SR23-3467-0
Course 11298

IBM Field Engineering Education
Supplementary Course Material

Programming System Introduction
Project Book 1

PREFACE

This publication is primarily intended for use by IBM personnel enrolled in course 11298.

PRELIMINARY EDITION (November 1970)
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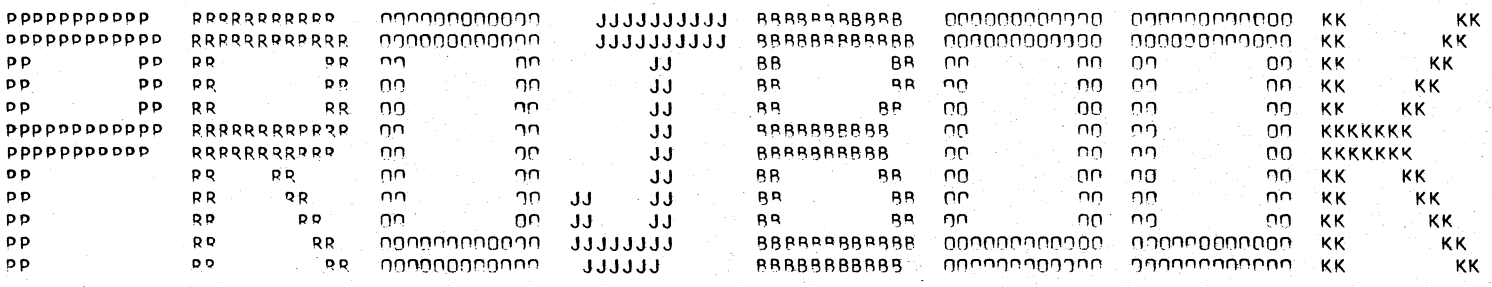
CONTENTS

*ALWP03 is in the Lab Activity Section of the Student Guide.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PP PP RR RR OO OO JJ BB BB OO OO OO OO KK KK
PP PP RR RR OO OO JJ BB BB OO OO OO OO KK KK
PP PP RR RR OO OO JJ BB BB OO OO OO OO KK KK
PPPPPPPPPPPP RRRRRRRRRRRP OO OO JJ BBBBBBBBB OO OO OO OO KKKKKKK
PPPPPPPPPPP RRRRRRRRRRR OO OO JJ BBBBBBBBB OO OO OO OO KKKKKKK
PP RR RR OO OO JJ BB BB OO OO OO OO KK KK
PP RR RR OO OO JJ JJ BB BB OO OO OO OO KK KK
PP RR RR OO OO JJ JJ BB BB OO OO OO OO KK KK
PP RR RR OOOOOOOOOOOO JJJJJJJJ BBBBBBBBBBB OOOOOOOOOOO OOOOOOOOOOO KK KK
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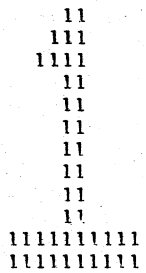
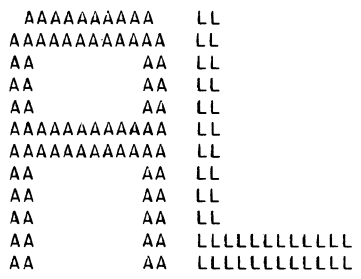
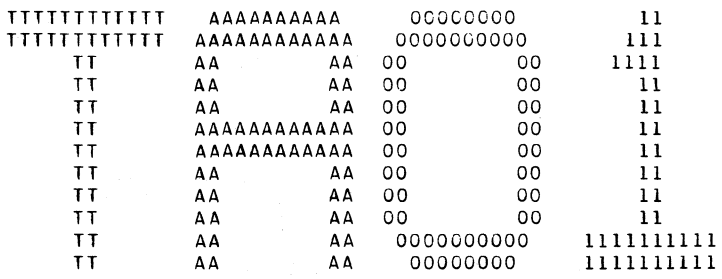
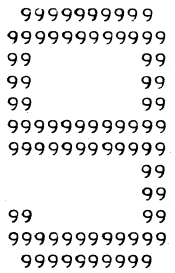

11
111
1111
11
11
11
11
11
11
11
1111111111
1111111111


AAAAAAAAAA LL
AAAAAAAAAAAA LL
AA AA LL
AA AA LL
AA AA LL
AAAAAAAAAAAA LL
AAAAAAAAAAAA LL
AA AA LL
AA AA LL
AA AA LL
AA AA LLLLLLLLLLLL
AA AA LLLLLLLLLLLL


TTTTTTTTTTTT AAAAAAAAAA 00000000 11
TTTTTTTTTTTT AAAAAAAAAAAA 0000000000 111
TT AA AA 00 00 1111
TT AA AA 00 00 11
TT AA AA 00 00 11
TT AAAAAAAAAAAA 00 00 11
TT AAAAAAAAAAAA 00 00 11
TT AA AA 00 00 11
TT AA AA 00 00 11
TT AA AA 00 00 11
TT AA AA 0000000000 1111111111
TT AA AA 00000000 1111111111


9999999999
999999999999
99 99
99 99
99 99
999999999999
999999999999
99
99
99 99
999999999999
9999999999

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                    1 ********** SOMEBODY   ELSES  CODE  ******************************
                                    2          COPY  LP1SECTA                                          004
000000                              3 FIRST    CSECT                                                 00000100
000000 05C0                         4          BALR  12,0                                            00000200
000002                              5          USING *,12                                            00000300
000002 41D0 C036          00038     6          LA    13,FIRSTSAV                                     00000400
000006 41F0 C07E          00080     7          LA    15,FIELD                                        00000500
00000A 50F0 C136          00138     8          ST    15,POINTER                                      00000600
00000E 1BFF                         9          SR    15,15                                           00000700

                                   12 ****************** B R U C E S    C O D E ***********************
000010 48A0 C136          00138    13          LH    10,POINTER              LOADS POINTER INTO REG 10
000014 D20A C0B7 A025 000B9 00025  14          MVC   DATA1(11),37(10)        PUTS 'MY NAME IS' IN DATA1     *
00001A D204 C0C2 C022 000C4 00024  15          MVC   DATA1+11(5),NAME        THERE'S MY NAME...
000020 47F0 C028          0002A    16          BC    15,CONTINUE             ENDIT ALL                      *
000024 C2D9E4C3C5                  17 NAME     DC    C'BRUCE'                MY NAME                        *
                                   18 *                                                                   *
                                   19 *                                                                   *
                                   20 ************************************************************************

                                   22 ********** SOMEBODY   ELSES  CODE  ******************************
                                   23 *                                                                   *
                                   24 *                                                                   *
                                   25          COPY  LP1SECTB                                           *

000029 00
00002A 4110 C0B6          000B8    27 CONTINUE LA    1,DATA1-1                                       00010100
00002E 58F0 C132          00134    28          L     15,ADCON                                        00010200
000032 05EF                        29          BALR  14,15                                           00010300
000034 0000                        30          DC    H'0'            GET A DUMP NEXT                 00010400
000038                             31 FIRSTSAV DS    18F                                             00010500
000080                             32 FIELD    DS    9F                                              00010600
0000A4 40D4E840D5C1D4C5            33          DC    C' MY NAME IS '                                 00010700
0000B0 C1C1D9C4E5C1D9D2            34          DC    C'AARDVARK'                                     00010800
0000B8 F1                          35          DC    C'1'                                            00010900
0000B9 4040404040404040            36 DATA1    DC    12CL10' '                                       00011000
                                   37          EXTRN PRINT                                           00011100
000131 000000
000134 00000000                    38 ADCON    DC    A(PRINT)                                        00011200
000138 00000000                    39 POINTER  DC    F'0'                                            00011300
00013C                             40          END                                                   *
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES
ADCON	00004	000134	00038	0028
CONTINUE	00004	00002A	00027	0016
DATA1	00010	000089	00036	0014 0015 0027
FIELD	00004	000080	00032	0007
FIRST	00001	000000	00003	
FIRSTSAV	00004	000038	00031	0006
NAME	00005	000024	00017	0015
POINTER	00004	000138	00039	0008 0013
PRINT	00001	000000	00037	0038

NO STATEMENTS FLAGGED IN THIS ASSEMBLY

BRUCE

```
F.P. REGS.  00.000000 00000000   00.000000 404C4C40   00.01983C 000CC090   00.07E8B8 0C000BAA

REGS 0-7     FFFFFF2E 000411D8 0001C38C 00C00000    0001585C 00015BD8 0001CA8C 000161C8
REGS 8-15    0001C370 00000000 0CC00004 00000000    6F041122 00041158 4F041154 000412C2

000000    00000000 00000000 0C000000 00000000    00041120 00000000 FF040000 A000A93C  *................................*
000020    FF040003 4007803A FFF50001 5F041156    000CFF00 00000000 FF060231 80000000  *.... ....5.....................*
000040    0004DFB0 0C000000 E0001358 00005920    02C036A4 00C0996C C0040000 000C7498  *................................*
000060    00040000 00007BC8 00040000 C0007588    00000000 00012D10 00040000 0000751A  *.......H.......................*

041120    05C041D0 C03641F0 C07E50F0 C1361BFF    48ACC136 D20AC0B7 A025D204 C0C2C022  *.......C...0A.....A.K.....K..B..*
041140    47F0C028 C2D9E4C3 C5004110 C0B658F0    C13205EF 0000,9332 D503C000 953A4740  *.0..BRUCE......0A.......N...... *
041160    000415E0 4F041154 000412C2 FFFFFF2E    000411D8 0001C38C 00000000 00015850  *............B.......Q..C.........*
041180    00015BD8 0001CA80 000161C8 0001C370    00000000 00000004 00000000 6F041122  *...Q.......H..C...............*
0411A0    94B05BD0 9512D503 D00494FF 47809392    581D0004 58010004 5A009512 540094F6  *......N.......................6*
0411C0    D503C000 40D4E840 D5C1D4C5 40C9E240    C1C1D9C4 E5C1D9D2 F1B50001 0F05BB04  *N... MY NAME IS AARDVARK1.....*
0411E0    00CCFFCC C2D9E4C3 C5404040 40404040    40404040 40404040 40404040 4040404C  *....BRUCE                      *
041200    40404040 40404040 40404040 40404040    40404040 40404040 40404040 40404040  *                               *
041220    40404040 40404040 40404040 40404040    40404040 40404040 40404040 40404040  *                               *
041240    4C404040 40404040 40404040 40404040    400C0000 000412C2 C00411A0 5600953E  *                  ......B........*
041260    90ECD00C 05C004F0 07004110 C0100511    0F041304 7FFF0A0E 58B00010 911CB074  *.......0........................*

041820    4A009BDE 40050000 47F095C6 48609BEE    8A600001 4770969E 48609C26 41660001  *.... ....0.F...................*
```

5

****

```
  AAAAAAAAAA    LL
 AAAAAAAAAAAA   LL
 AA          AA LL
 AA          AA LL
 AA          AA LL
 AAAAAAAAAAAAAA LL
 AAAAAAAAAAAAAA LL
 AA          AA LL
 AA          AA LL
 AA          AA LL
 AA          AA LLLLLLLLLLLL
 AA          AA LLLLLLLLLLLL
```

```
WW          WW  PPPPPPPPPPP      OOOOOOOO          11
WW          WW  PPPPPPPPPPPP    OOOOOOOOOO        111
WW          WW  PP          PP  OO        OO      1111
WW          WW  PP          PP  OO        OO        11
WW          WW  PP          PP  OO        OO        11
WW          WW  PPPPPPPPPPPP    OO        OO        11
WW    WW    WW  PPPPPPPPPPP     OO        OO        11
WW   WWWW   WW  PP              OO        OO        11
WW WW   WW  WW  PP              OO        OO        11
WWWW     WWWW   PP              OO        OO        11
WWW       WWW   PP               OOOOOOOOOO    1111111111
WW          WW  PP                 OOOOOO      1111111111
```

```
  9999999999
 999999999999
 99          99
 99          99
 99          99
 999999999999
 999999999999
             99
             99
 99          99
 999999999999
  9999999999
```


****

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70  9/16/70

                                    12 *++++++++++++++++++++++++++++PROLOGUE++++++++++++++++++++++++++++++++++ 00001200
                                    13 *                                                                    + 00001300
                                    14 *                                                                    + 00001400
                                    15 *        S P E C I A L   I N S T R U C T I O N S   P R O J E C T     + 00001500
                                    16 *        -------------   -----------------------   -------------     + 00001600
                                    17 *                                                                    + 00001700
                                    18 *                                                                    + 00001800
                                    19 *      O EXAMPLES OF THE RESULTS OF INSTRUCTIONS AT ASSEMBLY TIME    + 00001900
                                    20 *           AS WELL AS EXECUTION TIME WILL BE PROVIDED.              + 00002000
                                    21 *                                                                    + 00002100
                                    22 *                                                                    + 00002200
                                    23 *      O WRITE THE ANSWERS TO ALL QUESTIONS IN THE SPACE PROVIDED.   + 00002300
                                    24 *        ------------------------------------------------------      + 00002400
                                    25 *                                                                    + 00002500
                                    26 *      O ANSWERS WILL BE PROVIDED WITH EXPLANATIONS WHERE NECESSARY. + 00002600
                                    27 *                                                                    + 00002700
                                    28 *                                                                    + 00002800
                                    29 *                                                                    + 00002900
                                    30 *      O DUMPS OF STORAGE WILL BE PROVIDED TO SHOW THE RESULTS OF AN + 00003000
                                    31 *           INSTRUCTION AT EXECUTION TIME.(THE DUMPS ARE OBTAINED    + 00003100
                                    32 *           BY THE FORCING OF A PROGRAM CHECK. THIS CAUSES LINKING   + 00003200
                                    33 *           TO A DUMP PROGRAM. THE PROGRAM CHECK IS FORCED BY AN     + 00003300
                                    34 *           ATTEMPT TO EXECUTE A ZERO INSTRUCTION.)                  + 00003400
                                    35 *                                                                    + 00003500
                                    36 *                                                                    + 00003600
                                    37 *      O READ THE COMMENTS, THEY SAY A GREAT DEAL ABOUT THE INSTRUCTION 00003700
                                    38 *        ------------------------------------------------------------ 00003800
                                    39 *        XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 00003900
                                    40 *        ------------------------------------------------------------ 00004000
                                    41 *                                                                    + 00004100
                                    42 *                                                                    + 00004200
                                    43 *                                                                    + 00004300
                                    44 *                                                                    + 00004400
                                    45 *                                                                    + 00004500
                                    46 *                                                                    + 00004600
                                    47 *                          DOCUMENTATION REQUIRED                    + 00004700
                                    48 *                          ----------------------                    + 00004800
                                    49 *                                                                    + 00004900
                                    50 *        1.DOS ASSEMBLER MANUAL                                      + 00005000
                                    51 *        2.S/360 PRINCIPLES OF OPERATION MANUAL                      + 00005100
                                    52 *        3.PROGRAMMER'S INTRODUCTION TO S/360 ASSEMBLER LANGUAGE     + 00005200
                                    53 *          STUDENT TEXT                                              + 00005300
                                    54 *                                                                    + 00005400
                                    55 *++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00005500
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                                ********** I N T R O D U C T I O N **********
                                *                                            *
                                * THIS PROJECT DEALS WITH SOME OF THOSE S/360 INSTRUCTIONS WHICH *
                                *       YOU MAY NOT HAVE SEEN BEFORE. THE PROJECT IS DIVIDED INTO *
                                *       TWO SECTIONS.                        *
                                *                                            *
                                *    THE INSTRUCTIONS WE ARE GOING TO LOOK AT ARE:  *
                                *                                            *
                                *                   SECTION ONE              *
                                *                   -----------              *
                                *                                            *
                                *       O  SHIFT INSTRUCTIONS                *
                                *       O  MOVE INSTRUCTIONS                 *
                                *       O  PACK AND UNPACK INSTRUCTIONS      *
                                *       O  EDIT AND EDIT AND MARK            *
                                *                                            *
                                *                   SECTION TWO              *
                                *                   -----------              *
                                *                                            *
                                *       O EXECUTE INSTRUCTION                *
                                *       O TRANSLATE AND TRANSLATE AND TEST.  *
                                *                                            *
                                ******************************************************************
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                        83 *          ////////////////////////////////////          00008300
                        84 *          /                                  /          00008400
                        85 *          /       S E C T I O N   O N E      /          00008500
                        86 *          /       ---------------------      /          00008600
                        87 *          /                                  /          00008700
                        88 *          ////////////////////////////////////          00008800
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                                                                                00009100
                    ******************** S H I F T   I N S R U C T I O N S ***************** 00009200
                    *                                                                 * 00009300
                    *                                                                 * 00009400
                    *                                                                 * 00009500
                    *          SHIFT INSTRUCTIONS ARE AS THE NAME IMPLIES DESIGNED    * 00009600
                    *            TO SHIFT THE CONTENTS OF A REGISTER.                 * 00009700
                    *                                                                 * 00009800
                    *          THE DIRECTION THE REGISTER IS SHIFTED IS DETERMINED BY THE * 00009900
                    *            TYPE OF SHIFT INSTRUCTION.                           * 00010000
                    *                                                                 * 00010100
                    *          THE NUMBER OF BIT POSITIONS SHIFTED IS DETERMINED BY THE * 00010200
                    *            LOW ORDER 6 BITS OF THE SECOND OPERAND OF THE SHIFT INST.* 00010300
                    *                                                                 * 00010400
                    *            FOR EXAMPLE A  SLL 2,1 WOULD SHIFT REGISTER 2 LEFT 1 BIT * 00010500
                    *            POSITION.                                            * 00010600
                    *                                                                 * 00010700
                    *          SOME SHIFT INSTRUCTIONS ARE CAPABLE OF SHIFTING TWO    * 00010800
                    *            REGISTERS AT ONCE.                                   * 00010900
                    *                                                                 * 00011000
                    *          THESE ARE THE DOUBLE SHIFT INSTRUCTIONS.(SLDL)         * 00011100
                    *                                                                 * 00011200
                    *          THERE ARE SPECIFICATIONS TO BE FOLLOWED WHEN USING DOUBLE * 00011300
                    *            SHIFT INSTRUCTIONS.                                  * 00011400
                    *                                                                 * 00011500
                    *          ONE IS THAT THE FIRST OPERAND MUST POINT TO AN EVEN    * 00011600
                    *            REGISTER OF AN EVEN / ODD COMBINATION.               * 00011700
                    *                                                                 * 00011800
                    *          ANOTHER IS THAT NO MORE THEN 63 BIT POSITIONS CAN BE   * 00011900
                    *            SHIFTED WITH ONE DOUBLE SHIFT INSTRUCTION.           * 00012000
                    *                                                                 * 00012100
                    *          OTHER THAN SINGLE AND DOUBLE SHIFT INSTRUCTIONS SHIFT  * 00012200
                    *            INSTRUCTIONS CAN BE CLASSIFIED AS LOGICAL OR ALGEBRAIC. * 00012300
                    *          IN A LOGICAL SHIFT ALL BIT POSITIONS OF THE REGISTER   * 00012400
                    *             PARTICIPATE IN THE SHIFTING INCLUDING THE SIGN BIT. * 00012500
                    *                                                                 * 00012600
                    *          IN AN ALGEBRAIC SHIFT THE SIGN BIT OF THE REGISTER IS  * 00012700
                    *            NOT SHIFTED. (IN A DOUBLE ALGEBRAIC SHIFT THE SIGN OF * 00012800
                    *            THE ODD REGISTER IS SHIFTED AND THE EVEN REGISTER SIGN * 00012900
                    *            IS NOT).                                             * 00013000
                    *                                                                 * 00013100
                    *          NOW THAT YOU HAVE ALL THE SHIFT INSTRUCTIONS DOWN PAT  * 00013200
                    *            WE CAN LOOK AT SOME EXAMPLES . PLEASE TURN THE PAGE. * 00013300
                    *                                                                 * 00013400
                    ******************************************************************* 00013500
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70  9/16/70

                                   138 *++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00013800
                                   139 *+                                                                               + 00013900
                                   140 *+    O WE'LL USE THE FAMILY OF "LOAD" INSTRUCTIONS TO LOAD                      + 00014000
                                   141 *+      INFORMATION INTO THE REGISTERS WE'LL BE SHIFTING. THE                    + 00014100
                                   142 *+      COMMENTARY WILL DESCRIBE THE ACTION PERFORMED BY EACH OF                 + 00014200
                                   143 *+      THE LOAD INSTRUCTIONS.                                                   + 00014300
                                   144 *+                                                                               + 00014400
                                   145 *++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00014500

000012 5820 802A          0002C    147          L     2,CONSTANT    (LOAD INSTRUCTION) PLACES THE CONTENTS OF      00014700
                                   148 *                            STORAGE LOCATION 'CONSTANT' INTO REGISTER 2    00014800
                                   149 *                                                                           00014900
                                   150 *                                                                           00015000
                                   151 *                                                                           00015100
000016 1832                        152          LR    3,2           (LOAD REGISTER) PLACES THE ENTIRE CONTENTS     00015200
                                   153 *                            OF REGISTER 2 INTO REGISTER 3.                 00015300
                                   154 *                                                                           00015400
                                   155 *                                                                           00015500
                                   156 *                                                                           00015600
000018 4840 802C          0002E    157          LH    4,CONSTANT+2  (LOAD HALFWORD) PLACES THE CONTENTS OF THE     00015700
                                   158 *                            2 BYTES AT STORAGE LOCATION 'CONSTANT+2'       00015800
                                   159 *                            INTO BIT POSITIONS 16->31 OF REGISTER 4.       00015900
                                   160 *                                                                           00016000
                                   161 *                                                                           00016100
                                   162 *                                                                           00016200
00001C 1755                        163          XR    5,5           THIS EXCLUSIVE OR REGISTER CLEARS REG 5. I     00016300
                                   164 *                            DID THIS BECAUSE THE FOLLOWING INSERT          00016400
                                   165 *                            CHARACTER INSTRUCTION WILL ONLY CHANGE THE     00016500
                                   166 *                            LOW-ORDER BYTE OF REGISTER 5.                  00016600
                                   167 *                                                                           00016700
00001E 4350 802D          0002F    168          IC    5,CONSTANT+3  (INSERT CHARACTER) PLACES THE CONTENTS OF      00016800
                                   169 *                            THE ONE BYTE AT STORAGE LOCATION 'CONSTANT+3'  00016900
                                   170 *                            INTO BIT POSITIONS 24->31 OF REGISTER 5.       00017000
                                   171 *                                                                         * 00017100
                                   172 *                                                                         * 00017200
                                   173 ************************************************************************** 00017300
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70


                                   176 ******************** T H E   L O A D   A D D R E S S ****************** 00017600
                                   177 *                                                                      * 00017700
                                   178 *                                                                      * 00017800
000022 4165 0000                   179          LA    6,0(5)     (LOAD ADDRESS)  THIS INSTRUCTION IS SLIGHTLY   00017900
                                   180 *              | | |      DIFFERENT FROM THE OTHER LOAD INSTRUCTIONS. IT  00018000
                                   181 *              V | |      ADDS THE DISPLACEMENT VALUE,THE CONTENTS OF     00018100
                                   182 *              R V |      THE SPECIFIED BASE REGISTER AND THE CONTENTS    00018200
                                   183 *              1 D V      OF THE SPECIFIED INDEX REGISTER (IF ANY)      00018300
                                   184 *                I P      TOGETHER. THIS SUM IS WHAT IS KNOWN AS AN     00018400
                                   185 *                S A      EFFECTIVE ADDRESS. THIS EFFECTIVE ADDRESS IS  00018500
                                   186 *                P S      THEN PLACED IN THE REGISTER SPECIFIED BY THE  00018600
                                   187 *                L E      R1 FIELD OF THE INSTRUCTION.                  00018700
                                   188 *                A                                                     00018800
                                   189 *                C R                                                   00018900
                                   190 *                . E                                                   00019000
                                   191 *                  G                                                   00019100
                                   192 *                                                                      00019200
000026 47F0 802C                   193           B     *+8                                                    00019300
00002A 0000
00002C 00000001                    194 CONSTANT DC    F'1'       =========00000001====4BYTES===1 FULL WORD    00019400
                                   195 *                                                                      00019500
                                   196 *          ------------------>R E G I S T E R S  2-->6 NOW CONTAIN....  00019600
                                   197 *                                    00000001                          00019700
                                   198 *                                                                      00019800
                                   199 *            ON TO THE EXAMPLES. PLEASE TURN THE PAGE.                 00019900
                                   200 *                                                                      00020000
                                   201 ********************************************************************** 00020100
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70  9/16/70


                                  204 *.......................... E X A M P L E S ..........................  00020400
                                  205 *                                                                       00020500
                                  206 *                                                                       00020600
000030 8920 0004                  207         SLL   2,4   I JUST SHIFTED REG 2 LEFT FOUR BIT POSITIONS.      00020700
                                  208 *                                                                       00020800
                                  209 *                                                                       00020900
                                  210 *     NOW FOR A SHIFT RIGHT DOUBLE LOGICAL.                             00021000
000034 8C60 0020                  211         SRDL  6,32  I JUST SHIFTED THE BIT ALL THE WAY TO POSITION     00021100
                                  212 *                   31 OF REGISTER 7. REGISTER 6 IS NOW EMPTY.        00021200
                                  213 *                                                                       00021300
                                  214 ***************************************************************************  00021400
                                  215 *                                                                       00021500
                                  216 * O I FORGOT TO MENTION THAT THE NUMBER OF POSITIONS SHIFTED IS A       00021600
                                  217 *    FUNCTION OF THE EFFECTIVE ADDRESS GENERATED BY THE INSTRUCTION.    00021700
                                  218 *                   LET'S LOOK AT AN EXAMPLE.                         00021800
                                  219 *                                                                       00021900
000038 8930 3004                  220         SLL   3,4(3)  THE 1 IN REG. 3 WILL BE ADDED TO THE DISPLACEMENT 00022000
                                  221 *                     VALUE OF 4 TO RESULT IN A TOTAL SHIFT OF 5 POS.   00022100
                                  222 *                                                                       00022200
                                  223 ***************************************************************************  00022300
                                  224 *                                                                       00022400
                                  225 *      LET'S TRY AN ALGEBRAIC SHIFT ON FOR SIZE...                      00022500
                                  226 *                                                                       00022600
                                  227 *                                                                       00022700
00003C 8B50 001F                  228         SLA   5,31   REG 5 WAS JUST SHIFTED LEFT 31 BIT POSITIONS.      00022800
                                  229 *                                                                       00022900
                                  230 ***************************************************************************  00023000
                                  231 *                                                                     *  00023100
                                  232 *   ACCORDING TO MY CALCULATIONS THE REGISTER CONTENTS SHOULD BE       *  00023200
                                  233 *                                                                     *  00023300
                                  234 *                                                                     *  00023400
                                  235 *     REG 2=00000010                                                  *  00023500
                                  236 *     REG 3=00000020                                                  *  00023600
                                  237 *     REG 4=00000001                                                  *  00023700
                                  238 *     REG 5=80000000                                                  *  00023800
                                  239 *     REG 6=00000000                                                  *  00023900
                                  240 *     REG 7=00000001                                                  *  00024000
                                  241 *   LETS GET A DUMP AND LOOK AND SEE IF WE'RE RIGHT.......            *  00024100
                                  242 *            PLEASE TURN THE PAGE AND LOOK AT THE DUMP. THEN ON TO     *  00024200
                                  243 *            THE QUESTION ON THE FOLLOWING PAGE......                  *  00024300
                                  244 *                                                                     *  00024400
                                  245 *                                                                     *  00024500
                                  246 ***************************************************************************  00024600
```

```
F.P. REGS.  00.000000C C0000000   00.0CCCCC C0000000C   00.000000 00000000   00.00000C 00000000

                                        R2        R3        R4        R5        R6        R7
REGS 0-7      00000050 0006E7F8 00000010 00000020     00000001 00000000 00000000 00000001
REGS 8-15     6F063822 C0000000 0006E7B0 0006E7F8     60063A22 0006E7B0 00002170 00063D0E

000000     00000000 0000020C F0F0F2C0 5006ED90     00063820 00002A18 01040080 8003AFFE  *........C02.....................*
000020     FF150003 4F063850 FF150CC8 BF063860     0000FF00 00000000 FF470130 80012938  *.....................................*
000040     40001598 0C000000 400016C0 00002120     588F62C0 00071248 00040000 000002C0  * ....... ......................*
000060     00040000 00000366 000400C0 CC00030A     00000000 0000CA68 00040000 00000226  *.....................................*

063820     058058F0 8226D201 F000800E 47F08010     07FE5820 802A1832 4840802C 17554350  *...0..K.0....0.......... ......*
063840     802D4165 000047F0 8C2C0000 00000001     89200004 8C600020 89303004 8B50001F  *........0.........................*
063860     92FF8046 47F08048 00CCD200 80528046     47F08054 00000000 47F08060 F1000000  *.....C....K.......C........C..1...*
063880     0000D203 805B805A 000047F0 8C76F1F2     F3C40000 00000000 F2338072 806C0000  *..K.........0..123D......2.......*
0638A0     47F08086 00000000 F3338082 8C720000     47F080AE F8F3F2F1 C4000000 00000000  *.0......3........0..8321D........*
0638C0     00000000 00000000 00000000 0CCCC000     F27480A6 8092F377 809E80A6 000047F0  *.................2.....3........0*
0638E0     80E05B20 6B202020 6B202021 4B2020C3     5749297C 00000000 00000000 00000000  *.....................................*
063900     0000D20C 80D280C0 DE0C80D2 80CD0000     925C80C0 47F080FC 00091775 4C00D20C  *..K..K.....K.........0........K.*
063920     80D280C0 DECC80D2 80F60000 924C80C0     411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940     0610925B 100CC000 47FC8134 00002567     5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960     812F0610 925B1000 00004110 00FF4410     815447F0 815A9200 81581F00 00004120  *.....................C.............*
063980     00C14420 816C4780 8172477C 81769500     8170C100 415000BC 00004130 00044150  *.A.................A..............*
0639A0     0C134450 818847F0 8192436C 818CF1F2     F3F4F500 0000DC09 819E81A8 47F081B4  *.......0......12345..........0..*
0639C0     07030101 09080409 03000A09 08070605     04030201 00000000 DC0681C0 81CA47F0  *.................................0*
0639E0     81D60704 02050809 00010306 FFFEFDFC     FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.0.................987654.....W.0*
063A00     415081E6 47FC81FA C7C906C8 C9C30104     0301001C C0000000 00000000 0000DC07  *...W.0.............................*
063A20     8206820E 47408216 01040607 00010305     05000502 005B0000 41308206 00004110  *.....  ...........................*
063A40     00200A0D 47F09084 00063D0E DC0447F0     90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......C........*

064000     000C0000 00000000 00000000 0CCCCC00     CC000000 00004000 9400025D 00790000  *..................... .........*
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
249 ********************************************************************** 00024900
250 *                                                                    * 00025000
251 *   HOW ABOUT THAT ALL OUR ANSWERS WERE RIGHT EXCEPT THE ONE FOR REG  * 00025100
252 *    5. I MUST HAVE MISCALCULATED THE 'SLA' OPERATION. THE DUMP TELLS * 00025200
253 *    ME THAT REGISTER 5 IS EMPTY AND THAT THERE'S AN INTERRUPTION     * 00025300
254 *    CODE OF 08 IN THE PROGRAM OLD P.S.W.                            * 00025400
255 *            --                                                      * 00025500
256 *                                                                    * 00025600
257 *$$$$$$$$$$$$$$$$$$$$$$ QUESTION 1.1 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00025700
258 *$                                                                   $ 00025800
259 *$                 TELL ME WHY WE GOT THE PREVIOUS RESULTS????       $ 00025900
260 *$                                                                   $ 00026000
261 *$                                                                   $ 00026100
262 *$                                                                   $ 00026200
263 *$                                                                   $ 00026300
264 *$                                                                   $ 00026400
265 *$                                                                   $ 00026500
266 *$                                                                   $ 00026600
267 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00026700
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                  269 *======================== ANSWER 1.1 ================================== 00026900
                                  270 *=                                                                    = 00027000
                                  271 *= LET'S LOOK AT THE INTERRUPTION CODE OF 08 FIRST.                    = 00027100
                                  272 *=                                                                    = 00027200
                                  273 *=  I THINK ITS SAFE TO SAY YOU FOUND THAT IT WAS CAUSED BY A FIXED   = 00027300
                                  274 *=   POINT OVERFLOW.THE INSTRUCTION POINTED TO BY THE PROGRAM OLD PSW = 00027400
                                  275 *=   WAS THE    SLA  5,31                                             = 00027500
                                  276 *=                                                                    = 00027600
                                  277 *=   REGISTER 5 ALSO WOUND UP EMPTY SO WHY DON'T WE LOOK AT WHAT TOOK = 00027700
                                  278 *=   PLACE DEEP WITHIN THE SYSTEM/360 WHEN WE ISSUED THE SHIFT LEFT   = 00027800
                                  279 *=   ALGEBRAIC.                                                       = 00027900
                                  280 *=                                                                    = 00028000
                                  281 *=  WHEN ORIGINALLY LOADED REG 5 LOOKED LIKE THIS:                    = 00028100
                                  282 *=                       00000001  SO FAR SO GOOD.                    = 00028200
                                  283 *=                                                                    = 00028300
                                  284 *=  EXPANDED IT LOOKED LIKE THIS:                                     = 00028400
                                  285 *=                     00000000000000C0000000000000001                = 00028500
                                  286 *=  AFTER 15 SHIFTS:                 <---------------                 = 00028600
                                  287 *=                     00000000000000010000000C00000                  = 00028700
                                  288 *=  AFTER 30 SHIFTS: <------------------------------                  = 00028800
                                  289 *=                     01000000000000C0000000000C0000000              = 00028900
                                  290 *=                                                                    = 00029000
                                  291 *=  LO AND BEHOLD, ONE MORE SHIFT TAKES THE BIT OUT OF THE 1 POSITION = 00029100
                                  292 *=  AND THINGS BEGIN TO HAPPEN OR NOT HAPPEN AS THE CASE MAY BE.      = 00029200
                                  293 *=                                                                    = 00029300
                                  294 *=                                                                    = 00029400
                                  295 *=  AFTER 31 SHIFTS:                                                  = 00029500
                                  296 *=                     00000000000000C0000000000000000                = 00029600
                                  297 *=      BIT BUCKET=1                                 REG 5 IS NOW EMPTY= 00029700
                                  298 *=                                                                    = 00029800
                                  299 *=   SINCE THIS WAS AN ALGEBRAIC SHIFT WE COULDN'T SHIFT INTO THE     = 00029900
                                  300 *=      SIGN POSITION AND THE BIT WAS LOST FOREVER.....               = 00030000
                                  301 *=                                                                    = 00030100
                                  302 *=   IF WE LOOK AT THE 360 PRINCIPLES OF OPERATION MANUAL WE CAN SEE  = 00030200
                                  303 *=      THAT A FIXED POINT OVERFLOW OCCURS WHEN THE VALUE OF THE BIT  = 00030300
                                  304 *=      SHIFTED OUT OF THE 'ONE' POSITION DIFFERS FROM THE VALUE OF   = 00030400
                                  305 *=      THE 'SIGN' POSITION.IN OUR CASE THE 'ONE' POSITION CONTAINED  = 00030500
                                  306 *=      A VALUE OF ONE AND THE 'SIGN' POSITION CONTAINED A VALUE OF   = 00030600
                                  307 *=      ZERO.HENCE THE FIXED POINT OVERFLOW.                          = 00030700
                                  308 *=                                                                    = 00030800
                                  309 *====================================================================== 00030900
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                    F08APR70   9/16/70

                                  312 ******************** MORE USES OF SHIFT INSTRUCTIONS ******************** 00031200
                                  313 *                                                                       * 00031300
                                  314 *                                                                       * 00031400
                                  315 *                                                                       * 00031500
                                  316 *       C ONE OTHER COMMON USE OF THE FAMILY OF SHIFT INSTRUCTIONS IS  * 00031600
                                  317 *          THE MULTIPLICATION AND DIVISION OF REGISTER CONTENTS.       * 00031700
                                  318 *                                                                       * 00031800
                                  319 *         LET'S SEE HOW THIS MAY BE ACCOMPLISHED....SUPPOSE WE HAVE    * 00031900
                                  320 *         AN 9 BIT REGISTER(FOR EXAMPLE PURPOSES ONLY). LETS PUT A     * 00032000
                                  321 *         1 BIT IN THE LOW ORDER POSITION:                              * 00032100
                                  322 *           THE REGISTER NOW CONTAINS: 000000001 ===== 1                * 00032200
                                  323 *        +--                                                            * 00032300
                                  324 * TOTAL  |  SUPPOSE WE WERE TO SHIFT THIS REGISTER LEFT 2 POSITIONS    * 00032400
                                  325 *   OF    |   THE REGISTER WOULD THEN CONTAIN: 000000100 ===== 4        * 00032500
                                  326 * 3 POS. |                                                             * 00032600
                                  327 *SHIFTED<   THEREFORE INORDER TO MULTIPLY THE CONTENTS OF THE REGISTER* 00032700
                                  328 * MULT.  |   BY 2 WE SHOULD SHIFT THE REG LEFT 1 POSITION.             * 00032800
                                  329 * ORIG.  |    THE REGISTER WOULD THEN CONTAIN:000001000==== 8          * 00032900
                                  330 *NUMB.X 8+___                                                           * 00033000
                                  331 *                                                                       * 00033100
                                  332 *         IT SHOULD NOW BE QUITE OBVIOUS THAT IN ORDER TO DIVIDE THE    * 00033200
                                  333 *           CONTENTS OF A REGISTER WE MERELY FOLLOW A REVERSE           * 00033300
                                  334 *           PROCESS. WE SHOULD THEN SHIFT THE REGISTER RIGHT.           * 00033400
                                  335 *           LETS ATTEMPT TO DIVIDE THE 8 IN OUR HYPOTHETICAL            * 00033500
                                  336 *           REGISTER BY 8. I THINK WE BETTER SHIFT RIGHT 3 PLACES...    * 00033600
                                  337 *            THE REGISTER NOW CONTAINS: 000000001                       * 00033700
                                  338 *                                                                       * 00033800
                                  339 *                                                                       * 00033900
                                  340 *                       IF YOU HAVE QUESTIONS SEE YOUR INSTRUCTOR       * 00034000
                                  341 *                             IF NOT TURN THE PAGE TO THE MOVE INST.    * 00034100
                                  342 *                                                                       * 00034200
                                  343 ************************************************************************* 00034300


                                  345 *LET'S GO ON TO THE NEXT SUBJECT:THE MOVE INSTRUCTIONS                 * 00034500
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                   347 *        ////////////////////                                  * 00034700
                                   348 *        /MOVE INSTRUCTIONS/                                   * 00034800
                                   349 *        ////////////////////                                  * 00034900



                                   351 ************************************************************************ 00035100
                                   352 *                                                                      * 00035200
                                   353 *    THE MOVE INSTRUCTIONS WE'LL LOOK AT ARE:                          * 00035300
                                   354 *        O  MVI MOVE IMMEDIATE                                         * 00035400
                                   355 *        O  MVC MOVE CHARACTER                                         * 00035500
                                   356 *                                                                      * 00035600
                                   357 *    LET'S LOOK AT WHAT A MVI WILL DO FOR US:                          * 00035700
                                   358 *                                                                      * 00035800
000040 92FF 8046       00048       359          MVI   SWITCH,X'FF' PLACE X'FF' IN STORAGE LOCATION 'SWITCH'   * 00035900
                                   360 *                                                                      * 00036000
000044 47F0 8048             0004A 361          BC    15,MOVE      BRANCH AROUND CONSTANTS.                  * 00036100
                                   362 *                                                                      * 00036200
000048 00                          363 SWITCH   DC    X'00'                                                  * 00036300
                                   364 *                                                                      * 00036400
                                   365 ************************************************************************ 00036500
                                   366 *                                                                      * 00036600
                                   367 *    LOCATION 'SWITCH' SHOULD NOW CONTAIN FF.                          * 00036700
                                   368 *                                                                      * 00036800
                                   369 *    LET'S NOW TAKE THE FF AT LOCATION 'SWITCH' AND MOVE IT IN         * 00036900
                                   370 *      STORAGE TO LOCATION 'READ'.                                     * 00037000
                                   371 *                                                                      * 00037100
                                   372 ************************************************************************ 00037200
                                   373 *                                                                      * 00037300
000049 00
00004A D200 8052 8046 00054 00048  374 MOVE     MVC   READ,SWITCH BOTH 'READ' AND 'SWITCH' SHOULD CONTAIN    * 00037400
                                   375 *                              FF.                                     * 00037500
                                   376 *                                                                      * 00037600
000050 47F0 8054             00056 377          BC    15,DUMP      BRANCH AROUND CONSTANT.                   * 00037700
                                   378 *                                                                      * 00037800
000054 00                          379 READ     DC    X'00'                                                  * 00037900
                                   380 *                                                                      * 00038000
000055 00
000056 0000                        381 DUMP     DC    H'00'                                                  * 00038100
                                   382 *                                                                      * 00038200
                                   383 *                                                                      * 00038300
                                   384 *  THE FOLLOWING DUMP HAS BOTH 'READ' AND 'SWITCH' CIRCLED.....       * 00038400
                                   385 *                                                                      * 00038500
                                   386 *                                                                      * 00038600
                                   387 *                                                                      * 00038700
                                   388 ************************************************************************ 00038800
```

```
F.P. REGS.  00.00000C CCCCC00C   00.0CCCC0 0000000C   00.000000 00000000   00.000000 000000CC

REGS 0-7     00000050 0006E7F8 C0CC001C 00000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 C0000000 0006E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    0C000000 0000020C F0F0F2C0 5CC6ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 BF063860 FF150001 7F063878    CC00FF00 00000000 FF040234 9001820A  *.....................................*
000040    4C027000 50CC0000 40001590 00002120    588E09C0 00071248 00040000 000002C0  * ....... ......................*
000060    00040000 00000366 0CC40CC0 0C00030A    0C000000 0000CA68 00040000 00000226  *.....................................*

063820    058058F0 8226D201 FCCC800E 47F08010    07FE5820 8802A1832 4840802C 17554350  *...0..K.0....0..... ......*
063840    802D4165 000047F0 802C0000 0C000001    89200004 88C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47F08048 FF00D2C0 8C528046    47F08054 FF000000 47F08060 F1000000  *.....0....K......0.......C..1...*
063880    0000D203 805B805A 000047F0 8C76F1F2    F3C40000 00000000 F2338072 806C0000  *..K.........0..123D......2.......*
0638A0    47F08C86 00000000 F3338082 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0......3........0..8321D.......*
0638C0    00000000 0000000C C0C000C0 00000000    F27480A6 8092F377 809E80A6 000047F0  *................2.....3........0*
0638E0    80E05B20 6B202020 6B202021 4B202003    5749297C 00000000 00000000 00000000  *.....................................*
063900    0000D20C 80D280C0 DECC8CD2 8CCD0000    925C80C0 47F080FC 00091775 4C00D20C  *..K..K.....K.........0........K.*
063920    80D280C0 DE0C80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    061C925B 10000000 47F08134 00002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F061C 925B1000 00004110 00FF4410    815447F0 815A9200 81581F00 00004120  *.....................0.............*
063980    00C14420 816C4780 81724770 81769500    817CC100 415000BC 00004130 00044150  *.A..............A.............*
0639A0    00134450 818847FC 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......0......12345..........0..*
0639C0    07030101 09080409 03000A09 C8070605    04030201 00000000 DC0681C0 81CA47F0  *.................................0*
0639E0    81D60704 02050809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O..............987654.....W.0*
063A00    415081E6 47F081FA 07090608 C9C30104    0301001C 00000000 00000000 0000DD07  *...W.0.......................*
063A20    8206820E 47408216 01040607 00010305    C5000502 005B0000 41308206 00004110  *..... ......................*
063A40    00200A0D 47F09084 00063D0E D00447F0    90ECD00C 05C004F0 07004110 C0100511  *.....C.........0.......0........*

064000    00000000 000CCCCC CCC00C00 CCC00000    00000000 00004000 9400025D 00790000  *..................... .........*
```

SWITCH

READ

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                                  F08APR70   9/16/70
                                    390 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 1.2 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00039000
                                    391 *$                                                                   $ 00039100
                                    392 *$                                                                   $ 00039200
                                    393 *$                                                                   $ 00039300
                                    394 *$        GIVEN THE FOLLOWING:                                       $ 00039400
                                    395 *$                                                                   $ 00039500
000058 47F0 8060            00062   396          BC    15,MVC   BRANCH AROUND CONSTANTS                      $ 00039600
                                    397 *$                                                                   $ 00039700

00005C F1                           399 A        DC    C'1'                                                  $ 00039900

                                    401 *$                                                                   $ 00040100

00005D 00000000                     403 B        DC    X'00000000'                                           $ 00040300

                                    405 *$                                                                   $ 00040500
                                    406 *$  WRITE THE MVC INSTRUCTION THAT WILL FILL LOCATION 'B' WITH 1'S    $ 00040600
                                    407 *$        FROM LOCATION 'A'.                                         $ 00040700
                                    408 *$                                                                   $ 00040800
                                    409 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00040900
                                    410 *$                                                                   $ 00041000
                                    411 *$                                                                   $ 00041100
                                    412 *$                                                                   $ 00041200
                                    413 *$                                                                   $ 00041300
                                    414 *$                                                                   $ 00041400
                                    415 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00041500
```

```
LOC   OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70  9/16/70


                                    418 *============================== ANSWER 1.2 ================================ 00041800
                                    419 *=                                                                        = 00041900
                                    420 *=                                                                        = 00042000
                                    421 *=  THE ANSWER COULD RESEMBLE THE FOLLOWING MVC                           = 00042100

000061 00
000062 D203 805B 805A 0005D 0005C   423 MVC      MVC   B,A     OR POSSIBLY......MVC   B(4),A                    = 00042300
000068 0000                         424          DC    H'CO'                                                      = 00042400
                                    425 *=                                                                        = 00042500
                                    426 *=  LET'S LOOK AT A DUMP ON THE FOLLOWING PAGE WHICH HAS THE FOUR         = 00042600
                                    427 *=    BYTES AT 'B' CIRCLED...                                             = 00042700
                                    428 *=                                                                        = 00042800
                                    429 *============================================================================ 00042900


                                    431 *.....................ON TO PACK AND UNPACK.....................* 00043100
```

```
F.P. REGS.  00.000000 00000000   00.CCCCCC 00000CCC   00.000000 00000000   00.CCCCCC 000C0000

REGS 0-7     00000050 0006E7F8 00000010 00000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 CCCCCCCC 0006E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0F0F2C0 5006ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 7F063878 FF15C001 7FC6388A    0000FF00 00000000 FF040130 80018006  *.....................0.0.....*
000040    40001598 5000000C 400016C0 00002120    588CB5C0 00071248 00040000 000002C0  * ....... ..... ..... ..... ....*
000060    00040000 00000366 00040000 CCCC030A    00000000 0000CA68 00040000 00000226  *.....................6.....&*

063820    058058F0 8226D201 F000800E 47FC8C10    07FE5820 802A1832 4840802C 17554350  *...0..K.0....0.....0.... .....*
063840    802D4165 000C47F0 802C0000 0C000001    89200004 8C600020 89303004 8B50001F  *.....0.....0.....0.....0.....*
063860    92FF8046 47FC8C48 FF00D200 80528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K.....0.....0..1111*
063880    F100D203 8058805A 00CC47F0 8076F1F2    F3C40000 00000000 F2338072 806C0000  *1.K.....0..123D.....2.....*
0638A0    47F08086 00000000 F3338082 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0.....3.....0..8321D.....*
0638C0    0C000000 00000000 00000CCC 0C000000    F27480A6 8092F377 809E80A6 000047F0  *.............2.....3.....0*
0638E0    80E05B20 6B202020 6B202021 4B202003    5749297C 00000000 00000000 00000000  *.....*
063900    0000D20C 80D280C0 DE0C80D2 80CD0000    925C80C0 47F080FC 00091775 4C00D20C  *..K..K.....K.....0.....K.*
063920    80D280C0 DE0C80D2 80F60CC0 924080C0    411C80DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... .....K..K.....K..*
063940    0610925B 10000000 47FC8134 0C002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.....0.....K..K.....K*
063960    812F0610 925B1000 00004110 0CFF4410    815447F0 815A9200 81581F00 00004120  *.....0.....*
063980    00C14420 816C4780 81724770 81769500    817CC100 415000BC 00004130 00044150  *.A.....A.....*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.....0.....12345.....0..*
0639C0    07030101 09080409 03000A09 08070605    04030201 00000000 DC0681C0 81CA47F0  *.....0*
0639E0    81D60704 020508C9 C0010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.0.....987654.....W.0*
063A00    415081E6 47F081FA 07C906C8 C9C30104    0301001C 00000000 00000000 0000DD07  *...W.0.....*
063A20    8206820E 47408216 01040607 0C010305    05000502 005B0000 41308206 00004110  *..... .....*
063A40    00200A0D 47F09084 00063D0E DCC447F0    90ECD00C 05C004F0 07004110 C0100511  *.....C.....0.....C.....*

N 064000  00000000 00000000 00000000 0C000000    00000000 00004000 9400025D 00790000  *..... .....*
```

```
                                435 *                                                                 * 00043500
                                436 *        ////////////////////////////////                         * 00043600
                                437 *        /PACK AND UNPACK INSTRUCTIONS/                           * 00043700
                                438 *        ////////////////////////////////                         * 00043800



                                441 ************************** P A C K   A N D   U N P A C K ***********  00044100
                                442 *                                                                 * 00044200
                                443 * THE PACK AND UNPACK(UNPK) INSTRUCTIONS PROVIDE A MEANS OF CHANGING  * 00044300
                                444 *     THE FORMAT OF DATA WHILE IN STORAGE.                        * 00044400
                                445 *                                                                 * 00044500
                                446 *                                                                 * 00044600
                                447 *  THE PACK INSTRUCTION CHANGES THE FORMAT OF THE SECOND OPERAND FROM * 00044700
                                448 *       ZONED DECIMAL TO PACKED DECIMAL AND PLACES THE RESULT IN THE  * 00044800
                                449 *       FIRST OPERAND LOCATION.............WATCH.............       * 00044900
                                450 *                                                                 * 00045000
00006A 47F0 8076          00078 451           BC    15,PACK                                           * 00045100
                                452 *                                                                 * 00045200
00006E F1F2F3C4                 453 ZONE      DC    Z'1234'  FIRST I NEED SOMETHING TO PACK..I'LL ASK THE  * 00045300
                                454 *                            ASSEMBLER TO BUILD A ZONED DECIMAL NUMBER.  * 00045400
000072 0000
000074 00000000                 455 PACT      DC    F'CO'                                             * 00045500
                                456 *                                                                 * 00045600
000078 F233 8072 8C6C 00074 0006E 457 PACK    PACK  PACT(4),ZONE(4)                                   * 00045700
                                458 *                                                                 * 00045800
00007E 0000                     459           DC    H'GO'                                             * 00045900
                                460 *LOCATION 'PACT' SHOULD NOW CONTAIN THE PACKED DECIMAL EQUIVALENT OF  * 00046000
                                461 *    F1F2F3C4.                                                    * 00046100
                                462 *                                                                 * 00046200
                                463 *  LET'S GO INTO STORAGE AND TAKE A LOOK ....                     * 00046300
                                464 * ON THE FOLLOWING DUMP LOCATION 'ZONE' AND 'PACT' ARE BOTH CIRCLED.  * 00046400
                                465 * THEN ITS ON TO THE UNPACK......                                 * 00046500
                                466 *                                                                 * 00046600
                                467 *                                                                 * 00046700
                                468 ***********************************************************************  00046800
```

```
F.P. REGS.  00.00000C CCCCC00C   C0.CCCCC0 0000000C   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 00000C1C C0000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 00000000 0CC6E7B0 C006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0FCF2C0 5006ED90    0C063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 7F06388A FF150001 7F0638A0    0000FF00 00000000 FF040134 B0017F60  *.............................. *
000040    40001598 0CCC000C 4000167C 00002120    588B4DC0 00071248 00040000 000002C0  * ....... ......................*
000060    00040000 00000366 C0C40000 0C00030A    00000000 0000CA68 00040000 00000226  *..............................*

063820    058058F0 8226D201 F0C0800E 47FC8010    07FE5820 B802A1832 4840802C 17554350  *...0..K.0....0.......... .....*
063840    802D4165 000047F0 802C0C00 0CCC0001    89200004 8C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47FC8048 FF00D200 8C528C46    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......0.......0..1111*
063880    F100D203 805B805A 000047F0 8C78F1F2    F3C40000 00001234 F2338072 806C0000  *1.K.........0..123D......2.......*
0638A0    47F08C86 00000000 F3338082 80720000    47F080AE F8F3F2F1 C4000000 00000000  *.0.......3........0..8321D.......*
0638C0    00000000 0C000000 00000000 0C000000    F27480A6 8092F377 809E80A6 000047F0  *................2.....3.........0*
0638E0    80E05B20 6B202020 6B202C21 4B2C2003    5749297C 00000000 00000000 00000000  *..............................*
063900    0000D20C 80D280C0 DEC C80D2 8CCD0000   925C80C0 47F080FC 00091775 4C00D20C  *..K..K.....K.........0.........K.*
063920    80D280C0 DE0C80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... .....K..K.....K..*
063940    0610925B 100C0000 47F08134 00002567    5C0C0000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1000 00004110 0CFF4410    815447F0 815A9200 81581F00 00004120  *.....................C............*
063980    00C14420 816C4780 81724770 81769500    817CC100 415000BC 00004130 00044150  *.A.................A............*
0639A0    00134450 818847F0 8192436C 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *........0......12345..........0..*
0639C0    07030101 09080409 03C00A09 08070605    04030201 00000000 DC0681C0 81CA47F0  *..............................0*
0639E0    81D60704 02050809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....W.0*
063A00    415081E6 47F081FA 07C90608 09030104    0301001C 00000000 00000000 0000DD07  *...W.0........................*
063A20    8206820E 474C8216 01040607 00010305    C5000502 005B0000 41308206 00004110  *.....  ......................*
063A40    00200A0D 47F09084 00063D0E DCC447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........C.......C........*

064000    00000000 00000000 00C00CC0 CC000000    00000000 00004000 9400025D 00790000  *.....................  .........*
```

ZONE

PAGE

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```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70  9/16/70


                                    471 ********************* U N P A C K ********************************** 00047100
                                    472 *                                                                    * 00047200
                                    473 *   THE UNPK INSTRUCTION CHANGES THE FORMAT OF THE DATA AT THE SECOND * 00047300
                                    474 *     OPERAND LOCATION FROM PACKED DECIMAL TO ZONED DECIMAL AND PLACES* 00047400
                                    475 *     THE RESULT IN THE FIRST OPERAND LOCATION.................      * 00047500
                                    476 *                                                                    * 00047600
                                    477 * NOW WE'LL SEE WHAT THE UNPK INSTRUCTION WILL DO TO THE DATA WE JUST * 00047700
                                    478 *  PACKED INTO LOCATION 'PACT'...LET'S UNPACK THE DATA AT 'PACT' INTO * 00047800
                                    479 *  A LOCATION CALLED 'UNPACT'...AND HERE WE GO...........            * 00047900
                                    480 *                                                                    * 00048000
                                    481 *    IT MIGHT BE A WEE BIT CONFUSING BUT YOU CAN MAKE IT.            * 00048100
                                    482 *                                                                    * 00048200
                                    483 *                                                                    * 00048300
000080 47F0 8086            00088   484          BC    15,UNPAK  BRANCH AROUND CONSTANTS                     * 00048400
                                    485 *                                                                    * 00048500
                                    486 ********************************************************************** 00048600
000084 00000000                     487 UNPACT   DC    F'00'                                                 * 00048700
                                    488 *                                                                    * 00048800
000088 F333 8082 8072 00084 00074   489 UNPAK    UNPK  UNPACT(4),PACT(4) LOCATION 'UNPACT' SHOULD NOW CONTAIN * 00048900
                                    490 *                                 THE ZONED DECIMAL EQUIVALENT OF 1234C  * 00049000
00008E 0000                         491          DC    H'00' THIS CAUSES A DUMP.                             * 00049100
                                    492 *                                                                    * 00049200
                                    493 *                                                                    * 00049300
                                    494 *  LET'S TAKE ANOTHER CORE DUMP AND CHECK IT OUT.'UNPACT' IS CIRCLED. * 00049400
                                    495 *                                                                    * 00049500
                                    496 *'UNPACT' SHOULD =F1F2F3C4 AND IT DOES........                       * 00049600
                                    497 *                                                                    * 00049700
                                    498 *                                                                    * 00049800
                                    499 *                                                                    * 00049900
                                    500 ********************************************************************** 00050000
```

```
F.P. REGS.   00.000000 00000000   00.0CCCCC 00000000   00.000000 00000000   00.00000C 00000000

REGS 0-7      00000050 C006E7F8 00000010 00000020    00000001 00000000 00000000 00000001
REGS 8-15     6F063822 C0000000 0006E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0FCF2C0 5006ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 7F0638A0 FF150001 7F0638B0    0000FF00 00000000 FF470130 80012938  *.............................)*
000040    40001598 50000000 400016C0 00002120    588A12C0 00071248 00040000 000002C0  * ....... ......................*
000060    00040000 00000366 00040000 0CCC030A    00000000 0000CA68 00040000 00000226  *.............................&*

063820    058058F0 8226D201 F000800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....0.......... .....*
063840    802D4165 00C047FC 8C2C0000 00000001    89200004 8C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47F08048 FFC0D2C0 8C528046    47F08C54 FF000000 47F08060 F1F1F1F1  *.....0....K......C.......0..1111*
063880    F100D203 805B805A 000047F0 8076F1F2    F3C40000 0001234C F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338082 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    00000000 00000000 00000000 CCCC0000    F27480A6 8092F377 809E80A6 000047F0  *................2.....3........0*
0638E0    80E05B20 6B202020 6B202021 4B202003    5749297C 00000000 00000000 00000000  *.............................. *
063900    0000D20C 80D280CC DE0C80D2 80CD0000    925C80C0 47F080FC 00091775 4C00D20C  *..K..K.....K.........0........K.*
063920    80D280C0 DE0C80D2 80F60C00 924C80C0    411080DC D20C80D2 80C0CF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47FC8134 00002567    5C000000 001CD20C 80D280C0 CF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1000 00004110 0CFF4410    815447F0 815A9200 81581F00 00004120  *.....................0............*
063980    00C14420 816C4780 81724770 81769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000CC09 819E81A8 47F081B4  *.......0......12345..........0..*
0639C0    07030101 09080409 03000A09 08070605    04030201 00000000 DC0681C0 81CA47F0  *.................................0*
0639E0    81D60704 02050809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000CC09 81E681F0  *.O.................987654.....W.0*
063A00    415081E6 47F081FA 07C9C6C8 C9030104    0301001C 00000000 00000000 0000CC07  *...W.0.........................*
063A20    8206820E 47408216 01040607 0C010305    05000502 005B0000 41308206 00004110  *..... ........................*
063A40    0C200A0D 47F09084 00063DCE DC0447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......C........*

064000    00000000 00000000 00000000 0C000000    0C000000 00004000 9400025D 00790000  *.......................... .........*
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                                F08APR70   9/16/70

                                   502 *$$$$$$$$$$$$$$$$$$$$ QUESTION 1.3 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00050200
                                   503 *$                                                                  $ 00050300
                                   504 *$                                                                  $ 00050400
                                   505 *$ NOW ONE FOR YOU.......                                           $ 00050500
                                   506 *$                                                                  $ 00050600
                                   507 *$     GIVEN THE FOLLOWING:                                         $ 00050700
000090 47F0 80AE           000B0   508          BC    15,DOIT          BRANCHES AROUND THE CONSTANTS.       $ 00050800
                                   509 *$                                                                  $ 00050900

000094 F8F3F2F1C4                  511 CC       DC    Z'83214'         THIS GIVES US THE ZONED DECIMAL      $ 00051100


                                   513 *$                                EQUIVALENT OF 83214....           $ 00051300
                                   514 *$                                                                  $ 00051400
                                   515 *$                                                                  $ 00051500


000099 00000000000000
0000A0 0000000000000000            517 DD       DC    D'00'                                                $ 00051700

                                   519 *$                                                                  $ 00051900


0000A8 0000000000000000            521 EE       DC    D'CC'                                                $ 00052100

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                                   523 *$                                                                  $ 00052300
                                   524 *$  WRITE THE SEQUENCE OF INSTRUCTIONS THAT WILL PLACE 'CC' IN 'EE' $ 00052400
                                   525 *$    PACKED DECIMAL,THEN UNPACK 'EE' INTO LOCATION 'DD'...         $ 00052500
                                   526 *$                                                                  $ 00052600
                                   527 *$$$$$$$$$$$$$$$$$$$$$$ PLACE ANSWER HERE $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00052700
                                   528 *$                                                                  $ 00052800
                                   529 *$                                                                  $ 00052900
                                   530 *$                                                                  $ 00053000
                                   531 *$                                                                  $ 00053100
                                   532 *$                                                                  $ 00053200
                                   533 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00053300
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70  9/16/70


                                  536 *============================ ANSWER 1.3 ============================== 00053600
                                  537 *=                                                                    = 00053700
                                  538 *=                                                                    = 00053800
                                  539 *=      HERE'S ONE POSSIBLE SOLUTION.............                     = 00053900
                                  540 *=                                                                    = 00054000
                                  541 *=                                                                    = 00054100
0000B0 F274 80A6 8C92 0C0A8 00094 542 DOIT     PACK  EE(8),CC(5)  THIS WILL PUT PACKED DECIMAL IN LOCATION  = 00054200
                                  543 *=                            'EE'.......                             = 00054300
                                  544 *=                                                                    = 00054400
0000B6 F377 809E 8CA6 000A0 000A8 545          UNPK  DD(8),EE(8)  THIS WILL UNPACK 'EE' INTO LOCATION 'DD'. = 00054500
                                  546 *=                                                                    = 00054600
                                  547 *=                                                                    = 00054700
0000BC 0000                       548          DC    H'00'        THIS WILL GIVE US A DUMP TO GAZE UPON     = 00054800
                                  549 *=                                                                    = 00054900
                                  550 *=           LET'S LOOK AT LOCATIONS 'DD'AND 'EE' ON THE NEXT PAGE..  = 00055000
                                  551 *=                                                                    = 00055100
                                  552 *=                                                                    = 00055200
                                  553 *============================================================================ 00055300

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                                  555 ************ ON TO THE BIGGER AND BETTER EDIT INSTRUCTIONS **********  00055500
```

```
F.P. REGS.  00.00000C CCCCC0CC   CC.CCCCCC 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0000001C 00000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 C0000000 0C06E7BC C006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0F0F2CC 5006ED90    0C063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 7F0638B0 FF150001 7F0638DE    0C00FF00 00000000 FF470230 80012938  *.....................................*
000040    40001598 0C00000C 400C167C 00002120    5888D7C0 00071248 00040000 000002C0  * ....... .........P.............*
000060    00040000 0000C366 C0C4CCCC CCC0030A    00000000 0000CA68 00040000 00000226  *.....................................*

063820    058058F0 8226D201 F00C800E 47FC8010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....0........... ......*
063840    802D4165 000047F0 802C0000 CCC00001    89200004 8C600020 89303004 8850001F  *.......0.....................*
063860    92FF8046 47FC8048 FF00D200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......0.......C..1111*
063880    F100D203 805B805A 000047F0 8076F1F2    F3C40000 0001234C F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338082 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 CCCC0CC0 CC83214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E05B20 6B202020 6B202021 4B202003    5749297C 00000000 00000000 00000000  *.....................................*
063900    0000D20C 80D280C0 DECC80D2 80CD0000    925C80C0 47F080FC 00091775 4C00D20C  *..K..K.....K.........C........K.*
063920    80D280C0 DEOC80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47F08134 00002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1000 00004110 00FF4410    815447F0 815A9200 81581F00 00004120  *.....................0.............*
063980    00C14420 816C4780 8172477C 81769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *........0......12345..........0..*
0639C0    07030101 09080409 03000A09 08070605    04030201 00000000 DC0681C0 81CA47F0  *.....................................0*
0639E0    81D60704 02C50809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....W.0*
063A00    415081E6 47FC81FA 07C90608 09030104    0301001C 00000000 00000000 0000DD07  *...W.0.............................*
063A20    8206820E 474C8216 01040607 00010305    C5000502 005B0000 41308206 00004110  *.....  ...............................*
063A40    00200A0D 47F09C84 00063D0E D00447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......0........*

064000    00000000 00000000 CCCC0C00 00000000    00000000 00004000 9400025D 00790000  *...................... .........*
```

DD

EE

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                   557 *       ////////////////////////////////                          00055700
                                   558 *       /EDIT,EDIT AND MARK INSTRUCTIONS/                         00055800
                                   559 *       ////////////////////////////////                          00055900


                                   561 ************* T H E   M A G N I F I C E N T   E D I T ***************** 00056100
                                   562 *   . . . . . . . . . I N S T R U C T I O N . . . . . . . .          * 00056200
                                   563 *                                                                    * 00056300
                                   564 *                                                                    * 00056400
                                   565 *   THE FORMAT OF THE DATA SPECIFIED BY THE SECOND OPERAND IS CHANGED * 00056500
                                   566 *    FROM PACKED TO ZONED DECIMAL AND IS MODIFIED UNDER CONTROL OF A  * 00056600
                                   567 *    PATTERN POINTED TO BY THE FIRST OPERAND.THE EDITED RESULT        * 00056700
                                   568 *    REPLACES THE PATTERN.                                           * 00056800
                                   569 *                                                                    * 00056900
                                   570 ******************** LET'S TRY ONE.......OK???? ********************** 00057000
                                   571 *                                                                    * 00057100
                                   572 *    SINCE EVERYONE IS INTERESTED IN MONEY WE'LL USE A PATTERN WITH A * 00057200
                                   573 *     $ IN IT.                                                       * 00057300
                                   574 *                                                                    * 00057400
0000BE 47F0 80E0          000E2    575          BC    15,EDITIT   BRANCHES AROUND CONSTANTS.               * 00057500
0000C2 5B                          576 PATTERN  DC    C'$'                                                 * 00057600
0000C3 206B202020                  577          DC    X'206B202020'  CONTAINS DIGIT SELECTORS AND A COMMA  * 00057700
0000C8 6B                          578          DC    C','                ANOTHER COMMA                    * 00057800
0000C9 202021                      579          DC    X'202021'      DIGIT SELECTORS AND A SIGNIFICANCE    * 00057900
0000CC 4B                          580          DC    C'.'                STARTER. A DECIMAL POINT         * 00058000
0000CD 2020                        581          DC    X'2020'        MORE DIGIT SELECTORS.                 * 00058100
                                   582 *                                                                    * 00058200
                                   583 *                                                                    * 00058300
                                   584 *                  THE PATTERN LOOKS LIKE THIS:$_,___,___.__         * 00058400
                                   585 *                        AND THATS A BIG NUMBER.                     * 00058500
                                   586 *                                                                    * 00058600
                                   587 *   WHY DONT I BUILD A NUMBER TO EDIT?                               * 00058700
                                   588 *                                                                    * 00058800
0000CF 035749297C                  589 MONEY    DC    P'35749297'  THE RULES SAY IT MUST BE PACKED DECIMAL  * 00058900
0000D4 0000000000000000            590 IMAGE    DC    XL13'00'                                             * 00059000
0000DC 0000000000
                                   591 *                                                                    * 00059100
                                   592 *                                                                    * 00059200
                                   593 *  IF WE'RE RIGHT AND I SUSPECT WE ARE,AFTER THE EDIT INSTRUCTION    * 00059300
                                   594 *   IS EXECUTED LOCATION 'IMAGE' WILL CONTAIN THE FOLLOWING:         * 00059400
                                   595 *                                                                    * 00059500
                                   596 *       5B5B5BF3F5F76BF4F9F24BF9F7                                   * 00059600
                                   597 *PRINTS $ $ $ 3 5 7 , 4 9 2 . 9 7 = $$$357,492.97 A TIDY SUM AY WHAT  * 00059700
                                   598 *                                                                    * 00059800
0000E1 00
0000E2 D20C 80D2 80C0 000D4 000C2  599 EDITIT   MVC IMAGE(13),PATTERN WE'LL WORK IN LOCATION 'IMAGE' SO WE   * 00059900
                                   600 *                                CAN SAVE THE PATTERN FOR LATER USE. * 00060000
0000E8 DE0C 80D2 80CD 000D4 000CF  601          ED  IMAGE(13),MONEY                                       * 00060100
                                   602 *                                                                    * 00060200
0000EE 0000                        603          DC  H'00'  LET US PEEK AT A DUMP.                         * 00060300
                                   604 *                                                                    * 00060400
                                   605 ********************************************************************** 00060500
```

```
F.P. REGS.  0C.000000 00000000   00.000000 0C000CCC   00.000000 00000000   00.000CCC 00000000

REGS 0-7     00000050 0006E7F8 00000010 00000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 0CC000C0 CCC6E7B0 0006E7F8    60C63A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0F0F2C0 5006ED90    00063820 00002A18 01040080 8003AFFE  *.........002.....................*
000020    FF150003 7F0638DE FF150001 6F063910    0000FF00 00000000 FE040130 800011D6  *.............................C*
000040    40001598 0C000000 4000167C 0C002120    58879CC0 00071248 00040000 000002C0  * ....... .....................*
000060    0004C000 00000366 00040000 0000030A    00000000 0000CA68 00040000 0000022E  *.............................*

063820    058058F0 8226D201 F000800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....0........... .....*
063840    802D4165 000047F0 802C0000 CCC00001    89200004 8C600020 89303004 8B50001F  *........0.....................*
063860    92FF8046 47FC8048 FFC0D200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......C.......C..1111*
063880    F100D203 805B805A 000047F0 8C76F1F2    F3C40000 00001234 F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338082 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00000000 0083214C    F27480A6 E8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E05B20 6B2C2020 6B202021 4B202003    57492970 5B5B5BF3 F5F76BF4 F9F24BF9  *.........................357.492.9*
063900    F700D20C 80D280C0 DECC80D2 80CD0000    925C80C0 47F080FC 00091775 4C00D20C  *7.K..K.....K.........C........K.*
063920    80D280C0 DECC80D2 80F60000 924080C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47F08134 0C002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1000 00004110 00FF4410    815447F0 815A9200 81581F00 00004120  *.....................C............*
063980    0CC14420 816C4780 81724770 E1769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......0......12345..........0..*
0639C0    07030101 090804C9 03C00A09 08070605    04030201 00000000 DC0681C0 81CA47F0  *.............................0*
0639E0    81D60704 02050809 C0C103C6 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DC09 81E681F0  *.O.................987654.....h.0*
063A00    415081E6 47F081FA 07C90608 09030104    0301001C 00000000 00000000 0000DD07  *...W.0.......................*
063A20    8206820E 47408216 01040607 0C010305    05000502 005B0000 41308206 00004110  *..... .....................*
063A40    00200A0D 47FC9084 00063D0E D0C447F0    90ECD00C 05C004F0 07004110 C0100511  *.....C.........0.......0........*

064000    00000000 00000000 00000000 00000000    00000000 00004000 9400025D 00790000  *..................... .........*
```

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```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                            F08APR70   9/16/70

                                    608 *$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 1.4 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00060800
                                    609 *$                                                                    $ 00060900
                                    610 *$                                                                    $ 00061000
                                    611 *$  GIVEN THE FOLLOWING INSTRUCTION STREAM:                           $ 00061100
0000F0 925C 80C0      000C2         612          MVI   PATTERN,C'*'                                           $ 00061200
0000F4 47F0 80FC            000FE   613          BC    15,EDPROB  AROUND CONSTANTS                            $ 00061300
0000F8 000917754C                   614 MANUMBER DC    PL5'917754' MY MAN NUMBER-ISN'T IT PRETTY?             $ 00061400
0000FD 00
0000FE D20C 80D2 80C0 000D4 000C2   615 EDPROB   MVC   IMAGE(13),PATTERN WE'LL USE THE SAME PATTERN...EXCEPT  $ 00061500
000104 DE0C 80D2 80F6 000D4 000F8   616          ED    IMAGE(13),MANUMBER    FOR THE '*'IN POSITION UNO.....  $ 00061600
                                    617 *$                                                                    $ 00061700
                                    618 *$                                                                    $ 00061800
                                    619 *$  WHAT WILL LOCATION 'IMAGE' LOOK LIKE AFTER THE EDIT IS EXECUTED???$ 00061900
                                    620 *$                                                                    $ 00062000
                                    621 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00062100
                                    622 *$                                                                    $ 00062200
                                    623 *$                                                                    $ 00062300
                                    624 *$                                                                    $ 00062400
                                    625 *$                                                                    $ 00062500
                                    626 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00062600
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                  628 *======================== ANSWER 1.4 ================================== 00062800
                                  629 *=                                                                    = 00062900
                                  630 *=                                                                    = 00063000
                                  631 *=     HOW ABOUT   *****9,177.54                                      = 00063100
                                  632 *=                                                                    = 00063200
                                  633 *=      ANOTHER ANSWER IS 5C5C5C5C5CF96BF1F7F74BF5F4                   = 00063300
                                  634 *=                                                                    = 00063400
                                  635 *=  ............SEE THE SECTION IN THE STUDENT TEXT ON EDIT IF YOU     = 00063500
                                  636 *=                  ARE STILL A TEENEY BIT HAZY.................      = 00063600
                                  637 *=                                                                    = 00063700
                                  638 *=     LET'S LOOK AT LOCATION 'IMAGE' IN THE FOLLOWING CORE DUMP TO BE= 00063800
00010A 0000                       639          DC    H'00'   SURE.                                          = 00063900
                                  640 *=                                              THE EDMK IS NEXT.     = 00064000
                                  641 *=========================================================================== 00064100
```

```
F.P. REGS.  00.000000 000C0000   C0.CCCCC0 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 000C001C C0000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 00000000 00C6E7BC 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0F0F2C0 5006ED90    0C063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 6F063910 FF150001 6F06392C    0000FF00 00000000 FF040130 80018006  *.............................*
000040    40001598 0CC00000 4000167C 00002120    58862FC0 00071248 00040000 000002C0  * ....... .....................*
000060    00040000 00000366 00C40000 0000030A    00000000 0000CA68 00040000 00000226  *.............................*

063820    058058F0 8226D201 F000800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....0.......... .....*
063840    802D4165 000047F0 802C0000 CCC00001    89200004 8C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47F08048 FF00D200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......0.......0..1111*
063880    F100D203 805B805A 000047F0 8076F1F2    F3C40000 00001234 F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338C82 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........C..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00C00CC0 0083214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E05C20 6B202020 6B202021 4B202003    57492970 5C5C5C5C 5CF96BF1 F7F74BF5  *.........................9.177.5*
063900    F400D20C 80D280C0 DEOC80D2 8CCDC000    925C80C0 47F080FC 00091775 4C00D20C  *4.K..K.....K.........C........K.*
063920    80D280C0 DE0C80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 1CCC0000 47F08134 00002567    5C0C0000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B100C 000C4110 00FF4410    815447F0 815A9200 81581F00 00004120  *.....................C............*
063980    00C14420 816C4780 8172477C 81769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......0......12345..........0..*
0639C0    07030101 09080409 03000A09 C8070605    04030201 00000000 DC0681C0 81CA47F0  *.............................C*
0639E0    81D60704 02050809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....W.0*
063A00    415081E6 47F081FA 07C90608 09030104    0301001C 00000000 00000000 0000DD07  *...W.0.......................*
063A20    8206820E 474C8216 01040607 00010305    C5000502 005B0000 41308206 00004110  *..... .......................*
063A40    00200A0D 47F09084 00C63DCE DCC447F0    9CECDC0C C5C004F0 07004110 C0100511  *.....0.........C.......C........*

064000    00000000 00000000 00000000 CC000000    00000000 00004000 9400025D 00790000  *..................... .........*
```

```
LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                   643 ***** T H E   F A M O U S  'E D I T   A N D   M A R K' ***************** 00064300
                                   644 *                                                                       * 00064400
                                   645 *                                                                       * 00064500
                                   646 *                                                                       * 00064600
                                   647 * O I'M SURE YOU NOTICED IN THE EXAMPLES OF THE EDIT INSTRUCTION       * 00064700
                                   648 *    THAT IF WE DIDN'T HAVE ENOUGH SIGNIFICANT DIGITS TO FILL THE       * 00064800
                                   649 *    PATTERN WE USED THE CHARACTER AT THE LEFT MOST POSITION OF THE      * 00064900
                                   650 *    PATTERN AS A FILL CHARACTER($,*).THIS CAN GET A LITTLE MESSY.      * 00065000
                                   651 *    THE ANSWER TO YOUR EXTRA DOLLAR SIGN PROBLEMS IS THE 'E D M K'     * 00065100
                                   652 *    NOT ONLY WILL THIS LITTLE GEM DO ALL THAT THE 'EDIT' WILL,BUT      * 00065200
                                   653 *    IT WILL DO SO MUCH MORE.....NAMELY PROVIDING YOU THE USER WITH     * 00065300
                                   654 *    THE ADDRESS OF THE LEFT MOST SIGNIFICANT DIGIT IN THE PATTERN      * 00065400
                                   655 *    AFTER EDITING.THIS ADDRESS IS LOCATED IN REGISTER ONE.BY A         * 00065500
                                   656 *    SIMPLE FLICK OF THE WRIST ITS THEN A SIMPLE MATTER TO STUFF ONLY   * 00065600
                                   657 *    ONE $ OR * IN THE EDITED NUMBER.SINCE ONE EXAMPLE IS WORTH           00065700
                                   658 *                  10,000 BYTES(2500 WORDS OR PICTURE/4)LET US LOOK...* 00065800
                                   659 *                                                                       * 00065900
                                   660 ***************************************************************************** 00066000
                                   661 *                                                                       * 00066100
                                   662 *    WHY DON'T WE USE THE SAME 'PATTERN' WE USED IN THE EDIT EXAMPLES   * 00066200
                                   663 *      BUT FIRST I'LL GET RID OF THE LEFTMOST CHARACTER (*)AND MAKE IT  * 00066300
                                   664 *      A 'BLANK'.....ABRA CADABRA.....                                  * 00066400
                                   665 *                                                                       * 00066500
000010C 9240 80C0       000C2      666          MVI   PATTERN,C' '        'PATTERN' IS NOW.... _,___,___.__  * 00066600
                                   667 *                                                                       * 00066700
000110 4110 80DC              000DE 668          LA    1,IMAGE+10    JUST TO BE ON THE SAFE SIDE.IF THE NUMBER  * 00066800
                                   669 *                              IS TOO SMALL 'EDMK' WON'T RETURN THE     * 00066900
                                   670 *                              ADDRESS IN REGISTER ONE.(THE X'21'WE     * 00067000
                                   671 *                              PLACED IN 'PATTERN'IS CALLED A           * 00067100
                                   672 *                              'SIGNIFICANCE STARTER'.IF THE MOST       * 00067200
                                   673 *                              SIGNIFICANT DIGIT OF THE NUMBER TO BE    * 00067300
                                   674 *                              EDITED FALLS ON OR TO THE LEFT OF THIS   * 00067400
                                   675 *                              'SIGNIFICANCE STARTER'AN ADDRESS IS      * 00067500
                                   676 *                              RETURNED IN REGISTER ONE.IF THE MOST     * 00067600
                                   677 *                              SIGNIFICANT DIGIT OF THE NUMBER TO BE    * 00067700
                                   678 *                              EDITED FALLS TO THE RIGHT OF THE         * 00067800
                                   679 *                              'SIGNIFICANCE STARTER'IN THE PATTERN,THE* 00067900
                                   680 *                              ADDRESS WON'T BE RETURNED IN REG.1)      * 00068000
                                   681 *                                                                       * 00068100
                                   682 ***************************************************************************** 00068200
                                   683 *                                                                       * 00068300
000114 D20C 80D2 80C0 000D4 000C2   684          MVC   IMAGE(13),PATTERN                                      * 00068400
00011A DF0C 80D2 812A 000D4 0012C  685          EDMK  IMAGE(13),CASH                                         * 00068500
                                   686 *                                                                       * 00068600
                                   687 *                                                                       * 00068700
                                   688 ***************************************************************************** 00068800
```

```
                                691 ********************************************************************** 00069100
                                692 *                                                                    * 00069200
                                693 *                                                                    * 00069300
                                694 *                                                                    * 00069400
                                695 * 0 REGISTER ONE SHOULD NOW CONTAIN THE ADDRESS OF THE '2' IN LOCATION* 00069500
                                696 *    'IMAGE'.....                                                    * 00069600
                                697 *                                                                    * 00069700
000120 0610                     698          BCTR  1,0 THIS SUBTRACTS 1 FROM REGISTER ONE,AND DOESN'T    * 00069800
                                699 *                    BRANCH .....                                    * 00069900
                                700 *                                                                    * 00070000
                                701 * 0 REGISTER ONE NOW POINTS ONE POSITION TO THE LEFT OF THE '2' IN  * 00070100
                                702 *    LOCATION 'IMAGE'.                                               * 00070200
000122 925B 1000      00000     703          MVI   0(1),C'$' WE'LL PUT A '$' IN IMAGE                    * 00070300
000126 0000                     704          DC    H'00' LET US EXAMINE A DUMP OF CORE.....              * 00070400
000128 47F0 8134            00136 705          BC    15,EDMKQUES AROUND 'CASH'                           * 00070500
00012C 000025675C               706 CASH     DC    PL5'25675'                                          * 00070600
                                707 *                                                                    * 00070700
                                708 *                                                                    * 00070800
                                709 * 0 WE NOW HAVE $256.75(5BF2F5F66BF7F5)-A MERE PITTANCE-IN LOCATION * 00070900
                                710 *      'IMAGE'.                                                      * 00071000
                                711 *                                                                    * 00071100
                                712 *         .............LET'S HAVE A LOOK.....................       * 00071200
                                713 *                                                                    * 00071300
                                714 ********************************************************************** 00071400
```

```
F.P. REGS.  00.00000C 00C00000   00.000CC0 CCCCCCCC   00.000000 00000000   00.000000 00000CC0

REGS 0-7     00000050 CC0638FA 00000010 00000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 CCCCCCC0 0006E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0FCF2C0 5C06ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 6F06392C FF150001 6F063948    0000FF00 00000000 FF040230 80018276  *.............................*
000040    40001598 0C000000 400016C0 0CC02120    588503C0 00071248 00040000 000002C0  * ....... .....................*
000060    00040000 00000366 00C40000 0000030A    CC000000 0000CA68 00040000 00000226  *.............................*

063820    058058F0 8226D201 F0C0800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.C....C........... .....*
063840    802D4165 000047FC 8C2C0000 00000001    89200004 8C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47F08048 FFCCD200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......C.......0..1111*
063880    F100D203 805B805A 000047F0 8076F1F2    F3C40000 00001234 F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338082 8C720000    47F080AE F8F3F2F1 C4000000 C0000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 0000C000 0083214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........C*
0638E0    80E04020 6B202020 6B202021 4B202003    57492970 40404040 40405BF2 F5F64BF7  *.. ..................      .256.7*
063900    F500D20C 80D280C0 DECC80D2 80CD0000    925C80C0 47F080FC 00091775 4C00D20C  *5.K..K.....K.........0.........K.*
063920    80D280C0 DE0C80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47FC8134 00002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F061C 925B1000 00004110 0CFF4410    815447F0 815A9200 81581F00 00004120  *.....................0.............*
063980    00C14420 816C4780 81724770 81769500    817CC100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *........C......12345..........0..*
0639C0    07030101 09080409 03C00A09 C8070605    04030201 00000000 DC0681C0 81CA47F0  *..............................0*
0639E0    81D60704 020508C9 C0C10306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DC09 81E681F0  *.O.................987654.....W.0*
063A00    415081E6 47F081FA 07C90608 C903C104    0301001C 00000000 00000000 0000DC07  *...W.0.......................*
063A20    8206820E 47408216 01040607 0C010305    C5000502 005B0000 41308206 00004110  *..... .......................*
063A40    CC200A0D 47F09084 00063DCE DCC447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......C........*

064000    00000000 000CCC00 00000000 00000000    0C000000 00004000 9400025D 00790000  *.......................... .........*
```

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```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70


                                   717 *$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 1.5 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00071700
                                   718 *$                                                                      $ 00071800
                                   719 *$                                                                      $ 00071900
                                   720 *$     GIVEN THE FOLLOWING:                                             $ 00072000
                                   721 *$                                                                      $ 00072100
000131 000000001C                  722 LOOT      DC     PL5'1'                                                 $ 00072200
                                   723 *$                                                                      $ 00072300
000136 D20C 80D2 80C0 00D4 00C2    724 EDMKQUES MVC     IMAGE(13),PATTERN                                      $ 00072400
                                   725 *$                                                                      $ 00072500
                                   726 *$                                                                      $ 00072600
                                   727 *$                                                                      $ 00072700
00013C DF0C 80D2 812F 00D4 00131   728            EDMK   IMAGE(13),LOOT                                      $ 00072800
                                   729 *$                                                                      $ 00072900
000142 0610                        730            BCTR   1,0                                                  $ 00073000
                                   731 *$                                                                      $ 00073100
000144 925B 1000       00000       732            MVI    0(1),C'$'                                            $ 00073200
                                   733 *$                                                                      $ 00073300
                                   734 *$                                                                      $ 00073400
                                   735 *$     WHAT WILL LOCATION 'IMAGE' CONTAIN AFTER THE PREVIOUS             $ 00073500
                                   736 *$       INSTRUCTIONS HAVE BEEN EXECUTED???????                         $ 00073600
                                   737 *$                                                                      $ 00073700
000148 0000                        738            DC     H'00' HERE COMES A DUMP                              $ 00073800
                                   739 *$                                                                      $ 00073900
                                   740 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00074000
                                   741 *$                                                                      $ 00074100
                                   742 *$                                                                      $ 00074200
                                   743 *$                                                                      $ 00074300
                                   744 *$                                                                      $ 00074400
                                   745 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00074500
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
749 *========================= ANSWER 1.5 ================================== 00074900
750 *=                                                                     = 00075000
751 *=                                                                     = 00075100
752 *=   HOW ABOUT $____.01   THE DOLLAR SIGN IS NOT IMMEDIATELY TO THE   '= 00075200
753 *=                       LEFT OF THE DECIMAL POINT.                    = 00075300
754 *=                                                                     = 00075400
755 *=  THINKING BACK I'M SURE YOU'LL REMEMBER THAT THE EDMK WILL NOT       = 00075500
756 *=   RETURN AN ADDRESS IN REGISTER ONE IF A SIGNIFICANT DIGIT IS NOT    = 00075600
757 *=   FOUND ON OR TO THE LEFT OF THE 'SIGNIFICANCE STARTER'(X'21')IN THE= 00075700
758 *=   PATTERN. REGISTER 1 HAS NOT IN ANY WAY BEEN CHANGED BY THIS        = 00075800
759 *=   'E D M K' (NO SIGNIFICANT DIGIT). THE $ WAS PLACED WHERE EVER      = 00075900
760 *=   REGISTER 1  HAPPENED TO BE POINTING.                              = 00076000
761 *=   I'M SORRY TO SAY, FOR OUR PURPOSES THIS ISN'T VERY SWELL,THAT'S    = 00076100
762 *=   WHY WE SHOULD HAVE LOADED REG.1 WITH THE ADDRESS OF THE DECIMAL    = 00076200
763 *=   POINT FIRST.................                                      = 00076300
764 *=                                                                     = 00076400
765 *=   LET'S LOOK AT THE DUMP TO BE SURE.                                = 00076500
766 *=                                                                     = 00076600
767 *===================================================================== 00076700
```

```
770 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00077000
771 *+                                                                    + 00077100
772 *+    THAT CONCLUDES SECTION ONE OF THIS PROJECT.................     + 00077200
773 *+                                                                    + 00077300
774 *+ O  NOTIFY YOUR INSTRUCTOR OF YOUR COMPLETION OF THIS SECTION BY    + 00077400
775 *+    DISPLAYING THE 'G R E E N'  ANSWER CUE.                         + 00077500
776 *+                   ----------                                       + 00077600
777 *+                                                                    + 00077700
778 *+        ..............THE EXECUTE INSTRUCTION LEADS OFF THE NEXT    + 00077800
779 *+                                SECTION.................            + 00077900
780 *+                                                                    + 00078000
781 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00078100
```

```
F.P. REGS.  00.000000 0000000C   C0.0CC0C0 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 000638F9 0000001C 00000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 C0000CC0 0C06E7BC C006E7F8    60C63A22 0006E7B0 00002170 0CC63D0E

000000    00000000 0000020C F0F0F2C0 5006ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 6F063948 FF150001 6F06396A    C000FF00 00000000 FF150134 AF063D06  *.....................................*
000040    40027058 50CCC000 40001590 00002120    5883C8C0 00071248 00040000 000002C0  * ....... .........H.............*
000060    00040000 00000366 00C4CC00 0000030A    00000000 0000CA68 00040000 00000226  *.....................................*

063820    058058F0 8226D201 F000800E 47FC8010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....C........... .....*
063840    802D4165 000047F0 802C0000 CC00CC01    89200004 8C6C0020 89303004 8B50C01F  *.......0.....................*
063860    92FF8046 47F08048 FF00D200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....C....K......0.......C..1111*
063880    F100D203 805B8C5A 000C47F0 8076F1F2    F3C40C00 00001234 F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338C82 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00CCCCC0 0C83214C    F27480A6 F8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E04020 6B202020 6B202021 4B202003    57492970 40404040 405B4040 40404BF0  *.. ..................    .    .0*
063900    F100D20C 80D280C0 DEC C8CD2 80CD00C0   925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........C.........K.*
063920    80D280C0 DEOC80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47F08134 00002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........C.............K..K.....K*
063960    812F061C 925B10CC 00004110 00FF4410    815447F0 815A9200 81581F00 00004120  *.....................C.............*
063980    00C14420 816C4780 8172477C 81769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......0.......12345..........0..*
0639C0    07030101 09080409 03000A09 C8C70605    04030201 00000000 DC0681C0 81CA47F0  *.....................................C*
0639E0    81D60704 02050809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....W.O*
063A00    415081E6 47FC81FA 07C90608 09030104    0301001C 00000000 00000000 0000DD07  *...W.O.....................*
063A20    8206820E 474C8216 01C4C6C7 00010305    05000502 005B0000 41308206 00004110  *..... ..........................*
063A40    00200A0D 47F09084 00C63D0E DC0447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......C.........*

064000    00000000 00000000 00000000 0C000000    00000000 00004000 9400025D 00790000  *..................... .........*
```

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LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                        785 *                                                          00078500
                        786 *                                                          00078600
                        787 *                                                          00078700
                        788 *          ****************************************        00078800
                        789 *          *                                      *        00078900
                        790 *          *           S E C T I O N              *        00079000
                        791 *          *                2                     *        00079100
                        792 *          *                                      *        00079200
                        793 *          ****************************************        00079300
                        794 *                                                          00079400
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                        797 *        //////////////////////////                                      * 00079700
                        798 *        /THE EXECUTE INSTRUCTION/                                      * 00079800
                        799 *        //////////////////////////                                      * 00079900


                        801 ************************** E X E C U T E ****************************** 00080100
                        802 *                                                                       * 00080200
                        803 *                                                                       * 00080300
                        804 *0 IN ORDER TO INVESTIGATE THE INNER WORKINGS OF THE EXECUTE           * 00080400
                        805 *    INSTRUCTION,IT MIGHT BE A GOOD IDEA TO FIRST DRAW A PICTURE OF    * 00080500
                        806 *    THE CAST OF CHARACTERS AND HOW THEY RELATE.                       * 00080600
                        807 *                                                                       * 00080700
                        808 *                                                                       * 00080800
                        809 *    ------------------------------------                             * 00080900
                        810 *   | EX | REGX | X2 | B2 |LOCATION (D2) |   THE EXECUTE INSTRUCTION   * 00081000
                        811 *    ------------------------------------                             * 00081100
                        812 *         ||      |    |      ||||                                      * 00081200
                        813 *         ||      |    |      ||||                                      * 00081300
                        814 *         ||      |     ----->||||                                      * 00081400
                        815 *         ||       ---------->||||                                     * 00081500
                        816 *         ||                  VVVV   ---------------------------      * 00081600
                        817 *         ||              LOCATION=| INST | ?????? | XXXXXXXXXX|     * 00081700
                        818 *         ||                       ---------------------------      * 00081800
                        819 *         ||                             8++++++++15                  * 00081900
                        820 *         VV          ---------------------++++++++                    * 00082000
                        821 *       REGISTERX= | XXXXXXXXXXXXXXXXXXXXX|????????|                  * 00082100
                        822 *                   ------------------------------                    * 00082200
                        823 *                  0                      24        31                 * 00082300
                        824 *                                                                       * 00082400
                        825 ***************************************************************************** 00082500
                        826 *                                                                       * 00082600
                        827 * 0  THE EXECUTE INSTRUCTION CAUSES BITS 24-31 OF REGX(R1) TO BE OR'ED* 00082700
                        828 *      WITH BITS 8-15 OF  THE INSTRUCTION TO BE EXECUTED(LOCATION).     * 00082800
                        829 *      THE INSTRUCTION AT 'LOCATION' IS THEN EXECUTED.THE OR'ING DOES   * 00082900
                        830 *      NOT CHANGE EITHER THE CONTENTS OF THE REGISTER OR THE CONTENTS   * 00083000
                        831 *      OF STORAGE.IF R1=0 (BITS 8-11 OF THE EXECUTE INSTRUCTION),NO     * 00083100
                        832 *      PERMANENT MODIFICATION OF THE INSTRUCTION TO BE EXECUTED         * 00083200
                        833 *      TAKES PLACE                                                      * 00083300
                        834 *                                                                       * 00083400
                        835 *         ..... WHY DON'T WE TRY AN EXAMPLE ????.....                   * 00083500
                        836 *                                                                       * 00083600
                        837 ***************************************************************************** 00083700
```

```
                                    840 ********************* E X E C U T E   E X A M P L E  1 ***************** 00084000
                                    841 *                                                                       * 00084100
                                    842 *                                                                       * 00084200
                                    843 *                                                                       * 00084300
00014A 4110 00FF            000FF   844           LA    1,X'FF'        PUTS FF IN REGISTER 1                    * 00084400
                                    845 *                                                                       * 00084500
00014E 4410 8154            00156   846           EX    1,LOCATION                                              * 00084600
                                    847 *                                                                       * 00084700
000152 47F0 815A            0015C   848           BC    15,DUMPAWAY      BRANCH AROUND CONSTANT                 * 00084800
                                    849 *                                                                       * 00084900
000156 9200 8158      0015A         850 LOCATION MVI    PLACE,X'00'    THE INSTRUCTION TO BE EXECUTED.....      * 00085000
                                    851 *                                                                       * 00085100
00015A 1F                           852 PLACE     DC    X'1F'                                                   * 00085200
                                    853 *                                                                       * 00085300
                                    854 * O THE X'FF' IN REG.1 WILL BE OR'ED INTO THE IMMEDIATE FIELD OF THE   * 00085400
                                    855 *       MVI.THE X'FF' WILL THEN BE MOVED INTO STORAGE LOCATION 'PLACE'* 00085500
                                    856 *                                                                       * 00085600
                                    857 *                                                                       * 00085700
00015B 00
00015C 0000                         858 DUMPAWAY DC   H'00'                                                     * 00085800
                                    859 *                                                                       * 00085900
                                    860 *     @@@@@LET'S LOOK AT THE DUMP FOR EXAMPLE 1 WHICH FOLLOWS@@@@@@   * 00086000
                                    861 *                                 ---------                             * 00086100
                                    862 *   -----> 'LOCATION' IS CIRCLED TO PROVE THAT NO PERMANENT              * 00086200
                                    863 *          MODIFICATION OF THE INSTRUCTION EXECUTED TAKES PLACE.        * 00086300
                                    864 *                                                                       * 00086400
                                    865 ************************************************************************ 00086500
```

```
F.P. REGS.  00.000000 00CCCCCC   00.000000 0C000CC0   00.000000 00000000   00.000CCC 00000000

REGS 0-7     00000050 CC0000FF 00000010 00000020    00000001 00000000 00000000 00000001
REGS 8-15    6F063822 CC0CCCCC CCC6E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0F0F2C0 5006ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 6F06396A FF15C001 6F06397E    0000FF00 00000000 FF040134 4001809C  *.............................. ...*
000040    40001598 0CC00000 4000167C 0C0C2120    58827EC0 00071248 00040000 000002C0  * ....... .......................*
000060    0C04C000 00000366 00040000 0000030A    00000000 0000CA68 00040000 0000022E  *.............................*

063820    058058F0 8226D201 FC00800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.C....0........... ......*
063840    802D4165 00C047FC 8C2CCCCC CCC00001    89200004 8C600020 89303004 8B50001F  *.......0.......................*
063860    92FF8046 47F08048 FF00D200 80528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......0.......0..1111*
063880    F100D203 805B8C5A 000047F0 8C76F1F2    F3C40000 0001234C F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08C86 F1F2F3C4 F3338082 8C72CCC0    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00C00000 0083214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........C*
0638E0    80E04020 6B2C2020 6B202021 4B202003    5749297C 40404040 405B4040 40404BF0  *.. ..................    .    .0*
063900    F100D20C 80D280C0 DECC80D2 80CD0000    925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........0........K.*
063920    80D280C0 DE0C80D2 80F60C00 924080C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47F08134 0C002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1000 00004110 0CFF4410    815447F0 815A9200 8158FF00 00004120  *.....................0.............*
063980    00C14420 816C4780 81724770 817695C0    8170C100 415000BC 00004130 00044150  *.A.................A..............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *........0......12345..........0..*
0639C0    07030101 09080409 C3C00A09 08070605    04030201 00000000 DC0681C0 81CA47F0  *.................................0*
0639E0    81D60704 02050809 C0C10306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....w.0*
063A00    415081E6 47F081FA 07C90608 C9C30104    0301001C 00000000 00000000 0000DD07  *...W.0.........................*
063A20    8206820E 47408216 0104C6C7 CC010305    05000502 005B0000 41308206 00004110  *..... ..........................*
063A40    00200A0D 47F09084 00063D0E D00447F0    9CECD00C 05C004F0 07004110 C0100511  *.....0.........0.......0........*

*  064000    0CCC0000 00000C00 00000000 00000000    0C000000 00004000 94000250 00790000  *..................... .........*
```

PLACE

EXAMPLE 1

```
                                868 ****************** E X E C U T E   E X A M P L E   2 ****************** 00086800
                                869 *                                                                       * 00086900
                                870 *                                                                       * 00087000
                                871 *                                                                       * 00087100
                                872 *   THIS EXAMPLE OF THE EXECUTE WILL ALLOW FOR THE COMPARISON OF ONE    * 00087200
                                873 *     BYTE IN A REGISTER AND ONE BYTE IN STORAGE.                       * 00087300
                                874 *                                                                       * 00087400
                                875 * O INCIDENTLY,THIS METHOD IS THE ONLY WAY ONE BYTE OF A REGISTER      * 00087500
                                876 *     MAY BE COMPARED TO ONE BYTE OF STORAGE WITHOUT USING A GREAT      * 00087600
                                877 *     NUMBER OF INSTRUCTIONS.                                           * 00087700
                                878 *                                                                       * 00087800
                                879 *                                                                       * 00087900
00015E 4120 00C1        000C1   880          LA    2,C'A'      LOADS THE CHARACTER 'A' INTO REG.2          * 00088000
                                881 *                             TO BE USED FOR COMPARING.               * 00088100
                                882 *                                                                       * 00088200
000162 4420 816C        0016E   883          EX    2,COMPARE                                                 * 00088300
                                884 *                                                                       * 00088400
000166 4780 8172        00174   885          BE    EXT                                                       * 00088500
00016A 4770 8176        00178   886          BNE   EXTRA       THESE TWO TEST THE RESULTS OF COMPARISON.   * 00088600
                                887 *                                                                       * 00088700
00016E 9500 8170  00172         888 COMPARE  CLI   THING,X'00'     INSTRUCTION TO BE EXECUTED               * 00088800
000172 C1                       889 THING    DC    C'A'        'THING' ALSO CONTAINS 'A' REG.2='THING'     * 00088900
000173 00
000174 4150 00BC        000BC   890 EXT      LA    5,X'BC'          WE SHOULD BRANCH TO HERE AFTER THE CLI * 00089000
000178 0000                     891 EXTRA    DC    H'00'            IS EXECUTED.THEN A DUMP WILL BE TAKEN. * 00089100
                                892 *                                                                       * 00089200
                                893 *  'THING' SHOULD EQUAL THE BYTE IN REG 2 WHEN THE EXECUTE INSTRUCTION* 00089300
                                894 *    IS PERFORMED.THE CLI WILL FIND THEM EQUAL AND WE SHOULD BRANCH     * 00089400
                                895 *    TO 'EXT',LOAD REG 5 WITH 'BC',  THEN GO TO 'EXTRA'AND GET A DUMP.* 00089500
                                896 *                                                                       * 00089600
                                897 *      @@@@@LET'S LOOK AT THE DUMP FOR EXAMPLE 2 WHICH FOLLOWS@@@@@     * 00089700
                                898 *                                    ---------                          * 00089800
                                899 *                                                                       * 00089900
                                900 ***************************************************************************** 00090000
```

```
F.P. REGS.  00.000000 00000000   00.CCCCCC 00000000   00.000000 00000000   00.000000 00000000

                                                        R5
REGS 0-7     00000050 C00000FF 000000C1 00000020   00000001 000000BC 00000000 00000001
REGS 8-15    6F063822 C0000000 0C06E7BC C006E7F8   60063A22 0006E7B0 00002170 00063D0E

000000   00000000 0000020C F0F0F2C0 5006ED90   00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020   FF150003 6F06397E FF150001 4F06399A   0000FF00 00000000 FF040130 800180A4  *.....................................*
000040   40001598 0C0C000C 400C167C 00002120   58811BC0 00071248 00040000 000002C0  * ....... ......................*
000060   00040000 00000366 00040000 0000030A   00000000 0000CA68 00040000 00000226  *.....................................*

063820   058058F0 8226D201 F000800E 47FC8010   07FE5820 802A1832 4840802C 17554350  *...0..K.0....0.......... ......*
063840   802D4165 00C047F0 802C0000 CCCCC001   89200004 8C600020 89303004 8B50001F  *........0.............................*
063860   92FF8046 47F08048 FF00D200 80528046   47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K.......0........0..1111*
063880   F100D203 805B8C5A 000047F0 8076F1F2   F3C40000 0001234C F2338072 806C0000  *1.K........0..123D......2.......*
0638A0   47F08086 F1F2F3C4 F3338C82 8C720000   47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0   F0F0F0F8 F3F2F1C4 00000000 0083214C   F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3.........0*
0638E0   80E04020 6B202020 6B202021 4B202003   5749297C 40404040 405B4040 40404BF0  *.. ...................     .    .0*
063900   F100D20C 80D280C0 DEC80D2 8CCD0CC0   925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........0........K.*
063920   80D280C0 DE0C80D2 80F60000 924C80C0   411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940   0610925B 10000000 47F08134 00002567   5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960   812F0610 925B10CC 000C4110 00FF4410   815447F0 815A9200 8158FF00 00004120  *.....................C.............*
063980   00C14420 816C4780 8172477C 81769500   8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0   00134450 818847F0 81924360 818CF1F2   F3F4F500 0000DC09 819E81A8 47F08184  *.......0......12345..........0..*
0639C0   07030101 09080409 03000A09 08070605   04030201 00000000 DC0681C0 81CA47F0  *.................................C*
0639E0   81D60704 02C50809 0001030E FFFEFDFC   FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....W.O*
063A00   415081E6 47FC81FA 07090608 09030104   0301001C 00000000 00000000 0000DD07  *...W.O..........................*
063A20   8206820E 474C8216 01040607 0C010305   C5000502 005B0000 41308206 00004110  *.....  ..........................*
063A40   00200A0D 47F09084 00C63D0E DCC447F0   90ECD00C 05C004F0 07004110 C0100511  *.....0.........C.......C........*

064000   00000000 00000000 00000000 00000000   00000000 00004000 9400025C 00790000  *..................... .........*
```

EXAMPLE 2

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70  9/16/70


                                  903 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 1.21 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00090300
                                  904 *$                                                                    $ 00090400
                                  905 *$                                                                    $ 00090500
                                  906 *$     GIVEN THE FOLLOWING INSTRUCTION STREAM:                        $ 00090600
                                  907 *$                                                                    $ 00090700
00017A 4130 0004          00004   908           LA    3,4                                                   $ 00090800
00017E 4150 0013          00013   909           LA    5,X'13'                                               $ 00090900
000182 4450 8188          0018A   910           EX    5,INSERT                                              $ 00091000
000186 47F0 8192          00194   911           BC    15,GOAWAY                                             $ 00091100
                                  912 *$                                                                    $ 00091200

00018A 4360 818C          0018E   914 INSERT    IC    6,KARACTER                                            $ 00091400
00018E F1F2F3F4F5                 915 KARACTER  DC    C'12345'                                              $ 00091500
000193 00
000194 0000                       916 GOAWAY    DC    H'00'              THIS WILL GET A DUMP.              $ 00091600

                                  918 *$                                                                    $ 00091800
                                  919 *$                                                                    $ 00091900
                                  920 *$    WHICH OF THE FOLLOWING WILL BE THE RESULT OF THE PERFORMANCE OF  $ 00092000
                                  921 *$      THE EXECUTE INSTRUCTION ?                                     $ 00092100
                                  922 *$                                                                    $ 00092200
                                  923 *$           A. REGISTER 6 WILL CONTAIN X'F1' IN BITS 24-31           $ 00092300
                                  924 *$           B. REGISTER 7 WILL CONTAIN X'F1' IN BITS 24-31           $ 00092400
                                  925 *$           C. REGISTER 7 WILL CONTAIN X'F5' IN BITS 24-31           $ 00092500
                                  926 *$           D. REGISTER 6 WILL CONTAIN X'F4' IN BITS 24-31           $ 00092600
                                  927 *$           E. REGISTER 1 WILL CONTAIN X'F1' IN BITS 24-31           $ 00092700
                                  928 *$                                                                    $ 00092800
                                  929 *$                                                                    $ 00092900
                                  930 *$    THE CORRECT ANSWER IS ____.                                     $ 00093000
                                  931 *$                                                                    $ 00093100
                                  932 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00093200
```

```
935 *======================= ANSWER 1.21 =============================== 00093500
936 *=                                                                 = 00093600
937 *=                                                                 = 00093700
938 *=   C--- IS THE CORRECT ANSWER,REG 7 WILL CONTAIN X'F5' IN BITS 24-31= 00093800
939 *=                        LET'S SEE WHY, OKAY?                       = 00093900
940 *=                                                                 = 00094000
941 *=        WHEN THE EXECUTE IS PERFORMED BITS 24-31 OF REGISTER 5 ARE = 00094100
942 *=         OR'ED WITH BITS 8-15 OF THE INSERT CHARACTER INSTRUCTION. = 00094200
943 *=         THE INSERT CHARACTER INSTRUCTION BECOMES(INTERNALLY):     = 00094300
944 *=              IC     7,KARACTER(3)       REG 3=4                   = 00094400
945 *=                                                                 = 00094500
946 *=         THEREFORE WE INSERT THE CHARACTER FROM 'KARACTER+4'(X'F5') = 00094600
947 *=         INTO REG 7.                                               = 00094700
948 *=                                                                 = 00094800
949 *=             THE DUMP ON THE NEXT PAGE WILL PROVE IT.              = 00094900
950 *=                                                                 = 00095000
951 *=      NEXT WE'LL EXPLORE THE TRANSLATE, AND TRANSLATE AND TEST     = 00095100
952 *=       INSTRUCTIONS.                                               = 00095200
953 *=                                                                 = 00095300
954 *================================================================== 00095400
```

```
F.P. REGS.   C0.000000C 00000000   00.000000C C0000000C   00.000000 00000000   00.000000 0C0C0000

                                                                        REG 7
REGS 0-7     00000050 C0000CFF CC00000C1 C0000004    00000001 00000013 00000000 000000F5
REGS 8-15    6F063822 CCCCCCC0 0006E7BC 0006E7F8    60063A22 0006E7B0 00002170 00063D0F

000000    00000000 0000020C F0F0F2C0 5C06ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 4F06399A FF150001 4FC639B6    0000FF00 00000000 FF470230 80012938  *.............................)*
000040    40001598 50CCC000 40001670 CC0C2120    587FD1C0 00071248 00040000 000002C0  * ....... .........J.............*
000060    00040000 00000366 0004C000 0000030A    CC000000 0000CA68 00040000 0000022E  *.............................H*

063820    058058F0 8226D201 FCCC800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....C.......... .....*
063840    802D4165 00CC47FC 8C2C0000 00000001    89200004 8C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47F08048 FF00D200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K.....0.......C..1111*
063880    F100D203 805B805A 000047F0 8076F1F2    F3C40000 0001234C F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338082 8C72C000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00C00000 0083214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........C*
0638E0    80E04020 6B2C2020 6B202021 4B202003    5749297C 40404040 405B4040 40404BF0  *.. .................    .    .0*
063900    F100D20C 80D280CC DECC80D2 8CCD0000    925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........0........K.*
063920    80D280C0 DE0C80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47FC8134 00002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1CC0 00004110 0CFF441C    815447F0 815A9200 8158FF00 00004120  *.....................C.............*
063980    00C14420 816C4780 81724770 81769500    817CC100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847FC 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *........C......12345.........0..*
0639C0    07030101 09C804C9 C3C00A09 C8070605    04030201 00000000 DC0681C0 81CA47F0  *.............................0*
0639E0    81D60704 02050809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....W.0*
063A00    415081E6 47FC81FA 07C90608 C9C30104    0301001C 00000000 00000000 0000CDD7  *...W.0.......................*
063A20    8206820E 47408216 01040607 0CC10305    C5000502 005B0000 41308206 00004110  *..... .....................*
063A40    00200A0D 47F09084 00063D0E DC0447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......0........*

064000    00000000 0CCC0000 00000000 00000000    CC000000 00004000 9400025D 00790000  *..................... .........*
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                        957 *       ////////////////////////////                                    00095700
                        958 *       /TRANSLATE,TRANSLATE & TEST/                                    00095800
                        959 *       ////////////////////////////                                    00095900


                        961 ********** T R A N S L A T E   I N S T R U C T I O N **********         00096100
                        962 *                                                                       * 00096200
                        963 *                                                                       * 00096300
                        964 *         ............... TR  D1(L,B1),D2(B2) ...................       * 00096400
                        965 *                                                                       * 00096500
                        966 *    O  AS THE NAME INDICATES,THE TRANSLATE INSTRUCTION WAS DESIGNED    * 00096600
                        967 *       TO TRANSLATE BYTES OF INFORMATION FROM ONE CODE TO BYTES OF     * 00096700
                        968 *       INFORMATION IN SOME OTHER CODE.THE FIRST OPERAND OF THE         * 00096800
                        969 *       INSTRUCTION POINTS TO THE BEGINNING OF THE FIELD WE WISH TO     * 00096900
                        970 *       TRANSLATE.THE NUMBER OF BYTES TO BE TRANSLATED IS REPRESENTED   * 00097000
                        971 *       BY 'L'. A TABLE OF ALL POSSIBLE COMBINATIONS OF BITS IN THE     * 00097100
                        972 *       NEW CODE IS ADDRESSED BY THE SECOND OPERAND.OTHER TERMS YOU     * 00097200
                        973 *       MIGHT HEAR REFERRING TO THESE OPERANDS ARE:                     * 00097300
                        974 *                                                                       * 00097400
                        975 *            FIRST OPERAND = ARGUMENT FIELD                             * 00097500
                        976 *            SECOND OPERAND = FUNCTION FIELD                            * 00097600
                        977 *                                                                       * 00097700
                        978 *                                                                       * 00097800
                        979 *         HERE COMES A THUMB NAIL SKETCH OF THE TRANSLATE.              * 00097900
                        980 *                                                                       * 00098000
                        981 ************************************************************************ 00098100
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
 984 *&&&&&&&&&&&&&&&&&&&&&&&&&&&& THUMBNAIL SKETCH &&&&&&&&&&&&&&&&&&&&&&&&&&&& 00098400
 985 *&                                                                        & 00098500
 986 *&              +---------- NUMBER OF BYTES TO BE TRANSLATED.             & 00098600
 987 *&              V                                                         & 00098700
 988 *&       +-----------------------------+                                  & 00098800
 989 *&       | TR | L | B1 | D1 | B2 | D2 |     THE TRANSLATE INSTRUCTION     & 00098900
 990 *&       +-----------------------------+                                  & 00099000
 991 *&                 |    |    |    |                                       & 00099100
 992 *&                 |    |    |    |                                       & 00099200
 993 *&                 |    |    |    |                                       & 00099300
 994 *&                 +----+    +----+                                       & 00099400
 995 *&                    |         |                                         & 00099500
 996 *&                    |         |                                         & 00099600
 997 *&        +-----------+         +------+                                  & 00099700
 998 *&        |                             |                                 & 00099800
 999 *&        |----PROCESSING-------->|     |                                 & 00099900
1000 *&        |                       |     |                                 & 00100000
1001 *&        V                       |     V                                 & 00100100
1002 *&    ARGUMENT FIELD              |   FUNCTION FIELD                      & 00100200
1003 *&       +-------------------------+   +---------,,--------------------+& 00100300
1004 *&       | BYTES TO BE TRANSLATED |   | NEW CODE,ALL BIT COMBINATIONS |& 00100400
1005 *&       +-------------------------+   +---------,,--------------------+& 00100500
1006 *&                                                                        & 00100600
1007 *&                                                                        & 00100700
1008 *&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&& 00100800


1010 ************************************************************************** 00101000
1011 *                                                                        * 00101100
1012 *    DURING THE OPERATION AS EACH ARGUMENT BYTE IS PROCESSED ITS VALUE   * 00101200
1013 *      IS ADDED TO THE STARTING ADDRESS OF THE FUNCTION FIELD.THE BYTE   * 00101300
1014 *      AT THIS NEW ADDRESS IN THE FUNCTION FIELD REPLACES THE ARGUMENT   * 00101400
1015 *      BYTE IN THE ARGUMENT FIELD.                                       * 00101500
1016 *                ..... ENOUGH CHATTER LETS LOOK AT AN EXAMPLE.....       * 00101600
1017 *                                                                        * 00101700
1018 *                                                                        * 00101800
1019 ************************************************************************** 00101900
```

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                   1021 ********************************************************************** 00102100
                                   1022 *                                                                    * 00102200
                                   1023 *                                                                    * 00102300
                                   1024 *                                                                    * 00102400
000196 DC09 819E 81A8 C01A0 001AA  1025          TR    OLDCODE(10),NEWCODE   TEN BYTES AT 'OLDCODE' WILL BE  * 00102500
                                   1026 *                                     TRANSLATED.                    * 00102600
                                   1027 *                                                                    * 00102700
00019C 47F0 81B4            001B6  1028          BC    15,LOOKSEE          I BET YOU KNOW WHAT THIS DOES.    * 00102800
                                   1029 *                                                                    * 00102900
0001A0 0703010109080409            1030 OLDCODE  DC    X'07030101090804090300'    BYTES TO BE TRANSLATED     * 00103000
0001A8 0300
                                   1031 *                                                                    * 00103100
0001AA 0A09080706050403            1032 NEWCODE  DC    X'0A09080706050403020100'    THE STRUCTURE OF THE NEW  * 00103200
0001B2 020100
                                   1033 *                                            CODE                    * 00103300
                                   1034 ********************************************************************** 00103400
                                   1035 *                                                                    * 00103500
                                   1036 *    FOR EXPLANATION PURPOSES,LET'S SAY THAT LOCATION 'NEWCODE'      * 00103600
                                   1037 *     CONTAINS ALL POSSIBLE COMBINATIONS OF BITS IN THE NEW CODE.    * 00103700
                                   1038 *                    (EBCDIC HAS 256 COMBINATIONS)                   * 00103800
                                   1039 *    THE FIRST ARGUMENT BYTE TO BE OPERATED UPON IS THE X'07' AT     * 00103900
                                   1040 *     LOCATION 'OLDCODE'.THIS X'07' IS ADDED TO THE STARTING         * 00104000
                                   1041 *     ADDRESS OF 'NEWCODE'.THE BYTE AT 'NEWCODE+7'(X'03')THEN        * 00104100
                                   1042 *     REPLACES THE X'07'IN LOCATION 'OLDCODE'.PROCESSING CONTINUES   * 00104200
                                   1043 *     WITH THE TRANSLATION OF THE BYTE AT 'OLDCODE+1'.THE BYTE AT    * 00104300
                                   1044 *     'NEWCODE+3'(X'07') REPLACES THE BYTE AT 'OLDCODE+1'AND SO ON.  * 00104400
                                   1045 *     AFTER EXECUTION OF THE TRANSLATE INSTRUCTION LOCATION 'OLDCODE' * 00104500
                                   1046 *     SHOULD CONTAIN THE FOLLOWING:                                  * 00104600
                                   1047 *                                                                    * 00104700
                                   1048 *                          +--------------------+                    * 00104800
                                   1049 *          'OLDCODE'=====>|03070909010206010704|                    * 00104900
                                   1050 *                          +--------------------+                    * 00105000
                                   1051 *                                                                    * 00105100
0001B5 00
0001B6 0000                        1052 LOOKSEE  DC    H'0C'          D U M P I T ...................        * 00105200
                                   1053 *                                                                    * 00105300
                                   1054 *      O COMING SOON (IN THE NEXT PROJECT),"A REAL NEAT WAY TO BUILD  * 00105400
                                   1055 *        A FUNCTION FIELD."                                          * 00105500
                                   1056 *                                                                    * 00105600
                                   1057 *                                                                    * 00105700
                                   1058 *               "LET US PROCEED TO THE DUMP ON THE NEXT PAGE"        * 00105800
                                   1059 *                                                                    * 00105900
                                   1060 ********************************************************************** 00106000
```

```
F.P. REGS.  00.000000 00000000   CC.CCCCCC 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 000000FF 000000C1 00000004    00000001 00000013 00000000 000000F5
REGS 8-15    6F063822 C0000000 0006E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000055C F0F0F5C5 5006ED90    00063820 00002A18 01040080 8003AFFE  *........005E.....................*
000020    FF150003 4F0639B6 FF150001 4F0639D8    0000FF00 00000000 FF060130 A001867C  *..............Q.................*
000040    000641A8 0C000000 00001670 00002120    587EA0C0 00071248 00040000 000002C0  *.....................................*
000060    00040000 00000366 00C4CCC0 0000030A    00000000 0000CA68 00040000 00000226  *.....................................*

063820    058058F0 8226D201 F000800E 47FC8010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....0.......... ......*
063840    802D4165 000047F0 802C00C0 0C000001    89200004 8C600020 89303004 8B50C01F  *.......0.....................*
063860    92FF8046 47FC8048 FF00D200 80528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......0.......0..1111*
063880    F100D203 805B8C5A 00CC47F0 8C76F1F2    F3C40000 0001234C F2338072 806C0000  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338082 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00C000C0 0C83214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E04020 6B2C2020 6B202021 4B202003    5749297C 40404040 405B4040 40404BF0  *.. ..................     .    .0*
063900    F100D20C 80D280C0 DE0C8CD2 8CCD0000    925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........0........K.*
063920    80D280C0 DE0C80D2 80F60000 924080C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47FC8134 0C002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B10CC C0004110 C0FF4410    815447F0 815A9200 8158FF00 00004120  *.....................C...........*
063980    00C14420 816C4780 81724770 81769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......0......12345..........0..*
0639C0    03070909 01020601 07CA0A09 C8C70605    04030201 00000000 DC0681C0 81CA47F0  *.............................C*
0639E0    81D60704 02050809 00010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.O.................987654.....W.0*
063A00    415081E6 47FC81FA 07C90608 09030104    0301001C 00000000 00000000 0000DD07  *...W.0.......................*
063A20    8206820E 474C8216 01C4C6C7 0C010305    05000502 C05B0000 41308206 00004110  *..... .......................*
063A40    00200A0D 47F09084 00063D0E D00447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......0........*

064000    00000000 00000000 00C00CC0 C0000000    00000000 00004000 9400025D 00790000  *..................... .........*
```

OLDCODE

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70


                                 1063 *$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 1.22 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00106300
                                 1064 *$                                                                      $ 00106400
                                 1065 *$                                                                      $ 00106500
                                 1066 *$     GIVEN THE FOLLOWING CODE:                                        $ 00106600
                                 1067 *$                                                                      $ 00106700
0001B8 DC06 81C0 81CA 001C2 001CC 1068           TR     MESSG(7),TRTBL                                       $ 00106800
0001BE 47F0 81D6            001D8 1069           BC     15,CRASH                                             $ 00106900
                                 1070 *$                                                                      $ 00107000
0001C2 0704020508090001          1071 MESSG     DC     X'07040205080900010306'                               $ 00107100
0001CA 0306
                                 1072 *$                                                                      $ 00107200
0001CC FFFEFDFCFBFAF9F8          1073 TRTBL     DC     X'FFFEFDFCFBFAF9F8F7F6F5F4'                           $ 00107300
0001D4 F7F6F5F4
                                 1074 *$                                                                      $ 00107400
                                 1075 *$                                                                      $ 00107500
                                 1076 *$       WHAT WILL THE ARGUMENT FIELD CONTAIN AFTER COMPLETION           $ 00107600
                                 1077 *$            OF THE TRANSLATE?                                         $ 00107700
                                 1078 *$                                                                      $ 00107800
                                 1079 *$       A.F9FCFEFBF8F7FFFEFDFA                                         $ 00107900
                                 1080 *$                                                                      $ 00108000
                                 1081 *$       B.F8FBFDFAF7F6FF010306                                         $ 00108100
                                 1082 *$                                                                      $ 00108200
                                 1083 *$       C.F9FCFEFBF8F7FF010306                                         $ 00108300
                                 1084 *$                                                                      $ 00108400
                                 1085 *$       D.07040205080900010306                                         $ 00108500
                                 1086 *$                                                                      $ 00108600
                                 1087 *$                                                                      $ 00108700
                                 1088 *$                                                                      $ 00108800
                                 1089 *$            THE CORRECT ANSWER IS_____?                               $ 00108900
                                 1090 *$                                                                      $ 00109000
                                 1091 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00109100
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70


                                 1094 *========================== ANSWER 1.22 ================================= 00109400
                                 1095 *=                                                                      = 00109500
                                 1096 *=                                                                      = 00109600
                                 1097 *=      ANSWER  B  IS CORRECT.                                          = 00109700
                                 1098 *=                                                                      = 00109800
                                 1099 *=    '7' BYTES IN THE ARGUMENT FIELD ('MESSG' THROUGH 'MESSG+6')       = 00109900
                                 1100 *=        ARE REPLACED BY FUNCTION BYTES FROM THE TABLE CALLED 'TRTBL' = 00110000
                                 1101 *=                                                                      = 00110100
                                 1102 *=                                                                      = 00110200
0001D8 0000                      1103 CRASH     DC     H'00'                                                  = 00110300
                                 1104 *=                                                                      = 00110400
                                 1105 *======================================================================== 00110500
```

```
F.P. REGS.  00.000000 COCCCOOO   00.000000 OOOOOOCC   C0.000000 00000000   00.000CCC COCCOOOO

REGS 0-7     00000050 C00000FF C00000C1 0C000004    00000001 00000013 00000000 000000F5
REGS 8-15    6F063822 C000000C CCC6E7B0 0006E7F8    60C63A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0F0F2C0 5006ED90    0C063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 4F0639D8 FF150001 4F0639FA    0000FF00 00000000 FF060130 A001867C  *.......Q.....................*
000040    000641A8 0C0C0000 0000167C 00002120    587D79C0 00071248 00040000 000002C0  *.............................*
000060    0C040000 00000366 00C40000 0000030A    00000000 0000CA68 00040000 00000226  *.............................*

063820    058058F0 8226D201 FCC0800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.C....C.......... .....*
063840    802D4165 000047F0 802C0CC0 CC000001    89200004 8C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47F08048 FF00D200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......0.......C..1111*
063880    F100D203 805B805A 000047FC 8C76F1F2    F3C40000 0001234C F2338072 806C000C  *1.K.....3..0..123D......2.....*
0638A0    47F08086 F1F2F3C4 F3338082 8C7200C0    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.....*
0638C0    FCF0F0F8 F3F2F1C4 00000000 0083214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E04020 6B202020 6B202021 4B202003    5749297C 40404040 405B4040 40404BF0  *.. ..................    .    .0*
063900    F100D20C 80D280C0 DEC C80D2 8CCD0000   925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........C........K.*
063920    80D280C0 DE0C80D2 80F60CC0 924080C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47F08134 CCCC2567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1000 00004110 00FF4410    815447F0 815A9200 8158FF00 00004120  *.....................0.............*
063980    00C14420 816C4780 81724770 81769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 8192436C 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......0......12345..........0..*
0639C0    03070909 01020601 C7CA0A09 08070605    04030201 00000000 DC0681C0 81CA47F0  *.............................0*
0639E0    81D8F8FB FDFAF7F6 FF010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.08...76..........987654.....W.0*
063A00    415081E6 47F081FA 07C90608 C9030104    0301001C 00000000 00000000 0000DC07  *...W.0.......................*
063A20    82C6820E 47408216 01040607 0CC10305    05000502 005B0000 41308206 00004110  *.....  .....................*
063A40    00200A0D 47FC9C84 00063D0E D00447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......0........*

064000    0C0C0000 00000000 00C00000 00000000    00000000 00004000 9400025D 00790000  *..................... .........*
```

MISSING

```
LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70  9/16/70


                                  1108 ***************** T R A N S L A T E  &  T E S T ********************** 00110800
                                  1109 *                                                                       * 00110900
                                  1110 *                                                                       * 00111000
                                  1111 * C THE TRANSLATE AND TEST INSTRUCTION IS SIMILAR TO THE TRANSLATE     * 00111100
                                  1112 *    INSTRUCTION IN THAT IT UTILIZES THE ARGUMENT BYTES TO REFERENCE   * 00111200
                                  1113 *    LOCATIONS IN THE FUNCTION FIELD.HERE THE SIMILARITY ENDS.IF THE   * 00111300
                                  1114 *    FUNCTION BYTE REFERENCED CONTAINS A ZERO THE OPERATION CONTINUES  * 00111400
                                  1115 *    ON TO PROCESS THE NEXT ARGUMENT BYTE.IF THE FUNCTION BYTE         * 00111500
                                  1116 *    REFERENCED CONTAINS ANY NON-ZERO CHARACTER THE ADDRESS OF THE     * 00111600
                                  1117 *    RELATED ARGUMENT BYTE IS PLACED IN REGISTER 1.ALSO THE FUNCTION   * 00111700
                                  1118 *    BYTE IS LOADED INTO BITS 24-31 OF REGISTER 2.                      * 00111800
                                  1119 *                                                                       * 00111900
                                  1120 * C IN THE FOLLOWING EXAMPLE I'M GOING TO SCAN A 10 BYTE FIELD         * 00112000
                                  1121 *    ('MARIE') LOOKING FOR A X'01'.                                     * 00112100
                                  1122 *                                                                       * 00112200
                                  1123 ************************************************************************ 00112300
                                  1124 *                                                                       * 00112400
                                  1125 *                                                                       * 00112500
0001DA DD09 81E6 81F0 001E8 001F2 1126          TRT   MARIE(10),LOUISE      MARIE=THE ARGUMENT FIELD         * 00112600
                                  1127 *                                      LOUISE=THE FUNCTION FIELD        * 00112700
                                  1128 *                                                                       * 00112800
0001E0 4150 81E6            001E8 1129          LA    5,MARIE    FOR US TO COMPARE TO REG.1                   * 00112900
0001E4 47F0 81FA            001FC 1130          BC    15,UPANAWAY                                             * 00113000
                                  1131 *                                                                       * 00113100
                                  1132 *                              ++--------- 'MARIE+6' (ONE BYTE)        * 00113200
                                  1133 *                              ||                                       * 00113300
                                  1134 *                              VV                                       * 00113400
                                  1135 *                              --                                       * 00113500
0001E8 0709060809030104           1136 MARIE    DC    X'0709060809030104030l'                                 * 00113600
0001F0 0301
                                  1137 *                                                                       * 00113700
                                  1138 *                                                                       * 00113800
0001F2 001C000000000000           1139 LOUISE   DC    X'001C0000000000000000'   ONLY LOUISE+1 IS NON-ZERO     * 00113900
0001FA 0000
                                  1140 *                                                                       * 00114000
                                  1141 *O THE OPERATION BEGINS BY EXAMINING THE ARGUMENT BYTE AT 'MARIE'.THIS* 00114100
                                  1142 *   BYTE REFERENCES LOCATION 'LOUISE+7' IN THE FUNCTION FIELD.THE      * 00114200
                                  1143 *   VALUE OF 'LOUISE+7' IS ZERO SO PROCESSING OF THE ARGUMENT FIELD    * 00114300
                                  1144 *   CONTINUES.THE ONLY ARGUMENT BYTE WHICH HAS A CORRESPONDING         * 00114400
                                  1145 *   NON-ZERO FUNCTION BYTE IS LOCATED AT 'MARIE+6'.WHEN THIS ARGUMENT  * 00114500
                                  1146 *   BYTE IS OPERATED UPON THE EXECUTION OF THE TRT IS SUSPENDED.       * 00114600
                                  1147 *   THE ADDRESS OF 'MARIE+6' IS LOADED INTO REG.1 AND THE FUNCTION     * 00114700
                                  1148 *   BYTE(X'1C') IS INSERTED INTO REG.2.                                * 00114800
                                  1149 *                                                                       * 00114900
0001FC 0000                       1150 UPANAWAY DC    H'00'                                                   * 00115000
                                  1151 *                                                                       * 00115100
                                  1152 ************************************************************************ 00115200
```

```
F.P. REGS.  00.000000 00000000   00.00CC00 00000000   00.000000 00000000   00.000000 00000000

                      R1          R2
REGS 0-7     00000050 CC063A0E 0000001C C0000004    00000001 00063A08 00000000 0C0000F5
REGS 8-15    6F063822 C0000000 0006E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063D0E

000000    00000000 0000020C F0F0F2C0 5006ED90    0C063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 4F0639FA FF150001 5F063A1E    0000FF00 00000000 FF060230 90007E1C  *.............................*
000040    000641A8 0C000000 000C167C 0C002120    587C11C0 00071248 00040000 000002C0  *.............................*
000060    00040000 00000366 00040000 0000030A    00000000 0000CA68 00040000 00000226  *.............................*

063820    058058F0 8226D201 F000800E 47FC8010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....0.......... .....*
063840    802D4165 000047F0 8C2C0000 0CC00001    89200004 8C600020 89303004 8B50001F  *.......0.....................*
063860    92FF8046 47FC8048 FF00D200 80528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......C.......0..1111*
063880    F100D203 805B8C5A 0CC047F0 8076F1F2    F3C40000 0001234C F2338072 806C0000  *1.K........C..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338C82 8C720000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........C..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00000000 0083214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E04020 6B202020 6B202C21 4B202003    57492 97C 40404040 405B4040 40404BF0  *.. ..................  .    .0*
063900    F100D20C 80D280C0 DECC80D2 8CCD0000    925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........0........K.*
063920    80D280C0 DE0C80D2 80F60000 924080C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 100C0000 47FC8134 0C002567    5C0C0000 001CD20C 80D280C0 CF0C80D2  *.........0.............K..K.....K*
063960    812F0610 925B1000 00004110 00FF4410    815447F0 815A9200 8158FF00 00004120  *.....................C.............*
063980    00C14420 816C4780 81724770 81769500    8170C100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847F0 8192436C 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......C......12345..........0..*
0639C0    C3070909 01020601 07CA0A09 08070605    C4030201 00000000 DC0681C0 81CA47F0  *.............................0*
0639E0    81D6F8FB FDFAF7F6 FF010306 FFFEEDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.08...76..........987654.....W.0*
063A00    415081E6 47FC81FA 07C90608 09010104    0301001C 00000000 00000000 0000DD07  *...W.0.......................*
063A20    8206820E 474C8216 01040607 00010305    05000502 005B0000 41308206 00004110  *..... ........................*
063A40    00200A0D 47F09084 00063D0E DC0447F0    90ECD00C 05C004F0 07004110 C0100511  *.....0.........0.......C........*

064000    00000000 00000000 00000000 CCC00000    00000000 00004000 9400025D 00790000  *..................... .........*
```

```
LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70  9/16/70


                                  1155 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 1.23 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00115500
                                  1156 *$                                                                        $ 00115600
                                  1157 *$                                                                        $ 00115700
                                  1158 *$      HERE'S ONE FOR YOU.                                               $ 00115800
                                  1159 *$           GIVEN THE FOLLOWING CODE:                                    $ 00115900
                                  1160 *$                                                                        $ 00116000
0001FE DD07 8206 820E 00208 00210 1161            TRT   CONNIE(8),ANN                                          $ 00116100
000204 4740 8216            00218 1162            BC    4,HIOSILVA                  THIS IS DIFFERENT ISN'T IT $ 00116200
                                  1163 *$                                                                        $ 00116300
                                  1164 *$                                                                        $ 00116400
000208 0104060700010305           1165 CONNIE      DC    X'0104060700010305'                                     $ 00116500
                                  1166 *$                                                                        $ 00116600
000210 050005020058B0000          1167 ANN         DC    X'050005020058B000C'                                    $ 00116700
                                  1168 *$                                                                        $ 00116800
000218 4130 8206            00208 1169 HIOSILVA    LA    3,CONNIE        FOR COMPARISON PURPOSES                 $ 00116900
00021C 0000                       1170             DC    H'00'  DUMPSIT                                          $ 00117000
                                  1171 *$                                                                        $ 00117100
                                  1172 *$                                                                        $ 00117200
                                  1173 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00117300
                                  1174 *$                                                                        $ 00117400
                                  1175 *$                                                                        $ 00117500
                                  1176 *$    WHICH OF THE FOLLOWING SHOW THE CORRECT CONTENTS OF REG.1 AND        $ 00117600
                                  1177 *$     REG.2 AFTER THE TRT IS EXECUTED?                                   $ 00117700
                                  1178 *$                                                                        $ 00117800
                                  1179 *$           A.REG.1=ADDRESS OF 'CONNIE+2';REG.2=X'05'                    $ 00117900
                                  1180 *$                                                                        $ 00118000
                                  1181 *$           B.REG.1=ADDRESS OF 'CONNIE+6';REG.2=X'5B'                    $ 00118100
                                  1182 *$                                                                        $ 00118200
                                  1183 *$           C.REG.1=ADDRESS OF 'CONNIE+4';REG.2=X'05'                    $ 00118300
                                  1184 *$                                                                        $ 00118400
                                  1185 *$           D.REG.1=ADDRESS OF 'CONNIE+2';REG.2=X'02'                    $ 00118500
                                  1186 *$                                                                        $ 00118600
                                  1187 *$                                                                        $ 00118700
                                  1188 *$     THE CORRECT ANSWER IS_______?                                      $ 00118800
                                  1189 *$                                                                        $ 00118900
                                  1190 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00119000
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
1193 *========================== ANSWER 1.23 ================================ 00119300
1194 *=                                                                     = 00119400
1195 *=                                                                     = 00119500
1196 *=    C   I S   C O R R E C T .....                                    = 00119600
1197 *=                                                                     = 00119700
1198 *=      PROCESSING OF THE ARGUMENT FIELD CONTINUES UNTIL A NON-ZERO     = 00119800
1199 *=       FUNCTION BYTE IS REFERENCED.THE ARGUMENT BYTE WHICH FIRST      = 00119900
1200 *=       REFERENCES A NON-ZERO FUNCTION BYTE IS LOCATED AT 'CONNIE+4'   = 00120000
1201 *=       THE FUNCTION BYTE REFERENCED IS A X'05' AT LOCATION            = 00120100
1202 *=       'ANN'                                                         = 00120200
1203 *=                              THE DUMP WILL PROVE IT....             = 00120300
1204 *======================================================================= 00120400
```

```
F.P. REGS.  00.000000 00000000   00.000000 CC000000   00.000000 00000000   00.000000 0CCC0000

                        R1          R2
REGS 0-7     00000050 CC063A2C CCCC0005 00063A28    00000001 00063A08 00000000 000000F5
REGS 8-15    6F063822 C0000C00 0006E7B0 0006F7F8    60063A22 0006E7B0 00002170 00063D0E
                               CONNIE-44

000000    00000000 0000020C F0FCF2C0 5006ED90    00063820 00002A18 01040080 8003AFFE  *........002.....................*
000020    FF150003 5F063A1E FF150001 5F063A3E    C000FF00 00000000 FF040230 4001807A  *.............................. ...*
000040    40001598 5C000000 400016C0 0C002120    587AC2C0 00071248 00040000 000002C0  * ....... .........B.............*
000060    0004000C 00000366 00040000 0000030A    CC000000 0000CA68 00040000 00000226  *................................*

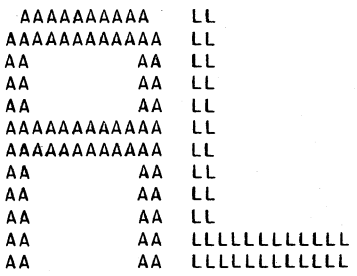
063820    058058F0 8226D2C1 FCCC800E 47F08010    07FE5820 802A1832 4840802C 17554350  *...0..K.0....C........... ......*
063840    802D4165 000047F0 8C2C0C00 00000001    89200004 8C600020 89303004 8B50001F  *.......0.......................*
063860    92FF8046 47F08048 FF00D200 8C528046    47F08054 FF000000 47F08060 F1F1F1F1  *.....0....K......0.......C..1111*
063880    F100D203 805B8C5A 000047F0 8C76F1F2    F3C40000 0001234C F2338072 806C0C0C  *1.K........0..123D......2.......*
0638A0    47F08086 F1F2F3C4 F3338082 8C72C000    47F080AE F8F3F2F1 C4000000 00000000  *.0..123D3........0..8321D.......*
0638C0    F0F0F0F8 F3F2F1C4 00000000 0083214C    F27480A6 8092F377 809E80A6 000047F0  *0008321D........2.....3........0*
0638E0    80E04020 6B2C202C 6B202021 4B202003    57492970 40404040 405B4040 40404BF0  *.. ..................     .    .0*
063900    F100D20C 80D280C0 DECC80D2 8CCD0000    925C80C0 47F080FC 00091775 4C00D20C  *1.K..K.....K.........C........K.*
063920    80D280C0 DE0C80D2 80F60000 924C80C0    411080DC D20C80D2 80C0DF0C 80D2812A  *.K.....K.6... ......K..K.....K..*
063940    0610925B 10000000 47FC8134 00002567    5C000000 001CD20C 80D280C0 DF0C80D2  *.........0.............K..K.....K*
063960    812F061C 925B1000 00004110 00FF4410    815447F0 815A9200 8158FF00 00004120  *.....................C.............*
063980    00C14420 816C4780 81724770 81769500    817CC100 415000BC 00004130 00044150  *.A.................A.............*
0639A0    00134450 818847FC 81924360 818CF1F2    F3F4F500 0000DC09 819E81A8 47F081B4  *.......C.......12345..........0..*
0639C0    03070909 01020601 07CA0A09 C8070605    04030201 00000000 DC0681C0 81CA47F0  *.............................0*
0639E0    81D6F8FB FDFAF7F6 FF010306 FFFEFDFC    FBFAF9F8 F7F6F5F4 0000DD09 81E681F0  *.08...76..........987654.....W.0*
063A00    415081E6 47F081FA 07C90608 C5C3C104    0301001C 00000000 00000000 0000DC07  *...W.C.........................*
063A20    8206820E 47408216 01040607 00010305    C5000502 005B0000 41308206 00004110  *..... .........................*
063A40    00200A0D 47F09C84 00063D0E DC0447F0    90ECD00C 05C004F0 07004110 C0100511  *.....C.........0.......0........*

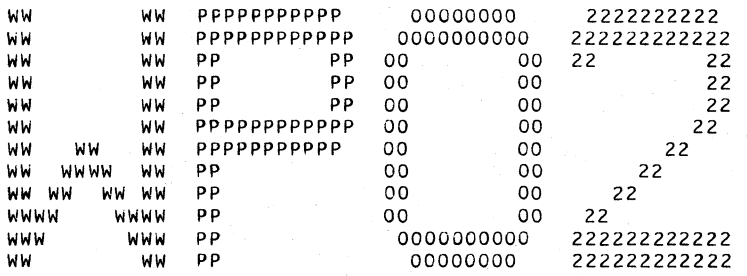
064000    00000000 00000000 00CCC000 0C000000    0C000000 00004000 94000250 00790C00  *..................... .........*
```

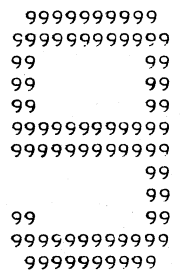
```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                    F08APR70   9/16/70

                                 1206 ************************** N O T I C E ****************************** 00120600
                                 1207 *                                                                    * 00120700
                                 1208 *      THAT DOES IT FOR THIS PROJECT. PLEASE USE THIS SHEET FOR ANY  * 00120800
                                 1209 *      COMMENTS YOU MAY HAVE. NOTIFY YOUR INSTRUCTOR OF COMPLETION OF* 00120900
                                 1210 *      THIS PROJECT BY DISPLAYING THE  'B L U E' ANSWER CUE          * 00121000
                                 1211 *                                      --------                      * 00121100
                                 1212 *                                                                    * 00121200
                                 1213 ********************************************************************** 00121300


                                 1215 ************************** C O M M E N T S ************************** 00121500
```


AAAAAAAAAA LL
AAAAAAAAAAAA LL
AA AA LL
AA AA LL
AA AA LL
AAAAAAAAAAAA LL
AAAAAAAAAAAA LL
AA AA LL
AA AA LL
AA AA LL
AA AA LLLLLLLLLLLL
AA AA LLLLLLLLLLLL


WW WW PPPPPPPPPPP 00000000 2222222222
WW WW PPPPPPPPPPPP 0000000000 222222222222
WW WW PP PP 00 00 22 22
WW WW PP PP 00 00 22
WW WW PP PP 00 00 22
WW WW PPPPPPPPPPPP 00 00 22
WW WW WW PPPPPPPPPPP 00 00 22
WW WWWW WW PP 00 00 22
WW WW WW WW PP 00 00 22
WWWW WWWW PP 00 00 22
WWW WWW PP 0000000000 222222222222
WW WW PP 00000000 222222222222


9999999999
999999999999
99 99
99 99
99 99
999999999999
999999999999
99
99
99 99
999999999999
9999999999

****

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
15 ********************* P R O L O G U E ******************************** 00001500
16 *                                                                      * 00001600
17 *       IN THIS WORK PROJECT WE'LL TAKE A CLOSER LOOK AT THOSE         * 00001700
18 *        INSTRUCTIONS WHICH ALLOW US TO COMMUNICATE WITH,AND CONTROL   * 00001800
19 *        THE ASSEMBLER. THIS PROJECT IS DIVIDED INTO TWO SECTIONS.     * 00001900
20 *                                                                      * 00002000
21 *       LET'S FIRST EXPLORE SOME OF THE OPERATIONS THE ASSEMBLER       * 00002100
22 *        PERFORMS.                                                     * 00002200
23 *                                                                      * 00002300
24 *                                                                      * 00002400
25 *             1.BY USING THE ASSEMBLER WE ARE FREED FROM THE TEDIOUS   * 00002500
26 *                TASK OF WRITING OUR INSTRUCTIONS IN MACHINE LANGUAGE. * 00002600
27 *                                                                      * 00002700
28 *             2.THE ASSEMBLER WILL RESOLVE SYMBOLIC ADDRESSES,AND      * 00002800
29 *                IN SOME CASES,INSERT THE LENGTH FIELD IN AN 'SS'      * 00002900
30 *                INSTRUCTION.                                          * 00003000
31 *                                                                      * 00003100
32 *             3.THE ASSEMBLER WILL GENERATE OUTPUT LISTINGS OF THE     * 00003200
33 *                PROGRAM BEING ASSEMBLED.                              * 00003300
34 *                                                                      * 00003400
35 *             4.THE ASSEMBLER WILL RESERVE STORAGE SPACE FOR US.       * 00003500
36 *                                                                      * 00003600
37 *             5.DATA CAN BE CONVERTED FROM ONE FORM TO ANOTHER.        * 00003700
38 *                                                                      * 00003800
39 *             6.BOUNDARY ALIGNMENT WILL BE TAKEN CARE OF FOR US.       * 00003900
40 *                                                                      * 00004000
41 *             7.THE ASSEMBLER WILL ALLOW US TO MAKE A SYMBOL EQUAL     * 00004100
42 *                TO A VALUE OR EVEN ANOTHER SYMBOL.                    * 00004200
43 *                                                                      * 00004300
44 *    WHY DON'T WE TAKE A LOOK AT SOME OF THOSE ASSEMBLER INSTRUCTIONS  * 00004400
45 *      WITH WHICH WE MAY CONTROL THE PERFORMANCE OF THE ABOVE          * 00004500
46 *      OPERATIONS ?                                                    * 00004600
47 *                                                                      * 00004700
48 ************************************************************************ 00004800
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                                                                                00005100
*                                                                               00005200
*                                                                               00005300
*  THE INSTRUCTIONS WE'LL EXAMINE IN   S E C T I O N   O N E:                   00005400
*                                                      -----                    00005500
*         O LISTING CONTROL INSTRUCTIONS (3)                                    00005600
*                                                                               00005700
*         O DATA DEFINITION INSTRUCTIONS (5)                                    00005800
*                                                                               00005900
*         O STORAGE DEFINITION INSTRUCTIONS (4)                                 00006000
*                                                                               00006100
*  IN   S E C T I O N   T W O   OF THE PROJECT WE'LL LOOK AT:                   00006200
*                      -----                                                    00006300
*                                                                               00006400
*         O PROGRAM CONTROL INSTRUCTIONS (6)                                    00006500
*                                                                               00006600
*         O SYMBOL DEFINITION INSTRUCTION (7)                                   00006700
*                                                                               00006800
*                                                                               00006900
*  ALSO IN   S E C T I O N   T W O   WE'LL TAKE A GLANCE AT SOME ITEMS          00007000
*   OF A GENERAL NATURE,SUCH AS:                                                00007100
*                                                                               00007200
*          O TERMS  (2)                                                         00007300
*          O EXPRESSIONS (2)                                                    00007400
*          O LITERALS (2)                                                       00007500
*          O LENGTHS--EXPLICIT AND IMPLIED (2)                                  00007600
*                                                                               00007700
*                                                                               00007800
*              REQUIRED DOCUMENTATION                                           00007900
*              ----------------------                                           00008000
*               1.  D.O.S. ASSEMBLER MANUAL                                     00008100
*                                                                               00008200
*                                                                               00008300
*   ------> NOTE:THE NUMBERS ENCLOSED IN () REFER TO THE RELATED                00008400
*                 OPERATIONS ON THE PREVIOUS PAGE.                              00008500
*                                                                               00008600
*  O IN CASE YOU HAVEN'T ALREADY GUESSED IT,THIS PROJECT IS AN                  00008700
*     ASSEMBLY LISTING. THEREFORE IF YOU KEEP CLOSE WATCH ON THE LEFT           00008800
*     HAND SIDE OF THE PAGE YOU CAN SEE HOW THE INSTRUCTIONS ARE                00008900
*     ASSEMBLED. LET US PROCEED..                                               00009000
*                                                                               00009100
*                                                                               00009200
*                                                                               00009300
                                                                                00009400
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                        97 *  ////////////////////////////                00009700
                        98 *  /                          /                00009800
                        99 *  /      S E C T I O N       /                00009900
                       100 *  /         O N E            /                00010000
                       101 *  /                          /                00010100
                       102 *  ////////////////////////////                00010200
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                                                                                00010500
*                                                                               00010600
*              ////////////////////////////////                                 00010700
*              /LISTING CONTROL INSTRUCTIONS/                                   00010800
*              ////////////////////////////////                                 00010900
*                                                                               00011000
*                                                                               00011100
*         ///////                                                               00011200
*         /TITLE/                                                               00011300
*         ///////                                                               00011400
*                                      IF ISSUED THIS 'TITLE' STATEMENT         00011500
*PSI      TITLE 'UP TO 100 CHAR'      WOULD CAUSE A SKIP TO ONE AND THE        00011600
*                                     OPERAND TO BE PRINTED AT THE TOP OF      00011700
*                                     THE FOLLOWING PAGES. IF TITLE CARD       00011800
*                                     HAS A NAME FIELD (1 TO 4 ALPHA OR        00011900
*                                     NUMERIC CHAR.), THE NAME WILL BE         00012000
*                                     PUNCHED IN THE OBJECT DECK AS ID IN      00012100
*                                     COLS 73-76. ANY 4 CHAR MAY BE USED       00012200
*                                     THE LISTING TITLE MAY BE CHANGED BY      00012300
*                                     ANOTHER TITLE CARD BUT THE DECK ID       00012400
*       THIS 'TITLE CARD              REMAINS UNCHANGED.                        00012500
*         WILL BE ISSUED                                                        00012600
*            |                  O THE NEXT CARD WILL CHANGE THE TITLE          00012700
*            |                    THAT CARD SAYS AND I QUOTE,"TITLE            00012800
*            |                    'F.E. EDUCATION,P.S.I. ASSEMBLY LANGUAGE     00012900
*            |                    WORK PROJECT.'                               00013000
*            V                                                                  00013100
*PGMA     TITLE 'F.E. EDUCATION, P.S.I ASSEMBLY LANGUAGE WORK PROJECT.'        00013200
*                                                                               00013300
                                                                                00013400
```

```
                                137 *$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.1 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00013700
                                138 *$                                                                      $ 00013800
                                139 *$          WILL PGMA BE PUNCHED IN COL.73-76 OF THE OBJECT DECK        $ 00013900
                                140 *$             DEVELOPED FROM THIS WORK PROJECT???                      $ 00014000
                                141 *$                                                                      $ 00014100
                                142 *$                                                                      $ 00014200
                                143 *$                                                                      $ 00014300
                                144 *$                                                                      $ 00014400
                                145 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014500
```

```
 LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70  9/16/70

                                  147 *============================ ANSWER 2.1 ============================== 00014700
                                  148 *=                                                                    = 00014800
                                  149 *=                                                                    = 00014900
                                  150 *=          YES.THE TITLE CARD PROVIDES THE CAPABILITY OF IDENTIFYING  = 00015000
                                  151 *=              THE OBJECT DECK WITH UP TO 4 ALPHABETIC OR NUMERIC     = 00015100
                                  152 *=              CHARACTERS. THESE 4 CHARACTERS MUST BE PLACED IN THE   = 00015200
                                  153 *=              NAME FIELD OF THE FIRST 'TITLE' CARD IN THE SOURCE     = 00015300
                                  154 *=              DECK..................... I TRIED IT AND IT PUNCHES.... = 00015400
                                  155 *=                                                                    = 00015500
                                  156 *============================================================================ 00015600



                                  158 *         ///////                                                       00015800
                                  159 *         /PRINT/                                                       00015900
                                  160 *         ///////                                                       00016000
                                  161 *                                                                       00016100
                                  162 ********************************************************************** 00016200
                                  163 *                                                                    * 00016300
                                  164 * -->NOTE - PRINT IS THE ONLY LISTING CONTROL INSTRUCTION THAT WILL   * 00016400
                                  165 *            PRINT ON THE PROGRAM LISTING                           * 00016500
                                  166 *         PRINT 1 TO 3 PARAMETERS                                   * 00016600
                                  167 *               PARAMETERS - ON - PRINT A LISTING                   * 00016700
                                  168 *                            OFF - NO LISTING PRINTED               * 00016800
                                  169 *------------------------------------------------------------------* 00016900
                                  170 *                            GEN - PRINT MACRO GENERATED STATEMENTS * 00017000
                                  171 *MACROS COME LATER-----> NOGEN - PRINT MACRO INSTRUCTION BUT DO NOT  * 00017100
                                  172 * IN AN ADVANCED CLASS.          PRINT STATEMENTS GENERATED BY MACROS * 00017200
                                  173 *------------------------------------------------------------------* 00017300
                                  174 *                          DATA - PRINT CONSTANTS IN FULL           * 00017400
                                  175 *                        NODATA - PRINT UP TO 8 BYTES OF CONSTANTS  * 00017500
                                  176 *                                                                   * 00017600
                                  177 *                                                                   * 00017700
                                  178           PRINT NODATA                                                00017800
00201A D5D6E3C540C8D6E6           179           DC    C'NOTE HOW MUCH OF ME IS PRINTED ON THIS ONE'         * 00017900
                                  180 * <-------------------------------------------------                 * 00018000
                                  181 *                                                                     00018100
                                  182           PRINT DATA                                                  00018200
                                  183 *                                                                   * 00018300
002044 D5D6E3C540C8D6E6           184           DC    C'NOTE HOW MUCH OF ME IS PRINTED ON THIS ONE'         * 00018400
00204C 40D4E4C3C840D6C6
002054 40D4C540C9E240D7
00205C D9C9D5E3C5C440D6
002064 D540E3C8C9E240D6
00206C D5C5
                                  185 * <-------------------------------------------------                 * 00018500
                                  186 *                                                                   * 00018600
                                  187 *            0  IF NO PRINT STATEMENT APPEARS ASSEMBLER ASSUMES     * 00018700
                                  188 *               PARAMETERS TO BE - ON,GEN,NODATA                    * 00018800
                                  189 *                                                                   * 00018900
                                  190 ********************************************************************** 00019000
```

```
                        193 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.2 $$$$$$$$$$$$$$$$$$$$$$$$$$ 00019300
                        194 *$                                                                      $ 00019400
                        195 *$      WHAT WOULD BE PRINTED AS A RESULT OF THE FOLLOWING STATEMENT?   $ 00019500
                        196 *$                                                                      $ 00019600
                        197 *$        PRINT OFF,NODATA                                              $ 00019700
                        198 *$        DC    C'THIS IS QUESTION 2.2'                                 $ 00019800
                        199 *$                                                                      $ 00019900
                        200 *$            A. THE ENTIRE 20 BYTES OF THE CONSTANT.                   $ 00020000
                        201 *$            B. THE PRINT STATEMENT.                                   $ 00020100
                        202 *$            C. THE PRINT STATEMENT AND THE ENTIRE CONSTANT.           $ 00020200
                        203 *$            D. THE PRINT STATEMENT AND THE FIRST 8 BYTES OF THE       $ 00020300
                        204 *$                  CONSTANT.                                           $ 00020400
                        205 *$                                                                      $ 00020500
                        206 *$                                                                      $ 00020600
                        207 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00020700
```

```
                                ANSWER 2.2
*=                                                                    =
*=        B IS CORRECT... SINCE PRINT OFF SUPPRESSES PRINTING THE     =
*=          CONSTANT WILL NOT BE PRINTED.                             =
*=                                                                    =
*=                          WATCH I'LL ISSUE THE 2 STATEMENTS         =
*=                          THE FIRST ONE YOU'LL SEE IS THE 'PRINT OFF'=
*=                          THE SECOND ONE YOU'LL HAVE TO TAKE MY WORD =
*=                          FOR (PRINT ON). SINCE PRINT HAS BEEN TURNED=
*=                          OFF BY THE 'PRINT OFF',IT ONLY SEEMS RIGHT =
*=                          AND REASONABLE TO ASSUME THAT WHEN THE     =
*=                          PRINT HAS BEEN TURNED OFF WE WON'T SEE ANY =
*=                          STATEMENT PRINTED NOT EVEN A 'PRINT ON'    =
*=                          PLEASE TRUST ME .                          =
*=                                                                    =
         PRINT OFF,NODATA
*=                                                                    =
*=        NOTE:       I ISSUED A 'PRINT ON,DATA' TO GET US BACK TO    =
*=     ------------->    NORMAL AND TO ALLOW US TO PRINT ENTIRE        =
*=                       CONSTANTS LATER. SORRY,BUT THE 'PRINT ON,DATA'=
*=                       DOES NOT PRINT AFTER THE 'PRINT  OFF', OR DID =
*=                       I ALREADY SAY THAT ?                         =
*=                                                                    =
*====================================================================
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                    238 *        ///////                                                 * 00023800
                    239 *        /SPACE/                                                 * 00023900
                    240 *        ///////                                                 * 00024000
                    241 *                              IF ISSUED THIS 'SPACE 6' STATEMENT * 00024100
                    242 *        SPACE 6               WILL CAUSE NUMBER OF BLANK LINES   * 00024200
                    243 *                              SPECIFIED IN OPERAND TO BE INSERTED * 00024300
                    244 *                              IN LISTING. NOTE THAT WHEN A SPACE CARD * 00024400
                    245 *                              IS USED IT DOES NOT PRINT BUT STATEMENT * 00024500
                    246 *                              NUMBER STILL ADVANCES. I USE THE 'SPACE'* 00024600
                    247 *                              THROUGHOUT THIS PROJECT.           * 00024700

                    249 * THE BLANK LINE ABOVE THIS COMMENT IS THE RESULT OF A SPACE 1 CARD. * 00024900
                    250 *                                                                  * 00025000
                    251 ************************************************************************ 00025100


                    253 *        ///////                                                 * 00025300
                    254 *        /EJECT/                                                 * 00025400
                    255 *        ///////                                                 * 00025500
                    256 *                              IF ISSUED THIS 'EJECT' STATEMENT WILL * 00025600
                    257 *        EJECT                 CAUSE A SKIP TO NEXT PAGE, BY USE OF AN * 00025700
                    258 *                              EJECT STATEMENT THE NEXT STATEMENT WILL * 00025800
                    259 *                              APPEAR AS FIRST LINE OF THE NEXT PAGE. * 00025900
                    260 *                                                                  * 00026000
                    261 *++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00026100
                    262 *                                                                  * 00026200
                    263 *  O THE NEXT LINE WILL BE ON A NEW PAGE AS A RESULT OF MY ISSUING * 00026300
                    264 *      AN 'EJECT'.                                                 * 00026400
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70  9/16/70
                                  266 *  . . . . I A M   T H E   N E X T   L I N E   . . . .          * 00026600


                                  268 *                  ////////////////////////////////             * 00026800
                                  269 *                  /DATA DEFINITION INSTRUCTIONS/               * 00026900
                                  270 *                  ////////////////////////////////             * 00027000
                                  271 *                                                               * 00027100
                                  272 *O THESE STATEMENTS ARE USED TO ENTER DATA CONSTANTS INTO STORAGE AND * 00027200
                                  273 *    TO DEFINE AND RESERVE AREAS OF STORAGE.                    * 00027300
                                  274 *                                                               * 00027400
                                  275 *                                                               * 00027500
                                  276 *                                                               * 00027600
                                  277 *                                                               * 00027700
                                  278 *                                                               * 00027800
                                  279 *                                                               * 00027900
                                  280 *      ////////////////////////////////////                     * 00028000
                                  281 *      /THE DC STATEMENT. (DEFINE CONSTANT)/                    * 00028100
                                  282 *      ////////////////////////////////////                     * 00028200
                                  283 *                                                               * 00028300
                                  284 *                                                               * 00028400
                                  285 *       O THE DEFINE CONSTANT INSTRUCTION IS USED TO PROVIDE CONSTANT * 00028500
                                  286 *            DATA IN STORAGE. IT MAY SPECIFY ONE CONSTANT OR A  * 00028600
                                  287 *            SERIES OF CONSTANTS.THIS DATA MAY BE IN A VARIETY OF * 00028700
                                  288 *            FORMATS.LET'S TAKE A CLOSER LOOK AT THESE INSTRUCTIONS..* 00028800
                                  289 *                                                               * 00028900
                                  290 *                                                               * 00029000
                                  291 *                FORMAT OF DC STATEMENTS                        * 00029100
                                  292 *ANYDC    DC    4CL8'ABCDEFGH'                                   * 00029200
                                  293 *         DC    FORMAT  1ST - DUPLICATION FACTOR=4               * 00029300
                                  294 *                       2ND - TYPE (C,X,B,P,Z,F,H,A,Y,S,V,E, AND D)=C * 00029400
                                  295 *                       3RD - MODIFIERS ( LENGTH, SCALE, OR EXPONENT ) * 00029500
                                  296 *                             =LENGTH OF 8                      * 00029600
                                  297 *                       4TH - CONSTANTS ='ABCDEFGH'             * 00029700
                                  298 *                                                               * 00029800
                                  299 ********************************************************************** 00029900
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70


                                    302 *            ////////////////////////////////                    * 00030200
                                    303 *            /CHARACTER CONSTANTS ( C TYPE )/                    * 00030300
                                    304 *            ////////////////////////////////                    * 00030400
                                    305 *                                                                * 00030500
002082 C3D6D5E2E3C1D5E3             306          DC    C'CONSTANT'                                         * 00030600
00208A F1F2F3C1C2C3                 307          DC    C'123ABC'                                           * 00030700
C02090 7D                           308          DC    C''''          SPECIAL CASE, TWO '' NEEDED WITHIN QUOTES 00030800
                                    309 *                             TO ASSEMBLE ONE '                  * 00030900
C02091 F1F2F3404040                 310          DC    CL6'123'       PADDING ( RIGHT WITH BLANKS )       * 00031000
002097 F1F2                         311          DC    CL2'123'       TRUNCATION ( RIGHT )                * 00031100
C02099 F1F2F3F1F2F3                 312          DC    2C'123'        DUP FACTOR                          * 00031200
                                    313          DC    C'UP TO 256 CHARACTERS MAY BE ENCLOSED IN QUOTES--'  *C00031300
                                                      'HOWEVER, ONLY TWO CONTINUATION CARDS MAY BE USED'   *C00031400
00209F E4D740E3D640F2F5                               'FOR ANY ONE ASSEMBLER STATEMENT.'                  * 00031500
0020A7 F640C3C8C1D9C1C3
0020AF E3C5D9E240D4C1E8
0020B7 40C2C540C5D5C3D3
0020BF D6E2C5C440C9D540
0020C7 D8E4D6E3C5E26060
0020CF 4040404040404040             314 NAME1    DC    C'              '     ASSEMBLES 16 BLANKS           * 00031600
0020D7 4040404040404040
0020DF 4040404040404040             315 NAME2    DC    8C' '               ASSEMBLES 16 BLANKS           * 00031700
0020E7 4040404040404040
0020EF 4040404040404040             316 NAME3    DC    4CL4'    '          ASSEMBLES 16 BLANKS           * 00031800
0020F7 4040404040404040
0020FF 4040404040404040             317 SAMEBASE DC    CL52' '             WOULD YOU BELIEVE 52 BLANKS ? * 00031900
002107 4040404040404040
00210F 4040404040404040
002117 4040404040404040
00211F 4040404040404040
002127 4040404040404040
00212F 40404040
                                    318 *                                                                * 00032000
                                    319 *            NAME1 HAS AN IMPLIED LENGTH ATTRIBUTE OF 16         * 00032100
                                    320 *            NAME2 HAS AN IMPLIED LENGTH ATTRIBUTE OF 2          * 00032200
                                    321 *            NAME3 HAS AN EXPLICIT LENGTH ATTRIBUTE OF 4         * 00032300
                                    322 *            SAMEBASE HAS AN EXPLICIT LENGTH OF 52               * 00032400
                                    323 *                                                                * 00032500
                                    324 *  W E ' L L  S E E  M O R E  A B O U T  L E N G T H <---------- * 00032600
                                    325 *          A T T R I B U T E S  L A T E R .                      * 00032700
                                    326 *                                                                * 00032800
                                    327 ************************************************************** * 00032900
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                        329 *$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.3 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00033100
                        330 *$                                                                       $ 00033200
                        331 *$                                                                       $ 00033300
                        332 *$      AFTER THE FOLLOWING DC IS ISSUED WHAT WILL BE THE CONTENTS OF    $ 00033400
                        333 *$       LOCATION 'FIRST'?                                               $ 00033500
                        334 *$                                                                       $ 00033600
                        335 *$             FIRST     DC    3CL4'12345'                               $ 00033700
                        336 *$                                                                       $ 00033800
                        337 *$                  A. F2F3F4F5F2F3F4F5F2F3F4F5                          $ 00033900
                        338 *$                  B. 123412341234                                      $ 00034000
                        339 *$                  C. F1F2F3F4                                          $ 00034100
                        340 *$                  D. F1F2F3F4F1F2F3F4F1F2F3F4                          $ 00034200
                        341 *$                  E. F1F2F3F1F2F3F1F2F3F1F2F3                          $ 00034300
                        342 *$                                                                       $ 00034400
                        343 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00034500
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70  9/16/70
                                   345 *============================ ANSWER 2.3 ============================== 00034700
                                   346 *=                                                                    = 00034800
                                   347 *=                                                                    = 00034900
                                   348 *=       D  IS THE CORRECT ANSWER.....                                = 00035000
                                   349 *=                    3 IS THE DUPLICATION FACTOR SOOO WE GET 3 SETS  = 00035100
                                   350 *=                                                                    = 00035200
                                   351 *=                   4 IS THE LENGTH SO WE GET 4 OF THE CHARACTERS   = 00035300
                                   352 *=                      SPECIFIED.                                    = 00035400
                                   353 *=                    BUT YOU ASK "WHICH 4?"                          = 00035500
                                   354 *=                      CHARACTER CONSTANTS TRUNCATE (CUT OFF) THE    = 00035600
                                   355 *=                       RIGHT END IF THE CONSTANT EXCEEDS THE        = 00035700
                                   356 *=                       LENGTH SPECIFIED(L4).HENCE THE MISSING 'F5'  = 00035800
                                   357 *=                                                                    = 00035900
                                   358 *=                                                                    = 00036000
                                   359 *=                                                                    = 00036100
                                   360 *========================================================================= 00036200


                                   362 *             ////////////////////////////////////                    * 00036400
                                   363 *             /HEXIDECIMAL CONSTANTS ( X TYPE )/                      * 00036500
                                   364 *             ////////////////////////////////////                    * 00036600
                                   365 *                                                                     * 00036700
002133 123ABC                      366          DC    X'123ABC'      UP TO 256 BYTES LONG ( 512 HEX DIGITS ) * 00036800
002136 FF0000FF                    367          DC    X'FF0000FF'  SETS UP 1'ST AND LAST BYTES OF WORD TO ONES 00036900
00213A 0123                        368          DC    X'123'         PADDING ( LEFT WITH ZEROS )              * 00037000
00213C 0123                        369          DC    XL2'123'                                                * 00037100
00213E 000C00000123                370          DC    XL6'123'                                                * 00037200
002144 345678                      371          DC    XL3'12345678'  TRUNCATION ( LEFT )                      * 00037300
002147 ABCDEFABCDEF                372          DC    2X'ABCDEF'              DUPLICATION FACTOR              * 00037400
00214D 0000000C0000000C            373 NAME4    DC    3XL4'0'                                                 * 00037500
002155 00000000
002159 000C0000000C0000            374 NAME5    DC    XL12'0'                                                 * 00037600
002161 00000000
                                   375 *             NAME4 HAS A LENGTH ATTRIBUTE OF 4                       * 00037700
                                   376 *             NAME5 HAS A LENGTH ATTRIBUTE OF 12                      * 00037800
                                   377 *                                                                     * 00037900
                                   378 ********************************************************************** 00038000


                                   380 *$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.4 $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00038200
                                   381 *$                                                                    $ 00038300
                                   382 *$                  A GIVEN FIELD CONTAINS THE FOLLOWING DATA:        $ 00038400
                                   383 *$                      02FF02FF02FF                                  $ 00038500
                                   384 *$                                                                    $ 00038600
                                   385 *$          WHICH OF THE FOLLOWING DC STATEMENTS COULD GENERATE        $ 00038700
                                   386 *$            THIS FIELD?                                             $ 00038800
                                   387 *$                                                                    $ 00038900
                                   388 *$                 A. DC   3X'02FF'                                   $ 00039000
                                   389 *$                 B. DC   XL6'02FF02FF02FF'                          $ 00039100
                                   390 *$                 C. DC   3XL2'BC02FF'                               $ 00039200
                                   391 *$                 D. DC   XL6'BCBC02FF02FF02FF'                      $ 00039300
                                   392 *$                 E. ALL OF THE ABOVE                                $ 00039400
                                   393 *$                                                                    $ 00039500
                                   394 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00039600
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                                F08APR70  9/16/70

                                    396 *========================= ANSWER 2.4 ================================== 00039800
                                    397 *=                                                                  = 00039900
                                    398 *=      WOULD YOU BELIEVE THE CORRECT ANSWER IS E ?                  = 00040000
                                    399 *=            I DIDN'T THINK YOU WOULD.                             = 00040100
                                    400 *=                  LET US PROVE IT. PLEASE STEP THIS-----+         = 00040200
                                    401 *=                                                      |           = 00040300
                                    402 *=    <-----------------------------------------.Y A W------+         = 00040400
                                    403 *=                                                                  = 00040500
002165 02FF02FF02FF                 404          DC    3XL2'02FF'      THATS ONE ------ UNO                 = 00040600
002168 02FF02FF02FF                 405          DC    XL6'02FF02FF02FF'    THATS TWO ------  DUO           = 00040700
002171 02FF02FF02FF                 406          DC    3XL2'BC02FF'              THATS THREE  -------  TRES  = 00040800
002177 02FF02FF02FF                 407          DC    XL6'BCBC02FF02FF02FF'         I CAN TELL YOU'RE CONVINCED.= 00040900
                                    408 *=                                                                  = 00041000
                                    409 *=                                                                  = 00041100
                                    410 *========================================================================== 00041200


                                    412 *              ////////////////////////////////////                 * 00041400
                                    413 *              /FIXED POINT CONSTANTS (F AND H TYPE)/               * 00041500
                                    414 *              ////////////////////////////////////                 * 00041600
                                    415 *                                                                   * 00041700
                                    416 *  O A FIXED POINT CONSTANT IS WRITTEN AS A DECIMAL NUMBER,WHICH MAY * 00041800
                                    417 *     BE FOLLOWED BY A DECIMAL EXPONENT IF DESIRED. THE NUMBER MAY BE * 00041900
                                    418 *     AN INTEGER OR A FRACTION,OR A MIXED NUMBER (ONE WITH AN INTEGRAL* 00042000
                                    419 *     AND FRACTIONAL PORTION). SEE THE ASSEMBLER MANUAL FOR MORE INFO.* 00042100
                                    420 *                                                                   * 00042200
                                    421 *                                                                   * 00042300
                                    422 *  O A P P E N D I X  D  OF THIS PROJECT CONTAINS INFORMATION ON     * 00042400
                                    423 *              FIXED POINT CONSTANTS CONTAINING FRACTIONAL VALUES.  * 00042500
                                    424 *                                                                   * 00042600
                                    425 *                                                                   * 00042700
                                    426 *                                                                   * 00042800
                                    427 *                                                                   * 00042900
002170 000000
002180 00007AB8                     428          DC    F'31416'       FULLWORD   NOTE NO SIGN OR DECIMAL POINT* 00043000
002184 7AB8                         429          DC    H'31416'       HALFWORD   BOTH F AND H TYPE ASSUME     * 00043100
                                    430 *                                          POSITIVE INTEGER         * 00043200
002186 007AB8                       431          DC    FL3'31416'     LENGTH MODIFIER NO ALIGNMENT           * 00043300
002189 000000
00218C 00000C45                     432          DC    F'3141'        PADDING (LEFT WITH SIGN BIT)           * 00043400
002190 FFFFF3BB                     433          DC    F'-3141'       PADDING (LEFT WITH SIGN BIT)           * 00043500
C02194 01DF5EB301DF5EB3             434 LGTH4    DC    3F'31415987'   DUP FACTOR                             * 00043600
00219C 01DF5EB3
0021A0 00100040000C4                435 LTHATBU2 DC    H'16,64,196'   MULTIPLE CONSTANTS                     * 00043700
                                    436 *                                                                   * 00043800
                                    437 ********************************************************************** 00043900
```

```
440 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.5 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00044200
441 *$                                                                    $ 00044300
442 *$                                                                    $ 00044400
443 *$         GIVEN THE FOLLOWING 'F' TYPE CONSTANT:                     $ 00044500
444 *$                                                                    $ 00044600
445 *$             DC    F'1'                                             $ 00044700
446 *$                                                                    $ 00044800
447 *$               WHAT WILL BE GENERATED AS A RESULT OF THIS DC ?      $ 00044900
448 *$                                                                    $ 00045000
449 *$                 A. FFFFFFFF                                        $ 00045100
450 *$                 B. 00000001                                        $ 00045200
451 *$                 C. 11111111                                        $ 00045300
452 *$                 D. F1F1F1F1                                        $ 00045400
453 *$                                                                    $ 00045500
454 *$                             THE ANSWER IS_______.                  $ 00045600
455 *$                                                                    $ 00045700
456 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00045800
```

```
                                                                                00046100
*=============================  ANSWER 2.5  ============================== 00046200
*=                                                                        = 00046300
*=                B  I  S   T H E   C O R R E C T   A N S W E R  .        = 00046400
*=                        THIS DC GENERATES A FULL WORD OF 00000001        = 00046500
*=                                                                        = 00046600
*=                   LETS TRY ANOTHER ONE .                               = 00046700
*=                                                                        = 00046800
*========================================================================== 00046900



*$$$$$$$$$$$$$$$$$$$$$$$$  QUESTION 2.6  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00047100
*$                                                                       $ 00047200
*$                                                                       $ 00047300
*$          WHAT WILL THE FOLLOWING DC GENERATE ?                        $ 00047400
*$                                                                       $ 00047500
*$               DC  H'1'                                                $ 00047600
*$                                    THE ANSWER IS _______.             $ 00047700
*$                                                                       $ 00047800
*$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00047900
```

```
                        *========================= ANSWER 2.6 ================================= 00048200
                        *=                                                                    = 00048300
                        *=      ONE HALF WORD IS GENERATED WITH A VALUE OF 0001               = 00048400
                        *=                                                                    = 00048500
                        *=                              LET'S TRY ONE MORE,OKAY ?             = 00048600
                        *=                                                                    = 00048700
                        *====================================================================== 00048800



                        *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.7 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00049000
                        *$                                                                    $ 00049100
                        *$  GIVEN THE FOLLOWING:      DC    D'1'                              $ 00049200
                        *$                                                                    $ 00049300
                        *$        WHAT WILL BE THE RESULT IN CORE AFTER THE DC IS ASSEMBLED ? $ 00049400
                        *$                                                                    $ 00049500
                        *$                A.F0F0FCFCF0F0F0F1                                  $ 00049600
                        *$                B.0000000000000001                                  $ 00049700
                        *$                C.4110000000000000                                  $ 00049800
                        *$                D.1111111111111111                                  $ 00049900
                        *$                                          THE ANSWER IS ______.   $ 00050000
                        *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00050100
```

```
                         502 *====================== ANSWER 2.7 ====================================== 00050400
                         503 *=                                                                      = 00050500
                         504 *=    I PULLED A DIRTY TRICK ON YOU. THE 'D' TYPE OF DC CAUSES A        = 00050600
                         505 *=      DOUBLE PRECISION 'FLOATING POINT' NUMBER TO BE GENERATED NOT    = 00050700
                         506 *=      A DOUBLE WORD OF FIXED POINT INFO. WE'LL GET A CLOSER LOOK      = 00050800
                         507 *=      AT WHAT A FLOATING POINT NUMBER IS IN A LATER SECTION OF THE    = 00050900
                         508 *=      COURSE.     THE ONLY 'FLOATING POINT' CHOICE GIVEN WAS:         = 00051000
                         509 *=                                                                      = 00051100
                         510 *=                           .... C ....                                = 00051200
                         511 *=                                                                      = 00051300
                         512 *=                                                                      = 00051400
0021A6 0000
0021A8 4110000000000000  513           DC    D'1'        LOOK OVER ON THE LEFT FOR A GRAPHIC         = 00051500
                         514 *=          <--------------  REPRESENTATION.                             = 00051600
                         515 *=                                                                      = 00051700
                         516 *====================================================================== 00051800
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70


                                     519 *            ////////////////////////////////////                  * 00052100
                                     520 *            /ADDRESS CONSTANTS ( A,Y,AND S TYPE )/                * 00052200
                                     521 *            ////////////////////////////////////                  * 00052300
                                     522 *                                                                  * 00052400
                                     523 *                                                                    00052500
                                     524 * O AN ADDRESS CONSTANT IS A STORAGE ADDRESS THAT IS TRANSLATED INTO * 00052600
                                     525 *     A CONSTANT. ADDRESS CONSTANTS CAN BE USED FOR INITIALIZING     * 00052700
                                     526 *     BASE REGISTERS TO FACILITATE THE ADDRESSING OF STORAGE.        * 00052800
                                     527 *                                                                  * 00052900
                                     528 * O ADDRESS CONSTANTS ARE ENCLOSED IN PARENTHESES(). IF YOU SPECIFY * 00053000
                                     529 *     TWO OR MORE ADDRESS CONSTANTS IN ONE STATEMENT, THEY SHOULD BE * 00053100
                                     530 *     SEPERATED BY A COMMA.THE ENTIRE SEQUENCE IS ENCLOSED IN ().    * 00053200
                                     531 *                                                                  * 00053300
                                     532 *                                                                  * 00053400
                                     533 ************************************************************************ 00053500
                                     534 *                                                                  * 00053600
0021B0 000020CF                      535          DC    A(NAME1)       IMPLIED LENGTH OF FOUR BYTES. ALIGNS TO * 00053700
                                     536 *                               A FULL WORD BOUNDARY               * 00053800
0021B4 0020CF                        537          DC    AL3(NAME1)     SPECIFIED LENGTH OF THREE BYTES.   * 00053900
                                     538 *                               NO ALIGNMENT.                      * 00054000
0021B7 00
0021B8 000020000000300C              539          DC    A(COOL2,COOL2+4096,COOL2+8192)    AN ADCON CAN HAVE * 00054100
0021C0 00004000
                                     540 *                                                 MULTIPLE OPERANDS  * 00054200
                                     541 *                                                                    00054300
                                     542 *    NOTE: 'COOL2' IS DEFINED IN STATEMENT NUMBER 001 AND ITS        * 00054400
                                     543 *          ASSEMBLED ADDRESS IS 002000. I DIDN'T PUT THE PAGES WHICH * 00054500
                                     544 *          INCLUDED  THE START CARD  ( STATEMENT #001 ) IN THIS      * 00054600
                                     545 *          LISTING.                                                  * 00054700
                                     546 *                                                                    00054800
                                     547 *                                                                  * 00054900
0021C4 00001000                      548          DC    A(4096)     ABSOLUTE ADDRESS SPECIFICATION           * 00055000
                                     549 *                                                                  * 00055100
0021C8 20CF                          550          DC    Y(NAME1)    IMPLIED LENGTH OF 2 BYTES. ALIGNS TO A   * 00055200
                                     551 *                             HALF WORD BOUNDARY.                  * 00055300
                                     552 *                                                                    00055400
0021CA C0C9                          553          DC    S(NAME1)    AGAIN A HALF WORD ON A HALF WORD BOUNDARY, * 00055500
                                     554 *                             BUT THIS ADDRESS IS BROKEN DOWN INTO A * 00055600
                                     555 *                             BASE AND DISPLACEMENT.                 * 00055700
                                     556 *                                                                    00055800
                                     557 ************************************************************************ 00055900
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70  9/16/70

                                    559 *                                                                 * 00056100
                                    560 *     -------->W A T C H   T H I S   O N E<-------                * 00056200
                                    561 *                                                                 * 00056300
                                    562 *FUNCTION DC   256AL1(*-FUNCTION) THIS SHOULD GENERATE A TABLE OF 256 * 00056400
                                    563 *               |  |               BYTES STARTING WITH A VALUE OF 00  * 00056500
                                    564 *               |  |               AND ENDING WITH FF.(* IS THE VALUE * 00056600
                                    565 * 256 TIMES<-----+  +--->LENGTH     OF THE LOCATION COUNTER WHICH     * 00056700
                                    566 *                          OF       INCREASES WITH EVERY BYTE GENERATED* 00056800
                                    567 *                         ONE      'FUNCTION' REMAINS CONSTANT.THUS THE* 00056900
                                    568 *                                   FIRST BYTE =00,THE LAST=255=FF...) * 00057000
                                    569 *                                                                 * 00057100
                                    570 *                                HERE WE GO.....................  * 00057200
                                    571 *                                                                 * 00057300
0021CC 0001020304050607             572 FUNCTION DC    256AL1(*-FUNCTION)                                   00057400
0021D4 08090A0B0C0D0E0F
0021DC 1011121314151617
0021E4 18191A1B1C1D1E1F
0021EC 2021222324252627
0021F4 28292A2B2C2D2E2F
0021FC 3031323334353637
002204 38393A3B3C3D3E3F
00220C 4041424344454647
002214 48494A4B4C4D4E4F
00221C 5051525354555657
002224 58595A5B5C5D5E5F
00222C 6061626364656667
002234 68696A6B6C6D6E6F
00223C 7071727374757677
002244 78797A7B7C7D7E7F
00224C 8081828384858687
002254 88898A8B8C8D8E8F
00225C 9091929394959697
002264 98999A9B9C9D9E9F
00226C A0A1A2A3A4A5A6A7
002274 A8A9AAABACADAEAF
00227C B0B1B2B3B4B5B6B7
002284 B8B9BABBBCBDBEBF
00228C C0C1C2C3C4C5C6C7
002294 C8C9CACBCCCDCECF
00229C D0D1D2D3D4D5D6D7
0022A4 D8D9DADBDCDDDEDF
0022AC E0E1E2E3E4E5E6E7
0022B4 E8E9EAEBECEDEEEF
0022BC F0F1F2F3F4F5F6F7
0022C4 F8F9FAFBFCFDFEFF
                                    573 *                                LOOK AT THE TABLE WE GENERATED ON    * 00057500
                                    574 *                                 THE LEFT AND YOU TELL ME THAT       * 00057600
                                    575 *          <----------------------  WASN'T THE SLICKEST THING YOU EVER * 00057700
                                    576 *            THIS WAY TO TABLE      SAW                               * 00057800
                                    577 *                                                                    * 00057900
                                    578 ************************************************************************ 00058000
```

```
                    581 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.8 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00058300
                    582 *$                                                                      $ 00058400
                    583 *$      GIVEN THE FOLLOWING:                                            $ 00058500
                    584 *$                                                                      $ 00058600
                    585 *$        TBLE  DC  256AL1(TBLE-*+255)                                  $ 00058700
                    586 *$                                                                      $ 00058800
                    587 *$           WHAT WILL BE THE RESULT IN CORE AFTER THE PREVIOUS DC       $ 00058900
                    588 *$              IS ISSUED ?                                             $ 00059000
                    589 *$                                                                      $ 00059100
                    590 *$                          A. 256 BYTES WHOSE VALUE RANGE IS 00-->FF   $ 00059200
                    591 *$                          B. 256 BYTES WHOSE VALUE RANGE IS FF-->00   $ 00059300
                    592 *$                          C. 256 BYTES WHOSE VALUE RANGE IS FF-->01   $ 00059400
                    593 *$                          D. 256 BYTES WHOSE VALUE RANGE IS FE-->00   $ 00059500
                    594 *$                                                                      $ 00059600
                    595 *$                                  THE CORRECT ANSWER IS _________.    $ 00059700
                    596 *$                                                                      $ 00059800
                    597 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00059900
```

```
 LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                   599 *============================== ANSWER 2.8 ============================== 00060100
                                   600 *=                                                                      = 00060200
                                   601 *=                                                                      = 00060300
                                   602 *=    B IS THE CORRECT ANSWER. LET'S SEE WHY                            = 00060400
                                   603 *=                                                                      = 00060500
                                   604 *=    I BELIEVE YOU'LL AGREE THAT 256 BYTES WILL BE GENERATED           = 00060600
                                   605 *=     (ALL THE CHOICES HAVE 256 BYTES)                                 = 00060700
                                   606 *=        NOW THE ONLY QUESTION THAT REMAINS IS THE VALUE OF THE 256     = 00060800
                                   607 *=        BYTES.                                                        = 00060900
                                   608 *=    TBLE HAS AN INITIAL VALUE EQUAL TO THAT OF THE LOCATION COUNTER   = 00061000
                                   609 *=      HENCE TBLE-* = 0. 0 + 255 = FF(255). THEREFORE                  = 00061100
                                   610 *=      THE FIRST BYTE IN THE 'TBLE' HAS A VALUE OF FF. OKAY,SO FAR ?   = 00061200
                                   611 *=      THE LOCATION COUNTER IS THEN INCREMENTED BY ONE SO THE           = 00061300
                                   612 *=      NEXT TIME TBLE-*=FF. FF+255=FE(254). THIS OPERATION             = 00061400
                                   613 *=      CONTINUES UNTIL WE HAVE GENERATED 256 BYTES. THE VALUE OF       = 00061500
                                   614 *=      LAST BYTE GENERATED IS 01+255=00 (THE CARRY IS IGNORED)         = 00061600
                                   615 *=             I SENSE DISBELIEF AMONGST THE THRONG . I GUESS I'LL      = 00061700
                                   616 *=             HAVE TO PROVE MYSELF CORRECT, RIGHT ? ----------+        = 00061800
                                   617 *=                                                             |        = 00061900
                                   618 *=<------------------------------------------------------------+        = 00062000
0022CC FFFEFDFCFBFAF9F8            619 TBLE    DC  256AL1(TBLE-*+255)                                           00062100
0022D4 F7F6F5F4F3F2F1F0
0022DC EFEEEDECEBEAE9E8
0022E4 E7E6E5E4E3E2E1E0
0022EC DFDEDDDCDBDAD9D8
0022F4 D7D6D5D4D3D2D1D0
0022FC CFCECDCCCBCAC9C8
002304 C7C6C5C4C3C2C1C0
00230C BFBEBDBCBBBAB9B8
002314 B7B6B5B4B3B2B1B0
00231C AFAEADACABAAA9A8
002324 A7A6A5A4A3A2A1A0
00232C 9F9E9D9C9B9A9998
002334 9796959493929190
00233C 8F8E8D8C8B8A8988
002344 8786858483828180
00234C 7F7E7D7C7B7A7978
002354 7776757473727170
00235C 6F6E6D6C6B6A6968
002364 6766656463626160
00236C 5F5E5D5C5B5A5958
002374 5756555453525150
00237C 4F4E4D4C4B4A4948
002384 4746454443424140
00238C 3F3E3D3C3B3A3938
002394 3736353433323130
00239C 2F2E2D2C2B2A2928
0023A4 2726252423222120
0023AC 1F1E1D1C1B1A1918
0023B4 1716151413121110
0023BC 0F0E0D0C0B0A0908
0023C4 0706050403020100

                                   620 *====================== ANSWER TO BE CONTINUED ====================== 00062200
```

```
                                623 *============================== ANSWER 2.8  CONTINUED ================ 00062500
                                624 *=                                                                      = 00062600
                                625 *=         THATS EVEN SLICKER THAN THE LAST DC WE PLAYED AROUND WITH. = 00062700
                                626 *=                                                                      = 00062800
                                627 *=      BELIEVE IT OR NOT THERE IS A USE FOR THIS TYPE OF HOKUS POKUS. = 00062900
                                628 *=       REMEMBER WHEN WE EXAMINED THE INNER WORKINGS OF THE TRANSLATE = 00063000
                                629 *=       INSTRUCTION IN THE FIRST PROJECT? HERE'S THE SCOOP. THE       = 00063100
                                630 *=       TRANSLATE INSTRUCTION REQUIRES A 'FUNCTION FIELD',WHICH       = 00063200
                                631 *=       CONTAINS ALL THE POSSIBLE BIT COMBINATIONS OF THE NEW CODE.   = 00063300
                                632 *=       IN THE EXAMPLES USED IN THE FIRST WORK PROJECT I              = 00063400
                                633 *=       SET UP THE FUNCTION FIELD WITH A PLAIN OLD RUN OF THE MILL OR-= 00063500
                                634 *=       DINARY DC.LET'S SAY THAT THE RELATIONSHIP OF THE OLDCODE TO   = 00063600
                                635 *=       NEWCODE IS AS FOLLOWS:  (TAKE A FEW MINUTES AND GO BACK TO THE= 00063700
                                636 *=       'TRANSLATE" INST.IN THE FIRST PROJECT AND REFRESH YOUR MEMORY,= 00063800
                                637 *=       IF YOU THINK IT'S NECESSARY)                                  = 00063900
                                638 *=                                                                      = 00064000
                                639 *=                                                                      = 00064100
                                640 *= OLDCODE  NEWCODE   FUNCTION FIELD                                    = 00064200
                                641 *=   00       FF         FF                                              = 00064300
                                642 *=   01       FE         FE                                              = 00064400
                                643 *=   |        |          |                                               = 00064500
                                644 *=   V        V          V       O A QUICK AND EASY WAY TO GENERATE THE  = 00064600
                                645 *=   FE       01         01        FUNCTION FIELD,THEN ,WOULD BE TO USE  = 00064700
                                646 *=   FF       00         00        A DC SIMILAR TO THAT AT LOCATION'TBLE'= 00064800
                                647 *=                                                                      = 00064900
                                648 *========================================================================== 00065000


                                650 ****************************** N O T I C E  ***************************** 00065200
                                651 *                                                                        * 00065300
                                652 *     O  THERE IS INFORMATION ON BINARY, PACKED AND ZONED TYPES OF      * 00065400
                                653 *          CONSTANTS IN   A P P E N D I X   C   OF THIS PROJECT.        * 00065500
                                654 *            YOU MAY LOOK IT OVER AT YOUR CONVIENCE.                   * 00065600
                                655 *                                                                        * 00065700
                                656 ************************************************************************** 00065800
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                   658 *              ////////////////////////////////                    * 00066000
                                   659 *              /STORAGE DEFINITION INSTRUCTIONS/                   * 00066100
                                   660 *              ////////////////////////////////                    * 00066200
                                   661 *                                                                  * 00066300
                                   662 *                                                                  * 00066400
                                   663 *                                                                  * 00066500
                                   664 *      ////////////////////////////////                            * 00066600
                                   665 *      /THE DS STATEMENT (DEFINE STORAGE)/                         * 00066700
                                   666 *      ////////////////////////////////                            * 00066800
                                   667 *                                                                  * 00066900
                                   668 *    O THE DS INSTRUCTION IS USED TO RESERVE AREAS OF STORAGE AND TO * 00067000
                                   669 *        ASSIGN NAMES TO THOSE AREAS. THE USE OF THIS INSTRUCTION IS * 00067100
                                   670 *        THE PREFERRED WAY OF SYMBOLICALLY DEFINING STORAGE FOR WORK * 00067200
                                   671 *        AREAS,INPUT/OUTPUT AREAS,ETC. THE DS STATEMENT DOES NOT     * 00067300
                                   672 *        GENERATE ANY DATA IN STORAGE.......                         * 00067400
                                   673 *                                                                  * 00067500
                                   674 ************************************************************************ 00067600
                                   675 *ANYDS   DS    4CL80              E X A M P L E                     * 00067700
                                   676 *                                                                  * 00067800
                                   677 *        DS    FORMAT   1ST DUPLICATION FACTOR                     * 00067900
                                   678 *                       2ND TYPE                                   * 00068000
                                   679 *                       3RD LENGTH (EXPLICIT)                      * 00068100
                                   680 *                       4TH DATA (OPTIONAL)                        * 00068200
                                   681 *                                                                  * 00068300
87                                 682 *************** M O R E   D S   E X A M P L E S ********************** 00068400
                                   683 *                                                                  * 00068500
0023CC                             684 AREA5    DS    CL80           RESERVES 80 BYTES NAMED AREA5.       * 00068600
                                   685 *                             AREA5 HAS A LENGTH ATTRIBUTE OF 80.  * 00068700
00241C                             686 AREA6    DS    3C         DUP FACTOR OF 3. AREA6 LENGTH ATTRIBUTE IS 1.* 00068800
002420                             687 AREA7    DS    2F         TWO FULL WORDS. AREA7 LENGTH ATTRIBUTE IS 4. * 00068900
002428                             688 AREA8    DS    D          ONE DOUBLE WORD. AREA8 LENGTH ATTRIBUTE IS 8,* 00069000
002430                             689          DS    H          ONE HALF WORD.                       * 00069100
002432                             690          DS    C'HOW LONG IS THIS AREA'   RESERVES AREA THE LENGTH OF * 00069200
                                   691 *                                         THE DATA WITHIN QUOTES.  * 00069300
002447                             692 AREAEND  EQU   *              SHOWS END OF ABOVE AREA              * 00069400
                                   693 *  NOTE THE FORCED ALIGNMENT FOR NEXT FULL WORD DS STATEMENT..      * 00069500
                                   694 *  THE LENGTH SPECIFICATION OVER RIDES BOUNDARY ALIGNMENT, BUT-     * 00069600
                                   695 *  THE DS OF ZERO DUPLICATION FORCES ALIGNMENT AGAIN.               * 00069700
002448                             696          DS    0D          ZERO DUP FACTOR USE TO FORCE ALIGNMENT. * 00069800
002448                             697 FULLWD   DS    FL4                                                * 00069900
                                   698 *                                                                  * 00070000
                                   699 ************************************************************************ 00070100
                                   700 *                                                                  * 00070200
                                   701 *  O DS STATEMENTS MAY BE USED TO LABEL FIELDS AND SUBFIELDS       * 00070300
                                   702 *      IN AN AREA SUCH AS AN INPUT OR AN OUTPUT AREA. AN EXAMPLE   * 00070400
                                   703 *      FOLLOWING THE NEXT QUESTION SHOWS HOW THIS IS DONE.         * 00070500
                                   704 *                                                                  * 00070600
                                   705 ************************************************************************ 00070700
```

```
                                  708 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.9 $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00071000
                                  709 *$                                                                       $ 00071100
                                  710 *$           TRUE/FALSE                                                  $ 00071200
                                  711 *$                                                                       $ 00071300
                                  712 *$      THE DS INSTRUCTION ALLOWS FOR BOUNDARY ALIGNMENT AS WELL AS      $ 00071400
                                  713 *$         PROVIDES A MEANS FOR SETTING ASIDE AN AREA OF STORAGE.        $ 00071500
                                  714 *$                                                                       $ 00071600
                                  715 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00071700
```

```
                        718 *============================== ANSWER 2.9 ==============================* 00072000
                        719 *=                                                                      = 00072100
                        720 *=                              T R U E                                 = 00072200
                        721 *=                                                                      = 00072300
                        722 *=          IF YOU MISSED THAT ONE GO BACK AND STUDY THE DS STATEMENTS   = 00072400
                        723 *=                    AGAIN..                                           = 00072500
                        724 *=                                                                      = 00072600
                        725 *======================================================================* 00072700



                        727 *************** EXAMPLE OF FIELD DEFINITION USING DS STATEMENTS ******* 00072900
                        728 *                            (STRUCTURING)                            * 00073000
                        729 *                                                                     * 00073100
                        730 *                                                                     * 00073200
00244C                  731 RDAREA   DS    0CL70     ZERO DUP FACTOR. RDAREA LENGTH ATTRIBUTE IS 70 00073300
00244C                  732          DS    CL4       UNUSED AREA                                 * 00073400
002450                  733 PAYNO    DS    CL6                                                   * 00073500
002456                  734 NAME     DS    CL20                                                  * 00073600
00246A                  735 DATE     DS    0CL6      NAME DATE WILL INCLUDE DAY, MONTH, YEAR FIELDS 00073700
00246A                  736 DAY      DS    CL2                                                   * 00073800
00246C                  737 MONTH    DS    CL2                                                   * 00073900
00246E                  738 YEAR     DS    CL2                                                   * 00074000
002470                  739          DS    CL10      UNUSED AREA                                 * 00074100
00247A                  740 GROSS    DS    CL8                                                   * 00074200
002482                  741 FEDTAX   DS    CL6                                                   * 00074300
002488                  742          DS    CL10      UNUSED AREA                                 * 00074400
                        743 *                                                                     * 00074500
                        744 *<---------------------------- R D A R E A ----------------------------> * 00074600
                        745 *1                              <-DATE-->                            70* 00074700
                        746 *-----------------------------------------------------------------------* 00074800
                        747 *| U |  P  |    N              |D |M |Y |    U     |G      |   F  |U|* 00074900
                        748 *| N |  A  |      A            |A |O |E |    N     | R     |   E  |N|* 00075000
                        749 *| U |  Y  |         M         |Y |N |A |    U     |  O    |   D  |U|* 00075100
                        750 *| S |  N  |           E       |  |T |R | UNUSED   |   S   |   T  |S|* 00075200
                        751 *| E |  O  |             (20)  |  |H |  |    E     |    S  |   A  |E|* 00075300
                        752 *| D | (6) |                   |  |  |  |    D     |       |   X  |D|* 00075400
                        753 *|(4)|     |                   |2 |2 |2 |      (10)|   (8) | (6) | |* 00075500
                        754 *-----------------------------------------------------------------------* 00075600
```

```
757 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.10 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00075900
758 *$                                                                          $ 00076000
759 *$                                                                          $ 00076100
760 *$      WHICH OF THE FOLLOWING STATEMENTS DEALING WITH 'RDAREA',IN          $ 00076200
761 *$       THE PREVIOUS EXAMPLE, ARE   T R U E ?                              $ 00076300
762 *$                                                                          $ 00076400
763 *$          A. 'RDAREA' WAS PLACED ON A FULL WORD BOUNDARY BY THE           $ 00076500
764 *$               FIRST DS ISSUED.                                           $ 00076600
765 *$                                                                          $ 00076700
766 *$          B. 'PAYNO' MAY BE REFERRED TO AS 'PAYNO' OR AS 'RDAREA+4'.      $ 00076800
767 *$                                                                          $ 00076900
768 *$          C. 'RDAREA' IS 0 BYTES LONG.                                    $ 00077000
769 *$                                                                          $ 00077100
770 *$          D. 'RDAREA' IS 70 BYTES LONG.                                   $ 00077200
771 *$                                                                          $ 00077300
772 *$          E. MVI  DATE+4,X'46'   WILL PLACE 70 DECIMAL IN 'YEAR'.         $ 00077400
773 *$                                                                          $ 00077500
774 *$          F. THE ENTIRE 'RDAREA' WILL CONTAIN BLANKS(X'40') AFTER         $ 00077600
775 *$              THE ISSUANCE OF THE DS STATEMENTS.                          $ 00077700
776 *$                                                                          $ 00077800
777 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00077900
```

```
                        780 *========================= ANSWER 2.10 ================================= 00078200
                        781 *=                                                                    = 00078300
                        782 *=          B...D...E ARE THE CORRECT ANSWERS. AS FOR THE OTHERS....  = 00078400
                        783 *=                                                                    = 00078500
                        784 *=      A.    DS  0CL70  DOES NOT FORCE BOUNDARY ALIGNMENT.           = 00078600
                        785 *=      C. 'RDAREA' TAKES ON THE SPECIFIED LENGTH=70                  = 00078700
                        786 *=      F. REMEMBER,A DS DOES NOT ENTER ANYTHING INTO STORAGE.        = 00078800
                        787 *=                                                                    = 00078900
                        788 *======================================================================== 00079000
```

```
791 ********************************************************************** 00079300
792 *                                                                    * 00079400
793 *       THAT CONCLUDES   S E C T I O N   O N E  OF THIS PROJECT      * 00079500
794 *       INFORM YOUR INSTRUCTOR OF YOUR COMPLETION BY DISPLAYING      * 00079600
795 *       THE   Y E L L O W   ANSWERCUE. PLEASE USE THIS SHEET FOR ANY * 00079700
796 *       COMMENTS YOU MAY HAVE .                                      * 00079800
797 *                                                                    * 00079900
798 ********************************************************************** 00080000


800 ********************** C O M M E N T S ****************************** 00080200
```

```
                        803 *  ////////////////////////////
                        804 *  /                          /                00080600
                        805 *  /     S E C T I O N        /                00080700
                        806 *  /        T W O             /                00080800
                        807 *  /                          /                00080900
                        808 *  ////////////////////////////                00081000
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                                  810 *             ////////////////////////////////                                  * 00081200
                                  811 *             /PROGRAM CONTROL INSTRUCTIONS/                                    * 00081300
                                  812 *             ////////////////////////////////                                  * 00081400
                                  813 *                                                                               * 00081500
                                  814 *                                                                               * 00081600
                                  815 *        //////                                                                 * 00081700
                                  816 *        /ICTL/                                                                 * 00081800
                                  817 *        //////                                                                 * 00081900
                                  818 *                                                                               * 00082000
                                  819 *                                                                               * 00082100
                                  820 *            ICTL  1,79,16     USED TO REFORMAT THE SOURCE STATEMENT.          * 00082200
                                  821 *                              THE NORMAL FORMAT OF THE SOURCE CARD IS         * 00082300
                                  822 *                              COL1=START,COL71=END AND COL16=CONTINUE.        * 00082400
                                  823 *                              THE FORM OF THE ICTL IS AS FOLLOWS:             * 00082500
                                  824 *                              OPERAND1(1)=THE STARTING COLUMN OF THE          * 00082600
                                  825 *                              SOURCE STATEMENT.OPERAND2(79)=THE END           * 00082700
                                  826 *                              COLUMN OF THE SOURCE STATEMENT.                 * 00082800
                                  827 *                              OPERAND3(16)=THE COLUMN IN WHICH A              * 00082900
                                  828 *                              CONTINUATION STATEMENT SHOULD START.            * 00083000
                                  829 *                                                                               * 00083100
                                  830 *        //////                                                                 * 00083200
                                  831 *        /ISEQ/                                                                 * 00083300
                                  832 *        //////                                                                 * 00083400
                                  833 *                                                                               * 00083500
                                  834 *                                                                               * 00083600
                                  835 *        ISEQ  75,80          CAUSE SEQUENCE CHECKING OF SOURCE                 * 00083700
                                  836 *                             DECK IN COLUMNS 75 THRU 80                        * 00083800
                                  837 *        ISEQ                 WITH BLANK OPERAND, STOPS SEQ. CHECKING           * 00083900
                                  838 *                                                                               * 00084000
                                  839 *        ///////                                                                * 00084100
                                  840 *        /REPRO/                                                                * 00084200
                                  841 *        ///////                                                                * 00084300
                                  842 *                                                                               * 00084400
                                  843          REPRO                                                                  * 00084500
                                  844 I WOULD BE PUNCHED IN THE OBJECT DECK IF THERE WAS AN OBJECT DECK.               * 00084600
                                  845 *                                                                               * 00084700
                                  846 *        ///////                                                                * 00084800
                                  847 *        /PUNCH/                                                                * 00084900
                                  848 *        ///////                                                                * 00085000
                                  849 *                                                                               * 00085100
                                  850          PUNCH 'I WOULD BE IN OBJECT DECK DUE TO PUNCH INSTRUCTION.'            * 00085200
                                  851 *                                                                               * 00085300
                                  852 *                THE DIFFERENCE BETWEEN THE 'REPRO' AND THE 'PUNCH'             * 00085400
                                  853 *                STATEMENTS IS THIS. THE 'REPRO' PUNCHES THE FOLLOWING          * 00085500
                                  854 *                CARD AND THE 'PUNCH' PUNCHES INFO INCLUDED ON THE SAME         * 00085600
                                  855 *                CARD ENCLOSED IN APOSTROPHES (')                               * 00085700
                                  856 *                                                                               * 00085800
                                  857 ********************************************************************************* 00085900
```

```
                                860 *        /////                                                  * 00086200
                                861 *        /ORG/                                                  * 00086300
                                862 *        /////                                                  * 00086400
                                863 *                                                               * 00086500
                                864 *                                                               * 00086600
002A6E                          865          ORG   *+1500          SET LOCATION COUNTER 1500 HIGHER  * 00086700
                                866 *                              THAN PRESENT SETTING             * 00086800
                                867 *          ANY SYMBOLS USED IN AN ORG CARD MUST BE PREVIOUSLY DEFINED.* 00086900
                                868 *                                                               * 00087000
                                869 *        ///////               LITERALS ARE DISCUSSED LATER IN THIS * 00087100
                                870 *        /LTORG/                        PROJECT.                 * 00087200
                                871 *        ///////                          |                      * 00087300
                                872 *                                         |                      * 00087400
                                873 *                                         V                      * 00087500
                                874 *        LTORG                 CAUSES ALL LITERALS THUS FAR ENCOUNTERED* 00087600
                                875 *                              TO BE ALIGNED AND ASSEMBLED AT FIRST * 00087700
                                876 *                              DOUBLE WORD BOUNDARY FOLLOWING THE   * 00087800
                                877 *                              LTORG STATEMENT.                     * 00087900
                                878 *                                                               * 00088000
                                879 *        //////                                                 * 00088100
                                880 *        /CNOP/                                                 * 00088200
                                881 *        //////                                                 * 00088300
                                882 *                                                               * 00088400
002A6E 07000700                 883          CNOP  2,8             ALLOWS PROGRAMMER TO ALIGN AN INSTRUCTION 00088500
                                884 *                              AT A SPECIFIC WORD BOUNDARY. IF ANY BYTES 00088600
                                885 *                              NEED TO BE SKIPPED IN ORDER TO ALIGN * 00088700
                                886 *  <--PSSST,LOOK OVER THERE.   THE INSTRUCTION PROPERLY, THE ASSEMBLER * 00088800
                                887 *                              INSURES AN UNBROKEN INSTRUCTION FLOW BY * 00088900
                                888 *                              GENERATING NOP (BCR  0,0) INSTRUCTIONS * 00089000
                                889 *                              TO FILL THE GAP.                 * 00089100
                                890 *                                                               * 00089200
                                891 *          SEE THE ASSEMBLER MANUAL FOR THE ENTIRE SCOOP ON CNOP * 00089300
                                892 *                                                               * 00089400
                                893 ********************************************************************** 00089500
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
896 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.21 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00089800
897 *$                                                                    $ 00089900
898 *$     MATCH THE FOLLOWING:                                           $ 00090000
899 *$                                                                    $ 00090100
900 *$                                                                    $ 00090200
901 *$  ___ A. LTORG          1.CAUSES INFO ON THE CARD TO BE PUNCHED IN  $ 00090300
902 *$                          IN THE OBJECT DECK                        $ 00090400
903 *$  ___ B. ORG            2.SPECIFIES THE STARTING POINT FOR THE      $ 00090500
904 *$                          ASSEMBLY OF LITERALS.                     $ 00090600
905 *$  ___ C. ISEQ           3.CAUSES BOUNDARY ALIGNMENT TO A DOUBLE     $ 00090700
906 *$                          WORD BOUNDARY.                            $ 00090800
907 *$  ___ D. ICTL           4.USED TO CHECK THE SEQUENCE OF INPUT       $ 00090900
908 *$                          CARDS.                                    $ 00091000
909 *$  ___ E. REPRO          5.USED IN THE INSTRUCTION STREAM TO         $ 00091100
910 *$                          CAUSE BOUNDARY ALIGNMENT.                 $ 00091200
911 *$  ___ F. PUNCH          6.CHANGES FORMAT OF SOURCE STATEMENTS       $ 00091300
912 *$                                                                    $ 00091400
913 *$  ___ G. CNOP           7.USED TO CHANGE THE ASSEMBLER LOCATION     $ 00091500
914 *$                          COUNTER.                                  $ 00091600
915 *$                        8.CAUSES THE CARD FOLLOWING TO BE PUNCHED   $ 00091700
916 *$                          IN THE OBJECT DECK.                       $ 00091800
917 *$                                                                    $ 00091900
918 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00092000
```

```
                                921 *=========================== ANSWER 2.21 ================================ 00092300
                                922 *=                                                                    = 00092400
                                923 *=                                                                    = 00092500
                                924 *=            _2_ A. LTORG                                            = 00092600
                                925 *=                                                                    = 00092700
                                926 *=            _7_ B. ORG                                              = 00092800
                                927 *=                                                                    = 00092900
                                928 *=            _4_ C. ISEQ                                             = 00093000
                                929 *=                                                                    = 00093100
                                930 *=            _6_ D. ICTL                                             = 00093200
                                931 *=                                                                    = 00093300
                                932 *=            _8_ E. REPRO                                            = 00093400
                                933 *=                                                                    = 00093500
                                934 *=            _1_ F. PUNCH                                            = 00093600
                                935 *=                                                                    = 00093700
                                936 *=            _5_ G. CNOP                                             = 00093800
                                937 *=                                                                    = 00093900
                                938 *=                                                                    = 00094000
                                939 *======================================================================== 00094100
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                   941 *            ////////////////////////////////                    * 00094300
                                   942 *            /SYMBOL DEFINITION INSTRUCTION/                     * 00094400
                                   943 *            ////////////////////////////////                    * 00094500
                                   944 *                                                                * 00094600
                                   945 *                                                                * 00094700
                                   946 *        /////                                                   * 00094800
                                   947 *        /EQU/                                                   * 00094900
                                   948 *        /////                                                   * 00095000
                                   949 *                                                                * 00095100
                                   950 *     O THE EQU INSTRUCTION IS USED TO DEFINE A SYMBOL BY ASSIGNING * 00095200
                                   951 *       TO IT THE LENGTH, VALUE, AND RELOCATABILITY ATTRIBUTES OF * 00095300
                                   952 *       AN EXPRESSION IN THE OPERAND FIELD. HOW ABOUT THAT?      * 00095400
                                   953 *                                                                * 00095500
                                   954 *                                                                * 00095600
                                   955 *                                                                * 00095700
002A72 0000
002A74 00000003                    956 EXPRSON  DC    A(FIELDB-FIELDA)                                  00095800
002A74                             957 SYMBOL   EQU   EXPRSON         ASSIGNS ATTRIBUTES OF THE EXPRESSION * 00095900
                                   958 *                              TO THE SYMBOL. EXPRSON MUST BE PREVIOUSLY 00096000
                                   959 *                              DEFINED BECAUSE IT IS A SYMBOL.   * 00096100
000002                             960 REG2     EQU   2               THIS EQUATES THE SYMBOL REG2 TO A VALUE 8 00096200
                                   961 *                              OF 2. IT NOW TAKES AN IDENTITY FROM HOW * 00096300
                                   962 *                              IT IS USED IN A STATEMENT.        * 00096400
                                   963 *                              THIS IS THE ONLY WAY TO CREATE AN  * 00096500
                                   964 *                              ABSOLUTE SYMBOL.                  * 00096600
002A78 D205 3002 CB2A 00002 02B30  965          MVC   REG2(6,3),AREA       SYMBOL REG2 USED AS DISPLACEMENT. * 00096700
002A7E D205 2006 CB2A 00006 02B30  966          MVC   6(6,REG2),AREA       SYMBOL REG2 USED AS BASE REGISTER. * 00096800
002A84 D201 3006 CB2A 00006 02B30  967          MVC   6(REG2,3),AREA       SYMBOL REG2 USED AS LENGTH CODE.  * 00096900
002A8A 1A28                        968          AR    REG2,8               SYMBOL REG2 USED AS GENERAL REGISTER 00097000
002A8C 9202 CB2A      02B30        969          MVI   AREA,REG2        SYMBOL REG2 USED AS SELF DEFINING TERM. * 00097100

00244C                             971 YOUUSEME EQU RDAREA                                            * 00097300
00244C                             972 HEREIAM  EQU  YOUUSEME       SYMBOLS EQUATED TO SYMBOLS -"NEAT".   * 00097400
00244C                             973 GOTOIT   EQU HEREIAM                                           * 00097500
                                   974 *                                                              * 00097600
                                   975 *                                                              * 00097700
                                   976 ************************************************************** 00097800
```

```
979 *$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.22 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00098100
980 *$                                                                        $ 00098200
981 *$                                                                        $ 00098300
982 *$        GIVEN THE FOLLOWING INSTRUCTION STREAM:                         $ 00098400
983 *$                                                                        $ 00098500
984 *$ REGA   EQU    5                                                        $ 00098600
985 *$ REGB   EQU    4                                                        $ 00098700
986 *$ REGC   EQU    2                                                        $ 00098800
987 *$ REGD   EQU    REGA-REGB+REGC                                           $ 00098900
988 *$        LR     REGB,REGD                                                $ 00099000
989 *$                                                                        $ 00099100
990 *$        WHICH OF THE FOLLOWING SHOWS THE REGISTERS ASSIGNED TO THE      $ 00099200
991 *$         'LR' INSTRUCTION BY THE ASSEMBLER ?                            $ 00099300
992 *$                                                                        $ 00099400
993 *$                A. LR   5,6                                             $ 00099500
994 *$                B. LR   2,4                                             $ 00099600
995 *$                C. LR   4,3                                             $ 00099700
996 *$                D. LR   4,11                                            $ 00099800
997 *$                                   THE CORRECT ANSWER IS ______.        $ 00099900
998 *$                                                                        $ 00100000
999 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00100100
```

```
                        1002 *========================== ANSWER 2.22 ================================ 00100400
                        1003 *=                                                                    = 00100500
                        1004 *=          C IS CORRECT.....R1=REGB=4 AND R2=REGD=5-4+2=3             = 00100600
                        1005 *=                 L E T'S   T R Y   I T.....................         = 00100700
                        1006 *=                                                                    = 00100800
                        1007 *=                                                                    = 00100900
000005                  1008 REGA     EQU  5                                                       = 00101000
000004                  1009 REGB     EQU  4                                                       = 00101100
000002                  1010 REGC     EQU  2                                                       = 00101200
000003                  1011 REGD     EQU  REGA-REGB+REGC                                          = 00101300
                        1012 *=                                                                    = 00101400
                        1013 *=                                                                    = 00101500
                        1014 *= C  LET'S ISSUE THE 'LOAD REGISTER' AND SEE HOW IT ASSEMBLES ON     = 00101600
                        1015 *=     THE LEFT.....................                                  = 00101700
                        1016 *=                                                                    = 00101800
002A90 1843             1017          LR    REGB,REGD                                            = 00101900
                        1018 *=                                                                    = 00102000
                        1019 *=                                                                    = 00102100
                        1020 *=============================================================================== 00102200
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                                F08APR70   9/16/70

                                  1022 ************************************************************************** 00102400
                                  1023 *                          //////////////////////                        * 00102500
                                  1024 *                          /TERMS AND EXPRESSIONS/                       * 00102600
                                  1025 *                          //////////////////////                        * 00102700
                                  1026 *                                                                        * 00102800
                                  1027 *                                                                        * 00102900
                                  1028 *                                                                        * 00103000
                                  1029 *                                                                        * 00103100
                                  1030 *                 ///////                                                * 00103200
                                  1031 *                 /TERMS/                                                * 00103300
                                  1032 *                 ///////                                                * 00103400
                                  1033 *                                                                        * 00103500
                                  1034 *    O  EVERY TERM REPRESENTS A VALUE. THIS VALUE MAY BE ASSIGNED        * 00103600
                                  1035 *        BY THE ASSEMBLER(SYMBOLS,SYMBOL LENGTH ATTRIBUTES,LOCATION      * 00103700
                                  1036 *        COUNTER REFERENCE) OR MAY BE DEFINED BY THE TERM ITSELF         * 00103800
                                  1037 *        (SELF-DEFINING TERM OR LITERAL<---- THERES THAT WORD AGAIN).    * 00103900
                                  1038 *                                                                        * 00104000
                                  1039 *                  LET'S GO ON TO EXAMINE THE TYPES OF TERMS,OKAY ?      * 00104100
                                  1040 *                                                                        * 00104200
                                  1041 *                                                                        * 00104300
                                  1042 *                                                                        * 00104400
                                  1043 *    ########## TERMS MAY BE ABSOLUTE OR RELOCATABLE. ############       * 00104500
                                  1044 *                                                                        * 00104600
                                  1045 *  O  AN ABSOLUTE TERM IS ONE WHOSE VALUE DOES NOT CHANGE NO MATTER      * 00104700
                                  1046 *       WHAT HAPPENS. IT'S VALUE REMAINS THE SAME FOREVER AND EVER OR    * 00104800
                                  1047 *       UNTIL NEXT THURSDAY,WHICHEVER COMES FIRST.                       * 00104900
                                  1048 *                                                                        * 00105000
                                  1049 *                                                                        * 00105100
                                  1050 *  O  A RELOCATABLE TERM,ON THE OTHER HAND,CHANGES VALUE DEPENDING       * 00105200
                                  1051 *       ON WHERE IT WINDS UP IN STORAGE.                                 * 00105300
                                  1052 *                                                                        * 00105400
                                  1053 ************************************************************************** 00105500
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                 1055 *..................  EXAMPLES OF ABSOLUTE AND RELOCATABLE.............* 00105700
                                 1056 *                                                                      * 00105800
                                 1057 *       A B S O L U T E                R E L O C A T A B L E          * 00105900
                                 1058 *                                                                      * 00106000
                                 1059 *          12345                          SAM                            00106100
                                 1060 *          67890                          JOE                         * 00106200
                                 1061 *          ALL PLUS AND MINUS             ALL SYMBOLS (UNLESS EQU TO  * 00106300
                                 1062 *           NUMBERS                           AN ABSOLUTE TERM)       * 00106400
                                 1063 *            .                                                        * 00106500
                                 1064 *                                                                      * 00106600
                                 1065 *                                         'ABSOLUTE' COULD BE RE-      * 00106700
                                 1066 *                                           LOCATABLE---HOW DOES THAT* 00106800
                                 1067 *                                           GRAB YOU ?                 * 00106900
                                 1068 *                                                                      * 00107000
                                 1069 *.......................M O R E   T E R M S  .......................* 00107100
                                 1070 *                                                                      * 00107200
                                 1071 *              NAME        AN ABSOLUTE OR RELOCATABLE SYMBOL IS A TERM* 00107300
                                 1072 *                          REMEMBER,IF I PREVIOUSLY SAID:              * 00107400
                                 1073 *                               NAME   EQU  2  NAME WOULD BE ABSOLUTE.* 00107500
                                 1074 *                                                                      * 00107600
                                 1075 *                                                                      * 00107700
                                 1076 *              *           AN * USED AS A LOCATION REFERENCE IS A TERM* 00107800
                                 1077 *                           * MEANS "HERE" AS FAR AS THE ASSEMBLER IS * 00107900
                                 1078 *                           CONCERNED. IF I SAID :                     * 00108000
                                 1079 *                            BC   15,* ----> WE WOULD BE HERE WAY PAST * 00108100
                                 1080 *                                            NEXT THURSDAY--CAUSES A   * 00108200
                                 1081 *                                            BRANCH TO ITSELF.         * 00108300
                                 1082 *                                                                      * 00108400
                                 1083 *                                                                      * 00108500
                                 1084 *              L'NAME      A SYMBOLIC LENGTH ATTRIBUTE IS A TERM.      * 00108600
                                 1085 *                            SEEMS TO ME,THAT WAY BACK IN THE DARK     * 00108700
                                 1086 *                            PAST WE DISCOVERED THAT CONSTANTS (DC,DS)* 00108800
                                 1087 *                            HAVE LENGTH ATTRIBUTES(HOW LONG THEY ARE)* 00108900
                                 1088 *                            THAT MEANS WE MIGHT BE ABLE TO ASSIGN     * 00109000
                                 1089 *                            THIS LENGTH ATTRIBUTE TO SOMETHING.       * 00109100
                                 1090 *                                                                      * 00109200
                                 1091 *                                                                      * 00109300
                                 1092 *$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.23 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00109400
                                 1093 *$                                                                     $ 00109500
                                 1094 *$             T R U E / F A L S E                                     $ 00109600
                                 1095 *$                                                                     $ 00109700
                                 1096 *$             SAM     EQU     L'JOE                                   $ 00109800
                                 1097 *$             JOE     DC      CL2'03'                                 $ 00109900
                                 1098 *$                                     WILL ASSIGN 2 AS THE VALUE OF SAM. $ 00110000
                                 1099 *$                                                                     $ 00110100
                                 1100 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00110200
```

```
1103 *========================== ANSWER 2.23 ================================ 00110500
1104 *=                                                                     = 00110600
1105 *=        T R U E . . . . THE EXPLICIT LENGTH ATTRIBUTE OF 'JOE' IS 2.= 00110700
1106 *=                         BY SAYING (L2) I GAVE 'JOE' THE LENGTH      = 00110800
1107 *=                         ATTRIBUTE OF 2. I THEN EQUATED THIS LENGTH = 00110900
1108 *=                         ATTRIBUTE TO 'SAM'.                         = 00111000
1109 *=                                                                     = 00111100
1110 *=                                                                     = 00111200
1111 *=    >>>>>>>>>>> MORE EXAMPLES OF SYMBOLIC LENGTH ATTRIBUTES <<<<<<< = 00111300
1112 *=                    MAY BE FOUND IN APPENDIX A AT THE END            = 00111400
1113 *=                              OF THIS SECTION.                       = 00111500
1114 *=                                                                     = 00111600
1115 *===================================================================== 00111700


1117 ************************ MORE EXAMPLES OF TERMS ********************** 00111900
1118 *                                                                     * 00112000
1119 *             B'01C0'     IS A SELF DEFINING TERM                     * 00112100
1120 *                                                                     * 00112200
1121 *  O A SELF-DEFINING TERM IS A TERM WHICH DEFINES ITS OWN VALUE. LET'S* 00112300
1122 *      LOOK AT SOME SELF-DEFINING TERMS.                              * 00112400
1123 *                                                                     * 00112500
1124 *                                                                     * 00112600
1125 *              348             DECIMAL                                * 00112700
1126 *              14235641        DECIMAL MAX LENGTH EIGHT DIGITS        * 00112800
1127 *                              MAX DECIMAL VALUE 16,777,215           * 00112900
1128 *              X'F1A3'         HEXADECIMAL                            * 00113000
1129 *              X'FFFFFF'       MAXIMUM VALUE ALLOWED                  * 00113100
1130 *              B'10111001'     BINARY MAXIMUM LENGTH 24 BITS          * 00113200
1131 *              B'01'     EXPANDED TO FULL BYTE. LEFT ZERO PAD         * 00113300
1132 *              C'ABC'          CHARACTER MAXIMUM LENGTH 3 CHARACTERS  * 00113400
1133 *              C'13'           NUMERICAL DATA CAN BE USED             * 00113500
1134 *              C' '            BLANK                                  * 00113600
1135 *              C''''           QUOTES ARE SPECIAL CASE, TWO REQUIRED  * 00113700
1136 *              C'&&'           TO ENTER ONE. SAME WITH AMPERSANDS.    * 00113800
1137 *                                                                     * 00113900
1138 *   >>>>>>>>>> MORE EXAMPLES OF SELF-DEFINING TERMS MAY BE <<<<<<<<<  * 00114000
1139 *                    FOUND IN APPENDIX B AT THE END OF                * 00114100
1140 *                              THIS SECTION.                          * 00114200
1141 *                                                                     * 00114300
1142 ********************************************************************** 00114400
```

```
1145 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.24 $$$$$$$$$$$$$$$$$$$$$$$$$ 00114700
1146 *$                                                                $ 00114800
1147 *$  MATCH THE FOLLOWING:                                          $ 00114900
1148 *$                                                                $ 00115000
1149 *$ ___ A. B'01010101'              1. SELF-DEFINING HEXADECIMAL TERM$ 00115100
1150 *$                                                                $ 00115200
1151 *$ ___ B. C'BAC'                    2. SYMBOLIC LENGTH ATTRIBUTE    $ 00115300
1152 *$                                                                $ 00115400
1153 *$ ___ C. SNORT                      3. LITERAL                      $ 00115500
1154 *$                                                                $ 00115600
1155 *$ ___ D. L'SNORT                   4. SELF-DEFINING BINARY TERM    $ 00115700
1156 *$                                                                $ 00115800
1157 *$ ___ E. X'FEFE'                   5. SYMBOL                       $ 00115900
1158 *$                                                                $ 00116000
1159 *$ ___ F.  *                        6. SELF-DEFINING CHARACTER TERM $ 00116100
1160 *$                                                                $ 00116200
1161 *$ ___ G. 917754                    7. LOCATION COUNTER REFERENCE   $ 00116300
1162 *$                                                                $ 00116400
1163 *$                                 8. ABSOLUTE DECIMAL TERM        $ 00116500
1164 *$                                                                $ 00116600
1165 *$                                                                $ 00116700
1166 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00116800
```

```
1169 *============================ ANSWER 2.24============================== 00117100
1170 *=                                                                    = 00117200
1171 *=                          _4_ A. B'01010101'                        = 00117300
1172 *=                          _6_ B. C'BAC'                             = 00117400
1173 *=                          -5_ C. SNORT                              = 00117500
1174 *=                          _2_ D. L'SNORT                            = 00117600
1175 *=                          _1_ E. X'FEFE'                            = 00117700
1176 *=                          _7_ F.  *                                 = 00117800
1177 *=                          _8_ G. 917754                             = 00117900
1178 *=                                                                    = 00118000
1179 *=                                                                    = 00118100
1180 *==================================================================== 00118200
```

```
1183 *             //////////                                              * 00118500
1184 *             /LITERALS/ <-- YES, VIRGINIA, THERE REALLY IS A LITERAL.* 00118600
1185 *             //////////                                              * 00118700
1186 *                                                                     * 00118800
1187 *                                                                     * 00118900
1188 * O A LITERAL TERM IS ONE OF THE BASIC WAYS TO INTRODUCE DATA INTO    * 00119000
1189 *     A PROGRAM. IT IS SIMPLY A CONSTANT PRECEEDED BY AN EQUAL SIGN   * 00119100
1190 *     (=). THE ASSEMBLER IS DIRECTED TO ASSEMBLE THE DATA IN A        * 00119200
1191 *     "LITERAL POOL" AND PLACE THE ADDRESS OF THIS DATA IN THE        * 00119300
1192 *     ASSEMBLED STATEMENT. LET'S DRAW A PICTURE.                      * 00119400
1193 *                                                                     * 00119500
1194 *                                                                     * 00119600
1195 *       LET'S TAKE THE FOLLOWING STATEMENT AS AN EXAMPLE.             * 00119700
1196 *                                                                     * 00119800
1197 *                          -------->    L    5,=X'456789FF' <------  * 00119900
1198 *                                                                     * 00120000
1199 *                                THIS SHOULD CAUSE X'456789FF' TO     * 00120100
1200 *                                BE LOADED INTO REG.5 .THE ASSEMBLER  * 00120200
1201 *                                WILL PLACE THE HEXADECIMAL CONSTANT  * 00120300
1202 *                                '456789FF' IN STORAGE AFTER THE      * 00120400
1203 *      L     R    B    D       A    'LTORG' STATEMENT.(IN A LITERAL POOL)* 00120500
1204 *      O     E    A    I       D    THE ASSEMBLER WILL THEN PLACE THE    * 00120600
1205 *      A     G    S    S       D    ADDRESS OF THIS LOCATION IN THE LOAD * 00120700
1206 *      D     5    E    P       R    INSTRUCTION. THE ASSEMBLED RESULT    * 00120800
1207 *      |     |    |    |       2    MIGHT LOOK LIKE THIS-----+           * 00120900
1208 *      |     |    |    |       |                           |           * 00121000
1209 *      |     |    |    |       |       <-------------------+           * 00121100
1210 *      |     |    |    |       |                                       * 00121200
1211 *      |     |    |    |       |                                       * 00121300
1212 *      |     |    |    |       |                                       * 00121400
1213 *      |     V    |    V       V                                       * 00121500
1214 *      +->5850    ->C102     00104                                     * 00121600
1215 *                   | |                                               * 00121700
1216 *                   -                                                 * 00121800
1217 *                   |                                                 * 00121900
1218 *         +---------+                                                 * 00122000
1219 *         |                                                           * 00122100
1220 *         V                                                           * 00122200
1221 *        104  456789FF                                                * 00122300
1222 *                                                                     * 00122400
1223 *                   O THEREFORE, WHEN WE EXECUTE THE LOAD INSTRUCTION,* 00122500
1224 *                     THE CONTENTS OF LOCATION 104 GETS LOADED INTO   * 00122600
1225 *                     REG5.(456789FF)                                 * 00122700
1226 *                                                                     * 00122800
1227 *                                                                     * 00122900
1228 *                                                                     * 00123000
1229 ********************************************************************** 00123100
```

```
                                       1232 ************************** MORE LITERALS ******************************** 00123400
                                       1233 *                                                                       * 00123500
                                       1234 *                                                                       * 00123600
                                       1235 *                                                                       * 00123700
002A92 9879 CACA              02AD0    1236          LM    7,9,=A(NAME1,NAME2,NAME3) MULTIPLE OPERANDS IN A LITERAL 00123800
002A96 5820 CAD6              02ADC    1237          L     2,=F'1234'                      IS QUITE ALRIGHT.       * 00123900
002A9A 5880 CADA              02AE0    1238          L     8,=X'FF0000FF'                       M     L            * 00124000
002A9E D200 0001 CAF6 00001   02AFC    1239          MVC   1,=C'AB'                             O     I            * 00124100
002AA4 D503 CBD6 CADE 02BDC   02AE4    1240          CLC   FIELD,=C'PAGE'                       R     T            * 00124200
002AAA 5A10 CAE2              02AE8    1241          A     1,=CL4'23'                           E     R            * 00124300
002AAE 5830 CAE6              02AEC    1242          L     3,=A(AREA)                                 L            * 00124400
002AB2 D200 0C01 CAEA 000C1   02AF0    1243          MVC   1,=CL4'AB'                           S                  * 00124500
002AB8 0000 0000              00000    1244          SLL   10,=X'01'    WATCH OUT FOR ILLEGAL LITERAL USAGE..... * 00124600
         *** ERROR ***
002ABC FA32 CB2A CAF9 02B30   02AFF    1245          AP    AREA,=P'2500'  NOTE ONLY ONE ENTRY IN LITERAL POOL.    * 00124700
002AC2 FA32 CBD6 CAF9 02BDC   02AFF    1246          AP    FIELD,=P'2500'       FOR IDENTICALLY ALIKE LITERALS...  * 00124800
002AC8 5850 CAEE              02AF4    1247          L     5,=F'0'       HOWEVER, THE LITERALS MUST BE            * 00124900
002ACC 5850 CAF2              02AF8    1248          L     5,=XL4'00'    IDENTICAL IN ALL RESPECTS.               * 00125000
002AD0                                 1249          LTORG         HERE COMES THE LITERAL POOL..................... * 00125100
002AD0 000020CF000020DF                1250                =A(NAME1,NAME2,NAME3)
107 002AD8 000020EF
002ADC 000004D2                        1251                =F'1234'
002AE0 FF0000FF                        1252                =X'FF0000FF'
002AE4 D7C1C7C5                        1253                =C'PAGE'
002AE8 F2F34040                        1254                =CL4'23'
002AEC 00002B30                        1255                =A(AREA)
002AF0 C1C24040                        1256                =CL4'AB'
002AF4 00000000                        1257                =F'0'
002AF8 00000000                        1258                =XL4'00'
002AFC C1C2                            1259                =C'AB'
002AFE 01                              1260                =X'01'
002AFF 02500C                          1261                =P'2500'
                                       1262 *                                                                       * 00125200
                                       1263 *                    READY FOR A QUESTION HUH ?????? I THINK YOU ARE.   * 00125300
                                       1264 *                                                                       * 00125400
                                       1265 ************************************************************************** 00125500
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
1268 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.25 $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00125800
1269 *$                                                                    $ 00125900
1270 *$        CHOOSE THE CORRECT STATEMENTS FROM THE FOLLOWING LIST.      $ 00126000
1271 *$                                                                    $ 00126100
1272 *$         A. A LITERAL IS ONE WAY TO ENTER DATA INTO A PROGRAM.       $ 00126200
1273 *$                                                                    $ 00126300
1274 *$         B. DUPLICATE LITERALS CAUSE DUPLICATE ENTRIES IN THE        $ 00126400
1275 *$             LITERAL POOL.                                          $ 00126500
1276 *$                                                                    $ 00126600
1277 *$         C. A LITERAL POOL IS A SPECIAL AREA WHERE THE ASSEMBLER     $ 00126700
1278 *$             PLACES ALL LITERALS.                                   $ 00126800
1279 *$                                                                    $ 00126900
1280 *$         D. A LITERAL MAY BE SPECIFIED IN AN ADDRESS CONSTANT.(IE    $ 00127000
1281 *$             A(=X'1000'))                                           $ 00127100
1282 *$                                                                    $ 00127200
1283 *$         E. SLL  5,=F'1'  WILL CAUSE REG.5 TO BE SHIFTED LEFT 1.    $ 00127300
1284 *$                                                                    $ 00127400
1285 *$                                                                    $ 00127500
1286 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00127600
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
1289 *============================ ANSWER 2.25 ============================== 00127900
1290 *=                                                                     = 00128000
1291 *=          THE CORRECT STATEMENTS ARE.....A AND C.  HERE'S THE SCOOP  = 00128100
1292 *=            ON THE OTHERS:                                           = 00128200
1293 *=                                                                     = 00128300
1294 *=      B.DUPLICATE LITERALS ONLY CAUSE ONE ENTRY IN THE LITERAL POOL. = 00128400
1295 *=         INCIDENTLY,IF THERE IS NO LTORG THE ASSEMBLER WILL PLACE    = 00128500
1296 *=         THE LITERAL POOL AT THE END OF THE FIRST CONTROL SECTION.   = 00128600
1297 *=         ( WE'LL GET TO CONTROL SECTIONS SOON-JUST KEEP THIS WORD    = 00128700
1298 *=           OF WISDOM IN MIND.)                                       = 00128800
1299 *=                                                                     = 00128900
1300 *=      D. SORRY ,YOU CAN'T USE LITERALS IN ADDRESS CONSTANTS.         = 00129000
1301 *=                                                                     = 00129100
1302 *=      E. OR IN SHIFT INSTRUCTIONS EITHER.                            = 00129200
1303 *=                                                                     = 00129300
1304 *===================================================================== 00129400
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                 1306 ************************************************************************ 00129600
                                 1307 *                  //////////////                                      * 00129700
                                 1308 *                  /EXPRESSIONS/                                       * 00129800
                                 1309 *                  //////////////                                      * 00129900
                                 1310 *                                                                      * 00130000
                                 1311 *                                                                      * 00130100
                                 1312 *                                                                      * 00130200
                                 1313 *    O  EXPRESSIONS WHICH ARE USED IN CODING OPERAND ENTRIES FOR        * 00130300
                                 1314 *       ASSEMBLER LANGUAGE STATEMENTS,ARE MADE UP OF EITHER A SINGLE   * 00130400
                                 1315 *       TERM(YOU KNOW WHAT THESE ARE) OR AN ARITHMETIC COMBINATION     * 00130500
                                 1316 *       OF TERMS. TERMS ENCLOSED IN PARENTHESES MAY BE USED.           * 00130600
                                 1317 *                                                                      * 00130700
                                 1318 *    O  THE TERMS IN AN EXPRESSION ARE SEPERATED BY WHAT IS CALLED AN  * 00130800
                                 1319 *       ARITHMETIC OPERATOR. THESE OPERATORS ARE :                     * 00130900
                                 1320 *                        + PLUS                                        * 00131000
                                 1321 *                        - MINUS                                       * 00131100
                                 1322 *                        * MULTIPLY                                    * 00131200
                                 1323 *                        / DIVIDE                                      * 00131300
                                 1324 *                                                                      * 00131400
                                 1325 *    O  THE EVALUATION OF TERMS ENCLOSED IN PARENTHESES TAKES PLACE    * 00131500
                                 1326 *       FIRST WITH THE INNER-MOST PAIR OF PARENTHESES. THE EVALUATION  * 00131600
                                 1327 *       PROCEEDS THROUGH THE OUTER-MOST PAIR OF PARENTHESES. LET'S     * 00131700
                                 1328 *       LOOK AT THAT A LITTLE BIT....                                  * 00131800
                                 1329 *                                                                      * 00131900
                                 1330 *                    EXPRESSION--> (2*(C*(A+B)))                       * 00132000
                                 1331 *                                  3  2   1                           * 00132100
                                 1332 *         1. FIRST A+B                                                 * 00132200
                                 1333 *         2. THEN  MULTIPLY RESULT BY C                                * 00132300
                                 1334 *         3. FINALLY  MULTIPLY THAT RESULT BY 2                        * 00132400
                                 1335 *                                                                      * 00132500
                                 1336 *    O THE ASSEMBLER EVALUATES EXPRESSIONS FROM LEFT TO RIGHT,DOES ALL * 00132600
                                 1337 *      MULTIPLICATION AND DIVISION FIRST,THEN ADDITION AND SUBTRACTION* 00132700
                                 1338 *                                                                      * 00132800
                                 1339 *                        1. 1/2*12   WILL REDUCE TO ZERO               * 00132900
                                 1340 *     SOME EXAMPLES:     2. 12*1/2   WILL REDUCE TO SIX                * 00133000
                                 1341 *                        3. 12+2/2   WILL REDUCE TO THIRTEEN           * 00133100
                                 1342 *                        4. (12+2)/2 WILL REDUCE TO SEVEN              * 00133200
                                 1343 *                                                                      * 00133300
                                 1344 *         1. ONE IS TRUE BECAUSE WE ARE DEALING WITH AN ASSEMBLER THAT * 00133400
                                 1345 *            ONLY HANDLES INTEGER VALUES WHEN REDUCING EXPRESSIONS.    * 00133500
                                 1346 *            1/2 WILL REDUCE TO ZERO(REMAINDERS ARE LOST). THIS TIMES  * 00133600
                                 1347 *            12=0,NATCHERLY.                                           * 00133700
                                 1348 *         2. TWO IS TRUE BECAUSE THE ASSEMBLER WILL FIRST MULTIPLY 12X1* 00133800
                                 1349 *            THEN DIVIDE BY 2.                                         * 00133900
                                 1350 *         3. THREE IS CORRECT BECAUSE 2 IS DIVIDED BY 2 FIRST THEN THIS* 00134000
                                 1351 *            RESULT IS ADDED TO 12.                                    * 00134100
                                 1352 *         4. FOUR REDUCES TO 7 BECAUSE,AS YOU KNOW,THE PARENTHESESIZED * 00134200
                                 1353 *            EXPRESSION IS EVALUATED FIRST TO 14. THEN THE DIVISION    * 00134300
                                 1354 *            HAPPENS, N'CEST PAS (ENGLISH SUBTITLE=ISN'T THAT RIGHT).  * 00134400
                                 1355 *                                                                      * 00134500
                                 1356 ************************************************************************ 00134600
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                  1358 ********************************************************************** 00134800
                                  1359 *                                                                    * 00134900
                                  1360 *..................... EXAMPLES OF VALID EXPRESSIONS ..................* 00135000
                                  1361 *                                                                    * 00135100
                                  1362 *                                                                    * 00135200
                                  1363 *         A+B/C                                                      * 00135300
                                  1364 *         SYMBOL1/SYMBOL2*SYMBOL3                                    * 00135400
                                  1365 *         *+32                    LOCATION COUNTER+32   (SELF+32)    * 00135500
                                  1366 *         A*(A*(B-3))                                                * 00135600
                                  1367 *         ABLE-25                                                    * 00135700
                                  1368 *                                                                    * 00135800
                                  1369 *     ------------->>>SEE THE ASSEMBLER MANUAL FOR THE RULES FOR      * 00135900
                                  1370 *                          C O D I N G   E X P R E S S I O N S       * 00136000
                                  1371 *                                                                    * 00136100
                                  1372 *                                                                    * 00136200
                                  1373 *..................... HERE COMES A QUESTION .........................* 00136300
                                  1374 *                                                                    * 00136400
                                  1375 *                                                                    * 00136500
                                  1376 ********************************************************************** 00136600
```

```
1379 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.26 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00136900
1380 *$                                                                       $ 00137000
1381 *$                                                                       $ 00137100
1382 *$        ASSUME FOR A MOMENT THAT YOU ARE AN ASSEMBLER.                 $ 00137200
1383 *$                A PROGRAMMER HAS GIVEN YOU THE FOLLOWING VALUES FOR    $ 00137300
1384 *$                 HIS TERMS.                                            $ 00137400
1385 *$                                                                       $ 00137500
1386 *$                                                                       $ 00137600
1387 *$        ABLE  DC   F'1'                                                $ 00137700
1388 *$                                                                       $ 00137800
1389 *$        DOG   EQU  L'ABLE                                              $ 00137900
1390 *$                                                                       $ 00138000
1391 *$        EASY  DC 3D'00'                                                $ 00138100
1392 *$                                                                       $ 00138200
1393 *$        FOX   EQU  8                                                   $ 00138300
1394 *$                                                                       $ 00138400
1395 *$        SAM   EQU (16*(L'EASY+L'UNCLE))/2                              $ 00138500
1396 *$                                                                       $ 00138600
1397 *$        UNCLE  DS 18F                                                  $ 00138700
1398 *$                                                                       $ 00138800
1399 *$              --------->EVALUATE THIS EXPRESSION.<----------           $ 00138900
1400 *$                                                                       $ 00139000
1401 *$                        (DOG*(2*(DOG+FOX)))-SAM                        $ 00139100
1402 *$                                                                       $ 00139200
1403 *$                                                                       $ 00139300
1404 *$                                                                       $ 00139400
1405 *$             THE CORRECT ANSWER IS ____________TO THE BASE 10.         $ 00139500
1406 *$                                                                       $ 00139600
1407 *$                                                                       $ 00139700
1408 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00139800
```

```
1411 *============================ ANSWER 2.26 ============================== 00140100
1412 *=                                                                     = 00140200
1413 *=       HOW DOES 'O' STRIKE YOU ?                                     = 00140300
1414 *=                                                                     = 00140400
1415 *=  LETS TAKE IT A STEP AT A TIME.                                      = 00140500
1416 *=                                                                     = 00140600
1417 *=          1. DOG+FOX=12 ..'DOG'=LENGTH ATTRIBUTE OF ABLE=4..+8=12    = 00140700
1418 *=                                                                     = 00140800
1419 *=          2. 2* THE PREVIOUS RESULT=24(DATSANEAZY1.)                 = 00140900
1420 *=                                                                     = 00141000
1421 *=          3. 'DOG' STILL EQUALS 4 (THE LENGTH ATTRIBUTE OF 'ABLE')   = 00141100
1422 *=               THEREFORE, 4*24=96                                    = 00141200
1423 *=                                                                     = 00141300
1424 *=          4. LET'S EVALUATE 'SAM' A STEP AT A TIME. FIRST, MR.       = 00141400
1425 *=              ASSEMBLER, WE'LL EVALUATE INSIDE THE PARENTHESES.      = 00141500
1426 *=              L'EASY (8) + L'UNCLE (4) = 12.SOFARSOGOOD ?            = 00141600
1427 *=              12 TIMES 16 =192                                       = 00141700
1428 *=              192 DIVIDED BY 2 = 96                                  = 00141800
1429 *=          5. THEREFORE,HENCEFORTH,FROM THIS DAY FORWARD THE          = 00141900
1430 *=              VALUE OF THIS EXPRESSION = 96-96 = ZILTCH,ZERO,NUTTIN.= 00142000
1431 *=                                                                     = 00142100
1432 *=                                                                     = 00142200
1433 *======================================================================== 00142300
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70


                                  1436 ************************************************************************ 00142600
                                  1437 *                    ////////////////////////////////                  * 00142700
                                  1438 *                     EXPLICIT AND IMPLIED LENGTHS/                    * 00142800
                                  1439 *                    ////////////////////////////////                  * 00142900
                                  1440 *                                                                     * 00143000
                                  1441 *                                                                     * 00143100
                                  1442 *              //////////                                             * 00143200
                                  1443 *              /EXPLICIT/                                             * 00143300
                                  1444 *              //////////                                             * 00143400
                                  1445 *                                                                     * 00143500
                                  1446 *                                                                     * 00143600
                                  1447 *    O AN EXPLICIT LENGTH IS THAT WHICH IS WRITTEN BY THE PROGRAMMER,  * 00143700
                                  1448 *        IN THE OPERAND FIELD OF AN INSTRUCTION,AS AN ABSOLUTE        * 00143800
                                  1449 *        EXPRESSION .                                                 * 00143900
                                  1450 *                                                                     * 00144000
                                  1451 *                FOR EXAMPLE:                                         * 00144100
                                  1452 *                                                                     * 00144200
002B02 F231 CB26 CB22 C2B2C 02B28 1453          PACK   HOURS(4),RATE(2)                                     * 00144300
002B08 D504 6018 6C1C 00018 0001C 1454          CLC    24(5,6),28(6)                                        * 00144400
002B0E D200 CB1A CB26 02B20 02B2C 1455          MVC    WORK(1),HOURS                                        * 00144500
                                  1456 *                                                                     * 00144600
                                  1457 *                                                                     * 00144700
                                  1458 *              //////////////////                                     * 00144800
                                  1459 *              /IMPLIED LENGTHS/                                      * 00144900
                                  1460 *              //////////////////                                     * 00145000
                                  1461 *                                                                     * 00145100
                                  1462 *                                                                     * 00145200
                                  1463 *                                                                     * 00145300
                                  1464 *  O AN IMPLIED LENGTH IS ONE THAT IS OMITTED BY THE PROGRAMMER       * 00145400
                                  1465 *      FROM THE OPERAND OF THE INSTRUCTION. THE ASSEMBLER THEN        * 00145500
                                  1466 *      USES THE LENGTH ATTRIBUTE OF THE SYMBOL IN THE OPERAND.WOW,    * 00145600
                                  1467 *      WE BETTER TAKE A CLOSER LOOK AT THAT ONE.....                  * 00145700
                                  1468 *                                                                     * 00145800
                                  1469 *    IF I WROTE:                                                      * 00145900
                                  1470 *                                                                     * 00146000
002B14 D207 CB1A CB22 02B2C 02B28 1471          MVC    WORK,RATE  THE ASSEMBLER WOULD HAVE TO OBTAIN THE     * 00146100
                                  1472 *                            LENGTH FROM THE LENGTH ATTRIBUTE OF THE  * 00146200
002B20                            1473 WORK       DS     D          FIELD DEFINED AS 'WORK'(THE FIRST OPERAND). * 00146300
002B28                            1474 RATE       DS     F          'WORK'IS STATED TO BE A DOUBLE WORD(LENGTH  * 00146400
002B2C                            1475 HOURS      DS     H          ATTRIBUTE OF 8). THEREFOR IF WE EXAMINE THE * 00146500
002B30                            1476 AREA       DS     F          ASSEMBLED 'MVC' WE'LL SEE THAT THE LENGTH   * 00146600
                                  1477 *                            ASSIGNED BY THE ASSEMBLER IS 8. OF COURSE,  * 00146700
                                  1478 *                            THE LENGTH IN THE ASSEMBLED INSTRUCTION     * 00146800
                                  1479 *                            SHOWS UP AS 7.                              * 00146900
                                  1480 *                                                                     * 00147000
                                  1481 ************************************************************************ 00147100
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
1484 *$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.27 $$$$$$$$$$$$$$$$$$$$$$$$$$ 00147400
1485 *$                                                                    $ 00147500
1486 *$                          M A T C H   T H E S E:                    $ 00147600
1487 *$                                                                    $ 00147700
1488 *$            INSTRUCTION                      LENGTH SPECIFICATION   $ 00147800
1489 *$            ++++++++++++                     ++++++++++++++++++++++ $ 00147900
1490 *$                                                                    $ 00148000
1491 *$                                                                    $ 00148100
1492 *$            ___ A. UNPK  23(3,6),WORK(1)       1.IMPLIED LENGTH.    $ 00148200
1493 *$                                                                    $ 00148300
1494 *$            ___ B. MVC FIELD1(8),FIELD2        2.EXPLICIT LENGTH.   $ 00148400
1495 *$                                                                    $ 00148500
1496 *$            ___ C. MVC FIELD1(,12),FIELD2      3.BOTH IMPLIED AND   $ 00148600
1497 *$                                                 EXPLICIT LENGTHS   $ 00148700
1498 *$            ___ D. PACK TEMP(3),JUNK             IN THE SAME INST.  $ 00148800
1499 *$                                                                    $ 00148900
1500 *$            --- E. OC    ME,YOU                4. NO LENGTH NEEDED  $ 00149000
1501 *$                                                                    $ 00149100
1502 *$            ___ F. TRT   NANN(10),EEGOAT                            $ 00149200
1503 *$                                                                    $ 00149300
1504 *$                                                                    $ 00149400
1505 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00149500
```

```
1508 *============================== ANSWER 2.27 ============================== 00149800
1509 *=                                                                       = 00149900
1510 *=                        _2_ A. UNPK    23(3,6),WORK(1)                  = 00150000
1511 *=                                                                       = 00150100
1512 *=                        _2_ B. MVC     FIELD1(8),FIELD2                 = 00150200
1513 *=                                                                       = 00150300
1514 *=                        _1_ C. MVC     FIELD1(,12),FIELD2               = 00150400
1515 *=                                                                       = 00150500
1516 *=                        _3_ D. PACK    TEMP(3),JUNK                     = 00150600
1517 *=                                                                       = 00150700
1518 *=                        _1_ E. OC      ME,YOU                           = 00150800
1519 *=                                                                       = 00150900
1520 *=                        _2_ F. TRT     NANN(10),EEGOAT                  = 00151000
1521 *=                                                                       = 00151100
1522 *=                                                                       = 00151200
1523 *=                                                                       = 00151300
1524 *======================================================================== 00151400
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
1527 ********************************************************************** 00151700
1528 *                                                                    * 00151800
1529 *   O THAT CONCLUDES SECTION 2 AND THIS PROJECT. PLEASE NOTIFY YOUR  * 00151900
1530 *       INSTRUCTOR OF YOUR COMPLETION BY DISPLAYING THE              * 00152000
1531 *                        R E D   A N S W E R C U E                   * 00152100
1532 *                                                                    * 00152200
1533 *                                                                    * 00152300
1534 *   O PLEASE USE THIS SHEET FOR ANY COMMENTS YOU MAY HAVE CONCERNING  * 00152400
1535 *       THE PROJECT.                                                 * 00152500
1536 *                                                                    * 00152600
1537 *                                                                    * 00152700
1538 *   O THE APPENDICES FOLLOW,YOU MAY EXAMINE THEM AT YOUR CONVIENCE.  * 00152800
1539 *                                                                    * 00152900
1540 ********************************************************************** 00153000


1542 ****************************  C O M M E N T S  ********************** 00153200
```

```
                                1545 *%%%%%%%%%%%%%%%%%%%%%%%%% APPENDIX A %%%%%%%%%%%%%%%%%%%%%%%%%%% 00153500
                                1546 *%                                                                  % 00153600
                                1547 *%        ////////////////////////////////////////////////          % 00153700
                                1548 *%        /MORE EXAMPLES OF SYMBOLIC LENGTH ATTRIBUTES/             % 00153800
                                1549 *%        ////////////////////////////////////////////////          % 00153900
                                1550 *%                                                                  % 00154000
                                1551 *%                                                                  % 00154100
                                1552 *%                                                                  % 00154200
                                1553 *%                                                                  % 00154300
002B34                          1554 A1         DS    CL8                                                % 00154400
002B3C C1C2                     1555 B2         DC    CL2'AB'          MOVES CONTENTS OF B2 INTO         % 00154500
002B3E D201 CB2E CB36 02B34 02B3C 1556 HIORD    MVC   A1(L'B2),B2      LEFTMOST 2 BYTES OF A1            % 00154600
002B44 D201 CB34 CB36 02B3A 02B3C 1557 LOORD    MVC   A1+L'A1-L'B2(L'B2),B2    MOVES CONTENTS OF B2 INTO % 00154700
                                1558 *%                                        RIGHTMOST 2 BYTES OF A1   % 00154800
002B4A D201 CB30 CB36 02B36 02B3C 1559          MVC   A1+L'B2(L'B2),B2         MOVES CONTENTS OF B2 INTO % 00154900
                                1560 *%                                        THIRD AND FOURTH POSITION % 00155000
                                1561 *%                                        OF A1                     % 00155100
                                1562 *%                                                                  % 00155200
                                1563 *%                                                                  % 00155300
                                1564 *%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% 00155400
```

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                   1566 *%%%%%%%%%%%%%%%%%%%%%%%%%%%% APPENDIX B %%%%%%%%%%%%%%%%%%%%%%%%%%%% 00155600
                                   1567 *%                                                                      % 00155700
                                   1568 *%  ////////////////////////////////////////////////////////////        % 00155800
                                   1569 *%  /M O R E   E X A M P L E S   O F   U S I N G   S E L F/            % 00155900
                                   1570 *%  /          D E F I N I N G   T E R M S .....          /            % 00156000
                                   1571 *%  ////////////////////////////////////////////////////////////        % 00156100
                                   1572 *%                                                                      % 00156200
                                   1573 *%                                                                      % 00156300
                                   1574 *%              /////////                                               % 00156400
                                   1575 *%              /DECIMAL/                                               % 00156500
                                   1576 *%              /////////                                               % 00156600
                                   1577 *%                                                                      % 00156700
                                   1578 *%                                                                      % 00156800
002B50 1AAC                        1579          AR     10,12           DEFINING REGISTERS                      % 00156900
002B52 9504 CB2A       02B30       1580          CLI    AREA,4          IMMEDIATE DATA IN DECIMAL(COULD BE X'') % 00157000
002B56 9108 CB2A       02B30       1581          TM     AREA,8          MASKS                                   % 00157100
002B5A D203 CBD6 0FFF  02BDC 00FFF 1582          MVC    FIELD,4095      ADDRESS                                 % 00157200
002B60 4A10 CB2C             02B32 1583          AH     1,AREA+2        ADDRESS INCREMENT                       % 00157300
                                   1584 *%                                                                      % 00157400
                                   1585 *%                                                                      % 00157500
                                   1586 *%              //////////////                                          % 00157600
                                   1587 *%              /HEXADECIMAL/                                           % 00157700
                                   1588 *%              //////////////                                          % 00157800
                                   1589 *%                                                                      % 00157900
                                   1590 *%                                                                      % 00158000
002B64 1AAC                        1591          AR     X'A',X'C'       DEFINING REGISTERS                      % 00158100
002B66 9504 CB2A       02B30       1592          CLI    AREA,X'4'       IMMEDIATE DATA                          % 00158200
002B6A 9108 CB2A       C2B30       1593          TM     AREA,X'08'      MASKS                                   % 00158300
002B6E D203 CBD6 0FFF  02BDC 00FFF 1594          MVC    FIELD,X'FFF'    ADDRESS                                 % 00158400
002B74 4A10 CB2C             02B32 1595          AH     1,AREA+X'02'    ADDRESS INCREMENT                       % 00158500
                                   1596 *%                                                                      % 00158600
                                   1597 *%                                                                      % 00158700
                                   1598 *%              ////////                                                % 00158800
                                   1599 *%              /BINARY/                                                % 00158900
                                   1600 *%              ////////                                                % 00159000
                                   1601 *%                                                                      % 00159100
                                   1602 *%                                                                      % 00159200
002B78 1A12                        1603          AR     B'1',B'10'      DEFINE REGISTERS                        % 00159300
002B7A 9504 CB2A       02B30       1604          CLI    AREA,B'0100'    IMMEDIATE DATA                          % 00159400
002B7E 9108 CB2A       02B30       1605          TM     AREA,B'1000'    MASK                                    % 00159500
                                   1606 *%                                                                      % 00159600
                                   1607 *%                                                                      % 00159700
                                   1608 *%              ///////////                                             % 00159800
                                   1609 *%              /CHARACTER/                                             % 00159900
                                   1610 *%              ///////////                                             % 00160000
                                   1611 *%                                                                      % 00160100
                                   1612 *%                                                                      % 00160200
002B82 92D3 CBD6       02BDC       1613          MVI    FIELD,C'L'      IMMEDIATE DATA                          % 00160300
002B86 91F1 CB2A       02B30       1614          TM     AREA,C'1'       MASK  1111  0001                       % 00160400
002B8A 97F3 CB2A       02B30       1615          XI     AREA,C'3'       IMMEDIATE DATA                          % 00160500
                                   1616 *%                                                                      % 00160600
                                   1617 *%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% 00160700
```

```
                        1620 ****************************** A P P E N D I X   C ********************** 00161000
                        1621 *              ////////////////////////////                              * 00161100
                        1622 *              /BINARY CONSTANTS ( B TYPE )/                             * 00161200
                        1623 *              ////////////////////////////                              * 00161300
                        1624 *                                                                        * 00161400
                        1625 *     0  A BINARY CONSTANT IS WRITTEN USING 1'S AND 0'S ENCLOSED IN      * 00161500
                        1626 *          APOSTROPHES. THE IMPLIED LENGTH OF A BINARY CONSTANT IS THE   * 00161600
                        1627 *          NUMBER OF BYTES OCCUPIED BY THE CONSTANT INCLUDING ANY        * 00161700
                        1628 *          PADDING NECESSARY. PADDING AND TRUNCATION TAKES PLACE ON      * 00161800
                        1629 *          THE LEFT.                                                     * 00161900
                        1630 *                                                                        * 00162000
                        1631 *                                                                        * 00162100
002B8E AA               1632 NAME6     DC    B'10101010'     UP TO 256 BYTES LONG                     * 00162200
002B8F 01               1633 NAME7     DC    B'01'           PADDING (LEFT WITH ZEROS)                * 00162300
002B90 55               1634           DC    BL1'101010101' TRUNCATION (LEFT)                         * 00162400
002B91 AFAF             1635           DC    2B'10101111'    DUP FACTOR                               * 00162500
                        1636 *               NAME6 AND NAME7 BOTH HAVE LENGTH ATTRIBUTES OF ONE       * 00162600
                        1637 *                                                                        * 00162700
                        1638 ************************************************************************** 00162800

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                        1640 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.S1 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00163000
                        1641 *$                                                                       $ 00163100
                        1642 *$                                                                       $ 00163200
                        1643 *$          GIVEN THE FOLLOWING BINARY TYPE CONSTANT:                    $ 00163300
                        1644 *$                                                                       $ 00163400
                        1645 *$               DC   BL2'1111101110111101111011'                        $ 00163500
                        1646 *$                                                                       $ 00163600
                        1647 *$          WHAT WILL THE ASSEMBLER GENERATE AS A RESULT OF THIS          $ 00163700
                        1648 *$              DEFINE CONSTANT ????                                     $ 00163800
                        1649 *$                                                                       $ 00163900
                        1650 *$                   THE ANSWER IS _____.....                            $ 00164000
                        1651 *$                                                                       $ 00164100
                        1652 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00164200
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  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                   1654 *================================ ANSWER 2.S1 ========================== 00164400
                                   1655 *=                              B   B   B   B                          = 00164500
                                   1656 *=                  HOW ABOUT 1011101110111011 =BBBB                   = 00164600
                                   1657 *=                      BINARY TYPE CONSTANTS OPERATE ON A BYTE BY BYTE = 00164700
                                   1658 *=                       BASIS EVEN THOUGH THEY'RE SPECIFIED IN        = 00164800
                                   1659 *=                       BITS(1) AND NOBITS(0). BY SAYING L2 WE TELL THE = 00164900
                                   1660 *=                       ASSEMBLER WE WANT 2 BYTES. AGAIN I HEAR YOU SAY, = 00165000
                                   1661 *=                       "WHICH 2 ?" WELL I'LL TELL YOU. BINARY TYPE   = 00165100
                                   1662 *=                       CONSTANTS TRUNCATE ON THE LEFT,SO WE CUT OFF THE = 00165200
                                   1663 *=                       1111. IF OUR DUPLICATION FACTOR HAD BEEN GREATER = 00165300
                                   1664 *=                       THAN ONE,THE ANSWER WOULD HAVE BEEN DUPLICATED = 00165400
                                   1665 *=                       THE SPECIFIED NUMBER OF TIMES. IF YOU'RE STILL = 00165500
                                   1666 *=                       A WEE BIT HAZY TALK TO YOUR INSTRUCTOR.....   = 00165600
                                   1667 *=                                                                     = 00165700
                                   1668 *=            I'LL ISSUE THE DC JUST TO SEE IF I'M RIGHT..             = 00165800
                                   1669 *=                                                                     = 00165900
002B93 BBBB                        1670               DC BL2'1111101110111011'   LET'S LOOK AT THE ASSEMBLED = 00166000
                                   1671 *=                                         NUMBER ON THE LEFT.         = 00166100
                                   1672 *=                                                                     = 00166200
                                   1673 *================================================================== 00166300


                                   1675 *                ////////////////////////////////////          * 00166500
                                   1676 *                /PACKED DECIMAL CONSTANTS ( P TYPE )/          * 00166600
                                   1677 *                ////////////////////////////////////          * 00166700
                                   1678 *                                                               * 00166800
                                   1679 *     O A DECIMAL CONSTANT IS WRITTEN AS A SIGNED OR UNSIGNED DECIMAL * 00166900
                                   1680 *         VALUE. IF THE SIGN IS OMITTED,A PLUS SIGN IS ASSUMED.NO   * 00167000
                                   1681 *         BOUNDARY ALIGNMENT IS PERFORMED.                          * 00167100
                                   1682 *                                                                   * 00167200
002B95 18725C                      1683               DC    P'+18725'      UP TO 16 BYTES (31 DIGITS AND SIGN) * 00167300
002B98 18725C                      1684               DC    P'+187.25'     DECIMAL POINT IS PROGRAMMERS REFERENCE * 00167400
002B9B 18725C                      1685               DC    P'18725'       PLUS SIGN IS ASSUMED                * 00167500
002B9E 18725D                      1686               DC    P'-18725'      MINUS SIGN                          * 00167600
002BA1 00015C                      1687               DC    PL3'15'        PADDING (LEFT WITH ZEROS)           * 00167700
002BA4 01369C                      1688               DC    PL3'13.69'                                         * 00167800
002BA7 369C                        1689               DC    PL2'13.69'     TRUNCATION (LEFT)                   * 00167900
002BA9 123D123D                    1690               DC    2P'-123'       DUP FACTOR                          * 00168000
                                   1691 *                                                                    * 00168100
                                   1692 ********************************************************************** 00168200


                                   1694 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.S2 $$$$$$$$$$$$$$$$$$$$$$$ 00168400
                                   1695 *$                                                                   $ 00168500
                                   1696 *$       DC 2PL2'1234'  WILL GENERATE WHICH OF THE FOLLOWING?        $ 00168600
                                   1697 *$                                                                   $ 00168700
                                   1698 *$                  A. F1F2F3C4F1F2F3C4                              $ 00168800
                                   1699 *$                  B. F2F3C4F2F3C4                                  $ 00168900
                                   1700 *$                  C. 234C234C                                      $ 00169000
                                   1701 *$                  D. 123C123C                                      $ 00169100
                                   1702 *$                                    THE ANSWER IS_____.            $ 00169200
                                   1703 *$                                                                   $ 00169300
                                   1704 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00169400
```

```
                        17C6 *============================ ANSWER 2.S2 ============================== 00169600
                        1707 *=                                                                    = 00169700
                        1708 *=                                                                    = 00169800
                        1709 *=       C IS THE CORRECT ANSWER.  THE DATA IS GENERATED IN PACKED     = 00169900
                        1710 *=           DECIMAL FORMAT AND THE P TYPE CONSTANTS TRUNCATE LEFT.    = 00170000
                        1711 *=                                                                    = 00170100
                        1712 *=                                                                    = 00170200
                        1713 *==================================================================== 00170300


                        1715 *             ////////////////////////////////////                   * 00170500
                        1716 *             /ZONED DECIMAL CONSTANTS ( Z TYPE )/                   * 00170600
                        1717 *             ////////////////////////////////////                   * 00170700
                        1718 *                                                                    * 00170800
                        1719 *    0  IF ZONED DECIMAL FORMAT IS SPECIFIED EACH DIGIT IS TRANSLATED * 00170900
                        1720 *       INTO ONE BYTE. THE RIGHTMOST BYTE CONTAINS THE SIGN AS WELL  * 00171000
                        1721 *       AS THE RIGHT MOST DIGIT. YOU PROBABLY REMEMBER WE USED THIS  * 00171100
                        1722 *       TYPE OF CONSTANT IN THE FIRST WORK PROJECT.                  * 00171200
                        1723 *                                                                    * 00171300
                        1724 *                                                                    * 00171400
002BAD F1F8F7F2C5       1725          DC    Z'+18725'      UP TO 16 BYTES (16 DIGITS AND A SIGN)  * 00171500
002BB2 F1F8F7F2C5       1726          DC    Z'+187.25'     DECIMAL POINT IS PROGRAMMERS REFERENCE * 00171600
002BB7 F1F8F7F2C5       1727          DC    Z'18725'       PLUS SIGN IS ASSUMED                   * 00171700
002BBC F1F8F7F2D5       1728          DC    Z'-18725'      MINUS SIGN                             * 00171800
122 002BC1 F0F1C5       1729          DC    ZL3'15'        PADDING (LEFT WITH ZEROS 'F0')         * 00171900
002BC4 F6C9             1730          DC    ZL2'13.69'     TRUNCATION (LEFT)                      * 00172000
002BC6 F1F2D3F1F2D3     1731          DC    2Z'-123'       DUP FACTOR                             * 00172100
                        1732 *                                                                    * 00172200
                        1733 ************************************************************************ 00172300


                        1735 *$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 2.S3 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00172500
                        1736 *$                                                                    $ 00172600
                        1737 *$                                                                    $ 00172700
                        1738 *$          GIVEN THE FOLLOWING FIELD IN CORE:                        $ 00172800
                        1739 *$              F5F7F6F4F3F5D5                                        $ 00172900
                        1740 *$                                                                    $ 00173000
                        1741 *$       WHICH OF THE FOLLOWING DC'S COULD HAVE BEEN ISSUED TO        $ 00173100
                        1742 *$          GENERATE THIS FIELD ?                                     $ 00173200
                        1743 *$                                                                    $ 00173300
                        1744 *$            A. DC   Z'5764355'                                      $ 00173400
                        1745 *$            B. DC   Z'-F5F7F6F4F3F5D5'                              $ 00173500
                        1746 *$            C. DC   Z'-5764355'                                     $ 00173600
                        1747 *$            D. DC   P'-5764355'                                     $ 00173700
                        1748 *$                                                                    $ 00173800
                        1749 *$                                    THE CORRECT ANSWER IS____....   $ 00173900
                        1750 *$                                                                    $ 00174000
                        1751 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00174100
```

```
                        1753 *========================== ANSWER 2.S3 ================================ 00174300
                        1754 *=                                                                    = 00174400
                        1755 *=                                                                    = 00174500
                        1756 *=        C IS CORRECT..... REMEMBER THE FIELD IS MINUS.(THE RIGHT- = 00174600
                        1757 *=                              MOST BYTE IS D5)                      = 00174700
                        1758 *==================================================================== 00174800




                        1760 *%%%%%%%%%%%%%%%%%%%%%%%% A P P E N D I X   D  %%%%%%%%%%%%%%%%%%%%% 00175000
                        1761 *%                                                                    % 00175100
                        1762 *%                  F I X E D   P O I N T   C O N S T A N T S         % 00175200
                        1763 *%            W I T H   F R A C T I O N A L   V A L U E S             % 00175300
                        1764 *%                              (SCALING FACTOR)                      % 00175400
                        1765 *%                                                                    % 00175500
                        1766 *%                                                                    % 00175600
                        1767 *% O SEE THE POWERS OF TWO TABLE AND THE HEXADECIMAL FRACTION          % 00175700
                        1768 *%    CONVERSION CHART IN THE APPENDICES OF THE  P. OF O.             % 00175800
                        1769 *%    MANUAL FOR INFORMATION ON THE CONVERSION OF THE NUMBERS TO THE  % 00175900
                        1770 *%    RIGHT OF A DECIMAL POINT FROM HEX TO DECIMAL. IF YOU NEED HELP  % 00176000
                        1771 *%    SEE YOUR INSTRUCTOR.                                            % 00176100
                        1772 *%                                                                    % 00176200
123 002BCC 0324         1773          DC    HS8'3.1416'     SCALE MODIFIER                       % 00176300
    002BCE 0324         1774          DC    HS8'3.1415987'                                       % 00176400
    002BD0 FCDC         1775          DC    HS8'-3.1416'    MINUS                                % 00176500
    002BD2 B800         1776          DC    HS8'31416'      TRUNCATION (LEFT)-NOTE ERROR MSG.    % 00176600
          *** ERROR ***
    002BD4 0009         1777          DC    HS8'3.50E-2'    EXPONENT                             % 00176700
    002BD6 00A001950640 1778          DC    HS4'10,25.3,100'    MULTIPAL CONSTANTS (EACH WITH FOUR % 00176800
                        1779 *%                                                  DECIMAL PLACES)% 00176900
                        1780 *%                                                                    % 00177000
                        1781 *%                                                                    % 00177100
                        1782 *%                                                                    % 00177200
                        1783 *%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% 00177300
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                    00177500
002BDC                            1785 FIELD    DS    F                     00177500
002BE0 12345C                     1786 FIELDA   DC    P'12345'              00177600
002BE3 67890C                     1787 FIELDB   DC    P'67890'              00177700
002BE8                            1788 SAVER    DS    18F                   00177800
                                  1789          END                         00177900
```

POS.ID	REL.ID	FLAGS	ADDRESS
01	01	0C	0021B0
01	01	08	0021B4
01	01	0C	0021B8
01	01	0C	0021BC
01	01	0C	0021C0
01	01	04	0021C8
01	01	0C	002AD0
01	01	0C	002AD4
01	01	0C	002AD8
01	01	0C	002AEC

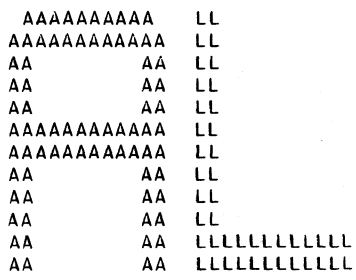
9/16/70

SYMBOL	LEN	VALUE	DEFN	REFERENCES
AREA	00004	002B30	01476	0965 0966 0967 0969 1242 1245 1255 1580 1581 1583 1592 1593 1595 1604 1605 1614 1615
AREAEND	00001	002447	00692	
AREA5	00080	0023CC	00684	
AREA6	00001	00241C	00686	
AREA7	00004	002420	00687	
AREA8	00008	002428	00688	
A1	00008	002B34	01554	1556 1557 1557 1559
B2	00002	002B3C	01555	1556 1556 1557 1557 1557 1559 1559 1559
COOL2	00001	002000	00001	0539 0539 0539
DATE	00006	00246A	00735	
DAY	00002	00246A	00736	
EXPRSON	00004	002A74	00956	0957
FEDTAX	00006	002482	00741	
FIELD	00004	002BDC	01785	1240 1246 1582 1594 1613
FIELDA	00003	002BE0	01786	0956
FIELDB	00003	002BE3	01787	0956
FULLWD	00004	002448	00697	
FUNCTION	00001	0021CC	00572	0572
GOTOIT	00070	00244C	00973	
GROSS	00008	00247A	00740	
HEREIAM	00070	00244C	00972	0973
HIORD	00006	002B3E	01556	
HOURS	00002	002B2C	01475	1453 1455
LGTH4	00004	002194	00434	
LOORD	00006	002B44	01557	
LTHATBU2	00002	0021A0	00435	
MONTH	00002	00246C	00737	
NAME	00020	002456	00734	
NAME1	00016	0020CF	00314	0535 0537 0550 0553 1236 1250
NAME2	00002	0020DF	00315	1236 1250
NAME3	00004	0020EF	00316	1236 1250
NAME4	00004	00214D	00373	
NAME5	00012	002159	00374	
NAME6	00001	002B8E	01632	
NAME7	00001	002B8F	01633	
PAYNO	00006	002450	00733	
RATE	00004	002B28	01474	1453 1471
RDAREA	00070	00244C	00731	0971
REGA	00001	000005	01008	1011
REGB	00001	000004	01009	1011 1017
REGC	00001	000002	01010	1011
REGD	00001	000003	01011	1017
REG2	00001	000002	00960	0965 0966 0967 0968 0969
SAMEBASE	00052	0020FF	00317	
SAVER	00004	002BE8	01788	0006
SYMBOL	00004	002A74	00957	
TBLE	00001	0022CC	00619	0619
WORK	00008	002B20	01473	1455 1471
YEAR	00002	00246E	00738	
YOUUSEME	00070	00244C	00971	0972

```
STMT  ERROR CODE   MESSAGE

      IEU046       AT LEAST ONE RELOCATABLE Y-TYPE CONSTANT IN ASSEMBLY
 1244 IEU015       NEAR OPERAND COLUMN  10--INVALID LITERAL USAGE
 1776 IEU017       NEAR OPERAND COLUMN   5--DATA ITEM TOO LARGE


    2 STATEMENTS FLAGGED IN THIS ASSEMBLY
    8 WAS HIGHEST SEVERITY CODE
*STATISTICS*     SOURCE RECORDS (SYSIN) =  1779
*OPTIONS IN EFFECT*   LIST, NODECK, LOAD, NORENT, XREF, NOTEST, ALGN, OS, LINECNT =  55
 2032 PRINTED LINES
```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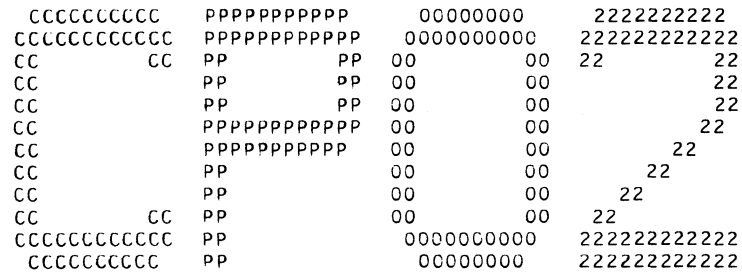
AA AA LL
AA AA LL
AAAAAAAAAAAA LL
AAAAAAAAAAAA LL
AA AA LL
AA AA LL
AA AA LL
AA AA LLLLLLLLLLLL
AA AA LLLLLLLLLLLL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CCCCCCCCCCCC PPPPPPPPPPPP 0000000000 222222222222
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CC PP PP 00 00 22
CC PP PP 00 00 22
CC PPPPPPPPPPPP 00 00 22
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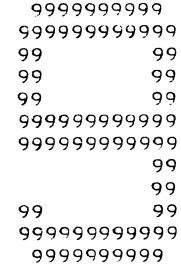
9999999999
999999999999
99 99
99 99
99 99
999999999999
999999999999
99
99
99 99
999999999999
9999999999

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 3/18/70

```
                            ********** P I C T U R E **********
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *  AREACIRC=πR²                    *
                            *                                  *
                            *  AREASQRE=L*W                    *
                            *                                  *
                            *  AREATRI=1/2 base*ALT.           *
                            *  π = 3.1416                      *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
                            *                                  *
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                            *                                  *
                            *                                  *
                            *                                  *
                            ************************************
```

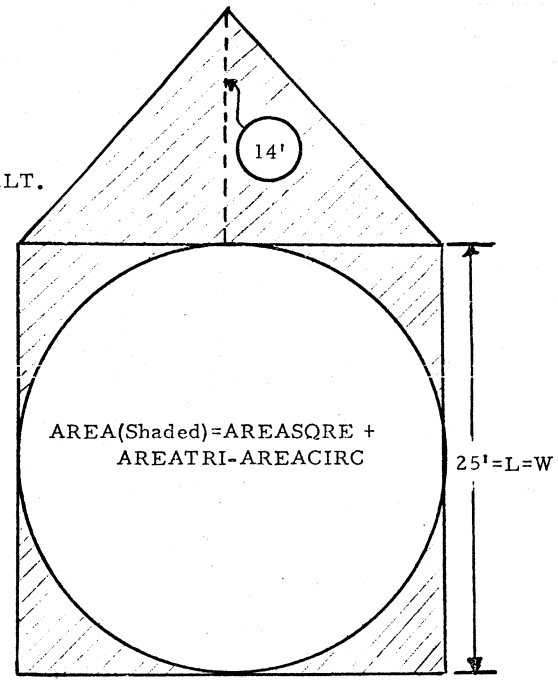

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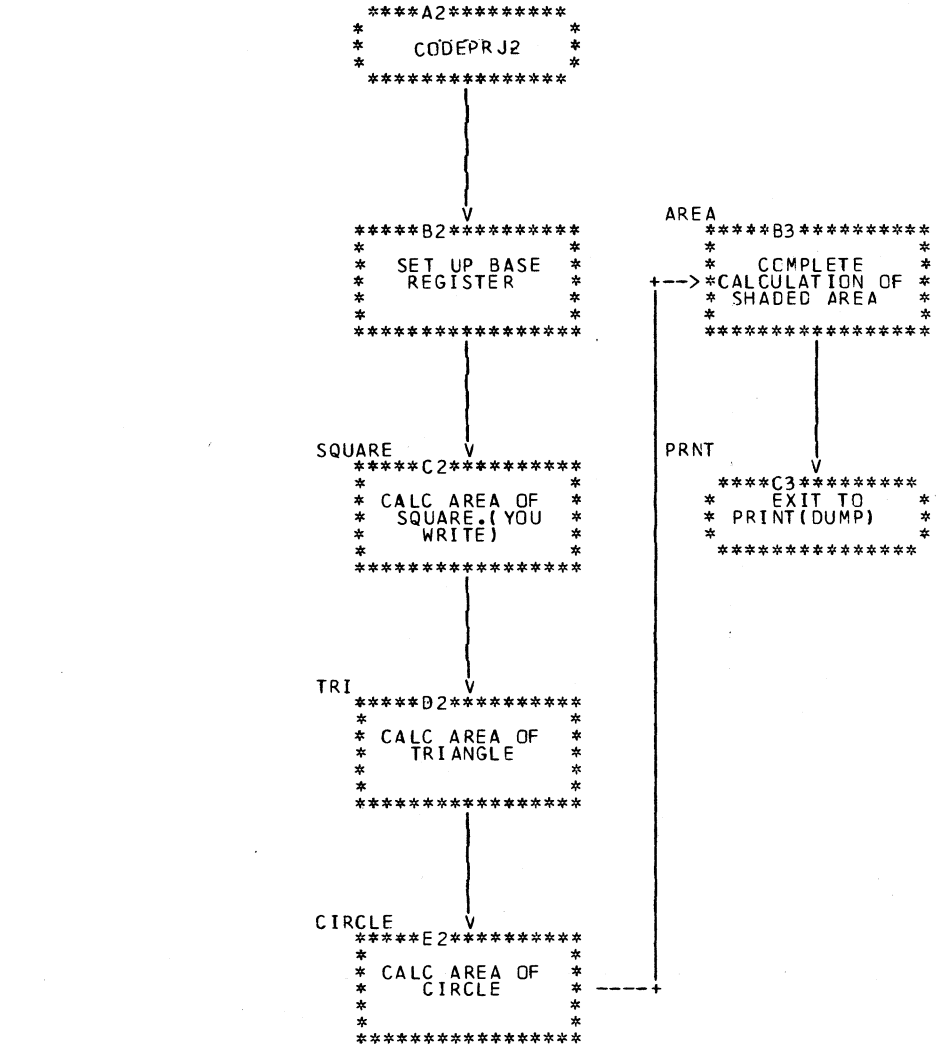
CHART CODEPRJ2
PAGE 1



```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

001000                             1 CODEPRJ2 START X'1000'                  'HOLE IN THE HOUSE'
                                   2 ************************************************************************
                                   3 **                                                                    *
                                   4 **       THIS ROUTINE CALCULATES THE AREA OF THE SHADED PORTION OF
                                   5 **       THE 'HOLE IN THE HOUSE'. THE FORMULAS USED ARE THOSE SHOWN
                                   6 **       IN THE PICTURE AND ON FIGURE 01.010. YOU SHOULD PLACE THE
                                   7 **       CARDS YOU HAVE PUNCHED TO CALCULATE THE AREA OF THE SQUARE
                                   8 **       FOLLOWING THE CARD.....SQUARE  EQU  *....
                                   9 **                S A V E   T H I S   D E C K   F O R   L A T E R
                                  10 **                                        U S E
                                  11 **
                                  12 **
                                  13 ************************************************************************
001000 05C0                       14          BALR  12,0          SET UP BASE REG
001002                            15          USING *,12          TELL ASSEMBLER ABOUT IT
                                  16 *                             FIND THE AREA OF THE SQUARE
C01002                            17 SQUARE   EQU   *             PUT CARDS YOU PUNCHED FOLLOWING THIS CARD


C01002                            19 TRI      EQU   *             AREA OF TRIANGLE CALC HERE
001002 F871 C096 C090 C098 01092  20          ZAP   WRKA(8),LNGH  START CALC AREA OF TRIANGLE
001008 FC71 C096 CCAA C098 010AC  21          MP    WRKA(8),TEN   1/2 BASE TIMES ALT
00100E FD70 C096 C095 01098 01097 22          DP    WRKA(8),HALF
001014 F876 C0AE C096 010B0 01098 23          ZAP   BHOLD,WRKA(7)
00101A D207 C096 C0AE 01098 010B0 24          MVC   WRKA,BHOLD
001020 FC71 C096 CC8E 01098 01090 25          MP    WRKA(8),HITE
001026 FD71 C096 C0AA 01098 010AC 26          DP    WRKA(8),TEN
00102C F875 CC9E C096 010A0 01098 27          ZAP   WRKB(8),WRKA(6)
C01032 D203 C0B6 C0A2 010B8 010A4 28          MVC   ARTRI,WRKB+4
C01038 D203 C0BA C0B6 010BC 010B8 29          MVC   TOTAR,ARTRI
C0103E FA33 C0BA C0A6 010BC 010A8 30          AP    TOTAR,SQARA   ADD AREA OF SQUARE TO AREA OF TRIANGLE
001044                            31 CIRCLE   EQU   *             FIND AREA OF CIRCLE
001044 F877 C096 C0AE 01098 010B0 32          ZAP   WRKA,BHOLD    PI *R**2
00104A FC71 C096 C0B4 01098 010B6 33          MP    WRKA,BHOLD+6(2)
001050 F8B7 C0BE C096 010C0 01098 34          ZAP   WRKC(12),WRKA
001056 FCB2 C0BE CC92 C10C0 01094 35          MP    WRKC(12),PY
00105C FDB1 C0BE C0AA 010C0 010AC 36          DP    WRKC(12),TEN
001062 F8B9 C0DA C0BE 010DC 010C0 37          ZAP   WRKD(12),WRKC(10)
001068 D20B C0CE C0DA C10D0 010DC 38          MVC   CIRAR(12),WRKD
00106E                            39 AREA     EQU   *             COMPLETE CALCULATIONS OF SHADED AREA
00106E D203 C0F2 C0BA 010F4 010BC 40          MVC   FINTOT+12(4),TOTAR
001074 FCF3 C0E6 CCCA 010E8 010CC 41          MP    FINTOT(16),ZR05
00107A FBFB C0E6 C0CE 010E8 010D0 42          SP    FINTOT(16),CIRAR(12)
001080                            43 PRNT     EQU   *             MAKE THE TOTAL PRINTABLE
001080 D20B C112 C0F6 01114 010F8 44          MVC   WRKE(12),PTRN
001086 DE0B C112 C0F1 01114 010F3 45          ED    WRKE(12),FINTOT+11      EDIT FINAL TOTAL INTO PRINTABLE
                                  46 *                                      FORM
00108C 00000000                   47          DC    F'0'           PROG CHECK
                                  48 *                             THESE ARE THE CONSTANTS
001090 014C                       49 HITE     DC    P'14'
001092 025C                       50 LNGH     DC    P'25' L E N G T H   O F   S I D E   O F   S Q U A R E .
001094 31416C                     51 PY       DC    P'31416'
001097 2C                         52 HALF     DC    P'2'
001098 0000000000000000           53 WRKA     DC    D'0'
```

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```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

0010A0 0000000000000000              54 WRKB     DC    D'0'
0010A8 00000000                      55 SQARA    DC    F'0'     P L A C E   A R E A   O F   S Q U A R E   HERE
0010AC 010C                          56 TEN      DC    P'10'
0010AE 0000
0010B0 0000000000000000              57 BHOLD    DC    D'0'
0010B8 00000000                      58 ARTRI    DC    F'0'
0010BC 00000000                      59 TOTAR    DC    F'0'
0010C0 0000000000000000              60 WRKC     DC    3F'0'
0010CC 0100000C                      61 ZR05     DC    P'100000'
0010D0 0000C0000000000C0             62 CIRAR    DC    3F'0'
0010DC 0000000000000000              63 WRKD     DC    3F'0'
0010E8 0000000000000000              64 FINTOT   DC    4F'0'
0010F8 40206B2020204B20              65 PTRN     DC    X'40206B2020204B20202C2020'
001104 40404040                      66          DC    4C' '
001108 D9C5E2E4D3E340C9              67          DC    C'RESULT IS'
001111 000000
001114 0000000000000000              68 WRKE     DC    3F'0'
001000                               69          END   CODEPRJ2
```

6/05/70

SYMBOL	LEN	VALUE	DEFN	REFERENCES										
AREA	00001	00106E	0039											
ARTRI	00004	0010B8	0058	0028	0029									
BHOLD	00008	0010B0	0057	0023	0024	0032	0033							
CIRAR	00004	0010D0	0062	0038	0042									
CIRCLE	00001	001044	0031											
CODEPRJ2	00001	001000	0001	0069										
FINTOT	00004	0010E8	0064	0040	0041	0042	0045							
HALF	00001	001097	0052	0022										
HITE	00002	001090	0049	0025										
LNGH	00002	001092	0050	0020										
PRNT	00001	001080	0043											
PTRN	00012	0010F8	0065	0044										
PY	00003	001094	0051	0035										
SQARA	00004	0010A8	0055	0030										
SQUARE	00001	001002	0017											
TEN	00002	0010AC	0056	0021	0026	0036								
TOTAR	00004	0010BC	0059	0029	0030	0040								
TRI	00001	001002	0019											
WRKA	00008	001098	0053	0020	0021	0022	0023	0024	0025	0026	0027	0032	0033	0034
WRKB	00008	0010A0	0054	0027	0028									
WRKC	00004	0010C0	0060	0034	0035	0036	0037							
WRKD	00004	0010DC	0063	0037	0038									
WRKE	00004	001114	0068	0044	0045									
ZR05	00004	0010CC	0061	0041										

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
107 PRINTED LINES

```
 AAAAAAAAAA   LL
AAAAAAAAAAAA  LL
AA          AA  LL
AA          AA  LL
AA          AA  LL
AAAAAAAAAAAA  LL
AAAAAAAAAAAA  LL
AA          AA  LL
AA          AA  LL
AA          AA  LL
AA          AA  LLLLLLLLLLLL
AA          AA  LLLLLLLLLLLL
```

```
TTTTTTTTTTTT   AAAAAAAAAA    2222222222
TTTTTTTTTTTT  AAAAAAAAAAAA  222222222222
     TT       AA          AA 22          22
     TT       AA          AA             22
     TT       AA          AA             22
     TT       AAAAAAAAAAAA             22
     TT       AAAAAAAAAAAA           22
     TT       AA          AA       22
     TT       AA          AA     22
     TT       AA          AA   22
     TT       AA          AA  222222222222
     TT       AA          AA  222222222222
```

```
 9999999999
999999999999
99          99
99          99
99          99
999999999999
999999999999
            99
            99
99          99
999999999999
 9999999999
```

```
                                                                                PAGE    1
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                  F01FEB69   3/18/70
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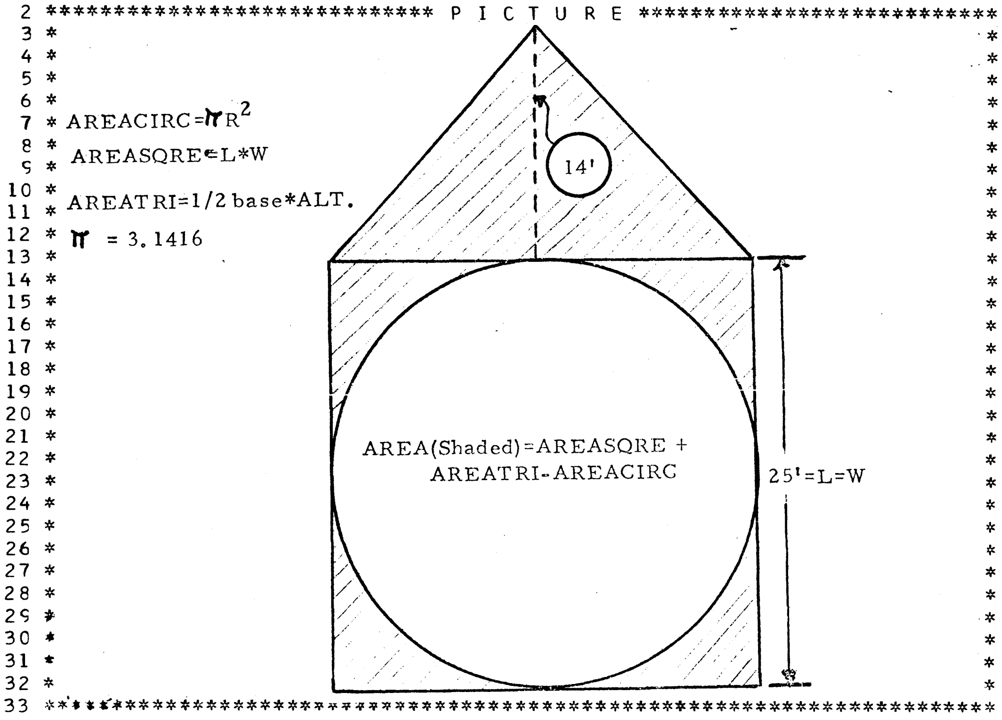


```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                                F08APR70   9/16/70

001000                                    35 BCOHEN   START X'1000'
001000 0580                               36          BALR  8,0                      SET UP BASE REGISTERS
001002                                    37          USING *,8
001002 D207 8080 8088 01082 0108A         38 AREATRI  MVC   HALFL,L                 PUT LENGTH IN HALFL
001008 FD70 8080,8098,01082 0109A         39          DP    HALFL,TWO                DIVIDE BY 2
00100E FC77 8090 8080 01092 01082         40          MP    HEIGHT,HALFL         TIMES  ALTITUDE
001014 FC62 8080 8084 01082 01086         41 AREACIRC MP HALFL(LOVER2),HALFL+4(LOVER2-4)     COMPUTE R SQUARE
00101A FC62 8080 807D 01082 0107F         42          MP    HALFL(LOVER2),PIE        R SQUARE TIMES PI
001020 FC73 8088 808C 0108A 0108E         43 AREASQRE MP    L,L+4(L'L-4)             LENGTH TIMES LENGTH
001026 F163 8080 8080 01082 01082         44          MVO   HALFL(LOVER2),HALFL(LOVER2-3)     RESOLVE DECIMAL PLACE
00102C F176 8088 8088 0108A 0108A         45          MVO   L,L(L'L-1)               RESOLVE DECIMAL PLACES
001032 FB76 8088 8080 0108A 01082         46          SP    L,HALFL(LOVER2)          COMPUTE AREASQ-AREACIRC
001038 FA77 8090 8088 01092 0108A         47          AP    HEIGHT,L                 ADD AREATRI
00103E F367 806E 8090 01070 01092         48          UNPK  ANS(7),HEIGHT(8)         MAKE IT PRINTABLE
001044 96F0 8074      01076               49          OI    ANS+6,X'F0'              LOW ORDER BYTE TOO
001048 D200 8075 8074 01077 01076         50          MVC   ANS+7(1),ANS+6           GET IT TO OUTPUT AREA
00104E 924B 8074      01076               51          MVI   ANS+6,C'.'               PUT DECIMAL POINT IN
001052 0000                               52          DC    H'00'                    CAUSES PROGRAM CHECK
001062                                    53          ORG   *+14                     FUNNY BUSINESS
001062 D9C5E2E4D3E340C5                   54 RESULT   DC    C'RESULT EQUALS          '   CONSTANTS
001078 40E2D84BC6E34B                     55          DC    C' SQ.FT.'
00107F 31416C                             56 PIE      DC    PL3'31416'
001082 F040404040404040                   57 HALFL    DC    CL8'0'
00108A 000000000000250C                   58 L        DC    PL8'250'                 ''
001092 000000000000014C                   59 HEIGHT   DC    PL8'14'                  ''
00109A 2C                                 60 TWO      DC    P'2'                     ''
001070                                    61          ORG   RESULT+14                MORE FUNNY BUSINESS
001070 4040404040404B40                   62 ANS      DC    C'       . '             OUTPUT AREA
000007                                    63 LOVER2   EQU   L'HALFL-L'TWO           GIVES A LENGTH WE CAN USE
001000                                    64          END   BCOHEN
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES									
ANS	00008	001070	00062	0048	0049	0050	0050	0051					
AREACIRC	00006	001014	00041										
AREASQRE	00006	001020	00043										
AREATRI	00006	001002	00038										
BCOHEN	00001	001000	00035	0064									
HALFL	00008	001082	00057	0038	0039	0040	0041	0041	0042	0044	0044	0046	0063
HEIGHT	00008	001092	00059	0040	0047	0048							
L	00008	00108A	00058	0038	0043	0043	0043	0045	0045	0045	0046	0047	
LOVER2	00001	000007	00063	0041	0041	0042	0044	0044	0046				
PIE	00003	00107F	00056	0042									
RESULT	00022	001062	00054	0061									
TWO	00001	00109A	00060	0039	0063								

NO STATEMENTS FLAGGED IN THIS ASSEMBLY

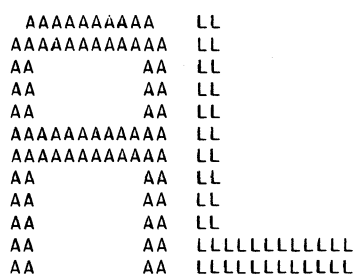
```
F.P. REGS.  80.001BC0 000198BC   00.0198FC 00000000   00.01B3C0 00036FC8   00.250600 D6C7F0F1

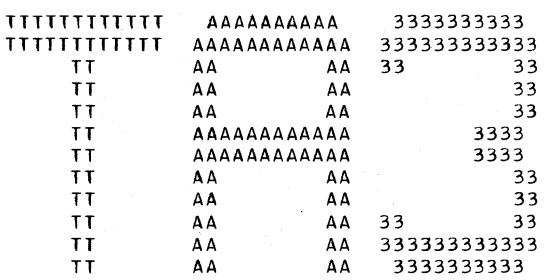
REGS 0-7     FFFFFF2E 000367F8 00C1ACFC 00000000    0001B060 0001B3C0 0001AE30 0001BD40
REGS 8-15    6F02A1C2 00000000 0001ADC8 000C0000    4007ECA2 00036768 0000C7D4 0002A1C0

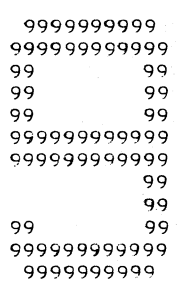
000000    00000000 00000000 00000000 00000000    0002A1C0 00000000 FFF50080 9F04EDD2  *.....................5.....K*
000020    00040003 50006A3E FFE50CC7 EF02A1D4    0000FF00 00000000 FE04000F 80000A1E  *.........V.....M.............*
000040    00070DA0 08000000 00070D98 00005920    02CC36A4 0000996C 00040000 00007498  *.............................*
000060    00040000 00007BC8 00040000 00007588    00000000 00012D10 C004000C 0000751A  *.......H.....................*

02A1C0    0580D2C7 80808088 FD708080 8098FC77    80908080 FC628080 8084FC62 8080807D  *..K.............................*
02A1E0    FC738088 808CF163 80808080 F1768088    8088FB76 80888080 FA778090 8088F367  *......1.....1.................3.*
02A200    806E8090 96F08074 D2008075 8074924B    80740000 600C600C 47F09CDC D503C020  *.....0..K.............0..N...*
02A220    94FED9C5 E2E4D3E3 40C5D8E4 C1D3E240    40404040 40404B40 40E2D84B C6E34B31  *..RESULT EQUALS      . SQ.FT..*
02A240    416C0000 00000012 5C0C0000 00000000    250C0000 00000000 014C2C12 540094F6  *.............................6*
02A260    90ECD00C 05C004FC 07004110 C0100511    0F02A304 7FFF0A0E 58B0001C 9110B074  *.......0.....................*

02A820    4A009BDE 40050000 47F095C6 48609BEE    8A600001 4770969E 48609C26 41660001  *.... ....0.F.................*
```

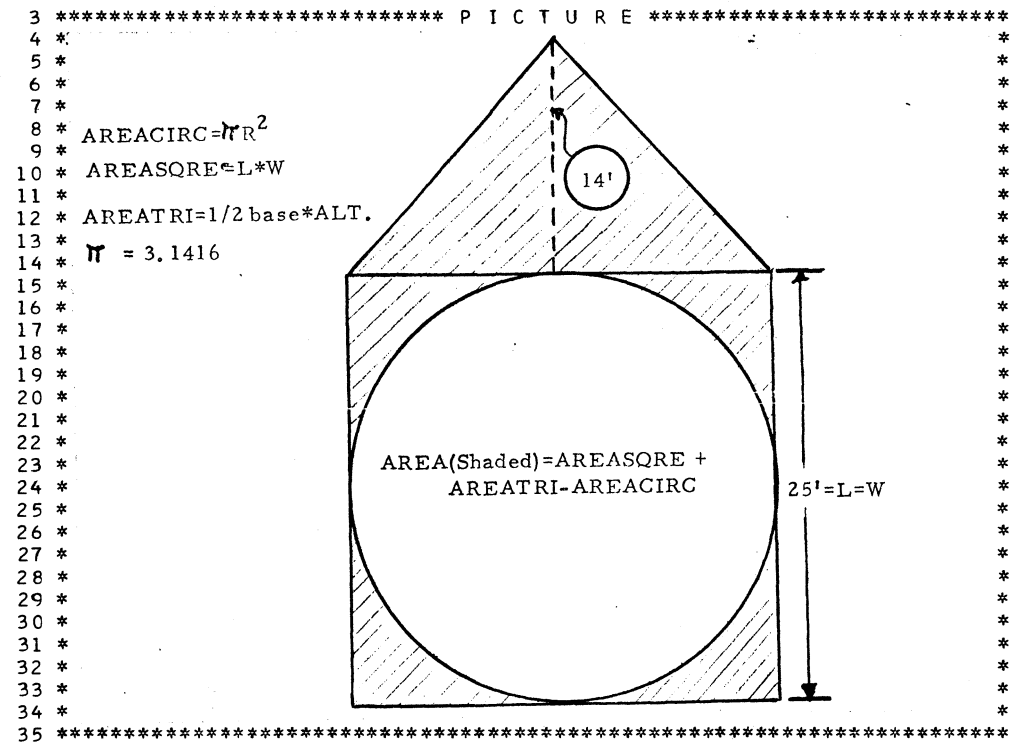

AAAAAAAAAA LL
AAAAAAAAAAAA LL
AA AA LL
AA AA LL
AA AA LL
AAAAAAAAAAAA LL
AAAAAAAAAAAA LL
AA AA LL
AA AA LL
AA AA LL
AA AA LLLLLLLLLLLL
AA AA LLLLLLLLLLLL


TTTTTTTTTTTT AAAAAAAAAA 3333333333
TTTTTTTTTTTT AAAAAAAAAAAA 333333333333
TT AA AA 33 33
TT AA AA 33
TT AA AA 33
TT AAAAAAAAAAAA 3333
TT AAAAAAAAAAAA 3333
TT AA AA 33
TT AA AA 33
TT AA AA 33 33
TT AA AA 333333333333
TT AA AA 3333333333


9999999999
999999999999
99 99
99 99
99 99
999999999999
999999999999
99
99
99 99
999999999999
9999999999

****

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 3/18/70



```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

001000                                 35 BCOHEN   START X'1000'
001000 0580                            36          BALR  8,0       SET UP BASE REGISTER
001002                                 37          USING *,8       TELL THE ASSEMBLER
001002 7820 8046            01048      38 AREASQRE LE    2,LENGTH
001006 7C20 8046            01048      39          ME    2,LENGTH
00100A 7020 8042            01044      40          STE   2,SQUARE
00100E 7820 8046            01048      41 AREATRI  LE    2,LENGTH
001012 3422                            42          HER   2,2
001014 7C20 804A            0104C      43          ME    2,HEIGHT
001018 7A20 8042            01044      44          AE    2,SQUARE
00101C 7840 8046            01048      45 AREACIRC LE    4,LENGTH
001020 3444                            46          HER   4,4
001022 3C44                            47          MER   4,4
001024 7C40 804E            01050      48          ME    4,PIE
001028 3B24                            49          SER   2,4
00102A 7020 803E            01040      50          STE   2,ANS
00102E 0000                            51          DC    H'00'
001030 D9C5E2E4D3E340C5                52 INHERE   DC    C'RESULT EQUALS'
00103D 000000
001040 00000000                        53 ANS      DC    F'0'
001044 00000000                        54 SQUARE   DC    F'0'
001048 42190000                        55 LENGTH   DC    E'.25E+2'
00104C 41E00000                        56 HEIGHT   DC    E'14'
001050 421F6A7F                        57 PIE      DC    E'31416E-3'
001054 43135200                        58 ANSSHDBE DC    E'309.125'        THIS IS WHAT THE ANSWER SHOULD BE.
001000                                 59          END   BCOHEN
```

9/16/70

SYMBOL	LEN	VALUE	DEFN	REFERENCES			
ANS	00004	001040	00053	0050			
ANSSHDBE	00004	001054	00058				
AREACIRC	00004	00101C	00045				
AREASQRE	00004	001002	00038				
AREATRI	00004	00100E	00041				
BCOHEN	00001	001000	00035	0059			
HEIGHT	00004	00104C	00056	0043			
INHERE	00013	001030	00052				
LENGTH	00004	001048	00055	0038	0039	0041	0045
PIE	00004	001050	00057	0048			
SQUARE	00004	001044	00054	0040	0044		

NO STATEMENTS FLAGGED IN THIS ASSEMBLY

```
F.P. REGS.  00.01AE38 0001A538   C4.100CC0 00000000   44.132CC0 03C00000   00.0B0F00 0001B3C0

REGS 0-7     FFFFFF2E 000367F8 0001A554 00000000    0001A750 0001AB20 0001AE80 0001D600
REGS 8-15    6F02A20A 00000000 0001A560 00000000    4007ECA2 00036768 0000C7D4 0002A208

000000    00000000 00000000 00000000 00000000    0002A208 00000000 FFF50080 9F04EDD2  *.....................5.....K*
000020    FFC50001 4007EA2C FFD50001 5F02A238    0000FF00 00000000 FFD50134 8F02A278  *.E.. ....N.............N......*
000040    C004D880 0C000000 C00014D0 00005920    02C040A4 0000996C 00040000 00007498  *..Q.............. .............*
000060    00040000 00007BC8 00040000 00007588    00000000 00012D10 00040000 0000751A  *.......H.....................*

02A200    907A9120 10164780 05807820 80467C20    80467020 80427820 80463422 7C20804A  *.............................*
02A220    7A208042 78408046 34443C44 7C40804E    3B247020 803E0000 D9C5E2E4 D3E340C5  *..... ..... .........RESULT E*
02A240    D8E4C1D3 E2000000 C4100CC0 43271000    42190000 41E00000 421F6A7F 43135200  *QUALS...D.....................*
02A260    90ECD00C 05C004F0 07004110 C0100511    0F02A304 7FFF0A0E 58B00010 9110B074  *.......0.....................*

02A820    4A009BDE 40050000 47F095C6 48609BEE    8A600001 4770969E 48609C26 41660001  *.... ....0.F.................*
```


****

```
  AAAAAAAAAA    LL
 AAAAAAAAAAAA   LL
 AA          AA  LL
 AA          AA  LL
 AA          AA  LL
 AAAAAAAAAAAA   LL
 AAAAAAAAAAAA   LL
 AA          AA  LL
 AA          AA  LL
 AA          AA  LL
 AA          AA  LLLLLLLLLLLL
 AA          AA  LLLLLLLLLLLL
```

```
WW          WW  PPPPPPPPPPP      00000000          444
WW          WW  PPPPPPPPPPPP    0000000000        4444
WW          WW  PP          PP  00          00    44 44
WW          WW  PP          PP  00          00   44  44
WW          WW  PP          PP  00          00  44   44
WW          WW  PPPPPPPPPPPP    00          00 44444444444
WW    WW    WW  PPPPPPPPPPP     00          00 44444444444
WW  WWWW    WW  PP              00          00        44
WW WW  WW   WW  PP              00          00        44
WWWW     WWWW   PP              00          00        44
WWW        WWW  PP               0000000000          44
WW          WW  PP                00000000           44
```

```
  9999999999
 999999999999
 99          99
 99          99
 99          99
 999999999999
 999999999999
             99
             99
 99          99
 999999999999
  9999999999
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                    F08APR70  9/16/70

001000                              1 JULIDATE START X'1000'                          00000100
001000 90EC D00C             000CC  2          STM   14,12,12(13)                   00000200
001004 05C0                         3          BALR  12,0                          00000300
001006                              4          USING *,12                          00000400
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                 7 ********** D E S C R I P T I O N   O F   P R O J E C T ********** 00000700
                                 8 *                                                                 * 00000800
                                 9 * 0  THIS PROJECT WAS DESIGNED TO FAMILIARIZE YOU WITH THE ASSEMBLER  * 00000900
                                10 *      LISTING AND HOW IT RELATES TO A STORAGE DUMP.                 * 00001000
                                11 *                                                                 * 00001100
                                12 * 0  AN ASSEMBLER LISTING,CROSS-REFERENCE LIST,AND STORAGE DUMP AFTER * 00001200
                                13 *     EXECUTION ARE PROVIDED .                                    * 00001300
                                14 *                                                                 * 00001400
                                15 * 0  ANSWER ALL QUESTIONS IN THE SPACE PROVIDED.                   * 00001500
                                16 *                                                                 * 00001600
                                17 * 0  THIS PROJECT IS LAYED OUT AS FOLLOWS:                         * 00001700
                                18 *                                        1. QUESTIONS             * 00001800
                                19 *                                        2. LISTING OF THE SAMPLE    * 00001900
                                20 *                                             ROUTINE,CROSS REFERENCE* 00002000
                                21 *                                             LIST AND DIAGNOSTICS.  * 00002100
                                22 *                                        3. STORAGE DUMP.            * 00002200
                                23 *                                        4. ANSWERS                  * 00002300
                                24 *                                                                 * 00002400
                                25 * 0  DOCUMENTATION REQUIRED:                                       * 00002500
                                26 *                              1. S/360 PRINCIPLES OF OPERATION MANUAL  * 00002600
                                27 *                              2. S/360 DOS TOS ASSEMBLER MANUAL        * 00002700
                                28 *                                                                 * 00002800
                                29 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00002900
                                30 *                                                                 * 00003000
                                31 * 0  THE PURPOSE OF THE FOLLOWING ROUTINE IS TO CONVERT THE DATE     * 00003100
                                32 *      FROM JULIAN FORM TO GREGORIAN FORM. THE JULIAN FORM OF DATE   * 00003200
                                33 *      IS THE TYPE WE USE IN THE COMPUTER (IE.70031=JULIAN =01/31/70) * 00003300
                                34 *      THE GREGORIAN FORM OF DATE IS THE NORMAL EVERY DAY TYPE OF DATE* 00003400
                                35 *      (JAN. 31,1970).                                            * 00003500
                                36 *                                                                 * 00003600
                                37 *                                                                 * 00003700
                                38 * 0  THE JULIAN DATE I'LL USE FOR THIS EXAMPLE IS 70218,WHICH I'LL   * 00003800
                                39 *      PLACE IN LOCATION 'YEAR@DAY'                               * 00003900
                                40 *                                                                 * 00004000
                                41 *                                                                 * 00004100
                                42 * 0  THE CONVERTED FORM OF DATE (AUG. 6,1970) MAY BE FOUND IN LOCATION* 00004200
                                43 *      'MSGDATE'.                                                 * 00004300
                                44 *                                                                 * 00004400
                                45 * 0  YOU WILL FIND YHE STARTING ADDRESS OF THIS PROGRAM AT CORE      * 00004500
                                46 *      STORAGE LOCATION X'10'IN THE STORAGE DUMP.                 * 00004600
                                47 *                                                                 * 00004700
                                48 *                                                                 * 00004800
                                49 ********************************************************************** 00004900
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                  139 ########## N O T I C E ######### N O T I C E ###### N O T I C E ###### 00013900
                                  140 *#                                                                    # 00014000
                                  141 *#       T H E   A N S W E R S   M A Y   B E   F O U N D   A T        # 00014100
                                  142 *#               E N D   O F   T H I S   P R O J E C T                # 00014200
                                  143 *#                                                                    # 00014300
                                  144 ######################################################################## 00014400




                                  146 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.1 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014600
                                  147 *$                                                                    $ 00014700
                                  148 *$      THE INSTRUCTION AT STATEMENT NUMBER 67 IS A:                  $ 00014800
                                  149 *$                                                                    $ 00014900
                                  150 *$                  A. LOAD ADDRESS                                   $ 00015000
                                  151 *$                  B. SUBTRACT HALFWORD                              $ 00015100
                                  152 *$                  C. COMPARE HALFWORD                               $ 00015200
                                  153 *$                  D. CONVERT TO DECIMAL                             $ 00015300
                                  154 *$                                                                    $ 00015400
                                  155 *$                           THE ANSWER IS _______.                   $ 00015500
                                  156 *$                                                                    $ 00015600
                                  157 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00015700


                                  159 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.2 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00015900
                                  160 *$                                                                    $ 00016000
                                  161 *$      THE ASSEMBLED ADDRESS OF THE INSTRUCTION AT STATEMENT         $ 00016100
                                  162 *$        NUMBER 76 IS:                                               $ 00016200
                                  163 *$                       A. 1068                                      $ 00016300
                                  164 *$                       B. 1054                                      $ 00016400
                                  165 *$                       C. 1066                                      $ 00016500
                                  166 *$                       D. 1076                                      $ 00016600
                                  167 *$                                                                    $ 00016700
                                  168 *$                              THE CORRECT ANSWER IS_______.         $ 00016800
                                  169 *$                                                                    $ 00016900
                                  170 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00017000
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                  173 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.3 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00017300
                                  174 *$                                                                        $ 00017400
                                  175 *$          WHICH OF THE FOLLOWING IS THE OBJECT CODE FOR THE             $ 00017500
                                  176 *$            INSTRUCTION AT STATEMENT NUMBER 65:                         $ 00017600
                                  177 *$                                                                        $ 00017700
                                  178 *$               A. 4EF0 C0DA                                             $ 00017800
                                  179 *$               B. 41F0 000C                                             $ 00017900
                                  180 *$               C. D20B C0FC C10A                                        $ 00018000
                                  181 *$               D. D201 C0E0 C0E8                                        $ 00018100
                                  182 *$                                      ANSWER =__________.               $ 00018200
                                  183 *$                                                                        $ 00018300
                                  184 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00018400


                                  186 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.4 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00018600
                                  187 *$                                                                        $ 00018700
                                  188 *$      THE INSTRUCTION AT ASSEMBLED ADDRESS 1012 STORES BITS             $ 00018800
                                  189 *$      _____THROUGH____ OF _______ IN THE LOCATION WHOSE ASSEMBLED        $ 00018900
                                  190 *$      ADDRESS IS_____ .                                                 $ 00019000
                                  191 *$                                                                        $ 00019100
                                  192 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00019200


                                  194 *$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.5 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00019400
                                  195 *$                                                                        $ 00019500
                                  196 *$        WHAT IS THE ASSEMBLED ADDRESS OF THE SYMBOL 'SADIFCHK'?         $ 00019600
                                  197 *$                                                                        $ 00019700
                                  198 *$       THE ANSWER IS   __________.                                      $ 00019800
                                  199 *$                                                                        $ 00019900
                                  200 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00020000
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
203 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.6 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00020300
204 *$                                                                  $ 00020400
205 *$       CHOOSE THE CORRECT STATEMENTS CONCERNING THE ASSEMBLER      $ 00020500
206 *$         CROSS-REFERENCE LIST.                                    $ 00020600
207 *$                                                                  $ 00020700
208 *$                     A. CONTAINS THE LENGTH ATTRIBUTE ASSIGNED TO $ 00020800
209 *$                         ANY SYMBOL.                              $ 00020900
210 *$                                                                  $ 00021000
211 *$                     B. CONTAINS THE CORE STORAGE LOCATION OF SYMBOLS$ 00021100
212 *$                                                                  $ 00021200
213 *$                                                                  $ 00021300
214 *$                     C. SHOWS THE ASSEMBLED ADDRESS OF ANY SYMBOL $ 00021400
215 *$                                                                  $ 00021500
216 *$                     D. GIVES THE STATEMENT NUMBER WHERE THE SYMBOL $ 00021600
217 *$                         IS DEFINED.                              $ 00021700
218 *$                                                                  $ 00021800
219 *$                     E. SHOWS THE CONTENTS OF ANY STORAGE LOCATION . $ 00021900
220 *$                                                                  $ 00022000
221 *$                     F. CONTAINS THE STATEMENT NUMBERS OF ALL STATE- $ 00022100
222 *$                         MENTS WHICH REFERENCE A SYMBOL.          $ 00022200
223 *$                                                                  $ 00022300
224 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00022400

226 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.7 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00022600
227 *$                                                                  $ 00022700
228 *$   --->(USE THE ASSEMBLER CROSS-REFERENCE LIST)                    $ 00022800
229 *$                                                                  $ 00022900
230 *$     THE SYMBOL WHOSE NAME IS 'LEPYRCHK' HAS A LENGTH ATTRIBUTE   $ 00023000
231 *$      OF____,A VALUE OF____, IT'S DEFINED AT STATEMENT NUMBER ____, $ 00023100
232 *$      AND IT IS REFERENCED BY STATEMENT NUMBERS _____________.$ 00023200
233 *$                                                                  $ 00023300
234 *$                                                                  $ 00023400
235 *$  -----> IF YOU HAVE ANY PROBLEM WITH THIS ONE TAKE A LOOK AT THE $ 00023500
236 *$          APPENDIX IN THE DOS,TOS ASSEMBLER MANUAL WHICH HAS A    $ 00023600
237 *$          SAMPLE ASSEMBLER LISTING. CHECK THE TABLE OF CONTENTS FOR $ 00023700
238 *$          PAGE NUMBER.                                            $ 00023800
239 *$                                                                  $ 00023900
240 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00024000
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
243 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.8 $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00024300
244 *$                                                                      $ 00024400
245 *$  WHAT IS THE CONTENTS OF THE FIELD CALLED 'LEPYRCHK' IN STORAGE ?    $ 00024500
246 *$                                                                      $ 00024600
247 *$                                                                      $ 00024700
248 *$           THE ANSWER IS ________.                                    $ 00024800
249 *$                                                                      $ 00024900
250 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00025000


252 *$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.9 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00025200
253 *$                                                                      $ 00025300
254 *$     TRUE/FALSE                                                       $ 00025400
255 *$       THE FIRST 4 BYTES OF LOCATION 'MSGDATE' IN STORAGE CONTAIN     $ 00025500
256 *$                          40C1E4C7.                                   $ 00025600
257 *$                                                                      $ 00025700
258 *$                                                                      $ 00025800
259 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00025900


261 *$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.10 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00026100
262 *$                                                                      $ 00026200
263 *$     WHAT IS THE ASSEMBLED ADDRESS OF THE LITERAL POOL ?              $ 00026300
264 *$                                                                      $ 00026400
265 *$                 THE ANSWER IS _____.                                 $ 00026500
266 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00026600
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F08APR70 9/16/70

```
                                269 *$$$$$$$$$$$$$$$$$$$$ QUESTION 5.11 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00026900
                                270 *$                                                                  $ 00027000
                                271 *$       LOCATE THE ERROR MESSAGE ISSUED FOR THE FOLLOWING STATEMENT  $ 00027100
                                272 *$        THE LAST THREE DIGITS OF THE ERROR CODE ARE ______?          $ 00027200
                                273                                                                     $ 00027300
     *** ERROR ***
                                274 *$        THE CAUSE OF THIS ERROR IS                                $ 00027400
                                275 *$                    A. ILLEGAL STATEMENT NUMBER                   $ 00027500
                                276 *$                    B. OPERATION CODE CONTAINS MORE THEN 8        $ 00027600
                                277 *$                        CHARACTERS.                               $ 00027700
                                278 *$                    C. BLANK OP CODE.                             $ 00027800
                                279 *$                    D. ADDRESSABILITY ERROR                       $ 00027900
                                280 *$                                                                  $ 00028000
                                281 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00028100


                                283 *$$$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.12 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00028300
                                284 *$                                                                  $ 00028400
                                285 *$    THE STATEMENT AT STATEMENT NUMBER 90 WILL BRANCH IF:          $ 00028500
                                286 *$                                                                  $ 00028600
                                287 *$           A. REGISTER 5 CONTAINS 6                               $ 00028700
                                288 *$           B. REGISTER 5 IS EQUAL TO ZERO .                       $ 00028800
                                289 *$           C. JUPITER IS ALIGNING WITH SATURN IN CONJUCTION        $ 00028900
                                290 *$               WITH MARS.                                         $ 00029000
                                291 *$           D. REGISTER 5 CONTAINS ANYTHING .                      $ 00029100
                                292 *$                                                                  $ 00029200
                                293 *$                                                                  $ 00029300
                                294 *$                          THE ANSWER IS_________.                 $ 00029400
                                295 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00029500


                                297 *$$$$$$$$$$$$$$$$$$$$$$ QUESTION 5.13 $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00029700
                                298 *$                                                                  $ 00029800
                                299 *$     WILL THE INSTRUCTION AT STATEMENT NUMBER 90 BRANCH ?______    $ 00029900
                                300 *$                                                                  $ 00030000
                                301 *$                                                                  $ 00030100
                                302 *$     WHAT WILL BE THE NEXT INSTRUCTION EXECUTED ?___________      $ 00030200
                                303 *$                                                                  $ 00030300
                                304 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00030400
```

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LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70


                                307 *$$$$$$$$$$$$$$$$$$$$ OPTIONAL QUESTION $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00030700
                                308 *$                                                                       $ 00030800
                                309 *$            THE BXLE AT STMT NUMBER 71 WILL NOT BRANCH WHEN:           = 00030900
                                310 *$                                                                       $ 00031000
                                311 *$               A. REGISTER 3 EQUALS REGISTER 5.                        $ 00031100
                                312 *$               B. THE YEAR WE TRY TO CONVERT EXCEEDS 1984.             $ 00031200
                                313 *$               C. REG.3 BECOMES > REG.5                                $ 00031300
                                314 *$               D. REGISTER 4'S VALUE EXCEEDS THE VALUE OF 'MONLOOP'    $ 00031400
                                315 *$                                                                       $ 00031500
                                316 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00031600
```

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 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70  9/16/70

                                    51 ************************** R O U T I N E ****************************** 00005100
                                    52 *                                                                       * 00005200
                                    53 *  ----->MAKE THE DATE PRINTABLE MMMM DD, 19YY <-----                   * 00005300
                                    54 *                                                                       * 00005400
001006                              55 NOTIME   EQU   *                                                       * 00005500
001006 47F0 C074            0107A   56          BC    15,SADIHCHK                                             * 00005600
00100A                              57 RETIFLP  EQU    *                                                      * 00005700
00100A 48F0 C090            01096   58          LH    15,FEBRUARY                                             * 00005800
00100E 41FF 0001            00001   59          LA    15,1(15)                                                * 00005900
001012 40F0 C090            01096   60          STH   15,FEBRUARY                                             * 00006000
001016 4130 C08E            01094   61 NOTLEAP  LA    3,YEARTAB          PROCESS AS NORMAL YEAR.FEB.=28 DAYS  * 00006100
00101A 4140 0002            00002   62          LA    4,2                                                     * 00006200
00101E 4150 C0A4            C10AA   63          LA    5,MONTHTAB-2                                            * 00006300
001022 4160 C0A6            010AC   64          LA    6,MONTHTAB                                              * 00006400
001026 D201 C0E0 C0E8 010E6 010EE   65          MVC   DBLWORD+6(2),DATE+2      MOVE DDDS(DAY,DAY,DAY,SIGN)  * 00006500
00102C 4FFC C0DA            010E0   66          CVB   15,DBLWORD                 CONVERT FROM PACKED TO BIN.  * 00006600
001030 49F3 0000            00000   67 MONLOOP  CH    15,0(3)  <-------+       IS THIS THE MONTH ??????    * 00006700
001034 47D0 C048            0104E   68          BNH   MONFOUND         |        YEAH                          * 00006800
001038 4BF3 0000            00C00   69          SH    15,0(3)          |        NAW.SUBTRACT NUMBER OF DAYS.* 00006900
00103C 4166 0004            00004   70          LA    6,4(6)           |        POINT TO NEXT MONTH           * 00007000
001040 8734 C02A            01030   71          BXLE  3,4,MONLOOP -----+           INVALID DATE CHECKER     * 00007100
001044 D20B C0FC C10A 01102 01110   72          MVC   DATE@MON(12),=C'INVALID ****'   "      "      "       * 00007200
00104A 47F0 C06E            01074   73          B     DUMPIT                     GETOUT.................      * 00007300
00104E                              74 MONFOUND EQU   *                                                       * 00007400
00104E D203 C0FC 6000 01102 00000   75          MVC   DATE@MON(4),0(6)     PUT NAME OF MONTH IN DATE@MON  * 00007500
001054 4EF0 C0DA            010E0   76          CVD   15,DBLWORD             CONVERT DAYS TO DECIMAL       * 00007600
001058 F311 C101 C0E0 01107 010E6   77          UNPK  DATE@DAY(2),DBLWORD+6(2)    MAKE IT PRINTABLE      * 00007700
00105E 96F0 C102      01108         78          OI    DATE@DAY+1,C'0'        ZERO OUT SIGN                 * 00007800
001062 960F C0E8      010EE         79          OI    DATE+2,X'0F'           MAKE SIGN OF YEAR +           * 00007900
001066 F321 C0E6 C0E7 010EC 010ED   80          UNPK  DATE(3),DATE+1(2)       UNPK YEAR FOR PRINTING...    * 00008000
00106C D201 C106 C0E6 0110C 010EC   81          MVC   DATE@YR(2),DATE         PUT IT IN OUTPUT AREA        * 00008100
001072 0000                         82          DC    H'0C'                   NORMAL ENDING DUMP           * 00008200
001074 41F0 000C            0000C   83 DUMPIT   LA    15,X'0C'                BAD ENDING,PUT A CODE IN 15. * 00008300
001078 0000                         84          DC    H'00'                                 TO SIGNAL US.  * 00008400
00107A 1755                         85 SADIHCHK XR    5,5                                                     * 00008500
00107C F170 C0EA C0E7 010F0 010ED   86          MVO   LEPYRCHK,DATE+1(1)       GET YEAR                     * 00008600
001082 4F40 C0EA            010F0   87          CVB   4,LEPYRCHK                                              * 00008700
001086 8C40 0002            00002   88          SRDL  4,2                      DIVIDE X 4                   * 00008800
00108A 1255                         89          LTR   5,5                       ANY SPILL OVER              * 00008900
00108C 4760 C010            01016   90          BC    6,NOTLEAP                 YEP.                        * 00009000
001090 47F0 C004            0100A   91          BC    15,RETIFLP                NOPE.                       * 00009100
                                    92 *                                                                      * 00009200
                                    93 ********************************************************************** 00009300
```

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LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F08APR70   9/16/70

                                    96 ************************** C O N S T A N T S ************************ 00009600
                                    97 *                                                                    * 00009700
                                    98 *                              +----- C R U T C H   C O R N E R -----* 00009800
001094 001F                         99 YEARTAB   DC     H'31'        |                                      * 00009900
001096 001C                        100 FEBRUARY  DC     H'28'        |                                      * 00010000
001098 001F                        101           DC     H'31'        |                                      * 00010100
00109A 001E                        102           DC     H'30'        |     THIRTY DAYS HAS SEPTEMBER, APRIL,  * 00010200
00109C 001F                        103           DC     H'31'        |                   J                  * 00010300
00109E 001E                        104           DC     H'30'        |                   U                  * 00010400
0010A0 001F                        105           DC     H'31'        |                   N                  * 00010500
0010A2 001F                        106           DC     H'31'        |                   E                  * 00010600
0010A4 001E                        107           DC     H'30'        |                   ,                  * 00010700
0010A6 001F                        108           DC     H'31'        |      AND NOVEMBER. ALL THE REST HAVE   * 00010800
0010A8 001E                        109           DC     H'30'        |                                      * 00010900
0010AA 001F                        110           DC     H'31'        |      THIRTY-O   EXCEPT FEBRUARY WHICH HAS * 00011000
0010AC D1C1D54B                    111 MONTHTAB  DC     C'JAN.'      |            N                         * 00011100
0010B0 C6C5C24B                    112           DC     C'FEB.'      |            E                  28 1/4* 00011200
0010B4 D4C1D94B                    113           DC     C'MAR.'      +----------------------------------------* 00011300
0010B8 C1D7D94B                    114           DC     C'APR.'                                               * 00011400
0010BC D4C1E840                    115           DC     C'MAY '                                               * 00011500
0010C0 D1E4D5C5                    116           DC     C'JUNE'                                               * 00011600
0010C4 D1E4D3E8                    117           DC     C'JULY'                                               * 00011700
0010C8 C1E4C74B                    118           DC     C'AUG.'                                               * 00011800
0010CC E2C5D74B                    119           DC     C'SEP.'                                               * 00011900
0010D0 D6C3E34B                    120           DC     C'OCT.'                                               * 00012000
0010D4 D5D6E54B                    121           DC     C'NOV.'                                               * 00012100
0010D8 C4C5C34B                    122           DC     C'DEC.'                                               * 00012200
0010DC 00000000
0010E0 0000C00000000000            123 DBLWORD   DC     D'0'                                                  * 00012300
0010E8 000000000070218C            124 YEAR@DAY  DC     PL8'70218'       ........ SAMPLE DATE.......          * 00012400
0010F0 000000C000000000C           125 LEPYRCHK  DC     PL8'0'                                                * 00012500
0010F8                             126 UNPACK    DS     CL9                                                   * 00012600
0010EC                             127 DATE      EQU    YEAR@DAY+4                                            * 00012700
001101 4040404040404040            128 MSGDATE   DC     C'         ,19  , '                                   * 00012800
001110                             129 JITTERS   EQU    *                                                     * 00012900
001102                             130 DATE@MON  EQU    MSGDATE+1                                             * 00013000
001107                             131 DATE@DAY  EQU    MSGDATE+6                                             * 00013100
00110C                             132 DATE@YR   EQU    MSGDATE+11                                            * 00013200
                                   133 *                                                                      * 00013300
                                   134 *                                                                      * 00013400
                                   135 *                                                                      * 00013500
                                   136 ********************************************************************** 00013600
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                F08APR70   9/16/70
001110                              338      LTORG                                  00033800
001110 C9D5E5C1D3C9C440             339                =C'INVALID ****'
001000                              340      END   JULIDATE                        00033900
```

9/16/70

SYMBOL	LEN	VALUE	DEFN	REFERENCES					
DATE	00008	0010EC	00127	0065	0079	0080	0080	0081	0086
DATE@DAY	00015	001107	00131	0077	0078				
DATE@MON	00015	001102	00130	0072	0075				
DATE@YR	00015	00110C	00132	0081					
DBLWORD	00008	0010E0	00123	0065	0066	0076	0077		
DUMPIT	00004	001074	00083	0073					
FEBRUARY	00002	001096	00100	0058	0060				
JITTERS	00001	001110	00129						
JULIDATE	00001	001000	00001	0340					
LEPYRCHK	00008	0010F0	00125	0086	0087				
MONFOUND	00001	00104E	00074	0068					
MONLOOP	00004	001030	00067	0071					
MONTHTAB	00004	0010AC	00111	0063	0064				
MSGDATE	00015	001101	00128	0130	0131	0132			
NOTIME	00001	001006	00055						
NOTLEAP	00004	001016	00061	0090					
RETIFLP	00001	00100A	00057	0091					
SADIHCHK	00002	00107A	00085	0056					
UNPACK	00009	0010F8	00126						
YEAR@DAY	00008	0010E8	00124	0127					
YEARTAB	00002	001094	00099	0061					

9/16/70

STMT	ERROR CODE	MESSAGE
273	IEU034	INVALID OP-CODE

1 STATEMENT FLAGGED IN THIS ASSEMBLY
8 WAS HIGHEST SEVERITY CODE

```
F.P. REGS.  00.01FCE0 0001FE90   00.01FBF8 0001F9D4   00.01AE90 00036E08   0D.01AAA8 4000008C

REGS 0-7     FFFFFF2E 0004DFF8 0001D804 000419E2    00000002 000419EA 00041A08 00019598
REGS 8-15    0001D7E8 00000000 0001D810 00C00000    6F041946 0004DF68 C000C7D4 00000006

000000    00000000 00000000 00000000 00000000    00041940 00000000 FF050080 A0022790  *.................. .............*
000020    FF040003 40006A3E FFC50001 5F0419B4    0000FF00 00000000 FFC50233 8F041A78  *.... ....E..............E......*
000040    00001360 08000000 00001358 00005920    083D5B00 0000996C 00040000 00007498  *.............................*
000060    00040000 00007BC8 00040000 00007588    00000000 00012D10 00040000 0000751A  *.......H.....................*

041940    90ECD00C 05C047F0 C07448F0 CC9041FF    000140F0 C0904130 C08E4140 00024150  *.......0...C...... 0....... ....*
041960    C0A44160 C0A6D201 C0E0C0E8 4FF0C0DA    49F30000 47D0C048 4BF30000 41660004  *......K....Y.0...3.......3......*
041980    8734C02A D20BC0FC C10A47F0 C06ED203    CCFC6000 4EF0C0DA F311C101 C0E096F0  *....K...A..0..K......0..3.A....0*
0419A0    C102960F C0E8F321 C0E6C0E7 D201C106    C0E60000 41F0000C 00001755 F170C0EA  *A....Y3..W.XK.A..W...0......1...*
0419C0    C0E74F40 C0EA8C40 00021255 4760C010    47F0C004 001F001C 001F001E 001F001E  *.X. ... .........0.............*
0419E0    001F001F 001E001F 001E001F D1C1D54B    C6C5C24B D4C1D94B C1D7D94B D4C1E840  *............JAN.FEB.MAR.APR.MAY *
041A00    D1E4D5C5 D1E4D3E8 C1E4C74B E2C5D74B    D6C3E34B D5D6E54B C4C5C34B 00000000  *JUNEJULYAUG.SEP.OCT.NOV.DEC.....*
041A20    00000000 0000006C 00000000 F7F0F28C    00000000 0000070C 94349104 70044710  *............702.................*
041A40    9440C1E4 C74B40F0 F66BF1F9 F7F06B40    C9D5E5C1 D3C9C440 5C5C5C5C 94FE4780  *. AUG. 06.1970. INVALID ........*
041A60    90ECD00C 05C004F0 07004110 C0100511    0F041B04 7FFF0A0E 58B00010 9110B074  *.......0.....................*

042020    4A009BDE 40050000 47FC95C6 48609BEE    8A6C0001 4770969E 48609C26 416600C1  *.... ....0.F...................*
```


****

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F08APR70   9/16/70

                                                                                                    00031900
*=                                                                                                  00032000
*=    5.1  COMPARE HALFWORD (C)                    5.8  000000000000070C                            00032100
*=                                                                                                  00032200
*=    5.2  1054 (B)                                5.9  TRUE                                        00032300
*=                                                                                                  00032400
*=    5.3  D201 C0E0 C0E8 (D)                      5.10  1110                                       00032500
*=                                                                                                  00032600
*=    5.4  16-31,REG.15,1096                       5.11  034, C                                     00032700
*=                                                                                                  00032800
*=    5.5  107A                                    5.12  D                                         00032900
*=                                                                                                  00033000
*=    5.6  A,C,D,F                                 5.13  YES,THE 'LA' AT                            00033100
*=                                                       STMT 61.                                   00033200
*=    5.7  8,10F0,125 86 AND 87                 OPTIONAL. ANSWER=C(R3>R5)                         00033300
*=                                                                                                  00033400
*=                                                                                                  00033500
*====================================================================================               00033600
```

```
RRRRRRRRRRR    EEEEEEEEEEEE   LL             PPPPPPPPPPP     AAAAAAAAAA                 CCCCCCCC          11
RRRRRRRRRRRR   EEEEEEEEEEEE   LL             PPPPPPPPPPPP    AAAAAAAAAAAA              OCOOCCOOCC         111
RR         RR  EE             LL             PP         PP   AA         AA          OO         OO     1111
RR         RR  EE             LL             PP         PP   AA         AA          OC         CC       11
RR         RR  EE             LL             PP         PP   AA         AA          OO         OO       11
RRRRRRRRRRRR   EEEEEEEE       LL             PPPPPPPPPPPP    AAAAAAAAAAAA           OO         OO       11
RRRRRRRRRRR    EEEEEEEE       LL             PPPPPPPPPPP     AAAAAAAAAAAA           OO         OO       11
RR     RR      EE             LL             PP              AA         AA          CC         CC       11
RR      RR     EE             LL             PP              AA         AA          OO         CO       11
RR       RR    EE             LL             PP              AA         AA          OO         CO       11
RR        RR   EEEEEEEEEEEE   LLLLLLLLLLLL   PP              AA         AA           0000000000    1111111111
RR         RR  EEEEEEEEEEEE   LLLLLLLLLLLL   PP              AA         AA            00000000     1111111111
```

```
 9999999999
999999999999
99        99
99        99
99        99
999999999999
999999999999
          99
          99
99        99
999999999999
 9999999999
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69  6/05/70

                                    3 *          XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 00000300
                                    4 *         X                                                     X 00000400
                                    5 *         X THIS PROJECT WILL HELP SHOW YOU HOW THREE MODULES    X 00000500
                                    6 *         X 'PROGAA1'-'PROGB'-'PROGC' LINK TOGETHER AT EXECUTION X 00000600
                                    7 *         X TIME. IT SHOULD DESCRIBE THE REASONS FOR USING THE   X 00000700
                                    8 *         X ESTABLISHED CONVENTIONS. THE PROJECT IS DIVIDED INTO X 00000800
                                    9 *         X SECTIONS. EACH SECTION CONSISTS OF,                  X 00000900
                                   10 *         X     QUESTIONS                                        X 00001000
                                   11 *         X     LISTINGS OF THE THREE MODULES                    X 00001100
                                   12 *         X     DUMP                                             X 00001200
                                   13 *         X     ANSWERS                                          X 00001300
                                   14 *         X                                                      X 00001400
                                   15 *         X THE PROGRAMS ARE DESIGNED AS A LEARNING AID, AND NOT X 00001500
                                   16 *         X AS AN EXAMPLE OF A LEGITIMATE APPLICATION.           X 00001600
                                   17 *         X                                                      X 00001700
                                   18 *         X PLEASE WRITE THE ANSWERS TO EACH QUESTION, AND       X 00001800
                                   19 *         X THEN CHECK YOUR ANSWERS WITH THE ANSWER PAGE THAT    X 00001900
                                   20 *         X FOLLOWS THE LISTING OF 'PROGC'. PLEASE BUG YOUR IN-  X 00002000
                                   21 *         X STRUCTOR IF YOU DON'T UNDERSTAND ANY OF THE ANSWERS. X 00002100
                                   22 *         X                                                      X 00002200
                                   23 *          XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 00002300
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   6/05/70

                                   25 *                          //////////////                          00002500
                                   26 *                          / SECTION 1 /                          00002600
                                   27 *                          //////////////                          00002700


                                   29 *              ++++++++++++++++++++++++++++++++++++++++++++++      00002900
                                   30 *              +  EXIT OF THE MAIN LINE ROUTINE             +      00003000
                                   31 *              ++++++++++++++++++++++++++++++++++++++++++++++      00003100


                                   33 *               XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  00003300
                                   34 *              X FOR THIS SECTION, A DUMP WAS TAKEN BY FORCING A PROG-  00003400
                                   35 *              X RAM CHECK RIGHT AFTER ESTABLISHING A BASE REGISTER     00003500
                                   36 *              X IN THE CONTROL SECTION LABELED 'PROGB'. THE ANSWERS TO 00003600
                                   37 *              X THE FOLLOWING QUESTIONS WILL SHOW THE CONVENTIONS USED CCCC37C0
                                   38 *              X WHEN EXITING FROM A ROUTINE, AND WHAT IS DONE BY ANY   00003800
                                   39 *              X CONTROL SECTION THAT EXPECTS TO BE ENTERED.            00003900
                                   40 *               XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  00004000


                                   42 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.01  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004200
                                   43 *              WHAT ARE THE CORE ADDRESSES OF 'PROGAA1 AND EXMPL2' ?  $ 00004300
                                   44 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004400
                                   45 *                                                                     $ 00004500
                                   46 *                                                                     $ CC004600
                                   47 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004700


                                   49 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.02  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 0CCC4900
                                   50 *              IN THE ASSEMBLY LISTING OF PROGAA1, LOCATE THE FIELD   $ 00005000
                                   51 *              THAT WILL CONTAIN THE ADDRESS OF PROGB, CIRCLE THIS    $ C0005100
                                   52 *              FIELD IN THE CORE DUMP.                                $ 000C5200
                                   53 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00005300
                                   54 *                                                                     $ 00005400
                                   55 *                                                                     $ 00005500
                                   56 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC005600


                                   58 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.03  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 0CCC58C0
                                   59 *              IT IS A LINKAGE CONVENTION THAT REGISTER 13 SHOULD     $ 00005900
                                   60 *              CONTAIN THE ADDRESS OF AN AREA OF CORE THAT THE CALLED $ 000060CC
                                   61 *              ROUTINE WILL USE TO SAVE THE CALLING ROUTINES REGISTERS$ 00006100
                                   62 *                                                                     $ 00006200
                                   63 *                  WHAT WILL BE THE CONTENTS OF REGISTERS 13, 14 AND  $ C0006300
                                   64 *                  15 AFTER THE BALR AT STMT 134 OF PROGAA1 HAS BEEN  $ 0CCC64C0
                                   65 *                  EXECUTED?                                          $ 00006500
                                   66 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00006600
                                   67 *                                                                     $ 00006700
                                   68 *                                                                     $ C0CC6800
                                   69 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00006900
```

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LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69  6/05/70

                                   71 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.04  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007100
                                   72 *                THE ADDRESS IN REG 13 POINTS TO THE FIRST BYTE OF A     $ 00007200
                                   73 *                 (HOW MANY) -------- BYTE FIELD.                         $ CC007300
                                   74 *                   (THIS IS ANOTHER LINKAGE CONVENTION)                  $ 00C07400
                                   75 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007500
                                   76 *                                                                         $ 00007600
                                   77 *                                                                         $ CC007700
                                   78 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 0CCC7800



                                   80 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.05  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0008000
                                   81 *                WHAT DOES THE ADDRESS IN REG 14 POINT TO?                $ 00008100
                                   82 *                   (THIS IS ALSC ANCTHER CONVENTION)                     $ CCCC8200
                                   83 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00008300
                                   84 *                                                                         $ 00008400
                                   85 *                                                                         $ C0008500
                                   86 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00008600



                                   88 *                ** THE NEXT QUESTIONS ARE DIRECTED AT THE FIRST          CCCC8800
                                   89 *                   EXECUTABLE INSTRUCTION IN THE CSECT 'PROGB' **        C0008900

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                                   91 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.06  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00C09100
                                   92 *                HOW MANY REGISTERS WERE SAVED BY THIS INSTRUCTION?       $ 00009200
                                   93 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC93C0
                                   94 *                                                                         $ 00009400
                                   95 *                                                                         $ CCCC9500
                                   96 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00009600



                                   98 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.07  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0009800
                                   99 *                WITHIN THE SAVE AREA, (LABELED SVA LOCATED IN PROGAA1)   $ 00009900
                                  100 *                CIRCLE AND LABEL REGISTERS 13, 6 AND 12.                $ CC010000
                                  101 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0010100
                                  102 *                                                                         $ 00010200
                                  103 *                                                                         $ C0010300
                                  104 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00010400
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                                F01FEB69   6/05/70

                                  106 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.08  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00010600
                                  107 *                A. HAVE ANY REGISTERS BEEN CHANGED FROM THERE                $ 00010700
                                  108 *                PRESENTLY DISPLAYED CONTENTS, TO THE CONTENTS SHOWN IN $ 00010800
                                  109 *                THE SAVE AREA. (SVA)                                         $ 00010900
                                  110 *                                                                             $ 00011000
                                  111 *                B. WHICH ONE/ONES ?                                          $ 00011100
                                  112 *                                                                             $ 00011200
                                  113 *                C. WHAT CAUSED THE CHANGE ?                                  $ 00011300
                                  114 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00011400
                                  115 *                                                                             $ 00011500
                                  116 *                                                                             $ 00011600
                                  117 *                                                                             $ 00011700
                                  118 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00011800


                                  120 *  NOTE   * THIS COMPLETES THE QUESTIONS FOR SECTION ONE. PLEASE CHECK    00012000
                                  121 *          YOUR ANSWERS WITH THE ANSWER PAGE THAT FOLLOWS THE LISTING    00012100
                                  122 *          OF 'PROGC'. WHEN ALL YOUR ANSWERS ARE VERIFIED, PLEASE        00012200
                                  123 *          PROCEED TO SECTION TWO.  THANK YOU                            00012300
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   8/20/70

000000                           125 PROGAA1  START 0                          PROGAA1                  00000100
                                 126          EXTRN PROGB                                              00012600
000000 05C0                      127          BALR  12,0          ESTABLISH A BASE REG                 00012700
000002                           128          USING *,12                                               00012800
                                 129 *    NORMALLY YOU WOULD FIND INSTRUCTIONS IN THIS AREA. THE INSTRUCTIONS 00012900
                                 130 *    WOULD ACCOMPLISH A FUNCTION. SINCE WE ARE ONLY INTERESTED IN LEARN- 00013000
                                 131 *    ING HOW PROGRAMS LINK TOGETHER, I HAVE ELEMINATED ANY EXTRA IN-     00013100
                                 132 *    STRUCTIONS. THE NEXT 3 STATEMENTS ARE USED FOR LINKING.             00013200
000002 58D0 C066          00068  133          L     13,=A(SVA)                                         00013300
000006 58F0 C016          00018  134          L     15,EXT1                                            00013400
00000A 05FF                      135          BALR  14,15         HERE'S THE EXIT                    00013500
                                 136 *    THE FOLLOWING TWO INSTRUCTIONS ARE USED TO BRANCH US TO THE SECOND  00013600
                                 137 *    CONTROL SECTION IN THIS PROGRAM.                                    00013700
00000C 58F0 C01A          0001C  138          L     15,SCEXT                                           00013800
000010 07FF                      139          BR    15                                                 00013900
000012 999999999999              140          DC    3X'9999'      JUST USING THIS TO MAKE FINDING THE  00014000
000018 00000000                  141 EXT1     DC    A(PROGB)      ADDRESS OF 'PROGB' EASIER            00014100
00001C 00000070                  142 SCEXT    DC    A(ASUB1)                                           00014200
000020 0000000000000000          143 SVA      DC    18F'0'        THIS IS THE SAVE AREA FOR THIS CSECT 00014300
000068                           144          LTORG                                                    00014400
000068 00000020                  145                =A(SVA)
000070                           146 ASUB1    CSECT                                                    00014500
000070 05C0                      147          BALR  12,0          ESTABLISH A BASE REGISTER FOR THIS CSECT 00014600
000072                           148          USING *,12                                               00014700
                                 149 *    HERE AGAIN YOU NORMALLY FIND INSTRUCTIONS FOR SOME FUNCTION. I'VE   00014800
                                 150 *    AGAIN ELEMINATED THOSE INSTRUCTIONS UNNECESSARY. HOWEVER I LEFT     00014900
                                 151 *    THE FOLLOWING INSTRUCTION HERE JUST FOR AN EXAMPLE.                 00015000
000072 1766                      152          XR    6,6           JUST CLEARING A REGISTER             00015100
000074 0700                      153          CNOP  2,4
000000                           154          END   PROGAA1                                            00015200
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   8/20/70

000000                                    2 EXMPL2   START 0                 EXMPL2                          00000100
                                          3          EXTRN PROGC                                           00005100
000000 90EC D00C              0000C       4          STM   14,12,12(13)     THIS IS A DUMMY ROUTINE USED FOR 00005200
000004 05A0                               5          BALR  10,0             ILLUSTRATION PURPOSES ONLY. PLEASE 00005300
000006                                    6          USING *,10             IGNORE THE INSTRUCTIONS IN THIS CONTROL 00005400
000006 D204 A010 A015 00016 0001B         7          MVC   HERE,THERE       SECTION.  THANKS                 00005500
00000C 58DD 0C04              00004       8          L     13,4(13)                                          00005600
000010 98EC D00C              0000C       9          LM    14,12,12(13)                                      00005700
000014 07FE                              10          BR    14                                                00005800
000016 C2D3C1D5D2                        11 HERE     DC    C'BLANK'                                          00005900
00001B E3C8C5D9C5                        12 THERE    DC    C'THERE'                                          00006000
000020                                   13          LTORG                                                 00006100
000020                                   14 PROGB    CSECT                                                 00006200
000020 90EC D00C              0000C      15          STM   14,12,12(13)       SAVE CALLERS REGISTERS       00006300
000024 05C0                              16          BALR  12,0                                            00006400
000026                                   17          USING *,12                                            00006500
000026 0000                              18          DC    H'0'           FORCE A PROGRAM CHECK

                                         20 *    THESE NEXT THREE INSTRUCTIONS ARE PREPARING FOR FUTURE LINKING 00006800
                                         21 *    AND ALSO PREPARING FOR THE RETURN WHEN WE DECIDE TO RETURN.   00006900
000028 41F0 C02E              00054      22          LA    15,SAVBB           ADDRESS OF THIS SAVE AREA      00007000
00002C 50FD 0008              00008      23          ST    15,8(13)                                          00007100
000030 50DF 0004              00004      24          ST    13,4(15)                                          00007200
000034 4700 0000              00000      25          BC    0,0(0)                 FILLER ONLY

                                         27 *                          AS I SAID BEFORE, NORMALLY THERE WOULD BE 00007400
                                         28 *                          INSTRUCTIONS HERE FOR ACCOMPLISHING SOMETHING 00007500

                                         30 *    YOU WILL BE ASKED TO REPLACE THE NEXT THREE INSTRUCTIONS WITH THE
                                         31 *     CODE NECESSARY TO LINK TO A THIRD PROGRAM.

000038 4700 0000              00000      33          BC    0,0(0)                       NO BRANCH
00003C 4700 0000              00000      34          BC    0,0(0)                       NO BRANCH
000040 0700                              35          BCR   0,0                          NO BRANCH
000042 1777                              36          XR    7,7    THIS INSTRUCTION IS BEING USED FOR FILL IN ONLY 00008300
000044                                   37 GOBACK   EQU   *                                                 00008400
000044 58DD 0004              00004      38          L     13,4(13)                                          00008500
000048 98EC D00C              0000C      39          LM    14,12,12(13)                                      00008600
00004C 07FE                              40          BR    14                                                00008700
00004E 0000
000050 00000000                          41 BAZ      DC    A(PROGC)                                          00008800
000054 0000000000000000                  42 SAVBB    DC    18F'0'                                            00008900
0000A0                                   43       LTORG                                                    00009000
                                         44          END                                                   00009100
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                    F01FEB69   8/20/70

000000                              2 EXAMPL3  START 0                                                    00000100
                                    3          ENTRY PROGC                                               00005300
000000 E3C8C9E240D9D6E4             4          DC    C'THIS ROUTINE'    THESE TWO DC'S SERVE NO USEFUL  00005400
00000C C4D6C5E240D5D6E3             5          DC    C'DOES NOTHING'    PURPOSE.                        00005500
000018 90EC D00C            0000C   6 PROGC    STM   14,12,12(13)       HERE IS THE START OF THE GOOD CODE 00005600
00001C 05C0                         7          BALR  12,0                                                00005700
00001E                              8          USING *,12                                                00005800
00001E 58F0 C06A            00088   9          L     15,=A(SAVCC)                                        00005900
000022 50FD 0008            00008  10          ST    15,8(13)                                            00006000
000026 50DF 0004            00004  11          ST    13,4(15)                                            00006100
00002A 18DF                        12          LR    13,15                                               00006200
                                   13 *   HERE'S WHERE THE INSTRUCTIONS WOULD GO IF THIS PROGRAM WERE TO  00006300
                                   14 *   ACCOMPLISH ANYTHING OTHER THAN HELPING YOU LEARN LINKING.       00006400

00002C 1788                        16          XR    8,8       DUMMY INSTRUCTION FOR FILL IN ONLY        00006600
00002E                             17 GOBACK  EQU   *                                                    00006700
00002E 58DD 0004            00004  18          L     13,4(13)                                            00006800
000032 98EC D00C            0000C  19          LM    14,12,12(13)                                        00006900
000036 0700                        20          CNOP  0,4               FILLER ONLY
000038 07FE                        21          BR    14                                                  00007000
00003A 0000
00003C 0000000000000000            22 SAVCC   DC    18F'0'                                              00007100
000088                             23          LTORG                                                     00007200
000088 0000003C                    24                =A(SAVCC)
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                    F01FEB69   8/20/70

                                  26 *         ++++++++++++++++++++++++++                                00012500
                                  27 *         + ANSWERS TO SECTION 1   +                                00012600
                                  28 *         ++++++++++++++++++++++++++                                00012700


                                  30 *  6.01   ************************************************************ 00012900
                                  31 *         * PROGAA1 IS AT ADDRESS 063820                           * 00013000
                                  32 *         *                                                        * 00013100
                                  33 *         * EXMPL2 IS AT ADDRESS 063898                            * 00013200
                                  34 *         ************************************************************ 00013300

                                  36 *  6.02   ************************************************************ 00013500
                                  37 *         * DC LABELED EXT1                                        * 00013600
                                  38 *         *                                                        * 00013700
                                  39 *         * DUMP ADDRESS OF 063838                                 * 00013800
                                  40 *         ************************************************************ 00013900

                                  42 *  6.03   ************************************************************ 00014100
                                  43 *         * REG 13=063840                                          * 00014200
                                  44 *         * REG 14=06382C                                          * 00014300
                                  45 *         * REG 15=063888                                          * 00014400
                                  46 *         ************************************************************ 00014500

                                  48 *  6.04   ************************************************************ 00014700
                                  49 *         *-- 72 --                                                * 00014800
                                  50 *         ************************************************************ 00014900

                                  52 *  6.05   ************1************************************************ 00015100
                                  53 *         * ADDRESS OF THE NEXT SEQUENTIAL INSTRUCTION AFTER THE BALR * 00015200
                                  54 *         * INSTRUCTION THAT WAS USED TO GET TO 'PROGB'            * 00015300
                                  55 *         ************************************************************ 00015400

                                  57 *  6.06   ************************************************************ 00015600
                                  58 *         * 15, ONLY REG 13 WAS NOT SAVED                          * 00015700
                                  59 *         ************************************************************ 00015800

                                  61 *  6.07   ************************************************************ 00016000
                                  62 *         * REG 14 IS 12 BYTES FROM THE BEGINNING OR 063840        * 00016100
                                  63 *         * REG 6 IS 063860                                        * 00016200
                                  64 *         * REG 12 IS THE LAST FOUR BYTES IN THE AREA SET ASIDE AS * 00016300
                                  65 *         * THE SAVE AREA 063884                                   * 00016400
                                  66 *         ************************************************************ 00016500

                                  68 *  6.08   ************************************************************ 00016700
                                  69 *         * A...YES                                                * 00016800
                                  70 *         *                                                        * 00016900
                                  71 *         * B...REG 12                                             * 00017000
                                  72 *         *                                                        * 00017100
                                  73 *         * C...THE PROGRAM CHECK WAS TAKEN AFTER A BASE REGISTER WAS * 00017200
                                  74 *         * ESTABLISHED IN PROGB. SINCE WE WILL EVENTUALLY RETURN TO * 00017300
                                  75 *         * PROGAA1, IT SEEMS TO BE A GOOD IDEA TO SAVE IT'S REGISTERS* 00017400
                                  76 *         ************************************************************ 00017500
                                  77           END                                                        00017600
```

8/20/70

SYMBOL	LEN	VALUE	DEFN	REFERENCES
EXAMPL3	00001	000000	0002	
GOBACK	00001	00002E	0017	
PROGC	00004	000018	0006	0003
SAVCC	00004	0C003C	0022	0009 C024

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
87 PRINTED LINES

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
           VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000                ENTRY UTILITY


                                                MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME    LOCATION      NAME    LOCATION      NAME    LOCATION      NAME    LOCATION

  PROGAA1         00      6C
  ASUB1           70       6
  EXMPL2          78      20
  PROGB           98      80
  EXAMPL3        118      8C
                                           PROGC          130
  UTILITY        1A8     5A0
                                           PRINT          20A     PCHKRETN       466

  ENTRY ADDRESS         1A8
  TOTAL LENGTH          748

****GO          DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.000000 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006E800    0006E770 00000048 00004F20 0006E430
REGS 8-15    0006E778 00000000 0006E7B0 0006E7F8    6F06388E 00063840 6F06382C 00063888

000000    00000000 0000019C F0F0F1C9 50071D90    00063820 00002A18 FF050080 8006632A  *........001I.....................*
000020    0004000A 7000240C FF150001 6F0638C0    0000FF00 00000000 FE040232 800011D6  *.............................O*
000040    000085D0 0C0000F1 000016C0 00002120    00004B1E 00074248 00040000 000002C0  *.......1.....................*
000060    00040000 00000366 00040000 0000030A    00000000 0000CA68 00040000 00000226  *.............................*

063820    05C058D0 C06658F0 C01605EF 58F0C01A    07FF9999 99999999 00063888 00063890  *.......0.....0..................*
063840    00000000 00000000 00000000 6F06382C    00063888 00000050 0006E7F8 0006E800  *.........................X8..Y.*
063860    0006E800 0006E770 00000048 00004F20    0006E430 0006E778 00000000 0006E7B0  *..Y...X...........U...X.......X.*
063880    0006E7F8 6F063822 00063840 0A0AD70B    05C01766 07009536 90ECD00C 05A0D204  *..X8..... ..P..............K.*
0638A0    A010A015 58DD0004 98ECD00C 07FEC2D3    C1D5D2E3 C8C5D9C5 90ECD00C 05C00000  *............BLANKTHERE........*
0638C0    41F0C02E 50FD0008 50DF0004 47000000    47000000 47000000 07001777 58DD0004  *.0.............................*
0638E0    98ECD00C 07FE0000 00063950 00000000    00000000 00000000 00000000 00000000  *.............................*
063900    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *.............................*
063920    00000000 00000000 00000000 00000000    00000000 95144180 E3C8C9E2 40D9D6E4  *.....................THIS ROU*
063940    E3C9D5C5 C4D6C5E2 40D5D6E3 C8C9D5C7    90ECD00C 05C058F0 C06A50FD 000850DF  *TINEDOES NOTHING.....0........*
063960    000418DF 178858DD 00049BEC D00C0700    07FE0000 00000000 00000000 00000000  *.............................*
063980    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *.............................*
0639A0    00000000 00000000 00000000 00000000    00000000 00000000 00000000 40404040  *........................        *
0639C0    00063974 4040E2E8 90ECD00C 05C004F0    07004110 C0100511 0F063A6C 7FFF0A0F  *....  SY.......0.............*

063F80    00000000 00000000 00000000 00004000    9400025D 00790000 00008000 000A0000  *.............. ................*
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   6/05/70

                                    1 *                          //////////////                          00000200
                                    2 *                          / SECTION 2 /                          00000300
                                    3 *                          //////////////                          00000400


                                    5 *                  ++++++++++++++++++++++++++++++++++++++++       00000600
                                    6 *                  + SAVE AREA LINKING CONVENTIONS          +     000007C0
                                    7 *                  ++++++++++++++++++++++++++++++++++++++++       00000800


                                    9 *         **  FOR THIS SECTION THE DUMP WAS TAKEN AFTER THE STORE IN-    00001000
                                   10 *             STRUCTION AT STMT #29 OF EXMPL2. **                    00001100

                                   12 *$$$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.21  $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00001300
                                   13 *         AN ADDITION HAS BEEN MADE TO THE SAVE AREA. LOCATE AND       $ C0CC1400
                                   14 *         CIRCLE IT.  WHAT DOES THE ADDITIONAL ADDRESS POINT TO?       $ CCCC1500
                                   15 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00001600
                                   16 *                                                                      $ 00001700
                                   17 *                                                                      $ 00001800
                                   18 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00001900


                                   20 *$$$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.22  $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 0000210C
                                   21 *         THE PROGRAMMER THAT WROTE 'PROGB' HAS SAVED THE CONTENTS OF  $ 00002200
                                   22 *         REGISTER 13 SCME PLACE. NOW REMEMBER PLEASE, THE ADDRESS NOW $ 00002300
                                   23 *         IN REG 13 WAS PLACED THERE BY PROGAA1.                        $ 00002400
                                   24 *                                                                       $ C0C02500
                                   25 *         WHERE IN 'PROGB' HAS THE CONTENTS OF REG 13 BEEN SAVED?  (IN $ 00002600
                                   26 *         THE DUMP LOCATE AND CIRCLE THIS FIELD)                        $ CCCC2700
                                   27 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC2800
                                   28 *                                                                      $ 0000290C
                                   29 *                                                                      $ 00003000
                                   30 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 000031 00


                                   32 *$$$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.23  $$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00003300
                                   33 *         YOU SHOULD NOW BE FAMILIAR WITH THE LINKAGE CONVENTIONS USED  C0C03400
                                   34 *         TO GO FROM ONE MODULE TO ANOTHER. REFER TO 'PROGB'S' LIST-    C0C03500
                                   35 *         ING AND CODE THE NECESSARY INSTRUCTIONS TO GO TO 'PROGC'. THE 00003600
                                   36 *         NECESSARY DC STATEMENTS ARE THERE SO YOU JUST HAVE TO CODE    C0C03700
                                   37 *         THE INSTRUCTIONS THAT ARE TO BE PLACED IN THE STREAM BEFORE   00003800
                                   38 *         THE  XR  7,7  INSTRUCTION AT STATEMENT # 36.                  00003900
                                   39 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004000
                                   40 *                                                                      $ 00004100
                                   41 *                                                                      $ C0004200
                                   42 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 000043CC

                                   44 *    THAT'S ALL THE QUESTIONS FOR SECTION TWO. PLEASE VERIFY YOUR       00004500
                                   45 *    ANSWERS WITH THE ANSWER SHEET THAT FOLLOWS THE LISTING OF PROGC.
                                   46 *    WHEN YOU HAVE COMPLETED THIS SECTION, PLEASE TURN YOUR ANSWER
                                   47 *    CUE TO RED AND THEN CONTINUE ON TO SECTION THREE.  THANK YOU
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   8/20/70

000000                            49 PROGAA1  START 0                                PROGAA1                 00000100
                                  50          EXTRN PROGB                                                    00012600
000000 05C0                       51          BALR  12,0          ESTABLISH A BASE REG                       00012700
000002                            52          USING *,12                                                     00012800
                                  53 *   NORMALLY YOU WOULD FIND INSTRUCTIONS IN THIS AREA. THE INSTRUCTIONS 00012900
                                  54 *   WOULD ACCOMPLISH A FUNCTION. SINCE WE ARE ONLY INTERESTED IN LEARN- 00013000
                                  55 *   ING HOW PROGRAMS LINK TOGETHER, I HAVE ELEMINATED ANY EXTRA IN-     00013100
                                  56 *   STRUCTIONS. THE NEXT 3 STATEMENTS ARE USED FOR LINKING.             00013200
000002 58D0 C066          00068   57          L     13,=A(SVA)                                               00013300
000006 58F0 C016          00018   58          L     15,EXT1                                                  00013400
00000A 05EF                       59          BALR  14,15         HERE'S THE EXIT                          00013500
                                  60 *   THE FOLLOWING TWO INSTRUCTIONS ARE USED TO BRANCH US TO THE SECOND  00013600
                                  61 *   CONTROL SECTION IN THIS PROGRAM.                                    00013700
00000C 58F0 C01A          0001C   62          L     15,SCEXT                                                 00013800
000010 07FF                       63          BR    15                                                       00013900
000012 999999999999               64          DC    3X'9999'      JUST USING THIS TO MAKE FINDING THE        00014000
000018 00000000                   65 EXT1     DC    A(PROGB)      ADDRESS OF 'PROGB' EASIER                  00014100
00001C 00000070                   66 SCEXT    DC    A(ASUB1)                                                 00014200
000020 0000000000000000           67 SVA      DC    18F'0'        THIS IS THE SAVE AREA FOR THIS CSECT       00014300
000068                            68          LTORG                                                          00014400
000068 00000020                   69                =A(SVA)
000070                            70 ASUB1    CSECT                                                          00014500
000070 05C0                       71          BALR  12,0          ESTABLISH A BASE REGISTER FOR THIS CSECT   00014600
000072                            72          USING *,12                                                     00014700
                                  73 *   HERE AGAIN YOU NORMALLY FIND INSTRUCTIONS FOR SOME FUNCTION. I'VE   00014800
                                  74 *   AGAIN ELEMINATED THOSE INSTRUCTIONS UNNECESSARY. HOWEVER I LEFT     00014900
                                  75 *   THE FOLLOWING INSTRUCTION HERE JUST FOR AN EXAMPLE.                 00015000
000072 1766                       76          XR    6,6           JUST CLEARING A REGISTER                   00015100
000074 0700                       77          CNOP  2,4            FILLER ONLY
000000                            78          END   PROGAA1                                                   00015200
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES
ASUB1	00001	000070	0070	0066
EXT1	00004	000018	0065	0058
PROGAA1	00001	000000	0049	0078
PROGB	00001	000000	0050	0065
SCEXT	00004	00001C	0066	0062
SVA	00004	000020	0067	0057 0069

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
98 PRINTED LINES

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                    F01FE869  8/20/70

000000                                2 EXMPL2   START 0                  EXMPL2                          00000100
                                      3          EXTRN PROGC                                              00005100
000000 90EC D00C            0000C     4          STM   14,12,12(13)    THIS IS A DUMMY ROUTINE USED FOR  00005200
000004 05A0                           5          BALR  10,0             ILLUSTRATION PURPOSES ONLY. PLEASE 00005300
000006                                6          USING *,10             IGNORE THE INSTRUCTIONS IN THIS CONTROL 00005400
000006 D204 A010 A015 00016 0001B     7          MVC   HERE,THERE       SECTION.  THANKS                  00005500
00000C 58DD 0004            00004     8          L     13,4(13)                                            00005600
000010 98EC D00C            0000C     9          LM    14,12,12(13)                                        00005700
000014 07FE                          10          BR    14                                                  00005800
000016 C2D3C1D5D2                    11 HERE     DC    C'BLANK'                                            00005900
00001B E3C8C5D9C5                    12 THERE    DC    C'THERE'                                            00006000
000020                               13          LTORG                                                     00006100
000020                               14 PROGB    CSECT                                                     00006200
000020 90EC D00C            0000C    15          STM   14,12,12(13)       SAVE CALLERS REGISTERS           00006300
000024 05C0                          16          BALR  12,0                                                00006400
000026                               17          USING *,12                                                00006500

000026 0700                          19          CNOP  0,4              FILLER ONLY
                                     20 *    THESE NEXT THREE INSTRUCTIONS ARE PREPARING FOR FUTURE LINKING  00006800
                                     21 *    AND ALSO PREPARING FOR THE RETURN WHEN WE DECIDE TO RETURN.    00006900
000028 41F0 C02E            00054    22          LA    15,SAVBB           ADDRESS OF THIS SAVE AREA        00007000
00002C 50FD 0008            00008    23          ST    15,8(13)                                            00007100
000030 500F 0004            00004    24          ST    13,4(15)                                            00007200
000034 00000000                      25          DC    F'0'               FORCE A PROGRAM CHECK

                                     27 *                          AS I SAID BEFORE, NORMALLY THERE WOULD BE  00007400
                                     28 *                          INSTRUCTIONS HERE FOR ACCOMPLISHING SOMETHING 00007500

                                     30 *    YOU WILL BE ASKED TO REPLACE THE NEXT THREE INSTRUCTIONS WITH THE
                                     31 *     CODE NECESSARY TO LINK TO A THIRD PROGRAM.

000038 4700 0000            00000    33          BC    0,0(0)                    NO BRANCH
00003C 4700 0000            00000    34          BC    0,0(0)                    NO BRANCH
000040 0700                          35          BCR   0,0                       NO BRANCH
000042 1777                          36          XR    7,7     INSTRUCTION USED AS AN EXAMPLE ONLY CLEARS REG  00008300
000044                               37 GOBACK   EQU   *                                                     00008400
000044 58DD 0004            00004    38          L     13,4(13)                                            00008500
000048 98EC D00C            0000C    39          LM    14,12,12(13)                                        00008600
00004C 07FE                          40          BR    14                                                  00008700
00004E 0000
000050 00000000                      41 BAZ      DC    A(PROGC)                                            00008800
000054 0000000000000000              42 SAVBB    DC    18F'0'                                              00008900
0000A0                               43       LTORG                                                      00009000
                                     44          END                                                       00009100
```

8/20/70

SYMBOL	LEN	VALUE	DEFN	REFERENCES
BAZ	00004	000050	0041	
EXMPL2	00001	000000	0002	
GOBACK	00001	000044	0037	
HERE	00005	000016	0011	0007
PROGB	00001	000020	0014	
PROGC	00001	000000	0003	0041
SAVBB	00004	000054	0042	0022
THERE	00005	00001B	0012	0007

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
63 PRINTED LINES

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FE869  8/20/70

000000                              2 EXAMPL3  START 0                                                00000100
                                    3          ENTRY PROGC                                           00005300
000000 E3C8C9E240D9D6E4             4          DC    C'THIS ROUTINE'    THESE TWO DC'S SERVE NO USEFUL 00005400
00000C C4D6C5E240D5D6E3             5          DC    C'DOES NOTHING'    PURPOSE.                       00005500
000018 90EC D00C            0000C   6 PROGC    STM   14,12,12(13)       HERE IS THE START OF THE GOOD CODE 00005600
00001C 05C0                         7          BALR  12,0                                            00005700
00001E                              8          USING *,12                                            00005800
00001E 58F0 C06A            00088   9          L     15,=A(SAVCC)                                    00005900
000022 50FD 0008            00008  10          ST    15,8(13)                                        00006000
000026 50DF 0004            00004  11          ST    13,4(15)                                        00006100
00002A 18DF                        12          LR    13,15                                           00006200
                                   13 *   HERE'S WHERE THE INSTRUCTIONS WOULD GO IF THIS PROGRAM WERE TO 00006300
                                   14 *   ACCOMPLISH ANYTHING OTHER THAN HELPING YOU LEARN LINKING.     00006400

00002C 1788                        16          XR    8,8        DUMMY INSTRUCTION FOR FILL IN ONLY  00006600
00002E                             17 GOBACK  EQU   *                                                00006700
00002E 58DD 0004            00004  18          L     13,4(13)                                        00006800
000032 98EC D00C            0000C  19          LM    14,12,12(13)                                    00006900
000036 0700                        20          CNOP  0,4                FILLER ONLY
000038 07FE                        21          BR    14                                              00007000
00003A 0000
00003C 0000000000000000            22 SAVCC   DC    18F'0'                                          00007100
000088                             23          LTORG                                                 00007200
000088 0000003C                    24                =A(SAVCC)
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69  8/20/70
                                   26 *        ++++++++++++++++++++++++++                          00005400
                                   27 *        + ANSWERS TO SECTION 2   +                          00005500
                                   28 *        ++++++++++++++++++++++++++                          00005600

                                   30 *  6.21   ************************************************************ 00005800
                                   31 *        * 8 BYTES FROM THE BEGINNING OF 'PROGAAL'S' SAVE AREA.      * 00005900
                                   32 *        * IT POINTS TO THE ADDRESS OF A SAVE AREA THAT IS LOCATED   * 00006000
                                   33 *        * IN PROGB.                                                 * 00006100
                                   34 *        ************************************************************ 00006200

                                   36 *  6.22   ************************************************************ 00006400
                                   37 *        * FOUR BYTES FROM THE BEGINNING OF 'PROGB'S' SAVE AREA      * 00006500
                                   38 *        ************************************************************ 00006600
                                   39          END                                                         00007300
```

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
           VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000                ENTRY UTILITY


                                                  MODULE MAP

  CONTROL SECTION                                 ENTRY

    NAME     ORIGIN  LENGTH                        NAME    LOCATION      NAME    LOCATION      NAME    LOCATION      NAME    LOCATION

  PROGAA1        00      6C
  ASUB1          70       6
  EXMPL2         78      20
  PROGB          98      80
  EXAMPL3       118      8C
                                                  PROGC          130
  UTILITY       1A8     5A0
                                                  PRINT          20A     PCHKRETN       466

  ENTRY ADDRESS       1A8
  TOTAL LENGTH        748

****GO         DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.000000 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006E800    0006E770 00000048 00004F20 0006F430
REGS 8-15    0006E778 00000000 0006E7B0 0006E7F8    6F0638BE 00063840 6F06382C 000638EC

000000    00000000 0000019C F0F0F1C9 00000000    00063820 00002A18 FF050080 8006690C  *........001I..................*
000020    0004000A 7000240C FF150001 6F0638CE    0000FF00 00000000 FF040232 800011D6  *.............................O*
000040    000085D0 0C0000F1 000016C0 00002120    0000461E 00000000 00040000 000002C0  *.......I.....................*
000060    00040000 00000366 00040000 0000030A    00000000 0000CA68 00040000 00000226  *.............................*

063820    05C058D0 C06658F0 C01605EF 58F0C01A    07FF9999 99999999 000638B8 00063890  *.......0.....0.................*
063840    00000000 00000000 000638EC 6F06382C    000638B8 00000050 0006E7F8 0006E800  *.........................X8..Y.*
063860    0006E800 0006E770 00000048 00004F20    0006E430 0006E778 00000000 0006E7B0  *..Y...X...........U...X.......X.*
063880    0006E7F8 6F063822 00063840 0A0AD70B    05C01766 07009536 90ECD00C 05A0D204  *..X8..... ..P..............K.*
0638A0    A010A015 58DD0004 98ECD00C 07FEC2D3    C1D5D2E3 C8C5D9C5 90ECD00C 05C00700  *.............BLANKTHERE........*
0638C0    41F0C02E 50FD0008 50DF0004 00000000    47000000 47000000 07001777 58DD0004  *.0.............................*
0638E0    98ECD00C 07FE0000 00063950 00000000    00063840 00000000 00000000 00000000  *.................. .............*
063900    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *................................*
063920    00000000 00000000 00000000 00000000    00000000 95144180 E3C8C9E2 40D9D6E4  *.......................THIS ROU*
063940    E3C9D5C5 C4D6C5E2 40D5D6E3 C8C9D5C7    90ECD00C 05C058F0 C06A50FD 000850DF  *TINEDOES NOTHING.......0........*
063960    000418DF 178858DD 000498EC D00C0700    07FE0000 00000000 00000000 00000000  *................................*
063980    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *................................*
0639A0    00000000 00000000 00000000 00000000    00000000 00000000 00000000 40404040  *............................    *
0639C0    00063974 4040E2E8 90ECD00C 05C004F0    07004110 C0100511 0F063A6C 7FFF0A0E  *....  SY.......0..............*

063F80    00000000 00000000 00000000 00004000    9400025D 00790000 00008000 000A0000  *.............. ................*
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   6/05/70

                                    2 *                          //////////////                          00000200
                                    3 *                          / SECTION 3 /                          00000300
                                    4 *                          //////////////                          00000400

                                    6 *                  ++++++++++++++++++++++++++++++++++++++++       00000600
                                    7 *                  + CONVENTIONS OF RETURNING FROM A RTNE  +       00000700
                                    8 *                  ++++++++++++++++++++++++++++++++++++++++       00000800

                                   10 *        I HOPE YOUR CODING WAS SIMILIAR TO THE INSTRUCTIONS I USED AT  00001000
                                   11 *        STMT'S 32,33 + 34 IN 'PROGB'. IF THE CODING YOU DID WAS NOT   00001100
                                   12 *        SIMILIAR, PLEASE BUG YOUR INSTRUCTOR BEFORE GOING ON.         00001200

                                   14 *$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.31  $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00001400
                                   15 *        WHAT WERE THE CONTENTS OF REG 13 BEFORE THE INSTRUCTION AT    $ 00001500
                                   16 *        STATEMENT #18 OF EXMPL3 WAS EXECUTED?   ( L   13,4(13) )     $ 00001600
                                   17 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00001700
                                   18 *                                                                      $ 00001800
                                   19 *                                                                      $ 00001900
                                   20 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002000


                                   22 *$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.32  $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002200
                                   23 *        WHAT WERE THE CONTENTS OF REG 13 AFTER THIS INSTRUCTION WAS    $ 00002300
                                   24 *        EXECUTED?                                                      $ 00002400
                                   25 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002500
                                   26 *                                                                      $ 00002600
                                   27 *                                                                      $ 00002700
                                   28 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002800


                                   30 *$$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.33  $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00003000
                                   31 *        WHY DID THE PROGRAMMER THAT WROTE EXAMPL3 PUT THIS --LM--      $ 00003100
                                   32 *        INSTRUCTION IN HIS (OR HER) PROGRAM?  (STMT #19)               $ 00003200
                                   33 *                                                                       $ 00003300
                                   34 *        IF IT WASN'T IN THIS MODULE, WOULD THE OPERATION OF THIS       $ 00003400
                                   35 *        MODULE BE AFFECTED?  HOW?                                      $ 00003500
                                   36 *                                                                       $ 00003600
                                   37 *        WOULD THE OPERATION OF ANY OTHER MODULES BE AFFECTED?          $ 00003700
                                   38 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00003800
                                   39 *                                                                      $ 00003900
                                   40 *                                                                      $ 00004000
                                   41 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004100


                                   43 *$$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.34  $$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004300
                                   44 *        WHAT DO THE CONTENTS IN REG 14 POINT TO?                       $ 00004400
                                   45 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004500
                                   46 *                                                                      $ 00004600
                                   47 *                                                                      $ 00004700
                                   48 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004800
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                51 *      THAT'S THE FINAL QUESTION FOR SECTION 3. PLEASE VERIFY YOUR
                52 *      ANSWERS WITH THE ANSWER SHEET THAT FOLLOWS THE LISTING OF
                53 *      'PROGC'. IF ALL YOUR ANSWERS ARE CORRECT PLEASE PROCEED TO
                54 *      SECTION FOUR.  THANK YOU
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   8/20/70

000000                            56 PROGAA1  START 0                    PROGAA1                    00000100
                                  57          EXTRN PROGB                                           00012600
000000 05C0                       58          BALR  12,0          ESTABLISH A BASE REG              00012700
000002                            59          USING *,12                                            00012800
                                  60 *   NORMALLY YOU WOULD FIND INSTRUCTIONS IN THIS AREA. THE INSTRUCTIONS 00012900
                                  61 *   WOULD ACCOMPLISH A FUNCTION. SINCE WE ARE ONLY INTERESTED IN LEARN- 00013000
                                  62 *   ING HOW PROGRAMS LINK TOGETHER, I HAVE ELEMINATED ANY EXTRA IN-     00013100
                                  63 *   STRUCTIONS. THE NEXT 3 STATEMENTS ARE USED FOR LINKING.             00013200
000002 58D0 C066        00068     64          L     13,=A(SVA)                                      00013300
000006 58F0 C016        00018     65          L     15,EXT1                                         00013400
00000A 05EF                       66          BALR  14,15         HERE'S THE EXIT                 00013500
                                  67 *   THE FOLLOWING TWO INSTRUCTIONS ARE USED TO BRANCH US TO THE SECOND  00013600
                                  68 *   CONTROL SECTION IN THIS PROGRAM.                                    00013700
00000C 58F0 C01A        0001C     69          L     15,SCEXT                                        00013800
000010 07FF                       70          BR    15                                              00013900
000012 999999999999               71          DC    3X'9999'      JUST USING THIS TO MAKE FINDING THE 00014000
000018 00000000                   72 EXT1     DC    A(PROGB)      ADDRESS OF 'PROGB' EASIER         00014100
00001C 00000070                   73 SCEXT    DC    A(ASUB1)                                        00014200
000020 0000000000000000           74 SVA      DC    18F'0'        THIS IS THE SAVE AREA FOR THIS CSECT 00014300
000068                            75          LTORG                                                 00014400
000068 00000020                   76                =A(SVA)
000070                            77 ASUB1    CSECT                                                 00014500
000070 05C0                       78          BALR  12,0          ESTABLISH A BASE REGISTER FOR THIS CSECT 00014600
000072                            79          USING *,12                                            00014700
                                  80 *   HERE AGAIN YOU NORMALLY FIND INSTRUCTIONS FOR SOME FUNCTION. I'VE   00014800
                                  81 *   AGAIN ELEMINATED THOSE INSTRUCTIONS UNNECESSARY. HOWEVER I LEFT     00014900
                                  82 *   THE FOLLOWING INSTRUCTION HERE JUST FOR AN EXAMPLE.                 00015000
000072 1766                       83          XR    6,6           JUST CLEARING A REGISTER          00015100
000074 0700                       84          CNOP  2,4            FILLER ONLY
000000                            85          END   PROGAA1                                          00015200
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES
ASUB1	00001	000070	0077	0073
EXT1	00004	000018	0072	0065
PROGAA1	00001	000000	0056	0085
PROGB	00001	000000	0057	0072
SCEXT	00004	00001C	0073	0069
SVA	00004	000020	0074	0064 0076

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
108 PRINTED LINES

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FE869  8/20/70

000000                              2 EXMPL2   START 0                 EXMPL2                          00000100
                                    3          EXTRN PROGC                                          00005100
000000 90EC D00C            0000C   4          STM   14,12,12(13)    THIS IS A DUMMY ROUTINE USED FOR 00005200
000004 05A0                         5          BALR  10,0            ILLUSTRATION PURPOSES ONLY. PLEASE 00005300
000006                              6          USING *,10            IGNORE THE INSTRUCTIONS IN THIS CONTROL 00005400
000006 D204 A010 A015 00016 00018   7          MVC   HERE,THERE      SECTION.  THANKS                 00005500
00000C 58DD 0004            00004   8          L     13,4(13)                                           00005600
000010 98EC D00C            0000C   9          LM    14,12,12(13)                                       00005700
000014 07FE                        10          BR    14                                                 00005800
000016 C2D3C1D5D2                  11 HERE     DC    C'BLANK'                                           00005900
00001B E3C8C5D9C5                  12 THERE    DC    C'THERE'                                           00006000
000020                             13          LTORG                                                    00006100
000020                             14 PROGB    CSECT                                                    00006200
000020 90EC D00C            0000C  15          STM   14,12,12(13)      SAVE CALLERS REGISTERS           00006300
000024 05C0                        16          BALR  12,0                                               00006400
000026                             17          USING *,12                                               00006500

000026 0700                        19          CNOP  0,4             FILLER ONLY
                                   20 *    THESE NEXT THREE INSTRUCTIONS ARE PREPARING FOR FUTURE LINKING 00006800
                                   21 *    AND ALSO PREPARING FOR THE RETURN WHEN WE DECIDE TO RETURN.    00006900
000028 41F0 C02E            00054  22          LA    15,SAVBB          ADDRESS OF THIS SAVE AREA        00007000
00002C 50FD 0008            00008  23          ST    15,8(13)                                           00007100
000030 50DF 0004            00004  24          ST    13,4(15)                                           00007200
000034 4700 0000            00000  25          BC    0,0(0)                FILLER ONLY

                                   27 *                          AS I SAID BEFORE, NORMALLY THERE WOULD BE 00007400
                                   28 *                          INSTRUCTIONS HERE FOR ACCOMPLISHING SOMETHING 00007500

                                   30 *    NECESSARY TO LINK TO THE THIRD PROGRAM                         00007800

000038 41D0 C02E            00054  32          LA    13,SAVBB
00003C 58F0 C02A            00050  33          L     15,BAZ
000040 05EF                        34          BALR  14,15
000042 1777                        35          XR    7,7         EXTRA ININSTRUCTION FOR EXAMPLE ONLY   00008300
000044                             36 GOBACK   EQU   *                                                  00008400
000044 58DD 0004            00004  37          L     13,4(13)                                           00008500
000048 98EC D00C            0000C  38          LM    14,12,12(13)                                       00008600
00004C 07FE                        39          BR    14                                                 00008700
00004E 0000
000050 00000000                    40 BAZ      DC    A(PROGC)                                           00008800
000054 0000000C00000000            41 SAVBB    DC    18F'0'                                             00008900
0000A0                             42       LTORG                                                    00009000
                                   43          END                                                      00009100
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES
BAZ	00004	000050	0040	0033
EXMPL2	00001	000000	0002	
GOBACK	00001	000044	0036	
HERE	00005	000016	0011	0007
PROGB	00001	000020	0014	
PROGC	00001	000000	0003	0040
SAVBB	00004	000054	0041	0022 0032
THERE	00005	000018	0012	0007

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
62 PRINTED LINES

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FE869  8/20/70

000000                              2 EXAMPL3  START 0                                                  00000100
                                    3          ENTRY PROGC                                             00005300
000000 E3C8C9E240D9D6E4             4          DC    C'THIS ROUTINE'   THESE TWO DC'S SERVE NO USEFUL  00005400
00000C C4D6C5E240D5D6E3             5          DC    C'DOES NOTHING'   PURPOSE.                      00005500
000018 90EC D00C            0000C   6 PROGC    STM   14,12,12(13)      HERE IS THE START OF THE GOOD CODE 00005600
00001C 05C0                         7          BALR  12,0                                              00005700
00001E                              8          USING *,12                                              00005800
00001E 58F0 C06A            00088   9          L     15,=A(SAVCC)                                      00005900
000022 50FD 0008            00008  10          ST    15,8(13)                                          00006000
000026 50DF 0004            00004  11          ST    13,4(15)                                          00006100
00002A 18DF                        12          LR    13,15                                             00006200
                                   13 *   HERE'S WHERE THE INSTRUCTIONS WOULD GO IF THIS PROGRAM WERE TO 00006300
                                   14 *   ACCOMPLISH ANYTHING OTHER THAN HELPING YOU LEARN LINKING.      00006400

00002C 1788                        16          XR    8,8       DUMMY INSTRUCTION FOR FILL IN ONLY      00006600
00002E                             17 GOBACK  EQU   *                                                  00006700
00002E 58DD 0004            00004  18          L     13,4(13)                                          00006800
000032 98EC D00C            0000C  19          LM    14,12,12(13)                                      00006900
000036 0000
000038 00000000                    20          DC    F'0'              FORCE A PROGRAM CHECK
00003C 07FE                        21          BR    14                                                00007000
00003E 0000
000040 0000000000000000            22 SAVCC   DC    18F'0'                                            00007100
000088                             23          LTORG                                                   00007200
000088 00000040                    24                =A(SAVCC)
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69  6/05/70

001000                                2 EXAMPL3  START X'1000'                                        00000100
                                      3          ENTRY PROGC                                        00005300
001000 E3C8C9E240D9D6E4               4          DC    C'THIS ROUTINE'   THESE TWO DC'S SERVE NO USEFUL 00005400
00100C C4D6C5E240D5D6E3               5          DC    C'DOES NOTHING'   PURPOSE.                   00005500
001018 90EC D00C            0000C     6 PROGC    STM   14,12,12(13)      HERE IS THE START OF THE GOOD CODE 00005600
00101C 05C0                           7          BALR  12,0                                         00005700
00101E                                8          USING *,12                                         00005800
00101E 58F0 C06A            01088     9          L     15,=A(SAVCC)                                 00005900
001022 50FD 0008            00008    10          ST    15,8(13)                                     00006000
001026 50DF 0004            00004    11          ST    13,4(15)                                     00006100
00102A 18DF                          12          LR    13,15                                        00006200
                                     13 *   HERE'S WHERE THE INSTRUCTIONS WOULD GO IF THIS PROGRAM WERE TO 00006300
                                     14 *   ACCOMPLISH ANYTHING OTHER THAN HELPING YOU LEARN LINKING.     00006400

00102C 1788                          16          XR    8,8       DUMMY INSTRUCTION FOR FILL IN ONLY   00006600
00102E                               17 GCRACK  EQU   *                                              00006700
00102E 58DD 0004            00004    18          L     13,4(13)                                     00006800
001032 98EC D00C            0000C    19          LM    14,12,12(13)                                 00006900
001036 0000                          20          DC    H'00'             FORCE A PROGRAM CHECK      00006600
001038 07FE                          21          BR    14                                           00007000
00103A 0000
00103C 0000000000000000              22 SAVCC   DC    18F'0'                                       00007100
001088                               23          LTORG                                              00007200
001088 0000103C                      24                =A(SAVCC)
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                    F01FEB69  6/05/70

                                   26 *         ++++++++++++++++++++++++++                                00006800
                                   27 *         + ANSWERS TO SECTION 3   +                                00006900
                                   28 *         ++++++++++++++++++++++++++                                00007000


                                   30 *  6.31   ************************************************************ 00007200
                                   31 *         * ADDRESS OF THE SAVE AREA THAT IS IN EXAMPL3. NOTICE THE    * 00007300
                                   32 *         * - LR   13,15 INSTRUCTION AT STMT #12. THE PROGRAMMER WAS   * 00007400
                                   33 *         * FOLLOWING CONVENTIONS AND SETTING UP REG 13 IN CASE HE     * 00007500
                                   34 *         * WENT TO ANOTHER SUB-ROUTINE.                               * 00007600
                                   35 *         ************************************************************ 00007700


                                   37 *  6.32   ************************************************************ 00007900
                                   38 *         * ADDRESS OF THE SAVE AREA LOCATED IN 'PROGB'. NOTE WHERE THE* 00008000
                                   39 *         * ADDRESS WAS RETREIVED FROM. IT WAS THE FOURTH BYTE INTO    * 00008100
                                   40 *         * THE  SAVE AREA LOCATED IN EXMPL3. SO YOU SEE, ANOTHER CO-  * 00008200
                                   41 *         * NVENTION WAS FOLLOWED.                                     * 00008300
                                   42 *         ************************************************************ 00008400


                                   44 *  6.33   ************************************************************ 00008600
                                   45 *         * THE  -LM- INSTRUCTION WAS USED BECAUSE THE PROGRAMMER KNEW * 00008700
                                   46 *         * HIS ROUTINE WAS GOING TO RETURN CONTROL TO A MODULE THAT   * 00008800
                                   47 *         * CALLED IT. THEREFORE HE MUST RETURN THE REGISTERS TO THERE * 00008900
                                   48 *         * ORIGINAL CONTENTS OR THE CALLING ROUTINE WOULD HAVE BEEN   * 00009000
                                   49 *         * WIPED OUT WHEN IT TRIED TO EXECUTE AGAIN.                  * 00009100
                                   50 *         *                                                            * 00009200
                                   51 *         * NO, HECK NO                                                * 00009300
                                   52 *         *                                                            * 00009400
                                   53 *         * LIKE WE JUST SAID, THE CALLING ROUTINE.                    * 00009500
                                   54 *         ************************************************************ 00009600


                                   56 *  6.34   ************************************************************ 00009800
                                   57 *         * REGISTER 14 CONTAINS THE ADDRESS OF THE NEXT SEQUENTIAL    * 00009900
                                   58 *         * INSTRUCTION AFTER THE -BALR   14,15- THAT TRANSFERRED      * 00010000
                                   59 *         * CONTROL FROM PROGB TO EXAMPL3.                             * 00010100
                                   60 *         ************************************************************ 00010200
                                   61           END                                                          00009300
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES
EXAMPL3	00001	001000	0002	
GOBACK	00001	00102E	0017	
PROGC	00C04	001018	0006	0003
SAVCC	00004	00103C	0022	0009 0024

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
78 PRINTED LINES

```
F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
          VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000             ENTRY UTILITY


                                                MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION

  PROGAA1        00      6C
  ASUB1          70       6
  EXMPL2         78      20
  PROGB          98      80
  EXAMPL3       118      8C
                                           PROGC        130
  UTILITY       1A8     5A0
                                           PRINT        20A    PCHKRETN     466

  ENTRY ADDRESS       1A8
  TOTAL LENGTH        748

****GO         DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.000000 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006E800    0006E770 00000048 00004F20 0006E430
REGS 8-15    0006E778 00000000 0006E7B0 0006E7F8    6F0638BE 000638EC 6F0638DA 00063950

000000    00000000 0000019C F0F0F1C9 50071D90    00063820 00002A18 FF050080 800662E6  *........001I.....................W*
000020    0004000A 7000240C FF150001 4F063970    0000FF00 00000000 FE040132 80001106  *.................................0*
000040    000085D0 0C0000F1 00001670 00002120    00004B1E 00074248 00040000 000002C0  *.......1.....................*
000060    00040000 00000366 00040000 0000030A    00000000 0000CA68 00040000 00000226  *.....................................*

063820    05C058D0 C06658F0 C01605EF 58F0C01A    07FF9999 99999999 000638B8 00063890  *.......0.....0...................*
063840    00000000 00000000 000638EC 6F06382C    000638B8 00000050 0006E7F8 0006E800  *.............................X8..Y.*
063860    0006E800 0006E770 00000048 00004F20    0006E430 0006E778 00000000 0006E7B0  *..Y...X...........U...X.......X.*
063880    0006E7F8 6F063822 00063840 954695FF    05C01766 07004110 90ECD00C 05A0D204  *..X8..... ....................K.*
0638A0    A010A015 58DD0004 98ECD00C 07FEC2D3    C1D5D2E3 C8C5D9C5 90ECD00C 05C00700  *.............BLANKTHERE.........*
0638C0    41F0C02E 50FD0008 50DF0004 47000000    41D0C02E 58F0C02A 05EF1777 58DD0004  *.0.....................0..........*
0638E0    98ECD00C 07FE0000 00063950 00000000    00063840 00063978 6F0638DA 00063950  *.................. ..............*
063900    00000050 0006E7F8 0006E800 0006E800    0006E770 00000048 00004F20 0006E430  *.......X8..Y...Y...X...........U.*
063920    0006E778 00000000 0006E7B0 0006E7F8    6F0638BE 92009561 E3C8C9E2 40D9D6E4  *..X........X...X8.........THIS ROU*
063940    E3C9D5C5 C4D6C5E2 40D5D6E3 C8C9D5C7    90ECD00C 05C058F0 C06A50FD 000850DF  *TINEDOES NOTHING.......0.........*
063960    000418DF 178858DD 000498EC D00C0000    00000000 07FE0000 00000000 000638EC  *.................................*
063980    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *.................................*
0639A0    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *.................................*
0639C0    00063978 40404040 90ECD00C 05C004F0    07004110 C0100511 0F063A6C 7FFF0A0E  *....     .......0................*

063F80    00000000 00000000 00000000 00004000    9400025D 00790000 00008000 000A0000  *.............. .................*
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69  6/05/70

                                    2 *                          //////////////                      CC010100
                                    3 *                          / SECTICN 4 /                      00010200
                                    4 *                          //////////////                      00010300

                                    6 *                  ++++++++++++++++++++++++++++++++++++++++++++      00010500
                                    7 *                  + SUMMARY OF SECTION LINKING CONVENTIONS +        00010600
                                    8 *                  ++++++++++++++++++++++++++++++++++++++++++++      00010700

                                   10 *$$$$$$$$$$$$$$$$$$$$  QUESTION 6.41  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00010900
                                   11 *        WHY ISN'T THERE A --STM-- INSTRUCTION AT THE BEGINNING OF    $ 00011000
                                   12 *        THE CSECT LABELED 'ASUB1'?                                   $ 00011100
                                   13 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00011200
                                   14 *                                                                     $ 00011300
                                   15 *                                                                     $ 00011400
                                   16 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00011500

                                   18 *$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.42  $$$$$$$$$$$$$$$$$$$$$$$$$$$ CC011700
                                   19 *        STATE UNDER WHAT CONDITIONS THE PROGRAMMER SHOULD HAVE MADE  $ 00011800
                                   20 *        PROVISIONS FCR THE SAVING OF REGISTERS?                      $ C0011900
                                   21 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCC12000
                                   22 *                                                                     $ 00012100
                                   23 *                                                                     $ C0012200
                                   24 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00012300

                                   26 *$$$$$$$$$$$$$$$$$$$$$$  QUESTION 6.43  $$$$$$$$$$$$$$$$$$$$$$$$$$$ CC012500
                                   27 *        LIST IN SEQUENCE THE CONTROL SECTIONS EXECUTED SINCE THE     $ C0012600
                                   28 *        LCADER TURNED CCNTRCL OVER TO 'PROGAA1'.                     $ C0012700
                                   29 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00012800
                                   30 *                                                                     $ 00012900
                                   31 *                                                                     $ 00013000
                                   32 *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC013100
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FE869  8/20/70

000000                             34 PROGAA1  START 0                        PROGAA1                 00000100
                                   35          EXTRN PROGB                                            00012600
000000 05C0                        36          BALR  12,0          ESTABLISH A BASE REG               00012700
000002                             37          USING *,12                                             00012800
                                   38 *   NORMALLY YOU WOULD FIND INSTRUCTIONS IN THIS AREA. THE INSTRUCTIONS 00012900
                                   39 *   WOULD ACCOMPLISH A FUNCTION. SINCE WE ARE ONLY INTERESTED IN LEARN- 00013000
                                   40 *   ING HOW PROGRAMS LINK TOGETHER, I HAVE ELEMINATED ANY EXTRA IN-    00013100
                                   41 *   STRUCTIONS. THE NEXT 3 STATEMENTS ARE USED FOR LINKING.            00013200
000002 5800 C066           00068   42          L     13,=A(SVA)                                       00013300
000006 58F0 C016           00018   43          L     15,EXT1                                          00013400
00000A 05EF                        44          BALR  14,15         HERE'S THE EXIT                  00013500
                                   45 *   THE FOLLOWING TWO INSTRUCTIONS ARE USED TO BRANCH US TO THE SECOND  00013600
                                   46 *   CONTROL SECTION IN THIS PROGRAM.                                   00013700
00000C 58F0 C01A           0001C   47          L     15,SCEXT                                         00013800
000010 07FF                        48          BR    15                                               00013900
000012 999999999999                49          DC    3X'9999'      JUST USING THIS TO MAKE FINDING THE 00014000
000018 00000000                    50 EXT1     DC    A(PROGB)      ADDRESS OF 'PROGB' EASIER          00014100
00001C 00000070                    51 SCEXT    DC    A(ASUB1)                                         00014200
000020 0000000000000000            52 SVA      DC    18F'0'        THIS IS THE SAVE AREA FOR THIS CSECT 00014300
000068                             53          LTORG                                                  00014400
000068 00000020                    54                =A(SVA)
000070                             55 ASUB1    CSECT                                                  00014500
000070 05C0                        56          BALR  12,0          ESTABLISH A BASE REGISTER FOR THIS CSECT 00014600
000072                             57          USING *,12                                             00014700
                                   58 *   HERE AGAIN YOU NORMALLY FIND INSTRUCTIONS FOR SOME FUNCTION. I'VE   00014800
                                   59 *   AGAIN ELEMINATED THOSE INSTRUCTIONS UNNECESSARY. HOWEVER I LEFT     00014900
                                   60 *   THE FOLLOWING INSTRUCTION HERE JUST FOR AN EXAMPLE.                 00015000
000072 1766                        61          XR    6,6           JUST CLEARING A REGISTER           00015100

000074 0000                        63          DC    H'00'               FORCE A PROGRAM CHECK        00006600
000000                             64          END   PROGAA1                                           00015200
```

8/20/70

SYMBOL	LEN	VALUE	DEFN	REFERENCES
ASUB1	00001	000070	0055	0051
EXT1	00004	000018	0050	0043
PROGAA1	00001	000000	0034	0064
PROGB	00001	000000	0035	0050
SCEXT	00004	00001C	0051	0047
SVA	00004	000020	0052	0042 0054

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
84 PRINTED LINES

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   8/20/70
000000                                    2 EXMPL2   START 0                  EXMPL2                          00000100
                                          3          EXTRN PROGC                                             00005100
000000 90EC D00C             0000C        4          STM   14,12,12(13)     THIS IS A DUMMY ROUTINE USED FOR 00005200
000004 05A0                               5          BALR  10,0             ILLUSTRATION PURPOSES ONLY. PLEASE 00005300
000006                                    6          USING *,10             IGNORE THE INSTRUCTIONS IN THIS CONTROL 00005400
000006 D204 A010 A015 00016 00018         7          MVC   HERE,THERE       SECTION.  THANKS                00005500
00000C 58DD 0004             00004        8          L     13,4(13)                                          00005600
000010 98EC D00C             0000C        9          LM    14,12,12(13)                                      00005700
000014 07FE                              10          BR    14                                                00005800
000016 C2D3C1D5D2                        11 HERE     DC    C'BLANK'                                          00005900
00001B E3C8C5D9C5                        12 THERE    DC    C'THERE'                                          00006000
000020                                   13          LTORG                                                   00006100
000020                                   14 PROGB    CSECT                                                   00006200
000020 90EC D00C             0000C       15          STM   14,12,12(13)       SAVE CALLERS REGISTERS         00006300
000024 05C0                              16          BALR  12,0                                              00006400
000026                                   17          USING *,12                                              00006500
000026 0700                              18          CNOP  0,4              FILLER ONLY

                                         20 *    THESE NEXT THREE INSTRUCTIONS ARE PREPARING FOR FUTURE LINKING  00006800
                                         21 *    AND ALSO PREPARING FOR THE RETURN WHEN WE DECIDE TO RETURN.    00006900
000028 41F0 C02E             00054       22          LA    15,SAVBB           ADDRESS OF THIS SAVE AREA      00007000
00002C 50FD 0008             00008       23          ST    15,8(13)                                          00007100
000030 50DF 0004             00004       24          ST    13,4(15)                                          00007200
000034 4700 0000             00000       25          BC    0,0(0)                FILLER ONLY

                                         27 *                          AS I SAID BEFORE, NORMALLY THERE WOULD BE  00007400
                                         28 *                          INSTRUCTIONS HERE FOR ACCOMPLISHING SOMETHING 00007500

                                         30 *    NECESSARY TO LINK TO THE THIRD PROGRAM                         00007800

000038 41D0 C02E             00054       32          LA    13,SAVBB
00003C 58F0 C02A             00050       33          L     15,BAZ
000040 05FF                              34          BALR  14,15
000042 1777                              35          XR    7,7    EXTRA INSTRUCTION USED FOR EXAMPLE PURPOSES ONLY 00008300
000044                                   36 GOBACK   EQU   *                                                   00008400
000044 58DD 0004             00004       37          L     13,4(13)                                          00008500
000048 98EC D00C             0000C       38          LM    14,12,12(13)                                      00008600
00004C 07FE                              39          BR    14                                                00008700
00004E 0000
000050 00000000                          40 BAZ      DC    A(PROGC)                                          00008800
000054 0000000000000000                  41 SAVBB    DC    18F'0'                                            00008900
0000A0                                   42       LTORG                                                    00009000
                                         43          END                                                     00009100
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES	
BAZ	00004	000050	0040	0033	
EXMPL2	00001	000000	0002		
GOBACK	00001	000044	0036		
HERE	00005	000016	0011	0007	
PROGB	00001	000020	0014		
PROGC	00001	000000	0003	0040	
SAVBB	00004	00C054	0041	0022	0032
THERE	00005	00001B	0012	0007	

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
62 PRINTED LINES

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   8/20/70

000000                                    2 FXAMPL3  START 0                                                00000100
                                          3          ENTRY PROGC                                             00005300
000000 E3C8C9E240D9D6E4                   4          DC    C'THIS ROUTINE'    THESE TWO DC'S SERVE NO USEFUL 00005400
00000C C4D6C5E240D5D6E3                   5          DC    C'DOES NOTHING'    PURPOSE.                       00005500
000018 90EC D00C              0000C       6 PROGC    STM   14,12,12(13)       HERE IS THE START OF THE GOOD CODE 00005600
00001C 05C0                               7          BALR  12,0                                              00005700
00001E                                    8          USING *,12                                              00005800
00001E 58F0 C06A              00088       9          L     15,=A(SAVCC)                                      00005900
000022 50FD 0008              00008      10          ST    15,8(13)                                          00006000
000026 50DF 0004              00004      11          ST    13,4(15)                                          00006100
00002A 18DF                              12          LR    13,15                                             00006200
                                         13 *    HERE'S WHERE THE INSTRUCTIONS WOULD GO IF THIS PROGRAM WERE TO 00006300
                                         14 *    ACCOMPLISH ANYTHING OTHER THAN HELPING YOU LEARN LINKING.     00006400

00002C 1788                              16          XR    8,8       DUMMY INSTRUCTION FOR FILL IN ONLY      00006600
00002E                                   17 GOBACK  EQU   *                                                  00006700
00002E 0700                              18          CNOP  0,4               FILLER ONLY
000030 58DD 0004              00004      19          L     13,4(13)                                          00006800
000034 98EC D00C              0000C      20          LM    14,12,12(13)                                      00006900
000038 07FE                              21          BR    14                                                00007000
00003A 0000
00003C 0000000000000000                  22 SAVCC   DC    18F'0'                                            00007100
000088                                   23          LTORG                                                   00007200
000088 0000003C                          24                =A(SAVCC)
```

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
           VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000                ENTRY UTILITY

                                                  MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME    LOCATION      NAME    LOCATION      NAME    LOCATION      NAME    LOCATION

  PROGAA1         00      6C
  ASUB1           70       6
  EXMPL2          78      20
  PROGB           98      80
  EXAMPL3        118      8C
                                           PROGC          130
  UTILITY        1A8     5A0
                                           PRINT          20A     PCHKRETN       466

  ENTRY ADDRESS         1A8
  TOTAL LENGTH          748

****GO          DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.000000 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006F800    0006E770 00000048 00000000 0006E430
REGS 8-15    0006E778 00000000 0006E7B0 0006E7F8    4F063892 00063840 6F06382C 00063890

000000    00000000 0000019C F0F0F1C9 50071090    00063820 00002A18 FF050080 90066382  *........0011.....................*
000020    0004000A 7000240C FF150001 4F063896    0000FF00 00000000 FF040233 800011D6  *.............................0*
000040    000085D0 0C00J0F1 000016C0 00002120    0000461E 00074248 00040000 000002C0  *.......1.....................*
000060    00040000 00000366 00040000 0000030A    00000000 0000CA68 00040000 00000226  *..............................*

063820    05C058D0 C06658F0 C01605EF 58F0C01A    07FF9999 99999999 00063888 00063890  *.......0.....0..................*
063840    00000000 00000000 000638EC 6F06382C    000638B8 00000050 0006E7F8 0006E800  *..........................X8..Y.*
063860    0006E800 0006E770 00000048 00004F20    0006E430 0006E778 00000000 0006E7B0  *..Y...X...........U...X.......X.*
063880    0006E7F8 6F063822 00063840 954695FF    05C01766 00004110 90ECD00C 05A0D204  *..X8.......  ..................K.*
0638A0    A010A015 58DD0004 98ECD00C 07FEC2D3    C1D5D2E3 C8C5D9C5 90ECD00C 05C00700  *..............BLANKTHERE........*
0638C0    41F0C02E 50FD0008 50DF0004 47000000    41D0C02E 58F0C02A 05EF1777 58DD0004  *.0.....................0..........*
0638F0    98ECD00C 07FE0000 00063950 00000000    00063840 00063974 6F0638DA 00063950  *..................  .............*
063900    00000050 0006E7F8 0006E800 0006E800    0006E770 00000048 00004F20 0006E430  *.......X8..Y...Y...X...........U.*
063920    0006E778 00000000 0006E7B0 0006E7F8    6F0638BE 92009561 E3C8C9E2 40D9D6E4  *..X........X...X8........THIS ROU*
063940    E3C9D5C5 C4D6C5E2 40D5D6E3 C8C9D5C7    90ECD00C 05C058F0 C06A50FD 000850DF  *TINEDOES NOTHING.......0........*
063960    000418DF 17880700 58DD0004 98ECD00C    07FE0000 00000000 000638EC 00000000  *................................*
063980    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *................................*
0639A0    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00250000  *................................*
0639C0    00063974 40404040 90ECD00C 05C004F0    07004110 C0100511 0F063A6C 7FFF0A0E  *....    .......0................*

063F80    00000000 00000000 00000000 00004000    94000250 00790000 00008000 000A0000  *.............. ................*
```

```
RRRRRRRRRRR     EEEEEEEEEEEE   LL                          TTTTTTTTTTTT    AAAAAAAAAA          11
RRRRRRRRRRRR    EEEEEEEEEEEE   LL                          TTTTTTTTTTTT    AAAAAAAAAAAA        111
RR          RR  EE             LL                              TT          AA          AA      1111
RR          RR  EE             LL                              TT          AA          AA        11
RR          RR  EE             LL                              TT          AA          AA        11
RRRRRRRRRRRR    EEEEEEEE       LL                              TT          AAAAAAAAAAAA          11
RRRRRRRRRRR     EEEEEEEE       LL                              TT          AAAAAAAAAAAA          11
RR     RR       EE             LL                              TT          AA          AA        11
RR      RR      EE             LL                              TT          AA          AA        11
RR       RR     EE             LL                              TT          AA          AA        11
RR        RR    EEEEEEEEEEEE   LLLLLLLLLLLL                    TT          AA          AA    1111111111
RR         RR   EEEEEEEEEEEE   LLLLLLLLLLLL                    TT          AA          AA    1111111111
```

```
 9999999999
999999999999
99          99
99          99
99          99
999999999999
999999999999
            99
            99
99          99
999999999999
 9999999999
```


****

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   3/18/70

001000                                    1 PROG1    START X'1000'                 PROG1          REL BUG1
                                          2          ENTRY NUMSEQ
001000 05B0                               3          BALR  11,0
001002                                    4          USING *,11
001002 1777                               5          XR    7,7
001004 4A70 B07A            0107C         6          AH    7,=H'1'
001008 41D0 B01A            0101C         7          LA    13,SAVE1
00100C 58F0 B076            01078         8          L     15,=V(PROG2)
001010 05EF                               9          BALR  14,15
001012 D203 B062 B06E 01064 01070        10          MVC   NUMSEQ(4),FIGONE
001018 0000                              11          DC    H'0'
00101A 0000
00101C 0000000000000000                  12 SAVE1   DC    18F'0'
001064                                   13 NUMSEQ  DS    3F
001070 D6D5C540                          14 FIGONE  DC    C'ONE '
001000                                   15          END   PROG1
001078 00000000                          16                =V(PROG2)
00107C 0001                              17                =H'1'
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   3/18/70

001000                                1 PROG2    START X'1000'                 PROG2        REL BUG1
                                      2          EXTRN NUMSEQ,PROG3
001000 90EC D00C            0000C     3          STM   14,12,12(13)
001004 05B0                           4          BALR  11,0
001006                                5          USING *,11
001006 41F0 B032            01038     6          LA    15,SAVE2
00100A 50FD 0008            00008     7          ST    15,8(13)
00100E 50DF 0004            00004     8          ST    13,4(15)
001012 18DF                           9          LR    13,15
001014 1788                          10          XR    8,8
001016 4A80 B08A            01090    11          AH    8,=H'2'
00101A 5830 B07A            01080    12          L     3,ADDSEQ
00101E 5840 B07E            01084    13          L     4,FIGTWO
001022 5043 0004            00004    14          ST    4,4(3)
001026 58F0 B082            01088    15          L     15,NEXT
00102A 05FE                          16          BALR  15,14
00102C 58DD 0004            00004    17          L     13,4(13)
001030 98EC D00C            0000C    18          LM    14,12,12(13)
001034 07FE                          19          BR    14
001036 0000
001038 0000000000000000              20 SAVE2   DC    18F'0'
001080 00000000                      21 ADDSEQ  DC    A(NUMSEQ)
001084 E3E6D640                      22 FIGTWO  DC    C'TWO '
001088 00000000                      23 NEXT    DC    A(PROG3)
                                     24         END
001090 0002                          25               =H'2'
```

```
  LCC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   3/18/70

001000                                    1 PROG3    START X'1000'                  PROG3        REL BUG1
                                          2          EXTRN NUMSEQ
001000 90EC D00C             0000C        3          STM   14,12,12(13)
001004 05C0                               4          BALR  12,0
001006                                    5          USING *,12
001006 41F0 C02A             01030        6          LA    15,SAVE3
00100A 50FD 0008             00008        7          ST    15,8(13)
00100E 50DF 0004             00004        8          ST    13,4(15)
001012 18DF                               9          LR    13,15
001014 1799                              10          XR    9,9
001016 4A90 C07A             01080       11          AH    9,=H'3'
00101A 5850 C072             01078       12          L     5,SEQADD
00101E 5860 C076             0107C       13          L     6,FIGFOR
001022 5065 0000             00000       14          ST    6,0(5)
001026 58DD 0004             00004       15          L     13,4(13)
00102A 98EC D00C             0000C       16          LM    14,12,12(13)
00102E 07FE                              17          BR    14
001030 0000000000000000                  18 SAVE3   DC    18F'0'
001078 00000008                          19 SEQADD  DC    A(NUMSEQ+8)
00107C C6D6E4D9                          20 FIGFOR  DC    C'FOUR'
                                         21          END
001080 0003                              22                =H'3'
```

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
         VARIABLE OPTIONS USED - SIZE=(45056,6144)                DEFAULT OPTION(S) USED
IEW0000      ENTRY UTILITY

                                                MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME    LOCATION     NAME    LOCATION     NAME    LOCATION     NAME    LOCATION

  PROG1         00      7E
                                            NUMSEQ        64
  PROG2         80      92
  PROG3        118      82
  UTILITY      1A0     5A0
                                            PRINT        202     PCHKRETN     45E

 ENTRY ADDRESS      1A0
 TOTAL LENGTH       740

****GO         DOES NOT EXIST BUT HAS BEEN ADDED TC DATA SET
```

```
F.P. REGS.  00.000000 00CC0000   00.00CC00 00000000   00.000000 00000000   00.000000 00000000

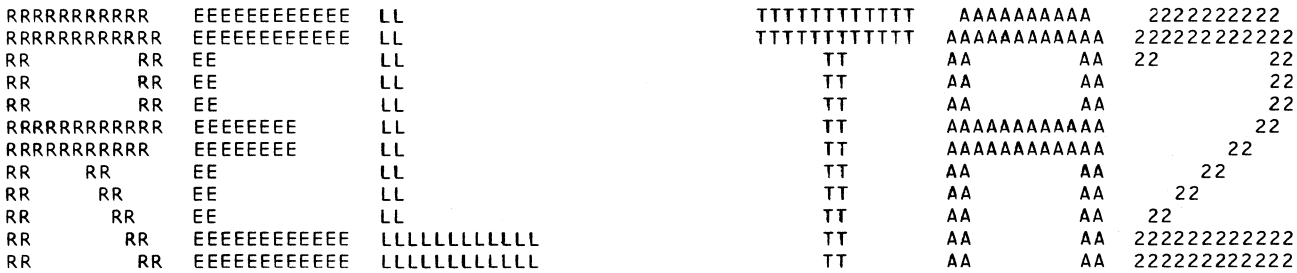
REGS 0-7     00000050 0006E7F8 0006E800 00063884     E3E6D640 00000048 00004F20 00000001
REGS 8-15    00000002 00000000 0006E7B0 6F0638A6     60063A22 000638D8 6F063832 6F0628CC

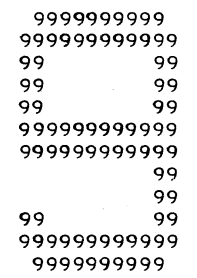
000000     00000000 0000019C F0F0F1C9 50071D90     00063820 00002A18 01040080 8003AFFE  *........001I..................*
000020     0004000A 7000240C FF150001 6F06383A     0000FF00 00000000 FE040231 800011D6  *.............................C*
000040     3004CA08 0C000000 40001670 00002120     29A27EC0 00074200 00040000 000002C0  *........ .....................*
000060     00040000 00000366 00C4C000 0000030A     00000000 0000CA68 00040000 00000226  *..............................*

063820     05B01777 4A70B07A 41D0B01A 58F0B076     05EFD203 B062B06E 00000000 00000000  *.............0....K............*
063840     00000000 000638D8 6F063832 0C0638A0     00000050 0006E7F8 0006E800 0006E800  *.......Q.............X8..Y...Y.*
063860     0006E770 00000048 00004F20 0CC00001     0006E778 00000000 0006E7B0 6F063822  *..X.............X.......X.....*
063880     60063A22 410000B0 E3E6D640 0A0AD70B     D6D5C540 58909536 000638A0 000195FF  *........TWO ..P.ONE ............*
0638A0     90ECD00C 05B041F0 B03250FD 000850DF     000418DF 17884A80 B08A5830 B07A5840  *........0.......................*
0638C0     B07E5043 000458F0 B08205FE 58DD0004     98ECD00C 07FE0000 00000000 0006383C  *........0.....................*
0638E0     00000000 00000000 00000000 00000000     00000000 00000000 00000000 00000000  *..............................*
063900     00000000 00000000 00000000 00000000     00000000 00000000 00000000 00000000  *..............................*
063920     00063884 E3E6D64C 00063938 061C0610     000244B0 951441B0 90ECD00C 05C041F0  *....TWO .....................0*
063940     C02A50FD 000850DF 000418DF 17994A90     C07A5850 C0725860 C0765065 000058DD  *..............................*
063960     000498EC D00C07FE 00000000 00000000     00000000 00000000 000J0000 00000000  *..............................*
063980     00000000 0000000C 0C000000 00000000     00000000 00000000 00000000 00000000  *..............................*
0639A0     00000000 00000000 00000000 0C000000     0006388C C6D6E4D9 0003FF00 40404040  *....................FOUR....    *
0639C0     90ECD00C 05C004F0 07004110 CC100511     0F063A64 7FFF0A0E 58B00010 9110B074  *........0.....................*

063F40     00040000 0000030A 00000000 0000CA68     00040000 00000226 000639C0 00063F40  *.............................. *
063F60     00000000 0000A078 01460C4D 00000001     00000000 00000000 00000000 00000000  *..............................*
```


****


RRRRRRRRRR EEEEEEEEEEE LL
RRRRRRRRRRR EEEEEEEEEEE LL
RR RR EE LL
RR RR EE LL
RR RR EE LL
RRRRRRRRRRR EEEEEEEE LL
RRRRRRRRRR EEEEEEEE LL
RR RR EE LL
RR RR EE LL
RR RR EEEEEEEEEEE LLLLLLLLLLL
RR RR EEEEEEEEEEE LLLLLLLLLLL
TTTTTTTTTTT AAAAAAAAAA 2222222222
TTTTTTTTTTT AAAAAAAAAAA 222222222222
TT AA AA 22 22
TT AA AA 22
TT AA AA 22
TT AAAAAAAAAAA 22
TT AAAAAAAAAAA 22
TT AA AA 22
TT AA AA 22
TT AA AA 22
TT AA AA 222222222222
TT AA AA 222222222222


9999999999
999999999999
99 99
99 99
99 99
999999999999
999999999999
99
99
99 99
999999999999
9999999999

****

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69  3/18/70

001000                                    1 BUGGSY   START  X'1000'              PROG1        REL BUG2     C0000100
                                          2          ENTRY HOLDBAS,ARACIR                                  CC000200
                                          3          EXTRN BUGCIR                                          00000300
001000 05A0                               4          BALR  10,0                                            00000400
001002                                    5          USING *,10                                            CC000500
001002 47F0 A008            0100A         6          B     BEGIN                                           00000600
001006 40404040                           7          DC    C'    '                                         00000700
00100A F871 A076 A066 01078 01068         8 BEGIN    ZAP   WRKA(8),LNGH                                    00000800
001010 FC71 A076 A066 01078 01068         9          MP    WRKA(8),LNGH                                    C0000900
001016 D203 A09E A07A C10A0 0107C        10          MVC   SQARA,WRKA+4                                    00001000
00101C F871 A076 A066 01078 01068        11          ZAP   WRKA(8),LNGH                                    00001100
001022 FC71 A076 A06A 01078 0106C        12          MP    WRKA(8),TEN                                     00001200
001028 FD70 A076 A06C 01078 0106E        13          DP    WRKA(8),HALF                                    00001300
00102E D207 A08E A076 C1090 01078        14          MVC   HOLDBAS,WRKA                                    00001400
001034                                   15 TRI      EQU   *                                               C0001500
001034 F876 A086 A076 01088 01078        16          ZAP   BHOLD,WRKA(7)                                   C0001600
00103A D207 A076 A086 01078 01088        17          MVC   WRKA,BHOLD                                      00001700
001040 FC71 A076 A068 01078 0106A        18          MP    WRKA(8),HITE                                    00001800
001046 FD71 A076 A06A 01078 0106C        19          DP    WRKA(8),TEN                                     00001900
00104C F875 A07E A076 01080 01078        20          ZAP   WRKB(8),WRKA(6)                                 00002000
001052 D203 A09A A082 0109C 01084        21          MVC   ARTRI,WRKB+4                                    00002100
001058 D203 A096 A09A 01098 0109C        22          MVC   TOTAR,ARTRI                                     00002200
00105E FA33 A096 A09E 01098 010A0        23          AP    TOTAR,SQARA                                     00002300
001064 47F0 A0A2            010A4        24          B     EXT1      GO AROUND CONSTANTS                   00002400
001068 025C                              25 LNGH     DC    P'25'                                           00002500
00106A 014C                              26 HITE     DC    P'14'                                           00002600
00106C 010C                              27 TEN      DC    P'10'                                           00002700
00106E 2C                                28 HALF     DC    P'2'                                            CC002800
00106F 0100000C                          29 ZRO5     DC    P'100000'                                       00002900
001073 0000000000
001078 0000000000000000                  30 WRKA     DC    D'0'                                            00003000
001080 0000000000000000                  31 WRKB     DC    D'0'                                            00003100
001088 0000C00000000000                  32 BHOLD    DC    D'0'                                            00003200
001090 0000000000000000                  33 HOLDBAS  DC    D'0'                                            00003300
001098 00000000                          34 TOTAR    DC    F'0'                                            00003400
00109C 00000000                          35 ARTRI    DC    F'0'                                            00003500
0010A0 00000000                          36 SQARA    DC    F'0'                                            C0003600
0010A4 58D0 A0B6            010B8        37 EXT1     L     13,OUT                                          00003700
0010A8 58F0 A0B2            010B4        38          L     15,NEXT                                         00003800
0010AC 05EF                              39          BALR  14,15                                           00003900
0010AE 47F0 A106            01108        40          B     SUMMARY                                         CC004000
0010B2 0000
0010B4 00000000                          41 NEXT     DC    A(BUGCIR)                                       00004100
0010B8 000010C0                          42 OUT      DC    A(REGSAV)                                       00004200
0010BC 00000000
0010C0 0000000000000000                  43 REGSAV   DC    9D'0'                                           00004300
001108                                   44 SUMMARY  EQU   *                                               00004400
001108 D203 A132 A096 01134 01098        45          MVC   FINTOT+12(4),TOTAR                              00004500
00110E FCF3 A126 A06D 01128 0106F        46          MP    FINTOT(16),ZRO5                                 00004600
001114 FBFB A126 A136 01128 01138        47          SP    FINTOT(16),ARACIR(12)                           00004700
00111A                                   48 PRNT     EQU   *                                               00004800
00111A D20B A15E A142 01160 01144        49          MVC   WRKE(12),PTRN                                   00004900
001120 DE0B A15E A131 01160 01133        50          ED    WRKE(12),FINTCT+11                              C0005000
001126 0000                              51          DC    H'00'               GET A DUMP                  00005100
001128 0000000000000000                  52 FINTOT   DC    2D'0'                                           00005200
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   3/18/70

001138 0000000000000000                53 ARACTR   DC    3F'0'                                        00005300
001144 40206B2020204B20                54 PTRN     DC    X'40206B2020204B2020202020'                  00005400
001150 40404040                        55          DC    4C' '                                        00005500
001154 D9C5E2E4D3E340C9                56          DC    C'RESULT IS '                                00005600
00115E 0000
001160 0000000000000000                57 WRKE     DC    3F'0'                                        00005700
001000                                 58   END  BUGGSY                                              CC005800
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   3/18/70

001000                                    1 BUGCIR   START X'1000'          PROG2          REL BUG3    00000100
                                          2          EXTRN HOLDBAS,ARACIR                              00000200
001000 90EC D00C              0000C       3          STM   14,12,12(13)                                00000300
001004                                    4          USING *,11                                        00000400
001004 05B0                               5          BALR  11,0                                        00000500
001006 41F0 B0A4              010A8       6          LA    15,SAVE2                                    00000600
00100A 50FD 0008              00008       7          ST    15,8(13)                                    00000700
00100E 50DF 0004              00004       8          ST    13,4(15)                                    00000800
001012 18FD                               9          LR    15,13                                       00000900
001014 5850 B068              0106C      10          L     5,ADBASE                                    00001000
001018 5865 0000              00000      11          L     6,0(5)          GET 1/2 BASE FROM BUGGSY    00001100
00101C 5875 0004              00004      12          L     7,4(5)                                      00001200
001020 5060 B06C              01070      13          ST    6,BHOLD                                     00001300
001024 5070 B070              01074      14          ST    7,BHOLD+4                                   00001400
001028 F876 B074 B06C 01078   01070      15          ZAP   WRKA,BHOLD(7)                               00001500
00102E FC71 B074 B071 01078   01075      16          MP    WRKA,BHOLD+5(2)                             00001600
001034 F8B7 B07C B074 01080   01078      17          ZAP   WRKC(12),WRKA                               00001700
00103A FCB2 B07C B0EC 01080   010F0      18          MP    WRKC(12),PY                                 00001800
001040 FDB1 B07C B0EF 01080   010F3      19          DP    WRKC(12),TEN                                00001900
001046 F8B9 B088 B07C 0108C   01080      20          ZAP   WRKD(12),WRKC(10)                           00002000
00104C D20B B094 B088 01098   0108C      21          MVC   CIRAR(12),WRKD                              00002100
001052 5880 B064              01068      22          L     8,ADCARA                                    00002200
001056 D20B 8000 B094 00000   01098      23          MVC   0(12,8),CIRAR                               00002400
00105C 58DD 0004              00004      24          L     13,4(13)                                    00002500
001060 98EC D00C              0000C      25          LM    14,12,12(13)                                00002600
001064 07FE                              26          BR    14                                          00002700
001066 0000
001068 00000000                          27 ADCARA  DC    A(ARACIR)                                   00002800
00106C 00000000                          28 ADBASE  DC    A(HOLDBAS)                                  00002900
001070 0000000000000000                  29 BHOLD   DC    D'0'                                        00003000
001078 0000000000000000                  30 WRKA    DC    D'0'                                        00003100
001080 0000000000000000                  31 WRKC    DC    3F'0'                                       00003200
00108C 0000000000000000                  32 WRKD    DC    3F'0'                                       00003300
001098 0000000000000000                  33 CIRAR   DC    3F'0'                                       00003400
0010A4 00000000
0010A8 0000C00000000000                  34 SAVE2   DC    9D'0'                                       00003500
0010F0 31416C                            35 PY      DC    P'31416'                                    00003600
0010F3 010C                              36 TEN     DC    P'10'                                       00003700
                                         37         END                                               00003800
```

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
           VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000      ENTRY UTILITY

                                                MODULE MAP

  CONTROL SECTION                               ENTRY

    NAME     ORIGIN  LENGTH                      NAME    LOCATION     NAME    LOCATION     NAME    LOCATION     NAME    LOCATION

  BUGGSY          00     16C
                                                HOLDBAS        90    ARACIR        138
  BUGCIR         170      F5
  UTILITY        268     5A0
                                                PRINT         2CA    PCHKRETN      526

  ENTRY ADDRESS        268
  TOTAL LENGTH         808

****GO         DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.00000C 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006E800     0006E770 00000048 00004F20 0006E430
REGS 8-15    0006E778 00000000 6F063822 6F063996     60063A22 000638E0 6F0638CE 00063A3A

000000     00000000 0000019C F0F0F1C9 5C071D90     00063820 00002A18 01040080 8003AFFE  *........001I.....................*
000020     0004000A 7000240C FF150006 AF0639A2     0000FF00 00000000 FF040132 800011D6  *.............................C*
000040     000085D0 0C0000F1 00001670 00002120     3E76DBC0 00074200 00040000 000002C0  *.......1.....................*
000060     00040000 00000366 0004C000 C000030A     C0000000 0000CA68 00040000 00000226  *.............................*

063820     05A047F0 A0084040 4040F871 A076A066     FC71A076 A066D203 A09EA07A F871A076  *...0..    8..........K.....8...*
063840     A066FC71 A076A06A FD70A076 AC6CD207     AC8EA076 F876A086 A076D207 A076A086  *.............K.....8.....K.....*
063860     FC71A076 A068FD71 A076A06A F875A07E     A076D203 A09AA082 D203A096 A09AFA33  *............8.....K.....K......*
063880     A096A09E 47F0A0A2 025C014C 010C2C01     00000C00 00000000 00000000 175C000C  *.....0.......................*
0638A0     00000000 0000175C 00000000 C000125C     00000000 00125C0C 0000800C 0000175C  *.............................*
0638C0     0000625C 58D0A0B6 58F0A0B2 05EF47F0     A1060000 00063990 000638E0 00000000  *.........0.....0.............*
0638E0     00000000 00000000 00063A3A 6F0638CE     00063990 00000050 0006E7F8 0006E800  *.........................X8..Y.*
063900     0006E800 0006E770 00000048 0CC04F20     0006E430 0006E778 00000000 6F063822  *..Y...x...........U...x.......*
063920     0006E7F8 60063A22 D203A132 A096FCF3     A126A06D FBFBA126 A136D208 A15EA142  *..X8....K......3.........K.....*
063940     DE0BA15E A1310000 00000000 00000000     00000000 00000000 00000000 00000000  *.............................*
063960     00000000 402C6B20 20204B20 20202020     40404040 D9C5E2E4 D3E340C9 E2400000  *.... ..........    RESULT IS ..*
063980     00000000 00000000 00000000 0006853C     90ECD00C 05B041F0 B0A450FD 000850DF  *.....................0........*
0639A0     000418FD 5850B068 58650000 58750004     5060B06C 5070B070 F876B074 B06CFC71  *.....................8.......*
0639C0     B074B071 F8B7B07C B074FCB2 B07CB0EC     FDB1B07C B0EFF8B9 B088B07C D20BB094  *....8.................8.....K...*
0639E0     B0885880 B064D20B 8000B094 58DD0004     98ECD00C 07FE0000 00063958 000638B0  *......K.....................*
063A00     00000000 00000000 00000000 00000000     00000000 00000000 00000000 00000000  *.............................*
063A20     00000000 00000000 00000000 00000000     00000000 00000000 00000000 00000000  *.............................*
063A40     00000000 00000000 00000000 C0000000     00000000 00000000 00000000 00000000  *.............................*
063A60     00000000 00000000 00000000 0C000000     00000000 00000000 00000000 00000000  *.............................*
063A80     31416C01 0C08000A 90ECD00C 05C004F0     07004110 C0100511 0F063B2C 7FFF0A0E  *.............0...............*

064020     00063A88 00064008 00000000 00009FB0     0146004F 00000001 00000000 00000000  *......  .........................*
064040     00000000 00000000 00000000 00004000     9400025D 00790000 00008000 000A0000  *..............  ................*

*****************************************************************************************************************************
```

```
RRRRRRRRRR    EEEEEEEEEEE   LL
RRRRRRRRRRR   EEEEEEEEEEE   LL
RR         RR EE            LL
RR         RR EE            LL
RR         RR EE            LL
RRRRRRRRRRR   EEEEEEEE      LL
RRRRRRRRRR    EEEEEEEE      LL
RR     RR     EE            LL
RR      RR    EE            LL
RR       RR   EE            LL
RR        RR  EEEEEEEEEEE   LLLLLLLLLLL
RR         RR EEEEEEEEEEE   LLLLLLLLLLL
```

```
TTTTTTTTTTT    AAAAAAAAA     3333333333
TTTTTTTTTTT   AAAAAAAAAAA   333333333333
    TT        AA         AA  33         33
    TT        AA         AA             33
    TT        AA         AA             33
    TT        AAAAAAAAAAAAA          3333
    TT        AAAAAAAAAAAAA          3333
    TT        AA         AA             33
    TT        AA         AA             33
    TT        AA         AA  33         33
    TT        AA         AA  333333333333
    TT        AA         AA   3333333333
```

```
 9999999999
999999999999
99         99
99         99
99         99
999999999999
999999999999
           99
           99
99         99
999999999999
 9999999999
```


****

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   3/18/70

001000                                    1 BUG3     START X'1000'                  PROG1      REL BUG3    00000100
                                          2          ENTRY HOLDBAS,ARACIR                                   00000200
                                          3          EXTRN BUGCIR                                           00000300
001000 05A0                               4          BALR  10,0                                             00000400
001002                                    5          USING *,10                                             00000500
001002 47F0 A008             0100A        6          B     BEGIN                                            00000600
001006 40404040                           7          DC    C'    '                                          00000700
00100A F871 A076 A066 01078 01068         8 BEGIN    ZAP   WRKA(8),LNGH                                     00000800
001010 FC71 A076 A066 01078 01068         9          MP    WRKA(8),LNGH                                     00000900
001016 D203 A09E A07A 010A0 0107C        10          MVC   SQARA,WRKA+4                                     00001000
00101C F871 A076 A066 01078 01068        11          ZAP   WRKA(8),LNGH                                     00001100
001022 FC71 A076 A06A 01078 0106C        12          MP    WRKA(8),TEN                                      00001200
001028 FD70 A076 A06C 01078 0106E        13          DP    WRKA(8),HALF                                     00001300
00102E D207 A08E A076 01090 01078        14          MVC   HOLDBAS,WRKA                                     00001400
001034                                   15 TRI      EQU   *                                                00001500
001034 F876 A086 A076 01088 01078        16          ZAP   BHOLD,WRKA(7)                                    00001600
00103A D207 A076 A086 01078 01088        17          MVC   WRKA,BHOLD                                       00001700
001040 FC71 A076 A068 01078 0106A        18          MP    WRKA(8),HITE                                     00001800
001046 FD71 A076 A06A 01078 0106C        19          DP    WRKA(8),TEN                                      00001900
00104C F875 A07E A076 01080 01078        20          ZAP   WRKB(8),WRKA(6)                                  00002000
001052 D203 A09A A082 0109C 01084        21          MVC   ARTRI,WRKB+4                                     00002100
001058 D203 A096 A09A 01098 0109C        22          MVC   TOTAR,ARTRI                                      00002200
00105E FA33 A096 A09E 01098 010A0        23          AP    TOTAR,SQARA                                      00002300
001064 47F0 A0A2             010A4       24          B     EXT1      GO AROUND CONSTANTS                    00002400
001068 025C                              25 LNGH     DC    P'25'                                            00002500
00106A 014C                              26 HITE     DC    P'14'                                            00002600
00106C 010C                              27 TEN      DC    P'10'                                            00002700
00106E 2C                                28 HALF     DC    P'2'                                             00002800
00106F 0100000C                          29 ZRO5     DC    P'100000'                                        00002900
001073 0000000000
001078 0000000000000000                  30 WRKA     DC    D'0'                                             00003000
001080 0000000000000000                  31 WRKB     DC    D'0'                                             00003100
001088 0000C00000000000                  32 BHOLD    DC    D'0'                                             00003200
001090 0000000000000000                  33 HOLDBAS  DC    D'0'                                             00003300
001098 00000000                          34 TOTAR    DC    F'0'                                             00003400
00109C 00000000                          35 ARTRI    DC    F'0'                                             00003500
0010A0 00000000                          36 SQARA    DC    F'0'                                             00003600
0010A4 58D0 A0B6             010B8       37 EXT1     L     13,OUT                                           00003700
0010A8 58F0 A0B2             010B4       38          L     15,NEXT                                          00003800
0010AC 05EF                              39          BALR  14,15                                            00003900
0010AE 47F0 A106             01108       40          B     SUMMARY                                          00004000
0010B2 0000
0010B4 00000000                          41 NEXT     DC    A(BUGCIR)                                        00004100
0010B8 000010C0                          42 OUT      DC    A(REGSAV)                                        00004200
0010BC 00000000
0010C0 0000000000000000                  43 REGSAV   DC    9D'0'                                            00004300
001108                                   44 SUMMARY  EQU   *                                                00004400
001108 D203 A132 A096 01134 01098        45          MVC   FINTOT+12(4),TOTAR                               00004500
00110E FCF3 A126 A06D 01128 0106F        46          MP    FINTOT(16),ZRO5                                  00004600
001114 FBFB A126 A136 01128 01138        47          SP    FINTOT(16),ARACIR(12)                            00004700
00111A                                   48 PRNT     EQU   *                                                00004800
00111A D20B A15E A142 01160 01144        49          MVC   WRKE(12),PTRN                                    00004900
001120 DE0B A15E A131 01160 01133        50          ED    WRKE(12),FINTOT+11                               00005000
001126 0000                              51          DC    H'00'               GET A DUMP                   00005100
001128 0000C00000000000                  52 FINTOT   DC    2D'0'                                            00005200
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   3/18/70

001138 0000000000000000                53 ARACIR   DC    3F'0'                                      CC005300
001144 40206B2020204B20                54 PTRN     DC    X'40206B2020204B2020202020'                CC005400
001150 40404040                        55          DC    4C' '                                      00005500
001154 D9C5E2E4D3E340C9                56          DC    C'RESULT IS '                              00005600
00115E 0000
001160 0000000000000000                57 WRKE     DC    3F'0'                                      00005700
001000                                 58     END        BUG3                                       CCC05800
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   3/18/70

001000                                   1 BUGCIR   START X'1000'          PROG2        REL BUG3      00000100
                                         2          EXTRN HOLDBAS,ARACIR                               00000200
001000 90EC D00C             0000C       3          STM   14,12,12(13)                                 00000300
001004 05B0                              4          BALR  11,0                                         00000400
001006                                   5          USING *,11                                         00000500
001006 41F0 B0A2             010A8       6          LA    15,SAVE2                                     00000600
00100A 50FD 0008             00008       7          ST    15,8(13)                                     00000700
00100E 50DF 0004             00004       8          ST    13,4(15)                                     00000800
001012 18FD                              9          LR    15,13                                        00000900
001014 5850 B066             0106C      10          L     5,ADBASE                                     00001000
001018 5865 0000             00000      11          L     6,0(5)       GET 1/2 BASE FROM BUGGSY        00001100
00101C 5875 0004             00004      12          L     7,4(5)                                       00001200
001020 5060 B06A             01070      13          ST    6,BHOLD                                      00001300
001024 5070 B06E             01074      14          ST    7,BHOLD+4                                    00001400
001028 F876 B072 B06A 01078  01070      15          ZAP   WRKA,BHOLD(7)                                00001500
00102E FC71 B072 B06F 01078  01075      16          MP    WRKA,BHOLD+5(2)                              00001600
001034 F8B7 B07A B072 01080  01078      17          ZAP   WRKC(12),WRKA                                00001700
00103A FCB2 B07A B0EA 01080  010F0      18          MP    WRKC(12),PY                                  00001800
001040 FDB1 B07A B0ED 01080  010F3      19          DP    WRKC(12),TEN                                 00001900
001046 F8B9 B086 B07A 0108C  01080      20          ZAP   WRKD(12),WRKC(10)                            00002000
00104C D20B B092 BC86 01098  0108C      21          MVC   CIRAR(12),WRKD                               00002100
001052 5880 B062             01068      22          L     8,ADCARA                                     00002200
001056 D20B 8000 B092 00000  01098      23          MVC   0(12,8),CIRAR                                00002400
00105C 58DD 0004             00004      24          L     13,4(13)                                     00002500
001060 98EC D00C             0000C      25          LM    14,12,12(13)                                 00002600
001064 07FE                             26          BR    14                                           00002700
001066 0000
001068 00000000                         27 ADCARA  DC    A(ARACIR)                                    00002800
00106C 00000000                         28 ADBASE  DC    A(HOLDBAS)                                   00002900
001070 0000000000000000                 29 BHOLD   DC    D'0'                                         00003000
001078 0000000000000000                 30 WRKA    DC    D'0'                                         00003100
001080 0000C00000000000                 31 WRKC    DC    3F'0'                                        00003200
00108C 0000000000000000                 32 WRKD    DC    3F'0'                                        00003300
001098 0000C00000000000                 33 CIRAR   DC    3F'0'                                        00003400
0010A4 00000000
0010A8 0000000000000000                 34 SAVE2   DC    9D'0'                                        00003500
0010F0 31416C                           35 PY      DC    P'31416'                                     00003600
0010F3 010C                             36 TEN     DC    P'10'                                        00003700
                                        37         END                                                00003800
```

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
          VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000       ENTRY UTILITY

                                                MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME    LOCATION     NAME    LOCATION     NAME    LOCATION     NAME    LOCATION

  BUG3           00     16C
                                           HOLDBAS       90     ARACIR       138
  BUGCIR        17C      F5
  UTILITY       268     5A0
                                           PRINT         2CA    PCHKRETN     526

  ENTRY ADDRESS       268
  TOTAL LENGTH        808

****GO         DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.000000 000C0000   00.000000 00000000   00.000000 00000000   00.000000 00000000

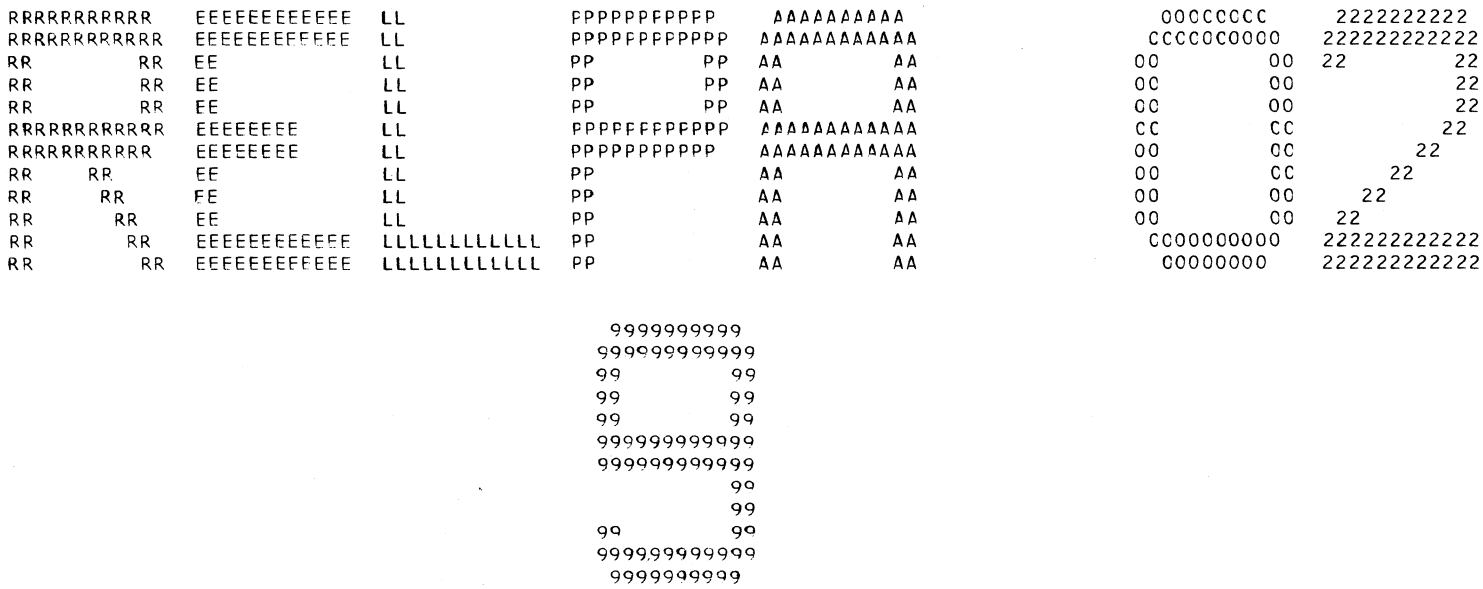
REGS 0-7     00002A18 01040080 8003AFFE 0004000A    7000240C FF450001 50000002 0000FF00
REGS 8-15    00000000 FE040131 800011D6 00001598    08000000 00000000 50071D90 00002120

000000    00000000 0000027C F0F0F2C7 50071D90    00063820 00002A18 01040080 8003AFFE  *........002G.....................*
000020    0004000A 7000240C FF150004 AF071D94    0000FF00 00000000 FE040131 800011D6  *.............................C*
000040    00001598 08000000 00001590 00002120    27C51CC0 00074200 00040000 000002C0  *.................E..............*
000060    00040000 00000366 00C40000 0000030A    00000000 0000CA68 00040000 00000226  *.............................*

063820    05A047F0 A0084040 4040F871 A076A066    FC71A076 A066D203 A09EA07A F871A076  *...0..     8..........K.....8...*
063840    A066FC71 A076A06A FD70A076 AC6CD207    AC8EA076 F876A086 A076D207 A076A086  *.............K.....8.....K.....*
063860    FC71A076 A068FD71 A076A06A F875A07E    A076D203 A09AA082 D203A096 A09AFA33  *............8.....K.....K.......*
063880    A096A09E 47F0A0A2 025C014C 010C2C01    00000C00 00000000 00000000 175C000C  *.....0.........................*
0638A0    00000000 0000175C 00C00000 000012 5C   00000000 00125C0C 0000800C 0000175C  *.............................*
0638C0    0000625C 58D0A0B6 58F0A0B2 05EF47F0    A1060000 00063990 000638E0 00000000  *.........0.....0...............*
0638E0    00000000 00000000 00063A38 6F0638CF    00063990 00000050 0006E7F8 0006E800  *.........................X8..Y.*
063900    0006E800 0006E770 00000048 00004F20    0006E430 0006E778 00000000 6F063822  *..Y...x...........U...X.........*
063920    0006E7F8 60063A22 D203A132 A096FCF3    A126A06D FBFBA126 A136D20B A15EA142  *..X8....K......3.........K.....*
063940    DE0BA15E A1310000 00000000 00000000    00000000 00000000 00000000 00000004  *.............................*
063960    9087500C 402C6B20 20204B20 20202020    40404040 D9C5E2E4 D3E340C9 E2400000  *.... ...........     RESULT IS ..*
063980    00000000 0000000C 0CC00000 0006853C    90ECD00C 05B041F0 B0A250FD 000850DF  *.....................0........*
0639A0    000418FD 5850B066 5865000C 58750004    5060B06A 5070B06E F876B072 B06AFC71  *.....................8........*
0639C0    B072B06F F8B7B07A B072FCB2 B07AB0EA    FDB1B07A B0EDF8B9 B086B07A D20BB092  *....8.............8.....K...*
0639E0    B0865880 B062D20B 8000B092 58DD0004    98ECD00C 07FE0000 00063958 000638B0  *......K.....................*
063A00    00000000 00125C0C 00C00000 0015625C    0C000000 00049087 500C000C 00000000  *.............................*
063A20    00000004 9087500C 00C00000 00000004    9C87500C 00000000 00000000 000638E0  *.............................*
063A40    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *.............................*
063A60    00000000 00000000 00000000 0CCC0000    00000000 00000000 00000000 00000000  *.............................*
063A80    31416C01 0C C08000A 90ECD00C 05C004F0  07004110 C0100511 0F063B2C 7FFF0A0E  *.............0...............*

064020    00063A88 00064008 00000000 00009FB0    0146004D 00000001 00000000 00000000  *...... .........................*
064040    00000000 0000000C 00C00000 0C004000    9400025D 00790000 00008000 000A0000  *.............. ................*

*****************************************************************************************************************************
```


RRRRRRRRRRR EEEEEEEEEEEE LL PPPPPPPPPPP AAAAAAAAAA OOOCCCCC 2222222222
RRRRRRRRRRRR EEEEEEEEEEEE LL PPPPPPPPPPPP AAAAAAAAAAAA CCCCOCOOOO 222222222222
RR RR EE LL PP PP AA AA OO OO 22 22
RR RR EE LL PP PP AA AA OC OO 22
RR RR EE LL PP PP AA AA OC OO 22
RRRRRRRRRRRR EEEEEEEE LL PPPPPPPPPPPP AAAAAAAAAAAA CC CC 22
RRRRRRRRRRR EEEEEEEE LL PPPPPPPPPPP AAAAAAAAAAAA OO CC 22
RR RR EE LL PP AA AA OO CC 22
RR RR EE LL PP AA AA OO OO 22
RR RR EE LL PP AA AA OO OO 22
RR RR EEEEEEEEEEE LLLLLLLLLLLL PP AA AA CCOOOOOOOO 222222222222
RR RR EEEEEEEEEEE LLLLLLLLLLLL PP AA AA OOOOOOOO 222222222222
9999999999
999999999999
99 99
99 99
99 99
999999999999
999999999999
99
99
99 99
999999999999
9999999999

```
                        3 *          ********************************************************** C0CC03CC
                        4 *          *                                                        00000400
                        5 *          * THIS PROJECT CONSISTS OF TWO SECTIONS. THE FIRST SECTION C0000500
                        6 *          * HAS LISTINGS, QUESTIONS, DUMPS AND ANSWERS. IT WILL AID  0000060C
                        7 *          * YOU IN LEARNING THE FUNDAMENTALS NECESSARY FOR MODULES   C00007C0
                        8 *          * TO BE RELOCATABLE.                                       00000800
                        9 *          *                                                          CC0C0900
                       10 *          * YOU SHOULD NOT, I REPEAT-NOT-, READ EACH INSTRUCTION IN  000010CC
                       11 *          * THE PROGRAM LISTINGS. READ THE QUESTIONS AND THEN ONLY   C0C01100
                       12 *          * THE CODE THAT APPLIES TO THAT QUESTION. NOW PLEASE       CCCC1200
                       13 *          * TURN THE PAGE AND PROCEED ON TO QUESTION 7.01            00001300
                       14 *          *                                                          00001400
                       15 *          ********************************************************** CCCC1500
```

SECTION ONE


```
  LCC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  FC1FEB69   6/05/70
C01000                              17 PROGAA1  START X'1000'          PART ONE                        CCC01700
                                    18          EXTRN PROGB                                           00C01800
                                    19          ENTRY SIGN                                            CC001900
00100C 05C0                         20          BALR  12,0          $$$$$$$  QUESTION 7.01  $$$$$$$$$$$$ 00002000
001002                              21          USING *,12          $ WHY WASN'T THE ADCON CONTAINING   $ CCC02100
001002 5840 C026            01028   22          L     4,GUESS       $ THE SYMBOL PROGB FLAGGED IN ERROR $ 00002200
001006 5850 C076            01078   23          L     5,CHRB        $ WHILE THE ADCON CONTAINING THE    $ CC002300
00100A 5054 0004            00004   24          ST    5,4(4)        $ SYMBOL PROG2 WAS?                 $ 00CC2400
00100E 58D0 C07E            01080   25          L     13,=A(SVA)    $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00C02500
001012 58F0 C01E            01020   26          L     15,EXT1       $                                   $ 00002600
001016 05EF                         27          BALR  14,15         $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002700
001018 58F0 C022            01024   28          L     15,SCEXT                                          00C2800
00101C 07FF                         29          BR    15                                            00002900
00101E 0000                         30          DC    H'0'          $$$$$$$  QUESTION 7.02  $$$$$$$$$$$$ C0003000
00102C 00000000                     31 EXT1     DC    A(PROGB)      $ WHY DOES THE ADCON LABELED -EXT1- $ 000031CC
001024 00001C88                     32 SCEXT    DC    A(ASUB1)      $ HAVE ALL ZEROS, WHILE THE ADCON   $ C0003200
001028 00000000                     33 GUESS    DC    A(DOT)        $ LABELED -SCEXT- HAS A VALUE?      $ 00003300
00102C CCC0CCCC00000000             34 SVA      DC    18F'0'        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00003400
001074 D3E4C3D2                     35 SIGN     DC    C'LUCK'       $                                   $ 00003500
001078 D7D9C7C1                     36 CHRB     DC    C'PRGA'       $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC3600
00107C 00000000                     37 DUMDUM   DC    A(PROG2)                                          00003700
         *** ERROR ***
001080                              38          LTORG                                                 CC003800
00108C 0000102C                     39                =A(SVA)
001088                              40 ASUB1    CSECT         $$$$$$$  QUESTION 7.03  $$$$$$$$$$$$ 00003900
001088 05C0                         41          BALR  12,0          $ LIST THE DIFFERENT LOCATIONS      $ CC004000
00108A                              42          USING *,12          $ THAT OTHER PROGRAMS COULD USE TO  $ CCC04100
00108A 58B0 C046            010D0   43          L     11,=A(DOT)    $ GET INSIDE PROGRAM 'PROGAA1'.     $ 00004200
000000                              44          USING DOT,11        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCC04300
00108E D203 B0C0 CC24 C0000 010AE   45          MVC   DOT,ZOOT      $                                   $ 00004400
001094 D203 C02A B000 C10B4 00000   46          MVC   FINAL,DOT     $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004500
00109A D203 C032 B004 C10BC 00004   47          MVC   FINAL+8,KAREN                                     00004600
0010A0 D203 C03A B008 C10C4 00008   48          MVC   FINAL+16,SANDY  $$$$$$$  QUESTION 7.04  $$$$$$$$$$$$ CC004700
0010A6 D203 C042 B00C 010CC 0000C   49          MVC   FINAL+24,DAVID  $ THE LOADER HAS TO KNOW THE NAMES  $ 00004800
0010AC 0000                         50          DC    H'00'         $ AND ADDRESSES AND THE FACT THAT   $ CCC04900
0010AE D7C7C1F1                     51 ZOOT     DC    C'PGA1'       $ THEY ARE ENTRY POINTS. HOW DOES   $ CCCC5C00
0010B4                              52 FINAL    DS    7F            $ THE ASSEMBLER SAVE THIS INFORMA-  $ 00005100
                                    53 *                            $ TION FOR THE LOADER?              $ 00005200
                                    54 *                            $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC5300
                                    55 *                            $                                   $ CCCC5400
                                    56 *                            $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC55CC
0010D0                              57          LTORG                                                 00005600
0010D0 00000000                     58                =A(DOT)
000000                              59          CCM                                                   CCCC57C0
000000                              60 DOT      DS    F         ++++++++++++++++++++++++++++++++      CCC05800
000004                              61 KAREN    DS    F         + ANSWERS ARE ON THE NEXT PAGE +      C0005900
0000C8                              62 SANDY    DS    F         ++++++++++++++++++++++++++++++++      C0006000
00000C                              63 DAVID    DS    F                                               00006100
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                   F01FEB69  6/05/70

                                   65 *  7.01   ************************************************************ 00CC6300
                                   66 *         * SYMBOL -PROGB- IS ALSO THE OPERAND OF AN EXTRN ASSEMBLER   * 00006400
                                   67 *         * INSTRUCTION WHILE THE SYMBOL -PROG2- CAIN'T BE FOUND BY    * 000065C0
                                   68 *         * THE ASSEMBLER.                                             * CCCC66CC
                                   69 *         ************************************************************ 00C067C0


                                   71 *  7.02   ************************************************************ 00006900
                                   72 *         * THE ASSEMBLER DOES NOT KNOW THE ADDRESS OF PROGB, THERE-   * 00007000
                                   73 *         * FORE HE PLACES ALL ZEROS IN THE FIELD REFERENCED BY PROGB. * 00007100
                                   74 *         * ALSO KEEP IN MIND, HE EXPECTS THE LOADER TO FILL IN A      * CCCC7200
                                   75 *         * GOOD VALUE AT LOAD TIME. THE ASSEMBLER DID KNOW THE ASSEM- * 00073C0
                                   76 *         * BLED ADDRESS OF ASUB1, THEREFORE HE PLACED THAT VALUE IN   * 00007400
                                   77 *         * THE FIELD. HE STILL HAS TO RELY ON THE LOADER TO UPDATE    * 00007500
                                   78 *         * THIS FIELD AT LOAD TIME TO REFLECT THE ACTUAL CORE ADDRESS.* CC007600
                                   79 *         ************************************************************ CCCC77CC


                                   81 *  7.03   ************************************************************ 0000C79CC
                                   82 *         * PROGAA1,SIGN,ASUB1                                         * 00008000
                                   83 *         ************************************************************ CCCC8100

222

                                   85 *  7.04   ************************************************************ CCCC83CC
                                   86 *         * THESE FACTS ARE SAVED IN THE VARIABLE FIELDS OF THE ESD    * 00008400
                                   87 *         * CARDS                                                      * 00CC8500
                                   88 *         ************************************************************ 00008600


                                   90 *    THIS CONCLUDES THE FIRST PART OF SECTION ONE. TURN YOUR ANSWER     C0008800
                                   91 *    CUE TO GREEN IF YOUR ANSWERS WERE CORRECT AND YOU UNDERSTAND WHY   C00C8900
                                   92 *    THEY WERE CORRECT. NOW PLEASE PROCEED TO THE NEXT PART WHICH       CCCC9CCC
                                   93 *    BEGINS ON THE FOLLOWING PAGE.                                      CCCC91C0
                                   94       END                                                               CCCC9200
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   6/05/70
001000                                    2 PROGAA1  START X'1000'                PART TWO                        CCC00200
                                          3          EXTRN PROGB                                                  CCC00300
                                          4          ENTRY SIGN                                                   CCC00400
001000 05C0                               5          BALR  12,0          $$$$$$$  QUESTION 7.21  $$$$$$$$$$$$$ 00000500
001002                                    6          USING *,12          $ THE LOADER HAS TO KNOW WHICH      $ CCCC0600
001002 5840 C026             01028        7          L     4,GUESS       $ FIELDS CONTAINED ADCONS.  WHY???  $ 00000700
001006 5850 C076             01078        8          L     5,CHRB        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00000800
00100A 5054 0004             00004        9          ST    5,4(4)        $                                   $ 00000900
00100E 58D0 C07E             01080       10          L     13,=A(SVA)    $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCC01000
001012 58F0 C01E             01020       11          L     15,EXT1                                                  00001100
001016 05EF                              12          BALR  14,15         $$$$$$$  QUESTION 7.22 $$$$$$$$$$$$$$ CCC01200
001018 58FC C022             01024       13          L     15,SCEXT      $ WHERE DOES THE ASSEMBLER SAVE THIS$ 00001300
00101C 07FF                              14          BR    15            $ INFORMATION FOR THE LOADER?       $ CCC01400
00101E 0000                              15          DC    H'0'          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC1500
001020 00000000                          16 EXT1     DC    A(PRCGB)      $                                   $ C0001600
001024 00001088                          17 SCEXT    DC    A(ASUB1)      $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00001700
001028 C0000000                          18 GUESS    DC    A(DOT)                                                 00001800
00102C 0000000000C000C                   19 SVA      DC    18F'0'        $$$$$$$  QUESTION 7.23  $$$$$$$$$$$$$ 00001900
001074 D3E4C3D2                          20 SIGN     DC    C'LUCK'       $ LIST THE STATEMENTS IN THIS PROG- $ 0CC02000
001078 D7D9C7C1                          21 CHRB     DC    C'PRGA'       $ RAM THAT PRODUCE RLD CARDS.       $ 00002100
                                         22 *                            $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00CC2200
                                         23 *                            $                                   $ 00002300
                                         24 *                            $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002400
001080                                   25          LTORG                                                        00002500
001080 0000102C                          26                =A(SVA)
001088                                   27 ASUB1    CSECT                 $$$$$$$  QUESTION 7.24  $$$$$$$$$$$$$ 00C02600
001088 05C0                              28          BALR  12,0          $ IF THIS PROGRAM WAS EXECUTED      $ 000027CC
00108A                                   29          USING *,12          $ WITHOUT THE MODULE PROGB, WHAT    $ CCC02800
00108A 58B0 C046             010D0       30          L     11,=A(DOT)    $ WOULD YOU EXPECT TO HAPPEN?       $ 00002900
000000                                   31          USING DOT,11        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC3000
00108E D203 B000 C024 C0000 010AE        32          MVC   DOT,ZOOT       $                                   $ 00003100
001094 D203 C02A B000 C10B4 00000        33          MVC   FINAL,DOT       $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00CC3200
00109A D203 C032 B004 010BC 00004        34          MVC   FINAL+8,KAREN                                           000033C0
0010A0 D203 C03A B008 C10C4 00008        35          MVC   FINAL+16,SANDY  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCC03400
0010A6 D203 C042 B00C 010CC 0000C        36          MVC   FINAL+24,DAVID  $ ON THE NEXT PAGE YOU WILL FIND A  $ 00003500
0010AC 0000                              37          DC    H'00'         $ DUMP THAT SHOWS WHAT HAPPENS.     $ CCCC3600
0010AE D7C7C1F1                          38 ZOOT     DC    C'PGA1'       $ WHERE YOU CORRECT? IF YOU WEREN'T,$ CCCC37CC
0010B4                                   39 FINAL    DS    7F            $ PLEASE BUG YOUR INSTRUCTOR BEFORE $ 00003800
                                         40 *                            $ CONTINUING.                       $ 00003900
                                         41 *                            $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCC04000
                                         42 *                            $                                   $ C0004100
                                         43 *                            $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC42CC
0010D0                                   44          LTORG                                                        000043C0
0010D0 000CC000                          45                =A(DOT)
000000                                   46          CCM                                                          C0004400
000000                                   47 DOT      DS    F         ++++++++++++++++++++++++++++++++++++++++++++ CCC04500
000004                                   48 KAREN    DS    F         + ON THE PAGE FOLLOWING THE DUMP YOU WILL FIND+ 000046CC
000008                                   49 SANDY    DS    F         + THE ANSWERS TO QUESTIONS 7.21 THRU 7.24.    + C0004700
00000C                                   50 DAVID    DS    F         ++++++++++++++++++++++++++++++++++++++++++++ CCC04800
```

```
F.P. REGS.  43.121C0C CCCC0000   C2.A80000 00000CCC   00.000000 00000000   00.000000 00000CCC

REGS 0-7     00000050 CC0637F8 00063800 00063800    00058E98 D7D9C7C1 00005060 00063430
REGS 8-15    00063778 C00C000C CCC637B0 000637F8    6FC58822 0005884C 6FC58838 00000000

000000    00000000 0000019C F0F0F1C9 5006ED90    00058820 00002A18 01040080 8003AFFE  *........001I.....................*
000020    0C04000A 7000240C FF250001 6F0C0002    000CFF00 00000000 FE040230 800011D6  *.............................C*
000040    000085D0 0C0000F1 000016C0 00002120    454EFCC0 00071248 00040000 000002C0  *.......1.....................*
000060    0C040000 00000366 00C40000 0C00030A    0C000C00 0000CA68 00040000 00000226  *.............................*

058820    05C05840 C0265850 CC765054 000458D0    CC7E58F0 C01E05EF 58F0C022 07FF0000  *... ..............C.....0.....*
058840    00000000 000588A8 00C58E98 00C00000    00000000 00000000 00000000 00000000  *.............................*
058860    00000000 00000000 00000000 CC000000    00000000 00000000 00000000 00000000  *.............................*
058880    0C000000 000C0000 00000C00 CCC00000    00000000 D3E4C3D2 D7D9C7C1 954695FF  *.................LUCKPRGA....*
0588A0    0005884C 94644110 05C058B0 C046D203    B000C024 D203C02A B000D203 C032B004  *.............K.....K.....K.....*
0588C0    D203C03A B008D203 C042B00C 0000D7C7    C1F1946C 18B11B1F 1BFF4910 954A47B0  *K.....K.......PGA1............*
0588E0    94A04210 9573411C 95720A23 91019561    00058E98 58109546 90ECD00C 05C004F0  *.............................0*

058EA0    90081819 58F0C346 0C000000 0000A130    0146009C 00000001 00000000 00000000  *.....0C.....................*
058EC0    00000000 0C0C000C 00000000 00004000    9400025D 00790000 00008000 000A0000  *.............. ...............*
```

NOTE: STORAGE LOCATIONS

PROGAAI	058820
SIGN	058894
ASUBI	0588A8

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                    FO1FEB69  6/05/70

                                  53 *  7.21 ************************************************************ 00CC51CC
                                  54 *       * THE LOADER MUST BE ABLE TO UPDATE THESE FIELDS IN CORE SO   * 00005200
                                  55 *       * THAT THE FIELD AT EXECUTION TIME CONTAINS THE CORRECT AD-   * CCC05300
                                  56 *       * DRESS. I DON'T THINK THE ASSEMBLED ADDRESS MEANS TO MUCH AT * C0005400
                                  57 *       * EXECUTION TIME, DO YOU?                                     * CCCC5500
                                  58 *       ************************************************************ C0005600

                                  60 *  7.22 ************************************************************ 00005800
                                  61 *       * IN THE RLD CARDS                                            * CC005900
                                  62 *       ************************************************************ CCCC60C0

                                  64 *  7.23 ************************************************************ CC006200
                                  65 *       * SYMBOLIC LOCATIONS SVA, PROGB, ASUB1 AND DOT                * 000063C0
                                  66 *       ************************************************************ C0C06400

                                  68 *  7.24 ************************************************************ 00006600
                                  69 *       * PROGRAM CHECK OCCURRED AT CORE STORAGE LOCATION 000000.     * CCCC67C0
                                  70 *       * THE PROGRAM STILL TRIED TO GO TO PROGB AND SINCE WE DIDN'T  * 0000680C
                                  71 *       * LOAD THE PROGRAM PROGB, THE FIELD THAT WAS LOADED INTO      * 0CCC6900
                                  72 *       * REG 15 STILL CONTAINED ZEROS.                               * 00007000
                                  73 *       ************************************************************ C0007100

                                  75 *   THAT CONCLUDES PART TWO OF SECTION ONE. ON THE NEXT TWO PAGES YOU   C00073C0
                                  76 *   WILL FIND AN ILLUSTRATION OF THE ESD CARDS PRODUCED BY THE PROGRAM  00007400
                                  77 *   YOU HAVE JUST FINISHED ANSWERING QUESTIONS ABOUT. PLEASE PROCEED TO CC007500
                                  78 *   THE NEXT PAGE AND DO AS THE DIRECTIONS SAY. THANKS                  00007600
                                  79       END                                                               C0007700
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   6/05/70
                                    2 *   $$$$$$$$$$$$$$$  QUESTION 7.31  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0000200
                                    3 *   $ THIS PAGE AND THE NEXT CONTAIN EXAMPLES OF THE ESD CARDS PRO-    $ C0000300
                                    4 *   $ DUCED BY THE PROGRAM LABELED PROGAA1.(LISTING OF THIS PROGRAM    $ C0000400
                                    5 *   $ IS THE SAME ONE USED IN PART TWO OF THIS PROJECT)                $ CCC00500
                                    6 *   $                                                                 $ 00000600
                                    7 *   $ FILL IN THE BLANKS POINTED TO BY THE ARROWS. DO THIS FOR THE     $ CCC00700
                                    8 *   $ SECOND AND THIRD FIELDS OF CARD 1 AND THE TWO FIELDS OF CARD 2.  $ CCCC0800
                                    9 *   $ YOU WILL BE ABLE TC DO THIS BY USING THE FOLLOWING INFORMATION   $ CCCC0900
                                   10 *   $    .FIGURE 7.01 IN THE STUDENT GUIDE                           $ C0001000
                                   11 *   $    .ASM.SRL SECTION ON ESD INFORMATION (APPENDIX K9             $ 000011CC
                                   12 *   $    .FIRST VARIABLE FIELD OF CARD ONE (THIS PAGE)                $ 00001200
                                   13 *   $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC1300


                                   15 *                          -- OBJECT DECK --                                  CCCC15C0
                                   16 * CARD CCLUMNS      2         3         4         5         6                 CCCC16CC
                                   17 *12345678901234567890123456789012345678901234567890123456789012345678901234567890  00001700
                                   18 * ESD      30  01PRCGAA1          PROGB           SIGN                  *       00001800
                                   19 *0                        ZA   0          E0              0A  0        *       CCC01900
                                   20 *0                        Z D  8         E 0             N D  0        *       CCC02000
                                   21 *0                        Z  D   4       E  0            E  D  1      *       00002100
                                   22 *                                                                      *       00002200
                                   23 *X---XXXXXX--XX--XXXXXXXXXXXXXXXX----------------XXXXXXXXXXXXXXXX*****      00002300


                                   25 *   CARD ONE                                    USE THIS AS A COMPL-      CCCC2500
                                   26 *     FIRST VARIABLE FIELD   CC 17-32           ETED EXAMPLE OF HOW       CCCC26CC
                                   27 *      17-24 PROGAA1                            THE VARIABLE FIELD        CCCC27CC
                                   28 *      25    00 SECTION DEFINITION (SD)         WILL LOOK.                00002800
                                   29 *      26-28 HEX 001000                                                   C0002900
                                   30 *      29    BLANK                              ZZZ=ZEROS                 C0003000
                                   31 *      30-32 000084                             EEE=02                    CCCC3100
                                   32 *                                               ONE=01                    00003200
                                   33 *     SECOND FIELD  CC  33-48                   555=05                    CCCC3300
                                   34 *      33-40 ________                  <---     ADD=ADDRESS OF SYMBOL     00003400
                                   35 *      41    __ EXTERNAL REFERENCE (ER) <---                            CCCC3500
                                   36 *      42-44 ______                    <---                             00003600
                                   37 *      45    BLANK                                                      C0003700
                                   38 *      46-48 BLANK                                                      CCC03800
                                   39 *                                                                       00C03900
                                   40 *     THIRD FIELD   CC  49-64                                           00004000
                                   41 *      49-56 ________                  <---                             00004100
                                   42 *      57    01 _____ __________  (__) <---                             CCCC4200
                                   43 *      58-60 ______                    <---                             000043CC
                                   44 *      61    BLANK                                                      CCC04400
                                   45 *      62-64 ______                    <---                             CCCC4500
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   6/05/70

                                   47 *                    THIS IS THE SECOND CARD                          00004700
                                   48 *1234567890123456789012345678901234567890123456789012345678901234567890 00004800
                                   49 * ESD      20  03ASUB1                                                 * 00004900
                                   50 *0                        ZA    0          5A  0                      * 00005000
                                   51 *0                        Z D   0          5 D  1                     * 00005100
                                   52 *0                        Z  D  0          5  D  0                    * 00005200
                                   53 *X---XXXXXX--XX--XXXXXXXXXXXXXXX----------------XXXXXXXXXXXXXXXXX***** 00005300


                                   55 *   CARD TWO                                                           00005500
                                   56 *     FIRST VARIABLE FIELD  CC 17-32                                   00005600
                                   57 *       17-24 ________                    <---                        00005700
                                   58 *       25    __ _______ __________ (__) <---                        00005800
                                   59 *       26-28 ______                    <---                         00005900
                                   60 *       29    BLANK                                                  00006000
                                   61 *       30-32 000000                    <---                         00006100
                                   62 *                                                                     00006200
                                   63 *     SECOND FIELD  CC 33-38                                          00006300
                                   64 *       33-40 BLANKS                                                  00006400
                                   65 *       41    05 COMMON (CM)                                          00006500
                                   66 *       42-44 000000                                                  00006600
                                   67 *       45    BLANK                                                   00006700
                                   68 *       46-48 0000/0                                                  00006800

                                   70 *   CHECK YOUR ANSWER BY REFERRING TO THE NEXT PAGE PLEASE            00007000
```

THIS IS HOW THE FIELD WOULD LOOK FOR A COMMON STATEMENT. WE WILL BE STUDYING THE COMMON LATER, SO PLEASE IGNORE THIS FIELD NOW.

CARD ONE

FIRST VARIABLE FIELD CC17-32

17-24	PROGAAI
25	00 SECTION DEFINITION (SD)
26-28	HEX 001000
29	BLANK
30-32	000084

SECOND FIELD 33-48

33-40	PROB
41	02 EXTERNAL REFERENCE (ER)
42-44	HEX 000000
45	BLANK
46-48	BLANK

THIRD FIELD 49-64

49-56	SIGN
57	01 LABEL DEFINITION (LD)
58-60	001074
61	BLANK
62-64	BLANK

CARD TWO

FIRST VARIABLE FIELD 17-32

17-24	ASUBI
25	00 SECTION DEFINITION (SD)
26-28	001088
29	BLANK
30-32	00004C

SECOND FIELD

33-40	BLANK
41	05 COMMON (CM)
42-44	000000
45	BLANK
46-48	000010

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69  6/05/70

                                   72 *         **********  ANSWER 7.31  ************************************ C0007200
                                   73 *         * BESIDE PUNCHING THE ESD INFORMATION FOR THE LOADER, THE    * C0007300
                                   74 *         * ASSEMBLER IS NICE ENOUGH TO PRINT THE INFORMATION FOR US   * 00007400
                                   75 *         * HUMANS. WE CALL THE PRINTED INFORMATION THE 'EXTERNAL      * 00007500
                                   76 *         * SYMBOL DICTIONARY' LISTING. THIS LISTING PRINTS AS THE     * 00007600
                                   77 *         * FIRST PAGE ON AN ASSEMBLY. THE ESD LISTING FOR 'PROGAA1'   * 00007700
                                   78 *         * HAS BEEN DUPLICATED BELOW. PLEASE USE IT TO CHECK YOUR     * 00007800
                                   79 *         * ANSWERS. IF ANY OF YOUR ANSWERS ARE WRONG AND YOU DON'T    * 00007900
                                   80 *         * UNDERSTAND WHY, PLEASE BUG YOUR INSTRUCTOR BEFORE CONTIN-  * 00008000
                                   81 *         * UING.                                                      * 00008100
                                   82 *         ************************************************************** 00008200

                                   84 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00008400
                                   85 *                          EXTERNAL SYMBOL DICTIONARY                        + 00008500
                                   86 * SYMBOL    TYPE ID  ADDR   LENGTH LD ID                                     + 00008600
                                   87 *                                                                           + 00008700
                                   88 *                                                                           + 00008800
                                   89 * PROGAA1    SD  01 001000 000084                                           + 00008900
                                   90 * PROGB      ER  02                                                         + 00009000
                                   91 * SIGN       LD     001074         01                                       + 00009100
                                   92 * ASUBI      SD  03 001088 00004C                                          + 00009300
                                   93 *            CM  04 000000 000010                                          + 00009400
                                   94 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00009500

                                   96 *  THAT CONCLUDES PART THREE OF SECTION ONE. PLEASE PROCEED TO PART       00009700
                                   97 *  FOUR THAT BEGINS ON THE NEXT PAGE.  THANK YOU                          00009800
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
100 *        ************************************************************ 00010100
101 *        * THE FOLLOWING ESD LISTING IS A DUPLICATION OF THE LISTING  * 00010200
102 *        * PRODUCED BY A PROGRAM CALLED 'EXAMPL2'. (LISTING OF THIS   * 00010300
103 *        * PROGRAM IS ON THE NEXT PAGE) PLEASE ANSWER THE QUESTIONS   * 00010400
104 *        * THAT APPEAR ON THE COMMENT SIDE OF THE LISTING. YOU SHOULD * 00010500
105 *        * USE AS REFERENCE THIS ESD LISTING AND THE ASSEMBLY LISTING * 00010600
106 *        * OF EXAMPL2.                                                 00010700
107 *        ************************************************************ 00010800
```

229

```
109 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00011000
110 *                        EXTERNAL SYMBOL DICTIONARY                       00011100
111 * SYMBOL    TYPE ID  ADDR   LENGTH LD ID                                   00011200
112 *                                                                       + 00011300
113 *                                                                       + 00011400
114 * EXMPL2     SD  01 001000 000018                                       + 00011500
115 * SIGN       ER  02                                                     + 00011600
116 * PROGC      ER  03                                                     + 00011700
117 * DAV        LD     0010AC         04                                   + 00011800
118 * PROGB      SD  04 001018 0000A4                                       + 00011900
119 *            CM  05 000000 000010                                       + 00012000
120 *                                                                       + 00012100
121 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00012200
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69  6/05/70

001000                            123 EXMPL2   START X'1000'          EXMPL2                          CCC124C0
                                  124          EXTRN SIGN,PROGC                                      00012500
                                  125          ENTRY DAV          $$$$ QUESTION 7.41 $$$$$$$$$$$$$$$$$$$ CCC12600
001000 05A0                       126          BALR  10,0         $ HOW MANY VARIABLE FIELDS WOULD HAVE $ C00127C0
001002                            127          USING *,10         $ BEEN PUNCHED FOR THIS PROGRAM?      $ 00012800
001002 D204 A006 A00B 01008 0100D 128          MVC   HERE,THERE   $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00012900
001008 C2D3C1D5D2                 129 HERE     DC    C'BLANK'     $                                     $ 00013000
00100D E3C8C5D9C5                 130 THERE    DC    C'THERE'     $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00013100
001018                            131          LTORG                                                 CC013200
001018                            132 PROGB    CSECT                                                 CCC13300
001018 90EC D00C            0000C 133          STM   14,12,12(13) $$$  QUESTION 7.42 $$$$$$$$$$$$$$$$$$ 00013400
00101C 05C0                       134          BALR  12,0         $ LIST THE SYMBOLS THAT PRODUCED      $ C0013500
00101E                            135          USING *,12         $ SECTION DEFINITION (00) TYPE FIELDS.$ 00013600
00101E 58B0 C09A            010B8 136          L     11,=A(DOT)   $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0C13700
000000                            137          USING DOT,11       $                                     $ 00013800
001022 41F0 C046            01064 138          LA    15,SAVBB     $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00013900
001026 50FD 0008            00008 139          ST    15,8(13)                                              00014000
00102A 50DF 0004            00004 140          ST    13,4(15)     $$$  QUESTION 7.43  $$$$$$$$$$$$$$$$$ CCC14100
00102E 5830 C03E            0105C 141          L     3,FLDB       $ WHY DOES THE SYMBOL DAV APPEAR IN   $ 00014200
001032 5843 0000            00000 142          L     4,0(3)       $ THE ESD LISTING?                    $ CC014300
001036 5040 C042            01060 143          ST    4,FLDC       $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014400
00103A D203 B008 C092 C0008 010B0 144          MVC   SANDY,LAIG   $                                     $ CC014500
001040 41D0 C046            01064 145          LA    13,SAVBB     $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014600
001044 58F0 C03A            01058 146          L     15,BAZ                                                CC014700
001048 05EF                       147          BALR  14,15        $$$  QUESTION 7.44 $$$$$$$$$$$$$$$$$$ 00014800
00104A 5800 C092            010B0 148          L     0,LAIG       $ ARE THERE ANY UNKNOWN ASSEMBLED AD- $ CC014900
00104E                            149 GOBACK   EQU   *            $ DRESSES IN THIS LISTING? LIST THEM  $ C0C15000
00104E 58DD 0004            CCCC4 150          L     13,4(13)     $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00015100
001052 98EC D00C            CC00C 151          LM    14,12,12(13) $                                     $ C0015200
001056 07FE                       152          BR    14           $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00015300
001058 00000000                   153 BAZ      DC    A(PROGC)                                              00015400
00105C 00000000                   154 FLDB     DC    A(SIGN)      $$$  QUESTION 7.45 $$$$$$$$$$$$$$$$$$ 00015500
001060 00C0C000                   155 FLDC     DC    F'0'         $ IN WHICH CONTROL SECTION IS THE     $ C0015600
001064 0000C00000C00000           156 SAVBB    DC    18F'0'       $ SYMBOL DAV DEFINED? FROM THE ESD    $ C0015700
0010AC D7D9C7C3                   157 DAV      DC    C'PRGC'      $ LISTING, WHAT ID NUMBER HAS BEEN AS-$ C0015800
0010B0 D7D9C7C2                   158 LAIG     DC    C'PRGB'      $ SIGNED TO THAT CONTROL SECTION?     $ C0015900
                                  159 *                           $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCC16CC0
                                  160 *                           $                                     $ C0016100
                                  161 *                           $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00016200
0010B8                            162          LTORG                                                 00016300
0010B8 00000000                   163                    =A(DOT)
000000                            164          CSM                                                   CCC16400
000000 00000000                   165 DOT      DC    F'0'       PLEASE VERIFY YOUR ANSWER BY CHECKING THE  C0016500
000004 00000000                   166 KAREN    DC    F'0'       NEXT PAGE                                  C0016600
000008                            167 SANDY    DS    F                                                     CC016700
00000C                            168 DAVID    DS    F                                                     CC016800
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT FC1FEB69 6/05/70

```
                    171 *  7.41  ************************************************************ CCC171CC
                    172 *        * SIX (6), ONE FOR EACH ENTRY IN THE IN THE ESD LISTING      * CCC172CC
                    173 *        ************************************************************ CC017300


                    175 *  7.42  ************************************************************ CCC17500
                    176 *        * EXMPL2  AND PRCGB                                          * CCC17600
                    177 *        ************************************************************ CC017700


                    179 *  7.43  ************************************************************ CC017900
                    180 *        * LABELED DEFINITION TYPE BECAUSE OF THE ' ENTRY ' ASSEMBLER * 00018000
                    181 *        * INSTRUCTION                                              8 CCC18100
                    182 *        ************************************************************ 000182CC


                    184 *  7.44  ************************************************************ 00018400
                    185 *        * YES THE EXTERNAL REFERENCES  (SIGN ANDPROGC)               * CC018500
                    186 *        ************************************************************ CCC18600


                    188 *  7.45  ************************************************************ 00018800
                    189 *        * IN THE CONTROL SECTION KNOWN AS 'PROGB'. THIS CONTROL SEC_ * CC018900
                    190 *        * TION WILL HAVE HAVE AN ESD ID NUMBER OF 04.                * CCC19000
                    191 *        ************************************************************ 000191CC


                    193 *    THAT CONCLUDES PART FOUR OF THIS SECTION. PLEASE PROCEED ON TO     00019300
                    194 *    THE NEXT PAGE WHICH BEGINS THE FIFTH AND FINAL PART.               00019400
                    195        END                                                            00019500
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                    FC1FEB69  6/05/70

                                     3 *     ********************************************************************* CCC00300
                                     4 *     * THE PREVIOUS FOUR PARTS OF THIS SECTION SHOWED WHAT INFORMA-  * CCC00400
                                     5 *     * TION THE ASSEMBLER SAVED. THIS PART WILL AID YOU IN LEARNING  * 00000500
                                     6 *     * HOW THE LOADER WILL USE THIS INFORMATION. FOR THIS PART OF THE* CCC00600
                                     7 *     * SECTION, THE ANSWERS IMMEDIATELY FOLLOW THE QUESTIONS.        * CCC00700
                                     8 *     * PLEASE PROCEED TO THE CONCLUSION OF THIS SECTION. IT STARTS   * 00000800
                                     9 *     * RIGHT HERE AND ONLY GOES FOR FOUR MORE PAGES.                 * 00000900
                                    10 *     ********************************************************************* CCCC1000

                                    12 *             $$$$$$$$$$  QUESTION  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 000012CC
                                    13 *             $ WHERE DOES THE LOADER GET THE NECESSARY INFORMATION?$ 00001300
                                    14 *             $ FOR RESOLVING ADDRESSES?                             $ 00001400
                                    15 *             $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC1500
                                    16 *             $                                                      $ 00001600
                                    17 *             $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC001700

                                    19 *                          ==========  ANSWER  ======================== CCCC1900
                                    20 *                          = FROM THE ESD CARDS OF THE OBJECT DECK     = 00002000
                                    21 *                          ============================================== 00002100
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  FC1FEB69  6/05/70

                                    23 *     ************************************************************** CCC02300
                                    24 *     * TABLES BUILT BY THE LOADER WILL HAVE ONE EXTRA FIELD FOR EACH * CCCC24C0
                                    25 *     * ENTRY THAT HAS AN ESD IDENTIFICATION NUMBER. THE NEXT FEW     * 00002500
                                    26 *     * QUESTIONS AND ANSWERS WILL SHOW YOU A NEED FOR THIS EXTRA     * 00002600
                                    27 *     * FIELD AND HOW IT IS USED BY THE LOADERS.                      * 00002700
                                    28 *     ************************************************************** 00002800


                                    3C *               $$$$$$$$$$  QUESTION  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC3CC0
                                    31 *               $ HINT---- REMEMBER, ONLY THOSE ENTRIES THAT HAVE AN  $ 000C31C0
                                    32 *               $ ESD ID NUMBER WILL HAVE THE EXTRA FIELD.             $ 000C32CC
                                    33 *               $                                                      $ 00003300
                                    34 *               $ WHICH OF THE ENTRIES IN THE FOLLOWING ESD LISTING    $ CC003400
                                    35 *               $ WILL HAVE THE EXTRA FIELD?                           $ CC003500
                                    36 *               $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0003600
                                    37 *               $                                                      $ 00003700
                                    38 *               $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC003800


                                    4C *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ CCCC4000
                                    41 *                  EXAMPLE OF A TABLE BUILT BY A LOADER                + 00004100
                                    42 * SYMBOL     TYPE ID  ADDR   LENGTH LD ID      >EXTRA FIELD<           + CCCC4200
                                    43 *                                               ...........            + 00004300
                                    44 * PROGAA1     SD  01 001000 000084             .         .            + CCCC4400
                                    45 * PROGB       ER  02                           .         .            + 00004500
                                    46 * SIGN        LD     001074         01         .         .            + CC004600
                                    47 * ASUB1       SD  03 001088 00004C             .         .            + 00004700
                                    48 *            CM  04 000000 000010             .         .            + CC004800
                                    49 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00004900
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  FC1FEB69  6/05/70

                                  51 *******  ANSWER  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00005100
                                  52 *                                EXTERNAL SYMBOL DICTIONARY                        + 00005200
                                  53 * SYMBOL     TYPE ID  ADDR  LENGTH LD ID       >EXTRA FIELD<                     + CC005300
                                  54 *                                               ...........                       + C0C05400
                                  55 * PROGAA1     SD  01 001000 000084           -->.          .                      + C0005500
                                  56 * PROGB       ER  02                         -->.          .                      + CC0C5600
                                  57 * SIGN        LD     001074         01          .          .                      + C0005700
                                  58 * ASUB1       SD  03 001088 00004C           -->.          .                      + CCC05800
                                  59 *             CM  04 000000 000010           -->.          .                      + 00005900
                                  6C *++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ CCC06000

                                  62 ******* YOU WERE CORRECT IF YOU SAID EVERY ONE BUT THE LABEL DEFINI-              C0006200
                                  63 *          TICN (LD) ENTRY. *******                                              C0006300

                                  65 *     ********************************************************************** 00CC65C0
                                  66 *     *                                                                    * 000066C0
                                  67 *     * NCW A LITTLE ABOUT THE VALUE IN THE EXTRA FIELD.                   * C0CC67CC
                                  68 *     *                                                                    * 00006800
                                  69 *     * THE EXTRA FIELDS WILL CONTAIN A VALUE THAT IS THE DIFFERENCE       * CCCC6900
                                  70 *     * BETWEEN THE ASSEMBLED ADDRESS OF THE ENTRY AND WHERE IN CORE       * CCCC7000
                                  71 *     * THE LOADER DECIDES TO PLACE THE INFORMATION REFERENCED BY          * 00C071CC
                                  72 *     * THAT SYMBOL. THIS VALUE IS KNOWN AS THE RELOCATION FACTOR.         * 000C72CC
                                  73 *     *                                                                    * 00007300
                                  74 *     *   RELOCATION FACTCR = CCRE ADDRESS - ASSEMBLED ADDRESS             * CCC07400
                                  75 *     *                                                                    * 0CC075C0
                                  76 *     *                                                                    * C0C076C0
                                  77 *     *                                                                    * 00007700
                                  78 *     *                                                                    * C00078C0
                                  79 *     ********************************************************************** CCCC79CC

                                  81 *              $$$$$$$$$$  QUESTION  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC0C81C0
                                  82 *              $ USING THE ESD LISTING FROM THE ABOVE ANSWER                $ 00008200
                                  83 *              $ AND THE FORMULA FOR A RELOCATION FACTOR, FIGURE            $ CCCC83C0
                                  84 *              $ THE RELOCATION FACTOR FOR PROGAA1 AND ASUB1.               $ 00C08400
                                  85 *              $                                                            $ C0008500
                                  86 *              $ ASSUME THE PROGRAM WAS LOADED AT 063820.                   $ C0CC8600
                                  87 *              $                                                            $ CCCC87CC
                                  88 *              $                                                            $ 00008800
                                  89 *              $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0008900
                                  90 *              $                                                            $ 00009000
                                  91 *              $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00009100
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  FC1FEB69  6/05/70

                                  93 *********  ANSWER  ********************************************************* 00009300
                                  94 *                              EXTERNAL SYMBOL DICTIONARY                    + 00009400
                                  95 * SYMBOL    TYPE ID   ADDR  LENGTH LD ID       >EXTRA FIELD<                + 00009500
                                  96 *                                              ...........                   + 00009600
                                  97 * PROGAA1    SD  01 001000 000084           -->. 062820  .                   + 00009700
                                  98 * PROGB      ER  02                            .          .                   + 00009800
                                  99 * SIGN       LD     001074         01          .          .                   + 00009900
                                 100 * ASUB1      SD  03 001088 00004C           -->. 062820  .                   + 00010000
                                 101 *            CM  04 000000 000010             . 063F48  .                   + 00010100
                                 102 ********************************************************************************** 00010200

                                 104 *     ********************************************************************** 00010400
                                 105 *     * AS YOU SHOULD NOW KNOW, EACH OF THE TEXT (TXT) CARDS HAD AN    * 00010500
                                 106 *     * ESD NUMBER CONTAINED IN IT. THE LOADER USES THIS NUMBER TO     * 00010600
                                 107 *     * FIND OUT WHERE TO PLACE THE TEXT INFORMATION (INSTRUCTIONS     * 00010700
                                 108 *     * AND CONSTANTS) IN CORE.                                        * 00010800
                                 109 *     *                                                                * 00010900
                                 110 *     * REMEMBER, EACH TEXT CARD ALSO CONTAINS AN ASSEMBLED ADDRESS    * 00011000
                                 111 *     * AND A FIELD THAT SAYS HOW MANY BYTES OF TEXT INFORMATION THE   * 00011100
                                 112 *     * CARD CONTAINS.                                                 * 00011200
                                 113 *     ********************************************************************** 00011300

                                 115 *          ..................................................... 00011500
                                 116 *          . USE THE ABOVE ESD LISTING AND THE INFORMATION SUPPLIED  . 00011600
                                 117 *          . BELOW ABOUT A TXT CARD TO ANSWER THE FOLLOWING QUESTIONS . 00011700
                                 118 *          ..................................................... 00011800

                                 120 *       INFORMATION IN A TEXT CARD                                      00012000
                                 121 *          ASSEMBLED ADDRESS = HEX 001008                               00012100
                                 122 *          ESDID NUMBER      = 01                                       00012200
                                 123 *          NUMBER OF BYTES   = HEX 36                                   00012300

                                 125 *          $$$$$$$$$$$$$$$  QUESTION 7.51  $$$$$$$$$$$$$$$$$$$$$$$$$$ 00012500
                                 126 *          $ WHICH ENTRY IN THE TABLE WOULD THE LOADER GO TO WHEN IT  $ 00012600
                                 127 *          $ RETRIEVES THE VALUE IT HAS TO ADD TO THE ASSEMBLED ADD-  $ 00012700
                                 128 *          $ RESS IN THE CARD?                                        $ 00012800
                                 129 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00012900
                                 130 *          $                                                          $ 00013000
                                 131 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00013100

                                 133 *          $$$$$$$$$$$$$$$  QUESTION 7.52  $$$$$$$$$$$$$$$$$$$$$$$$$$ 00013300
                                 134 *          $ AT WHAT CORE LOCATION WOULD THE FIRST BYTE OF TEXT IN-   $ 00013400
                                 135 *          $ FORMATION IN THIS CARD BE PLACED? (ADD. OF PROGAA1 63820)$ 00013500
                                 136 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00013600
                                 137 *          $                                                          $ 00013700
                                 138 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00013800

                                 140 *          $$$$$$$$$$$$$$$  QUESTION 7.53  $$$$$$$$$$$$$$$$$$$$$$$$$$ 00014000
                                 141 *          $ AT WHAT LOCATION WOULD THE LAST BYTE FROM THIS CARD BE   $ 00014100
                                 142 *          $ PLACED?                                                  $ 00014200
                                 143 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014300
                                 144 *          $                                                          $ 00014400
                                 145 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014500
```

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LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69  6/05/70

                                  147 *                  ANSWERS                                          CC0147C0

                                  149 * 7.51  ================================================================ CC014900
                                  150 *       = FIRST ENTRY- PRCGAA1.                                      = CC015000
                                  151 *       = WHY--BECAUSE THE ESDID NUMBER IN THE TEXT CARD WAS AS 01.  = 000151CC
                                  152 *       = THE LCADER GOES TC THE ESD TABLE THAT HE BUILT AND SEARCHES = C0015200
                                  153 *       = FOR AN ESDID NUMBER THAT MATCHES THE ONE IN THE TEXT CARD. = 00015300
                                  154 *       ================================================================ 00015400

                                  156 * 7.52  ================================================================ 0001560C
                                  157 *       = CORE LOCATION 063828.(ASSEMBLED ADDRESS + RELOCATION FACTOR = 00015700
                                  158 *       ================================================================ CCC15800

                                  160 * 7.53  ================================================================ 00016000
                                  161 *       = CORE LOCATION 06385D.  THIS CORE ADDRESS IS 35 BYTES AWAY   = 000161C0
                                  162 *       = FROM THE BEGINING ADDRESS THAT WAS SPECIFIED IN THE CARD.   = 00016200
                                  163 *       = IF THE LCADER STARTED PLACING THE BYTES IN CORE AT THE      = 000163C0
                                  164 *       = ASSEMBLED ADDRESS PLUS RELOCATION FACTOR, AND IF IT KNEW    = C0016400
                                  165 *       = IT HAD TO PUT HEX 36 BYTES CF INFORMATION IN CORE, THE IN-  = 000165CC
                                  166 *       = FORMATICN CONTAINED IN THE CARD WOULD GO FROM CORE LOCATION = C0016600
                                  167 *       = 063828 TO CORE LOCATION 06385D.                             = 00C167C0
                                  168 *       ================================================================ 00016800

                                  170 *    THIS CCMPLETES SECTION ONE OF THIS PROJECT.(RELPA.02) WHEN YOU HAVE 00017000
                                  171 *    REACHED THIS POINT PLEASE TURN YOUR ANSWER CUE TO W H I T E.VERIFY  00017100
                                  172 *    WITH YCUR INSTRUCTCR THAT YOU HAVE COMPLETED THIS SECTION BY        CCC17200
                                  173 *    COMPLETING THE NEXT PAGE AND SUBMITTING IT TO HIM.                  00017300
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT FC1FEB69 6/05/70

```
                          176 *   NAME----------  .                C0017600
                          178 *   CLASS NUMBER----  .              C0017800
                          180 *   DATE----------  .                CCC18000
                          182 *  COMMENTS                          00018200
```

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```
                          184        END                           C0018400
```

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
184 PRINTED LINES

```
PPPPPPPPPPP     AAAAAAAAAA     2222222222
PPPPPPPPPPPP   AAAAAAAAAAAA   222222222222
PP         PP  AA         AA  22         22
PP         PP  AA         AA             22
PP         PP  AA         AA             22
PPPPPPPPPPPP   AAAAAAAAAAAA             22
PPPPPPPPPPP    AAAAAAAAAAAA           22
PP             AA         AA       22
PP             AA         AA     22
PP             AA         AA   22
PP             AA         AA  222222222222
PP             AA         AA  222222222222

 SSSSSSSSSS    CCCCCCCCCC   TTTTTTTTTTTT   2222222222
SSSSSSSSSSSS  CCCCCCCCCCCC  TTTTTTTTTTTT  222222222222
SS         SS  CC         CC       TT       22         22
SS             CC                  TT                  22
SSS            CC                  TT                  22
 SSSSSSSSS     CC                  TT                 22
  SSSSSSSSS    CC                  TT               22
        SSS    CC                  TT             22
          SS   CC                  TT           22
SS         SS  CC         CC       TT         22
SSSSSSSSSSSS  CCCCCCCCCCCC        TT       222222222222
 SSSSSSSSSS    CCCCCCCCCC         TT       222222222222

 9999999999
999999999999
99        99
99        99
99        99
999999999999
999999999999
          99
          99
99        99
999999999999
 9999999999
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   6/05/70

                                    3 * THIS SECTION CONSISTS OF TWO PARTS. PART ONE IS AN EXTENSION OF THE   00000300
                                    4 * THE PREVIOUS SECTION. BY THE TIME YOU HAVE COMPLETED THIS SECTION     00000400
                                    5 * YOU WILL HAVE SEEN HOW A LOADER USES THE VARIOUS OBJECT CARD FIELDS   00000500
                                    6 * TO RESOLVE THE ADDRESSES WHICH MAKE MODULAR RELOCATABILITY POSSIBLE.  00000600

                                    8 * DON'T, I REPEAT, DON'T READ EACH PIECE OF CODE IN THE LISTING. READ   00000800
                                    9 * THE QUESTION AND ANSWER IT BY GOING TO THE NECESSARY CODE, ESD LIST-  00000900
                                   10 * ING, RLD LISTING AND DUMP. PART ONE OF THIS SECOND SECTION BEGINS     00001000
                                   11 * RIGHT ON THIS PAGE. SO PLEASE PROCEED AND DON'T FORGET TO BUG YOUR    00001100
                                   12 * INSTRUCTOR WHEN YOU RUN INTO ANY PROBLEMS.                           00001200


                                   14 *                          PART ONE                                    00001400


000000                             16   START                                                                 00001600
                                   17 *     ********************************************************************* 00001700
                                   18 *     * HERE IS HOW THE MATERIAL FOR THIS SECTION IS ARRANGED. PLEASE   00001800
                                   19 *     * READ OVER THIS LIST BEFORE BEGINING THE QUESTIONS.              00001900
                                   20 *     *                                                                 00002000
                                   21 *     *     ESD LISTINGS OF TWO PROGRAMS SHOWING THE EXTRA FIELDS USED  00002100
                                   22 *     *     BY THE LOADER.              (PAGE 2)                        00002200
                                   23 *     *                                                                 00002300
                                   24 *     *     ASSEMBLY LISTING OF PROGAA1 (PAGE 3)                        00002400
                                   25 *     *                                                                 00002500
                                   26 *     *     ASSEMBLY LISTING OF EXMPL2  (PAGE 4)                        00002600
                                   27 *     *                                                                 00002700
                                   28 *     *     RLD LISTING OF PROGAA1                                      00002800
                                   29 *     *        AND EXMPL2               (PAGE 5-6)                      00002900
                                   30 *     *                                                                 00003000
                                   31 *     *     CORE DUMP                   (PAGE 7)                        00003100
                                   32 *     *                                                                 00003200
                                   33 *     *     LINKAGE EDITOR MAP          (PAGE 8)                        00003300
                                   34 *     *                                                                 00003400
                                   35 *     *     QUESTIONS AND COMMENTS      (PAGE 9)  PART ONE              00003500
                                   36 *     *                                                                 00003600
                                   37 *     *     QUESTIONS AND COMMENTS      (PAGE 15)  PART TWO             00003700
                                   38 *     ********************************************************************* 00003800


                                   40 * NOW PLEASE BEGIN THE QUESTIONS THAT START ON PAGE 9 OF THIS SECTION   00004000
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   6/05/70
                                   42 *   SECTION TWO                                       PAGE 2    00004200


                                   44 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00004400
                                   45 *                  EXAMPLE OF A TABLE BUILT BY A LOADER                + 00004500
                                   46 * SYMBOL     TYPE ID  ADDR  LENGTH LD ID       >EXTRA FIELD<           + CCCC4600
                                   47 *                                             ...........             + CCCC4700
                                   48 * PROGAA1     SD  01 001000 000080             . 062820  .             + 00004800
                                   49 * PROGB       ER  02                           . 063908  .             + CCCC4900
                                   50 * SIGN        LD     001074         01         .         .             + 00005000
                                   51 * ASUB1       SD  03 001080 00004C             . 062820  .             + CCCC5100
                                   52 *             CM  04 000000 000010             . 063F48  .             + C0005200
                                   53 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ CCCC5300


                                   55 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00005500
                                   56 *                  EXAMPLE OF A TABLE BUILT BY A LOADER                + 00005600
                                   57 * SYMBOL     TYPE ID  ADDR  LENGTH LD ID       >EXTRA FIELD<           + CC005700
                                   58 *                                             ...........             + C0005800
                                   59 * EXMPL2      SD  01 001000 000018             . 0628F0  .             + 00005900
                                   60 * SIGN        ER  02                           . 063894  .             + CC006000
                                   61 * DAV         LD     0010A8         03         .         .             + 00006100
                                   62 * PROGB       SD  03 001018 0000A0             . 0628F0  .             + CC006200
                                   63 * PROGC       ER  04                          X. 000000  .X            + 00006300
                                   64 *             CM  05 000000 000010             . 063F48  .             + C0C06400
                                   65 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00006500


                                   67 *       PLEASE ASSUME THE THAT PROGAA1 AND EXMPL2 HAVE BEEN LOADED      C0006700
                                   68 *      CORRECTLY AT THE FOLLOWING CORE LOCATIONS:                       00006800
                                   69 *          PROGAA1.... 063820.                                          00006900
                                   70 *          EXMPL2..... 0638F0                                           C0007000
```

```
  LCC   OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69   3/18/70

001000                                    1 PROGAA1  START X'1000'          ESD SECTION ADDRESS RESOLUTION      00000100
                                          2          EXTRN PROGB                                               00000200
                                          3          ENTRY SIGN                                                00000300
001000 05C0                               4          BALR  12,0                                                00000400
001002                                    5          USING *,12                                                00000500
001002 5840 C026              01028       6          L     4,GUESS                                             00000600
001006 5850 C076              01078       7          L     5,CHRB                                              00000700
00100A 5054 0004              00004       8          ST    5,4(4)                                              00000800
00100E 58D0 C07A              0107C       9          L     13,ADCONSVE                                         00000900
001012 58F0 C01E              01020      10          L     15,EXT1                                             00001000
001016 05EF                               11          BALR  14,15                                               00001100
001018 58F0 C022              01024      12          L     15,SCEXT                                            00001200
00101C 07FF                               13          BR    15                                                  00001300
00101E 0000                               14          DC    H'0'                                                00001400
001020 00000000                           15 EXT1     DC    A(PROGB)                                            00001500
001024 00001080                           16 SCEXT    DC    A(ASUB1)                                            00001600
001028 00000000                           17 GUESS    DC    A(DOT)                                              00001700
00102C 0000000000000000                   18 SVA      DC    18F'0'                                              00001800
001074 D3E4C3D2                           19 SIGN     DC    C'LUCK'                                             00001900
001078 D7D9C7C1                           20 CHRB     DC    C'PRGA'                                             00002000
00107C 0000102C                           21 ADCONSVE DC    A(SVA)                                              00002100
001080                                    22          LTORG                                                     00002200
001080                                    23 ASUB1    CSECT                                                     00002300
001080 05C0                               24          BALR  12,0                                                00002400
001082                                    25          USING *,12                                                00002500
001082 58B0 C046              010C8       26          L     11,=A(DOT)                                          00002600
000000                                    27          USING DOT,11                                              00002700
001086 D203 B000 C024 00000 010A6         28          MVC   DOT,ZOOT                                            00002800
00108C D203 C02A B000 010AC 00000         29          MVC   FINAL,DOT                                           00002900
001092 D203 C032 B004 010B4 00004         30          MVC   FINAL+8,KAREN                                       00003000
001098 D203 C03A B008 C10BC 00008         31          MVC   FINAL+16,SANDY                                      00003100
00109E D203 C042 B00C 010C4 0000C         32          MVC   FINAL+24,DAVID                                      00003200
0010A4 0000                               33          DC    H'00'                                               00003300
0010A6 D7C7C1F1                           34 ZOOT     DC    C'PGA1'                                             00003400
0010AC                                    35 FINAL    DS    7F                                                  00003500
0010C8                                    36          LTORG                                                     00003600
0010C8 00000000                           37                =A(DOT)
000000                                    38          CCM                                                       00003700
000000                                    39 DOT      DS    F                                                   00003800
000004                                    40 KAREN    DS    F                                                   00003900
000008                                    41 SANDY    DS    F                                                   00004000
00000C                                    42 DAVID    DS    F                                                   00004100
                                          43          END                                                       00004200
```

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```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  FC1FEB69   3/18/70

001000                                    1 EXMPL2   START X'1000'      ESD SECTION ADDRESS RESOLUTION (2)      00000100
                                          2          EXTRN SIGN                                                 CCCC0200
                                          3          ENTRY DAV                                                  00000300
001000 05A0                               4          BALR  10,0                                                 00000400
001002                                    5          USING *,10                                                 CCCC0500
001002 D204 A006 A00B 01008 0100D         6          MVC   HERE,THERE                                           00000600
001008 C2D3C1D5D2                         7 HERE     DC    C'BLANK'                                             00000700
00100D E3C8C5D9C5                         8 THERE    DC    C'THERE'                                             CCCC0800
001018                                    9          LTORG                                                      CCCC0900
001018                                   10 PROGB    CSECT                                                      00001000
001018 90EC D00C             0000C       11          STM   14,12,12(13)                                         00001100
00101C 05C0                              12          BALR  12,0                                                 00001200
00101E                                   13          USING *,12                                                 00001300
00101E 58B0 C092             010B0       14          L     11,=A(DOT)                                           00001400
000000                                   15          USING DOT,11                                               CC001500
001022 41F0 C042             01060       16          LA    15,SAVBB                                             00001600
001026 50FD 0008             00008       17          ST    15,8(13)                                             00001700
00102A 50DF 0004             00004       18          ST    13,4(15)                                             00001800
00102E 5830 C03A             01058       19          L     3,FLDB                                               CCC01900
001032 5843 0000             00000       20          L     4,0(3)                                               00002000
001036 5040 C03E             0105C       21          ST    4,FLDC                                               C0002100
00103A D203 B008 C08E 00008  010AC       22          MVC   SANDY,LAIG                                           00002200
001040 41D0 C042             01060       23          LA    13,SAVBB                                             00002300
001044 58F0 C096             010B4       24          L     15,=V(PROGC)                                         00C02400
001048 05EF                              25          BALR  14,15                                                00002500
00104A 5800 C08E             010AC       26          L     0,LAIG                                               00002600
00104E                                   27 GOBACK   EQU   *                                                    00002700
00104E 58DD 0004             00004       28          L     13,4(13)                                             C0002800
001052 98EC D00C             0000C       29          LM    14,12,12(13)                                         00C02900
001056 07FE                              30          BR    14                                                   C0003000
001058 00000000                          31 FLDB     DC    A(SIGN)                                              CCC03100
00105C 00000000                          32 FLDC     DC    F'0'                                                 00003200
001060 0000C0C000000000                  33 SAVBB    DC    18F'0'                                               00C03300
0010A8 D7D9C7C3                          34 DAV      DC    C'PRGC'                                              00C03400
0010AC D7D9C7C2                          35 LAIG     DC    C'PRGB'                                              CCC03500
0010B0                                   36       LTORG                                                       C0C03600
0010B0 00000000                          37                 =A(DOT)
0010B4 00000000                          38                 =V(PROGC)
000000                                   39          CCM                                                        C0003700
000000 00000000                          40 DOT      DC    F'0'                                                 CCC03800
000004 00000000                          41 KAREN    DC    F'0'                                                 CC003900
000008                                   42 SANDY    DS    F                                                    CC004000
00000C                                   43 DAVID    DS    F                                                    C0004100
                                         44          END                                                        CCC04200
```

RELOCATION DICTIONARY

3/18/70

POS. ID	REL. ID	FLAGS	ADDRESS
01	01	0C	00107C
01	02	0C	001020
01	03	0C	001024
01	04	0C	001028
03	04	0C	0010C8

POS.ID	REL.ID	FLAGS	ADDRESS
03	02	0C	001058
03	04	1C	0010B4
03	05	0C	0010B0

```
F.P. REGS.  00.000000 C0000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 00063894    D3E4C3D2 D7D9C7C1 00004F20 0006E430
REGS 8-15    0006E778 0C000000 0006E7BC 00063F48    6F06390E 00063950 6F06393A 00000000

000000    00000000 0000007C F0F0F0C7 50C71D90    00063820 00002A18 01040080 8003AFFE  *........000G.....................*
000020    0004000A 7000240C FF150001 6FC00002    0000FF00 00000000 FE040233 800011D6  *.............................C*
000040    00001598 08000000 00001590 00002120    243172C0 00074200 00040000 000002C0  *.............................{.*
000060    0004000C 00000366 00040000 0000030A    00000000 0000CA68 00040000 0000226E  *.............................?.*

063820    05C05840 C0265850 C0765054 0C0458D0    C07A58F0 C01E05EF 58F0C022 07FF0000  *... .............0.....0......*
063840    00063908 000638A0 00063F48 00000000    00000000 00063950 6F063838 00063908  *.............................{.*
063860    00000050 0006E7F8 0006E800 C006E800    00063F48 D7D9C7C1 00004F20 0006E430  *......X8..Y...Y.....PRGA......U.*
063880    0006E778 00000000 0006E7B0 CC06E7F8    6F063822 D3E4C3D2 D7D9C7C1 0006384C  *..X.......X...X8....LUCKPRGA....*
0638A0    05C058B0 C046D203 B000C024 D203C02A    B000D203 C032B004 D203C03A B008D203  *......K.....K.....K.....K.....K.*
0638C0    C042B00C 0000D7C7 C1F19562 41110001    4770946C 18B11B1F 1BFF4910 954A47B0  *......PGA1.....................*
0638E0    94A04210 95734110 00063F48 91019561    05A0D204 A006A00B C2C3C1D5 D2E3C8C5  *..................K.....BLANKTHE*
063900    D9C51B1F 96019561 90ECD00C C5CC58B0    C09241F0 C04250FD 000850DF 00045830  *RE.............0............*
063920    C03A5843 00005040 C03ED203 BCC8C08E    41D0C042 58F0C096 05EF5800 C08E58DD  *....... ..K.........0..........*
063940    000498EC D00C07FE 00063894 D3E4C3D2    00000000 0006384C 00000000 00000000  *............LUCK...............*
063960    00000000 00C00000 00000000 0CC0C000    00000000 00000000 00000000 00000000  *.............................{.*
063980    00000000 00000000 00000000 00000000    00000000 00000000 D7D9C7C3 D7D9C7C2  *.......................PRGCPRGB*
0639A0    00063F48 0CC00000 90ECD00C 05C004F0    07004110 C0100511 0F063A4C 7FFF0A0E  *.............0.................*

063F40    000639A8 00063F28 4770C324 D7D9C7C1    D7D9C7C2 902043F3 00000000 0000A080  *..........C.PRGAPRGB...3........*
063F60    0146004D 00000001 00000000 00C00000    00000000 00000000 00000000 00004000  *.............................. .*
```

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****

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
           VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000       ENTRY UTILITY
IEW0461  PROGC
```

MODULE MAP

CONTROL SECTION			ENTRY							
NAME	ORIGIN	LENGTH	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION
PROGAA1	00	80								
			SIGN	74						
ASUB1	80	4C								
EXMPL2	D0	18								
PROGB	E8	A0								
			DAV	178						
UTILITY	188	5A0								
			PRINT	1EA	PCHKRETN	446				
$BLANKCOM	728	10								

```
ENTRY ADDRESS      188
TOTAL LENGTH       738

****GO        DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```


DIAGNOSTIC MESSAGE DIRECTORY

```
  IEW0461 WARNING - SYMBOL PRINTED IS AN UNRESOLVED EXTERNAL REFERENCE, NCAL WAS SPECIFIED.
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT FC1FEB69 6/05/70

```
                        72 * SECTION TWO                                                PAGE 9  00007200

                        74 *          $$$$$$$$$$  QUESTION 7.61  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007400
                        75 *          $ WHY WAS THE EXTERNAL REFERENCE (ER) FOR THE SYMBOL PROGC $ CCC07500
                        76 *          $ GENERATED?                                                $ CCC07600
                        77 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007700
                        78 *          $                                                           $ 00007800
                        79 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC007900

                        81 *          $$$$$$$$$$  QUESTION 7.62  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00008100
                        82 *          $ HOW DOES THE LOADER KNOW THAT THE FIELD FOR THE SYMBOL    $ CCCC8200
                        83 *          $ PROGB WAS PRODUCED BY AN EXTRN INSTRUCTION IN ONE         $ 00008300
                        84 *          $ PROGRAM AND BY A NAMED CSECT OR NAMED START INSTUCTION    $ 00C08400
                        85 *          $ IN THE OTHER PROGRAM?                                     $ 00008500
                        86 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC008600

                        88 *          $$$$$$$$$$  QUESTION 7.63  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00008800
                        89 *          $ WHY IS THE RELOCATION FACTOR FOR THE SYMBOL PROGB DIF-    $ 00008900
                        90 *          $ FERENT IN THE TWO TABLES?                                 $ 00009000
                        91 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC9100
                        92 *          $                                                           $ 00009200
                        93 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00009300

                        95 *          $$$$$$$$$$  QUESTION 7.64  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00009500
                        96 *          $ WHAT IS THE ACTUAL CORE ADDRESS OF THE DATA POINTED TO    $ CCC09600
                        97 *          $ BY THE SYMBOL PROGB?                                      $ CCC09700
                        98 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00009800
                        99 *          $                                                           $ 00009900
                       100 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC010000

                       102 *          $$$$$$$$$$  QUESTION 7.65  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00010200
                       103 *          $ AT WHAT CORE STORAGE LOCATION IN PROGAA1 DOES THE LOADER $ 00010300
                       104 *          $ HAVE TO PLACE THE ACTUAL ADDRESS OF PROGB.                $ 00010400
                       105 *          $ HINT----- YOU CAN FIND THIS ADDRESS BY USING THE ASSEMB-  $ 00010500
                       106 *          $ LED ADDRESS OF THE SYMBOL EXT1 (IN PROGAA1) AND THEN AD-  $ 00010600
                       107 *          $ DING THE CORRECT RELOCATION FACTOR.                       $ CC010700
                       108 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00010800
                       109 *          $                                                           $ 00010900
                       110 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00011000

                       112 *          $$$$$$$$$$  QUESTION 7.66  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00011200
                       113 *          $ NOTICE THE VALUE THE ASSEMBLER PLACED IN THE FIELD LAB-   $ CCC113CC
                       114 *          $ ELED ADCONSVE (IN PROGAA1) DURING ASSEMBLY TIME.          $ CCC114C0
                       115 *          $ (0000102C)                                                $ C0011500
                       116 *          $ WHAT VALUE DOES THIS FIELD CONTAIN IN THE CORE DUMP?      $ 000116CC
                       117 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC011700
                       118 *          $                                                           $ 00011800
                       119 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCC11900
```

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```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  FC1FEB69  6/C5/70
                                  244 *          ---------ANSWERS----------                          00024400
                                  245 *          ================================================== 00024600
                                  246 *    7.61  ================================================== 00024600
                                  247 *          = BECAUSE OF THE V TYPE ADCON AT ASSEMBLED ADDRESS 0010B4      CC024700
                                  248 *          ================================================== CCC24800
                                  249 *          ================================================== 00024900
                                  250 *    7.62  ================================================== 00025000
                                  251 *          = THE TYPE CODE IN THE NINTH COLUMN OF THE VARIABLE FIELD    = 00025100
                                  252 *          ================================================== 00025200
                                  253 *          ================================================== 00025300
                                  254 *    7.63  ================================================== 00025400
                                  255 *          = ASSEMBLED ADDRESS CF PRCGB IN PROGAA1 IS '000000'. THE     = CCC25500
                                  256 *          = ASSEMBLED ADDRESS CF PRCGB IN EXMPL2 IS'001018'.           = 00025600
                                  257 *          ================================================== 00025700
                                  258 *          ================================================== 00025800
                                  259 *    7.64  ================================================== 00025900
                                  260 *          = --063908--                                                 = 00026000
                                  261 *          ================================================== 00026100
                                  262 *          ================================================== 00026200
                                  263 *    7.65  ================================================== 00026300
                                  264 *          =    ASSEMBLED ADDRESS    = 001020                       = 00026400
                                  265 *          =    RELCCATICN FACTCR    = 062820 - IN THE CONTROL SECTION = CCC26500
                                  266 *          =                                 THAT HAS AN ESDID OF 01 = 00026600
                                  267 *          =   ACTUAL CORE ADDRESS   = 063840                       = 00026700
                                  268 *          ================================================== 00026800
                                  269 *          ================================================== 00026900
                                  270 *    7.66  ================================================== 00027000
                                  271 *          = -- 06384C                                                  = 00027100
                                  272 *          ================================================== 00027200
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   6/05/70

                                  121 *         $$$$$$$$$$  QUESTION 7.67  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00012100
                                  122 *         $ USEING THE ASSEMBLY LISTING OF PROGAA1, LIST THE ESDID     $ 00012200
                                  123 *         $ NUMBER OF THE CONTROL SECTIONS IN WHICH THE FOLLOWING      $ CCC12300
                                  124 *         $ ADDRESS CONSTANTS ARE LOCATED,                             $ CCC12400
                                  125 *         $ ADCON             ESDID NUMBER                             $ CCC12500
                                  126 *         $                                                            $ 00012600
                                  127 *         $ ADCONSVE          ...          THIS NUMBER YOU ARE NOW     $ C0012700
                                  128 *         $ EXT1              ...          LOCATING IS KNOWN AS THE    $ 00012800
                                  129 *         $ SCEXT             ...          POSTION ID OF THE ADCON     $ CCC12900
                                  130 *         $ GUESS             ...                                      $ CC013000
                                  131 *         $ ------            ...                                      $ CCC13100
                                  132 *         $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00013200

                                  134 **** THE NEXT QUESTIONS REFER TO THE TABLE. PLEASE ANSWER THE QUESTIONS CC013400
                                  135 *    BY FILLING IN THE BLANKS OF THE TABLE.                           CC013500

                                  137 *         $$$$$$$$$$  QUESTION 7.68  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC013700
                                  138 *         $  NOW USE THE EXAMPLES OF THE ESD LISTINGS THAT CONTAIN      $ CC013800
                                  139 *         $  THE EXTRA FIELD. THESE LISTINGS ARE ON PAGE 2 OF THIS      $ 00013900
                                  140 *         $  SECTION.                                                   $ 00014000
                                  141 *         $ LIST THE ESDID NUMBER OF THE ENTRIES IN THE TABLES THE      $ CC014100
                                  142 *         $ LOADER WOULD GO TO WHEN IT NEEDS THE VALUE FOR MODIFYING    $ 00014200
                                  143 *         $ THE CONTENTS OF THE ADCON. REMEMBER, THE CONTENTS HAVE TO   $ CC014300
                                  144 *         $ END UP HAVING THE CORRECT CORE ADDRESS. THE NUMBERS YOU     $ CCC14400
                                  145 *         $ ARE NOW LOCATING ARE KNOWN AS THE RELOCATION ID OF THE      $ 00014500
                                  146 *         $ ADCON.                                                      $ 00014600
                                  147 *         $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014700


                                  149 *         $$$$$$$$$$  QUESTION 7.69  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00014900
                                  150 *         $ PLEASE COMPLETE THE REMAINDER OF THE TABLE. (CORE ADDRES-   $ CCC15000
                                  151 *         $ SES AND FINAL CONTENTS OF THE FIELD)                        $ 00015100
                                  152 *         $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00015200


                                  154 *++++++++++  QUESTIONS 7.68 AND 7.69  ++++++++++++++++++++++++++++++++++ C0015400
                                  155 * ESDID NUMBER OF   CORE     ESDID NUMBER OF  ASSEMBL   FINAL CONTENTS+ 00015500
                                  156 * THE CSECT IN      ADDRS    ENTRY IN ESD     ADDRES    OF THE FIELD  + CC015600
                                  157 * WHICH THE FIELD             TABLE WHERE                            + CC015700
                                  158 * IS LOCATED                  MODIFYING VALUE                        + 00015800
                                  159 *                            IS LOCATED.                            + CCC15900
                                  160 *                                                                   + 00016000
                                  161 *  01             06389C         01          00107C    06384C       + CCC16100
                                  162 *  01             ......         ..          001020    ......       + C0016200
                                  163 *  01             ......         ..          001024    ......       + CCC16300
                                  164 *  01             ......         ..          001028    ......       + C0016400
                                  165 *  03             ......         ..          0010C8    ......       + CCC16500
                                  166 *++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ C0016600

                                  168 *  THE ANSWERS TO THESE QUESTIONS ARE ON THE NEXT PAGE. PLEASE VERIFY   00016800
                                  169 *  YOUR ANSWERS BEFORE CONTINUING.                                      00016900
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69  6/05/70

                                 171 *      ********   ANSWERS  7.67, 7.68 AND 7.69  ************************ C0017100
                                 172 *      * THE ASSEMBLER PRINTS THE RLD THAT IT PRODUCES, JUST AS IT DID * C0017200
                                 173 *      * THE ESD TABLE. THE RLD LISTING IS PRINTED FOLLOWING THE SOURCE* C0017300
                                 174 *      * LISTING.                                                      * C0017400
                                 175 *      *                                                               * C0017500
                                 176 *      * THE 'POSTION ID' (POS.ID) IS THE ESDID NUMBER OF THE CSECT    * C0017600
                                 177 *      * IN WHICH THE ADCON IS LOCATED.                                * C0017700
                                 178 *      *                                                               * C0017800
                                 179 *      * THE 'RELOCATION ID' (REL.ID) IS THE ESDID NUMBER OF THE ENTRY * C0017900
                                 180 *      * IN THE ESD TABLE WHERE THE LOADER CAN THE RELOCATION FACTOR   * C0018000
                                 181 *      * TO USE TO MODIFY THE ADCON'S CONTENTS.                        8 C0018100
                                 182 *      *                                                               * C0018200
                                 183 *      * PRINTED BELOW IS THE RLD TABLE FROM PROGAA1. CHECK YOUR       * C0018300
                                 184 *      * ANSWERS FOR THE PRECEEDING 3 QUESTIONS.(POS.ID AND REL.ID)    * C0018400
                                 185 *      ********************************************************************* C0018500

                                 187 *++++++++  ANSWERS  7.67, 7.68 AND 7.69  ++++++++++++++++++++++++++++++++ C0018700
                                 188 *  POS.ID  REL.ID  FLAGS  ADDRESS                                        + C0018800
                                 189 *                                                                        + C0018900
                                 190 *    01      01     0C    00107C                                        + C0019000
                                 191 *    01      02     0C    001020                                        + C0019100
                                 192 *    01      03     0C    001024                                        + C0019200
                                 193 *    01      04     0C    001028                                        + C0019300
                                 194 *    03      04     0C    0010C8                                        + C0019400
                                 195 *++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ C0019500

                                 197 *      AFTER CHECKING YOUR ANSWERS PLEASE CONTINUE                      C0019700
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                                199 *            ********************************************************* 00019900
                                200 *            * THE THREE QUESTIONS ON THIS PAGE SHOULD BE ANSWERED BY * 00020000
                                201 *            * USEING THE TABLES ON PAGE 2 OF THIS SECTION AND THE    * 00020100
                                202 *            * RLD LISTING BELOW.                                     * 00020200
                                203 *            ********************************************************* 00020300

                                205 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00020500
                                206 *  POS.ID  REL.ID  FLAGS  ADDRESS                                        + 00020600
                                207 *                                                                        + 00020700
                                208 *    03      02      0C    001058                                        + 00020800
                                209 *    03      04      1C    0010B4                                        + 00020900
                                210 *    03      05      0C    0010B0                                        + 00021000
                                211 *+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ 00021100

                                213 *          $$$$$$$$$$  QUESTION 7.71  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00021300
                                214 *          $ WHAT IS THE NAME OF THE CSECT IN WHICH ALL THREE ADCONS   $ 00021400
                                215 *          $ ARE LOCATED?                                              $ 00021500
                                216 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00021600
                                217 *          $                                                           $ 00021700
                                218 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00021800

                                220 *          $$$$$$$$$$  QUESTION 7.72  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00022000
                                221 *          $ WHAT RELOCATION FACTOR SHOULD YOU ADD TO THE ASSEMBLED     $ 00022100
                                222 *          $ ADDRESSES OF THESE ADCONS TO FIND THERE CORE LOCATION?     $ 00022200
                                223 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00022300
                                224 *          $                                                           $ 00022400
                                225 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00022500

                                227 *          $$$$$$$$$$  QUESTION 7.73  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00022700
                                228 *          $ WHY DOESN'T THE ENTRY FOR 'SIGN' IN PROGAA1 HAVE AN ESDID  $ 00022800
                                229 *          $ NUMBER?  HINT  DOES IT REALLY NEED ONE?                    $ 00022900
                                230 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00023000
                                231 *          $                                                           $ 00023100
                                232 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00023200

                                234 *          THIS CONCLUDES PART ONE OF SECTION TWO. YOU SHOULD NOW BE    00023400
                                235 *          FAMILIAR WITH THE ESD NUMBERS THE LOADER USES TO RESOLVE THE 00023500
                                236 *          ADDRESSES IT HAS TO. THAT'S ALL THERE IS TO THIS DARK SECRET 00023600
                                237 *          OF RELOCATABILITY. THE ASSEMBLER SUPPLIES NUMBERS TO THE CON- 00023700
                                238 *          TROL SECTIONS IT ENCOUNTERS, PUNCHES THAT NUMBER IN THE OBJECT 00023800
                                239 *          DECK, AND THEN ASSOCIATES ALL THE DATA IN THOSE CONTROL SEC- 00023900
                                240 *          TIONS WITH THAT NUMBER. THE LOADERS THEN BUILD SIMILIAR TABLES 00024000
                                241 *          AND RESOLVE THE ADDRESSES SO THE PROGRAMS WORK CORRECTLY AT  00024100
                                242 *          EXECUTION TIME.                                              00024200
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FE869 6/05/70

```
                        274 *                    ANSWERS                                                  00027400


                        276 *  7.71  ==========================================================          00027600
                        277 *        = PROGB                                                   =          00027700
                        278 *        ==========================================================          00027800


                        280 *  7.72  ==========================================================          00028000
                        281 *        = --0628F0--                                              =          00028100
                        282 *        ==========================================================          00028200


                        284 *  7.73  ==========================================================          00028400
                        285 *        = AN ENTRY PRODUCED BY AN ENTRY STATEMENT DOES NOT HAVE AN  =          00028500
                        286 *        = ESDID NUMBER OF ITS OWN. (LD) IT HAS AN LD ID THAT REFERS =          00028600
                        287 *        = TO THE CSECT IN WHICH THE ENTRY IS USED. IN THE EXAMPLE OF=          00028700
                        288 *        = SIGN, IT IS AN ENTRY POINT IN THE CSECT PROGAA1 (01).     =          00028800
                        289 *        = THEREFORE IT MUST HAVE THE SAME RELOCATION FACTOR.        =          00028900
                        290 *        ==========================================================          00029000


252

                        292 *   PLEASE TURN YOUR ANSWERS DUE TO  B L U E  WHEN YOU HAVE COMPLETED          00029200
                        293 *   THIS PART. IF YOU HAVE NO PROBLEMS AND DON'T HAVE TO BUG YOUR IN-          00029300
                        294 *   STRUCTOR ABOUT ANYTHING PLEASE CONTINUE TO PART TWO OF THIS SECTION        00029400
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

PAGE 15

```
                                                                      00000400
                                                                      00000500
                                                                      00000600
                                                                      00000700
                                                                      00000800
                                                                      00000900
                                                                      00001000
                                                                      00001100

                                                                      00001300

                                                                      00001500
                                                                      00001600
                                                                      00001700
                                                                      00001800
                                                                      00001900
                                                                      00002000

                                                                      00002200
                                                                      00002300
                                                                      00002400
                                                                      00002500
                                                                      00002600
                                                                      00002700

                                                                      00002900
                                                                      00003000
                                                                      00003100
                                                                      00003200
                                                                      00003300
                                                                      00003400
                                                                      00003500
                                                                      00003600
                                                                      00003700
                                                                      00003800
                                                                      00003900
                                                                      00004000
                                                                      00004100

                                                                      00004300
                                                                      00004400
                                                                      00004500
                                                                      00004600
                                                                      00004700
                                                                      00004800
```

```
LCC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69  6/05/70
                                   50 *          ---- ANSWERS----                                    CCCC50CC


                                   52 *  7.81    ..................................................... C0005200
                                   53 *          . ASUB1, EXMPL2, PRCGB, UTILITY AND $BLANKCOM.      . CCCC5300
                                   54 *          . I BET THE LAST TWO WERE A SURPRISE TO YOU. UTILITY IS A . 00005400
                                   55 *          . CONTROL SECTION WRITTEN FOR THIS COURSE TO ALLOW US TO . 00005500
                                   56 *          . PRINT THE DUMPS. $BLANKCOM IS THE NAME GIVEN TO A SPECIAL . C0005600
                                   57 *          . AREA THAT WE WILL DISCUSS LATER. (IT'S SIMILIAR TO A CON- . 00005700
                                   58 *          . TROL SECTION)                                     . CCCC5800
                                   59 *          ..................................................... C0005900


                                   61 *  7.82    ..................................................... 0CCC61C0
                                   62 *          .    01F0F4                                         . CCCC62C0
                                   63 *          . +     74                                          . CCCC6300
                                   64 *          .   --------                                        . 00006400
                                   65 *          .    01F168                                         . 00006500
                                   66 *          .                                                   . CCCC66CC
                                   67 *          ..................................................... CCC067C0


                                   69 *  7.83    ..................................................... 00006900
                                   70 *          .  ASUB1----0638A0                                  . 00007000
                                   71 *          .  EXMPL2---0638F0                                  . 00007100
                                   72 *          .  PRCGB----063908                                  . 00007200
                                   73 *          .  UTILITY--0639A8                                  . CCCC7300
                                   74 *          .  COMMON---063F48                                  . C00C7400
                                   75 *          ..................................................... 00007500


                                   77 *  7.84    ..................................................... 00007700
                                   78 *          .  21FA------- 2446                                 . C0007800
                                   7C *          ..................................................... CC0C7900
```

```
RRRRRRRRRRR    EEEEEEEEEEEE  LL            PPPPPPPPPPP     AAAAAAAAAA              CCCCCCCC     3333333333
RRRRRRRRRRRR   EEEEEEEEEEEE  LL            PPPPPPPPPPPP   AAAAAAAAAAAA            OOOOCCCCCC   333333333333
RR         RR  EE            LL            PP         PP  AA          AA        OO        OO  33        33
RR         RR  EE            LL            PP         PP  AA          AA        OO        CC              33
RR         RR  EE            LL            PP         PP  AA          AA        OO        OO              33
RRRRRRRRRRRR   EEEEEEEE      LL            PPPPPPPPPPPP   AAAAAAAAAAAA        CC        OO          3333
RRRRRRRRRRR    EEEEEEEE      LL            PPPPPPPPPPP    AAAAAAAAAAAA        OO        OO          3333
RR     RR      EE            LL            PP             AA          AA      CC        CC              33
RR      RR     EE            LL            PP             AA          AA      OO        OO              33
RR       RR    EE            LL            PP             AA          AA      OO        OO  33          33
RR        RR   EEEEEEEEEEEE  LLLLLLLLLLLL  PP             AA          AA       OOOOOOOOOO   333333333333
RR         RR  EEEEEEEEEEEE  LLLLLLLLLLLL  PP             AA          AA        OOOOOOOO     3333333333
```

```
         999999999
       99999999999
      99         99
      99         99
      99         99
      999999999999
      999999999999
                 99
                 99
      99         99
       99999999999
        9999999999
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                    3 *      THIS PROJECT WILL AID YOU IN LEARNING HOW MULTIPLE BASE          00000300
                    4 *      REGISTERS GET ASSIGNED AND LOADED. THE PROJECT CONSISTS OF       CCC00400
                    5 *      AN ASSEMLER LISTING, QUESTIONS AND A CORE DUMP.                  CC000500

                    7 *           NOW PLEASE PRCCEED TO THE NEXT PAGE WHICH CONTAINS          CCC00700
                    8 *           THE LISTING. IN THE COMMENTS PORTION OF THE                 00000800
                    9 *           LISTING YCU WILL FIND THE QUESTIONS. PLEASE ANSWER THE      CC000900
                   10 *           QUESTIONS AND THEN CHECK YOUR ANSWERS WITH THE              CC001000
                   11 *           ANSWER PAGE THAT FOLLOWS THE DUMP.                          CCCC1100
```

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                                F01FEB69  6/05/70

001000                              13 MULTBSE  START X'1000'              MULTIPLE BASE REGISTERS          C0001300
001000 0590                         14          BALR  9,0                                                  C0001400
001002                              15          USING HERE,9,10,11,12                                      00001500
001002 98AC 900A            0100C   16 HERE     LM    10,12,BASES                                          C0001600
001006 47FC 9016            01018   17          B     *+18                                                 0CCC1700
00100A 0000
00100C 00002002000C3002             18 BASES    DC    A(HERE+4096,HERE+8192)                               C0001800
001014 00004002                     19          DC    A(HERE+12288)                                        0C001900
001018 5850 9026            01028   20          L     5,FLDA                                               00002000
00101C D203 9026 A032 01028 02034   21          MVC   FLDA,FLDB                                            00002100
001022 47F0 A024            02026   22          B     SECOND                                               00C022C0
001026 0000
001028 00000001                     23 FLDA     DC    F'1'                                                 CC002300
002026                              24          ORG   *+4090                                               CCC02400
                                    25 **************************                                         CCC02500
002026 5860 A032            02034   26 SECCND   L     6,FLDB                                               00002600
00202A D203 A032 B03E 02034 03040   27          MVC   FLDB,FLDC       $$$$$$$$$$  QUESTION 8.01  $$$$$$$$$$ 00002700
002030 47FC B030            03032   28          B     THIRD           $ WHICH BASE REGISTER WILL CONTAIN   $ 00002800
002034 00000064                     29 FLDB     DC    F'100'          $ THE VALUE OF HERE?                 $ 00C02900
003032                              30          ORG   *+4090          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0003000
                                    31 **************************    $                                    $ 00003100
003032 587C B03E            03040   32 THIRD    L     7,FLDC          $                                    $ C0003200
003036 D203 B03E CC3C 03040 0403E   33          MVC   FLDC,FLDD       $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ C0003300
00303C 47F0 C040            04C42   34          B     FCURTH                                               CCC03400
003040 00001000                     35 FLDC     DC    F'4096'                                              00003500
00403E                              36          ORG   *+4090                                               CC003600
                                    37 **************************                                         C0003700
00403E C4D6D5C5                     38 FLDD     DC    C'DONE'                                              00003800
004042 0000                         39 FOURTH   DC    H'0'                                                 00003900
                                    40 *                              $$$$$$$$$$  QUESTION 8.02  $$$$$$$$$$ 0CC04000
                                    41 *                              $ WHAT STATEMENT WAS THE FIRST ONE   $ 000041C0
                                    42 *                              $ TO HAVE A SYMBOL DEFINED WITH A    $ 00004200
                                    43 *                              $ VALUE OF HERE+12288?               $ 00004300
                                    44 *                              $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC44C0
                                    45 *                              $                                    $ C0C04500
                                    46 *                              $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00CC4600
                                    47 *                                                                   00004700
                                    48 *                                                                   0CC04800
                                    49 *                              $$$$$$$$$$  QUESTION 8.03  $$$$$$$$$$ C0004900
                                    50 *                              $ REFER TO THE DUMP AND LIST THE CON-$ CC005000
                                    51 *                              $ TENTS OF REGISTERS 9,10,11 AND 12. $ CCCC5100
                                    52 *                              $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CCCC5200
                                    53 *                              $                                    $ 00005300
                                    54 *                              $                                    $ 00005400
                                    55 *                              $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00005500
                                    56 *                                                                   C0005600
                                    57 *                                                                   CCC057C0
                                    58 *                              $$$$$$$$$$  QUESTION 8.04  $$$$$$$$$$ CCCC5800
                                    59 *                              $ DID THIS PROGRAM EXECUTE CORRECTLY $ 000059C0
                                    60 *                              $ THROUGH THE LAST BRANCH INSTRUC-   $ 00006000
                                    61 *                              $ TION? HOW CAN YOU TELL BY LOOKING  $ 00006100
                                    62 *                              $ AT THE CONTENTS OF THE REGISTERS?  $ CC006200
                                    63 *     ANSWERS ARE ON THE PAGE  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00006300
                                    64 *     FOLLOWING THE DUMP.      $                                    $ 00006400
                                    65 *                              $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 0CC06500
```

```
 F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
           VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000                ENTRY UTILITY

                                                    MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN   LENGTH                 NAME    LOCATION     NAME    LOCATION     NAME    LOCATION     NAME    LOCATION

  MULTBSE         00     3044
  UTILITY       3048      5A0
                                            PRINT        30AA    PCHKRETN     3306

  ENTRY ADDRESS       3048
  TOTAL LENGTH        35E8

****GO          DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  43.121000 00000000   C2.A8C000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 000637F8 00C638CC 00063800    00063770 00000001 00000064 00001000
REGS 8-15    00063778 6F058822 00C59822 0005A822    0005B822 00063780 00002170 00C58820

000000    00000000 0000019C F0F0F1C9 5006ED90    00058820 00002A18 01040080 8003AFFE  *........001I.....................*
000020    0004000A 700C240C FF250001 6F05B864    0000FF00 00000000 FE040133 800011D6  *.....................................C*
000040    00008710 0C0000F1 0000167C 0C002120    400F5AC0 00071248 00040000 000002C0  *.......1........ ...............*
000060    00040000 00000366 00C4CCCC CC00030A    00000000 0000CA68 00040000 00000226  *................................*

058820    059098AC 900A47F0 90160C00 0CC59822    0005A822 0005B822 58509026 D2039026  *.......0.....................K...*
058840    A03247F0 A0240000 00000064 45E0914C    47FC9322 41F08060 45E0914C 926BB003  *...0.............0...0.........*
058860    47F091D8 41FC8068 45E0914C 47F091D4    D503954E 95624780 9434D603 95529552  *.0.Q.0.......0.MN.........C.....*
058880    47809434 410C00B0 58109552 0ACAD70B    954E954E 58909536 07FE5010 954695FF  *.............P..................*
0588A0    D0024770 94644110 958341FC 0C12956B    10004780 94F24111 000146F0 94544110  *............0.........2.....0....*
0588C0    958341F0 9572D505 10C09562 41110001    4770946C 18B11B1F 1BFF4910 954A47B0  *...0..N.....................*
0588E0    94A04210 95734110 95720A23 91C19561    471094C6 58109546 07FE41F0 95765810  *.....................F.......0....*
058900    954E1B1F 96019561 95FFD002 478094BE    41101004 47F09488 41101002 47F09488  *.....................0.......0..*
058920    5810954E 95FFD002 477094D6 C6100610    18B144B0 951441B0 B00D42B0 9573D209  *...........0...................K.*
058940    95769562 92009561 47F0948C D2499583    100095F4 957B4770 946458F0 001058F0  *.........0..K......4.......0...0*
058960    F03C9104 FC89471C 948C47FC 9464D200    95801000 00060358 0005CE00 0005CDF0  *0...0......0..K................0*
058980    0005D4E4 0005D528 0005D58E CC05D53C    0005C9AA 0005DCF8 580091DA 1B114510  *..MU..N...N...N...I....8........*
0589A0    90600A0A 004F0000 00000000 0CCC0000    00000000 0105DC2C FFFFFF00 40404040  *.....................................    *
0589C0    40404040 4040E2E8 E202807C CC25CC00    4C4C4040 40404040 40404040 40404040  *       SYS.......                   *
0589E0    40404040 404C4040 40404040 40404040    40404040 40404040 40404040 40404040  *                                    *
058A00    40404040 404C4040 4C404040 40404040    404C4040 40404040 40404040 40404040  *                                    *
058A20    40404040 404C404C 404C4C4C 4C404000    D605D004 D0044780 911447F0 90CAD605  *                  .0.........0..0.*
058A40    D004D004 47F09084 D205B000 DC0447F0    90A492F0 D005D705 D004D004 9110D002  *.....0..K.......0...0..P.........*
058A60    47E093EE 47FC93E6 120C4780 95FC47F0    930091C2 18D35810 0005DD7C 00080017  *.....0.W........0...B.L.........*
058A80    0005DD7D 0CC8000A 0005DD7E 0CC800C0    0005DD7F 00060000 0005DD7B 00060000  *................................*
058AA0    0005DD8C 000F0016 0305DD81 0C000C00    0105DD85 00040000 0105DD87 00040000  *................................*
058AC0    0505DD75 001C000C 05C5DD68 00100000    0105DD6E 00170000 0205DD70 00170000  *................................*
058AE0    0105DD73 0017C0CC D7D9C9E5 C1E3D5D3    D5E2D3E2 D3E2C3D9 E3C3C8C9 D4D9C4C1  *.........PRIVATNLNSLSLSCRTCHIMRDA*
C58B00    6BC9C5C6 F2F3F3F3 F403471C 913E95FF    059047F0 9010C9C5 C6E7E3F0 F0C40315  *.IEF23334..........C..IEFXTOOD..*
058B20    19685880 C0201288 4770904 41CC00F6    45109022 0A0A1871 18279240 20004100  *................W.......... ....*
058B40    0C0E0600 45E09AAC 92002000 41000CD8    060045E0 9AAC58D0 C03441DD 000058B0  *................Q...............*
058B60    C02450B0 70AC58BB 0C0041BB 0CC050BC    70B441BB 001858AB 0000D207 70C8C024  *.....................K..H...*
058B80    12AA4780 9AFA5880 C0201288 4780913C    D501C02E 9C114780 9B02D501 C02E9C13  *.....................N.......N.....*
058BA0    47809B02 18B841BB 00C0D203 C0249B66    41FC0160 50F0C028 45F0994C D501C028  *..........K......C...0......N...*
058BC0    C02A4770 9B0A58F0 C03C5CFC 7CD841FF    00B050F0 7094D403 70A870A8 478090F8  *.......0...0.Q.....C..M........8*
058BE0    9108B001 4780962E 58F07CA8 5E60F010    45F0916E 18E65860 B01045F0 916E19E6  *.........0....0..0...W.....0...W*
058C00    477C962E D70370A8 70A850BC 7CCC9114    B00F4770 97304100 00019160 B001477C  *....P.........................Q. *
058C20    979A9108 B0014780 944C9180 BCCF4770    965A5830 B00C45E0 99BE58A0 70D89140  *.....................Q.  *
058C40    B010478C 916241BB 000447F0 912C9601    701345F0 99D81B00 5000C020 D501C02E  *.........0........Q......N...*
058C60    9C114780 9B02D501 C02E9C13 47809B02    47FC9098 41107078 5860B010 41F0918E  *......N..........C...........0..*
058C80    89600008 88600014 1266C78F C66C8960    00015A60 C0044866 00005460 9B7207FF  *................................*
058CA0    45E09926 91406006 586C7C90 47109AE6    50607078 96807078 582070CC 180A18F6  *.....  .........W..............6*
058CC0    91FF6002 471091BA 4BF09B9C D2C57000    A076D205 A076F01C 17FF45E0 98EE9180  *.........C..K.....K...C.........*
058CE0    200F478C 92000A20 45E09910 89F00018    12FF4770 9B12D203 C02C7098 41F000B0  *.............0........K.......0..*
058D00    50F0C028 D203C024 9B7645E0 994C47F0    92220A20 45E09910 D205A076 700089F0  *.0..K...........0........K......0*
058D20    001812FF 4770AAF4 45EC9926 94DF60CC    58607090 41F0928C 180B5B00 70CC078F  *.......4.............0...........*
058D40    88000002 58B070CC 1B114310 BCC04B10    989ED203 7074B010 06104410 9C1A4111  *.....................K...........*
058D60    00011AB1 D203B010 70741BB1 46CC9240    07FFD203 98BA70DC D2039B8E 709C41F0  *....K...........  ..K.....K.....0*
058D80    00045810 C03441D1 00004111 CC9C42F0    1008D203 10209B62 58F09B52 07FF45E0  *.......J........0..K......C.....*
058DA0    99D89608 600395FF 60C2477C 98BC9110    60224770 92B09124 60034770 92B09608  *.Q.............................*
058DC0    602258A0 70D89120 B0014710 93D691C8    B0014780 944295FF 60024770 98DAD505  *.....Q.......0.................N.*
058DE0    601CA076 478C9442 9500AC75 478093D6    1BFF50F0 70DC9505 A07547DC 92F441F0  *...............0...C.........4.0*
058E00    000547FC 92F843FC A07543C0 AC751B0F    41E0A07C 95FF6002 477098E4 D505601C  *....0.8.0.....................UN...*
058E20    E0004780 938A41EE 000646F0 93C21200    478093D6 42009BB6 581070DC 12114770  *.............C........C.........*
058E40    935C4100 00BC5000 C028D203 C0249B66    45E0994C D501C028 C02A4770 9B0AD203  *..........K.........N.........K.*
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058E60  7CDCC030 D2037C9C AC9547FC 9362D203   7C9C1C00 92007C9F 45E09260 58F07CDC  *....K......C..K................*
058E80  41EE0004 1BCC4300 9BB641F0 000F190F   47209384 18F01B0F 47F09302 D705A076  *..........O.........O...O..P...*
058EA0  E000D705 E000A076 D7C5AC76 ECOC5800   7CDC1200 478C9424 D2039B8A 70DCD203  *..P.....P.............K.....K.*
058EC0  9B8E709C 41F00003 45E0927C D203C02C   70DCD203 C024CB76 41F000B0 50F0C028  *.....O......K.....K.....C...O..*
058EE0  45E0994C 47F09424 9102AC57 478C94CA   95FF6002 477098D2 91046022 4770940A  *.....O.................K........*
058F00  4150003B 5050C028 58509B3A D2075008   BC045050 C02458F0 9B4A05EF 95FF6002  *............K..........O........*
058F20  477098C8 D205A076 601C9500 AC754770   94249201 A0755830 B00C41F0 000345E0  *...HK.....................O....*
058F40  99C25860 B01C8960 00141266 47709442   9604B013 5860B010 41660000 1B009101  *.B.....................O.....*
058F60  B00F4780 95FC1200 47809466 58B07CCC   5830B00C 45E099BE 58A070D8 58E0C010  *.....O.....................Q....*
058F80  5830F018 45E0998C 58B07C94 92009C10   581080AC 50109B92 1B114310 80844120  *................................*
058FA0  00035830 80A8D52B A00C800C 478C94DC   4188002C 06204610 949447FC 94D0D507  *......N.....................O..N.*
058FC0  B0049BA2 4780952E D507B004 9BAA4780   9F2E4180 9BB84910 9B9A4740 94D047F0  *........N..................... ...O*
058FE0  94A25880 7C945830 9B9247F0 94724188   0C2C4910 9B9A4780 94F04720 94FA47F0  *............C.............O.....O*
059000  9500D22B 9BB88000 47F09500 D2579BB8   80009101 9C104710 95185010 9B9645E0  *..K......O..K..................*
059020  998C5810 9B969201 9C1C583C 70941788   43829C15 1A83D502 B00C8004 477094AC  *.....................N..........*
059040  D2008003 B0024130 00CB94CC 7C125086   707C1744 4340B002 89400002 1A4B5860  *K..................... ... .....*
059060  B01C45F0 916E4780 95D64630 95CE5810   C03441D1 00004111 00909201 100858E0  *...O.....D.........J...........*
059080  C01CD20C 100FE005 D2031020 9B5E58F0   9B5205EF 12FFD203 C02470C8 58F09B56  *...K.....K......O......K....H.O..*
0590A0  077F583C 9B8A9500 7C124780 95A85880   7C945030 815447F0 95B494FF 70125880  *................................O........*
0590C0  7C7C5030 803418E3 583C7CBC 5CE070BC   41F00003 45E09990 41300028 58807094  *.......T.........O.............*
0590E0  50608000 4188C004 41BB0C04 15B44770   954C5830 70BC41F0 000345E0 99905880  *.....................O..........*
059100  70CC9120 B0014780 962E58AC 7CD8D202   C02DA0A3 5810C02C 12114780 962ED202  *..............QK..............K.*
059120  70A110A3 D202A0A3 70A14110 CCBC5010   C028D203 C0249B76 45E0994C 47F095FC  *....K..............K.........O..*
059140  58BC70CC 947F70E5 1B445040 CC2C4040   9BB64340 B0001AB4 4340B000 12444770  *.......V... ..  ... ..... .....*
059160  90C441EC 000058F0 9B4E07FF D203C024   9B6641F0 00B050F0 C02845E0 994CD501  *.D.....C....K......O...O......N.*
059180  C028C02A 477C9B0A D2039B8A 7CD858F0   B00CD203 7098C030 41E096B2 5810C034  *........K....Q.O..K.............*
0591A0  54F09B6A 41D10000 4111CC9C 50F09B8E   D2031020 9B6241F0 000442F0 100858F0  *.O...J.......C..K......C...O...O*
0591C0  9B5207FF 58809B8A D2039B8A 7C9858F0   802445E0 968AD203 9B827098 D2039B7A  *........K......O......K.....K...*
0591E0  7CD858F0 802043F0 B00F50FC B00C54F0   986A50F0 9B7E5880 709858F0 802054F0  *.Q.O...O...O...O...C.......O...O*
059200  9B6A50FC 9B86581C C03441D1 00C04111   C090D203 10209B5A 41F00004 42F01008  *...O.......J......K......C...C..*
059220  58F09B52 05EF58A0 70D8D202 A0A87099   41F09162 1B554350 B0031255 078F47F0  *.O.......QK......O.............O*
059240  98681B55 4350B003 5840B010 89400008   88400014 12444770 91041B44 4340B000  *.......... ... ... ...........  ..*
059260  4B409BA0 88400002 181B58B0 7C9441BB   00181B22 47F0976C 4320B000 1AB24650  *.  ... ..............O..........*
059280  97661B5B 18B5583C B01C8930 00088830   000818B1 5030B010 41550004 41110004  *................................*
0592A0  46409772 58B070CC 47F09104 9120B001   47E097C6 58A070D8 D20270F1 A0A35830  *.  .......C.........F...QK.....*
0592C0  B00C45E0 998E58A0 70D8D202 ACA37CE1   41F09898 47F09868 5810C034 41D10000  *.........QK......O...O.......J..*
0592E0  41110090 50B070CC D2031020 9B6241E0   000442E0 1008D203 70A470D8 D203C024  *........K.............K....QK...*
059300  9B6641F0 00BC50FC C02847F0 981A45E0   994CD501 C028C02A 47709B0A 58A070A4  *...C...C...O......N............*
059320  D202A0A3 C031D2C3 70A4C030 D2039B8A   70A45850 B00C5450 9B6A5050 9B8E9120  *K.....K.....K..................*
059340  B0014710 98385050 7CCC58F0 9B525810   C0344111 009005EF 1B334330 B0001233  *..........O....................*
059360  4780985C 1AB39120 B001477C 97FC58B0   70CC58A0 70D847F0 912C1B55 4350B003  *.....................Q.O........*
059380  181B58B0 7CB441BB 001847FC 98841B22   4320B000 1AB24650 987C5850 B0105450  *..........O....................*
0593A0  9B6E18B1 5050B010 07FF585C 7C804B50   9B9E5050 70B09400 70785860 707847F0  *.............................O*
0593C0  928C9110 60024770 92B09124 6C034770   92B09608 600247F0 92B0D205 A0766004  *.........................O..K.....*
0593E0  47F09418 91046C02 47F093EA D5056004   A07647F0 92D2D505 6004E000 47F09310  *.O.......O..N......C.KN......O..*
059400  9120A034 478C99CE D2C19BB2 AC66D201   9BB4A05A D701A066 A066D701 A05AA05A  *........K.....K.....P.....P.....*
059420  07FE9120 A0344780 9924D201 AC669BB2   D201A05A 9BB407FE 50607090 95FF6002  *..........K.....K..............*
059440  078E50E0 70881BEE 48E06C0C 8BE00004   41EE0038 13EE1A6E 58E07088 07FE58D0  *................................*
059460  C03441DD 00009001 705C480C C0261200   4780997C 4800C02A 4510996A 0A0AD201  *.........................K.*
059480  C028C02A 5010C030 98017C5C 07FE4800   C02A5810 C02C0A0A 9801705C 07FE41F0  *.............................0*
0594A0  00045430 9B6A5030 70BC5030 9B8ED203   9B8A7094 5810C034 41D10000 41110090  *..............K..........J.....*
0594C0  42F01008 D2031020 9B6258F0 9B5207FF   41F00004 54309B6A 503070C0 50309B8E  *.O..K......O.....O.............*
0594E0  D2039B8A 70D847FC 99A2900F 7C141B55   1B449101 70134710 9A104350 B00245E0  *K....Q.O.......................*
C59500  9A5895FF 60024770 9A009120 6C124780   9A0445E0 9A7E41B0 B0044650 99EC47F0  *.............................C*
059520  9A94435C B000188B 9500BC00 47809A94   9108B001 47109A50 4340B002 12444780  *.......................... .....*
059540  9A5045E0 9A5895FF 60024770 9A449120   60124780 9A4845E0 9A7E41B0 B0044640  *.............................. *
059560  9A3018B8 1AB547FC 9A105860 B0108960   00088860 00141266 47809A48 06608960  *.......O.....................O.....*
059580  00015A60 C0044866 C00C546C 9B7207FE   95FF6002 47709A9E 43106038 41110001  *................................*
0595A0  42106038 07FE9200 7013980F 7C14C7FE   4310600F 41110001 4210600F 07FE1B11  *................................*
0595C0  8C000008 12114780 9AC68810 CC180610   44109ADA 41221001 12004780 9AD84110  *.........F.....................Q..*
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0595EC  00FF4410 9ADA4122 10C107FE D2C020C1  2C0058E0 9B4607FF 58F09B3E 58909B42  *.............K.......0.....C.......*
059600  41990002 07FF5850 9B4207F5 58F09B2A  47F09B20 58F09B2E 47F09B20 58F09B32  *...........5.0...0...0...0...0...0..*
059620  47FC9B20 585C9B36 585C9B4E 41990002  07F558C0 9B4E4199 000207FF 0005F02A  *.0.............5...........0.*
059640  0C05F108 0C05F098 0005FC88 00061116  0005FCEA 0005F808 0005C9A8 00060378  *..1...0...0...........8...I.....*
059660  0005ED38 00060358 0005F9B8 0205E90C  1005E91C 0105E91C 000500FF FFFFFF00  *..........Z...Z...Z...Z.........*
059680  FFFFF000 0000FFFF 0005C00C 0ACA5855  00041871 41870000 06304430 00063CD0  *..0.........................*
0596AC  01150F00 00000000 0000C001 00020018  0C140010 D7C7D47E 5C4BC4C4 D1D6C2D3  *.................PGM...DDJOBL*
0596C0  C9C24040 007FC000 00000A23 F8180004  D7031000 10001BBB 41000001 0A0158A8  *IB  .............P.............*
0596E0  0000D505 91F6ACC0 478C912E D5C391FC  A0004780 913ED504 9200A000 47809136  *..N..6......N.........N.........*
059700  47F090F2 41BC00C4 47F09142 41B00008  47F09142 9610C00C 41000006 181A0A0A  *.0.2.....C.......0.............*
059720  58180103 08010AC0 7C38CC0C D2C0B010  B0144118 00000A0A 059041F0 030150F0  *............K..............0...0*
059740  C02C58FC 900E07FF 000606F8 2A0C00F9  90ECD00C C59047F0 9014CCCC C9C5C6E2  *...0.......8...9.......0....IEFS*
059760  C4F0F9F5 11011966 CCCC95D1 CC244780  91749110 C00C4710 91785810 91F21B33  *D095.......J.................2..*
059780  43310000 58510000 18034510 9C380A0A  18710630 443091EA 41670000 41330001  *.............................*
0597A0  89300018 1663582C C01C5830 CC14D207  700C2008 D2077015 30345840 C028D207  *..............K.....K..... ..K.*
0597C0  7C1E4004 1817CA23 18C688C0 0C181816  CA0A1B00 43004000 41240000 1A2047F0  *.. ..................... .....0*
0597E0  90904144 0004410C 40101520 47DC916C  91204010 471090A6 47F090BC 585091F2  *........ ......... ......0.....2*
C59800  1B334335 00041803 4510909B CA0A5855  00041871 41870000 06304430 91EA4133  *.............................*
059820  00018930 00181683 41000004 451C9CDA  CA0A5018 00044100 00064510 90E80A0A  *.............................Y..*
059840  50180000 92065860 A032D203 AC32B03E  47F0B03C 00001000 41000001 0A0158A8  *..........K......0.............*
059860  C000D505 91F6A000 4780912E D50391FC  A0004780 913ED504 9200A000 47809136  *..N..6......N.........N.........*
059880  47F090F2 41BC00C4 47F09142 41B00008  47F09142 9610C00C 41000006 181A0A0A  *.0.2.....0.......0.............*
0598A0  58180004 41000004 0A0A1B00 16C88800  00184118 00000A0A 12BB4770 91E047F0  *.............................0*
0598C0  91789610 C00C47FC 91789620 CCCC5870  C01CD703 70087008 41109206 0A304100  *.......0.........P.............*
0598E0  0008451C 91900A0A 41870008 5C81C000  5880C000 41008018 50010004 18619680  *.............................*
059900  1004410C 00011311 0A011BBB 58A60004  9140A000 478091CA 41B00004 47F091D2  *................. ..........0.K*
059920  58A6000C 94BFA000 41109206 0A381816  41000008 0A0A18FB 980CD014 47FFE000  *.............................*
059940  D2007000 500C00C0 0005EBF8 C3C1D5C3  C5D3E6C1 C9E3D5D6 E2C5D7F0 FF024000  *K..........8CANCELWAITNOSEP0.. .*
059960  0005E8E8 0005E8FC E2E8F2C9 C5C6E2C4  D8F5D20D 9000900E 3D05EC0C 3605EC4C  *...Y...0SYSIEFSDQ5K.............*
059980  3A05EC84 3A05ECC0 3A05ECFA 0C3D0000  C9C5C6F2 F3F9C940 41000006 5000C02C  *................IEF239I ........*
0599A0  4003C02F 92E5C023 0740189F 4B9CF85A  410040E6 C1C9E3C9 D5C740C6 D6D940C1  * ....V... ....8... WAITING FOR A*
0599C0  D3D3D6C3 C1E3C9D6 D5ACC024 06000000  0C000000 002E0000 C9C5C6F2 F3F8C140  *LLOCATION..............IEF238A *
0599E0  D9C5D7D3 E8407DC3 C1D5C3C5 D37D6B40  7DE6C1C9 E37D6B40 D6D9407D D5D6E2C5  *REPLY .CANCEL.. .WAIT.. OR .NOSE*
059A00  D77DC024 0C3AC00C C9C5C6F3 F8F8C940  4B4C97FE 88400002 4B409800 9120C00C  *P.......IEF388I . ... ... ......*
059A20  474B90FC 9140C00C 471C9CE6 C1C9E3C9  D5C740C6 D6D940C4 C5E5C9C3 C5E2B004  *..... .....WAITING FOR DEVICES..*
059A40  003A0000 C9C5C6F3 F8F9C940 4ABC8020  462090BA 4BBFC00C 58B0989E 474B9110  *....IEF389I .....................*
059A60  58B0989E D503C0E2 C5D74CD9 C5D8E4C5  E2E340C9 C7D5D6D9 C5C4003A 0000C9C5  *....N..SEP REQUEST IGNCRED....IE*
059A80  C6F2F3F5 C94092E2 C03145A0 95084B03  C02C9862 4780944B D500B000 B00E4740  *F235I .S.............N...... *
059AA0  91E6C1C9 E3C9D5C7 40C6D6D9 40E5D6D3  E4D4C5E2 9400984A 059047F0 900CC9C5  *.WAITING FOR VOLUMES.......0..IE*
059AC0  C6E7E3F0 F0F258BC 70B441BB C01858A0  7CAC58AA 000441AA 00004BA0 9A6450A0  *FXT002.......................*
059AE0  70B01B11 501070B8 1B111B22 4320B002  4310B000 D507B004 70544770 904850B0  *.....................N.........*
059B00  7CCC1861 12224780 909C4B10 9A668810  00021512 4780909C 4310B000 1A1B8920  *.............................*
059B20  00024122 0010422C B0001A2B 18311B32  58507088 1A535050 70B85800 70B01B06  *.............................*
059B40  5C0070B0 41A000FF 15A047C0 9CB01830  063047F0 90B45800 70B01B06 500070B0  *.................0...........*
059B60  47F090CA D2002000 10004130 00FF4430  90AA4111 01004122 01004133 00011B03  *.0..K.......................*
059B80  4770908A 1B114310 B0001AB1 4310B000  12114770 902ED203 70AC70C8 582070B8  *.....................K....H....*
059BA0  12224780 917C5830 70AC5843 C0005A43  00041824 41BB0004 1B2B5020 70B8182B  *.............................*
059BC0  502070AC 502070C8 D2072000 3CCC4144  00081B55 8C400003 89400003 12554780  *.......HK.......... ... ......*
059BE0  912C4144 00C84122 000C1B33 8C2CC003  89200003 12334780 91444122 00081B42  *.............................*
059C00  47CC9170 18321824 58407CAC 58540004  1B525054 00045810 9A869013 C02450EC  *......... ..................*
059C20  708045E0 990E58E0 70805830 7CB81233  47809194 58B070B4 41BB0018 1B444340  *.............................. *
059C40  B0001244 47809194 1AB447F0 918458EE  99FA07FF D207C02C 9A9AD207 C02470C8  *.............0........K.....K....H*
059C60  18174100 0CE6CACA 58FC99DA 07FF58B0  70B441BB 00181B44 4340B000 12444780  *.....W...O.......... ......*
059C80  91DA9108 B0014780 91D494F7 BCC11AB4  47F091BE 58B070B4 41BB0018 58A070D8  *.........M.7.....0.............Q*
059CA0  1B444340 B0001244 478092F6 D20C70D0  B00FD200 70C4B001 9400B00F 1A4B4B40  *... .......WK.....K..D..... *
059CC0  9A669400 7C0D50B0 70CC5860 B01C45F0  99804780 92D09500 700D4770 92B49140  *..............0.............. *
059CE0  7CD04770 92B49104 70C44780 92B495FF  60024770 925C9180 60124780 925C9180  *.........D.....................*
059D00  60234710 92B4911C 70D0477C 92B491FF  601C4780 92B496FF 700D9504 B0134780  *.............................*
059D20  927A5850 B01C8950 00148850 0C141255  47709284 95FF6002 47709286 91A06012  *.............................*
059D40  478092B4 58E070CC 5830E00C 45E0994E  95FF6002 477098DE D205A076 601C9201  *.......................K.......*
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059D60  AC75583C 70C041F0 000345EC 995255B0   70CC4780 92CC95FF 60024770 92D09120  *.......0.........................*
059D80  60124710 92D05660 9A825060 B01041BB   000415B4 47709210 4AB09A66 47F091E6  *.............................0.W*
059DA0  D203C024 70B445E0 941058A0 70D84100   00E61817 0A0A12AA 4780931A D203C02C  *K............Q...w..........K...*
059DC0  70D841F0 016050F0 C028D203 CC249A86   45E0990E D203C024 70C858F0 C0144840  *.Q.0...0..K.........K....H.0... *
059DE0  F03E1244 47809348 5810F024 4B109A68   D203F024 10005440 9A7E4144 00041804  *0.........0.....K.0.... ........*
059E00  0A0A58F0 99F207FF 88F00C19 C6FCC6F0   485F9AAA 47F09366 41500300 47F09378  *...0.2...0...C.0.....0.......0..*
059E20  41BB0010 50BCC030 58307CCC D2C77054   30045050 C02C41E0 93CE9001 705C9200  *............K...................*
059E40  CC3C5810 70D81211 478093C8 581C10A8   88100008 12114780 93A64100 00B00A0A  *.....Q.....H...................*
059E60  581070D8 410C0160 12114780 93C8D202   C03110A3 0A0A4100 00B05810 C03047F0  *...Q.........HK.............0*
059E80  93AE9801 705C07FE 58E070B4 41EE0018   1B4419BE 47D09402 1B114310 E0001A1E  *.....................8.7... ...U.C.QK...*
059EA0  19B147D0 940291C8 E0C1478C 93F894F7   E0014340 E0001AE4 47F093D8 D2079A9A  *.....0......K.........N...... *
059EC0  C02C41E0 000447FC 90CC900F 7014D203   7C6CC024 58300010 D503C000 9A764740  *....... ..........C............*
059EE0  943C5833 00949140 3020478C 943896FF   700E47F0 944C5833 003C9101 308C4780  *.....K..K.....K.....H.0... *
059F00  944C96FF 7C0E58B0 706C41BB CC1894CC   7C0F5860 706C4150 002D5050 C0285850  *................................*
059F20  99CED207 50136000 D207501C 6008D207   50256010 453099A0 1B444340 B0001244  *..K.....K.....K.....8.7... ...U.C.QK...*
059F40  4780950C D402B011 B0114770 949A1AB4   47F0947E 1A4B4B40 9A665850 99D2D207  *....M.....0..... .....KK.*
059F60  5008B004 D20270D5 B0115850 99D24160   00195060 C0285860 70D445E0 988ED204  *....K..N.....K.........M....K.*
059F80  50147008 453099AC 91C86012 4780969A   95FF700E 4770969A 9180600C 4770969A  *................................*
059FA0  45E098CE 45E0952A 41BB0004 154B4770   94AA4AB0 9A6647F0 947E9400 700E9500  *.........................C......*
059FC0  9A6B4780 9524954A 9A6B47B0 952496FF   700F4830 9A6A45E0 952A9200 9A6B980F  *................................*
059FE0  7C1407FE 90127064 50E07C70 95FF7CCF   478C957F 9500700F 478095B6 58509906  *.............................C*
05A000  954A9A6B 47B095AE 4A509A6A 41550001   4130001A 4A309A6A 40309A6A D2075008  *.......................... ...K...*
05A020  059098AC 900A47FC 90160000 00C02002   00003002 00004002 58509026 D2039026  *.......0.............. .....K...*
05A040  A03247F0 AC240000 0CCCCC01 45E0914C   47F09322 41F08060 45E0914C 926BB003  *...0.............C...C..........*
05A060  47F091D8 41F08068 45E0914C 47FC91D4   D503954E 95624780 9434D603 95529552  *.0.Q.0.......0.MN.........C.....*
05A080  47809434 410C00B0 58109552 CACAD70B   954E954E 58909536 07FE5010 954695FF  *.............P.................*
05A0A0  D0024770 9464411C 958341F0 CC12956B   10004780 94F24111 000146F0 94544110  *............0.........2.....0....*
05A0C0  958341F0 9572D5C5 10C09562 41110001   477C946C 18B11B1F 1BFF4910 954A47B0  *...0..N.....................*
05A0E0  94A04210 9573411C 95720A23 91C19561   471094C6 58109546 07FE41F0 95765810  *.....................F.......0....*
05A100  954E1B1F 96C19561 95FFD002 478094BE   41101004 47F09488 41101002 47F09488  *.....................0.......0..*
05A120  5810954E 95FFD002 477094D6 C61C0610   18B144B0 951441B0 B00D42B0 9573D209  *.....................D.............K.*
05A140  95769562 92009561 47F0948C D2499583   100095F4 95784770 946458F0 001058F0  *.........0..K......4.......C...0*
05A160  F03C9104 F0894710 948C47F0 9464D200   95801000 00060358 0005CE00 0005CDF0  *0...0.......0..K...............0*
05A180  0005D4E4 0005D528 0005D58E CC05D53C   0005C9AA 0005DCF8 580091DA 1B114510  *..MU..N...N...N...I....8........*
05A1A0  90600A0A 004F000C CCC000C0 CCC00000   0C000000 0105DC2C FFFFFF00 40404040  *.............................  *
05A1C0  40404040 404CE2E8 E2C28C79 CC250000   40404040 40404040 40404040 40404040  *       SYS.......                *
05A1E0  404C404C 40404040 4040404C 4C404040   40404040 40404040 40404040 40404040  *                                 *
05A200  4C404040 4040404C 4040404C 4C4C4040   40404040 40404040 40404040 40404040  *                                 *
05A220  4C4C4040 404C404C 40404040 4C404000   D605D004 D0044780 911447F0 90CAD605  *                  .O..........O..O.*
05A240  D004D004 47FC9084 D205B000 DC0447FC   90A492F0 D005D705 D004D004 9110D002  *.....O..K......O...O..P.........*
05A260  47E093EE 47F093E6 120047B0 95FC47F0   930091C2 18D35810 0005DD7C 00080017  *.....C.W.......O...B.L..........*
05A280  0005DD7D 0CC8000A 0CC5DD7E CCC80000   0005DD7F 00060000 C005DD7B 00060000  *................................*
05A2A0  0005DD8C 000F0016 0305DD81 CCCC0000   0105DD85 00040000 0105DD87 00040000  *................................*
05A2C0  0505DD75 0010C000 0505DD68 CC1C0000   0105DD6E 00170000 0205DD70 C0170000  *................................*
05A2E0  0105DD73 0C17C000 D7D9C9E5 C1E3D5D3   D5E2D3E2 D3E2C3D9 E3C3C8C9 D4D9C4C1  *........PRIVATNLNSLSLSCRTCHIMRDA*
05A300  6BC9C5C6 F2F3F3F3 F4034710 913E95FF   C59047F0 9010C9C5 C6E7E3F0 F0C40315  *.IEF23334.........0..IEFXT00D..*
05A320  19685880 C0201288 47709044 410C00E6   45109022 0A0A1871 18279240 20004100  *.............W.......... ....*
05A340  000E0600 45E095AC 92CC2CC0 410000D8   060C45E0 9AAC58D0 C03441DC 000058B0  *.............Q...............*
05A360  C02450B0 70AC58BB 00004158 CCCC50B0   70B4415B 001858AB 0000D207 70C8C024  *.........................K..H..*
05A380  12AA4780 9AFA5880 C0201288 47BC913C   D501C02E 9C114780 9B02D501 C02E9C13  *.....................N.........N.....*
05A3A0  47809B02 18B841BB 000CD203 CC249B66   41F00160 50F0C028 45E0994C D501C028  *.........K......0...O.......N...*
05A3C0  C02A477C 9B0A58F0 C03050F0 7CD841FF   00B050F0 7094D403 70A870A8 478090F8  *.......C...0.Q.....0..M........8*
05A3E0  9108B001 478C962E 58F07CA8 5860F010   45F0916F 18E65860 B01045F0 916E19E6  *.........C....C..0...W.....0...W*
05A400  4770962E D7037CA8 7CA850B0 7CCC9114   B00F4770 97304100 00019160 B0014770  *....P.........................*
05A420  979A9108 B001478C 944C9180 B00F4770   965A5830 B00C45E0 99BE58A0 70D89140  *.....................Q.  *
05A440  B0104780 91624188 000447F0 912C9601   701345E0 99D81B00 5000C020 D501C02E  *..........0.........Q......N...*
05A460  9C114780 9B02D501 C02E9C13 478C9BC2   47F09098 41107078 5860B010 41F0918E  *......N.........0.........C..*
05A480  89600008 88600014 1266078F 06608960   00015A60 C0044866 00005460 9B7207FF  *................................*
05A4A0  45E09926 91406006 58607C90 47109AE6   50607078 96807078 582070CC 180A18F6  *..... .........W..............6*
05A4C0  91FF6002 4710918A 4BFC9B9C D2057000   A076D205 A076F01C 17FF45E0 98EE9180  *.........C..K.....K...O.........*
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05A4E0  200F4780 92000A20 45E09910 89FC0018   12FF4770 9B12D203 C02C7098 41F000B0  *.............C........K......0..*
05A500  5CF0C028 D203C024 9B7645F0 994C47F0   92220A20 45E09910 D205A076 700089F0  *.0..K..........0........K......0*
05A520  001812FF 477C9AF4 45E09926 94DF6CCC   58607090 41F0928C 180B5B00 70CC078F  *.......4............0..........*
05A540  88000002 58B070CC 1B114310 BC004B10   9B9ED203 7074B010 06104410 9C1A4111  *....................K.............*
05A560  00011AB1 D203B010 70741BB1 46009240   07FFD203 9B8A70CC C2039B8E 709C41F0  *....K.............. ..K.....K.....0*
05A580  00045810 C03441D1 00004111 CC9042F0   1C08D203 10209B62 58F09B52 07FF45E0  *.......J........0..K......0......*
05A5A0  99D89608 600395FF 6002477C 98B09110   60224770 92B09124 60034770 92B09608  *.Q.............................*
05A5C0  602258A0 70D89120 B0014710 93D69108   B0014780 944295FF 60024770 98DAD505  *.....Q.......0.................N.*
05A5E0  601CA076 47809442 9500A075 478093D6   1BFF50F0 70DC9505 A07547D0 92F441F0  *................0...0.........4.C*
05A600  000547FC 92F843F0 A0754300 AC751BCF   41E0A07C 95FF6002 477098E4 D505601C  *...0.8.0.....................UN...*
05A620  E0004780 938A41EF 00C646F0 93021200   478093D6 42009BB6 581070CC 12114770  *...........C........0...........*
05A640  935C4100 00BC5000 C028D203 CC249866   45E0994C D501C028 C02A4770 9B0AD203  *..........K.........N.........K.*
05A660  7CDCC030 D203709C A09547FC 9362D203   7C9C1000 9200709F 45E09260 58E070DC  *....K.......0..K................*
05A680  41EE0004 1B004300 9BB641F0 000F190F   47209384 18F01B0F 47F09302 D705A076  *...........0.........C...0..P...*
05A6A0  E000D705 E000A076 D705A076 EC0C5800   7CDC1200 47809424 D2039B8A 70DCD203  *..P.....P.....................K.....K.*
05A6C0  9B8E709C 41F00003 45E09270 D203C02C   7CDCD203 C0249B76 41F000B0 50F0C028  *.....0......K.....K......0...0..*
05A6E0  45E0994C 47F09424 9102A057 4780940A   95FF6002 477098D2 91046022 4770940A  *.....0.................K........*
05A700  4150003B 5050C028 5850983A D2075008   B0045050 C02458F0 9B4A05EF 95FF6002  *............K.........C........*
05A720  477C98C8 D205A076 601C95C0 A0754770   94249201 A0755830 B00C41F0 000345E0  *...HK.......................0....*
05A740  99C25860 B01C8960 00141266 477C9442   9604B013 5860B010 41660C00 1B009101  *.B.............................*
05A760  B00F4780 95F01200 47809466 58B070CC   5830B00C 45E099BE 58A070D8 58E0C010  *.....0.....................Q....*
05A780  5830E018 45E098C 58807094 92009C10   581080AC 50109B92 1B114310 80844120  *................................*
05A7A0  00035830 80A8D52B A0C08000 478094DC   4188002C 06204610 949447F0 94D0D507  *......N.....................0..N.*
05A7C0  B0049BA2 478C952F D507B004 9BAA4780   952E4180 9BB84910 9B9A4740 94D047F0  *.........N..................0...0*
05A7E0  94A25880 70945830 9B9247FC 94724188   002C4910 9B9A4780 94F04720 94FA47F0  *.............0.............0.....0*
05A800  9500D22B 96B88000 47F09500 D2579BB8   80009101 9C104710 95185010 9B9645E0  *..K.....0..K.....................*
05A820  998C5810 9B969201 9C105830 7C941788   43829C15 1A83D502 B00C8004 477094AC  *.....................N.........*
05A840  D2CC8003 B0024130 000B94C0 7C125080   707C5870 B03ED203 B03EC03C 47F0C040  *K.....................K......0. *
05A860  C4D6D5C5 916E478C 95D64630 95CE5810   C03441D1 00004111 00909201 100858E0  *DONE.....D.........J...........*
05A880  C010D200 100FE005 D2031020 9B5E58F0   9B52C5EF 12FFD203 C02470C8 58F09B56  *..K.....K......0......K....H.0..*
05A8A0  077F5830 9B8A950C 7C12478C 95A85880   7C945030 815447F0 95B494FF 70125880  *.....................0.........*
05A8C0  707C5030 803418E3 58307CBC 5CE070BC   41F00003 45E09990 41300028 58807C94  *.......T.........0.............*
05A8E0  5060800C 41880004 419B0004 15B44770   954C5830 708C41F0 000345E0 999058B0  *.........................C........*
05A900  7CCC9120 B0014780 962E58A0 7CD8D202   C02DA0A3 5810C02C 12114780 962ED202  *..............QK..............K.*
05A920  7CA110A3 D202A0A3 70A14110 00B05010   C028D203 C0249B76 45E0994C 47F095FC  *....K.....................K.....0..*
05A940  58B070CC 947F70E5 1B445040 C0204040   9BB64340 B0001AB4 4340B000 12444770  *.......V... ..  ... ..... ......*
05A960  90C441EC 000C58FC 9B4EC7FF D203C024   9B6641F0 00B050F0 C02845E0 994CD501  *.D.....0....K......C...0......N.*
05A980  C028C02A 47709B0A D2039B8A 7CD858F0   B00CD203 7098C030 41E096B2 5810C034  *........K....Q.0..K.............*
05A9A0  54F09B6A 41D10000 4111CC9C 5CF09B8E   D2031020 9B6241F0 000442F0 100858F0  *.0...J.......0..K......C...0...0*
05A9C0  9B5207FF 58809B8A D2039B8A 7C9858FC   8C2445E0 968AC203 9B827098 D2039E7A  *.........K......C......K.....K...*
05A9E0  7CD858FC 802043F0 BCCF50F0 B00C54F0   9B6A50F0 9B7E5880 709858F0 80205 4F0  *.Q.0...0...0...0...0........0...C*
05AA00  9B6A50F0 9B86581C C03441D1 00004111   0090D203 10209B5A 41F00004 42F01008  *...C........J......K......0...0..*
05AA20  58F09B52 05EF58A0 70D8D202 ACA87099   41F09162 1B554350 B0031255 078F47F0  *.0........QK......0.............0*
05AA40  98681B55 4350B0C3 584CB010 89400008   88400014 12444770 91041B44 4340B000  *.......... ... ... ..........  ..*
05AA60  4B409BA0 88400002 181B58B0 7CB441BB   00181B22 47F0976C 4320B000 1AB24650  *.  ... ..............0..........*
05AA80  97661B5B 18B5583C B01C8930 CCC8883C   0C0818B1 5030B010 41550004 41110004  *................................*
05AAA0  46409772 58B070CC 47F09104 912080C1   47E097C6 58A070D8 D20270E1 A0A35830  *.  .......0.........F...QK.......*
05AAC0  B00C45E0 99BE58A0 70D8D202 ACA370E1   41FC9898 47F09868 5810C034 41D10000  *.........QK......C...0.......J..*
05AAE0  41110090 50B070CC D2031020 9B6241E0   000442F0 1008D203 70A470D8 D203C024  *.........K.............K....QK...*
05AB00  9B6641F0 00B050F0 C02847FC 981A45E0   994CD501 C028C02A 47709B0A 58A070A4  *....C...0...0......N.............*
05AB20  D202A0A3 C031D203 70A4C030 D2C39B8A   70A45850 B00C5450 9B6A5050 9B8E9120  *K.....K.....K..................*
05AB40  B0014710 98385050 70CC58FC 9B525810   C0344111 009005EF 1B334330 B0001233  *..........0.....................*
05AB60  4780985C 1AB39120 B0C14770 97FC58B0   7CCC58A0 70D847F0 912C1B55 4350B003  *.....................Q.0........*
05AB80  181B58B0 70B441BB 001847F0 98841B22   4320B000 1AB24650 987C5850 B0105450  *...........0...................*
05ABA0  9B6E18B1 5050BC10 07FF5850 70B04B50   9B9E5050 70B09400 70785860 707847F0  *.............................0*
05ABC0  928C9110 6002477C 92BC9124 6CC34770   92B09608 600247F0 92B0D205 A0766004  *.....................C..K......*
05ABE0  47F09418 91046002 47F093EA D5C56004   A07647F0 92D2D505 6004E000 47F09310  *.0........0..N......0.KN......0..*
05AC00  9120A034 4780990E D2019BB2 AC66D201   9BB4A05A D701A066 A066D701 A05AA05A  *........K.....K.....P.....P.....*
05AC20  96FE4140 00015810 C004D501 C02E1000   478095AE 41110002 41440001 47F09598  *... ......N.....................0..*
05AC40  581096FE 8C400003 8850001D 12554770   95C20640 1AB41B00 4300B014 50A09732  *..... ..........B. ............*
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05AC60  18A91A95 D400B014 97CF4810 8C24412C  00011B12 89100002 1AB1D400 B018970E  *....M.....................M.....*
05AC80  1BB11BB4 1B114310 97161401 41100000  189A58A0 97324780 960C4110 00011700  *..............................*
05ACA0  4300B000 1B01420C B00C1200 477C9632  41FF0000 55F0973A 47809632 9500B00A  *..................0...........*
05ACC0  477C96A8 4300B00E 1B014200 B0CE07FF  4ABC8020 55B08008 478096E4 9110B007  *..........................U....*
05ACE0  4710963E 07FE5060 967E95FF 60020787  50E09682 1BEE48E0 60008BE0 000441EE  *..............................*
05AD00  003813EE 1AE6186E 58E09682 07F70004  41FF0038 13FF1AF6 D5054000 600447F0  *.....W.......7.........6N. ....0*
05AD20  912A9124 600347FC 918295FF 971E4770  92F29400 971E47F0 94A69104 B0074710  *........0.........2.....0.......*
05AD40  96C850B0 C02041FC 0CC450B0 C02841B0  03065080 C02C47F0 96EED503 C0009742  *.H.....0..............0..N.....*
05AD60  47B096D8 58F0973E 05EF92C4 CC2347F0  96B494DF B0061BFF 47F096EE 41F00008  *....Q.0.....D...0.........C...0..*
05AD80  58D0C034 980ED000 47FEFC0C 71B40001  74845860 C02CD200 74876001 0000FFFF  *..........0...........K........*
05ADA0  FE7FBFDF EFF7FBFD 01804020 1C080402  00000000 00000000 00000000 50210000  *.....7.... ...................*
05ADC0  41110004 46307146 41EC719E 0C05A820  0005AE38 000000FF 801858F0 74BE580F  *..............................0....*
05ADE0  00008C00 00038810 001D1211 4770717C  06001A20 18A71A71 43107406 187A4410  *..............................F....*
05AE00  72E04820 749A4122 00014020 749A58F0  74BA07FF 4820749A 80000000 20059120  *.......... ....0..............*
05AE20  45F0F014 0005AE2C 00000000 C9C5C6E7  01E7F5C1 0A079180 45F0F014 0005AE44  *.00.........IEFXJX5A.....C0.....*
05AE40  00000000 C9C5C6E5 F1F5E7D3 0AC70A30  05909200 9B6AD2CA 9B6B9B6A 47F0901E  *....IEFV15XL.........K......C..*
05AE60  CCCCC9C5 C6E6C3C9 D4D70404 1966CCCC  58D0C034 50D09B92 5820C014 1B554830  *..IEFWCIMP.....................*
05AE80  200A1233 478C936A 58B0C024 5810B00C  1B441B66 1B774820 B0209180 10044710  *..............................*
05AEA0  90729120 1012478C 906891FF 1C084770  90689180 10064780 99AC4360 10081A76  *..............................*
05AEC0  47F09092 4177C001 47F09C92 D203C02C  9B52D703 C020C020 D703C028 C02858F0  *.0.......0..K.....P.....P......0*
05AEE0  9B4207FF 1A12463C 90488970 CC024810  B0268910 00041A71 18374133 00244030  *..............................  .*
05AF00  9B7A58D0 9B925030 9BDA503C 9BDEC700  451090CC 0005BA2C 0005BA34 E0000A04  *..............................*
05AF20  12FF477C 907AD203 9BB29BE2 47F09376  58109BB2 1B665060 9B7E5820 C01448F0  *......K....S.0.................0*
05AF40  200A12FF 478C9102 58A0B00C 91C19B8A  471C98B8 58D09B92 5820C010 D2071000  *..............................K...*
05AF60  20085010 9B9A582C C014D207 10082034  D2071010 202C4111 00181BFF 50F10000  *..........K.....K............1..*
05AF80  4880B026 1288478C 91CC5820 2CCC5860  9B7E4166 00015060 9B7E9180 A0044710  *..............................*
05AFA0  91789120 A0124780 917891FF ACC84780  91709180 A0064770 91789601 9B8B47F0  *..............................0*
05AFC0  91789180 A0064780 938A58D0 9B925860  9B2E05E6 58609B3A 58060000 50009B86  *..................W...........*
05AFE0  5806CC04 50009B8A 58060CC8 5CC09B8E  94FE9B8B 4AA0B020 41220044 4680913C  *..............................*
05B000  58F09B36 581C9BB2 41101018 58809B32  C5EF58F0 9BB24AF0 9B7A4BF0 9B6650F0  *.0.....................0...0...0...0*
05B020  9BAA5800 9BB25C0F 00005820 C0144860  200A1266 478091F6 58A0200C 4BA09B64  *.....................6........*
05B040  58AA0000 50A0200C 48EC9B7A 4BEC9B66  5CEF0004 4800200A 12004780 92705800  *..............................*
05B060  202458F0 B0144BF0 9B644780 9220500F  000041FF 000450F0 202458D0 9B929200  *...0...0.................0.......*
05B080  B01C5810 B01C4800 B0220A0A 58DC9B92  9200C024 5810C024 58F0C004 41FF0000  *..........................C.....*
05B0A0  41110000 18CF1B01 4B009B64 0ACA48F0  9B7C12FF 47809270 58109BA2 48009B7C  *..............0...............*
05B0C0  0A0A58B0 C00448EB 000054F0 9B5A4780  929455E0 9B5A4780 929C95FF E0024780  *..............................*
05B0E0  92949200 EC0C41BB 000247F0 92749501  9AD24780 92B09701 9AD241BB 000447F0  *...........C.....K.......K.....0*
05B100  92749701 9AD258FC 9BB241FF 0C181BBB  43BF0000 12BB4780 933C1ABF 41FF0010  *.....K.0......................*
05B120  45E09318 95FFD002 477C92E4 D503D010  9B4A4780 92EA18FB 47F092BC 185F41FF  *...........UN.............0.....*
05B140  0C0419FB 478092BC 45E09318 D5C3D010  9B4E4770 92EC58EF 00005805 0000500F  *.............N................*
05B160  0C0050E5 000047F0 92E458DF 000C89D0  0C0988D0 001512DD 478092E4 4BD09B62  *...V...0.U.................U....*
05B180  89D00001 5AD0C004 48DD0000 07FE58F0  9B465800 9BAA5000 C0245820 C0145870  *...............0..............*
05B1A0  00105877 000C5877 000494BF 7C149110  20044780 93689640 701407FF 41300024  *.....................  .......*
05B1C0  40309B7A 47FC90BC 48C09B7A 4B009B66  5A009BB2 50009B82 47F090DE 900ED000  *  ....0.................0......*
05B1E0  91082038 47109178 911CA004 47109178  9500A00B 47709178 9610A007 C200A008  *.....................K...*
05B200  AC0A50A0 C028D200 9B97A00A 58709BA2  58A0C028 58B0C024 5830B000 1B554140  *......K.......................*
05B220  00074160 00804155 00C148CC 9C301406  478C93F8 58009BAA 12004780 941A4803  *.....................8........*
05B240  00004900 9C32474C 941A8860 00014133  00024640 93D45880 9B6E5680 9B725080  *.......  ..........  .M.........*
05B260  9B6E5850 9BAA0650 47F09438 58809B6E  14864740 93F85060 9B725050 9BAA4803  *.........0.........  .8.........*
05B280  000C4000 9C3247FC 93F81805 41600080  1B885080 9BB65080 9BAA4080 9C3250A0  *..  ....0.8.................  ....*
05B2A0  98C24180 00018950 00011200 47809474  88600001 4600945E 47F09474 1B554180  *.B.....................C......*
05B2C0  0C0758B0 C0245A50 B0005810 C00458A0  C02858E0 9BA658B0 9B5E1B33 1B444821  *..............................*
05B2E0  00005420 9B5A4780 95605920 9B5A4780  94A447F0 94C49501 9AD24780 94BC9701  *.....................C.D...K......*
05B300  9AD24111 000288B0 000147F0 95609701  9AD247F0 961C50F0 9AC65020 9ABE45F0  *.K.........0.....K.0....0.F.....0*
05B320  9A8A5820 9AC258F0 9AC64330 20015820  9ABE1436 47809560 580A0000 91019BB7  *.....B.0.F....................*
05B340  471094F6 5800A014 140B478C 956095FF  20024770 9AD49120 20124780 95609505  *...6.....................M.....*
05B360  20134780 956C9110 2022478C 95249108  20034710 95609500 20004770 981C9101  *..............................*
05B380  9BB64710 959A5830 9B7E1B44 434E0000  95FF2002 47709552 91402006 47809552  *.............. ...  ..... .....*
05B3A0  41440001 12334780 95864940 9C2E4740  95864111 000288B0 000112BB 47809576  *.............. ...  ..............*
05B3C0  41EE0001 47F0948C 58B09B5E 41AA0004  41EE0001 47F0948C 50209B76 40409C2E  *.....0.....................0..... ..*
```

```
05B3E0    50E09BD2 5C5C9BD6 47F09560 507C9BEA    58709BA2 59709BEA 478095C2 49207002  *...K...O.C..................B....*
05B400    478095BA 4177CCC8 47F095A2 587C9BEA    47F09560 D5009C35 9C2B47B0 98384020  *.........C.......O..N......... .*
05B420    7C029101 9BB7478C 95DC9602 70014177    00084800 9C344A00 9B624000 9C344300  *.............................. .....*
05B440    9B971200 478C9560 06004200 9B97430E    00004A00 9B62420E 00004B05 00005400  *................................*
05B46C    9B5A4A00 9B624005 00C047FC 956C8860    00010603 9B769B76 47709630 D2C39B76  *...... ....O......O.........K...*
05B480    9BAED703 9BAE9BAE 49609B62 4780964A    41550002 46809478 47F09652 41600080  *..P.....................O......*
05B4A0    47F09642 91019BB6 47809672 91019BB7    47109702 91019BB8 47109712 96019BB8  *.O.............................*
05B4C0    47F0946A 58009B76 120C478C 93BE4000    7C024177 00084800 9C344A00 9B624000  *.O..........  ..............  .*
05B4E0    9C341B00 50009B6E 50C09B72 96019BB6    43009B97 06004200 9B9758E0 9BD2430E  *..............................K..*
05B500    00004A00 9B62420F 000C5850 9BD64805    00005400 9B5A4A00 9B624005 0000D203  *..............O.............. ...K.*
05B520    C02C9B76 D20396FE C0285880 CC2490DF    9BC641D0 9BEA58F0 9B3E05EF 47F096EE  *....K.............F.....C.....O..*
05B540    98DF98C6 D203C028 96FE47F0 946AC000    0C063230 91019BB8 47109838 96019BB8  *...FK......O...................*
05B560    47F0946A 96019BB7 94009BB8 5810C004    58B0C024 5880B018 4820B024 58A0C028  *.O.............................*
05B580    89200002 185A1A52 062C4420 97F24420    97F858B0 9B5E4821 00005420 9B5A4780  *.............2...8.............*
05B5A0    97DC5920 9B5A478C 975C47F0 977C9501    9AD24780 97749701 9AD24111 000288B0  *...........C.....K.......K......*
05B5C0    000147FC 97DC9701 9AD247FC 98CC58C8    0000140B 478097DC 91802003 478097FE  *...O.....K.O...................*
05B5E0    95FF2002 47709AEC 91202012 478097FE    95052013 478097FE 91102022 478097DC  *................................*
05B600    91C82003 478C97DC D5009C35 9C2B47B0    97FE4020 70024800 9C344A00 9B624000  *.........N.........  ..........  .*
05B620    9C349604 7C014177 000847F0 97FE4111    00028BB0 000112BB 47709744 41880004  *...........C...................*
05B640    47F0974C D2CC8000 5014D7C0 8C00A014    58080000 170B5C08 000047F0 97DC58B0  *.O. K.....P.................O....*
05B660    C02458AC B01850AC CC2847FC 946A9101    9BB64780 98309101 9BB84780 956047F0  *...........O...................O*
05B680    959A5020 9BAE47F0 9560980E DCC0D203    9BBAB010 D203B010 9BA258A0 9BC2D201  *........O......K.....K........BK.*
05B6A0    9BBEA00C 41000001 4000A00C D2009BC1    A003D200 A0039C35 58D09B92 96019B8B  *........  ...K..A..K.............*
05B6C0    58609B2E 05E65860 9B3A5806 0C0C50CC    9B865806 00045000 9B8A5806 00085C00  *.....W.........................*
05B6E0    9B8E94FE 9B8B1B00 40009C34 50009B76    40009C2E D203B010 9BBAD201 A00C9BBE  *........  .......  ...K.....K.....*
05B700    D200A003 9BC147FC 91A248F0 9C2A89F0    000340F0 9C2C5800 B0185B00 B0084000  *K....A.C...O...O.. O..........  .*
05B720    9B9E1AF0 40F09B7C 58D09B92 50FC9BDA    50F09BDE 50109B6A 451098F4 0005BA2C  *...O O.......C...C.........4....*
05B740    0005BA34 E0000A04 12FF5810 9B6A477C    907A58F0 9BE250F0 9BA24AF0 9C2C50F0  *.....................O.S.O...O...O*
05B760    9BA648F0 9C2A58EC C0041B55 5840C9BA6   58D09BA2 1B771B00 488E0000 54809B5A  *...O..........  ...................*
05B780    478099A0 59809B5A 4780999C 95FF8002    477C9AF4 91208012 478099A0 91808003  *.....................4.............*
05B7A0    478C99A0 91108022 478C996A 95058013    478099A0 91088003 4710998E 5000D004  *................................*
05B7C0    5000D000 435C8038 42574000 41770001    41EE0002 41DD0008 46F09926 47F09102  *..........  ...............C...O..*
05B7E0    D503C000 9B5647BC 996A47F0 99A041EE    000241EE 00024177 000147F0 9926900E  *N..........O..............O....*
05B800    D0009101 9B8A471C 9A8258BC C0041BAA    1B8848EB 000054E0 9B5A4780 9A5455E0  *................................*
05B820    07FE9120 A0344780 9924D201 A0669BB2    D201A05A 9BB407FE 50607090 95FF6002  *...........K.....K.............*
05B840    078E50E0 70881BEE 48E06000 8BE00004    41EE0038 13EE1A6E 58E07088 07FEC4D6  *................................DC*
05B860    D5C5000C 00009001 90ECD00C 05C0C4F0    07004110 C0100511 0F05B90C 7FFF0A0E  *NE.............0...............*

05BE20    00000000 0CCCCCCC 00C00000 0CC04000    9400025D 00790000 00008000 000A0000  *.............. ................*
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                    68 *                    ANSWERS                                          00006800
                    70 *  8.01  ..................................................          00007000
                    71 *        . BASE REGISTER 9                                .          00007100
                    72 *        ..................................................          00007200

                    74 *  8.02  ..................................................          00007400
                    75 *        . THE SYMBOLS FOURTH AND FLOD WILL HAVE A BASE REG .        00007500
                    76 *        . OF 12 SINCE THEY ARE MORE THAN HEX 4002 BYTES    .        00007600
                    77 *        . DISPLACED FROM HERE. THE INSTRUCTIONS FOLLOWING  .        00007700
                    78 *        . THE INSTRUCTION LABELED THIRD ILLUSTRATE THIS.   .        00007800
                    79 *        ..................................................          00007900

                    81 *  8.03  ..................................................          00008100
                    82 *        . 9=58822, 10= 59822, 11=5A822, 12=5B822                    00008200
                    83 *        ..... ..... ..... .....                                     00008300

                    85 *  8.04  ..................................................          00008500
                    86 *        . REG 7 HAS HEX 1000 IN IT. NOTE ALSO THE WORD DONE .       00008600
                    87 *        . NOW LOCATED IN FLDC.                           .          00008700
                    88 *        ..................................................          00008800
                    89      END                                                             00008900
```

SYMBOL	TYPE	ID	ADDR	LENGTH	LD ID
BASEBUG	SD	01	001000	001070	

REL TA 04

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   3/18/70

001000                                1 BASEBUG  START X'1000'              MULTIPLE BASE BUG          00000100
001000 0590                           2          BALR  9,0                                            00000200
001002                                3          USING BEGIN,10,11,12                                 00000300
001002 98AC A00A             0100C    4 BEGIN    LM    10,12,BASES                                    00000400
001006 47F0 A016             01018    5          B     *+18                                           00000500
00100A 0000
00100C 0000102A00001020               6 BASES    DC    A(BEGIN+40,BEGIN+30)                           00000600
001014 00001020                       7          DC    A(BEGIN+30)                                    00000700
001018 5850 A026             01028    8          L     5,FLDA                                         00000800
00101C D203 A026 A042 01028 01044     9          MVC   FLDA,FLDB                                      00000900
001022 47F0 A034             01036   10          B     SECCND                                         00001000
001026 0000
001028 00000001                      11 FLDA     DC    F'1'                                           00001100
001036                               12          ORG   *+10                                           00001200
001036 5860 A042             01044   13 SECOND   L     6,FLDB                                         00001300
00103A D203 A042 A06A 01044 0106C    14          MVC   FLDB,FLDC                                      00001400
001040 47F0 A05A             0105C   15          B     THIRD                                          00001500
001044 00000064                      16 FLDB     DC    F'100'                                         00001600
00105C                               17          ORG   *+20                                           00001700
00105C 5870 A06A             0106C   18 THIRD    L     7,FLDC                                         00001800
001060 D203 A06A B068 0106C  0206A   19          MVC   FLDC,FLDD                                      00001900
001066 47F0 B06C             0206E   20          B     FOURTH                                         00002000
00106A 0000
00106C 00001000                      21 FLDC     DC    F'4096'                                        00002100
00206A                               22          ORG   *+4090                                         00002200
00206A C4D6D5C5                      23 FLDD     DC    C'DONE'                                        00002300
00206E 0000                          24 FOURTH   DC    H'0'                                           00002400
001000                               25          END   BASEBUG                                        00002500
```

```
F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
          VARIABLE OPTIONS USED - SIZE=(45056,6144)                DEFAULT OPTION(S) USED
IEW0000     ENTRY UTILITY

                                                  MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME   LOCATION     NAME   LOCATION     NAME   LOCATION     NAME   LOCATION

  BASEBUG        00    1070
  UTILITY      107C     5A0
                                            PRINT       10D2    PCHKRETN    132E

  ENTRY ADDRESS      1070
  TOTAL LENGTH       1610

****GO        DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.000000 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006E800    0006E770 00000048 00004F20 0006E430
REGS 8-15    0006E778 6F063822 0006E7B0 0006E7F8    60063A22 0006E7B0 00002170 00063820

000000    00000000 0000019C F0F0F1C9 50071D90    00063820 00002A18 01040080 8003AFFE  *........001I....................*
000020    0004000A 7000240C FF150006 AF063826    0000FF00 00000000 FE040233 800011D6  *.............................C*
000040    00008850 0C0000F1 000016C0 00002120    20EFDAC0 00074200 00040000 000002C0  *.......1.....................*
000060    00040000 00000366 00040000 0000030A    00000000 0000CA68 00040000 0000022E  *.....................................*

063820    059098AC A00A47F0 A0160000 0006384A    00063840 00063840 5850A026 D203A026  *.......0.......... ... ....K...*
063840    A04247F0 A0340000 00000001 45E0914C    47F09322 41F05860 A042D203 A042A06A  *...0.............0...0....K.....*
063860    47F0A05A 00000064 45E0914C 47F091D4    D503954E 95624780 9434D603 5870A06A  *.0...........0.MN.........C.....*
C63880    D203A06A B06847F0 B06C0000 0C001000    954E954E 58909536 07FE5010 954695FF  *K.....0.....................*
0638A0    D0024770 94644110 958341F0 0012956B    10004780 94F24111 000146F0 94544110  *...........0.........2.....0....*
0638C0    958341F0 9572D505 10009562 41110001    4770946C 18B11B1F 1BFF4910 954A47B0  *...0..N.....................*
0638E0    94A04210 95734110 95720A23 91019561    471094C6 58109546 07FE41F0 95765810  *...................F.......0....*
063900    954E1B1F 96019561 95FFD002 478094BE    41101004 47F09488 41101002 47F09488  *.....................0.......0..*
063920    5810954E 95FFD002 477094D6 06100610    1BB144B0 951441B0 B00D42B0 9573D209  *..........0...................K.*
063940    95769562 92009561 47F0948C D2499583    100095F4 957B4770 946458F0 001058F0  *.........0..K......4.......0...0*
063960    F03C9104 F0894710 948C47F0 9464D200    95801000 0006B358 00067E00 00067DF0  *0...0......0..K.................0*
063980    000684E4 00068528 0006858E CC06853C    000679AA 00068CF8 580091DA 1B114510  *...U.....................8........*
0639A0    90600A0A 004F0000 00000000 00000000    00000000 01068C2C FFFFFF00 40404040  *.............................    *
0639C0    40404040 4040E2E8 E2028079 00250000    40404040 40404040 40404040 40404040  *       SYS.......                  *
0639E0    40404040 40404040 40404040 40404040    40404040 40404040 40404040 40404040  *                                   *
063A00    40404040 404C404C 40404040 40404040    40404040 40404040 40404040 40404040  *                                   *
063A20    40404040 40404040 40404040 40404000    D605D004 D0044780 911447F0 90CAD605  *                  .0..........0..0.*
063A40    D004D004 47F09084 D205B000 DCC447F0    90A492F0 D005D705 D004D004 9110D002  *.....0..K......0...0..P.........*
063A60    47E093EE 47F093E6 12004780 95FC47F0    930091C2 18D35810 00068D7C 00080017  *.....0.W.......0...B.L..........*
063A80    00068D7D 0CC8000A 00068D7E 00080000    00068D7F 00060000 00068D7B 00060000  *.....................#.....#.....*
063AA0    00068D80 000F0016 03068D81 00000000    01068D85 00040000 01068D87 00040000  *.....................#.....#.....*
063AC0    05068D75 00100000 05068D68 C0100000    01068D6E 00170000 02068D70 00170000  *.....................#.....#.....*
063AE0    01068D73 00170000 D7D9C9E5 C1E3D5D3    D5E2D3E2 D3E2C3D9 E3C3C8C9 D4D9C4C1  *.....#.....PRIVATNLNSLSLSCRTCHIMRDA*
063B00    6BC9C5C6 F2F3F3F3 F4034710 913E95FF    059047F0 9010C9C5 C6E7E3F0 F0C40315  *.IEF23334..........0..IEFXTOOD..*
063B20    19685880 C0201288 47709044 410000E6    45109022 0A0A1871 18279240 20004100  *.................W...........  ....*
063B40    000E0600 45E09AAC 92002000 410000D8    060045E0 9AAC58D0 C03441DD 000058B0  *.....................Q.....#.....*
063B60    C02450B0 70AC58BB 000041BB 0C0050B0    70B441BB 001858AB 0000D207 70C8C024  *.....................#.....#.....*
063B80    12AA4780 9AFA5880 C0201288 4780913C    D501C02E 9C114780 9B02D501 C02E9C13  *.................N.........N.....*
063BA0    47809B02 18B841BB 0000D203 C0249B66    41F00160 50F0C028 45E0994C D501C028  *.........K......0...0......N...*
063BC0    C02A4770 9B0A58F0 C03050F0 7CD841FF    00B050F0 7094D403 70A870A8 478090F8  *.......0...0.Q.....0..M........8*
063BE0    9108B001 4780962E 58F07CA8 5860F010    45F0916E 18E65860 B01045F0 916E19E6  *.........0....0..0...W.....0...W*
063C00    4770962E D70370A8 70A850B0 7CCC9114    B00F4770 97304100 00019160 B0014770  *....P.........................*
063C20    979A9108 B0014780 944C9180 B00F4770    965A5830 B00C45E0 99BE58A0 70D89140  *.............................Q. *
063C40    B0104780 916241BB 000447F0 912C9601    701345E0 99D81B00 5000C020 D501C02E  *...........0.........Q......N...*
063C60    9C114780 9B02D501 C02E9C13 47809B02    47F09098 41107078 5860B010 41F0918E  *......N...........0...........0..*
063C80    89600008 88600014 1266078F 066C8960    00015A60 C0044866 00005460 9B7207FF  *.....................#.....#.....*
063CA0    45E09926 91406006 58607090 47109AE6    50607078 96807078 582070CC 180A18F6  *.....  .........W..............6*
063CC0    91FF6002 471091BA 4BF09B9C D2057000    A076D205 A076F01C 17FF45E0 98EE9180  *.........0..K.....K...0.........*
063CE0    200F4780 92000A20 45E09910 89F00018    12FF4770 9B12D203 C02C7098 41F000B0  *.............0.........K......0..*
063D00    50F0C028 D203C024 9B7645E0 994C47F0    92220A20 45E09910 D205A076 700089F0  *.0..K...........0.........K......0*
063D20    001812FF 47709AF4 45E09926 94DF600C    58607090 41F0928C 180B5B00 70CC078F  *.......4.............0...........*
063D40    88000002 58B070CC 1B114310 B0004B10    9B9ED203 7074B010 06104410 9C1A4111  *.....................K.....#.....*
063D60    00011AB1 D203B010 70741BB1 46C09240    07FFD203 9B8A70DC D2039B8E 709C41F0  *....K..........  ..K.....K......0*
063D80    00045810 C03441D1 00004111 009042F0    1008D203 10209B62 58F09B52 07FF45E0  *.......J.......0..K......C......*
063DA0    99D89608 600395FF 60024770 98B09110    60224770 92B09124 60034770 92B09608  *.Q.....................#.....#.....*
063DC0    602258A0 70D89120 B0014710 93D69108    B0014780 944295FF 60024770 98DAD505  *.....Q.......0.....................N.*
063DE0    601CA076 478C9442 9500A075 478093D6    1BFF50F0 70DC9505 A07547D0 92F441F0  *.................0...0.........4.0*
063E00    000547F0 92F843F0 AC754300 A0751B0F    41E0A07C 95FF6002 477098E4 D505601C  *...0.8.0.....................UN...*
063E20    E0004780 938A41EE 000646FC 93C21200    478093D6 42009BB6 581070DC 12114770  *...........0.......0.....#.....*
063E40    935C4100 00B05000 C028D203 C0249B66    45E0994C D501C028 C02A4770 9B0AD203  *..........K.........N.........K.*
```

```
063E60  7CDCC030 D203709C A09547F0 9362D203   7C9C1000 9200709F 45E09260 58E070DC  *....K......0..K................*
063E80  41EE0004 1B004300 9BB641F0 000F190F   47209384 18F01B0F 47F09302 D705A076  *..........0.........0...0..P...*
063EA0  E000D705 E000A076 D705A076 E0005800   70DC1200 47809424 D2039B8A 70DCD203  *..P.....P.............K.....K.*
063EC0  9B8E709C 41F00003 45E09270 D203C02C   70DCD203 C0249B76 41F000B0 50F0C028  *.....0......K.....K......0...0..*
063EE0  45E0994C 47F09424 9102A057 4780940A   95FF6002 477098D2 91046022 4770940A  *.....0.................K........*
063F00  4150003B 5050C028 58509B3A D2075008   B0045050 C02458F0 9B4A05EF 95FF6002  *............K.........0........*
063F20  477098C8 D205A076 601C9500 AC754770   94249201 A0755830 B00C41F0 000345E0  *...HK.....................0....*
063F40  99C25860 B01C8960 00141266 47709442   9604B013 5860B010 41660000 1B009101  *.B.............................*
063F60  B00F4780 95F0120C 47809466 58B070CC   5830B00C 45E099BE 58A070D8 58E0C010  *.....0.....................Q....*
063F80  5830E018 45E0998C 58807094 92009C10   581080AC 50109B92 1B114310 80844120  *.....................................*
063FA0  00035830 80A8D52B A00C8000 478094DC   4188002C 06204610 949447F0 94D0D507  *......N.....................0..N.*
063FC0  B0049BA2 4780952E D507B004 9BAA4780   952E4180 9BB84910 9B9A4740 94D047F0  *........N..................  ...0*
063FE0  94A25880 70945830 9B9247F0 94724188   002C4910 9B9A4780 94F04720 94FA47F0  *............0.............0.....0*
064000  9500D22B 9BB88000 47F09500 D2579BB8   80009101 9C104710 95185010 9B9645E0  *..K.......0..K.................*
064020  998C5810 9B969201 9C105830 70941788   43829C15 1A83D502 B00C8004 477094AC  *.....................N..........*
064040  D2008003 B0024130 00CB9400 7C125080   707C1744 4340B002 89400002 1A4B5860  *K.....................  ...  ......*
064060  B01045F0 916E4780 95D64630 95CE5810   C03441D1 00004111 00909201 100858E0  *...0.....O.........J...........*
064080  C010D200 100FE005 D2031020 9B5E58F0   9B5205EF 12FFD203 C02470C8 58F09B56  *..K.....K......0......K....H.0..*
0640A0  077F5830 9B8A9500 70124780 95A85880   70945030 815447F0 95B494FF 70125880  *.........................C........*
0640C0  707C5030 803418E3 583070BC 5CE070BC   41F00003 45E09990 4130002B 58807094  *.......T.........0.............*
0640E0  5060800C 41880004 41BB0004 15B44770   954C5830 70BC41F0 000345E0 999058B0  *.....................0..........*
064100  70CC9120 B0014780 962E58A0 7CD8D202   C02DA0A3 5810C02C 12114780 962ED202  *.............QK..............K.*
064120  70A110A3 D202A0A3 70A14110 0CB05010   C028D203 C0249B76 45E0994C 47F095FC  *....K.............K..........0..*
064140  58B070CC 947F70E5 1B445040 CC204040   9BB64340 B0001AB4 4340B000 12444770  *.......V...  ..  ... ..... ......*
064160  90C441E0 000058F0 9B4E07FF D203C024   9B6641F0 00B050F0 C02845E0 994CD501  *.D.....0....K......C...0......N.*
064180  C028C02A 477C9B0A D2039B8A 7CD858F0   B00CD203 7098C030 41E096B2 5810C034  *........K....Q.0..K............*
0641A0  54F09B6A 41D10000 41110090 50F09B8E   D2031020 9B6241F0 000442F0 100858F0  *.0...J.......0..K......0...0...0*
0641C0  9B5207FF 58809B8A D2039B8A 7C9858F0   802445E0 968AD203 9B827098 D2039B7A  *........K......0......K.....K...*
0641E0  70D858F0 802043FC B00F50F0 B00C54F0   9B6A50F0 9B7E5880 709858F0 802054F0  *.Q.0...0...0...0...0.......0...0*
064200  9B6A50F0 9B865810 C03441D1 00004111   0090D203 10209B5A 41F00004 42F01008  *...0.......J......K......0...0..*
064220  58F09B52 05EF58A0 70D8D202 ACA87099   41F09162 1B554350 B0031255 C78F47F0  *.0........QK......0............0*
064240  98681B55 4350B003 5840B010 8940C008   88400014 12444770 91041B44 4340B000  *.........  ...  ...  ...........  ..*
064260  4B409BA0 88400002 181B58B0 70B441BB   00181B22 47F0976C 4320B000 1AB24650  *.  ...  ..............0..........*
064280  9766185B 18B5583C B01C8930 00088830   000818B1 5030B010 41550004 41110004  *.....................................*
0642A0  46409772 58B070CC 47F09104 9120B001   47E097C6 58A070D8 D20270E1 A0A35830  *.  ........0.........F...QK.......*
0642C0  B00C45E0 99BE58A0 70D8D202 A0A370E1   41F09898 47F09868 5810C034 41D10000  *.........QK......0...0.......J..*
0642E0  41110090 50B070CC D2031020 9B6241E0   000442E0 1008D203 70A470D8 D203C024  *........K.............K....QK...*
064300  9B6641F0 00B050F0 C02847F0 981A45E0   994CD501 C028C02A 47709B0A 58A070A4  *...0...0...0......N............*
064320  D202A0A3 C031D203 70A4C030 D2039B8A   70A45850 B00C5450 9B6A5050 9B8E9120  *K.....K.....K..................*
064340  B0014710 98385C50 70C058F0 9B525810   C0344111 009005EF 1B334330 B0001233  *............0.....................*
064360  4780985C 1AB3912C B0014770 97FC58B0   70CC58A0 70D847F0 912C1B55 4350B003  *.............................Q.0........*
064380  181B58B0 70B441BB 001847F0 98841B22   4320B000 1AB24650 987C5850 B0105450  *............0.....................*
0643A0  9B6E18B1 5050B010 07FF5850 7CB04B50   9B9E5050 70B09400 70785860 707847F0  *.....................................0*
0643C0  928C9110 6002477C 92B09124 6C034770   92B09608 600247F0 92B0D205 A0766004  *.....................0..K......*
0643E0  47F09418 91046002 47F093EA D5056004   A07647F0 92D2D505 6004E000 47F09310  *.0.......0..N......0.KN......0..*
064400  9120A034 478C990E D2019BB2 A066D201   9BB4A05A D701A066 A066D701 A05AA05A  *.........K.....K.....P.....P.....*
064420  07FE9120 A0344780 9924D201 A0669BB2   D201A05A 9BB407FE 50607090 95FF6002  *..........K.....K..............*
064440  078E50E0 70881BEE 48E06000 8BE00004   41EE0038 13EE1A6E 58E07088 07FE58D0  *.....................................*
064460  C03441DD 00009001 705C4800 C0261200   4780997C 4800C02A 4510996A 0A0AD201  *.....................................K.*
064480  C028C02A 5010C030 9801705C 07FE4800   C02A5810 C02C0A0A 9801705C 07FE41F0  *.....................................0*
0644A0  00045430 9B6A5030 70BC5030 9B8ED203   9B8A7094 5810C034 41D10000 41110090  *.............K.........J......*
0644C0  42F01008 D2031020 9B6258F0 9B5207FF   41F00004 54309B6A 503070C0 50309B8E  *.0..K......0.....0.............*
0644E0  D2039B8A 70D847FC 99A2900F 7C141B55   1B449101 70134710 9A104350 B00245E0  *K....Q.C.......................*
064500  9A5895FF 60024770 9A009120 60124780   9A0445E0 9A7E41B0 B0044650 99EC47F0  *.....................................0*
064520  9A944350 B000188B 9500B000 47809A94   9108B001 47109A50 4340B002 12444780  *.....................  ......*
064540  9A5045E0 9A5895FF 60024770 9A449120   60124780 9A4845E0 9A7E41B0 B0044640  *.....................  *
064560  9A3018B8 1AB547FC 9A105860 B01C8960   00088860 00141266 47809A48 06608960  *.......0.....................*
064580  00015A60 C0044866 00005460 9B7207FE   95FF6002 47709A9E 43106038 41110001  *.....................................*
0645A0  42106038 07FE9200 7013980F 701407FE   4310600F 41110001 4210600F 07FE1B11  *.....................................*
0645C0  8C000008 12114780 9AC68810 00180610   44109ADA 41221001 12004780 9AD84110  *.........F...................Q..*
```

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0645E0    00FF4410 9ADA4122 100107FE D2C02001    200058F0 9B4607FF 58F09B3E 58909B42  *.............K......0.....C.......*
064600    41990002 07FF5850 9B4207F5 58F09B2A    47F09B20 58F09B2E 47F09B20 58F09B32  *............5.0...0...0...0...0...0..*
064620    47F09B20 58509B36 58909B4E 41990002    07F55890 9B4E4199 000207FF 0006A02A  *.0..............5..............*
064640    0006A108 0006A098 0006A088 0006C116    0006ACEA 0006A808 000679A8 0006B378  *..............A..................*
064660    00069D38 0006B358 000699B8 0206990C    1006991C 0106991C 000500FF FFFFFF00  *................................*
064680    FFFFF000 0000FFFF 00050000 0A0A5855    00041871 41870000 06304430 0006E0D0  *..0............................*
0646A0    00C31800 00000000 00C00001 00020018    00140010 D7C7D47E 5C4BC4C4 D1D6C2D3  *.C....................PGM...DDJOBL*
0646C0    C9C24040 00790000 00000A23 5E180004    D7031000 10001BBB 41000001 0A0158A8  *IB .............P..............*
0646E0    0000D505 91F6A000 4780912E D5C391FC    A0004780 913ED504 9200A000 47809136  *..N..6......N.........N.........*
064700    47F090F2 41B00004 47F09142 41B00008    47F09142 9610C00C 41000006 181A0A0A  *.0.2.....0.......0.............*
064720    58180103 08010A00 70380000 D200B010    B0144118 00000A0A 059041F0 030150F0  *............K..............0...0*
064740    C02C58F0 900E07FF 0006B6F8 2A0000F9    90ECD00C 059047F0 9014CCCC C9C5C6E2  *...0.......8...9.......0....IEFS*
064760    C4F0F9F5 11011966 CCCC95D1 C0244780    91749110 C00C4710 91785810 91F21B33  *D095.......J.................2..*
064780    43310000 58510000 18034510 90380A0A    18710630 443091EA 41670000 41330001  *................................*
0647A0    89300018 16635820 C0105830 CC14D207    700C2008 D2077015 30345840 C028D207  *..............K.....K...... ..K.*
0647C0    701E4004 18170A23 18068800 00181816    0A0A1B00 43004000 41240000 1A2047F0  *.. ..................... .........0*
0647E0    90904144 00044100 40101520 47D0916C    91204010 471090A6 47F0908C 585091F2  *........ ......... ......0.....2*
064800    1B334335 0C041803 451090B6 0A0A5855    00041871 41870000 06304430 91EA4133  *................................*
064820    00018930 001E1683 41000004 451090DA    0A0A5018 00044100 00064510 90E80A0A  *.............................Y..*
064840    50180000 92068000 18180A23 58180004    D7031000 10001BBB 41000001 0A0158A8  *.................P..............*
064860    0000D505 91F6A000 4780912E D5C391FC    A0004780 913ED504 9200A000 47809136  *..N..6......N.........N.........*
064880    47F090F2 41B00004 47F0C4D6 D5C50000    90ECD00C 05C004F0 07004110 C0100511  *.0.2.....0DONE.........0.........*

064E20    0004000C 00000226 00064890 00064E10    00000000 000091A8 0146004D 00000001  *................................*
064E40    0C000000 00000000 00000000 00000000    00000000 00004000 9400025D 00790000  *........................ .........*
```


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```
RRRRRRRRRRR   EEEEEEEEEEEE  LL            PPPPPPPPPPP    AAAAAAAAAA              00000000         444
RRRRRRRRRRRR  EEEEEEEEEEEE  LL            PPPPPPPPPPPP   AAAAAAAAAAAA           0000000000       4444
RR         RR EE            LL            PP         PP  AA        AA          00        00    44 44
RR         RR EE            LL            PP         PP  AA        AA          00        00   44  44
RR         RR EE            LL            PP         PP  AA        AA          00        00  44   44
RRRRRRRRRRRR  EEEEEEEE      LL            PPPPPPPPPPPP   AAAAAAAAAAAA          00        00 4444444444
RRRRRRRRRRR   EEEEEEEE      LL            PPPPPPPPPPP    AAAAAAAAAAAA          00        00 444444444444
RR     RR     EE            LL            PP             AA        AA          00        00         44
RR      RR    EE            LL            PP             AA        AA          00        00         44
RR       RR   EE            LL            PP             AA        AA          00        00         44
RR        RR  EEEEEEEEEEEE  LLLLLLLLLLLL  PP             AA        AA           0000000000        44
RR         RR EEEEEEEEEEEE  LLLLLLLLLLLL  PP             AA        AA            00000000         44
```

```
 9999999999
999999999999
99          99
99          99
99          99
999999999999
999999999999
            99
            99
99          99
999999999999
 9999999999
```


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LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                                3 *     THIS PROJECT IS DESIGNED TO HELP YOU LEARN SOME FUNDEMENTALS      00000300
                                4 *     OF ADDRESSING. THIS PROJECT CONSISTS OF TWO PARTS. PART ONE       00000400
                                5 *     CONSISTS OF A LISTING THAT HAS THREE QUESTIONS CONTAINED IN       00000500
                                6 *     IN THE COMMENT PORTION OF THE LISTING. ANSWER THOSE QUESTIONS,    00000600
                                7 *     VERIFY THE ANSWERS AND THEN GO ON TO PART TWO. PLEASE TURN THE    00000700
                                8 *     PAGE AND BEGIN.                                                   00000800
```

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                    F01FEB69   6/05/70

000000                              10 ASUB1    CSECT                                                      00001000
                                    11 *                                        ADDRESSING QUESTIONS       00001100
000000 05A0                         12          BALR  10,0          ESTABLISH A BASE REG                   00001200
000002                              13          USING *,10                                                   00001300
000002 58B0 A04E            00050   14          L     11,=A(DOT)    ESTABLISH A SECOND BASE REGISTER       00001400
00002A                              15          USING DOT,11                                                 00001500
000006 5880 B01E            00048   16 INST1    L     8,FIELD2                                               00001600
                                    17 *                        $$$$$$$$$  QUESTION 8.21  $$$$$$$$$$$$$$$$$$$ 00001700
                                    18 *                        $ WHICH REG IS BEING USED AS A BASE REGISTER  $ 00001800
                                    19 *                        $ IN THE ABOVE INSTRUCTION?  WHY?             $ 00001900
                                    20 *                        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002000
                                    21 *                        $                                             $ 00002100
                                    22 *                        $                                             $ 00002200
                                    23 *                        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002300
00000A D203 B01E A008 00048 0000A   24 INST2    MVC   FIELD2,INST2                                           00002400
000010 D201 B01A A026 00044 00028   25          MVC   FIELD1,FIELDA                                          00002500
                                    26 *                        $$$$$$$$$  QUESTION 8.22  $$$$$$$$$$$$$$$$$$$ 00002600
                                    27 *                        $ EXPLAIN WHY THE ABOVE INSTRUCTION HAS TWO   $ 00002700
                                    28 *                        $ DIFFERENT BASE REGISTERS.                   $ 00002800
                                    29 *                        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002900
                                    30 *                        $                                             $ 00003000
                                    31 *                        $                                             $ 00003100
                                    32 *                        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00003200
000016 47F0 A018            0001A   33 INST3    B     INST4                                                  00003300
00001A 47F0 A01C            0001E   34 INST4    B     *+4                                                    00003400
00001E 5A70 B02A            00054   35          A     7,=F'2'                                                00003500
000022 4A60 B02E            00058   36          AH    6,=H'1'                                                00003600
000026 0000                         37          DC    H'0'                                                   00003700
000028 C1C1                         38 FIELDA   DC    C'AA'                                                  00003800
00002A C1C4C4D9C5E2E2               39 DOT      DC    C'ADDRESS'                                             00003900
000031 C1C2C9D3C9E3E8               40          DC    C'ABILITY'                                             00004000
000038 40E2C5C3E3C9D6D5             41          DC    C' SECTION'                                            00004100
000040 47F0 B016            00040   42          B     *             $$$$$$$$$  QUESTION 8.23  $$$$$$$$$$$$$$$$$$$ 00004200
                                    43 *                        $ WHY DOES THIS BRANCH INSTRUCTION HAVE THE   $ 00004300
                                    44 *                        $ BASE REGISTER THAT IT DOES                  $ 00004400
                                    45 *                        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004500
                                    46 *                        $                                             $ 00004600
                                    47 *                        $                                             $ 00004700
                                    48 *                        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004800
000044 0000                         49 FIELD1   DC    H'0'                                                   00004900
000046 0000
000048 00000000                     50 FIELD2   DC    F'0'                                                   00005000
                                    51 *                    ANSWERS TO THESE QUESTIONS ARE ON THE NEXT PAGE.  00005100
000050                              52          LTORG
000050 0000002A                     53                =A(DOT)
000054 00000002                     54                =F'2'
000058 0001                         55                =H'1'
```

LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                    58 *                    ANSWERS                                                 00005500

                    60 *  8.21  ------------------------------------------------------------------ 00005700
                    61 *        - THE SYMBOL FIELD2 HAS A GREATER DISPLACEMENT THAN THE SYM-  -   00005800
                    62 *        - BOL DOT.(FIELD2 IS DEFINED LATER IN THE PROGRAM THAN DOT)   -   00005900
                    63 *        - THEREFORE, BECAUSE OF THE     USING    DOT,11  STATEMENT,   -   00006000
                    64 *        - FIELD2 HAS A BASE REGISTER OF 11.                           -   00006100
                    65 *        ------------------------------------------------------------------ 00006200


                    67 *  8.22  ------------------------------------------------------------------ 00006400
                    68 *        - FIELDA IS DEFINED BEFORE DOT-FIELD1 DEFINED AFTER DOT       -   00006500
                    69 *        ------------------------------------------------------------------ 00006600


                    71 *  8.23  ------------------------------------------------------------------ 00006800
                    72 *        - SINCE ASTERIX (*) IS A SYMBOL, THEN SINCE IT IS DEFINED     -   00006900
                    73 *        - LATER THAN DOT IT USES A BASE REGISTER OF 11                -   00007000
                    74 *        ------------------------------------------------------------------ 00007100


                    76 *        THAT COMPLETES PART ONE OF THIS PROJECT. CONGRATULATIONS ON        00007300
                    77 *        ANOTHER JOB ACCOMPLISHED IN YOUR SEARCH FOR MORE KNOWLEDGE.       00007400
                    78 *        THAT'S A NICE WAY OF SAYING PLEASE PROCEED ON TO THE NEXT PART.   00007500
                    79          END                                                                00007600
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  FC1FEB69  6/05/70

001000                               2 PROGAA1  START X'1000'          ADDRESSABILITY ERRORS                  CC000200
                                     3          EXTRN PROGB                                                   00000300
                                     4          ENTRY CLRG,SIGN                                               00000400
001000 05C0                          5          BALR  12,0            FOR THIS PART YOU WILL SEE AN ERROR    00000500
001002                               6          USING *,12            MESSAGE FROM THE ASSEMBLER. SINCE      C0C00600
001002 47F0 C00E            01010    7          B     CLRG            FOR THIS PARTICULAR RUN OF THE PRO-    000007CC
001006 40D9E2D34BD7D74B              8          DC    C' RSL.PP.01'   JECT THE SYSTEM USED WAS OS, YOU WILL   00000800
001010 1766                          9 CLRG     XR    6,6             HAVE TO USE ONLY THE LAST THREE DIGITS 00C00900
001012 1788                         10          XR    8,8             OF THE MESSAGE WHEN LOOKING IT UP. THE CC001000
001014 0000 0000            00000   11          A     6,=F'1'         ANSWERS ARE ON THE PAGE FOLLOWING THE  00001100
         *** ERROR ***
001018 5840 C03A            0103C   12          L     4,GUESS         ERROR MESSAGES.                        000012CC
00101C 5850 CC8A            0108C   13          L     5,CHRB                                                 CC001300
001020 5054 0004            00004   14          ST    5,4(4)                                                 00001400
001024 0000 0000            C0000   15          L     13,=A(SVA)                                             CCC01500
         *** ERROR ***
001028 58F0 C032            01034   16          L     15,EXT1          $$$$$$$  QUESTION 8.31  $$$$$$$$$$$$$ 0000160C
00102C 05EF                         17          BALR  14,15          $ (ERROR MESSAGES ON THE NEXT PAGE)   $ CCC017C0
00102E 58F0 C036            01038   18          L     15,SCEXT       $                                     $ 00001800
001032 07FF                         19          BR    15             $ WHAT CAUSED THE TWO ERRORS SHOWN    $ CCC01900
001034 00000000                     20 EXT1     DC    A(PROGB)       $ ON THIS PAGE?                       $ C0002000
001038 C0001090                     21 SCEXT    DC    A(ASUB1)       $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 000021CC
00103C 00000000                     22 GUESS    DC    A(DCT)         $                                     $ 00002200
00104C CCCCCCCC000000000            23 SVA      DC    18F'0'         $                                     $ CCC023CC
001088 D3E4C3D2                     24 SIGN     DC    C'LUCK'         $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00002400
00108C D7D9C7C1                     25 CHRB     DC    C'PRGA'                                               CCC02500
001090                              26 ASUB1    CSECT                                                       00002600
001090 05C0                         27          BALR  12,0            $$$$$$$  QUESTION 8.32  $$$$$$$$$$$$$ 00002700
001092                              28          USING *,12           $ HOW WOULD YOU CORRECT THIS PROBLEM   $ 00002800
001092 58B0 C056            010E8   29          L     11,=A(DOT)     $ AND STILL CONTINUE TO MAKE USE OF   $ 00002900
000000                              30          USING DOT,11         $ THE LITERALS?                       $ 00003000
001096 5A70 C05A            010EC   31          A     7,=F'2'        $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ CC003100
00109A 4A6C C05E            010F0   32          AH    6,=H'1'        $                                     $ 00003200
00109E D203 B000 C02A 0CCC0 010BC   33          MVC   DCT,ZCCT       $                                     $ CC003300
0010A4 D203 C02E B000 010C0 00000   34          MVC   FINAL,DOT       $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00003400
0010AA D203 C036 B004 010C8 00004   35          MVC   FINAL+8,KAREN                                         C0003500
0010B0 D203 C03E B008 010D0 00008   36          MVC   FINAL+16,SANDY                                        00003600
0010B6 D203 C046 B00C 010D8 0000C   37          MVC   FINAL+24,DAVID                                        C0003700
0010BC D7C7C1F1                     38 ZOOT     DC    C'PGA1'                                               00003800
0010C0                              39 FINAL    DS    7F                                                    00003900
0010E0                              40          LTORG                                                       00004000
0010EC 00000001                     41                =F'1'
0010E4 00001040                     42                =A(SVA)
0010E8 00000000                     43                =A(DOT)
0010EC C0000002                     44                =F'2'
0010F0 0001                         45                =H'1'
000000                              46          CCM                                                         CCC04100
000000                              47 DOT      DS    F                                                     00004200
000004                              48 KAREN    DS    F                                                     00004300
000008                              49 SANDY    DS    F                                                     00004400
00000C                              50 DAVID    DS    F                                                     CC004500
```

```
STMT  ERROR CODE   MESSAGE

  11  IEU035       NEAR OPERAND COLUMN   8--ADDRESSABILITY ERROR
  15  IEU035       NEAR OPERAND COLUMN  11--ADDRESSABILITY ERROR


   2 STATEMENTS FLAGGED IN THIS ASSEMBLY
  16 WAS HIGHEST SEVERITY CODE
 129 PRINTED LINES
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                      F01FEB69   6/05/70


                                  53 *                    ANSWERS                                    00004800

                                  55 *  8.31 '''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''  00005000
                                  56 *       ' BOTH ERROR MESSAGES WERE CAUSED BY LITERALS. THERE AD-     '  00005100
                                  57 *       ' DRESSABLITY ERRORS. NOTICE THE ASSEMBLED ADDRESS ASSIGNED '  00005200
                                  58 *       ' TO THE TWO OF THEM. IT'S OUT OF THE RANGE OF ADDRESSES IN '  00005300
                                  59 *       ' THE FIRST CONTROL SECTION.                                 '  00005400
                                  60 *       '''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''  00005500


                                  62 *  8.32 '''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''  00005700
                                  63 *       ' PLACE A  LTORG INSTRUCTION BEFORE THE CSECT STATEMENT.    '  00005800
                                  64 *       ' THIS FORCES THE ASSEMBLER TO ASSEMBLE THE LITERALS WITHIN '  00005900
                                  65 *       ' THE ADDRESS BOUNDS OF THIS CONTROL SECTION                '  00006000
                                  66 *       '''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''  00006100



                                  68 *              THAT CONCLUDES THIS PART, THIS PROJECT AND THIS PAGE.    00006300
                                  69 *              PLEASE LET YOUR INSTRUCTOR KNOW YOU HAVE COMPLETED       00006400
                                  70 *              THIS PROJECT BY HANDING THE NEXT PAGE. THANK YOU         00006500
                                  71 *              FOR YOUR KIND ATTENTION.                                 00006600
```

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                        74 *            NAME----------                  00006900
                        75 *                                            00007000
                        76 *            CLASS---------                  00007100
                        77 *                                            00007200
                        78 *            DATE----------                  00007300
                        79 *                                            00007400
                        80 *            PROJECT #------                 00007500
                        81        END                                   00007600
```

```
RRRRRRRRRRR     EEEEEEEEEEEE    LL              PPPPPPPPPPP      AAAAAAAAAA                 CCCCCCCC     555555555555
RRRRRRRRRRRR    EEEEEEEEEEEE    LL              PPPPPPPPPPPP    AAAAAAAAAAAA               CCCCCCCCCC    555555555555
RR          RR  EE              LL              PP          PP  AA          AA          OO          OO  55
RR          RR  EE              LL              PP          PP  AA          AA          CC          OO  55
RR          RR  EE              LL              PP          PP  AA          AA          OO          OO  55
RRRRRRRRRRRR    EEEEEEEE        LL              PPPPPPPPPPPP    AAAAAAAAAAAAAA          CC          CC  555555555
RRRRRRRRRRR     EEEEEEEE        LL              PPPPPPPPPPP     AAAAAAAAAAAAAA          OO          OO  5555555555
RR     RR       EE              LL              PP              AA          AA          OO          CC          55
RR      RR      EE              LL              PP              AA          AA          OO          OO            55
RR       RR     EE              LL              PP              AA          AA          OO          OO            55
RR        RR    EEEEEEEEEEEE    LLLLLLLLLLLL    PP              AA          AA           CCOCCCOCCO   555555555555
RR         RR   EEEEEEEEEEEE    LLLLLLLLLLLL    PP              AA          AA            OOOCCCOC    55555555555
```

```
          99999999999
        999999999999
       99          99
       99          99
       99          99
       999999999999
       999999999999
                   99
                   99
       99          99
        999999999999
          9999999999
```

```
 LCC  OBJECT CODE   ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F01FEB69  6/C5/70
000000                             2         START                                                 00000200


                                   4 *       THIS PROJECT CONSISTS OF THREE SEPERATELY ASSEMBLED PROGRAMS   C0C00400
                                   5 *       THAT EXECUTE AS ONE PROGRAM. IT IS DESIGNED TO AID YOU IN      C0000500
                                   6 *       LEARNING ABOUT AN AREA THAT A PROGRAMMER CAN CODE KNOWN AS A   C0CC06CC
                                   7 *       COMMON.(CCM)                                                  00000700

                                   9 *       THE THREE PROGRAMS CONSIST OF A TOTAL OF FOUR CONTROL SECTIONS C0000900
                                  1C *       THAT USE A COMMON. EACH CONTROL SECTION MOVES SOME DATA INTO,  C0001000
                                  11 *       CUT OF, OR MODIFYS A WORD OF THIS COMMON AREA.                 00CC11CC

                                  13 *       BY ANSWERING THE QUESTIONS OF THIS PROJECT, YOU WILL LEARN HOW 00001300
                                  14 *       THE COMMON IS ADDRESSED.                                       00001400

                                  16 *             ************************************************         00CC1600
                                  17 *             *  LISTING OF EXAMPL1     PAGE      3                C0001700
                                  18 *             *                                                     CCCC18CC
                                  19 *             *  LISTING OF EXMPL2      PAGE      5                00001900
                                  20 *             *                                                     00002000
                                  21 *             *  LISTING OF EXAMPL3     PAGE      6                000021CC
                                  22 *             *                                                     C0002200
                                  23 *             *  LINKAGE EDITOR MAP1    PAGE      7                CCCC2300
                                  24 *             *                                                     CCCC2400
                                  25 *             *  CORE DUMP 1            PAGE      8                0000250C
                                  26 *             *                                                     000026CC
                                  27 *             *  LINKAGE EDITOR MAP2    PAGE      9                00002700
                                  28 *             *                                                     00002800
                                  29 *             *  CORE DUMP 2            PAGE      10               C0002900
                                  30 *             *                                                     C0C03000
                                  31 *             *  QUESTIONS              PAGE      11               0CCC3100
                                  32 *             ************************************************         00CC3200

                                  34 *       NOW PLEASE PROCEED ON TO PAGE 9 FOR THE QUESTIONS OF THIS      00003400
                                  35 *       PROJECT.                                                       C0003500
```

EXTERNAL SYMBOL DICTIONARY

PAGE 2

SYMBOL	TYPE	ID	ADDR	LENGTH	LD ID
EXMPL1	SD	01	001000	00007C	
PROGB	ER	02			
ASUB1	SD	03	001C80	000056	
	CM	04	000000	000010	

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```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                          F01FEB69  3/18/70
001000                                  1 EXMPL1   START X'1000'       FIRST PROGRAM OF COMMON PROJECT   00000100
                                        2          EXTRN PRCGB                                          00000200
001000 05C0                             3          BALR  12,0                                           00000300
001002                                  4          USING *,12                                           00000400
001002 5840 C026             01028      5          L     4,GUESS         I                              00000500
001006 5850 C072             01074      6          L     5,CHRB           > PRGA                        00000600
00100A 5054 0004             00004      7          ST    5,4(4)          I                              00000700
00100E 58D0 C076             01078      8          L     13,=A(SVA)                                     00000800
001012 58F0 C01E             01020      9          L     15,EXT1                                        00000900
001016 05EF                            10          BALR  14,15                                          00001000
001018 58F0 C022             01024     11          L     15,SCEXT                                       00001100
00101C 07FF                            12          BR    15                                           00001200
00101E 0000
001020 00000000                        13 EXT1     DC    A(PROGB)                                     00001300
001024 00001080                        14 SCEXT    DC    A(ASUB1)                                     00001400
001028 00000000                        15 GUESS    DC    A(DOT)                                       00001500
00102C 0000000000000000                16 SVA      DC    18F'0'                                       00001600
001074 D7D9C7C1                        17 CHRB     DC    C'PRGA'                                      00001700
001078                                 18          LTORG                                              00001800
001078 0000102C                        19                =A(SVA)
001080                                 20 ASUB1    CSECT                                              00001900
001080 05C0                            21          BALR  12,0                                           00002000
001082                                 22          USING *,12                                           00002100
001082 58B0 C04E             010D0     23          L     11,=A(DOT)                                     00002200
000000                                 24          USING DOT,11                                         00002300
001086 1777                            25          XR    7,7                                            00002400
001088 4A70 C052             010D4     26          AH    7,=H'1'                                        00002500
00108C D203 B000 C02A 00000 010AC     27          MVC   DOT,ZOOT                                       00002600
001092 D203 C02E B000 010B0 00000     28          MVC   FINAL,DOT                                      00002700
001098 D203 C036 B004 010B8 00004     29          MVC   FINAL+8,KAREN                                  00002800
00109E D203 C03E B008 010C0 00008     30          MVC   FINAL+16,SANDY                                 00002900
0010A4 D203 C046 B00C 010C8 0000C     31          MVC   FINAL+24,DAVID                                 00003000
0010AA 000F                            32          DC    H'15'           FORCE A PROGRAM CHECK          00003100
0010AC D7C7C1F1                        33 ZOOT     DC    C'PGA1'                                        00003200
0010B0 4040404040404040                34 FINAL    DC    7CL4' '                                        00003300
0010D0                                 35          LTORG                                              00003400
0010D0 00000000                        36                =A(DOT)
0010D4 0001                            37                =H'1'
000000                                 38          CCM                                                00003500
000000                                 39 DOT      DS    F                                            00003600
000004                                 40 KAREN    DS    F                                            00003700
000008                                 41 SANDY    DS    F                                            00003800
00000C                                 42 DAVID    DS    F                                            00003900
                                       43          END                                                00004000
```

EXTERNAL SYMBOL DICTIONARY

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SYMBOL	TYPE	ID	ADDR	LENGTH	LD ID
EXMPL2	SD	01	001000	000018	
PROGB	SD	02	001018	0000A0	
PROGC	ER	03			
	CM	04	000000	00000C	

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69   3/18/70

001000                                    1 EXMPL2   START X'1000'      SECOND PROGRAM FOR COMMON PROJECT      00000100
001000 05A0                               2          BALR  10,0                                              00000200
001002                                    3          USING *,10                                              00000300
001002 D204 A006 A00B 01008 0100D         4          MVC   HERE,THERE                                        00000400
001008 C2D3C1D5D2                         5 HERE     DC    C'BLANK'                                          00000500
00100D E3C8C5D9C5                         6 THERE    DC    C'THERE'                                          00000600
001018                                    7          LTORG                                                   00000700
001018                                    8 PROGB    CSECT                                                   00000800
001018 90EC D00C             0000C        9          STM   14,12,12(13)                                      00000900
00101C 05C0                              10          BALR  12,0                                              00001000
00101E                                   11          USING *,12                                              00001100
00101E 5890 C092             010B0       12          L     09,=A(EXMPCOM)                                    00001200
000000                                   13          USING EXMPCOM,09                                        00001300
001022 41F0 C03A             01058       14          LA    15,SAVBB                                          00001400
001026 50FD 0008             00008       15          ST    15,8(13)                                          00001500
00102A 50DF 0004             00004       16          ST    13,4(15)                                          00001600
00102E D203 9008 CC8A 00008 010A8        17          MVC   THIRD,LAIG                                        00001700
001034 D203 C086 9004 010A4 00004        18          MVC   A1,SECOND                                         00001800
00103A 41D0 C03A             01058       19          LA    13,SAVBB                                          00001900
00103E 58F0 C096             010B4       20          L     15,=V(PROGC)                                      00002000
001042 05EF                              21          BALR  14,15                                             00002100
001044 5800 C08A             010A8       22          L     0,LAIG                                            00002200
001048                                   23 GOBACK  EQU   *                                                  00002300
001048 58DD 0004             00004       24          L     13,4(13)                                          00002400
00104C 98EC D00C             0000C       25          LM    14,12,12(13)                                      00002500
001050 07FE                              26          BR    14                                                00002600
001052 0000
001054 00000000                          27 FLDC    DC    F'0'                                              00002700
001058 0000000000000000                  28 SAVBB   DC    18F'0'                                            00002800
0010A0 00000000                          29 A       DC    F'0'                                              00002900
0010A4 00000001                          30 A1      DC    F'1'                                              00003000
0010A8 D7D9C7C2                          31 LAIG    DC    C'PRGB'                                           00003100
0010AC 00000003                          32 C       DC    F'3'                                              00003200
0010B0                                   33       LTORG                                                   00003300
0010B0 00000000                          34                 =A(EXMPCOM)
0010B4 00000000                          35                 =V(PROGC)
000000                                   36          CCM                                                     00003400
000000 00000006                          37 EXMPCOM DC    F'6'                                              00003500
000004 5805 0000             00000       38 SECOND  L     0,0(5)                                            00003600
000008                                   39 THIRD   DS    F                                                 000037C0
                                         40          END                                                     00003800
```

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```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F01FEB69  3/18/70

001000                                    1 EXAMPL3  START X'1000'          THIRD PROGRAM OF PROJ ON COMMON   00000100
                                          2          ENTRY PROGC                                             00000200
001000 E3C8C9E240D9D6E4                   3          DC    C'THIS ROUTINE'                                   00000300
00100C C4D6C5E240D5D6E3                   4          DC    C'DOES NOTHING'                                   00000400
001018 90EC D00C              0000C       5 PROGC    STM   14,12,12(13)                                      00000500
00101C 05C0                               6          BALR  12,0                                            00000600
00101E                                    7          USING *,12                                            00000700
00101E 5880 C082              010A0       8          L     08,=A(HERECOM)                                  00000800
000000                                    9          USING HERECOM,08                                      00000900
001022 58F0 C086              010A4      10          L     15,=A(SAVCC)                                    00001000
001026 50FD 0008              00008      11          ST    15,8(13)                                        00001100
00102A 50DF 0004              00004      12          ST    13,4(15)                                        00001200
00102E 18DF                              13          LR    13,15                                           00001300
001030 D207 C076 8004 01094   00004      14          MVC   ORDER+4(8),HERECOM+4                            00001400
001036 D203 800C C07E 0000C   0109C      15          MVC   HERECOM+12(4),LAST                              00001500
00103C                                   16 GOBACK  EQU   *                                               00001600
00103C 58DD 0004              00004      17          L     13,4(13)                                        00001700
001040 98EC D00C              0000C      18          LM    14,12,12(13)                                    00001800
001044 07FE                              19          BR    14                                              00001900
001046 0000
001048 0000000000000000                  20 SAVCC   DC    18F'0'                                          00002000
001090 0000C0C000000000                  21 ORDER   DC    3F'0'                                           00002100
00109C D7D9C7C3                          22 LAST    DC    CL4'PRGC'                                       00002200
0010A0                                   23          LTORG                                                 00002300
0010A0 00000000                          24                =A(HERECOM)
0010A4 00001048                          25                =A(SAVCC)
000000                                   26          CCM                                                   00002400
000000                                   27 HERECOM DS    4F                                              00002500
                                         28          END                                                   00002600
```

```
F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
          VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000       ENTRY UTILITY

                                                MODULE MAP
```


CONTROL SECTION			ENTRY					
NAME	ORIGIN	LENGTH	NAME	LOCATION	NAME	LOCATION	NAME	LOCATION
EXMPL1	00	7C						
ASUB1	80	56						
EXMPL2	D8	18						
PROGB	F0	A0						
EXAMPL3	190	A8						
			PROGC	1A8				
UTILITY	238	5A0						
			PRINT	29A	PCHKRETN	4F6		
$BLANKCOM	7D8	10						

```
ENTRY ADDRESS       238
TOTAL LENGTH        7E8

****GO          DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
```

```
F.P. REGS.  00.000000 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006E800    0006E770 00000048 00004F20 0006E430
REGS 8-15    0006E778 CC000000 0006E7B0 0006E7F8    6F063822 0006E7B0 00002170 00063820

000000    00000000 0000019C F0F0F1C9 50071D90    00063820 00002A18 01040080 8003AFFE  *........001I.....................*
000020    0004000A 7000240C FF150001 6F063824    0000FF00 00000000 FE040131 800011D6  *.............................C*
000040    000085D0 0C0000F1 00001670 00002120    239096C0 00074200 00040000 000002C0  *.......1.....................*
000060    0C04C000 00000366 00040000 0CC003CA    0C000000 0000CA68 00040000 00000226  *.............................*

063820    05C00000 5840C026 5850C072 50540004    58D0C076 58F0C01E 05EF58F0 C02207FF  *.....  ..............0.....0....*
063840    00063910 000638A0 00063FF8 00000000    00000000 00000000 00000000 00000000  *...........8.................*
063860    00000000 000000CC 00000000 00000000    00000000 00000000 00000000 00000000  *.............................*
063880    00000000 00000000 00000000 00C00000    00000000 D7D9C7C1 0006384C 954695FF  *..................PRGA........*
0638A0    05C058B0 C04E1777 4A70C052 D203B000    C02AD203 C02EB000 D203C036 B004D203  *............K.....K.....K.....K.*
0638C0    C03EB008 D203C046 B00C000F D7C7C1F1    40404040 40404040 40404040 40404040  *....K........PGA1               *
0638E0    40404040 40404040 40404040 91019561    00063FF8 00019546 05A0D204 A006A00B  *               .......8......K.....*
063900    C2D3C1D5 D2E3C8C5 D9C5D002 4780948E    90ECD00C 05C05890 C09241F0 C03A50FD  *BLANKTHERE.................0....*
063920    000850DF 0004D203 90C8C08A D203C086    900441D0 C03A58F0 C09605EF 5800C08A  *......K.....K..........0........*
063940    58DD0004 98ECD00C 07FE0C00 0C000000    00000000 00000000 00000000 00000000  *.............................*
063960    00000000 0000000C 00000000 0C000000    00000000 00000000 00000000 00000000  *.............................*
063980    0C000000 00000000 00000000 00000000    00000000 00000000 00000000 00000001  *.............................*
0639A0    D7D9C7C2 00000003 00063FF8 000639C8    E3C8C9E2 40D9D6E4 E3C9D5C5 C4D6C5E2  *PRGB.......8...HTHIS ROUTINEDOES*
0639C0    40D5D6E3 C8C9D5C7 90ECD00C 05C05880    C08258F0 C08650FC 000850DF 000418DF  * NOTHING..........0...........*
0639E0    D207C076 8004D203 800CC07E 58DD0004    98ECD00C 07FE0000 00000000 00000000  *K.....K.....................*
063A00    00000000 0000000C 00C00000 CC000000    00000000 00000000 00000000 00000000  *.............................*
063A20    00000000 0000000C 00000000 00000000    00000000 00000000 00000000 00000000  *.............................*
063A40    00000000 00000000 00000000 D7D9C7C3    00063FF8 000639F8 90ECD00C 05C004F0  *............PRGC...8...8.......0*

063FE0    00000000 0000CA68 00040000 00000226    00063A58 00063FC8 C3244150 002C1883  *.....................QC.......*
064000    47F0C0E8 45E0C16A 00000000 00009FD0    0146004D 00000001 00000000 00000000  *.0.Y..A.....................*
064020    00000000 000C0000 00000000 00C04000    9400025D 00790000 00008000 000A0000  *.............. ..............*

*************************************************************************************************************************
```

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```
F44-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED LIST,MAP,NCAL,LET
          VARIABLE OPTIONS USED - SIZE=(45056,6144)                    DEFAULT OPTION(S) USED
IEW0000       ENTRY UTILITY

                                                MODULE MAP

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME    LOCATION     NAME    LOCATION     NAME    LOCATION     NAME    LOCATION

  EXMPL1       00       7C
  ASUB1        80       56
  EXMPL2       D8       18
  PROGB        F0       A0
  EXAMPL3     190       A8
                                           PROGC       1A8
  UTILITY     238      5A0
                                           PRINT       29A     PCHKRETN    4F6
  $BLANKCOM   7D8       10


  ENTRY ADDRESS      238
  TOTAL LENGTH       7E8

****GO          DOES NOT EXIST BUT HAS BEEN ADDED TC DATA SET
```

```
F.P. REGS.  00.000000 00000000   00.000000 00000000   00.000000 00000000   00.000000 00000000

REGS 0-7     00000050 0006E7F8 0006E800 0006E800    00063FF8 D7D9C7C1 00004F20 00000001
REGS 8-15    0006E778 00000000 0006E7B0 00063FF8    6F0638A2 0006384C 6F063838 000638A0

000000    00000000 0000032C F0F0F3C2 50071D90    00063820 00002A18 01040080 8003AFFE  *........003B....................*
000020    0004000A 7000240C FF150001 6F0638CC    0000FF00 00000000 FF040135 800025B4  *................................*
000040    00001598 08000000 00001590 00002120    229628C0 00074200 00040000 000002C0  *................................*
000060    00040000 00000366 00C40000 0000030A    00000000 0000CA68 00040000 00000226  *................................*

063820    05C05840 C0265850 C0725054 00C458D0    C07658F0 C01E05EF 58F0C022 07FF0000  *... ..............0.....C......*
063840    00063910 000638A0 00063FF8 00000000    00000000 00063950 6F063838 00063910  *............8.....................*
063860    00000050 0006E7F8 0006E800 0006E800    00063FF8 D7D9C7C1 00004F20 0006E430  *......X8..Y...Y....8PRGA......U.*
063880    0006E778 00000000 0006E7B0 0006E7F8    6F063822 D7D9C7C1 0006384C 954695FF  *..X.......X...X8....PRGA........*
0638A0    05C058B0 C04E1777 4A70C052 D203B000    C02AD203 C02EB000 D203C036 B004D203  *.............K.....K.....K.....K.*
0638C0    C03EB008 D203C046 B00C000F D7C7C1F1    D7C7C1F1 40404040 D7D9C7C1 40404040  *....K........PGA1PGA1    PRGA    *
0638E0    D7D9C7C2 40404040 D7D9C7C3 91019561    00063FF8 00019546 05A0D204 A006A00B  *PRGB    PRGC.......8......K.....*
063900    C2D3C1D5 D2E3C8C5 D9C5D002 478094BE    90ECD00C 05C05890 C09241F0 C03A50FD  *BLANKTHERE.................0....*
063920    000850DF 0004D203 9008C08A D203C086    900441D0 C03A58F0 C09605EF 5800C08A  *......K.....K..........0........*
063940    58DD0004 98ECD00C 07FE0000 00000000    00000000 0006384C 000639F8 6F06393C  *............................8....*
063960    000639C8 00000050 0006E7F8 0006E800    0006E800 00063FF8 D7D9C7C1 00004F20  *...H.......X8..Y...Y....8PRGA....*
063980    0006E430 0006E778 00063FF8 0006E7B0    0006E7F8 6F063916 00000000 D7D9C7C1  *..U...X....8..X...X8........PRGA*
0639A0    D7D9C7C2 00000003 00063FF8 000639C8    E3C8C9E2 40D9D6E4 E3C9D5C5 C4D6C5E2  *PRGB.......8...HTHIS ROUTINEDOES*
0639C0    40D5D6E3 C8C9D5C7 90ECD00C 05C05880    C08258F0 C08650FD 000850DF 000418DF  * NOTHING...........0............*
0639E0    D207C076 8004D203 800CC07E 58DD0004    98ECD00C 07FE0000 00000000 00063950  *K.....K........................*
063A00    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000  *................................*
063A20    00000000 00000000 00000000 00C00000    00000000 00000000 00000000 00000000  *................................*
063A40    00000000 D7D9C7C1 D7D9C7C2 D7D9C7C3    00063FF8 000639F8 90ECD00C 05C004F0  *....PRGAPRGBPRGC...8...8.......0*

063FE0    00000000 0000CA68 00040000 00000226    00063A58 00063FD8 D7C7C1F1 D7D9C7C1  *.....................QPGA1PRGA*
064000    D7D9C7C2 D7D9C7C3 00000000 00C09FD0    0146004D 00000001 00000000 00000000  *PRGBPRGC.......................*
064020    00000000 00000000 00000000 00004000    9400025D 00790000 00008000 000A0000  *.............. ................*
```

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****

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                         37 *          $$$$$$$$$$$$$$  QUESTION 9.01  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00003700
                         38 *          $ REFER TO THE FIRST DUMP FOR THIS QUESTION                       $ 00003800
                         39 *          $                                                                 $ 00003900
                         40 *          $ WHY DOESN'T THE DUMP AND ANY OF THE ASSEMBLER LISTINGS          $ 00004000
                         41 *          $ OF THE COMMON AGREE?                                            $ 00004100
                         42 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004200
                         43 *          $                                                                 $ 00004300
                         44 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004400

                         46 *          $$$$$$$$$$$$$$  QUESTION 9.02  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00004600
                         47 *          $ EACH OF THE CONTROL SECTIONS REFERENCES THE SECOND WORD          $ 00004700
                         48 *          $ OF THE COMMON AREA.                                             $ 00004800
                         49 *          $                                                                 $ 00004900
                         50 *          $ LIST HOW EACH OF THE FOLLOWING CSECTS ADDRESS THIS WORD.         $ 00005000
                         51 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00005100
                         52 *          $  EXMPL1--                                                       $ 00005200
                         53 *          $  PROGB---                                                       $ 00005300
                         54 *          $  EXMPL3--                                                       $ 00005400
                         55 *          $  ASUB1---                                                       $ 00005500
                         56 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00005600

                         58 *          $$$$$$$$$$$$$$  QUESTION 9.03  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00005800
                         59 *          $ MATCH THE CSECT NAME WITH THE BASE REGISTER THE CSECT            $ 00005900
                         60 *          $ USES TO ADD OR REMOVE INFORMATION FROM THE COMMON.              $ 00006000
                         61 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00006100
                         62 *          $     CSECT NAME           BASE REGISTER                           $ 00006200
                         63 *          $                                                                 $ 00006300
                         64 *          $  ___ EXMPL1             A. REG 4                                $ 00006400
                         65 *          $  ___ ASUB1              B. REG 9                                $ 00006500
                         66 *          $  ___ PROGB              C. REG 8                                $ 00006600
                         67 *          $  ___ EXMPL3             D. REG 11                               $ 00006700
                         68 *          $                         E. REG 10                               $ 00006800
                         69 *          $                         F. NONE                                 $ 00006900
                         70 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007000

                         72 *          $$$$$$$$$$$$$$  QUESTION 9.04  $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007200
                         73 *          $ WHY DOES PROGB ONLY HAVE A THREE WORD COMMON, WHILE THE          $ 00007300
                         74 *          $ OTHER THREE SECTS HAVE FOUR WORDS?                              $ 00007400
                         75 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007500
                         76 *          $                                                                 $ 00007600
                         77 *          $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ 00007700
```

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LOC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT F01FEB69 6/05/70

```
                                79 *          ---- ANSWERS----                                                  00007900
                                80 *  9.01    ============================================================      00008000
                                81 *          = DATA HAS TO BE PLACED THERE AT EXECUTION TIME. THE DC'S  =      0000810C
                                82 *          = AND DS STATEMENTS BUY NOTHING EXCEPT GIVING YOU THE      =      CCCC8200
                                83 *          = BENIFITS OF USING SYMBOLS. THIS LETS THE ASSEMBLER       =      00008300
                                84 *          = ASSIGN LENGTHS AND DISPLACEMENTS TO THE INSTRUCTIONS YOU =      CCC08400
                                85 *          = REFERENCE THE COMMON WITH.                               =      C0CC8500
                                86 *          ============================================================      00008600

                                88 *  9.02    ============================================================      00008800
                                89 *          =   EXMPL1----- ADRESS OF DOT+4                            =      C0008900
                                90 *          =    (STATEMENT NUMBERS 5,6 AND 7)                         =      C0CC9000
                                91 *          =                                                          =      00009100
                                92 *          =   PROGB--- SECOND                                        =      00CC9200
                                93 *          =                                                          =      00009300
                                94 *          =   EXMPL3-- HERECOM+4                                     =      CCCC9400
                                95 *          =                                                          =      00009500
                                96 *          =   ASUB1--- KAREN                                         =      00CC9600
                                97 *          ============================================================      00009700

                                99 *  9.03    ============================================================      00009900
                               100 *          =     CSECT NAME          BASE REGISTER                    =      C0010000
                               101 *          =                                                          =      CCC10100
                               102 *          =   -A- EXMPL1            A. REG 4                         =      C0010200
                               103 *          =   -D- ASUB1             B. REG 9                         =      00C10300
                               104 *          =   -B- PRCGB             C. REG 8                         =      C0010400
                               105 *          =   -C- EXMPL3            D. REG 11                        =      CCC10500
                               106 *          =                         E. REG 10                        =      C0010600
                               107 *          =                         F. NONE                          =      CCC107C0
                               108 *          ============================================================      C0010800

                               110 *  9.04    ============================================================      00011000
                               111 *          = PROGB ONLY HAS TO DISPLACE INTO THE COMMON A MAXIMUM OF  =      CC011100
                               112 *          = 8 BYTES TO ADDRESS DATA, THE OTHER THREE CSECTS HAVE TO  =      000112C0
                               113 *          = GO TO A MAXIMUM OF 12 BYTES.                             =      C0C11300
                               114 *          ============================================================      C0C11400

                               116 *        THAT CONCLUDES THIS PROJECT. PLEASE TURN YOUR ANSWER CUE TO       C0011600
                               117 *         R E D .                                                          C0C11700
```