USERS MANUAL FOR COMPUTER PROGRAM HEPCAT

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TRW
SYSTEMS GROUP

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PROJECT TECHNICAL REPORT

USER'S MANUAL
FOR COMPUTER PROGRAM
HEPCAT

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Prepared for
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ABSTRACT

The purpose of the HEPCAT (Houston Engine Performance Calculation and Transient) computer program is to provide an engineering tool which can perform automatic data reduction and test data analysis in support of rocket engine test programs conducted at the MSC Thermochemical Test Area (TTA). This document describes the program and provides both the user's and programmer's manuals.

HEPCAT is functionally divided into three areas: data acquisition and reduction, steady state engine performance analysis and the reduction of data to standard conditions for run-to-run test correlation. All of these functional areas of the program can be user specified to both read and output the test data in a sequential converted format. Data reduction takes place automatically when the user utilizes the steady-state engine performance and the engine standarization options. The program has the flexibility to provide the user with the option to output any parameters available from calculations or measured data. Included in the user's manual is the engineering formulation, program operating instructions, validation sample case and the data tape format of the TTA SEL 600 Computer operating in mode 3.

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1. PROGRAM DESCRIPTION

A data reduction program for evaluating engine performance parameters from ground tests conducted in the MSC Thermochemical Test Facilities has been developed in support of the MSC Auxiliary Propulsion and Pyrotechnics Branch. This program provides a rapid scan of large quantities of data recorded on magnetic tape at the test facilities, computes steady-state engine performance parameters based on the test data and reduces the performance parameters to standardized test conditions. In addition, the program provides the capability for plotting all calculated or measured parameters. The program was developed to process test data regardless of the errors encountered on the data tape.

1.1.0 THERMOCHEMICAL TEST FACILITIES

The propulsion test setup for the gas/gas system is located in Bldg. 353 at the MSC Thermochemical Test Area (TTA) and in general consists of supply tanks for both hydrogen and oxygen gases, main shutoff valves, two pressure regulators in series, orifices, main and ignitor lines, engine and ignitor shutoff valves and facilities for a multipe configuration test engine. Distributed throughout the test system are pressure and temperature sensing devices which provide the data measurements recorded during an engine test firing. A simplified schematic of the installation and location of measurements is presented in Figure 1-1.

During a test firing the data parameters are permanently recorded on magnetic tape by a SEL Digital Data System Computer. This computer multiplexes the data in a unique non-sequential cyclic manner as illustrated in Figure 1 -2. The cyclic channel sampling presented in Figure 1 -2 conforms to the Mode 3 (normal operating mode) multiplex sequence by the SEL 600 in this test facility. As shown on the figure, the sample rate for channels 1 through 30 (500 S/S)

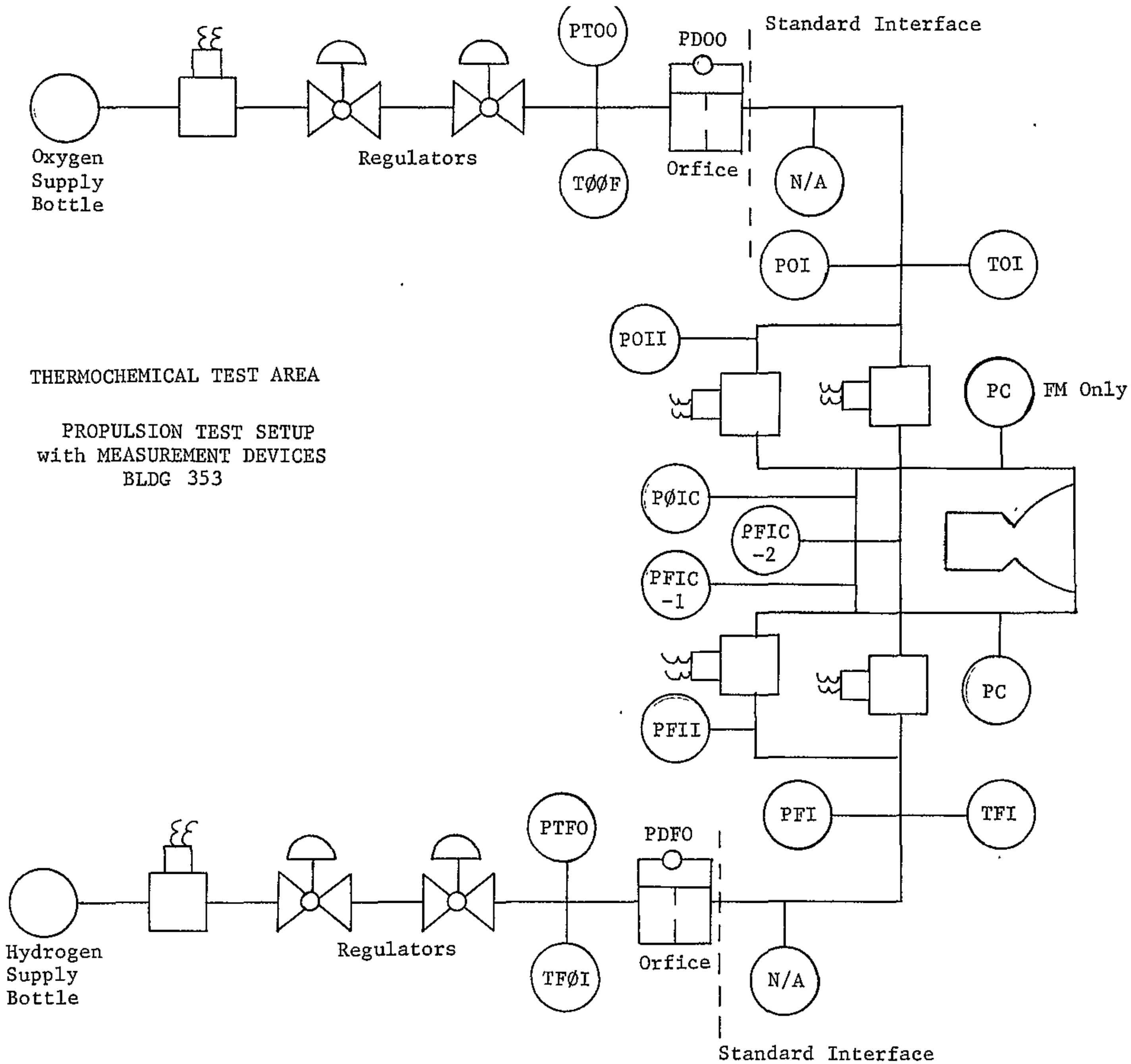

Standard Interface
PTOO
PDOO
Oxygen Supply Bottle
Regulators
TØØF
Orfice
N/A
POI
TOI
POII
THERMOCHEMICAL TEST AREA
PROPULSION TEST SETUP
with MEASUREMENT DEVICES
BLDG 353
PC
FM Only
PØIC
PFIC -2
PFIC -1
PC
PFII
PFI
TFI
PTFO
PDFO
Hydrogen Supply Bottle
Regulators
TFØI
Orfice
N/A
Standard Interface

FIGURE 1 -1

SEL 600 MULTIPLEX SCHEME - MODE 3
(CHANNEL SEQUENCING SCHEME)

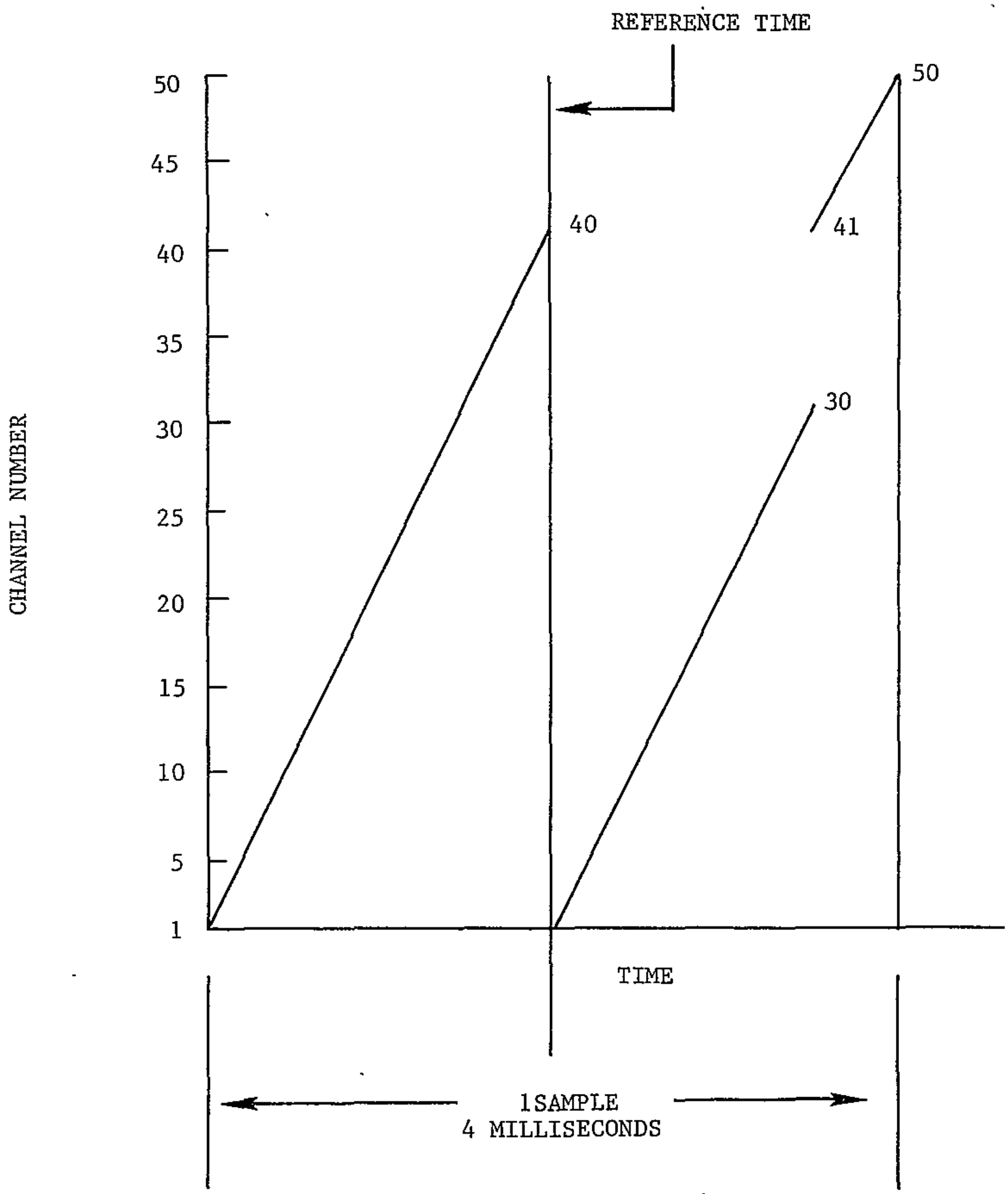
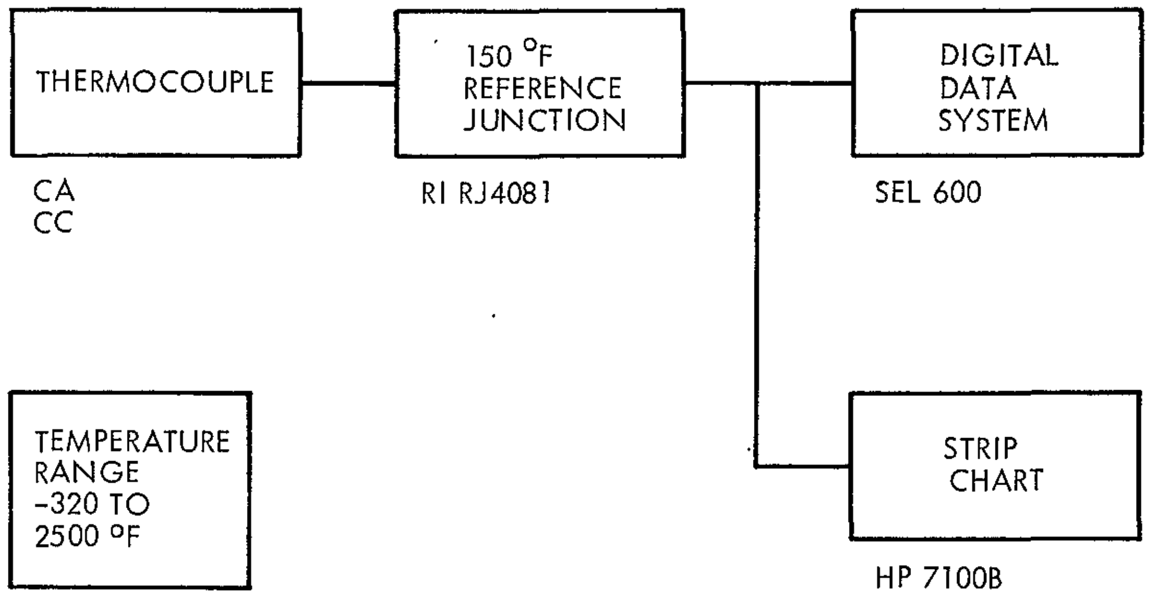


FIGURE 1 -2

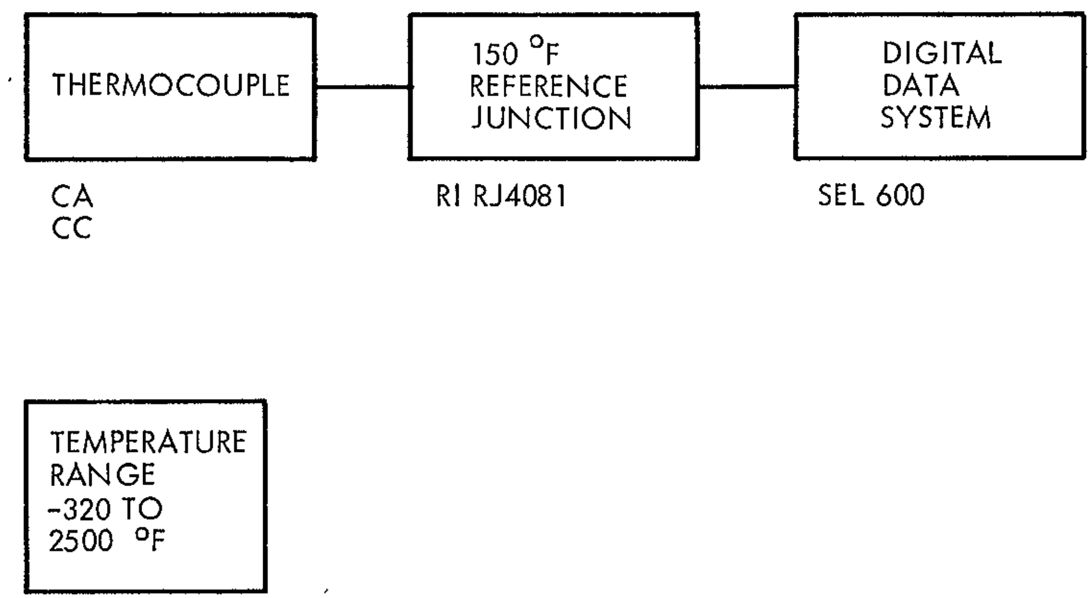
are twice that of Channels 31 through 50 (250 S/S). The magnetic tape generally contains data from one day's testing which can be up to approximately 25 engine pulse test runs. Figures 1 -3 through 1 -15 present possible configurations for measuring temperature, pressure, force and flows for both gas or liquid systems using the TTA SEL 600 Digital Data System.

Table 1 -1 presents typical SEL 600 Computer Test Channel Assignments with respect to test variable name and symbol.



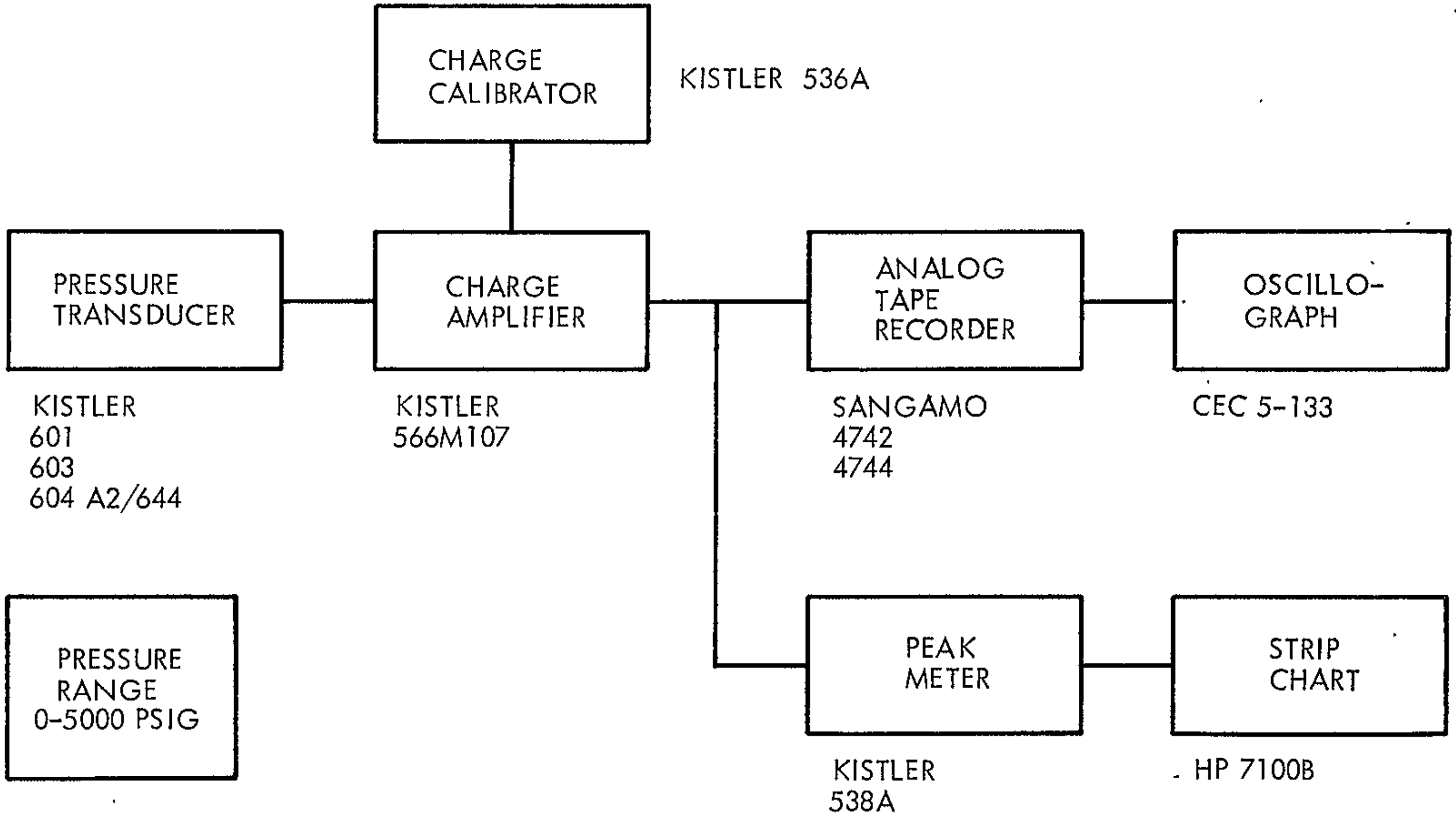
TEMPERATURE MEASUREMENT--THERMOCOUPLE SENSORS
PROPULSION TEST FACILITY

FIGURE 1 -3



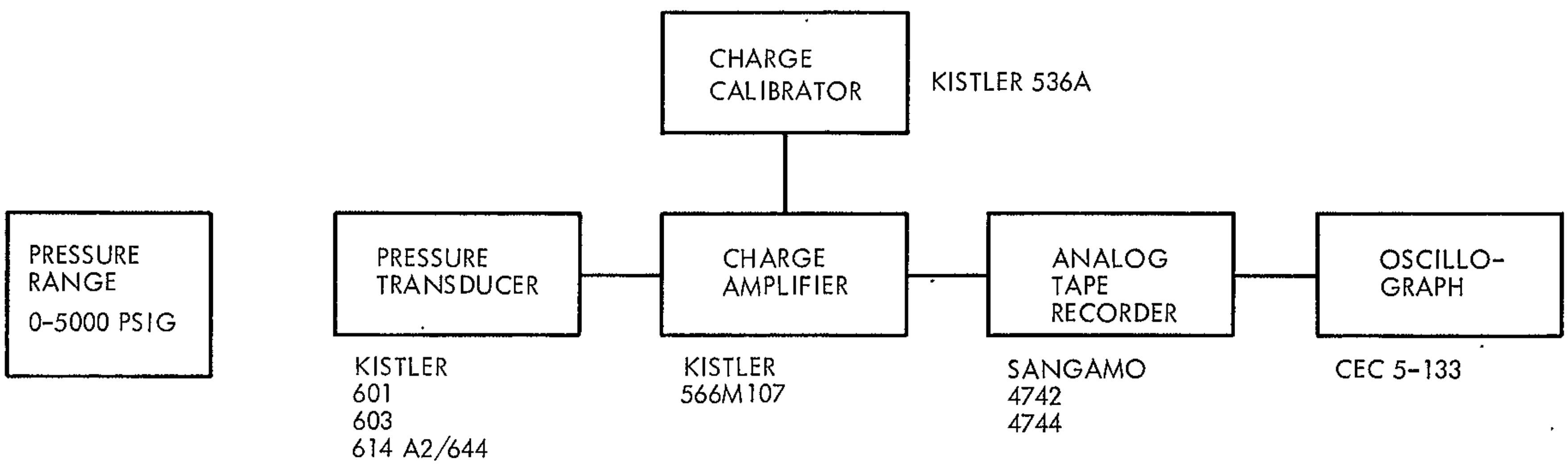
TEMPERATURE MEASUREMENT - THERMOCOUPLE SENSORS
PROPULSION TEST FACILITY

FIGURE 1 -4



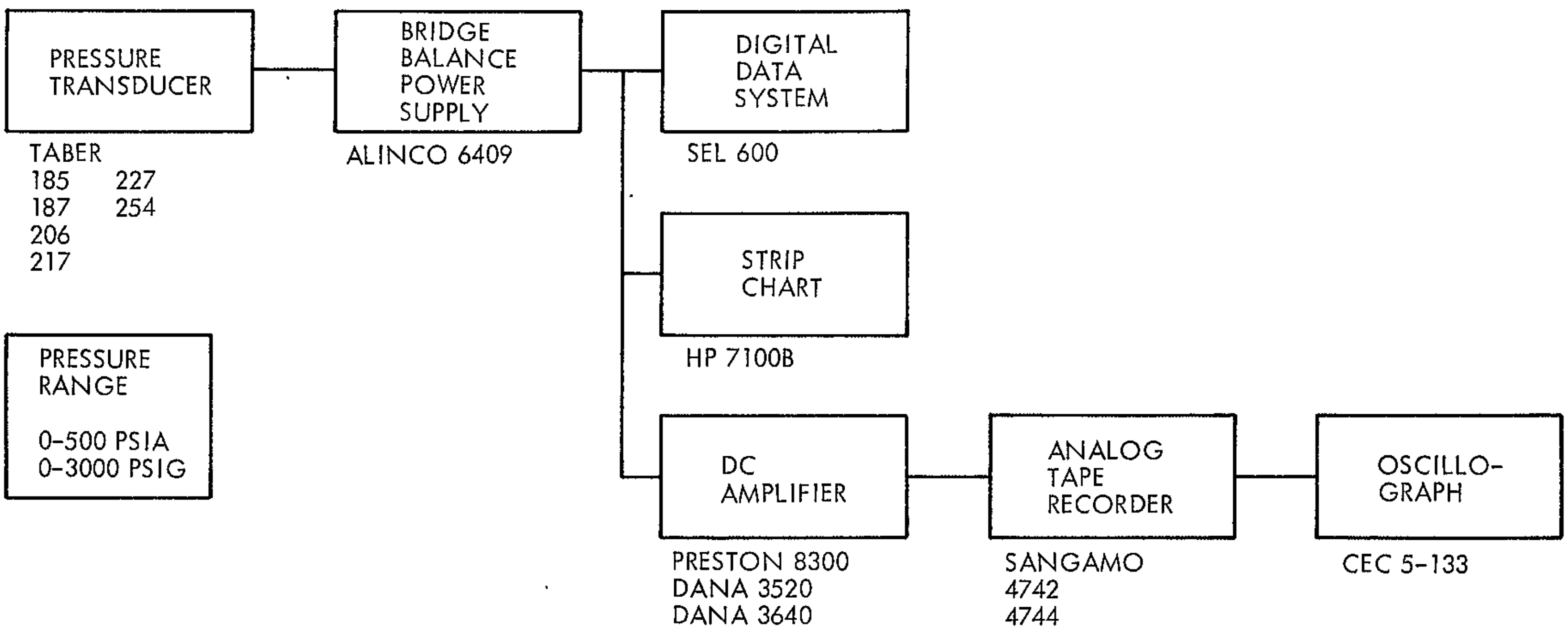
PRESSURE MEASUREMENT - PIEZOELECTRIC SENSORS
PROPULSION TEST FACILITY

FIGURE 1 -5



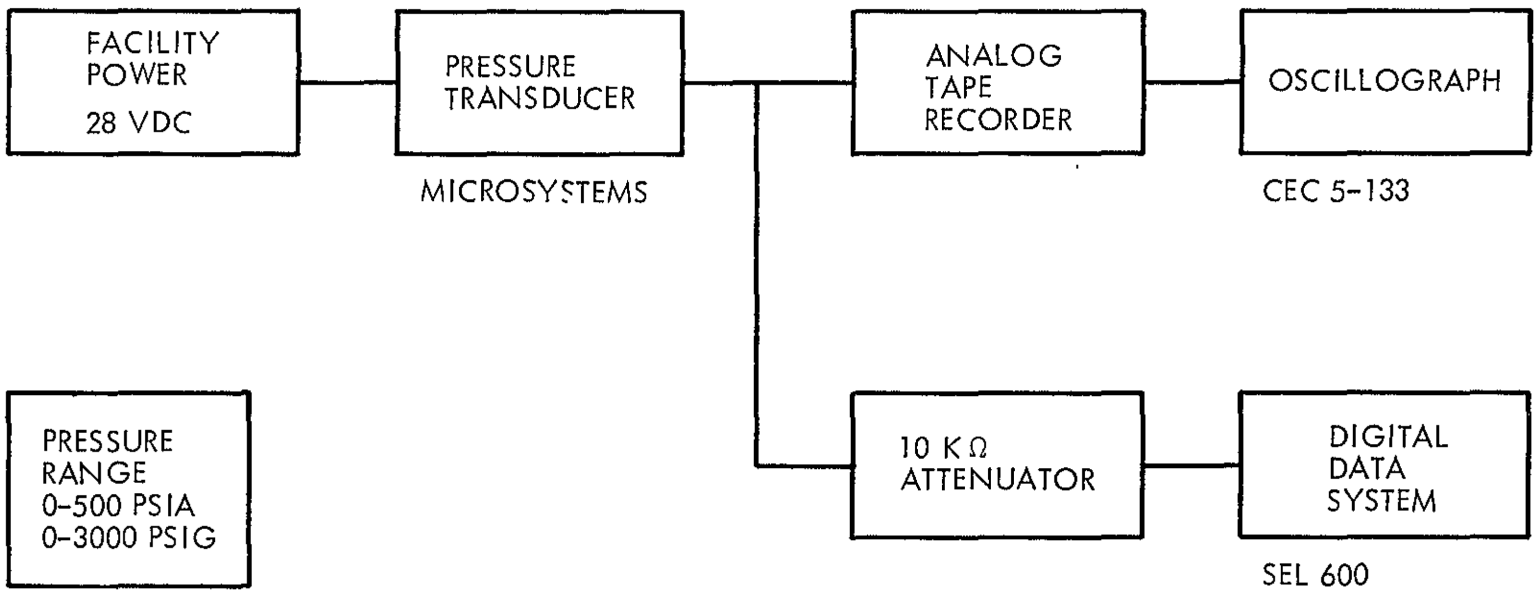
PRESSURE MEASUREMENT - PIEZOELECTRIC SENSORS
PROPULSION TEST FACILITY

FIGURE 1.-6



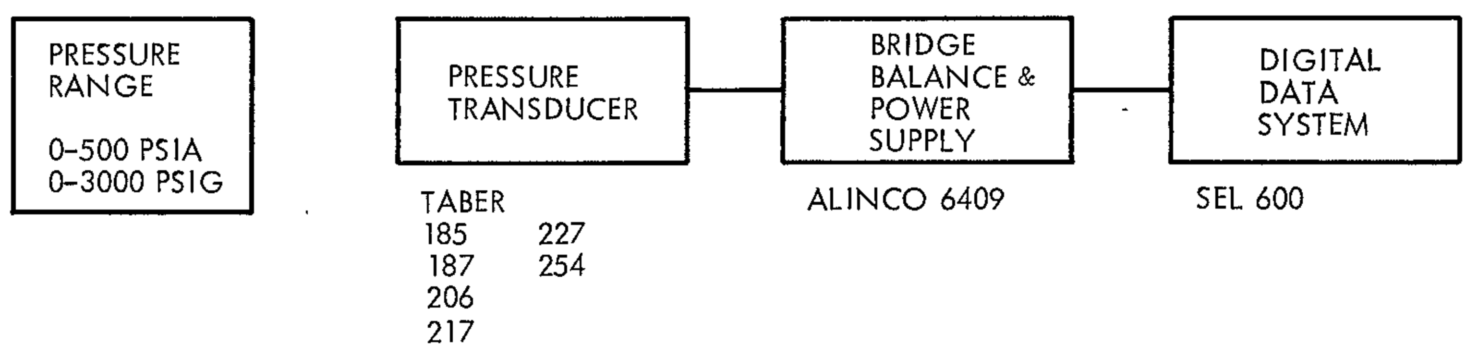
PRESSURE MEASUREMENT - STRAIN GAGE SENSORS
PROPULSION TEST FACILITY

FIGURE 1 -7



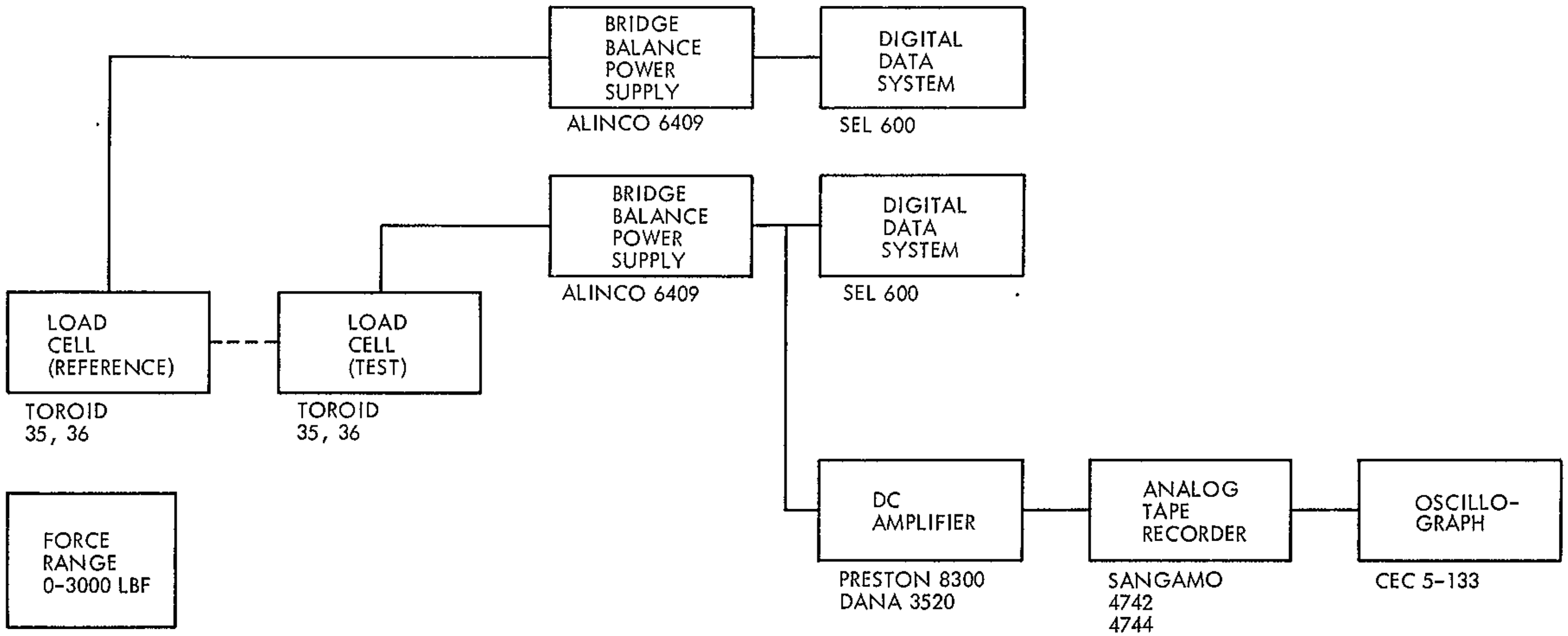
PRESSURE MEASUREMENT - STRAIN GAGE SENSORS
PROPULSION TEST FACILITY

FIGURE 1 -8



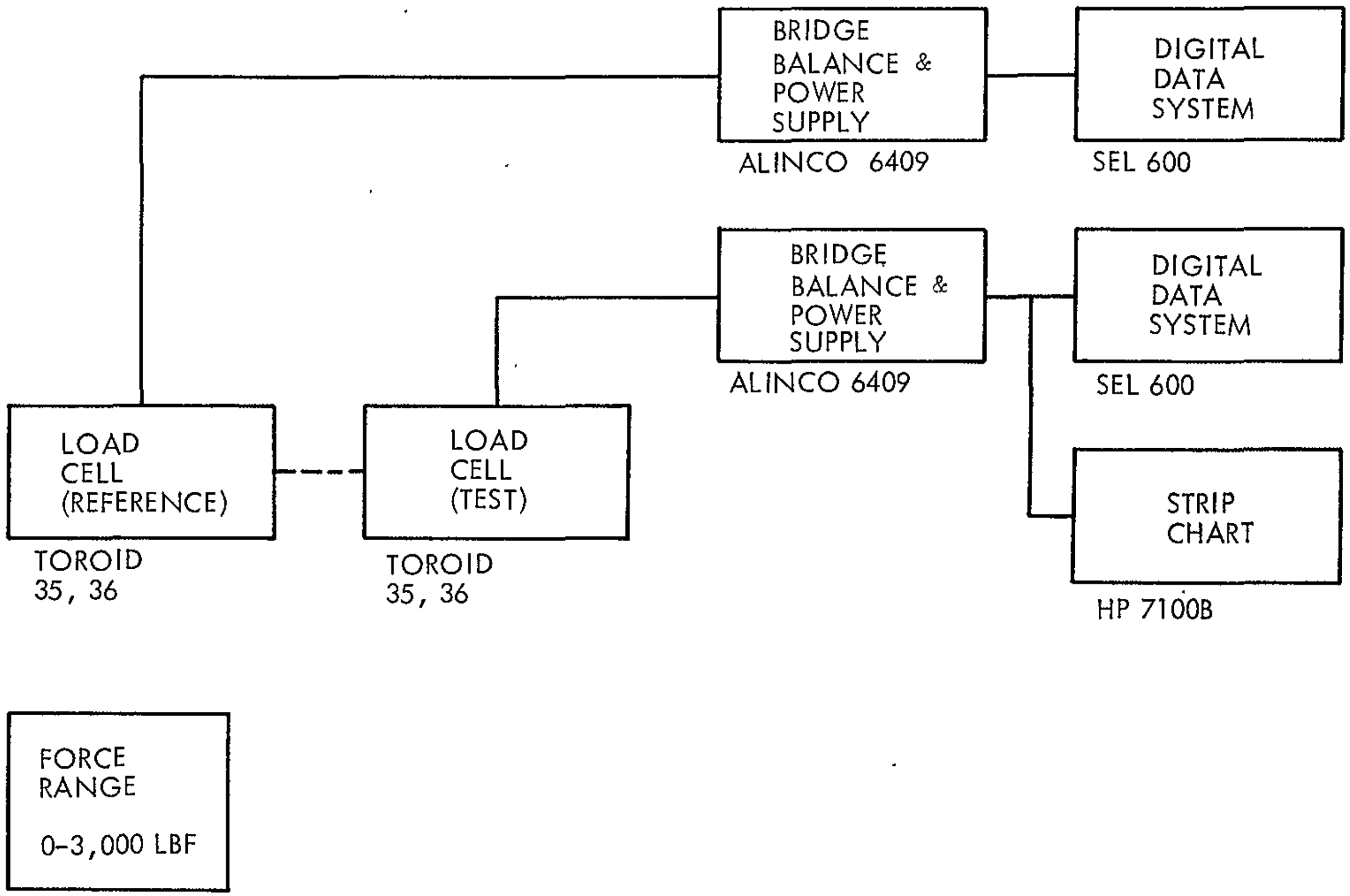
PRESSURE MEASUREMENT - STRAIN GAGE SENSORS
PROPULSION TEST FACILITY

FIGURE 1 -9



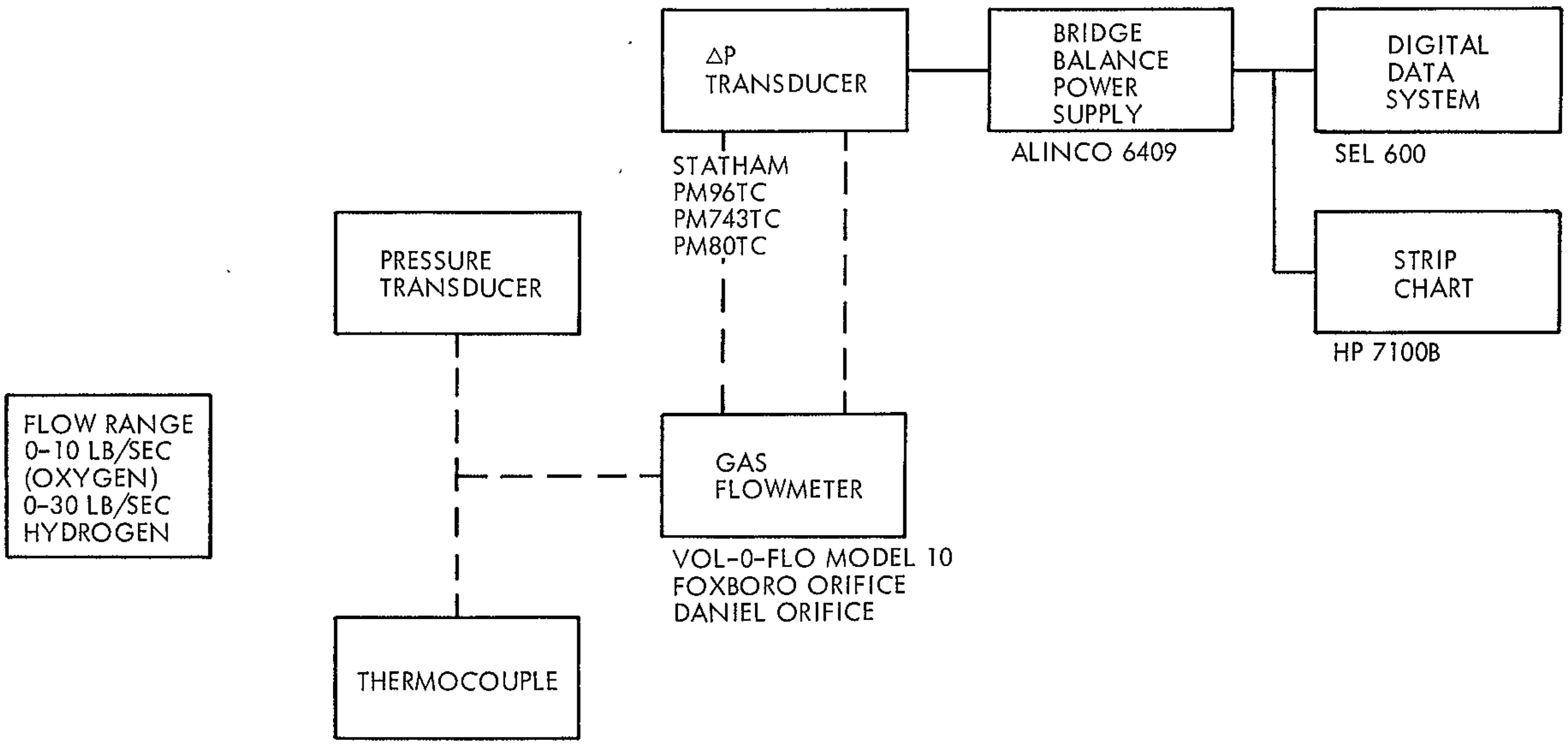
FORCE MEASUREMENT
PROPULSION TEST FACILITY

FIGURE 1 -10



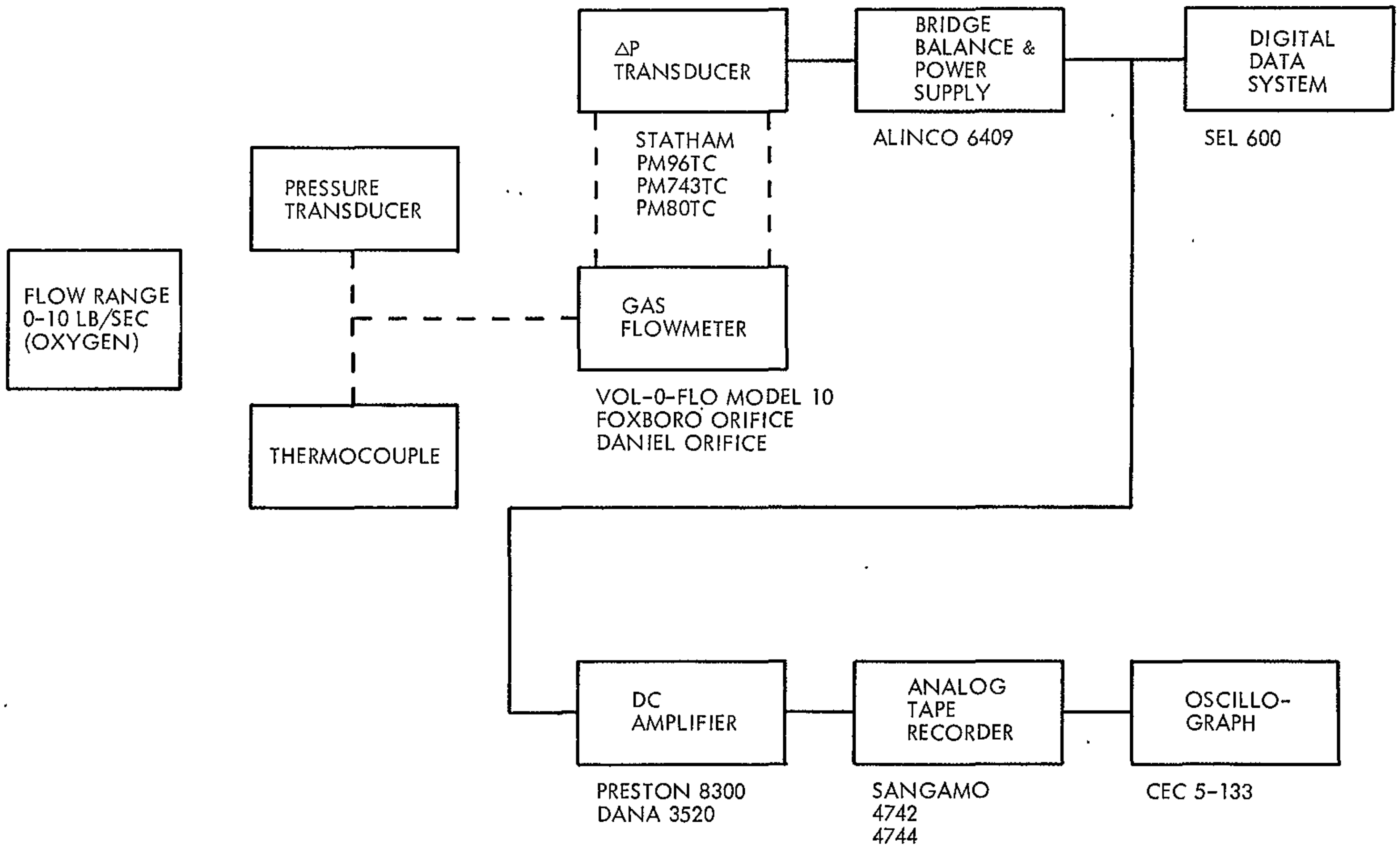
FORCE MEASUREMENT
PROPULSION TEST FACILITY

FIGURE 1 -11



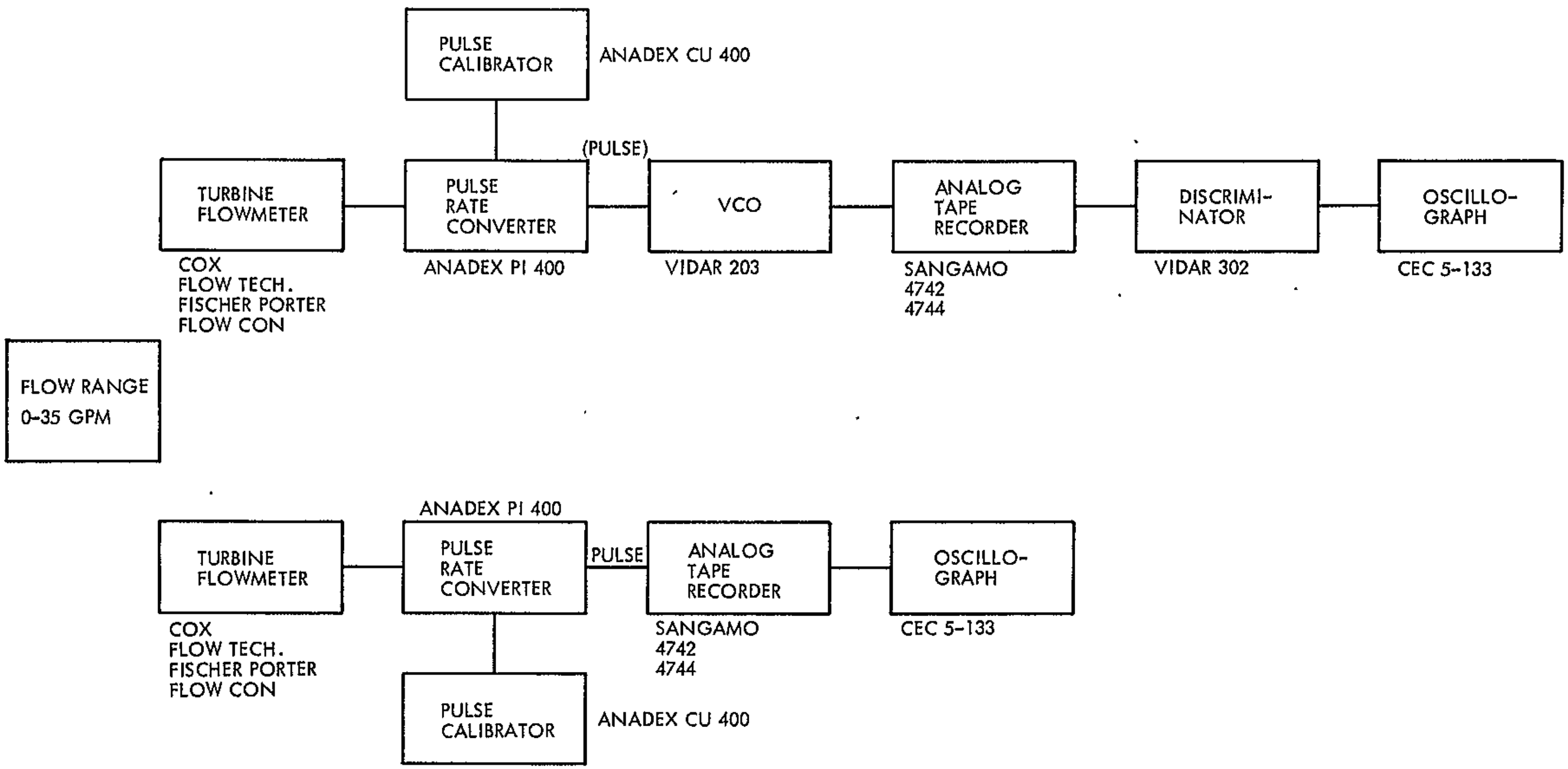
FLOW MEASUREMENT - GAS
PROPULSION TEST FACILITY

FIGURE 1 -12



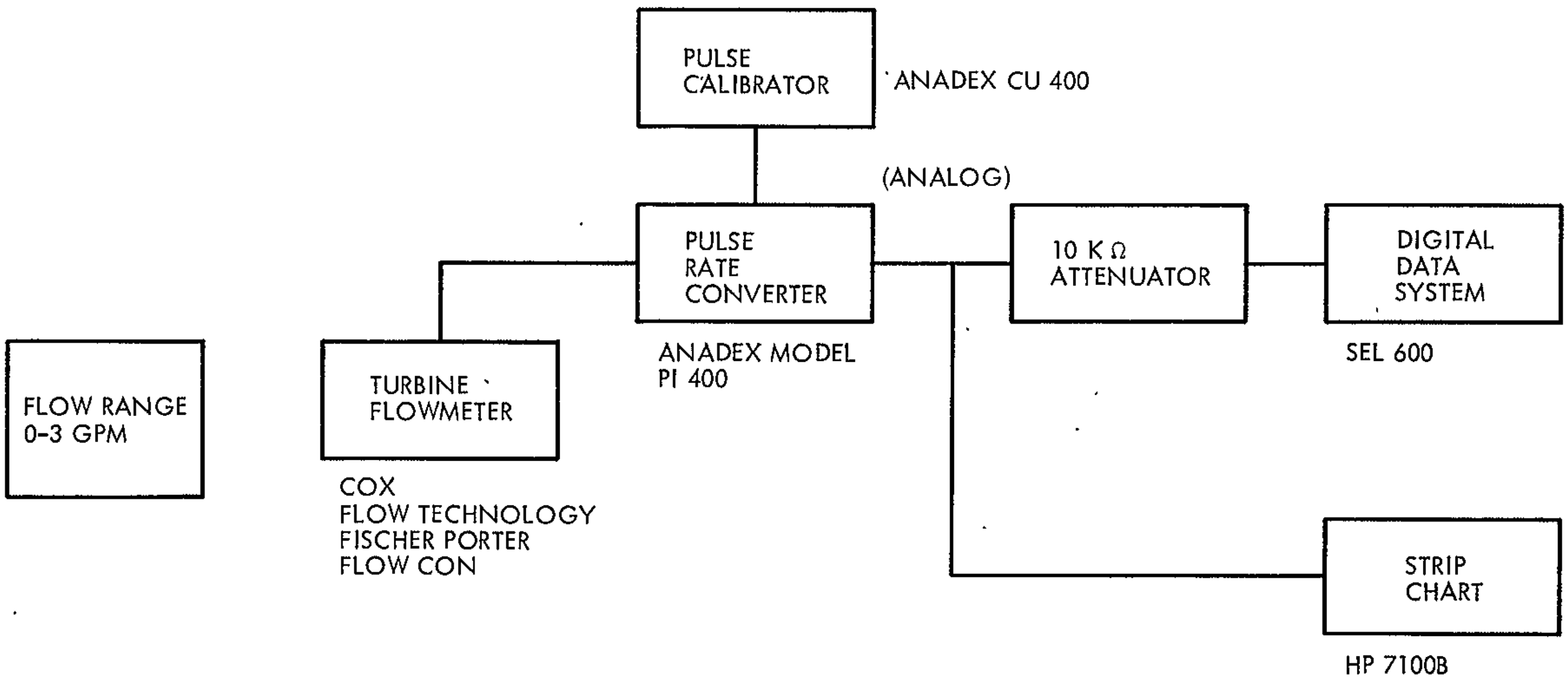
FLOW MEASUREMENT - GAS
PROPULSION TEST FACILITY

FIGURE 1 -13



FLOW MEASUREMENT - LIQUID PROPULSION TEST FACILITY

FIGURE 1 -14



FLOW MEASUREMENT - LIQUID
PROPULSION TEST FACILITY

FIGURE 1 -15

TABLE 1-1

Typical SEL 600 Computer Test Channel Assignments

	Test Variable Name	Variable Symbol
Channel 1	Thrust	F
2	Chamber Pressure	PC
3	Fire Voltage	FV
4	Fuel Injection Pressure	PFI
5	Oxidizer Injection Pressure	POI
6	Fuel Ignition Injection Pressure	PFII
7	Oxidizer Ignitor Injection Pressure	POII
8	Fuel Orifice Total Pressure	PTFO
9	Oxidizer Orifice Total Pressure	PTOO
10	Fuel Orifice ΔP	PDFO
11	Oxidizer Orifice ΔP	PDOO
12	Injector Fuel Cavity Pressure #1	PFIC1
13	Injector Oxidizer Cavity Pressure	POIC
14	Injector Fuel Cavity Pressure #2	PFIC2
15	Spark Signal	SS
16	Turbine Flowmeter Fuel Inlet Pressure	PFTI
17	Turbine Flowmeter Oxidizer Inlet Pressure	POTI
18	Fuel Injection Temperature	TFI
19	Oxidizer Injection Temperature	TOI
20	Chamber Temperature #1	TC1
21	Chamber Temperature #2	TC2
22	Chamber Temperature #3	TC3
23	Chamber Temperature #4	TC4
24	Chamber Temperature #5	TC5
25	Chamber Temperature #6	TC6

TABLE 1 -1 (Continued)

		Test Variable Name	Variable Symbol
Channel	26-31	Not Assigned	
	32	Fuel Orifice Inlet Temperature	TFOI
	33	Oxidizer Orifice Inlet Temperature	TOOI
	34	Turbine Flowmeter Fuel Inlet Temperature	TFTI
	35	Turbine Flowmeter Oxidizer Inlet Temperature	TOTI
	36-39	Not Assigned	
	40	Turbine Flowmeter Fuel Flowrate	WFT
	41	Turbine Flowmeter Oxidizer Flowrate	WOT
	42-49	Not Assigned	
	50	Run Annotation	RUNNO

1.2 Method of Solution

The HEPCAT (Houston Engine Performance Calculations and Transients) Computer Program has been developed based on the TTA data processing requirements and the engine performance parameters required by NASA/MSC to perform engine tradeoff studies.

1.2.1 HEPCAT Functional Requirements

The functional requirements of the HEPCAT Computer Program are to read the SEL 600 data tape, demultiplex the data, time align the data, reduce the number of data points, perform engineering performance evaluations and mathematically reduce the test engine parameters to a set of standardized conditions so that run to run test comparisions can be accurately evaluated by the user. The functional output of the program is a history tape, microfilm data tape, printed output and a demultiplexed printed raw data dump. Functionally the card input required to operate the program is divided into the following four categories:

1. Measurement parameters
2. Tables of calibration curves
3. Program constants
4. Flag control card

An overall layout presenting HEPCAT's functional categories which comprise the data reduction, performance computation and output is presented in Figure 1-16.

1.2.2 Analytical Formulations

In order to perform engine performance analysis, it is necessary to have the values of parameters measured during one sample (channels 1 through 50 as shown in Figure 1.-2) aligned to a common time. The time alignment of data is the function of subroutine FILTR1. In order to produce a uniform sample

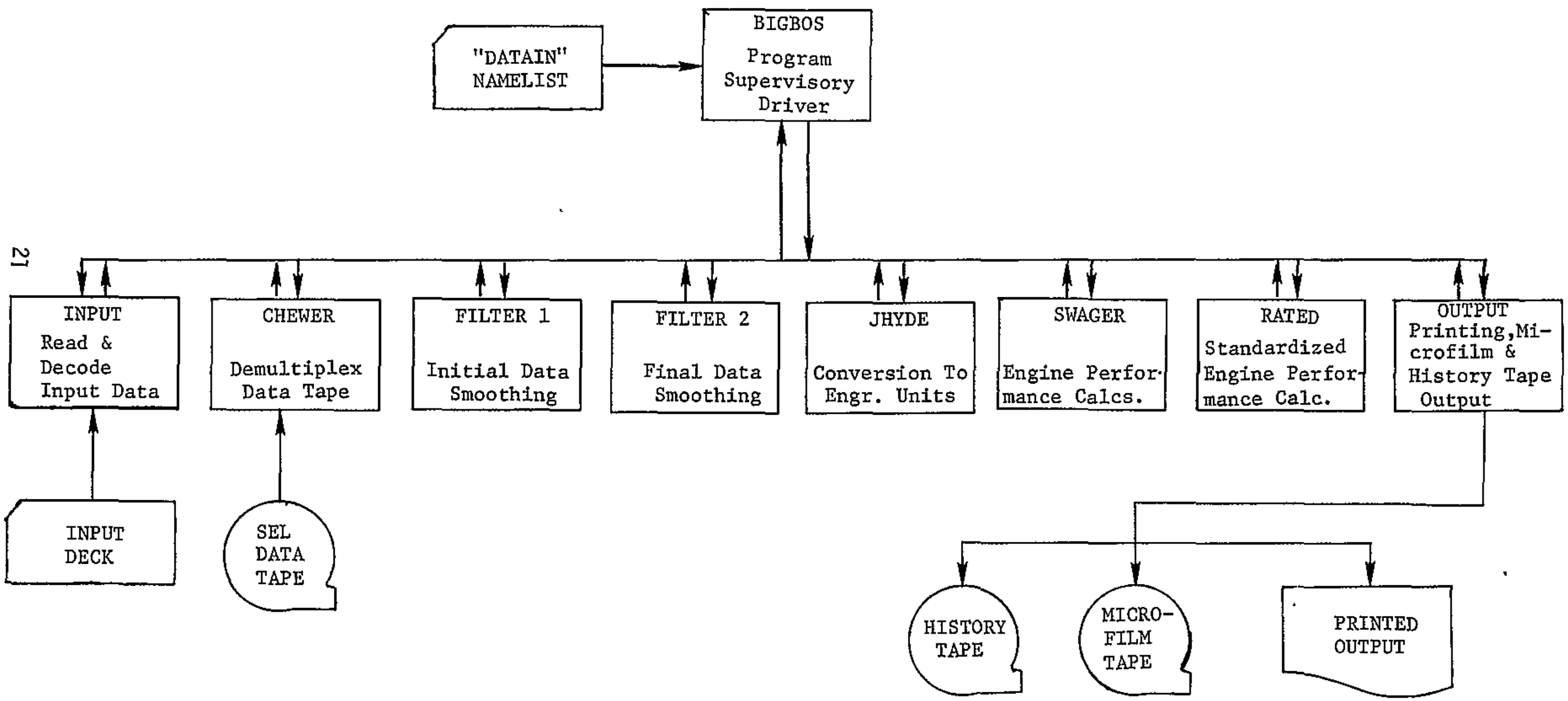


FIGURE 1-16 "HEPCAT PROGRAM

rate of 250 samples per second, values of parameters which are recorded twice within one sample are arithmetically averaged. Parameters which are recorded once within one sample are transferred together with the averaged values to correspond to the time associated with the midpoint of the sample. This time alignment of the data produces a maximum time error within one sample of 2 milliseconds and since the "true" data can only be assumed between samples, any errors due to this time shifting are negligible. This relatively high sample rate is not used directly in the program at present, but will be important for future analysis of engine transients.

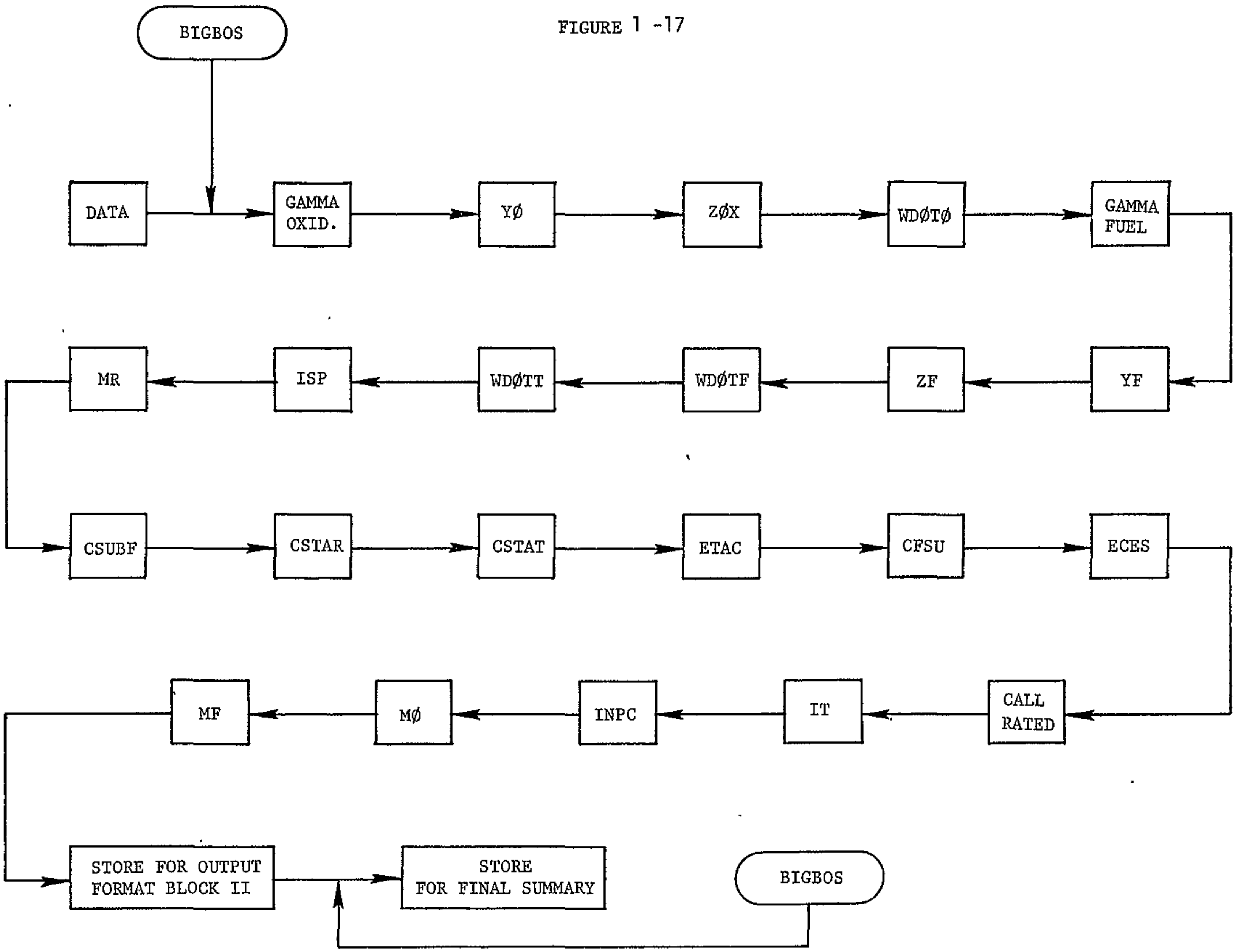
The high sample rate data from FILTR1 is fed directly into subroutine FILTR2. FILTR2 reduces the sample rate by arithmetically averaging sequential blocks of five samples into one sample and time aligning the resulting average sample to correspond with the time of the middle sample in the original block. To avoid biasing the time of the average sample at the beginning and end of a engine pulse, the center of the five sample average is translated forward or backward in time to coincide with the beginning of the start and shutdown transients. The recentering logic is activated at a threshold value of 3300 counts on the fire voltage. A fire voltage of 3300 counts signals the beginning and end of a fire pulse. A sample rate of 50 samples per second is output from FILTR2 and is more than adequate for engine performance analysis. Output from FILTR2 is converted to engineering units and the appropriate scales and instrumentation biases applied in the Subroutine JHYDE prior to use with program constants and/or card input variables by the engine performance evaluation Subroutines SWAGER and RATED.

1.2.2.1 - SWAGER (Engineering Formulations)

The general flow diagram presented in Figure 1-17 shows the computational order of the equations in the Subroutine SWAGER. This subroutine computes the parameters used for evaluating engine performance. Nomenclature for the

SUBROUTINE SWAGER
GENERAL FLOW DIAGRAM

FIGURE 1 -17



terms shown in Figure 1-17 and in the following equations is presented in Appendix 1.

The following equations for the compressibility and ratio of specific heat for gaseous oxygen and hydrogen, including standard deviations, are the result of polynominal curve fits of NBS data and data from other sources. The equations presented are valid for pressures up to 100 atmospheres and temperatures ranging between 100 and 400° Kelvin.

COMPRESSIBILITY FACTOR FOR GASEOUS OXYGEN: ZØX

$$ZØX = 1 + B*P + C*P^2 + D*P^3 \qquad \text{Eq. (1)}$$

Where:

P = Pressure in atmospheres

B,C,D = Functions of Temperature in Degrees Kelvin

T = Temperature in degrees Kelvin

$$B = -8.7136945E\text{-}06 + 4.606507E\text{-}01*\left(\frac{1}{T}\right) - 1.3795294E\text{+}02*\left(\frac{1}{T}\right)^2 -2.1663662E\text{+}04*\left(\frac{1}{T}\right)^3 + 2.2765597E\text{+}06*\left(\frac{1}{T}\right)^4 - 2.2174297E\text{+}08*\left(\frac{1}{T}\right)^5 + 1.0580819E\text{+}10*\left(\frac{1}{T}\right)^6 - 2.1920552E\text{+}11*\left(\frac{1}{T}\right)^7$$

$$C = 6.753855E\text{-}06 - 1.0277166E\text{-}02*\left(\frac{1}{T}\right) + 6.5537055*\left(\frac{1}{T}\right)^2 -2.1384872E\text{+}03*\left(\frac{1}{T}\right)^3 + 4.2428099E\text{+}05*\left(\frac{1}{T}\right)^4 -5.3177903E\text{+}07*\left(\frac{1}{T}\right)^5 + 3.2860596E\text{+}09\left(\frac{1}{T}\right)^6 -1.1314356E\text{+}11*\left(\frac{1}{T}\right)^7$$

$$D = -1.7671108E\text{-}10 - 6.3527586E\text{-}06*B + 1.5610387E\text{-}02*B^2 + 4.6457575*B^3 + 4.3213223E\text{+}02*B^4 + 7.8725193E\text{+}04*B^5 + 2.8552410E\text{+}06*B^6 + 1.4952967E\text{+}08*B^7$$

COMPRESSIBILITY FACTOR OF GASEOUS HYDROGEN: ZH

$$
\begin{aligned}
ZH = {} & 1. - 5.3350829E{+}03*\left(\frac{1}{T}\right)^2 + 1.8336324E{+}02*\left(\frac{1}{T}\right) - 2.6772676 \\
& + 2.1605597E{-}02*T - 1.0357253E{-}04*T^2 + 2.9241458E{-}07*T^3 \\
& - 4.4684258E{-}10*T^4 + 2.8380505E{-}13*T^5 - 3.9254562E{-}03*P \\
& + 2.5326543E{-}05*P^2 + 4.572284E{-}10*P^3 + 6.1928900E{-}05*T*P \\
& - 2.9497530E{-}07*T^2*P - 2.5910804E{-}07*T*P^2 \\
& + 5.8954277E{-}10*T^3*P + 8.7135669E{-}10*T^2*P^2 \\
& - 4.247153E{-}13*T^4*P - 9.5916114E{-}13*T^3*P^2
\end{aligned}
\qquad \text{Eq. (2)}
$$

Where:

P = Pressure in atmospheres

T = Temperature in degrees Kelvin

SPECIFIC HEAT RATIO FOR GASEOUS OXYGEN: GAMMAØ

$$
\begin{aligned}
GAMMAØ = {} & 1.4 - 1.7457824E{-}02 + 1.9357917E{-}04*T - 7.2588636E{-}07*T^2 \\
& + 1.0841843E{-}09*T^3 - 1.2549120E{-}12*T^4 + 0.1634301*P \\
& + 1.4833429E{-}03*P^2 - 5.3033020E{-}08*P^3 \\
& - 2.2332967E{-}03*T*P + 1.1615558E{-}05*T^2*P - 1.3824483E{-}05*T*P^2 \\
& - 2.665282E{-}08*T^3*P + 4.2607112E{-}08*T^2*P^2 \\
& + 2.2589584E{-}11*T^4*P - 4.3236307E{-}11*T^3*P^2
\end{aligned}
\qquad \text{Eq. (3)}
$$

Where:

P = Pressure in atmospheres

T = Temperature in degrees Kelvin

SPECIFIC HEAT RATIO OF GASEOUS HYDROGEN: GAMMAH

$$
\begin{aligned}
GAMMAH = {} & 1.4 + 1.7916552 - 9.3494600E{+}01*\ 1/T + 3.4401152E{+}03*(1/T)^2 \\
& - 1.5811495E{-}02*T + 7.3710370E{-}05*T^2 - 1.9032770E{-}07*T^3 \\
& + 2.5607340E{-}10*T^4 - 1.3934965E{-}13*T^5 \\
& + 9.5212948E{-}03*P - 9.4796595E{-}06*P^2 + 4.7574151E{-}08*P^3
\end{aligned}
$$

$$-9.8875463E-05*T*P + 3.9974179E-07*T^2*P - 3.3917970E-08*T*P^2$$
$$- 7.3903897E-10*T^3*P + 3.0774794E-10*T^2*P^2$$
$$+ 5.2240539E-13*T^4*P - 4.6828143E-13*T^3*P^2 \qquad \text{Eq. (4)}$$

Where:

P = Pressure in atmospheres

T = Temperature in degrees Kelvin

The engine test data is used to compute parameters for use in evaluating the test engine performance. These parameters include the flow rate for both the fuel and oxidizer, the total flow rate, specific impulse, engine mixture ratio, thrust coefficients, characteristic exhaust velocity, efficiency and total impulse. In addition, the nozzle stagnation pressure and total oxidizer and fuel consumption is integrated over the length of the firing pulse.

The equations for computing these parameters follow.

To compute mass flow rates from ΔP measurements

A. Oxygen

$$WD\emptyset T\emptyset = (Y\emptyset)(K\emptyset)(0.16028)(D\emptyset\emptyset)^2 \sqrt{\frac{(PT\emptyset\emptyset)(PD\emptyset\emptyset)(MW\emptyset)}{Z_{\emptyset X}\ T\emptyset\emptyset F}} \qquad \text{Eq. (5)}$$

where:

$$Y\emptyset = 1.0 - [0.41 + 0.35(BETA\emptyset)^4]\ \frac{X\emptyset}{(GAMM\emptyset)} \qquad \text{Eq. (6)}$$

$$X\emptyset = \frac{PD\emptyset\emptyset}{PT\emptyset\emptyset} \qquad \text{Eq. (7)}$$

$$BETA\emptyset = \frac{D\emptyset\emptyset}{DP\emptyset} \qquad \text{Eq. (8)}$$

Z∅X = Eq. (1)

GAMM∅ = Eq. (3)

K∅ = Orifice Coefficient (CIV)

PT∅∅ = (psia) measured value

PD∅∅ = (psid) measured value

D∅∅ = (in) orifice diameter (CIV)

DP∅ = (in) PIPE diameter (CIV)

TØØF = (°R) measured value +459.7

MWØ = 32.00 Molecular Weight of Oxygen

Unit conversion factor for flow rate = 0.16028

WDØTØ = Oxidizer flowrate - lb/sec

B. Hydrogen

$$WD\O TF = (YF)(KF)(0.16028)(DH\O)^2 \sqrt{\frac{(PTF\O)(PDF\O)(MWH)}{Z_H TF\O I}} \qquad \text{Eq. (9)}$$

where:

$$XF = \frac{PDF\O}{PTF\O} \qquad \text{Eq. 10}$$

$$YF = 1.0 - [0.41 + 0.35(BETAF)^4] \frac{XF}{(GAMMAH)} \qquad \text{Eq. (11)}$$

$$BETAF = \frac{DH\O}{DPH} \qquad \text{Eq. (12)}$$

Z_H = Eq. (2)

GAMMAH = Eq. (4)

KF = Orifice Coefficient (CIV)

Unit conversion factor for flow rate = 0.16028

DHØ = Diameter of Hydrogen Fuel Orifice (IN)(CIV)

DPH = Diameter of Hydrogen Pipe (IN)(CIV)

PTFØ = (PSIA) Measured Value

PDFØ = (PSIA) Measured Value

TFØI = (°R) Measured Value +459.7

MWH = 2.016 Molecular Weight of Hydrogen

Compute Total Fowrate (WDØTT)

$$WD\O TT = WD\O T\O + WD\O TF \qquad \text{Eq. (13)}$$

Compute Specific Impulse (ISP)

$$ISP = \frac{F}{WD\O TT} \qquad \text{Eq. (14)}$$

Compute Mixture Ratio (MR)

$$MR = \frac{WD\emptyset T\emptyset}{WD\emptyset TF} \quad \text{Eq. (15)}$$

Compute Thrust Coefficient (CSUBF)

$$CSUBF = \frac{F}{(AT)(PNS)} \quad \text{Eq. (16)}$$

Where:

F = Measured Value

PC = Measured Value

AT = Area of throat (IN^2)(CIV)

$$PNS = PC(K) \quad \text{Eq. (17)}$$

K = Function of the Contraction Ratio

Compute Characteristic Exhaust Velocity CSTAR

$$CSTAR = \frac{(32.174)(PC)(AT)}{WD\emptyset TT} \quad \text{Eq. (18)}$$

CSTAR = CSTAR + ΔCSTAR where: ΔCSTAR is currently assumed = 0

Compute Theoretical CSTAR from MSC/EP4 Supplied Equation

See Figure 1-18

$$CSTAT = 6428.561 + 2233.567(MR) - 885.0861(MR)^2 + 143.8467(MR)^3$$
$$- 11.13366(MR)^4 + .3348754(MR)^5 \quad \text{Eq. (19)}$$

Derived from a frozen composition at a pressure of 30 psia and an ambient temperature of 298.15°K.

Compute CSTAR Efficiency

$$ETAC = \frac{CSTAR}{CSTAT} \quad \text{Eq. (20)}$$

Compute Theoretical Vacuum Thrust Coefficient from MSC/EP4 Supplied Equation

See Figure 1-19

$$CFSV = 1.477818 + .003907214(MR) - .0005934259(MR)^2$$
$$+ .00002873259(MR)^3 \quad \text{Eq. (21)}$$

Derived from a frozen composition at a pressure of 30 psia and an ambient temperature of 298.15°K and an expansion ratio of 5.

Compute CF Efficiency

$$ECFS = \frac{CSUBF}{CFSV} \qquad \text{Eq. (22)}$$

Total Impulse (IT)

$$IT = \int_{st}^{c/o} F \, \Delta T \qquad \text{Eq. (23)}$$

where:

st = Engine start command

c/o = Engine cutoff command plus time constant
Where time constant = 50 data points

ΔT = Computed time interval

The program uses the trapezoidal rule for integration.

Pressure integral (INPNS)

$$INPNS = \int_{st}^{c/o} PNS \, \Delta T \qquad \text{Eq. (24)}$$

Same integration technique as used to solve Eq. (23).

Total Oxidizer Consumed (MØ)

$$M\text{Ø} = \int_{st}^{c/o} (WD\text{Ø}T\text{Ø}) \, \Delta T \qquad \text{Eq. (25)}$$

Same integration technique as Eq. (23)

Total Fuel Consumed (MF)

$$MF = \int_{st}^{c/o} (WD\text{Ø}TF) \, \Delta T \qquad \text{Eq. (26)}$$

Same integration technique as used to solve Eq. (23)

Plots of theoretical values for the characteristic exhaust velocity (CSTAR) and the coefficient of force C_F are presented in Figures 1-18 and 1-19, respectively. The values presented in these Figures are valid for both the measured mixture ratio data and the calculated rated mixture ratios.

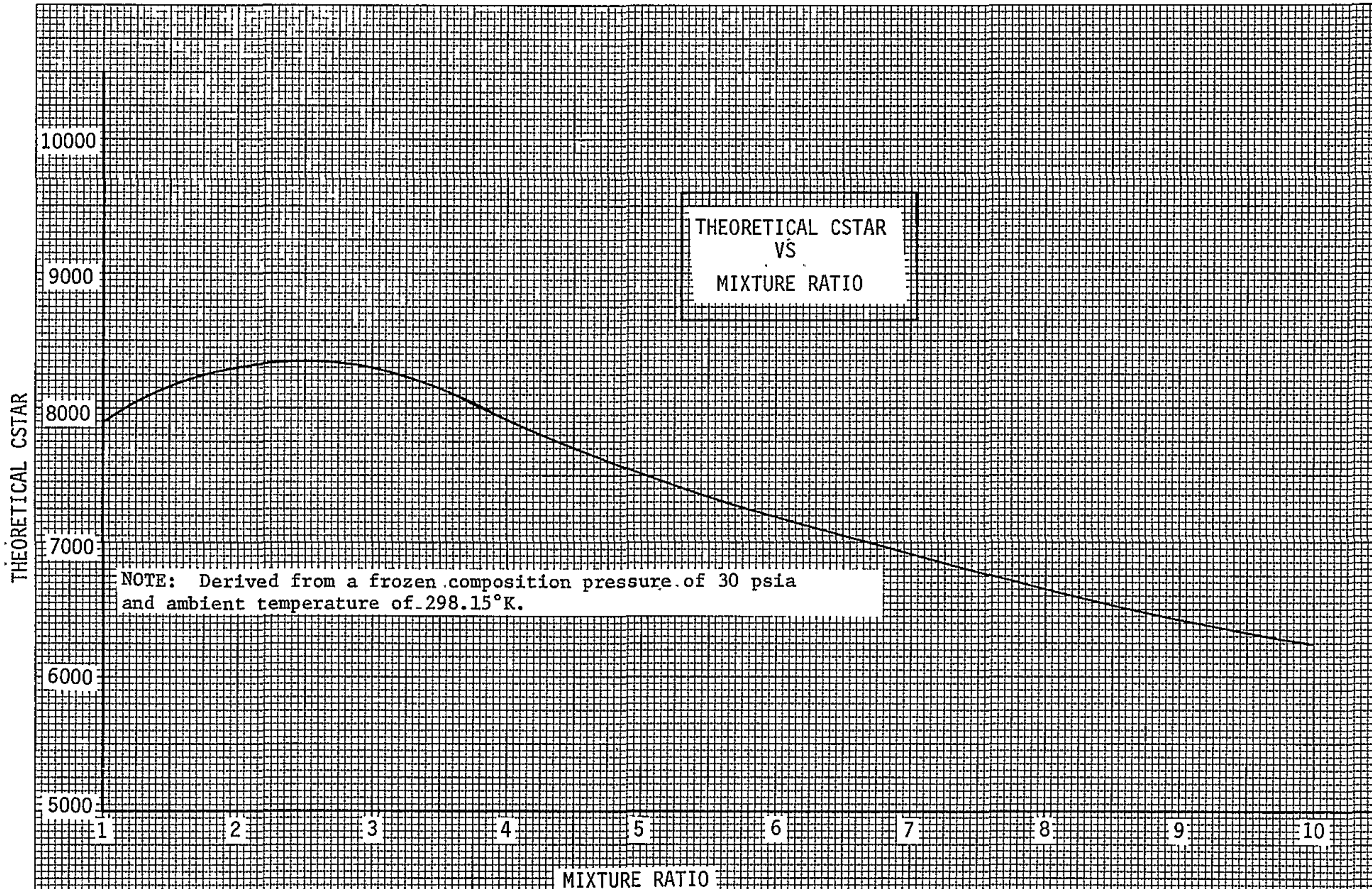

THEORETICAL CSTAR
VS
MIXTURE RATIO
10000
9000
8000
7000
6000
5000
THEORETICAL CSTAR
NOTE: Derived from a frozen composition pressure of 30 psia
and ambient temperature of 298.15°K.
1
2
3
4
5
6
7
8
9
10
MIXTURE RATIO

FIGURE 1 -18

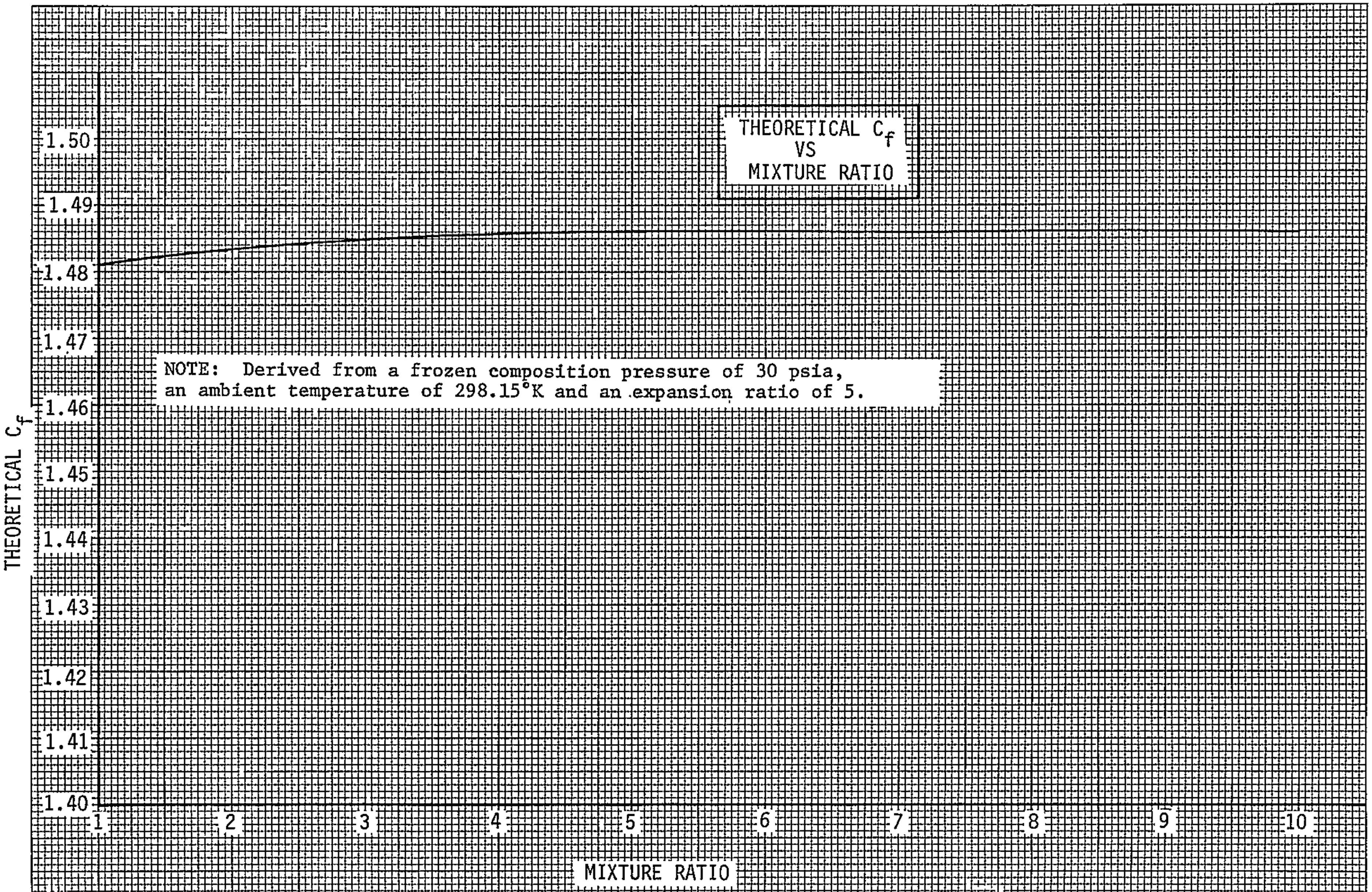

THEORETICAL C_f
VS
MIXTURE RATIO
NOTE: Derived from a frozen composition pressure of 30 psia, an ambient temperature of 298.15°K and an expansion ratio of 5.
THEORETICAL C_f
1.50
1.49
1.48
1.47
1.46
1.45
1.44
1.43
1.42
1.41
1.40
1
2
3
4
5
6
7
8
9
10
MIXTURE RATIO

FIGURE 1-19

1.2.2.2 RATED (Engine Performance)

The purpose of this subroutine is to reduce the performance parameters to a set of standardized conditions to allow an accurate comparison of test engine performance on a run-to-run basis. Since standard engine performance is only applicable to steady state portions of this run, this subroutine is not entered until the engine start command has been exceeded by 200 milliseconds. Although this time delay is sufficient for the present test program, it may have to be lengthened for future tests. The performance standardization calculations are completed when the engine shutdown signal is received. The results of this subroutine are output in Block IV of the printout in a format which permits easy comparision with measured performance.

Basically, the computations in this subroutine reduce the measured test data to values which correspond to a set of standard conditions (pressure, temperature, etc.) at the engine interface for a given chamber pressure. Although, the standard values may be user specific a typical set of appropriate values for the standard conditions are built into the program. A list of the standardization parameters follow.

<u>RATED Subroutine Equations</u>

TFD = TFØI			Eq. (1)
TØD = TØØI			Eq. (2)
PFD = PTFØ - (PDFØ)			Eq. (3)
PØD = PTØØ - PDØØ			Eq. (4)
PC = PC			Eq. (5)
TFDS = CIV or PV			Eq. (6)
TØDS = CIV or PV			Eq. (7)
PFDS = CIV or PV			Eq. (8)
PØDS = CIV or PV			Eq. (9)
PCS = CIV or 30 psia	CIV - card input value		Eq. (10)
PAB = CIV or PV	PV - program value		Eq. (11)

The following equations are used to reduce both the measured data and the engine evaluation parameters (computed in the SWAGER subroutine) to correspond to the standardized engine values.

<u>To compute interface densities:</u>

Site-fuel

$$RFD = \frac{(PFD)(MWH)}{(10.73)(ZH)(TDF + 459.7)} \qquad \text{Eq. (12)}$$

Site-oxidizer

$$RØD = \frac{(PØD)(MWØ)}{(10.73)(ZØX)(TØD + 459.7)} \qquad \text{Eq. (13)}$$

Standard-fuel

$$RFDS = \frac{(PFDS)(MWH)}{(10.73)(ZH)(TFDS + 459.7)} \qquad \text{Eq.(14)}$$

Standard-oxidizer

$$RØDS = \frac{(PØDS)(MWØ)}{(10.73)(ZØX)(TØDS + 459.7)} \qquad \text{Eq.(15)}$$

$$DPF = PFD - PC \qquad \text{Eq. (16)}$$

$$PDØ = PØD - PC \qquad \text{Eq. (17)}$$

Start of loop

Assume

$$PCCI = PCS \qquad \text{Eq. (18)}$$

$$DPFS = PFDS - PCCI \qquad \text{Eq. (19)}$$

$$WDØTFS = \left(\sqrt{\frac{DPFS}{DPF} \times \frac{RFDS}{RFD}}\right) \times WDØTF \qquad \text{Eq. (20)}$$

<u>New adjusted oxidizer flowrate to standard conditions</u>

$$DPØS = PØDS - PCCI \qquad \text{Eq. (21)}$$

$$WD\O T\O S = \left(\sqrt{\frac{DP\O S}{PD\O} \times \frac{R\O DS}{R\O D}}\right) \times WD\O T\O \qquad \text{Eq. (22)}$$

Adjusted standard mixture ratio

$$MRS = \frac{WD\O T\O S}{WD\O TFS} \qquad \text{Eq. (23)}$$

Adjusted standard total propellant flow

$$WD\O TTS = WD\O T\O S + WD\O TFS \qquad \text{Eq. (24)}$$

Standard nozzle stagnation pressure

$$PNSS = (PCCI) \times (K) \qquad \text{Eq. (25)}$$

where: $K = \frac{PNS}{PC}$ table lookup value in SWAGER

Theoretical frozen C-star obtained from NASA at PCS of 30 psia and ambient temperature = 298.15°K (67°F)

$$CSTATS = 6428.561 + 2233.567(MRS) - 885.0861(MRS)^2 + 143.8467(MRS)^3 - 11.13366(MRS)^4 + .3348754(MRS)^5 \qquad \text{Eq. (26)}$$

ATTC = AT + f(T) where f(T) presently = 0 and is the increase in the nozzle throat area due to thermal expansion. Eq. (27)

$$EPS = \frac{AE}{ATTC} \qquad \text{Eq. (28)}$$

$$CSTASD = (CSTATS)(ETAC) \qquad \text{Eq. (29)}$$

$$PCCIA = \frac{(CSTASD)(WD\O TTS)}{(G)(ATTC)} \qquad \text{Eq. (30)}$$

Convergence Criteria

$$PCE = PCCI - PCCIA \qquad \text{Eq. (31)}$$

$$I = I + 1 \qquad \text{Eq. (32)}$$

if $|PCE| \leq .1$ go to CF theoretical (Equation 36) Eq. (33)

if I > 10 print all numbers and flag PCCI did not converge; go to (42)

PCCI = PCCIA Eq. (34)

Go to Equation 19 for loop Eq. (35)

Theoretical vacuum thrust coefficient at PNSS, MRS, and $\varepsilon = 5$

$$CFNSV = 1.477818 + .003907214(MRS) - .0005934259(MRS)^2 + .00002873259(MRS)^3$$

where: MRS is last converged value of standard mixture ratio

Note: In general, CF is a function of MR, PNS, and ε; but the effect of PC on vacuum CF functions is small and is assumed to be negligible

This equation was derived for a frozen composition, a pressure of 30 psia and an ambient temperature of 298.15°K.

Standard thrust coefficient efficiency

Assume $\eta CF_{STD} = \eta CF_{Site}$

ECFSTD = ECFS Eq. (37)

Standard thrust coefficient at vacuum

CFSTDV = ECFSTD x CFNSV Eq. (38)

$$CFSTD = CFSTDV - \frac{PAB \times EPS}{PCS} \quad \text{Eq. (39)}$$

F_{STD} = (PCS)(ATTC)(CFSTD) Eq. (40)

ISPS = FSTD/WDØTTS Eq. (41)

This statement ends the standardization for a particular data slice. All parameters are printed into Block IV format or a diagnostic of no convergence is flagged. The program than moves to the next data slice.

2. PROGRAM USER'S GUIDE

2.1 INTRODUCTION

The Program User's Guide has been written to give the user detailed instructions on the operation of the HEPCAT (HD011C) program. With the exception of Section 2.2.2, this portion of the document is completely self-contained.

2.2 PROGRAM DESCRIPTION

2.2.1 Program Definition

This program was designed for the acquisition, reduction and engineering analysis of data recorded on magnetic tape by an SEL 600 computer. The SEL 600 is a 12 bit, 50 channel analog/digital converter. The data was produced by the Thermochemical Test Facility at MSC in the testing of experimental gas-gas reaction control system (RCS) jets. It is a stand-alone program which generates data for plotting by use of a separate program.

2.2.2 Method of Solution

The method of data reduction and the mathematics of the program are described in Section 1.

2.3 USER'S INFORMATION

2.3.1 Input Description

The program has two types of inputs, cards and magnetic tape. Both are required inputs and are described in the next two subsections together with the pertinent restrictions on program usage.

2.3.1.1 Card Input

Card input for the program is divided into the following four categories:

A. Measurement parameters
B. Tables of calibration curves
C. Program constants
D. Flag control card

Nomenclature for the input and output variables is presented in Appendix 1.

A. Measurement Parameters

The definition of the measurement parameters requiring a user load sheet assignment in terms of the SEL 600 channel assignments, scale factors, biases, and engineering units is presented as an example in Appendix 3. The load sheet format which consists of one card for each parameter (channel assignment) is defined for each 80-column card as follows:

Column No.	Description
1 and 2	Channel number on SEL tape, right justified (1 to 50)
3	Blank
4 to 9	Alphanumeric name of channel, left justified
10	Blank
11	Bias flag; 1 for bias, a "blank" for no bias
12	Blank
13	Scale factor flag; 1 for scale factor, a "blank" for no scale factor
14	Blank
15	Calibration curve flag; 1 for calibration curve, a "blank" for no calibration curve
16	Blank
17 to 25	Channel bias value, if any
26	Blank
27 to 35	Scale factor value.
36	Blank
37 to 39	Table number for calibration curve required to convert counts to millivolts. The number is between 101 to 150; i.e., a count to millivolt table is required for each parameter which utilizes a table.
40	Blank
41 to 43	Table number for calibration curve required to convert millivolts to engineering units. The number is between 201 and 250; i.e., a millivolt to engineering unit calibration curve is required for each parameter which utilizes a table.

Column No.	Description
44	Blank
45 to 48	Units to which the measurement is to be converted
49 to 80	Not used

B. Tables of Calibration Curves

The second category of required user inputs are the tables of calibration curves for the test instrumentation, shown by example in Section 2.3.3. There are two sets of input tables: the first, defined as the 100 series is designed to convert the value of the parameter on the SEL 600 tape from counts into millivolts. The normal number of points is expected to be two (linear fit), but a maximum of 10 points is permissable to provide for higher order curve fits if desired.

The format of the cards making up the 100 series per individual column assignment is as follows:

Card No.	Column No.	Description and Value
1	1	A "1" defining it as the 100 series
	2 and 3	The channel assignment number to correspond with the table, same table may be used more than once.
	4	Blank
	5 and 6	The number of sets of points in the table
2	1 to 10	The starting floating point value of counts; X1
	11 to 20	The corresponding floating point value of the counts X1 in millivolts; Y1
	21 to 30	The 2nd floating point value of counts; X2
	31 to 40	The corresponding floating point value of the counts X2 in millivolts; Y2
	41 to 50	The 3rd floating point value of counts; X3
	51 to 60	The corresponding floating point value of the counts X3 in millivolts; Y3
	61 to 70	The 4th floating point value of counts; X4
	71 to 80	The corresponding floating point value of the counts X4 in millivolts; Y4

Card No.	Column No.	Description and Value
3	1 to 10	The 5th floating point value of counts; X5
	11 to 20	The corresponding floating point value of the counts X5 in millivolts; Y5
	: etc.	

The entry process of cards is repeated sequentially until the user designated number of points is reached. The second table, defined as the 200 series, is designed to convert values of the parameter in millivolts into engineering units. The maximum number of sets of points allowed is 20. The format of the cards making up the 200 series is the same as the 100 series, the only exception is the number "2" inserted in Column 1 of card number 1.

C. Program Constants

In the present program, the user is required to input nine constants. In addition, there are six constants which the user may or may not change at his discretion. If the user does not input a value, then the value stored in the program will be used. These constants are identified in the following description:

Card No.	Column No.	Description and Value	Engr. Units
1	1 to 15	Value of nozzle throat area (IN^2)	AT
	16 to 30	Value of the oxidizer orifice coefficient	KØ
	31 to 45	Value of oxidizer orifice diameter (IN)	DØØ
	46 to 60	Value of oxidizer pipe diameter (IN)	DPØ
	61 to 75	Value of fuel orifice coefficient	KF
2	1 to 15	Value of fuel orifice diameter (IN)	DHØ
	16 to 30	Value of fuel pipe diameter (IN)	DPH
	31 to 45	Combustion chamber area (IN^2)	AC
	46 to 60	Area of nozzle exit (IN^2)	AE
	61 to 75	Pressure ambient (PSIA). If not input, a value of 0.0 PSIA is used.	PAB

Card No.	Column No.	Description and Value	Engr. Units
	1 to 15	Standard temperature of fuel at interface (°F). If not input, a value of 67°F is used.	TFDS
	16 to 30	Standard temperature of oxidizer at interface (°F). If not input, a value of 67°F is used.	TØDS
3	31 to 45	Standard pressure of fuel at interface (PSIA). If not input, a value of 40 PSIA is used.	PFDS
	46 to 60	Standard pressure of oxidizer at interface (PSIA). If not input, a value of 40 PSIA is used.	PØDS
	61 to 75	Standard chamber pressure (PSIA). If not input, a value of 30 PSIA is used.	PC

D. Flag Control Card

A single program control card input enables the user to select the various outputs by flag options. These options are illustrated in Section 2.3.4 and described below:

Column No.	Description and Value
1	A "1" implies a data dump is required. A "blank" or 0 implies no dump is required.
2	Blank
3 and 4	The number of the pulse to be dumped. The number should be right adjusted, e.g., pulse No. 9 is written as 0 or blank in Column 3 and 9 in Column 4. Only one pulse in a run can be dumped.
5	Blank
6	Print option flag location: 0 = no print 1 = every 5th point printed 2 = every 10th point printed The value 2 is recommended in general as it will produce the least amount of output per pulse (about 40 pages) and will also be at a sufficient sample rate (5 times per second) for most purposes
7	Blank
8	A "1" indicates that 4020 plots are desired. A "blank" implies no plots are desired.

Column No.	Description and Value
9	Blank
10 and 11	The total number of pulses to be processed. The number is right adjusted, e.g., 08 implies eight pulses to be processed.
12	Blank
13	Microfilm output flag location 1 = microfilm 0 = no microfilm
14	Blank
15	Engine performance standardization option flag. 1 = perform engine standardization 0 = no engine standardization
16 to 80	Blank

2.3.1.2 Tape Input

The program requires one data tape to operate. The tape is generated by a SEL 600 computer which utilizes a 12-bit word. The SEL is a 50 channel analog/digital converter. Each record contains 801 words of data. Each word contains 36 bits and therefore represents three channels of information from the SEL 600. The SEL 600 multiplexes the data in a unique non-sequential cyclic manner. Figure 1-2 presents the multiplex sequence used. Each record contains 120 milliseconds of data. The SEL 600 does not write time on the data tape, thus the first record is assumed to be time zero and all subsequent timing is referenced to this point. Each record is demultiplexed into 2403 words. The first word of each data record is an identification word and is ignored.

2.3.1.3 Input Restrictions

The following is a set of restrictions applicable to the operation of the program:

A. In regard to Section 2.3.1.1, Part A, a program stop is generated by the following misassignments:

i) A "1" in Columns 13 and 15

ii) A "1" in Column 15 and zeros in Columns 37 to 39 and/or Columns 41 to 43, inclusively

iii) A "0" in Columns 13 and 15 when an alphanumeric name appears in Columns 4 to 9

iv) If the user does not assign an alphanumeric name between Columns 4 and 9 inclusively, the measured digitized values contained on the data channel is zeroed out. The user must assign an alphanumeric name for those channels required for the engineering evaluation in the engineering subroutine. Otherwise a program stop will occur. Required alphanumeric names are: F, PC, PTFØ, PTØØ, PDFØ, PDØØ, TFØI, TØØI. Their meaning is explained in Appendix 1.

B. The input constants described in Section 2.3.1.1, Part C, must be input as floating point numbers. Also, if the user chooses to use the program values for the six discretionary constants (Card #3) a blank card must be present in their place.

C. At the end of the data deck, a card containing 'CASEND' in Columns 1 to 6 must be present.

2.3.2 Output Description

The program has three possible means of output, any one of which may be used either separately or concurrently.

2.3.2.1 Printed Output

With the print flag set, the program will produce paper output. Each phase of the program has its own particular output as defined below.

A. All inputs are printed out. This includes all card images, scales for each channel, biases for each channel, calibration curves for each channel and all program constants. These are all grouped under the heading of BLOCK I printout.

B. BLOCK II printout is the final result of the filtering of the data from the SEL 600 magnetic tape. Each channel is identified by its input alphanumeric name followed by its filtered value.

C. A BLOCK III printout is the result of the calculations made by the engineering subroutine.

D. The engine performance standardization routine produces the results output in a BLOCK IV printout. The standardized value is printed next to the original test value.

E. The final type of printed output is a BLOCK V printout. This is produced only when the data tape is dumped.

2.3.2.2 Microfilm Tape Output

Each type of output that is produced in the printed output is available with the microfilm option. The difference between the two options is the type of final output and the fact that every computed point is output on microfilm, not just every fifth or tenth point.

2.3.2.3 History Tape Output

The history tape is generated whenever 4020 plots are desired. It is then used as an input tape to the plot program TRWPLT (see Appendix 2 for documentation on the use of TRWPLT). The format of the tape is explained in Appendix 2.

2.3.3 Sample Case

A sample run is presented in Appendix 3 including the load sheets, listing of input, and the output generated by the program. In the case presented, all output option flags were set. More extensive data setups can be found in Appendix 2.

2.3.4 Diagnostics

The program has built in checks to insure correct operation. The following error messages can be generated by program. Also indicated is the corrective action to be taken by the user.

A.	Error Message -	CHANNEL NØ. 'XX' HAS SCALING AND CURVE FLAG SET
	Corrective Action -	Remove scaling flag or curve flag from card.
B.	Error Message -	TABLE NO. 'XXX' NØT FOUND. CHANNEL NØ. REQUESTING CAL TABLE WAS 'XX'
	Corrective Action -	Check to insure table ID number is in correct card columns. Put table in data deck if not present.

C. Error Message - CHANNEL NØ. 'XX' HAS NØ SCALING ØR CURVE FLAG SET.

Corrective Action - Insert a scaling flag or curve flag on channel parameter card.

D. Error Message - DATA CHANNEL CARD WAS NØT INPUT FØR VARIABLE 'XXXXXX' AND IS REQUIRED IF THE ENGINEERING SUBROUTINE IS TO PRODUCE VALID RESULTS.

Correction Action - If all eight required parameters were defined, check keypunching for errors and insure the alphanumeric name is left justified. If not present, the offending parameters must be defined.

E. Error Message - ERRØRS IN CARD INPUT HAVE CAUSED CANCELLATIØN ØF RUN.

Corrective Action - Correct all errors in data deck.

F. Diagnostic Message - BAD RECØRD ENCØUNTERED IN FILE 'XX' - RECØRD NUMBER 'XXX' - RECØRD LENGTH IS 'XXX' ... SKIP AND READ NEXT RECØRD.

Corrective Action - None to be taken by user. Program has encountered bad data on the input data tape.

G. Diagnostic Message - DEVICE ERRØR AND/ØR TRANSMISSIØN ABØRT WHILE READING FILE 'XX' - RECØRD NUMBER 'XXX' ... SKIP AND READ NEXT RECØRD.

Corrective Action - None by user. Data tape is bad at that particular point.

H. Diagnostic Message - PCCI DID NØT CØNVERGE AFTER 'XXX' ITERATIØNS.

Corrective Action - User should insure all input constants are correct. Otherwise, the message indicates the data may be bad. This is followed by a printout of all the engine performance standardization parameters.

I. Diagnostic Message - ØNE ØR MØRE ØF THE FØLLØWING PARAMETERS HAS GØNE NEGATIVE INDICATING A CHAMBER PRESSURE GREATER THAN LINE PRESSURE. STANDARDIZATIØN WILL BE DISCØNTINUED FØR THIS TIME SLICE. DPFS = 'XXX', RFDS = 'XXX', DPF = 'XXX', RFD = 'XXX'

Corrective Action - Verify all input constants are correct, otherwise tape input data may be erroneous. The four parameters printed out are explained in Appendix 1.

J. Diagnostic Message - THE STANDARDIZED MIXTURE RATIØ HAS GØNE BEYØND THE ALLØWABLE LIMITS WHICH ARE 1.0 TØ 10.0. NØ STANDARDIZATION WILL BE ATTEMPTED FØR THIS PULSE. MRS = 'XXX'

Corrective Action - Verify all input constants are correct, otherwise tape input data may be erroneous.

K. Error Message - THE RATIØ ØF CØMBUSTIØN CHAMBER AREA TØ THRØAT AREA IS 'XXX.X'. THIS IS AN ØUT-ØF-RANGE VALUE FØR THE INTERPØLATIØN TABLES USED TØ CØMPUTE THE CØNTRACTIØN RATIØ. THE LIMITS ØF THE INTERPØLATIØN TABLES ARE 'XXX.X' TØ 'XXX.X'.

Corrective Action - Check the two constant inputs for chamber areas and throat area. If these are correct, the interpolation tables will have to be changed.

2.4 OPERATING PROCEDURES

This section is a description of the deck setup and operating procedures.

2.4.1 System Requirements

The program is written in FORTRAN IV. At present, it is operative on the UNIVAC 1108 using the EXEC II system. HD011C utilizes one input data tape and one scratch file. The input tape must be assigned to logical unit G, physical unit 9. The internal scratch file is usually a drum file, although it is possible to assign it to a tape unit. In this situation, logical unit B, physical unit 2 would be used. If the user has not requested 4020 plots or microfilm output, the program requires no additional output files other than the system output tape. If 4020 plots are needed, an additional output file is necessary. This would be fore logical unit F, physical unit 8. If microfilm is requested, no additional output file is necessary. The file is generated by the machine operator. Section 2.4.3 gives an annotated description of the data deck.

2.4.2 Program Operations

Although the program, HD011C, is designed for execution of a single data case, it will process multiple engine firings on one data tape. If 4020 plots are desired immediately, the program tape (PCF) contains the plot program, TRWPLT, in the second file, Therefore, a double execution is possible. The program run time is approximately 30 seconds for each pulse processed from the data tape. If plots are made, an additional factor of 5 minutes for each pulse should be added. Print requirements can be estimated by the following: 100 pages per pulse if every fifth point is being printed, 50 pages per pulse if every tenth point is being output. If a pulse is being dumped, approximately 1800 pages of output is produced. Approximately 100 pages of output is generated by the plot program, TRWPLT. It is recommended that the plot portion of the program not be run until the output of HD011C has been inspected for valid answers.

2.4.3 Illustrations and Explanations of the Deck Setup

Table 2.-1 is an annotated listing of the data deck used in the sample case. Input information required to operate the TRW plot routine can be found in Appendix A2.

```
                          Data Card                                                                  Explanation
Card Column
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
∇Z RUN 59368,TRW,XXXX,1079L,A025,P,6,3                       PRINGLE,R.W.       -RUN IDENTIFICATIØN CARD
∇  PLT                                                                          -CØNTRØL CARD NECESSARY FØR MICRØFILM AND 4020 ØUTPUT
∇  ASG F                                                                        -PHYSICAL UNIT 8, ØUTPUT FILE FØR PLØT DATA
∇  ASG G=71107                                                                  -PHYSICAL UNIT 9, INPUT DATA TAPE TØ HD011C
∇  ASG Y=72287                                                                  -PHYSICAL UNIT 28, PRØGRAM PCF TAPE
∇  XQT CUR                                                                      -BRING IN TAPE HANDLER RØUTINES
   TRW Y                                                                        -REWIND PCF TAPE TØ LØAD PØINT
   IN  Y                                                                        -READ PCF TAPE ØNTØ DRUM FILE
∇  XQT HD011C                                                                   -EXECUTE PRØGRAM
01 F         1         0.01               LBF                                   -THRUST, REQUIRED PARAMETER, SCALED, FACTØR, UNITS
02 PC        1         0.1                PSIA                                  -CHAMBER PRESSURE, REQUIRED PARAMETER
03 FV        1         1.0                CNTS                                  -FIRE VØLTAGE, REQUIRED PARAMETER,
04 PFI       1         0.1                PSIA                                  -FUEL INJECTIØN PRESSURE, SCALED, SCALE FACTØR, UNITS
05 PØI       1         0.1                PSIA                                  -ØXIDIZER INJECTIØN PRESSURE, SCALED, SCALE FACTOR, UNITS
06 PFII      1         0.1                PSIA                                  -FUEL IGNITØR INJECTIØN PRESSURE, SCALED, FACTØR, UNITS
07 PØII      1         0.1                PSIA                                  -ØXIDIZER IGNITØR INJECTIØN PRESSURE, SCALED, FACTØR, UNITS
08 PTFØ      1         0.1                PSIA                                  -FUEL ØRIFICE TØTAL PRESSURE, REQUIRED PARAMETER
09 PTØØ      1         0.1                PSIA                                  -ØXIDIZER ØRIFICE TØTAL PRESSURE, REQUIRED PARAMETER
10 PDFØ      1         0.01               PSID                                  -FUEL ØRIFICE DELTA PRESSURE, REQUIRED PARAMETER
11 PDØØ      1         0.01               PSID                                  -ØXIDIZER ØRIFICE DELTA PRESSURE, REQUIRED PARAMETER
12 PFIC1     1         0.1                PSIA                                  -INJECTØR FUEL CAVITY PRESSURE #1, SCALED, FACTØR, UNITS
13 PØIC      1         0.1                PSIA                                  -ØXIDIZER INJECTØR CAVITY PRESSURE, SCALED, FACTØR, UNITS
14 PFIC2     1         0.1                PSIA                                  -INJECTØR FUEL CAVITY PRESSURE #2, SCALED, FACTØR, UNITS
15 SS        1         1.0                CNTS                                  -SPARK SIGNAL, SCALED, SCALE FACTØR, UNITS
16 PFTI      1         0.1                PSIA                                  -FUEL TURBINE INLET PRESSURE, SCALED, SCALE FACTØR, UNITS
17 PØTI      1         0.1                PSIA                                  -ØXIDIZER TURBINE INLET PRESSURE, SCALED, FACTØR, UNITS
18 TFI         1                118 218 DEGF                                    -FUEL INJECTIØN TEMP., CAL TABLE, CAL TABLE ID'S, UNITS
19 TØI         1                118 218 DEGF                                    -ØXIDIZER INJECTION TEMP., CAL TABLE, CAL TABLE ID'S, UNITS
20 TC1         1                120 220 DEGF                                    -THERMØCØUPLE #1, CAL TABLE FLAG, CAL TABLE ID'S, UNITS
21 TC2         1                120 220 DEGF                                    -THERMØCØUPLE #2, CAL TABLE FLAG, CAL TABLE ID'S, UNITS
22 TC3         1                120 220 DEGF                                    -THERMØCØUPLE #3, CAL TABLE FLAG, CAL TABLE ID'S, UNITS
23 TC4         1                120 220 DEGF                                    -THERMØCØUPLE #4, CAL TABLE FLAG, CAL TABLE ID'S, UNITS
24 TC5         1                120 220 DEGF                                    -THERMØCØUPLE #5, CAL TABLE FLAG, CAL TABLE ID'S, UNITS
25 TC6         1                120 220 DEGF                                    -THERMØCØUPLE #6, CAL TABLE FLAG, CAL TABLE ID'S, UNITS
26                                                                              -THIS CHANNEL NØT IN USE
27                                                                              -THIS CHANNEL NØT IN USE
28                                                                              -THIS CHANNEL NØT IN USE
29                                                                              -THIS CHANNEL NØT IN USE
30                                                                              -THIS CHANNEL NØT IN USE
31                                                                              -THIS CHANNEL NØT IN USE
32 TFØI        1                118 218 DEGF                                    -FUEL ØRIFICE INLET TEMPERATURE, REQUIRED PARAMETER
```

TABLE 2.-1 Annotated Data Deck

```
Card Column                                   Data Card                                                      Explanation
         1          2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
33 TØØI       1                          118 218 DEGF                           -ØXIDIZE ØRIFICE INLET TEMPERATURE, REQUIRED PARAMETERS
34 TFTI       1                          118 218 DEGF                           -FUEL TURBINE INLET TEMP., CAL TABLE, CAL TABLE ID'S, UNITS
35 TØTI       1                          118 218 DEGF                           -ØXIDIZER TURBINE INLET TEMP., CAL TABLE, CAL TABLE ID'S, UNITS
36                                                                              -THIS CHANNEL NØT IN USE
37                                                                              -THIS CHANNEL NØT IN USE
38                                                                              -THIS CHANNEL NØT IN USE
39                                                                              -THIS CHANNEL NØT IN USE
40 WFT      1          0.02                CFM                                  -FUEL FLØWRATE TURBINE, SCALE FLAG, FACTØR, UNITS
41 WØT      1          0.01                CFM                                  -ØXIDIZER FLØWRATE TURBINE, SCALE FLAG, FACTØR, UNITS
42                                                                              -THIS CHANNEL NØT IN USE
43                                                                              -THIS CHANNEL NØT IN USE
44                                                                              -THIS CHANNEL NØT IN USE
45                                                                              -THIS CHANNEL NØT IN USE
46                                                                              -THIS CHANNEL NØT IN USE
47                                                                              -THIS CHANNEL NØT IN USE
48                                                                              -THIS CHANNEL NØT IN USE
49                                                                              -THIS CHANNEL NØT IN USE
50 RUNNØ    1         1.0                                                       -RUN ANNØTATIØN
118  2                                                                          -CAL TABLE ID CARD, TABLE NØ., NØ. ØF PØINTS, 100 SERIES
    0.        0.     5000.     5000.                                            -PØINTS X1, Y1  X2, Y2
218 20                                                                          -CAL TABLE ID CARD, TABLE NØ., NØ. ØF PØINTS, 200 SERIES
    0.     -302.      662.        0.      725.       30.      735.       35.    -PØINTS X1, Y1     X2, Y2      X3, Y3      X4, Y4
  746.       40.      757.       45.      768.       50.      779.       55.    -       X5, Y5     X6, Y6      X7, Y7      X8, Y8
  790.       60.      801.       65.      812.       70.      823.       75.    -       X9, Y9     X10, Y10    X11, Y11    X12, Y12
  835.       80.      846.       85.      858.       90.      869.       95.    -       X13, Y13   X14, Y14    X15, Y15    X16, Y16
  881.      100.      892.      105.      904.      110.     4095.     1137.    -       X17, Y17   X18, Y18    X19, Y19    X20, Y20
120  2                                                                          -CAL TABLE ID CARD, TABLE NØ., NØ. ØF PØINTS, 100 SERIES
    0.     -302.               5000.     5000.                                  -PØINTS X1, Y1  X2, Y2
220 20                                                                          -CAL TABLE ID CARD, TABLE NØ., NØ. ØF PØINTS, 200 SERIES
    0.     -302.      768.       50.      881.      100.     1000.      150.    -POINTS X1, Y1     X2, Y2      X3, Y3      X4, Y4
 1126.      200.     1257.      250.     1394.      300.     1464.      325.    -       X5, Y5     X6, Y6      X7, Y7      X8, Y8
 1535.      350.     1608.      375.     1681.      400.     1756.      425.    -       X9, Y9     X10, Y10    X11, Y11    X12, Y12
 1832.      450.     1909.      475.     1986.      500.     2145.      550.    -       X13, Y13   X14, Y14    X15, Y15    X16, Y16
 2306.      600.     2471.      650.     2639.      700.     4095.     1137.    -       X17, Y17   X18, Y18    X19, Y19    X20, Y20
         .4255          .655          .46           1.0           .624          -PRØGRAM CØNSTANTS - AT, KØ, DØØ, DPØ, KF
         .42            1.0          7.9173         2.1275        0.0           -PRØGRAM CØNSTANTS - DHØ, DPH, AC, AE, PAB
       67.0           67.0          40.0           40.0          30.0           -PRØGRAM CØNSTANTS - TFDS, TØDS, PFDS, PØDS, PCS
0 00 1 1  1 1 1                                                                 -PRØGRAM LØGIC FLAGS
CASEND                                                                          -DATA DECK TERMINATIØN CARD
```

TABLE 2.-1 Annotated Data Deck (continued)

Data Card	Explanation
Card Column	
1 2 3 4 5 6 7 8	
12345678901234567890123456789012345678901234567890123456789012345678901234567890	
∇ XQT CUR	-BRING IN TAPE HANDLING RØUTINES
ERS	-CLEAR USER PCF AREA
IN Y	-READ IN SECØND FILE ØN TAPE, PLØTTING PRØGRAM
TRI Y	-REWIND TAPE AND INTERLØCK
∇ XQT TRWPLT	-EXECUTE PLØTTING PRØGRAM
ISCALX=1	-USER WILL SCALE X-AXIS
XLØ=0.	-LØWER LIMIT ØN X-AXIS
XHI=10.	-UPPER LIMIT ØN X-AXIS
ISCALY=1	-USER WILL SCALE Y-AXIS
YLØ=0.	-LØWER LIMIT ØN Y-AXIS
YHI=100.	-UPPER LIMIT ØN Y-AXIS
XLABEL=ID= CØMPUTER TIME SEC	-ANNØTATIØN FØR X-AXIS
YLABEL=ID= THRUST LBS	-ANNØTATIØN FØR Y-AXIS
TITLE=ID= THRUST (LBS)	-ANNØTATIØN FØR PLØT
PLØT=TC,1,F,1,ENDLST	-PLØT THRUST AS A FUNCTIØN ØF TIME
ENDPLT	-END ØF PLØT 1
YLØ=0.	-LØWER LIMIT ØN Y-AXIS
YHI=100.	-UPPER LIMIT ØN Y-AXIS
YLABEL=ID= CHAMBER PRESSURE PSIA	-ANNØTATIØN FØR Y-AXIS
TITLE=ID= CHAMBER PRESSURE (PSIA)	-ANNØTATIØN FØR PLØT
PLØT=TC,1,PC,1,ENDLST	-PLØT CHAMBER PRESSURE AS A FUNCTIØN ØF TIME
ENDPLT	-END ØF PLØT 2
YLØ=0.	-LØWER LIMIT ØN Y-AXIS
YHI=300.	-UPPER LIMIT ØN Y-AXIS
YLABEL=ID= ENGINE SPECIFIC IMPULSE SEC	-ANNØTATIØN FØR Y-AXIS
TITLE=ID= ENGINE SPECIFIC IMPULSE (SEC)	-ANNØTATIØN FØR PLØT
PLØT=TC,2,ISP,2,ENDLST	-PLØT SPECIFIC IMPULSE AS A FUNCTIØN ØF TIME
ENDPLT	-END ØF PLØT 3
XLØ=0.	-LØWER LIMIT ØN X-AXIS
XHI=20.	-UPPER LIMIT ØN X-AXIS
YLØ=0.	-LØWER LIMIT ØN Y-AXIS
YHI=10000.	-UPPER LIMIT ØN Y-AXIS
XLABEL=ID= TØTAL IMPULSE	-ANNØTATIØN FØR X-AXIS
YLABEL=ID= CHARACTERISTIC EXHAUST VELØCITY FT/SEC	-ANNØTATIØN FØR Y-AXIS
TITLE=ID= CHARACTERISTIC EXHAUST VELØCITY .VS. TØTAL IMPULSE	-ANNØTATIØN FØR PLØT
PLØT=IT,2,CSTAR,2,ENDLST	-PLØT CSTAR AS A FUNCTIØN ØF TØTAL IMPULSE
ENDPLT	-END ØF PLØT 4
XLABEL=ID= CØMPUTER TIME SEC	-ANNØTATIØN FØR X-AXIS
YLABEL=ID= STANDARDIZED ENGINE SPECIFIC IMPULSE SEC	-ANNØTATIØN FØR Y-AXIS
TITLE=ID= STANDARDIZED ENGINE SPECIFIC IMPULSE (SEC)	-ANNØTATIØN FØR PLØT
PLØT=TC,2,ISPS,3,ENDLST	-PLØT STANDARDIZED ISP AS A FUNCTIØN ØF TIME

TABLE 2.-1 Annotated Data Deck (continued)

```
                                    Data Card                                                   Explanation
Card Column
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
ENDPLT                                                                          -END ØF PLØT 5
ENDFIL                                                                          -END ØF PLØTS FØR THIS FILE ØF DATA
ENDRUN                                                                          -END ØF THIS RUN
∇  EØF                                                                          -END ØF FILE
```

TABLE 2.-1 Annotated Data Deck (continued)

3. PROGRAMMER'S GUIDE

3.1 PROGRAM DESCRIPTION

Data Reduction Program - HC011C

This program has been designed to perform data acquisition, reduction, and analysis information recorded on magnetic tape by a SEL 600 12-bit, 50-channel analog/digital converter. The converter multiplexes the data in a unique non-sequential cyclic manner. One cycle or sample consists of sampling channels 1-40, channels 1-30, and channels 41-50. The sampling rate for channels 1-30 (500 S/S) is double that of channels 31-50 (250 S/S). Each 36-bit word in the data stream consists of three 12-bit packed words.

The program reads the SEL 600 data tape with NTRAN in 801-word records. Each word is then unpacked into three words and placed in a storage array of dimension 2403. Data in this array is demultiplexed into 50 channels and placed in another array of dimension 60 X 50, each column representing one channel of data. In order to produce a uniform sample rate of 250 samples per second, those parameters which are recorded twice within one sample are simply arithmetically averaged. The parameters which are recorded once within one sample are transferred along with the averaged values to correspond with the time associated with the midpoint of the sample. The quantity of data is further reduced by combining 5 samples into one by simple averaging with the associated time of the center sample. One channel of the fifty contains a square pulse which recenters the averaging window and triggers analysis of the reduced data. Based on a threshold-crossing criterion, the beginning and end of the pulses are determined. This activates a recentering of the averaging window to coincide with the beginning of the start and shutdown transients. The subset of data defined by the pulse start and stop-time is then reordered (since there is no unique relationship between channel number and type of data) and is input to the engineering routines. Results are then output according to the user's specifications (paper, historical tape, microfilm).

The historical tape format is compatable with the input format required by the plotting program, TRWPLT. To create plots, TRWPLT is used in a double execution with HD011C. The user also has the option to simply obtain a dump of raw data which has been demultiplexed and converted into engineering units.

A complete listing of the program is presented in Appendix IV.

3.2 PROGRAM INTERFACES

This section presents cross references of the following nature; 1) entry point cross reference, 2) common block cross reference, 3) intermediate storage on drum and fastrand files. Section 3.2.4 provides a complete description of each common block and the blank common storage.

3.2.1 Entry Point Cross Reference

Table 3-1 gives a cross reference of calling and called subroutines. Also included in the cross reference are system library functions.

	CALLING ROUTINE							
	HD011C	CHEWER	FILTR1	FILTR2	JHYDE	OUTPUT	RATED	SWAGER
AVRGR				X				
BLKDTA								
CDNPUT	X	X						
CHEWER	X							
CR2TAP	X							
FILTR1	X							
FILTR2	X	X						
HGAMMA								X
HZH							X	X
JHYDE	X							
ØGAMMA								X
ØUTPUT	X	X						
ØXZØX							X	X
RATED								X
SHIFT				X				
SWAGER	X	X						
ZERØ				X				
	SYSTEM FUNCTIONS							
NTRAN		X						
FLD		X				X		
AMIN1.			X					
AMAX1			X					
ABS					X			
MØD						X		X
ØR						X		
SQRT							X	X

Table 3-1. Entry Point Cross Reference

3.2.2 Common Block Cross Reference

Table 3-2 shows the usage of the common blocks and blank common by each subprogram in HD011C.

GLOBAL STORAGE

SUBPROGRAM	BLANK CØMMØN	CØMRAT	CØMRT1	ENG	FACTØR	FILES	FLAGS	FUNCTN	ICT	LABELS	RØWS	TIME	TIMLST	UNITS
HD011C						X	X				X			X
AVRGR	X													
BLKDTA	X		X	X	X	X	X	X		X	X	X		X
CDNPUT		X	X	X	X	X				X	X			X
CHEWER	X				X	X	X				X	X	X	X
CR2TAP														X
FILTR1	X						X				X			
FILTR2	X						X				X	X		
JHYDE	X				X	X					X			
ØUTPUT	X	X		X	X	X			X	X	X			X
RATED	X	X		X		X			X	X				
SHIFT	X													
SWAGER	X	X		X		X		X	X	X	X		X	
ZERØ	X													

Table 3-2 Global Storage Cross Reference

3.2.3 Use of Intermediate Storage Devices

As presently constructed the program uses one drum file on every run. Its physical unit designation is 2; its logical unit designation is B; it is referenced in the program through the variable IØTAPE. All card images which pertain only to HD011C are stored in this file. In this manner, the program has ready access to the input data for each pulse.

When plots are required and a double execution is performed, the logical unit F, physical unit 8 is utilized as a fastrand file. This allows HD011C to store the plot data on this file where it will still be available for TRWPLT to use when it is executed. A drum file is not permissable, as data stored on drum files is not available from one execution to the next. It would be possible to assign this file to a working tape if the user desires. However, using a fastrand file relieves the user of the necessity of keeping track of tapes.

3.2.4 Description of Blank and Block Common

This section describes each variable stored in blank or block common.

3.2.4.1 Blank Common

Storage: 7137 cells

Variable	Type	Dimension	Units	Description
ENGDAT	Real	9,100	--	Contains data calculated in the engineering routines.
ENGRAT	Real	9,50	--	Contains data calculated by the engine performance standardization routines.
FILT1	Real	40,51*	--	Contains the SEL 600 data after the first filtering process, a simple arithmetical averaging.
FILT2	Real	9,53**	--	Results of the second compression or filtering are stored here. Also, computed time is stored in this array.
STØRE	Real	60,53***	--	When the SEL 600 data tape is de-multiplexed so that each channel is identifiable, it is stored in this array.

* Each column in the array corresponds to one channel. The 51st column is not being used.

** Each column in the array corresponds to one channel. Columns 51 and 52 have time stored in them. Column 53 is not in use.

*** Each column in the array corresponds to one channel. Each row corresponds to one sample (one cycle) of forty channels.

3.2.4.2 Block Common CØMRAT

Storage: 42 cells

Variable	Type	Dimension	Units	Description
AE	Real	1	in^2	Area of nozzle exit
ATTC	Real	1	in^2	Area of nozzle throat thermally compensated
CFNSV	Real	1	--	Standard theoretical vacuum thrust coefficient
CFSTD	Real	1	--	Standard thrust coefficient
CFSTDV	Real	1	--	Standard thrust coefficient at vacuum
CFSV	Real	1	--	Theoretical thrust coefficient at vacuum
CSTASD	Real	1	ft/sec	Standard characteristic exhaust velocity (C*)
CSTAT	Real	1	ft/sec	Site theoretical C* at 30 psia nozzle stagnation pressure
CSTATS	Real	1	ft/sec	Standard theoretical C* at 30 psia nozzle stagnation pressure.
DPF	Real	1	psia	Pressure differential from interface to combustion chamber for fuel
DPFS	Real	1	psia	Pressure differential standard interface to calculated chamber pressure for fuel
DPØS	Real	1	psia	Pressure differential standard interface to calculated chamber pressure for oxidizer.
ECFSTD	Real	1	--	Standard thrust efficiency coefficient
ECFS	Real	1	--	Site thrust efficiency coefficient
EPS	Real	1	--	Ratio of exit area to thermal corrected throat area of nozzle
ETAC	Real	1	--	Site C* efficiency
FSTD	Real	1	lbf	Standard thrust
IRATED	Integer	1	--	Logic flag used to indicate use of engine performance standardization routine =0 - do not use routine =1 - use routine
ISPS	Real	1	sec	Standard specific impulse
MRS	Real	1	--	Standard mixture ratio
PAB	Real	1	psia	Pressure ambient
PCCI	Real	1	psia	Calculated chamber pressure at injector face
PCCIA	Real	1	psia	Adjusted calcualted chamber pressure at injector face
PCE	Real	1	psia	Chamber pressure convergence criteria
PCS	Real	1	psia	Standard chamber pressure
PDØ	Real	1	psia	Pressure differential from interface to combustion chamber for oxidizer
PFD	Real	1	psia	Pressure of the fuel at interface
PFDS	Real	1	psia	Standard pressure of the fuel at interface

Variable	Type	Dimension	Units	Description
PNSS	Real	1	psia	Standard nozzle stagnation pressure
PØD	Real	1	psia	Pressure of the oxidizer at interface
PØDS	Real	1	psia	Standard pressure of the oxidizer at interface
RFD	Real	1	lb/cu ft	Density of the fuel at interface
RFDS	Real	1	lb/cu ft	Standard density of the fuel at interface
RØD	Real	1	lb/cu ft	Density of the oxidizer at interface
RØDS	Real	1	lb/cu ft	Standard density of the oxidizer at interface
TFD	Real	1	°F	Temperature of fuel at interface
TFDS	Real	1	°F	Standard temperature of fuel at interface
TØD	Real	1	°F	Temperature of oxidizer at interface
TØDS	Real	1	°F	Standard temperature of oxidizer at interface
WDØTFS	Real	1	lb/sec	Adjusted fuel flowrate to standard values
WDØTØS	Real	1	lb/sec	Adjusted oxidizer flowrate to standard values
WDØTTS	Real	1	lb/sec	Total adjusted propellant flowrate to standard values

3.2.4.3 Block Common CØMRT1

Storage: 6 cells

Variable	Type	Dimension	Units	Description
PAB1	Real	1	psia	Value of pressure, ambient used if not changed by input
PCS1	Real	1	psia	Value of standard chamber pressure used if not changed by input
PFDS1	Real	1	psia	Value of standard pressure of fuel at interface used if not changed by input
PØDS1	Real	1	psia	Value of standard pressure of oxi-dizer at interface used if not changed by input
TFDS1	Real	1	°F	Value of standard temperature of the fuel at interface used if not changed by input
TØDS1	Real	1	°F	Value of standard temperature of the oxidizer at interface used if not changed by input

3.2.4.4 Block Common ENG

Storage: 18 cells

Variable	Type	Dimension	Units	Description
AC	Real	1	in^2	Chamber area
AT	Real	1	in^2	Throat area
CF1	Real	1	--	Constant used to compute fuel and oxidizer flowrates
CF2	Real	1	--	Constant used to compute oxidizer gas compressibility factor
CF3	Real	1	--	Same as CF2
CF4	Real	1	--	Same as CF2
DCSTAR	Real	1	--	Constant additive factor to C*
DHØ	Real	1	in	Fuel orifice diameter
DØØ	Real	1	in	Oxidizer orifice diameter
DPH	Real	1	in	Fuel upstream pipe diameter
DPØ	Real	1	in	Oxidizer upstream pipe diameter
G	Real	1	ft/sec^2	Earth's gravitational acceleration (local)
GAMMA	Real	1	--	Ratio of specific heats of oxidizer and fuel
K	Real	1	--	Coefficient used in computing nozzle stagnation pressure
KF	Real	1	--	Coefficient of discharge of fuel orifice
KØ	Real	1	--	Coefficient of discharge of oxidizer orifice
MWH	Real	1	lb/mole	Molecular weight of hydrogen
MWØ	Real	1	lb/mole	Molecular weight of oxygen

3.2.4.5 Block Common FACTØR

Storage: 3418 cells

Variable	Type	Dimension	Units	Description
BIAS	Real	51	--	Contains input biases for each channel
IB	Integer	51	--	Input logic flag for use of bias =0 - do not use bias =1 - use input bias
IC	Integer	51	--	Input logic flag for use of calibration curves =0 - no cal curves =1 - use input cal curves
IRUNNØ	Integer	1	--	Contains run ID stored in it. ID comes from data tape.
IS	Integer	51	--	Input logic flag for use of scale factor =0 - no scale factor =1 - use input scale factor
NP1	Integer	51	--	Array containing number of points in 100 series cal curves.
NP2	Integer	51	--	Array containing number of points in 200 series cal curves.
SCALE	Real	51	--	Contains scale factors for each channel

Variable	Type	Dimension	Units	Description
TABX1	Real	51,10	--	Contains abscissa values for 100 series cal curves
TABX2	Real	51,20	--	Contains abscissa values for 200 series cal curves
TABY1	Real	51,10	--	Contains ordinate values for 100 series cal curves
TABY2	Real	51,20	--	Contains ordinate values for 200 series cal curves

3.2.4.6 Common Block FILES

Storage: 11 cells

Variable	Type	Dimension	Units	Description
BEGFIL	Integer	1	--	Starting file on data tape
IBL	Integer	1	--	Flag which indicates 'BLØCK I' output is to be produced. =0 - do not output 'BLØCK I' report =1 - report 'BLØCK I' output
IDUMP	Integer	1	--	Logic flag used to dump a pulse on data tape =0 - do not dump pulse =1 - dump data pulse
ILINE	Integer	1	--	Line counter for printed output
INT	Integer	1	--	Logic flag data tape initialization has been done =0 - data tape not initialized =1 - data tape positioned properly
IPC	Integer	1	--	Printer control flag =0 - do not produce printed output =1 - print every 5th computed point =2 - print every 10th computed point
IPLØT	Integer	1	--	Logic flag to control creation of a data plot tape =0 - do not create a plot tape =1 - create a plot data tape
MXFILE	Integer	1	--	Maximum number of consecutive end-of-file marks allowed on data tape before stopping run
NDP	Integer	1	--	Number of pulse on data tape to be dumped
NLINES	Integer	1	--	Maximum number of lines on a page
NP	Integer	1	--	Number of pulses to process

3.2.4.7 Block Common FLAGS

Storage: 5 cells

Variable	Type	Dimension	Units	Description
ISCAN	Integer	1	--	Flag used to indicate the program has scanned the next record for detection of an engine off or engine on command =0 - next record not yet scanned =1 - next record has been scanned
ISEND	Integer	1	--	Flag to indicate to the main routine to use the previous record in engineering logic =0 - not ready to use previous record =1 - ready to use previous record
ITØN	Integer	1	--	Logic flag to keep the program from detecting an engine off command before an engine on command due to noise in the data =0 - no noise in data =1 - noise in the data has caused engine off before an engine on to be detected
LAST	Integer	1	--	Last record on data tape has been read and needs to be processed =0 - last record has not been read =1 - last record has been read
LØØK	Integer	1	--	Logic flag to indicate program is ready to read ahead one record to scan it for engine off or engine on command =0 - not ready to read ahead =1 - program ready to read ahead

3.2.4.8 Block Common FUNCTN

Storage: 200 cells

Variable	Type	Dimension	Units	Description
CX	Real	100	--	Data points along abscissa for computation of contraction ratio which is area of combustion chamber to area of throat.
CY	Real	1000		Data points along ordinate for computation of contraction ratio which is area of combustion chamber to area of throat

3.2.4.9 Block Common ICT

Storage: 2 cells

Variable	Type	Dimension	Units	Description
ICT1	Integer	1	--	Counter used to determine when output should be reported
NØCØNV	Integer	1	--	Logic flag which indicates that the engine performance standardization routine did not converge on an answer =0 - convergence was obtained =1 - convergence was not obtained

3.2.4.10 Block Common LABELS

Storage: 208 cells

Variable	Type	Dimension	Units	Description
IPØINT	Integer	8	--	Contains the location of the eight variables, located in the FILT2 array, which are mandatory for the engineering routine
LABELS	Integer	50	--	Contains the alphanumeric name of each channel in BCD. Used for output and as identifiers on the plot tape.
LABENS	Integer	100	--	Contains the alphanumeric name of each engineering output parameter in BCD. Used for output and as identifiers on the plot tape.
LABRAT	Integer	50	--	Contains the alphanumeric name of each engine performance standardization parameter in BCD. Used for output and as identifiers on the plot tape.

3.2.4.11 Block Common RØWS

Storage: 13 cells

Variable	Type	Dimension	Units	Description
IBEGIN	Integer	1	--	Flag used to give starting location in the FILT1 array to begin the second filtering
IFV	Integer	1	--	Identifies the channel the fire voltage is in
INITL	Integer	1	--	Logic flag to indicate an initialization pass through a subroutine =0 - not an initialization pass =1 - initialize all variables in the subroutine

Variable	Type	Dimension	Units	Description
IØN	Integer	1	--	Logic flag that gives the status of the engine =-1 - firing has terminated =0 - engine has not been fired =1 - engine is on
IQUIT	Integer	1	--	Flag, which when set, will not allow any engineering calculations to take place until the next pulse. <99999 - use engineering routines ≥99999 - do not use engineering routines until next pulse
IRØW	Integer	1	--	Flag giving the row in the FILT2 array in which the engine on command was sensed in some data record
JEND	Integer	1	--	Flag used to indicate the engine is definitely off and that the sensed-off command was not a data dropout =0 - status indeterminate from this flag alone =1 - engine has definitely gone off
JØN	Integer	1	--	Flag used to indicate the engine is definitely on and that the sensed engine on command was not a data dropout =0 - status indeterminate from this flag alone =1 - engine is definitely on
JRØW	Integer	1	--	Flag giving the row in the FILT2 array where the engine off command was sensed in some data record
KKPBEG	Integer	1	--	Row in FILT1 array where engine on command was first detected
KKPEND	Integer	1	--	Row in FILT1 array where engine off command was first detected.
KKSAVE	Integer	1	--	Used to save the value of the subscript of the last row of the FILT1 array which was averaged in the FILTR2 subroutine
LSTPTS	Integer	1	--	Number of points in the integration scheme after the engine-off command is sensed

3.2.4.12 Block Common TIME

Storage: 1 cell

Variable	Type	Dimension	Units	Description
N	Integer	1	--	Number of rows of the FILT1 array that have been averaged. Used to calculate the time of that average.

3.2.4.13 Block Common TIMLST

Storage: 1 cell

Variable	Type	Dimension	Units	Description
TIMLST	Real	1	sec	Contains the length of the pulse in seconds

3.2.4.14 Block Common UNITS

Storage: 4 cells

Variable	Type	Dimension	Units	Description
IØTAPE	Integer	1	--	Intermediate input for the storage of the input card images
MICRØT	Integer	1	--	When microfilm output is requested, this referencesthe tape drive the microfilm output tape is mounted on
PLTAPE	Integer	1	--	When 4020 plots are desired, this is the unit, fastrand or tape, on which is stored the plot data
UNIT	Integer	1	--	References the tape drive that has the data tape mounted on it

3.3 SUBROUTINE DOCUMENTATION

This section presents detailed descriptions of each subprogram in the HEPCAT (HD011C) program. The descriptions include the function of each subprogram, its entry points, core requirements, external references, the common blocks used and internal symbols used. A basic logic diagram is also included to show the logic of each subprogram.

3.3.1 MAIN PROGRAM HD011C

3.3.1.1 Introduction

HD011C is the master logic routine of the program. Its function is to keep the three basic portions of the program, input, calculations and output, in the proper sequence.

3.3.1.2 Method

When execution of the program begins, the first function undertaken is to put the input card images in an intermediate data file. Upon completion of this task, the data cards are read in and checked for errors. A loop is then defined which consists of reading the data tape, checking for errors, demultiplexing the data, filtering the data, performing engineering calculations if the engine is on, and reporting the results. This loop is redefined for each pulse processed.

3.3.1.3 Entry Points

This routine has one entry point, the execution name of HD011C.

3.3.1.4 Core Requirements

86 cells

3.3.1.5 Subroutines Called

CDNPUT
CHEWER
CR2TAP
FILTR1
FILTR2
JHYDE
ØUTPUT
SWAGER

3.3.1.6 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.6	FILES	IDUMP, INT, IPLØT
3.2.4.7	FLAGS	ISEND, LAST, LØØK
3.2.4.11	RØWS	IØN, IQUIT, JØN
3.2.4.14	UNITS	PLTAPE

3.3.1.7 Internal Symbol Table

There are no internal variables in this routine.

3.3.1.8 Logic Diagram

The basic logic of the main program is shown in Figure 3-1.

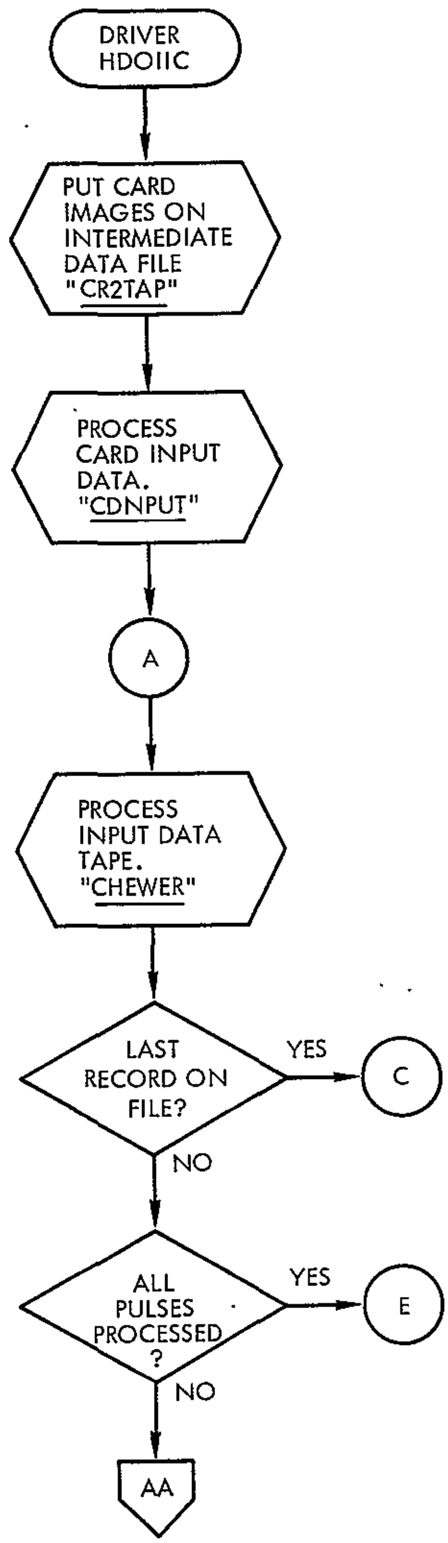


Figure 3-1 Main Program (HD011C) Logic Diagram

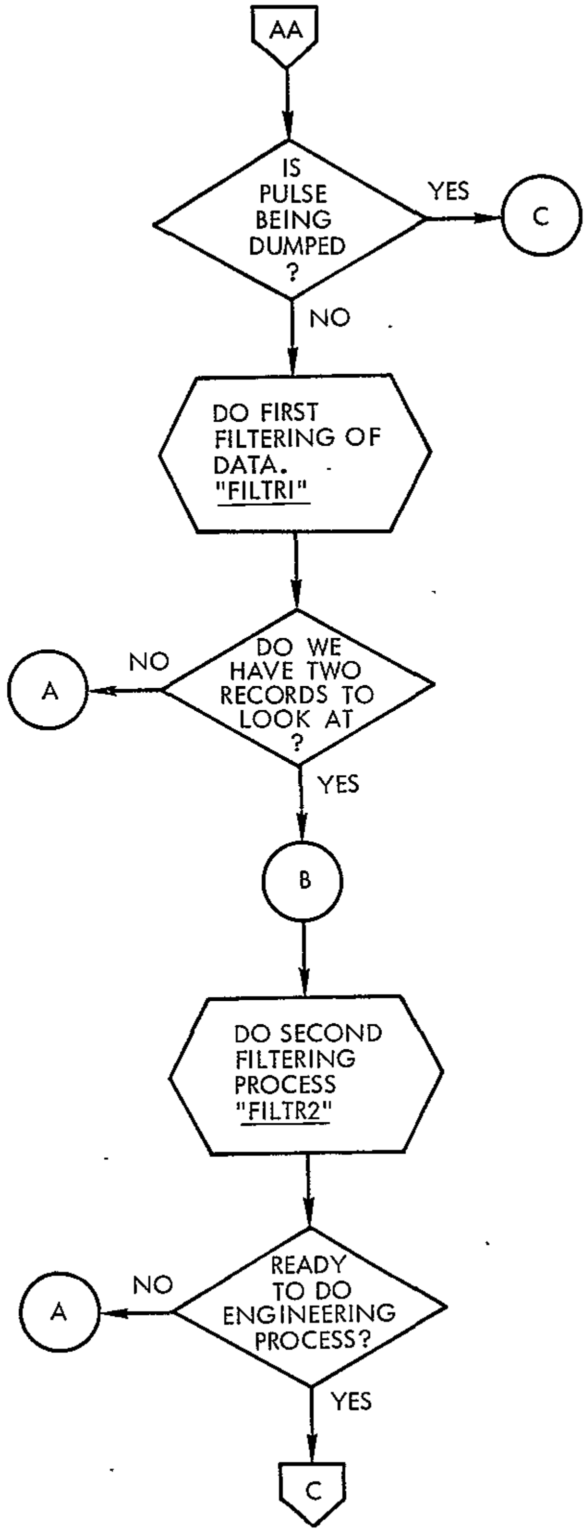


Figure 3-1 Main Program (HD011C) Logic Diagram (continued)

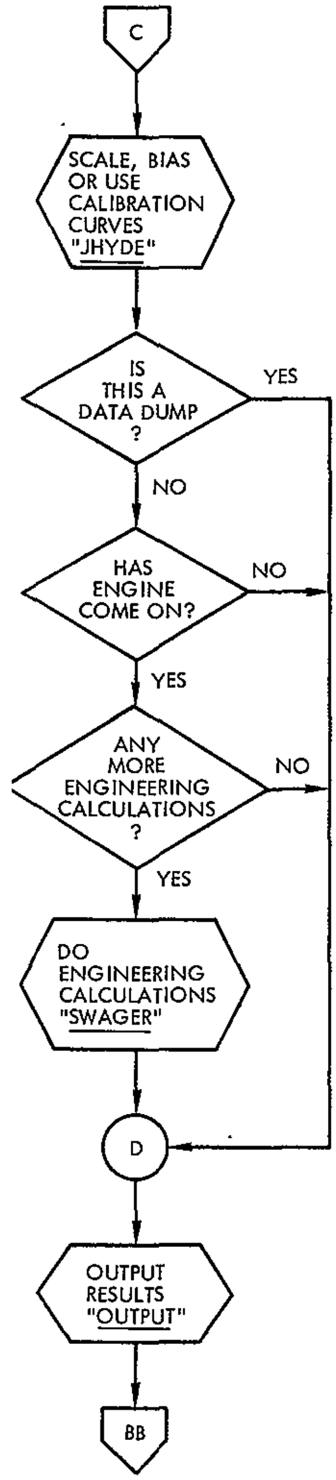


Figure 3-1 Main Program (HD011C) Logic Diagram (continued)

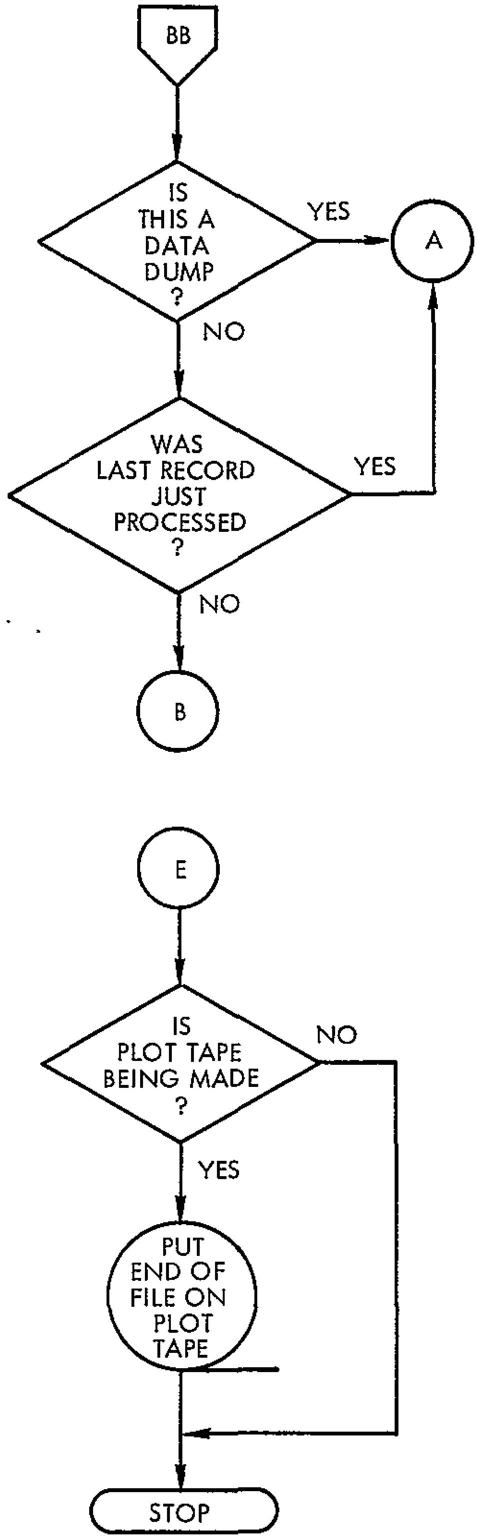


Figure 3-1 Main Program (HD011C) Logic Diagram (continued)

3.3.2 SUBPROGRAM AVRGR

3.3.2.1 Introduction

This subprogram has one purpose - to filter five samples of the FILT1 array into one sample of the FILT2 array giving a smoother data base.

3.3.2.2 Method

Given five samples of one channel measurement, the subroutine filters these samples producing one sample.

3.3.2.3 Entry Points

This subroutine has one entry point, AVRGR. There are three arguments.

Argument	Type	Description
KK	Integer	Channel being averaged, row subscript in the FILT1 array.
ISTART	Integer	Start column in the FILT1 array for the averaging technique
ISTØP	Integer	Stop column in the FILT1 array for the averaging technique

3.3.2.4 Core Requirements

70 cells

3.3.2.5 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	Blank	FILT1, FILT2

3.3.2.6 Internal Symbol Definition

Symbol	Type	Dimension	Units	Description
I	Integer	1	--	Subscript controlling the channel of the FILT1 array which is being filtered
MM	Integer	1	--	Subscript controlling the sample of the FILT1 array being filtered. Also used to store the filtered samples into the correct column of the FILT2 array.

3.3.2.7 Logic Diagram

A diagram depicting the logic of Subprogram AVRGR is presented in Figure 3-2.

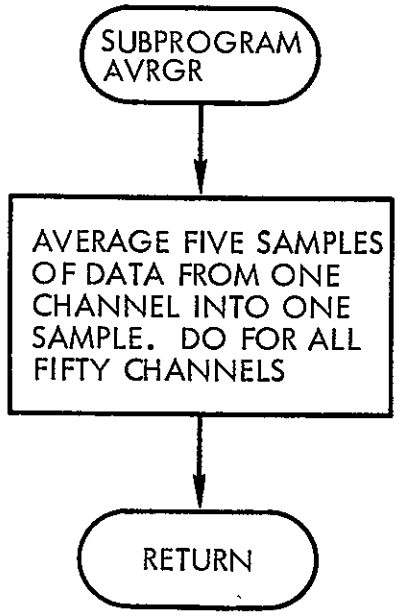


Figure 3-2. Subprogram AVRGR Logic Diagram

3.3.3 SUBPROGRAM BLKDTA

3.3.3.1 Introduction

This is a block data routine used to initialize the arrays and different logic flags to some preset value until changed by input or program calculation.

3.3.3.2 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	Blank	ENGDAT, ENGRAT, FILT1, FILT2, STØRE
3.2.4.3	CØMRT1	PAB1, PCS1, PFDS1, PØDS1, TFDS1, TØDS1
3.2.4.4	ENG	CF1, CF2, CF3, CF4, DCSTAR, G, GAMMA, K, MWH, MWØ
3.2.4.5	FACTØR	BIAS, IB, IC, IS, NP1, NP2, SCALE, TABX1, TABX2, TABY1, TABY2
3.2.4.6	FILES	BEGFIL, IDUMP, INT, MXFILE, NLINES, NP
3.2.4.7	FLAGS	ISCAN, ISEND, ITØN, LAST, LØØK,
3.2.4.8	FUNCTN	CX, CY
3.2.4.10	LABELS	LABELS, LABENS, LABRAT
3.2.4.11	RØWS	IFV, IØN, JØN, LSTPTS
3.2.4.12	TIME	N
3.2.4.14	UNITS	IØTAPE, MICRØT, PLTAPE, UNIT

3.3.3.3 Logic Diagram

The logic of Subprogram BLKDTA is presented in Figure 3.3.

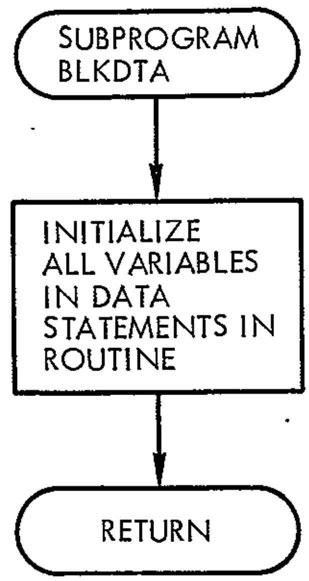


Figure 3.3 Subprogram BLKDTA Logic Diagram

3.3.4 SUBPROGRAM CDNPUT

3.3.4.1 Introduction

Subprogram CDNPUT is the routine used to read and decode the user card input.

3.3.4.2 Method

As each channel data card is read, all appropriate error checks are made and reported if errors are detected. The rest of the channel cards will be scanned for errors but no pulse will be processed. If no errors are found, the calibration curves will be read and assigned to the proper channel. The program constants are read, after which the logic flag card is read. If a plot tape is desired, the subroutine writes the identifying records at the beginning of the tape.

3.3.4.3 Entry Points

There is one entry point to this subprogram; it is through the name CDNPUT. There are no calling arguments.

3.3.4.4 Core Requirements

878 cells.

3.3.4.5 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.2	CØMRAT	PAB, PCS, PFDS, PØDS, TFDS, TØDS
3.2.4.3	CØMRT1	PAB1, PCS1, PFDS1, PØDS1, TFDS1, TØDS1
3.2.4.4	ENG	AC, AT, DHØ, DØØ, DPH, DPØ, KF, KØ
3.2.4.5	FACTØR	BIAS, IB, IC, IS, NP1, NP2, SCALE, TABX2, TABX2, TABY1, TABY2
3.2.4.6	FILES	IDUMP, IPC, IPLOT, NDP, NP
3.2.4.10	LABEES	IPØINT, BABELS, LABENS, LABRAT
3.2.4.11	RØWS	IFV, INITL
3.2.4.14	UNITS	IØTAPE, MICRØT, PLTAPE

3.3.4.6 Internal Symbol Table

Variable	Type	Dimensions	Units	Description
BIASIN	Real	1	-	Temporary storage for the bias factor input by user
I	Integer	1	-	Do loop index variable
IBLANK	Integer	1	-	Contains BCD blanks. Used to check for a channel card with no parameter name
ICØUNT	Integer	1	-	Number of 100 series calibration tables that must be read
ICØUT1	Integer	1	-	Number of 200 series calibration tables that must be read
ID	Integer	1	-	Input channel number
IER	Integer	1	-	Error condition flag = 0 -No input error = 1 -Some error in input deck
IIFV	Integer	1	-	BCD word which contains FV. Used to search for fire voltage channel
IL	Integer	1	-	Temporary storage
ILL	Integer	1	-	Do loop index variable
INAM	Integer	8	-	Contains the BCD names of the eight required enginneering parameters
INDEX	Integer	1	-	Contains total number of distinct calibration tables that must be input
IT	Integer	50	-	Temporary storage array containing the 100 series curve ID
ITABL1	Integer	1	-	Temporary storage to read 100 series table ID into
ITABL2	Integer	1	-	Temporary storage to read 200 series table ID into
ITAB1	Integer	50	-	Used to store ID into for the 100 series table
ITAB2	Integer	50	-	Used to store ID into for the 200 series table.
ITYPE	Integer	1	-	Used to identify record type on creation of plot tape
IT1	Integer	1	-	Temporary storage array containing the 200 series cal curve IDs
I23	Integer	1	-	Used to print the number of data words in a type two plot record
I42	Integer	1	-	Used to print the number of data words in a type three plot record

Variable	Type	Dimensions	Units	Description
I52	Integer	1	-	Used to print the number of data words in a type one plot record
J	Integer	1	-	Do loop index variable
KK	Integer	1	-	Do loop index variable in an implied do loop
LL	Integer	1	-	Do loop index variable
N	Integer	1	-	Do loop index variable
NAME	Integer	1	-	Variable containing BCD channel name
NBIAS	Integer	1	-	Bias flag
NCALCR	Integer	1	-	Calibration curve flag
NSCALE	Integer	1	-	Scaling flag
NUMTAB	Integer	1	-	Flag containing calibration curve identification
TABX11	Real	20	-	Temporary storage for abscissa values of cal tables
TABY11	Real	20	-	Temporary storage for ordinate values of cal tables
TC	Real	1	-	Contains BCD name for computer time in plot tape
TR	Real	1	-	Contains BCD name for pulse reference time in plot tape

3.3.4.7 Logic Diagram

The logic diagram for subprogram CDNPUT is provided in Figure 3-4.

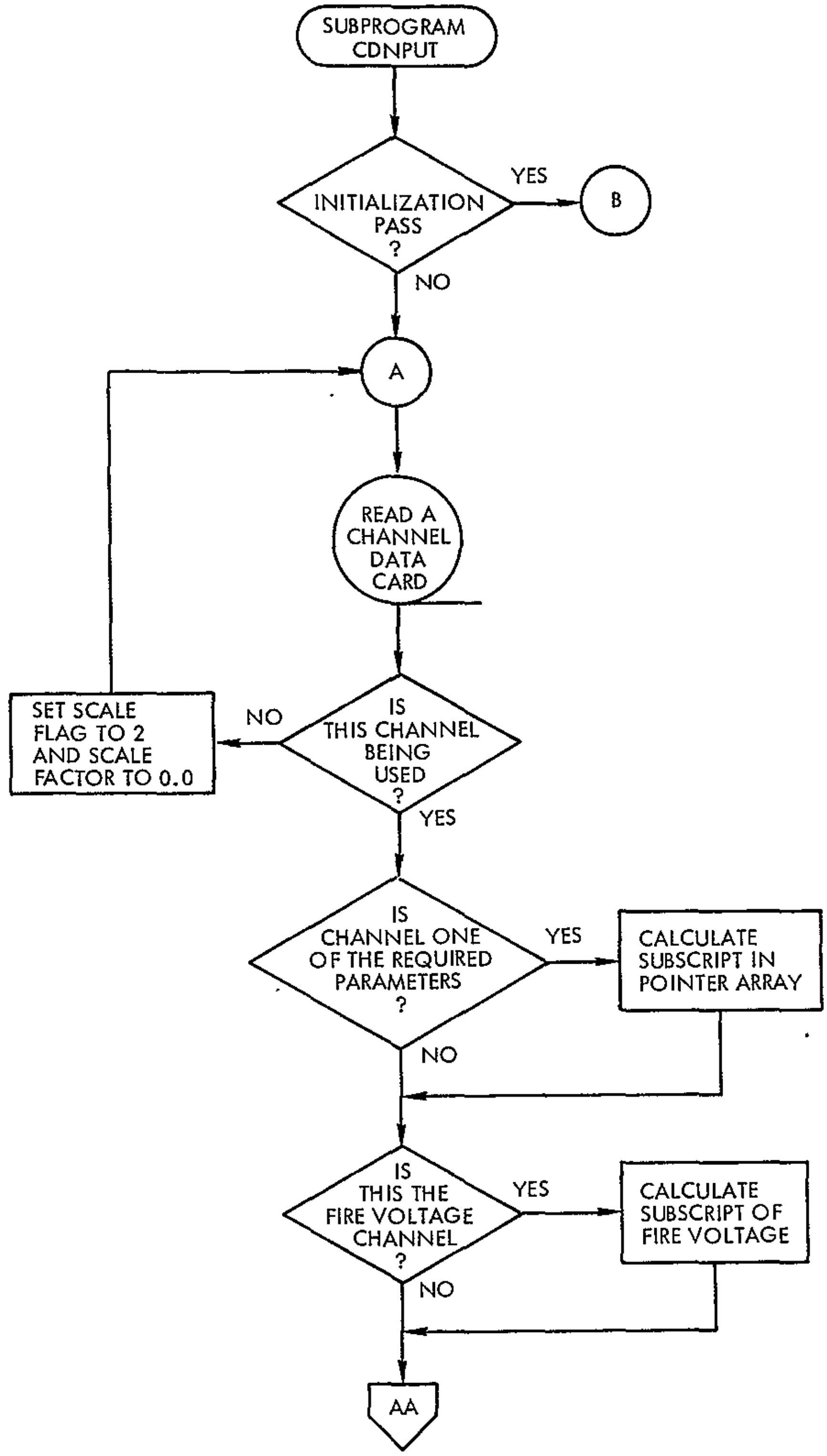


Figure 3-4 Subprogram CDNPUT Logic Diagram

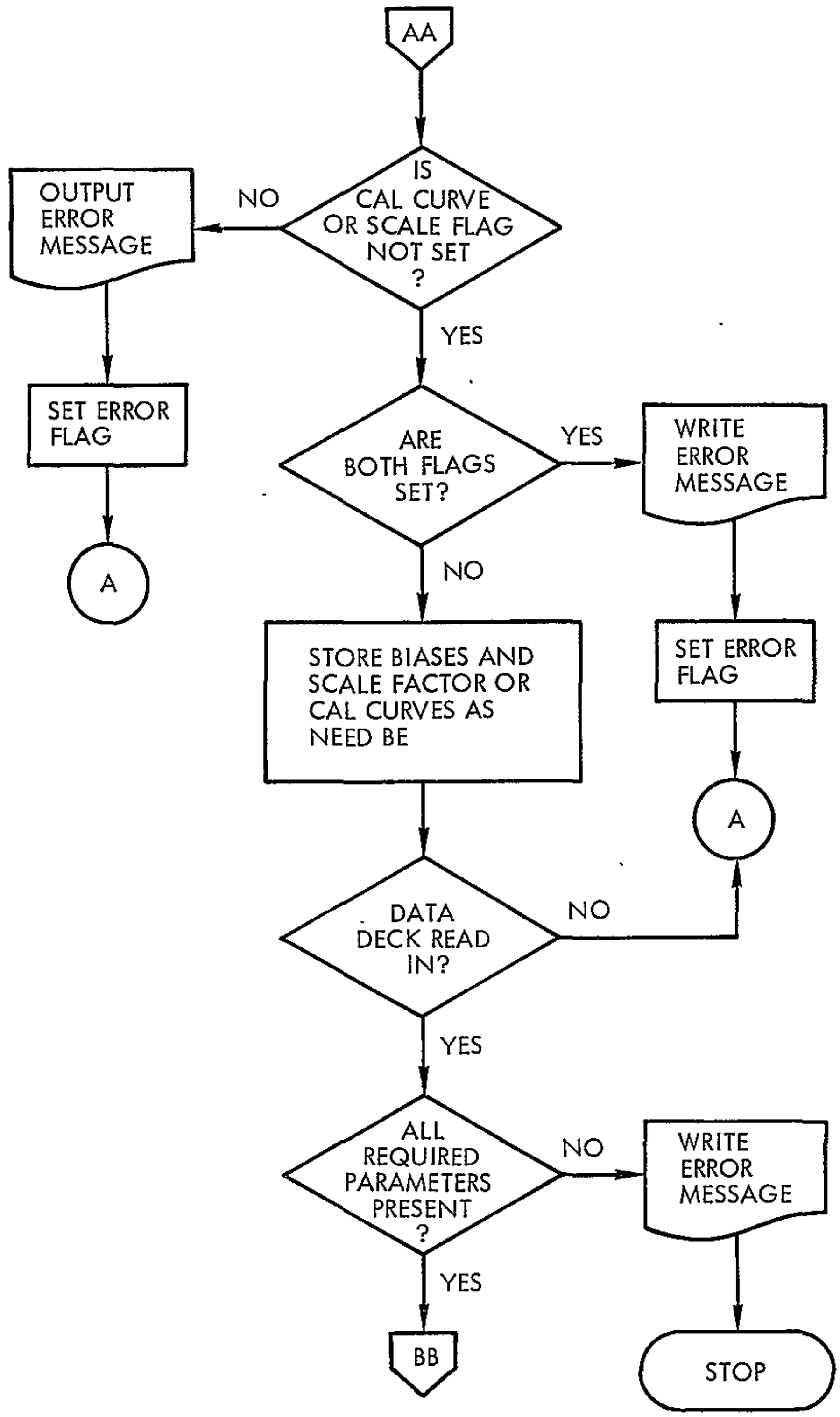


Figure 3-4 Subprogram CDNPUT Logic Diagram (Continued)

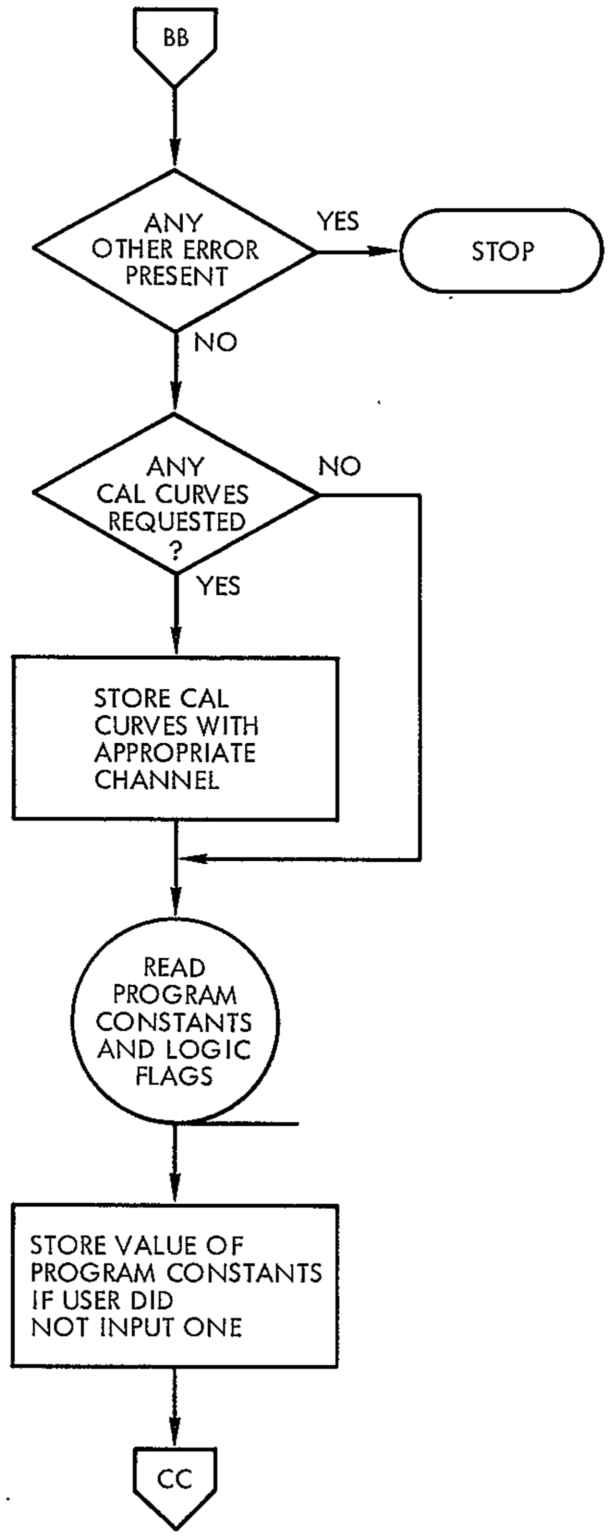


Figure 3-4 Subprogram CDNPUT Logic Diagram (Continued)

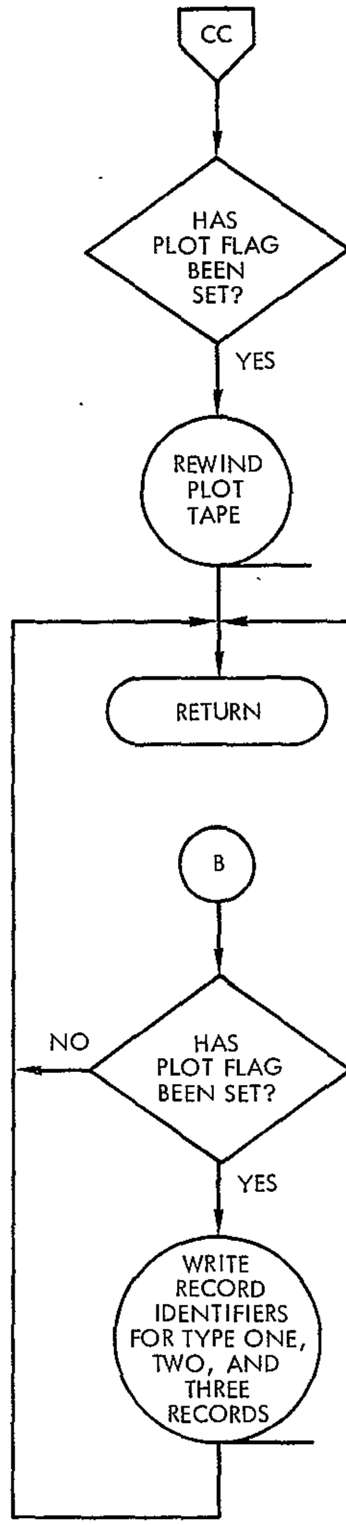


Figure 3-4 Subprogram CDNPUT Logic Diagram (Continued)

3.3.5 SUBPROGRAM CHEWER

3.3.5.1 Introduction

Subprogram CHEWER is responsible for reading and demultiplexing the data tape.

3.3.5.2 Method

Because the data tapes are not created by Fortran write statements, the systems routine called NTRAN was used to process the tape. After being positioned to the proper file, a record of 801 words is read in. Error checks are performed to ensure valid data. An error causes a message to be written and processing moves to the next record. When the first record of a file is read, all initialization of the other routines takes place. Once the unpacking is completed, the data is demultiplexed and identified with the proper channel.

3.3.5.3 Entry Points

The subprogram has one entry point through the name CHEWER. There are no calling arguments.

3.3.5.4 Core Requirements

3750 cells.

3.3.5.5 Subroutines Called

CDNPUT
FILTR2
FLD
NTRAN
ØUTPUT
SWAGER

3.3.5.6 Common Cross Reference

Reference Section	Common	Variable Used
3.2.4.1	BLANK	STØRE
3.2.4.5	FACTØR	IRUNNØ
3.2.4.6	FILES	BEGFIL, IBL, IDUMP, ILINE, INT, MXFILE, NDP, NLINES, NP
3.2.4.7	FLAGS	ISCAN, ISEND, ITØN, LAST, LØØK
3.2.4.11	RØWS	INITL, IØN, JØN
3.2.4.12	TIME	N
3.2.4.13	TIMLST	TIMLST
3.2.4.14	UNITS	MICRØT, PLTAPE, UNIT

3.3.5.7 Internal Symbol Table

Variable	Type	Dimensions	Units	Description
DAT	Real	2403	-	Unpacked data is stored in this array
I	Integer	1	-	Do loop index variable
ICC	Integer	1	-	Flip-flop flag used in the demultiplexing of the unpacked data
IDATIN	Integer	802	-	Array the data is read into before it is unpacked
IEND	Integer	1	-	Flag which indicates a pulse has been completely processed = 0 -not finished with a pulse = 1 -finished processing a pulse
IFLAG	Integer	1	-	Flag to indicate the first record of the file has just been read = 0 -first record has not been read = 1 -first record has just been read
IFLIP	Integer	1	-	Flag used to show a record was skipped because of faulty data = 0 -record not skipped = 1 -record just read was skipped
IR	Integer	1	-	Index of a computed go to statement = 1 -initialization for all subroutines must take place = 2 -initialization has already been done for this pulse
I1	Integer	1	-	Subscript used in unpacking data
I2	Integer	1	-	Subscript used in unpacking data
I3	Integer	1	-	Subscript used in unpacking data
KM	Integer	1	-	Subscript used in demultiplexing data
KNTFIL	Integer	1	-	Number of consecutive end-of-file mails encountered on the data tape
L	Integer	1	-	Subscript used in demultiplexing data
M	Integer	1	-	Subscript used in demultiplexing data
NFILE	Integer	1	-	Number of files passed on the data tape
NREC	Integer	1	-	Number of records processed in a file
PCOUNT	Integer	1	-	Number of pulses processed

3.3.5.8 Logic Diagram

The basic logic of subprogram CHEWER is presented in Figure 3-5.

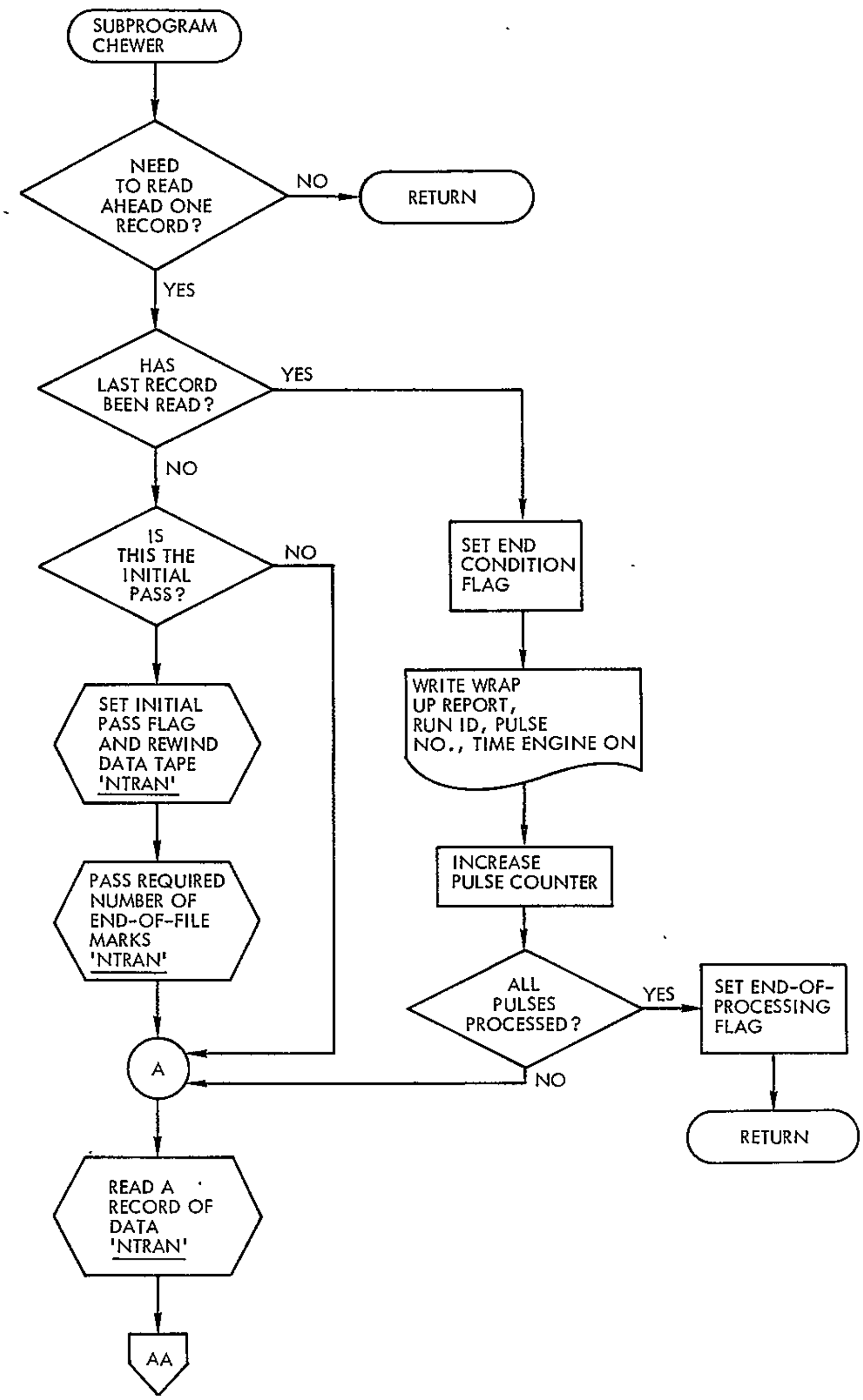


Figure 3-5 Subprogram CHEWER Logic Diagram

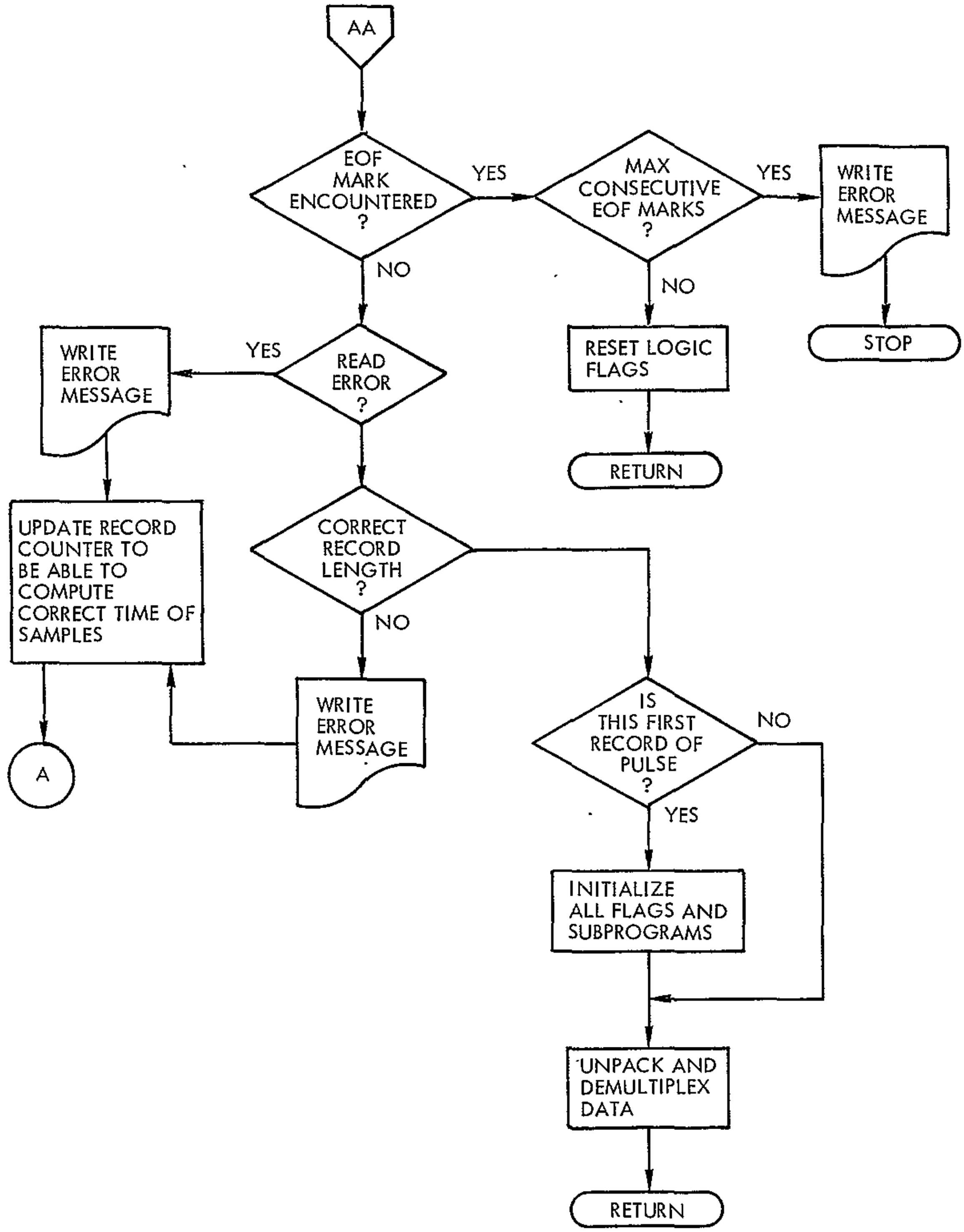


Figure 3-5 Subprogram CHEWER Logic Diagram (Continued)

3.3.6 SUBPROGRAM CR2TAP

3.3.6.1 Introduction

Subprogram CR2TAP is used to read card images from the system input tape and write them on an intermediate data file.

3.3.6.2 Method

After rewinding the intermediate storage device, the routine defines a loop consisting of reading a card image from the system input tape, writing the card image on the intermediate storage device, and checking for the end of the data deck. When the end card is reached, an end-of-file mark is placed on the intermediate storage device and it is rewound in preparation to being used.

3.3.6.3 Entry Points

This routine has one entry point, CR2TAP, and has no calling arguments.

3.3.6.4 Core Requirements

395 cells

3.3.6.5 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.14	UNITS	IØTAPE, MICRØT

3.3.6.6 Internal Symbol Table

Variable	Type	Dimension	Units	Description
I	Integer	1	--	Subscript in read statement and write statement
IDATA	Integer	14	--	Card images are read into this array and written out of it.
IEND	Integer	1	--	Read terminator. Contains the BCD data, 'CASEND'. When this word is encountered in the read statement, the data deck has been completely transferred from the system input tape to the intermediate data file.

3.3.6.7 Logic Diagram

The basic logic of subprogram CR2TAP is presented in Figure 3-6.

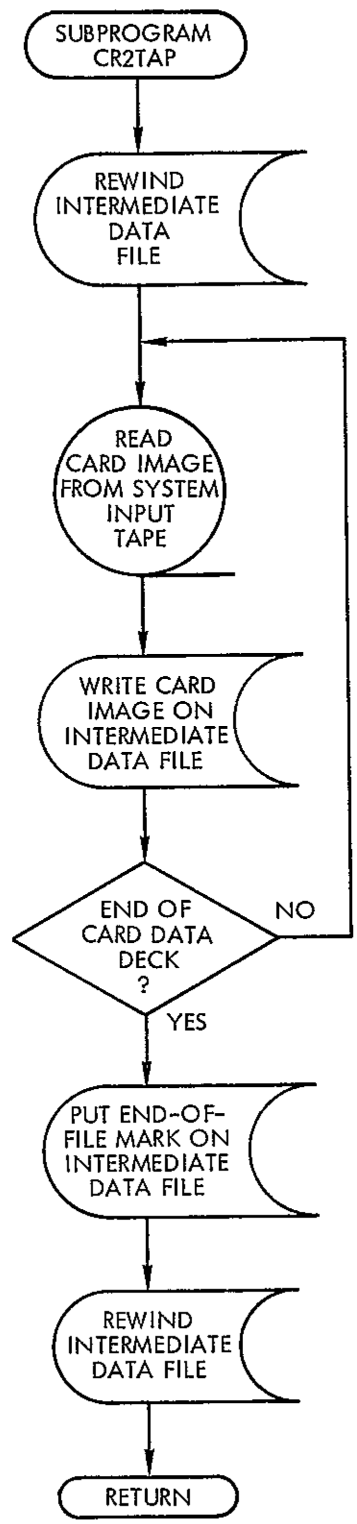


Figure 3-6 Subprogram CR2TAP Logic Diagram

3.3.7 SUBPROGRAM FILTR1

3.3.7.1 Introduction

FILTR1 has been designed to perform the first filtering of data and to determine when the fire voltage crosses the threshold value (3300 counts).

3.3.7.2 Method

Subroutine FILTR1 is used to smooth data points by simple arithmetic averaging. Two points from the STORE array are combined into one and placed in the FILT1 array. After this occurs, FILTR1 searches for the point in time the fire voltage crosses the threshold or for the point the fire voltage drops below the threshold value.

3.3.7.3 Entry Points

There is one entry point through the name FILTR1. There are no calling arguments.

3.3.7.4 Core Requirements

392 cells.

3.3.7.5 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	BLANK	FILT1, STØRE
3.2.4.7	FLAGS	ISCAN, ITØN, LØØK
3.2.4.11	RØWS	IFV, IØN, KKPBEG, KKPEND

3.3.7.6 Internal Symbol Table

Variable	Type	Dimension	Units	Description
I	Integer	1	-	Do loop index variable
IADD	Integer	1	-	Starting point for storage into the FILT1 array
IJ	Integer	1	-	Row subscript for the FILT1 array
IM1	Integer	1	-	Do loop index parameter
J	Integer	1	-	Do loop index variable
KM	Integer	1	-	Odd row subscript for STØRE array
KMP1	Integer	1	-	Even row subscript for STØRE array
KPBEG	Integer	1	-	Beginning row in the STØRE array containing the fire voltage signal that has gone over the threshold

3.3.7.6 Internal Symbol Table (cont)

Variable	Type	Dimension	Units	Description
KPEND	Integer	1	-	Last row in the STØRE array containing the fire voltage signal before it has dropped below the threshold
M	Integer	1	-	Do loop index variable
THMAX	Real	1	-	Maximum threshold - fire voltage must exceed this value for engine to be considered "on"
THMIN	Real	1	-	Minimum threshold - fire voltage less than or equal to this value implies an engine "off" condition

3.3.7.7 Logic Diagram

The basic logic of subprogram FILTR1 is presented in Figure 3-7.

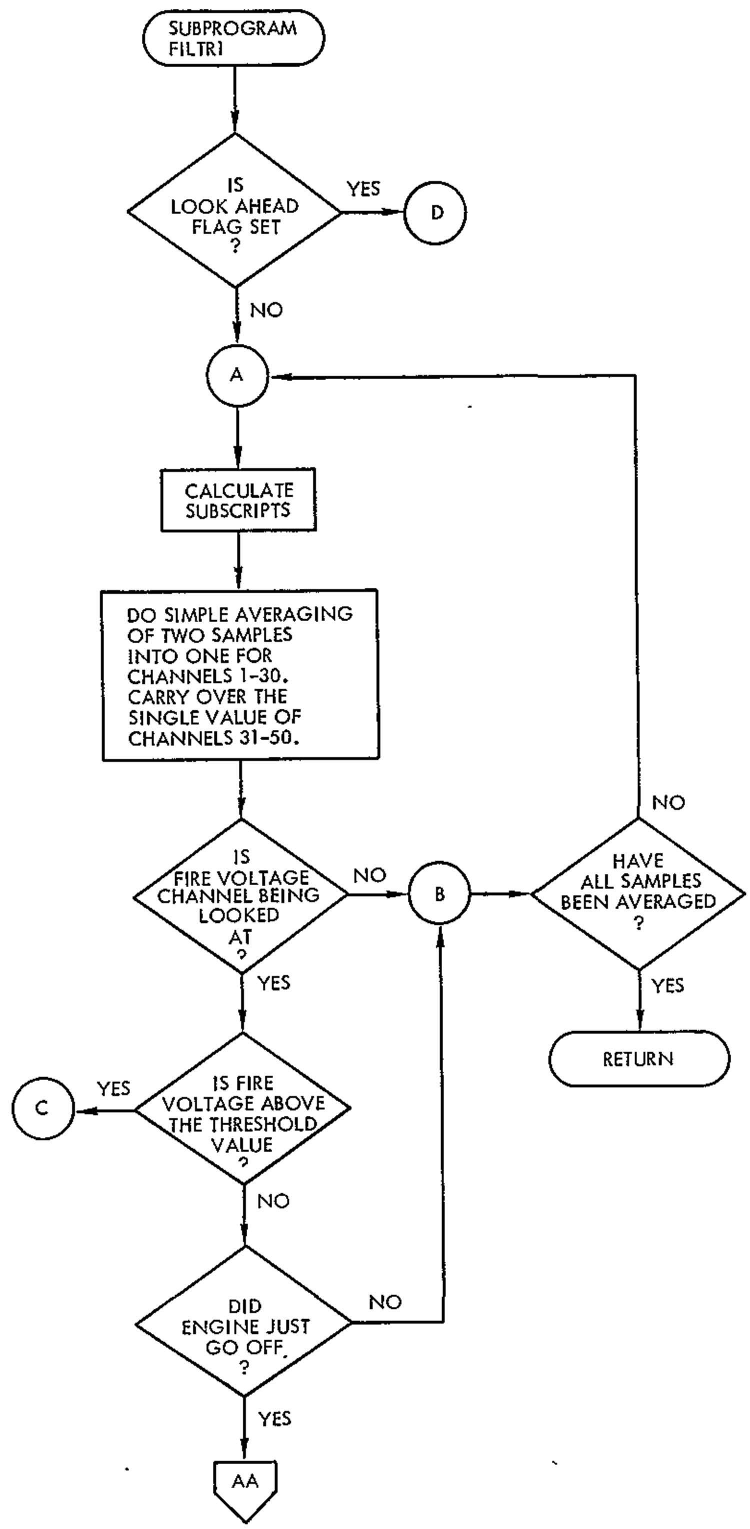


Figure 3-7 Subprogram FILTR1 Logic Diagram

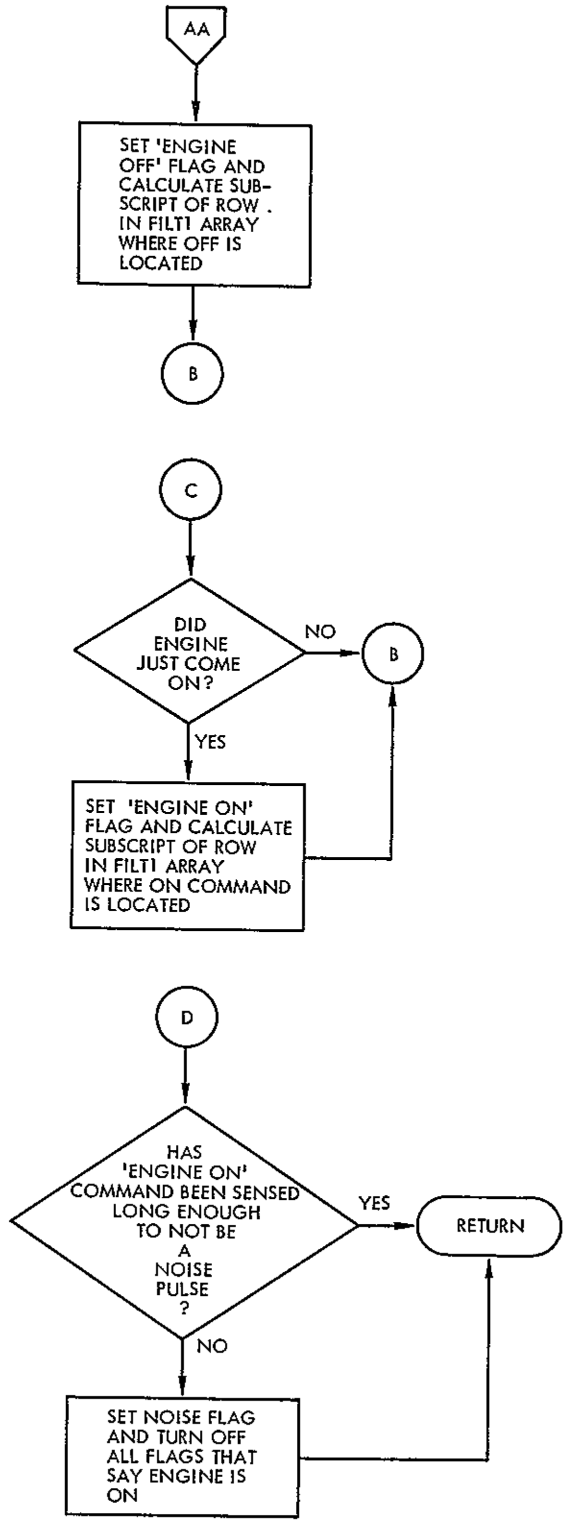


Figure 3-7 Subprogram FILTR1 Logic Diagram (Continued)

3.3.8 SUBPROGRAM FILTR2

3.3.8.1 Introduction

FILTR2 is designed to provide the second filtering process-averaging five samples to form a single sample value. It also recenters the averaging window when the fire voltage rises above or goes below the threshold.

3.3.8.2 Method

Until the fire voltage rises above the threshold value, FILTR2 performs a simple averaging process. When the rise in fire voltage above the threshold value is detected, the filtering process stops until the next record is read. This is to provide sufficient data to detect a noise spike. If the detected 'on' is not a noise spike the averaging is recentered around the time when the fire voltage crossed the threshold value. At this point the averaging process starts again. When the fire voltage drops below the threshold value, the averaging window is recentered again. Simple averaging is then continued to the end of the data file being processed.

3.3.8.3 Entry Points

The name FILTR2 is the only entry point to this subroutine. There are no calling arguments.

3.3.8.4 Core Requirements

1052 cells.

3.3.8.5 Subroutines Called

AVRGR
SHIFT
ZERØ

3.3.8.6 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	BLANK	ENGDAT, ENGRAT, FILT1, FILT2, STØRE
3.2.4.7	FLAGS	ISEND
3.2.4.11	RØWS	IFV, INITL, DØN, IRØW, JEND, JRØW, KKPBEG, KKPEND, KKSAVE
3.2.4.12	TIME	N

3.3.8.7 Internal Symbol Table

Variable	Type	Dimension	Units	Description
DELT	Real	1	sec	Line interval between final filtered data points
I	Integer	1	-	Do loop index variable
ICENTR	Integer	1	-	Window centering flag for beginning of engine fire pulse = 0 -Initial value = 1 -Beginning of engine fire pulse detected and window centering complete
ICNT1	Integer	1	-	Counter used to sequence events
ICNT2	Integer	1	-	Counter used to sequence events
ICNT3	Integer	1	-	Counter used to sequence events
ICNT4	Integer	1	-	Counter used to sequence events
IPIV	Integer	1	-	Row subscript of FILT1 array considered to be the beginning of the engine fire pulse
IPØINT	Integer	1	-	Flag used for branching after entry into subroutine
ISTART	Integer	1	-	Starting row in the five element set of FILT1 values to be averaged
ISTØP	Integer	1	-	Ending row in the five element set of FILT1 values to be averaged
J	Integer	1	-	Do loop index variable
JCENTR	Integer	1	-	Same as ICENTR except used for end of engine fire pulse
JJ	Integer	1	-	Do loop index variable
KK	Integer	1	-	Starting row in averaging process
LØC	Integer	1	-	Row location of the engine fire pulse beginning or end in the five element set of numbers in the filter frame in which the change occurred
NØISE	Integer	1	-	Flag used to screen out noise pulses, i.e., pulses which begin and end in one physical record. = 0 -no noise encountered = 1 -noise in this record, treat as engine off
TREF	Real	1	sec	Pulse reference time. Use to calculate length of engine burn
ISAVE	Real	1	sec	Time reference initialized to zero at beginning of each file and reset for referencing at first and second window centerings at the beginning and end of each engine fire pulse respectively
TTSAVE	Real	1	sec	Temporary storage for the last time saved
TZERØ	Real	1	sec	Initial time reference

3.3.8.8 Logic Diagram

A logic diagram showing the major functions of subprogram FILTR2 is provided in Figure 3-8.

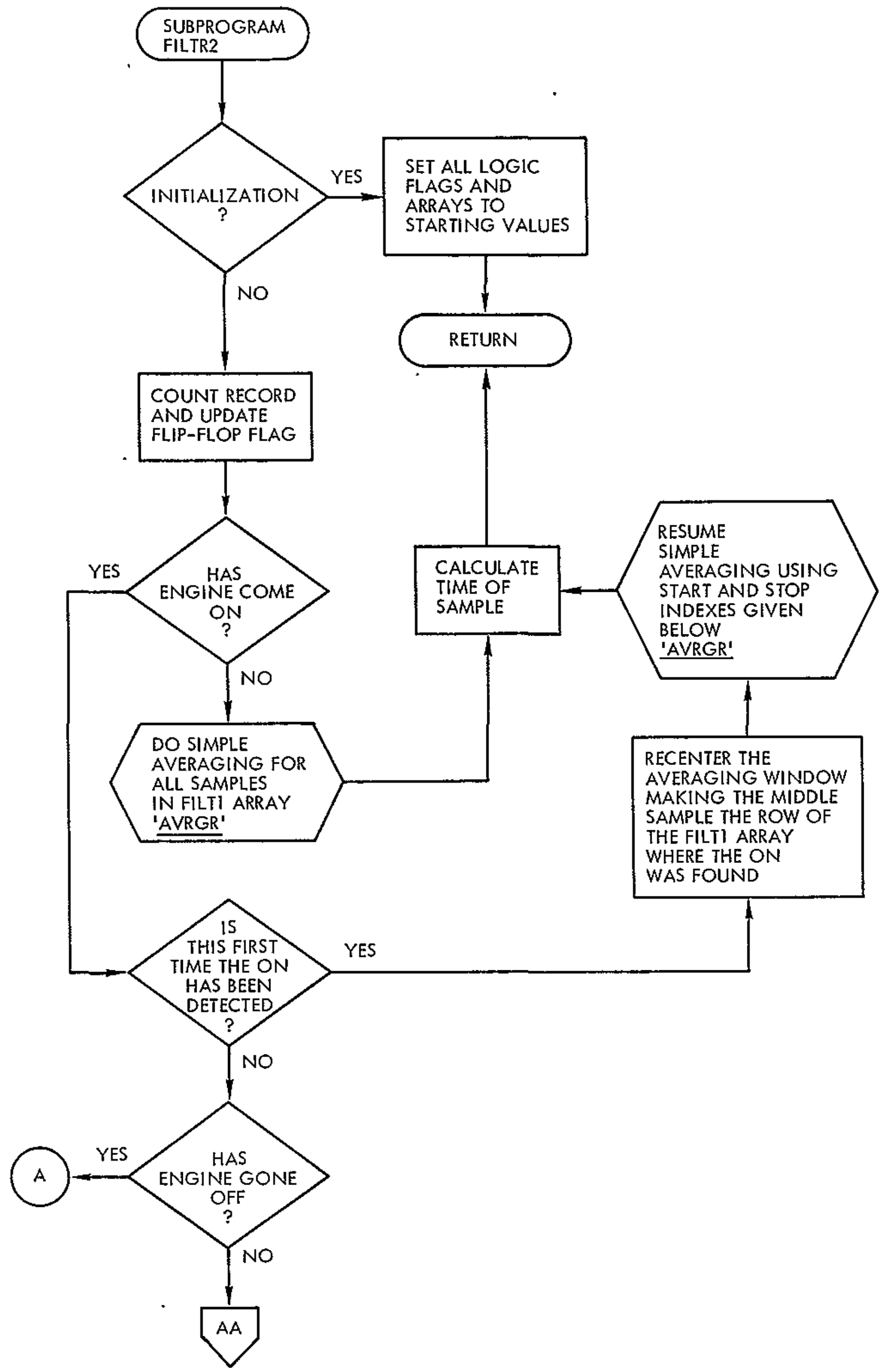


Figure 3-8 Subprogram FILTR2 Logic Diagram

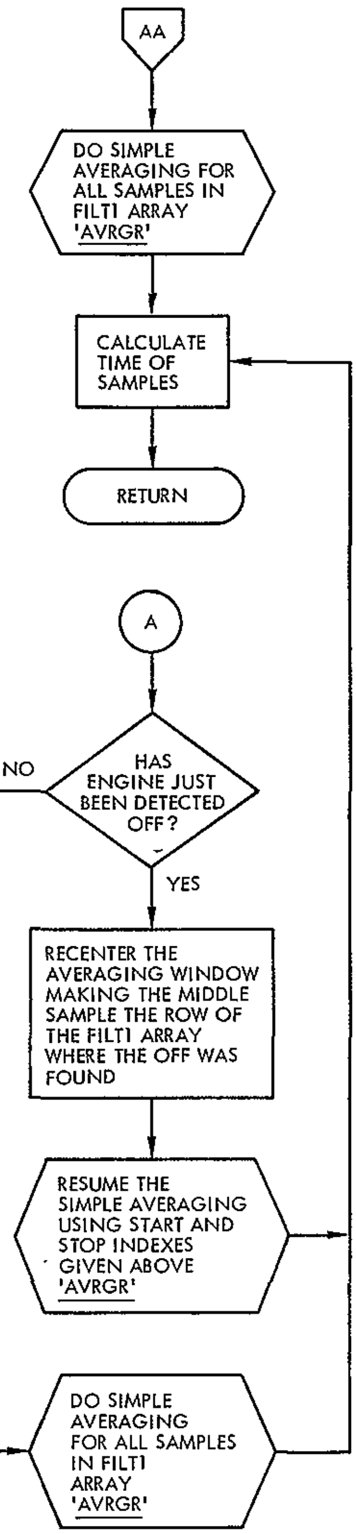


Figure 3-8 Subprogram FILTR2 Logic Diagram (Continued)

3.3.9 SUBPROGRAM HGAMMA

3.3.9.1 Introduction

HGAMMA calculates the specific heat ratio of gaseous hydrogen.

3.3.9.2 Method

The following equation is used to calculate the specific heat ratio of gaseous hydrogen. The equation was developed from polynomial curve fits of data available from the National Bureau of Standards and other sources on gaseous hydrogen. The equation presented is valid for pressures up to 100 atmospheres and temperatures between 100° and 400° Kelvin.

$$
\begin{aligned}
\text{GAMMAH} = {} & 1.4 + 1.7916552 - 9.3494600\text{E+01} * 1/T + 3.4401152\text{E+03} * (1/T)^2 \\
& -1.5811495\text{E-02} * T + 7.3710370\text{E-05} * T^2 - 1.9032770\text{E-07} * T^3 \\
& +2.5607340\text{E-10} * T^4 - 1.3934965\text{E-13} * T^5 \\
& -9.5212948\text{E-03} * P - 9.4796595\text{E-06} * P^2 + 4.7574151\text{E-08} * P^3 \\
& -9.8875463\text{E-05} * T * P + 3.9974179\text{E-07} * T^2 * P - 3.3917970\text{E-08} * T * P^2 \\
& -7.3903897\text{E-10} * T^3 * P + 3.0774794\text{E-10} * T^2 * P^2 \\
& +5.2240539\text{E-13} * T^4 * P - 4.6828143\text{E-13} * T^3 * P^2
\end{aligned}
$$

where:

P:= Pressure in atmospheres

T:= Temperature in degrees Kelvin

3.3.9.3 Entry Points

There is one entry point to this subprogram, HGAMMA. The routine has three calling arguments.

Argument	Type	Dimension	Units	Description
TFI	Real	1	°F	Fuel injection temperature
PFII	Real	1	psia	Fuel ignitor injector pressure
GAMMAH	Real	1	--	Specific heat ratio for gaseous hydrogen

3.3.9.4 Core Requirements

119 cells

3.3.9.5 Internal Symbol Table

Variable	Type	Dimension	Units	Description
PATM	Real	1	ATM	Fuel ignitor injector pressure converted to atmospheres.
T	Real	1	°K	Fuel injection temperature converted to °Kelvin

3.3.9.6 Logic Diagram

The basic logic of subprogram HGAMMA is presented in Figure 3-9.

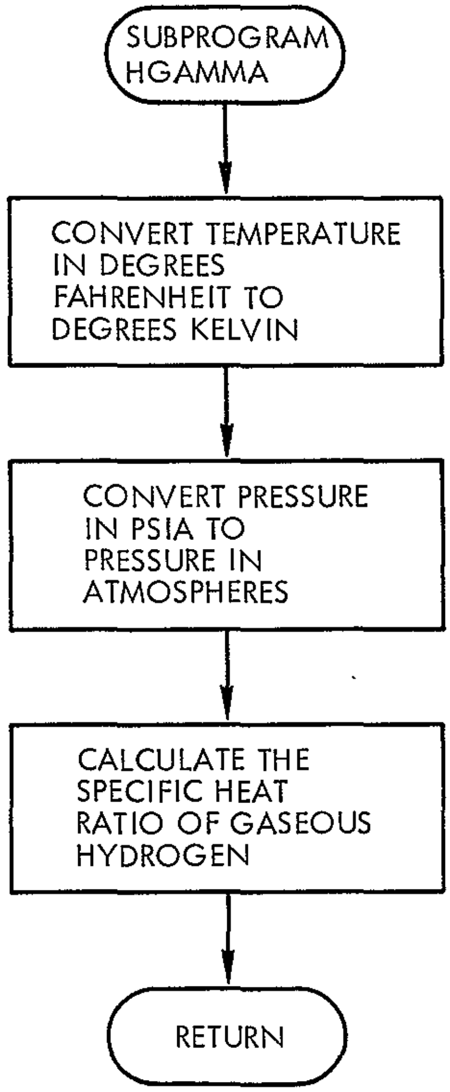


Figure 3-9 Subprogram HGAMMA Logic Diagram

3.3.10 SUBPROGRAM HZH

3.3.10.1 Introduction

Subprogram HZH calculates the compressibility factor for gaseous hydrogen.

3.3.10.2 Method

The following equation is used to compute the compressibility factor. The equation was developed from polynomial curve fits of data available from the National Bureau of Standards and other sources on gaseous hydrogen. The equation presented is valid for pressures up to 100 atmospheres and temperatures between 100° and 400° Kelvin.

$$
\begin{aligned}
ZH = {} & 1. - 5.3350829E{+}03*\left(\frac{1}{T}\right)^2 + 1.8336324E{+}02*\left(\frac{1}{T}\right) - 2.6772676 \\
& + 2.1605597E{-}02*T - 1.0357253E{-}04*T^2 + 2.9241458E{-}07*T^3 \\
& - 4.4684258E{-}10*T^4 + 2.8380505E{-}13*T^5 - 3.9254562E{-}03*P \\
& + 2.5326543E{-}05*P^2 + 4.572284E{-}10*P^3 + 6.1928900E{-}05*T*P \\
& - 2.9497530E{-}07*T^2*P - 2.5910804E{-}07*T*P^2 \\
& + 5.8954277E{-}10*T^3*P + 8.7135669E{-}10*T^2*P^2 \\
& - 4.247153E{-}13*T^4*P - 9.5916114E{-}13*T^3*P^2
\end{aligned}
$$

where:

P = Pressure in atmospheres

T = Temperature in degrees Kelvin

3.3.10.3 Entry Points

This subprogram has one entry point, HZH. There are three arguments.

Argument	Type	Dimension	Units	Description
TFI	Real	1	°F	Fuel injection temperature
PFII	Real	1	psia	Fuel ignitor injection pressure
ZH	Real	1	--	Compressibility factor for hydrogen

3.3.10.4 Core Requirements

118 cells

3.3.10.4 Internal Symbol Table

Variable	Type	Dimension	Units	Description
PATM	Real	1	atm	Fuel ignitor injection pressure converted to atmospheres
T	Real	1	°K	Fuel injection temperature converted to °Kelvin

3.3.10.5 Logic Diagram

The logic diagram for subprogram HZH is provided in Figure 3-10.

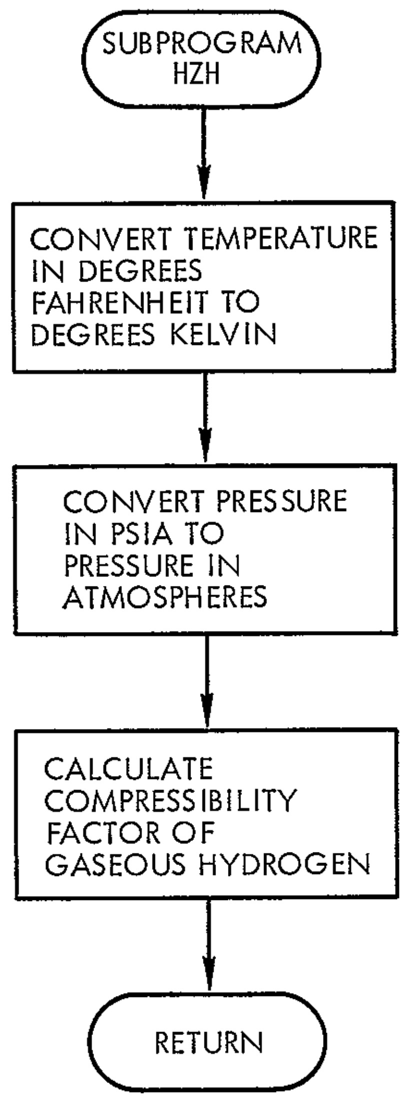


Figure 3-10 Subprogram HZH Logic Diagram

3.3.11 SUBPROGRAM JHYDE

3.3.11.1 Introduction

The function of subprogram JHYDE is to provide all the scaling, biasing, and conversions from counts to engineering units.

3.3.11.2 Method

Each channel must have either a scaling flag or a calibration curve flag set. The routine searches each table of flags until it finds one which is set. It then takes the appropriate action. The routine then checks to see if the channel has to be biased. If the calibration curves are used, a check is made to insure that there are no off-scale points. If one is found, the program prints an error message and halts.

3.3.11.3 Entry Points

The only entry point is through the name JHYDE. There are no calling arguments.

3.3.11.4 Core Requirements

608 cells.

3.3.11.5 Common Cross Reference

Section Reference	Common	Variables Used
3.2.4.1	BLANK	FILT2, STØRE
3.2.4.5	FACTØR	BIAS, IB, IC, IS, NP1, NP2, SCALE, TABX1, TABX2, TABY1, TABY2
3.2.4.6	FILES	IDUMP
3.2.4.11	RØWS	KKSAVE

3.3.11.6 Internal Symbol Table

Variable	Type	Dimension	Units	Description
BIGX	Real	1	-	Factor used in the two point interpolation of the cal curves
BIGY	Real	1	-	Factor used in the two point interpolation of the cal curves
I	Integer	1	-	Do loop index variable
J	Integer	1	-	Do loop index variable
K	Integer	1	-	Do loop index variable
LL	Integer	1	-	Number of points in the table being used

3.3.11.6 Internal Symbol Table (Continued)

Variable	Type	Dimension	Unit	Description
SMLX	Real	1	-	Factor used in the two point interpolation of the cal curves
SMLY	Real	1	-	Factor used in the two point interpolation of the cal curves

3.3.11.7 Logic Diagram

A logic diagram for subprogram JHYDE is provided in Figure 3-11.

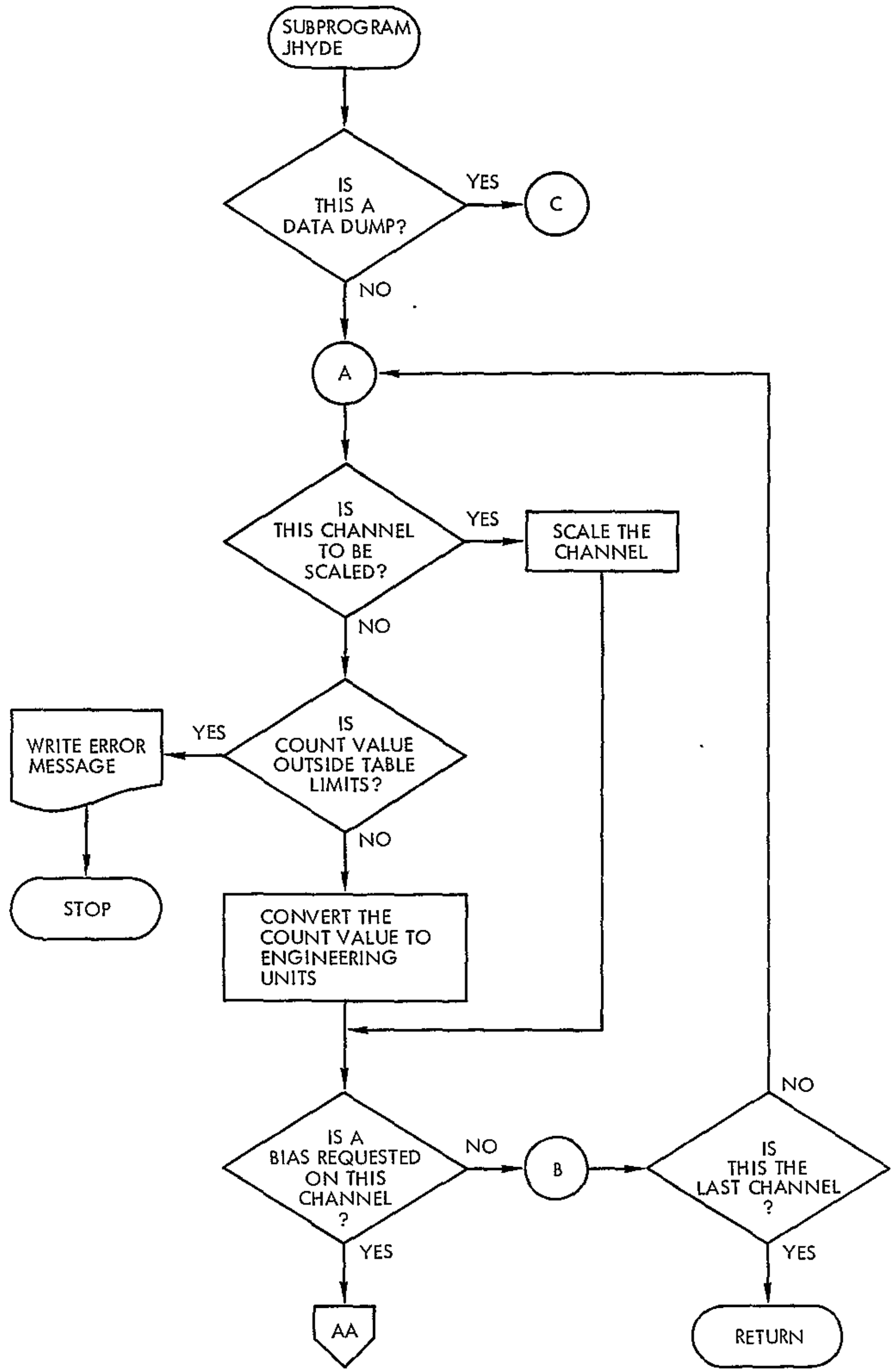


Figure 3-11 Subprogram JHYDE Logic Diagram

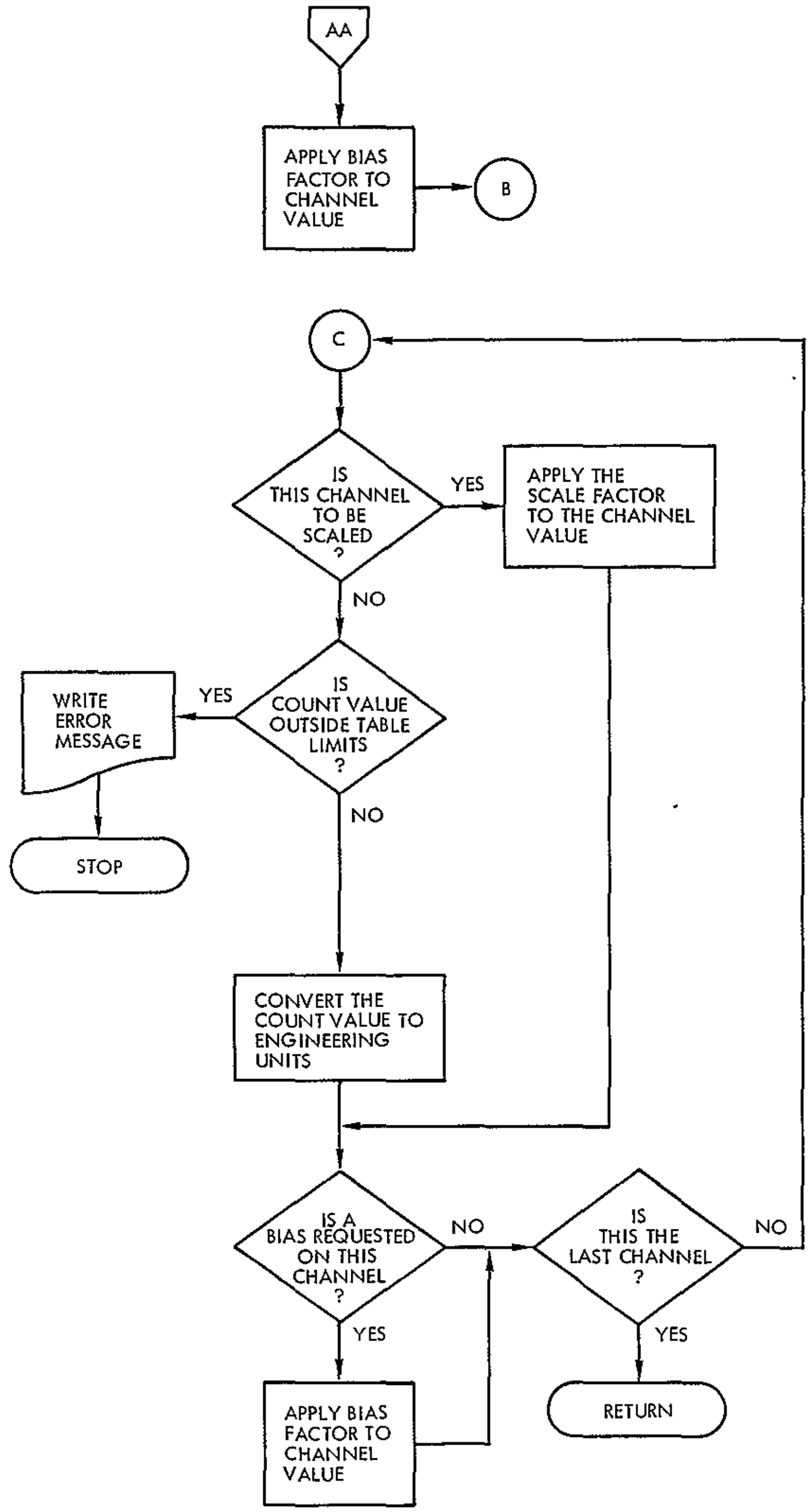


Figure 3-11 Subprogram JHYDE Logic Diagram (Continued)

3.3.12 SUBPROGRAM ØGAMMA

3.3.12.1 Introduction

Subroutine ØGAMMA is used to calculate the specific heat ratio for gaseous oxygen.

3.3.12.2 Method

The following equation is used to compute the specific heat ratio. The equation was developed from polynomial curve fits of data available from the National Bureau of Standards and other sources on gaseous oxygen. The equation presented is valid for pressures up to 100 atmospheres and temperatures between 100° and 400° Kelvin.

$$
\begin{aligned}
GAMMA\emptyset = {} & 1.4-1.7457824E-02 + 1.9357917E-04*T - 7.2588636E-07*T^2 \\
& +1.0841843E-09*T^3 - 1.2549120E-12*T^4 + 0.1634301*P \\
& +1.4833429E-03*P^2 - 5.3033020E-08*P^3 \\
& -2.2332967E-03*T*P + 1.1615558E-05*T^2*P - 1.3824483E-05*T*P^2 \\
& -2.665282E-08*T^3*P + 4.2607112E-08*T^2*P^2 \\
& +2.2589584E-11*T^4*P - 4.3236307E-11*T^3*P^2
\end{aligned}
$$

where:

P = Pressure in atmospheres

T = Temperature in degrees Kelvin

3.3.12.3 Entry Points

There is one entry point to this subprogram, ØGAMMA, and it has three arguments.

Argument	Type	Dimension	Units	Description
TØI	Real	1	°F	Oxidizer injection temperature
PØII	Real	1	psia	Oxidizer ignitor injection pressure
GAMMAØ	Real	1	--	Specific heat ratio for gaseous oxygen

3.3.12.4 Core Requirements

102 cells

3.3.12.5 Internal Symbol Table

Variable	Type	Dimension	Units	Description
PATM	Real	1	ATM	Oxidizer ignitor injection pressure converted to atmospheres
T	Real	1	°K	Oxidizer injection temperature converted to °Kelvin

3.3.12.6 Logic Diagram

The logic of subprogram ØGAMMA is presented in Figure 3-12.

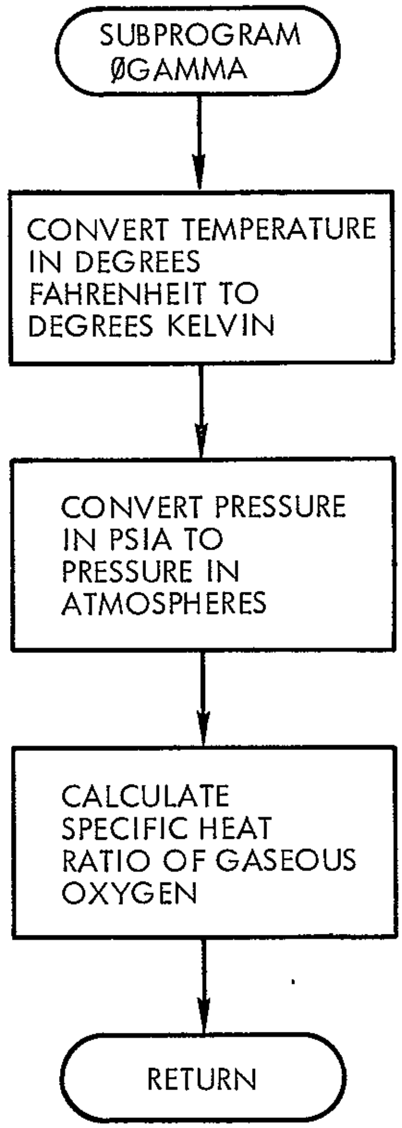


Figure 3-12 Subprogram ØGAMMA Logic Diagram

3.3.13 SUBPROGRAM ØUTPUT

3.3.13.1 Introduction

Subroutine OUTPUT is responsible for handling all reports generated by HD011C. The error messages are the only exception to the above statement; they are produced in the routine where they occur.

3.3.13.2 Method

This subprogram controls the generation of all reports; printed, microfilm and history tape. There are five types of written reports. Each type of printed output can be duplicated on microfilm. A type one report or a BLOCK 1 report is a print out of all the input data. This includes card images, scale factors, biases, calibration curves and program constants. The BLOCK II print out is the report on each channel after it has been demultiplexed, scaled, biased or converted to engineering units. The BLOCK III report gives the results of the engine performance analysis. Closely associated with this is the BLOCK IV report in which engine performance standardization results are output. If a pulse on the data tape is to be dumped, a BLOCK V report is generated. OUTPUT also generates the plot tape which is used as input data to the TRWPLT plotting program.

3.3.13.3 Entry Points

This routine's entry point is the name OUTPUT. There are no calling arguments.

3.3.13.4 Core Requirements

2135 cells

3.3.13.5 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	BLANK	ENGDAT, ENGRAT, FILT2, STORE
3.2.4.2	COMRAT	AE, IRATED, PAB, PCS, PODS, TFDS, TODS
3.2.4.4	ENG	AC, AT, CF1, CF2, CF3, CF4, DCSTAR, DHO, DOO, DPH, DPO, G, GAMMA, K, KF, KO, MWH, MWO,
3.2.4.5	FACTOR	BIAS, IB, IC, IRUNNO, IS, NP1, NP2, SCALE, TABX1, TABX2, TABY1, TABY2

3.3.13.5 Common Cross Reference (Continued)

Reference Section	Common	Variables Used
3.2.4.6	FILES	IBL, IDUMP, ILINE, IPC, IPLØT,NDP, NLINES, NP
3.2.4.9	ICT	ICT1, NØCØNV
3.2.4.10	LABELS	LABELS, LABENS, LABRAT
3.2.4.11	RØWS	IQUIT, IRØW, JØN, JRØW, KKSAVE, LSTPTS
3.2.4.13	TIMLST	TIMLST
3.2.4.14	UNITS	IØTAPE, MICRØT, PLTAPE

3.3.13.6 Internal Symbol Table

Variable	Type	Dimension	Unit	Description
CIV	Real	80	-	Used in the BLØCK I output process. Different sets of constants are stored here to make output easier.
I	Integer	1	-	Do loop index variable
IALPHA	Integer	10	-	Contains the integers 0-9 in BCD form. Used to translate SEL 600 BCD run ID into UNIVAC 1108 BCD.
IBEGN1	Integer	1	-	This flag causes the engine start up point to be printed independently of the print counter
IBEGN2	Integer	1	-	This flag causes the engine shut down point to be printed independently of the print counter.
IBLANK	Integer	1	-	Used in masking operation in the translation of run ID.
ICAN	Integer	50	-	Array containing the channel numbers
IDATA	Integer	14	-	Array used to read card images into
IDU1	Integer	1	-	Used to create channel output labels, the channel parameter names = 0 -names already stored = 1 -store names in proper output array
IEND	Integer	1	-	BCD data word containing CASEND in it. Used to stop card reading process.
IFND	Integer	12	-	Contains the UNIVAC 1108 BCD translation after a match has occurred in the run ID
IGØ	Integer	1	-	Index on a computed go to statement. Controls page ejection and return to correct print statement
IØUTLB	Integer	80	-	Array containing the alphanumeric parameter name of each channel arranged in proper sequence for output
IØ1	Integer	80	-	Contains the alphanumeric names of the program constants
IREC	Integer	1	-	Record counter, counts number of records processed
IRØW1	Integer	1	-	Flag to keep engine startup point from being printed more than once.
ISKIP	Integer	1	-	Used to determine when the BLØCK II, BLØCK III, and BLØCK IV report should be generated.

3.3.13.6 Internal Symbol Table (Continued)

Variable	Type	Dimension	Units	Description
ITRY	Integer	10	-	Contains the integer 0-9 in SEL 600 BCD notation
ITYPE1	Integer	1	-	Record identifier for a type one record on the TRWPLT plot tape
ITYPE2	Integer	1	-	Same as ITYPE1 except for a type two record
ITYPE3	Integer	1	-	Same as ITYPE1 except for a type three record
J	Integer	1	-	Do loop index variable
JRØW1	Integer	1	-	Flag to keep engine shutdown point from being printed more than once
J1	Integer	1	-	Subscript controlling print of STØRE array
L	Integer	1	-	Do loop index parameter
LL	Integer	1	-	Do loop index parameter
LLL	Integer	1	-	Do loop index parameter
L1	Integer	1	-	Flag used to determine if the BCD run ID needs to be shifted right or left
M	Integer	1	-	Used as a power of two to cause the shift of the run ID
NWRD	Integer	6	-	Array used in the masking process of the translation of the run ID
NWRD1	Integer	1	-	Number of data words in a type one record on the TRWPLT plot tape
NWRD2	Integer	1	-	Same as above except for a type two record
NWRD3	Integer	1	-	Same as above except for a type three record

3.3.13.7 Logic Diagram

Subprogram OUTPUT logic is presented in Figure 3-13.

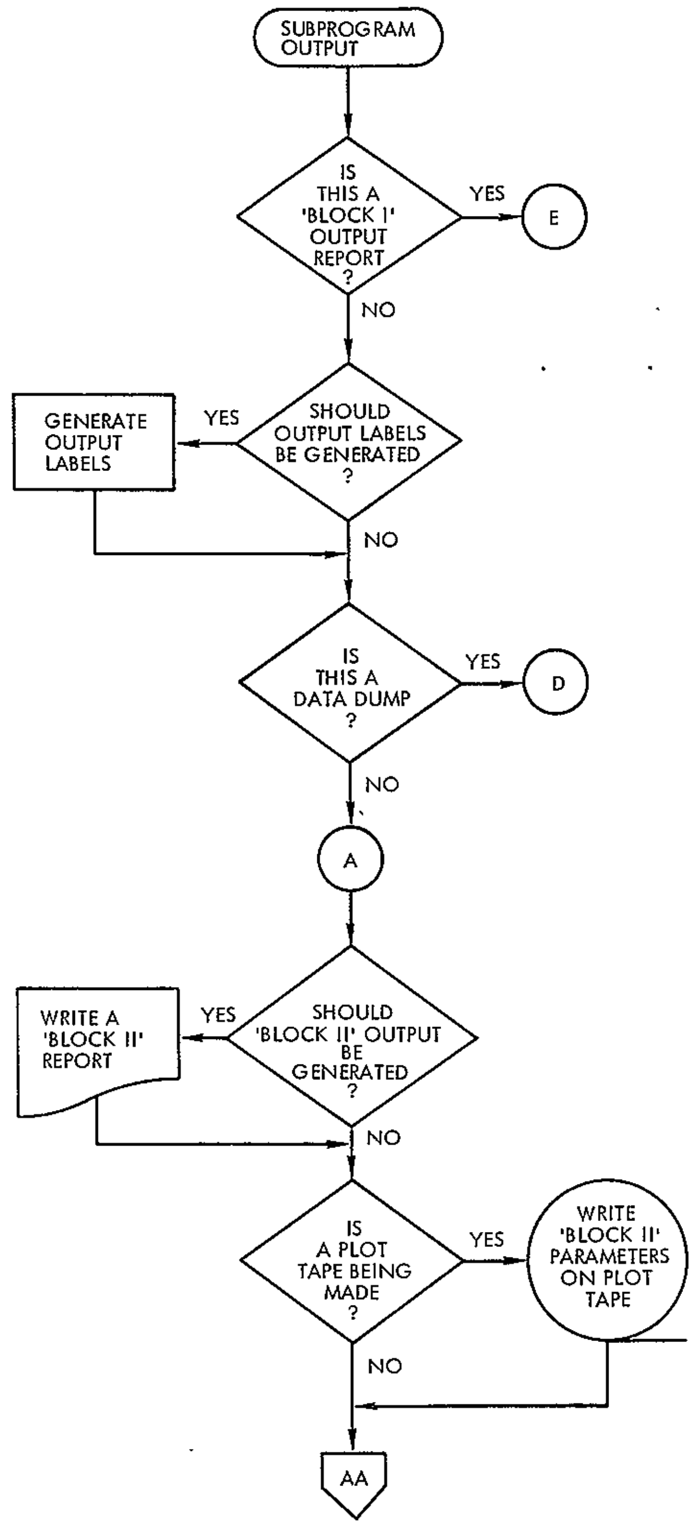


Figure 3-13 Subprogram OUTPUT Logic Diagram

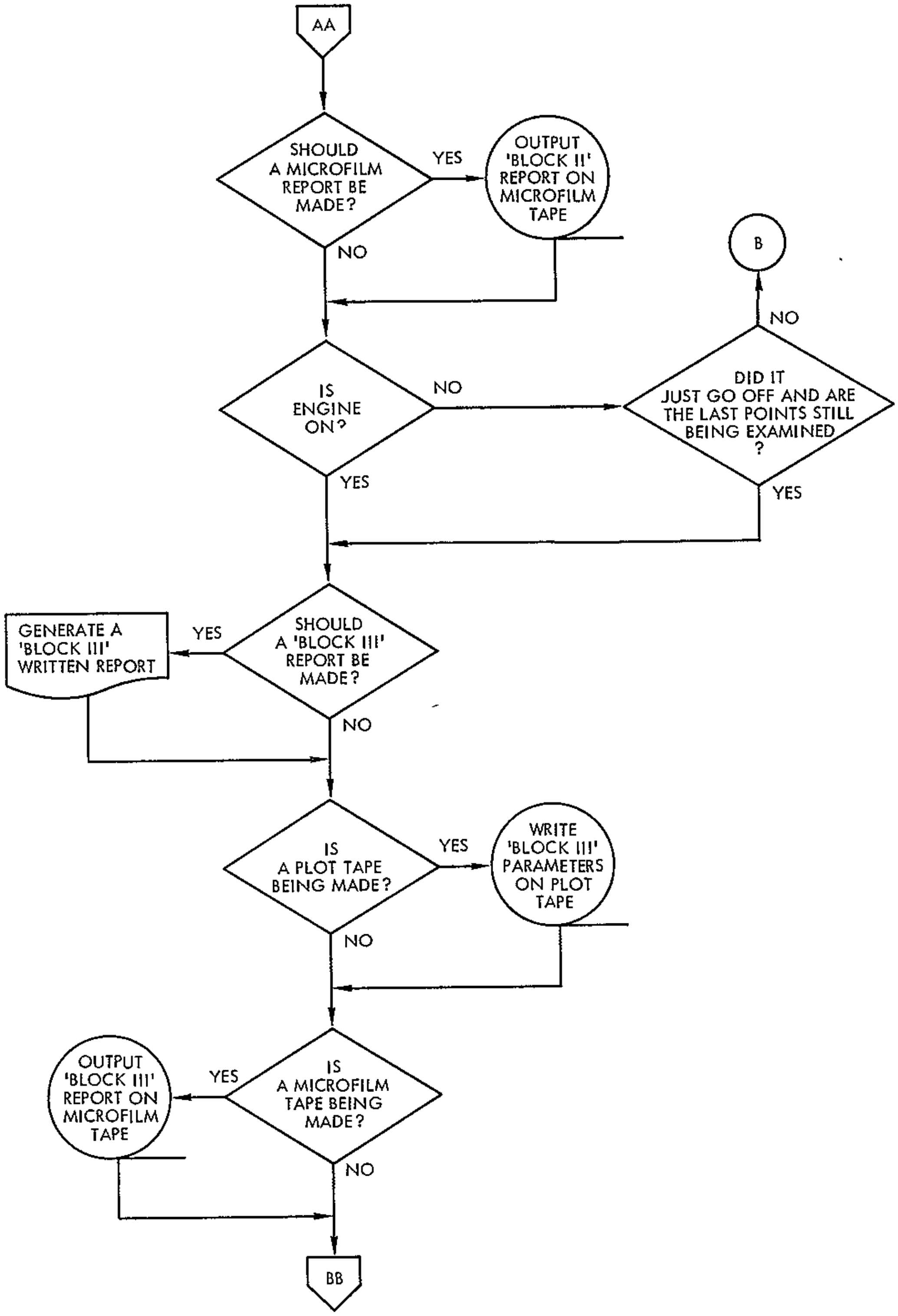


Figure 3-13 Subprogram OUTPUT Logic Diagram (Continued)

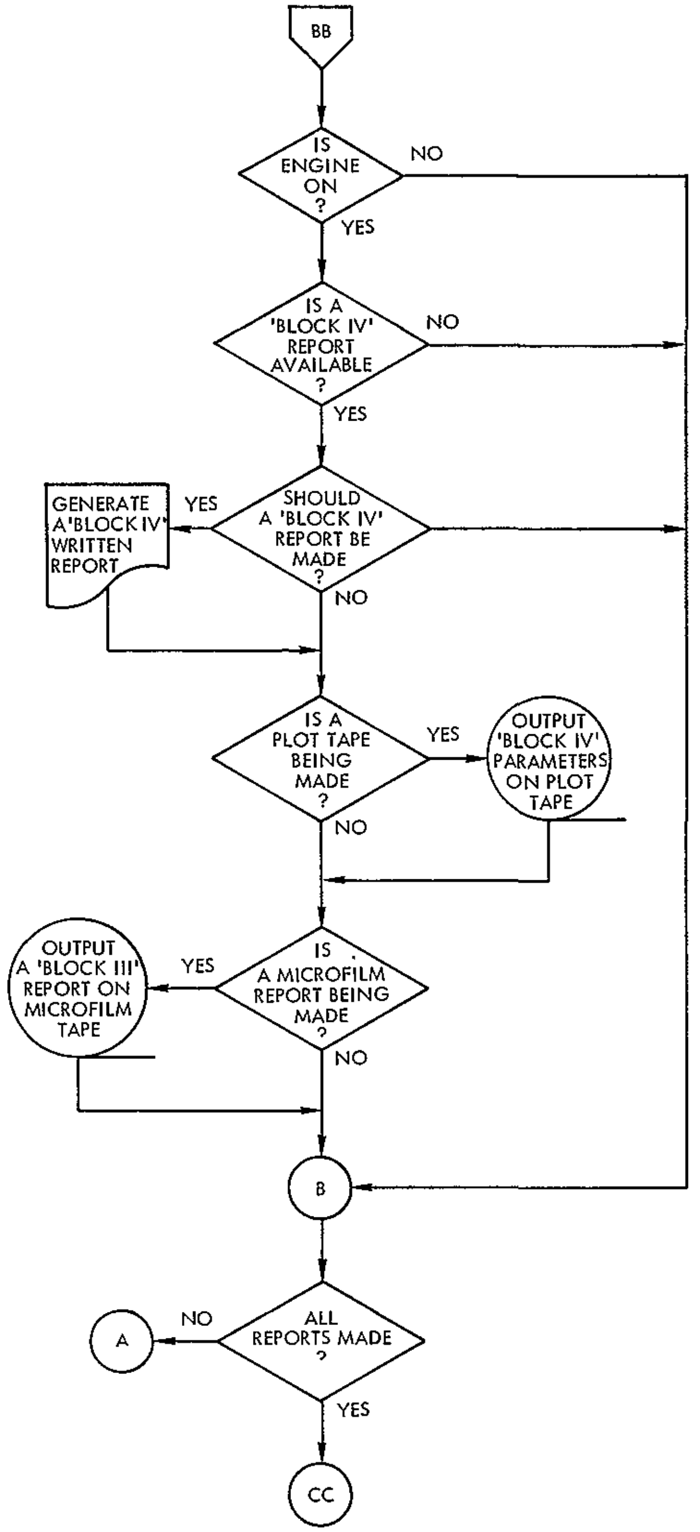


Figure 3-13 Subprogram OUTPUT Logic Diagram (Continued)

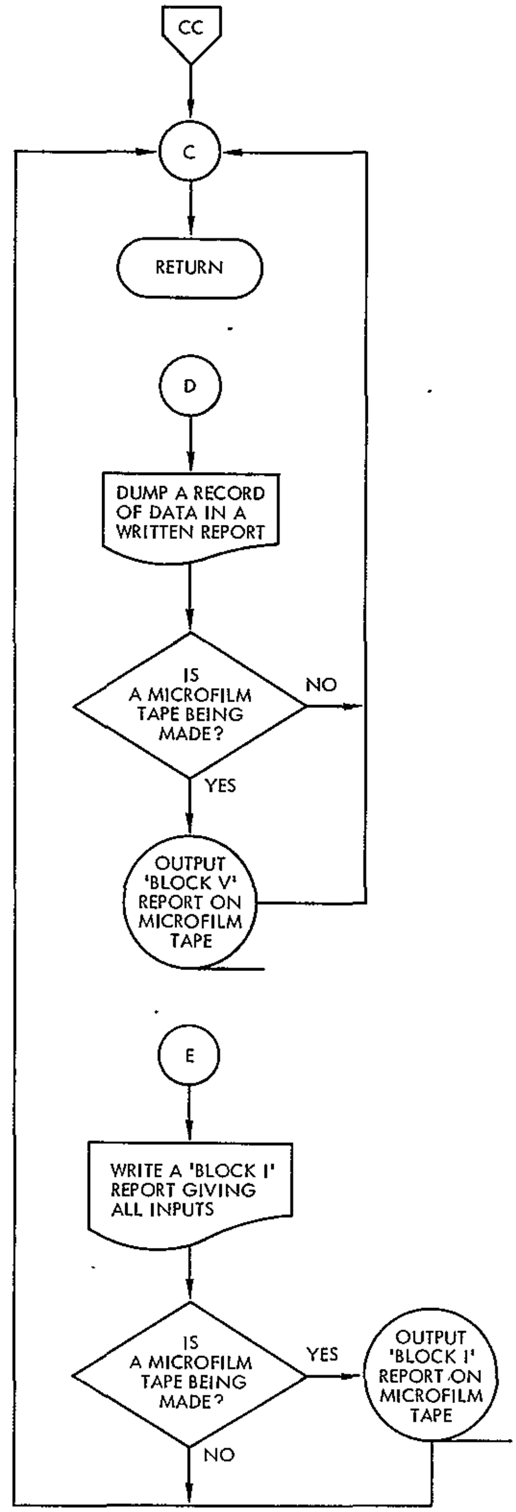


Figure 3-13 Subprogram OUTPUT Logic Diagram (Continued)

3.3.14 SUBPROGRAM ØXZØX

3.3.14. Introduction

Subroutine ØXZØX is used to calculate the compressibility factor of gaseous oxygen.

3.3.14.2 Method

The following equations are used to compute the compressibility factor for gaseous oxygen. The equations were developed from polynomial curve fits of the data available from the National Bureau of Standards and other sources on gaseous exygen. The equations presented are valid for pressures up to 100 atmospheres and temperatures between 100° and 400° Kelvin.

$$B = -8.7136945E-06 + 4.606507E-01*\left(\frac{1}{T}\right) - 1.3795294E+02*\left(\frac{1}{T}\right)^2$$
$$-2.1663662E+04*\left(\frac{1}{T}\right)^3 + 2.2765597E+06*\left(\frac{1}{T}\right)^4 - 2.2174297E+08*\left(\frac{1}{T}\right)^5$$
$$+1.0580819E+10*\left(\frac{1}{T}\right)^6 - 2.1920552E+11*\left(\frac{1}{T}\right)^7$$

$$C = 6.753855E-06 - 1.0277166E-02*\left(\frac{1}{T}\right) + 6.5537055*\left(\frac{1}{T}\right)^2$$
$$-2.1384872E+03*\left(\frac{1}{T}\right)^3 + 4.2428099E+05*\left(\frac{1}{T}\right)^4$$
$$-5.3177903E+07*\left(\frac{1}{T}\right)^5 + 3.2860596E+09*\left(\frac{1}{T}\right)^6$$
$$-1.1314356E+11*\left(\frac{1}{T}\right)^7$$

$$D = -1.7671108E-10 - 6.3527586E-06*B + 1.5610387E-02*B^2 + 4.6457575*B^3$$
$$+4.3213223E+02*B^4 + 7.8725193E+04*B^5 + 2.8552410E+06*B^6$$
$$+1.4952967E+08*B^7$$

$$Z\emptyset X = 1 + B*P + C*P^2 + D*P^3$$

where:

P = Pressure in atmospheres
B,C,D = Functions of Temperature in degrees Kelvin
T = Temperature in degrees Kelvin

3.3.14.3 Entry Point

The only entry point to this subprogram is through the name ØXZØX. There are three calling arguments associated with the entry point.

Argument	Type	Dimension	Units	Description
TØI	Real	1	°F	Oxidizer injection temperature
PØII	Real	1	psia	Oxidizer ignitor injection pressure
ZØX	Real	1	--	Compressibility factor of gaseous oxygen

3.3.14.4 Core Requirements

119 cells

3.3.14.5 Internal Symbol Table

Variable	Type	Dimension	Units	Description
B	Real	1	--	Function of temperature in degrees Kelvin
C	Real	1	--	Same as B
D	Real	1	--	Same as B
PATM	Real	1	ATM	Oxidizer ignitor injection pressure converted to atmospheres
T	Real	1	°K	Oxidizer injection temperature converted to degrees Kelvin

3.3.14.6 Logic Diagram

The logic of subprogram ØXZØX is provided in Figure 3-14.

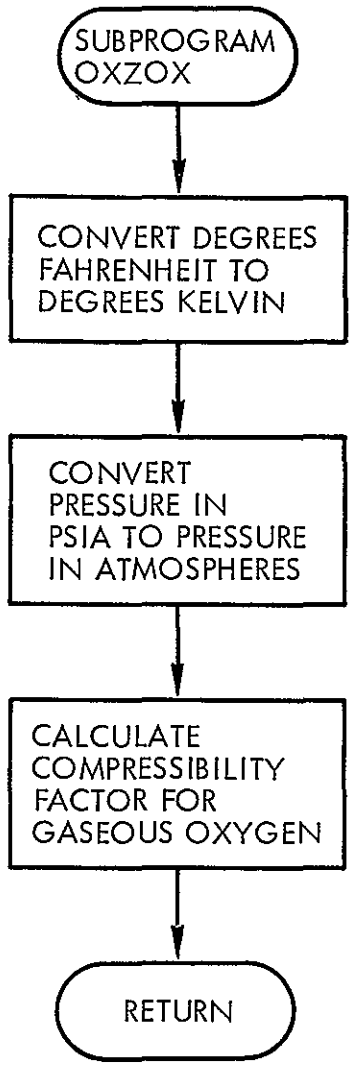


Figure 3-14 Subprogram ØXZØX Logic Diagram

3.3.15 SUBPROGRAM RATED

3.3.15.1 Introduction

Subprogram RATED was developed to perform engine performance standardization calculations.

3.3.15.2 Method

Basically the subroutine uses an iteration type scheme to standardize the engine's performance. All equations and assumptions are stated in Section 1. The convergence criteria is that the calculated chamber pressure at injector face must be sufficiently close to the adjusted calculated chamber pressure at injection face. If this condition cannot be met, the iteration is stopped for the particular time slice being examined and an error message is written. Several error checks are also made during the process. If any of the error conditions are encountered, an error message is written and the iteration is stopped for that time slice.

3.3.15.3 Entry Points

Only one entry point has been established for this subroutine. That entry is through the name RATED. There are six calling arguments:

Argument	Type	Dimension	Units	Description
I	Integer	1	-	Subscript specifying which row of the FILT2 array is being used.
PNS	Real	1	psia	Nozzle stagnation pressure.
WDOTF	Real	1	lbm/sec	Fuel flowrate
WDOTO	Real	1	lbm/sec	Oxidizer flowrate
WDOTT	Real	1	lbm/sec	Total flowrate
INITL	Integer	1	-	Initialization flag. = 0 - do not initialize routine = 1 - initialize routine

3.3.15.4 Core Requirements

889 cells

3.3.15.5 Subprograms Called

HZH
ØXZØX
SQRT

3.3.15.6 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	Blank	FILT2
3.2.4.2	COMRAT	All variables
3.2.4.4	ENG	AT,G,MWH,MWØ
3.2.4.6	FILES	ILINE,NLINES
3.2.4.9	ICT	NØCØNV
3.2.4.10	LABELS	IPØINT

3.3.15.7 Internal Symbol Table

Variable	Type	Dimension	Units	Description
FT	Real	1	-	Function of thrust, presently set to zero.
J	Integer	1	-	Iteration counter.
M2	Integer	1	-	Subscript giving location of PC parameter in FILT2 array.
M3	Integer	1	-	Subscript giving location of PTFØ parameter in FILT2 array.
M4	Integer	1	-	Subscript giving location of PTØØ parameter in FILT2 array.
M5	Integer	1	-	Subscript giving location of PDFØ parameter in FILT2 array.
M6	Integer	1	-	Subscript giving location of PDØØ parameter in FILT2 array.
M7	Integer	1	-	Subscript giving location of TFØI parameter in FILT2 array.
M8	Integer	1	-	Subscript giving location of TØØI parameter in FILT2 array.
NOIT	Integer	1	-	Maximum number of iterations allowed. Currently set to 10.
PC	Real	9	psia	Chamber pressure.

3.3.15.7 Internal Symbol Table (Continued)

Variable	Type	Dimension	Units	Description
PDFØ	Real	9	psia	Fuel orifice delta pressure.
PDØØ	Real	9	psia	Oxidizer orifice delta pressure.
PTFØ	Real	9	psia	Fuel orifice total pressure.
PTØØ	Real	9	psia	Oxidizer orifice total pressure.
TFØI	Real	9	°F	Fuel orifice inlet temperature.
TØØI	Real	9	°F	Oxidizer orifice inlet temperature.
ZH	Real	1	-	Compressibility factor of gaseous hydrogen.
ZØX	Real	1	-	Compressibility factor of gaseous oxygen.

3.3.15.8 Logic Diagram

The logic of subprogram RATED is provided in Figure 3-15.

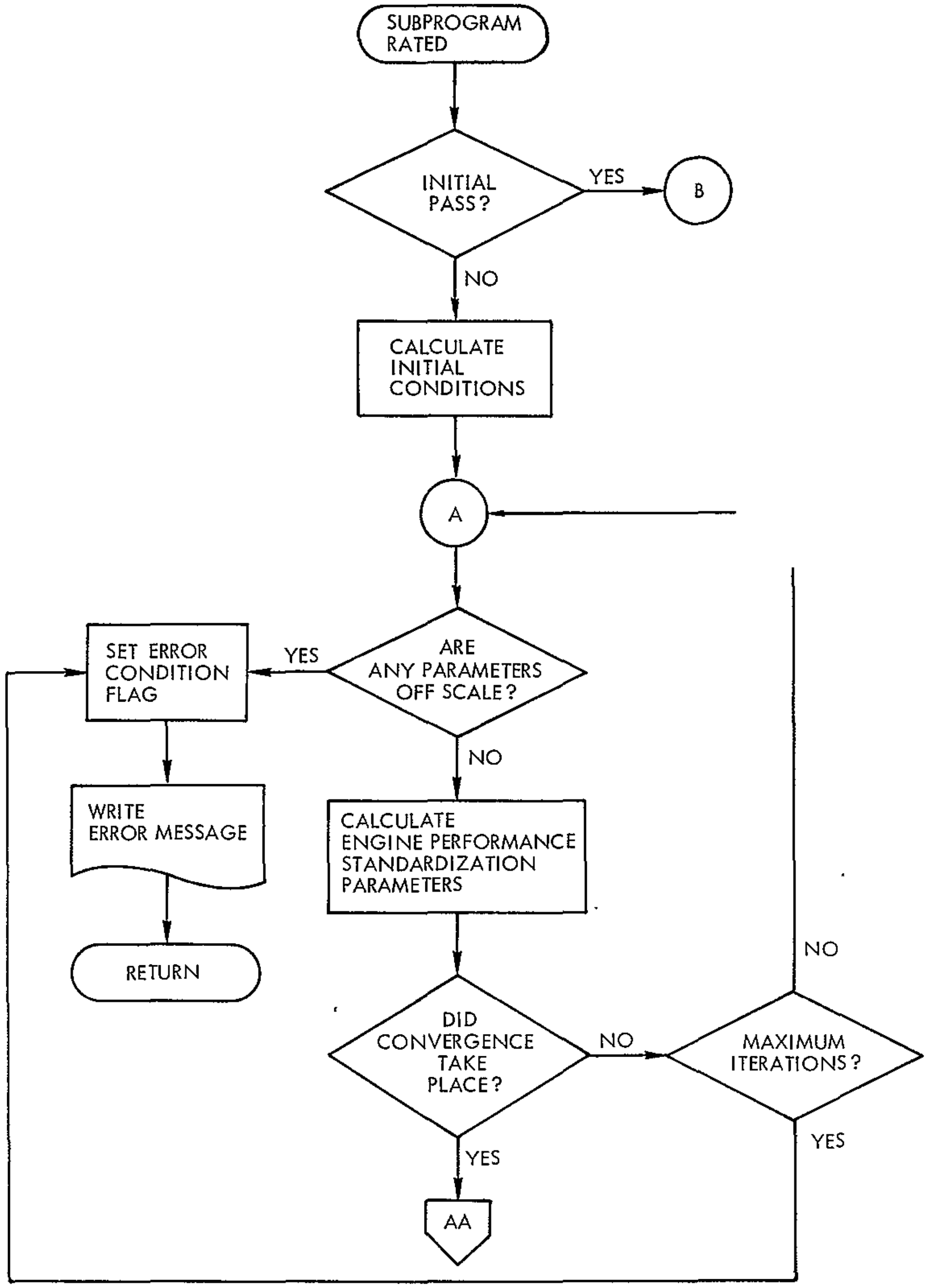


Figure 3-15 Subprogram RATED Logic Diagram

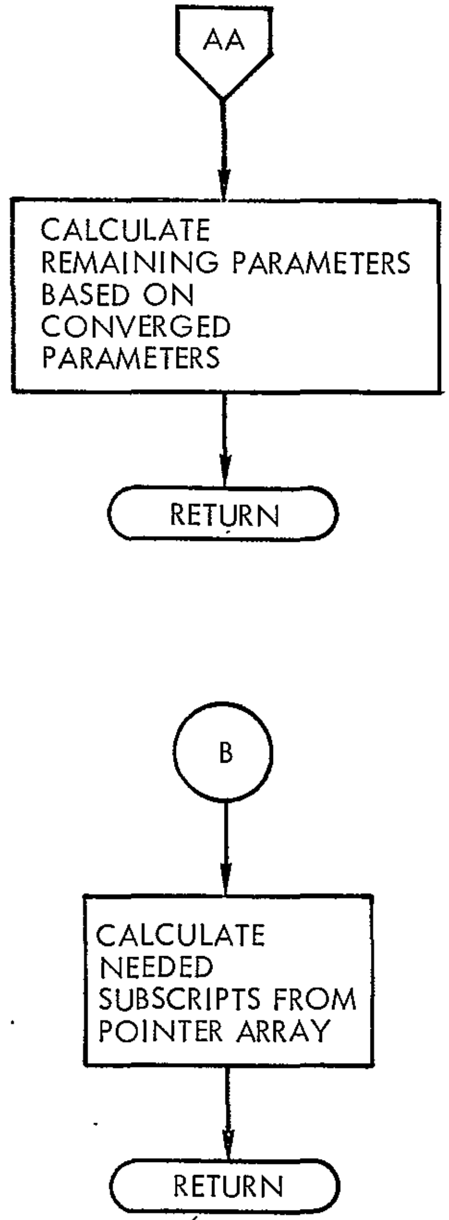


Figure 3-15 Subprogram RATED Logic Diagram (Continued)

3.3.16 SUBPROGRAM SHIFT

3.3.16.1 Introduction

This subprogram is used to shift data from one part of the FILT1 array to another section of the same array.

3.3.16.2 Method

The first ten rows of the FILT1 array are replaced by the last ten rows. This is done to insure that the averaging window can be centered correctly when the fire voltage exceeds the threshold value.

3.3.16.3 Entry Points

The entry into this routine is through the name SHIFT. There are no calling arguments.

3.3.16.4 Core Requirements

38 cells

3.3.16.5 Common Cross Reference

Section Reference	Common	Variables Used
3.2.4.1	Blank	FILT1

3.3.16.6 Internal Symbol Table

Variable	Type	Dimension	Units	Description
I	Integer	1	-	Subscript controlling the rows of the FILT1 array which correspond to the first filtered sample
J	Integer	1	-	Subscript controlling the columns of the FILT1 array which correspond to the channels

3.3.16.7 Logic Diagram

The logic of subprogram SHIFT is provided in Figure 3-16.

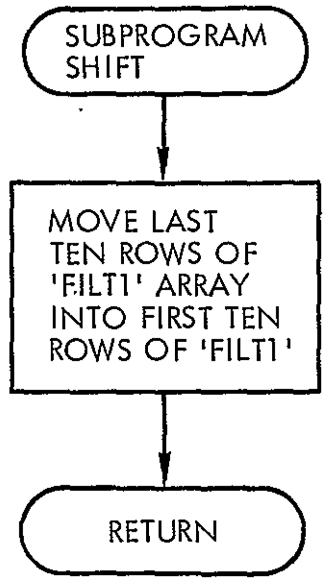


Figure 3-16 Subprogram SHIFT Logic Diagram

3.3.17 SUBPROGRAM SWAGER

3.3.17.1 Introduction

This subprogram was developed to calculate the engineering data required to analyze engine performance.

3.3.17.2 Method

This routine is not called until the fire voltage has crossed the threshold value which indicates the engine is on. The equations used to calculate the engineering parameters are explained in detail in Section 1.

The parameters are calculated until the fire voltage drops below the threshold value. At this point, the next fifty data points are included in the calculations to display the shutdown transients. The integration in the subroutine is done by the trapezoidal method.

3.3.17.3 Entry Points

This routine has only one entry point, through the name SWAGER. There are no calling parameters.

3.3.17.4 Core Requirements

969 cells

3.3.17.5 Subprograms Referenced

HGAMMA
HZH
ØGAMMA
ØXZØX
RATED
SQRT

3.3.17.6 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	Blank	ENGDAT,ENGRAT, FILT2
3.2.4.2	CØMRAT	All variables
3.2.4.4	ENG	AC,AT,CF1,DCSTAR,DHØ,DØØ DPH,DPØ,G,K,KF,KØ,MWH,MWØ
3.2.4.6	FILES	IPC
3.2.4.8	FUNCTN	CX,CY
3.2.4.9	ICT	ICT1,NØCØNV
3.2.4.10	LABELS	IPØINT
3.2.4.11	RØWS	INITL,IQUIT,JØN,KKSAVE,LSTPTS
3.2.4.13	TIMLST	TIMLST

3.3.17.7 Internal Symbol Table

Variable	Type	Dimension	Units	Description
BETAF	Real	1	-	Ratio of fuel orifice diameter to upstream fuel pipe diameter.
BETAØ	Real	1	-	Ratio of oxidizer orifice diameter to upstream oxidizer pipe diameter.
CSTAR	Real	1	ft/sec	Characteristic exhaust velocity
CSTRMX	Real	1	ft/sec	Maximum value CSTAR can be. If it exceeds CSTRMX, it is set equal to zero.
CSUBF	Real	1	-	Thrust coefficient
DCSTA1	Real	1	ft/sec	Equivalenced to the 12th position of the TENG array. Used to facilitate output procedures. Set equal to CSTAR.
DT	Real	1	sec	Increment time step in the integration section.
DTMAX	Real	1	sec	Largest value DT may assume.
ETACS	Real	1	-	Standardized CSTAR efficiency factor.
F	Real	9	lbf	Thrust
F1	Real	1	lbf	Same as F. Equivalenced to 4th position of the TENG array for output purposes.
GAMMAH	Real	1	-	Specific heat ratio of gaseous hydrogen.
GAMMAØ	Real	1	-	Specific heat ratio of gaseous oxygen.
I	Integer	1	-	Do loop index.
IBEGN1	Integer	1	-	Logic flag used to indicate first pass through SWAGER is over. = 1 - first pass not finished = 2 - first pass is finished

3.3.17.7 Internal Symbol Table (Continued)

Variable	Type	Dimension	Units	Description
IBEGN2	Integer	1	-	Logic flag used to indicate fire voltage has dropped below threshold, therefore start including points of shutdown transients. = 1 - engine has not gone off = 2 - engine has gone off
ICT2	Integer	1	-	Flag used to determine if the engine performance standardization (EPS) should take place for a particular time slice. ≠ 1 - EPS should not take place = 1 - EPS should take place
IDUM1	Integer	1	-	Dummy calling argument
IF	Integer	1	-	Flag used to initialize integration process = 1 - initialize integration parameters = 2 - do not initialize integration parameters
IFST	Integer	1	-	Flag used to keep program from computing contraction ratio more than once. = 0 - compute contraction ratio = 1 - do not compute contraction ratio
INPNS	Real	1	lbf-sec/in^2	Integral of nozzle stagnation pressure.
ISKIP	Integer	1	-	Flag used in conjunction with the ICT2 flag.
ISP	Real	1	sec	Specific impulse
IT	Real	1	lb-sec	Total impulse
J	Integer	1	-	Do loop index variable
LLL	Integer	1	-	Do loop index variable
LLLL	Integer	1	-	Do loop index variable
MF	Real	1	lbm	Total fuel consumption of pulse
MØ	Real	1	lbm	Total oxidizer consumption of pulse

3.3.17.7 Internal Symbol Table (Continued)

Variable	Type	Dimension	Units	Description
MR	Real	1	-	Mixture ratio.
M1	Integer	1	-	Subscript giving location of F parameter in the FILT2 array.
M2	Integer	1	-	Subscript giving location PC parameter in FILT2 array.
M3	Integer	1	-	Subscript giving location of PTFØ parameter in FILT2 array.
M4	Integer	1	-	Subscript giving location of PTØØ parameter in FILT2 array.
M5	Integer	1	-	Subscript giving location of PDFØ parameter in FILT2 array.
M6	Integer	1	-	Subscript giving location of PDØØ parameter in FILT2 array.
M7	Integer	1	-	Subscript giving location of TFØI parameter in FILT2 array.
M8	Integer	1	-	Subscript giving location of TØØI parameter in FILT2 array.
PC	Real	9	psia	Chamber pressure.
PC1	Real	1	psia	Equivalenced to 3rd position of TENG array for output purposes. Same meaning as PC.
PDFØ	Real	9	psia	Fuel orifice delta pressure.
PDØØ	Real	9	psia	Oxidizer orifice delta pressure.
PNS	Real	1	psia	Nozzle stagnation pressure.
PTFØ	Real	9	psia	Fuel orifice delta pressure.
PTØØ	Real	9	psia	Oxidizer orifice delta pressure.
RAT	Real	1	-	Contraction area ratio which is combustion chamber area to throat area.
SAVF	Real	1	lbf	Used to save the previous value of the I parameter for the integration process.
SAVPNS	Real	1	psia	Used to save the previous value of the PNS parameter for the integration process.

3.3.17.7 Internal Symbol Table (Continued)

Variable	Type	Dimension	Units	Description
ST	Real	1	sec	Used to save the previous DT parameter for the integration process.
STAR	Real	1	ft/sec	Intermediate calculation of CSTAR.
SWDØTF	Real	1	lbm/sec	Used to save previous value of WDØTF parameter for integration process.
SWDØTØ	Real	1	lbm/sec	Used to save previous value of WDØTØ parameter for integration process.
TENG	Real	100	-	Array used to facilitate output process. Also used as intermediate storage.
TFØI	Real	9	°F	Fuel orifice inlet temperature.
TØØI	Real	9	°F	Oxidizer orifice inlet temperature.
WDØTF	Real	1	lbm/sec	Fuel flowrate.
WDØTØ	Real	1	lbm/sec	Oxidizer flowrate.
WDØTT	Real	1	lbm/sec	Total flowrate.
XF	Real	1	-	Fuel pressure ratio.
XØ	Real	1	-	Oxidizer pressure ratio.
YF	Real	1	-	Expansion factor used for computing fuel flowrate.
YØ	Real	1	-	Expansion factor used for computing oxidizer flowrate.
ZH	Real	1	-	Compressibility factor for gaseous hydrogen.
ZØX	Real	1	-	Compressibility factor for gaseous oxygen.

3.3.17.8 Logic Diagram

The logic of subprogram SWAGER is presented in Figure 3-17.

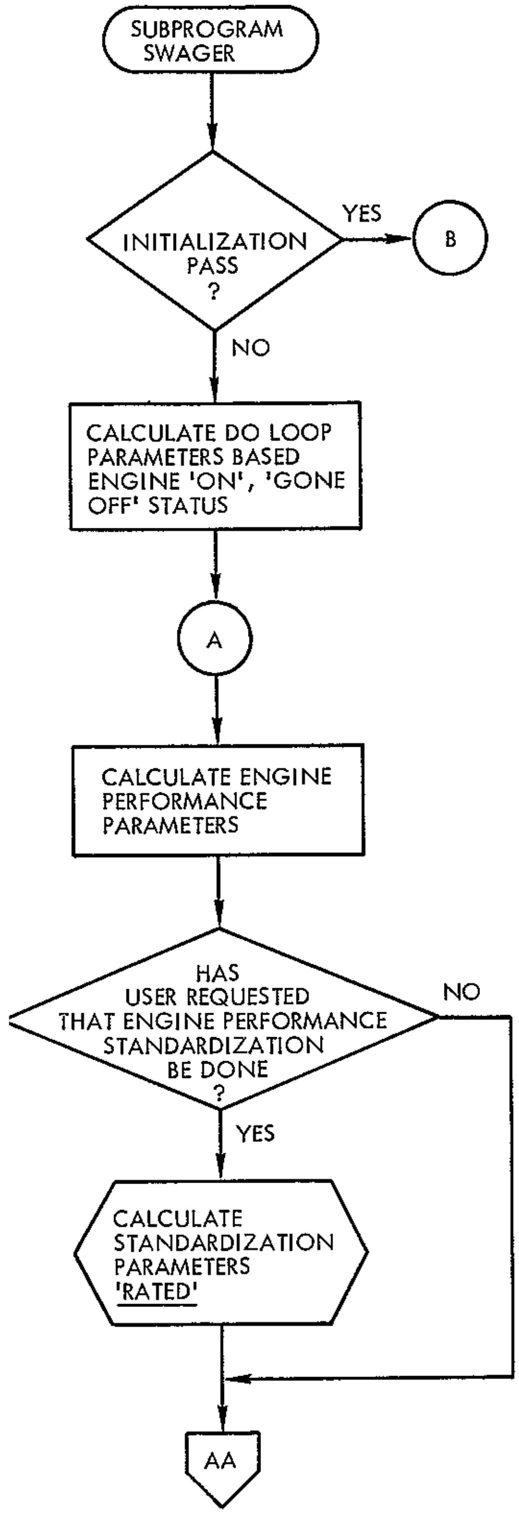


Figure 3-17 Subprogram SWAGER Logic Diagram

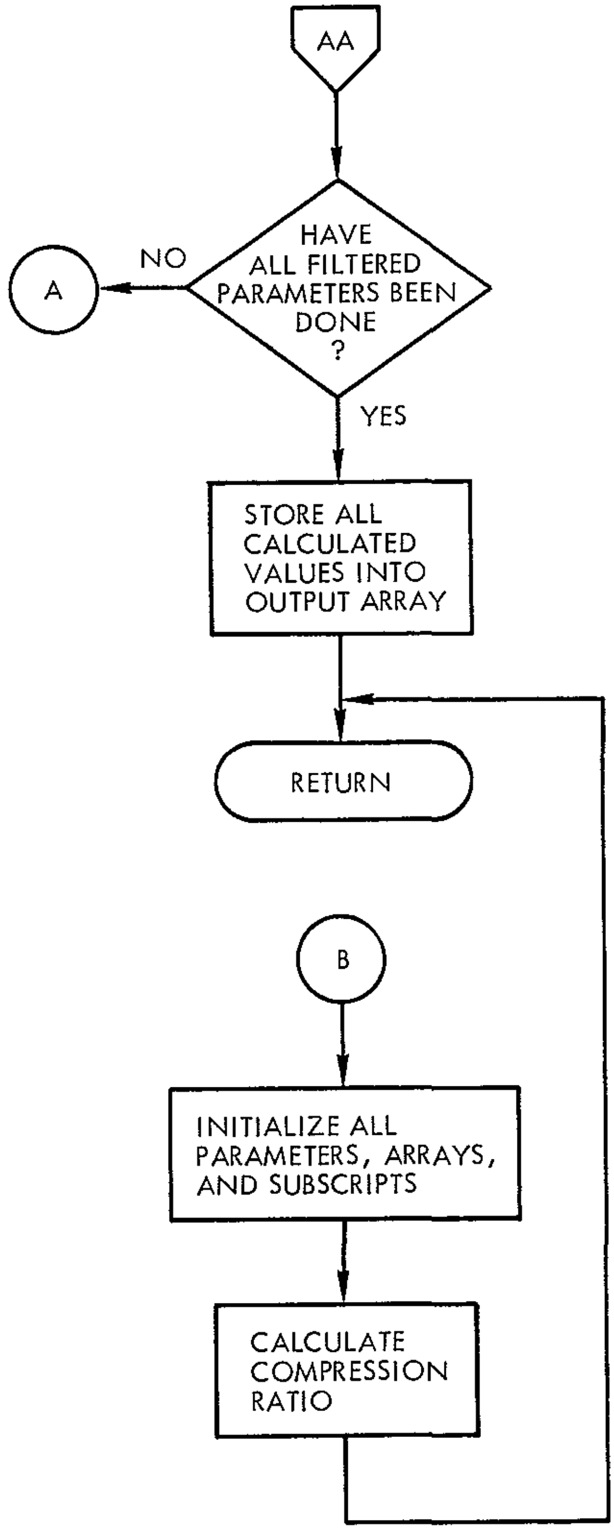


Figure 3-17 Subprogram SWAGER Logic Diagram (Continued)

3.3.18 SUBPROGRAM ZERØ

3.3.18.1 Introduction

This subprogram is used to clear the FILT2 array.

3.3.18.2 Method

Due to the frequency with which the FILT2 array must be zeroed out, this subroutine has been created specifically for this purpose.

3.3.18.3 Entry Points

There is one entry point to this subprogram, ZERØ. There are no calling arguments.

3.3.18.4 Core Requirements

37 cells

3.3.18.5 Common Cross Reference

Reference Section	Common	Variables Used
3.2.4.1	Blank	FILT2

3.3.18.6 Internal Symbol Table

Variable	Type	Dimension	Units	Description
I	Integer	1	-	Row subscript of the FILT2 array
J	Integer	1	-	Column subscript of the FILT2 array

3.3.18.7 Logic Diagram

The logic of subprogram ZERØ is provided in Figure 3-18.

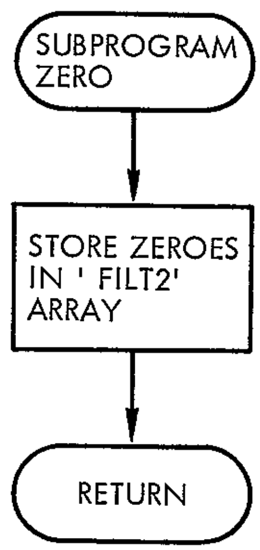


Figure 3-18 Subprogram ZERØ Logic Diagram

APPENDIX 1

NOMENCLATURE

Unless otherwise stated, card input value (CIV) adjacent to a variable indicates the user must input that variable. Numerical value indicates the internally set value of the variable.

AE	Nozzle exit area (sq in) (CIV)
AT	Throat area (sq in) (CIV)
AC	Chamber area, user's card input (sq in) (CIV)
ATTC	Area of nozzle throat corrected for thermal expansion
BEGFIL	Third file on SEL tape, =3
CF1'	Constant used to compute WDØTØ and WDØTF, = .1603
CF2	Constant, used to compute ZØX, = .9905
CF3	Constant, used to compute ZØX, = .0031
CF4	Constant, used to compute ZØX, = 74
CF	Thrust coefficient, computed
CFNSV	Standard theoretical vacuum coefficient of thrust at EPS = 5
CFSTD	Standard thrust coefficient
CFSTDV	Standard thrust coefficient at vacuum
CFSV	Theoretical thrust coefficient at vacuum
CSTAR	Characteristic exhaust velocity, computed (ft/sec)
CSTASD	Standard CSTAR
CSTAT	Site theoretical CSTAR at 30 psia nozzle stagnation pressure (ft/sec)
CSTATS	Standard theoretical CSTAR at 30 psia nozzle stagnation pressure (ft/sec)
DCSTAR	Change in CSTAR, not computed at present,= 0 (ft/sec)
DHØ	Fuel orifice diameter, user's card input (in) (CIV)
DØØ	Oxidizer orifice diameter, user's card input (in) optional (CIV)
DPF	Pressure differential from interface to combustion chamber for fuel (psia)(CIV)
DPH	Fuel upstream pipe diameter, user's card input (in) (CIV)
DPØ	Oxidizer upstream pipe diameter, user's card input (in) (CIV)

DPØS	Pressure differential from standard interface to calculated chamber pressure
ECFSTD	Standard thrust coefficient efficiency
ECFS	Site thrust coefficient efficiency
EPS	Ratio of exit area to thermal corrected throat area of nozzle
ETAC	Site C-star efficiency
F	Thrust, measured (lbf)
FSTD	Standard thrust (lbf)
FV	Fire voltage, measured (counts)
G	Earth's gravitational acceleration (local), = 32.1302 (ft/sec^2)
GAMMA	Ratio of specific heats
IDUMP	Dump flag, card input value = 0 for no dump, = 1 for dump (CIV)
INPNS	Time integral of PNS, computed (lbf-sec/in^2)
IØTAPE	Assignment for intermediate output tape, = 2
IPC	Print control flag (CIV)
IPLØT	Calcomp output tape (CIV)
ISP	Specific impulse, computed (secs)
ISPS	Standard specific impulse (secs)
K	Coefficient used for computing PNS from PC, = .9999: to .5531 dependent on A_c to A_t ratio and taken from a table
KF	Coefficient of discharge of fuel orifice, user's card input, (CIV)
KØ	Coefficient of discharge oxidizer orifice, user's card input, (CIV)
LSTPTS	Number of points to be included in the integration scheme after the fire voltage goes below threshold value, = 50
IT	Total impulse, computed (lb-sec)
MF	Total fuel consumption of pulse, computed (lbm)
MICRØT	Tape unit microfilm output of printed data (CIV)

MØ	Total oxidizer consumption of pulse, computed (lbm)
MR	Mixture ratio, computed
MRS	Standard mixture ratio
MWH	Molecular weight of hydrogen, (lb/mole)
MWØ	Molecular weight of oxygen, (lb/mole)
MXFILE	Execution terminated when maximum number of consecutive end of file marks on SEL tape
NDP	Number of the pulse on data tape to be dumped.
NLINES	Number of lines to be printed per page = 41
NP	Number of pulses to be processed for each run; = 1 if a pulse is to be dumped (CIV)
PAB	Pressure ambient (psia) optional (CIV)
PC	Chamber pressure, measured (psia)
PCCI	Calculated chamber pressure at injector face (psia)
PCCIA	Adjusted calculated chamber pressure at injector face (psia)
PCE	PC Convergence criteria (psia)
PCS	Standard chamber pressure (psia)
PDFØ	Fuel orifice delta pressure, measured (psia)
PDØ	Pressure differentail from interface to combustion chamber for oxidizer (psia)
PDØØ	Oxidizer orifice delta pressure, measured (psia)
PFD	Pressure of the fuel at interface (psia)
PFDS	Standard pressure of the fuel at interface (psia)
PFI	Fuel injection pressure, measured (psia)
PFIC1	Injector fuel cavity pressure #1, measured (psia)
PFIC2	Injector fuel cavity pressure #2, measured (psia)
PFII	Fuel ignitor injection pressure, measured (psia)
PFTI	Fuel turbine inlet pressure, measured (psia)

PLTAPE	Tape assignment of TRWPLT tape, i.e. HEPCAT output tape, = 8
PNS	Nozzle stagnation pressure (psia)
PNSS	Standard nozzle stagnation pressure (psia)
PØD	Pressure of the oxidizer at interface (psia)
PØDS	Standard pressure of oxidizer at interface (psia)
PØI	Oxidizer injection pressure, measured (psia)
PØIC	Oxidizer injector cavity pressure, measured (psia)
PØII	Oxidizer igniter injection pressure, measured (psia)
PØTI	Oxidizer turbine inlet pressure, measured (psia)
PTFØ	Fuel orifice total pressure, measured (psia)
PTØØ	Oxidizer orifice total pressure, measured (psia)
RAT	Contraction area ratio
RFD	Density of the fuel at interface (lb/cu ft)
RFDS	Standard density of the fuel at interface (lb/cu ft)
RØD	Density of the oxidizer at interface (lb/cu ft)
RØDS	Standard density of the oxidizer at interface (lb/cu ft)
RUNNØ	Run annotation, measured
SS	Spark signal, measured (counts)
TC1	Thermocouple #1, measured (°F)
TC2	Thermocouple #2, measured (°F)
TC3	Thermocouple #3, measured (°F)
TC4	Thermocouple #4, measured (°F)
TC5	Thermocouple #5, measured (°F)
TC6	Thermocouple #6, measured (°F)
TFI	Fuel injection temperature, measured. (°F)
TFD	Temperature of the fuel at interface (°F)
TFDS	Standard temperature of the fuel at interface (°F)
TFØI	Fuel orifice inlet temperature, measured, (°F)

TFTI	Fuel turbine inlet temperature, measured, (°F)
TØD	Temperature of the oxidizer at interface (°F)
TØDS	Standard temperature of the oxidizer at interface (°F)
TØI	Oxidizer injection temperature, measured, (°F)
TØØI	Oxidizer orifice inlet temperature, (°F)
TØTI	Oxidizer turbine inlet temperature, measured, (°F)
UNIT	Tape assignment of SEL tape, (°F)
WDØTF	Fuel flowrate, computed, (lbm/sec)
WDØTFS	Adjusted fuel flowrate to standard values (lb/sec)
WDØTØ	Oxidizer flowrate, computed, (lbm/sec)
WDØTØS	Adjusted oxidizer flowrate to standard values (lb/sec)
WDØTT	Total flowrate, computed, (lbm/sec)
WDØTTS	Total adjusted propellant flowrate to standard values (lb/sec)
WFT	Fuel flowrate, turbine, measured, (c.f.m.)
WØT	Oxidizer flowrate, turbine, measured, (c.f.m.)
YF	Expansion factor used for computing fuel flowrate WDØTF, computed
YØ	Expansion factor used for computing oxidizer flowrate WDØTØ, computed
ZF	Fuel gas compressibility factor, computed
ZH	Fuel gas compressibility factor, computed
ZØX	Oxidizer gas compressibility factor, computed

APPENDIX 2

TRW Plot Package

This appendix is a condensed version of HCC Report No. 3141.20-10 dated May 1969 and is included as a user's guide for the plotting package of the HD011C program. There are four sections which describe the following: (1) Data tape format, (2) Data deck description, (3) control card description, and (4) Listings of data decks for specific jobs.

Section I: DATA TAPE FØRMAT

The data tape generated by HD011C for use by the plotting program, TRWPLT, has three record format types. A Type One record contains time and channel data. A Type Two record contains time and engineering data. A Type Three record contains time and engine performance standardization data. The order of data in each record type is as follows:

Type One Record -

Word 1 - record identifier
Word 2 - number of data words in record, =52
Word 3 - computer time
Word 4 - pulse reference time
Words 5-54 - data from each channel

Type Two Record -

Word 1 - record identifier
Word 2 - number of data words in record, =23
Word 3 - computer time
Word 4 - pulse reference time
Words 5-25 - engineering data

Type Three Record -

Word 1 - record identifier
Word 2 - number of data words in record, =42
Word 3 - computer time
Word 4 - pulse reference time
Words 5-44 - engine performance standardization data

All the data from the SEL 600 tape is put on the plot tape as well as all the data calculated in the engineering and engine performance standardization routines. This is pointed out to the user because each point is not printed by the HD011C program.

Section II: DATA DECK DESCRIPTION

For one plot to be made, four cards are required. A description of the four required cards is followed by a description of some of the options available to the user.

1. PLØT - Specifies the variables to be plotted (must be input for each plot).

   The variables to be plotted may be specified either by BCD symbols or by the variable in the record. The BCD symbols correspond to the alphanumeric identification on the channel cards for the Type One record. The alphanumeric names of the variables in the Type Two record are WDØTØ, PNS, PC, F, ISP, WDØTF, CSTAR, CF, MR, ZØX, WDØTT, DCSTAR, YF, YØ, ZF, IT, INPNS, MØ, MF, GAMMAØ, GAMMAF. The alphanumeric names of the variables in the Type Three record are F, FSTD, CF, CFSTD, ISP, ISPS, CFSV, CFNSV, WDØTT, WDØTTS, ECFS, ECFSTD, WDØTØ, WDØTØS, TØD, TØDS, WDØTF, WDØTFS, TFD, TFDS, MR, MRS, PØD, PØDS, PC, PCS, PFD, PFDS, CSTAR, CSTASD, AE, PAB, CSTAT, CSTATS, AT, ATTC, ETAC, ETACS, PCCI, PCCIA. In addition, the two times used by the program are referenced by the BCD symbols of TC for computer time and TR for pulse reference time.

   A. Specification by BCD symbols:

   PLØT = XSYM, IRECX, $YSYM_1$, $IRECY_1$, $YSYM_2$, $IRECY_2$, ..., $YSYM_n$, $IRECY_n$, ENDLST

   where

   XSYM denotes the BCD symbol for the abscissa variable,
   IRECX denotes the record type in which XSYM will be found,
   $YSYM_i$ denotes the BCD symbol for the i^{th} ordinate variable ($i = 1, n$ where max $n = 10$),
   IRECY denotes the record type in which $YSYM_i$ will be found,
   ENDLST terminates the list of symbols and record types.

   The resultant graph will consist of n traces, XSYM vs. $YSYM_1$, XSYM vs. $YSYM_2$, ..., XSYM vs. $YSYM_n$.

   B. Specification by location of the variable in the record: Note that the physical location is determined from the first data word in the record, not from the first physical word in the record.

PLØT = LØCX, IRECX, $LØCY_1$, $IRECY_1$, ..., $LØCY_n$, $IRECY_n$, ENDLST

where:

LØCX specifies $LØCX^{th}$ data word in the record as the abscissa variable,

IRECX specifies the record type in which the abscissa variable will be found,

$LØCY_i$ specifies the $LØCY_i^{th}$ data word in the record as the i^{th} ordinate variable (i = 1, n where max n = 10),

$IRECY_i$ specifies the record type in which the data for the i^{th} ordinate variable will be found,

ENDLST terminates the list of locations and record types.

The resultant graph will consist of n traces, $DATA_{LØCX}$ vs. $DATA_{LØCY_1}$, $DATA_{LØCX}$ vs. $DATA_{LØCY_2}$, ..., $DATA_{LØCX}$ vs. $DATA_{LØCY}$

where the symbol DATA denotes the HD011C processed output data words in each record.

Examples:

PLØT = X, 1, Y, 3, Z, 4, ENDLST

Two traces will be plotted on the graph, X vs Y and X vx Z

where the data for X is in record type 1,

where the data for Y is in record type 3, and

where the data for Z is in record type 4.

PLØT = 4, 2, 9, 7, 1, 2, 4, 3, ENDLST

Three traces will be plotted on the graph,

$DATA_4$ (Record type 2) vs $DATA_9$ (Record type 7),

$DATA_4$ (Record type 2) vs $DATA_1$ (Record type 2),

$DATA_4$ (Record type 2) vs $DATA_4$ (Record type 3).

2. ENDPLT - This card marks the termination of the inputs for one plot.

3. ENDFIL - The appearance of this card marks the termination of the inputs for one file and causes that file of data to be plotted.

4. ENDRUN - This card marks the termination of all inputs, causes a wrap-up to occur and control to exit the program.

   NOTE: The symbols ENDPLT, ENDFIL, and ENDRUN must appear on a separate card from other inputs. To creat more than one plot per file, cards 1 and 2 would be repeated for as many plots as desired.

To create labels on the plots, the next three cards can be used. It should be noted that once these inputs are defined by the user they will be used on all subsequent plots until changed or deleted. All are 66 characters in length. Each symbol must be followed by = ID = which indicates any combination of characters may follow and is legal.

5. TITLE - Graph title; printed at the top of the graph.
   EX: TITLE = ID = USER'S SAMPLE GRAPH TITLE

6. XLABEL - X-axis title; printed below the independent variable axis.
   EX: XLABEL = ID = USER'S SAMPLE X-AXIS TITLE

7. YLABEL - Y-axis title; printed to the left of the dependent variable axis.
   EX: YLABEL = ID = USER'S SAMPLE Y-AXIS TITLE

TRWPLT automatically scales plots and optimizes the limits to insure all points are included. Provision is made for the user to input his own scales instead of using TRWPLT automatic logic. If user scale inputs are used they will continue to be utilized for each plot until changed in some manner by the addition of the following cards.

8. ISCALX - abscissa scale selector
   = 0 TRWPLT will optimize scaling
   = 1 Input limits will be used

   NOTE: If set = 1 in plot A, and set = 0 in plot B, the scales from plot A will be used in plot B also.

9. ISCALY - ordinate scale selector
   = 0 TRWPLT will do scaling
   = 1 input limits will be used

   NOTE: The note about ISCALX also applies to ISCALY.

10. XLØ - lower limit for the X-axis

11. XHI - upper limit for the X-axis

12. YLØ - lower limit for the Y-axis

13. YHI - upper limit for the Y-axis

   NOTE: If both XLØ and XHI are zero, then the limits will be set equal to the minimum and the maximum of the abscissa data points. If both YLØ and YHI are zero, then the limits will be set equal to the minimum snf maximum of the ordinate data points. If conjunction with the note on card 8, the only way to return to automatic scaling is to set both limits, XLØ and XHI, YLØ and YHI to zero.

The next two options are very useful in multi-file and multi-reel plotting.

14. REPEAT - The card causes the next file of the data tape (or a new data tape) to be read and processed with the same inputs as in the preceding file.

    NOTE: The symbol REPEAT must appear on a separate card from other inputs. No new inputs may be used with this option except for the next card.

15. KUNIT - The number of the tape unit on which the input data tape is mounted (initialized to 8). Units 2, 4, 12, and 13 are used for working storage and cannot be used.

This description does not cover all the inputs to TRWPLT although, those described above will allow the user a fair degree of sophistication for plotting.

Section III: DESCRIPTION OF CONTROL CARDS

Because of the possibility of a double execution of HD011C and TRWPLT, control cards for both programs will be discussed.

1. Control cards for HD011C

```
     Card Column
     1 2 3 4 5 6 7 8 . . .                                   61-74
A.   ∇ P Δ R U N Δ F1, F2, F3, F4, F5, F6, F7, F8, F9, F10  NAME
B.   ∇     ASG   X = ααααα
C.   ∇     ASG   G = βββββ
D.   ∇     XQT   CUR
E.         TRW   X
F.         IN    X
G.         TRW   X
H.   ∇     XQT   HD011C
I.         HD011C  DATA DECK
J.   ∇     EØF
```

Description:

A. The fields for card A are as follows:

   P - Priority indicator, either A, P, or Z. A priority code must be present.

a) "A" - Special priority to be used only with approval of the MSC operations monitor of shift supervisor.

b) "P" - Standard priority to be used for EXPRESS jobs and for those groups that have been authorized priority for specific jobs.

c) "Z" - To be used for all nominal work.

F1 - Six character badge number

F2 - Division code

F3 - Building, box number

F4 - Project number (1-6 characters)

F5 - Program number (1-6 characters)

F6 - Type run (1 character)

F7 - Estimated time for run (min)

F8 - Estimated hundreds of pages output for run

F9 - Print channel

F10 - Punch channel

Name - Programmer's name

Fields F1 - F6 are always required. Fields F7 - F10 are optional. System will use 3 minutes and 100 pages for F7 and F8, respectively, if not input.

B. ααααα is the tape number of the program tape

C. βββββ is the tape number of the data tape

D. Execute the complex utility routine to manipulate tapes

E. Rewind tape X to load point

F. Read program into PCF area

G. Rewind tape X to load point

H. Execute the program

I. Data deck

J. End of file card

2. Control card for microfilm output

If any type of microfilm output is desired, either from HD011C or TRWPLT, the following card must be put in the deck after card A.

```
Card Column
1 2 3 4
∇     PLT
```

3. Control cards for HD011C and TRWPLT

```
    Card Column
    1 2 3 4 5 6 7 8 . . .                61-74
A.  ∇ P   R U N   F1, F2, . . ., F10   NAME
B.  ∇     PLT
C.  ∇     ASG X = ααααα
D.  ∇     ASG Y = TRWPLT
E.  ∇     ASG F
F.  ∇     ASG G = βββββ
G.  ∇     XQT CUR
H.        TRW X
I.        IN  X
J.        TRW X
K.  ∇     XQT HD011C
L.        HD011C DATA DECK
M.  ∇     XQT CUR
N.        ERS
O.        TRW Y
P.        IN  Y
Q.        TRW Y
R.  ∇     XQT TRWPLT
S.        PLØT DATA DECK
T.  ∇     EØF
```

Description:

A,B,C. Discussed above

D. Identifier to tell operator to hang TRWPLT tape on Unit Y

E. Fastrand file that will contain the plot data for TRWPLT

F-M. Discussed above

N. Clear the PCF area

O. Rewind tape Y to the load point

P. Read TRWPLT into PCF area

Q. Rewind tape Y to load point

R. Execute TRWPLT

S. TRWPLT data deck

T. Discussed above

If the user wants to save the plot data on a tape and plot it at a later time, the following change should be made.

a) Remove card B, D

b) Change card E to

∇S ASG F=SAVE

c) Remove cards M-S

4. Control cards for TRWPLT

```
    Card Columns
    1 2 3 4 5 6 7 8 . . .         61-74
A.  ∇ P   R U N   F1, . . ., F10  NAME
B.  ∇     PLT
C.  ∇     ASG Y = TRWPLT
D.  ∇     ASG F = ααααα
E.  ∇     XQT CUR
F.        TRW Y
G.        IN  Y
H.        TRW Y
I.  ∇     XQT  TRWPLT
J.        TRWPLT DATA DECK
K.  ∇     EØF
```

All cards have been explained previously except D. D contains the number of the data tape to be plotted.

Section IV. LISTINGS OF DATA DECKS FOR SPECIFIC JOBS

The listings in this section represent the deck setups necessary to carry out a specific function. The header on each deck gives the purpose of each deck.

It should be noted that the user has the ability to use this plot package to cross plot, i.e., plot variable against variable, not just variable against time. It is also possible to plot one record type against another record type. The last listing gives an example of this cross plotting capability.

```
******* DECK SETUP FOR EXECUTION OF HD011C PROGRAM ONLY *******


∇Z RUN T59368,FM7,12,1135N,266310,P,3,1                        PRINGLE,R.W.
∇  ASG  G=48921
∇  ASG  X=23856
∇  XQT  CUR
   TRW  X
   IN   X
   TRW  X
∇  XQT HD011C
01 F         1             0.04              LBF
02 PC        1             0.1               PSIA
03 FV        1             1.0               CNTS
04 PFI       1             0.1               PSIA
05 POI       1             0.1               PSIA
06 PFII      1             0.1               PSIA
07 POII      1             0.1               PSIA
08 PTFO      1             0.1               PSIA
09 PTOO      1             0.1               PSIA
10 PDFO      1             0.01              PSID
11 PDOO      1             0.01              PSID
12 PFIC1     1             0.1               PSIA
13 POIC      1             0.1               PSIA
14 PFIC2     1             0.1               PSIA
15 SS        1             1.0               CNTS
16 PFTI      1             0.1               PSIA
17 POTI      1             0.1               PSIA
18 TFI         1                     118 218 DEGF
19 TOI         1                     118 218 DEGF
20 TC1         1                     120 220 DEGF
21 TC2         1                     120 220 DEGF
22 TC3         1                     120 220 DEGF
23 TC4         1                     120 220 DEGF
24 TC5         1                     120 220 DEGF
25 TC6         1                     120 220 DEGF
26
27
28
29
```

```
31
32 TFOI        1                       118 218 DEGF
33 TOOI        1                       118 218 DEGF
34 TFTI        1                       118 218 DEGF
35 TOTI        1                       118 218 DEGF
36
37
38
39
40 WFT       1            0.02                CFM
41 WOT       1            0.01                CFM
42
43
44
45
46
47
48
49
50 RUNNO     1            1.
118  2
 0.0      0.0       5000.     5000.
218 20
    0.   -302.      662.        0.      725.       30.       735.       35.
  746.     40.      757.       45.      768.       50.       779.       55.
  790.     60.      801.       65.      812.       70.       823.       75.
  835.     80.      846.       85.      858.       90.       869.       95.
  881.    100.      892.      105.      904.      110.      4095.     1137.
120  2
 0.0      0.0       5000.     5000.
220 20
    0.   -302.      768.       50.      881.      100.      1000.      150.
 1126.    200.     1257.      250.      1394.     300.      1464.      325.
 1535.    350.     1608.      375.      1681.     400.      1756.      425.
 1832.    450.     1909.      475.      1986.     500.      2145.      550.
 2306.    600.     2471.      650.     2639.      700.      4095.     1137.
  1.9273          0.655          0.46           1.0          0.624
  0.42            1.0        7.9173
0 00 1 1  1 0
CASEND
∇  EOF
```

******* DECK SETUP FOR EXECUTION OF HD011C PROGRAM WITH MICROFILM OUTPUT *******

```
∇Z RUN T59368,FM7,12,1135N,266310,P,3,1                        PRINGLE,R.W.
∇  PLT
∇  ASG  G=48921
∇  ASG  X=23856
   XQT  CUR
   TRW  X
   IN   X
   TRW  X
∇  XQT HD011C
01 F          1            0.04              LBF
02 PC         1            0.1               PSIA
03 FV         1            1.0               CNTS
04 PFI        1            0.1               PSIA
05 POI        1            0.1               PSIA
06 PFII       1            0.1               PSIA
07 POII       1            0.1               PSIA
08 PTFO       1            0.1               PSIA
09 PTOO       1            0.1               PSIA
10 PDFO       1            0.01              PSID
11 PDOO       1            0.01              PSID
12 PFIC1      1            0.1               PSIA
13 POIC       1            0.1               PSIA
14 PFIC2      1            0.1               PSIA
15 SS         1            1.0               CNTS
16 PFTI       1            0.1               PSIA
17 POTI       1            0.1               PSIA
18 TFI          1                   118 218 DEGF
19 TOI          1                   118 218 DEGF
20 TC1          1                   120 220 DEGF
21 TC2          1                   120 220 DEGF
22 TC3          1                   120 220 DEGF
23 TC4          1                   120 220 DEGF
24 TC5          1                   120 220 DEGF
25 TC6          1                   120 220 DEGF
26
27
28
```

```
29
30
31
32 TFOI        1                      118 218 DEGF
33 TOOI        1                      118 218 DEGF
34 TFTI        1                      118 218 DEGF
35 TOTI        1                      118 218 DEGF
36
37
38
39
40 WFT       1             0.02             CFM
41 WOT       1             0.01             CFM
42
43
44
45
46
47
48
49
50 RUNNO     1             1.
118  2
 0.0       0.0       5000.     5000.
218 20
    0.    -302.      662.        0.      725.       30.       735.       35.
  746.      40.      757.       45.      768.       50.       779.       55.
  790.      60.      801.       65.      812.       70.       823.       75.
  835.      80.      846.       85.      858.       90.       869.       95.
  881.     100.      892.      105.      904.      110.      4095.     1137.
120  2
 0.0       0.0       5000.     5000.
220 20
    0.    -302.      768.       50.      881.      100.      1000.      150.
 1126.     200.     1257.      250.     1394.      300.      1464.      325.
 1535.     350.     1608.      375.     1681.      400.      1756.      425.
 1832.     450.     1909.      475.     1986.      500.      2145.      550.
 2306.     600.     2471.      650.     2639.      700.      4095.     1137.
  1.9273         0.655          0.46          1.0           0.624
  0.42           1.0          7.9173
0 00 1 1  1 1
```

```
CASEND
∇  EOF
```

******* DECK SETUP FOR EXECUTION OF HD011C SAVING A DATA TAPE FOR TRWPLT *******

```
∇Z RUN T59368,FM7,12,1135N,266310,P,3,1                               PRINGLE,R.W.
∇S ASG  F=SAVE
∇  ASG  G=48921
∇  ASG  X=23856
∇  XQT  CUR
   TRW  X
   IN   X
   TRW  X
∇  XQT HD011C
01 F         1             0.04              LBF
02 PC        1             0.1               PSIA
03 FV        1             1.0               CNTS
04 PFI       1             0.1               PSIA
05 POI       1             0.1               PSIA
06 PFII      1             0.1               PSIA
07 POII      1             0.1               PSIA
08 PTFO      1             0.1               PSIA
09 PTOO      1             0.1               PSIA
10 PDFO      1             0.01              PSID
11 PDOO      1             0.01              PSID
12 PFIC1     1             0.1               PSIA
13 POIC      1             0.1               PSIA
14 PFIC2     1             0.1               PSIA
15 SS        1             1.0               CNTS
16 PFTI      1             0.1               PSIA
17 POTI      1             0.1               PSIA
18 TFI         1                     118 218 DEGF
19 TOI         1                     118 218 DEGF
20 TC1         1                     120 220 DEGF
21 TC2         1                     120 220 DEGF
22 TC3         1                     120 220 DEGF
23 TC4         1                     120 220 DEGF
24 TC5         1                     120 220 DEGF
25 TC6         1                     120 220 DEGF
26
27
28
```

```
29
30
31
32 TFOI        1                       118 218 DEGF
33 TOOI        1                       118 218 DEGF
34 TFTI        1                       118 218 DEGF
35 TOTI        1                       118 218 DEGF
36
37
38
39
40 WFT       1             0.02              CFM
41 WOT       1             0.01              CFM
42
43
44
45
46
47
48
49
50 RUNNO     1             1.
118  2
 0.0       0.0       5000.     5000.
218 20
    0.    -302.       662.        0.       725.       30.       735.       35.
  746.      40.       757.       45.       768.       50.       779.       55.
  790.      60.       801.       65.       812.       70.       823.       75.
  835.      80.       846.       85.       858.       90.       869.       95.
  881.     100.       892.      105.       904.      110.      4095.     1137.
120  2
 0.0       0.0       5000.     5000.
220 20
    0.    -302.       768.       50.       881.      100.      1000.      150.
 1126.     200.      1257.      250.       1394.     300.      1464.      325.
 1535.     350.      1608.      375.       1681.     400.      1756.      425.
 1832.     450.      1909.      475.       1986.     500.      2145.      550.
 2306.     600.      2471.      650.      2639.      700.      4095.     1137.
  1.9273         0.655          0.46              1.0          0.624
  0.42           1.0        7.9173
0 00 1 1  1 0
```

```
CASEND
▽  EOF
```

******* DECK SETUP FOR DOUBLE EXECUTION OF HD011C AND TRWPLT *******

```
∇Z RUN T59368,FM7,12,1135N,266310,P,3,1                        PRINGLE,R.W.
∇  PLT
∇  ASG  F
∇  ASG  G=48921
∇  ASG  X=23856
∇  ASG  Y=TRWPLT
∇  XQT  CUR
   TRW  X
   IN   X
   TRW  X
∇  XQT HD011C
01 F         1            0.04               LBF
02 PC        1            0.1                PSIA
03 FV        1            1.0                CNTS
04 PFI       1            0.1                PSIA
05 POI       1            0.1                PSIA
06 PFII      1            0.1                PSIA
07 POII      1            0.1                PSIA
08 PTFO      1            0.1                PSIA
09 PTOO      1            0.1                PSIA
10 PDFO      1            0.01               PSID
11 PDOO      1            0.01               PSID
12 PFIC1     1            0.1                PSIA
13 POIC      1            0.1                PSIA
14 PFIC2     1            0.1                PSIA
15 SS        1            1.0                CNTS
16 PFTI      1            0.1                PSIA
17 POTI      1            0.1                PSIA
18 TFI         1                    118 218 DEGF
19 TOI         1                    118 218 DEGF
20 TC1         1                    120 220 DEGF
21 TC2         1                    120 220 DEGF
22 TC3         1                    120 220 DEGF
23 TC4         1                    120 220 DEGF
24 TC5         1                    120 220 DEGF
25 TC6         1                    120 220 DEGF
26
```

```
27
28
29
30
31
32 TFOI       1                         118 218 DEGF
33 TOOI       1                         118 218 DEGF
34 TFTI       1                         118 218 DEGF
35 TOTI       1                         118 218 DEGF
36
37
38
39
40 WFT      1           0.02                  CFM
41 WOT      1           0.01                  CFM
42
43
44
45
46
47
48
49
50 RUNNO    1           1.
118  2
 0.0      0.0      5000.    5000.
218 20
    0.   -302.     662.      0.      725.      30.     735.      35.
  746.     40.     757.     45.      768.      50.     779.      55.
  790.     60.     801.     65.      812.      70.     823.      75.
  835.     80.     846.     85.      858.      90.     869.      95.
  881.    100.     892.    105.      904.     110.    4095.    1137.
120  2
 0.0      0.0      5000.    5000.
220 20
    0.   -302.     768.     50.      881.     100.    1000.     150.
 1126.    200.    1257.    250.     1394.     300.    1464.     325.
 1535.    350.    1608.    375.     1681.     400.    1756.     425.
 1832.    450.    1909.    475.     1986.     500.    2145.     550.
 2306.    600.    2471.    650.     2639.     700.    4095.    1137.
  1.9273        0.655         0.46            1.0          0.624
```

```
  0.42             1.0          7.9173
C 00 1 1  1 0
CASEND
∇  XQT  CUR
   ERS
   TRW  Y
   IN   Y
   TRW  Y
∇  XQT  TRWPLT
ISCALX=1
XLO=0.
XHI=10.
ISCALY=1
YLO=0.
YHI=100.
XLABEL=ID= COMPUTER TIME  SEC
YLABEL=ID= THRUST   LBS
TITLE=ID= THRUST  (LBS)
PLOT=TC,1,F,1,ENDLST
ENDPLT
YLO=0.
YHI=100.
YLABEL=ID= CHAMBER PRESSURE   PSIA
TITLE=ID= CHAMBER PRESSURE (PSIA)
PLOT=TC,1,PC,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= FUEL INJECTION PRESSURE   PSIA
TITLE=ID= FUEL INJECTION PRESSURE (PSIA)
PLOT=TC,1,PFI,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= OXIDIZER INJECTION PRESSURE   PSIA
TITLE=ID= OXIDIZER INJECTION PRESSURE (PSIA)
PLOT=TC,1,POI,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= FUEL IGNITOR INJECTION PRESSURE   PSIA
```

```
TITLE=ID= FUEL IGNITOR INJECTION PRESSURE (PSIA)
PLOT=TC,1,PFII,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= OXIDIZER IGNITOR INJECTION PRESSURE   PSIA
TITLE=ID= OXIDIZER IGNITOR INJECTION PRESSURE
PLOT=TC,1,POII,1,ENDLST
ENDPLT
ENDFIL
ENDRUN
∇  EOF
```

******* DECK SETUP FOR EXECUTION OF TRWPLT PROGRAM ONLY *******

```
∇Z RUN T59368,FM7,12,1135N,266310,P,3,1                          PRINGLE,R.W.
∇  PLT
∇  ASG  F=22222
∇  ASG  Y=TRWPLT
∇  XQT  CUR
   TRW  Y
   IN   Y
   TRW  Y
∇  XQT  TRWPLT
ISCALX=1
XLO=0.0
XHI=10.0
ISCALY=1
YLO=0.
YHI=200.
XLABEL=ID= COMPUTER TIME   SEC
YLABEL=ID= FUEL ORFICE TOTAL PRESSURE   PSIA
TITLE=ID= FUEL ORFICE TOTAL PRESSURE  (PSIA)
PLOT=TC,1,PTFO,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= OXIDIZER ORFICE TOTAL PRESSURE   PSIA
TITLE=ID= OXIDIZER ORFICE TOTAL PRESSURE (PSIA)
PLOT=TC,1,PTOO,1,ENDLST
ENDPLT
YLO=0.
YHI=50.
YLABEL=ID= FUEL ORFICE DELTA P   PSIA
TITLE=ID= FUEL ORFICE DELTA P (PSIA)
PLOT=TC,1,PDFO,1,ENDLST
ENDPLT
YLO=0.
YHI=30.
YLABEL=ID= OXIDIZER ORFICE DELTA P   PSIA
TITLE=ID= OXIDIZER ORFICE DELTA P (PSIA)
PLOT=TC,1,PDOO,1,ENDLST
```

```
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= INJECTOR FUEL CAVITY PRESSURE NO. 1   PSIA
TITLE=ID= INJECTOR FUEL CAVITY PRESSURE NO. 1 (PSIA)
PLOT=TC,1,PFIC1,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= INJECTOR OXIDIZER CAVITY PRESSURE   PSIA
TITLE=ID= INJECTOR OXIDIZER CAVITY PRESSURE (PSIA)
PLOT=TC,1,POIC,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= INJECTOR FUEL CAVITY PRESSURE NO. 2   PSIA
TITLE=ID= INJECTOR FUEL CAVITY PRESSURE NO. 2 (PSIA)
PLOT=TC,1,PFIC2,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= PRESSURE FUEL TURBINE INLET   PSIA
TITLE=ID= PRESSURE FUEL TURBINE INLET (PSIA)
PLOT=TC,1,PFTI,1,ENDLST
ENDPLT
YLO=0.
YHI=200.
YLABEL=ID= PRESSURE OXIDIZER TURBINE INLET   PSIA
TITLE=ID= PRESSURE OXIDIZER TURBINE INLET (PSIA)
PLOT=TC,1,POTI,1,ENDLST
ENDPLT
YLO=20.
YHI=100.
YLABEL=ID= FUEL INJECTION TEMPERATURE   DEG F
TITLE=ID= FUEL INJECTION TEMPERATURE (DEG F)
PLOT=TC,1,TFI,1,ENDLST
ENDPLT
YLO=20.
YHI=100.
YLABEL=ID= OXIDIZER INJECTION TEMPERATURE   DEG F
TITLE=ID= OXIDIZER INJECTION TEMPERATURE (DEG F)
```

```
PLOT=TC,1,TOI,1,ENDLST
ENDPLT
YLO=20.
YHI=500.
YLABEL=ID= THERMO COUPLE 1   DEG F
TITLE=ID= THERMO COUPLE 1 (DEG F)
PLOT=TC,1,TC1,1,ENDLST
ENDPLT
YLO=20.
YHI=500.
YLABEL=ID= THERMO COUPLE 2   DEG F
TITLE=ID= THERMO COUPLE 2 (DEG F)
PLOT=TC,1,TC2,1,ENDLST
ENDPLT
YLO=20.
YHI=500.
YLABEL=ID= THERMO COUPLE 3   DEG F
TITLE=ID= THERMO COUPLE 3 (DEG F)
PLOT=TC,1,TC3,1,ENDLST
ENDPLT
YLO=20.
YHI=500.
YLABEL=ID= THERMO COUPLE 4   DEG F
TITLE=ID= THERMO COUPLE 4 (DEG F)
PLOT=TC,1,TC4,1,ENDLST
ENDPLT
YLO=20.
YHI=500.
YLABEL=ID= THERMO COUPLE 5   DEG F
TITLE=ID= THERMO COUPLE 5 (DEG F)
PLOT=TC,1,TC5,1,ENDLST
ENDPLT
ENDFIL
ENDRUN
*∇  EOF
```

******* DECK SETUP FOR EXECUTION OF TRWPLT WITH MULTIPLE INPUT TAPES *******

```
∇Z RUN T59368,FM7,12,1135N,266310,P,3,1                      PRINGLE,R.W.
∇   PLT
∇   ASG  F=22222
∇   ASG  G=33333
∇   ASG  H=44444
∇   ASG  Y=TRWPLT
∇   XQT  CUR
    TRW  Y
    IN   Y
    TRW  Y
∇   XQT  TRWPLT
ISCALX=1
XLO=0.0
XHI=10.0
ISCALY=1
YLO=20.
YHI=500.
XLABEL=ID= COMPUTER TIME   SEC
YLABEL=ID= THERMO COUPLE 6   DEG F
TITLE=ID= THERMO COUPLE 6 (DEG F)
PLOT=TC,1,TC6,1,ENDLST
ENDPLT
YLO=480.
YHI=560.
YLABEL=ID= FUEL ORFICE IN TEMPERATURE   DEG R
TITLE=ID= FUEL ORFICE IN TEMPERATURE (DEG R)
PLOT=TC,1,TFOI,1,ENDLST
ENDPLT
YLO=480.
YHI=560.
YLABEL=ID= OXIDIZE ORFICE IN TEMPERATURE   DEG R
TITLE=ID= OXIDIZER ORFICE IN TEMPERATURE (DEG R)
PLOT=TC,1,TOOI,1,ENDLST
ENDPLT
YLO=480.
YHI=560.
YLABEL=ID= TEMPERATURE FUEL TURBINE INLET   DEG R
```

```
TITLE=ID= TEMPERATURE FUEL TURBINE INLET (DEG R)
PLOT=TC,1,TFTI,1,ENDLST
ENDPLT
YLO=480.
YHI=560.
YLABEL=ID= TEMPERATURE OXIDIZER TURBINE INLET   DEG R
TITLE=ID= TEMPERATURE OXIDIZER TURBINE INLET (DEG R)
PLOT=TC,1,TOTI,1,ENDLST
ENDPLT
YLO=0.
YHI=100.
YLABEL=ID= FUEL TURBINE FLOW RATE   CFM
TITLE=ID= FUEL TURBINE FLOW RATE (CFM)
PLOT=TC,1,WFT,1,ENDLST
ENDPLT
YLO=0.
YHI=50.
YLABEL=ID= OXIDIZER TURBINE FLOW RATE   CFM
TITLE=ID= OXIDIZER TURBINE FLOW RATE (CFM)
PLOT=TC,1,WOT,1,ENDLST
ENDPLT
YLO=0.
YHI=0.1
YLABEL=ID=OXIDIZER FLOW RATE   LBM SEC
TITLE=ID= OXIDIZER FLOW RATE (LBM/SEC)
PLOT=TC,2,WDOTO,2,ENDLST
ENDPLT
YLO=0.
YHI=60.
YLABEL=ID=NOZZLE STAGNATION PRESSURE   PSIA
TITLE=ID= NOZZLE STAGNATION PRESSURE (PSIA)
PLOT=TC,2,PNS,2,ENDLST
ENDPLT
YLO=0.
YHI=300.
YLABEL=ID=ENGINE SPECIFIC IMPULSE      SEC
TITLE=ID=ENGINE SPECIFIC IMPULSE (SEC)
PLOT=TC,2,ISP,2,ENDLST
ENDPLT
YLO=0.
YHI=0.03
```

```
YLABEL=ID=FUEL FLOW RATE    LBM/SEC
TITLE=ID=FUEL FLOW RATE (LBM/SEC)
PLOT=TC,2,WDOTF,2,ENDLST
ENDPLT
YLO=0.
YHI=10000.
YLABEL=ID=CHARACTERISTIC EXHAUST VELOCITY   FT/SEC
TITLE=ID=CHARACTERISTIC EXHAUST VELOCITY
PLOT=TC,2,CSTAR,2,ENDLST
ENDPLT
YLO=0.
YHI=0.
YLABEL=ID= C SUB F
TITLE=ID=  C SUB F
PLOT=TC,2,CF,2,ENDLST
ENDPLT
YLO=0.
YHI=5.
YLABEL=ID= ENGINE MIXTURE RATIO
TITLE=ID=  ENGINE MIXTURE RATIO
PLOT=TC,2,MR,2,ENDLST
ENDPLT
YLO=0.
YHI=0.1
YLABEL=ID= TOTAL FLOW RATE    LBM/SEC
TITLE=ID= TOTAL FLOW RATE (LBM/SEC)
PLOT=TC,2,WDOTT,2,ENDLST
ENDPLT
YLO=0.
YHI=20.
YLABEL=ID= TOTAL IMPULSE
TITLE=ID= TOTAL IMPULSE
PLOT=TC,2,IT,2,ENDLST
ENDPLT
YLO=0.
YHI=60.
YLABEL=ID=NOZZLE STAGNATION PRESSURE INTEGRAL   LBF SEC/IN2
TITLE=ID= NOZZLE STAGNATION PRESSURE INTEGRAL (LBF-SEC/IN2)
PLOT=TC,2,INPNS,2,ENDLST
ENDPLT
YLO=0.
```

```
YHI=0.06
YLABEL=ID= TOTAL OXIDIZER CONSUMED   LBM
TITLE=ID= TOTAL OXIDIZER CONSUMED (LBM)
PLOT=TC,2,MO,2,ENDLST
ENDPLT
YLO=0.
YHI=0.02
YLABEL=ID= TOTAL FUEL CONSUMED   LBM
TITLE=ID= TOTAL FUEL CONSUMED (LBM)
PLOT=TC,2,MF,2,ENDLST
ENDPLT
XLO=0.
XHI=20.
YLO=0.
YHI=10000.
TITLE=ID=CHARACTERISTIC EXHAUST VELOCITY .VS. TOTAL IMPULSE
YLABEL=ID=CHARACTERISTIC EXHAUST VELOCITY  FT/SEC
XLABEL=ID=TOTAL IMPULSE
PLOT=IT,2,CSTAR,2,ENDLST
ENDPLT
XLO=480.
XHI=560.
YLO=0.
YHI=0.1
TITLE=ID=OXIDIZER FLOW RATE .VS. OXIDIZER ORFICE IN TEMPERATURE
XLABEL=ID=OXIDIZER ORFICE IN TEMPERATURE   DEG R
YLABEL=ID=OXIDIZER FLOW RATE  LBM/SEC
PLOT=TOOI,1,WDOTO,2,ENDLST
ENDPLT
ENDFIL
KUNIT=9
REPEAT
KUNIT=10
REPEAT
ENDRUN
∇  EOF
```

APPENDIX 3

This appendix presents the input and output for a sample run with the HEPCAT program. Included are the load sheets, a listing of the input and the output generated by the program. All option flags in the example presented in this appendix were set. Pages A3-2 to A3-8 are the load sheets used to generate the data deck. Pages A3-9 to A3-27 are a listing generated by the program of the input data. Pages A3-28 to A3-78 contain the output generated by the HD011C program.

DATE ____ PRIORITY ____

NAME ____ PROBLEM NO ____

EXT ____ SPECIAL CHARACTERS

NO OF CARDS ____

TRW SYSTEMS
HOUSTON COMPUTING CENTER

80 COLUMN FREE KEY PUNCH FORM

CARD STOCK
☐ PLAIN ____
☐ FORTRAN SOURCE
☐ 7094 SYMBOLIC

PAGE 1 OF 7

KEYPUNCHED BY ____

VERIFIED BY ____

```
▽Z RUN 59368,TRW,XXXX,1079L,A025,C,6,3                     PRINGLE,R.W.
▽   PLT
▽   ASG F
▽   ASG G=71107
▽   ASG Y=72287
▽   XQT CUR
    TRW Y
    IN  Y
▽   XQT HD011C
01  F          1             0.01               LBF
02  PC         1             0.1                PSIA
03  FV         1             1.0                CNTS
04  PFI        1             0.1                PSIA
05  PØI        1             0.1                PSIA
06  PFII       1             0.1                PSIA
07  PØII       1             0.1                PSIA
08  PTFØ       1             0.1                PSIA
09  PTØØ       1             0.1                PSIA
10  PDFØ       1             0.01               PSID
11  PDØØ       1             0.01               PSID
```

STL FORM 708 REV. 6 65

DATE ______ PRIORITY ______ PROBLEM NO ______

NAME ______ EXT ______ NO OF CARDS ______

SPECIAL CHARACTERS

TRW SYSTEMS
HOUSTON COMPUTING CENTER

80 COLUMN FREE KEY PUNCH FORM

CARD STOCK.
☐ PLAIN ______
☐ FORTRAN SOURCE
☐ 7094 SYMBOLIC

PAGE 2 OF 7

KEYPUNCHED BY ______

VERIFIED BY ______

12	PFIC1	1	0.1		PSIA
13	PØIC	1	0.1		PSIA
14	PFIC2	1	0.1		PSIA
15	SS	1	1.0		CNTS
16	PFTI	1	0.1		PSIA
17	PØTI	1	0.1		PSIA
18	TFI	1		118 218	DEGF
19	TØI	1		118 218	DEGF
20	TC1	1		120 220	DEGF
21	TC2	1		120 220	DEGF
22	TC3	1		120 220	DEGF
23	TC4	1		120 220	DEGF
24	TC5	1		120 220	DEGF
25	TC6	1		120 220	DEGF
26					
27					
28					
29					
30					
31					

STL FORM 708 REV 6 65

DATE
NAME
EXT
NO OF CARDS

PRIORITY
PROBLEM NO
SPECIAL CHARACTERS

TRW SYSTEMS
HOUSTON COMPUTING CENTER

80 COLUMN FREE KEY PUNCH FORM

CARD STOCK
☐ PLAIN
☐ FORTRAN SOURCE
☐ 7094 SYMBOLIC

KEYPUNCHED BY
VERIFIED BY

```
32 TFΦI        1                       118  218  DEGF
33 TΦΦI        1                       118  218  DEGF
34 TFTI        1                       118  218  DEGF
35 TΦTI        1                       118  218  DEGF
36
37
38
39
40 WFT       1              0.02               CFM
41 WΦT       1              0.01               CFM
42
43
44
45
46
47
48
49
50 RUNNΦ     1              1.0
118  2
```

STL FORM 708 REV 8 65

DATE	PRIORITY	TRW SYSTEMS HOUSTON COMPUTING CENTER	CARD STOCK ☐ PLAIN ☐ FORTRAN SOURCE ☐ 7094 SYMBOLIC
NAME	PROBLEM NO	80 COLUMN FREE KEY PUNCH FORM	PAGE 4 OF 7
EXT	SPECIAL CHARACTERS		KEYPUNCHED BY
NO OF CARDS			VERIFIED BY

```
    0.        0.      5000.      5000.
218 20
    0.     -302.      662.       10.      725.       30.      735.       35.
  746.       40.      757.       45.      768.       50.      779.       55.
  790.       60.      801.       65.      812.       70.      823.       75.
  835.       80.      846.       85.      858.       90.      869.       95.
  881.      100.      892.      105.      904.      110.     4095.     1137.
120  2
    0.        0.      5000.      5000.
220 20
    0.     -302.      768.       50.      881.      100.     1000.      150.
 1126.      200.     1257.      250.     1394.      300.     1464.      325.
 1535.      350.     1608.      375.     1681.      400.     1756.      425.
 1832.      450.     1909.      475.     1986.      500.     2145.      550.
 2306.      600.     2471.      650.     2639.      700.     4095.     1137.
          .4255          .655           .46          1.0            .624
          .42           1.0            7.9173        2.1275         0.0
       67.0            67.0           40.0          40.0           30.0
0 00 1 1  1 1 1
CASEND
```

STL FORM 709 REV. 5 65

DATE
NAME
EXT
NO OF CARDS

PRIORITY
PROBLEM NO
SPECIAL CHARACTERS.

TRW SYSTEMS
HOUSTON COMPUTING CENTER

80 COLUMN FREE KEY PUNCH FORM

CARD STOCK
☐ PLAIN
☐ FORTRAN SOURCE
☐ 7094 SYMBOLIC

PAGE 5 OF 7
KEYPUNCHED BY
VERIFIED BY

```
∇  XQT CUR
   ERS
   IN Y
   TRI Y
∇  XQT TRWPLT
ISCALX=1
XLØ=0.
XHI=10.
ISCALY=1
YLØ=0.
YHI=100.
XLABEL=ID= COMPUTER TIME  SEC
YLABEL=ID= THRUST  LBS
TITLE=ID=  THRUST  (LBS)
PLØT=TC,1,F,1,ENDLST
ENDPLT
YLØ=0.
YHI=100.
YLABEL=ID= CHAMBER PRESSURE  PSIA
TITLE=ID=  CHAMBER PRESSURE  (PSIA)
```

STL FORM 704 REV. 8 65

DATE

NAME

EXT.

NO. OF CARDS

PRIORITY

PROBLEM NO.

SPECIAL CHARACTERS

TRW SYSTEMS
HOUSTON COMPUTING CENTER

80 COLUMN FREE KEY PUNCH FORM

CARD STOCK

☐ PLAIN

☐ FORTRAN SOURCE

☐ 7094 SYMBOLIC

KEYPUNCHED BY

VERIFIED BY

```
PLØT=TC,1,PC,1,ENDLST
ENDPLT
YLØ=0.
YHI=300.
YLABEL=ID= ENGINE SPECIFIC IMPULSE, SEC
TITLE=ID=  ENGINE SPECIFIC IMPULSE  (SEC)
PLØT=TC,2,ISP,2,ENDLST
ENDPLT
XLØ=0.
XHI=20.
YLØ=0.
YHI=10000.
XLABEL=ID= TØTAL IMPULSE
YLABEL=ID= CHARACTERISTIC EXHAUST VELØCITY  FT/SEC
TITLE=ID=  CHARACTERISTIC EXHAUST VELØCITY  FT/SEC
PLØT=IT,2,CSTAR,2,ENDLST
ENDPLT
XHI=10.
YHI=600.
XLABEL=ID= CØMPUTER TIME, SEC
```

STL FORM 708 REV. 8 65

DATE

NAME

EXT.

NO. OF CARDS

PRIORITY

PROBLEM NO.

SPECIAL CHARACTERS

TRW SYSTEMS
HOUSTON COMPUTING CENTER

80 COLUMN FREE KEY PUNCH FORM

CARD STOCK

☐ PLAIN

☐ FORTRAN SOURCE

☐ 7094 SYMBOLIC

PAGE 7 OF 7

KEYPUNCHED BY

VERIFIED BY

```
YLABEL=ID= STANDARDIZED ENGINE SPECIFIC IMPULSE  SEC
TITLE=ID=  STANDARDIZED ENGINE SPECIFIC IMPULSE  (SEC)
PLØT=TC,2,ISPS,3,ENDLST
ENDPLT
ENDFIL
ENDRUN
∇  EØF
```

STL FORM 708 REV. 5 65

```
TTTTTTTTTTTT      RRRRRRRRRR         WW        WW
TTTTTTTTTTTT      RRRRRRRRRRR        WW        WW
     TT           RR        RR       WW        WW
     TT           RR        RR       WW        WW
     TT           RR        RR       WW        WW
     TT           RRRRRRRRRRR        WW   WW   WW
     TT           RRRRRRRRRR         WW  WWWW  WW
     TT           RR    RR           WW WWWWWW WW
     TT           RR     RR          WWWWW  WWWWW
     TT           RR      RR         WWWW    WWWW
     TT           RR       RR        WWW      WWW
     TT           RR        RR       WW        WW

   222222                11             888888         777777777777
 2222222222             111            88888888        777777777777
222      222           1111           88      88                777
22      222              11           88       88              777
       222               11            88     88              777
     222                 11             888888               777
   222                   11           8888888888            777
 222                     11          888      888          777
222                      11          88        88         777
222                      11          888      888        777
222222222222           111111         8888888888       .777
222222222222           111111          88888888        777

PPPPPPPPPP        RRRRRRRRRR            IIIIII         NN        NN         GGGGGGGG        LL                 EEEEEEEEEEEE
PPPPPPPPPPP       RRRRRRRRRRR           IIIIII         NNN       NN        GGGGGGGGGG       LL                 EEEEEEEEEEEE
PP        PP      RR        RR            II           NNNN      NN       GG        GG      LL                 EE
PP        PP      RR        RR            II           NNNNN     NN       GG        GG      LL                 EE
PP        PP      RR        RR            II           NN NNN    NN       GG                LL                 EE
PPPPPPPPPPP       RRRRRRRRRRR             II           NN  NNN   NN       GG                LL                 EEEEEEEE
PPPPPPPPPP        RRRRRRRRRR              II           NN   NNN  NN       GG      GGGG      LL                 EEEEEEEE
PP                RR    RR                II           NN    NNN NN       GG      GGGG      LL                 EE
PP                RR     RR               II           NN     NNNNN       GG        GG      LL                 EE
PP                RR      RR              II           NN      NNNN       GG        GG      LL                 EE
PP                RR       RR           IIIIII         NN       NNN        GGGGGGGGGG       LLLLLLLLLLLL       EEEEEEEEEEEE
PP                RR        RR          IIIIII         NN        NN         GGGGGGGG        LLLLLLLLLLLL       EEEEEEEEEEEE
```

```
    11          0000                          JJ    UU       UU    NN        NN
   111        00000000                        JJ    UU       UU    NNN       NN
  1111       000    000                       JJ    UU       UU    NNNN      NN
    11      000      000                      JJ    UU       UU    NNNNN     NN
    11      00        00                      JJ    UU       UU    NN NNN    NN
    11      00        00                      JJ    UU       UU    NN  NNN   NN
    11      00        00                      JJ    UU       UU    NN   NNN  NN
    11      00        00                      JJ    UU       UU    NN    NNN NN
    11      000      000                      JJ    UU       UU    NN     NNNNN
    11       000    000             JJ        JJ    UUU     UUU    NN      NNNN
  111111      00000000               JJJJJJJJJJ      UUUUUUUUUU    NN       NNN
  111111        0000                  JJJJJJJJ        UUUUUUUU     NN        NN
```

```
∇  XQT CUR                                                    10 JUN 70          16&27&20.464
    1.    TRW Y                                                                  16&27&20.882
    2.    IN  Y                                                                  16&27&20.883

      END OF FILE -- UNIT Y

      END CUR LCC 1102-0038 L8
```

```
∇ XQT HD011C                                                    10 JUN 70          16&27&26.230

        BLANK COMMON       146171      163777

        STARTING ADDRESS   014000

        CORE LIMITS 014000 036211     100000 125175     146163 146170
```



```
HD011C/CODE
0    100000-100003
1    014000-014121

NSTOP$/CODE
1    014122-014137

NIER$ /CODE
0    100004-100004
1    014140-014444
2    100005-100076

NFMT$ /CODE
1    014445-015332
2    100077-100112

NCNVT$/CODE
1    015333-015542
2    100113-100176
```

```
NFTV$ /CODE
1    015543-015565

NOTIN$/CODE
1    015566-016161
2    100177-100241

FPACK$/CODE
1    016162-016225

DEPTH /******
0    100242-100247

NERR$ /CODE
0    100250-100407
1    016226-016630

NIOIN$/CODE
1    016631-016676
2    100410-100440

NRWND$/CODE
1    016677-016771

NTAB$ /CODE
0    100441-100567

OUTPUT/CODE
0    100570-102002
1    016772-021705

NINPT$/CODE
0    102003-102004
1    021706-022615
2    102005-102037

NININ$/CODE
1    022616-022767
2    102040-102070
```

```
NEXP1$/CODE
1    022770-023067
2    102071-102072

NFOUT$/CODE
1    023070-023311
2    102073-102074

NBUFF$/CODE
1    023312-023333
2    102075-103105

NOUT$ /CODE
0    103106-103110
1    023334-024204
2    103111-103126

NBDCV$/CODE
0    103127-103313

SWAGER/CODE
0    103314-103773
1    024205-025435

SQRT  /CODE
0    103774-104030
2    104031-104072

RATED /CODE
0    104073-104635
1    025436-026463

HGAMMA/CODE
0    104636-104677
1    026464-026610

HZH   /CODE
0    104700-104742
1    026611-026733

OGAMMA/CODE
```

```
0    104743-104776
1    026734-027050

OXZOX /CODE
0    104777-105051
1    027051-027164

ICT    /******
0    105052-105053

FUNCTN/******
0    105054-105363

JHYDE /CODE
0    105364-105527
1    027165-030160

FILTR2/CODE
0    105530-105607
1    030161-032110

SHIFT /CODE
0    105610-105624
1    032111-032141

AVRGR /CODE
0    105625-105651
1    032142-032222

ZERO  /CODE
0    105652-105666
1    032223-032252

FILTR1/CODE
0    105667-105731
1    032253-033017

CHEWER/CODE
0    105732-114354
1    033020-033642
```

```
NTRAN /CODE
0    114355-114355
1    033643-035143
2    114356-114505

TLABL$/CODE
0    114506-114515

TSCRH$/CODE
0    114516-114570

THRU$ /CODE
0    114571-114706

TSWAP$/CODE
0    114707-115007

TINTL$/CODE
0    115010-115106

TIMLST/******
0    115107-115107

TIME  /******
0    115110-115110

CDNPUT/CODE
0    115111-115721
1    035144-036110

LABELS/******
0    115722-116241

COMRT1/******
0    116242-116247

COMRAT/******
0    116250-116321

CR2TAP/CODE
0    116322-116357
```

```
1   036111-036211

UNITS /******
0   116360-116363

ROWS  /******
0   116364-116400

FLAGS /******
0   116401-116405

FILES /******
0   116406-116420

FACTOR/******
0   116421-125153

ENG   /******
0   125154-125175
```


END OF ALLOCATION 1103 0038

BLOCK I -- INPUT DATA -- LOAD SHEETS -- CARD INPUT -- RUN NO. -- 001501

01	F	1		0.01			LBF
02	PC	1		0.1			PSIA
03	FV	1		1.0			CNTS
04	PFI	1		0.1			PSIA
05	POI	1		0.1			PSIA
06	PFII	1		0.1			PSIA
07	POII	1		0.1			PSIA
08	PTFO	1		0.1			PSIA
09	PTOO	1		0.1			PSIA
10	PDFO	1		0.01			PSID
11	PDOO	1		0.01			PSID
12	PFIC1	1		0.1			PSIA
13	POIC	1		0.1			PSIA
14	PFIC2	1		0.1			PSIA
15	SS	1		1.0			CNTS
16	PFTI	1		0.1			PSIA
17	POTI	1		0.1			PSIA
18	TFI		1		118	218	DEGF
19	TOI		1		118	218	DEGF
20	TC1		1		120	220	DEGF
21	TC2		1		120	220	DEGF
22	TC3		1		120	220	DEGF
23	TC4		1		120	220	DEGF
24	TC5		1		120	220	DEGF
25	TC6		1		120	220	DEGF
26							
27							
28							
29							
30							
31							
32	TFOI		1		118	218	DEGF
33	TOOI		1		118	218	DEGF
34	TFTI		1		118	218	DEGF
35	TOTI		1		118	218	DEGF
36							
37							
38							

```
BLOCK I -- INPUT DATA -- LOAD SHEETS -- CARD INPUT -- RUN NO. -- 001501

39
40  WFT       1            0.02              CFM
41  WOT       1            0.01              CFM
42
43
44
45
46
47
48
49
50  RUNNO     1             1.
118  2
    0.         0.      5000.     5000.
218 20
    0.      -302.       662.        0.        725.        30.       735.        35.
  746.        40.       757.       45.        768.        50.       779.        55.
  790.        60.       801.       65.        812.        70.       823.        75.
  835.        80.       846.       85.        858.        90.       869.        95.
  881.       100.       892.      105.        904.       110.      4095.      1137.
120  2
    0.         0.      5000.     5000.
220 20
    0.      -302.       768.       50.        881.       100.      1000.       150.
 1126.       200.      1257.      250.       1394.       300.      1464.       325.
 1535.       350.      1608.      375.       1681.       400.      1756.       425.
 1832.       450.      1909.      475.       1986.       500.      2145.       550.
 2306.       600.      2471.      650.       2639.       700.      4095.      1137.
         .4255          .655            .46            1.0              .624
         .42           1.0             7.9173          2.1275          0.0
       67.0           67.0            40.0            40.0            30.0
0 00 1 1  1 1 1
CASEND
```

BLOCK I -- INPUT CONSTANTS -- CARD INPUT VARIABLES -- RUN NO. -- 001501

AC	7.9173	AE	2.1275	AT	.4255	CF1	.1603	CF2	.9905
CF3	.0031	CF4	74.0000	DCSTAR	.0000	DHO	.4200	DOO	.4600
DPH	1.0000	DPO	1.0000	G	32.1302	GAMMA	1.4000	IDUMP	.0000
IPC	1.0000	IPLOT	1.0000	IRATED	1.0000	K	.9993	KF	.6240
KO	.6550	MICROT	17.0000	MWH	2.0160	MWO	32.0000	NDP	.0000
NP	1.0000	PAB	.0000	PCS	30.0000	PFDS	40.0000	PODS	40.0000
TFDS	67.0000	TODS	67.0000						

BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BIASES -- CARD INPUT VARIABLES -- RUN NO. -- 001501

THE SCALING FACTORS FOR REQUESTED CHANNELS ARE --

CH	PARAM	FACTOR	CH	PARAM	FACTOR	CH	PARAM	FACTOR	CH	PARAM	FACTOR	CH	PARAM	FACTOR
1	F	.0100	2	PC	.1000	3	FV	1.0000	4	PFI	.1000	5	POI	.1000
6	PFII	.1000	7	POII	.1000	8	PTFO	.1000	9	PTOO	.1000	10	PDFO	.0100
11	PDOO	.0100	12	PFIC1	.1000	13	POIC	.1000	14	PFIC2	.1000	15	SS	1.0000
16	PFTI	.1000	17	POTI	.1000	40	WFT	.0200	41	WOT	.0100	50	RUNNO	1.0000

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 18 TFI   CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 18 TFI   CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	662.0000/ .0000	725.0000/ 30.0000	735.0000/ 35.0000	746.0000/ 40.0000
757.0000/ 45.0000	768.0000/ 50.0000	779.0000/ 55.0000	790.0000/ 60.0000	801.0000/ 65.0000
812.0000/ 70.0000	823.0000/ 75.0000	835.0000/ 80.0000	846.0000/ 85.0000	858.0000/ 90.0000
869.0000/ 95.0000	881.0000/ 100.0000	892.0000/ 105.0000	904.0000/ 110.0000	4095.0000/ 1137.0000

BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BIASES -- CARD INPUT VARIABLES -- RUN NO. -- 001501

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 19 TOI   CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 19 TOI   CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	662.0000/ .0000	725.0000/ 30.0000	735.0000/ 35.0000	746.0000/ 40.0000
757.0000/ 45.0000	768.0000/ 50.0000	779.0000/ 55.0000	790.0000/ 60.0000	801.0000/ 65.0000
812.0000/ 70.0000	823.0000/ 75.0000	835.0000/ 80.0000	846.0000/ 85.0000	858.0000/ 90.0000
869.0000/ 95.0000	881.0000/ 100.0000	892.0000/ 105.0000	904.0000/ 110.0000	4095.0000/ 1137.0000

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 20 TC1   CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 20 TC1   CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	768.0000/ 50.0000	881.0000/ 100.0000	1000.0000/ 150.0000	1126.0000/ 200.0000
1257.0000/ 250.0000	1394.0000/ 300.0000	1464.0000/ 325.0000	1535.0000/ 350.0000	1608.0000/ 375.0000
1681.0000/ 400.0000	1756.0000/ 425.0000	1832.0000/ 450.0000	1909.0000/ 475.0000	1986.0000/ 500.0000
2145.0000/ 550.0000	2306.0000/ 600.0000	2471.0000/ 650.0000	2639.0000/ 700.0000	4095.0000/ 1137.0000

BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BIASES -- CARD INPUT VARIABLES -- RUN NO. -- 001501

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 21 TC2   CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE	
.0000/	.0000	5000.0000/	5000.0000						

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 21 TC2   CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE	
.0000/	-302.0000	768.0000/	50.0000	881.0000/	100.0000	1000.0000/	150.0000	1126.0000/	200.0000
1257.0000/	250.0000	1394.0000/	300.0000	1464.0000/	325.0000	1535.0000/	350.0000	1608.0000/	375.0000
1681.0000/	400.0000	1756.0000/	425.0000	1832.0000/	450.0000	1909.0000/	475.0000	1986.0000/	500.0000
2145.0000/	550.0000	2306.0000/	600.0000	2471.0000/	650.0000	2639.0000/	700.0000	4095.0000/	1137.0000

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 22 TC3   CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE	
.0000/	.0000	5000.0000/	5000.0000						

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 22 TC3   CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE		ABSCISSA/ORDINATE	
.0000/	-302.0000	768.0000/	50.0000	881.0000/	100.0000	1000.0000/	150.0000	1126.0000/	200.0000
1257.0000/	250.0000	1394.0000/	300.0000	1464.0000/	325.0000	1535.0000/	350.0000	1608.0000/	375.0000
1681.0000/	400.0000	1756.0000/	425.0000	1832.0000/	450.0000	1909.0000/	475.0000	1986.0000/	500.0000
2145.0000/	550.0000	2306.0000/	600.0000	2471.0000/	650.0000	2639.0000/	700.0000	4095.0000/	1137.0000

BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BIASES -- CARD INPUT VARIABLES -- RUN NO. -- 001501

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 23 TC4   CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 23 TC4   CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	768.0000/ 50.0000	881.0000/ 100.0000	1000.0000/ 150.0000	1126.0000/ 200.0000
1257.0000/ 250.0000	1394.0000/ 300.0000	1464.0000/ 325.0000	1535.0000/ 350.0000	1608.0000/ 375.0000
1681.0000/ 400.0000	1756.0000/ 425.0000	1832.0000/ 450.0000	1909.0000/ 475.0000	1986.0000/ 500.0000
2145.0000/ 550.0000	2306.0000/ 600.0000	2471.0000/ 650.0000	2639.0000/ 700.0000	4095.0000/ 1137.0000

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 24 TC5   CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 24 TC5   CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	768.0000/ 50.0000	881.0000/ 100.0000	1000.0000/ 150.0000	1126.0000/ 200.0000
1257.0000/ 250.0000	1394.0000/ 300.0000	1464.0000/ 325.0000	1535.0000/ 350.0000	1608.0000/ 375.0000
1681.0000/ 400.0000	1756.0000/ 425.0000	1832.0000/ 450.0000	1909.0000/ 475.0000	1986.0000/ 500.0000
2145.0000/ 550.0000	2306.0000/ 600.0000	2471.0000/ 650.0000	2639.0000/ 700.0000	4095.0000/ 1137.0000

BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BIASES -- CARD INPUT VARIABLES -- RUN NO. -- 001501

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 25 TC6 CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 25 TC6 CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	768.0000/ 50.0000	881.0000/ 100.0000	1000.0000/ 150.0000	1126.0000/ 200.0000
1257.0000/ 250.0000	1394.0000/ 300.0000	1464.0000/ 325.0000	1535.0000/ 350.0000	1608.0000/ 375.0000
1681.0000/ 400.0000	1756.0000/ 425.0000	1832.0000/ 450.0000	1909.0000/ 475.0000	1986.0000/ 500.0000
2145.0000/ 550.0000	2306.0000/ 600.0000	2471.0000/ 650.0000	2639.0000/ 700.0000	4095.0000/ 1137.0000

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 32 TFOI CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 32 TFOI CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	662.0000/ .0000	725.0000/ 30.0000	735.0000/ 35.0000	746.0000/ 40.0000
757.0000/ 45.0000	768.0000/ 50.0000	779.0000/ 55.0000	790.0000/ 60.0000	801.0000/ 65.0000
812.0000/ 70.0000	823.0000/ 75.0000	835.0000/ 80.0000	846.0000/ 85.0000	858.0000/ 90.0000
869.0000/ 95.0000	881.0000/ 100.0000	892.0000/ 105.0000	904.0000/ 110.0000	4095.0000/ 1137.0000

BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BIASES -- CARD INPUT VARIABLES -- RUN NO. -- 001501

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 33 TOOI CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 33 TOOI CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	662.0000/ .0000	725.0000/ 30.0000	735.0000/ 35.0000	746.0000/ 40.0000
757.0000/ 45.0000	768.0000/ 50.0000	779.0000/ 55.0000	790.0000/ 60.0000	801.0000/ 65.0000
812.0000/ 70.0000	823.0000/ 75.0000	835.0000/ 80.0000	846.0000/ 85.0000	858.0000/ 90.0000
869.0000/ 95.0000	881.0000/ 100.0000	892.0000/ 105.0000	904.0000/ 110.0000	4095.0000/ 1137.0000

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 34 TFTI CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 34 TFTI CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	662.0000/ .0000	725.0000/ 30.0000	735.0000/ 35.0000	746.0000/ 40.0000
757.0000/ 45.0000	768.0000/ 50.0000	779.0000/ 55.0000	790.0000/ 60.0000	801.0000/ 65.0000
812.0000/ 70.0000	823.0000/ 75.0000	835.0000/ 80.0000	846.0000/ 85.0000	858.0000/ 90.0000
869.0000/ 95.0000	881.0000/ 100.0000	892.0000/ 105.0000	904.0000/ 110.0000	4095.0000/ 1137.0000

BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BIASES -- CARD INPUT VARIABLES -- RUN NO. -- 001501

COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL 35 TOTI CONSISTS OF 2 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ .0000	5000.0000/ 5000.0000			

MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEL 35 TOTI CONSISTS OF 20 POINTS --

ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE	ABSCISSA/ORDINATE
.0000/ -302.0000	662.0000/ .0000	725.0000/ 30.0000	735.0000/ 35.0000	746.0000/ 40.0000
757.0000/ 45.0000	768.0000/ 50.0000	779.0000/ 55.0000	790.0000/ 60.0000	801.0000/ 65.0000
812.0000/ 70.0000	823.0000/ 75.0000	835.0000/ 80.0000	846.0000/ 85.0000	858.0000/ 90.0000
869.0000/ 95.0000	881.0000/ 100.0000	892.0000/ 105.0000	904.0000/ 110.0000	4095.0000/ 1137.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .0000 -- SEC

F	.0020	PC	17.1000	FV	462.8000	PFI	.7100	POI	3.2400
PFII	241.0800	POII	192.9200	PTFO	235.9700	PTOO	189.8300	PDFO	.0730
PDOO	.1470	PFIC1	16.4300	POIC	312.8800	PFIC2	14.6000	SS	499.6000
PFTI	263.0800	POTI	210.5400	TFI	58.7727	TOI	57.7273	TC1	71.3717
TC2	71.9027	TC3	71.6372	TC4	71.2389	TC5	71.7699	TC6	71.1504
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .1000 -- SEC

F	.0050	PC	14.7000	FV	506.3000	PFI	.0000	POI	.0000
PFII	262.8400	POII	210.8700	PTFO	262.2000	PTOO	210.1900	PDFO	.0060
PDOO	.0140	PFIC1	14.6700	POIC	312.9100	PFIC2	14.6100	SS	499.7000
PFTI	263.0700	POTI	210.5500	TFI	58.6364	TOI	57.8182	TC1	71.4159
TC2	72.0354	TC3	71.6814	TC4	71.5044	TC5	71.9469	TC6	71.1504
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.5454	TFTI	56.1818	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .2000 -- SEC

F	.0040	PC	14.7100	FV	505.7000	PFI	.0000	POI	.0000
PFII	262.9200	POII	210.9000	PTFO	262.3000	PTOO	210.2000	PDFO	.0060
PDOO	.0150	PFIC1	14.7100	POIC	14.6000	PFIC2	14.6400	SS	498.4000
PFTI	409.5000	POTI	210.5800	TFI	59.0909	TOI	57.7273	TC1	71.2832
TC2	71.8584	TC3	71.6814	TC4	71.4602	TC5	71.8584	TC6	71.1947
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.4545	TFTI	55.9091	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0000		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .3000 -- SEC

F	.0000	PC	14.7000	FV	505.8000	PFI	.0000	POI	.0000
PFII	262.9200	POII	210.8200	PTFO	262.3100	PTOO	210.1900	PDFO	.0060
PDOO	.0120	PFIC1	14.6800	POIC	14.5800	PFIC2	14.6200	SS	498.3000
PFTI	409.5000	POTI	210.5400	TFI	59.0909	TOI	57.5909	TC1	71.2832
TC2	71.6372	TC3	71.5929	TC4	71.3274	TC5	71.7257	TC6	71.0619
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .4000 -- SEC

F	.0000	PC	14.7200	FV	506.0000	PFI	.0000	POI	.0000
PFII	262.9400	POII	210.8700	PTFO	262.3100	PTOO	210.2100	PDFO	.0050
PDOO	.0160	PFIC1	14.6500	POIC	14.6000	PFIC2	14.6200	SS	498.7000
PFTI	263.2100	POTI	210.5400	TFI	58.7273	TOI	57.8636	TC1	71.3717
TC2	71.9469	TC3	71.5929	TC4	71.4602	TC5	71.9027	TC6	71.1504
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.1818
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .5000 -- SEC

F	.0010	PC	14.7300	FV	505.8000	PFI	.0000	POI	.0000
PFII	262.9400	POII	210.8900	PTFO	262.3200	PTOO	210.2200	PDFO	.0080
PDOO	.0160	PFIC1	14.6900	POIC	14.6100	PFIC2	14.6400	SS	498.6000
PFTI	263.2000	POTI	210.5700	TFI	58.7273	TOI	57.7273	TC1	71.5044
TC2	72.0354	TC3	71.8142	TC4	71.4602	TC5	72.0354	TC6	71.1947
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.6364	TFTI	55.9091	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0000		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .6000 -- SEC

F	.0000	PC	14.7200	FV	505.7000	PFI	.0000	POI	.0000
PFII	262.9000	POII	210.8400	PTFO	262.2900	PTOO	210.1700	PDFO	.0070
PDOO	.0130	PFIC1	14.7200	POIC	14.5800	PFIC2	14.6000	SS	498.6000
PFTI	263.1900	POTI	210.5800	TFI	58.7727	TOI	57.5000	TC1	71.2832
TC2	71.7699	TC3	71.6814	TC4	71.3274	TC5	71.7257	TC6	71.1504
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .7000 -- SEC

F	.0050	PC	14.7000	FV	506.2000	PFI	.0000	POI	.0000
PFII	262.8900	POII	210.8400	PTFO	262.2800	PTOO	210.2100	PDFO	.0070
PDOO	.0140	PFIC1	14.6800	POIC	14.6200	PFIC2	14.6400	SS	498.8000
PFTI	263.1500	POTI	210.5600	TFI	58.7273	TOI	57.7273	TC1	71.3274
TC2	71.9911	TC3	71.6814	TC4	71.5044	TC5	71.9469	TC6	71.1504
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	56.0000	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .8000 -- SEC

F	.0000	PC	14.7300	FV	506.0000	PFI	.0000	POI	.0000
PFII	262.8900	POII	210.9400	PTFO	262.2900	PTOO	210.2300	PDFO	.0080
PDOO	.0190	PFIC1	14.6900	POIC	14.6400	PFIC2	14.6400	SS	498.8000
PFTI	263.1800	POTI	210.5800	TFI	58.7273	TOI	57.6818	TC1	71.4602
TC2	72.1239	TC3	71.8584	TC4	71.5929	TC5	72.1239	TC6	71.2832
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.6364	TFTI	55.9091	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- .9000 -- SEC

F	.0000	PC	14.7100	FV	505.7000	PFI	.0000	POI	.0000
PFII	262.8700	POII	210.8800	PTFO	262.3000	PTOO	210.2000	PDFO	.0110
PDOO	.0170	PFIC1	14.7000	POIC	14.5900	PFIC2	14.6400	SS	498.6000
PFTI	263.1800	POTI	210.5800	TFI	58.7727	TOI	57.6818	TC1	71.4602
TC2	71.8142	TC3	71.7257	TC4	71.3717	TC5	71.9469	TC6	71.1504
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.7273	TOOI	55.4545	TFTI	55.9091	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.0000 -- SEC

F	5.0570	PC	263.0200	FV	2102.8000	PFI	262.9500	POI	210.9700
PFII	262.4300	POII	210.2000	PTFO	.0700	PTOO	.1300	PDFO	1.4700
PDOO	1.4630	PFIC1	14.6300	POIC	352.7500	PFIC2	263.2000	SS	2105.7000
PFTI	78.7200	POTI	78.4900	TFI	71.8182	TOI	72.5455	TC1	71.6372
TC2	71.6814	TC3	71.9469	TC4	71.1504	TC5	737.0069	TC6	114.4118
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.4545	TOOI	55.0909	TFTI	55.2727	TOTI	53.9091
	.0000		.0000		.0000		.0000	WFT	3.0360
WOT	.0000		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	146.6000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.1000 -- SEC

F	1.4840	PC	.1500	FV	2632.0000	PFI	50.5900	POI	262.9500
PFII	210.3000	POII	262.2700	PTFO	210.9000	PTOO	.0700	PDFO	21.0230
PDOO	1.4630	PFIC1	.1600	POIC	14.6100	PFIC2	14.6200	SS	2631.9000
PFTI	352.8100	POTI	78.6900	TFI	496.3721	TOI	71.8636	TC1	57.0796
TC2	71.8584	TC3	72.3451	TC4	72.0796	TC5	71.5487	TC6	737.3971
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.6364	TOOI	55.9091	TFTI	55.5454	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	15.6000
WOT	.3300		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.2000 -- SEC

F	.0090	PC	14.8300	FV	505.7000	PFI	263.2000	POI	210.4500
PFII	262.9800	POII	211.0200	PTFO	262.3400	PTOO	210.2500	PDFO	.0100
PDOO	.0170	PFIC1	14.6800	POIC	14.6900	PFIC2	14.6800	SS	3527.9000
PFTI	263.1900	POTI	210.6700	TFI	58.9091	TOI	57.7273	TC1	71.4159
TC2	72.3894	TC3	71.8142	TC4	71.5487	TC5	72.1239	TC6	71.4602
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.8182	TOOI	56.0000	TFTI	56.1818	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.3000 -- SEC

F	.0020	PC	14.8100	FV	505.6000	PFI	263.2100	POI	210.3600
PFII	262.9400	POII	210.9100	PTFO	262.2700	PTOO	210.2100	PDFO	.0090
PDOO	.0180	PFIC1	14.6900	POIC	14.6100	PFIC2	14.6400	SS	3528.1000
PFTI	263.1200	POTI	210.6000	TFI	58.7727	TOI	57.5909	TC1	71.2389
TC2	72.2124	TC3	71.9469	TC4	71.4159	TC5	71.9469	TC6	71.2832
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	56.0000	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1500.6000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.4000 -- SEC

F	.0010	PC	14.7700	FV	505.7000	PFI	263.1800	POI	210.3400
PFII	262.9300	POII	210.9000	PTFO	262.2600	PTOO	210.1900	PDFO	.0070
PDOO	.0140	PFIC1	14.6900	POIC	14.6200	PFIC2	14.6000	SS	3528.5000
PFTI	263.1100	POTI	210.5700	TFI	58.6818	TOI	57.8182	TC1	71.4159
TC2	72.3451	TC3	71.7699	TC4	71.3717	TC5	71.9469	TC6	71.1062
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.6364	TFTI	56.3636	TOTI	55.1818
	.0000		.0000		.0000		.0000	WFT	.0000
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.5000 -- SEC

F	.0010	PC	14.7300	FV	505.8000	PFI	263.2000	POI	210.4300
PFII	262.9500	POII	210.8700	PTFO	262.1700	PTOO	210.2300	PDFO	.0070
PDOO	.0160	PFIC1	14.6400	POIC	14.6600	PFIC2	14.6300	SS	3529.0000
PFTI	263.1500	POTI	210.6200	TFI	58.8182	TOI	57.7727	TC1	71.2832
TC2	72.2566	TC3	71.7257	TC4	71.7699	TC5	72.1239	TC6	71.4602
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.7273	TOOI	55.6364	TFTI	55.9091	TOTI	55.4545
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.6000 -- SEC

F	.0000	PC	14.7100	FV	505.7000	PFI	263.1900	POI	210.3500
PFII	262.9200	POII	210.9300	PTFO	262.2800	PTOO	210.2300	PDFO	.0110
PDOO	.0170	PFIC1	14.6700	POIC	14.6800	PFIC2	14.7200	SS	3528.7000
PFTI	263.2100	POTI	210.6200	TFI	58.7727	TOI	57.6818	TC1	71.4159
TC2	72.3009	TC3	71.7699	TC4	71.4159	TC5	72.0796	TC6	71.2389
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.4545	TFTI	56.0000	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.7000 -- SEC

F	.0020	PC	14.6900	FV	505.7000	PFI	263.1300	POI	210.3300
PFII	262.9300	POII	210.8600	PTFO	262.2200	PTOO	210.1700	PDFO	.0070
PDOO	.0120	PFIC1	14.6900	POIC	14.5500	PFIC2	14.5900	SS	3526.4000
PFTI	263.0800	POTI	210.5800	TFI	58.8182	TOI	57.5000	TC1	71.1062
TC2	72.1239	TC3	71.6814	TC4	71.5929	TC5	72.1239	TC6	71.3717
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.3636	TOOI	55.3636	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.8000 -- SEC

F	.0030	PC	14.6800	FV	505.9000	PFI	263.1600	POI	210.3600
PFII	262.8900	POII	210.9100	PTFO	262.2500	PTOO	210.2200	PDFO	.0080
PDOO	.0130	PFIC1	14.6700	POIC	14.6200	PFIC2	14.6200	SS	3527.6000
PFTI	263.1500	POTI	210.6500	TFI	58.8182	TOI	57.9091	TC1	71.3274
TC2	72.3451	TC3	71.8142	TC4	71.6372	TC5	72.1239	TC6	71.3274
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.8182	TFTI	56.0000	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0060		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 1.9000 -- SEC

F	.0070	PC	14.7400	FV	505.5000	PFI	263.1300	POI	210.3700
PFII	262.9400	POII	210.9200	PTFO	262.2400	PTOO	210.2500	PDFO	.0140
PDOO	.0190	PFIC1	14.6900	POIC	14.6100	PFIC2	14.6100	SS	3527.4000
PFTI	263.1900	POTI	210.6600	TFI	58.9545	TOI	57.8182	TC1	71.1947
TC2	72.3009	TC3	71.8142	TC4	71.7257	TC5	72.1239	TC6	71.2832
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.5454	TFTI	56.0909	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.0000 -- SEC

F	.0010	PC	14.6500	FV	505.5000	PFI	263.1300	POI	210.3200
PFII	262.9300	POII	210.8400	PTFO	262.2200	PTOO	210.1800	PDFO	.0060
PDOO	.0100	PFIC1	14.5700	POIC	14.5900	PFIC2	14.6000	SS	3528.5000
PFTI	263.1800	POTI	210.5800	TFI	58.6818	TOI	57.5909	TC1	71.1947
TC2	72.1681	TC3	71.7257	TC4	71.5044	TC5	72.2124	TC6	71.2389
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	56.0000	TOTI	54.9091
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1500.6000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.1000 -- SEC

F	.0040	PC	14.6600	FV	506.0000	PFI	263.1300	POI	210.3300
PFII	262.9300	POII	210.8900	PTFO	262.2400	PTOO	210.1700	PDFO	.0060
PDOO	.0150	PFIC1	14.6700	POIC	14.6200	PFIC2	14.5800	SS	3528.5000
PFTI	263.1300	POTI	210.5700	TFI	58.7727	TOI	57.7727	TC1	71.2832
TC2	72.3451	TC3	71.8584	TC4	71.4159	TC5	72.1239	TC6	71.3274
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.5454	TFTI	56.0909	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.2000 -- SEC

F	.0030	PC	14.7200	FV	505.6000	PFI	263.1600	POI	210.3900
PFII	262.9400	POII	210.9000	PTFO	262.2300	PTOO	210.2300	PDFO	.0150
PDOO	.0190	PFIC1	14.7100	POIC	14.6400	PFIC2	14.6100	SS	3528.0000
PFTI	263.1500	POTI	210.6200	TFI	58.9091	TOI	57.7273	TC1	71.2832
TC2	72.2566	TC3	71.8142	TC4	71.7257	TC5	72.1239	TC6	71.4602
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.7273	TOOI	55.6364	TFTI	55.9091	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.3000 -- SEC

F	.0040	PC	14.6700	FV	505.5000	PFI	263.1300	POI	210.3600
PFII	262.9500	POII	210.8500	PTFO	262.2300	PTOO	210.1800	PDFO	.0100
PDOO	.0140	PFIC1	14.6800	POIC	14.5900	PFIC2	14.6200	SS	3527.6000
PFTI	263.1400	POTI	210.5800	TFI	58.9091	TOI	57.6818	TC1	71.2832
TC2	72.1239	TC3	71.6372	TC4	71.5044	TC5	72.1239	TC6	71.2389
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	56.0000	TOTI	54.9091
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.4000 -- SEC

F	.0040	PC	14.6400	FV	505.6000	PFI	263.1700	POI	210.3800
PFII	409.5000	POII	210.8500	PTFO	262.3600	PTOO	210.2100	PDFO	.0060
PDOO	.0140	PFIC1	14.6700	POIC	14.6200	PFIC2	14.6200	SS	3527.4000
PFTI	263.2100	POTI	210.5900	TFI	58.9091	TOI	57.8636	TC1	71.3717
TC2	72.2124	TC3	71.6814	TC4	71.6372	TC5	72.1239	TC6	71.3274
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.5454	TFTI	56.0000	TOTI	55.1818
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.5000 -- SEC

F	.0040	PC	14.7200	FV	505.7000	PFI	263.2200	POI	210.3700
PFII	409.5000	POII	210.9200	PTFO	262.3900	PTOO	210.2400	PDFO	.0100
PDOO	.0170	PFIC1	14.7200	POIC	14.6500	PFIC2	14.6400	SS	3527.1000
PFTI	263.2400	POTI	210.6100	TFI	58.9545	TOI	58.0454	TC1	71.4159
TC2	72.2566	TC3	71.7257	TC4	71.5487	TC5	72.1239	TC6	71.5044
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.6364	TFTI	55.9091	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0060		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.6000 -- SEC

F	20.7850	PC	14.6900	FV	506.1000	PFI	263.2500	POI	210.3400
PFII	263.0800	POII	409.5000	PTFO	409.5000	PTOO	210.2500	PDFO	.0100
PDOO	.0130	PFIC1	14.7200	POIC	14.5700	PFIC2	14.6000	SS	3526.3000
PFTI	263.2500	POTI	210.6100	TFI	58.7727	TOI	57.6818	TC1	71.1504
TC2	71.9911	TC3	71.5929	TC4	71.4602	TC5	72.1239	TC6	71.3274
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.7273	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.7000 -- SEC

F	20.7850	PC	14.6800	FV	506.5000	PFI	263.2400	POI	210.3300
PFII	263.0600	POII	409.5000	PTFO	409.5000	PTOO	210.3700	PDFO	.0260
PDOO	.0170	PFIC1	14.6700	POIC	14.6100	PFIC2	14.6200	SS	3525.7000
PFTI	263.2400	POTI	210.5800	TFI	58.6818	TOI	57.7727	TC1	71.3274
TC2	72.1681	TC3	71.6814	TC4	71.4159	TC5	71.9911	TC6	71.3274
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.8000 -- SEC

F	6.9870	PC	14.7100	FV	506.2000	PFI	263.2700	POI	210.2500
PFII	262.9800	POII	211.0500	PTFO	275.6400	PTOO	210.2700	PDFO	.0090
PDOO	.0150	PFIC1	14.6600	POIC	14.6400	PFIC2	14.6500	SS	3526.9000
PFTI	263.2400	POTI	210.6100	TFI	58.7727	TOI	57.8636	TC1	71.3274
TC2	72.2566	TC3	71.7257	TC4	71.6814	TC5	72.1239	TC6	71.3274
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.6364	TFTI	55.9091	TOTI	55.7273
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 2.9000 -- SEC

F	.0040	PC	14.7000	FV	505.5000	PFI	263.2800	POI	210.3800
PFII	263.0300	POII	210.9500	PTFO	262.3200	PTOO	210.2000	PDFO	.0070
PDOO	.0150	PFIC1	14.6900	POIC	14.6200	PFIC2	14.6500	SS	3527.0000
PFTI	263.2300	POTI	210.6100	TFI	58.9545	TOI	57.9091	TC1	71.5044
TC2	72.0354	TC3	71.7257	TC4	71.5487	TC5	72.1239	TC6	71.4159
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.7273	TOOI	55.4545	TFTI	56.0000	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.0000 -- SEC

F	27.7270	PC	14.6900	FV	506.5000	PFI	263.2000	POI	210.3600
PFII	263.0000	POII	210.8600	PTFO	262.3200	PTOO	305.3200	PDFO	.0080
PDOO	.0150	PFIC1	265.2100	POIC	14.6300	PFIC2	14.6700	SS	3534.9000
PFTI	263.2100	POTI	210.6200	TFI	58.8182	TOI	57.6364	TC1	71.2832
TC2	72.1681	TC3	71.7699	TC4	71.5044	TC5	72.0796	TC6	71.3274
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.6364	TFTI	55.8182	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.2000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.1000 -- SEC

F	27.7200	PC	237.3400	FV	506.6000	PFI	263.3200	POI	210.4100
PFII	263.0000	POII	210.9300	PTFO	262.2800	PTOO	305.2900	PDFO	.0080
PDOO	.0200	PFIC1	265.2400	POIC	14.6700	PFIC2	14.6700	SS	3535.9000
PFTI	263.2300	POTI	210.5600	TFI	58.7727	TOI	57.7727	TC1	71.3274
TC2	72.1681	TC3	71.6372	TC4	71.7257	TC5	72.1239	TC6	71.4159
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.7273	TFTI	56.0909	TOTI	55.4545
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.2000 -- SEC

F	.0000	PC	237.3800	FV	505.9000	PFI	263.3200	POI	210.3800
PFII	262.9800	POII	210.9100	PTFO	262.3000	PTOO	210.2400	PDFO	.0090
PDOO	19.2340	PFIC1	42.1600	POIC	14.6900	PFIC2	14.6800	SS	3536.2000
PFTI	263.2400	POTI	210.6400	TFI	58.8636	TOI	57.9091	TC1	71.5044
TC2	72.2566	TC3	71.7257	TC4	71.5487	TC5	72.1239	TC6	71.4602
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.8182	TFTI	56.0909	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0080		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.2000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.3000 -- SEC

F	.0000	PC	14.7600	FV	505.5000	PFI	409.5000	POI	210.3500
PFII	263.0800	POII	210.8800	PTFO	262.3900	PTOO	210.1700	PDFO	.0060
PDOO	19.2360	PFIC1	14.7100	POIC	14.6600	PFIC2	14.6400	SS	3535.9000
PFTI	263.2400	POTI	210.5900	TFI	58.6818	TOI	57.9091	TC1	71.3274
TC2	72.1681	TC3	71.6814	TC4	71.4159	TC5	72.1681	TC6	71.1947
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.4000 -- SEC

F	.0000	PC	14.7400	FV	505.6000	PFI	409.5000	POI	210.3400
PFII	263.0800	POII	210.8400	PTFO	262.3100	PTOO	210.2100	PDFO	15.6200
PDOO	10.0880	PFIC1	14.7100	POIC	14.6400	PFIC2	14.6200	SS	3536.1000
PFTI	263.2300	POTI	210.5800	TFI	58.6818	TOI	57.8636	TC1	71.3274
TC2	72.3451	TC3	71.7699	TC4	71.4602	TC5	72.1239	TC6	71.2832
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.6364	TFTI	55.9091	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0080		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.5000 -- SEC

F	.0000	PC	14.7100	FV	505.9000	PFI	263.4200	POI	210.4000
PFII	263.0100	POII	210.9100	PTFO	262.3300	PTOO	210.2100	PDFO	15.6710
PDOO	.0220	PFIC1	14.6400	POIC	14.6400	PFIC2	14.6500	SS	3536.1000
PFTI	263.2400	POTI	210.6100	TFI	58.8182	TOI	57.8182	TC1	71.3717
TC2	72.4779	TC3	71.9469	TC4	71.5929	TC5	72.1681	TC6	71.4159
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.9091	TFTI	56.4545	TOTI	55.7273
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.6000 -- SEC

F	.0000	PC	14.7100	FV	505.5000	PFI	263.3000	POI	210.3500
PFII	262.9900	POII	210.8600	PTFO	262.3300	PTOO	210.2300	PDFO	.8830
PDOO	.0170	PFIC1	14.7300	POIC	14.6100	PFIC2	14.6100	SS	3535.5000
PFTI	263.2200	POTI	210.6100	TFI	58.7727	TOI	57.8636	TC1	71.6814
TC2	72.2124	TC3	71.7699	TC4	71.1504	TC5	71.9911	TC6	71.1504
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.5454	TFTI	56.2727	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.7000 -- SEC

F	.0000	PC	14.6500	FV	505.9000	PFI	263.2200	POI	210.3400
PFII	262.9600	POII	210.8400	PTFO	262.2800	PTOO	210.2000	PDFO	.0150
PDOO	.0160	PFIC1	14.6800	POIC	14.6000	PFIC2	14.6100	SS	3535.6000
PFTI	263.2000	POTI	210.5600	TFI	58.7273	TOI	57.7273	TC1	71.3274
TC2	72.0796	TC3	71.6814	TC4	71.4602	TC5	72.1239	TC6	71.2832
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.1818
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1500.6000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.8000 -- SEC

F	.0010	PC	14.7200	FV	505.8000	PFI	263.2500	POI	409.5000
PFII	262.9900	POII	210.9800	PTFO	262.3100	PTOO	210.2500	PDFO	.0130
PDOO	.0190	PFIC1	14.6600	POIC	14.6700	PFIC2	14.6500	SS	3535.7000
PFTI	263.2100	POTI	210.5900	TFI	58.6818	TOI	57.8182	TC1	71.4159
TC2	72.3451	TC3	71.8584	TC4	71.5044	TC5	72.0354	TC6	71.2389
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.5454	TFTI	56.0000	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 3.9000 -- SEC

F	.0000	PC	14.7200	FV	505.5000	PFI	263.2400	POI	409.5000
PFII	262.9900	POII	210.9300	PTFO	262.2800	PTOO	210.2100	PDFO	.0110
PDOO	.0150	PFIC1	14.7000	POIC	14.5900	PFIC2	14.6500	SS	3535.3000
PFTI	263.2200	POTI	210.6000	TFI	58.8636	TOI	57.8182	TC1	71.5487
TC2	72.1239	TC3	71.6814	TC4	71.3717	TC5	72.1239	TC6	71.4159
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	56.0000	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.0000 -- SEC

F	.0040	PC	14.6800	FV	505.8000	PFI	263.2100	POI	210.4800
PFII	262.9500	POII	210.8300	PTFO	262.2700	PTOO	210.1500	PDFO	.0060
PDOO	.0120	PFIC1	14.6900	POIC	14.5600	PFIC2	264.9300	SS	3535.2000
PFTI	263.2700	POTI	210.5800	TFI	58.7273	TOI	57.6818	TC1	71.4602
TC2	72.1681	TC3	71.7257	TC4	71.4159	TC5	72.0354	TC6	71.0177
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0060		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.1000 -- SEC

F	.0060	PC	14.7100	FV	505.8000	PFI	263.1500	POI	210.4800
PFII	262.9500	POII	210.8900	PTFO	262.2800	PTOO	210.2400	PDFO	.0090
PDOO	.0150	PFIC1	14.6700	POIC	14.6500	PFIC2	265.0200	SS	3535.8000
PFTI	263.2600	POTI	210.5500	TFI	58.5909	TOI	57.7273	TC1	71.4602
TC2	72.2124	TC3	71.7699	TC4	71.5487	TC5	72.1681	TC6	71.2832
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.4545	TFTI	55.9091	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.2000 -- SEC

F	.0050	PC	14.7000	FV	505.6000	PFI	263.2400	POI	210.3700
PFII	262.9300	POII	210.8900	PTFO	262.3100	PTOO	210.2300	PDFO	.0100
PDOO	.0160	PFIC1	14.6900	POIC	14.6400	PFIC2	15.5000	SS	3535.7000
PFTI	263.1900	POTI	210.6200	TFI	58.8182	TOI	57.6818	TC1	71.3717
TC2	72.2566	TC3	71.8142	TC4	71.5044	TC5	71.9911	TC6	71.3717
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.5454	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.3000 -- SEC

F	.0050	PC	14.6800	FV	505.8000	PFI	263.1900	POI	210.3200
PFII	262.9400	POII	210.8300	PTFO	262.2600	PTOO	210.1700	PDFO	.0060
PDOO	.0130	PFIC1	14.6800	POIC	14.5400	PFIC2	14.6100	SS	3535.5000
PFTI	263.1600	POTI	210.5900	TFI	58.7727	TOI	57.6818	TC1	71.4602
TC2	72.0796	TC3	71.5929	TC4	71.4602	TC5	71.9469	TC6	70.9734
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	55.9091	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0000
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.4000 -- SEC

F	.0060	PC	14.6800	FV	505.9000	PFI	263.1900	POI	210.4000
PFII	262.9200	POII	210.8800	PTFO	262.2500	PTOO	210.2200	PDFO	.0060
PDOO	.0180	PFIC1	14.7400	POIC	14.6600	PFIC2	14.6600	SS	3535.8000
PFTI	263.1300	POTI	210.5800	TFI	58.7727	TOI	57.7273	TC1	71.4159
TC2	72.2124	TC3	71.6814	TC4	71.5929	TC5	72.1239	TC6	71.1947
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.6364	TFTI	56.0909	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.5000 -- SEC

F	.0050	PC	14.7100	FV	505.7000	PFI	263.2000	POI	210.4000
PFII	262.9000	POII	211.0000	PTFO	262.3300	PTOO	210.2200	PDFO	.0100
PDOO	.0170	PFIC1	14.7300	POIC	14.6600	PFIC2	14.7000	SS	3536.9000
PFTI	263.2700	POTI	210.6100	TFI	58.9545	TOI	57.9091	TC1	71.6372
TC2	72.1681	TC3	71.6372	TC4	71.4159	TC5	72.1239	TC6	71.3717
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.8182	TOOI	55.3636	TFTI	55.9091	TOTI	55.1818
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.6000 -- SEC

F	.0080	PC	14.7000	FV	505.6000	PFI	263.2200	POI	210.3600
PFII	262.9400	POII	210.8700	PTFO	262.2500	PTOO	210.1800	PDFO	.0080
PDOO	.0140	PFIC1	14.6500	POIC	14.6400	PFIC2	14.6800	SS	3535.6000
PFTI	263.1500	POTI	210.5800	TFI	58.8636	TOI	57.5455	TC1	71.4602
TC2	72.1681	TC3	71.9027	TC4	71.4602	TC5	71.9469	TC6	71.2389
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0000
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.7000 -- SEC

F	.0080	PC	14.6900	FV	506.0000	PFI	263.2100	POI	210.3800
PFII	262.9000	POII	210.9300	PTFO	262.2700	PTOO	210.2300	PDFO	.0070
PDOO	.0200	PFIC1	14.7100	POIC	14.6300	PFIC2	14.6400	SS	3535.2000
PFTI	263.1500	POTI	210.5800	TFI	59.0454	TOI	57.8636	TC1	71.4159
TC2	72.1239	TC3	71.6814	TC4	71.5044	TC5	72.1239	TC6	71.1947
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.4545	TFTI	56.0000	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0080
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.8000 -- SEC

F	.0070	PC	14.7200	FV	506.0000	PFI	263.2000	POI	210.4500
PFII	262.9400	POII	210.9600	PTFO	262.2700	PTOO	210.2400	PDFO	.0100
PDOO	.0180	PFIC1	14.7100	POIC	14.6600	PFIC2	14.6500	SS	3534.9000
PFTI	263.1600	POTI	210.6100	TFI	58.8636	TOI	57.8182	TC1	71.5929
TC2	72.1681	TC3	71.5929	TC4	71.7257	TC5	72.2124	TC6	71.4602
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.7273	TOOI	55.8182	TFTI	56.1818	TOTI	55.4545
	.0000		.0000		.0000		.0000	WFT	.0120
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 4.9000 -- SEC

F	.0060	PC	14.7200	FV	505.7000	PFI	263.1900	POI	210.4000
PFII	262.9300	POII	210.9100	PTFO	262.2200	PTOO	210.2100	PDFO	.0060
PDOO	.0160	PFIC1	14.7000	POIC	14.6100	PFIC2	14.6400	SS	3535.0000
PFTI	263.1500	POTI	210.6100	TFI	58.9091	TOI	57.8636	TC1	71.4602
TC2	72.2566	TC3	71.8142	TC4	71.5044	TC5	72.0796	TC6	71.0619
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.6364	TOOI	55.5454	TFTI	56.0000	TOTI	55.0909
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.0000 -- SEC

F	.0040	PC	14.6600	FV	506.1000	PFI	263.1500	POI	210.3700
PFII	262.9200	POII	210.8400	PTFO	262.2300	PTOO	210.2200	PDFO	.0050
PDOO	.0170	PFIC1	14.6700	POIC	14.5900	PFIC2	14.5800	SS	3530.5000
PFTI	263.1300	POTI	210.6200	TFI	59.1364	TOI	57.8636	TC1	71.3717
TC2	72.1239	TC3	71.7257	TC4	71.4159	TC5	72.0354	TC6	71.1062
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.5454	TOOI	55.4545	TFTI	55.9091	TOTI	55.0000
	.0000		.0000		.0000		.0000	WFT	.0000
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.1000 -- SEC

F	.0080	PC	14.6700	FV	506.0000	PFI	263.1900	POI	210.3600
PFII	262.8900	POII	210.9100	PTFO	262.2000	PTOO	210.2300	PDFO	.0040
PDOO	.0150	PFIC1	14.6700	POIC	14.6500	PFIC2	14.6200	SS	3532.0000
PFTI	263.1500	POTI	210.6000	TFI	58.9091	TOI	58.0000	TC1	71.6372
TC2	72.2124	TC3	71.8142	TC4	71.5929	TC5	72.0796	TC6	71.4159
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.7273	TOOI	55.8182	TFTI	56.0909	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	.0040
WOT	.0040		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.2000 -- SEC

F	.0090	PC	14.7300	FV	506.0000	PFI	263.1800	POI	210.3900
PFII	262.9300	POII	210.9100	PTFO	262.2500	PTOO	210.2100	PDFO	.0060
PDOO	.0190	PFIC1	14.7100	POIC	14.6300	PFIC2	14.6600	SS	3531.5000
PFTI	263.2300	POTI	210.6100	TFI	59.0000	TOI	57.8182	TC1	71.4602
TC2	71.9911	TC3	71.6814	TC4	71.4159	TC5	72.0796	TC6	71.2832
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.9091	TOOI	55.5454	TFTI	56.0909	TOTI	55.1818
	.0000		.0000		.0000		.0000	WFT	.0120
WOT	.0020		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.2320 -- SEC

F	.0060	PC	14.6300	FV	3435.0000	PFI	263.2100	POI	210.4800
PFII	262.9600	POII	210.9300	PTFO	262.2100	PTOO	210.1800	PDFO	.0060
PDOO	.0130	PFIC1	14.6800	POIC	14.6100	PFIC2	14.6300	SS	3535.0000
PFTI	263.1200	POTI	210.5900	TFI	58.8182	TOI	57.7273	TC1	71.4159
TC2	72.1239	TC3	71.8142	TC4	71.4602	TC5	72.1239	TC6	71.1062
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.2727	TOOI	55.4545	TFTI	56.1818	TOTI	54.9091
	.0000		.0000		.0000		.0000	WFT	.2680
WOT	1.0980		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.2320 -- SEC -- TIME R -- .0000 -- SEC

WDOTO	.0092	PNS	14.6200	PC	14.6300	F	.0060	ISP	.5671
WDOTF	.0014	CSTAR	18904.2087	CF	.0010	MR	6.6822	ZOX	.9892
WDOTT	.0106	DCSTAR	.0000	YF	1.0000	YO	1.0000	ZF	1.0110
IT	.0000	INPNS	.0000	MO	.0000	MF	.0000	GAMMAO	1.4309
GAMMAF	1.4094								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.3320 -- SEC

F	7.0080	PC	15.9400	FV	3505.6000	PFI	213.6000	POI	180.9000
PFII	256.8000	POII	209.8100	PTFO	252.3500	PTOO	197.0000	PDFO	19.9030
PDOO	6.7100	PFIC1	52.9200	POIC	43.2600	PFIC2	51.4200	SS	3539.6000
PFTI	258.1600	POTI	210.2400	TFI	58.8182	TOI	57.8182	TC1	71.2389
TC2	72.2124	TC3	72.4336	TC4	76.9911	TC5	73.2301	TC6	72.1681
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	55.5454	TFTI	56.0909	TOTI	55.2727
	.0000		.0000		.0000		.0000	WFT	.2080
WOT	.4500		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.3320 -- SEC -- TIME R -- .1000 -- SEC

WDOTO	.2003	PNS	15.9291	PC	15.9400	F	7.0080	ISP	25.3663
WDOTF	.0760	CSTAR	788.7946	CF	1.0340	MR	2.6358	ZOX	.9899
WDOTT	.2763	DCSTAR	.0000	YF	.9764	YO	.9899	ZF	1.0106
IT	.1827	INPNS	1.4833	MO	.0032	MF	.0015	GAMMAO	1.4286
GAMMAF	1.4094								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.4320 -- SEC

F	7.0650	PC	15.5900	FV	3495.8000	PFI	199.7100	POI	171.9500
PFII	241.4200	POII	193.8300	PTFO	237.1200	PTOO	191.7000	PDFO	40.9500
PDOO	27.7020	PFIC1	46.1600	POIC	41.7200	PFIC2	46.0700	SS	3539.4000
PFTI	244.9300	POTI	200.4700	TFI	57.4091	TOI	57.3636	TC1	71.3274
TC2	71.6814	TC3	72.7434	TC4	92.4336	TC5	73.8938	TC6	72.8761
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.0000	TOOI	55.4545	TFTI	55.9091	TOTI	55.3636
	.0000		.0000		.0000		.0000	WFT	12.1280
WOT	7.7820		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.4320 -- SEC -- TIME R -- .2000 -- SEC

WDOTO	.3881	PNS	15.5794	PC	15.5900	F	7.0650	ISP	14.3958
WDOTF	.1027	CSTAR	434.2937	CF	1.0658	MR	3.7787	ZOX	.9901
WDOTT	.4908	DCSTAR	.0000	YF	.9484	YO	.9569	ZF	1.0099
IT	.9224	INPNS	3.0545	MO	.0383	MF	.0115	GAMMAO	1.4277
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.4320 -- SEC -- TIME R -- .2000 -- SEC

F	7.0650	FSTD	13.6078	CF	1.0658	CFSTD	1.0660
ISP	14.3958	ISPS	118.8784	CFSV	1.4857	CFNSV	1.4860
WDOTT	.4908	WDOTTS	.1145	ECFS	.7174	ECFSTD	.7174
WDOTO	.3881	WDOTOS	.0939	TOD	55.4545	TODS	67.0000
WDOTF	.1027	WDOTFS	.0206	TFD	55.0000	TFDS	67.0000
MR	3.7787	MRS	4.5607	POD	163.9980	PODS	40.0000
PC	15.5900	PCS	30.0000	PFD	196.1700	PFDS	40.0000
CSTAR	434.2937	CSTASD	418.7789	AE	2.1275	PAB	.0000
CSTAT	7980.0314	CSTATS	7694.9526	AT	.4255	ATTC	.4255
ETAC	.0544	ETACS	.0544	PCCI	3.5897	PCCIA	3.5064

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.5320 -- SEC

F	7.3080	PC	15.6100	FV	3493.4000	PFI	204.9200	POI	171.1400
PFII	248.4800	POII	196.3000	PTFO	243.7100	PTOO	191.3400	PDFO	40.9500
PDOO	28.1060	PFIC1	47.0900	POIC	41.9200	PFIC2	46.8600	SS	500.4000
PFTI	254.6000	POTI	200.8700	TFI	56.0909	TOI	56.5454	TC1	71.2832
TC2	71.0177	TC3	72.5221	TC4	107.9412	TC5	73.4513	TC6	72.2124
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	54.0000	TOOI	54.6364	TFTI	55.4545	TOTI	54.5455
	.0000		.0000		.0000		.0000	WFT	51.9440
WOT	17.6100		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.5320 -- SEC -- TIME R -- .3000 -- SEC

WDOTO	.3906	PNS	15.5994	PC	15.6100	F	7.3080	ISP	14.7663
WDOTF	.1044	CSTAR	431.2108	CF	1.1010	MR	3.7425	ZOX	.9901
WDOTT	.4949	DCSTAR	.0000	YF	.9498	YO	.9562	ZF	1.0102
IT	1.6276	INPNS	4.6133	MO	.0771	MF	.0218	GAMMAO	1.4278
GAMMAF	1.4095								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.5320 -- SEC -- TIME R -- .3000 -- SEC

F	7.3080	FSTD	14.0584	CF	1.1010	CFSTD	1.1013
ISP	14.7663	ISPS	122.1122	CFSV	1.4856	CFNSV	1.4861
WDOTT	.4949	WDOTTS	.1151	ECFS	.7411	ECFSTD	.7411
WDOTO	.3906	WDOTOS	.0949	TOD	54.6364	TODS	67.0000
WDOTF	.1044	WDOTFS	.0202	TFD	54.0000	TFDS	67.0000
MR	3.7425	MRS	4.6992	POD	163.2340	PODS	40.0000
PC	15.6100	PCS	30.0000	PFD	202.7600	PFDS	40.0000
CSTAR	431.2108	CSTASD	412.4329	AE	2.1275	PAB	.0000
CSTAT	7992.8531	CSTATS	7644.7888	AT	.4255	ATTC	.4255
ETAC	.0539	ETACS	.0539	PCCI	3.5548	PCCIA	3.4731

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.6320 -- SEC

F	7.3620	PC	15.6700	FV	3495.6000	PFI	214.1400	POI	172.9100
PFII	259.5800	POII	197.4100	PTFO	254.5900	PTOO	193.4500	PDFO	40.9500
PDOO	28.3870	PFIC1	49.0800	POIC	42.0300	PFIC2	48.6700	SS	500.6000
PFTI	264.7100	POTI	203.6100	TFI	55.8636	TOI	56.0909	TC1	71.0619
TC2	70.2655	TC3	72.5221	TC4	119.9160	TC5	73.0088	TC6	72.0354
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	53.6364	TOOI	54.3636	TFTI	55.4545	TOTI	54.4545
	.0000		.0000		.0000		.0000	WFT	81.8560
WOT	20.6640		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.6320 -- SEC -- TIME R -- .4000 -- SEC

WDOTO	.3948	PNS	15.6593	PC	15.6700	F	7.3620	ISP	14.6732
WDOTF	.1069	CSTAR	426.9848	CF	1.1049	MR	3.6927	ZOX	.9899
WDOTT	.5017	DCSTAR	.0000	YF	.9520	YO	.9563	ZF	1.0107
IT	2.3661	INPNS	6.1780	MO	.1163	MF	.0324	GAMMAO	1.4282
GAMMAF	1.4096								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.6320 -- SEC -- TIME R -- .4000 -- SEC

F	7.3620	FSTD	14.1087	CF	1.1049	CFSTD	1.1053
ISP	14.6732	ISPS	123.1487	CFSV	1.4856	CFNSV	1.4861
WDOTT	.5017	WDOTTS	.1146	ECFS	.7437	ECFSTD	.7437
WDOTO	.3948	WDOTOS	.0949	TOD	54.3636	TODS	67.0000
WDOTF	.1069	WDOTFS	.0196	TFD	53.6364	TFDS	67.0000
MR	3.6927	MRS	4.8396	POD	165.0630	PODS	40.0000
PC	15.6700	PCS	30.0000	PFD	213.6400	PFDS	40.0000
CSTAR	426.9848	CSTASD	404.8227	AE	2.1275	PAB	.0000
CSTAT	8010.3242	CSTATS	7594.5579	AT	.4255	ATTC	.4255
ETAC	.0533	ETACS	.0533	PCCI	3.4702	PCCIA	3.3924

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.7320 -- SEC

F	7.7950	PC	15.7900	FV	3497.8000	PFI	214.2600	POI	175.0500
PFII	258.9600	POII	200.0000	PTFO	254.2900	PTOO	195.7900	PDFO	40.9500
PDOO	28.7320	PFIC1	49.2500	POIC	42.8400	PFIC2	49.0000	SS	500.9000
PFTI	261.9900	POTI	205.4000	TFI	56.5000	TOI	56.1364	TC1	71.2389
TC2	69.8230	TC3	72.8319	TC4	128.9076	TC5	73.0088	TC6	71.9469
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	54.4545	TOOI	54.4545	TFTI	55.8182	TOTI	54.4545
	.0000		.0000		.0000		.0000	WFT	81.4160
WOT	20.9460		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.7320 -- SEC -- TIME R -- .5000 -- SEC

WDOTO	.3996	PNS	15.7792	PC	15.7900	F	7.7950	ISP	15.3944
WDOTF	.1068	CSTAR	426.3253	CF	1.1610	MR	3.7428	ZOX	.9898
WDOTT	.5064	DCSTAR	.0000	YF	.9519	YO	.9563	ZF	1.0106
IT	3.1246	INPNS	7.7535	MO	.1562	MF	.0431	GAMMAO	1.4286
GAMMAF	1.4095								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.7320 -- SEC -- TIME R -- .5000 -- SEC

F	7.7950	FSTD	14.8246	CF	1.1610	CFSTD	1.1613
ISP	15.3944	ISPS	129.3924	CFSV	1.4856	CFNSV	1.4861
WDOTT	.5064	WDOTTS	.1146	ECFS	.7815	ECFSTD	.7815
WDOTO	.3996	WDOTOS	.0949	TOD	54.4545	TODS	67.0000
WDOTF	.1068	WDOTFS	.0196	TFD	54.4545	TFDS	67.0000
MR	3.7428	MRS	4.8336	POD	167.0580	PODS	40.0000
PC	15.7900	PCS	30.0000	PFD	213.3400	PFDS	40.0000
CSTAR	426.3253	CSTASD	405.2017	AE	2.1275	PAB	.0000
CSTAT	7992.7266	CSTATS	7596.7029	AT	.4255	ATTC	.4255
ETAC	.0533	ETACS	.0533	PCCI	3.4737	PCCIA	3.3957

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.8320 -- SEC

F	7.3470	PC	15.6700	FV	3497.0000	PFI	208.8900	POI	175.6200
PFII	252.6900	POII	200.6100	PTFO	248.0700	PTOO	196.3400	PDFO	40.9500
PDOO	28.8280	PFIC1	47.8100	POIC	42.8500	PFIC2	47.6100	SS	500.4000
PFTI	256.3100	POTI	205.8600	TFI	56.3182	TOI	56.0000	TC1	71.3717
TC2	69.0708	TC3	72.9646	TC4	136.0924	TC5	72.5664	TC6	71.4602
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	54.6364	TOOI	54.0909	TFTI	56.2727	TOTI	53.5454
	.0000		.0000		.0000		.0000	WFT	71.0160
WOT	19.7560		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.8320 -- SEC -- TIME R -- .6000 -- SEC

WDOTO	.4010	PNS	15.6593	PC	15.6700	F	7.3470	ISP	14.5118
WDOTF	.1053	CSTAR	423.1496	CF	1.1026	MR	3.8075	ZOX	.9897
WDOTT	.5063	DCSTAR	.0000	YF	.9507	YO	.9563	ZF	1.0104
IT	3.8831	INPNS	9.3272	MO	.1962	MF	.0537	GAMMAO	1.4287
GAMMAF	1.4095								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.8320 -- SEC -- TIME R -- .6000 -- SEC

F	7.3470	FSTD	14.0790	CF	1.1026	CFSTD	1.1029
ISP	14.5118	ISPS	122.5544	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5063	WDOTTS	.1149	ECFS	.7422	ECFSTD	.7422
WDOTO	.4010	WDOTOS	.0949	TOD	54.0909	TODS	67.0000
WDOTF	.1053	WDOTFS	.0200	TFD	54.6364	TFDS	67.0000
MR	3.8075	MRS	4.7515	POD	167.5120	PODS	40.0000
PC	15.6700	PCS	30.0000	PFD	207.1200	PFDS	40.0000
CSTAR	423.1496	CSTASD	404.8979	AE	2.1275	PAB	.0000
CSTAT	7969.7717	CSTATS	7626.0118	AT	.4255	ATTC	.4255
ETAC	.0531	ETACS	.0531	PCCI	3.4806	PCCIA	3.4023

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.9320 -- SEC

F	7.7390	PC	15.6400	FV	3495.6000	PFI	209.9300	POI	175.4500
PFII	254.2100	POII	200.2200	PTFO	249.4700	PTOO	196.0800	PDFO	40.9500
PDOO	28.6550	PFIC1	47.8800	POIC	42.9000	PFIC2	47.7600	SS	500.4000
PFTI	258.8200	POTI	205.3800	TFI	56.1364	TOI	55.6818	TC1	71.1062
TC2	68.3186	TC3	73.0531	TC4	143.0672	TC5	72.1239	TC6	71.1062
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	54.5455	TOOI	54.0000	TFTI	56.2727	TOTI	53.0909
	.0000		.0000		.0000		.0000	WFT	71.8880
WOT	19.2440		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.9320 -- SEC -- TIME R -- .7000 -- SEC

WDOTO	.3996	PNS	15.6293	PC	15.6400	F	7.7390	ISP	15.3168
WDOTF	.1056	CSTAR	423.1890	CF	1.1637	MR	3.7827	ZOX	.9897
WDOTT	.5053	DCSTAR	.0000	YF	.9510	YO	.9565	ZF	1.0104
IT	4.6332	INPNS	10.8929	MO	.2362	MF	.0642	GAMMAO	1.4287
GAMMAF	1.4095								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 5.9320 -- SEC -- TIME R -- .7000 -- SEC

F	7.7390	FSTD	14.8588	CF	1.1637	CFSTD	1.1640
ISP	15.3168	ISPS	129.7286	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5053	WDOTTS	.1145	ECFS	.7833	ECFSTD	.7833
WDOTO	.3996	WDOTOS	.0946	TOD	54.0000	TODS	67.0000
WDOTF	.1056	WDOTFS	.0199	TFD	54.5455	TFDS	67.0000
MR	3.7827	MRS	4.7562	POD	167.4250	PODS	40.0000
PC	15.6400	PCS	30.0000	PFD	208.5200	PFDS	40.0000
CSTAR	423.1890	CSTASD	404.3970	AE	2.1275	PAB	.0000
CSTAT	7978.6027	CSTATS	7624.3087	AT	.4255	ATTC	.4255
ETAC	.0530	ETACS	.0530	PCCI	3.4656	PCCIA	3.3880

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.0320 -- SEC

F	7.4720	PC	15.7600	FV	3498.8000	PFI	211.8400	POI	175.4900
PFII	256.0100	POII	200.3700	PTFO	251.3000	PTOO	196.1200	PDFO	40.9500
PDOO	28.4430	PFIC1	48.5600	POIC	42.3800	PFIC2	48.3700	SS	501.0000
PFTI	259.8200	POTI	205.5300	TFI	56.2727	TOI	55.9545	TC1	71.2389
TC2	68.0973	TC3	73.4956	TC4	146.3865	TC5	71.9469	TC6	71.1947
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	54.7273	TOOI	54.0909	TFTI	56.3636	TOTI	53.1818
	.0000		.0000		.0000		.0000	WFT	76.2400
WOT	19.4360		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.0320 -- SEC -- TIME R -- .8000 -- SEC

WDOTO	.3983	PNS	15.7493	PC	15.7600	F	7.4720	ISP	14.8158
WDOTF	.1060	CSTAR	427.2269	CF	1.1150	MR	3.7557	ZOX	.9898
WDOTT	.5043	DCSTAR	.0000	YF	.9513	YO	.9568	ZF	1.0105
IT	5.3933	INPNS	12.4632	MO	.2762	MF	.0748	GAMMAO	1.4287
GAMMAF	1.4095								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.0320 -- SEC -- TIME R -- .8000 -- SEC

F	7.4720	FSTD	14.2371	CF	1.1150	CFSTD	1.1153
ISP	14.8158	ISPS	124.8845	CFSV	1.4856	CFNSV	1.4861
WDOTT	.5043	WDOTTS	.1140	ECFS	.7505	ECFSTD	.7505
WDOTO	.3983	WDOTOS	.0942	TOD	54.0909	TODS	67.0000
WDOTF	.1060	WDOTFS	.0198	TFD	54.7273	TFDS	67.0000
MR	3.7557	MRS	4.7578	POD	167.6770	PODS	40.0000
PC	15.7600	PCS	30.0000	PFD	210.3500	PFDS	40.0000
CSTAR	427.2269	CSTASD	407.7353	AE	2.1275	PAB	.0000
CSTAT	7988.1876	CSTATS	7623.7380	AT	.4255	ATTC	.4255
ETAC	.0535	ETACS	.0535	PCCI	3.4782	PCCIA	3.4000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.1320 -- SEC

F	7.7030	PC	15.7100	FV	3499.8000	PFI	210.3800	POI	175.5200
PFII	254.6600	POII	200.4200	PTFO	249.8900	PTOO	196.1500	PDFO	40.9500
PDOO	28.7930	PFIC1	48.2000	POIC	42.2100	PFIC2	47.9100	SS	500.3000
PFTI	258.6400	POTI	205.6100	TFI	56.4091	TOI	55.7727	TC1	71.3717
TC2	67.5664	TC3	73.9380	TC4	-302.0000	TC5	71.0177	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.0000	TOOI	54.0909	TFTI	56.7273	TOTI	52.5455
	.0000		.0000		.0000		.0000	WFT	73.7240
WOT	19.5240		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.1320 -- SEC -- TIME R -- .9000 -- SEC

WDOTO	.4005	PNS	15.6993	PC	15.7100	F	7.7030	ISP	15.2165
WDOTF	.1057	CSTAR	424.2725	CF	1.1531	MR	3.7895	ZOX	.9898
WDOTT	.5062	DCSTAR	.0000	YF	.9511	YO	.9563	ZF	1.0105
IT	6.1549	INPNS	14.0370	MO	.3162	MF	.0854	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.1320 -- SEC -- TIME R -- .9000 -- SEC

F	7.7030	FSTD	14.7238	CF	1.1531	CFSTD	1.1535
ISP	15.2165	ISPS	128.2756	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5062	WDOTTS	.1148	ECFS	.7762	ECFSTD	.7762
WDOTO	.4005	WDOTOS	.0949	TOD	54.0909	TODS	67.0000
WDOTF	.1057	WDOTFS	.0199	TFD	55.0000	TFDS	67.0000
MR	3.7895	MRS	4.7754	POD	167.3570	PODS	40.0000
PC	15.7100	PCS	30.0000	PFD	208.9400	PFDS	40.0000
CSTAR	424.2725	CSTASD	405.1907	AE	2.1275	PAB	.0000
CSTAT	7976.1679	CSTATS	7617.4373	AT	.4255	ATTC	.4255
ETAC	.0532	ETACS	.0532	PCCI	3.4802	PCCIA	3.4019

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.2320 -- SEC

F	7.4970	PC	15.6500	FV	3495.4000	PFI	210.4900	POI	175.5000
PFII	254.9600	POII	200.3000	PTFO	250.1600	PTOO	196.1700	PDFO	40.9500
PDOO	28.7680	PFIC1	48.2500	POIC	42.3200	PFIC2	48.0700	SS	500.4000
PFTI	259.1200	POTI	205.5500	TFI	56.2727	TOI	55.5909	TC1	71.2832
TC2	66.8142	TC3	73.9823	TC4	-302.0000	TC5	70.8407	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	54.8182	TOOI	54.0000	TFTI	56.8182	TOTI	51.8182
	.0000		.0000		.0000		.0000	WFT	73.7920
WOT	19.3320		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.2320 -- SEC -- TIME R -- 1.0000 -- SEC

WDOTO	.4004	PNS	15.6393	PC	15.6500	F	7.4970	ISP	14.8101
WDOTF	.1058	CSTAR	422.6664	CF	1.1266	MR	3.7857	ZOX	.9897
WDOTT	.5062	DCSTAR	.0000	YF	.9511	YO	.9563	ZF	1.0105
IT	6.9142	INPNS	15.6052	MO	.3562	MF	.0959	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.2320 -- SEC -- TIME R -- 1.0000 -- SEC

F	7.4970	FSTD	14.3850	CF	1.1266	CFSTD	1.1269
ISP	14.8101	ISPS	125.4001	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5062	WDOTTS	.1147	ECFS	.7583	ECFSTD	.7583
WDOTO	.4004	WDOTOS	.0949	TOD	54.0000	TODS	67.0000
WDOTF	.1058	WDOTFS	.0199	TFD	54.8182	TFDS	67.0000
MR	3.7857	MRS	4.7759	POD	167.4020	PODS	40.0000
PC	15.6500	PCS	30.0000	PFD	209.2100	PFDS	40.0000
CSTAR	422.6664	CSTASD	403.5793	AE	2.1275	PAB	.0000
CSTAT	7977.5300	CSTATS	7617.2751	AT	.4255	ATTC	.4255
ETAC	.0530	ETACS	.0530	PCCI	3.4639	PCCIA	3.3863

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.3320 -- SEC

F	7.6870	PC	15.6800	FV	3497.6000	PFI	211.0000	POI	175.4900
PFII	255.2600	POII	200.3800	PTFO	250.5700	PTOO	196.1500	PDFO	40.9500
PDOO	28.6310	PFIC1	48.6200	POIC	42.6100	PFIC2	47.9900	SS	500.7000
PFTI	259.2300	POTI	205.5500	TFI	56.4545	TOI	55.6818	TC1	71.5044
TC2	66.5487	TC3	74.3363	TC4	-302.0000	TC5	70.7522	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.0000	TOOI	54.1818	TFTI	57.0000	TOTI	51.9091
	.0000		.0000		.0000		.0000	WFT	74.6920
WOT	19.2780		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.3320 -- SEC -- TIME R -- 1.1000 -- SEC

WDOTO	.3995	PNS	15.6693	PC	15.6800	F	7.6870	ISP	15.2121
WDOTF	.1059	CSTAR	424.2215	CF	1.1529	MR	3.7739	ZOX	.9898
WDOTT	.5053	DCSTAR	.0000	YF	.9512	YO	.9565	ZF	1.0105
IT	7.6807	INPNS	17.1730	MO	.3962	MF	.1065	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.3320 -- SEC -- TIME R -- 1.1000 -- SEC

F	7.6870	FSTD	14.7214	CF	1.1529	CFSTD	1.1533
ISP	15.2121	ISPS	128.6673	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5053	WDOTTS	.1144	ECFS	.7760	ECFSTD	.7760
WDOTO	.3995	WDOTOS	.0946	TOD	54.1818	TODS	67.0000
WDOTF	.1059	WDOTFS	.0198	TFD	55.0000	TFDS	67.0000
MR	3.7739	MRS	4.7673	POD	167.5190	PODS	40.0000
PC	15.6800	PCS	30.0000	PFD	209.6200	PFDS	40.0000
CSTAR	424.2215	CSTASD	405.0149	AE	2.1275	PAB	.0000
CSTAT	7981.7317	CSTATS	7620.3594	AT	.4255	ATTC	.4255
ETAC	.0531	ETACS	.0531	PCCI	3.4672	PCCIA	3.3895

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.4320 -- SEC

F	7.6160	PC	15.7100	FV	3500.2000	PFI	210.8200	POI	175.6200
PFII	255.0700	PJII	200.3700	PTFO	250.3700	PTOO	196.2600	PDFO	40.9500
PDOO	28.7090	PFIC1	48.1900	POIC	42.5200	PFIC2	48.1900	SS	500.6000
PFTI	259.0400	POTI	205.5300	TFI	56.5000	TOI	55.6818	TC1	71.3274
TC2	66.1947	TC3	74.6903	TC4	-302.0000	TC5	70.4425	TC6	69.6903
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.2727	TOOI	54.2727	TFTI	57.1818	TOTI	51.7273
	.0000		.0000		.0000		.0000	WFT	74.3560
WOT	19.3160		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.4320 -- SEC -- TIME R -- 1.2000 -- SEC

WDOTO	.4000	PNS	15.6993	PC	15.7100	F	7.6160	ISP	15.0565
WDOTF	.1058	CSTAR	424.6075	CF	1.1401	MR	3.7820	ZOX	.9898
WDOTT	.5058	DCSTAR	.0000	YF	.9512	YO	.9564	ZF	1.0105
IT	8.4453	INPNS	18.7452	MO	.4362	MF	.1171	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.4320 -- SEC -- TIME R -- 1.2000 -- SEC

F	7.6160	FSTD	14.5575	CF	1.1401	CFSTD	1.1404
ISP	15.0565	ISPS	127.0839	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5058	WDOTTS	.1146	ECFS	.7674	ECFSTD	.7674
WDOTO	.4000	WDOTOS	.0947	TOD	54.2727	TODS	67.0000
WDOTF	.1058	WDOTFS	.0198	TFD	55.2727	TFDS	67.0000
MR	3.7820	MRS	4.7711	POD	167.5510	PODS	40.0000
PC	15.7100	PCS	30.0000	PFD	209.4200	PFDS	40.0000
CSTAR	424.6075	CSTASD	405.4571	AE	2.1275	PAB	.0000
CSTAT	7978.8433	CSTATS	7618.9860	AT	.4255	ATTC	.4255
ETAC	.0532	ETACS	.0532	PCCI	3.4753	PCCIA	3.3973

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.5320 -- SEC

F	7.7180	PC	15.7300	FV	3497.6000	PFI	210.5000	POI	175.5300
PFII	255.0300	POII	200.3600	PTFO	250.1500	PTOO	196.2400	PDFO	40.9500
PDOO	28.7110	PFIC1	48.2300	POIC	43.0800	PFIC2	47.8200	SS	500.4000
PFTI	259.0400	POTI	205.7500	TFI	56.3636	TOI	55.4545	TC1	71.3274
TC2	65.4867	TC3	74.9557	TC4	-302.0000	TC5	70.2212	TC6	69.4690
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.0909	TOOI	54.0909	TFTI	57.1818	TOTI	50.9091
	.0000		.0000		.0000		.0000	WFT	74.1880
WOT	19.4620		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.5320 -- SEC -- TIME R -- 1.3000 -- SEC

WDOTO	.4001	PNS	15.7193	PC	15.7300	F	7.7180	ISP	15.2572
WDOTF	.1057	CSTAR	425.1206	CF	1.1539	MR	3.7838	ZOX	.9897
WDOTT	.5059	DCSTAR	.0000	YF	.9511	YO	.9564	ZF	1.0105
IT	9.2124	INPNS	20.3165	MO	.4762	MF	.1277	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.5320 -- SEC -- TIME R -- 1.3000 -- SEC

F	7.7180	FSTD	14.7337	CF	1.1539	CFSTD	1.1542
ISP	15.2572	ISPS	128.5971	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5059	WDOTTS	.1146	ECFS	.7767	ECFSTD	.7767
WDOTO	.4001	WDOTOS	.0947	TOD	54.0909	TODS	67.0000
WDOTF	.1057	WDOTFS	.0199	TFD	55.0909	TFDS	67.0000
MR	3.7838	MRS	4.7688	POD	167.5290	PODS	40.0000
PC	15.7300	PCS	30.0000	PFD	209.2000	PFDS	40.0000
CSTAR	425.1206	CSTASD	406.0222	AE	2.1275	PAB	.0000
CSTAT	7978.2172	CSTATS	7619.7990	AT	.4255	ATTC	.4255
ETAC	.0533	ETACS	.0533	PCCI	3.4810	PCCIA	3.4027

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.6320 -- SEC

F	7.7050	PC	15.7400	FV	3497.2000	PFI	210.6900	POI	175.5300
PFII	255.0900	POII	200.3900	PTFO	250.4000	PTOO	196.2500	PDFO	40.9500
PDOO	28.6790	PFIC1	48.5400	POIC	42.8000	PFIC2	48.2800	SS	500.8000
PFTI	259.0900	POTI	205.6200	TFI	56.4545	TOI	55.6818	TC1	71.4602
TC2	65.2212	TC3	75.2655	TC4	-302.0000	TC5	69.9115	TC6	69.2478
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.0909	TOOI	54.1818	TFTI	57.2727	TOTI	50.9091
	.0000		.0000		.0000		.0000	WFT	74.3640
WOT	19.4820		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.6320 -- SEC -- TIME R -- 1.4000 -- SEC

WDOTO	.3999	PNS	15.7293	PC	15.7400	F	7.7050	ISP	15.2367
WDOTF	.1058	CSTAR	425.5348	CF	1.1512	MR	3.7796	ZOX	.9898
WDOTT	.5057	DCSTAR	.0000	YF	.9512	YO	.9565	ZF	1.0105
IT	9.9800	INPNS	21.8866	MO	.5161	MF	.1383	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.6320 -- SEC -- TIME R -- 1.4000 -- SEC

F	7.7050	FSTD	14.6996	CF	1.1512	CFSTD	1.1516
ISP	15.2367	ISPS	128.3904	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5057	WDOTTS	.1145	ECFS	.7749	ECFSTD	.7749
WDOTO	.3999	WDOTOS	.0946	TOD	54.1818	TODS	67.0000
WDOTF	.1058	WDOTFS	.0198	TFD	55.0909	TFDS	67.0000
MR	3.7796	MRS	4.7686	POD	167.5710	PODS	40.0000
PC	15.7400	PCS	30.0000	PFD	209.4500	PFDS	40.0000
CSTAR	425.5348	CSTASD	406.3452	AE	2.1275	PAB	.0000
CSTAT	7979.7189	CSTATS	7619.8723	AT	.4255	ATTC	.4255
ETAC	.0533	ETACS	.0533	PCCI	3.4813	PCCIA	3.4029

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.7320 -- SEC

F	7.7100	PC	15.7000	FV	3497.8000	PFI	211.0200	POI	175.5800
PFII	255.1800	POII	200.4300	PTFO	250.4600	PTOO	196.2500	PDFO	40.9500
PDOO	28.7060	PFIC1	48.4100	POIC	42.7300	PFIC2	48.1300	SS	500.8000
PFTI	259.1300	POTI	205.5700	TFI	56.5454	TOI	55.8182	TC1	71.4602
TC2	64.8673	TC3	75.6195	TC4	-302.0000	TC5	69.8672	TC6	69.1150
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	54.5455	TFTI	57.5455	TOTI	50.9091
	.0000		.0000		.0000		.0000	WFT	74.4240
WOT	19.3220		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.7320 -- SEC -- TIME R -- 1.5000 -- SEC

WDOTO	.3999	PNS	15.6893	PC	15.7000	F	7.7100	ISP	15.2466
WDOTF	.1058	CSTAR	424.4548	CF	1.1549	MR	3.7806	ZOX	.9898
WDOTT	.5057	DCSTAR	.0000	YF	.9512	YO	.9564	ZF	1.0105
IT	10.7493	INPNS	23.4583	MO	.5561	MF	.1488	GAMMAO	1.4286
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.7320 -- SEC -- TIME R -- 1.5000 -- SEC

F	7.7100	FSTD	14.7466	CF	1.1549	CFSTD	1.1552
ISP	15.2466	ISPS	128.7456	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5057	WDOTTS	.1145	ECFS	.7774	ECFSTD	.7774
WDOTO	.3999	WDOTOS	.0947	TOD	54.5455	TODS	67.0000
WDOTF	.1058	WDOTFS	.0198	TFD	55.4545	TFDS	67.0000
MR	3.7806	MRS	4.7720	POD	167.5440	PODS	40.0000
PC	15.7000	PCS	30.0000	PFD	209.5100	PFDS	40.0000
CSTAR	424.4548	CSTASD	405.2678	AE	2.1275	PAB	.0000
CSTAT	7979.3475	CSTATS	7618.6492	AT	.4255	ATTC	.4255
ETAC	.0532	ETACS	.0532	PCCI	3.4734	PCCIA	3.3954

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.8320 -- SEC

F	7.6870	PC	15.7100	FV	3497.0000	PFI	210.8500	POI	175.4500
PFII	255.1900	POII	200.3100	PTFO	250.3800	PTOO	196.1800	PDFO	40.9500
PDOO	28.8150	PFIC1	48.3700	POIC	42.4300	PFIC2	48.0400	SS	500.3000
PFTI	259.2100	POTI	205.7300	TFI	56.4091	TOI	55.5454	TC1	71.5044
TC2	64.2478	TC3	75.6195	TC4	-302.0000	TC5	69.0265	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	54.1818	TFTI	57.5455	TOTI	50.0000
	.0000		.0000		.0000		.0000	WFT	74.3800
WOT	19.1720		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.8320 -- SEC -- TIME R -- 1.6000 -- SEC

WDOTO	.4007	PNS	15.6993	PC	15.7100	F	7.6870	ISP	15.1789
WDOTF	.1058	CSTAR	424.1034	CF	1.1507	MR	3.7884	ZOX	.9898
WDOTT	.5064	DCSTAR	.0000	YF	.9512	YO	.9562	ZF	1.0105
IT	11.5194	INPNS	25.0307	MO	.5961	MF	.1594	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.8320 -- SEC -- TIME R -- 1.6000 -- SEC

F	7.6870	FSTD	14.6932	CF	1.1507	CFSTD	1.1511
ISP	15.1789	ISPS	127.9953	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5064	WDOTTS	.1148	ECFS	.7746	ECFSTD	.7746
WDOTO	.4007	WDOTOS	.0949	TOD	54.1818	TODS	67.0000
WDOTF	.1058	WDOTFS	.0198	TFD	55.4545	TFDS	67.0000
MR	3.7884	MRS	4.7838	POD	167.3650	PODS	40.0000
PC	15.7100	PCS	30.0000	PFD	209.4300	PFDS	40.0000
CSTAR	424.1034	CSTASD	404.8508	AE	2.1275	PAB	.0000
CSTAT	7976.5595	CSTATS	7614.4567	AT	.4255	ATTC	.4255
ETAC	.0532	ETACS	.0532	PCCI	3.4776	PCCIA	3.3994

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.9320 -- SEC

F	7.7710	PC	15.6700	FV	3499.0000	PFI	210.9100	POI	175.4500
PFII	255.1700	POII	200.3200	PTFO	250.3300	PTOO	196.2100	PDFO	40.9500
PDOO	28.6250	PFIC1	48.4000	POIC	42.7700	PFIC2	48.0600	SS	500.6000
PFTI	259.0300	POTI	205.5300	TFI	56.4091	TOI	55.5909	TC1	71.4602
TC2	63.9381	TC3	75.8407	TC4	-302.0000	TC5	68.9380	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.1818	TOOI	54.1818	TFTI	57.6364	TOTI	50.0000
	.0000		.0000		.0000		.0000	WFT	74.3280
WOT	19.1760		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.9320 -- SEC -- TIME R -- 1.7000 -- SEC

WDOTO	.3995	PNS	15.6593	PC	15.6700	F	7.7710	ISP	15.3797
WDOTF	.1058	CSTAR	423.9884	CF	1.1663	MR	3.7768	ZOX	.9898
WDOTT	.5053	DCSTAR	.0000	YF	.9511	YO	.9565	ZF	1.0105
IT	12.2895	INPNS	26.5990	MO	.6361	MF	.1700	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 6.9320 -- SEC -- TIME R -- 1.7000 -- SEC

F	7.7710	FSTD	14.8918	CF	1.1663	CFSTD	1.1666
ISP	15.3797	ISPS	130.1794	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5053	WDOTTS	.1144	ECFS	.7850	ECFSTD	.7850
WDOTO	.3995	WDOTOS	.0945	TOD	54.1818	TODS	67.0000
WDOTF	.1058	WDOTFS	.0199	TFD	55.1818	TFDS	67.0000
MR	3.7768	MRS	4.7624	POD	167.5850	PODS	40.0000
PC	15.6700	PCS	30.0000	PFD	209.3800	PFDS	40.0000
CSTAR	423.9884	CSTASD	404.9371	AE	2.1275	PAB	.0000
CSTAT	7980.6954	CSTATS	7622.0936	AT	.4255	ATTC	.4255
ETAC	.0531	ETACS	.0531	PCCI	3.4659	PCCIA	3.3883

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.0320 -- SEC

F	7.7160	PC	15.7200	FV	3498.0000	PFI	210.7500	POI	175.5900
PFII	255.2500	POII	200.4400	PTFO	250.4400	PTOO	196.2500	PDFO	40.9500
PDOO	28.4710	PFIC1	48.5600	POIC	42.4900	PFIC2	48.0800	SS	501.1000
PFTI	259.1700	POTI	205.5500	TFI	56.6364	TOI	55.7273	TC1	71.5044
TC2	63.8496	TC3	76.1947	TC4	-302.0000	TC5	68.4513	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFJI	55.4545	TOOI	54.5455	TFTI	57.7273	TOTI	49.9091
	.0000		.0000		.0000		.0000	WFT	74.3360
WOT	19.1620		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.0320 -- SEC -- TIME R -- 1.8000 -- SEC

WDOTO	.3984	PNS	15.7093	PC	15.7200	F	7.7160	ISP	15.3038
WDOTF	.1058	CSTAR	426.2568	CF	1.1543	MR	3.7667	ZOX	.9898
WDOTT	.5042	DCSTAR	.0000	YF	.9512	YO	.9568	ZF	1.0105
IT	13.0610	INPNS	28.1679	MO	.6760	MF	.1806	GAMMAO	1.4286
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.0320 -- SEC -- TIME R -- 1.8000 -- SEC

F	7.7160	FSTD	14.7394	CF	1.1543	CFSTD	1.1547
ISP	15.3038	ISPS	129.2315	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5042	WDOTTS	.1141	ECFS	.7770	ECFSTD	.7770
WDOTO	.3984	WDOTOS	.0942	TOD	54.5455	TODS	67.0000
WDOTF	.1058	WDOTFS	.0198	TFD	55.4545	TFDS	67.0000
MR	3.7667	MRS	4.7470	POD	167.7790	PODS	40.0000
PC	15.7200	PCS	30.0000	PFD	209.4900	PFDS	40.0000
CSTAR	426.2568	CSTASD	407.2145	AE	2.1275	PAB	.0000
CSTAT	7984.2926	CSTATS	7627.6069	AT	.4255	ATTC	.4255
ETAC	.0534	ETACS	.0534	PCCI	3.4752	PCCIA	3.3972

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.1320 -- SEC

F	7.7240	PC	15.7000	FV	3493.6000	PFI	211.2400	POI	175.5400
PFII	255.0700	POII	200.3400	PTFO	250.3800	PTOO	196.1900	PDFO	40.9500
PDOO	28.6500	PFIC1	48.4000	POIC	42.5900	PFIC2	47.8800	SS	500.3000
PFTI	259.2300	POTI	205.6600	TFI	56.4091	TOI	55.5909	TC1	71.5929
TC2	63.1416	TC3	76.4159	TC4	-302.0000	TC5	68.0088	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	54.0909	TFTI	57.7273	TOTI	49.1818
	.0000		.0000		.0000		.0000	WFT	74.3520
WOT	19.2580		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.1320 -- SEC -- TIME R -- 1.9000 -- SEC

WDOTO	.3997	PNS	15.6893	PC	15.7000	F	7.7240	ISP	15.2820
WDOTF	.1058	CSTAR	424.6683	CF	1.1570	MR	3.7790	ZOX	.9898
WDOTT	.5054	DCSTAR	.0000	YF	.9512	YO	.9565	ZF	1.0105
IT	13.8334	INPNS	29.7414	MO	.7160	MF	.1912	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.1320 -- SEC -- TIME R -- 1.9000 -- SEC

F	7.7240	FSTD	14.7734	CF	1.1570	CFSTD	1.1573
ISP	15.2820	ISPS	129.0813	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5054	WDOTTS	.1145	ECFS	.7788	ECFSTD	.7788
WDOTO	.3997	WDOTOS	.0946	TOD	54.0909	TODS	67.0000
WDOTF	.1058	WDOTFS	.0198	TFD	55.4545	TFDS	67.0000
MR	3.7790	MRS	4.7662	POD	167.5400	PODS	40.0000
PC	15.7000	PCS	30.0000	PFD	209.4300	PFDS	40.0000
CSTAR	424.6683	CSTASD	405.5550	AE	2.1275	PAB	.0000
CSTAT	7979.9047	CSTATS	7620.7482	AT	.4255	ATTC	.4255
ETAC	.0532	ETACS	.0532	PCCI	3.4731	PCCIA	3.3951

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.2280 -- SEC

F	7.6930	PC	16.0400	FV	3498.0000	PFI	210.8800	POI	175.4300
PFII	255.1500	POII	200.2900	PTFO	250.3500	PTOO	196.2600	PDFO	40.9500
PDOO	28.6970	PFIC1	48.4300	POIC	42.5500	PFIC2	48.2200	SS	500.4000
PFTI	259.1200	POTI	205.6500	TFI	56.3636	TOI	55.3636	TC1	71.2389
TC2	62.6991	TC3	76.4159	TC4	-302.0000	TC5	68.0973	TC6	519.4968
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.0909	TOOI	54.0909	TFTI	57.7273	TOTI	48.8182
	.0000		.0000		.0000		.0000	WFT	74.3440
WOT	21.4800		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.2280 -- SEC -- TIME R -- 1.9960 -- SEC

WDOTO	.4000	PNS	16.0291	PC	16.0400	F	7.6930	ISP	15.2084
WDOTF	.1058	CSTAR	433.5158	CF	1.1279	MR	3.7815	ZOX	.9897
WDOTT	.5058	DCSTAR	.0000	YF	.9512	YO	.9564	ZF	1.0105
IT	14.5739	INPNS	31.2480	MO	.7544	MF	.2013	GAMMAO	1.4287
GAMMAF	1.4094								

BLOCK IV OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.2280 -- SEC -- TIME R -- 1.9960 -- SEC

F	7.6930	FSTD	14.4022	CF	1.1279	CFSTD	1.1283
ISP	15.2084	ISPS	125.7492	CFSV	1.4857	CFNSV	1.4861
WDOTT	.5058	WDOTTS	.1145	ECFS	.7592	ECFSTD	.7592
WDOTO	.4000	WDOTOS	.0947	TOD	54.0909	TODS	67.0000
WDOTF	.1058	WDOTFS	.0198	TFD	55.0909	TFDS	67.0000
MR	3.7815	MRS	4.7707	POD	167.5630	PODS	40.0000
PC	16.0400	PCS	30.0000	PFD	209.4000	PFDS	40.0000
CSTAR	433.5158	CSTASD	413.9612	AE	2.1275	PAB	.0000
CSTAT	7979.0264	CSTATS	7619.1161	AT	.4255	ATTC	.4255
ETAC	.0543	ETACS	.0543	PCCI	3.5494	PCCIA	3.4679

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.3280 -- SEC

F	1.7270	PC	14.6900	FV	506.3000	PFI	272.0700	POI	214.8200
PFII	271.8600	POII	212.3700	PTFO	271.0200	PTOO	214.4200	PDFO	4.2720
PDOO	2.3390	PFIC1	13.6100	POIC	14.5800	PFIC2	14.6900	SS	500.4000
PFTI	272.2700	POTI	211.7300	TFI	56.7273	TOI	55.6818	TC1	71.3717
TC2	64.3805	TC3	78.0973	TC4	1137.0000	TC5	69.7788	TC6	70.6195
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.4545	TOOI	54.5455	TFTI	57.7273	TOTI	49.0909
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	19.9460		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.3280 -- SEC -- TIME R -- 2.0960 -- SEC

WDOTO	.1244	PNS	14.6800	PC	14.6900	F	1.7270	ISP	10.6879
WDOTF	.0372	CSTAR	1242.8937	CF	.2765	MR	3.3468	ZOX	.9889
WDOTT	.1616	DCSTAR	.0000	YF	.9953	YO	.9968	ZF	1.0113
IT	15.0396	INPNS	32.7528	MO	.7859	MF	.2099	GAMMAO	1.4317
GAMMAF	1.4094								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.4280 -- SEC

F	.5320	PC	14.7200	FV	505.8000	PFI	276.4700	POI	217.0500
PFII	276.1400	POII	218.9300	PTFO	275.3100	PTOO	216.8500	PDFO	.0370
PDOO	.0030	PFIC1	14.8500	POIC	14.6400	PFIC2	14.7900	SS	500.2000
PFTI	276.2000	POTI	216.4900	TFI	57.4091	TOI	55.8182	TC1	71.4602
TC2	65.1770	TC3	78.8496	TC4	1137.0000	TC5	70.1770	TC6	71.0619
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.8182	TOOI	54.5455	TFTI	58.1818	TOTI	48.8182
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	9.2140		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.4280 -- SEC -- TIME R -- 2.1960 -- SEC

WDOTO	.0045	PNS	14.7100	PC	14.7200	F	.5320	ISP	66.5232
WDOTF	.0035	CSTAR	25164.1487	CF	.0850	MR	1.2839	ZOX	.9887
WDOTT	.0080	DCSTAR	.0000	YF	1.0000	YO	1.0000	ZF	1.0115
IT	15.1065	INPNS	34.2255	MO	.7894	MF	.2108	GAMMAO	1.4322
GAMMAF	1.4093								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.5280 -- SEC

F	.4620	PC	14.6900	FV	506.1000	PFI	275.5400	POI	215.1300
PFII	275.2600	POII	215.7600	PTFO	274.4400	PTOO	215.0600	PDFO	.0730
PDOO	.0130	PFIC1	14.8000	POIC	14.6000	PFIC2	14.7300	SS	500.2000
PFTI	275.3000	POTI	216.0200	TFI	57.8636	TOI	56.0000	TC1	71.3274
TC2	65.1770	TC3	78.9823	TC4	1137.0000	TC5	69.9557	TC6	70.8407
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	55.9091	TOOI	54.6364	TFTI	58.1818	TOTI	48.4545
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	6.7360		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.5280 -- SEC -- TIME R -- 2.2960 -- SEC

WDOTO	.0093	PNS	14.6800	PC	14.6900	F	.4620	ISP	32.4703
WDOTF	.0049	CSTAR	14114.9630	CF	.0740	MR	1.8978	ZOX	.9888
WDOTT	.0142	DCSTAR	.0000	YF	.9999	YO	1.0000	ZF	1.0115
IT	15.1592	INPNS	35.6958	MO	.7903	MF	.2112	GAMMAO	1.4318
GAMMAF	1.4093								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.6280 -- SEC

F	.1290	PC	14.7100	FV	506.1000	PFI	275.0200	POI	215.5200
PFII	274.7500	POII	215.6900	PTFO	273.9400	PTOO	215.4300	PDFO	.0690
PDOO	.0080	PFIC1	14.7600	POIC	14.6100	PFIC2	14.6900	SS	500.4000
PFTI	274.8200	POTI	215.8900	TFI	58.1818	TOI	56.1364	TC1	71.3274
TC2	65.3982	TC3	79.0265	TC4	1137.0000	TC5	70.0000	TC6	70.8407
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.2727	TOOI	54.8182	TFTI	58.2727	TOTI	48.7273
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	6.6400		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.6280 -- SEC -- TIME R -- 2.3960 -- SEC

WDOTO	.0073	PNS	14.7000	PC	14.7100	F	.1290	ISP	10.6765
WDOTF	.0048	CSTAR	16644.2627	CF	.0206	MR	1.5343	ZOX	.9888
WDOTT	.0121	DCSTAR	.0000	YF	.9999	YO	1.0000	ZF	1.0114
IT	15.1906	INPNS	37.1630	MO	.7912	MF	.2117	GAMMAO	1.4319
GAMMAF	1.4093								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.7280 -- SEC

F	.3240	PC	14.7200	FV	505.7000	PFI	274.6900	POI	215.7400
PFII	274.3900	POII	216.4700	PTFO	273.5900	PTOO	215.6300	PDFO	.0640
PDOO	.0060	PFIC1	14.7000	POIC	14.6300	PFIC2	14.6900	SS	500.3000
PFTI	274.4800	POTI	215.7500	TFI	58.5000	TOI	56.2273	TC1	71.3717
TC2	65.3540	TC3	79.1150	TC4	1137.0000	TC5	70.0000	TC6	70.7080
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.3636	TOOI	55.0000	TFTI	58.3636	TOTI	48.8182
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	5.8380		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.7280 -- SEC -- TIME R -- 2.4960 -- SEC

WDOTO	.0063	PNS	14.7100	PC	14.7200	F	.3240	ISP	29.6564
WDOTF	.0046	CSTAR	18420.1643	CF	.0518	MR	1.3810	ZOX	.9888
WDOTT	.0109	DCSTAR	.0000	YF	.9999	YO	1.0000	ZF	1.0114
IT	15.2241	INPNS	38.6325	MO	.7920	MF	.2122	GAMMAO	1.4319
GAMMAF	1.4093								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.8280 -- SEC

F	.2140	PC	14.7000	FV	505.6000	PFI	274.4000	POI	215.2200
PFII	274.1100	POII	215.7900	PTFO	273.3000	PTOO	215.1200	PDFO	.0530
PDOO	.0090	PFIC1	14.6700	POIC	14.6000	PFIC2	14.6500	SS	500.2000
PFTI	274.2100	POTI	215.6000	TFI	58.4545	TOI	56.0454	TC1	71.2389
TC2	65.4425	TC3	79.0265	TC4	1137.0000	TC5	69.9115	TC6	70.4867
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.3636	TOOI	54.7273	TFTI	58.2727	TOTI	48.6364
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	5.0920		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.8280 -- SEC -- TIME R -- 2.5960 -- SEC

WDOTO	.0078	PNS	14.6900	PC	14.7000	F	.2140	ISP	17.9423
WDOTF	.0042	CSTAR	16849.8254	CF	.0342	MR	1.8579	ZOX	.9888
WDOTT	.0119	DCSTAR	.0000	YF	.9999	YO	1.0000	ZF	1.0114
IT	15.2500	INPNS	40.1019	MO	.7928	MF	.2126	GAMMAO	1.4318
GAMMAF	1.4093								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.9280 -- SEC

F	.2760	PC	14.6800	FV	506.2000	PFI	274.2200	POI	215.3200
PFII	273.9000	POII	215.7300	PTFO	273.1000	PTOO	215.2200	PDFO	.0470
PDOO	.0090	PFIC1	14.6600	POIC	14.6100	PFIC2	14.6500	SS	500.3000
PFTI	274.0100	POTI	215.5400	TFI	58.7727	TOI	56.2727	TC1	71.3274
TC2	65.8849	TC3	79.0708	TC4	1137.0000	TC5	69.9115	TC6	70.5752
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.4545	TOOI	55.0000	TFTI	58.5454	TOTI	48.8182
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	5.2420		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 7.9280 -- SEC -- TIME R -- 2.6960 -- SEC

WDOTO	.0078	PNS	14.6700	PC	14.6800	F	.2760	ISP	23.6267
WDOTF	.0039	CSTAR	17180.4023	CF	.0442	MR	1.9737	ZOX	.9889
WDOTT	.0117	DCSTAR	.0000	YF	.9999	YO	1.0000	ZF	1.0114
IT	15.2759	INPNS	41.5695	MO	.7936	MF	.2130	GAMMAO	1.4318
GAMMAF	1.4092								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.0280 -- SEC

F	.2330	PC	14.7200	FV	505.9000	PFI	274.0700	POI	215.4900
PFII	273.7900	POII	215.9900	PTFO	272.9800	PTOO	215.2900	PDFO	.0420
PDOO	.0100	PFIC1	14.6900	POIC	14.6600	PFIC2	14.6600	SS	500.3000
PFTI	273.8800	POTI	215.4600	TFI	58.8636	TOI	56.5000	TC1	71.3274
TC2	65.9734	TC3	79.0265	TC4	1137.0000	TC5	70.0000	TC6	70.6637
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.4545	TOOI	55.0000	TFTI	58.4545	TOTI	49.0909
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	5.4060		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.0280 -- SEC -- TIME R -- 2.7960 -- SEC

WDOTO	.0082	PNS	14.7100	PC	14.7200	F	.2330	ISP	19.6016
WDOTF	.0037	CSTAR	16929.9480	CF	.0372	MR	2.2016	ZOX	.9889
WDOTT	.0119	DCSTAR	.0000	YF	1.0000	YO	1.0000	ZF	1.0114
IT	15.2990	INPNS	43.0391	MO	.7945	MF	.2133	GAMMAO	1.4318
GAMMAF	1.4092								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.1280 -- SEC

F	.2570	PC	14.7200	FV	505.4000	PFI	273.9400	POI	215.1300
PFII	273.6200	POII	215.6300	PTFO	272.8400	PTOO	215.0100	PDFO	.0370
PDOO	.0090	PFIC1	14.6300	POIC	14.5700	PFIC2	14.6300	SS	500.2000
PFTI	273.7600	POTI	215.3900	TFI	58.8636	TOI	56.3636	TC1	71.2389
TC2	65.9292	TC3	78.9823	TC4	1137.0000	TC5	69.9115	TC6	70.2655
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.3636	TOOI	55.0000	TFTI	58.4545	TOTI	48.7273
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	3.7740		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.1280 -- SEC -- TIME R -- 2.8960 -- SEC

WDOTO	.0077	PNS	14.7100	PC	14.7200	F	.2570	ISP	22.8776
WDOTF	.0035	CSTAR	17914.2332	CF	.0411	MR	2.2242	ZOX	.9889
WDOTT	.0112	DCSTAR	.0000	YF	1.0000	YO	1.0000	ZF	1.0114
IT	15.3214	INPNS	44.5103	MO	.7955	MF	.2137	GAMMAO	1.4318
GAMMAF	1.4093								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.2280 -- SEC

F	.1550	PC	14.6800	FV	506.0000	PFI	273.8100	POI	215.1400
PFII	273.5000	POII	215.6100	PTFO	272.7200	PTOO	215.0300	PDFO	.0310
PDOO	.0080	PFIC1	14.6200	POIC	14.5900	PFIC2	14.6200	SS	500.3000
PFTI	273.6600	POTI	215.3000	TFI	59.0000	TOI	56.4545	TC1	71.2389
TC2	66.2389	TC3	78.9380	TC4	1137.0000	TC5	69.9115	TC6	70.2655
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.3636	TOOI	55.0000	TFTI	58.4545	TOTI	48.9091
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	3.6160		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK III OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.2280 -- SEC -- TIME R -- 2.9960 -- SEC

WDOTO	.0073	PNS	14.6700	PC	14.6800	F	.1550	ISP	14.7687
WDOTF	.0032	CSTAR	19122.6902	CF	.0248	MR	2.2916	ZOX	.9889
WDOTT	.0105	DCSTAR	.0000	YF	1.0000	YO	1.0000	ZF	1.0114
IT	15.3419	INPNS	45.9783	MO	.7963	MF	.2140	GAMMAO	1.4318
GAMMAF	1.4093								

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.3280 -- SEC

F	.1920	PC	14.7200	FV	506.1000	PFI	273.7600	POI	215.2900
PFII	273.4700	POII	215.7700	PTFO	272.6800	PTOO	215.1100	PDFO	.0290
PDOO	.0150	PFIC1	14.6700	POIC	14.6300	PFIC2	14.6400	SS	500.3000
PFTI	273.5600	POTI	215.2900	TFI	59.1364	TOI	56.5454	TC1	71.2389
TC2	66.5487	TC3	78.9823	TC4	1133.5184	TC5	69.9557	TC6	70.3540
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.5454	TOOI	55.0909	TFTI	58.4545	TOTI	49.0909
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	4.4900		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.4280 -- SEC

F	.2120	PC	14.7200	FV	505.5000	PFI	273.7100	POI	215.0900
PFII	273.3700	PDII	215.5700	PTFO	272.6000	PTOO	214.9100	PDFO	.0310
PDOO	.0140	PFIC1	14.6600	POIC	14.6200	PFIC2	14.6400	SS	500.2000
PFTI	273.5300	PDTI	215.2600	TFI	59.1364	TOI	56.5909	TC1	71.2832
TC2	66.4602	TC3	78.8496	TC4	1083.3954	TC5	70.0442	TC6	70.3540
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.8182	TOOI	55.0000	TFTI	58.4545	TOTI	48.9091
	.0000		.0000		.0000		.0000	WFT	81.9000
WOT	3.0140		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.5280 -- SEC

F	.1320	PC	14.6600	FV	505.9000	PFI	273.5900	POI	215.0600
PFII	273.3100	PDII	215.5200	PTFO	272.5300	PTOO	214.9300	PDFO	.0260
PDOO	.0110	PFIC1	14.6200	POIC	14.6100	PFIC2	14.6300	SS	500.3000
PFTI	273.4300	PDTI	215.1600	TFI	59.2273	TOI	56.6818	TC1	71.2832
TC2	66.5487	TC3	78.6726	TC4	1037.6845	TC5	69.9557	TC6	70.1770
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.3636	TOOI	55.0000	TFTI	58.3636	TOTI	48.8182
	.0000		.0000		.0000		.0000	WFT	80.1480
WOT	3.4900		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1500.8000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.6280 -- SEC

F	.2550	PC	14.6900	FV	506.3000	PFI	273.5500	POI	215.1500
PFII	273.2500	PDII	215.6200	PTFO	272.4900	PTOO	214.9800	PDFO	.0250
PDOO	.0150	PFIC1	14.6200	POIC	14.6600	PFIC2	14.6500	SS	500.6000
PFTI	273.3900	PDTI	215.1600	TFI	59.3182	TOI	56.7273	TC1	71.3717
TC2	66.8142	TC3	78.6726	TC4	996.1155	TC5	70.0885	TC6	70.4867
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.6364	TOOI	55.0909	TFTI	58.4545	TOTI	49.2727
	.0000		.0000		.0000		.0000	WFT	77.6160
WOT	4.2440		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.7280 -- SEC

F	.0960	PC	14.7200	FV	505.8000	PFI	273.5200	POI	214.9700
PFII	273.2000	POII	215.5200	PTFO	272.4500	PTOO	214.8300	PDFO	.0230
PDOO	.0140	PFIC1	14.6700	POIC	14.6500	PFIC2	14.6600	SS	500.4000
PFTI	273.3600	POTI	215.1500	TFI	59.2727	TOI	56.7727	TC1	71.3274
TC2	66.8584	TC3	78.5841	TC4	958.1181	TC5	69.9557	TC6	70.3097
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.7273	TOOI	55.0909	TFTI	58.4545	TOTI	49.1818
	.0000		.0000		.0000		.0000	WFT	75.2320
WOT	2.1400		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

BLOCK II OUTPUT -- RUN NO. -- 001501 -- TIME C -- 8.8280 -- SEC

F	.2490	PC	14.6700	FV	505.9000	PFI	273.4600	POI	214.9400
PFII	273.1600	POII	215.4200	PTFO	272.3700	PTOO	214.7700	PDFO	.0190
PDOO	.0130	PFIC1	14.6200	POIC	14.6100	PFIC2	14.6300	SS	500.5000
PFTI	273.2900	POTI	215.0700	TFI	59.2273	TOI	56.6818	TC1	71.2832
TC2	66.8584	TC3	78.4956	TC4	923.3922	TC5	69.9115	TC6	70.0442
	.0000		.0000		.0000		.0000		.0000
	.0000	TFOI	56.4545	TOOI	55.0000	TFTI	58.3636	TOTI	49.0000
	.0000		.0000		.0000		.0000	WFT	73.0000
WOT	2.4520		.0000		.0000		.0000		.0000
	.0000		.0000		.0000		.0000	RUNNO	1501.0000

```
****************************************************************************************************
*
*            END PROCESSING PULSE NO. --  1 -- RUN NO. -- 001501 -- ENGINE ON -- 1.9960 -- SEC
*
****************************************************************************************************
```

```
∇  XQT CUR                                        10 JUN 70          16&29& 2.389
    1.   ERS                                                          16&29& 2.911
    2.   IN  Y                                                        16&29& 2.911

       END OF FILE -- UNIT Y
    3.   TRI Y                                                        16&29& 4.997

       END CUR LCC 1102-0038 L8


∇  XQT TRWPLT                                     10 JUN 70          16&29& 4.710
```

```
ISCALX=1
XLO=0.
XHI=10.
ISCALY=1
YLO=0.
YHI=100.
XLABEL=ID= COMPUTER TIME  SEC
YLABEL=ID= THRUST  LBS
TITLE=ID=  THRUST  (LBS)
PLOT=TC,1,F,1,ENDLST
ENDPLT
YLO=0.
YHI=100.
YLABEL=ID= CHAMBER PRESSURE  PSIA
TITLE=ID=  CHAMBER PRESSURE  (PSIA)
PLOT=TC,1,PC,1,ENDLST
ENDPLT
YLO=0.
YHI=300.
YLABEL=ID= ENGINE SPECIFIC IMPULSE  SEC
TITLE=ID=  ENGINE SPECIFIC IMPULSE  (SEC)
PLOT=TC,2,ISP,2,ENDLST
ENDPLT
XLO=0.
XHI=20.
YLO=0.
YHI=10000.
XLABEL=ID= TOTAL IMPULSE
YLABEL=ID= CHARACTERISTIC EXHAUST VELOCITY  FT/SEC
TITLE=ID=  CHARACTERISTIC EXHAUST VELOCITY  (FT/SEC)
PLOT=IT,2,CSTAR,2,ENDLST
ENDPLT
XHI=10.
YHI=600.
XLABEL=ID= COMPUTER TIME  SEC
YLABEL=ID= STANDARDIZED ENGINE SPECIFIC IMPULSE  SEC
TITLE=ID=  STANDARDIZED ENGINE SPECIFIC IMPULSE  (SEC)
PLOT=TC,2,ISPS,3,ENDLST
ENDPLT
ENDFIL
```

MICROFILM PLOT COMPLETED

MICROFILM PLOT COMPLETED

MICROFILM PLOT COMPLETED

MICROFILM PLOT COMPLETED

MICROFILM PLOT COMPLETED
ENDRUN

APPENDIX 4

This appendix presents a complete listing of the HEPCAT program. Information pertaining to the TRW plot program may be found in TRW HCC report No. 3141.20-10, titled: "TRW Generalized Plot Program Input Manual," dated May 1969.

```
&     FOR,*    HD011C,HD011C                                          14 JUL 70          17& 5&45.392
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&05&45

   MAIN PROGRAM

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001   *CODE   000122
        0000   *DATA   000004
        0002   *BLANK  000000
        0003   FILES   000014
        0004   FLAGS   000005
        0005   ROWS    000015
        0006   UNITS   000004


   EXTERNAL REFERENCES (BLOCK, NAME)

        0007   CR2TAP
        0010   CONPUT
        0011   CHEWER
        0012   FILTR1
        0013   FILTR2
        0014   JHYDE
        0015   SWAGER
        0016   OUTPUT
        0017   NWEF$
        0020   NSTOP$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000004 10L      0001   000112 163G     0001   000030 20L      0001   000037 30L      0001   000060 40L
    0001   000107 50L      0001   000116 70L      0003 I 000000 BEGFIL   0000 I 000000 I        0005 I 000000 IBEGIN
    0003 I 000001 IBL      0003 I 000002 IDUMP    0005 I 000001 IFV      0003 I 000003 ILINE    0005 I 000002 INITL
    0003 I 000004 INT      0005 I 000003 ION      0006 I 000000 IOTAPE   0003 I 000005 IPC      0003 I 000006 IPLOT
    0005 I 000004 IQUIT    0005 I 000005 IROW     0004 I 000000 ISCAN    0004 I 000001 ISEND    0004 I 000002 ITON
```

```
0005 I 000006 JEND      0005 I 000007 JON       0005 I 000010 JROW      0005 I 000011 KKPBEG    0005 I 000012 KKPEND
0005 I 000013 KKSAVE    0004 I 000003 LAST      0004 I 000004 LOOK      0005 I 000014 LSTPTS    0006 I 000001 MICROT
0003 I 000007 MLINE     0003 I 000010 MXFILE    0003 I 000011 NDP       0003 I 000012 NLINES    0003 I 000013 NP
0006 I 000002 PLTAPE    0006 I 000003 UNIT
```

```
00101          INTEGER           BEGFIL,PLTAPE,UNIT                                  HD010000
00103          COMMON / FILES  / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE          HD010001
00103         1                , MXFILE,NDP,NLINES,NP                                HD010002
00104          COMMON / FLAGS  / ISCAN,ISEND,ITON,LAST,LOOK                          HD010003
00105          COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW       HD010004
00105         1                , KKPBEG,KKPEND,KKSAVE,LSTPTS                         HD010005
00106          COMMON / UNITS  / IOTAPE,MICROT,PLTAPE,UNIT                           HD010006
00106    C * * PUT DATA DECK ON TAPE...                                              HD010007
00107          CALL CR2TAP                                                           HD010008
00107    C * * READ IN CHANNEL DATA...                                               HD010009
00110          CALL CDNPUT                                                           HD010010
00110    C * * UNPACK DATA...                                                        HD010011
00111       10 CONTINUE                                                              HD010012
00112          CALL CHEWER                                                           HD010013
00113          IF (LAST.EQ.1) GO TO 30                                               HD010014
00113    C * * CHECK FOR END OF JOB...                                               HD010015
00115          IF (INT.EQ.-1) GO TO 50                                               HD010016
00115    C * * CHECK FOR DUMP OF DATA TAPE...                                        HD010017
00117          IF (IDUMP.EQ.1) GO TO 30                                              HD010018
00117    C * * DO FIRST COMPRESSION...                                               HD010019
00121          CALL FILTR1                                                           HD010020
00122          IF (LOOK.EQ.1) GO TO 10                                               HD010021
00124       20 CONTINUE                                                              HD010022
00124    C * * DO SECOND COMPRESSION...                                              HD010023
00125          CALL FILTR2                                                           HD010024
00126          IF (ISEND.EQ.1) GO TO 30                                              HD010025
00130          GO TO 10                                                              HD010026
00131       30 CONTINUE                                                              HD010027
00131    C * * SCALE DATA...                                                         HD010028
00132          CALL JHYDE                                                            HD010029
00132    C * * CHECK FOR DUMP OF DATA...                                             HD010030
00133          IF (IDUMP.EQ.1) GO TO 40                                              HD010031
00135          IF (ION.EQ.0) GO TO 40                                                HD010032
```

```
00137         IF (JON.EQ.0) GO TO 40                                  HD010033
00141         IF (IQUIT.GE.99999) GO TO 40                            HD010034
00141   C * * DO ENGINEERING CALCULATIONS...                          HD010035
00143         CALL SWAGER                                             HD010036
00143   C * * OUTPUT RESULTS...                                       HD010037
00144      40 CONTINUE                                                HD010038
00145         IF (ION .EQ. 1) JON = 1                                 HD010039
00147         IF (ION .EQ.-1) JON =-1                                 HD010040
00151         CALL OUTPUT                                             HD010041
00152         IF (IDUMP.EQ.1) GO TO 10                                HD010042
00154         IF (LAST.EQ.1) GO TO 10                                 HD010043
00156         GO TO 20                                                HD010044
00156   C * * PUT LAST END OF FILE MARK ON THE PLOT TAPE...            HD010045
00157      50 CONTINUE                                                HD010046
00160         IF (IPLOT.EQ.0) GO TO 70                                HD010047
00162         DO 60 I=1,5                                             HD010048
00165         END FILE PLTAPE                                         HD010049
00166      60 CONTINUE                                                HD010050
00170      70 CONTINUE                                                HD010051
00171         STOP                                                    HD010052
00172         END                                                     HD010053

     END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
   HD011C          SYMBOLIC                    25 JUN 70  12&26&37  0  01436670   14    54  (DELETED)
   HD011C  CODE    RELOCATABLE                 25 JUN 70  12&26&37  1  01440254   36     1  (DELETED)
                                                                    0  01440320   14    10
&      HDG      HD011C-AVPGR
```

```
&     FOR,*     AVRGR,AVRGR                                                                  14 JUL 70            17& 5&46.646
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&05&46

   SUBROUTINE AVRGR      ENTRY POINT 000052

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001    *CODE    000061
        0000    *DATA    000025
        0002    *BLANK   015607


   EXTERNAL REFERENCES (BLOCK, NAME)

        0003    NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000021 105G        0001   000022 110G        0002 R 000000 ENGDAT      0002 R 001604 ENGRAT      0002 R 002506 FILT1
    0002 R 006476 FILT2       0000 I 000001 I           0000 I 000000 MM          0002 R 007433 STORE


00101      1*          SUBROUTINE AVRGR (KK,ISTART,ISTOP)                          AVRG0000
00103      2*          COMMON          ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)      AVRG0001
00103      3*         1              , FILT2(9,53),STORE(60,53)                     AVRG0002
00104      4*          DO 20 MM=1,50                                                AVRG0003
00107      5*          DO 10 I=ISTART,ISTOP                                         AVRG0004
00112      6*          FILT2(KK,MM)  = FILT2(KK,MM) + FILT1(I,MM)                   AVRG0005
00113      7*       10 CONTINUE                                                     AVRG0006
00115      8*          FILT2(KK,MM)  = FILT2(KK,MM) / 5.0                           AVRG0007
00116      9*       20 CONTINUE                                                     AVRG0008
00120     10*          RETURN                                                       AVRG0009
00121     11*          END                                                          AVRG0010
```

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   END OF UNIVAC 1108 FORTRAN V COMPILATION.      0 *DIAGNOSTIC* MESSAGE(S)
  AVRGR          SYMBOLIC                         25 JUN 70  12&26&38  0  01440534   14    11  (DELETED)
  AVRGR   CODE   RELOCATABLE                      25 JUN 70  12&26&38  1  01440766   24     1  (DELETED)
                                                                       0  01441016   14     6
8    HDG     HD011C-BLKDTA
```

```
&     FOR,*    BLKDTA,BLKDTA                                                          14 JUL 70            17& 5&47.661
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&05&47

   BLOCK DATA

   STORAGE USED (BLOCK, NAME, LENGTH)

         0003   COMPT1   000006
         0004   ENG      000022
         0005   FACTOR   006533
         0006   FILES    000014
         0007   FLAGS    000005
         0010   FUNCTN   000310
         0011   LABELS   000320
         0012   ROWS     000015
         0013   TIME     000001
         0014   UNITS    000004

   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0004 R 000000 AC        0004 R 000001 AT        0006 I 000000 BEGFIL    0005 R 000000 BIAS      0004 R 000002 CF1
    0004 R 000003 CF2       0004 R 000004 CF3       0004 R 000005 CF4       0010 R 000000 CX        0010 R 000144 CY
    0004 R 000006 DCSTAR    0004 R 000007 DHO       0004 R 000010 DOO       0004 R 000011 DPH       0004 R 000012 DPO
    0002 R 000000 ENGDAT    0002 R 001604 ENGRAT    0002 R 002506 FILT1     0002 R 006476 FILT2     0004 R 000013 G
    0004 R 000014 GAMMA     0000 I 000000 I         0005 I 000063 IB        0012 I 000000 IBEGIN    0006 I 000001 IBL
    0005 I 000146 IC        0006 I 000002 IDUMP     0012 I 000001 IFV       0006 I 000003 ILINE     0012 I 000002 INITL
    0006 I 000004 INT       0012 I 000003 ION       0014 I 000000 IOTAPE    0006 I 000005 IPC       0006 I 000006 IPLOT
    0011 I 000000 IPOINT    0012 I 000004 IQUIT     0012 I 000005 IROW      0005 I 000231 IRUNNO    0005 I 000232 IS
    0007 I 000000 ISCAN     0007 I 000001 ISEND     0007 I 000002 ITON      0000 I 000001 J         0012 I 000006 JEND
    0012 I 000007 JON       0012 I 000010 JROW      0004 R 000015 K         0004 R 000016 KF        0012 I 000011 KKPBEG
    0012 I 000012 KKPEND    0012 I 000013 KKSAVE    0004 R 000017 KO        0011 I 000010 LABELS    0011 I 000072 LABENS
    0011 I 000236 LABRAT    0007 I 000003 LAST      0007 I 000004 LOOK      0012 I 000014 LSTPTS    0014 I 000001 MICROT
    0006 I 000007 MLINE     0004 R 000020 MWH       0004 R 000021 MWO       0006 I 000010 MXFILE    0013 I 000000 N
    0006 I 000011 NDP       0006 I 000012 NLINES    0006 I 000013 NP        0005 I 000315 NP1       0005 I 000400 NP2
    0003 R 000000 PAB1      0003 R 000001 PCS1      0003 R 000002 PFDS1     0014 I 000002 PLTAPE    0003 R 000003 PODS1
    0005 R 000464 SCALF     0002 R 007433 STORE     0005 R 000547 TABX1     0005 R 001545 TABX2     0005 R 003541 TABY1
    0005 R 004537 TABY2     0003 R 000004 TFDS1     0003 R 000005 TODS1     0014 I 000003 UNIT
```

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00101          BLOCK DATA                                                   BLKD0000
00102          INTEGER          BEGFIL,PLTAPE,UNIT                          BLKD0001
00103          REAL             K,KF,KO,MWH,MWO                             BLKD0002
00104          COMMON           ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)     BLKD0003
00104         1               , FILT2(9,53),STORE(60,53)                    BLKD0004
00105          COMMON / COMRT1 / PAB1,PCS1,PFDS1,PODS1,TFDS1,TODS1          BLKD0005
00106          COMMON / ENG    / AC,AT,CF1,CF2,CF3,CF4,DCSTAR,DHO,DOO,DPH,DPO,G BLKD0006
00106         1               , GAMMA,K,KF,KO,MWH,MWO                       BLKD0007
00107          COMMON / FACTOR / BIAS(51),IB(51),IC(51),IRUNNO,IS(51),NP1(51) BLKD0008
00107         1               , NP2(52),SCALE(51),TABX1(51,10),TABX2(51,20) BLKD0009
00107         2               , TABY1(51,10),TABY2(51,20)                   BLKD0010
00110          COMMON / FILES  / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE BLKD0011
00110         1               , MXFILE,NDP,NLINES,NP                        BLKD0012
00111          COMMON / FLAGS  / ISCAN,ISEND,ITON,LAST,LOOK                 BLKD0013
00112          COMMON / FUNCTN / CX(100),CY(100)                            BLKD0014
00113          COMMON / LABELS / IPOINT(8),LABELS(50),LABENS(100),LABRAT(50) BLKD0015
00114          COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW BLKD0016
00114         1               , KKPBEG,KKPEND,KKSAVE,LSTPTS                 BLKD0017
00115          COMMON / TIME   / N                                          BLKD0018
00116          COMMON / UNITS  / IOTAPE,MICROT,PLTAPE,UNIT                  BLKD0019
00117          DATA BEGFIL / 3 /                                            BLKD0020
00121          DATA (BIAS(I),I=1,51) / 51*0.0 /                             BLKD0021
00123          DATA CF1 / 0.1603 /                                          BLKD0022
00125          DATA CF2 / 0.9905 /                                          BLKD0023
00127          DATA CF3 / 0.0031 /                                          BLKD0024
00131          DATA CF4 / 74.000 /                                          BLKD0025
00133          DATA (CX(I),I=1,100)/ 1.0000 ,1.0001 ,1.0004 ,1.0008 ,1.0014 BLKD0026
00133         *                    ,1.0023 ,1.0033 ,1.0045 ,1.0059 ,1.0075 BLKD0027
00133         *                    ,1.0094 ,1.0114 ,1.0136 ,1.0161 ,1.0188 BLKD0028
00133         *                    ,1.0217 ,1.0249 ,1.0283 ,1.0320 ,1.0359 BLKD0029
00133         *                    ,1.0401 ,1.0446 ,1.0493 ,1.0543 ,1.0596 BLKD0030
00133         *                    ,1.0653 ,1.0712 ,1.0775 ,1.0841 ,1.0911 BLKD0031
00133         *                    ,1.0984 ,1.1062 ,1.1143 ,1.1228 ,1.1317 BLKD0032
00133         *                    ,1.1411 ,1.1509 ,1.1613 ,1.1721 ,1.1834 BLKD0033
00133         *                    ,1.1953 ,1.2076 ,1.2209 ,1.2346 ,1.2490 BLKD0034
00133         *                    ,1.2640 ,1.2798 ,1.2964 ,1.3138 ,1.3320 BLKD0035
00133         *                    ,1.3512 ,1.3713 ,1.3924 ,1.4147 ,1.4381 BLKD0036
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00133      *                  ,1.4627 ,1.4886 ,1.5159 ,1.5448 ,1.5752       BLKD0037
00133      *                  ,1.6073 ,1.6414 ,1.6774 ,1.7156 ,1.7561       BLKD0038
00133      *                  ,1.7991 ,1.8450 ,1.8938 ,1.9459 ,2.0016       BLKD0039
00133      *                  ,2.0613 ,2.1254 ,2.1943 ,2.2686 ,2.3488       BLKD0040
00133      *                  ,2.4358 ,2.5304 ,2.6334 ,2.7462 ,2.8700       BLKD0041
00133      *                  ,3.0066 ,3.1579 ,3.3264 ,3.5151 ,3.7279       BLKD0042
00133      *                  ,3.9695 ,4.2461 ,4.5657 ,4.9393 ,5.3813       BLKD0043
00133      *                  ,5.9124 ,6.5623 ,7.3755 ,8.4220 ,9.8185       BLKD0044
00133      *                  ,11.775 ,14.711 ,19.607 ,29.402 ,58.795 /     BLKD0045
00135       DATA (CY(I),I=1,100)/ 0.5531 ,0.5592 ,0.5654 ,0.5717 ,0.5779    BLKD0046
00135      *                  ,0.5841 ,0.5904 ,0.5967 ,0.6030 ,0.6093       BLKD0047
00135      *                  ,0.6156 ,0.6219 ,0.6282 ,0.6346 ,0.6409       BLKD0048
00135      *                  ,0.6472 ,0.6536 ,0.6599 ,0.6662 ,0.6726       BLKD0049
00135      *                  ,0.6789 ,0.6852 ,0.6915 ,0.6978 ,0.7041       BLKD0050
00135      *                  ,0.7103 ,0.7166 ,0.7228 ,0.7290 ,0.7352       BLKD0051
00135      *                  ,0.7414 ,0.7475 ,0.7536 ,0.7597 ,0.7657       BLKD0052
00135      *                  ,0.7717 ,0.7777 ,0.7836 ,0.7895 ,0.7954       BLKD0053
00135      *                  ,0.8012 ,0.8070 ,0.8127 ,0.8183 ,0.8239       BLKD0054
00135      *                  ,0.8295 ,0.8350 ,0.8405 ,0.8458 ,0.8512       BLKD0055
00135      *                  ,0.8564 ,0.8616 ,0.8667 ,0.8718 ,0.8768       BLKD0056
00135      *                  ,0.8817 ,0.8865 ,0.8913 ,0.8959 ,0.9005       BLKD0057
00135      *                  ,0.9050 ,0.9095 ,0.9138 ,0.9181 ,0.9222       BLKD0058
00135      *                  ,0.9263 ,0.9303 ,0.9341 ,0.9397 ,0.9416       BLKD0059
00135      *                  ,0.9452 ,0.9487 ,0.9520 ,0.9553 ,0.9585       BLKD0060
00135      *                  ,0.9615 ,0.9645 ,0.9673 ,0.9701 ,0.9727       BLKD0061
00135      *                  ,0.9752 ,0.9776 ,0.9798 ,0.9820 ,0.9840       BLKD0062
00135      *                  ,0.9859 ,0.9877 ,0.9894 ,0.9910 ,0.9924       BLKD0063
00135      *                  ,0.9937 ,0.9949 ,0.9960 ,0.9969 ,0.9977       BLKD0064
00135      *                  ,0.9984 ,0.9990 ,0.9994 ,0.9997 ,0.9999 /     BLKD0065
00137       DATA DCSTAR / 0.0 /                                             BLKD0066
00141       DATA ((ENGDAT(I,J),I=1,9),J=1,100) / 900*0.0 /                  BLKD0067
00143       DATA ((ENGRAT(I,J),I=1,9),J=1,50) / 450*0.0 /                   BLKD0068
00145       DATA ((FILT1(I,J),I=1,40),J=1,51) / 2040*0.0 /                  BLKD0069
00147       DATA ((FILT2(I,J),I=1,9),J=1,53) / 477*0.0 /                    BLKD0070
00151       DATA G / 32.1302 /                                              BLKD0071
00153       DATA GAMMA / 1.40 /                                             BLKD0072
00155       DATA (IB(I),I=1,51) / 51*000 /                                  BLKD0073
00157       DATA (IC(I),I=1,51) / 51*000 /                                  BLKD0074
00161       DATA IDUMP / 0 /                                                BLKD0075
00163       DATA IFV / 3 /                                                  BLKD0076
00165       DATA INT / 0 /                                                  BLKD0077
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00167     DATA ION / 0 /                                                  BLKD0078
00171     DATA IOTAPE / 2 /                                               BLKD0079
00173     DATA (IS(I),I=1,51) / 51*000 /                                  BLKD0080
00175     DATA ISCAN / 0 /                                                BLKD0081
00177     DATA ISEND / 1 /                                                BLKD0082
00201     DATA ITON / 0 /                                                 BLKD0083
00203     DATA JON / 0 /                                                  BLKD0084
00205     DATA K / 0.9993 /                                               BLKD0085
00207     DATA (LABELS(I),I=1,50) /                                       BLKD0086
00207    1 50*6H          /                                               BLKD0087
00211     DATA (LABENS(I),I=1,100) /                                      BLKD0088
00211    1 6HWDOTO ,6HPNS   ,6HPC    ,6HF     ,6HISP   ,6HWDOTF ,6HCSTAR , BLKD0089
00211    2 6HCF    ,6HMR    ,6HZOX   ,6HWDOTT ,6HDCSTAR,6HYF    ,6HYO    , BLKD0090
00211    3 6HZF    ,6HIT    ,6HINPNS ,6HMO    ,6HMF    ,6HGAMMAO,6HGAMMAF  BLKD0091
00211    4,79*6H          /                                               BLKD0092
00213     DATA (LABRAT(I),I=1,40) /                                       BLKD0093
00213    1 6HF     ,6HFSTD  ,6HCF    ,6HCFSTD ,6HISP   ,6HISPS  ,6HCFSV  , BLKD0094
00213    2 6HCFNSV ,6HWDOTT ,6HWDOTTS,6HECFS  ,6HECFSTD,6HWDOTO ,6HWDOTOS, BLKD0095
00213    3 6HTOD   ,6HTODS  ,6HWDOTF ,6HWDOTFS,6HTFD   ,6HTFDS  ,6HMR    , BLKD0096
00213    4 6HMRS   ,6HPOD   ,6HPODS  ,6HPC    ,6HPCS   ,6HPFD   ,6HPFDS  , BLKD0097
00213    5 6HCSTAR ,6HCSTASD,6HAE    ,6HPAB   ,6HCSTAT ,6HCSTATS,6HAT    , BLKD0098
00213    6 6HATTC  ,6HETAC  ,6HETACS                                      BLKD0099
00213    7,6HPCCI  ,6HPCCIA  /                                            BLKD0100
00215     DATA LAST  / 0 /                                                BLKD0101
00217     DATA LOOK / 0 /                                                 BLKD0102
00221     DATA LSTPTS / 50 /                                              BLKD0103
00223     DATA MICROT / 18 /                                              BLKD0104
00225     DATA MWH / 2.0160 /                                             BLKD0105
00227     DATA MWO / 32.000 /                                             BLKD0106
00231     DATA MXFILE / 3 /                                               BLKD0107
00233     DATA N / 0 /                                                    BLKD0108
00235     DATA NLINES / 41 /                                              BLKD0109
00237     DATA NP / 1 /                                                   BLKD0110
00241     DATA (NP1(I),I=1,51) / 51*000 /                                 BLKD0111
00243     DATA (NP2(I),I=1,51) / 51*000 /                                 BLKD0112
00245     DATA PAB1  / 0.0 /                                              BLKD0113
00247     DATA PCS1  / 30. /                                              BLKD0114
00251     DATA PFDS1 / 40. /                                              BLKD0115
00253     DATA PLTAPE / 8 /                                               BLKD0116
00255     DATA PODS1 / 40. /                                              BLKD0117
00257     DATA (SCALE(I),I=1,51) / 51*0.0 /                               BLKD0118
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00261    120*        DATA ((STORE(I,J),I=1,60),J=1,53) / 3180*0.0 /                 BLKD0119
00263    121*        DATA ((TABX1(I,J),I=1,51),J=1,10)  / 510*0.0 /                 BLKD0120
00265    122*        DATA ((TABX2(I,J),J=1,51),J=1,20)  / 1020*0.0 /                BLKD0121
00267    123*        DATA ((TABY1(I,J),I=1,51),J=1,10)  / 510*0.0 /                 BLKD0122
00271    124*        DATA ((TABY2(I,J),I=1,51),J=1,20)  / 1020*0.0 /                BLKD0123
00273    125*        DATA TFDS1 / 67. /                                             BLKD0124
00275    126*        DATA TODS1 / 67. /                                             BLKD0125
00277    127*        DATA UNIT / 9 /                                                BLKD0126
00301    128*        END                                                            BLKD0127

     END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
   BLKDTA          SYMBOLIC                          25 JUN 70  12&26&42  0  01441142   14   128  (DELETED)
   BLKDTA  CODE    RELOCATABLE                       25 JUN 70  12&26&42  1  01444542   60     1  (DELETED)
                                                                          0  01444636   14   994
&     HDG      HD011C-CONPUT
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                    HD011C-CONPUT                                                   DATE  140770  PAGE    18

&     FOR,*    CONPUT,CONPUT                                                                14 JUL 70            17& 5&50.871
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&05&51

   SUBROUTINE CONPUT    ENTRY POINT 000731

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001   *CODE    000745
         0000   *DATA    000611
         0002   *BLANK   000000
         0003   COMRAT   000052
         0004   COMRT1   000006
         0005   ENG      000022
         0006   FACTOR   006533
         0007   FILES    000014
         0010   LABELS   000320
         0011   ROWS     000015
         0012   UNITS    000004


   EXTERNAL REFERENCES (BLOCK, NAME)

         0013   NRDU$
         0014   NIO1$
         0015   NIO2$
         0016   NWDU$
         0017   NSTOP$
         0020   NREW$
         0021   NWBU$
         0022   NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000    000425 10F         0001    000127 110L        0001    000146 120L        0001    000161 130L        0001    000165 140L
    0001    000012 150G        0001    000204 150L        0001    000231 170L        0001    000054 171G        0001    000256 190L
    0000    000435 20F         0001    000345 210L        0001    000367 230L        0001    000372 240L        0001    000171 243G
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0001 000413 250L	0001 000210 256G	0001 000431 260L	0001 000222 266G	0001 000444 270L
0001 000235 277G	0001 000542 290L	0000 000437 30F	0001 000247 307G	0001 000547 310L
0001 000267 323G	0001 000554 330L	0001 000311 333G	0001 000321 341G	0001 000340 350G
0001 000561 350L	0001 000362 364G	0001 000566 370L	0001 000374 377G	0001 000573 390L
0000 000441 40F	0001 000607 400L	0001 000710 410L	0000 000452 50F	0001 000632 552G
0001 000657 566G	0000 000470 60F	0001 000704 602G	0000 000502 70F	0000 000514 80F
0000 000526 90F	0005 R 000000 AC	0003 R 000000 AE	0005 R 000001 AT	0003 R 000001 ATTC
0007 I 000000 BEGFIL	0006 R 000000 BIAS	0000 R 000407 BIASIN	0003 R 000002 CFNSV	0003 R 000003 CFSTD
0003 R 000004 CFSTDV	0003 R 000005 CFSV	0005 R 000002 CF1	0005 R 000003 CF2	0005 R 000004 CF3
0005 R 000005 CF4	0003 R 000006 CSTASD	0003 R 000007 CSTAT	0003 R 000010 CSTATS	0005 R 000006 DCSTAR
0005 R 000007 DHO	0005 R 000010 DOO	0003 R 000011 DPF	0003 R 000012 DPFS	0005 R 000011 DPH
0005 R 000012 DPO	0003 R 000013 DPOS	0003 R 000015 ECFS	0003 R 000014 ECFSTD	0003 R 000016 EPS
0003 R 000017 ETAC	0003 R 000020 FSTD	0005 R 000013 G	0005 R 000014 GAMMA	0000 I 000401 I
0006 I 000063 IB	0011 I 000000 IBEGIN	0007 I 000001 IBL	0000 I 000370 IBLANK	0006 I 000146 IC
0000 I 000375 ICOUNT	0000 I 000376 ICOUT1	0000 I 000402 ID	0007 I 000002 IDUMP	0000 I 000400 IER
0011 I 000001 IFV	0000 I 000371 IIFV	0000 I 000414 IL	0007 I 000003 ILINE	0000 I 000413 ILL
0000 I 000000 INAM	0000 I 000377 INDEX	0011 I 000002 INITL	0007 I 000004 INT	0011 I 000003 IDN
0012 I 000000 IOTAPE	0007 I 000005 IPC	0007 I 000006 IPLOT	0010 I 000000 IPOINT	0011 I 000004 IQUIT
0003 I 000021 IRATED	0011 I 000005 IROW	0006 I 000231 IRUNNO	0006 I 000232 IS	0003 I 000022 ISPS
0000 I 000010 IT	0000 I 000411 ITABL1	0000 I 000412 ITABL2	0000 I 000154 ITAB1	0000 I 000236 ITAB2
0000 I 000421 ITYPF	0000 I 000072 IT1	0000 I 000423 I23	0000 I 000424 I42	0000 I 000422 I52
0000 I 000415 J	0011 I 000006 JEND	0011 I 000007 JON	0011 I 000010 JROW	0005 R 000015 K
0005 R 000016 KF	0000 I 000372 KK	0011 I 000011 KKPBEG	0011 I 000012 KKPEND	0011 I 000013 KKSAVE
0005 R 000017 KO	0010 I 000010 LABELS	0010 I 000072 LABENS	0010 I 000236 LABRAT	0000 I 000416 LL
0011 I 000014 LSTPTS	0012 I 000001 MICROT	0007 I 000007 MLINE	0003 I 000023 MRS	0005 R 000020 MWH
0005 R 000021 MWO	0007 I 000010 MXFILE	0000 I 000420 N	0000 I 000403 NAME	0000 I 000404 NBIAS
0000 I 000406 NCALCR	0007 I 000011 NDP	0007 I 000012 NLINES	0007 I 000013 NP	0006 I 000315 NP1
0006 I 000400 NP2	0000 I 000405 NSCALE	0000 I 000417 NUMTAB	0003 R 000024 PAB	0004 R 000000 PAB1
0003 R 000025 PCCI	0003 R 000026 PCCIA	0003 R 000027 PCE	0003 R 000030 PCS	0004 R 000001 PCS1
0003 R 000031 PDO	0003 R 000032 PFD	0003 R 000033 PFDS	0004 R 000002 PFDS1	0012 I 000002 PLTAPE
0003 R 000034 PNSS	0003 R 000035 POD	0003 R 000036 PODS	0004 R 000003 PODS1	0003 R 000037 RFD
0003 R 000040 RFDS	0003 R 000041 ROD	0003 R 000042 RODS	0006 R 000464 SCALE	0000 R 000410 SCALED
0006 R 000547 TABX1	0000 R 000320 TABX11	0006 R 001545 TABX2	0006 R 003541 TABY1	0000 R 000344 TABY11
0006 R 004537 TABY2	0000 R 000373 TC	0003 R 000043 TFD	0003 R 000044 TFDS	0004 R 000004 TFDS1
0003 R 000045 TOD	0003 R 000046 TODS	0004 R 000005 TODS1	0000 R 000374 TR	0012 I 000003 UNIT
0003 R 000047 WDOTFS	0003 R 000050 WDOTOS	0003 R 000051 WDOTTS		

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00101      1*        SUBROUTINE CDNPUT                                          CDNP0000
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00103          INTEGER           BEGFIL,PLTAPE,UNIT                                  CDNP0001
00104          REAL              K,KF,KO,MWH,MWO                                     CDNP0002
00105          DIMENSION         INAM(8),IT(50),IT1(50),ITAB1(50),ITAB2(50)          CDNP0003
00105         1                , TABX11(20),TABY11(20)                              CDNP0004
00106          COMMON / COMPAT / AE,ATTC,CFNSV,CFSTD,CFSTDV,CFSV,CSTASD,CSTAT       CDNP0005
00106         1                , CSTATS,DPF,DPFS,DPOS,ECFSTD,ECFS,EPS,ETAC,FSTD     CDNP0006
00106         2                , IRATED,ISPS,MRS,PAB,PCCI,PCCIA,PCE,PCS,PDO,PFD     CDNP0007
00106         3                , PFDS,PNSS,POD,PODS,RFD,RFDS,ROD,RODS,TFD,TFDS      CDNP0008
00106         4                , TOD,TODS,WDOTFS,WDOTOS,WDOTTS                      CDNP0009
00107          COMMON / COMPT1 / PAB1,PCS1,PFDS1,PODS1,TFDS1,TODS1                  CDNP0010
00110          COMMON / ENG    / AC,AT,CF1,CF2,CF3,CF4,DCSTAR,DHO,DOO,DPH,DPO,G     CDNP0011
00110         1                , GAMMA,K,KF,KO,MWH,MWO                              CDNP0012
00111          COMMON / FACTOR / BIAS(51),IB(51),IC(51),IRUNNO,IS(51),NP1(51)       CDNP0013
00111         1                , NP2(52),SCALE(51),TABX1(51,10),TABX2(51,20)        CDNP0014
00111         2                , TABY1(51,10),TABY2(51,20)                          CDNP0015
00112          COMMON / FILES  / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE         CDNP0016
00112         1                , MXFILE,NDP,NLINES,NP                               CDNP0017
00113          COMMON / LABELS / IPOINT(8),LABELS(50),LABENS(100),LABRAT(50)        CDNP0018
00114          COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW      CDNP0019
00114         1                , KKPBEG,KKPEND,KKSAVE,LSTPTS                        CDNP0020
00115          COMMON / UNITS  / IOTAPE,MICROT,PLTAPE,UNIT                          CDNP0021
00116          DATA      IBLANK             / 6H                                   /CDNP0022
00120          DATA      IIFV               / 6HFV                                 /CDNP0023
00122          DATA      (INAM(KK),KK=1,8) / 6HF      ,6HPC     ,6HPTFO  ,6HPTOO    CDNP0024
00122         1                             , 6HPDFO  ,6HPDOO   ,6HTFOI  ,6HTOOI   /CDNP0025
00124          DATA      TC                 / 6HTC                                 /CDNP0026
00126          DATA      TP                 / 6HTR                                 /CDNP0027
00130       10 FORMAT(I2,1X,A6,3(1X,I1),1X,F9.3,1X,F9.4,1X,I3,1X,I3)                 CDNP0028
00131       20 FORMAT(I3,1X,I2)                                                      CDNP0029
00132       30 FORMAT(8F10.4)                                                        CDNP0030
00133       40 FORMAT(5F15.5/5F15.5/5F15.5/I1,I3,I2,I2,I3,I2,I2,63X,I2)              CDNP0031
00134       50 FORMAT(' TABLE NO.',I4,' NOT FOUND.  CHANNEL NO. REQUESTING CAL TACDNP0032
00134         1BLE WAS',I3,'.')                                                      CDNP0033
00135       60 FORMAT(' CHANNEL NO.',I3,' HAS SCALING AND CURVE FLAG SET')           CDNP0034
00136       70 FORMAT(' CHANNEL NO.',I3,' HAS NO SCALING OR CURVE FLAG SET')         CDNP0035
00137       80 FORMAT('OERRORS IN CARD INPUT HAVE CAUSED CANCELLATION OF RUN')       CDNP0036
00140       90 FORMAT('ODATA CHANNEL CARD WAS NOT INPUT FOR VARIABLE ',A6,' AND ICDNP0037
00140         1S REQUIRED IF THE ENGINEERING SUBROUTINE IS TO PRODUCE VALID RESULCDNP0038
00140         2TS.')                                                                 CDNP0039
00141          IF (INITL.EQ.1) GO TO 400                                             CDNP0040
00143          ICOUNT    = 0                                                         CDNP0041
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00144          ICOUT1    = 0                                                  CDNP0042
00145          INDEX     = 0                                                  CDNP0043
00146          IER       = 0                                                  CDNP0044
00147          DO 140 I=1,50                                                  CDNP0045
00152          READ (IOTAPE,10)ID,NAME,NBIAS,NSCALE,NCALCR,BIASIN,SCALED,ITABL1,ICDNP0046
00152         1TABL2                                                          CDNP0047
00165          IF (NAME.EQ.IBLANK) GO TO 130                                  CDNP0048
00167          LABELS(I) = NAME                                               CDNP0049
00170          DO 100 ILL=1,8                                                 CDNP0050
00173          IF (NAME .EQ. INAM(ILL)) IPOINT(ILL) = ID                      CDNP0051
00175      100 CONTINUE                                                       CDNP0052
00177          IF (NAME .EQ. IIFV) IFV = I                                    CDNP0053
00201          IB(ID)    = NBIAS                                              CDNP0054
00202          IS(ID)    = NSCALE                                             CDNP0055
00203          IC(ID)    = NCALCR                                             CDNP0056
00204          BIAS(ID)  = BIASIN                                             CDNP0057
00205          SCALE(ID) = SCALED                                             CDNP0058
00206          IF (NCALCR.NE.0.OR.NSCALE.NE.0) GO TO 110                      CDNP0059
00210          IER       = 1                                                  CDNP0060
00211          WRITE (6,70)ID                                                 CDNP0061
00214          GO TO 120                                                      CDNP0062
00215      110 CONTINUE                                                       CDNP0063
00216          IF (NCALCR.NE.NSCALE) GO TO 120                                CDNP0064
00220          IER       = 1                                                  CDNP0065
00221          WRITE (6,60)ID                                                 CDNP0066
00224          ID        = 51                                                 CDNP0067
00225      120 CONTINUE                                                       CDNP0068
00226          IF (NCALCR.LE.0) GO TO 140                                     CDNP0069
00230          ITAB1(I)  = ITABL1                                             CDNP0070
00231          ITAB2(I)  = ITABL2                                             CDNP0071
00232          IT(I)     = ITABL1                                             CDNP0072
00233          IT1(I)    = ITABL2                                             CDNP0073
00234          GO TO 140                                                      CDNP0074
00235      130 CONTINUE                                                       CDNP0075
00236          IS(ID)    = 2                                                  CDNP0076
00237          SCALE(ID) = 0.                                                 CDNP0077
00240      140 CONTINUE                                                       CDNP0078
00242          DO 150 I=1,8                                                   CDNP0079
00245          IF (IPOINT(I).NE.0) GO TO 150                                  CDNP0080
00247          IER       = 1                                                  CDNP0081
00250          WRITE (6,90)INAM(I)                                            CDNP0082
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00253        150 CONTINUE                                          CDNP0083
00255            DO 170 I=1,50                                     CDNP0084
00260            IF (IT(I).EQ.0) GO TO 170                         CDNP0085
00262            IL         = IT(I)                                CDNP0086
00263            IT(I)      = 0                                    CDNP0087
00264            ICOUNT     = ICOUNT + 1                           CDNP0088
00265            DO 160 J=1,50                                     CDNP0089
00270            IF (IL .EQ. IT(J)) IT(J) = 0                      CDNP0090
00272        160 CONTINUE                                          CDNP0091
00274        170 CONTINUE                                          CDNP0092
00276            DO 190 I=1,50                                     CDNP0093
00301            IF (IT1(I).EQ.0) GO TO 190                        CDNP0094
00303            IL         = IT1(I)                               CDNP0095
00304            IT1(I)     = 0                                    CDNP0096
00305            ICOUT1     = ICOUT1 + 1                           CDNP0097
00306            DO 180 J=1,50                                     CDNP0098
00311            IF (IL .EQ. IT1(J)) IT1(J) = 0                    CDNP0099
00313        180 CONTINUE                                          CDNP0100
00315        190 CONTINUE                                          CDNP0101
00317            INDEX      = ICOUNT + ICOUT1                      CDNP0102
00320            IF (INDEX.EQ.0) GO TO 240                         CDNP0103
00322            DO 230 LL=1,INDEX                                 CDNP0104
00325            READ (IOTAPE,20)NUMTAB,NP                         CDNP0105
00331            READ (IOTAPE,30)(TABX11(I),TABY11(I),I=1,NP)      CDNP0106
00340            DO 230 J=1,50                                     CDNP0107
00343            IF (NUMTAB.NE.ITAB1(J)) GO TO 210                 CDNP0108
00345            NP1(J)     = NP                                   CDNP0109
00346            ITAB1(J)   = 0                                    CDNP0110
00347            DO 200 N=1,NP                                     CDNP0111
00352            TABY1(J,N)= TABY11(N)                             CDNP0112
00353            TABX1(J,N)= TABX11(N)                             CDNP0113
00354        200 CONTINUE                                          CDNP0114
00356        210 CONTINUE                                          CDNP0115
00357            IF (NUMTAB.NE.ITAB2(J)) GO TO 230                 CDNP0116
00361            ITAB2(J)   = 0                                    CDNP0117
00362            NP2(J)     = NP                                   CDNP0118
00363            DO 220 N=1,NP                                     CDNP0119
00366            TABX2(J,N)= TABX11(N)                             CDNP0120
00367            TABY2(J,N)= TABY11(N)                             CDNP0121
00370        220 CONTINUE                                          CDNP0122
00372        230 CONTINUE                                          CDNP0123
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00375        240 CONTINUE                                                   CDNP0124
00376            DO 260 I=1,50                                              CDNP0125
00401            IF (ITAB1(I).EQ.0) GO TO 250                               CDNP0126
00403            IER        = IER + 1                                       CDNP0127
00404            WRITE (6,50)ITAB1(I),I                                     CDNP0128
00410        250 CONTINUE                                                   CDNP0129
00411            IF (ITAB2(I).EQ.0) GO TO 260                               CDNP0130
00413            IER        = IER + 1                                       CDNP0131
00414            WRITE (6,50)ITAB2(I),I                                     CDNP0132
00420        260 CONTINUE                                                   CDNP0133
00422            IF (IER.EQ.0) GO TO 270                                    CDNP0134
00424            WRITE (6,80)                                               CDNP0135
00426            STOP                                                       CDNP0136
00427        270 CONTINUE                                                   CDNP0137
00430            READ (IOTAPE,40)AT,KO,DOO,DPO,KF,DHO,DPH,AC,AE,PAB,TFDS,TODS,PFDS,CDNP0138
00430           1PODS,PCS,IDUMP,NDP,IPC,IPLOT,NP,MICROT,IRATED,BEGFIL       CDNP0139
00461            IF (BEGFIL .EQ. 0) BEGFIL = 3                              CDNP0140
00463            IF (IRATED.EQ.0) GO TO 390                                 CDNP0141
00465            IF (PAB) 290,280,290                                       CDNP0142
00470        280 CONTINUE                                                   CDNP0143
00471            PAB        = PAB1                                          CDNP0144
00472        290 CONTINUE                                                   CDNP0145
00473            IF (PCS) 310,300,310                                       CDNP0146
00476        300 CONTINUE                                                   CDNP0147
00477            PCS        = PCS1                                          CDNP0148
00500        310 CONTINUE                                                   CDNP0149
00501            IF (PFDS) 330,320,330                                      CDNP0150
00504        320 CONTINUE                                                   CDNP0151
00505            PFDS       = PFDS1                                         CDNP0152
00506        330 CONTINUE                                                   CDNP0153
00507            IF (PODS) 350,340,350                                      CDNP0154
00512        340 CONTINUE                                                   CDNP0155
00513            PODS       = PODS1                                         CDNP0156
00514        350 CONTINUE                                                   CDNP0157
00515            IF (TFDS) 370,360,370                                      CDNP0158
00520        360 CONTINUE                                                   CDNP0159
00521            TFDS       = TFDS1                                         CDNP0160
00522        370 CONTINUE                                                   CDNP0161
00523            IF (TODS) 390,380,390                                      CDNP0162
00526        380 CONTINUE                                                   CDNP0163
00527            TODS       = TODS1                                         CDNP0164
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00530    166*      390 CONTINUE                                               CDNP0165
00531    167*          IF (MICROT .EQ. 1) MICROT = 17                         CDNP0166
00533    168*          IF (IPLOT.EQ.0) GO TO 410                              CDNP0167
00535    169*          REWIND PLTAPE                                          CDNP0168
00536    170*          GO TO 410                                              CDNP0169
00537    171*      400 CONTINUE                                               CDNP0170
00540    172*          IF (IPLOT.EQ.0) GO TO 410                              CDNP0171
00542    173*          ITYPE     = -1                                         CDNP0172
00543    174*          I52       = 52                                         CDNP0173
00544    175*          WRITE (PLTAPE) ITYPE,I52,TC,TR,(LABELS(I),I=1,50)      CDNP0174
00556    176*          ITYPE     = -2                                         CDNP0175
00557    177*          I23       = 23                                         CDNP0176
00560    178*          WRITE (PLTAPE) ITYPE,I23,TC,TR,(LABENS(I),I=1,21)      CDNP0177
00572    179*          ITYPE     = -3                                         CDNP0178
00573    180*          I42       = 42                                         CDNP0179
00574    181*          WRITE (PLTAPE) ITYPE,I42,TC,TR,(LABRAT(I),I=1,40)      CDNP0180
00606    182*      410 CONTINUE                                               CDNP0181
00607    183*          RETURN                                                 CDNP0182
00610    184*          END                                                    CDNP0183

      END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
     CDNPUT        SYMBOLIC                       25 JUN 70  12&26&44  0  01477772   14   184  (DELETED)
     CDNPUT  CODE  RELOCATABLE                    25 JUN 70  12&26&44  1  01505012   60     1  (DELETED)
                                                                       0  01505106   14    61
ε   HDG      HD011C-CHEWER
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&     FOR,*    CHEWER,CHEWER                                                      14 JUL 70            17& 5&53.488
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&05&53

   SUBROUTINE CHEWER    ENTRY POINT 000716

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001    *CODE    000730
         0000    *DATA    006423
         0002    *BLANK   015607
         0003    FACTOR   006533
         0004    FILES    000014
         0005    FLAGS    000005
         0006    ROWS     000015
         0007    TIME     000001
         0010    TIMLST   000001
         0011    UNITS    000004


   EXTERNAL REFERENCES (BLOCK, NAME)

         0012    NTRAN
         0013    CONPUT
         0014    FILTR2
         0015    SWAGER
         0016    OUTPUT
         0017    NWDU$
         0020    NIO2$
         0021    NIO1$
         0022    NWEF$
         0023    NSTOP$
         0024    NERR2$
         0025    NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)
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0000   006225 10F       0001   000066 100L      0001   000073 110L      0001   000077 120L      0001   000112 130L
0001   000161 140L      0001   000216 150L      0001   000231 160L      0001   000252 170L      0001   000274 180L
0001   000327 190L      0000   006253 20F       0001   000341 200L      0001   000373 210L      0001   000440 220L
0001   000470 230L      0001   000500 240L      0001   000516 250L      0001   000526 260L      0001   000555 270L
0001   000644 290L      0000   006301 30F       0001   000662 300L      0001   000666 310L      0001   000677 330L
0000   006324 40F       0001   000557 426G      0001   000627 444G      0000   006366 50F       0001   000004 60L
0001   000036 70L       0001   000045 80L       0001   000063 90L       0004 I 000000 BEGFIL    0003 R 000000 BIAS
0000 R 000001 DAT       0002 R 000000 ENGDAT    0002 R 001604 ENGRAT    0002 R 002506 FILT1     0002 R 006476 FILT2
0000 I 006216 I         0003 I 000063 IB        0006 I 000000 IBEGIN    0004 I 000001 IBL       0003 I 000146 IC
0000 I 006223 ICC       0000 I 004544 IDATIN    0004 I 000002 IDUMP     0000 I 006213 IEND      0000 I 006206 IFLAG
0000 I 006207 IFLIP     0006 I 000001 IFV       0004 I 000003 ILINE     0006 I 000002 INITL     0004 I 000004 INT
0006 I 000003 ION       0011 I 000000 IOTAPE    0004 I 000005 IPC       0004 I 000006 IPLOT     0006 I 000004 IQUIT
0000 I 006210 IR        0006 I 000005 IROW      0003 I 000231 IRUNNO    0003 I 000232 IS        0005 I 000000 ISCAN
0005 I 000001 ISEND     0005 I 000002 ITON      0000 I 006217 I1        0000 I 006220 I2        0000 I 006221 I3
0006 I 000006 JEND      0006 I 000007 JON       0006 I 000010 JROW      0006 I 000011 KKPBEG    0006 I 000012 KKPEND
0006 I 000013 KKSAVE    0000 I 006224 KM        0000 I 006215 KNTFIL    0000 I 006214 L         0005 I 000003 LAST
0005 I 000004 LOOK      0006 I 000014 LSTPTS    0000 I 006222 M         0011 I 000001 MICROT    0004 I 000007 MLINE
0004 I 000010 MXFILE    0007 I 000000 N         0004 I 000011 NDP       0000 I 006212 NFILE     0004 I 000012 NLINES
0004 I 000013 NP        0003 I 000315 NP1       0003 I 000400 NP2       0000 I 006211 NREC      0000 I 000000 PCOUNT
0011 I 000002 PLTAPE    0003 R 000464 SCALE     0002 R 007433 STORE     0003 R 000547 TABX1     0003 R 001545 TABX2
0003 R 003541 TABY1     0003 R 004537 TABY2     0010 R 000000 TIMLST    0011 I 000003 UNIT
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00101           SUBROUTINE CHEWER                                                   CHEW0000
00103           INTEGER          BEGFIL,PCOUNT,PLTAPE,UNIT                          CHEW0001
00104           DIMENSION        DAT(2403),IDATIN(802)                              CHEW0002
00105           COMMON           ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)            CHEW0003
00105          1               , FILT2(9,53),STORE(60,53)                           CHEW0004
00106           COMMON / FACTOR / BIAS(51),IB(51),IC(51),IRUNNO,IS(51),NP1(51)      CHEW0005
00106          1               , NP2(52),SCALE(51),TABX1(51,10),TABX2(51,20)        CHEW0006
00106          2               , TABY1(51,10),TABY2(51,20)                          CHEW0007
00107           COMMON / FILES  / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE        CHEW0008
00107          1               , MXFILE,NDP,NLINES,NP                               CHEW0009
00110           COMMON / FLAGS  / ISCAN,ISEND,ITON,LAST,LOOK                        CHEW0010
00111           COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW     CHEW0011
00111          1               , KKPBEG,KKPEND,KKSAVE,LSTPTS                        CHEW0012
00112           COMMON / TIME   / N                                                 CHEW0013
00113           COMMON / TIMLST / TIMLST                                            CHEW0014
00114           COMMON / UNITS  / IOTAPE,MICROT,PLTAPE,UNIT                         CHEW0015
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00115         DATA     IFLAG              / 1                          /CHEW0016
00117         DATA     IFLIP              / 0                          /CHEW0017
00121         DATA     IR                 / 1                          /CHEW0018
00123         DATA     NREC               / 0                          /CHEW0019
00125         DATA     PCOUNT             / 0                          /CHEW0020
00127      10 FORMAT('0BAD RECORD ENCOUNTERED IN FILE ',I2,' - RECORD NUMBER ',ICHEW0021
00127        13,' - RECORD LENGTH IS ',I3,'...SKIP AND READ NEXT RECORD...')   CHEW0022
00130      20 FORMAT('0DEVICE ERROR AND/OR TRANSMISSION ABORT WHILE READING FILECHEW0023
00130        1 ',I2,' - RECORD NUMBER ',I3,'...SKIP AND READ NEXT RECORD...')  CHEW0024
00131      30 FORMAT('0',I2,' CONSECUTIVE END-OF-FILES ENCOUNTERED.  PROCESSING CHEW0025
00131        1COMPLETE AFTER READING FILE MARK NO. ',I2,'.')                   CHEW0026
00132      40 FORMAT('1',18(/),/' ',109('*')/' *',107X,'*'/' *',13X,'END PROCESSCHEW0027
00132        1ING PULSE NO. --',I3,' -- RUN NO. -- ',A6,' -- ENGINE ON -- ',F6.4CHEW0028
00132        2,' -- SEC',T110,'*'/' *',T110,'*'/' ',109('*'))                  CHEW0029
00133      50 FORMAT('1')                                                      CHEW0030
00134         IF (ISCAN.EQ.0) GO TO 60                                         CHEW0031
00136         ISCAN      = 0                                                   CHEW0032
00137         GO TO 330                                                        CHEW0033
00140      60 CONTINUE                                                         CHEW0034
00141         IF (LAST.EQ.1) GO TO 210                                         CHEW0035
00141   C * * CHECK FOR INITIAL PASS BEING OVER...                             CHEW0036
00143         IF (INT.NE.0) GO TO 100                                          CHEW0037
00143   C * * SAVE BEGINNING FILE...                                           CHEW0038
00145         NFILE      = BEGFIL                                              CHEW0039
00145   C * * REWIND THE DATA TAPE...                                          CHEW0040
00146         CALL NTRAN (UNIT,10)                                             CHEW0041
00146   C * * CHECK FOR FIRST FILE...                                          CHEW0042
00147         IF (NFILE-1.LE.0) GO TO 70                                       CHEW0043
00147   C * * PASS REQUIRED NUMBER OF END-OF-FILE MARKS...                     CHEW0044
00151         CALL NTRAN (UNIT,8,NFILE-1)                                      CHEW0045
00151   C * * SET PASS FLAG...                                                 CHEW0046
00152      70 CONTINUE                                                         CHEW0047
00152   C * * CHECK FOR DATA DUMP...                                           CHEW0048
00153         IF (IDUMP.EQ.1) GO TO 80                                         CHEW0049
00155         INT        = 1                                                   CHEW0050
00156         GO TO 100                                                        CHEW0051
00156   C * * CHECK FOR DUMP PULSE BEING IN FIRST FILE...                      CHEW0052
00157      80 CONTINUE                                                         CHEW0053
00160         IF (NDP-1.LE.0) GO TO 90                                         CHEW0054
00160   C * * PASS REQUIRED END-OF-FILE MARKS...                               CHEW0055
00162         CALL NTRAN (UNIT,8,NDP-1)                                        CHEW0056
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00162   C * * SET PASS FLAG...                                         CHEW0057
00163      90 CONTINUE                                                 CHEW0058
00164         INT       = 1                                            CHEW0059
00165         GO TO 120                                                CHEW0060
00166     100 CONTINUE                                                 CHEW0061
00166   C * * CHECK TO SEE IF WE PROCESSED CORRECT NUMBER OF PULSES... CHEW0062
00167         IF (PCOUNT.LE.NP) GO TO 120                              CHEW0063
00171     110 CONTINUE                                                 CHEW0064
00172         LAST      = 0                                            CHEW0065
00172   C * * SET PASS FLAG TO SHOW END OF JOB...                      CHEW0066
00173         INT       = -1                                           CHEW0067
00174         GO TO 330                                                CHEW0068
00174   C * * READ A RECORD OF DATA...                                 CHEW0069
00175     120 CONTINUE                                                 CHEW0070
00176         IEND      = 0                                            CHEW0071
00177         NREC      = NREC + 1                                     CHEW0072
00200         CALL NTRAN (UNIT,2,802,IDATIN,L)                         CHEW0073
00200   C * * CHECK FOR READ OPERATION BEING COMPLETE...               CHEW0074
00201     130 CONTINUE                                                 CHEW0075
00202         IF (L.EQ.-1) GO TO 130                                   CHEW0076
00202   C * * CHECK FOR END-OF-FILE MARK...                            CHEW0077
00204         IF (L.EQ.-2) GO TO 200                                   CHEW0078
00204   C * * ZERO CONSECUTIVE END-OF-FILE MARK COUNTER...             CHEW0079
00206         KNTFIL    = 0                                            CHEW0080
00206   C * * CHECK FOR READ ERROR...                                  CHEW0081
00207         IF (L.EQ.-3.OR.L.EQ.-4) GO TO 170                        CHEW0082
00207   C * * CHECK FOR CORRECT RECORD LENGTH...                       CHEW0083
00211         IF (L.EQ.801) GO TO 230                                  CHEW0084
00211   C * * CHECK AND UPDATE LINE COUNTER...                         CHEW0085
00213         ILINE     = ILINE + 2                                    CHEW0086
00214         IF (ILINE.LE.NLINES) GO TO 140                           CHEW0087
00216         ILINE     = 3                                            CHEW0088
00217         WRITE (6,50)                                             CHEW0089
00221     140 CONTINUE                                                 CHEW0090
00221   C * * WRITE ERROR MESSAGE...                                   CHEW0091
00222         WRITE (6,10)NFILE,NREC,L                                 CHEW0092
00227         IF (MICROT.NE.17) GO TO 160                              CHEW0093
00231         MLINE     = MLINE + 2                                    CHEW0094
00232         IF (MLINE.LE.NLINES) GO TO 150                           CHEW0095
00234         MLINE     = 3                                            CHEW0096
00235         WRITE (MICROT,50)                                        CHEW0097
```

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00237     150 CONTINUE                                          CHEW0098
00240         WRITE (MICROT,10)NFILE,NREC,L                     CHEW0099
00245     160 CONTINUE                                          CHEW0100
00246         IF (NREC .EQ. 1) N = N + 5                        CHEW0101
00250         IF (NREC .NE. 1) N = N + 6                        CHEW0102
00252         IFLIP     = 1                                     CHEW0103
00253         GO TO 120                                         CHEW0104
00253   C * * RE-ENABLE UNIT...                                 CHEW0105
00254     170 CONTINUE                                          CHEW0106
00255         CALL NTRAN (UNIT,22)                              CHEW0107
00255   C * * UPDATE AND CHECK LINE CONTROL...                  CHEW0108
00256         ILINE     = ILINE + 2                             CHEW0109
00257         IF (ILINE.LE.NLINES) GO TO 180                    CHEW0110
00261         ILINE     = 3                                     CHEW0111
00262         WRITE (6,50)                                      CHEW0112
00264     180 CONTINUE                                          CHEW0113
00264   C * * WRITE ERROR MESSAGE...                            CHEW0114
00265         WRITE (6,20)NFILE,NREC                            CHEW0115
00271         IF (MICROT.NE.17) GO TO 160                       CHEW0116
00273         MLINE     = MLINE + 2                             CHEW0117
00274         IF (MLINE.LE.NLINES) GO TO 190                    CHEW0118
00276         MLINE     = 3                                     CHEW0119
00277         WRITE (MICROT,50)                                 CHEW0120
00301     190 CONTINUE                                          CHEW0121
00302         WRITE (MICROT,20)NFILE,NREC                       CHEW0122
00306         GO TO 160                                         CHEW0123
00306   C * * RE-ENABLE TAPE UNIT...                            CHEW0124
00307     200 CONTINUE                                          CHEW0125
00310         CALL NTRAN (UNIT,22)                              CHEW0126
00311         N         = 0                                     CHEW0127
00312         NREC      = 0                                     CHEW0128
00312   C * * CHECK FOR MAX NUMBER OF CONSECUTIVE END OF FILE MARKS...   CHEW0129
00313         IF (KNTFIL.GT.MXFILE) GO TO 220                   CHEW0130
00313   C * * RESET FLAGS AND PUT END-OF-FILE MARK ON PLTAPE...  CHEW0131
00315         IFLAG     = 1                                     CHEW0132
00316         KNTFIL    = KNTFIL + 1                            CHEW0133
00316   C * * CONSECUTIVE END-OF-FILE MARKS DOES NOT MEAN A PULSE HAS BEEN   CHEW0134
00316   C * * PROCESSED...                                      CHEW0135
00317         IF (KNTFIL.GT.1) GO TO 120                        CHEW0136
00321         NFILE     = NFILE + 1                             CHEW0137
00322         IR        = 1                                     CHEW0138
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00323          LAST      = 1                                                     CHEW0139
00324          GO TO 330                                                         CHEW0140
00325      210 CONTINUE                                                          CHEW0141
00326          ION       = 0                                                     CHEW0142
00327          JON       = 0                                                     CHEW0143
00330          IEND      = 1                                                     CHEW0144
00331          IF (IPLOT .NE. 0) END FILE PLTAPE                                 CHEW0145
00331    C * * WRITE END-OF-PROCESSING MESSAGE ON OUTPUT TAPE AND MICROFILM TAPE.CHEW0146
00333          WRITE (6,40)PCOUNT,IRUNNO,TIMLST                                  CHEW0147
00340          IF (MICROT.EQ.17) WRITE (MICROT,40)PCOUNT,IRUNNO,TIMLST           CHEW0148
00346          TIMLST    = 0.0                                                   CHEW0149
00347          GO TO 240                                                         CHEW0150
00347    C * * WRITE 'TOO MANY CONSECUTIVE END-OF-FILE MARKS' MESSAGE AND QUIT...CHEW0151
00350      220 CONTINUE                                                          CHEW0152
00351          WRITE (6,30)KNTFIL,NFILE                                          CHEW0153
00355          IF (MICROT.EQ.17) WRITE (MICROT,30)KNTFIL,NFILE                   CHEW0154
00362          STOP                                                              CHEW0155
00363      230 CONTINUE                                                          CHEW0156
00364          IF (IFLIP.EQ.0) GO TO 240                                         CHEW0157
00366          IF (ION .EQ. 0) N = N + 1                                         CHEW0158
00370          IFLIP     = 0                                                     CHEW0159
00370    C * * CHECK FOR FIRST ON A NEW FILE...                                  CHEW0160
00371      240 CONTINUE                                                          CHEW0161
00372          IF (IFLAG.EQ.0) GO TO 250                                         CHEW0162
00372    C * * INCREASE THE PULSE COUNTER...                                     CHEW0163
00374          PCOUNT    = PCOUNT + 1                                            CHEW0164
00374    C * * RESET FLAG AND CHECK FOR MAXIMUM PULSES...                        CHEW0165
00375          IFLAG     = 0                                                     CHEW0166
00376          IF (PCOUNT.GT.NP) GO TO 110                                       CHEW0167
00400          IF (IEND.EQ.1) GO TO 120                                          CHEW0168
00400    C * * INITIALIZE ALL SUBROUTINES THAT NEED IT...                        CHEW0169
00402      250 CONTINUE                                                          CHEW0170
00403          GO TO (260,270),IR                                                CHEW0171
00404      260 CONTINUE                                                          CHEW0172
00405          IR        = 2                                                     CHEW0173
00406          IRUNNO    = IDATIN(1)                                             CHEW0174
00407          INITL     = 1                                                     CHEW0175
00410          LAST      = 0                                                     CHEW0176
00411          ISEND     = 1                                                     CHEW0177
00412          LOOK      = 0                                                     CHEW0178
00413          ISCAN     = 0                                                     CHEW0179
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00414          ITON      = 0                                          CHEW0180
00415          CALL CDNPUT                                            CHEW0181
00416          CALL FILTR2                                            CHEW0182
00417          CALL SWAGER                                            CHEW0183
00420          INITL     = 0                                          CHEW0184
00421          IBL       = 1                                          CHEW0185
00422          CALL OUTPUT                                            CHEW0186
00423          IBL       = 0                                          CHEW0187
00423    C * * UNPACK DATA.  STORED AS THREE TWELVE BIT WORDS...       CHEW0188
00424      270 CONTINUE                                               CHEW0189
00425          DO 280 I=1,801                                         CHEW0190
00430          I1        = I * 3 - 2                                  CHEW0191
00431          I2        = I * 3 - 1                                  CHEW0192
00432          I3        = I * 3                                      CHEW0193
00433          DAT(I1)   = FLD(0,12,IDATIN(I))                        CHEW0194
00434          DAT(I2)   = FLD(12,12,IDATIN(I))                       CHEW0195
00435          DAT(I3)   = FLD(24,12,IDATIN(I))                       CHEW0196
00436      280 CONTINUE                                               CHEW0197
00436    C * * STORE UNPACKED DATA INTO THE WORKING ARRAY...          CHEW0198
00440          M         = 1                                          CHEW0199
00441          ICC       = 1                                          CHEW0200
00442          KM        = 1                                          CHEW0201
00443          DO 320 I=4,2403                                        CHEW0202
00446          IF (M.EQ.31) GO TO 290                                 CHEW0203
00450          IF (M.EQ.41) GO TO 300                                 CHEW0204
00452          IF (M.EQ.51) GO TO 300                                 CHEW0205
00454          GO TO 310                                              CHEW0206
00455      290 CONTINUE                                               CHEW0207
00456          ICC       = -ICC                                       CHEW0208
00457          IF (ICC .EQ. 1) M = 41                                 CHEW0209
00461          IF (ICC .EQ. -1) M = 31                                CHEW0210
00463          GO TO 310                                              CHEW0211
00464      300 CONTINUE                                               CHEW0212
00465          M         = 1                                          CHEW0213
00466          KM        = KM + 1                                     CHEW0214
00467      310 CONTINUE                                               CHEW0215
00470          STORE(KM,M) = DAT(I)                                   CHEW0216
00471          M         = M + 1                                      CHEW0217
00472      320 CONTINUE                                               CHEW0218
00474      330 CONTINUE                                               CHEW0219
00475          RETURN                                                 CHEW0220
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00476   222*        END                                                                    CHEW0221

      END OF UNIVAC 1108 FORTRAN V COMPILATION.      0 *DIAGNOSTIC* MESSAGE(S)
   CHEWER         SYMBOLIC                                25 JUN 70  12&26&47   0  01506634    14    222  (DELETED)
   CHEWER  CODE   RELOCATABLE                             25 JUN 70  12&26&47   1  01514700    60      1  (DELETED)
                                                                                0  01514774    14     60
&      HDG      HD011C-CR2TAP
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&     FOR,*    CR2TAP,CR2TAP                                                          14 JUL 70          17& 5&56.108
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&05&56

   SUBROUTINE CR2TAP    ENTRY POINT 000074

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001   *CODE    000101
        0000   *DATA    000036
        0002   *BLANK   000000
        0003   UNITS    00C004


   EXTERNAL REFERENCES (BLOCK, NAME)

        0004   NREW$
        0005   NRDU$
        0006   NIO1$
        0007   NIO2$
        0010   NWDU$
        0011   NWEF$
        0012   NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000   000020 10F        0001   000011 114G      0001   000023 122G      0001   000041 131G      0001   000003 20L
    0000 I 000017 I          0000 I 000000 IDATA     0000 I 000016 IEND      0003 I 000000 IOTAPE     0003 I 000001 MICROT
    0003 R 000002 PLTAPE     0003 R 000003 UNIT


00101      1*         SUBROUTINE CR2TAP                                         CR2T0000
00103      2*         DIMENSION        IDATA(14)                                CR2T0001
00104      3*         COMMON / UNITS  / IOTAPE,MICROT,PLTAPE,UNIT               CR2T0002
00105      4*         DATA      IEND                / 6HCASEND                 /CR2T0003
```

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00107      5*        10 FORMAT(13A6,A2)                                                   CR2T0004
00107      6*     C * * REWIND OUTPUT TAPE...                                            CR2T0005
00110      7*           REWIND IOTAPE                                                    CR2T0006
00110      8*     C * * READ A CARD IMAGE FROM SYSTEM INPUT TAPE...                      CR2T0007
00111      9*        20 CONTINUE                                                         CR2T0008
00112     10*           READ (5,10)(IDATA(I),I=1,14)                                     CR2T0009
00112     11*     C * * WRITE CARD IMAGE ON OUTPUT TAPE...                               CR2T0010
00120     12*           WRITE (IOTAPE,10)(IDATA(I),I=1,14)                               CR2T0011
00120     13*     C * * WRITE CARD IMAGE ON MICROFILM...                                 CR2T0012
00126     14*           IF (MICROT.EQ.17) WRITE (MICROT,10)(IDATA(I),I=1,14)             CR2T0013
00126     15*     C * * CHECK FOR END OF DATA DECK...                                    CR2T0014
00135     16*           IF (IDATA(1).NE.IEND) GO TO 20                                   CR2T0015
00135     17*     C * * PUT END-OF-FILE MARK ON OUTPUT TAPE...                           CR2T0016
00137     18*           END FILE IOTAPE                                                  CR2T0017
00137     19*     C * * REWIND OUTPUT TAPE...                                            CR2T0018
00140     20*           REWIND IOTAPE                                                    CR2T0019
00141     21*           RETURN                                                           CR2T0020
00142     22*           END                                                              CR2T0021

       END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
    CR2TAP          SYMBOLIC                            25 JUN 70  12&26&48   0  01516504    14      22  (DELETED)
    CR2TAP   CODE   RELOCATABLE                         25 JUN 70  12&26&48   1  01517170    24       1  (DELETED)
                                                                              0  01517220    14       8
&      HDG      HD011C-FILTR1
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```
&     FOR,*     FILTR1,FILTR1                                   14 JUL 70        17& 5&57. 90
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONF ON 14 JUL 70 AT 17&05&57

   SUBROUTINE FILTR1    ENTRY POINT 000532

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001   *CODE   000545
         0000   *DATA   000043
         0002   *BLANK  015607
         0003   FLAGS   000005
         0004   ROWS    000015


   EXTERNAL REFERENCES (BLOCK, NAME)

         0005   NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000053 10L      0001   000260 100L     0001   000312 110L     0001   000006 117G     0001   000337 120L
    0001   000034 125G     0001   000403 140L     0001   000425 150L     0001   000445 160L     0001   000453 170L
    0001   000512 190L     0001   000063 20L      0001   000433 267G     0001   000066 30L      0001   000507 310G
    0001   000130 40L      0001   000160 50L      0001   000200 60L      0001   000221 70L      0001   000230 80L
    0001   000250 90L      0002 R 000000 ENGDAT   0002 R 001604 ENGRAT   0002 R 002506 FILT1    0002 R 006476 FILT2
    0000 I 000003 I        0000 I 000000 IADD     0004 I 000000 IBEGIN   0004 I 000001 IFV      0000 I 000004 IJ
    0000 I 000012 IM1      0004 I 000002 INITL    0004 I 000003 ION      0004 I 000004 IQUIT    0004 I 000005 IROW
    0003 I 000000 ISCAN    0003 I 000001 ISEND    0003 I 000002 ITON     0000 I 000013 J        0004 I 000006 JEND
    0004 I 000007 JON      0004 I 000010 JROW     0004 I 000011 KKPBEG   0004 I 000012 KKPEND   0004 I 000013 KKSAVE
    0000 I 000005 KM       0000 I 000006 KMP1     0000 I 000011 KPBEG    0000 I 000010 KPEND    0003 I 000003 LAST
    0003 I 000004 LOOK     0004 I 000014 LSTPTS   0000 I 000007 M        0002 R 007433 STORE    0000 R 000001 THMAX
    0000 R 000002 THMIN
```

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00101        SUBROUTINE FILTR1                                          FLT10000
00103        COMMON             ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)  FLT10001
00103       1                 , FILT2(9,53),STORE(60,53)                 FLT10002
00104        COMMON / FLAGS  / ISCAN,ISEND,ITON,LAST,LOOK                FLT10003
00105        COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW   FLT10004
00105       1                 , KKPBEG,KKPEND,KKSAVE,LSTPTS              FLT10005
00106        DATA     IADD              / 10                            /FLT10006
00110        DATA     THMAX             / 3300.                         /FLT10007
00112        DATA     THMIN             / 600.                          /FLT10008
00114        IF (LOOK.EQ.1) GO TO 150                                    FLT10009
00116        DO 120 I=1,30                                               FLT10010
00121        IJ            = I + IADD                                    FLT10011
00122        KM            = 2 * I - 1                                   FLT10012
00123        KMP1          = KM + 1                                      FLT10013
00124        DO 120 M=1,50                                               FLT10014
00127        IF (M.GT.30) GO TO 10                                       FLT10015
00131        IF (M.EQ.IFV) GO TO 30                                      FLT10016
00133        FILT1(IJ,M)   = (STORE(KM,M) + STORE(KMP1,M)) / 2.0         FLT10017
00134        GO TO 120                                                   FLT10018
00135     10 CONTINUE                                                    FLT10019
00136        IF (M.GT.40) GO TO 20                                       FLT10020
00140        FILT1(IJ,M)   = STORE(KM,M)                                 FLT10021
00141        GO TO 120                                                   FLT10022
00142     20 CONTINUE                                                    FLT10023
00143        FILT1(IJ,M)   = STORE(KMP1,M)                               FLT10024
00144        GO TO 120                                                   FLT10025
00145     30 CONTINUE                                                    FLT10026
00146        IF (STORE(KM,IFV).LE.THMIN) GO TO 60                        FLT10027
00150        IF (STORE(KM,IFV).GE.THMAX) GO TO 80                        FLT10028
00152        IF (STORE(KMP1,IFV).LE.THMIN) GO TO 40                      FLT10029
00154        IF (STORE(KMP1,IFV).GE.THMAX) GO TO 70                      FLT10030
00156        IF (ION.EQ.0) GO TO 50                                      FLT10031
00160     40 CONTINUE                                                    FLT10032
00161        FILT1(IJ,IFV) = AMIN1(STORE(KM,IFV) , STORE(KMP1,IFV))      FLT10033
00162        IF (ION.LE.0) GO TO 120                                     FLT10034
00164        ION           = -1                                          FLT10035
00165        KPEND         = KM - 1                                      FLT10036
00166        GO TO 120                                                   FLT10037
00167     50 CONTINUE                                                    FLT10038
00170        FILT1(IJ,IFV) = AMAX1(STORE(KM,IFV) , STORE(KMP1,IFV))      FLT10039
00171        GO TO 120                                                   FLT10040
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00172       60 CONTINUE                                                  FLT10041
00173          IF (STORE(KMP1,IFV).LE.THMIN) GO TO 110                   FLT10042
00175          IF (STORE(KMP1,IFV).GE.THMAX) GO TO 70                    FLT10043
00177          GO TO 50                                                  FLT10044
00200       70 CONTINUE                                                  FLT10045
00201          IF (ION .EQ. 0) ION = 1                                   FLT10046
00203          KPBEG          = KMP1                                     FLT10047
00204          GO TO 50                                                  FLT10048
00205       80 CONTINUE                                                  FLT10049
00206          IF (STORE(KMP1,IFV).LE.THMIN) GO TO 90                    FLT10050
00210          IF (STORE(KMP1,IFV).GE.THMAX) GO TO 100                   FLT10051
00212       90 CONTINUE                                                  FLT10052
00213          IF (ION.LE.0) GO TO 120                                   FLT10053
00215          ION            = -1                                       FLT10054
00216          KPEND          = KM                                       FLT10055
00217      100 CONTINUE                                                  FLT10056
00220          FILT1(IJ,IFV) = AMAX1(STORE(KM,IFV) , STORE(KMP1,IFV))    FLT10057
00221          IF (ION.EQ.1) GO TO 120                                   FLT10058
00223          IF (ION .EQ. 0) ION = 1                                   FLT10059
00225          KPBEG          = KM                                       FLT10060
00226          GO TO 120                                                 FLT10061
00227      110 CONTINUE                                                  FLT10062
00230          FILT1(IJ,IFV) = (STORE(KM,IFV) + STORE(KMP1,IFV)) / 2.0   FLT10063
00231          IF (ION.LE.0) GO TO 120                                   FLT10064
00233          ION            = -1                                       FLT10065
00234          KPEND          = KM - 1                                   FLT10066
00235      120 CONTINUE                                                  FLT10067
00240          IF (ION) 130,190,140                                      FLT10068
00243      130 CONTINUE                                                  FLT10069
00244          KKPEND         = KPEND / 2 + 1                            FLT10070
00245          IF ((KPEND - 2 * (KPEND / 2)) .EQ. 0) KKPEND = KPEND / 2  FLT10071
00247          IF (LOOK.GE.2) GO TO 190                                  FLT10072
00251          IF (ITON .NE. 1) ION = 0                                  FLT10073
00253          ITON           = 0                                        FLT10074
00254          LOOK           = 0                                        FLT10075
00255          GO TO 190                                                 FLT10076
00256      140 CONTINUE                                                  FLT10077
00257          KKPBEG         = KPBEG / 2 + 1                            FLT10078
00260          IF ((KPBEG - 2 * (KPBEG / 2)) .EQ. 0) KKPBEG = KPBEG / 2  FLT10079
00262          ITON           = 1                                        FLT10080
00263          LOOK           = LOOK + 1                                 FLT10081
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00264     83*          GO TO 190                                           FLT10082
00265     84*      150 CONTINUE                                            FLT10083
00266     85*          DO 160 I=1,60                                       FLT10084
00271     86*          IF (STORE(I,IFV).GE.THMAX) GO TO 160                FLT10085
00273     87*          ION           = 0                                   FLT10086
00274     88*          ITON          = 0                                   FLT10087
00275     89*          LOOK          = 0                                   FLT10088
00276     90*          GO TO 170                                           FLT10089
00277     91*      160 CONTINUE                                            FLT10090
00301     92*          LOOK          = LOOK + 1                            FLT10091
00302     93*      170 CONTINUE                                            FLT10092
00303     94*          ISCAN         = 1                                   FLT10093
00304     95*          IF (I.LE.1.OR.I.GE.60) GO TO 190                    FLT10094
00306     96*          IM1           = I - 1                               FLT10095
00307     97*          DO 180 J=1,IM1                                      FLT10096
00312     98*          STORE(J,IFV)  = STORE(I,IFV)                        FLT10097
00313     99*      180 CONTINUE                                            FLT10098
00315    100*      190 CONTINUE                                            FLT10099
00316    101*          RETURN                                              FLT10100
00317    102*          END                                                 FLT10101

     END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
   FILTR1          SYMBOLIC         25 JUN 70  12&26&51  0  01517400  14  104  (DELETED)
   FILTR1  CODE    RELOCATABLE      25 JUN 70  12&26&51  1  01522260  24    1  (DELETED)
                                                         0  01522310  14   37
&    HDG     HD011C-FILTR2
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```
&     FOR,*     FILTR2,FILTR2                                                         14 JUL 70            17& 5&59. 93
UNIVAC 1108 FORTRAN V LEVEL    2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&05&59

   SUBROUTINE FILTR2    ENTRY POINT 001723

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001    *CODE    001734
         0000    *DATA    000061
         0002    *BLANK   015607
         0003    FLAGS    000005
         0004    ROWS     000015
         0005    TIME     000001


   EXTERNAL REFERENCES (BLOCK, NAME)

         0006    ZERO
         0007    AVRGR
         0010    SHIFT
         0011    NERR2$
         0012    NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000054 10L      0001   000201 100L      0001   000247 110L      0001   000265 120L      0001   000303 130L
    0001   000344 140L     0001   000405 150L      0001   000441 160L      0001   000145 167G      0001   000452 170L
    0001   000475 180L     0001   000542 190L      0001   000067 20L       0001   000546 200L      0001   000557 210L
    0001   000601 220L     0001   000645 230L      0001   000650 240L      0001   000655 250L      0001   000705 260L
    0001   000732 270L     0001   000767 280L      0001   001006 290L      0001   000102 30L       0001   001022 300L
    0001   001072 310L     0001   001112 320L      0001   001130 330L      0001   001174 340L      0001   001237 350L
    0001   001275 360L     0001   001306 370L      0001   001332 380L      0001   001401 390L      0001   001405 400L
    0001   001416 410L     0001   001442 420L      0001   001507 430L      0001   001512 440L      0001   001513 450L
    0001   001552 460L     0001   001605 470L      0001   000106 50L       0001   001705 550L      0001   000122 60L
    0001   000133 70L      0001   001637 701G      0001   001641 704G      0001   001644 712G      0001   001656 723G
    0001   001657 726G     0001   001670 735G      0001   001671 740G      0001   001674 746G      0001   000163 90L
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A4-33

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0000 R 000001 DELT      0002 R 000000 ENGDAT    0002 R 001604 ENGRAT    0002 R 002506 FILT1     0002 R 006476 FILT2
0000 I 000024 I         0004 I 000000 IBEGIN    0000 I 000013 ICENTR    0000 I 000016 ICNT1     0000 I 000017 ICNT2
0000 I 000021 ICNT3     0000 I 000022 ICNT4     0004 I 000001 IFV       0004 I 000002 INITL     0004 I 000003 ION
0000 I 000014 IPIV      0000 I 000007 IPOINT    0004 I 000004 IQUIT     0004 I 000005 IROW      0003 I 000000 ISCAN
0003 I 000001 ISEND     0000 I 000004 ISTART    0000 I 000006 ISTOP     0003 I 000002 ITON      0000 I 000023 J
0000 I 000020 JCENTR    0004 I 000006 JEND      0000 I 000011 JJ        0004 I 000007 JON       0004 I 000010 JROW
0000 I 000010 KK        0004 I 000011 KKPBEG    0004 I 000012 KKPEND    0004 I 000013 KKSAVE    0003 I 000003 LAST
0000 I 000000 LOC       0003 I 000004 LOOK      0004 I 000014 LSTPTS    0005 I 000000 N         0000 I 000002 NOISE
0002 R 007433 STORE     0000 R 000015 TREF      0000 R 000012 TSAVE     0000 R 000005 TTSAVE    0000 R 000003 TZERO
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00101          SUBROUTINE FILTR2                                                 FLT20000
00103          COMMON             ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)        FLT20001
00103         1                 , FILT2(9,53),STORE(60,53)                       FLT20002
00104          COMMON / FLAGS  / ISCAN,ISEND,ITON,LAST,LOOK                      FLT20003
00105          COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW   FLT20004
00105         1                 , KKPBEG,KKPEND,KKSAVE,LSTPTS                    FLT20005
00106          COMMON / TIME   / N                                               FLT20006
00107          DATA      DELT                 / 0.02                            /FLT20007
00111          DATA      NOISE                / 1                               /FLT20008
00113          DATA      TZERO                / 0.0                             /FLT20009
00115          IF (INITL.EQ.1) GO TO 470                                         FLT20010
00117          ISEND          = 1 - ISEND                                        FLT20011
00120          IF (ION .EQ. 1) NOISE = 0                                         FLT20012
00122          IF (ION .EQ. -1 .AND. NOISE .EQ. 1) ION = 0                       FLT20013
00124          IF (ISEND.EQ.0) GO TO 20                                          FLT20014
00126          IF (ION.EQ.-1.AND.KKPEND.EQ.0.AND.ISTART.EQ.11) GO TO 10          FLT20015
00130          GO TO 550                                                         FLT20016
00131       10 CONTINUE                                                          FLT20017
00132          KKSAVE         = KKSAVE - 1                                       FLT20018
00133          TTSAVE         = FILT2(KKSAVE,51)                                 FLT20019
00134          ISTART         = 6                                                FLT20020
00135          ISTOP          = ISTART + 4                                       FLT20021
00136          GO TO 550                                                         FLT20022
00137       20 CONTINUE                                                          FLT20023
00140          CALL ZERO                                                         FLT20024
00141          GO TO (30,120,320),IPOINT                                         FLT20025
00142       30 CONTINUE                                                          FLT20026
00143          IF (ION) 290,40,90                                                FLT20027
```

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00146        40 CONTINUE                                                        FLT20028
00146     C ***********************************************************************FLT20029
00146     C      ION = 0, FILTER DATA PRIOR TO ENGINE FIRE SIGNAL.                 *FLT20030
00146     C ***********************************************************************FLT20031
00147        50 CONTINUE                                                        FLT20032
00150           ISTART        = ISTART + 5                                      FLT20033
00151           ISTOP         = ISTART + 4                                      FLT20034
00152           IF (ISTOP.LE.40) GO TO 60                                       FLT20035
00154           ISTART        = 6                                               FLT20036
00155           GO TO 70                                                        FLT20037
00156        60 CONTINUE                                                        FLT20038
00157           KK            = KK + 1                                          FLT20039
00160           CALL AVRGR (KK,ISTART,ISTOP)                                    FLT20040
00161           GO TO 50                                                        FLT20041
00162        70 CONTINUE                                                        FLT20042
00163           KKSAVE        = KK                                              FLT20043
00164           KK            = 0                                               FLT20044
00165           CALL SHIFT                                                      FLT20045
00166           DO 80 JJ=1,KKSAVE                                               FLT20046
00171           N             = N + 1                                           FLT20047
00172           FILT2(JJ,51)  = TZERO + (N - 1) * DELT                          FLT20048
00173        80 CONTINUE                                                        FLT20049
00175           TSAVE         = FILT2(KKSAVE,51)                                FLT20050
00176           GO TO 550                                                       FLT20051
00177        90 CONTINUE                                                        FLT20052
00177     C ***********************************************************************FLT20053
00177     C      ION = 1, FIRE SIGNAL 'ON' IS DETECTED.  CENTER WINDOW AND         *FLT20054
00177     C               CONTINUE FILTERING PROCESS.                            *FLT20055
00177     C ***********************************************************************FLT20056
00200           IF (ICENTR.EQ.1) GO TO 250                                      FLT20057
00202           KK            = 0                                               FLT20058
00203           ISTART        = 6                                               FLT20059
00204           IBEGIN        = KKPBEG + 10                                     FLT20060
00205           IF (IBEGIN.GT.35) GO TO 270                                     FLT20061
00207       100 CONTINUE                                                        FLT20062
00207     C ***********************************************************************FLT20063
00207     C      SCAN COLUMN OF FILT1 ARRAY CONTAINING THE FIRE CHANNEL TO LOCATE *FLT20064
00207     C      THE ROW WHICH FLAGS ENGINE COMMAND 'ON'.                          *FLT20065
00207     C ***********************************************************************FLT20066
00210           ISTART        = ISTART + 5                                      FLT20067
00211           ISTOP         = ISTART + 4                                      FLT20068
```

```
00212         IF (IBEGIN.GE.ISTART.AND.IBEGIN.LE.ISTOP) GO TO 110
00214         KK              = KK + 1
00215         CALL AVRGR (KK,ISTART,ISTOP)
00216         N               = N + 1
00217         FILT2(KK,51)    = TZERO + (N - 1) * DELT
00220         GO TO 100
00221     110 CONTINUE
00221   C ***********************************************************************
00221   C     BEGINNING OF FIRING FOUND IN SCAN.  LOCATE ROW POSITION IN FIVE  *
00221   C     ELEMENT ORDERED SET OF NUMBERS FOR FIRST WINDOW CENTERING.       *
00221   C ***********************************************************************
00222         LOC             = IBEGIN - ISTART + 1
00223         IF (KK .GE. 1) TSAVE = FILT2(KK,51)
00225     120 CONTINUE
00226         KK              = KK + 1
00227         GO TO (130,140,150,160,200),LOC
00230     130 CONTINUE
00231         ISTART          = ISTART - 2
00232         ISTOP           = ISTART + 4
00233         CALL AVRGR (KK,ISTART,ISTOP)
00234         IPIV            = ISTART + 2
00235         FILT2(KK,IFV)   = FILT1(IPIV,IFV)
00236         FILT2(KK,51)    = TSAVE + 0.012
00237         TREF            = FILT2(KK,51)
00240         TSAVE           = TREF
00241         N               = 0
00242         IROW            = KK
00243         ICENTR          = 1
00244         GO TO 240
00245     140 CONTINUE
00246         ISTART          = ISTART - 1
00247         ISTOP           = ISTART + 4
00250         CALL AVRGR (KK,ISTART,ISTOP)
00251         IPIV            = ISTART + 2
00252         FILT2(KK,IFV)   = FILT1(IPIV,IFV)
00253         FILT2(KK,51)    = TSAVE + 0.016
00254         TREF            = FILT2(KK,51)
00255         TSAVE           = TREF
00256         N               = 0
00257         IROW            = KK
00260         ICENTR          = 1
```

```
      GO TO 240                                                  FLT20110
  150 CONTINUE                                                   FLT20111
      CALL AVRGR (KK,ISTART,ISTOP)                               FLT20112
      IPIV         = ISTART + 2                                  FLT20113
      FILT2(KK,IFV) = FILT1(IPIV,IFV)                            FLT20114
      FILT2(KK,51)  = TSAVE + 0.020                              FLT20115
      TREF         = FILT2(KK,51)                                FLT20116
      TSAVE        = TREF                                        FLT20117
      N            = 0                                           FLT20118
      IROW         = KK                                          FLT20119
      ICENTR       = 1                                           FLT20120
      GO TO 240                                                  FLT20121
  160 CONTINUE                                                   FLT20122
      GO TO (170,180,190),ICNT1                                  FLT20123
  170 CONTINUE                                                   FLT20124
      ISTART       = ISTART - 2                                  FLT20125
      ISTOP        = ISTART + 4                                  FLT20126
      CALL AVRGR (KK,ISTART,ISTOP)                               FLT20127
      FILT2(KK,51)  = TSAVE + 0.012                              FLT20128
      N            = 0                                           FLT20129
      ICNT1        = ICNT1 + 1                                   FLT20130
      GO TO 160                                                  FLT20131
  180 CONTINUE                                                   FLT20132
      KK           = KK + 1                                      FLT20133
      ISTART       = ISTOP - 1                                   FLT20134
      ISTOP        = ISTART + 4                                  FLT20135
      CALL AVRGR (KK,ISTART,ISTOP)                               FLT20136
      IPIV         = ISTART + 2                                  FLT20137
      FILT2(KK,IFV) = FILT1(IPIV,IFV)                            FLT20138
      FILT2(KK,51)  = TSAVE + 0.024                              FLT20139
      TREF         = FILT2(KK,51)                                FLT20140
      TSAVE        = TREF                                        FLT20141
      N            = 0                                           FLT20142
      IROW         = KK                                          FLT20143
      ICNT1        = ICNT1 + 1                                   FLT20144
      GO TO 160                                                  FLT20145
  190 CONTINUE                                                   FLT20146
      ICNT1        = 1                                           FLT20147
      ICENTR       = 1                                           FLT20148
      GO TO 240                                                  FLT20149
  200 CONTINUE                                                   FLT20150
```

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00332            GO TO (210,220,230),ICNT2                                   FLT20151
00333        210 CONTINUE                                                    FLT20152
00334            ISTART         = ISTART - 2                                 FLT20153
00335            ISTOP          = ISTART + 4                                 FLT20154
00336            CALL AVRGR (KK,ISTART,ISTOP)                                FLT20155
00337            FILT2(KK,51)   = TSAVE + 0.012                              FLT20156
00340            ICNT2          = ICNT2 + 1                                  FLT20157
00341            GO TO 200                                                   FLT20158
00342        220 CONTINUE                                                    FLT20159
00343            KK             = KK + 1                                     FLT20160
00344            ISTART         = ISTOP                                      FLT20161
00345            ISTOP          = ISTART + 4                                 FLT20162
00346            CALL AVRGR (KK,ISTART,ISTOP)                                FLT20163
00347            IPIV           = ISTART + 2                                 FLT20164
00350            FILT2(KK,IFV)  = FILT1(IPIV,IFV)                            FLT20165
00351            FILT2(KK,51)   = TSAVE + 0.028                              FLT20166
00352            TREF           = FILT2(KK,51)                               FLT20167
00353            TSAVE          = TREF                                       FLT20168
00354            N              = 0                                          FLT20169
00355            IROW           = KK                                         FLT20170
00356            ICNT2          = ICNT2 + 1                                  FLT20171
00357            GO TO 200                                                   FLT20172
00360        230 CONTINUE                                                    FLT20173
00361            ICNT2          = 1                                          FLT20174
00362            ICENTR         = 1                                          FLT20175
00363        240 CONTINUE                                                    FLT20176
00364            ISTART         = ISTART + 5                                 FLT20177
00365            ISTOP          = ISTART + 4                                 FLT20178
00366        250 CONTINUE                                                    FLT20179
00367            IF (ISTOP.LE.40) GO TO 260                                  FLT20180
00371            LOC            = 10 - 40 + ISTART                           FLT20181
00372            ISTART         = LOC                                        FLT20182
00373            ISTOP          = LOC + 4                                    FLT20183
00374            TTSAVE         = FILT2(KK,51)                               FLT20184
00375            KKSAVE         = KK                                         FLT20185
00376            KK             = 0                                          FLT20186
00377            CALL SHIFT                                                  FLT20187
00400            IPOINT         = 1                                          FLT20188
00401            GO TO 550                                                   FLT20189
00402        260 CONTINUE                                                    FLT20190
00403            KK             = KK + 1                                     FLT20191
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00404          CALL AVRGR (KK,ISTART,ISTOP)                                   FLT20192
00405          N              = N + 1                                         FLT20193
00406          FILT2(KK,51)   = TSAVE + N * DELT                              FLT20194
00407          FILT2(KK,52)   = FILT2(KK,51) - TREF                           FLT20195
00410          GO TO 240                                                      FLT20196
00411      270 CONTINUE                                                       FLT20197
00412          ISTART         = ISTART + 5                                    FLT20198
00413          ISTOP          = ISTART + 4                                    FLT20199
00414          IF (ISTOP.GT.35) GO TO 280                                     FLT20200
00416          KK             = KK + 1                                        FLT20201
00417          CALL AVRGR (KK,ISTART,ISTOP)                                   FLT20202
00420          N              = N + 1                                         FLT20203
00421          FILT2(KK,51)   = TZERO + (N - 1) * DELT                        FLT20204
00422          GO TO 270                                                      FLT20205
00423      280 CONTINUE                                                       FLT20206
00424          KKSAVE         = KK                                            FLT20207
00425          KK             = 0                                             FLT20208
00426          CALL SHIFT                                                     FLT20209
00427          LOC            = IBEGIN - 35                                   FLT20210
00430          ISTART         = 6                                             FLT20211
00431          ISTOP          = 10                                            FLT20212
00432          IPOINT         = 2                                             FLT20213
00433          GO TO 550                                                      FLT20214
00434      290 CONTINUE                                                       FLT20215
00434    C **********************************************************************FLT20216
00434    C     ION = -1, FIRE SIGNAL 'OFF' IS DETECTED.  CENTER WINDOW AND      *FLT20217
00434    C               CONTINUE FILTERING PROCESS.                            *FLT20218
00434    C **********************************************************************FLT20219
00435          IF (JCENTR.EQ.1) GO TO 250                                     FLT20220
00437          KK             = 0                                             FLT20221
00440          JEND           = KKPEND + 10                                   FLT20222
00441          IF (JEND.GT.35) GO TO 450                                      FLT20223
00443      300 CONTINUE                                                       FLT20224
00443    C **********************************************************************FLT20225
00443    C     SCAN COLUMN OF FILT1 ARRAY CONTAINING THE FIRE CHANNEL TO LOCATE *FLT20226
00443    C     THE ROW WHICH FLAGS ENGINE COMMAND 'OFF'.                        *FLT20227
00443    C **********************************************************************FLT20228
00444          IF (JEND.GE.ISTART.AND.JEND.LE.ISTOP) GO TO 310                FLT20229
00446          KK             = KK + 1                                        FLT20230
00447          CALL AVRGR (KK,ISTART,ISTOP)                                   FLT20231
00450          N              = N + 1                                         FLT20232
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00451         FILT2(KK,51)  = TSAVE + N * DELT                          FLT20233
00452         FILT2(KK,52)  = FILT2(KK,51) - TREF                       FLT20234
00453         ISTART        = ISTART + 5                                FLT20235
00454         ISTOP         = ISTART + 4                                FLT20236
00455         GO TO 300                                                 FLT20237
00456     310 CONTINUE                                                  FLT20238
00457         TSAVE         = TTSAVE                                    FLT20239
00460         IF (KK .GE. 1) TSAVE = FILT2(KK,51)                       FLT20240
00462         LOC           = JEND - ISTART + 1                         FLT20241
00463     320 CONTINUE                                                  FLT20242
00464         KK            = KK + 1                                    FLT20243
00464   C ******************************************************************FLT20244
00464   C     END OF FIRING FOUND IN SCAN.  LOCATE ROW POSITION IN FIVE      *FLT20245
00464   C     ELEMENT ORDERED SET OF NUMBERS FOR SECOND WINDOW CENTERING.    *FLT20246
00464   C ******************************************************************FLT20247
00465         GO TO (330,340,350,360,400),LOC                           FLT20248
00466     330 CONTINUE                                                  FLT20249
00467         ISTART        = ISTART - 2                                FLT20250
00470         ISTOP         = ISTART + 4                                FLT20251
00471         CALL AVRGR (KK,ISTART,ISTOP)                              FLT20252
00472         FILT2(KK,51)  = TSAVE + 0.012                             FLT20253
00473         FILT2(KK,52)  = FILT2(KK,51) - TREF                       FLT20254
00474         TSAVE         = FILT2(KK,51)                              FLT20255
00475         N             = 0                                         FLT20256
00476         IPIV          = ISTART + 2                                FLT20257
00477         FILT2(KK,IFV) = FILT1(IPIV,IFV)                           FLT20258
00500         JROW          = KK                                        FLT20259
00501         JCENTR        = 1                                         FLT20260
00502         GO TO 440                                                 FLT20261
00503     340 CONTINUE                                                  FLT20262
00504         ISTART        = ISTART - 1                                FLT20263
00505         ISTOP         = ISTART + 4                                FLT20264
00506         CALL AVRGR (KK,ISTART,ISTOP)                              FLT20265
00507         IPIV          = ISTART + 2                                FLT20266
00510         FILT2(KK,IFV) = FILT1(IPIV,IFV)                           FLT20267
00511         FILT2(KK,51)  = TSAVE + 0.016                             FLT20268
00512         FILT2(KK,52)  = FILT2(KK,51) - TREF                       FLT20269
00513         TSAVE         = FILT2(KK,51)                              FLT20270
00514         N             = 0                                         FLT20271
00515         JROW          = KK                                        FLT20272
00516         JCENTR        = 1                                         FLT20273
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00517           GO TO 440                                         FLT20274
00520       350 CONTINUE                                          FLT20275
00521           CALL AVRGR (KK,ISTART,ISTOP)                      FLT20276
00522           IPIV            = ISTART + 2                      FLT20277
00523           FILT2(KK,IFV) = FILT1(IPIV,IFV)                   FLT20278
00524           FILT2(KK,51)  = TSAVE + 0.020                     FLT20279
00525           FILT2(KK,52)  = FILT2(KK,51) - TREF               FLT20280
00526           TSAVE           = FILT2(KK,51)                    FLT20281
00527           N               = 0                               FLT20282
00530           JROW            = KK                              FLT20283
00531           JCENTR          = 1                               FLT20284
00532           GO TO 440                                         FLT20285
00533       360 CONTINUE                                          FLT20286
00534           GO TO (370,380,390),ICNT3                         FLT20287
00535       370 CONTINUE                                          FLT20288
00536           ISTART          = ISTART - 2                      FLT20289
00537           ISTOP           = ISTART + 4                      FLT20290
00540           CALL AVRGR (KK,ISTART,ISTOP)                      FLT20291
00541           FILT2(KK,51)  = TSAVE + 0.012                     FLT20292
00542           FILT2(KK,52)  = FILT2(KK,51) - TREF               FLT20293
00543           ICNT3           = ICNT3 + 1                       FLT20294
00544           GO TO 360                                         FLT20295
00545       380 CONTINUE                                          FLT20296
00546           KK              = KK + 1                          FLT20297
00547           ISTART          = ISTOP - 1                       FLT20298
00550           ISTOP           = ISTART + 4                      FLT20299
00551           CALL AVRGR (KK,ISTART,ISTOP)                      FLT20300
00552           IPIV            = ISTART + 2                      FLT20301
00553           FILT2(KK,IFV) = FILT1(IPIV,IFV)                   FLT20302
00554           FILT2(KK,51)  = TSAVE + 0.024                     FLT20303
00555           FILT2(KK,52)  = FILT2(KK,51) - TREF               FLT20304
00556           TSAVE           = FILT2(KK,51)                    FLT20305
00557           N               = 0                               FLT20306
00560           JROW            = KK                              FLT20307
00561           ICNT3           = ICNT3 + 1                       FLT20308
00562           GO TO 360                                         FLT20309
00563       390 CONTINUE                                          FLT20310
00564           ICNT3           = 1                               FLT20311
00565           JCENTR          = 1                               FLT20312
00566           GO TO 440                                         FLT20313
00567       400 CONTINUE                                          FLT20314
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00570          GO TO (410,420,430),ICNT4                     FLT20315
00571      410 CONTINUE                                      FLT20316
00572          ISTART         = ISTART - 2                   FLT20317
00573          ISTOP          = ISTART + 4                   FLT20318
00574          CALL AVRGR (KK,ISTART,ISTOP)                  FLT20319
00575          FILT2(KK,51)  = TSAVE + 0.012                 FLT20320
00576          FILT2(KK,52)  = FILT2(KK,51) - TREF           FLT20321
00577          ICNT4          = ICNT4 + 1                    FLT20322
00600          GO TO 400                                     FLT20323
00601      420 CONTINUE                                      FLT20324
00602          KK             = KK + 1                       FLT20325
00603          JROW           = KK                           FLT20326
00604          ISTART         = ISTOP                        FLT20327
00605          ISTOP          = ISTART + 4                   FLT20328
00606          CALL AVRGR (KK,ISTART,ISTOP)                  FLT20329
00607          IPIV           = ISTART + 2                   FLT20330
00610          FILT2(KK,IFV) = FILT1(IPIV,IFV)               FLT20331
00611          FILT2(KK,51)  = TSAVE + 0.028                 FLT20332
00612          FILT2(KK,52)  = FILT2(KK,51) - TREF           FLT20333
00613          TSAVE          = FILT2(KK,51)                 FLT20334
00614          N              = 0                            FLT20335
00615          ICNT4          = ICNT4 + 1                    FLT20336
00616          GO TO 400                                     FLT20337
00617      430 CONTINUE                                      FLT20338
00620          ICNT4          = 1                            FLT20339
00621          JCENTR         = 1                            FLT20340
00622      440 CONTINUE                                      FLT20341
00623          GO TO 240                                     FLT20342
00624      450 CONTINUE                                      FLT20343
00625          IF (ISTOP.GE.JEND) GO TO 460                  FLT20344
00627          KK             = KK + 1                       FLT20345
00630          CALL AVRGR (KK,ISTART,ISTOP)                  FLT20346
00631          N              = N + 1                        FLT20347
00632          FILT2(KK,51)  = TSAVE + N * DELT              FLT20348
00633          FILT2(KK,52)  = FILT2(KK,51) - TREF           FLT20349
00634          ISTART         = ISTART + 5                   FLT20350
00635          ISTOP          = ISTART + 4                   FLT20351
00636          GO TO 450                                     FLT20352
00637      460 CONTINUE                                      FLT20353
00640          IF (ISTOP.LE.38) GO TO 310                    FLT20354
00642          TSAVE          = FILT2(KK,51)                 FLT20355
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00643          KKSAVE         = KK                                   FLT20356
00644          KK             = 0                                    FLT20357
00645          CALL SHIFT                                            FLT20358
00646          LOC            = JEND - ISTART + 1                    FLT20359
00647          ISTART         = 10 - 40 + ISTART                     FLT20360
00650          ISTOP          = ISTART + 4                           FLT20361
00651          IPOINT         = 3                                    FLT20362
00652          GO TO 550                                             FLT20363
00653      470 CONTINUE                                              FLT20364
00654          IBEGIN         = 0                                    FLT20365
00655          ICENTR         = 0                                    FLT20366
00656          ICNT1          = 1                                    FLT20367
00657          ICNT2          = 1                                    FLT20368
00660          ICNT3          = 1                                    FLT20369
00661          ICNT4          = 1                                    FLT20370
00662          IPIV           = 0                                    FLT20371
00663          IPOINT         = 1                                    FLT20372
00664          IROW           = 0                                    FLT20373
00665          ISTART         = 6                                    FLT20374
00666          JCENTR         = 0                                    FLT20375
00667          JEND           = 0                                    FLT20376
00670          JROW           = 0                                    FLT20377
00671          KK             = 0                                    FLT20378
00672          KKPBEG         = 0                                    FLT20379
00673          KKSAVE         = 0                                    FLT20380
00674          LOC            = 0                                    FLT20381
00675          NOISE          = 1                                    FLT20382
00676          TREF           = 0.0                                  FLT20383
00677          TSAVE          = 0.0                                  FLT20384
00700          DO 500 J=1,53                                         FLT20385
00703          DO 480 I=1,60                                         FLT20386
00706          STORE(I,J)     = 0.0                                  FLT20387
00707      480 CONTINUE                                              FLT20388
00711          DO 490 I=1,9                                          FLT20389
00714          FILT2(I,J)     = 0.0                                  FLT20390
00715      490 CONTINUE                                              FLT20391
00717          STORE(I,J)     = 0.0                                  FLT20392
00720      500 CONTINUE                                              FLT20393
00722          DO 510 I=1,40                                         FLT20394
00725          DO 510 J=1,51                                         FLT20395
00730          FILT1(I,J)     = 0.0                                  FLT20396
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00731        510 CONTINUE                                              FLT20397
00734            DO 540 I=1,9                                          FLT20398
00737            DO 520 J=1,50                                         FLT20399
00742            ENGRAT(I,J)    = 0.0                                  FLT20400
00743        520 CONTINUE                                              FLT20401
00745            DO 530 J=1,100                                        FLT20402
00750            ENGDAT(I,J)    = 0.0                                  FLT20403
00751        530 CONTINUE                                              FLT20404
00753        540 CONTINUE                                              FLT20405
00755        550 CONTINUE                                              FLT20406
00756            RETURN                                                FLT20407
00757            END                                                   FLT20408

    END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
  FILTR2          SYMBOLIC                      25 JUN 70  12&26&55   0  01523316   14   409  (DELETED)
  FILTR2  CODE    RELOCATABLE                   25 JUN 70  12&26&55   1  01536454   36     1  (DELETED)
                                                                      0  01536520   14   102
&      HDG       HDO11C-HGAMMA
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&     FOR,*    HGAMMA,HGAMMA                                                     14 JUL 70              17& 6& 3.586
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&03

   SUBROUTINE HGAMMA    ENTRY POINT 000120

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001   *CODE   000125
         0000   *DATA   000042
         0002   *BLANK  000000

   EXTERNAL REFERENCES (BLOCK, NAME)

         0003   NERR3$

   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000001 PATM        0000 R 000000 T          0000 R 000002 U

00101      1*          SUBROUTINE HGAMMA (TFI,PFII,GAMMAH)                                HGAM0000
00103      2*          T          = 5.0 * (TFI + 459.7) / 9.0                             HGAM0001
00104      3*          PATM       = PFII / 14.696                                         HGAM0002
00105      4*          U          = 1.0 / T                                               HGAM0003
00106      5*          GAMMAH     = 1.4 + 1.7916552 - 9.34946E+1 * U + 3.4401152E+3 * U * UHGAM0004
00106      6*         1             + (-1.5811495E-2 + (7.371037E-5 + (-1.903277E-7 +     HGAM0005
00106      7*         2             (2.560734E-10 - 1.3934965E-13 * T) * T) * T) * T +HGAM0006
00106      8*         3             (9.5212948E-3 + (-9.4796595E-6 + 4.7574151E-8 * PATM) *HGAM0007
00106      9*         4             PATM) * PATM - 9.8875463E-5 * T * PATM + 3.9974179E-7  HGAM0008
00106     10*         5             * T * T * PATM - 3.391797E-8 * T * PATM * PATM -       HGAM0009
00106     11*         6             7.3903897E-10 * T * T * T * PATM + 3.0774794E-10 * T * HGAM0010
00106     12*         7             T * PATM * PATM + 5.2240539E-13 * T ** 4 * PATM -      HGAM0011
00106     13*         8             4.6828143E-13 * T * T * T * PATM * PATM                HGAM0012
```

```
00107    14*         RETURN                                                    HGAM0013
00110    15*         END                                                       HGAM0014

      END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
    HGAMMA          SYMBOLIC                    25 JUN 70  12&26&56   0  01541344   14   15  (DELETED)
    HGAMMA  CODE    RELOCATABLE                 25 JUN 70  12&26&56   1  01541666   24    1  (DELETED)
                                                                      0  01541716   14   12
&      HDG      HDO11C-HZH
```

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&     FOR,*    HZH,HZH                                                                     14 JUL 70              17& 6& 4.704
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&04

   SUBROUTINE HZH       ENTRY POINT 000116

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001   *CODE   000123
         0000   *DATA   000043
         0002   *BLANK  000000


   EXTERNAL REFERENCES (BLOCK, NAME)

         0003   NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000001 PATM       0000 R 000000 T          0000 R 000002 U



00101      1*          SUBROUTINE HZH (TFI,PFII,ZH)                                    HZH00000
00103      2*          T          = 5.0 * (TFI + 459.7) / 9.0                          HZH00001
00104      3*          PATM       = PFII / 14.696                                      HZH00002
00105      4*          U          = 1.0 / T                                            HZH00003
00106      5*          ZH         = 1.0 - 2.6772676 + (1.8336324E+2 - 5.3350829E+3 * U) *  HZH00004
00106      6*         1              U + (2.1605597E-2 + (-1.0357253E-4 + (2.9241458E-7 +  HZH00005
00106      7*         2              (-4.4684258E-10 + 2.8380505E-13 * T) * T) * T) * T) * HZH00006
00106      8*         3              T + (-3.9254562E-3 + (2.5326543E-5 + 4.572284E-10 *    HZH00007
00106      9*         4              PATM) * PATM) * PATM + 6.19289E-5 * T * PATM          HZH00008
00106     10*         5              - 2.949753E-7 * T * T * PATM - 2.5910804E-7 * T * PATM HZH00009
00106     11*         6              * PATM + 5.8954277E-10 * T * T * T * PATM +           HZH00010
00106     12*         7              8.7135669E-10 * T * T * PATM * PATM - 4.247153E-13 *  HZH00011
00106     13*         8              T ** 4 * PATM - 9.5916114E-13 * T **3 * PATM * PATM   HZH00012
```

```
00107    14*         RETURN                                                        HZH00013
00110    15*         END                                                           HZH00014

      END OF UNIVAC 1108 FORTRAN V COMPILATION.      0 *DIAGNOSTIC* MESSAGE(S)
   HZH              SYMBOLIC                              25 JUN 70  12&26&58   0  01542166    14      15  (DELETED)
   HZH      CODE    RELOCATABLE                           25 JUN 70  12&26&58   1  01542510    24       1  (DELETED)
                                                                                0  01542540    14      12
&      HDG       HD011C-JHYDE
```

```
&     FOR,*    JHYDE,JHYDE                                                                       14 JUL 70              17& 6& 5.720
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&05

   SUBROUTINE JHYDE      ENTRY POINT 001031

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001    *CODE    001046
         0000    *DATA    000136
         0002    *BLANK   015607
         0003    FACTOR   006533
         0004    FILES    000014
         0005    ROWS     000015
         0006    UNITS    000004


   EXTERNAL REFERENCES (BLOCK, NAME)

         0007    NWDU$
         0010    NIO1$
         0011    NIO2$
         0012    NSTOP$
         0013    NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000    000010 10F         0001    000261 100L        0001    000264 110L        0001    000011 115G        0001    000021 120G
    0001    000072 135G        0001    000306 140L        0001    000311 150L        0001    000341 160L        0001    000207 170G
    0001    000343 170L        0001    000374 180L        0001    000415 190L        0000    000043 20F         0001    000515 200L
    0001    000520 210L        0001    000523 220L        0001    000526 230L        0001    000624 240L        0001    000627 250L
    0001    000376 252G        0001    000406 255G        0001    000632 260L        0001    000635 270L        0001    000451 272G
    0001    000030 30L         0001    000653 300L        0001    000731 310L        0001    000560 325G        0001    000136 40L
    0001    000141 50L         0001    000144 60L         0001    000147 70L         0001    000253 80L         0001    000256 90L
    0004 P  000000 BEGFIL      0003 R  000000 BIAS        0000 R  000004 BIGX        0000 R  000006 BIGY        0002 R  000000 ENGDAT
    0002 P  001604 ENGRAT      0002 R  002506 FILT1       0002 R  006476 FILT2       0000 I  000001 I           0003 I  000063 IB
    0005 I  000000 IBEGIN      0004 I  000001 IBL         0003 I  000146 IC          0004 I  000002 IDUMP       0005 I  000001 IFV
```

```
0004 I 000003 ILINE     0005 I 000002 INITL     0004 I 000004 INT       0005 I 000003 ION       0006 I 000000 IOTAPE
0004 I 000005 IPC       0004 I 000006 IPLOT     0005 I 000004 IQUIT     0005 I 000005 IROW      0003 I 000231 IRUNNO
0003 I 000232 IS        0000 I 000000 J         0005 I 000006 JEND      0005 I 000007 JON       0005 I 000010 JROW
0000 I 000003 K         0005 I 000011 KKPBEG    0005 I 000012 KKPEND    0005 I 000013 KKSAVE    0000 I 000002 LL
0005 I 000014 LSTPTS    0006 I 000001 MICROT    0004 I 000007 MLINE     0004 I 000010 MXFILE    0004 I 000011 NDP
0004 I 000012 NLINES    0004 I 000013 NP        0003 I 000315 NP1       0003 I 000400 NP2       0006 R 000002 PLTAPE
0003 R 000464 SCALE     0000 R 000005 SMLX      0000 R 000007 SMLY      0002 R 007433 STORE     0003 R 000547 TABX1
0003 R 001545 TABX2     0003 R 003541 TABY1     0003 R 004537 TABY2     0006 R 000003 UNIT
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00101         SUBROUTINE JHYDE                                                  JHYD0000
00103         COMMON          ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)           JHYD0001
00103        1              , FILT2(9,53),STORE(60,53)                          JHYD0002
00104         COMMON / FACTOR / BIAS(51),IB(51),IC(51),IRUNNO,IS(51),NP1(51)    JHYD0003
00104        1              , NP2(52),SCALE(51),TABX1(51,10),TABX2(51,20)       JHYD0004
00104        2              , TABY1(51,10),TABY2(51,20)                         JHYD0005
00105         COMMON / FILES  / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE      JHYD0006
00105        1              , MXFILE,NDP,NLINES,NP                              JHYD0007
00106         COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW   JHYD0008
00106        1              , KKPBEG,KKPEND,KKSAVE,LSTPTS                       JHYD0009
00107         COMMON / UNITS  / IOTAPE,MICROT,PLTAPE,UNIT                       JHYD0010
00110      10 FORMAT('OTHE COUNT VALUE,'E14.8,', FOR CHANNEL',I3,' WAS OUTSIDE OJHYD0011
00110        1NE OF THE LIMITS FOR'/' THE COUNTS TO MILLI-VOLT CALIBRATION TABLEJHYD0012
00110        2.  THOSE LIMITS ARE',2E14.8)                                      JHYD0013
00111      20 FORMAT('OTHE MILLI-VOLT VALUE,'E14.8,', FOR CHANNEL',I3,' WAS OUTSJHYD0014
00111        1IDE ONE OF THE LIMITS FOR'/' THE MILLI-VOLTS TO ENGINEERING UNITS JHYD0015
00111        2CALIBRATION TABLE.  THOSE LIMITS ARE',2E14.8)                     JHYD0016
00111   C * * CHECK FOR WORKING ON DUMP DATA RATHER THAN FILTERED DATA...       JHYD0017
00112         IF (IDUMP.EQ.1) GO TO 180                                         JHYD0018
00112   C * * WORK ON FILTERED DATA...                                          JHYD0019
00114         DO 130 J=1,KKSAVE                                                 JHYD0020
00117         DO 120 I=1,50                                                     JHYD0021
00117   C * * CHECK FOR SCALING OF DATA...                                      JHYD0022
00122         IF (IS(I).EQ.0) GO TO 30                                          JHYD0023
00122   C * * SCALE DATA...                                                     JHYD0024
00124         FILT2(J,I)    = FILT2(J,I) * SCALE(I)                             JHYD0025
00125         GO TO 110                                                         JHYD0026
00126      30 CONTINUE                                                          JHYD0027
00126   C * * CHECK FOR USE OF CAL CURVE ON DATA...                             JHYD0028
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00127           IF (IC(I).EQ.0) GO TO 110                                   JHYD0029
00127     C * * OBTAIN ADDRESS OF LAST POINT IN TABLE...                    JHYD0030
00131           LL             = NP1(I)                                     JHYD0031
00131     C * * CHECK FOR DATA OUTSIDE OF TABLE...                          JHYD0032
00132           IF (FILT2(J,I).LT.TABX1(I,1).OR.FILT2(J,I).GT.TABX1(I,LL)) GO TO 1JHYD0033
00132          150                                                          JHYD0034
00134           DO 60 K=2,LL                                                JHYD0035
00134     C * * FIND LOCATION OF POINT IN TABLE...                          JHYD0036
00137           IF (FILT2(J,I).GT.TABX1(I,K)) GO TO 60                      JHYD0037
00137     C * * DETERMINE IF EQUAL TO AN END POINT IN INTERVAL...           JHYD0038
00141           IF (ABS(FILT2(J,I)-TABX1(I,K)).LE.1.0E-06) GO TO 40         JHYD0039
00143           IF (ABS(FILT2(J,I)-TABX1(I,K-1)).LE.1.0E-06) GO TO 50       JHYD0040
00143     C * * CALCULATE THE MILLI-VOLT VALUE FOR DATA...                  JHYD0041
00145           BIGX           = TABX1(I,K) - TABX1(I,K-1)                  JHYD0042
00146           SMLX           = FILT2(J,I) - TABX1(I,K-1)                  JHYD0043
00147           BIGY           = TABY1(I,K) - TABY1(I,K-1)                  JHYD0044
00150           SMLY           = TABY1(I,K-1)                               JHYD0045
00151           FILT2(J,I)     = BIGY * SMLX / BIGX + SMLY                  JHYD0046
00152           GO TO 70                                                    JHYD0047
00152     C * * STORE HIGH END OF INTERVAL...                               JHYD0048
00153        40 CONTINUE                                                    JHYD0049
00154           FILT2(J,I)     = TABY1(I,K)                                 JHYD0050
00155           GO TO 70                                                    JHYD0051
00155     C * * STORE LOW END OF INTERVAL...                                JHYD0052
00156        50 CONTINUE                                                    JHYD0053
00157           FILT2(J,I)     = TABY1(I,K-1)                               JHYD0054
00160           GO TO 70                                                    JHYD0055
00161        60 CONTINUE                                                    JHYD0056
00163        70 CONTINUE                                                    JHYD0057
00163     C * * OBTAIN ADDRESS OF LAST POINT IN TABLE...                    JHYD0058
00164           LL             = NP2(I)                                     JHYD0059
00164     C * * CHECK FOR DATA OUTSIDE OF TABLE...                          JHYD0060
00165           IF (FILT2(J,I).LT.TABX2(I,1).OR.FILT2(J,I).GT.TABX2(I,LL)) GO TO 1JHYD0061
00165          170                                                          JHYD0062
00167           DO 100 K=2,LL                                               JHYD0063
00167     C * * FIND LOCATION OF POINT IN TABLE...                          JHYD0064
00172           IF (FILT2(J,I).GT.TABX2(I,K)) GO TO 100                     JHYD0065
00172     C * * DETERMINE IF EQUAL TO AN END POINT IN INTERVAL...           JHYD0066
00174           IF (ABS(FILT2(J,I)-TABX2(I,K)).LE.1.0E-6) GO TO 80          JHYD0067
00176           IF (ABS(FILT2(J,I)-TABX2(I,K-1)).LE.1.0E-6) GO TO 90        JHYD0068
00176     C * * CALCULATE THE ENGINEERING VALUE FOR DATA...                 JHYD0069
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00200              BIGX           = TABX2(I,K) - TABX2(I,K-1)                 JHYD0070
00201              SMLX           = FILT2(J,I) - TABX2(I,K-1)                 JHYD0071
00202              BIGY           = TABY2(I,K) - TABY2(I,K-1)                 JHYD0072
00203              SMLY           = TABY2(I,K-1)                              JHYD0073
00204              FILT2(J,I)     = BIGY * SMLX / BIGX + SMLY                 JHYD0074
00205              GO TO 110                                                  JHYD0075
00206           80 CONTINUE                                                   JHYD0076
00207              FILT2(J,I)     = TABY2(I,K)                                JHYD0077
00210              GO TO 110                                                  JHYD0078
00211           90 CONTINUE                                                   JHYD0079
00212              FILT2(J,I)     = TABY2(I,K-1)                              JHYD0080
00213              GO TO 110                                                  JHYD0081
00214          100 CONTINUE                                                   JHYD0082
00216          110 CONTINUE                                                   JHYD0083
00216        C * * CHECK FOR BIASING OF DATA...                               JHYD0084
00216        C * * BIAS THE DATA...                                           JHYD0085
00217              IF (IB(I) .EQ. 1) FILT2(J,I) = FILT2(J,I) + BIAS(I)        JHYD0086
00221          120 CONTINUE                                                   JHYD0087
00223          130 CONTINUE                                                   JHYD0088
00225          140 CONTINUE                                                   JHYD0089
00226              RETURN                                                     JHYD0090
00226        C * * WRITE ERROR MESSAGE...                                     JHYD0091
00227          150 CONTINUE                                                   JHYD0092
00230              WRITE (6,10)FILT2(J,I),I,TABX1(I,1),TABX1(I,LL)            JHYD0093
00236          160 CONTINUE                                                   JHYD0094
00237              STOP                                                       JHYD0095
00237        C * * WRITE ERROR MESSAGE...                                     JHYD0096
00240          170 CONTINUE                                                   JHYD0097
00241              WRITE (6,20)FILT2(J,I),I,TABX2(I,1),TABX2(I,LL)            JHYD0098
00247              GO TO 160                                                  JHYD0099
00247        C * * WORK ON DATA TO BE DUMPED...                               JHYD0100
00250          180 CONTINUE                                                   JHYD0101
00251              DO 290 J=1,60                                              JHYD0102
00254              DO 280 I=1,50                                              JHYD0103
00254        C * * CHECK FOR SCALING OF DATA...                               JHYD0104
00257              IF (IS(I).EQ.0) GO TO 190                                  JHYD0105
00257        C * * SCALE DATA...                                              JHYD0106
00261              STORE(J,I)     = STORE(J,I) * SCALE(I)                     JHYD0107
00262              GO TO 270                                                  JHYD0108
00263          190 CONTINUE                                                   JHYD0109
00263        C * * CHECK FOR USE OF CAL CURVE ON DATA...                      JHYD0110
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00264           IF (IC(I).EQ.0) GO TO 270                                          JHYD0111
00264     C * * OBTAIN ADDRESS OF LAST POINT IN TABLE...                           JHYD0112
00266           LL             = NP1(I)                                            JHYD0113
00266     C * * CHECK FOR DATA OUTSIDE OF TABLE...                                 JHYD0114
00267           IF (STORE(J,I).LT.TABX1(I,1).OR.STORE(J,I).GT.TABX1(I,LL)) GO TO 3JHYD0115
00267          100                                                                 JHYD0116
00271           DO 220 K=2,LL                                                      JHYD0117
00271     C * * FIND LOCATION OF POINT IN TABLE...                                 JHYD0118
00274           IF (STORE(J,I).GT.TABX1(I,K)) GO TO 220                            JHYD0119
00274     C * * DETERMINE IF EQUAL TO AN END POINT IN INTERVAL...                  JHYD0120
00276           IF (ABS(STORE(J,I)-TABX1(I,K)).LE.1.0E-6) GO TO 200                JHYD0121
00300           IF (ABS(STORE(J,I)-TABX1(I,K-1)).LE.1.0E-6) GO TO 210              JHYD0122
00300     C * * CALCULATE THE MILLI-VOLT VALUE FOR DATA...                         JHYD0123
00302           BIGX           = TABX1(I,K) - TABX1(I,K-1)                         JHYD0124
00303           SMLX           = STORE(J,I) - TABX1(I,K-1)                         JHYD0125
00304           BIGY           = TABY1(I,K) - TABY1(I,K-1)                         JHYD0126
00305           SMLY           = TABY1(I,K-1)                                      JHYD0127
00306           STORE(J,I)     = BIGY * SMLX / BIGX + SMLY                         JHYD0128
00307           GO TO 230                                                          JHYD0129
00307     C * * STORE HIGH END OF INTERVAL...                                      JHYD0130
00310       200 CONTINUE                                                           JHYD0131
00311           STORE(J,I)     = TABY1(I,K)                                        JHYD0132
00312           GO TO 230                                                          JHYD0133
00312     C * * STORE LOW END OF INTERVAL...                                       JHYD0134
00313       210 CONTINUE                                                           JHYD0135
00314           STORE(J,I)     = TABY1(I,K-1)                                      JHYD0136
00315           GO TO 230                                                          JHYD0137
00316       220 CONTINUE                                                           JHYD0138
00316     C * * OBTAIN ADDRESS OF LAST POINT IN TABLE...                           JHYD0139
00320       230 CONTINUE                                                           JHYD0140
00321           LL             = NP2(I)                                            JHYD0141
00321     C * * CHECK FOR DATA OUTSIDE OF TABLE...                                 JHYD0142
00322           IF (STORE(J,I).LT.TABX2(I,1).OR.STORE(J,I).GT.TABX2(I,LL)) GO TO 3JHYD0143
00322          110                                                                 JHYD0144
00324           DO 260 K=2,LL                                                      JHYD0145
00324     C * * FIND LOCATION OF POINT IN TABLE...                                 JHYD0146
00327           IF (STORE(J,I).GT.TABX2(I,K)) GO TO 260                            JHYD0147
00327     C * * DETERMINE IF EQUAL TO AN END POINT IN INTERVAL...                  JHYD0148
00331           IF (ABS(STORE(J,I)-TABX2(I,K)).LE.1.0E-6) GO TO 240                JHYD0149
00333           IF (ABS(STORE(J,I)-TABX2(I,K-1)).LE.1.0E-6) GO TO 250              JHYD0150
00333     C * * CALCULATE THE ENGINEERING VALUE FOR DATA...                        JHYD0151
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00335             BIGX          = TABX2(I,K) - TABX2(I,K-1)                    JHYD0152
00336             SMLX          = STORE(J,I) - TABX2(I,K-1)                    JHYD0153
00337             BIGY          = TABY2(I,K) - TABY2(I,K-1)                    JHYD0154
00340             SMLY          = TABY2(I,K-1)                                 JHYD0155
00341             STORE(J,I)    = BIGY * SMLX / BIGX + SMLY                    JHYD0156
00342             GO TO 270                                                    JHYD0157
00343         240 CONTINUE                                                     JHYD0158
00344             STORE(J,I)    = TABY2(I,K)                                   JHYD0159
00345             GO TO 270                                                    JHYD0160
00346         250 CONTINUE                                                     JHYD0161
00347             STORF(J,I)    = TABY2(I,K-1)                                 JHYD0162
00350             GO TO 270                                                    JHYD0163
00351         260 CONTINUE                                                     JHYD0164
00351       C * * CHECK FOR BIASING OF DATA...                                 JHYD0165
00351       C * * BIAS THE DATA...                                             JHYD0166
00353         270 CONTINUE                                                     JHYD0167
00354             IF (TB(I) .EQ. 1) STORE(J,I) = STORE(J,I) + BIAS(I)          JHYD0168
00356         280 CONTINUE                                                     JHYD0169
00360         290 CONTINUE                                                     JHYD0170
00362             GO TO 140                                                    JHYD0171
00362       C * * WRITE ERROR MESSAGE...                                       JHYD0172
00363         300 CONTINUE                                                     JHYD0173
00364             WRITE (6,10)STORE(J,I),I,TABX1(I,1),TABX1(I,LL)              JHYD0174
00372             IF (MICROT.EQ.17) WRITE (MICROT,10)STORE(J,I),I,TABX1(I,1),TABX1(IJHYD0175
00372            1,LL)                                                         JHYD0176
00401             GO TO 160                                                    JHYD0177
00401       C * * WRITE ERROR MESSAGE...                                       JHYD0178
00402         310 CONTINUE                                                     JHYD0179
00403             WRITE (6,20)STORE(J,I),I,TABX2(I,1),TABX2(I,LL)              JHYD0180
00411             IF (MICROT.EQ.17) WRITE (MICROT,20)STORE(J,I),I,TABX2(I,1),TABX2(IJHYD0181
00411            1,LL)                                                         JHYD0182
00420             GO TO 160                                                    JHYD0183
00421             END                                                          JHYD0184

     END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
   JHYDE          SYMBOLIC                        25 JUN 70  12&27&01  0  01543010   14   185  (DELETED)
   JHYDE    CODE  RELOCATABLE                     25 JUN 70  12&27&01  1  01550046   36     1  (DELETED)
                                                                       0  01550112   14    62
&    HDG     HD011C-OGAMMA
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&     FOR,*     OGAMMA,OGAMMA                                              14 JUL 70            17& 6& 8.710
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&08

   SUBROUTINE OGAMMA    ENTRY POINT 000111

   STORAGE USED (BLOCK, NAME, LENGTH)

         0001   *CODE    000115
         0000   *DATA    000034
         0002   *BLANK   000000


   EXTERNAL REFERENCES (BLOCK, NAME)

         0003   NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000001 PATM        0000 R 000000 T


00101             SUBROUTINE OGAMMA (TOI,POII,GAMMAO)                         OGAM0000
00103             T          = 5.0 * (TOI + 459.7) / 9.0                      OGAM0001
00104             PATM       = POII / 14.696                                  OGAM0002
00105             GAMMAO     = 1.4 - 1.7457824E-2 + (1.9357917E-4 + (-7.2588636E-7 +  OGAM0003
00105         1          (1.0841843E-9 - 1.254912E-12 * T) * T) * T) * T +      OGAM0004
00105         2          0.16343016 * PATM + 1.4833429E-3 * PATM * PATM -       OGAM0005
00105         3          5.303302E-8 * PATM ** 3 - 2.2332967E-3 * T * PATM +    OGAM0006
00105         4          1.1615558E-5 * T * T * PATM - 1.3824483E-5 * T * PATM  OGAM0007
00105         5          * PATM - 2.6652882E-8 * T * T * T * PATM + 4.2607112E-8OGAM0008
00105         6          * T * T * PATM * PATM + 2.2589584E-11 * T ** 4 * PATM  OGAM0009
00105         7          - 4.3236307E-11 * T **3 * PATM * PATM                  OGAM0010
00106             RETURN                                                      OGAM0011
00107             END                                                         OGAM0012
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  END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
 OGAMMA        SYMBOLIC                        25 JUN 70  12&27&02  0  01551656   14    13  (DELETED)
 OGAMMA  CODE  RELOCATABLE                     25 JUN 70  12&27&02  1  01552144   24     1  (DELETED)
                                                                    0  01552174   14    11
&     HDG      HD011C-OUTPUT
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&     FOR,*    OUTPUT,OUTPUT                                   14 JUL 70          17& 6& 9.759
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&09

   SUBROUTINE OUTPUT    ENTRY POINT 002767

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001   *CODE   003004
        0000   *DATA   001213
        0002   *BLANK  015607
        0003   COMRAT  000052
        0004   ENG     000022
        0005   FACTOR  006533
        0006   ICT     000012
        0007   LABELS  000320
        0010   ROWS    000015
        0011   UNITS   000004
        0012   FILES   000014

   EXTERNAL REFERENCES (BLOCK, NAME)

        0013   NWDU$
        0014   NIO2$
        0015   NIO1$
        0016   NWBU$
        0017   NERR2$
        0020   NEXP1$
        0021   NREW$
        0022   NRDU$
        0023   NERR3$

   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000   000560 10F       0000   000713 100F      0001   001505 1001G     0001   001614 1034G     0001   001626 1042G
    0001   001644 1051G     0000   000736 110F      0001   002056 1145G     0001   002102 1156G     0000   000763 120F
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0001 002137 1201G	0001 002250 1236G	0001 002301 1253G	0001 002313 1263G	0000 001020 130F
0001 002503 1336G	0001 002526 1350G	0001 002555 1364G	0001 002600 1376G	0000 001055 140F
0001 002613 1407G	0001 002707 1442G	0001 002731 1453G	0000 001100 150F	0001 000037 160L
0001 000041 170L	0001 000025 176G	0001 000064 180L	0001 000157 190L	0000 000577 20F
0001 000167 200L	0001 000176 210L	0001 000200 220L	0001 000072 224G	0001 000250 230L
0001 000304 240L	0001 000312 250L	0001 000362 260L	0001 000231 267G	0001 000442 270L
0001 000242 274G	0001 000460 280L	0001 000477 290L	0000 000603 30F	0001 000544 300L
0001 000272 310G	0001 000624 310L	0001 000300 314G	0001 000632 320L	0001 000675 330L
0001 000343 334G	0001 000740 340L	0001 000354 341G	0001 001005 350L	0001 001041 360L
0001 001047 370L	0001 001113 380L	0001 001133 390L	0000 000605 40F	0001 001153 400L
0001 001156 410L	0001 000527 411G	0001 000536 415G	0001 001204 420L	0001 001363 430L
0001 000612 435G	0001 000620 441G	0001 001372 450L	0001 000660 460G	0001 001413 460L
0001 000667 464G	0001 001416 470L	0001 001471 490L	0000 000625 50F	0001 001473 500L
0001 000770 520G	0001 001560 520L	0001 000777 524G	0001 001606 530L	0001 001027 540G
0001 001667 540L	0001 001035 544G	0001 002007 550L	0001 002111 560L	0001 001075 563G
0001 001104 567G	0001 002132 570L	0001 002156 580L	0001 002230 590L	0000 000653 60F
0001 002311 600L	0001 002363 610L	0001 002437 620L	0001 001203 623G	0001 002455 630L
0001 002606 640L	0001 001246 645G	0001 002630 650L	0001 001267 651G	0001 001300 656G
0001 002676 660L	0001 001311 663G	0001 002745 670L	0001 001333 674G	0000 000671 70F
0001 001344 701G	0001 001355 706G	0001 001433 747G	0001 001441 756G	0001 001454 762G
0000 000673 80F	0000 000675 90F	0004 R 000000 AC	0003 R 000000 AE	0004 R 000001 AT
0003 R 000001 ATTC	0012 I 000000 BEGFIL	0005 R 000000 BIAS	0003 R 000002 CFNSV	0003 R 000003 CFSTD
0003 R 000004 CFSTDV	0003 R 000005 CFSV	0004 R 000002 CF1	0004 R 000003 CF2	0004 R 000004 CF3
0004 R 000005 CF4	0000 R 000000 CIV	0003 R 000006 CSTASD	0003 R 000007 CSTAT	0003 R 000010 CSTATS
0004 R 000006 DCSTAR	0004 R 000007 DHO	0004 R 000010 DOO	0003 R 000011 DPF	0003 R 000012 DPFS
0004 R 000011 DPH	0004 R 000012 DPO	0003 R 000013 DPOS	0003 R 000015 ECFS	0003 R 000014 ECFSTD
0002 R 000000 ENGDAT	0002 R 001504 ENGRAT	0003 R 000016 EPS	0003 R 000017 ETAC	0002 R 002506 FILT1
0002 R 006476 FILT2	0003 R 000020 FSTD	0004 R 000013 G	0004 R 000014 GAMMA	0000 I 000526 I
0000 I 000120 IALPHA	0005 I 000063 IB	0010 I 000000 IBEGIN	0000 I 000541 IBEGN1	0000 I 000542 IBEGN2
0012 I 000001 IBL	0000 I 000527 IBLANK	0005 I 000146 IC	0000 I 000132 ICAN	0006 I 000000 ICT1
0000 I 000214 IDATA	0012 I 000002 IDUMP	0000 I 000537 IDU1	0000 I 000530 IEND	0000 I 000232 IFND
0010 I 000001 IFV	0000 I 000546 IGO	0000 I 000550 IGO1	0012 I 000003 ILINE	0010 I 000002 INITL
0012 I 000004 INT	0010 I 000003 ION	0011 I 000000 IOTAPE	0000 I 000366 IOUTLB	0000 I 000246 IO1
0012 I 000005 IPC	0012 I 000006 IPLOT	0007 I 000000 IPOINT	0000 I 000543 IPRINT	0010 I 000004 IQUIT
0003 I 000021 IRATED	0000 I 000551 IREC	0010 I 000005 IROW	0000 I 000545 IROW1	0005 I 000231 IRUNNO
0005 I 000232 IS	0000 I 000540 ISKIP	0003 I 000022 ISPS	0000 I 000506 ITRY	0000 I 000531 ITYPE1
0000 I 000532 ITYPE2	0000 I 000533 ITYPE3	0000 I 000547 J	0010 I 000006 JEND	0010 I 000007 JON
0010 I 000010 JROW	0000 I 000544 JROW1	0000 I 000553 J1	0004 R 000015 K	0004 R 000016 KF
0010 I 000011 KKPBEG	0010 I 000012 KKPEND	0010 I 000013 KKSAVE	0004 R 000017 KO	0000 I 000554 L
0007 I 000010 LABELS	0007 I 000072 LABENS	0007 I 000236 LABRAT	0000 I 000555 LL	0000 I 000557 LLL
0010 I 000014 LSTPTS	0000 I 000556 L11	0000 I 000552 M	0011 I 000001 MICROT	0012 I 000007 MLINE

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0003 I 000023 MRS      0004 R 000020 MWH      0004 R 000021 MWO      0012 I 000010 MXFILE   0012 I 000011 NDP
0012 I 000012 NLINES   0006 I 000001 NOCONV   0012 I 000013 NP       0005 I 000315 NP1      0005 I 000400 NP2
0000 I 000520 NWRD     0000 I 000534 NWRD1    0000 I 000535 NWRD2    0000 I 000536 NWRD3    0003 R 000024 PAB
0003 R 000025 PCCI     0003 R 000026 PCCIA    0003 R 000027 PCE      0003 R 000030 PCS      0003 R 000031 PDO
0003 R 000032 PFD      0003 R 000033 PFDS     0011 I 000002 PLTAPE   0003 R 000034 PNSS     0003 R 000035 POD
0003 R 000036 PODS     0003 R 000037 RFD      0003 R 000040 RFDS     0003 R 000041 ROD      0003 R 000042 RODS
0005 R 000464 SCALE    0002 R 007433 STORE    0005 R 000547 TABX1    0005 R 001545 TABX2    0005 R 003541 TABY1
0005 R 004537 TABY2    0003 R 000043 TFD      0003 R 000044 TFDS     0003 R 000045 TOD      0003 R 000046 TODS
0011 I 000003 UNIT     0003 R 000047 WDOTFS   0003 R 000050 WDOTOS   0003 R 000051 WDOTTS
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00101        SUBROUTINE OUTPUT                                                  OUTP0000
00103        INTEGER             BEGFIL,PLTAPE,UNIT                             OUTP0001
00104        REAL                K,KF,KO,MWH,MWO                                OUTP0002
00105        DIMENSION           CIV(80),IALPHA(10),ICAN(50),IDATA(14),IFND(12) OUTP0003
00105       1                  , IO1(80),IOUTLB(80),ITRY(10),NWRD(6)            OUTP0004
00106        COMMON              ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)        OUTP0005
00106       1                  , FILT2(9,53),STORE(60,53)                       OUTP0006
00107        COMMON / COMRAT / AE,ATTC,CFNSV,CFSTD,CFSTDV,CFSV,CSTASD,CSTAT     OUTP0007
00107       1                  , CSTATS,DPF,DPFS,DPOS,ECFSTD,ECFS,EPS,ETAC,FSTD OUTP0008
00107       2                  , IRATED,ISPS,MRS,PAB,PCCI,PCCIA,PCE,PCS,PDO,PFD OUTP0009
00107       3                  , PFDS,PNSS,POD,PODS,RFD,RFDS,ROD,RODS,TFD,TFDS  OUTP0010
00107       4                  , TOD,TODS,WDOTFS,WDOTOS,WDOTTS                  OUTP0011
00110        COMMON / ENG    / AC,AT,CF1,CF2,CF3,CF4,DCSTAR,DHO,DOO,DPH,DPO,G   OUTP0012
00110       1                  , GAMMA,K,KF,KO,MWH,MWO                          OUTP0013
00111        COMMON / FACTOR / BIAS(51),IB(51),IC(51),IRUNNO,IS(51),NP1(51)     OUTP0014
00111       1                  , NP2(52),SCALE(51),TABX1(51,10),TABX2(51,20)    OUTP0015
00111       2                  , TABY1(51,10),TABY2(51,20)                      OUTP0016
00112        COMMON / ICT    / ICT1,NOCONV(9)                                   OUTP0017
00113        COMMON / LABELS / IPOINT(8),LABELS(50),LABENS(100),LABRAT(50)      OUTP0018
00114        COMMON / ROWS   / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW    OUTP0019
00114       1                  , KKPBEG,KKPEND,KKSAVE,LSTPTS                    OUTP0020
00115        COMMON / UNITS  / IOTAPE,MICROT, PLTAPE,UNIT                       OUTP0021
00116        COMMON / FILES  / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE       OUTP0022
00116       1                  , MXFILE,NDP,NLINES,NP                           OUTP0023
00117        DATA     (IALPHA(I),I=1,10)/ 0000000000060,0000000000061           OUTP0024
00117       1                           , 0000000000062,0000000000063           OUTP0025
00117       2                           , 0000000000064,0000000000065           OUTP0026
00117       3                           , 0000000000066,0000000000067           OUTP0027
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00117        4                          , 000000000070,000000000071          /OUTP0028
00121         DATA      IBLANK          / 000000000000                       /OUTP0029
00123         DATA      IEND            / 6HCASEND                           /OUTP0030
00125         DATA      (IO1(I),I=1,32) / 6HAC     ,6HAE     ,6HAT     ,6HCF1     OUTP0031
00125        1                          , 6HCF2    ,6HCF3    ,6HCF4    ,6HDCSTAR  OUTP0032
00125        2                          , 6HDHO    ,6HDOO    ,6HDPH    ,6HDPO     OUTP0033
00125        3                          , 6HG      ,6HGAMMA  ,6HIDUMP  ,6HIPC     OUTP0034
00125        4                          , 6HIPLOT  ,6HIRATED,6HK       ,6HKF      OUTP0035
00125        5                          , 6HKO     ,6HMIGROT,6HMWH     ,6HMWO     OUTP0036
00125        6                          , 6HNDP    ,6HNP     ,6HPAB    ,6HPCS     OUTP0037
00125        7                          , 6HPFDS   ,6HPODS   ,6HTFDS   ,6HTODS   /OUTP0038
00127         DATA      (ITRY(I),I=1,10) / 000000000000,000000000001          OUTP0039
00127        1                          , 000000000002,000000000003          OUTP0040
00127        2                          , 000000000004,000000000005          OUTP0041
00127        3                          , 000000000006,000000000007          OUTP0042
00127        4                          , 000000000010,000000000011         /OUTP0043
00131         DATA      ITYPE1          / 1                                  /OUTP0044
00133         DATA      ITYPE2          / 2                                  /OUTP0045
00135         DATA      ITYPE3          / 3                                  /OUTP0046
00137         DATA      (NWRD(I),I=1,6) / 005050500505,005050000505           OUTP0047
00137        1                          , 005050000005,005000000005           OUTP0048
00137        2                          , 005000000000,000000000000          /OUTP0049
00141         DATA      NWRD1           / 52                                 /OUTP0050
00143         DATA      NWRD2           / 23                                 /OUTP0051
00145         DATA      NWRD3           / 42                                 /OUTP0052
00147     10 FORMAT(/'  BLOCK V OUTPUT -- DATA TAPE DUMP -- RECORD NO. -- ',   OUTP0053
00147       1I3,' -- TEST NO. -- ',A6,/)                                     OUTP0054
00150     20 FORMAT(5(2X,A6,1X,F10.4))                                       OUTP0055
00151     30 FORMAT('1')                                                     OUTP0056
00152     40 FORMAT(/'  BLOCK II OUTPUT -- RUN NO. -- ',A6,' -- TIME C -- ',  OUTP0057
00152       1F7.4,' -- SEC'//(5(2X,A6,F11.4)))                               OUTP0058
00153     50 FORMAT(/'  BLOCK III OUTPUT -- RUN NO. -- ',A6,' -- TIME C -- ', OUTP0059
00153       1F7.4,' -- SEC -- TIME R -- ',F7.4,' -- SEC'//(5(2X,A6,F11.4)))  OUTP0060
00154     60 FORMAT('1'/'  BLOCK I -- INPUT DATA -- LOAD SHEETS -- CARD INPUT -OUTP0061
00154       1- RUN NO. -- ',A6,/)                                            OUTP0062
00155     70 FORMAT(13A6,A2)                                                 OUTP0063
00156     80 FORMAT(2X,13A6,A2)                                              OUTP0064
00157     90 FORMAT( /'  BLOCK I -- INPUT CONSTANTS -- CARD INPUT VARIABLES -- OUTP0065
00157       1RUN NO. -- ',A6,/)                                              OUTP0066
00160    100 FORMAT(  /'  BLOCK I -- TABLES OF SCALES, CALIBRATION CURVES AND BOUTP0067
00160       1IASES -- CARD INPUT VARIABLES -- RUN NO. -- ',A6)               OUTP0068
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00161        110 FORMAT( /'  THE SCALING FACTORS FOR REQUESTED CHANNELS ARE --'//  OUTP0069
00161           14(2X,'CH',1X,'PARAM',6X,'FACTOR')/(4(2X,I2,1X,A6,1X,F10.4)))     OUTP0070
00162        120 FORMAT( /'  COUNTS TO MILLI-VOLTS CALIBRATION CURVE FOR CHANNEL ',OUTP0071
00162           1I2,1X,A6,' CONSISTS OF',I3,' POINTS --',//2X,4(2X,'ABSCISSA/ORDINAOUTP0072
00162           2TE',4X)/(2X,4(F10.4,'/',F10.4,2X)))                              OUTP0073
00163        130 FORMAT( /'  MILLI-VOLTS TO ENG. UNITS CALIBRATION CURVE FOR CHANNEOUTP0074
00163           1L',I3,1X,A6,' CONSISTS OF',I3,' POINTS --'//2X,4(2X,'ABSCISSA/ORDIOUTP0075
00163           2NATE',4X)/(2X,4(F10.4,'/',F10.4,2X)))                            OUTP0076
00164        140 FORMAT(/'  BIAS FACTORS FOR REQUESTED CHANNELS --'//4(2X,'CH',1X,'OUTP0077
00164           1PARAM',4X,'BIAS',3X)/(4(2X,I2,1X,A6,F10.4)))                     OUTP0078
00165        150 FORMAT(/'  BLOCK IV OUTPUT -- RUN NO. -- ',A6,' -- TIME C -- ',   OUTP0079
00165           1F7.4,' -- SEC -- TIME P -- ',F7.4,' -- SEC'//(2(2X,A6,F11.4),18X, OUTP0080
00165           22(2X,A6,F11.4)))                                                 OUTP0081
00165     C * * CHECK FOR 'BLOCK I' OUTPUT...                                     OUTP0082
00166            IF (IBL.EQ.1) GO TO 470                                          OUTP0083
00166     C * * CHECK FOR INITIAL PASS TO CREATE OUTPUT LABELS...                 OUTP0084
00170            IF (IDU1.NE.1) GO TO 180                                         OUTP0085
00172            ISKIP      = 5 * IPC                                             OUTP0086
00173            ICT1       = 0                                                   OUTP0087
00174            IDU1       = 0                                                   OUTP0088
00175            DO 170 I=1,40                                                    OUTP0089
00200            IOUTLB(I) = LABELS(I)                                            OUTP0090
00201            IF (I.GT.30) GO TO 160                                           OUTP0091
00203            IOUTLB(I+40) = LABELS(I)                                         OUTP0092
00204            GO TO 170                                                        OUTP0093
00205        160 CONTINUE                                                         OUTP0094
00206            IOUTLB(I+40) = LABELS(I+10)                                      OUTP0095
00207        170 CONTINUE                                                         OUTP0096
00211            WRITE (6,30)                                                     OUTP0097
00213            IF (MICROT.EQ.17) WRITE (MICROT,30)                              OUTP0098
00216            ILINE      = 1                                                   OUTP0099
00217            MLINE      = 1                                                   OUTP0100
00217     C * * CHECK FOR DATA DUMP...                                            OUTP0101
00220        180 CONTINUE                                                         OUTP0102
00221            IF (IDUMP.EQ.1) GO TO 410                                        OUTP0103
00221     C * * OUTPUT BLOCK II DATA...                                           OUTP0104
00223            DO 400 I=1,KKSAVE                                                OUTP0105
00226            IF (ISKIP.EQ.0) GO TO 230                                        OUTP0106
00230            IF (JON.EQ.1.AND.IBEGN1.EQ.1.AND.I.EQ.IROW) GO TO 200            OUTP0107
00232            IF (IQUIT.EQ.99999.AND.IBEGN2.EQ.1.AND.I.EQ.JROW) GO TO 190      OUTP0108
00234            ICT1       = ICT1 + 1                                            OUTP0109
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00235        IF (ISKIP.GT.10) GO TO 210
00237        IF (MOD(ICT1,ISKIP).NE.1) GO TO 230
00241        GO TO 210
00242    190 CONTINUE
00243        IPRINT    = 1
00244        IBEGN2    = 2
00245        JROW1     = JROW
00246        ICT1      = 1
00247        GO TO 210
00250    200 CONTINUE
00251        IBEGN1    = 2
00252        IROW1     = IROW
00253        ICT1      = 1
00254        IPRINT    = 1
00255    210 CONTINUE
00256        IGO       = 1
00257    220 CONTINUE
00260        ILINE     = ILINE + 13
00261        IF (ILINE.GT.NLINES) GO TO 380
00263        WRITE (6,40)IRUNNO,FILT2(I,51),(IOUTLB(J),FILT2(I,J),J=1,40),(IOUT
00263       1LB(J+30),FILT2(I,J),J=41,50)
00301    230 CONTINUE
00301  C * * CREATE PLOT TAPE...
00302        IF (IPLOT.EQ.0) GO TO 240
00304        WRITE (PLTAPE) ITYPE1,NWRD1,(FILT2(I,J),J=51,52),(FILT2(I,J),J=1,
00304       150)
00320    240 CONTINUE
00321        IF (MICROT.NE.17) GO TO 260
00323        IGO1      = 1
00324    250 CONTINUE
00325        MLINE     = MLINE + 13
00326        IF (MLINE.GT.NLINES) GO TO 390
00326  C * * CREATE MICROFILM...
00330        WRITE (MICROT,40)IRUNNO,FILT2(I,51),(IOUTLB(J),FILT2(I,J),J=1,40),
00330       1(IOUTLB(J+30),FILT2(I,J),J=41,50)
00346    260 CONTINUE
00347        IF (ISKIP.EQ.0) GO TO 300
00351        IF (IPRINT.EQ.1) GO TO 270
00353        IF (ISKIP.GT.10) GO TO 290
00355        IF (MOD(ICT1,ISKIP).NE.1) GO TO 300
00357        IF (JON.EQ.1.AND.I.GE.IROW1) GO TO 280
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00361          IF (JON.EQ.-1.AND.IQUIT.LE.LSTPTS) GO TO 280                      OUTP0151
00363          IF (IQUIT.EQ.99999) GO TO 280                                     OUTP0152
00365          GO TO 400                                                         OUTP0153
00366      270 CONTINUE                                                          OUTP0154
00367          IF (JON .EQ. -1 .AND. IQUIT .EQ. 99999) IQUIT = 100000            OUTP0155
00371      280 CONTINUE                                                          OUTP0156
00372          IPRINT    = 0                                                     OUTP0157
00373          IF (IQUIT .LT. 99999) IROW = 0                                    OUTP0158
00375          IF (IQUIT .LT. 99999) JROW = 0                                    OUTP0159
00377          IROW1     = 0                                                     OUTP0160
00400          JROW1     = 0                                                     OUTP0161
00401      290 CONTINUE                                                          OUTP0162
00402          IGO       = 2                                                     OUTP0163
00403          ILINE     = ILINE + 8                                             OUTP0164
00404          IF (ILINE.GT.NLINES) GO TO 380                                    OUTP0165
00406          WRITE (6,50)IRUNNO,(FILT2(I,J),J=51,52),(LABENS(J),ENGDAT(I,J),J=1OUTP0166
00406         1,21)                                                              OUTP0167
00422      300 CONTINUE                                                          OUTP0168
00423          IF (IQUIT.EQ.0.AND.3300.-FILT2(I,IFV).GT.1.0E-7) GO TO 330        OUTP0169
00425          IF (IQUIT.EQ.100000) GO TO 400                                    OUTP0170
00427          IF (IPLOT.EQ.0) GO TO 310                                         OUTP0171
00431          WRITE (PLTAPE) ITYPE2,NWRD2,(FILT2(I,J),J=51,52),(ENGDAT(I,J),J=1,OUTP0172
00431         1 21)                                                              OUTP0173
00445      310 CONTINUE                                                          OUTP0174
00446          IF (MICROT.NE.17) GO TO 330                                       OUTP0175
00450          IGO1      = 2                                                     OUTP0176
00451      320 CONTINUE                                                          OUTP0177
00452          MLINE     = MLINE + 8                                             OUTP0178
00453          IF (MLINE.GT.NLINES) GO TO 390                                    OUTP0179
00453    C * * CREATE MICROFILM...                                               OUTP0180
00455          WRITE (MICROT,50)IRUNNO,(FILT2(I,J),J=51,52),(LABENS(J),ENGDAT(I,JOUTP0181
00455         1),J=1,21)                                                         OUTP0182
00471      330 CONTINUE                                                          OUTP0183
00472          IF (IRATED.EQ.0) GO TO 400                                        OUTP0184
00474          IF (.2-FILT2(I,52).GT.1.0E-7) GO TO 400                           OUTP0185
00476          IF (3300.-FILT2(I,IFV).GT.1.0E-7) GO TO 400                       OUTP0186
00500          IF (NOCONV(I).EQ.1) GO TO 400                                     OUTP0187
00502          IF (ISKIP.EQ.0) GO TO 350                                         OUTP0188
00504          IF (ISKIP.GT.10) GO TO 340                                        OUTP0189
00506          IF (MOD(ICT1,ISKIP).NE.1) GO TO 350                               OUTP0190
00510      340 CONTINUE                                                          OUTP0191
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00511            IGO        = 3                                                    OUTP0192
00512            ILINE      = ILINE + 13                                           OUTP0193
00513            IF (ILINE.GT.NLINES) GO TO 380                                    OUTP0194
00515            WRITE (6,150)IRUNNO,(FILT2(I,J),J=51,52),(LABRAT(J),ENGRAT(I,J),J=OUTP0195
00515           11,40)                                                             OUTP0196
00531        350 CONTINUE                                                          OUTP0197
00532            IF (IPLOT.EQ.0) GO TO 360                                         OUTP0198
00534            WRITE (PLTAPE) ITYPE3,NWRD3,(FILT2(I,J),J=51,52),(ENGRAT(I,J),J=  OUTP0199
00534           1                1,40)                                             OUTP0200
00550        360 CONTINUE                                                          OUTP0201
00551            IF (MICROT.NE.17) GO TO 400                                       OUTP0202
00553            IGO1       = 3                                                    OUTP0203
00554        370 CONTINUE                                                          OUTP0204
00555            MLINE      = MLINE + 13                                           OUTP0205
00556            IF (MLINE.GT.NLINES) GO TO 390                                    OUTP0206
00556      C * * CREATE MICROFILM...                                               OUTP0207
00560            WRITE (MICROT,150)IRUNNO,(FILT2(I,J),J=51,52),(LABRAT(J),ENGRAT(I,OUTP0208
00560           1J),J=1,40)                                                        OUTP0209
00574            GO TO 400                                                         OUTP0210
00575        380 CONTINUE                                                          OUTP0211
00576            ILINE      = 1                                                    OUTP0212
00577            WRITE (6,30)                                                      OUTP0213
00601            GO TO (220,290,330),IGO                                           OUTP0214
00602        390 CONTINUE                                                          OUTP0215
00603            MLINE      = 1                                                    OUTP0216
00604            WRITE (MICROT,30)                                                 OUTP0217
00606            GO TO (250,320,370),IGO1                                          OUTP0218
00607        400 CONTINUE                                                          OUTP0219
00611            GO TO 670                                                         OUTP0220
00611      C * * PROCESS BLOCK V DATA, DUMP DATA TAPE...                            OUTP0221
00612        410 CONTINUE                                                          OUTP0222
00612      C * * COUNT RECORDS...                                                  OUTP0223
00613            IREC       = IREC + 1                                             OUTP0224
00614            WRITE (6,30)                                                      OUTP0225
00616            IF (MICROT.EQ.17) WRITE (MICROT,30)                               OUTP0226
00621            ILINE      = 1                                                    OUTP0227
00622            DO 460 M=1,60,4                                                   OUTP0228
00622      C * * WRITE HEADER...                                                   OUTP0229
00625        420 CONTINUE                                                          OUTP0230
00626            ILINE      = ILINE + 39                                           OUTP0231
00627            IF (ILINE.GT.NLINES) GO TO 450                                    OUTP0232
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00631         WRITE (6,10)IREC,IRUNNO                                          OUTP0233
00635         IF (MICROT.EQ.17) WRITE (MICROT,10)IREC,IRUNNO                   OUTP0234
00635   C * * SET UP SUBSCRIPTS...                                             OUTP0235
00642         J           = M                                                  OUTP0236
00643         J1          = M + 1                                              OUTP0237
00644         DO 440 L=1,2                                                     OUTP0238
00644   C * * OUTPUT 'STORE'...                                                OUTP0239
00647         WRITE (6,20)(IOUTLB(I),STORE(J,I),I=1,40),(IOUTLB(I+40),STORE(J1,IOUTP0240
00647        1),I=1,30),(IOUTLB(I+30),STORE(J1,I),I=41,50)                     OUTP0241
00670         IF (MICROT.NE.17) GO TO 430                                      OUTP0242
00672         WRITE (MICROT,20)(IOUTLB(I),STORE(J,I),I=1,40),(IOUTLB(I+40),STOREOUTP0243
00672        1(J1,I),I=1,30),(IOUTLB(I+30),STORE(J1,I),I=41,50)                OUTP0244
00672   C * * INCREASE SUBSCRIPTS...                                           OUTP0245
00713     430 CONTINUE                                                         OUTP0246
00714         J           = J + 2                                              OUTP0247
00715         J1          = J + 1                                              OUTP0248
00716     440 CONTINUE                                                         OUTP0249
00720         GO TO 460                                                        OUTP0250
00721     450 CONTINUE                                                         OUTP0251
00722         ILINE       = 1                                                  OUTP0252
00723         WRITE (6,30)                                                     OUTP0253
00725         IF (MICROT.EQ.17) WRITE (MICROT,30)                              OUTP0254
00730         GO TO 420                                                        OUTP0255
00731     460 CONTINUE                                                         OUTP0256
00733         GO TO 670                                                        OUTP0257
00733   C * * PROCESS 'BLOCK I' DATA...                                        OUTP0258
00734     470 CONTINUE                                                         OUTP0259
00735         IPRINT      = 0                                                  OUTP0260
00736         IBEGN1      = 1                                                  OUTP0261
00737         IBEGN2      = 1                                                  OUTP0262
00740         IROW1       = 999                                                OUTP0263
00741         JROW1       = 999                                                OUTP0264
00742         IREC        = 0                                                  OUTP0265
00743         ILINE       = 0                                                  OUTP0266
00744         IDU1        = 1                                                  OUTP0267
00745         L           = 0                                                  OUTP0268
00746         DO 480 I=1,12                                                    OUTP0269
00751         IEND(I)     = IBLANK                                             OUTP0270
00752     480 CONTINUE                                                         OUTP0271
00754         LL          = 0                                                  OUTP0272
00755         DO 500 I=1,6                                                     OUTP0273
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```
00760        J          = FLD (I*6-6,6,IRUNNO)                        OUTP0274
00761        DO 490 M=1,10                                            OUTP0275
00764        IF (J.NE.ITRY(M)) GO TO 490                              OUTP0276
00766        LL         = 1                                           OUTP0277
00767        L          = L + 1                                       OUTP0278
00770        IFND(L)    = IALPHA(M)                                   OUTP0279
00771        GO TO 500                                                OUTP0280
00772    490 CONTINUE                                                 OUTP0281
00774    500 CONTINUE                                                 OUTP0282
00776        IRUNNO     = IBLANK                                      OUTP0283
00777        IBL        = IBLANK                                      OUTP0284
01000        DO 510 J=1,L                                             OUTP0285
01003        M          = L - J                                       OUTP0286
01004        IBL        = IFND(J) * 2 ** (M * 6)                      OUTP0287
01005        IRUNNO     = OR (IRUNNO,IBL)                             OUTP0288
01006        IBL        = IBLANK                                      OUTP0289
01007    510 CONTINUE                                                 OUTP0290
01011        L11        = 2 - L / 3                                   OUTP0291
01012        IF (L11 .NE. 0) IRUNNO = IRUNNO * 2 ** (L11 * 6)         OUTP0292
01014        IRUNNO     = OR (IRUNNO,NWRD(L))                         OUTP0293
01015        L          = 0                                           OUTP0294
01015  C * * REWIND OUTPUT TAPE...                                    OUTP0295
01016        REWIND IOTAPE                                            OUTP0296
01017    520 CONTINUE                                                 OUTP0297
01020        ILINE      = 0                                           OUTP0298
01020  C * * OUTPUT HEADER...                                         OUTP0299
01021        WRITE (6,60)IRUNNO                                       OUTP0300
01021  C * * OUTPUT HEADER ON MICROFILM IF ASKED FOR...               OUTP0301
01024        IF (MICROT.EQ.17) WRITE (MICROT,60)IRUNNO                OUTP0302
01030        ILINE      = ILINE + 3                                   OUTP0303
01031    530 CONTINUE                                                 OUTP0304
01032        READ (IOTAPE,70)(IDATA(I),I=1,14)                        OUTP0305
01032  C * * WRITE CARD IMAGES ON OUTPUT TAPE AND MICROFILM TAPE...   OUTP0306
01040        WRITE (6,80)(IDATA(I),I=1,14)                            OUTP0307
01046        IF (MICROT.EQ.17) WRITE (MICROT,80)(IDATA(I),I=1,14)     OUTP0308
01055        IF (IDATA(1).EQ.IEND) GO TO 540                          OUTP0309
01057        ILINE      = ILINE + 1                                   OUTP0310
01060        IF (ILINE.GE.NLINES) GO TO 520                           OUTP0311
01062        GO TO 530                                                OUTP0312
01063    540 CONTINUE                                                 OUTP0313
01063  C * * WRITE PROGRAM CONSTANTS IN 'BLOCK I' REPORT...            OUTP0314
```

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01064        CIV(1)     = AC                                   OUTP0315
01065        CIV(2)     = AE                                   OUTP0316
01066        CIV(3)     = AT                                   OUTP0317
01067        CIV(4)     = CF1                                  OUTP0318
01070        CIV(5)     = CF2                                  OUTP0319
01071        CIV(6)     = CF3                                  OUTP0320
01072        CIV(7)     = CF4                                  OUTP0321
01073        CIV(8)     = DCSTAR                               OUTP0322
01074        CIV(9)     = DHO                                  OUTP0323
01075        CIV(10)    = DOO                                  OUTP0324
01076        CIV(11)    = DPH                                  OUTP0325
01077        CIV(12)    = DPO                                  OUTP0326
01100        CIV(13)    = G                                    OUTP0327
01101        CIV(14)    = GAMMA                                OUTP0328
01102        CIV(15)    = IDUMP                                OUTP0329
01103        CIV(16)    = IPC                                  OUTP0330
01104        CIV(17)    = IPLOT                                OUTP0331
01105        CIV(18)    = IRATED                               OUTP0332
01106        CIV(19)    = K                                    OUTP0333
01107        CIV(20)    = KF                                   OUTP0334
01110        CIV(21)    = KO                                   OUTP0335
01111        CIV(22)    = MICROT                               OUTP0336
01112        CIV(23)    = MWH                                  OUTP0337
01113        CIV(24)    = MWO                                  OUTP0338
01114        CIV(25)    = NOP                                  OUTP0339
01115        CIV(26)    = NP                                   OUTP0340
01116        CIV(27)    = PAB                                  OUTP0341
01117        CIV(28)    = PCS                                  OUTP0342
01120        CIV(29)    = PFDS                                 OUTP0343
01121        CIV(30)    = PODS                                 OUTP0344
01122        CIV(31)    = TFDS                                 OUTP0345
01123        CIV(32)    = TODS                                 OUTP0346
01124        LL         = 32                                   OUTP0347
01125        LLL        = 0                                    OUTP0348
01126        IF (MOD(LL,5) .NE. 0) LLL = 1                     OUTP0349
01130    550 CONTINUE                                          OUTP0350
01131        ILINE      = ILINE + 3 + LLL + LL / 5             OUTP0351
01132        IF (ILINE.GT.NLINES) GO TO 560                    OUTP0352
01134        WRITE (6,90)IRUNNO                                OUTP0353
01137        IF (MICROT.EQ.17) WRITE (MICROT,90)IRUNNO         OUTP0354
01143        WRITE (6,20)(IO1(I),CIV(I),I=1,LL)                OUTP0355
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01152        IF (MICROT.NE.17) GO TO 570                        OUTP0356
01154        WRITE (MICROT,20)(IO1(I),CIV(I),I=1,LL)            OUTP0357
01163        GO TO 570                                          OUTP0358
01164    560 CONTINUE                                           OUTP0359
01165        WRITE (6,30)                                       OUTP0360
01167        IF (MICROT.EQ.17) WRITE (MICROT,30)                OUTP0361
01172        ILINE     = 1                                      OUTP0362
01173        GO TO 550                                          OUTP0363
01174    570 CONTINUE                                           OUTP0364
01175        LL        = 0                                      OUTP0365
01176        LLL       = 0                                      OUTP0366
01177        L         = 0                                      OUTP0367
01200        DO 580 I=1,50                                      OUTP0368
01200  C * * WRITE OUT SCALING FACTORS...                       OUTP0369
01203        IF (IS(I).NE.1) GO TO 580                          OUTP0370
01205        L         = L + 1                                  OUTP0371
01206        ICAN(L)   = I                                      OUTP0372
01207        IOUTLB(L) = LABELS(I)                              OUTP0373
01210        CIV(L)    = SCALE(I)                               OUTP0374
01211    580 CONTINUE                                           OUTP0375
01213        IF (L.EQ.0) GO TO 600                              OUTP0376
01215        IF (MOD (L,4) .NE. 0) LL = 1                       OUTP0377
01217        ILINE     = ILINE + 6 + LL + L / 4                 OUTP0378
01220        IF (ILINE.LE.NLINES) GO TO 590                     OUTP0379
01222        WRITE (6,30)                                       OUTP0380
01224        IF (MICROT.EQ.17) WRITE (MICROT,30)                OUTP0381
01227        ILINE     = 7 + LL + L / 4                         OUTP0382
01230    590 CONTINUE                                           OUTP0383
01231        WRITE (6,100)IRUNNO                                OUTP0384
01234        WRITE (6,110)(ICAN(M),IOUTLB(M),CIV(M),M=1,L)      OUTP0385
01244        IF (MICROT.NE.17) GO TO 600                        OUTP0386
01246        WRITE (MICROT,100)IRUNNO                           OUTP0387
01251        WRITE (MICROT,110)(ICAN(M),IOUTLB(M),CIV(M),M=1,L) OUTP0388
01261    600 CONTINUE                                           OUTP0389
01262        DO 640 I=1,50                                      OUTP0390
01262  C * * WRITE OUT CALIBRATION CURVES...                    OUTP0391
01265        IF (IC(I).EQ.0) GO TO 640                          OUTP0392
01267        LL        = I                                      OUTP0393
01270        J         = NP1(I)                                 OUTP0394
01271        J1        = NP2(I)                                 OUTP0395
01272        LLL       = 0                                      OUTP0396
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01273            IF (MOD (J,4) .NE. 0) LLL = 1                                      OUTP0397
01275            IF (MOD (J1,4) .NE. 0) LLL = LLL + 1                               OUTP0398
01277            IF (L.NE.0) GO TO 620                                              OUTP0399
01301            ILINE      = ILINE + 8 + LLL + J / 4 + J1 / 4                      OUTP0400
01302            IF (ILINE.LE.NLINES) GO TO 630                                     OUTP0401
01304        610 CONTINUE                                                           OUTP0402
01305            WRITE (6,30)                                                       OUTP0403
01307            IF (MICROT.EQ.17) WRITE (MICROT,30)                                OUTP0404
01312            WRITE (6,100)IRUNNO                                                OUTP0405
01315            IF (MICROT.EQ.17) WRITE (MICROT,100)IRUNNO                         OUTP0406
01321            L          = 6                                                     OUTP0407
01322            ILINE      = 11 + LLL + J / 4 + J1 / 4                             OUTP0408
01323            GO TO 630                                                          OUTP0409
01324        620 CONTINUE                                                           OUTP0410
01325            ILINE      = ILINE + 8 + LLL + J / 4 + J1 / 4                      OUTP0411
01326            IF (ILINE.GT.NLINES) GO TO 610                                     OUTP0412
01330        630 CONTINUE                                                           OUTP0413
01331            WRITE (6,120)LL,LABELS(I),J,(TABX1(I,M),TABY1(I,M),M=1,J)          OUTP0414
01343            WRITE (6,130)LL,LABELS(I),J1,(TABX2(I,M),TABY2(I,M),M=1,J1)        OUTP0415
01355            IF (MICROT.NE.17) GO TO 640                                        OUTP0416
01357            WRITE (MICROT,120)LL,LABELS(I),J,(TABX1(I,M),TABY1(I,M),M=1,J)     OUTP0417
01371            WRITE (MICROT,130)LL,LABELS(I),J1,(TABX2(I,M),TABY2(I,M),M=1,J1)   OUTP0418
01403        640 CONTINUE                                                           OUTP0419
01405            L          = 0                                                     OUTP0420
01406            DO 650 I=1,50                                                      OUTP0421
01406      C * * WRITE OUT BIASING FACTORS...                                       OUTP0422
01411            IF (IB(I).EQ.0) GO TO 650                                          OUTP0423
01413            L          = L + 1                                                 OUTP0424
01414            CIV(L)     = BIAS(I)                                               OUTP0425
01415            ICAN(L)    = I                                                     OUTP0426
01416            IOUTLB(L) = LABELS(I)                                              OUTP0427
01417        650 CONTINUE                                                           OUTP0428
01421            IF (L.EQ.0) GO TO 670                                              OUTP0429
01423            LLL        = 0                                                     OUTP0430
01424            IF (MOD (L,4) .NE. 0) LLL = 1                                      OUTP0431
01426            ILINE      = ILINE + 4 + LLL + L / 4                               OUTP0432
01427            IF (ILINE.LE.NLINES) GO TO 660                                     OUTP0433
01431            WRITE (6,30)                                                       OUTP0434
01433            IF (MICROT.EQ.17) WRITE (MICROT,30)                                OUTP0435
01436            ILINE      = 0                                                     OUTP0436
01437        660 CONTINUE                                                           OUTP0437
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01440   439*        WRITE (6,140)(ICAN(M),IOUTLB(M),CIV(M),M=1,L)                    OUTP0438
01450   440*        IF (MICROT.EQ.17) WRITE (MICROT,140)(ICAN(M),IOUTLB(M),CIV(M),M=1,OUTP0439
01450   441*       *L)                                                               OUTP0440
01461   442*        ILINE     = 0                                                    OUTP0441
01462   443*    670 CONTINUE                                                         OUTP0442
01463   444*        RETURN                                                           OUTP0443
01464   445*        END                                                              OUTP0444

     END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
   OUTPUT         SYMBOLIC                          25 JUN 70  12&27&08   0  01552426    14   445  (DELETED)
   OUTPUT  CODE   RELOCATABLE                       25 JUN 70  12&27&08   1  01566554    60     1  (DELETED)
                                                                          0  01566650    14   188
&     HDG     HD011C-OXZOX
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&     FOR,*    OXZOX,OXZOX                                                        14 JUL 70            17& 6&15.240
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&15

   SUBROUTINE OXZOX     ENTRY POINT 000107

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001    *CODE   000114
        0000    *DATA   000053
        0002    *BLANK  000000

   EXTERNAL REFERENCES (BLOCK, NAME)

        0003    NERR3$

   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000003 B         0000 R 000004 C         0000 R 000005 D         0000 R 000001 PATM       0000 R 000000 T
    0000 R 000002 U


00101      1*          SUBROUTINE OXZOX (TOI,POII,ZOX)                                   OXZ00000
00103      2*          T          = 5.0 * (TOI + 459.7) / 9.0                            OXZ00001
00104      3*          PATM       = POII / 14.696                                        OXZ00002
00105      4*          U          = 1.0 / T                                              OXZ00003
00106      5*          B          = -8.7136945E-6 + (4.606507E-1 + (-1.3795294E+2 +      OXZ00004
00106      6*        1              (-2.1663662E+4 + (2.2765597E+6 + (-2.2174297E+8 +    OXZ00005
00106      7*        2              (1.0580819E+10 - 2.1920552E+11 * U) * U) * U) * U) *  OXZ00006
00106      8*        3              U) * U) * U                                          OXZ00007
00107      9*          C          = 6.753855E-6 + (-1.0277166E-2 + (6.5537055 +          OXZ00008
00107     10*        1              (-2.1384872E+3 + (4.2428099E+5 + (-5.3177903E+7 +    OXZ00009
00107     11*        2              (3.2860596E+9 - 1.1314356E+11 * U) * U) * U) * U) * U) OXZ00010
00107     12*        3              * U) * U                                             OXZ00011
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                 HD011C-OXZOX                                                     DATE  140770  PAGE    78

00110     13*          D        = -1.7671108E-10 + (-6.3527586E-6 + (1.5610387E-2 +      OXZ00012
00110     14*         1           (4.6457575 + (4.3213223E+2 + (7.8725193E+4 +           OXZ00013
00110     15*         2           (2.855241E+6 + 1.4952967E+8 * B) * B) * B) * B) * B)   OXZ00014
00110     16*         3           * B) * B                                               OXZ00015
00111     17*          ZOX      = 1.0 + (B + (C + D * PATM) * PATM) * PATM                OXZ00016
00112     18*          RETURN                                                            OXZ00017
00113     19*          END                                                               OXZ00018

      END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
   OXZOX           SYMBOLIC                                   25 JUN 70  12&27&09   0  01573760    14     19  (DELETED)
   OXZOX    CODE   RELOCATABLE                                25 JUN 70  12&27&09   1  01574372    24      1  (DELETED)
                                                                                    0  01574422    14     12
&      HDG      HD011C-RATED
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&     FOR,*    RATED,RATED                                          14 JUL 70        17& 6&16.290
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&16

   SUBROUTINE RATED     ENTRY POINT 001316

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001   *CODE   001337
        0000   *DATA   000551
        0002   *BLANK  015607
        0003   COMRAT  000052
        0004   ENG     000022
        0005   FILES   000014
        0006   ICT     000012
        0007   LABELS  000320
        0010   UNITS   000004


   EXTERNAL REFERENCES (BLOCK, NAME)

        0011   HZH
        0012   DXZOX
        0013   SQRT
        0014   NWDU$
        0015   NIO1$
        0016   NIO2$
        0017   NERR2$
        0020   NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000    000116 10F      0001    000467 100L     0001    000506 110L     0001    000510 120L     0001    000513 130L
    0001    000547 140L     0001    000574 150L     0001    000630 160L     0001    000655 170L     0001    000703 180L
    0001    000722 190L     0000    000127 20F      0001    000741 200L     0001    001103 210L     0001    001234 220L
    0001    001256 230L     0000    000315 30F      0000    000370 40F      0000    000443 50F      0000    000500 60F
    0001    000147 70L      0001    000404 80L      0001    000441 90L      0004 R  000000 AC       0003 R  000000 AE
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A4-73

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0004 R 000001 AT        0003 R 000001 ATTC      0005 R 000000 BEGFIL    0003 R 000002 CFNSV     0003 R 000003 CFSTD
0003 R 000004 CFSTDV    0003 R 000005 CFSV      0004 R 000002 CF1       0004 R 000003 CF2       0004 R 000004 CF3
0004 R 000005 CF4       0003 R 000006 CSTASD    0003 R 000007 CSTAT     0003 R 000010 CSTATS    0004 R 000006 DCSTAR
0004 R 000007 DHO       0004 R 000010 DOO       0003 R 000011 DPF       0003 R 000012 DPFS      0004 R 000011 DPH
0004 R 000012 DPO       0003 R 000013 DPOS      0003 R 000015 ECFS      0003 R 000014 ECFSTD    0002 R 000000 ENGDAT
0002 R 001604 ENGRAT    0003 R 000016 EPS       0003 R 000017 ETAC      0002 R 002506 FILT1     0002 R 006476 FILT2
0003 R 000020 FSTD      0000 R 000107 FT        0004 R 000013 G         0004 R 000014 GAMMA     0005 I 000001 IBL
0006 I 000000 ICT1      0005 I 000002 IDUMP     0000 I 000113 IGO       0000 I 000114 IGO1      0005 I 000003 ILINE
0005 I 000004 INT       0010 I 000000 IOTAPE    0005 I 000005 IPC       0005 I 000006 IPLOT     0007 I 000000 IPOINT
0003 I 000021 IRATED    0003 R 000022 ISPS      0000 I 000110 J         0004 R 000015 K         0004 I 000016 KF
0004 I 000017 KO        0007 I 000010 LABFLS    0007 I 000072 LABENS    0007 I 000236 LABRAT    0010 I 000001 MICROT
0005 I 000007 MLINE     0003 R 000023 MRS       0004 R 000020 MWH       0004 R 000021 MWO       0005 I 000010 MXFILE
0000 I 000077 M2        0000 I 000100 M3        0000 I 000101 M4        0000 I 000102 M5        0000 I 000103 M6
0000 I 000104 M7        0000 I 000105 M8        0005 I 000011 NDP       0005 I 000012 NLINES    0006 I 000001 NOCONV
0000 I 000106 NOIT      0005 I 000013 NP        0003 R 000024 PAB       0000 R 000000 PC        0003 R 000025 PCCI
0003 R 000026 PCCIA     0003 R 000027 PCE       0003 R 000030 PCS       0000 R 000011 PDFO      0003 R 000031 PDO
0000 R 000022 PDOO      0003 R 000032 PFD       0003 R 000033 PFDS      0010 R 000002 PLTAPE    0003 R 000034 PNSS
0003 R 000035 POD       0003 R 000036 PODS      0000 R 000033 PTFO      0000 R 000044 PTOO      0003 R 000037 RFD
0003 R 000040 RFDS      0003 R 000041 ROD       0003 R 000042 RODS      0002 R 007433 STORE     0003 R 000043 TFD
0003 R 000044 TFDS      0000 R 000055 TFOI      0000 R 000115 TIME      0003 R 000045 TOD       0003 R 000046 TODS
0000 R 000066 TOOI      0010 R 000003 UNIT      0003 R 000047 WDOTFS    0003 R 000050 WDOTOS    0003 R 000051 WDOTTS
0000 R 000111 ZH        0000 R 000112 ZOX
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00101     SUBROUTINE RATED   (I,PNS,WDOTF,WDOTO,WDOTT,INITL)              RATE0000
00103     REAL               ISPS,K,MWH,MWO,MRS                           RATE0001
00104     DIMENSION          PC(9),PDFO(9),PDOO(9),PTFO(9),PTOO(9),TFOI(9) RATE0002
00104    1                 , TOOI(9)                                      RATE0003
00105     COMMON             ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)      RATE0004
00105    1                 , FILT2(9,53),STORE(60,53)                     RATE0005
00106     COMMON / COMRAT / AE,ATTC,CFNSV,CFSTD,CFSTDV,CFSV,CSTASD,CSTAT  RATE0006
00106    1                 , CSTATS,DPF,DPFS,DPOS,ECFSTD,ECFS,EPS,ETAC,FSTD RATE0007
00106    2                 , IRATED,ISPS,MRS,PAB,PCCI,PCCIA,PCE,PCS,PDO,PFD RATE0008
00106    3                 , PFDS,PNSS,POD,PODS,RFD,RFDS,ROD,RODS,TFD,TFDS RATE0009
00106    4                 , TOD,TODS,WDOTFS,WDOTOS,WDOTTS                RATE0010
00107     COMMON / ENG    / AC,AT,CF1,CF2,CF3,CF4,DCSTAR,DHO,DOO,DPH,DPO,G RATE0011
00107    1                 , GAMMA,K,KF,KO,MWH,MWO                        RATE0012
00110     COMMON / FILES  / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE    RATE0013
00110    1                 , MXFILE,NDP,NLINES,NP                         RATE0014
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00111          COMMON / ICT    / ICT1,NOCONV(9)                             RATE0015
00112          COMMON / LABELS / IPOINT(8),LABELS(50),LABENS(100),LABRAT(50)     RATE0016
00113          COMMON / UNITS  / IOTAPE,MICROT,PLTAPE,UNIT                  RATE0017
00114       10 FORMAT('OPCCI DID NOT CONVERGE AFTER',I3,' ITERATIONS.')         RATE0018
00115       20 FORMAT('OJ     =',I15,  ' FT    =',E15.8,' TFD   ='E15.8,' TOD   =RATE0019
00115         1'E15.8,' PFD   =',E15.8/' POD   =',E15.8,' ZH    ='E15.8,' ZOX   =RATE0020
00115         2'E15.8,' RFD   =',E15.8,' ROD   =',E15.8/' RFDS  ='E15.8,' RODS  =RATE0021
00115         3'E15.8,' TIME  =',F15.8,' DPF   =',E15.8,' PDO   ='E15.8/' TFDS  =RATE0022
00115         4'E15.8,' TODS  =',E15.8,' PCS   =',E15.8,' PCCI  ='E15.8,' PCCIA =RATE0023
00115         5'E15.8/' DPFS  =',E15.8,' WDOTFS=',E15.8,' WDOTF ='E15.8,' DPOS  =RATE0024
00115         6'E15.8,' WDOTOS=',E15.8/' WDOTO =',E15.8,' MRS   ='E15.8,' WDOTTS=RATE0025
00115         7'F15.8,' WDOTT =',E15.8,' PNSS  =',E15.8/' CSTATS='E15.8,' ATTC  =RATE0026
00115         8'E15.8,' AT    =',E15.8,' EPS   =',E15.8,' AE    ='E15.8/' CSTASD=RATE0027
00115         9'E15.8,' G     =',E15.8,' PCE   =',E15.8)                     RATE0028
00116       30 FORMAT('OONE OR MORE OF THE FOLLOWING PARAMETERS HAS GONE NEGATIVERATE0029
00116         1 INDICATING A CHAMBER PRESSURE GREATER THAN LINE PRESSURE.'/' STANRATE0030
00116         2DARDIZATION WILL BE DISCONTINUED FOR THIS TIME SLICE.'/' DPFS =',ERATE0031
00116         315.8,' RFDS =',E15.8,' DPF =',E15.8,' RFD =',E15.8)          RATE0032
00117       40 FORMAT('OONE OR MORE OF THE FOLLOWING PARAMETERS HAS GONE NEGATIVERATE0033
00117         1 INDICATING A CHAMBER PRESSURE GREATER THAN LINE PRESSURE.'/' STANRATE0034
00117         2DARDIZATION WILL BE DISCONTINUED FOR THIS TIME SLICE.'/' DPOS =',ERATE0035
00117         315.8,' RODS =',E15.8,' PDO =',F15.8,' ROD =',E15.8)          RATE0036
00120       50 FORMAT('OTHE STANDARDIZED MIXTURE RATIO HAS GONE BEYOND ONE OF THERATE0037
00120         1 ALLOWABLE LIMITS OF 1.0 TO 10.0.'/' STANDARDIZATION WILL BE DISCORATE0038
00120         2NTINUED FOR THIS TIME SLICE.  MRS =',E15.8)                  RATE0039
00121       60 FORMAT('1')                                                  RATE0040
00122          IF (INITL.EQ.1) GO TO 190                                    RATE0041
00124          PC(I)     = FILT2(I,M2)                                      RATE0042
00125          PTFO(I)   = FILT2(I,M3)                                      RATE0043
00126          PTOO(I)   = FILT2(I,M4)                                      RATE0044
00127          PDFO(I)   = FILT2(I,M5)                                      RATE0045
00130          PDOO(I)   = FILT2(I,M6)                                      RATE0046
00131          TFOI(I)   = FILT2(I,M7)                                      RATE0047
00132          TOOI(I)   = FILT2(I,M8)                                      RATE0048
00133          NOIT      = 10                                               RATF0049
00134          FT        = 0.0                                              RATE0050
00135          J         = 0                                                RATE0051
00136          TFD       = TFOI(I)                                          RATE0052
00137          TOD       = TOOI(I)                                          RATF0053
00140          PFD       = PTFO(I) - PDFO(I)                                RATE0054
00141          POD       = PTOO(I) - PDOO(I)                                RATE0055
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00142     CALL HZH (TFD,PFD,ZH)                                              RATE0056
00143     CALL OXZOX (TOD,POD,ZOX)                                           RATE0057
00144     RFD       = PFD * MWH / 10.73 / ZH / (TFD + 459.7)                 RATE0058
00145     ROD       = POD * MWO / 10.73 / ZOX / (TOD + 459.7)                RATE0059
00146     RFDS      = PFDS * MWH / 10.73 / ZH / (TFDS + 459.7)               RATE0060
00147     RODS      = PODS * MWO / 10.73 / ZOX / (TODS + 459.7)              RATE0061
00150     DPF       = PFD - PC(I)                                            RATE0062
00151     PDO       = POD - PC(I)                                            RATE0063
00152     PCCI      = PCS                                                    RATE0064
00153  70 CONTINUE                                                           RATE0065
00154     J         = J + 1                                                  RATE0066
00155     DPFS      = 0.0                                                    RATE0067
00156     WDOTFS    = 0.0                                                    RATE0068
00157     DPOS      = 0.0                                                    RATE0069
00160     WDOTOS    = 0.0                                                    RATE0070
00161     MRS       = 0.0                                                    RATE0071
00162     WDOTTS    = 0.0                                                    RATE0072
00163     PNSS      = 0.0                                                    RATE0073
00164     CSTATS    = 0.0                                                    RATE0074
00165     ATTC      = 0.0                                                    RATE0075
00166     EPS       = 0.0                                                    RATE0076
00167     CSTASD    = 0.0                                                    RATE0077
00170     PCCIA     = 0.0                                                    RATE0078
00171     PCF       = 0.0                                                    RATE0079
00172     DPFS      = PFDS - PCCI                                            RATE0080
00173     IF (DPFS.LT.0..OR.RFDS.LT.0..OR.DPF.LT.0..OR.RFD.LT.0.) GO TO 130 RATE0081
00175     WDOTFS    = SQRT (DPFS * RFDS / DPF / RFD) * WDOTF                 RATE0082
00176     DPOS      = PODS - PCCI                                            RATE0083
00177     IF (DPOS.LT.0..OR.RODS.LT.0..OR.PDO.LT.0..OR.ROD.LT.0.) GO TO 150 RATE0084
00201     WDOTOS    = SQRT (DPOS * RODS / PDO / ROD) * WDOTO                 RATE0085
00202     MRS       = WDOTOS / WDOTFS                                        RATE0086
00203     IF (MRS.LT.1..OR.MRS.GT.10.) GO TO 170                             RATE0087
00205     WDOTTS    = WDOTOS + WDOTFS                                        RATE0088
00206     PNSS      = PCCI * K                                               RATE0089
00207     CSTATS    = 6428.561 + 2233.567 * MRS - 885.0861 * MRS ** 2 +      RATE0090
00207    1            143.8467 * MRS ** 3 - 11.13366 * MRS ** 4 +            RATE0091
00207    2            0.3348754 * MRS ** 5                                   RATE0092
00210     ATTC      = AT + ET                                                RATE0093
00211     EPS       = AE / ATTC                                              RATE0094
00212     CSTASD    = CSTATS * ETAC                                          RATE0095
00213     PCCIA     = CSTASD * WDOTTS / G / ATTC                             RATE0096
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00214           PCE       = PCCI - PCCIA                                                 RATE0097
00215           IF (ABS(PCE).LE..1) GO TO 80                                             RATE0098
00217           IF (J.EQ.NOIT) GO TO 90                                                  RATE0099
00221           PCCI      = PCCIA                                                        RATE0100
00222           GO TO 70                                                                 RATE0101
00223        80 CONTINUE                                                                 RATE0102
00224           CFNSV     = 1.477818 + 3.907214E-3 * MRS - 5.934259E-4 * MRS * MRS RATE0103
00224          1            + 2.873259E-5 * MRS * MRS * MRS                              RATE0104
00225           ECFSTD    = ECFS                                                         RATE0105
00226           CFSTDV    = ECFSTD * CFNSV                                               RATE0106
00227           CFSTD     = CFSTDV - PAB * EPS / PCS                                     RATE0107
00230           FSTD      = PCS * ATTC * CFSTD                                           RATE0108
00231           ISPS      = FSTD / WDOTTS                                                RATE0109
00232           GO TO 120                                                                RATE0110
00233        90 CONTINUE                                                                 RATE0111
00234           ILINE     = ILINE + 2                                                    RATE0112
00235           IGO       = 1                                                            RATE0113
00236           IF (ILINE.GT.NLINES) GO TO 220                                           RATE0114
00240           WRITE (6,10)NOIT                                                         RATE0115
00243           IF (MICROT.NE.17) GO TO 200                                              RATE0116
00245           IGO1      = 1                                                            RATE0117
00246       100 CONTINUE                                                                 RATE0118
00247           MLINE     = MLINE + 2                                                    RATE0119
00250           IF (MLINE.GT.NLINES) GO TO 230                                           RATE0120
00252           WRITE (MICROT,10)NOIT                                                    RATE0121
00255           GO TO 200                                                                RATE0122
00256       110 CONTINUE                                                                 RATE0123
00257           NOCONV(I)= 1                                                             RATE0124
00260       120 CONTINUE                                                                 RATE0125
00261           RETURN                                                                   RATE0126
00262       130 CONTINUE                                                                 RATE0127
00263           ILINE     = ILINE + 4                                                    RATE0128
00264           IGO       = 2                                                            RATE0129
00265           IF (ILINE.GT.NLINES) GO TO 220                                           RATE0130
00267           WRITE (6,30)DPFS,RFDS,DPF,RFD                                            RATE0131
00275           IF (MICROT.NE.17) GO TO 200                                              RATE0132
00277           IGO1      = 2                                                            RATE0133
00300       140 CONTINUE                                                                 RATE0134
00301           MLINE     = MLINE + 4                                                    RATE0135
00302           IF (MLINE.GT.NLINES) GO TO 230                                           RATE0136
00304           WRITE (MICROT,30)DPFS,RFDS,DPF,RFD                                       RATE0137
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00312            GO TO 200                                                         RATE0138
00313        150 CONTINUE                                                          RATE0139
00314            ILINE     = ILINE + 4                                             RATE0140
00315            IGO       = 3                                                     RATE0141
00316            IF (ILINE.GT.NLINES) GO TO 220                                    RATE0142
00320            WRITE (6,40)DPOS,RODS,PDO,ROD                                     RATE0143
00326            IF (MICROT.NE.17) GO TO 200                                       RATE0144
00330            IGO1      = 3                                                     RATE0145
00331        160 CONTINUE                                                          RATE0146
00332            MLINE     = MLINE + 4                                             RATE0147
00333            IF (MLINE.GT.NLINES) GO TO 230                                    RATE0148
00335            WRITE (MICROT,40)DPOS,RODS,PDO,ROD                                RATE0149
00343            GO TO 200                                                         RATE0150
00344        170 CONTINUE                                                          RATE0151
00345            ILINE     = ILINE + 3                                             RATE0152
00346            IGO       = 4                                                     RATE0153
00347            IF (ILINE.GT.NLINES) GO TO 220                                    RATE0154
00351            WRITE (6,50)MRS                                                   RATE0155
00354            IF (MICROT.NE.17) GO TO 200                                       RATE0156
00356            IGO1      = 4                                                     RATE0157
00357        180 CONTINUE                                                          RATE0158
00360            MLINE     = MLINE + 3                                             RATE0159
00361            IF (MLINE.GT.NLINES) GO TO 230                                    RATE0160
00363            WRITE (MICROT,50)MRS                                              RATE0161
00366            GO TO 200                                                         RATE0162
00367        190 CONTINUE                                                          RATE0163
00370            M2        = IPOINT(2)                                             RATE0164
00371            M3        = IPOINT(3)                                             RATE0165
00372            M4        = IPOINT(4)                                             RATE0166
00373            M5        = IPOINT(5)                                             RATE0167
00374            M6        = IPOINT(6)                                             RATE0168
00375            M7        = IPOINT(7)                                             RATE0169
00376            M8        = IPOINT(8)                                             RATE0170
00377            GO TO 120                                                         RATE0171
00400        200 CONTINUE                                                          RATE0172
00401            ILINE     = ILINE + 9                                             RATE0173
00402            IGO       = 5                                                     RATE0174
00403            IF (ILINE.GT.NLINES) GO TO 220                                    RATE0175
00405            TIME      = FILT2(I,52)                                           RATE0176
00406            WRITE (6,20)J,FT,TFD,TOD,PFD,POD,ZH,ZOX,RFD,ROD,RFDS,RODS,TIME,DPFRATE0177
00406          1,PDO,TFDS,TODS,PCS,PCCI,PCCIA,DPFS,WDOTFS,WDOTF,DPOS,WDOTOS,WDOTO,RATE0178
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00406           2MRS,WDOTTS,WDOTT,PNSS,CSTATS,ATTC,AT,EPS,AE,CSTASD,G,PCE          RATE0179
00456             IF (MICROT.NE.17) GO TO 200                                      RATE0180
00460             IGO1      = 5                                                    RATE0181
00461         210 CONTINUE                                                         RATE0182
00462             MLINE     = MLINE + 9                                            RATE0183
00463             IF (MLINE.GT.NLINES) GO TO 230                                   RATE0184
00465             WRITE (MICROT,20)J,FT,TFD,TOD,PFD,POD,ZH,ZOX,RFD,ROD,RFDS,RODS,TIMRATE0185
00465           1E,DPF,POO,TFDS,TODS,PCS,PCCI,PCCIA,DPFS,WDOTFS,WDOTF,DPOS,WDOTOS,WRATE0186
00465           2DOTO,MRS,WDOTTS,WDOTT,PNSS,CSTATS,ATTC,AT,EPS,AE,CSTASD,G,PCE     RATE0187
00535             GO TO 110                                                        RATE0188
00536         220 CONTINUE                                                         RATE0189
00537             ILINE     = 1                                                    RATE0190
00540             WRITE (6,60)                                                     RATE0191
00542             GO TO (90,130,150,170,200),IGO                                   RATE0192
00543         230 CONTINUE                                                         RATE0193
00544             MLINE     = 1                                                    RATE0194
00545             WRITE (MICROT,60)                                                RATE0195
00547             GO TO (100,140,160,180,210),IGO1                                 RATE0196
00550             END                                                              RATE0197

   END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
 RATED          SYMBOLIC                          25 JUN 70  12&27&12  0  01574672   14   198  (DELETED)
 RATED    CODE  RELOCATABLE                       25 JUN 70  12&27&12  1  01602216   48     1  (DELETED)
                                                                       0  01602276   14   102
&     HDG      HD011C-SHIFT
```

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&     FOR,*     SHIFT,SHIFT                                                       14 JUL 70            17& 6&19.250
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&19

   SUBROUTINE SHIFT     ENTRY POINT 000024

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001    *CODE    000031
        0000    *DATA    000015
        0002    *BLANK   015607


   EXTERNAL REFERENCES (BLOCK, NAME)

        0003    NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001    000002 105G       0001    000003 110G       0002 R 000000 ENGDAT     0002 R 001604 ENGRAT     0002 R 002506 FILT1
    0002 R 006476 FILT2       0000 I 000000 I           0000 I 000001 J          0002 R 007433 STORE


00101      1*          SUBROUTINE SHIFT                                          SHIF0000
00103      2*          COMMON          ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)   SHIF0001
00103      3*        1                , FILT2(9,53),STORE(60,53)                 SHIF0002
00104      4*          DO 10 I=1,10                                              SHIF0003
00107      5*          DO 10 J=1,51                                              SHIF0004
00112      6*          FILT1(I,J)= FILT1(I+30,J)                                 SHIF0005
00113      7*       10 CONTINUE                                                  SHIF0006
00116      8*          RETURN                                                    SHIF0007
00117      9*          END                                                       SHIF0008

     END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
    SHIFT           SYMBOLIC                                25 JUN 70  12&27&13   0  01605122    14     9  (DELETED)
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HD011C-SHIFT DATE 140770 PAGE 87

	SHIFT	CODE	RELOCATABLE	25 JUN 70	12&27&13	1	01605320	24	1 (DELETED)
						0	01605350	14	4
&	HDG	HD011C-SWAGER							

```
&     FOR,*    SWAGER,SWAGER                                        14 JUL 70      17& 6&20.299
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&20

 SUBROUTINE SWAGER    ENTRY POINT 001216

 STORAGE USED (BLOCK, NAME, LENGTH)

       0001   *CODE    001240
       0000   *DATA    000456
       0002   *BLANK   015607
       0003   COMRAT   000052
       0004   ENG      000022
       0005   FILES    000014
       0006   FUNCTN   000310
       0007   ICT      000012
       0010   LABELS   000320
       0011   ROWS     000015
       0012   TIMLST   000001
       0013   UNITS    000004

 EXTERNAL REFERENCES (BLOCK, NAME)

       0014   OXZOX
       0015   OGAMMA
       0016   HZH
       0017   HGAMMA
       0020   RATED
       0021   SQRT
       0022   NWDU$
       0023   NIO1$
       0024   NIO2$
       0025   NSTOP$
       0026   NERR3$

 STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)
```

0000 000151 10F	0001 000776 120L	0001 000006 132G	0001 001066 140L	0001 001122 150L
0001 001135 160L	0001 000165 177G	0001 001167 180L	0001 000031 30L	0001 000746 361G
0001 000061 40L	0001 001045 411G	0001 001162 453G	0001 000104 50L	0001 000655 60L
0001 000721 70L	0001 000735 80L	0001 000742 90L	0004 R 000000 AC	0003 R 000000 AE
0004 R 000001 AT	0003 R 000001 ATTC	0005 R 000000 BEGFIL	0000 R 000132 BETAF	0000 R 000130 BETAO
0003 R 000002 CFNSV	0003 R 000003 CFSTD	0003 R 000004 CFSTDV	0003 R 000005 CFSV	0004 R 000002 CF1
0004 R 000003 CF2	0004 R 000004 CF3	0004 R 000005 CF4	0000 R 000230 CSTAR	0003 R 000006 CSTASD
0003 R 000007 CSTAT	0003 R 000010 CSTATS	0000 R 000110 CSTRMX	0000 R 000231 CSUBF	0006 R 000000 CX
0006 R 000144 CY	0004 R 000006 DCSTAR	0000 R 000235 DCSTA1	0004 R 000007 DHO	0004 R 000010 DOO
0003 R 000011 DPF	0003 R 000012 DPFS	0004 R 000011 DPH	0004 R 000012 DPO	0003 R 000013 DPOS
0000 R 000137 DT	0000 R 000111 DTMAX	0003 R 000015 ECFS	0003 R 000014 ECFSTD	0002 R 000000 ENGDAT
0002 R 001604 ENGRAT	0003 R 000016 EPS	0003 R 000017 ETAC	0000 R 000135 ETACS	0000 R 000000 F
0002 R 002506 FILT1	0002 R 006476 FILT2	0003 R 000020 FSTD	0000 R 000225 F1	0004 R 000013 G
0004 R 000014 GAMMA	0000 R 000246 GAMMAH	0000 R 000245 GAMMAO	0000 I 000113 I	0011 I 000000 IBEGIN
0000 I 000116 IBEGN1	0000 I 000117 IBEGN2	0005 I 000001 IBL	0007 I 000000 ICT1	0005 I 000002 IDUMP
0000 I 000147 IDUM1	0000 I 000136 IF	0000 I 000112 IFST	0011 I 000001 IFV	0005 I 000003 ILINE
0011 I 000002 INITL	0000 R 000242 INPNS	0005 I 000004 INT	0011 I 000003 ION	0013 I 000000 IOTAPE
0005 I 000005 IPC	0005 I 000006 IPLOT	0010 I 000000 IPOINT	0011 I 000004 IQUIT	0003 I 000021 IRATED
0011 I 000005 IROW	0000 I 000150 ISKIP	0000 R 000226 ISP	0003 R 000022 ISPS	0000 R 000241 IT
0000 I 000145 J	0011 I 000006 JEND	0011 I 000007 JON	0011 I 000010 JROW	0004 R 000015 K
0004 R 000016 KF	0011 I 000011 KKPBEG	0011 I 000012 KKPEND	0011 I 000013 KKSAVE	0004 R 000017 KO
0010 I 000010 LABELS	0010 I 000072 LABENS	0010 I 000236 LABRAT	0000 I 000114 LLL	0000 I 000115 LLLL
0011 I 000014 LSTPTS	0000 R 000244 MF	0013 I 000001 MICROT	0005 I 000007 MLINE	0000 R 000243 MO
0000 R 000232 MR	0003 R 000023 MRS	0004 R 000020 MWH	0004 R 000021 MWO	0005 I 000010 MXFILE
0000 I 000120 M1	0000 I 000121 M2	0000 I 000122 M3	0000 I 000123 M4	0000 I 000124 M5
0000 I 000125 M6	0000 I 000126 M7	0000 I 000127 M8	0005 I 000011 NDP	0005 I 000012 NLINES
0007 I 000001 NOCONV	0005 I 000013 NP	0003 R 000024 PAB	0000 R 000011 PC	0003 R 000025 PCCI
0003 R 000026 PCCIA	0003 R 000027 PCF	0003 R 000030 PCS	0000 R 000224 PC1	0000 R 000022 PDFO
0003 R 000031 PDO	0000 R 000033 PDOO	0003 R 000032 PFD	0003 R 000033 PFDS	0013 R 000002 PLTAPE
0000 R 000223 PNS	0003 R 000034 PNSS	0003 R 000035 POD	0003 R 000036 PODS	0000 R 000044 PTFO
0000 R 000055 PTOO	0000 R 000146 RAT	0003 R 000037 RFD	0003 R 000040 RFDS	0003 R 000041 ROD
0003 R 000042 RODS	0000 R 000141 SAVF	0000 R 000142 SAVPNS	0000 R 000140 ST	0000 R 000134 STAR
0002 R 007433 STORE	0000 R 000144 SWDOTF	0000 R 000143 SWDOTO	0002 007400 TC	0000 R 000222 TENG
0003 R 000043 TFD	0003 R 000044 TFDS	0000 R 000066 TFOI	0012 R 000000 TIMLST	0003 R 000045 TOD
0003 R 000046 TODS	0000 R 000077 TOOI	0002 R 007411 TR	0013 R 000003 UNIT	0000 R 000227 WDOTF
0003 R 000047 WDOTFS	0000 R 000222 WDOTO	0003 R 000050 WDOTOS	0000 R 000234 WDOTT	0003 R 000051 WDOTTS
0000 R 000133 XF	0000 R 000131 XO	0000 R 000236 YF	0000 R 000237 YO	0000 R 000240 ZH
0000 R 000233 ZOX				

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00101         SUBROUTINE SWAGER                                                    SWAG0000
00103         REAL                 INPNS,ISP,ISPS,IT,K,KF,KO,MF,MO,MR,MRS,MWH,MWO  SWAG0001
00104         DIMENSION            F(9),PC(9),PDFO(9),PDOO(9),PTFO(9),PTOO(9),TC(9)SWAG0002
00104        1                   , TENG(100),TFOI(9),TOOI(9),TR(9)                 SWAG0003
00105         COMMON               ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)         SWAG0004
00105        1                   , FILT2(9,53),STORE(60,53)                        SWAG0005
00106         COMMON / COMRAT / AE,ATTC,CFNSV,CFSTD,CFSTDV,CFSV,CSTASD,CSTAT       SWAG0006
00106        1                   , CSTATS,DPF,DPFS,DPOS,ECFSTD,ECFS,EPS,ETAC,FSTD  SWAG0007
00106        2                   , IRATED,ISPS,MRS,PAB,PCCI,PCCIA,PCE,PCS,PDO,PFD  SWAG0008
00106        3                   , PFDS,PNSS,POD,PODS,RFD,RFDS,ROD,RODS,TFD,TFDS   SWAG0009
00106        4                   , TOD,TODS,WDOTFS,WDOTOS,WDOTTS                   SWAG0010
00107         COMMON / ENG      / AC,AT,CF1,CF2,CF3,CF4,DCSTAR,DHO,DOO,DPH,DPO,G   SWAG0011
00107        1                   , GAMMA,K,KF,KO,MWH,MWO                           SWAG0012
00110         COMMON / FILES    / BEGFIL,IBL,IDUMP,ILINE,INT,IPC,IPLOT,MLINE       SWAG0013
00110        1                   , MXFILE,NDP,NLINES,NP                            SWAG0014
00111         COMMON / FUNCTN / CX(100),CY(100)                                    SWAG0015
00112         COMMON / ICT      / ICT1,NOCONV(9)                                   SWAG0016
00113         COMMON / LABELS / IPOINT(8),LABELS(50),LABENS(100),LABRAT(50)        SWAG0017
00114         COMMON / ROWS     / IBEGIN,IFV,INITL,ION,IQUIT,IROW,JEND,JON,JROW    SWAG0018
00114        1                   , KKPBEG,KKPEND,KKSAVE,LSTPTS                     SWAG0019
00115         COMMON / TIMLST / TIMLST                                             SWAG0020
00116         COMMON / UNITS    / IOTAPE,MICROT,PLTAPE,UNIT                        SWAG0021
00117         EQUIVALENCE (FILT2(1,51),TC(1)),(FILT2(1,52),TR(1))                  SWAG0022
00117        1           , (TENG(1),WDOTO),(TENG(2),PNS),(TENG(3),PC1)             SWAG0023
00117        2           , (TENG(4),F1),(TENG(5),ISP),(TENG(6),WDOTF)              SWAG0024
00117        3           , (TENG(7),CSTAR),(TENG(8),CSUBF),(TENG(9),MR)            SWAG0025
00117        4           , (TENG(10),ZOX),(TENG(11),WDOTT),(TENG(12),DCSTA1)       SWAG0026
00117        5           , (TENG(13),YF),(TENG(14),YO),(TENG(15),ZH)               SWAG0027
00117        6           , (TENG(16),IT),(TENG(17),INPNS),(TENG(18),MO)            SWAG0028
00117        7           , (TENG(19),MF),(TENG(20),GAMMAO),(TENG(21),GAMMAH)       SWAG0029
00120         DATA      CSTRMX              / 999999.99                           /SWAG0030
00122         DATA      DTMAX               / 0.1                                 /SWAG0031
00124         DATA      IFST                / 0                                   /SWAG0032
00126      10 FORMAT('OTHE RATIO OF COMBUSTION CHAMBER AREA TO THROAT AREA IS',ESWAG0033
00126        115.8,'.  THIS IS AN OUT-OF-RANGE VALUE FOR THE'/' INTERPOLATION TASWAG0034
00126        2BLES USED TO COMPUTE THE CONTRACTION RATIO.  THE LIMITS OF THE INTSWAG0035
00126        3ERPOLATION'/' TABLES ARE',E15.8,' TO',E15.8)                         SWAG0036
00127         IF (INITL.EQ.1) GO TO 120                                            SWAG0037
00131         DO 20 J=1,9                                                          SWAG0038
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00134          NOCONV(I)      = 0                                   SWAG0039
00135       20 CONTINUE                                             SWAG0040
00137          IF (JON.EQ.-1) GO TO 30                              SWAG0041
00141          LLL            = IROW                                SWAG0042
00142          LLLL           = KKSAVE                              SWAG0043
00143          IF (IBEGN1 .NE. 1) LLL = 1                           SWAG0044
00145          IBEGN1         = 2                                   SWAG0045
00146          GO TO 50                                             SWAG0046
00147       30 CONTINUE                                             SWAG0047
00150          LLL            = 1                                   SWAG0048
00151          LLLL           = JROW                                SWAG0049
00152          IF (IBEGN2.EQ.2) GO TO 40                            SWAG0050
00154          TIMLST         = FILT2(JROW,52)                      SWAG0051
00155          IQUIT          = KKSAVE - JROW                       SWAG0052
00156          IBEGN2         = 2                                   SWAG0053
00157          IF (IQUIT .LE. LSTPTS) LLLL = KKSAVE                 SWAG0054
00161          GO TO 50                                             SWAG0055
00162       40 CONTINUE                                             SWAG0056
00163          IQUIT          = IQUIT + KKSAVE                      SWAG0057
00164          LLLL           = KKSAVE                              SWAG0058
00165          JROW           = KKSAVE                              SWAG0059
00166          IF (IQUIT.LT.LSTPTS) GO TO 50                        SWAG0060
00170          LLLL           = KKSAVE - IQUIT + LSTPTS             SWAG0061
00171          JROW           = LLLL                                SWAG0062
00172          IQUIT          = 99999                               SWAG0063
00173          IF (LLLL.LE.0) GO TO 180                             SWAG0064
00175       50 CONTINUE                                             SWAG0065
00176          DO 110 I=LLL,LLLL                                    SWAG0066
00201          F(I)           = FILT2(I,M1)                         SWAG0067
00202          PC(I)          = FILT2(I,M2)                         SWAG0068
00203          PTFO(I)        = FILT2(I,M3)                         SWAG0069
00204          PTOO(I)        = FILT2(I,M4)                         SWAG0070
00205          PDFO(I)        = FILT2(I,M5)                         SWAG0071
00206          PDOO(I)        = FILT2(I,M6)                         SWAG0072
00207          TFOI(I)        = FILT2(I,M7)                         SWAG0073
00210          TOOI(I)        = FILT2(I,M8)                         SWAG0074
00211          PC1            = PC(I)                               SWAG0075
00212          F1             = F(I)                                SWAG0076
00213          DCSTA1         = DCSTAR                              SWAG0077
00214          BETAO          = DOO / DPD                           SWAG0078
00214     C                                                         SWAG0079
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00214    C * * CALCULATE COMPRESSIBILITY FACTOR FOR GASEOUS OXYGEN - ZOX         SWAG0080
00214    C                                                                      SWAG0081
00215          CALL OXZOX (TOOI(I),PTOO(I),ZOX)                                 SWAG0082
00216          XO              = PDOO(I) / PTOO(I)                              SWAG0083
00216    C                                                                      SWAG0084
00216    C * * CALCULATE SPECIFIC HEAT RATIO OF GASEOUS OXYGEN - GAMMAO         SWAG0085
00216    C                                                                      SWAG0086
00217          CALL OGAMMA (TOOI(I),PTOO(I),GAMMAO)                             SWAG0087
00220          YO              = 1.0 - (0.41 + (0.35 * BETAO ** 4)) * XO / GAMMAO SWAG0088
00221          WDOTO           = YO * KO * CF1 * DOO * DOO * SQRT (ABS (PTOO(I) * SWAG0089
00221         1                  PDOO(I) * MWO / ZOX / (TOOI(I) + 459.67)))     SWAG0090
00221    C                                                                      SWAG0091
00221    C * * CALCULATE COMPRESSIBILITY FACTOR FOR GASEOUS HYDROGEN - ZH       SWAG0092
00221    C                                                                      SWAG0093
00222          CALL HZH (TFOI(I),PTFO(I),ZH)                                    SWAG0094
00223          BETAF           = DHO / DPH                                      SWAG0095
00224          XF              = PDFO(I) / PTFO(I)                              SWAG0096
00224    C                                                                      SWAG0097
00224    C * * CALCULATE SPECIFIC HEAT RATIO OF GASEOUS HYDROGEN - GAMMAH       SWAG0098
00224    C                                                                      SWAG0099
00225          CALL HGAMMA (TFOI(I),PTFO(I),GAMMAH)                             SWAG0100
00226          YF              = 1.0 - (0.41 + (0.35 * BETAF ** 4)) * XF / GAMMAH SWAG0101
00227          WDOTF           = YF * KF * CF1 * DHO * DHO * SQRT (PTFO(I) * PDFO(I)SWAG0102
00227         1                  * MWH / ZH / (TFOI(I) + 459.67))               SWAG0103
00230          WDOTT           = WDOTO + WDOTF                                  SWAG0104
00231          ISP             = F1 / WDOTT                                     SWAG0105
00232          MR              = WDOTO / WDOTF                                  SWAG0106
00233          PNS             = PC1 * K                                        SWAG0107
00234          CSUBF           = F1 / PNS / AT                                  SWAG0108
00235          STAR            = G * PC1 * AT / WDOTT                           SWAG0109
00236          CSTAR           = STAR + DCSTAR                                  SWAG0110
00237          IF (CSTAR .GE. CSTRMX) CSTAR = 0.0                               SWAG0111
00241          IF (IRATFD.EQ.0) GO TO 60                                        SWAG0112
00243          IF (.2-TR(I).GT.1.0E-7) GO TO 60                                 SWAG0113
00245          IF (3300.-FILT2(I,3).GT.1.0E-7) GO TO 60                         SWAG0114
00247          CSTAT           = 6428.561 + 2233.567 * MR - 885.0861 * MR ** 2 + SWAG0115
00247         1                  143.8467 * MR ** 3 - 11.13366 * MR ** 4 +      SWAG0116
00247         2                  0.3348754 * MR ** 5                            SWAG0117
00250          ETAC            = CSTAR / CSTAT                                  SWAG0118
00251          CFSV            = 1.477818 + 3.907214E-3 * MR - 5.934259E-4 * MR * SWAG0119
00251         1                  MR + 2.873259E-5 * MR * MR * MR                SWAG0120
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00252   ECFS         = CSUBF / CFSV                                SWAG0121
00253   CALL RATED (I,PNS,WDOTF,WDOTO,WDOTT,INITL)                 SWAG0122
00254   IF (NOCONV(I).EQ.1) GO TO 60                               SWAG0123
00256   ETACS        = CSTASD / CSTATS                             SWAG0124
00257   ENGRAT(I,1)  = F1                                          SWAG0125
00260   ENGRAT(I,2)  = FSTD                                        SWAG0126
00261   ENGRAT(I,3)  = CSUBF                                       SWAG0127
00262   ENGRAT(I,4)  = CFSTD                                       SWAG0128
00263   ENGRAT(I,5)  = ISP                                         SWAG0129
00264   ENGRAT(I,6)  = ISPS                                        SWAG0130
00265   ENGRAT(I,7)  = CFSV                                        SWAG0131
00266   ENGRAT(I,8)  = CFNSV                                       SWAG0132
00267   ENGRAT(I,9)  = WDOTT                                       SWAG0133
00270   ENGRAT(I,10) = WDOTTS                                      SWAG0134
00271   ENGRAT(I,11) = ECFS                                        SWAG0135
00272   ENGRAT(I,12) = ECFSTD                                      SWAG0136
00273   ENGRAT(I,13) = WDOTO                                       SWAG0137
00274   ENGRAT(I,14) = WDOTOS                                      SWAG0138
00275   ENGRAT(I,15) = TOD                                         SWAG0139
00276   ENGRAT(I,16) = TODS                                        SWAG0140
00277   ENGRAT(I,17) = WDOTF                                       SWAG0141
00300   ENGRAT(I,18) = WDOTFS                                      SWAG0142
00301   ENGRAT(I,19) = TFD                                         SWAG0143
00302   ENGRAT(I,20) = TFDS                                        SWAG0144
00303   ENGRAT(I,21) = MR                                          SWAG0145
00304   ENGRAT(I,22) = MRS                                         SWAG0146
00305   ENGRAT(I,23) = POD                                         SWAG0147
00306   ENGRAT(I,24) = PODS                                        SWAG0148
00307   ENGRAT(I,25) = PC1                                         SWAG0149
00310   ENGRAT(I,26) = PCS                                         SWAG0150
00311   ENGRAT(I,27) = PFD                                         SWAG0151
00312   ENGRAT(I,28) = PFDS                                        SWAG0152
00313   ENGRAT(I,29) = CSTAR                                       SWAG0153
00314   ENGRAT(I,30) = CSTASD                                      SWAG0154
00315   ENGRAT(I,31) = AE                                          SWAG0155
00316   ENGRAT(I,32) = PAB                                         SWAG0156
00317   ENGRAT(I,33) = CSTAT                                       SWAG0157
00320   ENGRAT(I,34) = CSTATS                                      SWAG0158
00321   ENGRAT(I,35) = AT                                          SWAG0159
00322   ENGRAT(I,36) = ATTC                                        SWAG0160
00323   ENGRAT(I,37) = ETAC                                        SWAG0161
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00324            ENGRAT(I,38) = ETACS                                        SWAG0162
00325            ENGRAT(I,39) = PCCI                                         SWAG0163
00326            ENGRAT(I,40) = PCCIA                                        SWAG0164
00327         60 CONTINUE                                                    SWAG0165
00330            IF (IF.EQ.1) GO TO 80                                       SWAG0166
00332            DT           = TR(I) - ST                                   SWAG0167
00333            IF (DT.GE.DTMAX) GO TO 70                                   SWAG0168
00335            IT           = IT + (SAVF + F1) / 2. * DT                   SWAG0169
00336            INPNS        = INPNS + (SAVPNS + PNS) / 2. * DT             SWAG0170
00337            MO           = MO + (SWDOTO + WDOTO) / 2. * DT              SWAG0171
00340            MF           = MF + (SWDOTF + WDOTF) / 2. * DT              SWAG0172
00341         70 CONTINUE                                                    SWAG0173
00342            ST           = TR(I)                                        SWAG0174
00343            SAVF         = F1                                           SWAG0175
00344            SAVPNS       = PNS                                          SWAG0176
00345            SWDOTO       = WDOTO                                        SWAG0177
00346            SWDOTF       = WDOTF                                        SWAG0178
00347            GO TO 90                                                    SWAG0179
00350         80 CONTINUE                                                    SWAG0180
00351            IT           = 0.0                                          SWAG0181
00352            INPNS        = 0.0                                          SWAG0182
00353            MO           = 0.0                                          SWAG0183
00354            MF           = 0.0                                          SWAG0184
00355            GO TO 70                                                    SWAG0185
00356         90 CONTINUE                                                    SWAG0186
00357            IF           = 2                                            SWAG0187
00360            DO 100 J=1,21                                               SWAG0188
00363            ENGDAT(I,J)  = TENG(J)                                      SWAG0189
00364        100 CONTINUE                                                    SWAG0190
00366        110 CONTINUE                                                    SWAG0191
00370            GO TO 180                                                   SWAG0192
00371        120 CONTINUE                                                    SWAG0193
00372            IF (IFST.EQ.1) GO TO 160                                    SWAG0194
00374            M1           = IPOINT(1)                                    SWAG0195
00375            M2           = IPOINT(2)                                    SWAG0196
00376            M3           = IPOINT(3)                                    SWAG0197
00377            M4           = IPOINT(4)                                    SWAG0198
00400            M5           = IPOINT(5)                                    SWAG0199
00401            M6           = IPOINT(6)                                    SWAG0200
00402            M7           = IPOINT(7)                                    SWAG0201
00403            M8           = IPOINT(8)                                    SWAG0202
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00404            IFST          = 1                                            SWAG0203
00405            RAT           = AC / AT                                      SWAG0204
00406            IF (RAT.LT.CX(1).OR.RAT.GT.CX(100)) GO TO 140                SWAG0205
00410            DO 130 I=1,99                                                SWAG0206
00413            IF (RAT.GE.CX(I).AND.RAT.LE.CX(I+1)) GO TO 150               SWAG0207
00415        130 CONTINUE                                                     SWAG0208
00417        140 CONTINUE                                                     SWAG0209
00420            WRITE (6,10)RAT,CX(1),CX(100)                                SWAG0210
00425            IF (MICROT.EQ.17) WRITE (MICROT,10)RAT,CX(1),CX(100)         SWAG0211
00433            STOP                                                         SWAG0212
00434        150 CONTINUE                                                     SWAG0213
00435            K             = CY(I) + (RAT - CX(I)) * (CY(I+1) - CY(I)) /  SWAG0214
00435           1                (CX(I+1) - CX(I))                            SWAG0215
00436        160 CONTINUE                                                     SWAG0216
00437            IF            = 1                                            SWAG0217
00440            IQUIT         = 0                                            SWAG0218
00441            IBEGN1        = 1                                            SWAG0219
00442            IBEGN2        = 1                                            SWAG0220
00443            ST            = 0.0                                          SWAG0221
00444            SAVF          = 0.0                                          SWAG0222
00445            SAVPNS        = 0.0                                          SWAG0223
00446            SWDOTO        = 0.0                                          SWAG0224
00447            SWDOTF        = 0.0                                          SWAG0225
00450            TIMLST        = 0.0                                          SWAG0226
00451            CALL RATED (IDUM1,PNS,WDOTF,WDOTO,WDOTT,INITL)               SWAG0227
00452            DO 170 I=1,100                                               SWAG0228
00455            TENG(I)       = 0.0                                          SWAG0229
00456        170 CONTINUE                                                     SWAG0230
00460            ISKIP         = 5 * IPC                                      SWAG0231
00461        180 CONTINUE                                                     SWAG0232
00462            RETURN                                                       SWAG0233
00463            END                                                          SWAG0234

      END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
    SWAGER        SYMBOLIC              25 JUN 70  12&27&17  0  01605440  14  235  (DELETED)
    SWAGER  CODE  RELOCATABLE           25 JUN 70  12&27&17  1  01613772  60    1  (DELETED)
                                                             0  01614066  14   78
&     HDG     HD011C-ZERO
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&     FOR,*    ZERO,ZERO                                                    14 JUL 70              17& 6&23.698
UNIVAC 1108 FORTRAN V LEVEL   2206 0018 F5018H
THIS COMPILATION WAS DONE ON 14 JUL 70 AT 17&06&23

   SUBROUTINE ZERO      ENTRY POINT 000023

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001   *CODE    000030
        0000   *DATA    000015
        0002   *BLANK   015607


   EXTERNAL REFERENCES (BLOCK, NAME)

        0003   NERR3$


   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000002 105G       0001   000003 110G       0002 R 000000 ENGDAT      0002 R 001604 ENGRAT      0002 R 002506 FILT1
    0002 R 006476 FILT2      0000 I 000000 I          0000 I 000001 J           0002 R 007433 STORE


00101      1*          SUBROUTINE ZERO                                                ZERO0000
00103      2*          COMMON          ENGDAT(9,100),ENGRAT(9,50),FILT1(40,51)        ZERO0001
00103      3*         1              , FILT2(9,53),STORE(60,53)                       ZERO0002
00104      4*          DO 10 I=1,9                                                    ZERO0003
00107      5*          DO 10 J=1,53                                                   ZERO0004
00112      6*          FILT2(I,J)= 0.0                                                ZERO0005
00113      7*       10 CONTINUE                                                       ZERO0006
00116      8*          RETURN                                                         ZERO0007
00117      9*          END                                                            ZERO0008

      END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)
   ZERO             SYMBOLIC                                     25 JUN 70  12&27&18   0  01616172    14     9  (DELETED)
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HD011C-ZERO DATE 140770 PAGE 97

ZERO CODE RELOCATABLE 25 JUN 70 12&27&18 1 01616370 24 1 (DELETED)
0 01616420 14 4

&N HDG

A4-91