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DIGITAL SIMULATION OF A COMMUNICATION LINK FOR PIONEER SATURN URANUS ATMOSPHERIC ENTRY PROBE

Part II

by C. A. Hinrichs

Prepared by

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Prepared Under Contract No. NAS 2–7935

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for

AMES RESEARCH CENTER

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FOREWORD

This digital simulation study is a continuation of Contract NAS2-7395 and the previous study report (NASA CR-114739) and was performed under the auspices of the NASA Ames Research Center. The first study concentrated on accurately modeling the communications equipment of relay link and the atmospheric scintillation characteristics of an outer planet. This study optimizes the modulation/demodulation link of the previous study and investigates the impact of various scintillation models. For completeness, this report summarizes the results of the previous report. Both the mean error rate and the acquisition properties of the link are explored. The design of simulated equipment was formulated by the TRW Systems Group under subcontract to McDonnell Douglas Astronautics Company-East. Under both studies magnetic tapes of bit error histories were delivered to the Ames Research Center for evaluation of candidate convolutional code structures.

The author expresses his appreciation for the assistance provided by Mr. T. Grant of ARC who performed the decoding analysis and provided the preliminary decoding results for this report.

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DIGITAL SIMULATION OF A COMMUNICATION LINK FOR PIONEER SATURN URANUS ATMOSPHERIC ENTRY PROBE

SUMMARY

A digital simulation study is presented for a candidate modulator/demodulator design in an atmospheric scintillation environment with Doppler, Doppler rate and signal attenuation typical of the conditions of an outer planet atmospheric probe. The simulation results indicate that the mean channel error rate with and without scintillation are similar to theoretical characterizations of the link. In addition the simulation gives information for calculating other channel statistics and generates a quantized symbol stream on magnetic tape from which error correction decoding can be analyzed. Some results from the magnetic tape data analyses are also contained herein.

The receiver and bit synchronizer are modeled in the simulation at the level of hardware component parameters rather than at the loop equation level and individual hardware parameters are identified. The atmospheric scintillation amplitude and phase are modeled independently. Both normal and log normal amplitude processes are studied. In each case the scintillations are low pass filtered.

The receiver performance is given for a range of signal to noise ratios with and without the effects of scintillation. The performance is also reviewed for critical receiver parameter variations.

Part I of this report is the body of the study and is bound. Part II of this report contains the appendices and is unbound.

APPENDIX I

COMPLEX AMPLITUDE NOTATION

Complex amplitude notation is a convenient way to normalize the notation to a reference frequency. The signal waveform is thus

$$x(t) = \mathrm{Re}\{\tilde{x}(t) \exp(j w_0 t)\},$$

where the reference frequency is w_0, and the complex amplitude is

$$\tilde{x}(t) = A \exp(j\theta) = A\cos\theta + j A \sin\theta.$$

Herein, A is the signal amplitude, and θ the signal phase. The conventional notation is apparent by combining,

$$\begin{aligned} x(t) &= \mathrm{Re}\{ A \exp(j\theta) \exp(j w_0 t)\} \\ &= A \cos(w_0 t + \theta). \end{aligned}$$

When multiplying in complex amplitudes

$$z(t) = x(t)\, y(t)$$

or

$$z(t) = \mathrm{Re}\{\tilde{x}(t) \exp(j w_0 t)\}\ \mathrm{Re}\{\tilde{y}(t) \exp(j w_0 t)\}.$$

Using the identity

$$\mathrm{Re}\{\tilde{x}(t)\}\ \mathrm{Re}\{\tilde{y}(t)\} = \frac{1}{2}\mathrm{Re}\{\tilde{x}(t)\, \tilde{y}(t) + \tilde{x}(t)\, \tilde{y}^*(t)\},$$

the star denoting the complex conjugate, we have

$$\begin{aligned} z(t) = \frac{1}{2} \mathrm{Re}\{&\tilde{x}(t)\, \tilde{y}(t) \exp(j (w_0+w_1)t) \\ &+ \tilde{x}(t)\, \tilde{y}^*(t) \exp(j (w_0-w_1)t)\}. \end{aligned}$$

Normally one beats down, so the complex amplitude of the difference frequency term is $\frac{1}{2}\tilde{x}(t)\, \tilde{y}^*(t)$.

When filtering x(t) with h(t) to yield y(t), one normally expresses this as

$$y(t) = \int_{-\infty}^{\infty} x(\tau)\, h(t-\tau) d\tau .$$

In complex amplitude notation

$$\begin{aligned} y(t) &= \int_{-\infty}^{\infty} \mathrm{Re}\{\tilde{x}(t) \exp(j w_0 \tau)\}\ \mathrm{Re}\{\tilde{h}(t-\tau) \exp(j w_1 (t-\tau))\}\, d\tau \\ &= \frac{1}{2} \mathrm{Re}\{\int_{-\infty}^{\infty} \tilde{x}(\tau)\, \tilde{h}(t-\tau) \exp(j(w_0-w_1)\tau) \exp(j w_1 t)\, d\tau \} \\ &+ \frac{1}{2} \mathrm{Re}\{\int_{-\infty}^{\infty} \tilde{x}(\tau)\, \tilde{h}^*(t-\tau) \exp(j(w_0+w_1)\tau) \exp(-j w_1 t) d\tau \}. \end{aligned}$$

Normally, x(t) and h(t) are referenced to the same frequency, so that

$$y(t) = \frac{1}{2}\,\mathrm{Re}\,\{\exp(jwt)\int_{-\infty}^{\infty}\tilde{x}(\tau)\,\hat{h}(t-\tau)\,d\tau\}$$
$$+\frac{1}{2}\,\mathrm{Re}\,\{\exp(-jwt)\int_{-\infty}^{\infty}\tilde{x}(\tau)\,\hat{h}^{*}(t-\tau)\exp(2jwt)\,d\tau\}.$$

When the bandwidths of the signal and the filter are narrow compared to the center frequency, one may neglect the second term, so

$$\tilde{y}(t) = \frac{1}{2}\int_{\infty}^{\infty}\tilde{x}(t)\,\hat{h}(t-\tau)\,d\tau.$$

Finally, when the carrier is zero, to represent baseband signals,

$$\tilde{y}(t) = \int_{-\infty}^{\infty}\tilde{x}(t)\,\hat{h}(t-\tau)\,d\tau.$$

Figure I-1 illustrates the usage of complex amplitudes in the simulation. The input has the signal amplitude M_0 and phase θ_1 plus noise θ_n. This represents the radio frequency, and is beat down by the first mixer to intermediate frequency by straightforward multiplication. After filtering, the extraneous phase is represented by ϕ, with M_f representing the filtered amplitude. The real part of the signal from the phase detector is just the amplitude times the sine of the phase. Similarly the real part of the signal from the coherent amplitude detector is just the negative of the amplitude times the cosine of the phase.

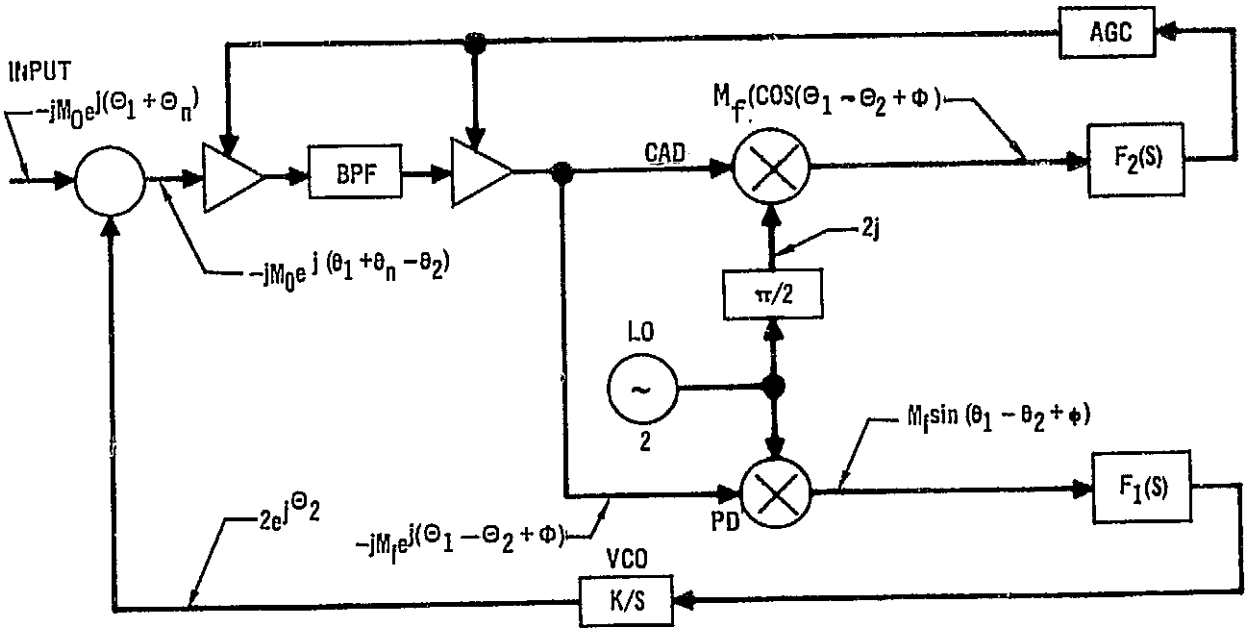


FIGURE I-1 COMPLEX AMPLITUDE USAGE

APPENDIX II

SCINTILLATION FILTERING

ABSTRACT: A tapped delay line filter is presented to represent atmospheric scintillation effects. Data is given to show the aliasing effects of the truncation.

1. Introduction - It is well known that atmospheric turbulence, herein defined as variations in the complex dielectric constant, can cause variation in the amplitude and phase of a received electromagnetic wave. From Tatarski in Ref (A2-1), the power spectral densities of the amplitude and the phase is proportional to the -8/3 power of the frequency above cutoff. This assumes the Kolmogorov form of the turbulent flow. The nature of the fluctuations is different however for amplitude and phase; amplitude fluctuations being dominated by the microscale of the turbulence, and phase fluctuations being dominated by the macroscale of the turbulence.

According to Ames Research Center RFP, the atmospheric effects can be adequately modeled by assuming the amplitude effects of the form

$$A(t) = A_o(1 + x(t))$$

where x(t) is a Gaussian process of zero mean and a root variance of 0.23, low pass filtered with a cutoff of 2.0 Hertz and a $f^{-4/3}$ roll off (note herein the signal is a voltage term). Similarly, the phase effects could be modeled as

$$\theta(t) = \theta_o + \theta_1 t + \theta_2 t^2 + s(t)$$

where s(t) is a Gaussian process of zero mean and a root variance of 0.47, low pass filtered with a cutoff of 0.2 Hertz and a -4/3 roll off.

This note presents the digital form these filters will take.

2. Filter Form - In electrical engineering terms the transfer function of the filter is

$$F(s) = (a/(s+a))^{4/3},$$

where a is the cutoff frequency in radians, and s is $j\omega$.

By simple algebra, the corner is then

$$\omega/a = (2^{3/4} - 1)^{1/2} = .8257074727,$$

or for amplitude $a_x = 15.21891351$

and for phase $a_s = 1.521891351$.

The Laplace transform of the impulse response from Ref (A2-2), is

$$h(t) = [a^{4/3}/\Gamma(4/3)]t^{1/3}\exp(-at),$$

and $$\Gamma(4/3) = .892979511 .$$

For t of zero or infinity of course

$$h(t)\Big|_{\substack{t=0\\ t=\infty}} = 0$$

The function has a maxima at

$$dh(t)/dt \Big|_{t=\frac{1}{3a}} = 0$$

The impulse response is shown in Figure II-1.

3. Z Transform - The quickest computational form of a filter is generally the Z transform (Ref (A2-3)). This is just the Laplace transform with the substitution:

$$z = \exp(sT)$$

Utilizing the simplest interpolator, zero order hold, the discrete transform is

$$(1 - z^{-1})\ Z\ (\tfrac{1}{s}\ F(s)).$$

Since for the case in question

$$\mathcal{L}((a/(s+a))^{4/3}) = a^{4/3}\ \Gamma^{-1}(4/3)\ t^{-1/3}\ e^{-at}\ ,$$

then $$\mathcal{L}(\tfrac{1}{s}F(s)) = \int_0^t a^{4/3}\ \Gamma^{-1}\ (4/3)\ t^{-1/3}\ e^{-at}\ dt = f(t)$$

and by definition

$$Z(\tfrac{1}{s}F(s)) = \sum_{n=0}^{\infty} f(n)z^{-n}$$

Thus

$$Z\left(\frac{1}{s}F(s)\right)= \sum_{n=0}^{\infty} \{a^{4/3} \Gamma^{-1}(4/3) \int_0^t (nT)^{-1/3} e^{-ant} d(nT)\} z^{-n}$$

From Abramowitz and Stegun, Ref (A2-2), the above incomplete gamma function can be written as a Chi-Squared function, or

$$Z\left(\frac{1}{s}F(s)\right) = \sum_{n=0}^{\infty} \{P\left(2ant\middle|\frac{8}{3}\right)\} z^{-n} ,$$

Then the complete transform is

$$(1-z^{-1})\ Z\ \left(\frac{1}{s}F(s)\right)= (1-z^{-1})\{ \sum_{n=0}^{\infty} P\left(2anT\middle|\frac{8}{3}\right) z^{-n}\}$$

$$= P\left(o\middle|\frac{8}{3}\right) z^{-0} + P\left(2aT\middle|\frac{8}{3}\right) z^{-1} + P\left(4aT\middle|\frac{8}{3}\right) z^{-2} + \ldots$$

$$- P\left(2aT\middle|\frac{8}{3}\right) z^{-2} - P\left(4aT\middle|\frac{8}{3}\right) z^{-3} - \ldots$$

$$= 0 + P\left(2aT\middle|\frac{8}{3}\right) z^{-1} + \{P\left(4aT\middle|\frac{8}{3}\right) - P\left(2aT\middle|\frac{8}{3}\right)\} z^{-2}$$

$$+ \{P\left(6aT\middle|\frac{8}{3}\right) - P\left(4aT\middle|\frac{8}{3}\right)\} z^{-3}$$

$$+ \ldots$$

The output ϕ for the input I is then

$$\phi = P\left(2aT\middle|\frac{8}{3}\right) I((n-1)T) + \{P\left(4aT\middle|\frac{8}{3}\right) - P\left(2aT\middle|\frac{8}{3}\right)\} I((n-2)T)$$

$$+ \{P\left(6aT\ \frac{8}{3}\right) - P\left(4aT\middle|\frac{8}{3}\right)\} I((n-3)T)$$

$$+ \ldots$$

Since there appears to be no more concise form, at least to the writer, in this case it appears that the Z transform is no better than a conventional delay line representation. Also, since the Chi-Squared function is evaluated as a series,

$$P(\chi^2|\upsilon) = \Gamma^{-1}(\upsilon/2) \sum_{n=0}^{\infty} \frac{(-1)^n (\chi^2/2)^{\frac{\upsilon}{2}+n}}{n!\ (\frac{\upsilon}{2}+n}$$

the conventional delay line representation appears preferable.

4. Delay Line - There are two design parameters which must be set when representing a filter as a tapped delay line: the tap spacing, T, and the line length, NT. The former describes the "graininess" of the impulse response, and effectively defines the highest frequency represented,

$$f_m = a/(2\gamma) = Kf_b/\gamma$$

Therein $T = \gamma/a$,

f_b is the corner frequency, and for the 4/3 filter

$$K = 3.804728378.$$

The latter describes the fold over aliasing, and effectively defines the lowest frequency (excluding zero) represented,

$$f_L = 1/(NT)$$

As a rule of thumb, the maximum tap contribution, Th(t), should be of the order of 0.1, or

$$T = (0.1)3^{1/3}\,\Gamma(4/3)/(ae^{-1/3})$$

$$\simeq .179740828/a\ .$$

Similarly, the "length" should sum to 0.95 to 0.99, i.e., for the filter in question

$$P(2aNT|\tfrac{8}{3}) = a^{4/3}\,\Gamma^{-1}(4/3)\int_0^{\tau=2aNT}(\tfrac{\tau}{2a})^{1/3}\,e^{\frac{\tau}{2}}\,\frac{1}{2a}\,d\tau,$$

where $\tau = nT = \tau/(2a)$.

The function is plotted in Figure II-2. From the figure it appears that a length 2aNT of 8 to 10 should be adequate, or for 10,

$$NT = (\chi^2 = 10)/2a = 5/a\ .$$

Figures II-3 and II-4 illustrate the amplitude and phase response of three delay lines: T = .1707/a, N = 32; T = .09/a, N = 64 and T = .09/a, N = 128. The magnitude of the error is shown in Figure II-5. The number of taps shown are integer powers of two for convenience in the fast Fourier transform. The rule of thumb filter, T = .17/a, N = 32 appears quite reasonable to an octave beyond the corner, after which the phase response falls off quickly. The second filter, T = .09/a, N = 64 is approximately the same length as the first, but with twice the resolution. This filter holds the correct phase response to two octaves beyond the corner. The third filter, T = .09/a, N = 128 has the same resolution as the second but has twice the length. It shows very little improvement over the second filter.

5. Conclusion - A model for turbulence effects on propagation has been reviewed, and a digital representation designed. The design is summarized in Figure II-6. The magnitude of the amplitude error is less than 1.5% over a decade of frequency beyond the corner.

Reference

A2-1 - V. I. Tatarski, "The Effects of Turbulent Atmosphere on Wave Propagation", NSF TT-68-50464, 1971.

A2-2 - C. Abramowitz and I. A. Stegun, "Handbook of Mathematical Functions", NBS App. Math Se. 55, Dec. 1965.

A2-3 - J. D. Markel, "Z Transform Applications Using Digital Computers", Engineering Technology, Dec. 1968.

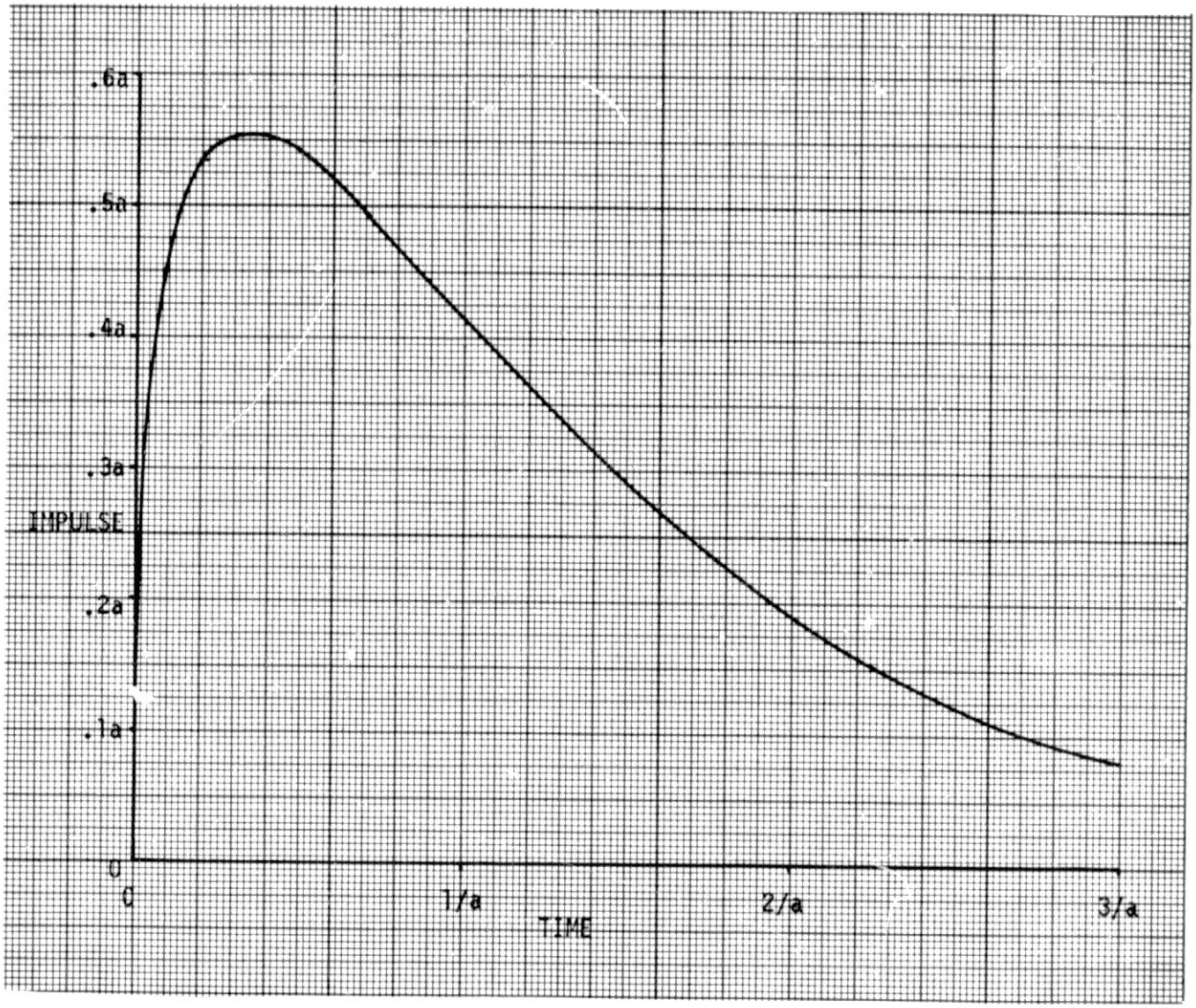


FIGURE II-1
IMPULSE RESPONSE
OF $(a/(s+a))^{4/3}$

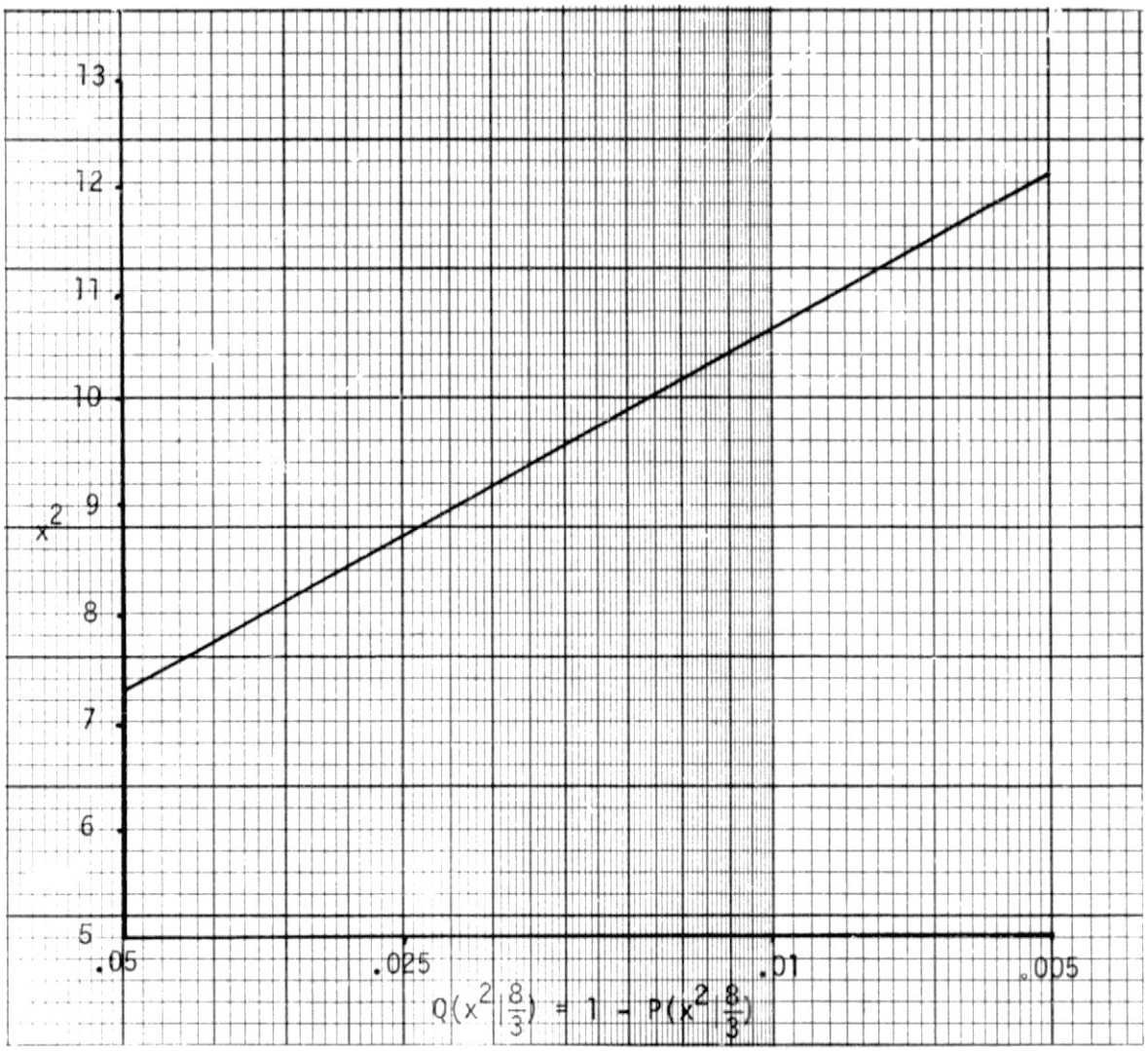


FIGURE II-2
LINE LENGTH APPROXIMATION

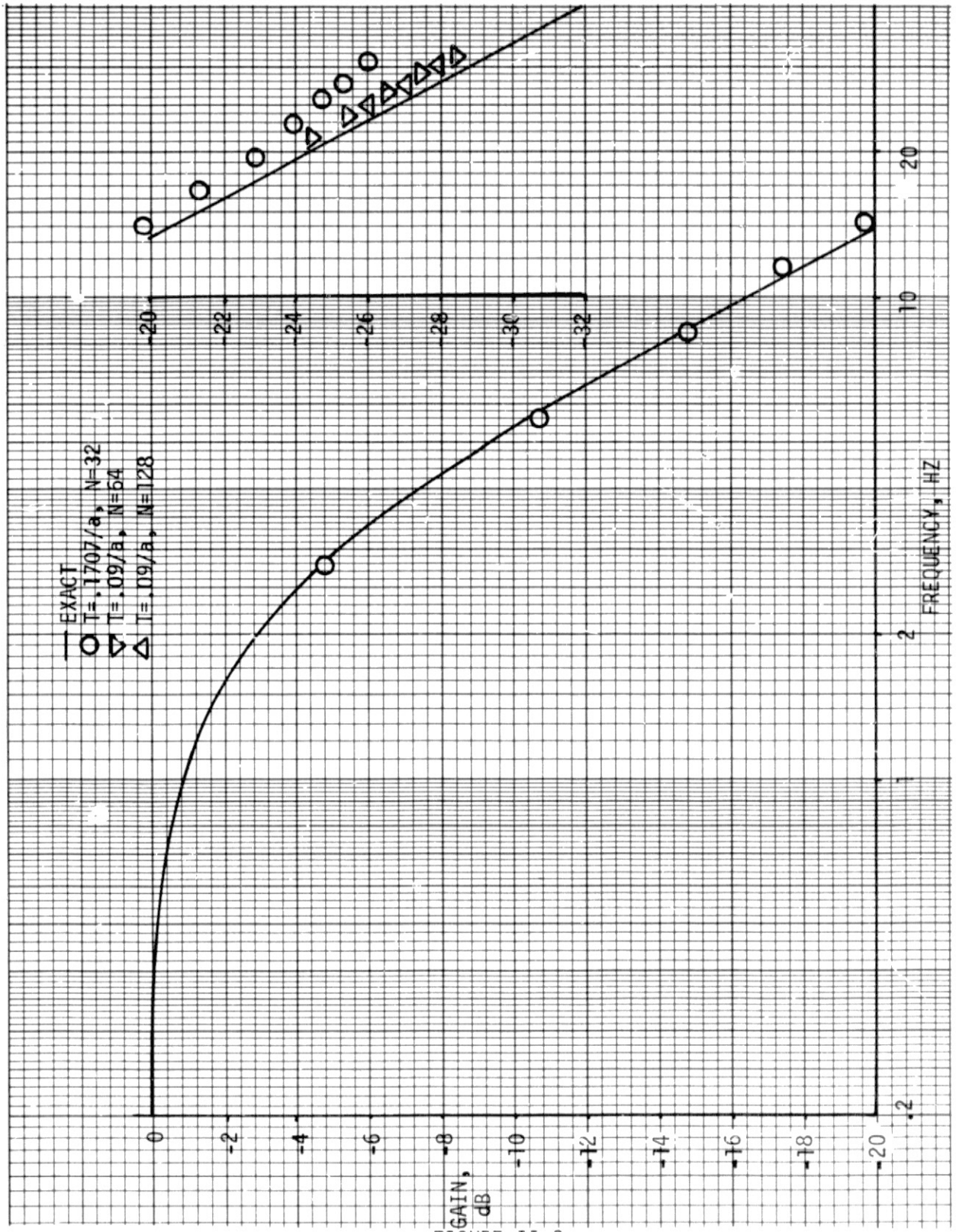


FIGURE II-3

AMPLITUDE RESPONSE

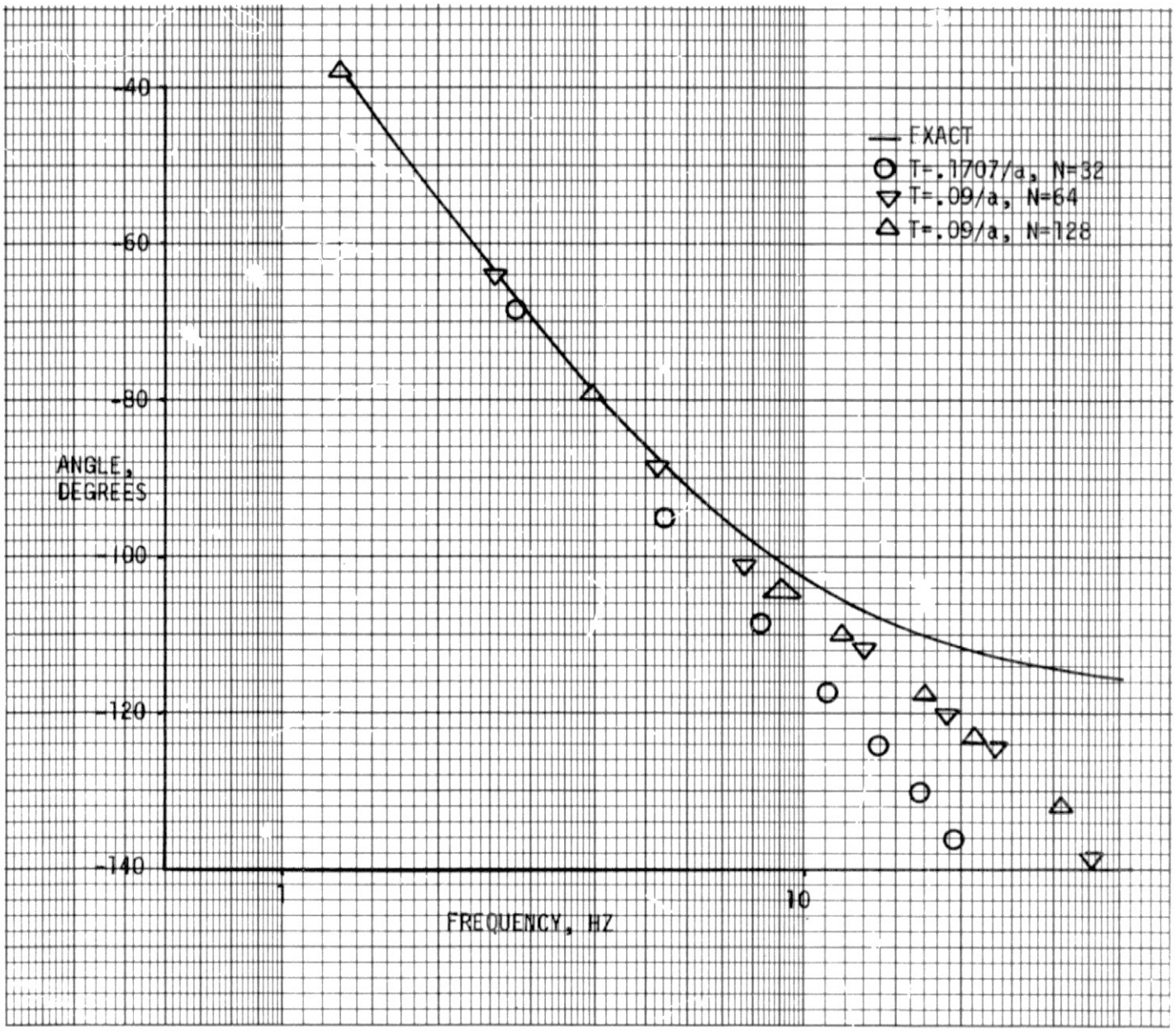


FIGURE II-4
PHASE RESPONSE

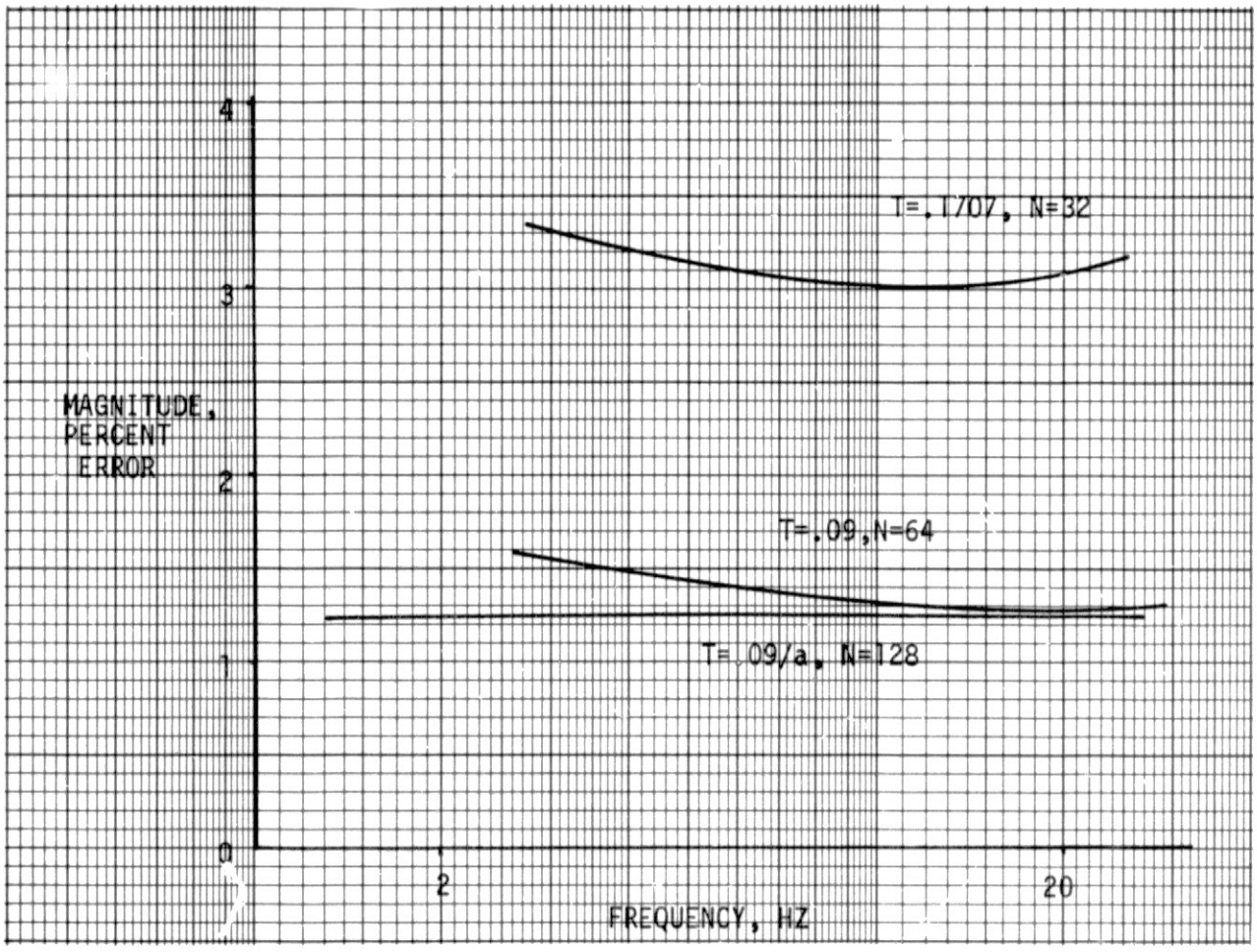
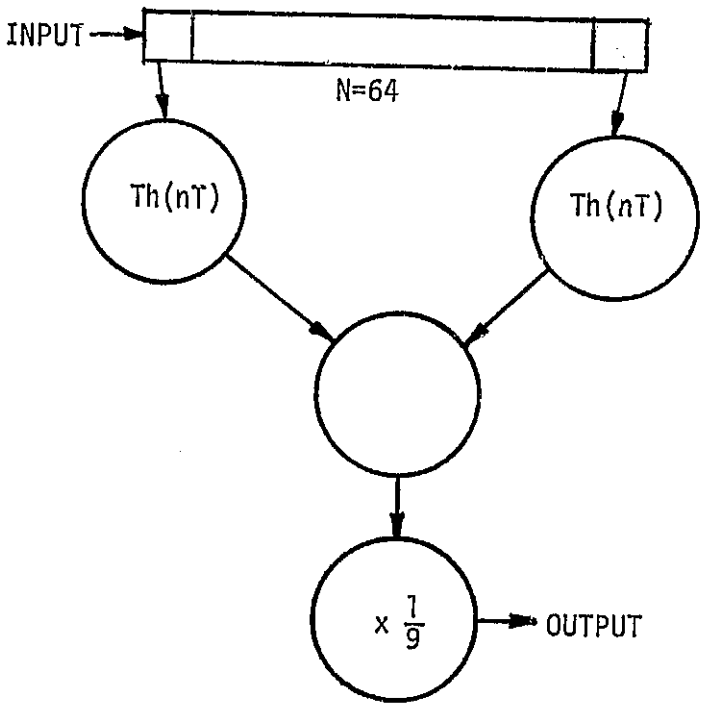


FIGURE II-5
TRUNCATION ERROR



$$Th(nT) = \gamma\Gamma^{-1}(4/3)(n\gamma)^{1/3} \exp(-n\gamma)$$

$$\gamma = .09$$

$$g = .9807$$

FIGURE II-6
TAPPED DELAY LINE FILTER

APPENDIX III

QUANTIZING STRATEGY FOR INPUTS TO VA DECODERS

1. A Viterbi Algorithm (VA) decoder can function with either hard or soft decisions on the input symbols. Typically, the use of 8 level soft decisions on the symbols permits the decoder to operate satisfactorily with ∿2dB less E_b/N_o than if hard decisions are employed. The normally used quantizing strategy results in quantization level spacings of about 0.5 to 0.7 times the standard deviation of the channel noise. This memo explores the derivation of a rationale for choosing the spacings based on the mean and variance of the received symbols. The selected spacings are found to vary between ∿0.58 and 0.64 for means between 1. and 2. sigmas.(3 to 9dB E_b/N_o). These results are equally applicable to a sequential decoder.

2. Theory of VA decoder operation

The VA decoder is a device which chooses the most likely state sequence of the encoded data from the set of possible state sequences. The formal statements of this principle are adequately covered in the published literature. The basic operating technique is to associate a path metric with each state sequence which allows the decoder to select the maximum likelyhood state sequence, based on a set of observations. The path metric, is formally defined as $-\ln \Pr\{\overline{X}|\overline{Z}\}$, where $\overline{X}$ is the set of observations, and $\overline{Z}$ is the state sequence. For a memorly less, binary symetric channel, with Gaussian noise statistics, the path metrics can be simply the sum of the observations, weighted by the expected observation, given the state sequence for the specific path metric. In simpler terms, if $M(= \pm 1)$ is the expected symbol at a given point in time, then $\Gamma_k(i) = \Gamma_k(i-1) - X_i M_i$, where $\Gamma_k(i)$ is the Kth path metric at time i. The state sequence with the smallest path metric is the maximum likelyhood state sequence.

Any two state sequences will have a number of expected symbols which have the same sense, and a number of expected symbols with the opposite sense. If one of these state sequences is the correct state sequence, then $D_{k,j}(i) = \Gamma_k(i) - \Gamma_j(i)$ will be less than zero unless $\sum_i X_i M_i < 0$, where the set, i, includes only those observations where the state sequences differ in interpretation. For the correct path, $E\{X_i M_i\} = n_X$.

Clearly, if X is a normal random variable, then $\Delta_{K,J}(i)$ is also a normal random variable, with a mean $n_\Delta = N n_X$, and $\sigma_\Delta^2 = N\sigma_X^2$, where N is the number of observations contributing to the decision. Then, at any point, an error is committed only if $\Delta_{K,J}(i) > 0$, which would occur with probability $Q(n_X\sqrt{N}/\sigma_X)$ given N pertinent observations. While this cannot be used to directly predict the decoder performance, it can be used to predict the degradation in performance when X is not normally distributed.

3. Quantization

When the symbols are quantized prior to decoding, the X's are no longer normally distributed, since they take only integer values, and finite range, linear quantization results in significant population groups in only a few values of X. Consider the quantization strategy shown in Figure III-1. We have arbitrarily assigned integer values to Z, the quantized estimate of X. If X is a normal random variable with mean η_X and unit variance, then the probability distribution of Z is given by,

$$\Pr\{Z = -7\} = Q(\eta_X+3a)$$
$$\Pr\{Z = -5\} = Q(\eta_X+2a)-Q(\eta_X+3a)$$
$$\Pr\{Z = -3\} = Q(\eta_X+a)-Q(\eta_X+2a)$$

$$\Pr\{Z = +5\} = Q(\eta_X-3a)-Q(\eta_X-2a)$$
$$\Pr\{Z = +7\} = 1-Q(\eta_X-3a)$$

where $Q(X) = \frac{1}{\sigma_X\sqrt{2\pi}} \int_X^\infty \exp-(t-\eta_X)^2/2\sigma_X^2 dt$ and "a" is the quantization level.

It is rather awkward to compute the probability that $\Delta>0$ directly, since the probability distribution of Δ is the result of N convolutions. A more useful approach is to use a Chernov bounds. In this case, we derive these bounds using the Laplace transform of the probability distribution of Z, proceeding as follows:

$$\phi_Z(S) = \sum_{J=1}^{8} \Pr\{Z = 2J-9\}e^{S(2J-9)}$$

Since convolution in normal space is simply a product in transform space, the transform of the probability distribution of Δ is,

$$\phi_\Delta(S) = [\phi_Z(S)]^N$$

Let $\Psi_\Delta(S) = \ln \phi_\Delta(S)$

$$\Psi_\Delta(S) = N\ln[\sum_{J=1}^{8} \Pr\{Z = 2J-9\}e^{S(2J-9)}]$$

$$\Psi_\Delta(S) = \frac{d\Psi_\Delta(S)}{dS} = \frac{N\sum_{J=1}^{8}(2J-9)\Pr\{Z=2J-9\}e^{S(2J-9)}}{\sum_{J=1}^{8}\Pr\{Z=2J-9\}e^{S(2J-9)}}$$

Now, the Chernov bound can be expressed,

$$\Pr\{\Delta>o\} \leq e^{\Psi\Delta(S)}\Big|_{\Psi_\Delta'(S)=0}$$

Thus, we need to solve for the value of S such that,

$$\sum_{J=1}^{8} (2J-9)\Pr\{Z=2J-9\}e^{S(2J-9)} = 0$$

This can be solved numerically, and a value for $\Pr\{\Delta>o\}$ found for any N. Note, however, that

$$\Pr\{\Delta>o\} \leq \left[e^{\Psi_Z(S)}\right]^N \Big|_{\Psi_Z'(S) = 0}$$

Thus, we need only solve for the case N=1, and find the value of "a" which minimized $\Pr\{\Delta>o\}\big|_{N=1}$. For the case $\eta_\chi = 2\sigma_\chi$, which is one of the conditions of interest, the variation of $\Pr\{\Delta>o\}$ with "a" is shown in Figure III-2. We can clearly see that varying "a" over rather broad limits does not change the probability value greatly, however, the optimum is clearly in the vicinity of $a = .62\sigma_\chi$. Figure III-3 illustrates the same information over a wider range of mean to standard deviation.

Now, we note that there is a hazard in using any bound to draw a conclusion of this nature, since varying the parameter "a" may result in variations in the relative tightness of the bound which could be on the order of the variations in the results. Thus, if our conclusions were at significant variance with emperical data, it would be necessary to use a more sophisticated approach to eliminate the uncertainty resulting from the use of bounds. However, the fact that the emperical data is in close agreement with the predicted results, and that the optimum is rather broad, suggests that the increased sophistication is unnecessary.

4. Conclusions

It has been shown that the criteria of minimizing the Chernov bounding value of $\Pr\{\Delta>o\}$ leads to a choice of quantization level of $\sim 0.6\sigma_\chi$, which is halfway between the emperically determined values of 0.5 to $0.7\sigma_\chi$.

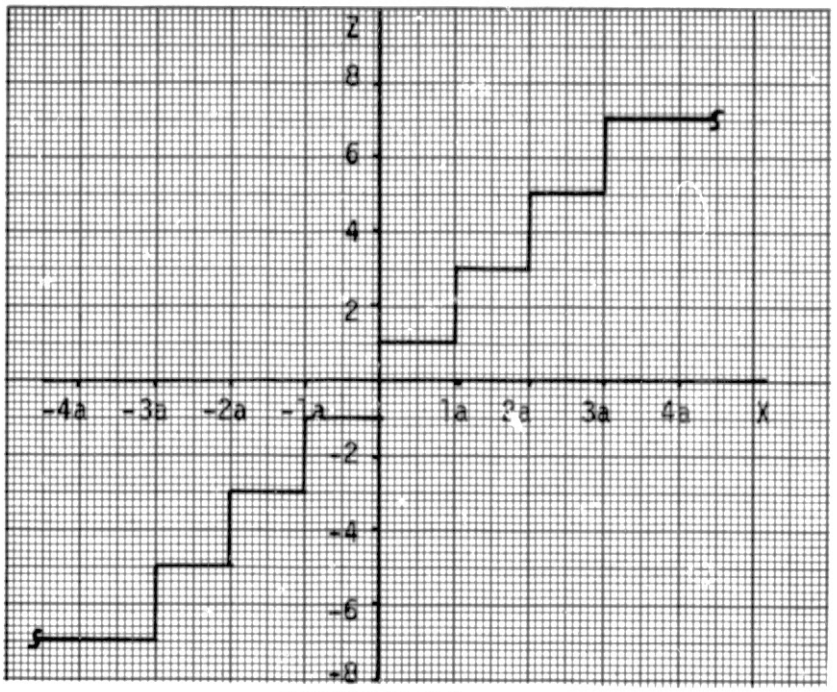


FIGURE III-1
QUANTIZATION SCHEME

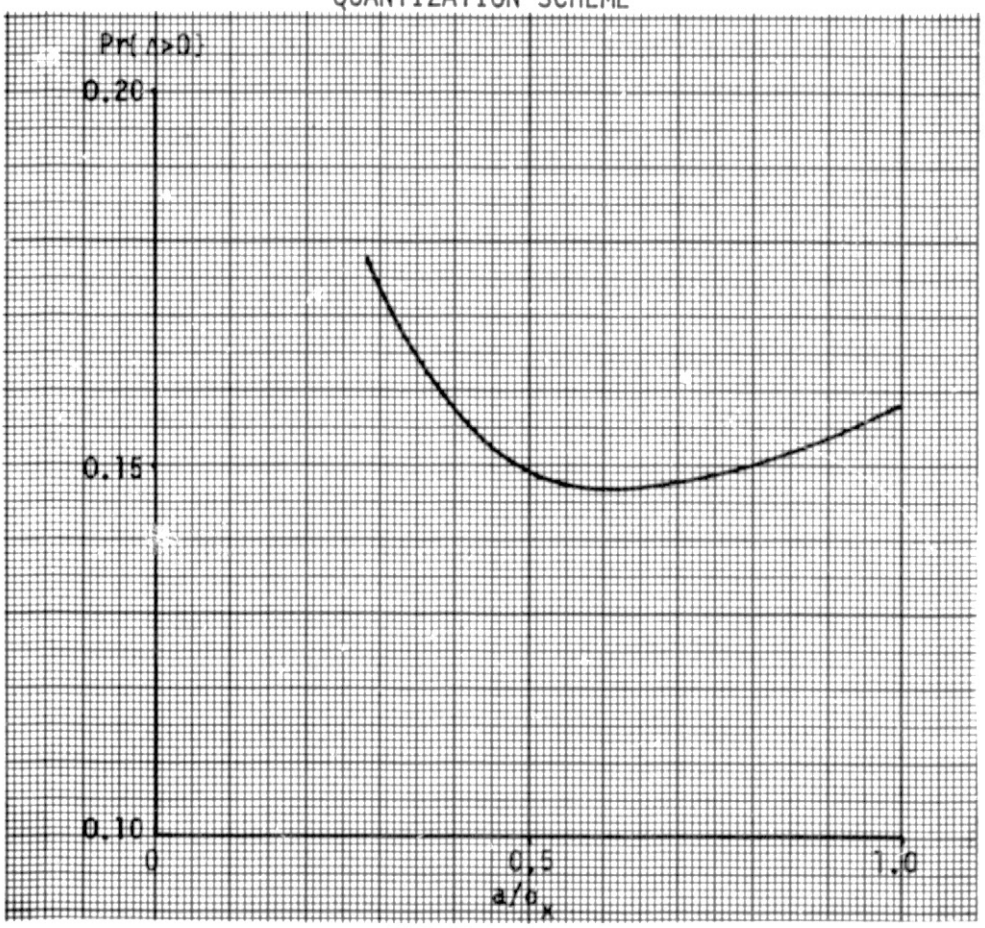


FIGURE III-2
BOUND ON Pr {Δ>0} VS QUANTIZATION LEVEL

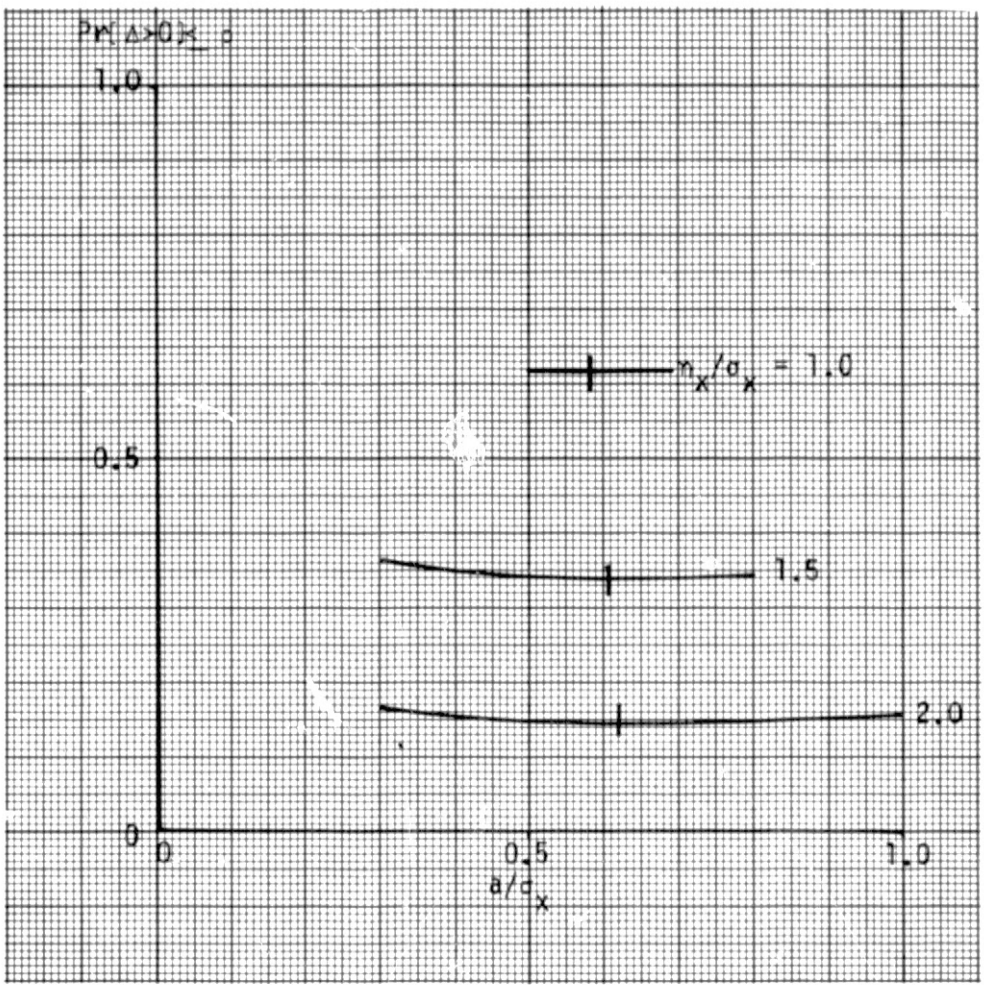


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FIGURE III-3

EFFECT OF VARYING MEAN ON
CHOICE OF QUANTIZATION LEVEL

APPENDIX IV
LIST OF SYMBOLS
(Input Symbols)

AKAGC	AGC Gain constant
AKEG	AGC offset
ASOFT	Soft decision quantization reference
BIF	IF Bandwidth
BL2	2 B_{LO} (AFC)
BL2B	2 B_{LO} (Bit sync)
DELF	Delta frequency
DYNR	Dynamic range of AGC below "minimum" signal
ENODB	Energy to noise density in decibels
FBAMP	Amplitude scintillation corner frequency
FBPHA	Phase scintillation corner frequency
FQDPRT	Frequency Doppler rate
FRQDOP	Frequency Doppler
ICLLN	Control variable for scintillation
NACQT	Number of acquisitions, each problem
NRUNS	Number of bits, each problem
PMFILT	Premodulation filter corner frequency
SDAMP	Gain of amplitude scintillation
SDPHA	Gain of phase scintillation
SVRHZ	Sweep slope in Hertz
SWNM	Sweep minimum
SWMX	Sweep maximum
TAU3	AGC time constant
TAU5	Baseband time constant
TAU6	Doppler time constant
TL	Threshold

(All Symbols)

A	Signal voltage
AAMP	Normalized amplitude scintillation
ACOR	Scintillation normalization
ACQ	Number of true acquisitions
ACTH1	A cos (TH1)
AFAL	Number of false acquisitions
ADB	A dropped bit
ADOA	Average number of bits in a dropout
ADOS	Standard deviation of number of bits per dropout
AERR	Printout form of AERRI
AERRI	Errors in a internal of bits
AGC	AGC gain furction
AK	AFC loop gain
AKAGC	AGC gain constant
AKOU	KDATA at acquisition
AKBMIN	Bit synchronizer AK minimum
AKEG	AGC gain offset
ALCOS	List cosine
ALSIN	List sine
AMIN	Minimum A to AFC
AMISS	Number of missed acquisitions
APHA	Normalized phase scintillations
APM	Premodulation filter constant
ARGU	Argument
ASOFT	Soft decision quantization reference
ASOFTI	Soft decision quantization slope
ASTH1	Asin (TH1)
AVEES	Average ES
AVEEV	Average EV
A1, A2	IF filter constants
A5	Baseline connection filter gain
BIF	IF Bandwidth

BL2	2 B_{LO} (AFC)
BL2B	2 B_{LO} (bit synchronizer)
BPER	Bit period
BPM	Premodulation filter constant
BRATE	Bit rate
B1, B2, B3, B4	IF filter constants
CAMP	Complex amplitude into BIF
CBIN1	Hits in SBINS1
CBIN2	Hits in SBINS2
CBIN3	Hits in SBINS3
CBIN4	Hits in SBINS4
CB1	Bit synchronizer Z transform constant 1
CB2	Bit synchronizer Z transform constant 2
CB3	Bit synchronizer Z transform constant 3
CFILT	IF filter output
CORAMP	RC Amplitude normalization
CORPHA	RC Phase normalization
CPM	Premodulation filter constant
CTH1	Cos (TH1)
CTH2	Cos (TH2)
COO	Gaussian polynominal coefficient
C1	AFC filter Z Transform constant 1
C11	Gaussian polynominal coefficient
C2	AFC filter Z transform constant 2
C22	Gaussian polynominal coefficient
C3	AFC filter Z transform constant 3
C4	Normalized AFC VCO gain
C5	AGC Z transform constant 1
C5AMP	RC Amplitude scintillation factor
C5DP	Doppler Z transform constant 1
C5MH	Baseline Z transform constant 1
C5PHA	RC Phase scintillation factor
C6	AGC Z transform constant 2
C6AMP	RF Amplitude scintillation factor

C6DP	Doppler Z transform constant 2
C6MH	Baseline Z transform constant 2
C6PHA	RC Phase scintillation factor
DELF	Delta frequency
DPM	Premodulation filter Z transform constant
DES	DT*SVR
DT	Delta time
DTH1	Delta TH1
DYNR	Dynamic range of AGC below "minimum" signal
D11,22,33	Gaussian polynominal coefficients
E	Voltage into AFC filter
EDOP	Doppler voltage
EDOPR	Doppler rate voltage
EDOPRX	Doppler plus Doppler rate voltage
ENO	Energy to noise density
ENODB	ENO in decibels
ENOM	Minimum ENO
ENOMIN	ENOM in decibels
EPULL	AFC pull in range
ERRDMP	Error count
ERRI	Running count of errors in an interval
ERRDMP	Error count
ERRM	Error spacing matrix
ES	Sweep voltage
EV	Voltage from AFC filter
EVMAX	Maximum sweep voltage
EVMIN	Minimum sweep voltage
EVO	Last EV
EV1	Voltage after Doppler addition
EV1C	Voltage into bit synchronizer
EV1O	Last EV1
EV1OC	Last EV1C
EO	Last E
FBAMP	Amplitude scintillation filter corner

FBPHA	Phase scintillation filter corner
FBTAU3	Corner frequency of TAU3
FBTAU5	Corner frequency of TAU5
FBTAU6	Corner frequency of TAU6
FDIFF	AFC pull in
FDIFFB	Bit synchronizer pull in
FIDO	Float (IDO)
FLO	Lo detune
FQDPRT	Frequency Doppler rate
FRQDOP	Frequency Doppler
FVCOB	Frequency VCO bit synchronizer
F1, F2	Dummy print variables
GAM43	Scintillation filter tap spacing target
GAM43A	GAM43 for amplitude
GAM43P	GAM43 for phase
G1	IF amplifier gain
G1LIM	Maximum G1
HDRI	Truncated ASCII Header
I	Dummy index
IAERRI	Index of AERRI
IAMP	Amplitude scintillation counter
IAMPC	Phase scintillation counter
IBIT	Phase of bit synchronizer
ICAMP	RC amplitude filter counter
ICCLRC	Control variable for RC scintillation
ICDC	Octal bit counter
ICLLN	Control variable for log normal scintillation
ICPHA	RC Phase filter counter
IDATA	Current bit
IDATAO	Last IDATA
IDATAW	Last IDATAO
IDLBIT	Number of output bits before error count
IDO	Number of dropouts
IDON	IDO counter

IDTS	Dummy line index
IDUM	Dummy counter
IERRSP	Error space
IFILT	Dummy line index
IFRAME	Counter to NFRAME
IHOLD	In phase bit synchronizer level
IHOLD1	Last IHOLD
ILOC	Counter, bits to lock
ILOCF	Final ILOC
INCREC	Tape record increment
INCTIM	Tape time increment
IPHA	Phase scintillation counter
IPHAC	Amplitude scintillation counter
IRCD	Register contents data generator
IREC	Record number
IRECB	Bit number in record
IRECO	Dummy record number
IRECT	Total number of records
IRUN	Number of tape problems plus 1
ITAPE	Counter of words in the record
ITH1	Integer of TH1
ITH2	Integer of TH2
ITIM1	Tape time initial
ITIM2	Tape time final
IWORDI	Bit packed word of symbol decisions
IX	Bin of soft decision
IXD	Data bit in the ship register
IXM	Last IX
I1, I11	Random generator number
I2, I22	Random generator number
I5,I55	Random generator number
I6,I66	Random generator number
J	Counter for samples per bit
JJ	Dummy counter

J1, J11	Random generator number
J2, J22	Random generator number
J5, J55	Random generator number
J6, J66	Random generator number
K	AFC VCO gain
KB	Bit synchronizer VCO gain
KKK	Total bits of the measurement
KDATA	Counter of IDATA
KOUNT	Counter of IMS
K1, K11	Random generator number
K2, K22	Random generator number
K5, K55	Random generator number
K6, K66	Random generator number
NACQ	Counter of NACQT trials
NACQT	Number of acquisition
NBIT	Phase of IBIT to dump in phase integrator
NBIT2	Phase of IBIT to dump quadraphase integrator
NC	Quadrature noise
NFRAME	Bit length to define error history
NN	N43-1
NNOUT	NOUT/10
NOUT	Rounded value of IAERRI
NRUNS	Number of bits per run
NS	Quadrature noise
NSPB	Number of samples per bit
NO	Noise density
N43	Number of scintillation filter taps
OMC	Baseband equivalent of IF in radians
OMT	Incremental OMC
OOTH1	Filtered TH1 plus YP
OTH1	Filtered TH1
OTH11	Filtered TH1 back one time
OTH12	Filtered TH1 back two times
PACQ	Probability of acquisition

PFAL	Probability of false acquisition
PEI	Probability of error
PHIB	Steady state bit synchronizer phase error
PHIDEG	Steady state AFC phase error
PHISS	PHIB in radians
PHISSB	PHIDEG in radians
PI	Pi
PI2	2*Pi
PMFILT	Premodulation filter corner
PRNO	Noise list
PROB	Probability list
PROBI	Incremental probability
PROBT	Dummy for probability list
PMISS	Probability of missed acquisition
QERR	Voltage to bit synchronizer filter
QERRO	Last QERR
QV	Voltage from bit synchronizer filter
RCA	Register contents amplitude
RCP	Register contents phase
REMTX	Trignometric routine number
RI	Random number
SBINS1	Probability matrix for -1-1 input
SBINS2	Probability matrix for +1-1 input
SBINS3	Probability matrix for -1+1 input
SBINS4	Probability matrix for +1+1 input
SB1	Hard decisions SBINS1
SB2	Hard decisions SBINS2
SB3	Hard decisions SBINS3
SB4	Hard decisions SBINS4
SDAMP	Gain of amplitude scintillation
SDPHA	Gain of phase scintillation
SGNRT	Sign Doppler ra
SHFTH	TH1 mod PI2
SIG	Normalized noise

SKOU	Standard deviation of acquisition at KDATA
STDAQ	Standard deviation of acquisitions
STDES	Standard deviation of ES
STDEV	Standard deviation of EV
SPEI	Standard deviation of PEI
STH1	Sin (TH1)
STH2	Sin (TH2)
SUYA1,2	RC amplitude filter statistics
SUYP1,2	RC Phase filter statistics
S2A,P	Amplitude, phase gain squared
S22A,P	Amplitude, phase gain sum
SVR	Sweep slope
SVRHZ	SVR in hertz
SWMN	Sweep minimum
SWMX	Sweep maximum
S2A	Amplitude tap gain squared
S2P	Phase tap gain squared
S22A	Amplitude tap gain sum
S22P	Phase tap gain sum
TAUB1	Bit synchronizer filter constant 1
TAUB2	Bit synchronizer filter constant 2
TAUPM	Premodulation filter constant
TAU	AFC filter constant 1
TAU2	AFC filter constant 2
TAU3	AGC filter constant
TAU4	Sample filter constant
TAU5	Baseline filter constant
TAU6	Doppler filter constant
TGA	Tap gain amplitude
TGP	Tap gain phase
TH1	Signal phase
TH11	Th1 back one time
TH12	TH12 back two times
TH2	Phase angle from AFC VCO
TL	Threshold

TSYNC	Period of bit synchronizer VCO
TSYNC2	Half TSYNC
U	Voltage into AGC filter
UMH	Voltage into baseline filter
V	Voltage from AGC filter
VA	Normalized corner frequency of amplitude scintillation filter
VD	Absolute version of V
VDP	Voltage from doppler filter
VMH	Voltage from baseline filter
VP	Normalized corner frequency of phase scintillation filter
VXQ	Voltage at XQ
VXQC	VXQ corrected
WN	AFC loop natural frequency
WNB	Bit synchronizer natural frequency
XI	In phase integrator voltage
XIHOLD	Last XI
XIO	Last XI
XIOO	Last XIO
XISIG	Standard deviation of in-phase integrator voltage
XISUM	Mean of in phase integrator voltage magnitude
XQ	Quadraphase integrator voltage
XQCOR	Voltage XQ corrected
XQO	Last XQ
Y	Absolute value of YA
YA	Scintillation amplitude
YAPO	One plus YA
YAPOA	YAPO in volts
YAX	Normalized RC amplitude
YAXX	Unnormalized RC amplitude
YP	Scintillation phase
YPX	Normalized RC amplitude
YPXX	Normalized RC amplitude
ZETA	AFC damping factor
ZETAB	Bit synchronizer damping factor

APPENDIX V

ERROR RATE

COMPUTER SOFTWARE

```
                      PROGRAM TNKR(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
000003                COMPLEX CAMP(4),CFILT(4)
000003                REAL NS,NC,NI,K,KB
000003                DIMENSION SB1(4),SB2(4),SB3(4),SB4(4)
000003                DIMENSION SBINS1(8,8),SBINS2(8,8),SBINS3(8,8),SBINS4(8,8)
000003                DIMENSION TGA(64),RCA(64),TGP(64),RCP(64)
000003                DIMENSION ADA(100),F1(8),F2(8),ERRM(100),IRCD(5)
000003                DIMENSION ALSIN(300),ALCOS(300),PROB(100),PRNG(100)
000003                DIMENSION AERRI(400),AERR(10)
000003                DATA I11,I22,I55,I66/1,2,5,6/
000003                DATA J11,J22,J55,J66/9,10,13,14/
000003                DATA K11,K22,K55,K66/17,18,21,22/
000003                DATA NFRAME/252/
000003                DATA IRCD/-1,-1,-1,-1,-1/
000003                DATA FBAMP,FBPHA,SDAMP,SDPHA,NO/2.,.2,.23,.47,1./
000003                DATA GAM43,N43/.09,64/
000003                DATA ENODB,BPATE,ENCMIN/8.,88.,9./
000003                DATA DELF,NSPB,NRUNS,BIF/62.,44,2000,1500./
000003                DATA BL2,PHIDEG,FDIFF/176.,10.,342.433/
000003                DATA BL2B,PHIB,FDIFFB/1.,11.,5./
000003                DATA TAU3,ASOFT/.07957,.17/
000003                DATA TAU5,TAU6,A5/.01808,.10603,.5/
000003                DATA FQDPRT,TL,IDLBIT,DYNR/10.8,-6.5,100,3./
000003                DATA C00,C11,C22,D11,D22,D33/2.015517,.802853,.010328,
                     +1.432788,.184269,.001308/
000003                DATA ICLLN,PHFILT/0,4./
000003                NAMELIST/IN1/NRUNS,ENODB,DELF,BIF,BL2,BL2B,FQDPRT
                     +,FBAMP,FBPHA,SDAMP,SDPHA,TL,DYNR,TAU3,TAU5,TAU6
                     +,ICLLN,PHFILT,AKEG,AKAGC
000003                ICCLRC=0
000004                PHFILT=.7
000006                PI=4.*ATAN(1.)$PI2=2.*PI
000012                ZETA=SQRT(0.5)$ZETAB=ZETA
000016                REMTX=299./PI2
000020                AKEG=26.44$AKAGC=.016$TAU3=.1187
000024                DO 1000 I=1,300
000026                ARGU=(FLOAT(I)-1.)/REMTX
000031                ALSIN(I)=SIN(ARGU)
000035          1000  ALCOS(I)=COS(ARGU)
000043          3     CONTINUE
                C
                C     READ INPUTS
000043                READ(5,IN1)
000046                IF(EOF,5)9999,9998
000051          9998  CONTINUE
000051                ASOFT=.37
000053                DYNR=6.
000054                PHFILT=.7$BL2=294.
000057                NRUNS=2016+IDLBIT
000061                NRUNS=4032+IDLBIT
000063                ERRI=0.$IFRAME=1$IAERRI=1
000066                I1=I11$I2=I22$I5=I55$I6=I66
000074                J1=J11$J2=J22$J5=J55$J6=J66
000102                K1=K11$K2=K22$K5=K55$K6=K66
000110                SUYA1=0.$SUYA2=0.$SUYP1=0.$SUYP2=0.
000114                SGNPT=1.
000115                XISUM=0.$XISIG=0.
```

TRIGNOMETRIC FUNCTION LIST

RETURN FOR NEW PROBLEM

STARTING ALL RANDOM GENERATORS AT THE SAME POSITION FOR EACH PROBLEM

```
000117          CBIN1=0.$CBIN2=0.$CBIN3=0.$CBIN4=0.
000123          ILOC=0$ILOCF=-1$IDO=0$IDON=-1
000127          ASOFTI=2./ASOFT
000131          DO 2000 I=1,400
000132   2000   AERRI(I)=0.
000135          DO 2009 I=1,6
000136   2009   IRCD(I)=-1                    } INITIALIZE DATA SOURCE
000141          IRCD(6)=1
000142          DO 199 I=1,8
000144          DO 199 J=1,8
000145          SBINS1(I,J)=0.$SBINS2(I,J)=0.$SBINS3(I,J)=0.$SBINS4(I,J)=0.
000155   198    CONTINUE
000157   199    CONTINUE
000161          IXM=0
000162          IBIT=30
                C
                C  CONVERT INPUTS (ENO,BPER,PHISS,PHISSB)
                C
000163          ENO=10.**(ENODB/10.)$ENOM=10.**(ENOMIN/10.)
000176          BPER=1./BRATE$DT=BPER/NSPB
000202          PHISS=PHIDEG*PI/180.$PHISSB=PHIB*PI/180.
000207          AMIN=SQRT(ENOM*NO*BRATE)$G1LIM=10.**(DYNR/20.)
000221          A=SQRT(ENO*NO*BRATE)
                C
                C  CALCULATE LOOP PARAMETERS (TAU1,TAU2,K,TAUB1,TAUB2,KB)
000226          WN=BL2/(ZETA+.25/ZETA)$AK=PI2*FOIFF/SIN(PHISS)
000236          TAU1=AK/(WN*WN)$TAU2=2.*(ZETA-.5/(WN*TAU1))/WN      } AFC LOOP
000245          K=AK/AMIN
000247          EDOPR=PI2*FOOPRT*DT/K$EOOPRX=EDOPR
000253          WNB=BL2B/(ZETAB+.25/ZETAB)$AK=PI2*FOIFFB/SIN(PHISSB)
000263          TAUB1=AK/(WNB*WNB)$TAUB2=2.*(ZETA-.5/(WNB*TAUB1))/WNB  } BIT SYNCHRONIZER LOOP
000272          AKBMIN=PI2*(DELF/2.)/(K*1.4125)
000276          KB=AK/AKBMIN
                C
                C  DEFINE CONSTANTS
000300          C1=1.-DT/TAU1$C2=TAU2/TAU1$C3=C1+C2-1.   Z-TRANSFORM FOR AFC FILTER
000307          C4=CT*K                                  VCO
000311          C5=DT/TAU3$C6=1.-C5                      Z-TRANSFORM FOR AGC FILTER
000314          C5=BPER/TAU3$C6=1.-C5
000317          DTH1=PI*DELF*DT                          MODULATION INDEX
000322          CB1=1.-BPER/TAUB1$CB2=TAUB2/TAUB1$CB3=CB1+CB2-1.   Z-TRANSFORM FOR BIT SYNC.
000331          C5MH=DT/TAU5$C6MH=1.-C5MH                Z-TRANSFORM FOR BASELINE FILTER
000334          C5DP=DT/TAU6$C6DP=1.-C5DP                Z-TRANSFORM FOR DOPPLER FILTER
000337          SIG=0.5*SQRT(NO/DT)
000344          DO 1001 I=1,50
000345          PROBI=FLOAT(I)/100.
000347          PROBT=SQRT(ALOG(1./(PROBI*PROBI)))
000356          PROB(I)=PROBT-(C0C+PROBT*(C11+PROBT*C22))/
                *(1.+PROBT*(D11+PROBT*(D22+PROBT*D33)))                  } NOISE TABLES
000377          PROB(I)=(PROB(I)-.314)*1.3404
000401   1001   PRNO(I)=PROB(I)*SIG
000405          DO 1002 I=1,50
000407          PROB(50+I)=-PROB(51-I)
000413   1002   PRNO(50+I)=-PRNO(51-I)
                C
                C  INITIALIZE LOOPS (TH2,E0,XI,XQ,QV,QERRD,ERR)
000417          NBIT=BPER/DT+.5$NBIT2=NBIT/2$TSYNC=BPER$TSYNC2=TSYNC/2.
000426          CAMP(1)=(0.,0.)$CAMP(2)=(0.,0.)$CAMP(3)=(0.,0.)
000436          CFILT(1)=(0.,0.)$CFILT(2)=(0.,0.)$CFILT(3)=(0.,0.)   } Z-TRANSFORM IF
```

```
000445          OMC=PI*BIF$OMT=OMC*DT
000451          B1=((OMT+8.)*OMT/24.+1.)*OMT+1.
000456          B2=(((11.*OMT/24.+1.)*OMT-1.)*OMT-3.)/B1
000466          B3=(((11.*OMT/24.-1.)*OMT-1.)*OMT+3.)/B1
000474          B4=(((OMT-8.)*OMT/24.+1.)*OMT-1.)/B1
000502          A1=OMT*OMT*OMT/(24.*B1)$A2=11.*A1
000507          PRINT 201,ENODB,DELF,BIF,BL2,ASOFT
000524      201 FORMAT(1X,*ENODB=*,F6.1,*  ,DELF=*,F6.1,*  ,BIF=*,F6.0,
               +*  ,BL2=*,F6.0,*  ,ASOFT=*,F6.4)
000524          PRINT 202,FQDPRT,TL,DYNR
000536      202 FORMAT(1X,*FQDPRT= *,E12.4,* TL= *,E12.4,* DYNR= *,E12.4)
000536          PRINT 203,SDAMP,FBAMP,SDPHA,FBPHA
000552      203 FORMAT(1X,*SDAMP= *,E12.4,* FBAMP= *,E12.4,
               +* SDPHA= *,E12.4,* FBPHA= *,E12.4)
000552          PRINT 204,WN,K,TAU1,TAU2,WNB,KB,TAUB1,TAUB2
000576      204 FORMAT(1X,*WN=*,F6.1,*  ,K=*,F6.1,*  ,TAU1=*,E12.4,*  ,TAU2=*,E12.4,
               +*  ,WNB=*,F6.1,*  ,KB=*,F6.1,*  ,TAUB1=*,E12.4,*  ,TAUB2=*,E12.4)
000576          IF(PMFILT.LT.3.1)PRINT 205,PMFILT
000606      205 FORMAT(1X,*PMFILT= *,E12.4)
000606          IF(ICLLN.EQ.1)PRINT 206
000614      206 FORMAT(1X,*LOG NORMAL SCINTILLATION*)
000614          FBTAU3=1./(PI2*TAU3)$FBTAU5=1./(PI2*TAU5)$FBTAU6=1./(PI2*TAU6)
000625          PRINT 2010,FBTAU3,FBTAU5,FBTAU6
000637      2010 FORMAT(1X,*FBTAU3= *,E12.4,* FBTAU5= *,E12.4,
               +* FBTAU6= *,E12.4)
000637          IERRSP=0
000640          DO 220 I=1,100
000642          ADB(I)=0.
000643      220 ERRM(I)=0.
000646          TAUPM=1./(PI2*BRATE*PMFILT)
000651          APM=(CT/TAUPM*DT/TAUPM)/2.$BPM=2.*DT/TAUPM
000656          CPM=-APM+BPM-1.$DPM=-APM-BPM+2.
000663          U=0.$V=.1$G1=1.
000667          TH2=0.
000670          CTH2=1.$STH2=0.
000672          E0=0.$EV=0.$EV0=0.$EV10=0.
000676          XI=0.$XQ=0.
000700          QV=0.$QERR0=0.
000702          TH1=0.$TH11=0.$TH12=0.$OTH1=0.$OTH11=0.$OTH12=0.
000710          ERRDMP=0.
000711          IHOLD=0$IHOLD1=0
000713          VMH=0.$UMH=0.
000715          VDP=0.
000716          XI00=0.$XI0=0.
000720          IDATA=-1$KOUNT=-1$J=NSPB
C
C               TURBULENCE INITIALIZATION
000723          ACOR=SQRT(2.**.75-1.)
000732          AAMP=PI2*FBAMP/ACOR$APHA=PI2*FBPHA/ACOR
000736          IAMP=INT(.5+GAM43/(AAMP*DT))$IPHA=INT(.5+GAM43/(APHA*DT))
000745          GAM43A=DT*FLOAT(IAMP)*AAMP$GAM43P=DT*FLOAT(IPHA)*APHA
000753          IF(ICCLRC.EQ.0)GOTO660
000754          C5AMP=GAM43A*ACOR$C5PHA=GAM43P*ACOR
000760          C6AMP=1.-C5AMP$C6PHA=1.-C5PHA
000764          CORAMP=1./SQRT(C5AMP/(2.-C5AMP))
000773          CORPHA=1./SQRT(C5PHA/(2.-C5PHA))
001002      660 CONTINUE
001002          IF(SDAMP.EQ.0.)GOTO500
```

RUN CONDITIONS PRINTOUT

Z-TRANSFORM PREMODULATION FILTER

OLD O/I OF TAUPM FILTER

→ NO AMPLITUDE SCINTILLATION

```
001003          YA=0.$S2A=0.
001005          DO 501 I=1,N43          FILL LINE INITIALLY
001006          VA=FLOAT(I-1)*GAM43A
001011          TGA(I)=GAM43A/.892979511*VA**.3333*EXP(-VA)
001024          S2A=S2A+TGA(I)*TGA(I)
001027          J1=129*J1+(1+129*J2)/2048$J1=MOD(J1,2048)$J2=MOD((1+129*J2),2048)
001051          R1=FLOAT(J1*2048+J2)/4194304.$RCA(I)=PROB(INT(100.*R1)+1)
001061     501  YA=YA+TGA(I)*RCA(I)
001066          S22A=SQRT(S2A)$YA=YA/S22A*SDAMP  NORMALIZE
001073          YAPO=YA+1.
001075          IF(ICLLN.NE.1)GOTO 502
001077          Y=ABS(YA)
001100          YAPO=1.+Y*(1.+.5*Y*(1.+.333*Y*(1.+.25*Y*(1.+.2*Y*(1.
               ++.1667*Y)))))
001123          IF(YA.LT.0.)YAPO=1./YAPO
001126          GOTO502
001127     500  YAPO=1.
001131     502  CONTINUE
001131          YAPOA=YAPO*A
001133          IF(SDPHA.EQ.0.)GOTO630 ————→ No PHASE SCINTILLATION
001134          YP=0.$S2P=0.
001136          DO 601 I=1,N43          FILL LINE INITIALLY
001137          VP=FLOAT(I-1)*GAM43P
001142          TGP(I)=GAM43P/.892979511*VP**.3333*EXP(-VP)
001155          S2P=S2P+TGP(I)*TGP(I)
001160          K1=129*K1+(1+129*K2)/2048$K1=MOD(K1,2048)$K2=MOD((1+129*K2),2048)
001202          R1=FLOAT(K1*2048+K2)/4194304.$RCP(I)=PROB(INT(100.*R1)+1)
001212     601  YP=YP+TGP(I)*RCP(I)
001217          S22P=SQRT(S2P)$YP=YP/S22P*SDPHA  NORMALIZE
001224          GOTO632
001224     600  YP=0.
001225     602  CONTINUE
001225          IAMPC=0$IPHAC=0$NN=N43-1
          C
          C     INDEX SCINTILLATION
001231      4   CONTINUE ←————————————————————————————RETURN FOR NEW SAMPLE
001231          IF(SDAMP.EQ.0..AND.SDPHA.EQ.0.)GOTO12
001240          IAMPC=IAMPC+1$IPHAC=IPHAC+1
001243          IF(IAMPC.GT.IAMP) GO TO 10 ————→ INDEX AMPLITUDE LINE
001246      13  IF(IPHAC.GT.IPHA) GO TO 11 ————→ INDEX PHASE LINE
001252          GO TO 12 ————→ LINE INDEX NOT REQUIRED
          C
          C     AMPLITUDE SCINTILLATION
001252      10  IAMPC=1
001253          IF(SDAMP.EQ.0.)GOTO503
001254          DO 504 JJ=1,NN          STEP LINE
001256     504  RCA(N43+1-JJ)=RCA(N43-JJ)
001264          J5=129*J5+(1+129*J6)/2048$J5=MOD(J5,2048)$J6=MOD((1+129*J6),2048)
001306          R1=FLOAT(J5*2048+J6)/4194304.$RCA(1)=PROB(INT(100.*R1)+1)
001316          IF(ICCLRC.EQ.0)GOTO661
001317          YAXX=C6AMP*YAXX+C5AMP*RCA(1)$ICAMP=ICAMP+1
001324          YAX=YAXX*CORAMP
001326          SUYA1=SUYA1+YAX$SUYA2=SUYA2+YAX*YAX
001331          YA=YAX*SDAMP$GOTO662
001333     661  CONTINUE
001333          YA=0.
001334          DO 505 JJ=1,N43
001336     505  YA=YA+TGA(JJ)*RCA(JJ)
```

```
001343          YA=YA/S22A*SDAMP
001345     662  CONTINUE
001345          YAPO=YA+1.
001347          IF(ICLLN.NE.1)GOTO506
001351          Y=ABS(YA)                    LOG NORMAL
001352          YAPO=1.+Y*(1.+.5*Y*(1.+.333*Y*(1.+.25*Y*(1.+.2*Y*(1.
               ++.1667*Y))))
001375          IF(YA.LT.0.)YAPO=1./YAPO
001400          GOTO508
001401     503  YAPO=1.
001403     506  CONTINUE
001403          YAPOA=YAPO*A
001405          GO TO 13
                C
                C     PHASE SCINTILLATION
001406      11  IPHAC=1
001407          IF(SOPHA.EQ.C.)GOTO603
001410          DO 604 JJ=1,NN                STEP LINE
001412     604  RCP(N43+1-JJ)=RCP(N43-JJ)
001423          K5=129*K5+(1+129*K6)/2048$K5=MOD(K5,2048)$K6=MOD((1+129*K6),2048)
001442          R1=FLOAT(K5*2048+K6)/4194304.$RCP(1)=PROB(INT(100.*R1)+1)
001452          IF(ICCLRC.EQ.0)GOTO663
001453          YPXX=C6PHA*YPXX+C5PHA*RCP(1)$ICPHA=ICPHA+1
001460          YPX=YPXX*CORPHA
001462          SUYP1=SUYP1+YPX$SUYP2=SUYP2+YPX*YPX
001465          YP=YPX*SOPHA$GOTO664
001467     663  CONTINUE
001467          YP=C.
001471          DO 605 JJ=1,N43
001472     605  YP=YP+TGP(JJ)*RCP(J..
001477          YP=YP/S22P*SOPHA
001501     664  CONTINUE
001501          GOTO606
001502     603  YP=C.
001503     606  CONTINUE
001503      12  CONTINUE
001503          IF(J.LT.NSPB)GO TO 1
001506          IF(KOUNT.EQ.2000*INT(FLOAT(KOUNT)/2000.))SGNRT=-SGNRT   OCCASIONALLY CHANGE SIGN OF DOPPLER RATE TO AVOID ALIASING PROBLEMS
                C
                C     NEW SYMBOL
001515          J=0
001516          IDATAW=IDATA$IDATA=IDATA
001520          IXD=-1
001521          IF(IRCD(1).NE.IRCD(6))IXD=1          } PN DATA GENERATOR
001524          DO 31 IDTS=1,5                       }
001526     31   IRCD(7-IDTS)=IRCD(8-IDTS)            }
001534          IRCD(1)=IXD                          }
001535          IDATA=IXD
001536          DTH1=SIGN(DTH1,FLOAT(IDATA))         MODULATION
001542      1   CONTINUE
001542          IF(ABS(TH1).GT.PI2)GOTO1010
001547     1011 CONTINUE
                C
                C     PREMODULATION FILTERING
001547          IF(PMFILT.GT.3.1)GOTO1013
001553          DTH1=CPM*DTH12+CPM*CTH11+APM*TH12+APM*TH11   - FILTER
001562          DTH12=DTH11$DTH11=DTH1$TH12=TH11$TH11=TH1 ——— INDEX OLD VALUES
001565          TH1=TH1+DTH1
```

```
001567     1014 OOTH1=OTH1+YP
001571          IF(ABS(OOTH1).GT.PI2)OOTH1=AMOD(OOTH1,PI2)
001577          ITH1=INT(REMTX*ABS(OOTH1)+1.)
001604          STH1=ALSIN(ITH1)$CTH1=ALCOS(ITH1)
001617          IF(OOTH1.LT.0.)STH1=-STH1
001612          GOTO1012
001613     1010 SHFTH=SIGN(PI2,TH1)
001616          TH1=TH1-SHFTH$TH11=TH11-SHFTH$TH12=TH12-SHFTH
001622          OTH1=OTH1-SHFTH$OTH11=OTH11-SHFTH$OTH12=OTH12-SHFTH
001627          GOTO1011
001627     1013 TH1=TH1+OTH1
001631          OTH1=TP1
001632          GOTO1014
001633     1012 ASTH1=YAPOA*STH1$ACTH1=YAPOA*CTH1
               C
               C     KTB NOISE
001637          I1=129*I1+(1+129*I2)/2048$I5=129*I5+(1+129*I6)/2048
001657          I1=MOD(I1,2048)$I5=MOD(I5,2048)
001666          I2=MOD((1+129*I2),2048)$I6=MOD((1+129*I6),2048)
001702          R1=FLOAT(I1*2048+I2)/4194304.$NC=PRNO(INT(100.*R1)+1)
001712          IF(R1.GT..003.AND.R1.LT..997)GOTO450
001723          IF(R1.LT..003)NC=1.3583*SQRT(-1.5726-ALOG(R1+1.E-13))
001736          IF(R1.GT..997)NC=-1.3583*SQRT(-1.5726-ALOG(1.-R1+1.E-13))
001753          IF(ABS(NC).GT.4.5)NC=SIGN(4.5,NC)
001761          NC=SIG*NC
001763     450  CONTINUE
001763          R1=FLOAT(I5*2048+I6)/4194304.$NS=PRNO(INT(100.*R1)+1)
001774          IF(R1.GT..003.AND.R1.LT..997)GOTO451
002006          IF(R1.LT..003)NS=1.3583*SQRT(-1.5726-ALOG(R1+1.E-13))
002020          IF(R1.GT..997)NC=-1.3583*SQRT(-1.5726-ALOG(1.-R1+1.E-13))
002035          IF(ABS(NS).GT.4.5)NS=SIGN(4.5,NS)
002043          NS=SIG*NS
002045     451  CONTINUE
002045          IBIT=IBIT+1$J=J+1
               C
               C     LOOP EQUATIONS
002050          CAMP(4)=CMPLX(ASTH1+NC,-ACTH1-NS)*CMPLX(CTH2,-STH2)*G1
002087          CFILT(4)=A1*(CAMP(4)+CAMP(1))+A2*(CAMP(3)+CAMP(2))
               +-B2*CFILT(3)-B3*CFILT(2)-B4*CFILT(1)
002131          DO 30 IFILT=1,3
002133          CAMP(IFILT)=CAMP(IFILT+1)
002137     30   CFILT(IFILT)=CFILT(IFILT+1)
               C
               C     AGC
002145          IF(J.NE.20)GOTO3000
002147          V=C6*V+C5*USU=AIMAG(CFILT(4))
002155          VD=ABS(V)-AKEGG1=EXP(-AKAGC*VD)
002164          IF(G1.GT.G1LIM)G1=G1LIM
002167     3000 CONTINUE
               C
               C     AFC
002167          E=REAL(CFILT(4))
002171          EV=C1*EV+C2*E-C3*E0
002177          EV1=EV0-EDOPRX
002201          EDOPRX=EDOPRX+EDOPR*SGNRT
002214          TH2=TH2+C4*EV1
002207          IF(ABS(TH2).GT.PI2)TH2=AMOD(TH2,PI2)
002215          ITH2=INT(REMTX*ABS(TH2)+1.)
```

π/4 INDEX

NO PREMODULATION FILTER

INPUT MULTIPLIER

IF FILTER

INDEX ONCE PER BIT

AGC FILTER

AGC PROCESSOR

DYNAMIC RANGE LIMITATION

AFC FILTER

VCO

```
002222          STH2=ALSIN(ITH2)$CTH2=ALCOS(ITH2)
002225          IF(TH2.LT.0.)STH2=-STH2
002230          VDP=C6DP*VDP+C5DP*EV1D     DOPPLER FILTER
002234          EV1C=EV1-VMH-VDP
002237          XI=XI+EV1C$XQ=XQ+EV1C
002242          EVD=EVIED=E$EV1D=EV1
                C
                C       BIT SYNC TIMING
002245          IF(IBIT.NE.NBIT2)GO TO 2
002247          XQD=XQ$VXQ=EV1C$XQ=VXQ  -DUMP QUADRATURE
002253     2    CONTINUE
002253          IF(IBIT.NE.NBIT2+1)GOTO802
002256          VXQC=(EV1C-VXQ)/DT*(TSYNC2-DT*FLOAT(NBIT2))+VXQ
002264          XQCOR=(VXQC+VXQ)/2.*(TSYNC2-DT*FLOAT(NBIT2))/DT
002273          XQD=(XQD+XQCOR)/FLOAT(NBIT)$XQ=XQ-XQCOR
002277     802  CONTINUE
002277          IF(IBIT.LT.NBIT)GOTO4 ————————ADDITIONAL SAMPLES
002302          IHOLD1=IHOLD$IHOLD=-1
002304          IF(XI.GT.0.)IHOLD=1     -DUMP IN-PHASE
002307          XIOD=XIO$XIO=XI/FLOAT(NBIT)
002313          VMH=(C6MH*VMH+C5MH*UMH)*A5$UMH=0.  BASELINE FILTER
002317          IF(IHOLD.NE.IHOLD1) UMH=XIOD+XIO
002323          XIHOLD=XI/FLOAT(NBIT)$XI=0.
002326          QERR=XQD*((IHOLD-IHOLD1)/2)$QV=C81*QV+C82*QERR-CB3*QERRD TRACKING
002337          QERRD=QERR                                                FILTER
002340          IBIT=0
002341          FVCOB=BRATE+KB*QV
002344          TSYNC=TSYNC-NBIT*DT+1./FVCOB$TSYNC2=TSYNC-1./(2.*FVCOB)
002354          NBIT=TSYNC/DT$NBIT2=TSYNC2/DT
002361          IF(V.GT.TL)GO     TO 95 ————————OUT OF LOCK
002365          ILOCF=ILOC
002366          IDON=-1
002367     402  CONTINUE
002367          KOUNT=KOUNT+1
002371          IF(KOUNT+2.NE.IDLBIT)GOTO33
                C
                C       REINITIALIZE DATA AT BEGINNING OF DATA TAKING
002373          DO 34 IDUM=1,5
002375     34   IRCD(IDUM)=-1
002400          IRCD(6)=1
002401     33   CONTINUE
002401          IF(KOUNT.LT.IDLBIT)GOTO93 ————————NOT TAKING DATA DURING THE
002404          IF(IHOLD.NE.IDATAD)ERRDMP=ERRDMP+1.          SETTLING TIME
002410          IFRAME=IFRAME+1
002412          IF(IFRAME.GT.NFRAME)GOTO2002
002415     2003 CONTINUE
002415          IF(IHOLD.NE.IDATAD)ERRI=ERRI+1.
002421          GOTO2004                                    ERROR RATE AS A FUNCTION
002422     2002 AERRI(IAERRI)=ERRI                               OF TIME
002424          ERRI=0.$IFRAME=1$IAERRI=IAERRI+1
002427          GOTO2003
002430     2004 CONTINUE ————————————————————————————————————
002430          XISUM=XISUM+ABS(XIHOLD)$XISIG=XISIG+XIHOLD*XIHOLD
                C
                C       ERROR SPACING
002435          IF(IHOLD.EQ.IDATAD)GOTO221
002437          IF(IERRSP.LT.1)IERRSP=1$IF(IERRSP.GT.100)IERRSP=100
002445          ERRM(IERRSP)=ERRM(IERRSP)+1.$IERRSP=0$GOTO222


002451     221  IERRSP=IERRSP+1
```

```
002451     222  CONTINUE
C
C            SOFT DECISION
002451           IX=INT(4.*SOFTI*XIHOLD+4.)+1
002456           IF(IX.GT.8)IX=8$IF(IX.LT.1)IX=1
002464           IF(IXM.EQ.0)GOTO96
002466           IF(IDATAW.EQ.-1.AND.IDATA0.EQ.-1)SBINS1(IX,IXM)=SBINS1(IX,IXM)+1.
002531           IF(IDATAW.EQ.-1.AND.IDATA0.EQ.-1)CBIN1=CBIN1+1.
002513           IF(IDATAW.EQ.-1.AND.IDATA0.EQ.+1)SBINS2(IX,IXM)=SBINS2(IX,IXM)+1.
002527           IF(IDATAW.EQ.-1.AND.IDATA0.EQ.+1)CBIN2=CBIN2+1.
002541           IF(IDATAW.EQ.+1.AND.IDATA0.EQ.-1)SBINS3(IX,IXM)=SBINS3(IX,IXM)+1.
002555           IF(IDATAW.EQ.+1.AND.IDATA0.EQ.-1)CBIN3=CBIN3+1.
002567           IF(IDATAW.EQ.+1.AND.IDATA0.EQ.+1)SBINS4(IX,IXM)=SBINS4(IX,IXM)+1.
002602           IF(IDATAW.EQ.+1.AND.IDATA0.EQ.+1)CBIN4=CBIN4+1.
002613     96    CONTINUE
002613           IXM=IX$GOTO93
002615     95    CONTINUE
C
C            LOCK/UNLOCK
002615           IF(ILOCF.EQ.ILOC)GOTO400
002617           ILOC=ILOC+1 ———————————— BITS TO LOCK
002622           IF(ILOC.GT.NRUNS)GOTO408
002623           GOTO93
002625     401   IF(IDO.EQ.IDON)GOTO401
002626           IDO=IDO+1 ———————————— DROPOUT BITS
002626           IF(IDO.GT.100)GOTO402
002631           IDON=IDO ———————————— CURRENT DROPOUT
002631           ADB(IDON)=0.
002632     421   ADB(IDON)=ADB(IDON)+1.
002635           GOTO402
002635     408   PRINT 409
002641     409   FORMAT(1X,*ACQUISITION FAILURE*)
002641           GOTO410
002642     93    CONTINUE
002642           IF(KOUNT.LT.NRUNS)GO TO 4 ———————————— ADDITIONAL BITS FOR THIS RUN
C
C            ERROR RATE CALCULATION
002645     92    CONTINUE
002645           IF(ICCLRC.EQ.0)GOTO665
002646           PRINT 666,ICAMP,SUYA1,SUYA2,ICPHA,SUYP1,SUYP2
002666     666   FORMAT(1X,I6,2E12.4,I6,2E12.4)
002666     665   CONTINUE
002666           KKK=KOUNT-IDL8IT$PEI=ERRDMP/KKK$SPEI=SQRT(PEI*(1.-PEI)/KKK )
002711           PRINT 411,PEI,SPEI,KKK
002712     411   FORMAT(1X,*PEI= *,E12.4,* SIDEV= *,E12.4,* BITS= *,I6)
002712           XISUM=XISUM/KKK$XISIG=SQRT(XISIG/KKK-XISUM*XISUM)
002722           PRINT 412,XISUM,XISIG
002731     412   FORMAT(1X,*XISUM= *,E12.4,* XISIG= *,E12.4)
002731           ADOA=0.$ADOS=0.
002733           IF(IDO.EQ.0)GOTO405
002734           IF(IDO.EQ.1)GOTO3501
002736           IF(IDO.GT.100)GOTO3502
002741           DO 403 I=1,IDO
002742           ADOA=ADOA+ADB(I)
002744     403   ADOS=ADOS+ADB(I)*ADB(I)
002751           ADOA=ADOA/IDO$ADOS=SQRT(ADOS/IDO-ADOA*ADOA)
002760           PRINT 404,ILOCF,IDO,ADOA,ADOS
002773     404   FORMAT(1X,*LOCKIN=*,I6,* ,DROPOUTS=*,I6,* ,AVE=*,E12.4,
```

MEAN ERROR RATE

DROPOUT PRINTOUTS

```
     +* ,STD DEV=*,E12.4)
0002773      GOTO406
0002774  405 PRINT 407,ILOCF
0003012  407 FORMAT(1X,*LOCKIN=*,I6,* ,DROPOUTS=0*)
0003012      GOTO406
0003013  3501 PRINT 3503,ILOCF,ADB(1)
0003013  3503 FORMAT(1X,*LOCKIN=*,I6,*DROPOUTS=1 CF*,E12.4)
0003013      GOTO406
0003014  3502 DO 3504 I=1,100
0003016      ADOA=ADOA+ADB(I)
0003025  3504 ADOS=ADOS+ADB(I)*ADB(I)
0003034      ADOA=ADOA/100.$ADOS=SQRT(ADOS/100.-ADOA*ADOA)
0003033      PRINT 3505,ILOCF,IDO,ADOA,ADOS
0003046  3505 FORMAT(1X,*LOCKIN=*,I6,*DROPOUTS=*,I6,
     +* OF FIRST 100*AVE=*,E12.4,* STD DEV=*,E12.4)
0003046  406 CONTINUE
0003046      PRINT 223,ERRM
0003054  223 FORMAT(1X,*ERRM*,/,10(1X,10E12.4,/))
0003054      PRINT 313,CBIN1,CBIN2
0003064  313 FORMAT(1X,*-1-1 P(R1,R2/T1,T2)TIMES*,F6.0,37X,
     +*-1+1 P(R1,R2/T1,T2)TIMES*,F6.0)
0003064      DO 314 I=1,8
0003066      DO 315 J=1,8
0003067      F1(J)=SBINS1(I,J)
0003072  315 F2(J)=SBINS2(I,J)
0003077  314 PRINT 316,F1,F2
0003110  316 FORMAT(1X,8F6.0,6X,8F6.0)
0003110      CALL CHQUA(SBINS1,SB1)$CALL CHQUA(SBINS2,SB2)
0003114      PRINT 350,SB1(1),SB1(2),SB2(1),SB2(2)
     +,SB1(3),SB1(4),SB2(3),SB2(4)
0003140  350 FORMAT(1X,*QUADRENT SUMS...HARD DECISIONS*,/,1X,2F8.0,37X,2F8.0
     +,/,1X,2F8.0,37X,2F8.0)
0003140      PRINT 317,CBIN3,CBIN4
0003150  317 FORMAT(1X,*+1-1 P(R1,R2/T1,T2)TIMES*,F6.0,37X,
     +*+1+1 P(R1,R2/T1,T2)TIMES*,F6.0)
0003150      DO 318 I=1,8
0003152      DO 319 J=1,8
0003153      F1(J)=SBINS3(I,J)
0003156  319 F2(J)=SBINS4(I,J)
0003163  318 PRINT 316,F1,F2
0003174      CALL CHQUA(SBINS3,SB3)$CALL CHQUA(SBINS4,SB4)
0003210      PRINT 350,SB3(1),SB3(2),SB4(1),SB4(2)
     +,SB3(3),SB3(4),SB4(3),SB4(4)
0003224      PRINT 2001,I1,I2,I5,I6,J1,J2,J5,J6,K1,K2,K5,K6
0003264  2001 FORMAT(3(1X,4I6,/))
0003265      PRINT 2005
0003266  2005 FORMAT(1X,*252 BIT ERROR INTERVALS*)
0003264      NOUT=10*INT(FLOAT(IAERR)/10.+1.)
0003271      NNOUT=NOUT/10
0003274      JJ=1
0003275      DO 2006 I=1,NNOUT
0003276      DO 2008 J=1,10
0003277      AERR(J)=AERR(JJ)
0003301  2008 JJ=JJ+1
0003304  2006 PRINT 2007,AERR
0003315  2007 FORMAT(1X,10E12.4)
0003315  410 CONTINUE
0003315  337 PRINT 104

0003321  104 FORMAT(1H1,////)
0003321      GO TO 3
0003322  9999 CONTINUE
0003322      END
```

ERROR MATRIX

SOFT DECISION BIN MATRICIES

RANDOM GENERATOR POSITIONS

MEAN ERROR AS A FUNCTION OF TIME

NEW PROBLEM

```
      SUBROUTINE CHQUA(SI,SO)
      DIMENSION SI(8,8),SO(4)
      DO 10 I=1,4
10    SO(I)=0.
      DO 11 I=1,4
      DO 12 J=1,4
      SO(1)=SO(1)+SI(I,J)$SO(2)=SO(2)+SI(I,9-J)
      SO(3)=SO(3)+SI(9-I,J)$SO(4)=SO(4)+SI(9-I,9-J)
12    CONTINUE
11    CONTINUE
      RETURN
      END
```

FORMS HARD
DECISION STATISTICS

APPENDIX VI

ACQUISITION

COMPUTER SOFTWARE

```
                      PROGRAM CHAS(INPUT,CUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
000003                COMPLEX CAMP(4),CFILT(4)
000063                REAL NS,NC,NJ,K,KB
000063                DIMENSION IRCD(6)
000003                DIMENSION FGA(64),RCA(64),TCP(64),RCP(64)
000003                DIMENSION ALSIN(300),ALCOS(300),PROB(100),PRND(100)
000003                DATA I11,I22,I55,I66/1,2,5,6/
000003                DATA J11,J22,J55,J66/9,10,13,14/
000003                DATA K11,K22,K55,K66/17,18,21,22/
000003                DATA IRCD/-1,-1,-1,-1,-1,1/
000003                DATA FBAMP,FBPHA,SDAMP,SDPHA,ND/2.,.2,.23,.47,1./
000003                DATA GAM43,N43/.09,64/
000003                DATA ENJOB,BRATE,ENDMIN/8.,88.,9./
000003                DATA DELF,NSPB,NACQT,BIF/62.,44,100,1500./
000003                DATA BL2,PHIDEG,FDIFF/176.,10.,342.433/
000003                DATA TAU3,DYNR,AKEG,AKAGC/.1187,6.,26.44,.016/
000003                DATA FRODOP,FQOPRT,TL/13.E3,10.8,-6.5/
000003                DATA SVRHZ,SWMX,SWMN/2.2E3,28.15E3,6.85E3/
000003                DATA COG,C11,C22,D11,D22,D33/2.515517,.802853,.010328,
                     +1.432788,.189269,.001308/
000003                DATA ICLLN,PHFILT/0,.4./
000003                NAMELIST/IN1/NACQT,ENDDB,DELF,BIF,ICLLN,PHFILT
                     +,BL2,FBAMP,FBPHA,SDAMP,SDPHA,TL,DYNR,AKEG,AKAGC
                     +,SVRHZ,SWMX,SWMN,FRODOP,FQOPRT
000003                PI=4.*ATAN(1.)$PI2=2.*PI
000010                ZETA=SQRT(0.5)
000012                REMTX=299./PI2
000015                DO 1000 I=1,300
000016                ARGU=(FLOAT(I)-1.)/REMTX          } TRIGNOMETRIC FUNCTION LIST
000021                ALSIN(I)=SIN(ARGU)                }
000025           1000 ALCOS(I)=COS(ARGU)
000033              3 CONTINUE ------------------------- RETURN FOR NEW PROBLEM
                    C
                    C     READ INPUTS
000033                READ(5,IN1)
000036                IF(EOF,5)9999,9998
000041            9998 CONTINUE
000041                ICLLN=1$PHFILT=.7$BL2=294.
000045                TL=-17.
000046                NSPB=200
000047                NACQT=36
000050                SWMX=2500.
000052                FRODOP=1000.
000053                I1=I11$I2=I22$I5=I55$I6=I66   } STARTING ALL RANDOM GENERATORS
000061                J1=J11$J2=J22$J5=J55$J6=J66   } AT THE SAME POSITION FOR
000067                K1=K11$K2=K22$K5=K55$K6=K66   } EACH PROBLEM
000076                DO 2009 I=1,6                 } START DATA GENERATOR AT THE
000077           2009 IRCD(I)=-1                    } SAME POSITION FOR
000102                IRCD(6)=1                     } EACH PROBLEM
                    C
                    C     CONVERT INPUTS (END,BPER,PHISS,PHISSB)
000103                END=10.**(ENDDB/10.)$ENDM=10.**(ENDMIN/10.)
000117                BPER=1./BRATE$DT=BPER/NSPB
000123                PHISS=PHIDEG*PI/180.
000125                AMIN=SQRT(ENDM*ND*BRATE)$G1LIM=10.**(DYNR/20.)
000140                A=SQRT(END*ND*BRATE)
                    C
```

```
C     CALCULATE LOOP PARAMETERS (TAU1,TAU2,K,TAUB1,TAUB2,KB)
000144      WN=BL2/(ZETA+.25/ZETA)$AK=PI2*FDIFF/SIN(PHISS)
000154      TAU1=AK/(WN*WN)$TAU2=2.*(ZETA-.5/(WN*TAU1))/WN
000163      K=AK/AMIN
000165      EDOP=PI2*FRODOP/K$EDOPR=PI2*FDOPRT*DT/K
000173      EDOPRX=EDOP+EDOPR
000174      EVMAX=PI2*SWMX/K$EVMIN=-PI2*SWMN/K$SVR=PI2*SVRHZ/K
000203      EPULL=PI2/K*(FDIFF+SVRH7/3RATE)
000207      DES=DT*SVR
C
C     DEFINE CONSTANTS
000211      C1=1.-DT/TAU1$C2=TAU2/TAU1$C3=C1+C2-1.
000220      C4=DT*K
000222      C5=BPER/TAU3$C6=1.-C5
000225      DTH1=PI*DELF*DT
000227      NACQ=0$ACQ=J.$AKOU=0.$SKOU=0.$AMISS=0.$AFAL=0.
000235      AVEES=0.$STDES=0.$AVEEV=0.$STDEV=0.
000241      SIG=0.5*SQRT(NO/DT)
000247      DO 1001 I=1,50
000250      PROBI=FLOAT(I)/100.
000252      PROBT=SQRT(ALOG(1./(PROBI*PROBI)))
000257      PROB(I)=PROBT-(C00+PROBT*(C11+PROBT*C22))/
           +(1.+PROBT*(D11+PROBT*(D22+PROBT*D33)))
000300      PROB(I)=(PROB(I)-.814)*1.0404
000303 1001 PRNO(I)=PROB(I)*SIG
000307      DO 1002 I=1,50
000311      PROB(50+I)=-PROB(51-I)
000315 1002 PRNO(50+I)=-PRNO(51-I)
000321      OMC=PI*BIF$CMT=OMC*DT
000324      B1=((OMT+8.)*CMT/24.+1.)*OMT+1.
000332      B2=(((11.*OMT/24.+1.)*OMT-1.)*CMT-3.)/B1
000340      B3=(((11.*OMT/24.-1.)*OMT-1.)*OMT+3.)/B1
000346      B4=((OMT-8.)*OMT/24.+1.)*OMT-1.)/B1
000355      A1=CMT*OMT*OMT/(24.*B1)$A2=11.*A1
000362      PRINT 202,ENODB,DELF,BIF,BL2
000375  202 FORMAT(1X,*ENODB=*,F6.1,*  ,DELF=*,F6.1,
           +*  ,BIF=*,F6.0,*  ,BL2=*,F6.0)
000375      PRINT 204,SVRHZ,SWMX,SWMN,FRODOP,FDOPRT
000413  204 FORMAT(1X,*SVRHZ=*,E12.4,*  SWMX=*,E12.4,* SWMN=*,E12.4,
           +* FRODP=*,E12.4,* FDOPRT=*,E12.4)
000413      PRINT 203,TL,DYNR,SDAMP,SOPHA
000427  203 FORMAT(1X,*TL=*,E12.4,* DYNR=*,E12.4,
           +*SDAMP=*,E12.4,* SOPHA=*,E12.4)
000427      PRINT 207,WN,K,TAU1,TAU2
000443  207 FORMAT(1X,*WN=*,F6.1,*  ,K=*,F6.1,
           +*  ,TAU1=*,E12.4,*  ,TAU2=*,E12.4)
000443      IF(PHFILT.LT.3.1)PRINT 205,PHFILT
000453  205 FORMAT(1X,*PHFILT= *,E12.4)
000453      IF(ICLLN.EQ.1)PRINT 206
000461  206 FORMAT(1X,*LOG NORMAL SCINTILLATION*)
C
C     INITIALIZE LOOPS (TH2,ES,XI,XQ,QV,QERRQ,ERR)
000461  400 CONTINUE
000461      IF(NACQ.EQ.1)PRINT399
000467  399 FORMAT(3X,*NACQ,AMISS*,7X,*AFAL*,8X,*ACQ*,10X,*KDATA,ES*
           +,10X,*EV*,10X,*EV1*)
000467      IF(NACQ.EQ.0)GOTO396
000470      PRINT 797,NACQ,AMISS,AFAL,ACQ,KDATA,ES,EV,EV1
```

AFC LOOP

VCO

AGC FILTER Z-TRANSFORM

MODULATION INDEX

NOISE TABLES

IF FILTER Z-TRANSFORM

RUN CONDITION PRINTOUTS

ANOTHER SWEEP ATTEMPT

INTERMEDIATE VALUES

```
000514     797  FORMAT(1X,I6,3E12.4,I6,3E12.4)
000514     396  CONTINUE
000514          NACO=NACO+1
000516          IF(NACO.GT.NACOT)GOTO402 ————————————→FINISHED THIS PROBLEM
000521          CAMP(1)=(0.,0.)$CAMP(2)=(0.,0.)$CAMP(3)=(0.,0.)
000530          CFILT(1)=(0.,0.)$CFILT(2)=(0.,0.)$CFILT(3)=(0.,0.)
000540          TAUPM=.6436/(PI2*BRATE*PMFILT)
000543          APH=(DT/TAUPM*DT/TAUPM)/2.$BPH=2.*DT/TAUPM ——— PREMODULATION FILTER
000547          CPH=-APH+BPH-1.$DPH=-APH-BPH+2. ————————— Z- TRANSFORM
000556          EDOPRX=EDOP
000557          U=0.$V=.1$G1=1.
000563          TH2=0.$CTH2=1.$STH2=0.
000566          J=NSP2
000570          IDATA=-1
000571          E0=0.$EV=0.$EV0=0.$EV1=EDOPRX$ES=0.
000575          TH1=0.$TH11=0.$TH12=0.$OTH1=0.$OTH11=0.$OTH12=0.   OLD I/O OF TAUPM FILTER
C
C         TURBULENCE INITIALIZATION
000603          ACOR=SQRT(2.**.75-1.)
000612          AAMP=PI2*FBAMP/ACOR$APHA=PI2*FBPHA/ACOR
000617          IAMP=INT(.5+GAM43/(AAMP*DT))$IPHA=INT(.5+GAM43/(APHA*DT))
000626          GAM43A=DT*FLOAT(IAMP)*AAMP$GAM43P=DT*FLOAT(IPHA)*APHA
000634          IF(SDAMP.EQ.0.)GOTO500 ————————→No AMPLITUDE SCINTILLATION
000636          YA=0.$S2A=0.
000640          DO 501 I=1,N43                    FILL LINE INITIALLY
000641          VA=FLOAT(I-1)*GAM43A
000644          TGA(I)=GAM43A/.892979511*VA**.3333*EXP(-VA)
000656          S2A=S2A+TGA(I)*TGA(I)
000662          J1=129*J1+(1+129*J2)/2048$J1=MOD(J1,2048)$J2=MOD((1+129*J2),2048)
000704          R1=FLOAT(J1*2048+J2)/4194304.$RGA(I)=PROB(INT(100.*R1)+1)
000714     501  YA=YA+TGA(I)*RGA(I)
000721          S2A=SQRT(S2A)$YA=YA/S2A*SDAMP   NORMALIZE
000726          YAPO=YA+1.
000727          IF(ICLLN.NE.1)GOTO 502
000732          Y=ABS(YA)
000733          YAPO=1.+Y*(1.+.5*Y*(1.+.333*Y*(1.+.25*Y*(1.+.2*Y*(1.
               ++.1667*Y))))))
000757          IF(YA.LT.0.)YAPO=1./YAPO
000762          GOTO502
000763     500  YAPO=1.
000765     502  CONTINUE
000765          YAPOA=YAPO*A
000767          IF(SDPHA.EQ.0.)GOTO600 ————————→No PHASE SCINTILLATION
000770          YP=0.$S2P=0.
000772          DO 601 I=1,N43                    FILL LINE INITIALLY
000773          VP=FLOAT(I-1)*GAM43P
000776          TGP(I)=GAM43P/.892979511*VP**.3333*EXP(-VP)
001010          S2P=S2P+TGP(I)*TGP(I)
001014          K1=129*K1+(1+129*K2)/2048$K1=MOD(K1,2048)$K2=MOD((1+129*K2),2048)
001036          R1=FLOAT(K1*2048+K2)/4194304.$RCP(I)=PROB(INT(100.*R1)+1)
001046     601  YP=YP+TGP(I)*RCP(I)
001053          S22P=SQRT(S2P)$YP=YP/S22P*SDPHA   NORMALIZE
001063          GOTO602
001060     600  YP=0.
001061     602  CONTINUE
001061          IAMPC=0$IPHAC=0$NN=N43-1
001064          KDATA=0
C
```

```
                C       INDEX SCINTILLATION
001066          4       CONTINUE <-------------------------- RETURN FOR NEW SAMPLE
001066                  IF(SDAMP.EQ.0..AND.SDPHA.EQ.0.)GOTO12
001075                  IAMPC=IAMPC+1$IPHAC=IPHAC+1
001100                  IF(IAMPC.GT.IAMP) GO TO 10 ----> INDEX AMPLITUDE LINE
001103           13     IF(IPHAC.GT.IPHA) GO TO 11 ----> INDEX PHASE LINE
001107                  GO TO 12 ----------> LINE INDEX NOT REQUIRED
                C
                C       AMPLITUDE SCINTILLATION
001107           10     IAMPC=1
001110                  IF(SDAMP.EQ.0.)GOTO503
001111                  DO 504 JJ=1,NN                  STEP LINE
001113           504    RCA(N43+1-JJ)=RCA(N43-JJ)
001121                  J5=129*J5+(1+129*J6)/2048$J5=MOD(J5,2048)$J6=MOD((1+129*J6),2048)
001143                  R1=FLOAT(J5*2048+J6)/4194304.$RCA(1)=PROB(INT(100.*R1)+1)
001152                  YA=0.
001154                  DO 505 JJ=1,N43
001155           505    YA=YA+TGA(JJ)*RCA(JJ)
001162                  YA=YA/S22A*SDAMP
001164                  YAPO=YA+1.
001166                  IF(ICLLN.NE.1)GOTO506
001170                  Y=ABS(YA)                       LOG NORMAL
001172                  YAPO=1.+Y*(1.+.5*Y*(1.+.333*Y*(1.+.25*Y*(1.+.2*Y*(1.
                       ++.1667*Y))))
001215                  IF(YA.LT.0.)YAPO=1./YAPO
001221                  GOTO506
001222           503    YAPO=1.
001224           506    CONTINUE
001224                  YAPOA=YAPO*A
001226                  GO TO 13
                C
                C       PHASE SCINTILLATION
001227           11     IPHAC=1
001230                  IF(SDPHA.EQ.0.)GOTO603
001231                  DO 604 JJ=1,NN                  STEP LINE
001233           604    RCP(N43+1-JJ)=RCP(N43-JJ)
001241                  K5=129*K5+(1+129*K6)/2048$K5=MOD(K5,2048)$K6=MOD((1+129*K6),2048)
001263                  R1=FLOAT(K5*2048+K6)/4194304.$RCP(1)=PROB(INT(100.*R1)+1)
001272                  YP=0.
001274                  DO 605 JJ=1,N43
001275           605    YP=YP+TGP(JJ)*RCP(JJ)
001302                  YP=YP/S22P*SDPHA
001304                  GOTO606
001305           603    YP=0.
001306           606    CONTINUE
001306           12     CONTINUE
001306                  IF(J.LT.NSPB)GO TO 1
                C
                C       NEW SYMBOL
001311                  J=0
001311                  IXO=-1 ----------
001312                  IF(IRCD(1).NE.IRCD(6))IXO=1     } IN DATA
001315                  DO 31 IOTS=1,5                  } GENERATOR
001317           31     IRCD(7-IOTS)=IRCD(6-IOTS)       }
001325                  IRCD(1)=IXO ------------------------
001326                  IDATA=IXO
001326                  DTH1=SIGN(DTH1,FLOAT(IDATA))  MODULATION
001333                  KDATA=KDATA+1
```

```
001335     1    CONTINUE
001335          IF(ABS(TH1).GT.PI2)GOTO1010
001342     1011 CONTINUE
           C
           C    PREMODULATION FILTERING
001342          IF(PMFILT.GT.3.1)GOTO1013
001346          OTH1=CPM*OTH12+OPM*CTH11+APM*TH12+APM*TH11  - FILTER
001354          OTH12=OTH11$OTH11=OTH1$TH12=TH11$TH11=TH1   - INDEX OLD VALUES
001360          TH1=TH1+OTH1
001362     1014 OOTH1=CTH1+YP
001364          IF(ABS(OOTH1).GT.PI2)OOTH1=AMOD(OOTH1,PI2)
001372          ITH1=INT(REMTX*ABS(OOTH1)+1.)
001376          STH1=ALSIN(ITH1)$CTH1=ALCOS(ITH1)
001401          IF(OOTH1.LT.0.)STH1=-STH1
001404          GOTO1012
001405     1010 SHFTH=SIGN(PI2,TH1)  ------------------------------------
001410          TH1=TH1-SHFTH$TH11=TH11-SHFTH$TH12=TH12-SHFTH  } 2π INDEX
001415          OTH1=OTH1-SHFTH$OTH11=OTH11-SHFTH$OTH12=OTH12-SHFTH }
001421          GOTO1011  ----------------------------------------------
001421     1013 TH1=TH1+OTH1
001423          OTH1=TH1                  } No PREMODULATION FILTER
001424          GOTO1014  ----------------
001425     1012 ASTH1=YAPOA*STH1$ACTH1=YAPOA*CTH1
           C
           C    KTB NOISE
001430          I1=129*I1+(1+129*I2)/2048$I5=129*I5+(1+129*I6)/2048
001451          I1=MOD(I1,2048)$I5=MOD(I5,2048)
001460          I2=MOD((1+129*I2),2048)$I6=MOD((1+129*I6),2048)
001474          R1=FLOAT(I1*2048+I2)/4194304.$NC=PRNG(INT(100.*R1)+1)
001503          IF(R1.GT..003.AND.R1.LT..997)GOTO450
001515          IF(R1.LT..003)NC=1.3583*SQRT(-1.5726-ALOG(R1+1.E-13))
001530          IF(R1.GT..997)NC=-1.3583*SQRT(-1.5726-ALOG(1.-R1+1.E-13))
001546          IF(ABS(NC).GT.4.5)NC=SIGN(4.5,NC)
001553          NC=SIG*NC
001555     450  CONTINUE
001555          R1=FLOAT(I5*2048+I6)/4194304.$NS=PRNG(INT(100.*R1)+1)
001565          IF(R1.GT..003.AND.R1.LT..997)GOTO451
001577          IF(R1.LT..003)NS=1.3583*SQRT(-1.5726-ALOG(R1+1.E-13))
001612          IF(R1.GT..997)NS=-1.3583*SQRT(-1.5726-ALOG(1.-R1+1.E-13))
001627          IF(ABS(NS).GT.4.5)NS=SIGN(4.5,NS)
001635          NS=SIG*NS
001637     451  CONTINUE
001637          J=J+1
           C
           C    LOOP EQUATIONS
001641          CAMP(4)=CMPLX(ASTH1+NC,-ACTH1-NS)*CMPLX(CTH2,-STH2)*G1 - INPUT MULTIPLIER
001660          CFILT(4)=A1*(CAMP(4)+CAMP(1))+A2*(CAMP(3)+CAMP(2))  }
               +-B2*CFILT(3)-B3*CFILT(2)-B4*CFILT(1)               } IF FILTER
001722          DO 30 IFILT=1,3                                     }
001724          CAMP(IFILT)=CAMP(IFILT+1)
001730     30   CFILT(IFILT)=CFILT(IFILT+1)  ------------------------------
           C
           C    AGC
001736          IF(J.NE.20)GOTO3000
001740          V=C6*V+C5*U$U=AIMAG(CFILT(4))   AGC FILTER
001745          G1=EXP(-AKAGC*(ABS(V)-AKEG))    AGC PROCESSOR
001753          IF(G1.GT.G1LIM)G1=G1LIM         DYNAMIC RANGE LIMITATION
001757     3000 CONTINUE
```

```
C
C       AFC
001757          E=REAL(CFILT(4))+ES
001762          EV=C1*EV+C2*E-C3*EV$EV1=EV0-EDOPRX   AFC FILTER
001772          IF(EV.GT.EDOPRX+EPULL)GOTO1500 ——→MISSED ACQUISITION
001777          IF(EV.GT.EVMAX)GOTO1500 ————————→MISSED ACQUISITION
002002          IF(V.LT.TL)GOTO401 ————————→MAYBE AN ACQUISITION
C               IF(EV.GT.EVMAX)DES=-DES  } SWEEP SIGN REVERSAL OUT-OUT
C               IF(EV.LT.EVMIN)DES=-DES  }
002004          EDOPRX=EDOPRX+EDOPP
002006          TH2=TH2+C4*EV1  - V60
002011          IF(ABS(TH2).GT.PI2)TH2=AMOD(TH2,PI2)
002016          ITH2=INT(REMTX*ABS(TH2)+1.)
002022          STH2=ALSIN(ITH2)$CTH2=ALCOS(ITH2)
002025          IF(TH2.LT.0.)STH2=-STH2
002030          EV0=EV$E0=E$EV10=EV1
002034          IF(V.GT.TL)ES=ES+DES   SWEEP RAMP
002041          GOTO4 ————————————————————→MORE SAMPLES
002042   401    CONTINUE
C
C       MAYBE AN ACQUISITION
002042          IF(ABS(EDOPRX-EV).GT.EPULL)GOTO1501 ——→FALSE ACQUISITION
002050          ACQ=ACQ+1
002052          AVEES=AVEES+ES$STDES=STDES+ES*ES
002056          AVEEV=AVEEV+EV$STDEV=STDEV+EV*EV
002062          AKOU=AKOU+FLOAT(KDATA)
002064          SKOU=SKOU+FLOAT(KDATA)*FLOAT(KDATA)
002067          GOTO400 ————————————————————→ANOTHER SWEEP
002070   402    PACQ=ACQ/FLOAT(NACQT)
002072          IF(ACQ.EQ.3.)GOTO1504 ————————→ NO ACQUISITIONS THIS SET-UP
002073          STDAQ=SQRT(PACQ*(1.-PACQ)/FLOAT(NACQT))
002102          AVEES=AVEES/ACQ$STDES=SQRT(STDES/ACQ-AVEES*AVEES)
002110          AVEEV=AVEEV/ACQ$STDEV=SQRT(STDEV/ACQ-AVEEV*AVEEV)
002116          AKOU=AKOU/ACQ
002120          SKOU=SQRT(SKOU/ACQ-AKOU*AKOU)
002126          PRINT 403,PACQ,STDAQ
002135   403    FORMAT(1X,*PACQ=*,E12.4,*  ,STDEV=*,E12.4)
002135          PRINT 404,AVEES,STDES
002145   404    FORMAT(1X,*AVEES=*,E12.4,*  ,STDES=*,E12.4)
002145          PRINT 406,AVEEV,STDEV
002155   406    FORMAT(1X,*AVEEV=*,E12.4,*  STDEV=*E12.4)
002155          PRINT 405,AKOU,SKOU
002165   405    FORMAT(1X,*AVE KDATA=*,E12.4,*  ,STD DEV=*,E12.4)
002165   1506   CONTINUE
002165          PMISS=AMISS/FLOAT(NACQT)
002170          PRINT 1502,PMISS
002175   1502   FORMAT(1X,*PR MISSED ACQ=*,E12.4)
002175          PFAL=AFAL/FLOAT(NACQT)
002200          PRINT 1503,PFAL
002205   1503   FORMAT(1X,*PR FALSE ACQ=*,E12.4)
002205   307    PRINT 104
002211    104   FORMAT(1H1)
002211          GO TO 3
002212   1500   CONTINUE
C
C       MISSED ACQ
002212          AMISS=AMISS+1.
002214          GOTO400
```

```
002215     1501 CONTINUE
           C
           C      FALSE ACQ
002215            AFAL=AFAL+1.
002217            GOTO400
002220     1504 PRINT 1505
002224     1505 FORMAT(1X,*NO ACQUISITIONS*)
002224            GOTO1506
002225     9999 CONTINUE
002225            END
```

APPENDIX VII
MISCELLANEOUS SUBROUTINES

This appendix presents three subroutines which were found useful in trouble-shooting the receiver during the software development, but were not used in the production runs.

The first is OSCILL which is an oscilloscope and plots three inputs. These are entered into the routine by lists. The routine automatically scales the output.

The second is SURV which is a voltmeter. It gives the mean and standard deviation of the input, as well as the mean and standard deviation of the absolute value of the input.

The third is CHMEM. This was used early in the analysis when there was one conditional probability matrix which was the position by position summation of all four of the matrices of this report, i.e., just P(B/A). It generates information to determine the skew of the matrix.

A subroutine, used to cut the magnetic tapes, which is not included herein is BUFFLT. This is a bit manipulation routine to transfer the 60 bit words of the CDC 6600 to the ARC magnetic tape format. The subroutine is peculiar to the Kronos 2.0 operating system, and is very system oriented, e.g., it is not compatible with the Kronous 2.1. The call statement has 5 arguments: a) identifier of particular tape number, b) read/write/rewind/end-of-file command, c) first and d) last word to be written and e) a number from the subroutine indicating the record number.

```
                      SUBROUTINE OSCILL(LLL,X,Y,Z)
                C     XYZ PLOTTED VS LLL
000007                DIMENSION OUT(66),X(90),Y(90),Z(90)
000007                DATA BLANK,STAR,XX,YY,ZZ,AZ/
                     +1H ,1H*,1HX,1HY,1HZ,1HO/
000007                L=LLL-1
                C     1 ST MAX+MIN
000010                XMAX=-1.E10
000012                XMIN=1.E10
000014                DO 10 I=1,L
000015                IF(Z(I).GT.XMAX) XMAX=Z(I)
000022                IF(Y(I).GT.XMAX) XMAX=Y(I)
000027                IF(Z(I).LT.XMIN) XMIN=Z(I)
000034                IF(Y(I).LT.XMIN) XMIN=Y(I)
000041                IF(X(I).GT.XMAX) XMAX=X(I)
000046          10    IF(X(I).LT.XMIN) XMIN=X(I)
000056                SLO=65./(XMAX-XMIN)
000060                B=-65.*XMAX/(XMAX-XMIN)+66.
                C     THEN SCALE
000064                XINT=(XMAX-XMIN)/65.
000067                PRINT 99,XMAX,XMIN,XINT
000101          99    FORMAT(1X,*MAX= *,G14.6,* MIN= *,G14.6,
                     +* INT= *,G14.6)
000101                IF(XMAX.GT.0..AND.XMIN.LT.0.) IYZ=INT(B)
000114                STEEP=0.
000115          24    DO 20 I=1,66
000117          20    OUT(I)=STAR
000123                IF(XMAX.GT.0..AND.XMIN.LT.0.) OUT(IYZ)=AZ
000134                IF(STEER.EQ.1.) GO TO 25
000136                OUT(INT(SLO*X(1)+B))=XX
000144                OUT(INT(SLO*Y(1)+B))=YY
000150                OUT(INT(SLO*Z(1)+B))=ZZ
000154                LL=1
000155                PRINT 22,LL,OUT
000164          22    FORMAT(1X,I3,66A1)
000164                LEND=L-1
000166                DO 23 LL=2,LEND
000172                DO 28 I=1,66
000173          28    OUT(I)=BLANK
000177                OUT(1)=STAR
000200                OUT(66)=STAR
000200                IF(XMAX.GT.0..AND.XMIN.LT.0.) OUT(IYZ)=STAR
000212                OUT(INT(SLO*X(LL)+B))=XX
000221                OUT(INT(SLO*Y(LL)+B))=YY
000230                OUT(INT(SLO*Z(LL)+B))=ZZ
000237          23    PRINT 22,LL,OUT
000253                STEER=1.
000255                GO TO 24
000255          25    OUT(INT(SLO*X(L)+B))=XX
000264                OUT(INT(SLO*Y(L)+B))=YY
000273                OUT(INT(SLO*Z(L)+B))=ZZ
000302                PRINT 22,L,OUT
000311                RETURN
000312                END
```

```
                      SUBROUTINE SURV(CX,V,VS)
000006                DIMENSION VS(6)
000006                IF(CX.EQ.1.)GO    TO 1
000010                VS(1)=VS(1)+1.
000011                VS(2)=VS(2)+V
000013                VS(4)=VS(4)+ABS(V)
000015                VS(6)=VS(6)+V*V
000020                GO TO 2
000020           1    CONTINUE
000020                IF(VS(1).EQ.0.)GOTO3
000021                VS(2)=VS(2)/VS(1)
000023                VS(4)=VS(4)/VS(1)
000025                DUM=VS(6)/VS(1)-VS(2)*VS(2)
000030                IF(DUM.LT.0.)GOTO4
000032                VS(3)=SQRT(DUM)
000036                DUM=VS(6)/VS(1)-VS(4)*VS(4)
000042                IF(DUM.LT.0.)GOTO5
000044                VS(5)=SQRT(DUM)
000050                PRINT 20,VS
000057           20   FORMAT(6E12.4)
000057                RETURN
000060           3    PRINT 10
000064           10   FORMAT(1X,*MISSED COUNT*)
000064                RETURN
000065           4    PRINT 11
000071           11   FORMAT(1X,*SQRT PBLM 1*)
000071                RETURN
000072           5    PRINT 12
000076           12   FORMAT(1X,*SQRT PBLM 2*)
000076           2    RETURN
000077                END
```

```
                      SUBROUTINE  CHMEM(SB,
000003                DIMENSION   SB(8,8)
000003                A=0.
000004                AUL=0.
000005                AUR=0.
000006                ALL=0.
000007                ALR=0.
000010                S=0.
000011                DO 10  I=1,4
000012                DO 20  J=1,4
000013                V=SB(I,J)+SB(9-I,9-J)-SB(I,9-J)-SB(9-I,J)
000033                A=A+V
000035                AUL=AUL+SB(I,J)
000041                AUR=AUR+SB(I,9-J)
000046                ALL=ALL+SB(9-I,J)
000052                ALR=ALR+SB(9-I,9-J)
000057          20    S=S+V*V
000063          10    CONTINUE
000065                A=A/16.
000067                S=SQRT(S/16.-A*A)
000074                PRINT 30,A,S
000103          30    FORMAT(1X,*MEAN SQ MEMORY *,2E12.4)
000103                PRINT 31,AUL,AUR,ALL,ALR
000117          31    FORMAT(1X,*BY QUADRENTS*,2E12.4,/,13X,2E12.4)
000117                RETURN
000120                END
```

APPENDIX VIII

RECEIVER OPTIMIZATION PRINTOUTS

APPENDIX VIII

RECEIVER OPTIMIZATION PRINTOUTS (CONT)

APPENDIX VIII
RECEIVER OPTIMIZATION PRINTOUTS (CONT)

APPENDIX VIII

RECEIVER OPTIMIZATION PRINTOUTS (CONT)

APPENDIX VIII

RECEIVER OPTIMIZATION PRINTOUTS (CONT)

```
ENODB=   7.0 ,DELF=  44.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.8803E+01 TL=  -6.5888E+88 DYNR=   6.8888E+88
SDAMP=   0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
NN= 277.2 ,K= 466.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WN8=     .9 ,KB= 866.4 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+88
PMFILI=   3.0000E-01
FBTAU3=   1.3488E+88 FBTAU5=   8.8828E+88 FBTAU6=   1.5818E+88
PEI=    2.5198E-01 STDEV=    9.6693E-03 BITS=    2016
XISUM=    2.0165E-01 XISIG=    1.3835E-01
LOCKIN=       6 ,DROPOUTS=       6 ,AVE=   1.3333E+00 ,STD DEV=  7.4536E-01
ERRM
  2.8900E+02  6.1000E+01  3.7000E+01  1.9000E+01  2.0000E+01  9.0000E+00  5.0000E+00  7.0000E+00  6.0000E+00  1.3000E+01
  1.0000E+01  2.0000E+00  4.0000E+00  5.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  5.0000E+00  4.0000E+00
  0.          1.0000E+00  2.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   481                          -1+1 P(R1.R2/T1.T2)TIMES   512
     0    0    0    3    6    1    1    0                0    0    0    1    1    0    0    0
     0    1    7   29   15    7    2    0                0    1    2    3    2    5    0    0
     1   19   56   81   40   15    2    0                0    3   15   25   24   11    1    1
     2   19   71   49   15    1    0    0                0   18   35   49   43    7    0    0
     2    9   14    0    5    0    0    0                4   10   63   74   21    0    0    0
     1    0    1    1    0    0    0    0                3   13   39   24    6    0    0    1
     0    0    0    1    0    0    0    1                1    2    7    4    0    1    0    0
QUADRENT SUMS...HARD DECISIONS
   338  108                                          144   95
    29    6                                          244   29
+1-1 P(R1.R2/T1.T2)TIMES   568                          +1+1 P(R1.R2/T1.T2)TIMES   915
     0    0    0    0    1    2    0    0                1    0    0    0    0    0    0    1
     0    0    1    0    4    9    8    1                0    0    0    0    0    1    0    0
     0    0    2    9   34   39    9    2                0    1    0    4    5   12    2    2
     0    0   10   36   88   58    9    1                1    3    4    5   12    4    2    0
     1    4   26   40   44   31    2    0                0    2    5   17   40   56   27    2
     0    2   12   12   13    4    0    0                1    4   15   36   62   70   32    4
     0    1    0    1    2    4    0    0                1    0    3   15   23   30   14    0
     0    0    0    0    1    0    0    1                0    0    3    2    5    2    1    0
QUADRENT SUMS...HARD DECISIONS
    58  249                                            5    25
    99  102                                          108   374
   331 1502 1990 1506
     9   10   13   14
    17   18   21   22

252 BIT ERROR INTERVALS
  6.4000E+01  3.1000E+01  6.0000E+01  8.7000E+01  6.1000E+01  1.0300E+02  7.0000E+01  3.2000E+01  0.          0.
```

```
ENODB=    7.0  ,DELF=   44.0  ,BIF=   1500  ,BL2=    294  ,ASOFT= .3706
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0059E+00
SDAMP=    0.          FBAMP=    2.CL00E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2  ,K= 468.6  ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WN8=     .9 ,KB= 866.4 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   5.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=   1.0268E-01 STDEV=    6.7603E-03 BITS=    2016
XISUM=    2.6265E-01 XISIG=    1.9762E-01
LOCKIN=      6 ,OROPOUTS=     14 ,AVE=   2.7857E+00 ,STD DEV=   3.2333E+00
ERRM
  6.6000E+01  2.1000E+01  1.0000E+01  1.3000E+01  1.1000E+01  8.0000E+00  7.0000E+00  7.0000E+00  2.0000E+00  6.0000E+00
  7.0000E+00  1.0000E+00  5.0000E+00  0.          3.0000E+00  6.0000E+00  3.0000E+00  2.0000E+00  4.0000E+00  0.
  0.          1.0000E+00  4.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  0.          1.0000E+00
  3.0000E+00  0.          1.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   481                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     3     1     0     7     2     1     0     0           4     0     0     1     2     0     1     0     0
     1     4    27    32     5     1     0     0           1     0     0     2     1     2     0     1     0
     4    40    91    52    12     2     0     0           1     0     2     2     0     1     2     0     0
    10    37    72    17     2     0     0     0           0     2     8    29     8     2     1     0     0
     6    16    18     7     0     0     1     0           0     9    61    60    24     1     0     0     1
     0     0     1     1     0     0     0     1           0     6    39    92    50    14     1     0     0
     0     0     0     0     0     0     1     0           1     6    16    32    15     4     1     0     2
     0     0     0     0     0     1     0     0           0     0     3     7     2     1     0     0     0

QUADRENT SUMS...HARD DECISIONS                            51    14
   398    25                                              338    49
    49     9                                                    +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   511                                     0     0     0     0     0     0     0     0
     5     1     0     1     3     6    11     1           4     0     0     0     1     0     0     0     0
     0     0     1     2    20    58    15     0           0     0     0     0     0     1     0     0     4
     0     0     1    18    90    80    23     0           0     0     0     2     4     7    11     5     5
     0     0     3    28    65    35     5     0           0     0     0     1     2    36    64    47     5
     0     1     3     7     9     5     2     0           0     0     1     3     6    51    85    37     9
     0     1     0     1     3     1     1     0           0     0     1     3     7    27    47    16     1
     0     1     1     1     0     0     0     3           0     0     0     2     2     4     4     2     4
     0     0     0     0     1     0     0     0

QUADRENT SUMS...HARD DECISIONS                            7     38
    60    412                                             28    439
    14     25
  1545  1624  1571   604
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  3.4000E+01  1.5000E+01  2.0000E+01  2.7000E+01  2.1000E+01  2.1000E+01  3.7000E+01  3.2000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  44.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FSDPRT=   1.0000E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 466.6 ,TAU1=   1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 866.4 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.9365E-02 STDEV=   6.0202E-03 BITS=    2016
XISUM=   2.8558E-01 XISIG=   1.9904E-01
LOCKIN=      6 ,DROPOUTS=     13 ,AVE=  2.7692E+00 ,STD DEV=  4.1907E+00
ERRM
  4.6000E+01  9.0000E+00  1.3000E+01  4.0000E+00  8.0000E+00  1.0000E+01  7.0000E+00  5.0000E+00  2.0000E+00  6.0000E+00
  6.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00
  1.0000E+00  2.0000E+00  0.          0.          1.0000E+00  3.0000E+00  1.0000E+00  0.          2.0000E+00  0.
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  1.8500E+00  5.0000E+00  1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00

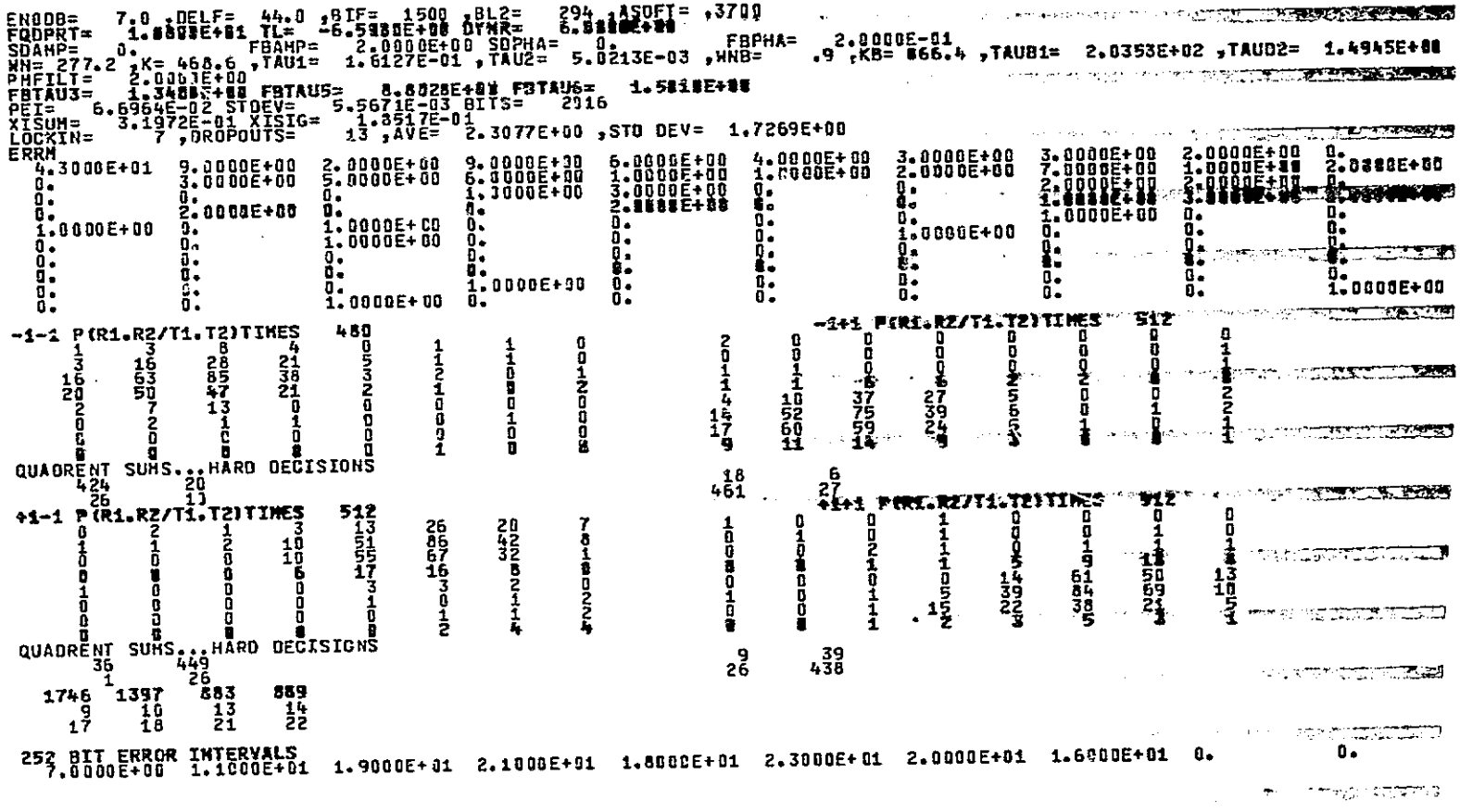
-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   513
     4     0     3     3     1     0     0     1           3     1     0     0     0     0     0     0
     2     9    34    28     6     0     0     0           2     8     0     8     1     0     0     0
     8    45    91    38     6     0     0     0           1     0     5     1     0     0     0     0
    12    52    51    26     3     0     0     0           0     5    11     7     0     0     0     0
     5    15    19     3     1     0     0     2           1    12    48    46    10     2     0     0
     0     3     0     1     0     0     0     0           4    52    85    78    19     1     1     0
     0     0     0     0     0     0     0     0           8    21    50    25     1     1     0     1
     0     0     0     0     0     1     1     6           2     8     7     3     0     1     0     3
QUADRENT SUMS...HARD DECISIONS                                                  24     7
    406    17                                                                 442    40
     46    11                                                                       +1+1 P(R1.R2/T1.T2)TIMES   511
+1-1 P(R1.R2/T1.T2)TIMES   512
     4     2     0     1     5     9    16     3           4     0     0     1     0     0     0     0
     0     0     0     0    46    58    23     4           0     0     0     0     0     0     0     1
     0     0     0    19    87    82    16     1           0     0     0     0     3    18    16     9
     0     0     3    17    50    27    13     0           0     0     0     2     6    21    72    54
     0     0     0     3     4     1     1     0           0     0     0     0     7    35    87    37
     0     0     0     0     1     0     1     0           0     0     0     0     3    25    45    20
     0     0     0     0     0     1     0     1           1     0     0     3     4     8     1     8
     6     0     0     0     0     2     0     3
QUADRENT SUMS...HARD DECISIONS                                                   5    49
     54    440                                                                22    435
      3     15
    905  1365  1570   857
      9    10    13    14
     17    16    21    22

252 BIT ERROR INTERVALS
  2.8000E+01  7.0000E+00  1.3000E+01  1.9000E+01  2.0000E+01  1.3000E+01  3.2000E+01  2.8000E+01  0.          0.
```

```
ENOOB=   7.0 ,DELF=  44.0 ,9IF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
*FQOPRT=  1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
 SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
*SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 466.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 566.4 ,TAUBi=  2.8353E+02 ,TAUB2=  1.4945E+00
PHFILT=   1.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.7540E-02 STDEV=   5.1864E-03 BITS=   2016
XISUM=   2.9519E-01 XISIG=   1.7190E-01
LOCKIN=     7 ,DROPOUTS=     7 ,AVE=  1.5714E+00 ,STD DEV=  1.0498E+00
ERRH
  2.9000E+01  6.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00
  5.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00  3.0000E+00  7.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00
  0.          2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          2.0000E+00  0.          0.
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
     0     0     9     4     2     0     1     2           0     0     0     0     0     0     0     0
     1     9    39    22     3     0     0     0           0     1     0     1     1     0     0     0
    10    58    96    39     9     1     1     0           2     0     2     1     0     0     0     0
    13    51    53    18     1     0     0     0           1     2     4     8     4     1     0     0
     4     8    15     1     0     0     0     1           2    15    47    36     6     1     0     0
     0     0     0     3     0     0     0     0          14    48    85    52     6     0     0     0
     0     0     0     0     0     1     0     1          12    37    60    19     6     0     2     1
     0     0     0     0     1     1     0     2           9     9    12     4     1     0     0     0
QUADRENT SUMS...HARD DECISIONS                                22     6
    422    20                                              461    23
      31     7
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     0     1     0     1     5    22    16     5           0     0     0     0     0     0     0     0
     0     0     0     4    42    70    42     6           0     0     0     0     0     0     0     0
     0     0     3    11    73    91    26     4           0     0     0     1     1     2     2     0
     0     0     2     9    25    29     7     0           0     0     0     0     2     5    10     3
     0     0     1     1     4     3     2     0           0     0     0     2     0    19    59    54    14
     0     0     0     1     0     0     1     0           0     1     1     6     4    47    91    55    11
     0     0     0     0     0     0     1     1           0     1     1     7    33    42    16     1
     0     0     0     0     0     0     1     2           0     1     1     4     4     4     4     1
QUADRENT SUMS...HARD DECISIONS                                 1    31
     31   463                                              25   455
      3    15
  1559   380  2041  1408
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  5.0000E+00  1.1000E+01  1.3000E+01  2.0000E+01  1.4000E+01  2.5000E+01  1.5000E+01  1.3000E+01  0.          0.
```


ENODB= 7.0 ,DELF= 44.0 ,BIF= 1500 ,BL2= 294 ,ASOFT= ,3700
FQDPRT= 1.8803E+01 TL= -6.5330E+00 DYNR= 6.8
SDAMP= 0. FBAMP= 2.0000E+00 SOPHA= 0. FBPHA= 2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,WNB= .9 ,KB= 866.4 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PHFILT= 2.0000E+00
FBTAU3= 1.3488E+00 FBTAU5= 8.8028E+01 FBTAU6= 1.5818E+00
PEI= 6.6964E-02 STOEV= 5.5671E-03 BITS= 2016
XISUM= 3.1972E-01 XISIG= 1.3517E-01
LOCKIN= 7 ,DROPOUTS= 13 ,AVE= 2.3077E+00 ,STD DEV= 1.7269E+00
ERRM
4.3000E+01 9.0000E+00 2.0000E+00 9.0000E+00 6.0000E+00 4.0000E+00 3.0000E+00 3.0000E+00 2.0000E+00 0.
0. 3.0000E+00 5.0000E+00 6.0000E+00 1.0000E+00 1.0000E+00 2.0000E+00 7.0000E+00 1.0000E+00 2.0000E+00
0. 0. 0. 1.3000E+00 3.0000E+00 0. 0. 2.0000E+00 0. 0.
0. 2.0000E+00 0. 0. 2.0000E+00 0. 0. 1.0000E+00 0. 0.
1.0000E+00 0. 1.0000E+00 0. 0. 0. 1.0000E+00 0. 0. 0.
0. 0. 1.0000E+00 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 1.0000E+00 0. 0. 0. 0. 0. 1.0000E+00
0. 0. 1.0000E+00 0.
-1-1 P(R1.R2/T1.T2)TIMES 480
1 3 8 4 0 1 1 0 2 0 0 0 0 0 0 0 0
3 16 28 21 5 1 1 0 2 0 1 0 0 0 0 0 1
16 63 85 38 3 2 1 0 1 1 5 6 2 0 0 1 1
20 50 47 21 2 1 0 0 1 1 4 10 37 27 5 0 1 2
2 7 13 0 0 0 0 1 0 0 15 52 75 39 5 0 1 2
0 2 1 1 0 0 1 0 0 0 17 60 59 24 5 1 0 1
0 0 0 0 0 0 0 0 0 0 9 11 14 9 3 0 0 1
0 0 0 0 0 1 0 0 0 0
QUADRENT SUMS...HARD DECISIONS
424 20 18 6
26 11 461 27
-1+1 P(R1.R2/T1.T2)TIMES 512
+1-1 P(R1.R2/T1.T2)TIMES 512
0 2 1 3 13 26 20 7 1 0 0 0 1 0 0 1 0
1 1 2 10 51 86 42 8 1 0 0 2 1 1 5 1 1
0 1 0 10 55 67 32 8 1 0 0 0 1 1 9 13 2
0 0 0 6 17 16 8 2 0 0 1 0 0 5 14 61 50 13
1 0 0 0 0 3 3 2 1 1 0 0 1 1 39 84 69 10
0 0 0 0 0 1 0 1 1 0 0 0 1 1 15 22 38 21 5
0 0 0 0 0 2 1 4 4 0 0 0 0 1 2 4 5 3 1
QUADRENT SUMS...HARD DECISIONS
35 449 9 39
1 26 26 438
1746 1397 883 859
9 10 13 14
17 18 21 22
252 BIT ERROR INTERVALS
7.0000E+00 1.1000E+01 1.9000E+01 2.1000E+01 1.8000E+01 2.3000E+01 2.0000E+01 1.6000E+01 0. 0.

```
ENODB=    7.0 ,DELF=   44.0 ,BIF=   1500 ,BL2=    294 ,ASOFI= .3700
FQDPRT=   1.0000E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 866.4 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4[illegible]
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.2917E-02 STDEV=   5.7907E-03 BITS=   2016
XISUM=    3.2098E-01 XISIG=    1.7291E-01
LOCKIN=      8 ,DROPOUTS=     18 ,AVE=   7.2778E+00 ,STD DEV=  1.8198E+00
ERRM
  4.6000E+01  9.0000E+00  7.0000E+00  6.0000E+00  8.0000E+00  4.0000E+00  7.0000E+00  5.0000E+00  2.0000E+00  2.0000E+00
  3.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  2.0000E+00  0.          4.0000E+00
  1.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00
  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  2.0000E+00  0.
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00
  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   511
     1     3     8     2     2     1     0          2     0     0     0     1     0     0     0
     5    27    33    21     3     1     1          0     0     0     0     2     3     0     1
    18    69    66    31     0     1     0          0     1     0     0     0     2     1     1
    19    50    39    27     1     0     0          0     2     6     0     0     0     1     1
     9     8     8     2     1     0     0          5    15    31    15     6     0     1     1
     1     1     2     2     0     0     3          2     6    63    51     9     2     0     0
     0     0     3     1     0     0     1          1    17    59    52    16     2     0     2
     0     0     0     0     1     0     1          1     6    20    16     6     2     1     2
QUADRENT SUMS...HARD DECISIONS                                    11    14
      420    15                                                   446    40
       37     8                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   513                                          0     0     0     0     0     0
     0     0     3     5     8    28    21     7          0     0     0     0     0     0     0     0
     0     0     3     7    56    99    45     9          0     0     0     0     0     1     0     1
     0     2     9    11    46    75    21     2          0     0     0     1     1     3     2     1
     1     1     2     3    11    13     6     1          0     0     0     1     1     4     5    16
     1     1     2     3    11    13     6     2          0     0     0     1     1    16    53    43
     0     0     2     2     4     1     2     1          0     0     0     1     1    16    53    43
     0     0     2     2     4     3     0     1          0     0     0     2     1     8    43    61
     0     0     0     0     0     0     1     4          0     0     1     1     4    20    43    31
     0     0     0     0     1     0     1     3          1     1     0     1     0     2     7     2
QUADRENT SUMS...HARD DECISIONS                                     2    41
       37    442                                                  19   450
       10     24
     1582    412   1560   1440
        9     10     13     14
       17     18     21     22

252 BIT ERROR INTERVALS
  3.0000E+01  9.0000E+00  1.0000E+01  1.8000E+01  2.3000E+01  2.2000E+01  1.[illegible]000E+01  2.1000E+01  0.          0.
```

```
ENOD9=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   3.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5810E+00
PEI=   1.2153E-01 STDEV=   7.2771E-03 BITS=   2016
XISUM=   2.7283E-01 XISIG=   1.6919E-01
LOCKIN=      6 ,DROPOUTS=     15 ,AVE=  2.0667E+00 ,STD DEV=  1.3400E+00
ERRM
  1.1500E+02  1.6000E+01  1.0000E+01  1.1000E+01  1.0000E+01  4.0000E+00  5.0000E+00  5.0000E+00  6.0000E+00  5.0000E+00
  5.0000E+00  6.0000E+00  4.0000E+00  5.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  4.0000E+00  4.0000E+00
  1.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  0.
  0.          0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.
  1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   478                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     1     2     5    19     3     3     0     1          0     1     0     1     0     2     0
     1    14    57    37    10     1     1     0          0     2     4     2     1     0     0
    11    49    99    34    10     1     1     0          1     5     8     3     8     5     0     0
    11    35    36     9     4     2     0     0          3     3    22    26    13     2     1     0
     3    10     5     0     0     0     0     0          4    36    70    70    12     1     0     0
     0     0     0     0     0     0     0     0          7    33    77    23     7     0     0     0
     0     0     0     0     0     0     0     2          2    12    12    19     2     0     0     0
     0     0     0     0     0     0     1     0          2     5     2     0     0     0     0     1
QUADRENT SUMS...HARD DECISIONS                                                    77    38
   420    37                                                                    374    23
    18     3                                                                          +1+1 P(R1.R2/T1.T2)TIMES   515
+1-1 P(R1.R2/T1.T2)TIMES   511                                                  0     1     0     0     0     0
     0     0     0     3     3     3     2          0     0     0     0     0     0     0     0
     0     0     0     2    29    32    16     5          1     0     0     0     0     0     0     1
     0     0     1    20    68    80    19     1          0     0     0     0     0     0     1     5
     0     0     5    16    69    46     5     0          1     0     0     0     4    11     5     0
     0     2    11    15    20     6     5     1          0     0     0     0     7    13    33    25    15
     0     1     4     3     3     4     2     0          1     0     0     0     9    41    59    51    21
     0     0     0     0     1     2     1     1          2     0     0     0     3     8    27    49    48    13
     0     0     0     2     0     1     1     0          1     2     0     5    14    28    11     5
QUADRENT SUMS...HARD DECISIONS                                                     2    21
    44   381                                                                     47   445
    38    48
   804    49   883  1589
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  2.2000E+01  1.6000E+01  5.8000E+01  2.2000E+01  2.4000E+01  3.5000E+01  4.3000E+01  2.4000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
HN= 277.2 ,K= 463.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,HNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=    5.2000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    4.0179E-02 STDEV=    4.3737E-03 BITS=    2016
XISUM=    3.3421E-01 XISIG=    1.7250E-01
LOCKIN=     10 ,DROPOUTS=     10 ,AVE=  1.6000E+00 ,STD DEV=  8.0000E-01
ERRM
  1.4000E+01  4.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  3.0000E+00  4.0000E+00  1.0000E+00  2.0000E+00
  0.          1.0000E+00  0.          2.0000E+00  2.0000E+00  5.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00
  1.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  0.          0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          3.0000E+00  0.          0.          0.
  1.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
     1     7    20    15     4     0     0     0           1     0     0     1     0     0     0     0
     7    49    54    15     1     0     1     0           2     0     0     0     0     0     0     0
    27    70    57    22     5     0     0     0           0     0     0     0     0     0     0     0
    26    35    32     7     1     0     0     0           0     3     9     7     1     1     0     1
     7     6     5     1     0     0     0     0           4    16    43    33     2     1     0     1
     1     0     1     0     1     0     0     0          12    65    82    34     6     0     0     0
     0     0     0     0     1     0     0     0          14    41    51    26     5     1     1     0
     0     0     0     0     0     1     0     0           5    16    16     9     1     0     0     1
QUADRENT SUMS...HARD DECISIONS
   444    12                                              23     3
    21     3                                             467    19
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     0     1     0     0     6    24    21     8           0     0     0     0     0     0     0     0
     0     0     0     4    33    90    49     5           0     0     0     0     0     0     0     0
     0     1     0    17    61    85    23     2           0     0     0     0     0     0     0     0
     0     0     0    13    31    20     5     0           0     0     0     0     0     3    10     5
     1     0     0     1     3     2     1     1           0     0     0     1     5    26    32    17
     0     0     0     0     1     0     0     0           0     0     0     2    11    68    88    28
     0     0     0     0     0     0     1     0           0     0     0     1    22    62    50    27
     0     0     0     0     0     1     0     1           1     0     0     1     8    15    20     9
QUADRENT SUMS...HARD DECISIONS
    36   463                                              0    18
     2    11                                              6   488
  2007  1037    30   529
     9    10    13    14
    17    18     7    22

252 BIT ERROR INTERVALS
  1.2000E+01  1.0000E+01  1.3000E+01  9.0000E+00  1.0000E+01  1.3000E+01  9.0000E+00  4.0000E+00  0.
```

```
ENODB=    7.0  ,DELF=   62.0  ,BIF=   1500  ,BL2=    294  ,ASOFT=  ,3700
FOOPRT=    1.0000E+01 TL=    -6.5000E+00 DYNR=    6.[illegible]
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
HN=  277.2  ,K=  468.6  ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9  ,KB=  614.9  ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5818E+00
PEI=    3.5714E-02 STOEV=    4.1331E-03 BITS=    2016
XISUM=    3.6890E-01 XISIG=    1.8600E-01
LOCKIN=     10  ,DROPOUTS=     16  ,AVE=   1.7500E+00 ,STO DEV=   1.0308E+00
ERRH
   1.1000E+01   0.           3.0000E+00   1.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   3.0000E+00   1.0000E+00   1.0000E+00
   0.           6.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   0.           1.0000E+00   2.0000E+00
   1.0000E+00   1.0000E+00   1.0000E+00   3.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00
   0.           0.           1.0000E+00   1.0000E+00   0.           2.0000E+00   2.0000E+00   1.0000E+00   0.           0.
   0.           0.           0.           0.           0.           0.           0.           1.0000E+00   0.           0.
   1.0000E+00   0.           0.           2.0000E+00   0.           0.           0.           0.           0.           0.
   0.           1.0000E+00   0.           1.0000E+00   0.           0.           0.           0.           0.           0.
   0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
   1.0000E+00   0.           0.           0.           1.0000E+00   0.           0.           0.           0.           3.0000E+00
   0.           0.           0.           0.           0.           0.           0.           0.           0.

-1+1 P(R1.R2/T1.T2)TIMES    480                                                  -1+1 P(R1.R2/T1.T2)TIMES    512
     4     8    16    20     1     0     1     1     1     1     0     1     1     0     0     0     0     0
    20    55    41     7     2     1     0     0     1     0     1     0     2     2     0     0     1     1
    37    74    46    21     3     0     0     0     2     1     2     2     3     0     0     1     1     1
    29    33    24     9     1     0     0     0     3    12    27    11     3     0     0     1     1     0
    11     4     5     1     0     1     0     0    19    62    78    28     4     0     0     0     0     0
     1     0     0     0     0     0     0     0    24    54    49    21     7     0     0     0     1     0
     0     0     0     0     0     0     0     0    12    30    25    13     1     1     0     0     0     0

QUADRENT SUMS...HARD DECISIONS                                                    13     6
   446    10                                                                     474    19
    22     2                                                                          +1+1 P(R1.R2/T1.T2)TIMES    512
+1-1 P(R1.R2/T1.T2)TIMES    512
     1     0     0     1    14    54    35    11     0     0     0     0     0     0     0     0     0     0
     1     0     2     8    54    86    50     8     0     0     0     0     0     0     0     0     1     1
     0     0     1     3    41    57    18     2     0     0     0     0     0     0     2     1    16    33
     0     0     1     3    12    16     6     1     0     0     0     0     2    19    44    33    41    27
     0     0     0     0     0     4     0     1     0     0     0     1    14    56    76    41    27    11
     0     0     0     1     0     1     0     2     0     0     0     1     7    60    47    27    11
     0     0     0     0     1     0     2     0     3     0     0     1    11    24    17    11

QUADRENT SUMS...HARD DECISIONS                                                     0    16
    26   473                                                                       7   489
     2    11
    68  1801  1898  1293
     9    10    13    14
    17    18    21    22

252 EIT ERROR INTERVALS
  1.1000E+01  1.3000E+01  8.0000E+00  3.0000E+00  1.4000E+01  8.0000E+00  9.0000E+00  5.0000E+00  0.          0.
```

```
ENOD3=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FODPRT=   1.0800E 01 TL=  -6.5000E+00 DYNR=   6.8000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   1.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=  5.3075E-02 STDEV=   4.9930E-03 BITS=   2016
XISUM=   3.9520E-01 XISIG=   1.9674E-01
LOCKIN=    10 ,DROPOUTS=    20 ,AVE=  2.1500E+00 ,STD DEV=  1.4925E+00
ERRM
  2.2000E+01  4.0000E+00  5.0000E+00  3.0000E+00  5.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  3.0000E+00  1.0000E+00
  1.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  3.0000E+00  5.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  3.0000E+00
  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          3.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  4.0000E+00
  0.          1.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          2.0000E+00  0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     6    21    21    12     4     1     1     0                1     3     0     0     1     0     0     0
    26    60    39     8     2     1     1     1                2     0     0     0     0     0     0     0
    45    59    35    16     3     0     1     1                1     1     0     1     0     0     0     0
    33    22    26     4     0     0     1     0                0     3     2     2     1     1     1     0
     9     6     5     3     1     0     0     0                7    17    15     7     4     2     0     3
     0     0     0     0     1     1     0     3               21    50    46    11     4     0     4     1
     0     0     0     0     0     0     0     2               40    65    53    24    11     0     0     0
     0     0     0     0     0     0     0     1               29    29    26    19     1     0     1     2
QUADRENT SUMS...HARD DECISIONS
     433    17                                                  16     4
      23     7                                                 459    33
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     1     0     1     6    23    68    45    10                0     0     0     0     0     0     0     0
     0     0     1    12    48    72    54    11                0     0     0     0     0     0     0     0
     0     1     2     9    24    43    22     7                0     0     0     0     2     1     1     1
     0     0     1     2     3     9     6     0                0     1     0     0     1     4     6     9
     1     0     0     1     2     2     2     1                0     0     1     0     3    21    31    34
     0     0     0     0     0     1     0     0                0     0     0     0    13    54    79    48
     0     0     1     0     0     2     1     6                0     0     1     1    17    35    51    27
     0     0     0     0     0     2     2     7                3     0     0     0     9    17    25    16
QUADRENT SUMS...HARD DECISIONS
      36   445                                                   1    25
       3    28                                                   6   480
   819     4   695  1032
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.0000E+01  2.0000E+01  1.6000E+01  .  00E+00  1.7000E+01  9.0000E+00  1.3000E+01  1.2000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.3 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SOAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   2.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=   6.4980E-02 STDEV=    5.4898E-03 BITS=    2016
XISUM=    4.3552E-01 XISIG=    2.2516E-01
LOCKIN=      9 ,DROPOUTS=     31 ,AVE=   2.6774E+00 ,STD DEV=  2.8780E+00
ERRM
  5.1000E+01  7.0000E+00  2.0000E+00  4.0000E+00  3.0000E+00  2.0000E+00  5.0000E+00  6.0000E+00  3.0000E+00  2.0000E+00
  3.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00  0.          3.0000E+00  4.0000E+00  0.          0.          1.0000E+00
  0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          0.          0.
  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          2.0000E+00  0.          0.          0.          0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES    480
    11     23     13     10      3      1      5      3
    46     61     27     14      3      0      0      4
    55     38     28     22      1      1      0      3
    30     21     22      6      2      1      0      1
     0      5      4      0      1      1      0      1
     1      0      1      0      0      0      1      3
     0      0      0      0      0      1      2     10
QUADRENT SUMS...HARD DECISIONS
    427     21
     11     21

+1-1 P(R1.R2/T1.T2)TIMES    512
     1      1      1      6     38     61     75     34
     8      2      0      6     33     61     46     25
     1      1      1      4     10     24     10      3
     1      2      0      1      4      4      3      4
     0      0      0      1      2      4      2      2
     0      0      0      0      1      3      4      5
     0      0      0      0      0      5      8      9
QUADRENT SUMS...HARD DECISIONS
     28    435
      2     47

   482    590    377    594
     9     10     13     14
    17     18     21     22

-1+1 P(R1.R2/T1.T2)TIMES    512
     1      2      0      1      0      1      0      0
     0      2      0      1      1      1      0      0
     1      0      1      1      2      1      0      0
     3      0      1      2      1      1      0      1
     9      7      1      3      2      0      1      2
    28     34     25      7      5      1      2      4
    53     79     33     18      2      2      1      2
    48     52     36     16      2      2      0      3
     16     11
    457     28

+1+1 P(R1.R2/T1.T2)TIMES    512
     0      0      0      1      0      1      0      0
     0      1      0      1      2      1      0      0
     0      0      1      0      1      2      0      1
     1      0      1      1      2      5      0      2
     0      0      0      1      4      5      1      2
     0      0      0      0      6     21     40     29
     0      0      0      1      4     16     39     51
     1      2      3      1      1     11     37     62     41     15
     4     19
    15    474

252 BIT ERROR INTERVALS
  1.6000E+01  7.0000E+00  1.5000E+01  1.6000E+01  1.7000E+01  1.9000E+01  1.4000E+01  2.5000E+01  0.          0.
```

```
ENDDB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   8.3333E-02 STDEV=   6.1956E-03 BITS=   2016
XISUM=   4.4410E-01 XISIG=   2.2970E-01
LOCKIN=     9 ,DROPOUTS=    37 ,AVE=  2.9189E+00 ,STD DEV=  2.5296E+00
ERRM
  7.0000E+01  1.5000E+01  7.0000E+00  4.0000E+00  6.0000E+00  5.0000E+00  2.0000E+00  1.0000E+00  4.0000E+00  2.0000E+00
  4.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  0.
  0.          4.0000E+00  1.0000E+00  4.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00
  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          1.0000E+00
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00

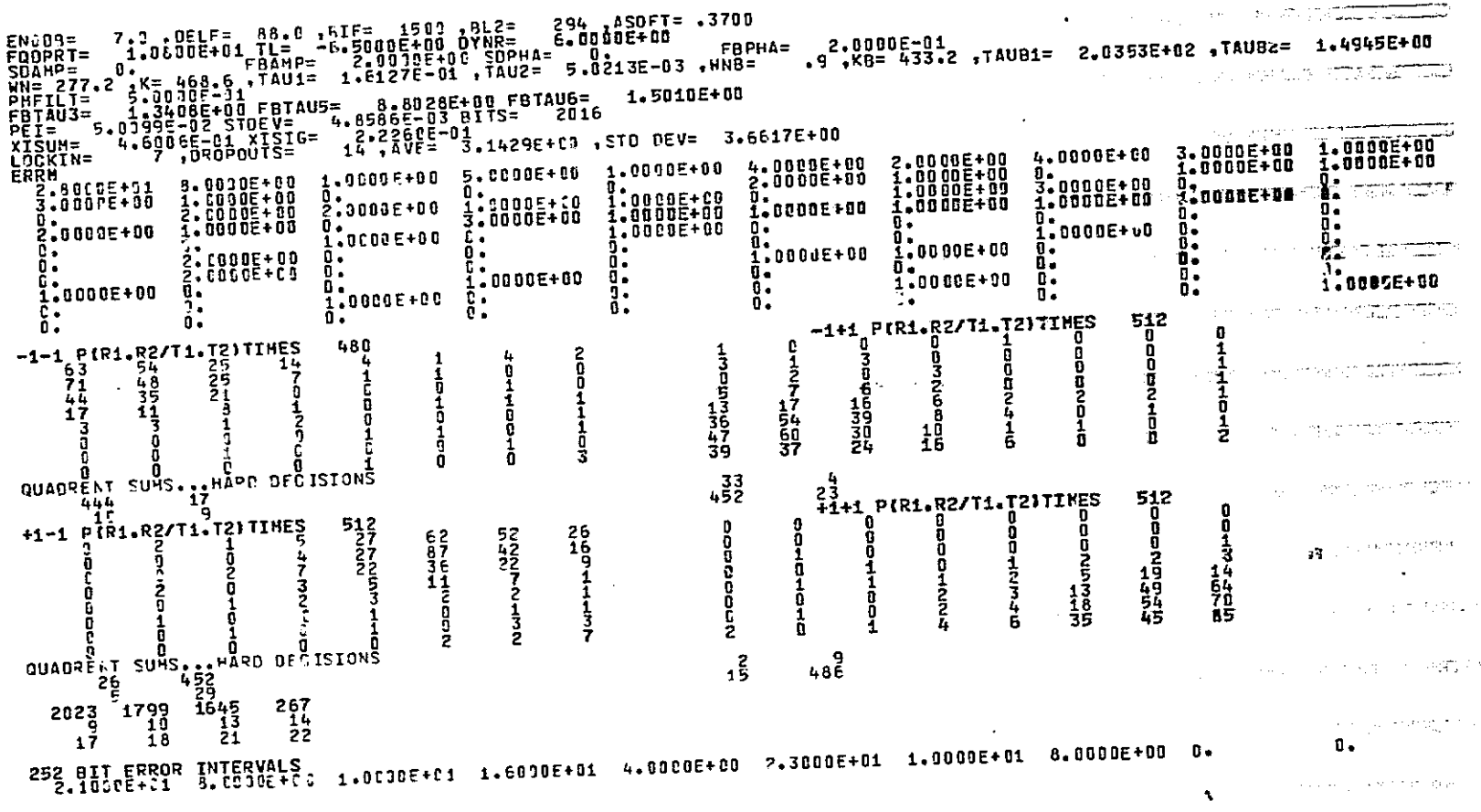
-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    23    15    21     8     1     3     1     2          4     2     1     1     0     0     0     0
    53    50    26    16     4     3     1     0          1     2     0     0     0     0     0     1
    59    42    20    20     3     0     1     0          2     0     3     0     0     0     0     1
    25    20    20     8     1     1     0     0          2     3     1     0     1     0     0     2
     3     4     2     1     0     0     0     2          7     5     5     3     0     0     3     3
     0     1     2     0     1     0     0     1         31    40    20     9     0     2     6     1
     0     0     1     0     0     0     1     2         53    68    38     9     1     2     1     1
     0     0     0     1     1     0     1    13         45    43    44    23     2     1     1     8
QUADRENT SUMS...HARD DECISIONS
   420    21                                             28     8
    15    24                                            444    32
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     2     0     7    14    32    71    64    45          4     0     0     0     0     0     0     0
     2     0     0     9    24    51    48    16          0     0     1     0     0     0     1     0
     0     0     1     4    10    23    15    10          2     1     1     2     0     1     1     1
     3     1     0     2     4     6     2     3          1     2     3     3     0     6     9     5
     0     0     0     0     0     1     1     3          1     0     1     1     5    19    30    25
     0     0     0     0     0     1     2     1          0     1     0     3     7    41    52    65
     0     0     0     0     0     0     2     9          1     0     0     1     7    17    38    53    26
     0     0     0     0     0     0     3     9          0     2     0     3     8    20    21    17
QUADRENT SUMS...HARD DECISIONS
    43   423                                             20    27
     0    46                                             20   445
  1213  1094  1234  1098
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  1.1000E+01  1.4000E+01  1.4000E+01  2.5000E+01  2.8000E+01  2.5000E+01  4.0000E+01  0.          0.
```

```
ENOD8=   7.0 ,DELF=  88.1 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+08
SDAMP=   0.          FBAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 433.2 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4345E+08
PMFILT=   3.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8026E+00 FBTAU6=   1.5018E+00
PEI=   9.9702E-02 STDEV=   6.6727E-03 BITS=   2016
XISUM=   3.6028E-01 XISIG=   2.0635E-01
LOCKIN=      5 ,DROPOUTS=      8 ,AVE=  2.1250E+00 ,STD DEV=  9.2702E-01
ERRH
  8.7000E+01  1.8000E+01  9.0000E+00  9.0000E+00  3.0000E+00  3.0000E+00  7.0000E+00  2.0000E+00  6.0000E+00  3.0000E+00
  3.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00  0.          2.0000E+00  4.0000E+00  2.0000E+00  6.0000E+00  1.0000E+00
  2.0000E+00  1.0000E+00  0.          3.0000E+00  2.0000E+00  3.0000E+00  0.          0.          0.          2.0000E+00
  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.
  0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1,R2/T1,T2)TIMES   481                                  -1+1 P(R1,R2/T1,T2)TIMES   511
    19    32    45    20     8     3     2                0     0     0     0     0     0     0     0
    37    63    57    11     7     3     1                2     4     3     0     0     4     2     0
    42    46    28     3     1     1     0                3     5     0     7     0     0     2     2
    15    17     7     2     0     2     0                2    13    22    15     6     0     2     2
     4     2     1     0     2     1     1               10    38    58    29     5     0     0     1
     0     0     0     0     0     0     1               16    47    55    24    13     1     0     1
     0     0     0     0     0     0     1               10    35    24    10     1     0     0     0
     0     0     0     0     2     0     2                3     5    12    18     0     0     0     0
QUADRENT SUMS...HARD DECISIONS
   430    31                                             76    27
    10    10                                            386    22
+1-1 P(R1,R2/T1,T2)TIMES   509                                  +1+1 P(R1,R2/T1,T2)TIMES   515
     0     0     0     3     7    12    14     3                0     0     0     0     0     0     0     0
     0     1     0    10    27    52    33     6                0     0     0     0     0     1     0     0
     3     1     2    25    54    60    33     9                0     0     0     0     0     0     0     0
     0     0     7     9    41    21     8     2                0     0     0     0     1     3     1     4
     0     3     5     7    14     5     4     1                0     0     1     0     2    11    16    15
     0     2     1     1     3     5     2     1                0     3     6     5    18    36    40    29
     0     1     0     0     1     3     1     1                0     3     3     5     7    48    54    49
     0     1     0     0     1     1     4     1                0     2     1     4     9    35    39    64
QUADRENT SUMS...HARD DECISIONS
    58   383                                                   0    10
    21    47                                                  33   472
   197  1931   620   399
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  4.6000E+01  1.5000E+01  1.4000E+01  5.6000E+01  1.3000E+01  1.9000E+01  2.1000E+01  1.7000E+01  0.          0.
```


ENOO9= 7.3 ,DELF= 88.0 ,BIF= 1500 ,BL2= 294 ,ASOFT= .3700
FQOPRT= 1.0000E+01 TL= -6.5000E+00 DYNR= 6.0000E+00
SOAMP= 0. FBAMP= 2.0000E+00 SOPHA= 0. FBPHA= 2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,WN8= .9 ,KB= 433.2 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PHFILT= 5.0000E-01
FBTAU3= 1.3408E+00 FBTAU5= 8.8028E+00 FBTAU6= 1.5010E+00
PEI= 5.0999E-02 STDEV= 4.8586E-03 BITS= 2016
XISUM= 4.6006E-01 XISIG= 2.2260E-01
LOCKIN= 7 ,DROPOUTS= 14 ,AVE= 3.1429E+00 ,STD DEV= 3.6617E+00
ERRM
-1-1 P(R1.R2/T1.T2)TIMES 480
QUADRENT SUMS...HARD DECISIONS
+1-1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
-1+1 P(R1.R2/T1.T2)TIMES 512
+1+1 P(R1.R2/T1.T2)TIMES 512
252 BIT ERROR INTERVALS

```
ENDDG=   7.0 ,DELF=  88.0 ,NTF=  1500 ,BL2=   294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SOAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,HNB=    .9 ,KB= 433.2 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.0437E-02 STDEV=   5.6989E-03 BITS=    2016
XISUM=    5.0756E-01 XISIG=   2.4046E-01
LOCKIN=      9 ,DROPOUTS=     12 ,AVE=  3.5833E+00 ,STD DEV=  3.5463E+00
ERRM
  5.7000E+01  7.0000E+00  6.0000E+01  1.0000E+00  6.0000E+00  4.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00
  2.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  5.0000E+00  0.          1.0000E+00  2.0000E+00
  2.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  1.0000E+00
  0.          2.0000E+00  0.          1.0000E+00  1.0000E+00  3.0000E+00  0.          0.          0.          0.
  2.0000E+00  0.          0.          1.0000E+00  0.          2.0000E+00  0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480
    31    43    32    10     6     2     3     2     6     0     0     0     0     0     0     0
    81    28    15     8     1     0     0     0     2     0     0     1     0     0     1     2
    44    31     7     3     1     1     0     0     3     0     0     0     1     1     2     8
    17    14     6     5     3     1     1     0     6     3     0     3     2     1     4     8
     5     1     1     0     4     1     2     1    21     9     3     3     1     1     5     6
     0     0     1     0     1     0     0     2    39    36    12     3     1     1     3     2
     0     0     0     0     0     0     1     8    77    44    29     5     1     0     0     4
QUADRENT SUMS...HARD DECISIONS
   425    21                                      66    45    35    19     3     0     1     4
     8    26                                      30     9
                                                 444    29
+1-1 P(R1.R2/T1.T2)TIMES   512
     1     0     4     8    29    94    93    40     0     0     0     0     0     0     0     0
     0     0     1     4    12    36    43    25     0     0     0     2     0     0     0     0
     1     0     4     7     7     2     8    10     0     0     1     1     1     0     0     2
     0     0     0     2     3     1     4     2     0     0     0     1     1     2     1     4
     0     0     0     0     1     0     1     5     0     0     1     1     0     0     4    12    14
     0     1     0     0     0     0     3     1     0     1     1     2     2     1     6    15    43    68
     0     0     0     0     1     0     1     4     3     2     3     6     1     2     2     4     7    13    49    75
QUADRENT SUMS...HARD DECISIONS
    26   435                                      21    10     8     4     9    22    49    88
     2    49                                     473
   982  1115   588  1631
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  6.0000E+00  2.0000E+01  1.2000E+01  1.7000E+01  1.8000E+01  2.5000E+01  3.3000E+01  0.          0.
```

```
ENDDB=    7.0 ,DELF=   88.0 ,BIF=   150 ,BL2=    294 ,ASOFT= .3700
FODPRT=    1.0000E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=     0.        FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 433.2 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=    1.0000E+00
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    9.5238E-02 STDEV=    6.5377E-03 BITS=    2016
XISUM=    5.3796E-01 XISIG=    2.7430E-01
LOCKIN=      8 ,DROPCUTS=     31 ,AVE=    1.7419E+00 ,STD DEV=   9.1467E-01
ERRM
  7.4000E+01   1.2000E+01   9.0000E+00   7.0000E+00   1.1000E+01   2.0000E+00   1.0000E+00   6.0000E+00   7.0000E+00   3.0000E+00
  3.0000E+00   3.0000E+00   2.0000E+00   3.0000E+00   6.0000E+00   0.           4.0000E+00   4.0000E+00   4.0000E+00   1.0000E+00
  1.3000E+00   2.0000E+00   3.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   0.           2.0000E+00   3.0000E+00   1.0000E+00
  1.0000E+00   1.0000E+00   0.           2.0000E+00   0.           1.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00
  1.3000E+00   0.           0.           0.           0.           1.0000E+00   0.           0.           0.           0.
  0.           0.           0.           0.           1.0000E+00   0.           0.           0.           0.           1.0000E+00
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
   104    35    15     4     6     6     5     2          15     5     0     0     0     0     0     0
    78    31    17     7     1     2     1     2           5     1     0     0     1     0     0     2
    42    20    14     6     1     1     1     1           5     1     0     1     2     0     0     1
    14    11     9     3     1     1     2     0           3     1     0     2     3     1     3     4
     1     2     1     2     0     0     2     1          13     2     7     5     1     1     1     7
     1     1     1     2     0     0     1     1          27    25     3     1     1     2     1     3
     0     1     0     0     0     0     2     3          77    46    14     7     1     2     1     2
     0     0     0     0     0     0     0     8          81    50    34    24     7     0     1     0
QUADRENT SUMS...HARD DECISIONS                                    41    16
      410    33                                                  416    39
      16    27                                                 +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                     1     0     0     0     0     0     0     2
     5     1     4    16    46    78    91    48           1     0     0     0     0     0     0     0
     1     1     1     1    12    28    29    20           2     0     0     0     1     0     0     0
     1     1     1     1     3     5    11     8           0     0     0     0     1     1     0     0
     6     1     1     1     1     3     5     3           0     0     0     0     3     1     3     5
     1     0     0     0     0     1     7     4           2     0     0     1     2     6    17    24
     0     1     0     0     0     1     6     4           1     0     0     1     2     6    11    35    58
     0     0     0     1     1     4     8     6           1     0     0     1     1     4    23    53    75
     0     0     0     0     1     1     7    19           2     3     4     5     7    14    36    95
QUADRENT SUMS...HARD DECISIONS                                     4    16
       43    391                                                  26    466
        4     74
      7   680  1844  1708
      9    10    13    14
     17    18    21    22

252 BIT ERROR INTERVALS
  1.9000E+01  2.1000E+01  2.6000E+01  1.7000E+01  1.9000E+01  2.6000E+01  3.2000E+01  3.2000E+01  0.          0.
```

```
ENGOB=    7.0 ,DELF=   88.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=    1.0800E+01 TL=   -6.5000E+00 OYNR=    6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 433.2 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILI=    2.0000E+00
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    1.3542E-01 STDEV=    7.6207E-03 BITS=    2016
XISUM=    5.6771E-01 XISIG=    2.9982E-01
LOCKIN=      8 ,DROPOUTS=     61 ,AVE=  3.5082E+00 ,STD DEV=  3.7531E+00
ERRM
  1.1800E+02  1.5000E+01  2.2000E+01  1.1000E+01  1.5000E+01  1.0000E+01  6.0000E+00  4.0000E+00  4.0000E+00  1.1000E+01
  5.0000E+00  2.0000E+00  4.0000E+00  5.0000E+00  3.0000E+00  2.0000E+00  3.0000E+00  5.0000E+00  5.0000E+00  2.0000E+00
  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  0.          0.          0.          1.0000E+00  1.0000E+00  1.0000E+00
  2.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  2.0000E+00  0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
   129    24    14    10     5    11     4     1          25     0     2     0     0     0     0     0
    63    26    14     5     2     1     0     0           9     2     2     1     0     0     0     2
    34    22    10     4     3     1     2     1           7     1     0     1     1     0     1     1
    10     8     4     1     0     1     1     1           6     0     1     3     2     3     3     3
     4     1     1     1     0     3     6     1          10     4     2     3     2     1     4     6
     0     1     2     1     0     2     1     3          28    16     3     5     4     1     0    10
     0     0     2     0     0     3     4     2          59    16     8     5     4     2     3     2
     0     0     1     0     2     5     5    15         111    50    49     9     5     4     4     9
QUADRENT SUMS...HARD DECISIONS
   378    34                                            60    16
    14    54                                           378    58
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     1     5     7    18    40    76    81    69           9     2     0     0     0     0     0     0
     5     1     1     0     4    12    18    19           0     0     0     0     0     0     0     1
     8     1     2     1     2     6     8     8           2     1     2     0     1     0     1     1
     5     0     0     1     3     3     6     7           2     0     1     2     4     3     1     2
     1     0     0     1     0     2     8     3           0     0     1     3     3     7     6    19
     1     0     0     0     0     4     7    11           1     1     1     6     4    17    27    53
     0     0     0     0     0     4     9     9           1     0     1     2     2    19    39    92
     0     0     0     0     0     1    10    23           3     6     3     3     6    26    36    45
QUADRENT SUMS...HARD DECISIONS
    56   362                                            21    14
     2    92                                            32   445
   321  1566   972  1570
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  3.2000E+01  2.4000E+01  2.8000E+01  2.9000E+01  2.5000E+01  4.4000E+01  3.3000E+01  5.8000E+01  0.          0.
```

```
ENDDB=   7.0 ,DELF=  88.0 ,9IF=   1500 ,BL2=    294 ,ASOFT= .3700
FODPRT=  1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 433.2 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
FBTAU3=  1.3408F+00 FBTAU5=  8.8024E+00 FBTAU6=  1.5010E+00
PEI=   1.4732E-01 STDEV=   7.8937E-03 BITS=   2016
XISUM=   5.9252E-01 XISIG=   3.2276E-01
LOCKIN=      8 ,DROPOUTS=    116 ,AVE=   5.1293E+00 ,STD DEV=  1.0182E+01
ERRH
  1.2000E+02  1.6000E+01  1.9000E+01  1.5000E+01  9.0000E+00  1.2000E+01  9.0000E+00  8.0000E+00  9.0000E+00  5.0000E+00
  1.1000E+11  7.0000E+00  4.0000E+00  3.0000E+00  7.0000E+00  6.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00
  5.0000E+00  3.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00
  0.          0.          0.          2.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

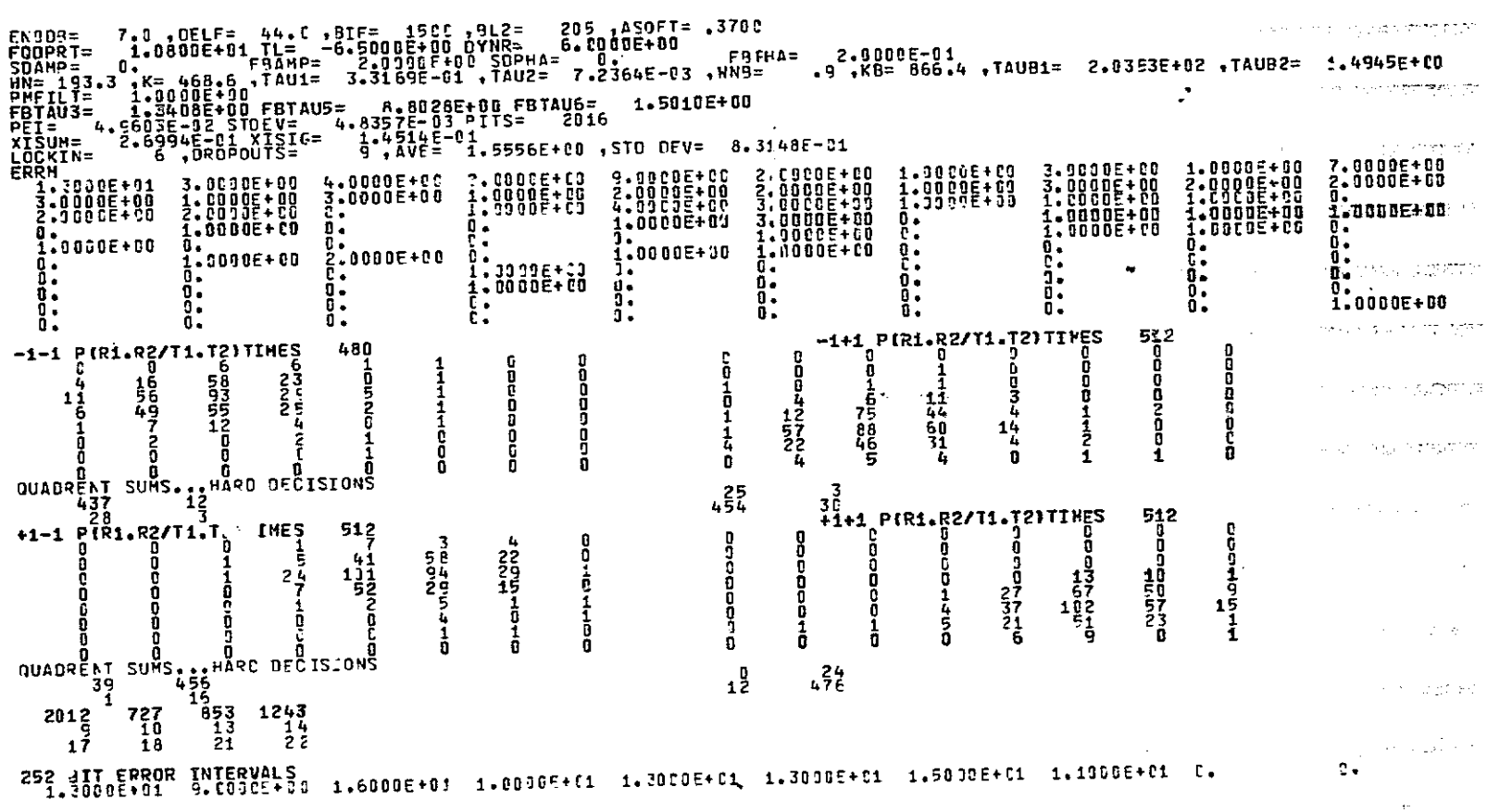
-1-1 P(P1.R2/T1.T2)TIMES    430                                                  -1+1 P(R1.R2/T1.T2)TIMES    512
   149      30      10      11       8       5       9       4      31       2       1       0       0       0       1       1
    56      24      13       7       1       0       2       0      14       1       1       1       0       1       2       2
     2       6      16       6       0       1       2       3       5       6       1       3       1       0       2       5
     7       2       8       4       1       1       3       1      11       2       5       3       1       5       4       8
     2       1       1       2       1       1       1       2       2       5       4       4       4       3       3       5
     0       0       0       1       0       0       4       2      59      14       4       4       4       3       3      14
                                                    21             126      53      28      11       4       0       3
QUADRENT SUMS...HARD DECISIONS                                       71      16
    390      33                                                      355      70
      9      48                                                              +1+1 P(R1.R2/T1.T2)TIMES    512
+1-1 P(R1.R2/T1.T2)TIMES    512                                                  0       0       0       0       0       0
    56       5       5      18      29      76      88      75       5       2       0       0       0       1       0       1
     5       5       0       3       7       7      10      14       1       2       1       1       1       2       0       1
     2       3       1       1       2       3      13       7       4       1       0       0       2       2       6       7
     1       1       0       1       3       4       4       8       2       4       3       2       2       8       4      12
     1       1       0       0       1       2       3       8       3       1       0       3       1       2      30      48
     1       1       0       0       0       1       4      12       3       2       2       0       1      22      34      66
     1       0       0       0       1       3       7      21       5       5       2       6       7      22      40      80
     0       0       0       1       0       3       3      29
QUADRENT SUMS...HARD DECISIONS                                       21      22
     57      345                                                     45      424
      7      103
   2128     1051     594    1567
      9       10      13      14
     17       18      21      22

252 BIT ERROR INTERVALS
  2.6000E+01  3.4000E+01  2.9000E+01  2.8000E+01  3.1000E+01  4.7000E+01  6.0000E+01  4.2000E+01  0.          0.
```

```
ENCOD=   7.0 ,OELF=  44.0 ,BIF=   150 ,BL2=   176 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
NN= 165.9 ,K= 468.6 ,TAU1=  4.5000E-01 ,TAU2=  8.4429E-03 ,WNB=    .9 ,KB= 866.4 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   1.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.3075E-02 STDEV=   4.9930E-03 PTTS=   2016
XISUM=   2.5694E-01 XISIG=   1.4165E-01
LOCKIN=    5 ,DROPCUTS=   12 ,AVE=  2.5000E+00 ,STD DEV=  1.9365E+00
ERRM
  1.5000E+01  6.0000E+00  5.0000E+00  0.          1.2000E+01  1.0000E+00  2.0000E+00  5.0000E+00  1.0000E+00  6.0000E+00
  4.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  5.0000E+00  4.0000E+00
  0.          1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00  0.
  1.0000E+00  0.          0.          0.          2.0000E+00  0.          0.          0.          1.0000E+00  0.
  1.0000E+00  0.          0.          2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00
  0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          2.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     0    3    4    9    1    0    0    0          0    0    0    0    1    0    0    0
     1   21   48   26    1    0    0    0          0    0    0    0    0    0    0    0
     8   62  100   32    1    2    1    0          0    1    2    3    0    1    0    0
     6   42   53   22    1    0    0    0          0    2   12    9    3    1    0    0
     2    4   10    6    2    1    0    0          1   19   88   50    4    0    1    1
     0    1    0    0    2    1    0    0          4   34   99   74   14    0    1    1
     0    0    0    1    0    0    0    0          0    9   40   26    3    0    0    0
     0    0    0    0    0    0    0    0          0    0    2    2    0    1    0    0
QUADRENT SUMS...HARD DECISIONS
   439    9                                       29    5
    24    8                                      448   30
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     0    0    0    1    2    2    0    0          0    0    0    0    0    0    0    0
     0    0    0    7   53   32    9    3          0    0    0    0    0    0    0    0
     0    0    4   21  112   87   24    1          0    0    0    0    0    0    0    0
     0    0    0    7   59   55   16    0          0    0    0    0    3    8   10    2
     0    0    0    0    1   13    2    0          0    0    0    0    2   23   74   52
     0    0    0    0    0    2    0    1          0    0    0    0    3   26   39   97   56   10
     0    0    0    0    0    0    0    0          0    0    0    0    4   23   60   22   22    2
     0    0    0    0    0    0    1    0          0    0    0    0    4    8    2    0
QUADRENT SUMS...HARD DECISIONS
    40  452                                        0   21
     0   20                                       15  476
   751  601 1993   93
     9   10   13   14
    17   18   21   22

252 BIT ERROR INTERVALS
  1.1000E+01  8.0000E+00  1.4000E+01  1.7000E+01  1.5000E+01  1.0000E+01  2.0000E+01  1.2000E+01  0.          0.
```



```
ENOOB=    7.0 ,OELF=   44.0 ,BIF=   1500 ,BL2=    235 ,ASOFT= .3700
FODPRT=   1.0000E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 221.6 ,K= 468.6 ,TAU1=  2.5241E-01 ,TAU2=  6.4523E-03 ,WN8=     .9 ,K8= 866.4 ,TAU81=  2.0353E+02 ,TAU82=  1.4945E+00
PMFILT=   1.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    5.0595E-02 STDEV=    4.8813E-03 BITS=    2016
XISUM=    2.7777E-01 XISIG=    1.4947E-01
LOCKIN=      6 ,DROPOUTS=     10 ,AVE=  1.2000E+01 ,STD DEV=  4.0000E-01
ERRM
  1.2000E+01  4.0000E+00  6.0000E+00  2.0000E+00  9.0000E+00  7.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  6.0000E+00
  1.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          3.0000E+00  4.0000E+00  5.0000E+00
  1.0000E+00  4.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.
  1.0000E+00  0.          0.          0.          2.0000E+00  0.          0.          4.0000E+00  3.0000E+00  0.
  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
     0    1    5    4    0    0    0    0               0    0    0    0    0    0    0    0
     1   15   46   25    2    2    0    0               1    0    0    0    0    0    0    0
     9   53   97   36    5    0    0    0               0    0    0    1    1    0    0    0
     9   46   56   19    3    0    0    0               0    1    4   13    2    0    0    0
     3    4   17    5    0    1    0    0               0   15   54   34    4    1    2    0
     0    2    1    1    2    0    0    0               5   51   93   64   14    1    0    0
     0    0    0    0    0    0    0    0               9   27   58   27    3    2    0    0
     0    0    0    0    0    0    0    0               1    7   10    4    1    1    0    1
QUADRENT SUMS...HARD DECISIONS
   432   12                                            20    3
    33    3                                           459   30
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     0    0    0    1    8   11    8    0               0    0    0    0    0    0    0    0
     0    1    1    6   41   57   31    4               0    0    0    0    0    0    0    0
     0    0    2    1   8   94   93   23    1          0    0    0    0    1    0    2    0
     0    0    0   12   45   29   14    0               0    0    0    0    0    9   14    5
     0    0    0    1    2    3    1    0               0    0    0    3   18   66   61   10
     0    0    0    0    0    0    1    1               0    0    1    2   39   99   50   11
     0    0    0    0    0    0    1    1               0    0    1    4   19   53   27    4
     0    0    0    0    0    0    1    0               0    0    0    1    2   10    8    2
QUADRENT SUMS...HARD DECISIONS
    41  459                                            0   31
     1   11                                           12  469
    94 2006 1879 2010
     9   10   13   14
    17   18   21   22

252 BIT ERROR INTERVALS
  1.4000E+01  6.0000E+00  1.2000E+01  1.1000E+01  1.5000E+01  1.1000E+01  2.0000E+01  1.3000E+01  0.          0.
```

```
ENDOB=   7.0 ,DELF=  44.0 ,BIF=  1500 ,BL2=   264 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 248.9 ,K= 468.6 ,TAU1=  2.0000E-01 ,TAU2=  5.6011E-03 ,WNB=    .9 ,KB= 866.4 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   1.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.5556E-02 STDEV=  5.1016E-03 BITS=   2016
>ISUM=   2.8613E-01 XISIG=   1.5591E-01
LOCKIN=      6 ,DROPOUTS=     10 ,AVE=  2.6000E+00 ,STD DEV=  1.1686E+00
ERRM
  1.9000E+01  6.0000E+00  8.0000E+00  3.0000E+00  6.0000E+00  5.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  5.0000E+00
  2.0000E+00  3.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  0.          4.0000E+00  3.0000E+00
  0.          1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          3.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          1.0000E+00  0.          0.          1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                          -1+1 P(R1.R2/T1.T2)TIMES   512
     1   0   4   3   3   0   0   1       0   0       0   0   0   0   0   0
     2  28  39  22   1   0   0   0       1   0       1   0   1   0   0   0
    10  63  94  35   5   0   0   0       0   0       0   0   0   0   0   1
    11  51  52  24   3   0   0   0       0   0       4   9   2   0   0   0
     4   6  16   3   0   0   1   1       2  12      51  33   7   0   2   0
     0   2   0   0   0   0   0   0       6  39      86  63  13   1   1   0
     1   9   1   1   0   0   0   0      16  35      61  26   3   1   0   0
     0   0   0   0   0   0   0   0       2  11      12   5   0   1   1   0
QUADRENT SUMS...HARD DECISIONS                                  15   7
   431  13                                                     460  30
    34   2                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512
     0   0   0   2   7  21  11   3       0   0       0   0   0   0   0   0
     0   1   1   5  41  70  32   5       0   0       0   0   1   0   0   1
     0   2   2  16  95  72  26   3       0   0       0   0   0   0   2   0
     0   0   0  11  41  20  10   1       0   0       0   0   1   9  20   4
     0   0   0   1   3   1   2   1       0   0       0   0   5  21  66  55  12
     0   0   0   0   1   0   0   1       0   1       0   0   3  31  97  56  12
     0   0   0   0   0   0   0   2       0   1       0   0   2   5  25  45  21   2
     0   0   0   0   0   1   0   2       0   1       0   2   4   7   3   0
QUADRENT SUMS...HARD DECISIONS                                   0  38
    43 453                                                      16 458
     1  15
   905 1365 1570  857
     9  10  13  14
    17  18  21  22

252 BIT ERROR INTERVALS
  1.7000E+01  1.0000E+01  8.0000E+00  1.3000E+01  2.1000E+01  1.9000E+01  2.3000E+01  1.2000E+01  0.          0.
```

```
ENCOD=    7.0 ,DELF=   44.0 ,BIF=   1500 ,BL2=    323 ,ASOFT= .3700
FOOPRI=   1.0800E+01 TL=    -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 304.5 ,K= 468.6 ,TAU1=   1.3361E-01 ,TAU2=   4.5633E-03 ,WNB=     .9 ,KB= 866.4 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=   1.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    8.3333E-02 STDEV=    6.1556E-03 BITS=    2016
XISUM=    3.1772E-01 XISIG=    2.4239E-01
LOCKIN=       7 ,DROPOUTS=      10 ,AVE=   8.7000E+00 ,STD DEV=   1.8677E+01
ERRM
  7.0000E+01  1.8000E+01  5.3000E+00  3.0000E+00  4.0000E+00  3.0000E+00  5.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00
  1.9000E+00  1.0000E+00  3.0000E+00  3.0000E+00  3.0000E+00  6.0000E+00  4.0000E+00  3.0000E+00  1.0000E+00  2.0000E+00
  1.3000E+00  2.0000E+00  0.          3.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          0.          1.0000E+00
  1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.          3.0000E+00  2.0000E+00
  0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          1.0000E+00  0.          2.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
                                                                                                   0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
       0   1   4   7          1   1   0   3              1   0   0   0   0   1   0   0
       2  12  36  21          2   0   0   0              0   0   0   1   0   0   0   0
      12  44  92  41          7   3   0   0              1   2   1   1   1   3   1   1
      20  43  52  20          0   2   0   1              3   6  10   3   1   1   2   2
       3   5  13   1          0   2   2   1             15  49  37  13   0   0   0   0
       0   2   1   1          2   1   1   1             42  88  38   3   0   0   1   1
       0   0   0   0          0   0   1   2             17  39  44  19   5   1   0   1
       0   0   0   2          0   1   1  14              8  14  10   4   1   1   0  11
QUADRENT SUMS...HARD DECISIONS
     407  20                                                22  10
      28  25                                               442  38
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
       2   0   0   0         11  23  25   4              1   0   1   0   0   1   0   0
       1   0   0   4         41  60  34   6              0   0   0   0   0   0   1   0
       0   0   3  12         75  78  24   5              0   0   0   0   1   3   9  14  10   0
       0   0   0  11         26  20   7   0              0   0   0   1   4  27  62  45  18   0
       0   1   1   2          4   2   0   1              0   0   1   6  42  78  50  11   0
       0   0   1   0          0   1   2   2              0   1   0  14  34  33  13   1   0
       0   0   0   2          0   1   1   0              0   0   0   4   8   7   3   6   0
QUADRENT SUMS...HARD DECISIONS
      33 439                                                 3  40
       8  32                                                31 438
      41 2038 1322 2042
       9   10   13   14
      17   18   21   22

252 BIT ERROR INTERVALS
  7.0000E+00  1.0000E+01  1.5000E+01  2.2000E+01  1.0000E+01  2.6000E+01  1.5000E+01  6.2000E+01  0.          0.
```

```
ENODB=    7.0 ,OELF=   44.0 ,BIF=   1500 ,BL2=    352 ,ASOFT= .3703
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00      FBFHA=    2.0000E-01
SOAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.
WN= 331.9 ,K= 468.6 ,TAU1=   1.1250E-01 ,TAU2=  4.1807E-03 ,HNB=     .9 ,KB= 866.4 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   1.0000E+00
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    9.3750E-02 STDEV=   6.4918E-01 9ITS=    2016
XISUM=    3.0438E-01 XISIG=   1.9874E+1
LOCKIN=      7 ,DROPOUTS=     15 ,AVE=  2.6930E+00 ,STD DEV=  2.1229E+00
ERRM
  6.0000E+01  8.0010E+00  9.0000E+03  7.0030E+00  1.3000E+01  8.0000E+00  6.0000E+00  6.0000E+00  7.0000E+00  6.0000E+00
  2.0000E+00  2.0000E+00  6.0000E+00  3.0000E+00  4.0000E+00  4.0000E+00  4.0000E+00  3.0000E+00  4.0000E+00  1.0000E+00
  0.          2.0000E+00  0.          3.0030E+00  0.          4.0000E+00  1.0030E+00  2.0000E+00  0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.
  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          2.0000E+00  0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480
      2   4   7   8   6   3   2   3
     2  15  30  14   8   1   0   0
    15  43  97  41   6   1   0   0
    16  30  48  12   5   0   0   0
     7  15  18   2   1   0   0   0
     0   1   0   1   0   0   0   0
     0   0   0   0   0   0   0   0
QUADRANT SUMS...HARD DECISIONS
   391  36
    45   8

+1-1 P(R1.R2/T1.T2)TIMES   512
     0   3   1   4   8  27  21   5
     0   0   0   4  43  55  38   5
     0   1   1  11  73  75  24   0
     0   0   3  11  31  20   5   1
     0   0   0   2   6   0   3   0
     0   0   0   0   3   7   0   1
     0   0   0   1   0   2   6   6
QUADRANT SUMS...HARD DECISIONS
    39  430
    10   33
  1639 1786 1577 1790
     9   10   13   14
    17   18   21   22

-1+1 P(R1.R2/T1.T2)TIMES   512
     1   0   0   0   3   0   0   0
     0   0   0   0   4   1   0   0
     0   0   0   0   4   6   1   0
     0   0   0   0   8   6   1   0
     0   0   0   0   8   1   0   0
     0   0   0   0   1   0   0   0
     0   0   0   0   0   0   0   0
    29  17
   431  35

+1+1 P(R1.R2/T1.T2)TIMES   512
     0   0   0   0   1   0   0   1
     0   0   1   1   0   2   2   0
     0   0   1   0   2   2   1   0
     0   0   0   2   2   3   2   1
     0   0   0   0   2   2   3   0
     0   0   0   0   1   2   2   1
     1   0   0   2   2   1   1   1
     6  41
    38 427

252 BIT ERROR INTERVALS
  1.4000E+01  1.8000E+01  1.4000E+01  3.0000E+01  3.3000E+01  2.2000E+01  3.3000E+01  2.5000E+01  0.          0.
```

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    176 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=   2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 165.9 ,K= 460.6 ,TAU1=  4.5000E-01 ,TAU2=  8.4420E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PPFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   1.0813E-01 STDEV=   6.9165E-03 BITS=    2016
XISUM=   3.2486E-01 XISIG=   1.8095E-01
LOCKIN=      5 ,DROPOUTS=     53 ,AVE=  2.7170E+00 ,STD DEV=  2.5945E+00
ERRM
  8.4000E+01  1.1000E+01  8.0000E+00  7.0000E+00  7.0000E+00  1.2000E+01  9.0000E+00  5.0000E+00  4.0000E+00  7.0000E+00
  1.1000E+01  4.0000E+00  2.0000E+00  6.0000E+00  2.0000E+00  4.0000E+00  3.0000E+00  5.0000E+00  1.0000E+00  0.
  1.0000E+00  5.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  0.          0.          0.          5.0000E+00
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          5.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     6    31    28    16     4     3     1     0     0     0     1     0     0     0     1     1     0     0     0
    21    57    45    15     6     6     1     0     0     0     1     7     4    10     2     4     3     0     0
    29    48    35    11     3     3     0     1     0     0     4     9    28    10     4     3     3     0     0
    14    15    28     6     5     6     1     0     1     0     1     3     4     2     1     3     2     1     0
     1     3     5     3     5     4     1     0     1     1    13    51    42    17    11     3     2     1     0
     0     0     1     6     2     1     1     1     1     1    14    52    64    29     5     1     1     1     0
     0     0     0     3     0     1     1     1     1     1     3    26    26    21     6     3     1     1     0
     0     0     0     0     1     1     0     2     0     0     0     3     7    14     1     2     1     1     0
QUADRENT SUMS...HARD DECISIONS                                                  75    16
   405    31                                                                    382    39
    22    22                                                                  +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                     0     0     0     0     0     0     0     0
     0     0     3     6     7     4     2     0     0     0     0     0     0     0     1     0     0     0     0
     0     1     3    16    54    63    17     2     0     0     0     0     0     0     1     0     2     0     0
     0     1     3    16    65    66    28     9     0     0     1     0     0     0     1     4     8     6     3
     0     0     6     8    20    28    19     9     2     0     0     0     0     0     1     1     8    23    28    14
     0     1     1     4     8    19     9     2     3     0     0     0     0     0     1     3     4    17    52    72    19
     0     0     0     2     1     6     8     3     2     0     0     0     0     0     2    11    27    57    54    20
     0     0     0     0     1     0     3     1     0     0     0     0     0     0     3     4     7    19    22    14
QUADRENT SUMS...HARD DECISIONS                                                   8    11
    63   385                                                                    31   462
     8    56
   673    48   816  1076
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  4.3000E+01  1.7000E+01  2.7000E+01  2.7000E+01  2.5000E+01  2.9000E+01  2.5000E+01  2.5000E+01  0.          0.
```

```
ENDDB=    7.0 ,DELF=   62.0 ,BIF=   150C ,BL2=    205 ,ASOFT= .370C
FOOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SOAMP=     0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 193.3 ,K= 468.6 ,TAU1=   3.3169E-01 ,TAU2=   7.2364E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    5.9028E-02 STDEV=    5.2489E-03 BITS=    2016
XISUM=    3.3876E-01 XISIG=    1.7931E-01
LOCKIN=       8 ,DROPOUTS=      26 ,AVE=    2.5000E+00 ,STD DEV=   2.0816E+00
ERRM
   3.0000E+01   2.0000E+00   7.0000E+00   3.0000E+00   9.0000E+00   4.0000E+00   2.0000E+00   0.           2.0000E+00   2.0000E+00
   3.0000E+00   6.0000E+00   0.           2.0000E+00   1.0000E+00   0.           5.0000E+00   4.0000E+00   3.0000E+00   1.0000E+00
   0.           1.0000E+00   1.0000E+00   4.0000E+00   0.           0.           1.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00
   1.0000E+00   0.           3.0000E+00   2.0000E+00   1.0000E+00   0.           0.           0.           0.           1.0000E+00
   2.0000E+00   2.0000E+00   1.0000E+00   0.           2.0000E+00   1.0000E+00   0.           0.           0.           0.
   1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.           0.
   0.           0.           0.           0.           0.           0.           0.           1.0000E+00   0.           0.
   0.           0.           0.           1.0000E+00   0.           0.           0.           0.           0.           1.0000E+00
   0.           0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     10     19     24      7      1      0      1      0                1      1      0      1      0      0      0      0
     28     64     34     14      1      1      0      0                4      3      3      1      0      0      1      2
     35     53     35     14      0      2      1      1                5      4      4      4      1      0      4      1
     16     36     25     10      3      3      1      0               13     11     11      3      0      0      4      3
      3      5      5      4      1      1      0      1               44     44     22      9      5      4      3      2
      0      0      0      2      2      0      1      0               63     70     22      5      5      3      3      1
      0      0      0      1      0      0      0      2               31     45     37      5      4      3      1      0
QUADRENT SUMS...HARD DECISIONS                                        24      5
    424     14                                                       440     43
     30     12                                                              +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                            0      0      0      0      0      0      0      0
      0      1      3      3     18     28      7      1                0      0      0      2      1      1      0      0
      0      0      7      7     63     84     38      3                0      0      0      2      0      1      1      2
      0      0      2     13     31     71     29      0                0      0      0      0      1      1      3      6
      1      0      3      0     20     27     15      2                0      0      0      0      0     10     22     42
      1      0      0      0      3      9      3      1                0      0      0      0      0     25     66     73
      0      0      0      0      1      4      3      0                0      0      0      1      1     14     56     58
      0      0      0      0      0      1      1      0                0      0      1      3      6     13     16     14
QUADRENT SUMS...HARD DECISIONS                                        2     14
     33    447                                                        9    487
      1     31
   1606    563   1686   1079
      9     10     13     14
     17     18     21     22

252 BIT ERROR INTERVALS
  1.1000E+01  1.2000E+01  1.5000E+01  1.3000E+01  1.3000E+01  2.0000E+01  2.3000E+01  1.4000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    235 ,ASOFT= .3730
FOOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=     2.0000E+00 SDPHA=     0.          FBPHA=     2.0000E-01
WN= 221.6 ,K= 468.6 ,TAU1=  2.5241E-01 ,TAU2=  6.3023E-03 ,WNB=     .9 ,K9= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    6.3492E-02 STDEV=    5.4309E-03 BITS=    2016
XISUM=    3.5458E-01 XISIG=    1.7968E-01
LOCKIN=     22 ,DROPOUTS=     16 ,AVE=  1.6250E+00 ,STD DEV=  1.2686E+00
EPOM
   4.0000E+01   1.0000E+01   7.0000E+00   3.0000E+00   5.0000E+00   4.0000E+00   4.0000E+00   1.0000E+00   4.0000E+00   3.0000E+00
   2.0000E+00   2.0000E+00   3.0000E+00   0.           1.0000E+00   1.0000E+00   1.0000E+00   3.0000E+00   0.           2.0000E+00
   0.           1.0000E+00   0.           2.0000E+00   3.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   0.
   0.           2.0000E+00   1.0000E+00   0.           1.0000E+00   1.0000E+00   2.0000E+00   0.           0.           0.
   0.           0.           1.0000E+00   0.           0.           1.0000E+00   0.           1.0000E+00   1.0000E+00   1.0000E+00
   0.           1.0000E+00   1.0000E+00   0.           1.0000E+00   0.           0.           0.           0.           0.
   0.           0.           0.           0.           0.           1.0000E+00   0.           0.           0.           0.
   0.           0.           1.0000E+00   0.           0.           0.           0.           0.           0.           0.
   0.           1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.
   0.           0.           0.           1.0000E+00   0.           0.           0.           0.           0.           2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     7     26     23      6      1      2      1      2                3      0      1      0      2      0      0      0
    29     42     48     10      2      0      0      1                0      0      0      0      0      0      0      0
    40     62     39     19      5      2      2      0                1      0      2      1      1      0      0      0
    22     28     19      8      1      0      2      0                0      6      6      5      2      3      2      3
     3      4      3      1      1      0      1      0                9     27     39     10      3      1      3      1
     0      0      1      1      4      1      2      0               24     54     81     28      4      4      2      0
     0      0      1      0      2      0      0      1                7     46     47     25      1      1      0      0
     0      0      0      0      1      0      0      2               10     10     22     13      3      0      1      0
QUADRENT SUMS...HARD DECISIONS
     428          19                                                 25     11
      16          17                                                452     24
+1-1 P(R1.R2/T1.T2)TIMES   512                                    +1+1 P(R1.R2/T1.T2)TIMES   512
     0      0      1      3     17     42     20      4                0      0      0      0      0      0      0      0
     0      0      0     16     46     64     40      7                0      0      0      0      0      0      0      0
     2      0      2     14     60     53     28      6                0      0      0      1      1      0      0      0
     2      0      0      4     17     17      8      1                0      0      0      1      1      5     10      4
     0      0      0      1      3      5      3      2                0      0      0      1      4     10     42     13
     0      0      0      0      2      4      1      2                0      0      0      2      2      9     59     64     33
     0      0      0      1      2      0      3      4                0      0      0      2      2     14     47     70     29
     0      0      0      0      2      0      3      4                0      0      1      1      5     19     16      8
QUADRENT SUMS...HARD DECISIONS
      44          430                                                 2     19
       2           36                                                 9    482
   119    410   1761    414
     9     10     13     14
    17     18     21     22

252 BIT ERROR INTERVALS
  1.2000E+01   9.0000E+00  1.8000E+01  8.0000E+00  1.7000E+01  2.9000E+01  2.6000E+01  9.0000E+00  0.          0.
```

```
ENDDB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   264 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 248.9 ,K= 468.6 ,TAU1=  2.0000E-01 ,TAU2=  5.6011E-03 ,WN8=    .9 ,K8= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.1000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.1091E-02 STDEV=   4.9039E-03 BITS=   2016
XISUM=   3.6395E-01 XISIG=   1.8200E-01
LOCKIN=    15 ,DROPOUTS=    11 ,AVE=  1.7273E+00 ,STC DEV=  1.2129E+00
ERRM
  3.3000E+01  2.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  0.
  3.0000E+00  2.0000E+00  0.          5.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          2.0000E+00
  0.          1.0000E+00  1.0000E+00  2.0000E+00  1.2000E+00  0.          3.0000E+00  1.0000E+00  0.          1.0000E+00
  3.0000E+00  2.0000E+00  1.0000E+00  0.          4.0000E+00  0.          0.          2.0000E+00  0.          0.
  1.0000E+00  0.          0.          0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00
  1.0000E+00  0.          1.0000E+00  2.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
   3   26   28   12    2    1    2    1          3    1    0    0    1    0    0    0
  22   39   41   19    3    0    0    0          1    2    0    0    1    0    0    1
  43   62   53   11    2    0    2    0          0    3    0    2    2    0    1    0
  22   27   26    7    0    0    0    1          2    3    7    6    2    1    0    0
   5    7    3    1    0    1    0    1          3   22   20   19    1    1    2    1
   0    0    0    1    0    1    1    1         23   57   69   21    4    0    2    1
   0    0    0    1    0    0    0    2         28   49   56   26    5    1    0    0
   0    0    0    0    0    0    0    1          8   21   14   16    4    0    1    1
QUADRENT SUMS...HARD DECISIONS
   441   13                                      30    7
    18    8                                     452   23
+1-1 P(R1.R2/T1.T2)TIMES   512                  +1+1 P(R1.R2/T1.T2)TIMES   512
   0    0    2    2   17   35   30    4          0    1    0    0    0    0    0    0
   0    0    2    2   43   87   52    9          0    0    0    2    0    3    0    0
   0    2    2    6   38   66   29    1          0    0    1    1    1    0    1    0
   2    1    1    8   14   25    7    2          0    0    0    0    1    1    2    5
   1    0    2    0    1    4    1    0          1    1    1    0    2   19   43   13
   0    0    0    1    0    1    0    1          0    0    3   12   53   88   33
   1    0    0    0    1    1    1    2          1    1    2    2   15   69   73   25
   0    0    0    0    0    0    2    7          0    1    1    1    5   14   16   12
QUADRENT SUMS...HARD DECISIONS
    28   459                                      5   10
     4    21                                     15  482
   960  1382   541  1386
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  1.7000E+01  1.4000E+01  8.0000E+00  7.0000E+00  2.3000E+01  1.3000E+01  1.0000E+01  0.          0.
```

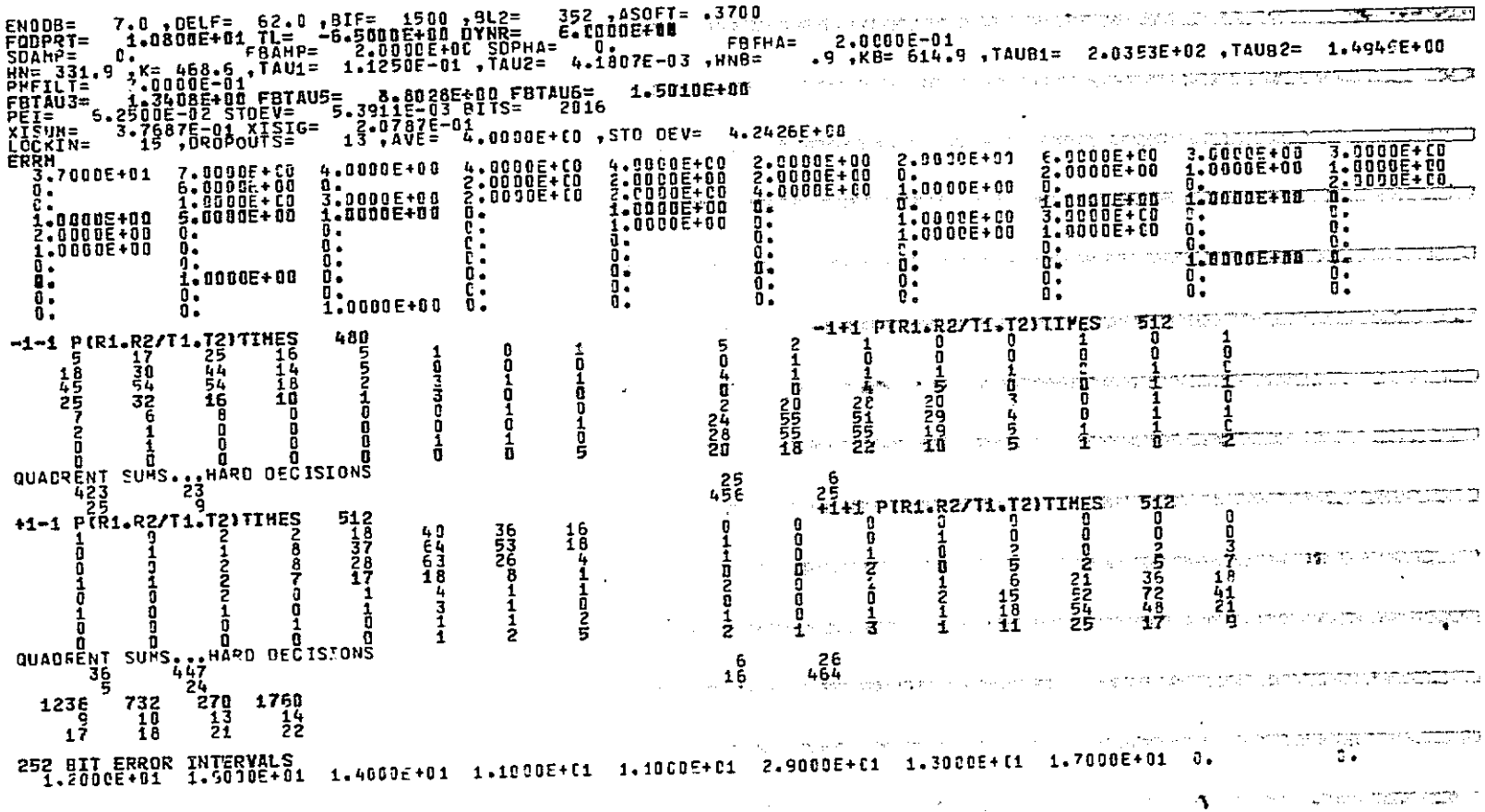
```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    323 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
HN= 304.5 ,K= 468.6 ,TAU1=  1.3361E-01 ,TAU2=  4.5633E-03 ,HNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.1587E-02 STDEV=   4.9263E-03 BITS=    2016
XISUM=    3.7798E-01 XISIG=   1.9580E-01
LOCKIN=     11 ,DROPOUTS=     9 .AVE=   1.4444E+00 ,STD DEV=  6.8493E-01
ERRM
  2.8000E+01  9.0000E+00  3.0000E+00  3.0000E+00  7.0000E+00  5.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00
  0.          2.0000E+00  2.0000E+00  0.          0.          2.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  3.0000E+00
  3.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.          2.0000E+00  0.          1.0000E+00  0.
  1.0000E+00  2.0000E+00  0.          0.          2.0000E+00  0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00
  0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.

-1-1 P(R1.R2/T1.T2)TIMES   480
     6     15     20     19      0      0      2      2      0      0      0      0      0      0      0      0      0      0
    25     49     37     15      3      0      0      2      0      0      0      0      0      3      0      1      3      1
    44     60     46     18      3      0      1      0      0      1      0      0      2      7      1      5      1      1
    23     26     26      7      0      0      0      0      1      1      0      1      4      6      4      2      1      1
     7      8      4      2      0      0      0      1      1      1      2      5      9      5      4      1      1      0
     0      0      1      1      0      0      0      1      4      3      8     16      5      5      1      0      0      0
     0      0      0      0      0      2      0      4      4     19     32     16      9      5      0      2      0      0
QUADRENT SUMS...HARD DECISIONS                                  18      8
   436     11                                                  451     25
    24      9

-1+1 P(R1.R2/T1.T2)TIMES   512
     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0

+1-1 P(R1.R2/T1.T2)TIMES   512
     0      2      3      6     13     43     56     11      0      0      0      0      0      0      0      0      0      0
     0      0      3      8     44     82     45     10      0      0      0      0      0      0      0      1      2      0
     0      0      4      7     35     55     19      1      0      0      0      0      0      0      2      6      1      0
     0      0      2      6     16     16      7      1      0      0      0      0      0      1      7     18     42     21
     0      0      0      2      0      1      0      0      0      0      0      0      2      1     13     44     72     55
     0      0      0      0      0      0      1      3      0      0      0      0      0      3     13     54     54     18
     0      0      0      0      0      1      4      6      0      0      0      0      0      1     13     20     24     10
QUADRENT SUMS...HARD DECISIONS                                   1     24
    38    454                                                    9    478
     5     17
    63    434    175    438
     9     10     13     14
    17     18     21     22

252 BIT ERROR INTERVALS
  1.2000E+01  1.1000E+01  1.0000E+01  9.0000E+00  1.8000E+01  5.0000E+00  1.6000E+01  2.3000E+01  0.          0.
```


ENODB= 7.0 ,DELF= 62.0 ,BIF= 1500 ,BL2= 352 ,ASOFT= .3700
FODPRT= 1.0800E+01 TL= -6.5000E+00 DYNR= 6.0000E+00
SOAMP= 0. FBAMP= 2.0000E+00 SOPHA= 0. FBPHA= 2.0000E-01
HN= 331.9 ,K= 468.6 ,TAU1= 1.1250E-01 ,TAU2= 4.1807E-03 ,HNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PHFILT= 1.0000E-01
FBTAU3= 1.3408E+00 FBTAU5= 8.8028E+00 FBTAU6= 1.5010E+00
PEI= 5.2500E-02 STDEV= 5.3911E-03 BITS= 2016
XISUM= 3.7687E-01 XISIG= 2.0787E-01
LOCKIN= 15 ,DROPOUTS= 13 ,AVE= 4.0000E+00 ,STD DEV= 4.2426E+00
ERRM
-1-1 P(R1.R2/T1.T2)TIMES 480
QUADRENT SUMS...HARD DECISIONS
+1-1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
-1+1 P(R1.R2/T1.T2)TIMES 512
+1+1 P(R1.R2/T1.T2)TIMES 512
252 BIT ERROR INTERVALS

```
ENDDB=    7.0 ,DELF=   88.0 ,BIF=   1500 ,BL2=    176 ,ASDEI=  .3700
FQDPRT=   1.0000E+01 TL=   -6.5000E+00 DYNB=    0.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 165.9 ,K= 468.6 ,TAU1=   4.5000E-01 ,TAU2=   8.4420E-03 ,WNB=     .9 ,KB= 433.2 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4949E+00
PMFILT=   5.0000E-01
FBTAU3=   1.3400E+00 FBTAU5=   8.8020E+00 FBTAU6=   1.5610E+00
PEI=    2.2321E-01 STDEV=    9.2740E-03 BITS=    2016
XISUM=    3.8531E-01 XISIG=    2.2846E-01
LOCKIN=      6 ,DROPOUTS=    149 ,AVE=   4.8725E+00 ,STD DEV=   1.9039E+01
ERRM
  2.2500E+02  4.9000E+01  2.9000E+01  2.0000E+01  2.9000E+01  1.8000E+01  1.5000E+01  1.4000E+01  4.8000E+00  1.2000E+01
  4.0000E+00  3.0000E+00  2.0000E+00  6.0000E+00  3.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  0.          2.0000E+00
  2.0000E+00  2.0000E+00              3.0000E+00              2.0000E+00  1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
-1-1 P(R1.R2/T1.T2)TIMES    480                                          -1+1 P(R1.R2/T1.T2)TIMES    512
    65    49    37    18    16     9     0     1          8     5     3     0     2     0     0     0
    36    19    17    10    11     6     0     0         10     3     5     3     4     5     0     0
    25    21    12     4     9     4     2     1         15     7    11     6     5     6     3     0
     7     7    10     3     3     3     2     1         21    15    14     6     3     4     3     0
     2     2     5     4     4     3     1     0         29    23    25    11     5    12     4     3
     0     1     6     8     6     4     5     2         26    26    27    12     2     4     6     3
     0     0     1     2     0     6     3     1         11    15    21     8    11     4     8     1
     0     0     0     0     0     0     2     0          1     4    10    12     8     6     1     2
QUADRENT SUMS...HARD DECISIONS
   340    67                                            132    42
    31    42                                            261    75
+1-1 P(R1.R2/T1.T2)TIMES    512                                          +1+1 P(R1.R2/T1.T2)TIMES    512
     1     1     3    12    23    15     4     2          0     2     0     1     0     0     0     0
     0     2     5    14    24    28    20     6          0     0     2     2     0     0     0     0
     1     6     6    12    30    34    30     8          1     1     2     5     4     1     0     1
     2     2     3     5    15    20    17     6          2     1     5     8     6     0     1     0
     6     4     5     6     3    14    14     7          1     3     3     7    10     5    12    15
     1     0     7     5     1     5     9    16          4     4     9     5     7    13    25    24
     1     1     1     3     7     3    11     9          1     3     9     5    13    23    29    57
     0     0     0     2     0     1     5     7          3     5     7    14    21    27    41    60
QUADRENT SUMS...HARD DECISIONS
    73   285                                             28    21
    42   112                                             89   385
   757  1324  1476   304
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  9.1000E+01  3.7000E+01  3.9000E+01  4.5000E+01  4.7000E+01  6.2000E+01  7.9000E+01  5.0000E+01  0.          0.
```

```
ENDDB=    7.0 ,DELF=   88.0 ,BIF=   1500 ,BL2=    205 ,ASOFT= .3704
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 GYNR=   6.0000E+00
SDAMP=    0.         FBAMP=    2.0000E+00 SOPHA=    0.         FBPHA=    2.0000E-01
WN= 193.3 ,K= 468.6 ,TAU1=   3.3169E-01 ,TAU2=   7.2364E-03 ,WNB=     .9 ,KB= 433.2 ,TAUB1=   2.3353E+02 ,TAUB2=   1.4945E+00
PHFILT=   5.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.6028E+09 FBTAU6=   1.5010E+00
PEI=   1.3746E-01 STDEV=   7.6675E-03 BITS=    2016
XISUM=    4.1770E-01 XISIG=   2.3399E-01
LOCKIN=      6 ,DROPOUTS=     79 ,AVE=   2.4684E+00 ,STD DEV=   2.3805E+00
ERRM
  1.2100E+02  1.7000E+01  1.6000E+01  8.0000E+00  1.0000E+01  6.0000E+00  7.0000E+00  1.3000E+01  1.1000E+01  1.2000E+01
  6.0000E+00  5.0000E+00  2.0000E+00  1.0000E+00  7.0000E+00  2.0000E+00  4.0000E+00  3.0000E+00  0.          2.0000E+00
  0.          2.0000E+00  1.0000E+00  3.0000E+00  6.0000E+00  3.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00
  0.          1.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
    69     56     32     18     10      7      1      0          4      1      0      1      3      1      1      0
    60     26     17      5      5      9      1      0          6      5      0      5      0      1      0      0
    30     25      9      4      4      1      0      0          8      7      3      5      5      2      3      2
    13     13      6      4      4      4      1      0         15     11      6      2      4      3      2      3
     3      1      3      4      1      4      2      1         25     27     25     10      4      2      0      3
     0      0      2      5      3      1      1      2         31     41     33     16      7      3      1      0
     0      0      0      0      0      1      0      3         19     34     26     17      6      1      0      2
     0      0      0      0      0      2      2      0         11     12     16     20      4      4      1      3
QUADRENT SUMS...HARD DECISIONS                              79     30
   390     47                                              362     41
   18      25                                                      +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512
     2      1      7      8     27     25     21     10          1      2      0      0      0      0      0      0
     2      3      4     11     35     52     29      6          1      1      0      1      1      0      0      1
     0      1      3      5     25     29     25     14          0      1      1      4      0      0      0      0
     2      3      0      2      8     23     23      7          0      0      2      1      1      3      4      3
     2      2      6      5      2      6     15      4          1      2      3      3      5      5     15     17
     0      1      4      1      3      6      7     13          1      1      6      5      4     14     31     31
     0      0      0      1      1      1      2      4          1      0      3      4      9     27     33     22
     0      0      0      0      0      1      5     10          1      3      5      9     22     33     45     78
QUADRENT SUMS...HARD DECISIONS                              14     12
    54    359                                               45    441
    22     77
   804     49    883   1589
     9     10     13     14
    17     18     21     22

252 BIT ERROR INTERVALS
  7.4000E+01  1.9000E+01  1.7000E+01  2.7000E+01  3.6000E+01  3.2000E+01  3.7000E+01  3.5000E+01  0.          0.
```

```
ENCOB=    7.3 ,DELF=   88.0 ,BIF=   1533 ,BL2=    235 ,ASOFT= .3733
FOOPRT=    1.0000E+01 TL=   -6.9000E+00 OYNR=    6.0000E+00
SDAMP=     0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
HN= 221.6 ,K= 448.6 ,TAU1=   2.5241E-01 ,TAU2=   6.3023E-03 ,HNA=     .9 ,K0= 433.2 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=    5.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.6028E+00 FBTAU6=    1.6010E+00
PEI=    8.9286E-02 STDEV=    6.3509E-03 BITS=    2016
XISUM=    4.3779E-01 XISIG=    2.2378E-01
LOCKIN=       7 ,DROPOUTS=      35 ,AVE=   2.2857E+01 ,STD DEV=   1.8757E+00
ERRM
  7.4000E+01   1.1000E+01   6.0000E+00   8.0000E+00   4.0000E+00   6.0000E+00   5.0000E+00   4.0000E+00   3.0000E+00   2.0000E+00
  3.0000E+00   2.0000E+00   2.0000E+00   2.0000E+00   2.0000E+00   2.0000E+00   3.0000E+00   2.0000E+00   2.0000E+00   2.0000E+00
  4.0000E+00   2.0000E+00   2.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00
  1.0000E+00   2.0000E+00   0.          1.0000E+00   0.          0.          1.0000E+00   0.          0.          0.
  0.           2.0000E+00   0.          0.           0.          0.          0.           0.          0.          0.
  1.0000E+00   1.0000E+00   0.          0.           0.          0.          0.           0.          0.          0.
  0.           0.           0.          0.           0.          0.          0.           0.          0.          0.
  0.           0.           0.          0.           0.          0.          0.           0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                -1+1 P(R1.R2/T1.T2)TIMES   511
     56    62    22     7    11
     64    43    29     9     1
     40    31    16     5     1
     13    17     6     5     1                                                17    19    15    14
      2     4     2     1     1                                                 6     5     7     1
      1     1     1     0     0                                                 3     2     3     1
      0     1     0     0     0                                                11    12    18    21

QUADRENT SUMS...HARD DECISIONS                                                 55    19
    415    29                                                                 416    21
     14    22                                                                      +1+1 P(R1.R2/T1.T2)TIMES   513
+1-1 P(R1.R2/T1.T2)TIMES   512
      0     2     7     7     3    57    26    11                                0     0     0     0     0     0     0     0
      1     1     4     2     2    67    48    17                                0     0     0     0     0     0     0     0
      0     1     1     1     1    33    26     8                                0     0     0     0     0     0     0     0
      0     1     2     1     3    18    14     4                                0     0     1     1     2     1     1     0
      0     0     0     1     1     4     7     2                                0     0     1     1     5     3     7     2
      0     0     0     0     0     1     4     5                                0     0     2     5    12    34    49    88

QUADRENT SUMS...HARD DECISIONS                                                  3    11
     46   410                                                                   33   469
      9    47
   1833  1247   804  1763
      9    10    13    14
     17    18    21    22

252 BIT ERROR INTERVALS
   3.4000E+01  2.0000E+01  1.9000E+01  2.6000E+01  1.7000E+01  3.0000E+01  2.0000E+01  1.3000E+01  0.          0.
```

```
ENDDB=    7.0 ,DELF=   88.0 ,BIF=   1500 ,BL2=    264 ,ASOFI= .3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 248.9 ,K= 468.6 ,TAU1=   2.0000E-01 ,TAU2=   5.6011E-03 ,WNB=     .9 ,KB= 433.2 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILI=   5.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    5.3075E-02 STDEV=    4.9930E-03 BITS=    2016
XISUM=    4.5344E-01 XISIG=    2.1764E-01
LOCKIN=      7 ,DROPOUTS=     20 ,AVE=   2.4500E+00 ,STD DEV=   2.1089E+00
ERRM
  2.7000E+01   5.0000E+00   4.0000E+00   3.0000E+00   3.0000E+00   4.0000E+00   2.0000E+00   4.0000E+00   3.0000E+00   3.0000E+00
  4.0000E+00   0.           1.0000E+00   1.0000E+00   0.           1.0000E+00   1.0000E+00   0.           1.0000E+00   2.0000E+00
  0.           1.4622E+00   3.0000E+00   2.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00
  1.0000E+00   2.0000E+00   2.0000E+00   0.           3.0000E+00   0.           0.           2.0000E+00   0.           0.
  0.           1.3000E+00   1.0000E+00   0.           1.3500E+00   1.0000E+00   0.           1.0000E+00   1.0000E+00   0.
  1.0000E+00   0.           0.           2.0000E+00   2.0000E+00   0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           1.0000E+00   0.           0.           0.           0.           0.           0.           0.           1.0000E+00
  0.           0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES    480                                  -1+1 P(R1.R2/T1.T2)TIMES    512
    61    55    27     9     3     4     8     3                3     0     0     0     0     0     0     0
    56    50    26     6     1     1     3     1                3     1     1     0     1     0     0     0
    52    31    13     2     1     0     1     0                2     2     2     1     0     0     0     0
    18    14    10     0     0     1     0     0                4     6     6     3     0     0     1     1
     1     4     2     2     1     0     0     0               16    24    15    12     2     0     3     2
     0     1     0     2     1     1     0     0               28    50    43    11     3     1     1     2
     0     0     0     0     0     0     1     0               53    47    32    12     1     1     1     0
     0     0     0     0     0     0     1     0               27    36    25    20     4     0     0     1
QUADRENT SUMS...HARD DECISIONS                                    35     4
   439    20                                                    451    22
    12     3                                                          +1+1 P(R1.R2/T1.T2)TIMES    512
+1-1 P(R1.R2/T1.T2)TIMES    512
     1     1     4     5    26    66    47    17                0     0     0     0     0     0     0     0
     0     0     1     5    27    72    43    23                0     0     0     0     0     0     0     0
     0     1     0     5    32    35    18    12                0     0     1     1     1     0     1     0
     1     1     3     4     8    11     9     4                0     0     0     2     1     3     3     4
     0     0     0     1     2     0     3     3                0     1     0     1     0     6    13    21
     0     0     0     0     1     3     3     5                0     1     3     3    13    42    57    57
     0     0     0     0     0     2     5     3                0     3     3    22    21    46    68    68
     0     0     0     0     0     2     4     6                1     0     1     2    14    29    57    93
QUADRENT SUMS...HARD DECISIONS
    31   447                                                    14    485
     3    31
   105   778  1839   782
     9    10    13    14
    17    18    21    22

252 BIT ERROR INT RVALS
  1.9000E+01  8.0000E+00  1.1000E+01  1.6000E+01  8.0000E+00  2.1000E+01  1.2000E+01  1.1000E+01  0.          0.
```

```
ENODB=   7.6 ,DELF=   88.6 ,BIF=   1533 ,BL2=    323 ,ASOFI= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
NN= 304.5 ,K= 468.6 ,TAU1=   1.3361E-01 ,TAU2=   4.5633E-03 ,WNR=     .9 ,KB= 433.2 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   5.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8026E+00 FBTAU6=   1.5010E+00
PEI=   4.3651E-02 STDEV=   4.5565E-03 BITS=   2016
XISUM=   4.6623E-01 XISIG=   2.1873E-01
LOCKIN=      8 ,DROPOUTS=     12 ,AVE=   3.7500E+00 ,STD DEV=   3.0311E+00
ERRM
  2.8000E+01  6.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00
  1.0000E+00  2.0000E+00  1.0000E+00  0.          2.0000E+00  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00
  1.0000E+00  0.          3.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          2.0000E+00
  1.0000E+00  0.          1.0000E+00  0.          2.0000E+00  0.          1.0000E+00  0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          2.0000E+00  0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          2.0000E+00
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    52     60     34     11      2      2      3      2          2      4      0      2      0      0      0      1
    70     39     15      3      2      0      1      0          1      1      0      1      1      0      1      1
    56     31     15      5      0      0      0      0          2      0      1      2      1      1      2      2
    30     10     13      1      0      0      0      0         10     13     19      5      1      1      0      0
     3      0      1      2      0      1      0      1         40     67     28     13      2      1      1      1
     0      1      1      3      0      1      0      1         46     49     38     18      2      1      1      1
     1      0      0      0      0      0      1      3         49     24     24     18      4      1      1      1
     0      0      0      0      0      0      1      3
QUADRENT SUMS...HARD DECISIONS                                    23      9
   445     15                                                   461     19
    13      7                                                          +1+1 P(R1.R2/T1.T2)TIMES   512+
+1-1 P(R1.R2/T1.T2)TIMES   512
     1      0      1      6     19     78     67     28          1      0      0      0      0      0      0      0
     0      0      0      4     28     70     48     20          0      0      0      0      0      0      0      0
     3      1      0      2     17     38     14      6          0      0      0      0      0      0      0      0
     0      1      0      1     11      9      8      1          0      0      0      1      0      0      0      0
     1      0      0      0      4      2      2      1          0      0      0      1      1      1      1      2
     1      0      0      0      1      1      1      1          0      3      1      1      1     19     43     22
     0      0      0      0      0      2      1      1          0      0      1      1      1     23     74     66
     0      0      0      0      0      3      3      7          2      2      0      1      7     22     56     75
QUADRENT SUMS...HARD DECISIONS
    29     462                                                    3      3
     1      29                                                   14     492
  1606     563   1686   1079
     9      10     13     14
    17      18     21     22

252 BIT ERROR INTERVALS
  1.2000E+01  5.0000E+00  1.3000E+01  6.0000E+00  1.3000E+01  1.4000E+01  1.7000E+01  1.1000E+01  0.          0.
```

```
EN0DB=   7.6 ,DELF=  88.6 ,BIF=  150. ,BL2=   352 ,ASOFT= .3766
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 AYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
HN= 331.9 ,K= 468.6 ,TAU1=  1.1250E-01 ,TAU2=  4.1807E-03 ,WNB=    .9 ,KB= 433.2 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   5.0000E-01
FBTAU3=   1.3406E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.3075E-02 STDEV=   4.9936E-03 BITS=   2016
XISUM=   4.8257E-01 XISIG=   2.5334E-01
LOCKIN=     8 ,DROPOUTS=    18 ,AVE=  3.7778E+00 ,STD DEV=  2.9355E+00
ERRM
  4.0000E+01  7.0000E+00  3.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.
  2.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          3.0000E+00  1.0000E+00
  0.          1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  0.          0.          0.          0.          2.0000E+00
  1.0000E+00  0.          0.          0.          2.0000E+00  0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.
  0.          2.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    59    59    32    10     1     1     2     3                5     3     0     2     1     0     0     0
    67    37    18     5     1     0     1     1                1     0     1     1     0     0     2     2
    51    29    19     2     1     0     1     4                1     2     2     0     0     2     0     2
    38     9    10     3     1     0     0     1               12    16    22     3     2     3     0     1
     3     2     1     1     1     0     0     0               37    57    29    12     1     2     1     1
     2     1     0     2     0     0     1     1               51    58    34    17     2     1     0     0
     0     0     0     0     0     0     1     1               58    25    17    16     1     4     1     4
 QUADRENT SUMS...HARD DECISIONS                                                21    13
      440    15                                                               456    25
       14    11                                                                    +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                    3     0     0     0     1     0     0
        3     2     4     6    23    66    72    29                1     0     0     0     0     0     0     2
        1     2     5     3    31    64    42    24                1     0     0     0     0     0     1     4
        0     1     0     3    22    34    21    15                0     0     0     0     0     2     2     1
        0     1     0     0     7     6     5     1                0     1     1     0     2     1    19    21
        1     1     1     0     2     1     2     2                1     1     1     2     1    16    38    32
        2     0     0     1     1     1     2     4                2     1     2     1    11    25    72    58
        0     0     0     0     1     5     3     9                2     2     5     2     4    26    59    73
 QUADRENT SUMS...HARD DECISIONS                                                 5    13
       25    451                                                              12    485
        4     32
   1606   563  1686  1079
      9    10    13    14
     17    18    21    22

 252 BIT ERROR INTERVALS
   1.5000E+01  7.3000E+00  1.3000E+01  9.0000E+00  1.2000E+01  2.1000E+01  2.0000E+01  1.6000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0000E+01 TL=   -6.5000E+00 DYNR=   0.
SDAMP=   0.          FBAMP=    2.0000E+00 SDPHA=   0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   4.0179E-02 STDEV=   4.3737E-03 BITS=   2016
XISUM=   3.7119E-01 XISIG=   1.8115E-01
LOCKIN=    23 ,DROPOUTS=    21 ,AVE=  2.0952E+00 ,STD DEV=  2.3886E+00
ERRH
  1.8000E+01  2.0000E+00  1.0000E+00  1.0000E+00  6.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00
  3.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          2.0000E+00  0.          1.0000E+00
  0.          0.          3.0000E+00  0.          1.0000E+00  2.0000E+00  0.          1.0000E+00  2.0000E+00  0.
  1.0000E+00  2.0000E+00  1.0000E+00  0.          0.          0.          0.          2.0000E+00  0.          0.
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     4     20     21      8      3      1      1      1              1      0      0      0      0      0      0      0
    23     56     43     21      2      1      0      0              0      0      0      1      0      0      0      0
    44     60     46     17      1      0      0      0              0      0      0      0      2      0      0      0
    24     38     24      3      0      0      0      0              0      2      4      2      2      1      0      1
     8      9      2      0      0      1      0      0              1     14     29     11      2      0      1      1
     0      1      1      2      6      3      1      1             22     65     70     32      5      3      0      2
     0      0      1      3      1      0      0      0             25     64     57     17      6      2      0      0
QUADRENT SUMS...HARD DECISIONS      1      0      0                 9     30     14      9      4      0      2      0
      444       7                                                      10       6
       24       5                                                  469      27
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     0      0      1      5     12     42     37      8              0      0      0      0      0      0      0      0
     0      0      1      8     51     91     48      6              0      1      0      0      0      0      0      0
     0      0      6      8     45     61     26      4              0      0      0      0      1      0      0      0
     0      0      0      4      7     25      4      2              0      0      0      0      0      1      0      0
     0      0      0      1      0      1      1      1              0      0      0      0      1      2      9      7
     0      0      0      0      2      3      1      1              0      1      0      1      1     13     20     43     22
     0      0      0      0      0      1      1      3              0      0      0      0      2      5     23     19      9
QUADRENT SUMS...HARD DECISIONS                                     1      0      0      2      5     48     79     35
       27     469                                                                                  61     70     27
        1      15                                                    1       19
  1204   1857   712  1349                                           7      485
     9     10     13     14
    17     18     21     22

252 BIT ERROR INTERVALS
  1.5000E+01  2.0000E+00  1.4000E+01  1.4000E+01  1.1000E+01  1.1000E+01  7.0000E+00  7.0000E+00  0.          0.
```

```
ENODB=   7.0 ,OELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    3.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    3.6211E-02 STDEV=    4.1667E-03 BITS=    2016
XISUM=    3.6979E-01 XISIG=    1.8632E-01
LOCKIN=     16 ,DROPOUTS=     15 ,AVE=   1.7333E+00 ,STD DEV=   9.9778E-01
ERRM
  1.0000E+01  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00
  0.          7.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00
  1.0000E+00  2.0000E+00  0.          4.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  0.
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          2.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          0.          1.0000E+00  0.          2.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.
  1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          3.0000E+00
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     4     9    17    20     2     1     1     1     1     1     0     1     1     0     0     0
    21    56    37     7     2     1     0     0     0     0     1     2     0     0     0     1
    38    72    48    20     3     3     0     0     0     0     2     3     3     3     0     0
    30    33    23    10     1     3     0     0     0     0     3    14    25    10     0     1
    10     4     5     1     0     1     0     0     0     0    19    61    79    27     4     0
     0     1     1     0     0     0     0     0     0     0    22    55    50    22     6     1
     0     1     0     0     0     0     0     0     0     0    21    29    24    13     1     0
     0     0     0     0     1     0     0     0     0     0                                    0
QUADRENT SUMS...HARD DECISIONS                                                    15     5
   445    12                                                                     474    18
    21     2                                                                    +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512
     1     0     0     1    11    58    31    14     0     0     0     0     0     0     0     0
     0     0     1    10    52    92    50     7     0     0     0     0     0     0     0     1
     0     0     1     3    39    55    19    12     0     0     0     0     0     2     3    10
     0     0     1     2    11    16     6     1     0     0     0     0     2    17    41    33
     0     0     0     1     1     4     1     1     0     0     0     1    14    60    78    43
     0     0     1     0     0     0     1     0     0     0     0     1     7    57    43    27
     0     0     0     1     1     1     0     2     0     0     0     2    16    26    18    12
     0     0     0     0     1                                                    0    16
QUADRENT SUMS...HARD DECISIONS                                                    8    488
    26   472
     2    12
    68  1891  1398  1293
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.2500E+01  1.4000E+01  8.0000E+00  3.0000E+00  1.4000E+01  6.0000E+00  1.0000E+01  5.0000E+00  0.          0.
```

```
ENGDB=   7.0 ,DELF=  62.0 ,RIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=  1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.6000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=  7.0003E-01
FBTAU3=  1.3408E+00 FBTAU5=  6.8028E+00 FBTAU6=  1.5010E+00
PEI=   3.5714E-02 STDEV=   4.1331E-03 BITS=   2016
XISUM=   3.6690E-01 XISIG=   1.8660E-01
LOCKIN=    16 ,DROPOUTS=    16 ,AVE=   1.7500E+00 ,STD DEV=  1.0308E+00
ERRM
  1.1000E+01   0.           3.0000E+00   1.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   3.0000E+00   1.0000E+00   1.0000E+00
  0.           6.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   0.           0.           2.0000E+00
  1.0000E+00   1.0000E+00   1.0000E+00   3.0000E+00   1.0000E+00   2.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00
  0.           0.           1.0000E+00   1.0000E+00   0.           2.0000E+00   0.           1.0000E+00   0.           0.
  0.           0.           0.           0.           0.           0.           0.           1.0000E+00   1.0000E+00   0.
  1.0000E+00   0.           0.           2.0000E+00   0.           0.           0.           0.           0.           0.
  0.           1.0000E+00   0.           1.3000E+00   0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           1.0000E+00   0.           0.           0.           0.           0.
  1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.           3.0000E+00
  0.           0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     4       8      18      20       1       0       1       1                1       1       0       1       1       0       0       0
    20      55      41       7       2       1       0       0                0       1       1       0       2       0       0       1
    37      74      46      21       3       1       0       0                0       0       2       2       3       0       0       1
    29      33      24       9       1       0       0       0                2       3      12      27      11       3       4       0
    11       4       5       1       0       0       0       0               19      62      78      28       7       4       0       0
     1       0       0       0       0       0       0       0               24      56      49      21       7       0       0       0
     0       0       0       0       1       0       0       0               18      30      25      13       1       1       0       0
QUADRENT SUMS...HARD DECISIONS                                                    13       6
     496      10                                                                 474      19
      22       2                                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                      0       0       0       0       0       0       0       0
       1       0       0       1      14      54      35      11                0       0       0       0       0       0       0       1
       0       0       2       8      54      86      50       8                0       0       0       0       0       2       3      16
       0       0       1       3      41      57      18       2                0       0       0       0       3       2      19      44      33
       0       0       1       3      12      16       6       1                0       0       0       0       1      14      56      76      41
       0       0       0       0       0       4       0       1                0       0       0       1       1       7      60      47      27
       0       0       1       0       1       0       1       0                0       0       0       1      11      24      17      11
       0       0       0       1       0       2       0       2                3       0       0       1
QUADRENT SUMS...HARD DECISIONS                                                    0      16
      26     473                                                                  7     489
       2      11
      68    1801    1098    1293
       9      10      13      14
      17      18      21      22

252 BIT ERROR INTERVALS
  1.1000E+01  1.3000E+01  8.0000E+00  3.0000E+00  1.4000E+01  8.0000E+00  9.0000E+00  5.0000E+00  0.          0.
```

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=  1503 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   2.0000E+01
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+00 ,TAUB2=  1.4945E+00
PMFILT=   7.0003E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   3.5714E-02 STDEV=   4.1331E-03 BITS=   2016
XISUM=   3.6890E-01 XISIG=   1.8660E-01
LOCKIN=    10 ,DROPOUTS=    16 ,AVE=  1.7500E+00 ,STD DEV=  1.0308E+00
ERRM
  1.1800E+01  0.          3.0000E+00  1.3000E+00  1.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00
  0.          6.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          2.0000E+00
  1.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  0.          2.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  1.0000E+00  0.          0.          2.0000E+00  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
     4     8    18    20     1     0     1     1           1     1     0     1     1     0     0     0
    20    55    41     7     2     1     0     0           0     0     1     0     0     0     0     0
    37    74    46    21     3     1     0     0           0     1     0     2     0     0     0     1
    29    33    24     9     1     0     0     0           2     0     2     2     3     0     0     1
    11     4     5     1     0     1     0     0           3    12    27    11     3     3     1     1
     1     0     0     0     0     0     0     0          19    62    78    28     4     0     0     0
     0     3     0     0     0     0     0     0          24    54    49    21     7     0     0     1
     0     0     0     0     1     0     0     0          18    30    25    13     1     1     0     0
QUADRENT SUMS...HARD DECISIONS
   446    10                                              13     6
    22     2                                             474    19
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     1     0     0     1    14    54    35    11           0     0     0     0     0     0     0     0
     0     0     2     8    54    86    50     8           0     0     0     0     0     0     0     0
     0     0     1     9    41    57    18     9           0     0     0     0     0     0     0     1
     0     0     1     3    12    16     6     2           0     0     0     0     0     2     3    10
     0     0     0     0     2     4     0     1           0     0     0     0     2    19    44    33
     0     0     1     0     0     0     1     0           0     1     0     1    14    56    76    41
     0     0     0     1     1     0     0     0           0     0     1     7    60    47    27
     0     0     0     0     0     2     0     2           3     0     0     1    11    24    17    11
QUADRENT SUMS...HARD DECISIONS
    26   473                                              0    16
     2    11                                              7   489
    68  1801  1098  1293
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  1.3000E+01  8.0000E+00  3.0000E+00  1.4000E+01  8.0000E+00  9.0000E+00  5.0000E+00  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   0.
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   1.1062E-01 STDEV=   6.9856E-03 BITS=   2016
XISUM=   3.8824E-01 XISIG=   2.3117E-01
LOCKIN=    24 ,DROPOUTS=    32 ,AVE=  6.1563E+00 ,STD DEV=  7.7866E+00
ERRH
  1.1300E+02  1.5000E+01  1.3000E+01  9.0000E+00  3.0000E+00  5.0000E+00  2.0000E+00  5.0000E+00  4.0000E+00  4.0000E+00
  3.0000E+00  4.0000E+00  3.0000E+00  4.0000E+00  1.3000E+00  2.0000E+00  3.0000E+00  0.          2.0000E+00  1.0000E+00
  1.0000E+00  4.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00  0.                      2.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.                      1.0000E+00
  1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.                      1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00              0.
  2.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.                      0.
  0.          0.          0.          0.          0.          0.          0.          0.                      0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.                      0.
  0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.                      0.

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
    21     15     26     10      1      2      1      3          9      1      1      1      0      0      1      0
    30     58     36     13      0      1      0      0          9      0      2      0      0      3      2      1
    47     57     36     12      0      1      0      1          2      0      2      0      4      3      2      4
    13     28     18      6      2      1      1      0          7     10      7      1      5      2      1      3
     2      2      3      2      2      1      1      0          6     19     30     13      1      0      4      1
     0      0      0      0      2      2      3      2         18     58     67     13      0      0      0      3
     0      0      0      0      0      3      3     13         22     57     37     19      3      0      0      0
                                                               6     12     23      8      3      3      1     12
QUADRENT SUMS...HARD DECISIONS
   418     13                                                 43     30
    11     38                                                408     31
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     4      3      5     12     20     34     20      6          2      0      1      0      0      0      0      0
     2      0      3      8     40     77     31     10          1      0      0      0      0      2      2      0
     3      4      3     17     33     51     21      3          0      1      0      1      0      1      1      2
     1      1      2      4     13     13      3      2          0      0      0      1      2      5      9      4
     0      2      0      1      2      3      2      0          0      0      2      1      6     22     36     14
     0      0      1      2      4      4      3      2          0      0      2      2      5      7     80     73     33
     0      0      1      0      2      4      0      6          1      0      0      2      4     13     41     47     21
     0      0      0      0      3      2      7     12          0      0      0      3     12     19     13     15
QUADRENT SUMS...HARD DECISIONS
    72    377                                                  9     29
     7     56                                                22    452
    62   1514    444   1518
  1199     74    957    908
  1239     82    276    561

252 BIT ERROR INTERVALS
  2.6000E+01  1.4000E+01  2.0000E+01  2.7000E+01  3.5000E+01  2.1000E+01  4.9000E+01  2.9000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.5 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   3.0000E+00
SOAMP=    2.3000E-01 FBAMP=    2.0000E+00 SOPHA=    4.7000E-01 FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=    6.8028E+00 FBTAU6=    1.5010E+00
PEI=    7.2917E-02 STDEV=    5.7907E-03 BITS=    2016
XISUM=    3.8677E-01 XISIG=    2.3049E-01
LOCKIN=     13 ,DROPOUTS=     29 ,AVE=   2.6207E+00 ,STD DEV=   2.0242E+00
ERRM
  1.1000E+01  8.0000E+00  6.0000E+00  1.1000E+01  6.0000E+00  4.0000E+00  1.0000E+00  5.0000E+00  2.0000E+00  4.0000E+00
  2.0000E+00  1.0000E+00  0.          2.0000E+00  2.0000E+00  1.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00
  1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  0.          1.0000E+00
  0.          0.          1.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00
  0.          2.0000E+00  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
    20    21    22    10     4     1     2     0          6     3     2     0     0     0     0     0
    22    50    40    11     6     1     1     0          2     0     0     1     1     0     0     0
    48    56    40    19     2     2     1     0          0     0     1     0     1     1     1     1
    17    29    23     1     1     0     0     0          2     2     6     8     3     2     2     2
     3     9     6     2     1     1     0     0          9    18    24     8     2     2     1     1
     0     0     0     0     1     0     0     0         15    42    87    29     2     2     0     0
     0     6     0     1     3     1     0     0         22    56    50    16     2     1     0     0
     0     0     0     0     0     0     0     2         16    17    23     7    10     2     0     0
QUADRENT SUMS...HARD DECISIONS                          33    12
   429    21                                            439    28
    21     9                                                  +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                          5     0     0     0     0     0     0     0
     2     0     0     5    17    43    27     8          0     2     0     1     0     0     0     0
     3     0     2     5    28    80    44    10          1     1     0     0     1     0     0     1
     5     0     3    18    37    64    27     7          0     1     0     0     1     1     4    10
     6     1     2     4    13    12     9     1          1     0     1     2     5    27    27    10
     2     0     1     0     2     6     3     3          0     0     0     3    13    57    81    34
     1     1     0     0     3     3     2     0          1     1     0     4    13    46    57    32
     0     0     0     0     0     0     1     0          1     0     0     3     5    16    28    21
     0     0     0     0     0     4     2     6
QUADRENT SUMS...HARD DECISIONS                          11    21
    45   427                                            16   464
     5    35
  1151  1286   196  1290
  1199    74   492   247
  1239    82  1350   687

252 BIT ERROR INTERVALS
  2.1000E+01  9.0000E+00  1.9000E+01  1.5000E+01  1.4000E+01  2.3000E+01  2.7000E+01  1.9000E+01  0.          0.
```

```
ENCDB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SOPHA=   4.7000E-01 FBPHA=   2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   6.8028E+00 FBTAU6=   1.5010E+00
PEI=   6.0516E-02 STDEV=   5.3165E-03 BITS=   2016
XISUM=   3.6886E-01 XISIG=   1.9405E-01
LOCKIN=    15 ,DROPOUTS=    14 ,AVE=  2.7857E+00 ,STD DEV=  2.6235E+00
ERRM
  4.3000E+01  6.0000E+00  2.0000E+00  5.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00
  3.0000E+00  4.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  0.          0.          1.0000E+00  2.0000E+00
  3.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.
  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          2.0000E+00  0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     4     20     25     15      4      3      3      1          4      4          1      0      0      0      0      0
    14     51     43     23      1      0      0      1          1      0          1      1      0      0      0      0
    42     59     41     16      4      0      1      1          2      1          1      2      1      0      0      2
    17     37     25     10      0      1      1      0          3      3          9      5      2      0      2      4
     2      5      4      4      0      3      0      0          4     16         29     16      2      1      0      1
     0      0      0      0      0      0      2      0         11     68         62     26      3      1      1      0
     0      0      1      0      1      3      0      2         29     61         47     18      3      0      1      2
     0      0      0      0      0      1      0      2         10     18         16      9      5      2      1      2
QUADRENT SUMS...HARD DECISIONS                                                      38     11
   442     16                                                                     440     23
    16      6                                                                  +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                      0      0      0      0      0      0
     0      0      4      1      9     27     25      8          1      0          0      0      0      0      0      0
     1      0      2      6     47     90     54     10          1      1          0      0      0      0      1      0
     1      0      2      5     40     63     26      3          1      0          1      0      1      2      4      3
     1      1      2      1     20     14      9      2          1      1          0      0      1      2      1      4
     1      0      1      1      0      4      2      0          0      0          0      2      2      9     27     33     16
     1      0      0      1      1      2      0      1          1      0          0      0      2      9     52     87     34
     0      0      1      1      0      0      1      3          1      1          0      3     12     61     57     28
     0      0      0      1      1      1      4      7          2      1          0      5      7     15     24      8
QUADRENT SUMS...HARD DECISIONS                                                      6     11
    31    447                                                                     23    472
     6     28
   747   1504   1255    484
  1199     74   1178    507
  1239     82   1350    687

252 BIT ERROR INTERVALS
  1.3000E+01  1.5000E+01  2.0000E+01  1.5000E+01  1.0000E+01  2.1000E+01  1.8000E+01  1.0000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   2.0000E+01
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
NN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   6.0516E-02 STDEV=   5.3105E-03 BITS=    2016
XISUM=   3.6886E-01 XISIG=   1.9405E-01
LOCKIN=    15 ,DROPOUTS=    14 ,AVE=  2.7857E+00 ,STD DEV=  2.6235E+00
ERRM
  4.3000E+01  6.0000E+00  2.0000E+00  5.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00
  3.0000E+00  4.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  0.          0.          1.0000E+00  2.0000E+00
  3.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00
  1.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                          -1+1 P(R1.R2/T1.T2)TIMES   512
     4     20     25     15      4      0      3      1              4      4      1      0      0      0      0      0
    14     51     43     23      1      0      3      1              1      0      1      1      0      0      0      0
    42     58     41     16      4      0      1      1              2      1      1      2      1      0      1      2
    17     37     25     10      0      0      1      0              3      3      9      5      2      0      2      3
     2      5      4      4      0      0      0      0              4     16     29     16      2      1      0      1
     0      0      0      0      0      0      0      0             11     68     62     26      3      1      1      0
     0      0      1      0      1      0      0      0             29     61     47     18      3      0      1      1
     0      0      0      0      0      1      0      2             10     18     18      9      5      2      1      2
QUADRENT SUMS...HARD DECISIONS
     442      16                                                    38     11
      16       6                                                   440     23
+1-1 P(R1.R2/T1.T2)TIMES   512                                          +1+1 P(R1.R2/T1.T2)TIMES   512
     0      0      4      1      9     27     25      8              1      0      0      0      0      0      0      0
     1      0      2      6     47     90     54     10              1      0      0      0      0      0      0      0
     1      0      2      5     40     63     26      3              0      1      1      0      0      1      1
     1      1      2      5     20     14      9      2              1      0      0      1      2      1      4      3
     0      0      1      1      8      4      3      2              0      0      0      2      5      9     27     33     16
     1      0      0      0      2      2      0      0              1      0      0      0      3     52     87     34
     0      0      1      1      0      1      3      0              0      1      0      3     12     61     57     28
     0      0      0      1      1      1      4      7              2      1      0      5      7     15     24      8
QUADRENT SUMS...HARD DECISIONS
      31     447                                                     6     11
       6      28                                                    23    472
   747   1504   1255    484
  1199     74   1178    507
  1239     62   1350    697

252 BIT ERROR INTERVALS
  1.3000E+01  1.5000E+01  2.0000E+01  1.5000E+01  1.0000E+01  2.1000E+01  1.8000E+01  1.0000E+01  0.          0.
```

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FODPRT=  1.0800E+01 TL=  -6.5000E+00 DYNR=    0.
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
NN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=  7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=  1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   9.8214E-02 STDEV=   6.6282E-03 BITS=   2016
XISUM=   3.8490E-01 XISIG=   2.3494E-01
LOCKIN=    24 ,DROPOUTS=    34 ,AVE=  5.1176E+00 ,STD DEV=  5.1092E+00
ERRH
  9.4000E+01  1.3000E+01  1.4000E+01  6.0000E+00  5.0000E+00  4.0000E+00  3.0000E+00  4.0000E+00  1.0000E+00  5.0600E+00
  1.          3.0000E+00  5.0000E+00  3.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00  3.0000E+00  0.
  1.0000E+00  4.0000E+00  1.0000E+00  0.          0.          2.0000E+00  1.0000E+00  0.          0.          1.0000E+00
  2.0000E+00  1.0000E+00  2.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                    -1+1 P(R1.R2/T1.T2)TIMES   512
    21    20    30     9     1     2     1     3          4     0     2     0     0     0     0     0
    25    51    37     7     0     1     2     0          2     4     0     1     1     0     1     1
    42    54    50    16     2     1     2     0          4     0     2     1     0     5     1     3
    19    18    16     1     1     0     0     1          1     6    10     6     1     2     3     2
     2     1     3     0     0     1     2     0         12    21    28    12     2     0     0     3
     0     0     1     1     1     2     0     1         20    57    61    16     3     0     0     0
     0     0     1     0     2     1     2     3         19    51    47    18     2     2     2     3
     0     0     0     0     1     2     2    11          8    14    19     8     2     2     2     3
QUADRENT SUMS...HARD DECISIONS                                                    39    24
     417    16                                                                   421    28
      10    37                                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                    1     0     0     0     0     0     0     0
     3     2     4     5    19    32    22     6          1     0     0     0     0     0     0     0
     1     0     2     6    44    80    37     8          0     0     0     0     1     0     2     2
     2     3     6    17    42    50    18     4          0     0     0     1     4     3     2     8
     0     1     1     2    15    15     5     2          0     0     1     4     3     6    29    36
     0     1     0     0     4     4     1     1          0     0     2     3     3    10    60    13
     0     0     0     0     2     1     3     2          1     0     2     3     6    12    46    45
     0     0     0     1     0     2     4     7         10     0     1     0     3     9    19    17
QUADRENT SUMS...HARD DECISIONS                                                     7    23
      55    399                                                                  25    457
       6     52
    62  1514   444  1518
  1199    74   957   908
  1239    82   276   561

252 BIT ERROR INTERVALS
  2.5000E+01  1.2000E+01  2.2000E+01  2.1000E+01  2.3000E+01  1.8000E+01  5.3000E+01  2.3000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.5 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   3.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.3000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   2.3008E-02 STDEV=   5.8268E-03 BITS=   2016
XISUM=   3.8549E-01 XISIG=   2.2126E-01
LOCKIN=    11 ,DROPOUTS=    25 ,AVE=  2.5600E+00 ,STD DEV=  2.6845E+00
ERRN
  6.9000E+01  9.0000E+00  4.0000E+00  6.0000E+00  4.0000E+00  3.0000E+00  4.0000E+00  3.0000E+00  3.0000E+00  0.
  3.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00
  1.0000E+00  4.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00
  0.          1.0000E+00  0.          1.0000E+00  0.          2.0000E+00  0.          0.          0.          0.
  1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          2.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     15    15    21    12    14     2     0     1          4     0     1     1     0     0     0     0
     16    54    44    10    42     0     0     1          3     0     1     1     0     0     2     1
     36    62    57    15    22     1     0     1          1     0     1     2     0     0     1     1
     22    22    26     3     8     0     1     0          5    14    34    10     3     1     1     3
      5     4     5     0     1     0     0     0         24    49    60    26     4     2     2     2
      1     1     0     1     1     2     1     2         25    59    60    21     4     0     2     1
      1     1     1     1     0     1     3     3         12    20    13    10     2     2     2     6
      0     0     0     0     0
QUADRENT SUMS...HARD DECISIONS                                                29     6
    426    13                                                              442    35
     21    20                                                                    +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                          2     1     0     0     0     0     0     0
      0     3     3     6    16    37    34    10          1     1     1     1     1     0     0     1
      0     2     3     6    37    81    39     7          1     0     1     1     1     1     0     3
      1     0     5     6    42    58    30     4          0     0     1     1     1     2    10     8
      0     0     0     5    20    16     6     2          0     1     0     3     5    22    42    18
      0     0     1     2     0     2     2     1          0     0     1     5    14    52    63    34
      0     2     0     0     0     1     1     2          0     1     0     2    13    46    59    26
      1     0     0     0     1     0     2     1          2     1     0     1    13    14    26    10
      0     0     1     0     1     2     4     7
QUADRENT SUMS...HARD DECISIONS                                                12    27
     40   439                                                               16   457
      7    26
   1168  1069  1759   561
   1199    74   446   372
   1239    82  1931   942

252 BIT ERROR INTERVALS
  2.1000E+01  1.2000E+01  1.4000E+01  1.3000E+01  1.6000E+01  2.5000E+01  2.8000E+01  2.0000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFI= .3700
FQOPRT=   1.0800E+01 TL=  -6.5000E+06 DYNR=   6.0000E+00
SOAMP=   2.3000E-01 FBAMP=   2.0000E+00 SOPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.3909E-02 STDEV=   5.8268E-03 BITS=   2016
XISUM=   3.8172E-01 XISIG=   2.2957E-01
LOCKIN=    14 ,DROPOUTS=    20 ,AVE=  3.8000E+00 ,STD DEV=  5.3722E+00
ERRH
  6.5000E+01  1.2000E+01  7.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00
  4.0000E+00  1.1000E+00  6.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00
  3.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.
  0.          3.0000E+00  0.          0.          4.0000E+00  0.          0.          0.          1.0000E+00  0.
  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES    480                                  -1+1 P(R1.R2/T1.T2)TIMES    512
    14     19     19     11      2      0      1      2              2      0      0      2      0      0      0
    23     51     35     14      3      1      0      0              3      1      0      0      1      0      0
    42     63     39     10      0      2      1      0              1      0      2      1      0      0      1
    17     36     24      7      2      1      1      2              4      4      1      4      1      0      2
     7      3      5      0      1      1      0      0             12     24     23     19      3      0      2
     0      0      0      0      1      0      0      2             18     68     71     22      5      1      1
     0      0      0      0      0      0      0      3             17     57     45     24      5      1      2
     0      0      1      1      0      1      2     11              8     15      9     14      2      1      0
QUADRENT SUMS...HARD DECISIONS                                     25      6
   424     18                                                     446     35
    17     21                                                  +1+1 P(R1.R2/T1.T2)TIMES    512
+1-1 P(R1.R2/T1.T2)TIMES    512                                     5      0      1      1      0      0      0
     22      4      2      8     22     34     20      8              1      0      0      1      1      0      0
     51      2      2      6     51    101     45      9              0      0      0      1      0      0      0
     33      0      1      1      5     33     58     18              0      0      1      1      2      5      2
      7      1      0      0      6      7     14      7              0      1      0      1      1      3      4
      3      0      0      1      0      3      4      1              0      1      0      0      1      3      5
      0      0      0      0      0      0      3      1              0      0      0      1      0      3      4
      4      0      0      0      0      4      3      4              0      0      1      3     11     14     19
QUADRENT SUMS...HARD DECISIONS                                     13     25
    40    430                                                     12    462
     4     38
  1995    562     91    566
  1199     74   1475    121
  1239     82   1350    687

252 BIT ERROR INTERVALS
  1.3000E+01  6.0000E+00  9.0000E+00  1.6000E+01  2.6000E+01  2.4000E+01  2.3000E+01  3.2000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    2.0000E+01
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SOPHA=    4.7000E-01 FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    7.3909E-02 STDEV=    5.8268E-03 BITS=    2016
XISUM=    3.8172E-01 XISIG=    2.2957E-01
LOCKIN=     14 ,DROPOUTS=     20 ,AVE=   3.8000E+00 ,STD DEV=   5.3722E+00
ERRM
  6.5000E+01   1.2000E+01   7.0000E+00   3.0000E+00   3.0000E+00   2.0000E+00   3.0000E+00   2.0000E+00   2.0000E+00   3.0000E+00
  4.0000E+00   1.0000E+00   6.0000E+00   1.0000E+00   0.           1.0000E+00   1.0000E+00   0.           2.0000E+00   1.0000E+00
  3.0000E+00   1.0000E+00   0.           1.0000E+00   1.0000E+00   4.0000E+00   0.           2.0000E+00   1.0000E+00   0.
  0.           3.0000E+00   0.           0.           1.0000E+00   1.0000E+00   1.0000E+00   0.           0.           1.0000E+00
  1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           1.0000E+00   0.           0.           1.0000E+00   0.           0.           1.0000E+00   0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.           2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES    480                                                -1+1 P(R1.R2/T1.T2)TIMES    512
    14    19    19    11    2    0    1    2    2    3    2    0    0    0    2    0    0    0    0    0
    23    51    39    14    3    0    2    1    1    4    1    0    2    1    4    0    1    0    0    1
    42    63    39    10    2    0    1    1    2    2    0    4    1    1    4    0    1    0    0    1
    17    36    24     7    0    0    1    0    0    2    12   24   23   19   15   3    0    1    1    2
     7     3     5     0    0    0    0    0    0    1    18   68   71   22   4    1    1    0    2    0
     0     0     0     0    0    0    0    0    0    3    17   57   45   24   2    1    0    0    1    9
     0     0     1     1    0    0    1    2    11        8    15    9    14
QUADRENT SUMS...HARD DECISIONS                                  25     6
   424    18                                                    446    35
    17    21                                                          +1+1 P(R1.R2/T1.T2)TIMES    512
+1-1 P(R1.R2/T1.T2)TIMES    512                                                0    1    1    0    0    0
     2     4     2     8    22    34    20    8    9    1    0    0    0    1    1    0    0    0    0    0
     2     0     1     0     5    51   101   45   18    7    1    0    0    0    1    1    0    5    2    2    0
     0     1     1     0     5    33    58   18    7    2    1    0    1    0    1    1    2    3    5    4    2    7    34   16    5
     1     1     0     0     6     7    14    7    1    2    0    0    0    0    1    1    0    0    3    1    6    2    9    8    1    2
     1     1     0     1     0     3     4    1    1    2    0    0    0    0    1    1    0    0    3    1    4    1    0    5    0    2
     0     0     0     0     0     4     1    1    2    4    1    0    0    0    0    0    1    3    1    1    1    4    1    9    1    1
     0     0     0     0     0     0     3    4    8         0    0    0    0    0    0    0    1    3    1    1    1    4    1    9    1    1
QUADRENT SUMS...HARD DECISIONS                                  13    25
    40   430                                                    12   462
     4    38
  1995   562    91   566
  1199    74  1475   121
  1239    82  1350   687

252 BIT ERROR INTERVALS
  1.3000E+01   6.0000E+00   9.0000E+00   1.6000E+01   2.6000E+01   2.4000E+01   2.3000E+01   3.2000E+01   0.           0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    2.3300E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAU01=   2.0353E+02 ,TAU02=   1.4945E+00
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   5.0286E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    7.9861E-02 STDEV=    6.0374E-03 BITS=    2016
XISUM=    3.7192E-01 XISIG=    2.0736E-01
LOCKIN=     22 ,DROPOUTS=0
ERRM
  6.1000E+01  1.3000E+01  1.5000E+01  6.0000E+00  5.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00
  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  0.          1.0000E+00  2.0000E+00
  0.          1.0000E+00  0.          1.0000E+00  0.          4.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00
  0.          1.0000E+00  3.0000E+00  0.          1.0000E+00  0.          2.0000E+00  0.          0.          0.
  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  0.
  0.          0.          1.3000E+00  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          1.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES    480                                  -1+1 P(R1.R2/T1.T2)TIMES    512
     8      16      20      12       2       3       1       1           5       1       0       0       1       1       0       2
    21      47      38      14       1       0       1       2           0       0       1       5       0       2       0       0
    50      55      53      19       2       1       1       0           0       3       3       3       0       2       0       0
    20      22      28       2       0       1       1       1           2       3       5       6       1       0       1       3
     6       3       1       0       1       2       0       1           9      25      28      15       5       1       1       1
     0       0       0       0       2       1       0       3          22      52      69      22       5       1       0       0
     0       0       0       1       0       2       1       3          28      49      54      17       6       1       0       0
     0       0       0       0       2       2       1       4           8      14      22       8       1       1       2       8
QUADRENT SUMS...HARD DECISIONS
   431      16                                                          34      14
    11      22                                                         434      30
+1-1 P(R1.R2/T1.T2)TIMES    512                                  +1+1 P(R1.R2/T1.T2)TIMES    512
     1       3       1       4      16      40      31      12           2       0       0       0       0       3       0       0
     2       3       3       7      39      66      38       6           0       1       0       1       0       1       0       1
     1       0       1      16      43      56      20       1           0       0       0       0       1       5       2       9
     0       1       1       3      18      18       7       2           0       1       1       1       2       9      27      40
     1       0       0       1       5       4       1       0           1       1       1       2      15      50      63      29
     1       0       0       0       0       1       3       3           0       1       2       4      12      44      63      30
     0       0       0       0       1       2       1       3           2       2       2       4      13      15      16      14
     0       0       0       0       3       0       6      10           2       2       2       4      13      15      16      14
QUADRENT SUMS...HARD DECISIONS
    47     416                                                           6      25
     3      46                                                          23     458
  1594    1431    1635    1947
  1199      74    1411    1161
  1239      82     113     560

252 BIT ERROR INTERVALS
  1.8000E+01  1.2000E+01  2.4000E+01  2.1000E+01  1.9000E+01  3.0000E+01  1.5000E+01  2.1000E+01  0.          0.
```

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=  1500  BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00  YNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   7.5002E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   6.1012E-02 STDEV=   5.3308E-03 BITS=   2016
XISUM=   3.7535E-01 XISIG=   2.0564E-01
LOCKIN=    15 ,DROPOUTS=     4 ,AVE=  4.2500E+00 ,STD DEV=  3.4911E+00
ERRM
  3.9000E+01  7.0000E+00  5.0000E+00  5.0000E+00  3.0000E+00  7.0000E+00  1.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00
  1.0000E+00  2.0000E+00  3.0000E+00  4.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00
  3.0000E+00  0.          1.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  0.          3.0000E+00  3.0000E+00
  0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          2.0000E+00  0.          0.
  1.0000E+00  1.0000E+00  0.          0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
      9     13     26     15      4      0      1      0              4      1      2      0      0      0      0      0
     17     53     48     18      2      0      0      1              3      1      1      0      0      1      0      0
     35     59     38     20      2      0      1      2              4      0      3      0      0      1      1      1
     21     40     23      6      2      0      0      0              1      6      7      4      1      0      1      3
      1      6      6      4      0      0      0      3              5     13     29     16      4      0      1      0
      0      0      0      0      1      0      0      2             15     68     59     27      3      1      0      0
      0      0      0      0      0      0      0      1             29     58     43     18      4      1      0      0
      0      0      0      0      0      1      0      2              8     21     15     14      4      2      1      4
QUADRENT SUMS...HARD DECISIONS                                      37      9
     441     15                                                    438     28
      17      7                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                          0      0      0      1      0      1
      3      1      3      2      8     30     30      7              1      0      0      0      0      1      0      0
      0      0      1      6     44     90     48     11              0      0      0      0      0      1      0      0
      1      1      2      6     36     58     33      3              0      0      1      2      0      1      0      4
      1      0      1      4     21     17      6      3              0      1      0      1      2      4      3      3
      0      0      1      0      2      4      3      0              1      1      0      1      3     25     34     15
      0      0      0      2      0      2      1      1              0      1      1      9     52     84     35      5
      1      0      0      1      0      0      0      4              1      0      1      7     16     58     57     31
      0      0      0      0      1      1      3      8              1      3      3      2      7     18     21      7
QUADRENT SUMS...HARD DECISIONS
     32     445                                                     5     13
      5      30                                                    22    472
    201    1505     133     997
   1199      74    1178     507
   1239      82    1350     687

252 BIT ERROR INTERVALS
  1.3000E+01  1.5000E+01  2.1000E+01  1.5000E+01  1.2000E+01  1.9000E+01  1.3000E+01  1.5000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.( ,BIF=   1500 ,BL2=    294 ,ASOFT= ,3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.[illegible]E+00
SOAMP=   2.3008E-01 FBAMP=   2.0000E+00 SOPHA=   4.7000E-01 FBPHA=   2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=  7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.0060E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.6052E-02 STDEV=   5.1230E-03 BITS=   2016
XISUM=   3.6985E-01 XISIG=   1.9251E-01
LOCKIN=    15 ,DROPOUTS=     5 ,AVE=  2.0000E+00 ,STD DEV=  1.5492E+00
ERRH
 3.3000E+01  5.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  3.0000E+00  4.0000E+00  4.0000E+00
 3.0000E+00  4.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          2.0000E+00  2.0000E+00
 3.0000E+00  0.          1.0000E+00  2.0000E+00  0.          1.0000E+00  0.          1.0000E+00  [illegible]E+00  1.[illegible]E+00
 0.          2.0000E+00  0.          0.          1.0000E+00  0.          2.0000E+00  0.          0.          0.
 1.0000E+00  1.0000E+00  0.          0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.
 0.          0.          0.          0.          0.          1.0000E+00  0.          2.0000E+00  0.          0.
 [illegible]  1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.
 0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
 0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     7    17    27    14     3     0     0     1     2     2     0     1     0     0     0     0
    14    [illegible]    40    20     1     0     0     0     3     0     3     1     1     [illegible]     0     1
    36    58    54    16     4     0     1     0     2     0     4     4     6     1     1     0
    19    37    24     7     1     0     2     0     8    16    30    17     5     0     1     0
     0     6     7     4     0     1     0     0    13    66    62    26     5     2     0     [illegible]
     [illegible]     0     0     1     0     0    27    58    47    20     4     1     [illegible]
     0     0     0     0     0     1     0     1    12    18    16     9     4     2     0     4

QUADRENT SUMS...HARD DECISIONS                                   34     8
   443    15                                                    445    25
    17     5                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                    1     0     0     0     0     1     0     0
     0     1     3     3    10    23    27     9     0     0     0     1     0     0     0     0
     0     1     1     3    42    66    53    12     0     0     0     1     1     0     [illegible]     1
     1     0     1    10    37    64    29     4     0     0     1     0     0     3     5     4
     1     0     3     3    16    18     6     4     0     1     0     0     2     4    21    34    18
     0     0     0     1     3     2     0     1     0     1     0     0     2     9    52    83    32
     2     0     0     0     1     1     1     2     1     1     1     0     6    22    58    58    24
     0     1     0     0     1     0     1     4     0     1     2     5     8    18    17     5
     0     0     0     0     0     1     3     4

QUADRENT SUMS...HARD DECISIONS                                    3    15
    31   451                                                     21   473
     5    26

     5  1631  1121    99
  1199    74  1178   507
  1239    82  1359   687

252 BIT ERROR INTERVALS
  1.3000E+01  1.7000E+01  2.0000E+01  1.4000E+01  9.0000E+00  1.8000E+01  1.2000E+01  1.0000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,HNB=    .9 ,KB= 614.3 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.5000E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.0437E-02 STDEV=   5.6989E-03 BITS=   2016
XISUM=   3.7765E-01 XISIG=   2.0816E-01
LOCKIN=     13 ,DROPOUTS=    24 ,AVE=  3.0833E+00 ,STD DEV=  2.5644E+00
ERRM
  4.7000E+01  1.2000E+01  5.3000E+00  8.3000E+00  5.0000E+00  3.0000E+00  0.          2.0000E+00  3.0000E+00  5.0000E+00
  4.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00  0.          1.0000E+00  3.0000E+00
  3.0000E+00  0.          3.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          3.0000E+00  0.          0.          0.          3.0000E+00  1.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          2.0000E+00  1.0000E+00  0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
    10   20   22   12    2    0    0    5    3    3    1    0    0    0    0    0
    28   53   37   20    5    1    2    0    2    1    0    1    1    1    1    0
    40   56   38   17    3    1    0    0    0    1    0    2    1    0    2    1
    24   28   23    3    0    0    0    1    0    3    5    6    1    0    1    1
     6    3    4    2    0    0    0    0    6   12   33   13    2    2    1    2
     0    1    0    0    1    0    0    1   15   66   74   22    2    1    0    1
     0    0    0    1    2    2    1    0   19   53   47   22    1    0    0    0
     0    0    0    1    0    0    2    2   19   15   21    8    6    3    0    5
QUADRENT SUMS...HARD DECISIONS
   431   20                                   31   10
    18   11                                  445   26
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     2    1    3    5   13   44   25    8    2    0    0    0    0    0    0    0
     0    2    4    4   31   77   42    9    0    0    0    0    0    0    0    1
     1    0    2   13   46   59   27    4    1    1    1    1    1    1    1    1
     0    1    2    8   14   11   15    1    1    1    0    1    0    3   10    8
     1    0    1    0    2    5    1    1    0    0    0    0    5   23   29   18
     0    1    0    1    3    2    0    2    0    0    0    3   16   57   80   26
     0    0    0    0    0    1    0    3    1    1    1    3   10   58   48   37
     0    0    0    0    0    5    4    5    0    0    1    4    6   17   20   14
QUADRENT SUMS...HARD DECISIONS
    48   426                                   9   25
     4    34                                  14  464
  1104     7   789   523
  1199    74   492   247
  1239    82  1350   687

252 EIT ERROR INTERVALS
  2.6000E+01  1.0000E+01  1.6000E+01  1.5000E+01  1.3000E+01  2.0000E+01  2.4000E+01  1.8000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.5 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+01
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   2.0002E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    6.2996E-02 STDEV=    5.4111E-03 BITS=    2016
XISUM=    3.7388E-01 XISIG=    2.0048E-01
LOCKIN=     13 ,DROPOUTS=     39 ,AVE=   2.6410E+00 ,STD DEV=   2.0442E+00
ERRH
  3.6000E+01  1.0000E+01  9.0000E+00  6.0000E+00  5.0000E+00  1.0000E+00  2.0000E+00  5.0000E+00  1.0000E+00  1.0000E+00
  3.0000E+00  1.0000E+00  4.0000E+00  0.          2.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00
  2.0000E+00  0.          3.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          1.0000E+00
  0.          0.          0.          2.0000E+00  2.9000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     8     22     26     12      4     1     1     2            2     1     2     0     0     0     0     0
    21     58     38     16      5     2     0     1            5     1     0     2     1     1     0     2
    45     56     35     14     10     0     1     0            5     3     8     2     1     1     1     1
    21     36     21      6      0     1     0     1            2     3     7     6     2     0     1     0
     2      5      6      2      0     1     0     0            7    17    29    16     3     2     1     2
     1      1      0      0      1     2     1     0           15    48    71    27     3     1     0     2
     0      0      0      1      2     1     0     0           25    57    49    20     1     1     0     0
     0      0      0      0      1     0     1     2           16    17    20    12     7     2     1     3
QUADRENT SUMS...HARD DECISIONS                                    31     7
   435    18                                                    446    28
    18     9                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                      0     0     0     0     0     0     0     1
     1     0     1     4    13    42    22    11            1     0     0     0     0     0     0     1
     2     2     2     4    35    81    46    11            0     0     1     1     0     0     1     1
     0     1     3    14    37    69    25     3            0     1     1     2     0     3     5     9
     0     0     0     7    16    12    11     3            0     1     0     0     4    24    31    14
     1     1     1     0     4     4     1     1            0     1     0     0    14    59    86    37
     1     0     0     1     3     2     1     2            1     1     1     3    14    47    57    29
     0     0     0     0     0     1     2     5            1     0     0     4     8    18    19    11
QUADRENT SUMS...HARD DECISIONS
    41   436                                                    7    20
     4    31                                                   13   472
   215   645   700   137
  1199    74   492   247
  1239    82  1350   687

252 BIT ERROR INTERVALS
  2.7000E+01  1.0000E+01  1.6000E+01  1.3000E+01  1.0000E+01  1.8000E+01  2.1000E+01  1.2000E+01  0.          0.
```

```
ENCOR=    7.0 ,DELF=   62.5 ,BIF=   1500 ,BL2=    294 ,ASOFT= ,3700
FOJPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   4.0140E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    7.9861E-02 STDEV=   6.0374E-03 BITS=    2015
XISUM=    3.8244E-01 XISIG=   2.3372E-01
LOCKIN=     11 ,DROPOUTS=    117 ,AVE=   2.8889E+00 ,STD DEV=  6.2344E+00
ERRH
  6.2000E+01   1.1000E+01   9.0000E+00   8.0000E+00   5.0000E+00   5.0000E+00   6.0000E+00   4.0000E+00   7.0000E+00   4.0000E+00
  1.2000E+00   1.0000E+00   1.0000E+00   2.0000E+00   0.           1.0000E+00   2.0000E+00   0.           1.0000E+00   0.
  2.0000E+00   1.0000E+00   4.0000E+00   2.0000E+00   2.0000E+00   0.           1.0000E+00   2.0000E+00   0.           0.
  0.           1.0000E+00   1.0000E+00   0.           2.0000E+00   0.           1.0000E+00   0.           2.0000E+00   1.0000E+00
  0.           0.           0.           1.0000E+00   0.           0.           0.           0.           0.           0.
  1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.           1.0000E+00
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           1.0000E+00   0.
  0.           1.0000E+00   0.           0.           1.0000E+00   0.           0.           0.           0.           2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES    480                                    -1+1 P(R1.R2/T1.T2)TIMES    512
    12     16     20     17      1      2      1      1      4      1      1      1      0      0      0      1
    18     45     44     11      4      0      1      1      5      8      0      0      5      1      0      1
    44     57     62     13      3      0      1      1      2      4      6      2      3      1      0      2
    23     21     18      7      1      0      0      0      8     22     32      9      4      1      0      5
     4      7      3      1      1      0      0      0      3     49     56     24      7      1      0      3
     0      0      2      2      0      0      0      0     25     56     50     18      5      0      0      4
     1      0      0      0      1      0      0      0     13     20     15     10      4      3      2      4
     0      0      1      1      0      4      0      6

QUADRENT SUMS...HARD DECISIONS                                      35      9
    428     16                                                     430     38
     22     14                                                             +1+1 P(R1.R2/T1.T2)TIMES    512
+1-1 P(R1.R2/T1.T2)TIMES    512                                     2      1      0      0      0      0      0      1
      3      1      4      8     16     32     40     10      0      1      0      0      0      0      0      2
      0      0      0      6     38     66     34      8      0      0      0      0      1      3      2      4
      1      2      5      9     33     54     20      5      1      0      0      1      2      4     10      4
      1      1      2      5     13     18     10      3      0      0      0      0      1      4      5      2
      1      1      1      4      6      4      2      3      0      1      0      4      7     22     39     33
      1      1      0      2      3      0      1      1      0      0      0      0      2     18     49     56
      0      0      0      0      0      0      1      4      0      0      0      1      2     14     19     26
      0      0      0      0      0      0      0      0

QUADRENT SUMS...HARD DECISIONS                                       8     31
     48    423                                                      19    454
      9     32
     63    434    175    438
   1199     74    446    372
   1239     82   1931    942

252 BIT ERROR INTERVALS
  3.0000E+01   1.8000E+01   1.2000E+01   1.3000E+01   2.7000E+01   2.1000E+01   1.7000E+01   2.3000E+01   0.           0.
```

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3009E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,HN8=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=  7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   8.0463E+00 FBTAU5=   8.8028E+00 FBTAL6=   1.5010E+00
PEI=   9.5734E-02 STDEV=   6.5529E-03 BITS=   2016
XISUM=   3.6216E-01 XISIG=   2.2167E-01
LOCKIN=    2 ,DROPOUTS=   378 ,AVE=  1.4889E+00 ,STD DEV=  4.3097E+00
ERRH
  7.1000E+01  1.0000E+01  9.0000E+00  5.0000E+00  8.0000E+00  1.0000E+01  7.0000E+00  7.0000E+00  8.0000E+00  3.0000E+00
  6.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00
  2.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.
  1.0000E+00  2.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  0.
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  2.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480
     8    12    30    17     5     2     1     2
    25    41    35     5     6     2     2     0
    39    52    56    18     7     2     0     0
    21    22    16    10     4     0     0     1
     1     6     7     2     2     1     0     1
     3     1     1     4     0     3     1     1
     0     0     0     0     0     1     1     0
     0     0     0     3     0     0     1     2
QUADRENT SUMS...HARD DECISIONS
   407    32
    28    13

-1+1 P(R1.R2/T1.T2)TIMES   512
     6     0     0     2     0     1     0     1
     2     1     1     0     1     0     0     1
     4     2     2     2     1     1     0     0
     1     6     3    11     2     5     0     2
     7    27    31    26     3     2     1     3
    21    38    75    20     3     2     3     3
    19    45    40    16     3     2     3     3
    10    11    17     6     9     4     0     2
    47    16
   409    40

+1-1 P(R1.R2/T1.T2)TIMES   512
     2     1     3     4    16    38    20    12
     1     0     3     9    39    22    26    10
     2     0     4    12    40    67    17     4
     1     0     4     9    18    21    11     4
     2     0     0     4     5     8     7     2
     1     0     1     2     0     5     2     1
     0     0     0     1     0     3     1     3
     0     0     0     1     2     5     1     4
QUADRENT SUMS...HARD DECISIONS
    55   397
    11    49

+1+1 P(R1.R2/T1.T2)TIMES   512
     2     1     0     1     0     0     0     2
     0     0     0     0     0     1     0     0
     0     0     1     0     0     1     2     0
     2     2     4     3     0     5     6     4
     0     0     1     0     1     3    11    16    35    15
     0     1     2     3    22    68    66    31
     2     0     0     2    15    56    45    22
     3     0     1     4    12    17    22    13
     7    22
    19   464

  1137  1058  1405  1062
  1199    74  1638   738
  1239    82   824  1325

252 BIT ERROR INTERVALS
  3.0000E+01  2.0000E+01  2.3000E+01  2.5000E+01  2.3000E+01  2.2000E+01  3.3000E+01  1.7000E+01  0.          0.
```

```
ENDOB=    7.  ,DELF=   62.6 ,DIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   5.0286E-01 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    4.2659E-02 STJEV=    4.5000E-03 BITS=    2016
XISUM=    3.6643E-01 XISIG=    1.9362E-01
LOCKIN=     20 ,DROPOUTS=      1 ,AVE=  1.0000E+00 ,STD DEV=  0.
ERRH
  2.0000E+01  2.0000E+00  3.0000E+00  0.          6.0000E+00  0.          1.0000E+00  4.0000E+00  1.0000E+00  5.0000E+00
  2.0000E+00  3.0000E+00  1.0000E+00  0.          1.0000E+00  0.          3.0000E+00  0.          1.0000E+00  0.
  1.0000E+00  .           1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.          2.0000E+00  0.
  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          0.
  0.          .           2.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00
  0.          .           .           0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          .           .           0.          .           0.          0.          0.          0.          0.
  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          .           .           0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     5     9    21    13     3     0     1     0     3     0     1     1     0     0     0     0
    13    53    39    18     2     0     0     0     1     1     0     0     3     2     0     0
    54    61    51    20     0     0     0     0     0     0     0     0     4     0     1     1
    24    30    28     4     0     0     0     0     0     0     0     1    32    19     2     0
     4    12     7     .     0     0     0     0     0     0     1     5    77    29     5     0
     1     .     2     .     0     0     0     0     0     0    19    55    53    17     8     2
     0     0     0     0     0     0     0     1     0     0    21    46    27    16     3     0
QUADRENT SUMS...HARD DECISIONS                                                  16     8
   438    13                                                                   463    25
    23     3                                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                        0     0     0     0     0     1
     1     .     2     7    11    45    43    12     0     0     0     0     0     0     0     0
     1     .     2     7    44    83    47     9     0     0     0     0     0     0     1     1
     1     .     2     7    55    62    17     1     0     0     0     0     0     0     2     4
     1     .     2     7    22    18     4     0     0     0     0     0     0     3    16    43    36
     1     .     2     7    11     2     2     0     0     0     0     0     1    15    58    71    32
     0     .     1     3     4     1     2     0     0     0     0     0     2    23    55    51    26
     0     0     0     0     1     3     2     3     0     0     0     1     1     9    20    21    11
QUADRENT SUMS...HARD DECISIONS                                                  .     13
    27   465                                                                     9    495
     1    14
  1297  1595   612    63
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  5.0000E+00  9.0000E+00  1.4000E+01  7.0000E+00  1.0000E+01  1.5000E+01  1.7000E+01  1.1000E+01  0.          0.
```

```
ENOOS=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WN8=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   7.5002E-01 FBTAU5=   8.5028E+00 FBTAU6=   1.5010E+00
FEI=   4.9107E-02 STOEV=   4.8127E-03 BITS=   2016
XISUM=   3.6995E-01 XISIG=   1.8960E-01
LOCKIN=    16 ,DROPOUTS=     2 ,AVE=   1.0000E+00 ,STO DEV=   0.
ERRH
  2.8000E+01  2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00  4.0000E+00  2.0000E+00
  3.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  2.0000E+00  3.0000E+00
  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  0.          0.          1.0000E+00  0.          0.          1.0000E+00
  0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.

-1+1 P(R1.R2/T1.T2)TIMES   480
   5   19   19    8        5        0   1   0        0   1   0   0   1   0   0   1   1
  18   45   33   20        4        1   1   1        1   1   1   1   0   2   0   1   1
  37   62   59   12        2        1   1   0        0   1   2   3   0   1   1   1   1
  27   37    2    3        0        0   0   0        1   2   1   7   0   1   0   1   0
   4   10    6    3        0        1   0   0        3   9  25  14   1   1   0   0   0
   1    0    0    0        0        0   0   1        5  15  54  71  31   7   1   0   0
   0    0    1    0        0        2   1   4       15  33  58  44  24   1   0   0   0
                              QUADRENT SUMS...HARD DECISIONS
                                                      21   8
                                                     461  22
                                                    +1+1 P(R1.R2/T1.T2)TIMES   512
                                                       0   0   0   0   0   0   0   1
                                                       0   0   0   0   0   0   1   1
                                                       0   0   0   0   0   4   3   1
                                                       0   0   1   1   4  24  37  25
                                                       0   1   1   2   8  68  78  36
                                                       1   2   1   2  12  46  52  28
                                                       2   3   1  11  26  11  11   1
+1-1 P(R1.R2/T1.T2)TIMES   512
   6    0    1    0        0        0   0   0        0   0   0   0   0   0   0   1   1
   0    1    0    4        0       44  33  12        0   0   0   0   0   0   1   1   1
   0    1    1   10        0       66  48  12        0   0   0   0   0   4   3   1   1
   1    1    0    7        0       40  26   5        0   0   0   0   1   4  24  37  25
   1    2    0    8        0       16   6   2        0   0   0   1   1  16  68  78  36
   0    0    0    1        0        1   2   3        0   0   1   1   2  12  46  52  28
   0    0    0    0        0        0   1   5        0   1   2   1  11  26  11  11   1
                              QUADRENT SUMS...HARD DECISIONS
                                                       2  13
                                                      12 485
      28  464
       2   18
  1326  1804  629  784
     9    10   13   14
    17    18   21   22

252 BIT ERROR INTERVALS
  1.3000E+01  1.0000E+01  1.5000E+01  1.4000E+01  1.2000E+01  1.2000E+01  1.0000E+01  1.3000E+01  0.          0.
```

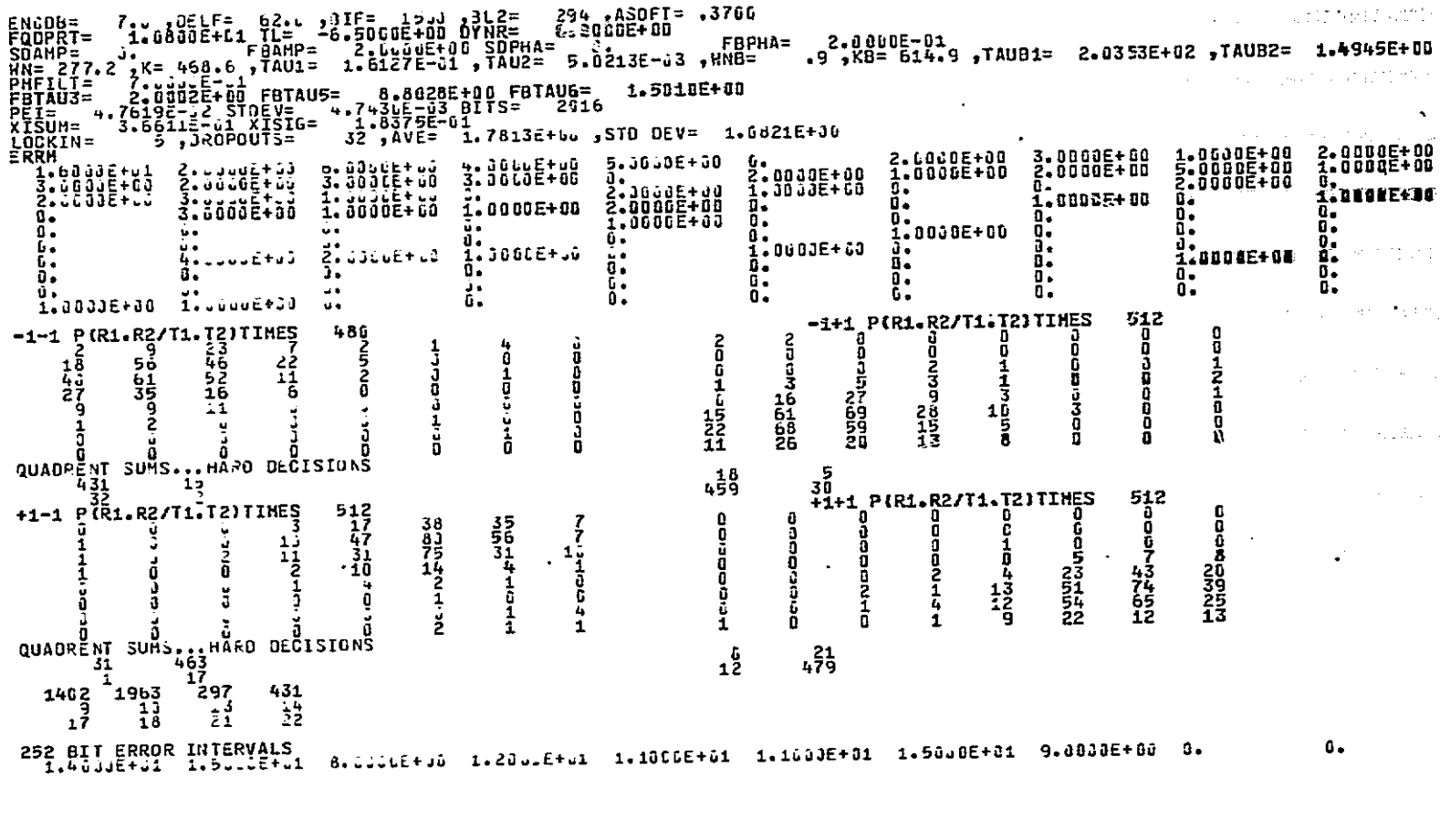
```
ENVOB=   7.  ,DELF=  62.  ,BIF=  151.  ,BL2=   294  ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5060E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0060E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,HNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.0060E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.1012E-02 STDEV=   5.3368E-03 BITS=   2016
XISUM=   3.6844E-01 XISIG=   1.9484E-01
LOCKIN=    15 ,DROPOUTS=     5 ,AVE=  2.6000E+00 ,STD DEV=  2.7276E+00
ERRM
  3.5000E+01  5.0000E+00  4.0000E+00  6.0000E+00  5.0000E+00  2.0000E+00  5.0000E+00  5.0000E+00  2.0000E+00  5.0000E+00
  1.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  5.0000E+00  0.          0.          2.0000E+00  0.          0.
  1.0000E+00  1.0000E+00  1.0000E+00  4.0000E+00  2.0000E+00  6.          1.0000E+00  0.          0.          3.0000E+00
  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.
  1.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  6.          1.0000E+00  2.0000E+00  0.          0.
  2.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  0.
  0.          0.          0.          2.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   486                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     6    21    44    12     5     1     2     3     4     1     0     1     0     0     1     1
    16    39    45    21     3     1     0     0     2     3     1     1     0     0     0     0
    49    66    39    15     1     1     0     0     0     1     1     1     0     0     0     0
    20    27    19     9     3     1     1     0     2     0     7     7     1     1     0     0
     6    12     7     2     1     0     0     0     4    18    34    14     0     1     1     0
     0     0     0     0     0     0     0     0    24    50    58    27     7     1     1     0
     0     0     0     0     1     0     0     0    31    55    69    14     6     1     0     0
     0     0     0     0     1     0     0     0    12    11    12    13     8     3     1     2
QUADRENT SUMS...HARD DECISIONS                                    31     4
   425    25                                                     446    31
    27     3                                                                +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                     0     0     0     0     0     0     0     0
     0     1     1     4    18    38    37    13     0     1     0     0     0     0     0     0
     1     1     1     7    33    64    33     1     0     1     0     2     1     1     0     0
     1     0     3     9    17    28     6     0     0     0     0     0     2     2     0     0
     2     0     1     3     3     2     2     0     0     1     1     6    16    45    14     4
     1     0     0     1     1     2     0     1     1     0     0     3    11    52    20     9
     0     0     0     0     0     0     0     0     2     1     1     2     5    32    17    11
QUADRENT SUMS...HARD DECISIONS                                     4    21
    32   452                                                      25   467
     4    24
     5  1631  1121    39
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  2.3000E+01  1.3000E+01  9.0000E+00  9.0000E+00  3.0000E+01  1.3000E+01  1.5000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FDOPRT=    1.0000E+01 TL=   -6.5000E+00 UYNR=    6.0000E+00
SDAMP=     0.         FBAMP=    2.0000E+00 SDPHA=    0.         FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILI=    7.0000E-01
FBTAU3=    1.5000E+00 FBTAU5=    5.8028E+00 FBTAU6=    1.5010E+00
PEI=    6.0020E-02 STDEV=    5.2901E-03 BITS=    2016
XISUM=    3.6954E-01 XISIG=    1.4726E-01
LOCKIN=     15 ,DROPOUTS=     12 ,AVE=   1.6667E+00 ,STD DEV=   7.4536E-01
  3.4000E+01  3.0000E+00  4.0000E+00  4.0000E+00  5.0000E+00  3.0000E+00  7.0000E+00  4.0000E+00  2.0000E+00  4.0000E+00
  2.0000E+00  4.0000E+00  1.0000E+00  2.0000E+00  5.0000E+00  0.          1.0000E+00  2.0000E+00  0.          1.0000E+00
  0.          3.          3.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          0.          1.0000E+00  3.0000E+00
  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.
  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.
  2.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.
-1-1 P(R1.R2/T1.T2)TIMES    480                                                    -1+1 P(R1.R2/T1.T2)TIMES    512
     5    21    22    11     5     0     1     5     3     0     0     0     0     0     0     0
    16    44    45    17     4     0     0     0     1     1     1     0     0     0     0     1
    48    64    51    14     2     0     0     0     0     2     3     1     0     0     1     0
    15    23    22     9     3     0     0     0     1     1     1     1     1     1     0     0
     8    10     6     0     0     0     0     0     0     1     7     1     1     1     1     1
     0     0     1     0     1     0     0     0     0     0     1     1     1     1     1     1
     0     0     0     0     0     1     0     0     0     0     2     1     1     1     1     1
     0     0     0     0     1     0     0     0     0     0     0     1     1     1     1     1
QUADRENT SUMS...HARD DECISIONS                                                      7    21    28    18     1     1     1     1
   427    22                                                                       26    48    64    21     4     2     3     2
    25     6                                                                       27    53    57    16     6     3     2     1
+1-1 P(R1.R2/T1.T2)TIMES    512                                                    17    15    16    12     7     4     3     1
     1     0     1     4    22    35    33    10     0     0     0     0     0     0     0     0
     0     0     2     2    38    78    45    13     0     1     0     0     0     0     0     0
     1     0     2     6    37    62    26     3     0     0     0     0     0     0     0     0
     1     0     2     9    13    24     5     2     0     0     0     0     0     0     0     0
     0     0     2     8     3     2     2     1     0     0     0     0     0     0     0     0
     0     1     0     0     0     2     2     3     0     0     1     1     1     1     1     1
     0     0     0     0     1     0     1     3     0     1     1     2     1     1     1     1
QUADRENT SUMS...HARD DECISIONS                                                      0     1     1     2     8    21    17    10
    31   451                                                                       5    19
     6    24                                                                      18   470
   201  1505   133   997
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  2.1000E+01  1.5000E+01  9.0000E+00  9.0000E+00  2.7000E+01  1.4000E+01  1.5000E+01  0.          0.
```


ENCOD= 7.. ,DELF= 62.. ,BIF= 129 ,BL2= 294 ,ASOFT= .3700
FQDPRT= 1.0800E-01 TL= -6.5000E+00 DYNR= 6.3000E+00
SDAMP= 0. FBAMP= 2.0000E+00 SDPHA= 0. FBPHA= 2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,HNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PHFILT= 7.0000E-1
FBTAU3= 2.0002E+00 FBTAU5= 8.8028E+00 FBTAU6= 1.5010E+00
PEI= 4.7619E-02 STDEV= 4.7436E-03 BITS= 2916
XISUM= 3.6611E-01 XISIG= 1.8375E-01
LOCKIN= 5 ,DROPOUTS= 32 ,AVE= 1.7813E+00 ,STD DEV= 1.0821E+00
ERRM
-1-1 P(R1.R2/T1.T2)TIMES 486
QUADRENT SUMS...HARD DECISIONS
-1+1 P(R1.R2/T1.T2)TIMES 512
+1-1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
252 BIT ERROR INTERVALS

```
ENDDB=    7.0 ,DELF=   62.5 ,NIF=   1500 ,BL2=    294 ,ASOFT= .3700
FDDPRT=   1.0800E+01 TL=  -6.5006E+00 DYNR=   6.0000E+00
SDAMP=       .0          FBAMP=   2.0000E+00 SDPHA=      .0          FBPHA=   2.0000E-01
WN= 277.2 ,K= 456.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=      .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   4.0140E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    5.5666E-02 SIGEV=   5.0801E-03 BITS=    2016
XISUM=    3.6182E-01 XISIG=   1.8625E-01
LOCKIN=       5 ,DROPOUTS=    134 ,AVE=   2.4179E+00 ,STD DEV=  3.2330E+00
ERRM
  2.4000E+01  5.0000E+00  5.0000E+00  4.0000E+00  8.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00
  0.          3.0000E+00  4.0000E+00  6.0000E+00  2.0000E+00  5.0000E+00  1.0000E+00  0.          6.0000E+00  2.0000E+00
  1.0000E+00  4.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.
  0.          2.0000E+00  0.          0.          0.          2.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     2   11   28    8    5    3    1                            2    1    0    0    3    0    0
    15   55   45   22    3    0    0                            0    1    2    1    1    0    0
    45   52   43   18    4    0    0                            0    1    8    3    3    0    2
    24   31   23    4    2    0    0                            5   16   36   18    3    0    1
    10   12    8    1    0    1    0                           13   32   64   26    8    1    0    1
     2    0    0    0    1    0    0                           22   57   44   16   10    0    0    0
     0    0    0    0    0    0    0                           10   24   22    7    7    0    0    0
QUADRENT SUMS...HARD DECISIONS                                                 20    9
    428   15                                                   452   31
     33    0                                                                 +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                    0    0    0    0    0    0    0    0    0
     0    0    1    1    1   14   34   34    8                    0    0    0    0    0    0    0    0    0
     0    0    0    4    1   45   77   47   12                    0    0    0    0    0    0    0    0    2
     0    0    0    0    1   38   66   33    8                    0    0    0    0    0    0    3    6    9
     0    0    0    0    0   17   18    4    1                    0    0    0    0    2   26   33   20    9
     0    0    0    0    0    4    2    2    0                    0    0    2    2    9   56   75   42   18
     0    0    0    0    0    1    1    0    0                    1    1    3    2   11   21   17   16    6
QUADRENT SUMS...HARD DECISIONS                                                  1   20
    34   456                                                     14   477
     1    21
  1402  1963   297   431
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.6000E+01  1.3000E+01  1.9000E+01  1.4000E+01  1.2000E+01  1.2000E+01  1.6000E+01  8.0000E+00  0.          0.
```

```
ENGDB=   7.0 ,DELF=  62.0 ,SIF=   1500 ,SL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=       .        FBAMP=    2.0000E+00 SDPHA=       .        FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   8.0463E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   1.0952E-01 STDEV=   6.9581E-03 BITS=    2016
XISUM=   3.5599E-01 XISIG=   2.1645E-01
LOCKIN=      2 ,DROPOUTS=    384 ,AVE=  1.4549E+00 ,STD DEV=  4.3766E+00
ERRM
  7.3000E+01  1.8000E+01  1.3000E+01  1.3000E+01  1.2000E+01  8.0000E+00  6.0000E+00  8.0000E+00  2.0000E+00  7.0000E+00
  4.0000E+00  4.0000E+00  5.0000E+00  4.0000E+00  5.0000E+00  5.0000E+00  3.0000E+00  2.0000E+00  5.0000E+00  3.0000E+00
  1.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          1.0000E+00  0.          3.0000E+00
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   509
     5     16     27     13      7      4      2      1          3      0      2      4      0      0      0      0
    19     41     35     19      6      1      0      0          1      2      2      2      3      0      0      0
    55     43     45     18      3      1      0      0          2      2      1      1      1      0      0      0
    16     21     24      9      1      2      0      0          3      8     16      7      8      2      6      1
    11      8      4      3      1      0      0      0          5     31     33     19      4      2      1      1
     2      3      4      2      0      0      0      0         16     37     62     25      5      1      1      1
     0      0      1      0      2      0      0      0         21     44     38     18      6      2      1      1
     0      0      1      0      1      0      0      0         10     21     13      9      3      5      2      4
QUADRENT SUMS...HARD DECISIONS                                  53     24
    403      3                                                394     38
     37     12                                                          +1+1 P(R1.R2/T1.T2)TIMES   514
+1-1 P(R1.R2/T1.T2)TIMES   513                                  0      0      0      0      0      0      1      0
     1      2      1      7     14     35     22     11          0      0      0      0      0      0      0      0
     2      3      1     12     39     58     25     12          1      0      0      1      0      0      0      5
     2      1      2     18     38     58     25      3          0      0      0      1      2      5      9     13
     0      2      1     14     23     18     12      4          1      0      0      3      9     15     35     27
     1      1      2      5      6      7      4      3          0      0      0      7     18     56     55     30
     0      0      1      0      2      3      2      2          0      2      3      6     17     42     41     22
     0      0      0      1      1      3      3      4          2      0      4      5     17     24     20     13
QUADRENT SUMS...HARD DECISIONS                                   4     35
     68     387                                                34     441
     11      47
    543     79    1270    595
      9      10      13      14
     17      18      21      22

252 BIT ERROR INTERVALS
  3.9000E+01  3.9000E+01  1.5000E+01  2.5000E+01  2.9000E+01  2.3000E+01  2.9000E+01  2.2000E+01  0.          0.
```

```
ENDDB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=.  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   3.7501E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   9.5238E-02 STDEV=   6.5377E-03 BITS=   2016
XISUM=   3.8060E-01 XISIG=   2.2931E-01
LOCKIN=    22 ,DROPOUTS=0
ERRM
  7.5000E+01  1.2000E+01  1.3000E+01  9.0000E+00  7.0000E+00  6.0000E+00  5.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00
  4.0000E+00  5.0000E+00  1.0000E+00  3.0000E+00  4.0000E+00  1.0000E+00  4.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          2.0000E+00  1.0000E+00  1.0000E+00  4.0000E+00  1.0000E+00  0.          0.
  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00
  1.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  0.          0.          0.          2.0000E+00  1.0000E+00  0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    13     13     19     13      4     0      3     5            7     1      0     2      3     1      0     0
    21     47     42     18      2     1      0     1            0     1      0     1      0     0      1     1
    46     43     56     14      6     0      3     0            1     2      3     2      1     0      2     0
    26     23     20     11      2     0      0     0            5     5      7     8      1     1      0     4
     8      4      4      0      0     0      3     0           10    24     28    16      2     2      1     3
     0      0      1      1      1     0      2     0           15    49     60    26      7     3      0     1
     0      0      0      0      1     2      1     4           23    51     43    16      1     1      0     1
     0      0      0      0      0     0      2     3           10    19     17    13      2     2      1     5
QUADRENT SUMS...HARD DECISIONS
    419     24                                                  45    15
     18     19                                                 420    32
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
      0      3      2      9     24    35     31    11           2     1      0     0      0     0      0     0
      0      0      3     10     26    66     37     8           2     0      1     1      1     0      1     0
      1      2      3     17     40    46     20     6           1     1      0     0      0     1      1     3
      5      1      2      3     23    18      6     1           0     0      0     1      3     5     11     6
      1      0      0      2      3     3      4     1           0     0      1     0      6    22     35    17
      0      0      1      1      3     1      0     2           1     1      0     3      9    63     65    34
      0      1      0      0      1     5      0     1           1     0      0     3     13    48     39    33
      0      0      0      3      1     3      6    10           3     0      5     4     14    20     18    12
QUADRENT SUMS...HARD DECISIONS
     61    398                                                  10    32
      9     44                                                 22    448
   916    280     93   1308
  1199     74   1411   1161
  1239     82    113    560

252 BIT ERROR INTERVALS
  2.2000E+01  1.8000E+01  2.4000E+01  1.9000E+01  2.4000E+01  3.4000E+01  2.6000E+01  2.4000E+01  0.          0.
```

```
ENGOB=   7.0 ,DELF=  62.5 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3300E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.3030E-01
FBTAU3=   9.9972E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   6.1012E-02 STDEV=   5.3308E-03 BITS=   2016
XISUM=   3.6957E-01 XISIG=   1.9143E-01
LOCKIN=    15 ,DROPOUTS=     4 ,AVE=  5.7500E+00 ,STD DEV=  3.5620E+00
ERRM
  4.7000E+01  3.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  0.          6.0000E+00  2.0000E+00
  2.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00
  3.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.                      0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00
  0.          0.                      0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
      7     21     24     15      4      0      2      1          4      3      2      0      0      1      0      0
     15     46     44     20      2      0      1      1          1      0      1      1      0      1      1      0
     39     62     38     19      1      1      1      2          2      0      4      0      1      1      0      1
     20     35     27      8      0      1      0      2          1      6      8      7      2      0      0      1
      2      3      5      3      0      0      1      0          8     13     30     13      3      2      0      2
      0      0      1      1      0      0      0      0         11     71     60     27      3      1      3      1
      0      0      0      0      1      0      1      2         27     61     44     20      2      1      0      3
      0      0      0      0      0      1      2                 9     16     20      9      5      1      1
QUADRENT SUMS...HARD DECISIONS                                  40      7
    441     18                                                439     26
     15      7                                                       +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                      0      0      0      0      0      0      0
      1      1      2      6     30     26      6                  2      0      0      0      0      1      0      0
      0      1      1      5     47     95     49     10          0      0      1      0      0      0      0      0
      1      0      2     10     46     60     32      1          0      1      0      0      0      0      0      0
      1      0      1      6     17     16      6      3          1      0      0      1      1      1      5      4
      1      0      1      1      0      3      3      1          1      0      0      0      1      1     28     36     14
      1      0      0      0      1      2      0      1          1      0      0      0      2      8     54     86     39
      0      0      1      2      1      0      2      3          1      1      1      6     21     56     56     24
      0      0      0      0      2      1      3      7          1      1      1      4      5     20     18      7
QUADRENT SUMS...HARD DECISIONS
     32    444                                                   6     12
      6     30                                                  21    473
    747   1504   1255    484
   1199     74   1178    507
   1239     82   1350    687

252 BIT ERROR INTERVALS
  1.4000E+01  1.4000E+01  2.0000E+01  1.6000E+01  1.2000E+01  2.0000E+01  1.5000E+01  1.2000E+01  0.          0.
```

```
ENCOD=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SOAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   3.7501E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.0099E-02 STDEV=   4.8586E-03 PITS=    2016
XISUM=   3.7506E-01 XISIG=   2.0319E-01
LOCKIN=    23 ,DROPOUTS=0
ERRM
  2.4000E+01  6.0000E+00  3.0000E+00  3.0000E+00  6.0000E+00  3.0000E+00  6.0000E+00  1.0000E+00  5.0000E+00  0.
  2.3000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          2.0000E+00
  0.          2.0000E+00  2.0000E+00  0.          2.0000E+00  0.          1.0000E+00  0.          0.          2.0000E+00
  0.          1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  0.
  1.3000E+30  0.          0.          1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.          1.0000E+00
  1.3000E+00  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          3.0000E+00

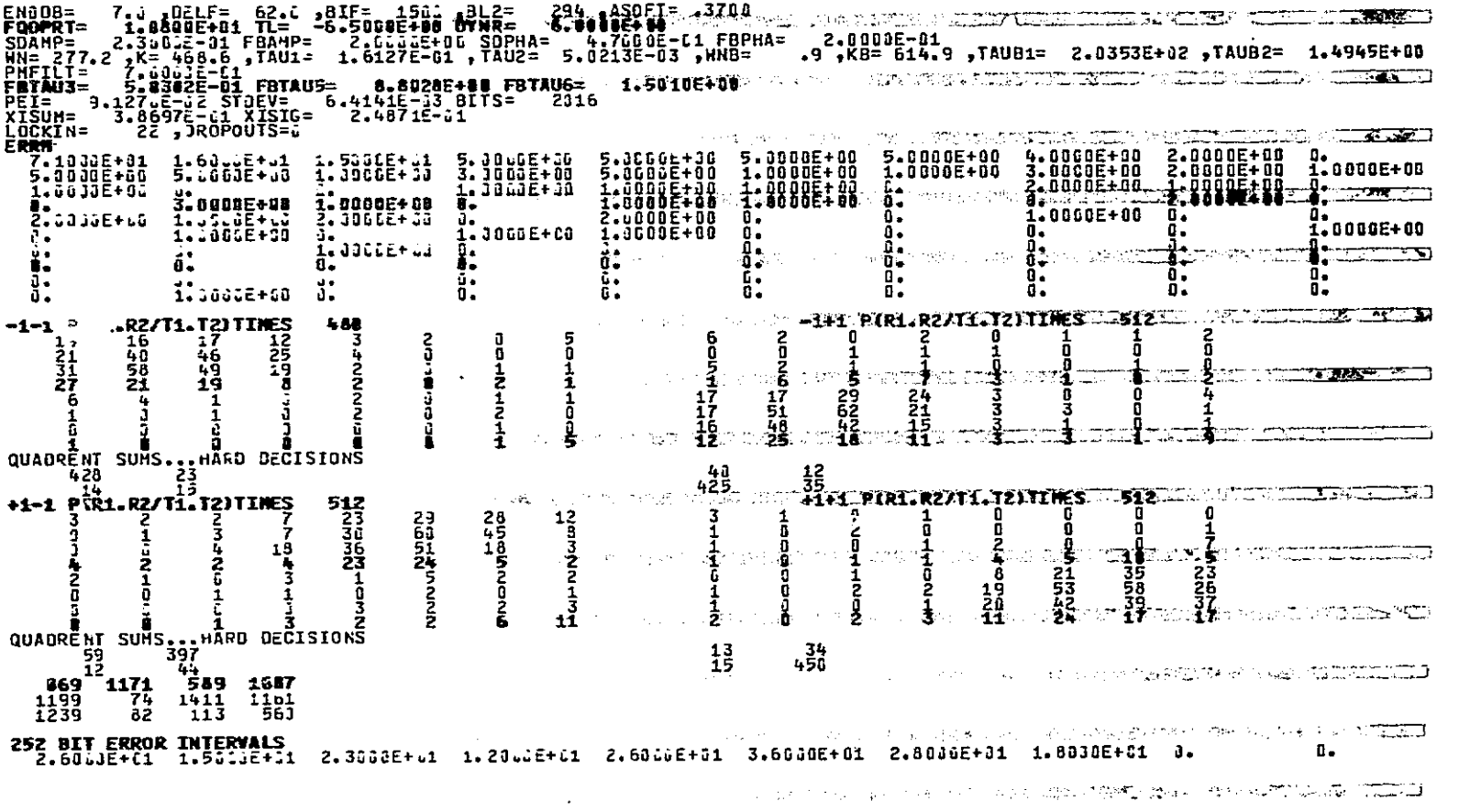
-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
     2    16    22    11     5     0     2     2           4     2     0     1     0     1     0     0
    18    58    47    25     2     0     0     1           1     0     0     0     1     0     1     1
    24    61    45    19     2     0     0     1           0     1     1     0     0     1     0     0
    34    24    22     5     1     0     0     0           2     2     2     4     2     1     0     1
     6    11     1     3     0     0     0     0           1    18    32    15     2     2     0     0
     1     3     0     0     0     1     1     0          22    72    70    30     4     0     0     0
     0     0     1     0     0     0     0     0          23    51    45    12     6     3     0     1
     1     0     0     0     1     0     0     1          13    30    18     6     4     1     2     0
QUADRENT SUMS...HARD DECISIONS
   433    16                                              20     9
    27     4                                             458    25
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     2     1     0     3     6    24    38    18           0     0     0     0     0     0     0     0
     0     1     1     5    41    91    46    13           0     1     0     0     0     0     0     0
     1     0     1     9    41    72    23     7           1     0     0     0     0     0     1     0
     1     0     1     4    14    20     3     2           0     0     0     0     0     4     2     9
     1     0     0     0     2     3     2     1           0     0     0     1     2    21    33    20
     0     0     0     1     0     1     1     1           1     0     1     1    13    69    75    38
     0     0     0     0     0     0     0     3           0     1     0     3    18    55    53    30
     0     0     0     0     0     2     0     3           1     1     1     2     8    26    24     4
QUADRENT SUMS...HARD DECISIONS
    30   459                                               2    16
     2    21                                              13   481
   452  1983  1144   451
     9    10    13    14
    17    18    21    22

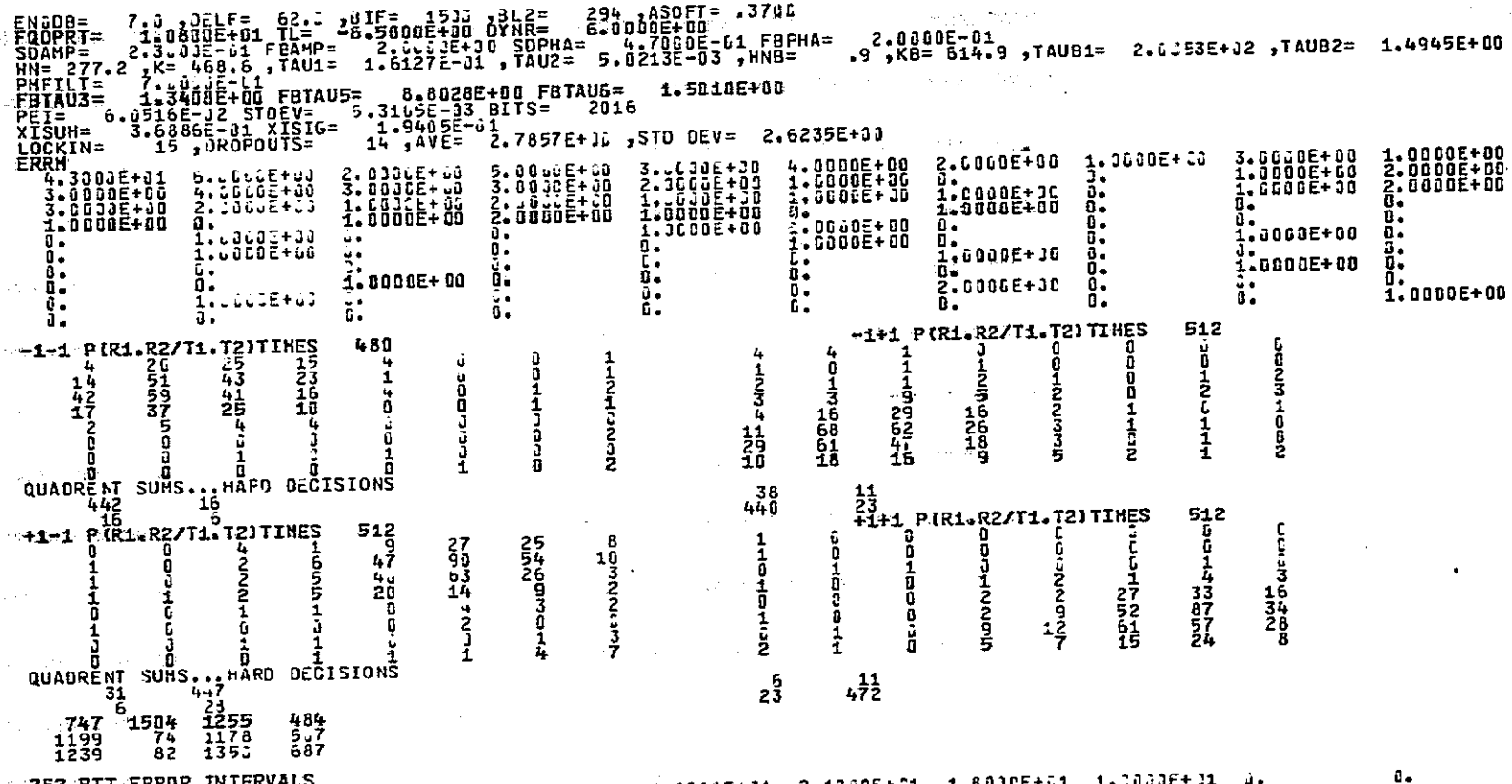
252 BIT ERROR INTERVALS
  1.8000E+01  1.7000E+01  1.4000E+01  1.9000E+01  1.0000E+01  1.1000E+01  4.0000E+00  8.0000E+00  0.          0.
```

```
ENGDB=   7.0 ,DELF=  62.0 ,3IF=  1501 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WN8=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.3000E-01
FBTAU3=   9.9972E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    4.7019E-02 STDEV=   4.7430E-03 BITS=   2016
XISUM=    3.7607E-01 XISIG=   1.9400E-01
LOCKIN=    11 ,DROPOUTS=     5 ,AVE=  1.4030E+00 ,STD DEV=  8.0000E-01
ERRM
  3.1000E+01  6.0000E+00  2.0000E+00  0.          6.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  0.          2.0000E+00
  0.          2.0000E+00  1.0000E+00  0.          0.          2.0000E+00  0.          0.          1.0000E+00  3.0000E+00
  2.0000E+00  2.0000E+00  2.0000E+00  0.          1.0000E+00  3.0000E+00  0.          2.0000E+00  0.          0.
  2.0000E+00  0.          0.          0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          2.0000E+00
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00
  1.0000E+00  0.          1.3000E+00  0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          2.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     1     19     28     10      1      0      0      2          0      0      0      1      0      0      0      0      0      0
    23     45     37     12      3      0      1      0          0      0      1      1      0      1      1      0      1      0
    17     59     58     13      3      1      0      1          1      0      1      4      6      1      0      0      1      2
    20     21     25      8      0      0      1      0          6      2      4      6      1      0      0      0      2      1
     6     13      3      2      1      0      0      1          6     14     20     10      1      0      0      0      0      0
     1      0      1      0      0      0      1      0         24     57     66     25      6      1      0      0      0      2
     0      0      0      0      0      1      0      5         34     54     64     18      6      1      0      0      0      2
                                                                13     26     18     13      3      0      0      2
QUADRENT SUMS...HARD DECISIONS                                                                                    5
                                                                23
      436     12                                                462     22
       23      9                                                       +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                                                    0
     0      1      3      5     18     46     40      8          0      0      0      0      0      0      0      0      0      0
     0      0      1      6     36     54     48     12          0      0      0      2      0      0      0      1      0      2
     0      0      2      1      8     35     24      3          0      0      1      0      0      2      1      2      6      6
     0      0      0      2      4     15     18      5          0      0      0      1      0      2     18     48     26     25
     0      0      0      0      1      0      1      1          0      0      1      0      4     15     52     74     36     30
     0      0      0      0      0      1      0      1          0      0      1      1      1     17     47     58     30     17
     0      0      0      0      0      0      2      3          0      0      0      3      9     19     24      7
QUADRENT SUMS...HARD DECISIONS                                                                                    3
                                                                10     17
       33     463                                               482
        2      14
  1433    334   1648   1332
     9     10     13     14
    17     18     21     22

252 BIT ERROR INTERVALS
   7.3000E+00  9.3000E+00  1.3000E+01  7.0000E+00  1.8000E+01  8.0000E+00  8.0000E+00  2.6000E+01  0.          0.
```




ENSDB= 7.0 ,DELF= 62.5 ,DIF= 1500 ,BL2= 294 ,ASOFT= .3700
FQOPRT= 1.0800E+01 TL= -6.5000E+00 DYNR= 6.0000E+00
SDAMP= 2.3600E-01 FBAMP= 2.0000E+00 SDPHA= 4.7000E-01 FBPHA= 2.0000E-01
HN= 277.2 ,K= 460.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,HNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PMFILT= 7.0000E-01
FBTAU3= 1.3408E+00 FBTAU5= 8.8028E+00 FBTAU6= 1.5010E+00
PEI= 6.0516E-02 STDEV= 5.3165E-33 BITS= 2016
XISUM= 3.6886E-01 XISIG= 1.9405E-01
LOCKIN= 15 ,DROPOUTS= 14 ,AVE= 2.7857E+00 ,STD DEV= 2.6235E+00
ERRM
-1+1 P(R1.R2/T1.T2)TIMES 512
-1-1 P(R1.R2/T1.T2)TIMES 480
QUADRENT SUMS...HARD DECISIONS
+1+1 P(R1.R2/T1.T2)TIMES 512
+1-1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
252 BIT ERROR INTERVALS

```
ENODB=   7.0 ,DELF=  62.5 ,BIF=  150 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   5.0302E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.9028E-02 STDEV=   5.2489E-03 BITS=   2016
XISUM=   3.6676E-01 XISIG=   2.1106E-01
LOCKIN=    20 ,DROPOUTS=     1 ,AVE=   1.0000E+00 ,STD DEV=   0.
ERRM
  3.0000E+01  4.0000E+00  7.0000E+00  1.0000E+01  1.3000E+01  2.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  4.0000E+00
  6.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  2.5000E+00  0.          2.0000E+00  0.          3.0000E+00  2.0000E+00
  2.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00  0.
  1.0000E+00  0.          1.0000E+00  1.0000E+00  7.0000E+00  3.0000E+00  0.          0.          0.          0.
  0.          0.          1.0000E+00  3.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     5    11    16    12     4     1     1     2     2     0     2     0     0     0     0     1
    19    44    53    12     4     1     1     1     1     0     3     0     0     0     0     0
    52    55    44    26     3     1     1     1     1     0     2     0     1     0     0     0
    28    32    24     9     0     1     0     0     4     2     4     1     1     0     0     0
     5    12    11     3     0     1     0     0     8    24    32    15     8     0     0     2
     0     1     1     1     0     1     0     0    49    55    66    30     8     0     1     1
     0     0     0     0     1     1     0     1    19    43    57    17     6     1     0     1
     0     0     0     0     1     1     0     3    11    25    16    13     2     2     1     3
 QUADRENT SUMS...HARD DECISIONS
     424    18                                              22     4
      31     7                                             455    36
+1-1 P(R1.R2/T1.T2)TIMES   512                             +1+1 P(R1.R2/T1.T2)TIMES   512
     1     1     3     5    13    43    40     8     0     0     0     0     0     0     0     0
     0     0     1     8    36    73    43     9     0     0     0     0     0     0     0     1
     1     0     5     7    46    71    18     6     0     0     0     1     1     1     1     4
     1     0     0     3    23    15     4     1     0     0     0     1     1     1     5     8
     0     0     0     1     4     3     2     0     0     0     0     0     1     4    19    34    32
     0     0     0     0     0     0     0     1     0     0     0     0     4    14    63    70    32
     0     0     0     0     0     0     0     1     1     0     0     0     2    27    49    37    21
     0     0     0     0     1     2     3     5     1     0     0     2     1     9    19    25    15
 QUADRENT SUMS...HARD DECISIONS
      36    449                                              3     25
       1     25                                             14    470
   2000  1855   612   323
      9    10    13    14
     17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  1.4000E+01  1.4000E+01  9.0000E+00  1.2000E+01  2.4000E+01  1.5000E+01  2.0000E+01  0.          0.
```

```
ENGOB=   7.0 ,DELF=  62.6 ,BIF=  1500 ,BL2=   294 ,ASOFI= .3700
FQDPRT=   1.0000E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.5408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   3.5714E-02 STDEV=   4.1331E-03 BITS=   2016
XISUM=   3.6890E-01 XISIG=   1.8600E-01
LOCKIN=    10 ,DROPOUTS=    16 ,AVE=  1.7500E+00 ,STD DEV=  1.0308E+00
ERRM
  1.1000E+01   0.           3.0000E+00   1.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   3.0000E+00   1.0000E+00   1.0000E+00
  0.           6.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   0.           0.           2.0000E+00
  1.0000E+00   1.0000E+00   1.0000E+00   3.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00
  0.           0.           1.0000E+00   1.0000E+00   0.           2.0000E+00   2.0000E+00   1.0000E+00   0.           0.
  0.           0.           0.           0.           0.           0.           0.           1.0000E+00   1.0000E+00   0.
  1.0000E+00   0.           0.           2.0000E+00   0.           0.           0.           1.0000E+00   0.           0.
  0.           1.0000E+00   0.           1.0000E+00   0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  1.0000E+00   0.           0.           0.           1.0000E+00   0.           0.           0.           0.           3.0000E+00
  0.           0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     4     8    18    23     1     0     1     1     1     0     1     1     0     0     0     0
    20    55    41     7     2     1     0     0     0     1     0     1     0     0     0     1
    37    74    46    21     3     0     0     0     1     0     2     2     0     0     1     1
    29    33    24     9     1     0     0     0     2     1     2     3     0     1     1     0
    11     4     5     1     0     0     0     0     3     2     7     2     0     0     0     1
     1     0     0     0     0     0     0     0     4     1     4     1     0     1     1     0
     0     0     0     0     1     0     0     0     5     0     1     1     0     0     0     0
QUADRENT SUMS...HARD DECISIONS                                  13     6
   446    17                                                    474    19
    22     2                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                    0     0     0     0     0     0     0     0
     1     3     6     1    14    54    35    11     0     0     0     0     0     0     0     0
     0     0     2     8    54    86    70     8     0     0     0     0     0     0     0     1
     0     0     1     3    41    57    18     3     0     0     0     0     0     2     3    10
     0     0     1     0    12    16     6     1     0     0     0     0     2    19    44    33
     0     0     0     0     3     4     1     0     0     0     0     1    14    56    76    41
     0     0     1     0     1     1     0     0     0     0     0     1     7    60    47    27
     0     0     0     1     0     2     0     2     3     0     0     1    11    24    17    11
QUADRENT SUMS...HARD DECISIONS                                  0     16
    26   473                                                    7    489
     2    11
    68  1801  1098  1293
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  1.3000E+01  8.0000E+00  3.0000E+00  1.4000E+01  8.0000E+00  9.0000E+00  5.0000E+00  0.          0.
```

```
ENGDB=   7.0 ,DELF=  62.5 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SOAMP=   2.3000E-01 FBAMP=   2.0000E+00 SOPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   7.5002E-01 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   8.9782E-02 STDEV=   6.3668E-03 BITS=   2016
XISUM=   3.9013E-01 XISIG=   2.6492E-01
LOCKIN=    15 ,DROPOUTS=     2 ,AVE=  2.5000E+00 ,STD DEV=  1.5000E+00
ERRM
  8.1000E+01  1.0000E+01  8.0000E+00  3.0000E+00  7.0000E+00  7.0000E+00  3.0000E+00  8.0000E+00  3.0000E+00  2.0000E+00
  2.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          2.0000E+00
  1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          1.0000E+00  4.0000E+00  1.0000E+00  0.          2.0000E+00
  2.0000E+00  2.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          0.
  0.          1.0000E+00  0.          0.          3.0000E+00  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00
  1.0000E+00  2.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     7    16    27    15     2     2     3     1                 6     3     0     1     0     0     0     1
    18    52    37    22     3     0     0     0                 4     1     4     1     0     0     0     1
    30    57    55    15     4     8     2     0                 5     0     1     2     1     0     0     2
    15    30    21     6     1     0     0     2                 2     4     8     7     2     0     1     4
     3     3     6     2     0     0     1     0                 7    13    30    15     5     1     0     1
     1     1     0     0     0     0     1     2                17    74    55    23     9     2     0     2
     0     0     0     0     0     2     0     1                19    54    40    16     4     2     1     2
     0     1     1     1     1     0     0     9                13    17    17     7     1     3     0     3
QUADRENT SUMS...HARD DECISIONS
   424    20                                                    49    12
    19    17                                                   417    34
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     4     1     1     2     6    20    27    12                 5     0     1     0     1     1     0     0
     2     1     2    19    28    90    49    12                 0     1     0     1     0     0     0     1
     1     1     0     7    32    63    24    11                 0     1     0     2     0     1     1     1
     0     0     2     7    21    21     4     4                 1     3     1     1     2     5     5     3
     4     1     2     4     2     3     2     0                 0     0     2     1     2    17    33    14
     1     0     0     0     3     1     1     1                 0     0     1     2     8    49    77    32
     0     0     0     2     0     1     1     2                 1     0     2     6    21    51    62    20
     0     1     1     0     2     2     1     9                 0     3     2     4    13    24    15    13
QUADRENT SUMS...HARD DECISIONS
    41   424                                                    17    20
    16    31                                                    24   451
    15  1886  1770  1890
  1199    74  1178   517
  1239    82  1350   687

252 BIT ERROR INTERVALS
  3.6000E+01  1.9000E+01  2.6000E+01  1.9000E+01  1.6000E+01  2.9000E+01  2.0000E+01  1.6000E+01  0.          0.
```

```
ENOD8=   7.0 ,DELF=  62.5 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAU81=  2.0353E+02 ,TAU82=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.9994E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   8.3829E-02 STDEV=   6.1722E-03 BITS=   2016
XISUM=   3.8887E-01 XISIG=   2.2448E-01
LOCKIN=    11 ,DROPOUTS=    63 ,AVE=  2.9286E+00 ,STD DEV=  3.4471E+00
ERRM
  8.3000E+01  8.0000E+00  1.2000E+01  4.0000E+00  2.0000E+00  2.0000E+00  6.0000E+00  5.0000E+00  1.0000E+00  2.0000E+00
  6.          3.0000E+00  6.3000E+00  1.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00
  8.          2.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          2.0000E+00
  8.          1.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00
  0.          0.          0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.
  1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          3.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    15    18    20     8     1     0     0     2             5     0     2     1     0     0     0     0
    23    53    43    14     3     0     1     1             1     1     2     1     1     2     0     2
    34    55    58    14     3     1     1     0             8     1     2     3     1     4     3     2
    22    24    17     6     1     1     0     0            10    18    29     3     1     3     2     2
     4     7     3     0     1     1     0     1            23    53    56     2     6     5     2     2
     0     1     1     1     0     1     1     0            19    62    51    15     5     5     1     2
     1     0     1     1     0     0     1     1            13    19    14    13     2     1     2     8
     0     0     0     1     0     0     1     0
QUADRENT SUMS...HARD DECISIONS                                                    33    10
      424    13                                                                  434    35
       19    24                                                                  +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                    4     0     1     1     0     0     0     1
     1     6     5     9    14    36    34    11             1     1     1     0     3     1     0     3
     1     0     1     5    34    85    41     8             1     0     0     0     2     1     0     2
     1     0     0     5     8    48    24     5             0     0     0     3     3     0     1     2
     0     0     0     1     4    14    18     6             0     0     0     2     5     2     0     1
     1     0     0     1     2     3     5     1             2     0     1     0     3     5    15    33
     0     1     0     0     0     1     1     0             0     1     0     3     3     1    15    46
     1     0     0     0     1     1     3     4             2     0     2     1     3     1    10    52
     0     0     0     1     0     1     0     1
QUADRENT SUMS...HARD DECISIONS                                                    14    29
       45    428                                                                 21   448
        7     32
   2010    691     74   1207
   1199     74    446    372
   1239     82   1931    942

252 BIT ERROR INTERVALS
  2.3000E+01  1.5000E+01  1.6000E+01  2.0000E+01  1.7000E+01  2.6000E+01  1.8000E+01  3.4000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FODPRT=    1.0800E+01 TL=    -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=    7.0000E-01
FBTAU3=    7.5002E-01 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    6.3492E-02 STDEV=    5.4399E-03 BITS=    2016
XISUM=    3.6513E-01 XISIG=    1.9737E-01
LOCKIN=     16 ,DROPOUTS=      2 ,AVE=   1.0000E+00 ,STD DEV=   0.
ERRM
  3.4000E+01  3.0000E+00  3.0000E+00  2.3000E+00  4.0000E+00  6.0000E+00  5.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00
  1.0000E+00  3.0000E+00  8.0000E+00  5.0000E+00  1.0000E+00  1.0000E+00  4.0000E+00  3.0000E+00  3.0000E+00  1.0000E+00
  3.0000E+00  2.0000E+00  2.0000E+00  0.          2.3000E+00  0.          0.          3.0000E+00  4.0000E+00  2.0000E+00
  0.          1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0030E+00  0.          0.          1.0000E+00
  0.          0.          0.          1.3000E+00  0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                    -1+1 P(R1.R2/T1.T2)TIMES   512
    13    17    16    12     4     0     0     1          4     1     0     0     0     0     0     0
    15    50    38    17     5     0     1     1          1     1     1     1     0     0     0     0
    34    58    62    14     2     1     0     1          0     3     1     1     0     0     0     3
    24    27    25     3     1     0     0     1          3     3     7     7     4     0     1     3
     8    10     4     3     1     0     1     0          5    24    23    15     7     1     0     6
     1     0     0     0     1     0     1     0         15    59    64    23     4     0     0     1
     3     0     1     0     0     0     2     0         29    53    47    26     4     1     0     0
     2     1     0     0     0     0     1     4         15    22    20    12     5     1     0     1
QUADRENT SUMS...HARD DECISIONS                                                        31     8
   422    18                                                                        442    31
    30    10                                                                              +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                          0     0     0     0     0     0     0     0
     0     0     0     5    24    39    28    10          0     0     0     0     0     0     0     1
     1     1     0     7    55    73    45     7          0     0     0     0     0     0     0     3
     0     1     3    15    32    55    25     6          0     0     1     0     0     2     5     4
     1     0     0    11    16    17     5     3          0     0     1     1     1     5    28    39    22
     2     0     0     0     2     2     4     1          0     1     0     0     1     0    15    60    76    40
     0     0     0     0     0     0     2     0          1     0     1     0     3    19    44    47    26
     0     0     0     0     0     1     1     1          0     0     1     4     7    24    16     9
QUADRENT SUMS...HARD DECISIONS
    45   440                                                                         1    21
     2    25                                                                        13   477
  1183  1293  1318   785
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.6000E+01  1.6000E+01  1.7000E+01  2.2000E+01  1.0000E+01  1.7000E+01  1.5000E+01  1.5000E+01  0.          0.
```

```
ENCOG=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FRAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WN8=    .5 ,K8= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.9994E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5016E+00
PEI=   3.9187E-02 STDEV=   4.3216E-03 BITS=   2016
XISUM=   3.6863E-01 XISIG=   1.8638E-01
LOCKIN=    10 ,DROPOUTS=    43 ,AVE=  1.8837E+00 ,STD DEV=  1.1854E+00
ERRM
  1.2000E+01  1.0000E+00  2.0000E+00  1.0000E+00  0.          4.0000E+00  2.0000E+00  6.0000E+00  1.0000E+00  1.0000E+00
  0.          5.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          0.          3.0000E+00
  2.0000E+00  1.0000E+00  0.          3.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.
  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          0.
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          2.0000E+00

-1-1 P(R1.R2/T1.T2) TIMES   480                          -1+1 P(R1.R2/T1.T2) TIMES   512
     4     10     21     14      5      0      0      1          1      1      0      0      1      0      0      0
    23     59     38      7      2      1      1      0          0      0      0      1      0      0      0      0
    37     70     48     21      3      0      0      0          0      1      0      0      0      0      0      1
    31     32     20      9      1      0      0      0          5      2      4      2      3      0      0      0
     7      6      6      3      0      1      0      0          1     16     25     13      2      0      1      1
     1      0      0      0      0      0      0      0         15     64     69     26      5      0      0      1
     0      0      0      0      0      0      0      0         24     61     50     24      5      1      0      1
     0      0      0      0      1      0      0      0         19     26     27     12      1      0      0      0
QUADRENT SUMS...HARD DECISIONS
     444                                                      17      5
      20                                                     472     18
+1-1 P(R1.R2/T1.T2) TIMES   512                          +1+1 P(R1.R2/T1.T2) TIMES   512
     1      0      0      2     10     57     32     11          0      0      0      0      0      0      0      0
     0      0      0      9     55     90     54      9          0      0      0      0      0      0      0      0
     0      0      1     12     37     52     21      6          0      0      0      0      0      0      0      1
     0      0      1      3     10     12      7      3          0      0      0      0      0      3      5      9
     0      0      0      0      3      5      0      1          0      0      0      0      2     20     38     28
     0      0      1      0      0      0      1      0          0      0      0      1     13     57     79     47
     0      0      0      1      0      0      1      2          0      0      0      2      9     53     42     28
     0      0      0      1      0      1      0      2          2      1      0      2      8     27     19     16
QUADRENT SUMS...HARD DECISIONS
      29     466                                               0     18
       3      14                                               8    486
      68    1801    1098    1293
       9      10      13      14
      17      18      21      22

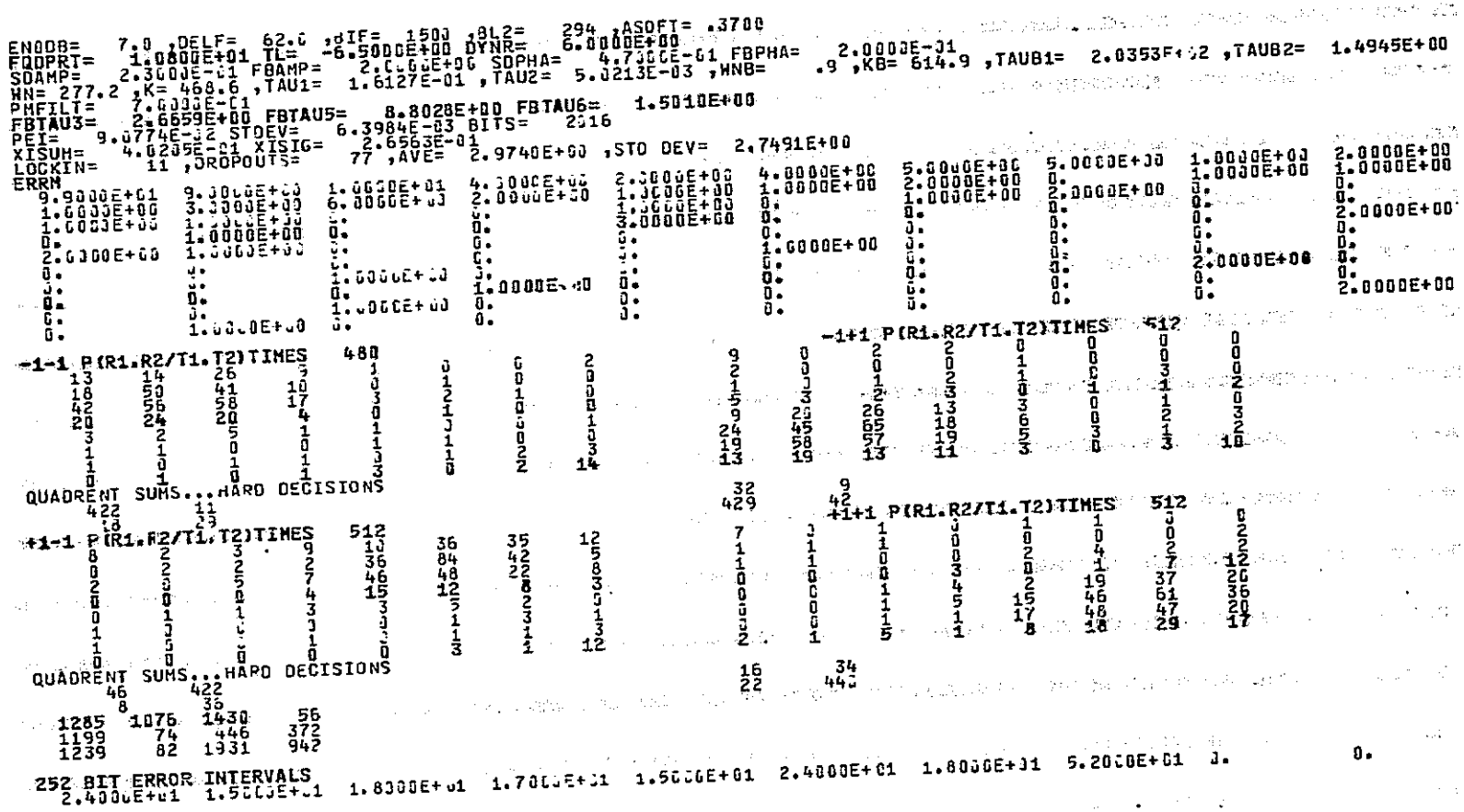
252 BIT ERROR INTERVALS
  1.3300E+01  1.4000E+01  1.1600E+01  4.0000E+00  1.5000E+01  7.0000E+00  8.0000E+00  6.0000E+00  0.          0.
```

```
ENCOB=    7.0 ,DELF=   62.5 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=   1.0000E+01 TL=   -6.5000E+00 OYNR=   6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    2.0000E-01
WN= 277.2 ,K=  468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,K8= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.0003E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    1.1266E-01 STDEV=    7.0462E-03 BITS=    2016
XISUM=    3.8961E-01 XISIG=    2.6533E-01
LOCKIN=     15 ,DROPOUTS=     5 ,AVE=   1.6000E+00 ,STD DEV=   8.0000E-01
ERRM
  1.0600E+02  1.8000E+01  1.1000E+01  6.0000E+00  8.0000E+00  5.0000E+00  6.0000E+00  4.0000E+00  2.0000E+00  5.0000E+00
  1.0600E+02  1.8000E+01  1.1000E+01  5.0000E+00  6.0000E+00  5.0000E+00  6.0000E+00  4.0000E+00  2.0000E+00  5.0000E+00
  5.0000E+00  2.0000E+00  1.0000E+00  5.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00
  5.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00
  1.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  0.          1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          2.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES    480
    13    18    26    14          6     1     6          7     1     1     0     0     0     1     1
    20    41    34    15          2     1     1          4     1     3     0     0     1     1     1
    33    58    57    16          1     1     0          3     2     3     1     2     1     1     3
    14    29    24     6          2     1     1          5    17    28    15     6     1     0     3
     4     7     4     2          1     0     1         12    55    52    21     5     1     0     1
     1     0     0     0          1     1     1         25    41    34    11     3     2     0     0
     0     0     0     1          0     1     0         18    17    20    14     5     3     0     7
QUADRENT SUMS...HARD DECISIONS                         56    15
   415    23                                           408    40
    21    21
+1-1 P(R1.R2/T1.T2)TIMES    512
     3     3     4     1         10    33    17    13          6     1     0     1     1     0     0
     1     1     1     1         29    78    38    14          8     1     1     0     0     1     1
     1     0     0     0         32    60    24     4          1     1     3     0     2     0     2
     1     0     0     0         11    18     5     1          1     1     3     3     6    13     5
     1     0     0     0          3     4     1     1          1     1     1     1    14    28    17
     2     1     1     0          4     1     1     3          0     1     2     1    15    48    62    34
     0     1     0     0          1     0     1     4          0     2     2     7    23    39    56    24
     0     0     0     1          0     1     0    14          0     2     2     7     9    23    19    17
QUADRENT SUMS...HARD DECISIONS                         21    34
    63   391                                           27   430
    16    42
  1236   732   270  1761
  1169    74  1178   587
  1239    82  1350   687

252 BIT ERROR INTERVALS
  3.9000E+01  2.2000E+01  2.8000E+01  2.7000E+01  3.2000E+01  2.8000E+01  2.2000E+01  2.9000E+01  0.          0.

-1+1 P(R1.R2/T1.T2)TIMES    512
+1+1 P(R1.R2/T1.T2)TIMES    512
```


ENODB= 7.0 ,DELF= 62.5 ,BIF= 150 ,BL2= 294 ,ASOFT= .3700
FDOPRI= 1.0800E+01 TL= -6.5000E+00 DYNR= 6.0000E+00
SOAMP= 2.3000E-01 FBAMP= 2.6000E+00 SOPHA= 4.7000E-01 FBPHA= 2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,WNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PHFILT= 7.0000E-01
FBTAU3= 2.6659E+00 FBTAU5= 8.8028E+00 FBTAU6= 1.5010E+00
PEI= 9.0774E-02 STDEV= 6.3984E-03 BITS= 2016
XISUM= 4.0235E-01 XISIG= 2.6563E-01
LOCKIN= 11 ,DROPOUTS= 77 ,AVE= 2.9740E+00 ,STD DEV= 2.7491E+00
ERRM
9.9000E+01 9.0000E+00 1.0000E+01 4.0000E+00 2.0000E+00 4.0000E+00 5.0000E+00 5.0000E+00 1.0000E+00 2.0000E+00
1.0000E+00 3.0000E+00 6.0000E+00 2.0000E+00 1.0000E+00 1.0000E+00 2.0000E+00 2.0000E+00 1.0000E+00 1.0000E+00
1.0000E+00 1.0000E+00 1.0000E+00 3.0000E+00 2.0000E+00
2.0000E+00 1.0000E+00 1.0000E+00
1.0000E+00
-1+1 P(R1.R2/T1.T2)TIMES 480
13 14 26 3 1 0 2 9 0 2 2 0 0 0 0
16 50 41 10 3 2 1 11 2 1 6 3 1 3 2
22 56 58 17 3 0 1 24 5 26 13 6 6 1 3
20 24 20 4 1 1 0 19 5 6 5 1 0 1 2
3 2 5 1 1 1 0 8 5 7 10 5 0 3 0
1 1 1 0 1 0 0 13 9 13 11 3 0 3 1
1 0 1 1 0 0 2 14 32 9
QUADRENT SUMS...HARD DECISIONS 429 42
422 11
13
+1+1 P(R1.R2/T1.T2)TIMES 512
8 2 3 9 16 36 35 12 7 1 1 1 1 0 0
8 2 2 7 36 84 42 5 1 1 0 2 0 2 2
2 0 5 4 46 48 22 8 0 1 3 1 4 2 1
0 1 1 3 15 12 3 0 0 1 1 2 19 37 20
0 1 0 3 3 3 2 3 1 1 5 1 15 46 61 36
1 1 0 1 3 1 3 1 1 1 1 1 17 48 47 20
0 0 0 0 0 3 1 12 2 1 5 1 8 18 29 17
-1+1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS 16 34
46 422 22 442
8 36
1285 1076 1430 56
1199 74 446 372
1239 82 1931 942
252 BIT ERROR INTERVALS
2.4000E+01 1.5000E+01 1.8000E+01 1.7000E+01 1.5000E+01 2.4000E+01 1.8000E+01 5.2000E+01 0. 0.

```
=NODB=   7.0   ,OFF=   62.4 ,BIF=   150  ,BL2=   294 ,ASOFT= .3750
FODPRT=   1.0[illegible]E+01 TL=  -6.5000E+00 OYNR=   6.0000E+00
SOAMP=    0.          FBAMP=    2.0000E+00 SOPHA=    0.          FBPHA=    2.0000E-01
HN= 277.2 ,V  468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
>NFILI=   7  .[illegible]E-1
FBTAU3=    .0003E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    7.  .61E-02 STDEV=    6.0374E-03 BITS=    2016
XISUM=    .7032E-01 XISIG=    2.2105E-01
LOCKIN=    15 ,DROPOUTS=     5 ,AVE=   1.4000E+00 ,STD DEV=  4.8992E-01
ERRM
  5.0000E+01  3.[illegible]E+00  8.0000E+00  9.0000E+00  3.0000E+00  6.0000E+00  4.0000E+00  1.0000E+01  4.0000E+00  6.0000E+00
  1.0000E+00  3.0000E+00  4.0000E+00  3.0000E+00  5.0000E+00  2.0000E+00  5.          3.0000E+00  0.          0.
  0.          1.[illegible]E+00  2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  0.          0.
  1.0000E+00  2.0000E+00  2.0000E+00  0.          0.          0.          0.          0.          2.0000E+00  0.
  1.0000E+00  0.          0.          1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.
  1.0000E+00  2.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.8000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

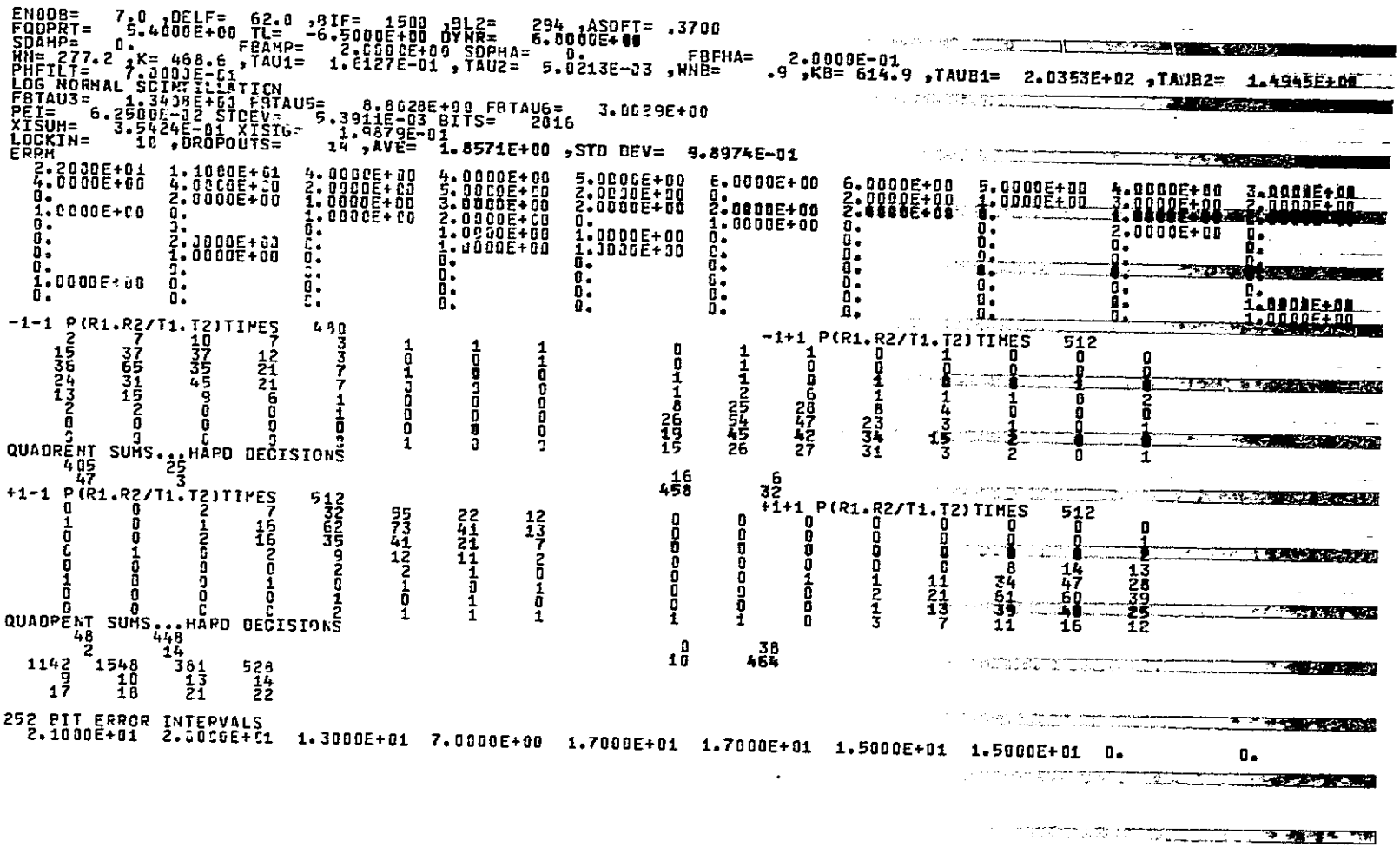
-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     6     21     19     16      4      1      1      2          3      1      1      0      0      0      1      1
    19     47     44     23      3      1      1      1          2      0      3      3      0      0      0      1
    37     52     42     19      2      1      0      0          1      2      0      2      1      2      1      0
    20     24     21      9      2      1      0      0          2      3      0      0      3      1      0      0
     5     16      3      4      2      1      1      0          0      1      0      0      0      0      0      0
     1      4      2      0      2      0      0      0          9     21     26     28      4      3      0      2
     0      0      0      0      2      0      0      1         16     59     56     30      5      1      2      0
     0      0      0      0      2      0      0      2         27     45     40     11      8      3      0      0
                                                               18     16     27      7      6      2      0      1
QUADRENT SUMS...HARD DECISIONS
   413     23                                                  37     18
    35     12                                                 428     37
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     1      1      3      3     22     33     24     12          0      0      1      0      0      0      0      1
     3      0      2      9     27     73     46     15          1      0      1      0      0      0      1      0
     0      1      3      9     49     41     27      8          1      2      0      3      0      1      2      2
     1      0      3     11     18     26      9      3          0      0      0      0      2      3     10      5
     0      0      0      2      5      4      1      2          0      1      0      1     10     28     32     21
     1      0      0      0      3      0      2      2          0      2      1      1     11     46     62     37
     0      0      0      0      0      3      2      4          1      0      2      2     15     53     55     21
                                                                0      2      2      2     16     28     15     15
QUADRENT SUMS...HARD DECISIONS
    50     43                                                  0     26
     3     29                                                 28    457
   747   1504   1255    484
     9     10     13     14
    17     18     21     22

252 BIT ERROR INTERVALS
  1.9000E+01  2.3000E+01  2.3000E+01  1.4000E+01  1.4000E+01  3.7000E+01  1.5000E+01  1.6000E+01  0.          0.
```

```
ENGOB=    7.0  ,DELF=   62.5  ,DIF=   1500  ,BL2=    294  ,ASOFI= .3700
FQOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=     0.          FBAMP=    2.0000E+00 SDPHA=     0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=    7.2000E-01
FBTAU3=    2.6653E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    7.2917E-02 STDEV=    5.7907E-03 BITS=    2016
XISUM=    4.0925E-01 XISIG=    2.9635E-01
LOCKIN=      5 ,DROPOUTS=     75 ,AVE=    3.1603E+00 ,STD DEV=  4.0597E+00
ERRM
  6.7000E+01  1.6000E+01  9.0000E+00  3.0000E+00  3.0000E+00  3.0000E+00  0.          1.0000E+00  1.0000E+00  2.0000E+00
  0.          0.          1.0000E+00  2.0000E+00  0.          3.0000E+00  0.          2.0000E+00  2.0000E+00  1.0000E+00
  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.
  0.          1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/Y1.T2)TIMES   512
    11    15    23     5      1     2     4     0             11     3     0     0     0     0     0     0
    14    56    41    21      1     3     1     0              1     1     0     0     0     0     0     1
    41    59    43    13      2     0     1     1              0     0     1     1     0     0     0     1
    23    32    20     4      1     0     1     0              1     4     4     1     2     0     0     1
     9     4     6     2      1     1     0     0              2    16    30     8     2     0     0     3
     0     1     0     0      1     1     0     0             15    61    58    27     3     1     1     3
     0     0     0     0      1     2     1     1             15    63    58    20     9     0     0     2
     0     0     0     0      0     2     0    10             10    23    25     9     3     0     1    11
QUADRENT SUMS...HARD DECISIONS                                    27     6
    421    18                                                  443    39
     22    19                                                       +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512
     7     1     1     2     18    30    24     9              9     1     0     0     0     0     0     0
     1     0     1     9     45    81    56     9              1     1     0     0     0     0     0     0
     2     0     2     7     39    65    28     4              0     0     1     1     0     1     0     0
     1     1     0     1      6    16     4     1              0     0     1     0     4     5     5     5
     1     0     0     2      1     3     0     1              0     0     0     3    19    39    25
     0     0     0     1      0     1     2     1              0     0     2    10    59    67    39
     0     0     0     0      0     3     4    12              0     1     0     1    11    46    64    24
                                                              1     0     1     3    10    26    13    22
QUADRENT SUMS...HARD DECISIONS
    36   435                                                  15    17
     4    37                                                   9   471
   178   435   226   951
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  9.0000E+00  1.4000E+01  8.0000E+00  1.2000E+01  7.0000E+00  6.0000E+00  1.2000E+01  7.8000E+01  0.          0.
```


ENOOB= 7.0 ,DELF= 62.0 ,BIF= 1500 ,BL2= 294 ,ASOFT= .3700
FOOPRT= 5.4000E+00 TL= -6.5000E+00 DYNR= 6.0000E+00
SDAMP= 0. FBAMP= 2.0000E+00 SOPHA= 0. FBPHA= 2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,WNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PHFILT= 7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3= 1.3430E+00 FBTAU5= 8.8028E+00 FBTAU6= 3.0029E+00
PEI= 6.2500E-02 STDEV= 5.3911E-03 BITS= 2016
XISUM= 3.5424E-01 XISIG= 1.9879E-01
LOCKIN= 10 ,DROPOUTS= 14 ,AVE= 1.8571E+00 ,STD DEV= 9.8974E-01
ERRH
-1-1 P(R1.R2/T1.T2)TIMES 480
QUADRENT SUMS...HARD DECISIONS
+1-1 P(R1.R2/T1.T2)TIMES 512
QUADPENT SUMS...HARD DECISIONS
-1+1 P(R1.R2/T1.T2)TIMES 512
+1+1 P(R1.R2/T1.T2)TIMES 512
252 BIT ERROR INTERVALS

```
ENOOB=   7.0 ,DELF=  62.C ,BIF=   1500 ,BL2=    294 ,ASOFI= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.CCCCE+00 SDPHA=   0.          FBPHA=   2.0303E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3403E+CO FBTAU5=   8.8028E+00 FBTAU6=   3.0029E+00
PEI=   6.2996E-02 STDEV=   5.4111E-03 BITS=   2016
XISUM=   3.5128E-01 XISIG=   1.9562E-01
LOCKIN=    10 ,DROPOUTS=    16 ,AVE=   1.7500E+00 ,STO DEV=  1.0308E+00
ERRM
  1.9000E+01  1.1000E+01  5.0000E+00  4.0000E+00  6.0000E+00  8.0003E+00  5.0000E+00  7.0000E+00  4.0000E+00  3.0000E+00
  3.0000E+00  5.1000E+00  1.0001E+00  4.0000E+00  2.0000E+00  0.          1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00
  0.          3.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  0.          1.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00  0.          3.0000E+00  0.          0.
  1.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.
  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     2     6    14    11     4     0     0     1     0     1     0     0     2     0     0     0
    14    36    36    13     3     1     1     0     0     1     1     2     1     0     1     0
    40    60    43    20     6     3     1     0     0     2     1     6     1     1     1     0
    21    29    47    15     9     1     0     0     0     1     0     1     0     1     1     0
    15    14    12     4     2     0     0     0     0     0     0     0     0     1     0     0
     8     2     0     1     0     0     0     0     0     0     0     0     0     0     0     0
     1     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     1     0     0     0     0     0     0     0     0     0     0

QUADRENT SUMS...HARD DECISIONS                                                  16     7
     402    26                                                                 456    33
      49     3                                                                        +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                    0     0     0     0     0     0
     9     0     0     4    32    96    21    12     0     0     0     0     0     0     0     1
     1     0     5    15    58    73    36    12     0     0     0     0     0     0     2     2
     0     0     2    15    37    41    26    11     0     0     0     0     0     8    12    10
     0     0     1     1    10    16     9     3     0     0     0     0     1     8    34    46    29
     0     0     0     0     3     2     2     1     0     0     0     0     1     1    23    58    57    48
     0     0     0     1     1     0     0     0     0     0     0     1     1     1    13    44    40    26
     0     0     0     0     1     1     0     0     0     2     1     0     3     6    16    14    10
     0     0     0     0     0     1     0     0     0     0     0     0     0     0     0     0     0

QUADRENT SUMS...HARD DECISIONS                                                   0     35
     45    451                                                                  11    466
      2     15

   2007  1037    30   529
      9    10    13    14
     17    18    21    22

252 BIT ERROR INTERVALS
  2.1000E+01  2.0000E+01  1.5000E+01  8.0000E+00  1.7000E+01  1.5000E+01  1.5000E+01  1.5000E+01  0.          0.
```

```
ENSDB=    7.0 ,DELF=   62.9 ,RIF=   1501 ,BL2=    294 ,ASOFT= .3700
FODPRT=   2.1600E+01 TL=   -8.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=   7.0000E+00 SDPHA=    0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.5000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3403E+00 FBTAU5=   8.8028E+00 FBTAU6=   3.0029E+00
PEI=   8.3829E-02 STDEV=   6.1722E-03 BITS=    2016
XISUM=    3.5779E-01 XISIG=   2.1275E-01
LOCKIN=     10 ,DROPOUTS=     21 ,AVE=   2.3810E+00 ,STD DEV=  3.2583E+00
ERRM
  5.3000E+01  1.1000E+01  6.0000E+00  6.0000E+00  7.0000E+00  8.0000E+00  1.0000E+01  3.0000E+00  5.0000E+00  4.0000E+00
  3.0000E+00  5.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  5.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00
  0.          0.          3.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  0.          0.
  0.          1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  0.          0.          1.0000E+00  2.0000E+00
  0.          0.          0.          2.0000E+00  0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.

-1+1 P(R1.R2/T1.T2)TIMES   490                                                    -1+1 P(R1.R2/T1.T2)TIMES   512
     6     8    16    11     5     1     1     1     3     0     0     2     1     0     0     0     0
    10    34    28    13     3     1     1     0     0     0     1     1     2     8     1     1     1
    32    57    34    19     4     2     1     0     0     1     2     2     3     3     3     3     0
    24    33    42    16     5     2     1     0     0     4     2     3     7     0     1     1     1
    11    10    11     6     2     1     0     0     1     2     3     6     5     1     1     0     1
     3     2     0     1     0     1     1     1     2     3     0     0     1     1     0     1     1
     1     0     0     1     1     0     1     4    13    28    24    28     3     0     3     1
     0     3     3     1     1

QUADPENT SUMS...HARD DECISIONS                                                  17    13
   302    28                                                                   442    40
    45    14                                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                    1     0     0     0     0     0     0     0     0     0
     1     1     3     8    39    55    16     6     1     0     0     0     1     0     0     0     1
     1     0     3    15    58    68    28     9     2     0     0     1     1     1     0     1     1
     1     0     2    18    32    34    29     9     2     0     1     1     1     1    14    10     1
     0     1     0     2    12    14     8     1     0     0     0     1     1    11    42    47    26
     0     0     0     1     4     4     1     2     0     0     0     0     3    31    57    60    38
     0     0     0     0     3     1     4     1     0     0     0     0     3    18    31    32    27
     0     0     0     0     0     2     3     4     1     1     0     0     7    15    12    13
     0     0     0     0     0

QUADRENT SUMS...HARD DECISIONS                                                   6    38
    58   419                                                                    9   459
     1    34
   693   906   411   913
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  2.0000E+01  1.5000E+01  1.6000E+01  1.4000E+01  2.7000E+01  1.3000E+01  2.5000E+01  4.0000E+01  0.          0.
```

```
ENSOB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   5.4000E+00 TL=   -5.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3403E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    3.7202E-02 STDEV=    4.2151E-03 BITS=    2016
XISUM=    3.7166E-01 XISIG=    1.8818E-01
LOCKIN=     10 ,DROPOUTS=     14 ,AVE=   1.8571E+00 ,STD DEV=   9.8974E-01
ERRM
  1.0000E+01  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  5.0000E+00  0.          1.3000E+00  0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  3.0000E+00
  4.0000E+00  0.          1.0000E+00  3.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00
  0.          0.          1.0000E+00  1.3000E+00  0.          0.          2.0000E+00  2.0000E+00  2.0000E+00  0.
  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          2.0000E+00

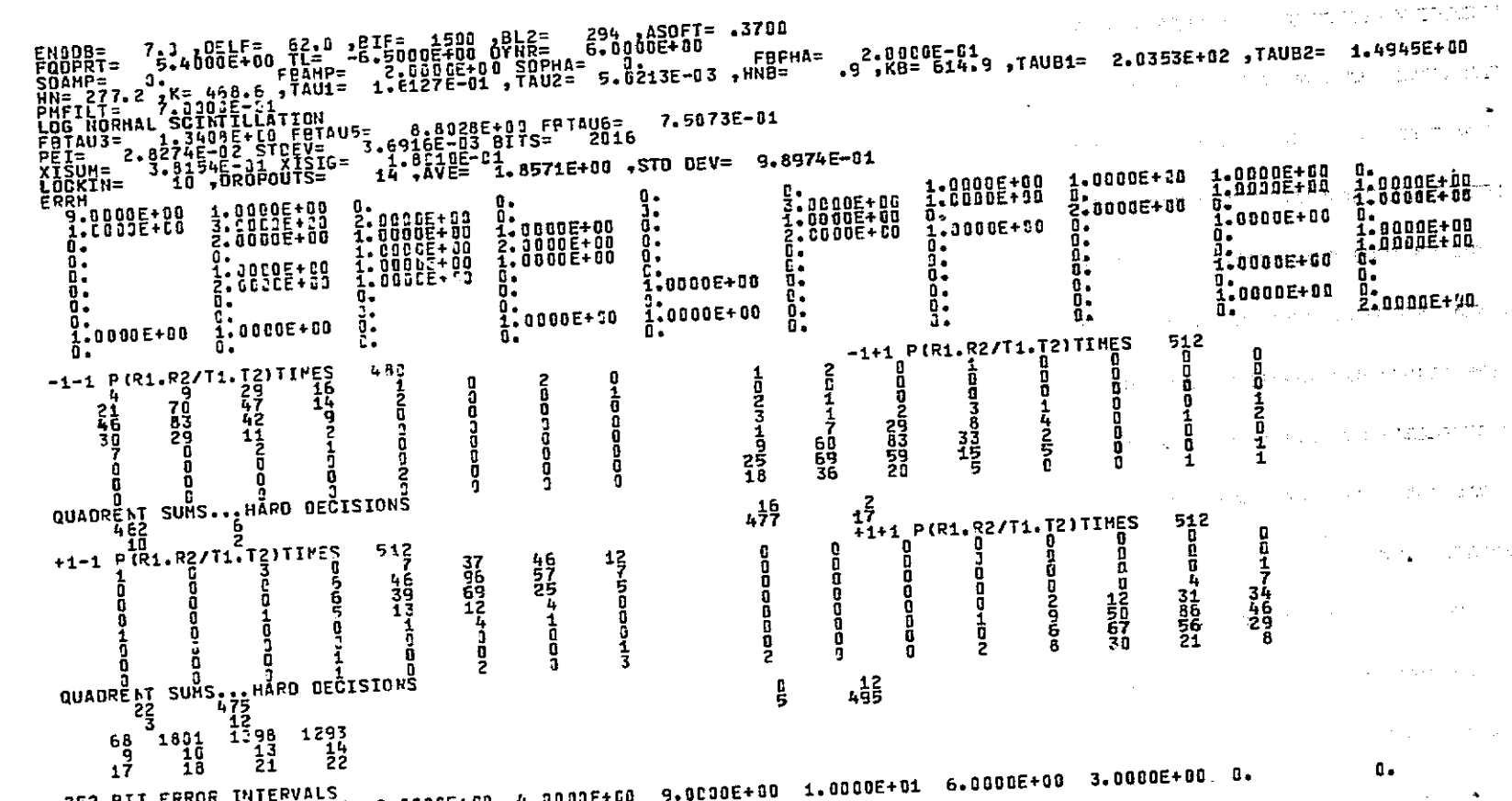
-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     4     5    21    14     2     1     1     1                1     2     0     0     1     0     0     0
    23    62    42     9     3     0     0     0                0     0     0     0     0     0     0     1
    53    71    38    23     2     0     0     0                1     1     0     0     0     0     1     0
    33    35    24    10     0     0     0     0                2     2     4     4     0     1     0     2
     8     8     3     1     0     0     0     0                5    14    24    11     1     0     0     2
     0     0     0     0     1     0     0     0               16    57    67    27     7     0     0     1
     0     0     0     0     0     0     0     0               24    55    50    25     7     0     0     1
     0     0     0     0     1     0     0     0               18    30    27    11     1     1     0     1
QUADRENT SUMS...HARD DECISIONS                                    17          3
   447          11                                             471          21
    20           2                                                  +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512
     1     0     2     1    14    52    36    13                0     0     0     0     0     0     0     0
     0     0     0     9    51    90    53     9                0     0     0     0     0     0     0     1
     0     0     1    11    41    55    21     4                0     0     0     0     0     0     1     1
     0     0     1     4     9    15     4     0                0     0     0     0     0     2     4    11
     1     0     0     1     3     1     0     0                0     0     0     0     1    20    38    30
     0     0     0     1     0     0     0     1                0     0     0     0     2    11    57    75    49
     0     0     0     0     1     0     0     0                0     0     0     0     1     7    32    44    25
     0     0     0     0     1     2     0     3                2     0     0     1     9    20    24    16
QUADRENT SUMS...HARD DECISIONS                                    0          18
    30          467                                             6          488
     2           13
  1556   776  1881  1804
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.2000E+01  1.6000E+01  8.0000E+00  3.0000E+00  1.3000E+01  9.0000E+00  9.0000E+00  4.0000E+00  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.5 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   2.1600E+01 TL=  -5.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=  7.5000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   6.1012E-02 STDEV=   5.3308E-03 BITS=   2016
XISUM=   3.8261E-01 XISIG=   2.2343E-01
LOCKTN=    10 ,DROPOUTS=    21 ,AVE=  2.3810E+00 ,STD DEV=  3.2563E+00
ERRH
  4.4000E+01  4.0000E+00  5.0000E+00  4.0000E+00  0.          3.0000E+00  6.0000E+00  1.0000E+00  4.0000E+00  2.0000E+00
  0.          2.0000E+00  2.0000E+00  2.0000E+00  0.          4.0000E+00  1.0000E+00  0.          2.0000E+00  2.0000E+00
  1.0000E+00  3.0000E+00  0.          4.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          0.          2.0000E+00  1.0000E+00  2.0000E+00  0.          0.          2.0000E+00
  0.          0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          2.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES    481                          -1+1 P(R1.R2/T1.T2)TIMES    512
    10    10    28    12     3     1     1     1           4     0     0     1     1     0     0     0
    24    52    36    11     1     1     2     1           1     0     0     0     2     0     0     0
    41    64    34    18     4     0     1     0           0     0     0     0     0     0     0     1
    25    32    26     5     1     0     1     0           2     1     6     2     0     1     2     3
    10     3     4     1     0     0     0     0          10    16    27    10     5     1     0     2
     1     0     0     1     1     0     0     1          16    64    63    25     2     0     0     2
     0     0     0     1     0     1     0     1          26    54    46    20     6     0     1     2
     0     0     0     0     1     3     1     7          16    29    24    12     0     1     1     4
QUADRENT SUMS...HARD DECISIONS
    428    18                                             17    10
     21    13                                            456    27
+1-1 P(R1.R2/T1.T2)TIMES    512                          +1+1 P(R1.R2/T1.T2)TIMES    512
     5     0     2     6    17    60    24     6           3     1     0     0     0     0     0     0
     0     0     1    11    57    78    44     7           0     1     0     0     0     0     0     0
     1     0     0    13    43    46    23     6           0     1     0     0     0     1     0     1
     0     0     1     3    11    13     4     0           0     0     0     0     3     4     6     8
     0     0     0     0     3     1     1     4           0     0     0     3     4    23    38    34
     0     0     0     0     0     1     0     1           0     0     0     2    13    56    71    39
     0     0     0     0     0     1     2     1           0     0     0     0     3    50    46    27
     0     0     0     0     0     0     2     7           1     1     0     1    10    21    19    17
QUADRENT SUMS...HARD DECISIONS
     42   436                                              5    23
      0    34                                              8   476
   1556   776  1881  1824
      9    10    13    14
     17    18    21    22

252 BIT ERROR INTERVALS
  1.3000E+01  8.0000E+00  8.0000E+00  7.0000E+00  1.9000E+01  1.0000E+01  2.1000E+01  3.6000E+01  0.          0.
```


ENODB= 7.1 ,DELF= 62.0 ,BIF= 1500 ,BL2= 294 ,ASOFT= .3700
FQOPRT= 5.4000E+00 TL= -6.5000E+00 OYNR= 6.0000E+00 FBPHA= 2.0000E-01
SOAMP= 0. FBAMP= 2.0000E+00 SOPHA= 0.
HN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,HNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PMFILT= 7.0303E-01
LOG NORMAL SCINTILLATION
FBTAU3= 1.3408E+00 FBTAU5= 8.8028E+00 FBTAU6= 7.5073E-01
PEI= 2.8274E-02 STDEV= 3.6916E-03 BITS= 2016
XISUM= 3.8154E-01 XISIG= 1.8710E-01
LOCKIN= 10 ,DROPOUTS= 14 ,AVE= 1.8571E+00 ,STD DEV= 9.8974E-01
ERRH
-1-1 P(R1.R2/T1.T2)TIMES 480
QUADRENT SUMS...HARD DECISIONS
+1-1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
-1+1 P(R1.R2/T1.T2)TIMES 512
+1+1 P(R1.R2/T1.T2)TIMES 512
252 BIT ERROR INTERVALS

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=   150 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0000E+01 TL=  -6.9000E+00 DYNR=   6.0000E+00
SOAMP=   0.          FBAMP=   2.0000E-02 SOPHA=   0.          FBPHA=   2.0300E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.3036E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   7.5073E-01
PEI=   3.0258E-02 STDEV=   3.8151E-03 BITS=   2016
XISUM=   3.7924E-01 XISIG=   1.7678E-01
LOCKIN=    10 ,DROPOUTS=    16 ,AVE=  1.7500E+00 ,STD DEV=  1.0308E+00
ERRM
  1.2000E+01   0.           1.0000E+00   1.0000E+00   0.           0.           1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00
  1.0000E+00   3.3000E+00   2.0000E+00   0.           1.0000E+00   1.0000E+00   1.0000E+00   0.           0.           1.0000E+00
  0.           2.0000E+00   1.0000E+00   1.0000E+00   0.           1.0000E+00   1.0000E+00   0.           0.           1.0000E+00
  0.           0.           1.0000E+00   3.0000E+00   0.           3.0000E+00   0.           0.           0.           0.
  0.           1.0000E+00   0.           1.0000E+00   0.           0.           0.           1.0000E+00   0.           1.0000E+00
  0.           0.           1.0000E+00   2.0000E+00   0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  1.0000E+00   0.           0.           1.0000E+00   1.0000E+00   0.           0.           0.           1.0000E+00   0.
  0.           1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     3     12     31     20      1      0      1      1          1      1      0      1      1      0      0      0
    27     60     45     12      3      0      0      0          0      1      0      0      0      0      0      0
    51     78     43      6      1      0      0      0          2      1      1      1      3      0      0      2
    29     28      9      2      1      0      0      0          1      7     25     10      6      0      1      0
     8      1      3      1      0      0      0      0         11     68     81     30      2      0      0      1
     0      0      0      0      0      0      0      0         19     68     62     16      3      0      0      1
     0      0      0      0      1      0      0      0         19     33     24      5      1      0      0      0
QUADRENT SUMS...HARD DECISIONS                                                    12      6
      458      7                                                                479     15
       13      2                                                                        +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                        0      0      0      0      0      0      0      0
     1      0      0      1      7     38     46      9          0      0      0      0      0      0      0      0
     0      0      0      6     45     94     59      7          0      0      0      0      0      0      0      1
     0      0      0      6     30     78     22      5          0      0      0      0      0      0      4      5
     0      0      1      5     15     11      6      3          0      0      0      0      2     14     27     32
     0      0      1      0      1      5      0      1          0      0      0      0      6     47     84     57
     0      0      0      2      0      0      1      2          0      0      0      1      9     53     60     25
     0      0      0      0      2      0      0      2          3      0      0      1     10     35     18      4
QUADRENT SUMS...HARD DECISIONS                                                    0      13
      22      475                                                                 6     493
       3       12
   693     906     411     913
     9      10      13      14
    17      18      21      22

252 BIT ERROR INTERVALS
  7.0000E+00   9.0000E+00   9.0000E+00   5.0000E+00   1.3000E+01   7.0000E+00   7.0000E+00   3.0000E+00   0.           0.
```

```
ENODB=    7.0 ,DELF=   62.5 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FODPRT=    2.1600E+01 TL=    -6.5000E+00 DYNR=    6.0000E+00
SOAMP=     0.          FBAMP=    2.0000E+00 SOPHA=     0.          FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,HNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=    7.3000E-01
LOG NORMAL SCINTILLATION
FBTAU3=    1.3400E+00 FBTAU5=    8.8026E+00 FBTAU6=    7.5073E-01
PEI=    5.7044E-02 STDEV=    5.1654E-03 BITS=    2016
XISUM=    3.9941E-01 XISIG=    2.3811E-01
LOCKIN=     10 ,DROPOUTS=     21 ,AVE=   2.3810E+00 ,STD DEV=   3.2583E+00
ERRM
   4.7000E+01   5.0000E+00   0.          2.0000E+00   3.0000E+00   1.0000E+00   4.0000E+00   4.0000E+00
   2.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00
   0.           2.0000E+00   0.          2.0000E+00   1.0000E+00   3.0000E+00   2.0000E+00   0.
   2.0000E+00   0.           1.0000E+00   1.0000E+00   0.           0.           1.0000E+00   2.0000E+00
   0.           0.           1.0000E+00   1.0000E+00   0.           1.0000E+00   0.           0.
   1.0000E+00   1.0000E+00   1.0000E+00   0.           0.           0.           0.           0.
   0.           0.           0.           1.0000E+00   0.           0.           0.           2.0000E+00
   0.           0.           0.           0.           0.           0.           0.

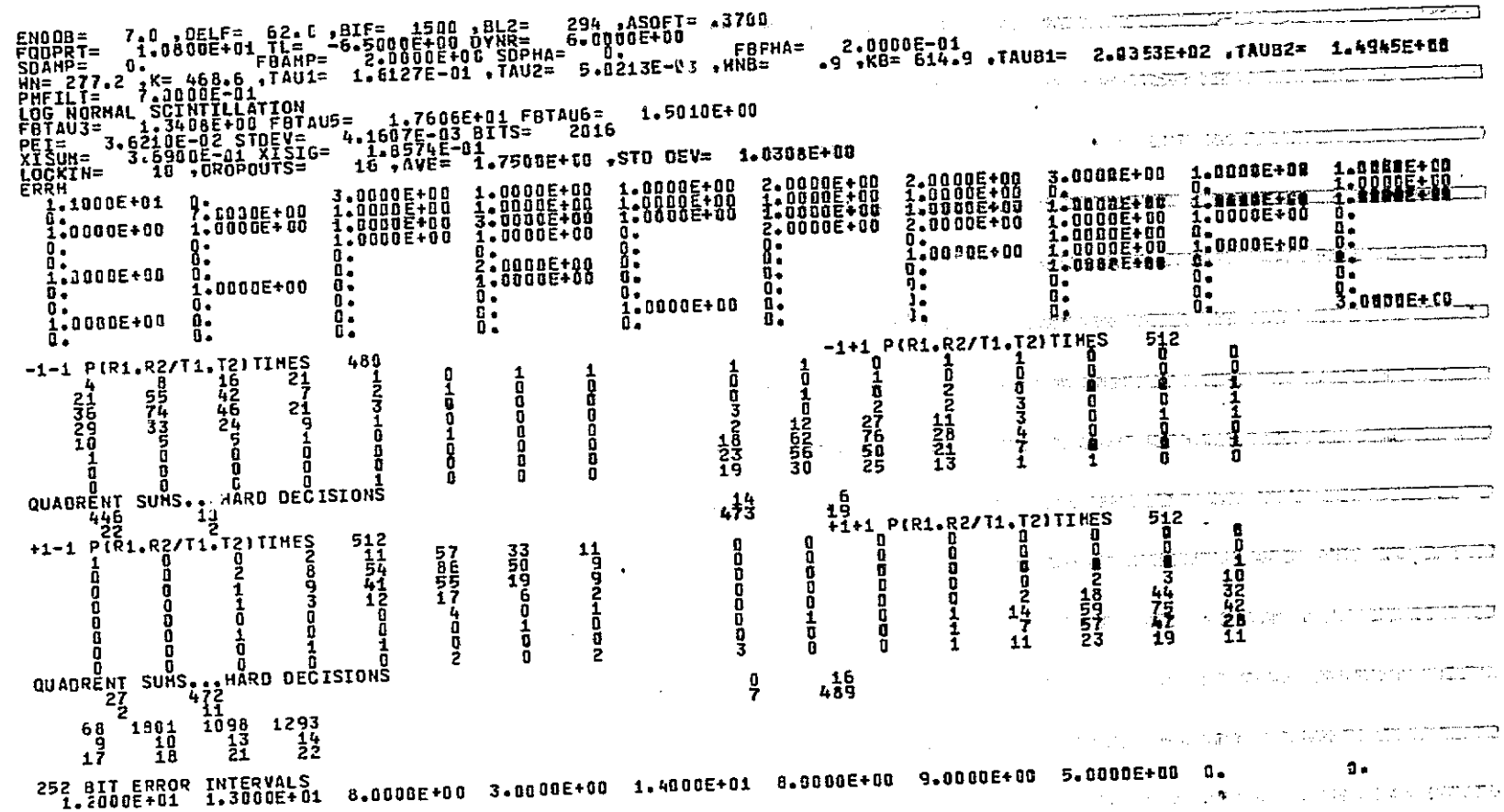
-1-1 P(R1.R2/T1.T2)TIMES   481                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    13   15   33   13    5    2    1    1          5    0    0    1    2    0    0    0
    27   55   44   14    1    1    1    1          2    0    0    0    2    0    1    0
    46   75   33    3    1    0    1    0          2    0    0    2    3    0    1    0
    33   22    6    1    1    1    0    0          7   11   29   10    4    1    1    1
     6    0    3    1    1    0    0    1         14   67   75   29    1    1    0    0
     1    0    0    1    1    1    1    0         21   61   46   14    4    1    0    0
     0    0    0    1    0    1    0    9         20   25   24    7    0    0    1    8
QUADRENT SUMS...HARD DECISIONS                                                    16    9
   437   13                                                                      460   27
    13   15                                                                           +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                        0    0    0    0    0    0
     5    2    1    3   18   47   29    9          4    0    1    0    0    0    0    0
     3    0    1    8   44   89   41    7          0    3    1    1    0    0    0    0
     1    0    0   10   38   59   23    5          0    3    3    0    1    1    1    0
     0    0    1    7   12   14    4    3          0    0    3    0    0    4   17    6
     0    0    0    0    3    1    1    0          0    0    0    3    0    1    9    1
     0    0    0    0    2    0    2    1          0    0    0    0    6   55   57   24
     0    0    0    0    0    2    2   13          2    0    0    2   10   27   19   14
QUADRENT SUMS...HARD DECISIONS                                                    10   14
    35   439                                                                       4  484
     0    38
  1556   776  1981  1834
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  9.0000E+00  7.0000E+00  6.0000E+00  9.0000E+00  2.1000E+01  7.0000E+00  1.7000E+01  3.8000E+01  0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FODPRT=   5.4800E+00 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.         FBAMP=    2.0000E+00 SDPHA=    0.         FBPHA=    2.0000E-01
PHFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   1.7606E+01 FBTAU6=   1.5010E+00
PEI=    3.6210E-02 STDEV=    4.1607E-03 BITS=    2016
XISUM=    3.7162E-01 XISIG=    1.8891E-01
LOCKIN=     10 ,DROPOUTS=     14 ,AVE=   1.8571E+00 ,STD DEV=   9.8974E-01
ERRH
  1.1000E+01  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  5.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00  2.0000E+00
  3.0000E+00  0.          1.0000E+00  3.0000E+00  0.          1.2000E+01  0.          1.0000E+00  0.
  0.          0.          1.0000E+00  0.          0.          1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  0.
  0.          1.0000E+00  0.          0.          0.                      1.0000E+00  1.0000E+00  1.0000E+00  0.
  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00                          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00                          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.                                  0.          0.          0.
  0.          0.          0.          0.          1.0000E+00                          0.          1.0000E+00  0.
                                                                                                  0.          3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES    430                                  -1+1 P(R1.R2/T1.T2)TIMES    512
    4     5    19    15     2     1     1     1                  1     2     0     0     1     0     0     0
   23    62    42     8     3     0     0     1                  0     0     0     0     0     0     0     0
   30    70    39    24     2     0     0     0                  1     1     0     0     0     0     0     0
   33    36    26    11     2     0     0     0                  2     1     3     3     1     0     0     0
    9     7     3     1     0     0     0     0                  5    14    27    11     4     1     0     0
    0     0     0     0     1     0     0     0                  1    67    63    29     7     0     0     2
    0     0     0     0     0     0     0     0                  2    57    49    25     8     0     1     1
    0     0     0     0     1     0     0     0                 21    30    26    12     0     1     0     1
QUADRENT SUMS...HARD DECISIONS
   407    11                                                    14     4
    21     2                                                   473    21
+1-1 P(R1.R2/T1.T2)TIMES    512                                  +1+1 P(R1.R2/T1.T2)TIMES    512
    1     0     2     1    14    52    35    13                  0     0     0     0     0     3     1     0
    0     0     0     9    54    87    52    11                  0     0     0     0     0     0     0     0
    0     0     1     9    41    58    19     4                  0     0     0     0     0     0     0     0
    0     0     1     4    10    13     5     0                  0     0     0     0     0     1     4    11
    1     0     0     0     1     4     1     0                  0     0     0     0     1    20    38    32
    0     0     0     1     0     0     1     0                  0     0     0     2    14    58    75    49
    0     0     0     0     1     0     0     1                  0     0     0     1     7    68    41    26
    0     0     0     0     1     2     0     3                  2     0     0     1    10    21    25    16
QUADRENT SUMS...HARD DECISIONS
    28   468                                                     0    17
     2    14                                                     5   490
  1556   776  1881  1804
     9    16    13    14
    17    18    21    22

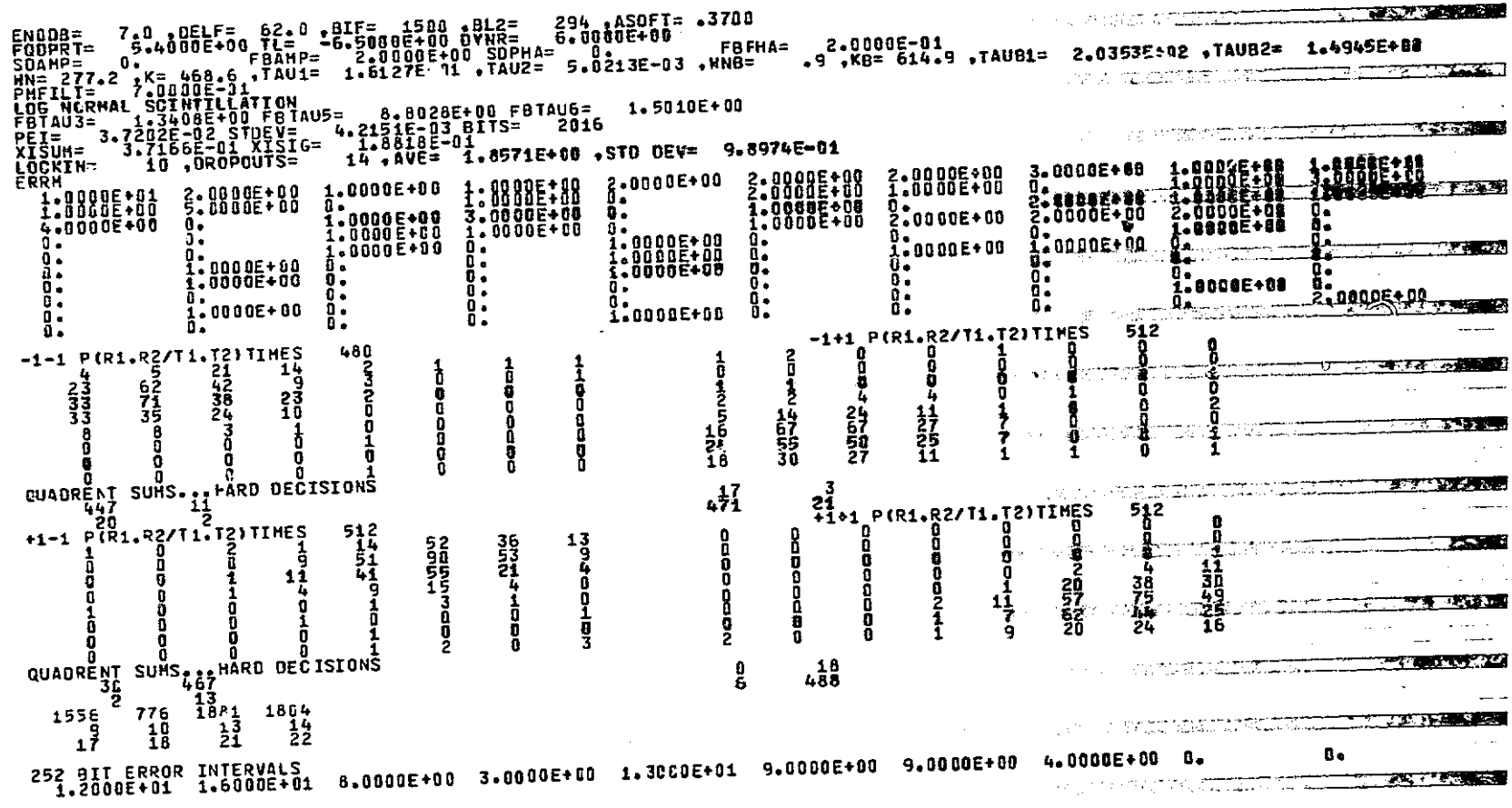
252 BIT ERROR INTERVALS
  1.1000E+01  1.6000E+01  8.0000E+00  3.0000E+00  1.3000E+01  8.0000E+00  9.0000E+00  4.0000E+00  0.          0.
```

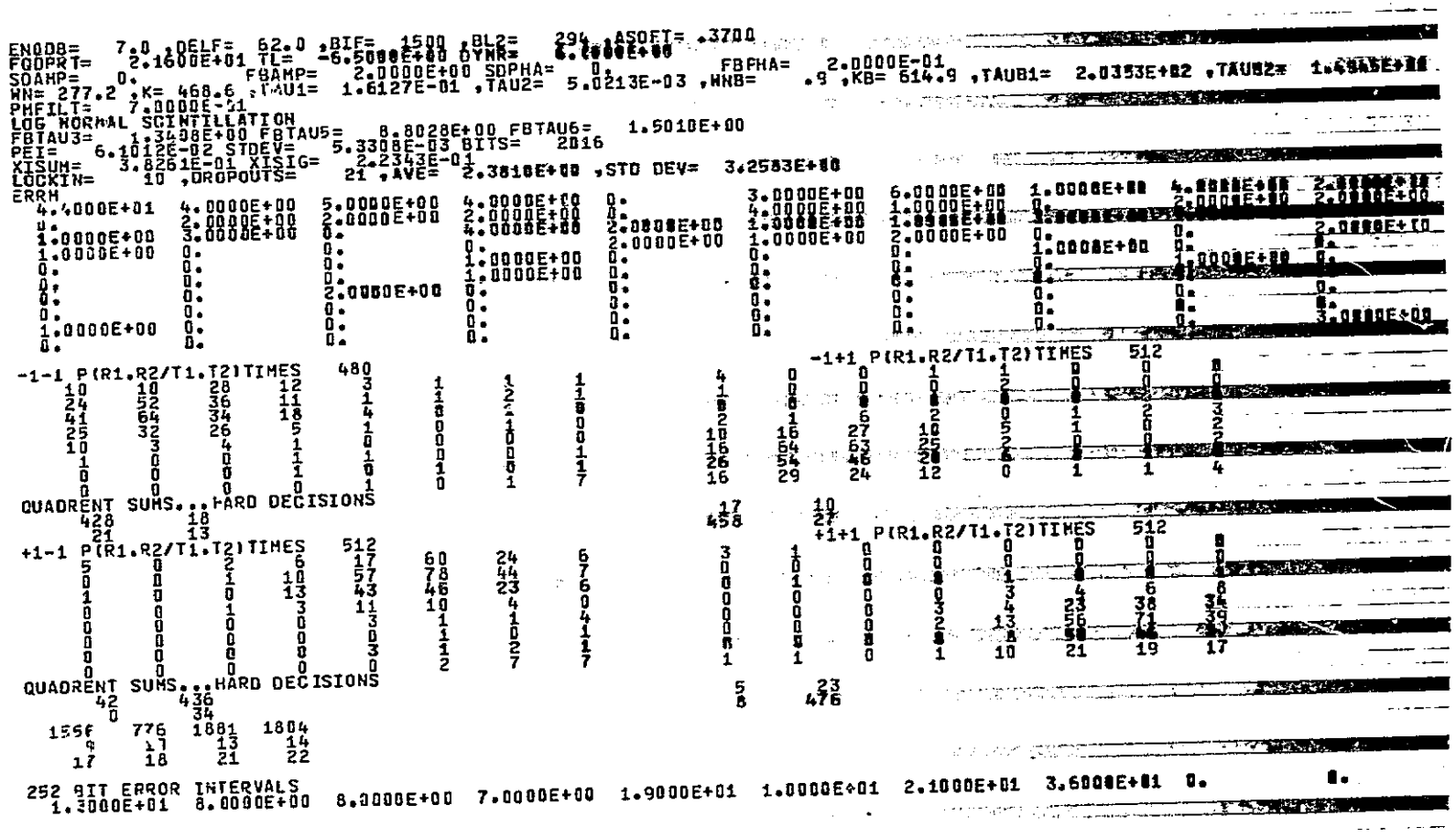


```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=    2.1600E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=     2.0000E+00 SDPHA=     0.          FBPHA=     2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=    7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=    1.3408E+00 FBTAU5=     1.7606E+01 FBTAU6=     1.5010E+00
PEI=     6.2996E-02 STDEV=     5.4111E-03 BITS=     2016
XISUM=     3.8236E-01 XISIG=     2.2343E-01
LOCKIN=     10 ,DROPOUTS=     21 ,AVE=   2.3810E+00 ,STD DEV=   3.2583E+00
ERRH
   4.6000E+01   7.0000E+00   4.0000E+00   4.0000E+00   0.           3.0000E+00   6.0000E+00   1.0000E+00   4.0000E+00   2.0000E+00
   0.           2.0000E+00   2.0000E+00   1.0000E+00   2.0000E+00   3.0000E+00   1.0000E+00   0.           3.0000E+00   2.0000E+00
   1.0000E+00   1.0000E+00   1.0000E+00   4.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00   3.0000E+00   4.0000E+00   1.0000E+00
   1.3000E+00   0.           0.           1.0000E+00   3.0000E+00   1.0000E+00   0.           0.           0.           2.0000E+00
   0.           0.           0.           1.0000E+00   0.           0.           0.           1.0000E+00   0.
   0.           0.           0.           1.0000E+00   0.           0.           0.           0.           1.0000E+00   0.
   0.           0.           2.0000E+00   0.           0.           0.           0.           0.           0.           0.
   0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
   1.0000E+00   0.           0.           0.           0.           0.           0.           0.           0.           0.
   0.           0.           0.           0.           0.           0.           0.           0.           0.           3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES    480                                    -1+1 P(R1.R2/T1.T2)TIMES    512
    10    10    27    12     4     1     1     1          4     0     0     1     1     0     0     0
    24    53    35    11     1     1     2     1          1     0     0     0     2     0     0     0
    41    65    31    18     5     0     1     0          3     0     0     0     0     0     0     1
    24    29    28     5     1     0     1     0          2     1     6     1     1     1     1     4
    11     4     5     1     0     0     0     0         10    15    26     9     6     3     0     2
     1     0     0     0     2     0     0     1         16    65    64    24     2     0     0     2
     0     0     0     1     0     1     0     1         26    52    47    22     5     0     1     2
     0     0     0     0     1     0     1     7         17    29    22    13     0     1     1     4
QUADRENT SUMS...HARD DECISIONS
   423    20                                              16    11
    23    14                                             457    28
+1-1 P(R1.R2/T1.T2)TIMES    512                                    +1+1 P(R1.R2/T1.T2)TIMES    512
     5     0     2     6    19    59    24     6          3     1     0     0     0     0     0     0
     0     0     1    11    51    81    44     7          0     0     0     0     0     0     0     0
     1     0     0    12    43    46    22     6          0     1     0     0     1     0     0     1
     0     0     1     3    13     9     4     0          0     0     0     0     2     4     6     8
     0     0     0     0     3     3     1     4          0     0     0     3     6    22    37    33
     0     0     0     0     0     1     1     1          0     0     0     1    12    59    71    41
     0     0     0     0     3     1     2     0          0     0     0     0     8    49    47    25
     0     0     0     0     0     2     8     7          1     1     0     1     9    21    19    18
QUADRENT SUMS...HARD DECISIONS
    42   434                                               5    22
     0    36                                               7   478
  1556   776  1881  1804
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.3000E+01  1.0000E+01  1.0000E+01  8.0000E+00  2.0000E+01  1.0000E+01  2.1000E+01  3.4800E+01  0.           8.
```

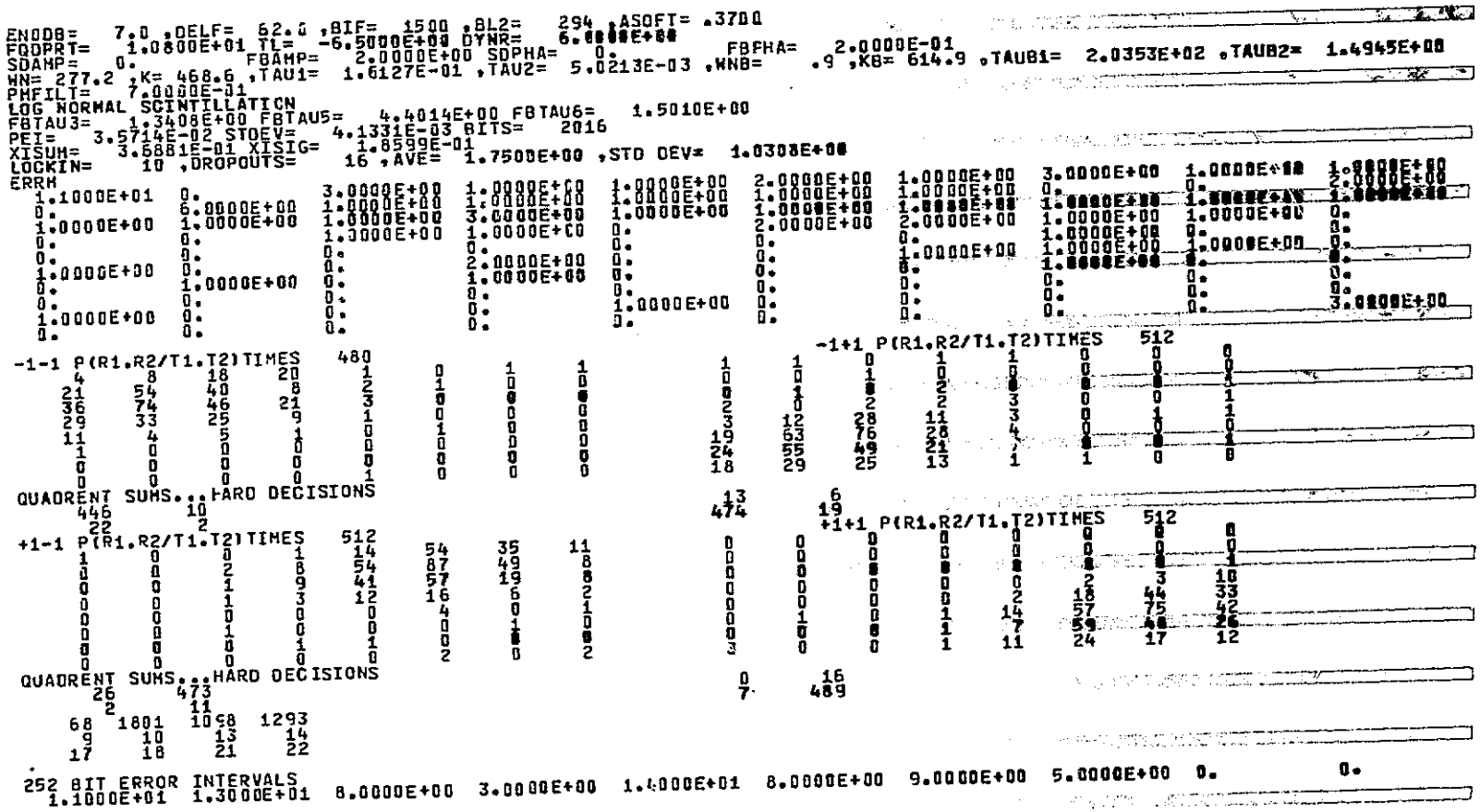

ENODB= 7.0 ,DELF= 62.0 ,BIF= 1500 ,BL2= 294 ,ASOFT= .3700
FODPRT= 5.4000E+00 TL= -6.5000E+00 OYNR= 6.0000E+00
SOAMP= 0. FBAMP= 2.0000E+00 SDPHA= 0. FBFHA= 2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1= 1.6127E 11 ,TAU2= 5.0213E-03 ,HNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PMFILT= 7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3= 1.3408E+00 FBTAU5= 8.8028E+00 FBTAU6= 1.5010E+00
PEI= 3.7202E-02 STDEV= 4.2151E-03 BITS= 2016
XISUM= 3.7166E-01 XISIG= 1.8818E-01
LOCKIN= 10 ,DROPOUTS= 14 ,AVE= 1.8571E+00 ,STD DEV= 9.8974E-01
ERRM
-1-1 P(R1.R2/T1.T2)TIMES 480
QUADRENT SUMS... HARD DECISIONS
+1-1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS... HARD DECISIONS
-1+1 P(R1.R2/T1.T2)TIMES 512
+1+1 P(R1.R2/T1.T2)TIMES 512
252 BIT ERROR INTERVALS


ENODB= 7.0 ,DELF= 62.0 ,BIF= 1500 ,BL2= 294 ,ASOFT= .3700
FSOPRT= 2.1600E+01 TL= -6.5000E+00 DYNR= 6.0000E+00
SOAMP= 0. FBAMP= 2.0000E+00 SOPHA= 0. FBPHA= 2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,WNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2=
PHFILT= 7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3= 1.3408E+00 FBTAU5= 8.8028E+00 FBTAU6= 1.5010E+00
PEI= 6.1012E-02 STDEV= 5.3308E-03 BITS= 2016
XISUM= 3.8261E-01 XISIG= 2.2343E-01
LOCKIN= 10 ,DROPOUTS= 21 ,AVE= 2.3818E+00 ,STD DEV= 3.2583E+00
ERRH
-1-1 P(R1.R2/T1.T2)TIMES 480
-1+1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
+1-1 P(R1.R2/T1.T2)TIMES 512
+1+1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
252 BIT ERROR INTERVALS

```
EN0DB=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   5.4000E+00 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=   2.0000E+00 SOPHA=    0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   4.4014E+00 FBTAU6=   1.5010E+00
PEI=   3.6706E-02 STDEV=   4.1880E-03 BITS=    2016
XISUM=   3.7166E-01 XISIG=   1.8813E-01
LOCKIN=    10 ,DROPOUTS=    14 ,AVE=  1.8571E+00 ,STD DEV=  9.8974E-01
ERRM
  1.0000E+01  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  5.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  3.0000E+00
  4.0000E+00  0.          1.0000E+00  3.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  0.
  0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     4     5    21    14     2     1     1     1                  1     2     0     0     1     0     0     0
    23    61    42     9     2     0     0     0                  0     1     0     0     0     0     0     1
    33    72    38    23     2     0     0     0                  1     0     0     0     1     0     0     0
    33    34    25    10     0     0     0     0                  2     2     4     4     0     1     0     2
     8     8     3     1     0     0     0     0                  5    14    24    12     1     0     0     0
     0     0     0     0     1     0     0     0                 16    68    67    27     6     0     0     1
     0     0     0     0     0     0     0     0                 24    54    58    25     7     0     0     1
     0     0     0     0     1     0     0     0                 18    30    27    11     1     1     0     1
QUADRENT SUMS...HARD DECISIONS                                   17     3
   447    11                                                    472    20
    20     2                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                    0     0     0     0     0     0     0     0
     1     1     1     1    14    53    35    13                  0     0     0     0     0     0     1     1
     1     0     0     9    52    83    53     9                  0     0     0     0     0     2     4    11
     0     0     1    11    42    54    21     4                  0     0     0     0     1     2    36    38
     0     0     1     4     9    16     4     1                  0     0     0     0     2    10    59    77    48
     1     0     0     0     1     2     1     0                  0     0     0     1     7    62    43    25
     0     0     0     1     0     1     0     0                  0     0     0     2     9    19    24    16
     0     0     0     0     1     2     0     3                  2     0     0     1     9    19    24    16
     0     0     0     0     1     1     0     1
QUADRENT SUMS...HARD DECISIONS                                   0    18
    30   468                                                     6   488
     2    12
  1556   776  1881  1804
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.2000E+01  1.6000E+01  8.0000E+00  3.0000E+00  1.3000E+01  9.0000E+00  8.0000E+00  4.0000E+00  8.          0.
```


ENODB= 7.0 ,DELF= 62.5 ,BIF= 1500 ,BL2= 294 ,ASOFT= .3700
FDOPRT= 1.0800E+01 TL= -6.5000E+00 DYNR= 6.0000E+00
SDAMP= 0. FBAMP= 2.0000E+00 SDPHA= 0. FBPHA= 2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03 ,WNB= .9 ,KB= 614.9 ,TAUB1= 2.0353E+02 ,TAUB2= 1.4945E+00
PMFILT= 7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3= 1.3408E+00 FBTAU5= 4.4014E+00 FBTAU6= 1.5010E+00
PEI= 3.5714E-02 STOEV= 4.1331E-03 BITS= 2016
XISUM= 3.6881E-01 XISIG= 1.8599E-01
LOCKIN= 10 ,DROPOUTS= 16 ,AVE= 1.7500E+00 ,STD DEV= 1.0308E+00
ERRH
-1-1 P(R1.R2/T1.T2)TIMES 480
-1+1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
+1-1 P(R1.R2/T1.T2)TIMES 512
+1+1 P(R1.R2/T1.T2)TIMES 512
QUADRENT SUMS...HARD DECISIONS
252 BIT ERROR INTERVALS
1.1000E+01 1.3000E+01 8.0000E+00 3.0000E+00 1.4000E+01 8.0000E+00 9.0000E+00 5.0000E+00 0. 0.

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=   2.1600E+01 TL=  -6.5000E+00 GYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WN8=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   4.4014E+00 FBTAU6=   1.5010E+00
PEI=   6.1508E-02 STDEV=   5.3510E-03 BITS=    2016
XISUM=   3.8252E-01 XISIG=   2.2336E-01
LOCKIN=    10 ,DROPOUTS=    21 ,AVE=  2.3810E+00 ,STD DEV=  3.258 )E+00
ERRM
  4.5000E+01  5.0000E+00  5.0000E+00  5.0000E+00  0.          3.0000E+00  5.0000E+00  1.0000E+00  4.0000E+00  2.0000E+00
  0.          1.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00
  0.          3.0000E+00  0.          4.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  2.0000E+00
  1.0000E+00  0.          0.          1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          2.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          3.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                    -1+1 P(R1.R2/T1.T2)TIMES   512
    10    10    29    13     3     1     1     1          4     0     0     1     1     0     0     0
    24    52    35     9     1     1     2     1          1     0     0     0     0     0     1     1
    41    65    36    18     4     1     1     2          2     1     0     0     1     1     1     1
    25    30    27     5     1     1     0     0         10    15    27    12     5     2     1     0
    10     3     4     1     0     0     1     0         16    65    64    25     5     2     0     0
     1     0     0     1     1     0     0     1         26    53    46    28     6     0     1     1
     0     0     0     1     0     1     1     7         18    27    24    12     0     1     1     4
     0     0     0     0     1     0     1     0

QUADRENT SUMS...HARD DECISIONS                                                    16    11
   428    18                                                                    458    27
    21    13                                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                     3     1     0     0     0     0     0     0
     5     0     2     6    17    60    24     6          3     1     0     0     0     0     0     1
     0     0     1    10    57    78    43     7          0     0     0     0     0     1     1     0
     1     0     0    12    45    46    23     6          0     1     0     0     0     3     4     6
     0     0     1     3    11     9     4     1          0     0     0     0     2     3     3     3
     0     0     0     0     3     2     1     0          0     0     0     0     2     1     5     7
     0     0     0     0     0     3     1     1          0     0     0     0     0     2     1     5
     0     0     0     0     0     2     8     7          1     1     0     2     9    21    19    17
     0     0     0     0     0

QUADRENT SUMS...HARD DECISIONS                                                    5     23
    41    436                                                                   9    475
     0     35
  1556   776  1881  1804
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.3000E+01  8.0000E+00  8.0000E+00  7.0000E+00  2.0000E+01  1.0000E+01  2.1000E+01  3.6000E+01  0.          0.
```

```
ENGDB=   6.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.[illegible]E+[illegible]
SDAMP=   0.          FBAMP=   2.0000E+00 SOPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.8353E+02 ,TAUB2=  1.4945E+[illegible]
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   8.3829E-02 STDEV=   4.3644E-03 BITS=   4032
XISUM=   3.7873E-01 XISIG=   2.1187E-01
LOCKIN=    11 ,DROPOUTS=    57 ,AVE=  2.3860E+00 ,STD DEV=  1.9890E+00
ERRH
  1.1700E+02  2.2000E+01  1.1000E+01  1.7000E+01  1.0000E+01  1.2000E+01  1.1000E+01  6.0000E+00  5.0000E+00  9.0000E+00
  5.0000E+00  4.0000E+00  4.0000E+00  1.2000E+01  7.0000E+00  6.0000E+00  3.0000E+00  3.0000E+00  6.0000E+00  7.[illegible]E+[illegible]
  4.0000E+00  3.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  4.0000E+00  3.0000E+00  2.0000E+00
  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  1.6000E+00  2.[illegible]E+[illegible]  [illegible]
  1.0000E+00  3.0000E+00  1.0000E+00  0.          0.          2.0000E+00  0.          1.0000E+00  0.          0.
  2.0000E+00  4.0000E+00  2.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  1.0000E+00  0.          0.          0.          0.          0.          0.          [illegible]  [illegible]  [illegible]
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.[illegible]E+[illegible]

-1-1 P(R1.R2/T1.T2)TIMES   960                                  -1+1 P(R1.R2/T1.T2)TIMES  1024
    25    29    61    24     8     8     5     1          6     2     1     0     0     1     0     0
    63    85    68    23    12     4     0     2          3     3     2     0     1     0     1     2
    84   110    73    30     6     2     1     4          4     4     2     3     1     0     1     5
    46    44    41    14     2     1     0     2          3    10    12    12     2     5     1     1
    10    14    11     3     2     1     1     1         23    37    53    25    12     3     1     0
     4     1     1     4     2     1     1     0         47   101   108    45    10     2     1     3
     0     0     2     0     2     2     1     4         65    86    75    43    13     2     2     3
     0     0     0     0     2     0     3     9         37    53    35    27     6     [illegible]  [illegible]  [illegible]
QUADRENT SUMS...HARD DECISIONS
   820    58                                              67    21
    50    32                                             860    76
+1-1 P(R1.R2/T1.T2)TIMES  1024                            +1+1 P(R1.R2/T1.T2)TIMES  1024
     1     2     7    12    41   107    64    25          2     1     0     0     0     0     0     0
     0     0     5    18    81   124    68    26          0     0     0     1     2     0     0     [illegible]
     0     2     3    14    61   103    44     8          0     1     1     1     2     1     3     4
     2     2     8     9    28    41    11     2          0     3     [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]
     3     1     2     5     9     6     9     3          1     1     0     4    13    43    68    50
     2     1     2     3     3     2     5     3          0     0     2     6    29   119   134    79
     1     0     1     0     1     4     2     2          0     1     1     7    37    79    89    55
     0     0     0     0     2     5     9    19          1     0     1     9    29    [illegible]  [illegible]  [illegible]
QUADRENT SUMS...HARD DECISIONS
    85   834                                             11    52
    21    84                                             34   927
   112   944  2015  1972
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.7000E+01  1.8000E+01  1.4000E+01  2.0000E+01  2.3000E+01  9.0000E+00  2.6000E+01  3.8000E+01  1.5000E+01  1.8000E+01
  2.6000E+01  2.0000E+01  3.3000E+01  2.1000E+01  2.0000E+01  1.9000E+01  0.          0.          0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=   -5.5000E+00 DYNR=   6.0800E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4943E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    3.9683E-02 STDEV=    3.0743E-03 BITS=    4032
XISUM=    3.7020E-01 XISIG=    1.8868E-01
LOCKIN=     10 ,DROPOUTS=     27 ,AVE=   1.7407E+00 ,STD DEV=   9.6581E-01
ERRM
  3.0000E+01  7.0000E+00  6.0000E+00  1.0000E+00  3.0000E+00  5.0000E+00  2.0000E+00  5.0000E+00  4.0000E+00  4.0000E+00
  1.0000E+00  6.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  2.0000E+00  2.0000E+00  0.          0.          5.0000E+00
  1.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00
  1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.
  1.0000E+00  0.          0.          2.0000E+00  0.          0.          2.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  1.0000E+00  0.
  1.0000E+00  0.          0.          1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          5.0000E+00
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.

-1-1 P(R1.R2/T1.T2)TIMES   960                                    -1+1 P(R1.R2/T1.T2)TIMES  1024
    13    23    39    31     4     0     1     1          2     1     0     1     1     0     0     0
    45   100    80    20     7     2     0     1          1     0     1     0     0     2     2     0
    85   140   105    33     5     0     2     0          3     2     0     2     1     1     2     2
    53    60    49    14     2     1     0     0          7     3     5     4     0     0     1     3
    17     6     9     2     1     1     1     0          6    33    66    28     5     0     1     3
     2     1     0     0     0     1     0     0         29   119   152    53     8     0     1     0
     0     0     0     0     1     0     0     0         49   109   104    38     8     1     0     1
     0     0     0     0     1     0     1     0         31    46    47    38     3     1     1     3
QUADRENT SUMS...HARD DECISIONS                                    32    16
   890    26                                                     940    36
    37     7                                                          +1+1 P(R1.R2/T1.T2)TIMES  1024
+1-1 P(R1.R2/T1.T2)TIMES  1024                                     0     0     0     0     0     0     0     0
     1     1     3     1    27    99    74    25          0     0     0     0     0     1     0     0
     0     0     3    16    93   159    94    23          0     0     0     0     0     0     0     2
     1     0     2    12    94   116    51    11          0     0     0     0     1     3     4     5
     0     1     1     6    24    26    14     5          0     0     1     2     6    42    73    57
     0     0     0     1     4     6     1     3          0     1     2     1    28   116   151    73
     0     0     1     0     1     0     3     2          0     1     0     3    21   117   112    56
     0     0     1     3     1     1     1     2          0     0     2     6    22    42    39    22
     0     0     0     0     0     6     1     5          3
QUADRENT SUMS...HARD DECISIONS                                     1    26
    48   935                                                      20   977
     6    35
   922  1798  1631  1802
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  1.1000E+01  1.3000E+01  8.0000E+00  3.0000E+00  1.4000E+01  8.0000E+00  9.0000E+00  5.0000E+00  1.9000E+01  1.7000E+01
  1.1000E+01  7.0000E+00  8.0000E+00  1.3000E+01  5.0000E+00  9.0000E+00  0.          0.          0.          0.
```

```
ENOOB=    8.0  ,DELF=   62.0  ,RIF=   1500  ,BL2=    294  ,ASOFT= .3700
FQDPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    0.          FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    2.4554E-02 STDEV=    2.4372E-03 BITS=    4032
XISUM=    3.6421E-01 XISIG=    1.6668E-01
LOCKIN=     15 ,DROPOUTS=      4 ,AVE=   1.2500E+00 ,STD DEV=   4.3301E-01
ERRM
  1.7000E+01  2.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00
  2.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  3.0000E+00  0.          0.          0.          2.0000E+00
  0.          0.          0.          1.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00
  0.          0.          1.0000E+00  0.          0.          3.0000E+00  0.          1.0000E+00  0.          0.
  1.0000E+00  0.          0.          0.          2.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00
  0.          0.          0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          2.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          0.          2.0000E+00
  1.0000E+00  0.          0.          2.0000E+00  0.          0.          0.          2.0000E+00  0.          1.0000E+01

-1-1 P(R1.R2/T1.T2)TIMES   960                          -1+1 P(R1.R2/T1.T2)TIMES  1024
     4    28    42    15     2     0     0     0          3     0     0     0     0     0     0     0
    24   112    98    37     6     1     0     1          1     0     0     0     1     0     1     1
    90   143   100    28     2     0     0     0          0     0     0     0     0     0     0     0
    41    76    47    19     3     0     0     0          0     3     6     5     1     1     1     1
     7    13    10     3     0     0     0     1          4    31    54    25     3     1     1     0
     1     1     0     0     1     0     0     0         33   146   150    55     3     0     0     1
     0     0     0     0     1     0     0     0         50   129   129    49    13     0     0     0
     0     0     0     0     1     0     1     1         19    40    27    25     8     1     1     1
QUADRENT SUMS...HARD DECISIONS
      904        15                                      18         7
       35         6                                     968        31
+1-1 P(R1.R2/T1.T2)TIMES  1024                          +1+1 P(R1.R2/T1.T2)TIMES  1024
     0     0     0     1    23    76    69    17          0     0     0     0     0     0     0     0
     0     0     0     3   101   207   118    16          0     0     0     0     0     0     0     1
     1     2     0    13    79   146    51     8          0     0     0     0     0     0     0     0
     1     1     0     8    21    34    10     0          0     0     0     0     1     5     7     7
     0     1     0     1     4     2     3     0          0     0     0     0     4    39    93    30
     0     0     0     0     0     0     0     0          0     0     0     2    25   121   196    63
     0     0     0     0     1     0     1     1          1     0     0     2    16   142   122    54
     0     0     0     0     0     0     2     2          0     1     0     2    10    29    37    20
QUADRENT SUMS...HARD DECISIONS
       30       976                                       0        15
        2        16                                       8      1001
  1717    223    432    739
     9     10     13     14
    17     18     21     22

252 BIT ERROR INTERVALS
  7.0000E+00  7.0000E+00  4.0000E+00  6.0000E+00  6.0000E+00  1.4000E+01  9.0000E+00  8.0000E+00  8.0000E+00  1.0000E+00
  9.0000E+00  8.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00  3.0000E+00  0.          0.          0.          0.
```

```
ENODB=   9.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   0.          FBAMP=   2.0000E+00 SDPHA=   0.          FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.1925E-03 STDEV=  1.3308E-03 BITS=   4032
XISUM=   3.6301E-01 XISIG=   1.5078E-01
LOCKIN=      5 ,DROPOUTS=      3 ,AVE=  1.3333E+00 ,STD DEV=  4.7140E-01
ERRM
  2.0000E+00  0.          0.          0.          3.0000E+00  0.          1.0000E+00  0.          0.          0.
  1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.5000E+01

-1-1 P(R1.R2/T1.T2)TIMES   960                                  -1+1 P(R1.R2/T1.T2)TIMES  1024
     3     9    26     6     1     0     0     1                  0     0     0     0     0     0     0     0
    24   136   119    21     0     0     0     0                  0     0     0     0     0     1     0     0
    87   180   142    31     0     0     0     0                  0     0     0     0     0     0     0     0
    24    54    70    11     0     0     0     0                  0     1     3     2     0     0     0     0
     3     3     7     1     0     0     0     0                  1    29    57    17     0     0     0     0
     1     0     0     0     0     1     0     0                 26   164   192    48     6     0     0     0
     0     0     0     0     0     0     0     0                 33   144   138    43     5     1     0     0
     0     0     0     0     0     0     0     0                 12    43    33    24     2     0     0     0
QUADRENT SUMS...HARD DECISIONS
   943     2                                                          5     1
    14     1                                                    1004    14
+1-1 P(R1.R2/T1.T2)TIMES  1024                                  +1+1 P(R1.R2/T1.T2)TIMES  1024
     0     0     0     1    10    80    63    14                  0     0     0     0     0     0     0     0
     0     0     0     1    97   227   125    13                  0     0     0     0     0     0     0     0
     0     0     0     5    82   194    56    10                  0     0     0     0     0     0     0     0
     0     0     0     0    13    24     6     0                  0     0     0     0     1     2     2     2
     0     0     0     0     0     1     0     0                  0     0     0     0     2    37    88    24
     0     0     0     0     0     0     0     1                  0     0     1     0    15   145   201    56
     0     0     0     0     0     0     0     0                  0     0     0     2    28   118   162    61
     0     0     0     0     0     0     0     1                  0     0     0     1     8    28    32    18
QUADRENT SUMS...HARD DECISIONS
     7  1014                                                          0     5
     0     3                                                       4  1015
  1431    35   867   551
     9    10    13    14
    17    18    21    22

252 BIT ERROR INTERVALS
  3.0000E+00  3.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  0.          1.0000E+00  3.0000E+00  1.0000E+00  2.0000E+00
  0.          1.0000E+00  3.0000E+00  0.          2.0000E+00  4.0000E+00  0.          0.          0.          0.
```

```
ENODB=    6.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SOAMP=    2.3000E-01 FBAMP=    2.0000E+00 SOPHA=    4.7000E-01 FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.8353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5810E+00
PEI=   1.2525E-01 STDEV=    5.2128E-03 BITS=    4032
XISUM=    4.1048E-01 XISIG=    3.0136E-01
LOCKIN=     24 ,DROPOUTS=     82 ,AVE=   4.3171E+00 ,STD DEV=  5.3257E+00
ERRM
  2.5600E+02  3.7000E+01  3.2000E+01  1.7000E+01  1.6000E+01  1.1000E+01  8.0000E+00  7.0000E+00  8.0000E+00  1.0000E+01
  6.0000E+00  7.0000E+00  7.0000E+00  5.0000E+00  5.0000E+00  4.0000E+00  3.0000E+00  3.0000E+00  1.0000E+01  6.0000E+00
  2.0000E+00  5.0000E+00  0.          2.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00
  0.          0.          2.0000E+00  0.          3.0000E+00  0.          0.          0.          1.0000E+00  0.
  0.          0.          2.0000E+00  0.          1.0000E+00  0.          0.          2.0000E+00  0.          1.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          1.0000E+01  2.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   960                                  -1+1 P(R1.R2/T1.T2)TIMES  1024
    54     25     56     23     5     3     0     4        15     3     4     2     2     0     0     1
    58     73     67     28     8     3     1     0         5     1     1     3     1     1     2     4
    76    111     75     26     5     1     4     2        11     6     3     7     5     3     5     4
    38     40     35     11     1     2     1     2         7    11    15    13     3     4     1     3
    12     12      6      2     4     3     0     6        24    53    51    18     6     3     2     2
     2      2      2      3     3     1     2     2        36    82   116    36    11     3     3     6
     0      0      1      2     2     1     2     5        38   107    70    27    11     2     1     4
     0      0      0      1     3     4     5    38        21    35    41    27     7     2     5    26
QUADRENT SUMS...HARD DECISIONS                            107    39
     796     42                                           784    94
      45     77                                          +1+1 P(R1.R2/T1.T2)TIMES  1024
+1-1 P(R1.R2/T1.T2)TIMES  1024                            10     1     3     1     0     0     0     0
     9      3     16     13     45    69    52    22        1     4     0     1     1     1     0     1
     4      4      5     22     74   130    67    17        3     1     7     4     1     1     4     3
     2      2      4     23     68    88    46    10        1     1     5     2     6    12    11    28
     2      1      6     12     39    28     8     3        2     2     2     6    16    43    68    45
     4      0      4      3      5     4     6     4        2     3     8     7    25    98   109    62
     2      1      1      3      4     4     2     6        0     0     4     7    35    75    73    53
     0      0      0      0      2     4     7     8        1    -2     1    13    19    46    43    48
     0      0      2      0      5     6    10    55
QUADRENT SUMS...HARD DECISIONS                             45    61
     128    766                                            60   858
      20    110
  1975   1647   1047    115
  1199     74   1284   1181
  1239     82    753   1716

252 BIT ERROR INTERVALS
  2.9000E+01  1.3000E+01  2.8000E+01  4.7000E+01  3.4000E+01  2.2000E+01  7.0000E+01  4.2000E+01  3.2000E+01  2.6000E+01
  3.0000E+01  3.4000E+01  2.4000E+01  2.2000E+01  2.7000E+01  2.2000E+01  0.          0.          0.          0.
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=    1.0000E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SOPHA=    4.7000E-01 FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=    7.0000E-01
FBTAU3=    1.3405E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    7.6141E-02 STDEV=    4.1769E-03 BITS=    4032
XISUM=    3.7238E-01 XISIG=    2.0368E-01
LOCKIN=     15 ,DROPOUTS=     30 ,AVE=   3.0000E+00 ,STD DEV=  2.8166E+00
ERRM
  1.2700E+02  1.3000E+01  1.4000E+01  1.0000E+01  1.1000E+01  9.0000E+00  5.0000E+00  5.0000E+00  4.0000E+00  2.0000E+00
  6.0000E+00  7.0000E+00  5.0000E+00  6.0000E+00  5.0000E+00  4.0000E+00  3.0000E+00  1.0000E+00  3.0000E+00  3.0000E+00
  6.0000E+00  5.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.           2.0000E+00  2.0000E+00
  2.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          5.0000E+00  0.          0.          1.0000E+00  0.          0.          2.0000E+00  0.          0.
  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.
  0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          1.0000E+00
  0.          0.          1.0000E+00  0.          0.          0.          2.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   968                                  -1+1 P(R1.R2/T1.T2)TIMES  1024
    16     38     45     26      9      3      0      2          9      7      1      1      2      0      0      0
    30     92     90     37      4      0      1      3          2      2      3      5      2      1      1      2
    84    116     85     30      8      0      1      2         10      9     18      9      5      2      3      3
    39     78     40     17      3      2      1      0         12     31     57     24      7      1      2      4
     8     11      7      7      2      1      0      4         30    126    135     49      7      3      1      4
     1      1      2      2      0      1      0      0         56    105     93     38      6      0      1      6
     0      0      1      1      1      0      1      3         19     32     36     19      9      3      1      6
     0      0      0      0      2      1      1     13

QUADRENT SUMS...HARD DECISIONS                                  81     23
   855     39                                                  862     58
    39     27                                                  +1+1 P(R1.R2/T1.T2)TIMES  1024
+1-1 P(R1.R2/T1.T2)TIMES  1024
     1      3      6     11     19     65     56     18          3      0      0      1      0      0      1      0
     2      1      2     14     84    165    100     18          4      0      1      1      0      2      1      2
     5      2      3     13     75    132     51      7          2      1      1      1      5      5      3      8
     5      1      5      9     30     26     16      4          1      1      0      4      3     21     53     59     33
     1      0      2      5      7      7      6      3          0      1      1      3     21    108    166     66     33
     2      0      0      2      1      3      2      1          1      1      1     11     28    116    101     36
     0      0      1      3      0      1      1      5          3      2      1      9     15     35     42     23
     0      0      1      1      1      5      8     12

QUADRENT SUMS...HARD DECISIONS                                  23     33
    77    866                                                   42    926
    18     63
   323     96    478   1124
  1199     74   1671    652
  1239     82   1499   1074

252 BIT ERROR INTERVALS
  1.3000E+01  1.5000E+01  2.0000E+01  1.5000E+01  1.0000E+01  2.1000E+01  1.8000E+01  1.0000E+01  1.8000E+01  1.7000E+01
  3.6000E+01  2.5000E+01  2.6000E+01  1.8000E+01  2.1000E+01  2.3000E+01  0.          0.          0.          0.
```

```
ENODB=    8.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SOPHA=    4.7000E-01 FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=    5.1339E-02 STDEV=    3.4755E-03 BITS=    4032
XISUM=    3.7370E-01 XISIG=    1.9000E-01
LOCKIN=     11 ,DROPOUTS=     20 ,AVE=   2.9500E+00 ,STD DEV=   2.9745E+00
ERRM
  8.4000E+01  1.4000E+01  7.0000E+00  1.0000E+01  3.0000E+00  5.0000E+00  2.0000E+00  3.0000E+00  4.0000E+00  0.
  1.0000E+00  3.0000E+00  2.0000E+00  0.          2.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  0.          2.0000E+00
  3.0000E+00  0.          2.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  5.0000E+00  0.          0.
  4.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.          2.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.
  0.          2.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  2.0000E+00  0.          0.          2.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00  6.0000E+00
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   960                                  -1+1 P(R1.R2/T1.T2)TIMES  1024
    16    25    41    23      6     2     0     1      9     1     1     2     0     0     0     2
    38   106    81    32      3     0     2     3      3     1     1     0     2     0     0     0
    82   138   112    36      3     0     1     3      2     3     1     1     1     1     0     2
    31    55    50    13      1     0     1     1      3     3     5     7     3     1     4     2
     9     5     8     2      0     1     1     0      9    35    64    15     4     2     1     3
     1     0     1     1      0     0     0     2     42   126   140    52     3     2     1     2
     0     1     0     2      1     0     0     3     40   123   128    35     3     2     0     2
     0     0     0     2      0     0     2    10     17    49    27    19     4     1     0     4
 QUADRENT SUMS...HARD DECISIONS                                45    14
    879    28                                                 921    44
     32    21                                                       +1+1 P(R1.R2/T1.T2)TIMES  1024
+1-1 P(R1.R2/T1.T2)TIMES  1024                                   3     1     0     0     0     0     0     0
     4     2     4     8     22    73    61    16      3     0     0     0     0     0     0     0
     2     0     2     9     87   185   105    17      3     0     1     1     2     0     1     0
     1     1     1     9     86   127    54     6      0     0     0     1     1     3     6     8
     1     1     3     8     25    33    14     3      0     0     0     1     1     6    41    93    36
     0     0     2     2      2     8     1     1      1     0     0     1     1     6    24   111   155    67
     1     0     1     0      0     1     3     0      1     0     0     1     0     3    36   111   117    51
     1     0     1     0      0     1     3     0      1     0     0     1     0     3    17    39    36    23
     0     0     0     2      1     2     5    14      2     2     0     3     3    17    39    36
 QUADRENT SUMS...HARD DECISIONS                                11    29
     56    914                                               21    963
     12    42
    171    945   2011   437
   1199     74    771  1156
   1239     82   1499  1074

 252 BIT ERROR INTERVALS
   1.1000E+01  3.0000E+00  1.3000E+01  1.2000E+01  1.0000E+01  4.0000E+00  8.0000E+00  1.3000E+01  2.1000E+01  1.1000E+01
   2.2000E+01  1.8000E+01  2.4000E+01  3.0000E+00  1.7000E+01  1.6000E+01  0.          0.          0.          0.
```

```
ENODB=    9.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0000E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    2.3000E-01 FBAMP=   2.0000E+00 SOPHA=   4.7500E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 466.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3400E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   3.7956E-02 STDEV=   3.0090E-03 BITS=   4032
XISUM=    3.6572E-01 XISIG=   1.7865E-01
LOCKIN=     11 ,DROPOUTS=     14 ,AVE=   3.6429E+00 ,STD DEV=   4.1851E+00
ERRM
  6.3000E+01  9.0000E+00  6.0000E+00  8.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00  0.          3.0000E+00  0.
  0.          2.0000E+00  0.          2.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          0.          2.0000E+00
  1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.
  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          2.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00
  0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  0.
  0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          2.0000E+00  0.          0.          0.          1.4000E+01

-1-1 P(R1.R2/T1.T2)TIMES   960                                          -1+1 P(R1.R2/T1.T2)TIMES  1024
    12    19    37    21     3     4     0     0     4     2     1     0     0     1     1     0
    31   112    94    23     1     2     0     1     1     0     2     1     2     1     0     0
    84   161   140    37     2     0     0     0     3     0     0     2     1     2     0     1
    20    52    52     9     0     4     0     2     4     2     4     2     4     2     3     1
     5     7     4     4     0     0     1     0    10    34    59    15     6     0     2     0
     2     0     0     0     0     2     1     5    34   140   184    41     8     0     0     0
     0     0     0     0     0     0     1     3    35   126   132    36     8     1     2     0
     0     0     0     0     1     0     1     3    17    36    29    19     3     1     2     0
QUADRENT SUMS...HARD DECISIONS                                          28    13
   904    19                                                           947    36
    22    15                                                                 41+1 P(R1.R2/T1.T2)TIMES  1024
+1-1 P(R1.R2/T1.T2)TIMES  1024                                          0     0     2     0     0     0     0     0
     4     0     3     4    11    71    66     6     0     0     0     0     0     0     0     0
     0     0     1     4    81   223   110    10     0     0     1     0     0     0     0     0
     1     1     1     7    85   153    54    10     0     0     0     2     1     2     2     0
     1     2     2     4    18    37     5     4     0     0     1     1     3     4     2     1
     1     0     0     4     2     5     2     0     0     0     1     0     3    40    72    28
     0     1     0     0     2     1     4     2     0     0     1     0     3    18   130   168    58
     0     0     1     0     2     2     2     4     0     0     1     0     2     6    36   123   121    49
     0     0     0     2     0     2     4     7     0     0     1     1     2     9    31    33    26
QUADRENT SUMS...HARD DECISIONS                                           6    22
    35   943                                                            20   976
     9    37
   171   945  2011   437
  1199    74   771  1156
  1239    82  1499  1074

252 BIT ERROR INTERVALS
  1.5000E+01  3.0000E+00  9.0000E+00  5.0000E+00  5.0000E+00  2.0000E+00  9.0000E+00  1.5000E+01  1.8000E+01  1.1000E+01
  1.9000E+01  9.0000E+00  1.6000E+01  1.0000E+00  7.0000E+00  0.0000E+00  0.          0.          0.          0.
```

```
ENODB=   7.0 ,DELF=   62.5 ,BIF=   1500 ,BL2=    294
SVRHZ=  2.2000E+03 SWMX=  5.5000E+03 SWMN=  6.8500E+03 FRQDP=  1.0000E+03 FQDPRT=  1.0000E+01
TL= -6.5000E+00 DYNR=  6.0000E+00SDAMP=  2.3000E-01 SDPHA=  4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03
PMFILT=  7.0000E-01
LOG NORMAL SCINTILLATION
NACQ,AMISS        AFAL              ACQ              KDATA,          ES              EV              EV1
     1   0.          1.0000E+00   0.                   7   2.0429E+00  -9.7535E-01  -1.4008E+01
     2   0.          2.0000E+00   0.                  13   4.0540E+00  -5.7897E-01  -1.2840E+01
     3   0.          3.0000E+00   0.                  18   5.7299E+00   1.8369E+00  -1.1558E+01
     4   0.          3.0000E+00   1.0000E+00          52   1.7126E+01   1.5807E+01   2.1236E+00
     5   0.          4.0000E+00   1.0000E+00          24   7.7409E+00   3.5117E+00  -1.0123E+01
     6   0.          5.0000E+00   1.0000E+00          16   5.1595E+00   1.5708E+00  -1.1707E+01
     7   0.          6.0000E+00   1.0000E+00           3   7.0220E-01   3.1474E-01  -1.3023E+01
     8   0.          6.0000E+00   2.0000E+00          51   1.6791E+01   1.3313E+01   1.0614E-01
     9   0.          7.0000E+00   2.0000E+00          39   1.2769E+01   7.1316E+00  -6.6272E+00
    10   0.          8.0000E+00   2.0000E+00          15   4.7243E+00   2.8052E+00  -1.0590E+01
    11   0.          9.0000E+00   2.0000E+00           5   1.3726E+00  -1.3949E+00  -1.4746E+01
    12   0.          1.0000E+01   2.0000E+00           3   7.0220E-01   3.4530E-01  -1.3033E+01
    13   0.          1.1000E+01   2.0000E+00          30   9.7520E+00   2.8434E+00  -1.0648E+01
    14   0.          1.1000E+01   3.0000E+00          53   1.7461E+01   1.5587E+01   1.7643E+00
    15   0.          1.2000E+01   3.0000E+00          12   3.7188E+00  -4.9931E-01  -1.4003E+01
    16   0.          1.2000E+01   4.0000E+00          53   1.7461E+01   1.2234E+01  -1.0168E+00
    17   0.          1.3000E+01   4.0000E+00           6   1.7077E+00   8.7228E-01  -1.2205E+01
    18   0.          1.4000E+01   4.0000E+00           8   2.3781E+00  -9.9136E-01  -1.4322E+01
    19   0.          1.5000E+01   4.0000E+00           7   2.0429E+00  -1.0718E+00  -1.4508E+01
    20   0.          1.6000E+01   4.0000E+00           4   1.0374E+00   1.5488E+00  -1.1869E+01
    21   0.          1.7000E+01   4.0000E+00           8   2.3781E+00  -7.6389E-01  -1.4142E+01
    22   0.          1.8000E+01   4.0000E+00           3   7.0220E-01   7.6937E-01  -1.2734E+01
    23   0.          1.9000E+01   4.0000E+00          33   1.0758E+01   6.1221E+00  -7.1465E+00
    24   0.          2.0000E+01   4.0000E+00          21   6.7354E+00   8.0686E-01  -1.2715E+01
    25   0.          2.1000E+01   4.0000E+00           4   1.0374E+00   2.9877E-01  -1.2946E+01
    26   0.          2.1000E+01   5.0000E+00          64   2.1148E+01   1.1606E+01  -1.8861E+00
    27   0.          2.2000E+01   5.0000E+00          18   5.7299E+00   2.1184E+00  -1.1877E+01
    28   0.          2.3000E+01   5.0000E+00           5   1.3726E+00  -1.1937E+00  -1.4513E+01
    29   0.          2.4000E+01   5.0000E+00          37   1.2098E+01   6.4507E+00  -7.9809E+00
    30   0.          2.5000E+01   5.0000E+00           4   1.0374E+00   9.0560E-01  -1.2216E+01

*ERROR*  39          NEGATIVE ARGUMENT
         SENSED BY SQRT
         CALLED BY CHAS    AT    2215 (  2114)
PACQ=  1.6667E-01 ,STDEV=          IIIII
AVEES=  1.7997E+01 ,STDES=  1.5948E+00
AVEEV=  1.3709E+01 STDEV=          IIIII
AVE KDATA=  5.4600E+01 ,STD DEV=  4.7582E+00
PR MISSED ACQ=  0.
PR FALSE ACQ=  8.3333E-01
```

```
ENGOJ=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294
SVRHZ=   2.2000E+07 SWMX=   2.5000E+03 SWMN=   6.8500E+03 FRQDP=   1.0000E+03 FQDPRT=  1.0800E+01
TL=  -8.0000E+00 ,TR=   6.0000E+00SDAMP=   2.3000E-01 SDPHA=   4.7000E-01
WN=  277.2 ,K=  468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PHFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
```

NACQ,	AMISS	AFAL	ACQ	KDATA,		ES	EV	EVi
1	0.	1.0000E+00	0.	10	3.0484E+00	-1.2919E+00	-1.5059E+01	
2	0.	2.0000E+00	0.	11	3.3836E+00	1.5396E+00	-1.1960E+01	
3	0.	3.0000E+00	0.	9	2.7133E+00	-1.1092E+00	-1.4359E+01	
4	0.	4.0000E+00	0.	28	9.0817E+00	5.8266E+00	-7.6978E+00	
5	0.	4.0000E+00	1.0000E+00	65	2.1483E+01	1.3206E+01	-4.1867E-01	
6	0.	5.0000E+00	1.0000E+00	33	1.0758E+01	7.2952E+00	-5.8411E+00	
7	0.	6.0000E+00	2.0000E+00	58	1.9137E+01	1.3483E+01	3.4293E-01	
8	0.	6.0000E+00	2.0000E+00	5	1.3726E+00	-1.3766E+00	-1.4405E+01	
9	0.	7.0000E+00	2.0000E+00	12	3.7168E+00	-4.8054E-02	-1.3433E+01	
10	0.	8.0000E+00	2.0000E+00	13	4.0540E+00	4.3647E+00	-8.8427E+00	
11	0.	8.0000E+00	3.0000E+00	59	1.9472E+01	1.2708E+01	-8.3400E-01	
12	0.	8.0000E+00	4.0000E+00	45	1.4780E+01	1.3371E+01	9.4010E-03	
13	0.	8.0000E+00	5.0000E+00	54	1.7796E+01	1.4782E+01	1.2022E+00	
14	0.	8.0000E+00	6.0000E+00	56	1.8467E+01	1.2621E+01	-7.3652E-01	
15	0.	8.0000E+00	7.0000E+00	58	1.9137E+01	1.3069E+01	-5.2241E-01	
16	0.	8.0000E+00	8.0000E+00	37	1.2098E+01	1.0616E+01	-2.7960E+00	
17	0.	8.0000E+00	9.0000E+00	48	1.5785E+01	1.2961E+01	-7.0240E-01	
18	0.	8.0000E+00	1.0000E+01	55	1.8131E+01	1.3022E+01	-1.0317E+00	
19	0.	9.0000E+00	1.0000E+01	31	1.0087E+01	6.6916E+00	-7.1486E+00	
20	0.	9.0000E+00	1.1000E+01	38	1.2433E+01	8.6354E+00	-5.0743E+00	
21	0.	9.0000E+00	1.2000E+01	46	1.5115E+01	1.3628E+01	4.4744E-01	
22	0.	1.0000E+01	1.2000E+01	45	1.4780E+01	5.9769E+00	-7.3191E+00	
23	0.	1.0000E+01	1.3000E+01	57	1.8802E+01	1.2334E+01	-7.6570E-01	
24	0.	1.1000E+01	1.3000E+01	39	1.2769E+01	7.4344E+00	-5.7758E+00	
25	0.	1.2000E+01	1.3000E+01	15	4.7243E+00	1.2791E+00	-1.2269E+01	
26	0.	1.3000E+01	1.3000E+01	4	1.0374E+00	9.9065E-01	-1.2226E+01	
27	0.	1.4000E+01	1.3000E+01	7	2.0429E+00	3.3731E-01	-1.2835E+01	
28	0.	1.5000E+01	1.3000E+01	16	5.0595E+00	3.7467E+00	-9.6585E+00	
29	0.	1.6000E+01	1.3000E+01	4	1.0374E+00	4.3947E-01	-1.3037E+01	
30	0.	1.7000E+01	1.3000E+01	20	6.4002E+00	3.6701E+00	-9.5236E+00	

```
*ERROR*  39          NEGATIVE ARGUMENT
         SENSED BY SQRT
         CALLED BY CHAS     AT    2215 (  2114)
PACQ=   4.3333E-01 ,STDEV=        IIIII
AVEES=   1.7126E+01 ,STDES=   2.7357E+00
AVEEV=   1.2649E+01 STDEV=        IIIII
AVE KDATA=   5.2000E+01 ,STD DEV=   8.1618E+00
PR MISSED ACQ=   0.
PR FALSE ACQ=   5.6667E-01
```

```
ENDOB=    7.0 ,DELF=   62.6 ,BIF=   150C ,BL2=    294
SYRHZ=   2.2000E+03 SWHX=   2.5000E+03 SWHN=   6.8500E+03 FRQDP=   1.0000E+03 FQDPRT=  1.8800E+01
TL= -9.5000E+00 DYNR=   6.0000E+00SOAHP=   2.3000E-01 SOPHA=   4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PMFILI=   7.0000E-01
LOG NORMAL SCINTILLATION
NACQ,AHISS          AFAL                ACQ                 KDATA,                ES                EV                EV1
     1   0.      1.0000E+00   0.          11   3.3836E+00  -2.1148E+00  -1.5472E+01
     2   0.      1.0000E+00   1.0000E+00  63   2.0813E+01   1.3040E+01  -6.4540E-01
     3   0.      1.0000E+00   2.0000E+00  71   2.3494E+01   1.2677E+01  -7.5720E-01
     4   0.      2.0000E+00   2.0000E+00  23   7.4058E+00   4.7835E+00  -8.6939E+00
     5   0.      3.0000E+00   2.0000E+00   9   2.7133E+00  -7.0044E-01  -1.3985E+01
     6   0.      4.0000E+00   2.0000E+00  16   5.0595E+00   2.3549E+00  -1.0926E+01
     7   0.      4.0000E+00   3.0000E+00  57   1.8802E+01   1.3553E+01  -2.8136E-01
     8   0.      4.0000E+00   4.0000E+00  47   1.5450E+01   1.1940E+01  -1.5647E+00
     9   0.      4.0000E+00   5.0000E+00  66   2.1818E+01   1.3566E+01   2.8479E-01
    10   0.      4.0000E+00   6.0000E+00  60   1.9807E+01   1.3500E+01  -3.8800E-02
    11   0.      5.0000E+00   6.0000E+00  14   4.3892E+00   1.6994E+00  -1.1770E+01
    12   0.      5.0000E+00   7.0000E+00  60   1.9807E+01   1.2898E+01  -6.1701E-01
    13   0.      6.0000E+00   7.0000E+00  13   4.0540E+00   1.3728E+00  -1.2212E+01
    14   0.      6.0000E+00   8.0000E+00  54   1.7796E+01   1.3993E+01   3.3515E-01
    15   0.      7.0000E+00   8.0000E+00  16   5.0595E+00   2.6429E+00  -1.0801E+01
    16   0.      8.0000E+00   8.0000E+00  14   4.3892E+00   2.8146E+00  -1.0200E+01
    17   0.      9.0000E+00   8.0000E+00  17   5.3947E+00   9.9881E-01  -1.2315E+01
    18   0.      9.0000E+00   9.0000E+00  45   1.4780E+01   1.2150E+01  -1.2673E+00
    19   0.      1.0000E+01   9.0000E+00  11   3.3836E+00  -5.6068E-01  -1.4146E+01
    20   0.      1.1000E+01   9.0000E+00   7   2.0429E+00   1.9809E+00  -1.1257E+01
    21   0.      1.1000E+01   1.0000E+01  48   1.5785E+01   1.1493E+01  -1.8136E+00
    22   0.      1.1000E+01   1.1000E+01  52   1.7126E+01   1.5217E+01   2.0456E+00
    23   0.      1.1000E+01   1.2000E+01  59   1.9472E+01   1.4207E+01   6.6317E-01
    24   0.      1.2000E+01   1.2000E+01  16   5.0595E+00   2.0215E+00  -1.1116E+01
    25   0.      1.3000E+01   1.2000E+01  37   1.2098E+01   7.3809E+00  -5.8626E+00
    26   0.      1.3000E+01   1.3000E+01  43   1.4109E+01   1.2051E+01  -1.7347E+00
    27   0.      1.4000E+01   1.3000E+01  30   9.7520E+00   3.4907E+00  -9.8841E+00
    28   0.      1.5000E+01   1.3000E+01  20   6.4002E+00   2.0996E-02  -1.3602E+01
    29   0.      1.6000E+01   1.3000E+01  27   8.7465E+00   5.6186E+00  -7.7807E+00
    30   0.      1.6000E+01   1.4000E+01  52   1.7126E+01   1.4077E+01   6.8878E-01

*ERROR*  39          NEGATIVE ARGUMENT
         SENSED BY SQRT      AT    2215 (  2114)
         CALLED BY CHAS
PACQ=   4.6667E-01 ,STDEV=        IIIII
AVEES=   1.8299E+01 ,STDES=   2.6627E+00
AVEEV=   1.3169E+01 STDEV=        IIIII
AVE KDATA=   5.5500E+01 ,STD DEV=   7.9440E+00
PR MISSED ACQ=   0.
PR FALSE ACQ=   5.3333E-01
```

```
ENGOB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294
SVRHZ=  2.2000E+03 SWMX=  2.5000E+03 SWMN=  6.6200E+03 FRQDP=  1.0000E+03 FQDPRT=  1.0800E+01
TL= -1.1000E+01 DYNR=  6.0000E+00SDHP=  2.3000E-01 SDPHA=  4.7000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03
PHFILT=  7.3000E-01
LOG NORMAL SCINTILLATION
NACC,AMISS       AFAL              ACQ              KDATA,          ES              EV              EV1
     1   0.   1.0000E+00   0.                 11  3.3836E+00 -2.1148E+00 -1.5472E+01
     2   0.   1.0000E+00   1.0000E+00        63  2.0813E+01  1.3040E+01 -6.4540E-01
     3   0.   1.0000E+00   2.0000E+00        71  2.3494E+01  1.2677E+01 -7.5720E-01
     4   0.   2.0000E+00   2.0000E+00        30  9.7520E+00  7.2175E+00 -6.0828E+00
     5   0.   3.0000E+00   2.0000E+00        10  3.0484E+00 -4.2105E-01 -1.4030E+01
     6   0.   3.0000E+00   3.0000E+00        82  2.0478E+01  1.3485E+01  8.1052E-02
     7   0.   4.0000E+00   3.0000E+00         7  2.0429E+00  1.8434E+00 -1.1466E+01
     8   0.   5.0000E+00   3.0000E+00        12  3.7188E+00  3.8016E-01 -1.2852E+01
     9   0.   6.0000E+00   3.0000E+00        13  4.0540E+00  2.6219E+00 -1.0658E+01
    10   0.   7.0000E+00   3.0000E+00        22  7.0706E+00  3.3960E+00 -9.9497E+00
    11   0.   7.0000E+00   4.0000E+00        69  2.2824E+01  1.4207E+01  6.7129E-01
    12   0.   7.0000E+00   5.0000E+00        55  1.8131E+01  1.4559E+01  1.0129E+00
    13   0.   8.0000E+00   5.0000E+00        15  4.7243E+00  2.2006E+00 -1.1298E+01
    14   0.   8.0000E+00   6.0000E+00        52  1.7126E+01  1.3286E+01  6.4819E-02
    15   0.   8.0000E+00   7.0000E+00        46  1.5115E+01  8.5832E+00 -5.0207E+00
    16   0.   8.0000E+00   8.0000E+00        60  1.9807E+01  1.2392E+01 -1.1405E+00
    17   0.   8.0000E+00   9.0000E+00        58  1.9137E+01  1.3448E+01  7.0124E-02
    18   0.   8.0000E+00   1.0000E+01        38  1.2433E+01  9.6341E+00 -3.8818E+00
    19   0.   9.0000E+00   1.0000E+01        10  3.0484E+00  1.8520E+00 -1.2159E+01
    20   0.   1.0000E+01   1.0000E+01        37  1.2098E+01  6.3216E+00 -7.0102E+00
    21   0.   1.1000E+01   1.0000E+01        31  1.0067E+01  6.4881E+00 -6.9547E+00
    22   0.   1.1000E+01   1.1000E+01        48  1.5785E+01  1.2382E+01 -1.1716E+00
    23   0.   1.2000E+01   1.1000E+01        10  3.0484E+00  2.0500E-02 -1.3280E+01
    24   0.   1.2000E+01   1.2000E+01        56  1.8467E+01  1.3781E+01  1.8641E-01
    25   0.   1.2000E+01   1.3000E+01        73  2.4165E+01  1.3974E+01  4.2905E-01
    26   0.   1.3000E+01   1.3000E+01         6  1.7077E+00 -2.4156E+00 -1.6013E+01
    27   0.   1.4000E+01   1.3000E+01        18  5.7299E+00  2.1241E+00 -1.1122E+01
    28   0.   1.5000E+01   1.3000E+01        20  6.4002E+00  2.8052E+00 -1.0441E+01
    29   0.   1.5000E+01   1.4000E+01        58  1.9137E+01  1.3096E+01 -6.8342E-02
    30   0.   1.6000E+01   1.4000E+01        17  5.3947E+00  8.1111E-01 -1.2559E+01

 *ERROR*  39          NEGATIVE ARGUMENT
          SENSED BY SQRT     AT    2215 (  2114)
          CALLED BY CHAS
PACQ=  4.6667E-01 ,STDEV=        IIIII
AVEES=  1.9065E+01 ,STDES=  3.1701E+00
AVEEV=  1.2753E+01 STDEV=        IIIII
AVE KDATA=  5.7786E+01 ,STD DEV=  9.4580E+00
PR MISSED ACQ=  0.
PR FALSE ACQ=  5.3333E-01
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294
SVRHZ=   2.2000E+03 SWMX=   2.5000E+03 SWMN=   6.8500E+03 FRQOP=   1.0000E+03 FQOPRT=  1.0000E+01
TL= -1.3000E+01 DYNR=   6.0000E+00SDAMP=   2.3000E-01 SDPHA=   4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
  NACQ,AMISS          AFAL                ACQ                KDATA,ES            EV            EV1
     1   0.          1.0000E+00   0.                    11   3.3836E+00 -2.1148E+00 -1.5472E+01
     2   0.          1.0000E+00   1.0000E+00            63   2.0813E+01  1.3040E+01 -6.4540E-01
     3   0.          1.0000E+00   2.0000E+00            77   2.5505E+01  1.3927E+01  4.0732E-01
     4   0.          1.0000E+00   3.0000E+00            56   1.8467E+01  1.4393E+01  1.0641E+00
     5   0.          1.0000E+00   4.0000E+00            43   1.4109E+01  1.3971E+01  3.1966E-01
     6   0.          1.0000E+00   5.0000E+00            62   2.0478E+01  1.1975E+01 -1.3597E+00
     7   1.0000E+00  1.0000E+00   5.0000E+00            66   2.2090E+01  1.8498E+01  4.8627E+00
     8   1.0000E+00  2.0000E+00   5.0000E+00            29   9.4168E+00  3.3530E+00 -1.0001E+01
     9   1.0000E+00  3.0000E+00   5.0000E+00             9   2.7133E+00 -1.0106E+00 -1.4285E+01
    10   1.0000E+00  3.0000E+00   6.0000E+00            49   1.6120E+01  1.4762E+01  1.2477E+00
    11   1.0000E+00  3.0000E+00   7.0000E+00            56   1.8467E+01  1.3454E+01 -5.2614E-02
    12   1.0000E+00  3.0000E+00   8.0000E+00            57   1.8802E+01  1.4651E+01  1.2432E+00
    13   1.0000E+00  4.0000E+00   8.0000E+00            21   6.7354E+00  1.3836E+00 -1.2158E+01
    14   1.0000E+00  4.0000E+00   9.0000E+00            58   1.9137E+01  1.4609E+01  6.8359E-01
    15   1.0000E+00  4.0000E+00   1.0000E+01            54   1.7796E+01  1.4991E+01  1.4041E+00
    16   1.0000E+00  4.0000E+00   1.1000E+01            53   1.7461E+01  1.2906E+01 -6.6347E-01
    17   1.0000E+00  4.0000E+00   1.2000E+01            51   1.6791E+01  1.3804E+01  8.4092E-02
    18   1.0000E+00  4.0000E+00   1.3000E+01            58   1.9137E+01  1.3869E+01  5.0986E-01
    19   1.0000E+00  4.0000E+00   1.4000E+01            51   1.6791E+01  1.4255E+01  5.5529E-01
    20   1.0000E+00  4.0000E+00   1.5000E+01            46   1.5115E+01  1.3415E+01 -3.8822E-01
    21   1.0000E+00  4.0000E+00   1.6000E+01            64   2.1148E+01  1.3771E+01  3.0070E-01
    22   1.0000E+00  4.0000E+00   1.7000E+01            58   1.9137E+01  1.3178E+01 -5.3741E-01
    23   1.0000E+00  5.0000E+00   1.7000E+01            23   7.4058E+00  4.9387E+00 -8.7917E+00
    24   1.0000E+00  5.0000E+00   1.8000E+01            57   1.8802E+01  1.2892E+01 -3.2378E-01
    25   1.0000E+00  5.0000E+00   1.9000E+01            45   1.4780E+01  1.3169E+01 -4.4824E-01
    26   1.0000E+00  5.0000E+00   2.0000E+01            55   1.8131E+01  1.3739E+01  1.8609E-01
    27   1.0000E+00  5.0000E+00   2.1000E+01            68   2.2489E+01  1.5774E+01  2.2864E+00
    28   1.0000E+00  5.0000E+00   2.2000E+01            50   1.6456E+01  1.2059E+01 -1.5658E+00
    29   1.0000E+00  5.0000E+00   2.3000E+01            53   1.7461E+01  1.3790E+01  2.3759E-01
    30   1.0000E+00  5.0000E+00   2.4000E+01            55   1.8131E+01  1.4826E+01  1.1565E+00
PACQ=   8.0000E-01 ,STDEV=   7.3030E-02
AVEES=   1.8397E+01 ,STDES=   2.4630E+00
AVEEV=   1.3802E+01 STDEV=   8.8691E-01
AVE KDATA=   5.5792E+01 ,STD DEV=   7.3484E+00
PR MISSED ACQ=   3.3333E-02
PR FALSE ACQ=   1.6667E-01
```

```
ENODb=    7.0 ,DELF=   62.5 ,BIF=   1500 ,BL2=    294
SVRHZ=   2.2000E+03 SWHX=   2.5000E+03 SWHN=   6.8500E+03 FRQOP=  1.0000E+03 FQDPRT=  1.0000E+01
TL= -1.5000E+01 DYNR=   6.0300E+06SDAMP=   2.3000E-01 SDPHA=   4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
```

NACQ	AMISS	AFAL	ACQ
1	0.	1.0000E+00	0.
2	0.	1.0000E+00	1.0000E+00
3	0.	2.0000E+00	1.0000E+00
4	0.	2.0000E+00	2.0000E+00
5	0.	3.0000E+00	2.0000E+00
6	0.	3.0000E+00	3.0000E+00
7	0.	3.0000E+00	4.0000E+00
8	0.	4.0000E+00	4.0000E+00
9	0.	5.0000E+00	4.0000E+00
10	0.	6.0000E+00	4.0000E+00
11	0.	6.0000E+00	5.0000E+00
12	0.	6.0000E+00	6.0000E+00
13	1.0000E+00	6.0000E+00	6.0000E+00
14	1.0000E+00	7.0000E+00	6.0000E+00
15	1.0000E+00	7.0000E+00	7.0000E+00
16	1.0000E+00	7.0000E+00	8.0000E+00
17	1.0000E+00	7.0000E+00	9.0000E+00
18	2.0000E+00	7.0000E+00	9.0000E+00
19	2.0000E+00	7.0000E+00	1.0000E+01
20	2.0000E+00	7.0000E+00	1.1000E+01
21	2.0000E+00	7.0000E+00	1.2000E+01
22	2.0000E+00	8.0000E+00	1.2000E+01
23	2.0000E+00	8.0000E+00	1.3000E+01
24	2.0000E+00	8.0000E+00	1.4000E+01
25	2.0000E+00	8.0000E+00	1.5000E+01
26	2.0000E+00	8.0000E+00	1.6000E+01
27	2.0000E+00	8.0000E+00	1.7000E+01
28	2.0000E+00	9.0000E+00	1.7000E+01
29	3.0000E+00	9.0000E+00	1.7000E+01
30	3.0000E+00	9.0000E+00	1.8000E+01

KDATA	ES	EV	EV1
12	3.7188E+00	6.6165E-01	-1.2845E+01
58	1.9137E+01	1.3035E+01	-2.0354E-01
7	2.0429E+00	-5.9701E-01	-1.4006E+01
72	2.3830E+01	1.2406E+01	-5.8074E-01
22	7.0706E+00	4.0606E+00	-9.4188E+00
68	2.2489E+01	1.3700E+01	1.1051E-01
56	1.8467E+01	1.1928E+01	-1.4825E+00
23	7.4058E+00	2.4966E+00	-1.0864E+01
14	4.3892E+00	1.2623E+00	-1.2345E+01
8	2.3781E+00	2.5836E+00	-1.0958E+01
52	1.7126E+01	1.4268E+01	5.5631E-01
49	1.6120E+01	1.2844E+01	-6.8966E-01
53	1.7649E+01	1.8429E+01	4.8767E+00
14	4.3892E+00	3.6417E+00	-9.9392E+00
58	1.9137E+01	1.0697E+01	-2.9562E+00
60	1.9807E+01	1.3826E+01	2.5011E-01
58	1.9137E+01	1.5095E+01	1.3728E+00
67	2.2388E+01	1.8471E+01	4.5061E+00
61	2.0143E+01	1.2859E+01	-4.7245E-01
55	1.8131E+01	1.3387E+01	1.2386E-01
57	1.8802E+01	1.2844E+01	-5.1298E-01
39	1.2769E+01	5.5346E+00	-7.9227E+00
69	2.2824E+01	1.4736E+01	8.5493E-01
53	2.0813E+01	1.3840E+01	5.2614E-01
60	1.9807E+01	1.4344E+01	9.8731E-01
50	1.6456E+01	1.2691E+01	-6.3028E-01
48	1.5785E+01	1.2961E+01	-4.3463E-01
35	1.1428E+01	5.2000E+00	-8.2884E+00
73	2.4429E+01	1.8605E+01	4.7157E+00
55	1.8131E+01	1.4525E+01	9.2935E-01

```
PACQ=   6.0000E-01 ,STDEV=   8.9443E-02
AVEES=   1.9230E+01 ,STDES=   2.1803E+00
AVEEV=   1.3344E+01 STDEV=   1.0311E+00
AVE KDATA=   5.8278E+01 ,STD DEV=   6.5047E+00
PR MISSED ACQ=   1.0000E-01
PR FALSE ACQ=   3.0000E-01
```

```
ENODB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294
SVRHZ=   2.2000E+03 SWHX=   2.5000E+03 SWHN=   6.8500E+03 FRQDP=   1.0000E+03 FQDPRT=   1.0800E+01
TL= -1.7000E+01 DYNR=   6.0000E+00SDAMP=   2.3000E-01 SDPHA=   4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
  NACQ,AHISS        AFAL              ACQ          KDATA,ES          EV          EV1
     1   0.        1.0000E+00   0.                  12  3.7188E+00  6.6165E-01 -1.2845E+01
     2   0.        1.0000E+00   1.0000E+00          59  1.9472E+01  1.2881E+01 -6.0171E-01
     3   0.        1.0000E+00   2.0000E+00          72  2.3630E+01  1.2460E+01 -7.5111E-01
     4   0.        1.0000E+00   3.0000E+00          50  1.6456E+01  1.4445E+01  1.2909E+00
     5   0.        1.0000E+00   4.0000E+00          64  2.1148E+01  1.4986E+01  1.4650E+00
     6   0.        1.0000E+00   5.0000E+00          70  2.3159E+01  1.2178E+01 -1.3307E+00
     7   0.        1.0000E+00   6.0000E+00          56  1.8467E+01  1.2280E+01 -1.3356E+00
     8   0.        2.0000E+00   6.0000E+00          19  6.0651E+00  2.4700E+00 -1.0877E+01
     9   0.        2.0000E+00   7.0000E+00          60  1.9807E+01  1.3768E+01  1.9769E-01
    10   0.        2.0000E+00   8.0000E+00          74  2.4500E+01  1.1821E+01 -1.7708E+00
    11   0.        2.0000E+00   9.0000E+00          65  2.1483E+01  1.3689E+01 -1.8804E-02
    12   0.        2.0000E+00   1.0000E+01          42  1.3774E+01  1.3503E+01  4.3326E-02
    13   1.0000E+00  2.0000E+00  1.0000E+01          54  1.7935E+01  1.8430E+01  4.8556E+00
    14   1.0000E+00  2.0000E+00  1.1000E+01          61  2.0143E+01  1.4392E+01  9.9778E-01
    15   1.0000E+00  3.0000E+00  1.1000E+01          40  1.3104E+01  7.1134E+00 -6.4666E+00
    16   1.0000E+00  3.0000E+00  1.2000E+01          60  1.9807E+01  1.3072E+01 -6.0756E-01
    17   2.0000E+00  3.0000E+00  1.2000E+01          75  2.4815E+01  1.8482E+01  4.8293E+00
    18   2.0000E+00  3.0000E+00  1.3000E+01          47  1.5450E+01  1.4164E+01  5.9569E-01
    19   2.0000E+00  3.0000E+00  1.4000E+01          63  2.0813E+01  1.4466E+01  1.1322E+00
    20   2.0000E+00  3.0000E+00  1.5000E+01          60  1.9807E+01  1.3275E+01 -3.4185E-01
    21   2.0000E+00  3.0000E+00  1.6000E+01          55  1.8131E+01  1.4143E+01  5.1146E-01
    22   2.0000E+00  3.0000E+00  1.7000E+01          58  1.9137E+01  1.3053E+01 -4.0306E-01
    23   2.0000E+00  3.0000E+00  1.8000E+01          57  1.8802E+01  1.3702E+01  2.26[illegible]E-01
    24   2.0000E+00  3.0000E+00  1.9000E+01          73  2.4165E+01  1.2760E+01 -6.01[illegible]E-01
    25   2.0000E+00  3.0000E+00  2.0000E+01          62  2.0478E+01  1.2069E+01 -1.87[illegible]E+00
    26   2.0000E+00  3.0000E+00  2.1000E+01          60  1.9807E+01  1.3898E+01  2.028[illegible]E-01
    27   2.0000E+00  3.0000E+00  2.2000E+01          60  1.9807E+01  1.4465E+01  8.7888E-01
    28   2.0000E+00  3.0000E+00  2.3000E+01          51  1.6791E+01  1.3826E+01  4.0642E-01
    29   3.0000E+00  3.0000E+00  2.3000E+01          86  2.8685E+01  1.8650E+01  4.8171E+00
    30   3.0000E+00  3.0000E+00  2.4000E+01          55  1.8131E+01  1.4047E+01  4.0221E-01
PACQ=   8.0000E-01 ,STDEV=   7.3030E-02
AVEES=   1.9724E+01 ,STDES=   2.5750E+00
AVEEV=   1.3473E+01 STDEV=   8.6266E-01
AVE KDATA=   5.9750E+01 ,STD DEV=   7.6825E+00
PR MISSED ACQ=   1.0000E-01
PR FALSE ACQ=   1.0000E-01
```

ENDDB= 7.0 ,DELF= 62.0 ,NIF= 1500 ,NL2= 294
SVRHZ= 2.2000E+03 SWMX= 2.5000E+03 SWMN= 6.8500E+03 FRQOP= 1.0000E+03 FQOPRT= 1.0800E+01
TL= -1.9000E+01 DYNR= 6.3000E+00SOAMP= 2.3000E-01 SDPHA= 4.7000E-01
HN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03
PMFILT= 7.5000E-01
LOG NORMAL SCINTILLATION

NACQ,AMISS	AFAL	ACQ	KOATA,ES	EV	EV1
1 0.	1.0000E+00	0.	13 4.0540E+00	-2.0450E-01	-1.3675E+01
2 1.0000E+00	1.0000E+00	0.	87 2.9078E+01	1.8602E+01	4.6348E+00
3 2.0000E+00	1.0000E+00	0.	77 2.5539E+01	1.8515E+01	4.6102E+00
4 2.0000E+00	1.0000E+00	1.0000E+00	67 2.2154E+01	1.3204E+01	-4.8900E-01
5 2.0000E+00	1.0000E+00	2.0000E+00	48 1.5785E+01	1.2860E+01	-6.7907E-01
6 2.0000E+00	1.0000E+00	3.0000E+00	63 2.3813E+01	1.4100E+01	7.7733E-01
7 2.0000E+00	1.0000E+00	4.0000E+00	58 1.9137E+01	1.4457E+01	1.1093E+00
8 2.0000E+00	1.0000E+00	5.0000E+00	56 1.8467E+01	1.4487E+01	1.0076E+00
9 2.0000E+00	1.0000E+00	6.0000E+00	68 2.2489E+01	1.5362E+01	1.8883E+00
10 2.0000E+00	1.0000E+00	7.0000E+00	68 2.2489E+01	1.3733E+01	4.3559E-01
11 2.0000E+00	1.0000E+00	8.0000E+00	72 2.3830E+01	1.3450E+01	-5.7077E-02
12 3.0000E+00	1.0000E+00	8.3000E+00	103 3.4393E+01	1.8615E+01	4.7692E+00
13 3.0000E+00	1.0000E+00	9.0000E+00	48 1.5785E+01	1.3168E+01	-3.1824E-01
14 3.0000E+00	1.0000E+00	1.0000E+01	71 2.3494E+01	1.3553E+01	1.8059E-01
15 3.0000E+00	1.0000E+00	1.1000E+01	52 1.7126E+01	1.4381E+01	9.0996E-01
16 3.0000E+00	1.0000E+00	1.2000E+01	73 2.4165E+01	1.2529E+01	-1.2180E+00
17 3.0000E+00	1.0000E+00	1.3000E+01	48 1.5785E+01	1.3306E+01	-1.0900E-02
18 3.0000E+00	2.0000E+00	1.3300E+01	32 1.0422E+01	3.5115E+00	-9.7502E+00
19 3.0000E+00	2.0000E+00	1.4000E+01	59 1.9472E+01	1.2845E+01	-5.7142E-01
20 3.0000E+00	2.0000E+00	1.5000E+01	52 1.7126E+01	1.5401E+01	1.8475E+00
21 3.0000E+00	2.0000E+00	1.6000E+01	61 2.0143E+01	1.3403E+01	-2.1672E-01
22 3.0000E+00	2.0000E+00	1.7000E+01	57 1.8802E+01	1.4235E+01	8.5362E-01
23 3.0000E+00	2.0000E+00	1.8000E+01	83 2.7516E+01	1.4926E+01	1.4142E+00
24 3.0000E+00	2.0000E+00	1.9000E+01	56 1.8467E+01	1.5630E+01	1.9600E+00
25 3.0000E+00	2.0000E+00	2.0000E+01	61 2.0143E+01	1.4135E+01	5.3276E-01
26 3.0000E+00	2.0000E+00	2.1000E+01	52 1.7126E+01	1.2082E+01	-1.3853E+00
27 4.0000E+00	2.0000E+00	2.1000E+01	82 2.7277E+01	1.8561E+01	4.7102E+00
28 5.0000E+00	2.0000E+00	2.1000E+01	73 2.4404E+01	1.8483E+01	4.7809E+00
29 5.0000E+00	2.0000E+00	2.2000E+01	73 2.4165E+01	1.4948E+01	1.4465E+00
30 5.0000E+00	2.0000E+00	2.3000E+01	57 1.8802E+01	1.4153E+01	8.4812E-01

PACQ= 7.6667E-01 ,STDEV= 7.7220E-02
AVEES= 2.0143E+01 ,STDES= 3.1067E+00
AVEEV= 1.3932E+01 STDEV= 9.3867E-01
AVE KOATA= 6.1300E+01 ,STD DEV= 9.2689E+00
PR MISSED ACQ= 1.6667E-01
PR FALSE ACQ= 5.6667E-02

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ENODB=    7.3  ,DELF=   62.5  ,BIF=   1500  ,BL2=    294
SVRHZ=   2.2000E+03 SWMX=   2.5000E+03 SWMN=   6.8500E+03 FRQDP=   1.0000E+03 FQDPRT=   1.0800E+01
TL= -2.1000E+01 DYNR=   6.0000E+00SDAMP=   2.3000E-01 SOPHA=   4.7000E-01
WN= 277.2  ,K= 468.6  ,TAU1=   1.6127E-01  ,TAU2=   5.0213E-03
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
   NACQ,AMISS        AFAL          ACQ          KDATA,ES          EV          EV1
      1   1.0000E+00   0.           0.             84   2.7992E+01  1.8609E+01  4.9244E+00
      2   1.0000E+00   0.           1.0000E+00     56   1.8467E+01  1.4222E+01  7.2713E-01
      3   2.0000E+00   0.           1.0000E+00     61   2.0168E+01  1.8513E+01  4.7805E+00
      4   2.0000E+00   0.           2.0000E+00     61   2.0143E+01  1.5037E+01  1.3599E+00
      5   2.0000E+00   0.           3.0000E+00     71   2.3494E+01  1.2704E+01 -5.8635E-01
      6   2.0000E+00   0.           4.0000E+00     72   2.3830E+01  1.3081E+01 -5.4961E-01
      7   2.0000E+00   1.0000E+00   4.0000E+00     31   1.0087E+01  7.1109E+00 -6.4455E+00
      8   3.0000E+00   1.0000E+00   4.0000E+00     54   1.7984E+01  1.8518E+01  4.7671E+00
      9   3.0000E+00   1.0000E+00   5.0000E+00     55   1.8131E+01  1.4511E+01  8.3762E-01
     10   3.0000E+00   1.0000E+00   6.0000E+00     57   1.8802E+01  1.4879E+01  1.3766E+00
     11   4.0000E+00   1.0000E+00   6.0000E+00     83   2.7562E+01  1.8596E+01  4.8632E+00
     12   5.0000E+00   1.0000E+00   6.0000E+00     68   2.2728E+01  1.8635E+01  4.9074E+00
     13   5.0000E+00   1.0000E+00   7.0000E+00     61   2.0143E+01  1.3078E+01 -3.4491E-01
     14   6.0000E+00   1.0000E+00   7.0000E+00     70   2.3261E+01  1.8580E+01  4.7540E+00
     15   6.0000E+00   1.0000E+00   8.0000E+00     58   1.9137E+01  1.2478E+01 -1.1907E+00
     16   6.0000E+00   1.0000E+00   9.0000E+00     54   1.7796E+01  1.2123E+01 -1.2976E+00
     17   7.0000E+00   1.0000E+00   9.0000E+00     91   3.0406E+01  1.8679E+01  4.8748E+00
     18   7.0000E+00   1.0000E+00   1.0000E+01     51   1.6791E+01  1.5475E+01  2.2905E+00
     19   7.0000E+00   1.0000E+00   1.1000E+01     60   1.9807E+01  1.2935E+01 -6.7911E-01
     20   8.0000E+00   1.0000E+00   1.1000E+01     63   2.0841E+01  1.8451E+01  4.8658E+00
     21   9.0000E+00   1.0000E+00   1.1000E+01     79   2.6189E+01  1.8583E+01  4.9168E+00
     22   9.0000E+00   1.0000E+00   1.2000E+01     61   2.0143E+01  1.3187E+01 -2.6860E-01
     23   1.0000E+01   1.0000E+00   1.2000E+01     75   2.4853E+01  1.8579E+01  4.8014E+00
     24   1.0000E+01   1.0000E+00   1.3000E+01     58   1.9137E+01  1.4903E+01  1.4784E+00
     25   1.1000E+01   1.0000E+00   1.3000E+01     77   2.5795E+01  1.8474E+01  4.7784E+00
     26   1.1000E+01   1.0000E+00   1.4000E+01     60   1.9807E+01  1.4825E+01  1.3434E+00
     27   1.1000E+01   1.0000E+00   1.5000E+01     56   1.8467E+01  1.3074E+01 -3.2353E-01
     28   1.1000E+01   1.0000E+00   1.6000E+01     54   1.7796E+01  1.3912E+01  4.1728E-01
     29   1.1000E+01   1.0000E+00   1.7000E+01     74   2.4500E+01  1.1811E+01 -1.6568E+00
     30   1.1000E+01   1.0000E+00   1.8000E+01     60   1.9807E+01  1.5489E+01  1.9641E+00
PACQ=   6.0000E-01  ,STDEV=   8.9443E-02
AVEES=   1.9789E+01  ,STDES=   2.0765E+00
AVEEV=   1.3758E+01  STDEV=   1.1518E+00
AVE KDATA=   5.9944E+01  ,STD DEV=   6.1956E+00
PR MISSED ACQ=   3.6667E-01
PR FALSE ACQ=   3.3333E-02
```

ENODB= 7.0 ,DELF= 62.5 ,BIF= 1530 ,BL2= 294
SVRHZ= 2.2000E+03 SWMX= 2.5000E+03 SWMN= 6.8500E+03 FRQOP= 1.0000E+03 FQOPRT= 1.0800E+01
TL= -2.3000E+01 DYNR= 6.0000E+00 SDAMP= 2.3000E-01 SDPHA= 4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03
PMFILT= 7.8000E-01
LOG NORMAL SCINTILLATION

NACQ	AMISS	AFAL	ACQ	KDATA	ES	EV	EV1
1	1.0000E+00	0.	0.	84	2.7992E+01	1.8609E+01	4.9244E+00
2	1.0000E+00	0.	1.0000E+00	57	1.8802E+01	1.3591E+01	3.5332E-01
3	2.0000E+00	0.	1.0000E+00	81	2.6942E+01	1.8499E+01	4.7087E+00
4	2.0000E+00	0.	2.0000E+00	66	2.1818E+01	1.4965E+01	1.4330E+00
5	3.0000E+00	0.	2.0000E+00	64	2.1272E+01	1.8460E+01	4.6268E+00
6	3.0000E+00	0.	3.0000E+00	58	1.9137E+01	1.3584E+01	-1.1558E-02
7	4.0000E+00	0.	3.0000E+00	78	2.5991E+01	1.8625E+01	4.6506E+00
8	4.0000E+00	0.	4.0000E+00	52	1.7126E+01	1.3496E+01	8.5245E-02
9	4.0000E+00	0.	5.0000E+00	59	1.9472E+01	1.3278E+01	-2.4661E-01
10	5.0000E+00	0.	5.0000E+00	71	2.3506E+01	1.8504E+01	4.8710E+00
11	6.0000E+00	0.	5.0000E+00	68	2.2760E+01	1.8549E+01	4.8799E+00
12	6.0000E+00	0.	6.0000E+00	71	2.3494E+01	1.4006E+01	5.8339E-01
13	7.0000E+00	0.	6.0000E+00	67	2.2293E+01	1.8453E+01	4.8125E+00
14	7.0000E+00	0.	7.0000E+00	69	2.2824E+01	1.2009E+01	-1.6594E+00
15	8.0000E+00	0.	7.0000E+00	80	2.6761E+01	1.8558E+01	4.7765E+00
16	8.0000E+00	0.	8.0000E+00	63	2.0813E+01	1.4038E+01	6.0379E-01
17	9.0000E+00	0.	8.0000E+00	75	2.5075E+01	1.8535E+01	4.8432E+00
18	9.0000E+00	0.	9.0000E+00	53	1.7461E+01	1.4231E+01	7.9029E-01
19	9.0000E+00	0.	1.0000E+01	59	1.9472E+01	1.3430E+01	5.7672E-02
20	1.0000E+01	0.	1.0000E+01	67	2.2415E+01	1.8472E+01	4.7421E+00
21	1.0000E+01	0.	1.1000E+01	66	2.1818E+01	1.4068E+01	6.2685E-01
22	1.1000E+01	0.	1.1000E+01	57	1.8832E+01	1.8486E+01	4.6945E+00
23	1.1000E+01	0.	1.2000E+01	55	1.8131E+01	1.3002E+01	-5.9329E-01
24	1.2000E+01	0.	1.2000E+01	66	2.2016E+01	1.8501E+01	4.8452E+00
25	1.2000E+01	0.	1.3000E+01	64	2.1148E+01	1.3536E+01	1.6595E-01
26	1.2000E+01	0.	1.4000E+01	62	2.0478E+01	1.4254E+01	8.8104E-01
27	1.2000E+01	0.	1.5000E+01	60	1.9807E+01	1.1618E+01	-1.9885E+00
28	1.2000E+01	0.	1.6000E+01	79	2.6176E+01	1.4780E+01	1.2891E+00
29	1.3000E+01	0.	1.6000E+01	78	2.5955E+01	1.8693E+01	4.8765E+00
30	1.4000E+01	0.	1.6000E+01	46	1.5120E+01	1.8430E+01	4.8477E+00

PACQ= 5.3333E-01 ,STDEV= 9.1084E-02
AVEES= 2.0499E+01 ,STDES= 2.2932E+00
AVEEV= 1.3618E+01 ,STDEV= 3.5213E-01
AVE KDATA= 6.2362E+01 ,STD DEV= 6.8417E+00
PR MISSED ACQ= 4.6667E-01
PR FALSE ACQ= 0.

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ENODB=    4.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294
SVRHZ=   2.2000E+03 SHMX=   2.5000E+03 SHMN=   6.8500E+03 FRQDP=   1.0000E+03 FQDPRT=  1.0800E+01
TL= -1.7000E+01 DYNR=   6.0000E+00SDAMP=    2.3000E-01 SOPHA=   4.7000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PHFILT=    7.0000E-01
LOG NORMAL SCINTILLATION
   NACQ,AMISS          AFAL          ACQ
      1   1.0000E+00   0.            0.
      2   2.0000E+00   0.            0.
      3   3.0000E+00   0.            0.
      4   4.0000E+00   0.            0.
      5   5.0000E+00   0.            0.
      6   5.0000E+00   0.            1.0000E+00
      7   6.0000E+00   0.            1.0000E+00
      8   6.0000E+00   0.            2.0000E+00
      9   6.0000E+00   0.            3.0000E+00
     10   7.0000E+00   0.            3.0000E+00
     11   8.0000E+00   0.            3.0000E+00
     12   9.0000E+00   0.            3.0000E+00
     13   1.0000E+01   0.            3.0000E+00
     14   1.0000E+01   0.            4.0000E+00
     15   1.1000E+01   0.            4.0000E+00
     16   1.1000E+01   1.0000E+00    4.0000E+00
     17   1.2000E+01   1.0000E+00    4.0000E+00
     18   1.3000E+01   1.0000E+00    4.0000E+00
     19   1.3000E+01   1.0000E+00    5.0000E+00
     20   1.4000E+01   1.0000E+00    5.0000E+00
     21   1.5000E+01   1.0000E+00    5.0000E+00
     22   1.5000E+01   1.0000E+00    6.0000E+00
     23   1.5000E+01   1.0000E+00    7.0000E+00
     24   1.5000E+01   1.0000E+00    8.0000E+00
     25   1.5000E+01   1.0000E+00    9.0000E+00
     26   1.6000E+01   1.0000E+00    9.0000E+00
     27   1.7000E+01   1.0000E+00    9.0000E+00
     28   1.8000E+01   1.0000E+00    9.0000E+00
     29   1.8000E+01   1.0000E+00    1.0000E+01
     30   1.9000E+01   1.0000E+00    1.0000E+01
PACQ=   3.3333E-01 ,STDEV=   8.6066E-02
AVEES=   2.0210E+01 ,STDES=   3.8004E+00
AVEEV=   1.4006E+01 STDEV=   1.5460E+00
AVE KDATA=   6.1200E+01 ,STD DEV=   1.1338E+01
PR MISSED ACQ=   6.3333E-01
PR FALSE ACQ=   3.3333E-02

KDATA,ES              EV              EV1
   81  2.6819E+01   1.8524E+01   4.8144E+00
   70  2.3400E+01   1.8623E+01   4.7050E+00
   66  2.1808E+01   1.8586E+01   4.8160E+00
   64  2.1165E+01   1.8546E+01   4.4522E+00
   66  2.1936E+01   1.8456E+01   4.6898E+00
   89  2.9528E+01   1.2671E+01  -1.0185E+00
   68  2.2777E+01   1.8670E+01   4.9100E+00
   51  1.6791E+01   1.4812E+01   1.4503E+00
   58  1.9137E+01   1.5056E+01   1.3879E+00
   74  2.4522E+01   1.8760E+01   4.7553E+00
   72  2.4099E+01   1.8552E+01   4.7982E+00
   65  2.1668E+01   1.8471E+01   4.7550E+00
   56  1.8500E+01   1.8404E+01   4.8230E+00
   64  2.1148E+01   1.3417E+01  -7.1293E-02
   75  2.4904E+01   1.8504E+01   4.7862E+00
   36  1.1763E+01   8.0172E+00  -5.3619E+00
   67  2.2125E+01   1.8458E+01   4.8383E+00
   65  2.1720E+01   1.8481E+01   4.8749E+00
   60  1.9807E+01   1.3633E+01  -7.1082E-02
   70  2.3389E+01   1.8492E+01   4.9152E+00
   65  2.1466E+01   1.8705E+01   4.8779E+00
   55  1.8131E+01   1.3896E+01   3.8144E-01
   49  1.6120E+01   1.3378E+01  -2.8474E-01
   52  1.7126E+01   1.0925E+01  -2.5726E+00
   62  2.0478E+01   1.5462E+01   1.9743E+00
   71  2.3662E+01   1.8451E+01   4.8315E+00
   62  2.0669E+01   1.8584E+01   4.9184E+00
   63  2.0902E+01   1.8514E+01   4.9040E+00
   72  2.3830E+01   1.6810E+01   2.9005E+00
   68  2.2604E+01   1.8569E+01   4.9010E+00
```

```
ENOOB=    5.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294
SVRHZ=  2.2000E+03 SHMX=  2.5000E+03 SHMN=  6.8500E+03 FROOP=  1.0000E+03 FOOPRT=  1.0800E+01
TL= -1.7000E+01 DYNR=  6.0000E+00SOAMP=  2.3000E-01 SOPHA=  4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03
PNFILT=  7.0000E-01
LOG NORMAL SCINTILLATION
```

NACQ	AMISS	AFAL	ACQ	KDATA	ES	EV	EV1
1	1.0000E+00	0.	0.	77	2.5577E+01	1.8474E+01	4.7951E+00
2	2.0000E+00	0.	0.	74	2.4530E+01	1.8504E+01	4.8471E+00
3	2.0000E+00	0.	1.0000E+00	65	2.1483E+01	1.4097E+01	4.3218E-01
4	2.0000E+00	0.	2.0000E+00	62	2.0478E+01	1.3534E+01	2.5913E-01
5	2.0000E+00	0.	3.0000E+00	63	2.0813E+01	1.4847E+01	1.1016E+00
6	2.0000E+00	0.	4.0000E+00	68	2.2489E+01	1.2432E+01	-1.1854E+00
7	2.0000E+00	0.	5.0000E+00	58	1.9137E+01	1.3566E+01	-3.5465E-02
8	2.0000E+00	0.	6.0000E+00	75	2.4835E+01	1.2586E+01	-9.7533E-01
9	2.0000E+00	0.	7.0000E+00	58	1.9137E+01	1.3621E+01	-6.3089E-02
10	2.0000E+00	0.	8.0000E+00	69	2.2824E+01	1.5833E+01	2.5511E+00
11	3.0000E+00	0.	8.0000E+00	73	2.4386E+01	1.8466E+01	4.7786E+00
12	4.0000E+00	0.	8.0000E+00	57	1.8807E+01	1.8442E+01	4.8579E+00
13	4.0000E+00	0.	9.0000E+00	57	1.8802E+01	1.3116E+01	-6.9612E-01
14	5.0000E+00	0.	9.0000E+00	74	2.4582E+01	1.8530E+01	4.7320E+00
15	5.0000E+00	0.	1.0000E+01	57	1.8802E+01	1.3262E+01	2.5755E-02
16	6.0000E+00	0.	1.0000E+01	69	2.2973E+01	1.8470E+01	4.7612E+00
17	6.0000E+00	0.	1.1000E+01	52	1.7126E+01	1.1717E+01	-1.9620E+00
18	7.0000E+00	0.	1.1000E+01	64	2.1359E+01	1.8535E+01	4.7210E+00
19	7.0000E+00	1.0000E+00	1.1000E+01	31	1.0087E+01	3.7312E+00	-9.7401E+00
20	7.0000E+00	1.0000E+00	1.2000E+01	64	2.1148E+01	1.4807E+01	1.3414E+00
21	8.0000E+00	1.0000E+00	1.2000E+01	71	2.3583E+01	1.8506E+01	4.8300E+00
22	8.0000E+00	1.0000E+00	1.3000E+01	70	2.3159E+01	1.4373E+01	7.2860E-01
23	9.0000E+00	1.0000E+00	1.3000E+01	72	2.4079E+01	1.8473E+01	4.7772E+00
24	9.0000E+00	1.0000E+00	1.4000E+01	70	2.3159E+01	1.4292E+01	8.2962E-01
25	9.0000E+00	1.0000E+00	1.5000E+01	60	1.9807E+01	1.5173E+01	1.5634E+00
26	1.0000E+01	1.0000E+00	1.5000E+01	75	2.4853E+01	1.8690E+01	4.9038E+00
27	1.0000E+01	1.0000E+00	1.6000E+01	70	2.3159E+01	1.2873E+01	-6.8598E-01
28	1.0000E+01	1.0000E+00	1.7000E+01	50	1.6456E+01	1.2484E+01	-9.5984E-01
29	1.0000E+01	1.0000E+00	1.8000E+01	55	1.8131E+01	1.3370E+01	-8.6278E-02
30	1.1000E+01	1.0000E+00	1.8000E+01	74	2.4486E+01	1.8498E+01	4.8870E+00

```
PACQ=  6.0000E-01 ,STDEV=  8.9443E-02
AVEES=  2.0608E+01 ,STDES=  2.2846E+00
AVEEV=  1.3666E+01 STDEV=  1.0499E+00
AVE KDATA=  6.2389E+01 ,STD DEV=  6.8161E+00
PR MISSED ACQ=  3.6667E-01
PR FALSE ACQ=  3.3333E-02
```

```
ENODB=    6.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294
SVRHZ=   2.2000E+03 SHMX=   2.5000E+03 SHMN=   6.6500E+03 FRQDP=   1.0000E+03 FQDPRT=  1.0800E+01
TL= -1.7000E+01 DYNR=   6.0000E+00SDAHP=   2.3000E-01 SDPHA=   4.7000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
  NACQ,AMISS          AFAL              ACQ              KDATA,ES            EV              EV1
     1   0.          1.0000E+00   0.                    12   3.7188E+00   8.6951E-01 -1.2638E+01
     2   0.          1.0000E+00   1.0000E+00            58   1.9137E+01   1.3102E+01 -1.4547E-01
     3   0.          2.0000E+00   1.0000E+00             7   2.0429E+00  -5.4571E-01 -1.3963E+01
     4   1.0000E+00  2.0000E+00   1.0000E+00            78   2.6035E+01   1.8554E+01  4.7398E+00
     5   2.0000E+00  2.0000E+00   1.0000E+00            81   2.6843E+01   1.8552E+01  4.6644E+00
     6   2.0000E+00  2.0000E+00   1.0000E+00            65   2.1483E+01   1.3201E+01 -2.8881E-01
     7   3.0000E+00  2.0000E+00   2.0000E+00            67   2.2444E+01   1.8461E+01  4.7257E+00
     8   3.0000E+00  2.0000E+00   2.0000E+00            63   2.0813E+01   1.4776E+01  1.4951E+00
     9   4.0000E+00  2.0000E+00   3.0000E+00            64   2.1235E+01   1.8475E+01  4.7608E+00
    10   4.0000E+00  2.0000E+00   3.0000E+00            55   1.8131E+01   1.3832E+01  5.5412E-01
    11   4.0000E+00  2.0000E+00   4.0000E+00            51   1.6791E+01   1.2469E+01 -8.0988E-01
    12   5.0000E+00  2.0000E+00   5.0000E+00            87   2.9085E+01   1.8559E+01  4.8882E+00
    13   5.0000E+00  2.0000E+00   5.0000E+00            70   2.3159E+01   1.4495E+01  1.1164E+00
    14   5.0000E+00  2.0000E+00   6.0000E+00            52   1.7126E+01   1.4333E+01  1.0624E+00
    15   5.0000E+00  2.0000E+00   7.0000E+00            54   1.7796E+01   1.2193E+01 -1.1706E+00
    16   5.0000E+00  2.0000E+00   8.0000E+00            75   2.4835E+01   1.4235E+01  7.2829E-01
    17   5.0000E+00  2.0000E+00   9.0000E+00            57   1.8802E+01   1.2076E+01 -1.3923E+00
    18   5.0000E+00  2.0000E+00   1.0000E+01            56   1.8467E+01   1.3440E+01 -5.4896E-02
    19   5.0000E+00  2.0000E+00   1.1000E+01            53   1.7461E+01   1.3440E+01 -6.0260E-02
    20   6.0000E+00  2.0000E+00   1.2000E+01            58   1.9202E+01   1.8441E+01  4.6759E+00
    21   6.0000E+00  2.0000E+00   1.2000E+01            57   1.8802E+01   1.3871E+01  2.4866E-01
    22   6.0000E+00  2.0000E+00   1.3000E+01            58   1.9137E+01   1.3358E+01 -9.8514E-02
    23   7.0000E+00  2.0000E+00   1.4000E+01            63   2.0838E+01   1.8488E+01  4.7549E+00
    24   7.0000E+00  2.0000E+00   1.4000E+01            66   2.1818E+01   1.5103E+01  1.5840E+00
    25   7.0000E+00  2.0000E+00   1.5000E+01            62   2.0478E+01   1.5040E+01  1.4557E+00
    26   7.0000E+00  2.0000E+00   1.6000E+01            60   1.9807E+01   1.4516E+01  9.1071E-01
    27   7.0000E+00  2.0000E+00   1.7000E+01            62   2.0478E+01   1.5374E+01  1.9109E+00
    28   8.0000E+00  2.0000E+00   1.8000E+01            75   2.5034E+01   1.8465E+01  4.7236E+00
    29   8.0000E+00  2.0000E+00   1.8000E+01            65   2.1483E+01   1.4197E+01  6.4219E-01
    30   8.0000E+00  2.0000E+00   1.9000E+01            55   1.8131E+01   1.3861E+01  3.0609E-01
PACQ=   6.6667E-01 ,STDEV=   8.6066E-02
AVEES=   1.9707E+01 ,STDES=   2.0501E+00
AVEEV=   1.3846E+01 STDEV=   9.1958E-01
AVE KDATA=   5.9700E+01 ,STD DEV=   6.1164E+00
PR MISSED ACQ=   2.6667E-01
PR FALSE ACQ=   6.6667E-02
```

ENOOP= 8.0 ,DELF= 62.0 ,BIF= 1500 ,BL2= 294
SVRHZ= 2.2000E+03 SWMX= 2.5000E+03 SWMN= 6.0500E+03 FRQOP= 1.0000E+03 FQDPRT= 1.0000E+01
TL= -1.7000E+01 DYNP= 6.0000E+00SDAMP= 2.3000E-01 SDPHA= 4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03
PMFILT= 7.0000E-01
LOG NORMAL SCINTILLATION

NACQ	AMISS	AFAL	ACQ	KDATA	ES	EV	EV1
1	0.	1.0000E+00	0.	12	3.7188E+00	7.7541E-01	-1.2724E+01
2	0.	1.0000E+00	1.0000E+00	58	1.9137E+01	1.3074E+01	-1.7414E-01
3	0.	2.0000E+00	1.0000E+00	7	2.0429E+00	-5.7538E-01	-1.3974E+01
4	0.	2.0000E+00	2.0000E+00	68	2.2489E+01	1.2816E+01	-6.0054E-01
5	0.	2.0000E+00	3.0000E+00	71	2.3494E+01	1.4680E+01	9.7979E-01
6	0.	2.0000E+00	4.0000E+00	50	1.6456E+01	1.4904E+01	1.4603E+00
7	0.	2.0000E+00	5.0000E+00	65	2.1483E+01	1.3666E+01	1.9167E-01
8	0.	2.0000E+00	6.0000E+00	53	1.7461E+01	1.2184E+01	-1.3634E+00
9	0.	2.0000E+00	7.0000E+00	53	1.7461E+01	1.2923E+01	-5.3913E-01
10	0.	2.0000E+00	8.0000E+00	58	1.9137E+01	1.5053E+01	1.3747E+00
11	0.	2.0000E+00	9.0000E+00	53	1.7461E+01	1.4137E+01	5.5154E-01
12	0.	2.0000E+00	1.0000E+01	56	1.8467E+01	1.2832E+01	-5.8489E-01
13	0.	2.0000E+00	1.1000E+01	53	1.7461E+01	1.4970E+01	1.4061E+00
14	0.	2.0000E+00	1.2000E+01	51	1.6791E+01	1.2895E+01	-6.5688E-01
15	0.	2.0000E+00	1.3000E+01	58	1.9137E+01	1.1872E+01	-1.8220E+00
16	0.	2.0000E+00	1.4000E+01	49	1.6120E+01	1.3467E+01	-9.1510E-02
17	0.	2.0000E+00	1.5000E+01	54	1.7796E+01	1.3307E+01	-2.8755E-02
18	0.	2.0000E+00	1.6000E+01	59	1.9472E+01	1.4728E+01	9.3011E-01
19	0.	2.0000E+00	1.7000E+01	59	1.9472E+01	1.3663E+01	6.8711E-02
20	0.	3.0000E+00	1.7000E+01	26	8.4113E+00	4.5518E+00	-8.9257E+00
21	0.	4.0000E+00	1.7000E+01	21	6.7354E+00	2.3639E+00	-1.1107E+01
22	0.	4.0000E+00	1.8000E+01	52	1.7126E+01	1.3262E+01	-1.1462E-01
23	0.	4.0000E+00	1.9000E+01	63	2.0813E+01	1.1912E+01	-1.7957E+00
24	0.	5.0000E+00	1.9000E+01	38	1.2433E+01	7.9831E+00	-5.3702E+00
25	0.	5.0000E+00	2.0000E+01	54	1.7796E+01	1.3818E+01	4.2942E-01
26	0.	5.0000E+00	2.1000E+01	41	1.3439E+01	9.4386E+00	-3.9889E+00
27	0.	5.0001E+00	2.2000E+01	68	2.2489E+01	1.5385E+01	1.9406E+00
28	0.	5.0000E+00	2.3000E+01	54	1.7796E+01	1.1799E+01	-1.5748E+00
29	0.	5.0000E+00	2.4000E+01	60	1.9807E+01	1.2561E+01	-8.1459E-01
30	0.	5.0000E+00	2.5000E+01	51	1.6791E+01	1.3744E+01	3.6080E-01

PACQ= 8.3333E-01 ,STDEV= 6.8041E-02
AVEES= 1.8614E+01 ,STDES= 2.2316E+00
AVEEV= 1.3324E+01 ,STDEV= 1.2947E+00
AVE KDATA= 5.6440E+01 ,STD DEV= 6.6578E+00
PR MISSED ACQ= 0.
PR FALSE ACQ= 1.6667E-01

ENODB= 9.0 ,DELF= 62.0 ,NIF= 1500 ,NL2= 294
SVRHZ= 2.2000E+03 SWMX= 2.5000E+03 SWMN= 6.8500E+03 FRQDP= 1.0000E+03 FQDPRT= 1.0800E+01
TL= -1.7000E+01 DYNR= 5.0000E+00SQAMP= 2.3000E-01 SDPHA= 4.7000E-01
WN= 277.2 ,K= 468.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03
PMFILT= 7.0003E-01
LOG NORMAL SCINTILLATION

NACQ	AMISS	AFAL	ACQ	KDATA	ES	EV	EV1
1	0.	1.0000E+00	0.	12	3.7188E+00	9.3874E-01	-1.2553E+01
2	0.	1.0000E+00	1.0000E+00	58	1.9137E+01	1.3038E+01	-2.0668E-01
3	0.	2.0000E+00	1.0000E+00	7	2.0429E+00	-9.8016E-01	-1.3965E+01
4	1.0000E+00	2.0000E+00	1.0000E+00	54	1.7815E+01	1.8810E+01	4.7637E+00
5	1.0000E+00	2.0000E+00	2.0000E+00	59	1.9472E+01	1.1132E+01	-2.4622E+00
6	1.0000E+00	2.0000E+00	3.0000E+00	51	1.6791E+01	1.2509E+01	-5.8674E-01
7	1.0000E+00	2.0000E+00	4.0000E+00	61	2.0143E+01	1.3095E+01	-5.2166E-01
8	1.0000E+00	2.0000E+00	5.0000E+00	51	1.6791E+01	1.3182E+01	-2.4181E-01
9	1.0000E+00	2.0000E+00	6.0000E+00	57	1.8802E+01	1.3660E+01	1.6559E-01
10	1.0000E+00	2.0000E+00	7.0000E+00	51	1.6791E+01	1.3722E+01	6.9340E-02
11	1.0000E+00	2.0000E+00	8.0000E+00	53	1.7461E+01	1.3091E+01	-3.7729E-01
12	1.0000E+00	2.0000E+00	9.0000E+00	59	1.9472E+01	1.5108E+01	1.5533E+00
13	1.0000E+00	2.0000E+00	1.0000E+01	57	1.8802E+01	1.3738E+01	4.5635E-01
14	1.0000E+00	2.0000E+00	1.1000E+01	55	1.8131E+01	1.3169E+01	-1.7185E-01
15	1.0000E+00	2.0000E+00	1.2000E+01	3	2.4165E+01	1.4203E+01	8.1451E-01
16	1.0000E+00	2.0000E+00	1.3000E+01	53	1.7461E+01	1.3618E+01	9.0269E-03
17	1.0000E+00	2.0000E+00	1.4000E+01	52	1.7126E+01	1.4812E+01	1.6675E+00
18	1.0000E+00	2.0000E+00	1.5000E+01	57	1.8802E+01	1.4356E+01	8.2266E-01
19	1.0000E+00	2.0000E+00	1.6000E+01	55	1.8131E+01	1.4663E+01	1.0965E+00
20	1.0000E+00	2.0000E+00	1.7000E+01	66	2.1818E+01	1.4587E+01	9.5143E-01
21	1.0000E+00	2.0000E+00	1.8000E+01	54	1.7796E+01	1.2500E+01	-9.4738E-01
22	1.0000E+00	2.0000E+00	1.9000E+01	66	2.1818E+01	1.4787E+01	1.4831E+00
23	1.0000E+00	2.0000E+00	2.0000E+01	57	1.8802E+01	1.3569E+01	1.0297E-01
24	1.0000E+00	2.0000E+00	2.1000E+01	51	1.6791E+01	1.3483E+01	-2.0832E-02
25	1.0000E+00	3.0000E+00	2.1000E+01	14	4.3892E+00	1.2514E+00	-1.2409E+01
26	1.0000E+00	3.0000E+00	2.2000E+01	76	2.5170E+01	1.4023E+01	5.2532E-01
27	1.0000E+00	3.0000E+00	2.3000E+01	48	1.5785E+01	1.3281E+01	-2.5610E-01
28	1.0000E+00	3.0000E+00	2.4000E+01	61	2.0143E+01	1.3444E+01	-4.0479E-02
29	1.0000E+00	3.0000E+00	2.5000E+01	46	1.5115E+01	1.4047E+01	5.1434E-01
30	1.0000E+00	3.0000E+00	2.6000E+01	60	1.9807E+01	1.2574E+01	-1.0540E+00

PACQ= 8.6667E-01 ,STDEV= 6.2063E-02
AVEES= 1.8866E+01 ,STDES= 2.3222E+00
AVEEV= 1.3592E+01 STDEV= 8.6566E-01
AVE KDATA= 5.7192E+01 ,STD DEV= 6.9283E+00
PR MISSED ACQ= 3.3333E-02
PR FALSE ACQ= 1.0000E-01

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ENODB=  10.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294
SVRHZ=  2.2000E+03 SHMX=  2.5000E+03 SHMN=  6.8500E+03 FRQDP=  1.0000E+03 FQDPRT=  1.0000E+01
TL= -1.7000E+01 DYNR=  6.0000E+00SDAMP=  2.3000E-01 SDPHA=  4.7000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03
PMFILT=  7.0000E-01
LOG NORMAL SCINTILLATION
  NACQ,AMISS          AFAL          ACQ          KDATA,ES          EV          EV1
     1   0.          1.0000E+00   0.            28  9.0817E+00  5.8100E+00 -8.1038E+00
     2   0.          1.0000E+00   1.0000E+00    56  1.8467E+01  1.3509E+01  7.4370E-02
     3   0.          1.0000E+00   2.0000E+00    56  1.8467E+01  1.4125E+01  7.3761E-01
     4   0.          1.0000E+00   3.0000E+00     3  1.7461E+01  1.3188E+01 -6.0130E-01
     5   0.          1.0000E+00   4.0000E+00    55  1.8131E+01  1.4364E+01  9.3593E-01
     6   0.          1.0000E+00   5.0000E+00    50  1.6456E+01  1.2043E+01 -1.3851E+00
     7   0.          1.0000E+00   6.0000E+00    64  2.1148E+01  1.4971E+01  1.5157E+00
     8   0.          1.0000E+00   7.0000E+00    50  1.6456E+01  1.3776E+01  3.4555E-01
     9   0.          2.0000E+00   7.0000E+00    24  7.7409E+00  4.0992E+00 -9.1641E+00
    10   0.          3.0000E+00   7.0000E+00    30  9.7520E+00  4.9708E+00 -8.4928E+00
    11   0.          3.0000E+00   8.0000E+00    55  1.8131E+01  1.5281E+01  1.7026E+00
    12   0.          4.0000E+00   8.0000E+00    44  1.4445E+01  7.2553E+00 -6.0786E+00
    13   0.          4.0000E+00   9.0000E+00    51  1.6791E+01  1.4770E+01  1.5471E+00
    14   0.          4.0000E+00   1.0000E+01    60  1.9807E+01  1.3622E+01  4.0629E-01
    15   0.          4.0000E+00   1.1000E+01    80  2.6511E+01  1.2083E+01 -1.9396E+00
    16   0.          4.0000E+00   1.2000E+01    57  1.8802E+01  1.3470E+01 -2.9358E-01
    17   0.          4.0000E+00   1.3000E+01    44  1.4445E+01  1.1030E+01 -2.6665E+00
    18   0.          4.0000E+00   1.4000E+01    51  1.6791E+01  1.2313E+01 -1.4146E+00
    19   0.          4.0000E+00   1.5000E+01    44  1.4445E+01  1.2606E+01 -6.8142E-01
    20   0.          4.0000E+00   1.6000E+01    63  2.0813E+01  1.4634E+01  1.1511E+00
    21   0.          4.0000E+00   1.7000E+01    55  1.8131E+01  1.3888E+01  2.8637E-01
    22   0.          4.0000E+00   1.8000E+01    66  2.1818E+01  1.4510E+01  9.0962E-01
    23   0.          4.0000E+00   1.9000E+01    61  2.0143E+01  1.4124E+01  4.5151E-01
    24   0.          4.0000E+00   2.0000E+01    55  1.8131E+01  1.2971E+01 -3.9421E-01
    25   0.          4.0000E+00   2.1000E+01    59  1.9472E+01  1.2708E+01 -8.3607E-01
    26   0.          4.0000E+00   2.2000E+01    62  2.0478E+01  1.4297E+01  8.2089E-01
    27   0.          4.0000E+00   2.3000E+01    55  1.8131E+01  1.2760E+01 -5.6692E-01
    28   0.          4.0000E+00   2.4000E+01    52  1.7126E+01  1.1025E+01 -2.3490E+00
    29   0.          4.0000E+00   2.5000E+01    54  1.7794E+01  1.3653E+01  2.1778E-01
    30   0.          4.0000E+00   2.6000E+01    58  1.9137E+01  1.1731E+01 -1.8280E+00
PACQ=  8.6667E-01 ,STDEV=  6.2063E-02
AVEES=  1.8596E+01 ,STDES=  2.3884E+00
AVEEV=  1.3364E+01 STDEV=  1.1509E+00
AVE KDATA=  5.6389E+01 ,STD DEV=  7.1257E+00
PR MISSED ACQ=  0.
PR FALSE ACQ=  1.3333E-01
```

```
ENOOB=    5.0 ,DELF=   62.C ,BIF=   150C ,BL2=    294
SVRHZ=   2.2000E+03 SHMX=   2.5000E+03 SHMN=   6.8500E+03 FRQOP=   1.0000E+03 FOOPRT=   1.0000E+01
TL= -2.1000E+01 DYNR=   6.0000E+00SOAMP=   2.3000E-01 SOPHA=   4.7000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03
PMFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
  NACC,AMISS          AFAL          ACO          KDATA,ES          EV          EV1
     1  1.0000E+00   0.            0.            77  2.5577E+01   1.8474E+01   4.7951E+00
     2  2.0000E+00   0.            0.            74  2.4530E+01   1.8504E+01   4.8471E+00
     3  2.0000E+00   0.            1.0000E+00    66  2.1818E+01   1.3970E+01   5.2565E-01
     4  3.0000E+00   0.            1.0000E+00    64  2.1269E+01   1.8732E+01   4.7076E+00
     5  4.0000E+00   0.            1.0000E+00    68  2.2583E+01   1.8614E+01   4.8915E+00
     6  4.0000E+00   0.            2.0000E+00    77  2.5505E+01   1.2695E+01  -7.6638E-01
     7  5.0000E+00   0.            2.0000E+00    64  2.1280E+01   1.8531E+01   4.7233E+00
     8  5.0000E+00   0.            3.0000E+00    60  1.9807E+01   1.3186E+01  -3.2220E-01
     9  6.0000E+00   0.            4.0000E+00    54  1.7796E+01   1.2557E+01  -1.1[illegible]E+00
    10  6.0000E+00   0.            4.0000E+00    71  2.3742E+01   1.8457E+01   4.7[illegible]E+00
    11  7.0000E+00   0.            4.0000E+00    73  2.4356E+01   1.8529E+01   4.8480E+00
    12  8.0000E+00   0.            4.0000E+00    72  2.3898E+01   1.8464E+01   4.8524E+00
    13  9.0000E+00   0.            4.0000E+00    88  2.9477E+01   1.8520E+01   4.7855E+00
    14  1.0000E+01   0.            4.0000E+00    84  2.7882E+01   1.8636E+01   4.8611E+00
    15  1.1000E+01   0.            4.0000E+00    61  2.0114E+01   1.8486E+01   4.8991E+00
    16  1.1000E+01   0.            5.0000E+00    46  1.5115E+01   1.3029E+01  -4.7058E-01
    17  1.2000E+01   0.            5.0000E+00    69  2.3075E+01   1.8453E+01   4.2151E+00
    18  1.3000E+01   0.            5.0000E+00    70  2.3129E+01   1.8609E+01   4.9054E+00
    19  1.3000E+01   0.            6.0000E+00    67  2.2154E+01   1.3512E+01   1.0998E-01
    20  1.4000E+01   0.            6.0000E+00    75  2.4961E+01   1.8463E+01   4.6779E+00
    21  1.5000E+01   0.            6.0000E+00    69  2.3946E+01   1.8616E+01   4.8808E+00
    22  1.5000E+01   0.            6.0000E+00    82  2.7334E+01   1.8553E+01   4.8658E+00
    23  1.7000E+01   0.            6.0000E+00    77  2.5561E+01   1.8512E+01   4.8675E+00
    24  1.8000E+01   0.            6.0000E+00    78  2.5854E+01   1.8615E+01   4.8084E+00
    25  1.8000E+01   0.            7.0000E+00    62  2.0478E+01   1.4442E+01   8.3551E-01
    26  1.8000E+01   0.            8.0000E+00    56  1.8467E+01   1.2943E+01  -4.E413E-01
    27  1.9000E+01   0.            8.0000E+00    87  2.9120E+01   1.8496E+01   4.8802E+00
    28  2.0000E+01   0.            8.0000E+00    75  2.5108E+01   1.8496E+01   4.8671E+00
    29  2.1000E+01   0.            8.0000E+00    75  2.5046E+01   1.8496E+01   4.9002E+00
    30  2.2000E+01   0.            8.0000E+00    74  2.4545E+01   1.8475E+01   4.7349E+00
PACQ=   2.6667E-01 ,STDEV=   8.0737E-02
AVEES=   2.0143E+01 ,STDES=   2.9459E+00
AVEEV=   1.3292E+01 STDEV=   6.0510E-01
AVE KDATA=   6.1000E+01 ,STD DEV=   8.7892E+00
PR MISSED ACQ=   7.3333E-01
PR FALSE ACQ=   0.
```

ENOOB= 9.0 ,DELF= 62.0 ,BIF= 1500 ,BL2= 294
SVRHZ= 2.2000E+03 SHMX= 2.5000E+03 SHMN= 6.6500E+03 FRODP= 1.0000E+03 FODPRT= 1.0800E+01
TL= -2.1000E+01 DYNR= 6.0000E+00SOAMP= 2.3200E-01 SOPHA= 4.7000E-01
WN= 277.2 ,K= 469.6 ,TAU1= 1.6127E-01 ,TAU2= 5.0213E-03
PMFILT= 7.0000E-01
LOG NORMAL SCINTILLATION

NACQ	AMISS	AFAL	ACQ	KDATA	ES	EV	EV1
1	0.	0.	1.0000E+00	80	2.6511E+01	1.2104E+01	-1.1529E+00
2	0.	0.	2.0000E+00	61	2.3143E+01	1.2125E+01	-1.4317E+00
3	0.	0.	3.0000E+00	62	2.0478E+01	1.4278E+01	9.0733E-01
4	0.	0.	4.0000E+00	54	1.7796E+01	1.3752E+01	3.4519E-01
5	0.	0.	5.0000E+00	58	1.9137E+01	1.3111E+01	-2.7230E-01
6	0.	0.	6.0000E+00	60	1.9807E+01	1.4275E+01	8.0948E-01
7	0.	0.	7.0000E+00	57	1.8802E+01	1.2803E+01	-7.1003E-01
8	1.0000E+00	0.	7.0000E+00	56	1.8762E+01	1.8488E+01	4.8677E+00
9	1.0000E+00	0.	8.0000E+00	55	1.8131E+01	1.4309E+01	7.8286E-01
10	1.0000E+00	0.	9.0000E+00	54	1.7796E+01	1.5367E+01	1.8712E+00
11	1.0000E+00	0.	1.0000E+01	58	1.9137E+01	1.5549E+01	2.1567E+00
12	1.0000E+00	0.	1.1000E+01	56	1.8467E+01	1.4968E+01	1.3444E+00
13	1.0000E+00	0.	1.2000E+01	66	1.8467E+01	1.5936E+01	2.5191E+00
14	1.0000E+00	0.	1.3000E+01	62	1.7126E+01	1.3272E+01	-1.3085E-01
15	1.0000E+00	0.	1.4000E+01	79	2.6176E+01	1.3039E+01	-5.1275E-01
16	1.0000E+00	0.	1.5000E+01	49	1.6120E+01	1.4591E+01	7.2238E-01
17	1.0000E+00	0.	1.6000E+01	70	2.3159E+01	1.4003E+01	4.2891E-01
18	1.0000E+00	0.	1.7000E+01	58	1.9472E+01	1.4245E+01	1.0161E+00
19	1.0000E+00	0.	1.8000E+01	60	2.1818E+01	1.4202E+01	6.9483E-01
20	1.0000E+00	0.	1.9000E+01	62	2.0478E+01	1.4154E+01	5.0358E-01
21	1.0000E+00	0.	2.0000E+01	65	2.1483E+01	1.3402E+01	1.9431E-01
22	2.0000E+00	0.	2.0000E+01	72	2.3893E+01	1.8694E+01	4.8832E+00
23	2.0000E+00	0.	2.1000E+01	56	1.8467E+01	1.4660E+01	9.9912E-01
24	3.0000E+00	0.	2.1000E+01	81	2.7054E+01	1.8525E+01	4.8996E+00
25	3.0000E+00	0.	2.2000E+01	66	2.1818E+01	1.3206E+01	-3.1517E-01
26	3.0000E+00	0.	2.3000E+01	56	1.8467E+01	1.3913E+01	3.3463E-01
27	3.0000E+00	0.	2.4000E+01	64	2.1148E+01	1.3993E+01	6.5420E-01
28	3.0000E+00	0.	2.5000E+01	55	1.8131E+01	1.3983E+01	2.2363E-01
29	3.0000E+00	0.	2.6000E+01	55	1.8131E+01	1.3185E+01	-3.6835E-01
30	3.0000E+00	0.	2.7000E+01	52	1.7126E+01	1.2794E+01	-7.2159E-01

PACQ= 9.0000E-01 ,STDEV= 5.4772E-02
AVEES= 1.9770E+01 ,STDES= 2.4653E+00
AVEEV= 1.3897E+01 STDEV= 9.3855E-01
AVE KDATA= 5.9889E+01 ,STD DEV= 7.3552E+00
PR MISSED ACQ= 1.0000E-01
PR FALSE ACQ= 0.

APPENDIX IX
SCINTILLATION MODEL PRINTOUTS

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    0.          FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    4.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    7.5397E-02 STDEV=    5.8804E-03 BITS=    2016
XISUM=    3.8426E-01 XISIG=    2.2017E-01
LOCKIN=     15 ,DROPOUTS=     12 ,AVE=   3.0000E+00 ,STD DEV=   2.9439E+00
ERRM
  5.0000E+01   8.0000E+00   8.0000E+00   2.0000E+00   1.0000E+00   7.0000E+00   4.0000E+00   3.0000E+00   3.0000E+00   4.0000E+00
  3.0000E+00   2.0000E+00   2.0000E+00   0.           4.0000E+00   2.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   1.0000E+00
  4.0000E+00   1.0000E+00   1.0000E+00   3.0000E+00   0.           1.0000E+00   1.0000E+00   1.0000E+00   1.0000E+00   2.0000E+00
  1.0000E+00   0.           1.0000E+00   1.0000E+00   0.           1.0000E+00   1.0000E+00   2.0000E+00   1.0000E+00   0.
  1.0000E+00   0.           0.           1.0000E+00   0.           2.0000E+00   1.0000E+00   0.           2.0000E+00   0.
  0.           0.           0.           0.           0.           1.0000E+00   0.           0.           0.           1.0000E+00
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
  0.           0.           0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    12    19    33    15     5     0     1     1          6     0     1     1     0     0     0     0
    20    34    34    13     4     0     3     0          3     1     1     0     0     1     0     0
    46    45    42    14     3     0     1     1          2     6     1     0     1     0     0     0
    29    25    21    10     3     2     1     1          4     5     4     6     0     0     0     1
    11     5     6     2     1     1     0     0          8    15    28    21     2     0     0     1
     0     2     0     1     0     0     0     0         12    52    46    26     4     1     0     1
     0     0     0     0     0     0     0    11         34    51    43    25     5     2     1     5
QUADRENT SUMS...HARD DECISIONS                                                    14    23    24    11    11
   412    26                                                                      41     2
    27    15                                                                    433    36
+1-1 P(R1.R2/T1.T2)TIMES   512                                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     2     1     2     2    26    36    39     7          6     1     0     0     0     0     0     0
     1     0     2    10    46    63    44    10          0     0     0     1     0     0     0     0
     0     0     3     7    44    40    32     6          0     0     1     1     1     3     7     1
     2     1     1     7    16    15     9     2          2     0     0     1     2     7    26    25
     0     1     0     1     0     6     5     2          0     0     0     2     2    11    52    47
     1     0     0     1     0     2     2     1          0     0     0     2     2    19    43    36    35
     1     0     1     0     0     2     2     0          0     2     2     2     5    24    21    15
     0     0     0     0     0     2     2     0          0
QUADRENT SUMS...HARD DECISIONS                                                    15    15
    41   434                                                                     12   470
     5    32
  1794   221   124  1761
     9    10    13    14
  1239    82  1896   228

252 BIT ERROR INTERVALS
  1.2000E+01  1.7000E+01  1.5000E+01  1.5000E+01  1.4000E+01  4.6000E+01  1.3000E+01  2.0000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E-01 SOPHA=   4.7000E-01 FBPHA=   1.0000E+00
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.3028E+00 FBTAU6=   1.5010E+00
PEI=   8.3829E-02 STDEV=   6.1722E-03 BITS=   2016
XISUM=   3.7526E-01 XISIG=   2.1796E-01
LOCKIN=    31 ,DROPOUTS=    34 ,AVE=  4.2941E+00 ,STD DEV=  4.0622E+00
ERRM
  6.9000E+01  1.2000E+01  1.0000E+01  1.0000E+01  7.0000E+00  4.0000E+00  4.0000E+00  3.0000E+00  3.0000E+00  5.0000E+00
  3.0000E+00  2.0000E+00  1.0000E+00  0.          2.0000E+00  3.0000E+00  1.0000E+00  4.0000E+00  0.          2.0000E+00
  0.          1.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  2.0000E+00  0.          0.          0.
  1.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          3.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
    11     19     16     12      3      1      1      1          5      2      1      1      0      1      0      0
    25     49     43     17      3      1      0      1          2      2      0      1      0      1      0      1
    32     53     38     13      5      0      1      1          1      2      3      4      0      0      0      1
    25     27     20      7      4      1      1      0          2      2      9      8      2      2      0      0
     5      5      5      6      1      0      1      0          6     27     22     13      5      3      1      0
     2      2      1      0      1      2      1      3         12     62     59     24      4      0      1      0
     0      0      0      1      1      0      0      2         23     52     52     19      2      3      1      1
     1      0      0      0      0      0      1      8         14     13     17     13      5      0      1      4
QUADRENT SUMS...HARD DECISIONS
     407         24                                            45          8
      28         21                                           428         31
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
      4      1      0      6     17     37     26     11          3      0      1      0      0      0      0      1
      4      2      1      6     42     80     42      5          1      1      0      0      0      0      0      0
      3      1      2     11     44     58     19      5          1      0      1      0      2      1      0      1
      1      1      3      9     18     12      9      1          0      2      1      3      0      4      6      3
      0      0      0      1      5      3      4      0          0      1      1      2      2     22     36     26
      0      0      1      1      0      1      0      0          1      0      2      1     14     44     82     35
      0      0      1      1      0      1      2      1          1      0      1      1     13     53     45     25
      0      0      0      0      0      4      3      6          0      0      2      2     10     21     19     18
QUADRENT SUMS...HARD DECISIONS
     51         426                                           14         18
      5          30                                           15        465
  1770    290    310    294
  1199     74    993    682
  1239     82    975    412

252 BIT ERROR INTERVALS
  1.5000E+01  3.9000E+01  1.9000E+01  3.4000E+01  2.7000E+01  1.1000E+01  6.0000E+00  1.8000E+01  0.          0.
```

```
EN0DB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    5.0000E-01 SDPHA=    4.7000E-01 FBPHA=    1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    8.9286E-02 STDEV=    6.3509E-03 BITS=    2016
XISUM=    3.8216E-01 XISIG=    2.1829E-01
LOCKIN=     23 ,DROPOUTS=     37 ,AVE=   2.9730E+00 ,STD DEV=   2.9545E+00
ERRM
  8.3000E+01  1.6000E+01  6.0000E+00  4.0000E+00  6.0000E+00  6.0000E+00  4.0000E+00  5.0000E+00  1.0000E+00  4.0000E+00
  5.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00  0.          0.          2.0000E+00  2.0000E+00
  0.          1.0000E+00  3.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00
  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  2.0000E+00  0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    12     15     23      8      4      2      3      3           5      0      2      1      1      2      0      0
    18     50     40     12      2      0      1      0           1      3      1      0      2      0      0      0
    39     53     48     16      4      1      1      0           1      1      1      2      1      1      2      3
    22     23     17      8      1      0      0      0           2      3      6      1      1      0      0      0
     6      6      8      3      1      4      1      1           7     10     31      9      1      0      0      4
     2      1      0      2      1      1      0      4          19     66     62     34      7      0      1      1
     0      0      1      0      0      0      0      4          30     45     49     10      7      0      0      2
     0      0      0      1      1      1      2      3           9     24     18      8      7      3      0      5
QUADRENT SUMS...HARD DECISIONS
    404     22                                                  30     13
     30     24                                                 431     38
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     3      4      2      5     18     35     30      6           1      1      0      0      0      0      0      0
     2      1      1      2     41     89     34      7           2      0      1      1      2      0      1      0
     2      1      0     11     40     58     20     13           0      1      2      0      1      0      1      1
     1      0      1      2     13     17      7      3           0      1      2      1      1      9      4      7
     0      1      1      0      3      1      3      2           0      0      2      3      5     19     47     25
     0      0      1      0      1      1      1      0           0      1      1      2     12     50     62     35
     0      0      0      1      0      0      2      3           1      0      1      5     17     50     40     23
     0      1      0      1      1      2      7     10           1      2      3      4      8     22     21     18
QUADRENT SUMS...HARD DECISIONS
     38    431                                                  13     27
      6     37                                                  26    446
  1088   1856    148    836
  1199     74    276   1421
  1239     82    707    916

252 BIT ERROR INTERVALS
  2.9000E+01  3.5000E+01  2.6000E+01  2.8000E+01  1.0000E+01  1.9000E+01  1.2000E+01  2.1000E+01  0.          0.
```

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BI2=    294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   1.0000E+00 SOPHA=   4.7000E-01 FBPHA=   1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   8.1845E-02 STDEV=   6.1053E-03 BITS=   2016
XISUM=   3.7560E-01 XISIG=   2.2079E-01
LOCKIN=    16 ,DROPOUTS=    32 ,AVE=  3.9063E+00 ,STD DEV=  4.2819E+00
ERRH
  7.0000E+01  1.3000E+01  6.0000E+00  3.0000E+00  6.0000E+00  3.0000E+00  9.0000E+00  4.0000E+00  1.0000E+00  6.0000E+00
  0.          3.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          0.
  1.0900E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          0.          2.0000E+00  2.0000E+00
  0.          0.          0.          3.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          2.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480
    15    19    19    13     2     2     3     1
    28    46    35    11     3     2     1     1
    36    50    39    17     3     0     1     1
    28    30    24     7     2     1     0     1
    14     2     5     1     1     1     0     0
     1     0     0     0     1     0     0     1
     0     0     0     0     0     0     0     9
QUADRENT SUMS...HARD DECISIONS
     4   17    20
        26    17

+1-1 P(R1.R2/T1.T2)TIMES   513
     0     0     5     5    27    40    27     7
     0     2     3    10    38    84    42     5
     0     2     3    10    37    59    19     2
     1     3     1     5    11    13     8     2
     1     0     0     1     2     5     2     2
     1     0     1     1     0     0     1     1
     0     1     0     0     0     1     0     5
     1     0     0     1     0     2     3     9
     0     0     1     0     1     0     0     0
QUADRENT SUMS...HARD DECISIONS
    50   421
     7    35
  1229     9   274  1549
  1199    74   592  1925
  1239    82  1428   909

252 BIT ERROR INTERVALS
  4.1000E+01  1.2000E+01  1.0000E+01  1.6000E+01  1.5000E+01  2.6000E+01  1.7000E+01  2.0000E+01  0.          0.

-1+1 P(R1.R2/T1.T2)TIMES   511
     1     2     0     0     0     0     0     0
     0     4     1     0     0     2     0     0
     4     1     0     2     2     0     1     1
     4     7     4     6     2     1     1     2
     8    23    25    16     2     1     1     2
    17    59    70    30     7     1     0     2
    18    45    38    19     4     0     2     7
    11    26    15    12     5     0     2     7
    32    12
   432    35
+1+1 P(R1.R2/T1.T2)TIMES   512
     0     0     0     1     0     0     0     1
     0     0     2     0     1     0     0     2
     0     1     1     3     1     0     5     6
     1     0     1     1     0     1     6    29    26    25
     1     0     0     1     1     2    19    67    66    35
     1     0     0     0     2     2    12    59    41    21
     0     0     3     0    12    15    14    17
    12    24
    12   464
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1900 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SOAMP=   2.3000E-01 FBAMP=   2.0000E+00 SOPHA=   4.7000E-01 FBPHA=   1.0000E+00
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.0933E-02 STDEV=   5.7174E-03 BITS=   2016
XISUM=   3.7699E-01 XISIG=   2.0688E-01
LOCKIN=    15 ,DROPOUTS=    26 ,AVE=  3.1923E+00 ,STD DEV=  3.4420E+00
ERRH
  5.2000E+01  8.0000E+00  9.0000E+00  3.0000E+00  6.0000E+00  4.0000E+00  0.          4.0000E+00  3.0000E+00  5.0000E+00
  2.0000E+00  2.0000E+00  1.0000E+00  4.0000E+00  4.0000E+00  4.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00
  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.
  0.          1.0000E+00  1.0000E+00  2.0000E+00  0.          0.          0.          2.0000E+00  0.          0.
  2.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.          3.0000E+00  1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    11    24    25    14     5     1     1     0          4     1     1     0     0     0     0     0
    24    43    34    16     2     0     0     0          4     1     3     1     0     1     0     1
    48    52    38    17     2     1     1     0          1     1     2     1     1     0     0     1
    22    29    23     7     0     2     1     1          3     3     7     9     0     0     0     2
     6     1     9     1     0     0     0     0         12    17    27    14     1     4     0     1
     0     2     0     2     0     0     0     3         15    63    55    24     6     2     0     2
     0     0     1     0     1     0     0     2         18    54    37    23     4     4     0     0
     0     0     0     0     0     2     1     5         13    26    20    10     4     0     4     4
QUADRENT SUMS...HARD DECISIONS
   427    17                                              42     6
    22    14                                             428    36
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     1     2     4     3    14    36    25    15          1     1     0     0     0     0     0     1
     0     1     1     6    43    95    44     8          0     1     0     0     1     0     0     1
     1     1     1    12    36    51    17     4          0     0     0     1     0     0     0     0
     2     2     0     3    13    16    12     4          0     2     0     0     0     1     7     5
     0     0     0     2     1     4     1     1          0     0     0     0     1    26    32    17
     2     1     0     1     1     2     2     1          1     0     0     4    18    52    89    36
     0     0     0     0     0     2     1     1          0     1     1     4    14    62    46    26
     0     0     0     0     0     2     3     9          1     2     1     2    11    17    15    11
QUADRENT SUMS...HARD DECISIONS
    40   435                                              7    15
     6    31                                             17   473
   397  1891  1322   359
  1199    74  1178   507
  1239    82  1979  1420

252 BIT ERROR INTERVALS
  1.8000E+01  1.3000E+01  2.0000E+01  1.7000E+01  8.0000E+00  1.8000E+01  2.8000E+01  2.1000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   4.0600E+00 SDPHA=   4.7000E-01 FBPHA=   1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   1.0417E-01 STDEV=   6.8035E-03 BITS=   2016
XISUM=   4.0361E-01 XISIG=   2.8194E-01
LOCKIN=    11 ,DROPOUTS=    25 ,AVE=  2.5600E+00 ,STD DEV=  3.6009E+00
ERRH
  1.0900E+02  1.3000E+01  9.0000E+00  1.1000E+01  9.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00  4.0000E+00  0.
  1.8000E+00  2.0000E+00  2.0000E+00  0.          3.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  4.0000E+00
  1.0000E+00  3.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  2.0000E+00
  0.          1.0000E+00  2.0000E+00  2.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.          1.0000E+00
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
    17    18    26    13     3     3     1     2          7     1     1     0     0     0     1     1
    21    57    25     9     6     0     1     0          2     2     1     1     1     1     0     0
    46    41    50    14     2     1     1     0          1     3     0     3     0     0     0     2
    21    19    17     9     3     1     1     1         11     7     5     5     2     2     0     1
     5     6     4     2     1     0     0     0          7    17    31    14     4     4     0     3     0
     0     1     1     0     0     2     1     1         23    47    62    15     5     1     0     1
     0     0     0     1     1     1     1     1         24    53    44    22     5     2     0     1
     0     0     0     0     0     0     2    21          8    21    21    10     2     0     0     8
QUADRENT SUMS...HARD DECISIONS
   403    25                                             50    11
    20    32                                            419    32
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     5     3     4     9    14    37    27    11          6     1     1     0     0     0     0     0
     0     2     1    11    36    79    41     5          1     2     1     0     1     0     1     3
     2     1     2     9    39    50    27     3          2     2     0     0     0     0     1     2
     0     0     1     1    14    16     7     7          0     1     0     3     4     4     3     9
     0     1     2     3     2     5     2     1          0     2     1     7     5    17    37    20
     0     0     0     1     0     3     2     2          1     0     0     3    13    44    63    31
     0     0     1     2     0     1     1     2          0     1     0     2    25    33    49    29
     0     0     0     0     0     3     3    11          2     1     3     6    12    17    26    14
QUADRENT SUMS...HARD DECISIONS
    51   413                                             20    28
    10    38                                             29   435
   665  1978  1675  1982
  1199    74  1906   717
  1239    82  1057  1673

252 BIT ERROR INTERVALS
  2.3000E+01  1.7000E+01  2.1000E+01  1.3000E+01  3.3000E+01  1.4000E+01  4.5000E+01  4.4000E+01  0.          0.
```

```
ENODB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SOAMP=   1.1500E-01 FBAMP=   2.0000E+00 SOPHA=   4.7000E-01 FBPHA=   1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   5.7540E-02 STOEV=   5.1864E-03 BITS=   2016
XISUM=   3.8441E-01 XISIG=   2.1316E-01
LOCKIN=    11 ,DROPOUTS=    21 ,AVE=  1.9524E+00 ,STD DEV=  1.3265E+00
ERRH
  4.2000E+01  7.0000E+00  7.0000E+00  3.0000E+00  6.0000E+00  1.0000E+00  4.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00
  1.0000E+00  2.0000E+00  4.0000E+00  0.          1.0000E+00  0.          0.          0.          2.0000E+00  2.0000E+00
  0.          2.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  0.          0.          2.0000E+00  0.
  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.
  1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.
  0.          0.          2.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          4.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    11     15     27      8      2      2      1      1          4      0      0      0      0      0      0      0
    26     59     25     22      5      0      0      0          2      0      0      1      0      1      0      0
    44     63     52     15      0      0      0      0          2      0      3      0      0      0      0      0
    28     20     26      7      0      0      0      0          1      2      4      2      0      1      1      1
     5      6      4      1      0      0      0      1         11     16     26     12      2      1      1      0
     0      0      0      1      0      0      0      1         22     52     70     21      7      1      0      1
     1      0      2      0      0      0      0      1         32     45     57     21      4      1      0      1
     0      0      0      0      0      0      1      7         16     33     19      8      3      1      1      2
QUADRENT SUMS...HARD DECISIONS                                      21      4
      440     11                                                   461     26
       18     11                                                  +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                      0      0      1      0      1      0      1
        1      2      3     10     15     52     36     11          1      0      1      0      0      1      0      1
        1      0      1      5     27     95     35     10          0      0      0      2      0      1      4      4
        0      1      2      7     33     64     27      5          0      2      1      1      4      2      6     10
        0      0      0      2     18     15      9      2          1      0      2      0      5     15     33     22
        1      0      0      2      2      0      1      0          0      0      0      3     15     49     80     38
        1      0      1      0      0      0      3      1          1      1      0      4     14     40     42     30
        0      0      0      0      0      1      0      2          0      1      0      2     12     25     17     22
        0      0      1      0      1      1      1      4
QUADRENT SUMS...HARD DECISIONS
       35     454                                                    8      30
        6      17                                                   15     459
   2010    691     74  -1207
   1199     74    446    372
   1239     82   1057   1673

252 BIT ERROR INTERVALS
  1.5000E+01  1.5000E+01  1.7000E+01  9.0000E+00  1.0000E+01  3.0000E+00  2.4000E+01  2.3000E+01  0.          0.
```

```
ENODB=    7.0  ,DELF=   62.0  ,BIF=   1500  ,BL2=    294  ,ASOFT= .3700
FOOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SOAMP=    1.6260E-01 F9AMP=    2.0000E+00 SOPHA=    4.7000E-01 F8PHA=    1.0000E+00
WN= 277.2  ,K= 468.6  ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9  ,KB= 614.9  ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PMFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    7.7381E-02 STDEV=    5.9509E-03 BITS=    2016
XISUM=    3.9709E-01 XI_IG=    2.6724E-01
LOCKIN=     11  ,DROPCUTS=     30  ,AVE=   2.5333E+00  ,STD DEV=   3.0521E+00
ERRH
  7.6000E+01  1.0000E+01  7.0000E+00  3.0000E+00  4.0000E+00  4.0000E+00  5.0000E+00  5.0000E+00  0.          0.
  0.          3.0000E+00  2.0000E+00  1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          3.0000E+00  2.0000E+00
  0.          4.0000E+00  0.          0.          2.0000E+00  1.0000E+00  0.          0.          2.0000E+00  0.
  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          1.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          2.0000E+00
  0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    11     9    28    11     2     2     2     1          5     1     0     0     0     0     0     1
    22    61    32    11     6     8     0     0          0     2     1     0     1     0     1     0
    44    60    55    15     1     0     0     0          2     6     1     1     1     0     1     1
    13    18    27     6     1     0     0     1          5     7     6     5     0     0     1     1
     5     5     4     0     1     0     0     2          5    21    31    12     4     0     1     3
     1     0     0     0     1     0     0     0         23    62    54    21     4     0     1     1
     0     0     0     0     0     0     1     1         28    45    59    21     3     1     0     5
     1     0     0     0     0     0     1    18         14    25    13     8     5     0     0     5
QUADRENT SUMS...HARD DECISIONS                                    36     7
   423    16                                                    442    27
    16    25                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                      0     0     1     0     0     0
     4     5     0     5    15    43    30    11          6     0     2     2     0     1     0     0
     0     1     0     9    32    96    35    11          0     0     2     0     0     1     0     1
     3     0     1    10    35    59    27     4          0     0     1     4     3     3     6     6
     1     1     1     3    15    14     9     2          0     0     0     2     4    13    40    23
     1     1     0     2     4     3     0     1          1     0     0     4    16    47    67    39
     0     0     0     1     0     0     1     3          0     1     0     3    22    38    47    24
     0     0     1     1     0     1     3     9          2     1     2     1    13    20    26    19
QUADRENT SUMS...HARD DECISIONS                                    16    21
    40   438                                                     17   458
     8    26
  1285  1076  1430    56
  1199    74   446   372
  1239    82  1057  1673

252 BIT ERROR INTERVALS
  1.5000E+01  1.0000E+01  1.8000E+01  1.6000E+01  1.2000E+01  5.0000E+00  2.6000E+01  5.1000E+01  0.          0.
```

```
ENDDB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=    1.0800E+01 TL=    -6.5000E+00 DYNR=    6.0000E+00
SOAMP=    3.2533E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    1.1260E-01 STDEV=    7.0402E-03 BITS=    2016
XISUM=    3.8898E-01 XISIG=    2.4252E-01
LOCKIN=     15 ,DPOPOUTS=     35 ,AVE=   4.0286E+00 ,STD DEV=   4.6074E+00
ERRM
  1.3900E+02  3.0000E+01  1.2000E+01  7.0000E+00  9.0000E+00  2.0000E+00  6.0000E+00  3.0000E+00  1.0000E+00  5.0000E+00
  1.0000E+00  2.0000E+00  0.          6.0000E+00  1.0000E+00  1.0000E+00  0.          3.0000E+00  2.0000E+00  0.
  2.0000E+00  1.0000E+00  0.          4.0000E+00  0.          1.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          2.0000E+00  0.          0.
  1.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.
  1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          3.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES    480
    12    21    23    11     3     2     0     8     2     4     0     0     1     0     0
    31    53    30    14     3     0     0     2     2     1     0     0     2     0     1
    37    58    37    10     4     1     1     2     2     2     0     0     1     1     5
    16    16    19    13     2     0     1     8     8     7     3     0     1     0     1
     6     2    12     2     2     0     1    10    19    21    15     3     0     4     2
     0     1     1     1     1     0     1    12    61    58    18     6     1     1     4
     0     0     1     1     1     0     0    20    51    41    12     5     2     0     1
     0     1     0     1     4     1     3    13     9    19    12     8     6     2     1     9
QUADRENT SUMS...HARC DECISIONS
   401    20                                                 64    15
    29    30                                                386    47

-1+1 P(R1.R2/T1.T2)TIMES    512
+1-1 P(R1.R2/T1.T2)TIMES    512
     9     3     6     6    13    31    22    10     3     1     0     0     1     0     0     1
     1     1     4     9    31    93    40     8     0     1     0     0     1     0     0     0
     4     3     2     8    32    47    23     3     1     0     3     2     1     2     0     0
     1     0     2     6    12    15    12     3     0     0     1     1     6     7     4     1
     0     0     0     1     4     6     3     3     0     1     1     2     5    22    21    15
     0     0     1     1     3     0     2     3     2     0     3     9    12    57    80    31
     0     0     1     0     1     1     2     5     0     0     2     7     9    50    47    28
     0     0     0     1     1     4     4     7     1     1     0     4    10    20    16    20
QUADRENT SUMS...HARC DECISIONS
    64   395                                                 13    23
     5    48                                                33   443
  1447  1634   835  1638
  1199    74  1178   507
  1239    82  1979  1420

+1+1 P(R1.R2/T1.T2)TIMES    512

252 EIT ERROR INTERVALS
  2.3000E+01  1.5000E+01  3.2000E+01  2.8000E+01  2.0000E+01  2.8000E+01  4.5000E+01  3.9000E+01  0.          0.
```

```
ENDDB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    4.6900E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    1.0000E+00
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,HN0=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    1.5327E-01 STDEV=    8.0234E-03 BITS=    2016
XISUM=    4.1225E-01 XISIG=    2.8140E-01
LOCKIN=     15 ,DROPOUTS=     33 ,AVE=   5.2121E+00 ,STD DEV=   6.4609E+00
ERRM
  1.7300E+02  3.5000E+01  1.9000E+01  1.5000E+01  5.0000E+00  4.0000E+00  4.0000E+00  5.0000E+00  2.0000E+00  4.0000E+00
  0.          3.0000E+00  2.0000E+00  4.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  2.0000E+00  0.
  2.0000E+00  0.          3.0000E+00  2.0000E+00  0.          0.          0.          0.          1.0000E+00  1.0000E+00
  2.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.
  1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          1.0000E+00  1.0000E+00
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    30    21    15    12     5     3     1     0          15     3     2     2     1     0     1     2
    20    46    32    11     4     0     1     0           5     1     2     1     1     1     0     1
    28    52    39    16     6     1     1     0           5     1     6     1     2     1     1     1
    16    18    20     6     5     0     0     2          10     4    11     5     4     3     1     2
     4     3     7     1     2     3     0     5          13    15    27    12     5     0     2     0
     1     2     4     2     2     1     1     5          17    56    47    23     4     1     0     3
     0     0     1     0     2     2     0     1          13    46    36    12     7     2     1     3
     0     0     0     0     0     3     2    15           6    17    11     7     5     3     4    16
QUADRENT SUMS...HARD DECISIONS
   382    29                                               74    22
     2E   44                                              358    58
+1-1 P(R1.R2/T1.T2)TIMES   512                            +1+1 P(R1.R2/T1.T2)TIMES   512
    13     5     5     9    16    22    18     8          13     1     1     1     0     1     0     0
     4     4     2     7    37    77    34     6           4     1     2     1     1     2     0     0
     3     3     2     5    34    45    23     2           1     3     0     3     0     3     0     1
     0     1     2     5     4    17    12     3           0     3     1     3     5     6     2     2
     1     0     3     4     8     4     7     3           0     1     1     5     5    29    20     8
     0     0     0     0     4     0     2     2           2     0     2     3    12    50    73    25
     0     0     0     1     0     1     1     7           1     0     4    11     9    47    42    22
     0     0     1     0     2     3     4    26           1     0     3     4     8    14    17    33
QUADRENT SUMS...HARD DECISIONS
    70   358                                               38    22
    10    74                                               38   414
   747  1504  1255   484
  1199    74  1178   507
  1239    82  1979  1420

252 EIT ERROR INTERVALS
  2.9000E+01  2.6000E+01  4.4000E+01  3.5000E+01  2.9000E+01  3.3000E+01  6.9000E+01  4.4000E+01  0.          0.
```

```
ENGDB=   7.0 ,DELF=  62.0 ,BTF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
  4077  2.3146E+02  3.7102E+03   409 -1.4252E+01  3.5985E+02
PET=  6.8948E-02 STDEV=  5.6429E-03 BITS=   2016
XISUM=   3.6678E-01 XISIG=   1.9666E-01
LOCKIN=    15 ,DROPOUTS=    14 ,AVE=  2.6429E+00 ,STD DEV=  2.6351E+00
ERRM
 5.2000E+01  1.0000E+01  6.0000E+00  2.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  4.0000E+00  3.0000E+00
 4.3000E+00  3.0000E+00  0.          2.0000E+00  1.          2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.
 4.0000E+00  2.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00
 1.0000E+00  0.          0.          0.          2.0000E+00  0.          1.0000E+00  0.          0.          0.
 0.          1.0000E+00  0.          2.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.
 1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
 0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.
 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
 0.          2.0000E+00  0.          1.0000E+00  0.          0.          0.          0.          0.          0.
 0.          0.          0.          0.          1.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
    10    17    18    17     5     0     1     1          6     2     0     0     1     0     0     0
    17    53    39    20     4     0     2     0          2     1     0     0     1     0     0     0
    38    55    37    19     2     0     2     0          2     0     2     0     1     1     0     2
    21    35    23    10     1     1     0     1          3     9     5     9     1     0     2     2
     3     4     6     3     1     0     0     0          9    18    24    16     1     2     1     2
     0     0     2     0     2     0     0     1         20    68    55    26     3     2     2     0
     0     1     0     0     2     0     0     2         21    58    48    19     7     0     0     0
     0     0     0     0     1     1     0     2          8    14    18    12     1     3     0     2
QUADRENT SUMS...HARD DECISIONS
   429    23                                             41    10
    19    12                                            434    27
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     1     0     2     3    14    34    30     7          1     0     0     0     0     0     0     0
     0     0     0     8    48    85    50     9          0     0     0     0     1     0     0     0
     2     2     0     9    32    49    24     6          0     0     0     1     0     3     0     3
     2     1     1     8    15    22     9     1          1     0     0     0     2     7     3     1
     0     0     1     6     1     7     2     1          0     1     0     1     4    21    37    21
     0     0     0     0     1     1     0     1          0     0     1     1    10    57    82    29
     0     0     0     0     0     0     1     4          1     0     2     5    18    56    58    25
     0     0     0     1     1     2     2     4          2     1     2     4    11    17    16     9
QUADRENT SUMS...HARD DECISIONS
    39   435                                              3    16
     8    30                                             20   473
  1447  1634   835  1638
  1199    74  1178   507
  1239    82  1350   687

252 BIT ERROR INTERVALS
  1.5000E+01  1.8000E+01  2.5000E+01  1.9000E+01  1.2000E+01  1.5000E+01  2.0000E+01  1.5000E+01  0.          0.
```

```
ENGOB=   7.0 ,DELF=  62.5 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    0.          FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   4.0000E+00
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,HN8=     .9 ,KB= 614.5 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0030E-31
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
  4077  0.          0.          8919 -8.6295E+02  8.3643E+03
PEI=   6.3988E-02 STDEV=   5.4506E-03 BITS=   2016
XISUM=   3.7486E-01 XISIG=   1.9654E-01
LOCKIN=    11 ,DROPOUTS=    14 ,AVE=  2.2857E+00 ,STD DEV=  1.7083E+00
ERRM
  2.9000E+01  9.0000E+00  8.0000E+00  6.0000E+00  6.0000E+00  7.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00
  1.0000E+00  4.0000E+00  4.0000E+00  3.0000E+00  4.0000E+00  0.          1.0000E+00  2.0000E+00  3.0000E+00  5.0000E+00
  3.0000E+00  2.0000E+00  1.0000E+00  0.          2.0000E+00  0.          0.          1.0000E+00  1.0000E+00  2.0000E+00
  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.
  0.          0.          1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  2.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     5    20    31    13     4     1     0     3                 0     0     0     0     0     0     0     0
    33    37    35    17     2     2     1     0                 0     0     1     0     0     0     1     0
    40    55    45     8     4     2     0     0                 2     2     1     1     0     1     0     1
    25    27    22    11     2     0     0     0                 5     4     3     0     3     0     0     0
     9     4     2     2     1     1     0     0                 9    17    30    14     4     2     0     3
     3     1     0     2     0     1     2     1                22    40    59    23     3     0     0     1
     0     0     0     0     1     1     0     0                37    56    49    24     3     1     0     1
     0     0     0     0     1     1     1     1                13    27    26    11     2     3     1     1
QUADRENT SUMS...HARD DECISIONS
   424    21                                                    24     6
    23    12                                                   457    25
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     0     0     2     6    17    46    39    16                 0     0     0     0     0     0     0     0
     0     0     2    12    36    63    44     6                 0     0     1     1     0     0     0     1
     0     1     2    16    39    64    24     9                 0     0     0     0     0     0     2     3
     0     1     1     3    13    14     7     0                 0     0     0     0     1     5     9    12
     0     1     1     0     2     2     5     2                 0     0     0     1     6    17    29    27
     0     0     1     0     0     1     2     2                 0     0     1     3    15    47    78    38
     0     0     0     0     0     0     1     3                 0     0     1     2    18    48    51    22
     0     0     0     0     0     1     1     6                 0     2     1     3    13    22    20    12
QUADRENT SUMS...HARD DECISIONS
    46   437                                                     2    33
     3    26                                                    14   463
  1662   431  1965   947
     9    10    13    14
  1239    82  1548  1236

252 BIT ERROR INTERVALS
  1.4000E+01  1.0000E+01  1.0000E+01  1.7000E+01  1.7000E+01  1.3000E+01  2.3000E+01  2.5000E+01  0.          0.
```

```
ENGDB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FODPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3300E-01 FBAMP=   2.0000E-01 SDPHA=   4.7000E-01 FBPHA=   1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
  4488 -1.1113E+02  2.9322E+02 1096.7 -2.1378E+02  1.8331E+03
PEI=   9.7718E-02 STDEV=   6.6132E-03 BITS=   2016
XISUM=   4.0689E-01 XISIG=   2.7660E-01
LOCKIN=    25 ,DROPOUTS=    33 ,AVE=  4.4242E+00 ,STD DEV=  6.8226E+00
ERRM
  9.8000E+01  1.3000E+01  7.0000E+00  6.0000E+00  8.3000E+00  2.0000E+00  7.0000E+00  4.0000E+00  2.0000E+00  3.0000E+00
  3.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  1.3000E+00  2.0000E+00  2.0000E+00  3.0000E+00  3.0000E+00  1.0000E+00
  2.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  0.          0.          0.          1.0000E+00  4.0000E+00  0.
  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00  0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    17    18    31     9     5     0     1     2                 7     3     0     0     0     0     0     0
    20    34    35    12     2     1     1     0                 4     2     2     1     1     0     0     1
    45    58    37    18     1     4     0     1                 2     4     0     1     1     0     0     1
    22    16    24     7     5     2     0     0                 2     3     5     5     3     1     1     2
     4     5     4     1     1     0     1     3                15    24    31    13     2     0     0     2
     0     0     1     1     2     0     1     1                17    45    56    27     9     1     2     0
     0     0     1     1     1     0     1     1                29    40    41    16     2     1     1     1
     0     0     0     0     3     4     0    17                15    23    28     7     1     1     1     9
QUADRENT SUMS...HARD DECISIONS
   403    25                                                    41    11
    18    34                                                   427    33
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     7     2     3     5    16    53    25     5                 6     0     1     0     0     0     0     1
     0     1     0     8    42    76    31    12                 0     1     0     0     1     0     0     0
     1     2     1    11    29    50    35     3                 1     1     2     0     3     0     1     2
     2     1     2     1    17    13     6     1                 0     0     0     3     3     2     7     4
     0     0     0     2     6     4     3     3                 1     0     4     2     7    21    29    23
     0     0     0     1     5     0     3     2                 0     0     3     3    11    59    74    29
     0     0     1     0     0     1     2     1                 0     0     1     5    28    37    39    33
     0     0     0     1     0     2     4    10                 0     4     1     2     6    15    16    17
QUADRENT SUMS...HARD DECISIONS
    47   414                                                    15    27
     5    46                                                    26   444
  1859   538  1495   542
  1199    74  1150  1577
  1239    82   726    22

252 BIT ERROR INTERVALS
  1.4000E+01  1.8000E+01  3.0000E+01  4.1000E+01  3.2000E+01  1.9000E+01  1.7000E+01  2.4000E+01  0.          0.
```

```
ENOD3=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=    2.3000E-01 FRAMP=    4.0000E+00 SDPHA=    4.7000E-01 FBFHA=    1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PMFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
 13014 -1.1960E+02  7.9377E+03 13005 -2.1973E+02  1.7831E+03
PEE=  9.6239E-02 STDEV=   6.5691E-03 BITS=   2016
XISUM=    3.8728E-01 XISIG=   2.3157E-01
LOCKIN=     15 ,DROPOUTS=     34 ,AVE=  3.0882E+00 ,STD DEV=  2.9443E+00
ERRM
  8.5000E+01  1.5000E+01  1.0000E+01  8.0000E+00  4.0000E+00  5.0000E+00  1.0000E+00  6.0000E+00  5.0000E+00  5.0000E+00
  4.0000E+00  8.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  1.0000E+00  0.          2.0000E+00
  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          0.          2.0000E+00  0.
  2.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.
  2.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          2.0000E+00  1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    19    22    32    14     4     2     0     3          18     2     0     8     8     8     0     2
    26    37    27    13     2     3     1     2           3     1     0     2     4     2     1     0
    38    46    37    12     2     3     0     1           0     2     2     4     1     1     1     1
    27    21    23    13     3     1     0     1           4     5     8     5     1     1     1     1
     1     6     3     2     2     0     0     2           7    18    33    11     2     0     1     1
     1     2     0     2     2     0     0     3          25    53    58    26     2     3     0     1
     0     2     1     0     1     0     0     2          29    45    43    17     3     3     1     1
     0     0     1     0     2     1     3     7           7    23    15    12     5     5     2     0
QUADRENT SUMS...HARD DECISIONS                                                    48    11
     407    27                                                                  414    39
      21    25                                                                        +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                      0     0     0     0     0     0     0     1
     5     3     0     5    15    32    28    13           2     1     0     0     0     0     0     0     0     0
     8     1     1     7    51    59    39     6           1     1     0     0     3     0     0     0     0     1
     1     1     2    10    40    48    32     2           0     1     0     0     3     4     0     0     0     1
     2     1     1     5    12    11     7     6           1     0     0     0     3     4     8     2     9     2
     0     0     2     2     3     5     3     1           0     0     0     0     1     1    14     5    29    32
     1     0     0     0     2     4     1     3           1     0     0     0     0     1    14     4    25    35
     0     0     0     0     0     2     1     5           0     2     0     0     0     6    14    57    36    24
     0     0     0     2     0     2     3    14           1     2     2     2     7    26    18    14
QUADRENT SUMS...HARD DECISIONS                                                    16    17
      45    411                                                                 24    455
       7     49
   747   159   1255    484
  1199    74   2041    220
  1239    82   1979   1426

252 BIT ERROR INTERVALS
  3.1000E+01  1.8000E+01  1.3000E+01  1.7000E+01  2.6000E+01  3.9000E+01  3.0000E+01  2.0000E+01  0.          0.
```

```
ENOB=    7.9 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   1.1500E-01 FBAMP=    2.0000E+00 SOPHA=    4.7000E-01 FBPHA=    1.0000E+00
HN= 277.2 ,K= 460.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,HNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PNFILT=   7.0000E-31
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
 17078  1.9779E+02  3.7293E+03 15037 -2.2146E+02  1.7799E+03
PEI=   6.9444E-02 STDEV=   5.6617E-03 BITS=    2016
XISUM=   3.9648E-01 XISIG=   2.6309E-01
LOCKIN=      8 ,DROPOUTS=     24 ,AVE=  2.7500E+00 ,STD DEV=  2.8759E+00
ERRH
  5.4000E+01  9.0000E+00  4.0000E+00  3.0000E+00  7.0000E+00  3.0000E+00  6.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00
  3.0000E+00  2.0000E+00  3.0000E+00  0.          1.0000E+00  2.0000E+00  0.          1.0000E+00  1.0000E+00  2.0000E+00
  0.          2.0000E+00  1.0000E+00  2.0000E+00  0.          2.0000E+00  0.          2.0000E+00  1.0000E+00  3.0000E+00
  1.0000E+00  0.          0.          0.          1.9000E+00  0.          1.0000E+00  0.          0.          1.0000E+00
  1.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480
    11     17     16     18      3      0      0      4
    25     36     43     17      2      1      0      1
    39     64     35     11      2      0      2      0
    21     31     28     10      1      0      0      0
     8      6      2      5      1      1      0      1
     1      1      0      1      1      0      0      0
     0      0      1      1      1      0      1      1
     0      0      0      0      1      0      1     11
QUADRENT SUMS...HARD DECISIONS
   422     14
    26     18
+1-1 P(R1.R2/T1.T2)TIMES   512
     5      2      0      4     14     38     33     16
     0      0      0     11     37     80     38     18
     2      1      0     11     46     55     27      6
     1      0      0      3     11     20     10      2
     2      0      0      1      0      1      2      3
     0      0      0      0      0      1      0      1
     0      0      1      0      0      2      1      1
     0      0      0      0      1      1      3     10
QUADRENT SUMS...HARD DECISIONS
    40    443
     4     25
   359    558    758    562
  1198     74    403   2030
  1239     82   1736   1030

252 BIT ERROR INTERVALS
  1.2000E+01  8.0000E+00  7.0000E+00  1.7000E+01  1.4000E+01  1.8000E+01  1.8000E+01  4.5000E+01  0.          0.

-1+1 P(R1.R2/T1.T2)TIMES   512
     8      3      0      0      0      0      0      0
     1      1      1      0      0      0      0      0
     2      0      1      1      0      0      0      2
     2      3      4      2      1      0      1      1
     5     17     33     11      5      0      1      1
    15     10      7     21     10      0      3      0
    20     10     14     27      5      0      0      1
    23     20     16     13      4      1      1      4
    29      5
   442     36
+1+1 P(R1.R2/T1.T2)TIMES   512
     5      0      0      0      0      0      0      0
     0      0      1      0      0      0      0      0
     0      1      2      0      0      0      0      0
     1      0      1      1      0      0      0      0
     0      0      0      1      1      0      0      0
     0      0      0      1      1      2      4     10
     0      0      0      3      2     14     53     66     44     14
     0      0      0      0      3     12     41     60     29     10
     0      0      0      2     13     26     17     21
    11     22
    12    467
```

```
ENOOB=    7.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    4.6300E-01 FRAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBFHA=    1.0000E+00
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=   7.0000E-11
FBTAU3=   1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
 21142   2.3038E+02   3.7367E+03 17069 -2.1773E+02   1.7741E+03
PEI=    1.5823E-01 STDEV=    8.1283E-03 BITS=    2016
XISUM=    3.9714E-01 XISIG=    2.6137E-01
LOCKIN=      8 ,DROPOUTS=     41 ,AVE=   4.6829E+00 ,STD DEV=   5.0337E+00
ERRM
  1.7300E+02  3.2000E+01  2.2000E+01  1.2000E+01  1.2000E+01  3.0000E+00  4.0000E+00  5.0000E+00  6.0000E+00  3.0000E+00
  3.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  5.0000E+00  0.          4.0000E+00  2.0000E+00  1.0000E+00  0.
  0.          2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  4.0000E+00  1.0000E+00  4.0000E+00  0.          2.0000E+00
  0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  2.0000E+00  1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    29    13    21    10     9     2     1     2          11     2     1     2     2     0     1     0
    23    54    29     9     5     1     0     1           2     3     0     1     0     0     0     1
    28    53    25    10     3     1     0     1           8     2     3     3     2     1     4     1
    12    15    18    13     1     1     0     1           7     6     9     3     3     0     3     2
    11     9     8     0     2     1     2     1          15    24    31     6     4     1     5     3
     2     0     0     2     1     4     2     6          26    35    64    15    10     3     2     0
     1     0     1     1     1     2     2     6          17    43    29    13     3     2     2     2
     0     0     0     3     1     5     3    14           6     9     9    16     4     3     4    15
QUADRENT SUMS...HARD DECISIONS                                    65    21
      362    30                                                   358    68
       38    50                                                          +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512                                                    3     0     1     0     0     0
    10     3     8    10    20    39    14     7           6     1     4     0     2     1     0     1
     1     1     1     6    39    56    34     4           1     2     5     1     3     1     1     3
     2     0     2     4    40    49    23     7           2     2     0     1     4     1     4     4
     4     3     1     7    10    13     6     4           2     0     5     3     7    10    27    28    15
     0     0     3     0     6     2     1     4           0     1     3     1     6    28    49    48    27
     0     1     2     1     4     7     1     6           0     1     1     3     6     7    37    42    25
     0     0     1     1     3     4     4     2           0     1     2     1     5     6    18    26    20
     0     1     1     2     3     3     2    16           2     1     1     5     6    18    26    20
QUADRENT SUMS...HARD DECISIONS                                    38    25
      63    368                                                  36    413
      13     68
  1428  1831  1570   299
  1199    74   403  2030
  1239    82  1736  1030

252 BIT ERROR INTERVALS
  4.3000E+01  2.5000E+01  3.1000E+01  5.4000E+01  4.6000E+01  3.8000E+01  4.2000E+01  3.9000E+01  0.          0.
```

```
ENOOB=   7.0 ,DELF=  62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,HNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
BTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   6.0516E-02 STDEV=   5.3105E-03 BITS=   2016
XISUM=   3.6886E-01 XISIG=   1.9405E-01
LOCKIN=    15 ,DROPOUTS=    14 ,AVE=  2.7857E+00 ,STD DEV=  2.6235E+00
ERRM
  4.3000E+01  6.0000E+00  2.0000E+00  5.0000E+00  3.0000E+00  4.0000E+00  2.0000E+00  1.0000E+00  3.0000E+00  1.0000E+00
  3.0000E+00  4.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00
  3.0000E+00  2.0000E+00  1.0000E+00  2.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00
  1.0000E+00  0.          1.0000E+00  2.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.
  0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.          0.          0.
  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.
  0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00  0.
  0.          1.0000E+00  0.          0.          0.          0.          2.0000E+00  0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                          -1+1 P(R1.R2/T1.T2)TIMES   512
     4    20    25    15     4     0     0     1           4     4     1     0     0     0     0     0
    14    51    43    23     1     0     0     1           1     0     1     1     0     0     0     0
    42    99    41    16     4     0     1     2           2     1     1     2     1     0     1     2
    17    37    25    10     0     0     1     1           3     3     9     5     2     0     2     3
     2     5     4     4     0     0     0     0           4    16    29    16     2     1     0     1
     0     0     0     0     0     0     0     2          11    68    62    26     3     1     1     0
     0     0     1     0     1     0     0     0          29    61    47    18     3     0     1     0
     0     0     0     0     0     1     0     2          10    18    16     9     5     2     1     2
QUADRENT SUMS...HARD DECISIONS
   442    16                                              38    11
    16     6                                             440    23
+1-1 P(R1.R2/T1.T2)TIMES   512                          +1+1 P(R1.R2/T1.T2)TIMES   512
     0     0     4     1     9    27    25     8           1     0     0     0     0     0     0     0
     1     0     2     6    47    90    54    10           1     0     0     0     0     0     0     0
     1     0     2     5    40    63    26     3           0     1     1     0     0     0     1     0
     1     1     2     5    20    14     9     2           1     0     0     1     2     1     4     3
     0     0     1     1     0     4     3     2           0     0     0     2     2    27    33    16
     1     0     0     0     0     2     0     3           1     0     0     2     9    52    87    34
     0     0     1     1     0     0     1     3           0     1     0     9    12    61    57    28
     0     0     0     1     1     1     4     7           2     1     0     5     7    15    24     8
QUADRENT SUMS...HARD DECISIONS
    31   447                                               6    11
     6    28                                              23   472
   747  1504  1255   484
  1199    74  1178   507
  1239    82  1350   687

252 BIT ERROR INTERVALS
  1.3000E+01  1.5000E+01  2.0000E+01  1.5000E+01  1.0000E+01  2.1000E+01  1.8000E+01  1.0000E+01  0.          0.
```

```
ENC[illegible]=    8.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOG[illegible]=   1.0800E+01 TL=   -6.5000E+00 DYNR=    6.[illegible]000E+00
SDAH=    2.3000E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=    7.0000E-01
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    3.6706E-02 STDEV=    4.1880E-03 BITS=    2016
XISUM=    3.7756E-01 XISIG=    1.9115E-01
LOCKIN=     11 ,DROPOUTS=     10 ,AVE=  2.7000E+00 ,STD DEV=  3.0348E+00
ERRH
  2.5000E+01  4.0000E+00  2.0000E+00  4.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.0000E+00  2.0000E+00  0.
  1.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          0.          1.0000E+00  0.          1.0000E+00
  2.0000E+00  0.          0.          0.          0.          0.          0.          2.0000E+00  1.0000E+00  0.
  0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  0.          0.
  2.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00  6.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    10     9    17    14     2     0     0     1          1     0     1     0     0     0     0     2
    20    63    44    12     2     0     0     0          2     0     0     0     0     0     0     0
    41    72    56    19     1     0     0     0          1     0     0     0     1     1     0     1
    16    29    24     6     1     0     1     1          1     0     2     3     0     0     0     0
     3     4     3     0     0     0     0     0          3    22    35     8     3     0     0     2
     1     0     0     1     0     0     0     0         24    57    71    26     2     2     0     2
     0     0     0     1     0     0     0     1         24    64    69    19     1     0     0     2
     0     0     0     0     0     0     1     4          8    26    11    12     2     1     0     2
QUADRENT SUMS...HARD DECISIONS
   452     9                                              11     5
    13     6                                             479    17
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     2     2     2     4     9    35    37    11          1     0     0     0     0     0     0     0
     1     0     1     5    44    93    55     6          0     0     0     0     1     0     0     0
     0     0     0     4    43    67    27     3          0     0     0     1     0     1     3     5
     0     0     2     3    13    20     5     0          0     0     0     0     1     2     5     8
     0     0     0     2     0     3     0     0          0     0     0     0     1     2    15    45    18
     1     0     0     0     0     0     1     0          0     0     0     0     1    15    59    75    37
     0     0     0     0     0     0     0     0          0     0     0     0     1    17    55    59    25
     0     0     0     1     0     0     2     8          1     0     0     0     1     9    21    22    13
QUADRENT SUMS...HARD DECISIONS
    26   468                                              2    18
     4    14                                              5   487
  1662   431  1965   947
  1199    74   446   372
  1239    82  1931   942

252 BIT ERROR INTERVALS
  1.1000E+01  3.0000E+00  1.3000E+01  1.2000E+01  1.0000E+01  4.0000E+00  8.0000E+00  1.3000E+01  0.          0.
```

```
ENOOB=   9.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FQDPRT=   1.0800E+01 TL=   -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SDPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,WNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=  3.1250E-02 STDEV=   3.8751E-03 BITS=   2016
XISUM=   3.7544E-01 XISIG=   1.8467E-01
LOCKIN=    11 ,DROPOUTS=     3 ,AVE=  7.3333E+00 ,STD DEV=  6.9442E+00
ERRH
  2.8000E+01  2.0000E+00  3.0000E+00  5.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          2.0000E+00  0.          1.0000E+00
  0.          1.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          0.
  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          8.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
     9     9    17    10     2     0     0     0                 1     1     0     0     0     0     1     0
    16    67    49     9     1     0     0     0                 1     0     0     0     1     1     0     0
    40    77    69    15     2     0     0     0                 2     1     0     0     1     1     0     0
     9    27    26     6     0     1     0     2                 2     1     1     3     0     1     0     1
     2     5     2     1     0     0     1     0                 2    22    27     8     1     1     0     1
     1     0     0     0     0     1     0     1                17    70    85    19     1     0     1     0
     0     0     0     0     0     0     1     2                23    70    70    20     2     0     0     1
QUADRENT SUMS...HARD DECISIONS                                  9    19    12     9     3     1     0     3
   455     8                                                   11     6
    11     6                                                  482    13
+1-1 P(R1.R2/T1.T2)TIMES   512                                  +1+1 P(R1.R2/T1.T2)TIMES   512
     3     0     3     1     6    36    34     3                 0     0     1     0     0     0     0     0
     0     0     1     2    42   119    58     4                 0     0     1     0     1     0     0     0
     0     0     1     3    50    67    27     6                 0     0     0     1     0     0     0     0
     0     1     0     2     9    16     1     1                 0     0     0     1     0     1     5     2
     0     0     0     1     1     1     1     0                 0     0     1     0     1    14    43    15
     0     0     0     0     0     0     2     2                 1     0     0     0     2    10    67    32    37
     0     0     0     1     0     1     2     4                 0     1     0     0     4    16    16    17
QUADRENT SUMS...HARD DECISIONS                                  3     9
    17   479                                                    8   492
     2    14
  1235   686  1666   690
  1199    74   446   372
  1239    82  1931   942

252 BIT ERROR INTERVALS
  1.5000E+01  3.0000E+00  9.0000E+00  5.0000E+00  5.0000E+00  2.0000E+00  9.0000E+00  1.5000E+01  0.          0.
```

```
ENDOB=   7.0 ,DELF=  62.0 ,BIF=  1500 ,BL2=   294 ,ASOFT= .3700
FOOPRT=   1.0800E+01 TL=  -6.5000E+00 DYNR=   6.0000E+00
SDAMP=   2.3000E-01 FBAMP=   2.0000E+00 SOPHA=   4.7000E-01 FBPHA=   2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=  1.6127E-01 ,TAU2=  5.0213E-03 ,HNB=    .9 ,KB= 614.9 ,TAUB1=  2.0353E+02 ,TAUB2=  1.4945E+00
PHFILT=   7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=   1.3408E+00 FBTAU5=   8.8028E+00 FBTAU6=   1.5010E+00
PEI=   7.3909E-02 STDEV=   5.8268E-03 BITS=   2016
XISUM=   3.8172E-01 XISIG=   2.2957E-01
LOCKIN=    14 ,DROPOUTS=    20 ,AVE=  3.8000E+00 ,STD DEV=  5.3722E+00
ERRH
  6.5000E+01  1.2000E+01  7.0000E+00  3.0000E+00  3.0000E+00  2.0000E+00  3.0000E+00  2.0000E+00  2.0000E+00  3.0000E+00
  4.0000E+00  1.0000E+00  6.0000E+00  1.0000E+00  0.          1.0000E+00  2.0000E+00  0.          2.0000E+00  1.0000E+00
  3.0000E+00  1.0000E+00  0.          1.0000E+00  1.0000E+00  0.          0.          2.0000E+00  0.          0.
  0.          3.0000E+00  0.          0.          4.0000E+00  0.          0.          1.0000E+00  0.          0.
  1.0000E+00  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          1.0000E+00
  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          0.          0.          1.0000E+00  0.          0.          0.          0.
  1.0000E+00  0.          0.          0.          0.          0.          0.          0.          0.          2.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    14     19     19     11      2      0      1      2          2      2      0      0      2      0      0      0
    23     51     35     14      3      1      0      0          3      1      0      0      0      1      0      0
    42     63     39     16      0      2      1      0          1      0      2      1      0      0      0      1
    17     36     24      7      2      1      1      2          4      4      1      4      1      0      0      1
     7      3      5      0      0      1      0      0         12     24     23     19      5      0      2      2
     0      0      0      0      1      0      0      2         18     68     71     22      3      1      0      1
     0      0      0      0      0      0      0      3         17     57     45     24      5      1      2      1
     0      0      1      1      0      1      2     11          8     15      9     14      2      1      0      9
QUADRANT SUMS...HARD DECISIONS                                  25      6
    424     18                                                446     35
     17     21                                                +1+1 P(R1.R2/T1.T2)TIMES   512
+1-1 P(R1.R2/T1.T2)TIMES   512
     2      4      2      8     22     34     28      8          5      0      0      1      1      0      0      0
     2      0      2      6     51    101     45      9          1      1      0      0      1      0      0      0
     0      1      1      5     33     58     18      1          0      0      1      1      0      2      0      2
     1      0      0      6      7     14      7      2          0      1      1      2      5      2      7      5
     1      0      1      0      3      4      1      0          0      1      1      3      4     27     34     16
     1      0      1      0      1      1      2      2          0      1      1      0     16     59     81     29
     0      0      0      0      0      1      4      1          0      0      0      3     14     50     56     22
     0      0      0      0      4      3      4      8          0      0      1      3     11     14     19     11
QUADRANT SUMS...HARD DECISIONS                                  13     25
     40     430                                                12     462
      4      38

  1995    562     91    566
  1199     74   1475    121
  1239     82   1350    687

252 BIT ERROR INTERVALS
  1.3000E+01  6.0000E+00  9.0000E+00  1.6000E+01  2.6000E+01  2.4000E+01  2.3000E+01  3.2000E+01  0.          0.
```

```
ENODa=    8.0 ,DELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FQDPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SDPHA=    4.7000E-01 FBPHA=    2.0000E-01
HN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.4945E+00
PHFILT=    7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    4.0675E-02 STDEV=    4.3995E-03 BITS=    2016
XISUM=    3.7185E-01 XISIG=    1.8919E-01
LOCKIN=     10 ,DROPOUTS=     19 ,AVE=   1.7895E+00 ,STD DEV=   8.9319E-01
ERRM
  2.2000E+01  1.0000E+00  3.0000E+00  3.0000E+00  4.0000E+00  1.0000E+00  3.0000E+00  3.0000E+00  1.0000E+00  1.0000E+00
  3.0000E+00  1.0000E+00  1.0000E+00  0.          2.0000E+00  0.          1.0000E+00  0.          2.0000E+00  1.0000E+00
  1.0000E+00  0.          0.          1.0000E+00  0.          2.0000E+00  0.          2.0000E+00  0.          2.0000E+00
  0.          0.          0.          0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.
  0.          0.          2.0000E+00  0.          1.0000E+00  0.          0.          1.0000E+00  0.          0.
  0.          0.          1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  0.          0.          0.          0.
  1.0000E+00  1.0000E+00  0.          1.0000E+00  0.          0.          0.          1.0000E+00  0.          0.
  0.          0.          0.          1.0000E+00  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.          0.          0.          0.          1.0000E+00
  0.          0.          0.          0.          0.          0.          0.          0.          0.          4.0000E+00

-1-1 P(R1.R2/T1.T2)TIMES   480                                  -1+1 P(R1.R2/T1.T2)TIMES   512
    10   15   15    8    3    1    0    2          2    0    0    0    0    0    0    0    0
    21   57   48   10    2    0    1    0          0    0    0    2    0    0    0    0    2
    38   88   50   16    0    2    1    0          0    0    2    0    0    0    0    0    1
    12   30   17    7    1    1    0    0          2    4    5    2    0    0    0    1
     4    4    5    0    0    0    0    0          4   16   29   12    4    2    0    0
     1    1    0    1    0    0    1    0         16   80   72   18    4    1    1    1
     0    0    0    0    0    0    0    1         23   58   57   22    4    0    0    1
     0    0    0    1    1    0    1    2          9   20   25    8    0    1    0    4
QUADRENT SUMS...HARD DECISIONS
   442       14                                   17        3
    17        7                                  469       23
+1-1 P(R1.R2/T1.T2)TIMES   512                              +1+1 P(R1.R2/T1.T2)TIMES   512
     2    0    0    1   15   44   22    4          0    0    0    1    0    1    0    1
     0    0    0    7   51  116   50   10          0    0    0    0    0    0    0    0
     0    0    1    6   34   61   24    4          0    0    0    0    0    0    0    1
     1    0    1    3    8   17    6    1          1    0    0    0    2    0    3    5
     1    0    0    0    3    2    0    0          0    0    0    1    2   25   35   19
     0    0    0    1    1    2    0    0          0    0    0    0    1    2   79   85   38
     0    0    0    0    0    0    3    5          0    0    0    1    0   16   41   61   23
QUADRENT SUMS...HARD DECISIONS
    22      467                                    2       13
     2       21                                    9      468
   819    4   695  1032
  1199   74   591  1778
  1239   82  1931   942

252 BIT ERROR INTERVALS
  6.0000E+00  8.0000E+00  8.0000E+00  5.0000E+00  1.2000E+01  1.3000E+01  1.5000E+01  1.4000E+01  0.          0.
```

```
ENOOB=    9.0 ,OELF=   62.0 ,BIF=   1500 ,BL2=    294 ,ASOFT= .3700
FOOPRT=    1.0800E+01 TL=   -6.5000E+00 DYNR=    6.0000E+00
SDAMP=    2.3000E-01 FBAMP=    2.0000E+00 SOPHA=    4.7000E-01 FBPHA=    2.0000E-01
WN= 277.2 ,K= 468.6 ,TAU1=   1.6127E-01 ,TAU2=   5.0213E-03 ,WNB=     .9 ,KB= 614.9 ,TAUB1=   2.0353E+02 ,TAUB2=   1.[illegible]345E+00
PHFILT=    7.0000E-01
LOG NORMAL SCINTILLATION
FBTAU3=    1.3408E+00 FBTAU5=    8.8028E+00 FBTAU6=    1.5010E+00
PEI=    2.2817E-02 STDEV=    3.3256E-03 BITS=    2016
XISUM=    3.6697E-01 XISIG=    1.6100E-01
LOCKIN=     11 ,DROPOUTS=      1 ,AVE=   1.0000E+00 ,STD DEV=   0.
ERRH
  1.7000E+01   0.           3.0000E+00   1.0000E+00   0.           0.           0.           1.0000E+00   1.0000E+00   1.0000E+00
   0.          1.0000E+00   0.           0.           0.           0.           0.           1.0000E+00   0.           1.0000E+00
   0.          0.           0.           0.           0.           0.           0.           1.0000E+00   0.           0.
   0.          0.           0.           0.           0.           0.           2.0000E+00   0.           0.           0.
   0.          1.0000E+00   0.           0.           0.           0.           0.           1.0000E+00   0.           0.
   0.          1.0000E+00   1.0000E+00   0.           0.           1.0000E+00   0.           0.           0.           0.
   0.          0.           0.           0.           0.           0.           0.           0.           0.           0.
   0.          1.0000E+00   0.           0.           0.           0.           0.           0.           0.           1.0000E+00
   0.          0.           0.           1.0000E+00   0.           0.           0.           0.           0.           8.0000E+00
   0.          0.           0.           0.           0.           0.           0.           0.           0.

-1-1 P(R1.R2/T1.T2)TIMES   480                                    -1+1 P(R1.R2/T1.T2)TIMES   512
    0    11    17     8     1     0     0     0                    0     0     1     0     0     0     0     1
   18    69    50     9     1     0     0     1                    0     0     0     0     0     0     0     1
   36    79    76    16     2     0     0     0                    1     0     0     2     0     0     0     1
    8    31    26     6     0     0     1     0                    1     1     0     3     1     1     0     1
    2     4     2     1     0     0     0     0                    3    21    33     4     0     0     0     1
    1     0     0     0     0     0     0     0                   18    67    85    19     0     0     0     1
    0     0     0     0     0     0     0     0                   26    69    73    22     2     0     0     1
    0     0     0     0     0     1     0     3                    6    22    14     9     3     0     0     1
QUADRENT SUMS...HARD DECISIONS
     460     6                                                      9     4
      10     4                                                    491     8
+1-1 P(R1.R2/T1.T2)TIMES   512                                    +1+1 P(R1.R2/T1.T2)TIMES   512
    1     0     1     1     8    35    32     5                    0     0     0     0     0     0     0     0
    0     0     0     3    42   119    58     4                    0     0     0     0     0     0     0     1
    0     0     1     5    49    81    26     6                    0     0     0     0     0     0     7     2
    0     0     0     3     5    15     3     1                    0     0     0     1     0    12    43    15
    0     0     0     0     0     1     0     1                    0     0     1     1    10    68    94    40
    0     0     0     0     0     0     0     1                    0     0     2     1    13    60    66    20
    0     0     0     0     1     0     2     2                    1     0     1     0     6    13    21    13
QUADRENT SUMS...HARD DECISIONS
      15     489                                                    0    10
       1       7                                                   8   494
  1168   1069  1759   561
  1199     74   446   372
  1239     82  1931   942

252 BIT ERROR INTERVALS
  1.2000E+01  2.0000E+00  1.2000E+01  6.0000E+00  4.0000E+00  2.0000E+00  3.0000E+00  5.0000E+00  0.           0.
```

APPENDIX X
ALTERNATE CONTINUOUS PHASE MODULATORS

Three alternate continuous phase modulators, a three step upconverter, an indirect FM modulator and a single step upconverter were considered during the course of this study. The latter was finally selected because of its simplicity and minimum parts count. This appendix discusses these alternate designs.

Three Step Upconverter

Figure 1 shows the block diagram for the modulator and upconverter. The 400 MHz FSK signal is synthesized by generating a 1 MHz signal in a voltage controlled crystal oscillator and up-converting this signal by mixing it with higher frequencies derived from a 23 MHz crystal oscillator. The mixing is done in three steps to make filtering practical at each frequency. FSK is accomplished by pulling the 1 MHz VCXO with a $\pm$3.2 volt DC signal amplified from the TTL data.

The oscillators are specified to have an end-of-life long term drift of $\pm$10 ppm. The 1 MHz oscillator is voltage controlled to provide the 64 Hz frequency shift. A VCO was chosen over frequency switching to provide phase continuity between frequencies.

A typical modulation range for a crystal oscillator is 80 ppm (Frequency Electronics, Inc.). For the needed 64 Hz modulation, this requires a 1 MHz center frequency and a DC control voltage of $\pm$3.2 volts. The frequency will typically switch in 20 microseconds.

The power losses and gains are indicated in Figure X-1. The criteria for the design are:

- o An input of 6 dBm into the local oscillator port of the mixer.
- o 0 dBm or less into the signal port to maintain at least a 6 dB ratio to minimize spurs.
- o Limit amplifier gain to approximately 10 dB due to environmental constraints.

The mixers have a loss of approximately 6 dB at a ratio of 6 dB between signal and L.O. (per Relcom Co.).

Filters are provided in the L.O. lines to eliminate the harmonics of the square waves generated by multiplying and dividing. This application is not critical.

Filters are also provided after each mixing operation to eliminate harmonic spurs. The filter bandwidths were chosen to have a -60 dB bandwidth at less than the separation of the closest low order spurs.

The spurs of the first mixer were the closest and a crystal filter is required. The crystal filter is specified by Crystal Network Products. The 2nd and 3rd mixer filters are designed according to Texscan tubular filter specifications and are summarized in Figure 1. The main objection to the Figure 1 design* is its overall hardware complexity, high parts count, and consequently, its lower reliability, higher power consumption, and added weight. Based on information obtained from a crystal oscillator manufacturer alternate designs are possible.

The following are the constraints which dictated the design parameters:

1. The modulation index is .7 radians $\pm$5% over the temperature range of -40°F to +160°F.
2. Over the temperature range, an ovenized oscillator can be pulled a minimum of $\pm$1 ppm and a maximum of $\pm$100 ppm. The minimum value is indicated by a crystal oscillator vendor as being the value one could pull an oscillator to an accuracy of <5%. The maximum is constrained by the phase noise of an oscillator which should be >76 dBc at 100 Hz from the carrier in a 1 Hz bandwidth. To deviate $\pm$31 Hz, this implies a VCXO may be centered between 300 KHz and 30 MHz. However, due to the limitations of practical crystal cuts, the best oscillators are constructed in the 5 to 20 MHz range.
3. The minimum two-sided bandpass filter 3 dB bandwidth is to be 3%. The filter attenuation of the closest spur should be at least 40 dB down at the modulator output. This is because the non-linear power amplifiers will enhance the spurs approximately 15 dB and also create intermodulation products. Because of the extreme temperature range and associated filter drift problems, 60 dB will be used as the design

*M. D. Saferstain, "SAEP Modulator", TRW IOC 7322.4-15, November 19, 1973.

constraint. The filter will have a maximum of 5 poles to minimize filter size and number of elements and maximize reliability.

Given these constraints, two alternate modulator configurations are realizable as shown in Figures X-2 and X-3.

Indirect FM Modulator

The indirect FM modulator design based on the narrowband phase modulator concept conceived by Armstrong, integrates the data, linearly phase modulates the resultant waveform with a modulation index of 0.0775, and multiplies the modulated carrier 8 times to achieve an output frequency of 400 MHz at a modulation index of 0.7. Linear phase modulation is achieved by summing the carrier in quadrature with the double sideband suppressed carrier modulated signal; i.e., the output Y(t) as a function of the input signal X(t) is,

$$Y(t) = \cos(\omega_c t) + X(t)\sin(\omega_c t)$$

$$= \cos(\omega_c t + \tan^{-1}X(t)) \simeq \cos(\omega_c t + X(t))$$

for $|X(t)| << 1$. In this case, $X(t) = \beta\int\phi(t)dt$ where β is the modulation index

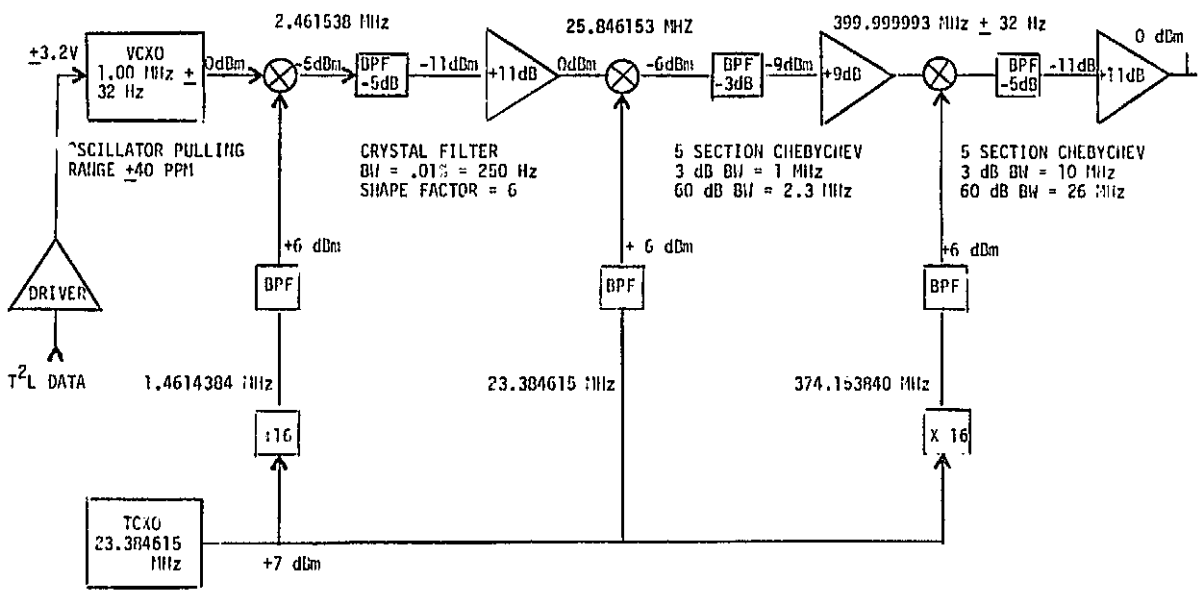


FIGURE X-1
THREE STEP UPCONVERTER MODULATOR

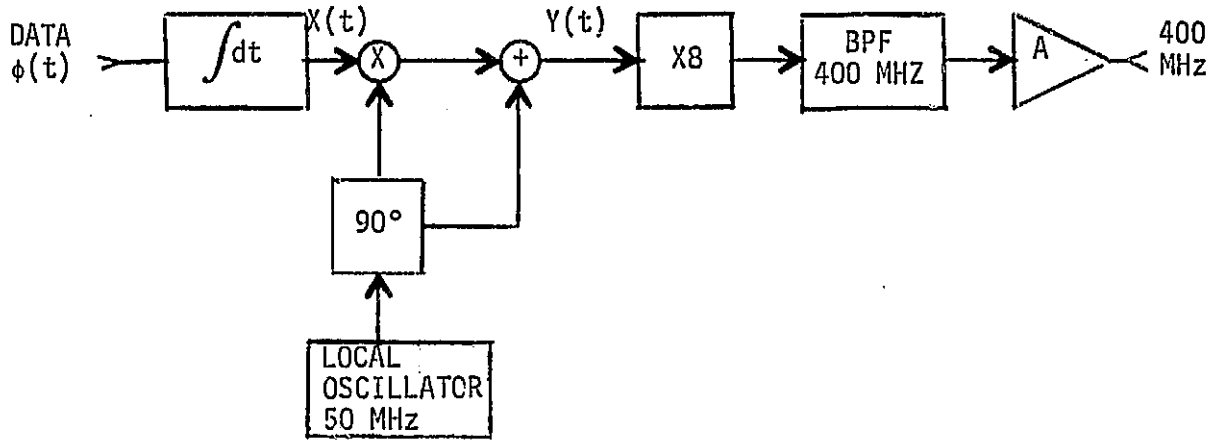


FIGURE X-2
INDIRECT FM MODULATOR

and $\phi(t)$ is the digital data. The one fundamental drawback to this concept is the practical implementation of the integrator and mixer. For long strings of marks or spaces, or where the average number of marks and spaces are not equal, the integrator and mixer must have sufficient dynamic range to operate over the entire period of data transmission. Furthermore, the phase modulation approximation holds only for the range where $|X(t)| << 1$. Since $\tan^{-1}\alpha = \alpha - \frac{\alpha^3}{3} + \frac{\alpha^5}{5} \ldots$, if we modulate one bit at a modulation index of .0775, a string of data where the marks outnumber the spaces by 10 bits would increase the distortion from .2% to 20%**, clearly an unacceptable situation. Lower modulation indices may be possible by decreasing the 50 MHz LO and increasing the multiplication factor. However, in view of the simplicity of the single conversion direct FM design discussed below, this design is untenable.

** The desired signal at the output of an FM modulator is:

$$Y(t) = \cos(\omega_{ct} + \beta\int\phi(t)dt).$$

The actual signal out of the narrowband FM modulator is:

$$Y(t) = \cos\left[\omega_c t + \tan^{-1}(\beta\int\phi(t)dt)\right]$$

$$= \cos\left[\omega_c t + \beta\int\phi(t)dt - \frac{\beta^3}{3}(\int\phi(t)dt)^3 + \frac{\beta^5}{5}(\ )^5 - + \cdots\right]$$

where the higher power terms in the expansion are the distortion terms. If for one bit, $\beta\int\phi(t)dt = .0775$ radians, then the distortion is in the order of $(.0775)^2/3 \approx .2\%$. Where the data is such that $\int\phi(t)dt = 10\int\phi(t)dt$, the distortion increases to $(.775)^2/3 \approx 20\%$.

Single Conversion FM Modulator

The single conversion direct FM modulator shown in Figure 3 takes the 0 dBm output of a FCXO at 20 MHz and upconverts in one step to the output frequency of 400 MHz. The nearest mixer sideband in the upconversion is 40 MHz away using a doubly balanced mixer which also suppresses the 380 MHz LO a minimum of 25 dB. This implies a 3% bandwidth, 5 pole Chebyshev filter may be used at 400 MHz which would result in the 380 MHz LO being attenuated an additional 40 dB to a total level of 65 dB and the 40 MHz sideband attenuated to 68 dB. The total loss in the filter is approximately 5 dB, thus an 11 dB gain amplifier is needed to bring the output to 0 dBm. This modulation technique is simple and straightforward, requiring a minimum of parts, meets all the design constraints and, based on the new oscillator data, is the TRW recommended design.

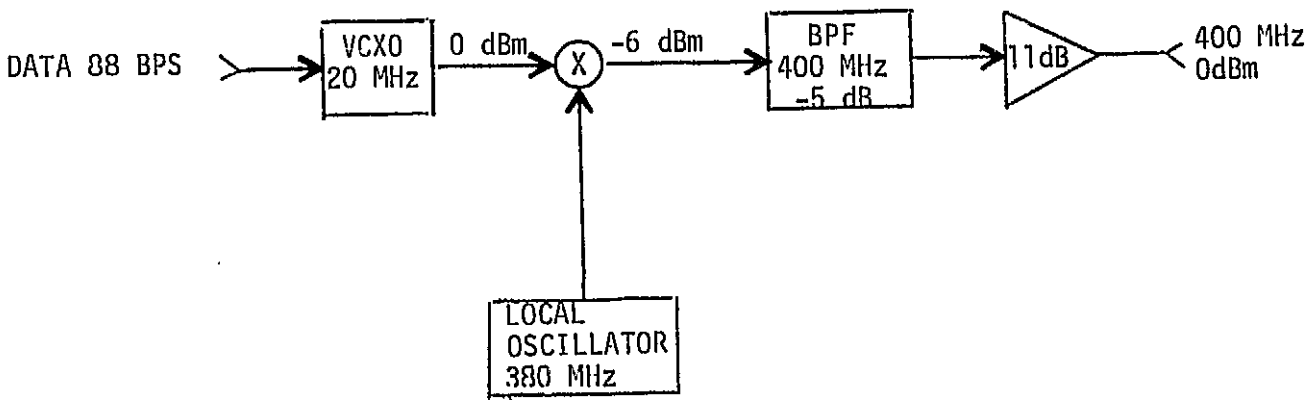
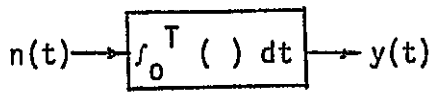


FIGURE X-3
SINGLE CONVERSION DIRECT FM MODULATOR

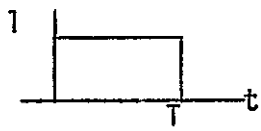
APPENDIX XI

NOISE NORMALIZATION

First, we determine the relationship between the variance of the noise at the input of the system to the variance of the noise at the output of an integrator. The output represents the noise of a transmitted symbol. For the continuous case we have,



with the function h(t)



By convolution

$$y(t) = \int_{-\infty}^{\infty} h(T)\ n\ (T-\tau)\ d\tau \quad ,$$

and squaring we have

$$|y(t)|^2 = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} h(\alpha)\ h^*\ (\beta)\ n\ (T-\alpha)\ n^*\ (T-\beta)\ d\alpha d\beta$$

introducing α and β to keep track of the integrations, and conjugates for real values, the expected square is:

$$E\ \{|y(t)|^2\} = \int_0^T \int_0^T E\ \{n\ (T-\alpha)\ n^*\ (T-\beta)\}\ d\alpha d\beta$$

where outside the interval o to T the integrals are zero, and within the intervals h (α) and h (β) are unity. Now

$$E\ \{n\ (T-\alpha)\ n^*\ (T-\beta)\} = \frac{N_o}{2}\ \delta_{\alpha\beta}\ (\alpha-\beta)$$

where N_o is the single ended noise density KT, and $\delta_{\alpha\beta}$ is the delta function. Thus,

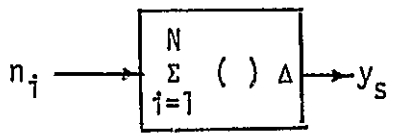
$$E\ \{|y(t)|^2\} = \frac{N_o}{2} \int_o^T \int_o^T \delta_{\alpha\beta}\ (\alpha-\beta)\ d\alpha d\beta$$

of course $\delta_{ij} = 1$ for $i = j$

$\delta_{ij} = 0$ elsewhere,

so $E\ \{|y(t)|\}^2 = \frac{N_o T}{2}$.

For the sampled case



where $\Delta N = T$

We have as before

$$E\ \{y_s y_s^*\} = \sum_{i=1}^{N} \sum_{j=1}^{N} \Delta^2\ \{E\ n_i n_j^*\} \ .$$

Defining $E\ \{n_i n_j^*\} = \sigma^2\ \delta_{ij}$

then $E\ \{y_s y^*\} = N\ \sigma^2 \Delta^2$.

Equating the continuous and sampled cases

$$\frac{N_o T}{2} = N\ \sigma^2 \Delta^2$$

or $$\sigma^2 = \frac{N_o T}{2}$$

$$= \frac{N}{\quad} \cdot \frac{1}{N}\frac{1}{\Delta}\frac{N}{T}$$

$$\frac{N_o}{2\Delta} \quad ,$$

is the total variance, each quaturature component being $\frac{N_o}{4\Delta}$.

In the initial report, the noise was

$$n(t) = n_s \sin w_o t + u_c \cos w_o t$$

where w_o is the carrier, so that in complex amplitudes

$$\tilde{n}(t) = n_c - jn_s$$

together with the signal

$$s(t) = \sqrt{2}\, A \sin (w_o t + \theta_1)$$

or

$$\tilde{s}(t) = -j\sqrt{2}\, A\, e^{+j\theta_1}$$

giving

$$\tilde{s}(t)+\tilde{n}(t) = -j\sqrt{2}\, A \cos\theta_1 - j\sqrt{2}\, Aj \sin\theta_1 + n_c - jns$$

$$= \sqrt{2}\, A \sin\theta_1 + n_c - j\sqrt{2}\, A \cos\theta_1 - jns \, .$$

However, looking at the noise

$$n^2(t) = n_s^2 \sin^2 w_o t + 2 n_c n_s \sin w_o t \cos w_o t + n_c^2 \cos^2 w_o t$$

then

$$E\{n^2(t)\} = E\{n_s^2\}\frac{1}{2} + 0 + E\{n_c^2\}\frac{1}{2} \quad ,$$

as obviously from trignometry

$$E\{\sin w_o t \cos w_o t\} = 0$$

and as the samples by definition are independent

$$E\{n_c n_s\} = 0 \quad .$$

From our previous report

$$n_s = n_c = N_o/(4\Delta)$$

then

$$\frac{N_o}{2\Delta} \neq \frac{N_o}{4\Delta}\frac{1}{2} + \frac{N_o}{4\Delta}\frac{1}{2} \quad .$$

Herein, the noise is

$$n(t) = \sqrt{2}\, n_s \sin w_o t + \sqrt{2}\, n_c \cos w_o t,$$

so that squaring

$$n^2(t) = 2n_s{}^2 \sin^2 s_o t + 4n_c n_s \sin w_o t \cos w_o t + 2n_c{}^2 \cos^2 w_o t$$

then taking the expectation

$$E\{n^2(t)\} = 2E\{n_s{}^2\}\frac{1}{2} + 0 + 2E\{n_c{}^2\}\frac{1}{2}$$

$$= E\{n_s{}^2\} + E\{n_c{}^2\} \quad .$$

Therefore $\tilde{n}(t) = \sqrt{2}\,(n_c - jn_s)$

i.e., $\sqrt{2}\,\mathrm{Re}\,[(n_c - jn_s)e^{jw_o t}] = \sqrt{2}\,\mathrm{Re}\,[n_c \cos w_o t + jn_c \sin w_o t - jn_s \cos w_o t - jnsjsin w_o t]$

$$= \sqrt{2}\,[n_c \cos w_o t + n_s \sin w_o t] \quad .$$

Thus, $\tilde{s}(t)+\tilde{n}(t) = -j\sqrt{2}A\cos\theta_1 - j\sqrt{2}Aj\sin\theta_1 + \sqrt{2}n_c - \sqrt{2}jn_s$

$$= \sqrt{2}A\sin\theta_1 + \sqrt{2}n_c - j\sqrt{2}A\cos\theta_1 - \sqrt{2}jn_s ,$$

as herein expressed.

Summarizing, in the previous report we had

$\tilde{x}(t) = \sqrt{2}A\sin\theta_1 + n_s - j[\sqrt{2}A\cos\theta_1 + n_c]$ → (×) → $\tilde{z}(t) = \{\sqrt{2}A\sin\theta_1 + n_2 - j[\sqrt{2}A\cos\theta_1 + n_c]\} e^{-j\theta}$

$\tilde{y}(t) = e^{j\theta}$

by interchanging the random variables n_c and n_s.

Now, we have

$\tilde{x}(t) = A\sin\theta_1 + n_s - j[A\cos\theta_1 + n_c]$ → (×) → $\tilde{z}(t) = \{A\sin\theta_1 + n_s - j[A\cos\theta_1 + n_c]\}\sqrt{2}e^{-j\theta}$

$\tilde{y}(t) = \sqrt{2}e^{-j\theta}$

Note that the multiplier, the local oscillator, $\tilde{y}(t)$, magnitude is irrelevant; the ratio of signal to noise is relevant. In the previous report the noise voltage was $\sqrt{2}$ (3dB) low.

APPENDIX XII

PHASE ERROR

In a low data rate system, high Doppler environment, a phase locked loop tracking the modulating waveform is an attractive receiver implementation. The focal point of this implementation is the phase error.

The first step is to analyze the system without premodulation filtering. Figure XII-1 illustrates the system, where in this paragraph the premodulation filter P(S) = 1. The tracking filter is the usual

$$F(S) = \frac{\tau_2 S+1}{\tau_1 S+1},$$

where $\tau_2 = (2/\omega_n)(\zeta - \frac{1}{2\omega_n\tau_1})$

and τ_1 is arbitrary. In transform notation then the error signal for the unfiltered case is

$$E(S) = (\frac{\omega_\Delta}{S^2}) \{\frac{S[S+(1/\tau_1)]}{S^2+2\zeta\omega_n S+\omega_n{}^2}\}$$

where of course ω_Δ is the step size of a step change in frequency,

$$2\zeta\omega_n = (1+\tau_2 K)/\tau_1$$

and $$\omega_n{}^2 = K/\tau_1$$

Using the transform

$$\mathcal{L}^{-1} \frac{a_1 S+a_0}{S[(S+\alpha)^2+\beta^2]} = \frac{a_0}{\beta_0{}^2} + \frac{[(a_0-a_1\alpha)^2+(a_1\beta)^2]^{1/2} e^{-\alpha t}\sin(\beta t+\psi)}{\beta\beta_0}$$

where $\beta_0{}^2 = \alpha^2+\beta^2$

and $$\psi = \psi_1 - \psi_2 = \tan^{-1}\frac{a_1\beta}{a_0-a_1\alpha} - \tan^{-1}\frac{\beta}{-\alpha},$$

the error signal is

$$E(t) = \omega_\Delta \left\{\frac{(1/\tau_1)}{\omega_n{}^2} + \frac{[((1/\tau_1)-(1)\zeta\omega_n)^2+((1)\omega_n\sqrt{1-\zeta^2})^2]^{1/2}}{\omega_n\sqrt{1-\zeta^2}\omega_n} e^{-\zeta\omega_n t}\right.$$

$$\left. \cdot \sin(\omega_n\sqrt{1-\zeta^2}t+\psi)\right\}$$

The substitutions are of course

$$a_1=1$$

$$a_o=(1/\tau_1)$$

$$\alpha^2+\beta^2=\omega_n{}^2$$

$$\alpha=\zeta\omega_n$$

and $$\beta^2=\omega_n{}^2(1-\zeta^2)\,.$$

Letting A be the first term, and B the factor before the exponential, the maximum frequency error is

$$\frac{d}{dt}\{A+B\exp(-\zeta\omega_n t)\sin(\omega_n\sqrt{1-\zeta^2}t+\psi)\}\omega_\Delta=0\,,$$

or $$\tan(\omega_n\sqrt{1-\zeta^2}t+\psi)=\frac{(1-\zeta^2)^{1/2}}{\zeta}$$

Now, whenever

$$1/\tau_1 << \zeta\omega_n\,,\ (\zeta K >> \omega_n)$$

as is the usual design case

$$\psi_1 = \tan^{-1}\frac{\omega_n\sqrt{1-\zeta^2}}{(1/\tau_1)-\zeta\omega_n} \simeq \tan^{-1}\frac{\sqrt{1-\zeta^2}}{-\zeta}$$

and $$\psi_2 = \tan^{-1}\frac{\omega_n\sqrt{1-\zeta^2}}{-\zeta\omega_n} = \tan^{-1}\frac{\sqrt{1-\zeta^2}}{-\zeta}$$

or $$\tan(\omega_n\sqrt{1-\zeta^2}t)=(1-\zeta^2)^{1/2}/\zeta,$$

thus $$\frac{d}{dt}\{E[\tan^{-1}(\frac{\sqrt{1-\zeta^2}}{\zeta})/(\omega_n\sqrt{1-\zeta^2})]\} = 0$$

yields the time of the maximum error. Substituting this time into the general error expression, the maximum phase error is

$$E_{max} = \frac{\omega_\Delta}{\omega_n}\{\frac{1}{\tau_1\omega_n} + \exp\,[-\frac{\zeta}{\sqrt{1-\zeta^2}}\tan^{-1}\frac{\sqrt{1-\zeta^2}}{\zeta}]\}.$$

The maximum phase error is shown in Figure XII-2, together with a break lock approximation

$$\omega_\Delta/\omega_n = 1.8\ (\zeta+1).$$

It is seen that the design point is near break lock, $\pi/2$ radians, without noise.

Following the same line of thought as in the phase error case, the output is

$$O(S) = \frac{\omega_\Delta}{S^2} \frac{S((\tau_2/\tau_1)S+(1/\tau_1))}{S^2+2\zeta\omega_n S+\omega_n{}^2}$$

and with the same conditions as before,

$$O(t) = \frac{\omega_\Delta}{\omega_n} \{\frac{1}{\tau_1\omega_n} + \frac{\tau_2/\tau_1}{\sqrt{1-\zeta^2}} \exp\ (-\zeta\omega_n t)\ \sin(\omega_n\sqrt{1-\zeta^2}t)\}.$$

In the same form

$$E(t) = \frac{\omega_\Delta}{\omega_n} \{\frac{1}{\tau_1\omega_n} + \frac{1}{\sqrt{1-\zeta^2}} \exp\ (-\zeta\omega_n t)\ \sin(\omega_n\sqrt{1-\zeta^2}t)\}.$$

The premodulation filter is taken as

$$P(S) = 1/(\tau_p S+1)^2$$

The error signal is now

$$E(S) = (\frac{\omega_\Delta}{S^2})\ (\frac{1}{\tau_p S+1})^2 \left[\frac{S[S+(1/\tau_1)]}{S^2+2\zeta\omega_n S+\omega_n{}^2}\right]$$

The term as noted before

$$\mathcal{L}^{-1} \frac{S+(1/\tau_1)}{S[S^2+2\zeta\omega_n S+\omega_n{}^2]} = \frac{1}{\tau_1\omega_n{}^2} + \frac{1}{\omega_n\sqrt{1-\zeta^2}}\ e^{\zeta\omega_n t}\ \sin(\omega_n\sqrt{1-\zeta^2}t)$$

together with

$$\mathcal{L}^{-1}\frac{1}{(\tau_p S+1)^2} = \frac{t}{\tau_p^2}\,e^{-t/\tau_p}$$

can be convolved

$$\int_0^t F_1(t-\tau)F_2(\tau)\,d\tau$$

for the result, i.e.,

$$E(t) = \omega_\Delta \int_0^t \frac{t-\tau}{\tau_p^2}\,e^{-\frac{t-\tau}{\tau_p}}\left(\frac{1}{\tau_1\omega_n^2} + \frac{1}{\omega_n\sqrt{1-\zeta^2}}\,e^{-\zeta\omega_n t}\sin(\omega_n\sqrt{1-\zeta^2}\,t)\right)d\tau,$$

or

$$E(t)/\omega_\Delta = \frac{e^{-t/\tau_p}}{\tau_p^2}\int_0^t \{tAe^{\tau/\tau_p} - \tau Ae^{\tau/\tau_p} + \frac{t}{b}\,e^{\tau/\tau_p}\,e^{-a\tau}\sin b\tau$$

$$- \frac{\tau}{b}\,e^{\tau/\tau_p}\,e^{-a\tau}\sin b\tau\}d\tau,$$

where $A = 1/(\tau_1\omega_n^2)$

$b = \omega_n\sqrt{1-\zeta^2}$

and $a = \zeta\omega_n$.

The first two integrals are straight forwardly evaluated:

$$tA\int_0^t e^{\tau/\tau_p}\,d\tau = \frac{tAe^{\tau/\tau_p}}{(1/\tau_p)}\Big|_0^t = tA\tau_p(e^{t/\tau_p}-1)$$

and

$$-A\int_0^t \tau e^{\tau/\tau_p}\,d\tau = \frac{-Ae^{\tau/\tau_p}}{(1/\tau_p)^2}\left(\frac{\tau}{\tau_p} - 1\right)\Big|_0^t$$

$$= -A\tau_p\left(e^{t/\tau_p}\left(\frac{t}{\tau_p} - 1\right)+1\right).$$

The third, somewhat more complex

$$\frac{t}{b}\int_0^t e^{(1/\tau_p - a)\tau} \sin b\tau \, d\tau = \frac{t}{b} e^{a'\tau} \frac{(a' \sin b\tau - b \cos b\tau)}{a'^2+b^2}\Big|_0^t$$

$$= \frac{t}{b(a'^2+b^2)} \{e^{a't}(a' \sin bt - b \cos bt)+b\}$$

where $a' = (1/\tau_p) - a$

Finally, the last is

$$-\frac{1}{b}\int_0^t \tau e^{a'\tau} \sin b\tau \, d\tau = \frac{-\tau e^{a'\tau}}{b(a'^2+b^2)} \{a' \sin b\tau - b \cos b\tau\}_0^t$$

$$+ \frac{e^{a'\tau}}{b(a'^2+b^2)^2} \{(a'^2-b^2) \sin b\tau - 2a'b \cos b\tau\}_0^t$$

$$= \frac{-te^{a't}}{b(a'^2+b^2)} \{a' \sin bt - b \cos bt\} + \frac{e^{a't}}{b(a'^2+b^2)^2}$$

$$\cdot\{(a'^2-b^2)\sin bt - 2a'b \cos bt\} - \frac{1}{b(a'^2+b^2)^2} \{-2a'b\}.$$

Combining

$$E(t)/\omega_\Delta = A+\bar{e}^{t/\tau_p} \{-\frac{tA}{\tau_p} - A + \frac{t}{\tau_p^2(a'^2+b^2)} + \frac{2a'}{\tau_p^2(a'^2+b^2)^2}\} +$$

$$+ \frac{\bar{e}^{at}}{\tau_p^2 b(a'^2+b^2)^2} \{(a'^2+b^2) \sin bt - 2a'b \cos bt\}.$$

Following the same steps for the output,

$$O(t)/\omega_\Delta = A+ \bar{e}^{t/\tau_p}\{- \frac{tA}{\tau_p} - A + \frac{b't}{\tau_p^2(a'^2+b^2)} + \frac{2a'b}{\tau_p^2(a'^2+b^2)^2} \}+$$

$$+ \frac{b' \bar{e}^{at}}{\tau_p^2 b(a'^2+b^2)^2} \{(a'^2+b^2)\sin bt - 2a'b \cos bt\},$$

where $b' = \tau_2/\tau_1$.

The expressions for phase error and output voltage are fairly straight forward

$$A+(B+Ct)\exp(-Dt)+(E\sin(bt)-B\cos(bt))\exp(-at)$$

where the coefficients vary with and without filtering; for the error or output signals. Table XII-1 lists the coefficients utilizing the intermediate symbols

$a = \zeta\omega_n$

$a' = 1/(\tau_p) - a$

$b = \omega_n\sqrt{1-\zeta^2}$

$b' = \tau_2/\tau_1$

$\Sigma = a'^2 + b^2$

$\Delta = a'^2 - b^2$

TABLE XII-1
COEFFICIENTS

COEFFICIENT	UNFILTERED E(t)	UNFILTERED O(t)	FILTERED E(t)	FILTERED O(t)
A	$[1/(\tau_1\omega_n)^2]\omega_\Delta$			
B	0	0	$\omega_\Delta[\frac{2a'}{(\tau_p\Sigma)^2} - \frac{1}{\tau_1\omega_n^2}]$	$\omega_\Delta[\frac{2a'b'}{(\tau_p\Sigma)^2} - \frac{1}{\tau_1\omega_n^2}]$
C	0	0	$\omega_\Delta[\frac{1}{\tau_p^2\Sigma} - \frac{1}{\tau_1\omega_n^2\tau_p}]$	$\omega_\Delta[\frac{b'}{\tau_p^2\Sigma} - \frac{1}{\tau_1\omega_n^2\tau_p}]$
D	0	0	$1/\tau_p$	$1/\tau_p$
E	ω_Δ/b	$\omega_\Delta b'/b$	$\omega_\Delta[\frac{\Delta}{\tau_p^2 b\Sigma^2}]$	$\omega_\Delta[\frac{\Delta b'}{\tau_p^2 b\Sigma^2}]$

Figure XII-3 compares filtered and unfiltered responses. Obviously the pre-modulation filter reduces the potential of break lock. Similarly a wider bandwidth also reduces the maximum phase error. Figures XII-4 and XII-5 show

several of the voltage histories for a "worst case" 62 Hertz step, and a "best case" alternating ±31 Hertz steps. (A PN sequence is bounded by these cases.) For the worst case sequence, a narrow loop potentially always breaks lock, even without noise, near the end of the symbol. Increasing loop bandwidth drastically reduces this possibility. The output signal level decreases with increasing bandwidth moderately for worst case sequences, but only slightly for best case sequences. The integral of the output, a measure of energy to the detector, is tabulated on the figure.

The foregoing theoretical expressions can be readily compared with the simulation. This is shown in Figures XII-6 and XII-7. These are "intensity" plots of 1900 overlaid one symbol traces at the multiplier output. In these intensity plots the number of "hits" on a position are quantized into five levels, "=", "+", ":", ".", and " ". It can be seen that the simulation intensity follows the theoretical curves, but a large variance about the mean is evident. A fast Fourier transform of the traces, Figure XII-8, shows that (at the phase detector output) considerable high frequency "noise" is present, i.e., noise not in the loop bandwidth as normally defined in linear loops. As this is before the loop filter the noise is "white", or as white as the sampling permits. By prefiltering this noise, i.e., a low pass filter before the "oscilloscope" (the subroutine which makes the picture); with a corner relative to the loop bandwidth, PEFILT, the phase variance at high signal to noise approaches the linear (high SNR) theory

$$\sigma_\phi^2 = 1/(SNR) = (N_o/E)TB_L$$

as shown in Figure XII-9. With PEFILT then the simulated phase variance in Figures XII-10 and XII-11 are quite similar to the foregoing theory (the "real" filter time delays not present in the linearized analysis are evident in the figure).

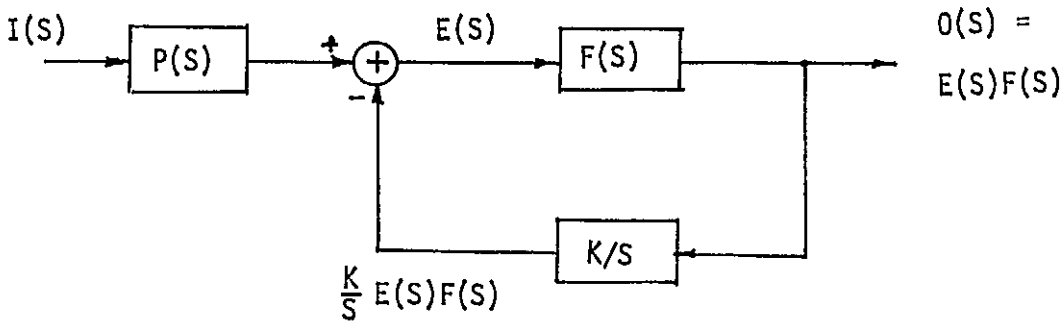


FIGURE XII-1
BLOCK DIAGRAM

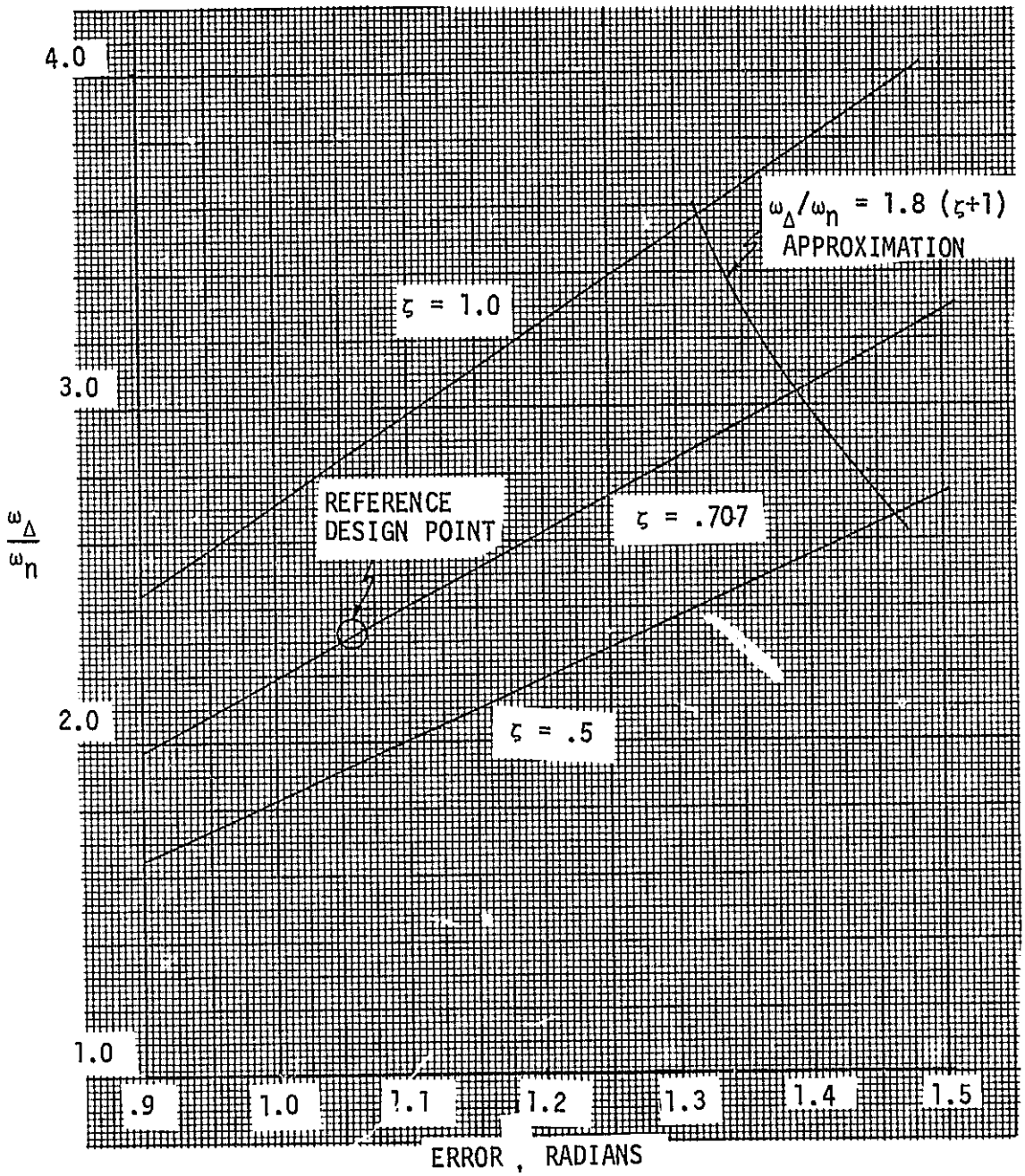


FIGURE XII-2

MAXIMUM PHASE ERROR

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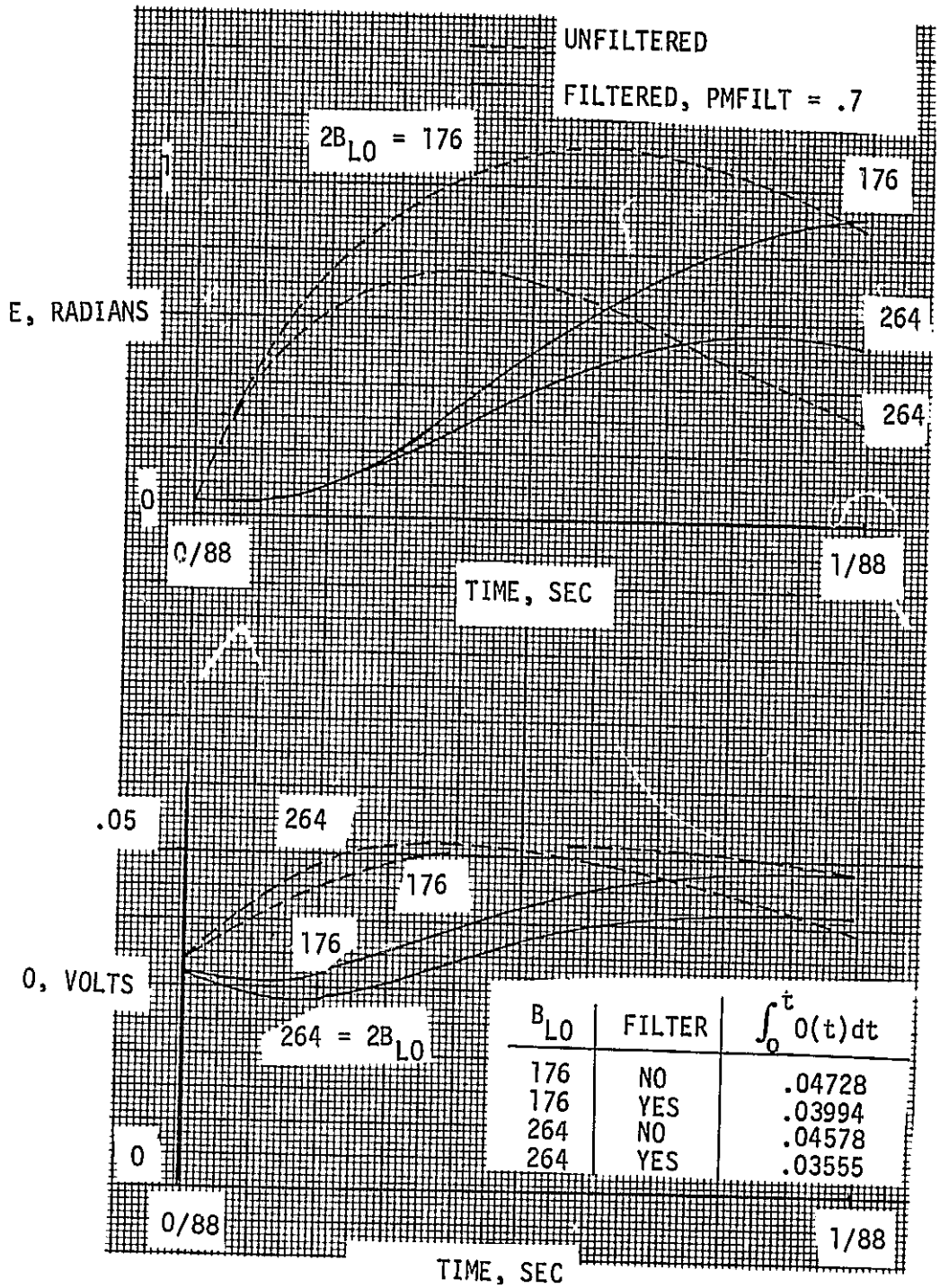
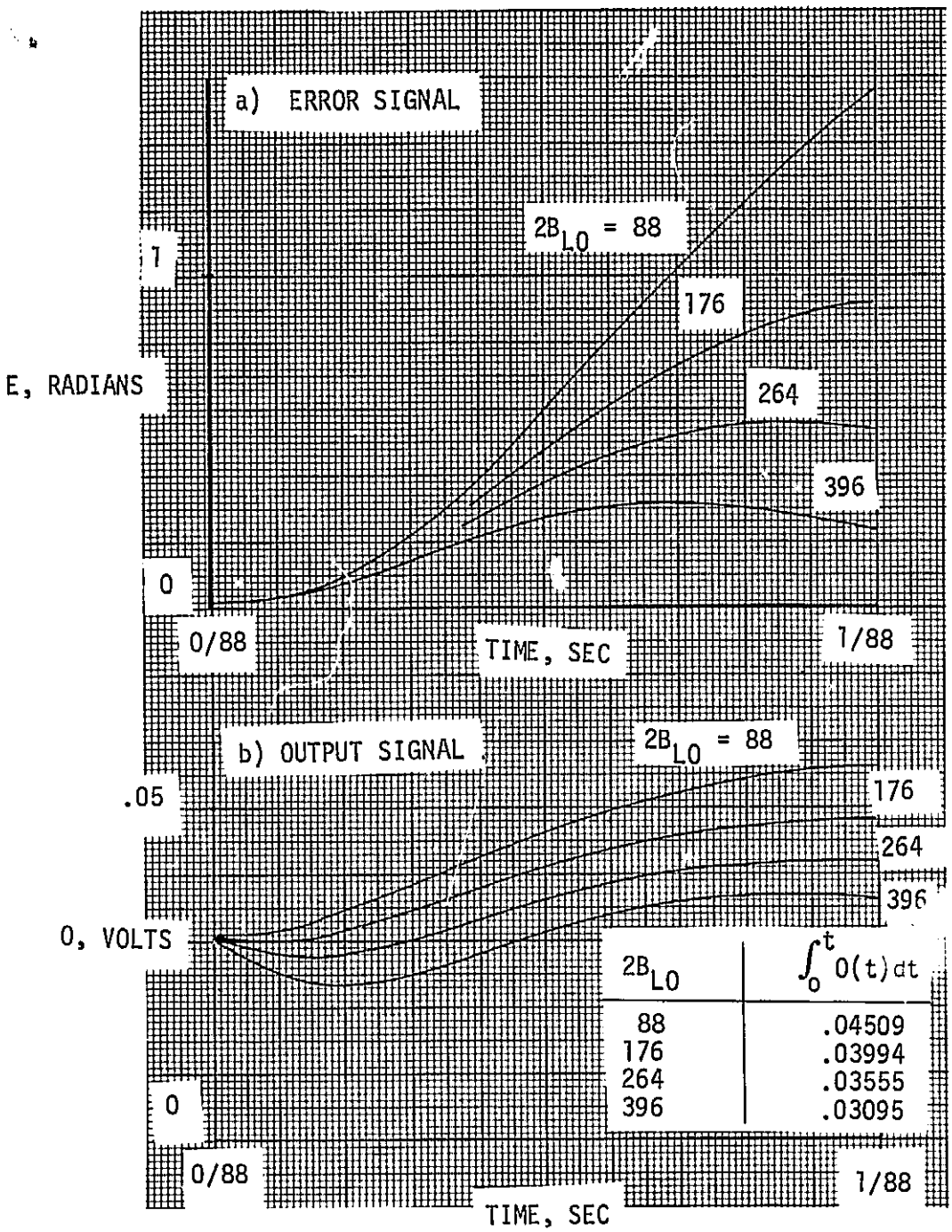


B_{LO}	FILTER	$\int_0^t O(t)dt$
176	NO	.04728
176	YES	.03994
264	NO	.04578
264	YES	.03555

FIGURE XII-3

62 HERTZ STEP FILTERED AND UNFILTERED RESPONSES

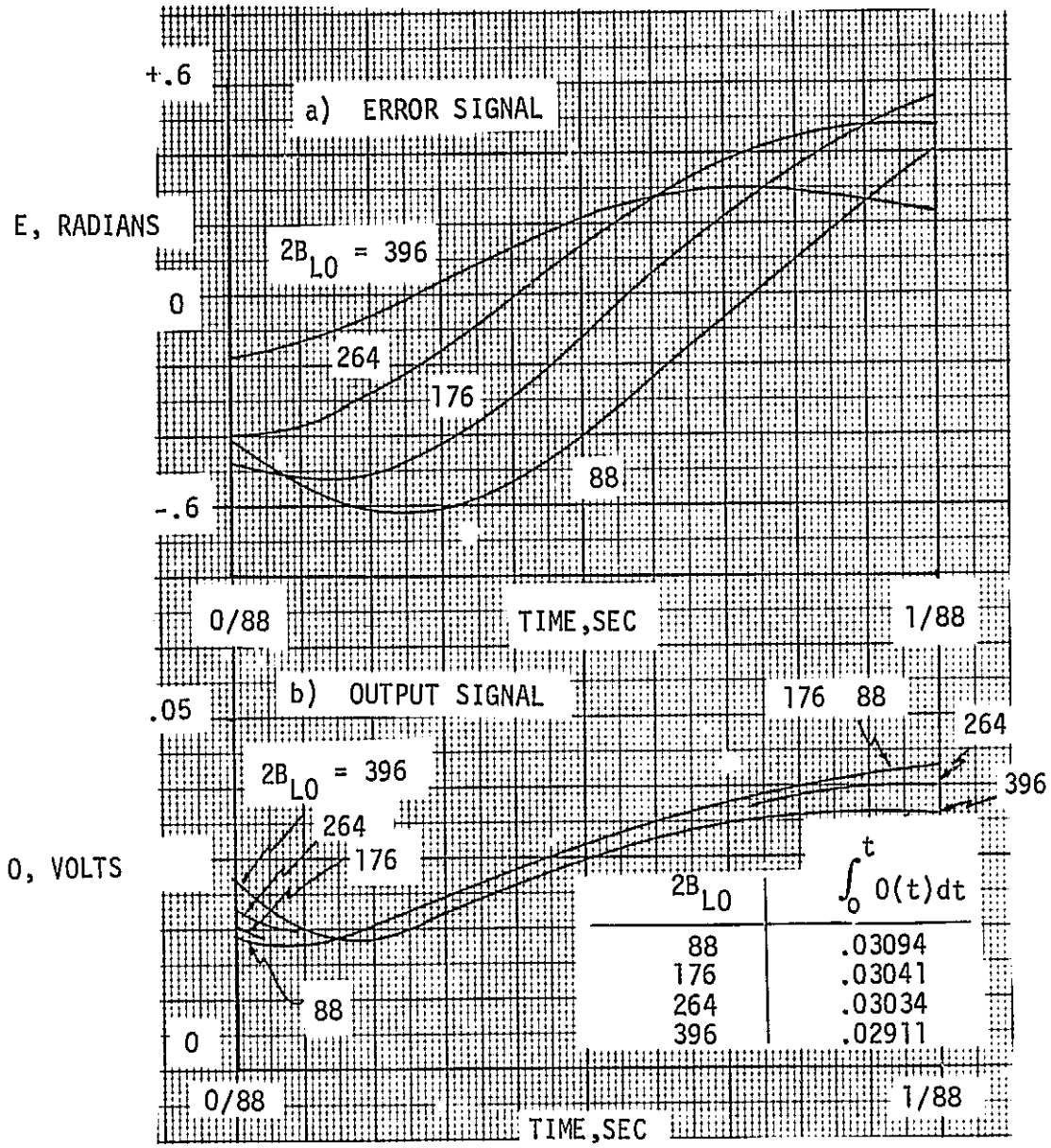
62 HERTZ STEP, PMFILT = .7



$2B_{LO}$	$\int_0^t \theta(t)dt$
88	.04509
176	.03994
264	.03555
396	.03095

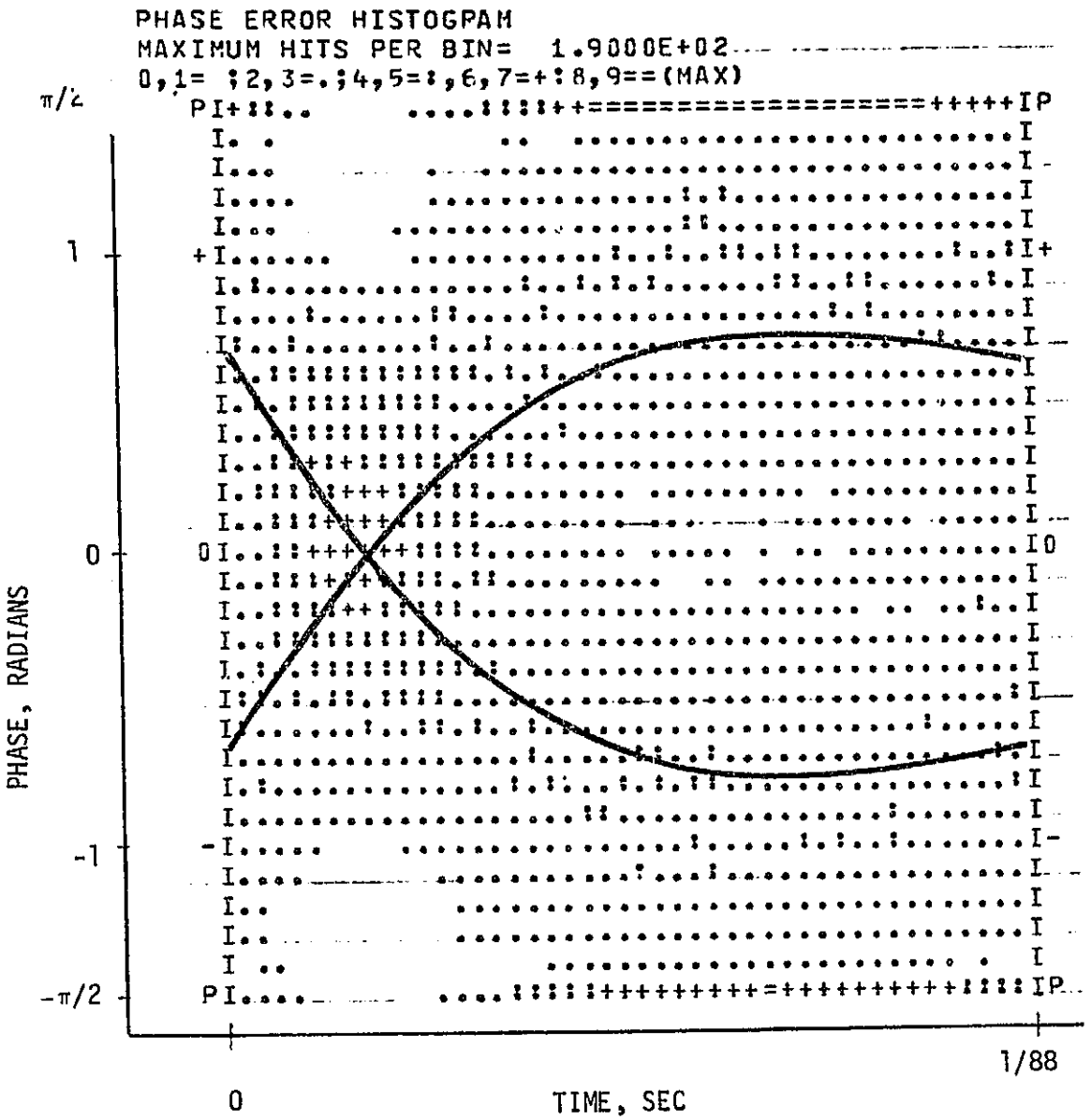
FIGURE XII-4
MAXIMUM FILTERED RESPONSE

±31 HERTZ STEPS, PMFILT = .7



$2B_{LO}$	$\int_0^t 0(t)dt$
88	.03094
176	.03041
264	.03034
396	.02911

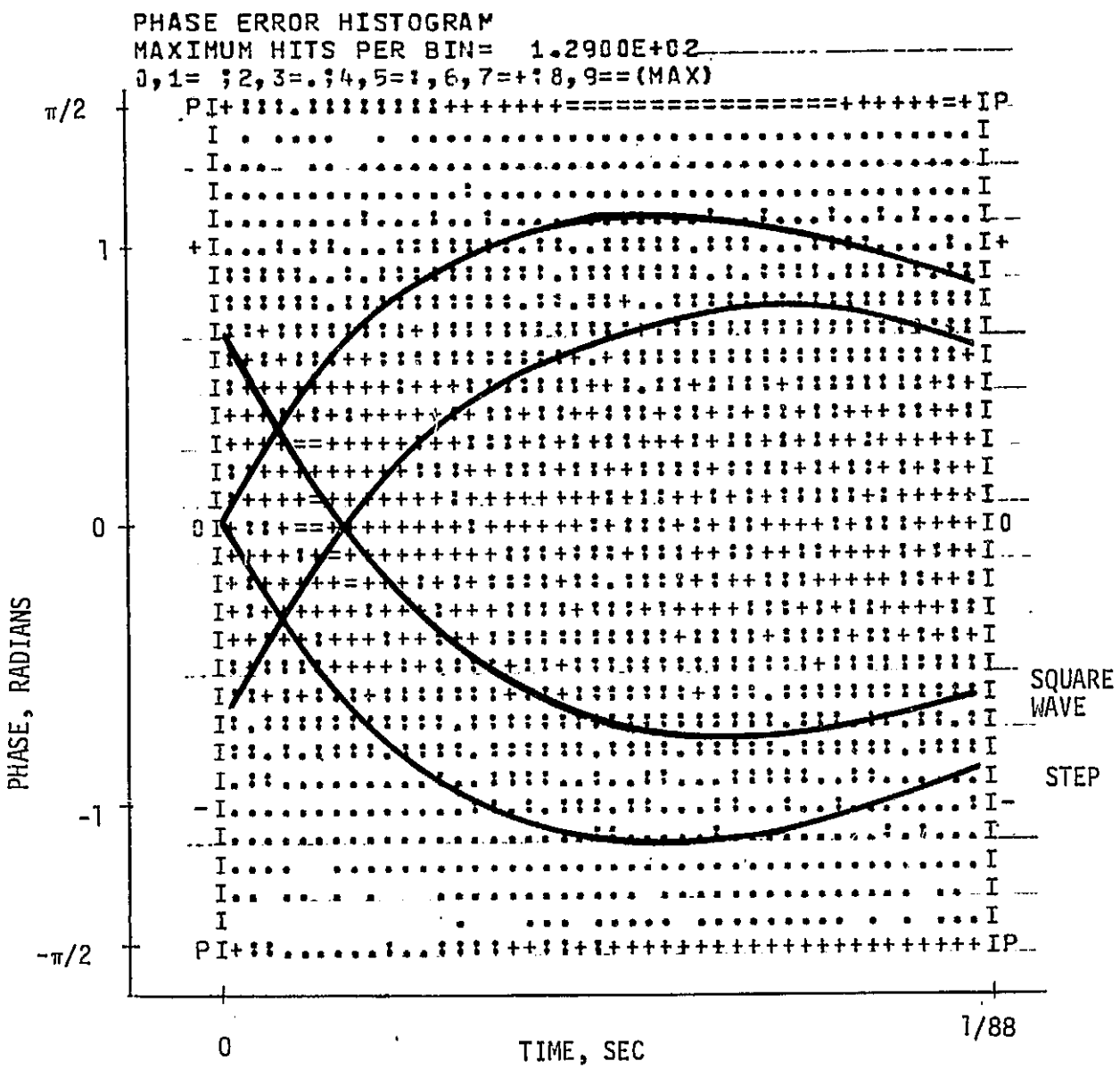
FIGURE XII-5
MINIMUM FILTERED RESPONSE



SOLID LINE IS THEORETICAL SQUAREWAVE

FIGURE XII-6

SQUAREWAVE PHASE ERROR
WITHOUT PREMODULATION FILTER
ENODB = 11, BL2 = 176



SOLID LINE IS THEORETICAL

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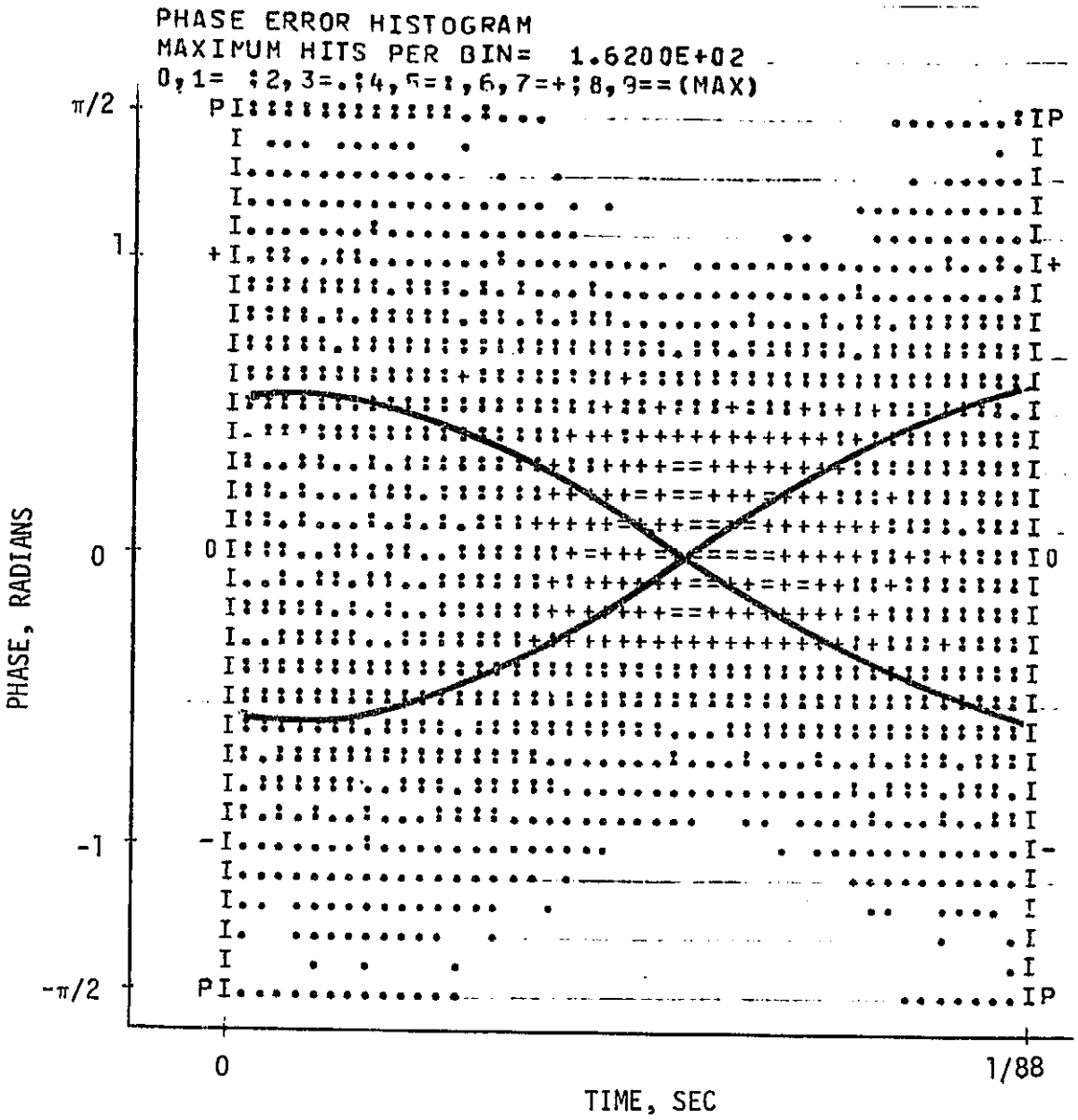
FIGURE XII-6 CONTINUED

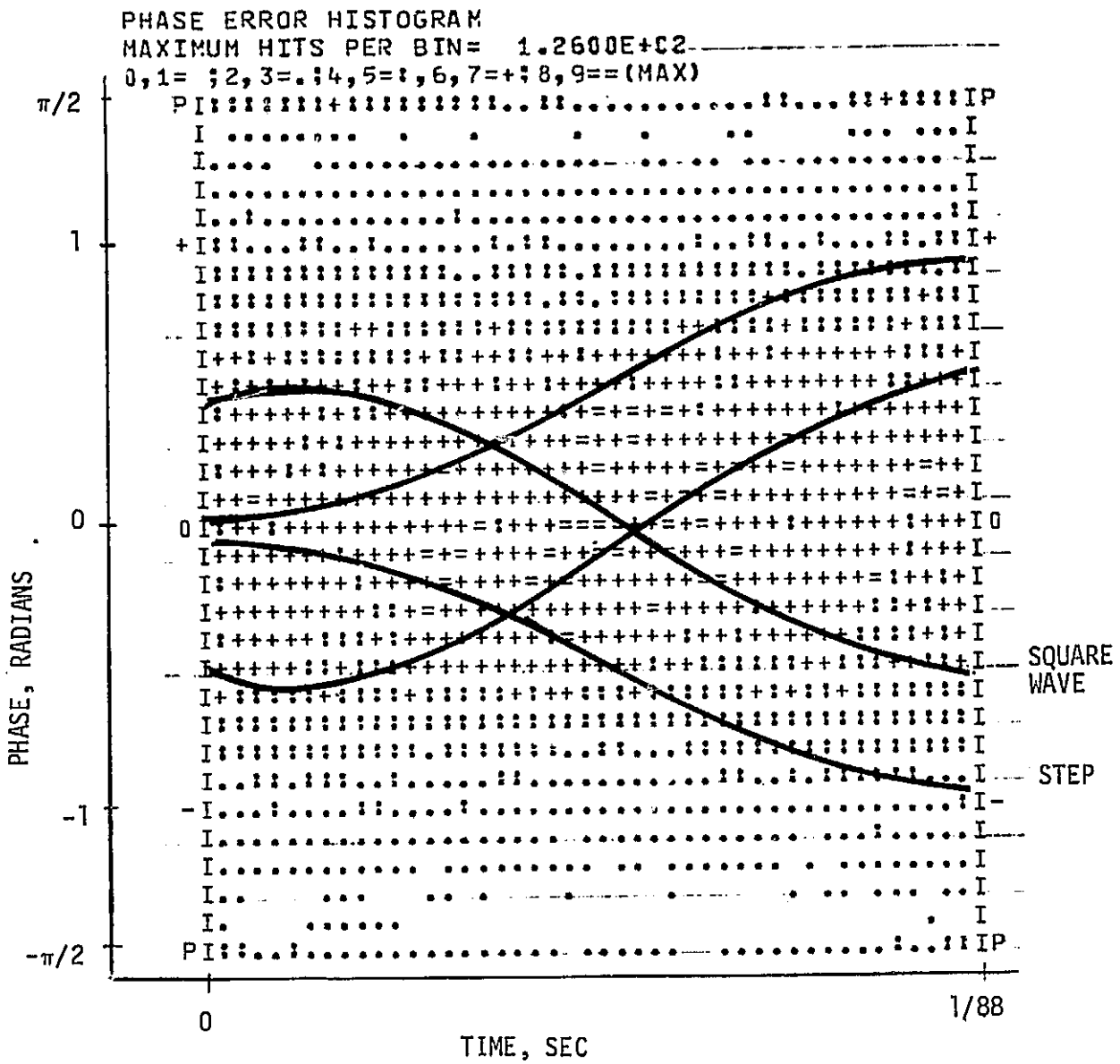
RANDOM WAVE PHASE ERROR
WITHOUT PREMODULATION FILTER
ENODB = 11, BL2 = 176



SOLID LINE IS THEORETICAL SQUAREWAVE

FIGURE XII-7

SQUAREWAVE PHASE ERROR
WITH PREMODULATION FILTER
ENODB = 11, BL2 = 176



SOLID LINES ARE THEORETICAL

FIGURE XII-7 CONTINUED

RANDOM WAVE PHASE ERROR
WITH PREMODULATION FILTER
ENODB = 11, BL2 = 176

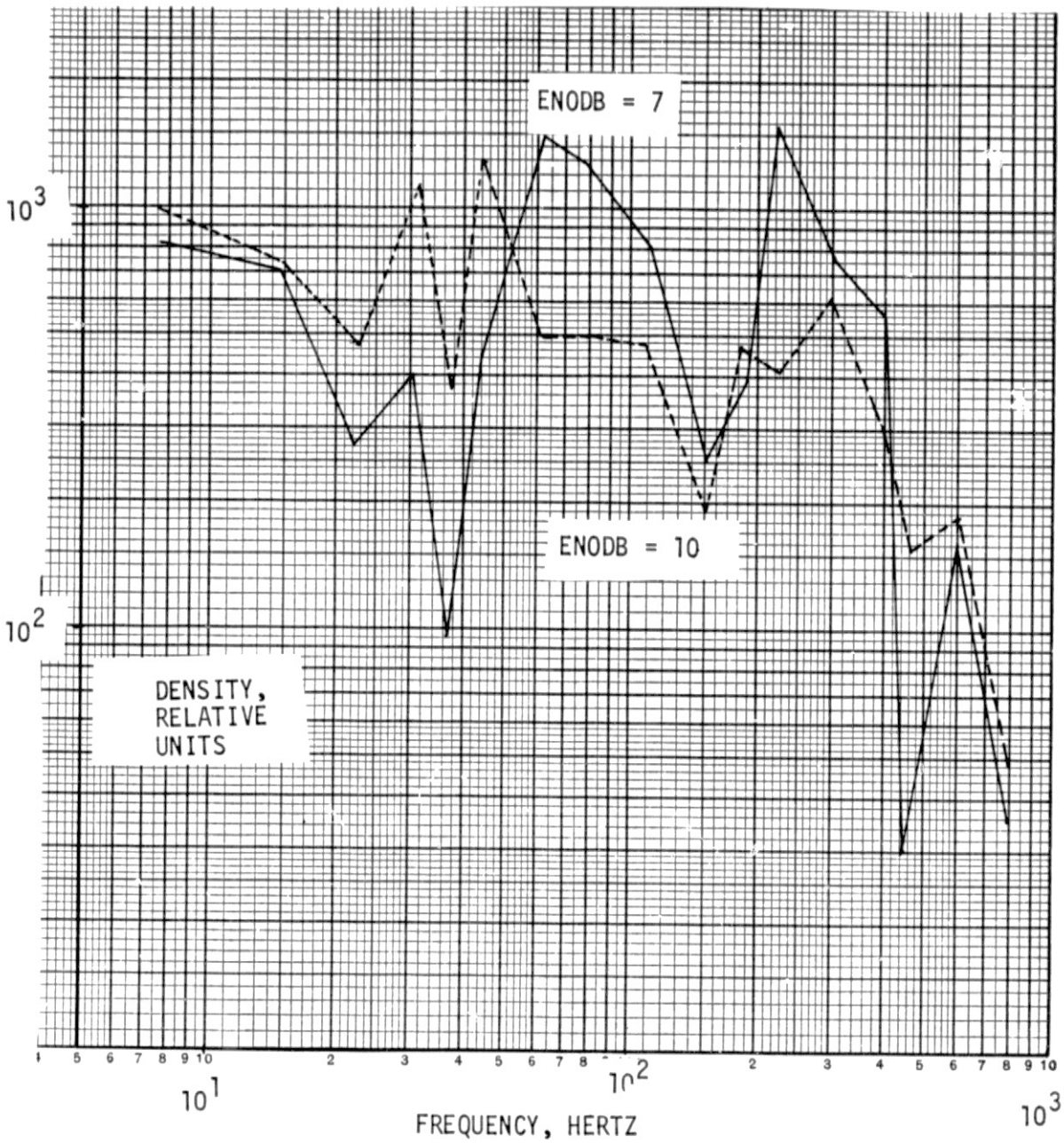


FIGURE XII-8

PHASE DETECTOR OUTPUT POWER SPECTRAL DENSITIES

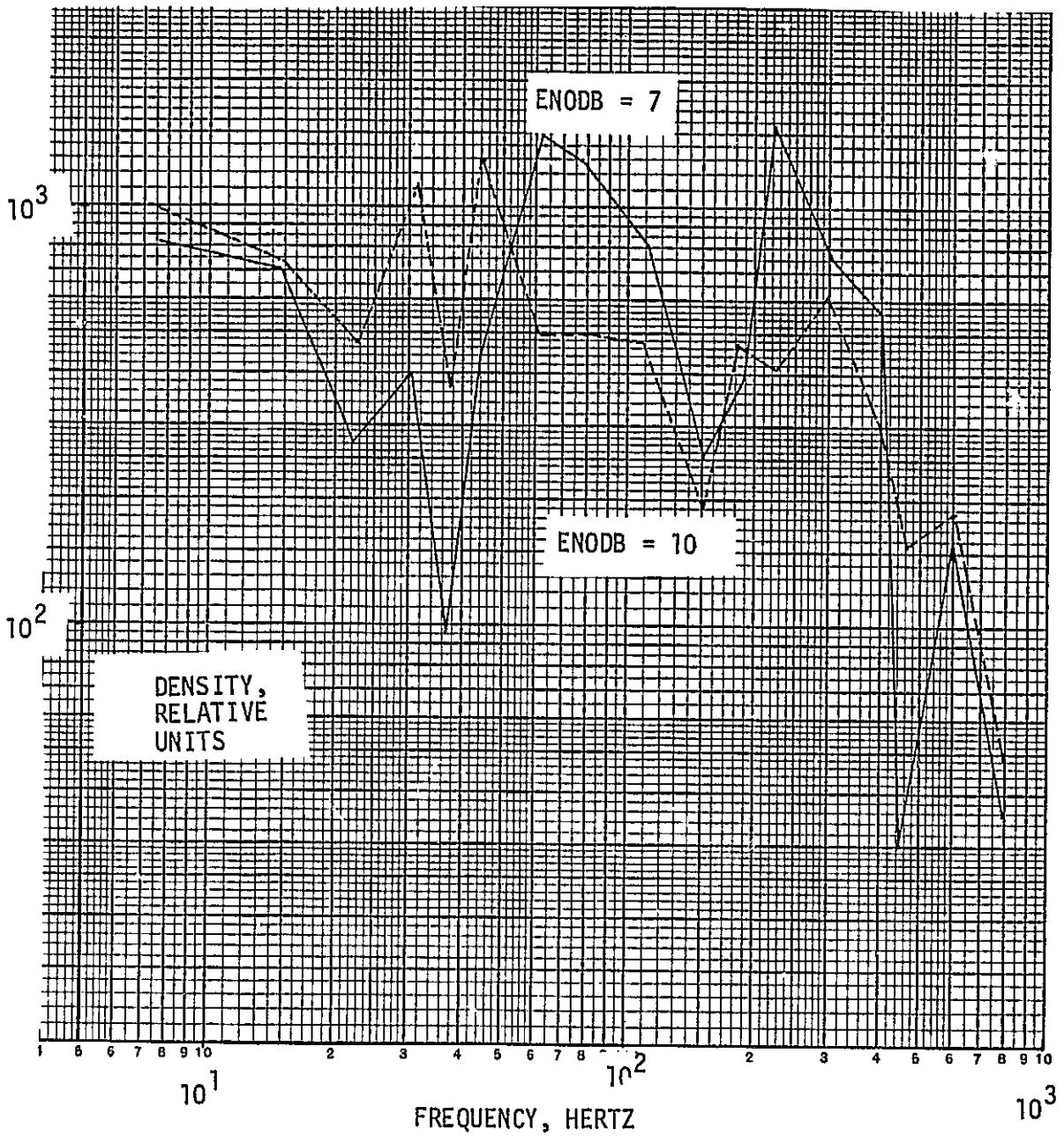


FIGURE XII-8

PHASE DETECTOR OUTPUT POWER SPECTRAL DENSITIES

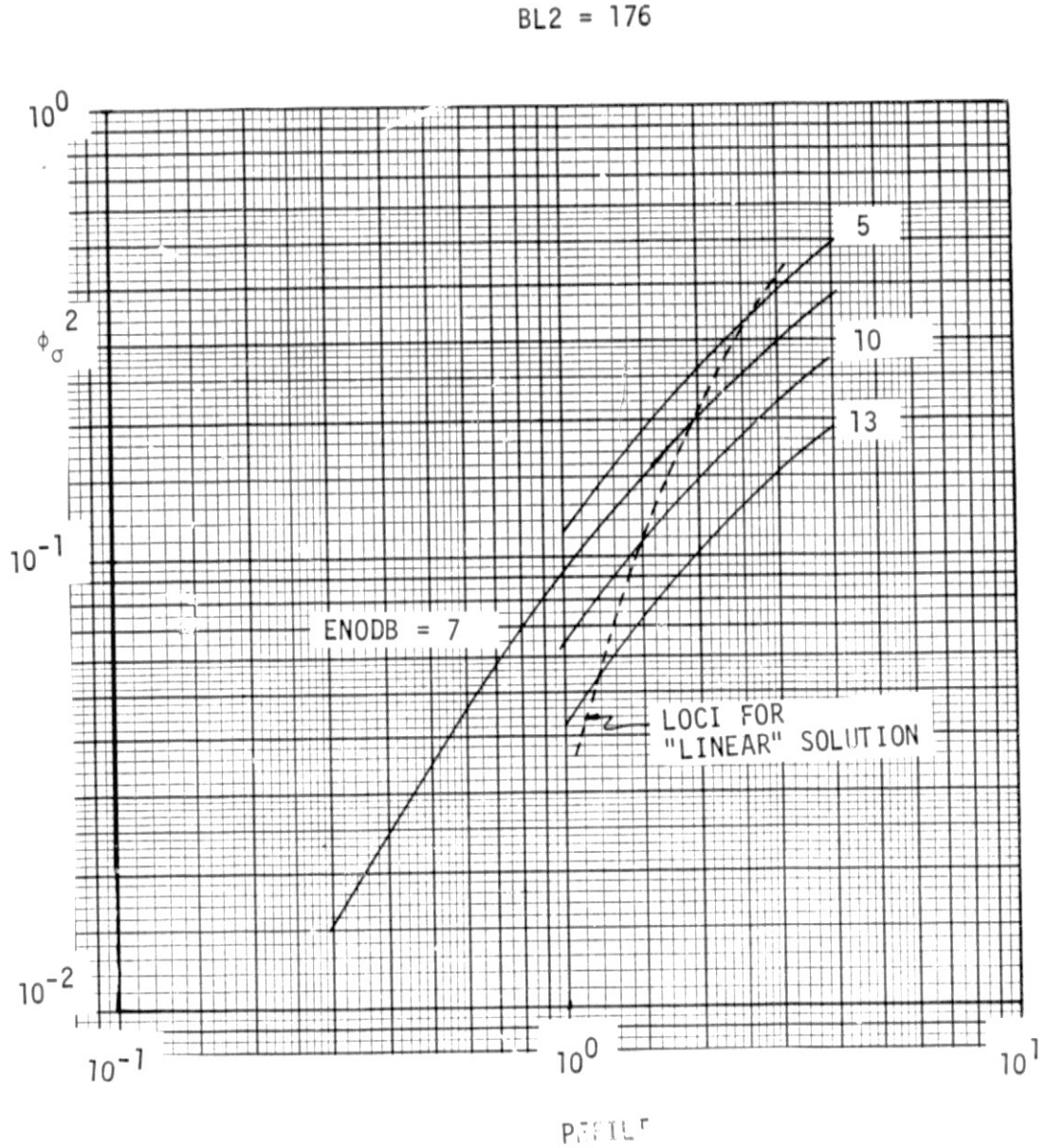
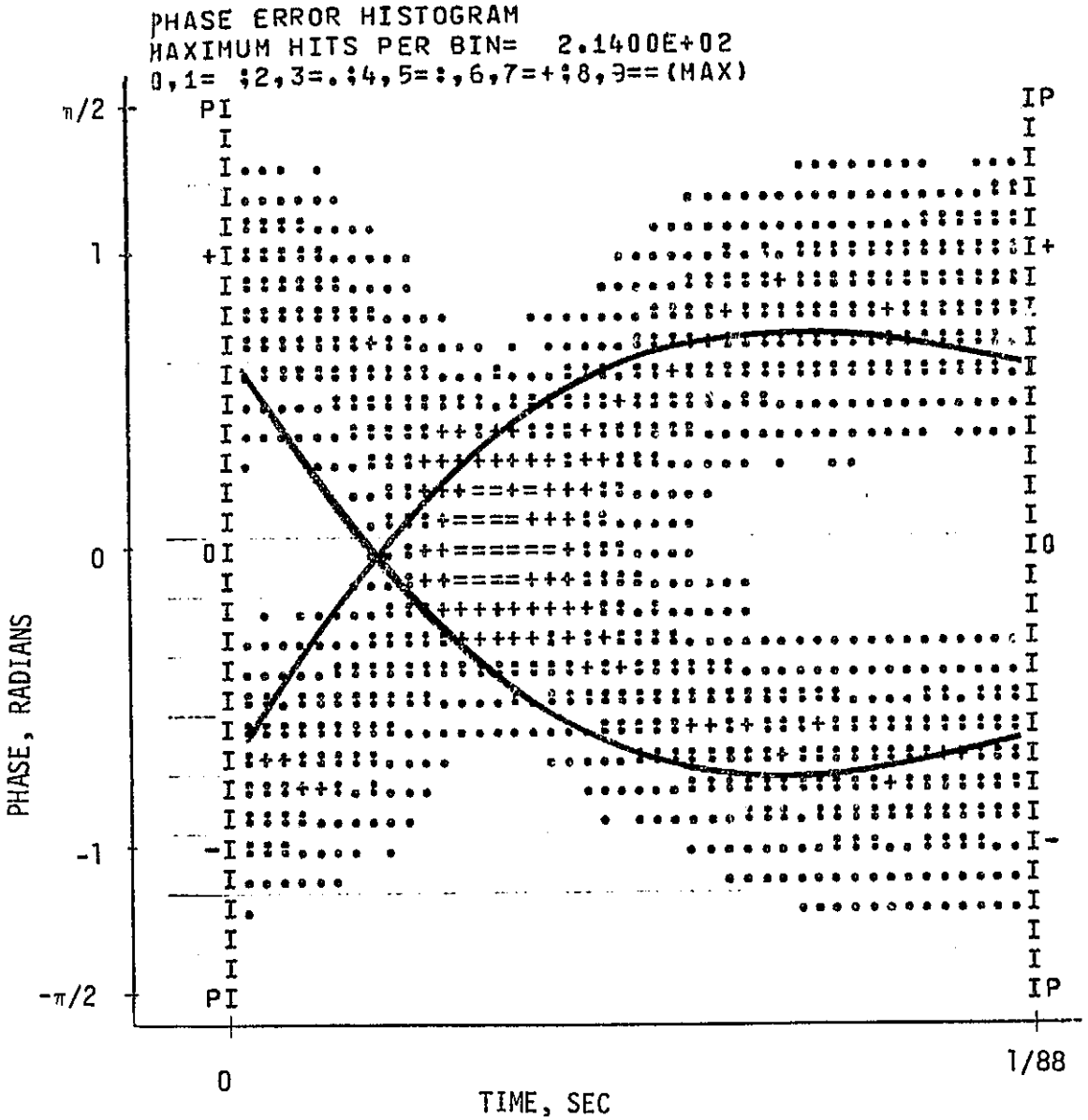


FIGURE XII-9
FILTERED DETECTOR NOISE



SOLID LINE IS THEORETICAL SQUAREWAVE

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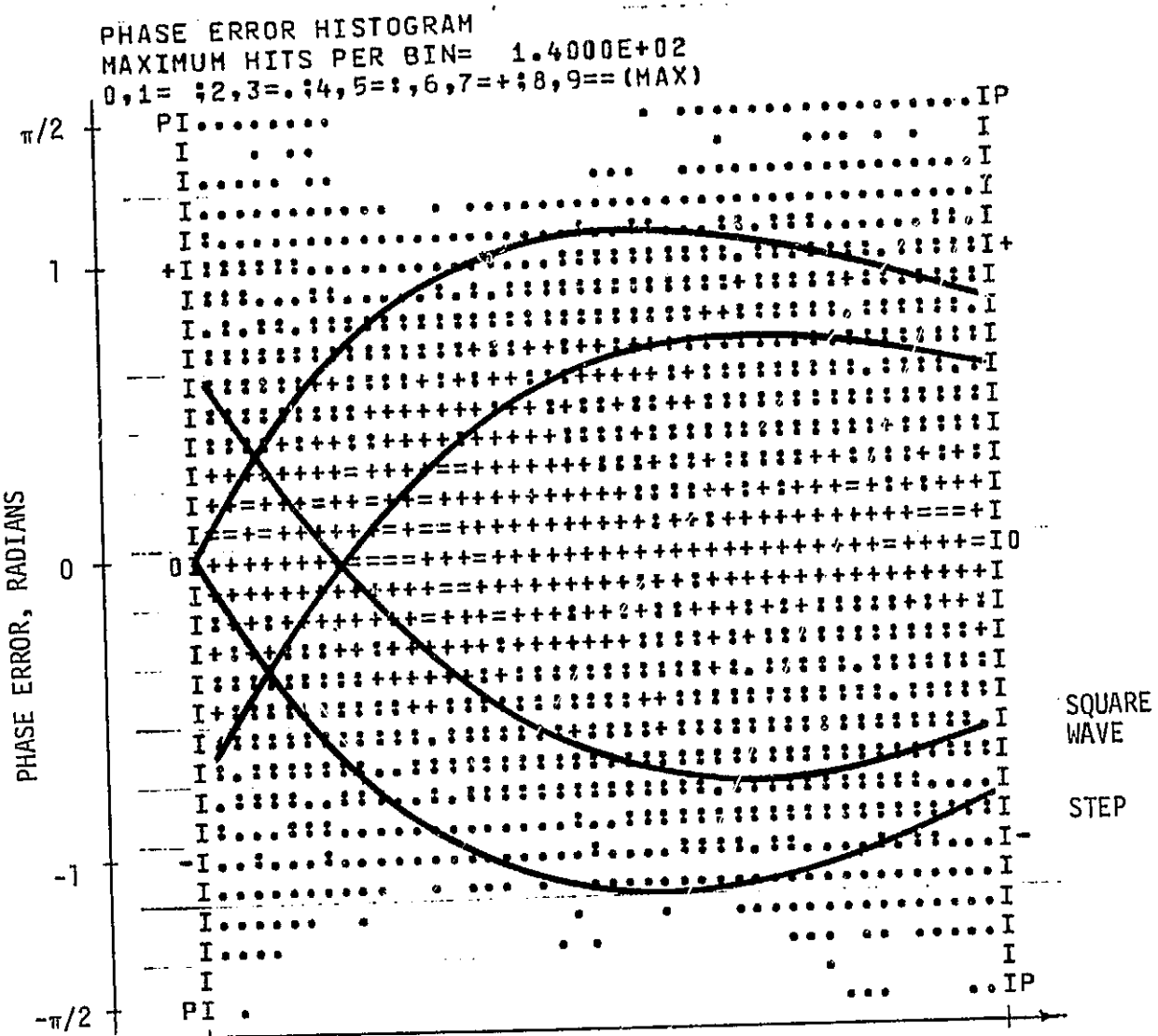
FIGURE XII-10

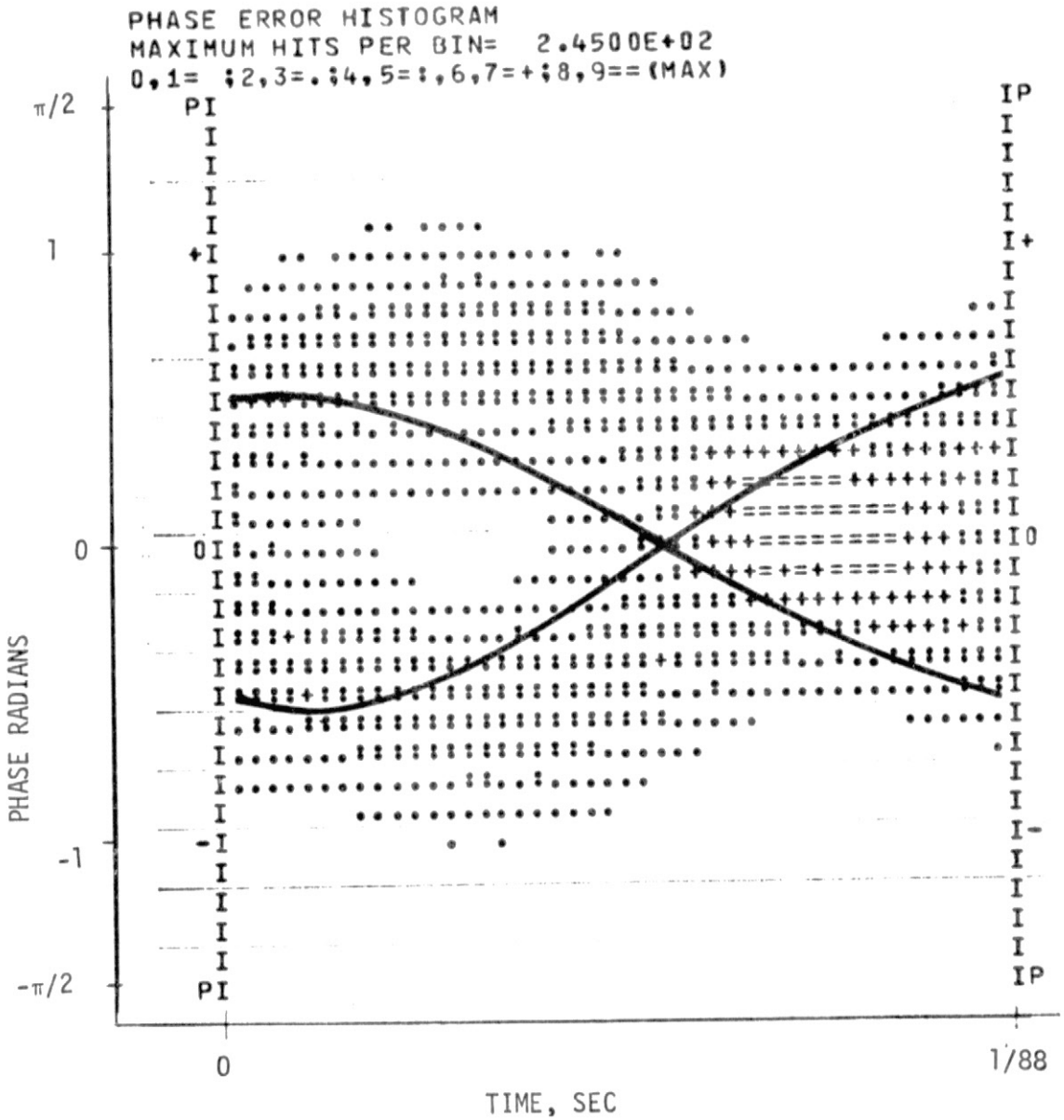
FILTERED RANDOM WAVE PHASE ERROR
WITHOUT PREMODULATION FILTER
ENODB = 11, BL2 = 176



SOLID LINES ARE THEORETICAL

FIGURE XII-10 CONTINUED

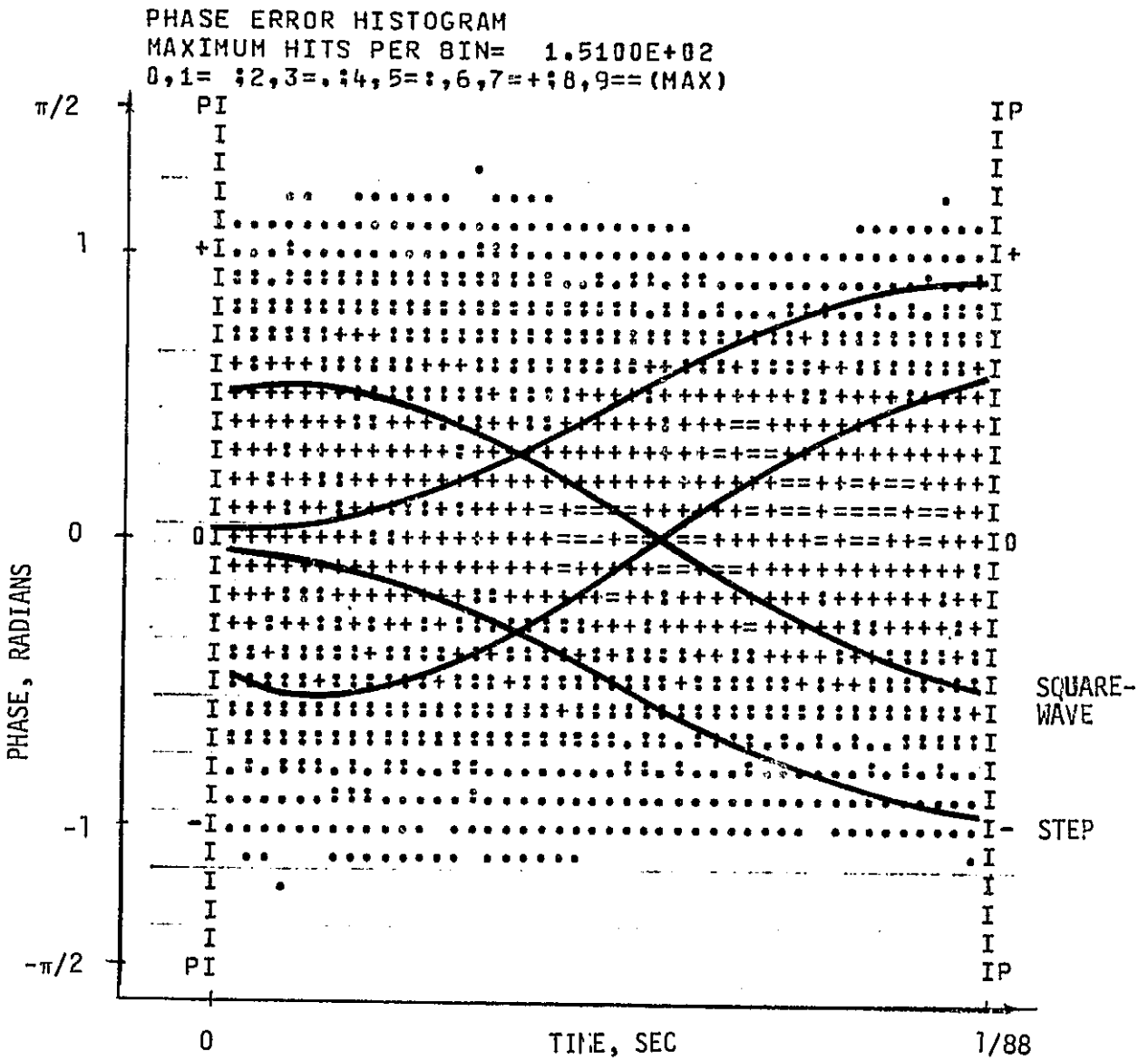
FILTERED RANDOM WAVE PHASE ERROR
WITHOUT PREMODULATION FILTER
ENODB = 11, BL2 = 176



SOLID LINE IS THEORETICAL SQUAREWAVE

FIGURE XII-11

FILTERED SQUAREWAVE PHASE ERROR
WITH PREMODULATION FILTER
ENODB = 11, BL2 = 176



SOLID LINES ARE THEORETICAL

FIGURE XII-11 CONTINUED

FILTERED RANDOM WAVE PHASE ERROR
WITH PREMODULATION FILTER
ENODB = 11, BL2 = 176

APPENDIX XIII

TAPE GENERATION COMPUTER SOFTWARE

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```
      PROGRAM FNNY(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,
     +TAPE1)
      COMPLEX CAMP(4),CFILT(4)
      REAL NS,NC,Nu,K,KB
      DIMENSION SB1(4),SB2(4),SB3(4),SB4(4)
      DIMENSION HDRI1(10),HDRI2(10)
      DIMENSION SBINS1(8,8),SBINS2(8,8),SBINS3(8,8),SBINS4(8,8)
      DIMENSION TGA(64),RCA(64),TGP(64),RCP(64)
      DIMENSION ADa(100),F1(8),F2(8),ERRM(100),IRCD(6)
      DIMENSION ALSIN(300),ALCOS(300),PROB(100),PRN0(100)
      DIMENSION IWORDI(506)
      DIMENSION AERRI(400)
      DATA NFRAME/252/
      DATA HDFT1/4J11154E234024J120B5B,
     +           4J041107112401144022B,
     +           1503051126J5224023118,
     +           1525140124111716404088,
     +           1417074061617221501148,
     +           4J2015061114247554678,
     +           4J351666757044J402408,
     +           4002146275627164544088,
     +           +J0123170624755463678,
     +           +J06020115207562404088/
      DATA HDFI2/4J11150E234024J120J5B,
     +           4004110711240114402288,
     +           1503051126J5224023118,
     +           1525140124111716404088,
     +           1417074061617221501148,
     +           4020150611142475546788,
     +           +J351666757140044J248,
     +           +J021462756271645440B,
     +           +J0123170624755463678,
     +           4040404040404040404088/
      DATA INCTIM,INCREC/100008,100000000000008/
      DATA I11,I22,I55,I66/1,2,5,6/
      DATA J11,J22,J55,J66/9,10,13,14/
      DATA K11,K22,K55,K66/17,18,21,22/
      DATA IRCO/-1,-1,-1,-1,-1,1/
      DATA FBAMP,FBPHA,SDAMP,SDPHA,NO/2.,.2,.23,.47,1./
      DATA GAM43,N+3/.09,64/
      DATA EN0DB,BRATE,ENDMIN/8.,88.,9./
      DATA DELF,NSPB,NRUNS,BIF/62.,44,2000,1500./
      DATA BL2,PHIDEG,FDIFF/176.,10.,342.433/
      DATA BL28,PHI8,FDIFFB/1.,1.,.5./
      DATA TAU5,TAU6,A5/.01808,.10603,.5/
      DATA TAU3,DYNR,AKEG,AKAGC/.1187,6.,26.44,.016/
      DATA ASOFT,FQDPRT,TL,IDLBIT/.37,10.8,-17.,100/
      DATA C00,C11,C22,D11,D22,D33/2.515517,.802853,.010328,
     +1.432788,.189269,.001308/
      DATA ICLLN,PMFIL1/C,4./
      PI=4.*ATAN(1.)$PI2=2.*PI
      ZETA=SORT(0.5)$ZETA8=ZETA
      REMTX=299./PI2
      DO 1000 I=1,300
      ARGU=(FLOAT(I)-1.)/REMTX
      ALSIN(I)=SIN(ARGU)
 1000 ALCOS(I)=COS(ARGU)
```

TAPE HEADING IN TRUNCATED ASCII

TRIGNOMETRIC FUNCTION LIST

```
000034          IRUN=0
000035          REWIND1
000037    3     CONTINUE  <-------------- RETURN FOR NEW PROBLEM
C
C               READ INPUTS
000037          IRUN=IRUN+1
000041          ENDDB=7.$PMFILT=.7$BL2=294.$ASOFT=.37$DYNR=6.
000050          IF(IRUN.EQ.3)GOTO899 ---- LAST RUN
000062          IF(IRUN.EQ.2)GOTO3002                    } PROBLEM VARIABLES
000054          WRITE(1) HDRI1
000061          GOTO497
000062    3002  CONTINUE
000062          SDAMP=0.$SDPHA=0.
000064          WRITE(1) HDRI2
000071          GOTO497
000072    497   CONTINUE
000072          I1=I11$I2=I22$I5=I55$I6=I66   } STARTING ALL RANDOM GENERATORS
000100          J1=J11$J2=J22$J5=J55$J6=J66   } AT THE SAME POSITION FOR
000107          K1=K11$K2=K22$K5=K55$K6=K56   } EACH PROBLEM
000114          ERRI=0.$IFRAME=1$IAERRI=1
000117          DO 2009 I=1,6
000120    2009  IRCD(I)=-1          } INITIALIZE DATA SOURCE
000123          IRCD(6)=1
000124          DO 2090 I=1,400
000126    2090  AERRI(I)=0.
000134          ITIM1=100008
000132          ITIM2=2
000133          IRECO=10006)$000000000CB
000135          IHORDI(1)=ITIM1
000136          ITAPE=2
000137          IXBB=0
000140          IREC=1
000141          IRECT=2
000142          IRECT=1
000143          IRECB=0
000144          SGNRT=1.
000146          CBIN1=0.$CBIN2=0.$CBIN3=0.$CBIN4=0.
000152          ILOC=0$ILOCF=-1$IDO=0$IDON=-1
000156          ASOFTI=2./ASOFT
000160          DO 199 I=1,8
000161          DO 198 J=1,8
000162          SBINS1(I,J)=0.$SBINS2(I,J)=0.$SBINS3(I,J)=0.$SBINS4(I,J)=0.
000172    198   CONTINUE
000174    199   CONTINUE
000176          IXM=0
000177          I9IT=39
C
C               CONVERT INPUTS (ENO,BPER,PHISS,PHISSB)
000200          ENO=10.**(ENDDB/10.)$ENOM=10.**(ENOMIN/10.)
000213          BPER=1./BRATE$DT=BPER/NSPB
000217          PHISS=PHIDEG*PI/180.$PHISSB=PHIB*PI/180.
000224          AMIN=SQRT(ENOM*NO*BRATE)$G1LIN=10.**(DYNR/20.)
000236          A=SQRT(ENO*NO*BRATE)
C
C               CALCULATE LOOP PARAMETERS (TAU1,TAU2,K,TAUB1,TAUB2,KB)
000243          WN=BL2/(ZETA+.25/ZETA)$AK=PI2*FDIFF/SIN(PHISS)   } AFC LOOP
000253          TAU1=AK/(WN*WN)$TAU2=2.*(ZETA-.5/(WN*TAU1))/WN
000262          K=AK/AMIN
```

```
000264          EDOPR=PI2*FDOPRT*DT/K$EDOPRX=EDOPR
000270          WNB=BL2B/(ZETAB+.25/ZETAB)$AK=PI2*FDIFFB/SIN(PHISSB)
000307          TAUB1=AK/(WNB*WNB)$TAUB2=2.*(ZETA-.5/(WNB*TAUB1))/WNB
000307          AKBMIN=PI2*(DELF/2.)/(K*1.4125)
000313          KB=AK/AKBMIN
                C
                C       DEFINE CONSTANTS
000315          C1=1.-DT/TAU1$C2=TAU2/TAU1$C3=C1+C2-1. Z TRANSFORM AFC FILTER
000324          C4=DT*K
000326          C5=DT/TAU3$C6=1.-C5       Z TRANSFORM AGC FILTER
000331          C5=BPER/TAU3$C6=1.-C5
000334          DTH1=PI*DELF*DT           MODULATION INDEX
000337          CB1=1.-BPER/TAUB1$CB2=TAUB2/TAUB1$CB3=CB1+CB2-1. Z TRANSFORM BIT SYNC.
000346          C5MH=DT/TAU5$C6MH=1.-C5MH     Z TRANSFORM BASELINE FILTER
000351          C5DP=DT/TAU6$C6DP=1.-C5DP     Z TRANSFORM DOPPLER FILTER
000354          SIG=0.5*SQRT(N0/DT)
000361          DO 1001 I=1,50
000362          PROBI=FLOAT(I)/100.
000364          PROBT=SQRT(ALOG(1./(PROBI*PROBI)))
000373          PROB(I)=PROBT-(C00+PROBT*(C11+PROBT*C22))/
                +(1.+PROBT*(D11+PROBT*(D22+PROBT*D33)))
000411          PRNO(I)=(PROB(I)-.014)*1.0404
000414   1001   PRNO(I)=PROB(I)*SIG
000420          DO 1002 I=1,50
000422          PROB(50+I)=-PROB(51-I)
000426   1002   PRNO(50+I)=-PRNO(51-I)
                C
                C       INITIALIZE LOOPS (TH2,E0,XI,XQ,QV,QERR0,ERR)
000433          NBIT=BPER/DT+.5$NBIT2=NBIT/2$TSYNC=BPER$TSYNC2=TSYNC/2.
000442          CAMP(1)=(0.,0.)$CAMP(2)=(0.,0.)$CAMP(3)=(0.,0.)
000451          CFILT(1)=(0.,0.)$CFILT(2)=(0.,0.)$CFILT(3)=(0.,0.)
000461          OMC=PI*BIF$CMT=OMC*DT
000465          B1=((OMT+8.)*OMT/24.+1.)*OMT+1.
000472          B2=(((11.*OMT/24.+1.)*OMT-1.)*OMT-3.)/B1
000502          B3=(((11.*OMT/24.-1.)*OMT-1.)*OMT+3.)/B1
000510          B4=(((OMT-8.)*OMT/24.+1.)*OMT-1.)/B1
000516          A1=OMT*OMT*OMT/(24.*B1)$A2=11.*A1
000523          PRINT 201,ENOOB,DELF,BIF,BL2,ASOFT
000540   201    FORMAT(1X,*ENOOB=*,F6.1,* ,DELF=*,F6.1,* ,BIF=*,F6.0,
                +* ,BL2=*,F6.0,* ,ASOFT=*,F6.4)
000540          PRINT 202,FDOPRT,TL,DYNR
000552   202    FORMAT(1X,*FDOPRT= *,E12.4,* TL= *,E12.4,* DYNR= *,E12.4)
000552          PRINT 203,SDAMP,FBAMP,SDPHA,FBPHA
000566   203    FORMAT(1X,*SDAMP= *,E12.4,* FBAMP= *,E12.4,
                +* SDPHA= *,E12.4,* FBPHA= *,E12.4)
000566          PRINT 204,WN,K,TAU1,TAU2,WNB,KB,TAUB1,TAUB2
000612   204    FORMAT(1X,*WN=*,F6.1,* ,K=*,F6.1,* ,TAU1=*,E12.4,* ,TAU2=*,E12.4,
                +* ,WNB=*,F6.1,* ,KB=*,F6.1,* ,TAUB1=*,E12.4,* ,TAUB2=*,E12.4)
000612          IF(PMFILT.LT.3.1)PRINT 205,PMFILT
000622   205    FORMAT(1X,*PMFILT= *,E12.4)
000622          IF(ICLLN.EQ.1)PRINT 206
000630   206    FORMAT(1X,*LOG NORMAL SCINTILLATION*)
000630          FBTAU3=1./(PI2*TAU3)$FBTAU5=1./(PI2*TAU5)$FBTAU6=1./(PI2*TAU6)
000641          PRINT 2010,FBTAU3,FBTAU5,FBTAU6
000653   2010   FORMAT(1X,*FBTAU3= *,E12.4,* FBTAU5= *,E12.4,
                +* FBTAU6= *,E12.4)
000653          IERRSP=0
000654          DO 220 I=1,100
```

BIT SYNCHRONIZER LOOP

NOISE TABLES

Z TRANSFORM IF

RUN CONDITION PRINTOUT

```
000656          AD3(I)=0.
000657     220  ERRM(I)=0.
000662          TAUPM=1./(PI2*BRATE*PMFILT)
000665          APM=(DT/TAUPM+DT/TAUPM)/2.$BPM=2.*DT/TAUPM  } Z TRANSFORM
000672          CPM=-APM+BPM-1.$DPM=-APM-BPM+2.  ---------- } PREMODULATION FILTER
000677          U=0.$V=.1$G1=1.
000703          TH2=0.
000704          CTH2=1.$STH2=0.
000706          E0=0.$EV=0.$EV2=0.$EV10=0.
000712          XI=0.$XQ=0.
000714          QV=0.$CERRC=0.
000716          TH1=0.$TH11=0.$TH12=0.$OTH1=0.$OTH11=0.$OTH12=0.   OLD I/O TAUPM FILTER
000724          ERRDMP=0.
000725          IHOLD=0$IHOLD1=0
000727          VMM=0.$UMM=0.
000731          VDP=0.
000732          XI00=0.$XIO=0.
000734          IDATA=-1$KOUNT=-1$J=NSPB
                C
                C       TURBULENCE INITIALIZATION
000737          ACOR=SQRT(2.**.75-1.)
000746          AAMP=PI2*FBAMP/ACOR$APHA=PI2*FBPHA/ACOR
000752          IAMP=INT(.5+GAM43/(AAMP*DT))$IPHA=INT(.5+GAM43/(APHA*DT))
000761          GAM43A=DT*FLOAT(IAMP)*AAMP$GAM43P=DT*FLOAT(IPHA)*APHA
000767          IF(SDAMP.EQ.0.)GOTO500 ---------- No AMPLITUDE SCINTILLATION
000770          YA=0.$S2A=0.
000772          DO 501 I=1,N43          FILL LINE INITIALLY
000773          VA=FLOAT(I-1)*GAM43A
000776          TGA(I)=GAM43A/.892979511*VA**.3333*EXP(-VA)
001011          S2A=S2A+TGA(I)*TGA(I)
001014          J1=129*J1+(1+129*J2)/2048$J1=MOD(J1,2048)$J2=MOD((1+129*J2),2048)
001035          R1=FLOAT(J1*2048+J2)/4194304.$RCA(I)=PROB(INT(100.*R1)+1)
001046     501  YA=YA+TGA(I)*RCA(I)
001053          S22A=SQRT(S2A)$YA=YA/S22A*SDAMP
001060          YAPO=YA+1.
001062          IF(ICLLN.NE.1)GOTO 502
001064          Y=ABS(YA)
001065          YAPO=1.+Y*(1.+.5*Y*(1.+.333*Y*(1.+.25*Y*(1.+.2*Y*(1.
               ++.1667*Y))))
001106          IF(YA.LT.0.)YAPO=1./YAPO
001111          GOTO502
001112     500  YAPO=1.
001114     502  CONTINUE
001114          YAPOA=YAPO*A
001116          IF(SDPHA.EQ.0.)GOTO600 ---------- No PHASE SCINTILLATION
001117          YP=0.$S2P=0.
001121          DO 501 I=1,N43          FILL LINE INITIALLY
001122          VP=FLOAT(I-1)*GAM43P
001125          TGP(I)=GAM43P/.892979511*VP**.3333*EXP(-VP)
001140          S2P=S2P+TGP(I)*TGP(I)
001143          K1=129*K1+(1+129*K2)/2048$K1=MOD(K1,2048)$K2=MOD((1+129*K2),2048)
001164          R1=FLOAT(K1*2048+K2)/4194304.$RCP(I)=PRCB(INT(100.*R1)+1)
001175     691  YP=YP+TGP(I)*RCP(I)
001202          S22P=SQRT(S2P)$YP=YP/S22P*SDPHA
001207          GOTO602
001207     600  YP=0.
001210     602  CONTINUE
001210          IAMPC=0$IPHAC=0$NN=N43-1
```

```
                C
                C     INDEX SCINTILLATION
001214          4     CONTINUE ————————————————————————RETURN FOR NEW SAMPLE
001214                IF(SDAMP.EQ.0.;AND.SDPHA.EQ.0.)GOTO12
001222                IAMPC=IAMPC+1$IPHAC=IPHAC+1
001224                IF(IAMPC.GT.IAMP) GO TO 10 ———— INDEX AMPLITUDE LINE
001227          13    IF(IPHAC.GT.IPHA) GO TO 11 ———— INDEX PHASE LINE
001233                GO TO 12 ————————→ LINE INDEX NOT REQUIRED
                C
                C     AMPLITUDE SCINTILLATION
001233          10    IAMPC=1
001234                IF(SDAMP.EQ.0.)GOTO503
001235                DO 504 JJ=1,NN                    STEP LINE
001237          504   RCA(N43+1-JJ)=RCA(N43-JJ)
001245                J5=129*J5+(1+129*J6)/2048$J5=MOD(J5,2048)$J6=MOD((1+129*J6),2048)
001266                R1=FLOAT(J5*2048+J6)/4194304.$RCA(1)=PROB(INT(100.*R1)+1)
001276                YA=0.
001277                DO 505 JJ=1,N43
001300          505   YA=YA+TGA(JJ)*RCA(JJ)
001306                YA=YA/S22A*SDAMP
001310                YAPO=YA+1.
001312                IF(ICLLN.NE.1)GOTO506
001314                Y=ABS(YA)                  LOG NORMAL
001315                YAPO=1.+Y*(1.+.5*Y*(1.+.333*Y*(1.+.25*Y*(1.+.2*Y*(1.
                     ++.1667*Y))))
001336                IF(YA.LT.0.)YAPO=1./YAPO
001341                GOTO506
001342          503   YAPO=1.
001344          506   CONTINUE
001344                YAPOA=YAPO*A
001346                GO TO 13
                C
                C     PHASE SCINTILLATION
001347          11    IPHAC=1
001350                IF(SDPHA.EQ.0.)GOTO603
001351                DO 604 JJ=1,NN                    STEP LINE
001353          604   RCP(N43+1-JJ)=RCP(N43-JJ)
001361                K5=129*K5+(1+129*K6)/2048$K5=MOD(K5,2048)$K6=MOD((1+129*K6),2048)
001402                R1=FLOAT(K5*2048+K6)/4194304.$RCP(1)=PROB(INT(100.*R1)+1)
001412                YP=0.
001413                DO 605 JJ=1,N43
001414          605   YP=YP+TGP(JJ)*RCP(JJ)
001422                YP=YP/S22P*SDPHA
001424                GOTO606
001425          603   YP=0.
001426          606   CONTINUE
001426          12    CONTINUE
001426                IF(J.LT.NSPB)GO TO 1
001431                IF(KOUNT.EQ.2000*INT(FLOAT(KOUNT)/2000.))SGNRT=-SGNRT  OCCASIONALLY CHANGE
                                                                              SIGN OF DOPPLER RATE
                C                                                             TO AVOID ALIASING
                C     NEW SYMBOL                                              PROBLEMS
001437                J=0
001440                IDATAH=IDATA0$IDATA0=IDATA
001442                IXD=-1
001443                IF(IRCD(1).NE.IRCD(6))IXD=1      } PN DATA
001446                DO 31 IDTS=1,5                   } GENERATOR
001450          31    IRCD(7-IDTS)=IRCD(6-IDTS)
001456                IRCD(1)=IXD
```

```
001457          IDATA=IXD
001460          DTH1=SIGN(DTH1,FLOAT(IDATA))
001464     1    CONTINUE
001464          IF(ABS(TH1).GT.PI2)GOTO1010
001471     1011 CONTINUE
                C
                C       PREMODULATION FILTERING
001471          IF(PMFILT.GT.3.1)GOTO1013
001475          OTH1=CPM*DTH12+DPM*DTH11+APM*TH12+APM*TH11   FILTER
001504          OTH12=OTH11$OTH11=OTH1$TH12=TH11$TH11=TH1    INDEX OLD VALUES
001507          TH1=TH1+DTH1
001511     1014 OOTH1=CTH1*YP
001513          IF(ABS(OOTH1).GT.PI2)COTH1=AMOD(OOTH1,PI2)
001521          ITH1=INT(REMTX*ABS(OOTH1)+1.)
001526          STH1=ALSIN(ITH1)$CTH1=ALCOS(ITH1)
001531          IF(OOTH1.LT.0.)STH1=-STH1
001534          GOTO1012
001535     1010 SHFTH=SIGN(PI2,TH1)                                  } 2π INDEX
001540          TH1=TH1-SHFTH$TH11=TH11-SHFTH$TH12=TH12-SHFTH
001544          OTH1=OTH1-SHFTH$OTH11=OTH11-SHFTH$OTH12=OTH12-SHFTH
001551          GOTO1011
001551     1013 TH1=TH1+DTH1                                         } NO PREMODULATION FILTER
001553          OTH1=TH1
001554          GOTO1014
001555     1012 ASTH1=YAPOA*STH1$ACTH1=YAPOA*CTH1
                C
                C       KT8 NOISE
001561          I1=129*I1+(1+129*I2)/2048$I5=129*I5+(1+129*I6)/2048
001577          I1=MOD(I1,2048)$I5=MOD(I5,2048)
001606          I2=MOD((1+129*I2),2048)$I6=MOD((1+129*I6),2048)
001622          R1=FLOAT(I1*2048+I2)/4194304.$NC=PRNG(INT(100.*R1)+1)
001632          IF(R1.GT..003.AND.R1.LT..997)GOTO450
001642          IF(R1.LT..003)NC=1.3583*SQRT(-1.5726-ALOG(R1+1.E-13))
001655          IF(R1.GT..997)NC=-1.3583*SQRT(-1.5726-ALOG(1.-R1+1.E-13))
001672          IF(ABS(NC).GT.4.5)NC=SIGN(4.5,NC)
001700          NC=SIG*NC
001702     450  CONTINUE
001702          R1=FLOAT(I5*2048+I6)/4194304.$NS=PRNG(INT(100.*R1)+1)
001713          IF(R1.GT..003.AND.R1.LT..997)GOTO451
001723          IF(R1.LT..003)NS=1.3583*SQRT(-1.5726-ALOG(R1+1.E-13))
001736          IF(R1.GT..997)NS=-1.3583*SQRT(-1.5726-ALOG(1.-R1+1.E-13))
001753          IF(ABS(NS).GT.4.5)NS=SIGN(4.5,NS)
001761          NS=SIG*NS
001763     451  CONTINUE
001763          I8IT=I8IT+1$J=J+1
                C
                C       LOOP EQUATIONS
001766          CAMP(4)=CMPLX(ASTH1+NC,-ACTH1-NS)*CMPLX(CTH2,-STH2)*G1   INPUT MULTIPLIER
002005          CFILT(4)=A1*(CAMP(4)+CAMP(1))+A2*(CAMP(3)+CAMP(2))       } IF FILTER
                +-B2*CFILT(3)-B3*CFILT(2)-B4*CFILT(1)
002047          DO 30 IFILT=1,3                                          }
002051          CAMP(IFILT)=CAMP(IFILT+1)
002055     30   CFILT(IFILT)=CFILT(IFILT+1)
                C
                C       AGC
002063          IF(J.NE.20)GOTO3000          INDEX ONCE PER BIT
002065          V=C6*V+C5*U$U=AIMAG(CFILT(4))    AGC FILTER
002072          G1=EXP(-AKAGC*(ABS(V)-AKEG))     AGC PROCESSOR
```

```
002100          IF(G1.GT.G1LIM)G1=G1LIM   DYNAMIC RANGE LIMITATION
002103    3000  CONTINUE
          C
          C     AFC
002103          E=REAL(CFILT(4))
002105          EV=C1*EV+C2*E-C3*E0       AFC FILTER
002112          EV1=EV0-EDOPRX
002114          EDOPRX=EDOPRX+EDOPR*SGNRT
002117          TH2=TH2+C4*EV1                  VCO
002122          IF(ABS(TH2).GT.PI2)TH2=AMOD(TH2,PI2)
002130          ITH2=INT(REMTX*ABS(TH2)+1.)
002135          STH2=ALSIN(ITH2)$CTH2=ALCOS(ITH2)
002140          IF(TH2.LT.0.)STH2=-STH2
002143          VDP=C6DP*VDP+C5DP*EV10   DOPPLER FILTER
002147          EV1C=EV1-VMH-VDP
002152          XI=XI+EV1C$XQ=XQ+EV1C
002155          EV0=EV$E0=E$EV10=EV1
          C
          C     BIT SYNC TIMING
002160          IF(IBIT.NE.NBIT2)GO TO 2
002162          XQC=XQ$VXQ=EV1C$XQ=VXQ   DUMP QUADRAPHASE
002166    2     CONTINUE
002166          IF(IBIT.NE.NBIT2+1)GOTO802
002171          VXQC=(EV1C-VXQ)/DT*(TSYNC2-DT*FLOAT(NBIT2))+VXQ
002177          XQCOR=(VXQC+VXQ)/2.*(TSYNC2-DT*FLOAT(NBIT2))/DT
002206          XQQ=(XQQ+XQCOR)/FLOAT(NBIT)$XQ=XQ-XQCOR
002212    802   CONTINUE
002212          IF(IBIT.LT.NBIT)GOTO4 ——→ ADDITIONAL SAMPLES
002215          IHOLD1=IHOLD$IHOLD=-1
002217          IF(XI.GT.0.)IHOLD=1          DUMP IN-PHASE
002222          XIQQ=XIC$XIQ=XI/FLOAT(NBIT)
002225          VMH=(C6MH*VMH+C5MH*UMH)*A5$UMH=0.  BASELINE FILTER
002232          IF(IHCLD.NE.IHOLD1) UMH=XIQQ+XIQ
002236          XIHOLD=XI/FLOAT(NBIT)$XI=0.
002241          QERR=XQQ*((IHOLD-IHOLD1)/2)$QV=CB1*QV+CB2*QERR-CB3*QERR0 TRACKING
002252          QERR0=QERR                                                FILTER
002353          IBIT=0
002254          FVCOB=BRATE+KB*QV
002257          TSYNC=TSYNC-NBIT*DT+1./FVCOB$TSYNC2=TSYNC-1./(2.*FVCOB)
002267          NBIT=TSYNC/DT$NBIT2=TSYNC2/DT
002274          IF(V.GT.TL)GO     TO 95 ——— OUT OF LOCK
002300          ILOCF=ILOC
002301          IDON=-1
002302    402   CONTINUE
002302          KOUNT=KOUNT+1
002304          IF(KOUNT+2.NE.IDLBIT)GOTO33
          C
          C     REINITIALIZE DATA AT BEGINNING OF DATA TAKING
002306          DO 34 IDUM=1,5
002310    34    IRCD(IDUM)=-1
002313          IRCD(6)=1
002314    33    CONTINUE
002314          IF(KOUNT.LT.IDLBIT)GOTO93 ——→ NOT TAKING DATA DURING THE
002317          IRECB=IRECB+1                    SETLING TIME
002320          IF(IRECB.GT.IJJ60)GOTO800 ——→ TIME TO INDEX RECORD AND WRITE
002323    801   CONTINUE ————— RECORD WRITTEN
002323          IF(IHCLD.NE.IDATAJ)ERRDMP=ERRDMP+1.
002327          IFRAME=IFRAME+1
```

```
002331          IF(IFRAME.GT.NFRAME)GOTO2002
002334   2003   CONTINUE
002334          IF(IHOLD.NE.IDATA)ERRI=ERRI+1.
002340          GOTO2004
002341   2002   AERRI(IAERRI)=ERRI
002343          ERRI=0.$IFRAME=1$IAERRI=IAERRI+1
002346          IF(IAERRI.GT.400)IAERRI=400
002351          GOTO2003
002352   2004   CONTINUE
C
C       ERROR SPACING
002352          IF(IHOLD.EQ.IDATA0)GOTO221
002354          IF(IERRSP.LT.1)IERRSP=1$IF(IERRSP.GT.100)IERRSP=100
002363          ERRM(IERRSP)=ERRM(IERRSP)+1.$IERRSP=0$GOTO222
002367    221   IERRSP=IERRSP+1
002371    222   CONTINUE
C
C       SOFT DECISION
002371          IX=INT(ASOFTI*4.+.)+1
002376          IF(IX.GT.8)IX=8$IF(IX.LT.1)IX=1
002404          IF(IXM.EQ.0)GOTO96
002405          IF(IDATAH.EQ.-1.AND.IDATA0.EQ.-1)SBINS1(IX,IXM)=SBINS1(IX,IXM)+1.
002420          IF(IDATAH.EQ.-1.AND.IDATA0.EQ.-1)CBIN1=CBIN1+1.
002431          IF(IDATAH.EQ.-1.AND.IDATA0.EQ.+1)SBINS2(IX,IXM)=SBINS2(IX,IXM)+1.
002444          IF(IDATAH.EQ.-1.AND.IDATA0.EQ.+1)CBIN2=CBIN2+1.
002455          IF(IDATAH.EQ.+1.AND.IDATA0.EQ.-1)SBINS3(IX,IXM)=SBINS3(IX,IXM)+1.
002470          IF(IDATAH.EQ.+1.AND.IDATA0.EQ.-1)CBIN3=CBIN3+1.
002501          IF(IDATAH.EQ.+1.AND.IDATA0.EQ.+1)SBINS4(IX,IXM)=SBINS4(IX,IXM)+1.
002513          IF(IDATAH.EQ.+1.AND.IDATA0.EQ.+1)CBIN4=CBIN4+1.
002523          IF(IX.GT.4)IX8=IX-1
002530          IF(IX.LT.5)IX8=-IX+4
002533          IF(IRECB.GT.16)GOTO496 ------------> ASSIGN WORD(2)
002537          IX88=ISHIFT(IX88,3).OR.IX8   PACK WORD(2)
002543          GOTO490 ---------------> LOCK/UNLOCK
002543    496   IF(IRECB.NE.17)GOTO495 ---------> INDEX CDC
002545          IWORDI(2)=IX88
002547          IWORDI(2)=IRECO.OR.IWORDI(2)
002550          IX88=0
002551          ITAPE=3
002552          ICDC=0
002553    495   ICDC=ICDC+1
002555          IF(ITAPE.EQ.506)GOTO492     LAST WORD
002557          IF(ICDC.EQ.21)GOTO494
002561    493   IX88=ISHIFT(IX88,3).OR.IX8
002565          GOTO490
002565    494   ICDC=1
002566          IWORDI(ITAPE)=IX88
002570          IX88=0
002571          ITAPE=ITAPE+1
002572          IF(ITAPE.EQ.506)GOTO492
002574          GOTO493
002574    492   IX88=ISHIFT(IX88,3).OR.IX8
002600          IF(ICDC.EQ.4)GOTO491
002602          GOTO498
002602    491   IWORDI(506)=ISHIFT(IX88,48).OR.ITIM2   ASSIGN LAST WORD
002606    490   CONTINUE
002606     96   CONTINUE
002606          IXM=IX$GOTO93
```

ERROR RATE AS A FUNCTION OF TIME

```
002610     95   CONTINUE
           C
           C    LOCK/UNLOCK
002610          IF(ILOCF.EQ.ILOC)GOTO400
002612          ILOC=ILOC+1                          BITS TO LOCK
002613          IF(ILOC.GT.NRUNS)GOTO408
002616          GOTO93
002616     400  IF(IDO.EQ.IDON)GOTO401
002620          IDO=IDO+1                  DROPOUT BITS
002621          IF(IDO.GT.100)GOTO402
002624          IDON=IDO                   CURRENT DROPOUT
002624          ADB(IDON)=0.
002625     401  ADB(IDON)=ADB(IDON)+1.
002630          GOTO402
002630     408  PRINT 409
002634     409  FORMAT(1X,*ACQUISITION FAILURE*)
002634          GOTO410
002635     93   CONTINUE
002635          GOTO4 ————————→ ADDITIONAL BITS FOR THIS RUN
           C
           C    ERROR RATE CALCULATION
002636     92   CONTINUE
002636          WRITE(1) IWORDI
002643          ENDFILE 1
002645          KKK=KOUNT-IDL$BIT$PEI=ERRDMP/KKK$SPEI=SQRT(PEI*(1.-PEI)/KKK )   } ERROR RATE
002657          PRINT 411,PEI,SPEI,KKK
002670     411  FORMAT(1X,*PEI= *,E12.4,* STDEV= *,E12.4,* BITS= *,I6) ————————
002670          ADOA=0.$ADOS=0.
002672          IF(IDO.EQ.0)GOTO405
002673          IF(IDO.EQ.1)GOTO3501
002675          IF(IDO.GT.100)GOTO3502
002700          DO 403 I=1,IDO
002701          ADOA=ADOA+ADB(I)
002703     403  ADOS=ADOS+ADB(I)*ADB(I)                                  } DROPOUT PRINTOUTS
002710          ADOA=ADOA/IDO$ADOS=SQRT(ADOS/IDO-ADOA*ADOA)
002717          PRINT 404,ILOCF,IDO,ADOA,ADOS
002732     404  FORMAT(1X,*LOCKIN=*,I6,* ,DROPOUTS=*,I6,* ,AVE=*,E12.4,
                +* ,STD DEV=*,E12.4)
002732          GOTO406
002733     405  PRINT 407,ILOCF
002741     407  FORMAT(1X,*LOCKIN=*,I6,* ,DROPOUTS=0*)
002741          GOTO406
002742     3501 PRINT 3503,ILOCF,ADB(1)
002752     3503 FORMAT(1X,*LOCKIN=*,I6,*DROPOUTS=1 OF*,E12.4)
002752          GOTO406
002753     3502 DO 3504 I=1,100
002755          ADOA=ADOA+ADB(I)
002757     3504 ADOS=ADOS+ADB(I)*ADB(I)
002763          ADOA=ADOA/100.$ADOS=SQRT(ADOS/100.-ADOA*ADOA)
002772          PRINT 3505,ILOCF,IDO,ADOA,ADOS
003005     3505 FORMAT(1X,*LOCKIN=*,I6,*DROPOUTS=*,I6,
                +* OF FIRST 100;AVE=*,E12.4,* STD DEV=*,E12.4)
003005     406  CONTINUE
003005          PRINT 223,ERRM ————————————————————————————————————} ERROR MATRIX
003013     223  FORMAT(1X,*ERRM*,/,10(1X,10E12.4,/))
003013          PRINT 313,CBIN1,CBIN2
003023     313  FORMAT(1X,*-1-1 P(R1,R2/T1,T2;TIMES*,F6.0,37X,
                +*-1+1 P(R1,R2/T1,T2)TIMES*,F6.0)
```

```
003023          DO 314 I=1,8
003025          DO 315 J=1,8
003026          F1(J)=SBINS1(I,J)
003032    315   F2(J)=SBINS2(I,J)
003036    314   PRINT 316,F1,F2
003050    316   FORMAT(1X,8F6.0,6X,8F6.0)
003050          CALL CHQUA(SBINS1,SB1)$CALL CHQUA(SBINS2,SB2)
003054          PRINT 350,SB1(1),SB1(2),SB2(1),SB2(2)
               +,SB1(3),SB1(4),SB2(3),SB2(4)
003100    350   FORMAT(1X,*QUADRENT SUMS...HARD DECISIONS*,/,1X,2F8.0,37X,2F8.0
               +,/,1X,2F8.0,37X,2F8.0)
003100          PRINT 317,C8IN3,C8IN4
003110    317   FORMAT(1X,'+1-1 P(R1.R2/T1.T2)TIMES*,F6.0,37X,
               +'+1+1 P(R1.R2/T1.T2)TIMES*,F6.0)
003110          DO 318 I=1,8
003112          DO 319 J=1,8
003113          F1(J)=SBINS3(I,J)
003117    319   F2(J)=SBINS4(I,J)
003123    318   PRINT 316,F1,F2
003135          CALL CHQUA(SBINS3,SB3)$CALL CHQUA(SBINS4,SB4)
003141          PRINT 350,SB3(1),SB3(2),SB4(1),SB4(2)
               +,SB3(3),SB3(4),SB4(3),SB4(4)
003165          PRINT 104
003171          PRINT 700,I1,I2,I5,I6,J1,J2,J5,J6,K1,K2,K5,K6
003225    700   FORMAT(1X,1216)
003225          PRINT 701,RCA
003233          PRINT 701,RCP
003241    701   FORMAT(//,8(1X,8E12.4,/))
003241          CALL BLOCK(AERRI,IAERRI)
003243    418   CONTINUE
003243    307   PRINT 104
003247    104   FORMAT(1H1,////)
003247          GO TO 3
003250    800   IREC=IREC+1
003252          IF(IREC.GT.IRECT)GOTO92
003255          IREC8=1
003256          WRITE(1) IWORDI
003263          ITIM1=ITIM1+INCTIM
003265          ITIM2=ITIM2+1
003266          IREC0=IREC0+INCREC
003270          IWORDI(1)=ITIM1
003271          IX88=0
003272          GOTO841
003272    899   CONTINUE
003272          STOP
003274          END
```

SOFT DECISION SIN MATRICES

RANDOM GENERATOR POSITIONS

SCINTILLATION LINE CONTENTS

NEW PROBLEM

END OF THIS PROBLEM

```
000005          SUBROUTINE CHOUA(SI,SO)
000005          DIMENSION SI(8,8),SO(4)
000006    10    DO 10 I=1,4
000011          SO(I)=0.
000013          DO 11 I=1,4
000014          DO 12 J=1,4
000025          SO(1)=SO(1)+SI(I,J)$SO(2)=SO(2)+SI(I,9-J)
000037    12    SO(3)=SO(3)+SI(9-I,J)$SO(4)=SO(4)+SI(9-I,9-J)
000040    11    CONTINUE
000042          RETURN
000043          END
```

FORMS HARD DECISION STATISTICS

```
000005          SUBROUTINE BLOCK(AERRI,IAERRI)
000005          DIMENSION AERRI(400),BERRI(200),CERRI(100)
000013          PRINT 1004,AERRI
000013    1004  FORMAT(1H1,////,1X,*252 BIT INTERVALS*,/,40(1X,10E12.4,/))
000014          NF=252
000014          CALL HISTO(AERRI,IAERRI,NF)
000017          CALL MESD(AERRI,IAERRI)
000022          DO 1000 I=1,200
000025    1000  BERRI(I)=AERRI(2*I-1)+AERRI(2*I)
000034          PRINT 1001,BERRI
000041    1001  FORMAT(1H1,////,1X,*504 BIT INTERVALS*,/,20(1X,10E12.4,/))
000041          NF=504$IA=IAERRI/2
000045          CALL HISTO(BERRI,IA,NF)
000047          CALL MESD(BERRI,IA)
000051          DO 1002 I=1,100
000054    1002  CERRI(I)=BERRI(2*I-1)+BERRI(2*I)
000062          PRINT 1003,CERRI
000070    1003  FORMAT(1X,*1008 BIT INTERVALS*,/,10(1X,10E12.4,/))
000070          NF=1008$IA=IAERRI/4
000074          CALL HISTO(CERRI,IA,NF)
000076          CALL MESD(CERRI,IA)
000100          RETURN
000101          END
```

FORMS MEAN ERROR RATE AS A FUNCTION OF TIME FOR VARIOUS BLOCK SIZES

ORIGINAL PAGE IS
OF POOR QUALITY

```
000006          SUBROUTINE HISTO(A,IA,NF)      FORMS HISTOGRAMS
000006          DIMENSION A(400),BIN(20)       OF MEAN ERROR
000006          DIMENSION OUT(40)              RATE AS A FUNCTION
000006          IA10=NF/10                        OF TIME
000011          DO 1001 I=1,20
000012    1001  BIN(I)=0.
000015          DO 1000 I=1,IA
000017          IBIN=20*INT(A(I))/IA10
000024          IF(IBIN.LT.1)IBIN=1
000030          IF(IBIN.GT.20)IBIN=20
000033    1000  BIN(IBIN)=BIN(IBIN)+1.
000040          PRINT 1004,NF
000045    1004  FORMAT(1X,*HISTOGRAM OF *,I6,* FRAMES*)
000045          X=0.
000046          DO 1002 I=1,20
000052          X=X+.005
000054          OUT(2*I-1)=X
000056    1002  OUT(2*I)=BIN(I)
000062          PRINT 1003,OUT
000070    1003  FORMAT(1X,10E12.4,/,1X,10E12.4,/,1X,10E12.4,/,1X,10E12.4)
000070          RETURN
000071          END

000005          SUBROUTINE MESD(A,I)           MEAN AND
000005          DIMENSION A(400)               STANDARD
000007          S=0.$SS=0.                     DEVIATION
000007          DO 1000 II=1,I
000010          S=S+A(II)
000013    1000  SS=SS+A(II)*A(II)
000017          FI=FLOAT(I)
000020          S=S/FI$SS=SQRT(SS/FI-S*S)
000027          PRINT 1001,S,SS
000036    1001  FORMAT(1X,*MEAN+STD DEV *,2E12.4)
000036          RETURN
000037          END
```

```
                                               WRITES TAPE
                                               FROM DISK
                PROGRAM FNNY01(TAPE3=102,TAPE1)
000003          DIMENSION IWORD(506),HDR(10)
000003          EQUIVALENCE(IWORD,HDR)
000003          CALL BUFFLT(5LTAPE3,508,IWORD(1),IWORD(10),NWD)
000007          REWIND 1
000011          DO 1000 I=1,2
          C     THE DO IS THE NO. CASES(ENDOFFILE)
000013          READ(1) HDR
000020          CALL BUFFLT(5LTAPE3,248,HDR(1),HDR(10),NWD)
000024     100  READ(1) IWORD
000031          IF(EOF,1) 900,200
000034     200  CALL BUFFLT(5LTAPE3,248,IWORD(1),IWORD(506),NWD)
000040          GOTO100
000041     900  ENDFILE 3
000043    1000  CONTINUE
000045          STOP1
000047          END
```

APPENDIX XIV
THEORETICAL CHARACTERIZATION

This appendix attempts to theoretically characterize the simulation data. If the simulation data is compared with "ideal" receivers as in Figure XIV-1, two things are apparent; first, these theories do not describe the simulation very well, and second, the effects of scintillation are not considered. By "ideal" the following mean error expressions are inferred: ideal coherent, $.5 \text{ erfc } (E/N_o)^{1/2}$, nonideal coherent, $.5 \text{ erfc } (E/(2N_o))^{1/2}$ and ideal noncoherent, $.5 \exp(-E/(2N_o))^{1/2}$. One theory that does both is presented by Turin (Ref. 6). In exploring this theory, both coherent and noncoherent systems will be considered.

The key parameter in this theory is the complex cross correlation coefficient of the signal waveforms

$$\lambda = \frac{1}{2E}\int_0^T \zeta_1^*(t)\ \zeta_2(t)\ dt,$$

where the signal waveforms, in complex amplitude notation are

$$\zeta_i(t) = x_i(t)\ \exp(j\omega_o t)$$

where $i = 1,2$

herein, and ω_o is the carrier, and $x_i(t)$ is

$$x_i(t) = A(t)\ \exp(j\phi)$$

ϕ being the phase. By way of explanation, for "conventional" coherent phase shift keying (PSK)

$$x_i(t) = \exp(\pm j\theta);\ \theta = \pi/2$$

and for "conventional" noncoherent frequency shift keying (FSK)

$$x_i(t) = A(t)\ \exp(\pm j\pi\Delta f t)$$

with Δf the tone separation. The signal energy in the initial expression is of course

$$E = \frac{1}{2}\int_0^T |\zeta_i(t)|^2 dt,$$

The signals are assumed to be of equal energy, and the channel herein is assumed to be Rician, i.e., the received signal is

$$n_i(t) = x_i(t-\tau)[\alpha \exp(-j\delta) + s \exp(-j\varepsilon)] \exp(j2\pi f_0 t)$$

with τ the delay, α and δ the fixed path strength and phase, and s and ε the random path strength and phase. The random path strength is Rayleigh with a mean square of $2\sigma^2$ and a uniform phase. Thus "burstiness" <u>per se</u> is not definable.

The ideal coherent receiver's decision is via the greater of

$$\frac{\sigma^2}{N_0} |r_i(\tau)|^2 + \alpha \mathrm{Re}\{r_i(\tau) \exp - j\delta\} \qquad i = 1 \text{ or } 2$$

where $r_i(\tau) = \frac{1}{2}\int z^*(t) x_i(t-\tau)\, dt$

given the received version z(t) of x(t). In addition to knowing δ(a "tight" loop) the receiver also knows $\sigma^2/\alpha N_0$.

The noncoherent receiver decides only on $|r_i(\tau)|$.

In either case the error function is

$$P_e = Q(ac,bc) - \frac{1}{2}\left[1 + \frac{\mu\sqrt{1-|\lambda|^2}}{\sqrt{1-\mu^2|\lambda|^2}}\right] \exp\left[-(a^2+b^2)c^2/2\right) I_0(abc^2)$$

where the Marcum Q function is

$$Q(x,y) = \int_y^\infty t \exp(-(t^2+x^2)/2) I_0(xt) dt,$$

$I_0(x)$ is the modified bessel function, and

$$\mu = \beta/(\beta+2)$$
$$\beta = 2\sigma^2 E/No$$
$$\gamma = \alpha/\sigma \ .$$

For the coherent receiver

$$a = \sqrt{1 - \frac{\sqrt{(1-|\lambda|^2)(1-\mu^2|\lambda|^2)}}{1-\mu|\lambda|^2}}$$

$$b = \sqrt{1 + \frac{\sqrt{(1-|\lambda|^2)(1-\mu^2|\lambda|^2)}}{1-\mu|\lambda|^2}}$$

and $$c = \sqrt{\frac{\mu\gamma^2}{2}\ \frac{1-\mu|\lambda|^2}{1-\mu^2|\lambda|^2}}$$

The next step is to apply the algorithm to the candidate Modem. Herein

$$x_i(t) = A(t)\exp j(\mp 2\pi\Delta f/2 \pm 2\pi\Delta f F(t))$$

where $$F(t) = \mathcal{L}^{-1}\ \frac{1}{s}\ \frac{1}{(\tau s+1)^n}$$

Thus $$\lambda = \frac{1}{2(T/2)} \int_0^T \exp j(+2\pi\Delta f t - 4\pi\Delta f t F(t))dt$$

Figure XIV-2 illustrates the results of the integration.

Finally, the candidate modem is characterized by evaluating complex cross correlation coefficient of the signal in question, a tone separation of 62 Hertz and a premodulation filter of .7. The magnitude of the coefficient is .2401 and the real part is .2278. Figure XIV-3 is a plot of the simulation data, and both coherent and noncoherent ideal receivers (for this signal structure), with and without scintillation. For the nonscintillation case the candidate Modem appears to be similar to a differentially coherent phase shift keyed (DPSK) system, i.e., it appears noncoherent at low E/N_0 and coherent at high E/N_0. With scintillation the candidate Modem appears to be noncoherent with a 1 dB degradation from an ideal receiver.

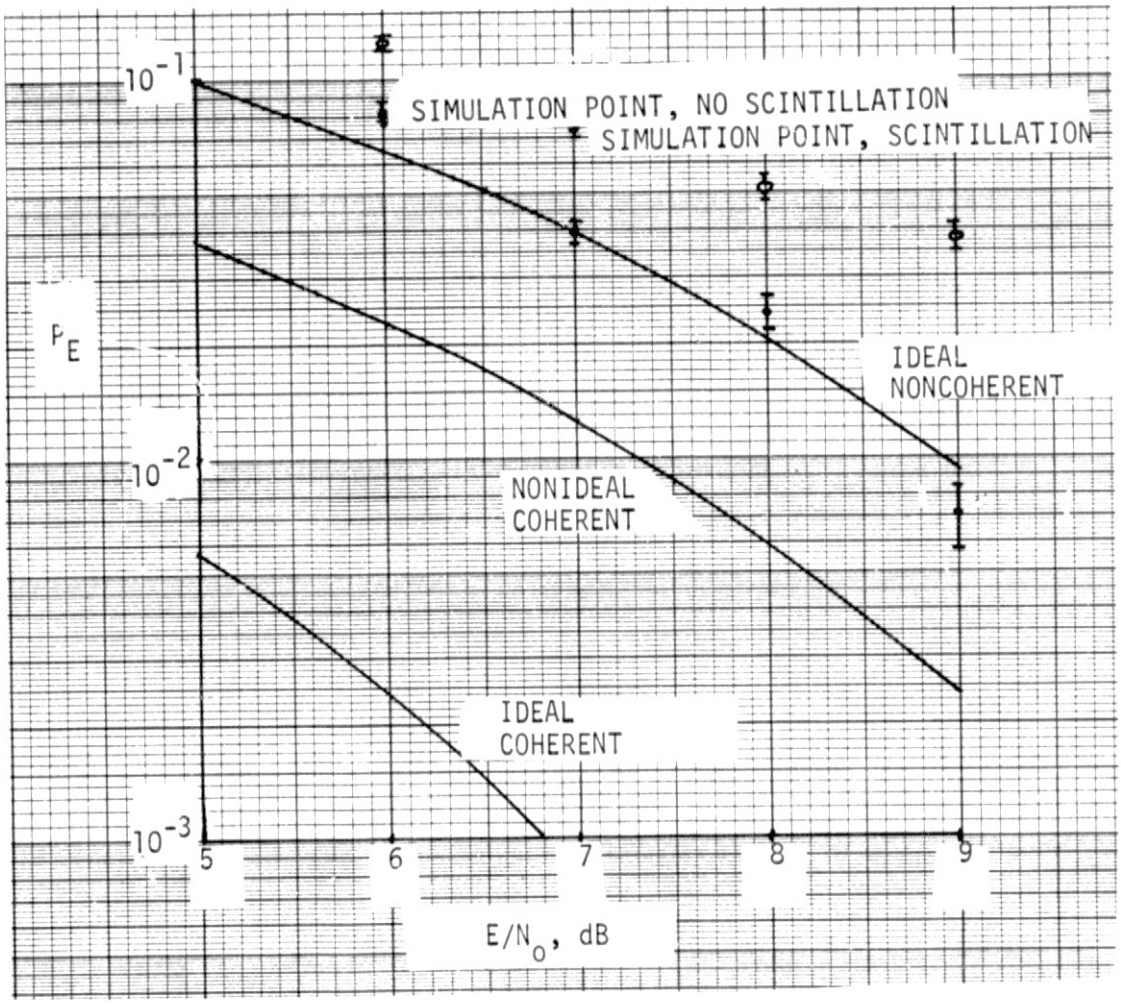

FIGURE XIV-1

COMPARISON OF SIMULATION WITH IDEAL

MODULATION INDEX = .7

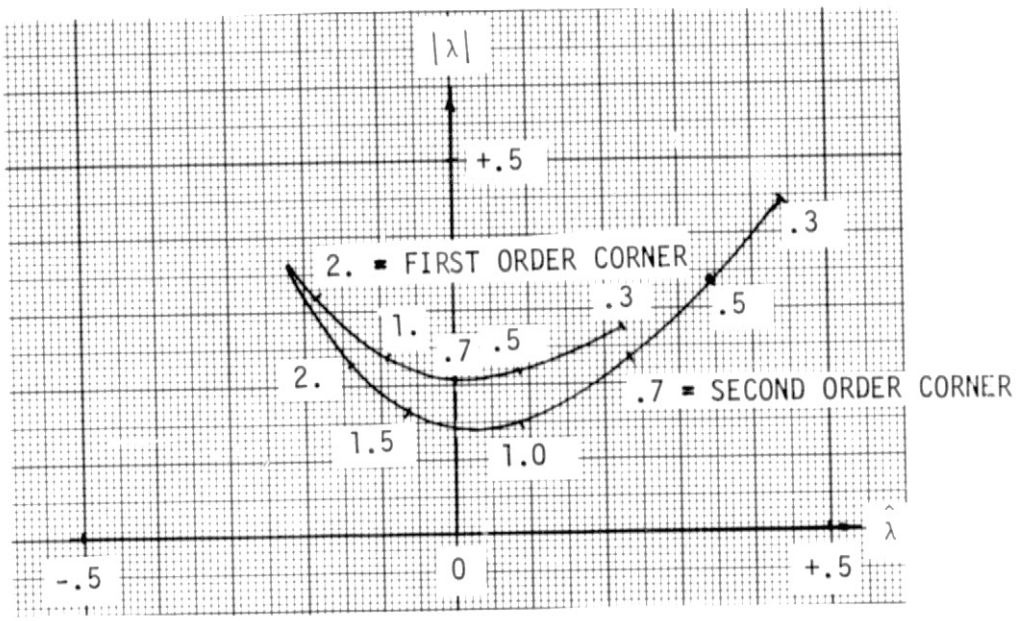

FIGURE XIV-2

COMPLEX CROSS CORRELATION COEFFICIENTS

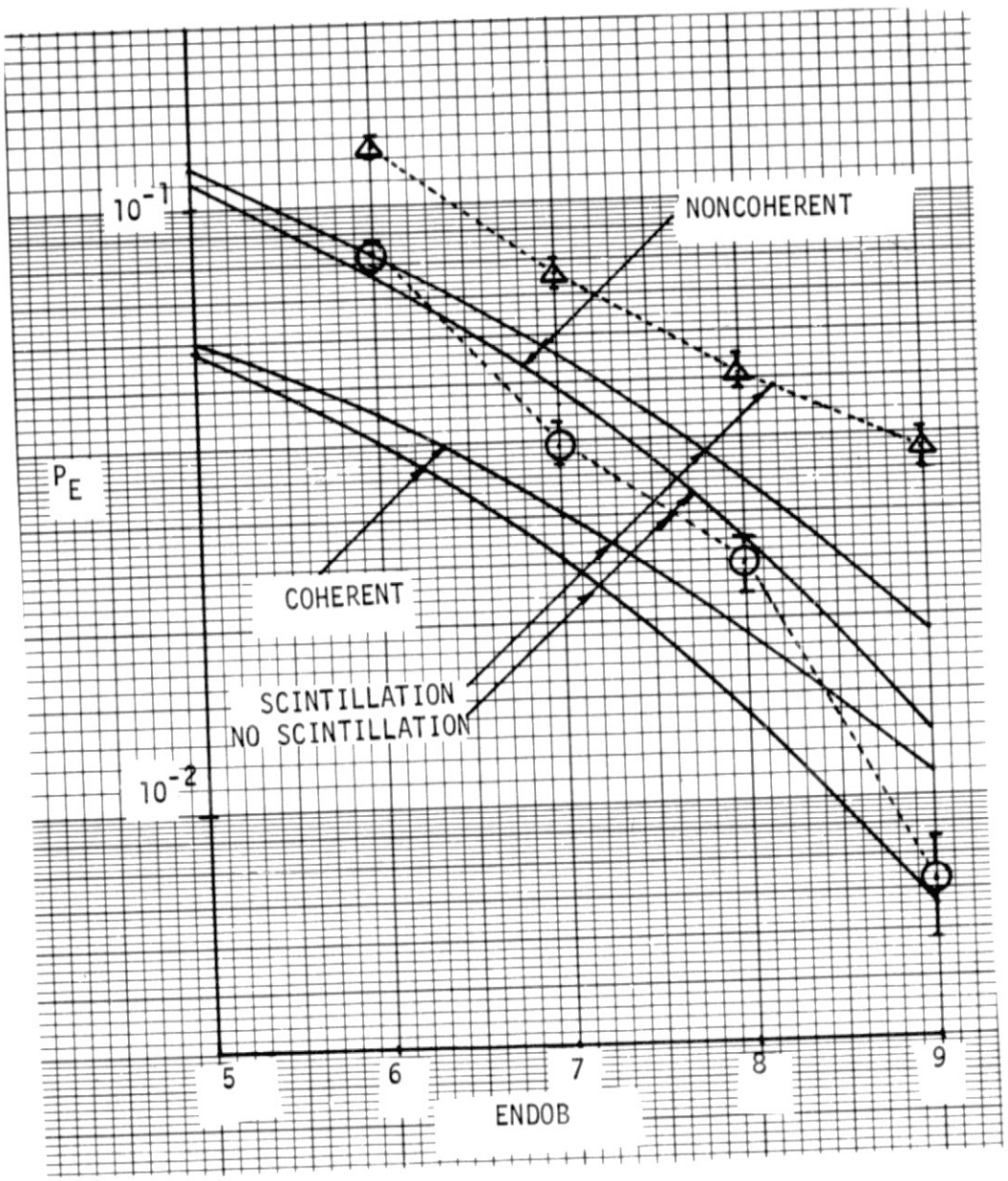

FIGURE XIV-3
COMPARISON OF THEORY AND EXPERIMENT