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RADC-TR-67-17
Final Report



AMR DIGITAL TROPOSCATTER TEST RESULTS

Environmental Science Services Administration
Staff of ESSA/ITSA

TECHNICAL REPORT NO. RADC-TR-67-17
March 1967

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FOREWORD

This final technical report was prepared by the Institute for Telecommunications Sciences and Aeronomy of the Environmental Science Services Administration (ESSA/TISA), Boulder, Colorado 80302 for the Rome Air Development Center under Contract AF 30(602)-3446, Project 6523, Task 652304. Secondary report number is 3446 04.

The report has been coordinated with each digital technique manufacturer upon the receipt of the draft and their comments have been included.

Reference is made to RADC-TR-65-427 which covers the results of the Sunde Tropo Channel Model used to predict error probabilities on this test. The Signal Processing Section (EMCRS) undertook the theoretical and mathematical analysis of the communication techniques tested.

RADC Project Engineer is Frank Chiffy (EMCTW-3).

This technical report has been reviewed and is approved.

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ABSTRACT

This report describes the work performed under Contract AF30(602)3446. Its purpose was to evaluate the performance of three types of contractor furnished digital modulation equipment, using simultaneous data from an FM-FDM system as a standard.

The tests covering a period from November 1964 through May 1965 were conducted on an over-water path between East Island, Puerto Rico and Grand Turk Island, BWI.

The standard FM-FDM system technique referenced was the Radio Set AN/MRC-98 a transportable tropospheric scatter radio set operating in the 755-985 MHz range with an output r.f. power capability of 10 K.W.

The digital techniques were variations of Pulse Code Modulation, Pulse Position Modulation, and Delta Modulation schemes.

A description of test instrumentation configurations and data collection procedures is presented. Test results are discussed and presented in tabular and graphical form.

EVALUATION

This report confirms the need to run 200 and 100 mile tropo tests that are presently being conducted in upstate New York. The contractor experienced difficulties during his data analysis and some data was removed for such reasons as, power failures, noisy tapes, errors in time code and for conditions during which the data was outside the range of calibration.

A limited amount of looping and quad-diversity data has not been reduced by ESSA due to a lack of time but is available on magnetic tape for reduction should the need arise.

This report was coordinated with each technique manufacturer upon receipt of the rough draft and their comments have been included.


FRANK P. CHIFFY
Project Engineer
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I. Introduction

Tests were conducted over an over-water path between East Island, Puerto Rico, and Grand Turk Island in order to obtain data for the purpose of evaluating the performance of three types of contractor furnished digital modulation equipment, using simultaneous data from an FM-FDM system as a control. The tests were divided into three time periods, one for each contractor, covering a period from November 25, 1964 through May 13, 1965. The purpose of this report is to describe the tests and to present the data obtained from them.

Some of the data were recorded on 14 channel magnetic tape for later reduction (see Section IV). An attempt was made to record simultaneously for both systems as many of the following parameters as possible:

- (1) time code
- (2) carrier levels (possibility of four receivers on the digital system and four on FDM when quad diversity used)
- (3) digital data, out-of-sync information
- (4) digital data, errors
- (5) combined signal levels (when using diversity)
- (6) signal-to-noise ratio (see Section IV. 2)
- (7) idle channel noise.

Priority was assigned to parameters (1), (2) and (4).

Voice data were recorded on a separate magnetic tape recorder.

Because of the wide variety of conditions encountered and the large number of variations of the type of data obtained, it is difficult to derive definite conclusions from the data. However, the information from these tests should be valuable when evaluating the results from later tests. Two additional paths, (1) an over-land path approximately 200 miles long between

Verona, N. Y. and Model City, N. Y. and (2) an over-land path between Verona, N. Y. and a point approximately 100 miles distant along the Verona-Model City path, are proposed for these later tests.

II. Path Description

The path extends over water from Grand Turk Island to East Island, Puerto Rico as shown in figure 1. The antennas are located at $21^{\circ}, 25', 32.25''$ north by $71^{\circ}, 8', 43.00''$ west and $18^{\circ}, 28', 34.93''$ north by $66^{\circ}, 10', 48''$ west. The distance d indicated in the lower portion of figure 1 is 613.7 km. The angle θ (see figure 1) for a surface refractivity value, $N_s = 347$, corresponding to the average value for February is .0596 radians, and for $N_s = 380$, corresponding to the average for August. $\theta = .0551$ radians, where the bending was calculated using Bean and Thayer [1959]. The scattering volume lies above approximately 9 km above sea level. Two 18.3 meter parabolic section reflectors fed by offset horns are located at each end of the path. The heights of the center of the reflectors above sea level are 14 meters at Grand Turk and 25.9 meters at East Island. The antennas at East Island are shown in figure 2, and one feed horn with a section of wave guide are shown in figure 3.

The AN/MRC-98 communications system consists basically of two (2) transmitters, four (4) receivers with necessary combiners for dual or quadruple diversity, a twenty-four (24) channel multiplex-demultiplex system, a mobile diesel generator, and test equipment, waveguide, etc., necessary for independent operation as a communications terminal. One complete AN/MRC-98 system was installed at each end of the path. In addition, a third system was divided between the terminals to provide three (3) transmitters and six (6) receivers at each end of the path. This provides the combinations of equipment configurations shown in figure 4. Generally throughout the tests, the FM-FDM system was operated in the dual diversity mode using horizontal polarization.

The path area is near the tropical hurricane region of the Eastern Caribbean. The climate is tropical marine, slightly modified by insular influence when land breezes blow. A preliminary examination of seven years of radiosonde data taken at San Juan, Puerto Rico, was made to determine, to some extent, the radio climatology. At the San Juan end, radio ducts are believed to exist about 25% of the time. However, two years of radio data, [RCA, 1964] do not contain field strengths as large as would be expected if the ducts extended the length of the path.

Ducting gradients were found to exist 35% of the time for the winter months of December through February, 28% of the time for the March-April-May period, 20% of the time for the summer months of June through August, and 19% for the autumn period of September through November. Fifty (50) percent of these ducting layers showed a range from 157-200 N units/kilometer, decreasing to a 0.6% occurrence for a gradient of 588 N units/kilometer. Twenty-three (23) percent of the total number of ducting gradients were surface ducts and about twice as many of these occurred at 1500 GCT (1000 local time) as were found to occur at 0300 GCT (2200 of the previous day).

Predictions of transmission loss [Rice, et. al., 1965] were made and compared with the available data [RCA, 1964], using the maritime temperate overseas classification to obtain the distributions shown in figures 5, 6, 7, 8. Pertinent values of the parameters used for these calculations are: Transmitter power, $P_t = 7.5$ kw, line losses, .5 dB, antenna gain, $G_t = G_r = 41$ dB, and frequencies, $f = 779.5$ MHz and $f = 879.5$ MHz.

III. Test Facility Equipment Descriptions

The basic RF system used in these tests is discussed briefly in Section II, Path Description. These equipments were used in various combinations as required by the test being performed. For example, it was

possible to operate both the FM-FDM system and a digital modulation system dual diversity by transmitting both from one end of the path and receiving at the other. When quad diversity was used, the FM-FDM was transmitted from one end of the path and the digital modulation was transmitted from the other. All receiving was then done at the opposite end of the path.

The exciter and power amplifier of the transmitters and the RF section of the receivers were used with each of the digital modulation systems. Each contractor was required to properly interface their digital modulation system to the AN/MRC-98 transmitting and receiving systems. The point in the system for making the interface connections was at the discretion of the contractor. Details of the interface connections are discussed in the description of each digital modulation system.

Each system was basically a 24 channel communications system. During most of the tests all systems were fully loaded with four channels used for data and the other 20 channels noise loaded. Periods when less than 24 channels were loaded are noted in Section VII. The methods of noise loading each system are discussed in the descriptions of each system.

III. 1. FM-FDM Equipment Description

As was mentioned in the introduction, the purpose of this test was to obtain data to evaluate the performance of three types of contractor furnished digital modulation equipment using simultaneous data from an FM-FDM system as a control. The FM-FDM system used was an AN/MRC-98 tropospheric scatter communications system. This is a diversity system with flexibility so that it can be operated using a single transmitter and a single receiver (no diversity); dual diversity with one transmitter, spaced receiving antennas and two receivers; or quad diversity using two transmitters on spaced antennas, spaced receiving antennas and four receivers. The combiner is a post detection combiner.

The AN/MRC-98 is a 24 channel system. At the transmitter the 24 channels are combined into a baseband by a frequency division multiplexer. The baseband is then used to frequency modulate the RF carrier in the exciter stage of the transmitter. The multiplexer has sufficient output to drive two exciters for quad diversity operation. At the receiving end, the baseband output of the combiner is separated by the demultiplexer system into the 24 individual channels.

For these tests four channels were used for data measurement and the other 20 channels were noise loaded. The purpose of the noise loading was to simulate a fully loaded system. The noise loading was accomplished by driving the baseband input of an FDM demultiplexer with a random noise generator. The output of these individual channels were connected into the channels of the FDM multiplexer which were to be noise loaded. This method of loading provides a noise source to each channel which is statistically independent of the noise in the other channels.

III. 2. PCM Equipment Description

Figures 9 and 10 are block diagrams of the interface equipment used between the PCM equipment and the AN/MRC-98 system for transmitting and receiving purposes respectively. The same equipment using different plug-in band shaping networks is used in the transmission of either PCM or FDM information.

The transmitter interface equipment consists of a baseband amplifier and a video shaping network followed by a 70 MHz modulator and an AFC. The baseband amplifier, and the modulator are broadband and are capable of multi-channel operation. The AFC unit is used to stabilize the modulator. The modulator output has sufficient output level to drive either one or two AN/MRC-98 exciters. Thus, both dual diversity and quadruple diversity operations were possible. Video shaping for 12/24

channel FDM or 12/24 channel PCM was achieved by plug-in networks per CCIR recommendations for FDM operation and low pass filters approximating a Gaussian response for PCM operation.

The receiver interface equipment was connected to the AN/MRC-98 receiver at the 70 MHz IF amplifier ahead of the limiter. Thus, no limiting or AGC features of the AN/MRC-98 were used with the PCM equipment. The interface equipment consisted of a five pole Gaussian shaped filter of approximately 2 MHz bandwidth for 24 channel operation and 900 kHz bandwidth for 12 channel operation followed by a heterodyne mixer and IF amplifier-filter configuration and an equal gain predetection combiner. The second local oscillator was voltage controlled to provide coherent combining. The IF filter appeared as a single tuned circuit with a bandwidth of approximately 4 MHz for 24 channel operation. The overall filter configuration preceding the combiner was equivalent to a six pole Gaussian shaped filter with a bandwidth of 1.77 MHz for 24 channel operation and

800 kHz for 12 channel operation. An AGC voltage, with a time constant of about 1 millisecond, was derived from the combined output and was fed back to each IF amplifier. The combiners were designed to operate in either dual or quadruple diversity modes by proper connections. In either mode the combiner compares the phase of the IF carrier at its input with the phase of the combined output. The error voltage, which is proportional to the phase difference, is used to adjust the phase of the VCO in that channel and bring the input signal into coherence with the combined output. The time constant of the loop was approximately 30 microseconds. The linear demodulator and the baseband amplifier are broadband to accommodate multi-channel PCM or FDM information. The receiver band shaping is achieved by both predetection and post-detection filtering. Post-detection band shaping for the FDM case consists of de-emphasis networks

designed to produce the inverse of the corresponding pre-emphasis shaping. When PCM type information is to be transmitted, these networks are replaced by filters producing approximately Gaussian attenuation characteristics.

The following is a functional description of the multiplexer equipment based on the PCM multiplexer block diagram of Figure 11.

Each input channel has two parts, the voice input and signalling or address input. The voice input is amplified by the input amplifier and sampled at an 8 kHz rate by the sample switch. During one 125 μ sec. frame, the channels are each sampled once for three bit lengths. The composite of all these samples appears on the PAM bus as a pulse amplitude modulated signal. The signalling input, via an interface buffer, is sampled by a sample switch in the same manner as the voice.

The timing of the internal functions of the multiplexer is determined by the 1,352 kHz oscillator when 12 to 24 voice channels are used. When 12 voice channels or less are used, the timing is derived from the 676 kHz oscillator. The 12/24 line switching is a manual operation. The clock pulse generator provides the proper pulse width and fan-out for the 1,352/676 kHz clock. The time counter changes state once for each clock pulse and goes through one cycle of seven states for each channel in the frame. A diagram of the PCM format is given in figure 12. The timing decoder produces one pulse for each state of the time counter. These timing pulses are distributed as needed to other parts of the equipment.

The channel counter changes state once for every cycle of the time counter and goes through a cycle of 12 or 24 states (as determined by the 12/24 line switch) for each frame. Each state or code of the channel counter represents a channel. These codes are detected and sampled by the channel selector which sends channel select signals to the sample switches, except for the channel "0" select signal. It is used to activate

the frame synchronization generator. The frame synchronization is a single pulse which assures the "1" state for one frame and then the "0" state for the next frame, etc.

The compressor gain decreases as signal amplitude increases, thereby decreasing the vulnerability to noise. The sample and hold circuit samples the center of each PAM pulse with a one bit wide pulse ($1.28/0.74 \mu s$) thus reducing noise and cross talk. The amplitude sample is held for $5.18 \mu sec.$ (or $10.36 \mu sec.$ for 12 line operation) while it is being converted to a six bit binary code.

The coder control programs the analog-to-digital conversion. First, it sends code 32 (which corresponds to the middle of the analog signal swing) in binary to the digital to analog converter and the resulting trial voltage is compared with the signal voltage by the comparator. Second, the trial code (32) is increased or decreased by 16, depending respectively on whether the signal voltage was higher or lower than the trial voltage, and then another comparison is made. Third, the above is repeated, except that eight is added or subtracted from the trial code. On the fourth time, four is used to increment the trial code. Fifth, two is used, and sixth, one is used. The six high/low decisions made in this way are equivalent to a six bit binary code representing the amplitude of the PAM pulse.

The data format assembler produces the final PCM output. The signalling or addressing is added as a seventh bit to the six bit serial code produced by the coder control. The alternating 1, 0 bit frame synchronization produced by the frame synchronization generator is added to the 24 (or 12) voice channels as though it had originated from a 25^{th} (or 13^{th}) channel.

PCM Demultiplexer: The following is a functional description of the PCM demultiplexer equipment based on the block diagram given in figure 13. The PCM data enters the demultiplexer through a slicer which includes a differential amplifier and internal DC restorer. The slicer

output goes to an extremely high or low value depending on whether the PCM input is above or below a central threshold level. The phase difference integrator integrates the difference between the phase of the slicer output and the phase of the voltage controlled oscillator to adjust the voltage controlling the frequency of the VCO. This frequency-tracking system is arranged to produce a synchronous clock centered halfway between the transitions of the slicer output. The 12/24 line switching is used to accommodate either 1.352 MHz or 676 kHz bit rate. The clock pulse generator provides the proper pulse shape to advance the time counter. The time counter changes state once for every bit and goes through a cycle of seven states for each channel. The timing decoder produces one pulse for each state of the time counter, and these timing pulses are distributed to other parts of the equipment as required.

The input shift register converts the serial binary output of the slicer to a sequence of seven bit, parallel codes, one for each channel. Each six bit code (excluding the signaling bit) is converted by the digital to analog converter to an amplitude modulated pulse (PAM). The expander restores the PAM signal, which had been compressed by the multiplexer, to its original form. The PAM bus connects the central equipment to the individual channel.

The channel counter changes state once for every seven bits going through a cycle of 12 or 24 states (depending on the 12/24 line switching) during each frame. The channel selector detects each state of the channel counter, selecting the 24 (or 12) sample and hold circuits in sequence.

During frame synchronization, no sample-and-hold circuits are selected, and the frame synchronization control examines the sync waveform to see whether or not the expected frame sync waveform has arrived at the expected time. If the received waveform deviates from the expected waveform beyond a particular limit, the frame sync control will halt the time counter until the proper sync waveform arrives.

Each sample and hold circuit samples the amplitude of the center of the selected PAM pulse and holds the amplitude until the next sample (in the next frame). The low pass filter smooths out the step-like waveform coming from the sample and hold circuit. The output amplifier drives a 600 ohm telephone line.

The input shift register puts the signaling bit of each seven bit code on the signaling bus. The signaling bit is gated into the appropriate signaling storage device by the channel selector. The signaling storage holds the signaling output constant from one frame to the next.

III. 3. Martin PPM Equipment Description

The essential features of the system supplied by Martin Company are the use of fourth order frequency diversity, and the combination of frequency and time division multiplexing as an integral portion of the equipment.

The digital modulation technique has a bit length of eight microseconds. This is subdivided into six intervals of 1.33 microseconds each. RF pulses, each at a different frequency are transmitted in four of the six sub-intervals. The spacing between the individual frequencies is 2 MHz making the overall bandwidth 8 MHz. From the standpoint of the receiver, which is programmed when to expect the signal on each frequency, a permutation in the order of transmitting the four frequencies can be readily recognized and made the basis for multiplexing several channels on the same basic bandwidth.

The system is basically a 24 channel combination TDM/FDM multiplex system which employs PPM of the quantized data. Only four of the channels were completely implemented. Twenty channels used simulated data during the experiments. A block diagram of the transmitting portion of this equipment is given in figure 14. A bandpass filter with a bandwidth

of 150 to 3500 Hz and a pre-emphasis network of 6 dB/octave which can be optionally switched in or out is supplied at the input to each of the four fully-instrumented voice channels.

The audio AGC operates on the peak of the audio input signal. It has characteristics of fast pull-in and slow drop-out. The pull-in time is approximately equal to $1/2$ cycle of the audio present and the drop out time is approximately ten seconds. The squelch circuit has approximately the same pull-in time with a drop-out time of five seconds.

In the compressor an instantaneous compression is obtained using several sections of resistively loaded diodes to achieve an approximate logarithmic response.

A diagram showing the processing that takes place in the voice quantizer is shown in figure 15. The analog waveform is sampled once every $128\mu\text{sec}$. The time between such samples is divided into sixteen $8\mu\text{s}$ frames. The instantaneous amplitude of the voice at the time of sampling is translated into a short pulse whose position in this $128\mu\text{s}$ period is proportional to the amplitude. This pulse position is continuous and may begin at any time during the sample period. The start of the pulse will fall within one of 16 discrete time frames in the sample period. An $8\mu\text{s}$ pulse will then be transmitted in this frame. The result may be considered equivalent to a 16 level quantized PPM system. To make the most efficient use of this relatively small number of amplitude levels, the analog voice signal is processed in the compressor and AGC circuits prior to sampling to make all amplitudes within a certain dynamic range nearly equal.

To simulate the output of the other 20 channels there are 20 asymmetric, free-running multivibrators operating close to but not exactly at 7.8125 kHz. All are maintained to within a 5% tolerance. Each multivibrator puts out a $3\mu\text{s}$ pulse at the 7.8125 kHz rate. Each of the multivibrator outputs is quantized into one of the discrete 16 intervals by a

separate quantizer. These noise quantizers are similar to the voice quantizers. The noise channel programs were keyed on at near random quantum levels at rates of one noise program per two sample periods. This rate made each noise channel approximate a 50 % duty factor phone channel.

The data system generator was used to transmit data by "Time Shift Keying" (TSK) between Frames 8 and 9 on Channel 1. Frame 8 represented a one and Frame 9 a zero. Data at 2604 bps was sent using TSK three times redundant.

The synchronization pulse generator sends synchronization once per sample period during Frame 1. The synchronization program was also used for an order wire having 13 levels of QPPM between Frames 3 and 15.

The encoder patch panel and program selector serve the function of ensuring each channel has proper addressing. Each of the 24 channels has its own address which comes from a 4 x 6 matrix (four frequencies and six 1.33 μ sec. time slots). Of these 24, some are exclusive (no overlap) in others 2 frequencies or more overlap in a time slot.

The frequency time program used in these tests are given in figure 16. Figure 17 is a diagram in schematic form showing how the programs are selected for transmission over the four frequencies. The program selector selects the frequencies in accordance with the address program and in turn furnishes the gating function which reads the appropriate frequency. The oscillators furnishing the carrier frequencies to the gating circuits are separated by 2 MHz and cover the band between 67 MHz and 73 MHz as shown in figure 14.

The outputs of the four gated oscillators are summed together in a resistive network to assure linearity and low intermodulation. The output of this coupling network is then matched to the AN/MRC-98 exciter.

The Martin receiving equipment is matched to the AN/MRC-98 receiver at the 70 MHz IF. A block diagram of the Martin PPM equipment is given in figure 18. The four frequencies each have separate IF amplifiers with bandwidths of about 750 kHz measured at the 1 dB point.

The AGC, which is fed to the individual IF amplifiers, is controlled by the median signal level from the linear detectors of each of the channels. The time constant of the AGC is on the order of seconds.

The synchronization summer delays the $F_1 T_1$, $F_2 T_2$, $F_3 T_3$ information such that it will be time coincident with $F_4 T_4$. The output is used to synchronize the receiver clock. The synchronization time constant is on the order of seconds.

The output of each of the four intermediate frequency amplifiers is detected by a square-law detector. Figure 19 is a schematic presentation of the gate matrix and decoder patch panel. The squared signal is then synchronously integrated at the time it is expected. This yields a d-c output proportional to the energy of signal plus noise. The integrator outputs are held for the full pulse period (to the end of the eight micro-second frame), and then summed to produce an equal-gain combined output. Each of the 16 frames in a sample period is similarly examined by the detector. At the end of the sample period the frame having the highest d-c level is chosen as having the greatest energy present. The frame is then passed to the balance of the demodulator. A descriptive diagram of the integrator and demodulator process is given in figure 20.

The expander, figure 19, performs the opposite function of the compressor except $\mu = 10$ instead of $\mu = 50$ as in the encoder, figure 14. This reduction of μ aids in the reduction of quantizing noise.

The data TSK demodulates the data from the order wire channel. The data rate is 1/3 the frame rate. Therefore, there is a two out of three majority decision requirement that must be satisfied before the bit is accepted. An internally generated pattern can be used to compare with the incoming data to establish the number of errors.

III. 4. Motorola Deltaplex Terminal Equipment

The delta modulation equipment furnished by Motorola is a 25 channel system which employs a combination of TDM/FDM. Only four data information channels were implemented completely. These channels were 5, 10, 15, and 20. Channel 25 was used for frame synchronization and order wire purposes. The remaining 20 channels consisted of dummy TDM equipment and were fed with a pseudo-random pattern generator. A multiplex transmitter is shown in figure 21.

The four data information channels have bandpass filters which are required for filtering the voice signals before they are applied to the delta modulator. The high frequency cutoff of 3.5 kHz was selected to minimize harmonics of the voice signal that could beat with the sampling frequency and produce audio interference. In addition the high frequency cut-off eliminates false frame synchronization. Two inputs into the delta modulator are provided - one for logically generated audio inputs and one for digital data. The audio input is to the differential amplifier of the delta modulator. For digital data, the input is fed directly into the sampling section of the delta modulator. The four delta modulators are sequentially sampled every 26 μ sec. with a 1.04 μ sec. pulse produced by the clocking mechanism. Figure 22 shows a single channel input and a frequency-time diagram which will further clarify the input to the channels as well as the sequential sampling.

The frame synchronization and order wire channel provides two functions each using one-half the channel. The frame synchronization pattern is a repetitive series of a mark followed by three spaces, or 1 0 0 0 1 0 0 0 1 0 0 0, etc. This pattern is directly derived

from the system clock, and has a low probability of being generated by data signals. The frame length is 26μ sec. The order wire signal is delta modulated at a 19.2 kHz sampling rate, one-half the sampling rate of the 24 data transmission channels.

The time division multiplexing groups the 25 channels in five groups of five channels each. To provide maximum spacing within a group, the channels are grouped with constituent channels five sampling periods of 5.2μ sec. apart.

Since there are five time division multiplexed groups, there are also five FSK frequency pairs. Each time division multiplexed group was used to key one FSK frequency pair. If a "1" (mark) is to be transmitted, one of the frequencies is keyed while the other is constrained to the off state. If a "0" (space) is to be transmitted, the other frequency in the pair is keyed on while the prior one in the pair is constrained to the off position. The ten total frequencies are so chosen that no adjacent time slot has an adjacent frequency element. Each pair is also arranged so that the mark and space frequencies for any time slot are five frequency elements apart. In figure 22, the arrangement of the frequency pairs about the 70 megacycle center frequency is given.

The outputs of the FDM gates consist of ten lines, each line having one 1.04μ sec. pulse at one of two frequencies every 5.2μ sec. The outputs of the FDM gates are linearly combined and the output is a succession of pulses, one every 1.04μ sec. at different frequencies from 65.68 to 74.32 MHz spaced 0.96 MHz apart. The output of the linear combiner is fed to the transmitter exciter. There is no pulse shaping done in the Motorola equipment. The power spectrum at the output of the Motorola equipment may be considered a rectangular pulse.

The Motorola receiving equipment was interfaced with the AN/MRC-98 receiving equipment after the AGC portion, but before the limiting action of the AN/MRC-98 receiver. RADC furnished an IF

amplifier panel with a bandwidth of 10 MHz to accomplish the necessary equipment interface. As shown in figure 23 the two receiver IF sections are fed from separate receivers for diversity operation. The output from one receiver is split into two paths, one path to detect the mark signal (f_3) and the other to detect the space signal (f_8). The filter provided for each path or channel is a triple section synchronously tuned filter. The overall bandwidth of the filter is approximately 300 kHz.

The outputs of the filters are differentially envelope detected and added to form a bipolar analog pulse train. The integration time at the output of the envelope detectors was about 1 microsecond.

The transmitted signal is processed in a second receiver IF strip identically as described above. The analog pulse trains are passed through individual delay lines to equalize the differential delay between the two pulse trains due to the possibility that the diversity antennas may not be precisely aimed at the same common volume. The time equalized pulse trains are then added in a linear adder to form the composite bit stream. This 192 kHz signal is used to obtain bit synchronization. The clock output is then routed to a divide-by-five commutator. The TDM wave train from the diversity combiner is fed to a threshold amplifier. This amplifier converts the analog bipolar input to a squared binary output. The threshold amplifier is reset prior to each sample by the recovered bit clock. The binary output of the threshold amplifier is in turn sampled by each of the five separate outputs of the commutator to separate the serial train into five parallel digital outputs, each output being 26 microseconds long.

Frame sync is achieved by looking for the 9.6 kHz tone applied to the sync channel. A 9.6 kHz bandpass filter is located at the output of the five digital channel outputs. The energy from the filter having frame sync is used to inhibit the sequential sampling until receiver frame sync is obtained. Normally less than 1 milliseconds are required to obtain frame sync.

The digital output of the channel is fed directly to the delta demodulator. The delta demodulator consists of an integrator circuit with equal charge and discharge time constants. The output is then filtered to obtain 0.3 to 3.5 kHz audio bandwidth.

IV. Data Sources and Recording Techniques

IV. 1. Carrier Level

The received carrier levels were recorded on magnetic tape during all test periods. The method of recording the carrier levels varied due to the different types of modulation used. For the FM-FDM system an LEL Model 5264 logarithmic amplifier-detector was connected to the AN/MRC-98 receiver at a point in the 70 MHz IF amplifier ahead of the limiter and the feedback point for the AGC. The detector output of the Model 5264 was recorded on magnetic tape using the FM recording mode. All received carrier levels for the FM-FDM system were recorded, i.e., two for dual diversity and four for quad diversity. The carrier level recording system was calibrated by connecting a signal generator to the antenna input connector of the AN/MRC-98 receiver and reading the output in terms of the frequency of the voltage controlled oscillator of the magnetic tape recording system. This method calibrates all components of the carrier level recording system simultaneously. The system was normally calibrated from -70 dBm to -115 dBm.

The LEL Model 5264 logarithmic amplifier-detector was also used to record the received carrier levels for the PCM digital modulation system. The connection to the AN/MRC-98 receiver and the recording and calibration techniques were the same as those used for the FM-FDM system.

During the testing of the Martin Company PPM digital modulation system several methods for recording the received carrier levels were tried. As was discussed in Section III. 3. the RF carrier consisted of pulses of RF energy at four frequencies spaced 2 MHz apart and contained in a bandwidth of 8 MHz. A receiving system with an 8 MHz bandwidth was not available.

The receiving system had four IF amplifiers, one for each of the frequencies transmitted. Each IF amplifier had an AGC circuit that was controlled by the median signal level from the linear detector of that channel. However, the time constant of the AGC was on the order of seconds. The time constant was so long that the AGC did not follow the fast fading of the received carrier level. Thus, this recorded AGC is used to determine the magnitude of the received carrier level, but can not be used to study the fading characteristics of the carrier.

During the course of the PPM tests three different methods of calibrating the AGC voltages were used. These were:

1. The AN/MRC-98 exciter or power amplifier through a frequency converter to the AN/MRC-98 receiver input at a pulse rate of 7812.5 pps.
2. The AN/MRC-98 exciter or power amplifier through a frequency converter to the AN/MRC-98 receiver input at a pulse rate of 125 K pps.
3. A signal generator direct into the AN/MRC-98 receiver input at a pulse rate of 7812.5 pps or 125 K pps.

A comparison plot of the three methods of calibration is shown in figure 25. In this graph all curves have been normalized to curve number 2. The wide variation between the various methods has not been satisfactorily explained. The periods when each method was used are noted in Section VIII of this report.

During a portion of the test period on the PPM system a CW signal at 70.0 MHz was inserted with the four gated oscillators, discussed in Section III. 3., into the AN/MRC-98 modulator. The level of the CW signal was 10 dB below the peak power of the gated oscillators. At the receiving end a Communications Electronics, Inc. Model 960 receiver was connected to the AN/MRC-98 receiver at a point in the IF amplifier ahead of the feedback point for the AGC and the limiter. The Model 960 was tuned to 70.0 MHz and its bandwidth was set to 200 kHz. This system was unsatisfactory due to frequency drifts of the system.

During the tests of the Motorola deltaplex digital modulation system the received carrier level was recorded using the LEL Model logarithmic amplifier-detector discussed with the FM-FDM system. Since the LEL amplifier-detector has a bandwidth of 2 MHz, its bandwidth will include only frequencies f_5 and f_6 (see Section III. 4.). For these tests the information was carried on the frequency pair f_3 and f_8 , all other frequencies being driven by a psuedo-random pattern. Thus, f_5 and f_6 should contain one-fifth of the spectrum power, or 7 dB below full power. This system was calibrated using a CW signal generator with its output power level set to -7 dBm. The calibration was then performed using an external attenuator.

IV. 2. Signal-to-Noise

The Philco SNM-2 Signal-to-Noise Meter measures the ratio, in dB, of the signal power plus noise power to noise power in a voice channel of a multiplexed communications system. The signal used is a 2075 Hz tone from an audio signal generator inserted into a voice channel at the transmitting end of the path. The SNM-2 accepts the audio tone from the receiver demultiplex and passes it through a voice band filter. The 2075 Hz signal is then split into two components, noise and signal plus noise,

by a band rejection filter. The two components are put into diode logarithmic shaping networks and their difference taken. This process gives the ratio of signal plus noise to noise in decibels. For large ratios this will approach the true signal to noise ratio. The output of the signal-to-noise meter was a direct reading on a meter on the instrument and a varying d-c voltage for recording on magnetic tape. This system was calibrated using an audio oscillator and a noise source over a range from 15 to 60 dB.

IV. 3. Digital Data

Two sources were used for digital data transmission. The Frederick Electronics Corporation Data Transmission Test Set, Model 600, is a pseudo-random digital test pattern generator consisting of a transmitter and a receiver. The generator produces a repetitive test pattern, 2047 bits in length, at any rate from 10 to 100,000 bits per second. The receiver accepts the transmitted test pattern and synchronizes a locally generated perfect pattern to it. The two patterns are compared and errors in the received pattern are indicated by a voltage pulse output. The error pulses are widened from 2 or 3 microseconds to 200 microseconds by one-shot multivibrators and directly recorded onto magnetic tape. The error pulses are also counted in a Hewlett-Packard 524/560A printing counter. The number of accumulated errors is printed out every minute onto paper tape. The one minute print commands are given by a voltage pulse from an Astrodata Time Code Generator, Model 6140, used for time coding the magnetic tape recordings.

The Model 600 contains a mechanical counter capable of counting errors at speeds up to 20 per second. As errors occur they are stored in a 1520 bit capacity high speed buffer counter. The errors are then read into the mechanical counter at a 20 per second rate. Whenever the capacity of the high speed counter is exceeded a visual and audible out-

of-sync alarm appears. A voltage derived from the sync alarm light is FM recorded on magnetic tape for later use in evaluating the recorded error data.

The Frederick re-syncs on any string of 16 consecutive correct bits and consequently, if errors are occurring in the data at a rate greater than one in sixteen, the Frederick may not re-sync. During periods when the Frederick is giving an out-of-sync indication, it may indicate error rates up to 100% even though the actual error rate is smaller. Thus, the sync-outage as recorded must be used to determine the bounds for the actual error rates.

The AN/GSC-4 Data Modem Modulator/Demodulator, built by Collins Radio Corp. is a system designed for sending digital information over ordinary voice bandwidth channels of radio, wire, microwave, etc. communication circuits. The AN/GSC-4 accepts binary data at 600, 1200, 2400, 3600, 4800, or 5400 bits per second rates. Two or three data channels are encoded by phase shift modulation onto tones spaced 440 Hz apart in the frequency range 935 to 3195 Hz and transmitted through an audio channel. The digital data is detected from the received audio tones at the receiving end by another AN/GSC-4 Modem.

The AN/GSC-4 contains an Integral Test Facility. This consists of a 16 bit test pattern that is transmitted and compared to a locally generated perfect pattern in the receiving Modem. Errors are indicated visually and by a voltage pulse output. The recording of error pulses is the same as explained above for the Frederick. The receiving Modem resets synchronization between the transmitted and locally generated test patterns every minute in case of loss of sync.

The Frederick pattern was usually fed directly into a data channel for the digital modulation system but was always fed through the AN/GSC-4 into a voice channel, for the FM-FDM system.

IV. 4. Idle Channel Noise

The noise from an idle channel of each system, FM-FDM and the digital modulation system under test was recorded on magnetic tape. At the transmitter the channel that was to be used for the noise test was terminated with a 600 ohm resistor. At the receiving end the noise was amplified and recorded on the magnetic tape in a direct record mode.

For calibration purposes, it was assumed that the maximum noise would appear in the idle channel when there was no RF signal into the receivers. The peak-to-peak output of an audio oscillator was matched approximately to the peak-to-peak amplitude of this maximum noise. The audio oscillator output was then used to calibrate the direct recorded channel on the magnetic tape. The output of the audio oscillator was then stepped down in 3 dB steps as the signal was recorded on magnetic tape. Calibration in this manner provided good recording of the noise peaks, but was too compressed to provide a good recording of the average noise.

IV. 5. Teletype

During much of the test period a teletype message was sent over one voice channel of each system, i. e., FM-FDM and digital modulation system being tested. A standard fox teletype test message was used as a data input. These data were generated by a Teletype Corporation TS-2 Fox Generator which produces a 1275 Hz tone that is frequency shift keyed ± 42.5 Hz. This tone was inserted into a voice channel of the multiplexer. At the other end of the path the message was taken from the system demultiplexer, fed through a teletype tone converter and printed out on a Teletype Corporation M-28 Printer.

IV. 6. Voice

Voice tests were made over the FM-FDM and various digital modulations systems using prerecorded tapes furnished by the U.S. Air Force Electronic Systems Division, Decision Sciences Laboratory, L. G. Hanscom Field.

The articulation test employed was the Modified Rhyme Test, [House, et. al, 1963; Williams, Hecker and Kryter, 1964]. Twelve (12) word lists - fifty (50) words per list - were recorded in an anechoic chamber on an Ampex Model 602 Recorder by six trained male talkers. The words were spoken one every 2-1/2 seconds with pauses at the end of each 50 word list. Thus the voice tape was approximately 35 minutes in length. This tape was played back over an Ampex 602 Recorder and transmitted over the path through a voice channel of both systems under test. The received voice from both systems under test was recorded on the two tracks of the Ampex 602 recorders for later analysis by ESD.

The voice tapes also contained special recorded signals used by the Speech Communication Index Meter (SCIM) discussed in Section V. 6. of this report.

V. Data Reduction Techniques

The data recorded on magnetic tape, as described in Section IV, above, were reduced in the laboratory. The following paragraphs describe briefly the data reduction techniques employed in reducing the data.

V. 1. Cumulative Amplitude Distribution

The cumulative amplitude distribution analysis is performed by a system shown in figure 26. The data are played back from the magnetic

tape at a tape speed of 60 ips (25 times the recording speed). The time track is played into the Time Code Reader and Control unit and is used to select the time periods to be analyzed.

The Distribution Analysis System (shown within the dashed line on figure 26) samples the data 20,000 times per second and compares the amplitude of each sample to ten calibrated signal reference levels. The Level Accumulators accumulate one count each time its associated signal reference level is exceeded by a sample. The Reference Accumulator registers a count for each possible sample within the time period selected. At the end of the time period all accumulators are printed out. From this one can determine percent of time each signal reference level is exceeded.

V. 2. Five Minute Medians

The carrier levels recorded on the magnetic tape were analyzed to determine the median of successive five minute periods. This analysis was performed using techniques the same as those used to determine the cumulative amplitude distribution. However, for the five minute periods all that was desired was the median, no information was required in the small percentage regions of the signal statistics.

To perform this analysis the ten Amplitude Comparators (figure 26) were divided into two groups of five and a separate Sampler used as the input of each group of five comparators. With this arrangement a five point cumulative amplitude distribution was run for two carrier levels simultaneously. The medians for the five minute periods were determined from these cumulative amplitude distributions.

V. 3. Digital Data Error Counting

The digital data errors (Frederick and GSC-4) were recorded on magnetic tape in a direct record mode as described in Section IV. 3. of

this report. The maximum error pulse repetition rate was near the high frequency limit of the direct record system for the tape speed of 2.4 inches per second which was used for data recording. As a result the pulse shape coming directly from the tape was very poor.

To properly recover the digital error data from the magnetic tape, the data from the direct playback amplifier was passed through a band pass filter and a pulse shaping circuit (see figure 27). The shaped pulses were counted by an electronic counter. Each decade of the counter had a staircase output. The first four decade outputs were recorded on separate channels of a strip chart recorder. Also recorded on the strip chart recorder were the recorded time from the magnetic tape and one related carrier level record (i. e., one FM-FDM carrier level when counting errors from the FM-FDM system, etc.). Thus, by referring to the time track it was possible to determine the number of errors made in any specific time period. Errors were counted continuously for each recording run and scaled to determine the number of errors in successive five minute time blocks.

As discussed in Section IV. 3. of this report, when the Frederick Model 600 receiver is out of sync the error information recorded on magnetic tape is not a true representation of the digital errors. The out-of-sync indication which was recorded on one channel of the magnetic tape was used to disable the error counting during out-of-sync periods. This was done by summing an out-of-sync voltage into the input of the pulse shaper to shift the error pulses out of the range of the pulse shaper.

However, total exclusion of errors during the out-of-sync periods does not give a true indication of the total errors committed either. The reason for the system being out-of-sync may be a higher error rate than the system can handle. Thus errors were counted including out-of-sync periods and excluding them as discussed above. These effects are discussed further in Section VIII. 1.

V. 4. Cumulative Amplitude Distribution of Two "Combined" Carrier Levels

The purpose of this analysis system was to determine the percent of time both received carrier levels of a diversity system were below given levels. The system used is shown in the block diagram of figure 28. The received carrier level data, which were recorded on magnetic tape, were played back through No. 1 and No. 2 data discriminators. The discriminators were adjusted to provide equal outputs for inputs representing equal received field strength, e.g., -85 dBm into each receiver would produce the same voltage out of the two discriminators, etc. By selecting the proper polarity for the bias voltage supply and the proper orientation of the two diodes, the output at the junction of the two diodes will follow the higher of the two carrier levels.

This "combined" signal was analyzed by the Distribution Analysis System (shown in figure 26). This is not the same as the distribution of the output of the combiner in the AN/MRC-98 diversity system. However, it should give a good indication of the possible effectiveness of the diversity system.

As indicated in the block diagram, figure 28, the time code on the magnetic tape is used to select specific periods of data for analysis.

V. 5. Crossings of the Five Minute Median

The system used to determine the crossings of the five minute medians does not give a highly accurate count of the median crossing, but does give a very close approximation. Since the distribution of the five minute periods are very nearly Rayleigh the crossings of the median are approximately equal to the crossings of the mean.

The system used to obtain the crossings is shown in figure 29. The data from the Data Discriminator are averaged by a circuit made up by the 1 M Ω resistor, the 10 μ f capacitor and A₁. The RC time constant was selected to be equivalent to five minutes in recorded data time. (The data were played back twenty-five times the record speed.) The averaged data and the non-averaged data were then compared by the difference amplifier, A₂. The output of A₂ was then passed through a zener diode clipper and a Schmitt trigger. This provided a squared wave which represented the crossings of the mean. These were then counted by an electronic counter. The staircase outputs of the first two decades were recorded on a strip chart recorder. This produced a continuous count of the crossing for each run. The crossings for successive five minute periods were obtained by referring to the time recorded on the strip chart from the Time Code Reader.

V. 6. Voice Tape Evaluation

The voice tapes recorded over the communications systems were evaluated for the intelligibility of the voice data and the SCIM data by the SCIM equipment.

For the voice analysis the received voice tapes were played back on Ampex 602 Recorders to groups of ten (10) listeners. The listeners were in a quiet listening room and were presented the received voice tapes monaurally to their preferred ear through a set of hi fidelity cushioned ear phones. From this listener response data the average intelligibility of each test run was computed (intelligibility = percent correct response by all listeners to all words) along with the standard deviation.

In 1947 Bell Telephone Laboratories [French, 1947] presented the theory for the articulation index (AI) which relates in a quantitative way the physical characteristics of a speech communication system and the intelligibility of speech as perceived by a crew of trained listeners.

This theory holds that the signal (speech)-to-noise ratio (in 20 narrow frequency bands) of a communication system will, when properly weighted and summed, provide an AI value that is directly related to the intelligibility of speech heard over that system.

The Speech Communication Index Meter (SCIM) [Kryter and Ball, 1964] uses the 9 band method as established by Kryter [1962] rather than the 20 band method of calculating the articulation index. The SCIM, however, accommodates additional factors affecting speech that are not involved in the original procedures for calculating AI. Generally speaking the use of AI and SCIM is predicated upon the assumption that the system is reasonably steady state during both the time the measurements are being made and during general use. This assumption is not met by a tropo system; however, by using conventional sampling statistics, it is probable that AI and SCIM calculations have some degree of validity. These data are presented in Table I.

V. 7. Idle Channel Noise

The idle channel noise of an unloaded channel was recorded on one channel of the magnetic tape in a direct record mode. On playback the noise data was passed through a direct playback amplifier and a band-pass filter having a bandpass equivalent to the normal channel voice band of the MRC-98 system. The noise was then amplitude detected to obtain the envelope of the noise. The envelope was analyzed with the Distribution Analysis System. This analysis yields a plot of the percent of time the idle channel noise exceeds given levels.

V. 8. Correlation Computer

The correlation computer [Johnson, 1961], shown in figure 30, is a special purpose analog computer designed to continuously perform

the multiplication and integration or averaging required in solving the normalized correlation equations [Florman, 1960].

Two random input signals, x' and y' , are first applied to the servo controlled signal conditioning amplifiers. The function of these amplifiers is to amplitude condition the incoming signals so as to equate their variances over the averaging time to be used in the computation. The two conditioned signals, x and y , are then applied to a sum and difference circuit and then to squarers followed by averaging circuits. This succession of circuitry produces the variance of the sum of the signals and the variance of their difference as follows:

$$\sigma_{x+y}^2 = \sigma_x^2 + \sigma_y^2 + 2\sigma_{xy} = 2(\sigma_x^2 + \sigma_{xy})$$

$$\sigma_{x-y}^2 = \sigma_x^2 + \sigma_y^2 - 2\sigma_{xy} = 2(\sigma_x^2 - \sigma_{xy}).$$

By further taking sums and differences of the above equations the covariance, σ_{xy} , and the sum of the variances, $\sigma_x^2 + \sigma_y^2 = 2\sigma_x^2$ are computed. The correlation coefficient is obtained through the use of a second servo system which computes the ratio (K) of the covariance to the variance σ_x^2 .

$$K = \frac{2\sigma_{xy}}{\sigma_x^2 + \sigma_y^2} = \frac{\sigma_{xy}}{\sigma_x^2} = \rho = \frac{\sigma_{x'y'}}{\sigma_{x'}\sigma_{y'}}.$$

The Correlation Computer was used wherever the cross correlation of two parameters was desired.

VI. Editing and Comparing Data

Some data are not included in the analysis for various reasons, while other data which are included might be considered as valid for some purposes but not for others. This section describes some of the reasons for eliminating data completely and retaining data with limited usefulness.

The philosophy used in the analysis of data for this report was to include as much as possible so that it would be available in a condensed form for use at some later time for possibly some other purpose.

A preliminary editing consisted of removing data, for reasons such as power failures, bad tape, etc. as indicated by the logs kept on-site during the tests. A second editing was performed by visually inspecting the playback from the magnetic tape onto chart rolls. Data were removed again for "obvious" power failures (see Table II), errors in the time code and for conditions during which the data were outside the range of calibrations. What remained, then, is contained in Table III which is explained in Section VII.

Several conditions were observed which might effect the accuracy, or the consistency of the data. During the early parts of the tests, pre and post calibrations were frequently quite different due to unstable power supplies. Also, it was generally true that whenever the 5 minute medians for the two FM (or other) receivers differed by 5 dB or more throughout a run, the calibrations for the two receivers differed by the same amount, and when the medians did not differ, the calibrations did not. The runs for which the calibrations differed by 5 dB or more are listed in Table II. Also listed in this table are those samples which show apparent aircraft effects, together with miscellaneous remarks which give reasons for omitting data, and observations concerning fading, power levels, etc.

The median signal levels given here are not strictly comparable for each of the systems. Although the medians for runs 1-52 for the FM and PCM show almost the same variation, the medians for the PCM are approximately 3 dB lower due to additional line losses. For runs 61-157, the carrier level was recorded by a different method for the PPM equipment than for any of the other systems, as noted in Section IV. Also, three different methods of calibration were used during these runs as noted previously. Figure 25 gives a rough estimate of the differences obtained by using these different methods, normalized to method 2. Additional differences were noted between successive calibrations using the same method. Moreover, the carrier levels for the digital system which were recorded during runs 61-157 were from the same receiver, at two different frequencies chosen from the four frequencies 67, 69, 71 and 73 MHz, while the two signals recorded for all other systems were from two different receiving systems using the spaced antennas. For runs 158-320, the carrier level for the delta-mod system was recorded by the same method as for the FM. However, the delta-mod used a wider bandwidth than the FM, and the LEL equipment did not have a sufficiently wide bandwidth to include the entire signal. At least part of the variability between the FM system and the digital systems from one run to the next is due to changes in transmitter power.

As with the medians, the error rates are not always comparable, the major difference being that two different systems, the Frederick and the GSC-4 were used to measure errors. However, differences also occurred within each system.

When the Frederick system was used, an out-of-sync pulse could be recorded as discussed in Section IV. Many times when it was recorded however, it could not be recovered from the magnetic tape for various reasons. The following observations were made for those periods for which the pulse could be recovered. Out-of-sync pulses occurred most

frequently for periods of high error rates. When the error rates were determined eliminating out-of-sync periods, they were changed by approximately 10% (i. e., an error rate of 10% would be 9% when out-of-sync periods were removed). Error rates greater than 10% are considered unreliable.

When the GSC-4 was used, an out-of-sync indication was not available for recording. It appeared that when the GSC-4 was out-of-sync, an error rate of 100% was recorded. The GSC-4 appeared to go out-of-sync for periods up to 1 minute. These apparent out-of-sync periods which were longer than a few seconds, are noted in the analysis.

The Frederick error counts taken from the magnetic tape agreed almost exactly with the minute-to-minute tabulations kept on site. However, the GSC-4 counts from the magnetic tape differed from the on-site counts, sometimes by large amounts. A possible explanation for this difference is that different types of pulses were used for recording and counting.

The median crossing rates for the different systems were generally comparable, with the exception of the Martin runs for which the different method of recording carrier level prevented fast fades from being recorded due to a long time constant in the equipment.

VII. Explanation of Table III (List of Data)

Table III contains the data remaining after the editing explained in the last Section. The listing gives the run number, the beginning of the 5 minute period (local time at East Island), the data rate, the number of channels, medians for two receivers (when available), the median crossings for the corresponding tracks, and (possibly) two columns of errors (percentages) together with the columns identifying the types of errors.

The final column contains remarks about the types of diversity used, whether the tests were looping tests, periods of obvious out-of-sync conditions for the Frederick or GSC-4, or periods when pads were put into the receiver.

The percent errors for the run may be obtained by averaging the percents for the 5 minute periods in that run, and a good approximation to the run median can be obtained by averaging the 5 minute medians.

Figures 31-49 show graphically the medians and errors from Table III. Figures 31-39 show both Frederick and GSC-4 errors while Figures 40-49 for the digital systems show only the Frederick errors. The median crossings from Table III are shown in Figures 50-74. Note that these are not always comparable, since some of the runs represented looping data, quad diversity, non diversity, etc.

VIII. System Performance

VIII. 1. Digital Data

Back-to-back tests were run on all of the systems in order to obtain information on the performance under steady signal conditions. The results of these tests for digital data are summarized in Figures 75-82. In these figures, different symbols are used to indicate the number of channels which were noise-loaded.

Figures 83-92 show the average of two recorded medians for a 5 minute period plotted versus the percent errors for that period. The different types of errors (GSC-4 and Frederick) are plotted on different graphs. Different symbols are used to denote the number of channels which were noise-loaded. Also noted on these figures are the data rates for those periods. All points on the lower boundary represent zero

errors. The limit of accuracy of the percentages is at least 10^{-4} and probably larger, since this represents an absolute accuracy of 7 counts in a 5 minute period.

These data have been severely edited with data removed for many reasons including the following:

Any data suspect of representing out-of-sync conditions has been removed. If an out-of-sync condition for GSC-4 data occurred during two 5 minute periods, the entire run was removed. If a power outage was noted in the log, the 5 minute periods preceding and following this were removed.

The PCM data shown in figures 86-87 are shown only for the runs after run 28 since equipment changes were made prior to run 28.

The PPM data are shown in 3 different blocks to correspond to the different methods of calibration used for those periods, as discussed in Section IV. 1. For runs 62-97 (figure 88) calibration method 2 (see figure 25) with 7.8 kpps was used. Runs 98-103 using the signal generator direct at 7.8 kpps and runs 104-112 using the signal generator direct at 125 kpps (method 3 in figure 25) are shown in figure 89. Runs 113-120 using the power amplifier through the converter at 125 kpps and runs 121-157 using the exciter through the converter at 125 kpps (method 1 in figure 25) are shown in figure 90.

As expected, the more data available the greater the spread of the data. However, one would expect that a more definite clustering of points would occur than appears in these data. Some of this spread is due to changing propagation conditions which can not be controlled, and some is due to factors which can be controlled. It is clear that every effort should be made to maintain standard operating conditions in the future tests, such as restricting the error measurements to only one type, adopting a standard bit rate for the tests, and obtaining immediate comparisons of calibrations in order to avoid possible uncertainties in the data.

VIII. 2. Idle Channel Noise

The idle channel noise was recorded directly onto the magnetic tape, as discussed in Section IV. The range was set to cover approximately -0 dBm to -25 dBm in order to record the peak noise. This range however, prevents obtaining a distribution of the noise. Only very occasional peaks (above -25 dBm from approximately .001 to .01 percent of the time) were noted. These peaks did not appear to correlate with errors. One possible explanation of this lack of correlation is that the idle channel noise was recorded from a different channel than the errors.

VIII. 3. Signal-to-Noise

The signal-to-noise for the digital systems appears to have an almost discrete character, i.e., it either appears at a high level or a low level. Thus, the distributions have a very sharp transition region between two level regions. As with the idle channel noise, the low regions of S/N did not appear to correspond with errors, or bursts of errors, and many errors occurred during periods of high S/N . Again, a possible explanation is that the S/N was recorded from a different channel than the errors. However, a visual inspection indicated that for 5 minute periods containing a large number of dropouts of S/N , there were also a large number of errors, and for periods with few dropouts, there were few errors. Since, for almost all runs, the median level, S/N , was the same as the high level S/N , the median was not useful for determining errors. However, it appeared that the percentage at which the transition from low to high level on the distribution occurred would correlate well with the errors for the same 5 minute period. A sufficiently detailed analysis has not been performed to verify this.

For the FM system, the S/N had characteristics more nearly resembling those of the carrier, and even though the instantaneous correlation of S/N with errors was not good, the median S/N was more indicative than for the digital systems. However, throughout much of the tests, S/N could not be measured below 15 dB, and consequently, meaningful numerical estimates of correlation could not be obtained.

FDM and PCM systems should be compared from the standpoint of idle channel noise and also from the standpoint of signal distortion. It appears more appropriate to consider quantizing noise in the PCM channel to be equivalent to signal distortion of the FDM channel. PCM will have a relatively fixed level of quantizing noise whenever a signal is present in the voice band. However in the absence of signal the idle channel noise in a PCM channel is low due to the absence of quantizing steps.

IX. Propagation

All of the data from these tests appear to exhibit fading characteristics such as would be expected from "scattering". To a first order approximation, the short periods, such as the 5 minute periods used here, are Rayleigh distributed. The 5 minute periods were chosen as a result of preliminary analysis which indicated some variations between successive 5 minute periods of more than 6 dB. The variations between two minute medians within a 5 minute period were small. Because fade rates of 10 per 5 minute period were noted, a shorter period would not have been an adequate sampling interval. An indication that the 5 minute periods were not too short was that the spread of points for the 5 minute medians of figures 83-92 was only slightly larger than that of the comparable 30 minute periods.

The medians given here are not the same as the median transmission loss because these have not been normalized for the proper transmitted power. The transmitter power was varied from about 1kW. to 10 kW during the tests. At least one 40 minute run shows a variation of 6 dB (from 1 kW to 4 kW) during the run. These power variations will be accounted for in a later report. During the tests the medians varied from approximately -70 dBm to -110 dBm with a median value of 88.2, and are in general agreement with the previous data shown in figures 5-8.

The median crossing varied from 10 per 5 minute period to almost 200 per 5 minute period (the latter being somewhat unusual) with a median value of 28.

A number of runs were selected for more detailed analysis. If anything, these runs should be considered as "exceptions" because of the way in which they were chosen, although they do not differ much from what might be considered "typical". The runs were chosen to try to include all possible combinations of high or low median signal levels and high or low fade rates. Distributions for both receivers for these runs are shown in figures 93-103 for the 5 minute periods noted in the figures. The curves labeled 4 and 5, or 2 and 3 in these figures represent the percent of time the signals from both receivers are below the level indicated on the ordinate. This should give a good indication of the improvement that can be obtained by the use of diversity. Also given in these figures is the correlation coefficient between the signals from the two receivers. It is easily seen that the correlation coefficient would not give a good measure of the expected diversity improvement for most of these samples. The median crossing rates for each receiver for these runs are given in Table IV.

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Table I

Word % Correct and SCIM Scores - ITT FDM by Run No.

FDM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
1	96.14	1.80	.95	.06
2	96.02	1.54	.96	.03
3	96.36	1.71	.96	.06
6	96.96	1.47	.96	.07
7	96.36	1.35	.96	.01
8	96.00	1.79	.98	.09
9	97.04	1.86	.96	.09
10	98.06	1.02	.99	.00
11	97.20	1.43	.98	.02
12	97.62	1.59	.98	.01
13	98.04	1.22	.99	.00
14	97.70	0.98	.99	.00
15	97.44	1.50	.99	.00
18	98.55	1.27	.96	.04
19	95.44	1.62	.97	.03
28	96.16	1.50	.92	.10
29	95.72	1.65	.89	.11
30	92.94	1.92	.89	.10
31	93.50	2.12	.89	.13
33	96.20	1.87	.97	.05
34	95.14	1.45	.98	.02
35	96.04	1.73	.95	.10
36	93.80	2.26	.91	.12
37	96.54	1.36	.97	.19
38	96.84	1.84	.95	.22
39	95.36	2.11	.94	.08
40	95.12	1.90	.95	.04
41	97.00	1.33	.96	.07
42	97.04	1.44	.98	.05
43	94.48	2.28	.96	.07

FDM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
45	96.86	1.41	.95	.08
46	94.10	1.76	.89	.11
47	95.38	1.89	.87	.16
48	94.52	1.88	.89	.12
49	95.06	1.93	.91	.11
52	94.08	2.06	.91	.12

Word % Correct and SCIM Scores - ITT PCM by Run No.

PCM	% Correct	Standard Deviation of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
2	72.96	6.37	.55	.34
3	77.64	3.38	.55	.31
6	69.16	6.62	.79	.22
7	64.48	7.06	.56	.27
8	63.30	13.15	.69	.25
9	88.98	3.12	.75	.21
10	84.10	4.56	.79	.20
11	84.36	3.12	.63	.20
12	93.70	2.34	.86	.18
13	94.42	1.83	.83	.16
14	89.26	3.78	.84	.16
15	90.24	2.47	.69	.24
18	NDA *	NDA *	.40	.30
28	92.94	2.39	.78	.15
29	97.26	1.51	.83	.12
30	92.10	2.17	.78	.23
31	90.04	2.52	.72	.18
33	96.40	1.31	.90	.15
34	96.74	1.48	.92	.04
35	81.92	8.55	.65	.32
36	85.04	2.55	.59	.28
37	87.36	3.19	.80	.18
38	95.64	1.64	.89	.08
39	87.46	2.86	.74	.28
40	92.84	2.61	.80	.18
41	92.52	2.37	.84	.17
42	94.46	1.70	.89	.10
43	90.62	2.55	.83	.22

PCM	% Correct	Standard Deviation of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
45	96.90	1.48	.83	.22
46	93.08	2.80	.80	.22
47	94.18	4.67	.81	.18
48	91.64	3.00	.78	.21
49	95.66	1.85	.86	.16
52	83.48	3.64	.66	.28

* NDA - No Data Available

Word % Correct and SCIM Scores - Martin FDM by Run No.

FDM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
61	97.80	1.01	.99	.00
62	96.70	1.75	.90	.12
63	97.74	1.20	.98	.02
64	96.00	1.66	.92	.07
65	NDA *	NDA *	.91	.13
66	94.66	1.70	.84	.11
67	94.14	2.06	.83	.13
68	94.40	1.79	.85	.11
69	94.92	2.48	.80	.18
70	96.36	1.53	.79	.16
71	93.04	2.61	.85	.08
72	92.74	2.36	.77	.16
73	95.56	2.58	.91	.11
74	NDA *	NDA *	.94	.04
75	97.76	1.19	.95	.03
76	NDA *	NDA *	.94	.09
77	97.74	1.40	.98	.02
78	96.44	2.42	.99	.26
79	96.26	1.97	.98	.02
80	96.48	2.14	.98	.02
81	97.74	1.00	.98	.03
82	96.60	1.52	.98	.02
83	97.46	1.19	.98	.02
84	97.70	1.47	.98	.02
85	98.20	1.11	.98	.03
86	97.30	1.33	.98	.02
87	97.88	1.32	.98	.04
88	97.26	.87	.98	.01
89	96.36	2.01	.98	.03
90	96.80	1.26	.96	.06

FDM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
91	94.16	4.08	.96	.05
98	95.56	1.44	.93	.12
99	96.36	1.68	.95	.05
100	94.06	1.98	.83	.20
104	94.46	2.34	.91	.05
106	91.90	2.61	.85	.11
107	93.34	1.99	.89	.10
108	95.20	1.63	.90	.10
109	93.90	1.86	.91	.06
110	90.50	2.68	.66	.19
112	96.80	1.23	.97	.03
113	91.22	2.64	.97	.05
114	97.74	1.43	.98	.00
115	NDA *	NDA *	.91	.10
116	96.70	1.61	.97	.01
117	96.26	1.90	.95	.02
118	96.84	1.39	.88	.08
119	92.70	2.08	.69	.14
120	91.76	2.90	.84	.24
121	95.64	1.70	.92	.09
122	94.06	2.02	.85	.12
123	93.04	1.97	.88	.09
124	94.92	2.14	.97	.03
125	NDA *	NDA *	.92	.11
126	93.14	2.14	.82	.15
127	93.86	2.05	.83	.09
128	96.66	1.73	.94	.06
129	96.60	1.39	.94	.06
130	96.96	1.50	.96	.04
132	96.06	1.59	.97	.04
133	97.06	1.49	.97	.05

<u>FDM</u>	<u>% Correct</u>	<u>Standard Deviations of Errors</u>	<u>Average SCIM Scores</u>	<u>Standard Deviations of SCIM Scores</u>
134	95.90	1.56	.98	.02
135	96.36	1.46	.95	.09
136	96.30	1.86	.97	.08
137	97.20	1.90	.99	.02
138	96.20	1.45	.99	.01
139	95.50	2.38	.98	.05
142	95.70	2.36	.98	.01
143	95.84	1.61	.98	.03
144	NDA *	NDA *	.98	.07
145	88.10	2.73	.59	.19
146	96.86	4.35	.57	.20
147	94.76	2.09	.83	.13
148	95.12	1.75	.89	.11
149	94.92	2.87	.88	.15
150	NDA *	NDA *	.53	.21
151	NDA *	NDA *	.54	.19
152	89.16	3.52	.69	.18
153	91.76	2.44	.64	.15
154	92.46	3.08	.79	.11
155	94.64	2.03	.90	.16
156	91.74	3.31	.89	.13

Word % Correct and SCIM Scores - Martin PPM by Run No.

PPM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
61	91.96	2.45	.32	.08
62	64.68	6.40	.19	.06
63	91.62	2.98	.52	.12
64	72.76	5.32	.18	.05
65	93.28	2.41	.36	.13
66	53.66	5.32	.16	.03
67	77.26	3.58	.24	.08
68	81.34	3.97	.34	.12
69	78.46	5.45	.41	.23
70	80.76	5.16	.39	.14
71	70.26	6.79	.66	.07
72	67.44	5.61	.26	.06
73	69.64	5.42	.06	.03
74	94.56	1.71	.35	.09
75	NDA *	NDA *	.48	.12
76	64.96	14.69	.06	.02
77	96.74	1.53	.60	.11
78	86.48	3.33	.16	.11
79	81.52	3.10	.07	.05
80	NDA *	NDA *	.51	.09
81	96.04	1.66	.61	.07
82	NDA *	NDA *	.69	.05
83	NDA *	NDA *	.48	.10
84	97.30	1.29	.71	.07
85	96.34	1.53	.62	.11
86	96.54	1.57	.56	.09
87	85.88	4.40	.14	.08
88	90.84	2.60	.31	.11

PPM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
89	95.90	1.86	.64	.08
90	91.94	2.08	.34	.09
91	96.64	1.63	.69	.03
98	83.24	13.24	.56	.16
99	89.44	3.42	.44	.18
100	46.80	6.32	.04	.02
104	85.44	5.29	.51	.16
106	73.14	3.83	.47	.13
107	71.84	5.23	.30	.14
108	82.98	3.77	.37	.17
109	80.84	4.39	.33	.18
110	71.16	6.48	.28	.17
112	95.66	1.67	.63	.16
113	90.34	3.00	.55	.14
114	88.72	2.94	.33	.10
115	87.16	7.49	.11	.08
116	76.10	4.27	.20	.12
117	87.90	3.40	.34	.19
118	92.16	2.38	.48	.19
119	63.46	3.35	.33	.13
120	87.66	3.48	.53	.17
121	88.76	2.66	.28	.16
122	85.28	2.60	.48	.18
123	79.00	5.19	.47	.16
124	91.88	2.15	.40	.18
125	74.94	3.14	.15	.08
126	60.54	5.42	.24	.16
127	79.92	3.34	.27	.12
128	92.32	2.13	.47	.14
129	81.78	3.47	.15	.07
130	85.00	2.62	.18	.07

PPM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
132	NDA *	NDA *	.20	.08
133	82.12	3.20	.22	.10
134	81.78	3.68	.20	.08
135	80.52	3.61	.23	.10
136	86.66	2.96	.25	.05
137	89.78	2.76	.33	.11
138	91.12	2.46	.38	.09
139	91.08	2.77	.38	.13
142	NDA *	NDA *	.26	.07
143	94.94	1.86	.49	.09
144	NDA *	NDA *	.20	.12
145	87.16	2.90	.32	.05
146	90.56	2.62	.33	.10
147	89.62	4.93	.44	.10
148	NDA *	NDA *	.27	.12
149	NDA *	NDA *	.17	.08
150	NDA *	NDA *	.51	.10
151	NDA *	NDA *	.41	.10
152	77.68	4.76	.22	.13
153	79.24	4.44	.24	.13
154	92.40	2.22	.34	.09
155	85.62	2.62	.14	.08
156	84.96	3.89	.18	.04

* NDA - No Data Available

Word % Correct and SCIM Scores - Motorola FDM by Run No.

<u>FDM</u>	<u>% Correct</u>	<u>Standard Deviations of Errors</u>	<u>Average SCIM Scores</u>	<u>Standard Deviations of SCIM Scores</u>
163	85.78	3.94	.68	.19
164	92.30	3.06	.80	.13
165	93.04	2.05	.80	.16
166	95.44	1.77	.92	.10
169	94.48	3.21	.93	.07
170	96.96	1.69	.94	.08
171	94.74	3.91	.97	.04
172	97.14	1.47	.95	.08
173	96.60	1.32	.91	.10
174	93.86	3.68	.92	.08
176	94.52	5.26	.98	.02
177	97.26	1.30	.98	.06
178	NDA *	NDA *	.98	.05
179	97.46	1.83	.94	.07
180	97.30	1.51	.97	.01
181	95.58	3.04	.98	.00
182	95.20	1.74	.91	.05
183	93.00	2.13	.82	.04
184	95.82	1.82	.95	.08
185	87.46	13.14	.78	.05
186	93.56	2.33	.77	.05
187	93.36	1.94	.83	.17
188	94.36	2.33	.83	.12
189	83.80	3.82	.65	.20
190	88.48	6.94	.79	.18
191	81.48	12.36	.76	.15
192	85.08	3.73	.77	.15
193	87.70	7.24	.72	.20
198	86.08	4.76	.77	.18

FDM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
200	NDA *	NDA *	.61	.18
201	82.36	4.48	.64	.21
202	88.88	2.78	.73	.14
203	89.76	3.31	.64	.23
204	NDA *	NDA *	.98	.00
208	89.94	6.42	.93	.05
209	NDA *	NDA *	.94	.12
210	NDA *	NDA *	.51	.27
211	NDA *	NDA *	.70	.16
212	NDA *	NDA *	.70	.15
215	95.64	2.05	.96	.07
216	95.16	2.05	.90	.07
217	95.96	1.55	.96	.01
218	94.58	1.70	.90	.06
221	73.34	5.81	.53	.24
222	NDA *	NDA *	.60	.22
223	75.04	4.14	.67	.19
224	89.76	4.08	.74	.18
226	92.14	2.86	.83	.10
227	NDA *	NDA *	.77	.18
229	NDA *	NDA *	.92	.07
232	NDA *	NDA *	.83	.05
233	NDA *	NDA *	.79	.09
256	NDA *	NDA *	.86	.10
257	NDA *	NDA *	.77	.01
258	93.84	2.26	.67	.24
259	93.96	2.33	.78	.12
261	96.56	1.38	.80	.02
262	92.08	2.20	.78	.01
263	NDA *	NDA *	.78	.03

FDM	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
264	NDA *	NDA *	.94	.04
265	95.94	1.91	.87	.03
266	96.00	1.82	.87	.04
267	97.24	1.77	.90	.08
268	96.56	2.10	.88	.10
270	98.18	1.24	.90	.05
271	NDA *	NDA *	.90	.04
272	97.56	1.67	.90	.08
273	96.80	1.59	.95	.03
274	96.86	1.85	.90	.07
275	96.30	1.39	.89	.05
278	92.58	2.74	---	---
280	91.80	2.69	---	---
282	91.74	4.66	.84	.09
283	91.14	6.69	.85	.07
284	94.44	3.22	.88	.05
285	96.20	2.26	---	---
286	96.08	1.87	.92	.08
290	85.50	6.06	.57	.28
292	89.92	2.91	---	---
294	88.30	3.41	---	---
279	58.32	5.79	.45	.05
298	NDA *	NDA *	.36	.06
299	NDA *	NDA *	.48	.17
300	89.06	2.81	.72	.11
301	85.62	3.68	.70	.15
310	91.00	3.02	---	---
312	91.80	2.99	---	---
313	89.42	3.65	---	---
314	82.44	6.44	---	---
315	90.56	2.91	---	---
317	96.64	1.43	---	---
318	80.36	5.05	---	---

*NDA - No Data Available

Word % Correct and SCIM Scores - Motorola Delta Modulation

Delta Mod.	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
160	95.04	1.97	.85	.07
161	95.02	2.59	.89	.02
162	95.84	1.70	.89	.01
163	95.56	1.92	.87	.06
164	95.04	2.01	.77	.10
165	94.50	1.98	.88	.09
166	94.78	2.68	.92	.02
167	93.12	2.20	.76	.20
168	94.92	3.24	.85	.20
169	96.44	1.88	.91	.02
170	96.64	1.17	.89	.08
171	95.20	1.97	.82	.05
172	96.60	1.39	.89	.04
173	96.68	1.92	.89	.04
174	96.70	1.36	.85	.08
176	95.80	2.12	.90	.02
177	96.28	1.67	.90	.17
178	92.94	3.11	.78	.02
179	95.30	2.10	.79	.03
180	97.64	1.29	.80	.04
181	95.56	2.48	.79	.03
182	93.70	2.51	.77	.03
183	92.06	2.54	.77	.04
184	NDA*	NDA*	.80	.12
185	94.50	2.27	.78	.15
186	NDA*	NDA*	.77	.16
187	93.30	2.07	.76	.02
188	93.48	2.29	.79	.06
189	86.02	4.31	.64	.25
190	88.82	4.20	.75	.11

Delta Mod.	% Correct	Standard Deviations of Errors	Average SCIM Scores	Standard Deviations of SCIM Scores
191	90.78	2.87	.70	.14
192	84.22	3.68	.65	.16
193	91.82	3.46	.78	.06
198	92.16	3.05	.75	.07
200	81.22	3.71	.65	.13
201	90.98	2.37	.69	.16
202	89.76	3.31	.70	.14
203	NDA*	NDA*	.65	.01
204	NDA*	NDA*	.76	.10
208	NDA*	NDA*	.77	.01
209	NDA*	NDA*	.83	.01
210	NDA*	NDA*	.52	.27
211	NDA*	NDA*	.65	.18
212	NDA*	NDA*	.78	.09
213	92.84	4.31	---	---
214	92.34	3.45	---	---
215	89.06	2.90	.83	.02
216	NDA*	NDA*	.80	.06
217	92.12	2.00	.83	.02
218	92.34	2.16	.83	.05
219	93.50	2.28	.63	.16
220	93.38	2.21	---	---
221	NDA*	NDA*	.63	.16
222	NDA*	NDA*	.61	.22
223	80.56	1.65	.57	.06
224	91.52	2.74	.79	.09
226	93.24	2.26	.78	.10
227	90.66	3.40	.82	.07
228	88.76	2.58	.83	.02
229	NDA*	NDA*	.84	.02
232	92.76	2.36	.78	.02

<u>Delta Mod.</u>	<u>% Correct</u>	<u>Standard Deviations of Errors</u>	<u>Average SCIM Scores</u>	<u>Standard Deviations of SCIM Scores</u>
233	87.38	5.48	.77	.08
235	91.38	2.70	.79	.04
236	89.42	2.91	.76	.03
237	88.20	3.18	.77	.02
238	NDA*	NDA*	.78	.02
239	89.16	3.41	.78	.05
240	90.36	2.31	.80	.04
241	92.16	2.27	.81	.03
242	92.04	2.29	.79	.06
243	91.56	2.36	.80	.03
244	92.96	2.21	.78	.03
245	92.92	1.90	.79	.03
246	93.06	2.20	.79	.04
247	92.18	2.47	.80	.03
248	86.82	5.00	---	---
249	NDA*	NDA*	.71	.11
250	90.84	3.24	.76	.04
251	91.52	3.07	.82	.03
252	83.04	5.08	.68	.13
256	NDA*	NDA*	.85	.02
257	NDA*	NDA*	.86	.02
258	96.92	1.63	.87	.02
259	96.68	1.70	.85	.02
261	97.28	1.62	.86	.02
262	96.92	1.84	.87	.02
263	NDA*	NDA*	.83	.02
264	91.86	2.97	.76	.04
265	90.88	3.56	.74	.01
266	91.02	2.57	.75	.03
267	93.12	1.93	.75	.01

<u>Delta Mod.</u>	<u>% Correct</u>	<u>Standard Deviations of Errors</u>	<u>Average SCIM Scores</u>	<u>Standard Deviations of SCIM Scores</u>
268	93.34	2.36	.76	.04
270	92.10	2.38	.78	.08
271	93.70	2.08	.80	.02
272	90.26	2.98	.79	.02
273	90.08	4.06	.79	.05
274	87.70	5.07	.80	.02
275	92.54	2.70	.80	.02
277	92.52	5.77	---	---
278	NDA*	NDA*	.82	.02
279	NDA*	NDA*	.83	.02
280	89.60	3.50	.81	.04
281	NDA*	NDA*	.83	.02
282	NDA*	NDA*	.81	.02
283	NDA*	NDA*	.81	.03
284	93.38	2.42	.80	.02
285	91.40	3.01	.79	.02
286	89.84	3.91	.78	.02
287	NDA*	NDA*	.68	.21
290	92.72	3.10	.71	.16
291	90.36	3.42	.79	.06
292	90.52	2.76	.78	.03
293	NDA*	NDA*	.80	.05
295	88.64	1.21	.80	.04
296	88.88	3.21	.69	.12
297	69.6	6.06	.32	.15
298	NDA*	NDA*	.35	.27
299	84.14	4.56	.49	.16
300	91.28	2.72	.70	.14
301	NDA*	NDA*	.63	.17
310	91.44	2.95	.78	.03
312	90.14	3.39	.80	.04

<u>Delta Mod.</u>	<u>% Correct</u>	<u>Standard Deviations of Errors</u>	<u>Average SCIM Scores</u>	<u>Standard Deviations of SCIM Scores</u>
313	90.94	4.43	.81	.02
314	89.42	2.69	.71	.16
315	89.86	2.76	.78	.03
317	92.84	2.27	.80	.07
318	74.6	1.54	.60	.22

Table II

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
1	5, 6	6			
2	5, 6	6		0455-0505	
3	5, 6	6		0615-0625	
4	5, 6				
5	1, 3; 5, 6				
6	1, 3; 5, 6			2205-2210	
7	1, 3; 5, 6			2300-2310	
8	1, 3; 5, 6			0020-0025	
9	1, 3; 5, 6	1			
10	5, 6	1		0935-0940	
11	5, 6			1235-1240	
12	1, 3; 5, 6	1		1705-1710	
13			1106-1108 1110-1113	1135-1140	

A -- Calibration differences between receivers

C -- Occurrence of possible aircraft

B -- Calibration differences between pre & post

D -- Omit due to apparent power failure

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
14				1405-1410	
15			1535-1538		
18					
19					
28		6			
29				1740-1750	
30				1150-1210	
31					
32					
33			1605-1607		
34					
35	5, 6	6	1625-1626		
36	5, 6	6	1442-1444 1445-1447		
37	5, 6	6	1600-1602		
38	5, 6	6			

No post tape calibration

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
39	5, 6	5, 6			
40	5, 6	5, 6			
41	5, 6	5, 6			
42	5, 6	5, 6			
43	5, 6	5, 6			
44	5, 6	5, 6			
45	5, 6	5, 6	1316-1318 1322-1325		
46	1, 3; 5, 6	5, 6			
47	1, 3; 5, 6	5, 6			
48	1, 3; 5, 6	5, 6			
49	1, 3; 5, 6	5, 6			
52					
62					
63					
64		69 Mc, 73 Mc			

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
65		69 Mc, 73 Mc			
66	67, 69 Mc	69 Mc, 73 Mc			
67	67, 69 Mc	69 Mc, 73 Mc			
68	67, 69; 71, 73; 1, 3	3			
69	67, 69; 71, 73; 1, 3	3			
70	67, 69; 71, 73; 1, 3	3			Omit period 1345-1350 due to bad time code
71	67, 69; 71, 73; 1, 3	3			Omit period 1435-1440 due to bad time code
72	67, 69; 71, 73; 1, 3	3			Omit period 1545-1550 due to bad time code
73	67, 73				
74	67, 73				Omit period 1110-1115 due to bad time code
75	67, 73				
76	67, 73		1342-1355		Power failure G. T. I.
77	67, 73				Omit period 1505-1510 due to bad time code
78	67, 73				
79			1607-1610		

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
80		1		1649-1700	
81		1			Omit period 1805-1810 due to bad time code
82	1, 3	1			
83	1, 3	1		1933-1936	
84		73			
85		73			
86	Omit runs 86-87				Calibration curves not available
88		67			
89		67			
90		67			
91		67			
92					
93					
94					No post tape calibrations for R x 69 Mc, 73 Mc, 1 and 3
98	1, 3	73			

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
99	1, 3	73			
100	69, 73	73			
104		1			
105		1	1628-1631 1634-1636 1644-1647		
106	69, 73	1			
107	69, 73	1			
108	69, 73	1			
109	69, 73	1			
110	69, 73	1			
112	69, 71	69, 71			
113		1	1054-1100		
114		1			
115		1			
116	69, 71; 1, 3	1			
117	69, 71; 1, 3	1			

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
118	69, 71; 1, 3	1			
119	1, 3	3	1039-1040		
120	1, 3	3	1130-1132		
121	69, 71; 1, 3		0956-1001		
122	69, 71; 1, 3				
123	69, 71; 1, 3				
124	69, 71; 1, 3				
125	69, 71; 1, 3				
126	69, 71; 1, 3				
127	69, 71; 1, 3				
128	1, 3	3			
129	1, 3	3	1055-1101		
130	1, 3	3	1155-1157		
131	1, 3	3			
132		3			

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
133		3			
134		3			
135	67, 69	67			
136	67, 69	67			
137		67	1514-1517		
138		67			
139		67			
141		73, 1, 3			
142	67, 73	73			
145	1, 3	1			
146	1, 3	1			
147	1, 3	1			
148		1			
149		1			
150	1, 3	1, 3	1245-1247		

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
151	1, 3	1, 3			
152	1, 3	1, 3			
153	1, 3	1, 3	1533-1537		
154	1, 3	1, 3			Omit channel 4, R x 1 out 1622-1625
155	1, 3				
156	1, 3				
157	1, 3				
158		1, 5			
159	1, 3; 5, 6	1, 5	1623-1626		
160					
161					No pre tape calibration for R x 5 and 6; no signal on R x 5 and 6
162	1, 3				No pre tape calibration for R x 5 and 6; no signal on R x 5 and 6 Rapid fading channel 4, R x 5
163	1, 3		1108-1110		No signal on R x 6 channel 5
164	1, 3				
165					

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
166					
167	5, 6	5, 6			Omit channels 4 and 5
168	5, 6	5, 6		1345-1350	Omit channels 4 and 5; Omit channels 2 and 3 (1345-1350) due to power failure
169	5, 6	5, 6	1613-1616		
170	5, 6	5, 6			
171	Omit runs 171-172				No Run 171 recorded; High signal on Run 172 caused data to go out of range on all receivers
173					
174					
175	Omit run 175				No Run 175 recorded
176	1, 3	1			
177	Omit runs 177-178				Data unreliable for these runs
179	5, 6				
180	5, 6				
181	5, 6				
182	1, 3; 5, 6				

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
183	1, 3; 5, 6				
184	Omit run 184				No record on sanborn charts
185					
186					
187	5, 6				
188	5, 6				
189		1, 5			
190		1, 5			
191	1, 3; 5, 6	1, 5			
192	1, 3; 5, 6	1, 5			
193					
194					
195					
196	1, 3				
198	1, 3		1625-1628		

Rapid fading on channels 4 and 5 at 1345-1350

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
200			1154-1157		
201					All channels either limited on tape or in transmitting or receiving (particularly 5)
202					All channels either limited on tape or in transmitting or receiving (particularly 5)
203					All channels either limited on tape or in transmitting or receiving (particularly 5)
204		1	1039-1053		
205		1			
206		1			
207	1, 3	1			
208	1, 3	1			
209	1, 3	1			
210					All channels either limited on tape or in transmitting or receiving
211					All channels either limited on tape or in transmitting or receiving
212	1, 3; 5, 6				All channels either limited on tape or in transmitting or receiving
213					
214					

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
215					High signal level
216					
217					High signal level
218		1, 3; 5, 6			Omit channel 4, R x 5 at 1335 to end of run (signal out of range)
219		1, 3; 5, 6			High signal level going out of range 1425-1440 and 1455-1500
220		1, 3; 5, 6			
221				0945-0950	Omit channels 4 and 5 for period 0945-0950 (transmitter off at 0948)
222		5			
223		5			
224		5			
225		5			
226		5			
227		5			
228		5			
229		5			

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
231		5			
232	5, 6	5			
233	5, 6	5			Low signal level on channel 5, R x 6
234	5, 6	5			
235					
236					
237					
238					
239		1			
240		1			
241		1			
242		1			
243		1			
244					
245					

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
246					
247					
248					
249					
250					
251					
252					
253					
254		1			No pre tape calibration for R x 3
255	1, 3	1			
256	1, 3; 5, 6	1, 5			
257	1, 3; 5, 6	1, 5			Rapid fading
258	1, 3	1, 5			
259	1, 3	1, 6			
260	1, 3	1, 6			

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
261	1, 3	1, 6			Channel 3 has break or disturbance in signal at 1555
262	5, 6	1, 6			
263	5, 6	1, 6			
264	1, 3; 5, 6				
265		1			
266		1			
267		1			
268	1, 3; 5, 6	1			
269	1, 3; 5, 6	1			
270	5, 6	5	1041-1043		
271	5, 6	5	1130-1132		
272	5, 6	5			
273	5, 6	5			
274	5, 6	5			
275	5, 6	5			

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
278	1, 3				Rapid fading channel 3
279	1, 3				Rapid fading
280	1, 3				
281	1, 3				Channel 2 is noise limited from 1620 to
282	1, 3; 5, 6		1139-1141		end of run
283	1, 3; 5, 6		1303-1307		
284	1, 3; 5, 6				
285	1, 3; 5, 6				
286	1, 3; 5, 6				1609-1614
287					
290	5, 6				Rapid fading
291					
292					Channels 2 and 3 are noise limited
293					Channels 2 and 3 are noise limited
295					Channels 2 and 3 are noise limited

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
296					
297		1, 5			
298		1, 5			
299		1, 5			
300	5, 6	1, 5			
301	5, 6	1, 5			
303					
304					
305					High signal level
306		1			Rapid fading
307		1			Rapid fading
308		1			High fade rate
309	1, 3	1			High fade rate
310	1, 3	1			High fade rate
312					No post tape calibrations R x 1 and R x 5

Run No.	A Receiver	B Receiver	C Time	D Time	Remarks
313					No post tape calibrations R x 1 and R x 5; High fade rate
314					No post tape calibrations R x 1 and R x 5; High fade rate
315	Omit run 315				Extremely rapid fading in all channels; all channels go out of range; FDM channels consist
316					High signal level; High fade rate
317					High signal level
318					
319	5, 6				High signal level
320	5, 6				High signal level for channels 4 and 5

Table III

FDM DATA							
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR
1	235			-98.4	42	NONE	
	240			-91.0	31		
	245			-88.2	33		
	250			-89.2	36		
	255			-89.2	37		
2	300			-89.2	39		
	305			-89.2	37		
	310			-89.2	35		
	315			-89.2	34		
	320			-89.2	30		
3	525			-87.5	29		
	530			-87.5	30		
	535			-87.5	31		
	540			-87.5	24		
	545			-87.5	24		
4	605			-84.5	24		
	1500	2400	24	-84.7	19	GSC4	0.5300
	1505			-85.9	17		0.0000
	1510			-87.7	16		0.0000
	1515			-86.6	23		0.0000
5	2035	2400	24	-85.3	21	GSC4	0.0000
	2040			-82.2	13		0.0000
	2045			-81.4	17		0.0000
	2050			-83.7	15		0.0000
	2055			-81.4	17		0.0000
6	2100			-83.5	14		0.0000
	2105			-83.5	15		0.0000
	2110			-83.5	15		0.0000
	2115			-83.5	15		0.0000
	2120			-83.5	15		0.0000
7	2235	2400	24	-84.3	15	GSC4	0.0140
	2240			-84.1	11		0.0130
	2245			-84.1	10		0.0170
	2250			-84.1	14		0.0030
	2255			-84.1	12		0.0140

FUM DATA

RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
8	0	2400	24	-47.1 -49.5 -46.8 -47.4 -48.1 -49.0	17 23 24 21 17 18	GSCL	0.0120 0.0780 0.0014 0.0053 0.2100 0.2200	NONE
9	1810	2400	CHS	-44.4 -44.6 -44.9 -44.9 -43.9 -42.4 -41.2	27 25 30 27 26 23 26	NONE	ERROR	
10	1905	2400	CHS	-73.0 -74.4 -72.7 -73.4 -73.2 -73.9	19 20 22 26 22 22	FOED	0.6500 27.0000 1.6500 23.6100 7.8100 29.2300	NO SYNC NO SYNC NO SYNC
11	1205	2400	CHS	-78.2 -79.1 -77.6 -74.3 -76.0 -76.6	37 36 49 40 41 37	FAED	0.0003 0.0014 0.0015 0.0011 0.0021 0.0019	
12	1435	2400	CHS	-74.9 -71.2 -73.2 -73.0 -72.7 -72.4	12 15 16 15 14 24	FAED	ERROR	
13	1105	2400	CHS	-83.3 -82.1 -81.7 -80.8 -81.9 -82.0	53 49 28 24 19 27	FAED	0.0004 0.0001 0.0000 0.0001 0.0017 0.0003	
14	1335	2400	CHS	-85.4 -84.5 -85.1 -84.1 -84.4 -84.0	24 25 33 32 30 28	FAED	0.0003 0.0000 0.0000 0.0010 0.0000 0.0007	

FORM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
15	1505	2400	24	-81.4	22	FRED	0.0001	
	1510			-82.4	23		0.0000	
	1515			-81.9	25		0.0000	
	1520			-82.6	21		0.0000	
	1525			-81.3	30		0.0004	
	1530			-80.8	160		0.0122	
	1535			-78.8	130			
18	2225	2400	24	-87.2	112	GSC4	4.4600	REMARKS NO SYNC
	2230			-89.1	130		0.0003	
	2235			-90.4	150		0.0000	
	2240			-90.2	96		0.0190	
	2245			-87.5	144		0.0190	
19	1420		CHS	-94.1	69	TYPE NONE	ERROR	REMARKS
	1425			-93.7	63			
	1430			-94.5	73			
	1435			-93.8	64			
	1440			-93.0	54			
	1445			-93.2	58			
	1450			-93.8	49			
28	1605	2400	24	-95.4	73	GSC4	0.0000	
	1610			-95.3	75		0.0000	
	1615			-96.6	81		0.0000	
	1620			-96.2	71		0.0000	
	1625			-95.9	85		0.0000	
	1630			-96.5	85		0.0000	
	1635			-95.8	90		0.0000	
29	1735	2400	24	-95.8	90	GSC4	0.1200	
	1750			-95.7	90		0.2200	
	1755			-95.0	90		0.0860	
	1800			-94.2	90		0.0660	
	1805			-94.6	90		0.3100	
30	1135	2400	24	-95.8	60	TYPE NONE	ERROR	REMARKS
	1140			-96.8	65		2.1600	
	1145			-96.5	65		1.3200	
	1150			-96.1	55		0.5400	
	1155			-96.3	55		0.6400	
	1400			-94.5	60		0.7700	
	1405			-95.2	52		0.7600	
	1410			-95.3	42		1.0500	
	1415			-94.7	50		0.8500	
	1420			-93.2	50		0.1100	

FDM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
32	1505	2400	24	-91.8	48	FRED	0.2100	
	1510			-91.1	48		0.1900	
	1515			-88.7	38		0.0110	
	1520			-86.5	35		0.0040	
	1525			-86.4	40		0.0690	
	1530			-93.5	33		0.0940	
	1535			-92.9	44		0.0620	
33	1605	2400	24	-89.4	55	FRED	0.0720	
	1610			-89.2	36		0.0220	
	1615			-88.3	49		0.0015	
	1620			-87.8	46		0.0330	
	1625			-89.6	46		0.0046	
	1630			-86.7	47		0.0030	
	1635			-85.3	33		0.0010	
34	1750	2400	24	-83.6	44	FRED	0.0025	
	1755			-85.6	61		0.2200	
	1800			-88.8	47		0.0650	
	1805			-87.7	58		0.1100	
	1810			-91.9	79		0.0420	
	1815			-88.7	65		0.0140	
	1820			-86.5	53		0.0140	
35	1330	2400	24	-89.0	52	GSC4	14.4100	NO SYNC
	1335			-87.3	44		2.1400	
	1340			-87.6	36		3.1600	
	1345			-89.0	50		3.3000	
	1350			-90.6	52		27.1300	
	1355			-90.7	43		5.7000	
36	1425	2400	24	-94.0	71	GSC4	4.3000	REMARKS
	1430			-92.8	70		3.1200	
	1435			-92.7	71		3.9900	
	1440			-90.8	54		3.0000	
	1445			-90.0	40		2.6800	
	1450			-91.5	40		2.3900	
	1455			-94.3	65		4.8200	
37	1535			-89.6	55	NONF	ERROR	
	1540			-89.7	50		4.3000	
	1545			-87.9	51		3.9900	
	1550			-86.4	43		3.0000	
	1555			-87.0	54		2.6800	
	1600			-85.6	39		2.3900	
	1605			-83.4	43		4.8200	
38	1625			-84.4	47	NONF	ERROR	
	1630			-83.0	48		4.3000	
	1635			-84.7	46		3.9900	
	1640			-84.7	50		3.0000	
	1645			-84.3	61		2.6800	
	1650			-82.9	54		2.3900	
	1655			-81.6	53		4.8200	

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
39	720	2400	24	-87.9	49	GSC4	0.0001	
	725			-86.4	50		0.0000	
	730			-86.1	44		0.0000	
	735			-87.0	59		0.0007	
	740			-86.1	55		0.0010	
	745			-86.4	55		0.0004	
	750			-87.2	54		0.0010	
40	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	810			-92.3	47	NONE		
	815			-91.2	41			
	820			-91.3	42			
	825			-91.6	43			
	830			-91.5	41			
	835			-91.7	38			
	840			-91.6	26			
	845			-91.3	22			
41	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	905			-87.5	40	NONE		
	910			-86.5	35			
	915			-86.2	42			
	920			-85.9	29			
	925			-86.4	45			
	930			-86.5	41			
	935			-86.2	46			
42	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1005	2400	24	-80.0	39	GSC4	0.0025	
	1010			-79.5	31		0.0000	
	1015			-79.8	32		0.0120	
	1020			-80.5	19		0.0030	
	1025			-79.9	22		0.2000	
	1030			-79.1	14		0.0003	
	1035			-79.5	24		0.0007	
43	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1105	2400	24	-86.7	33	GSC4	0.0010	
	1110			-83.5	30		0.0015	
	1115			-83.1	24		0.0003	
	1120			-84.6	26		0.0040	
	1125			-85.5	14		0.0003	
	1130			-85.7	24		0.0040	
	1135			-84.2	35		0.0003	
44	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1205	2400	24	-73.5	26	GSC4	0.0000	
	1210			-77.4	18		0.0000	
	1215			-76.9	24		0.0046	
	1220			-82.2	16		0.0026	
	1225			-79.0	12		0.0130	
	1230			-79.5	20		0.0210	
	1235			-80.4	12		0.0000	
45	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1250	2400	24	-73.1	12	GSC4	0.0210	
	1255			-75.7	15		0.0000	
	1300			-77.0	19			
	1305			-75.3	23			
	1310			-79.0	14			
	1315			-77.4	44			
	1320			-74.8	51			

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
46	450	2400	24	-92.4	34	GSC4	0.0640	NONE		
	855			-94.1	35		0.0840			
	900			-95.6	31		0.0400			
	905			-95.2	50		0.3000			
	910			-95.4	47		0.4000			
	915			-95.9	50		0.3100			
	920			-95.6	41		0.0330			
47	1005	2400	24	-92.5	39	GSC4	0.1000	NONE		
	1010			-94.8	40		0.4400			
	1015			-95.4	46		0.1600			
	1020			-95.2	46		0.0140			
48	1105	2400	24	-94.8	43	GSC4	0.0120	NONE		
	1110			-90.6	31		0.0430			
	1115			-93.6	24		0.0020			
	1120			-93.3	37		0.6500			
	1125			-95.5	37		0.4000			
	1130			-95.1	34		0.2200			
	1135			-97.1	32		0.0450			
49	1405	2400	24	-92.6	31	FRED	0.0240	NONE		
	1410			-90.7	36		0.0170			
	1415			-94.8	36		0.0048			
	1420			-94.0	25		0.0085			
	1425			-91.5	41		0.0530			
	1430			-98.8	35		0.1800			
	1435			-90.4	48		0.1750			
52	1620	2400	24	-97.0	74	GSC4	0.1500	NONE		
	1625			-95.3	68		0.1000			
	1630			-94.8	61		0.0940			
	1635			-95.9	75		0.1300			
	1640			-96.0	72		0.0340			
	1645			-95.0	43		0.1547			
	1650			-94.5	42		0.1205			
62	1455	2400	24	-93.3	21	GSC4	0.2378	NONE		
	1500			-94.4	31		0.1700			
	1505			-95.2	49		0.1630			
	1510			-91.7	34		0.0048			
	1515			-94.2	60		0.0085			
	1520			-93.5	63		0.0530			
	1525			-93.4	55		0.1800			
63	1550	2400	24	-91.5	27	NONE	0.1750	NONE		
	1555			-89.4	20		0.1500			
	1600			-93.2	14		0.1000			
	1605			-93.2	22		0.0940			
	1610			-91.4	22		0.1300			
	1615			-92.6	24		0.0340			
	1620			-95.8	14		0.1547			

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RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
64	1105	1200	24	-85.8	16	GSC4	0.0000	
	1110			-86.7	22		0.0000	
	1115			-87.6	32		0.0000	
	1120			-88.6	24		0.0000	
	1130			-91.0	23		0.0000	
65	1135			-71.4	27		0.0000	
	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1155	1200	24	-84.0	28	GSC4	0.0000	
	1200			-90.2	25		0.0000	
	1205			-92.3	39		0.0000	
66	1210			-99.2	33		0.0000	
	1215			-84.3	31		0.0000	
	1220			-80.2	25		0.0000	
	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1510	2400	24	-93.5	58	GSC4	0.2900	
67	1515			-92.1	46		0.1350	
	1520			-94.3	48		0.2220	
	1525			-96.1	64		0.2910	
	1530			-95.8	71		0.2870	
	1535			-92.5	38		0.1500	
68	1540			-91.5	41		0.1200	
	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1605	2400	24	-93.7	54	GSC4	0.3230	
	1610			-93.8	52		0.2340	
	1615			-95.4	52		0.3640	
69	1620			-94.5	60		0.0790	
	1625			-92.8	67		0.1460	
	1630			-91.8	61		0.1630	
	1635			-93.1	44		12.2400	NO SYNC
	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1035	1200	24	-87.9	19	GSC4	0.1430	
70	1040			-93.2	24		0.0860	
	1045			-95.7	29		0.1460	
	1050			-95.7	31		0.0750	
	1055			-93.7	23		0.2030	
	1100			-92.3	33		0.0890	
69	1105			-90.1	25		0.5130	
	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1135	1200	24	-96.4	39	GSC4	0.0060	
	1140			-91.3	23		0.0430	
	1145			-87.8	22		0.1390	
70	1150			-92.5	26		0.3560	
	1155			-88.8	23		0.2200	
	1200			-95.7	31		0.1320	
	1205			-95.7	42		0.3630	
	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1340	2400	24	-95.7	37	GSC4	0.3790	
70	1350			-92.7	30		0.2640	
	1355			-92.4	27		0.2240	
	1400			-91.3	15		0.2290	
	1405			-94.3	21		0.2460	
	1410			-94.1	14		0.3780	
70	1415			-91.0	13			
	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1410	2400	24	-93.3	30	GSC4		
	1415			-90.4	29			
	1420			-90.4	29			

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RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
71	1435	2400	24	-95.2	24	23	0.6110	
	1440			-94.5	21	19	0.5230	
	1445			-96.2	21	22	0.4840	
	1450			-96.9	29	24	1.1550	
	1455			-95.4	33	33	0.3610	
	1500			-94.7	32	30	0.2470	
	1505			-93.7	26	27	0.3480	
72	1525	1200	24	-94.2	24	21	0.1440	
	1530			-95.1	22	22	0.4010	
	1535			-95.4	30	24	0.1770	
	1540			-95.7	34	27	0.2590	
	1545			-95.0	22	23	0.1740	
	1550			-94.4	27	23	0.1350	
	1555			-95.2	26	25	0.3500	
73	1005	1200	24	-87.1	77	85	0.0110	
	1010			-86.9	81	75	0.0100	
	1015			-87.6	79	78	0.0030	
	1020			-87.1	85	74	0.0060	
	1025			-87.1	78	66	0.0020	
	1030			-88.8	83	66	0.0080	
	1035			-88.5	74	85	0.0090	
74	1055	1200	24	-87.6	64	56	0.0005	
	1100			-87.7	66	64	0.0010	
	1105			-86.0	75	65	0.0030	
	1115			-87.6	82	73	0.0340	
	1120			-84.2	89	79	0.0903	
	1125			-84.2	94	79	0.0005	
75	1150	1200	24	-85.4	85	77	0.0005	
	1155			-87.0	87	85	0.0005	
	1200			-85.4	94	84	0.0030	
	1205			-85.1	87	84	0.0110	
	1210			-86.3	73	84	0.0110	
	1215			-87.3	90	90	0.0090	
	1220			-88.4	92	90	0.0030	
76	1320	1200	24	-83.4	106	89	0.0010	
	1325			-81.8	89	92	0.0000	
	1330			-81.6	105	97	0.0000	
	1335			-82.5	90	92	0.0290	
77	1445	1200	24	-71.2	53	53	0.0000	
	1450			-69.8	53	50	0.0000	
	1455			-72.0	50	41	0.0000	
	1500			-69.0	41	39	0.0000	
	1510			-73.7	39	39	0.0020	
	1515			-68.2	39	39	0.0003	

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RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
78	1540	1200	24	-60.0	34	GSC4	0.0000	
	1545			-69.2	32		0.0000	
	1550			-76.0	36		0.0000	
	1555			-75.4	34		0.0000	
	1600			-76.2	52		0.0000	
	1605			-71.7	48		0.0000	
	1610			-71.0	49		0.0000	
79	1535	1200	24	-74.4	49	GSC4	0.0006	
	1540			-70.2	53		0.0000	
	1545			-79.4	50		0.0400	
	1550			-80.1	47		0.0000	
	1555			-79.0	50		0.0000	
	1600			-81.5	51		0.0020	
	1605			-70.4	46		21.9400	NO SYNC
80	1625	1200	24	-79.4	41	GSC4	0.0006	
	1630			-76.7	54		0.0340	
	1635			-80.7	65		0.0040	
	1640			-77.9	51		0.0020	
	1645			-80.4	51		0.0000	
	1650			-81.9	71		0.0020	
	1655			-82.0	74		0.0020	
81	1745	1200	24	-85.1	76	GSC4	0.0006	
	1750			-82.9	72		0.0006	
	1755			-83.8	71		0.0060	
	1800			-84.0	74		0.0300	
	1810			-81.9	79		0.0000	
	1815			-82.0	74		0.0020	
	1820			-80.3	74		0.0020	
82	1835	1200	24	-77.2	64	GSC4	0.0003	
	1840			-74.2	65		0.0008	
	1845			-79.4	53		0.0000	
	1850			-77.5	48		0.0000	
	1855			-77.6	53		0.0020	
	1900			-77.1	48		0.0003	
	1905			-74.8	49		0.0000	
83	1905	1200	24	-77.4	59	GSC4	0.0006	
	1910			-74.6	44		0.0006	
	1915			-75.6	42		0.0003	
	1920			-75.5	46		0.0030	
	1925			-76.2	35		25.0430	NO SYNC
	1930			-75.4	40		19.6220	NO SYNC
	1935			-77.1	52		0.0030	
84	2000			-75.0	45		0.0020	
	2005			-77.4	40		0.0000	
	2010			-78.3	44		0.0006	
	2015			-77.4	44		0.0006	
	2020			-74.4	42		0.0003	
	2025			-75.5	46		0.0030	
	2030			-76.5	55		25.0430	NO SYNC
84	1420			-73.4	17	TYPE NONE	0.0000	
	1425			-71.5	14		0.0000	
	1430			-74.4	17		0.0000	
	1435			-71.0	13		0.0000	
	1440			-75.4	21		0.0000	
	1445			-72.2	20		0.0000	
	1450			-74.4	13		0.0000	

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RUN	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
85	1530			-75.7	16	NONE			
	1535			-78.6	12				
	1540			-79.2	16				
	1545			-75.3	13				
	1550			-75.5	13				
	1555			-76.4	10				
88	1600			-74.6	11				
	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
	1420			-84.0	15	NONE			
	1425			-83.7	14				
	1430			-83.9	11				
	1435			-81.7	14				
89	1440			-79.5	9				
	1445			-82.2	14				
	1450			-85.4	12				
	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
	1530			-83.7	19	NONE			
	1535			-83.8	15				
90	1540			-82.0	8				
	1545			-84.0	23				
	1550			-83.1	14				
	1555			-81.9	14				
	1600			-82.3	12				
	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
91	1640			-81.1	14	NONE			
	1645			-79.0	15				
	1650			-78.1	12				
	1655			-80.5	17				
	1700			-81.5	9				
	1705			-82.2	14				
92	1710			-81.8	15				
	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
	1750			-79.9	9	NONE			
	1755			-81.0	16				
	1800			-79.8	10				
	1805			-81.1	13				
92	1810			-81.6	15				
	1815			-81.0	14				
	1820			-82.0	15				
	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
	1020			-89.7	22	NONE			
	1025			-90.6	22				
92	1030			-91.5	23				
	1035			-91.1	24				
	1040			-90.4	25				
	1045			-89.6	14				
	1050			-88.2	33				
	1055			-88.6	24				

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
93	1350			-82.6	22	NONE				
	1355			-84.1	23					
	1400			-84.5	20					
	1405			-85.6	24					
	1410			-85.0	16					
	1415			-84.7	27					
	1420			-86.0	12					
94	1455	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1500			-80.2	27	GSC4	0.0110			
	1505			-77.5	24		0.0590			
	1510			-81.7	18		0.0011			
	1515			-77.6	20		0.0290			
	1520			-74.5	43		0.0170			
	1525			-80.1	20		0.0011			
96	1650	1200	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1655			-78.5	34	GSC4	0.0420			
	1700			-92.1	32		0.0058			
	1705			-91.5	29		0.0003			
	1710			-86.9	23		0.0330			
	1715			-92.1	28		0.0450			
	1720			-89.1	37		0.0150			
99	1750	1200	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1755			-86.7	30	GSC4	0.0970			
	1800			-92.7	32		0.0000			
	1805			-89.6	37		0.0050			
	1810			-91.2	27		0.0000			
	1815			-89.5	40		0.0440			
	1820			-92.2	48		0.0060			
100	1935	1200	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1940			-90.1	33	GSC4	0.0060			
	1945			-98.3	46		0.0330			
	1950			-98.7	37		16.0700			NO SYNC
	1955			-98.1	44		0.3300			
	2000			-99.0	42		0.1200			
	2005			-98.2	45		0.4200			
104	1535	1200	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1540			-98.2	43	GSC4	0.2800			
	1545			-99.2	44		0.4200			
	1550			-93.3	44		0.2500			
	1555			-97.2	44		0.0000			
	1600			-93.3	21	GSC4	0.0000			
	1605			-91.5	17		0.0000			
105	1625	1200	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1630			-86.3	12	GSC4	0.0000			
	1635			-91.1	16		0.0000			
	1640			-93.3	17		0.0000			
	1645			-97.2	14		0.0000			
	1650			-97.7	10	GSC4	0.0000			
	1655			-96.5	45		0.0000			

FDM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
106	1715	1200	24	-99.3	17	21	0.0000	
	1720			-97.3	25	16	0.0000	
	1725			-99.0	26	24	0.0000	
	1730			-98.8	29	30	0.0000	
	1735			-100.2	33	18	0.0000	
	1740			-99.9	33	18	0.0000	
	1745			-98.9	22	24	0.0000	
	1750			-97.7	24	22	0.0000	
107	1835			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1840			-99.2	27	19	NONE	
	1845			-100.3	20	15	NONE	
	1850			-100.1	24	16	NONE	
	1855			-97.0	16	22	NONE	
	1900			-99.3	14	16	NONE	
	1905			-96.4	17	18	NONE	
	1910			-96.1	21	19	NONE	
108	1935			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1940			-96.2	42	36	NONE	
	1945			-95.1	29	24	NONE	
	1950			-94.7	44	24	NONE	
	1955			-96.3	38	44	NONE	
	2000			-98.7	51	33	NONE	
	2005			-96.1	50	34	NONE	
	2010			-94.9	39	41	NONE	
109	2025			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	2030			-97.0	28	34	NONE	
	2035			-99.3	30	32	NONE	
	2040			-97.2	40	44	NONE	
	2045			-95.2	38	35	NONE	
	2050			-97.8	40	37	NONE	
	2055			-97.3	46	49	NONE	
	2100			-97.8	45	44	NONE	
110	2115			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	2120			-97.8	41	40	NONE	
	2125			-99.3	34	38	NONE	
	2130			-98.2	37	38	NONE	
	2135			-98.8	32	33	NONE	
	2140			-99.4	30	27	NONE	
	2145			-103.0	38	44	NONE	
	2150			-104.8	37	31	NONE	
112	1615			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1620			-97.5	25	23	0.0000	
	1625			-87.5	18	23	0.0000	
	1630			-87.6	20	14	0.0000	
	1635			-83.1	23	29	0.0000	
	1640			-81.1	14	15	0.0000	
	1645			-85.6	19	14	0.0000	
	1650			-87.9	42	38	0.0000	

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
113	1025	1200	24	-90.5	22	GSC4	0.0003	
	1030			-87.6	21		0.0044	
	1035			-89.2	24		0.0003	
	1040			-87.3	23		0.0003	
	1045			-81.9	12		0.0008	
	1050			-84.6	13		0.0496	
	1055			-87.4	46		0.0380	
	1055			-78.0	39		0.0000	
	1100			-80.8	47		0.0000	
114	1150	1200	24	-81.0	22	GSC4	0.0000	
	1155			-79.4	13		0.0000	
	1200			-82.0	16		0.0000	
	1205			-81.6	17		0.0000	
	1210			-77.6	10		0.0178	
	1215			-78.5	11		0.0000	
	1220			-79.9	17		0.0133	
	1225			-76.2	13		0.0039	
	1230			-77.5	17		0.0000	
	1235			-74.5	12		0.0000	
	1240			-80.2	11		0.0000	
115	1320			-93.1	17	NONE	0.0000	
	1325			-94.7	22		0.0000	
	1330			-97.1	34		0.0000	
	1335			-98.2	29		0.0000	
	1340			-96.2	36		0.0000	
	1345			-95.0	33		0.0000	
	1350			-95.9	26		0.0000	
	1355			-92.8	23		0.0000	
116	1420	1200	24	-91.4	18	GSC4	0.0000	
	1425			-89.0	13		0.0000	
	1430			-87.7	14		0.0000	
	1435			-91.0	16		0.0000	
	1440			-91.4	11		0.0390	
	1445			-92.7	11		0.0014	
	1450			-98.6	13		0.0000	
	1455			-86.9	12		0.0000	
	1460			-90.8	15		0.0003	
117	1520	1200	24	-91.5	13	GSC4	0.0000	
	1525			-93.2	10		0.0005	
	1530			-93.9	17		0.0050	
	1535			-94.1	17		0.0025	
	1540			-96.5	13		0.0050	
	1545			-94.9	22		0.0694	
	1550			-97.6	12		0.1640	
118	1615	1200	24	-96.8	12	GSC4	0.0144	
	1620			-93.3	13		0.0147	
	1625			-93.4	13		0.0103	
	1630			-93.8	12		0.0039	
	1635			-91.2	16		0.0047	
	1640			-99.6	10		0.0000	
	1645			-91.4	11		0.0900	

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RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
119	1025	1200	24	-100.6	32	GSC4	0.3290	
	1030			-99.9	99		0.5000	
	1035			-94.2	67		0.4840	
	1040			-99.0	137		0.3510	
	1045			-94.8	100		0.306	
	1050			-100.2	86		0.3220	
	1055			-100.6	36		0.4100	
120	1125		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1130			-96.9	37	NONE		
	1135			-96.4	96			
	1140			-96.7	55			
	1145			-92.5	31			
	1150			-91.0	33			
	1155			-92.4	32			
	1155			-94.5	38			
121	1250		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1255			-90.6	30	GSC4	0.0590	
	1300			-86.6	37		0.0320	
	1305			-92.8	37		0.0175	
	1310			-92.8	45		0.0015	
	1315			-87.5	30		0.0330	
	1320			-86.2	32		0.0022	
	1325			-80.9	46		0.0360	
122	1400		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1405			-88.4	38	GSC4	0.0390	
	1410			-91.3	40		0.0120	
	1415			-93.8	39		0.1050	
	1420			-94.5	51		0.1440	
	1425			-91.8	52		0.0870	
	1430			-93.0	73		0.0740	
	1435			-94.5	70		0.0980	
123	1500		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1505			-96.2	71	GSC4	0.1760	
	1510			-97.2	66		0.1470	
	1515			-92.9	55		0.1920	
	1520			-92.4	80		0.0890	
	1525			-88.5	57		0.0450	
	1530			-90.6	38		0.0360	
	1535			-78.2	45		0.0175	
124	1600		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1605			-82.6	44	NONE		
	1610			-79.5	44			
	1615			-80.2	41			
	1620			-81.5	29			
	1625			-85.5	34			
	1630			-83.9	70			
	1635			-86.2	75			

FDM DATA

RUN	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
125	1450			-84.4	50	NONE				
	1455			-89.1	54					
	1500			-87.8	52					
	1505			-84.5	38					
	1510			-85.1	44					
	1515			-86.0	33					
	1520			-86.4	35					
	1520			-85.9	47					
126	1540			-87.1	53	NONE				
	1545			-89.4	59					
	1550			-93.2	63					
	1555			-94.0	76					
	1600			-93.1	95					
	1605			-94.4	86					
	1610			-96.6	72					
	1610			-95.6	72					
127	1625			-94.5	95	NONE				
	1630			-94.5	69					
	1635			-94.1	73					
	1640			-94.0	68					
	1645			-95.4	106					
	1650			-94.2	45					
	1655			-94.2	101					
	1655			-95.7	74					
128	1745			-84.9	97	GSC4	0.0014			
	1750		24	-87.6	104		0.0159			
	1755			-86.5	94		0.5320			
	1800			-85.0	73		0.0042			
	1805			-83.9	93		0.0108			
	1810			-85.2	113		0.0428			
	1815			-83.9	95		0.0006			
	1815			-84.0	89		0.0006			
129	1835			-81.8	72	GSC4	0.0370			
	1840		24	-78.6	60		0.0006			
	1845			-81.9	69		0.0420			
	1850			-80.5	53		0.0019			
	1855			-79.6	56		0.0031			
	1900			-80.2	62		0.0220			
	1905			-80.2	55		0.0036			
	1905			-82.1	50		0.0036			
130	1930			-79.6	45	GSC4	0.0005			
	1935		24	-76.5	19		0.0033			
	1940			-78.6	41		0.0140			
	1945			-77.6	33		0.0306			
	1950			-76.0	35		0.0111			
	1955			-75.9	40		0.0450			
	1955			-81.1	49		0.0450			
	1200			-81.5	45		0.0400			

FDM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
131	1255			-77.7	52	NONE				
	1300			-79.8	77					
	1305			-79.6	94					
132	1445			-77.4	52	NONE				
	1450			-76.8	55					
	1455			-79.1	81					
133	1500			-77.5	70					
	1505			-79.1	60					
	1510			-81.2	73					
134	1625			-75.5	53	NONE				
	1640			-75.0	67					
	1645			-73.4	63					
135	1655			-75.2	81					
	1700			-76.7	74					
	1710			-75.2	61					
136	1125			-84.2	11	FRED				
	1130			-81.4	12					
	1135			-82.2	11					
137	1405			-81.4	14					
	1410			-81.4	14					
	1415			-81.4	16					
138	1420			-81.4	14					
	1505			-83.0	11					
	1510			-79.6	32					
139	1515			-76.8	56					
	1520			-75.3	10					
	1525			-77.4	9					
140	1530			-75.8	4					
	1535			-73.8	4					

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138	1555	2400	CHS	MEANS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
	1600			-76.7	-76.4	12 15	ASC4	0.0410	
	1605			-75.0	-76.4	11 8		0.1240	
	1610			-75.6	-77.4	11 10		0.0300	
	1615			-75.3	-76.4	12 13		0.0620	
	1625			-76.4	-76.7	10 7		0.0950	
139	1655		CHS	MEANS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
	1700			-76.2	-76.5	8 6	NONE	0.0310	
	1705			-79.6	-79.7	11 9		ERROR	
	1710			-76.0	-77.1	7 7			
	1715			-79.6	-79.4	14 11			
	1720			-80.3	-79.5	9 10			
	1725			-80.2	-78.2	14 10			
	1735			-81.0	-79.7	10 7			
141	1725			-85.1	-85.3	19 13			
	1805		CHS	MEANS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
	1810			-84.6	-83.0	35 34	NONE		LOOP
	1815			-83.8	-80.3	25 21			
	1820			-85.0	-85.0	27 29			
	1825			-84.2	-80.6	27 21			
	1830			-84.6	-84.6	26 33			
	1835			-85.1	-83.0	27 34			
142	1835			-89.8	-84.1	20 27			
	1245		CHS	MEANS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
	1250			-74.4	-72.4	12 11	NONE		LOOP
	1255			-74.8	-73.6	15 14			
	1300			-73.6	-74.1	17 10			
	1305			-72.2	-72.8	8 9			
	1310			-73.5	-75.0	12 10			
	1315			-73.5	-72.4	16 12			
145	1315			-73.7	-73.5	15 15			
	1105		CHS	MEANS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
	1110			-89.4	-93.2	19 20	NONE		LOOP
	1115			-88.7	-93.0	22 22			
	1120			-88.8	-94.1	23 23			
	1125			-89.4	-94.9	25 20			
	1130			-90.6	-94.5	20 27			
	1135			-89.5	-93.3	19 23			
146	1135			-90.0	-94.4	22 21			
	1205		CHS	MEANS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
	1210			-88.6	-95.4	16 19	NONE		LOOP
	1215			-88.1	-95.9	16 17			
	1220			-89.2	-94.5	22 19			
	1225			-89.9	-95.6	20 24			
	1230			-89.5	-95.9	19 27			
	1235			-89.3	-94.8	22 24			
147	1235			-86.9	-93.4	23 21			
	1305		CHS	MEANS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
	1310			-90.0	-89.8	19 16	NONE		LOOP
	1315			-87.8	-93.8	25 18			
	1320			-83.6	-88.0	16 10			
	1325			-86.4	-91.4	17 22			
	1330			-85.0	-90.3	22 19			
	1335			-80.1	-85.2	16 24			
				-81.0	-85.7	19 17			

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RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
148	1405			-86.8	13	NONE				LOOP
	1410			-77.4	8					
	1415			-77.7	7					
	1420			-81.2	17					
	1425			-80.7	10					
	1430			-80.4	13					
	1435			-81.2	8					
149	1505			-80.5	10					LOOP
	1510			-80.7	13					
	1515			-81.4	13					
	1520			-82.0	13					
	1525			-84.1	9					
	1530			-86.1	9					
	1535			-89.1	18					
150	1235			-93.5	49	GSC4				LOOP
	1240			-95.7	43					
	1245			-91.9	60					
	1250			-92.4	45					
	1255			-92.8	39					
	1300			-92.1	34					
	1305			-90.5	31					
151	1325			-90.0	37	GSC4				LOOP
	1330			-94.4	50					
	1335			-94.2	46					
	1340			-91.8	40					
	1345			-91.5	41					
	1350			-92.4	42					
	1355			-93.0	38					
152	1415			-90.4	47	GSC4				LOOP
	1420			-91.0	57					
	1425			-91.3	49					
	1430			-90.5	49					
	1435			-86.5	44					
	1440			-89.5	48					
	1445			-89.8	45					
153	1505			-90.5	44	GSC4				LOOP
	1510			-92.1	44					
	1515			-90.4	48					
	1520			-90.0	44					
	1525			-90.3	44					
	1530			-92.5	44					
	1535			-84.2	40					
154	1615			-96.1	54	GSC4				LOOP
	1620			-95.4	47					
	1625			-93.4	51					
	1630			-90.5	46					
	1635			-93.7	41					
	1640			-90.2	49					

FDM DATA

RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
155	1355	2400	24	-76.9	13	TYPE	0.0068	LOOP
	1400			-76.4	12	GSC4	0.0093	
	1405			-76.5	9		0.0049	
	1410			-77.0	7		0.0000	
	1415			-75.0	9		0.0004	
	1420			-74.5	10		0.0670	
	1425			-78.7	11		0.0012	
156	1445	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1450			-78.7	8	GSC4	0.0110	LOOP
	1455			-80.0	8		0.0520	
	1500			-78.4	9		0.0019	
	1505			-83.0	7		0.0250	
	1510			-80.0	9		0.0480	
	1515			-77.5	6		0.1030	
	1515			-84.7	5		0.2790	
157	1535	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1540			-83.2	14	GSC4	0.4900	LOOP
	1545			-77.0	8		0.0004	
	1550			-74.5	11		0.0980	
	1555			-76.1	7		0.0170	
	1600			-78.8	10		0.0520	
	1605			-80.1	9		0.0740	
	1605			-83.0	9		0.1420	
158	1505	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1510			-96.9	36	GSC4	0.2630	
	1515			-98.0	45		0.5280	
	1520			-95.0	44		0.2050	
	1525			-99.9	52		0.4190	
	1530			-98.4	55		0.1180	
	1535			-97.6	42		0.0088	
	1535			-97.4	53		0.0660	
159	1615	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1620			-91.0	33	GSC4	0.0350	
	1625			-87.5	87		0.0272	
	1630			-93.7	40		0.0854	
	1635			-92.1	25		0.0968	
	1640			-89.0	26		0.0156	
	1645			-89.9	29		0.0340	
	1645			-88.5	22		0.0115	
162	1535	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1540			-87.4	46	GSC4	0.0035	
	1545			-86.9	42		0.0008	
	1550			-86.7	40		0.0003	
	1555			-84.4	35		0.0003	
	1600			-85.8	27		0.0035	
	1605			-84.8	44		0.1020	
	1605			-84.0	34		0.0747	

FDM DATA									
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
163	1050	2400	24	-95.4	15	GSC4	0.7370	NONE	
	1055			-95.6	14		0.5740		
	1100			-96.9	12		1.1290		
	1105			-93.8	40		0.8820		
	1110			-95.7	12		4.4520		
	1115			-97.5	13		1.6100		
	1120			-94.7	12		0.6230		
	1125			-99.7	15		ERROR		
164	1250	2400	24	-96.0	15	GSC4	0.1640	NONE	
	1255			-100.3	16		0.2190		
	1300			-99.9	13		0.1210		
	1305			-101.2	18		0.0840		
	1310			-100.3	24		0.0347		
	1315			-97.5	23		0.0128		
	1320			-98.0	22		0.1530		
	1325			-96.8	17		ERROR		
165	1350	2400	24	-95.2	13	GSC4	0.0144	NONE	
	1355			-97.0	23		0.0300		
	1400			-96.4	31		0.0139		
	1405			-96.4	21		0.1290		
	1410			-96.6	19		0.1370		
	1415			-98.7	23		0.1740		
	1420			-98.2	24		0.0815		
	1425			-89.6	35		ERROR		
166	1520	2400	24	-91.8	28	GSC4	0.0021	NONE	
	1525			-93.0	27		0.0018		
	1530			-91.0	31		0.0125		
	1535			-92.0	33		0.0044		
	1540			-88.8	28		0.0003		
	1545			-89.7	26		ERROR		
	1550			-91.9	47		ERROR		
	1555			-92.6	22				
169	1600			-95.0	24	NONE			
	1605			-93.9	29				
	1610			-92.2	47				
	1615			-92.8	47				
	1620			-91.4	22				
	1625			-91.4	25				
	1630			-91.4	28				
	1635			-92.0	25				
170	1650	2400	24	-91.4	28	GSC4	0.0001	NONE	
	1655			-92.0	25		0.0009		
	1700			-95.0	27		0.0000		
	1705			-96.8	29		0.0071		
	1710			-95.2	30		0.0001		
	1715			-90.4	20		ERROR		
	1720			-87.8	19		0.0010		
	1725			-87.0	20		0.0128		
173	1955	2400	24	-86.2	20	GSC4	0.0012	NONE	
	2000			-89.7	20		0.0250		
	2005			-89.0	23		0.0149		
	2010			-86.8	20				
	2015			-86.2	21				
	2020			-88.4	21				
	2025			-88.2	21				

FDM DATA

RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
174	2105	2400	24	-89.7	24	23	0.0021	
	2110			-92.4	23	21	0.0001	
	2115			-87.5	22	18	0.0017	
	2120			-90.2	18	22	0.0051	
	2125			-86.3	19	15	0.0025	
176	1120	2400	24	-81.0	35	30	0.0000	
	1125			-80.2	36	36	0.0000	
	1130			-82.0	30	30	0.0001	
	1135			-81.2	29	38	0.0000	
	1140			-80.5	36	26	0.0000	
	1145			-81.5	33	32	0.0000	
	1150			-82.3	36	36	0.0000	
179	950	2400	24	-86.0	30	21	0.0001	
	955			-86.5	36	26	0.0014	
	1000			-86.8	35	27	0.0011	
	1005			-86.5	29	20	0.0124	
	1010			-85.5	27	30	0.0000	
	1015			-84.2	31	29	0.0000	
	1020			-85.0	32	32	0.0010	
180	1150	2400	24	-77.6	27	28	0.0000	
	1155			-78.8	29	25	0.0024	
	1200			-76.9	23	29	0.0000	
	1205			-83.4	20	20	0.0000	
	1210			-85.2	31	23	0.0001	
	1215			-86.2	24	31	0.0106	
	1220			-85.4	31	33	0.0032	
181	1150	2400	24	-81.0	27	26	0.0003	
	1155			-80.5	28	31	0.0000	
	1200			-78.3	29	25	0.0003	
	1205			-77.5	24	20	0.0000	
	1210			-72.9	20	17	0.0006	
	1215			-75.6	25	18	0.0000	
	1220			-77.2	16	21	0.0000	
182	1250	2400	24	-92.5	25	21	0.0145	
	1255			-92.5	30	22	0.0975	
	1300			-93.5	24	29	0.0047	
	1305			-95.2	23	22	0.0113	
	1310			-93.1	28	29	0.0029	
	1315			-92.2	22	25	0.0040	
	1320			-93.8	30	30	0.0135	
183	1350	2400	24	-93.5	30	24	0.0142	
	1355			-94.1	24	25	0.0008	
	1400			-95.6	24	22	0.1450	
	1405			-95.4	26	22	0.0299	
	1410			-94.5	24	18	0.0253	
	1415			-95.2	26	26	0.0215	
	1420			-93.7	31	27	0.0782	

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RUN	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
185	1245	2400	24	-92.4 -91.1	15 16	TYPE NONE	0.0000	
	1250			-93.2 -91.4	20 18		0.0494	
	1255			-93.7 -91.4	24 16		0.0079	
	1300			-94.3 -92.4	19 14		0.0054	
	1305			-95.8 -94.0	19 21		0.0010	
	1310			-95.8 -94.1	21 15		0.0144	
	1315			-94.4 -92.4	14 23		0.0439	
186	1345	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1350			-94.9 -95.4	115 116	TYPE NONE	0.0389	
	1355			-95.1 -94.4	41 39		0.0012	
	1400			-97.6 -94.6	15 11		0.0744	
	1405			-98.7 -94.4	16 12		0.0322	
	1410			-96.9 -94.3	22 20		0.0870	
	1415			-95.4 -93.5	18 18		0.0475	
	1420			-97.1 -94.3	13 14		0.0307	
187	1500	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1505			-96.5 -95.3	27 19	TYPE NONE	0.2430	
	1510			-96.7 -95.8	24 21		0.0633	
	1515			-96.6 -94.8	25 24		0.0500	
	1520			-94.8 -93.7	31 28		0.0075	
	1525			-93.2 -92.0	26 18		0.0243	
	1530			-95.8 -93.9	36 29		0.0246	
188	1600	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1605			-95.1 -95.1	31 25	TYPE NONE	0.0572	
	1610			-96.7 -95.4	40 36		0.0751	
	1615			-97.4 -95.5	44 30		0.0383	
	1620			-97.6 -96.2	34 30		0.1790	
	1625			-96.8 -95.1	34 38		0.0508	
	1630			-96.3 -96.7	44 24		0.0493	
	1635			-97.7 -95.3	35 38		0.2170	
189	1820	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1825			-101.8 -102.6	29 8	TYPE NONE	1.7500	
	1830			-103.0 -102.8	39 22		2.0800	
	1835			-100.6 -102.1	37 29		0.0490	
	1840			-101.3 -102.2	34 30		1.6600	
	1845			-103.0 -102.3	43 29		3.4500	
	1850			-103.0 -102.1	44 31		2.6500	
	1855			-103.1 -102.3	31 18		4.9900	
190	1920	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1925			-100.9 -99.9	33 21	TYPE NONE	0.9370	
	1930			-99.9 -99.1	31 21		0.0510	
	1935			-99.3 -99.1	24 18		0.4190	
	1940			-99.0 -99.1	29 19		0.3940	
	1945			-101.5 -100.4	20 15		0.3920	
	1950			-100.0 -100.3	20 26		0.7570	
	1955			-98.8 -99.7	30 28		0.2540	
191	2020	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	2025			-97.3 -101.0	31 23	TYPE NONE	0.2810	
	2030			-97.4 -101.0	23 21		0.2490	
	2035			-98.1 -102.4	30 18		0.5650	
	2040			-98.3 -103.0	21 18		0.8950	
	2045			-98.2 -102.1	22 19		0.8940	
	2050			-97.7 -101.7	22 17		0.9510	

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
192	1520	2400	24	-100.0	25	ASC4	2.8100	
	1525			-100.4	25		1.4600	
	1530			-99.2	23		1.4100	
	1535			-98.8	23		1.2500	
	1540			-101.0	23		2.3100	
	1545			-100.5	23		2.7000	
	1550			-101.7	20		1.5600	
193	1550	2400	24	-96.3	32	GSC4	ERROR	
	955			-97.3	27		1.1100	
	1000			-97.4	20		0.8910	
	1005			-97.2	26		1.6200	
	1010			-97.3	22		2.0700	
	1015			-96.2	21		1.0300	
	1020			-97.4	22		1.2700	
194	1050	2400	24	-95.2	23	GSC4	0.9250	
	1055			-94.4	17		ERROR	
	1100			-94.3	19		0.3010	
	1105			-101.7	17		0.5210	
	1110			-93.7	19		0.5010	
	1115			-101.7	14		0.3340	
	1120			-92.5	10		0.3810	
198	1605	2400	24	-97.5	22	GSC4	1.2500	
	1610			-97.3	24		0.3570	
	1615			-97.4	27		ERROR	
	1620			-96.0	39		0.1430	
	1625			-101.1	83		0.1070	
	1630			-96.9	24		0.1500	
	1635			-97.1	24		0.2280	
200	1130	2400	24	-95.2	48	ASC4	0.0800	
	1135			-95.5	52		0.1590	
	1140			-95.2	45		0.2390	
	1145			-92.2	40		40.1400	
	1150			-94.6	25		34.4500	
	1155			-92.1	31		39.8600	
	1200			-97.3	20		27.3500	
201	1415	2400	24	-100.1	31	GSC4	1.6700	
	1420			-100.0	40		1.0200	
	1425			-97.9	37		3.1500	
	1430			-98.1	43		ERROR	
	1435			-99.8	29		2.0000	
	1440			-99.7	19		0.7760	
	1445			-99.2	42		0.5770	

FDM DATA

RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
202	1515	2400	24	-99.3 -103.4	48 29	OSC4	0.5910	
	1520			-99.5 -103.1	34 23		0.9710	
	1525			-99.0 -103.0	37 22		0.4250	
	1530			-99.7 -103.1	37 25		1.3700	
	1535			-100.3 -103.4	32 21		0.9780	
	1540			-102.0 -104.8	29 17		1.1600	
	1545			-99.7 -103.3	32 25		0.6330	
203	1620	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1625			-100.5 -104.5	37 55	OSC4	1.8200	
	1630			-99.6 -104.5	33		1.3700	
	1635			-100.6	31		1.7900	
	1640			-101.5	27		3.2200	
	1645			-100.1	40		0.6060	
	1650			-100.0	42		0.6140	
	1655			-98.5 -102.2	32 45		1.0600	
204	1025	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1030			-91.8 -89.2	13 13	OSC4	0.0000	
	1035			-91.5 -82.4	14 11		0.0000	
	1040			-96.1 -90.5	18 18		0.0019	
	1045			-94.0 -90.5	18 18		0.0000	
	1050			-92.5 -93.3	15 13		0.0000	
	1055			-92.5 -85.4	4		0.0024	
	1055			-98.9 -90.3	17 15		0.0033	
205	1135	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1140			-95.4 -95.7	9 6	OSC4	0.0149	
	1145			-95.8 -95.4	22 13		0.0226	
	1150			-92.8 -94.0	10 13		0.0129	
	1155			-92.9 -94.1	13 12		0.0049	
	1200			-94.0 -91.4	5 7		0.0003	
	1205			-99.0 -91.1	7 3		0.0922	
	1205			-95.6 -95.7	17 6		0.0736	
206	1315	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1320			-92.4 -94.0	11 9	OSC4	0.0025	
	1325			-92.2 -94.4	18 10		0.0451	
	1330			-92.7 -93.4	21 22		0.0111	
	1335			-95.0 -93.6	17 10		0.0411	
	1340			-94.5 -94.5	21		0.0263	
	1345			-96.3 -95.7	26 14		0.0428	
	1345			-96.3	20		0.0696	
207	1440	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1445			-91.5 -93.4	21 25	OSC4	0.0012	
	1450			-90.1 -91.3	19 20		0.0015	
	1455			-91.2 -92.4	17 16		0.0000	
	1500			-92.3 -94.1	19 17		0.0056	
	1505			-91.1 -93.3	14 23		0.0099	
	1510			-91.0 -93.7	24 18		0.0000	
	1510			-98.4 -91.2	19 19		0.0100	

FDM DATA

RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
208	1620	2400	24	-89.1 -91.0	29 33	GSC4	0.0057	
	1625			-88.6 -90.5	32 31		0.0003	
	1630			-88.4 -90.6	30 33		0.0007	
	1635			-88.4 -90.2	32 27		0.0003	
	1640			-87.7 -89.9	30 30		0.0036	
	1645			-88.6 -90.3	35 30		0.0190	
	1650			-88.7 -90.4	31 30		0.0037	
209	1705	2400	24	-87.0 -89.5	32 33	GSC4	0.0000	
	1710			-86.9 -89.0	30 32		0.0003	
	1715			-87.5 -89.5	43 38		0.0007	
	1720			-84.2 -86.9	25 28		0.0007	
	1725			-86.5 -89.1	24 23		0.0000	
	1730			-87.1 -91.4	27 25		0.0025	
	1735			-86.7 -90.1	38 37		0.0000	
210	1250	2400	24	-102.8 -104.1	9 13	GSC4	0.0000	
	1255			-103.3 -104.4	21 30		1.2300	
	1300			-102.9 -105.1	41 26		2.4000	
	1305			-103.3 -106.2	39 30		1.9200	
	1310			-101.5 -105.5	37 32		1.9000	
	1315			-100.7 -104.3	40 37		2.3500	
	1320			-101.6 -105.5	33 27		1.3300	
211	1430	2400	24	-100.4 -104.1	36 35	GSC4	1.5000	
	1435			-100.5 -104.3	33 26		0.0100	
	1440			-99.4 -104.7	34 33		0.4520	
	1445			-98.7 -103.9	37 35		0.6540	
	1450			-98.1 -102.0	34 30		0.1710	
	1455			-97.8 -101.8	25 30		0.5560	
	1500			-99.2 -101.2	34 38		0.4070	
212	1535	2400	24	-96.0 -99.8	29 20	GSC4	0.2170	
	1540			-95.7 -99.7	25 24		0.4570	
	1545			-95.7 -100.1	24 26		0.1380	
	1550			-95.7 -100.1	27 23		0.4550	
	1555			-95.0 -98.4	29 26		0.7660	
	1600			-95.2 -98.6	29 30		0.3700	
	1605			-95.9 -99.5	24 32		0.4440	
213	1055	2400	24	-86.1 -87.8	18 19	GSC4	0.5180	
	1100			-85.4 -86.7	18 16		0.0000	
	1105			-85.2 -87.8	9 9		0.0010	
	1110			-84.0 -85.2	16 10		0.0008	
	1115			-85.0 -85.4	18 17		0.0000	
	1120			-83.0 -83.0	14 12		0.0000	
	1125			-83.0 -84.0	12 12		0.0014	

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RUN	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
214	1205	2400	24	-92.5	17	17	0.0001	
	1210			-81.0	17	12	0.0003	
	1215			-79.1	11	14	0.0057	
	1220			-78.0	14	16	0.0007	
	1225			-78.7	14	13	0.0000	
	1230			-81.0	21	15	0.0006	
	1235			-78.3	10	12	0.0000	
215	1300	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1305			-82.5	14	9	0.0014	
	1310			-77.9	10	11	0.0008	
	1315			-78.4	18	13	0.0001	
	1320			-76.8	24	20	0.0000	
	1325			-76.7	16	19	0.0000	
	1330			-77.3	10	12	0.0037	
	1335			-79.3	23	20	0.0019	
216	1410	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1415			-84.3	29	9	0.0446	REC PAD
	1420			-84.6	8	10	0.0054	
	1425			-89.2	13	10	0.0001	
	1430			-89.6	9	14	0.0000	
	1435			-90.2	15	10	0.0000	
	1440			-92.4	17	13	0.0011	
	1445			-90.8	19	16	0.0001	
217	1510	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1515			-72.9	7	11	0.0000	
	1520			-75.7	7	7	0.0000	
	1525			-77.4	10	10	0.0003	
	1530			-74.8	13	13	0.0057	
	1535			-80.4	19	16	0.0003	
	1540			-80.6	14	14	0.0003	
	1545			-85.3	11	16	0.0001	
218	1615	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1620			-75.4	11	11	0.0003	
	1625			-75.0	12	13	0.0004	
	1630			-75.3	14	24	0.0000	
	1635			-74.2	18	13	0.0043	
	1640			-74.8	11	11	0.0000	
	1645			-71.5	10	10	0.0000	
	1650			-77.3	9	10	0.0000	
219	1715	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1720			-74.8	10	10	0.0001	
	1725			-77.2	15	15	0.0296	
	1730			-77.3	12	12	0.0106	
220	1815	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1820			-93.7	7	5	0.0540	
	1825			-96.5	9	6	0.0350	
	1830			-91.6	7	4	0.8720	
	1835			-91.1	13	9	0.2210	
	1840			-93.7	9	9	0.4970	
	1845			-97.0	7	3	3.4730	
	1850			-91.9	5	5	1.3110	

FDM DATA

RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
221	935			-100.5	33	NONE				
	940			-101.0	37					
	950			-100.2	41					
	955			-100.3	45					
	1000			-110.2	37					
	1005			-98.0	45					
222	1105	WATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1110			-97.4	28	NONE				
	1115			-100.5	34					
	1120			-100.2	35					
	1125			-99.3	41					
	1130			-100.0	45					
	1135			-98.9	53					
	1205			-98.4	55					
223	1205	WATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1210			-98.0	53	NONE				
	1215			-97.8	56					
	1220			-98.5	42					
	1225			-99.6	37					
	1230			-96.6	33					
	1235			-99.4	31					
224	1335	WATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1340			-95.8	28	NONE				
	1345			-96.4	23					
	1350			-96.0	29					
	1355			-96.2	27					
	1400			-94.6	25					
	1405			-93.3	21					
225	1435	WATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1440			-99.7	18	NONE				
	1445			-97.2	26					
	1450			-97.5	24					
	1455			-97.5	34					
	1500			-97.8	24					
	1505			-97.5	23					
	1540			-97.4	25					
226	1540	RATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1545			-96.2	22	NONE				
	1550			-94.2	15					
	1555			-95.8	14					
	1600			-91.2	24					
	1605			-88.4	14					
	1610			-91.5	15					
	1615			-90.2	19					
227	1635	RATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1640			-95.0	13	NONE				
	1645			-94.5	17					
	1650			-93.3	22					
	1655			-93.3	29					
	1700			-94.9	31					
	1705			-93.4	30					

FDM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
228	935			-78.0	6	NONE		
	940			-77.5	6			
	945			-81.8	7			
	950			-84.9	8			
	955			-79.6	9			
	1000			-79.8	3			
	1005			-77.9	3			
	1050			-82.5	6			
229	1050			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1055			-82.4	7	NONE		
	1100			-81.5	7			
	1105			-79.5	9			
	1110			-86.7	9			
	1115			-87.2	10			
	1120			-83.2	8			
	1125			-80.9	10			
231	1325			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1330			-91.4	9	NONE		
	1335			-90.5	9			
	1340			-88.5	8			
	1345			-88.3	8			
	1350			-87.9	8			
	1355			-90.1	8			
	1400			-90.6	11			
232	1425			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1430			-91.7	9	NONE		
	1435			-92.7	7			
	1440			-92.6	9			
	1445			-88.3	8			
	1450			-92.3	9			
	1455			-95.5	15			
	1500			-92.8	12			
233	1540			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1545			-97.1	17	NONE		
	1550			-96.4	17			
	1555			-96.4	13			
	1600			-95.7	16			
	1605			-93.4	11			
	1610			-99.5	17			
	1615			-99.6	20			
234	1650			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1655			-91.9	17	NONE		
	1700			-89.3	16			
	1705			-90.0	20			
	1710			-91.5	20			
	1715			-91.4	21			
	1720			-91.2	21			
				-91.3	17			
				-93.3	18			

FDM DATA

RUN	TIME	NATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
RUN 254	1505			-45.2	26	NONE		NONE		
	1510			-83.8	24					
	1515			-82.7	23					
	1520			-84.5	26					
	1525			-86.2	30					
	1530			-87.5	62					
	1535			-84.1	31					
	1540			-84.3	30					
	1545			-86.4	38					
RUN 255	1605	RATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1610			-87.0	34	NONE		NONE		
	1615			-85.9	34					
	1620			-87.5	30					
	1625			-86.5	38					
	1630			-86.7	36					
	1635			-86.0	37					
	1640			-86.9	37					
	1645			-87.1	34					
RUN 256	1705	RATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1710			-74.8	60	NONE		NONE		REMARKS LOOP
	1715			-77.0	48					
	1720			-75.5	52					
	1725			-74.3	43					
	1730			-75.3	55					
	1735			-76.7	49					
	1740			-75.3	48					
	1745			-76.6	45					
	1750			-79.0	50					
	1755			-77.6	49					
	1800			-77.0	53					
	1805			-75.2	54					
	1810			-78.5	46					
RUN 257	1855	RATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	1900			-82.0	41	NONE		NONE		REMARKS LOOP
	1905			-80.4	28					
	1910			-77.3	20					
	1915			-79.2	15					
	1920			-82.0	21					
	1925			-85.2	30					
	1930			-82.9	26					
	1935			-83.8	29					
	1940			-83.0	39					
RUN 258	2000	RATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	2005			-83.4	25	NONE		NONE		REMARKS LOOP
	2010			-81.6	24					
	2015			-84.5	22					
	2020			-85.9	25					
	2025			-86.7	23					
	2030			-86.8	25					
	2035			-85.5	20					
RUN 259	2115	RATE	CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	TYPE	ERROR	REMARKS
	2120			-82.8	19	NONE		NONE		REMARKS LOOP
	2125			-81.0	24					
	2130			-79.5	25					
	2135			-80.1	22					
	2140			-79.0	19					
	2145			-81.4	22					
	2150			-80.9	16					

FDM DATA									
RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
260	1325			-80.8	21	NONE		NONE	
	1330			-81.4	17				
	1335			-81.1	14				
	1340			-81.7	23				
	1345			-81.5	22				
261	1435		CHS	-78.2	17	NONE	ERROR	NONE	REMARKS LOOP
	1440			-81.0	11				
	1445			-82.3	17				
	1450			-83.7	20				
	1455			-85.3	17				
	1500			-84.8	14				
	1505			-86.0	21				
262	1540		CHS	-89.2	15	NONE	ERROR	NONE	REMARKS LOOP
	1545			-89.7	17				
	1550			-91.0	19				
	1555			-91.0	22				
	1600			-89.0	24				
	1605			-91.4	17				
	1610			-91.0	19				
263	1635		CHS	-85.3	16	NONE	ERROR	NONE	REMARKS LOOP
	1640			-84.9	17				
	1645			-86.0	17				
	1650			-88.1	16				
	1655			-88.5	19				
	1700			-90.0	22				
	1705			-88.8	20				
264	1225		CHS	-82.7	34	NONE	ERROR	NONE	REMARKS LOOP
	1230			-81.8	23				
	1235			-83.9	30				
	1240			-82.5	30				
	1245			-83.3	32				
	1250			-81.0	31				
	1255			-82.3	35				
265	945		CHS	-89.5	18	NONE	ERROR	NONE	REMARKS LOOP
	950			-86.0	21				
	955			-88.8	26				
	1000			-87.9	24				
	1005			-88.7	23				
	1010			-89.0	21				
	1015			-88.3	19				
266	1050		CHS	-84.4	20	NONE	ERROR	NONE	REMARKS LOOP
	1055			-86.9	17				
	1100			-86.5	25				
	1105			-87.2	19				
	1110			-87.5	23				
	1115			-87.0	26				
	1120			-86.2	27				

FDM DATA

RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
267	1205			-88.5	28	NONE		
	1210			-85.3	31			
	1215			-86.5	27			
	1220			-87.3	26			
	1225			-88.0	28			
	1230			-84.6	25			
	1235			-86.9	22			
	1240			-84.5	18			
	1245			-87.0	17			
	1250			-84.0	19			
	1255			-88.0	23			
268	1405			-85.0	19	NONE		
	1410			-87.7	21			
	1415			-86.0	24			
	1420			-84.3	19			
	1425			-87.1	16			
	1430			-86.8	21			
	1435			-85.0	17			
	1440			-86.7	19			
	1445			-89.9	23			
	1450			-90.0	25			
	1455			-87.7	18			
	1460			-89.8	19			
	1465			-88.5	18			
269	1525			-89.5	19	NONE		
	1530			-87.0	23			
	1535			-86.1	20			
	1540			-84.3	21			
	1545			-86.7	12			
	1550			-85.6	15			
	1555			-84.1	13			
	1560			-83.6	16			
	1565			-84.0	17			
	1570			-83.1	16			
	1575			-86.8	27			
270	1030			-84.1	17	NONE		
	1035			-89.4	39			
	1040			-87.4	15			
	1045			-88.5	101			
	1050			-87.9	118			
	1055			-89.5	25			
	1060			-87.8	33			
	1065			-90.0	18			
	1070			-89.5	15			
	1075			-88.8	17			
	1080			-86.2	14			
	1085			-89.0	24			
	1090			-87.6	21			
271	1100			-85.3	96	NONE		
	1105			-86.5	21			
	1110			-85.1	22			
	1115			-84.9	17			
	1120			-83.2	17			
	1125			-85.9	23			
	1130			-88.0	23			
	1135			-86.6	28			
	1140			-84.9	25			
	1145			-83.1	27			
	1150			-84.9	26			
	1155			-84.3	20			
272	1200			-82.8	17	NONE		
	1205			-86.2	17			
	1210			-83.2	22			
	1215			-85.5	16			
	1220			-82.3	19			
	1225			-83.2	14			
	1230			-81.2	17			
	1235			-83.7	16			
	1240			-80.0	19			
	1245			-85.4	11			
	1250			-81.5	12			
	1255			-93.1	15			
	1260			-79.8	15			
	1265			-80.2	17			
	1270			-83.0	14			

FDM DATA									
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
273	1320			-78.5	16	NONE			
	1325			-77.3	19				
	1330			-77.5	16				
	1335			-78.2	41				
	1340			-78.5	18				
	1345			-77.1	17				
	1350			-78.2	14				
274	1455			-84.5	15				
	1500			-81.2	15				
	1505			-87.6	14				
	1510			-83.5	16				
	1515			-82.0	26				
	1520			-83.4	42				
	1525			-85.5	11				
275	1610			-85.6	14				
	1615			-84.3	12				
	1620			-86.7	16				
	1625			-85.0	19				
	1630			-84.9	15				
	1635			-85.7	20				
	1640			-87.0	63				
282	1110			-86.2	21				
	1115			-92.4	22				
	1120			-93.0	21				
	1125			-92.4	98				
	1130			-92.8	97				
	1135			-91.3	71				
	1140			-90.4	84				
283	1235			-90.2	90				
	1240			-89.1	91				
	1245			-87.1	190				
	1250			-86.6	100				
	1255			-84.6	103				
	1300			-89.4	144				
	1305			-87.0	147				
284	1350			-83.1	133				
	1355			-84.4	147				
	1400			-89.1	107				
	1405			-88.9	125				
	1410			-89.9	110				
	1415			-89.2	126				
	1420			-90.0	74				

FDM DATA

RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
285	1500			-89.7	98	NONE				
	1505			-88.4	95					
	1510			-88.2	81					
	1515			-87.2	98					
	1520			-86.0	76					
	1525			-86.3	66					
	1530			-86.7	72					
286	1530			-87.0	76					
	1605			-82.0	74	NONE				
	1610			-79.2	32					
	1615			-84.6	67					
	1620			-85.4	77					
	1625			-86.1	80					
	1630			-84.9	69					
	1635			-85.1	73					
290	1635			-84.6	78					
	1650			-87.1	73	NONE				
	1655			-87.3	64					
	1700			-86.9	75					
	1705			-87.2	62					
	1710			-85.4	49					
	1715			-85.1	40					
	1720			-85.5	51					
297	1720			-85.5	66					
	1035			-96.8	47	NONE				
	1040			-96.9	50					
	1045			-97.4	52					
	1050			-97.7	41					
	1055			-97.9	40					
	1100			-98.2	46					
	1105			-97.5	54					
298	1105			-97.5	54					
	1155			-96.8	37	NONE				
	1200			-97.3	34					
	1205			-99.7	45					
	1210			-97.4	39					
	1215			-99.5	42					
	1220			-97.8	45					
	1225			-96.5	37					
	1230			-98.9	36					
	1235			-98.5	32					
299	1235			-101.0	39					
	1255			-98.3	33	NONE				
	1300			-100.3	32					
	1305			-97.5	34					
	1310			-99.5	36					
	1315			-97.3	40					
	1320			-100.1	38					
	1325			-97.6	36					
	1330			-100.2	37					
	1335			-97.2	35					
	1340			-100.5	39					
	1345			-98.2	45					

FORM DATA	TIME	DATE	CHS	MEDIAN	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
300	1405			-100.1	24	NONE		NONE		
	1410			-00.7	23					
	1415			-101.3	25					
	1420			-00.3	29					
	1425			-00.4	21					
	1430			-00.4	27					
	1435			-00.0	21					
301	1545			-00.4	45	NONE		NONE		
	1550			-00.0	42					
	1555			-00.1	32					
	1600			-00.1	32					
	1605			-00.2	26					
303	1255	2400	24	-02.5	37	GSC4		NONE		
	1300			-02.3	34					
	1305			-02.8	29					
	1310			-03.9	33					
	1315			-04.7	41					
304	1425	2400	24	-04.9	38	GSC4		NONE		
	1430			-03.3	45					
	1435			-06.0	32					
	1440			-04.0	44					
	1445			-02.7	42					
305	1515	2400	24	-08.0	33	GSC4		NONE		
	1520			-02.1	25					
	1525			-03.5	37					
	1530			-02.4	44					
	1535			-07.8	35					
	1540			-07.9	38					
	1545			-05.7	34					
	1550			-06.3						
	1555			-08.3						
	1600			-07.2						
	1605			-09.0						
	1610			-00.6						
	1615			-00.6						
	1620			-09.0						
	1625			-07.7						
	1630			-06.7						
	1635			-08.2						
	1640			-09.4						
	1645			-01.4						
	1650			-01.6						
	1655			-01.4						
	1700			-02.9						
	1705			-03.1						

FDM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
306	1220			-94.9	101	NONE		LOOP
	1225			-94.4	106			
	1230			-94.2	115			
	1235			-95.0	103			
	1240			-94.6	126			
307	1305		CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	REMARKS
	1310			-92.2	123	NONE		LOOP
	1315			-91.8	115			
	1320			-90.8	95			
	1325			-91.0	87			
	1330			-92.3	113			
308	1350		CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	REMARKS
	1355			-88.4	142	NONE		LOOP
	1400			-88.4	123			
	1405			-87.2	130			
	1410			-87.6	123			
	1415			-82.2	120			
309	1500		CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	REMARKS
	1505			-92.7	129	NONE		LOOP
	1510			-92.2	145			
	1515			-92.7	139			
	1520			-92.4	144			
	1525			-91.2	145			
310	1550		CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	REMARKS
	1555			-89.2	137	NONE		LOOP
	1600			-89.7	145			
	1605			-89.2	116			
	1610			-88.3	123			
	1615			-86.6	136			
	1620			-89.5	119			
	1625			-90.1	144			
312	1205		CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	REMARKS
	1210			-83.3	157	NONE		NON DIV
	1215			-83.0	151			
	1220			-82.5	152			
	1225			-80.8	89			
	1230			-82.9	157			
	1235			-81.9	154			
	1240			-84.0	150			
313	1315		CHS	MEDIANS	MEDIAN CROSSINGS <td>TYPE</td> <td>ERROR</td> <td>REMARKS</td>	TYPE	ERROR	REMARKS
	1320			-82.7	137	NONE		NON DIV
	1325			-82.5	139			
	1330			-81.8	132			
	1335			-81.6	130			
	1340			-81.4	134			

FDM DATA									
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
314	1415			-87.5	148	NONE		NONE	NON DIV
	1420			-86.2	183				
	1425			-84.9	169				
	1430			-85.6	204				
	1435			-85.0	191				
	1440			-85.2	173				
	1445			-84.6	174				
316	1445			-84.6	184				
	1615			-74.3	56	NONE		NONE	REMARKS LOOP
	1620			-76.0	65				
	1625			-74.3	77				
	1630			-75.5	93				
	1635			-75.0	82				
	1640			-73.2	78				
	1645			-73.2	93				
317	1105			-75.5	35	NONE		NONE	REMARKS LOOP
	1110			-75.2	37				
	1115			-74.0	38				
	1120			-75.7	48				
	1125			-75.4	37				
	1130			-77.6	43				
	1135			-77.0	58				
318	1230			-94.7	17	NONE		NONE	REMARKS LOOP
	1235			-96.1	30				
	1240			-96.9	30				
	1245			-95.1	28				
	1250			-94.7	25				
	1255			-95.2	34				
	1300			-95.6	32				
319	1300			-95.6	31				
	1350			-78.8	39	NONE		NONE	REMARKS LOOP
	1355			-76.0	27				
	1400			-77.4	33				
	1405			-74.0	41				
	1410			-79.2	34				
320	1425			-79.0	33	NONE		NONE	REMARKS LOOP
	1430			-79.2	53				
	1435			-78.3	33				

PCM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
1	235	2400	24	-97.0	-93.5					
	240			-96.1	-93.7				0.0330	
	245			-96.6	-93.6				0.0200	
	250			-97.0	-93.6				0.0060	
	255			-97.9	-94.1				0.0057	
	300			-94.0	-93.4				0.0075	
	455	2400	24	-97.2	-94.3				0.0043	
2	500			-96.5	-94.0					
	505			-95.9	-92.8				0.0017	
	510			-97.0	-93.0				3.0300	
	515			-96.2	-94.0				1.2700	
	520			-97.0	-95.0				14.4200	
	525			-97.5	-95.5				0.0160	
	550			-98.5	-91.5				ERROR	
3	555			-97.4	-91.6				0.0175	
	600			-98.0	-92.4				0.0051	
	605			-98.0	-91.6				0.0048	
	1500	2400	24	-92.1	-90.7				0.0024	
	1505			-92.2	-90.0				ERROR	
	1510			-92.6	-90.5				27.3000	
	1515			-91.5	-90.1				0.0000	
4	1520			-92.1	-90.4				13.5000	
	1525			-90.4	-91.2				1.8000	
	1530			-91.3	-90.2				3.0000	
	2035	2400	24	-92.7	-91.9				5.6000	
	2040			-93.7	-92.3				4.2000	
	2050			-92.4	-90.1				ERROR	
	2055			-91.0					3.4700	
5	2100			-90.8	-89.0				2.8000	
	2135	2400	24	-92.4	-91.7				2.5200	
	2140			-92.3	-91.2				3.2200	
	2145			-91.2	-90.2				ERROR	
	2150			-92.3	-90.9				5.3700	
	2155			-94.4	-92.9				3.5000	
	2200			-91.3	-90.1				4.2800	
6	2235	2400	24	-94.9	-93.2				10.4000	
	2240			-94.1	-91.2				10.4200	
	2245			-94.9	-92.4				11.8300	
	2250			-93.3	-91.5				ERROR	
	2255			-91.8	-91.8				5.7800	
									13.2300	
									5.3100	
7									1.8300	
									15.1900	

PCM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
8	0	2400	24	-84.0	22	MSC	4.3100	
	5			-92.4	26		21.7900	
	10			-91.4	29		18.9000	
	15			-83.1	21		31.1400	
	2350			-91.0	16		4.8000	
9	2355			-82.2	21		3.6100	
	1810			-86.5	33		ERROR	
	1815			-85.9	33			
	1820			-86.1	28			
	1825			-87.1	30			
10	1830			-80.9	22			
	1835			-79.1	21			
	1840			-83.1	21			
	1905			-81.4	22			
	1910			-81.6	21			
11	1915			-76.2	19			
	1920			-80.6	26			
	1925			-76.6	23			
	1930			-80.7	26			
	1935			-77.3	25			
12	1205			-84.5	28			
	1210			-86.5	45			
	1215			-84.8	43			
	1220			-84.9	39			
	1225			-83.7	34			
13	1230			-85.2	42			
	1635			-77.5	16			
	1640			-77.7	19			
	1645			-77.6	16			
	1650			-77.4	18			
14	1655			-76.3	14			
	1700			-72.7	15			
	1105			-86.7	77			
	1110			-86.5	69			
	1115			-86.1	21			
15	1120			-86.4	24			
	1125			-85.3	26			
	1130			-86.7	22			
	1335			-88.8	35			
	1340			-89.2	30			
16	1345			-87.4	30			
	1350			-87.9	35			
	1355			-88.6	35			
	1400			-86.1	25			

PCM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
15	1505	2400	24	-84.7	23	FREQ	0.7000	
	1510			-85.0	20		0.5600	
	1515			-85.5	22		0.9400	
	1520			-84.6	20		0.5100	
	1525			-85.0	110		0.9000	
	1530			-85.6	160		0.8300	
	1535			-83.3				
18	2225	2400	24	-92.3	109	GSC4	0.0140	
	2230			-92.8	129		0.0590	
	2235			-94.5	110		0.0700	
	2240			-94.5	111		13.0300	
	2245			-91.5	113		57.2000	
19	1420		CHS	-97.9	65	NONE	ERROR	
	1425			-98.1	62			
	1430			-98.1	60			
	1435			-99.6	60			
	1440			-97.9	52			
	1445			-97.2	67			
	1450			-97.0	65			
28	1605	2400	5	-99.8	55	GSC4	2.9800	
	1610			-99.2	70		3.0500	
	1615			-99.3	80		1.8700	
	1625			-99.2	75		2.3100	
	1630			-99.7	85		3.0700	
29	1735	2400	6	-96.0	103	GSC4	0.8800	
	1740			-97.4	110		0.9200	
	1745			-96.0	104		0.7300	
	1750			-97.9	100		0.5600	
	1755			-96.0	92		0.7700	
	1800			-96.1	93		1.0700	
	1805			-95.4	89		1.6100	
30	1135	2400	6	-97.2	82	FREQ	9.0200	
	1140			-96.7	77		7.0300	
	1145			-95.1	86		4.9100	
	1150			-97.1	68		30.7100	
	1155			-97.3	58		11.1300	
	1200			-96.3	68		9.1600	
	1205			-96.4	50		12.1800	
31	1350	2400	7	-96.1	60	FREQ	10.4600	
	1355			-95.6	50		9.6800	
	1400			-96.9	65		12.7500	
	1405			-96.8	62		13.0500	
	1410			-96.2	55		10.4000	
	1415			-95.3	54		4.9200	
	1420			-94.9	45		3.1400	

PCM DATA																	
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS	RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
32	1505	2400	6	-92.7	46	FRFD	0.8900	NONE									
	1510			-95.1	49		1.2500										
	1515			-91.1	42		0.1800										
	1520			-89.4	43		0.4400										
	1525			-89.3	38		0.2700										
	1530			-93.5	40		1.3200										
	1535			-92.6	33		1.3000										
33	1605	2400	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	NONE									
	1610			-86.0	36	FRFD	0.3500										
	1615			-90.0	44		0.0400										
	1620			-89.2	43		0.4300										
	1625			-89.5	43		0.0740										
	1630			-89.5	40		0.1000										
	1635			-87.7	37		0.0310										
34	1750	2400	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	NONE									
	1755			-84.0	53	FRFD	0.0640										
	1800			-88.0	52		0.3200										
	1805			-93.2	70		0.3400										
	1810			-92.6	57		0.5200										
	1815			-94.6	58		0.6600										
	1820			-92.8	62		0.2000										
35	1330	2400	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	NONE									
	1335			-87.9	44	GSC4	0.0940										
	1340			-86.0	48		0.0640										
	1345			-88.6	38		0.1200										
	1350			-89.3	64		0.0470										
	1355			-91.0	68		0.1200										
	1355			-89.9	52		0.0470										
36	1425	2400	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	NONE									
	1430			-96.2	100	GSC4	0.4600										
	1435			-74.2	71		0.4300										
	1440			-94.6	40		0.1000										
	1445			-90.3	46		0.1300										
	1450			-88.8	33		0.5200										
	1455			-90.1	37		2.4700										
37	1535	2400	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	NONE									
	1540			-94.7	69	GSC4	1.0000										
	1545			-95.0	64		0.0150										
	1550			-93.0	64		0.0250										
	1555			-91.5	54		0.1240										
	1555			-90.7	61		0.0140										
	1600			-91.1	57		0.1240										
38	1605	2400	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	NONE									
	1610			-89.2	45	GSC4	0.0230										
	1615			-88.1	46		0.0100										
	1625			-89.8	53		0.0001										
	1630			-89.2	47		0.0100										
	1640			-88.5	58		0.0050										
	1650			-88.2	53		0.0030										
1655			-85.8	56		0.0030											
1655			-87.0	53		0.0037											
1655			-84.5	54		0.0007											

PCM DATA

RUN	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
39	720			-85.5	47	NONE		
	725			-86.4	63			
	730			-86.8	55			
	735			-87.2	64			
	740			-87.4	71			
	745			-88.1	58			
	750			-88.6	68			
40	810	2400	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	815			-88.6	47	GSC4	1.8500	
	820			-89.3	41		1.1600	
	825			-89.1	47		2.3300	
	830			-88.4	40		1.5100	
	835			-88.8	35		0.8300	
	840			-82.5	29		0.0940	
	845			-81.9	22		0.5700	
41	905	2400	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	910			-87.5	44	FRED	1.3800	
	915			-88.4	43		1.4200	
	920			-86.4	26		1.3600	
	925			-87.8	51		0.9700	
	930			-85.5	47		1.8800	
	935			-85.9	47		0.4700	
	940			-83.5	41		0.2300	
42	1005	2400	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1010			-85.0	39	GSC4	0.4000	
	1015			-81.3	32		0.2400	
	1020			-85.8	24		1.3200	
	1025			-81.4	21		0.4900	
	1030			-82.3	22		0.1600	
	1035			-81.4	25		0.4200	
	1040			-85.2	36		0.5900	
43	1105	2400	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1110			-90.3	29	GSC4	1.8900	
	1115			-88.3	25		1.6400	
	1120			-90.2	30		1.0700	
	1125			-90.4	32		3.4100	
	1130			-90.8	29		0.8500	
	1135			-88.5	17		1.0400	
	1140			-90.4	23		0.9900	
44	1205	2400	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1210			-78.2	15	GSC4	0.0070	
	1215			-80.1	9		0.5300	
	1220			-76.7	15		0.0015	
	1225			-85.0	24		0.4800	
	1230			-85.8	28		1.4200	
	1235			-86.1	19		2.4300	
	1240			-84.1	14		1.2000	
	1245			-84.4	19		0.1900	

PCM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
45	1250	2400	6	-75.8	18	GSC4	0.0410	NONE		
	1255			-79.5	21		0.1400			
	1300			-80.6	23					
	1305			-77.3	20					
	1310			-81.5	20					
	1315			-78.7	33					
	1320			-81.0	33					
46	850	2400	6	-93.7	42	FRED		NONE		
	855			-96.1	41		2.6600			
	900			-94.4	31		1.7700			
	905			-95.1	43		0.1600			
	910			-95.4	65		0.6000			
	915			-94.5	38		0.6800			
	920			-94.6	49		0.7800			
47	1005	2400	6	-94.6	53	GSC4		NONE		
	1010			-95.5	43		0.3700			
	1015			-96.4	46		0.4200			
	1020			-95.8	58		1.1400			
48	1105	2400	6	-93.6	41	FRED		NONE		
	1110			-93.1	45		1.0500			
	1115			-94.1	31		0.8200			
	1120			-95.4	38		0.1100			
	1125			-95.6	38		0.7400			
	1130			-95.3	39		1.1400			
	1135			-99.7	38		0.3100			
49	1405	2400	6	-90.8	38	GSC4		NONE		
	1410			-88.8	36		3.7000			
	1415			-86.3	41		11.6400			
	1420			-88.3	45		ERROR			
	1425			-89.8	31		1.0800			
	1430			-87.7	38		0.7800			
	1435			-88.6	39		0.5600			
52	1620	2400	6	-99.7	69	GSC4		NONE		
	1625			-99.4	61		0.2200			
	1630			-94.2	57		0.7100			
	1635			-94.0	74		0.2000			
	1640			-97.0	76		0.2500			
	1645			-97.1	92		ERROR			
	1650			-97.1	76		9.0100			

PPM DATA

RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
62	1455	2604	24	-92.0 -92.4 -91.7 -91.7 -91.6 -90.7 -92.3 -94.6 -92.4 -95.6 -84.8 -84.2 -85.0 -85.6 -82.4 -83.4 -82.2 -74.2 -79.4 -80.0 -80.4 -74.4 -87.4 -85.0 -87.6 -91.0 -87.6 -90.4 -86.2 -84.4 -81.1 -81.9 -89.4 -89.8 -87.6 -87.4 -87.7 -89.0 -89.0 -92.0 -90.0 -90.9 -84.0 -87.6 -85.2 -95.2 -93.4 -95.5 -95.7 -95.0 -94.5 -95.1 -94.3 -94.6 -95.2 -95.2 -93.6 -94.4 -94.2 -99.5 -95.1 -99.5 -95.7 -100.6 -94.8 -99.4 -94.8 -100.0 -94.5 -94.3 -94.9 -99.5 -93.9 -93.3 -96.1 -95.4 -95.4 -94.5 -95.3 -94.7 -95.2	7 7 12 10 19 14 13 10 14 14 16 20 19 11 25 19 24 16 22 22 20 10 16 26 21 24 20 16 14 12 20 14 12 15 18 22 16 15 17 16 14 20 26 32 22 25 46 30 27 41 29 31 40 31 10 9 10 15 12 13 17 10	TYPE NONE TYPE FRED TYPE NONE TYPE NONE TYPE NONE TYPE NONE TYPE FRED TYPE FRED TYPE FRED TYPE FRED	ERROR 1.2310 2.4090 3.1550 1.1330 2.6400 0.4200 0.4000 ERROR 0.5390 0.0990 0.0450 0.0160 0.0860 0.0300 0.1270 ERROR 1.0850 1.0970 0.2770 0.0010 1.1680 2.9750 ERROR 3.7920 11.1090 6.7550 7.4500 5.3930 5.5600 ERROR 3.0740 6.3950 3.4390 3.4820 2.2740 2.2840 1.0340 ERROR 2.0170 1.8040 2.8300 3.1070 2.5960 1.4040 1.0740 ERROR 1.0690 1.4110 3.6540 1.7210 2.0940 1.0530 2.5570	
63	1555	1200	14			TYPE GSC4		
64	1105	2604	24			TYPE FRED		
65	1155	1200	12			TYPE GSC4		
66	1510	2604	24			TYPE FRED		
67	1605	2604	12			TYPE FRED		
68	1035	2604	6			TYPE FRED		

PPM DATA									
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS	TYPE
69	1135	1200	6	-93.5	16	18	3.3050		
	1140			-92.7	16	14	2.4210		
	1145			-93.4	10	13	7.8050		
	1150			-97.2		13	16.2370		
	1155			-93.7		18	17.7920		
	1200			-93.8		18	14.8730		
	1205			-93.9		17	13.7330		
70	1340	2604	6				ERROR		
	1350			-98.1	9	11	4.2880		
	1355			-95.8	10	13	3.8930		
	1400			-94.6	8	8	1.0470		
	1405			-98.0	12	11	4.6170		
	1410			-97.8	12	9	3.0880		
	1415			-97.7	12	9	5.2740		
71	1440	2604	12				ERROR		
	1445			-97.6	15	14	3.4060		
	1450			-98.0	15	13	6.0070		
	1455			-97.1	19	17	3.9780		
	1500			-99.2	11	19	3.9680		
	1505			-96.5	11	14	7.0680		
	1510			-97.6	17	9	2.7640		
72	1525	2604	12				ERROR		
	1535			-98.1	10	8	4.1130		
	1540			-99.4	15	15	4.9150		
	1545			-96.7	21	14	2.6370		
	1550			-97.2		9	4.0090		
	1555			-97.4		19	3.4420		
	1605	2604	24				ERROR		
73	1005			-89.0	84	57	0.2430		
	1010			-88.9	57	40	0.3380		
	1015			-86.4	62	49	0.3980		
	1020			-86.1	59	53	0.2780		
	1025			-86.0	65	45	0.7540		
	1030			-85.7	71	46	0.5680		
	1035			-88.1	54	49	0.4940		
74	1055	1200	12				ERROR		
	1100			-89.1	42	32	6.6720		
	1105			-88.8	50	47	7.8910		
	1110			-89.4	54	47	7.6450		
	1115			-86.0	65	54	4.7540		
	1120			-86.4	65	49	3.8640		
	1125			-89.9	63	73	3.5310		
75	1150	1200	6				ERROR		
	1155			-87.0	68	45	0.8380		
	1200			-89.5	70	59	1.0150		
	1205			-88.3	76	66	1.2480		
	1210			-86.2	74	57	1.0620		
	1215			-84.9	70	57	0.9320		
	1220			-88.4	73	64	0.9300		
76	1225			-85.1	73	64	0.9300		
	1230			-87.6	69	47	0.9010		
	1235			-85.7					
	1240			-85.7					
	1245			-85.7					
	1250			-85.7					
	1255			-85.7					

PPM DATA

RUN	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
76	1320	1200	24	-84.3	86	ASC4	10.3690	
	1325			-83.1	81		7.0330	
	1330			-83.4	81		7.0610	
	1335			-84.5	62		9.0550	
77	1445	2604	12	-72.3	34	FRED	0.0004	
	1450			-76.8	31		0.0010	
	1455			-72.0	40		0.0001	
	1500			-72.7	24		0.0001	
	1510			-77.1	35		0.0006	
	1515			-74.4	36		0.0006	
78	1540	2604	24	-68.2	6	FRED	0.0130	
	1545			-67.4	13		0.0770	
	1550			-67.4	17		0.0220	
	1555			-68.0	23		0.0140	
	1600			-68.0	26		0.0140	
	1605			-70.8	26		0.0270	
	1610			-72.0	46		0.0220	
79	1535	2404	24	-76.1	47	FRED	0.0310	
	1540			-79.2	42		0.1320	
	1545			-79.0	40		0.0990	
	1550			-79.2	43		0.0630	
	1555			-80.0	33		0.1210	
	1600			-79.9	34		0.1360	
80	1625	2604	12	-78.8	40	FRED	0.0240	
	1630			-77.6	44		0.0160	
	1635			-74.5	43		0.0040	
	1640			-78.6	52		0.0012	
81	1745	2604	6	-84.2	57	FRED	0.0003	
	1750			-82.2	52		0.0003	
	1755			-85.0	64		0.0020	
	1800			-83.6	69		0.0230	
	1810			-82.6	49		0.0830	
	1815			-82.0	65		0.0000	
82	1835	2604	24	-83.9	56	FRED	0.1080	
	1840			-84.9	55		0.4330	
	1845			-83.9	41		0.0300	
	1850			-84.2	47		0.1380	
	1855			-85.0	39		0.0140	
	1900			-84.4	47		0.0600	
	1905			-83.9	39		0.0440	

PPM DATA

RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
83	1440	2604	12	-81.8	22	FREN	4.9830	
	1445			-82.4	36		0.1400	
	1450			-82.0	27		0.0330	
	1455			-81.2	31		0.0160	
	2000			-81.2	30		0.0680	
	2005			-82.6	34		0.0060	
	2005			-81.1	31		0.0060	
84	1420	2604	24	-74.5	24	FREN	0.0000	
	1425			-72.6	7		0.0010	
	1430			-74.2	16		0.0440	
	1435			-76.0	11		0.0000	
	1440			-75.0	15		0.0140	
	1445			-72.8	18		0.0000	
	1450			-74.2	22		0.0000	
85	1530	2604	6	-76.1	19	FREN	0.0000	
	1535			-76.6	10		0.0015	
	1540			-75.6	18		0.0000	
	1545			-76.4	17		0.0013	
	1550			-76.9	15		0.0010	
	1555			-75.7	20		0.0006	
	1600			-75.8	22		0.0004	
88	1420	2604	24	-81.2	13	FREN	0.0000	
	1425			-82.4	21		0.0000	
	1430			-80.1	23		0.0000	
	1435			-80.2	19		0.0000	
	1440			-78.2	10		0.0000	
	1445			-81.6	12		0.0000	
	1450			-82.6	14		0.0000	
89	1530	2604	12	-82.7	17	FREN	0.0000	
	1535			-84.4	14		0.0000	
	1540			-84.3	12		0.0000	
	1545			-82.8	14		0.0000	
	1550			-85.0	13		0.0000	
	1555			-82.6	14		0.0000	
	1600			-83.2	19		0.0000	
90	1640	2604	6	-82.1	21	FREN	0.0000	
	1645			-81.9	21		0.0000	
	1650			-82.9	18		0.0000	
	1655			-83.1	12		0.0000	
	1700			-82.8	21		0.0000	
	1705			-81.5	18		0.0000	
	1710			-82.5	19		0.0000	
91	1750	2604	24	-83.4	28	FREN	0.0047	
	1755			-83.1	52		0.0008	
	1800			-82.9	28		0.0005	
	1805			-83.7	36		0.0058	
	1810			-83.9	32		0.0022	
	1815			-81.7	10		0.0006	
	1820			-82.9	21		0.0275	

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RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
92	1020			-93.1	12	NONE				
	1025			-92.9	16					
	1030			-92.2	15					
	1035			-92.6	18					
	1040			-92.1	14					
	1045			-92.5	21					
	1050			-92.9	18					
93	1350	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1355			-88.0	24	GSC4	0.1330	NONE	0.1330	
	1400			-88.7	12		4.0700		4.0700	
	1405			-87.8	14		4.9100		4.9100	
	1410			-89.4	21		2.1700		2.1700	
	1415			-88.6	18		1.3100		1.3100	
	1420			-88.1	16		0.2190		0.2190	
94	1455			-87.5	14		0.1150		0.1150	
	1500			MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1505			-86.0	33	NONE				
	1510			-84.8	36					
	1515			-83.7	46					
	1520			-83.0	19					
	1525			-82.0	20					
98	1650	2604	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1655			-99.9	29	FRED	0.0740	NONE	0.0740	
	1700			-97.5	27		0.4990		0.4990	
	1705			-97.0	29		0.0550		0.0550	
	1710			-98.3	23		0.2020		0.2020	
	1715			-97.2	30		0.0186		0.0186	
	1720			-97.3	23		0.2580		0.2580	
99	1750	2604	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1755			-94.1	41	FRED	0.4040	NONE	0.4040	
	1800			-97.7	35		0.2630		0.2630	
	1805			-96.6	25		0.2920		0.2920	
	1810			-96.7	35		0.2570		0.2570	
	1815			-96.1	43		0.0370		0.0370	
	1820			-95.2	40		0.0510		0.0510	
100	1935	2604	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1940			-97.0	25	FRED	0.2490	NONE	0.2490	
	1945			-101.6	45		2.7500		2.7500	
	1950			-102.2	34		1.8000		1.8000	
	1955			-101.3	40		2.2500		2.2500	
	2000			-101.8	75		1.8400		1.8400	
	2005			-101.1	36		3.8300		3.8300	
104	1535	2604	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1540			-100.7	33	FRED	2.9900	NONE	2.9900	
	1545			-102.9	20		0.7430		0.7430	
	1550			-101.9	16		1.9400		1.9400	
	1555			-101.0	8		1.6300		1.6300	
	1560			-101.9	36		1.2600		1.2600	
	1565			-102.1	12		2.1000		2.1000	
104	1600			-95.0	7		0.2120		0.2120	
	1605			-92.4	2					
	1610			-91.9	17					
	1615			-99.9	23					
	1620			-104.6	8					
	1625			-102.6	14					
	1630			-104.6	3					

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RUN	TIME	RATE	CMS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
105	1630	2604	12	-102.1	11	FREQ	6.8600	NONE		
	1635			-94.7	10		11.0300			
	1640			-99.2	14					
	1645			-100.6	24		7.3300			
	1650			-102.1	30		1.8400			
106	1655	2604	6	-101.9	30	FREQ	1.4300	NONE		
	1700			-102.4	16		1.4300			
	1705			-94.1	14					
	1710			MEDIANS	MEDIAN CROSSINGS		ERROR			
	1715			-103.3	28		3.9300			
107	1720	2604	12	-102.3	34	FREQ	2.9500	NONE		
	1725			-102.3	30		3.9500			
	1730			-103.8	55		2.5100			
	1735			-102.0	12		2.0700			
	1740			-102.2	23		2.0000			
108	1745	2604	12	-101.2	28	FREQ	0.9770	NONE		
	1750			-100.6	19		2.9600			
	1755			-99.4	18		4.0800			
	1800			MEDIANS	MEDIAN CROSSINGS		2.6500			
	1805			-101.2	14		2.3200			
109	1810	2604	12	-100.7	19	FREQ	1.8200	NONE		
	1815			-99.6	10		0.9730			
	1820			-99.6	20		0.8000			
	1825			-98.1	24		0.2800			
	1830			-98.1	21		0.4800			
110	1835	2604	12	-97.4	10	FREQ	0.5600	NONE		
	1840			-97.4	26		0.4500			
	1845			-97.4	32		0.3500			
	1850			-97.8	14		0.2700			
	1855			-97.5	37		0.3200			
111	1900	2604	12	-95.4	26	FREQ	1.8000	NONE		
	1905			-97.7	19		1.7800			
	1910			-97.2	24		1.0600			
	1915			-98.5	27		1.5800			
	1920			-98.3	32		1.3700			
112	1925	2604	12	-97.7	36	FREQ	1.7400	NONE		
	1930			-98.5	30		ERROR			
	1935			-98.4	19		3.1100			
	1940			-98.4	24		1.7900			
	1945			-97.4	34		0.8150			
113	1950	2604	12	-97.4	11	FREQ	3.3700	NONE		
	1955			-97.4	27		2.2900			
	2000			-100.1	24		7.1400			
	2005			-98.9	22		7.6800			
	2010			-102.5	35		0.3000			
114	2015	2604	12	-102.4	15	FREQ	0.0500	NONE		
	2020			-84.7	24		0.0120			
	2025			-84.7	16		0.0000			
	2030			-82.6	15		0.0000			
	2035			-82.6	11		0.1000			
115	2040	2604	12	-83.2	9	FREQ	0.5100	NONE		
	2045			-83.2	15					
	2050			-84.7	17					
	2055			-84.7	9					
	2060			-84.7	17					

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
113	1025	2604	24	-92.7 -89.5 -88.3 -91.7 -89.9 -91.1 -88.5 -87.8 -84.7 -91.7 -88.0 -79.4 -80.3	16 29 20 15 13 19 27 23 20 15 18 7 18	FRED	0.2900 0.0570 0.0400 0.0910 0.0430 0.1000 0.0001	
114	1150	2604	24	-82.4 -83.9 -83.4 -83.9 -84.5 -81.2 -82.4 -82.0 -82.7 -82.2 -83.3 -82.4 -84.9 -94.2 -94.8 -94.1 -100.3 -99.2 -94.6 -94.4 -94.5 -98.4 -97.7 -96.6 -99.6 -95.6	30 16 12 23 21 28 25 14 22 27 34 24 13 10	FRED	0.0240 0.01430 0.0520 0.0390 0.0140 0.0080 0.0080 0.0240 0.0240 1.0570 3.8500 4.7000 3.2800 4.3300 3.3100 1.1700	
115	1320	2604	24	-91.0 -87.6 -88.7 -94.1 -96.2 -90.6 -92.0 -89.4 -89.3 -89.7 -91.0 -84.7 -95.9 -95.9 -92.8 -92.8 -93.9 -93.9 -95.7 -93.9 -94.7 -99.4 -98.9 -97.1 -97.9	19 20 15 21 12 19 14 11 18 17 13 15 21 9 12 18 19 20 16 12 30 37 32 60 41 29 23	FRED	0.2100 0.0230 0.5440 0.8360 0.2300 0.2440 0.1290 0.1500 0.2460 0.2160 0.1000 0.6100 1.5600 1.0400	
116	1420	2604	12	-93.2 -91.7 -92.1 -93.7 -95.2 -92.4 -93.4 -92.1 -92.3 -91.8	18 19 15 11 14 9 18 20 20 14	FRED	0.0240 0.0880 0.0776 0.2500 0.0550 0.1060 0.2920	
117	1520	2604	12	-92.8 -94.5 -93.9 -95.7 -93.9 -94.7 -99.4 -98.9 -97.1 -97.9	18 19 20 16 12 30 37 32 60 41 29 23	FRED	0.1500 0.2460 0.2160 0.1000 0.6100 1.5600 1.0400	
118	1615	2604	12	-93.2 -91.7 -92.1 -93.7 -95.2 -92.4 -93.4 -92.1 -92.3 -91.8	18 19 15 11 14 9 18 20 20 14	FRED	0.0240 0.0880 0.0776 0.2500 0.0550 0.1060 0.2920	

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RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
119	1025	2604	12	-98.7	24	FREN	5.3800	
	1030			-98.0	34		6.3100	
				-97.2	37		4.9000	
	1040			-96.7	30		4.4300	
				-94.3	26		1.4600	
	1045			-94.3	63		1.4900	
				-99.4	69		2.4400	
	1050			-98.5	23		0.4200	
				-96.7	22		0.5700	
	1055			-98.0	20		0.2500	
				-98.9	24		0.4300	
120	1125	2604	6	-96.3	29	FREN	0.6710	
	1130			-95.5	29		11.1500	
	1135			-95.4	34		7.1300	
	1140			-93.7	25		13.3100	
	1145			-92.9	28		10.5600	
	1150			-92.6	23		4.0400	
				-92.4	19		5.5100	
	1155			-94.0	14		9.5100	
				-91.3	14		14.9600	
	1155			-96.0	24		11.3600	
121	1200	2400	12	-91.3	15	GSC4	20.8600	
	1205			-87.3	23		13.7100	
	1210			-83.1	8		14.9000	
				-89.5	14		25.2500	
	1005			-87.6	14		23.7900	
	1010			-86.7	22		23.2900	
	1015			-86.7	13		23.2900	
	1020			-84.8	21		23.2900	
				-89.3	24		23.2900	
122	1040	2400	12	-92.0	15	GSC4	23.2900	
	1045			-92.4	21		27.1300	
	1050			-90.0	20		26.9500	
	1055			-95.3	20		24.0300	
	1100			-95.0	19		17.7000	
	1105			-94.3	19		9.3800	
	1110			-93.4	32		9.4200	
				-97.2	32		0.0745	
	1115			-97.9	36		0.0745	
123	1150	2400	12	-97.6	31	GSC4	0.0745	
	1155			-95.5	27		0.0745	
	1200			-95.7	27		0.0540	
	1205			-95.5	24		0.1000	
	1210			-96.5	30		0.0740	
	1215			-93.4	19		0.1730	
	1220			-91.0	19		0.2990	
				-87.0	12			
	1225			-91.3	26			
				-88.7	13			
124	1345	2404	12	-81.3	27	FREN		
	1350			-80.7	28			
	1355			-81.2	36			
	1400			-78.4	26			
	1405			-80.0	19			
	1410			-78.0	23			
	1415			-81.6	33			
				-81.0	29			
				-83.7	16			

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RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
125	1450	2604	24	-89.1	-85.7	FRED	1.0970	NONE		
	1455			-90.7	-87.2		1.3800			
	1500			-91.3	-89.2		1.5500			
	1505			-88.6	-85.6		1.1300			
	1510			-89.4	-85.9		1.0500			
	1515			-91.0	-87.5		1.5600			
	1520			-88.2	-85.6		1.3600			
	1540			-91.6	-89.2		0.2450			
126	1545	2004	24	-93.3	-89.4	FRED	0.3300	NONE		
	1550			-95.1	-91.5		0.5080			
	1555			-94.0	-95.2		0.0000			
	1600			-97.2	-95.5		0.7370			
	1605			-96.9	-95.8		1.1200			
	1610			-90.3	-96.4		1.7500			
	1625			-99.3	-94.8		0.3040			
	1630			-96.6	-96.2		0.4420			
127	1635	2604	12	-98.1	-95.4	FRED	0.1840	NONE		
	1640			-98.2	-95.9		0.2340			
	1645			-94.0	-96.0		1.5500			
	1650			-99.4	-95.2		0.4500			
	1655			-99.8	-95.4		0.0970			
	1705			-94.1	-90.6		0.0010			
	1750			-87.5	-93.7		0.0044			
	1855			-88.3	-90.7		0.0040			
128	1000	2604	12	-86.4	-90.1	FRED	0.0004	NONE		
	1005			-87.4	-90.3		0.0001			
	1010			-87.6	-89.3		0.0006			
	1015			-87.1	-88.6		0.0059			
	1035			-85.2	-89.5		0.0320			
	1040			-83.8	-87.2		0.0087			
	1045			-85.7	-88.6		0.0236			
	1050			-84.9	-87.6		0.0171			
129	1055	2604	24	-83.0	-84.4	FRED	0.0158	NONE		
	1100			-84.2	-85.3		0.0161			
	1105			-83.4	-84.5		0.0140			
	1130			-81.9	-83.1		0.0046			
	1135			-81.3	-77.9		0.0150			
	1140			-81.4	-81.6		0.0037			
	1145			-82.3	-84.5		0.0174			
	1150			-82.2	-83.1		0.0163			
130	1155	2604	24	-83.8	-84.8	FRED	0.0143	NONE		
	1200			-83.4	-82.3		0.0130			
	1205			-83.4	-84.5		0.0140			
	1210			-83.4	-84.5		0.0140			
	1215			-83.4	-84.5		0.0140			
	1220			-83.4	-84.5		0.0140			
	1225			-83.4	-84.5		0.0140			
	1230			-83.4	-84.5		0.0140			

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
131	1255			-82.1 -82.4	33 43	NONE			
	1300			-80.2 -82.4	43 29				
	1305			-82.3 -83.5	32 38				
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
132	1445			-78.6 -81.4	42 22	NONE			
	1450			-80.4 -83.3	33 32				
	1455			-82.8 -84.2	27 24				
	1500			-82.5 -84.1	32 37				
	1505			-83.1 -82.4	37 33				
	1510			-82.0 -81.7	21 30				
	1515			-82.0 -82.2	35 26				
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
133	1555			-81.2 -77.3	57 30	NONE			
	1600			-80.9 -78.4	40 52				
	1605			-81.2 -77.9	33 35				
	1610			-82.0 -80.2	44 36				
	1615			-79.6 -76.6	29 28				
	1620			-81.1 -77.8	45 39				
	1625			-80.4 -77.1	38 34				
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
134	1640			-81.1 -76.8	53 39	NONE			
	1645			-80.8 -76.6	45 26				
	1650			-81.2 -77.8	39 27				
	1655			-81.2 -78.2	49 39				
	1700			-81.9 -77.4	46 38				
	1705			-80.8 -77.2	45 42				
	1710			-79.8 -76.7	46 30				
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
135	1125			-89.0 -92.4	13 8	NONE			
	1130			-89.4 -90.0	12 8				
	1135			-86.4 -88.5	12 5				
	1140			-87.3 -91.1	18 21				
	1145			-86.0 -90.0	10 9				
	1150			-85.2 -89.7	10 9				
	1155			-84.6 -94.5	10 8				
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
136	1350			-92.0 -89.1	10 12	NONE			
	1355			-89.7 -88.2	18 14				
	1400			-89.8 -87.4	14 15				
	1405			-86.6 -84.9	14 12				
	1410			-88.4 -85.6	10 11				
	1415			-88.5 -85.3	19 12				
	1420			-88.9 -87.5	14 9				
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	REMARKS
137	1505	2604	24	-82.9 -80.1	8 8	FREI	0.0000	NONE	
	1510			-84.3 -81.3	17 16		0.0000		
	1515			-78.5 -77.5	12 9		0.0000		
	1520			-81.3 -78.7	11 8		0.0000		
	1525			-81.1 -78.7	13 9		0.0000		
	1530			-80.1 -79.8	22 10		0.0290		
	1535			-77.5 -76.6	24 8		0.0000		

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RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
138	1555	2604	24	-80.5	23	FRED	0.0000	
	1600			-77.5	21		0.0295	
	1605			-79.7	10		0.0282	
	1610			-77.2	18		0.0290	
	1615			-78.6	16		0.0298	
	1620			-76.8	13		0.0003	
	1625			-76.7	13		0.0027	
139	1655	2604	24	-78.8	14	FRED	0.0290	
	1700			-80.3	10		0.0580	
	1705			-83.0	13		0.0290	
	1710			-80.0	26		0.0440	
	1715			-77.8	20		0.0292	
	1720			-81.5	28		0.0549	
	1725			-84.0	24		0.0291	
141	1605	2604	24	-83.1	43	FRED	0.2000	
	1610			-80.9	25		0.0890	
	1615			-85.6	24		0.1210	
	1620			-81.7	21		5.4800	
	1625			-85.4	20		0.6200	
	1630			-82.2	31		0.1900	
	1635			-86.7	19		0.5100	
142	1245	2604	24	-75.4	14	FRED	0.0340	
	1250			-73.1	15		0.1310	
	1255			-73.2	16		0.0210	
	1300			-73.4	15		0.0170	
	1305			-75.9	14		0.0350	
	1310			-73.1	13		0.0906	
	1315			-75.3	17		0.0250	
145	1105	2604	12	-98.9	12	FRED	0.5770	
	1110			-97.3	16		0.3130	
	1115			-97.9	15		0.5010	
	1120			-93.8	17		0.8190	
	1125			-98.4	15		0.4640	
	1130			-97.8	13		0.3330	
	1135			-100.1	11		0.6210	
146	1205	2604	6	-101.2	12	FRED	0.6920	
	1210			-100.4	16		0.3560	
	1215			-101.4	21		0.8150	
	1220			-100.3	17		0.5890	
	1225			-98.8	15		0.4830	
	1230			-97.8	10		0.3790	
	1235			-99.3	15		0.5950	

PPM DATA

RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
147	1305	2604	12	-96.2 -94.0	14 22	FREQ	0.1100	
	1310			-94.5 -95.0	13 22		0.0740	
	1315			-93.4 -95.0	16 16		0.1140	
	1320			-94.8 -94.6	14 20		0.1270	
	1325			-94.1 -92.7	20 20		0.1100	
	1330			-94.6 -94.8	21 17		0.0340	
	1335			-97.8 -87.6	18 10		0.0230	
148	1405	2504	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1410			-87.4 -87.5	15 10	FREQ	0.1030	
	1415			-74.0 -78.6	13 3		0.0390	
	1420			-91.4 -80.1	13 13		0.0450	
	1425			-83.3 -80.7	24 9		0.0550	
	1430			-86.0 -86.2	21 12		0.0850	
	1435			-43.5 -83.5	20 8		0.0590	
				-86.3 -86.4	20 15		0.0390	
149	1505	2604	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1510			-85.5 -87.0	22 11	FREQ	0.0500	
	1515			-87.2 -86.5	14 18		0.1170	
	1520			-86.5 -83.4	14 12		0.0700	
	1525			-89.3 -86.4	10 9		0.1410	
	1530			-92.5 -90.3	11 13		0.1100	
	1535			-92.2 -89.5	13 11		0.3070	
150	1235	2604	6	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1240			-90.0 -90.6	15 20	FREQ	0.0770	
	1245			-93.2 -93.7	19 27		0.0610	
	1250			-93.0 -93.3	14 14		0.0330	
	1255			-93.8 -93.5	28 35		0.0670	
	1300			-91.2 -91.2	26 30		0.0190	
	1305			-89.0 -89.8	17 21		0.0260	
				-91.0 -90.2	23 24		0.0086	
151	1325	2604	12	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1330			-90.7 -90.7	20 26	FREQ	0.1610	
	1335			-92.3 -93.5	22 28		0.1610	
	1340			-92.2 -91.4	28 27		0.0810	
	1345			-90.5 -92.7	22 30		0.2220	
	1350			-89.6 -91.3	23 26		0.0610	
	1355			-84.4 -90.8	27 28		0.0660	
				-84.4 -90.0	20 23		0.0480	
152	1415	2604	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1420			-86.8 -87.3	35 38	FREQ	0.2040	
	1425			-87.4 -88.6	42 48		0.2200	
	1430			-87.7 -85.2	25 40		0.2000	
	1435			-87.5 -84.7	38 33		0.4000	
	1440			-83.5 -84.4	23 22		0.1070	
	1445			-87.1 -87.4	24 33		0.1310	
				-86.6 -87.1	33 36		0.1100	
153	1505	2604	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1510			-84.8 -85.8	36 26	FREQ	0.2100	
	1515			-86.7 -84.9	31 28		0.1900	
	1520			-84.5 -86.1	38 30		0.1490	
	1525			-83.9 -82.1	31 29		0.1180	
	1530			-86.0 -85.6	24 22		0.1060	
	1535			-86.4 -84.1	29 18		0.2080	
				-81.3 -81.0	16 8		0.0800	

PPM DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
154	1615	2604	12	-89.1	29	2A	0.0079	NONE	0.0079	LOOP
	1620			-88.0	34	3B	0.0200		0.0200	
	1625			-89.3	33	31	0.0150		0.0150	
	1630			-88.1	32	37	0.0200		0.0200	
	1635			-86.5	32	24	0.0048		0.0048	
	1640			-86.9	35	42	0.0144		0.0144	
	1645			-82.5	25	27	0.0012		0.0012	
155	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1355	2604	24	-80.5	18	5	0.1570	NONE	0.1570	
	1400			-81.3	13	7	0.0214		0.0214	
	1405			-79.5	14	13	0.0530		0.0530	
	1410			-81.1	11	9	0.0640		0.0640	
	1415			-78.9	17	10	0.0230		0.0230	
	1420			-78.0	19	14	0.0370		0.0370	
156	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1425			-78.4	18	8	0.0270	NONE	0.0270	
	1445	2604	24	-86.0	9	9	0.1970	NONE	0.1970	
	1450			-81.3	13	6	0.0820		0.0820	
	1455			-80.5	11	13	0.0184		0.0184	
	1500			-84.8	12	6	0.0830		0.0830	
	1505			-86.4	10	8	0.0600		0.0600	
157	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1510			-83.3	14	4	0.1240	NONE	0.1240	
	1515			-85.1	5	5	0.0770		0.0770	
	1515			-88.2	5	5	0.0770		0.0770	
	1535	2604	24	-90.0	10	11	0.1770	NONE	0.1770	
	1540			-80.7	14	6	0.1040		0.1040	
	1545			-77.9	6	5	0.0480		0.0480	
1550			-82.7	13	8	0.0580		0.0580		
1555			-85.7	16	9	0.0410		0.0410		
1600			-84.9	15	9	0.0570		0.0570		
1605			-85.0	14	9	0.3850		0.3850		

DELTA MOD DATA

RUN	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
164	1250	2400	24	-93.2 -95.5	26 9	FRED	0.8930	
	1255			-93.5 -95.2	31 10		1.2500	
	1300			-94.9 -96.5	14 10		1.6000	
	1305			-95.2 -96.5	32 11		1.4300	
	1310			-94.2 -96.6	28 15		2.1400	
	1315			-93.7 -96.0	20 12		1.0800	
	1320			-94.4 -96.9	21 11		1.3400	
165	1350	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1355			-94.2 -93.0	25 10	FRED	0.9290	
	1400			-93.6 -92.8	24 7		0.5750	
	1405			-93.9 -93.7	14 16		0.1190	
	1410			-93.0 -92.5	22 18		0.2630	
	1415			-96.0 -94.4	35 11		0.9990	
	1420			-94.0 -92.4	19 15		0.3050	
	1425			-94.4 -94.0	32 16		0.3390	
166	1520	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1525			-89.0 -89.5	39 33	FRED	0.3330	
	1530			-90.4 -90.5	26 27		0.1990	
	1535			-89.7 -89.8	32 26		1.0500	
	1540			-89.8 -89.0	45 22		0.6210	
	1545			-89.4 -89.2	43 21		0.1970	
	1550			-89.4 -89.0	52 21			
167	1235		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1240			-96.4 -103.3	15 1	NONE		
	1245			-96.3 -103.7	32 7			
	1250			-96.9 -103.5	24 12			
	1255			-98.0 -104.2	28 13			
	1300			-97.5 -103.2	32 14			
	1305			-96.4 -101.6	23 15			
	1310			-94.1 -102.9	21 12			
168	1335		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1340			-92.7 -96.7	23 8	NONE		
	1345			-94.4	18			
	1350			-93.4	28			
	1355			-94.5	27 13			
	1400			-92.4 -98.2	28 15			
	1405			-95.2 -98.9	32 13			
169	1550		CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1555			-89.8 -90.1	32 17	NONE		
	1600			-88.9 -91.0	34 21			
	1605			-89.9 -92.0	30 15			
	1610			-90.1 -92.6	38 22			
	1615			-89.9 -90.8	40 34			
	1620			-89.4 -91.4	33 23			
	1625			-89.1 -90.3	31 16			
170	1650	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1655			-89.2 -91.0	22 15	FRED	0.0515	
	1700			-90.4 -90.0	22 23		0.2850	
	1705			-93.5 -94.3	17 14		0.0076	
	1710			-95.8 -87.3	36 26		0.2630	
	1715			-85.5 -86.6	33 23		0.1050	

DELTA MOD	DATA	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
RUN 173		1955	2400	24	-87.3	12	FRED	0.0000	NONE	0.0000	
		2000			-86.5	13		0.0000			
		2005			-83.8	18		0.0000			
		2010			-83.6	15		0.0000			
		2015			-86.4	20		0.0000			
		2020			-85.8	16		0.0000			
RUN 174		2025			-87.1	15		0.0000	NONE	0.0000	
		2105	2400	24	-86.7	22	FRED	0.0000			
		2110			-85.3	16		0.0000			
		2115			-86.3	16		0.0000			
		2120			-87.5	15		0.0000			
		2125			-86.6	19		0.0000			
RUN 176		2125			-86.3	18	FRED	0.0238	NONE	0.0000	
		1120	2400	24	-80.7	29	FRED	0.0000			
		1125			-86.0	26		0.0000			
		1130			-77.5	28		0.0000			
		1135			-80.5	27		0.0000			
		1140			-77.3	25		0.0000			
RUN 179		1135			-79.0	27	FRED	0.0000	NONE	0.0000	
		1140			-75.6	24		0.0000			
		1145			-80.3	26		0.0000			
		1150			-76.8	22		0.0000			
		950	2400	24	-77.0	25	FRED	0.0000			
		955			-81.4	36		0.0000			
RUN 180		1000			-82.4	27	FRED	0.0000	NONE	0.0000	
		1005			-84.5	19		0.0000			
		1010			-84.5	18		0.0010			
		1015			-84.2	22		0.0012			
		1020			-83.7	20		0.0000			
		1025			-83.1	23		0.0000			
RUN 181		1105			-83.6	29	FRED	0.0000	NONE	0.0000	
		1150	2400	24	-79.5	22	FRED	0.0000			
		1155			-78.5	19		0.0000			
		1200			-77.9	17		0.0000			
		1205			-75.2	31		0.0000			
		1210			-77.5	24		0.0000			
RUN 181		1215			-83.4	11	FRED	0.0001	NONE	0.0000	
		1220			-80.9	4		0.0000			
		1225			-63.7	22		0.0000			
		1230			-84.4	15		0.0000			
		1235			-85.0	20		0.0000			
		1240			-83.4	13		0.0000			
RUN 181		1240			-82.5	31	FRED	0.0000	NONE	0.0000	
		1150	2400	24	-80.1	21	FRED	0.0000			
		1155			-79.1	21		0.0000			
		1200			-79.2	24		0.0000			
		1205			-77.0	41		0.0000			
		1210			-76.2	22		0.0000			
RUN 182		1215			-74.0	15	FRED	0.0000	NONE	0.0000	
		1220			-72.4	30		0.0000			
		1225			-73.8	12		0.0014			
		1230			-74.6	9		0.0000			
		1235			-72.6	15		0.0000			
		1240			-73.3	14		0.0000			
RUN 182		1250	2400	24	-75.9	12	FRED	0.0000	NONE	0.0000	
		1255			-91.1	18		0.0000			
		1300			-91.1	17		0.0000			
		1305			-91.9	10		0.0000			
		1310			-90.5	29		0.0000			
		1315			-91.1	16		0.0000			
RUN 182		1315			-90.6	32	FRED	0.0000	NONE	0.0000	
		1320			-91.0	27		0.0000			
		1325			-90.7	20		0.0000			
		1330			-91.1	27		0.0000			
		1335			-90.4	17		0.0000			
		1340			-89.6	25		0.0000			
RUN 182		1340			-91.2	21	FRED	0.0000	NONE	0.0000	
		1345			-90.4	27		0.0000			
		1350			-91.2	17		0.0000			
		1355			-91.2	27		0.0000			
		1360			-91.2	17		0.0000			
		1365			-91.2	17		0.0000			

DELTA MOD	DATA	TIME	WATE	CHS	MEDIAN	CROSSINGS	TYPE	ERROR	REMARKS
RUN 183	1350	2400	24		-91.0	31	FRED	0.0000	REMARKS
	1355				-90.7	28		0.0000	REC PAD
	1400				-91.9	13		0.0014	
	1405				-92.4	24		0.0000	
	1410				-91.7	22		0.0001	
	1415				-91.5	26		0.0000	
	1420				-90.5	29		0.0000	
RUN 185	1245	2400	24		-96.8	19	FRED	0.0000	REMARKS
	1250				-91.7	27		0.0004	
	1255				-92.9	12		0.0000	
	1300				-93.5	17		0.0003	
	1305				-93.7	14		0.0001	
	1310				-93.2	15		0.0039	
	1315				-93.7	19		0.0000	
RUN 186	1345	2400	24		-95.2	9	FRED	0.0226	REMARKS
	1350				-94.5	16		0.0003	
	1355				-96.4	11		0.0000	
	1400				-97.3	14		0.0136	
	1405				-96.4	18		0.0046	
	1410				-94.7	15		0.0003	
	1415				-96.3	12		0.0017	
RUN 187	1500	2400	24		-94.5	27	FRED	0.0000	REMARKS
	1505				-95.2	31		0.0021	
	1510				-96.7	25		0.0010	
	1515				-95.0	21		0.0001	
	1520				-93.3	25		0.0000	
	1525				-94.3	29		0.0025	
RUN 188	1600	2400	24		-92.8	31	FRED	0.0004	REMARKS
	1605				-93.3	34		0.0000	
	1610				-95.0	40		0.0003	
	1615				-95.7	36		0.0006	
	1620				-94.0	43		0.0024	
	1625				-94.2	41		0.0012	
	1630				-93.9	41		0.0000	
RUN 189	1020	2400	24		-90.2	24	FRED	1.2300	REMARKS
	1025				-89.9	39		1.4900	
	1030				-89.3	36		0.2870	
	1035				-91.6	32		0.3220	
	1040				-92.3	33		3.1300	
	1045				-92.2	44		3.6300	
	1050				-92.5	42		6.5200	
RUN 190	1220	2400	24		-88.9	31	FRED	0.4660	REMARKS
	1225				-88.2	27		0.1000	
	1230				-87.6	28		0.0351	
	1235				-87.7	27		0.0035	
	1240				-86.4	22		0.4980	
	1245				-87.8	32		0.0022	
	1250				-88.3	29		0.1280	

DELTA MOD	DATA	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
191	1320	1320	2400	24	-96.5	30	FRED	0.2930	
		1325			-95.5	18		0.0815	
		1330			-95.3	23		1.1800	
		1335			-96.0	28		0.4710	
		1340			-97.7	20		0.8335	
192	1345	1345			-97.2	24		0.2090	
		1350			-96.2	18		0.0960	
		1355			-96.7	16		0.0961	
		1400			-96.2	19		0.0638	
		1405			-96.0	23		0.0742	
193	1410	1410			-97.8	24		0.1350	
		1415			-98.1	18		0.0403	
		1420			-98.4	13		0.0190	
		1425			-98.4	19		0.1710	
		1430			-98.5	16		0.0463	
194	1435	1435			-98.5	14		0.1130	
		1440			-98.8	24		0.2120	
		1445			-99.1	16		0.1730	
		1450			-99.3	19		0.0181	
		1455			-99.4	21		0.0807	
195	1455	1455			-99.4	29		0.0791	
		1500			-99.4	19		0.0606	
		1505			-99.4	38		0.0010	
		1510			-99.4	16		0.0000	
		1515			-99.4	13		0.0000	
196	1515	1515			-99.2	19		0.0000	
		1520			-99.2	10		0.0000	
		1525			-99.2	16		0.0119	
		1530			-99.4	11		0.4940	
		1535			-99.4	10		0.0000	
197	1535	1535			-99.4	10		0.0000	
		1540			-99.4	16		0.0075	
		1545			-99.4	12		0.0000	
		1550			-99.4	9		0.0000	
		1555			-99.4	11		0.0033	
198	1555	1555			-99.4	14		0.0039	
		1600			-99.4	8		0.0000	
		1605			-99.4	9		0.0244	
		1610			-99.4	10		0.0000	
		1615			-99.4	13		0.0000	
199	1615	1615			-99.4	7		0.0004	
		1620			-99.4	12		0.0004	
		1625			-99.4	9		0.0036	
		1630			-99.4	13		0.0012	
		1635			-99.4	10		0.0003	
200	1635	1635			-99.4	15		0.0124	
		1640			-99.4	12		0.0011	
		1645			-99.4	19		0.0008	
		1650			-99.4	15		0.0175	
		1655			-99.4	12		0.0214	
201	1655	1655			-99.4	18		0.0042	
		1660			-99.4	21			
		1665			-99.4	19			
		1670			-99.4	10			
		1675			-99.4	15			

DELTA MOD	DATA	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
RUN 200	TIME 1130	24	-91.7 -90.2	28 15	FRED	1.6800	
	1135		-91.0 -92.0	21 14		3.3900	
	1140		-91.5 -92.3	22 16		8.3900	
	1145		-92.0 -92.6	21 17		3.8400	
	1150		-94.5 -94.0	16 14		2.7800	
	1155		-91.9 -91.9	9 9		6.7700	
	1200		-96.8 -97.2	8 3		9.3500	
RUN 201	TIME 1415	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1420		-98.1 -98.3	25 17	FRED	0.1380	
	1425		-98.3 -97.9	25 24		0.1580	
	1430		-99.1 -97.1	26 25		0.0920	
	1435		-99.6 -97.8	18 18		0.1860	
	1440		-98.5 -96.9	26 19		0.0825	
	1445		-100.5 -96.6	22 25		0.0714	
	1450		-102.3 -97.5	17 18		0.3110	
RUN 202	TIME 1515	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1520		-99.6 -98.7	22 25	FRED	0.1480	
	1525		-98.3 -98.7	29 27		0.0814	
	1530		-98.9 -99.0	31 23		0.5360	
	1535		-99.3 -99.8	22 21		0.7110	
	1540		-99.1 -98.7	25 25		0.0365	
	1545		-99.3 -99.5	22 19		0.3770	
	1550		-100.7 -101.3	26 25		0.8330	
RUN 203	TIME 1620	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1625		-98.4 -99.3	20 18	FRED	1.0900	
	1630		-97.9 -99.5	26 23		1.2800	
	1635		-96.6 -98.5	33 33		1.0000	
	1640		-97.4 -98.8	24 25		0.2760	
	1645		-97.9 -99.2	29 31		0.4710	
	1650		-97.0 -98.9	22 27		1.0300	
	1655		-95.8 -98.2	34 30		0.2780	
RUN 204	TIME 1025	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1030		-83.7 -81.2	18 12	FRED	1.0400	
	1035		-86.0 -84.5	10 10		1.2000	
	1040		-88.3 -86.2	14 14		0.8800	
	1045		-83.2 -82.6	19 15		1.1800	
	1050		-83.6 -82.8	16 14		1.3200	
	1055		-82.7 -79.0	7 10		1.2300	
	1055		-90.1 -88.6	5 7		1.0400	
RUN 205	TIME 1135	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
	1140		-93.3 -92.5	5 4	FRED	0.0012	
	1145		-94.0 -91.2	13 10		0.1370	
	1150		-91.6 -89.0	14 16		0.3690	
	1155		-91.7 -90.0	8 7		0.4810	
	1200		-89.2 -86.3	10 6		0.0018	
	1205		-92.5 -90.2	15 5		0.4570	
	1205		-94.0 -91.7	9 6		0.2960	

DELTA MOD DATA							
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR
206	1315	2400	24	-93.8	10	FRED	0.0938
	1320			-93.9	11		0.1680
	1325			-90.6	8		0.0143
	1330			-91.0	10		0.0388
	1335			-85.5	4		0.0006
	1340			-91.5	13		0.0415
	1345			-93.5	12		0.0107
207	1440	2400	24	-91.9	22	TYPE NONE	ERROR
	1445			-85.4	15	FRED	0.0058
	1450			-86.3	13		0.0397
	1455			-89.0	16		1.2500
	1500			-85.3	14		0.4200
	1505			-87.8	12		0.0019
	1510			-88.5	15		0.7010
	1515			-88.2	14		0.5780
	1520			-86.9	19		0.0870
	1525			-87.4	15		0.3360
	1530			-86.6	18		0.2680
208	1620	2400	24	-87.3	20	TYPE NONE	0.0099
	1625			-85.8	26	FRED	0.0188
	1630			-85.3	21		0.1770
	1635			-86.4	20		0.1730
	1640			-85.7	18		ERROR
	1645			-85.6	26		0.0786
	1650			-86.1	29		0.1340
209	1705	2400	24	-85.2	21	TYPE NONE	0.2140
	1710			-85.5	27	FRED	0.3670
	1715			-84.6	29		0.0600
	1720			-85.1	23		0.1700
	1725			-83.7	34		0.0640
	1730			-84.3	25		ERROR
	1735			-86.3	27		7.5600
210	1250	2400	24	-86.4	20	TYPE NONE	10.4000
	1255			-101.5	29	FRED	6.6000
	1300			-102.3	2		7.2900
	1305			-102.2	9		5.5100
	1310			-101.8	19		6.3900
	1315			-101.5	26		7.0000
	1320			-102.4	20		ERROR
	1325			-101.9	17		0.8300
211	1430	2400	24	-98.4	25	TYPE NONE	0.0430
	1435			-108.8	29	FRED	0.0630
	1440			-106.2	23		0.0097
	1445			-103.6	26		0.0004
	1450			-103.2	27		0.0002
	1455			-99.6	19		0.0001
	1500			-96.6	34		0.0002
				-92.4	28		0.0001

DELTA MOD DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS
212	1535	2400	24	-95.6	21	FRED	0.0146	
	1540			-95.0	18		0.0075	
	1545			-94.3	22		0.0470	
	1550			-86.4	1		0.0138	
	1555			-90.5	37		0.0008	
	1600			-87.0	6		0.1270	
	1605			-85.9	2		0.0104	
213	1055	2400	24	-85.2	9	FRED	0.0003	
	1100			-86.8	13		0.0019	
	1105			-85.2	7		0.0015	
	1110			-84.1	14		0.0043	
	1115			-86.0	11		0.0039	
	1120			-82.6	7		0.1080	
	1125			-83.7	12		14.9900	
214	1205	2400	24	-82.0	8	FRED	0.1450	
	1210			-81.7	12		0.0024	
	1215			-80.6	13		0.2440	
	1220			-79.5	12		0.0014	
	1225			-80.2	15		0.0260	
	1230			-80.0	9		0.0021	
	1235			-79.8	11		0.0440	
215	1300	2400	24	-78.0	10	FRED	0.0000	
	1305			-78.6	10		0.0132	
	1310			-79.5	6		0.2160	
	1315			-80.0	15		0.0419	
	1320			-78.1	10		0.0025	
	1325			-74.1	15		0.0007	
	1330			-78.5	9		0.0019	
216	1410	2400	24	-84.8	7	FRED	0.0000	
	1415			-84.7	10		0.0000	
	1420			-87.7	8		0.0003	
	1425			-86.8	9		0.0000	
	1430			-89.2	4		0.0004	
	1435			-89.8	10		0.0018	
	1440			-90.0	8		0.0000	
217	1510	2400	24	-74.8	7	FRED	0.0000	
	1515			-75.7	13		0.3580	
	1520			-73.0	9		0.0078	
	1525			-74.4	8		0.1540	
	1530			-78.7	4		0.0068	
	1535			-82.0	8		0.0111	
	1540			-82.3	8		0.0040	

DELTA MOD DATA

RUN	TIME	WATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
225	1435	2400	24	-98.8	14	GSC4	0.3070	FRED	0.0020	
	1440			-98.9	15		0.4390		0.0680	
	1445			-98.4	15		0.4700		0.0370	
	1450			-98.2	20		0.3470		0.0040	
	1455			-98.3	17		0.4280		0.0020	
	1500			-102.4	21		0.6360		0.0040	
	1505			-101.0	22		0.4470		0.0004	
226	1540	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1545			-94.4	12	GSC4	0.0670	FRED	0.0030	
	1550			-92.8	10		0.0330		0.0010	
	1555			-89.6	13		0.0340		0.0020	
	1600			-90.7	13		0.0700		0.0040	
	1605			-91.5	17		0.0560		0.0050	
	1610			-93.7	13		0.0460		0.0020	
	1615			-91.9	9		0.0550		0.0030	
227	1635	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1640			-92.1	9	GSC4	0.2330	FRED	0.2130	
	1645			-93.7	12		0.0700		0.0090	
	1650			-93.9	17		0.0250		0.0010	
	1655			-93.4	24		0.0780		0.0230	
	1700			-93.6	22		0.0640		0.0003	
	1705			-93.0	21		0.0430		0.0010	
	1710			-93.5	27		0.0290		0.0001	
228	935	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	945			-71.1	5	GSC4	0.0210	FRED	0.0030	
	950			-72.8	12		0.0190		0.0100	
	955			-76.5	10		0.0190		0.0130	
	1005			-76.4	10		0.0580		0.0070	
	1050			-72.8	6		0.0130		0.0010	
229	1050	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1055			-80.9	10	GSC4	0.0004	FRED	0.0000	
	1100			-77.8	8		0.0001		0.0000	
	1105			-77.1	5		0.0003		0.0000	
	1110			-81.5	6		0.0000		0.0000	
	1115			-83.1	8		0.0006		0.0010	
	1120			-80.0	7		0.0020		0.0070	
	1325			-79.6	7		0.0000		0.0001	
231	1325	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1330			-90.6	7	GSC4	0.0001	FRED	0.0000	REC PAD
	1335			-88.6	5		0.0030		0.0000	
	1340			-85.0	6		0.0010		0.0000	
	1345			-89.4	9		0.0860		0.0010	
	1350			-85.8	5		0.0000		0.0000	
	1355			-87.1	8		0.0030		0.0000	
	1425			-88.3	4		0.0000		0.0000	
232	1425	2400	24	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
	1430			-88.8	6	GSC4	0.0020	FRED	0.0000	REC PAD
	1435			-88.9	11		0.0004		0.0000	
	1440			-85.3	6		0.0010		0.0000	
	1445			-88.7	7		0.0060		0.0000	
	1450			-88.7	10		0.0001		0.0000	
	1455			-91.2	14		0.0060		0.0000	
				-90.0	12		0.0050		0.1160	

DELTA MOD	DATA	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
RUN 233	1540	2400	24								REC PAD
	1545				-90.3	15	GSC4	0.0140	FRED	0.0000	
	1550				-91.4	15		0.0120		0.0000	
	1555				-89.2	7		0.0460		0.0120	
	1600				-91.0	10		0.0040		0.0000	
	1605				-90.0	11		0.1100		0.0030	
	1610				-95.1	11		0.0010		0.0010	
	1615				-96.4	15		0.2670		0.0004	
RUN 234	1650	2400	24								REC PAD
	1655				-89.1	15	GSC4	0.0010	FRED	0.0000	
	1700				-88.1	10		0.0003		0.0000	
	1705				-87.0	10		0.0004		0.0000	
	1710				-87.4	15		0.0007		0.0380	
	1715				-91.0	13		0.0030		0.0000	
	1720				-90.0	14		0.0001		0.0000	
	1725				-87.4	17		0.0020		0.0000	
RUN 235	1335	2400	24								QUAD DIV
	1340				-89.1	15	GSC4	0.0300	FRED	0.0000	
	1345				-89.5	16		0.0280		0.0000	
	1350				-90.4	15		0.0940		0.0060	
	1355				-89.6	12		0.0300		0.0000	
	1400				-89.0	15		0.0050		0.0000	
	1405				-87.7	13		0.0140		0.0000	
	1410				-89.5	17		0.0120		0.0000	
RUN 236	1435	2400	24								QUAD DIV
	1440				-88.4	12	GSC4	0.0140	FRED	0.0000	
	1445				-88.0	12		0.0130		0.0000	
	1450				-84.7	12		0.0020		0.0000	
	1455				-84.7	15		0.0150		0.0000	
RUN 237	1535	2400	24								QUAD DIV
	1540				-86.4	7	GSC4	0.0140	FRED	0.0000	
	1545				-84.5	13		0.0050		0.0000	
	1550				-84.2	4		0.0170		0.0000	
	1555				-86.4	12		0.0010		0.0000	
	1600				-87.3	12		0.0030		0.0000	
	1605				-85.6	14		0.0120		0.0000	
	1610				-85.3	12		0.0003		0.0000	
RUN 238	1620	2400	24								QUAD DIV
	1625				-87.4	9	GSC4	0.0000	FRED	0.0000	
	1630				-87.1	9		0.0050		0.0000	
	1635				-85.3	9		0.0150		0.0000	
	1640				-85.4	7		0.0003		0.0000	
	1645				-86.9	11		0.0030		0.0000	
	1650				-84.0	13		0.0060		0.0000	
	1655				-86.7	13		0.0006		0.0000	
	1660				-86.7	11		0.0050		0.0000	
RUN 239	1105	2400	24								QUAD DIV
	1110				-85.5	32	GSC4	0.0040	FRED	0.0280	
	1115				-85.4	35		0.0050		0.0290	
	1120				-84.9	29		0.0030		0.0120	
	1125				-85.8	24		0.0030		0.0010	
	1130				-85.5	27		0.0040		0.0006	
	1135				-84.9	24		0.0030		0.0001	
	1140				-85.4	28		0.0020		0.0010	

DELTA MOD DATA

RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
240	1205	2400	24	-85.0	22	13	0.0030	FRED	0.0000	QUAD DIV
	1210			-86.3	24	22	0.0030		0.0000	
	1215			-85.2	14	21	0.0040		0.0100	
	1220			-85.5	12	17	0.0040		0.0007	
	1225			-86.0	19	13	0.0050		0.0000	
	1230			-85.4	16	19	0.0040		0.0000	
	1235			-85.5	19	24	0.0100		0.0006	
241	1320	2400	24	-87.9	14	14	0.0090	FRED	0.5090	QUAD DIV
	1325			-89.0	13	11	0.0030		0.4780	
	1330			-89.4	14	12	0.0020		0.1930	
	1335			-88.4	14	12	0.0040		0.5040	
	1340			-90.4	11	8	0.0210		0.2900	
	1345			-88.1	19	18	0.0020		0.0620	
	1350			-87.9	16	19	0.0030		0.1150	
242	1510	2400	24	-91.5	15	13	0.0158	FRED	0.2180	QUAD DIV
	1515			-91.0	12	16	0.0065		0.5540	
	1520			-91.6	16	16	0.0107		0.4820	
	1525			-91.7	17	14	0.0045		0.1320	
	1530			-90.0	11	14	0.0040		0.2450	
	1535			-92.3	8	14	0.0047		0.0530	
	1540			-92.2	13	14	0.0093		0.7470	
243	1610	2400	24	-92.5	15	8	0.0120	FRED	0.2570	QUAD DIV
	1615			-89.2	14	10	0.0040		0.0350	
	1620			-88.6	16	11	0.0040		0.0840	
	1625			-90.0	12	10	0.0060		0.1270	
	1630			-89.5	15	16	0.0080		0.2120	
	1635			-90.9	10	9	0.0050		0.1720	
	1640			-90.3	13	10	0.0100		0.1280	
244	1040	2400	24	-85.3	8	14	0.0150	FRED	0.0000	QUAD DIV
	1045			-90.2	14	17	0.0140		0.0000	
	1050			-92.1	13	14	0.0260		0.0000	
	1055			-91.2	15	14	0.0300		0.0000	
	1100			-91.7	15	16	0.0070		0.0000	
	1105			-91.6	15	14	0.0240		0.0030	
	1110			-91.5	15	12	0.0240		0.0003	
245	1140	2400	24	-90.4	13	14	0.0315	FRED	0.0004	QUAD DIV
	1145			-92.8	13	15	0.0021		0.0007	
	1150			-93.0	11	14	0.0015		0.0005	
	1155			-95.0	15	11	0.0550		0.0130	
	1200			-95.0	17	16	0.0148		0.0045	
	1205			-91.6	15	13	0.0260		0.0098	
	1210			-94.4	13	11	0.0132		0.0045	

DELTA MOD DATA																						
RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS	QUAD DIV	RUN	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	REMARKS	QUAD DIV	
246	1240	2400	24	-93.7	13	GSC4	0.0370	FRED	0.0087			247	1340	2400	24	-92.0	10	GSC4	0.0115	FRED	0.0026	
	1245			-93.7	20		0.1660		0.0567				0.0004	0.0000	0.0000							
	1250			-92.7	23		0.0091		0.0017				0.0003	0.0085								
	1255			-94.2	25		0.0100		0.0020				0.0196	0.0077								
	1300			-94.2	9		0.0157		0.0045				0.0004	0.0002								
	1305			-93.4	14		0.0164		0.0038				0.0019	0.0010								
	1310			-93.2	10		0.0164		0.0043				0.1840	0.0636								
	1315				11		0.0115		0.0026				0.0000	0.0000								
	1320				16		0.0019		0.0004				0.0000	0.0000								
	1325				12		0.0003		0.0000				0.0000	0.0000								
248	1400			-92.5	12	GSC4	0.0019	FRED	0.0077			249	1500			-92.9	9	GSC4	0.0007	FRED	0.0002	
	1405			-94.0	13		0.0196		0.0077				0.0000	0.0000								
	1410			-93.4	10		0.0004		0.0002				0.0014	0.0003								
	1415			-93.5	9		0.0019		0.0010				0.0030	0.0000								
	1420				11		0.0111		0.0000				0.0000	0.0000								
	1425				12		0.0114		0.0075				0.0620	0.0270								
	1430				13		0.0012		0.0009				0.0000	0.0000								
	1435				8		0.0090		0.0057				0.0000	0.0000								
	1440				9		0.0270		0.0066				0.0000	0.0000								
	1445				10		0.0920		0.0314				0.0000	0.0000								
250	1610			-93.2	5	GSC4	0.0300	FRED	0.0110			251	1710			-94.2	5	GSC4	0.0154	FRED	0.0065	
	1615				10		0.0790		0.0173				0.0683	0.0264								
	1620				14		0.1840		0.0683				0.0021	0.0021								
	1625				8		0.1540		0.0503				0.0004	0.0004								
	1630				9		0.0390		0.0143				0.0044	0.0022								
	1635				10		0.0430		0.0178				0.0000	0.0014								
	1640				15		0.0003		0.0007				0.0001	0.0020								
	1645				12		0.0003		0.0007				0.0009	0.0039								
	1650				12		0.0154		0.0065				0.0018	0.0056								
	1655				5		0.0074		0.0264				0.0004	0.0004								
251	1740			-87.0	8	GSC4	0.0074	FRED	0.0264			252	1840			-86.5	10	GSC4	0.0004	FRED	0.0021	
	1745				15		0.0004		0.0021				0.0004	0.0022								
	1750				16		0.0044		0.0022				0.0000	0.0014								
	1755				10		0.0000		0.0014				0.0001	0.0020								
	1760				14		0.0009		0.0039				0.0009	0.0039								
	1765				11		0.0018		0.0056				0.0018	0.0056								
	1770				13		0.0004		0.0004				0.0004	0.0004								
	1775				9		0.0004		0.0004				0.0004	0.0004								
	1780				4		0.0004		0.0004				0.0004	0.0004								
	1785				5		0.0004		0.0004				0.0004	0.0004								

DELTA MOD DATA

RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
252	1510	2400	24	-83.7	8	12	0.0011	FRED	0.0139	QUAD DIV
	1515			-83.9	9	10	0.0001		0.0076	
	1520			-83.6	14	11	0.0050		0.0263	
	1525			-82.0	10	8	5.1200		0.0036	
	1530			-82.5	12	10	0.0004		0.0024	
	1535			-84.1	12	16	0.0001		0.0035	
	1540			-85.5	10	11	0.0006			
253	1610	2400	24	-84.5	17	7	0.0003	FRED	0.0003	QUAD DIV
	1615			-84.9	17		0.0001		0.0014	
	1620			-85.0	26	15	0.0001		0.0021	
	1625			-84.0	18	15	0.0001		0.0004	
	1630			-84.1	14	18	0.0001		0.0009	
	1635			-83.4	13	16	0.0004		0.0004	
	1640			-84.2	13	15	0.0001		0.0018	
254	1505	2400	24	-83.2	28	20	0.0001	FRED	0.0001	REMARKS
	1510			-82.0	22	23	0.0001		0.0757	
	1515			-83.2	23	23	0.0003		0.0014	
	1520			-83.2	24	24	0.0003		0.0000	
	1525			-82.9	25	24	0.0140		0.0031	
	1530			-81.0	20	20	0.0005		0.0001	
	1535			-80.7	20	19	0.0022		0.0001	
255	1605	2400	24	-81.1	30	30	0.0015	FRED	0.0011	REMARKS
	1610			-81.8	24	22	0.0097		0.0024	
	1615			-81.6	22	30	0.0109		0.0021	
	1620			-80.9	29	26	0.0000		0.0000	
	1625			-80.6	29	32	0.0014		0.0000	
	1630			-80.4	30	22	0.0001		0.0000	
	1635			-80.8	24	20	0.0004		0.0000	
256	1305	2400	24	-74.9	56	61	0.6750	FRED	0.3990	REMARKS
	1310			-73.0	56	46	0.5830		0.2760	LOOP
	1315			-73.7	60	50	0.8910		0.3990	
	1320			-73.4	47	41	0.3560		0.1580	
	1325			-76.1	38	36	1.6200		0.1010	
	1330			-75.0	42	40	0.6900		0.2640	
	1335			-76.2	39	31	0.0000		0.0000	
257	1455	2400	24	-81.6	21	22	0.0001	FRED	0.0000	REMARKS
	1500			-77.9	24	25	0.0000		0.0000	LOOP
	1505			-79.2	4	8	0.0001		0.0000	
	1510			-83.1	11	13	0.0003		0.0000	
	1515			-83.7	22	20	0.0012		0.0000	
	1520			-82.2	23	23	0.0093		0.0000	
	1525			-83.1	21	19	0.0011		0.0000	

DELTA MOD		DATA											
RUN	TIME	MATE	CHS	MEDIANS	MEDIAN CROSSINGS		TYPE	ERROR	TYPE	ERROR	REMARKS		
258	1600	2400	24	-78.7	-79.0	20	18	0.0007	FRED	0.0000	LOOP		
	1605			-79.2	-79.3	27	25	0.0000		0.0000			
	1610			-80.5	-81.7	16	12	0.0019		0.0000			
	1615			-81.6	-82.7	19	17	0.0021		0.0000			
	1620			-81.4	-83.4	17	20	0.0012		0.0001			
	1625			-81.4	-83.7	19	15	0.0049		0.0000			
	1630			-82.5	-83.6	21	18	0.0051		0.0000			
259	1215	2400	24	-79.9	-80.9	17	14	0.0104	FRED	0.0007	LOOP		
	1220			-79.8	-80.2	18	20	0.0007		0.0003			
	1225			-77.0	-79.3	16	19	0.0004		0.0000			
	1230			-77.7	-79.3	16	19	0.0000		0.0000			
	1235			-77.6	-79.4	21	17	0.0014		0.0004			
	1240			-78.4	-79.5	18	20	0.0055		0.0000			
	1245			-78.8	-79.4	11	12	0.0044		0.0010			
260	1325	2400	24	-76.9	-77.2	18	20	0.0010	FRED	0.0007	LOOP		
	1330			-76.1	-77.0	12	13	0.0026		0.0000			
	1335			-76.1	-76.6	20	16	0.0003		0.0000			
	1340			-75.3	-75.6	16	22	0.0007		0.0000			
	1345			-76.9	-78.4	19	18	0.0007		0.0001			
	1435	2400	24	-73.1	-74.4	17	18	0.0003	FRED	0.0004	LOOP		
	1440			-74.2	-75.3	10	9	0.0003		0.0006			
261	1445			-75.7	-76.9	14	14	0.0001		0.0007			
	1450			-77.1	-78.5	16	11	0.0026		0.0032			
	1455			-77.5	-79.2	16	15	0.0000		0.0020			
	1500			-78.2	-79.8	13	15	0.0019		0.0027			
	1505			-78.7	-80.5	14	20	0.0000		0.0010			
	1540	2400	24	-84.7	-83.0	14	12	0.0019	FRED	0.0135	LOOP		
	1545			-86.0	-84.7	13	16	0.0000		0.0004			
262	1550			-85.3	-83.5	18	15	0.0000		0.0115			
	1555			-85.3	-85.7	19	14	0.0000		0.0165			
	1600			-85.3	-83.5	14	17	0.0000		0.0074			
	1605			-87.0	-85.5	12	17	0.0000		0.0435			
	1610			-85.9	-85.0	23	20	0.0000		0.0246			
	1635	2400	24	-78.4	-80.3	15	16	0.0000	FRED	0.0052	LOOP		
	1640			-77.9	-79.2	19	19	0.0000		0.0013			
263	1645			-80.2	-79.4	14	15	0.0000		0.0163			
	1650			-83.0	-82.5	9	14	0.0006		0.0065			
	1655			-82.6	-82.6	15	12	0.0000		0.0654			
	1700			-82.4	-82.4	16	14	0.0000		0.0428			
	1705			-82.2	-81.4	16	17	0.0000		0.0188			
	1725	2400	24	-78.8	-77.2	26	20	0.0006	FRED	0.0069	LOOP		
	1230			-79.0	-77.1	34	29	0.0038		0.0111			
264	1235			-79.2	-77.3	28	26	0.0192		0.0095			
	1240			-77.8	-76.7	16	30	0.0001		0.0048			
	1245			-76.7	-76.4	23	20	0.0010		0.0036			
	1250			-76.6	-76.9	23	26	0.0336		0.0279			
	1255			-76.7	-76.5	21	24	0.0011		0.0090			

DELTA MOD	DATA	TIME	RATE	CHS	MEDIAN	CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
265	945	2400	24	CHS	-82.4	19	19	0.0004	FRED	0.0050	REMARKS LOOP
266	1015	2400	24	CHS	-82.0	16	17	0.0006	FRED	0.0070	REMARKS LOOP
267	1115	2400	24	CHS	-77.6	16	22	0.0018	FRED	0.0048	REMARKS LOOP
268	1235	2400	24	CHS	-82.7	16	18	0.0058	FRED	0.0118	REMARKS LOOP
269	1435	2400	24	CHS	-83.3	13	13	0.0164	FRED	0.0147	REMARKS LOOP
270	1555	2400	24	CHS	-79.5	11	11	0.0251	FRED	0.0055	REMARKS LOOP

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RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
285	1500	2400	24	-85.9	81	GSC4	0.0000	FRED	0.0003	LOOP
	1505			-86.6	93		0.0001		0.0003	
	1510			-85.9	82		0.0001		0.0003	
	1515			-85.1	73		0.0001		0.0002	
	1520			-83.7	58		0.0000		0.0000	
	1525			-84.4	56		0.0000		0.0001	
	1530			-84.3	47		0.0000		0.0000	
RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
286	1605	2400	24	-80.7	28	GSC4	0.0006	FRED	0.0000	LOOP
	1610			-80.3	31		0.0000		0.0018	
	1615			-84.1	50		0.0007		0.0006	
	1620			-84.3	67		0.0000		0.0007	
	1625			-84.6	62		0.0000		0.0000	
	1630			-83.8	59		0.0021		0.0006	
	1635			-83.3	50		0.0000		0.0021	
RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
287	1250	2400	24	-84.5	60	GSC4	3.6670	FRED	23.7519	LOOP
	1255			-90.0	82		2.9155		20.8350	
	1300			-87.4	98		5.3039		15.4179	
	1305			-88.7	88		1.5855		12.6399	
	1310			-86.3	98		1.2625		8.7465	
	1315			-86.3	84		1.3337		6.6714	
	1320			-85.7	90		0.4424		5.2504	
RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
290	1650	2400	24	-81.6	47	GSC4	0.0403	FRED	0.0236	LOOP
	1655			-82.2	43		0.0087		0.0240	
	1700			-82.4	55		0.0087		0.0165	
	1705			-82.0	50		0.0458		0.0422	
	1710			-81.2	25		0.0140		0.0210	
	1715			-80.8	21		0.0172		0.0135	
	1720			-79.4	25		0.0028		0.0086	
RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
291	1105	2400	24	-91.3	27	GSC4	0.0000	FRED	0.0082	
	1110			-91.6	36		0.0000		0.0054	
	1115			-91.5	49		0.0001		0.0050	
	1120			-91.4	45		0.0000		0.0033	
	1125			-90.9	60		0.0014		0.0196	
	1130			-91.2	44		0.0015		0.0238	
	1135			-90.2	54		0.0115		0.0636	
RUN	TIME	HATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
292	1205	2400	24	-96.3	25	GSC4	0.0106	FRED	0.1135	QUAD DIV
	1210			-94.4	37		0.0406		0.1354	
	1215			-93.9	48		0.0022		0.0460	
	1220			-95.9	37		0.0039		0.0781	
	1225			-92.7	55		0.0007		0.0283	
	1230			-92.8	45		0.0031		0.0385	
	1235			-94.3	38		0.0007		0.0337	

DELTA MOD	DATA	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
293	1305	2400	24	-97.0	-97.3	26	18	0.0406	FRED	0.1339	QUAD DIV
	1310			-98.0	-96.6	37	32	0.0251		0.1024	
	1315			-95.8		50		0.0098		0.0633	
	1320			-96.0	-96.1	43	45	0.0232		0.0983	
	1325			-92.9	-95.5	49	38	0.0056		0.0406	
	1330			-96.0	-97.2	28	27	0.0708		0.1092	
	1335			-95.0	-96.4	30	22	0.1404		0.1040	
295	1505	2400	24	-93.5	-92.5	43	34	0.0015	FRED	0.0002	QUAD DIV
	1510			-93.7	-91.7	41	40	0.0014		0.0008	
	1515			-92.6	-93.3	47	33	0.0004		0.0008	
	1520			-93.4	-91.3	41	25	0.0026		0.0019	
	1530			-93.1	-92.4	33	31	0.0006		0.0008	
296	1615	2400	24	-100.2		19		2.1724	FRED	0.7576	QUAD DIV
	1620			-101.0		25		1.5091		0.1749	
	1625			-102.3		17		1.1636		0.3518	
	1630			-100.2		23		0.7156		0.2585	
297	1040	2400	24	-92.6	-95.2	37	29	59.3103	FRED	11.6312	REMARKS LOOP
	1045			-92.5	-95.4	30	28	19.4460		7.8120	
	1050			-95.3	-96.1	31	27	25.5576		9.7216	
298	1155	2400	24	-93.6	-93.0	29	25	38.0586	FRED	12.7510	REMARKS LOOP
	1200			-93.3	-93.2	23	18	35.4195		13.0844	
	1205			-96.6	-93.6	33	31	42.0867		15.9735	
	1210			-95.3	-94.3	32	30	44.5860		18.7515	
	1215			-93.5	-94.8	23	24	15.1401		38.4753	
	1220			-91.7	-91.6	21	21	11.8065		31.9470	
	1225			-97.0	-95.6	20	20	15.2790		43.0590	
299	1255	2400	24	-97.0	-93.4	21	20	14.7234	FRED	4.0796	REMARKS LOOP
	1300			-95.5	-93.4	24	26	15.1401		3.8192	
	1305			-96.7	-93.5	31	23	17.4597		4.3574	
	1310			-93.7	-92.8	33	32	13.7924		3.4720	
	1315			-93.4	-92.4	28	25	12.6816		3.5241	
	1320			-96.0	-93.2	19	19	16.7652		3.9234	
	1325			-96.0	-93.5	25	13	19.3071		4.4789	
300	1405	2400	24	-98.1	-95.3	18	16	0.3939	FRED	0.4914	REMARKS LOOP
	1410			-99.1	-97.0	23	15	0.8680		0.8297	
	1415			-100.5	-97.9	17	15	0.4577		0.6628	
	1420			-99.4		20		0.5652		0.4661	
	1425			-100.5		21		0.5453		0.7261	
	1430			-99.3		20		0.5173		0.6677	
	1435					20		0.3432		0.4754	

DELTA MOD	DATA	TIME	RATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
RUN 301	1550	1605	RATE 2400	CHS 24	-100.5	28	NONE		NONE		REMARKS LOOP
					-99.8	19					
					-80.9	27		0.9681			REMARKS LOOP
					-79.4	22	GSC4	1.8470			
					-80.3	17		0.1631			
					-82.3	23		0.0083			
					-83.9	30		1.5608			
					-80.0	36		0.0361			
					-80.0	35		0.0079			
					-81.6	27		0.1567			
RUN 303	1300	1315	RATE 2400	CHS 24	-80.7	24		0.0638			REMARKS LOOP
					-80.0	18		0.0575			
					-82.1	22		0.0001			
					-83.0	22		0.0108			
					-80.4	38		0.0300			
					-79.8	37		0.0061			
					-81.4	25		0.0006			
					-80.5	37		0.0035			
					-80.3	41		0.0056			
					-80.5	36					
RUN 304	1425	1430	RATE 2400	CHS 24	-74.6	20		0.0001			REMARKS LOOP
					-79.5	15		0.0108			
					-80.1	36		0.0300			
					-78.7	23		0.0061			
					-76.0	38		0.0006			
					-72.5	22		0.0035			
					-75.0	21		0.0056			
					-74.5	21					
					-75.1	16					
					-74.9	34					
RUN 305	1515	1520	RATE 2400	CHS 24	-74.9	36		0.0001			REMARKS LOOP
					-73.3	15		0.0108			
					-77.4	36		0.0300			
					-77.6	23		0.0061			
					-77.5	29		0.0006			
					-76.3	38		0.0035			
					-74.1	22		0.0056			
					-74.6	21					
					-77.0	17					
					-76.5	21					
RUN 306	1600	1605	RATE 2400	CHS 24	-77.4	34		0.0001			REMARKS LOOP
					-77.4	15		0.0108			
					-77.4	36		0.0300			
					-77.4	23		0.0061			
					-77.4	29		0.0006			
					-78.9	38		0.0035			
					-79.4	22		0.0056			
					-79.4	21					
					-79.4	17					
					-79.4	21					
RUN 307	1220	1225	RATE 2400	CHS 24	-90.3	99		0.0078			REMARKS LOOP
					-90.0	81		0.0003			
					-91.0	92		0.0179			
					-91.4	83		0.0003			
					-91.4	89		0.0003			
					-91.4	67		0.0057			
					-91.4	77		0.0022			
					-91.4	90		0.0050			
					-91.4	182		0.0031			
					-91.4	75		0.0046			
RUN 308	1305	1310	RATE 2400	CHS 24	-89.0	95		0.0001			REMARKS LOOP
					-88.4	49		0.0003			
					-87.8	74		0.0039			
					-88.2	69		0.0017			
					-89.9	82		0.0000			
					-89.9	78		0.0136			
					-89.9	68					
					-89.9	78					
					-89.9	78					
					-89.9	78					

DELTA MOD	DATA	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
RUN 308	TIME 1350	1355	2400	24	-79.6 -86.0 -79.2 -86.0 -77.8 -84.9 -75.9 -83.1 -75.7 -81.1	58 94 96 98 71 84 93 96 95 96	GSC4	0.0106 0.0004 0.0022 0.0000 0.0014 0.0000 0.0003 0.0014 0.0003 0.0003 0.0001 0.0118 0.0047 0.0008	FRED	0.0004 0.0000 0.0000 0.0000 0.0003 0.0003 0.0001 0.0118 0.0047 0.0008	REMARKS LOOP
RUN 309	TIME 1500	1505	2400	24	-94.2 -90.4 -92.3 -89.7 -93.0 -90.4 -91.1 -90.2 -91.8 -88.4	85 61 121 112 124 110 118 117 108 111	GSC4	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	FRED	0.0003 0.0003 0.0001 0.0001 0.0118 0.0047 0.0008	REMARKS LOOP
RUN 310	TIME 1550	1555	2400	24	-90.2 -87.0 -84.4 -86.8 -87.2 -85.2 -85.2 -84.0 -86.7 -87.1 -87.9 -88.1	104 94 106 87 85 79 96 85 65 54 61 79	GSC4	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	NONE	0.0008 0.0008 0.0008	REMARKS LOOP
RUN 312	TIME 1205	1210	2400	24	-83.0 -85.0 -82.7 -84.7 -82.4 -94.6 -80.3 -80.1 -82.7 -84.5 -81.9 -83.9 -83.0 -84.0	114 128 134 145 121 119 68 69 99 84 118 113 132 107	GSC4	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	FRED	0.0001 0.0004 0.0004 0.0036 0.0010 0.0004 0.0004 0.0056 0.0019 0.0019 0.0040 0.0000 0.0079 0.0015 0.0022 0.0004	REMARKS NON DIV
RUN 313	TIME 1315	1320	2400	24	-43.5 -84.9 -43.7 -85.1 -44.0 -85.0 -43.3 -84.7 -42.2 -84.2 -41.7 -83.9	97 87 94 94 103 91 87 80 94 90 91 73	GSC4	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	FRED	0.0004 0.0040 0.0000 0.0079 0.0015 0.0022 0.0004	REMARKS NON DIV
RUN 314	TIME 1415	1420	2400	24	-77.0 -90.4 -76.5 -90.5 -75.1 -90.1 -76.4 -90.4 -76.4 -90.4 -76.2 -90.4 -75.7	100 73 144 125 123 117 137 118 133 118 151 142 177	GSC4	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	FRED	0.0424 0.0065 0.0081 0.0043 0.0140 0.0014 0.0038	REMARKS NON DIV
RUN 316	TIME 1615	1620	2400	24	-94.1 -75.2 -83.3 -78.3 -78.2 -79.6 -78.5 -77.6 -83.8 -77.6	29 19 61 30 58 61 56 46 37 46	GSC4	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	FRED	0.0038 0.0038 0.0038 0.0038 0.0038 0.0038 0.0038 0.0038 0.0038 0.0038	REMARKS LOOP

DELTA MOD	DATA	TIME	DATE	CHS	MEDIANS	MEDIAN CROSSINGS	TYPE	ERROR	TYPE	ERROR	REMARKS
317	1105				-72.5	23	NONE				LOOP
	1110				-72.7	34					
	1130				-73.0	34					
	1135				-75.5	34					
318	1230				-74.8	37					LOOP
	1235				-89.8	16	NONE				
	1240				-91.2	31					
	1245				-90.2	28					
	1250				-92.4	30					
	1255				-90.4	31					
	1300				-92.4	31					
	1305				-90.2	26					
	1310				-90.7	31					
	1315				-90.5	31					
	1320				-90.3	26					
319	1350				-73.6	13	GSC4	0.0190	RSC4	0.0033	LOOP
	1355				-72.2	24		0.0129		0.0067	
	1400				-72.0	25		0.0190		0.0136	
	1405				-73.5	26		0.0104		0.0010	
	1410				-73.4	33		0.0221		0.0022	
320	1425				-85.4	37	GSC4	0.0097		0.0028	LOOP
	1430				-86.2	33		0.0065		0.0006	
	1435				-85.7	33		0.0207		0.0035	

Table IV

Run #	Time	Tracks	Fade Rates
36	1425-1430	2, 3	71, 72
42	1005-1010	2, 3	39, 29
	1025-1030	2, 3	22, 23
44	1205-1210	2, 3	20, 12
127	1645-1650	4, 5	106, 76
134	1645-1650	4, 5	63, 57
142	1300-1305	4, 5	8, 9
164	1305-1310	4, 5	18, 14
215	1320-1325	4, 5	16, 19
233	1540-1545	4, 5	17, 23
256	1310-1315	4, 5	52, 43

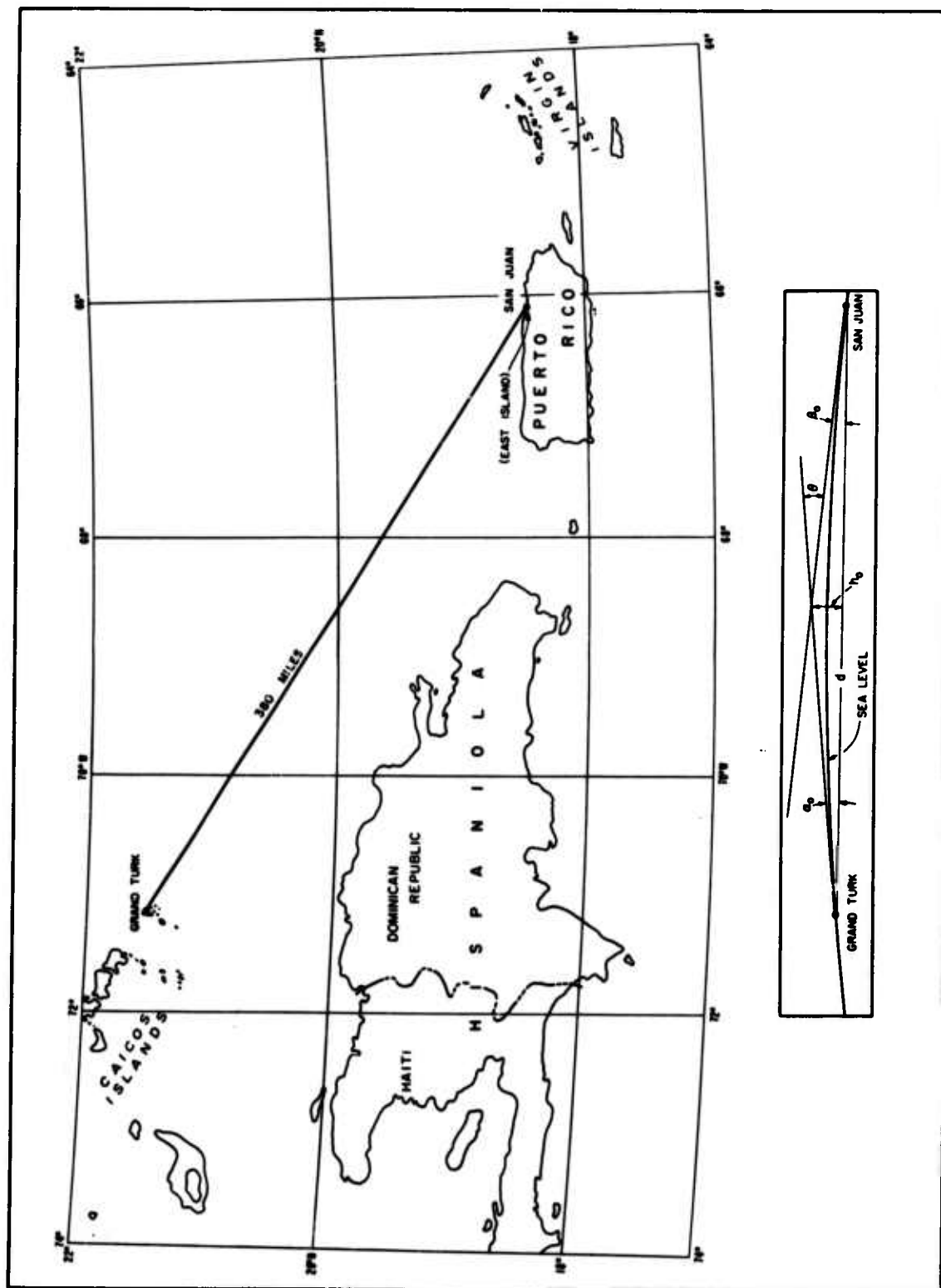


Figure 1. Maps of the Grand Turk - East Island path and side view showing path geometry.

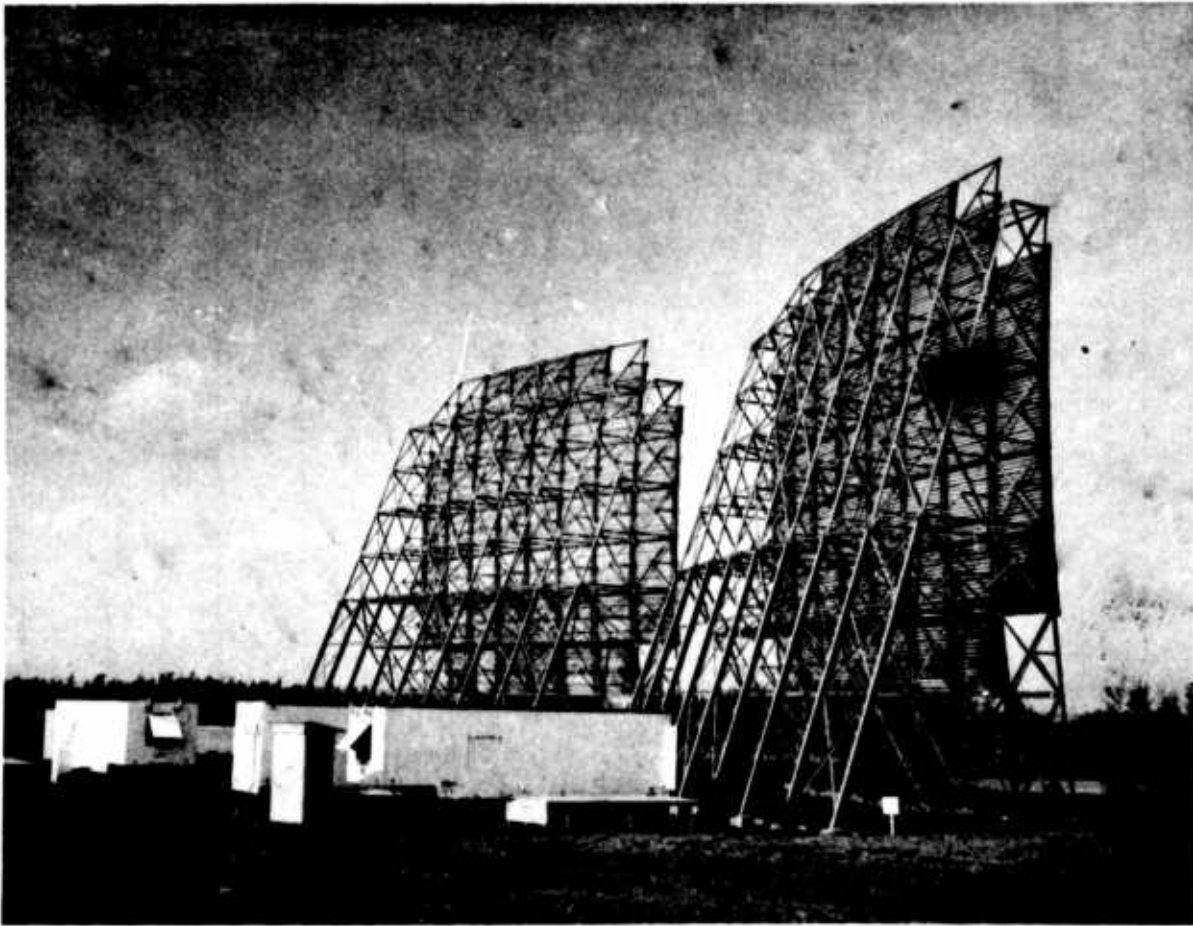


Figure 2. Sixty (60) ft. antennas at East Island site.

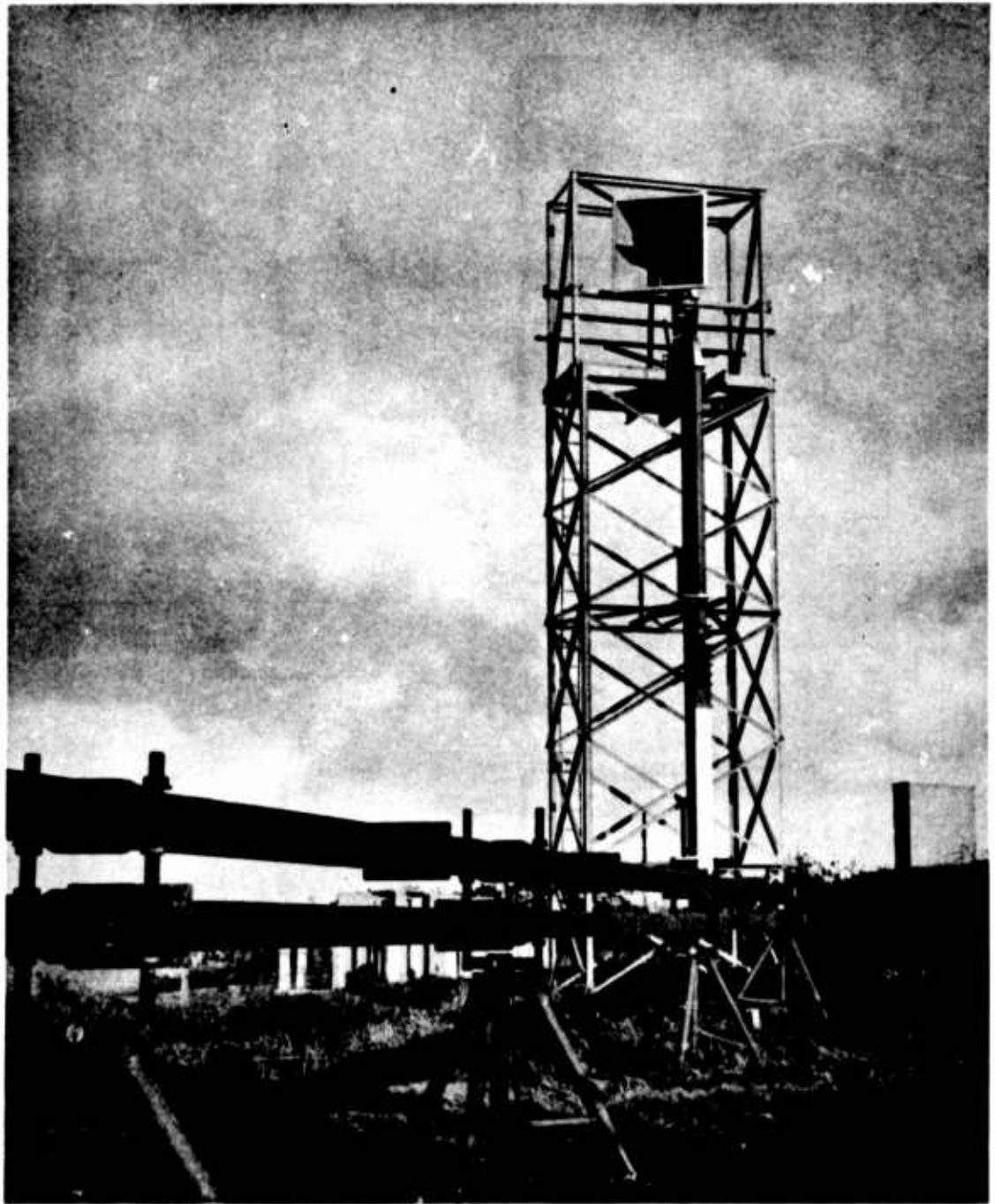


Figure 3. Feed horn and wave guide section at East Island site.

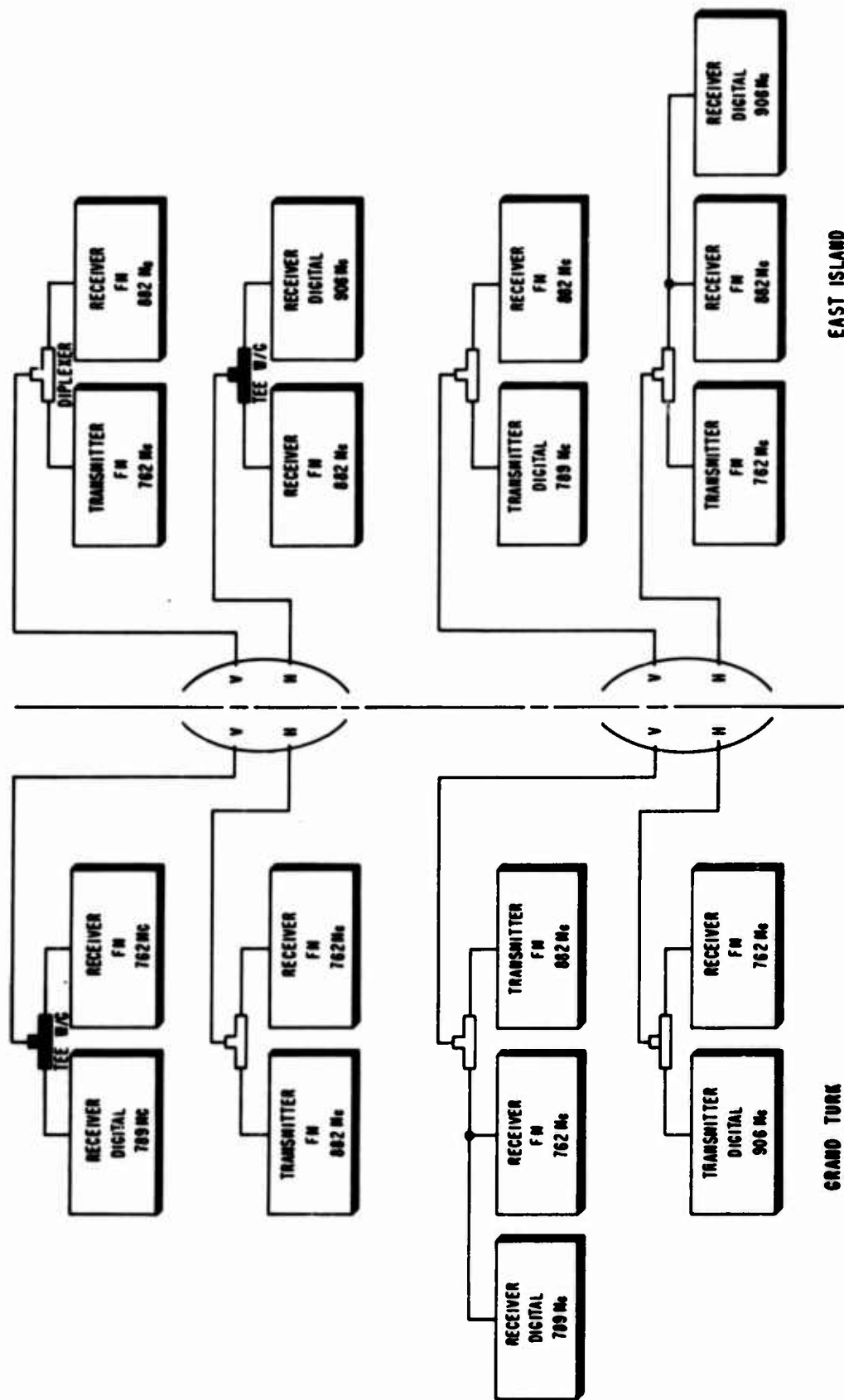


Figure 4. Schematic of available transmitting and receiving facilities.

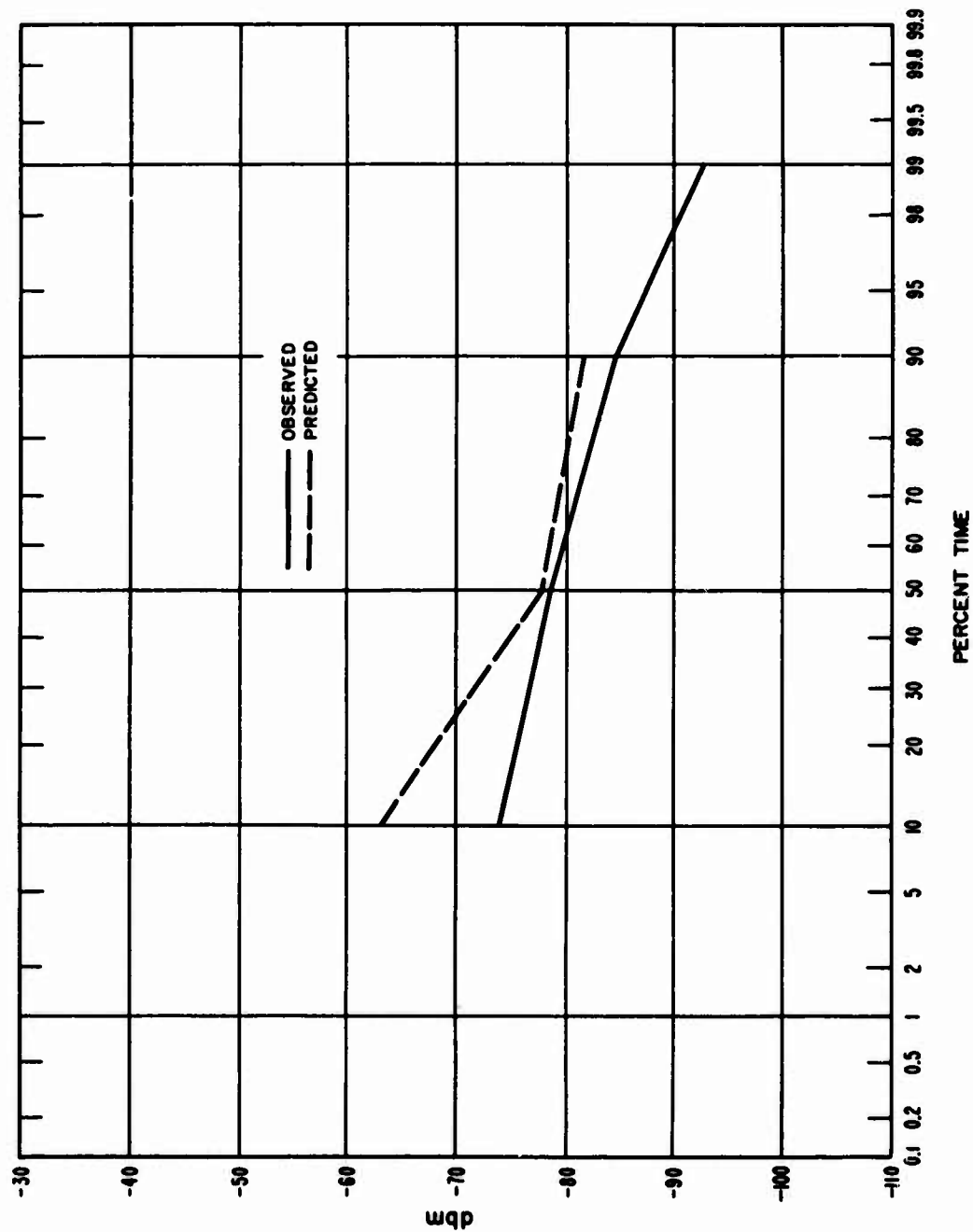


Figure 5. Cumulative distribution of predicted and observed received power for the period August, September and October 1962 at the East Island site.

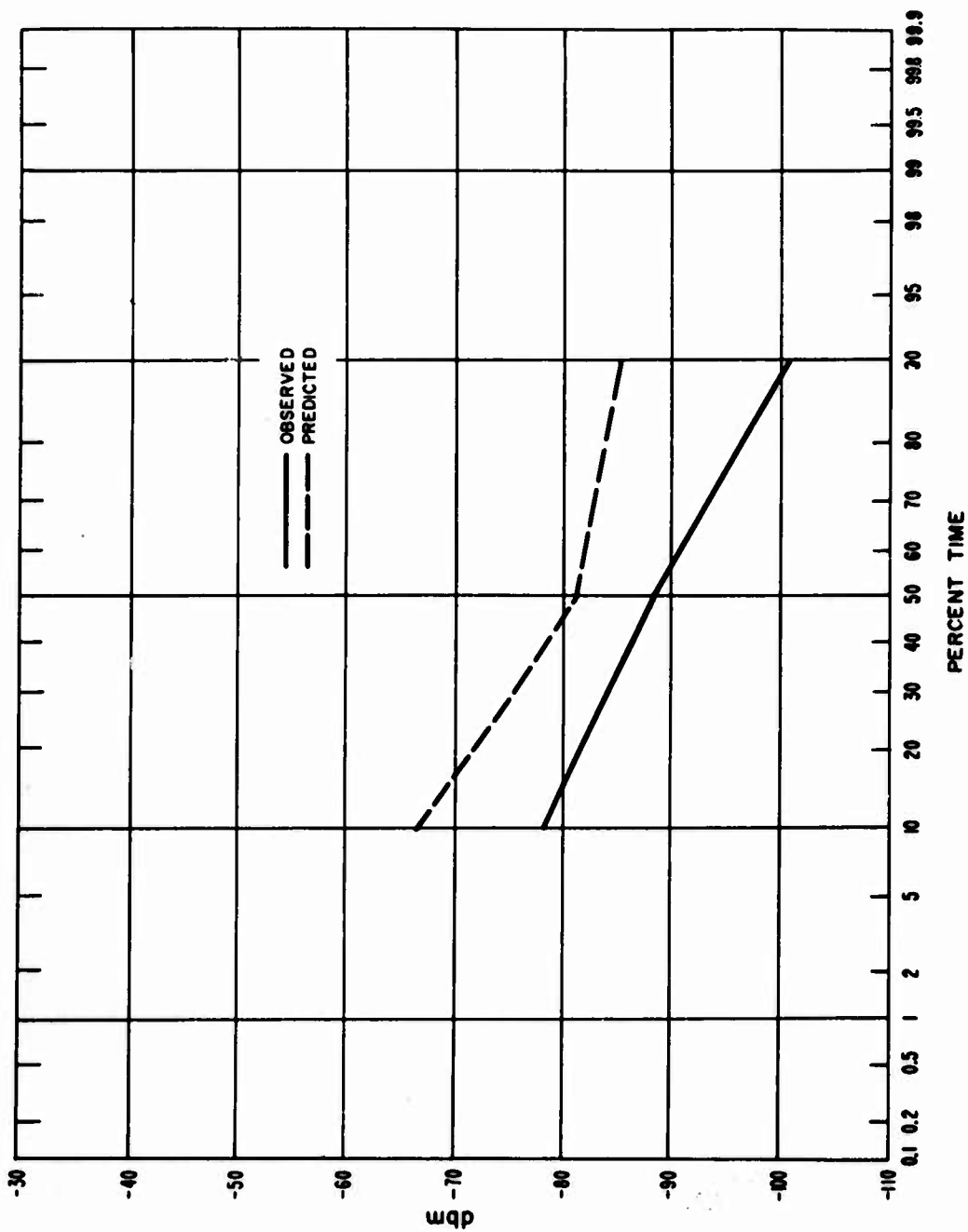


Figure 6. Cumulative distribution of predicted and observed received power for the period November and December 1962 - January 1963 at the East Island site.

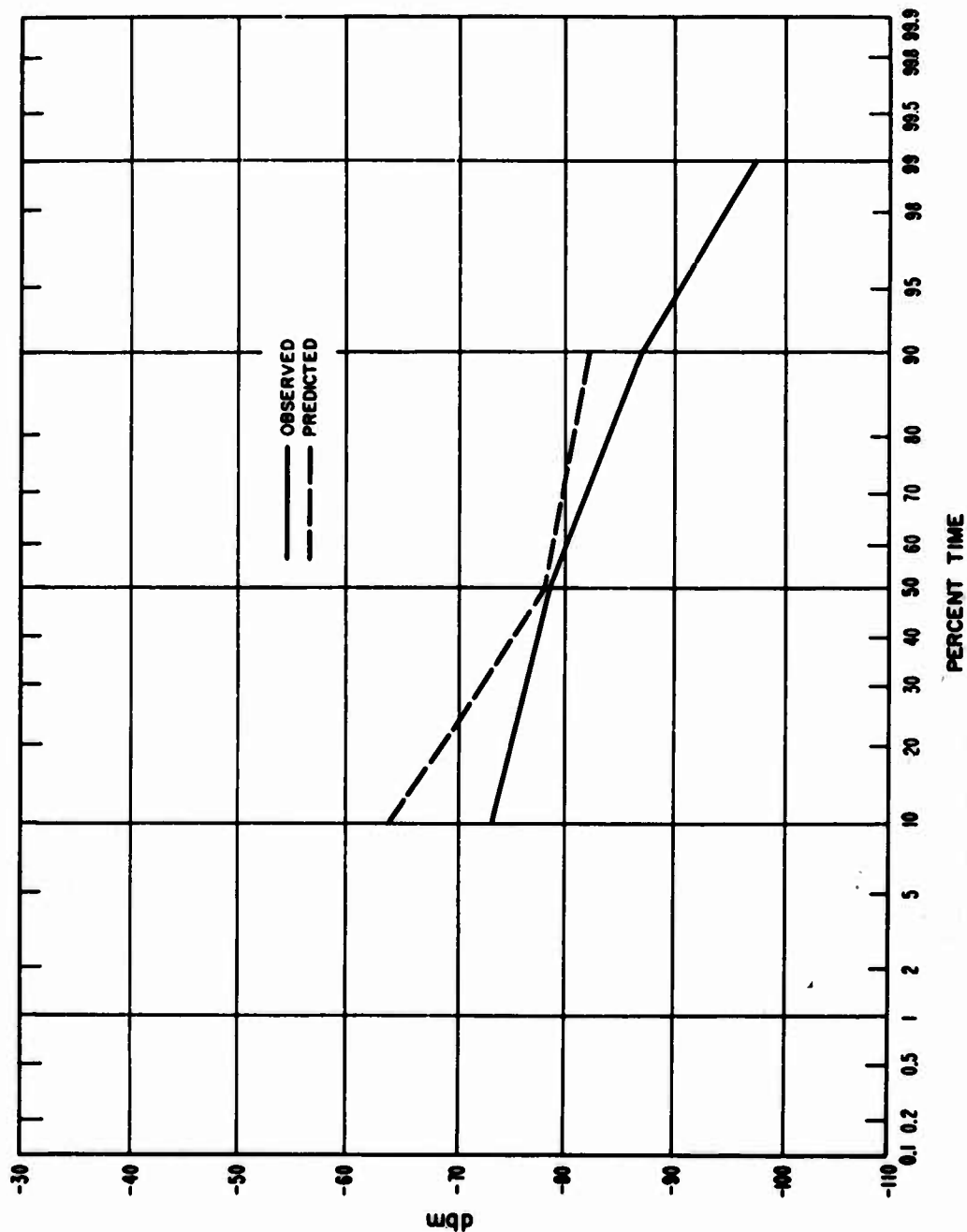


Figure 7. Cumulative distribution of predicted and observed received power for the period May, June, July, August and September 1963 at the Grand Turk site.

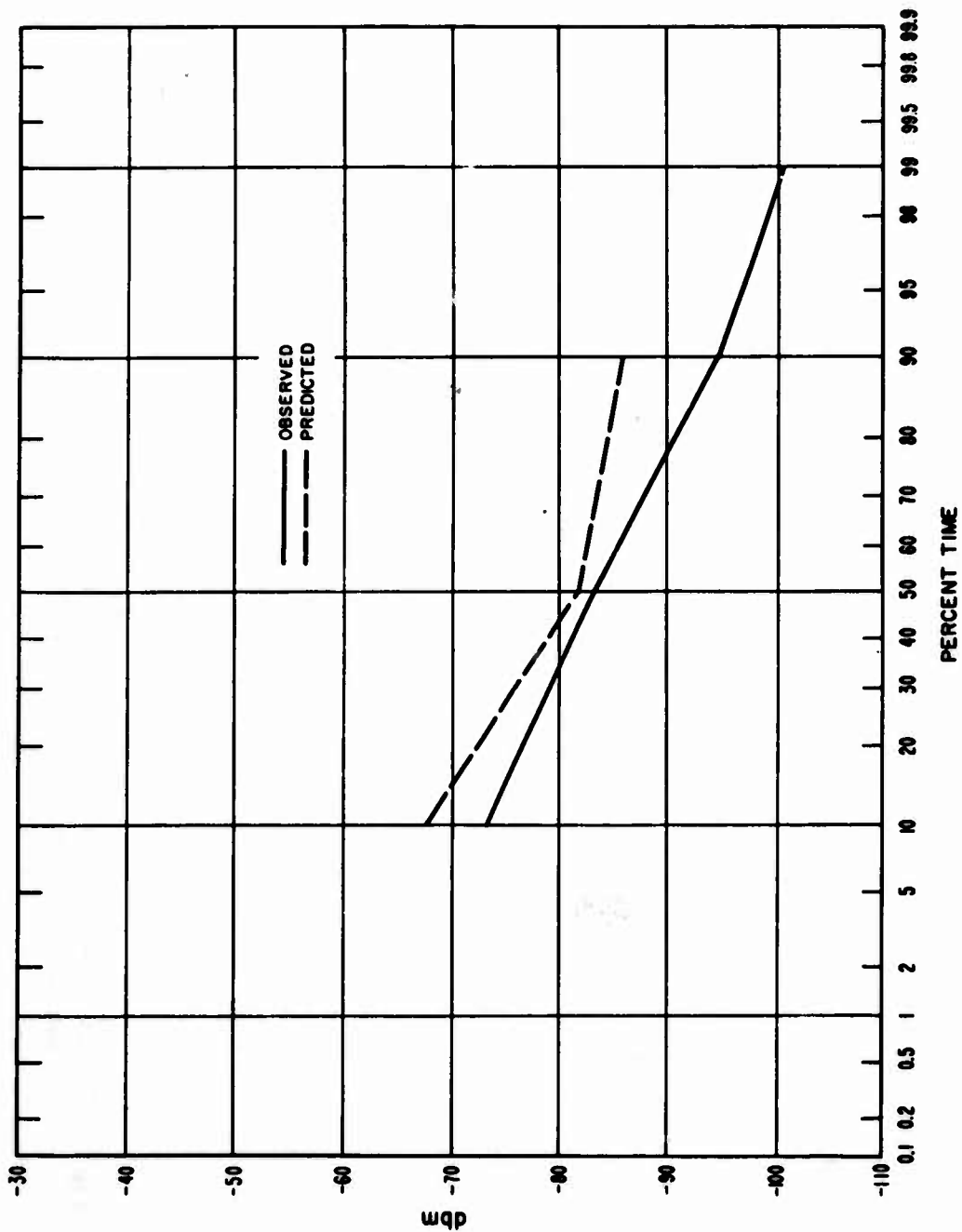


Figure 8. Cumulative distribution of predicted and observed received power for the period February, March and April 1963 at the Grand Turk site.

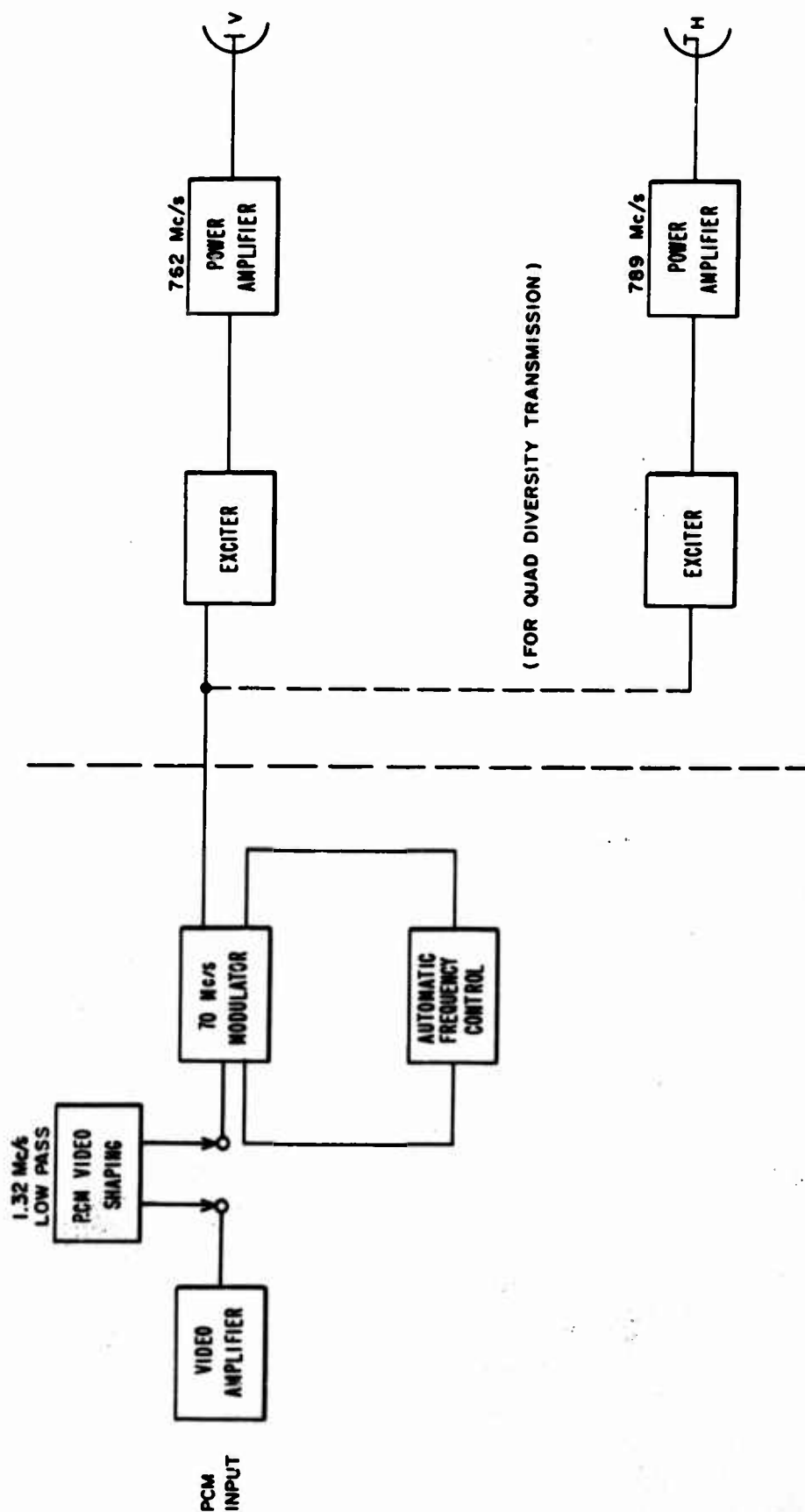


Figure 9. Block diagram - Equipment for the PCM interface with AN/MRC-98 Exciter.

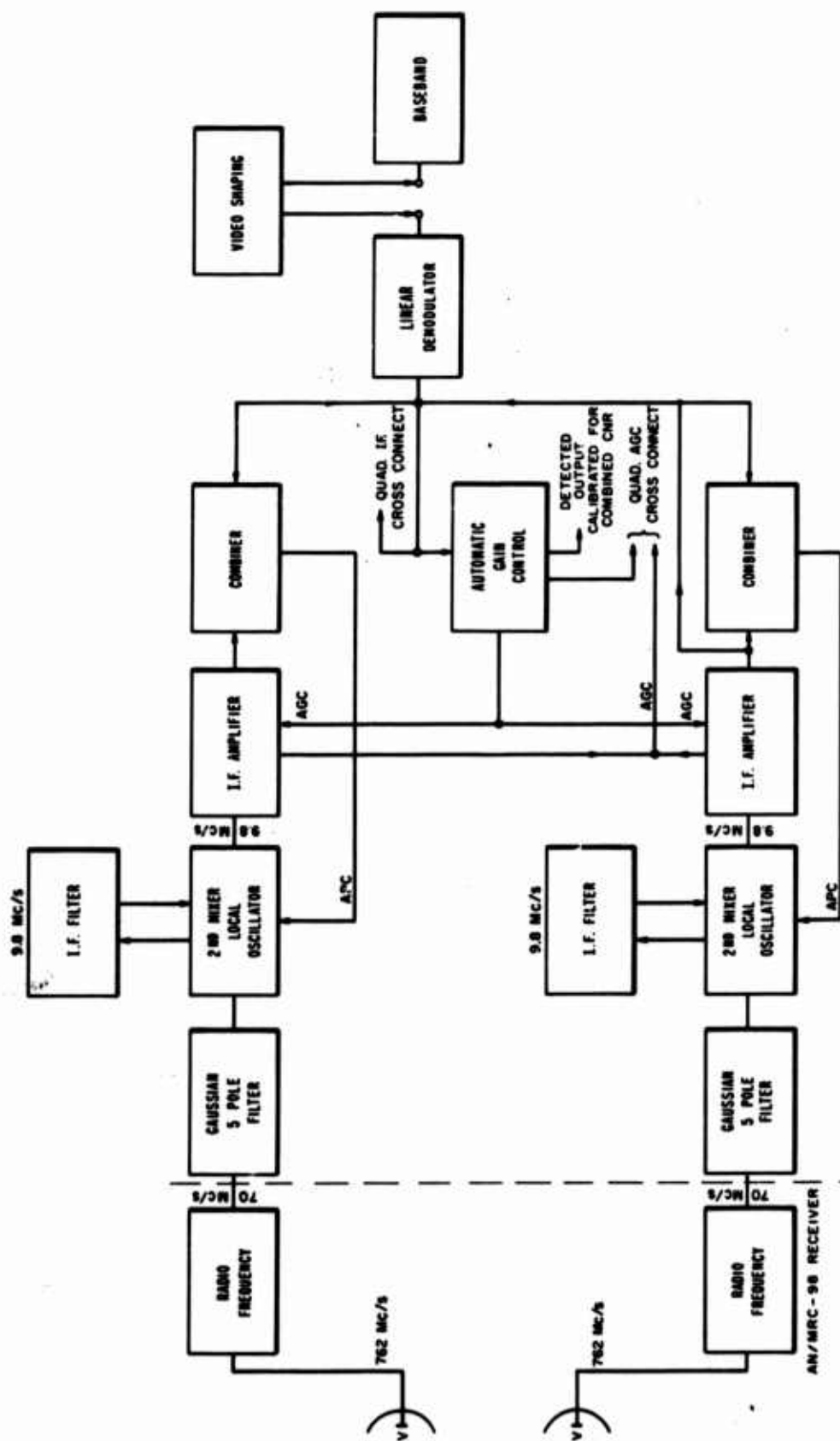


Figure 10. Block diagram - Equipment for AN/MRC-98 Receiver interface with PCM for dual diversity.

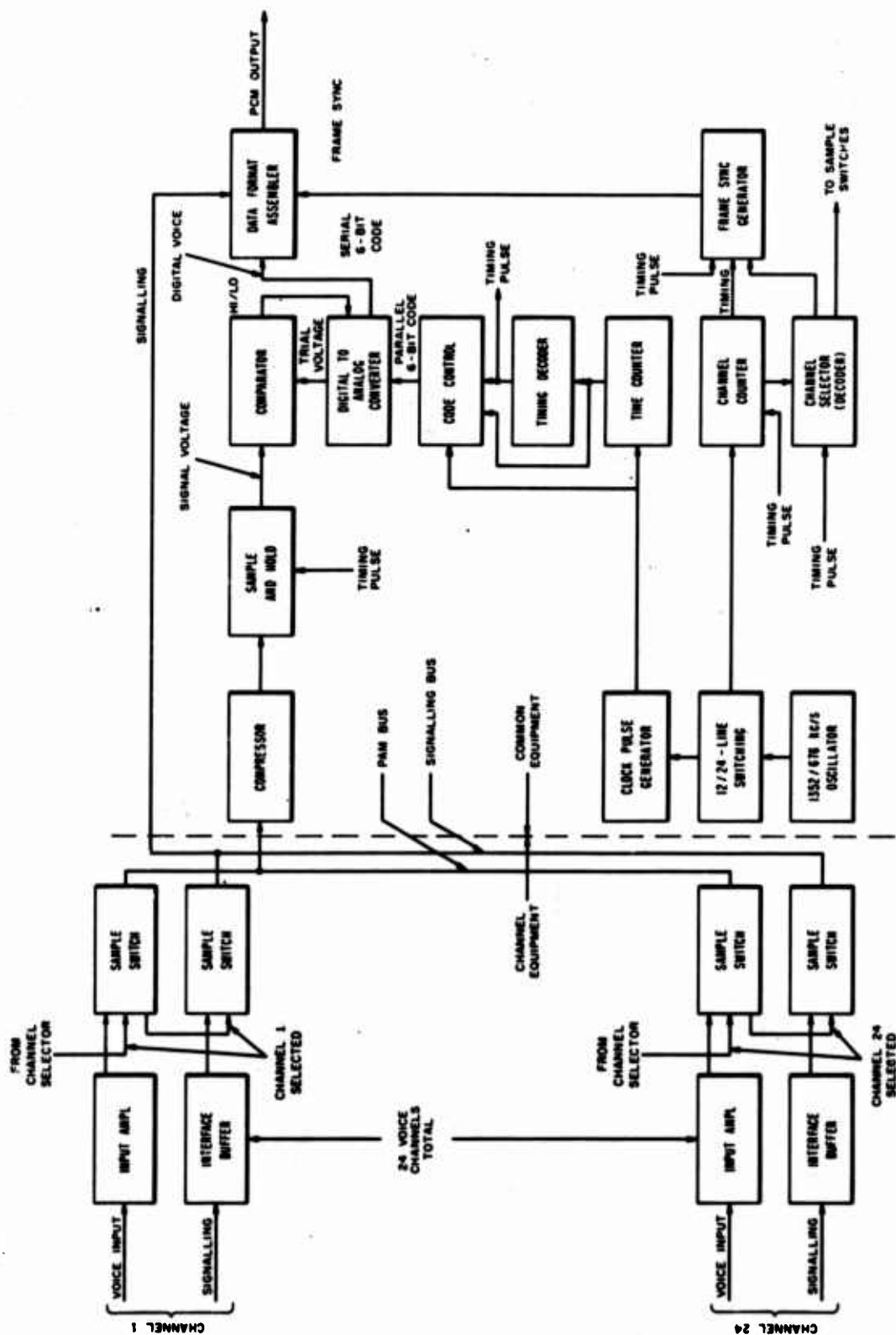


Figure 11. Block diagram - PCM Multiplexer.

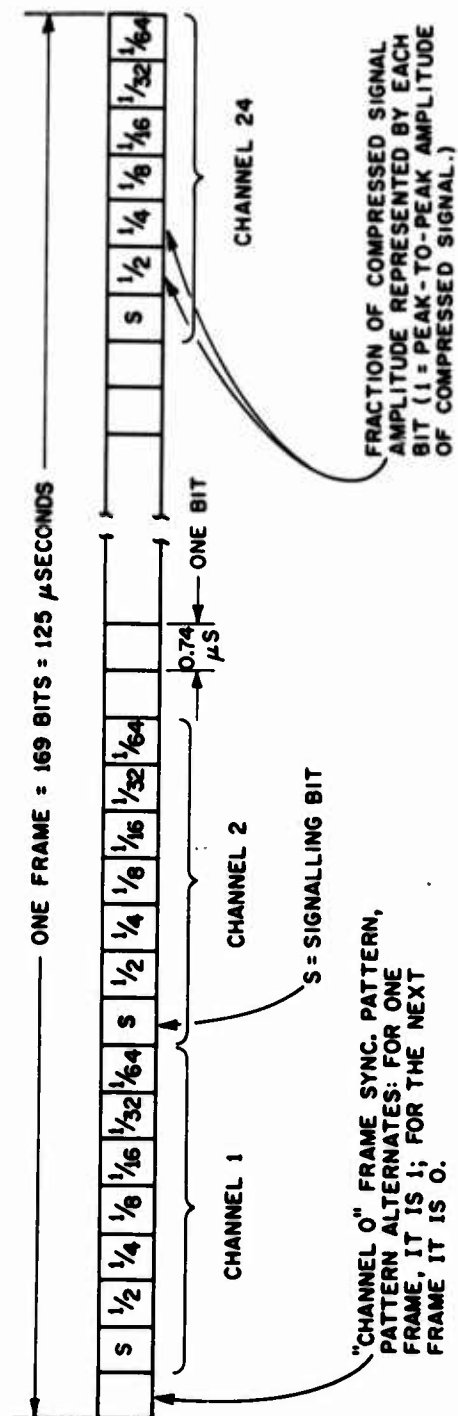


Figure 12. Block diagram - PCM Data format.

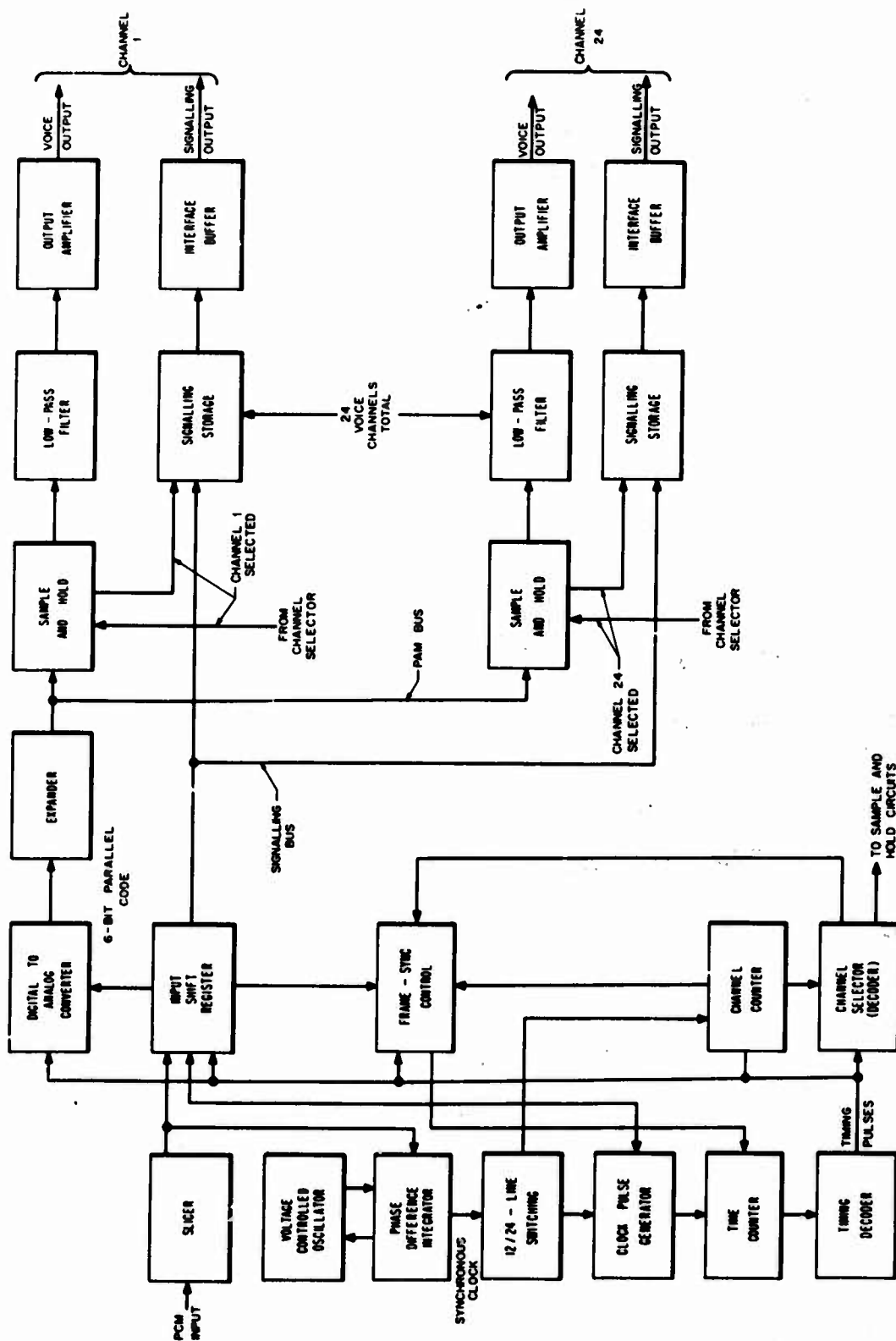


Figure 13. Block diagram - PCM Demultiplexer.

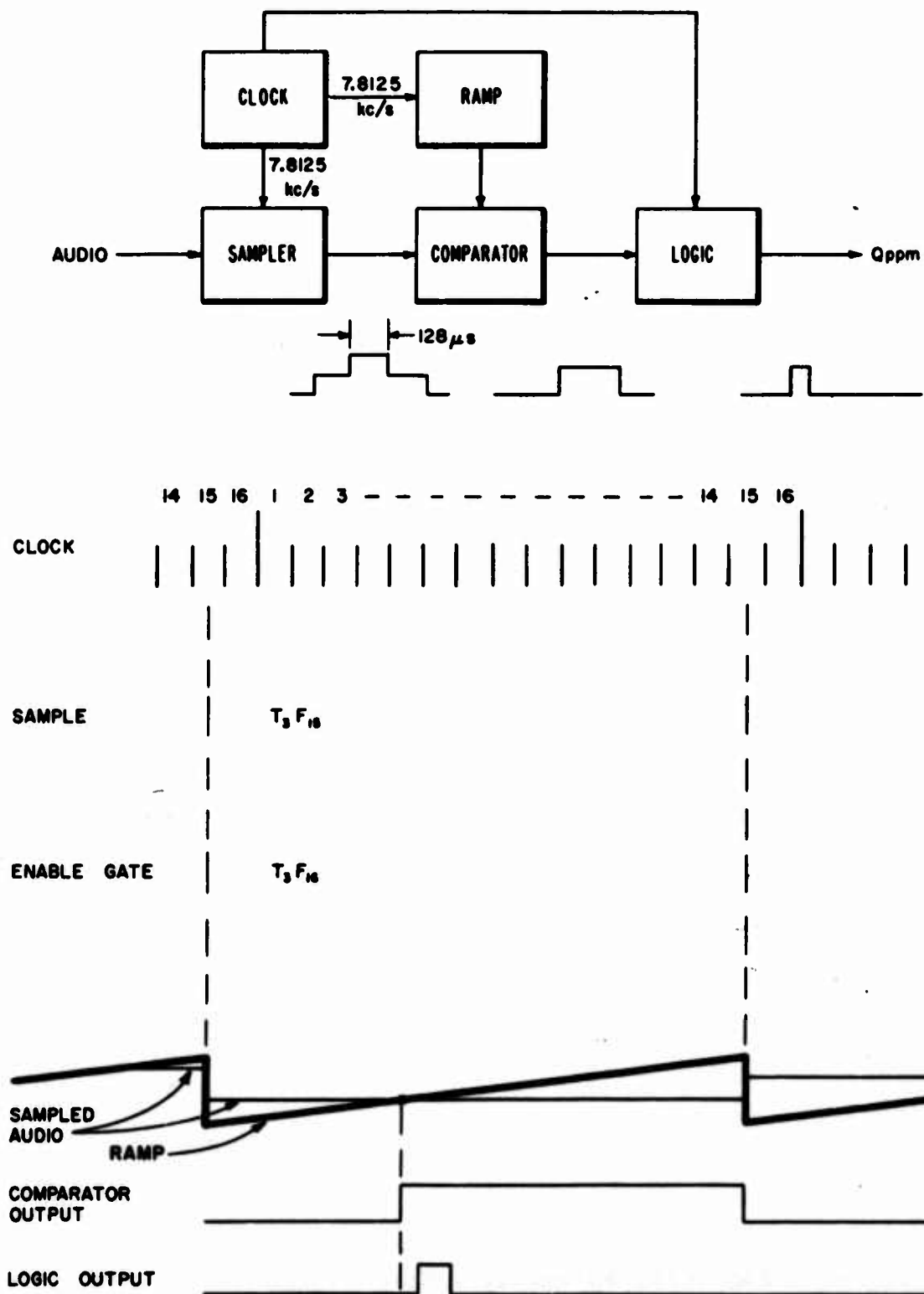


Figure 15. Voice Quantizer Timing Diagram.

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Time Slot	1 2 3 4 5 6	
	1 - 2 3 4 -	Noise Channel 1
	1 - - 2 3 4	
	1 4 - - 2 3	
	1 3 4 - - 2	
	2 4 1 3 - -	5
	2 - 4 1 3 -	
	2 - - 4 1 3	
	2 3 - - 4 1	
	2 1 3 - - 4	
	3 1 4 2 - -	10
	3 - 1 4 2 -	
	3 - - 1 4 2	
	3 2 - - 1 4	
	3 4 2 - - 1	
	4 3 1 2 - -	15
	4 - 3 1 2 -	
	4 - - 3 1 2	
	4 2 - - 3 1	
	4 1 2 - - 3	
	- 3 2 1 - 4	20
	- - 4 3 2 1	Voice Channel 2
	- 1 - 4 3 2	3
	- 2 1 - 4 3	4
	- 4 3 2 1 -	1
	1 2 3 4 - -	Sync and Order Wire

Figure 16. Frequency - Time Program

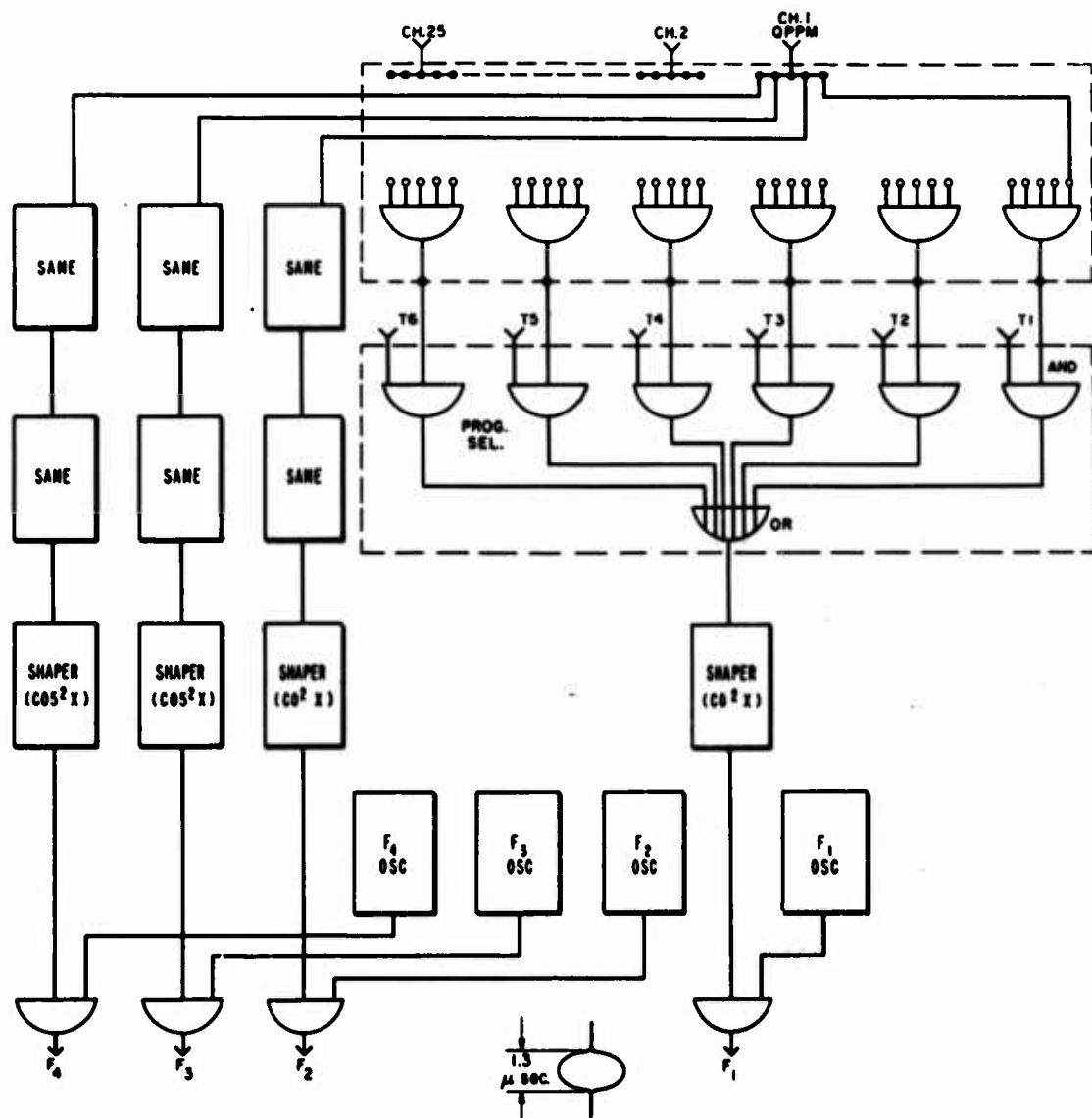


Figure 17. Block diagram - Match panel and program selector.

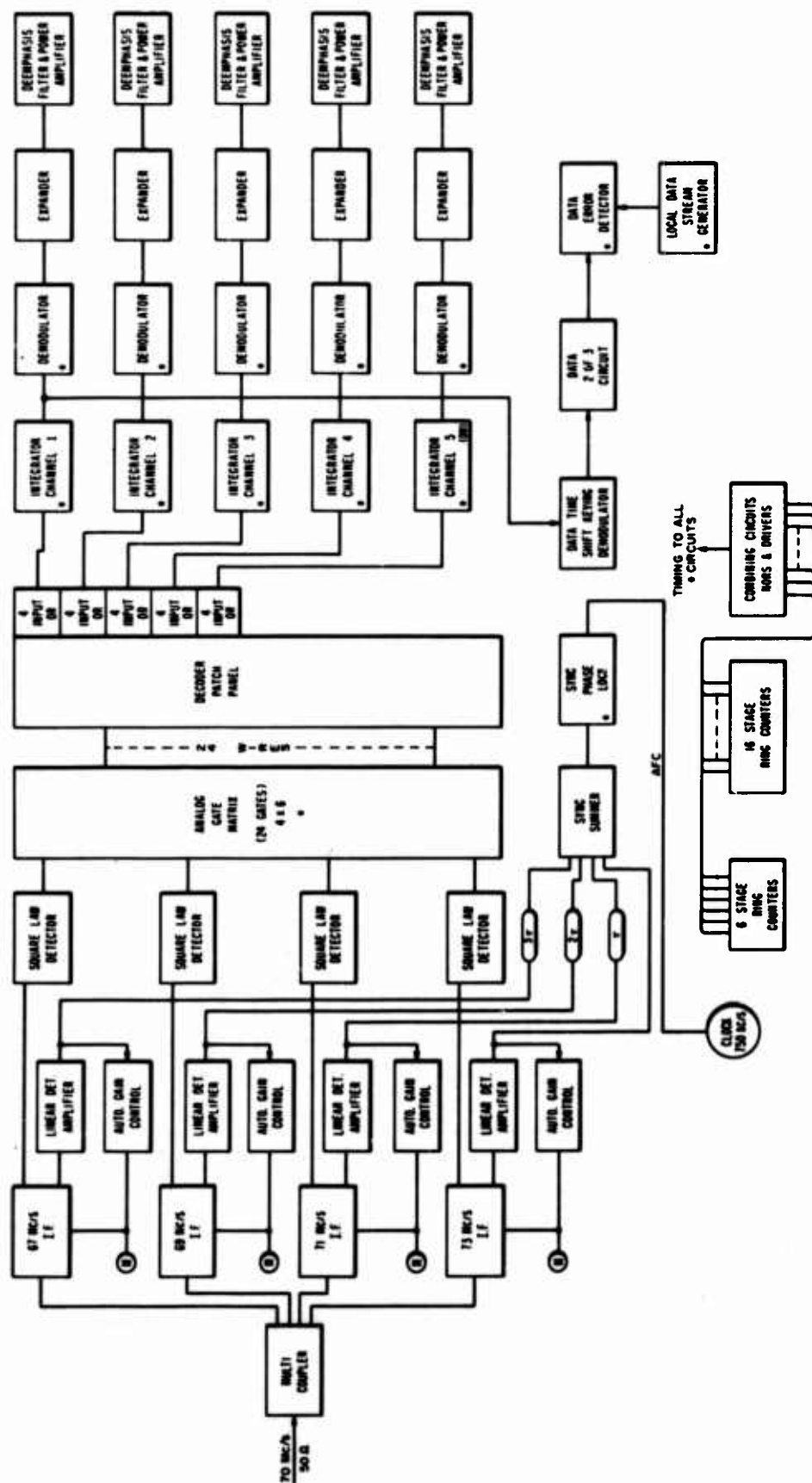


Figure 18. Block Diagram - PPM Decoder.

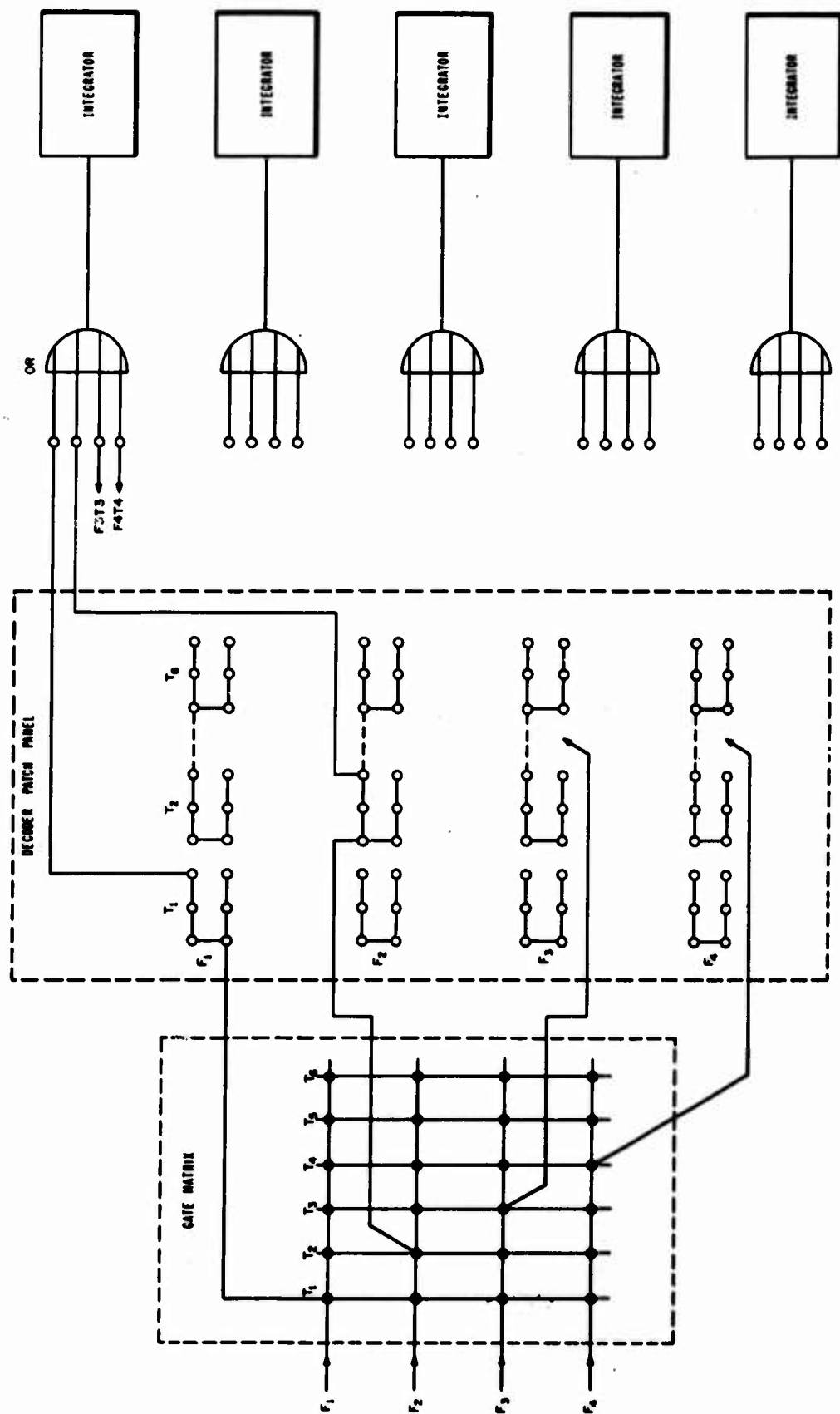
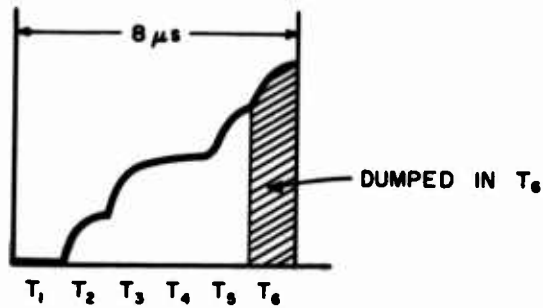


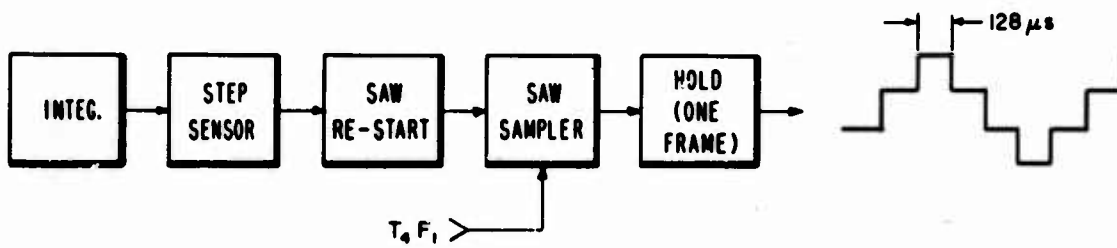
Figure 19. Block Diagram - Gate Matrix and Decoder patch panel.

INTEGRATOR

INTEGRATES OVER ONE FRAME ($8\mu s$). THE OUTPUT OF THE INTEGRATOR IS DUMPED AT THE END OF T_6 IN EACH FRAME.



DEMODULATOR



SAW

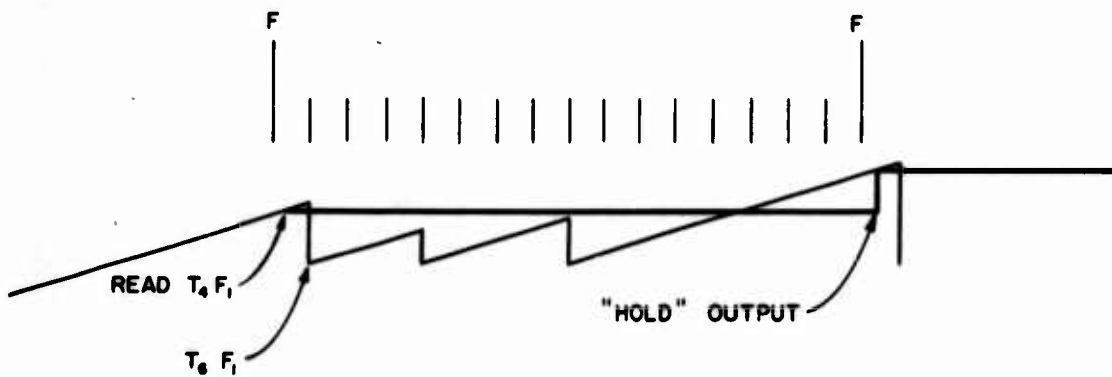


Figure 20. Integrator and Demodulator diagram

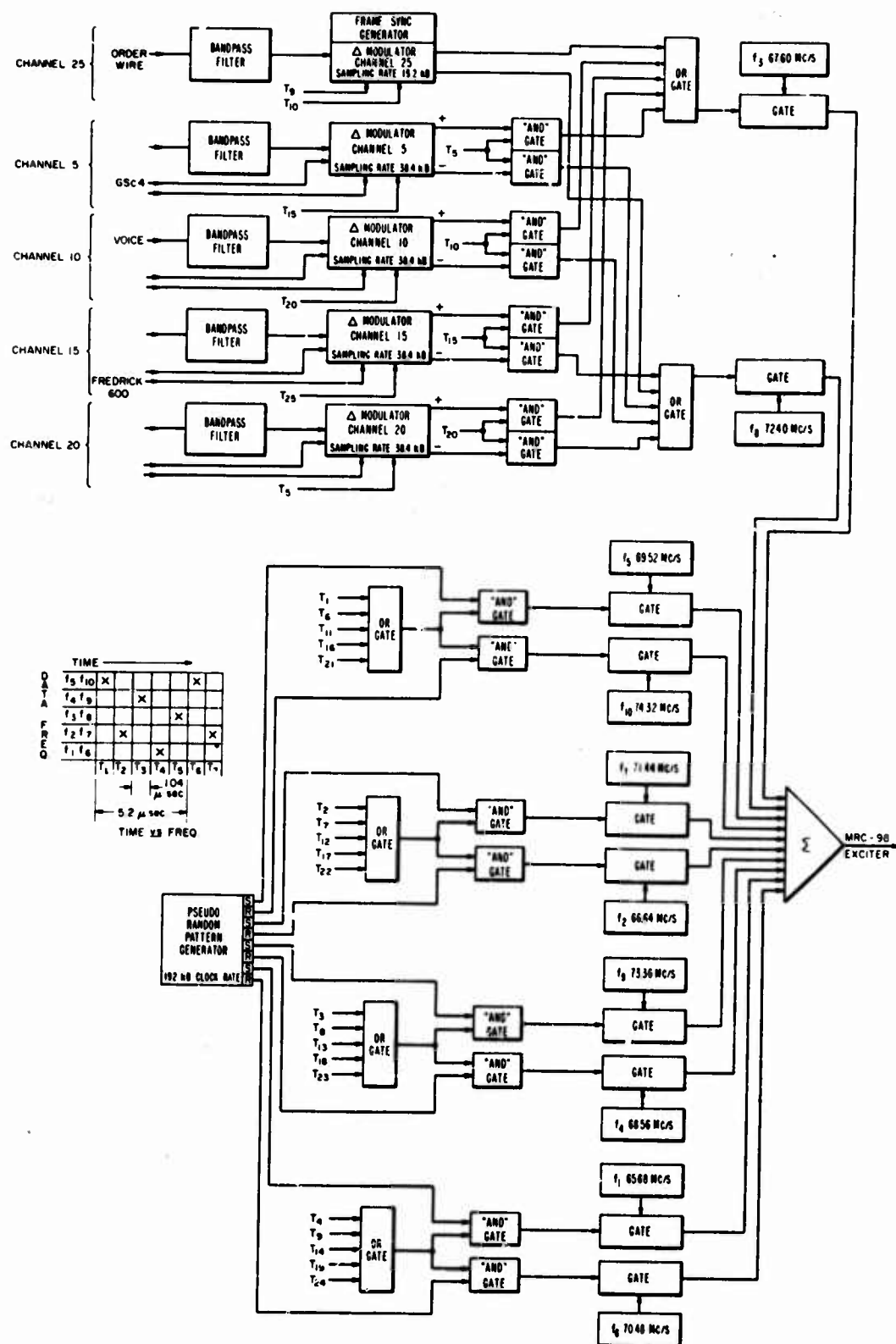


Figure 21.. Block Diagram - Motorola Δ modulator TDM/FDM Multiplexer transmit terminal.



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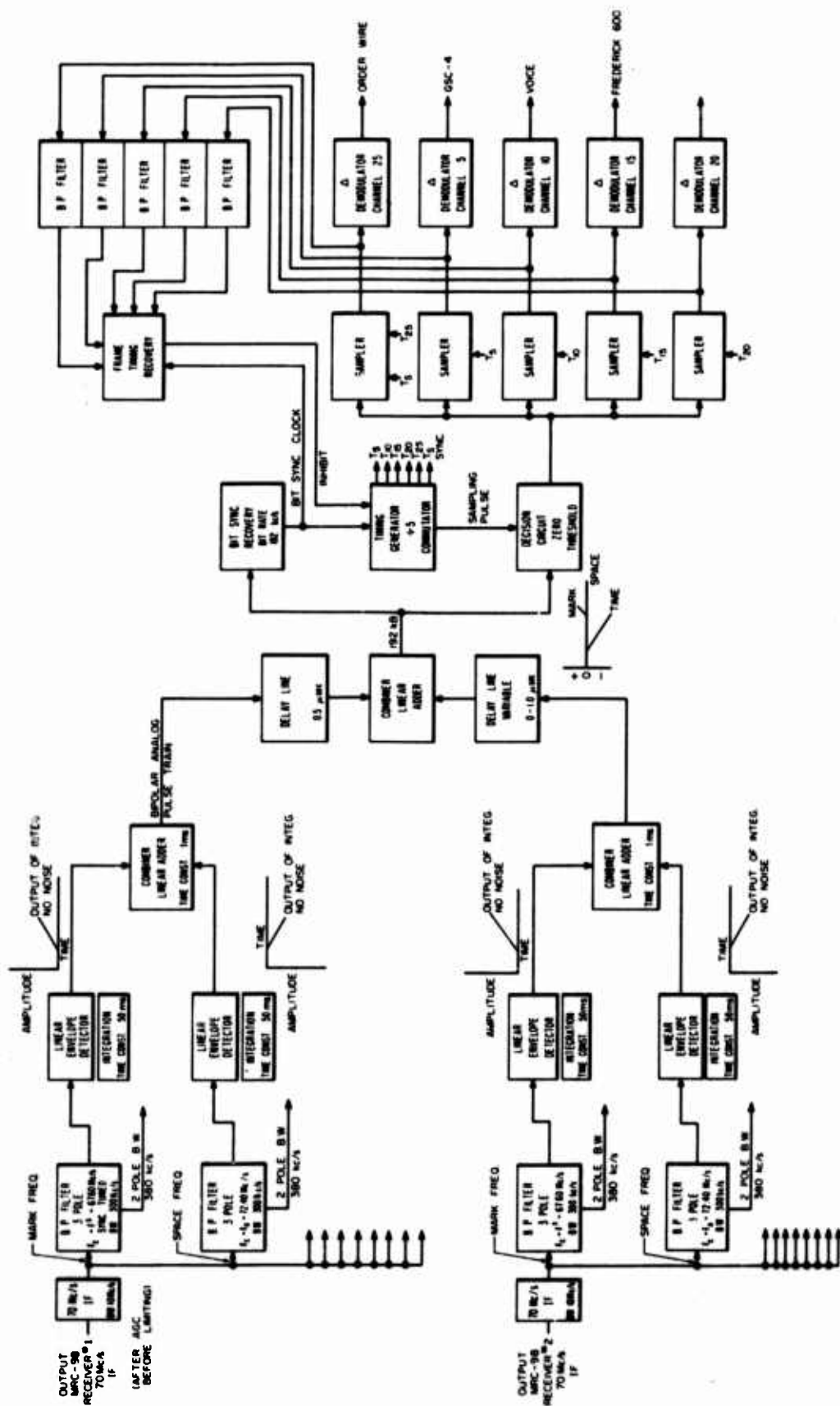


Figure 23. Block Diagram - Motorola Δ demodulator TDM/FDM demultiplexer receive terminal.

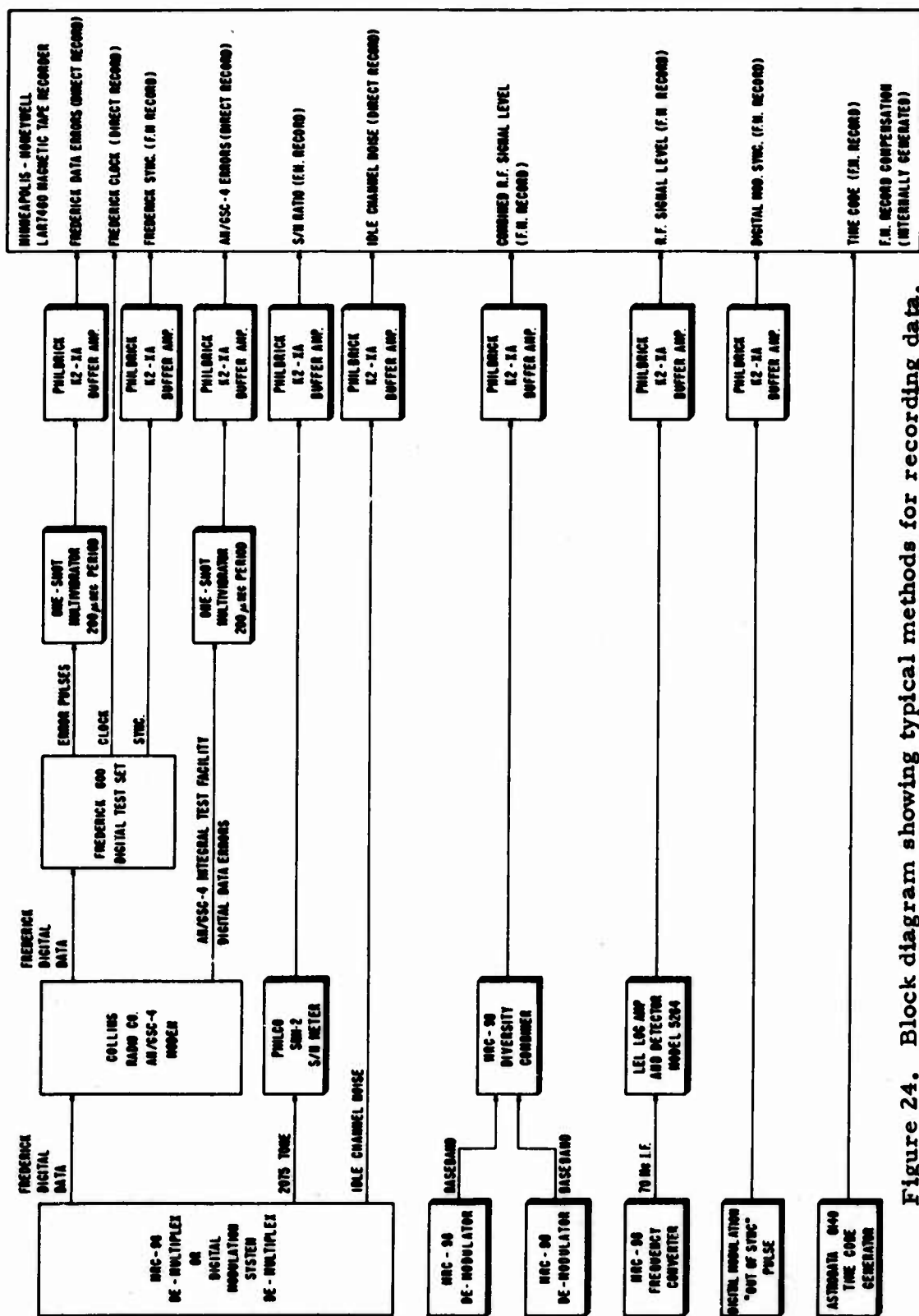


Figure 24. Block diagram showing typical methods for recording data.

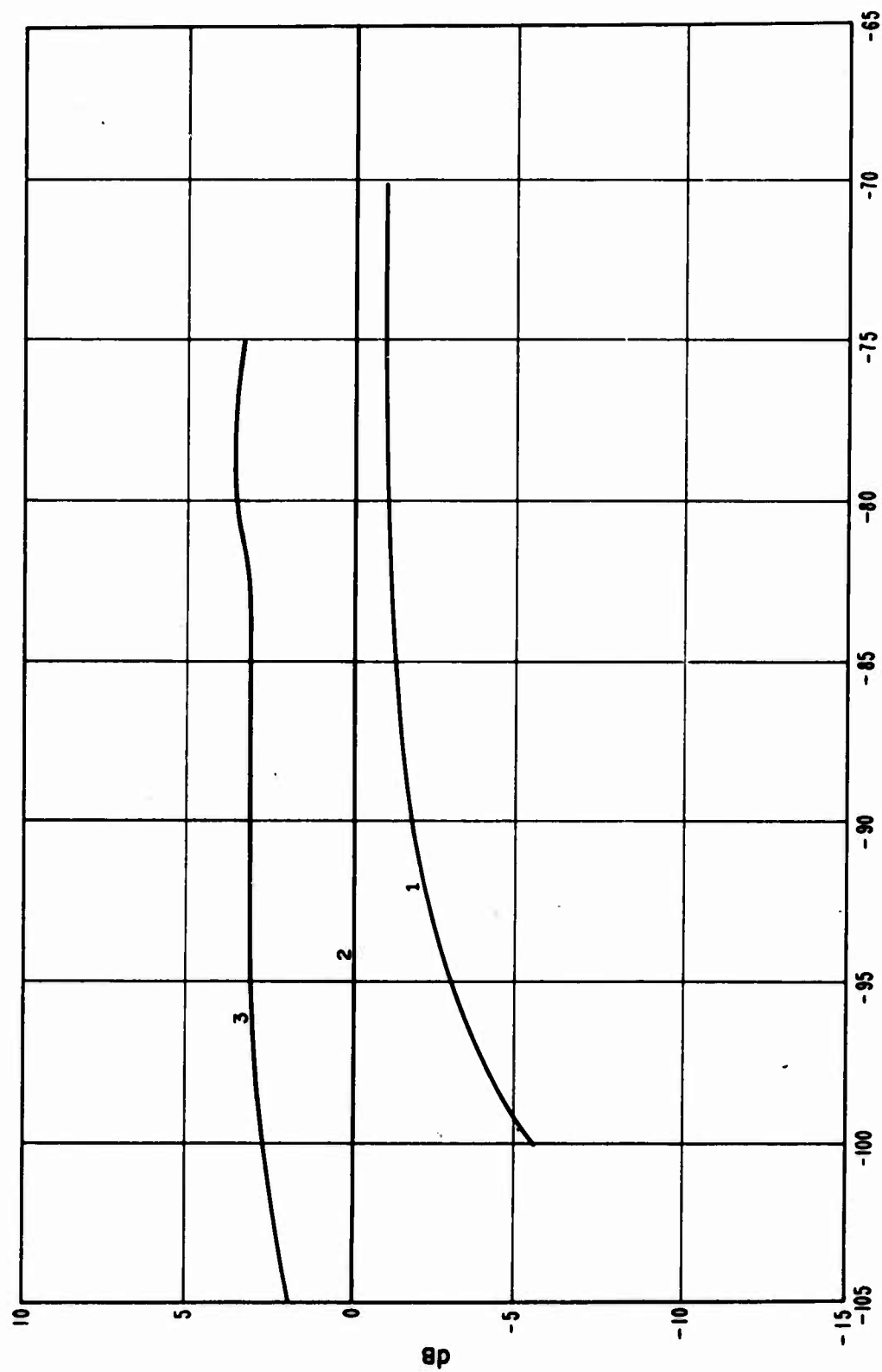


Figure 25. AGC correction curves for various methods of calibration.

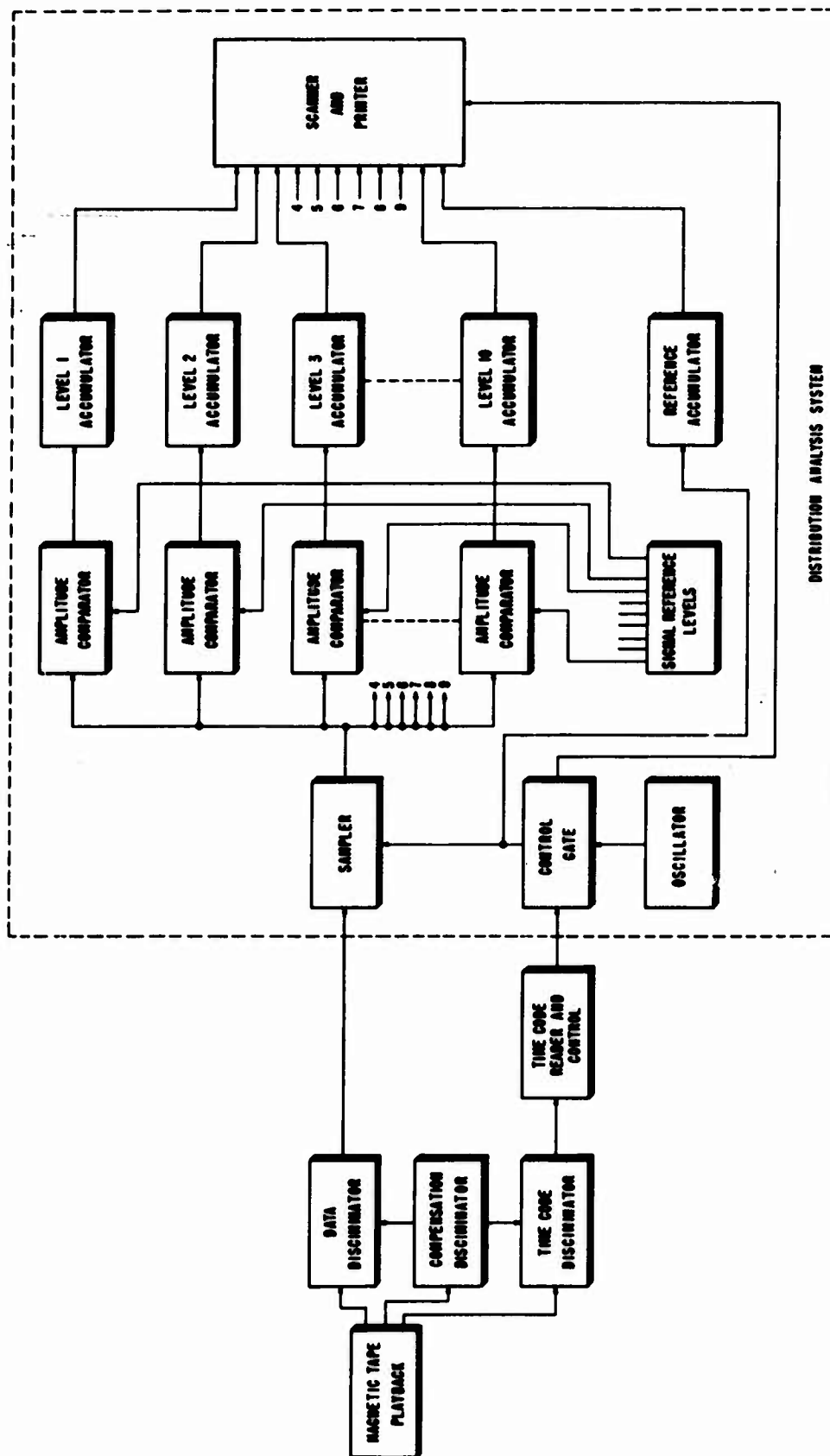


Figure 26. The system for obtaining the cumulative amplitude distribution and a detailed block diagram of the Distribution Analysis System.

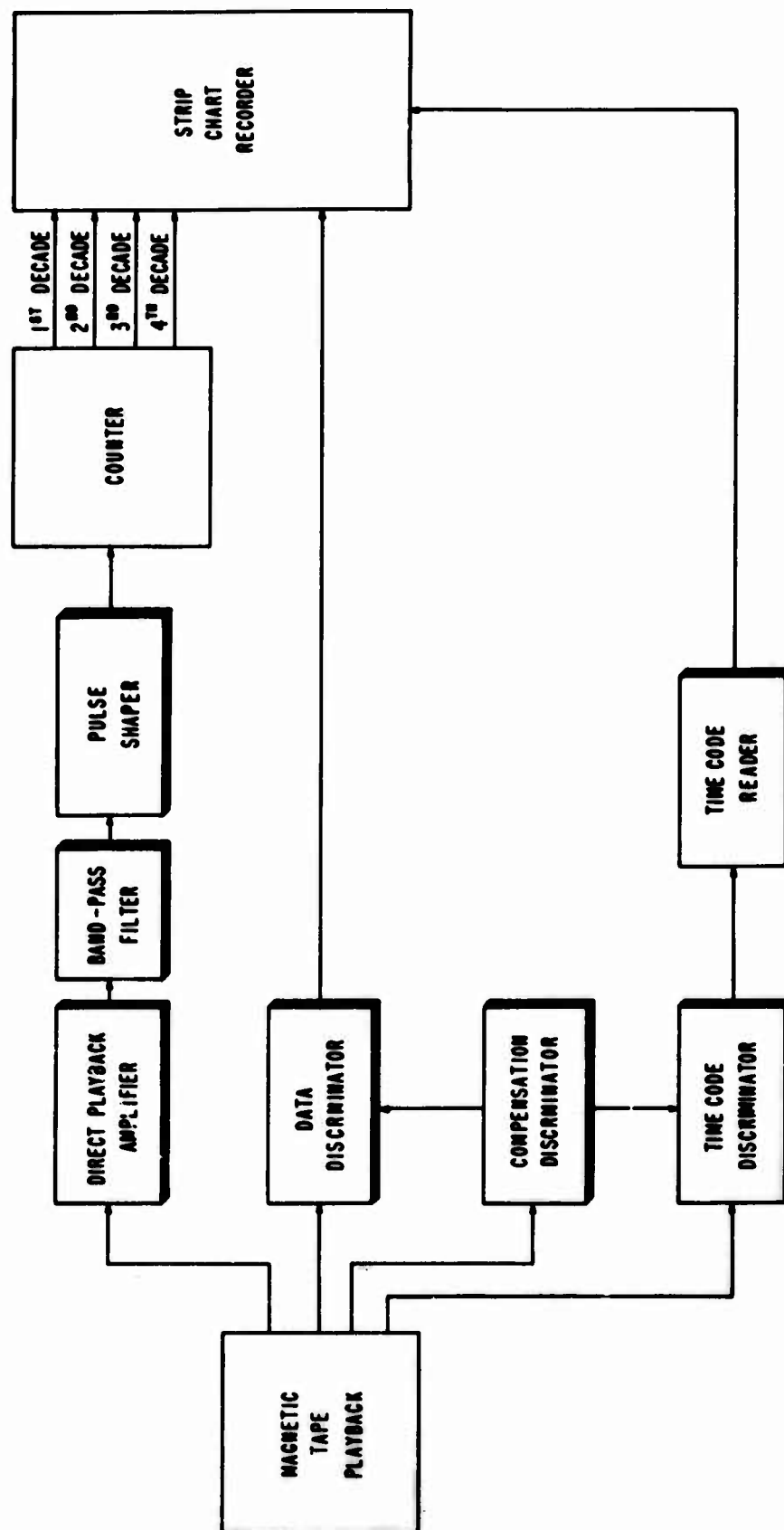
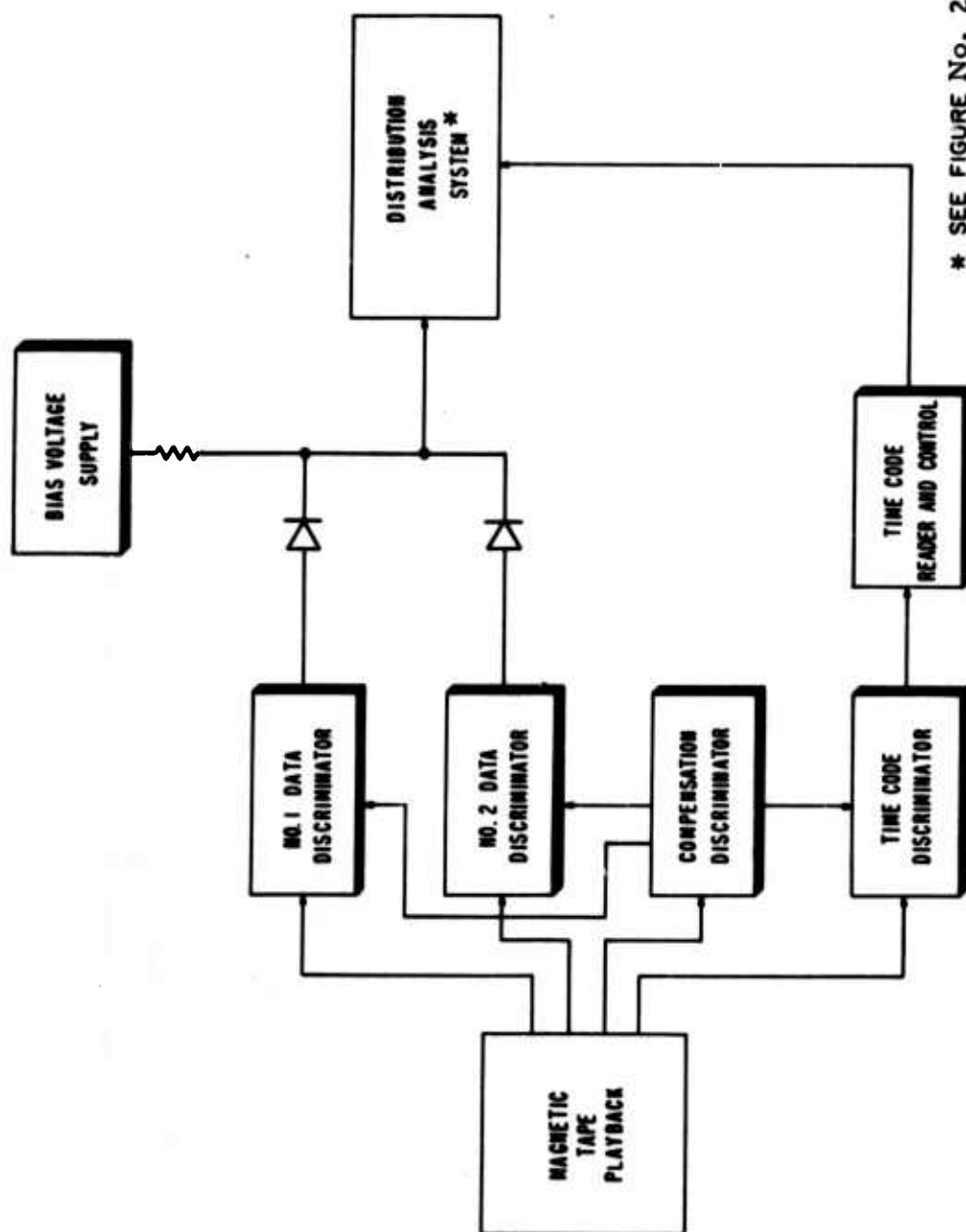


Figure 27. The system for counting digital data errors.



* SEE FIGURE NO. 26

Figure 28. The system used to determine the cumulative amplitude distribution of two "combined" received signal strengths.

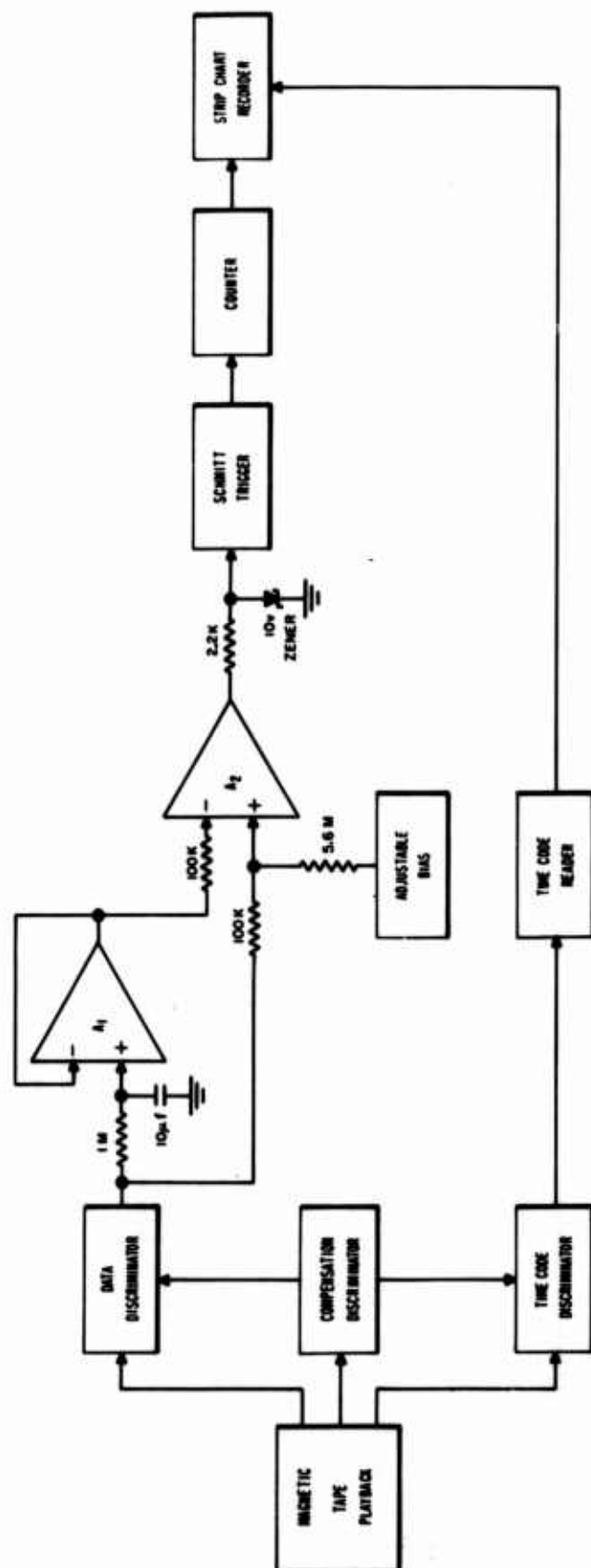


Figure 29. Circuit diagram for median crossings.

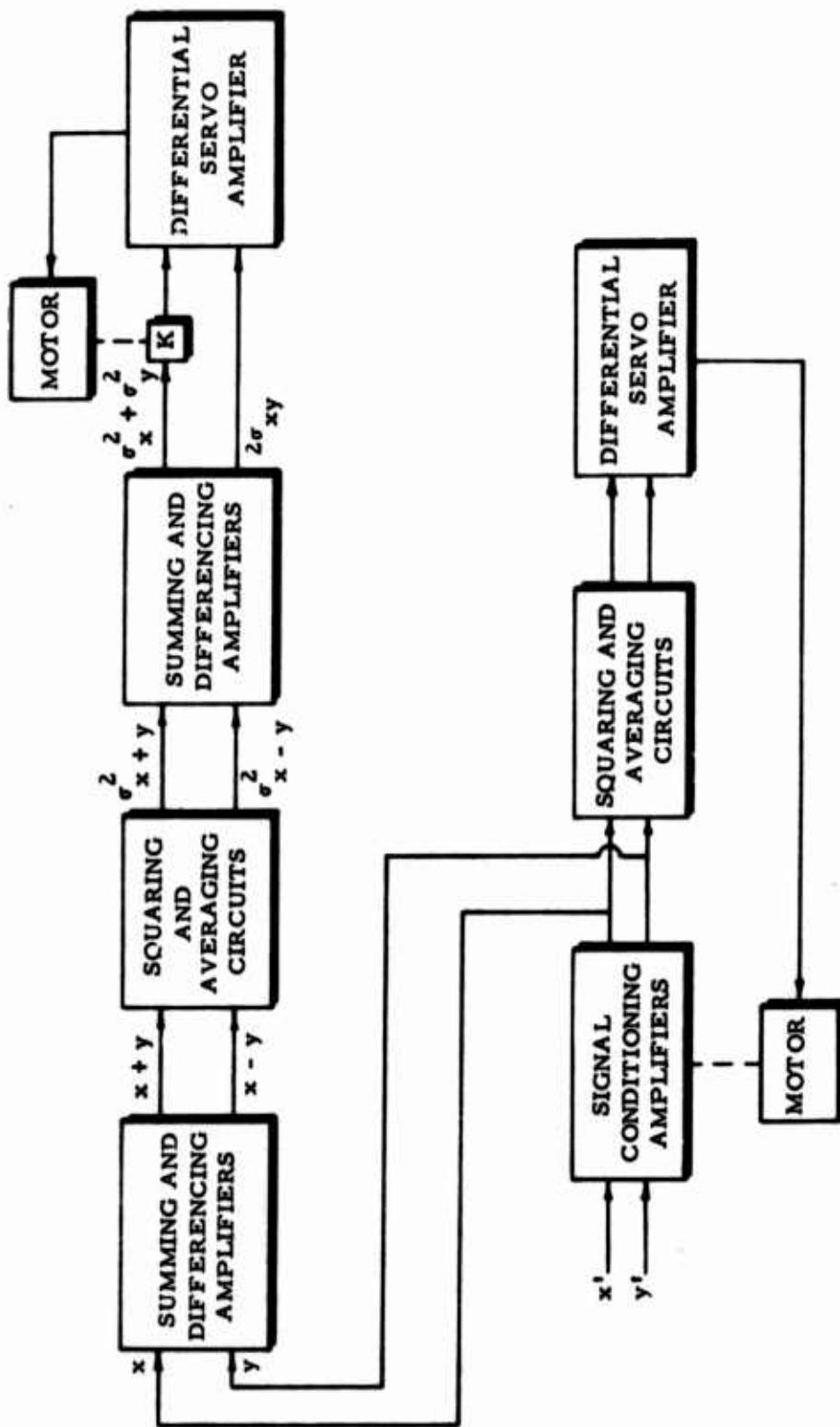
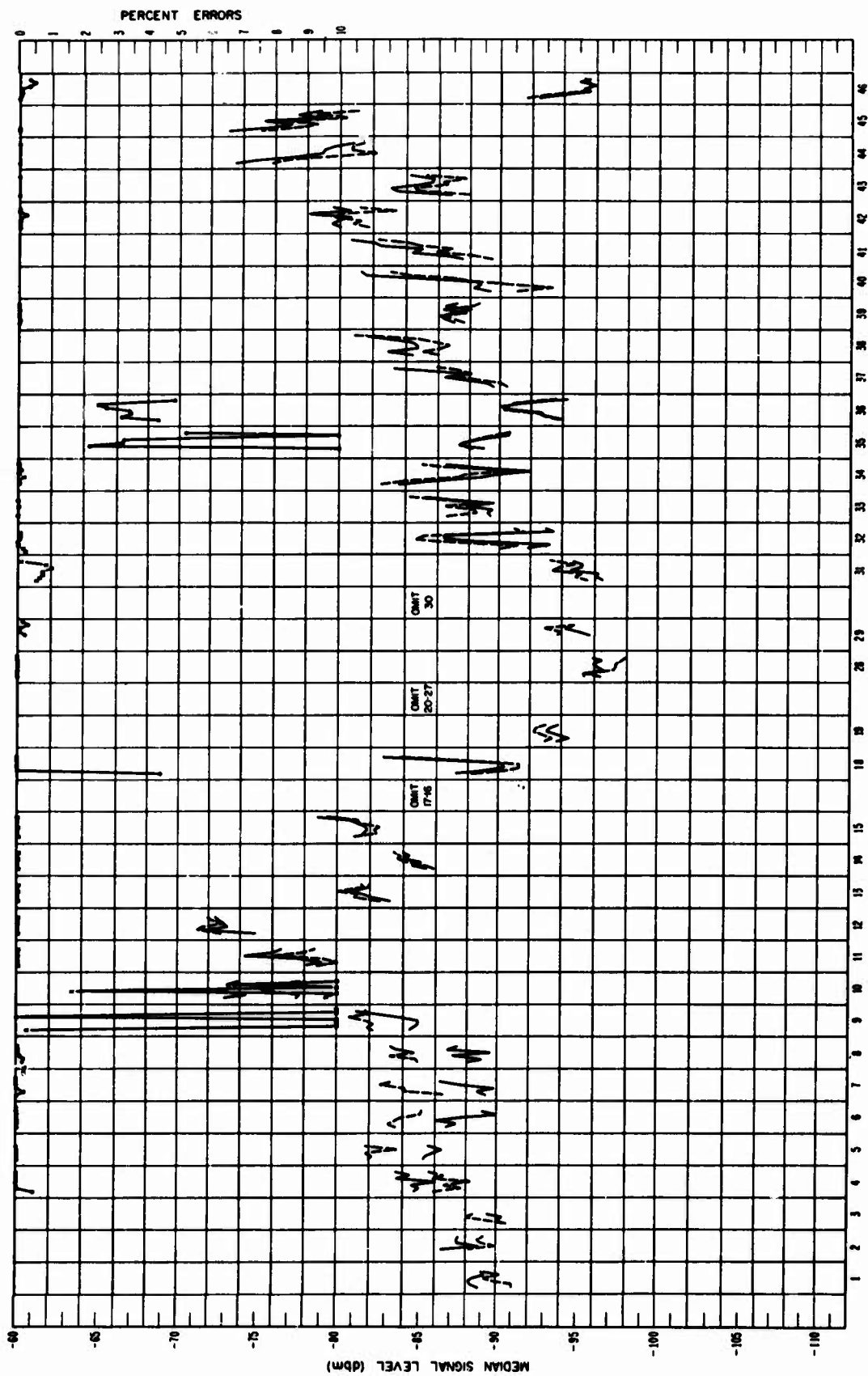
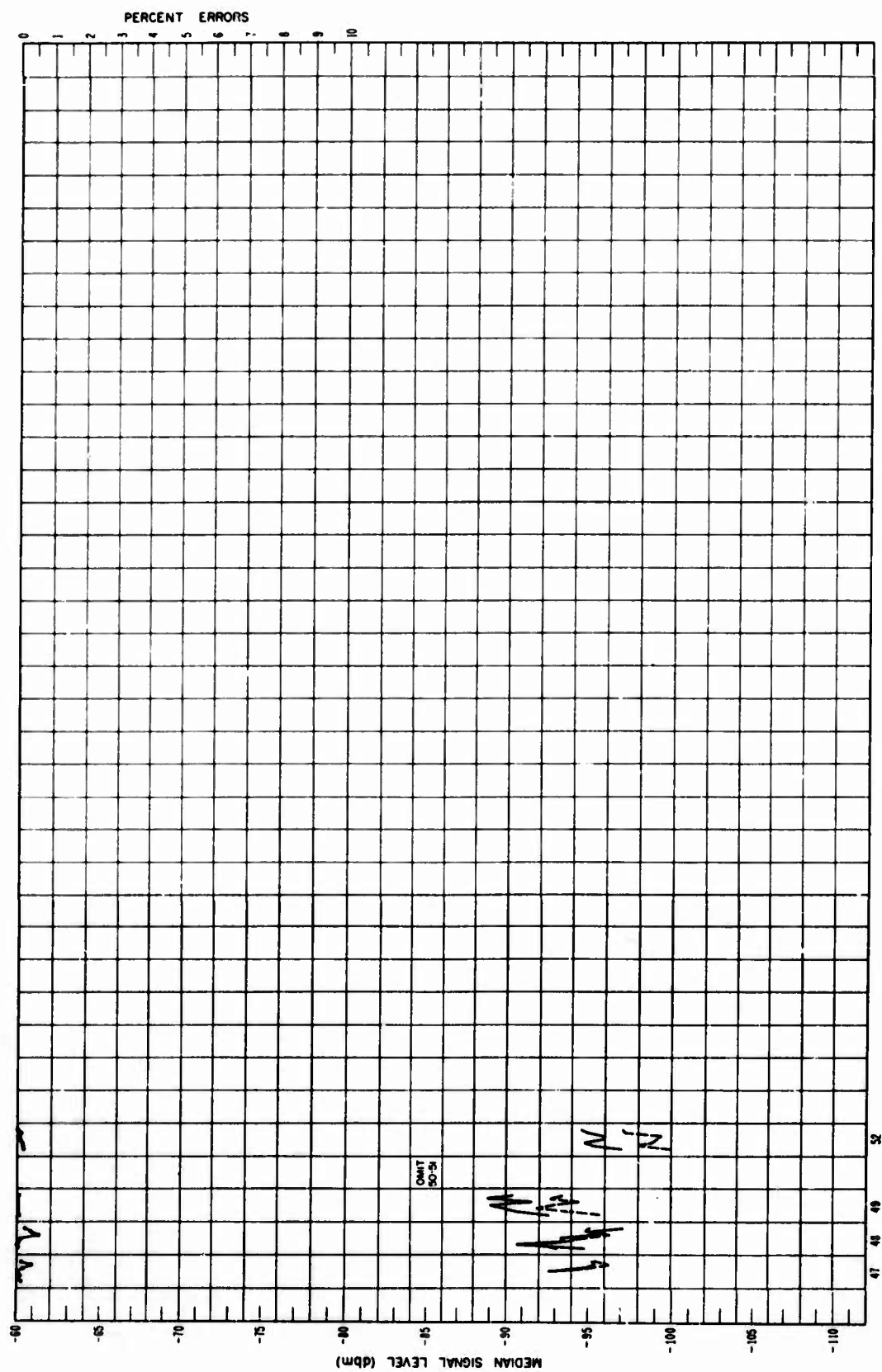


Figure 30. The analog correlation computer used to compute the cross correlation of two parameters.



Run Numbers
Figure 31. Medians and error rates for the FDM system.



Run Numbers
Figure 32. Medians and error rates for the FDM system.

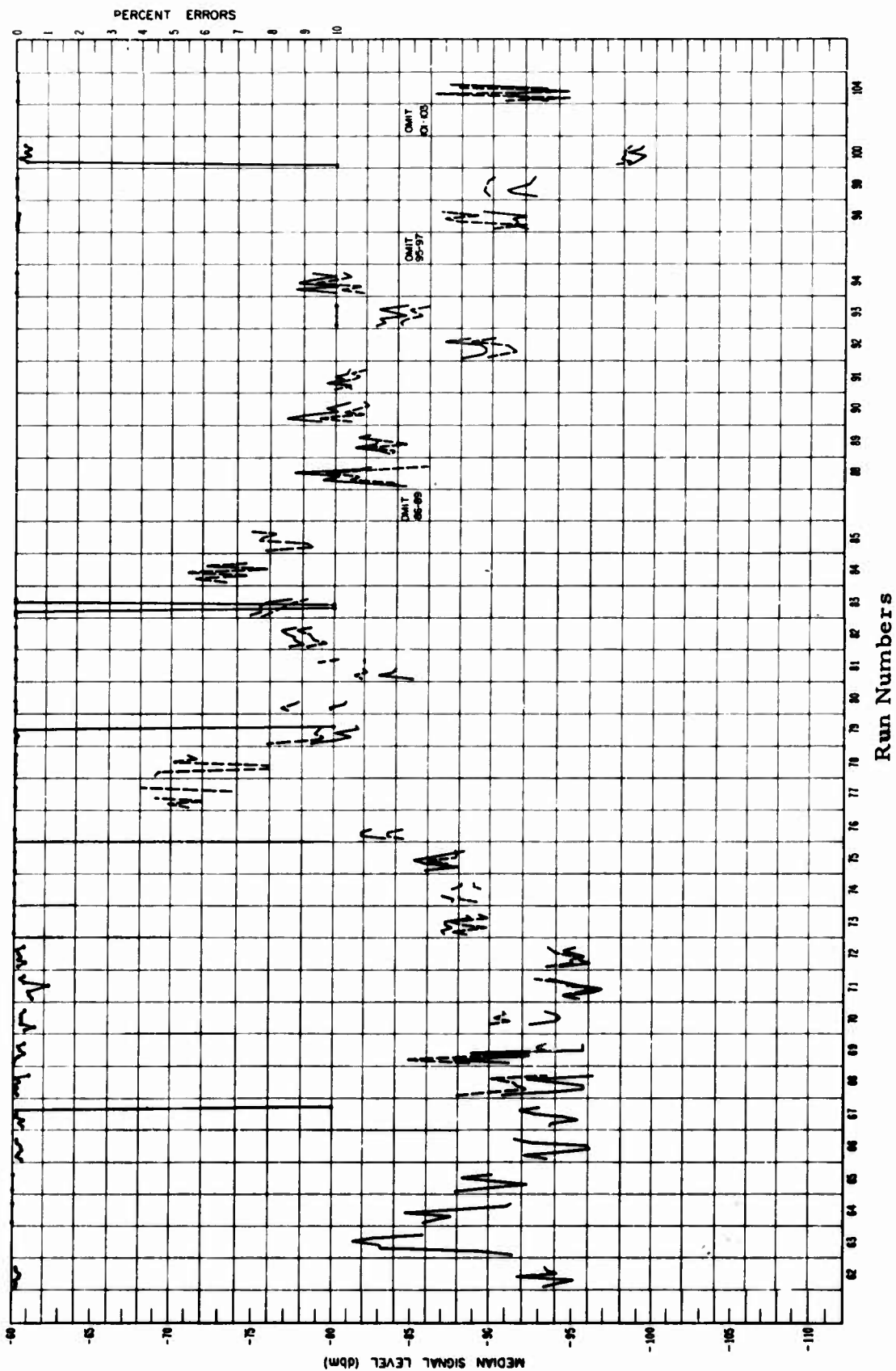
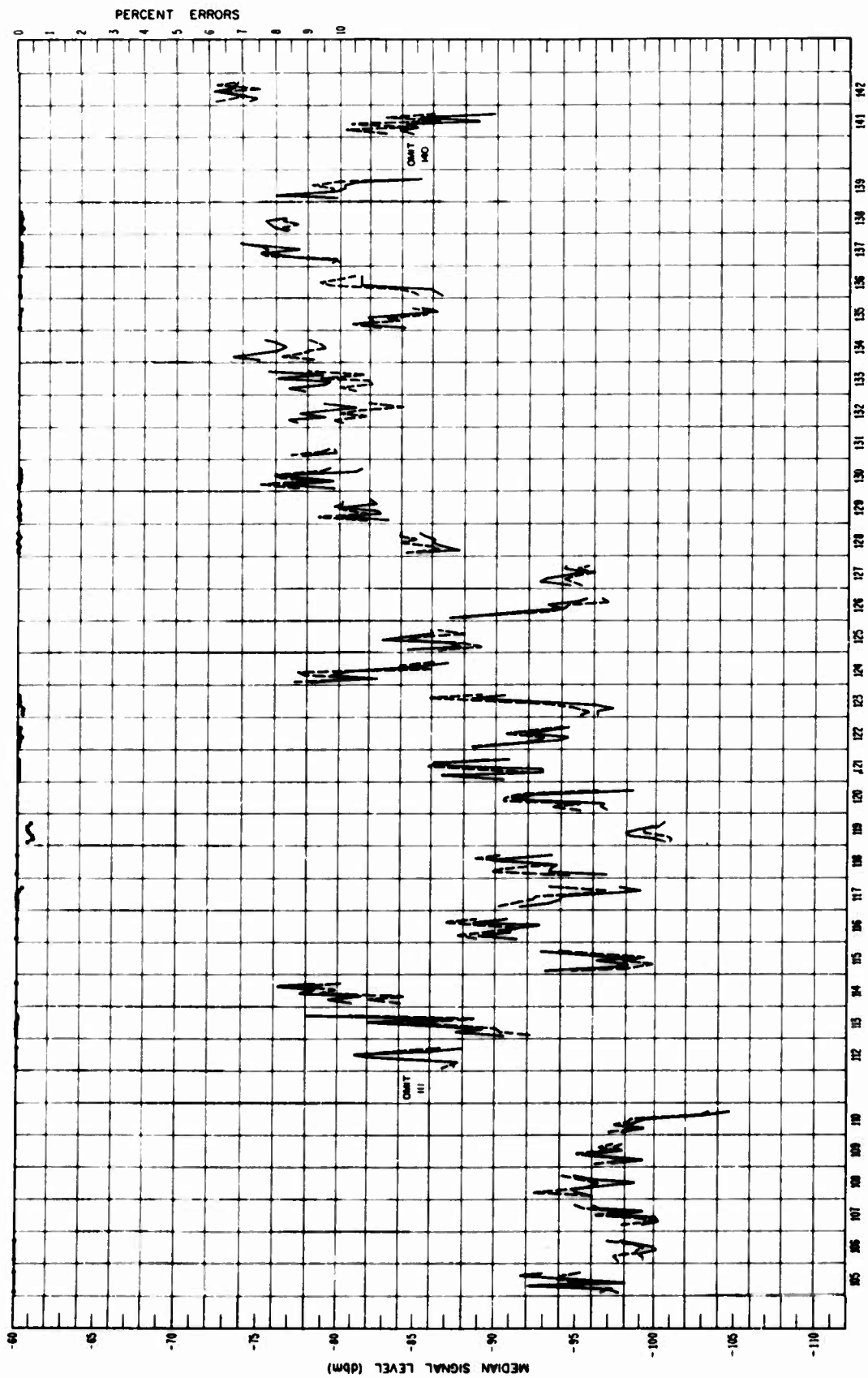


Figure 33. Medians and error rates for the FDM system.



Run Numbers
Figure 34. Medians and error rates for the FDM system.

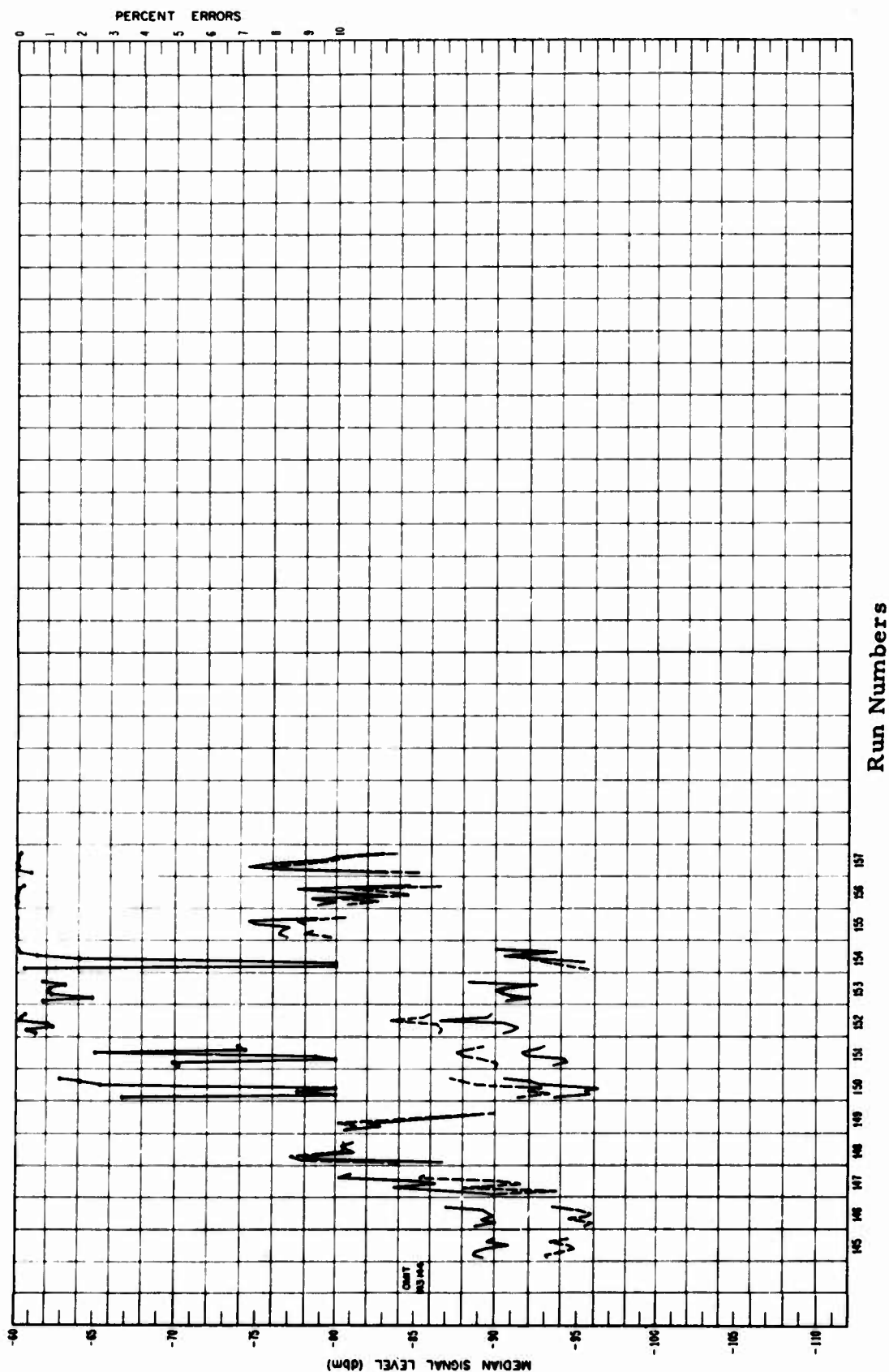
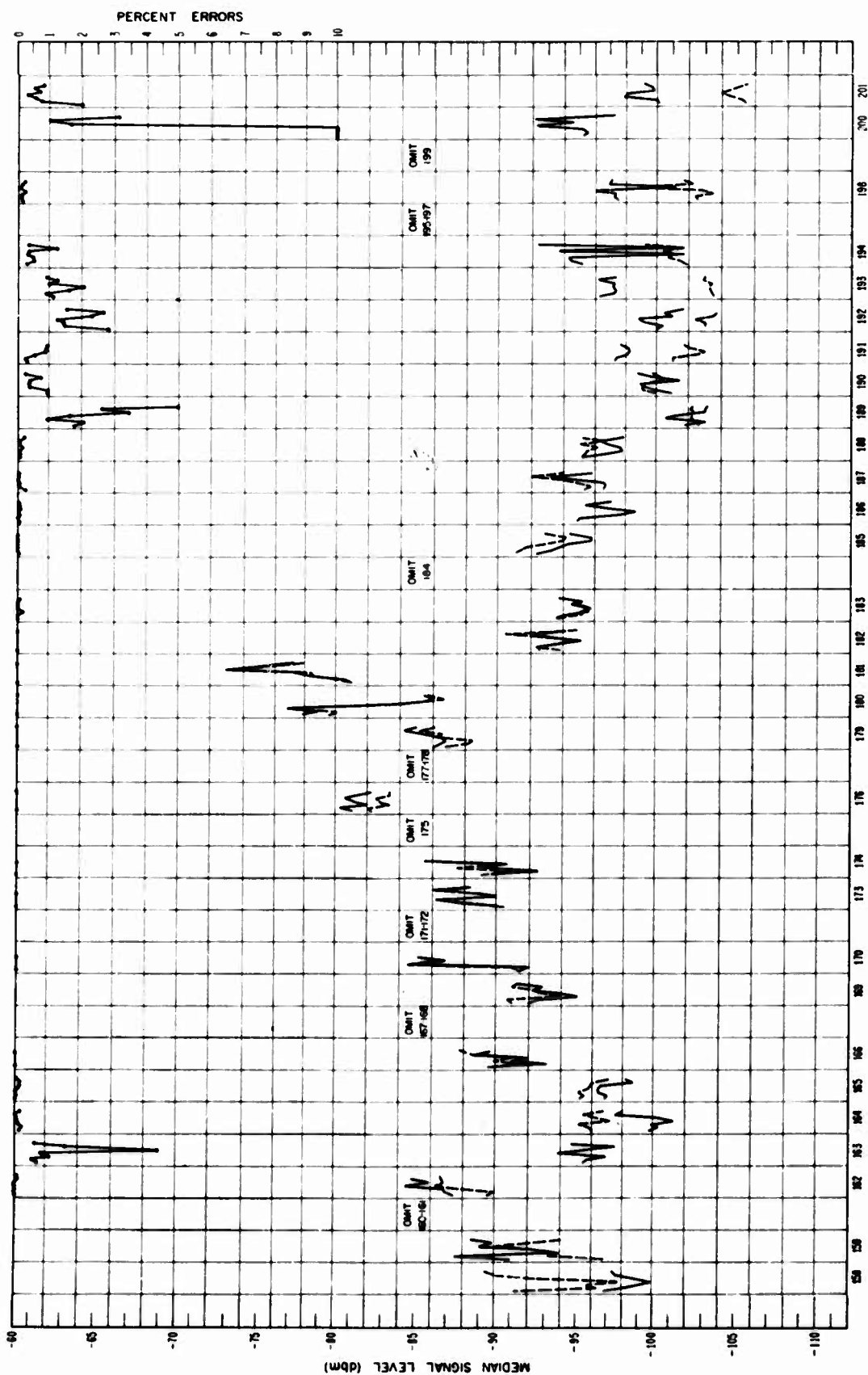


Figure 35. Medians and error rates for the FDM system.



Run Numbers
Figure 36. Medians and error rates for the FDM system.

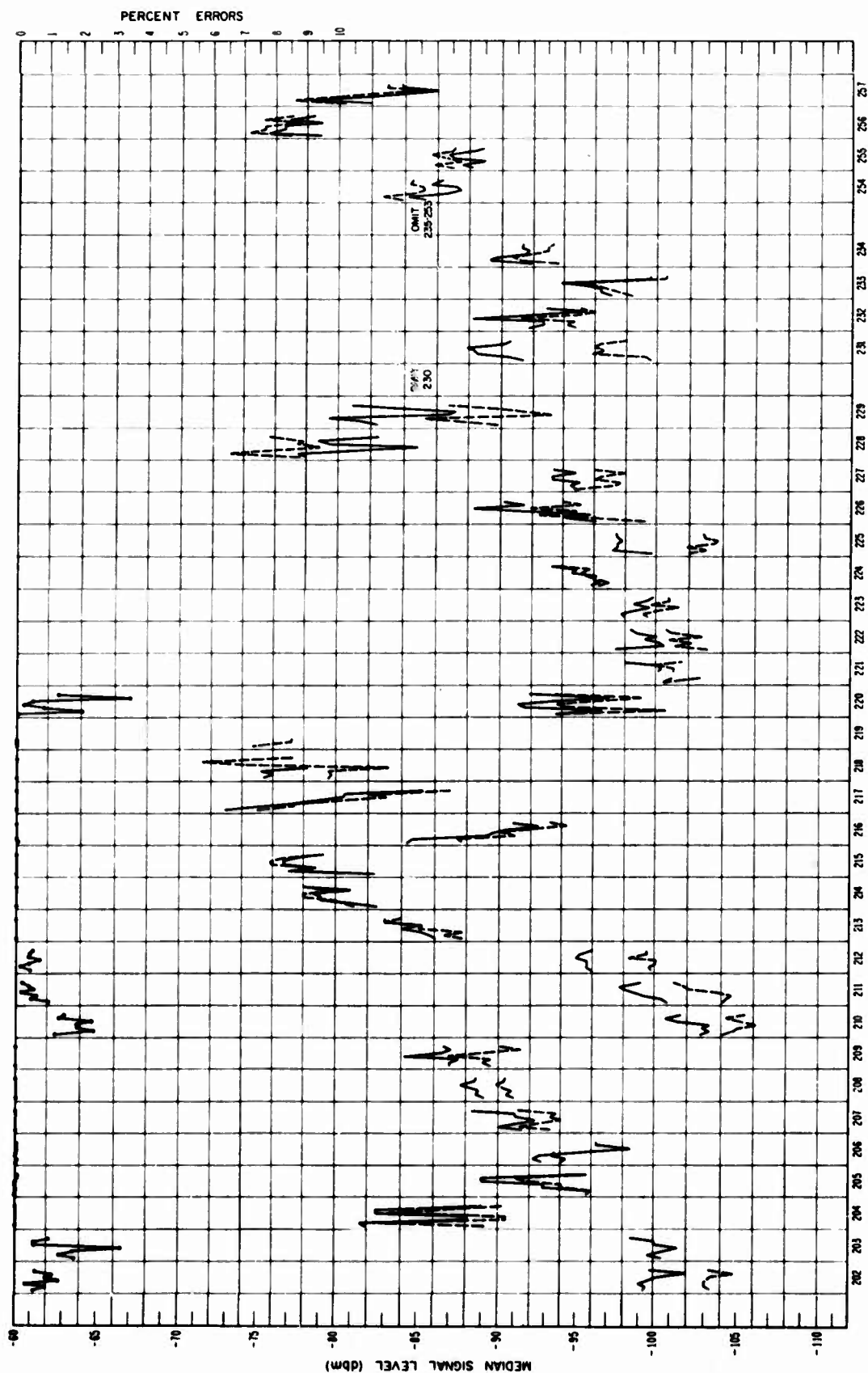
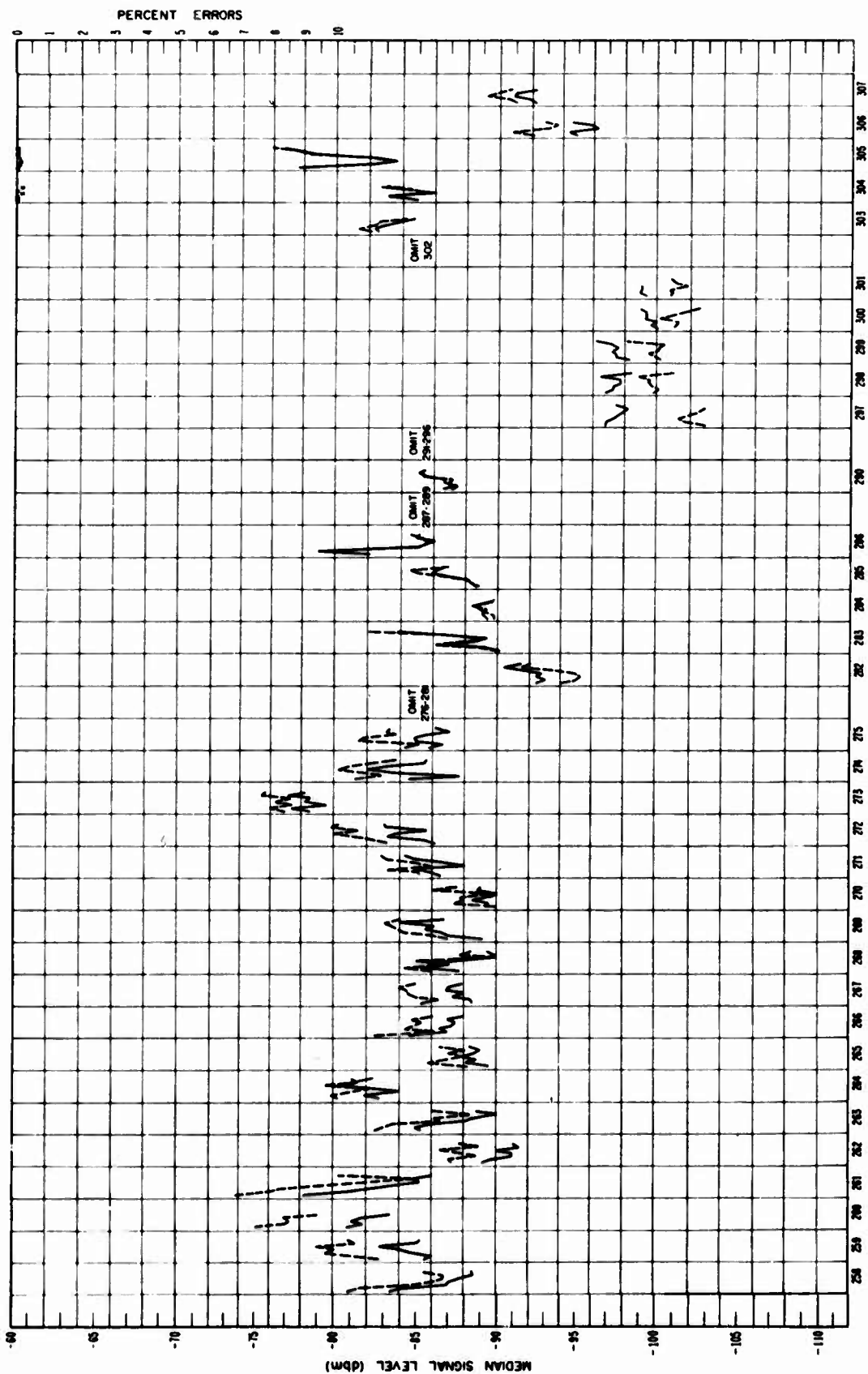
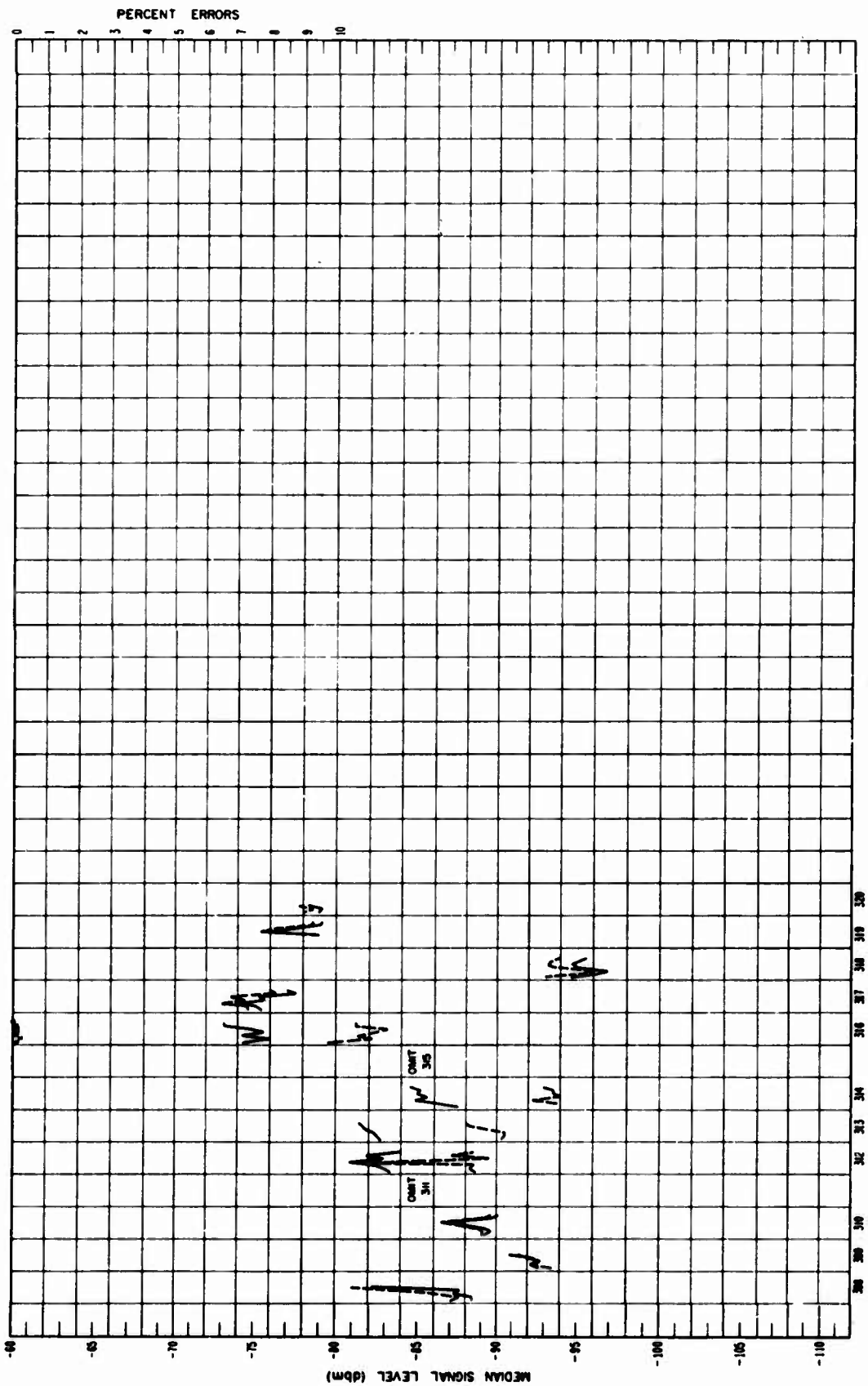


Figure 37. Medians and error rates for the FDM system.



Run Numbers
Figure 38. Medians and error rates for the FDM system.



Run Numbers
Figure 39. Medians and error rates for the FDM system.

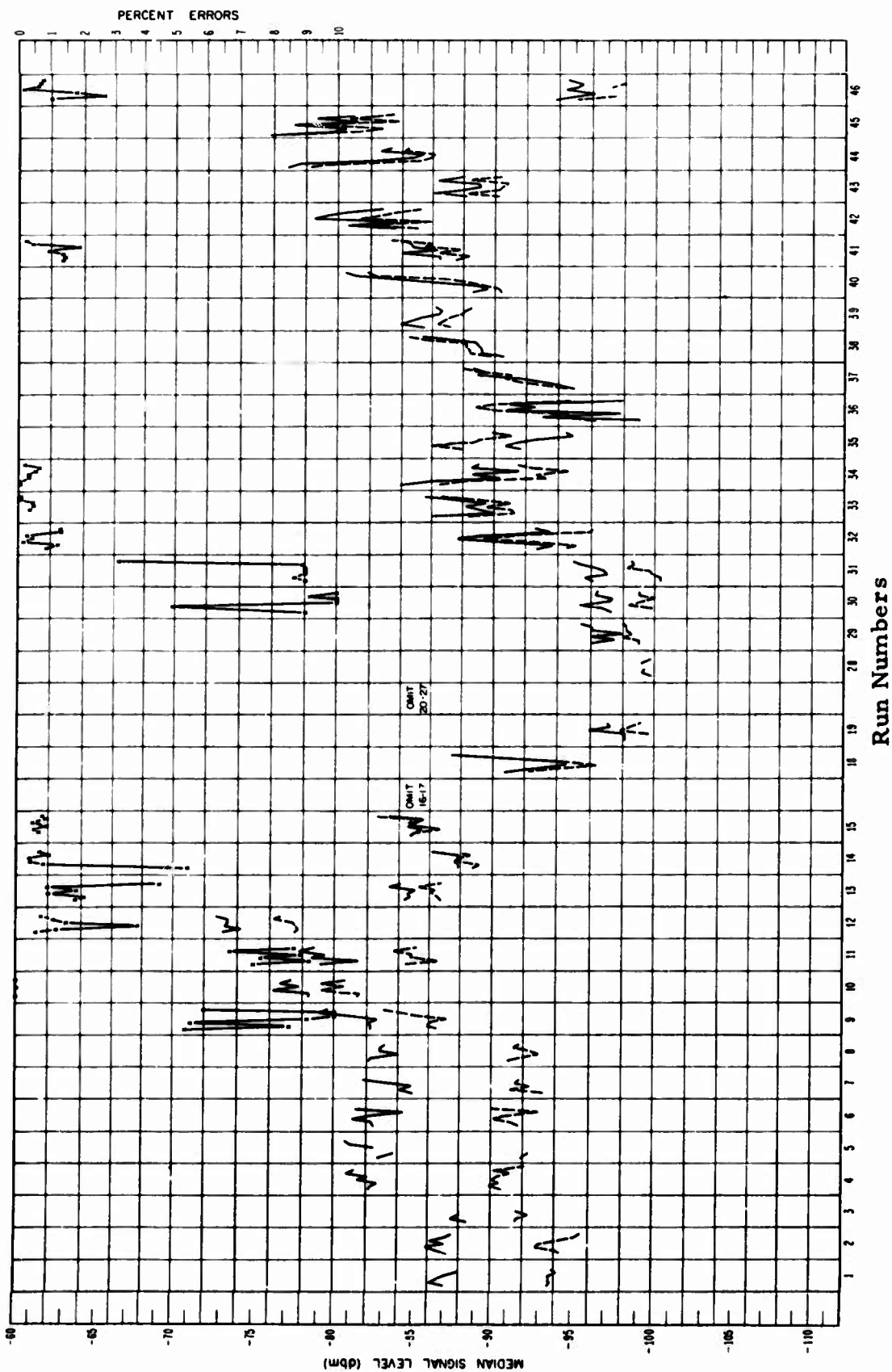


Figure 40. Medians and Frederick error rates for the PCM system.

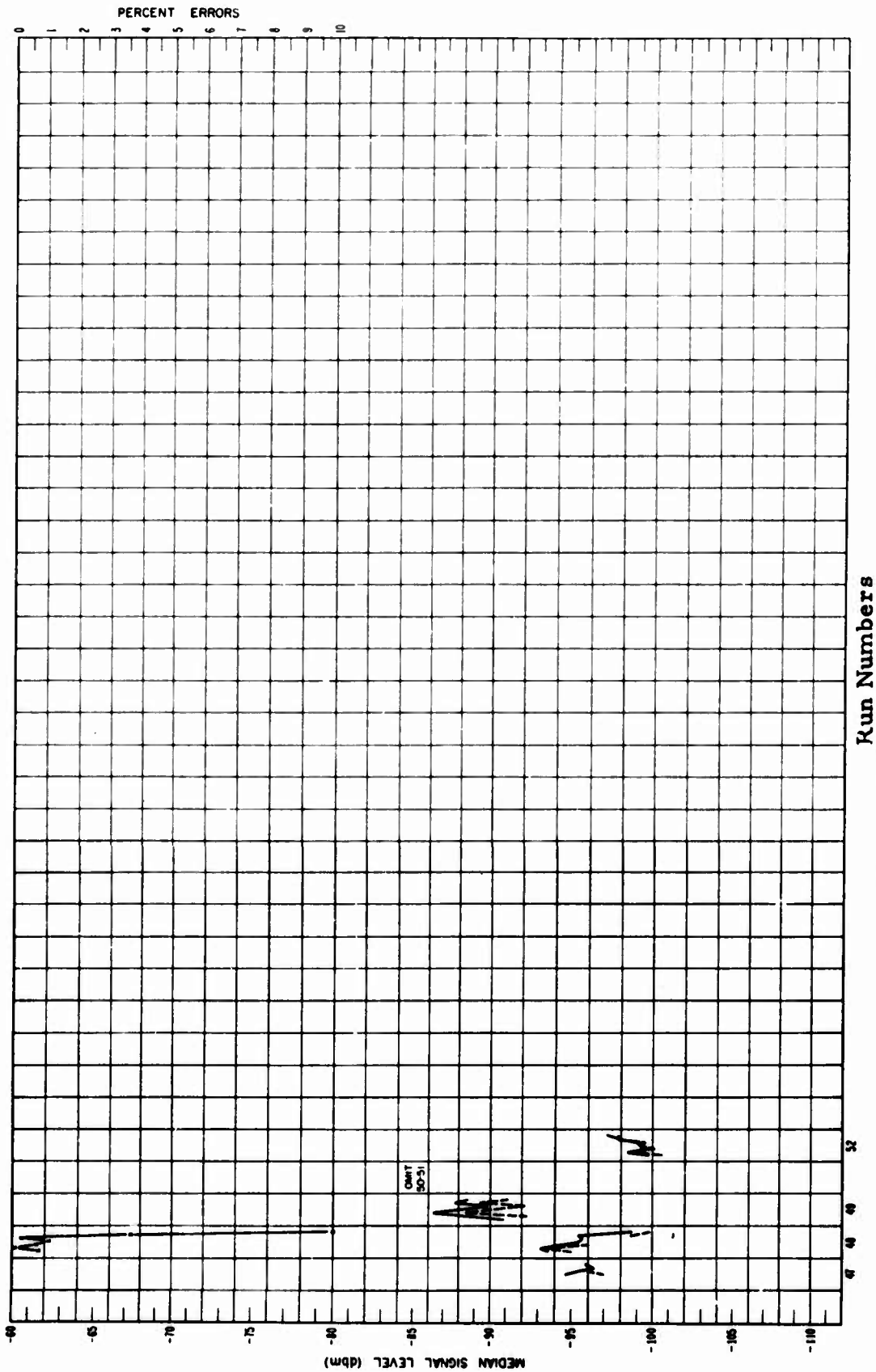
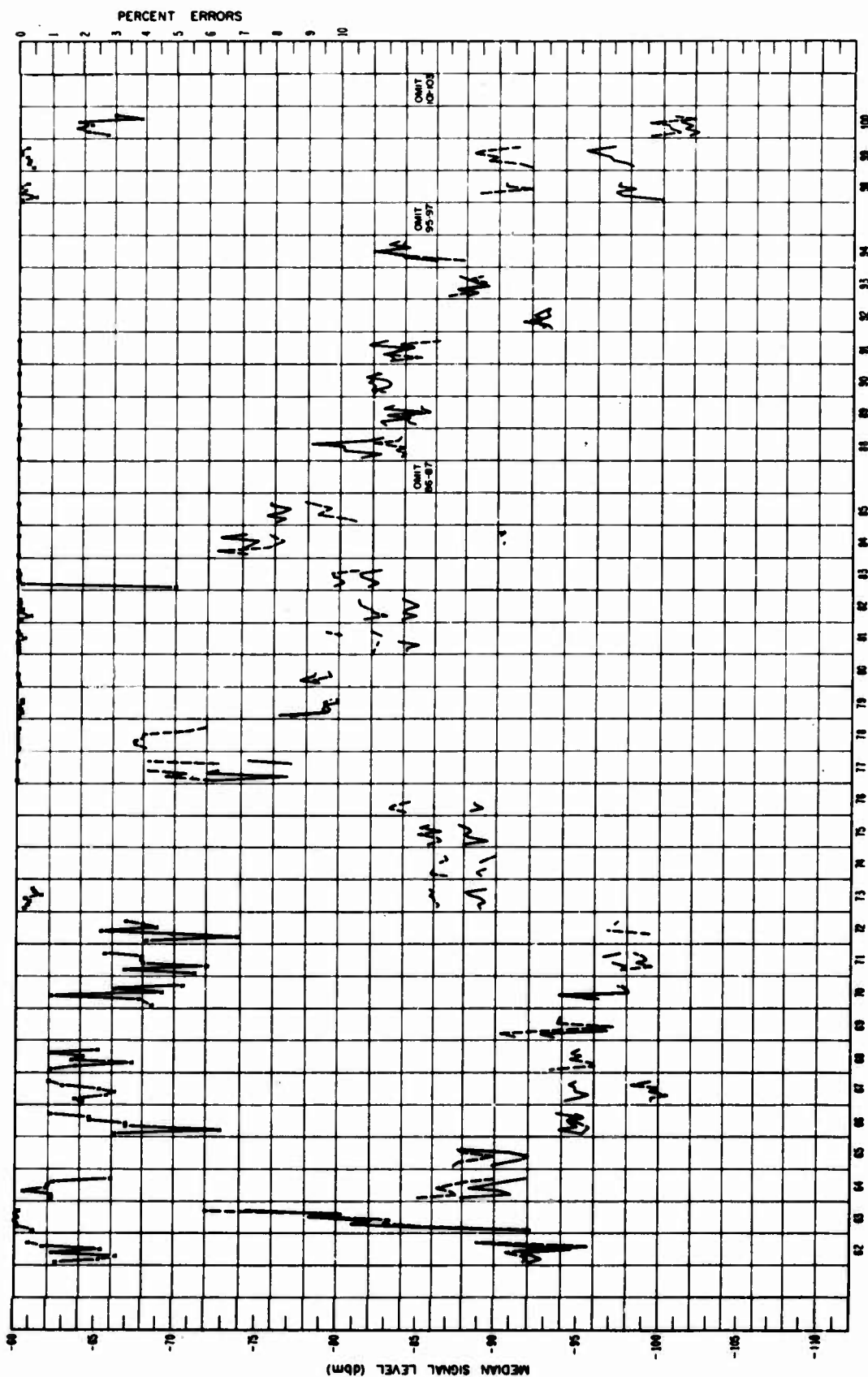


Figure 41. Medians and Frederick error rates for the PCM system.



Run Numbers
 FIGURE 42. Medians and Frederick error rates for the PPM system.

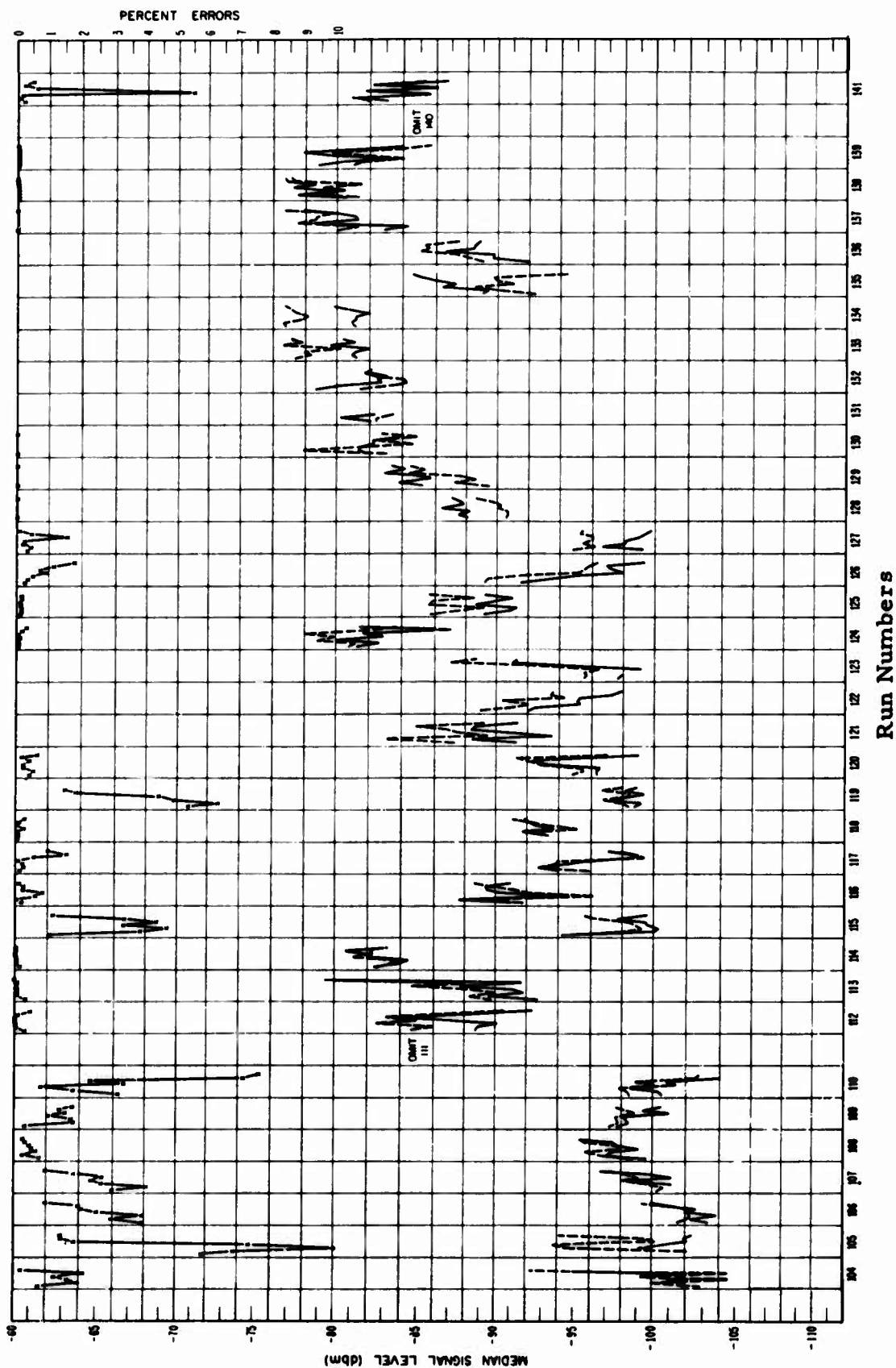


FIGURE 4.3. Medians and Frederick error rates for the PPM system.

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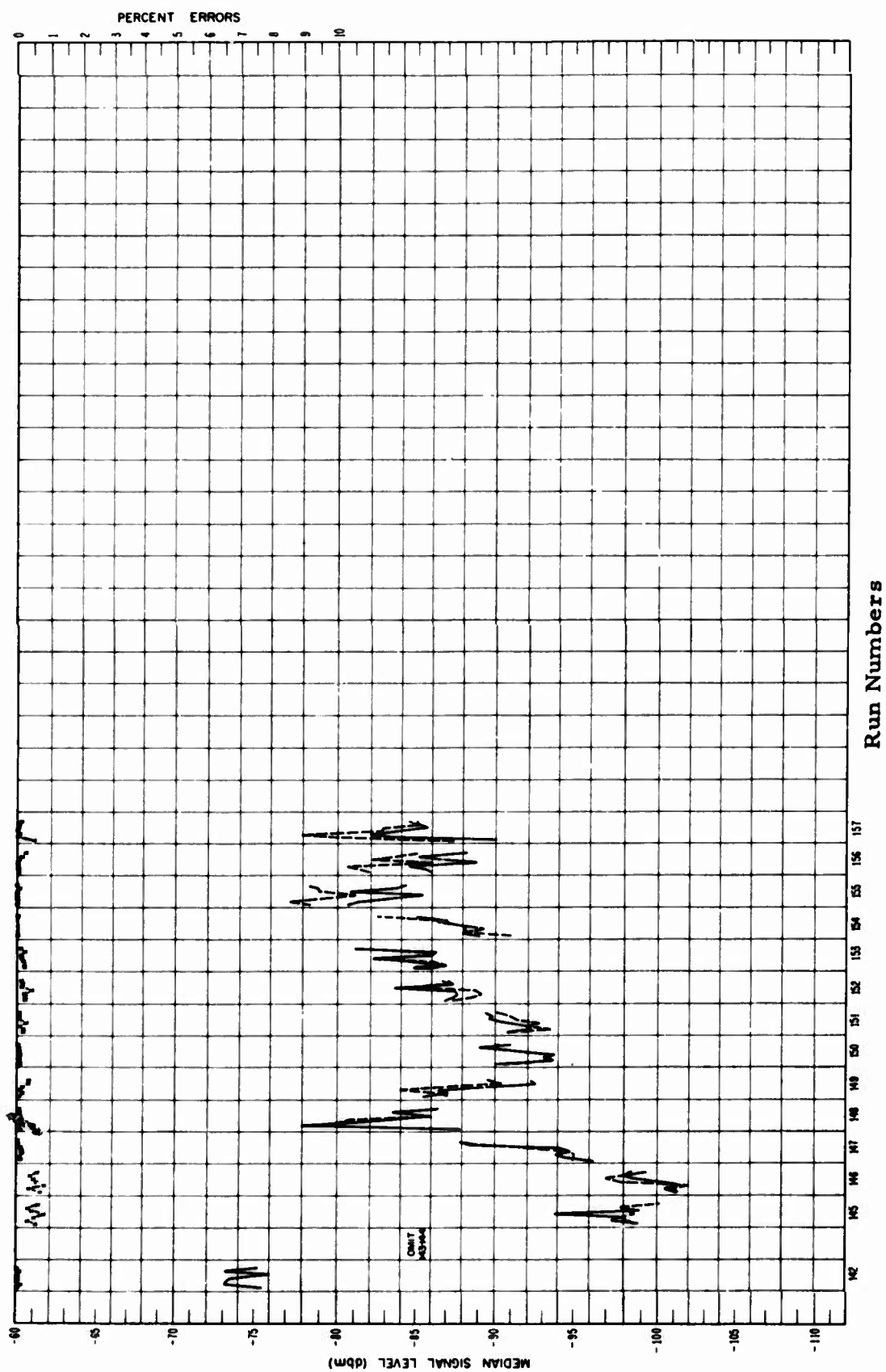


FIGURE 44. Medians and Frederick error rates for the PPM system.

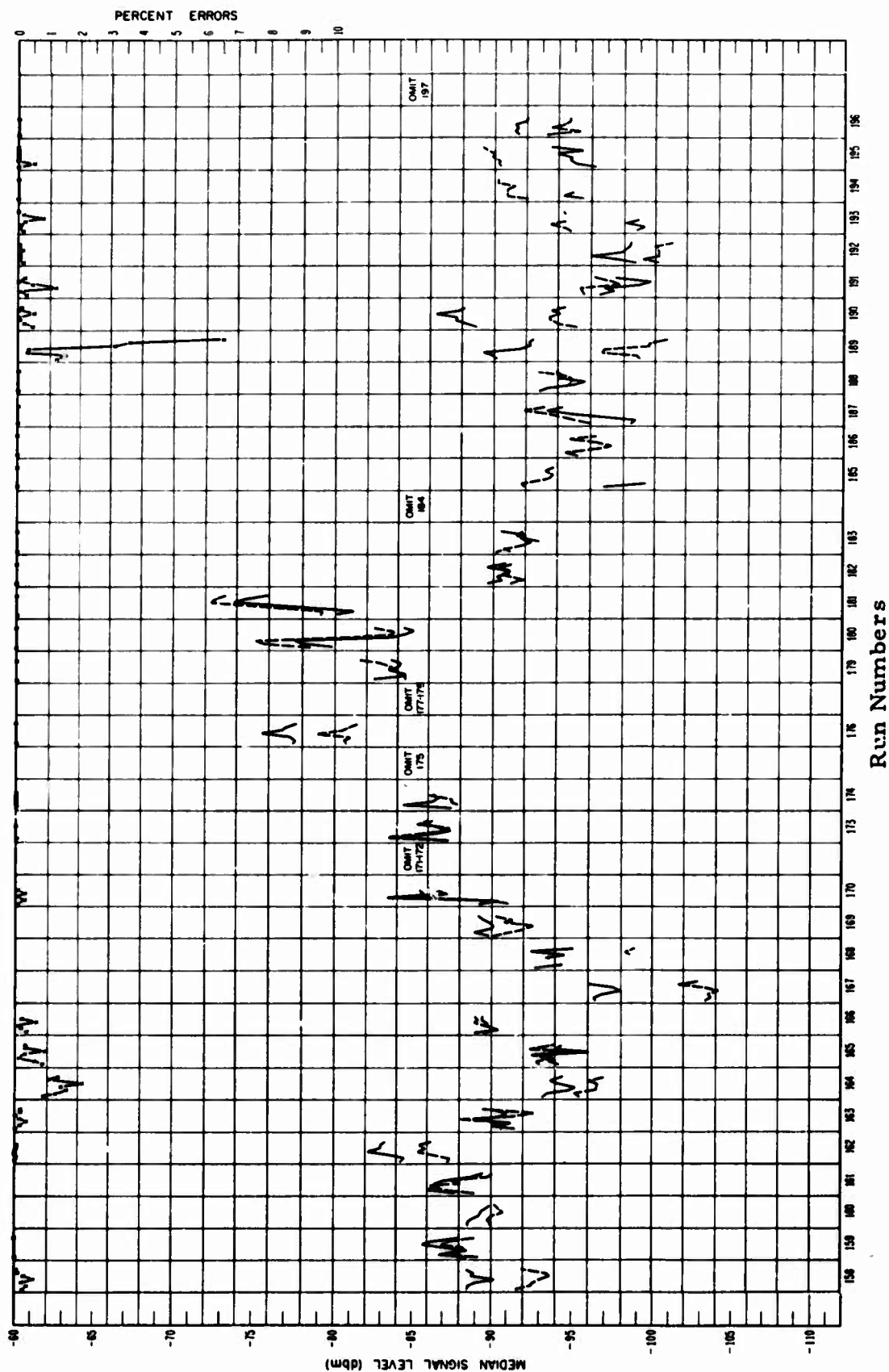
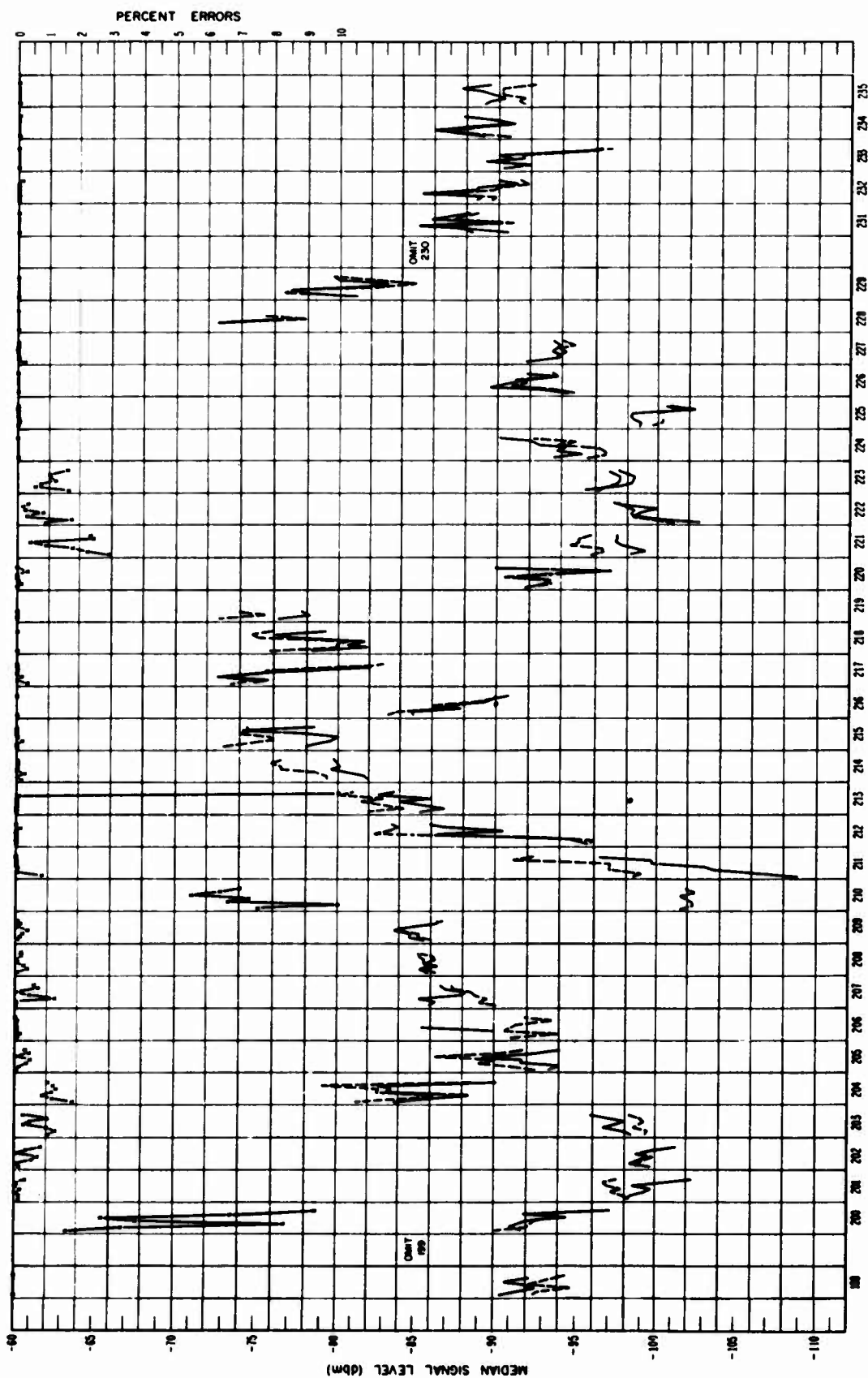


FIGURE 4.5. Medians and Frederick error rates for the Δ Mod system



Run Numbers

FIGURE 46. Medians and Frederick error rates for the Δ Mod system.

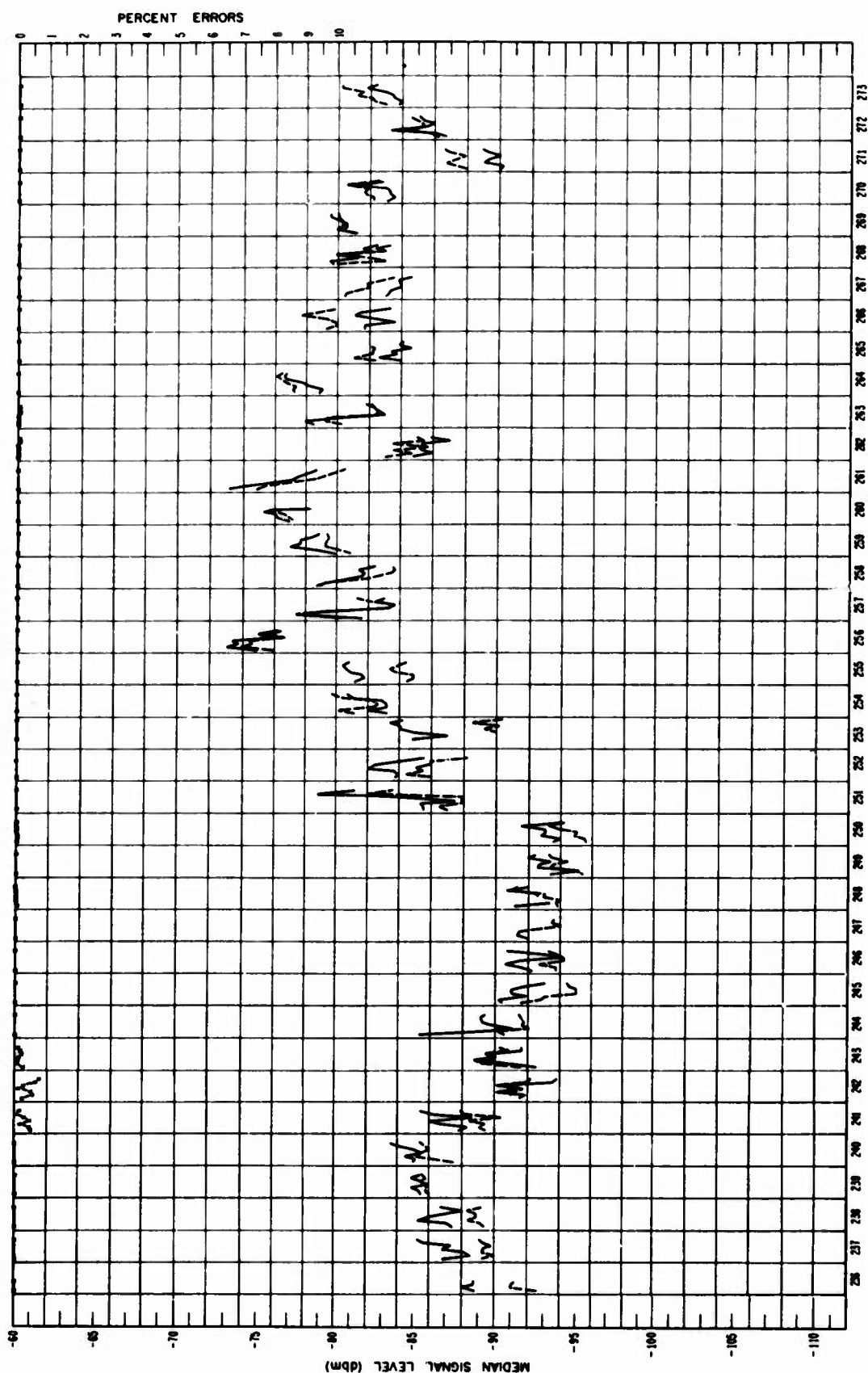


FIGURE 47. Medians and Frederick error rates for the Δ Mod system

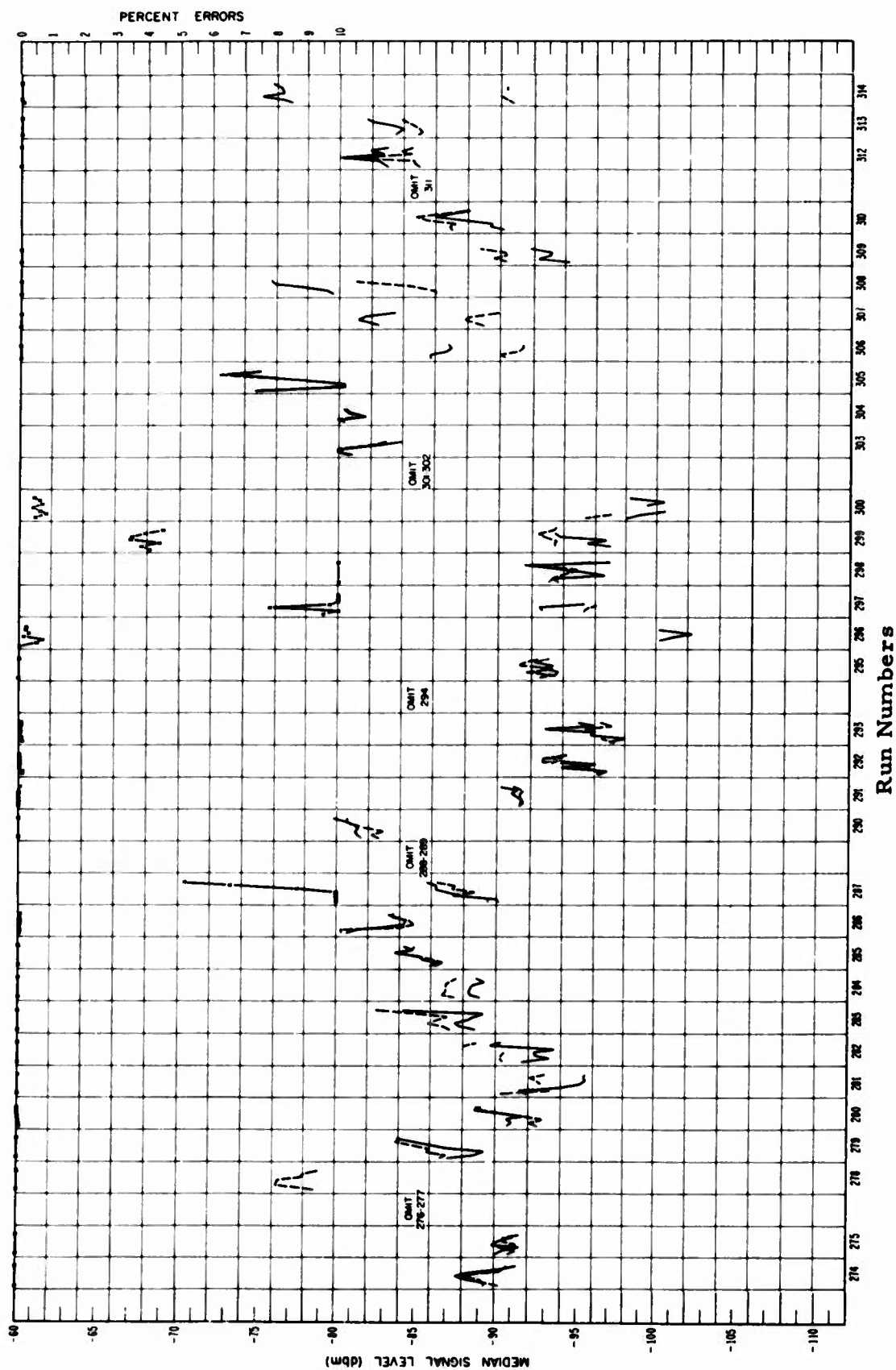


FIGURE 48. Medians and Frederick error rates for the Δ Mod system.

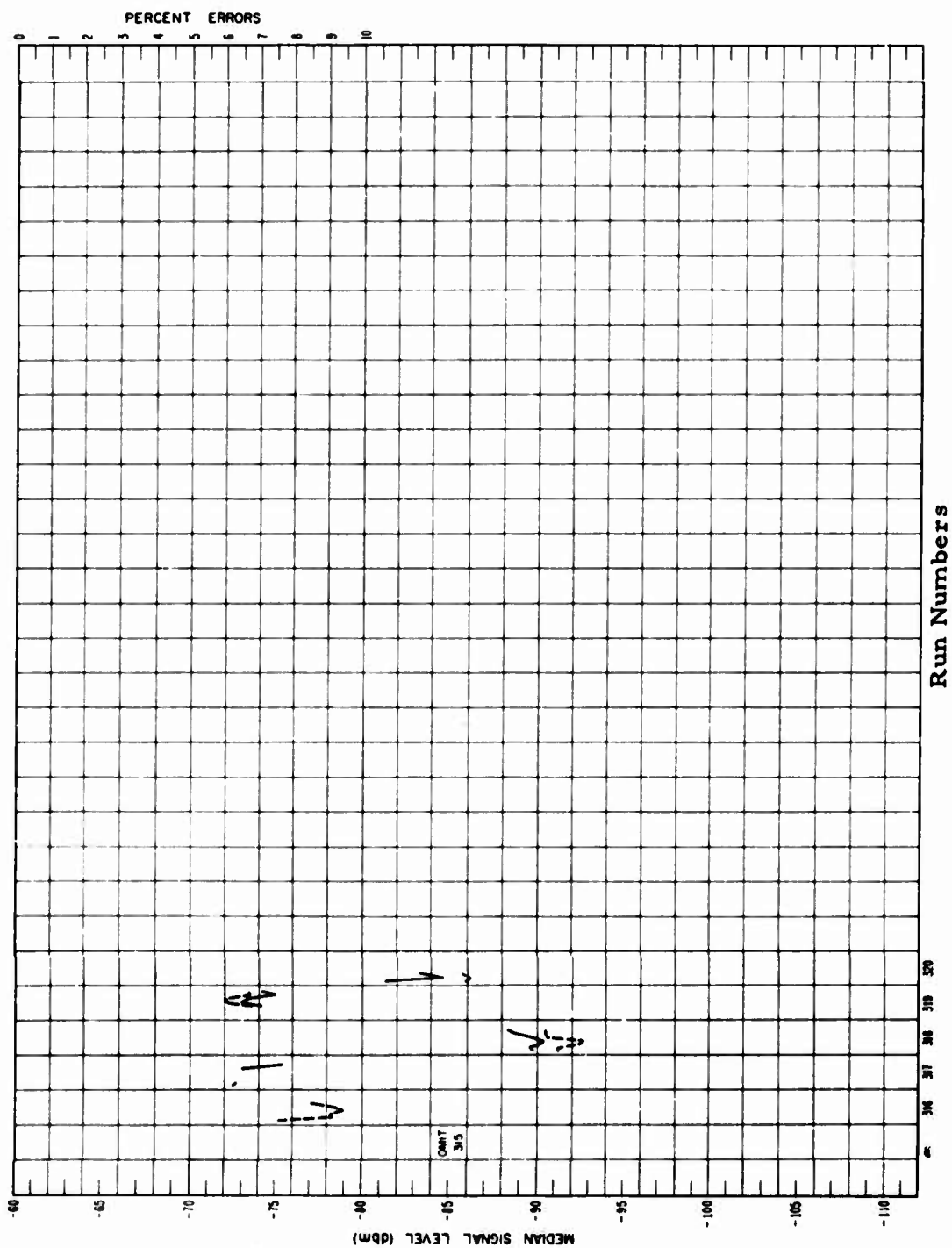
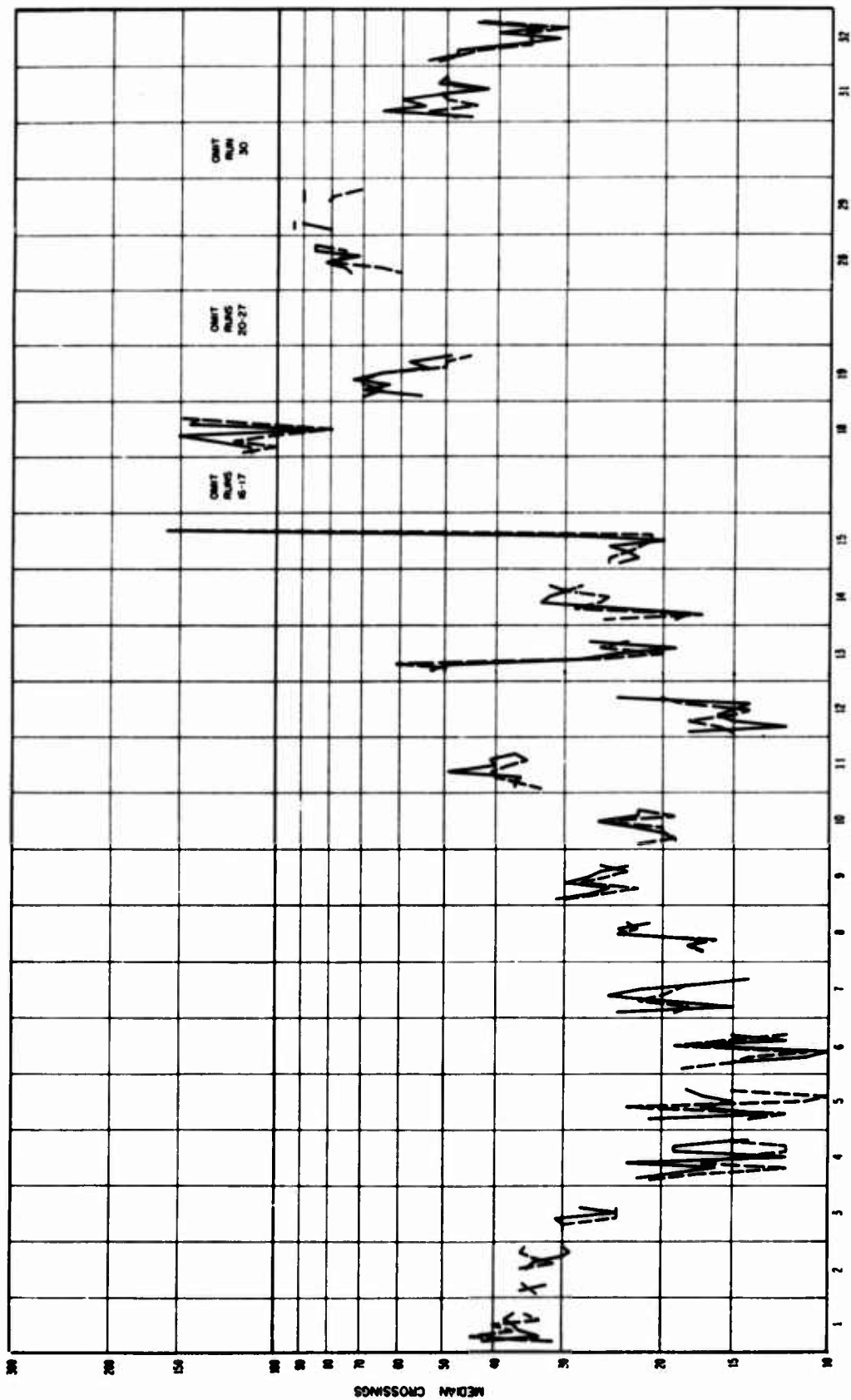


FIGURE 49. Medians and Frederick error rates for the Δ Mod system.



Run Numbers

Figure 50. Median crossings for the FDM system.

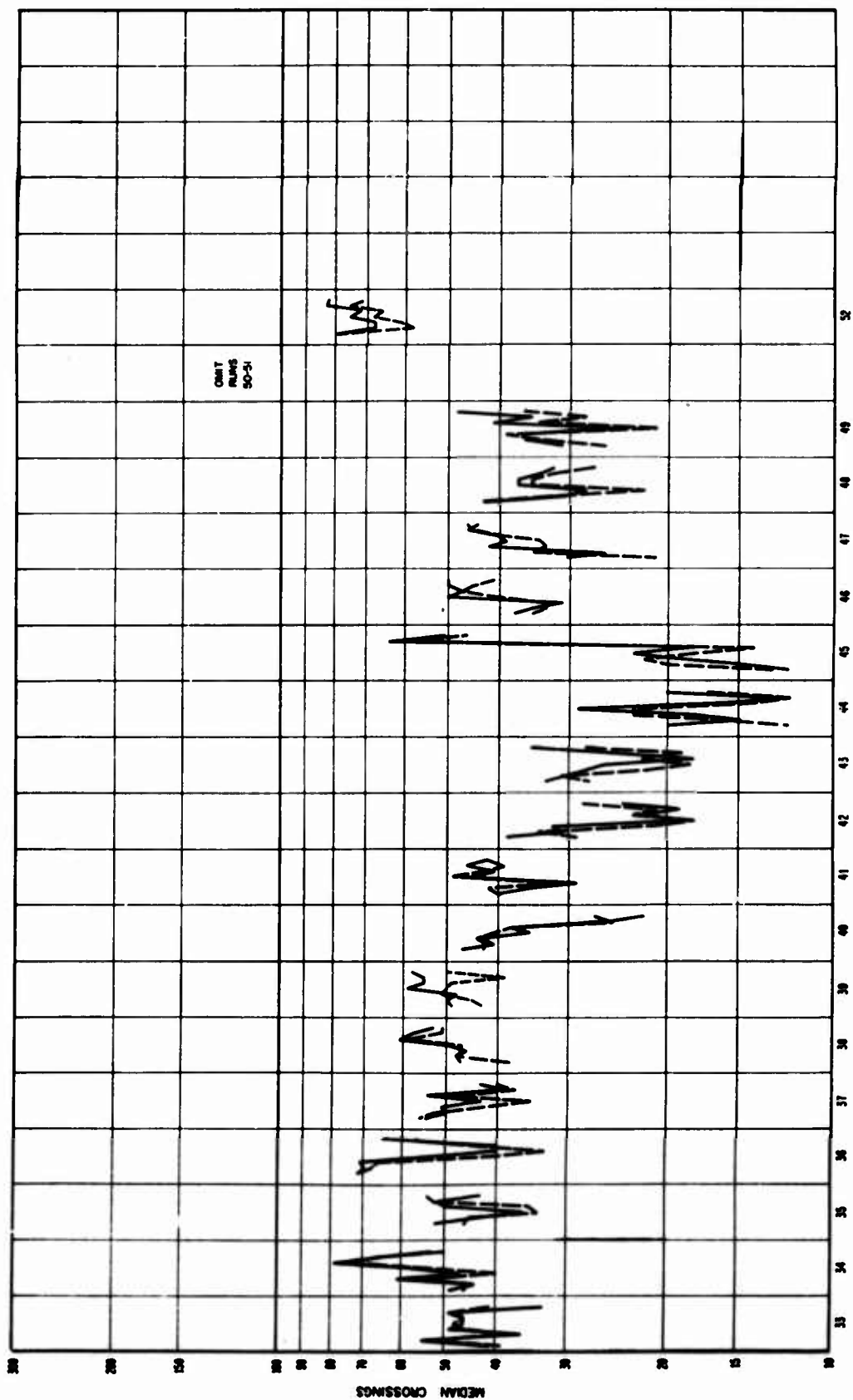


Figure 51. Median crossings for the FDM system.

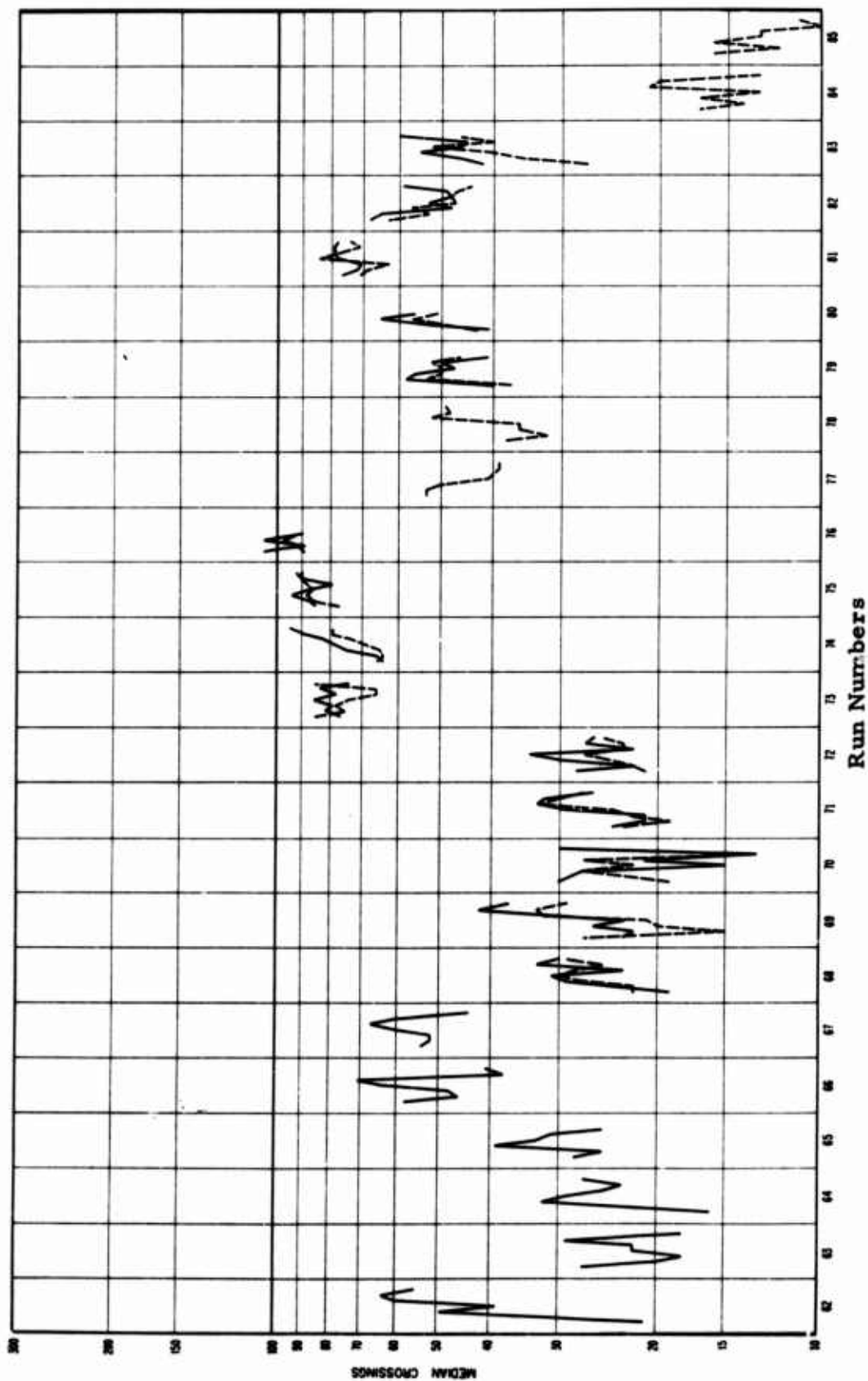
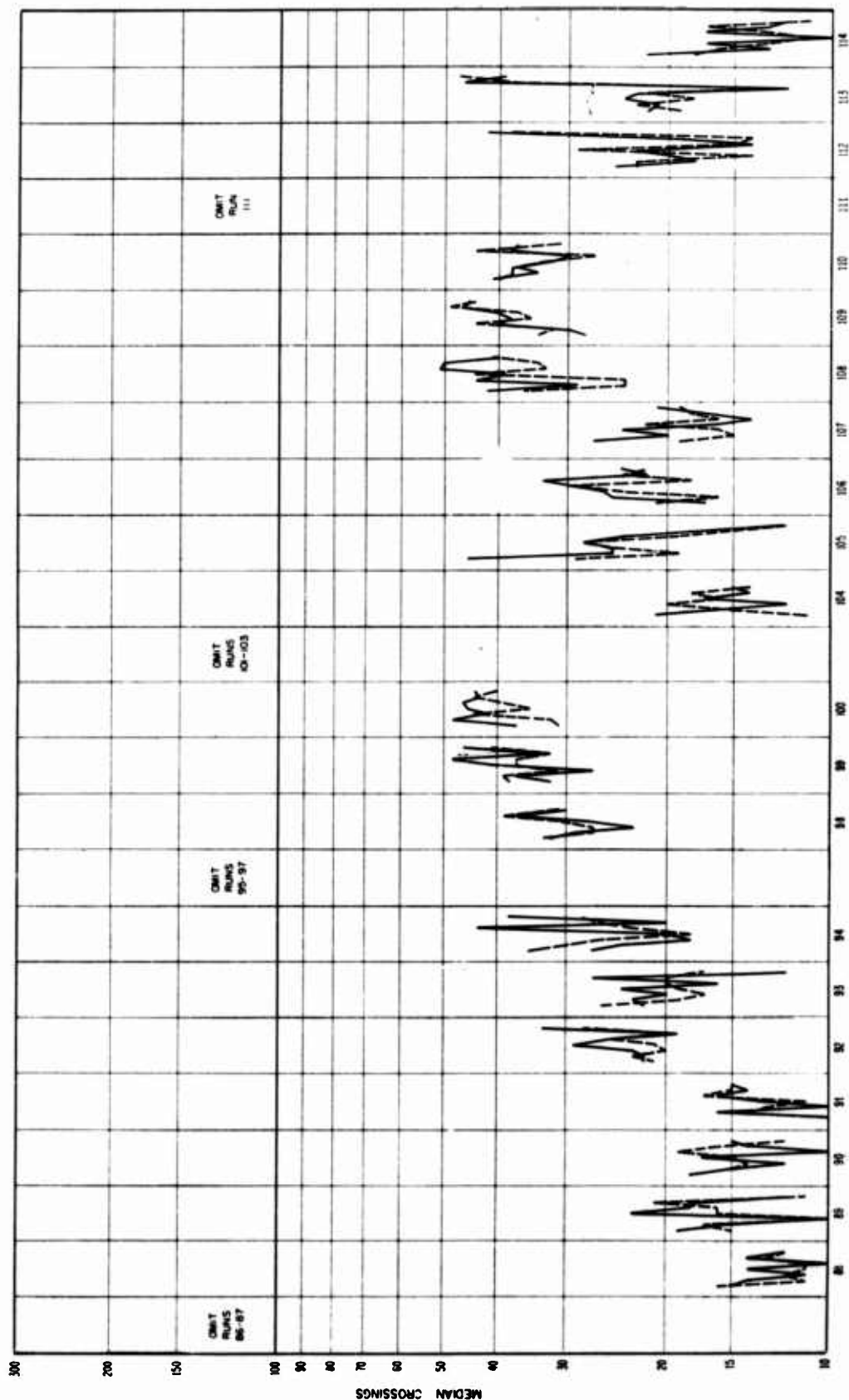
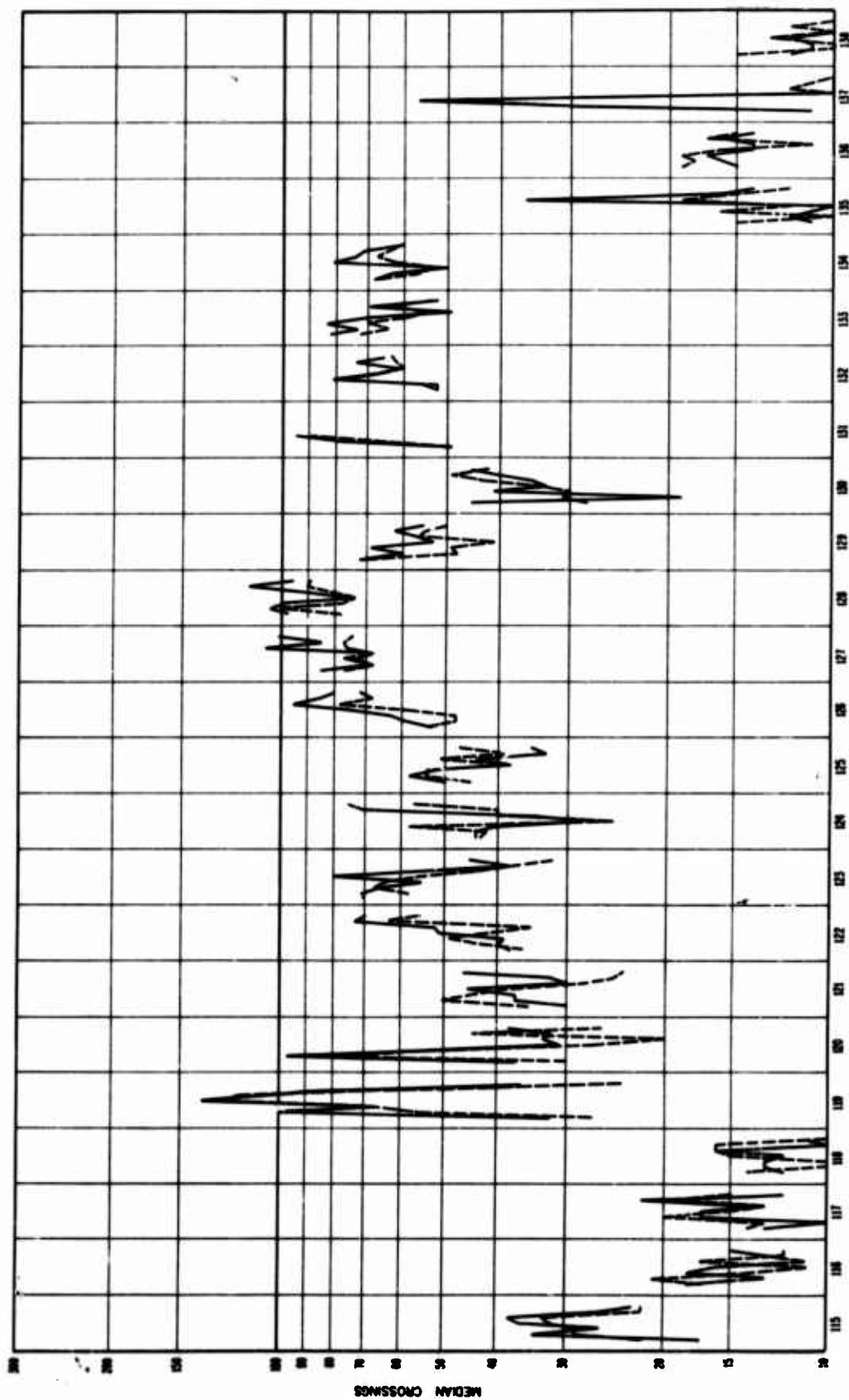


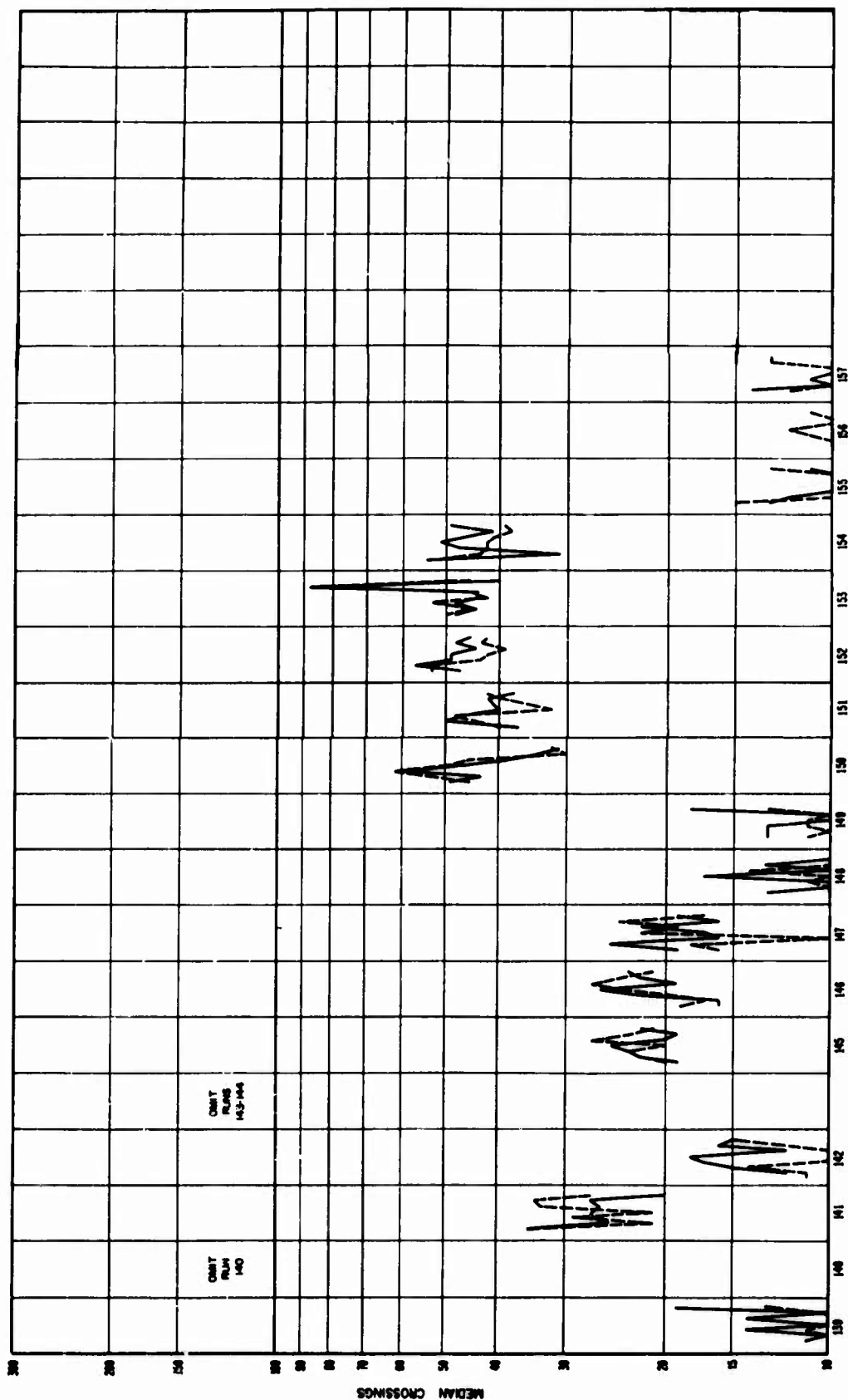
Figure 52. Median crossings for the FDM system.



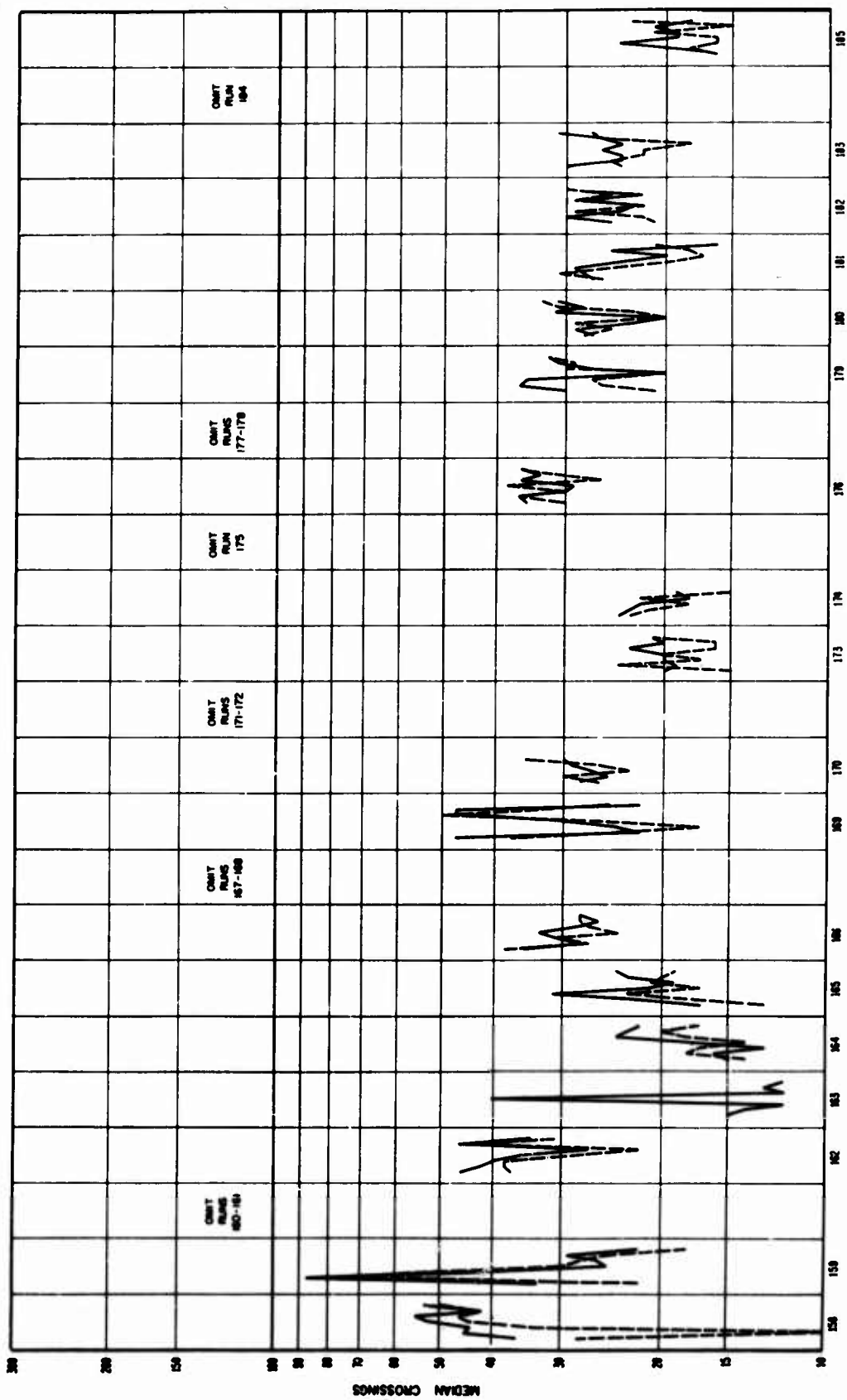
Run Numbers
Figure 53. Median crossings for the FDM system.



Run Numbers
Figure 54. Median crossings for the FDM system.



Run Numbers
Figure 55. Median crossings for the FDM system.



Run Numbers
Figure 56. Median crossings for the FDM system.

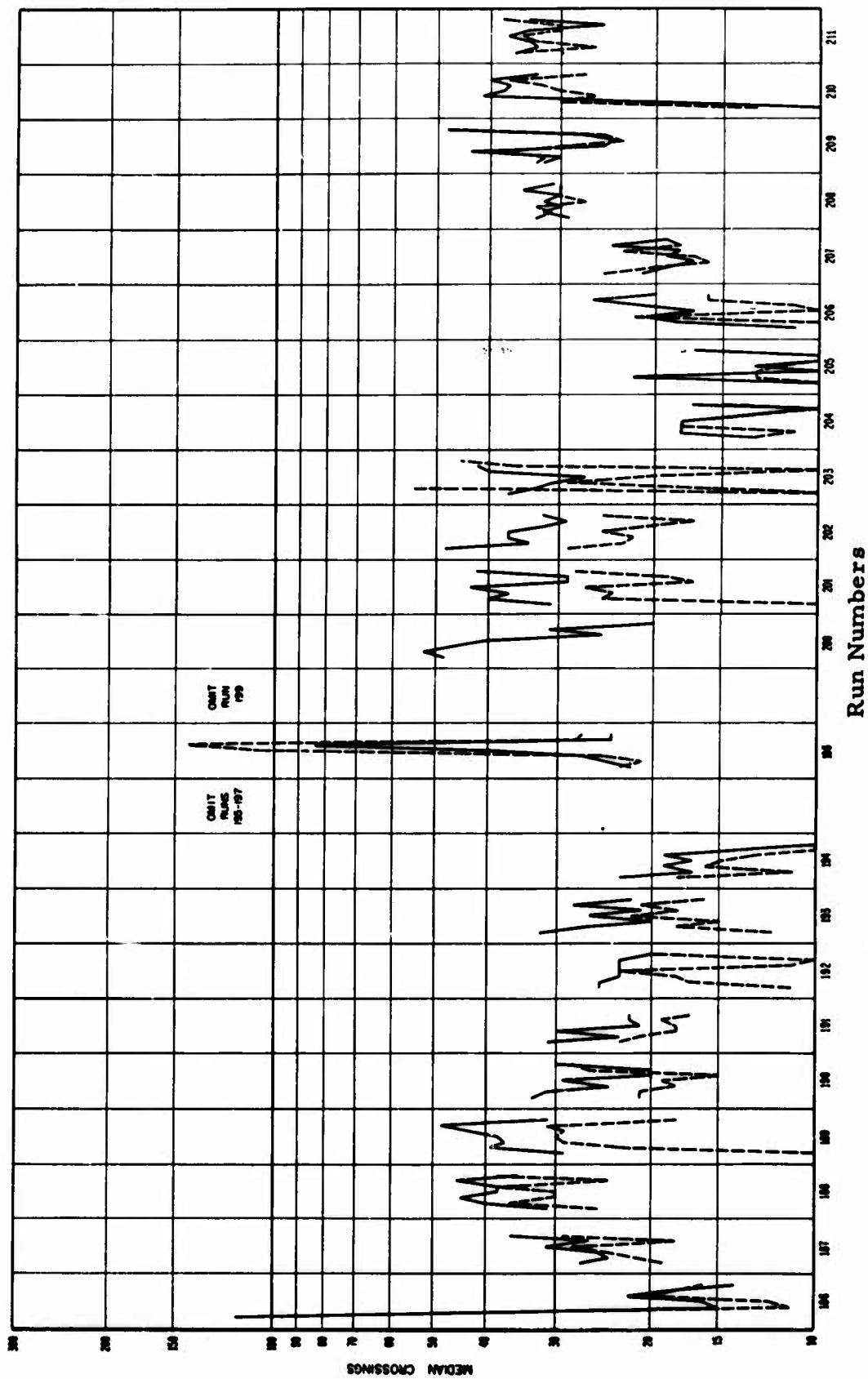


Figure 57. Median crossings for the FDM system.

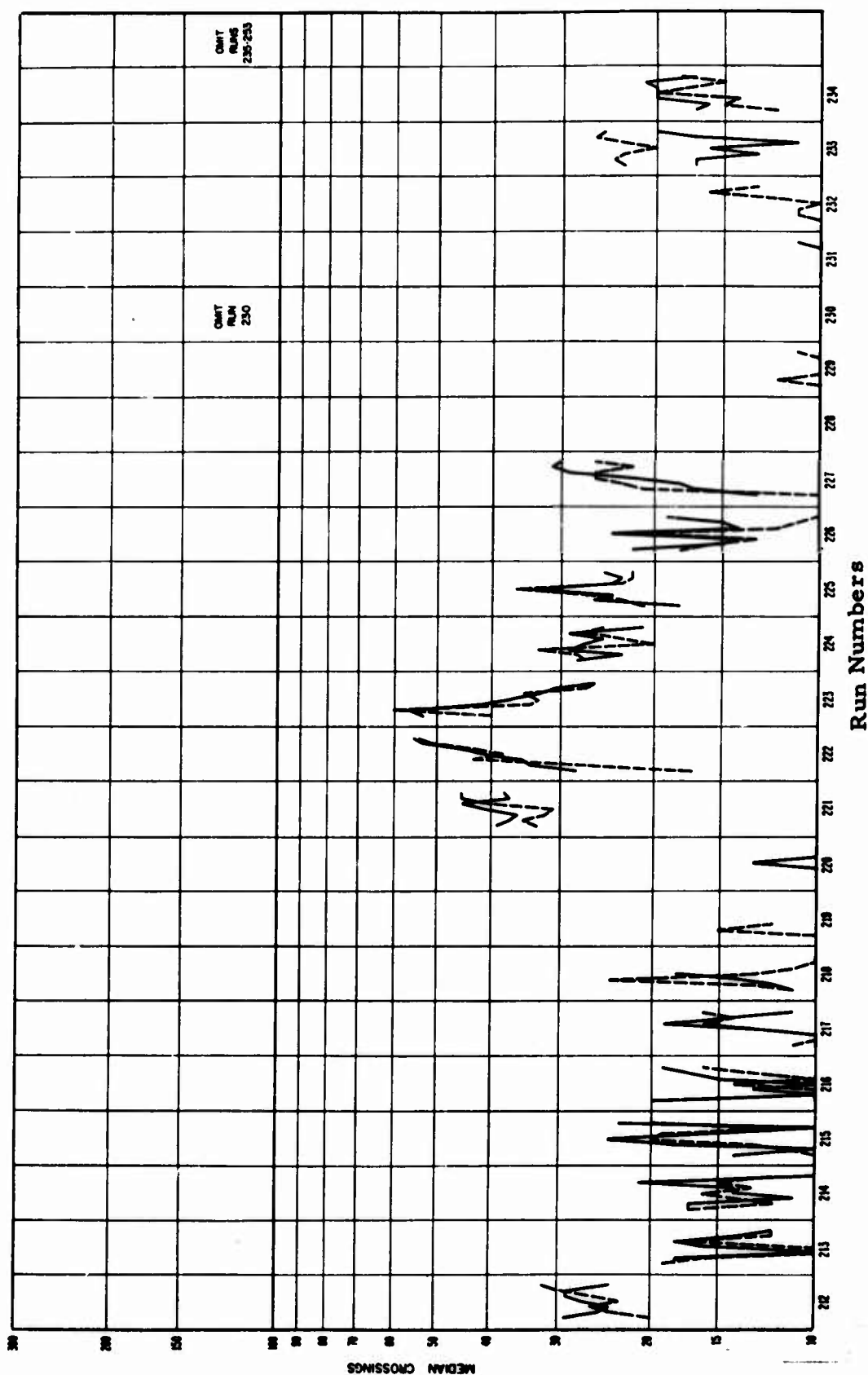
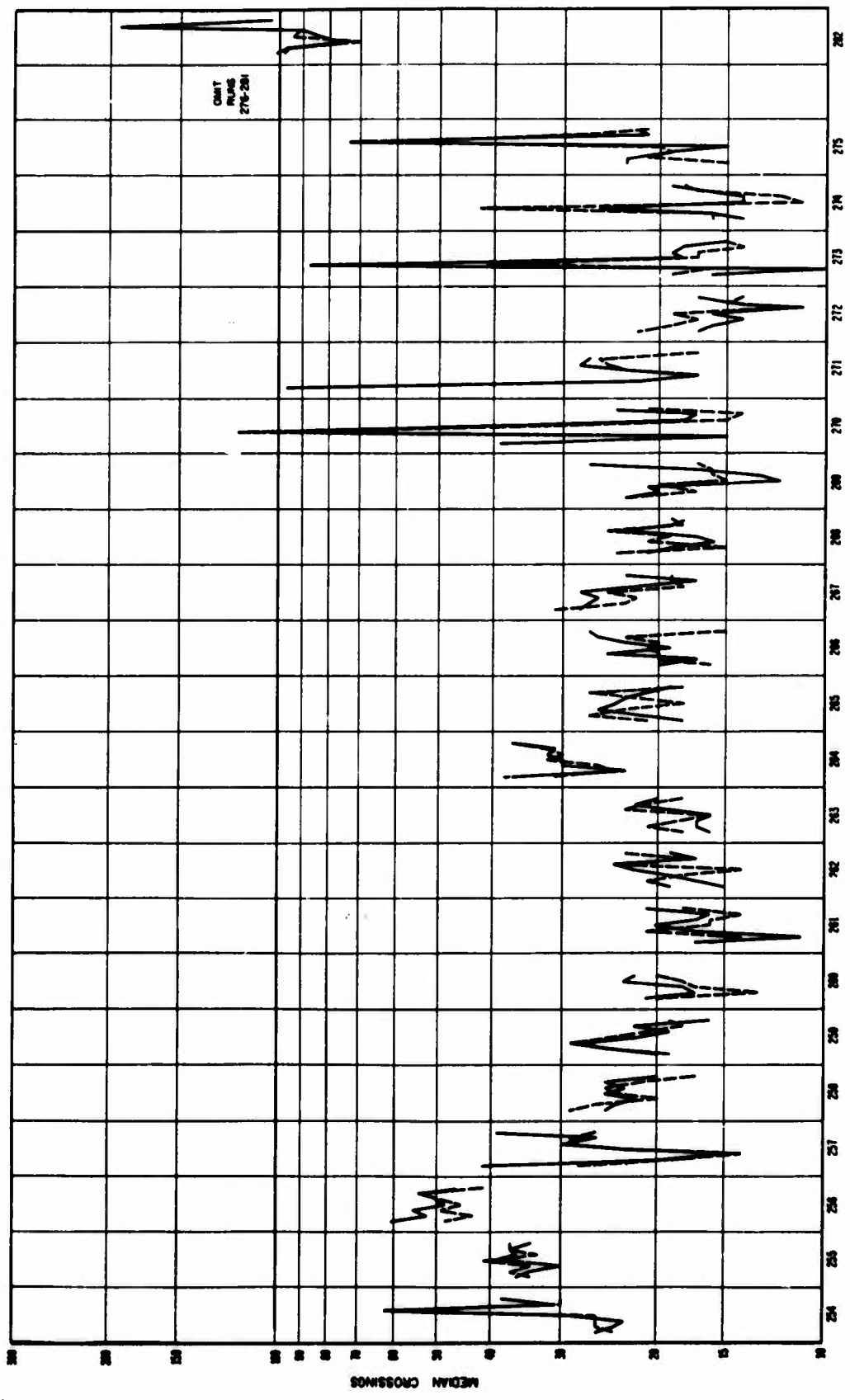


Figure 58. Median crossings for the FDM system.



Run Numbers
Figure 59. Median crossings for the FDM system.

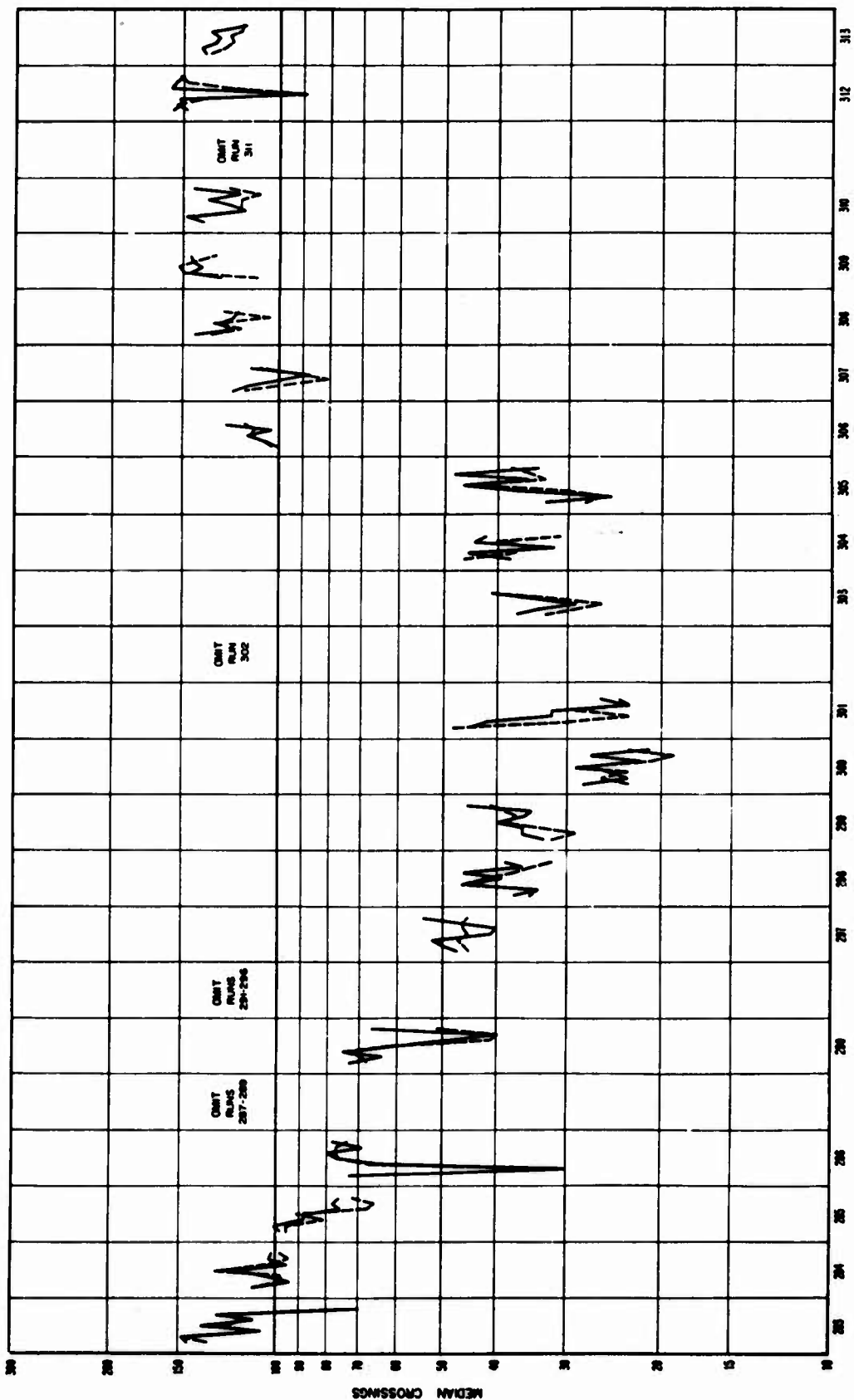
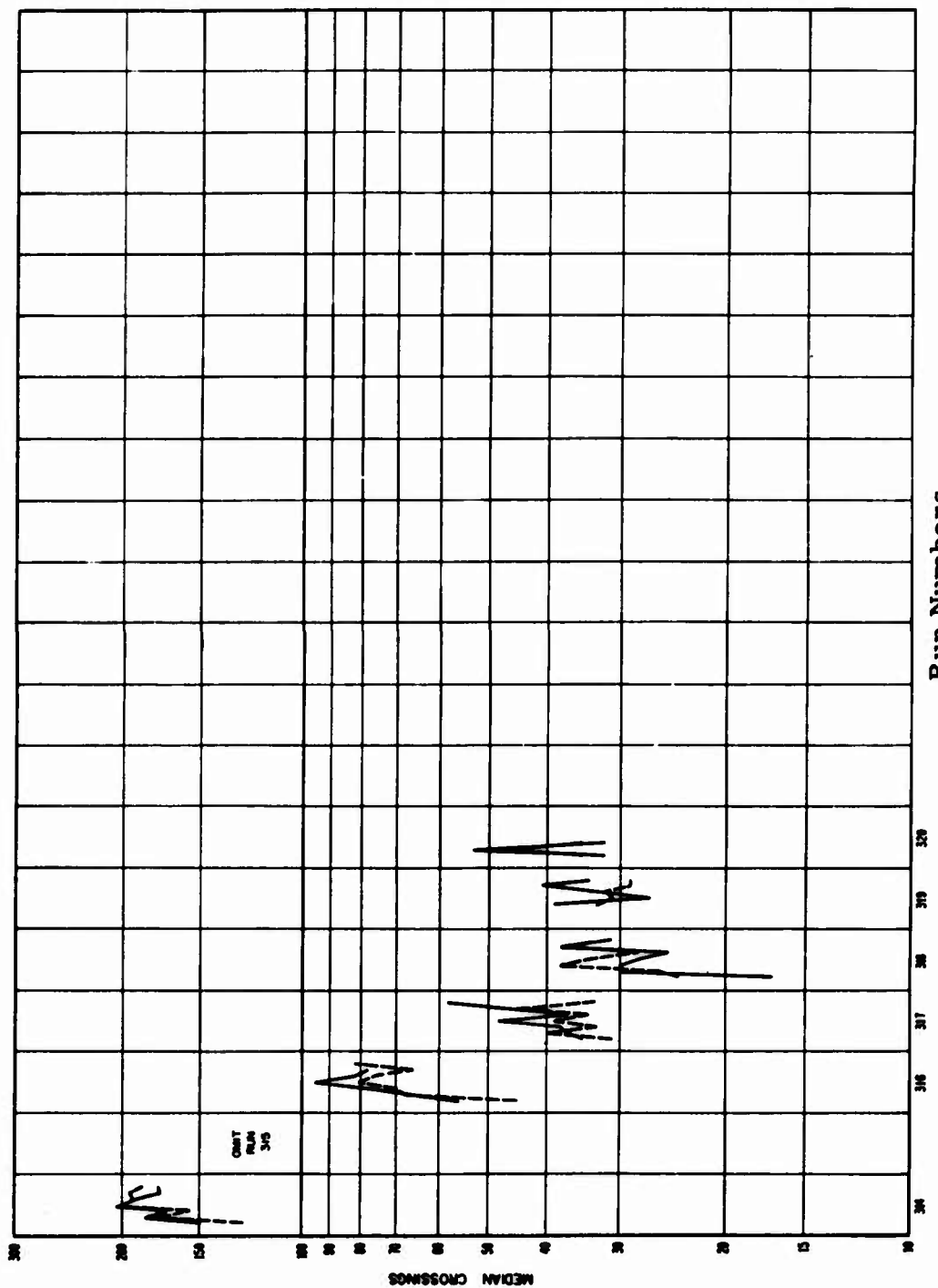


Figure 60. Median crossings for the FDM system.



Run Numbers
Figure 61. Median crossings for the FDM system.

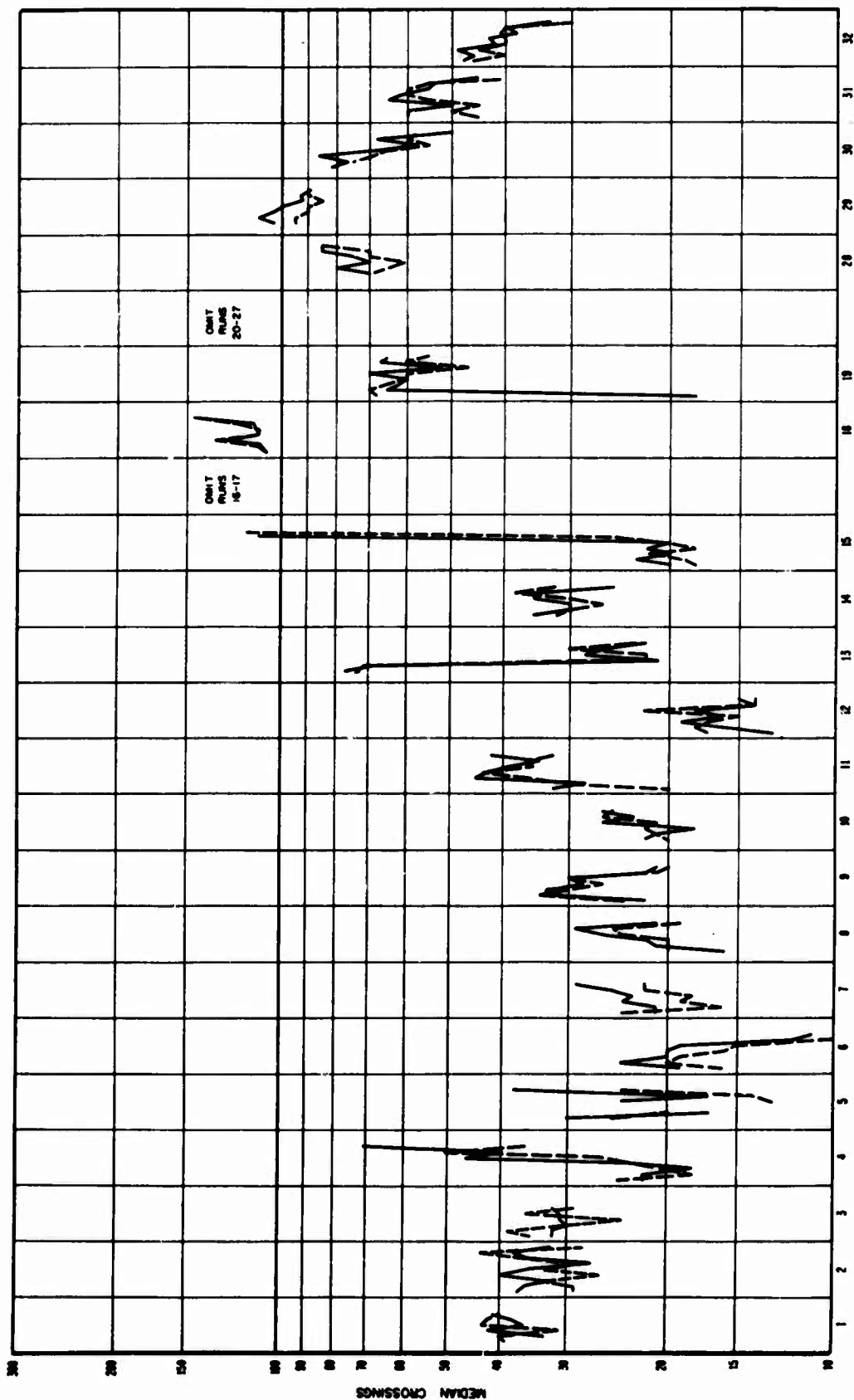


Figure 62. Median crossings for the PCM system.

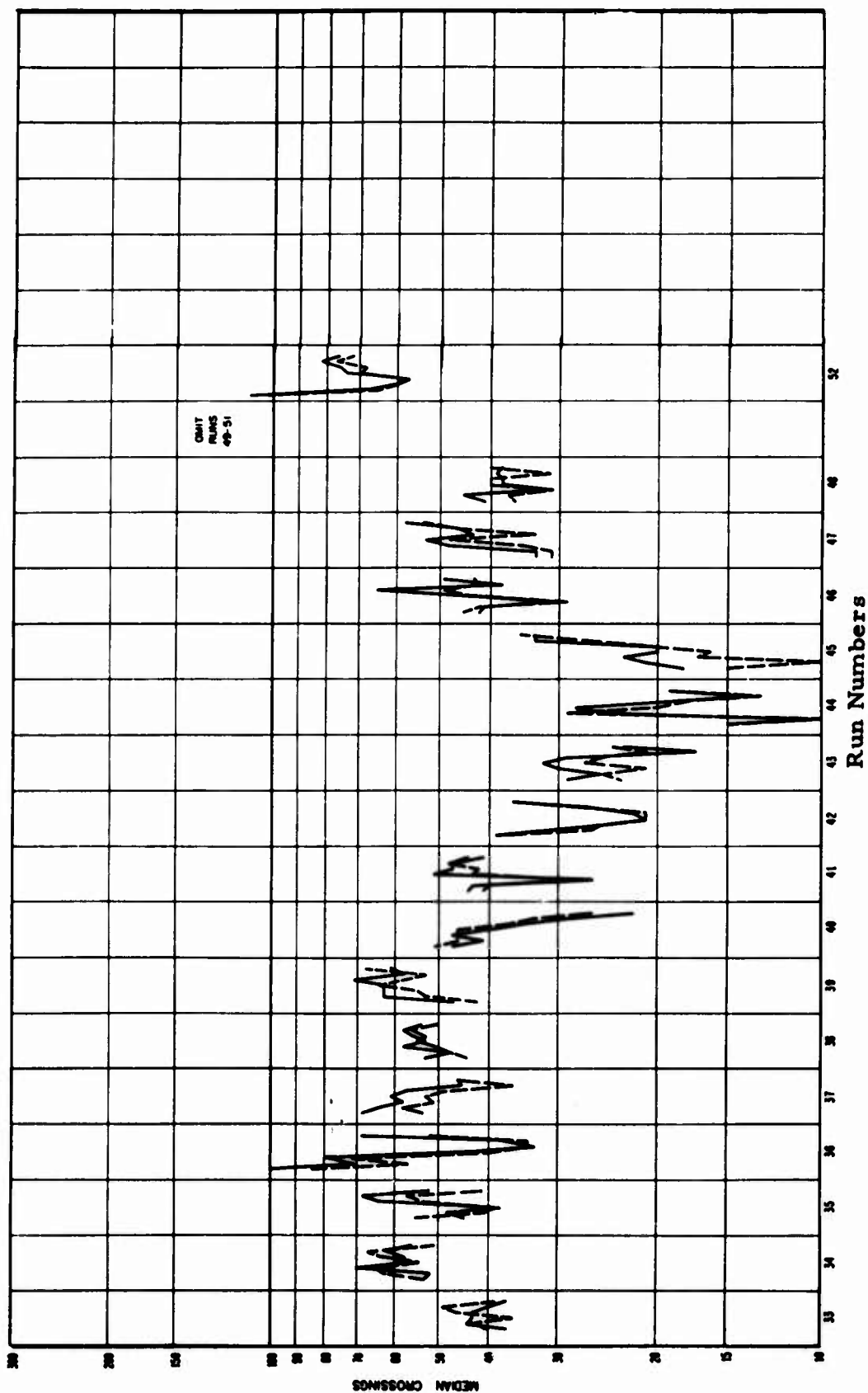


Figure 63. Median crossings for the PCM system.

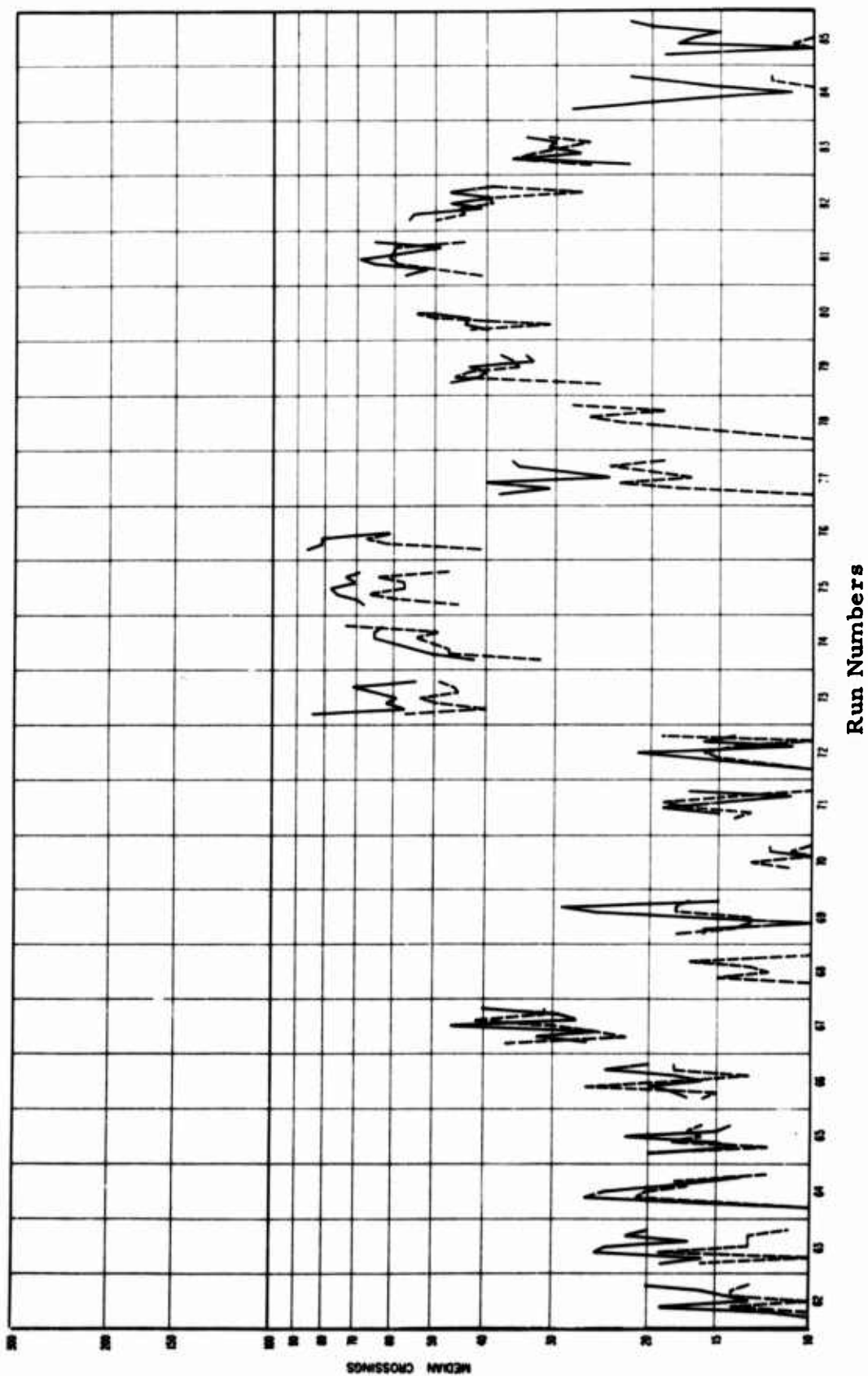


FIGURE 64. Median crossings for the PPM system.

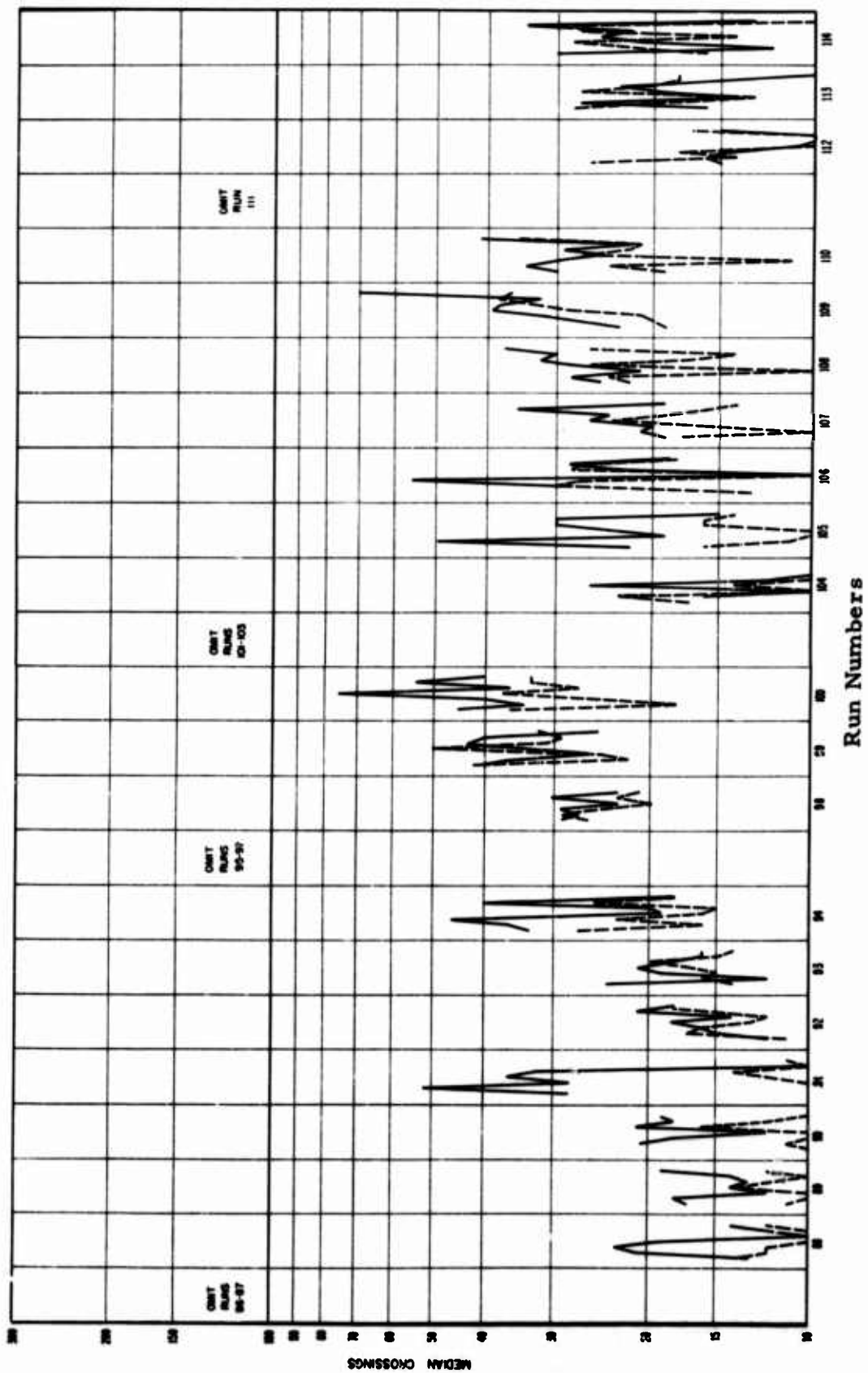


FIGURE 65. Median crossings for the PPM system.

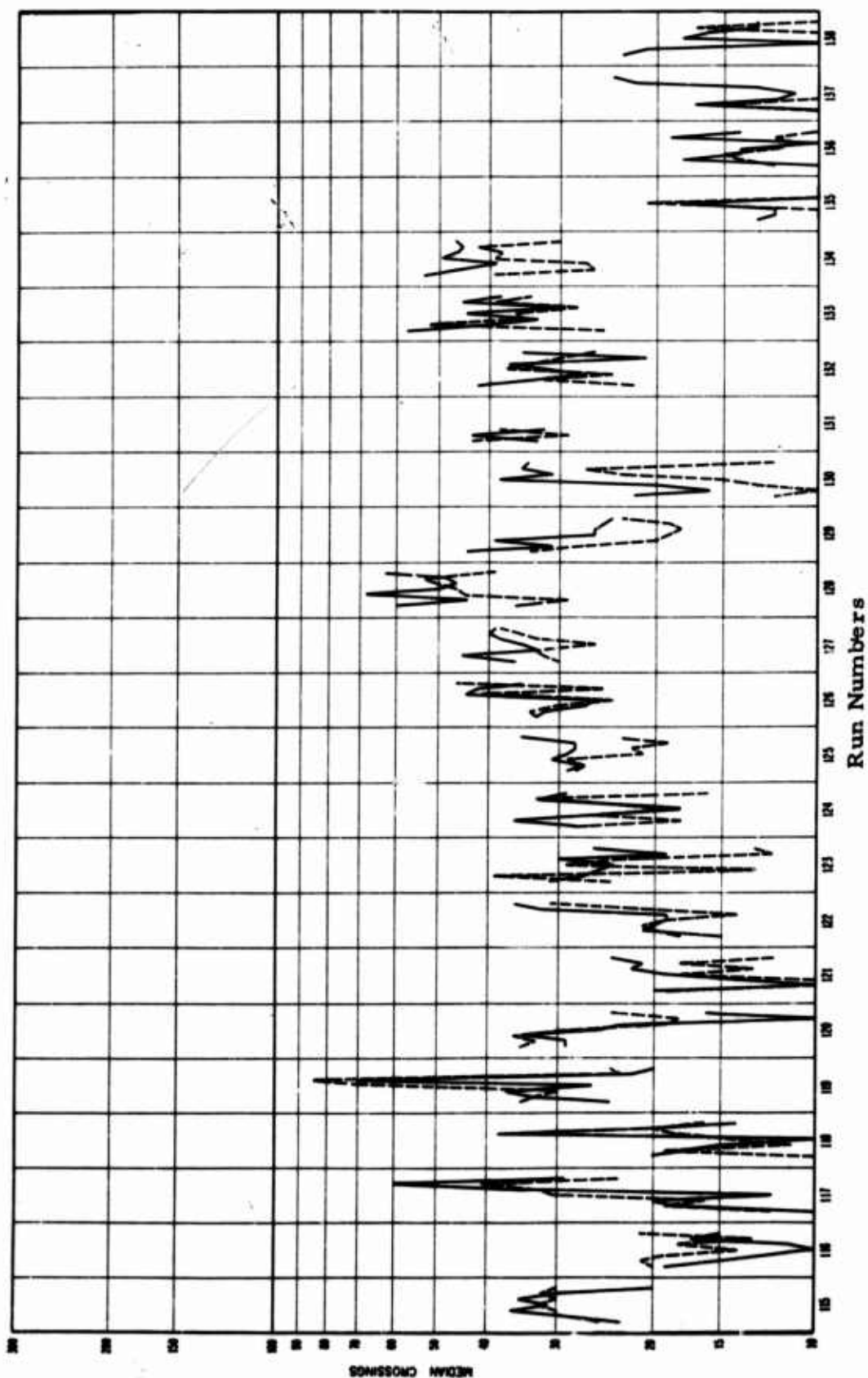


FIGURE 66. Median crossings for the PPM system.

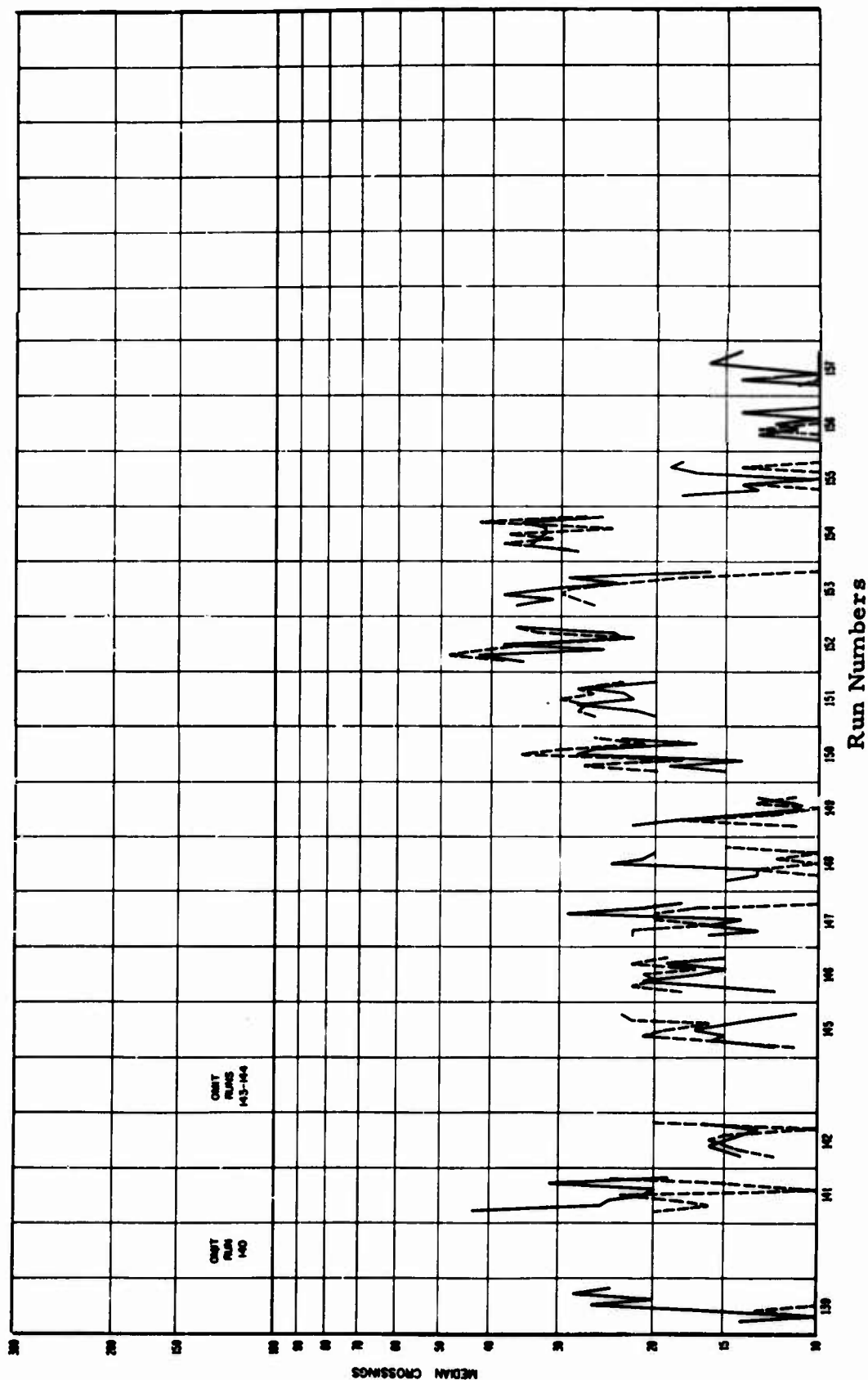


FIGURE 67. Median crossings for the PPM system.

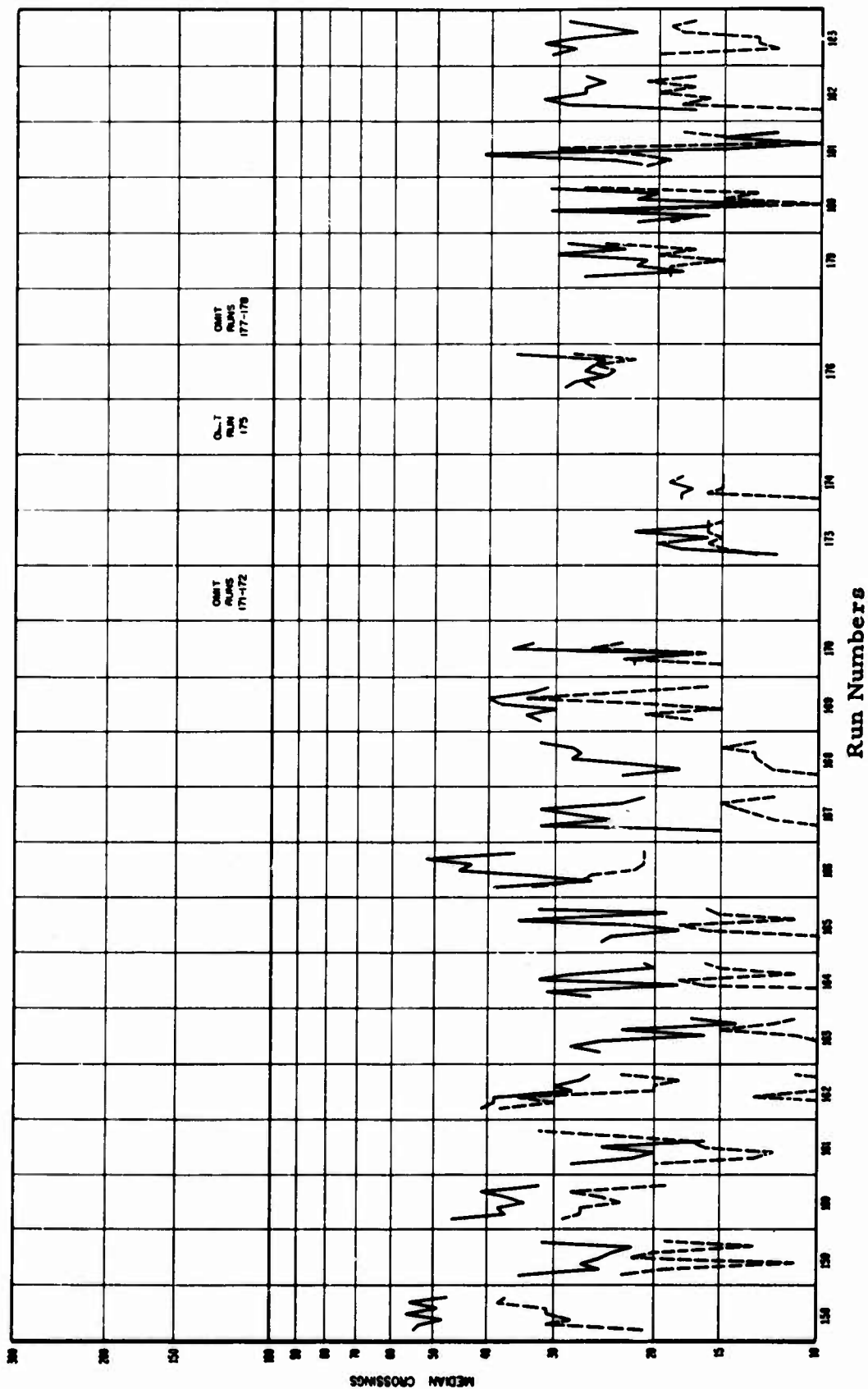
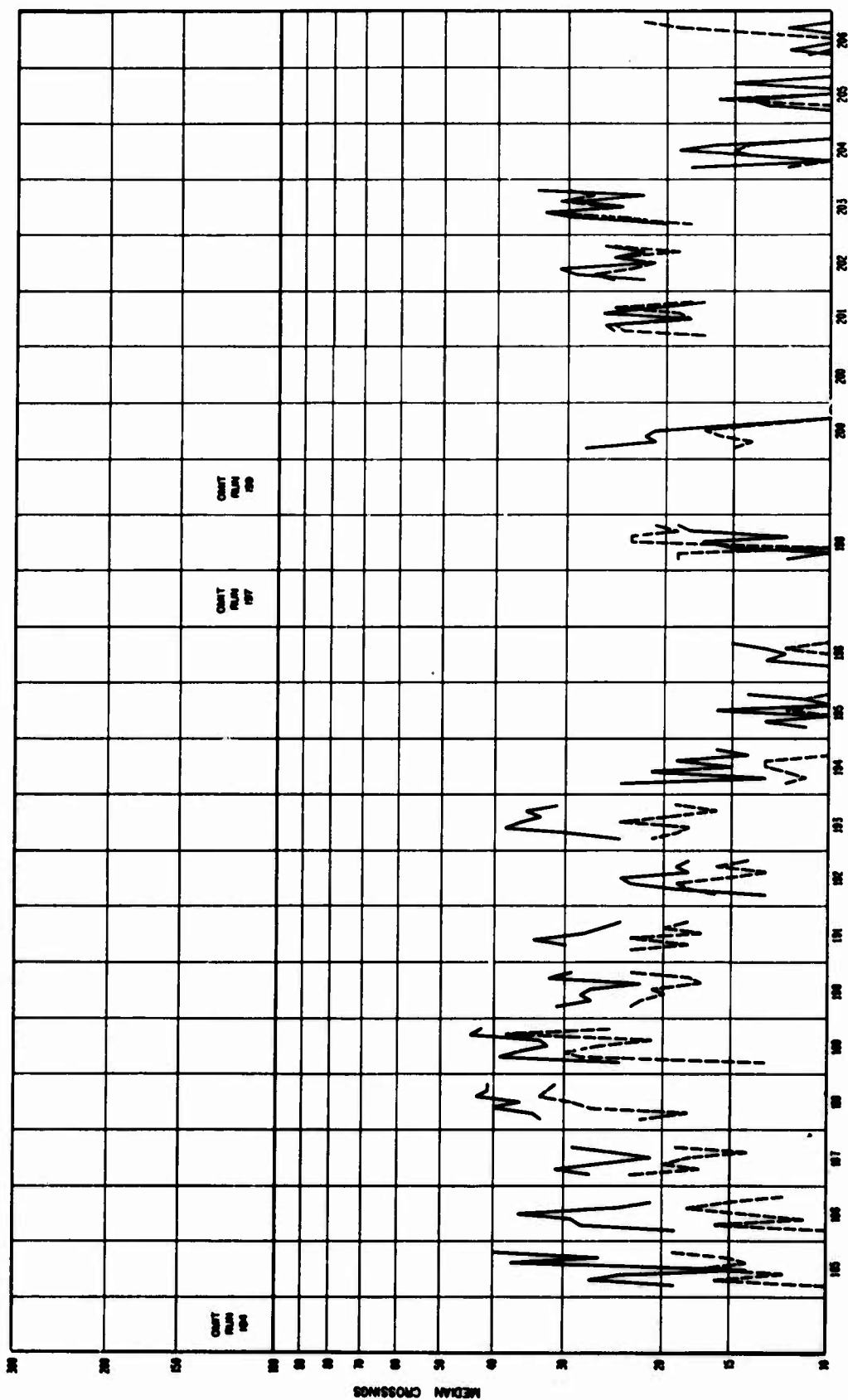


FIGURE 68. Median crossings for the Δ Mod system.



Run Numbers
FIGURE 69. Median crossings for the Δ Mod system.

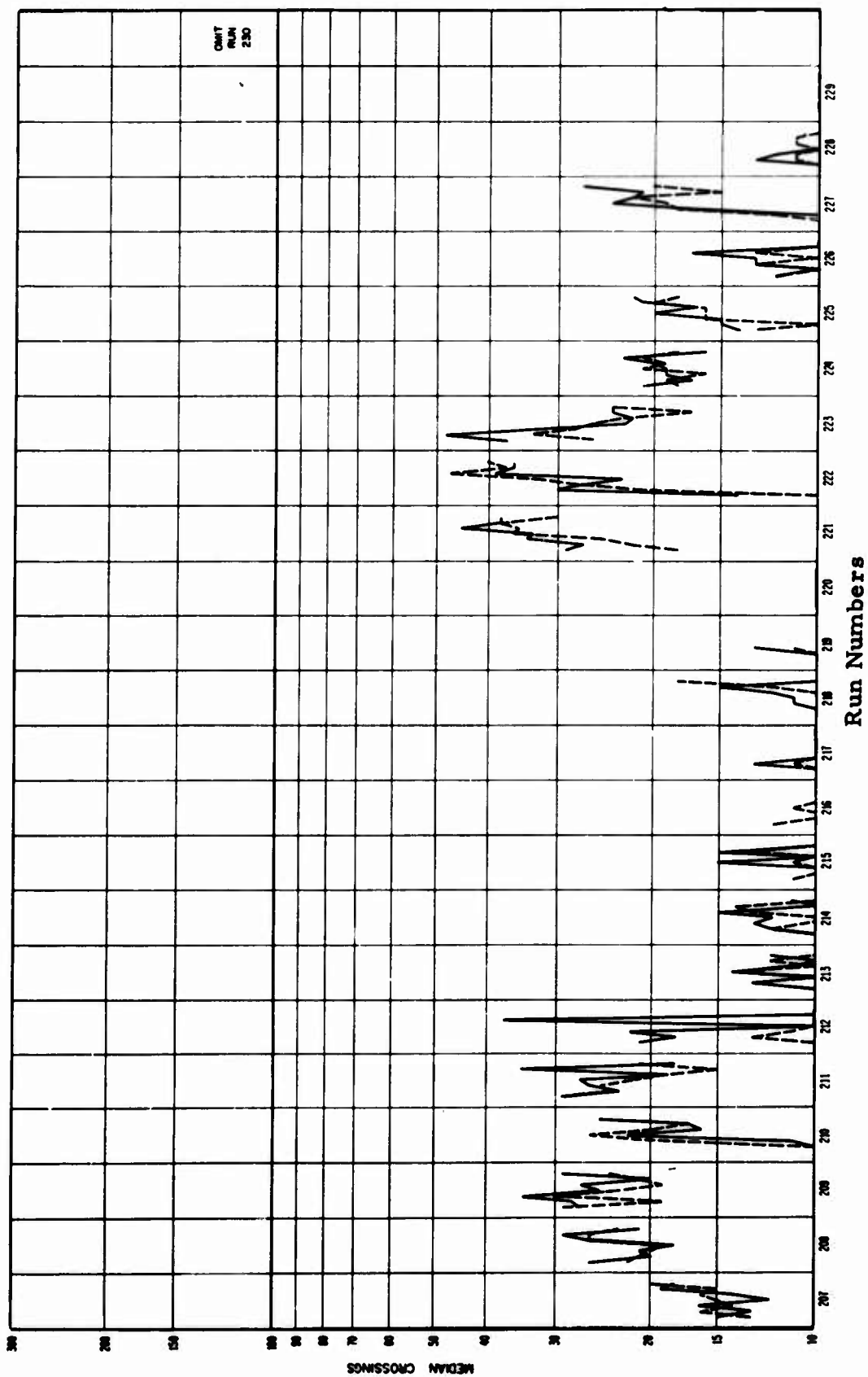


FIGURE 70. Median crossings for the Δ Mod system.

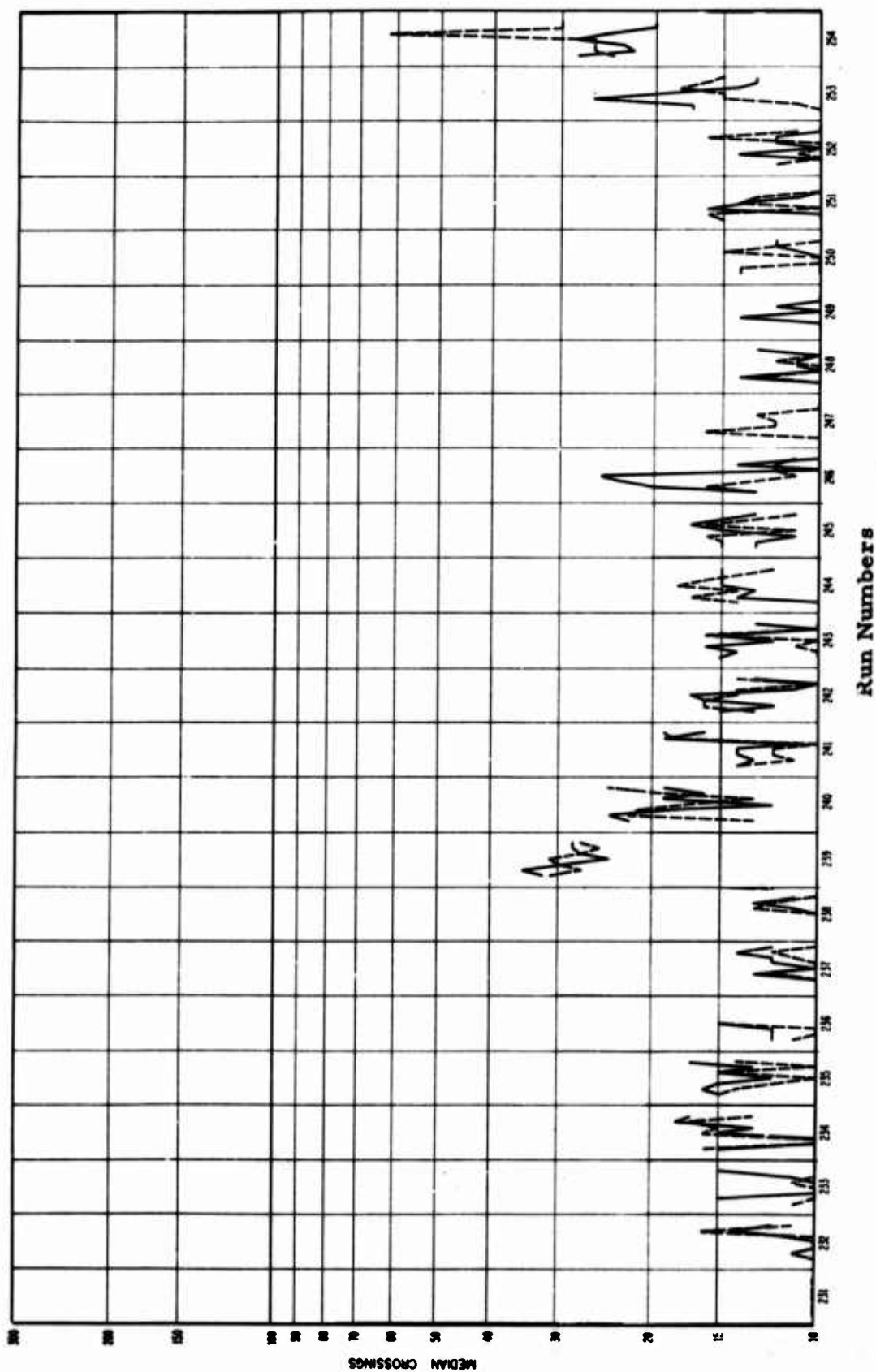


FIGURE 71. Median crossings for the Δ Mod system.

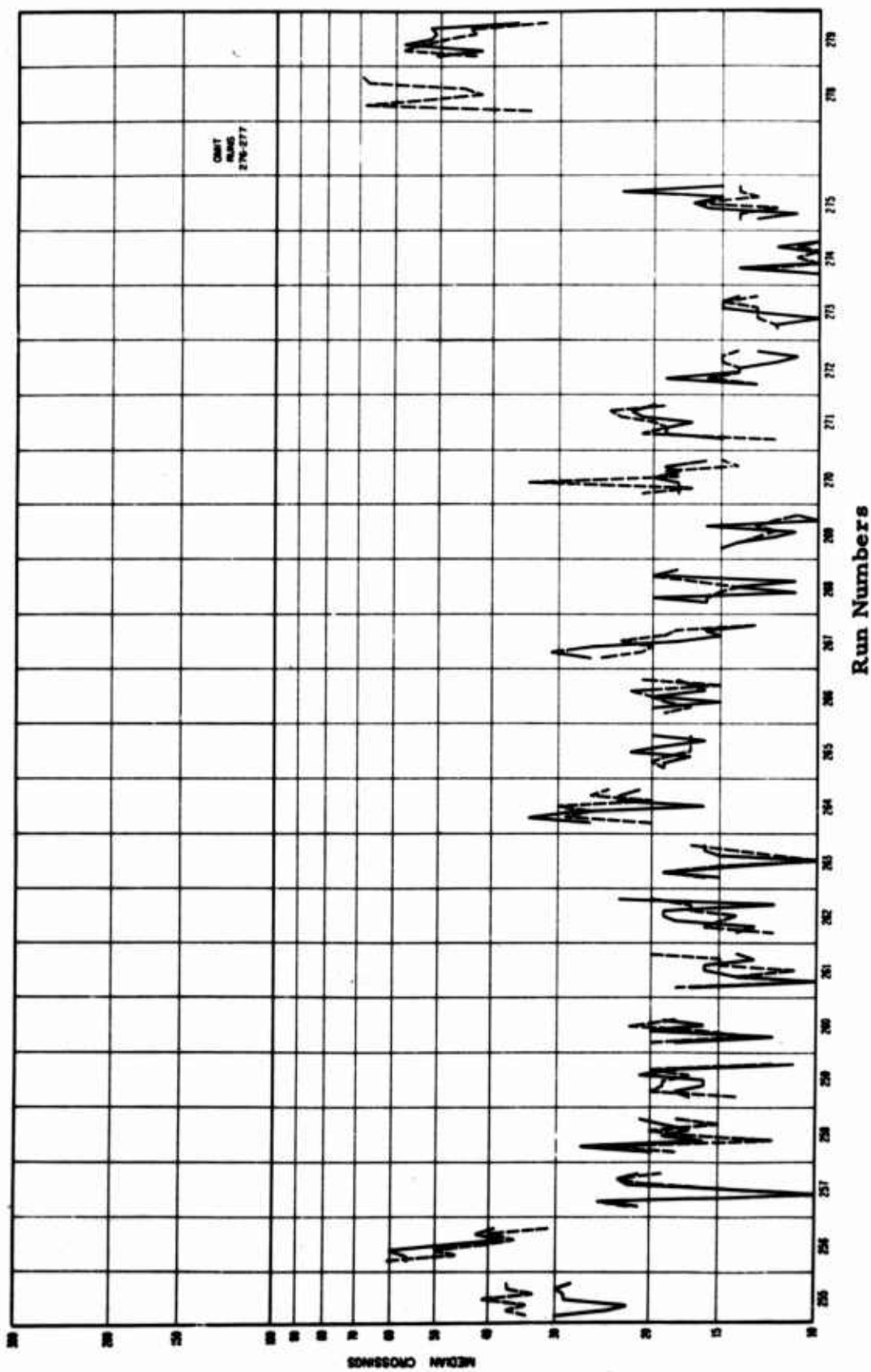
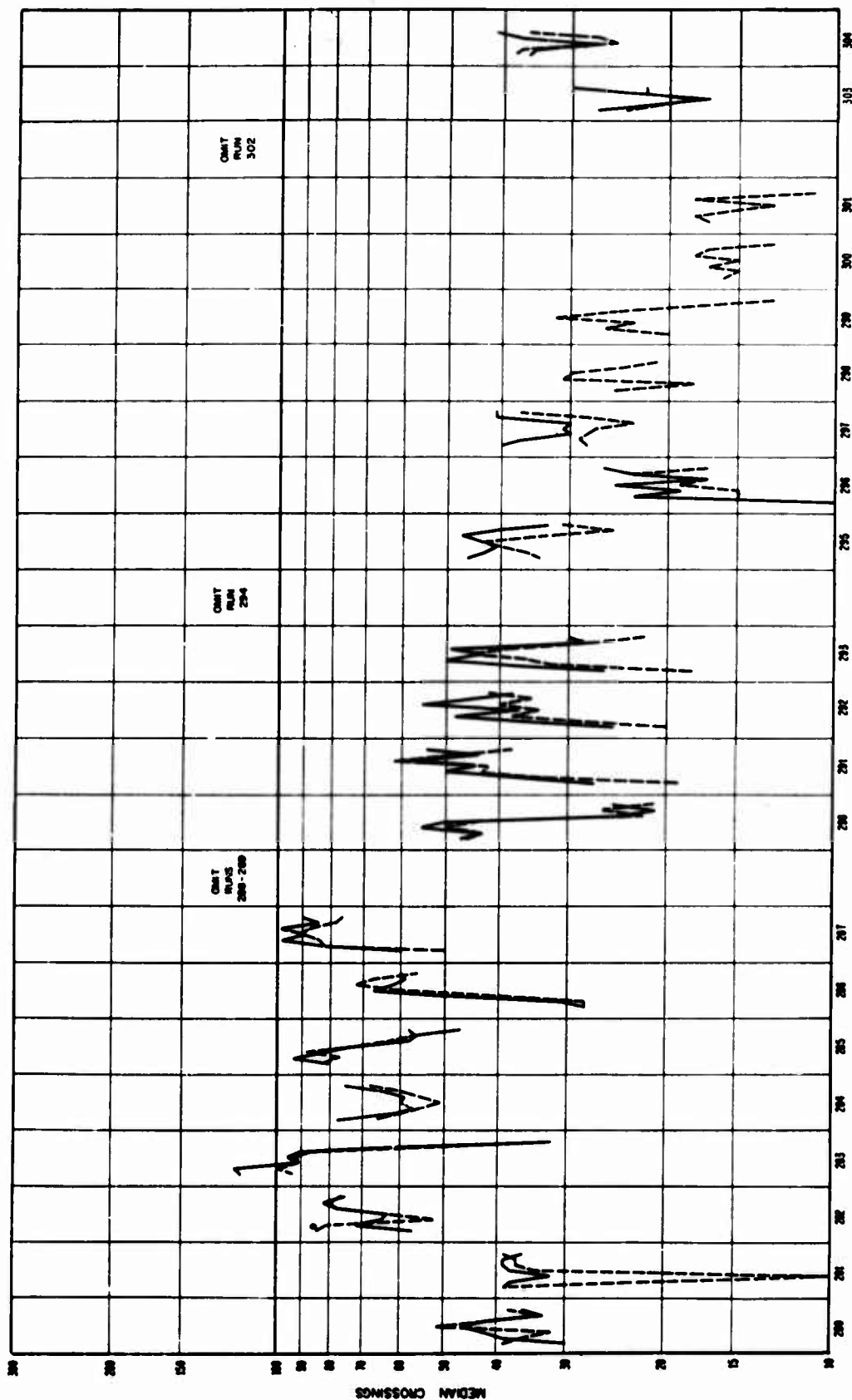


FIGURE 72. Median crossings for the Δ Mod System.



Run Numbers

FIGURE 73. Median crossings for the Δ Mod system.

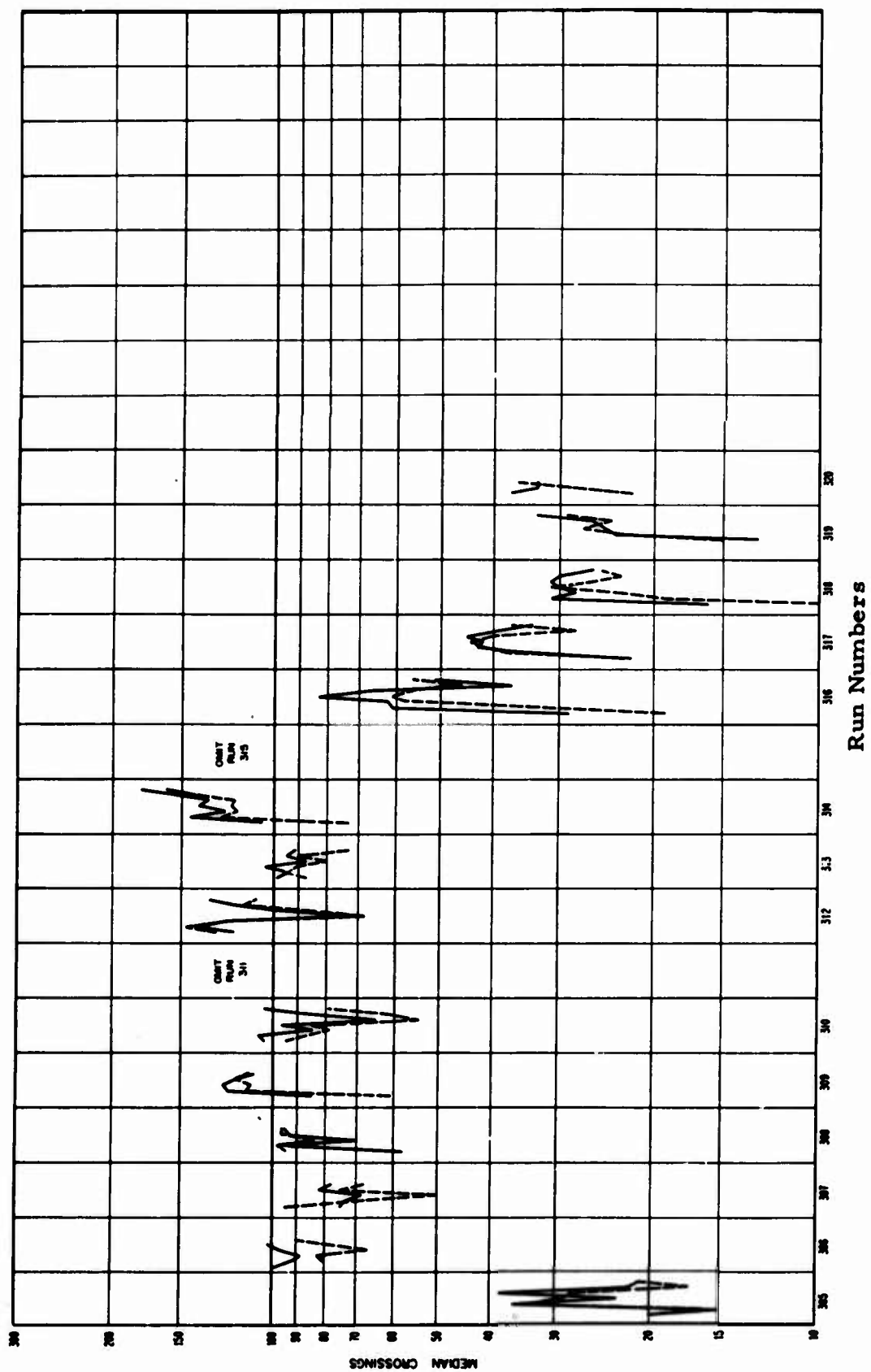


FIGURE 74. Median crossings for the Δ Mod system.

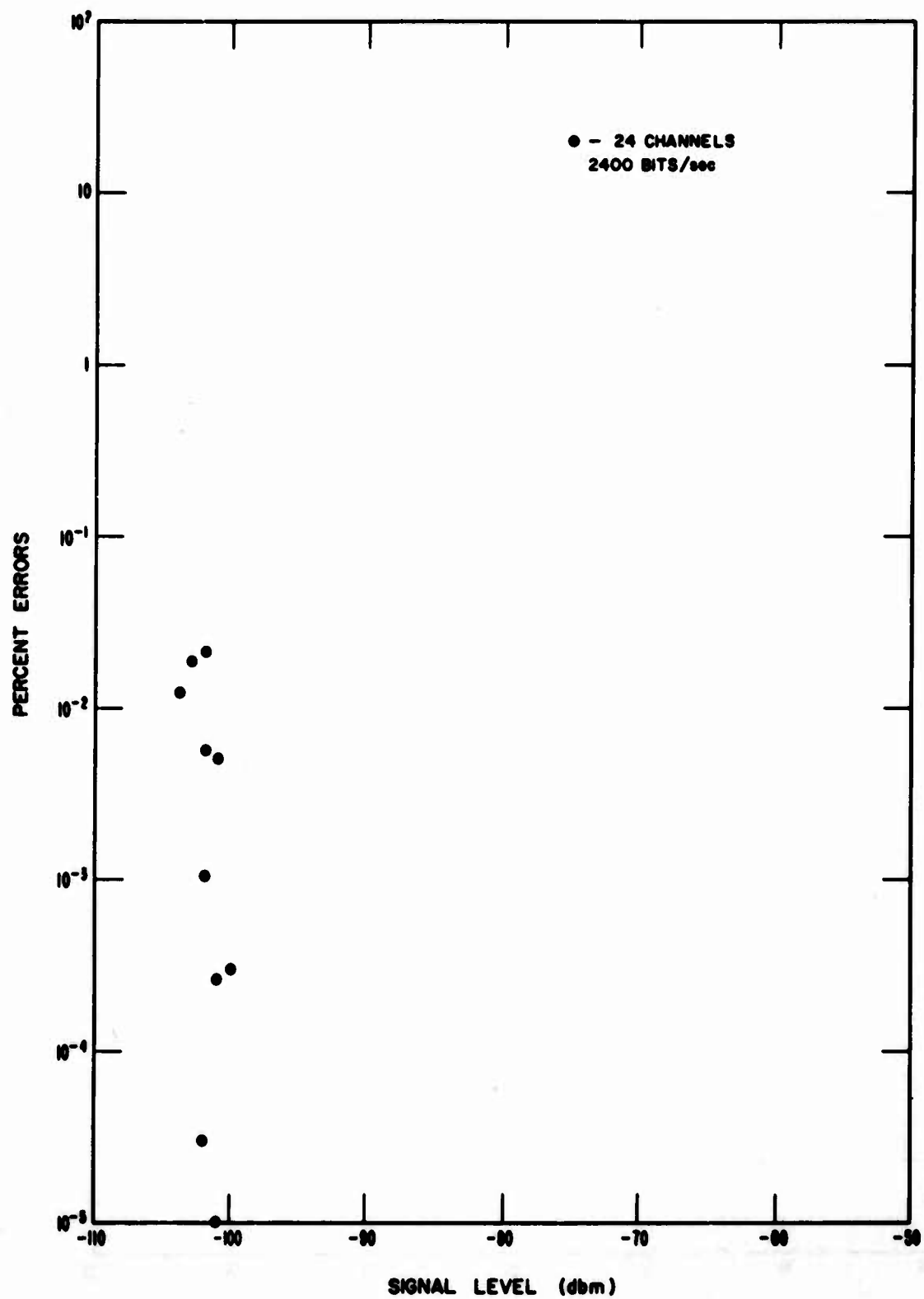


Figure 75. Back-to-back FDM Frederick.

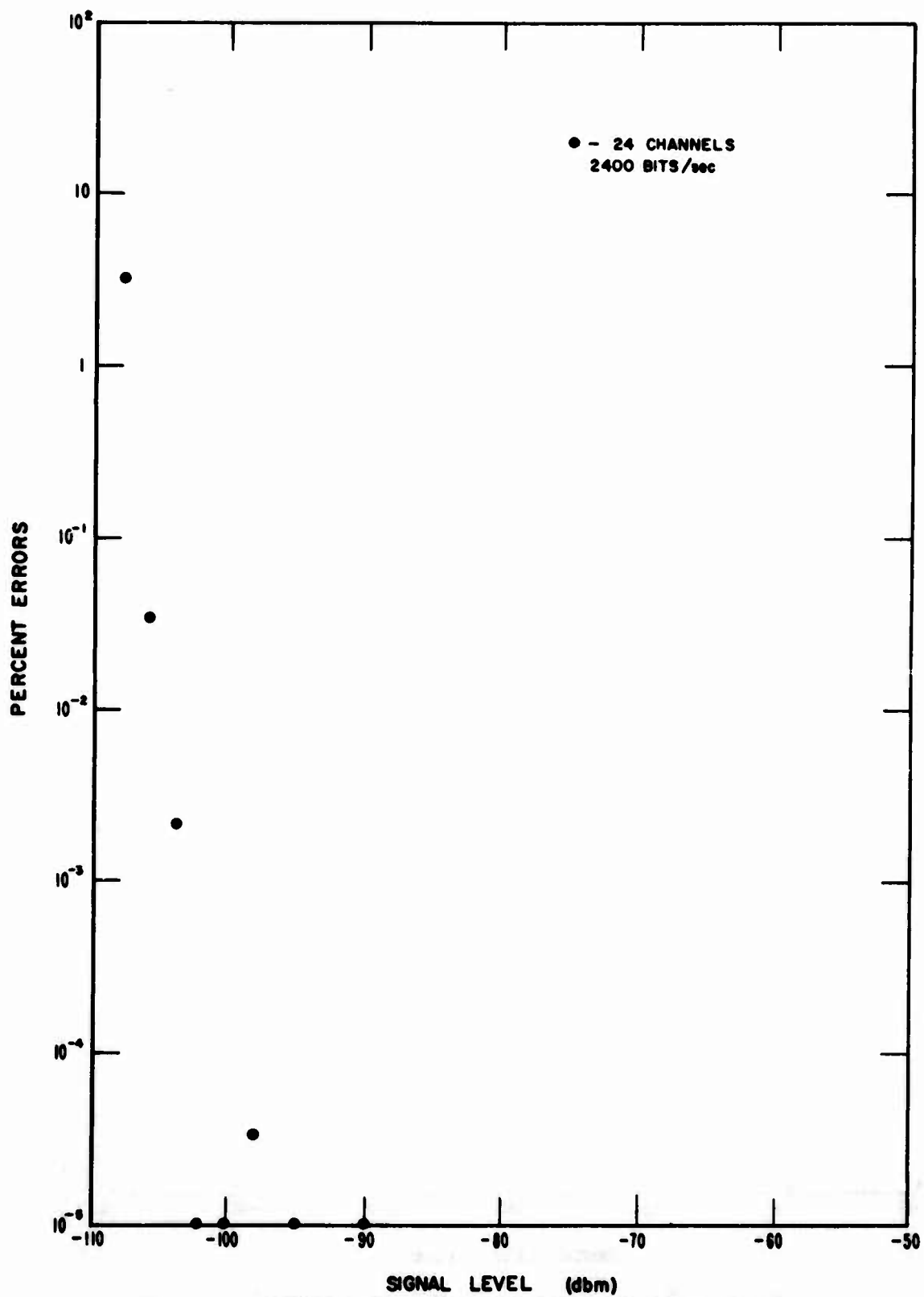
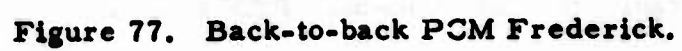


Figure 76. Back-to-back FDM GSC-4.



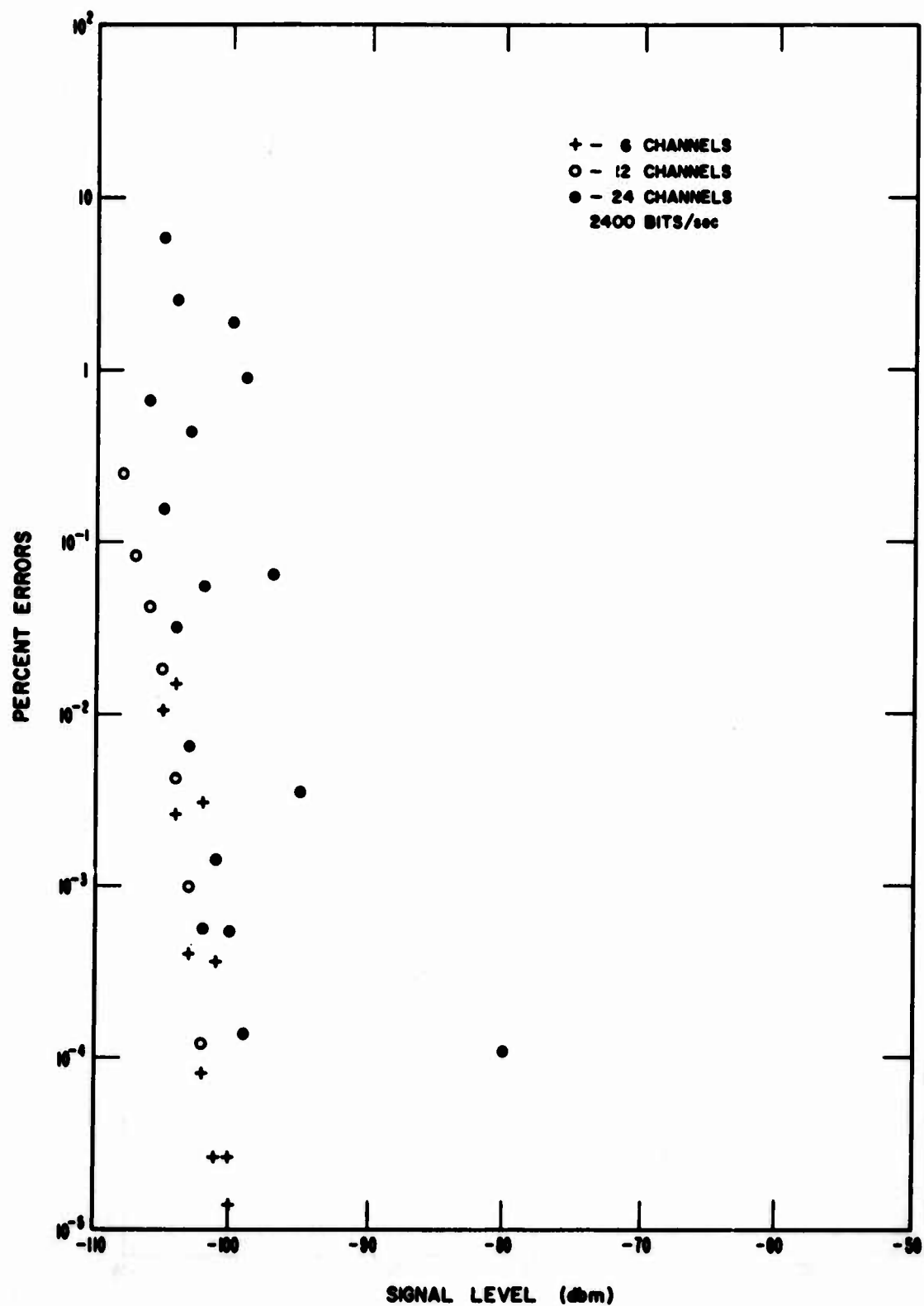


Figure 78. Back-to-back PCM GSC-4.

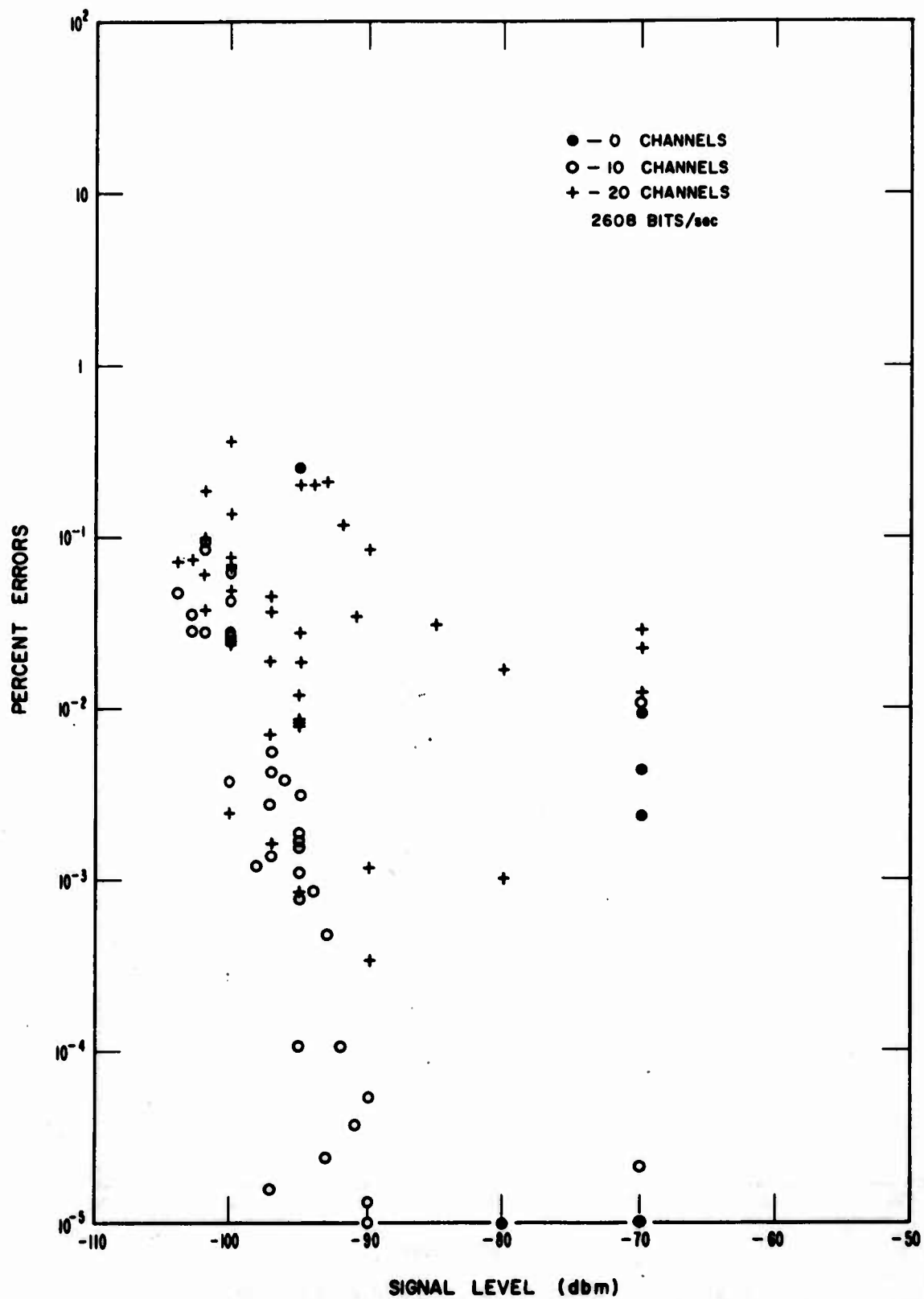


Figure 80. Back-to-back PPM GSC-4.

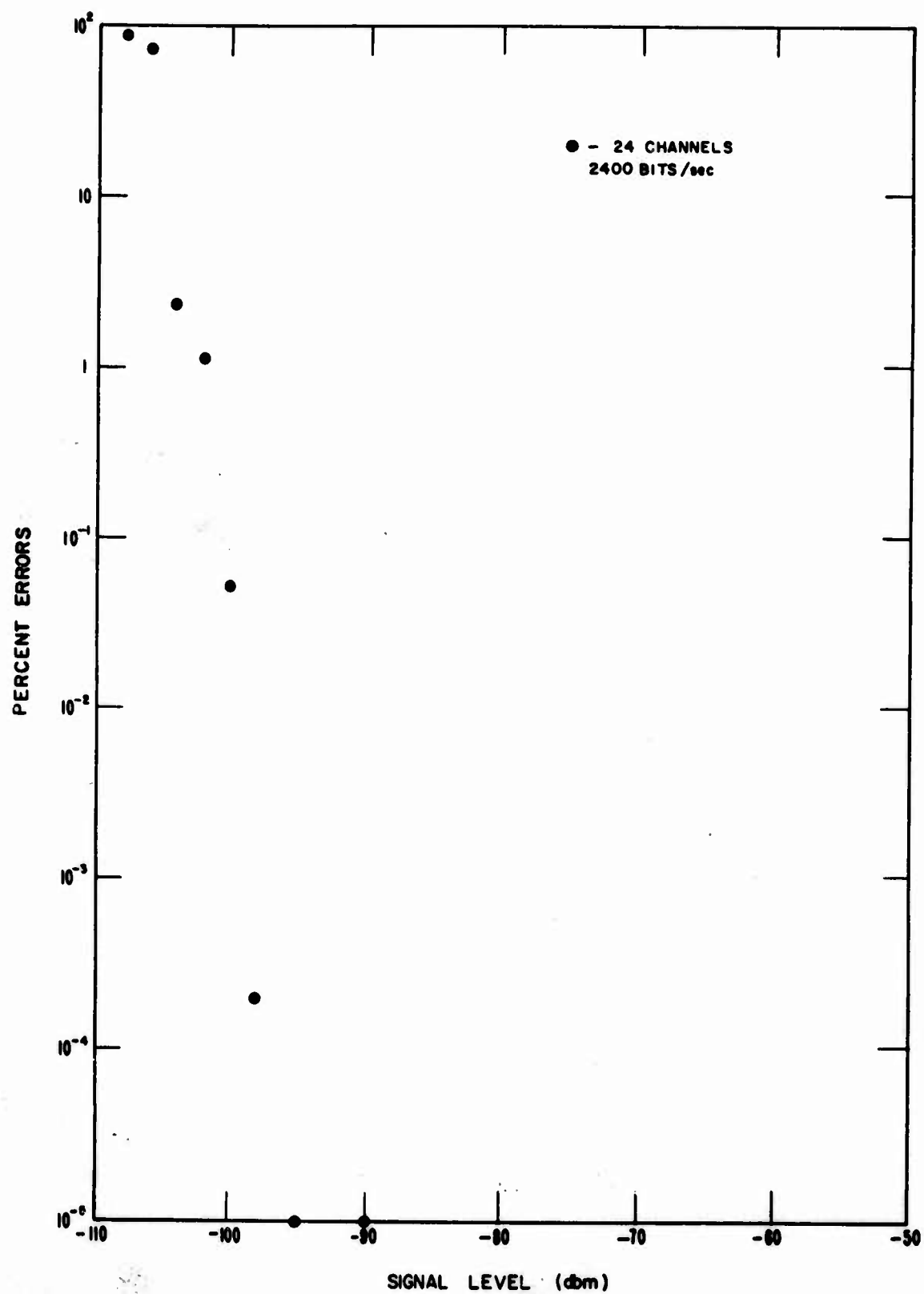


Figure 81. Back-to-back Δ Mod. Frederick.

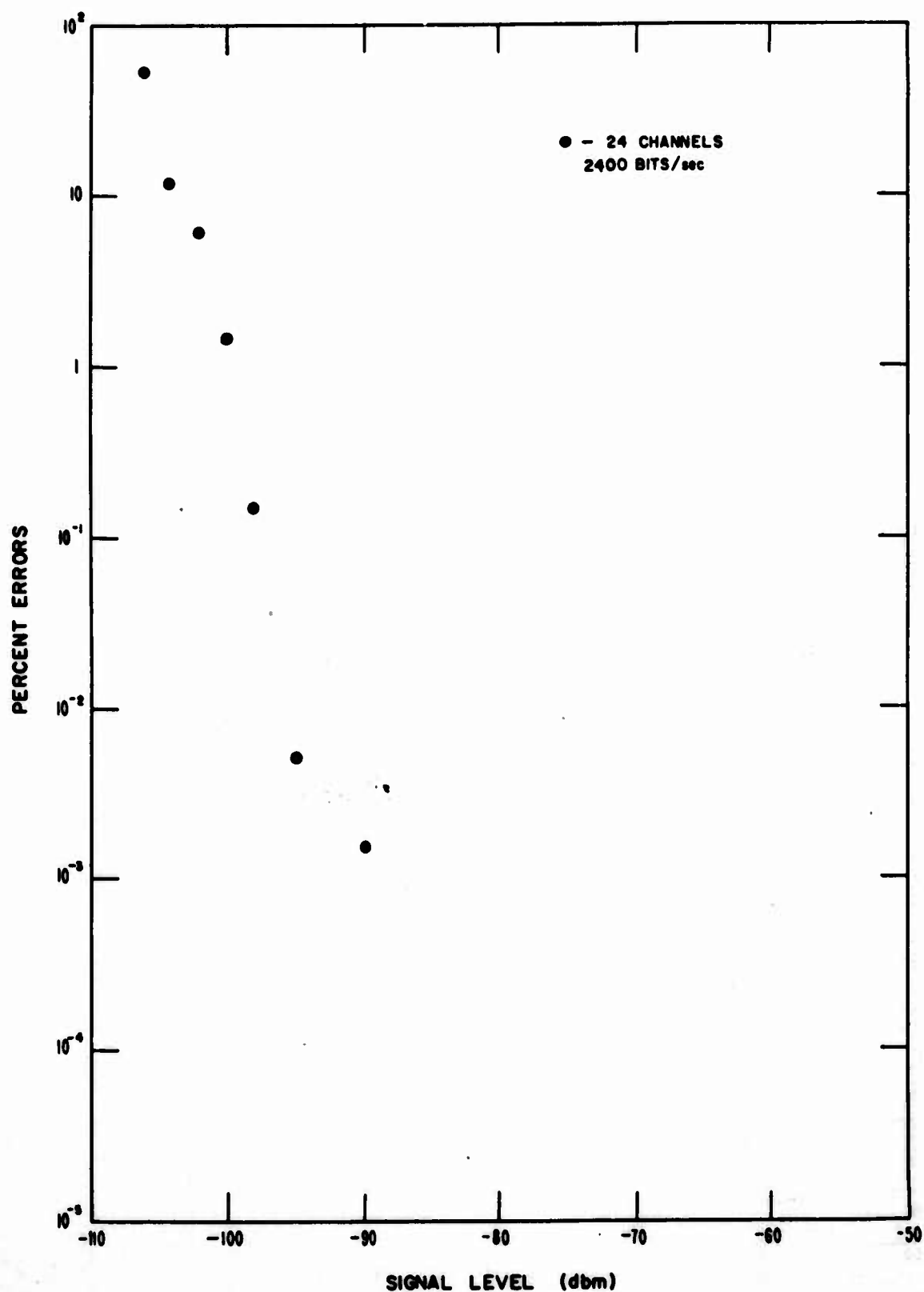


Figure 82. Back-to-back Δ Mod. GSC-4.
236

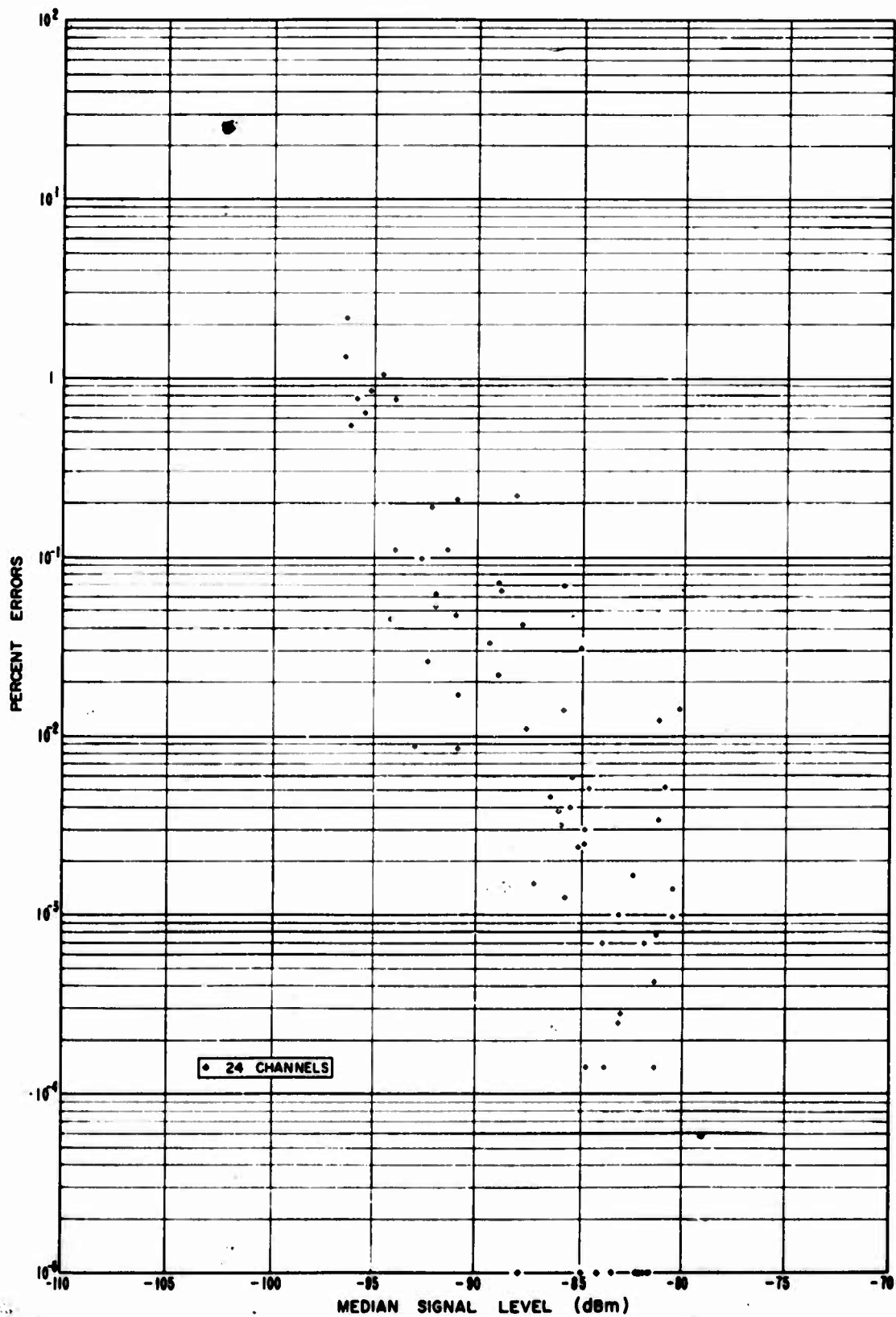


Figure 83. Frederick FDM 2400 Bits/sec.

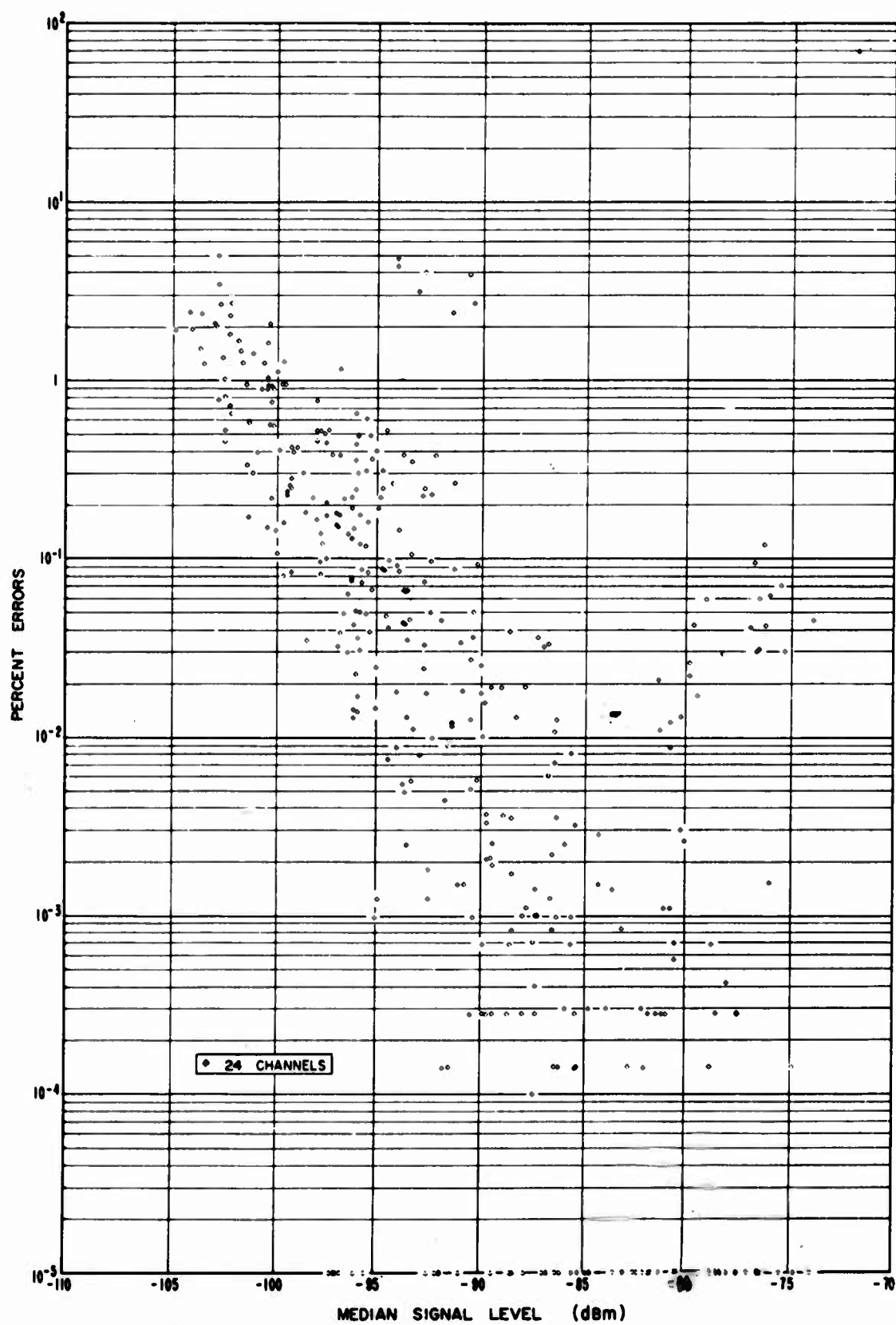


Figure 84. GSC-4 FDM 2400 Bits/sec.

1-51826

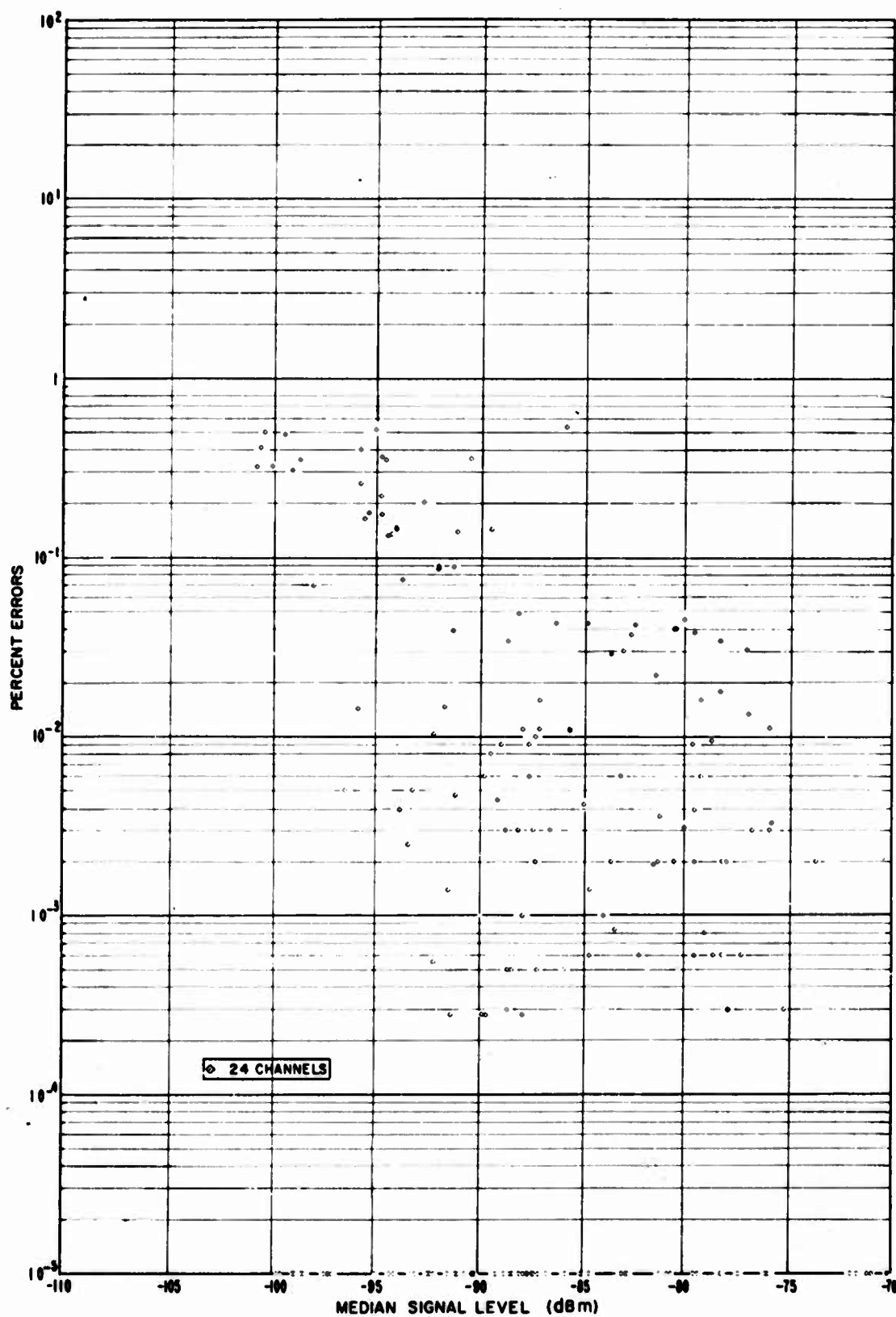


Figure 85. GSC-4 FDM 1200 Bits/sec.

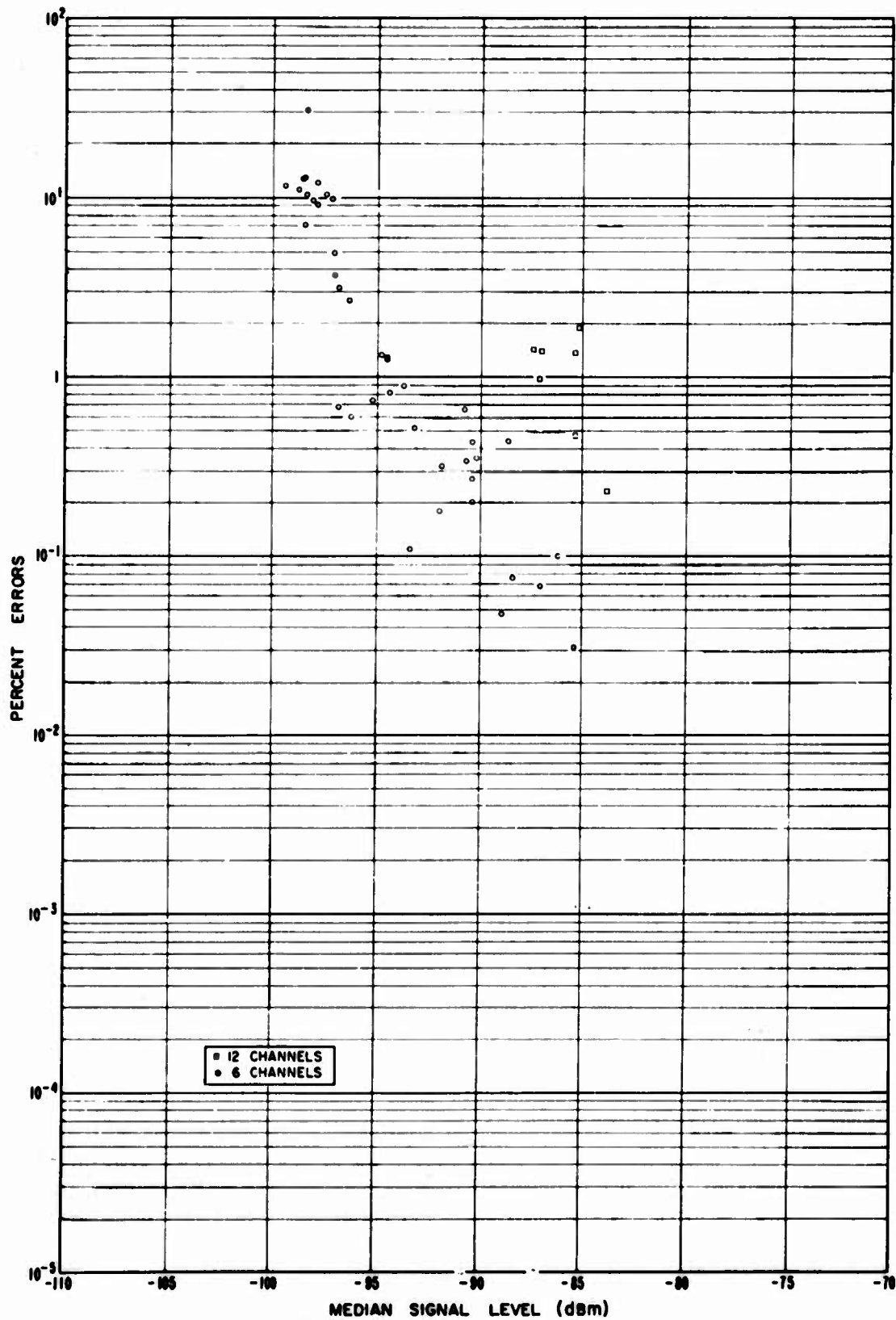


Figure 86. Frederick PCM 2400 Bits/sec.

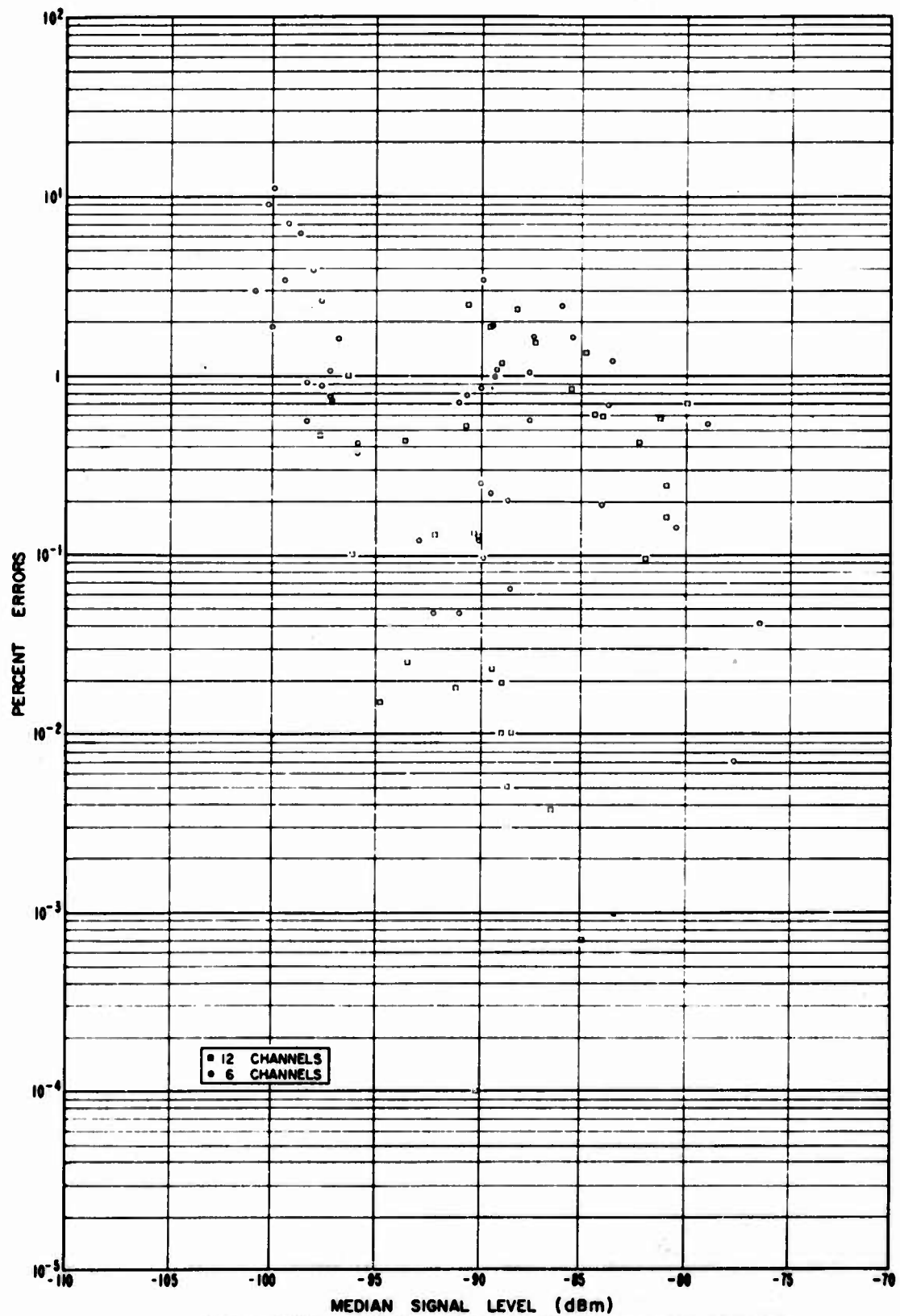


Figure 87. GSC-4 PCM 2400 Bits/sec.

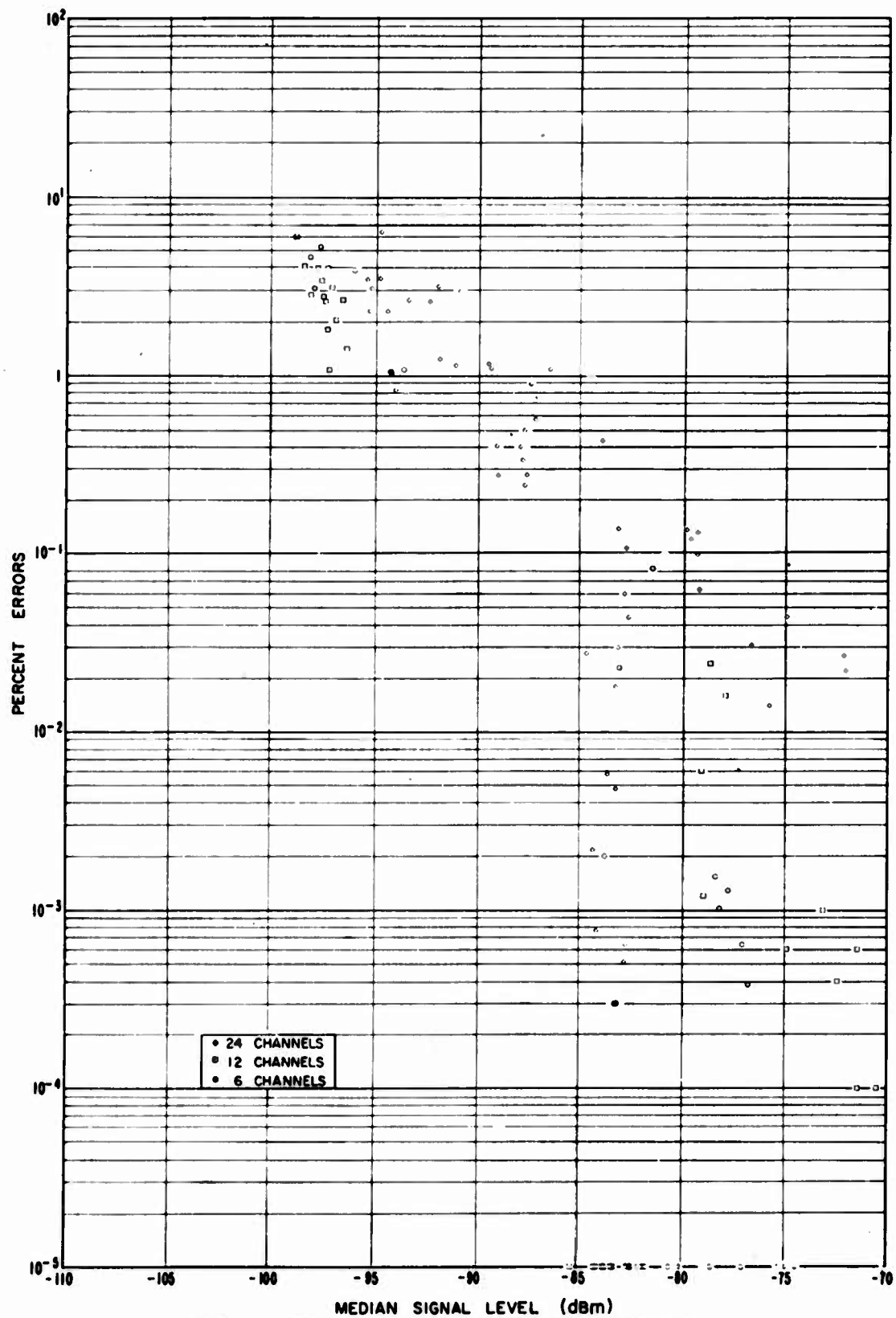


Figure 88. Frederick PPM 2604 Bits/sec.

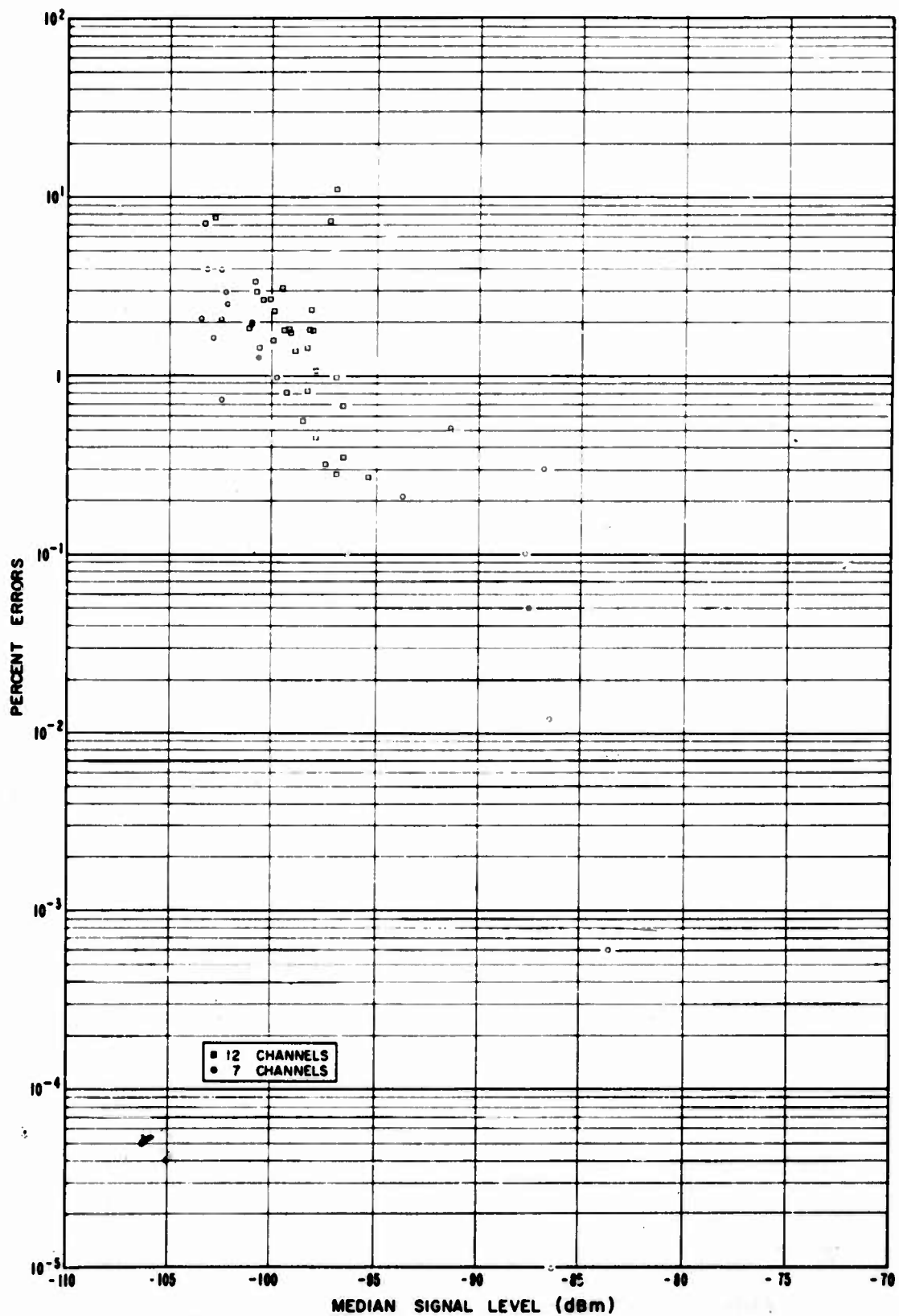


Figure 89. Frederick PPM 2604 Bits/sec.

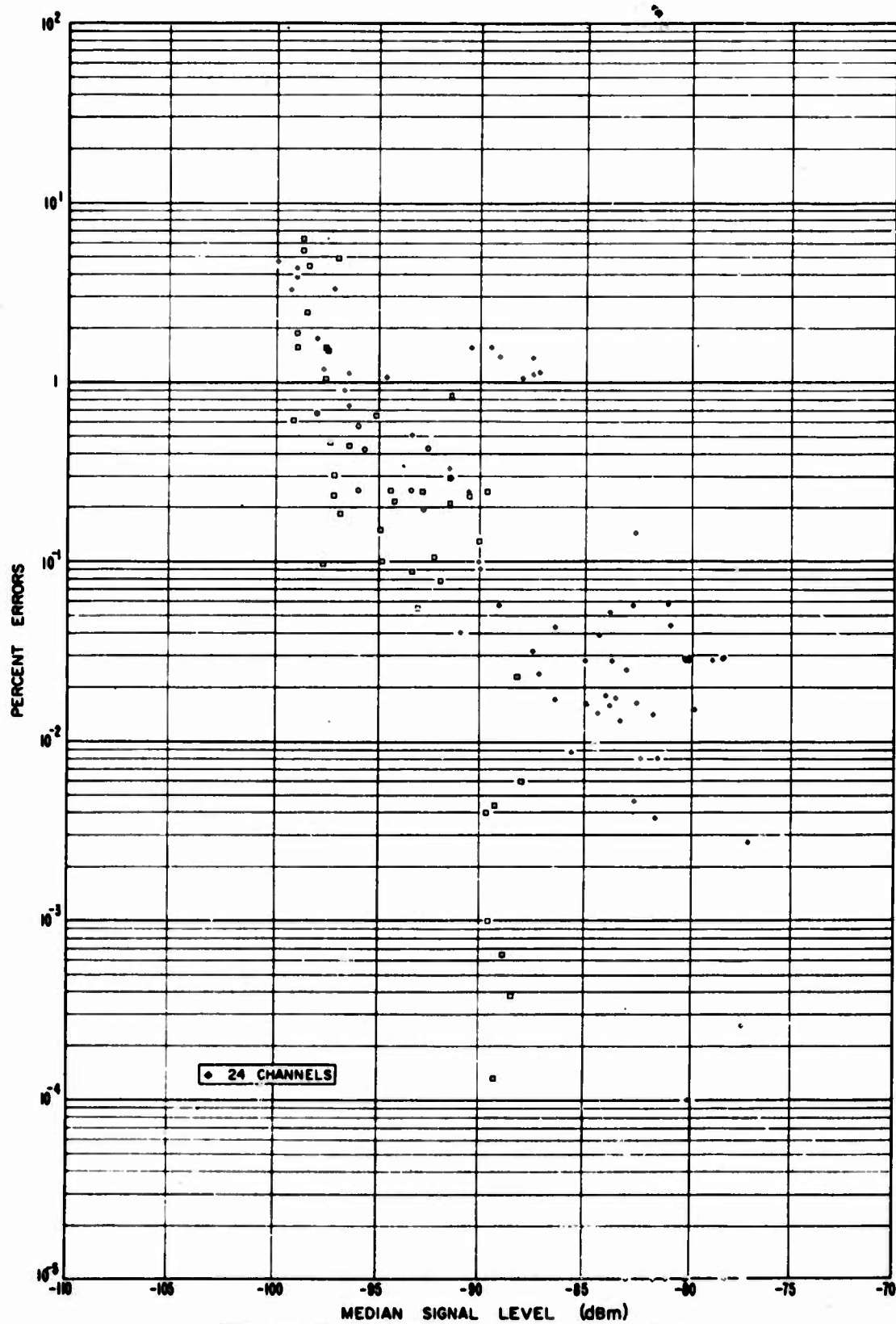


Figure 90. Frederick PPM 2604 Bits/sec.

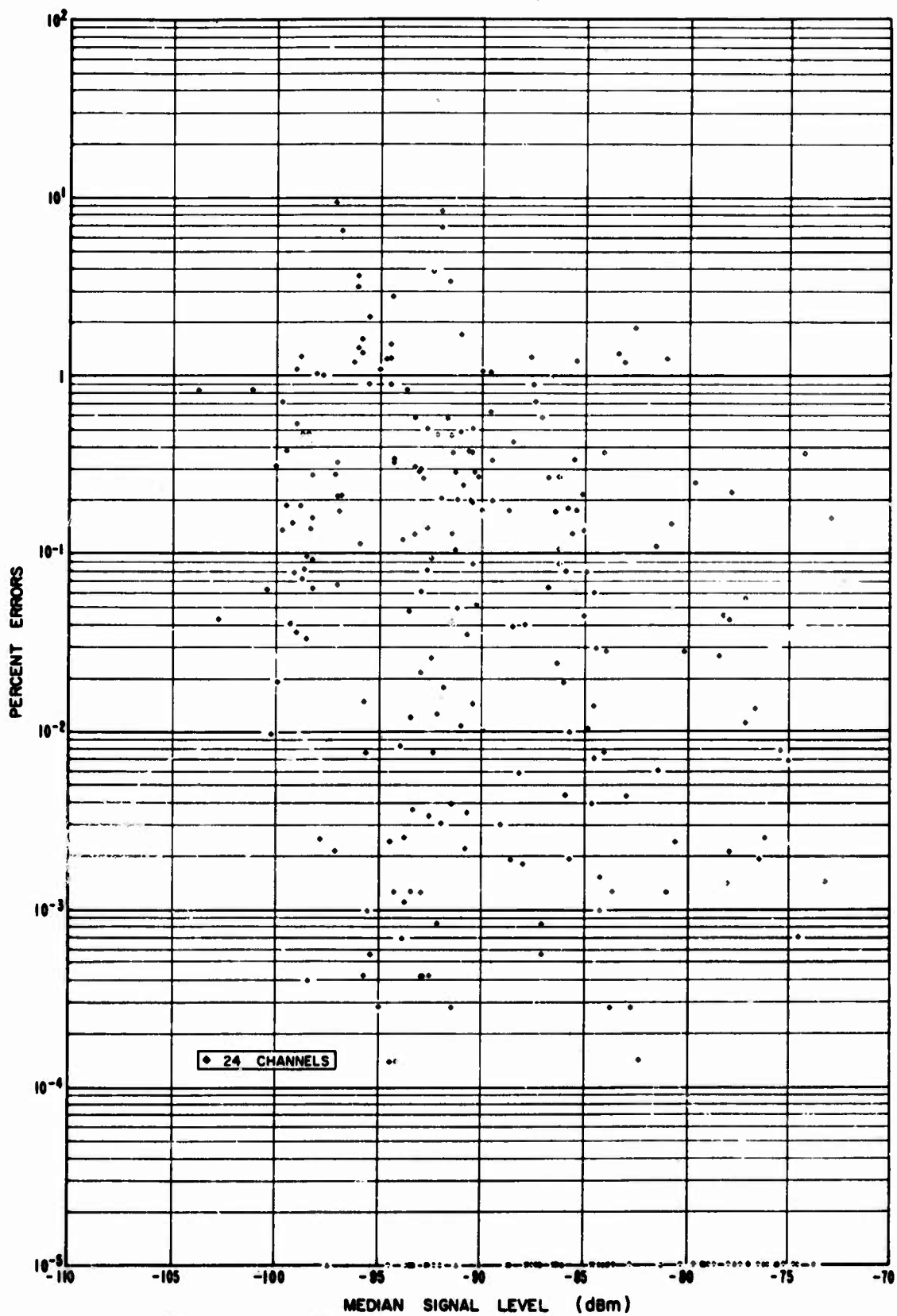


Figure 91. Frederick Δ modulated 2400 Bits/sec.

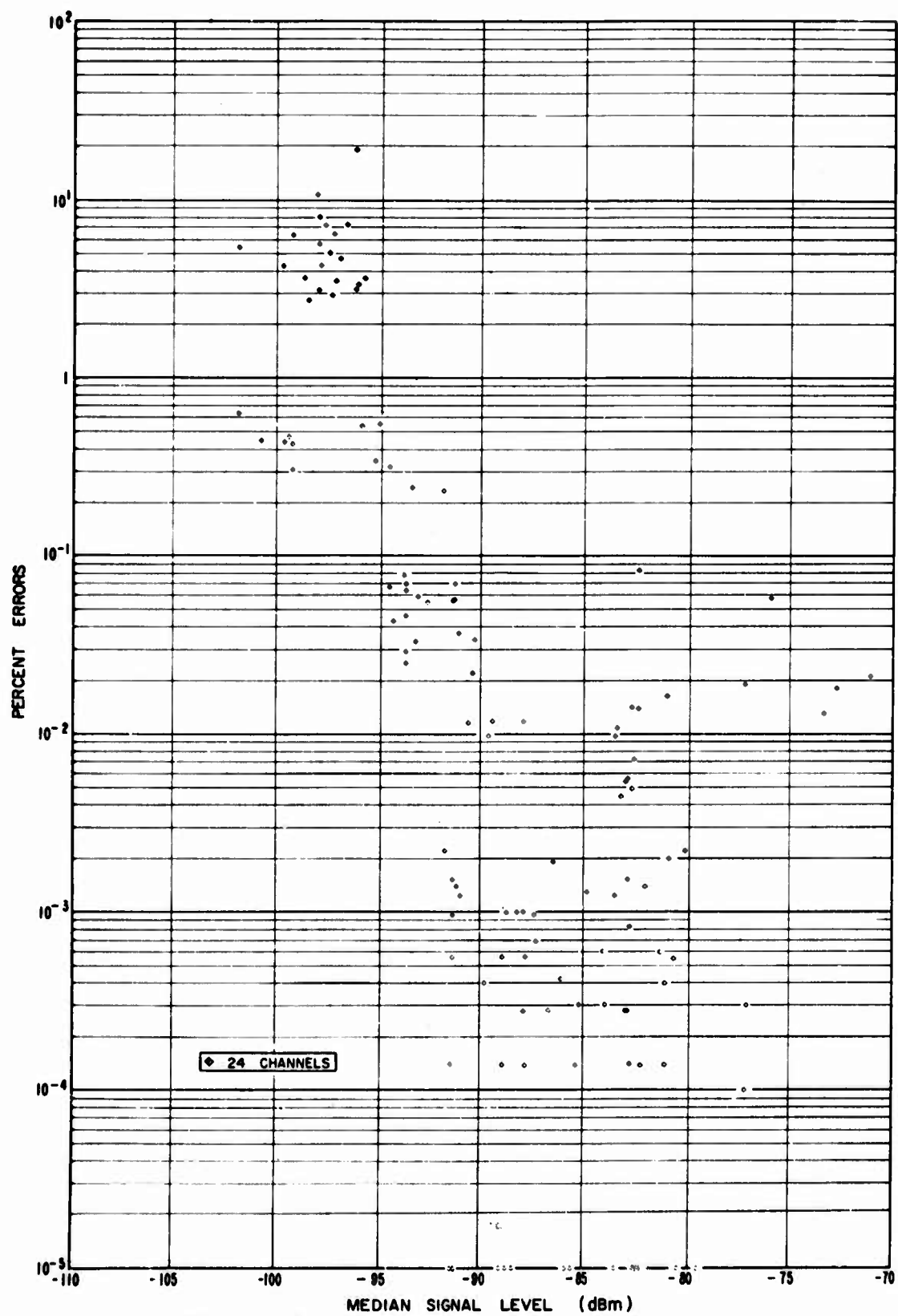


Figure 92. GSC-4 Δ modulated 2400 Bits/sec.

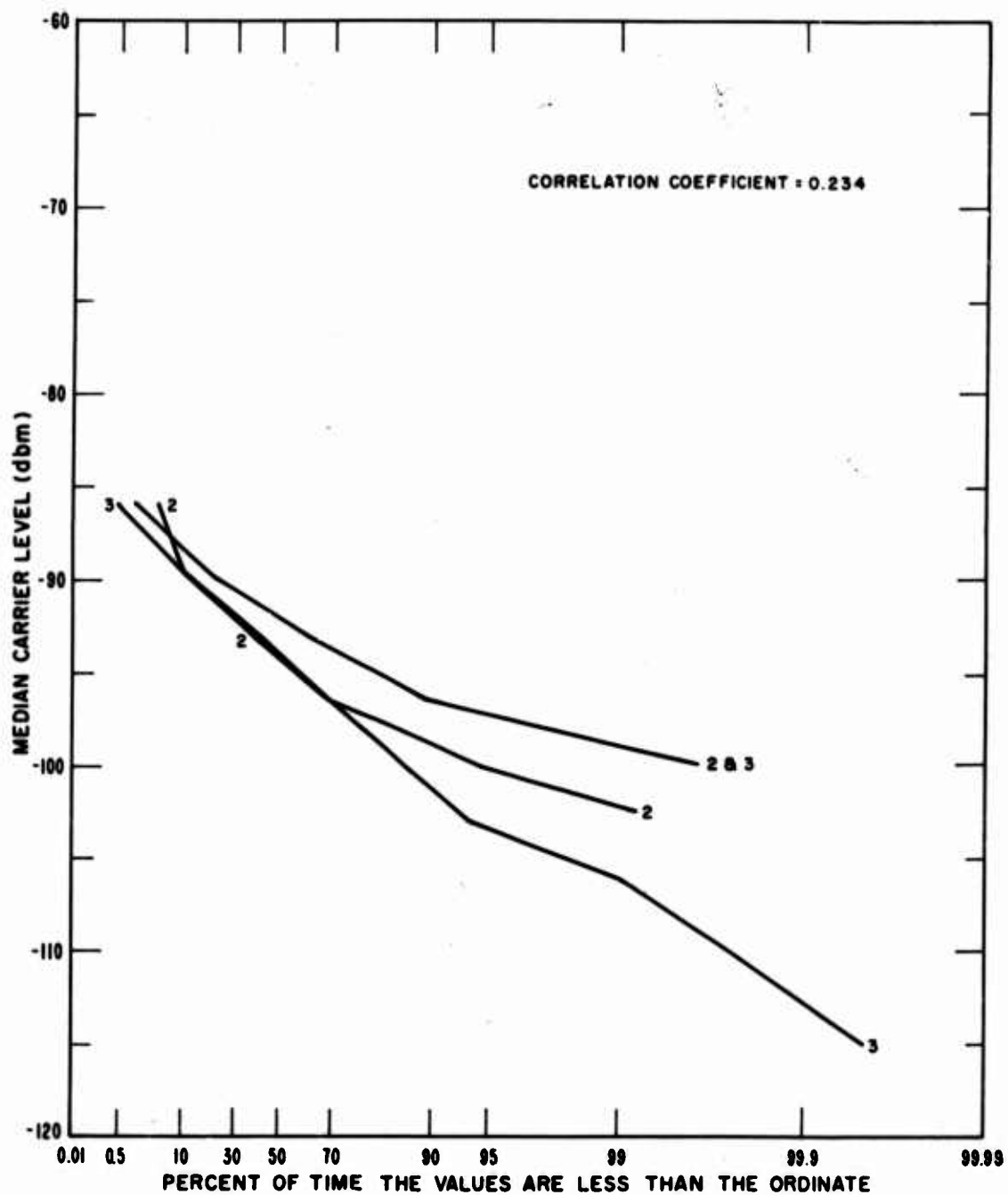


Figure 93. Sample distributions and combined distributions,
Run 36, Time 1425-1430, FDM.

RUN 42

TIME 1005-1010

FDM

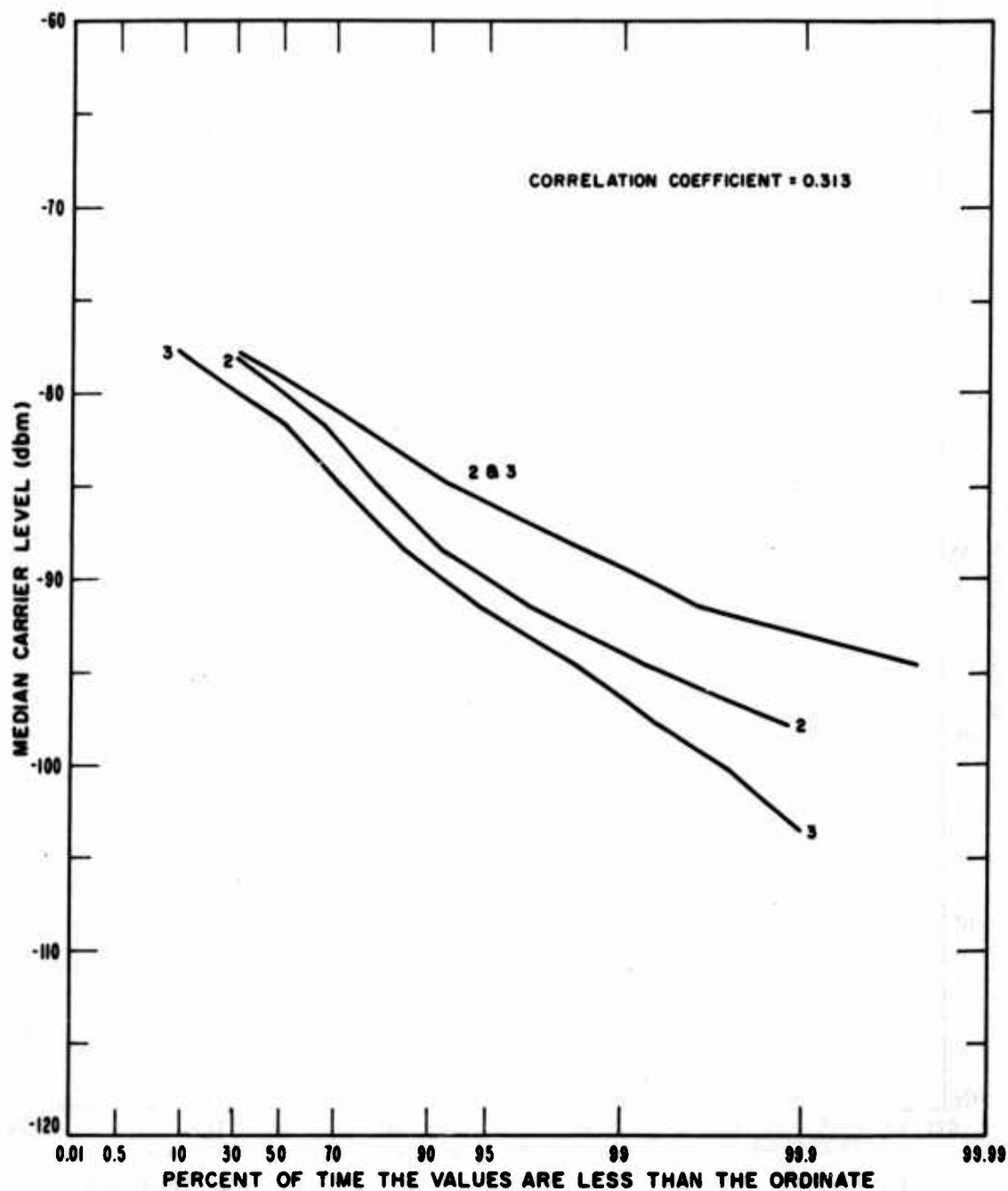


Figure 94. Sample distributions and combined distributions,
Run 42, Time 1005-1010, FDM.

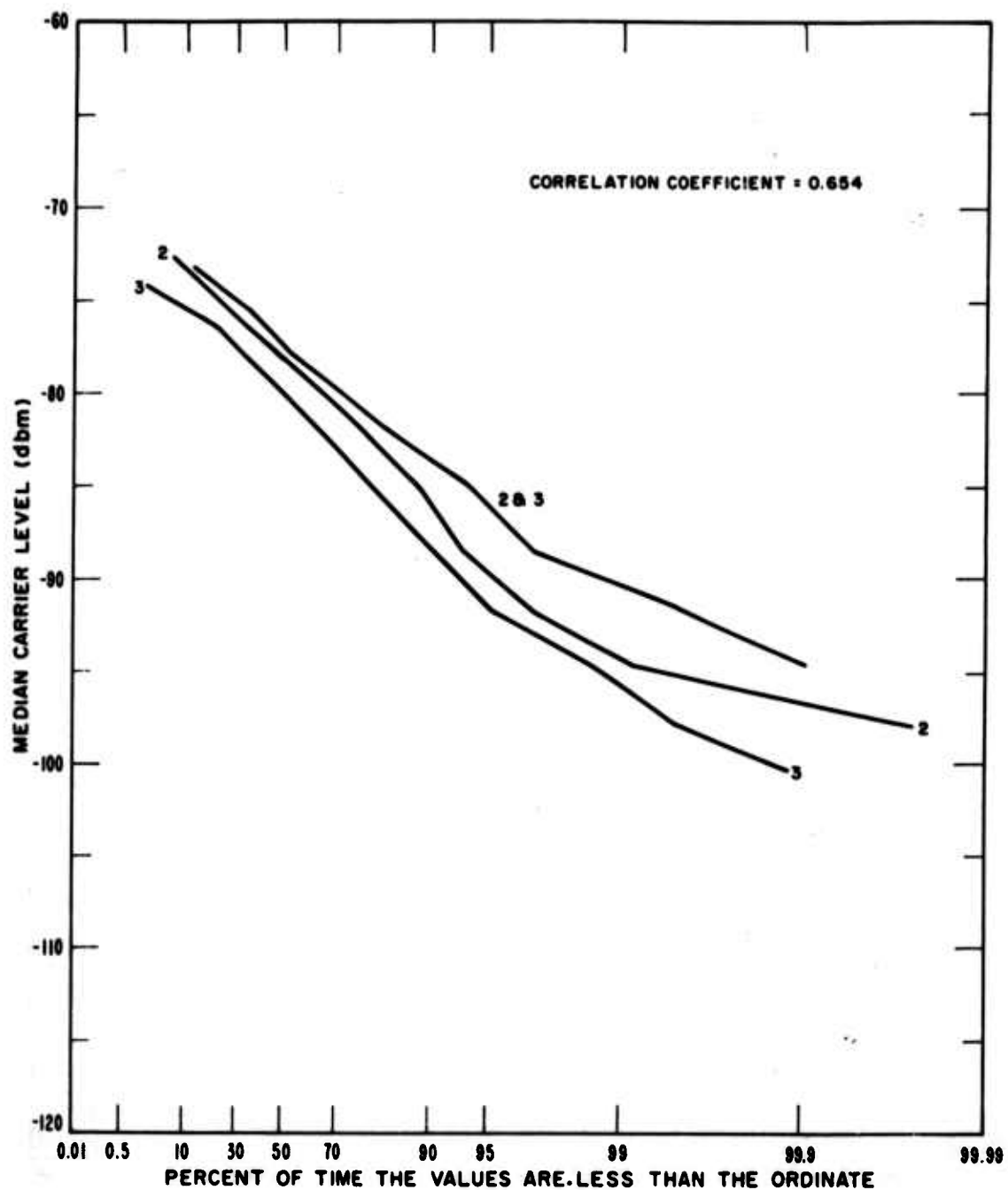


Figure 95. Sample distributions and combined distributions, Run 42, Time 1025-1030, FDM.

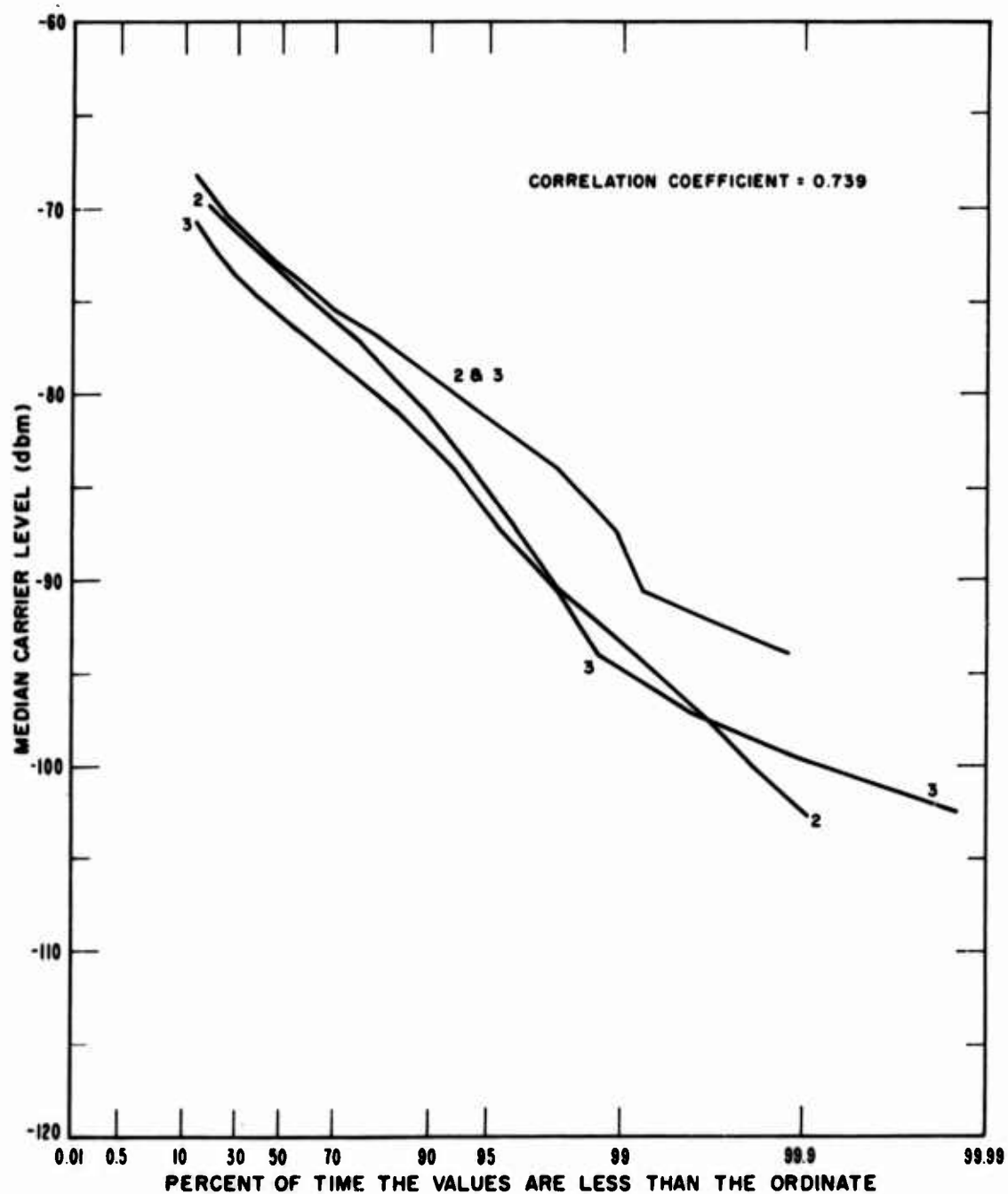


Figure 96. Sample distributions and combined distributions, Run 44, Time 1205-1210, FDM.

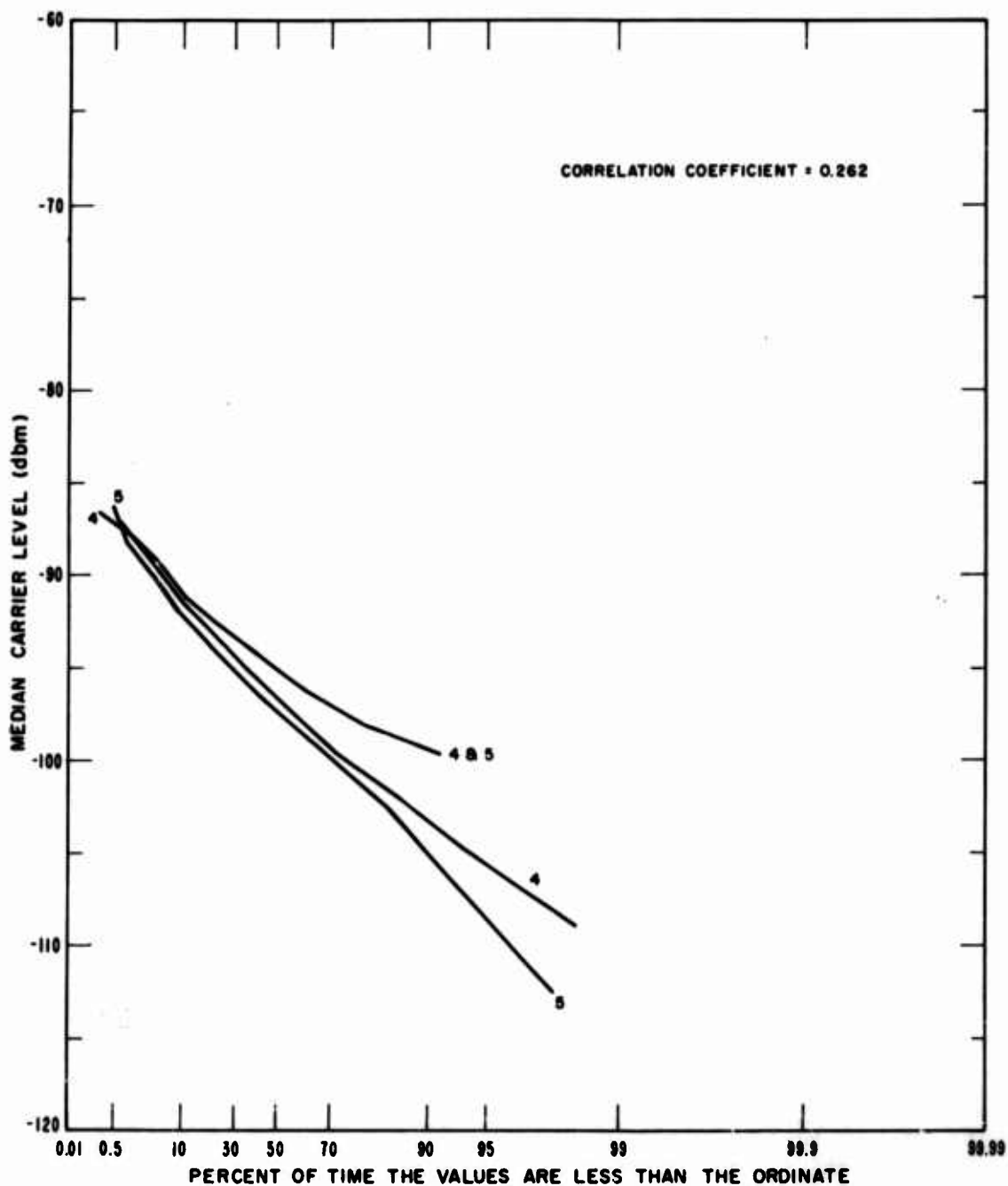


Figure 97. Sample distributions and combined distributions,
Run 127, Time 1645-1650, FDM.

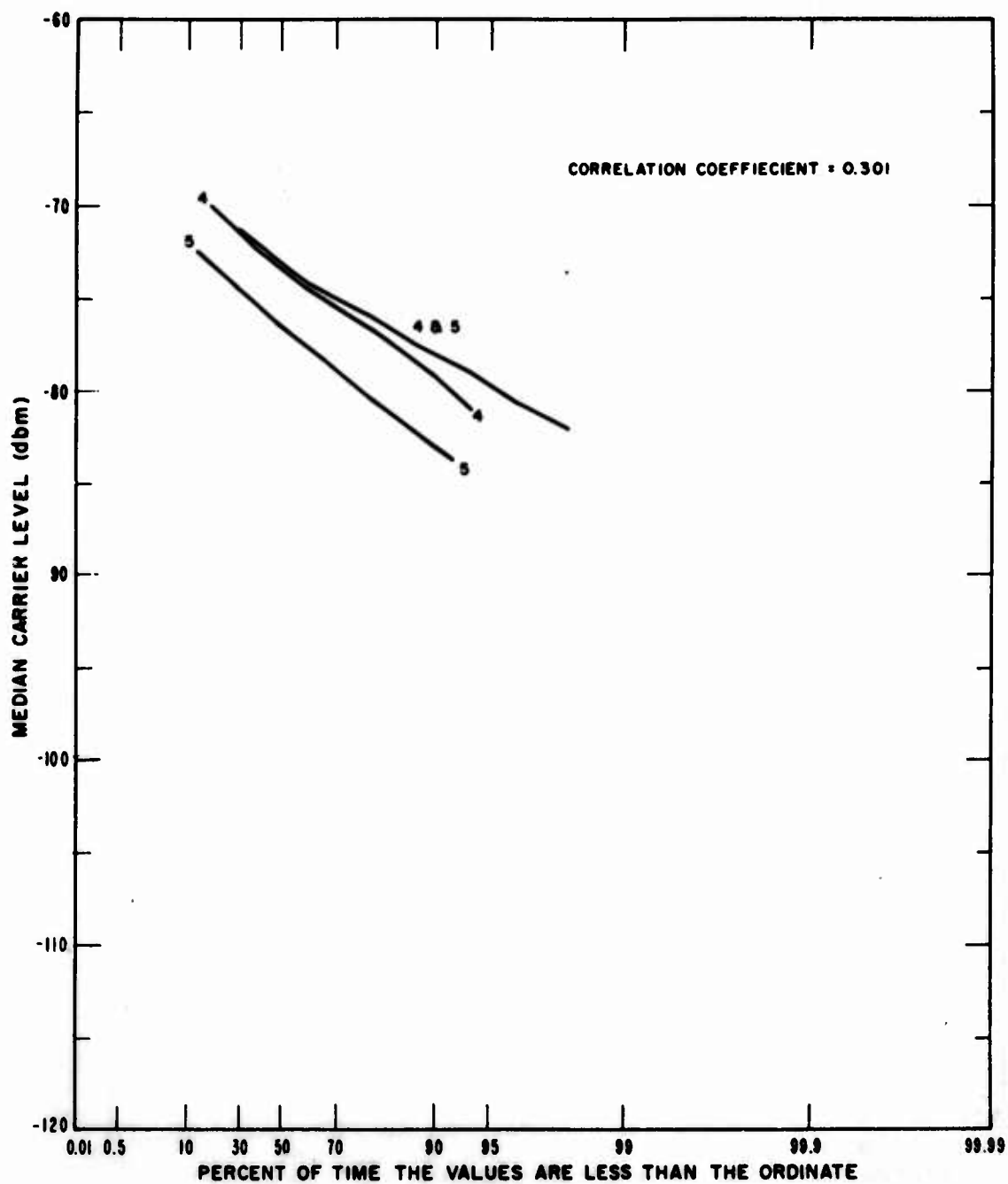


Figure 98. Sample distributions and combined distributions,
Run 134, Time 1645-1650, FDM.

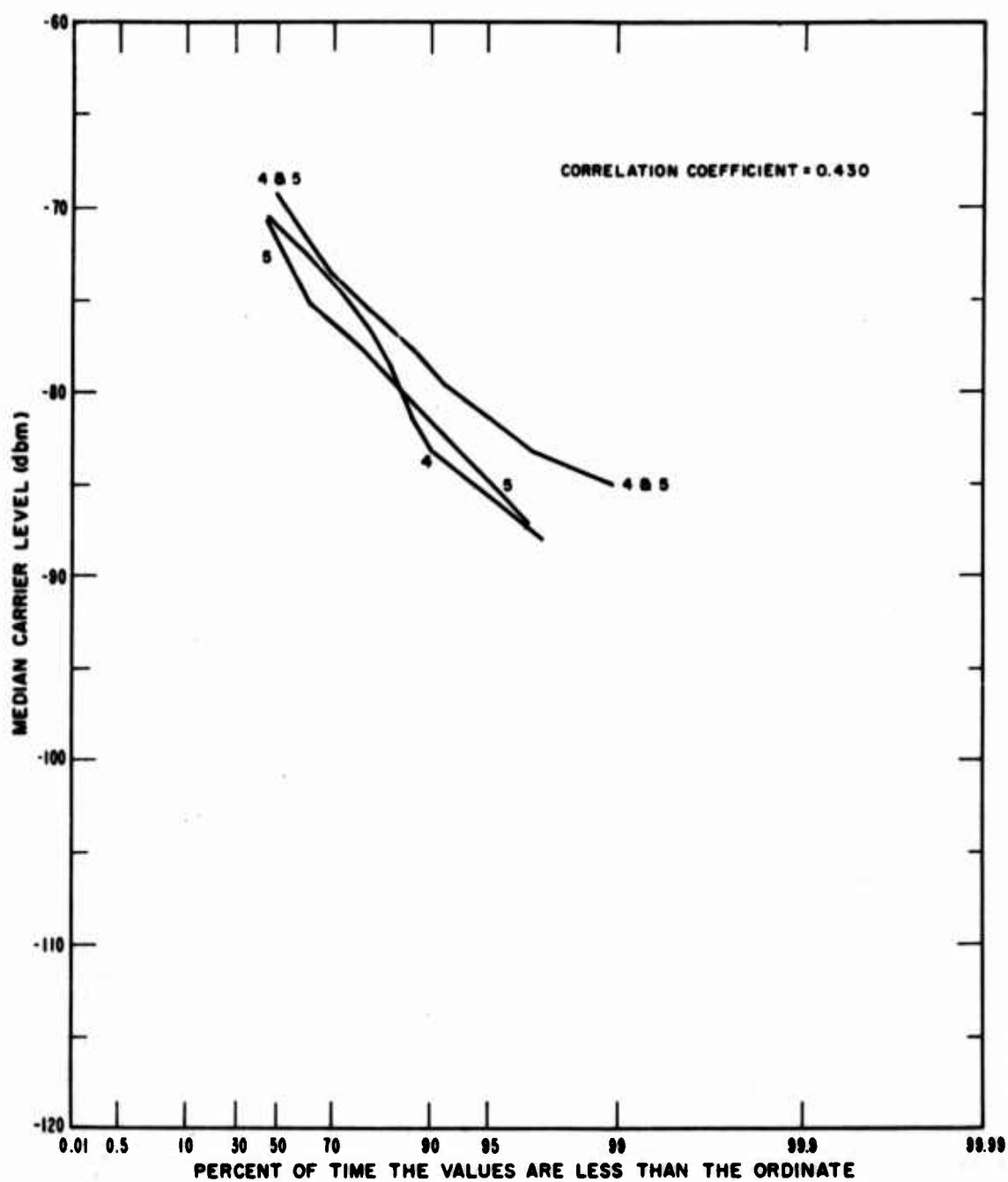


Figure 99. Sample distributions and combined distributions,
Run 142, Time 1300-1305, FDM.

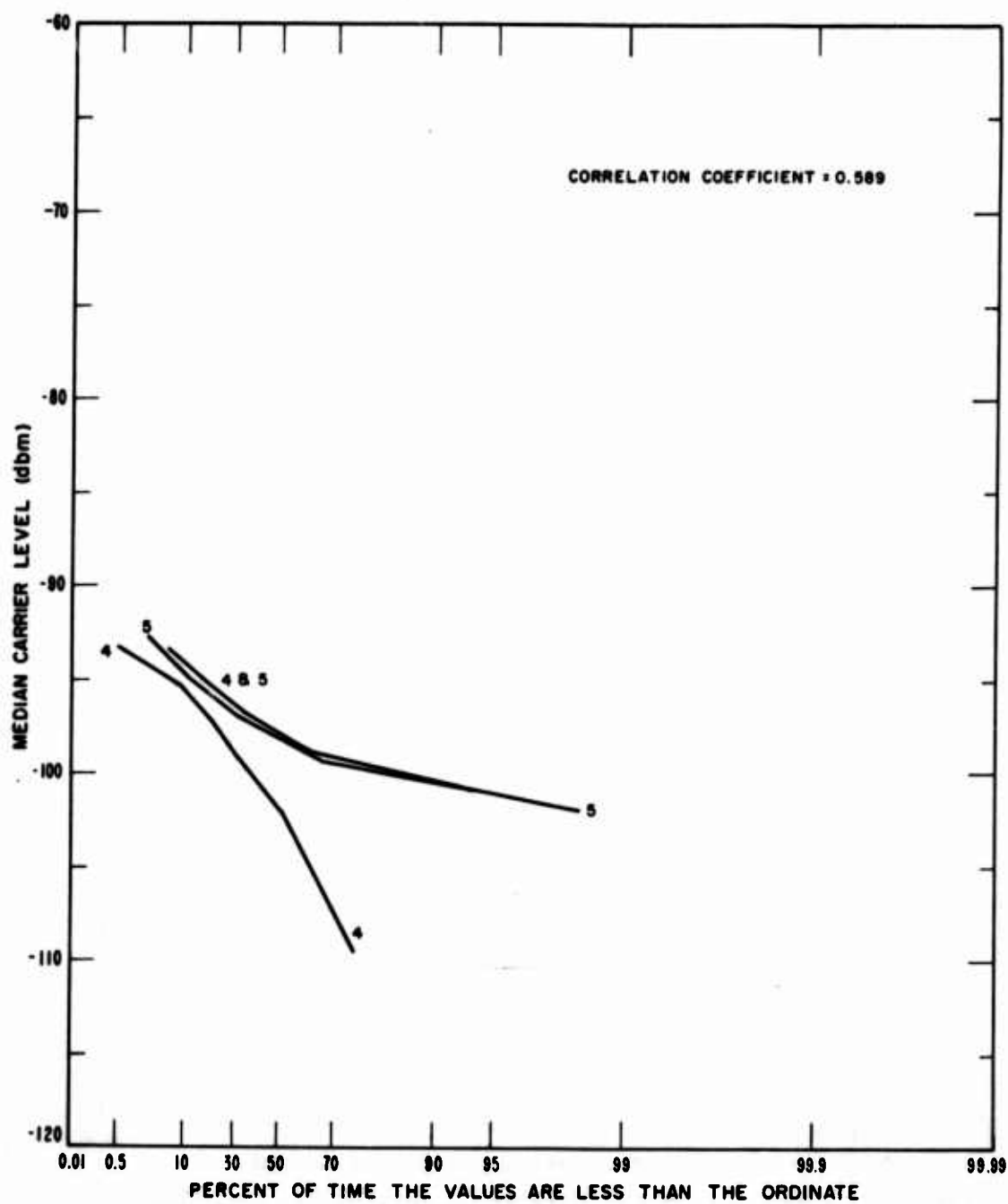


Figure 100. Sample distributions and combined distributions,
Run 164, Time 1305-1310, FDM.

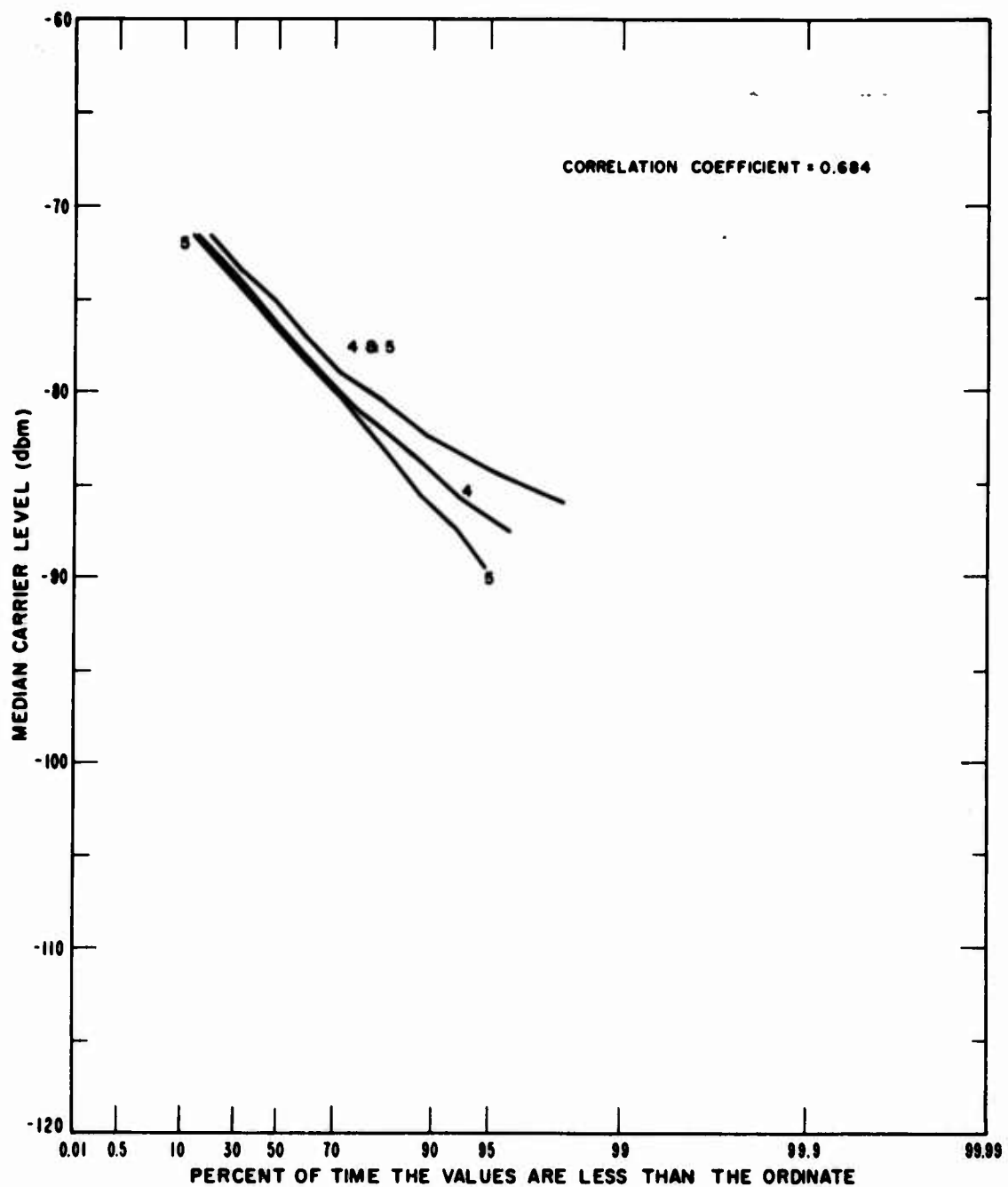


Figure 101. Sample distributions and combined distributions,
Run 215, Time 1320-1325, FDM.

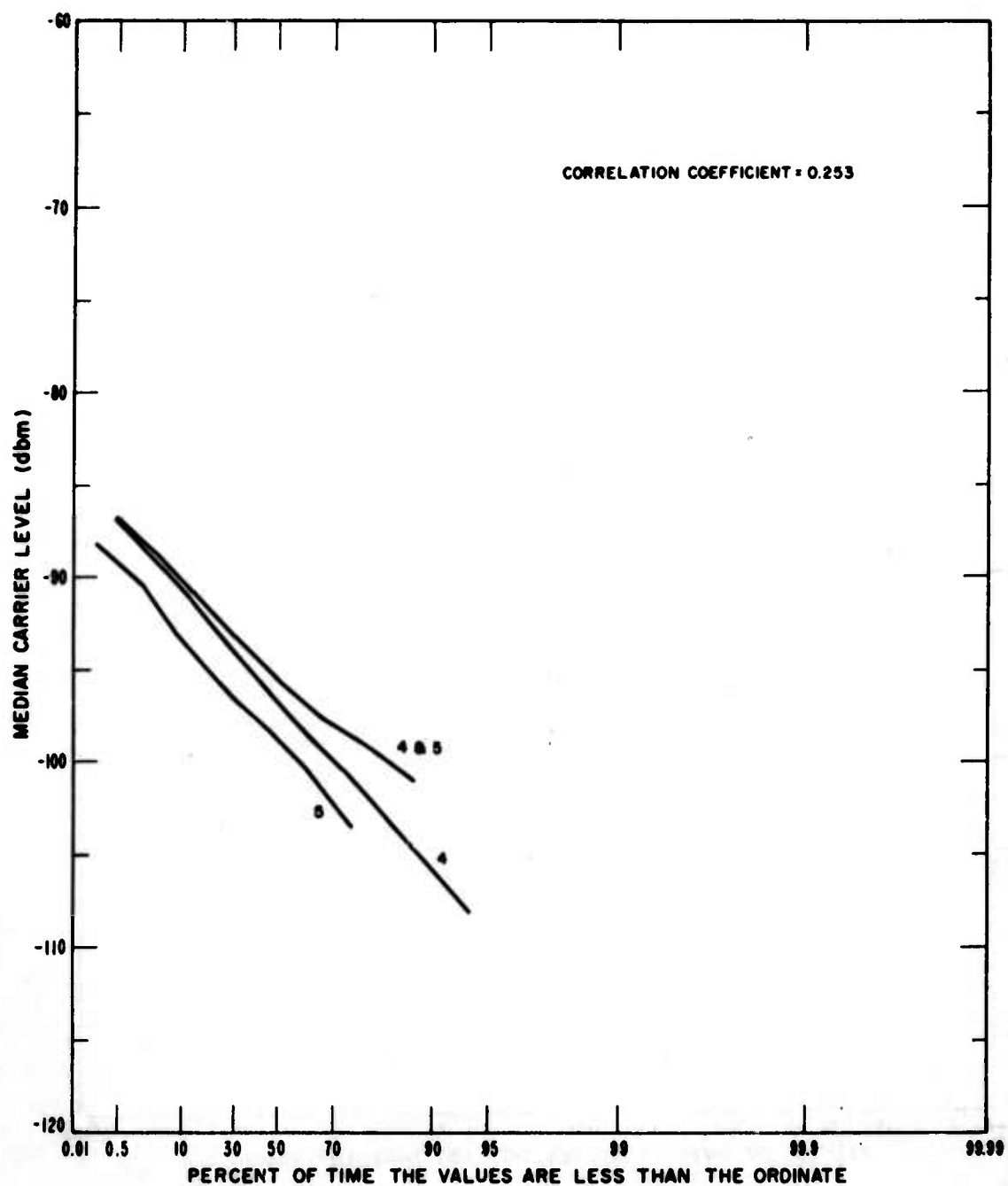


Figure 102. Sample distributions and combined distributions,
Run 233, Time 1540-1545, FDM.

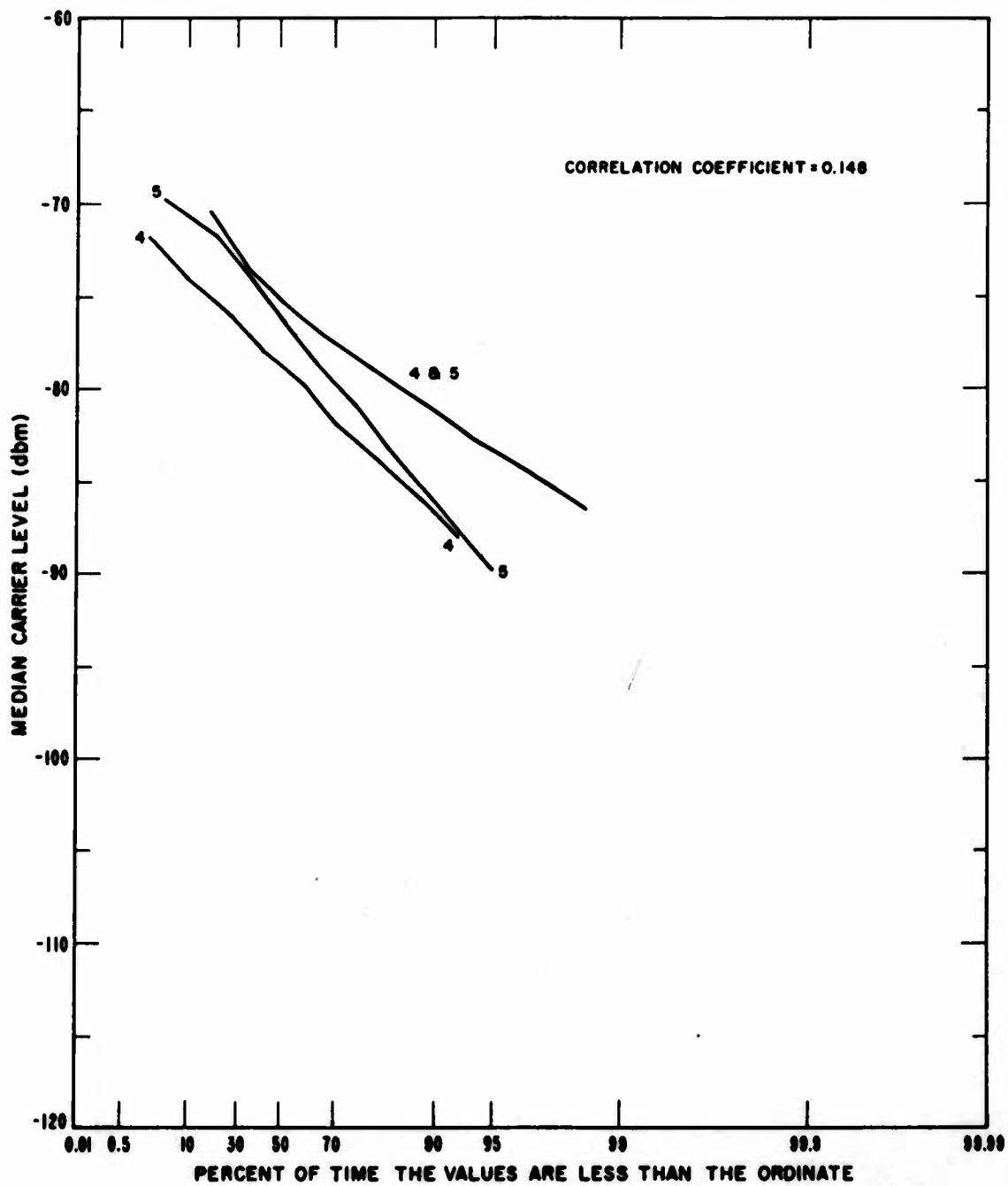


Figure 103. Sample distributions and combined distributions,
Run 256, Time 1310-1315, FDM

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11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Rome Air Development Center Griffiss Air Force Base, New York 13440
13. ABSTRACT This report describes the work performed under Contract AF 30(602)-3446. Its purpose was to evaluate the performance of three types of contractor furnished digital modulation equipment, using simultaneous data from an FM-FDM system as a standard. The tests covering a period from November 1964 through May 1965 were conducted on an over-water path between East Island, Puerto Rico and Grand Turk Island, BWI. The standard FM-FDM system technique referenced was the Radio Set AN/MRC-98, a transportable tropospheric scatter radio set operating in the 755-985 MHz range, with an output r.f. power capability of 10 KW. The digital techniques were variations of Pulse Code Modulation, Pulse Position Modulation, and Delta Modulation schemes. A description of test instrumentation configurations and data collection procedures is presented. Test results are discussed and presented in tabular and graphical form.		

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Tropospheric Scatter Pulse Code Modulation Pulse Position Modulation Delta Modulation Atlantic Missile Range						

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