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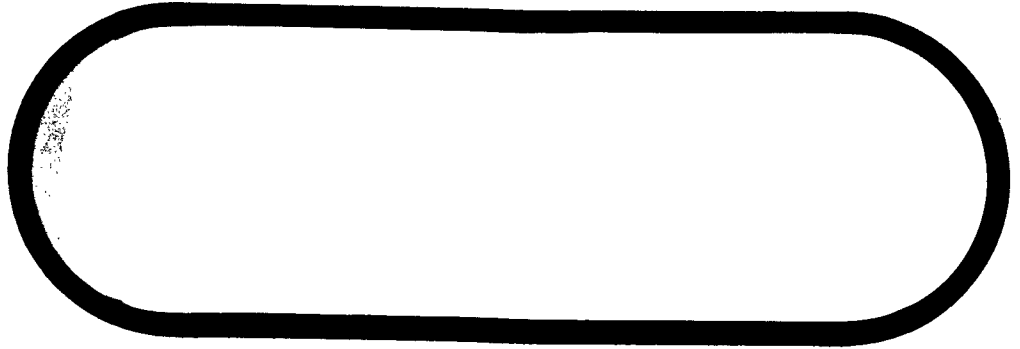
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CODE IDENT. NO. 81205
UNCLASSIFIED TITLE TEST REPORT FOR THE MIL-1-6051 TEST,

DR-6004-5 VOLUME 1, ON GTM DO/C IN MAB 2

MODEL NO WS-133 CONTRACT NO AF-4 (147) - 289

ISSUE NO 17 ISSUED TO AJCLA

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REFERENCES

- a) D2-0004-5 Vol. 1 MBI-1-0001 Test Requirements and Procedure, GTM 004, in Missile Assembly Building
- b) MBI-1-0051B Electrical/Electronic System Compatibility and Interference Control Requirements for Aeronautical Weapon Systems and Associated Subsystems
- c) D2-3602-2 Vol. 1 Modal Specification for Airborne Vehicle - WS-133A and WS-133A-M Minuteman (S-133-100)
- d) D2-3602-2 Vol. II, Deviations and Variations from Specification S-133-1000 for R&D Missiles
- e) D2-3602-2 Vol III Addendum IV PCM/FM System - Channel Accuracy GTM 004C; Addendum IV B FM/FM System Linearity - GTM 004C
- f) 25-33418 Sheet 1 PCM Telemetry Group Data Chart - GTM 004C - MAB 2
- g) 25-33418 Sheet 2 PCM Telemetry Group Data Chart - GTM 004C - MAB 2
- h) 25-33418 Sheet 3 PCM Telemetry Supplemental Data Sheets - GTM 004C - MAB 2
- i) Minuteman AMR Coordination Bulletin AN-522, dated 15 February, 1962, J. L. Melgaard(A/N) to R. F. Person (BAC), Subject: Electromagnetic Interference Experienced on GTM 004C in MAB 1 and 2.
- j) D2-0000-004C Volume 2, Minuteman AMR Field Test Report - GTM 004C - MAB 2 Processing (Confidential)

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1. OBJECTIVES

1.1 Steady State Compatibility

Determine that the most sensitive outputs of GTM OMAC and each TSE subsystem are within the stated limits while GTM OMAC and all electrical/electronic test support and facility equipment is energized in a steady state manner.

1.2 Dynamic Compatibility

Determine that the dynamic operations of each Airborne and TSE subsystem do not cause interference in excess of the steady state limits to any other Airborne or TSE Subsystem operated in a steady state mode. Also determine the absence of crosstalk within the airborne data collection system.

1.3 Facility Dynamic Compatibility with Airborne and TSE

Determine that dynamic operation of the facility electrical equipment does not cause interference to the Airborne and Test Support Equipment in excess of the stated limits, the latter being operated in a steady state mode.

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2.

INTRODUCTION

This test was planned in accordance with paragraph 4.3.1 of MIL-I-6051B. Paragraph 4.3.1 calls for a test on the complete weapon system, in this case, GIM OCAC (less re-entry vehicle) and Missile Assembly Building #2.

The test consisted of five parts. The first part consisted of monitoring all sensitive outputs of GIM OCAC and the Test Support Equipment with all electrical/electronic equipment and GIM OCAC in a fully energized steady state mode. The second part consisted of monitoring all sensitive equipment in the steady state mode while operating all electrically powered equipment one at a time. The next three parts demonstrated the ability to calibrate the telemetry system in an energized environment.

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3.

TEST ARTICLE CONFIGURATION

GEM GCZC was electrically complete except for the receiving vehicle which is absent. XAB 2 was in a configuration which would support a FGM missile.

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4. ABSTRACT

- 4.1 General - Below is a brief description of the interference encountered during the MIL-1-4 test on GFM 0040 in May. Complete details on the interference problem can be found in paragraph 8, Test Results, of this test report.
- 4.2 Steady State Competibility Test - During the steady state test the real time monitor point and the FM/FM playback monitor points failed to show any out-of-tolerance interferences. The PCM/FM playback monitor points which were analyzed using standard oscillograph analysis and computer analysis showed some out-of-tolerance interferences. There were 226 PCM/FM channels analyzed using standard oscillograph analysis. 201 of these channels were analyzed with a computer. The oscillograph analysis showed that a total of 42 channels (18.6% of the total) are out of tolerance due to steady state noise. 17 of these have random transients (one sample drop outs occurring randomly) which do not affect or hide the DC level. The computer analysis showed that 74 channels out of a total of 201 (36.7% of the total) are out of tolerance when the 3 limit is used. If the 2 limit had been used there would be only 19 channels (9.5% of the total) out of tolerance. One sample drop out may be the cause of more noise at the 3 than the 2 limit. Because the 2 limit will disregard more of the one sample drop outs which do not degrade the data than the 3 limit it would be more desirable to use the 2 limit.
- 4.3 Dynamic Test Results - During the Dynamic test the real time monitor points showed that ordnance hazardous current monitor tripped twice during the operation of the instrumentation power transfer switch and once when the 1st stage ignition F/T box was placed in the armed condition. All three hazardous currents were resettable.

The FM/FM playback monitor points failed to show any out-of-tolerance interferences.

The PCM/FM playback monitor points showed the following interferences: 1) A transient occurred on 25 T/M channels and the VSM monitor failed for .7 seconds when the power transfer switch was activated from ground power to missile power. 2) The steady state noise on F018P and S003X decreased when the channel 4 tone was turned off and increased when the Destruct Receivers were turned on. S003X also had a change in steady state noise when the channel 4 tone was turned on and the Destruct Receiver were turned off. 3) S003E and S035E had DC level shifts when the BT3-106 frequency meters and the VIVM were turned off. There was also another DC level shift on these channels which is unexplained. 4) When the NOU Hydraulic System was energized there were 51 additional channels out during the first operational test, 33 during the second operational test and 26 during the Nozzle Step Check. Most of these channels only had 25 noise on them. This noise is not present when operating on battery (or airborne) power.

4.4

BTS-19 and BTS-152 Dynamic Calibration Test - The real time monitor points and the FM/FM playback monitor points failed to show any out-of-tolerance interference.

The PCM/FM monitor points did show several interferences.

1) S030E and S061E shifted in DC level 15 times during the Section 47 BTS-19 operations and the BTS-152 dynamic operations. Some of the shifts were uncorrelated; therefore, it is possible that some of the shifts which seem to be correlated are not. 2) During the DC simulation sequencer operation A115T had a 6% increase in noise which lasted for 2 seconds. 3) During the BTS-152 Dynamic Operations G032E, H115T, and G041E had many DC level shifts and increase in steady state noise. This was due to the fact that the leads which connect BTS-152 to the transducers are not terminated unless BTS-152 steps on them and a stimulus is sent out. Because the leads are properly terminated when stepped on the noise disappears; therefore, there is no problem during calibration.

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5.

EQUIPMENT TESTED

The equipment that was tested is listed along with its part number and serial number in Appendix III.

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6. INSTRUMENTATION

The part number and serial number of all test equipment used will be found in Appendix IV.

- 6.1 Power Supplies - A 36 channel CEC oscillograph was used to monitor the power supplies. The following power supplies were monitored with AC coupling as shown in Figure 1: BTS-170 for PCM/FM, BTS-162 for Transducer Excitation, BTS-162 for FM/FM #1, BTS-162 for FM/FM #2, BTS-169 for 1st and 2nd NCU Electronics, BTS-168 for CMC Electronics, BTS-161 for Command Destruct Receiver A, and BTS-161 for Command Destruct Receiver B. The following power supplies were monitored by DC coupling as shown in Figure #2: BTS-165 for 3rd Stage NCU Hydraulics, BTS-164 for Stage 1 & 2 NCU Hydraulics, BTS-168 for CI9A, BTS-168 for PSCR, BTS-163 for the T/M Calibration Carts, B20A Resync Power Supply, Ablation Gauge Power Supply, and the Voltage Comparator trip circuit.
- 6.2 Facilities Power Lines - The Facilities 3-phase 60 cycle power was monitored for transients with Power Line Transient Probes GWF 10192. The Probes are 60cycle rejection filters which allowed frequencies above 200 cycles to be recorded but attenuated the 60cycles by approximately 50 db. The outputs of the Power Line Transient Probes were recorded on the CEC Oscillograph.
- 6.3 Events - A dynamic event marker was connected to the CEC oscillograph monitoring the power supplies and to the input of D021E so that the time of all dynamic events except destruct could be recorded on the CEC oscillograph and the Multistylus recorder at the PCM/FM ground station. This gave a time correlation between the two records and the time that each dynamic event occurred.
- 6.4 Ordnance Safe and Armed Devices - The Ordnance Safe and Armed Devices were replaced by Safe and Armed Test Boxes. The following simulated squibs were then installed in the boxes, two second stage ignition squibs, two 1-2 stage separation squibs, two third stage ignition squibs, two 2-3 stage separation squibs and 4 thrust termination squibs. Since a first stage ignition simulated squib cannot be fired in MAP 1, it was not installed. Since the Model Specification S-1000-133A required that the current through the destruct lines be measured, a 0.2 ohm resistor was used in place of the simulated squib. A six channel oscillograph was then connected across the 0.2 ohm resistors to measure the current which flowed during the destruct test.
- 6.5 Re-entry Vehicle Simulator - A Re-entry Vehicle Simulator, AVCO SKT-319 was connected to the G & C R/V Interface.

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7. TEST PROCEDURE

- 7.1 General - The test, which was conducted in Missile Assembly Building 2, consisted of the following five parts: 1) Steady State Compatibility Test, 2) Dynamic Compatibility Test, 3) Calibration Steady State Compatibility Test, 4) BTS-152 Ambient Test, and 5) Calibration Dynamic Compatibility Test.
- 7.2 Steady State Compatibility Test - The Steady State Compatibility Test consisted of monitoring all sensitive outputs of all missile and TSE subsystems, except BTS-19 and BTS-152, for one minute while they were energized and operating in a steady state condition to determine if any out-of-tolerance conditions exist. The center 20 seconds of the T/M data as recorded on the PCM/FM and FM/FM ground stations was analyzed. The PCM/FM data was analyzed using two methods: 1) a computer analysis, and 2) standard oscillograph playback format. The FM/FM data was analyzed using standard oscillograph format only.
- 7.3 Dynamic Compatibility Test - During Dynamic Compatibility Test all missile and TSE subsystems were energized and operated in a steady state mode. One subsystem was then dynamically operated while all sensitive outputs of the steady state subsystems were monitored to determine if the dynamic subsystem caused interference in excess of the stated limits in D2-6004-5. The dynamic subsystem was also monitored for proper operation.
- 7.4 Steady State Calibration Compatibility Test - The Steady State Calibration Compatibility Test is exactly like the Steady State Compatibility Test with the exception that BTS-19 and BTS-152 would have been connected to the missile. This test was not conducted because Air Force, STL, and Boeing did not consider it to be a necessary part of the test. All problems that would have been uncovered during this test were uncovered during the other parts of the MT-I-6051 test.
- 7.5 BTS-152 Ambient Test - During this test all subsystems including BTS-19 were to be observed while BTS-152 was dynamically operated in the ambient mode to prove that it is compatible with the other subsystems. The Telemetry data was to be analyzed to prove that the BTS-152 has not disturbed any channels. The digital printer was to be analyzed to prove that BTS-152 is functional. Since STL and Boeing agreed that there is no need to use the BTS-152 in the ambient mode, this test was omitted.

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BTS-19 and BTS-152 Dynamic Calibration Test - During this test BTS-152 and one BTS-19 Calibration Cart were connected to GTM OC/C. All airborne and TSM Subsystems, except the G&C Subsystem, were energized and placed in a steady state mode. BTS-19 was then dynamically operated so that it would calibrate the missile. Since only one BTS-19 T/M Calibration Cart was used it was moved from Section 43 to Sections 45 and 47 as required so that all channels calibrated by BTS-19 would be calibrated. After the BTS-19 went through all of its dynamic operations it was then disconnected, and BTS-152 was placed in a calibrate mode and dynamically operated so that the G&C inputs would be calibrated. During the dynamic operations of BTS-19 and BTS-152 all subsystems, except the G&C subsystem, were monitored to determine if any interference exists. The PCM/FM and FM/FM Telemetry Channels were analyzed for crosstalk on unsimulated channels and for noise-free stimulus signals on the simulated channels.

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3.

TEST RESULTS

8.1

General - The results of this test as to whether an interference problem is within tolerance or not is based on the requirements of Section 1 of D2-6004-5 Volume I. These requirements satisfy the requirements in D2-3602-2 Volume II, Deviations and Variations from Specification S-133-1000 for R&D missiles. Although there are out of tolerance interferences as described below, some of them are not intolerable. Whether the interference is tolerable or not will depend upon the type, magnitude, cause and effect of the interference. An example of a tolerable interference would be transients which cause excessive PCM bit drop-outs and which can be correlated to manual switching operations. This type of interference is tolerable because of the following two reasons: it will not affect flight data, and the switching operation can be controlled so that it will not occur during the acquisition of PCM/FM Telemetry data. A brief description of the different kinds of monitoring and interferences will be given below so that the discussion of the test results will be more easily understood.

8.1.1

Monitoring - There were two types of monitoring during the test, real time and playback. The real time monitoring consists of monitoring all monitor points in MAB 2 and the nixie, digital printer, and multistylus recorder at the PCM/FM Ground Station. Since all channels that were on the multistylus records were also on the playback records the multistylus records were only used to correlate range time with each dynamic event that occurred.

The playback monitoring consisted of monitoring the PCM/FM and FM/FM data which was stripped out on oscillograph records. The FM/FM data is listed as a real time monitor point in the test document but was analyzed as playback data because the data had to be processed to be analyzed.

8.1.2

Real Time Interference - Real time interferences are interferences which were observed on the real time monitor points. These interferences are recorded at the time they occurred on supplemental data sheets in Section 2 of D2-6004-5, Volume I.

8.1.3

Playback Interferences - The PCM/FM and FM/FM oscillograph traces were analyzed for the following 4 types of noise:

8.1.3.1

Steady State Noise - This type of noise, as seen on trace 6 of plot 1, is a steady noise which makes it almost impossible to determine the exact level of the transducer even though, in most cases, a close approximation is possible. Since the noise causes the trace to fluctuate randomly in magnitude and duration, the only practical way to measure the noise is in peak to peak values. This will give the absolute magnitude of the noise which is the value required in this test.

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8.1.3.2

Random Transients - This type of noise, as seen on trace 5 (AO3BT) of plot 30 is also a steady state noise which does not make it impossible to determine the DC level of the trace. The one sample drop-outs or transients are ignored by a data analyst because they do not reflect the true value of the T/M Channel. When analyzing a trace like this for noise the peak values of the positive and negative transients were recorded. To determine the peak-to-peak noise level of the trace the two values would have to be algebraically subtracted.

8.1.3.3

DC Level Shifts - A DC shift is a change in analog value on analog traces due to the operation of other equipment or equipments. This type of noise is the most serious because approximation of the actual value of the trace cannot be determined using the median value which is used for a trace with steady state noise. Since this type of noise is the most serious it should be fixed if at all possible.

8.1.3.4

Transients - A transient is a disturbance on a T/M channel which is greater than the background noise and lasts for short periods of time, less than 0.5 seconds for the purposes of this report. The transients that are recorded in this report can be caused by several types of disturbances which are:

- 1) A switching operation in the Missile, TSE, T/M Ground Station and/or T/M Playback Station.
- 2) Loss of Sync in the missile, ground station and PCM/FM playback station.
- 3) Bit drop-out in the missile, landline PCM/FM ground station and PCM/FM playback station.
- 4) A combination of skew and bit drop-outs on the PCM/FM magnetic tape.

Item 1 above applies to both FM/FM data and PCM/FM data.
Items 2, 3, and 4 apply to PCM/FM data only.

The PCM/FM bit drop-out rate that is permissible is one bit in 10^6 bits. Since there are 345.6 K bits every second it is permissible to lose approximately 1 bit every 3 seconds. This can cause one sample transient to occur which has a magnitude of up to 51% if the most significant bit of the 8 bit analog word was lost. Because of this permissible bit drop-out rate it must be realized that during the dynamic testing there are many one sample transients which look like they are correlated with switching operations but are due to random bit drop-outs.

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8.2

Steady State Compatibility Test Results

8.2.1

General - The results of the Steady State Compatibility Test will be discussed in two parts, first with respect to the Real Time Monitor Points then with respect to the Playback Monitor Points. The Playback Monitor Points will then be divided into 3 sections which are: 1) FM/FM Monitor Points, 2) PCM/FM Monitor Points, and 3) A comparison between the oscillograph analysis and computer analysis of the PCM Data.

8.2.2

Real Time Monitor Points - During the steady state compatibility test the real time monitor points failed to show that there are any out-of-tolerance interferences present. This was partially due to the fact that FM/FM power supplies had a capacitor (100 μ f) from the positive sense lead to static ground. The capacitor reduced the ripple from 900 MV p-p to 47 MV p-p on FM/FM #1 and 200 MV p-p to 50 MV p-p on FM/FM #2. All the other power supplies were within tolerance.

After the MIL-I-6051 test was completed the power supplies were rechecked. The FM/FM fix was removed and a different fix, 100 μ f capacitors between the positive sense lead and positive power lead and negative sense lead and negative power lead, was incorporated on the FM/FM supplies. This fix reduced the noise from 800 MV p-p to 180 MV p-p on FM/FM #1 and 220 MV p-p to 105 MV p-p on FM/FM #2. Although the reduction in noise with this fix was not as great as with the first fix, it is a better fix in that it eliminated the AC ground loop which was created by the first fix.

The recheck showed that the PCM/FM (120 MV p-p), Azusa (25 MV p-p), Destruct A (170 MV p-p), and Destruct B (175 MV p-p) power supplies were within tolerance.

The transducer excitation supply had 300 MV of ripple on it. The capacitor fix used on the FM/FM supplies was unsuccessful. Then it was determined that the load was generating the noise and decided that the load should be cleaned up instead of the transducer excitation ground power system. The G&C Electronic supply had 350 MV p-p of noise on the sense leads and 600 MV p-p on the output leads. The capacitor fix was also unsuccessful with this supply. A degenerative feedback circuit was placed in the power supply which eliminated the power supply amplification but did not reduce the noise so that it would be within the tolerance of 250 MV p-p, but did decrease it to 350 MV p-p.

After the above checks were made on the power supplies all fixes were removed and the equipment was restored to its original configuration. The necessary engineering required to bring the power supplies within tolerance with respect to noise will be initiated to permanently install all fixes necessary.

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8.2.3 FM/FM Playback Monitor Points - The FM/FM Monitor Points failed to show any out-of-tolerance interferences during the Steady State Compatibility Test.

8.2.4 PCM/FM Playback Monitor Points

8.2.4.1 Computer Analysis - The computer when analyzing test data will disregard a percentage of the samples starting with the sample furthest from the median. The number of samples that are disregarded will depend upon the confidence factor and the limit used. Since the confidence factor is 80% and a constant, the number of disregarded samples will depend upon whether the 3σ , 2σ , or 1σ limit is used.

The table below will show the number of samples that are disregarded using the 80% confidence factor and the 3σ and 2σ limits for three different sample sizes.

Sample Size	Number of Samples on each end	
	3σ	2σ
1600 to 2599	1	32 to 45
2600 to 3399	2	53 to 62
3400 to 4599	3	71 to 88

When using the 3σ limit in conjunction with the confidence factor there must be at least 1600 samples for the computer to analyze before the computer will disregard 1 sample on each end (positive and negative extremes) or .125% of the total samples. If the 2σ limit was used there would be 32 samples disregarded on each end or 4% of the total samples. Because 3σ limit eliminates only 2 or .125% of the samples it is possible that in a sample size of 1600 samples there can be a few one sample drop outs which will not be disregarded by the computer but do not degrade the data an appreciable amount. Therefore it would be better to use the 2σ limit instead of the 3σ limit.

The computer analyzed 201 PCM channels which are listed in Appendix 1. The following results were obtained:

Limit Used	Channels Within Limit	Percent of Total Channels Analyzed By the Computer
3σ	127	63.3
2σ	182	90.6
1σ	196	97.6

There were 5 channels which were not within limits for the 1σ limit. As can be seen there are 55 more channels that would be within tolerance if the 2σ limit were used.

8.2.4.1 (continued)

The reason that more channels were not within the 3σ limit is partially due to the fact that the channels which are sampled at $33\frac{1}{3}$ sample/seconds do not have any 1 sample drop outs disregarded by the computer. This is because the sample size analyzed was only 663 samples and the computer using the 3σ limit requires a sample size of at least 1600 samples to disregard any of the one sample drop outs that occur. There were 49 of these channels which were out of tolerance, using the 3σ limit. 36 of these were within tolerance using the 2σ limit which allowed some of the one sample drop outs to be disregarded. Therefore it is possible that if a larger sample size had been used for each of the 36 channels (at least 1600), allowing the computer to disregard some of the one sample drop outs, many of the 36 channels which were within tolerance using 2σ limits would be within tolerance using the 3σ limits. The 13 channels which were not within tolerance using the 2σ limits would not be in tolerance using the 3σ limit with a larger sample size.

There were an additional 19 channels which had a sample size of 1600 samples or larger as required by the computer that were within tolerance using the 2σ limit but out of tolerance using the 3σ limit. As stated before, this is due to the fact that additional one sample drop outs that do not degrade the data an appreciable amount are disregarded by the computer using the 2σ limit instead of the 3σ limit. A typical example of this type of channel is A035P on plot 37. As one can see it would be desirable to use the 2σ limit instead of the 3σ limit.

8.2.4.2

Oscilloscope Records - There were 226 PCM/FM channels analyzed on 41 oscilloscope records or plots. An $8\frac{1}{2}'' \times 11''$ section was taken out of each of these plots and placed in Appendix II. Each trace on the plots is annotated with its measurement code and the peak to peak noise values which were obtained from both manual and computer analysis. This not only gives a comparison between both methods of analysis but also allows one to see the oscilloscope traces.

The manual analysis showed that there were 25 channels which had a peak to peak noise level above 1.5% (all values expressed in percentages are in reference to full scale). There are an additional 17 PCM/FM channels which had random transients which were above 1.5% peak. This gave a total of 42 channels which were out of tolerance with respect to the 1.5% peak to peak noise limit. The magnitude of the noise was up to 6% peak to peak for steady state noise and $\pm 6\%$ peak for the random transient. Examples of the steady state interferences can be seen on plot 2, measurements G073E and G074E. An example of the random transient can be seen on

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8.2.4.2
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plot 26 measurements A0147 and A0167. As one can see the analog value of A0147 would be easy to determine because the random transients (or one sample dropouts) can be disregarded leaving a trace which is almost noise free. The steady state noise which is on channels G0731 and G0732 make it a little more difficult to obtain the DC analog value because all samples in the trace vary randomly in magnitude and duration.

There were 11 random transients recorded during the steady state test. Although the transients are random, at two times 2 transients occurred simultaneously and a third time 5 transients occurred simultaneously. Since all systems were in a static condition it is impossible to state what caused them. Some of the transients which occurred simultaneously can be seen on plot 14. These transients like the other transients recorded in the static test are only one sample.

An overall look at the results of the steady state test as to what channels were clean, had noise above 1.5% and had isolated random transients can be seen on the G7M-G046 PCM Telemetry Cross Data Chart, 25-33418 Sheet 1. The Steady State data is listed under Mode 1 Frame 1. This chart along with 25-33418, SHE3, PCM T/M Supplemental Data Sheets IAB 2 will give a complete record of all noises on the PCM/FM Telemetry System.

8.2.4.3

Computer and Manual Analysis Comparison - There were 226 PCM/FM channels manually analyzed. 201 of these channels were analyzed with a computer. Since the computer was more critical and accurate in its analysis of the data it found a greater number of channels out of tolerance. The manual analysis revealed that there were 42 channels out of a total of 226 or 18.6% of the total out of tolerance. The computer showed that there were 74 channels out of 201 channels or 36.7% of the total out of tolerance.

A comparison between the two methods of analysis on the channels which were analyzed using both methods showed that the computer, using the 3σ limit, found 37 additional channels out of tolerance than were found using oscillograph analysis. Out of the total 37 additional channels 15 of them had a peak-to-peak noise level between 1.51% p-p to 1.59% p-p. The remaining channels fell between 1.6% p-p and 3.3% p-p. If the 2σ limit was used instead of the 3σ limit all but one of the 37 channels would be within tolerance. A representative channel which the computer says is out of tolerance (1.93% peak-to-peak) but manual analysis says is within tolerance is A0507 on plot 22. As one can see it would be very easy to determine the DC analog level of the channel. With channels like this it would be desirable to use the 2σ limit instead of the 3σ limit.

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8.3 Dynamic Test Results

- 8.3.1 General - The dynamic test results will be discussed in two parts, first with respect to Real Time Monitor Points and then with respect to the Playback Monitor Points. The Playback Monitor Points were analyzed only using standard oscillograph strip out. The data was not analyzed with a computer because the type of computer program which would be necessary for the analysis required is not available.
- 8.3.2 Real Time Monitor Points - During the dynamic compatibility test an Ordnance Hazardous Current indication occurred when the power transfer switch was operated from ground power to missile power and missile power to ground power. It also occurred when the 1st stage ignition F/I box was placed in an armed condition. All three hazardous current indications were resettable. These are the only detected interferences to the Test Support Equipment.
- 8.3.3 FM/FM Playback Monitor Points - The FM/FM Playback Monitor Points failed to show any out of tolerance interferences during the Dynamic Compatibility Test.
- 8.3.4 PCM/FM Playback Monitor Points - During the dynamic compatibility test the data was analyzed for changes in steady state noise, random transients, correlated transients and DC level shifts. All changes in steady state noise and DC level shifts due to a dynamic operation are listed below. The random transients and part of the correlated transients are not listed below but data on these can be obtained on the GTM 204C PCM Telemetry Cross Data Chart, Sheets 1 and 3. The correlated transients which are not listed are one sample transients in which only one or two, occurring simultaneously, occurred during a dynamic operation. The possibility that these transients are random is much greater than the possibility of their being caused by the switching operation. When three or more transients occurred simultaneously during a switching operation they will be listed below because the possibility of their being caused by the switching operation is much greater than in the case of one or two transients occurring simultaneously.

The PCM/FM Telemetry Interferences are listed below:

1. When the instrumentation power transfer switch was operated from ground power to missile power the VGNR monitor failed for .7 seconds and a transient occurred on 25 transducers.
2. When the channel 4 tone was turned off SOOEX had a 5% decrease in noise the first time and a 1% decrease the second time. PCISP only had a 8% decrease in noise the first time.

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8.3.4

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3. There was a 3% DC level shift on S083E and a 1.5% DC level shift on S085E approximately 6 seconds after modulator frequency was turned on and six seconds before the destruct receiver power was turned off.
4. The noise on S003X increased 3% when the modulator frequency 3 (channel 4 tone) was turned on.
5. Turning the Destruct Receivers off decreased the noise on S003X 3%.
6. Turning the DTS-106 VIM off caused a 6% DC shift on S083E and 1.5% DC shift on S085E.
7. Turning DTS-106 Frequency Meter off caused a DC shift of 2% on S083E and 1.5% on S085E. The two channels were restored to their original level when the frequency meter was turned on.
8. When the Destruct Receivers were turned on the peak-to-peak noise changed 4% p-p on S003X and 8% p-p on F018F.
9. During the G&C operational test and the Nozzle Stop Check the noise on several PCM/FM channels increased while the hydraulic pumps were operating. Some of the channels were already out of tolerance but most of the channels were within tolerance before and after the hydraulic pump operation. Prior to the MIL-I-6051 test it was determined that the noise on the PCM/FM telemetry channels increased to the point where the channels were unusable while the model "D" NCU hydraulic pump motors were operating. A 1000 μ f capacitor was then placed across the power leads of the hydraulic pump motors. This fix, used during the MIL-I-6051 test, eliminated the noise on all the PCM/FM telemetry channels except those listed in the table below. A model "E" NCU, which has more RFI fixes than the model "D" NCU, was installed on the first stage engine to find out its effect on the T/M System. The noise that its motors generated was equivalent to the model "D" NCU with the 1000 μ f capacitor fix.

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8.3.4
(continued)

The first stage model "D" NCU was also operated on battery power to determine its effect in flight. It was found out that when operating on battery power the PCM/FM telemetry system is not affected by the NCU hydraulic pump motor. This shows that although there are some PCM/FM channels out of tolerance while on ground power when the missile is on battery power there is no RTI problem. Since most of the out of tolerance channels have only 2% noise it would be desirable to fix the worst cases, like G007E and G008E with 8% p-p and 4% p-p noise, respectively, and use the other channels as they are since they are usable with 2% steady state noise which is present only while the NCU hydraulic pump motors are running on ground power.

The table below lists all affected channels with the steady state noise that was generated on each by the NCU motors. As one can see the channels which are affected are different in the different tests. The reason for this is unknown.

	<u>Operational Test #1</u>	<u>Operational Test #2</u>	<u>Nozzle Step Check</u>
G006E			2
G007E	8	8	8
G008E	4	4	4
G023E	2		
G024E	2		
G025E	2		
G026E	2		
G027E	2		
G028E	2		2
G029E	2		
G035E	2	4	2
G037E	2	3	2
G040E	2		
G041E	2		
G042E		2	
G058E	2		
G070E		2	
G074E	2		
G080E	2	3	
G081E	2		
G082E	2		
G083E	2	2	
G084E		2	
G085E	2		
G090E			2
G091E	2		← Random Transients
G092E		2	
S013E		2	2
S018E	2	2	
S022E		2	
S080E		4	3
S081E		5	5

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8.3.4
(continued)

	Operational Test #1	Operational Test #2	Nozzle Step Check
S083E		2	
S085E		2	
A002H			3
A071E	2		
A025P	2		
A026P	2	2	
A028P		2	
A029P	2		
A032P	2		
H003P		2	2
H005P		2	2
H007P	2		
H008P	2		
H009P	2		
H010P	2		3
H011P	2	2	4
H012P	2	2	4
H013P	2	2	3
H015P	2	2	2
A001S	2		
A012T	2		
A024T	2		2
A026T	2		3
A027T			3
A040T			
A045T	2		
A046T	2		
A047T			
A050T	2		2
A051T	2		2
A053T	2		
A061T			2
A063T	2		3
A090T	2	2	
A190T	2		
A535T	2		
P004X	2	2	
3001X	2	2	2
3013X	2		

from 2% random transients
to 2% steady state noise

Noise increased from 2% to 3%

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8.4 BTS-19 and BTS-152 Dynamic Calibration Test

8.4.1 General - The objectives of the test were to prove that 1) no excessive crosstalk existed between data channels, 2) the calibration equipment injected noise-free stimulus signals, and 3) the calibration equipment did not affect all other subsystems, except the G&C subsystem.

When a BTS-19 calibration cart was connected to the missile, it was discovered that 60 cycle noise was injected on the unsimulated channels connected to the calibration cart. If three Telemetry Calibration Carts would have been used the 60 cycle noise that each would inject in the Telemetry Channels would have covered some of other interferences. When the BTS-19 Calibration Cart steps on to a channel to calibrate it the 60 cycle noise disappears and the calibration stimulus is clean.

Since the interest is only in the simulated channels which are clean during calibration the 60 cycle noise is not a problem during normal calibration, but only when looking for interference problems such as crosstalk. Therefore Boeing and SIL agreed that only one telemetry calibration cart instead of three would be connected to the missile for this test. A revision to the BTS-19 has since been made eliminating this interference on the unsimulated channels.

This test, like the other tests, will be discussed in two parts, first with respect to the Real Time Monitor Points, then with respect to the Playback Monitor Points. The Playback Monitor points were analyzed using only standard oscillograph strip out methods because the computer program necessary for the type analysis which is required was not available.

8.4.2 Real Time Monitor Points - The Real Time Monitor Points failed to show any out of tolerance interferences during the BTS-19 and BTS-152 Dynamic Competibility Test.

8.4.3 FM/FM Playback Monitor Points - The FM/FM Playback Monitor Points failed to show any out of tolerance interferences during the BTS-19 and BTS-152 Dynamic Competibility Test.

8.4.4 PCM/FM Playback Monitor Points

8.4.4.1 General - During the calibration competency test the PCM/FM telemetry data was analyzed for the different types of noise as stated in paragraphs 8.1.3 but because of the objectives of the Calibration Dynamic Competibility Test as stated in 8.4.1, changes in steady state noise and DC level shifts only will be listed below. The reason that steady state noise is not listed is that in a dynamic test of this type only the changes in steady state noise are of interest. The details on steady state noise can be obtained from 25-33418 Sheet 2 - GTM 0040 PCM Cross Telemetry Data

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8.4.4.1
(cont)

Chart. The transients are not listed because they will not present any calibration problems unless they are present in excessive numbers which may hide the level of the calibration stimuli. In this test all of the calibration stimuli were clean and the transients recorded were on the T/M channels while they were in a steady state condition. The number of transients which occurred on the T/M channels during the Dynamic Calibration Test are recorded on 25-33418 Sheet 2 and the details on each transient can be found on the supplemental data sheets in 25-33418 Sheet 3, PCM Supplemental Data Sheets.

8.4.4.2

BTS-19 Dynamic Operations at Missile Sections 43 and 45
The PCM/FM monitor points failed to show any changes in steady state noise or DC level shift for the Section 43 and Section 45 BTS-19 dynamic operations.

8.4.4.3

BTS-19 Dynamic Operations at Missile Section 47 - The PCM/FM Telemetry interferences which occurred during the Section 47 BTS-19 dynamic operations are listed below.

- 1) The DC level of 3080E and 3081E shifted +2% one second after the BTS-19 vibrator supply switch was turned off. The two transducers returned to their original level 7.8 seconds after the switch was turned on.
- 2) During the operation of the AC Simulation Sequencer A015T had a 6% increase in steady state noise for 2 seconds.
- 3) During the operation of the DC Simulation Sequencer two DC level shifts occurred on the following two transducers:

3080E +2% and +1%
3081E +1% and +2%
- 4) Turning the DC Simulation Switch off caused the following DC level shifts:

3080E -4%
3081E -4%
- 5) Turning the DC voltage measurements switch on caused the following DC level shifts:

3080E +3%
3081E +4%
- 6) During the operation of the DC voltage measurements sequencer the following DC level shifts occurred:

3080E -2%
3081E -2%
- 7) Operating the AC Transducer Output Sequencer caused 3081E to have a +1% DC level shift.

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8.4.4.3
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- 8) Placing the AC Voltage Measurement switch to the MOM position caused a DC level shift on the following channels:
S080E +1%
S081E +4%
- 9) During the operation of the AC Voltage Measurement switch the following DC level shifts occurred:
S080E -1%
S081E -2%
- 10) Switching the AC voltage supply frequency switch from the 100 cps position to the 20 cps position caused the following DC level shifts:
S080E -2%
S081E -3%
- 11) During the BTS-19 calibration sequence two DC level shifts which can not be correlated with any switching operation were noted on the following transducers:
S080E +2% and -2%
S081E +2% and -4%

Since S080E and S081E shifted its DC analog value even when no dynamic operation was taking place, it is very probable that some of the interferences recorded on these two channels as listed above may be random and are not correlated with the BTS-19 dynamic operations.

8.4.4.4

BTS-152 Dynamic Operations -- The PCM/FM interferences which occurred during the dynamic operations below are listed below.

- 1) During the BTS-152 Automatic Calibration Sequence three channels shifted their DC level and became noisy. The reason for this is that the leads which connect BTS-152 to the missile transducers are left open in BTS-152 unless BTS-152 is sending out a stimulus. If leads were properly terminated the noise would not be present. Since the leads are properly terminated when BTS-152 is simulating the transducers the noise disappears and a clean stimulus is present. Because the interest is only in the simulated channels, this is not a problem. The three channels which are affected are:

	<u>DC Shift</u>	<u>Steady State Noise Increase</u>
S082E	6	18
S083E	2	6
S084E	2	6

S080E and S081E also had 18 DC level shifts each being approximately 3%.

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5.1.4.4
(cont)

- 2) Turning the BPS-150 Frequency Meter off caused S080E and S081E to have a DC shift of 3%.
- 3) Turning the BPS-150 digital printer off caused S080E and S081E to have a DC shift of 3%.
- 4) An uncorrelated DC shift of 3% also occurred on S080E and S081E. As stated before since S080E and S081E shifted when no dynamic operation was taking place, it is very probable that some of the above interferences recorded above are random and are not due to the BPS-150 dynamic operations.

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9.

CONCLUSIONS

The objectives of this test were to determine if a PCM/FM missile can be processed in MAB 2 and to prove that the PCM/FM missile is free from crosstalk.

The results of this test have proved that a PCM/FM missile can be processed in MAB 2 successfully. The test results have also showed that the T/M channels are free from crosstalk, except for G060E and G081E which fluctuated frequently during dynamic operations and while all systems were in a static condition. Since they fluctuated while all systems were in a static condition it is possible that most of the other fluctuations which look like they are correlated are random. Also P018F and S003X were affected during the dynamic test but not while the T/M channels were calibrated. This indicates that no crosstalk exists between P018F and S003X and the other T/M channels.

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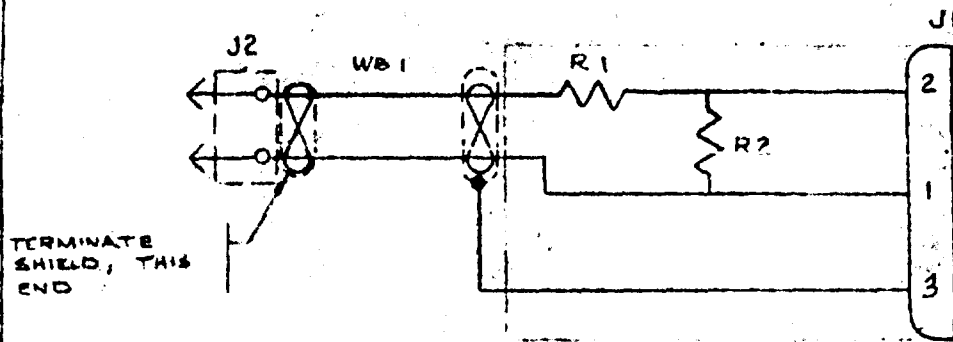
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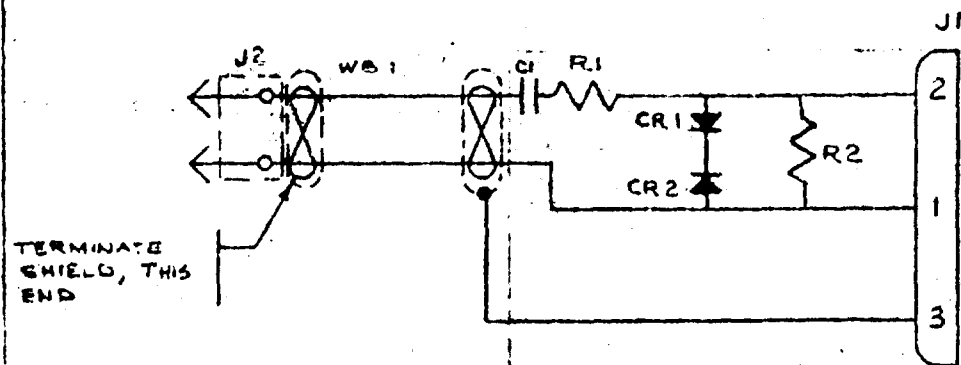
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FIGURE - 1



REF. DESIG.	PART NUMBER	DESCRIPTION	MATERIAL	SIZE
J1	XLR-3-11C	CONNECTOR - PLUG	CANNON ELEC. (OR EQUIV)	
J2	210	BANANA PLUG - DBL	H.H. SMITH (OR EQUIV)	
R1	M335044-21	RESISTOR - 600Ω, 1W	(RC32GF6AZJ, OR EQUIV)	
R2	M335044-24	RESISTOR - 200Ω, 1W	(RC32GF201J, OR EQUIV)	
WB1	-	2 COND SHIELDED WIRE	BMS 13-50, TYPE III, CLASS B	#16 X 20 FT

FIGURE - 2



REF. DESIG.	PART NUMBER	DESCRIPTION	MATERIAL	SIZE
J1	XLR-3-11C	CONNECTOR - PLUG	CANNON ELEC. (OR EQUIV)	
J2	210	BANANA PLUG - DBL	H.H. SMITH (OR EQUIV)	
R1	M335044-57	RESISTOR - 150Ω, 1W	(RC32GF150J, OR EQUIV)	
R2	M335044-24	RESISTOR - 200Ω, 1W	(RC32GF201J, OR EQUIV)	
CR1, CR2	10Z5.6T10	ZENER DIODE	INTERNATIONAL RESIST. CORP (OR EQUIV)	
WB1	-	2 COND SHIELDED WIRE	BMS 13-50, TYPE III, CLASS B	#16 X 20 FT
C1	115D 600E-700DM1	CAPACITOR - 4.7, 50VDC	SPRAGUE ELECT (OR EQUIV)	

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APPENDIX I

COMPUTER ANALYSIS OF PCM/FM DATA

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TEST TYPE MIB 2 STATIC COMPATIBILITY TEST CEM 0040
 PERIOD OF ANALYSIS 20 HRS 10 MIN 0 SEC TO 20 HRS 10 MIN 20 SEC

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE REGION		LIMITS		OTHER MEAN	PARAMS STD DEV.
					VALUE	TOL.	99.73 PCT	95.5 PCT	68.3 PCT	MEAN		
0013D	1959	52.00	54.80	2.80	3.75 2.22	10.00	0.95 -0.58	0.20 -0.20	0.15 -0.15		54.80	0.13
0014D	1959	51.00	55.20	4.20	4.79 3.62	10.00	0.59 -0.58	0.23 -0.22	-0.15 -0.15		55.20	0.14
0015D	1959	52.00	54.04	2.04	2.99 1.80	10.00	0.95 -0.24	0.54 -0.23	0.22 -0.17		54.07	0.20
0016D	1959	51.00	54.00	3.00	3.98 2.70	10.00	0.98 -0.30	0.20 -0.20	0.15 -0.15		54.01	0.13
0017D	1959	51.50	53.20	1.70	2.69 1.50	10.00	0.98 -0.20	0.30 -0.20	0.15 -0.15		53.21	0.14
0018D	1959	52.00	54.80	2.80	3.79 2.60	10.00	0.92 -0.20	0.22 -0.20	0.15 -0.15		54.81	0.14
0019D	1959	52.00	54.42	2.42	3.38 2.20	10.00	0.97 -0.22	0.52 -0.21	0.16 -0.16		54.43	0.17
0020D	1959	52.00	55.21	3.21	3.80 2.64	10.00	0.59 -0.57	0.42 -0.20	0.15 -0.15		55.21	0.14
0021D	1959	52.00	55.60	3.60	4.55 3.02	10.00	0.95 -0.58	0.20 -0.20	0.15 -0.15		55.60	0.13
0022D	1959	52.00	55.63	3.63	4.59 3.40	10.00	0.95 -0.23	0.54 -0.22	0.13 -0.17		55.66	0.19

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NAME	SAMPLE SIZE	EXP. OFFSET VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 66.3 PCT	OTHER MEAN	PARAMS STD DEV.
					VALUE	TOL.					
0023D	1959	51.50	54.39	2.89	3.49 2.31	10.00	0.59 -0.59	0.20 -0.39	0.15 -0.15	54.39	0.14
0024D	1959	51.00	53.61	2.61	3.59 2.15	10.00	0.98 -0.46	0.51 -0.20	0.15 -0.15	53.62	0.16
0006E	653	3.00	0.38	-2.62	-1.70 -5.19	5.00	0.92 -0.57	0.37 -0.52	0.17 -0.17	0.37	0.18
0006E	653	7.00	0.40	-6.60	-5.70 -7.18	10.00	0.90 -0.58	0.46 -0.44	0.16 -0.16	0.40	0.17
0008E	653	78.00	67.20	-10.80	-10.60 -11.00	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	67.20	0.12
0023E	653	82.00	81.54	-0.46	0.18 -1.00	10.00	0.65 -0.53	0.34 -0.51	0.20 -0.32	81.51	0.22
0024E	653	48.00	46.81	-1.19	-0.23 -1.40	10.00	0.95 -0.21	0.53 -0.21	0.15 -0.15	46.83	0.16
0025E	653	50.50	49.20	-1.30	-0.73 -1.78	10.00	0.57 -0.48	0.20 -0.20	0.15 -0.15	49.20	0.13
0026E	653	52.00	52.04	0.04	0.93 -0.80	10.00	0.89 -0.84	0.54 -0.60	0.35 -0.26	52.05	0.28
0027E	653	56.00	55.21	-0.79	0.10 -1.25	10.00	0.89 -0.46	0.42 -0.20	0.15 -0.15	55.21	0.14

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		REGION		LIMITS		OTHER		PARAMS STD DEV.
					VALUE	TOL.	99.73 PCT	95.5 PCT	68.3 PCT	MEAN	MEAN				
0028E	653	49.00	49.52	0.50	1.18 0.00	10.00	0.66 -0.52	0.36 -0.50	0.21 -0.33	59.59	0.23				
0029E	653	23.00	22.40	-0.60	-0.03 -0.80	10.00	0.57 -0.20	0.20 -0.20	0.15 -0.15	22.40	0.12				
0030E	653	17.50	17.00	-0.50	1.00 -1.95	10.00	1.50 -1.45	1.12 -1.13	0.62 -0.68	16.97	0.56				
0033E	653	1.00	0.77	-0.23	0.37 -0.79	10.00	0.60 -0.56	0.23 -0.52	0.17 -0.17	0.75	0.18				
0037E	653	72.50	61.60	-10.90	-10.70 -11.10	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	61.60	0.12				
0039E	653	51.00	51.18	0.18	0.40 -0.50	10.00	0.22 -0.68	0.21 -0.51	0.16 -0.16	51.16	0.17				
0040E	653	51.00	50.27	-0.73	0.35 -1.20	10.00	1.08 -0.47	0.33 -0.45	0.25 -0.33	50.25	0.24				
0041E	653	40.50	40.03	-0.47	0.47 -0.70	10.00	0.94 -0.23	0.54 -0.22	0.17 -0.17	40.06	0.19				
0042E	653	50.00	48.85	-0.15	0.57 -0.60	10.00	0.71 -0.45	0.34 -0.44	0.26 -0.32	48.83	0.23				
0043E	1959	51.00	51.16	0.16	0.75 -0.40	10.00	0.62 -0.56	0.24 -0.52	0.18 -0.24	51.13	0.19				

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE REGION		LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV.
					VALUE	TOL.	99.73 PCT	95.5 PCT			
G044E	1959	53.00	52.40	-0.60	0.39	10.00	0.98	0.19	0.15	52.41	0.14
					-0.80		-0.20	-0.10	-0.25		
G045E	1959	57.00	53.21	-3.79	-2.82	10.00	0.97	0.36	0.13	53.21	0.14
					-4.28		-0.40	-0.20	-0.15		
G059E	3918	46.00	45.99	-0.01	0.20	10.00	1.11	0.94	0.39	45.95	0.46
					-2.46		-1.55	-1.03	-0.51		
G060E	3918	46.00	44.65	-1.35	0.98	10.00	2.25	1.36	0.60	44.73	0.50
					-2.58		-1.23	-0.79	-0.37		
G061E	3918	49.50	49.62	0.12	1.05	10.00	0.73	0.52	0.16	49.64	0.18
					-0.48		-0.60	-0.22	-0.16		
G062E	3918	49.00	49.59	0.59	1.54	10.00	0.95	0.52	0.18	49.58	0.22
					0.00		-0.58	-0.52	-0.13		
G063E	3918	50.00	49.94	-0.06	0.57	10.00	0.63	0.25	0.12	49.91	0.21
					-0.60		-0.54	-0.51	-0.23		
G070E	3918	50.00	49.59	-0.41	0.57	10.00	0.98	0.58	0.35	49.59	0.30
					-1.00		-0.59	-0.50	-0.35		
G071E	3918	50.00	49.99	-0.01	0.90	10.00	0.91	0.21	0.13	49.97	0.17
					-0.60		-0.58	-0.45	-0.23		
G072E	3918	50.00	49.93	-0.07	0.66	10.00	0.66	0.26	0.19	49.90	0.22
					-0.60		-0.59	-0.50	-0.30		
G058E	3918	56.00	55.68	-0.32	0.97	10.00	1.27	0.88	0.56	55.74	0.41
					-1.38		-0.66	-0.68	-0.30		

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YEAR	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		REGION		LIMITS		OTHER		PARAMS	
					VALUE	TOL.	PCT	PCT	PCT	PCT	PCT	PCT	MEAN	STD DEV.		
0073E	3918	52.00	50.99	-1.01	0.91 -3.60	10.00	1.93 -2.59	1.27 -1.95	0.52 -1.18	50.73	0.83					
0074E	3918	49.00	58.35	-0.65	0.39 -1.72	10.00	1.04 -1.67	0.64 -0.53	0.36 -0.37	48.36	0.33					
0075E	3918	50.00	49.82	-0.18	1.37 -1.77	10.00	1.56 -2.59	1.10 -1.14	0.51 -0.65	49.78	0.55					
0081E	653	50.00	49.99	-0.01	0.90 -0.98	10.00	0.91 -0.57	0.31 -0.44	0.16 -0.15	49.99	0.16					
0082E	653	50.00	50.26	0.26	1.30 -0.20	10.00	1.04 -0.46	0.33 -0.45	0.25 -0.33	50.24	0.24					
0083E	653	55.00	54.79	-0.21	0.70 -0.78	10.00	0.91 -0.57	0.20 -0.40	0.15 -0.15	54.79	0.14					
0084E	653	52.00	51.60	-0.40	0.50 -0.70	10.00	0.90 -0.30	0.25 -0.20	0.15 +0.15	51.61	0.13					
0087E	653	0.	0.	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12					
0088E	653	0.	0.	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12					
0090E	653	8.00	0.40	-7.60	-6.70 -8.15	10.00	9.00 -0.55	0.39 -0.22	0.15 -0.15	0.40	0.14					

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEAN	OFFSET	ACCURACY		TOLERANCE 99.73 PCT	RANGE		LIMITS 68.3 PCT	OTHER		PARAMS STD DEV.
					VALUE	TOL.		FUT	MEAN		MEAN	DEV.	
1002E	653	77.00	66.00	-11.00	-10.80 -11.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	66.00	0.12		
1004E	653	0.	0.00	0.00	0.57 -0.20	1.00	0.57 -0.20	0.20 -0.19	0.15 -0.15	0.00	0.12		
1005E	653	100.00	100.40	0.40	1.35 0.20	1.00	0.95 -0.20	0.20 -0.20	0.15 -0.15	100.41	0.13		
1006E	653	0.	0.	0.	0.20 -0.20	1.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12		
1007E	653	100.00	100.02	0.02	0.93 -0.20	1.00	0.91 -0.22	0.52 -0.23	0.16 -0.16	100.04	0.17		
1008E	653	1.00	0.80	-0.20	6.73 -0.71	1.00	0.93 -0.51	0.20 -0.20	0.15 -0.15	0.80	0.13		
1009E	653	102.00	101.60	-0.40	0.19 -0.80	1.00	0.58 -0.40	0.32 -0.20	0.15 -0.15	101.61	0.13		
1010E	653	0.	21.60	21.60	21.60 21.40	1.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	21.60	0.12		
1012E	653	0.	0.24	0.24	0.97 -0.20	1.00	0.73 -0.43	0.36 -0.42	0.27 -0.31	0.22	0.23		
1019E	653	100.00	99.27	-0.73	0.15 -1.00	1.00	0.88 -0.77	0.51 -0.30	0.32 -0.19	99.30	0.21		

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NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEAN	OFFSET	ACCURACY		TOLERANCE	REGIM	LIMITS	OTHER	PARAMS
					VALUE	TOL.					
I 144	653	0.	0.	0.	0.26	1.00	0.20	0.19	0.15	0.	0.12
					-0.20		-0.20	-0.19	-0.14		
I015E	653	100.00	100.04	0.04	0.93	1.00	0.90	0.54	0.30	100.06	0.24
					-0.59		-0.63	-0.54	-0.20		
I016E	653	1.50	0.33	-1.17	-0.52	1.00	0.65	0.27	0.20	0.29	0.22
					-1.70		-0.52	-0.50	-0.33		
I017E	653	100.00	100.00	0.00	0.97	1.00	0.97	0.20	0.15	100.01	0.14
					-0.30		-0.30	-0.20	-0.15		
I018E	653	0.	0.36	0.36	0.28	1.00	0.62	0.29	0.13	0.34	0.20
					-0.19		-0.56	-0.52	-0.25		
I019E	653	100.00	99.00	-0.01	0.92	1.00	0.95	0.21	0.16	99.96	0.25
					-1.72		-1.72	-0.64	-0.16		
I020E	653	0.	0.85	0.85	1.70	1.00	0.93	0.63	0.09	0.09	0.22
					1.60		-0.25	-0.24	-0.23		
I021E	653	00.00	100.81	1.81	2.19	1.00	1.28	1.19	0.16	100.86	0.28
					1.26		-0.55	-0.22	-0.16		
I012E	653	21.0	90.67	-0.33	0.70	10.00	1.04	0.22	0.24	90.65	0.23
					-0.20		-0.47	-0.46	-0.33		
I013E	653	84.50	91.59	6.59	7.40	10.00	1.01	0.31	0.23	91.06	0.23
					6.10		-0.49	-0.47	-0.34		

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		RSMIGN		LIMITS		OTHER		PARAMS STD DEV
					VALUE	TOL.	PCT	PCT	PCT	PCT	68.3	PCT	MEAN		
S018E	653	83.00	38.78	0.78	1.77	10.00	0.90	0.22	0.22	0.16	0.16	88.77	0.18		
S021E	653	77.00	76.81	-0.19	0.70	10.00	0.89	0.46	0.46	0.15	0.15	76.82	0.14		
S022E	653	75.00	78.00	3.00	3.96	10.00	0.96	0.20	0.20	0.15	0.15	78.01	0.14		
S080E	653	35.00	45.60	10.60	2.80	10.00	-0.20	0.19	0.19	0.15	0.15	45.60	0.12		
S081E	653	82.00	71.20	10.80	10.80	10.00	0.20	0.19	0.19	0.15	0.15	71.20	0.12		
S082E	653	42.00	43.22	1.22	-11.00	10.00	-0.20	-0.19	-0.19	0.16	0.16	43.23	0.17		
S083E	653	39.50	24.17	-5.33	0.72	10.00	0.94	0.53	0.53	0.55	0.55	24.26	0.23		
S084E	653	1.00	0.01	-0.19	-4.50	10.00	0.83	0.80	0.80	0.15	0.15	0.81	0.25		
S085E	653	36.00	27.50	1.50	-5.70	10.00	-0.36	-0.35	-0.35	0.23	0.23	37.43	0.29		
S086E	653	57.00	54.72	-2.28	0.76	10.00	0.95	0.47	0.47	0.15	0.15				
					-0.72	10.00	-0.53	-0.30	-0.30	0.15	0.15				
					2.50	10.00	1.00	0.30	0.30	0.23	0.23				
					0.40	10.00	-1.10	-0.82	-0.82	0.23	0.23				
					-0.07	10.00	2.21	1.68	1.68	0.15	0.15				
					-5.50	10.00	-3.22	-2.47	-2.47	0.15	0.15				

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE REGION		LIMITS		PARAMS	
					VALUE	TOL.	99.73 PCT	95.5 PCT	68.3 PCT	OTHER MEAN	STD DEV	
AO01H	653	2.00	0.	-2.00	-1.90 -2.20	2.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12	
AO02H	653	3.50	2.05	-1.45	-0.15 -1.70	2.00	1.30 -0.25	0.53 -0.24	0.29 -0.18	2.09	0.22	
AO03H	653	1.00	1.63	0.63	1.55 0.97	2.00	0.92 -0.56	0.54 -0.23	0.17 -0.17	1.65	0.19	
AO22H	653	0.	0.	0.	0.20 -0.20	5.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12	
AO23H	653	0.	0.	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.	0.12	
AO24H	653	1.00	0.43	-0.57	-1.00 -1.16	10.00	0.57 -0.59	0.53 -0.30	0.22 -0.18	0.45	0.27	
AO25H	653	2.00	1.19	-0.91	0.13 -1.39	2.00	0.95 -0.58	0.43 -0.51	0.16 -0.16	1.13	0.18	
AO26H	653	0.	1.24	1.24	2.16 1.00	2.00	0.92 -0.24	0.54 -0.23	0.23 -0.17	1.27	0.19	
AO27H	653	3.00	2.45	-0.55	-1.10 -1.80	2.00	1.05 -1.25	0.72 -0.45	0.31 -0.19	2.48	0.26	
AO28H	653	2.00	2.40	0.40	1.37 -0.13	2.00	0.96 -0.54	0.43 -0.20	0.15 -0.15	2.41	0.15	

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		RSDIOM		LIMITS		OTHER		PARAMS STD DEV
					VALUE	TOL.	99.73 PCT	95.5 PCT	95.5 PCT	99.73 PCT	MEAN	STDEV			
AC25H	653	2.00	1.19	-0.81	0.15 -2.32	2.00	0.96 -0.58	0.21 -0.48	0.10 -0.16	1.18	0.14				
AC25H	653	3.00	2.41	-0.59	0.37 -0.80	2.00	0.96 -0.21	0.21 -0.20	0.15 -0.15	2.42	0.15				
AC13P	1959	102.00	102.00	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12				
AC14P	1959	102.00	102.00	0.	0.20 -0.20	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12				
AC21P	653	94.00	98.40	4.40	5.36 4.00	10.00	0.96 -0.40	0.20 -0.20	0.15 -0.15	98.40	0.14				
AC22P	653	97.00	95.65	-1.35	-0.44 -1.80	10.00	0.91 -0.40	0.23 -0.24	0.27 -0.13	95.65	0.12				
AC24J	653	95.00	93.72	3.72	4.40 3.20	10.00	0.67 -0.52	0.24 -0.24	0.24 -0.24	93.72	0.12				
AC23P	653	97.00	95.00	-1.40	-0.21 -2.77	10.00	0.59 -0.78	0.40 -0.39	0.17 -0.16	95.00	0.12				
AC29P	653	96.00	96.00	0.00	0.55 -0.70	10.00	0.55 -0.70	0.20 -0.19	0.15 -0.15	96.00	0.12				
AC30P	653	97.50	97.20	-0.30	0.66 -0.60	10.00	0.96 -0.30	0.27 -0.20	0.15 -0.15	97.20	0.14				

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YEAR	NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		REGION		LIMITS		OTHER		PARAMS	
						VALUE	TOL.	99.73 PCT	95.45 PCT	95.45 PCT	99.73 PCT	99.73 PCT	95.45 PCT	99.73 PCT	95.45 PCT	MEAN	STD DEV
	AC31P	653	90.00	94.81	4.81	6.10 4.24	10.00	1.29 -0.57	0.53 -0.31	0.16 -0.16	94.83	0.18					
	AC32P	653	95.00	95.26	0.26	1.17 -0.36	10.00	0.91 -0.61	0.53 -0.33	0.31 -0.19	95.29	0.22					
	AC33P	1959	102.00	102.00	0.	0.20 -1.2X	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12					
	AC34P	1959	102.00	102.00	0.	0.2X -0.20	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	102.00	0.12					
	AC35P	1959	49.00	48.00	-1.00	-0.01 -1.95	10.00	0.09 -0.95	0.25 -0.2X	0.15 -0.15	48.00	0.16					
	AC36P	15619	16.00	14.80	-1.20	-0.34 -1.78	5.00	0.86 -0.58	0.20 -0.27	0.14 -0.14	14.80	0.15					
	AC37P	15672	15.00	14.14	-0.86	-0.03 -1.56	5.00	0.83 -0.69	0.45 -0.33	0.32 -0.24	14.16	0.24					
	AC39P	25672	24.00	25.50	1.50	2.15 0.62	10.00	0.56 -0.37	0.20 -0.57	0.15 -0.15	25.57	0.18					
	AC40P	25672	23.00	23.40	0.40	1.19 -0.28	10.00	0.72 -0.74	0.33 -0.44	0.24 -0.32	23.44	0.24					
	HC01P	1959	7.00	0.25	-6.65	-6.01 -7.20	8.00	0.64 -0.53	0.24 -0.52	0.18 -0.27	0.33	0.20					

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MEAS NAME	SAMPLE SIZE	EXT. CUTOUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE 99.73 PCT	RUCION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
					VALUE	TOL.					
H003P	1959	45.00	34.70	-11.00	-10.30 -11.20	3.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	34.00	0.12
H004P	1959	43.00	32.00	-11.00	-10.80 -11.20	8.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	32.00	0.12
H005P	1306	45.00	34.00	-11.00	-10.90 -11.00	8.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	34.00	0.12
H006P	1959	46.00	35.20	-10.30	-10.60 -11.00	5.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	35.20	0.12
H015P	1959	72.50	61.00	-19.00	-10.70 -11.10	10.00	0.20 -0.20	0.19 -0.19	0.14 -0.14	61.00	0.12
F015P	1959	2.00	2.30	0.30	0.79 -0.00	2.50	0.11 -0.17	0.20 -0.21	0.16 -0.16	2.36	0.18
F016P	1059	2.50	3.50	1.00	1.60 0.50	3.00	0.00 -0.50	0.21 -0.49	0.16 -0.16	3.57	0.16
F018P	1959	3.00	3.00	0.20	3.50 -3.00	4.50	3.30 -3.40	2.64 -3.43	0.87 -2.17	3.08	1.45
A001S	3918	100.00	99.27	-0.73	0.10 -1.00	5.00	0.91 -0.27	0.51 -1.26	0.31 -0.19	99.31	0.22
A002S	3918	5.00	4.66	-0.34	0.63 -1.10	5.00	0.07 -0.81	0.33 -0.46	0.24 -0.33	4.63	0.25

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MEAS NAME	SAMPLE SIZE	EXT. OUTPUT VALUES	MEDIAN	OFFSET	ACCURACY		TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
					VALUE	TOL.					
A003S	3918	100.00	99.50	-0.50	0.20 -1.45	5.00	0.70 -0.95	0.52 -0.43	0.23 -0.33	99.47	0.25
A004S	3918	5.00	4.53	-0.47	0.35 -1.16	5.00	0.82 -0.69	0.46 -0.32	0.32 -0.23	4.55	0.24
A005S	3918	41.50	41.60	0.10	0.90 -0.10	5.00	0.80 -0.20	0.22 -0.20	0.14 -0.14	41.61	0.13
A006S	3918	44.50	45.54	1.04	2.03 0.16	5.00	0.38 -0.39	0.51 -0.52	0.20 -0.30	45.52	0.24
A007S	3918	48.00	47.94	-0.06	0.37 -1.35	5.00	0.65 -1.29	0.26 -0.77	0.19 -0.32	47.39	0.36
A008S	3918	42.00	41.60	-0.40	0.17 -0.94	5.00	0.57 -0.54	0.19 -0.19	0.14 -0.14	41.60	0.13
A009S	15672	62.00	61.20	-0.80	0.10 -1.39	5.00	0.90 -0.59	0.48 -0.45	0.16 -0.16	61.20	0.18
A010S	15672	69.50	68.39	-1.11	-0.24 -1.70	5.00	0.87 -0.53	0.32 -0.49	0.16 -0.16	68.38	0.18
A011S	15019	70.50	72.07	1.57	2.45 0.94	5.00	0.27 -0.64	0.50 -0.27	0.30 -0.19	72.11	0.23
A012S	15019	70.00	68.51	-1.49	-0.64 -1.30	5.00	0.35 -0.31	0.48 -0.29	0.32 -0.21	68.54	0.23

MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		REGION		LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
					VALUE	TOL.	99.73 PCT	95.5 PCT	99.73 PCT	95.5 PCT			
AC06T	653	10.00	12.51	2.51	4.93 5.10	6.00	2.43 -2.47	0.75 -0.82	10.51	0.36 -0.25	10.51	0.35	
AC08T	653	11.00	12.64	1.64	2.78 3.55	6.00	1.14 -1.09	0.72 -0.43	12.64	0.29 -0.32	12.64	0.29	
AC09T	653	11.00	11.60	0.60	1.97 -0.50	6.00	1.37 -1.10	0.58 -0.54	11.61	0.17 -0.17	11.61	0.24	
AD10T	653	11.00	11.99	0.99	1.09 -0.10	6.00	1.09 -1.09	0.71 -0.55	11.99	0.26 -0.30	11.99	0.28	
AD11T	653	11.00	12.49	1.49	3.35 -0.50	4.00	2.46 -1.99	0.71 -0.53	12.52	0.26 -0.24	12.52	0.24	
AD12T	653	11.00	13.00	2.00	3.00 0.30	4.00	1.90 -1.70	0.55 -0.42	13.00	0.20 -0.30	13.00	0.29	
AD13T	653	9.00	11.01	1.51	3.00 -0.75	4.00	1.49 -2.26	0.70 -1.40	10.88	0.28 -0.65	10.88	0.40	
AD14T	653	11.00	12.01	0.50	7.00 -0.50	4.00	6.00 -5.50	0.70 -0.40	11.95	0.20 -0.20	11.95	0.49	
AD15T	653	9.00	12.02	3.02	6.00 0.00	6.00	1.22 -0.59	0.60 -0.28	12.92	0.30 -0.20	12.92	0.24	
AD16T	653	10.00	10.42	0.42	3.70 -0.50	4.00	3.28 -3.22	1.53 -1.71	10.42	0.28 -0.19	10.42	0.56	

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MEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE 99.73 PCT	REGIST. 99.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
					VALUE	TOL.					
AO17T	653	11.00	11.28	0.28	1.19 0.99	4.00	0.91 -0.28	0.79 -0.27	0.35 -0.20	11.23	0.24
AO24T	653	8.50	8.85	0.35	1.60 -0.58	6.70	1.25 -0.93	0.80 -0.24	0.31 -0.18	8.89	0.25
AO26T	653	11.50	10.42	-1.09	0.60 -2.70	4.00	1.09 -1.61	0.74 -0.26	0.16 -0.16	11.42	0.21
AO27T	653	11.00	10.67	-0.33	0.40 -1.30	6.00	0.73 -0.97	0.69 -0.16	0.38 -0.34	10.69	0.31
AO28T	653	10.00	13.03	3.03	7.73 -5.73	4.00	4.70 -5.73	1.29 -0.78	0.44 -0.34	13.06	0.63
AO29T	653	10.00	12.56	2.56	0.33 -1.75	4.00	2.77 -3.20	1.11 -0.73	0.34 -0.39	12.53	0.43
AO30T	653	12.00	1.20	-10.80	-10.60 -11.00	8.00	0.00 -0.20	0.19 -0.19	0.15 -0.14	1.20	0.12
AO31T	653	13.00	23.60	10.60	10.80 10.40	6.00	0.00 -0.20	0.19 -0.19	0.15 -0.14	23.60	0.12
AO32T	653	3.00	2.49	-0.51	0.39 -1.10	2.00	0.89 -0.59	0.63 -0.39	0.35 -0.22	2.53	0.24
AO37T	653	2.00	2.41	0.41	0.37 -0.30	2.00	0.96 -0.25	0.44 -0.20	0.15 -0.15	2.41	0.15

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MEAS NAME	SAMPLE SIZE	ZEF. OUTPUT VALUE	MEAN	OFFSET	ACCURACY		TOLERANCE		REPLON		LIMITS		OTHER		PARAMS STL DEV
					VALUE	TOL.	99.73 PCT	95.5 PCT	68.3 PCT	MEAN					
AC38T	653	12.00	11.51	-0.49	1.75 -2.40	1.00	2.24 -1.91	0.78 -0.50	0.23 -0.35	11.49	0.33				
AC39T	653	12.00	11.62	-0.38	1.35 -1.33	8.00	1.73 -0.97	0.66 -0.22	0.17 -0.17	11.65	0.24				
AC40T	653	12.00	11.62	-0.38	0.90 -1.60	8.00	1.28 -1.22	0.57 -0.37	0.17 -0.17	11.63	0.22				
AC41T	653	12.00	11.38	-0.62	0.58 -2.08	8.00	1.20 -1.16	0.75 -0.41	0.32 -0.22	11.39	0.29				
AC42T	653	10.00	10.74	0.74	2.13 -0.45	8.00	1.39 -1.19	0.64 -0.53	0.22 -0.34	10.73	0.28				
AC43T	653	12.00	12.18	0.18	2.93 -2.30	8.00	2.46 -2.73	0.72 -0.76	0.37 -0.25	12.19	0.40				
AC44T	653	3.00	2.65	-0.35	0.38 -0.80	2.00	0.73 -0.45	0.25 -0.43	0.26 -0.32	2.63	0.24				
AC45T	653	4.00	2.39	-1.61	-0.63 -2.18	2.00	0.97 -0.57	0.33 -0.44	0.15 -0.15	2.39	0.16				
AC46T	653	3.00	1.96	-1.04	-0.43 -1.39	2.00	0.61 -0.56	0.24 -0.32	0.18 -0.24	1.94	0.19				
AC47T	653	1.00	2.41	2.41	3.37 1.92	2.00	0.37 -0.49	0.19 -0.20	0.19 -0.15	2.41	0.15				

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VOL 1

NO 2

NEAS NAME	SAMPLE SIZE	EXP. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		REGION 95.5 PCT	LIMITS 68.2 PCT	OTHER MEAN	BARAMS STD DEV
					VALUE	TOL.	99.73 PCT	8.00				
AC4ST	653	12.00	12.61	0.61	4.90 -4.80	8.00	4.29 -5.41	1.18 -1.41	0.33 -0.32	11.62	0.66	
AC4PT	653	12.00	12.69	0.89	4.10 -1.50	6.00	3.21 -2.39	0.90 -0.68	0.43 -0.25	12.94	0.40	
AC5OT	653	12.00	12.53	-0.47	0.76 -1.17	8.00	1.23 -0.79	0.47 -0.52	0.34 -0.25	12.55	0.25	
AC5LT	653	12.00	14.21	0.31	1.35 -1.20	6.00	1.04 -1.51	0.28 -0.73	0.21 -0.36	14.27	0.25	
AC5RT	653	1.00	2.28	1.23	1.98 0.90	1.50	0.69 -0.43	0.31 -0.47	0.24 -0.34	2.06	0.23	
AC5BT	653	3.00	2.50	-0.48	0.39 -0.70	1.50	0.97 -0.42	0.65 -0.31	0.35 -0.23	2.56	0.25	
AC5AT	653	0.	1.90	0.88	1.76 0.60	1.50	0.88 -0.23	0.50 -0.27	0.34 -0.21	1.92	0.22	
AC55T	653	2.00	1.90	-0.10	0.57 -0.60	1.50	0.67 -0.50	0.30 -0.48	0.22 -0.34	1.87	0.23	
AC56T	653	2.00	2.03	0.03	1.20 -0.70	1.50	1.27 -0.73	0.36 -0.23	0.22 -0.17	2.06	0.21	
AC57T	653	3.00	2.44	-0.56	0.35 -0.90	1.50	0.91 -0.34	0.33 -0.24	0.26 -0.18	2.47	0.21	

(14)

MEAS NAME	SAMPLE SIZE	EMT. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE 99.73 PCT	REGION 95.5 PCT	LIMITS 68.3 PCT	OTHER MEAN	PARAMS STD DEV
					VALUE	TOL.					
AC58T	653	1.00	3.83	2.83	3.59 2.40	5.00	0.76 -0.43	0.53 -0.41	0.28 -0.31	3.12	0.25
AC59T	653	69.50	69.56	0.06	1.00 -0.50	19.00	0.94 -0.55	0.24 -0.52	0.18 -0.26	69.53	0.20
AC60T	653	50.00	43.79	1.41	-0.62 -1.80	10.00	0.78 -0.39	0.40 -0.38	0.30 -0.28	43.60	0.24
AC61T	653	13.50	24.00	10.50	10.70 10.30	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	24.00	0.12
AC62T	653	3.50	0.56	-2.74	-0.14 -3.30	10.00	0.90 -0.35	0.43 -0.34	0.32 -0.26	0.58	0.23
AC64T	653	83.00	72.00	11.00	-11.80 -11.20	10.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	72.00	0.12
AC89T	653	14.00	12.83	0.83	4.10 -2.30	4.00	3.27 -2.13	1.61 -0.78	0.32 -0.20	12.86	0.14
AC90T	653	11.00	10.55	-0.25	-0.00 -1.51	8.00	0.93 -0.57	0.54 -0.25	0.31 -0.19	10.59	0.20
AC91T	653	12.00	11.87	-1.13	1.70 -2.70	0.00	2.88 -1.57	1.10 -0.50	0.34 -0.20	11.92	0.35
AC94T	653	0.00	0.00	0.00	0.20 -0.20	6.00	0.20 -0.20	0.19 -0.19	0.15 -0.14	0.00	0.12

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MEAS NAMS	SAMPLE SIZE	KG. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOL.	TOLERANCE		REGION 95.5 PCT	LIMITS 68.3 PCT		OTHER MEAN	PARAMS STD DEV
					VALUE	TOL.		99.73 PCT	99.73 PCT		68.3 PCT	68.3 PCT		
A098T	653	12.00	12.42	0.42	1.75 -0.30	6.00	1.33 -0.72	0.56 -0.49	0.18 -0.12	12.44	0.23			
A196T	653	2.00	2.40	0.49	1.37 0.10	8.00	0.88 -0.39	0.50 -0.28	0.24 -0.21	2.53	0.23			
A198T	653	3.00	2.83	-0.17	0.75 -0.74	1.50	0.92 -0.57	0.54 -0.23	0.22 -0.17	2.86	0.20			
A199T	653	3.00	2.01	-0.99	-0.03 -1.45	1.50	0.96 -0.46	0.51 -0.20	0.15 -0.15	2.02	0.16			
A200T	653	2.00	2.40	0.40	2.55 -1.65	6.00	2.15 -2.05	0.74 -0.51	0.15 -0.15	2.40	0.28			
A508T	653	12.00	12.81	0.81	2.50 -0.70	6.00	1.69 -1.52	0.77 -0.59	0.39 -0.37	12.82	0.33			
A533T	653	10.00	12.77	2.77	5.30 -0.30	6.00	2.83 -2.77	0.76 -0.60	0.35 -0.21	12.49	0.35			
A534T	653	2.00	2.42	0.42	1.28 0.20	2.00	0.96 -0.22	0.56 -0.21	0.16 -0.16	2.44	0.18			
A535T	653	12.00	13.37	1.37	1.25 -1.40	6.00	1.58 -1.77	0.62 -0.75	0.33 -0.35	13.35	0.35			
A536T	653	3.00	2.52	-0.48	0.37 -0.60	2.00	0.85 -0.32	0.47 -0.51	0.34 -0.23	2.56	0.23			

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MEAS NAME	SAMPLE SIZE	EXT. OUTPUT VALUE	MEDIAN	OFFSET	ACCURACY		TOLERANCE		REVISION	LIMITS	OTHER	PARAMS
					VALUE	TOL.	99.73 PCT	95.5 PCT				
A537C	653	10.00	12.62	2.62	4.50 1.36	6.00	1.28 -1.32	0.24 -0.42	0.30 -0.31	12.62	0.31	
F065A	653	1.00	2.05	1.05	1.97 0.80	4.00	0.92 -0.25	0.53 -0.25	0.30 -0.18	2.09	0.21	
F066A	653	1.00	2.40	1.40	2.30 0.83	4.00	0.90 -1.57	0.20 -0.38	0.15 -0.15	2.39	0.14	
F007K	653	3.00	2.80	-0.20	0.39 -0.76	4.00	0.59 -0.56	0.38 -0.29	0.15 -0.15	2.80	0.15	
F008L	653	2.00	1.66	0.66	1.77 0.15	4.00	0.90 -0.51	0.52 -0.26	0.32 -0.19	1.70	0.22	
F009X	653	3.00	2.57	-0.43	0.37 -1.80	4.00	0.79 -0.37	0.42 -0.36	0.31 -0.27	2.59	0.24	
S002E	653	12.00	12.30	0.30	1.37 0.29	4.00	0.57 -0.51	0.20 -0.20	0.15 -0.15	12.30	0.13	
S003K	1959	11.00	11.06	0.06	1.93 -1.58	4.00	1.87 -1.63	1.09 -1.25	1.71 -1.01	11.07	0.74	
S0135	15672	0.	0.34	0.94	2.59 -0.20	4.00	1.65 -0.11	1.01 -1.05	0.67 -0.33	1.01	0.53	
S014X	15672	0.	4.14	4.14	7.24 -4.33	6.00	7.24 -4.33	5.00 -4.09	1.22 -3.30	3.91	2.67	

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APPENDIX II

PCM/TM OSCILLOGRAPH PLOTS

The 41 oscillograph plots which follow are annotated with the following information:

- 1) The computer analysis of the steady state noise using the 3σ limit is listed under the column marked "Computer Data".
- 2) To the right of the column labeled "Computer Data" the plots are identified with the plot number, the T/M Channel Code, and the peak-to-peak noise on the trace that was measured during the manual analysis. If the T/M channel is within tolerance (below 1.5% p-p) there will be no value listed.

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US 4288 2000 (WAS BAC 41310)

BOEING

VOL. 1

NO T2-2279

SEC

PAGE 52

							COMPUTER DATA	
C	91						1.53	G061E-A
								2%
							2.35	G058E-A
(1.55	G062E-A
								2%
								G059E-A
							1.17	G063E-A
								4%
O							3.4	G060E-A

PLDT 1

TC-2679 VOL. 1

PAGE 53

2 5 1 0 1

0

1.49 G071E-A

2.11 G074E-A

1.57 G070E-A

5%

4.52 G073E-A

1.19 G072E-A

2%

3.15 G075E-A

PLOT 2

T2 2279 VOL-1
PAGE 54

COMPTON
M.I.

1.15 G043E-A

1.47 G044E-A

1.46 G045E-A

1.14 G070E-A

1.15 G044E-A

1.14 G072E-A

PL01

TC-227) VOL. 1

PAGE 55

DATE

G077E-A

G 15E-A

G074E-A

G078E-A

1.17

G072E-A

.4

A094T-A

PLOT 4

T2-2274 VOL-1

							PAGE 57
C						PAGE 57	
						117	G014D-A
						120	G016D-A
							G018D-A
						133	G013D-A
						149	G006EA
C						117	H001P-C
							PAGE 57

COMPUTER
DATA

1.18 G022D-A

1.44 G024D-A

1.19 G025D-A

1.53 G021D-A

0.70 G035E-A

0.4 HO15P-B

PL0T 7

722279 VOL 1

W15E 51

2-20 (2)

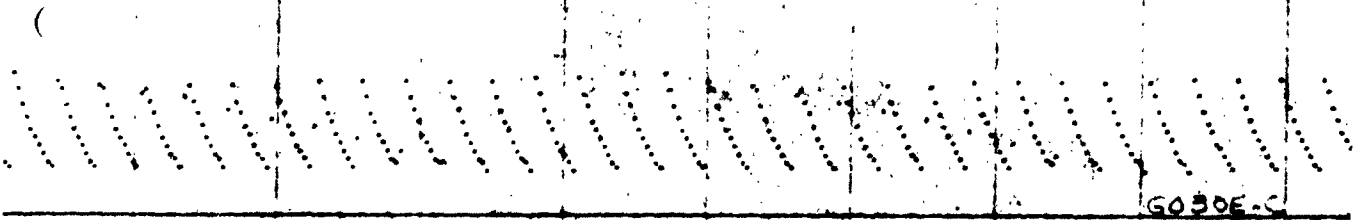
COMPUTER
DATA

0

1.44 A059T-A

1.17 A060T-A

1.19 A058T-A



G050E-C

G089E-A

0

PLOT 3

TR-2219 VOL 1
PAGE 60

COMPUTER
DATA

1.12 G023E-D

1.73 G026E-C

1.16 G034E-D

0.17 G029E-C

0.4 G038E-A

0.4 G037E-A

PL01

COMPUTER
DATA

1.16

G042E-C

G040E-C

1.45

G081E-C

1.50

G082E-C

1.45

G083E-C

1.20

G044E-C

PL0T 10

12-2279 VOL 1

PAGE 62

							COMPUTER DATA		
							0.4	H003P-C	
							0.4	H004P-C	
							0.4	H005P-C	
							0.4	H006P-C	
							1.45	G090E-B	
							1.1F	A002T-A	
								PL0T II	
							T2 Z279	VOL I	
								Page 63	

ADDITIONAL
DATA

C

H007P-B

H008P-B

H009P-B

H010P-B

G091E-B

A063T-A

PLOT 12

T2-2079 VOL 1

PAGE 14

COMPUTER
DATA

H011P-B

H012P-B

H013P-B

2 90
H014P-B

4 G092E-B

0.4 A064T-A

PLOT 13

20102

IT 2279 VOL 1

PAGE 65

COMPUTER
DATA

C

1.17 G041E-A

1.15 G040E-D

0.40 G039E-D

1.05 G025E-D

1.35 G027E-D

1.18 G028E-D

PLOT 14

12-2279 VOL 1

PAGE 66

THIS ORDER
DATA

G031E-B

27.

2.75

G032E-B

A004A-A

BLANK

A005A-A

BLANK

PILOT 15

T2-2279 VOL 1

PAGE 67

CONTINUED
DPC7

C

2.77 5013X-B

67c
11.57 5014X-E

1.47 A040P-A

1.53 A059P-A

1.44 A036P-A

1.52 A037P-A

PLOT 17

3 5/16

100279 VOL 1
PAGE 64

C							COMPUTER DATA		
							1.50	5012E-A	
							1.50	5013E-A	
							1.50	5018E-3	
(1.13	1007E-A	
							1.15	1005E-A	
							0.13	1009E-A	

PLOT 18

12-1277 VOL 1

PAGE 70

CONTINUED
PAGE

C

1.44 5082E-A

1.19 5083E-C

2.10 5085E-C

1.48 5084E-C

4%

5.43 5086E-C

D020A

PLOT 19

72-273 VOL I
PAGE 71

COMPUTED
DATA

1.47 P006X-A

1.15 P007X-A

1.41 P005X-A

1.16 P009X-A

270
3.00 S005X-A

1.10 A003X-A

PLOT 20

T2-273 VOL 1

PAGE 72

								DIAGNOSTIC LIST	
								1.05	S002X-A
								1.17	F035X-A
								6.19	6% F018P-A
								0.1	A014P-A
								4.10	+4 -6 R A048T-A
								1.16	A024H-A
									PLOT 21
								72-2279	VOL 1
									PAGE 73

2-162

72-2279 VOL 1

PAGE 73

COMPUTER
DATA

1.48

A003H-A

1.93

A050T-C

2.90

2.55

A051T-C

1.16

A026H-A

3.3

A016T-C

1.20

A027T-C

PLOT 26

3-26-62

TR-2279 VOL 1
PAGE 74

								0 10 20 30 40	
								1.25	A025H-A
								1.25	A029P-B
								1.26	A030P-B
								1.86	A031P-B
								1.52	A032P-B
								2.18	A024T-C

PLOT 23

3-30-62

72-2279 VOL 1

PAGE 75

DATE
DATA

1.45 A0105-C

1.51 A0115-C

1.16 A0125-C

1.49 A0095-C

PLOT 24

3-30-62

TZ-2279 VOL 1

PAGE 76

COMPOSITE
DATA

1.17 A052T-C

1.29 A053T-C

1.18 A054T-C

1.17 A055T-C

2.0 A056T-C

1.25 A057T-C

PLOT 25

3-3-62

72-2277 VOL 1

PAGE 77

COMPUTER
DATA

1.15 1015E-A

1.16 1012E-A

1011E-A

0.40 1010E-A

1.53 1015E-A

0.47 1014E-A

								CIRCUIT DATA	
								1.42	A199T-C
									Z ⁺ R
								4.20	A200T-A
									2%
									A025P-B
									2%
									A026P-B
									2%
									A027P-B
									A028P-B
									PLOT 28

3-2-67

T-2279 VOL I

PAGE 85

COMPUTER
DATA

1.00 A0055-C

1.57 A0065-C

1.94 A0075-C

2-
R

1.11 A0085-C

1.50 A0090T-A

PLOT 23

72-2279 VOL 1
PAGE 21

COMPUTER
DATA

5001X-A

P004X-A

1.15 P016P-A

0.4 A013P-A

4.15 A038T-C

0.4 A023H-A

PLOT 30

3-30-62

72-2279 VOL 1

1756 82

							COMPUTED DATA	
							04	A061T-A
							1.55	A002H-A
							2.50	A040T-C
							2.60	A041T-C
							2.65	A039T-C
							1.17	A071H-A
								PLOT 31
							72-2279	VOL 1
								PAGE 83

2-2-57

72-2279 VOL 1
PAGE 83

COMPUTER
DATA

1.18 A044T-C

1.17 A046T-C

1.54 A045T-C

2 +
R

1.46 A047T-C

3 +
R

E.24 A043T-D

2.54 A042T-C

PLOT 32

T2-2279 VOL 1
PAGE 24

							COMPUTER DATA	2 + R	
							4.45	A011T-C	
								2 + R	
							3.60	A012T-C	
							1.5	A028H-C	
							2.47	A009T-C	
								2%	
							2.09	A010T-C	
								3 + 2 - R	
							4.45	A091T-C	

							COMPUTER DATA	
							2.67	1019E-A
							1.18	1018E-A
							1.27	1017E-A
							1.17	1016E-A
							1.93	1021E-A
							1.18	1020E-A
								PLOT 34

3-30-62

TS-2279 VOL 1

PAGE 36

COMPUTER
DATA

0.

1.27 A196T-A

1.49 A198T-A

1.36 A021P-B

1.36 A022P-B

1.17 A023P-B

1.19 A024P-B

PLOT 35

3-3-62

TZ-22 19 VOL 1
PAGE 09

						COMPUTER DATA	
						1.18	A0015-C
						1.91	A0025C
						1.65	A0035-C
						1.51	A0045-C
							PLOT 36
						T2-2279	VOL 1
							PAGE 88

3-312-67

COMPUTER
DATA

1.18 P015R-A

0.4 A033P-A

0.4 A034P-A

2 -
R

1.94 A035P-A

5 ±
R

10.43 A028T-C

0.40 A022H-A

PLOT 37

TZ-2279 VOL I
PAGE 89

02

COMPUTER
DATA

1.48

A035T-C

1.16

A037T-C

1.18

A534T-C

1.17

A536T-C

1.15

A533T-C

1.15

A535T-C

PLOT 38

12-2279 VOL 1

PAGE 90

COMPUTER
DATA

0

0.40 A001H-A

0.4 A030T-C

0.4 A031T-C

2.00 A095T-A

2%

2.00 A029T-C

1.51 A015T-C

PLOT 39

2-3 42

T2-2279 VOL 1

PAGE 41

COMPUTER
DATA

2%

2.90 A027H-A

2%

1.11 A008T-C

3.2 A537T-C

2%

3.20 A505T-C

3%

4.84 A006T-C

PLOT 40

7-21-64
T3-22.79 VOL I

PAGE 92

								COMPUTER DATA	
								1.10	5021E-A
								1.16	5022E-A
								0.40	5080E-B
								0.40	5081E-B
									3%
									5002E-A
								1.49	5001E-A
									PL0T 41
								72-2279	VOL 1
									PAGE 93

0

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APPENDIX - 143

EQUIPMENT TESTED

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EQUIPMENT TO BE TESTED

BAC Power and Cooling Subsystem

	PART NO.	SERIAL NO.
(e) Instrumentation Power Transfer and Cooling Control Panel	25-18757-802	0001
(b) Power Status Panel (in BTS-62)	25-17763-14	0002
(c) BTC-168 for EPCO (part of BTS-36)	25-28104-2	1013
(d) Battery rack, item 57. Check that batteries are all installed.	Batteries Installed	Installed
(e) Power Supply Switching Racks (part of BTS-36)	25-14850-4113 25-14850-876	0002 0002
(f) BTS-36 Power Conversion Racks	25-14850-888 25-14850-886 25-14850-881 25-14850-852 25-14850-885 25-14850-874	0002 0002 0002 0002 0002 0002
(g) BTC-150 EPCO Subsystem. Record for EPCO drawer.	25-18967-824	0002
(h) External EPCO Boxes (in the High Bay Area)	25-14878-30 25-14878-20	0005 0006
(i) Instrumentation Section Cooling Unit	25-5202-820	109
(j) Equipment Cooling Alarm, item 96	N/A	None
(k) BTS-62	25-14806-826	0001
(l) BTS-45	24-2051-1	0001
(m) Voltage Comparator Power Supply	(Old) 25-14369-3	1024
(n) Voltage Comparator Power Supply	(New) 25-14369-3	1013

<u>EQUIPMENT TO BE TESTED</u>	<u>PART NO.</u>	<u>SERIAL NO.</u>
2. Ordnance Subsystem		
(a) Safety Monitor Panel (in B7S-62)	25-17791-50	0003
(b) Ordnance Functional Test Panel (in B7S-62)	25-18622-23	0001
(c) Ordnance Oscilloscope (in B7S-62)	25-22260-27	0001
(d) B7S-21	25-14881-150	0003
(e) Safe and Arm Monitor Indicator Panels 3C-LACS-23 (in the High Bay Area)	N/A N/A	None None
3 PCM Subsystem		
(a) B7S-171, for D2CA reset power	25-18648-11	0002
(b) B7S-170, for PCM	25-28103-2	101-12
(c) Control and Indicator Panel (in B7S-17)	25-17782-37	0002
(d) D2CA Converter Programmer	61037-505	A004
(e) SE2A Signal Conditioner	65191-505	A023
(f) 13-20402 Airborne PCM Equipment	Not Available	
(g) 10-20410 Voltage Regulator	Not Available	
(h) Airborne Patch Panels	Not Available	
(i) BAI-19 Event Mark Units	Not Available	
(j) BAI-9 Matching Units	25-19651-12 25-19649-25 25-19650-12	None None None

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<u>EQUIPMENT TO BE TESTED</u>	<u>PART NO.</u>	<u>SERIAL NO.</u>
(continued)		
(k) BAI-14 T/M VIBR Monitor	10-20460	13
(l) BAI-15 Pressure Transducers	10-20453-3	1404, 1392, 1410, 1411, 1406, 1407, 1408, 1409
(m) BAI-18 Thermocouple System & Reference Junctions (BAI-18) - 6 units	10-20478-5	A102, 101, 103, 104, 105, 110
(n) ETC-162 XINCHER Regulator Power Supply (located in ETS-96)	25-28101-1	29
(o) BAI-2		
(1) PF Section	Not Available	
(2) Multiplexer Programmer	21-50103-68	103-68
(3) Multiplexer Assembly	21-50103-78	103-78
(4) Control Box Assembly	21-50103-38	103-38
(5) Auxiliary Box Assembly	21-50103-42	103-42
	21-50103-39	103-39
	21-50103-40	103-40
	21-50103-41	103-41
	21-50103-43	103-43
	21-50103-44	103-44
	21-50103-45	103-45
(p) PCM Battery (part of BAI-30)	25-25173-4	4014
(q) Strain Transducers	Not Available	

<u>EQUIPMENT TO BE TESTED</u>	<u>PART NO.</u>	<u>SERIAL NO.</u>
(continued)		
(r) BAI-24 Antenna Triplexer	10-20409	1015
(s) BAI-25 Power Divider	Not Available	
(t) BAI-40 Calorimeters	Not Available	
(u) BTS-19 S/N Cards (one)	10-20423-30	101
(v) Control Panels for the T/N Cards (in BTS-17)	10-20423	201
(w) BTS-17 (two racks)	25-14884-31 25-14884-31	0002
(x) BTS-19 Digital Voltmeter and Digital Printer (in BTS-17)	10-20423-32 29-16457-1	#155343 0102
(y) BNS-103, for the S/M Calibration Cards	25-38109-3	101-7
(z) BAI-44 Differential Pressure Transducers	Not Available	
(aa) BTS-152	25-14860-801	0001
(bb) BTS-152 Digital Voltmeter & Digital Printer	10-20423-32 10-20423-32	103 101
(cc) Ablation Gauge Power Supply	29-18014-1	0006

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<u>EQUIPMENT TO BE TESTED</u>	<u>PART NO.</u>	<u>SERIAL NO.</u>
4. <u>AM/FM Converter</u>		
(a) BAI-7 FM/FM T/V Equipment (two)	10-20453-4 10-20453-6	598 595
(b) BAI-10 Test and Calibrate Transfer Switch	10-20429-1	971
(c) BAI-12 AC Signal Conditioning Amplifiers (four)	Not Available	
(d) BAI-13 DG Signal Conditioning Amplifiers (six)	10-20459-2 10-20459-2 10-20459-2 10-20459-2 10-20459-2 10-20459-2	145 146 149 171 162 148
(e) BTC-162, for FM/FM No. 1	25-28101-1	9919
(f) BTS-162, for FM/FM No. 2	25-28101-1	9937
(g) BAI-8 Linear Accelerometer	10-20454-3 10-20454-4 10-20454-4	10679 10933 10937
(h) BAI-14 Vibration Transducers	Not Available	
(i) BAI-20 Staging Switch	10-20476	102
(j) BAI-42 Angular Accelerometer	28550-507-31	AC09A

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EQUIPMENT TO BE TESTED

Amuse Subsystem

- (a) ETS-108 (Left hand rack) 0007
- (b) Convair 26-14 Rack in ETS-108 0260004
- (c) Amuse Transfer Relay 52
- (d) BAI-4 Radio Tracking Equipment 026-0059
- (e) VSR Monitor Transducer 13

Command Destruct Subsystem

- (a) ETS-106 0004
- (b) BAI-3 Command Destruct Receivers (two) 51
64
- (c) BAI-38 Pressure Separation Switch & Timer Not Installed
- (d) ETS-161 DC Power for Destruct "A" 101-3
- (e) ETS-163 DC Power for Destruct "B" 111-24
- (f) Command Destruct Power Transfer Switch 0015
- (g) BAI-29 Command Destruct Receiver A Battery 0040
- (h) Command Destruct Receiver B Battery N/A
- (i) Pressure Separation Batteries (2) BAI-25 25-17837-47
25-17837-45 N/A
- (j) BAI-33 Command Antenna Filter/Divider Not Available

SERIAL NO.

PART NUMBER

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<u>EQUIPMENT TO BE TESTED</u>	<u>PART NO.</u>	<u>SERIAL NO.</u>
<u>7. G&C Subsystem</u>		
(a) MP-10 System	40249-106-11	A0046
(b) C25A	15148-10	10450-2-11
(c) C19A	57000-305-11	A032
(d) BTC-163, for C19A	25-28104-2	1029
(e) 400 cycle converter for C19A	17652687A	150H-588
(f) BTS-164, for 1st and 2nd NCU Hydraulics	25-23824-1	204108
(g) BTS-169, for 1st and 2nd NCU Electronics	25-28104-3	1011
(h) BTS-165, for 3rd NCU Hydraulics	25-28105-1	15
(i) BTS-168, for G&C Electronics	25-28104-1	1003
<u>8. Support Subsystem</u>		
(a) PCA Time Terminal (in MAB 2) item 34	EM 60-10	81
(b) GAMA Terminal (in MAB 2) item 35	57753	S/N 10 S/N 12
(c) MCP3, item 32	None	305
(d) BTC-74	25-14890-33	0002
(e) BTC-17 (in T/M Room)	25-14895	0001
(f) PCA Time Terminal (in T/M Room)	EM 60-10	0
(g) P.A. System Rack, item 33	Not Available	

EQUIPMENT TO BE TESTED

Facilities Subsystem

(a) Lights in MAB 2			
(b) Air Conditioner for MAB 2	50K68289	8C71733	
(c) Air Conditioner for the Electronic Equipment in MAB 2	39M88099-1 -2	940368	
(d) Air Compressor for MAB 2			
(e) 400 cycle motor generator for G19 and CMCP, item 110	14652887A	15GH-588	
(f) Line Voltage Regulators GEXLD5004, items 102, 103, 104	GEXLD5004-G0 GEXLD5004-G1 GEXLD5004-G2	156217 156216 156218	

PCM/PM Ground Station

(a) BTS-11 PCM/PM Acquisition System	25-14312-808	0901
(b) BTS-143 PCM/PM Acquisition System	25-14313-806	0901
(c) BTS-146 PCM Raster Display System	10-29497-5	0001
(d) BTS-137 Serial Tape Recorder/Reproducer (two used with BTS-11)	25-14317-800 Not Used	142
(e) BTS-137 Serial Tape Recorder/Reproducer (used with BTS-143)	25-14317-800	141

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<u>EQUIPMENT TO BE INSTALLED</u>	<u>PART NO.</u>	<u>SERIAL NO.</u>
<u>FM/TM Ground Station:</u>		
(a) BMS-9 FM/TM Telemetry Data Acquisition Station No. 1	25-14304-813	103
(b) BMS-2 FM/TM/TM Telemetry Data Acquisition Station No. 2	25-14304-813	102
<u>Quick-Look Subsystem</u>		
(a) BTS-12 PCM Quick-Look System	25-14314-824	0901
(b) BTR-136 PCM Format Converter	25-14316-812	0801
(c) BTR-137 Serial Tape Recorder/Reproducer (used with BTR-136)	25-14317-800	107
(d) BTR-137 Serial Tape Recorder/Reproducer (used with BTR-12)	25-14317-800	126

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TABLE IV

TEST EQUIPMENT USED

2-311-G-2

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	<u>PART NO.</u>	<u>SERIAL NO.</u>
1.	25-23567 Ground Power Supply Oscillograph Back (PR38462)	25-23567-803
2.	One Consolidated Electrodynamics Corporation (CED) recording oscillograph type 5-11974-367 or equivalent CED oscillograph. (Installed in 25-23567)	19062
3.	List of galvanometers and parts required for the ODC oscillograph.	
	(a) Eleven galvanometers type 7-363	
	(b) Twelve galvanometers type 7-362	
	(c) One galvanometer type 7-002	
	(d) Resistors (all are 1 watt 5% resistors) Two 200 ohm One 12K ohm One 1000 ohm	
	(e) One push button switch momentary ON	
	(f) One six(6) volt battery	
	(g) Six Zener diodes type International Rectifier Corporation 10E25.6T1C	
	(h) Six single banana plugs	
	(i) Four Crimon plugs 2002-110	
	(j) 300 feet of 2 conductor shielded wire BK13-5D, type III, class 2 #12	
	(k) Eight 25-23585-3 Galvo Matching Box Modules	
	(l) Nine 25-23585-5 (preferable) or 25-23585-1 Galvo Matching Box Modules	
	(m) Spare magazine loaded with paper.	
4.	One Variable DC Power Supply	RTH 23-5 C/C 155239
5.	One Hewlett Packard DC Voltmeter Model 412A	412A C/C 117202
6.	One Direct Writing Oscillograph, Brush Mark II (UD 252160) or equivalent	UD 252160 No. 54
7.	Two Bellantone 305A peak to peak reading VTVMs	MOD 305A 1920 MOD 305A 1915

STANDARD AND SPECIAL TEST EQUIPMENT REQUIREMENT

8. One Tektronix Oscilloscope with a sweep rate up to 10mc. It shall have differential plug in amplifiers type F, type E, and type G.
9. Isolation Transformers with Faraday Shields:
- (a) One 1000 VA transformer (for Tektronix scopes if needed)
 - (b) Two 500 VA transformers (for Ballantines 305As)
10. One Hewlett Packard Audio Oscillator Model 200AB.
11. Three Power Line Transient Probes. (Genistron Number GMF 10192), P/NR 63028
12. The following Ordnance Test Boxes will be required
- (a) Three Ignition Test Boxes (25-23808)
 - (b) Two Stage Separation Test Boxes (25-23806)
 - (c) One Thrust Termination Test Box (25-23807)
 - (d) Three Destruct Test Boxes (25-23805)

<u>PART NO.</u>	<u>SERIAL NO.</u>
MOD 535	2330
TYPE D	C10490
TYPE E	003516
TYPE G	005411
N52M	C/C 118660
N57M	C/C 18665
N57H	C/C 118667
MOD 200AB	008-111S2
GMF 10192	None
GMF 10192	None
GMF 10192	None
25-23808-1	0002
25-23808-1	0001
25-23808-1	0004
25-23806-1	0004
25-23806-1	0002
25-23807-1	0002
25-23805-1	0002
25-23805-1	0001
25-23805-1	0006

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STANDARD AND SPECIAL TEST EQUIPMENT REQUIRED

PART NO. SERIAL NO.

13. The following simulated squibs will be required.
- (a) Two second stage ignition simulated squibs 1S3A2
1S3A2 N/A
 - (b) Two third stage ignition simulated squibs 1S207A0
1S207A0 N/A
 - (c) Two 1-2 stage separation simulated squibs 1S3A2
1S3A2 N/A
 - (d) Two 2-3 stage separation simulated squibs 1S3A2
1S3A2 N/A
 - (e) Four thrust termination simulated squibs 1S45A1
1S45A1 N/A
1S45B1 N/A
1S45A1 N/A
14. One six channel Brush oscillograph or equivalent
For Destruct Current read.
FD1662-20 C/G 156344
15. One AVO R/V simulator SKT-319 N/A
16. Two cooling squib jumper plugs (25-1962A) N/A
17. BTR-152 tapes as follows: One each DA-7237-2A (Ambient tape)
One each LA-7237-2C (Calib. tape)
DA-7237-2A
LA-7237-2C
18. One receptacle Bendix part number F071E-16-8P (CR) or
BTR00P-16-8P N/A

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