Aerospace Systems Division

B. N Jelay

Prototype Experiment Test Results

May - June 1967

NO.	REV. NO.
ATM-686	

PAGE 1 OF 27

DATE 8/23/67

This ATM describes the results of the ALSEP Prototype Tests performed during the May - June 1967 period of testing. Included are the experiment Pre-Integration, Integration and Crosstalk test results.

Prepared by: R. Wallace
R. Wallace

Approved by: R W Shay
R. W. Shay

GENERAL

During May and June, PIA and Integration tests were performed for the second time on Prototype experiments. These experiments had been returned to their respective manufacturer for rework. Cross-talk tests with SIDE and CCGE were performed for the first time with a full array of experiments. Operation of the experiments was similar to the first round of testing reported in ATM 657. Additional information aided in resolving some problems noted during those tests. SIDE was operated for the first time. A failure of its A/D converter between PIA and Integration prohibited a positive evaluation of this experiment.

System problems noted during previous testing were reduced. Additional data aided in eliminating a problem prohibiting recovery of data in the slow data rate mode. Distortion at the slower rate has required a FM recording technique of the bit stream at 530 pbs. Unexplained transients noted during playback of the PSE data were found to be inconsistant and not repeatable. They obviously were not contained in the bit stream. Other transients which were repeatable are believed to be due to "real time" EMI, probably effecting the STS, not ALSEP, because of the similarity in nature. These will require additional sorting to determine the cause. Investigation of the sensitivity of the STS to EMI is being made.

The replay of the 19 May Crosstalk Test provided useful data regarding a suspected processor problem. During the Central Station Command sequence, (refer to Table 6. 14. 3) items 2 and 13 were interchanged because of previous processor problems and it was desired to operate the major portion of the test employing Processor X. Upon switch over to Y Processor at the start of the sequence, the SWS data contained some words of all ones (octal 377). The SWS replay provided continuous data during this period and this information along with the SIDE printout provided the following log.

TIME	EVENT	SWS REACTION	SIDE REACTION
11/06/42	Switch to Processor Y	SWS Data begins printout off 1st and 4th word equal to 377 on every other ALSEP frame	SIDE Data becomes scrambled even and odd Sync Errors, Parity Errors
11/15/16	PDM #2 On-SIDE Rippled Off	SWS Data becomes Normal	SIDE OFF
11/16/38	PDM #2 Off	"	"
11/16/59	PDM #2 On	"	"
11/17/42	SIDE Turn-On fails not sufficient power reserve	"	"
11/17/30	"	"	"
11/17/35	"	"	"
11/18/24	PDM #2 Off	"	"
11/20/12	SIDE Turn-On successful	SWS resumes bad data AS AT 11/06/42	SIDE On data as 11/06/42
11/35/52	Switch to Processor X	SWS Data returns to normal	SIDE data OK but slipped by 1 Frame Odd & Even Sync Errors
11/36/50	SIDE Data Normal	NONE	SIDE Data in Sync

The LSM and PSE Data appeared normal during the Processor Y period of operation. During a Subsystem check, the Y process was found to operate satisfactorily. No further evidence of this problem has been noted.

1.0 Solar Wind Spectrometer Prototype Tests

1.1 General

A second series of tests were conducted on the SWS during the May-June period to operate the experiment with a complete Array A compliment of experiments. A crosstalk test with the CCGE was also performed, with the CCGE operating in the SIDE slot. No significant problems were noted with regard to the SWS during these tests.

1.2 SWS Pre-Integration Acceptance Test

The PIA was run on the SWS experiment in vacuum, however the High Voltage inhibit plug was not installed to avoid the four hour pump down at 10^{-4} torr. A maximum limit of ±5 counts, about previous test results, was placed on the calibration and engineering data. Nine High Voltage calibrate readings fell outside these limits. Shifts of 10-15 counts lower than previous results were noted for these points.

1.3 SWS Integration Test

No significant problems were noted during the SWS integration on 17 May. Power line noise on the +29V line was recorded at 250 MV p-p. This is an out-of-spec value, however, it was somewhat less than the 400 mv spikes photographed and reported in ATM 657. Variation in noise amplitudes has not been fully investigated. Shift pulse noise noted on the command line during previous tests was not present.

1.4 SWS Crosstalk Tests

Two crosstalk tests were performed during the May-June period. Crosstalk tests with SIDE, LSM and PSE were run on 19 May. The test with the CCGE in place of SIDE was performed on 6 June. There was no evidence of interaction of the SWS with other experiments or the interference from the experiment effecting the operation of SWS. No data was obtained during slow data rate on either Crosstalk Test. The SIDE Crosstalk test of 19 May was replayed from the magnetic tape to obtain HI/LO information. The program option prints the HIGH and LOW valued science data and associated sequence word once each sequence. It was felt this data would be an

TABLE 1.4

SWS HI/LO COUNT DURING CROSSTALK

SIDE COMMAND SEQUENCE

Time	High Count/Sequence Wd.	Low Count/Sequence Wd.	Test Event *
13/57/46	007/176	001/064	
13/58/14	005/183	001/048	Item 1, 13/58/04
13/58/43	006/008	001/048	
13/59/11	006/016	001/040	
13/59/39	005/183	001/048	Item 2, 13/59/51
14/00/07	005/183	001/073	
14/00/35	007/177	001/090	
14/01/03	006/176	001/048	Item 3, 14/01/27
14/01/31	005/183	001/048	
14/01/59	006/016	001/040	
14/02/27	006/007	001/040	Item 4, 14/02/21
14/02/55	006/176	001/048	
14/03/23	007/176	001/040	Item 5, 14/02/55
14/03/56	006/176	001/056	Item 6, 14/03/24
14/04/19	007/176	001/056	Item 7, 14/04/16
14/04/47	006/179	001/048	
14/05/16	007/176	001/056	
14/05/44	006/174	001/056	
14/06/12	007/168	001/056	Item 8, 14/06/36
14/06/40	006/174	001/048	
14/07/08	006/168	001/056	Item 9, 14/07/20
14/07/36	005/183	001/081	
14/08/04	007/177	001/083	Item 10, 14/08/15
14/08/32	015/006	001/032	
14/09/00	006/176	001/056	
14/09/28	006/176	001/056	
14/09/56	006/168	001/056	
14/10/24	006/179	001/048	
14/10/55	015/182	001/056	
14/11/21	006/176	001/056	
14/11/49	014/032	001/056	
14/12/17	006/176	001/056	
14/12/45	006/176	001/040	
14/13/13	007/176	001/056	
14/13/41	007/176	001/056	Item 11, 14/13/31
14/14/09	006/175	001/056	
14/14/37	005/182	001/056	

(Table 1.4 cont'd.)

Time	High Count/Sequence Wd.	Low Count/Sequence Wd.	Test Event *
14/15/05	006/183	001/065	Item 12, 14/15/11
14/15/33	007/177	001/081	
14/16/01	006/160	001/048	
14/16/29	005/182	001/056	
14/16/57	006/032	001/048	
14/17/25	007/168	001/056	Item 13, 14/17/38
14/17/54	006/016	001/048	
14/18/07	—	—	Loss Main Frame Sync.
14/19/45			SWS Lock Achieved
14/19/47	007/016	001/056	Item 14, 14/19/44
14/20/14	007/008	001/048	
14/20/42	006/176	001/056	Item 14, 14/20/57
14/21/10	005/182	001/056	
14/21/38	007/176	001/048	Item 15, 14/21/57
14/22/06	007/168	001/064	
14/22/34	005/183	001/073	Item 15, 14/22/34
14/23/03	007/177	001/082	
14/23/31	006/000	001/056	Item 16, 14/23/27
14/23/59	005/181	001/056	Item 17, 14/23/42

* Test Event Item refers to Command Sequence Table 6.14.5.

indicator of crosstalk, if present. Normally the science data drifts between 0 and 7. Occassional counts of 010 (octal) are not usual. Twice the count was over 010 during the test sequence. Word 6 contained a high count of 015 at time 14/08/31 and word 32 a count of 014 at 14/11/49. During this period the SIDE Dust Cover was initiated without command. The high count did not appear during the normal dust cover command and it is therfore assumed the cause for both disturbance was external EMI. Table 1.4 lists the HI/LO values of the SWS Science Data during the SIDE Command Sequence.

2.0 Lunar Surface Magnetometer - Prototype Tests

2.1 General

No significant change in operation from that reported in ATM 657 was noted during this second series of tests. No attempt was made to fully analyze the LSM data because of the difficulty in reducing the data. The PIA and Integration Procedures could not be thoroughly checked because of the LSM operational limitations.

2.2 Pre-Integration Acceptance Test

This test was not performed.

2.3 Integration Test

This test was not performed.

2.4 Crosstalk Tests

Operation of the LSM during Crosstalk tests was the same as that noted previously in ATM 657.

3.0 Passive Seismic Prototype Tests

3.1 General

The result of the second series of tests were essentially as previously reported. Several problem areas noted in ATM 657 were cleared up and several were further defined. A special test of the PSE, on the ETS and STS, was performed on 1-2 June. This test was directed towards an investigation of noise problems.

3.2 PSE Pre-Integration Acceptance Test

The second PIA performed on PSE was completed on 16 May. Several of the problems noted during previous testing were confirmed by Teledyne personnel who witnessed the test. Two new problems were noted and the lack of response from the instrument temperature channel was resolved. The problem with the instrument temperature monitor, which gave no temperature indication, was due to the inability of the sensor heaters to sufficiently heat the sensor to temperatures within the thermal sensor's range. A heat lamp directed toward the base of the sensor will be required in tests at ambient pressures to achieve an on scale indication of PSS temperature.

New problems not previously noted were:

a) The Sensor Exciter -12V supply was intermittent

b) The sensor calibration signals measured at the exciter test points contained noise which made measurement questionable -i.e. 250 mv noise on an 8 mv test signal.

Those confirmed from previous tests were:

a) The LP XYZ signals were saturated at Odb. Therefore the 10db changes in signal level could not be verified at all gain settings.

b) Tolerances on test signals were not available.

c) A satisfactory response to SP-Z test signals was not detected i.e. there were no significant signal detected.

d) The SP-Z channel saturated on the first change in gain. It did not recover until the 4th gain change command.

e) The thermal control status was incorrect.

3.3 PSE Integration Tests

The PSE was integrated for the second time on 17 May 1967. Several disturbances occurred during the first half-hour operation which caused changes in the sensor exciter and PSE central station electronics status. The majority of the interference apparently was due to making and breaking DVM and scope connections at the PSE Breakout Box. The PSE Central Station gain status changed when the scope was connected to the experiment +29V line to examine noise. When this was determined, connections to the B.O.B. were secured for the duration of the test. Problems noted during the test not previously reported were:

a) Sensitivity to high impedance test connection on the+29V line (mentioned in paragraph above)

b) Noise on the LPZ channel during power X and Y commands

These resolved were:

a) No response to LPX and Y gain changes. -problem due to broken connection in S BOB

b) Uncage command creates transients on LPX and tidal X channels. Response on the X channels is correct since the uncage signal is routed to the exciter modulator and reinserted into the LPX seismic channel. Information depicting response characteristics was not available however.

c) No status response to level direction command (occurred once), which was reported informally after the test, was due to the manual advance of the STS printer tape. Advancing the printer tape inhibits data readout. In the "printout if change" mode housekeeping data is not printed unless changes occur therefore it is not obvious what data, if any, is missing. Any discrepancy in the future will be verified by replaying the magnetic tape in the continuous data mode.

d) It was determined the LPZ channel did not have a 10db increment between -10db and -20db. The measured value was 8.6db.

e) Indication of the SP Cal Signal on the LPZ channel is the correct mode of operation for the same reason discussed in (b) above. Signal characteristics are not defined.

Other problems noted in ATM 657 not mentioned above were as previously reported. See the tables at the end of this report for current status.

3.4 PSE Crosstalk Tests

Results of the Crosstalk tests were similar to those previously obtained. No significant interactions were noted. The PSZ seismic data which was offset and contained intermittent noise showed evidence of noise which correlated with initiation of the magnetometer flip motors. This was noted during the SIDE tests. With the CCGE Crosstalk Test, the SPZ seismic channel was less susceptible to noise, due to the addition of a capacitor across the siesmic pick-up coil and no interaction was noted. The strip chart recording displaying experiment power showed evidence of interaction between PSE exciter status and PSE current drain. Approximately 10MA noise occurred when status changes were made.

The CCGE Crosstalk Test was performed on 6 June after the special PSE tests from 1-2 June. Addition of a capacitor across the SP-Z pick-up coil surpressed the 500 KHZ noise which was fed to the input to the CSE Multiplexer. This noise was the cause of the SP-Z 3/4 scale offset and DC saturation with gain change. A reasonable SP-Z output was obtained during the crosstalk test for the first time. Amplitude of the SP-Z test signals did not attenuate in 10db steps with gain change however. During replay of the magnetic tape to recover the PSE data, it was determined that the STS was susceptible to radiated and concluded EMI which cause transients in the PSE data. The transients disappear when replayed back. The transients were similar in appearance to those recorded in real time which have yet to be explained. Investigation is under way. The PSE, CCGE Crosstalk data showed less noise than previous tests. Noise, apparently feed-thru in the CSE multiplexer according to Teledyne personnel, was present throughout the test on all channels. Evidence of long term (10 minutes or greater) DC drift having the appearance of noise was also noted. No data was recovered in the slow data rate mode.

3.5 PSE Special Tests

A special test was performed on PSE on 1-2 June to determine more specifically the cause of the noise noted above, and to gain more information from Teledyne personnel concerning responses to the sensor exciter. The tests, utilizing the ETS and STS, were conducted to determine noise sources. 500 KC noise was noted on the PS-Z channel due to pick-up by the SP Seismic Coil. The addition of a capacitor to this coil reduced noise and eliminated the 3/4 scale offset noted previously. The SP-Z channel also responded to the exciter test signal which had not previously been obtained at a significant level. Noise was still present on the seismic channels on the order of 100-200 mv. It was spectulated that this may be caused by crosstalk at the PSE-CSE Multiplexer. Additional tests indicated noise was again reduced if the tidal inputs to the multiplexer were limited in magnitude. Teledyne personnel have since indicated the "switching noise" at the multiplexer was due to the tidal channel "feeding thru" the multiplexer because potentials on these channels were not limited to 5 VDC. Limiting is to be provided in future models. Signal responses due to what appeared to be drift was noted when the tidal inputs were limited. Drift of greater than 10 minutes was noted after signal levels had been perturbed by status changes. Random noise of 100-200 mv still appeared to be present periodically even though the tidal channel inputs had been terminated to keep potentials within the 5 V limit. During the tests some time was spent investigating the sensitivity of the experiment to external test connections on the 29V line. A 3K ohm ground loop was noted between the exciter test points labeled "Bendix return" and "signal" common. No further investigation was made pending repair of the exciter. The ground loop was caused by the grounding of the register indicating lamps to the signal return instead of the Bendix return. Further investigation of this problem will be made if this ground loop was not the source of the "over sensitive" situation.

4.0 Cold Cathode Gauge Experiment

4.1 General

The second PIA was performed on CCGE on the 1st of June. Integration to the Central Station was performed on 5 June and the Crosstalk test was completed on 7 June. Operation of the experiment was the same as noted on previous tests.

4.2 CCGE Pre-Integration Test

The PIA was performed on the CCGE without vacuum. There were no changes in performance from that noted in previous tests with exception of the calibration data. Normal data was obtained indicating the previous fault had been repaired. Vacuum equipment was not available.

4.3 CCGE Integration Test

No significant problems were noted during CCGE Integration. The test was performed with several channels in the Central Station Multiplexer not functional. These included HK 70 to 85; both of the CCGE analog channels. The experiment appears to normally turn on in the calibration mode although the logic indicates the mode to be "operate". The automatic-operate command is sent to reset the logic immediately after turn-on. A modification will be made in future models. Automatic calibration will be made after an auto-zero.

4.4 CCGE Crosstalk Test

The second crosstalk test gave the same results of previous tests. Again no significant problems were noted. The first good look at the calibration data was obtained. Apparently a cycle consisting of two consecutive auto-zeros (approximately 1 hour) is required to insure calibration data is valid. This sequence was not always obtained during the Crosstalk Test because of CCGE ripple-off due to PCU switch over, ripple-off dump load switching, etc. Two sets of calibration data were noted between the integration and crosstalk test:

RANGE	INTEGRATION	CROSSTALK
0	230	165
1	232	166
2	228	162
3	237	169
4	221	155
5	233	149
6	244	94 and Drifts to 162 (length)

The readings at 200 are nearer to the correct value of approximately 4.0 VDC. No tolerance has been given for these values. A science readout of near 160 occurred during the auto-zero sequence and was noted on several occasions. This is normal operation according to CCGE personnel. Science data noise (counts up to 20-28) began after the auto-zero and remained until a calibration was made. This was attributed to the open connection to the sensor (the Crosstalk Test is not conducted with vacuum equipment.) All other operations of the experiment appeared normal.

5.0 Supra-Thermal Ion Detector Experiment

5.1 General

The SIDE PIA was conducted on 12 May. Integration was on 15 May but was not completed because of an open digital data line located in the flat cable near the experiment connection. Repair was made at BxA and the test completed on 18 May. The first crosstalk test, with SIDE, was performed on 19 May. After the cable repair, a failure in the SIDE A/D converter occurred during a special subsystem test. This caused the positive parameters which are sub-commutated by the experiment to be read out as all ones - i.e. a full scale reading of 255 decimal.

5.2 SIDE Pre-Integration Test

The SIDE was delivered with several discrepancies. Those noted before electrical tests were:

a) Dust cover solenoid fires intermittently
b) HE log count rate does not limit above 5 KC
c) Solar cell was cracked (data was intermittent during test).
d) Several readouts of the velocity filter stepper were out-of-tolerance.

Results of the PIA tests showed the following additional problems:

a) A spurious response in the science data at initiation of printout. Frames 0, words 9 & 10 were 002 & 001. Other words in the frame were correct. Problem happened once.
b) Frames 124 thru 127, Word 2 containing CCGE calibration data were zero due to a relay failure.
c) Frame 120, Word 2 indicated CCGE range 2. Operation should be in range 1.
d) Pre-reg. duty factor was out of limit (Frame 65 Word 2). A value of 068 was obtained.
d) Frame 0 Word 3 containing HECPA data did not respond with a value of 249-255 for the 1 ST cycle only. The printed value obtained was 000. All other words in the frame were correct except 9 & 10 which were 002 & 001 respectively.

Evidence of the discrepancies noted in the ADP were also noted during the test.

5.3 SIDE Integration

Integration of the SIDE on 15 May was interrupted by the broken connection in the flat cable. No data was obtained from the experiment during this attempt. Upon resumption of the test on the 18th, the failure in the A/D Converter of the SIDE had occurred. Therefore all positive parameters were printed out as all ones. This included all positive measurements in the analog subcom word 2, all HECPA values printed in word 3, all velocity filter voltages in word 7 and all LECPA values in word 8. Because of the failure in SIDE, every frame of SIDE data was printed out by the STS printer causing data reduction to be very time consuming. The following problems, not previously noted were discovered:

a) The calibration data in Frames 120-127 slips a frame periodically. i. e. The calibration sequence, a count of 150-158 starts in frame 121 word 5 instead of frame 122.

b) The calibration sequence was scrambled periodically. The readout just prior to time 15/44/50 was:

FRAME	WD. 4 & 5	WD. 9 & 10
121	155	154
122	000	19,775
123	155	632,837
124	19,775	012
125	632,836	160
126	000	19,775
127	155	632,836
0	19,775	000

5.4 SIDE Crosstalk Tests

The crosstalk test employing SIDE was performed on 19 May, 1967. Some difficulty was experienced during the Central Station Command sequence as was noted in the log mentioned in the introduction of this ATM. The remainder of the test was completed without difficulty. Problems noted during the tests were:

a) Scrambled SIDE data during operation on data processor Y
b) SIDE dust cover blown without command;
b a condition noted in the data package. Occurred several times during the test.
c) A possible interaction with the extraneous dust cover command noted above.
Data obtained during this event was: Time 11/40/13

WD 1	WD 2	WD 3	WD 4 & 5
020	215	255	000 000
020	215	255	520 003
021	145	225	000 001

WD 6	WD 7	WD 8	WD 9 & 10
000	255	020	215 255
023	255	255	000 001
000	255	255	000 001

d) Extraneous count occurred in the seismic data on occasion, for example:

Time	11/41/13	Frame	WD 4 & 5	WD 9 & 10
		52	000 000	000 001
		55	000 000	000 001
		56	000 001	000 000
	13/31/21	21	000 000	255 255
		22	528 001	000 000
	13/32/51	81	536 002	000 001
	13/57/58	87		
		88		

e) During 13/31/21 when noise was noted in the science data, SIDE reset to frame 0 from frame 22, and the GPS reset from 001 to 000. The SIDE reset without command at 13/32/51 from frame 81. The GPS did not step remaining at zero. The science data contained the extraneous data noted in (d) above. A parity error was indicated.

f) Frame 124 word 10 read 021 at 13/35/22 indicating an error in limits. Word 10 frame 0 of same sequence read 011. Counts in these words during calibration of greater than 4 occurred. The data continued to be out-of-tolerance until 13/59/49 when the GPS was switched off.

g) At 14/19/44 the calibration sequence scrambled similar to that noted on integration.

h) During the Dust Cover command, execution at 14/26/29 frames 27, 28 and 29 contained counts of 1-3 in words 5 and 10, a condition similar to (c) above.

i) During forced calibration, X10 accumulation; sequence skips initially then begins proper read-out at frame 121.

SOLAR WIND SPECTROMETER EXPERIMENT PROBLEM AREAS

	Problem Area	ICS Para.	ICS Value	Remarks
1.	Sequence Counter in ETS Periodically Miscounts	N/A	N/A	No ICS on ETS. This condition has only been seen once since mod to tape punch.
2.	Power Line Noise	3.2.2.8.6	75mV	See ATM 618 Table 3.3.2.1 Item 2. Noise from converter was greater than 400mV PP. See Figures 1.3.1 and 1.3.2, ATM 657.
3.	Shift Pulse Crosstalk noted on the Command Line	N/A	N/A	No ICS for this condition. Typical spec for this item is 100mV PP. See Figures 1.3.5 and 1.3.6, ATM 657. Problem not present during May-June tests.

MAGNETOMETER PROTOTYPE PROBLEM AREAS

	PROBLEM AREA	ICS PARAGRAPH	ICS VALVE	REMARKS
1.	Flip Cal Power Transient: Motor Power was variable measured 470-520 ma	3.2.3	372 ma @ 29V	Para. 3.2.3.3 Flip-Cal mode day time operation & night time operation 300 sec max 10.8 W max
2.	Test Set Display Jitter: Jitter was apparent on the ETS display with the experiment & with the LSM Simulator operated in separate tests.	N/A	N/A	No specs for operation of ETS.
3.	Improper Flip Cal: Improper sequencing of motor phases was noted during the 4th Flip-Cal on the Z axis during P.A.	N/A	N/A	Flip Motor Sequence Not spelled out in ICS
4.	Transient on X, Y, Z. Science data : Transients occurred intermittently throughout all tests	N/A	N/A	No reason can be found for this condition. Contractor is aware of problem since it existed on EM Tests. Se See ATM 626 Table 3.3.4.1 Item 7.
5.	LSM not in proper preset condition on turn-on: Cal-Inhibit not in, Presite Gimbal position not obtainable	N/A	N/A	This condition also existed in EM Tests. (ATM 626 Table 3.3.4.1 Item 10).

MAGNETOMETER PROTOTYPE PROBLEM AREAS (con't.)

PROBLEM AREAS	ICS PARAGRAPH	ICS VALVE	REMARKS
6. Cal Raster from analog output of ETS garbled:	N/A	N/A	Jitter in raster appeared to be eliminated, however the digital filter was not in operation throughout tests. With the permanent offset to the sensor electronics and non-linear operation, it is impossible to determine if the Cal Raster is correct. See ATM 626-Table 3.3.4-1 Item 11.
7. Permanent offset in Sensor Electronics:	N/A	N/A	See ATM 626 Table 3.3.4-1 Item 12. Unable to null field with Helmholtz Coil with Solenoid was able to allow mid-scale reading on 400 gamma range.
8. Power ripple inconsistent:	N/A	N/A	See ATM 626 Table 3.3.4-1 Item 13. Power ripple changes during normal operation See photo Figure 2.3.8
9. No Z axis Sensor Electronics	N/A	N/A	See ATM 626 Table 3.3.4-1 Item 14.

MAGNETOMETER PROTOTYPE PROBLEM AREAS (con't.)

PROBLEM AREAS	ICS PARAGRAPH	ICS VALVE	REMARKS
10. Engineering Data for words 4 & 12 unstable:	N/A	N/A	See ATM 626 Table 3.3.4-1 Item 15 switches from 000-127 i.e. fullscale oscillation.
11. Y and Z Data changed sign intermittently:	N/A	N/A	Since both channels were tied together - change should not occur.
12. Z offset cycle incorrect:	Table IV	N/A	See ATM 626 Table 3.3.4-1 Item 8.
13. Engineering Data 16 Frame Sub Commutator stops, skips and jumps intermittently:	3.2.2.2	Table III	See ATM 626 Table 3.3.4-1 Item 21 occurred throughout tests, appears associated with science data glitches.
14. Logic and power switching unduly sensitive to EMI:	3.2.5	MIL-I-26600 amended by MSL-ASPD-EMI-10A	See ATM 626 Table 3.3.4-1 Item 22.
15. Channel 7 Engineering Data Jitter:	N/A	N/A	Shifted 1 bit from 010 - 011. See ATM 626 Table 3.3.4-1 Item 23.

MAGNETOMETER PROTOTYPE PROBLEM AREAS (con't.)

PROBLEM AREAS	ICS PARAGRAPH	ICS VALVE	REMARKS
16. Current Ripple during Flip Cal with morots energized was greater than 75 ma for frequencies over 250 HZ:	3.2.3.8 & 3.2.3.9		See Figure 2.3.9 and 2.3.10, ATM 657.
17. Noise on Command & shift line:	3.2.2.3.8	Will not exceed 100 MV p.p. at experiment output	Exceeded 100 MV p.p. 150 MV recorded in Figure 2.3.6, ATM 657.

PSE PROTOTYPE PROBLEM AREA

	PROBLEM AREAS	ICS PARAGRAPH OR PERFORMANCE SPEC.	ICS OR PERFORMANCE SPEC. VALVE	REMARKS
1.	Incorrect thermal control sequence:	AL270000 Table VIII	Auto ON/OFF CMD ON/OFF	Thermal Control sequence intermittent. Wrong during PIA, OK during integration and wrong during crosstalk for BOTH SIDE and CCGE.
2.	No SP-Z Response to Exciter.	ICS Paragraph 3. 2. 6. 19. 2 & AL270000 3. 1. 1. 2	Simulator Unit shall provide stimuli signals during system test.	Lack of response apparently due to 500 KC noise on SP-Z & Seismic Coil. Signal levels increased after addition of capacitor.
3.	SP-Z offset operated continuously at 3/4 scale.	N/A N/A	N/A	Offset due to 500 KC noise. Normal offset noted during CCGE Crosstalk Test after addition of capacitor.
4.	No response from instrument temp.	AL270000 Table I ICS Paragraph 3. 2. 2. 1	N/A	Lack of response due to insufficient heat on sensor. On scale data obtained during second series of tests. Response shifts back and forth in steps greater than 1 LSB as temp. stabilizes, shifts of 200 MV noted.
5.	No response to LPX, Y gain changes	ICS Paragraph 3. 2. 2. 3 AL 3. 4. 2. 1. 3	Attenuation to signals shall be commanded to 0, 10, 20, 30 db steps.	Problem due to broken connection in Breakout Box.

PSE PROTOTYPE PROBLEM AREAS (con't.)

	PROBLEM AREAS	ICS PARAGRAPH OR PERFORMANCE SPEC.	ICS OR PERFORMANCE SPEC. VALVE	REMARKS
6.	Response to Exciter Signals not defined	ICS Paragraph 3. 2. 6. 14. 2	Functional Test of Parameters (a) thru (m) ICS.	Expected response to HI/LOW Exciter 1 HZ test signals not defined with tolerances. Test signals amplitude insufficient to check PSE Gain steps.
7.	SP-Z Channel saturates after first change gain command	ICS Paragraph 3. 2. 2. 3 AL270000 3. 4. 2. 1. 3	Attenuation to signals from amplifier shall be commanded to 0, 10, 20, 30 db steps	Problem due to 500 KC noise, eliminated with addition of capacitor.
8.	Response to LP & SP Cal not defined	See Item 6	See Item 6	Calibration test signals not defined with tolerances.
9.	Interaction ON LPX, Y, Z to SP Cal Command	AL270000 3. 1. 1. 14	Mechanical, Magnetic or electrical cross coupling between seismic components will be less than 40 db.	Interaction not noted on CCGE crosstalk test. Signal on LP-Z Seismic & Tidal response. Response on SP-Z not fully defined. See item 8 above.
10.	Uncage command creates transients on LPX and tidal X channels	See Item 9	See Item 9	Normal response. Signal characteristics require definition.
11.	Response to filter feedback command not defined.	See Item 6	See Item 6	Test procedure revised to allow for 15 min. time constant. Revision made to check filter switching with LPX, YZ-H input from exciter.

PSE PROTOTYPE PROBLEM AREA (con't.)

	PROBLEM AREAS	ICS PARAGRAPH OR PERFORMANCE SPEC.	ICS OR PERFORMANCE SPEC. VALVE	REMARKS
12.	SP CAL command interacts with LPZ	See Item 9	See Item 9	Normal response SP-Z CAL signal modulates, exciter. Modulated (DC moduation) signal inserted into LPZ channel.
13.	Power converter noise ON 29 V line.	ICS 3. 2. 3. 5	20 MV	Greater than 800 MV measured.
14.	Power converter noise ON timing control and command lines.	ICS 3. 2. 2. 7	100 MV	Greater than 400 MV on command lines.
15.	Power Converter noise ON analog lines	———	———	Typical measured value 300 MV
16.	Power Converter noise ON science data	———	———	Noise present after addition of capacitor. adjustment of tidal voltage to eliminate feed-thru on improvement. Periodic noise still present.
17.	No connection to survival power in PSE converter	ICS 3. 2. 3. 2	———	OK in Prototype. Survival power measured at 150 MA.
18.	1 MS Rise time on positive going edge of uncage command pulse.	ICS 3. 2. 3. 5	$\leq 10\,\mu$ sec.	See memo L. Lewis 9711-169 3 Mar. 67. Wave shape on Prototype the same as the engineering model.

PSE PROTOTYPE PROBLEM AREAS(con't.)

	PROBLEM AREAS	ICS PARAGRAPH OR PERFORMANCE SPEC.	ICS OR PERFORMANCE SPEC. VALVE	REMARKS
19.	29V Noise due to level Power Switch ON	ICS 3.2.2.5	150 MV	See ATM 618 2.5 V p.p. Noise not present on Prototype.
20.	Intermittent -12V supply, PSE Exciter	———	———	Exciter returned for repair
21.	Noise on Calibrate Signals measured at Exciter Test points	———	———	3 KHZ Noise on Calibration Test points greater 250MV
22.	Sensitivity to test connections ON +29 V line	———	———	Scope connections to PSE +29V line causes change in status. Problem may be due to Ground Loop in Exciter. See Item 24.
23	Noise on LPZ Channel during Motor Power X & Y commands	———	———	———
24.	Ground Loop between Signal and "Bendix Return" in Exciter	———	———	A 3 K ohm ground loop was found in exciter due to grounding of command storage leads to signal ground rather than Bendix Ground.

COLD CATHODE GAUGE EXPERIMENT PROBLEM AREA

PROBLEM AREAS	ICS PARAGRAPH	ICS VALVE	REMARKS
1. Noise on data lines	N/A	N/A	There is no ICS for this experiment. Typical ICS valve for this item is 100 MV p. p. See Figure 4. 3. 6 ATM 657.