This ATM defines the acceptance techniques and limits to be used during ALSEP system tests at BASD and KSC.

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The system test set programmer/processor programs for all subsystem test sequences contain two common features:

(i) Central station housekeeping (word 33). By operation of a switch the octal equivalent of each subcommutated word will be continuously printed. At any time after acquisition of lock on the housekeeping subcommutated frame, if the numerical value of any subcommutated word either falls outside its predetermined limits or changes by a predetermined amount from its most recent value, the octal equivalent of that word is printed out. In all cases, the housekeeping word is prefixed by "HK" and the decimal value of subcommutator position.

(ii) Command verification (word 46 in Array 'A', word 5 in Array 'B'). Whenever this is non-zero (i.e., after reception of a command) this word is printed, followed by a printout of the next 90 housekeeping words. If the command decoder parity check fails, a 'p' is printed beside the command verification word. A comparison is made between the command transmitted by the STS and the command verification word. If the two are non-identical, an error message is printed out.

The acceptance criteria for use during system test are detailed in the following tables. These tables are divided into sections, one section per subsystem. Each section is prefaced by notes on the 'special-to-type' programming applicable to that subsystem. The tests will not necessarily be performed in the order shown.

Magnetometer Experiment

The following data will be printed out as indicated:

(i) The letter 'M', as an identifier.

(ii) Magnetometer housekeeping subcommutator count, in decimal.

(iii) The two status bits, in binary.

(iv) Magnetometer housekeeping word, in decimal.

(v) The ALSEP main frame count, in decimal.

(vi) Magnetometer scientific data, in decimal, arranged in three columns, one for each sensor.

(vii) Command verification word, in decimal.

(viii) Central station housekeeping word, in decimal.

Items (i), (ii), (iii), (v) are printed once per ALSEP frame.

Item (iv) is normally printed only when out of tolerance (only the out-of-tolerance word); switch operation will give a continuous printout, one word per ALSEP frame.

Item (vi) is printed twice per ALSEP frame.

Item (vii) is printed after command reception.

Item (viii) is printed (a) for 90 words following command reception

(b) any one (or more) word when that word (or those words) is out of tolerance, or has changed by a predetermined amount from its previous value

(c) continuously, on demand, by switch operation.

Flux tanks will be used to set the ambient field at the sensors.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Range Selection Command (CM 1, octal 123).	Transmit and verify command three times, monitor status bits of word 7 1 command (±100 gamma) 2 commands (±200 gamma) 3 commands (±400 gamma) Also monitor scientific data for correspondence with flux tank settings X sensor Y sensor Z sensor	1 0 1 1 bit patterns 0 0	Confirmation of command operation and sensor sensitivity.	
Steady field offset and steady field hold Commands (CM 2, 3, octal 124, 125).	Transmit and verify the following command group three times; 'hold' once; 'offset' seven times; then after the third group, transmit and verify the hold command once (a total of 25 command transmissions). Monitor the status bits of the following magnetometer housekeeping words: 9, 10, 11, 12, 13, 14.	Bit pattern sequence shall be 0 1, 1 0, 1 1, 0 1, 1 1, 1 0 1 0, 0 0, 1 1, 0 1, 1 1, 1 0 1 0, 1 0, 1 1, 0 1, 1 1, 1 0 1 1, 0 0, 1 1, 0 1, 1 1, 1 0 0 0, 0 0, 1 1, 0 1, 1 1, 1 0 0 0, 1 0, 1 1, 0 1, 1 1, 1 0 0 1, 0 0, 1 1, 0 1, 1 1, 1 0 0 1, 1 0, 1 1, 0 1, 1 1, 1 0 0 1, 1 0, 1 1, 0 1, 1 1, 0 1 0 1, 1 1, 0 0, 0 1, 1 1, 0 1 0 1, 1 1, 0 1, 0 1, 1 1, 0 1 0 1, 1 1, 1 0, 0 1, 1 1, 0 1 0 1, 1 0, 0 0, 0 1, 1 1, 0 1 0 1, 1 0, 0 1, 0 1, 1 1, 0 1 0 1, 1 0, 1 0, 0 1, 1 1, 0 1 0 1, 1 0, 1 1, 0 1, 1 1, 0 1 0 1, 1 0, 1 1, 0 1, 1 1, 1 1 0 1, 1 0, 1 1, 1 0, 0 1, 1 1 0 1, 1 0, 1 1, 1 0, 1 1, 1 1 0 1, 1 0, 1 1, 1 1, 0 1, 1 1 0 1, 1 0, 1 1, 0 0, 0 1, 1 1	Confirmation of command operation and offset sequencing.	

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
		0 1, 1 0, 1 1, 0 0, 1 1, 1 1 0 1, 1 0, 1 1, 0 1, 0 1, 1 1 0 1, 1 0, 1 1, 0 1, 1 1, 1 1 0 1, 1 0, 1 1, 0 1, 1 1, 0 0		
	Also monitor scientific outputs.	Outputs shall correspond to the commanded offsets, ±		
Flip/cal. inhibit and Flip/cal. initiate commands (CM 4, 5, octal 127, 131).	Transmit and verify 'initiate' command, monitor scientific data, and status bits of words 1, 2, 3, 13 and 15; transmit and verify 'inhibit' command during calibration sequence.	Scientific data shall step through a "raster" consisting of +75%, +50%, +25%, 0%, -25%, -50%, -75%, 0% of full scale twice (tolerance) with status bit pattern 0 1, 0 1, 0 1, 1 0, 0 0 then bit pattern shall go through the sequence 1 1, 0 1, 0 1, 1 0, 0 0 1 1, 1 1, 0 1, 1 0, 0 0 1 1, 1 1, 1 1, 1 0, 0 0 and the scientific data shall repeat the "raster" above, twice more; then the bit pattern shall change to 1 1, 1 1, 1 1, 1 1, 0 1		
	Transmit and verify 'initiate' command, monitor as above.	The calibration sequence shall not appear.		
	Transmit and verify 'inhibit' command once and 'initiate' command three times (suitably time spaced, monitor as above).	Scientific data shall step as above, status bit patterns shall be (for the first and third cal. sequences) 1 1, 1 1, 1 1, 1 0, 0 0 during first two rasters, then 0 1, 1 1, 1 1, 1 0, 0 0 0 1, 0 1, 1 1, 1 0, 0 0 0 1, 0 1, 0 1, 1 0, 0 0 After the second two rasters 0 1, 0 1, 0 1, 1 1, 0 0		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
		For the second cal. sequence, the bit patterns shall be 0 1, 0 1, 0 1, 1 0, 0 0 1 1, 1 0, 1 0, 1 0, 0 0 1 1, 1 1, 1 0, 1 0, 0 0 1 1, 1 1, 1 1, 1 0, 0 0 1 1, 1 1, 1 1, 1 1, 0 0		
Filter failure bypass Command (CM 6, octal 132).	Transmit and verify command twice, monitor status bits of word 15.	Status bits shall be 0 0 before commands transmitted and shall change to 1 0 and then to 0 0 as the command is executed twice.	Confirmation of command operation.	
	During above, inject square wave signal into flux tanks, monitor scientific data.	Scientific data shall indicate presence or absence of filter, at appropriate times.		
Site survey Command (CM 7, octal 133).	Transmit and verify command three times, monitor status bits of words 1, 2, 3, 4, 5.	Status bits shall cycle through the following three sequences, starting before the first command; 0 1, 0 1, 0 1, 0 0, 0 1 Command 1 1 1, 0 1, 0 1, 0 0, 0 1 1 1, 1 1, 0 1, 0 0, 0 1 1 1, 1 1, 1 1, 0 0, 0 1 0 1, 1 1, 1 1, 0 0, 0 1 0 1, 1 0, 1 1, 0 0, 0 1 0 1, 1 0, 1 0, 0 0, 0 1 Two minute pause 1 1, 1 0, 1 0, 0 0, 0 1 1 1, 1 1, 1 0, 0 0, 0 1 1 1, 1 1, 1 1, 0 0, 0 1 Command 2 0 1, 1 1, 1 1, 0 0, 0 1 0 1, 0 1, 1 1, 0 0, 0 1 0 1, 0 1, 0 1, 0 0, 0 1		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
		1 1, 0 1, 0 1, 0 0, 0 1		
		1 1, 1 1, 0 1, 0 0, 0 1		
		1 1, 1 1, 1 1, 0 0, 0 1		
		1 1, 1 1, 1 1, 0 1, 1 1		
		1 0, 1 1, 1 1, 0 1, 1 1,		
		1 0, 0 1, 1 1, 0 1, 1 1		
		1 0, 0 1, 1 0, 0 1, 1 1		
		Two minute pause		
		1 1, 0 1, 1 0, 0 1, 1 1		
		1 1, 1 1, 1 0, 0 1, 1 1		
		1 1, 1 1, 1 1, 0 1, 1 1		
		Command 3	Confirmation of command operation and site survey sequencing.	
		0 1, 1 1, 1 1, 0 1, 1 1		
		0 1, 0 1, 1 1, 0 1, 1 1		
		0 1, 0 1, 0 1, 0 1, 1 1		
		1 1, 0 1, 0 1, 0 1, 1 1		
		1 1, 1 1, 0 1, 0 1, 1 1		
		1 1, 1 1, 1 1, 0 1, 1 1		
		1 1, 1 1, 1 1, 1 1, 1 1		
		1 0, 1 1, 1 1, 1 1, 1 1		
		1 0, 1 0, 1 1, 1 1, 1 1		
		1 0, 1 0, 0 1, 1 1, 1 1		
		Two minute pause		
		1 1, 1 0, 0 1, 1 1, 1 1		
		1 1, 1 1, 0 1, 1 1, 1 1		
		1 1, 1 1, 1 1, 1 1, 1 1		
		0 1, 1 1, 1 1, 1 1, 1 1		
		0 1, 0 1, 1 1, 1 1, 1 1		
		0 1, 0 1, 0 1, 1 1, 1 1		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	Also monitor scientific data; immediately following each command and at the end of the third sequence, a flip/cal. sequence is initiated.	Calibration rasters as specified above.		
Thermal control select Command (CM 8, octal 134).	Transmit and verify command twice, monitor status bits of word 5.	Bit pattern shall be 1 1 before commands, then after successive commands 0 1 and 1 1.		
Scientific data.	Checked implicitly during the above command operations.			
Housekeeping data.	Monitor housekeeping subcommutation words 1, 9 2, 10 3, 11 4, 12 5, 13 6, 14 7, 15 8, 16		Check of housekeeping circuits.	

Solar Wind Spectrometer

Any one (or none) of six data printout formats may be selected by switch operation. These formats comprise:

(i) A format similar to that in IC 314104, page 18 (Figure 4) but excluding the calibration words 112 to 127.

(ii) Averages of scientific data over 1 to 127 sequences in similar format to (i) above.

(iii) The scientific data mean, variance and sample size, by energy level in a columnar format.

(iv) As (iii), but by collector.

(v) Any out-of-tolerance value, with identification.

(vi) The sixteen calibration words 112 to 127 from the most recent complete sequence.

Housekeeping (word 33) and command verification data will also be printed out at relevant times, with appropriate identification, and will then be interleaved with whatever data printout is selected above.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Dust cover removal Command (CW1, octal 122).	Transmit and verify command, monitor output of squib firing circuit.	Not known.	Confirmation of command operation and output of squib firing circuit.	This will not be possible after installation of the squib.
Experiment data format.	Check that subcommutator synchronization has been acquired as indicated by "search/check/lock" lamps. Select printout formats (i) and (ii); visually inspect.	Not applicable.	Check of experiment digital section.	
Experiment engineering data.	Select printout format (v); Programmer-processor comparison with limits:			
	A/D Calibration 9 mV		Check of experiment A/D converter.	Printout format (vi) may be used for visual inspection of complete set of data as an alternative.
	" " 90 mV			
	" " 900 mV			
	" " 3 V			
	" " 9 V			
	Electrometer calibration 5.76 pA		Check of electrometer amplifiers.	
	" " 57.6 pA			
	" " 5.76 nA			
	Proton HV DC component, level 1		Check of HV DC generation and stepping circuits.	Printout format (i) may be used for visual inspection of complete set of data as an alternative.
	" " " " " 2			
	" " " " " 3			
	" " " " " 4			
	" " " " " 5			
	" " " " " 6			
	" " " " " 7			
	" " " " " 8			
	" " " " " 9			
	" " " " " 10			
	" " " " " 11			
	" " " " " 12			
	" " " " " 13			
	" " " " " 14			
	Electron HV DC component, level 1			
	" " " " " 2			
	" " " " " 3			
	" " " " " 4			
	" " " " " 5			
	" " " " " 6			
	" " " " " 7			
	Proton HV AC component, level 1		Check of HV AC generation and stepping circuits.	
	" " " " " 2			
	" " " " " 3			
	" " " " " 4			
	" " " " " 5			
	" " " " " 6			
	" " " " " 7			
	" " " " " 8			
	" " " " " 9			
	" " " " " 10			
	" " " " " 11			
	" " " " " 12			
	" " " " " 13			
	" " " " " 14			

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Experiment engineering data (continued).	Electron HV AC component, level	1		Check of HV AC generation and stepping circuits.	Printout format (i) may be used for visual inspection of complete set of data as an alternative.
	" " " " "	2			
	" " " " "	3			
	" " " " "	4			
	" " " " "	5			
	" " " " "	6			
	" " " " "	7			
Experiment scientific data.	Select printout format (v); Programmer-processor comparison with limits:				
	Proton all-collector HV level	1		Check of scientific data 'noise' level.	Printout formats (i) or (ii) or (iii) or (iv) may be used for visual inspection of complete set of data as alternatives.
	" " " "	2			
	" " " "	3			
	" " " "	4			
	" " " "	5			
	" " " "	6			
	" " " "	7			
	" " " "	8			
	" " " "	9			
	" " " "	10			
	" " " "	11			
	" " " "	12			
	" " " "	13			
	" " " "	14			
	Proton single-collector HV level	1			
	" " " "	2			
	" " " "	3			
	" " " "	4			
	" " " "	5			
	" " " "	6			
	" " " "	7			
	" " " "	8			
	" " " "	9			
	" " " "	10			
	" " " "	11			
	" " " "	12			
	" " " "	13			
	" " " "	14			
	Electron all-collector HV level	1			
	" " " "	2			
	" " " "	3			
	" " " "	4			
	" " " "	5			
	" " " "	6			
	" " " "	7			
	Electron single-collector HV level	1			
	" " " "	2			
	" " " "	3			
	" " " "	4			
	" " " "	5			
	" " " "	6			
	" " " "	7			

Passive Seismic Experiment

The experimental data is output on eight channels of a multi-channel analog recorder, in the order SP, LPX, LPY, LPZ, LP tidal X, LP tidal Y, LP tidal Z, instrument temperature. The status information subcommutated within the central station housekeeping word format will be printed out in octal with identifiers on an alphanumeric line printer under any of the following circumstances:

(i) Following command reception.

(ii) If any word changes in value by more than a predetermined amount, or moves outside predetermined limits, that word alone will be printed out.

(iii) On demand, at any time, by switch operation.

The sensor outputs will be simulated by injection of low frequency a.c. signals into the appropriate test points on the experiment GSE connector.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Gain change LPX, LPY Command (CL 1, octal 63) and LPX, LPY, LP tidal X, LP tidal Y, scientific data channels.	Inject 0.0167 Hz signal, transmit and verify command four times, monitor housekeeping Channel 23. 1 command (0 db) 2 commands (-10 db) 3 commands (-20 db) 4 commands (-30 db) Also monitor traces 2, 3, 5, 6 on analog recorder. Traces 2, 3, { 0 db, -10 db, -20 db, -30 db } Traces 5, 6 { 0 db, -10 db, -20 db, -30 db }		Confirmation of command operation, accuracy of gain changes, and check of scientific data channels.	
Gain change LPZ Command (CL 2, octal 64) and LPZ, LP tidal Z scientific data channels.	As for Command CL 1, above, but monitoring housekeeping Channel 38, and trace 4 only.	As for CL 1 above.	As for CL 1, above.	
Calibration SP Command (CL 3, octal 65).	Inject 5 Hz signal, transmit and verify command twice, monitor housekeeping Channel 54 1 command (Cal On) 2 commands (Cal Off) Also monitor Trace 1 Cal On Cal Off		Confirmation of command operation and check of SP calibration circuit.	
Calibration LP Command (CL 4, octal 66).	As for Command CL 3 above, but 0.0167 Hz signal, traces 2, 3, 4, 5, 6, 7. Housekeeping Channel 54 1 command (Cal On) 2 commands (Cal Off)		As for CL 3, above, for LP.	
Gain change SPZ Command (CL 5, octal 67) and SPZ scientific data channel.	As for Command CL 1, above, with 5 Hz signal and monitoring housekeeping Channel 68 and Trace 1 only. Trace 1 { 0 db, -10 db, -20 db, -30 db }		As for CL 1 above.	

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Leveling power X, Y, Z motor Commands (CL 6, 7, 8, octal 70, 71, 72) and motor drive circuits.	Transmit and verify each command twice, monitor housekeeping Channel 8 (shunt regulator 1 current). Change in current from motor power 'On' to 'Off'.			Performed during leveling tests also involving Commands CL 10, 11, 14, 15 and monitoring of LP output traces.
Uncage Command (CL 9, octal 73).	Transmit and verify command ONCE ONLY, monitor housekeeping Channel 69 before and after. Before Command (Caged) After Command (Armed)		Confirmation of command operation.	Second operation of command (to 'fire' uncage circuit) not permissible unless output of uncage circuit is inhibited.
Leveling direction Command (CL 10, octal 74).	Transmit and verify command twice, monitor housekeeping Channel 53. 1 command (minus) 2 commands (plus)		Confirmation of command operation.	Performed during leveling tests also involving commands CL 6, 7, 8, 14, 15 and monitoring of LP output traces.
Leveling speed Command (CL 11, octal 75).	Transmit and verify command twice, monitor housekeeping Channel 53. 1 command (high) 2 commands (low)			
Thermal control mode Command (CL 12, octal 76).	Transmit and verify command four times, monitor housekeeping Channel 39. 1 command (Off) 2 commands (On) 3 commands (Off) 4 commands (Auto) Also, if time permits during low-temperature tests, monitor trace 8.		Confirmation of command operation and thermal control circuit.	
Feedback filter Command (CL 13, octal 101).	Transmit and verify command twice, monitor traces 5, 6, 7 for transient when command executed.		Confirmation of command operation.	
Coarse sensor Command (CL 14, octal 102).	Transmit and verify command twice, monitor housekeeping Channel 24. 1 command (In) 2 commands (Out)		Confirmation of command operation.	Performed during leveling tests also involving Commands CL 6, 7, 8, 10, 11 and monitoring of LP output traces.
Leveling mode Command (CL 15, octal 103).	Transmit and verify command twice, monitor housekeeping Channel 24. 1 command (On) 2 commands (Auto)			
Scientific and housekeeping data outputs.	Checked implicitly during the above.			

Suprathermal Ion Detector and Cold Cathode Gauge Experiments

The printout for this experiment occurs in two-line blocks, printed by a high speed 32-column alphanumeric printer, once per two ALSEP frames. The format comprises all ten SIDE words, the two SIDE words in the central station, indications of odd and even main frame sync, and the test-set-derived theoretical status of: the SIDE frame counter; frame number (0 - 9) in the "times-ten" mode; ground-plane step programmer on/off; LECPA, HECPA, CCGE and Channeltron voltage on/off; velocity filter counter reset point; and SIDE frame reset point. The GPS programmer on/off, and the LECPA, HECPA, CCGE and Channeltron voltage on/off status indications are multiplexed into two octal digits. All other printout is in decimal. Switch operation permits selection of either continuous printout or printout if an 'error' is detected. In this context an error is generally defined as either departure of any word from a predetermined nominal value and tolerance or a change in any word between consecutive readings which exceeds a predetermined value. The exceptions to this general rule are:

(i) SIDE frame counter — 'error' is a difference between the telemetered and 'theoretical' value.

(ii) One time command register status — 'error' is non-equivalence to the "dust cover blown, seal broken" value.

(iii) Dust cover and seal status — as (ii) above.

An 'error' printout consists of only that two-line block containing the word in error. In either print mode, a word in error is 'flagged' by an asterisk.

If command verification or housekeeping printout is demanded (either automatically or by switch operation), this will be line interleaved with any SIDE printout, and will be appropriately identified.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Break CCG seal and reset SFC at 10, Command (CI-1, octal 105, 110; same as CI-7).	Transmit and verify command set, monitor the following:		Confirmation of command operation and check of status and register indications.	Seal break inhibit must be in.
	SIDE word 1 (SIDE frame counter).	Shall reset at 10.		
	SIDE word 2, channels 33, 35, 97, 99 (one time command register).	Shall indicate seal break execution.		Check after master reset.
	SIDE word 6, frames 1, 5 (command input register).	Shall indicate the following sequence:		
	SIDE word 6, frame 3 (Mode register).	Shall indicate correct mode:		
	SIDE word 6, frame 7 (Dust cover and seal status).	Shall indicate seal break execution.		
Blow dust cover and master reset Command (CI-2, octal 107, 110; same as CI-13).	Transmit and verify command set, monitor the following:		As above.	Dust cover blow inhibit must be in. Master reset command also repeated when a 'mode' command is in effect to check reset action.
	SIDE word 1 (SIDE frame counter).	Shall reset at 127.		
	SIDE word 2, frames 33, 35, 97, 99 (one time command register).	Shall indicate dust cover blow execution.		
	SIDE word 2, frames 14, 78 (solar cell).	Shall indicate presence of illumination.		Provided dust cover removed and cell illuminated.
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:		
	SIDE word 6, frames 3, 11, 15, etc. (mode register).	Shall indicate correct mode:		
	SIDE word 6, frames 7, 39, 71, 103, (dust cover and seal status).	Shall indicate dust cover blow execution:		
Ground plane stepper on/off Command (CI-6, octal 104, 110).	Transmit and verify command set twice; monitor the following:		As above.	This will normally be done with Command CI-8 in effect (see below) to shorten test time.
	SIDE word 2, frames 13, 15, 29, etc. (GPV).	Shall remain at value operative at time of first command set execution. Second command set shall recommence stepping through values given below in "Housekeeping data".		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	SIDE word 6, frames 0, 2, 4, etc. (GPS).	Shall remain at number operative at time of first command set execution. Second command shall recommence stepping through range to		
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:		
Reset SFC at 39 Command (CI-8, octal 104, 105, 110).	Transmit and verify command set, monitor the following:		As above.	
	SIDE word 1 (SIDE frame counter).	Shall reset at 39.		
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:		
	SIDE word 6, frames 3, 11, 15, etc. (Mode register).	Shall indicate correct mode:		
Reset VFC at 9 Command (CI-9, octal 106, 110).	Transmit and verify command set, monitor the following:		As above.	Requires full frame sequence.
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:		
	SIDE word 6, frames 3, 11, 15, etc. (Mode register).	Shall indicate correct mode:		
	SIDE word 7 (V.F. voltage).	Shall cycle through modified sequence 1 shown below under "Housekeeping".		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Reset SFC at 79 Command (CI-10, octal 104, 106, 110).	Transmit and verify command set, monitor the following:		As above.	
	SIDE word 1 (SIDE frame counter).	Shall reset at 79.		
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:		
	SIDE word 6, frames 3, 11, 15, etc. (Mode register).	Shall indicate correct mode:		
Reset SFC at 79 and VFC at 9 Command (CI-11, octal 105, 106, 110).	Transmit and verify command set, monitor the following:		As above.	
	SIDE word 1 (SIDE frame counter).	Shall reset at 79.		
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:		
	SIDE word 6, frames 3, 11, 15, etc. (Mode register).	Shall indicate correct mode:		
	SIDE word 7 (V.F. voltage).	Shall cycle through modified sequence 2 shown below under "Housekeeping".		
X 10 accumulation interval on/off Command (CI-12, octal 104, 105, 106, 110).	Transmit and verify command set twice, monitor the following:		As above.	
	SIDE word 1 (SIDE frame counter).	Shall repeat each frame number ten times after first command set, then revert to normal after second command set.		
	SIDE words 4, 5, and 9, 10 (HE & LE count data).	Shall increase in count for nine steps, then reset at each change of SFC after first command set, then revert to normal after second command set.		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence for each command set:		
	SIDE word 6, frames 3, 11, 15, etc. (mode register).	Shall indicate correct modes: after 1 command after 2 commands		
Velocity filter voltage on/off Command (CI-14, octal 104, 107, 110).	Transmit and verify command set twice, monitor the following:		As above.	
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence for each command set:		
	SIDE word 7 (V.F. voltage).	All readings shall be less than after first command set, then revert to normal sequence (see below under "Housekeeping") after second command set.		
LECPA voltage on/off Command (CI-15, octal 105, 107, 110).	Transmit and verify command set twice, monitor the following:		As above	
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence for each command set:		
	SIDF word 8, (LECPA voltage).	All readings shall be less than after first command set, then revert to normal sequence (see below under "Housekeeping") after second command set.		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
HECPA voltage on/off Command (CI-16, octal 104, 105, 107, 110).	Transmit and verify command set twice, monitor the following:		As above.	
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence for each command set:		
	SIDE word 3, (HECPA voltage).	All readings shall be less than after first command set, then revert to normal sequence (see below under "Housekeeping") after second command set.		
Continuous calibration Command (CI-17, octal 106, 107, 110).	Transmit and verify command set, monitor the following:		As above.	
	SIDE word 1 (SIDE frame counter).	Shall sequence from 120 to 127.		
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:		
CCG high voltage on/off Command (CI-18, octal 104, 106, 107, 110).	Transmit and verify command set twice, monitor the following:		As above.	Can only be checked if no inhibit on CCG high voltage, and with system evacuated.
	SIDE word 2, frames 8, 40, 72, 104 (4.5 kV).	Readings shall not exceed after first command set, then shall indicate after second command set.		
	SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence for each command set:		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Channeltron high voltage on/off Command (CI-19, octal 105, 106, 107, 110).	Transmit and verify command set twice, monitor the following: SIDE word 2, frames 23, 55, 87, 119 (-3.5 kV). SIDE word 6, frames 1, 5, 13, etc. (command input register).	Readings shall not exceed after first command set, then shall indicate after second command set. Shall indicate the following sequence for each command set:	As above.	Can only be checked if no inhibit on Channeltron high voltage, and with system evacuated.
Reset command input register Command (CI-20, octal 104, 105, 106, 107).	Transmit and verify command set, monitor: SIDE word 6, frames 1, 5, 13, etc. (command input register).	Shall indicate the following sequence:	As above.	
Housekeeping, engineering and status data:	Monitor the following during normal operation, or as noted:		Check internal functioning of experiment.	
	SIDE word / SIDE frames			
+ 5.0 V	2 — 0, 32, 64, 96			
Temp. #1	2 — 2, 34, 66, 98			
Temp. #2	2 — 4, 36, 68, 100			
Temp. #3	2 — 6, 38, 70, 102			
4.5 kV	2 — 8, 40, 72, 104			Checked above (Command CI-18).
Temp. #4	2 — 11, 43, 75, 107			
Temp. #5	2 — 12, 44, 76, 108			

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Ground plane voltage (GPV) and ground plane step (GPS)	2	13, 15, 29, etc.	Shall step through the following 24 values, one step per cycle: GPS GPV		Checked above (Command CI-6).
	6	0, 2, 4, etc.			

FUNCTION TESTED		TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Solar cell	2	14, 78			Checked above (Command CI-2).
+ 60 V	2	16, 48, 80, 112			
+ 30 V	2	17, 49, 81, 113			
+ 12 V	2	18, 50, 82, 114			
Ground	2	19, 51, 83, 115			
- 5 V	2	20, 52, 84, 116			
- 30 V	2	21, 53, 85, 117			
Temp. #6	2	22, 54, 86, 118			
- 3.5 kV	2	23, 55, 87, 119			Checked above (Command CI-19).
+ 1.0 V cal.	2	24, 56, 88			
+ 30 mV cal.	2	25, 57, 89			
+ A/D Ref.	2	26, 58, 90			
= A/D Ref.	2	60, 62, 94			
- 1.0 V cal.	2	37, 101			
- 12 V cal.	2	39, 103			
+ 12 V cal.	2	28, 60, 92			
Pre-reg. duty factor	2	65			
- 30 mV cal.	2	46, 110			
CCG Zero Uncorrected	2	120			
CCG Zero part corrected	2	121			
CCG Zero corrected	2	122			
CCG towards CC #1	2	124	Not checked.		
CCG at CC #1	2	125			
CCG towards CC #2	2	126	Not checked.		
CCG at CC #1	2	127			
One time command register status	2	33, 35, 97, 99	No CI-1, no CI-2:		Checked above (Commands CI-1, CI-2).
			No CI-1, CI-2 received:		

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
			CI-1 and CI-2 received:		
HECPA voltage.	3	0, 20, 40, etc.			Checked above (Command CI-16).
	3	1, 21, 41, etc.			
	3	2, 22, 42, etc.			
	3	3, 23, 43, etc.			
	3	4, 24, 44, etc.			
	3	5, 25, 45, etc.			
	3	6, 26, 46, etc.			
	3	7, 27, 47, etc.			
	3	7, 28, 48, etc.			
	3	9, 29, 49, etc.			
	3	10, 30, 50, etc.			
	3	11, 31, 51, etc.			
	3	12, 32, 52, etc.			
	3	13, 33, 53, etc.			
	3	14, 34, 54, etc.			
	3	15, 35, 55, etc.			
	3	16, 36, 56, etc.			
	3	17, 37, 57, etc.			
	3	18, 38, 58, etc.			
	3	19, 39, 59, etc.			
	3	120 to 127			
Command input register.	6	1, 5, 13, etc.	Sequences as shown above.		Checked above, all commands.
Mode register.	6	3, 11, 15, etc.	Indications as shown above.		Checked above, Commands CI-1, CI-2, CI-8, CI-9, CI-10, CI-11, CI-12.
Dust cover and seal status.	6	7, 39, 71, 103.	Dust cover on, seal unbroken:		Checked above, Commands CI-1, CI-2.
			Dust cover off, seal unbroken:		

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
			Dust cover off, seal broken:		
Cal. rate #1	6	120, 124			
Cal. rate #2	6	121,			
Cal. rate #3	6	122, 126			
Cal. rate #4	6	123, 127			
Velocity filter voltage, normal sequence.	7	0			Checked above, Command CI414.
	7	1			
	7	2			
	7	3			
	7	4			
	7	5			
	7	6			
	7	7			
	7	8			
	7	9			
	7	10			
	7	11			
	7	12			
	7	13			
	7	14			
	7	15			
	7	16			
	7	17			
	7	18			
	7	19			
	7	20			
	7	21			
	7	22			

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	7	23			
	7	24			
	7	25			
	7	26			
	7	27			
	7	28			
	7	29			
	7	30			
	7	31			
	7	32			
	7	33			
	7	34			
	7	35			
	7	36			
	7	37			
	7	38			
	7	39			
	7	40			
	7	41			
	7	42			
	7	43			
	7	44			
	7	45			
	7	46			
	7	47			
	7	48			
	7	49			
	7	50			
	7	51			
	7	52			

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	7	53			
	7	54			
	7	55			
	7	56			
	7	57			
	7	58			
	7	59			
	7	60			
	7	61			
	7	62			
	7	63			
	7	64			
	7	65			
	7	66			
	7	67			
	7	68			
	7	69			
	7	70			
	7	71			
	7	72			
	7	73			
	7	74			
	7	75			
	7	76			
	7	77			
	7	78			
	7	79			
	7	80			
	7	81			
	7	82			

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	7	83			
	7	84			
	7	85			
	7	86			
	7	87			
	7	88			
	7	89			
	7	90			
	7	91			
	7	92			
	7	93			
	7	94			
	7	95			
	7	96			
	7	97			
	7	98			
	7	99			
	7	100			
	7	101			
	7	102			
	7	103			
	7	104			
	7	105			
	7	106			
	7	107			
	7	108			
	7	109			
	7	110			
	7	111			
	7	112			

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	7	113			
	7	114			
	7	115			
	7	116			
	7	117			
	7	118			
	7	119			
	7	120			
	7	121			
	7	122			
	7	123			
	7	124			
	7	125, 126, 127			
Velocity filter voltage, modified sequences 1 and 2.	7	0 to 9	As normal sequence.		Checked above, Commands CI-9, 11.
	7	10 to 19	As normal sequence 0 to 9.		
	7	20 to 29	As normal sequence.		
	7	30 to 39	As normal sequence 20 to 29.		
	7	40 to 49	As normal sequence.		
	7	50 to 59	As normal sequence 40 to 49.		
	7	60 to 69	As normal sequence.		
	7	70 to 79	As normal sequence 60 to 69.		
	Modified sequence 2 resets at this point.				
	Modified sequence 1 continues.				
	7	80 to 89	As normal sequence.		
	7	90 to 99	As normal sequence 80 to 89.		
	7	100 to 109	As normal sequence.		
	7	110 to 119	As normal sequence 100 to 109.		
	7	120 to 127	As normal sequence.		
LECPA Voltage.	8	0 to 19			Checked above, Command CI-15.
	8	20 to 39			

FUNCTIONS TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	8	40 to 59			
	8	60 to 79			
	8	80 to 99			
	8	100 to 119			
	8	120 to 127			
Scientific data:				Limited check of sensor operation.	All data recorded on magnetic tape: M.S.C./H will supply formatted tapes to P.I.'s.
CCG Data	2	1, 3, 5, etc.			
CCG Range	2	10, 27, 42, etc.			Printout of data at any time during SIDE tests.
HE Data (digital)	4 and 5				
LE Data (digital)	9 and 10				
HE Data (analog) (count rate)	Housekeeping word #33, subcommutator position 85.				
LE Data (analog) (count rate).	Housekeeping word #33, subcommutator position 70.				

Charged Particle Lunar Environment Experiment

The following data will be printed on a 32 column alphanumeric line printer:

(i) All six channels of count data from each C.P. frame.

(ii) The analyzer, voltage and polarity.

(iii) An even frame marker (also identifying the experiment). This data may be printed either continuously or only when an error is detected, selected by switch operation. In the latter case, an error is defined as either departure of a data word from predetermined limits or a change between consecutive readings of that word which exceeds a predetermined amount. In the case of status information, an error is non-equivalence to the programmer/processor-derived theoretical status.

In both print modes, any word or bit in error is "flagged". The six housekeeping data channels are telemetered via the central station housekeeping word, and these may be printed with identification either continuously or only when in error, selected by switch operation. This printout will be line interleaved with the scientific data printout.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Thermal Control bypass on and off Commands (CC-1 and CC-2, octal 111 and 112).	Transmit and verify commands in sequence, monitor the following: Central Station housekeeping word subcommutator positions 11 (Temperature #1) 90 (Temperature #2)	Temperatures shall drop after "on" command, and rise back to normal operating region (to) after "off" command.	Confirmation of command operation.	Can only be checked with system at low temperature during thermal/vacuum tests.
Dust cover removal Command (CC-3, octal 113).	Transmit and verify command, monitor dust cover removal circuit.		As above.	Can only be checked if the dust cover removal circuit output is inhibited.
Automatic voltage level sequencer on and off commands, and step voltage level Command (CC-4, CC-6, CC-5, octal 114, 117, 115).	Transmit and verify commands in sequence "off", "step" eight times, "on", monitor central station housekeeping word subcommutator position 25 (switchable power supply voltage) and status bits of ALSEP words 19 and 39 in "even" frames, 7 in "odd" frames.	Voltage level and status bit stepping shall cease after "off" command; successive "step" commands shall sequence the above through following sequence. The start and finish status shall be the same, but the start point may be any one of the eight states. Status Bits — Voltage 19, 39, 7 1, 1, 0 1, 0, 1 1, 1, 1 1, 0, 0 0, 1, 0 0, 0, 1 0, 1, 1 0, 0, 0 The on command shall return the system to automatic sequencing as above, each state being maintained for two CPLEE frames (four ALSEP frames).	As above.	
Channeltron p.s. voltage increase on and off Commands (CC-7 and CC-8, octal 120 and 121).	Transmit and verify commands in sequence, monitor central station housekeeping words 89 (Channeltron #1 p.s. voltage) 40 (Channeltron #2 p.s. voltage)	After "on" command, readings shall be (After "off" command, readings shall be	As above.	Can only be performed if system is evacuated and supply not inhibited.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Housekeeping data:	Monitor central station housekeeping word subcommutator positions:		Confirmation of status of experiment.	
Switchable p.s. voltage	25	See values above.		Checked above, Commands CC-4, CC-5, CC-6.
Channeltron #1 p.s. voltage	89	See values above.		Checked above, Commands CC-7, CC-8.
Channeltron #2 p.s. voltage	40	See values above.		Checked above, Commands CC-7, CC-8.
DC-DC converter voltage	10			
Temperature #1	11			
Temperature #2	90			Normal values given; checked above at low temperature, Commands CC-1, CC-2.
Sensor assembly, polarity and voltage step status.	Monitor status bits of ALSEP words 7, 19, 39 ("even" frames) and 7 ("odd" frames).	Status bits shall repeat the following sequence:		Partly checked above, Commands CC4, CC-5, CC-6.

CPLEE frame	Status Bits
1	1, 1, 1, 0
2	0, 1, 1, 0
3	1, 1, 0, 1
4	0, 1, 0, 1
5	1, 1, 1, 1
6	0, 1, 1, 1
7	1, 1, 0, 0
8	0, 1, 0, 0
9	1, 0, 1, 0
10	0, 0, 1, 0
11	1, 0, 0, 1
12	0, 0, 0, 1
13	1, 0, 1, 1
14	0, 0, 1, 1
15	1, 0, 0, 0
16	0, 0, 0, 0

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Scientific data.	Monitor scientific data, ALSEP words 7, 17, 19, 23, 39, 55 and status bits to identify frame number (see above).		Check of sensor and calibration.	Check of sensor only possible with ion source and system evacuated.

Frames	Channel
1 & 2	1
	2
	3
	4
	5
	6
3 & 4	1
	2
	3
	4
	5
	6
5 & 6	1
	2
	3
	4
	5
	6
7 & 8	1
	2
	3
	4
	5
	6
9 & 10	1
	2
	3

FUNCTION TESTED	TECHNIQUE		ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
		4			
		5			
		6			
	11 & 12	1			
		2			
		3			
		4			
		5			
		6			
	13 & 14	1			
		2			
		3			
		4			
		5			
		6			
	15 & 16	1			
		2			
		3			
		4			
		5			
		6			

Active Seismic Experiment ('A' version)

An analog recorder will be used to provide the following monitoring:

(i) The three geophone channel outputs, via D/A converters, in either mode.

(ii) Event marker signals.

(iii) Time markers (derived independently of the experiment).

(iv) The oscillator signal injected into the geophone inputs.

The remaining data will be output on an alphanumeric line printer:

(v) Inter-event times in frames, words and bits, in any mode.

(vi) Mode ID bits as decimal equivalent, in either mode.

(vii) Engineering data channels 4 to 16 inclusive, as decimal equivalent (in engineering mode).

The printout of (v) will occur whenever sets of events occur. (vi) will be printed at mode changes or when full engineering printout is selected. Engineering data will be printed out with ID, either continuously, one channel per five frames, or as a single point reading whenever a channel either exceeds predetermined limits or changes from its previous value by more than a predetermined amount. These alternate printout modes may be selected by switch operation. In either cases, an 'error' channel print will be 'flagged'.

During normal operation of the central station, the four AS temperatures will be under continuous surveillance, similar to the engineering data above.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Geophone calibrate Command (CS-1, octal 156).	Transmit command twice, monitor the following:		Confirmation of command operation.	Shall be in 'Engineering' mode prior to command.
	Geophone channels 1, 2, 3 on analog recorder.	Shall display 'blocked' response after second command.		
	Mode ID bits (word 1, bits 12, 13, 14).	Shall indicate change from 'Engineering' to 'Seismic' mode at second command.		
	Geophone calibrate pulse during engineering mode (words 10, 26, 42, 58, bits 1 to 8).			
Set Seismic data mode Command (CS-2, octal 160).	Transmit command, monitor mode ID bits (word 1, bits 12, 13, 14).	Shall indicate change from 'Engineering' to 'Seismic' mode.	As above.	As above.
Sequential fire, fire grenade 1-4 and arm grenade Commands (CS-3, CS-4, CS-5, CS-6, CS-7, CS-8, octal 162, 163, 164, 165, 166, 170).	Transmit commands in the following combinations:		As above, with check of mortar firing circuits and RTE circuits.	As above. Mortars simulated.
	"Arm", "sequential", monitor the following:			
	Mode ID bits (word 1, bits 12, 13, 14).	Shall indicate change from 'Engineering' to 'Seismic' mode after 'arm' command and revert to 'Engineering mode 120 ± seconds after 'sequential' command.		
	RTE timing			
	(a) Range start to range stop.			
	(b) Range start to grenade explosion.			
	Mortar simulator.	'Arm' command shall light 'armed' lamps, 'sequential' command shall extinguish 'armed' lamps and light 'grenade 1 fired' lamp.		
	Squib firing pulse.			Photograph from oscilloscope trace.
	Repeat the above sequence a further three times.	As above, but grenade fired lamp number shall sequence through 2, 3, 4.		
	Repeat the simulator lamps and repeat the above, with 'fire grenade' commands for 'sequential' commands, in order 3, 1, 2, 4.	As above, with 'fire grenade' command for 'sequential' command, and grenade fired lamps shall light in order 3, 1, 2, 4.		
Set engineering data mode Command (CS-9, octal 171).	Transmit command, monitor mode ID bits (word 1, bits 12, 13, 14).	Shall indicate change from 'seismic' to 'engineering' mode.	Confirmation of command operation.	Shall be in 'Seismic' mode prior to command.
Geophone sequence Command (CS-10, octal 172).	Transmit command with simulated geophone signal fed to one selected geophone amplifier input, monitor geophone channels on analog recorder.	Shall indicate reversal of order of geophone sampling.	As above.	Geophones disconnected.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Thumper RTE.	'Arm' thumper, monitor mode ID bits (word 1, bits 12, 13, 14).	Shall indicate change from 'engineering' to 'seismic' mode.	Check of thumper event circuits.	Shall be in 'engineering' mode prior to test. Thumper 'arm' and 'fire' signals simulated.
	'Fire' thumper, monitor the following:			
	'Event' trace on analog recorder.	Shall indicate event.		
	Mode ID bits (word 1, bits 12, 13, 14).	Shall indicate change from 'seismic' to 'engineering' mode 10 ± seconds after 'fire'.		
Engineering data:	Set 'engineering' mode and monitor bits 1 to 8 of the following words:		Check of engineering analog signal circuits.	
Geophones	2, 3, 17, 18, 19, etc.	—		Checked below.
RTG Temperature #1 cold junction	4, 20, 36, 52			
Shunt regulator #1 current	5, 21, 37, 53			
+5 V telemetry	6, 22, 38, 54			Simulated inputs.
E-W angle	7, 23, 39, 55			
N-S angle	8, 24, 40, 56			
GLA temperature	9, 25, 41, 57			
Geophone calibrate driver pulse	10, 26, 42, 58	—		Checked above (Command CS-1).
A/D calibrate 3.75 V	11, 27, 43, 59			
A/D calibrate 1.25 V	12, 28, 44, 60			
Temperature sensor	13, 29, 45, 61			
RTG output voltage	14, 30, 46, 62			
RTG output current	15, 31, 47, 63			
RTG temperature #1 hot junctions.	16, 32, 48, 64			
Seismic data channels.	Remove geophones, inject following signals, monitor geophone channels 1, 2, 3, on analog recorder.		Check of amplifier frequency response, log characteristic and signal/noise ratio.	In 'seismic' mode.
	3 Hz, 10 Hz, 50 Hz, 100 Hz, 250 Hz, 450 Hz — amplitude (10 db below maximum)			

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	10 Hz, amplitude (minimum level)			
G.L.A.	Check each squib continuity with ordnance continuity meter.			
	Tilt G.L.A. and monitor angle transducer position.			
Thumper staff.	With squib selector at off position, operate 'arm' and 'fire' switches, monitor output of squib firing circuit, photograph oscilloscope trace.			
	Check squib continuity in selector positions 1 to 21 with ordnance continuity meter.			
Telemetry via central station housekeeping:	Monitor central station housekeeping word 33 subcommutator positions:			With central station in 'normal' mode.
C.S. package temperature	29			
Mortar box temperature	44			
G.L.A. temperature	55			
Geophone temperature	73			

Active Seismic Experiment ('B' version)

The techniques and limits for this are very similar to the 'A' version, and only differences will be noted here.

1. Commands CS-2, CS-9, CS-10 ('mode' and 'geophone sequence') are not used, therefore delete these sections.

2. The geophone data channels will use 5-bit words instead of 7-bit words, so the acceptance limits for the seismic data channel tests shall be as follows:

Input	Acceptance Limits
3 Hz, 10 Hz, 50 Hz, 100 Hz, 250 Hz, 450 Hz	amplitude (10 db below maximum)
10 Hz	amplitude (minimum level)

Heat Flow Experiment

The data from this experiment will be printed out on a 32-column alphanumeric printer. Some simple arithmetic manipulation of the scientific data will be performed, and the results of this will be indicated in the printout.

Scientific Data:

(i) For each "ΔT" measurement (blocks 0 to 7, inclusive); the sub-sequence, sequence and heater register states and mode number, in decimal; each 13-bit scientific data word, in decimal; the ratio of (the sum of the output voltage numbers) to (the sum of the excitation voltage numbers), in decimal.

(ii) For each "TC ref" measurement (blocks 12 and 14); the sub-sequence, sequence and heater register states and mode number, in decimal; each 13-bit scientific data word, in decimal; the ratio of (the sum of the output voltage numbers) to (the sum of the excitation voltage numbers), in decimal; the mean of the excitation voltage numbers, in decimal half the difference between the excitation voltage numbers, in decimal.

(iii) For each "T" measurement (blocks 8 to 11, inclusive); the sub-sequence, sequence and heater register states and mode number, in decimal; each 13-bit scientific data word, in decimal; the ratio of (the sum of the bridge current numbers) to (the sum of the bridge voltage numbers), in decimal.

(iv) For each set of "TC" measurements (blocks 13 and 15); the sub-sequence, sequence and heater register states and mode number, in decimal; each 13-bit scientific data word, in decimal.

Housekeeping Data:

All seven housekeeping words, identified by subcommutation position, in decimal.

Printout of the above data will be either continuous or only when an error is detected (selected by switch operation, separate switches being provided for scientific and housekeeping data). An error is defined as:

(i) For a scientific, computed or housekeeping data word, the value of that word either exceeding predetermined limits or changing by more than a predetermined amount between consecutive readings;

(ii) for the sub-sequence, sequence, mode and heater register states, the value of the register state differing from STS programmer/processor computed value.

An error printout will comprise the complete data block containing the error for scientific, computed and register data, and the word in error (with ID) for housekeeping data.

In both continuous and error printout modes, any data in error will be "flagged".

Whenever central station housekeeping or command verification printout is initiated (whether by switch operation, command reception or an error) this printout, appropriately identified, will be line interleaved with the above.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Gradient mode select Command (CH-1, octal 135).	Transmit and verify command, monitor mode status bits.	Shall indicate gradient mode:	Confirmation of command operation.	Each command used to switch from another mode; other command functions checked in conjunction with Command CH-10.
Ring-source conductivity mode select Command (CH-2, octal 136).	Transmit and verify command, monitor mode status bits.	Shall indicate ring-source mode:	As above.	
Heat-pulse conductivity mode select Command (CH-3, octal 140).	Transmit and verify command, monitor mode status bits.	Shall indicate heat-pulse mode:	As above.	
Full sequence Command (CH-4, octal 141).	Transmit and verify command, monitor sequence and sub-sequence register status bits.	Sub-sequence register shall cycle through sequence 0, 1, 2, 3, Sequence register shall advance one step per sub-sequence through range 0 to 15.	As above, with check of sequence register.	After limited sequence, as selected by CH-5, CH-6, CH-7, CH-8, CH-9 combination.
Probe 1 select and probe 2 select Commands (CH-5, CH-6, octal 142, 143).	Transmit and verify commands, monitor sequence register after each command.	Sequence register shall cycle as above, but sequence shall be 0, 1, 4, 5, 8, 9, 12, 13, --- after probe 1 command, and 2, 3, 6, 7, 10, 11, 14, 15, --- after probe 2 command.	As above.	Starting from full sequence.
	Transmit and verify full sequence command, monitor sequence register.	See above.		
Measurement select Commands (CH-7, CH-8, CH-9, octal 144, 145, 146).	Transmit and verify the following command sequence, monitor sequence register	Sequence register cycle shall be:	As above.	Starting from full sequence.
	CH-7	0, 1, 2, 3, 0, 1, 2, 3, etc.		
	CH-8	4, 5, 6, 7, 4, 5, 6, 7, etc.		
	CH-9	12, 13, 14, 15, 12, 13, 14, 15, etc.		
	CH-7 followed by CH-9	8, 9, 10, 11, 8, 9, 10, 11, etc.		
	full sequence Command (CH-4).	0 to 15 in full (as above).		
Heater advance Command (CH-10, octal 142).	Transmit and verify heat-pulse mode command, transmit and verify heater command sixteen times, monitor shunt regulator #1 current (C.S. housekeeping word 33, subcommutator position 8).	Change in current between commands (decrease on "odd" commands, increase on "even") shall be:	Confirmation of command operation and check of heaters.	
	Also monitor heater register status bits.	Register shall be 0 initially, then shall cycle 1, 2, 3, etc. up to 15, 0, one step per command.		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	Transmit and verify gradient mode command, monitor shunt regulator #1 current as above.	Change in current shall be:		
Housekeeping data:	Monitor central station housekeeping word 33 subcommutator positions:		Check of supply voltage telemetry.	
+ 5 V supply	30			
- 5 V supply	45			
+15 V supply	56			
-15 V supply	74			
+29 V supply	86			
+11 V supply	57			
+35 V supply	75			
Scientific data.	Monitor full format;		Check of scientific data transmission and format for gross defects.	Probe maintained at temperature in the range 200° to 250° K.
	" T" measturements:			
	$+V_{ex}$ (high sens.)			
	$+V_{out}$ " "			
	$-V_{ex}$ " "			
	$-V_{out}$ " "			
	ratio of ($V_{out\ sum}$) to ($V_{ex\ sum}$)			
	"TC" ref measurements:			
	$+V_{ex}$			
	$+V_{out}$			
	$-V_{ex}$			
	$-V_{out}$			
	ratio of ($V_{out\ sum}$) to ($V_{ex\ sum}$)			
	V_{ex} mean			
	$\frac{1}{2}$ ($V_{ex\ difference}$)			

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	"T" measurements:			
	$+V_B$			
	$+I_B$			
	$-V_B$			
	$-I_B$			
	ratio of ($V_{B\ sum}$) to ($I_{B\ sum}$)			
	"TC" measurements:			
	V_{out}			

Central Station

The programming and printout for the central station are covered completely by the general command verification and housekeeping formats. The transmitter output is also monitored by an r.f. power meter and a frequency counter. The command signal generator (simulating the up-link transmitter) output level is initially set to the maximum expected signal strength at the moon (-61 dbm) to check one end of the telemetry scale. For all command transmissions, the level will be set to the minimum expected level (-101 dbm) to check the other end of the telemetry scale, and to provide a limited check of uplink error rate.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
	Throughout this section, "channel" number refers to the subcommutator position within the central station housekeeping word 33.			
Transmitter "A" select Command (CD-1, octal 12).	Transmit and verify command, monitor Channel 51. Also measure transmitter power output and frequency.	Shall increase from to Shall be watts minimum. Shall be nominal ± .	Confirmation of command operation.	Prior to test, transmitter "B" selected and on. Nominal frequencies: ALSEP 1 2276.5 MHz ALSEP 2 2278.5 MHz ALSEP 3 2275.5 MHz
Transmitter on Command (CD-2, octal 13).	Transmit command, monitor Channel 66.	Shall increase from to	As above.	Prior to test, transmitter "B" selected and off.
Transmitter off Command (CD-3, octal 14).	Transmit command, monitor Channel 66.	Shall decrease from to	As above.	Prior to test, transmitter "B" selected and on.
Transmitter "B" select Command (CD-4, octal 15).	Transmit and verify command, monitor Channel 66. Also measure transmitter power output and frequency.	Shall increase from to Shall be watts minimum. Shall be nominal ± .	As above.	Prior to tests, transmitter "A" selected and on. Nominal frequencies: ALSEP 1 2276.5 MHz ALSEP 2 2278.5 MHz ALSEP 3 2275.5 MHz
PDM load #1 on Command (CD-5, octal 17).	Transmit and verify command, monitor Channel 8.	Shall decrease by	As above.	Prior to test, ensure sufficient reserve power.
PDM load #1 off Command (CD-6, octal 21).	Transmit and verify command, monitor Channel 8.	Shall increase by	As above.	
PDM load #2 on Command (CD-7, octal 22).	Transmit and verify command, monitor Channel 8.	Shall decrease by	As above.	Prior to test, ensure sufficient reserve power.
PDM load #2 off Command (CD-8, octal 23).	Transmit and verify command, monitor Channel 8.	Shall increase by	As above.	
Back-up heater on Command (CD-9, octal 24).	Transmit and verify command, monitor Channel 8.	Shall decrease by	As above.	Only possible with CS temperature below -15°F.
Back-up heater off Command (CD-10, octal 25).	Transmit and verify command, monitor Channel 8.	Shall increase by	As above.	
Data processor "X" on Command (CD-11, octal 34).	Transmit command, monitor main frame sync acquisition indicators on STS.	Shall indicate temporary loss of sync.	As above.	
Data processor "Y" on Command (CD-12, octal 35).	Transmit command, monitor main frame sync acquisition indicators on STS.	Shall indicate temporary loss of sync.	As above.	
Experiment 1 power on Command (CD-13, octal 36).	Transmit and verify command, monitor experiment data format.	Experiment data shall appear.	As above.	Prior to test, experiment power off.
Experiment 1 power standby Command (CD-14, octal 37).	Transmit and verify command, monitor experiment data format. Also monitor Channel 12.	Experiment data shall disappear. Shall indicate standby power on.	As above.	Prior to test, experiment power on.

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Experiment 1 power off Command (CD-15, octal 41).	Transmit and verify command, monitor Channel 12.	Shall indicate standby power off:	As above.	Prior to test, experiment standby power on.
Experiments 2, 3, 4, 5 power on, standby, off (CD-16 to CD-27, octal 42, 43, 44; 45, 46, 50; 52, 53, 54; 55, 56, 57).	As above for experiment 1; for experiments 3, 4, 5 substitute Channel 14 for Channel 12.	As above for experiment 1; indication as follows: Expt. 2 Standby 2 Off 3 Standby 3 Off 4 Standby 4 Off 5 Standby 5 Off	As above.	As above for experiment 1. Tests performed during experiment sequences.
Power conditioning unit set Command (CU-1, octal 60).	Transmit and verify command, monitor channels: 8 13 20 35 50 65 79 80	Indications shall be:		
Power conditioning unit reset Command (CU-2, octal 62).	Transmit and verify command, monitor channels: 8 13 20 35 50 65 79 80	Indications shall be:		

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Dust detector on Command (CX-1, octal 27).	Transmit and verify command, monitor channels: 26 41 84	Indications shall be:		Cells shall be illuminated.
Dust detector off Command (CX-2, octal 31).	Transmit and verify command, monitor channels: 26 41 84	Indications shall be:		
Receiver sensitivity.	At switch-on, operate up-link signal generator at -61 dbm, monitor Channel 21; reduce level to -101 dbm, monitor Channel 21.	Indication shall be: Indication shall be:		All commands are transmitted at -101 dbm, giving check on errors due to receiver noise.
Housekeeping channel checks:	Monitor the following channels:	Indications shall be:		Channels 8, 12, 13, 14, 20, 21, 26, 35, 41, 50, 51, 65, 66, 79, 80, 84 checked during tests shown above; channels 10, 11, 23, 24, 25, 29, 38, 39, 40, 44, 45, 53, 54, 55, 57, 68, 69, 70, 73, 74, 75, 85, 86, 89, 90 checked during experiment tests.
Converter input voltage	1			
0.25 V d.c. calibration	2			
4.75 V d.c. calibration	3			
Thermal plate temperature 1	4			
Convertor input current	5			
RTG hot junction 1 temperature	6			
RTG cold junction 1 temperature	7			
Command demodulator sub-carrier	9			
Structure bottom temp. 1	15			
LO crystal A temperature	16			
LO crystal B temperature	17			
Transmitter A crystal temp.	18			
Transmitter A heat sink temp.	19			
RF level, P.A. 2, transmitter B	22			

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Sunshield temperature 1	27			
Thermal plate temperature 2	28			
Dust detector temperature 2	30 (Array "A" only)			
Transmitter B crystal temp.	31			
Transmitter B heat sink temp.	32			
Analog D.P. base temperature	33			
Analog D.P. internal temperature	34			
L.O. level (receiver)	36			
RTG hot junction temperature 2	37			
Sunshield temperature 2	42			
Thermal plate temperature 3	43			
Digital D.P. base temperature	46			
Digital D.P. Internal temperature	47			
Command decoder base temperature	48			
Command decoder internal temperature	49			
RTG hot junction temperature 3	52			
Dust detector temperature 3	56 (Array "A" only)			
Thermal plate temperature 4	58			
Structure side temperature 1	59			
Inner multilayer insulation temperature	60			

FUNCTION TESTED	TECHNIQUE	ACCEPTANCE LIMITS	REASON FOR TEST	NOTES
Command demodulator VC 0 temperature	61			
PDU base temperature	62			
PDU internal temperature	63			
PCU power osc. #1 temperature	64			
RTG cold junction temperature 2	67			With PCU reset command in effect.
Thermal plate temperature 5	71			
Outer multilayer insulation temperature	72			
PCU power osc. #2 temperature	76			With PCU set command in effect.
PCU regulator #1 temperature	77			With PCU reset command in effect.
PCU regulator #2 temperature	78			With PCU set command in effect.
RF level, P.A. 2, transmitter A	81			
RTG cold junction temperature 3	82			
Dust detector temperature 1	83			
Structure side temperature 2	87			
Structure bottom temperature 2	88			