

NO. 3 ESS SYSTEM VERIFICATION  
 CONTROL COMPLEX

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1. <u>GENERAL INFORMATION</u>	<u>DOCUMENT</u>	<u>TITLE</u>
1.1 <u>Description</u>	SD-1C907-01	System Status Panel Control Schematic
1.11 The purpose of this section is to test the Control Complex using the Control Complex diagnostics. The diagnostic programs consist of several test blocks. Each test block uses only circuitry that was tested in preceding blocks until the Control Unit is completely tested.	CD-1CXXX-01	Circuit Descriptions for abovementioned SDs
1.12 Also tested in section is the spare cartridge tape transport KS-21447,L2. This will insure the operating company of having a good spare.	FA-FB,FC, & JK	Circuit Pack Schematics
1.2 <u>Sequence</u>	HB 269 Sec 500	Planning Information for System Verification
1.21 This section follows the completion of Section 508.1.	HB 269 Sec 502	System Verification - General Information
1.3 <u>References</u>	HB 269 Sec 502.1	Teletypewriter Operating Procedures
1.31 The following documents will be useful as references during the verification with the Control Complex maintenance programs:	IM-3H300-01	No. 3 ESS Input Manual
<u>DOCUMENT</u>	IM-3H300-01	No. 3 ESS Output Manual
<u>TITLE</u>	TLM-1C900-01	Trouble Locating Manual
SD-1C900-01	3A Central Control Schematic	
SD-1C902-01	Main Store Controller Schematic	
SD-1C903-01	Main Store Memory Schematic	
SD-1C906-01	System Status Panel Schematic	
	1.4 <u>Test Records and Requirements</u>	
	1.41 The results of this section's tests shall be recorded on Forms SD-97-1313 and SD-97-1315. Detailed information for completing the record forms appears in Handbook 3, Section 6B.	
	1.42 The tests in this section are based on the No. 3 ESS Performance Requirements BSP 820-650-180.	

**2. TEST EQUIPMENT****2.1 Test Sets**

2.11 The following test set may be useful in troubleshooting faulty circuits:

<u>Amt.</u>	<u>ITE No.</u>	<u>Description</u>
1	5237B	Tektronix 465 Oscilloscope

**2.2 Test Accessories**

2.21 The following accessories may be useful in troubleshooting faulty circuits:

<u>Amt.</u>	<u>ITE No.</u>	<u>Description</u>	<u>With ITE.</u>
6	9140 L-1	Miniature Clip Leads	5543

**3. TEST PROCEDURES**

3.1 Refer to the Input Message Manual for a detailed explanation of each message used in the section.

**NOTE:** After a complete system initialization, most maintenance TTY requests are denied until a 5 minute period has elapsed.

3.2 Perform each step in the TEST PROCEDURES TABLE in the order indicated. Any troubles should be cleared before proceeding to the next step.

TEST PROCEDURES TABLE

STEP	PROCEDURE OR TYPE-IN	SYSTEM RESPONSE	REMARKS
1	Verify that the system has completed the requirements in Section 508.		Both MANUAL keys and both TEST MOD switches
2	Depress MANUAL button on offline CU	tt REPT CU STAT MAN	MANUAL lamp is lit on offline CU
3	DGN:CU;UCL!	tt DGN CU x COMPL ATP (x = offline CU number)	See paragraph 4 and 5 if response is not ATP.
4	Depress MANUAL BUTTON on offline CU	(wait about 2 minutes) tt UPD OMAS COMPL	MANUAL lamp is extinguished on offline CU.
5	RST:CU!	tt DGN CU x COMPL ATP tt UPD OMAS COMPL tt RST CU COMPL	
6	RMV:CU!	OK	CU is removed from standby status.
7	RST:CU;UCL!	tt UPD OMAS COMPL tt RST CU COMPL	CU is restored to standby status

TEST PROCEDURES TABLE (Cont'd)

STEP	PROCEDURE OR TYPE-IN	SYSTEM RESPONSE	REMARKS
8	If any offline peripheral controllers are out of service, type:  RST:PCF cs;UCL! c = peripheral control frame (PCF) number s = syc (0 or 1) on which the PCF is located	tt RST x COMPL x = peripheral controller identification	
9	SW:SYC!	OK	Newly online CU ACTIVE lamp is lit on SSP. Previously online CU ACTIVE lamp is extinguished on SSP.
10	Repeat Steps 2 through 8.		
11	REPT:TAPE STAT! If either TDC is out of service type:  RST:TAPE a;UCL! (a = 0 or 1) then type:  REPT:TAPE STAT!	tt REPT TAPE 000000 xx yy  OK  tt REPT TAPE 000000 xx yy	
12	INIT:TAPE! (Repeat 3 times)	tt INIT TAPE COMPL	Initializes both tapes.
13	DGN:TAPE 0!	tt DGN TAPE 0 ATP	Tests this CUs access to each TDC.
14	DGN:TAPE 1!	tt DGN TAPE 1 ATP	
15	SW:SYC!	OK	Newly online CU ACTIVE lamp is lit on SSP. Previously online CU ACTIVE lamp is extinguished on SSP.
16	Repeat Steps 13 and 14.		
17	ALW:TAPEUTIL!	tt ALW TAPEUTIL COMPL	Allows access to tape utilities.
18	AUDIT:TAPE (0,1);DETL!	tt AUDIT TAPE MATCH 0 (Audit will take approximately 45 minutes to complete)	
19	If spare cartridge tape transport is in the office proceed to paragraph 4.		

#### 4. TEST SPARE CARTRIDGE TAPE TRANSPORT

##### 4.1 Removal of Tape Transport

4.1.1 If a tape cartridge is in the cartridge tape transport to be replaced, rewind and remove the tape cartridge and store the tape in its plastic storage bag.

4.1.2 Remove power from the Tape Data Controller (TDC) and verify TDC power lamp is extinguished.

4.1.3 At the rear of the cartridge tape transport disconnect connectors J5 and J6.

4.1.4 Remove either screws (four at the top and four at the bottom) that secure the cartridge tape transport to the mounting plate.

4.1.5 At the front of the maintenance frame, remove the cartridge tape transport from the frame.

4.1.6 Transfer mounting flanges from the removed cartridge tape transport to the new cartridge tape transport.

##### 4.2 Installation of Tape Transport

4.2.1 At the front of the maintenance frame, insert the new tape transport into the frame.

4.2.2 At the rear of the maintenance frame, secure the tape transport to its mounting plate with eight screws (four at the top and four at the bottom).

4.2.3 Connect J5 and J6 connectors.

4.2.4 Operate TDC power key to restore power to the tape data controller.

4.2.5 Insert tape cartridge into the tape transport (tape may or may not rewind depending upon the hardware state of the machine from the power up).

4.2.6 The tape system is now ready for verification by the diagnostic program.

##### 4.3 Test Tape Transport

4.3.1 Repeat Step 13 or 14 of Test Procedure Table.

4.3.2 If the response is DGN TAPE 0/1 ATP, the tape transport is operating correctly.

4.3.3 Leave the tape transport installed and use the removed one as the office spare.

#### 5. TROUBLESHOOTING WITH CU DIAGNOSTICS

5.1 Request the failing test using the RPT mode. (If more than one test failed, request the first failing test only.)

NOTE: CU test 37, 54, 66 and 70 should not be requested in the repetitive mode as it may cause power converters to shut down or system initializations. Use STEP mode for these tests.

5.2 The diagnostic output message constitutes part of the TLM number. If the output message is not fully understood, refer to the Output Message Manual.

5.3 Unless a marginal fault exists, a single printout should be obtained and the trouble number referenced in the TLM. If an identical match is found in the TLM, replace the circuit pack(s) listed under the trouble number as follows:

##### \*\*REPLACEMENT OF OFFLINE CIRCUIT PACKS\*\*

- a) Stop the repetitive execution by operating EXECUTE key on the SSP.
- b) Power down the offline CU.
- c) Replace one circuit pack.
- d) Restore power to offline CU.

##### \*\*REPLACEMENT OF ONLINE CIRCUIT PACKS\*\*

- a) Clear the repetitive request and switch CUs using the following messages:
 

CLR:RPT:STEP!  
SW:CU;UCL!
- b) Place newly offline CU in manual by operating MANUAL Key.
- c) Power down offline CU.
- d) Replace one circuit pack.
- e) Restore and switch to original test state using the following messages:

RST:CU;UCL!  
SW:CU;UCL!  
DGN:CU:RPT:aa! aa = Failing Test

5.4 If the failing test passes after circuit pack replacement, continue testing with Step 3 in TABLE A. If not, repeat 4.1 through 4.3 until one of the following conditions results:

The first printout contains a new trouble number. However, the newly inserted pack should not have caused an earlier (lower numbered) test to fail. If this occurs, the last inserted pack may already be faulty. This situation does not hold for the segment numbers within an individual test, but caution should be exercised if a segment count decreases after insertion of a circuit pack. Evaluate this situation by program analysis.

5.5 If the entire list of circuit packs associated with the outputted trouble number have been replaced, or a marginal fault has caused a continuous change in the test's status, or no identical match of the outputted trouble number can be found in the TLM, the following procedures may be used.

5.51 Repetitively request the failing test (if more than one failing test, request the first only).

5.52 Locate the program listing in which the failing test is found. Use information in TLM-1C900, Section B under "Additional Repair Procedures" and "Additional Procedures."

5.53 Locate the area in the test associated with the trouble number. Analysis of this code will indicate why this segment failed.

5.54 Stop the online CU at the program address where the failure was detected using the following procedure:

- a) Place online CU in MANUAL and test mode.
- b) Operate HALT key up and operate the EXECUTE key to halt the CC.
- c) Load ADR IN register with the address of interest.
- d) Clear Bit 3 of INT MASK register (leave other bits unchanged).
- e) Clear ADR MASK register.
- f) Operate COMPARE ADR switch up.
- g) Operate HALT key down and momentarily operate EXECUTE key.

5.55 Wait for the halt lamp to light. When it does, operate the halt switch and display the PA to verify the correct operation. The PA should be pointing to the instruction which would have been executed immediately following the instruction pointed to by the ADR IN register.

**CAUTION:** If the CC does not halt, verify that the COMPARE ENABLED lamp is still lit. Certain autonomous memory correct circuitry disables the matcher. If this is the case, attempt to determine where the disabling occurs by moving the address of interest. If the CC halts but the PA is wrong, repeat paragraph 5.54. (Matches occur when the location is read as well as when it is executed.)

Inspection of the registers at this point should indicate why the test flowed down the fail path code.

5.56 The hardware problem can be searched for once the program has revealed the logical reason for the test failure a scope sync can be obtained at or near the address of the instruction which forces the hardware fault to respond as follows:

**NOTE:** This procedure is only useful if the system program is capable of cycling.

- a) With the system cycling, use the SET:MATCH input message to set up the address matcher, as described in the Input Message Manual.
- b) If the TTY cannot be used, the ADR MASK (AK) and ADR IN (AI) special registers can be loaded via the 3A CC panel.
- c) With the address matcher set up but not enabled (COMPARE ADR key down) the system will continue to cycle.
- d) A positive going pulse, suitable for use as a scope sync, is available at 02-16-008 on the 3A CC unit.

5.57 In the case of a marginal fault, the printout which contains the first failing segment number in the program flow should be used in the analysis of the failure. It is possible for the segment number to remain the same but for the data words in the printout to vary.

## 6. TEST AIDS

6.1 If a request is placed in the system for all the diagnostic tests, the sequence will be initiated with test 1 and continue to a point where a test fails or all the tests pass (ATP).

6.2 An unconditional diagnostic request will initiate the diagnostic sequence at test 1 and will not terminate the sequence upon encountering a failing test. Each test that fails will give its own diagnostic output message and the next test in the sequence will be initiated. In the event of a massive number of tests all the output messages due to limitations in outputting on the TTY and some of the output messages may be lost. Even though say, 20 of the diagnostic tests fail, the last 19 may be failing due to a fault in the circuitry associated with the first test that fails. Therefore, by correcting the CU trouble associated with the first test, a subsequent request for CU diagnostics may show more than just one additional test passing.

6.3 If a request is made to the system for a single diagnostic test, that test will either completely execute, if all the circuitry tested by the diagnostic passes, or terminate at

the point it encounters a fault. Again, depending on the request, repetitive or single shot, the test, at this point, will be restarted or diagnostics will exit from the loop. It must be pointed out that the information supplied by a single diagnostic test can be relied upon if all the preceding tests in the sequence pass.

6.4 When a repetitive (RPT) or single shot (Step) diagnostic request is entered into the system, the status of the test or tests running in the system can be visually observed on the test control lights on the SSP. Any change in these lights, during the running of the test or tests, indicates that the test or tests have: failed if originally passing, passed if originally failing, failed differently if originally failing. Any change in the lights should be accompanied with a new TTY response indicating what change had taken place.

6.5 A situation may occur in which a marginal fault can cause a rapid succession of changes in test status. This will result in the TTY program attempting to output a large amount of printouts related to this marginal fault. As mentioned previously, some of these messages may begin to be lost. The system response to losing messages with repetitive CU diagnostics in the loop is to no longer honor that request.

No arrows shown due to extensive changes.

Manager, ESS Installation & Field Engineering  
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Reason for Reissue:  
Changes were made to remove  
reference to No. 2B ESS.