

**DIGITAL TRANSMISSION SURVEILLANCE SYSTEM  
OVERALL SYSTEM MAINTENANCE REQUIREMENTS  
AND TEST PROCEDURES  
DIGITAL DATA SYSTEM**

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**1. GENERAL**

**1.01** This section provides the overall system maintenance requirements and test procedures for the Digital Transmission Surveillance System (DTSS). The scope of this section is to sectionalize

troubles to a facility, to the T1DM bay wiring, to a circuit pack, to an incorrect circuit pack option or strap, or to a cross-connect error at the DSX-0B.

**1.02** Whenever this section is reissued, the reason(s) for reissue will be given in this paragraph.

**1.03** Trouble investigation can originate anywhere in the DTSS network, such as at the Digital Network Administration Center (DNAC), minicomputer center, surveillance unit (CP HL95) location, or a remote looped location. DTSS troubles will primarily be detected and corrective action initiated by the DNAC, since the DNAC is the administrative focal point of the DTSS multipoint network. Other locations may initiate trouble clearing action with the guidance of DNAC.

**1.04** Troubles that affect both the customary T1DM service and the DTSS service should be restored in this order: customary T1DM service first and then DTSS service.

**1.05** The test procedures in this section may be used for initial installation or in-service trouble clearing. The test procedures are for the craft at the remote looped and SU locations and for the administrator at the DNAC. The in-service test procedures for an SU equipped bay differs from the initial installation procedure by two assumptions:

(a) The in-service procedure will likely be initiated by the DNAC because of absent (no data), incorrect, or suspicious data reports or by specific minicomputer trouble detection flags.

(b) Bay wiring troubles (not including SU strapping) are not likely to be the cause of

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a trouble since they should have been cleared during initial installation.

**1.06** The in-service test procedure consists of analyzing the location of the faulty reports in the DTSS network (schematic recommended) for commonality to a particular branch or SU location. Also, in-service test procedures can begin at the SU location *nearest* to the minicomputer known to have a specific trouble associated with its data. In either case, the installation test procedures in Section 314-984-200 should be followed at that site to determine the trouble. Then, the overall test procedures should be used to find and correct the trouble. Steps in this section which locate bay wiring troubles can be neglected for in-service troubles. Measurements made on bay wiring will still be necessary to determine an SU output failure.

**1.07** It is highly recommended that a DTSS network schematic of each branch be made available to the DNAC as a troubleshooting aid. In this manner, information regarding each DTSS communications path can be quickly analyzed and coordinated with field measurements and activities.

## 2. CHARTS

**2.01** The following information is an aid in determining which test procedure (chart) to perform for a particular trouble.

(a) **Chart 1:** The minicomputer reports incorrect or no data from a working T1DM. This chart is for a T1DM bay that is not equipped with an SU. This chart assumes that all other troubles in the associated T1DM bay have been cleared and the SU that is reported to by the CP HL16B under test has passed the installation test (Section 314-984-200) and is otherwise known to be operating properly. This should be confirmed by contacting the DTSS administrator in the DNAC. The administrator will coordinate the repair and maintenance of the SU.

(b) **Chart 2:** The minicomputer reports incorrect or no data from a spare T1DM whenever a working T1DM has been switched to the spare. This chart is for a T1DM bay not equipped with

an SU and assumes that all other troubles in the associated T1DM bay have been cleared.

(c) **Chart 3:** The SU self-test fails and the IN SRV indicator is off. The self-test should be performed before any troubleshooting procedures are performed. This chart is for an SU equipped bay.

(d) **Chart 4:** The SU POLL indicator does not blink, thus indicating the SU is not being polled by the minicomputer. This chart assumes that no known T1DM bay trouble exists and that the SU self-test was successful. Trouble is sectionalized to the DTSS communications channel in the downstream direction (from minicomputer to SU). Sectionalization may involve several intermediate locations. These intermediate locations may be higher SU address level locations or SU bypass locations.

(e) **Chart 5:** The dotting pattern test has been performed on all T1DMs associated with DTSS in a particular bay, but only one working T1DM fails the test with the SU POLL indicator blinking. In this case (one working T1DM fails), perform the procedure in Chart 5. If all T1DMs associated with DTSS in that bay fail the test, then a communications channel trouble exists towards the minicomputer and is documented in Chart 6.

(f) **Chart 6:** The failure of all dotting pattern tests (SU POLL indicator blinks) in a particular bay indicates the trouble is in the communications channel towards the minicomputer. This chart will sectionalize trouble in an upstream direction (from SU to minicomputer). Trouble may be sectionalized to an intermediate location, such as a higher SU address level location or an SU bypass location.

(g) **Chart 7:** The data pattern test fails when a working T1DM is switched to spare. The tests of the working T1DMs are okay.

(h) **Chart 8:** The dotting pattern test fails at the spare T1DM and all the working T1DMs.

## CHART 1

## MINICOMPUTER REPORTS INCORRECT OR NO DATA FROM WORKING T1DM

## APPARATUS:

- General purpose oscilloscope at SU location
- Two W1BF straps or equivalent single conductor straps with Digital Data System (DDS) test point plugs for HL faceplates are required at each location, the remote looped location and the SU location.
- Needle nose pliers or equivalent

STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
		<p><b>Note:</b> A DTSS network schematic including each branch is highly recommended so trouble can be quickly analyzed and coordinated with field measurements and activities.</p>
1	No action.	Verify that the facility reporting trouble has been entered into the DTSS minicomputer data base.
2	No action.	Determine the SU (CP HL95) location of the facility reporting trouble.
3	No action.	Place the SU location in the "change" mode.
4	No action.	Observe the error rate of the facility under test when in the quiescent (inactive or normal) condition.
		<p><b>Note:</b> This information will be used later in Step 6, in addition to other test information.</p>
<b>At the Remote Looped Location</b>		
5	Obtain circuit layout record card (CLRC) for facility reporting trouble and determine the bay and shelf location of the T1DM.	No action.
6	Insert W1BF test point strap between test point (TP) 5 and TP12 at the faceplate of CP HL16B.	If facility under test reports a 4000 error rate with a strap and 8000 error rate without a strap (information from Step 4), proceed to next step; if not, proceed to Step 10.
	<p><b>Note:</b> Leave this strap in place until instructed by the DNAC to remove it.</p>	<p><b>Note:</b> If a 4000 error rate is reported with a strap and a low or no error rate is reported without a strap, the facility is normal.</p>

STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
<b>At the SU Location</b>		
7	Obtain the CLRC for the facility under test to determine the receiving T1DM (specifically, CP HL16B).	No action.
8	Locate and correct a bay wiring tip and ring turnover with the RRA and RRB leads (Table A) between the receiving CP HL16B under test and the SU (CP HL95).	No action.
9	Proceed to Step 65.	← Same
10	No action.	If facility under test reports constant error rate of 8000 when a dotting pattern test is applied at the remote looped location, proceed to next step; if not, proceed to Step 26.
<b>At the Remote Looped Location</b>		
11	Switch the working T1DM associated with the facility under test to the spare T1DM as follows:  (a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.  (b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.  <b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.  (c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.  <b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on bay, clock, and power alarms (BCPA) panel.  (d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.	No action.
12	Insert a W1BF test point strap between TP5 and TP12 at the CP HL16B of the spare T1DM.	If facility under test reports a 4000 error rate, proceed to next step; if not, proceed to Step 24.

STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
13	Remove CP HL16B from the working T1DM under test.	No action.
14	If CP HL16B is in the looped option, position 2, proceed to Step 20; if not, proceed to next step.	No action.
15	Place shorting plug to position 2, looped option.	No action.
16	Insert W1BF test point strap between TP5 and TP12 on the replacement CP HL16B of the working T1DM under test.	No action.
17	Switch to original working T1DM as follows:  <b>Caution:</b> <i>The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</i>  (a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.  <b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.  <b>Requirement:</b> CP HL15 displays H.  (b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.  <b>Requirement:</b> CP HL15 display clears.	No action.
18	No action.	If facility under test reports a 4000 error rate, proceed to Step 65; if not, proceed to next step.
19	Switch the working T1DM associated with the facility under test to the spare T1DM by following substeps (a), (b), (c), and (d) of Step 11 as required.	← Same
20	Obtain and condition to test a replacement CP HL16B as follows:  (a) Place shorting plug to position 2, looped option.	No action.

STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
	<p>(b) Insert replacement CP HL16B into slot 37 of working T1DM under test.</p> <p>(c) Insert W1BF test point strap between TP5 and TP12 on the replacement CP HL16B of the working T1DM under test.</p> <p>(d) Remove W1BF test point strap from CP HL16B of the spare T1DM.</p>	
21	Switch to original working T1DM as follows:	No action.
	<p><b>Caution:</b> <i>The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</i></p> <p>(a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.</p> <p><b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.</p> <p><b>Requirement:</b> CP HL15 displays H.</p>	
	<p>(b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.</p> <p><b>Requirement:</b> CP HL15 display clears.</p>	<p>If facility under test reports a 4000 error rate, proceed to Step 65; if not, proceed to next step.</p>
22	Check and correct a T1DM bay wiring associated with the CP HL16B under test. If the bay has been modified to accept the SU, pay particular attention to wiring that should have been removed during bay modification.	No action.
23	Proceed to Step 65.	←Same
24	Switch to original working T1DM using substeps (a) and (b) of Step 17.	No action.
25	Remove the test point strap from CP HL16B of the spare T1DM.	No action.
	<p><b>Note:</b> No further action is required by this location at this time. Test strap removal from the working T1DM will be required after trouble has been found and corrected.</p>	

STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
<b>At the SU Location</b>		
26	No action.	Establish and maintain voice contact with the SU location associated with the CP HL16B under test.
27	Obtain and condition oscilloscope as follows: (a) Set volts/div switch to 1. (b) Set time/div switch to 50 $\mu$ sec/div.	Determine from the DTSS network schematic and pass along to the SU location the RSF and R terminals of the SU that are associated with the facility under test.
28	Connect oscilloscope probe to the RSF terminal indicated by DNAC for the facility under test.  <b>Note:</b> The RSF terminal number designation corresponds to the T1DM bay shelf number which is associated with the facility at the SU location, eg, T1DM 7 to RSF7.	No action.
29	If 8-kHz waveform (dotting pattern) is present at the RSF terminal, proceed to next step; if not, proceed to Step 40.	←Same
30	Remove defective CP HL95 from spare T1DM.	No action.
<b>Installing Replacement CP HL95</b>		
<b>Warning:</b> Handle by edges to prevent static discharge damage to circuitry of CP HL95.		
31	Carefully insert CP HL95 into slots 58, 60, and 62 of the protection spare T1DM (engage three 940A connectors).  <b>Requirement:</b> IN SRV indicator is lighted; POLL, FAIL, and TST OK indicators are extinguished.  <b>Note:</b> It may be necessary to reengage CP HL95 one more time to make proper contact with the three connectors.	No action.
32	Using a straight shank screwdriver, turn captive screw at top of CP HL95 to open the faceplate cover.	No action.

STEP REMOTE LOOPED LOCATION OR SU LOCATION

DNAC

**Initial Testing of Replacement CP HL95**

33 Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95. No action.

**Requirement:** POLL, IN SRV, TST OK, and FAIL indicators are lighted.

34 Release TST pushbutton switch. No action.

**Requirement:** After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.

**Note:** It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted or if the test sequence is not observed, replace CP HL95.

**Addressing CP HL95**

35 Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet for that SU. No action.

**Note 1:** Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.

**Note 2:** Whenever S1 and S2 switch positions are changed, the test sequence of Steps 33 and 34 must be repeated.

**Strapping CP HL95**

**Warning: Terminals are fragile requiring care when installing straps. Hold push-in tool perpendicular to the faceplate. Straps can be connected with minimal effort.**

36 Obtain push-in wire tool and single conductor 30-gauge Teflon coated wire provided with CP HL95. No action.

37 Remove all factory provided straps, if any, using the needle nose pliers. No action.

STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
38	Install straps as designated on the CLRC, CLOC, or strapping sheet using Fig. 1 as an aid in strapping.  <i>Note:</i> Only one wire should be strapped to a terminal.	No action.
39	Proceed to Step 65.	←Same
40	Connect oscilloscope probe to the R terminal of the facility under test, eg, RSF7 to R7.	No action.
41	If 8-kHz waveform (dotting pattern) is present at the R terminal, proceed to next step; if not, proceed to Step 44.	←Same
42	Check and correct SU strapping between the R and RSF terminals at the HL95 faceplate.	No action.
43	Proceed to Step 65.	←Same
44	Switch the working T1DM associated with the facility under test to the spare T1DM as follows:  (a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CPHL10 or HL90 in the NORM position.  (b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.  <b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.  (c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.  <b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on BCPA.  (d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.	No action.
45	Insert a W1BF test point strap between TP5 and TP12 at the CP HL16B of the spare T1DM.	If facility under test reports a 4000 error rate, proceed to next step; if not, proceed to Step 64.

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STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
46	Remove CP HL16B for slot 37 of the working T1DM associated with the facility under test.	No action.
47	If CP HL16B is in position 1, microprocessor option, proceed to Step 50, if not, proceed to next step.	←Same
48	Place shorting plug to position 1, microprocessor option, and reinsert CP HL16B into the working T1DM.	No action.
49	Proceed to Step 53 to verify proper operation using a dotting pattern test.	←Same
50	Remove CP HL16B from slot 37 of the working T1DM.	No action.
51	Obtain and option to position 1 a replacement CP HL16B.	No action.
52	Insert optioned (positioned 1) CP HL16B into slot 37 of the working T1DM.	No action.
53	Insert a test point strap between TP5 and TP12 of CP HL16B.	No action.
54	Switch to original working T1DM by following substeps (a) and (b) of Step 17.	No action.
55	Remove the test point strap from the spare T1DM (not the working T1DM).	No action.
56	No action.	If facility under test reports a 4000 error rate, proceed to Step 65; if not, proceed to next step.
57	Connect oscilloscope probe (using previous settings) to RRA and then to RRB leads that are associated with the facility under test (eg, RSF7, R7, RRA7, RRB7) using Table A.  <i>Note:</i> An extender card for CP HL95 will be available at a future date to allow this check to be made at the front of the T1DM bay.	No action.
58	If 8-kHz waveform (dotting pattern) is present on <i>both</i> the RRA and RRB leads, proceed to next step; if not, proceed to Step 60.	←Same

STEP	REMOTE LOOPED LOCATION OR SU LOCATION	DNAC
59	Replace CP HL95 with a replacement CP HL95 and perform Steps 30 through 39.	No action.
60	Connect oscilloscope probe to RRA and then to RRB leads at connector pins 35 and 37, respectively, for CP HL16B associated with the facility under test. See Table A.  <b>Note:</b> An extender card for CP HL16B will be available at a future date to allow this check to be made at the front of the bay.	No action.
61	If 8-kHz waveform (dotting pattern) is present on both the RRA and RRB leads, proceed to next step; if not, proceed to Step 64.	←Same
62	Locate and correct bay wiring trouble between CP HL16B and CP HL95.	No action.
63	Proceed to Step 65.	←Same
64	Transmission trouble exists in T1DM route between the remote looped location and the SU location. Check for normal T1DM service between these locations before you notify your supervisor.	No action.
65	Perform the following items, as required, because trouble has been found and cleared or trouble is not at this location:  (a) Remove all test point straps from CP HL16Bs.  (b) Set all switches to the pretest condition.  (c) Remove oscilloscope connections.	Change the SU location associated with the facility under test from the "change" mode to the normal monitoring mode. Verify all dotting pattern test straps have been removed (not receiving a 4000 error rate).

## CHART 2

## MINICOMPUTER REPORTS INCORRECT OR NO DATA FROM SPARE T1DM

## APPARATUS:

Two W1BF straps or equivalent single conductor straps with Digital Data System (DDS) test point plugs for HL faceplate are required at the remote looped location.

STEP	REMOTE LOOPED LOCATION	DNAC
		<b>Note:</b> A DTSS network schematic including each branch is highly recommended so trouble can be quickly analyzed and coordinated with field measurements and activities.
1	No action.	Verify that the facility reporting trouble has been entered into the DTSS minicomputer data base.
2	No action.	Determine the SU location of the facility reporting trouble.
3	No action.	Place the SU location in the "change" mode.
4	Maintain voice contact with DNAC throughout this procedure.	Establish and maintain voice contact with the remote looped location.
5	Obtain circuit layout record card (CLRC) for facility reporting trouble to determine the bay and shelf location of the T1DM.	No action.
6	Insert W1BF test point strap between test point (TP) 5 and TP12 at the faceplate of the working T1DM.	If facility under test reports a 4000 error rate, proceed to next step; if not, trouble exists in working T1DM. Proceed to Chart 1 and clear trouble before continuing with this chart.
7	Remove CP HL16B from the spare T1DM.	No action.
8	If CP HL16B is optioned to position 2, looped option, proceed to Step 14; if not, proceed to next step.	←Same
9	Place shorting plug to position 2, looped option.	No action.
10	Reinsert CP HL16B into the spare T1DM.	←Same
11	Insert test point strap between TP5 and TP12 of CP HL16B at spare T1DM.	No action.

STEP	REMOTE LOOPED LOCATION	DNAC
12	Switch the working T1DM associated with the facility under test to the spare T1DM as follows:	
	(a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.	
	(b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.	
	<b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.	
	(c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.	
	<b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on bay, clock, and power alarms (BCPA) panel.	
	(d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.	If facility under test reports a 4000 error rate, proceed to Step 20; if not, proceed to next step.
13	Switch to original working T1DM as follows:	
	<b>Caution:</b> <i>The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</i>	
	(a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.	
	<b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.	
	<b>Requirement:</b> CP HL15 displays H.	
	(b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.	If facility under test reports a 4000 error rate, proceed to Step 20; if not, proceed to next step.
	<b>Requirement:</b> CP HL15 display clears.	

STEP	REMOTE LOOPED LOCATION	DNAC
14	Remove defective CP HL16B from spare T1DM associated with facility under test.	No action.
15	Obtain and insert optioned (position 2) CP HL16B into spare T1DM.	No action.
16	Insert test point strap between TP5 and TP12 of CP HL16B at spare T1DM.	No action.
17	Switch the working T1DM associated with the facility under test to the spare T1DM as follows:  (a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.  (b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.  <b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.  (c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.  <b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on BCPA.  (d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.	No action.
18	No action.	If facility under test reports a 4000 error rate, proceed to Step 20; if not, proceed to next step.
19	Locate and correct bay wiring trouble associated with the spare T1DM CP HL16B and any possible spare switching operational trouble associated with the working T1DM and spare T1DM.	No action.
20	Perform the following items, as required, because trouble has been found and corrected:  (a) Remove all test point straps from CP HL16Bs.	No action.

**STEP**

**REMOTE LOOPED LOCATION**

**DNAC**

(b) Set all switches to the pretest condition.

Change the SU location associated with the facility under test from the "change" mode to the normal monitoring mode.

## CHART 3

## SU SELF-TEST FAILS/IN SRV INDICATOR IS OFF

## APPARATUS:

1—KS-16979-L1 Volt-Ohm-Milliammeter (VOM) or equivalent

1—General purpose oscilloscope at SU location

STEP	SU LOCATION	DNAC
		<b>Note:</b> A DTSS network schematic including each branch is highly recommended so trouble can be quickly analyzed and coordinated with field measurements and activities.
1	Maintain voice contact with DNAC throughout this procedure.	Establish and maintain voice contact with the SU location.
2	Obtain and condition VOM to measure dc volts in the range of +5 volts.	No action.
3	Measure +5 volts between pin 13 and pin 12 (ground) of 940A connector in position 62 of SU.	No action.
4	If +5 volts is present between pins 13 and 12 of connector in position 62, proceed to Step 7; if not, proceed to next step.	←Same
5	Locate and correct bay wiring trouble, or replace 74A or 78A power unit using Section 314-912-500.	←Same
6	Proceed to Step 18.	←Same
7	Obtain and condition oscilloscope as follows: (a) Set volts/div switch to 0.5. (b) Set time/div switch to 50 $\mu$ sec.	No action.
8	Connect oscilloscope probe to pin 37 of 940A connector in slot 62. If using a dual trace scope, connect other probe to pin 38 of connector in slot 62.	No action.
9	If 8-kHz waveform (dotting pattern) is present at pins 37 and 38 and a 64-kHz waveform is present at pins 15 and 17 of connector slot 62 (Fig. 2), proceed to Step 12; if not, proceed to next step.	←Same

STEP	SU LOCATION	DNAC
10	Locate and correct bay wiring between SU and connector J9 at T1DM-PM (SD-73079-01) or bay clock circuits on BCPA (SD-73082-01).	No action.
11	Proceed to Step 18.	←Same

### ***Installing Replacement CP HL95***

***Warning:*** Handle by edges to prevent static discharge damage to circuitry of CP HL95.

- |    |   |            |
|----|---|------------|
| 12 | Carefully insert CP HL95 into slots 58, 60, and 62 of the protection spare T1DM (engage three 940A connectors). | No action. |
|----|---|------------|

***Requirement:*** IN SRV indicator is lighted; POLL, FAIL, and TST OK indicators are extinguished.

***Note:*** It may be necessary to reengage CP HL95 one more time to make proper contact with the three connectors.

- |    |   |            |
|----|---|------------|
| 13 | Using a straight shank screwdriver, turn captive screw at top of CP HL95 to open the faceplate cover. | No action. |
|----|---|------------|

### ***Initial Testing of CP HL95***

- |    |  |            |
|----|--|------------|
| 14 | Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95. | No action. |
|----|--|------------|

***Requirement:*** POLL, IN SRV, TST OK, and FAIL indicators are lighted.

- |    |                                |            |
|----|--------------------------------|------------|
| 15 | Release TST pushbutton switch. | No action. |
|----|--------------------------------|------------|

***Requirement:*** After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.

***Note:*** It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted or if the test sequence is not observed, replace CP HL95.

STEP	SU LOCATION	DNAC
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**Addressing CP HL95**

16	Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet for that SU.	No action.
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**Note 1:** Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.

**Note 2:** Whenever S1 and S2 switch positions are changed, the test sequence of Steps 14 and 15 must be repeated.

**Strapping CP HL95**

**Warning: Terminals are fragile and require care when installing straps. Hold push-in tool perpendicular to the faceplate. Straps can be connected with minimal effort.**

17	Obtain push-in wire toll and single conductor 30-gauge Teflon coated wire provided with CP HL95.	No action.
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18	Perform the following items, as required, because trouble has been found and cleared:	
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(a) Set all switches to the pretest condition.

(b) Remove VOM connections.

(c) Remove oscilloscope connections.

No action.

## CHART 4

## NO SU POLL LAMP INDICATION

## APPARATUS:

1—General purpose oscilloscope at SU location

STEP	SU LOCATION	DNAC
1	No action.	<p><b>Note:</b> A DTSS network schematic including each branch is highly recommended so trouble can be quickly analyzed and coordinated with field measurements and activities.</p> <p>Verify the following items before calling the SU location.</p> <p>(a) Correct address assignment and that it is compatible with the next higher SU level (upstream toward the minicomputer). Determine if correct address exists by comparing the most significant non-zero digit in the troubled SU address with the communications path merging terminal digit assigned at the next higher SU level (upstream), eg, address 0041 corresponds to MI4 at the upstream SU (higher level).</p> <p>(b) No other trouble reported upstream. If any upstream troubles in the DTSS network or T1DM facilities have been reported, clear them first.</p> <p>(c) DTSS data base has been updated. Use character monitor test equipment to confirm that messages are being sent properly at the minicomputer output; refer to Section 314-984-300.</p> <p>(d) The SU strapping assignments agree with the desired DTSS communications path.</p> <p>If no trouble with the above items, proceed with this procedure.</p>
2	Maintain voice contact with DNAC throughout this procedure.	Establish and maintain voice contact with the SU location.
3	If the S1 and S2 switches on the SU are properly set to the correct address assignment, proceed to Step 8; if not, proceed to next step.	←Same

STEP	SU LOCATION	DNAC
4	Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet.  <b>Note 1:</b> Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.	No action.
5	Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95.  <b>Requirement:</b> POLL, IN SRV, TST OK, and FAIL indicators are lighted.	No action.
6	Release TST pushbutton switch.  <b>Requirement:</b> After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.  <b>Note:</b> It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted or if the test sequence is not observed, replace CP HL95.	No action.
7	Proceed to Step 93.	←Same
8	Obtain and condition oscilloscope as follows:  (a) Set volts/div switch to 0.5.  (b) Set time/div switch to 0.5 second.	No action.
9	Connect oscilloscope probe to the BI terminal (column C, row 26) of the SU faceplate.	No action.
10	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 second, proceed to next step; if not, proceed to Step 37.	←Same
11	If more of the idle state display is high than low (Fig. 3), proceed to Step 14; if not, proceed to next step.	←Same
12	Locate and correct a bay wiring tip and ring turnover with the RRA and RRB leads (Table A) or the RTA and RTB leads (Table B) between the receiving CP HL16B under test and CP HL95.	Assist as necessary.  <b>Note:</b> Locate the turnover by switching the working T1DMs to the spare T1DM. Switch, one at a time, every CP HL16B to spare that

STEP	SU LOCATION	DNAC
		is involved in the communications path up to and including the point where the path goes through a broadcast circuit on an SU. The T1DM that clears the trouble (correct waveform in Fig. 3) will be the location of the turnover.
13	Proceed to Step 93.	←Same
14	If the BI terminal is strapped to an R terminal, proceed to next step; if not, proceed to Step 34.	Check BI assignment for that SU.
15	Switch the working T1DM associated with the facility under test to the spare T1DM as follows:  (a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.  (b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.  <b>Requirement:</b> All working T1DMs display an H except the T1DM under test, which displays E.  (c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.  <b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on BCPA.  (d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.	No action.
16	If POLL indicator lights, proceed to Step 25; if not, proceed to next step.	←Same
17	Remove defective CP HL95 from spare T1DM.	No action.

### ***Installing Replacement CP HL95***

***Warning: Handle by edges to prevent static discharge damage to circuitry of CP HL95.***

STEP	SU LOCATION	DNAC
18	Carefully insert CP HL95 into slots 58, 60, and 62 of the protection spare T1DM (engage three 940A connectors).  <b>Requirement:</b> IN SRV indicator is lighted; POLL, FAIL, and TST OK indicators are extinguished.  <b>Note:</b> It may be necessary to reengage CP HL95 one more time to make proper contact with the three connectors.	Assist, if necessary, in obtaining and/or expediting CP HL95 to the SU location.
19	Using a straight shank screwdriver, turn captive screw at top of CP HL95 to open the faceplate cover.	No action.

**Initial Testing of CP HL95**

20	Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95.  <b>Requirement:</b> POLL, IN SRV, TST OK, and FAIL indicators are lighted.	No action.
21	Release TST pushbutton switch.  <b>Requirement:</b> After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.  <b>Note:</b> It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted or if the test sequence is not observed, replace CP HL95.	No action.

**Addressing CP HL95**

22	Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet for that SU.  <b>Note 1:</b> Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.  <b>Note 2:</b> Whenever S1 and S2 switch positions are changed, the test sequence of Steps 20 and 21 must be repeated.	No action.
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STEP	SU LOCATION	DNAC
<b>Strapping CP HL95</b>		
<b>Warning: Terminals are fragile and require care when installing straps. Hold push-in tool perpendicular to the faceplate. Straps can be connected with minimal effort.</b>		
23	Obtain push-in wire tool and single conductor 30-gauge Teflon coated wire provided with CP HL95.	No action.
24	Proceed to Step 93.	←Same
25	Remove CP HL16B from slot 37 of the working T1DM associated with the facility under test.	No action.
26	Obtain a replacement CP HL16B, option to position 1 (microprocessor option), and insert into slot 37 of the working T1DM.	No action.
27	Switch to original working T1DM as follows:  <b>Caution: The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</b>  (a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.  <b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.  <b>Requirement:</b> CP HL15 displays H.  (b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.  <b>Requirement:</b> CP HL15 display clears.	No action.
28	If POLL indicator lights, proceed to Step 93; if not, proceed to next step.	←Same
29	Connect oscilloscope probe to the appropriate RRA and RRB pins (Table A) between CP HL16B associated with the facility under test and CP HL95.	No action.

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STEP	SU LOCATION	DNAC
30	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 second, proceed to next step; if not, proceed to Step 32.	←Same
31	Replace CP HL95 following Steps 18 through 24.	←Same
32	Using Table A, locate and correct key wiring trouble (SD-73078-01) with the RRA and RRB leads between CP HL95 and CP HL16B of the working T1DM.	No action.
33	Proceed to Step 93.	←Same
34	If the BI terminal is strapped to a DA or DB terminal, proceed to Step 55; if not, proceed to next step.	←Same
35	Correct strapping assignment or actual wiring error; the BI terminal must be strapped to an R, DA, or DB terminal.	Check BI assignment for that SU.
36	Proceed to Step 93.	←Same
37	If the BI terminal is strapped to an R terminal, proceed to next step; if not, proceed to Step 47.	Check BI assignment for that SU.
38	Switch the working T1DM associated with the facility under test to the spare T1DM following substeps (a), (b), (c), and (d) of Step 15.	No action.
39	If POLL indicator lights, proceed to next step; if not, proceed to Step 60.	←Same
40	Remove CP HL16B from slot 37 of the working T1DM associated with the facility under test.	No action.
41	Obtain a replacement CP HL16B, option to position 1 (microprocessor option), and insert into slot 37 of the working T1DM.	No action.
42	Switch to original working T1DM by following substeps (a) and (b) of Step 27.	No action.
43	If POLL indicator lights, proceed to Step 93; if not, proceed to next step.	←Same
44	Connect oscilloscope probe to the appropriate RRA and RRB pins (Table A) between CP	No action.

STEP	SU LOCATION	DNAC
	HL16B associated with the facility under test and CP HL95.	
45	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 second, proceed to next step; if not, proceed to Step 47.	←Same
46	Remove defective CP HL95 and install, test, address, and strap replacement CP HL95 following Steps 18 through 24.	Assist as required.
47	Using Table A, locate and correct bay wiring trouble (SD-73D78-01) with the RRA and RRB leads between CP HL95 and CP HL16B of the working T1DM.	No action.
48	Proceed to Step 93.	←Same
49	If the BI terminal is strapped to a DA or DB terminal, proceed to Step 55; if not, proceed to next step.	←Same
50	Correct strapping assignment or actual wiring error; the BI terminal must be strapped to an R, DA, or DB terminal.	Check BI assignment for that SU.
51	Proceed to Step 93.	←Same
52	No action.	Contact or proceed to SU location in office which transmits polling messages via multiplex circuits to CP HL95 at trouble location at the demultiplex end.
<b>At Multiplex End of Circuit</b>		
53	Connect oscilloscope probe to the appropriate MA or MB terminal that corresponds to the DA or DB terminal at the demultiplex end of the circuit, eg, DB6 to MB6.	Check MA or MB to DA or DB for circuit assignment.
54	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 seconds, proceed to next step; if not, proceed to Step 65.	←Same
55	Verify correct cross-connects at DSX-0B for the circuit under test.	Check cross-connect assignments at DSX-0B for that circuit.
56	If any cross-connect errors are found, correct errors and proceed to Step 93; if not, proceed to next step.	←Same

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STEP	SU LOCATION	DNAC
<b>At the Demultiplex End of Circuit</b>		
57	Remove defective CP HL95 at the receiving end and install, test, address, and strap the replacement CP HL95 following Steps 16 through 22.	Assist as required.
58	If POLL indicator lights, proceed to Step 93; if not, proceed to next step.	←Same
59	Reinstall the original receiving CP HL95.	←Same
<b>At the Multiplex End of Circuit</b>		
60	Remove defective CP HL95 at the transmitting end (MUX) and install, test, address, and strap replacement CP HL95 following Steps 18 through 24.	Assist as required.  <b>Note:</b> If trouble continues, its likely to be excessive error rate or a faulty mux-demux circuit upstream (toward minicomputer).
61	Switch to original working T1DM by following substeps (a) and (b) of Step 27.	No action.
62	Connect oscilloscope probe to the appropriate RRA and RRB leads (Table A) between CP HL16B associated with the facility under test and CP HL95.	No action.
63	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 second, proceed to next step; if not, proceed to Step 65.	←Same
64	Remove defective CP HL95 and install, test, address, and strap replacement CP HL95 following Steps 18 through 24.	Assist as required.
65	No action.	Establish and maintain voice contact with the next SU location that is upstream (toward minicomputer) from the troubled SU location.  <b>Note:</b> Trouble in the communications channel is in the downstream direction (from minicomputer to SU).
66	Connect oscilloscope probe to the appropriate T terminal for the facility under test or to either the MA or MB terminal for the mux-demux circuit under test.	No action.
67	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 seconds,	←Same

STEP	SU LOCATION	DNAC
	proceed to Step 69; if not, proceed to next step. Trouble not at this location.	
68	No action.	Continue checking upstream until the polling waveform is found or until the communications channel passes through a broadcast circuit. If the polling waveform is not seen at the output of the broadcast circuit (BO terminal) and the associated SU has the POLL indicator on, replace this SU. Otherwise, proceed to the next upstream SU location where the polling waveform is first seen and continue with these procedures.
<b>Troubled SU Location</b>		
69	If polling waveform (Fig. 3) is observed on a T terminal, proceed to next step; if not, proceed to Step 92.	←Same
70	Switch the working T1DM associated with the transmitting T terminal to the spare T1DM by following substeps (a), (b), (c), and (d) of Step 15.	No action.
71	No action.	Contact original SU location reporting trouble and ask if POLL indicator is now blinking. If answer is yes, proceed to next step; if no, proceed to Step 81.
72	Remove CP HL16B from slot 37 of the working T1DM associated with the transmitting T terminal.	No action.
73	Obtain a replacement CP HL16B, option to position 1 (microprocessor option), and insert into slot 37 of the working T1DM.	Assist as required.
74	Switch to original working T1DM by following substeps (a) and (b) of Step 27.	Ask original SU location reporting trouble if POLL indicator is now blinking. If answer is yes, proceed to Step 93; if no, proceed to next step.
75	Connect oscilloscope probe to the appropriate RTA and RTB (Table B) leads between CP HL16B associated with the facility under test and CP HL95.	No action.
76	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 second, proceed to next step; if not, proceed to Step 79.	←Same

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STEP	SU LOCATION	DNAC
77	Locate and correct bay wiring trouble (SD-73078-01) with the RTA and RTB (Table B) between CP HL16B of the working T1DM and CP HL95.	No action.
78	Proceed to Step 93.	←Same
79	Remove defective CP HL95 and install, test, address, and strap replacement CP HL95 following Steps 18 through 24.	Assist as required.
80	No action.	Contact the SU location that is downstream from the minicomputer.  <i>Note:</i> This SU location is probably an intermediate location between the original SU location reporting trouble and the SU location where the polling waveform was observed.
<b>At Intermediate SU Location</b>		
81	Switch the working T1DM associated with the facility under test at the receiving end to the spare T1DM by following substeps (a), (b), (c), and (d) of Step 15.	No action.
82	No action.	Ask SU location reporting trouble if POLL indicator is now blinking. If answer is yes, proceed to next step; if no, proceed to Step 89.
83	Remove CP HL16B from slot 37 of the working T1DM at the receiving end for the facility under test.	No action.
84	Obtain a replacement CP HL16B, option to position 1 (microprocessor), and insert into slot 37 of the working T1DM.	Assist as required.
85	Switch to original working T1DM by following substeps (a) and (b) of Step 27.	No action.
86	No action.	Ask SU location reporting trouble if POLL indicator is now blinking. If answer is yes, proceed to Step 93; if no, proceed to next step.
87	Connect oscilloscope probe to the appropriate RRA and RRB leads (Table A) between CP HL16B associated with the facility under test and CP HL95.	No action.

STEP	SU LOCATION	DNAC
88	If polling waveform (Fig. 3) is observed reoccurring approximately every 0.5 second at the input to CP HL95, proceed to next step; if not proceed to Step 90.	←Same
89	Remove defective CP HL95 and install, test, address, and strap replacement CP HL95 following Steps 18 through 24.	Assist as required.
90	Locate and correct bay wiring trouble (SD-73078-01) with the RRA and RRB leads (Table A) between CP HL16B of the working T1DM and CP HL95.	No action.
91	Proceed to Step 93.	←Same
92	Verify proper cross-connect at the DSX-0B between the transmitting CP HL95 and the receiving CP HL95.	Check cross-connect assignments at DSX-0B for the mux-demux circuit.
<b>Note:</b> If cross-connects are correct, replace CP HL95 at the receiving end of the mux circuit following Steps 18 through 24. If this does not correct the trouble, reinstall the original receiving CP HL95 and replace the transmitting CP HL95.		
93	Perform the following items, as required, because trouble has been found and cleared:	
	(a) Set all switches to the pretest condition.	
	(b) Remove oscilloscope connections.	No action.

## CHART 5

## DOTTING PATTERN TEST FAILS AT ONE WORKING T1DM (POLL INDICATOR IS BLINKING)

## APPARATUS:

General purpose oscilloscope at SU location.

Two W1BF straps or equivalent single conductor straps with Digital Data System (DDS) test point plugs for HL faceplates are required at each location, the remote looped location and the SU location.

STEP	SU LOCATION	DNAC
1		<p><b>Note:</b> A DTSS network schematic including each branch is highly recommended so trouble can be quickly analyzed and coordinated with field measurements and activities.</p> <p>If troubled T1DM reports 8000 error rate when dotting pattern test is removed but 4000 error rate when tested, proceed to next step; if not, proceed to Step 4.</p>
2	Locate and correct a bay wiring tip and ring reversal with the SFA and SFB leads (Table C) between the CP HL16B of the working T1DM and the CP HL95.	No action.
3	Proceed to Step 24.	←Same
4	<p>Switch the working T1DM associated with the facility under test to the spare T1DM as follows:</p> <p>(a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.</p> <p>(b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.</p> <p><b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.</p> <p>(c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.</p> <p><b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on BCPA.</p>	

STEP	SU LOCATION	DNAC
	(d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.	No action.
5	Insert W1BF test point strap between test point (TP) 5 and TP12 at CP HL16B of the spare T1DM.	If facility under test reports a 4000 error rate, proceed to next step; if not, proceed to Step 13 (through 22).
6	Remove CP HL16B from slot 37 of the working T1DM associated with the facility under test.	No action.
7	Obtain and option to position 1 (microprocessor) a replacement CP HL16B.	No action.
8	Insert optioned CP HL16B into slot 37 of the working T1DM.	No action.
9	Switch to original working T1DM as follows:  <b>Caution:</b> <i>The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</i>  (a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.  <b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.  <b>Requirement:</b> CP HL15 displays H.  (b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.  <b>Requirement:</b> CP HL15 display clears.	
10	No action.	If facility under test reports a 4000 error rate, proceed to Step 24; if not, proceed to next step.
11	Connect oscilloscope probe to the appropriate SFA and SFB leads (Table C) between CP HL16B associated with the facility under test and CP HL95.	No action.
12	If dotting waveform is observed at the appropriate pins, proceed to next step; if not, proceed to Step 23.	←Same

STEP	SU LOCATION	DNAC
13	Remove defective CP HL95 from spare T1DM.	No action.
<b>Installing Replacement CP HL95</b>		
<b>Caution:</b> Before inserting CP HL95, make sure bay contains CP HL16Bs and not CP HL16s.		
<b>Warning:</b> Handle by edges to prevent static discharge damage to circuitry of CP HL95.		
14	Carefully insert CP HL95 into slots 58, 60, and 62 of the protection spare T1DM (engage three 940A connectors).	Assist, if necessary, in obtaining and/or expediting CP HL95 to the SU location.
<b>Requirement:</b> IN SRV indicator is lighted; POLL, FAIL, and TST OK indicators are extinguished.		
<b>Note:</b> It may be necessary to reengage CP HL95 one more time to make proper contact with the three connectors.		
15	Using a straight shank screwdriver, turn captive screw at top of CP HL95 to open the faceplate cover.	No action.

**Initial Testing of CP HL95**

16	Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95.	No action.
<b>Requirement:</b> POLL, IN SRV, TST OK, and FAIL indicators are lighted.		
17	Release TST pushbutton switch.	No action.
<b>Requirement:</b> After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.		
<b>Note:</b> It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted or if the test sequence is not observed, replace CP HL95.		

STEP	SU LOCATION	DNAC
<b>Addressing CP HL95</b>		
18	Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet for that SU.	No action.
	<b>Note 1:</b> Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.	
	<b>Note 2:</b> Whenever S1 and S2 switch positions are changed, the test sequence of Steps 16 and 17 must be repeated.	
<b>Strapping CP HL95</b>		
<b>Warning: Terminals are fragile and require care when installing straps. Hold push-in tool perpendicular to the faceplate. Straps can be connected with minimal effort.</b>		
19	Obtain push-in wire tool and single conductor 30-gauge Teflon coated wire provided with CP HL95.	No action.
20	Remove all factory provided straps, if any, using the needle nose pliers.	No action.
21	Install straps as designated on the CLRC, CLOC, or strapping sheet using Fig. 1 as an aid in strapping.	Verify strap assignments and assist as required.
	<b>Note:</b> Only one wire should be strapped to a terminal.	
22	Proceed to Step 24.	←Same
23	Locate and correct a bay wiring trouble with the SFA and SFB leads (Table C) between CP HL16B of the working T1DM under test and CP HL95.	No action.
24	Perform the following items, as required, because trouble has been found and corrected:	
	(a) Remove all test point straps from CP HL16Bs.	
	(b) Remove oscilloscope connection.	

**STEP**

**SU LOCATION**

**DNAC**

(c) Set all switches at the T1DM bay to their pretest condition.

Verify facility under test is registering low or no errors.

## CHART 6

## DOTTING PATTERN TEST FAILS AT ALL WORKING T1DM'S (POLL INDICATOR IS BLINKING)

## APPARATUS:

General purpose oscilloscope at SU location

Two W1BF straps or equivalent single conductor straps with Digital Data System (DDS) test point plugs for HL faceplates are required at the test locations.

STEP	SU LOCATION	DNAC
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**Note:** A DTSS network schematic including each branch is highly recommended so trouble can be quickly analyzed and coordinated with field measurements and activities.

1	No action.	
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Verify the following items before calling the SU location:

(a) That no DTSS circuits upstream (toward the minicomputer) from the troubled location are reporting trouble. The trouble nearest (level 1) must be cleared first.

(b) That all CP HL95 faceplate strapping assignments are consistent with the desired DTSS communication channel application.

(c) That no downstream SU locations which are connected through the trouble CP HL95 merging circuit are reporting normally. If any SU locations are reporting, replace CP HL95 at the trouble location by following Steps 6 through 13.

**At the Trouble Location:**

2	Obtain and condition oscilloscope as follows:	
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(a)	Set volts/div switch to 0.5.	
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(b)	Set time/div switch to 0.5 second.	
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No action.

3	Connect oscilloscope probe to the MO terminal (column C, row 28) of the SU faceplate.	
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No action.

4	If data message response is observed reoccurring approximately every 0.5 second when the idle state is high (Fig. 3), proceed to Step 15; if not, proceed to next step.	
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← Same

5	Remove defective CP HL95 from spare T1DM.	
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No action.

STEP	SU LOCATION	DNAC
<b>Installing Replacement CP HL95</b>		
<b>Caution:</b> Before inserting CP HL95, make sure bay contains CP HL16Bs and not CP HL16s.		
<b>Warning:</b> Handle by edges to prevent static discharge damage to circuitry of CP HL95.		
6	Carefully insert CP HL95 into slots 58, 60, and 62 of the protection spare T1DM (engage three 940A connectors).	Assist, if necessary, in obtaining and/or expediting CP HL95 to the SU location.
<b>Requirement:</b> IN SRV indicator is lighted; POLL, FAIL, and TST OK indicators are extinguished.		
<b>Note:</b> It may be necessary to reengage CP HL95 one more time to make proper contact with the three connectors.		
7	Using a straight shank screwdriver, turn captive screw at top of CP HL95 to open the faceplate cover.	No action.

**Initial Testing of CP HL95**

8	Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95.	No action.
<b>Requirement:</b> POLL, IN SRV, TST OK, and FAIL indicators are lighted.		
9	Release TST pushbutton switch.	No action.

**Requirement:** After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.

**Note:** It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted or if the test sequence is not observed, replace CP HL95.

STEP	SU LOCATION	DNAC
<b>Addressing CP HL95</b>		
10	Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet for that SU.	No action.
	<b>Note 1:</b> Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.	
	<b>Note 2:</b> Whenever S1 and S2 switch positions are changed, the test sequence of Steps 8 and 9 must be repeated.	
<b>Strapping CP HL95</b>		
<b>Warning: Terminals are fragile and require care when installing straps. Hold push-in tool perpendicular to the faceplate. Straps can be connected with minimal effort.</b>		
11	Obtain push-in wire tool and single conductor 30-gauge Teflon coated wire provided with CP HL95.	No action.
12	Remove all factory provided straps, if any, using the needle nose pliers.	No action.
13	Install straps as designated on the CLRC, CLOC, or strapping sheet using Fig. 1 as an aid in strapping.	Verify strap assignments and assist as required.
	<b>Note:</b> Only one wire should be strapped to a terminal.	
14	Proceed to Step 87.	←Same
15	If the MO terminal is strapped to a T terminal, proceed to next step; if not, proceed to Step 30.	Verify MO strap assignment and assist as required.
16	Switch the working T1DM associated with the T terminal to the spare T1DM as follows:	
	(a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.	
	(b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.	

STEP	SU LOCATION	DNAC
	<p><b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.</p> <p>(c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.</p> <p><b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on BCPA.</p> <p>(d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.</p>	
17	No action.	If data message responses are being received from the SU, proceed to next step; if not proceed to Step 40.
18	Remove CP HL16B from slot 37 of the working T1DM associated with the facility under test.	No action.
19	If CP HL16B is optioned to position 1 (microprocessor), proceed to Step 23; if not, proceed to next step.	No action.
20	Option to position 1 and insert into slot 37 of the working T1DM.	No action.
21	Insert W1BF test point strap between TP5 and TP12 on the CP HL16B of the working T1DM under test.	No action.
22	<p>Switch to original working T1DM as follows:</p> <p><b>Caution:</b> <i>The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</i></p> <p>(a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.</p> <p><b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.</p> <p><b>Requirement:</b> CP HL15 displays H.</p> <p>(b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.</p>	If facility under test reports a 4000 error rate, proceed to Step 87; if not, proceed to Step 39.

STEP	SU LOCATION	DNAC
	<b>Requirement:</b> CP HL15 display clears.	
23	Obtain and option to position 1 a replacement CP HL16B.	No action.
24	Switch to original working T1DM as follows:  <b>Caution: The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</b>  (a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.  <b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.  <b>Requirement:</b> CP HL15 displays H.  (b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.  <b>Requirement:</b> CP HL15 display clears.	
25	No action.	If data message responses are still being received from the SU, proceed to Step 87; if not, proceed to next step.
26	Connect oscilloscope probe to the appropriate RTA and RTB leads (Table B) for the facility under test.	No action.
27	If data message waveform is observed, proceed to Step 29; if not proceed to next step.	←Same
28	Remove defective CP HL95 and install, test, address, and strap replacement CP HL95 by following Steps 6 through 14.	Assist, as required.
29	Locate and correct bay wiring trouble (SD 73078-01) with the RTA and RTB leads (Table B) between CP HL16B and CP HL95.	No action.
30	Proceed to Step 87.	←Same
31	If the MO terminal is strapped to an MA or MB terminal, proceed to Step 34; if not, proceed to next step.	←Same

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STEP	SU LOCATION	DNAC
32	Locate and correct a strapping error in either the assignment or actual wiring.	Check MO terminal assignment for that SU.
33	Proceed to Step 87.	←Same
34	No action.	Proceed to the associated CP HL95 (demux end) of the multiplexed circuit under test.

**At Demultiplex End of Circuit**

35	Connect oscilloscope probe to the appropriate DA or DB terminal that corresponds to the MA or MB terminal of the multiplexed circuit, eg, DA6 to MA6.	No action.
36	If data message waveform is observed, proceed to Step 40; if not, proceed to next step.	←Same
37	Verify correct cross-connects at DSX-0B for the circuit under test.	Check cross-connect assignments at DSX-0B for that circuit.
38	If any cross-connect errors are found, correct errors and proceed to Step 87; if not, proceed to next step.	Assist as required.
39	Remove CP HL95 at the mux (transmit) and install, test, address, and strap the replacement CP HL95 following Steps 6 through 14.	Assist as required.

**Note:** If this does not correct trouble, reinstall the original transmitting CP HL95 and replace the receiving (demux end) CP HL95.

**Next Upstream SU Location**

40	No action.	Proceed (establish and maintain voice contact as required) to the next SU location that is upstream (toward minicomputer).  <b>Note:</b> Trouble in the communications channel is in the upstream direction (from SU to minicomputer).
41	Connect oscilloscope probe to the appropriate R terminal for facility under test or to either the DA or DB terminal for the mux-demux circuit under test.  <b>Note:</b> Only an R, DA, or DB terminal will be strapped to an MI terminal; therefore, check the MI terminal too.	No action.

STEP	SU LOCATION	DNAC
42	If data message waveform is observed with incorrect low idle state, proceed to Step 44; if not, proceed to next step.	←Same
43	Trouble is not at this SU location.	Continue checking upstream until the data message waveform is found absent, with an incorrect idle state, when the communications channel passes through a merging circuit (MO terminal), or absent at the minicomputer (DSX-0B). If no trouble has been found, replace the SU (Steps 6 through 14) in which the channel passes through the merging circuit or arrives at the minicomputer. Otherwise, proceed to the next upstream SU location where the data message responses are first seen faulty and continue with these procedures.

**Troubled SU Location**

44	If data message response is first seen faulty at an R terminal, proceed to next step; if not, proceed to Step 78.	←Same
45	Switch the working T1DM associated with the receiving R terminal to the spare T1DM by following substeps (a), (b), (c), and (d) of Step 16.	No action.
46	No action.	If data message response is being received, proceed to next step; if not, proceed to Step 60.
47	Remove CP HL16B from slo 37 of the working T1DM associated with the receiving R terminal.	No action.
48	If CP HL16B is optioned to position 1, proceed to Step 52; if not, proceed to next step.	←Same
49	Place shorting plug to position 1 (microprocessor) and reinsert CP HL16B into the working T1DM.	No action.
50	Insert W1BF test point strap between TP5 and TP12 at CP HL16B of the working T1DM under test.	No action.
51	Switch to original working T1DM as follows:  <b>Caution: The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.</b>	

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STEP	SU LOCATION	DNAC
	(a) Depress the RESET button CP HL34 of the T1DM-PM to switch to the original working T1DM under test.	
	<b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.	
	<b>Requirement:</b> CP HL15 displays H.	
	(b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.	If facility under test reports a 4000 error rate, proceed to Step 87; if not, proceed to Step 60.
	<b>Requirement:</b> CP HL15 display clears.	
52	Reinsert CP HL16B into slot 37 of the working T1DM.	No action.
53	Switch to the original working T1DM by following substeps (a) and (b) of Step 24.	No action.
54	No action.	If data message response is still being received from that SU location, proceed to Step 87; if not, proceed to next step.
55	Connect oscilloscope probe to the appropriate RRA and RRB leads (Table A) between CP HL16B of the working T1DM and CP HL95.	Assist as required.
56	If data message waveform is observed at the input to CP HL95 with proper polarity (RRA lead should be low idle state and RRB lead should be high idle state as shown in Fig. 3), proceed to next step; if not, proceed to Step 58.	←Same
57	Remove defective CP HL95 and install, test, address, and strap replacement CP HL95 by following Steps 6 through 14.	Assist as required.
58	Locate and correct a bay wiring tip and ring turnover with the RRA and RRB leads (Table A) between CP HL16B and CP HL95.	No action.
59	Proceed to Step 87.	←Same
60	No action.	Contact or proceed to the next SU location downstream (away from minicomputer).
		<b>Note:</b> This SU location is probably an intermediate SU location (bypass) between

STEP	SU LOCATION	DNAC
		the original SU location reporting trouble and the SU location where the data message waveform was absent.
<b>At Intermediate SU Location</b>		
61	Switch the working T1DM associated with the T terminal (transmit T1DM of the communications channel) to the spare T1DM by following substeps (a), (b), (c), and (d) of Step 16.	No action.
62	No action.	If data message response is being received, proceed to Step 64; if not, proceed to next step.
63	Remove defective CP HL95 and install, test, address, and strap the replacement CP HL95 by following Steps 6 through 14.	Assist as required.
64	Remove CP HL16B from slot 37 of the working T1DM associated with the facility under test.	No action.
65	If CP HL16B is optioned to position 1, proceed to Step 69; if not, proceed to next step.	←Same
66	Place shorting plug to position 1 (microprocessor), and reinsert CP HL16B into the working T1DM.	No action.
67	Insert W1BF test point strap between TP5 and TP12 at CP HL16B of the working T1DM under test.	No action.
68	Switch to original working T1DM as follows:	

**Caution:** *The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.*

(a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.

**Note:** CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.

STEP	SU LOCATION	DNAC
	<b>Requirement:</b> CP HL15 displays H.	
	(b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.	If facility under test reports a 4000 error rate, proceed to Step 87; if not, proceed to next step.
	<b>Requirement:</b> CP HL15 display clears.	
69	Obtain a replacement CP HL16B, option to position 1, and insert into slot 37 of the working T1DM.	No action.
70	Switch to the original working T1DM by following substeps (a) and (b) of Step 24.	No action.
71	No action.	If data message reponse is being received, proceed to Step 87; if not, proceed to next step.
72	Connect oscilloscope probe to the appropriate RTA and RTB leads (Table B) between CP HL16B of the working T1DM and CP HL95.	No action.
73	If data message waveform is observed at the output of the SU, proceed to Step 75; if not, proceed to next step.	←Same
74	Remove defective CP HL95 and install, test, address, and strap replacement CP HL95 by following Steps 6 through 14.	Assist as required.
75	Locate and correct a bay wiring trouble, paying close attention to a possible tip and ring turnover with the RTA and RTB leads (Table B) between CP HL16B of the working T1DM under test and CP HL95.	No action.
76	Proceed to Step 87.	←Same
77	Connect oscilloscope probe to the appropriate DA or DB terminal that is associated with the mux-demux circuit under test.	No action.
78	If the data message response is absent or faulty at a DA or DB terminal, proceed to Step 80; if not, proceed to next step.	←Same
79	Locate and correct a strapping error in either the assignment or actual wiring.	Check DA or DB terminal assignments for that SU.

STEP	SU LOCATION	DNAC
80	If DSX-0B cross-connects are made for mux-demux circuit under test, proceed to Step 83; if not, proceed to next step.	←Same
81	Locate and correct DSX-0B cross-connect error.	Check DSX-0B cross-connect assignments for that multiplex circuit.
82	Proceed to Step 87.	←Same
83	Remove suspected defective CP HL95 at the mux (transmit) and install, test, address, and strap replacement CP HL95 by following Steps 6 through 14.	Assist as required.
84	No action.	If data message response is being received, proceed to Step 87; if not, proceed to next step.
85	Reinstall the original mux (transmit) CP HL95.	No action.
86	Remove suspected defective CP HL95 at the demux (receive) and install, test, address, and strap replacement CP HL95 by following Steps 6 through 14.	Assist as required.  <b>Note:</b> If this procedure (Steps 83 through 86) fails to correct trouble, replace, one at a time, any CP HL95s through which the communications channel passes in a mux-demux circuit.
87	Perform the following items, as required, because trouble has been found and cleared:  (a) Set all switches at T1DM to the pretest condition.  (b) Remove oscilloscope connections.  (c) Remove all test point straps from CP HL16Bs.	No action.

## CHART 7

## DOTTING PATTERN TEST FAILS AT SPARE T1DM WHEN SWITCHED (WORKING T1DM TESTS ARE OK)

## APPARATUS:

1—KS-16979-L1 Volt-Ohm-Milliammeter (VOM) or equivalent

STEP	SU LOCATION	DNAC
1	Remove CP HL95 from spare T1DM.	No action.
2	Switch the trouble T1DM (associated with the facility under test) to the spare T1DM by the following substeps:  (a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.  (b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.  <b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.  (c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.  <b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on BCPA.  (d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.	No action.
3	Obtain and condition VOM to measure resistance (continuity).	No action.
4	Connect VOM probes as follows: ground lead to T1DM bay frame and positive (red) lead to appropriate SSB lead (Table D).	No action.
5	If continuity exists between SSB lead and ground, proceed to next step; if not, proceed to Step 17.	←Same
6	Connect VOM probes as follows: ground lead to T1DM bay frame and positive (red) lead to appropriate SSA lead (Table D).	No action.

STEP	SU LOCATION	DNAC
7	If continuity exists between SSA lead and ground, proceed to Step 17; if not, proceed to next step.	←Same

### ***Installing Replacement CP HL95***

***Caution; Before inserting CP HL95, make sure bay contains CP HL16Bs and not CP HL16s.***

***Warning: Handle by edges to prevent static discharge damage to circuitry of CP HL95.***

8	Carefully insert CP HL95 into slots 58, 60, and 62 of the protection spare T1DM (engage three 940A connectors).	No action.
	<b><i>Requirement:</i></b> IN SRV indicator is lighted; POLL, FAIL, and TST OK indicators are extinguished.	
	<b><i>Note:</i></b> It may be necessary to reengage CP HL95 one more time to make proper contact with the three connectors.	
9	Using a straight shank screwdriver, turn captive screw at top of CP HL95 to open the faceplate cover.	No action.

### ***Initial Testing of CP HL95***

10	Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95.	No action.
	<b><i>Requirement:</i></b> POLL, IN SRV, TST OK, and FAIL indicators are lighted.	
11	Release TST pushbutton switch.	No action.
	<b><i>Requirement:</i></b> After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.	
	<b><i>Note:</i></b> It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted	

## STEP

## SU LOCATION

## DNAC

or if the test sequence is not observed, replace CP HL95.

**Addressing CP HL95**

- 12 Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet for that SU. No action.

**Note 1:** Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.

**Note 2:** Whenever S1 and S2 switch positions are changed, the test sequence of Steps 11 and 12 must be repeated.

**Strapping CP HL95**

**Warning: Terminals are fragile and require care when installing straps. Hold push-in tool perpendicular to the faceplate. Straps can be connected with minimal effort.**

- 13 Obtain push-in wire tool and single conductor 30-gauge Teflon coated wire provided with CP HL95. No action.
- 14 Remove all factory provided straps, if any, using the needle nose pliers. No action.
- 15 Install straps as designated on the CLRC, CLOC, or strapping sheet using Fig. 1 as an aid in strapping. Verify strap assignments and assist as required.
- Note:** Only one wire should be strapped to a terminal.
- 16 Proceed to Step 19. ←Same
- 17 Locate and correct bay wiring with the SSA and/or SSB leads (Table D) between CP HL10 or HL90 of the trouble T1DM and CP HL95. If no wiring trouble is found, replace CP HL10 or HL90 of the trouble T1DM (facility under test).
- 18 Switch to original working T1DM as follows:

**Caution: The RESET button on the T1DM-PM should not be depressed unless a flashing 8 appears on the original working T1DM.**

STEP	SU LOCATION	DNAC
	<p>(a) Depress the RESET button on CP HL34 of the T1DM-PM to switch to the original working T1DM under test.</p> <p><b>Note:</b> CP HL34 SER III requires the NORMAL/NO ALARM switch to be in the NO ALARM position for resetting.</p> <p><b>Requirement:</b> CP HL15 displays H.</p>	
	<p>(b) Set NORM/NO ALM/LOOP switch on CP HL10 or HL90 at T1DM under test to NO ALM position.</p> <p><b>Requirement:</b> CP HL15 display clears.</p>	No action.
19	<p>Perform the following items, as required, because trouble has been found and cleared or trouble is not at this SU location:</p> <p>(a) Set all switches at the T1DM bay to their pretest condition.</p> <p>(b) Remove all VOM connections.</p>	No action.

## CHART 8

## DOTTING PATTERN TEST FAILS AT SPARE T1DM (ALL WORKING T1DM TESTS FAIL)

## APPARATUS:

General purpose oscilloscope at SU location

KS-16979-L1 Volt-Ohm-Milliammeter (VOM) or equivalent

Two W1BF straps or equivalent single conductor straps with Digital Data System (DDS) test point plugs for HL faceplates

STEP	SU LOCATION	DNAC
1	No action.	Select a working T1DM to be switched to the spare T1DM.
2	<p>Switch the working T1DM to the spare T1DM as follows:</p> <p>(a) Verify that the selected T1DM has the NORM/NO ALM/LOOP switch on CP HL10 or HL90 in the NORM position.</p> <p>(b) Set the NORM/NO ALM/LOOP switch on all CP HL10s or HL90s to the NO ALM position except the T1DM selected in (a) above.</p> <p><b>Requirement:</b> All working T1DMs display H except the T1DM under test, which displays E.</p> <p>(c) Switch the working T1DM to the protection spare T1DM by disengaging CP HL11, HL12, or HL14.</p> <p><b>Requirement:</b> CP HL15 displays flashing E at working T1DM, and yellow alarm lights on BCPA.</p> <p>(d) Depress the ACO pushbutton switch on CP HL50 of the T1DM-PM.</p>	No action.
3	No action.	If spare T1DM reports an 8000 error rate, proceed to next step; if not, proceed to Step 7.
4	Insert W1BF test point strap between test point (TP) 5 and TP12 of CP HL16B of the spare T1DM.	If spare T1DM reports a 4000 error rate, proceed to next step; if not, proceed to Step 7.
5	Locate and correct a tip and ring turnover in the bay wiring with the SFA and SFB leads (Table D) between the spare T1DM and CP HL95.	No action.



STEP	SU LOCATION	DNAC
15	Proceed to Step 33.	←Same
16	Remove CP HL95 from spare T1DM.	No action.
17	Switch working T1DM to spare T1DM by following substeps (a), (b), (c), and (d) of Step 2.	Select a working T1DM to be switched.
18	Obtain and condition VOM for resistance.	No action.
19	Connect VOM probe as follows: ground lead to T1DM bay frame and positive (red) lead to appropriate SSA lead (Table D).	No action.
20	If continuity exists between SSA lead and ground, proceed to Step 32; if not, proceed to next step.	←Same
21	Connect VOM probe as follows: ground lead to T1DM bay frame and positive lead to appropriate SSB lead (Table D).	No action.
22	If continuity exists between SSB lead and ground, proceed to next step; if not, proceed to Step 32.	←Same

### ***Installing Replacement CP HL95***

***Caution:*** Before inserting CP HL95, make sure bay contains CP HL16Bs and not CP HL16s.

***Warning:*** Handle by edges to prevent static discharge damage to circuitry of CP HL95.

23	Carefully insert CP HL95 into slots 58, 60, and 62 of the protection spare T1DM (engage three 940A connectors).	No action.
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***Requirement:*** IN SRV indicator is lighted; POLL, FAIL, and TST OK indicators are extinguished.

***Note:*** It may be necessary to reengage CP HL95 one more time to make proper contact with the three connectors.

STEP	SU LOCATION	DNAC
24	Using a straight shank screwdriver, turn captive screw at top of CP HL95 to open the faceplate cover.	No action.

#### ***Initial Testing of CP HL95***

25	Depress and hold for approximately 2 seconds the TST pushbutton switch of CP HL95.	No action.
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**Requirement:** POLL, IN SRV, TST OK, and FAIL indicators are lighted.

26	Release TST pushbutton switch.	No action.
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**Requirement:** After another 2 seconds, the TST OK indicator remains lighted. Observe that the TST OK indicator extinguishes and the IN SRV indicator lights again and remains on.

**Note:** It is normal for the FAIL indicator to briefly blink before the IN SRV indicator lights. If the FAIL indicator remains lighted or if the test sequence is not observed, replace CP HL95.

#### ***Addressing CP HL95***

27	Set S1 and S2 switches to address assigned per CLRC, CLOC, or strapping sheet for that SU.	No action.
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**Note 1:** Address switches S1 and S2: 0 = Rocker up at side of dots; 1 = Rocker down at side of dots.

**Note 2:** Whenever S1 and S2 switch positions are changed, the test sequence of Steps 25 and 26 must be repeated.

#### ***Strapping CP HL95***

**Warning:** *Terminals are fragile and require care when installing straps. Hold push-in tool perpendicular to the faceplate. Straps can be connected with minimal effort.*

28	Obtain push-in wire tool and single conductor 30-gauge Teflon coated wire provided with CP HL95.	No action.
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STEP	SU LOCATION	DNAC
29	Remove all factory provided straps, if any, using the needle nose pliers.	No action.
30	Install straps as designated on the CLRC, CLOC, or strapping sheet using Fig. 1 as an aid in strapping.  <i>Note:</i> Only one wire should be strapped to a terminal.	Verify strap assignments and assist as required.
31	Proceed to Step 33.	←Same
32	Locate and correct bay wiring trouble (SD-73078-01) associated with CP HL10 or HL90. Bay wiring was most likely not removed during bay modification.	No action.
33	Perform the following items, as required, because trouble has been found and cleared:  (a) Remove all VOM and oscilloscope connections.  (b) Set all switches at the T1DM bay to their pretest condition.	No action.

TABLE A

RRA AND RRB PIN LOCATIONS AT T1DM BAY					
T1DM SHELF POSITION NUMBER	LEADS	PINS AT CP HL16B CONNECTOR IN SLOT 37	PINS AT SU CONNECTOR IN SLOT 62	PINS AT SU CONNECTOR IN SLOT 60	PINS AT SU CONNECTOR IN SLOT 58
1	RRA RRB	35 37	6 31		
2	RRA RRB	35 37	10 35		
3	RRA RRB	35 37	19 44		
4	RRA RRB	35 37	23 48		
7	RRA RRB	35 37		2 27	
8	RRA RRB	35 37		6 31	
9	RRA RRB	35 37		10 35	
10	RRA RRB	35 37		19 44	
11	RRA RRB	35 37			2 27
12	RRA RRB	35 37			6 31
13	RRA RRB	35 37			10 35
14	RRA RRB	35 37			19 44

TABLE B

RTA AND RTB PIN LOCATIONS AT T1DM BAY					
T1DM SHELF POSITION NUMBER	LEADS	PINS AT CP HL16B CONNECTOR IN SLOT 37	PINS AT SU CONNECTOR IN SLOT 62	PINS AT SU CONNECTOR IN SLOT 60	PINS AT SU CONNECTOR IN SLOT 58
1	RTA	16	7		
	RTB	19	32		
2	RTA	16	11		
	RTB	19	36		
3	RTA	16	20		
	RTB	19	45		
4	RTA	16	24		
	RTB	19	49		
7	RTA	16		3	
	RTB	19		28	
8	RTA	16		7	
	RTB	19		32	
9	RTA	16		11	
	RTB	19		36	
10	RTA	16		20	
	RTB	19		45	
11	RTA	16			3
	RTB	19			28
12	RTA	16			7
	RTB	19			32
13	RTA	16			11
	RTB	19			36
14	RTA	16			20
	RTB	19			45

TABLE C

SFA AND SFB PIN LOCATIONS AT T1DM BAY					
T1DM SHELF POSITION NUMBER	LEADS	PINS AT CP HL16B CONNECTOR IN SLOT 37	PINS AT SU CONNECTOR IN SLOT 62	PINS AT SU CONNECTOR IN SLOT 60	PINS AT SU CONNECTOR IN SLOT 58
1	SFA SFB	3 1	5 30		
2	SFA SFB	3 1	9 34		
3	SFA SFB	3 1	18 43		
4	SFA SFB	3 1	22 47		
7	SFA SFB	3 1		1 26	
8	SFA SFB	3 1		5 30	
9	SFA SFB	3 1		9 34	
10	SFA SFB	3 1		18 43	
11	SFA SFB	3 1			1 26
12	SFA SFB	3 1			5 30
13	SFA SFB	3 1			9 34
14	SFA SFB	3 1			18 43

TABLE D

SSA AND SSB PIN LOCATIONS AT T1DM BAY					
T1DM SHELF POSITION NUMBER	LEADS	PINS AT CP HL10 OR HL90 CONNECTOR IN SLOT 22	PINS AT SU CONNECTOR IN SLOT 62	PINS AT SU CONNECTOR IN SLOT 60	PINS AT SU CONNECTOR IN SLOT 58
1	SSA	21	8		
	SSB	42	33		
2	SSA	21	14		
	SSB	42	39		
3	SSA	21	21		
	SSB	42	46		
4	—	—			
	—	—			
7	SSA	21		4	
	SSB	42		29	
8	SSA	21		8	
	SSB	42		33	
9	SSA	21		14	
	SSB	42		39	
10	SSA	21		21	
	SSB	42		46	
11	SSA	21			4
	SSB	42			29
12	SSA	21			8
	SSB	42			33
13	SSA	21			14
	SSB	42			39
14	SSA	21			21
	SSB	42			46

	A	B	C	D
1	MI14	R14	RSF14	MB6
2	B014	T14	B015	DB6
3	MI13	R13	RSF13	MA6
4	B013	T13	MI15	DA6
5	MI12	R12	RSF12	MB5
6	B012	T12	B06	DB5
7	MI11	R11	RSF11	MA5
8	B011	T11	MI6	DA5
9	MI10	R10	RSF10	MB4
10	B010	T10	B05	DB4
11	MI9	R9	RSF9	MA4
12	B09	T9	MI5	DA4
13	GRD14	---		
14	GRD12	GRD13		
15	GRD10	GRD11		
16	GRD8	GRD9		
17	GRD3	GRD7	---	MB3
18	GRD1	GRD2	---	DB3
19	MI8	R8	RSF8	MA3
20	B08	T8	B04	DA3
21	MI7	R7	RSF7	MB2
22	B07	T7	MI4	DB2
23	MI3	R3	RSF3	MA2
24	B03	T3	---	DA2
25	MI2	R2	RSF2	MB1
26	B02	T2	BI	DB1
27	MI1	R1	RSF1	MA1
28	B01	T1	M0	DA1

TERMINAL DESIGNATIONS

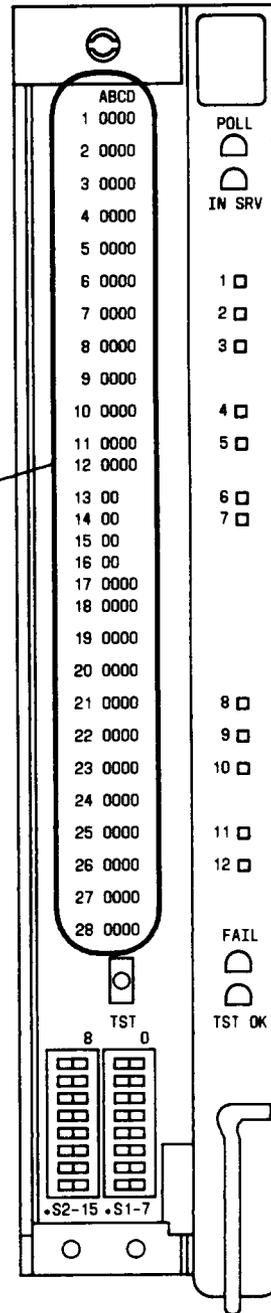


Fig. 1—CP HL95 Terminal Designations

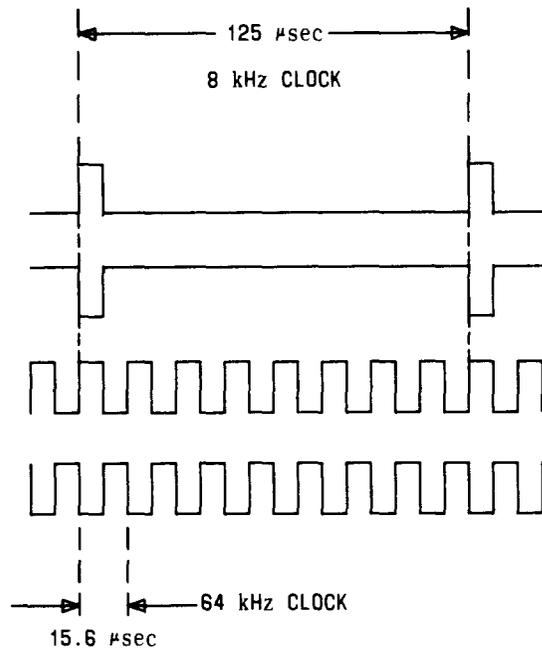


Fig. 2—Example of 8-kHz and 64-kHz Clock Waveform

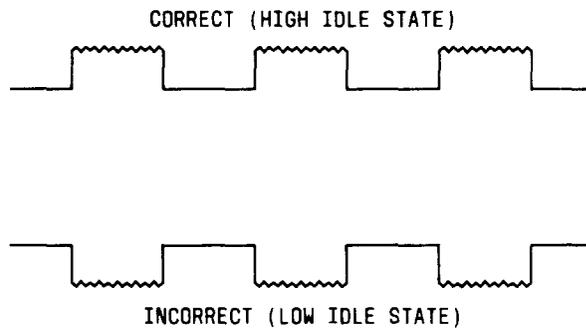


Fig. 3—Examples of Polling Waveform