CABLE PRESSURE MONITORING SYSTEM (CPMS)
SATELLITE TERMINAL SD-2P035-01
TROUBLE LOCATING PROCEDURES

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1. GENERAL

1.01 This section contains procedures for the analysis, locating, and corrective action for trouble within the satellite terminal and associated circuits in the remote of the Cable Pressure Monitoring System (CPMS). It also contains information to isolate the troubles to a specific cause and to determine the corrective action.

1.02 This section is reissued for the following reasons:

- To provide improved trouble locating and alignment procedures
- To cover requirements resulting from the addition of a CPMS peak detector and HY19 and HY20 circuit packs
- Include requirements resulting from modifications to the HY15 circuit pack.

1.03 The maintenance will consist of testing the remote terminal, dedicated trunk pair, and the satellite terminal. Voice-frequency signals will be measured and traced at both terminals. Proper operation will be verified by observation of relay operation and central terminal responses. Corrective action will then be taken based upon the area indicating the trouble condition.

1.04 Troubles at the remote and satellite terminals will be corrected by replacing circuit packs from the maintenance kit and correcting wiring problems. Troubles in the dedicated trunk pair will be corrected by using standard procedures for locating troubles on trunk pairs.

2. APPARATUS

2.01 The equipment required to perform the trouble locating procedures are as follows:

- CPMS maintenance kit (ED-2P007-01) which contains spare circuit packs
- CPMS peak detector
- CPMS test set (J1C013AD)—optional
- SD-2P035-01 (CPMS satellite terminal)
- Volt-ohmmeter (KS-14510 L11 or equivalent)
- 1013A handset equipped with a 4-foot H2B cord which has two P-16E167 test clips on one end.

2.02 Two versions of the CPMS peak detector are currently in distribution. One version has only two modes of operating—REMOTE and SATELLITE. The other version features four modes—REMOTE (333 to 500 Hz), REMOTE (667 to 2133 Hz), SATELLITE, and TEST RESISTOR. The four-mode version allows for direct measurement of the 333-Hz and 500-Hz signaling tones at the remote terminal (RT), simulation of transducer resistance, and provides a LED (light-emitting diode) for measuring levels of the satellite terminal (ST). Procedures for operation of both versions are included in the section.

2.03 The four-mode version should replace the two-mode version as soon as possible. If the two-mode version is used, a separate 110K-ohm test resistor is required for operation.

2.04 The trunk test is an operation that is seldom required. If the test is ever necessary, the equipment to perform the test is as follows:

- Oscillator (KS-29353 L4 or equivalent)
- 23A transmission measuring set (23A TMS) (J94023A or equivalent)
- 2W48A cord, consisting of a 5-foot long W2FR cord equipped with a 310 plug on one end and a 360C tool on the other end.

3. FAILURE MODES AND CAUSES

3.01 The three basic failure modes associated with the addition of access circuits to RT are as follows:

(1) Failure to access all transducers in an ST

(2) Failure to access individual transducers in an ST

(3) Failure of the remote terminal to function in any of its other operational modes.

If problems (1) and (2) occur for all STs connected to an RT, the problem is probably located within the RT. If problem (3) exists, the problem is within the RT. The remote terminal should be checked initially to verify proper operation, regardless of the problem.

A. Faulty Dedicated Trunk Pair

3.02 A faulty dedicated trunk pair causes many different alarm conditions in the ST. Table A lists the possible faulty conditions, along with the resulting effect on the system.

B. Power Supply Failure

3.03 An ST without ac power produces an open circuit response for all 32 transducers.

C. Remote Terminal Failure

3.04 A remote terminal failure causes many different alarm conditions. Table B lists some possible faulty conditions, along with the resulting effect on the system.

4. TROUBLE LOCATING PROCEDURES

4.01 Chart 1 is a standard trouble locating procedure. The procedures in Chart 1 assume that the loss of the dedicated trunk pair has previously been tested as good. The trunk test is also included as a separate chart (Chart 7). This is the only procedure which requires personnel at both the remote and satellite at one time.

4.02 The charts also include a procedure for the alignment of the satellite. This is necessary after initial installation if the trunk pair is changed or if tone decode (TD) readings are obtained regular-

ly. Satellite alignment is recommended every 2 years for periodic maintenance.

4.03 If problems are encountered while performing tests in Chart 1, references will be made to specific trouble procedures (Charts 2 through 7). Also included is a logic test procedure (Chart 6), which tests logic (eg, HY17, HY18, HY19) in the satellite without the use of tones from the remote.

5. REFERENCES

5.01 Following is a list of other BSPs that give further information on CPMS which are pertinent to this system.

SECTION	TITLE
201-612-101	Cable Pressure Monitoring System (CPMS)—Remote and Satellite Terminals (SD-7C000-01, SD-2P035-01) —Description
201-612-301	Cable Pressure Monitoring System (CPMS)—Remote Terminal SD7C000-01—Trouble Locating and Alignment
637-600-401	Expanded Cable Pressure Monitoring System (CPMS)—Description and Operation

TABLE A

FAILURE MODES AND CAUSES

CONDITION	EFFECT ON SYSTEM
Faulty trunk pair	Usually prevents access of all 32 transducers in the ST.
Wet or leaky trunk pair	May produce measurement errors. Condition is likely to occur for all 32 transducers in the ST.
Open trunk pair	Produces open circuit response. Condition will occur for all 32 transducers in the ST.
Change in loss of trunk pair failure or transfer to new trunk pair	Tone decode (TD) or erratic responses may occur on some transducers. Tone decodes may be due to poor alignment of the HY15 circuit pack at the ST. Testing at the ST will indicate the problem.
Noise due to 60-Hz ac power exceeds approximately 50 volts peak-to-peak to ground	Exhibits same effects as: • Wet or leaky trunk pair • Open trunk pair • Change in loss of trunk pair due to trunk failure or transfer to new trunk pair
Short circuit across trunk pair	Responses appear as either leaky (eg, IR [insulation resistance] or low pressure) or busy in the alarm reports. This fault occurs for all 32 transducers in the ST.
Tip-ring reversal	Erroneous readings. The drop-off pulse will not be detected by the ST, and thus relays will remain on for several seconds (eg, 4 to 5 seconds).

TABLE B

REMOTE TERMINAL FAILURE

CONDITION	EFFECT ON SYSTEM
Failure of HY 13 circuit pack in remote terminal (RT)	Generally causes the RT to malfunction in all access and measurement modes.
Failure of HY 14 circuit pack in remote terminal	Produces satellite terminal (ST) problems primarily. Loop resistance measurements may give erroneous readings.
Failure of circuits in remote terminal	May be apparent during other access and measurement modes.
Failures in circuit packs HY18 (D6), HY9 (SD), and HY10 (SIA2)	May cause trouble in the satellite terminal mode.

CHART 1

STANDARD TROUBLE LOCATING PROCEDURES

APPARATUS:

Volt-Ohmmeter (VOM)

CPMS Peak Detector

110K-Ohm Resistor

1013A Handset

STEP	PROCEDURE

Warning: When circuit packs (except for HY12) are inserted or removed, the satellite terminal should be powered down by removing the ac line cord.

At the remote terminal—

1 Have the central terminal personnel set up the TDM mode of the ACEPT program (Section 637-600-401) in the satellite terminal mode. The switch register will be set up according to the satellite and relay required.

2 Using the VOM, check for correct voltages at the test point panel.

3 On the CPMS peak detector, connect the GROUND, +12V, −12V, +5V, and −48V leads to the appropriate jacks on the RT power distribution panel.

Note: +5V and −48V connections are not required with the earlier version of the peak detector.

4 Set the VOM to the 12 Vdc scale (or the next higher scale if not equipped).

5 Connect the VOM on the output jacks on the peak detector.

6 Set the peak detector to REMOTE (REMOTE 667 through 2133 on the new version).

7 Select an unassigned (spare) satellite connection on the logic shelf (LS) terminal strip of the remote and attach the T (tip) and R (ring) leads of the peak detector. Location of the pairs on the LS strip is contained in Table C.

Note: The tip and ring can be hooked up either way.

8 Observe a voltage surge on the VOM. When the needle drifts below 3V, set the VOM to the 3V scale (or the next higher scale if not equipped).

CHART 1 (Contd)

STEP	PROCEDURE

Note: The discharge button on the latest version of the peak detector can be used to quickly eliminate any initial meter deflection due to the voltage surge.

9 From the central, transmit the 1067-Hz tone (OB relay) for the selected satellite.

Requirement 1: The HY10 relay should be operating periodically in cycles of approximately 2 seconds.

Requirement 2: The relay will close for approximately 1.5 seconds, then open for approximately 0.5 seconds.

Requirement 3: The central should see a retransmit code for every other response. The correct reading is a 20 OC (open circuit).

eg.	1240000	retransmit code
	*Y*0000*XX*	response (where *XX* is the reading)
	1240000	retransmit code
	*Y*0000*XX*	response (where *XX* is the reading)

Note 1: *y* is 0 or 1 depending on the particular reading.

Failure to meet the criteria of the example in this step indicates remote terminal problems (eg, HY13 or CP 3 circuit packs). See Section 201-612-301 for remote terminal trouble locating procedures.

Note 2: The CPMS test set can be used if the central is unavailable (see Section 201-612-101), but it will require an additional person to remain at the remote.

10 Verify the VOM needle deflects quickly to the right to a peak (maximum) value and then drifts slowly to the left.

Requirement: Peaks should be at periodic intervals (approximately 2 seconds apart) when an HY10 operation occurs.

11 If no peaking occurs, verify that the central is transmitting to the same satellite to which the peak detector is hooked. If tone is still not seen, refer to Chart 2 (Test Procedure When No Tones Are Out of the Remote).

CHART 1 (Contd)

STEP	PROCEDURE
12	Verify that the peak level is 1.1V ± 0.1V (1.5V ± .1V for the two-mode version of the peak detector) for the 1067-Hz tone. If the voltage does not fall in that range, adjust the potentiometer on the HY14 circuit pack until the voltage is correct.
13	At the central, transmit the remaining tones (see Table D).
14	Verify the tones are within a 1.0V to 1.6V range (1.5V to 2.0V for the two-mode version of the peak detector). ***Note:*** The 333-Hz and 500-Hz tones can only be measured with the four-mode version of the peak detector (using the REMOTE 300-500 position).
15	If voltage levels are not within the range (1.0V to 1.6V for four-mode, 1.5V to 2.0V for two-mode), adjust the voltage level with the potentiometer on HY14.
16	Hook on a 110K-ohm test resistor, (it is supplied with the four-mode version), in place of the tip-ring leads.
17	At the central, verify a 01 reading (0.5 pounds of pressure). ***Note:*** Failure to meet 01 reading indicates remote terminal problems (see Section 201-612-301).
18	Remove test resistor after verification.
19	Contact frame personnel at the satellite location. Tell personnel to open the pair (tip and ring) at the vertical main distrubing frame (VMDF).
20	At the central, access any relay for the satellite being tested.
21	At the central, verify that a 20-OC reading is obtained. ***Note:*** This is a partial test to verify the pair is free of faults. If the reading is not 20, the trunk pair or connections to the RT are faulty, or the wrong pair was opened.
22	Short the trunk pair tip to ring.
23	At the central, verify a 28 (busy) reading. ***Note:*** This insures the fact that the correct trunk pair was opened.
24	Without the central accessing the remote and with the short removed, measure the pair at the LS strip. ***Requirement:*** Insure the pair is free of low resistance shorts, ground, or foreign voltages. ***Note:*** If faulted, the satellite cannot be aligned until the fault is cleared or a transfer is made.

CHART 1 (Contd)

STEP	PROCEDURE
25	Reconnect the trunk pair (its normal condition).
26	Remove the peak detector and proceed to the satellite location.
	At the satellite terminal—
27	Using the VOM, check for correct voltages at the test point panel. The correct voltages are as follows:

VOLTAGE	TOLERANCE
-48V	— —
-40V	±0.5V
-12V	±1.5V
+12V	±1.5V
-6V	-1.0V, +0.5V
+5V	±0.5V

Note: The −40V is adjustable using the bottom potentiometer on HY20.

28 If any voltage exceeds the tolerance limits, refer to Chart 3 (Test Procedure for Defective Supply Voltages). Allow a 15-minute warm-up if system has not been in operation for 15 minutes before proceeding to the next step.

29 Verify that the drop-off bias (HY19, TP 1) is 1.7V ± 0.1V. Adjust the potentiometer on HY19 if the voltage does not fall into the range.

30 Verify that the threshold (HY15, pin 6) is +0.65V ± .05V. Replace circuit pack HY15 if voltage does not fall into the range.

Note: Adjustments which were previously required with original HY15 circuit packs are no longer required.

31 Connect the CPMS peak detector as in Steps 3 through 5.

32 Set the peak detector to SATELLITE.

33 If using the four-mode version of the peak detector, connect the HY15-6 lead to pin 6 of the HY15 connector.

34 At the central, transmit the 1067-Hz tone (OB relay) for the satellite.

35 Tune the filter by connecting the TO FILTER lead of the peak detector to the filter test point (see Table D).

CHART 1 (Contd)

STEP	PROCEDURE
36	Observe voltage surge on VOM. When the needle drifts below 3V, set the VOM to the 3V scale (or the next higher scale if not equipped). ***Note:*** The discharge button on the four-mode version of the peak detector can be used to quickly eliminate any initial meter deflection due to the surge.
37	Adjust the associated potentiometer for maximum output. ***Note:*** Several small adjustments may be required and should be made after the needle peaks.
38	Once tuned, adjust the gain potentiometer on HY20 (second potentiometer from top) so that a 1.1V peak is obtained. If tone is peaking erratically or not at all, go to Chart 4 (Test Procedure When Erratic, or No Tones at HY15 Test Points).
39	At the central, access the 4A relay.
40	Tune the 333-Hz and the 2133-Hz filters by adjusting their associated potentiometer.
41	Adjust the gain potentiometer on HY20 (second potentiometer from top) so that a 1.1V-peak signal is obtained for the 333-Hz tone.
42	Adjust the slope potentiometer on HY20 (top potentiometer) so that a 1.1V-peak value is obtained for the 2133-Hz tone. ***Note 1:*** Steps 41 and 42 may need to be repeated to obtain an acceptable value. ***Note 2:*** The voltage level is acceptable if the end of the potentiometer is reached before a reading of 1.1V is reached.
43	At the central, access the remaining relays in Table D and tune each filter. ***Requirement 1:*** The ten signal levels should be between 1.0V and 1.5V. ***Requirement 2:*** The green LED should flash on approximately 1 second for each signal if the four-mode version is used.
44	If the requirements of Step 43 are not met, readjust the gain potentiometer on HY20 (second potentiometer from top) so the requirements are met.
45	Recheck signal levels after all adjustments are final, in case of errors. ***Note:*** This step can be done at the same time as Steps 34 through 38.
46	If the signal levels do not fall within the allowed range, test the dedicated trunk pair (see Chart 7).

CHART 1 (Contd)

STEP	PROCEDURE
47	Verify that the correct relays HY12 and HY5 are working while the tones are transmitted. ***Requirement:*** The selected HY12 and HY5 (unless the line is busy) relays should work at periodic intervals (approximately 2 seconds). ***Note :*** Each of the four HY12 boards is wired to eight transducers. Both the A and B transducers are connected to the same HY12 relay. Location of the relays on the board is shown in Fig. 1. The HY5 board contains the A (bottom) and B (top) relays for all transducers.
48	Verify that one of the A or B relays work when the selected HY12 relay works. ***Note 1:*** The relays will not work if the line is in the busy condition. ***Note 2:*** Any battery on the tip in excess of −2V will cause a false busy.
49	If necessary, a loop can be bridged onto the back of satellite (see SD-2P035-01) to check for idle condition. ***Note:*** To examine the horizontal (office) and vertical (customer) sides separately, go to the MDF. Verify that line is idle before opening pair by bridging across it with the 1013A handset.
50	Perform the logic test in Chart 6, if the wrong relays or no relays are working and the tones are correct.
51	At the central, run several acceptance test scans of all 32 transducers. This test prints all readings which are different from those that the factory test resistors would give. ***Note 1:*** When running the acceptance test on a working satellite (one with transducers connected), most readings will print on a hard-copy basis. The readings that do not print out are the same as the test resistors. ***Note 2:*** Figure 2 lists the values which are not printed.
52	If any erroneous operations or readings occur, substitute boards from the maintenance kit individually to isolate the problem.

CHART 1 (Contd)

STEP	PROCEDURE
53	Erroneous readings may be the result of low resistance grounds or leakage to battery. To check for erroneous readings, go to the horizontal (office) and vertical (customer) sides as described in Step 49. ***Requirement 1:*** The horizontal side will have a central office battery on the ring if the pair is a working subscriber line. ***Requirement 2:*** The vertical side will have the transducer connected across tip and ring. ***Requirement 3:*** The pair should be free of any low resistance grounds. ***Note:*** A capacitative meter kick may occur when measuring due to the cable capacity.
54	To determine the pressure reading corresponding to the tip-to-ring resistance, refer to Table E.

TABLE C

LS TERMINAL CONNECTIONS FOR STs (NOTE)

ST NO.	LS LOCATION (COLUMN NUMBER – ROW NUMBER)* T	R
40	11-1	16-1
41	12-1	17-1
42	13-1	18-1
43	14-1	19-1
44	15-1	20-1

Note: For a complete list of all STs, see Section 637-600-401.

* Columns run from 1 to 20, while rows run from 0 to 7.

TABLE D

HY15 ALIGNMENT

RELAY	FILTER FREQUENCY (Hz)	FILTER POTENTIOMETER	FILTER TEST POINT LOCATION
4A	333	R3.0	SECOND FROM TOP
8A	500	R8.0	TOP
3B	667	R3.1	FOURTH FROM TOP
2B	762	R8.1	THIRD FROM TOP
1B	889	R3.2	SIXTH FROM TOP
0B	1067	R8.2	FIFTH FROM TOP
3A	1333	R3.3	EIGHTH FROM TOP
2A	1524	R8.3	SEVENTH FROM TOP
1A	1778	R3.4	TENTH FROM TOP
0A	2133	R8.4	NINTH FROM TOP

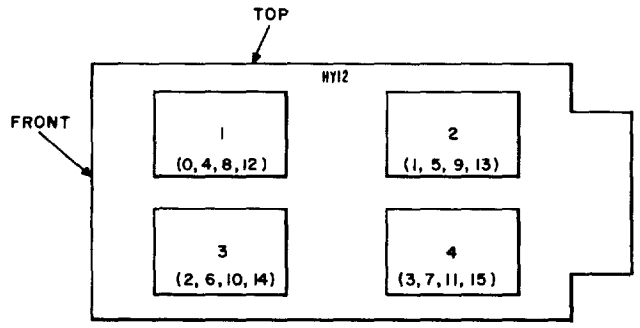

Fig. 1—Location of Relays on HY12

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LAB
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 TEST IN PROGRESS: SATELLITE  4Ø

ØØA ØØØØØ1  ØØB ØØØØ12  Ø1A ØØØØØ4  Ø1B ØØØØ15  Ø2A ØØØØ1Ø Ø2B ØØØØ16
Ø3A ØØØØ28  Ø3B ØØØØ13  Ø4A ØØØØ1Ø  Ø4B ØØØØ16  Ø5A ØØØØ28 Ø5B ØØØØ13
Ø6A ØØØØ12  Ø6B ØØØØØ1  Ø7A ØØØØ15  Ø7B ØØØØØ4  Ø8A ØØØØ12 Ø8B ØØØØØ1
Ø9A ØØØØ15  Ø9B ØØØØØ4  1ØA ØØØØ16  1ØB ØØØØ1Ø  11A ØØØØ13 11B ØØØØ28
12A ØØØØ16  12B ØØØØ1Ø  13A ØØØØ13  13B ØØØØ28  14A ØØØØØ1 14B ØØØØ12
15A ØØØØØ4  15B ØØØØ15

                                                  END OF TEST
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Fig. 2—Satellite Terminal Test

TABLE E

RELATION OF CABLE PRESSURE, TRANSDUCER RESISTANCE, AND VOLTMETER READING

NOMINAL PRESSURE RANGE AT TRANSDUCER (PSI)	ELECTRICAL RESISTANCE (KILOHMS)
0.0	100
0.5	110
1.0	122
1.5	135
2.0	150
2.5	166
3.0	186
3.5	208
4.0	232
4.5	265
5.0	301
5.5	344
6.0	400
6.5	468
7.0	568
7.5	698
8.0	898
8.5	1200
9.0	1820
9.5 and higher	3820

CHART 2

TEST PROCEDURE WHEN NO TONES ARE OUT OF THE REMOTE

APPARATUS:

1013A Handset

Spare Circuit Packs

STEP	PROCEDURE
	Warning: When circuit packs (except for HY12) are inserted or removed, the satellite terminal should be powered down by removing the ac line cord.
1	At the LS terminal strip on the remote (where the peak detector is connected), connect a 1013A handset across tip and ring and monitor the pair. ***Requirement 1:*** If the 1067-Hz tone bursts are heard, the peak detector is not working properly. ***Requirement 2:*** If the 1067-Hz tone bursts are not heard, a remote terminal problem exists (proceed to the next step).
2	Connect the 1013A handset across the output of the HY10 (SIA2) (see Table F). ***Requirement 1:*** If the 1067-Hz tone is heard, check the wiring from the HY10 to the LS terminal strip. ***Requirement 2:*** If no 1067-Hz tone is heard, proceed to the next step.
3	Connect the 1013A handset across terminals 29 and 56 of HY14. ***Requirement 1:*** If the 1067-Hz tone is heard, the HY10, another circuit pack (eg, HY9), or the wiring between HY14 and HY10 is bad. ***Requirement 2:*** If no 1067-Hz tone is heard, the HY14 or another circuit pack is bad. Refer to Section 201-612-301 for remote terminal trouble locating procedures.

TABLE F

SATELLITE HOOKUP FOR HY10 (NOTE)

SATELLITE NUMBER	HY10 (SIA2) T	PIN NUMBER R
40	55	57
41	54	20
42	53	49
43	52	50
44	56	48

Note: For a complete list of all STs, see SD-2P035-01.

CHART 3

TEST PROCEDURE FOR DEFECTIVE SUPPLY VOLTAGES

APPARATUS:

VOM

Spare Circuit Packs

STEP	PROCEDURE
	Warning: When circuit packs (except for HY12) are inserted or removed, the satelite terminal should be powered down by removing the ac line cord.
1	Remove all circuit packs.
2	Check all voltages on terminal.
3	If the voltages are unacceptable, the 83A power unit is bad or a wiring problem exists.
4	If the voltages are acceptable, replace each circuit pack one by one until the defective circuit pack is found.

CHART 4

TEST PROCEDURES WHEN ERRATIC, OR NO TONES AT HY15 TEST POINTS

APPARATUS:

1013A Handset

Spare Circuit Packs

STEP	PROCEDURE
	Warning: When circuit packs (except for HY12) are inserted or removed, the satellite terminal should be powered down by removing the ac line cord.
1	Connect the 1013A handset between BRCV (on the test panel) and ground.
	Note: This is the input to the HY15 from the HY19 and HY20 circuit packs.
	Requirement: If the tone burst is still erratic or not present, refer to Chart 5 (Test Procedure When Erratic, or No Tones at BRCV).
2	If the signal at the BRCV appears good, continue to observe the HY15 test points. Perform the following steps until a good signal is obtained.
3	Remove the following circuit packs: HY4, HY5, HY17, HY18, and all HY12s.
4	If removing these circuit packs corrects the problem, isolate the faulty circuit pack by replacing the boards and swapping known good boards on an individual basis.
5	Change the HY15, HY20, and HY19 individually in this order.
	Note: Readjustment of the potentiometers will be required.
6	Check the wiring (see SD-2P035-01).

CHART 5

TEST PROCEDURE WHEN ERRATIC, OR NO TONES AT BRCV

APPARATUS:

1013A Handset

Spare Circuit Packs

STEP	PROCEDURE

Warning: ***When circuit packs (except for HY12) are inserted or removed, the satellite terminal should be powered down by removing the ac line cord.***

1 Remove the HY5, HY19, and HY20 circuit packs.

Note: This disconnects the satellite from the dedicated trunk pair.

2 Connect the 1013A handset across HY19 pins 43 and 13.

Note: This is where the dedicated pair is connected to the satellite.

3 If tones are still erratic or not present, the trouble is not in the satellite. Recheck work previously done at the remote.

4 If the tones are correct, then either the HY19 or HY20 circuit pack is bad or a wiring problem exists. Perform the following steps until an acceptable signal is obtained at BRCV.

5 Change the HY19 and HY20 circuit packs individually.

Requirement: Readjustment of the potentiometers will be required.

6 Check the wiring.

Requirement: The tip and ring of the dedicated trunk pair should be connected to **only** the following places:

BOARD	T	R
HY19	43	13
HY20	39, 19, 17	9
HY5	15, 21	19, 30

CHART 5 (Contd)

STEP	PROCEDURE

And not to the following places as indicated erroneously in SD-2P035-01, issue 3A:

BOARD	T	R
HY19	30	60
HY20	43	13

This error typically causes problems during installation when the trunk pair may be hooked up incorrectly and will result in a totally unoperational system.

CHART 6

LOGIC TEST PROCEDURE

APPARATUS:

Spare Circuit Packs

STEP	PROCEDURE
	Warning: ***When circuit packs (except for HY12) are inserted or removed, the satellite terminal should be powered down by removing the ac line cord.***
1	At the satellite terminal, remove circuit pack HY15.
2	Perform each test in Table G. ***Requirement:*** Verify the results.
3	If all requirements were met, replace HY15.
4	If any requirement was not met, replace HY17.
5	Perform each test in Table G and verify the results.
6	If any requirement of Step 5 was not met, replace HY18.
7	Perform each test in Table G and verify the results.
8	If any requirement of Step 7 was not met, replace HY20.
9	Perform each test in Table G, and verify the results.
10	If any requirement of Step 9 was not met, check the satellite terminal wiring (SD-2P035-01).

TABLE G

LOGIC TEST CONNECTIONS

TEST	CONNECT FOLLOWING TERMINAL(S) TO GROUND ON CONNECTOR A-01	FOLLOWING RELAY ON HY5 (A-15) WILL OPERATE*	FOLLOWING RELAY ON HY12 WILL OPERATE (FIG. 1)	POSITION OF HY12
1	25	BOTTOM	03	A-20
2	54	BOTTOM	02	A-20
3	20	BOTTOM	01	A-20
4	18	BOTTOM**	00	A-20
5	15	TOP	03	A-20
6	12	TOP	02	A-20
7	10	TOP	01	A-20
8	8	TOP	00	A-20
9	25, 30	BOTTOM	07	A-25
10	15, 30	TOP	07	A-25
11	25, 57	BOTTOM	11	A-30
12	15, 57	TOP	11	A-30
13	25, 30, 57	BOTTOM	15	A-35
14	15, 30, 57	TOP	15	A-35
15	25, 15	NONE	NONE	—

* This relay will not operate when pair is busy.
** This relay will not operate with test terminations connected.

CHART 7

TRUNK TEST PROOCEDURE

APPARATUS:

Spare Circuit Packs

2W48A Cord with a 310 Plug

23A TMS

Oscillator

STEP	PROCEDURE
	Warning: When circuit packs (except for HY12) are inserted or removed, the satellite terminal should be powered down by removing the ac line cord.
1	At the satellite terminal power distribution panel, disconnect the ac power and remove a 1-amp fuse at the CO fuse panel.
2	Remove circuit packs HY5, HY19, and HY20.
	Note: This disconnects the satellite from the dedicated trunk pair.
3	Using a 2W48A cord with a 310 plug connected at one end, connect the 310 plug into the MEAS 310 jack on the 23A TMS.
4	Connect test clips to leads disconnected in Step 2.
5	At the 23A TMS, set the INPUT switch to 900.
6	Set DIAL-MEAS-SLV key to MEAS.
7	At the remote terminal, connect the oscillator to the dedicated pair which goes to the satellite terminal.
8	Set oscillator output to first frequency in Table H at 900-ohms impedance.
9	At the satellite terminal, record measured loss in Table H.
10	Repeat Steps 8 and 9 for each frequency in Table H.
11	If the loss measured at 1067 Hz is greater than 20 dB, the dedicated pair must be changed.
12	The difference between the minimum and maximum loss for these frequencies must not exceed 1.0 dB per each 4 dB of loss at 1067 Hz. The loss shall increase in a smooth manner (monotoni-

CHART 7 (Contd)

STEP	PROCEDURE
	cally increasing loss curve). If loss does not increase in a smooth manner, the dedicated pair must be changed.
13	At the remote terminal, disconnect the oscillator.
14	At the satellite terminal, disconnect the 23A TMS.

TABLE H

MEASURED LINE LOSS

FREQUENCY (Hz)	MEASURED LOSS (dB)
333	
500	
667	
762	
889	
1067	
1333	
1524	
1778	
2133	