

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

1. GENERAL

1.01 This section provides procedures for analysis, locating, and corrective action for trouble within the satellite terminal and associated circuits in the remote terminal of the Cable Pressure Monitoring System (CPMS).

1.02 This section is reissued to correct the information contained in Table C.

1.03 This section provides information to isolate the troubles to a specific cause and the corrective action.

1.04 The basic maintenance technique will be to trace voice frequency signals generated by the central terminal operating in the satellite terminal mode (STM). These signals will be traced through the three designated maintenance areas in order to locate the trouble area. Corrective action will then be taken based upon the maintenance area indicating the trouble condition.

1.05 Maintenance area 1 consists of the remote terminal circuits that are used in the satellite terminal mode of operation.

1.06 Maintenance area 2 is the dedicated trunk pair that connects the remote terminal to the satellite terminal. This includes the cable and the near-end and far-end cross-connections on the MDF.

1.07 Maintenance area 3 is the satellite terminal.

1.08 Troubles in maintenance area 1 and 3 will be corrected by replacing circuit packs from the maintenance kit.

1.09 Troubles in maintenance area 2 will be corrected by using standard procedures for locating troubles on dedicated trunk pairs.

1.10 Troubles with the satellite terminal will be indicated via alarm bulletins at the central terminal location. All trouble isolation procedures and tests will be initiated from central terminal operations and will be under their direction and control.

1.11 *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 3 of this section indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

2.01 One CPMS Remote Terminal Maintenance Kit—(ED-2P007-01) containing spare circuit packs.

2.02 One volt-ohm-milliammeter (KS-20538 L1 or equivalent).

2.03 One oscillator (KS-29353 L4 or equivalent).

2.04 One 23A Transmission Measuring Set (23A TMS) (J94023A or equivalent).

2.05 One 1013A handset equipped with an H2B cord, 4 feet long, equipped with two P-16E167 test clips on one end.

2.06 One 2W48A cord, consisting of a W2FR cord, 5 feet long, equipped with a 310 plug on

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one end and one 360B and one 360C tool on the other end.

3. TROUBLE LOCATING AND CALIBRATION PROCEDURES

Failure Modes

3.01 The three failure modes associated with the addition of satellite terminal (ST) access circuits to a remote terminal are as follows:

- (1) Failure to access all transducers in an ST.
- (2) Failure to access one or two transducers in an ST.
- (3) Failure of the remote terminal to function in any of its other operational modes.

3.02 Failure to access all transducers in an ST can be due to several different circuit problems. This failure will be indicated by the alarm bulletin responses obtained on ST transducers at the central terminal.

Faulty Trunk Pair

3.03 A faulty trunk pair will usually prevent the access of all 32 transducers in the ST.

3.04 A wet or leaky trunk pair may produce measurement errors but is most likely to cause an ST detection error, which is measured and recorded as a non-valid response in the alarm bulletin. This condition is likely to occur for all 32 transducers in the ST.

3.05 An open trunk pair will produce an open circuit response. This condition will occur for all 32 transducers in the ST.

3.06 A trunk pair that has more loss now than previously will reduce the level of the transmitted tones and will produce a non-valid

response, but it may not occur on all transducers to be accessed in the ST because some tones may be of sufficient level to be detected. Thus, some responses may appear erratic or inconsistent.

3.07 When the noise due to 60-Hz ac power exceeds approximately 50 volts peak-to-peak, the ST will exhibit erratic behavior and produce responses similar to 3.04 and 3.06.

3.08 A short circuit across the trunk pair will cause the responses to appear as either leaky or busy in the alarm reports. This fault will occur for all 32 transducers in the ST.

Power Supply Failure

3.09 A power supply failure in the ST will produce an open circuit response for all 32 transducers.

Remote Terminal Failure

3.10 Failure of the HY13 circuit pack in the remote terminal will generally cause the remote terminal to malfunction in all access and measurement modes.

3.11 Failure of the HY14 circuit pack in the remote terminal will produce ST problems primarily.

3.12 Failure of the other circuits in the remote terminal will usually be apparent to the central terminal operations.

3.13 Certain failures in circuit packs HY18 (D6) and HY10 (SIA2) may be the cause of some troubles in the satellite terminal mode.

3.14 Test requirements for circuit packs HY4, HY5, HY12, and HY18 are given in Section 201-612-301.

STEP

ACTION

VERIFICATION

A. Satellite Terminal Trouble Test

- 1 At central terminal—
Arrange to have personnel set up the TDM mode of the ACEPT program (Section 637-600-400) in the satellite terminal mode.
Set up the switch register to access the

STEP	ACTION	VERIFICATION
	satellite terminal being tested and to transmit a 1067-Hz tone.	
2	Obtain satellite terminal dedicated pair number from central terminal personnel.	
3	At auxiliary terminal strip on the MDF— Connect 1013A handset across tip and ring of dedicated pair.	1000-Hz tone heard.
4a	If requirement of Step 3 is not met— At LS terminal strip— Connect 1013A handset across tip and ring of dedicated pair.	1000-Hz tone heard.
5b	If requirement of Step 4a is met— Check for defective wiring between LS terminal strip and MDF.	
6c	If requirement of Step 4a is not met— At remote terminal— Connect 1013A handset across output of HY10 (SIA2).	1000-Hz tone heard.
7d	If requirement of Step 6c is met— Proceed to Step 11.	
8e	If requirement of Step 6c is not met— Connect 1013A handset across terminals 29 and 56 of HY14.	1000-Hz tone heard.
9f	If requirement of Step 8e is met— Replace HY18 and HY10 (SIA2) one at a time until requirement of Step 6c is met.	
10g	If requirement of Step 8e is not met— Replace HY13 and HY14 one at a time until requirement is met.	
11	At satellite terminal— Using VOM, check for correct voltages at test point panel.	
12	Connect 1013A handset across terminals 13 and 43 of HY16.	1000-Hz tone heard.
13h	If requirement of Step 12 is not met— Connect 1013A handset across dedicated pair on MDF.	1000-Hz tone heard.

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STEP	ACTION	VERIFICATION
14i	If requirement of Step 13h is met— Check for defective wiring between HY16 and the MDF.	
15j	If requirement of Step 13h is not met— Change the dedicated pair from the remote terminal to the satellite terminal.	
16k	If requirement of Step 12 is met— Connect 1013A handset across BRCV and ground.	1000-Hz tone heard.
17l	If requirement of Step 16k is met— Remove HY15 and perform logic test (Test B).	
18m	If requirement of Step 16k is not met— Replace HY16 and perform HY16 alignment procedure (Test C).	
19n	If logic test passes— Replace HY15 and perform HY15 alignment procedure (Test D).	
20o	If logic test fails— Replace HY18, HY17, and HY16 one at a time, repeating logic test after each replacement, until trouble is cleared.	
21p	If HY16 was replaced— Perform HY16 alignment procedure (Test C).	
22q	If all channel A or channel B transducers are not being accessed— Replace HY4 and HY5 and retest from the central terminal.	
23	Return satellite terminal to normal.	

B. Logic Test

1	At satellite terminal— Remove circuit pack HY15.	
2	Perform each test in Table A.	As shown in Table A.
3a	If all requirements were met— Replace HY15.	
4b	If any requirement was not met— Replace HY17.	

STEP	ACTION	VERIFICATION
5b	Perform each test in Table A.	As shown in Table A.
6c	If any requirement of Step 5b was not met— Replace HY18.	
7c	Perform each test in Table A.	As shown in Table A.
8d	If any requirement of Step 7c was not met— Replace HY16.	
9d	Perform each test in Table A.	As shown in Table A.
10e	If all requirements of Step 9d were met— Perform HY16 alignment (Test C).	
11f	If any requirement of Step 9d was not met— Replace HY16 with original circuit pack and check satellite terminal wiring per SD-2P035-01.	
12	Reinsert HY15 (if not done previously).	

C. HY16 Alignment Procedure

- 1 At satellite terminal power distribution panel—
Disconnect AC power cord and remove 1
AMP fuse.
- 2 Disconnect leads from pins 13 and 43 of HY16.
- 3 Using 2W48A cord, connect 310 plug to MEAS
310 jack on 23A TMS and connect test clips
to leads disconnected in Step 2.
- 4 At 23A TMS—
Set INPUT switch to 900.
- 5 Set DIAL-MEAS-SLV key to MEAS.
- 6 At remote terminal—
Connect oscillator to dedicated pair which goes
to the satellite terminal.
- 7 Set oscillator output to first frequency in Table
B at 900 ohms impedance.
- 8 At satellite terminal—
Record measured loss in Table B.
- 9 Repeat Steps 7 and 8 for each frequency in
Table B.

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STEP	ACTION	VERIFICATION
10a	If the loss measured at 1067 Hz is greater than 20 dB— The dedicated pair must be changed.	
11b	If the difference between the minimum and maximum loss for all frequencies exceeds 3.5 dB— The dedicated pair must be changed.	
12	At remote terminal— Disconnect oscillator.	
13	At satellite terminal— Disconnect 23A TMS.	
14	Remove circuit pack HY5 and all four HY12 circuit packs.	
15	At power distribution panel— Reconnect AC power cord and reinsert 1 AMP fuse. Note: Allow 30 minutes warmup before proceeding.	
16	At circuit pack HY16— Connect VOM (set for AC volts, 3-volt scale) to BRCV test point (pin 15) and ground.	
17	Using 2W48A cord, connect 310 plug to OUTPUT 310 jack on oscillator and test clips to tip and ring test points (pins 13 and 43) on HY16.	
18	At oscillator— Set FUNCTION switch to 900.	
19	Set OUTPUT LEVEL-DBM switch to loss measured in Table B for 1067 Hz.	
20	At HY16— Adjust R20 (fifth potentiometer from bottom) for 0.88-volt rms \pm 0.1-volt indication on VOM.	
21	Set oscillator to 333, 500, 1067, and 2133 Hz sequentially, using loss recorded in Table B for each frequency, and record VOM indication for each frequency.	Maximum voltage is 1.0-volt rms or less. Difference between minimum and maximum voltage is less than 0.2 volt.
22c	If difference between minimum and maximum voltage is less than 0.2 volt and the maximum	

STEP	ACTION	VERIFICATION
	is greater than 1.0 volt— Readjust R20 for 1.0 volt at 1067 Hz input.	
23d	If difference between minimum and maximum voltage exceeds 0.2 volt— Go to Step 24d.	
24d	Set oscillator for 2133 Hz using loss recorded in Table B.	
25d	At HY16— Adjust R22 (top potentiometer) for 0.9-volt rms ± 0.1 -volt indication on VOM.	
26d	Set oscillator for 500 Hz using loss recorded in Table B.	
27d	Adjust R22 for 0.9-volt rms ± 0.1 -volt indication on VOM.	
28d	Set oscillator to each frequency in Table B sequentially, using loss recorded in Table B for each frequency, and observe VOM.	VOM indicates 0.9-volt rms ± 0.1 -volt for each frequency.
29e	If requirement of Step 28d is not met— Repeat Steps 20 through 28d.	
	Note: It may be necessary to repeat these steps more than once.	
30	At power distribution panel— Disconnect AC power cord and remove 1 AMP fuse.	
31	Disconnect oscillator.	
32	Reconnect leads to pins 13 and 43 of HY16.	
33	Reconnect AC power cord and reinsert 1 AMP fuse.	
34	Wait 5 minutes.	
35	Observe VOM.	VOM indicates 25 millivolts rms or less.
36f	If requirement of Step 35 is not met— Adjust R38 (fourth potentiometer from bottom) for minimum VOM indication, then adjust R39 (third potentiometer from bottom) for minimum VOM indication.	

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STEP	ACTION	VERIFICATION
37f	Repeat Step 36f until a minimum indication is obtained with both potentiometers.	
38f	At power distribution panel— Disconnect AC power cord and remove 1 AMP fuse.	
39f	Disconnect leads from pins 13 and 43 of HY16.	
40f	Reconnect AC power cord and reinsert 1 AMP fuse.	
41f	Repeat Steps 17 through 21.	
42f	At power distribution panel— Disconnect AC power cord and remove 1 AMP fuse.	
43f	Disconnect oscillator.	
44f	Reconnect leads to pins 13 and 43 of HY16.	
45	Disconnect VOM.	
46	Replace circuit pack HY5 and four HY12 circuit packs.	
47	Reconnect AC cord and reinsert 1 AMP fuse.	
D. HY15 Alignment Procedure		
1	At satellite terminal— Remove circuit pack HY5.	
2	Remove all four HY12 circuit packs.	
3	Using VOM, measure voltage between pin 6 of connector A-01 and ground.	VOM indicates 0.25 Vac \pm 0.05-volt.
4a	If requirement of Step 3 is not met— Adjust R11 (bottom potentiometer) on HY15 until requirement is met.	
5	Set oscillator output for 1067 Hz.	
6	Connect oscillator across terminals 13 and 43 of HY16.	
7	Connect VOM between BRCV test point and ground.	

STEP	ACTION	VERIFICATION
8	Adjust oscillator until VOM indicates 0.9 volt ac.	
9	Set oscillator to each frequency in Table C sequentially and monitor each corresponding test point with VOM. Adjust each potentiometer for maximum indication on VOM.	

Note: Maximum voltage will be approximately 0.65 volt ac.

TABLE A
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	1	A-20
2	54	BOTTOM	2	
3	20	BOTTOM	3	
4	18	BOTTOM**	4	
5	15	TOP	1	
6	12	TOP	2	
7	10	TOP	3	
8	8	TOP	4	
9	25, 30	BOTTOM	1	A-25
10	15, 30	TOP	1	
11	25, 57	BOTTOM	1	A-30
12	15, 57	TOP	1	
13	25, 30, 57	BOTTOM	1	A-35
14	15, 30, 57	TOP	1	
15	25, 15	NONE	NONE	

* This relay will not operate when pair is busy.

** This relay will not operate with test terminations connected.

TABLE B
MEASURED LINE LOSS

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

TABLE C
HY15 ALIGNMENT

TEST	FILTER FREQUENCY (Hz)	FILTER POTENTIOMETER	FILTER TEST POINT LOCATION
1	333	R3.0	SECOND FROM TOP
2	500	R8.0	TOP
3	667	R3.1	FOURTH FROM TOP
4	762	R8.1	THIRD FROM TOP
5	889	R3.2	SIXTH FROM TOP
6	1067	R8.2	FIFTH FROM TOP
7	1333	R3.3	EIGHTH FROM TOP
8	1524	R8.3	SEVENTH FROM TOP
9	1778	R3.4	TENTH FROM TOP
10	2133	R8.4	NINTH FROM TOP

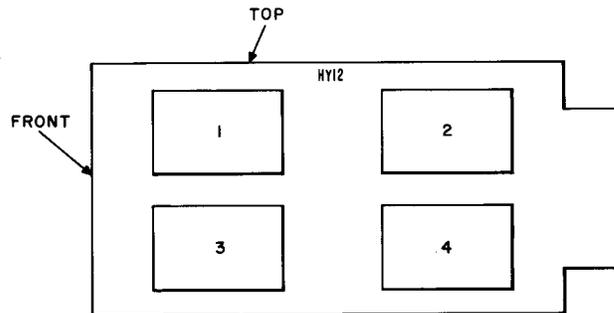


Fig. 1—Location of Relays on HY12.