REPLACING PAGE ADDENDUM
Filing Instructions:
1. REMOVE FROM THE SECTION THE PAGES NUMBERED THE SAME AS THOSE ATTACHED TO THIS PINK SHEET.
2. INSERT THE ATTACHED PAGES INTO THE SECTION IN THEIR PLACE.
3. PLACE THIS PINK SHEET AHEAD OF PAGE 1 OF THE SECTION.

43B1 VOICE FREQUENCY CARRIER DATA SYSTEM

OUT-OF-SERVICE AND INSTALLATION TESTS

1. GENERAL

1.001 This addendum supplements Section 312-710-200, Issue 1. The attached pages must be inserted in the section in accordance with the filing instructions above.

1.002 This addendum is issued to change and/or add the following:

- Change the number of the high voltage hub converter circuit pack from DP53 (now MD) to DP64
- Change the number of the system alarm circuit pack from DP54 (now MD) to DP62
- Change level values at send test point and remove pads on Fig. 3
- Add title and note to Fig. 9

The following change applies to Part 1 of the section:

(a) 1.03—revised

(b) Fig. 1—revised

3. STRAPPING AND OPTION CONNECTIONS

The following change applies to Part 3 of the section:

(a) 3.04 and 3.05—transposed

(b) 3.04—revised

(c) Fig. 3—revised

(d) Part 3C, Step 1 note—revised

(e) Part 3C, Step 2 note—revised

4. TEST AND ADJUSTMENTS

The following change applies to Part 4 of the section:

(a) 4.08—revised

(b) Fig. 9—revised

Attached:

Pages 1, 3, 5, 13, 19, 21, and 25 dated October 1971—revised
Pages 2, 4, 6, and 14 dated October 1971—reissued

43B1 VOICE FREQUENCY CARRIER DATA SYSTEM

OUT-OF-SERVICE AND INSTALLATION TESTS

CONTENTS PAGE

1. GENERAL

1.01 This section describes the initial lineup procedures and tests to be performed on a 43B1 Voice Frequency Carrier Data (VFCD) System after installation and prior to placing the system in service.

1.02 The lineup procedures for 2- and 4-wire connections, the compromise network connections, and the 4066G external balancing network, if required, are covered in Section 312-710-201.

1.03 The procedures outlined in this section assume that the carrier terminal appears at a No. 2 serviceboard, No. 9B serviceboard, Data Observing Test Center (DOTC) or equivalent hub-type office, and that the 43B1 VFCD system operates in conjunction with a type 2 high voltage hub through a high voltage converter ◗(DP64*)◖ interface or directly into a type 3 low voltage hub.

◗*Early units may have DP53 (MD) installed. DP64 is standard.◖

1.04 The sending and receiving frequencies of the 43B1 carrier terminal are determined by the transmitter and demodulator plug-ins. Table A lists the frequencies of the channels and the proper transmitter and demodulator, by number, to be used with each respective channel.

1.05 Figure 1 is a block diagram showing the signal paths through the transmit and receive portions of a channel and is presented to give an overall picture of the data circuit in the terminal. See Section 312-710-100 for a detailed discussion of the data transmission through the terminal.

THINK

Care should be exercised in handling the circuit packs, particularly the transmitter and demodulator packs, to avoid dropping them. The property of the ferrite core inductors used on these cards is such that a shock can change the inductance sufficiently to change the BIAS setting by a few percent and to change the frequency of the oscillator. A severe shock can crack the ferrite structure. It is possible for a hairline crack to develop and not be noticeable to the naked eye.

TABLE A

CORRELATION OF FREQUENCIES, TRANSMITTERS, DEMODULATORS AND BANDWIDTHS WITH RESPECT TO CHANNEL NUMBERS

CHANNEL NUMBER	SPACE FREQUENCY	CENTER FREQUENCY	MARK FREQUENCY	TRMTR NUMBER	DEM NUMBER
SINGLE BANDWIDTH					
1	390	425	460	DP1	DP26
2	560	595	630	DP2	DP27
3	730	765	800	DP3	DP28
4	900	935	970	DP4	DP29
5	1070	1105	1140	DP5	DP30
6	1240	1275	1310	DP6	DP31
7	1410	1445	1480	DP7	DP32
8	1580	1615	1650	DP8	DP33
9	1750	1785	1820	DP9	DP34
10	1920	1955	1990	DP10	DP35
11	2090	2125	2160	DP11	DP36
12	2260	2295	2330	DP12	DP37
13	2430	2465	2500	DP13	DP38
14	2600	2635	2670	DP14	DP39
15	2770	2805	2840	DP15	DP40
16	2940	2975	3010	DP16	DP41
17	3110	3145	3180	DP17	DP42
DOUBLE BANDWIDTH					
57	610	680	750	DP18	DP43
58	950	1020	1090	DP19	DP44
51	1290	1360	1430	DP20	DP45
52	1630	1700	1770	DP21	DP46
53	1970	2040	2110	DP22	DP47
54	2310	2380	2450	DP23	DP48
55	2650	2720	2790	DP24	DP49
56	2990	3060	3130	DP25	DP50

2. APPARATUS

2.01 The apparatus required to perform the lineup procedures is listed in (a) through (g).

(a) KS-14510 volt-ohm-milliammeter, or equivalent 20,000 ohms-per-volt meter, equipped with KS-14510 L8 test probes.

(b) Hewlett Packard 400L Voltmeter, or equivalent. for measuring ac voltages below 3 volts.

(c) 21A Transmission Measuring Set, or equivalent (Range 20 to 20,000 Hz).

(d) KS-19935 Stelma Telegraph Carrier Test Set (Section 103-825-100), or equivalent.

(e) 911-type Data Test Sets, or equivalent.

(f) 2P14A Patching Cord, or equivalent. (Dial for DOTC).

(g) 312B Plug

3. STRAPPING AND OPTION CONNECTIONS

A. General

3.01 Quick-clip terminals (code 216A) are provided on the transmitter (DP1-25), receive interface (DP51) and the line circuit (DP52) for strapping options and are designated by E numbers. ***Numbers 20-24 bare wire (uninsulated) should be used with these terminals.*** The wire is securely inserted into the terminals with a small needle nose pliers while the board is resting on a firm flat surface.

> ***Caution: Soldering of wire to the quick-clip terminal is prohibited. The circuit board will be damaged and the terminal will come loose.***

3.02 A switch, with a front panel window to indicate its state, is provided on the transmitter (DP1-25) to arrange for FDX or HDX operation and on the demodulator (DP26-50) to arrange for a MARK HOLD or SPACE HOLD condition. In order to change the state of the switch the circuit card is removed and the proper setting is made by loosening three screws behind the panel, sliding the switch to the desired position as indicated on the front panel, and retightening the three lock (and contact) screws on the board behind the panel.

> ***Note:*** Removal of the line circuit and/or the transmitter circuit packs may cause alarms in the far end office to be activated.

B. Strapping on Line Circuit (DP52)

3.03 While levels are generally standardized for ease of administration and to permit use of standard test equipment, individual central offices may have different level requirements for specific applications at the output of the line circuit. The desired sending levels at the facility position telegraph equipment (TGEQ) jacks may be determined from the toll circuit layout record (TCLR) card. To meet these requirements, the line circuit may be strapped to provide for different output levels within the limits as given in Table B. In order to determine the required strapping for a desired per-channel send level, determine the per channel telegraph level (TL) necessary at the output of the line circuit to provide the required level at the TLG LINE BD. Strap E28 and E24 accordingly as directed in Table B (see Fig. 2).

> ***Note:*** The strapping provides for changes in send level in 1.5-dB steps. Therefore, should the exact level not be listed in Table B, select the strapping which will provide the next ***lower*** level of output send level.

3.04 A specific example of strapping follows. Assume that the desired TL at the TLG LINE BD is −26 dBm for a SW channel and is −23 dBm for a DW channel. ▶Table B shows that E28 strapped to E35 and E24 strapped to E5 will provide a −25.5 dBm and −22.5 dBm send level for SW and DW channels, respectively, at the output of the line circuit into a 600-ohm facility (see Fig. 3).

> ***Note:*** The above levels are 0.5 dB higher than desired and are allowed. However, should a higher level be indicated, select the strapping which will provide the next ***lower*** level.◀

3.05 Since some of the higher send-level strappings will produce excessively high system send levels in some instances, such as multichannel operation, some of the strappings in Table B are not always permissible (see Table C). These excessively high system send levels might overload the transmit amplifier or the facility. In order to prevent this condition, the system send level should not exceed +5 dBm into a 600-ohm line or +3 dBm into a 900-ohm line. For example, in a 600-ohm, 4-wire system with 17 channels, the per-channel send level should not exceed −7.3 dBm, as indicated in Table C, in order that the system send level not exceed +5 dBm.

3.06 Strapping on the line circuit for 2-wire and 4-wire connections and the compromise network connections is covered in Section 312-710-201.

3.07 Adjustments and tests using the No. 3 low voltage hub will be covered in another practices.

TABLE B*

LINE CIRCUIT STRAPPING OPTIONS FOR PER CHANNEL TRANSMIT LEVELS IN DBM

2- OR 4-WIRE CONNECTIONS				STRAP	
DW CHANNEL		SW CHANNEL		E28 TO	E24 TO
600Ω	900Ω	600Ω	900Ω		
†	†	+3.0	+1.0	E30	None
†	†	+1.5	−0.5	E29	None
+3.0	+1.0	0	−2.0	E32	None
+1.5	−0.5	−1.5	−3.5	E35	None
0	−2.0	−3.0	−5.0	E30	E15
−1.5	−3.5	−4.5	−6.5	E29	E15
−3.0	−5.0	−6.0	−8.0	E32	E15
−4.5	−6.5	−7.5	−9.5	E35	E15
−6.0	−8.0	−9.0	−11.0	E30	E10
−7.5	−9.5	−10.5	−12.5	E29	E10
−9.0	−11.0	−12.0	−14.0	E32	E10
−10.5	−12.5	−13.5	−15.5	E35	E10
−12.0	−14.0	−15.0	−17.0	E30	E9
−13.5	−15.5	−16.5	−18.5	E29	E9
−15.0	−17.0	−18.0	−20.0	E32	E9
−16.5	−19.5	−19.5	−21.5	E35	E9
−18.0	−20.0	−21.0	−23.0	E30	E5
−19.5	−21.5	−22.5	−24.5	E29	E5
−21.0	−23.0	−24.0	−26.0	E32	E5
−22.5	−24.5	−25.5	−27.5	E35	E5
−24.0	−26.0	−27.0	−29.0	E30	E1
−25.5	−27.5	−28.5	−30.5	E29	E1
−27.0	−29.0	−30.0	−32.0	E32	E1
−28.5	−30.5	−31.5	−33.5	E35	E1

* Depending upon the number of channels, not all options are permissible. See Table C.

† Strapping options not permissible due to excessively high output levels.

TABLE C

MAXIMUM PERMITTED PER CHANNEL TRANSMIT LEVEL AT THE LINE CIRCUIT OUTPUT IN DBM

NUMBER OF SW CHAN* IN VF SYS	MAX PER CHAN LEVEL† 600Ω	MAX PER CHAN LEVEL† 900Ω
1	+5.0	+3.0
2	+2.0	0.0
3	+0.9	−1.1
4	−1.0	−3.0
5	−2.0	−4.0
6	−2.8	−4.8
7	−3.5	−5.5
8	−4.0	−6.0
9	−4.5	−6.5
10	−5.0	−7.0
11	−5.4	−7.4
12	−5.8	−7.8
13	−6.0	−8.0
14	−6.5	−8.5
15	−6.8	−8.8
16	−7.0	−9.0
17	−7.3	−9.3

* Two SW CHAN may be replaced by one DW CHAN (or vice versa) without altering the total system transmitted power.

† SW STL — 21 dBm

DW STL — 18 dBm

C. Options on Transmitter (DP1-25) (Fig. 4)

STEP	PROCEDURE
1	For hub operation set switch S1 to HDX or FDX as required. ***Note:*** For type 2 hub operation the HV CONV ▶(DP53, MD)◀ provides half-duplex operation when its associated channel is set for half-duplex. In order to provide full-duplex operation, two half-duplex type 2 ***hubs*** must be used and the associated channels set for full-duplex operation. ▶This note does not apply to HV CONV (DP64, Standard).◀
2	For carrier squelch operation strap terminal E3 to E4. ***Note:*** The squelch strapping ***cannot*** be applied to ***both*** ends of a channel. The channel will lock itself out ▶on carrier fail in either direction.◀ The CLR card will designate the terminal at which squelch strapping will be applied, if any.
3	For either EIA or back-to-back operation strap E1 to E2 and set S1 to FDX.

D. Mark-Hold Switch on Demodulator (DP26-50) (Fig. 5)

STEP	PROCEDURE
1	Operate HOLD slide switch to MARK or SPACE as required by the Engineering Service Order (ESO), circuit order, and/or TCLR card.

E. Strapping on Receive Interface (DP51) (Fig. 6)

STEP	PROCEDURE
1	If the channel is to be used with type 2 hub operation, as required by the circuit order and/or TCLR card, strap E1 to E2 (Fig. 6). It causes the TL lead to be clamped SPACING upon loss of received carrier regardless of the setting of the HOLD switch.

4. TEST AND ADJUSTMENTS

A. Transmitting Channels

4.01 This procedure is directly applicable to a No. 2, No. 9B, or DOTC serviceboard, and may be adopted to other offices serving type 2 hubs. It covers the application of a MARK or SPACE signal to the SL leads and the monitoring of the output of the line circuit for the MARK and SPACE frequencies and the level of the individual channels. The No. 3 hub is not applicable to these tests.

4.02 In addition to the strapping and option connections of Part 3, strapping for 2- and 4-wire connecting circuits as per Section 312-710-201 must have been completed prior to proceeding with tests on the transmitter channels.

STEP	PROCEDURE
1	Obtain a service release on the channel under test prior to making any tests or adjustments.
	At the Near Terminal:
	On KS-19935-L5 control unit (Stelma) (Section 103-825-100):
2	Operate AM/FM switch to the FM position.
3	Operate DW-F/SW slide switch to DW or SW as required for channel to be checked.
4	Position the CHANNEL SELECT switch to the first channel to be tested.
5	Operate the LEVEL dBm switch to the −26 dBm position.

STEP	PROCEDURE
18	Operate the CONN pushbutton switch ***once*** to gain access to the circuit.
19	Instruct far end terminal to send undistorted "fox" test sentence.
20	Adjust the RCV BIAS potentiometer on the near end terminal for a minimum reading on the 911F. ***Note:*** The RCV BIAS potentiometer has about 25 turns from end to end. If on the display the mark bias is greater then that indicated for the space bias, turn the screwdriver adjustment ***counterclockwise*** to ***subtract*** marking bias from the received data signal. If on display the spacing bias is greater than indicated for the mark bias, turn the screwdriver adjustment ***clockwise*** to ***subtract*** spacing bias from the received data signal. If the RCV BIAS control is near the maximum range in either direction, it is an indication of a line facility irregularity or defective equipment in either the send or receive terminal.
21	Repeat Steps 1 through 20 for each channel to be tested.
22	Restore channel terminals to normal operation.

C. Alarms

4.08 There is one system alarm card ▶(DP62*)◀ for each line circuit (DP52) of a 43B1 VFCD System. The system alarm monitors for high power, carrier failure, and excessive noise in two monitoring channels and for low power in all channels of the VF system.

▶*Early units may have DP54 (MD) installed. DP62 is Standard.◀

4.09 Positions 3 and 4 of the channel terminal housing are associated with system alarm 1, and positions 9 and 10 of the channel terminal housing are associated with system alarm 2.

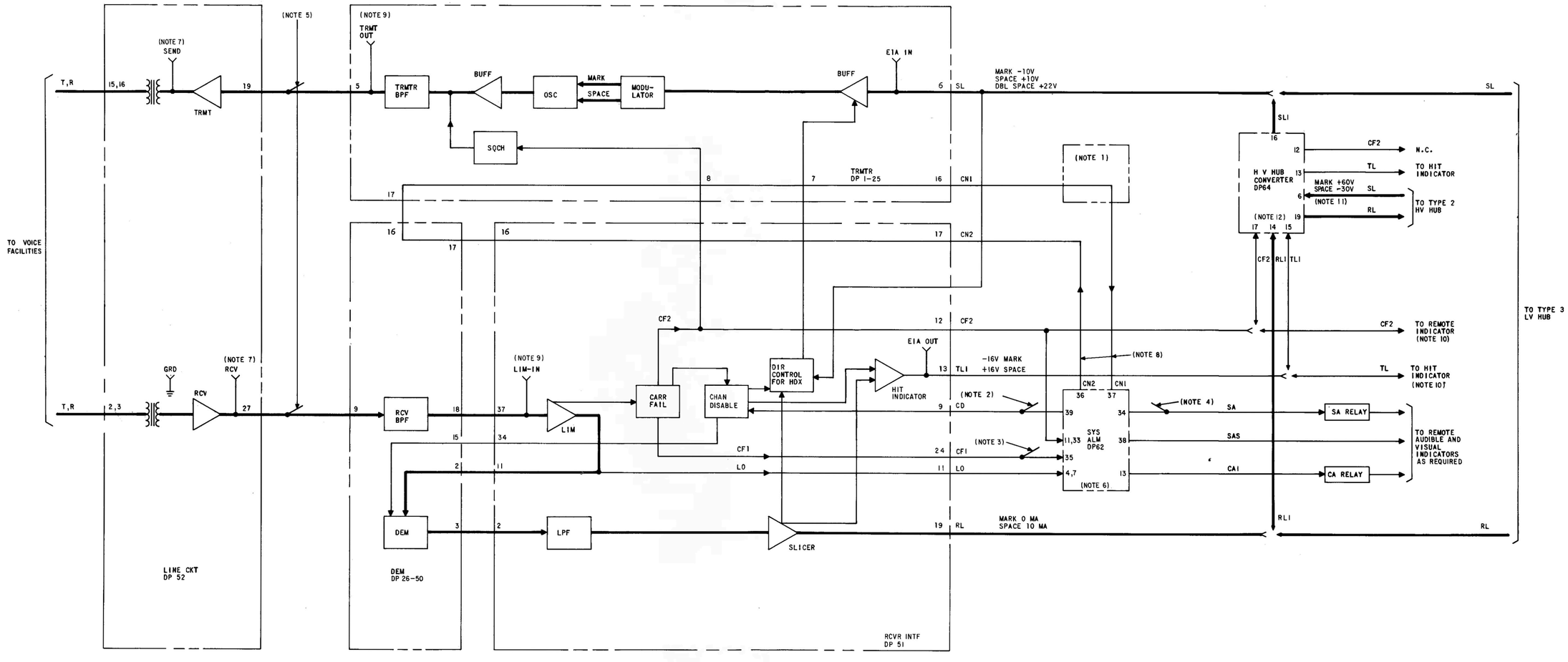
4.10 A system alarm (SA) relay and channel alarm (CA) relay are provided for each bay on the J70169AC fuse and alarm panel. The SA relay, which is normally released, operates when any system in the associated bay experiences a system alarm. The CA relay, which is normally operated, releases due to a channel alarm in any system alarm circuit pack of the associated bay, or due to a carrier fail in any channel in the bay not associated with a system alarm circuit pack. It also releases if any of the circuit packs of the two monitoring channels is removed or if the system alarm circuit pack is removed.

Note: If a system alarm circuit pack is not in either position 6 or 13 of the channel terminal housing, the associated SYS ALM switch must be in the OFF position.

4.11 Figure 9 is a block diagram presented to give an overall picture and understanding of system alarm.

4.12 The following tests are performed to determine whether a system alarm is operating properly.

STEP	PROCEDURE
	Caution: Precaution should be taken to avoid operating the bay alarms if this is undesirable and to avoid interrupting data transmission on any in-service channels connected to the system alarm position.
	Test For Channel and System Alarm Due to Carrier Fail
1	Obtain a service release on the system under test.
2	Operate the associated SYS ALM switch at the far end terminal to the OFF position to avoid operating the bay alarms, and to ON at the near end terminal.
	Note: Some of the following tests will cause central office alarms at the near end to be activated if the alarm relays are not blocked.
3	Remove the first demodulator (DP26-50 circuit pack) from the channel to be checked.
	Requirement: The following should occur.
	(a) The CF lamp on the RCV INT circuit pack of the associated channel will light.
	(b) The DS1 lamp on the SYS ALM circuit pack undergoing tests will light.
	Note: If the CF lamp on the RCV INT card lights and the DS1 lamp on the SYS ALM card does not light, check the CF1 wiring between the SYS ALM card and the channel terminal.
	(c) The red CA lamp on the fuse and alarm panel will light.
	(d) The CA relay will release and provide visual and audible indication at the near location.
4	Replace the demodulator circuit pack.
5	Repeat Steps 1 through 4 for all channels in the system.
	Check of Interlock Wiring (CN1 and CN2 Leads)
6	Remove the transmitter (DP1-25 circuit pack) of one of the monitoring channels at the near end.
	Requirement: The following should occur if the SYS ALM switch is in the ON position:
	(a) The CA lamp on the fuse and alarm panel should light.
	(b) The CA relay on the fuse and alarm panel should release.
	(c) The DS1 lamp on the SYS ALM card should remain dark.
	(d) The SA relay should remain released.

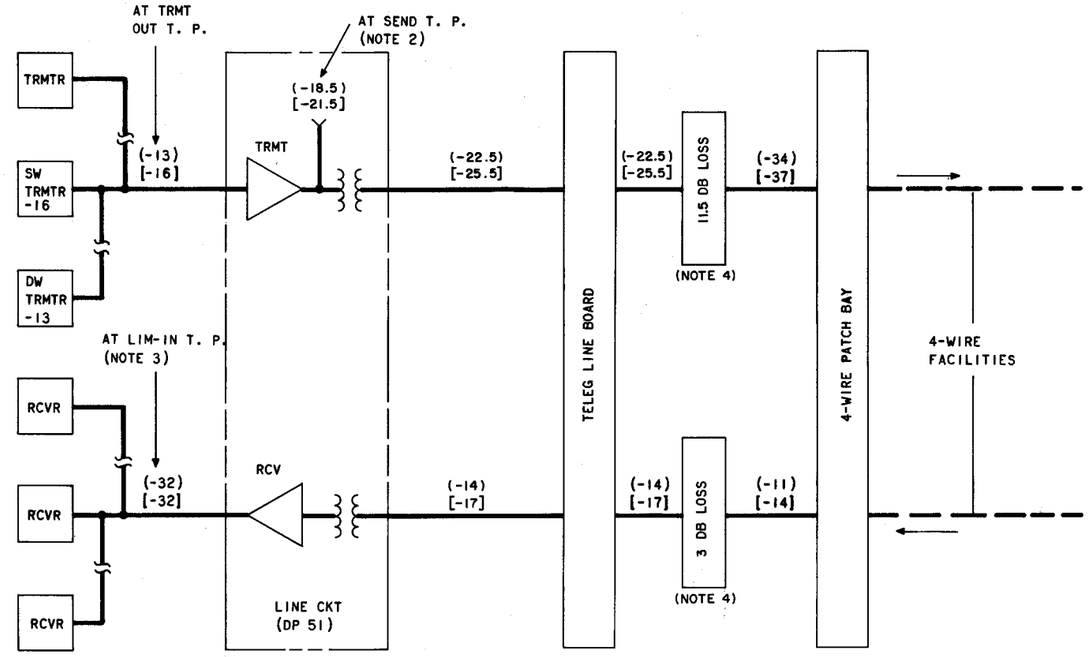


NOTES:

1. OTHER MONITORING POSITION, INCLUDING, TRMTR, DEM AND RCVR INTF.
2. MULTIPLE TO ALL CD LEADS OF ALL OTHER CHANNELS ASSOCIATED WITH SAME SYS ALM.
3. MULTIPLE TO ALL CF1 LEADS OF SAME VF SYSTEM.
4. MULTIPLE TO ALL SA LEADS IN SAME BAY.
5. MULTIPLE TO OTHER TERMINALS FEEDING SAME VF FACILITY.
6. DP54 (MD) MAY BE INSTALLED IN EARLY UNITS. DP62 IS STANDARD.
7. USE 600 Ω TERMINATED METER.
8. LEADS CONNECTED ONLY IF CHANNEL TERMINAL IS LOCATED IN POSITION 3,4,9 OR 10 OF THE CHANNEL HOUSING.
9. USE HIGH IMPEDANCE METER.
10. USED IN CONJUNCTION WITH LOW VOLTAGE HUB OPERATION ONLY.
11. −60 VOLTS WHEN SPACE CONDITION EXISTS ON TWO RL LEADS.
12. DP53 (MD) MAY BE INSTALLED IN EARLY UNITS. DP64 IS STANDARD.

TPA 537243

Fig. 1—One Channel—43B1 VFCD System—Block Diagram



NOTES:
1. LEVELS SHOWN FOR SW STL = -21 DBM AND DW STL = -18 DBM.
2. USE 600Ω TERMINATED METERS WHEN READING LEVELS ON LINE CKT.
3. USE HIGH IMPEDANCE METER AT LIM-IN T. P.
4. VALUE OF PADS INCLUDE OFFICE CABLING LOSS.

LEGEND:
[ ], SHOWN TL IN DBM FOR SINGLE BANDWIDTH CHANNELS.
( ), SHOWN TL IN DBM FOR DOUBLE BANDWIDTH CHANNELS.

TPA 537245

Fig. 3—Telegraph Levels—43B1 VFCD System

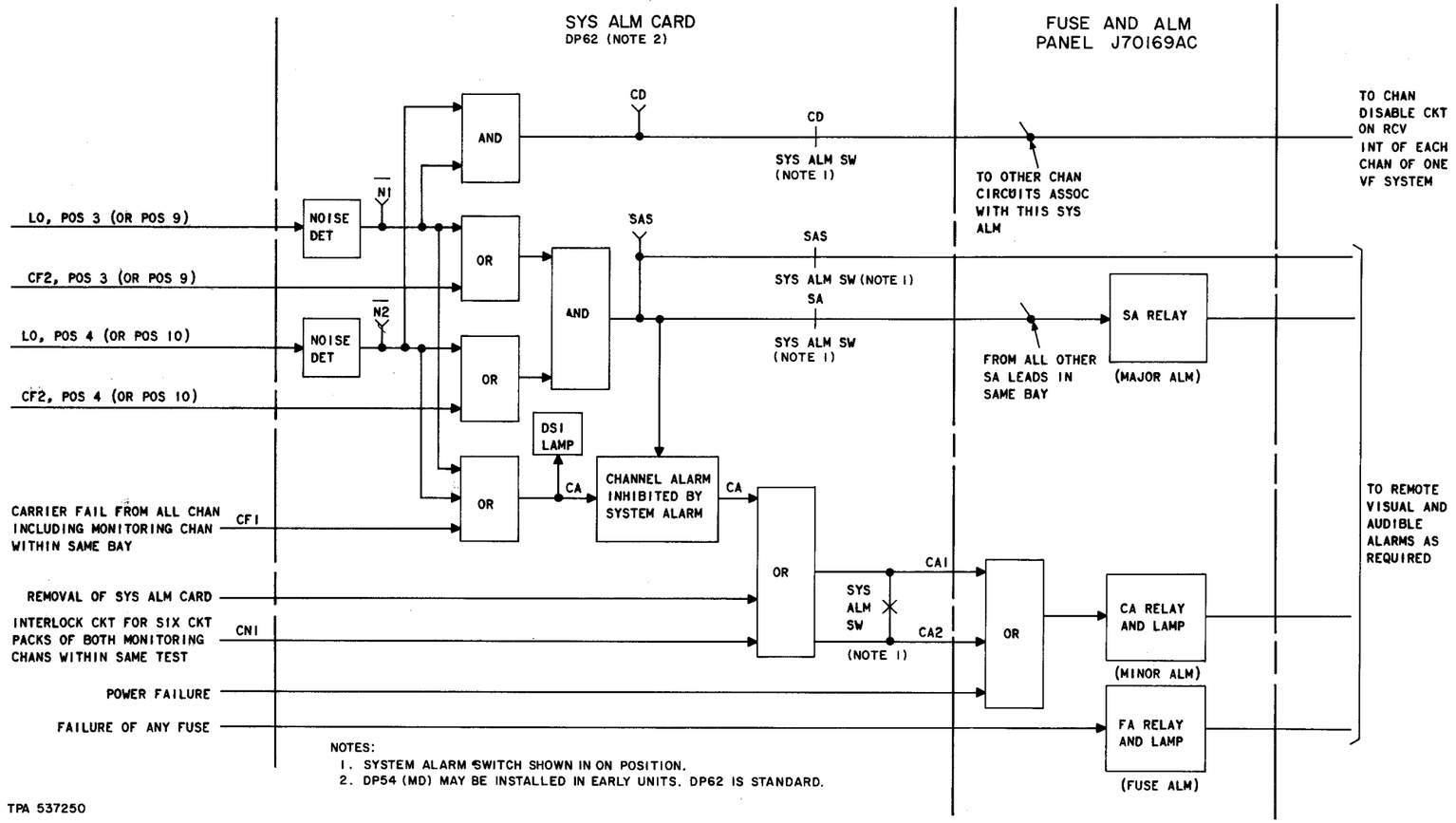


Fig. 9—System Alarm—43B1 VFCD System—Block Diagram