
D3 CHANNEL BANK
EQUIPMENT INSTALLATION AND TESTS
DIGITAL TRANSMISSION SYSTEMS

This section contains procedures for the *initial* installation and testing of plug-in units in both the D3 hot spare and maintenance (HS&M) panel and the D3 channel banks. These tests should not be repeated when installing channel units for initial circuit orders or reassignments. The D3 channel bank bay is shop-wired and it is assumed that wiring continuity and other bay tests have been completed.

This section is reissued to include the data logic unit (DLU) plug-in required for dataport operation; also to include more information on channel bank timing options and to make minor corrections. Revision arrows are used to emphasize the more significant changes. This reissue does not affect the Equipment Test List.

◆When the DLU is supplied as part of the common equipment, the D3 channel bank is being equipped for dataport channel units which apply digital data directly to carrier channels. Along with the use of a different plug-in, the channel bank must be prepared for looped or external timing as required. When used for dataport, the channel bank is called a D3B channel bank. Section 365-150-107 describes the D3B channel bank, timing requirements and dataports, and covers option selection when adding dataport service.◆

The procedures outlined in this section have been divided into four charts. Chart 1 covers installation and testing of the HS&M panel; Chart 2 contains procedures for installing the channel bank common equipment and testing the powering and the alarms; Chart 3 contains the transmission tests for the channel bank common equipment; Chart 4 covers testing the channel bank common signaling circuitry using the J98718BR signaling test unit. The following general information is applicable to these procedures.

Disregard the lighting or extinguishing of lamps not specifically referred to in the verification column of Charts 1 through 4.

When performing the tests of this section, if verification is not obtained, refer to Table A for corrective action and repeat the tests as required.

At the completion of the tests, the channel banks are to be left in the looped condition until the line is connected and overall tests are made per Section 365-150-502.

Only those channel banks to be installed should be fused.

NOTICE

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CHART 1

INSTALLATION AND TESTING OF PLUG-IN UNITS IN THE HOT SPARE AND MAINTENANCE PANEL

Note: Disregard the lighting or extinguishing of lamps not specifically referred to in the verification column.

APPARATUS:

- 1—J94003A or C Noise Measuring Set (NMS, Section 103-611-100 or 103-611-101) or equivalent
- 1—J98718BR Channel Signaling Test Unit
- 1—KS-14510 Volt-Ohm-Milliammeter (VOM), ♦KS-20599, L4 Digital Multimeter (DMM)♦ , or equivalent
- 1—P6AA Cord or 2—3P6D Cords for channel connections
- 1—3P6D or 3P17B Cord for NMS
- 1—3-Inch Shorting Strap Equipped With KS-19531, L2 pin plugs (Section 365-150-500)

STEP	ACTION	VERIFICATION
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A. Fusing

Note: Although equipment should be fused by the supplier, the following instructions are provided as contingency information.

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| 1 | Ensure that appropriate main and alarm fuses are installed at the battery distribution fuse board (BDFB). | |
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STEP	ACTION	VERIFICATION
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- 2 At the D3 channel bank bay, install the following fuses in the power distribution panel **in the order listed:**

7-FOOT BAY (ED-3C356-30) PER SD-3C104-01

- 2 - 48V MAIN A&B 30A (BDFB)
- 2 - 48V MAIN A&B 1-1/3A (BDFB)
- 2 - 48V FLT MAIN A&B 15A
- 2 - 48V FLT MAIN A&B 1-1/3A
- 2 - 48V ABS A&B 3A

11-FOOT 6-INCH/9-FOOT BAY (ED-3C352-30) PER SD-3C104-01

- 1 - 48V MAIN 30A (BDFB)
- 1 - 48V MAIN 1-1/3A (BDFB)
- 1 - 48V FLT MAIN 15A
- 1 - 48V FLT MAIN 1-1/3A
- 1 - 48V ABS 3A

11-FOOT 6-INCH/9-FOOT/7-FOOT BAY (ED-3C615-30) PER SD-3C104-02

- 1 - 48V MAIN 30A
- 1 - 48V MAIN 1-1/3A
- 1 - 48V FLT MAIN 15A
- 1 - 48V FLT MAIN 1-1/3A
- 1 - 48V ABS 3A

- 3 At power distribution panel, 3A fuse in -48V position for HS&M panel (designated MAINT SPARE on ED-3C354-30 panel or HS on ED-3C615-30 panel).

- 4 Check polarity of -48V supply by connecting the + lead to terminal punching 49 and - lead to 50 on CAU jack at rear of HS&M shelf. VOM set to 60 DC VOLTS or DMM set to VDC and 100.

Requirement: 43 through 53 volts.

Warning: If VOM reads off-scale to the left, recheck meter lead polarity.

STEP	ACTION	VERIFICATION
	<i>If correct, then power input is probably reversed and testing should be terminated until condition is corrected (check bay wiring and office battery input to bay).</i>	
B. HS&M Panel Installation Tests		
5	At the power distribution panel, install -48V (3A) and -48S (2A) fuses for HS&M panel.	No lamps lighted.
6	<i>With the switch in its OFF position.</i> install power converter unit (PCU).	Requirement: 43 through 53 volts.
	Note: On the J87380B PCU, the ON/OFF switch and extractor latch are mechanically interconnected which prevents insertion or extraction of this PCU with the switch in the ON position.	
7	Using the VOM or DMM with + lead to INPUT GRD (J87380A PCU) or BAT GRD (J87380B PCU) and - lead to -48V on PCU, measure indicated voltage. Set VOM to 60 DC VOLTS or set DMM to VDC and 100.	
	Warning: <i>If VOM reads off-scale to the left, recheck meter lead polarity. If correct, then power input is probably reversed and testing should be terminated until condition is corrected.</i>	
8	On the PCU, operate the ON/OFF switch to ON.	Red CONV FAIL lamp on PCU, if lighted, extinguishes within 10 seconds.
9	Using the VOM or DMM, measure indicated voltages at appropriate PCU test points, observing polarity.	

STEP	ACTION	VERIFICATION
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METER CONNECTIONS		METER SCALE	REQUIREMENT (VOLTS)
J87380A PCU	J87380B PCU		
+ to OUTPUT GRD - to -12V	+ to OP GRD - to -12	60V	10 thru 14
- to OUTPUT GRD + to +12V	- to OP GRD + to +12	60V	10 thru 14, but within $\pm 3/4$ volt of above reading
- to OUTPUT GRD + to +4V	- to OP GRD + to +4.2	12V	J87380A: 3.6 thru 4.6 J87380B: 3.6 thru 5.3

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|----|--|---|
| 10 | Remove test connections. | |
| 11 | On the PCU, operate the ON/OFF switch to OFF. | ◆ CONV FAIL lights on J87380B PCU◆ ; all lamps extinguished on J87380A PCU. |
| 12 | Install the remaining plug-in units (except channel unit) into the HS&M panel positions shown in Fig. 1 (disregard connections and NMS). | ALM CUTOFF lamp (POWER OFF lamp on J87380A L5) on PCU lights as ACU is inserted and remains lighted. |
| 13 | On the PCU, operate the ON/OFF switch to ON.

Note: The ACO button on the ACU can be depressed to extinguish the office alarms. If desired, office alarms may be disabled before continuing by blocking the BA and FA relays on all codes of power distribution panel except ED-3C615-30. | ALM CUTOFF (POWER OFF) lamp on PCU is extinguished.
Red CONV FAIL lamp, if lighted, extinguishes within 10 seconds.
Red bay alarm lamp and AR lamp (on ACU) light if the PATCH/LOCAL switch is set to PATCH on the CGU, or the ACO lamp lights if the PATCH/LOCAL switch is set to LOCAL. |
| 14 | Repeat Steps 9 and 10 as a loaded voltage check. | |
| 15 | On the CGU, ensure that PATCH/LOCAL switch is set to LOCAL. | ACO lamp on ACU is lighted. |
| 16 | On the ACU (List 1 through 3), depress the LT pushbutton or operate the LT switch to up position (List 4 and later). | LT lamp lights. |
| 17 | Set VOM to 3 DC VOLTS or ◆ DMM to DCV and 10◆ ; at TST jacks on ACU. | Requirement: 2.0 through 3.0 volts. |

STEP	ACTION	VERIFICATION
18	On the ACU, depress the LT pushbutton or operate the LT switch to down position.	LT lamp extinguishes. Requirement: 1.0 through 3.0 volts.
19	Remove test connections.	
20	On the CGU, operate the PATCH/LOCAL switch to PATCH.	On the ACU, the AR lamp lights and the ACO lamp remains lighted.
21	On the ACU, install a shorting strap from LP to GRD pin jacks.	AR lamp extinguishes. AY lamp lights but extinguishes along with the ACO lamp is less than 20 seconds.

C. HS&M Panel Alarm Tests

Note: If any lamp is not lighted as required in this test, remove the lamp and check its continuity with an ohmmeter before replacing the ACU. If the lamp is defective, replace it with another lamp.

22	On the CGU, ensure that the PATCH/LOCAL switch is set to PATCH.	
23	Perform the test operations of Table C.	Requirement: ACU lamps light per Table C.

D. Test of Common Signaling Circuitry for HS&M Panel

- 24 Verify that a shorting strap is between LP and GRD jacks on ACU.
- 25 Insert the J98718BR channel unit signaling test unit into the CU position on the HS&M panel.
- 26 Perform the following switch operations on the test unit.

SWITCH POSITION		INDICATORS		
A	B	RED	GREEN	YELLOW
ON-HOOK	ON HOOK	on	on	on
ON-HOOK	off-hook	on	off	on
off-hook	ON HOOK	off	on	on
off-hook	off-hook	off	off	off

STEP	ACTION	VERIFICATION
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Note: If the TU or RU is replaced to clear a signaling trouble, repeat Step 26 to test replacement unit.

- 27 Remove the test unit from the HS&M panel and install any type channel unit.

E. Transmission Tests for HS&M Panel

Note: Experienced personnel may bypass the following detailed HS&M transmission test procedures by referring directly to the tabulation of Fig. 1.

CAU Calibration Check

- 28 Referring to Fig. 1, on the CAU, operate the TEST switch to CAL.

Note: If requirement is not met, the CAU should be returned for factory alignment and a working CAU must be obtained to continue tests.

Requirement: CAU indicates in raised black area, and tone is heard when VOL control is adjusted clockwise.

Receiver Gain

- 29 Unloop HS&M panel by removing the shorting strap between the LP and GRD test jacks on the ACU. Operate the LT switch or pushbutton on the ACU to extinguish the LT lamp, if lighted.

- 30 On the CGU, operate the LEVEL switch to OdBm0 and the PATCH/LOCAL switch to LOCAL.

- 31 Connect the CAU as shown in Fig. 1 and set the TEST switch to CHAN LINE, REJ FLT switch to OUT, and SEND LEVEL switch to OFF.

Requirement: CAU indicates in black area, and tone is heard when VOL control is adjusted clockwise.

Net Loss

- 32 Loop HS&M panel by installing a shorting strap between the LP and GRD test jacks on the ACU.

- 33 On the CGU, operate the PATCH/LOCAL switch to PATCH.

- 34 On the CAU, operate the SEND LEVEL switch to 0.

Requirement: CAU indicates -0.25 through +0.25 dB (audible tone area).

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STEP	ACTION	VERIFICATION
NMS Calibration Check		
	<i>Note:</i> Before each test, using the NMS, condition it for a reading higher than the test requirement to prevent the needle from being driven against its stop.	
35	Connect the NMS to the CAU as shown in Fig. 1 and operate CAU TEST switch to CAL.	Requirement: 89.8 through 90.2 dBrn on NMS.
	<i>Note:</i> If the NMS fails to meet this requirement, it should be calibrated according to the instruction manual for the particular NMS being used (Section 103-611-101 for type 3C).	
Receiver Noise		
36	Unloop HS&M panel by removing the shorting strap between the LP and GRD test jacks on the ACU. Operate the LT switch or pushbutton on the ACU to extinguish the LT lamp, if lighted.	
37	On the CGU, operate the LEVEL switch to RCVR and PATCH/LOCAL switch to LOCAL.	
38	On the CAU, operate the SEND LEVEL switch to OFF and the TEST switch to CHAN LINE.	Requirement: 25 dBrc or less on NMS.
39	On the CGU, operate the LEVEL switch to IDLE.	Requirement: 18 dBrc or less on NMS.
Distortion		
40	Loop HS&M panel by installing a shorting strap between the LP and GRD tests jacks on the ACU.	
41	On the CGU, operate the PATCH/LOCAL switch to PATCH.	
42	On the CAU, operate the REJ FLT switch to IN.	
43	On the CAU, operate the SEND LEVEL switch to the positions shown and observe the NMS indications.	Requirement: dBrnC or less.

STEP	ACTION	VERIFICATION
	-0	56
	-10	46
	-20	36
	-30	26
	-40	22

Idle Circuit Noise

- 44 On the CAU, operate the REJ FLT switch to OUT and SEND LEVEL switch to OFF. **Requirement:** 23 dBrc or less on NMS.
- 45 Remove all test connections except the shorting strap between LP and GRD jacks on the ACU which is required to keep the HS&M panel in looped mode.
- 46 Operate the CGU PATCH/LOCAL switch to PATCH and operate the LT switch on the ACU to extinguish the LT lamp, if lighted. All lamps on the ACU and PCU should be extinguished in about 20 seconds.

Note: If the office alarms were disabled for the preceding tests, they should be enabled again.

CHART 2**INSTALLATION OF CHANNEL BANK COMMON EQUIPMENT, POWER AND ALARM TESTS**

Note 1: If it is known that the distant end of the system will be equipped with the D1D or D2 channel bank, adapters should be installed at this time. The ED-3C363-30, G2 adapters are required with a D2 channel bank at the far end. The ED-3C363-30, G1 adapters are required with a D1D channel bank at the far end. An adapter is placed between both the P30 and J30 connector set and between the P31 and J31 connector set for the D3 channel bank. Screws are used to hold the keyed adapter between the connector sets. No adapters are required at the D1D or D2 channel bank.

Note 2: *Disregard the lighting or extinguishing of lamps not specifically referred to in the verification column.*

APPARATUS:

- 1—3-inch Shorting Straps Equipped With KS-19531, L2 Pin Plugs (Section 365-150-500) for each channel bank installed
- 1—KS-14510 Volt-Ohm-Milliammeter (VOM), ♦KS-20599, L4 Digital Multimeter (DMM)♦, or equivalent

STEP	ACTION	VERIFICATION
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A. Common Equipment Installation Tests

1 At the power distribution panel, insert -48F (3A), -48S (2A), and -48V (3A) fuses associated with the bank to be installed.

2 **With switch in the OFF position**, install power converter unit (PCU) for the channel bank being installed.

Note: On the J87380B PCU, the ON/OFF switch and extractor latch are mechanically interconnected which prevents insertion or extraction of this PCU with the switch in the ON position.

3 Using the VOM or DMM with + lead to INPUT GRD (J87380A PCU) or BAT GRD (J87380B PCU) and - lead to -48V on PCU, measure indicated voltage. Set VOM to 60 DC VOLTS or set DMM to VDC and 100.

Requirement: 43 through 53 volts.

Warning: If VOM reads off-scale to the left, recheck meter lead polarity. If correct, then power input is probably reversed and testing should be terminated until condition is corrected.

4 On the PCU, operate the ON/OFF switch to ON.

Red CONV FAIL lamp on the PCU, if lighted, extinguishes within 10 seconds.

5 Using the VOM or DMM, measure indicated voltages at appropriate PCU test points, observing polarity.

METER CONNECTIONS		METER SCALE	REQUIREMENT (VOLTS)
J87380A PCU	J87380B PCU		
+ to OUTPUT GRD - to -12V	+ to OP GRD - to -12	60V	10 thru 14
- to OUTPUT GRD + to +12V	- to OP GRD + to +12	60V	10 thru 14, but within $\pm 3/4$ volt of above reading
- to OUTPUT GRD + to +4V	- to OP GRD + to +4.2	12V	3.6 thru 4.6

STEP	ACTION	VERIFICATION
6	Remove test connections.	
7	On the PCU, operate the ON/OFF switch to OFF.	◆CONV FAIL lighted on J87380B PCU◆ ; all lamps extinguished on J87380A PCU.
8	◆On the IU or DLU (for dataport) plug-in, verify that local timing is selected per TABLE B for this test and that option C is selected for normal operation. <i>Note:</i> After testing, the channel bank timing (local, looped, external) required for the circuit layout can be selected per TABLE B.	
9	If loop timing is required for the circuit layout, verify the installation of corrected loop timing wiring by inspecting behind the IU slot using Fig. 2. The wiring can be corrected per CN6482MV on a class B billable basis.◆	
10	Install the remaining plug-in units into the common equipment panel positions shown in Fig. 3 (disregard connections and NMS). <i>Note 1:</i> ◆When used for a trunk group going to a digroup terminal/No. 4 ESS, the receive unit (RU) must be a L4 or later or modified to prevent signaling trouble with looped timing. Modified units will be stamped L5 or will have an A or 5 stamped on the 116B H1C inside the unit; this latter identifier may appear as 116B5 or MSI5.◆ <i>Note 2:</i> The trunk processing unit (TPU) contains option screws behind removable front panel relating to channel units. ◆These are E-lead grounding options that are needed for DX, TDM and E&M channel units in some circuits.◆ The position of these option screws will not affect tests.	ALM CUTOFF lamp (POWER OFF lamp on J87380A, L5) on PCU lights as ACU is installed. TPU and MEM lamp lights as TPU is installed.
11	On the PCU, operate the ON/OFF switch to ON. <i>Note 1:</i> The ACO pushbutton on the ACU can be depressed to extinguish the bay alarm lamp. If desired, office alarms may be disabled before continuing by blocking the BA and FA relays on all codes of power distribution panels except ED-3C615-30.	ALM CUTOFF (POWER OFF) lamp on PCU is extinguished. Red CONV FAIL lamp, if lighted, extinguishes within 10 seconds. Red bay alarm lamp may light, depending on the condition of the system.

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STEP	ACTION	VERIFICATION
12	Repeat Steps 5 and 6 as a loaded voltage check.	
13	Set VOM to 3 DC VOLTS or set DMM to VDC and 10 and measure at ACU TST jacks.	Requirement: 0.75 through 3.0 volts.
14	On the ACU install a shorting strap between the LP and GRD pin jacks.	Requirement: 1.5 through 3.0 volts.
15	Remove voltmeter test connections.	

B. Common Equipment Alarm Test

Note: If any lamp fails to light as required, remove the lamp and check its continuity with an ohmmeter before replacing the plug-in unit. If the lamp is defective, replace it.

- 16 Verify that the LLC switch on the TPU is set to OFF and that the LP to GRD strap on the ACU is installed.

ACU Alarm Test

- 17 Perform the test operations of Table C. **Requirement:** ACU lamps light per Table C.

TPU Alarm Test

- 18 On the TPU, operate the LLC switch to ON.
- 19 Remove the LP to GRD strap on the ACU and wait until TPU operates (no more than 2 seconds is required to operate TPU). Reinstall LP to GRD strap on the ACU.
- 20 Operate the LLC switch to OFF.
- On the TPU, the TPU lamp and MEM lamp (if present) light (observe for 20 seconds), and on the ACU the AY lamp lights (observe for no less than 20 seconds).
- All lamps extinguish immediately except for the MEM lamp (if present on the TPU) which is cleared by depressing the MEM pushbutton (if present on the TPU).

C. Fuse Alarm Tests

- 21 At power distribution panel, remove -48S fuse associated with bank being installed. TPU and red AR lamps light.
- 22 Insert an operated (blown) fuse in -48S fuse holder. FUSE ALM lamp lights on PCU.
- 23 Replace operated fuse with good fuse. Yellow AY lamp lights. Red AR lamp is extinguished. TPU and yellow AY lamps should be extinguished **within 20 seconds.**

STEP	ACTION	VERIFICATION
24	Repeat Steps 21 through 23 for -48F fuse.	Indications are the same.
25	Remove -48V fuse associated with bank being installed.	TPU lamp lights.
26	Insert an operated fuse in the -48V fuse holder.	PCU FUSE alarm lamp lights.
27	Replace operated fuse with good fuse.	Red CONV FAIL lamp, if lighted, extinguishes within 10 seconds. Yellow AY lamp lights. Within 30 seconds , yellow AY and TPU lamps should be extinguished. MEM lamp on TPU remains lighted.

D. Equalization

Note: Equalization between the D3 channel bank bay and office repeater bay (ORB) or digital cross-connect (DSX-1) is provided by use of equalizers or pads mounted at the D3 channel bank bay. For J98718A, B, and C bays, an ED-97079 pad or 358-type equalizer is used at the top-bay equalizer panel. The J98718J, K, and L bays are equipped with a 988A equalizer board which is mounted behind channel position No. 1 of each channel bank. The amount of equalization is selected by option strapping on the 988A equalizer. Continue with Step 28 for J98718A, B, and C bays, or proceed to Step 32 for J, K, and L bays.

J98718A, B, and C Bays

- 28 Select an equalizer or pad dependent upon cable distance between D3 channel bank bay and ORB or DSX-1 as follows:

STEP

ACTION

VERIFICATION

CABLE LENGTH IN FEET*		EQUALIZER OR PAD
TO ORB	TO DSX-1	
0 to 150	0 to 150	ED-97079, G6 Pad
150 to 450	150 to 450	358D
450 to 750	450 to 655	358E

*At cable length transition point, use equalizer for the shorter length (Do Not Overequalize)

- 29 Install selected equalizer or pad into the equalizer and distribution panel.
- 30 Make wire-wrap connections between E1 to 1, E2 to 2, E3 to 3, and E4 to 4.
- 31 Proceed to Step 37.

J98718J, K, and L Bays

- 32 Determine equalizer option as follows:

CABLE LENGTH IN FEET*		988A EQUALIZER OPTION†
TO ORB	TO DSX-1	
0 to 220	0 to 220	A
220 to 440	220 to 440	B
440 to 750	440 to 655	C

*At cable length transition point, use equalizer for the shorter length (Do Not Overequalize)

†Option A installed in factory. If other option is required, remove Option A and install appropriate option.

STEP	ACTION	VERIFICATION
33	If option A is required, verify that it is provided and proceed to Step 36, otherwise, continue with Step 34.	
34	If option B or C is required, remove the wires between the three pair of terminals designated A.	
35	Select the appropriate option by installing jumper wires between the three pair of terminals designated B or C.	
36	◆Verify that the leads on the left side of equalizer board are no closer than 1/2 inch to the channel unit connector or to signal leads going to the connector. Also verify that all the ABAM transmit pairs are brought down the right side of bay and the receive pairs down the left. These measures prevent high noise conditions.◆	
37	If channel units are to be installed at a later date, ensure that the strap remains between LP and GRD pin jacks on the ACU. <i>Note 1:</i> If the office alarms were disabled for the preceding tests, they should be enabled again. <i>Note 2:</i> If the additional channel banks are to be installed, repeat Chart 2 for each channel bank being installed.	All lamps on ACU, PCU, and TPU should be extinguished.

CHART 3

INSTALLATION OF CHANNEL UNITS AND TRANSMISSION TESTS

Note 1: Channel bank transmission tests are illustrated by Fig. 3 and Fig. 4. Experienced personnel may refer to the tabulation of these figures and bypass the following detailed steps.

Note 2: Gain, distortion, crosstalk, and noise tests are performed on channel 1 or the first channel tested. Net loss is performed on all channels.

APPARATUS:

1—J94003A or C Noise Measuring Set (NMS, Section 103-611-100 or 103-611-101)

CHART 3 (Contd)

APPARATUS (Contd):

- 1—KS-14510 Volt-Ohm-Milliammeter (VOM), ♦KS-20599, L4 Digital Multimeter (DMM)♦ , or equivalent
- 1—P6AA Cord or 2—3P6D Cords for Channel Connections
- 1—3P6D or 3P17B Cord for NMS
- 1—3-inch Shorting Strap Equipped with KS-19531, L2 in plugs (Section 365-150-500)

STEP	ACTION	VERIFICATION
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|---|--|--|
| 1 | Install channel units assigned to channel bank being tested. If assignments have not been made at this time, equip CU slot 1 with any type channel unit. | |
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Note: ♦Prior to service, channel unit options must be set per circuit order information. If dataports are being installed, the ED-3C832 connector supplied with each dataport connects it to the DLU.♦

CAU Calibration Check

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|---|--|--|
| 2 | Referring to Fig. 3, on the CAU, operate the TEST switch to CAL. | |
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Note: If the requirement is not met, the CAU should be returned for factory alignment and a working CAU must be obtained to continue tests.

Requirement: CAU indicates in raised black area, and tone is heard when VOL control is adusted clockwise.

Receiver Gain

- | | | |
|---|--|--|
| 3 | Unloop channel bank under test by removing the shorting strap between th LP and GRD test jacks on the ACU. Operate the LT switch or pushbutton on the ACU to extinguish the LT lamp, if lighted. | |
| 4 | Connect the CGU as shown in Fig. 3 and operate the LEVEL switch to 0dBm0 and the PATCH/LOCAL switch to PATCH (LOCAL if CGU has been installed in IU slot). | |

STEP	ACTION	VERIFICATION
5	Connect the CAU as shown in Fig. 3 to the channel unit to be tested and operate the TEST switch to CHAN LINE, REJ FLT switch to OUT, and SEND LEVEL switch to OFF.	Requirement: CAU indicates in black area, and tone is heard when VOL control is adjusted clockwise.
Net Loss		
6	Loop channel bank.	
	Note 1: The channel bank can be looped as follows:	
	A. If an alarm condition exists (AR or AY lamp lighted on ACU), depress the ACO pushbutton and operate the LT switch to light the LT lamp on the ACU.	
	B. If no alarm condition exists, install a shorting strap between the LP and GRD test jacks on the ACU.	
	C. If the ACO lamp is lighted on the ACU, operate the LT switch to light the LT lamp on the ACU.	
	Note 2: The channel bank is unlooped by operating the LT switch on the ACU to extinguish the LT lamp or by removing the LP to GRD strap.	
7	On the CAU, operate the SEND LEVEL switch to 0.	Requirement: CAU indicates -0.25 to +0.25 dB (green-black-green area) or tone is audible.
	Note: Net Loss should be performed on all channels by moving the channel unit or test connections.	

NMS Calibration Check

Note: Before each test using the NMS, condition the NMS for a reading higher than the test requirement to prevent the needle from being driven against its stop.

8	Connect the NMS to the CAU as shown in Fig. 3 and operate the CAU TEST switch to CAL.	Requirement: 89.8 through 90.2 dB on NMS.
	Note: If the NMS fails to meet this requirement, it should be calibrated according to the instruction manual for the particular NMS being used (Section 103-611-101 for type 3C).	

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STEP	ACTION	VERIFICATION
Receiver Noise		
9	Unloop channel bank (see Note 2 of Step 6).	
10	On the CGU, operate the LEVEL switch to RCVR.	
11	On the CAU, operate the SEND LEVEL switch to OFF and TEST switch to CHAN LINE.	Requirement: 25 dBrnc or less on NMS.
12	On the CGU, operate the LEVEL switch to IDLE.	Requirement: 18 dBrnc or less on NMS.
13	Remove CGU test connections.	

Distortion

14	Loop channel bank (see Note 1 of Step 6).	
15	On the CAU, operate the REJ FLT switch to IN.	
16	On the CAU, operate the SEND LEVEL switch to the positions shown and observe the NMS indications.	Requirement: dBrnc or less.
	-0	56
	-10	46
	-20	36
	-30	26
	-40	22

Idle Circuit Noise

17	On the CAU, operate the REJ FLT switch to OUT and SEND LEVEL switch to OFF.	Requirement: 23 dBrnc or less on NMS.
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Crosstalk

Note: The crosstalk test is performed according to the connections and tabulation of Fig. 4 for channel 1 or the first channel tested (or if the channel units installed are to be used in their present positions, each channel may be tested).

18	Select (for each channel unit tested) the two most likely interfering channels from the tabulation of Fig. 4 according to the type channel bank at the distant end (D3 is used if the type is not known).
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STEP	ACTION	VERIFICATION
19	On the CAU, operate the TEST switch to CHAN LINE, REJ FLT switch to OUT, and SEND LEVEL switch to 0.	
20	Patch tone from the CAU to the XMT jack of the first listed interfering channel and measure crosstalk at the RCV jack of the channel under test using the NMS.	Requirement: 27 dBrc or less on NMS.
21	Move XMT connection from the first to the second interfering channel unit.	Requirement: 27 dBrc or less on NMS.
22	Remove all test connections.	
23	Insert 258C dummy plugs into XMT jacks of all channel units installed.	
	Note: ♦The plugs break the transmission path to eliminate a possible oscillation path through the hybrid in 2-wire channel units when the channels are equipped at both ends but trunk circuits are not yet connected. This potential problem does not exist on 4-wire circuits or when trunk circuits are connected to 2-wire units.♦	
24	Test common signaling circuitry per Chart 4.	

CHART 4
TESTING OF COMMON SIGNALING CIRCUITRY

APPARATUS:

1—J98718BR Channel Signaling Test Unit

STEP	ACTION	VERIFICATION
1	Loop the channel bank using the LT switch or a strap from LP to GRD jacks on the ACU.	
2	Insert the J98718BR channel signaling test unit into an unused channel unit position and perform the following switch operations on the test unit.	Requirement: Red, green, and yellow indicators on the test unit shall light as follows:

◆TABLE A◆

TEST FAILURE	PROBABLE CAUSE
Power	PCU
ACU alarm TPU alarm	ACU, RU TPU, ACU, TU, RU
Transmission/ Noise	Suspect Channel Unit, RU, TU. (Note)
Common Signaling	RU, TU

Note: On J98718J, K or L bays, also see noise considerations under Equalization in Chart 2.

◆TABLE B◆

CHANNEL BANK TIMING	OPTION SELECTION	
	IU	DLU
LOCAL	LOCAL down LOOP up	
LOOPED	LOOP down LOCAL up	
EXTERNAL	LOCAL up LOOP up TIMING FROM OFFICE NODAL SUPPLY	

* USE KS-21838 EXTRACTION TOOL OR LONG NOSE PLIERS FOR EXTRACTING AND INSERTING JUMPER PLUGS

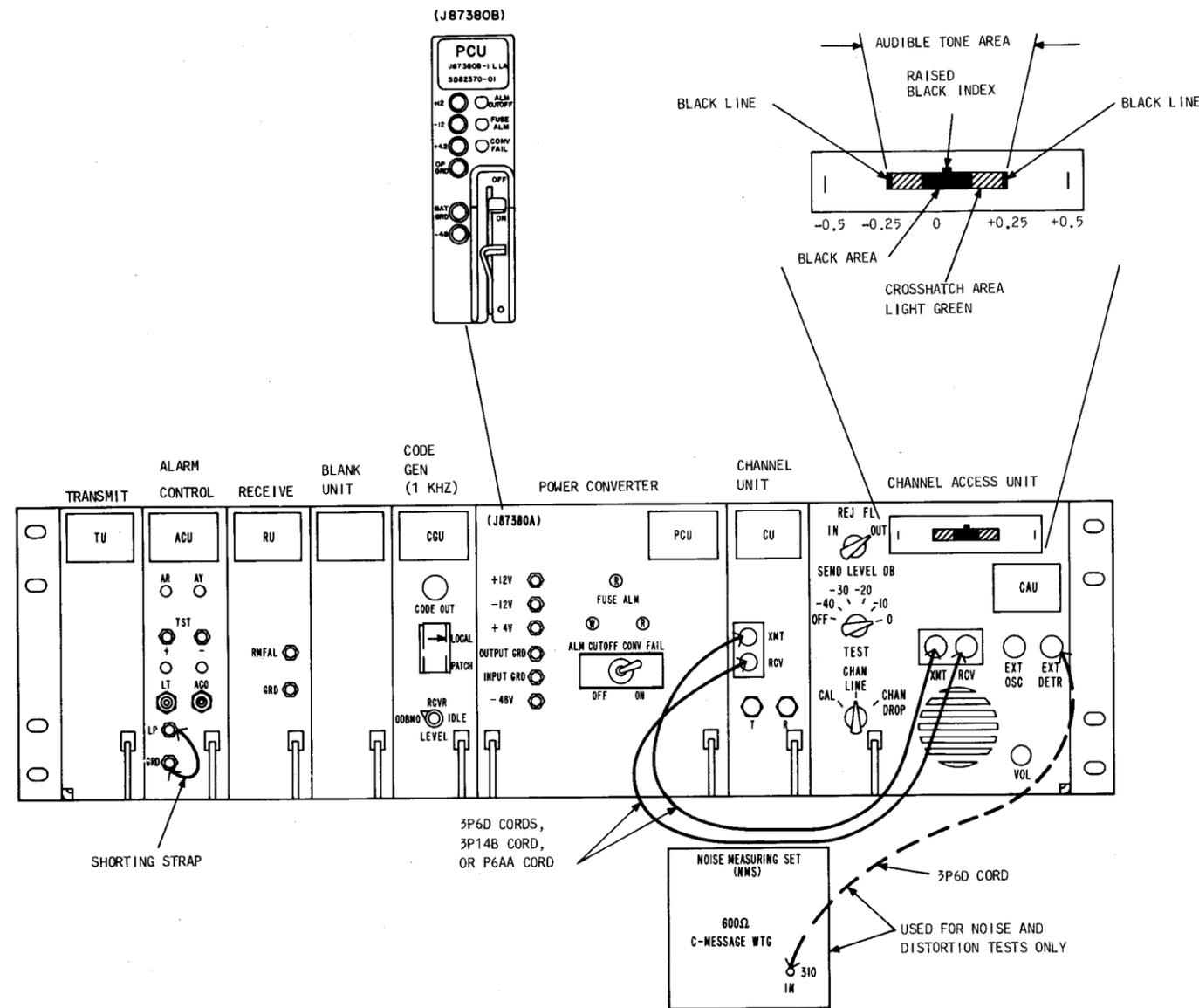
TABLE C

ACU ALARM TEST (NOTE 1)							
STEP	ACU ACTION		RU ACTION	ACU LAMP REQUIREMENTS			
	DEPRESS BUTTON	LP TO GRD STRAP	RNFAL TO GRD STRAP (NOTE 2)	LT	ACO	AR	AY
1		Installed		Off	Off	Off	Off
2		Installed	Installed			On	
3	ACO	Installed	Installed		On	On	
4	LT (Note 3)	Installed	Installed	On	On	On	
5	LT (Note 3)	Installed	Installed	Off	On	On	
6		Installed	Remove for at least 1 second and reinstall within 10 seconds		On	On	On
7		Installed	Remove		Off in 9 to 19 seconds	Off	Off in 9 to 19 seconds

Note 1: Read requirements before performing the action.

Note 2: The length of the strap from test points RNFAL and GRD should be 3 inches maximum.

Note 3: If an LT toggle switch (on L4 and later ACU lists) is present, operate the switch to up position in Step 4 and to down position in Step 5.



TEST	STEP 1 VERIFY LOOP STATUS (NOTE 1)	STEP 2 SET CGU SWITCHES AS FOLLOWS:		STEP 3 SET CAU SWITCHES AS FOLLOWS:			REQUIREMENTS
		LEVEL	PATCH/LOCAL	TEST	REJ FL	SEND LEVEL	
CAU CALIBRATION				CAL			CAU INDICATES IN RAISED BLACK AREA AND TONE IS AUDIBLE (NOTE 2)
RECEIVER GAIN	UNLOOPED	ODBMO	LOCAL	CHAN LINE	OUT	OFF	CAU INDICATES IN BLACK AREA AND TONE IS AUDIBLE
NET LOSS	LOOPED		PATCH	CHAN LINE	OUT	0	CAU INDICATES -0.25 TO +0.25 DB
NMS CALIBRATION				CAL			NMS INDICATES: 89.8 TO 90.2 DBRN (NOTE 3)
RECEIVER NOISE	UNLOOPED	RCVR	LOCAL	CHAN LINE	OUT	OFF	NMS INDICATES: 25 DBRNC OR LESS
		IDLE	LOCAL	CHAN LINE	OUT	OFF	18 DBRNC OR LESS
DISTORTION	LOOPED		PATCH	CHAN LINE	IN	0	56 DBRNC OR LESS
						-10	46 DBRNC OR LESS
						-20	36 DBRNC OR LESS
						-30	26 DBRNC OR LESS
						-40	22 DBRNC OR LESS
IDLE CKT NOISE	LOOPED		PATCH	CHAN LINE	OUT	OFF	23 DBRNC OR LESS

NOTES:

1. THE HS&M PANEL IS LOOPED BY INSTALLING A STRAP FROM LP TO GRD TEST JACKS ON THE ACU. REMOVING THE STRAP UNLOOPS THE BANK (UNLESS THE LT LAMP IS LIGHTED IN WHICH CASE THE LT SWITCH MUST BE OPERATED TO EXTINGUISH IT).
2. IF REQUIREMENT IS NOT MET DURING CAU CALIBRATION, THE CAU SHOULD BE RETURNED FOR FACTORY ALIGNMENT. A WORKING CAU MUST BE OBTAINED TO CONTINUE TESTS.
3. IF THE NMS FAILS TO MEET THIS REQUIREMENT, IT SHOULD BE CALIBRATED ACCORDING TO THE INSTRUCTION MANUAL FOR THE PARTICULAR NMS BEING USED.

Fig. 1—Transmission Tests for the HS&M Panel

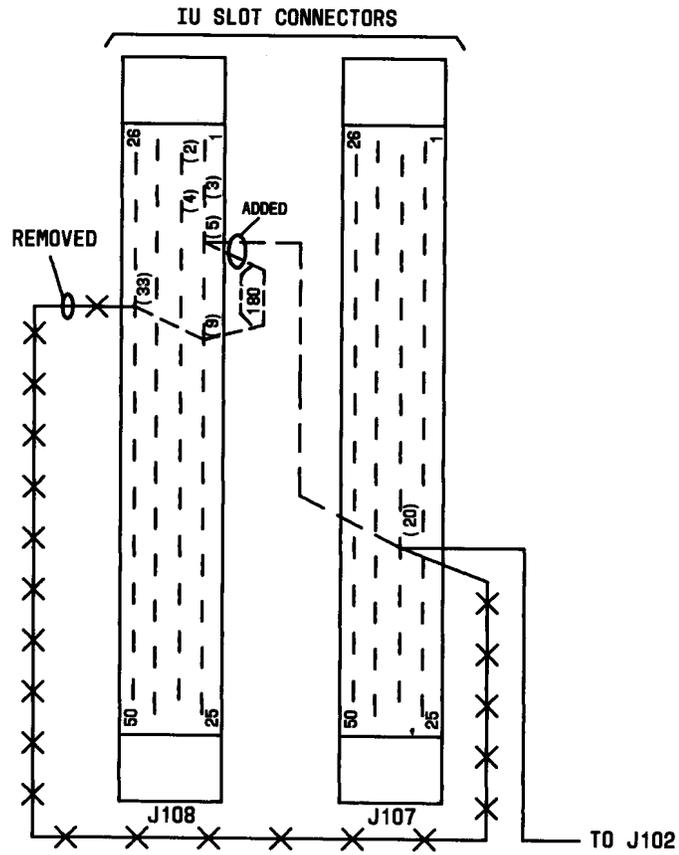
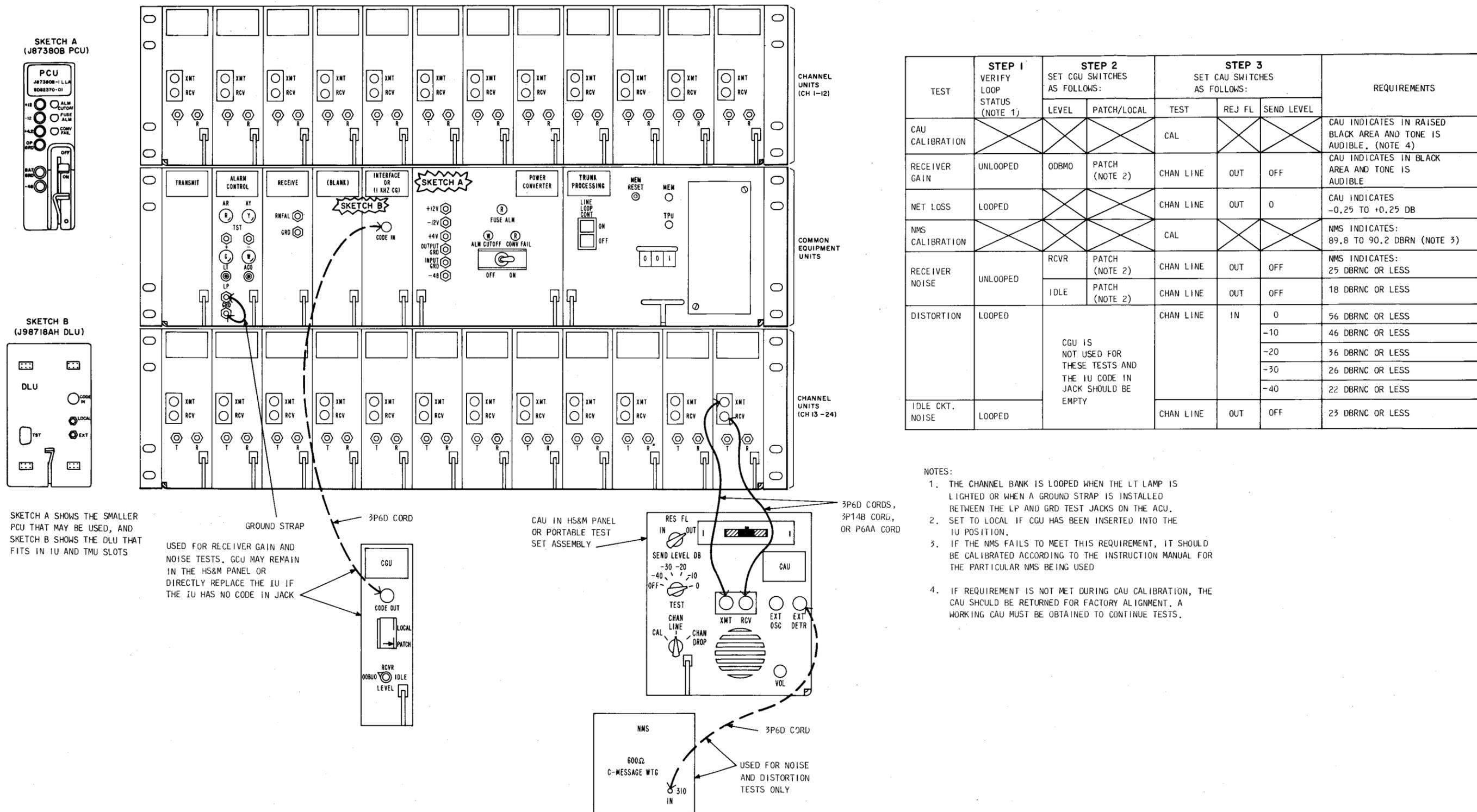


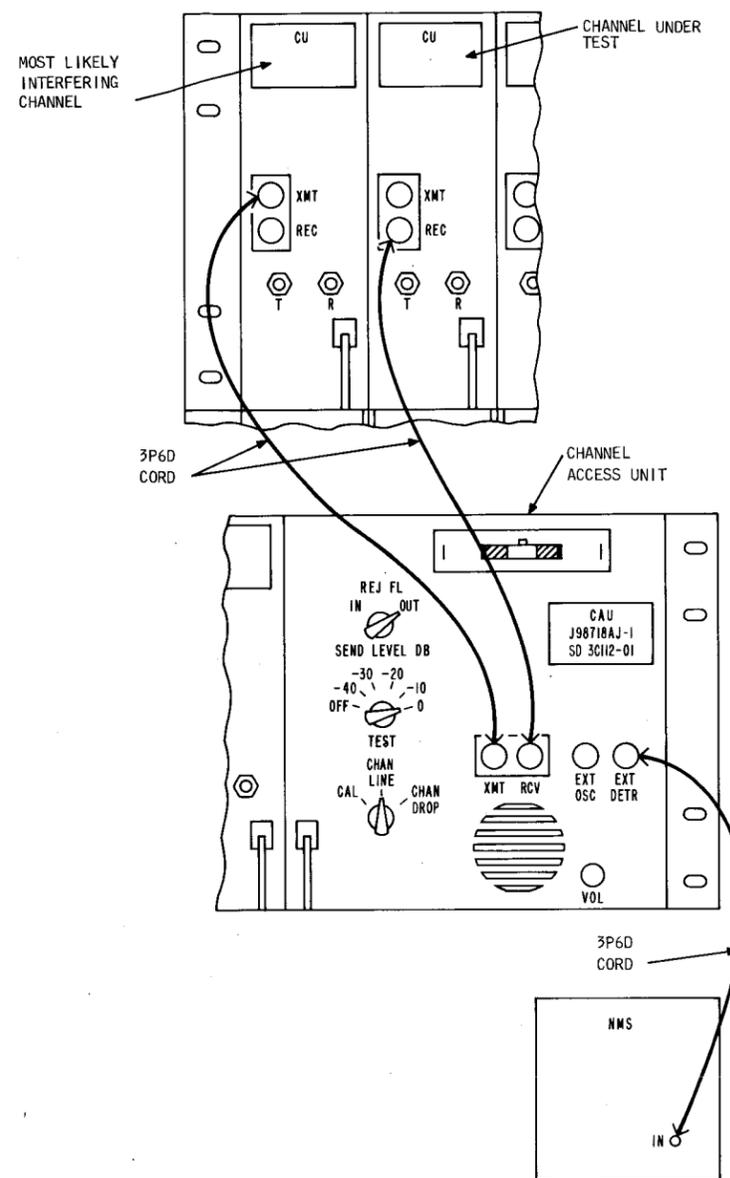
Fig. 2—Rear-Bay View of CN6482MV Loop Timing Modification



TEST	STEP 1 VERIFY LOOP STATUS (NOTE 1)	STEP 2 SET CGU SWITCHES AS FOLLOWS:		STEP 3 SET CAU SWITCHES AS FOLLOWS:			REQUIREMENTS
		LEVEL	PATCH/LOCAL	TEST	REJ FL	SEND LEVEL	
CAU CALIBRATION				CAL			CAU INDICATES IN RAISED BLACK AREA AND TONE IS AUDIBLE. (NOTE 4)
RECEIVER GAIN	UNLOOPED	ODBMO	PATCH (NOTE 2)	CHAN LINE	OUT	OFF	CAU INDICATES IN BLACK AREA AND TONE IS AUDIBLE
NET LOSS	LOOPED			CHAN LINE	OUT	0	CAU INDICATES -0.25 TO +0.25 DB
NMS CALIBRATION				CAL			NMS INDICATES: 89.8 TO 90.2 DBRN (NOTE 3)
RECEIVER NOISE	UNLOOPED	RCVR	PATCH (NOTE 2)	CHAN LINE	OUT	OFF	NMS INDICATES: 25 DBRNC OR LESS
		IDLE	PATCH (NOTE 2)	CHAN LINE	OUT	OFF	18 DBRNC OR LESS
DISTORTION	LOOPED	CGU IS NOT USED FOR THESE TESTS AND THE IU CODE IN JACK SHOULD BE EMPTY		CHAN LINE	IN	0	56 DBRNC OR LESS
						-10	46 DBRNC OR LESS
						-20	36 DBRNC OR LESS
						-30	26 DBRNC OR LESS
						-40	22 DBRNC OR LESS
IDLE CKT. NOISE	LOOPED			CHAN LINE	OUT	OFF	23 DBRNC OR LESS

- NOTES:
1. THE CHANNEL BANK IS LOOPED WHEN THE LT LAMP IS LIGHTED OR WHEN A GROUND STRAP IS INSTALLED BETWEEN THE LP AND GRD TEST JACKS ON THE ACU.
 2. SET TO LOCAL IF CGU HAS BEEN INSERTED INTO THE IU POSITION.
 3. IF THE NMS FAILS TO MEET THIS REQUIREMENT, IT SHOULD BE CALIBRATED ACCORDING TO THE INSTRUCTION MANUAL FOR THE PARTICULAR NMS BEING USED
 4. IF REQUIREMENT IS NOT MET DURING CAU CALIBRATION, THE CAU SHOULD BE RETURNED FOR FACTORY ALIGNMENT. A WORKING CAU MUST BE OBTAINED TO CONTINUE TESTS.

Fig. 3—Channel Bank Transmission Tests (Except Crosstalk)



CHANNEL UNDER TEST	MOST LIKELY INTERFERING CHANNELS		CHANNEL UNDER TEST	MOST LIKELY INTERFERING CHANNELS			
D1 CH BANK	1	24	12	D1 CH BANK	13	1	24
	2	13	1		14	2	13
	3	14	2		15	3	14
	4	15	3		16	4	15
	5	16	4		17	5	16
	6	17	5		18	6	17
	7	18	6		19	7	18
	8	19	7		20	8	19
	9	20	8		21	9	20
	10	21	9		22	10	21
	11	22	10		23	11	22
	12	23	11		24	12	23
D2 CH BANK	1	13	12	D2 CH BANK	13	12	24
	2	14	11		14	11	23
	3	15	9		15	9	21
	4	16	10		16	10	22
	5	17	1		17	1	13
	6	18	2		18	2	14
	7	19	3		19	3	15
	8	20	4		20	4	16
	9	21	5		21	5	17
	10	22	6		22	6	18
	11	23	7		23	7	19
	12	24	8		24	8	20
D3 CH BANK	1	24	23	D3 CH BANK	13	12	11
	2	1	24		14	13	12
	3	2	1		15	14	13
	4	3	2		16	15	14
	5	4	3		17	16	15
	6	5	4		18	17	16
	7	6	5		19	18	17
	8	7	6		20	19	18
	9	8	7		21	20	19
	10	9	8		22	21	20
	11	10	9		23	22	21
	12	11	10		24	23	22

CROSSTALK TEST	STEP 1 SET CAU SWITCHES AS FOLLOWS:			STEP 2 LOOP BANK	REQUIREMENT: NMS INDICATES 27 DBRNC OR LESS
	REJ FL	SEND LEVEL	TEST		
	OUT	0	CHAN LINE		

Fig. 4—Crosstalk Test