

**Task Oriented Practice**  
**(TOP)**

**LT-2 DIGITAL TRANSMULTIPLEXER**

**MAINTENANCE**

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## SYSTEM OVERVIEW AND ACCEPTANCE

### SYSTEM OVERVIEW

#### A. General

The LT-2 is an intelligent terminal, employing microprocessors to provide user communication with the bay. The built-in microprocessors allow remote control of circuit parameters including via net loss, channel level adjustment, echo control, and signaling conditioning. Also, the microprocessors control alarm collection and channel access for maintenance. The user can communicate with the LT-2 by using a keyboard terminal. A number of bays can be connected together to enable the circuit provisioning of all bays from one location. The LT-2 continuously monitors its own circuits by means of self-generated looping tones which detect failures in circuit packs.

#### B. Microprocessor Control Hierarchy

Each LT-2 bay contains one microprocessor located in the Control and Access Unit. This unit serves as the bay communicator to the user and may be mounted in any powered shelf in the bay. This unit also communicates with up to 16 other microprocessors, one per equipped Channel Processor Unit. Each of these digroup level microprocessors responds to commands from the Control and Access Unit.

#### C. LT-2 Communication Access

There are two ways to access an LT-2 bay. One is over the daisy-chain connector (on the distribution panel at the top of the bay) which is used to link bays together and provide communication access to multiple bays via a single data bus. The other method is through the Control and Access Unit (CAU) faceplate connector, providing single bay access. A bay can be accessed through only one of its connectors; i.e., daisy chain or CAU faceplate, at any one time. The CAU faceplate connector access takes precedence over the daisy-chain connector.

Bay communication via the daisy chain is inhibited once bay communication via the CAU faceplate connector is granted. To establish bay communication via the CAU faceplate connector, connect a terminal to it and depress any key. Faceplate control is granted (indicated by a **READY** message on the terminal plugged into the faceplate) once any communication in progress is completed by that bay. A **BAY GOING OFF-LINE** message is transmitted from the link connector on that bay. To restore daisy-chain communication to the bay, unplug the terminal from the CAU faceplate connector. A **BAY BACK ON-LINE** message is transmitted over the daisy chain by that bay.

The LT-2 bay must be part of an active daisy chain before it can grant CAU faceplate control with the **READY** message. If this message does not appear on the terminal, the daisy chain probably is not complete to the main LT-2 keyboard terminal or modem (which connects to the daisy-chain connector on the first bay in the lineup). However, faceplate control can be obtained by pressing the **RESET** button on the CAU after the terminal is connected to the CAU faceplate connector.

An on-line bay is one which communicates via the daisy-chain data bus. An off-line bay is (1) one which has been accessed through its CAU faceplate connector, (2) one with an insane CAU: the sanity timer has expired, lighting the **ALM** light-emitting diode (LED) on the Control and Access Unit, or (3) one without a powered-up CAU.

A bay that has been accessed via its CAU faceplate connector or one that has gone insane does not break the daisy-chain data bus communication for any other bay. However, a bay without a powered-up CAU

breaks the daisy chain at that bay, resulting in none of the subsequent bays (bays farther away from the daisy-chain terminal than this off-line bay) being able to communicate via the daisy-chain data bus. If this condition occurs, the daisy-chain break can be temporarily bypassed by unplugging the two data-bus cables from the two daisy-chain connectors on the distribution panel at the top of the bay and plugging these two cables together. This restores daisy-chain continuity to the subsequent bays.

With daisy-chain communication, all on-line bays are listening to commands as they are being entered. Either one or all bays can be addressed in a single command. Once an addressed bay begins its response, it will complete its output before another bay begins its response. The addressed bays will not necessarily respond in the same order as their daisy-chain lineup positions.

In a daisy-chain environment, one bay is the echoing bay. This bay echoes each character entered at the daisy-chain terminal and reports any syntax errors via the daisy-chain data bus. The echoing bay is the last on-line bay; i.e., farthest from the daisy-chain terminal, in the daisy chain. If the echoing bay goes off-line, the next preceding on-line bay becomes the echoing bay. When echo is passed to the next preceding on-line bay, an **ECHO TRANSFERRED TO THIS BAY** message is transmitted over the daisy-chain data bus by the new echoing bay.

If a nonechoing on-line bay goes insane, the next preceding on-line bay becomes an echoing bay. This results in a duplicate echo over the daisy-chain bus, since the original echoing bay continues to echo.

#### **D. General Operating Information**

Baud rate of the daisy chain is determined by the communication device (modem, TTY, etc.) attached to the daisy-chain bus. The baud rate switches must be set on the Control and Access Unit in each and every bay to be consistent with the daisy-chain baud rate. The baud rate of any device plugged into the Control and Access Unit faceplate connector must be consistent with the faceplate baud rate switch settings on the Control and Access Unit.

#### **E. Handheld Terminal**

The Type 12 pocket terminal has multifunction keys on its keypad. To activate the second function of a key (printed in white on a red background), press the **SHIFT** key at the top left-hand corner of the keypad before pressing the desired function key. If you make a mistake, you can backspace by pressing **CONTROL H** or **SHIFT 3**, or you can delete the whole line by pressing **SHIFT @**. Processes can be stopped using **CTRL X** (CONTROL X), which invokes the same function as **CANCEL** or **DELETE** on most full-sized terminal keyboards.

If for some reason the user cannot regain control of the system, **CTRL 0** (Control "Zero") will abort all processing. This invokes the same function as **BREAK** or **ESCAPE** on most full-sized terminal keyboards.

**Caution:** *The use of CTRL 0, BREAK, or ESCAPE is intended as a rarely-used immediate halt. Use of this function may cause database inconsistencies between the CAU and CH-PR. For this reason, CANCEL, DELETE, or CONTROL X are the preferred halt functions. Recovery from this type of abort should include an examination of the CAU and CH-PR data bases for consistency. Test setup status should also be examined.*

#### **F. Helpful Hints for Successful Command Usage**

Only one command may be entered at a time. All requested processing for a command must be completed before the next command is entered. Entering a new command before processing has been completed by all bays addressed by the previous command, can produce unpredictable results.

Sometimes a user might enter a command and not receive a response or an error message. This will most likely happen if the user enters a valid command with a valid address format, but the address used does not belong to any of the bays on the daisy chain. Each bay reads the command line, recognizes the command

line as being valid, but ignores the command because the address does not match its own. Since all of the bays on the daisy chain ignore the command, the user receives no response or error message.

An LT-2 bay, equipped with at least one digroup, contains two storage locations for provisioning data. One storage data base is located in the Control and Access Unit and the other is located in the Channel Processor Unit of each digroup. When the changing or copying of data in any of these locations is completed, the user should ensure that the data stored in the Control and Access Unit is the same as the data stored in each of the Channel Processor Units. This practice maintains a backup memory for the data stored in the bay.

If a Control and Access Unit is replaced with a spare unit, use the **UL** (UpLoad) command addressed to that bay to copy the provisioning data from all Channel Processor Units in the bay up to the new Control and Access Unit. Until the **UL** command is used to copy the data into the Control and Access Unit, the user should be aware that the only backup for the provisioning data will be paper records.

If a Channel Processor Unit is replaced with a spare unit, use the **DL** (DownLoad) command addressed to that digroup to copy the provisioning data from the Control and Access Unit down to the new Channel Processor Unit. Until the **DL** command is used to copy the data to the Channel Processor Unit, the user should be aware that the only backup for the provisioning data will be paper records.

**PAPER RECORDS SHOULD ALWAYS BE KEPT FOR ALL PROVISIONING DATA IN ALL BAYS EVEN IF BOTH DATA BASE LOCATIONS IN EACH BAY CONTAIN THE SAME DATA.**

With an SL174 Channel Processor Unit, channel gain may be pre-service adjusted by temporarily installing a digroup into the necessary bay location and conducting the auto-gain adjustment using the **AG** (Auto-Gain) command. Upon completion of channel gain adjustment, the **AG** command stores the gain coefficients for each channel in both the Control and Access Unit data base and the Channel Processor Unit data base. After adjusting the gains, the temporary digroup circuits may be removed and used to pre-service adjust another digroup location. However, the Control and Access Unit should remain in the bay. When the permanent circuits arrive and are installed, the **DL** (DownLoad) command can be used to copy the gain coefficients (and other provisioning data, if desired) from the Control and Access Unit down to the new digroup Channel Processor Unit.

**LT-2 ACCEPTANCE PHILOSOPHY**

The acceptance procedure for the LT-2 Digital Transmultiplexer frame is designed to verify that the bay has been installed properly and that the communication panel (if installed) is operating properly. Since the frame is shipped without circuit packs, circuit packs are tested as part of circuit order work requiring their installation.

Acceptance procedures do not contain any trouble-clearing information. If trouble is encountered or if requirements are not met, contact the responsible installation group.

All procedures are based upon the assumption that any specified test apparatus is functioning properly and is conditioned and connected correctly.

**LIST 1 - LT-2 DIGITAL TRANSMULTIPLEXER ACCEPTANCE TASK**

**ACCEPT J-68967A LT-2 DIGITAL  
TRANSMULTIPLEXER FRAMEWORK ASSEMBLY**

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**DO ITEMS BELOW IN ORDER LISTED . . . . . FOR DETAILS, GO TO**

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- |    |   |           |
|----|---|-----------|
| 1. | <b>Note:</b> Refer Any Problems to AT&T Installation Group<br>Perform Visual Inspection of Frame, Hardware, Cabling, Wiring, and Connectors | DLP - 500 |
| 2. | Test Operation of ED-54845 Communication Panel, if Installed  | DLP - 501 |

## ESTABLISH DIGROUP IN 96-CHANNEL MODULE

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**DO ITEMS BELOW IN ORDER LISTED . . . . . FOR DETAILS, GO TO**

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1. **Warning: The LT-2 Circuit Packs Contain Static-Sensitive Components Which Could Be Damaged by Electro-Static Discharge. Before Unpacking or Handling Circuit Packs, Refer to Special Handling Precautions in Section 032-173-301.**

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2. Connect Wrist Strap Between Wrist and LT-2 Bay DLP-502

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3. Install Basic Digroup Circuit Packs DLP-503

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4. Install Fuse in 39C Fuse Block for Digroup Being Installed DLP-505

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5. From Office Records, Determine if Signaling or Echo Canceler Options Are Required (Either Signaling or Echo Cancelers, or Neither)
  - A. Install Signaling Circuit Packs (Two per Digroup) : DLP-512

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  - B. Install Echo Canceler Circuit Pack(s) (One per Group) : DLP-513

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6. **Warning: Do Not Install More Than One CAU Per Bay. Each Bay Requires One Control and Access Unit (CAU) Mounted in CAU Position of One and Only One Shelf.**  
If Not Already Installed, Install Control and Access Unit DLP-508

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7. Install Power Converter Unit(s) DLP-507

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8. If Not Already Installed, Install SL106 Alarm Unit DLP-506

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9. If Not Already Initialized, Initialize Control and Access Unit DLP-509

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10. If Parameter Data Is To Be Entered from Remote Office, Update Office Records to Reflect Work Completed and Ignore Remaining Items in This Procedure

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11. Enter Channel Signaling, Via-Net-Loss (ICL), and Echo Canceler Parameters DLP-510

---

12. Establish Communication with Office at Far End of Analog Facility and Request Assistance in Performing Item 13

---

13. Align Receive Gain (Do A or B, not Both)
  - A. At LT-2 Equipped with SL114 Channel Processor Unit (CH-PR) (Using DATS L1, LB or L1 MOD A) : DLP-521

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  - B. AT LT-2 Equipped with SL174 Channel Processor Unit (CH-PR) (DATS Not Required) : DLP-511

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14. If Required, Conduct Echo Canceler Test (Must Be Performed for Each End of Trunk) DLP-515

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15. Terminate Communication with Far-End Office

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16. Update Office Records

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## ESTABLISH DIGROUP IN 48-CHANNEL MODULE

**DO ITEMS BELOW IN ORDER LISTED . . . . . FOR DETAILS, GO TO**

1. **Warning: The LT-2 Circuit Packs Contain Static-Sensitive Components Which Could Be Damaged by Electro-Static Discharge. Before Unpacking or Handling Circuit Packs, Refer to Special Handling Precautions in Section 032-173-301.**

---

2. Connect Wrist Strap Between Wrist and LT-2 Bay DLP- 502

---

3. Install Basic Digroup Circuit Packs DLP- 503

---

4. Install Fuse(s) in 39C Fuse Block for Digroup Being Installed DLP- 505

---

5. From Office Records, Determine if Signaling or Echo Canceler Options Are Required (One or Both Options May Be Installed in Digroup Located in 48-Channel Module)

---

6. If Required, Install Signaling Circuit Packs (Two per Digroup) DLP- 512

---

7. If Required, Install Echo Canceler Circuit Pack(s) (One per Group) DLP- 513

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8. **Warning: Do Not Install More Than One CAU Per Bay. Each Bay Requires One Control and Access Unit (CAU) Mounted in CAU Position of One and Only One Shelf.**  
If Not Already Installed, Install Control and Access Unit DLP- 508

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9. Install Power Converter Unit(s) DLP- 507

---

10. If Not Already Installed, Install SL106 Alarm Unit DLP- 506

---

11. If Not Already Initialized, Initialize Control and Access Unit DLP- 509

---

12. If Parameter Data Is To Be Entered from Remote Office, Update Office Records to Reflect Work Completed and Ignore Remaining Items in This Procedure

---

13. Enter Channel Signaling, Via-Net-Loss (ICL), and Echo Canceler Parameters DLP- 510

---

14. Establish Communication with Office at Far End of Analog Facility and Request Assistance in Performing Item 15

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15. Align Receive Gain (Do A or B, not Both)
  - A. LT-2 Equipped with SL114 Channel Processor Unit (CH-PR) (Using DATS L1,LB or L1 MOD A): DLP- 521

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  - B. LT-2 Equipped with SL174 Channel Processor Unit (CH-PR) (DATS Not Required): DLP- 511

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16. If Required, Conduct Echo Canceler Test (Must Be Performed for Each End of Trunk) DLP- 515

---

17. Terminate Communication with Far-End Office

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18. Update Office Records

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## ADD SIGNALING OPTION TO DIGROUP

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DO ITEMS BELOW IN ORDER LISTED . . . . . FOR DETAILS, GO TO

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1. ***Warning: The LT-2 Circuit Packs Contain Static-Sensitive Components Which Could Be Damaged by Electro-Static Discharge. Before Unpacking or Handling Circuit Packs, Refer to Special Handling Precautions in Section 032-173-301.***

---

2. Connect Wrist Strap Between Wrist and LT-2 Bay DLP - 502

---

3. Turn Off Power Unit for Digroup Being Modified

---

4. Install Signaling Circuit Packs (Two per Digroup) DLP - 512

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5. Turn On Power Unit for Digroup Being Modified

---

6. Update Office Records

---

## ADD ECHO CANCELER OPTION TO DIGROUP

---

**DO ITEMS BELOW IN ORDER LISTED . . . . . FOR DETAILS, GO TO**

---

1. ***Warning: The LT-2 Circuit Packs Contain Static-Sensitive Components Which Could Be Damaged by Electro-Static Discharge. Before Unpacking or Handling Circuit Packs, Refer to Special Handling Precautions in Section 032-173-301.***

---

2. Connect Wrist Strap Between Wrist and LT-2 Bay DLP-502

---

3. Turn Off Power Unit for Digroup Being Modified

---

4. Install Echo Canceler Circuit Pack(s) (One per Group) DLP-513

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5. If Installing Echo Cancelers in 48-Channel Module, Install Second Power Converter Unit, If Not Already Installed DLP-507

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6. If Installing Echo Cancelers in 48-Channel Module, Install Second Fuse in 39C Fuse Block DLP-505

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7. If Installing Echo Cancelers in 48-Channel Module, Turn On Power Unit for Echo Cancelers (PCU 1 or PCU 3) Before Turning on Power Unit for Digroup Circuit Packs (PCU 2 or PCU 4)

---

8. Turn On Power Unit for Digroup Being Modified

---

9. Conduct Echo Canceler Test (Must Be Performed for Each End of Trunk) DLP-515

---

10. Update Office Records

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## MAINTENANCE PHILOSOPHY

### OVERALL STRUCTURE

All procedures are designed to be used on a programmed-logic basis; therefore, any attempt to use procedures by other than the prescribed method of entry may cause erroneous test results and operational troubles.

### ALARMS

In the event of trouble, all alarms should be cleared first. If trouble remains, it should be cleared in accordance with indicated procedures.

When major and minor alarms occur simultaneously, the major alarm should be cleared first.

Some panel lamps that light during alarm conditions may not be significant in clearing trouble; thus, they may not be listed in the trouble-locating procedures.

### TROUBLE-LOCATION SEQUENCE

Trouble-location procedures are structured so that applicable adjustments are made first. If necessary, all circuit packs that may be causing trouble are replaced (one at a time). If this does not clear the trouble, associated wiring and components (external to circuit packs) are checked.

Aid in locating trouble in wiring and associated equipment not covered in this document may be obtained by use of SDs, EDs, etc., as provided locally.

### CIRCUIT PACKS

If a circuit pack is replaced with a spare in an attempt to correct a trouble, and the spare does not correct the trouble, the original circuit pack should be re-inserted.

If a circuit pack is replaced with a spare and the spare does correct the trouble, all tests that preceded the test in which the replacement was made should be repeated for any equipment that may be affected by the replacement unit.

If a circuit pack must be replaced with a spare, when the original circuit pack has been conditioned and adjusted according to prior procedures, those conditioning and adjusting procedures must be performed on the spare circuit pack also before continuing with the procedure requiring circuit pack replacement.

Defective circuit packs will normally be sent to a service center for repair.

### TEST EQUIPMENT

All tests are based on the assumption that the required test equipment is functioning properly.

## CLEAR MAJOR ALARM

1. (FIG. 1) At LT-2 terminal keyboard, enter following message using bay number of bay under test.  
**DS: bay:A;CARRIAGE RETURN**

Response: BAY = **fffffff** (fa) VER v.v  
DIGROUP s,d  
ALARM CONDITIONS:  
(description of alarm)  
DCFA COUNTER 000 (0000 HEX)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number

<p><b>DS:17:A;&lt;CARRIAGE RETURN&gt;</b> Where: 17 = 2-character frame (or bay) address A = Display parameter to give alarm status &lt;CARRIAGE RETURN&gt; = Executes command line</p>
---

FIG. 1 - Example of DS Command Line Input

2. The LT-2 display terminal will display trouble message. Did you receive one of these messages?

If **OUT OF LOCK**, then do Step 4.  
If **SIG CON OUT OF SYNC**, then do Step 12.  
If **LOOP TONE FAILED IN GRP X (WHERE X = 1 OR 2)**, then do Step 18.  
If **DCFA - RED ALM**, then do Step 23.  
If **DCFA - YELLOW ALM**, then do Step 34.  
If **DCFA - RED, YELLOW ALM**, then do Step 49.  
If **NONE OF THESE**, then continue to Step 3.

3. Which of these messages did you receive?

If **BASIC CKT PKS NOT PRES**, then do Step 58.  
If **TEMP EXCEEDS LIMITS**, then do Step 64.  
If **BOTH FANS FAILED**, then do Step 72.

4. Check position of synchronization switches on SL119 Clock Unit.

Reference: **DLP-518**

5. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 6.

6. Replace SL119 Clock Unit.

Reference: **DLP-519**

7. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 8.

8. Replace SL115 T-Interface Unit.

Reference: **DLP-519**

9. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 10.

10. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12. **Caution: Service could be interrupted when RS-CP command is executed.**

(FIG. 2) At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **RS-CP:bay,shelf,digroup:FULL;CARRIAGE RETURN**

Response: **BAY = ##### (fa) VER v.v**  
**EXECUTION COMPLETE (M23)**  
Where **f** = 10-character frame identification code  
**fa** = 2-character frame address  
**VER v.v** = generic version of firmware

13. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 14.

<p><b>RS-CP:17,3,4:FULL;&lt;CARRIAGE RETURN&gt;</b> Where <b>17</b> = 2-character frame (or bay) address <b>3</b> = Shelf number <b>4</b> = Digroup number <b>FULL</b> = Parameter to cause full restart <b>&lt;CARRIAGE RETURN&gt;</b> = Executes command line</p>
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FIG. 2 - Example of RS-CP Command Line Input

14. Replace SL117 Signaling Control Unit.

Reference: **DLP-519**

15. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue to Step 16.

16. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

18. (FIG. 3) At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **DG:bay,shelf,digroup;CARRIAGE RETURN**

Response: **BAY = ffffffff (fa) VER v.v**

**DIGROUP s,d**

**Diagnostic Message**

**EXECUTION COMPLETE (M23)**

Where **f** = 2-character frame identification code

**fa** = 2-character frame address

**VER v.v** = generic version of firmware

**s,d** = shelf number, digroup number

**Diagnostic Message (Dxx)** = One of 22 diagnostic messages listed in back of LT-2 USER GUIDE. This message will tell you probable cause of trouble.

19. Follow instructions given in diagnostic message.

20. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue to Step 21.

21. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

**DG:17,3,4;<CARRIAGE RETURN>**

Where **17** = 2-character frame (or bay) address

**3** = Shelf number

**4** = Digroup number

**<CARRIAGE RETURN>** = Executes command line

**FIG. 3 - Example of DG Command Line Input**

23. (FIG. 4) Loop digroup on itself by doing the following. At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **CN-LD: bay,shelf,digroup;**  
CARRIAGE RETURN

Response: BAY = **fffffff** (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

24. Wait for 20 seconds.  
25. Did red ALM stop?

If YES, then continue to Step 26.  
If NO, then do Step 29.

**CN-LD:17,3,4;**<CARRIAGE RETURN>  
Where 17 = 2-character frame (or bay) address  
3 = Shelf number  
4 = Digroup number  
<CARRIAGE RETURN> = Executes command line

FIG. 4 - Example of CN-LD Command Line Input

26. (FIG. 5) Remove digroup loop by entering following message using bay, shelf, and digroup numbers of digroup under test. **DC-LD: bay,shelf,digroup;**CARRIAGE RETURN

Response: BAY = **fffffff** (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

**DC-LD:17,3,4;**<CARRIAGE RETURN>  
Where 17 = 2-character frame (or bay) address  
3 = Shelf number  
4 = Digroup number  
<CARRIAGE RETURN> = Executes command line

FIG. 5 - Example of DC-LD Command Line Input

27. Test indicates SL115 T-Interface Unit is working properly. Check for trouble either at far-end or cable between near- and far-end.

28. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

29. (FIG. 5) Remove digroup loop by entering following message using bay, shelf, and digroup numbers of digroup under test. **DC-LD: bay,shelf,digroup;CARRIAGE RETURN**

Response: BAY = **fffffff (fa)** VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

30. Replace SL115 T-Interface Unit.

Reference: **DLP-519**

31. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 32.

32. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

33. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

34. (FIG. 4) Loop digroup on itself by entering following message using bay, shelf, and digroup numbers of digroup under test. **CN-LD: bay,shelf,digroup;CARRIAGE RETURN**

Response: BAY = **fffffff (fa)** VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

35. Wait for 20 seconds.

36. Did yellow ALM stop?

If **YES**, then continue to Step 37.  
If **NO**, then do Step 40.

37. (FIG. 5) Remove digroup loop by entering following message using bay, shelf, and digroup numbers of digroup under test. **DC-LD: bay,shelf,digroup;CARRIAGE RETURN**

Response: BAY = **fffffff (fa)** VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

38. Test indicates SL115 T-Interface Unit is working properly. Check for trouble either at far-end or cable between near- and far-end.

39. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

40. (FIG. 5) Remove digroup loop by entering following message using bay, shelf, and digroup numbers of digroup under test. **DC-LD:bay,shelf,digroup;CARRIAGE RETURN**

Response: **BAY = ffffffff (fa) VER v.v**  
**EXECUTION COMPLETE (M23)**  
Where **f** = 10-character frame identification code  
**fa** = 2-character frame address  
**VER v.v** = generic version of firmware

41. **Caution: Service could be interrupted when RS-CP command is executed.**

(FIG. 2) At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **RS-CP:bay,shelf,digroup:FULL;CARRIAGE RETURN**

Response: **BAY = ffffffff (fa) VER v.v**  
**EXECUTION COMPLETE (M23)**  
Where **f** = 10-character frame identification code  
**fa** = 2-character frame address  
**VER v.v** = generic version of firmware

42. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 43.

43. Check equalizer switches on SL115 T-Interface Unit and ensure that one and only one switch is in down position (bottom of rocker in).

Reference: **DLP-517**

44. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 45.

45. Replace SL-115 T-Interface Unit.

Reference: **DLP-519**

46. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 47.

47. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

48. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

49. (FIG. 4) Loop digroup on itself by entering following message using bay, shelf, and digroup numbers of digroup under test. **CN-LD:bay,shelf,digroup;CARRIAGE RETURN**

Response: BAY = ffffffff (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

50. Wait for 20 seconds.

51. (FIG. 5) Remove digroup loop by entering following message using bay, shelf, and digroup numbers of digroup under test. **DC-LD:bay,shelf,digroup;CARRIAGE RETURN**

Response: BAY = ffffffff (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

52. Wait for 20 seconds.

53. Which alarms do you have now?

If **RED ONLY**, then do Step 23.  
If **YELLOW ONLY**, then do Step 34.  
If **BOTH RED AND YELLOW**, then continue to Step 54.

54. Replace SL115 T-Interface Unit.

Reference: **DLP-519**

55. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 56.

56. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

57. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

58. (FIG. 5) To determine which equipment is present in digroup, enter following message using bay, shelf, and digroup numbers of digroup under test. **DS:bay,shelf,digroup:E;CARRIAGE RETURN**

Response: BAY = ffffffff (fa) VER v.v  
DIGROUP s,d  
EQUIPMENT:  
(Description of Equipment in Digroup)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number

59. Is any equipment missing from digroup?

If **YES**, then continue to Step **60**.  
If **NO**, then do Step **62**.

60. Install missing equipment.

61. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step **62**.

62. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

63. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

64. Ensure all shelf covers (front and rear) are properly installed.

65. Ensure bottom air inlet grill for fans is not blocked.

66. Ensure fan air filter is clean (replace if necessary).

Reference: **DLP-526**

67. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step **68**.

68. Replace each SL113 Translation Unit in alarming shelf (one at a time), stopping after each replacement to see if trouble is cleared.

69. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step **70**.

70. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

71. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

72. Ensure bottom air inlet grill for fans is not blocked.

73. Ensure fan air filter is clean (replace if necessary).

Reference: **DLP-526**

74. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step **75**.

75. Check both fan fuses (behind air inlet grill, to left of fans).

76. Are fuses blown?

If **YES**, then **replace fuses using TAP-103**.  
If **NO**, then continue to Step 77.

77. Replace both fans.

Reference: **DLP-525**

78. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step 79.

79. Check wiring in fan shelf and/or bay (SD-54500-01 application schematic) or (SD-54504-01 fan shelf).

80. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## CLEAR MINOR ALARM

1. (FIG. 1) At LT-2 keyboard terminal, enter following message using bay number of bay under test.  
**DS:bay:A;CARRIAGE RETURN**

Response: BAY = **fffffff** (fa) VER v.v  
DIGROUP s,d  
ALARM CONDITIONS:  
(Description of alarm)  
DCFA COUNTER 000 (0000 HEX)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number

**DS:17:A;<CARRIAGE RETURN>**  
Where: 17 = 2-character frame (or bay) address  
A = Display parameter to give alarm status  
<CARRIAGE RETURN> = Executes command line

**FIG. 1 - Example of DS Command Line Input**

2. The LT-2 display terminal will display trouble message. Which message did you receive?

If **FAN A FAILED**, then continue to Step 3.  
If **FAN B FAILED**, then do Step 12.  
If **T-INT INIT FAILURE**, then do Step 21.  
If **CH-PR INIT FAILURE**, then do Step 29.  
If **INVALID SIG OPT IN CH-PR**, then do Step 35.  
If **SIG BOARD WRITE ERR**, then do Step 44.  
If **SIG OPT MISMATCH**, then do Step 56.  
If **NONE OF THE ABOVE**, then do Step 68.

3. Ensure bottom air inlet grill for fans is not blocked.
4. Ensure fan air filter is clean (replace if necessary).

Reference: **DLP-526**

5. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 6.

6. Check fan fuse (behind air inlet grill, to left of fans; upper fuse, **F1**, protects fan **A**).

7. Is fuse blown?

If **YES**, then **replace fuse using TAP-103**.  
If **NO**, then continue to Step 8.

8. Replace fan A.

Reference: **DLP-525**

9. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step 10.

10. Check wiring in fan shelf and/or bay (SD-54500-01 application schematic) or (SD-54504-01 fan shelf).

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12. Ensure bottom air inlet grill for fans is not blocked.

13. Ensure fan air filter is clean (replace if necessary).

Reference: **DLP-526**

14. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step 15.

15. Check fan fuse (behind air inlet grill, to left of fans; lower fuse, **F2**, protects fan B).

16. Is fuse blown?

If **YES**, then **replace fuse using TAP-103**.  
If **NO**, then continue to Step 17.

17. Replace fan A.

Reference: **DLP-525**

18. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE**.  
If **NO**, then continue to Step 19.

19. Check wiring in fan shelf and/or bay (SD-54500-01 application schematic) or (SD-54504-01 fan shelf).

20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

21. **Caution:** *Service could be interrupted when RS-CP command is executed.*

(FIG. 2) At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **RS-CP:bay,shelf,digroup:FULL;**CARRIAGE RETURN

Response: BAY = **fffffff** (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

<p><b>RS-CP:17,3,4:FULL;</b>&lt;CARRIAGE RETURN&gt; Where 17 = 2-character frame (or bay) address 3 = Shelf number 4 = Digroup number FULL = Parameter to cause full restart &lt;CARRIAGE RETURN&gt; = Executes command line</p>
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**FIG. 2 - Example of RS-CP Command Line Input**

22. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 23.

23. Replace T-Interface Unit.

Reference: **DLP-519**

24. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 25.

25. Replace Channel Processor Unit.

Reference: **DLP-519**

26. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 27.

27. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

28. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

29. **Caution: Service could be interrupted when RS-CP command is executed.**

(FIG. 2) At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **RS-CP:bay,shelf,digroup:FULL;CARRIAGE RETURN**

Response: BAY = **fffffff** (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

30. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE..**  
If **NO**, then continue to Step 31.

31. Replace Channel Processor Unit.

Reference: **DLP-519**

32. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 33.

33. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

34. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

35. (FIG. 3) To determine which channel has invalid signaling option data, enter following message using bay, shelf, and digroup numbers of digroup under test. **DS:bay,shelf,digroup:CP;CARRIAGE RETURN**

Response: BAY = **fffffff** (fa) VER v.v  
DIGROUP s,d  
CH-PR DATABASE:  
(List of parameter data for all 24 channels in digroup)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number  
List of parameter data gives user-inserted options for GAIN,  
VNL, SIGNALING, and ECHO CANCELER for each channel

<p><b>DS:17,3,4:CP;&lt;CARRIAGE RETURN&gt;</b> Where 17 = 2-character frame (or bay) address 3 = Shelf number 4 = Digroup number CP = Parameter to display CH-PR database &lt;CARRIAGE RETURN&gt; = Executes command line</p>
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FIG. 3 - Example of DS Command Line Input

36. Review data base parameters displayed on terminal display and look for parameters with incorrect format.

37. Did you discover any incorrect parameters?

If **YES**, then continue to Step **38**.

If **NO**, then do Step **40**.

38. Enter correct parameters for those channels with incorrect data.

Reference: **DLP-510**

39. Has trouble been cleared?

If **YES**, then **STOP**. **YOU HAVE COMPLETED THIS PROCEDURE**.

If **NO**, then continue to Step **40**.

40. Replace Channel Processor Unit.

Reference: **DLP-519**

41. Has trouble been cleared?

If **YES**, then **STOP**. **YOU HAVE COMPLETED THIS PROCEDURE**.

If **NO**, then continue to Step **42**.

42. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

43. **STOP**. **YOU HAVE COMPLETED THIS PROCEDURE**.

44. This problem may have occurred during a DL or PR command. Attempt to provision data into digroup, again.

Reference: **DLP-510**

45. Has trouble been cleared?

If **YES**, then **STOP**. **YOU HAVE COMPLETED THIS PROCEDURE**.

If **NO**, then continue to Step **46**.

46. Replace Signaling Control Unit.

Reference: **DLP-519**

47. Has trouble been cleared?

If **YES**, then **STOP**. **YOU HAVE COMPLETED THIS PROCEDURE**.

If **NO**, then continue to Step **48**.

48. Replace T-Interface Unit.

Reference: **DLP-519**

49. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue to Step 50.

50. Replace Echo Canceler Unit.

Reference: **DLP-519**

51. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue to Step 52.

52. Replace Channel Processor Unit.

Reference: **DLP-519**

53. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue to Step 54.

54. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

55. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

56. **Caution: Service could be interrupted when RS-CP command is executed.**

(FIG. 4) At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **RS-CP: bay, shelf, digroup: HITL; CARRIAGE RETURN**

Response: BAY = **fffffff (fa)** VER **v.v**  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

**RS-CP:17,3,4:HITL;<CARRIAGE RETURN>**  
Where 17 = 2-character frame (or bay) address  
3 = Shelf number  
4 = Digroup number  
HITL = Parameter to cause hitless restart  
<CARRIAGE RETURN> = Executes command line

**FIG. 4 - Example of RS-CP Command Line Input**

57. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 58.

58. Replace Signaling Control Unit.

Reference: **DLP-519**

59. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 60.

60. Replace T-Interface Unit.

Reference: **DLP-519**

61. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 62.

62. Replace Echo Canceler Unit.

Reference: **DLP-519**

63. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 64.

64. Replace Channel Processor Unit.

Reference: **DLP-519**

65. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 66.

66. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

67. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

68. At alarming bay, is **ALM** lamp lighted on any SL118 Control and Access Unit (CAU)?

If **YES**, then continue to Step 69.  
If **NO**, then do Step 75.

69. At alarming CAU, press **RESET** button.

70. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 71.

71. Replace CAU with spare unit.

72. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 73.

73. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

74. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

75. At alarming bay, is **ON** lamp extinguished on any SL118 Control and Access Unit (CAU)?

If **YES**, then continue to Step 76.  
If **NO**, then do Step 88.

76. Replace CAU with spare unit.

77. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 78.

78. Determine position of power-option jumper plug in suspect CAU.

79. Is jumper plug set for **DIG1**, **DIG2**, **DIG3**, or **DIG4**?

If **DIG1**, then continue to Step 80.  
If **DIG2**, then do Step 82.  
If **DIG3**, then do Step 84.  
If **DIG4**, then do Step 86.

80. **Caution: To prevent loss of service, ensure service has been removed from digroup before removing power unit.**

Replace lower left power unit.

81. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then do Step 88.

82. **Caution: To prevent loss of service, ensure service has been removed from digroup before removing power unit.**

Replace lower right power unit.

83. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then do Step **88**.

84. **Caution:** *To prevent loss of service, ensure service has been removed from digroup before removing power unit.*

Replace upper left power unit.

85. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then do Step **88**.

86. **Caution:** *To prevent loss of service, ensure service has been removed from digroup before removing power unit.*

Replace upper right power unit.

87. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step **88**.

88. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

89. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## CLEAR FUSE ALARM

**OVERVIEW:** Each LT-2 digroup is protected by one fuse located in fuse block. Each fuse block may have up to four fuses, one for each power unit. In 96-channel shelves, fuses are numbered for digroup protected. In 48-channel shelves, fuses **2** and **4** protect digroups 1 and 2, respectively. Fuses **1** and **3** protect power units for echo canceler circuit packs: fuse **1** protects lower left power unit and fuse **3** protects upper left power unit. Fan fuses are located in left side of fan shelf (at bottom of bay). Upper fuse (**F1**) protects left fan (fan **A**); lower fuse (**F2**) protects right fan (fan **B**).

1. Check fuse blocks in all shelves of bay for blown fuse.
2. Is fuse blown?

If **YES**, then continue to Step 3.  
If **NO**, then do Step 5.

3. (TABLE A) Replace blown fuse with one of same type.

**TABLE A**

**LT-2 FUSES**

UNIT PROTECTED	-24 VOLT BATTERY	-48 VOLT BATTERY	+140 VOLT BATTERY
Digroup or Echo Canceler Power Unit	81B 7-1/2 AMP Gray tip C103828141	80C 3 AMP Blue tip C103752168	80A 1-1/3 AMP White tip C103752143
Cooling Fans	80D 5 AMP Green tip C103800637	80C 3 AMP Blue tip C103752168	

4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
5. Remove fan air-intake grill at bottom of bay.
6. Check fan fuses for blown fuse.

7. Is fuse blown?

If **YES**, then continue to Step 8.

If **NO**, then do Step 10.

8. (TABLE A) Replace blown fuse with one of same type.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10. Check **ON** lamp on all **ALM** units in bay.

11. Is **ON** lamp extinguished on any **ALM** unit?

If **YES**, then continue to Step 12.

If **NO**, then do Step 30.

12. Is **ON** lamp extinguished on all **ALM** units?

If **YES**, then continue to Step 13.

If **NO**, then do Step 15.

13. Check battery power for this bay.

14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

15. Remove **ALM** unit with extinguished **ON** lamp.

16. Determine position of power-option jumper plug on **ALM** unit.

17. Is jumper plug positioned to **DIG1**, **DIG2**, **DIG3**, or **DIG4**?

If **DIG1**, then continue to Step 18.

If **DIG2**, then do Step 21.

If **DIG3**, then do Step 24.

If **DIG4**, then do Step 27.

18. Re-insert **ALM** unit into correct shelf position.

19. Replace lower left power unit with spare unit.

20. Now do Step 29.

21. Re-insert **ALM** unit into correct shelf position.

22. Replace lower right power unit with spare unit.

23. Now do Step 29.

24. Re-insert **ALM** unit into correct shelf position.

25. Replace upper left power unit with spare unit.

26. Now do Step 29.

27. Re-insert **ALM** unit into correct shelf position.

28. Replace upper right power unit with spare unit.

29. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE..**

If **NO**, then continue to Step 30.

30. Check wiring in bay, double-shelf modules, distribution panel, and fan shelf (SD-54500-01 application schematic), (SD-54501-01, 96-channel module), (SD-54502-01, 48-channel module), (SD-54503-01 distribution panel, (SD-54504-01 fan shelf).

31. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## CLEAR DAISY-CHAIN PROBLEM

**OVERVIEW:** Problems associated with daisy chain connections between keyboard terminal and LT-2 bays are not difficult to correct if logical order of checks is followed. You should read sections in LT-2 USER GUIDE which refer to LT-2 CONTROL/BAY STRUCTURE and LT-2 COMMUNICATION ACCESS before attempting to locate problem. The USER GUIDE will familiarize you with basic concept of daisy chain, particularly those ideas dealing with **TRANSFER OF ECHO** and **BAY GOING OFF LINE/BAY BACK ON LINE** messages. Correct interpretation of symptoms can help you solve daisy-chain problems more easily.

1. Which of the following describes your problem?

If **NONE OF THE BAYS RESPONDS TO COMMANDS**, then continue to Step 2.

If **NONE OF THE BAYS AFTER A CERTAIN POINT RESPONDS TO COMMANDS**, then do Step 10.

If **ONE BAY OF SEVERAL BAYS DOES NOT RESPOND TO COMMANDS**, then do Step 33.

If **NO ECHO - WHEN TYPING ON KEYBOARD, CHARACTERS NOT DISPLAYED**, then do Step 5.

2. At keyboard terminal, press **RETURN** key.

3. Perform a Roll Call of all bays by entering the following message **RC:\*;CARRIAGE RETURN**

Response: All bays that can respond will do so but not necessarily in numeric order.

4. Did all bays respond?

If **YES**, then continue to Step 5.

If **NO**, then do Step 9.

5. Replace CAU in last bay on daisy chain.

6. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, then continue to Step 7.

7. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9. Did any bay(s) respond (i.e., 1 through 4 responded, but 5 through last bay did not respond)?

If **YES**, then continue to Step 10.

If **NO**, then do Step 16.

10. Replace CAU in first non-responding bay (i.e., if 1 through 4 responded, but 5 through last bay did not respond, replace CAU in bay 5).

11. Has trouble been cleared?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 12.

12. Bypass first non-responding bay by unplugging daisy-chain cables from jack **J1** and plug **P1** (on distribution panel at top of bay) and plugging the two cables into each other.

13. Has trouble been cleared?

If **YES**, then continue to Step 14.  
If **NO**, then do Step 16.

14. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16. Bypass first bay by unplugging daisy-chain cables from jack **J1** and plug **P1** (on distribution panel at top of bay) and plugging the two cables into each other.

17. Has trouble been cleared?

If **YES**, then continue to Step 18.  
If **NO**, then do Step 20.

18. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).

19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

20. Go to bay in middle of lineup and unplug daisy-chain cable from top connector (**J1**).

21. Has trouble been cleared?

If **YES**, then continue to Step 22.  
If **NO**, then do Step 28.

22. Problem is between middle bay and last bay. Re-connect cable at middle bay and unplug cable at 3/4 point.

23. Is trouble still cleared?

If **YES**, then continue to Step 24.  
If **NO**, then do Step 26.

24. Problem is between 3/4 point and last bay. Re-connect cable at 3/4 point and continue narrowing problem to single bay.

25. Now do Step 33.

26. Problem is between middle bay and 3/4 point. Re-connect cable at 3/4 point and continue narrowing problem to single bay.

27. Now do Step 33.

28. Problem is between first bay and middle bay. Re-connect cable at middle bay and unplug cable at 1/4 point.
29. Has trouble been cleared?  
  
    If **YES**, then continue to Step 30.  
    If **NO**, then do Step 32.
30. Problem is between 1/4 point and middle bay. Re-connect cable at 1/4 point and continue narrowing problem to single bay.
31. Now do Step 33.
32. Problem is between first bay and 1/4 point. Re-connect cable at 1/4 point and continue narrowing problem to single bay.
33. At problem bay, press **RESET** button on CAU.
34. Has trouble been cleared?  
  
    If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
    If **NO**, then continue to Step 35.
35. At problem bay, replace CAU.
36. Has trouble been cleared?  
  
    If **YES**, then continue to Step 37.  
    If **NO**, then do Step 39.
37. Re-Connect all unplugged daisy-chain cables.
38. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
39. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).
40. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## TEST SL112 VF ACCESS UNIT

**OVERVIEW:** This procedure verifies proper operation of input and output circuitry of SL112 VF Access Unit, repeater circuitry in SL106 Alarm Unit, and access circuitry in SL174 Channel Processor Unit. After test equipment is connected, **CN-AC** command is used to access any channel in digroup under test. This command splits transmission path in L-to-T direction, terminating selected channel coming from L-carrier side. At same time, **CN-AC** command inserts 1020-Hz, -10 dBm0 tone into selected channel going toward T-carrier side and also monitors same channel coming from T-carrier in T-to-L direction. **CN-LD** command causes 1020-Hz tone to be looped back in T-to-L direction, allowing it to be monitored on VF test set.

1. Obtain following equipment:

- One standard VF test set with 600-Ohm input and output terminations
- Two test cords with KS-20999 (miniature) plugs on one end (to plug into SL112 faceplate) and plugs on other ends to plug into VF test set (probably 310-type plugs)
- One SL174 Channel Processor Unit.

**Note:** An SL106 Alarm Unit must be present in same shelf module with Channel Processor Unit and in same shelf module with VF Access Unit if they are in separate shelves.

2. Using one of test cords, connect output of VF test set to **VF IN** jack on SL112 VF Access Unit
3. Using other test cord, connect input of VF test set to **VF OUT** jack of SL112 VF Access Unit.
4. Condition VF test set to output 1020-Hz tone at -10 dBm0.
5. (FIG. 1) At LT-2 keyboard terminal, enter following message using bay, shelf, digroup, and channel numbers of channel under test. **CN-AC:bay,shelf,digroup,channel:S,LT;CARRIAGE RETURN**

Response: BAY = ##### (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic firmware version

<p><b>CN-AC:17,3,4,1:S,LT;&lt;CARRIAGE RETURN&gt;</b> Where 17 = 2-character frame (or bay) address 3 = Shelf number 4 = Digroup number 1 = Channel number S = Parameter option to cause transmission path to be split LT = Direction parameter option which selects L-to-T direction of transmission &lt;CARRIAGE RETURN&gt; = Executes command line</p>
---

FIG. 1 - Example of CN-AC Command Line Input

6. (FIG. 2) At LT-2 keyboard terminal, enter following message using bay, shelf, and digroup numbers of digroup under test. **CN-LD:bay,shelf,digroup;CARRIAGE RETURN**

Response: BAY = **fffffff** (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic firmware version

<p><b>CN-LD:17,3,4;&lt;CARRIAGE RETURN&gt;</b> Where 17 = 2-character frame (or bay) address 3 = Shelf number 4 = Digroup number &lt;CARRIAGE RETURN&gt; = Executes command line</p>
--

**FIG. 2 - Example of CN-LD Command Line Input**

7. **Note:** Since VNL pad is in loop path that test tone is passing through, -10 dBm0 reading on VF Test Set will vary from -10 dBm0 by same amount as VNL pad setting.

At VF test set, does display indicate you are receiving 1020-Hz tone at -10 dBm0?

If **YES**, then do Step 16.  
If **NO**, then continue to Step 8.

8. At SL112 VF Access Unit and SL106 Alarm Unit, is green **ON** lamp lighted on both circuit packs?

If **YES**, then do Step 10.  
If **NO**, then continue to Step 9.

9. Check power-option jumper plugs on both SL112 VF Access Unit and SL106 Alarm Unit to ensure both are receiving power.

10. **Note:** Since VNL pad is in loop path that test tone is passing through, -10 dBm0 reading on VF Test Set will vary from -10 dBm0 by same amount as VNL pad setting.

At VF test set, does display indicate you are receiving a 1020-Hz tone at -10 dBm0?

If **YES**, then do Step 16.  
If **NO**, then continue to Step 11.

11. Repeat **CN-AC** and **CN-LD** commands ensuring you use correct bay, shelf, digroup, and channel numbers.

12. **Note:** Since VNL pad is in loop path that test tone is passing through, -10 dBm0 reading on VF Test Set will vary from -10 dBm0 by same amount as VNL pad setting.

At VF test set, does display indicate you are receiving a 1020-Hz tone at -10 dBm0?

If **YES**, then do Step 16.  
If **NO**, then continue to Step 13.

13. Replace SL112 VF Access Unit with spare unit.
14. **Note:** Since VNL pad is in loop path that test tone is passing through, -10 dBm0 reading on VF Test Set will vary from -10 dBm0 by same amount as VNL pad setting.

At VF test set, does display indicate you are receiving 1020-Hz tone at -10 dBm0?

If **YES**, then do Step 16.

If **NO**, then continue to Step 15.

15. Check wiring in shelf and/or bay (SD-54500-01 application schematic), (SD-54501-01, 96-channel shelf), or (SD-54502-01, 48-channel shelf).
16. VF Access Unit is working properly.
17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

**PERFORM VISUAL INSPECTION OF FRAME,  
HARDWARE, CABLING, WIRING, AND CONNECTORS**

1. Inspect frame for mechanical damage, loose hardware, etc.
2. Determine correct wiring assignments from office records.
3. Inspect installer wiring to office power source.
4. Inspect installer wiring to office primary frequency supply, if installed.
5. Inspect installer wiring to group distributing frame (GDF).
6. Inspect installer wiring to DSX-1 cross connect frame.
7. Ensure all interbay wiring is correctly identified (with tags, etc).
8. Ensure all shop or installer equipped components are identified (stenciled).
9. Ensure all slots for circuit packs are identified (stenciled).
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## TEST OPERATION OF ED-54845 COMMUNICATION PANEL

1. At communication panel, connect telephone handset to **HDST** jacks.
2. Depress appropriate pushbutton to connect communication panel to working telephone line.
3. Is test and ringer circuit available?  
  
    If **YES**, then continue to Step 4.  
    If **NO**, then do Step 6.
4. Call test and ringer circuit to verify proper operation of panel.
5. Now do Step 7.
6. Make local telephone call and request other party to call back.
7. Was test successful?  
  
    If **YES**, then continue to Step 8.  
    If **NO**, then do Step 10.
8. Disconnect and store handset.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
10. Correct problem.
11. Now repeat from Step 1.

## CONNECT WRIST STRAP BETWEEN WRIST AND LT-2 BAY

1. **Note:** Anti-static discharge wrist strap may be obtained from: Static Control Systems; 3M; 225-4S; 3M Center; St. Paul, MN 55144.

Put wrist strap on right wrist.

2. Connect button snap on spiral cord to matching connector on wrist strap.
3. Plug other end of spiral cord into jack labeled **GROUND WRIST STRAP HERE** at bottom right-hand corner of double-shelf module.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## INSTALL BASIC DIGROUP CIRCUIT PACKS

1. From office records, determine required line build-out (LBO) attenuation to group distributing frame (GDF), cable distance to DSX-1 cross-connect frame, and synchronization requirements for LT-2 SL119 Clock Unit.

2. Condition attenuators on SL111 or SL173 Analog Interface Units .

Reference: **DLP-516**

3. Condition equalizer and faceplate switches on SL115 T-Interface Unit.

Reference: **DLP-517**

4. Condition synchronization switches on SL119 Clock Unit .

Reference: **DLP-518**

5. Are you installing digroup in 48-channel module or 96-channel module?

If **48-CHANNEL MODULE**, then continue to Step 6.

If **96-CHANNEL MODULE**, then do Step 13.

6. (FIG. 1) Install SL111 or SL173 Analog Interface Unit(s) (**AIU**) into correct shelf position.

Reference: **DLP-519**

7. (FIG. 1) Install SL113 Translation Unit (**TRANS**) into correct shelf position.

8. (FIG. 1) Install SL114 or SL174 Channel Processor Unit (**CH-PR**) into correct shelf position.

9. (FIG. 1) Install SL119 Clock Unit (**CLK**) into correct shelf position.

10. (FIG. 1) Install SL115 T-Interface Unit (**T-INT**) into correct shelf position.

11. (FIG. 1) If not already installed, install 39C Fuse Block into correct shelf position.

12. Now do Step 19.

13. (FIG. 2) Install SL111 or SL173 Analog Interface Unit(s) (**AIU**) into correct shelf position.

14. (FIG. 2) Install SL113 Translation Unit (**TRANS**) into correct shelf position.

15. (FIG. 2) Install SL114 or SL174 Channel Processor Unit (**CH-PR**) into correct shelf position.

16. (FIG. 2) Install SL119 Clock Unit (**CLK**) into correct shelf position.

17. (FIG. 2) Install SL115 T-Interface Unit (**T-INT**) into correct shelf position.

18. (FIG. 2) If not already installed, install 39C Fuse Block into correct shelf position.



## UPLOAD PROVISIONING DATA FROM CH-PR TO CAU

**OVERVIEW:** This procedure is used to copy data from data base of Channel Processor Unit(s) (CH-PR) into data base of Control and Access Unit (CAU). It is normally used when CAU has been replaced with spare unit, eliminating need to re-type all of provisioning data back into new CAU. It is also handy for mass provisioning several CAUs that need to have same provisioning data. Once you have one bay provisioned, simply remove its CAU, put in new CAU, and execute **UL** command. New CAU now contains same data as original CAU. Either CAU can now be installed in new bay, and downloaded into CH-PRs of new bay, thus eliminating all typing normally required for this operation. See LT-2 USER GUIDE for more information.

1. (FIG. 1) At LT-2 keyboard terminal, enter following message using appropriate bay, shelf, digroup, and channel numbers. **UL:Bay,Shelf,Digroup,Channel:ALL;CARRIAGE RETURN**

Response: BAY = **fffffff** (fa) VER v.v  
PROCESSING IN PROGRESS (M9)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE..**

**UL:17,3,4,8:ALL;<CARRIAGE RETURN>**

Where 17 = 2-character frame (or bay) address

3 = Shelf address (\* could be used here if data from all shelves is desired)

4 = Digroup number (\* could be used here if data from all digroups is desired)

8 = Channel number (G1 or G2 could be used here if data from all of Group 1 or Group 2 is desired; or \* could be used if data from all channels is desired)

ALL = Parameter to upload all parameter variables (G, V, S, E, or combination of these four could be used here to upload selected parameter data)

<CARRIAGE RETURN> = Executes command line

**FIG. 1 - Example of UL Command Line Input**

### INSTALL FUSE(S) IN 39C FUSE BLOCK

1. Are you working at 48-channel module or 96-channel module?

If **48-CHANNEL MODULE**, then continue to Step 2.  
If **96-CHANNEL MODULE**, then do Step 9.

2. Which battery voltage is connected to LT-2 bay?

If **-24 V DC**, then continue to Step 3.  
If **-48 V DC**, then do Step 5.  
If **+140 V DC**, then do Step 7.

3. **Caution:** *Digroups located in 48-channel modules and equipped with echo cancelers must have two fuses per digroup to provide protection for second power converter unit.*

(FIG. 1) Install 81B fuses (7-1/2 amp with gray tip) into fuse block.

4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5. **Caution:** *Digroups located in 48-channel modules and equipped with echo cancelers must have two fuses per digroup to provide protection for second power converter unit.*

(FIG. 1) Install 80C fuses (3 amp with blue tip) into fuse block.

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

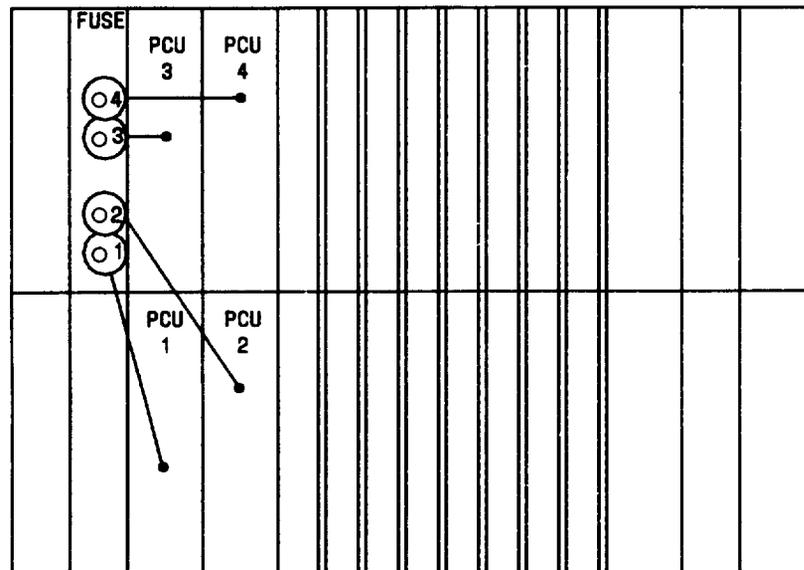


FIG. 1 - 48-Channel Module Fuse/Power Converter Unit Assignments

7. **Caution:** Digroups located in 48-channel modules and equipped with echo cancelers must have two fuses per digroup to provide protection for second power converter unit.

(FIG. 1) Install 80A fuses (1-1/3 amp with white tip) into fuse block.

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9. Which battery voltage is connected to LT-2 bay?

If -24 V DC, then continue to Step 10.

If -48 V DC, then do Step 12.

If +140 V DC, then do Step 14.

10. (FIG. 2) Install 81B fuse (7-1/2 amp with gray tip) into fuse block.

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12. (FIG. 2) Install 80C fuse (3 amp with blue tip) into fuse block.

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14. (FIG. 2) Install 80A fuse (1-1/3 amp with white tip) into fuse block.

15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

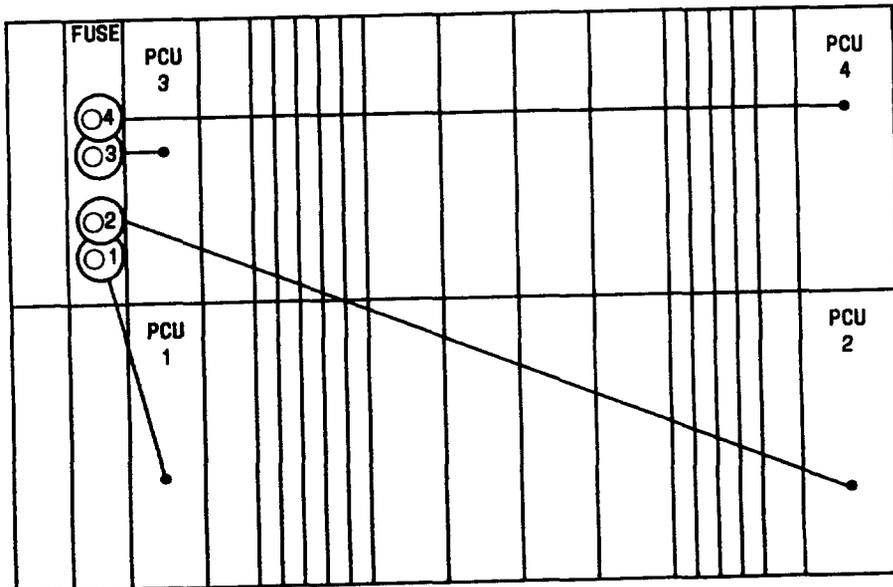


FIG. 2 - 96-Channel Module Fuse/Power-Converter-Unit Assignments

## INSTALL SL106 ALARM UNIT

**OVERVIEW:** The SL106 Alarm Unit is powered from one of the power units. For 96-channel module, simply position jumper plug next to any powered digroup (**DIG1**, **DIG2**, **DIG3**, or **DIG4**). The 48-channel module can have only two digroups, but can have up to four power units if both digroups are equipped with echo cancelers. Left-hand power unit on each shelf in 48-channel module, powers only echo cancelers in that shelf. To spread power load more evenly, jumper plug should be positioned to power alarm unit from one echo canceler power unit - either **DIG1** (echo cancel power unit for digroup 1) or **DIG3** (echo cancel power unit for digroup 2). If neither shelf contains echo cancelers, alarm unit must be powered from either **DIG2** (power unit for digroup 1) or **DIG4** (power unit for digroup 2).

1. Are you working at 48-channel module or 96-channel module?

If **48-CHANNEL MODULE**, then continue to Step 2.  
If **96-CHANNEL MODULE**, then do Step 5.

2. Are you installing echo cancelers into this digroup?

If **YES**, then continue to Step 3.  
If **NO**, then do Step 4.

3. (FIG. 1) Into which digroup are you installing echo cancelers?

If **DIGROUP 1**, then do Step 6.  
If **DIGROUP 2**, then do Step 10.

4. (FIG. 1) Which digroup are you installing?

If **DIGROUP 1**, then do Step 8.  
If **DIGROUP 2**, then do Step 12.

5. (FIG. 2) Which digroup are you installing?

If **DIGROUP 1**, then continue to Step 6.  
If **DIGROUP 2**, then do Step 8.  
If **DIGROUP 3**, then do Step 10.  
If **DIGROUP 4**, then do Step 12.

6. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG1** on printed wiring board.

7. Now do Step 14.

8. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG2** on printed wiring board.

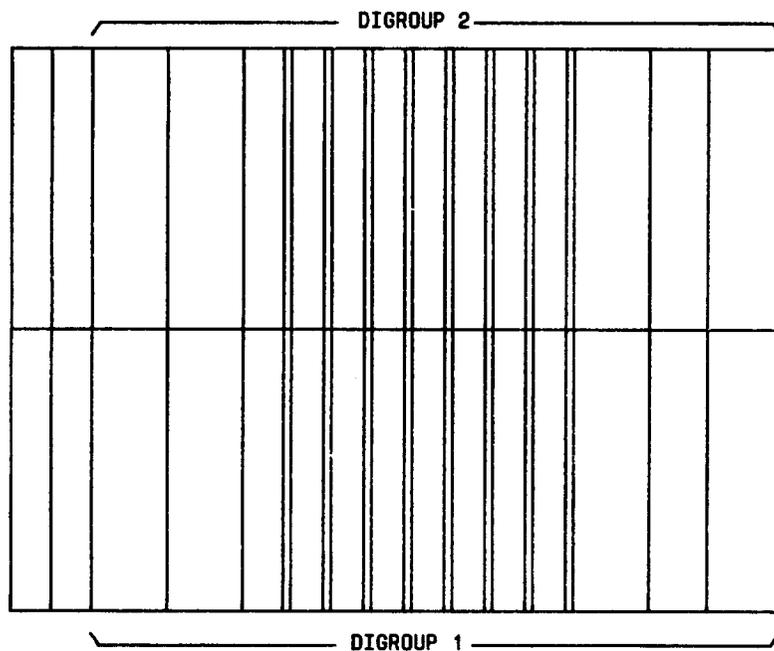
9. Now do Step 14.

10. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG3** on printed wiring board.

11. Now do Step 14.
12. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG4** on printed wiring board.
13. Now do Step 14.
14. (FIG. 4) Determine correct shelf location for SL106 Alarm Unit (**ALM**).
15. Insert SL106 Alarm Unit into correct shelf location.

Reference: **DLP-519**

16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**



**FIG. 1 - Digroup Identification, 48-Channel Module**

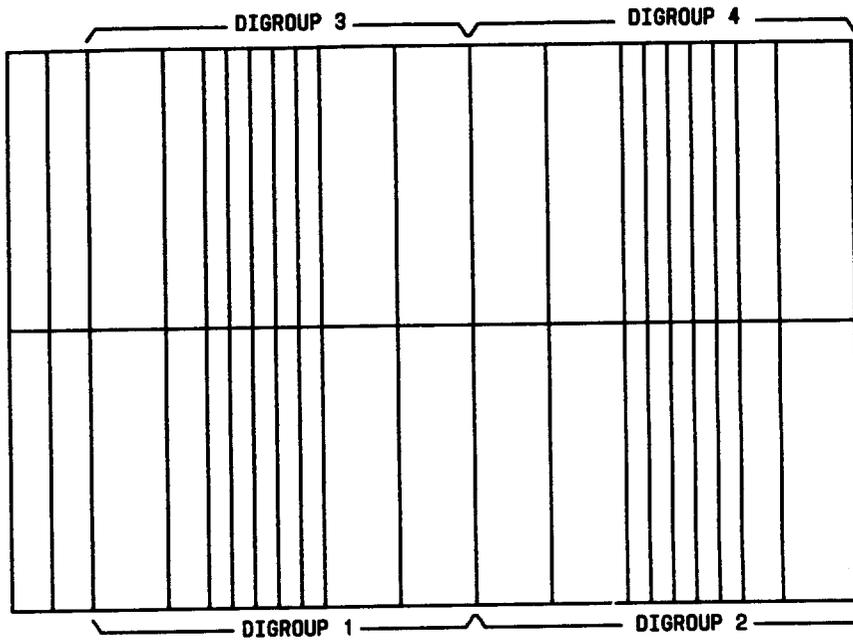


FIG. 2 - Digroup Identification, 96-Channel Module

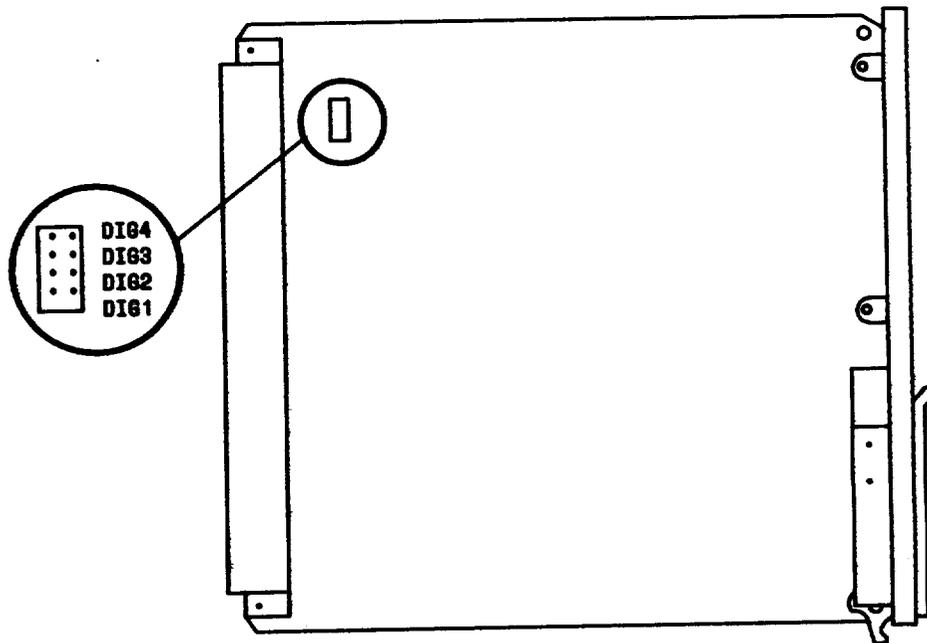


FIG. 3 - Location of Power-Option Jumper Plug

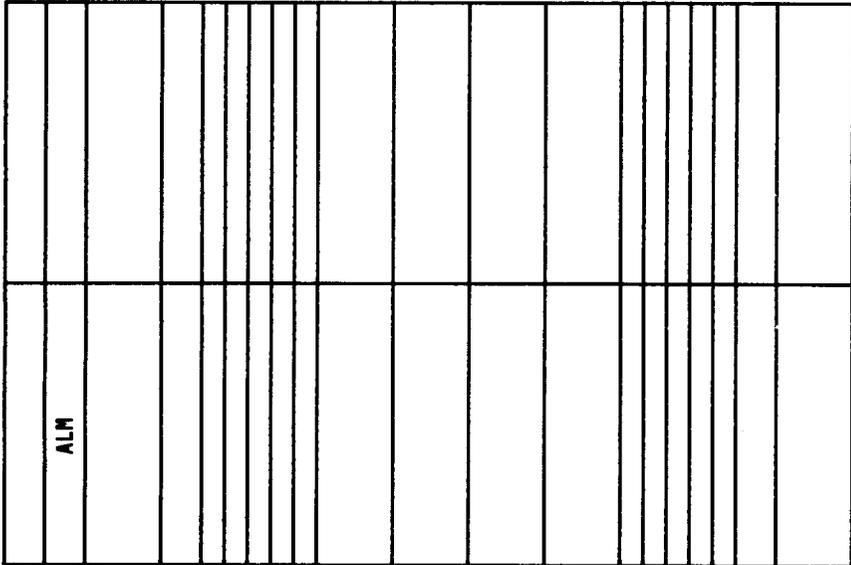


FIG. 4 - Shelf Position for SL106 Alarm Unit (ALM)

## INSTALL POWER CONVERTER UNIT(S)

1. Which battery voltage is connected to LT-2 bay?  
  
If **-24 V DC**, then continue to Step 2.  
If **-48 V DC**, then do Step 4.  
If **+140 V DC**, then do Step 6.
2. **Warning: Power converter units could be damaged if not properly matched to office battery voltage connected to LT-2 bay.**  
  
Ensure you are installing 471AA (-24 Vdc) power converter unit (type-number is on latch lever).
3. Now do Step 7.
4. **Warning: Power converter units could be damaged if not properly matched to office battery voltage connected to LT-2 bay.**  
  
Ensure you are installing 474AA (-48 Vdc) power converter unit (type-number is on latch lever).
5. Now do Step 7.
6. **Warning: Power converter units could be damaged if not properly matched to office battery voltage connected to LT-2 bay.**  
  
Ensure you are installing 477AA (+140 Vdc) power converter unit (type-number is on latch lever).
7. Are you working at 48-channel module or 96-channel module?  
  
If **48-CHANNEL MODULE**, then continue to Step 8.  
If **96-CHANNEL MODULE**, then do Step 9.
8. Have you installed echo canceler circuit packs in this digroup?  
  
If **YES**, then do Step 11.  
If **NO**, then do Step 15.
9. (FIG. 1) Locate correct shelf position for power converter unit (PCU).
10. Now do Step 16.
11. **Caution: Digroups equipped with echo cancelers and located in 48-channel modules must be equipped with two power converter units or digroup will not function properly.**  
  
(FIG. 2) Locate correct shelf position for power converter units (PCU).
12. Install left power converter unit (PCU 1 or PCU 3) in proper shelf position.



13. Install right power converter unit (PCU 2 or PCU 4) in proper shelf position.

Reference: DLP-519

14. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

15. (FIG. 3) Locate correct shelf position for power converter unit (PCU).

16. Install power converter unit in proper shelf position.

Reference: DLP-519

17. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

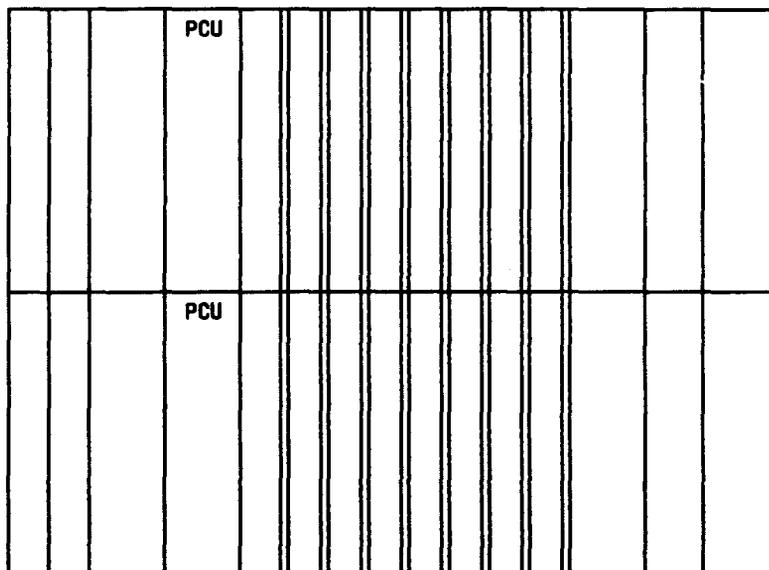


FIG. 3 - Power Converter Unit Positions for Non-Echo Canceler Equipped 48-Channel Modules

## INSTALL SL118 CONTROL AND ACCESS UNIT (CAU)

**OVERVIEW:** The SL118 Control and Access Unit (CAU) is powered from digroup power units. For 96-channel module, user must position jumper plug on CAU to **DIG1**, **DIG2**, **DIG3**, or **DIG4** according to which digroup is to power CAU. For 48-channel module, each digroup can have two power units - one for digroup circuit packs, and one for echo canceler circuit packs (if installed). The CAU should be powered by echo canceler power unit, if possible, to spread power load. For this case, select either **DIG1** (lower echo canceler power unit) or **DIG3** (upper echo canceler power unit). If there are no echo canceler circuit packs in 48-channel module, then select either **DIG2** (lower digroup power unit) or **DIG4** (upper digroup power unit).

1. Are you working at 48-channel module or 96-channel module?

If **48-CHANNEL MODULE**, then continue to Step 2.  
If **96-CHANNEL MODULE**, then do Step 5.

2. Are you installing echo cancelers into this digroup?

If **YES**, then continue to Step 3.  
If **NO**, then do Step 4.

3. (FIG. 1) Which digroup are you installing?

If **DIGROUP 1**, then do Step 6.  
If **DIGROUP 2**, then do Step 10.

4. (FIG. 1) Which digroup are you installing?

If **DIGROUP 1**, then do Step 8.  
If **DIGROUP 2**, then do Step 12.

5. (FIG. 2) Which digroup are you installing?

If **DIGROUP 1**, then continue to Step 6.  
If **DIGROUP 2**, then do Step 8.  
If **DIGROUP 3**, then do Step 10.  
If **DIGROUP 4**, then do Step 12.

6. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG1** on printed wiring board.

7. Now do Step 14.

8. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG2** on printed wiring board.

9. Now do Step 14.

10. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG3** on printed wiring board.

11. Now do Step 14.

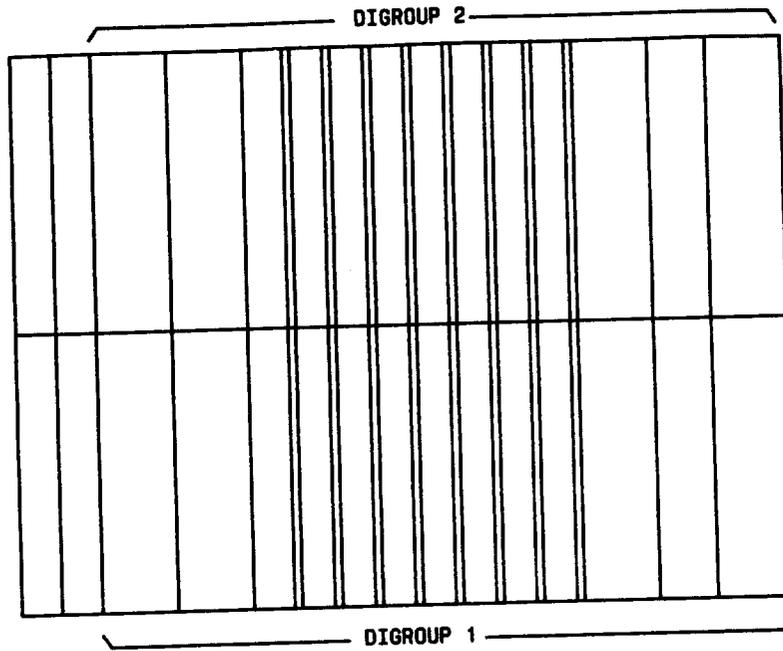


FIG. 1 - Digroup Identification, 48-Channel Module

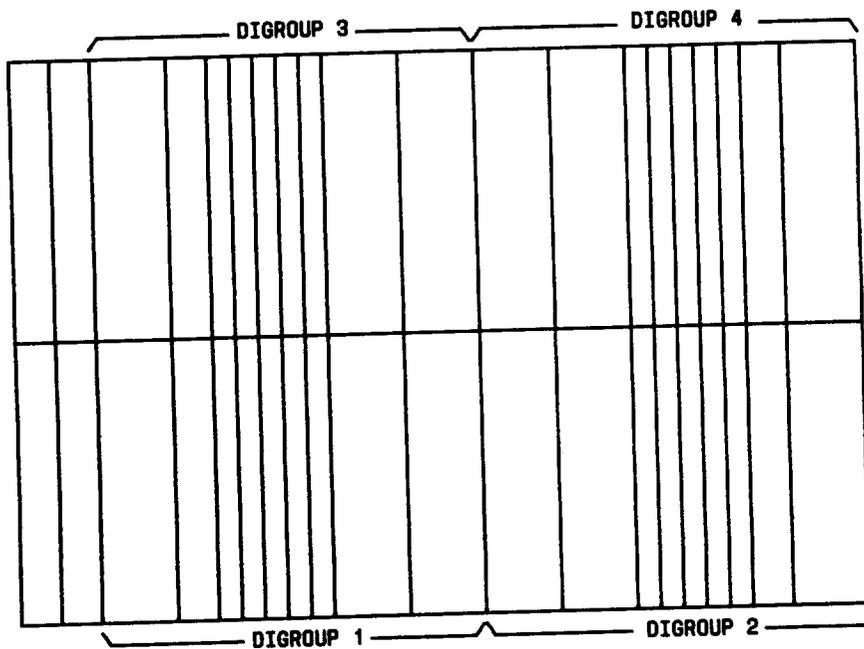


FIG. 2 - Digroup Identification, 96-Channel Module

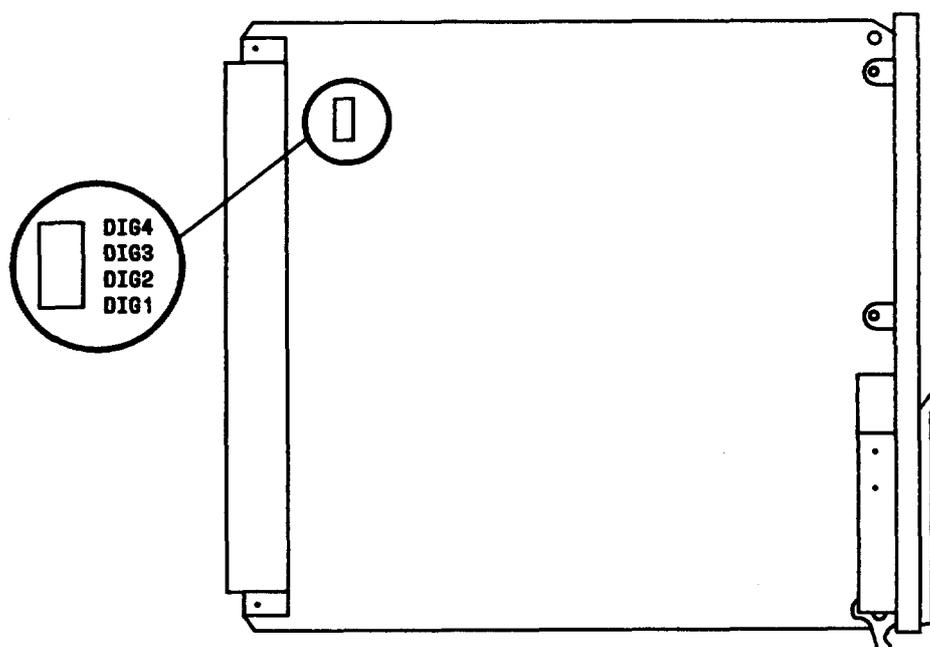


FIG. 3 - Location of Power-Option Jumper Plug

12. (FIG. 3) Move power-option jumper plug so that it is adjacent to **DIG4** on printed wiring board.
13. Now do Step 14.
14. From office records, determine terminal baud rate for daisy-chain terminal (connects to daisy chain at top of bay) and local terminal (connects to 25-pin jack on faceplate of Control and Access Unit).
15. (TABLE A) (FIG. 4) Set baud rate switches on Control and Access Unit printed wiring board for baud rate of daisy-chain terminal (which connects to daisy chain at top of LT-2 bay).
16. (TABLE B) (FIG. 4) Set baud rate switches on Control and Access Unit printed wiring board for baud rate of local terminal (which plugs into faceplate connector).
17. (TABLE C) (FIG. 4) Set firmware version switch on Control and Access Unit for type of firmware memory installed.
18. **Note:** The Control and Access Unit ideally should be mounted in third double-shelf module up from bottom, thus placing CAU at chest level of someone standing in front of bay. However, if third double-shelf module is not equipped with power converter unit, the Control and Access Unit must be mounted in another shelf in bay.

(FIG. 5) Determine correct shelf location for SL118 Control and Access Unit (CAU).

19. Insert SL118 Control and Access Unit into correct shelf location.

Reference: **DLP-519**

20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

**TABLE A**

**SWITCH SETTINGS FOR BAUD RATE  
OF DAISY-CHAIN LINK CONNECTOR**

BAUD RATE	SWITCH NUMBER TO BE SET		
	1	2	3
	SWITCH POSITION	SWITCH POSITION	SWITCH POSITION
110	Top of rocker in	Top of rocker in	Top of rocker in
150	Bottom of rocker in	Top of rocker in	Top of rocker in
300	Top of rocker in	Bottom of rocker in	Top of rocker in
600	Bottom of rocker in	Bottom of rocker in	Top of rocker in
1200	Top of rocker in	Top of rocker in	Bottom of rocker in
2400	Bottom of rocker in	Top of rocker in	Bottom of rocker in
4800	Top of rocker in	Bottom of rocker in	Bottom of rocker in

**TABLE B  
SWITCH SETTINGS FOR BAUD RATE  
OF CAU FACEPLATE CONNECTOR**

BAUD RATE	SWITCH NUMBER TO BE SET	
	4	5
	SWITCH POSITION	SWITCH POSITION
110	Top of rocker in	Top of rocker in
300	Bottom of rocker in	Top of rocker in
600	Top of rocker in	Bottom of rocker in
1200	Bottom of rocker in	Bottom of rocker in

**TABLE C  
SWITCHES 6 AND 7 SETTINGS  
FOR  
FIRMWARE MEMORY TYPE**

FIRMWARE PROGRAM IDENTIFICATION (PID)	POSITION OF SWITCH 6	POSITION OF SWITCH 7
16K EPROM (first office application) PID = AAPHB	Top of rocker in	Bottom of rocker in
32K EPROM (all other applications)	Top of rocker in	Top of rocker in

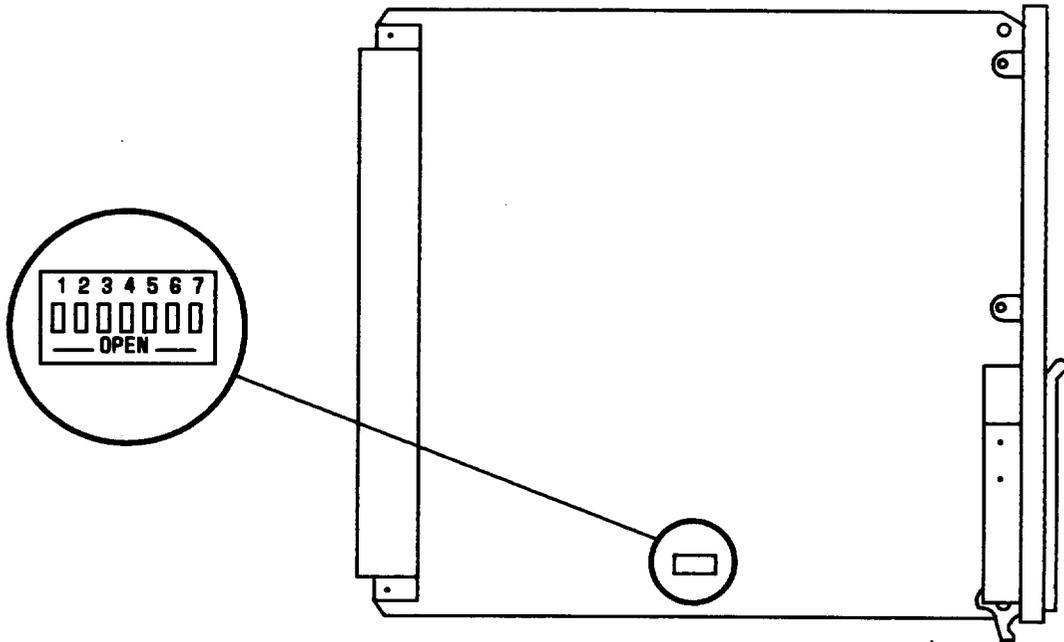


FIG. 4 - Location of Baud Rate Selector Switch

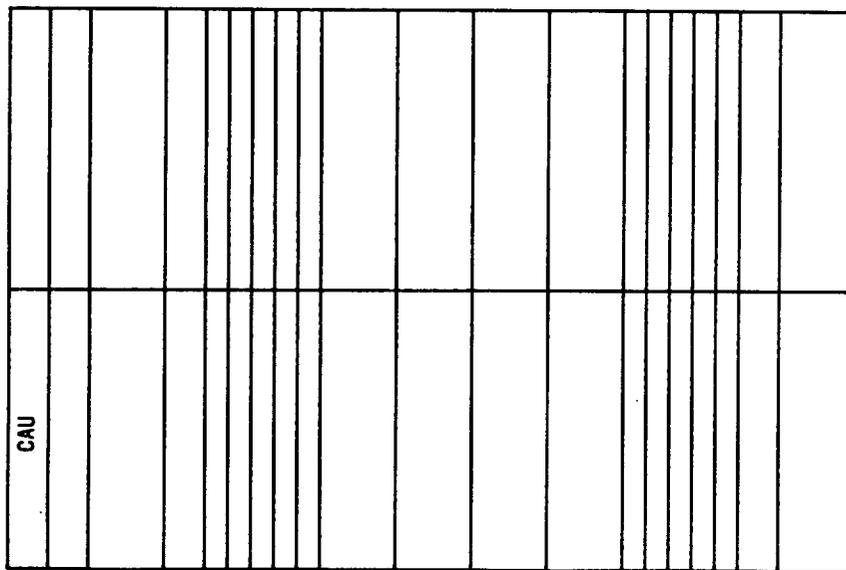


FIG. 5 - Shelf Position for SL118 Control and Access Unit (CAU)

## INITIALIZE CONTROL AND ACCESS UNIT

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.
2. From office records, determine 10-character frame identification code (FIC), and 2-character frame address (FA).
3. Obtain handheld terminal (G.R. Electronics, Ltd., Type 12 pocket terminal) or full-size keyboard terminal which is compatible with LT-2.
4. At LT-2 bay, insert RS232C plug of Type 12 pocket terminal into connector jack on Control and Access Unit faceplate or connect full-size keyboard terminal to Control and Access Unit faceplate using ED-54815-20,G6 cable or standard RS232C straight-through cable.
5. At keyboard terminal, press any key.

Response: **READY (M19)**

6. Are you using Type 12 pocket terminal?

If **YES**, then continue to Step 7.  
If **NO**, then do Step 13.

7. At Type 12 pocket terminal keyboard, press **SHIFT** key followed by **CLR** key (same as key 2) to clear display.
8. At Type 12 pocket terminal keyboard, enter following command line: **HH:\*,CARRIAGE RETURN**

Response: **EXECUTION COMPLETE (M23)**

9. Did you get correct response or error message?

If **CORRECT RESPONSE**, then do Step 12.  
If **ERROR MESSAGE**, then continue to Step 10.

10. Refer to LT-2 USER GUIDE and determine and correct cause of error message.
11. Now repeat from Step 7.
12. At Type 12 Pocket Terminal keyboard, press **SHIFT** key followed by **CLR** key (same as key 2) to clear display.

13. (FIG. 1) At LT-2 keyboard terminal, enter the following command line. **IN:\*,fa,fc;CARRIAGE RETURN** (when response occurs, you must press **SHIFT LF** to get second line of response if using handheld terminal).

Response: BAY = **fffffff** (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

14. Did you get correct response or error message?

If **CORRECT RESPONSE**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **ERROR MESSAGE**, then continue to Step 15.

15. Refer to LT-2 USER GUIDE and determine and correct cause of error message.  
16. Now repeat from Step 6.

**IN:\*,17,fffffff;<CARRIAGE RETURN>**  
Where: 17 = 2-character frame (or bay) address  
f = 10-character frame identification code  
<CARRIAGE RETURN> = Executes command line

**FIG. 1 - Example of IN Command Line Input**

## PERFORM SOFTWARE PROVISIONING

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.
2. From office records, obtain following provisioning data for all circuits to be provisioned at this time:
  - 10-character frame identification code (FIC) (or 2-digit frame address)
  - shelf number within bay
  - digroup number within shelf
  - group number or channel numbers within digroup
  - expected measured loss (EML) of trunks
  - type of signaling required
  - whether trunks require echo canceling
3. (FIG. 1) Subtract 6 dB from the EML to determine VNL coefficient.

If EML = 8.5, then:

$$(8.5) - (6) = +2.5$$

Therefore, +2.5 is VNL coefficient to be used when entering VNL using EN-PR or PR command.

IF EML = 5.5, then:

$$(5.5) - (6) = -0.5$$

Therefore, -0.5 is VNL coefficient to be used when entering VNL using EN-PR or PR command.

FIG. 1 - Example of VNL Coefficient Calculation

4. Do you wish to load provisioning data into only Control and Access Unit (CAU) or into both CAU and Channel Processor Unit(s) (CH-PRs)?

If **CAU ONLY**, then continue to Step 5.  
If **BOTH CAU AND CH-PR**, then do Step 7.

5. (FIG. 2)(TABLE A) At LT-2 keyboard terminal, enter following message. **EN-PR:bay,shelf,digroup,channel:x.xV, type of signaling,echo canceler enable/disable; CARRIAGE RETURN**

Response: BAY = ffffffff (fa) VER v.v  
DIGROUP = s,d  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-digit frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number

6. Now do Step 8.

7. (FIG. 3)(TABLE A) At LT-2 keyboard terminal, enter the following message. **PR:bay,shelf,digroup,channel:x.xV, type of signaling,echo canceler enable/disable; CARRIAGE RETURN**

Response: BAY = ffffffff (fa) VER v.v  
PROCESSING IN PROGRESS (M9)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-digit frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number

8. Did you get correct response or error message?

If **CORRECT RESPONSE**, then do Step 11.  
If **ERROR MESSAGE**, then continue to Step 9.

9. Refer to LT-2 USER GUIDE and determine and correct cause of error message.

10. Now repeat from Step 4.

11. Are there other circuits to be provisioned?

If **YES**, then do Step 4.  
If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

**EN-PR:17,3,4,1:1.7V,EM,ON;<CARRIAGE RETURN>**  
 Where 17 = 2-character frame (or bay) address  
 3 = Shelf number  
 4 = Digroup number  
 1 = Channel number  
 1.7V = Via-net-loss parameter. May be any value between -6.0 dB and +6.0 dB. In this example, the value happens to be +1.7 dB (the plus sign is optional).  
 EM = Signaling parameter. May be any of the six variables given in Table A. In this example, the variable happens to be EM for E&M signaling.  
 ON = Echo canceler parameter. May be either ON (for On or Enabled) or OF (for Off or Disabled). In this example, the parameter happens to be ON for ON or ENABLED.  
 <CARRIAGE RETURN> = Executes command line

**FIG. 2 - Example of EN-PR Command Line Input**

**TABLE A**

**CORRELATION BETWEEN SIGNALING TYPE  
AND LT-2 SIGNALING PROVISIONING CODE**

TYPE OF TRUNK SIGNALING	LT-2 SIGNALING CODE
General 2-State (including E&M)	EM
CCIS (or no signaling)	CC
Special Access Analog Office/Digital Station Ground Start	RG
Special Access Analog Office/Digital Station Loop Start	RL
Special Access Analog Station/Digital Office Ground Start	PG
Special Access Analog Station/Digital Office Loop Start	PL

**PR:17,3,4,1:1.7V,EM,ON;<CARRIAGE RETURN>**

Where 17 = 2-character frame (or bay) address

3 = Shelf number

4 = Digroup number

1 = Channel number

1.7V = Via-net-loss parameter. May be any value between -6.0 dB and +6.0 dB. In this example, the value happens to be +1.7 dB (the plus sign is optional).

EM = Signaling parameter. May be any one of the six variables given in Table A. In this example, the variable happens to be EM for E&M signaling.

ON = Echo canceler parameter. May be either ON (for On or Enabled) or OF (for Off or Disabled). In this example, the parameter happens to be ON for ON or ENABLED.

<CARRIAGE RETURN> = Executes command line

**FIG. 3 - Example of PR Command Line Input**

## ALIGN RECEIVE GAIN AT LT-2 EQUIPPED WITH SL174 CHANNEL PROCESSOR UNIT (DATS NOT REQUIRED)

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.

2. Does far-end office have any LT-1, LT-1B, LT-2, or other LT-type transmultiplexers?

If **YES**, then continue to Step 3.

If **NO**, then do Step 5.

3. Request far-end office to send 1004-Hz tone at -10 dBm0 on first channel to be tested.

4. Now do Step 6.

5. Request far-end office to send 1004-Hz tone at -10 dBm0 (-26 dBm at -16 TLP) on first channel to be tested.

6. At LT-2 keyboard terminal, press **CANCEL** or **DELETE** key, or **CONTROL X** (to reset "stepping" feature).

Response: @  
INPUT DELETED (M2)

7. (FIG. 1) At LT-2 keyboard terminal, enter following message using channel number of channel under test. **AG: bay,shelf,digroup,channel:-10!CARRIAGE RETURN**

8. Check the LT-2 keyboard terminal output.

Response: BAY = ##### (fa) VER v.v  
DIGROUP s,d  
-10 DBM0 AUTO GN ALIGN IN CH cc  
POWER IN DBM0 = +/-xy.z  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number,digroup number  
cc = channel number  
+/-xy.z = channel power in dBm0

9. Did you get correct response and indicated power of -10 dBm0 +/-0.2 dB or did you get error message?

If **CORRECT RESPONSE**, then do Step 16.

If **ERROR MESSAGE**, then continue to Step 10.

10. Ensure far-end office is applying tone to same channel you are trying to adjust.

11. (FIG. 1) At LT-2 keyboard terminal, enter following message. **AG:bay,shelf,digroup,channel:-10!**  
CARRIAGE RETURN.

12. Check LT-2 keyboard terminal output.

Response: BAY = ffffffff (fa) VER v.v  
DIGROUP s,d  
-10 DBM0 AUTO GN ALIGN IN CH cc  
POWER IN DBM0 = +/-xy.z  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number,digroup number  
cc = channel number  
+/-xy.z = channel power in dBm0

13. Did you get correct response and indicated power of -10 dBm0 +/-0.2 dB or did you get error message?

If **CORRECT RESPONSE**, then do Step 16.  
If **ERROR MESSAGE**, then continue to Step 14.

14. Refer to LT-2 USER GUIDE and determine and correct cause of error message.

15. Now repeat from Step 7.

16. Is this last channel to be tested?

If **NO**, then continue to Step 17.  
If **YES**, then do Step 20.

17. Notify far-end office to apply tone to next sequential channel (if far end is using DATS and C-0-D command, tell far end to press **D** button four times to skip signaling and talk tests).

18. Ensure far end has applied tone to channel under test, then at LT-2 keyboard terminal, enter plus sign (+) followed by CARRIAGE RETURN (to align next sequential channel).

19. Now repeat from Step 8.

20. At LT-2 keyboard terminal, press **CANCEL** or **DELETE** key (to terminate "stepping" feature).

Response: @  
INPUT DELETED (M2)

21. Notify far end to stop sending tone toward your office.

22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

**AG:17,3,4,1:-10!<CARRIAGE RETURN>**  
Where 17 = 2-character frame (or bay) address  
3 = Shelf number  
4 = Digroup number  
1 = Channel number  
-10 = Gain adjust parameter (LT-2 will adjust receive gain to this level)  
! = Command line terminator to invoke "stepping" feature  
<CARRIAGE RETURN> = Executes command line

**FIG. 1 - Example of AG Command Line Input**

## INSTALL SIGNALING CIRCUIT PACKS

1. Are you working at 48-channel module or 96-channel module?

If **48-CHANNEL MODULE**, then continue to Step 2.  
If **96-CHANNEL MODULE**, then do Step 6.

2. (FIG. 1) Determine correct shelf position for signaling circuit packs.
3. (FIG. 1) Insert SL116 signaling filter circuit pack into correct shelf position.

Reference: **DLP-519**

4. (FIG. 1) Insert SL117 signaling control circuit pack into correct shelf position.

Reference: **DLP-519**

5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
6. **Note:** In 96-channel module, digroups 1 and 3 have signaling units in A-B order, whereas digroups 2 and 4 have signaling units in B-A order.

(FIG. 2) Determine correct shelf position for signaling circuit packs.

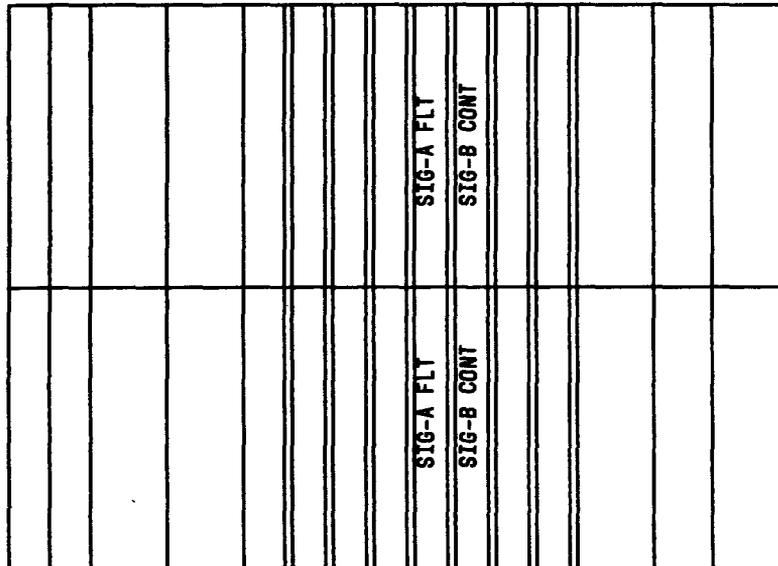


FIG. 1 - Signaling Circuit Pack Locations in 48-Channel Module







## CHANGE SIGNALING-TYPE PARAMETERS(S)

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.
2. (FIG. 1) (TABLE A) At LT-2 keyboard terminal, enter following message, using bay, shelf, digroup, and channel numbers of circuits to be changed. **PR: bay,shelf,digroup,channel:signaling parameter;**  
CARRIAGE RETURN

Response: BAY = **fffffff** (**fa**) VER **v.v**  
PROCESSING IN PROGRESS (M9)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

3. Did you get correct response or error message?  
  
If **CORRECT RESPONSE**, then do Step 6.  
If **ERROR MESSAGE**, then continue to Step 4.
4. Refer to LT-2 USER GUIDE and determine and correct cause of error message.
5. Now repeat from Step 2.
6. Are there other circuits to be changed?  
  
If **YES**, then do Step 2.  
If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

**PR:17,3,4,1:EM;<CARRIAGE RETURN>**  
Where 17 = 2-character frame (or bay) address  
3 = Shelf number  
4 = Digroup number  
1 = Channel number  
EM = Signaling parameter. May be any one of six variables given in Table A. In this example, the variable happens to be EM for E&M signaling.  
<CARRIAGE RETURN> = Executes command line

**FIG. 1 - Example of PR Command Line Input**

**TABLE A**

**CORRELATION BETWEEN SIGNALING TYPE  
AND LT-2 SIGNALING PROVISIONING CODE**

TYPE OF TRUNK SIGNALING	LT-2 SIGNALING CODE
General 2-State (including E&M)	EM
CCIS (or no signaling)	CC
Special Access Analog Office/Digital Station Ground Start	RG
Special Access Analog Office/Digital Station Loop Start	RL
Special Access Analog Station/Digital Office Ground Start	PG
Special Access Analog Station/Digital Office Loop Start	PL

## CONDUCT ECHO CANCELER TEST

1. Establish communication with analog far-end office, and request assistance in performing end-to-end echo canceler test.
2. Request far-end technician to enter following message at **DATS** keypad: **C-C-1-C-D**.
3. At near-end **DATS** keypad, enter following message: **C-C-1-A-D**.
4. Does far-end **DATS** indicate between -9 dBm0 and -11 dBm0 of noise power?  
If **YES**, then do Step 7.  
If **NO**, then continue to Step 5.
5. Request far-end to readjust channel gain on channel under test by performing receive gain test.
6. Now repeat from Step 2.
7. At near-end, measure and record facility idle channel noise from **DATS** readout.
8. Request far-end technician to enter **D** at **DATS** keypad.
9. At near-end **DATS** keypad, enter **D**.
10. Does near-end **DATS** indicate between -9 dBm0 and -11 dBm0?  
If **YES**, then do Step 13.  
If **NO**, then continue to Step 11.
11. At near-end, readjust channel gain on channel under test by performing receive gain test.  
Reference: **DLP-511**
12. Now repeat from Step 2.
13. Request far-end technician to enter **D** at **DATS** keypad.
14. At near-end **DATS** keypad, enter **D**.
15. Does near-end **DATS** indicate within +/-1 dB of measurement recorded in step 7?  
If **YES**, then do Step 18.  
If **NO**, then continue to Step 16.
16. Request far-end to replace echo canceler circuit pack with spare.
17. Now repeat from Step 2.

18. Was this last channel to be tested?

If **YES**, then continue to Step 19.

If **NO**, then do Step 21.

19. Terminate communication with far-end office.

20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

21. Request far-end technician to enter **D** at **DATS** keypad.

22. At near-end **DATS** keypad, enter **D**.

23. Now repeat from Step 4.

## CONDITION ATTENUATORS ON SL111 OR SL173 ANALOG INTERFACE UNITS

1. (FIG. 1) Position circuit pack as shown in illustration.
2. Locate two attenuators on printed wiring board.
3. Push up necessary switches on both attenuators to achieve required line build-out loss per office records (red bar will be visible on each switch that is in attenuating position). Example: For line build-out of 1.4 dB loss, switches 0.2, 0.4, and 0.8 must be up (red bar visible), since  $0.2 + 0.4 + 0.8 = 1.4$ ; switches 0.1 and 1.6 must be down (red bar not visible).
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

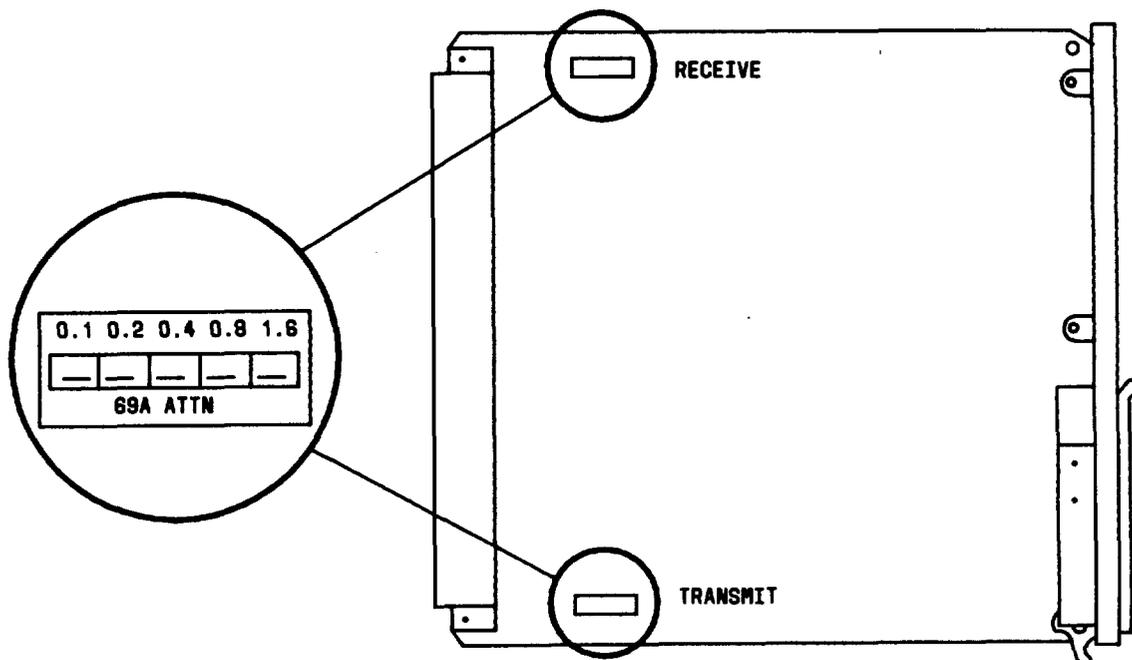


FIG. 1 - Location of Attenuators on Analog Interface Unit

## CONDITION EQUALIZER AND FACEPLATE SWITCHES ON SL115 T-INTERFACE UNIT

1. (FIG. 1) Position circuit pack as shown in illustration.
2. Locate equalizer on printed wiring board.
3. (TABLE A) Push down necessary switch on equalizer which corresponds to digital cable length per office records (all other switches must be up).
4. (FIG. 2) Locate two faceplate switches.
5. Place **LL-NORM-LT** switch in **NORM** position.
6. Place **D-CFA** switch in **OFF** position.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

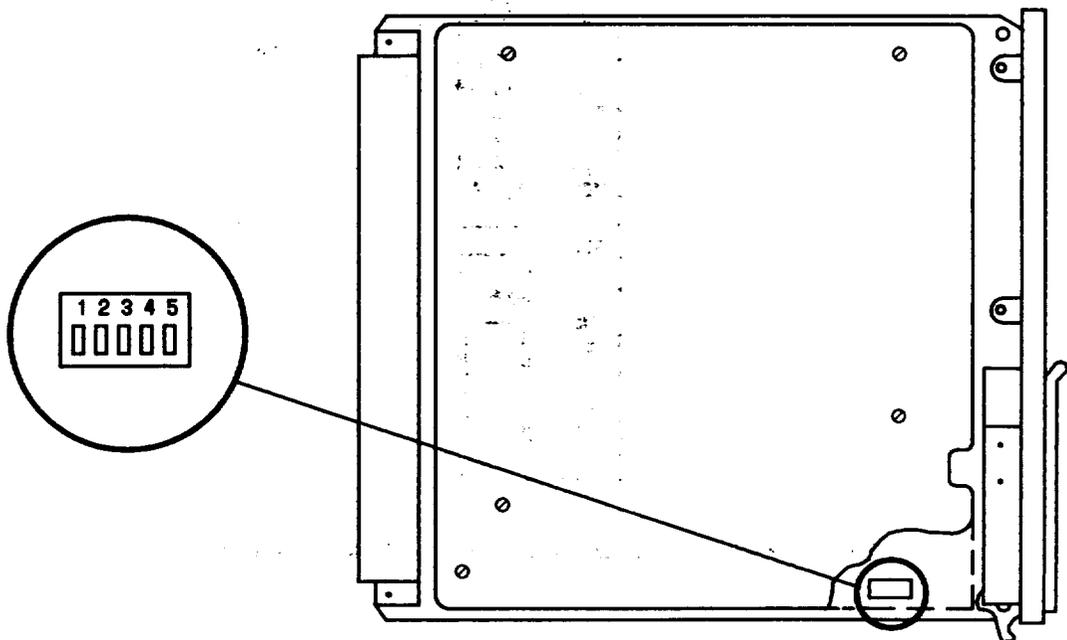
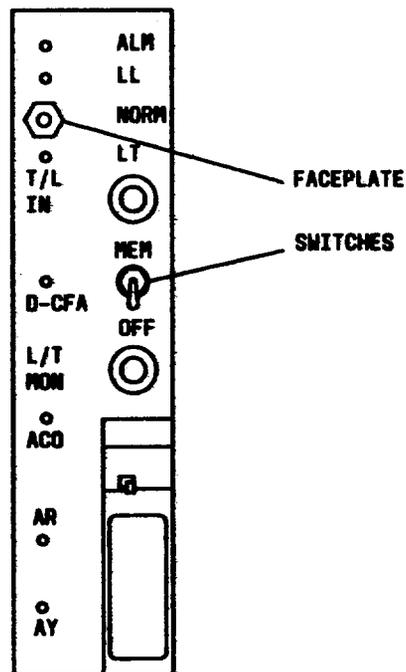


FIG. 1 - Location of Equalizer on T-Interface Unit

**TABLE A**  
**RELATIONSHIP BETWEEN CABLE**  
**LENGTH AND EQUALIZER SWITCHES**

DIGITAL CABLE LENGTH	POSITION OF SWITCHES
0 to 133 Feet	1 - Down
133 to 266 Feet	2 - Down
266 to 399 Feet	3 - Down
399 to 533 Feet	4 - Down
533 to 655 Feet	5 - Down



**FIG. 2 - Location of Faceplate Switches on T-Interface Unit**

## CONDITION SYNCHRONIZATION SWITCHES ON SL119 CLOCK UNIT

**OVERVIEW:** The 3-position switch on the clock unit is used to determine whether the digroup receives its timing from the primary frequency supply (PFS) or the T1 line (switch 2). If the PFS is used, switch 1 selects either 64 kHz or 512 kHz. If T1 line is used, position of switch 1 does not matter. Switch 3 selects either loop-timing or free running, and should always be in loop-time position.

1. (FIG. 1) Position circuit pack as shown in illustration.
2. Locate 3-position switch on printed wiring board.
3. (TABLE A) From office records, determine if LT-2 is to receive synchronization from primary frequency supply or T1 line?

If **PRIMARY FREQUENCY SUPPLY**, then continue to Step 4.  
If **T1 LINE**, then do Step 10.

4. Push bottom of rocker in on switch 2.

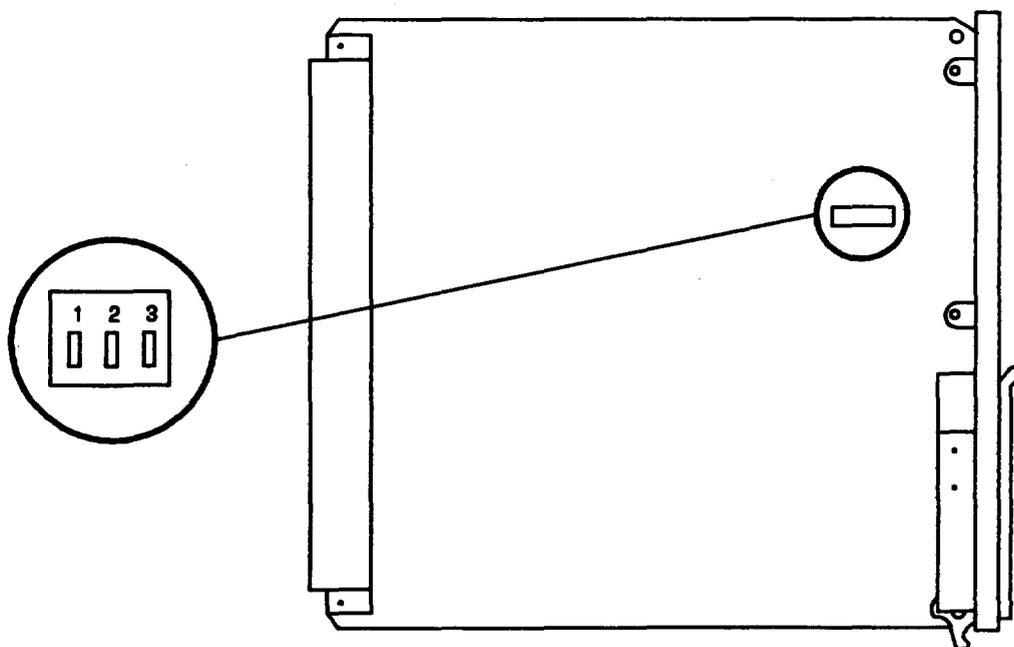


FIG. 1 - Location of Synchronization Switches on SL119 Clock Unit

**TABLE A**  
**RELATIONSHIP BETWEEN SYNC OPTION**  
**SETTINGS AND SWITCH POSITIONS**

POSITION OF ROCKER	OPTIONS FOR POSITION OF EACH SWITCH		
	1	2	3
Top of rocker in	512 kHz	T1 Line	Free-run
Bottom of rocker in	64 kHz	PFS	Loop-timed

5. From office records, determine if primary frequency supply is providing 64 kHz or 512 kHz to LT-2?  
  
    If **64 KHZ**, then continue to Step 6.  
    If **512 KHZ**, then do Step 8.
6. Push bottom of rocker in on switch 1.
7. Now do Step 11.
8. Push top of rocker in on switch 1.
9. Now do Step 11.
10. Push top of rocker in on switch 2.
11. Push bottom of rocker in on switch 3.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## INSTALL OR REMOVE CIRCUIT PACK

1. **Warning:** *To avoid equipment damage, remove service and turn off power unit for digroup in which you are working before installing or removing any circuit packs.*

2. Are you installing or removing circuit pack?

If **INSTALLING**, then continue to Step 3.

If **REMOVING**, then do Step 9.

3. **Warning:** *Devices mounted on printed wiring boards can be damaged if jammed against adjacent circuit packs.*

Line up unit with upper and lower shelf guides.

4. Slide unit into shelf until latch on bottom of unit strikes shelf.

5. (FIG. 1) Push up metal spring lock and pull out and down on latch lever.

6. While holding latch lever out, push unit into shelf until resistance is felt on backplane and lever cam engages groove on bottom of shelf.

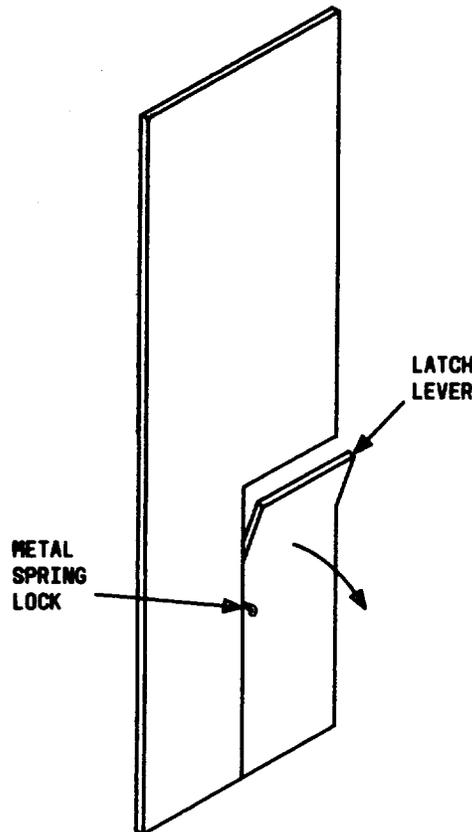


FIG. 1 - Location of Metal Spring Lock and Latch Lever on Faceplate of LT-2 Plug-In Units

7. (FIG. 1) Push latch lever up and in to push unit to its fully seated position (metal spring lock should catch on lip of latch lever).
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. (FIG. 1) Push up metal spring lock and pull out and down on latch lever to free unit of connector jack at rear of shelf.
10. Slide unit out of shelf.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## CONNECT DATS FOR CIRCUIT TESTS

1. Connect Digital Access Timeslot Selector (**DATS**) power cord to 120-V ac source (FIG. 1).
2. Operate **POWER** switch on **DATS** front panel to **ON** position. Ignore **DATS** indicators.
3. Connect test cord (KS-20999 plug to 310 plug) between **DATS** and T-Interface Unit with KS-20999 plug in **L/T MON** jack of T-Interface Unit and 310 plug in **DS1 IN** jack of **DATS** (FIG. 1).
4. Connect another test cord (KS-20999 plug to 310 plug) between **DATS** and T-Interface Unit with KS-20999 plug in **T/L IN** jack of T-Interface Unit and 310 plug in **DS1 OUT** jack of **DATS** (FIG. 1).
5. Connect 2W22A test cord to **DO IT** jack on **DATS** rear panel (FIG. 1).
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

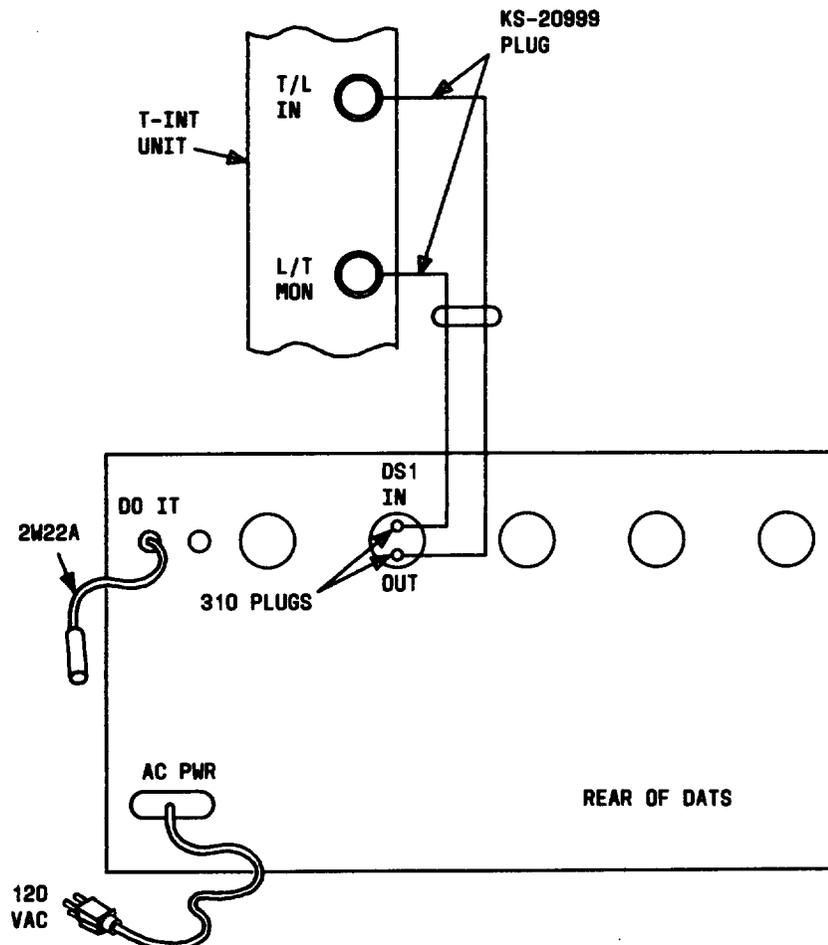


FIG. 1 - Test Connections Between LT-2 and DATS

## ALIGN RECEIVE GAIN AT LT-2 EQUIPPED WITH SL114 CHANNEL PROCESSOR UNIT (USING DATS L1, LB OR L1 MOD A)

**OVERVIEW:** The SL114 circuit pack cannot perform power measurement or auto-gain adjustment functions, so DATS is required to swap tones with far-end office and align receive gain. All gain parameters in data base for digroup being tested must be preset to 0.0 dB before measuring received tone. When tone is received from far-end office, determine difference between required level and actual received level. Difference is entered into data base as gain parameter for channel under test (could be either positive or negative number). For example, if required level is -10 dBm0 and actual received level is -12 dBm0, difference is +2 dB, so gain parameter entered would be +2.0. If received level had been -8 dBm0, difference would have been -2 dB.

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.
2. Connect **DATS** for circuit tests.

Reference: **DLP-520**

3. (FIG. 1) At LT-2 keyboard terminal, enter following message using appropriate bay, shelf, and digroup numbers. **PR: bay, shelf, digroup, \*:0.0G; CARRIAGE RETURN**

<p><b>PR:17,3,4,:0.0G;&lt;CARRIAGE RETURN&gt;</b> Where 17 = 2-character frame (or bay) address 3 = Shelf number 4 = Digroup number 0.0G = Gain adjust parameter (LT-2 sets gain of all channels to this level) &lt;CARRIAGE RETURN&gt; = Executes command line</p>
---

**FIG. 1 - Example of PR Command Line Input**

4. Check LT-2 keyboard terminal output.

Response: BAY = ##### (fa) VER v.v  
PROCESSING IN PROGRESS (M9)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

5. Did you get correct response or error message?

If **CORRECT RESPONSE**, then do Step 8.  
If **ERROR MESSAGE**, then continue to Step 6.

6. Refer to LT-2 USER GUIDE and determine and correct cause of error message.
7. Now repeat from Step 3.
8. Does far-end office have any LT-1, LT-1B, LT-2, or other LT-type transmultiplexers?  
If YES, then continue to Step 9.  
If NO, then do Step 11.
9. Request far-end office to send 1004-Hz tone at -10 dBm0 on first channel to be tested.
10. Now do Step 12.
11. Request far-end office to send 1004-Hz tone at -10 dBm0 (-26 dBm at -16 TLP) on first channel to be tested.
12. AT DATS control keypad, enter C-2-D.
13. At DATS control keypad, enter C-0-D (DATS sends -10 dBm0 tone toward far-end office).
14. Determine level of received tone by reading DATS 4-digit display.
15. (FIG. 2) Subtract DATS reading from -10 to obtain gain coefficient.
16. (FIG. 3) At LT-2 keyboard terminal, enter following message using channel number of channel under test and gain coefficient determined in last step: PR: bay,shelf,digroup,channel: +/-x.xG;  
CARRIAGE RETURN

If reading from DATS is -8.3, then:

$$(-10) - (-8.3) =$$

$$-10 + 8.3 = -1.7$$

Therefore, -1.7 is gain coefficient parameter to be used when entering gain using PR command.

If reading from DATS is -12.2, then:

$$(-10) - (-12.2) =$$

$$-10 + 12.2 = +2.2$$

Therefore, +2.2 is gain coefficient parameter to be used when entering gain using PR command.

FIG. 2 - Example of Obtaining Gain Coefficient

```
PR:17,3,4,1:-1.7G;<CARRIAGE RETURN>
      Where 17 = 2-character frame (or bay) address
             3 = Shelf number
             4 = Digroup number
             1 = Channel number
      -1.7G = Gain coefficient parameter (assuming it needs to be -1.7)
<CARRIAGE RETURN> = Executes command line
```

FIG. 3 - Example of PR Command Line Input

17. Check LT-2 keyboard terminal output

Response: BAY = ##### (fa) VER v.v  
PROCESSING IN PROGRESS (M9)  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware

18. Did you get correct response or error message?

If **CORRECT RESPONSE**, then do Step 21.  
If **ERROR MESSAGE**, then continue to Step 19.

19. Refer to LT-2 USER GUIDE and determine and correct cause of error message.

20. Now repeat from Step 16.

21. Is this first channel to be tested?

If **YES**, then continue to Step 22.  
If **NO**, then do Step 24.

22. At **DATS** control keypad, enter **E-8-D**.

23. Now do Step 26.

24. Is this last channel to be tested?

If **YES**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**  
If **NO**, then continue to Step 25.

25. At **DATS** control keypad, press key **D**.

26. Notify far-end office to apply tone to next sequential channel.

27. Now repeat from Step 14.

## SEND -10 DBM0 TEST TONE TOWARD ANALOG FACILITY FOR FAR-END TRUNK ADJUSTMENT

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.
2. At LT-2 keyboard terminal, press **CANCEL** or **DELETE** key (to reset "stepping" feature).

Response: @  
INPUT DELETED (M2)

3. (FIG. 1) At LT-2 keyboard terminal, enter following command line using channel number of channel under test (to send tone toward far-end) **OP-TN:bay,shelf,digroup,channel:-10,TL! CARRIAGE RETURN**

**OP-TN:17,3,4,1:-10,TL!<CARRIAGE RETURN>**  
Where 17 = 2-character frame (or bay) address  
3 = Shelf number  
4 = Digroup number  
1 = Channel number  
-10 = Tone level parameter (LT-2 will send this level tone toward far end)  
TL = Direction parameter (LT-2 will send tone in T-to-L direction; i.e., toward analog facility)  
! = Command line terminator to invoke "stepping" feature  
<CARRIAGE RETURN> = Executes command line

FIG. 1 - Example of OP-TN Command Line Input

4. Check terminal output.

Response: BAY = **fffffff** (fa) VER v.v  
DIGROUP = s,d  
-10 DBM0 TOWARD L-CARR, CH cc  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number  
cc = channel number

5. Did you get correct response or error message?

If **CORRECT RESPONSE**, then do Step 8.  
If **ERROR MESSAGE**, then continue to Step 6.

6. Refer to **LT-2 USER GUIDE** and determine and correct cause of error message.
7. Now repeat from **Step 2**.
8. Notify far-end that tone has been applied to channel under test.
9. Is this last channel to be tested?

If **YES**, then do **Step 12**.

If **NO**, then continue to **Step 10**.

10. When far-end requests tone on next sequential channel, at LT-2 keyboard terminal, enter plus sign (+) followed by **CARRIAGE RETURN** (to apply tone to next sequential channel).
11. Now repeat from **Step 4**.
12. At LT-2 keyboard terminal, press **CANCEL** or **DELETE** key, or **CONTROL X** (to terminate "stepping" feature).
13. (FIG. 2) At LT-2 keyboard terminal, enter following command line (to stop sending tone toward far-end). **RL-TN:bay,shelf,digroup;CARRIAGE RETURN**

<p><b>RL-TN:17,3,4;&lt;CARRIAGE RETURN&gt;</b> Where 17 = 2-character frame (or bay) address 3 = Shelf number 4 = Digroup number &lt;CARRIAGE RETURN&gt; = Executes command line</p>
--

**FIG. 2 - Example of RL-TN Command Line Input**

14. Check terminal output.

Response: BAY = **fffffff (fa)** VER **v.v**  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
v.v = generic version of firmware

15. Did you get correct response or error message?

If **CORRECT RESPONSE**, then **STOP**. **YOU HAVE COMPLETED THIS PROCEDURE**.

If **ERROR MESSAGE**, then continue to **Step 16**.

16. Refer to **LT-2 USER GUIDE** and determine and correct cause of error message.
17. Now repeat from **Step 13**.

## SEND -10 DBMO TONE TOWARD DIGITAL FACILITY FOR FAR-END DIGITAL TESTS

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.
2. At LT-2 keyboard terminal, press **CANCEL** or **DELETE** key (to reset "stepping" feature).

Response: @  
INPUT DELETED (M2)

3. (FIG. 1) At LT-2 keyboard terminal, enter following command line using channel number of channel under test (to send tone toward far-end). **OP-TN:bay,shelf,digroup,channel:-10,LT! CARRIAGE RETURN**

<p><b>OP-TN:17,3,4,1:-10,LT!&lt;CARRIAGE RETURN&gt;</b> Where 17 = 2-character frame (or bay) address 3 = Shelf number 4 = Digroup number 1 = Channel number -10 = Tone level parameter (LT-2 will send this level tone toward far end) LT = Direction parameter (LT-2 will send tone in L-to-T direction; i.e., toward digital facility) ! = Command line terminator to invoke "stepping" feature &lt;CARRIAGE RETURN&gt; = Executes command line</p>
--

**FIG. 1 - Example of OP-TN Command Line Input**

4. Check terminal output.

Response: BAY = **fffffff** (fa) VER v.v  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
v.v = generic version of firmware

5. Did you get correct response or error message?

If **CORRECT RESPONSE**, then do Step 8.  
If **ERROR MESSAGE**, then continue to Step 6.

6. Refer to LT-2 USER GUIDE and determine and correct cause of error message.
7. Now repeat from Step 2.

8. Notify far end that tone has been applied to channel under test.
9. Is this last channel to be tested?

If **YES**, then do Step 12.

If **NO**, then continue to Step 10.

10. When far-end requests tone on next sequential channel, at LT-2 keyboard terminal, enter plus sign (+) followed by CARRIAGE RETURN (to apply tone to next sequential channel).
11. Now repeat from Step 4.
12. At LT-2 keyboard terminal, press **CANCEL** or **DELETE** key, or **CONTROL X** (to terminate "stepping" feature).
13. (FIG. 2) At LT-2 keyboard terminal, enter following command line (to stop sending tone toward far-end). **RL-TN:Bay,Shelf,Digroup;CARRIAGE RETURN**

**RL-TN:17,3,4;<CARRIAGE RETURN>**  
 Where 17 = 2-character frame (or bay) address  
       3 = Shelf number  
       4 = Digroup number  
 <CARRIAGE RETURN> = Executes command line

**FIG. 2 - Example of RL-TN Command Line Input**

14. Check terminal output.

Response: BAY = ffffffff (fa) VER v.v

EXECUTION COMPLETE (M23)

Where f = 10-character frame identification code

fa = 2-character frame address

v.v = generic version of firmware

15. Did you get correct response or error message?

If **CORRECT RESPONSE**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **ERROR MESSAGE**, then continue to Step 16.

16. Refer to LT-2 USER GUIDE and determine and correct cause of error message.
17. Now repeat from Step 13.

## DOWNLOAD PROVISIONING DATA FROM CAU TO CH-PR

1. **Note:** This procedure assumes user familiarity with material in LT-2 USER GUIDE, particularly that dealing with terminal usage, correcting mis-typed character, retyping line, and error messages.
2. (FIG. 1) At LT-2 keyboard terminal, enter following message. **DL:bay,shelf,digroup,channel:G V S E or ALL;CARRIAGE RETURN**

Response: BAY = **fffffff** (fa) VER v.v  
DIGROUP = s,d  
Information showing which data parameters were downloaded and which options are present  
EXECUTION COMPLETE (M23)  
Where f = 10-character frame identification code  
fa = 2-character frame address  
VER v.v = generic version of firmware  
s,d = shelf number, digroup number

3. Did you get correct response or error message?  
If **CORRECT RESPONSE**, then do Step 6.  
If **ERROR MESSAGE**, then continue to Step 4.
4. Refer to LT-2 USER GUIDE and determine cause of error message.
5. Now repeat from Step 2.
6. Do you need to download more data parameters to other circuits?  
If **YES**, then do Step 2.  
If **NO**, then **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

```
DL:17,3,4,1:ALL;<CARRIAGE RETURN>
  Where 17 = 2-character frame (or bay) address
        3 = Shelf number (* used here will download parameters for all
        shelves in bay)
        4 = Digroup number (* used here will download parameters for all
        digroups in shelf)
        1 = Channel number (* used here will download parameters for all
        channels in digroup)
        ALL = Parameter(s) to be downloaded (can be G, V, S, E, or ALL)
<CARRIAGE RETURN> = Executes command line
```

FIG. 1 - Example of DL Command Line Input

## REPLACE FAILED FAN

**OVERVIEW:** The LT-2 cooling fans are ROTRON model PD48B2 (KS-22501-L2 or C403231673) for -48 volt bays and model PD24B2 (KS-22501-L6 or C403231681) for -24 volt bays. The fans are polarity protected, so if polarity is reversed, fan will not operate. Some fans may have wrong polarity and not operate after installation. If this occurs, terminal leads must be reversed as indicated in procedure. Protection fuses are 80C (3 amp with blue tip) for 48-volt fans and 80D (5 amp with green tip) for 24-volt fans.

1. Remove fan grill at bottom of bay by turning four slotted-head fasteners 1/4 turn.

- 2.

***DANGER: Hazardous voltages exist inside fan shelf.***

Remove fuse which protects fan you are replacing. (Fuses are located to left of fans. Upper fuse, **F1**, protects left fan; lower fuse, **F2**, protects right fan.)

3. Unplug fan power cord from fan fuse board (cord remains with fan).
4. Remove two machine screws which pass through fan flange.
5. Remove fan assembly from fan shelf.
6. Install replacement fan into shelf.
7. Install two machine screws through fan flange.
8. Plug fan power cord into shelf jack.

- 9.

***DANGER: Fan will start when fuse is inserted. Ensure you are clear of fan blades.***

Install fan fuse.

10. Is replacement fan operating properly?

If **YES**, then continue to Step 11.

If **NO**, then do Step 13.

11. Install fan grill by pushing in on four slotted-head fasteners.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13. Is fan correct model for voltage being used?

If **YES**, then do Step 16.

If **NO**, then continue to Step 14.

14. Replace fan with correct model type.

15. Now repeat from Step 10.

- 16.

***DANGER: Hazardous voltages exist inside fan shelf.***

Remove fuse which protects fan you are working on.

17. From fan, remove black plastic hood which covers terminal leads.

18. Reverse terminal leads.

19. Peel off polarity label and reverse it to correspond with new polarity of fan.

- 20.

***DANGER: Fan will start when fuse is inserted. Ensure you are clear of fan blades.***

Install fan fuse.

21. Is replacement fan operating properly?

If **YES**, then continue to Step 22.

If **NO**, then do Step 24.

22. Install fan grill by pushing in on four slotted-head fasteners.

23. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

24. Check fan shelf wiring (SD-54504-01).

25. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

## REPLACE FAN AIR FILTER

1. Remove fan grill at bottom of bay by turning four slotted-head fasteners 1/4 turn.
2. Slide out old air filter (filter is mounted horizontally above fans).
3. Slide in new air filter (air filter is Model FF-5X available from Universal Air Filter Co., East St. Louis, Illinois 62205).
4. Replace fan grill by pushing in on four fasteners.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

**CHECKLIST**

ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE
IXL-001 NTP-002 NTP-003 NTP-004 NTP-005		CKL-891 TNG-893					
NTP-006 NTP-007 TAD-100 TAP-101 TAP-102							
TAP-103 TAP-104 TAP-105 DLP-500 DLP-501							
DLP-502 DLP-503 DLP-504 DLP-505 DLP-506							
DLP-507 DLP-508 DLP-509 DLP-510 DLP-511							
DLP-512 DLP-513 DLP-514 DLP-515 DLP-516							
DLP-517 DLP-518 DLP-519 DLP-520 DLP-521							
DLP-522 DLP-523 DLP-524 DLP-525 DLP-526							

- Revised or added item
- Canceled item

## HOW TO USE TOP

This book is a Task Oriented Practice which is called a "TOP". It gives you all the step-by-step instructions you need to do your job (task). These instructions are given in the order that they *must* be done. Failure to follow the instructions in the order given may cause service interruptions.

Regardless of your work experience, TOP can be a useful tool in doing your job. If you have done a particular job many times, or if you do it frequently, TOP gives you "memory joggers" for those instructions you cannot recall. If you have never done a particular job, or if you do it infrequently, TOP gives you the detailed step-by-step instructions you need to do the job.

The work that you do can be divided into two broad job functions – work to clear troubles and work other than to clear troubles.

***Work to Clear Troubles:*** This is the work you do to fix troubles in the equipment. You may be doing this work in response to a customer's complaint, an office alarm, a trouble report, an abnormal printout, or any other equipment fault indication.

***Work Other Than to Clear Troubles:*** This is the work you do to install equipment, to test equipment after it is installed, to place equipment in service, to operate and maintain equipment, or anything else required to establish, to change, or to discontinue service to the customer.

Now, look at the front cover of this book. In the upper right corner is the 9-digit volume number. Near the center is the title, which tells you something about the contents such as the name of the equipment and maybe what types of jobs are included. Below the title is a flow diagram which uses logic symbols to direct you either to 893 or to 001 depending on your understanding of how to use TOP. Do you wonder what those numbers mean? Okay, a TOP is divided into parts called procedures. Each procedure is given a 3-digit number. These numbers range from 001 through 899. Procedures are arranged in this book in numerical order beginning with 001.

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Issue 2

## TASK INDEX LIST

**FIND YOUR JOB IN THE LIST BELOW . . . . . THEN GO TO**

Alert; External - Horn, Ringer, Etc. - Remove . . . . .	NTP-028
Amplifiers; Channel - Recorded Announcement Frame - Test . . . . .	NTP-009
BRDG LED - Does Not Light - Correct . . . . .	TAP-117
Bridging Controller; Trunk - J1C015MB - Replace . . . . .	DLP-572
Channel Amplifiers - Recorded Announcement Frame - Test . . . . .	NTP-009
Drum Wiper - Common Systems Recorded Announcement Frame - Inspect . . . . .	NTP-010
Extended Station Capability - Nonkey Set Only - Reported Failure . . . . .	TAP-123
External Alert - Horn, Ringer, Etc. - Remove . . . . .	NTP-028
Interchange Two Working Station Numbers . . . . .	NTP-081
LED: BRDG - Does Not Light - Correct . . . . .	TAP-117
Loudspeaker Paging - Add . . . . .	NTP-059
New International Trunk, R1 Signaling - Incoming - Establish . . . . .	NTP-010
New Tandem Trunk - T-Carrier and Digroup Terminal - Establish . . . . .	NTP-008
Station Capability; Extended - Nonkey Set Only - Reported Failure . . . . .	TAP-123
System Test - Perform . . . . .	NTP-016
Trunk Bridging Controller - J1C015MB - Replace . . . . .	DLP-572

Fig. 1 - Typical List of Jobs You May Have to Do

Now, look at Fig. 1. It is a typical 001 procedure and is always called a "Task Index List." It is an alphabetical listing of the jobs that you may have to do. To use a 001, just find the job you need to do in the "FIND YOUR JOB IN THE LIST BELOW" column. Next, follow the dotted line to the procedure number for that job in the "THEN GO TO" column. Then turn to that procedure number and begin the task.

For example, suppose you are given the job of doing a system test. On the 001 as shown in Fig. 1, find your job. Note that it is listed in the "FIND YOUR JOB IN THE LIST BELOW " column as "System Test-Perform." Now find the procedure number for that job. Note that it is listed in the "THEN GO TO" column as "NTP-016." It could have been any other 3-digit number. Now what does this procedure give you? Turn to next page.

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NTP-016  
Page 1 of 2

**PERFORM SYSTEM TEST**

**DO ITEMS BELOW IN ORDER LISTED . . . FOR DETAILS, GO TO**

1	Test Local Maintenance Terminal	DLP-531
2	Place SEC/SEB in Off-Line Mode	
	A. If in On-Line Mode, Change System From On-Line to Off-Line	DLP-509
	B. If Powered Down, Condition System for Off-Line Operation as Follows	
	1. Power up Minicomputer	DLP-503
	2. Power up Line Printer	DLP-528
	3. Power up Maintenance Terminal	DLP-510

7	Run Computer Display Terminal Test For All Positions	DLP-513
8	Mount Tape	DLP-500
9	Test Computer Display	DLP-522

**Fig. 2 - Typical List of Specific Instructions for Doing a Job**

Look at Fig. 2. It consists of numbered items (or steps) listed in the order that you must do them to complete your job. To use this procedure, you must start with item 1 in the "DO ITEMS BELOW IN THE ORDER LISTED" column and continue until all items have been done. When you get to an item that you do not know how to do, look for the procedure number for that item under the "FOR DETAILS, GO TO" column. This is the number of the procedure that will give you detailed step-by-step instructions to do that item. Note that item 2 in Fig. 2 uses lettered (A, B) entries. This means that there are alternate ways of doing item 2 depending on equipment options or equipment conditions. You do only the one that fits your equipment options or equipment conditions.

For example, suppose you are doing a system test. The 001 as shown in Fig. 1 has directed you to 016 as shown in Fig. 2 and you are on item 8 "Mount Tape" in the "DO ITEMS BELOW IN ORDER LISTED" column. If you know how to mount the tape, do it. If you do not know how to mount the tape, go to the procedure number listed in the "FOR DETAILS, GO TO" column for the detailed step-by-step instructions. In this case, it happens to be 500. In either case, you must continue with the next item listed in 016 until you complete the job.

## MOUNT TAPE

**SUMMARY:** Install tape with or without write enable ring, as required. Thread tape and position tape at beginning of tape (BOT) marker.

1. Get file reel and empty take-up reel.
2. Set *START/STOP* switch to *STOP*.
3. Set *ON LINE/OFF LINE* switch to *OFF LINE*.
4. Set *LOAD/BR REL* switch to center position.
5. Is data to be written on tape?  
    If **YES**, then install write enable ring on file reel and go to Step 7.  
    If **NO**, then do Step 6.
6. Ensure that write enable ring is not installed on file reel  
    Reference: DLP-563
7. Open tape transport door.

Fig. 3 - Typical List of Detailed Instructions for Doing a Job

Now, lets look at 500 as shown in Fig. 3. It is a typical page of a procedure that gives numbered step-by-step instructions. To use this procedure, you must start with Step 1 and proceed as directed by the instructions until you complete this procedure. Note that Step 1 of this procedure is preceded by a statement called a "SUMMARY." A summary is used as a "memory jogger," and briefly tells you how to do the procedure and what measurements or results you can observe. If you can do the procedure after reading the "SUMMARY", go ahead and do it without reading any further. Not all procedures have a "SUMMARY" statement.

Now, look at Step 6 of the 500 as shown in Fig. 3. Note that following the action statement there is the word "Reference" followed by "DLP-563" (Detailed Level Procedure). When you see a reference like this, it means that additional step-by-step instructions for doing just that step are given in the referenced procedure. In this case, 563 gives you the details on how to "Ensure that the write-enable ring is not installed on the file reel." If you, in this case, can do Step 6 without going to 563, go ahead and do it. If you do not know how to do Step 6, then go to 563. In either case, you must continue with Step 7 until you have completed the procedure. In some cases, you may be directed to a procedure where the procedure number is preceded by the letters "TAP" (Trouble Analysis Procedure), for example, TAP-109. This means that you have trouble in the equipment and in this case TAP-109 will give you step-by-step instructions to fix the trouble. After you have fixed the trouble, you must return to Step 1 of the procedure that sent you to TAP-109.

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<b>TASK INDEX LIST</b>	
<b>FIND YOUR JOB IN THE LIST BELOW . .</b>	<b>. . THEN GO TO</b>
Alert; External - Horn, Ringer, Etc. - Remove . . . . .	. . . . . NTP-028
Alarm - Major - Clear . . . . .	. . . . . <b>TAP-109</b>

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<b>CLEAR MAJOR ALARM AT TERMINAL</b>	
1. The following ISD is available for support Reference: <b>ISD-108</b>	
2. Is PWR ALM alarm lamp lighted on power regulator in terminal? If YES, then do Step 3 If NO, then do Step 4	

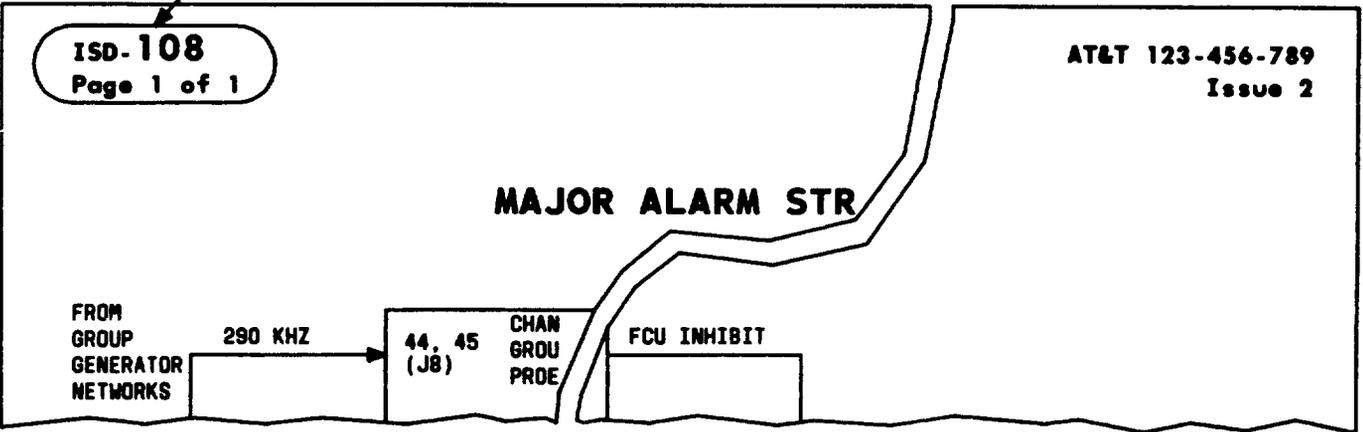


Fig. 4 - Typical Data Accessing for Trouble-Clearing Work

However, if you came directly from 001 to 109 as shown in Fig. 4, then your job is completed when you have fixed the trouble.

Note that Step 1 in TAP-109 as shown in Fig. 4 gives you a reference to "ISD-108." This is a block diagram of the trouble area and gives you support information for the 109 procedure.

**Safety:** Always do your job safely. Three safety notices are used in TOP as follows:

**DANGER:** *This means there is a possibility of personal injury.*

**Caution:** *This means there is a possibility of service interruption.*

**Warning:** *This means there is a possibility of equipment damage.*

**Important Items:** Look at Table A. It lists the more important items used in TOP.

**Reporting TOP Errors:** If, while using TOP you find errors, call the "TOP HOTLINE" number located on the front cover in the lower right corner. You can also report errors by using comment form E-3973. Details on how to fill out this form are in AT&T 000-010-015. Your comments are needed to provide useful and accurate TOP coverage.

**TABLE A**  
**IMPORTANT TOP ITEMS AND DEFINITIONS**

ITEM	DEFINITION
Acceptance (NTP-002)	Provides information and identifies jobs to be done to accept equipment after it is installed.
Maintenance Philosophy (TAD-100)	The maintenance philosophy, when provided, gives an overview of the considerations designed into the trouble-clearing procedures.
Checklist (CKL-891)	The checklist reflects the content (inventory) at any given time.
Documentation Plan (DPL-895)	The documentation plan gives a bird's-eye view of all the TOP books covering a system. This plan can help you to quickly determine the correct books to use.
DLP (Detailed Level Procedure)	Detailed step-by-step instructions.
ISD (Isolation Diagram)	A functional block diagram defining the trouble universe
TAD (Trouble Analysis Data)	A trouble-clearing aid other than instructions. It may be a functional schematic, text, trouble-locating chart, etc.
TAP (Trouble Analysis Procedure)	Step-by-step trouble-clearing instructions to locate and/or fix troubles.
NTP (Non Trouble-Clearing Procedure)	A list of items to perform normal work other than trouble-clearing.