

EDACS®
CONVENTIONAL NETWORK INTERFACE (CNI)
GETC CONFIGURATION MANUAL

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SPECIFICATIONS*

Input Voltage	+13.8 Vdc •20%
Current Drain with 9600 Baud Modem	1.5 Amp (typ), 2.0 Amp (max.)
Operating Temperature	-22°F to +140°F (-30°C to +60°C)
Dimensions (H x W)	1.75 x 19 inches (EIA rack mount) (4.5 x 48.3 cm)
Repeater Compatibility	MASTR II or IIe, all frequency bands MASTR III, all frequency bands
Network Interface: 2 & 4 wire circuits (audio and data) Bell Std 3002 grade	
Data Rate	9600 Baud
Transmit Level	0.77 Volts rms (0 dBm)
Receive Level	0.16 Volts rms on J3A-32 of GETC Logic Board
Repeater Audio	
Transmit Level	0 dBm, 0 Vdc offset
Receive Level	0 dBm, 0 Vdc offset
Channel Access	500 to 750 ms (IMC site)
Valid Channel Guard Tones (Hz)	67.0, 71.9, 74.4, 77.0, 79.7, 82.5, 85.4, 88.5, 91.5, 94.8, 100.0, 103.5, 107.2, 110.9, 114.8, 118.8, 123.0, 127.3, 131.8, 136.5, 141.3, 146.2, 151.4, 156.7, 162.2, 167.9, 173.8, 179.9, 186.2, 192.8
CNI Group/Channel Guard Pair	4

* These specifications are intended primarily for the use of the service technician. Refer to the appropriate Specification Sheet for the complete specifications.

SCOPE

The Conventional Network Interface (CNI) provides the communication link between a conventional repeater (MASTR II, IIe, or III) and an Enhanced Digital Access Communication System (EDACS). This communication link is provided by modifying the Ericsson GE Trunking Card (GETC) which interfaces with the Console Electronics Controller (CEC) or Integrated Multisite and Console (IMC) Controller. This manual explains the CNI operation and the steps necessary to reconfigure and program the GETC for CNI operation.

INTRODUCTION

The CNI station equipment is part of a wide area network that is interfaced to a CEC/IMC through an Uplink configured GETC. Figure 1 shows the CNI and Uplink connection which is implemented using a four-wire, data grade, type 3002 audio (telephone) line. The audio connection between the CEC/IMC and the repeater is also a four-wire audio (telephone) line.

The CNI GETC converts analog Channel Guard tones into EDACS Group ID's (GID) based on mapping informa-

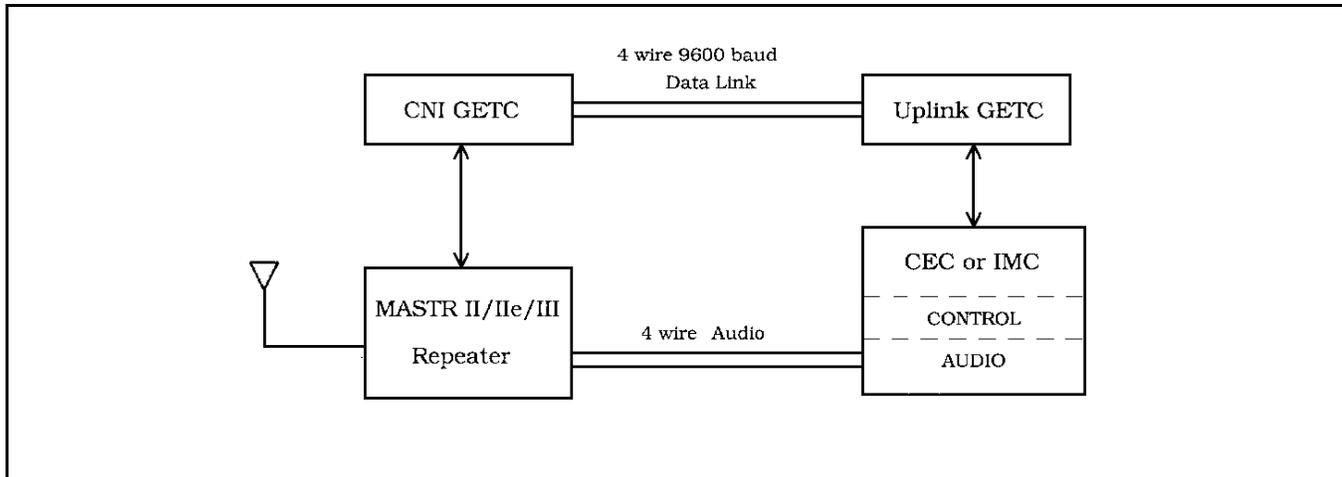


Figure 1 - CNI Block Diagram

tion stored in the CNI GETC personality EEPROM. When a conventional transmission is received, the GETC decodes the analog Channel Guard tones and associates the tone with an EDACS GID. The inbound Channel Guard tone is defined in the personality EEPROM along with a corresponding GID in the EDACS System. When the CEC/IMC transmits a Group Assignment, the GETC converts the GID to an outbound conventional transmission with its corresponding analog Channel Guard tone. The analog Channel Guard tone is generated in the GETC and sent to the repeater to accompany voice for transmission.

The CNI option may be installed in a conventional MASTR II or IIe (option STCP3Z) or MASTR III (option SXCP5T) repeater that uses EIA RS-220A Channel Guard tones. The options include the following major components with associated hardware, interconnect cables, and modification instructions:

- GETC Shelf 19D901868G3
(using GETC Logic Board 19D904266)
- Turbo Board 19D903536P1
- Rockwell Modem 19A705178P1
- CNI GETC PROM Kit 344A3497G1

SOFTWARE REQUIREMENTS

The CNI installation requires the following software:

Table 1 - Software Requirements

APPLICATION	SOFTWARE
CNI GETC	344A3497G1 or later
Turbo board	344A4414G1 or later
CEC/IMC Uplink GETC	344A4895G1 or later
GETC Shelf - PC Program	TQ-3357 V3.00 or later
MASTR II, IIe, III PC Program	TQ-3357 V9.00 or later

The CNI software is, to this date, compatible with all versions of the 19D904266 GETC Logic Board.

NOTE

The CNI GETC software, 344A3497G1, does not support Control Stations or Simplex Base Stations.

NOTE

This software is subject to change resulting from improvements or enhancements. When upgrading the software, refer to the accompanying software release notes for software compatibility information.

RELATED PUBLICATIONS

It may be necessary to consult one or more of the following documents during the installation process. These manuals will also provide additional guidance if you encounter technical difficulties during the configuration process.

LBI-33031	- Rockwell Modem Model R96FT (19A705178) Maintenance Manual
LBI-38430	- MASTR II, IIe Control Shelf Maintenance Manual
LBI-38636	- MASTR III Installation Manual
LBI-38662	- IMC Maintenance Manual
LBI-38822	- Turbo Board (GETC 1e) Maintenance Manual
LBI-38894	- GETC Trunking Card Maintenance Manual
LBI-38896	- EDACS Site Downlink and CEC/IMC Uplink Configuration Manual
LBI-38984	- EDACS System Manager User's Guide
LBI-38988	- EDACS Station GETC Configuration Manual
LBI-39024	- CEC/IMC Manager (MOM), Version 3.xx Operations Guide.
SRN-1008	- Software Release Notes for GETC CNI Software
SRN-1010	- Software Release Notes for Turbo Board Software
SRN-1061	- Software Release Notes for Link GETC Software
TQ-3353	- MASTR II, IIe, and III PC Programming Manual
TQ-3357	- GETC Shelf Programming Manual

OPERATION**GENERAL**

The CNI GETC performs two basic operations. First, it converts the Channel Guard tone information in a conventional transmission to an EDACS compatible Group Call Assignment message. It then functions as a Downlink GETC and transfers the EDACS message to the CEC/IMC's Uplink GETC.

Second, the CNI GETC functions as a Downlink GETC when receiving an EDACS message from the CEC/IMC's Uplink GETC. For example, the CNI GETC receives an EDACS message representing a Group Channel Request. It then converts the EDACS message to a conventional transmission including the appropriate Channel Guard tone information using Carrier Activated Squelch (CAS) only.

The CNI GETC performs the conversions between Channel Guard and EDACS Group ID's based on information stored in the CNI GETC's personality. It is also possible to convert a single EDACS group to a conventional transmission without Channel Guard tone.

INTERFACE TO EDACS

The CNI GETC provides the control and conversion functions necessary to implement EDACS access to the conventional service area. In addition to performing conversions between Channel Guard and EDACS formats, the CNI GETC acts as a message conduit providing a data communication path between the CNI GETC and the CEC/IMC. The CNI GETC supports any Channel Guard Frequency defined in EIA RS-220A between 67.0 Hz and 192.8 Hz (see Specification data for a listing of supported frequencies).

The CNI GETC decodes Channel Guard information when receiving a conventional transmission. If the Channel Guard information matches with the data in the CNI GETC's Personality, a Group Call Assignment Message goes to the CEC/IMC's Uplink GETC. The CNI GETC also regenerates the Channel Guard tone information for use by the CNI GETC's repeater.

The CNI GETC's phone modem data is synchronous at 9600 baud using the full duplex operating mode. Data flows simultaneously in both directions as illustrated in Figure 2.

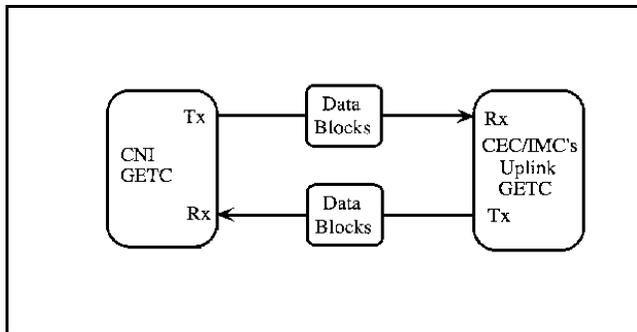


Figure 2 - Data Communication

The CNI GETC also performs data error detection and correction, general control of timer and I/O functions (DIP switch, LED's, UART's, etc.), receive and transmit buffer management, message scheduling, and Turbo Board interfacing.

When the CNI GETC receives a Group Channel Request Message from the CEC/IMC's Uplink, the CNI GETC compares the Group ID with configuration data in the CNI GETC's Personality. If the Group ID is valid, the CNI GETC sends a secondary assignment to the CEC/IMC's Uplink and simultaneously keys the base station using the appropriate Channel Guard information.

CONSOLE PREEMPT

Since the CNI GETC operates as a one channel site, only one conversation may occur at any time. The CNI GETC ignores additional conventional transmissions with the same Channel Guard information and Multisite Group Call Requests. However, when the Console preempts the current call, the CNI GETC will route audio from the Console to the receiving conventional radio. The original radio's unkey does not drop the call as long as the console is still keyed. The Console's unkey will drop the call regardless of the original radio's status.

A different situation occurs when the CNI GETC is processing one conventional transmission and is interrupted with another conventional transmission with different Channel Guard tone information. The additional call will most likely interfere with the current call.

NOTE

To prevent overlapping conventional transmissions, all of the conventional radios should be programmed with the Transmit Busy Lockout feature.

CHANNEL GUARD MAPPING

The CNI GETC performs conversions between Channel Guard tones and EDACS IDs based on mapping information within the CNI GETC's Personality. Personality refers to the GETC's region of memory that stores configuration data.

The personality data in Figure 13 shows an example of the mapping information used to convert between the Channel Guard tones and EDACS Group ID's. The bottom two lines of Figure 13 show a 67.0 Hz Channel Guard tone maps to a Network Group ID of 271. Mapping provides a maximum of four EDACS Network Groups for each CNI GETC.

MAPPING WITHOUT CHANNEL GUARD

In addition to standard mapping, it is also possible to map one EDACS group to a conventional transmission without any Channel Guard tone information using the CAS signal. This flexibility permits conventional radios, without Channel Guard, access to the advanced trunking features of EDACS. In this case, mapping provides one EDACS Network Group per CNI GETC.

INSTALLATION

The installation process involves the following steps and should be completed in the order presented:

NOTE

CNI GETC'S ordered from the factory have already been modified and set up for CNI operation using the latest software. Use these installation procedures for field conversion of a standard GETC to a CNI GETC or to upgrade firmware or software.

1. Hardware Installation - This procedure provides instructions for converting a standard GETC to a CNI GETC in the field. The instructions include hardware installation, instructions for modifying existing cables, and installation of GETC jumpers.
2. GETC Firmware Installation - This procedure provides instructions for installing the GETC operating firmware.
3. Turbo Software Installation - This procedure provides instructions for installing the Turbo Board software.

EQUIPMENT REQUIRED

The following equipment and software may be required to modify and configure the CNI GETC:

IBM compatible PC with at least 640K memory, monitor, and keyboard.

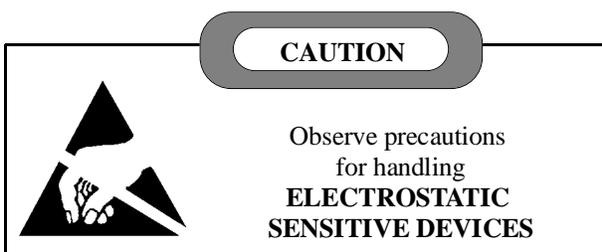
- Hard disk is recommended; but, not required.
- Serial Port configured as either COM1 or COM2.
- TQ-3360 programming cable.
- Male DB-25 to female DB-9 adapter.
- Software distribution diskette 344A4414.
- Oscilloscope.
- Standard hard tools.
- Temperature controlled soldering station.

HARDWARE INSTALLATION

Typically, a CNI GETC is installed in the repeater cabinet, just above the repeater's radio assembly, using hardware kit 19A130031G30. The tray containing the sub-assemblies is mounted within a slide out shelf measuring 1.75 inches high (one rack unit) by 19 inches wide.

Install the GETC Shelf into the repeater cabinet, refer to the MASTR II, IIe, or MASTR III Application Assembly and Installation Diagrams for detailed information on installing the GETC Shelf. Installation or removal of the shelf sub-assemblies involves sliding the GETC tray out of the cabinet and into the service position. This position allows access to the shelf's sub-assemblies.

Observe basic safety precautions to prevent injury or equipment damage.



Logic Board Modification

The following steps provide instructions for modifying the GETC Logic Board. Materials for this modification are provided in Hardware Kits 344A3845 and 344A4019. For additional GETC assembly and maintenance information, refer to LBI-38894 and LBI-38988.

1. Place the GETC shelf in the service position.
2. Disconnect all cables from the GETC Logic Board.
3. Remove the GETC Logic Board 19D904266 from the shelf. Refer to the GETC Service Manual LBI-38894 for detailed instructions for removing and installing the printed circuit board in the GETC shelf.
4. Solder an orange wire jumper 19A115663P4 (part of Hardware Kit 344A4019) from TP107 to J7-7. Route the wire as shown in Figure 4. This allows access to the test point which will be covered by the Turbo Board installation.

NOTE

Do Not install the jumper wire between TP107 and J7-7 when the CNI GETC is used in MASTR III repeaters. If the wire was previously installed, disconnect it from J7-7.

5. Solder the white wire 19A115871P22 (part of Hardware Kit 344A3845) between TP102 and J18-2 as shown in Figure 4. This essentially connects the output of the Low Speed Decode Filter to U1's interrupt line, $\overline{INT0}$ as shown in Figure 3.
6. Reinstall the Logic Board into the GETC Shelf using the installation instructions provided in LBI-38894. Omit the three (3) screws on the J3 end of the board (these will be used to secure the Turbo Board).

The modified circuit functions as follows:

The conventional received audio (VOL/SQ HI) enters the GETC at J7-2. This audio includes sub-audible signals that represents the Channel Guard tone information. The Low Speed Decode Filter removes the received audio and routes the Channel Guard tone information to U1, the GETC's main processor.

The standard parallel input at U1-3 is unused in the CNI configuration. Instead, U1 processes the Channel Guard tone information using the interrupt line at U1-12. The CNI application also requires a jumper from J18 pin 1 to pin 2.

The CNI uses the signal at $\overline{INT0}$ to convert a conventional transmission with Channel Guard tone information into a digital EDACS message representing Group Call Assignments. This process results in the CEC/IMC seeing a normal EDACS Group Call channel assignment message based on the sub-audible Channel Guard tone information embedded in a conventional transmission.

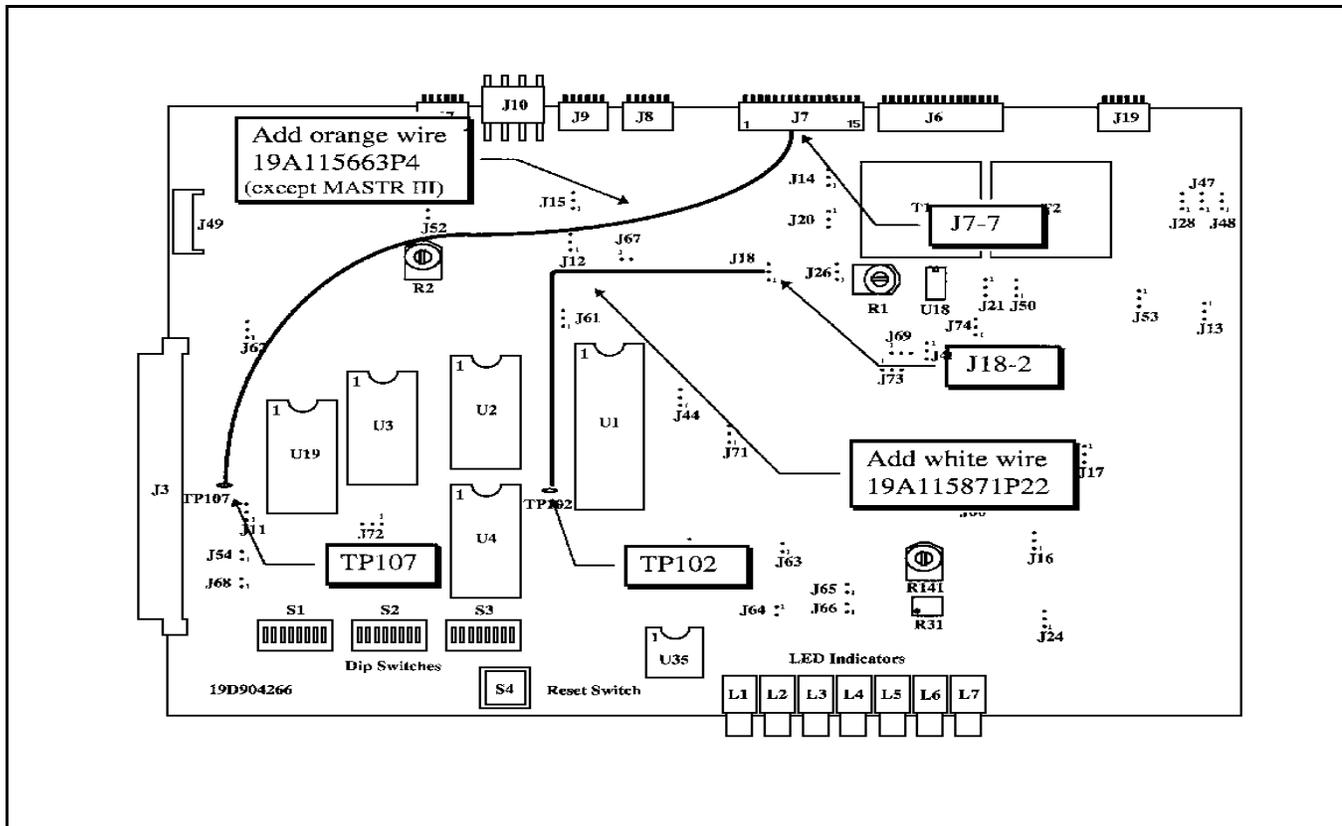


Figure 4 - Logic Board (19D904266) Modification

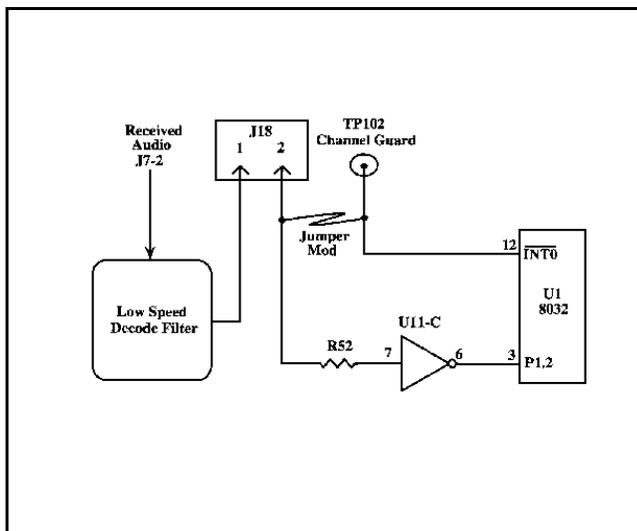


Figure 3 - Simplified Diagram of Modified Circuit

Rockwell Modem Installation

The Rockwell Modem provides a high speed synchronous serial interface between the CNI GETC and the CEC/IMC's Uplink. The CNI GETC uses the modem to send and receive serial digital data representing GID information, polling messages, keying messages, and channel assignments. Data transfer rates are typically 9600 bits per second (bps) using 3002 grade four-wire audio lines. Additional information on installing and testing the modem may be found in LBI-33031, LBI-38894, and LBI-38822.

Install the Rockwell Modem using the following procedure:

1. Insert the Rockwell Modem into J3 on the GETC Board and align the mounting holes over the GETC shelf standoffs.

2. Isolate the modem from the shelf by installing the eight (8) fiber washers (4035306P25, part of Hardware Kit 344A4019). Insert four (4) washers between the modem and the shelf standoffs and place the other four (4) washers on top of the modem board over the mounting holes.

NOTE

The modem must be insulated from the shelf mounting standoffs using eight washers. Four washers mount on top of the modem's printed circuit board and four washers mount on the bottom of the modem's printed circuit board.

3. Secure the modem by installing two screws (left over from the Logic Board installation) through the washers and modem board into the standoffs located on the end opposite J3.

Turbo Board Installation

The Turbo Board provides the CNI with additional memory and processing capability through dual 8051 based processors and support circuitry. It primarily provides additional processing power. However, it also provides real time debug capability during development, testing, and troubleshooting.

The Turbo Board uses mostly surface mounted components and mounts on stand offs above the GETC Logic Board. Electrical connections are made through a 28 conductor ribbon cable on the Turbo Board to the XU3 socket on the GETC Logic Board. Installation of a small mechanical shield above the Turbo Board protects it from inadvertent damage when sliding the GETC drawer in and out of the cabinet. Additional information on the Turbo Board assembly and maintenance instructions for the board may be found in LBI-38822.

Use the following procedures to install the Turbo Board. Mounting hardware for the Turbo Board is contained in Hardware Kit 344A4019.

1. Remove U3 (19A705558P1) from the XU3 socket on the GETC Logic Board. Observe precautions for handling electrostatic sensitive devices
2. Bend over or slightly move any components on the Logic Board whose height will interfere with the Turbo Board installation.

3. Install three (3) threaded spacers 19B201955P9 in place of the screws omitted when Logic Board was reinstalled.
4. Install two (2) threaded spacers 19B201955P9 through the modem and into the shelf standoffs next to J3.
5. Align the Turbo Board holes over the threaded spacers installed in steps 3 and 4 (orient the Turbo Board so connectors J2 and J3 are toward the rear of the GETC Shelf).
6. Secure the Turbo Board by installing two (2) pan head screws N80P13004B6 and two (2) lock washers N404P13B6 through the board and into the threaded spacers located near the front of the GETC Shelf (near S1 and Y1).
7. Install three threaded spacers 19B201955P9 through the Turbo Board into the remaining spacers. These will be used to mount the guard.
8. Install the guard 19B802166P1 using three (3) flat head screws N404P13B6. The guard protects the Turbo Board from inadvertent damage when sliding the GETC Shelf in and out of the service position.
9. Plug the ribbon cable from J1 on the Turbo Board into the XU3 socket on the GETC Logic Board.
10. Install the harness assembly, 19C337712G1, by sliding the P2/P3 end of the harness through the hole provided into the back of the GETC shelf.
11. Connect the 19C337712G1 Harness P2 and P3 to the J2 and J3 Turbo Board connectors, respectively.
12. Secure the harness to the GETC shelf using retaining strap 19J706152P5.
13. Mount the other end of the harness on the rear of the GETC Shelf. Secure the J103/J104 support bracket to the shelf using the two (2) nut clips 7160861P33 and self tapping screws 19A134011P1 included with the harness.

When the installation is complete, examine the GETC Shelf for any loose hardware. You may now proceed to modify and reconnect the GETC cables.

GETC Cable Modifications

Use the following procedures to modify and reconnect cables in the CNI GETC. Be sure to follow the correct procedures. Instructions titled MASTR II or IIe are for CNI GETC's installed in MASTR II or MASTR IIe repeaters, instructions titled MASTR III are for CNI GETC's installed in MASTR III repeaters only.

NOTE

Modification of the GETC for use with MASTR II (IIe) and MASTR III repeaters differ. Use the procedure applicable to the type of repeater associated with the CNI GETC.

MASTR II & IIe

The following procedure provides instructions for modifying the cables when the CNI GETC (option STCP3Z) is used with a MASTR II or IIe repeater. Materials for the modification are provided as part of the Hardware Kit 344A3845G1.

1. Mount the Terminal block, 19C301087P10, on the back of the GETC Shelf using the four (4) screws, N80P13007B6, and two (2) nuts, 7160508P2 provided. Refer to Figure 5.
2. Disconnect the two (2) pairs of twisted wire connected to P26-6, P26-7, P26 8 and P26-9 (part of cable harness 19C320811G15/G16) from the Backplane (19D417214) TB1201-18, -17, 11, and 10 or from the Control Panel (19B234871) or MIIe Backplane (19D902459) TB1201-5, -2, -3, and -4 respectively.
3. Connect the pair from P26-8 and P26-9 to the terminal block terminals 1 and 2 respectively. This is the GETC Transmit Data pair, see Figure 6.

4. Connect the pair from P26-6 and P26-7 to the terminal block terminals 3 and 4 respectively. This is the GETC Receive Data pair.

NOTE

On MASTR IIe stations only, using wire harness 19C320811G16. Cut the solid white jumpers connected from P27-14 to P27-15 and from P27-6 to P27-16.

5. Connect the harness assembly (19C320811) plug P26 to the GETC Logic Board connector J6.
6. Connect the harness assembly (19C320811) plug P27 to the GETC Logic Board connector J7.
7. Connect the harness assembly (19C320811) plug P10 to the GETC Logic Board connector J10.
8. Connect the harness assembly (19C336863) plug P8 to the GETC Logic Board connector J8.
9. Connect the harness assembly (part of 19C320811 and 19C336863) plug P19 to the GETC Logic Board connector J19.
10. Connect the Regulator Board harness assembly (A2W1) plug P1 to the GETC Logic Board connector J27.

MASTR III

The following procedure provides instructions for modifying the cables when the CNI GETC is used with a MASTR III repeater. Materials for the modification are provided as part of the MIII option SXCP5T.

1. Route the header (P26) on the Harness 19C337792P1 through the terminal block hole and mount the terminal block to the back of the GETC Shelf using the four (4) screws, N80P13007B6, and two (2) nuts, 7160508P2 provided. Refer to Figure 5.

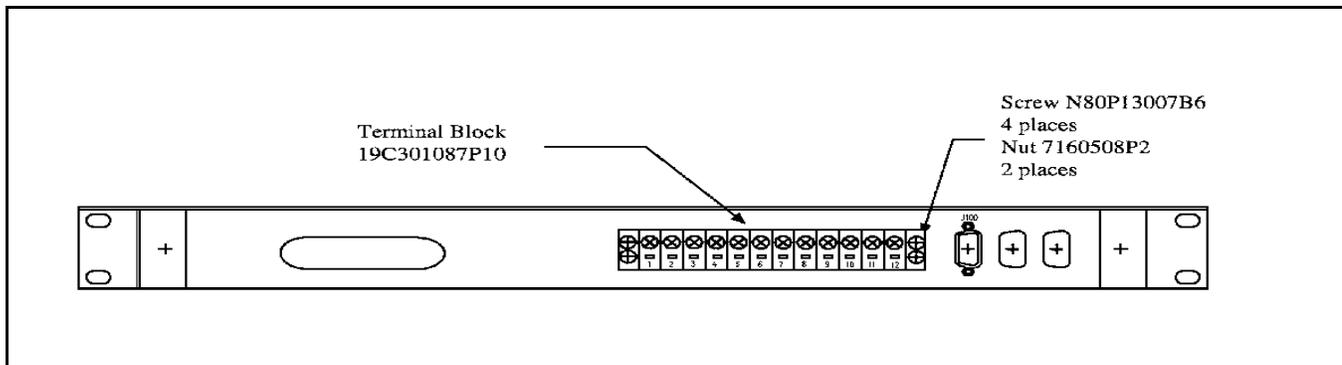


Figure 5 - GETC Shelf (Rear View)

2. Remove the contacts (4) from the header (P26) on the harness 19C337792P1.
3. Remove contacts from 19B802401P1, P6-8 and P6-9. This is the GETC Transmit Data pair, see Figure 6.
4. Remove contacts from 19B802401P1, P6-6 and P6-7. This is the GETC Receive Data pair.
5. Connect the harness assembly (19B802401P1) plug P6 to the GETC Logic Board connector J6.
6. Connect the harness assembly (19B802401P1) plug P7 to the GETC Logic Board connector J7.
7. Connect the harness assembly (19B802401P1) plug P10 to the GETC Logic Board connector J10.
8. Connect the harness assembly (19C336863) plug P8 to the GETC Logic Board connector J8.
9. Connect the harness assembly (part of 19B802401P1 and 19C336863) plug P19 to the GETC Logic Board connector J19.
10. Connect the Regulator Board harness assembly (A2W1) plug P1 to the GETC Logic Board connector J27.

Jumper Installation

There are a few jumpers on the GETC Logic Board which must be re-configured for CNI operation. To properly configure the jumpers, refer to Table 2 and install or remove jumpers according to table. The location of the jumpers may be found using the board layout diagram in Figure 7 or by referring to the full scale GETC Diagrams in LBI-38988.

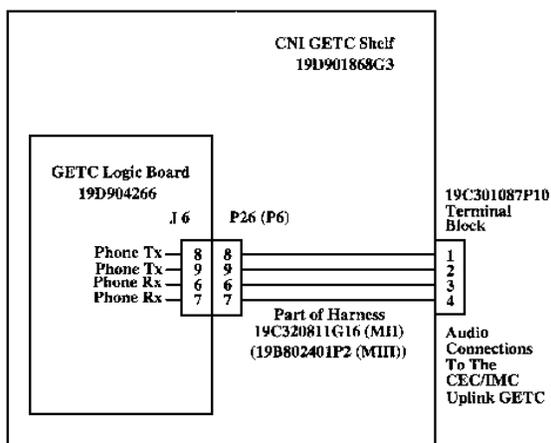


Figure 6 - Simplified Diagram of Modified Harness

GETC FIRMWARE INSTALLATION

The firmware installation procedure involves installing the latest version of the CNI EPROM (344A3497) into the CNI GETC.

NOTE

This software is subject to change resulting from improvements or enhancements. When upgrading the software, the procedures provided in the accompanying software release notes takes precedence over this manual.

CAUTION



Observe precautions
for handling
**ELECTROSTATIC
SENSITIVE DEVICES**

EPROM Installation

Perform the following steps to install the CNI GETC firmware:

1. Remove power from the GETC and place the GETC shelf in the service position. This will allow access to the EPROM.
2. Remove the GETC EPROM U2.
3. Install the CNI EPROM into the XU2 socket (ensure the EPROM's pin 1 is properly aligned with pin 1 on the socket, see Figure 4).
4. Proceed to the Software Installation procedure.

TURBO SOFTWARE INSTALLATION

The two Turbo Board processors communicate with each other through a parallel bus. Communication with the main GETC processor is through the 8K dual port RAM bank comprised of U3 and U4. In addition, each turbo processor has an RS-232 serial port used for Turbo Programming.

CNI stations built in the factory come with the latest software. To upgrade an existing station, refer to the software release notes for the appropriate version of the Turbo Board software. It will vary with the version of GETC Logic Board software. Group 1 of the CNI software, 344A3497G1, is compatible with Group 1 of the Turbo Board software, 344A4414G1.

This procedure provides instructions for programming the Turbo Board installed in the CNI GETC. The installation process uses the software diskette 344A4414, an IBM compatible personal computer (PC), and an interconnecting cable (TQ-3360).

The PC reads data from the files on the 344A4414 diskette and transfers the data to the Turbo Board microprocessor through connectors J103 and J104 at the rear of the GETC Shelf.

Running the "**load1e.exe**" executable program serially moves data from the "**1etop.hex**" and "**1eboot.hex**" files to the code segment of the Turbo Board's memory.

The "**1ecrc.hex**" file provides Cyclical Redundancy Check (CRC) information for use in error checking and verification during the file transfer or "programming" process. Any errors encountered during this procedure generally indicate a defective communication link between the PC and Turbo Board.

———— **NOTE** ————

If an error occurs, check connectors and cables. Cycle S2 and S3 from the front position, to the rear position, and again to the front position. If the PC continues to indicate an error, refer to the Turbo Board Maintenance Manual LBI-38822.

Preparation

Prepare the PC for programming the CNI GETC Turbo Board by performing the following steps:

1. Connect the TQ-3360 programming cable from the PC's serial port connector to the GETC Shelf connector J104 (see Figure 8). (A DB-25 to DB-9 adapter may be needed.)
2. Using standard DOS commands or a software file manager, create a directory named "LOAD1E" on the PC's hard drive.
3. Make "LOAD1E" the current default directory and copy the following files from the software diskette into the "LOAD1E" directory:
 - load1e.exe
 - 1etop.hex
 - 1ecrc.hex
 - 1eboot.hex

4. Move the Turbo Board run/load switches S2 and S3 to the load position (toward the front of the GETC shelf). The front position of S2 and S3 places the processors U1 and U2 into the programming mode. If either switch is already toward the front, move the switch to the rear and then back to the front position.
5. The Turbo Board LEDs D1 and D2 should turn OFF indicating that the Turbo Board is in the programming mode.

Programming Mode

This procedure downloads the Turbo Board software to the microprocessors U1 and U2 on the Turbo board.

———— **NOTE** ————

Re-programming the GETC Turbo Board will not alter previously stored Personality Data. When Personality Data is present, "load1e.exe" clears and performs CRC functions over the code portion of memory only.

1. Execute the "**load1e.exe**" program on the PC and follow the on screen instructions.

The "**load1e.exe**" program loads the file "**1etop.hex**" into the Turbo Board's upper half of memory for use by the top processor U1.

2. Monitor the PC's on screen instructions and prompts.
3. When directed, move the TQ-3360 programming cable from the GETC Shelf J104 to J103.
4. The PC will indicate it is loading the "1eboot.hex" file into the Turbo Board's lower half of memory for use by the bottom processor U2.

Normal Mode

Upon successful completion of the programming mode, the PC displays a "FINISHED" message. It will also provide instructions to switch S2 and S3 to the rear position for normal operation.

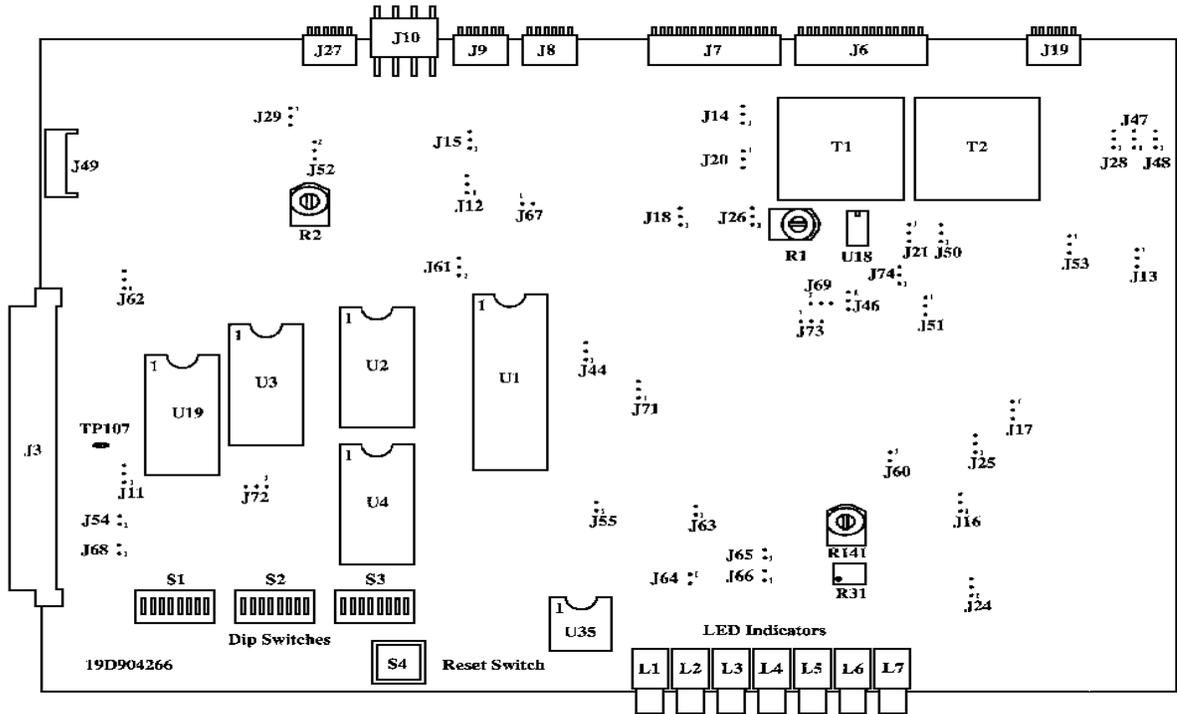


Figure 7 - CNI GETC (19D904266) Jumper Locations

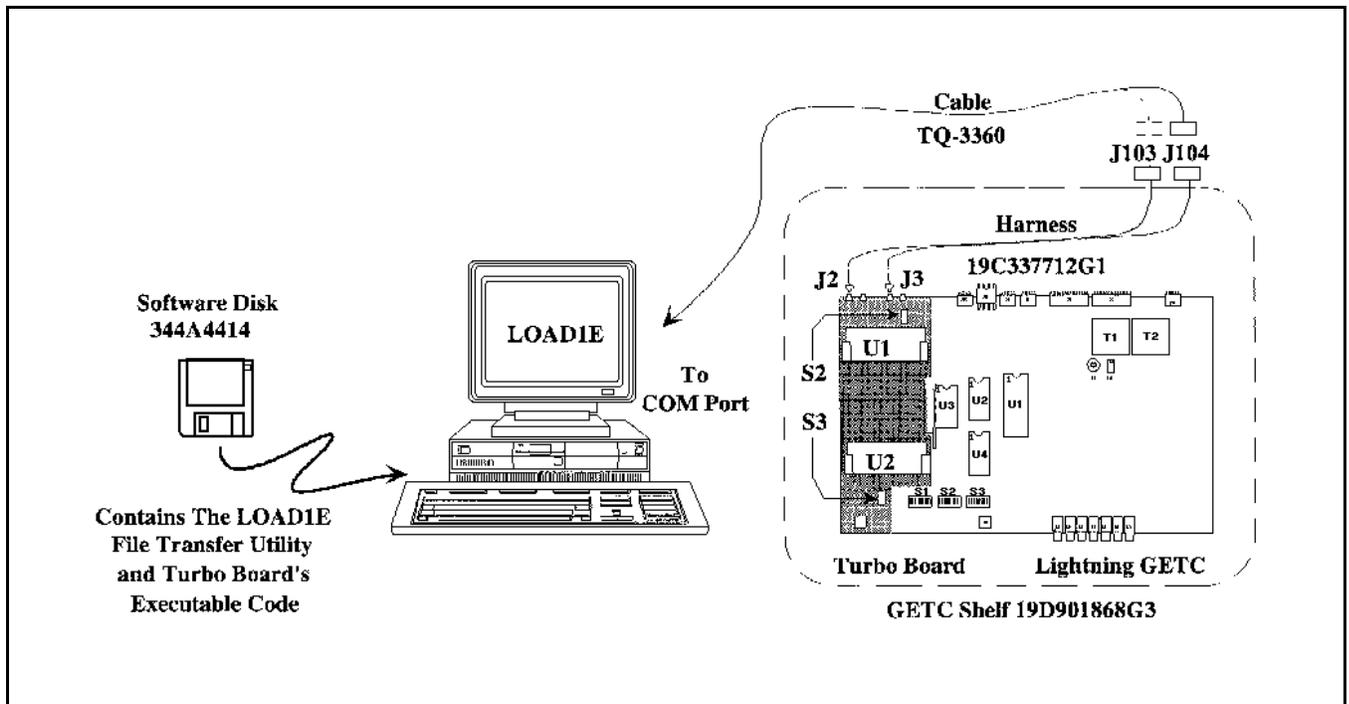


Figure 8 - Turbo Board Programming

Table 2 - Jumper Settings

<i>Jumper setting for CNI GETC (19D904266 ONLY).</i>			
Jumper Position	Wideband CNI GETC	Narrow band CNI GETC	FUNCTION
P11	1&2	1&2	Enables Receive Data from 9600 baud modem board.
P12	1&2	1&2	Enables Clear-To-Send (CTS) from 9600 baud modem board.
P13	1&2	1&2	BSL Tx output to BSL Rx input.
P14	1&2	1&2	Master site controller path selection enable.
P15	1&2	1&2	Backup site controller path selection enable.
P16	1&2	1&2	BSL selection enable.
P17	1&2	1&2	LSD encode path enable.
P18	1&2	1&2	LSD decode path enable.
P20	OMIT	OMIT	
P21	1&2	1&2	Enable high-speed data acquisition rate control, HSACQ.
P24	1&2	1&2	BSL selection (Failsoft) enable.
P25	1&2	1&2	LSD encode path enable.
P26	1&2	1&2	Lock-detect path enable.
P28	1&2	1&2	Sync line input path enable.
P29	1&2	1&2	Enable site controller RxD, J8-4.
P44	1&2	1&2	Use for 256K or 512K EPROM.
P46	1&2	1&2	Used for normal communications.
P47	1&2	1&2	BSL select.
P48	1&2	1&2	BSL select.
P50	1&2	1&2	Enable tone control for voted system
P51	OMIT	OMIT	
P52	2&3	2&3	TxD polarity invert.
P53	1&2	1&2	RxD polarity normal.
P54	1&2	1&2	Enable MODCNTL local control.
P55	OMIT	OMIT	
P60	1&2	1&2	Enables HSD path.
P61	2&3	2&3	Use for 512K EPROM.
P62	1&2	2&3	1 & 2 selects 11.0592 MHz clock Freq. for 9600 baud data (Wideband). 2 & 3 selects 5.5296 MHz clock freq. for 4800 baud data (Narrow band).
P63	OMIT	1&2	1 & 2 for 4800 baud (900 MHz Narrow band)
P64	OMIT	1&2	1 & 2 for 4800 baud (900 MHz Narrow band)
P65	OMIT	1&2	1 & 2 for 4800 baud (900 MHz Narrow band)
P66	OMIT	1&2	1 & 2 for 4800 baud (900 MHz Narrow band)
P67	OMIT	OMIT	
P68	1&2	1&2	Selects Local (on)/Remote (off) control of station PTT.
P69	OMIT	OMIT	
P71	1&2	1&2	Enables phone modem RTS control.
P72	1&2	1&2	Selects internal oscillator.
P73	2&3	2&3	Enables NOR gate U22B for EDACS applications.
P74	2&3	2&3	CAS polarity normal.

Legend: LSD = Low Speed Data BSL = Backup Serial Link RxD = Receive Data
 HSD = High Speed Data MSL = Main Serial Link TxD = Transmit Data

1. Move switches S2 and S3 to the "run" position (toward the back of the GETC shelf).
2. Press S4 to reset the GETC.
3. The Turbo Board LEDs, D1 and D2, will light indicating the station code is executing.
4. Disconnect the TQ-3360 programming cable upon successful completion of the programming procedure.

For additional information on programming the Turbo Board, refer to the Turbo Board Maintenance Manual LBI-38822 and Software Release Note SRN-1062.

CONFIGURATION

The configuration process involves the following operations:

1. Personality Programming - Use this procedure to set up the CNI GETC Personality.
2. Repeater Personality - Describes the procedure for setting up the MASTR III or IIe Repeater Personality (not required for MASTR II).
3. Dip Switch Settings - Provides instructions for setting DIP switches for CNI operation.
4. Modem Alignment - Provides Instructions for adjusting phone line levels.
5. CEC/IMC Personality Configuration - Describes the procedures necessary for setting up the System Manager and CEC/IMC for Conventional Network and Group ID's.

PERSONALITY PROGRAMMING

Personality refers to the system configuration data stored in the GETC's memory. The GETC's Personality includes system configuration information such as channel frequencies, call parameters, operating modes, and identification information.

The Personality Programming process stores the Personality data in EEPROM U35 on the GETC Logic Board (CNI GETC's with EPROM 344A3497G1). This process involves using the TQ-3357 (Version 3.00 or later) GETC Shelf PC programming Guide which includes the programming software.

NOTE

This software is subject to change resulting from improvements or enhancements. The instructions contained in this manual are for guidance only. When programming the personality, the detailed instructions contained in TQ-3357 and the accompanying software takes precedence over this manual.

Programming Set-up

Prepare the PC for Personality Programming by performing the following steps:

1. Connect the TQ-3360 programming cable from the PC's serial port connector (COM1/COM2) to the CNI GETC Shelf connector J100 (see Figure 10). (A DB-25 to DB-9 adapter may be needed.)
2. Set the GETC DIP switches S1, S2, and S3 for the programming mode as shown in Figure 9.

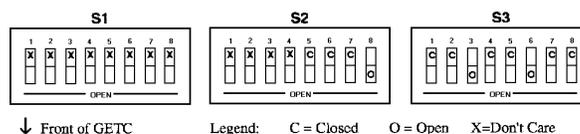
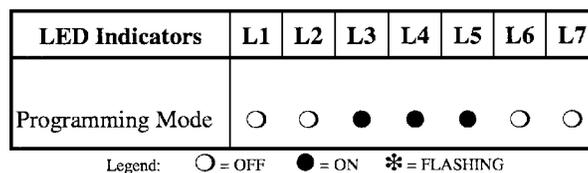


Figure 9 - Switch Settings for Personality Programming Mode

Programming the Personality

Program the personality into the CNI using the following procedures:

1. Reset the GETC by either cycling power or pressing the GETC RESET switch S4, located just below the DIP switches. Resetting the GETC, in combination with the DIP switch settings, places the GETC into the Personality Programming mode.
2. Verify that front panel LEDs L3, L4, and L5 are ON, this indicates the GETC is ready for programming.



3. Following the instructions in TQ-3357, select the "GE" directory and execute the "GTC" command. After a brief introductory screen, the Current Personalities Screen appears.

The programming software offers menu selections and function keys for comprehensive GETC Personality management including:

- Creating a new Personality
- Reading a GETC's current Personality
- Retrieving a Personality from disk storage
- Saving a Personality to the disk
- Editing an existing Personality
- Transferring a Personality to the GETC's memory

4. Read the existing personality from the CNI GETC to the PC. If the personality does not exist, retrieve the sample CNI Personality (shown in Figure 13) from the PC. Change the personality parameters as required.

NOTE

The Conventional Network Logical ID must be the same as the Logical ID in the System Manager Database. This ID must be valid on the corresponding trunked system(s). Likewise, the Conventional Network Group ID's must be the same as the Group ID's in the System Manager Database. These ID's must be valid on the corresponding trunked systems.

5. After entering the personality parameters, select the "Program Card" function to program the personality into the GETC.
6. Verify that the GETC has properly stored the personality data by selecting the "Read Unit Into File" function while in the Current Personalities Screen.
7. After completing the programming, save the revised personality to disk.
8. Reset the DIP switches and press S4 to reset the GETC.
9. Disconnect the TQ-3360 cable and verify GETC operation.

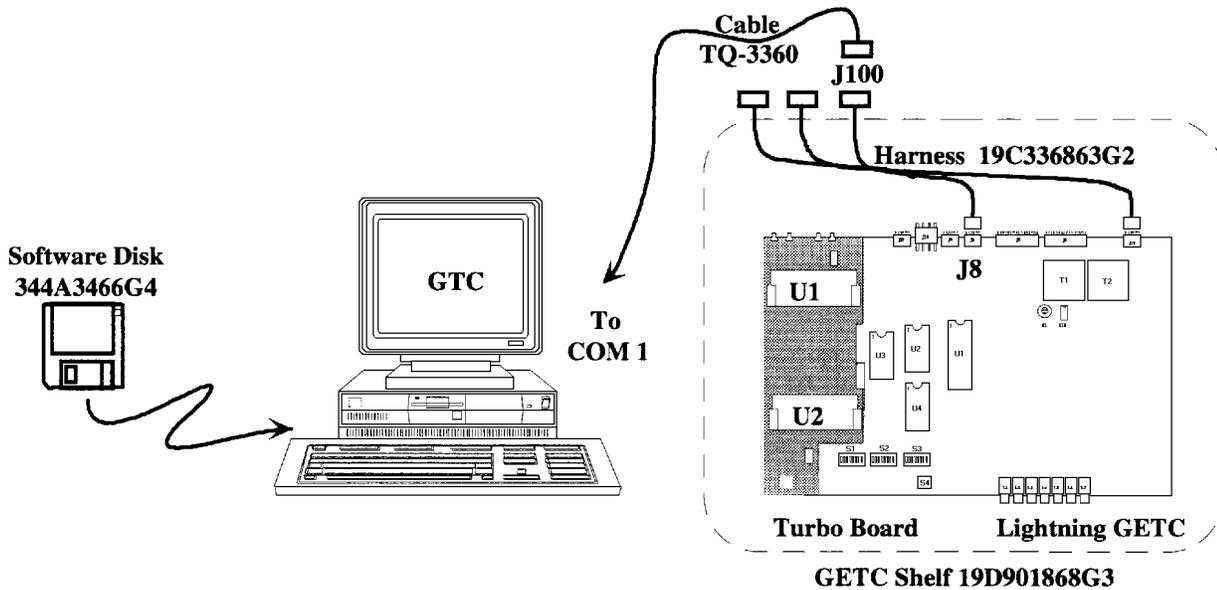


Figure 10 - Personality Programming

REPEATER PERSONALITY

It may be necessary to reprogram the personality of the MASTR III or Iie repeater. Refer to TQ-3353 (Version 9.0 or later). Select "GETC" from the Control Screen to access the GETC Data Screen.

Follow the instructions for making a change to the Current Personalities Screen and select the CNI field. Setting the field selection to YES disables the High Speed Data audio routing and routes the Channel Guard tones to and from the CNI GETC.

Use the procedures described in TQ-3353 and download the revised personality data into the MASTR III or Iie repeater.

DIP SWITCH SETTINGS

Three DIP switches on the GETC Logic Board must be properly set for CNI operation. S1-1 thru S1-7 and S2-1 thru S2-4 set the CNI's transmitting frequency for MASTR II and Iie repeaters. S3-1 through S3-5 select the channel number which is normally set to Channel One.

Set the GETC DIP switches using the following procedures (refer to Figure 11):

NOTE

Be sure the DIP switch settings correspond to the Personality data created.

1. Set S1-1 thru S1-7 and S2-1 thru S2-4 to the repeater's operating frequency (except MASTR III). Refer to the Station GETC manual, LBI-38988, for the DIP switch settings which correspond to the operating frequency.

NOTE

In MASTR III repeaters the operating frequency is programmed directly into the MASTR III's personality. Set S1-1 thru S1-7 and S2-1 thru S2-4 to the Closed position.

2. Set S1-8 to the Closed position (not used).
3. Set S2-5 to the Closed position (Conventional Failsoft enabled).
4. Set S2-6 thru S2-8 to the Closed position.

5. Set S3-1 to Open and S3-2 thru S3-5 to the Closed position. This sets the CNI GETC for operation on channel number 1.
6. Set S3-6 thru S3-8 to the Closed position. This sets the GETC to the normal trunked message mode.

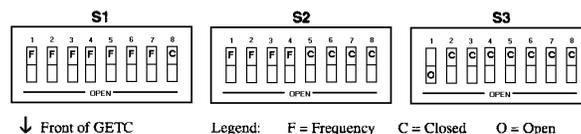


Figure 11 - CNI GETC Switch Settings

MODEM ALIGNMENT

Use the following steps to set up the basic audio line levels. If the CNI GETC is linked to a multisite system other than the CEC/IMC (i.e. Data Gateway), different levels may be required. Consult the applicable system installation manual for the required levels.

1. Ensure jumpers are installed on J11 and J12 pins 1 & 2.
2. Apply power to the GETC.
3. Adjust the receive level by monitoring U18 pin 1 (refer to Figure 12) and adjusting the receive level potentiometer R1 (located on the GETC Logic Board) for 400 mVpp as measured with an oscilloscope (85 mVrms if using an RMS Voltmeter).
4. Verify the presence of demodulated signal data at monitor jumper wire for MASTR II or Iie.
5. Adjust the transmit level potentiometer R2 for the maximum output level allowed by the phone line, microwave link, or equivalent communication line. For telephone lines linking the CNI GETC to the CEC/IMC Uplink GETC, adjust R2 for .77 Vrms (0 dBm) measured across J6-8 and J6-9 (TB10-1 and 2). For microwave links, adjust R2 for -10 dBm across J6-8 and J6-9.
6. Initialize the modem by pressing S4 (on the GETC Logic Board) to reset the CNI GETC or cycle the GETC Shelf's operating power.
7. Verify proper modem initialization and operation by observing the CNI GETC front panel LED's. Proper operation is indicated by illuminating LED indicator L1.

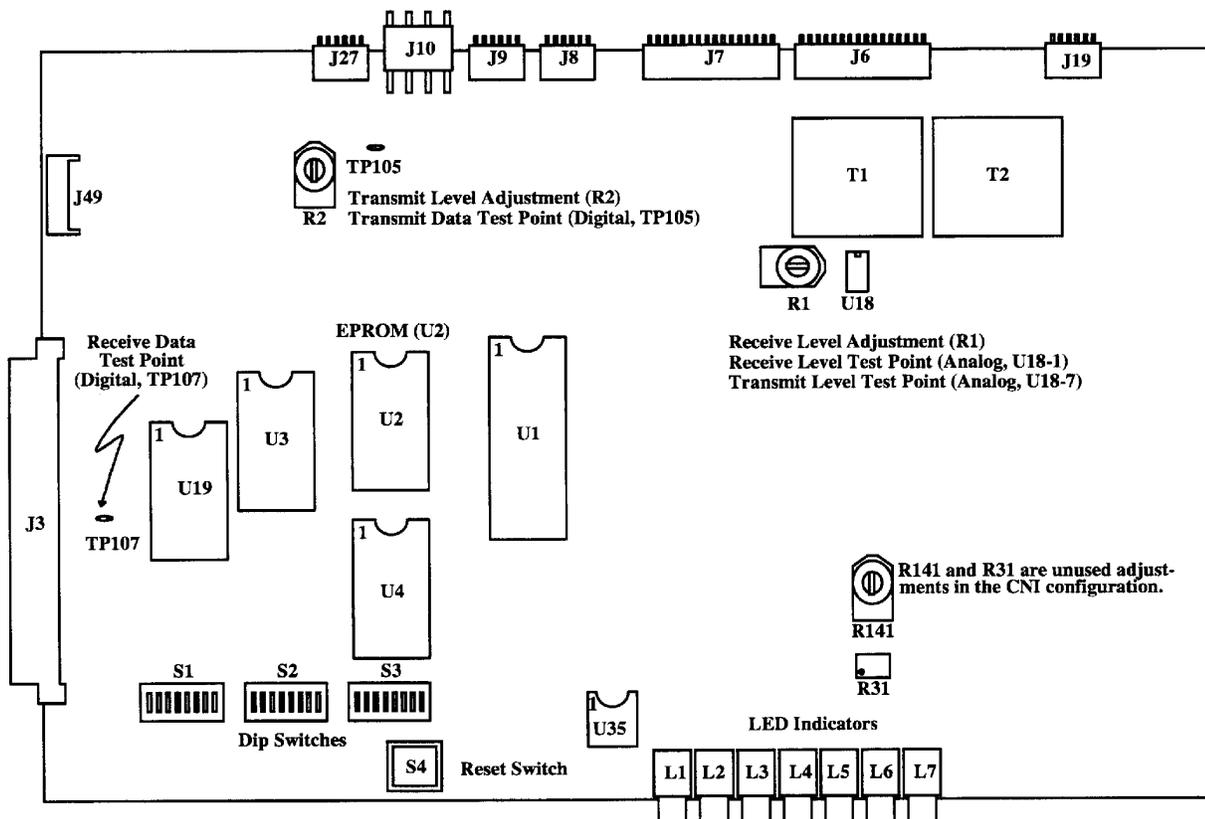
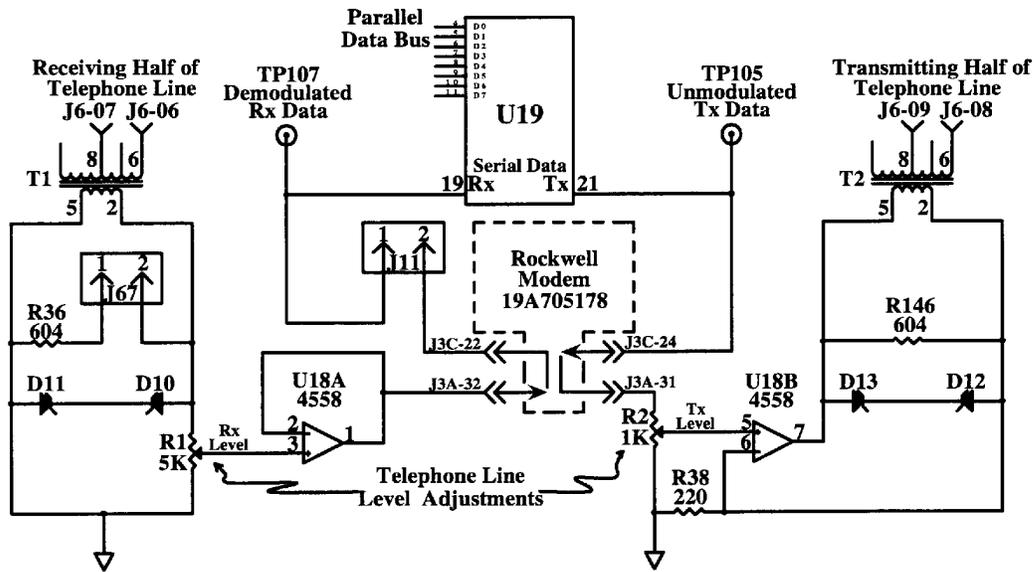


Figure 12 - GETC Phone Line Level Adjustments

Personality: C:\GE\GTC\RADIO\CNI_PBR.GTC

Radio Text:

This is a Sample CNI Personality.

Channel Allocations	1 - 10	11 - 20	21 - 30	31 - 32
Channel Number	1234567890	1234567890	1234567890	12
Control Channel
Clear Voice
Voice Guard
Data
Pager
Interconnect
Downlink
Multisite DownlinkY...	..
External CIU

Channel Data

System Type: WIDE BAND

Ch#	Freq (MHz)	Ch#	Freq (MHz)	Ch#	Freq (MHz)	Ch#	Freq
1	857.0125	11	0.0000	21	0.0000	31	0.0000
2	0.0000	12	0.0000	22	0.0000	32	0.0000
3	0.0000	13	0.0000	23	0.0000		
4	0.0000	14	0.0000	24	0.0000		
5	0.0000	15	0.0000	25	0.0000		
6	0.0000	16	0.0000	26	0.0000		
7	0.0000	17	0.0000	27	0.0000		
8	0.0000	18	0.0000	28	0.0000		
9	0.0000	19	0.0000	29	0.0000		
10	0.0000	20	0.0000	30	0.0000		

Site Data

Site Name	: CNISITE1	SITE ID	: 9
Date	: 09/21/93	Morse ID	:
Channel Assignment	: Descending	Individual Call Hangup	: 0
Rotating Assignment	: No	Group Call Hang	: 0
Site Ch/Frq Notification	: No	Special Call Hang	: 0
Individual Call Update	: One Slot	Voice Guard Hang	: 0
Logical IDs above 8192	: Yes	Emergency Call Hang	: 0
CNI	: No	System All Call Hang	: 0
Multisite System	: No	Transmission Trunked Timer	: 120
Simulcast System	: No	Message Trunked Timer	: 300
Voter System	: No	Morse Interval Timer	: 0
CTIS	: No	Test Call Timer	: 0
		Max Interconnect Calls	: 0

Conventional Network Logical ID	: 16100
Conventional Network Channel Guard	: 67.0 100.0 123.0 156.7
Conventional Network Group ID	: 271 273 570 573

Figure 13 - Sample CNI Personality

CEC/IMC PERSONALITY CONFIGURATION

At the System Manager (refer to LBI-38984), configure the CNI groups as TRACKED. This enables the CEC/IMC to route only Wide Area Group Calls to the CNI GETC corresponding to the last conventional CNI transmission. Also use the System Manager to set up the Logical ID's for the conventional repeaters. These ID's must be valid on the trunked systems for patching and should be the same ID's set in the GETC Personality during the CNI GETC Personality Programming.

Configuring the CNI as Forced in the CEC/IMC's Personality will result in the CNI receiving Wide Area Group Calls, regardless of the last call on the repeater. Remember, the CNI responds only to the Group ID's configured in the CNI's Personality.

A site must be set up in the CEC/IMC using the CEC/IMC Manager (MOM PC). It needs one (1) slot for CNI. Audio Board 1, Channel 1 should be used. We also recommend that CNI Systems not be Confirmed. Refer to LBI-39024.

The CEC/IMC bypasses the CNI system with other multisite calls making the CNI channel available for users within the CNI system coverage area for System Manager programming.

LED INDICATORS

The CNI's front panel LEDs indicate the CNI's operational state (refer to Table 3). Upon power up, L1 turns ON indicating proper CNI operation. For Narrow Band CNI GETC's, L3 also turns ON. These LED's will continue to remain ON.

When a conventional radio transmission with valid Channel Guard tone information is initiated, L6 also illuminates.

When the CNI GETC receives a valid Group Call Channel Request from the CEC/IMC's Uplink GETC, LED's L2 and L6 illuminate.

Table 3 - Front Panel LED State Indicators

WIDEBAND	L1	L2	L3	L4	L5	L6	L7
Idle State	●	○	○	○	○	○	○
Conventional Call. Locally initiated	●	○	○	○	○	●	○
Conventional Call. Multisite initiated.	●	●	○	○	○	●	○
NARROW BAND	L1	L2	L3	L4	L5	L6	L7
Idle State	●	○	●	○	○	○	○
Conventional Call. Locally initiated	●	○	●	○	○	●	○
Conventional Call. Multisite initiated.	●	●	●	○	○	●	○

Legend: ○ = OFF ● = ON * = FLASHING

TEST AND ALIGNMENT

This section provides instructions for performing a functional checkout of the CNI GETC and repeater using radios programmed for CNI operation.

In the event the repeater requires minor adjustments, this section also provides supplemental information for setting up MASTR II, IIe, or III repeaters for CNI operation.

FUNCTIONAL CHECKOUT

Verify the proper installation of the CNI software by reading the GETC's coded LED display.

Look for normal operation while placing several test calls. Test the system's fault tolerance by keying a radio then turning the radio power off without releasing the PTT switch. The channel should drop the call and return to an idle state within two to three seconds.

Locally Initiated Call

This procedure assumes that the test radios being used have their personalities set to the proper Channel Guard tones and are operating in the conventional mode.

1. Cycle power the repeater (or reset the GETC). The repeater should default to the Idle State.

2. Verify the CNI GETC LED's indicate the Idle State (see Table 3), L1 is ON, L2 thru L7 are OFF. (If Narrow Band repeater, L3 is also ON).
3. Initiate a call from the test radio to the console.
4. Verify that the CNI GETC switches to the Conventional Call mode and indicators L1 and L6 turn ON (also L3 for Narrow Band repeaters).

This indicates the CNI GETC has decoded the Channel Guard tone and has sent the Group Call Assignment message to the CEC/IMC Uplink GETC

5. Verify that voice can be heard on both radios.
6. Unkey the radio and verify that the CNI GETC returns to the Idle State.

Multisite Initiated Call

1. Initiate a multisite call or a console call to a radio assigned to the CNI repeater.
2. When the call is received, verify that CNI GETC switches to the Trunked Call mode and indicators L1, L2, and L6 turn ON (also L3 for Narrow Band repeaters).

This indicates the CNI GETC has received a Group Channel Request Message with a valid Group ID.

3. Verify that voice can be heard on the radio.
4. When the call is finished, verify that the CNI GETC returns to the Idle State.

REPEATER ADJUSTMENTS

The following adjustment information supplements the basic repeater alignment instructions found in the associated repeater maintenance or installation manuals. These procedures should be performed only when the repeater's performance is in doubt.

MASTR II and Iie Repeaters

Steps 1 thru 4 are for setting the TX MOD ADJUST in MASTR Iie repeaters only. For MASTR II repeaters, skip to step 5.

1. Key the transmitter by grounding DELAYED PTT (J931-8). Do not apply any audio to the microphone input so no microphone modulation is obtained.
2. Connect an Audio Oscillator between TX AUDIO HI (P8-6) and TX AUDIO LO (P8-5) and adjust

the oscillator for an output level of 1.0 Vrms at 1000 Hz.

3. Set the MOD ADJUST pot on the transmitter exciter for 3.75 kHz deviation.
4. Unkey the transmitter by removing the ground from J931-8 and disconnect the Audio Oscillator.

The following steps are applicable to the MASTR II and MASTR Iie repeaters.

5. Verify the CNI Software 344A3497 is installed (refer to the GETC FIRMWARE INSTALLATION section).
6. Verify the jumper wire has been installed between TP102 and J18-2 on the GETC Logic Board (refer to Figure 4 in the Logic Board Modification section).
7. Verify the GETC DIP switches are properly set for CNI operation (refer to Figure 11 in the DIP SWITCH SETTING section).
8. Ensure the CNI GETC's personality Channel Guard Mapping has one Conventional Network Channel Guard set for 123.0 Hz. (Refer to the personality example, Figure 13, in the Programming The Personality section.)
9. Verify the jumpers are properly installed as shown in Table 2.
10. Turn ON the Station Power Supply and verify L1 on the GETC is turned ON. This confirms proper operation of the modem. (For 900 Mhz applications, both L1 and L3 will be ON.)
11. Apply an "on channel" RF signal, modulated with a 123.0 Hz tone at 0.75 kHz deviation. Verify that indicator L6 turns ON. Verify the transmitter output deviation is 0.75 kHz • 50 Hz. Adjust the CG ADJUST POT on the receiver/exciter door if necessary.
12. Modulate the signal with an additional 1000 Hz tone at 3.0 kHz of deviation. Verify the transmitter output deviation is 3.75 kHz • 100 Hz. Adjust POT 2 (TX POT at MASTR Iie Control Shelf) if necessary.
13. Adjust the POT 1, Remote Audio Level, for 0 dBm into 600 ohms.
14. Remove the 1000 Hz tone from the signal generator, but leave Channel Guard (123.0 Hz) tone ON.
15. Apply a 2175 Hz tone at -30 dBm (25 mV rms) to TB1201-2,5. Verify that indicator L2 turns ON.

Apply an additional 1000 Hz tone at 0 dBm. Verify the output deviation of the transmitter is 3.75 kHz • 100 Hz. If necessary, adjust POT 7, Compressor Gain Pot.

16. Disconnect the signal from the remote audio receive ports (TB1201-2,5). Verify that indicator L2 turns OFF.
17. Re-apply the 1000 Hz tone to the signal generator (removed in step 14) and verify the repeater is now repeating the 1000 Hz tone and 123.0 Hz Channel Guard tone at 3.75 Hz deviation.
18. Disconnect the RF signal generator and verify that only indicator L1 is ON (L1 and L3 for 900 Mhz applications).

MASTR III Repeaters

The following adjustment information supplements the basic repeater alignment instructions found in the MASTR III maintenance or installation manuals.

1. Verify the CNI Software 344A3497 is installed (refer to the GETC FIRMWARE INSTALLATION section).
2. Verify the jumper wire has been installed between TP102 and J18-2 on the GETC Logic Board (refer to Figure 4 in the Logic Board Modification section).
3. Verify the GETC DIP switches are properly set for CNI operation (refer to Figure 11 in the DIP SWITCH SETTING section).
4. Ensure the CNI GETC's personality Channel Guard Mapping has one Conventional Network Channel Guard set for 123.0 Hz. (Refer to the personality example, Figure 13, in the Programming The Personality section.)
5. Verify the jumpers are properly installed as shown in Table 2.
6. Turn ON the Station Power Supply and verify L1 on the GETC is turned ON. This confirms proper operation of the modem
7. Apply an "on channel" RF signal, modulated with a 123.0 Hz tone at 0.75 kHz deviation (0.6 kHz if NASPAC). Verify that indicator L6 turns ON. Verify the transmitter output deviation is 0.75 kHz \pm 50 Hz (0.6 kHz if NASPAC). Adjust the CG (Channel Guard) software pot if necessary.
8. Modulate the signal with an additional 1000 Hz tone at 3.0 kHz of deviation(2.4 kHz if NASPAC).

Verify the transmitter output deviation is 3.75 kHz \pm 100 Hz (3.0 kHz if NASPAC).

9. Remove the 1000 Hz tone from the signal generator, but leave Channel Guard (123.0 Hz) tone ON.
10. Apply a 2175 Hz tone at -30 dBm (25 mV rms) to TB101-2,5 on the MIII T/R Shelf Interface Board. Verify that indicator L2 turns ON. Apply an additional 1000 Hz tone at -10 dBm (245 mV rms). Verify the output deviation of the transmitter is 3.75 kHz \pm 100 Hz (3.0 kHz if NASPAC). If necessary, adjust the deviation using the DI (DSP Line Input) software pot.
11. Disconnect the signal TB101-2,5. Verify that indicator L2 turns OFF.
12. Disconnect the RF signal generator and verify that only indicator L1 is ON.

TROUBLESHOOTING

Refer to the Troubleshooting Chart in Figure 14 as a guide for troubleshooting the CNI configuration. In addition, the following steps provide additional help in isolating problem areas while troubleshooting.

1. Check the CNI's Personality. Verify the following is correct:
 - Channel Frequency
 - Group ID and Channel Guard Frequency pairs are correct.
 - Repeater's Logical ID
 - Site ID
2. Check the Conventional Repeater. Verify that:
 - Limited Channel Guard signal appears at TP 102.
 - Channel Guard encode signal appears at J19-5.
3. Check CEC/IMC Data connections:
 - CEC/IMC Data connections consist of 2 pairs of 9600 Baud links. Make sure they are correctly connected. Refer CEC/IMC manual LBI-38662.

4. Check CEC/IMC Switch Audio connections.
 - This refers to audio connections between the CEC/IMC Switch and the CNI GETC or Repeater. Refer to CEC/IMC manual LBI-38662.

If the problem is isolated to the CNI GETC, refer to the GETC Maintenance Manual LBI-38894 for detailed board level test procedures.

CNI INTERFACE REQUIREMENTS

Refer to Figure 15 for the required connections between the CNI and a repeater, when using a repeater other than EGE's MASTR II (Ile) or MASTR III stations.

The CNI GETC requires the following voltages and signals:

POWER (J10-1) (Ground, J10-2)	+13.8 Vdc, 2A
VOL\SQ HI (J7-2) (Vol/Sq LO, J7-1)	Unfiltered receiver audio, including Voice and Channel Guard tone. Once in the GETC, this signal is routed to the Low Speed Data Filter where it is checked for the presence of a Channel Guard tone. Typically, the repeater is set up for a 1 V rms output when an "on channel" RF signal modulated with a 1000 Hz tone at 3 kHz deviation is applied.
Carrier Activated SQ. (RUS IN) (J7-14)	Input line should be set high (5 Vdc) when the receiver is unsquelched by an "on channel" carrier. The line is low when the receiver is squelched.

E & M Signalling voltage or Secur-it tone hold detect (Remote PTT IN, J7-9)
A ground (active low) needs to be applied to the GETC when the repeater decodes a 2175 Hz tone or E & M contact closure is used.

This signal (low) alerts the GETC to the presence of a call from a remote source (CEC/IMC) for the duration of the low condition.

The CNI GETC provides the following output signals:

Channel Guard tone (J19-5)	GETC outputs a 3 Vpp, EIA RS-220A Channel Guard tone (67 Hz to 192.8 Hz) to the repeater. Signal is sent for transmission with voice as an indicator of valid channel activity or to pass on priority scan information.
Delay PTT (J6-1)	This line is pulled low (4 mA O/C output) when the GETC wants to key the repeater's transmitter for any reason.
REPEAT/REMOTE REM PTT OUT (J6-16)	Output is High (5 Vdc) for Repeat Audio. Output is Low (0 Vdc) for Remote Audio.
CEC/IMC Switch levels:	
Remote Audio Level (In & Out)	0 dBm, 0 Vdc offset
Impedance	600 ohms
E & M Signalling voltage or 2175 Hz tone	-20 dBm

CEC/IMC Data signals:

Data Rate	9600 baud
Transmit level	0.77 Vrms
Receive level	0.16 Vrms on J3A-32 (U18A-1)

Repeater Configurations:

For Four Wire Tone Remote (transmit pair and receive pair), the repeater should be configured in such a way that:

- Allows the CNI GETC to key the transmitter.
- Transmits Channel Guard Tone generated by CNI GETC.
- Always routes the received audio to its remote receive pair.
- Allows local or remote audio to be transmitted depending on the REM PTT line.

TROUBLESHOOTING CHART

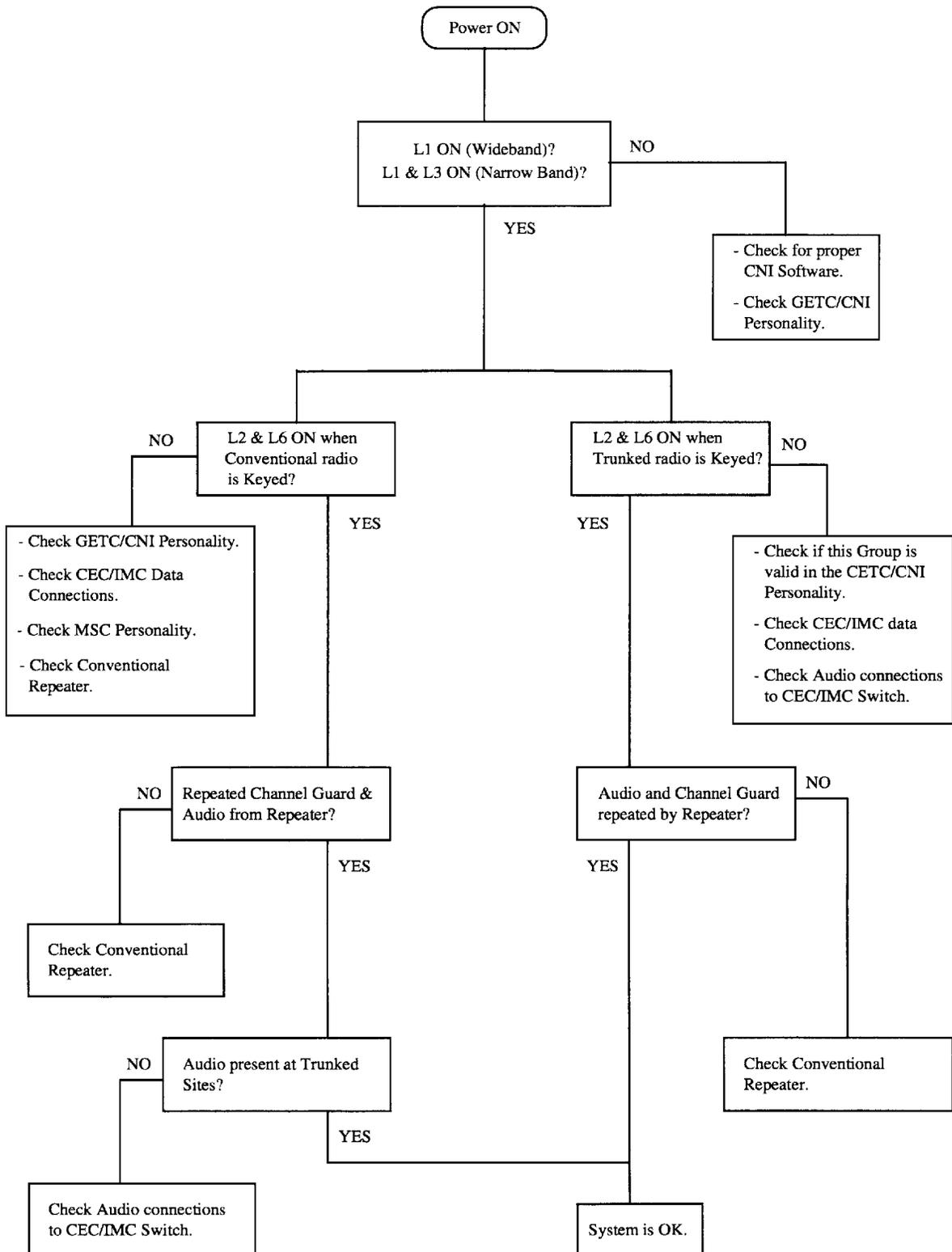


Figure 14 - CNI Troubleshooting Chart

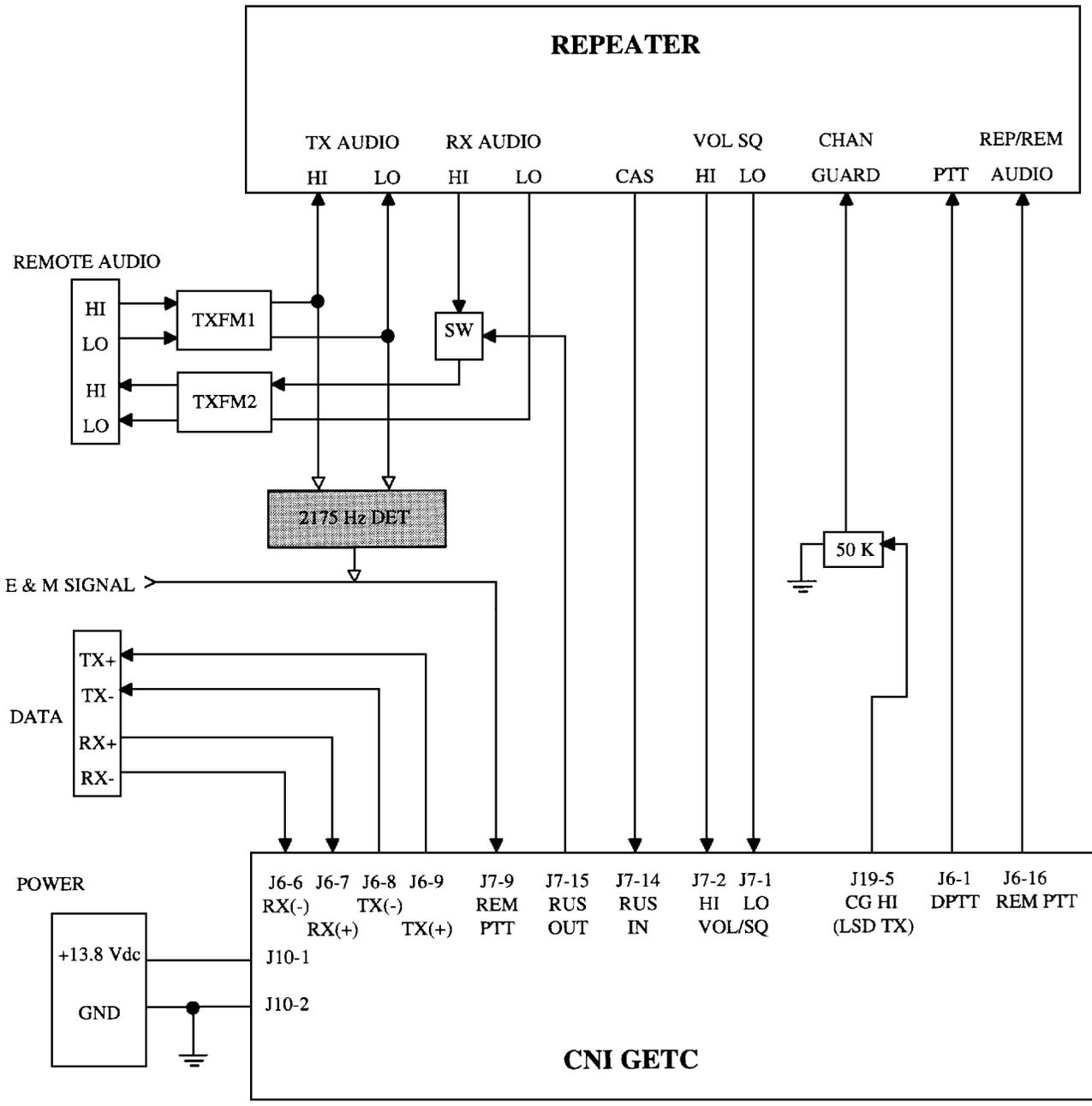
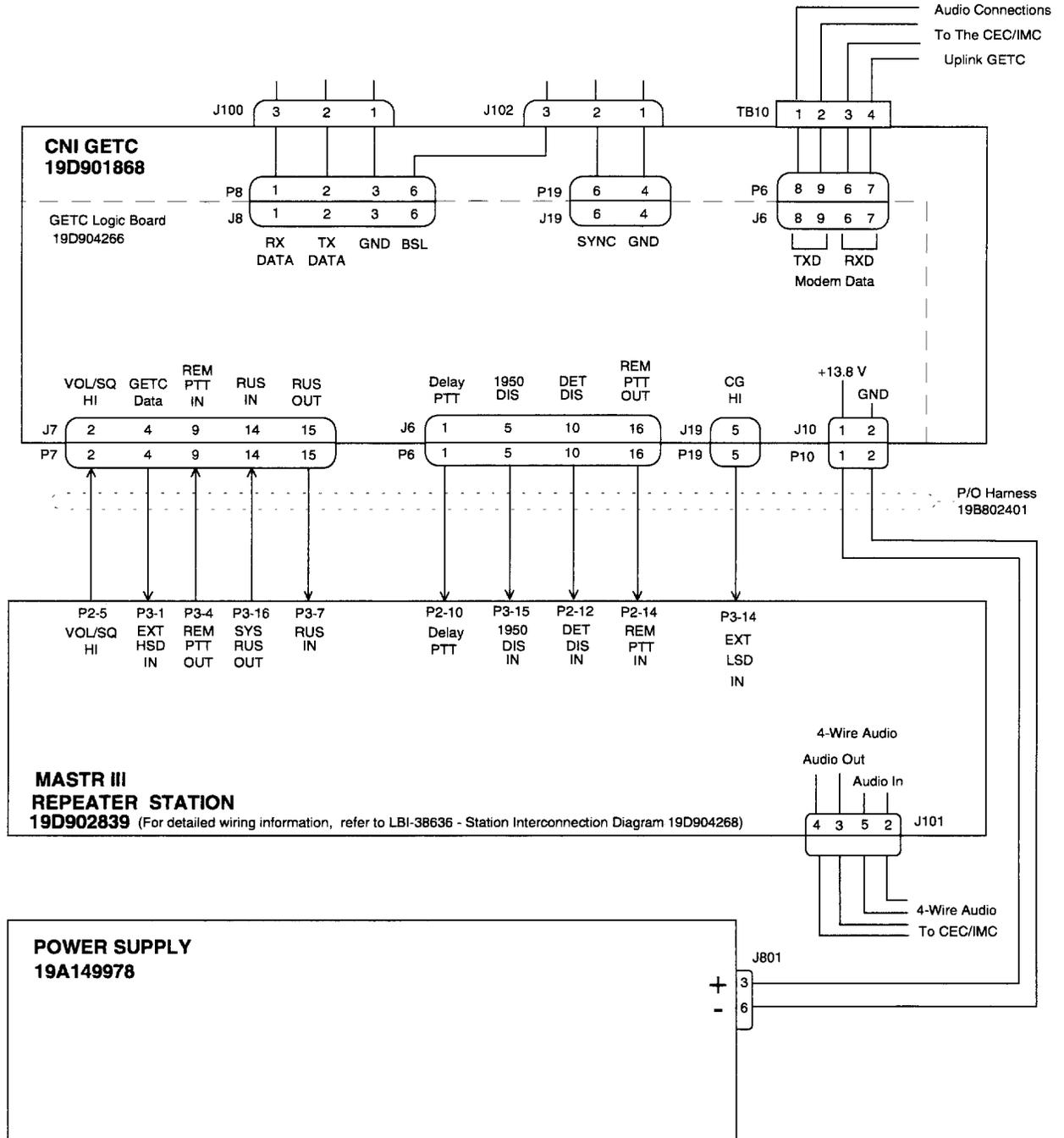
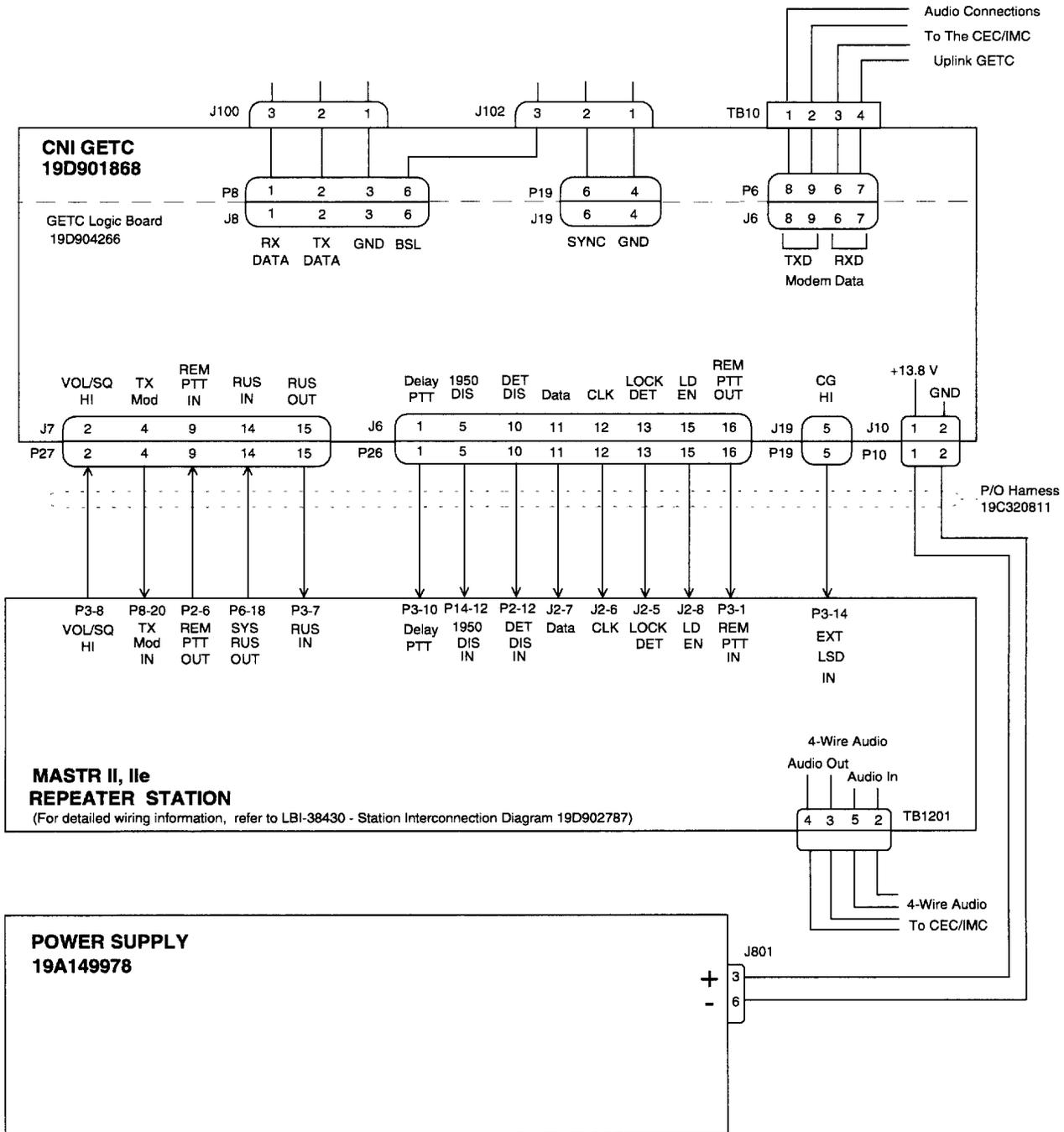


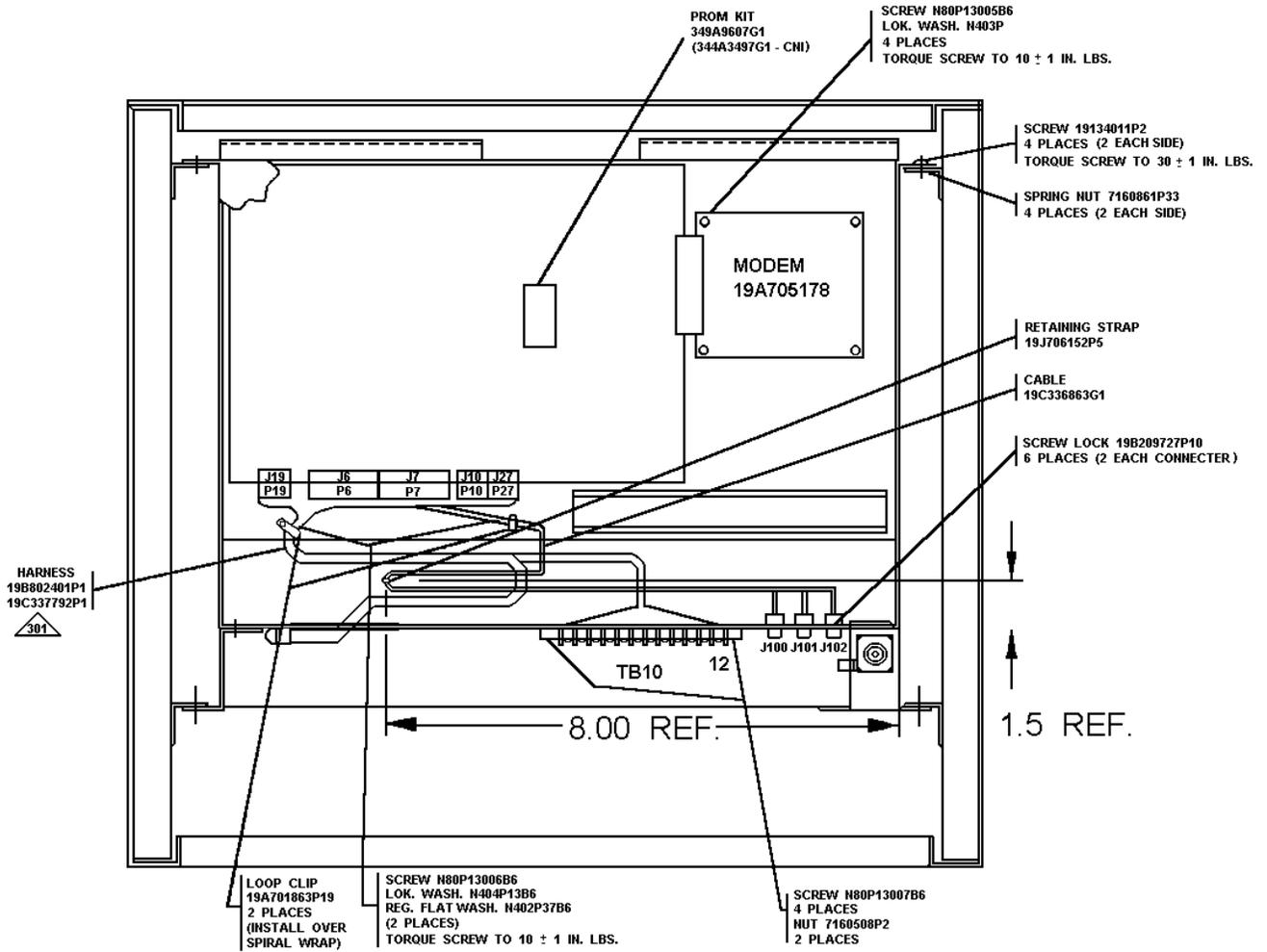
Figure 15 - Typical CNI to Conventional Repeater Interface



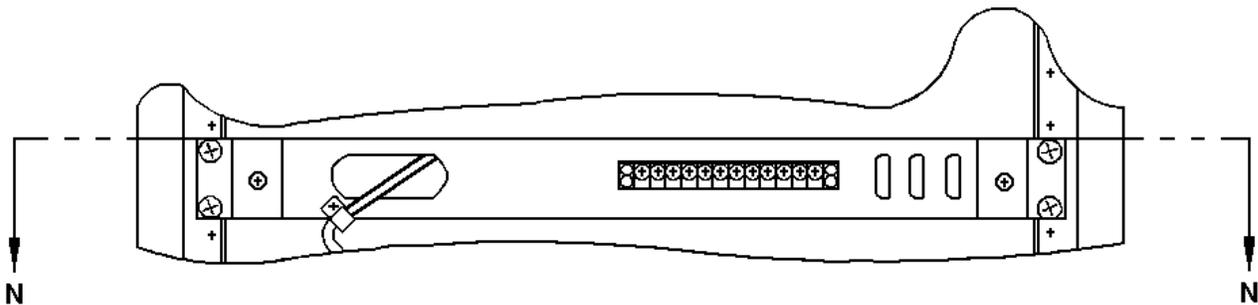
MASTR III STATION
SIMPLIFIED INTERCONNECT DIAGRAM



MASTR II, IIe STATION
SIMPLIFIED INTERCONNECT DIAGRAM



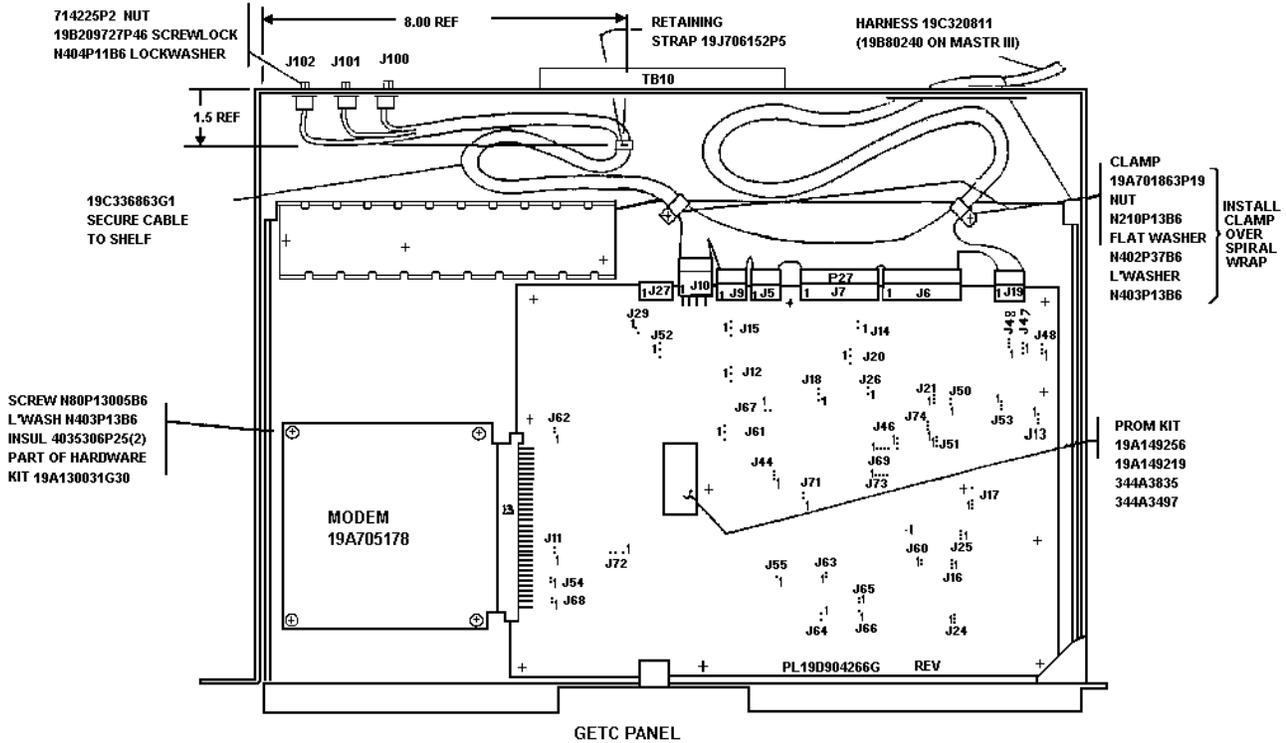
SECTION N - N



PARTIAL REAR VIEW OF CABINET

**CNI GETC SHELF
MASTR III INSTALLATION
SXCP5T**

(19D902845, Sh. 30, Rev. 1)



When installing GETC Panel 19D901868, Mount GETC Panel above Radio housing. If not CNI Application, connect 19C336861P2 sensor to transmit antenna connector. Remove wire from P19-5 on 19C320811 and install in P19-5 on 19C336863. Use Hardware Kit 19A130031G30. For CNI Application, refer to Mod. Instruction 344A3498P1, replace PROM Kit 19A149256 with PROM Kit 344A3497 provided, after tune and test. On MIIe Stations, cut the solid white jumper wires on harness 19C320811G16 from P27-14 to P27-15 and P27-6 to P27-16.

**CNI GETC SHELF
MASTR II, IIe INSTALLATION
STCP3Z**

(19D417483, Sh. 12, Rev. 27)

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