EDACS
SITE DOWNLINK & CEC/IMC UPLINK
GETC CONFIGURATION MANUAL

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LBI-38896

SCOPE

The Downlink and Uplink work together to provide a digital communication path between an Enhanced Digital Access Communication System (EDACS™) and the Console Electronics Controller (CEC) or the Integrated Multisite and Console Controller (IMC). This manual explains the Downlink and Uplink operation and configuration of the Ericsson GE Trunking Card (GETC).

This LBI's scope includes the GETC 1e configuration that uses the latest Link software. However, most of the information in this LBI also pertains to GETC configurations with earlier software.

INTRODUCTION

The Downlink and Uplink are unique applications of a GETC shelf that function as modems to provide a serial control link between an Enhanced Digital Access Communication System and the CEC/IMC. The link operates at 9600 baud full duplex over any four wire circuit such as standard data grade (type 3002) phone lines. The serial data link carries information representing, but not limited to, radio identification, polling messages, keying messages, and channel assignments.

The Uplink requires a standard GETC and the Downlink requires a GETC 1e. It is important to note that the GETC consists of a main Printed Wiring Board (PWB), a Rockwell modem card, metal shelving and cable harnessing, while the GETC 1e consists of the standard GETC with a Turbo Module installed. The current PWB hardware is the 'Lightning' GETC (19D904266G1) whose primary improvement is lightning protection on all I/O interface lines. The previous PWB version is referred to as the 'Classic' GETC (19D902104G1).

The Site's Downlink exchanges a variety of system messages with the CEC/IMC. The Site Controller includes a multitasking computer with Ericsson GE application software. The Site Controller provides moment to moment trunking features such as channel assignments, call validation, unit enable/disable, dynamic regrouping, and queuing management. The IMC is a multi-point switch with a distributed computer architecture. It is the hub for multi-site activity, and as such, requires intimate communication via GETC links with all connected sites.

The CEC uses the same basic architecture as the IMC to route audio between one or more consoles and an EDACS. The following text realizes the CEC and IMC are similar. Therefore, the term "IMC" will indicate either the CEC or IMC. Historically speaking, some literature refers to this same IMC architecture as the MSC or MultiSite Coordinator.

FAULT TOLERANCE

Both the Downlink and Uplink are part of a fault tolerant design philosophy that permits a system to continue operating if there is a major component failure. Figure 1 shows two fault tolerant elements. The Downlinks and Uplinks form a redundant data path between the System and the IMC. Furthermore, the Downlink supports both a Main Serial Link and a Failsoft Backup Serial Link (MSL and BSL). The Failsoft mode allows the system to continue trunked operation, with a reduced feature set, in the case of a Site Controller failure. The Downlink and Uplink are powerful enough to continue normal operations without the Site Controller.

SOFTWARE REQUIREMENTS

The Downlink and Uplink GETC's both employ the same link software. The Downlink, because of its requirement for a GETC 1e platform, has additional software and personality requirements. Please refer to Table 1 for the recommended software combinations that involve the Downlink and the Downlink's corresponding Station GETCs. Note: Please refer to the Link Software Release Notes SRN1061 for Link software versions later than 344A4895G1.

Table 1 - Software Combinations

Downlink and Uplink Recommended Software Combinations	
Wideband Applications	
*Downlink GETC, Use Software 344A4895G1 or Later.	*Turbo Board is Required, Use Software 344A4414G2.
Downlink GETC, Use Software 19A149256G18 or Later.	Turbo Board is Optional, Use Software 344A4414G1.
Uplink GETC, Use the same software specified for the corresponding Downlink GETC.	Turbo Board is Unused.
Narrowband Applications	
*Downlink GETC, Use Software 344A4895G1.	*Turbo Board is Required, Use Software 344A4414G2.
Downlink GETC, Use Software 19A705595G8 or Later.	Turbo Board is Optional, Use Software 344A4414G1.
Uplink GETC, Use the same software specified for the corresponding Downlink GETC.	Turbo Board is Unused.
* = Recommended Configuration	

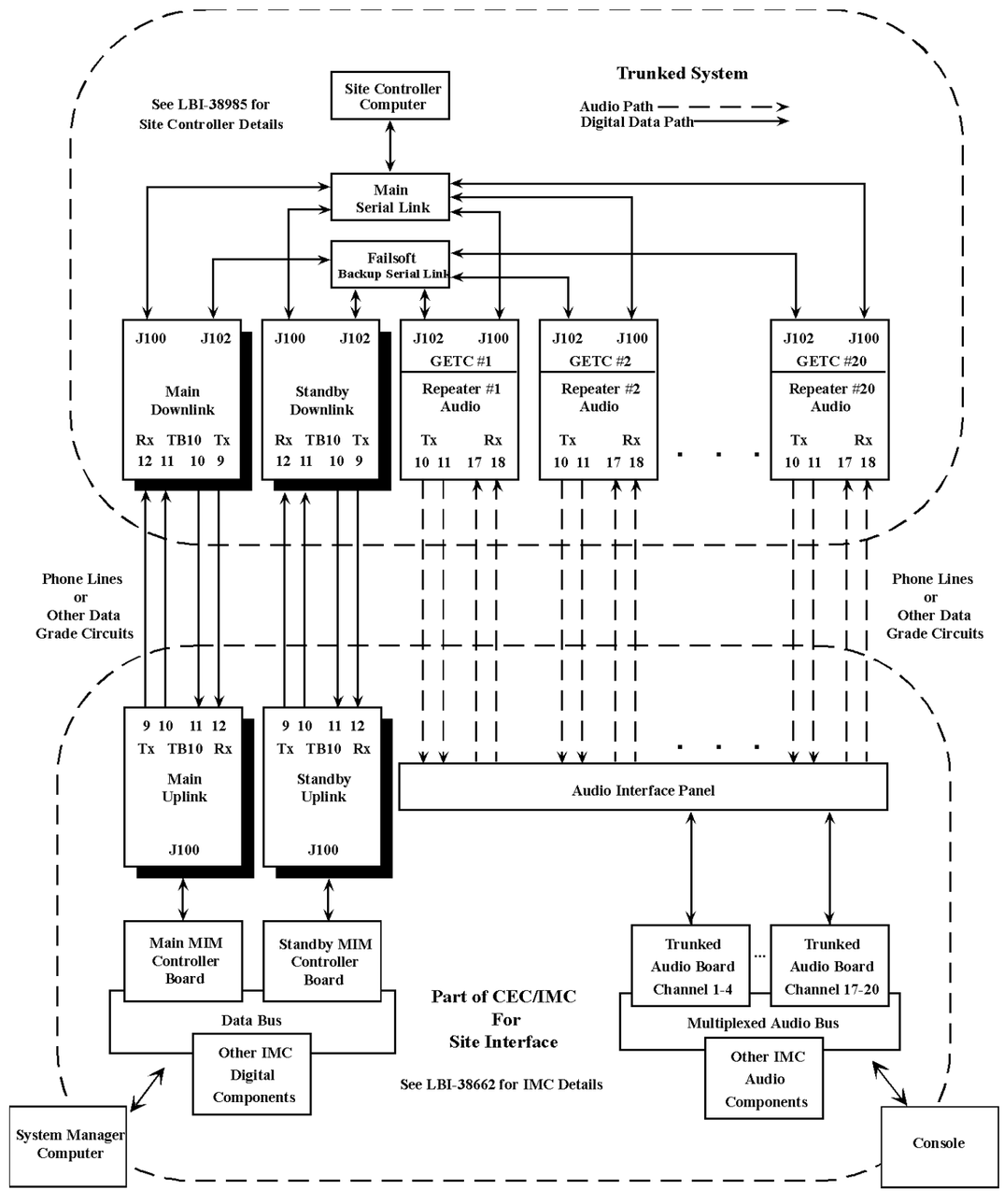

Figure 1 - Downlink and the IMC's Uplink for a Single Site Trunked System

LINK SOFTWARE

Link software, 344A4895, contains Downlink and Uplink functions that replace wideband 19A149256 software and narrowband 344A4455 software. Improvements in the Link software include enhanced performance and reliability. The Link software is contained in the GETC's U2 EPROM and is compatible with all versions of GETC hardware to date. In addition, the Link software is compatible with 344A3567/344A3568 or later IMC software, Site Controller software 344A3265G2 or later, and Turbo Board software 344A4414G2 or later.

Verify the proper installation of the Link Software by reading the GETC's coded LED display. Each GETC shelf has a row of seven front-panel mounted LED's. When on, L2 indicates the correct installation of software and operational readiness of the either the Downlink or Uplink. The remaining LED's indicate the status of the IMC/Site interface. Refer to Table 5 for specific information on the LED INDICATORS.

The Link software requires proper Dip Switch settings for S1, S2, and S3. Refer to Figure 6, for the switch locations and Table 4, for the switch settings. Use the TQ-3357 Programming Kit and the Personality Programming section of this LBI for proper configuration. Refer to the Link Software Release Notes SRN1061 for the latest information.

TURBO SOFTWARE

Program the Turbo Board by using the software diskette 344A4414 with an IBM compatible personal computer (PC), and an interconnecting cable, TQ-3360. The PC reads data from files on the 344A4414 diskette and uses the PC's serial port to serially transfer the data to the Turbo Board through J103 and J104 at the rear of the GETC Shelf.

1ETOOL.EXE

1ETOOL.EXE is a utility program shipped with Turbo software beginning with G2 of 344A4414. The primary function of 1ETOOL.EXE is to read the software version number from a Turbo Board. Future versions will add additional functions. Refer to the latest version of SRN1010 for more information.

To read a Turbo Board's software version number, connect a PC programming cable TQ-3360 from either COM Port on your PC to either J103 or J104 on the rear of the GETC. Follow the on screen instructions to select a comm port and the program reads and displays a string of information which is stored in all Turbo Board code. The string includes software version number and media kit number.

LOAD1E.EXE

The PC uses LOAD1E.EXE as a file transfer utility to serially move data from the 1ETOP.HEX AND 1EBOT.HEX files on the 344A4414 diskette to the code segment of the Turbo Board's memory. The file 1ECRC.HEX provides Cyclical Redundancy Check (CRC) information for use in error checking during the file transfer or "programming" process.

LOAD1E Features

The latest 344A4414 version of LOAD1E.EXE provides enhanced COM Port support. LOAD1E.EXE allows the user to specify the PC's COM Port for use during Turbo Programming. This feature allows the PC user to configure the PC for using LOAD1E.EXE and other serial devices such as a mouse or modem.

NOTE

These LOAD1E features begin with G2 of software 344A4414.

LOAD1E.EXE provides enhanced error message outputs. The error messages allow the user to quickly diagnose problems and take corrective action.

Turbo Programming leaves the GETC's current Personality Programming intact. The GETC retains its Personality Data after Turbo Programming. When Personality Data is present, LOAD1E clears and performs CRC functions only over the code portion of memory. LOAD1E stores CRC data in the DS-2250's memory for future data corruption checks.

PERSONALITY PROGRAMMING

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

The Personality Programming process stores data in a non-volatile region of memory. The GETC's non-volatile memory consists of an EEPROM installed in the XU35 socket. For GETC 1e (with Turbo Module) applications, Personality data is stored in battery backed RAM located on the Turbo Board. Refer to the Turbo Board's LBI-38822 for Personality Programming for the GETC 1e.

Figure 3 shows that Personality Programming is similar to Turbo Board Programming. Use the software kit TQ-3357 (344A3466G4) with an IBM compatible personal computer (PC), and an interconnecting cable, TQ-3360. The PC reads Personality information from a file on the PC. The PC serially transfers the Personality information to the GETC through J100 at the rear of the GETC Shelf.

Figure 3 also shows the TQ-3360 cable connected between the PC and J100. Use a male DB-25 to female DB-9 adapter to the PC if required. Harness 19C336863G1 provides the connection from J100 of the GETC Shelf to J8 of the GETC.

Follow the instructions in the Programming Guide TQ-3357 to install the programming software into the personal computer. Connect the TQ-3360 programming cable between the GETC Shelf J100 and the PC's COM 1 connector. Use a DB-25 to DB-9 adapter if required.

Prepare the target GETC by setting dip switches S1, S2, and S3 as shown in Figure 4. Reset the GETC by either applying power or using S4, the GETC's push button reset switch located just below the dip switches. The reset, in combination with the dip switch settings, places the GETC into the Personality Programming mode.

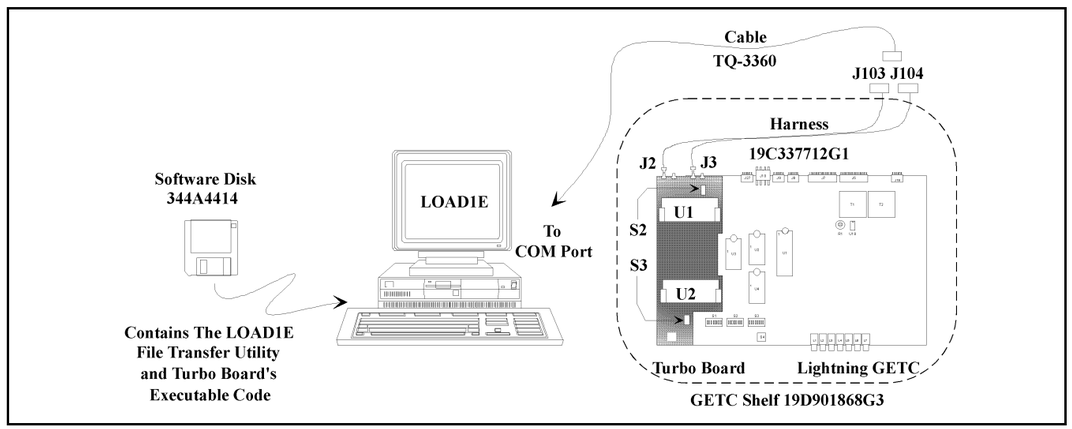

Figure 2 - Turbo Board Programming

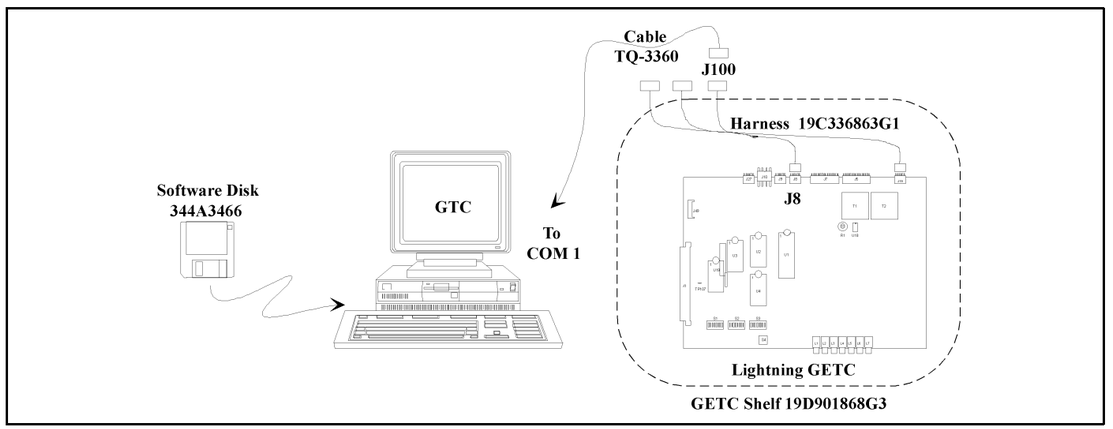

Figure 3 - Personality Programming

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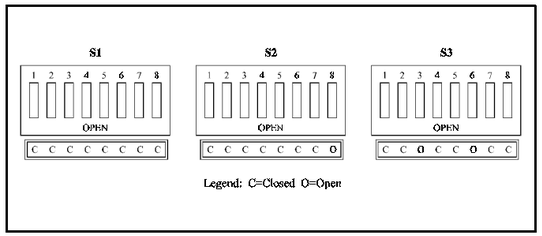

Figure 4 - Switch Settings for Personality Programming Mode

Execute the GTC command at the PC and follow the on screen instructions for Personality Programming. The controlling PC 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

INSTALLATION & CHECKOUT

Both Downlink GETCs are located within the Site Controller cabinet along with a transmission Power Monitor, the Site Controller Computer, Alarm Panel, Test Panel, Power Supply, and Continuous Power Source. Power cable 19D903880P150 connects the operating voltage to the GETC shelf at TB10-6 and TB10-7. Cable 19D903880P400 connects the Failsoft serial bus to the GETC shelf at J102. Some of the above equipment, including the Standby Downlink, are options. Please see LBI-38985.

The Uplink GETCs are part of the IMC, but are mounted in a separate cabinet that contains up to nine Uplinks in Main and Standby pairs. A dedicated power supply and two fused power distribution panels provide the operating voltage for the Uplink GETCs. The power supply's location is at the cabinet's bottom. Phone lines enter the cabinet's top and reach each Uplink's shelf through a connector panel 19B235360P1, and harnesses 19D902759 and 19B801676.

Replacement or installation of a Downlink or Uplink GETC involves the partial removal of the GETC shelf from its cabinet. Observe basic safety precautions to prevent injury or equipment damage. Remove the front panel hardware and slide the GETC Shelf forward to the service position that allows access to the shelf's interior. Remove the screw and washer hardware and the harness connectors from the GETC. Loosen or remove the Rockwell modem hardware enough to allow removal of the GETC. Note the modem uses insulating washers on both sides of the printed circuit board. Note the Downlink's configuration adds the Turbo Board as shown in the DRAWINGS section of this LBI.

When replacing or upgrading software, ensure the correct EPROM is in the GETC socket XU2. In addition, ensure the Downlink's Turbo Board's software is correct according to the TURBO SOFTWARE and PERSONALITY PROGRAMMING sections of this LBI. Verify the Downlink's dip switch settings are correct and jumper positions are correct. The default dip switch settings may be used for the Downlink, however, since the Site Controller ports 25 and 26 are typically reserved for the Downlinks, it is recommended that the DLGETC device addresses be set to 25 and 26 and that the personality identify devices 25 and 26 as being Downlinks. In this way, there will be a one to one correspondence between the Site Controller port, the System Manager port ID and the GETC device address.

NOTE

Ensure the GETC jumpers are properly configured and the dip switch settings are correct. Refer to SWTICH SETTINGS and JUMPER CONFIGURATION tables. Please refer to SRN1061 for the latest information.

Install the replacement GETC by reversing the removal procedure. Take care to replace all hardware and harness connectors. Carefully check the shelf's interior for loose washers and foreign objects. Ensure the insulating washers are present on both sides of the Rockwell Modem PWB.

When returning the Downlink or Uplink to service, ensure the phone line levels are correctly adjusted. Refer to Figure 6 to locate R1 and adjust it to 400 mVpp while using an oscilloscope to look at U18A pin 1. Check for the presence of demodulated digital data at TP107. Most ordinary average reading RMS volt meters (as opposed to a True RMS volt meter or a C weighted line test set) will indicate a reading of approximately 85 mVRMS at U18A pin 1.

Adjust the GETC's R2 for the maximum output level allowed by the phone line, microwave link, or equivalent communication line. For telephone lines, adjust R2 for .77 VRMS or 0 dBm across J6-8 and J6-9. For microwave links, adjust R2 for -10 dBm across J6-8 and J6-9.

Personality: C:\GE\GTC\RADIO\LINK_PER.GTC
Radio Text:
This is a sample Link Personality for a five channel site with Main and Standby links.

Channel Allocations	1 - 10	11 - 20	21 - 30	31 - 32
Channel Number	1234567890	1234567890	1234567890	12
Control Channel	YY********	**********	**********	**
Clear Voice	YYYYY*****	**********	**********	**
Voice Guard (or Aegis)	**********	**********	**********	**
Data	**********	**********	**********	**
Pager	**********	**********	**********	**
Interconnect	***YY*****	**********	**********	**
Downlink (To CSI/CML Switch)	**********	**********	**********	**
Multisite Downlink (To IMC)	**********	**********	****YY****	**
External CIU	**********	**********	**********	**

Channel Data
System Type: WIDE BAND

Ch#	Freq (MHz)	Ch#	Freq (MHz)	Ch#	Freq (MHz)
1	857.9625	2	858.9625	3	859.9625
4	860.4625	5	860.9625	6	0.0000
7	0.0000	8	0.0000	9	0.0000
0	0.0000	11	0.0000	12	0.0000
13	0.0000	14	0.0000	15	0.0000
16	0.0000	17	0.0000	18	0.0000
19	0.0000	20	0.0000	21	0.0000
22	0.0000	23	0.0000	24	0.0000
25	0.0000	26	0.0000	27	0.0000
28	0.0000	29	0.0000	30	0.0000

Site Data
Site Name: SITE 7
Date: 09/21/93

Channel Assignment	: Descending	SITE ID	: 7
Rotating Assignment	: Yes	Morse ID	: WXYZ821
Site Ch/Frq Notification	: No		
Individual Call Update	: One Slot	Individual Call Hang	: 5
Logical IDs above 8192	: Yes	Group Call Hang	: 5
SCAT	: No	Special Call Hang	: 5
Multisite System	: Yes	Voice Guard Hang	: 5
Simulcast System	: No	Emergency Call Hang	: 5
Voter System	: No	System All Call Hang	: 5
CTIS (or Jessica)	: Yes	Transmission Trunked Timer	: 60
		Message Trunked Timer	: 60
		Morse Interval Timer	: 15
		Test Call Timer	: 10
		Max Interconnect Calls	: 2

Figure 5 - Sample Link Personality

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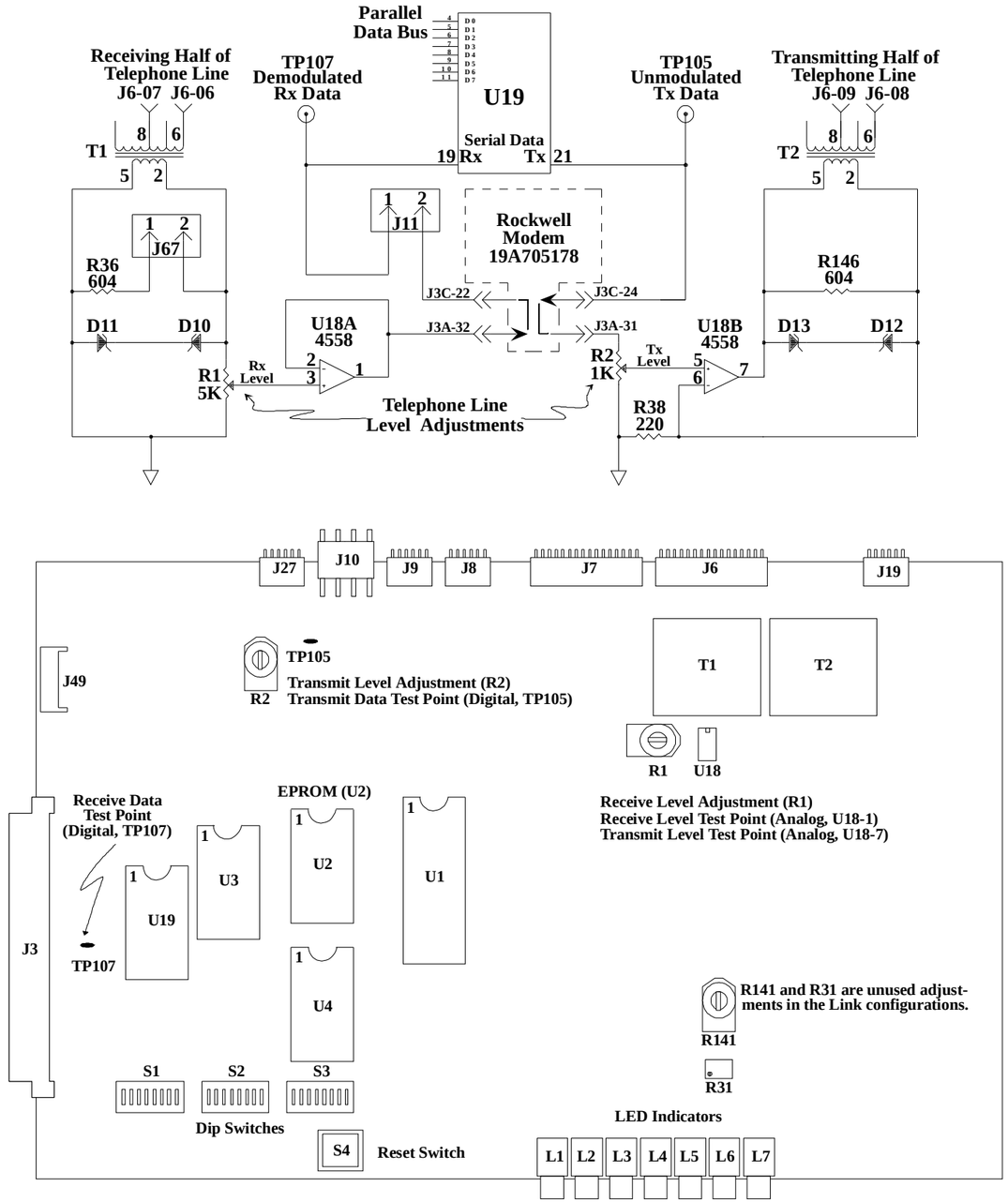

Figure 6 - GETC Phone Modem Level Adjustments

Refer to the GETC Maintenance Manual LBI-38894 for detailed board level GETC test procedures or to the Turbo Board's Maintenance Manual LBI-38822 for additional information.

OPERATION

The Downlink and Uplink work together to provide a serial communication path between the IMC and the Site Controller. The connection between the two Link GETCs operates synchronously at 9600 baud using the Rockwell Modem and 600 ohm data-grade (type 3002) phone lines or equivalent. The transferred data represents channel assignments, ID information, polling messages, and keying messages. The GETC stores the messages in a FIFO queue and processes them for transmission.

Figure 1 shows a full featured trunked system using the Downlink's J100 Main Serial Link (MSL). During the Failsoft trunking mode, the Backup Serial Link (BSL) connects the Downlink's J102 to the Site's Repeater GETC's. Both the MSL and BSL operate asychronously at 19.2 Kbaud. Message bytes are made up of 8 data bits, 1 stop bit, and no parity bit.

The Uplink extends the serial path to the IMC through the MASTR II/III Interface Module or MIM. The MIM serial connection to J100 of the Uplink is also an asynchronous 19.2K baud data stream. Message bytes are made up of 8 data bits, 1 stop bit, and no parity bit. The MIM is a microprocessor based Controller Board controlling up to five Audio Boards for a 20 channel system. An optional configuration includes a Standby Downlink matched with a corresponding Standby Uplink and Controller Board for redundant operation.

The Downlink and Uplink use an EGE proprietary protocol to form message based digital data in support of various trunking functions. The digital data messages represent channel requests from the IMC, channel assignments from the Site Controller, patch and Simulselect information, Failsoft indications, and user radio login during roaming.

CHANNEL ASSIGNMENTS

The Site Controller assigns a channel when a mobile or portable radio operator initiates a call by pressing the radio's PTT switch. During the channel access time, a working channel request is then transmitted to the Site Controller using the control channel.

When a Site Controller is present, the key steps within an EDACS network during an unconfirmed channel assignment process are:

- The user presses a mobile or portable's Push to Talk (PTT) switch and uses the Control Channel to transmit a channel request for Talk Group X.
- The Site Controller receives the channel request from the Control Channel GETC and validates the Unit ID and Group ID.
- The Site Controller sends a message through the Downlink to the IMC's Uplink and the IMC. The Site Controller also sends a message to the originating mobile or portable radio via the Control Channel. The message from the Site Controller to the originating radio contains information concerning the assigned Working Channel.
- If the Talk Group is associated with multiple systems, the IMC sends a message through the IMC's Uplinks to the Downlink of all other affected systems.
- The other systems use their Site Controller to verify the Unit ID and Group ID and send a channel assignment message through their Downlink back to the IMC.
- The IMC routes audio from the originating system to the other valid systems via the corresponding audio path for each system's Working Channel.
- The IMC also routes audio to the corresponding consoles that are programmed to receive that Talk Group.
- The radio's user releases the PTT switch that results in the radio transmitting a drop message over the assigned Working Channel.
- The Site Controller sends a drop message to the IMC.
- If multiple sites are involved, the IMC sends a drop message to the secondary systems on the MultiSite Network and to any corresponding consoles programmed to process the affected Talk Group.

In general, the same process applies for Clear Voice calls, Digital Group calls, I-calls, centralized telephone interconnect calls, and Data calls. Note that the IMC routes status and message information through the Uplink and Downlink to the Control Channel GETC. The connections from each Working Channel GETC to the IMC provide an audio path rather than a status and message link.

SWITCH CHANNEL STATUS MESSAGE

The Site Controller continuously sends messages to the IMC in order to verify the data link's integrity. Each Site Controller sends its Site ID to the IMC via the Main Link pair. If the IMC fails to receive the Site ID while using the Main Link pair, then the IMC looks for the Site ID message using the Standby Link pair. Likewise, should the Site Controller fail to

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receive the proper response from the IMC, the Standby Downlink and Uplink pair comes online.

The Site Controller sends its site ID to the IMC every two seconds. Should the IMC miss two consecutive Site Controller ID messages, and waiting for about five seconds, the IMC will follow programmed instructions and look for messages from the Standby Uplink and Downlink path to the Site controller.

The system operates in the Trunked Failsoft mode should the Site Controller fail or if the system is configured without a Site Controller. In this case the Control Channel GETC generates the channel assignment and communicates through the Backup Serial Link (BSL) and the Downlink to the IMC. The Downlink GETC generates the Site ID message in the Failsoft mode (no Patch or Simulselect messages) and sends the ID message through the Uplink to the IMC.

Please refer to the Interconnection Diagrams section of this LBI for detailed information on the connections within the Downlink and Uplink GETC Shelf. Table 2 shows additional reference material for the GETC, Turbo Board, IMC, Site Controller, MASTR II Station, and associated software.

Table 2 - Additional Reference Material

Additional Reference Information	Document Number and Title
GETC	LBI-38894, Overall GETC Maintenance Manual.
Link Software	SRN1061, Link SRN.
Turbo Board	LBI-38822, Maintenance Manual. SRN1010, Turbo Board SRN.
IMC	LBI-38662, Maintenance Manual.
Site Controller	LBI-38985, Maintenance Manual.

SRN = Software Release Notes

VOLTAGE REGULATOR

The Regulator Assembly generates the regulated +5 VDC to the GETC logic board, Rockwell Modem, and Turbo Board. The assembly maintains voltage regulation using two 5 Volt regulators, two series heat dissipating resistors, two terminal blocks, and a pig tail cable all mounted on a heat sink within the GETC Shelf.

The Regulator Assembly receives its input power from the GETC logic board at J27-4 and draws a maximum of 1.5 Amps. The Regulator Assembly supplies a maximum of 700 mA to the GETC logic board at J27-6 and 700 mA to the Rockwell Modem at J27-1. The voltage regulation is *5% of the nominal voltage rating.

ROCKWELL MODEM

Each GETC controls its corresponding modem and provides a high speed synchronous serial interface between the IMC and a trunked system. The Link GETCs use the Rockwell Modem to send and receive serial digital data representing system messages. Data transfer rates are 9600 bits per second (bps) using data grade four-wire telephone lines.

Along with transformer isolation, the modem provides automatic adaptive signal equalization and conditioning. This signal conditioning allows normal operation using input signal levels from -40 dBm to 0 dBm under ideal conditions. Even though the Rockwell Modem does have a 40 dBm dynamic range, the modem does require a 26 dBm Signal to Noise (S/N) ratio. The typical noise floor is approximately -36 to -40 dBm, therefore, the modem's practical dynamic range is approximately 0 to -36 dBm.

The Rockwell Modem demodulates the input signal and then transfers the resulting data to the GETC. The physical connections for the interface are at J3C-22, J11-1, J11-2, and U19-19.

In general, the Rockwell Modem performs digital to tone signal conversion, synchronous timing, training functions, and synchronous clock recovery on received data. The GETC's UART U19 and Rockwell Modem shall be collectively referred to as the "Phone Modem".

The modem senses a received signal by initiating a training state upon detecting an increase in the input signal level. The modem begins processing data at the end of the training state if the input signal is still above the nominal -40 dBm receiving threshold value. Otherwise, the modem returns to an idle mode if its below the threshold value.

GETC control signals determine the duration of the modem's training state at the time of power up. Resetting the GETC or cycling the GETC Shelf's operating power initializes the Rockwell modem for proper operation. Reset the GETC by either using GETC S4 (Figure 6) or cycling the GETC's operating power. Proper modem initialization and operation is indicated by the GETC illuminating LED indicator L2 on either the Downlink or Uplink front panel.

TURBO BOARD

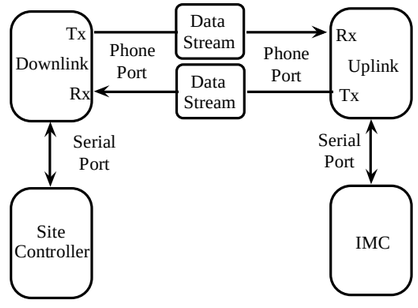
The Turbo Board provides the Downlink GETC with additional memory and processing capability through two 8051 based processors and support circuitry. The Turbo Board also stores the Site Personality when running Link software and provides real-time debug capability.

The two Turbo Board processors communicate with each other through a parallel bus. Communication with the main GETC processor is through special memory locations in the 8K dual port RAM. In addition, each turbo processor has an RS232 serial port used for downloading both Turbo operational software and system personality to the Downlink GETC.

The Turbo Board uses mostly surface mounted components and mounts on stand-offs above the GETC. Electrical connections are made through a 28 conductor ribbon cable on the Turbo Board to the XU3 socket on the GETC. A small mechanical shield above the Turbo Board protects against inadvertent damage when sliding the GETC drawer in and out of the cabinet.

DOWNLINK AND UPLINK

The Downlink and Uplink GETCs are essentially modems connecting the IMC and Site Controller EDACS system components. Each Link GETC has two full duplex ports, a serial port operating asynchronously at 19.2K baud and a phone port operating synchronously at 9600 baud. The serial port of the Downlink is connected to either the Site Controller (through the MSL) when in the fully trunked mode or all the remaining site GETCs collectively bussed together (through the BSL) when in the trunked failsoft mode. The serial port of the Uplink is connected to the IMC (MIM Controller Board). In general, the system operates as illustrated:



Communication among the various system elements is in the form of message packets. The GETC processes and transmits messages between the serial and phone ports. Since these two protocols are different, the Downlink and Uplink converts from one format to the other. The data formats will be discussed in the next section. In addition, the Link GETCs perform data error detection and correction, general control of timer and IO functions (DIP switch, LED's, UART's, etc.), receive and transmit buffer management, message scheduling, and Turbo interfacing.

PHONE PORT DATA FORMAT

Data is exchanged between the Downlink and Uplink synchronously at 9600 baud through the phone port. Data is difficult to analyze at this point since it is in tone form. However, data in digital form is accessible at test points within the GETC shelf. The phone port transmits a continuous bit stream within which is embedded the various system messages. The start of each message is identified with a '5712' sync byte which provides word synchronization.

Protocol Analyzer Setup: hex 8, sync, 9600 norm, MSB

Format:

AA AA ... AA 57 12 HH B1 B2 ... Bn CS AA AA ... AA
AA = idle bytes
5712= sync byte
HH= header byte
Bn= 1 to 12 message bytes
CS= inverted XOR check sum

Location: internally at J9-2, 3 TxClk, TxD
J9-4, 6 RxD, Gnd
externally at TB10-9,10 Tx (tone)
TB10-11,12 Rx (tone)

SERIAL PORT DATA FORMAT

Data is exchanged between the Link GETC and Site Controller or IMC asynchronously at 19.2K baud through the serial port. The serial port transmits out this port in bursts. The beginning of each message is identified with an 'AA' start byte.

Protocol Analyzer Setup: async 19200, N, 8, 1 hex8, norm, LSB

Format: AA HH B1 B2 ... Bn CS
AA = start byte
HH= header byte
Bn= 1 to 12 message bytes
CS= inverted XOR check sum

Location: internally at J8-1,2,3 (Tx,Rx,Gnd)
externally at J100-1,2,3 (Gnd,Rx,Tx)

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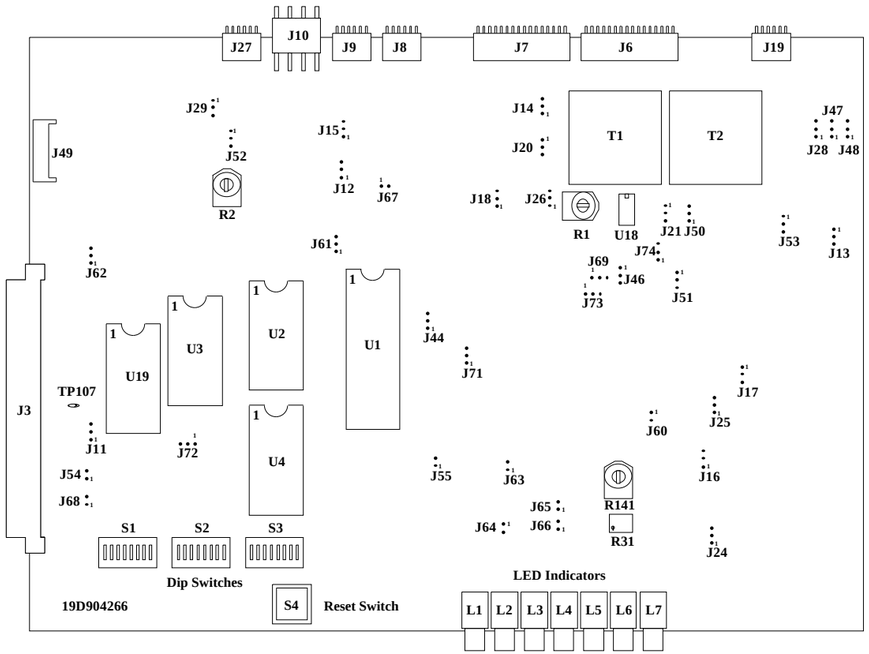


Table 3 - Downlink & Uplink (19D904266 only) Jumper Position

JUMPER	POSITION WB	*	NB	FUNCTION
P11	1 & 2		1 & 2	Enables 9600 baud modem RxD.
P12	1 & 2		1 & 2	Enables CTS from BSL.
P13	1 & 2		1 & 2	BSL Tx out / Rx in loopback.
P14	1 & 2		1 & 2	Enables Master Site Controller Path.
P15	1 & 2		1 & 2	Backup site controller path disabled.
P16	1 & 2		1 & 2	BSL selection enable.
P17	1 & 2		1 & 2	LSD encode enable.
P18	1 & 2		1 & 2	LSD decode enable.
P20	Omit		Omit	Combined PTT from station disable.
P21	1 & 2		1 & 2	High Speed Data Acquisition Rate.
P24	1 & 2		1 & 2	BSL selection (failsoft) enable.
P25	1 & 2		1 & 2	LSD encode enabled.
P26	1 & 2		1 & 2	Use for 800 MHz applications.
P28	1 & 2		1 & 2	Sync line input path enabled.
P29	1 & 2		1 & 2	Enables site controller RxD on J8-4.
P44	1 & 2		1 & 2	Use for 256K or 512K EPROM.
P46	1 & 2		1 & 2	Used for normal communication.
P47	1 & 2		1 & 2	BSL select.
P48	1 & 2		1 & 2	BSL select.
P50	1 & 2		1 & 2	Enables tone control for voted systems.

JUMPER	POSITION WB	*	NB	FUNCTION
P51	1 & 2		1 & 2	Enables Morse Code ID.
P52	2 & 3		2 & 3	TxD polarity invert.
P53	1 & 2		1 & 2	RxD polarity normal.
P54	1 & 2		1 & 2	Enables MODCNTL local control.
P55	Omit		Omit	Enables WALSH bit 1.
P60	1 & 2		1 & 2	Enables HSD.
P61	2 & 3		2 & 3	Use for 512K EPROM.
P62	1 & 2		2 & 3	Selects proper U4 clock.
P63	Omit		1 & 2	Sets TX data for 4800 baud.
P64	Omit		1 & 2	Sets TX data filter for 4800 baud.
P65	Omit		1 & 2	Sets TX data filter for 4800 baud.
P66	Omit		1 & 2	Sets TX data filter for 4800 baud.
P67	1 & 2		1 & 2	Terminates phone line receive.
P68	1 & 2		1 & 2	Enables Delayed PTT.
P69	1 & 2		1 & 2	Enables COMB PTT IN.
P71	1 & 2		1 & 2	Enables phone modem RTS control.
P72	1 & 2		1 & 2	Selects internal oscillator.
P73	2 & 3		2 & 3	Connects Input Port.
P74	2 & 3		2 & 3	CAS polarity normal.

*Notes: Wide Band Jumper Positions apply to Wide Band Downlinks and Uplinks, Narrow Band Jumper Positions apply to the Narrow Band Downlink. Please see SRN1061 for the latest information and for 19D902104 Jumper Positions.

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

Table 4 - Downlink and Uplink GETC Default Dip Switch Settings

SWITCH SETTING AND LED INDICATORS

Configuration	S1 (1 2 3 4 5 6 7 8, OPEN)	S2 (1 2 3 4 5 6 7 8, OPEN)	S3 (1 2 3 4 5 6 7 8, OPEN)
Main Downlink (to IMC) Standby Downlink (to IMC)	C C C C C C C O C C C C C C C O	C C C C C C C C C C C C C C C C	O O C O O C C C C C O O O C C C
Main Downlink (to CML/CSI) Standby Downlink (to CML/CSI)	C C C C C C C O C C C C C C C O	C C C C C C C C C C C C C C C C	O C C O O C C C C O C O O C C C
Main Uplink (from MSC I) Standby Uplink (from MSC I) TSIN Uplink (from CML/CSI) Uplink (from IMC)	C C C C C C C O C C C C C C C O C C C C C C C O C C C C C C C O	C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C C	C C C C C C C O C C C C C C O O C C C C C C C C C C C C C C C C
Program EEPROM Terminal Simon	C C C C C C C C C C C C C C C O	C C C C C C C O C C C C C C C O	C C O C C O C C O O O O O O C C

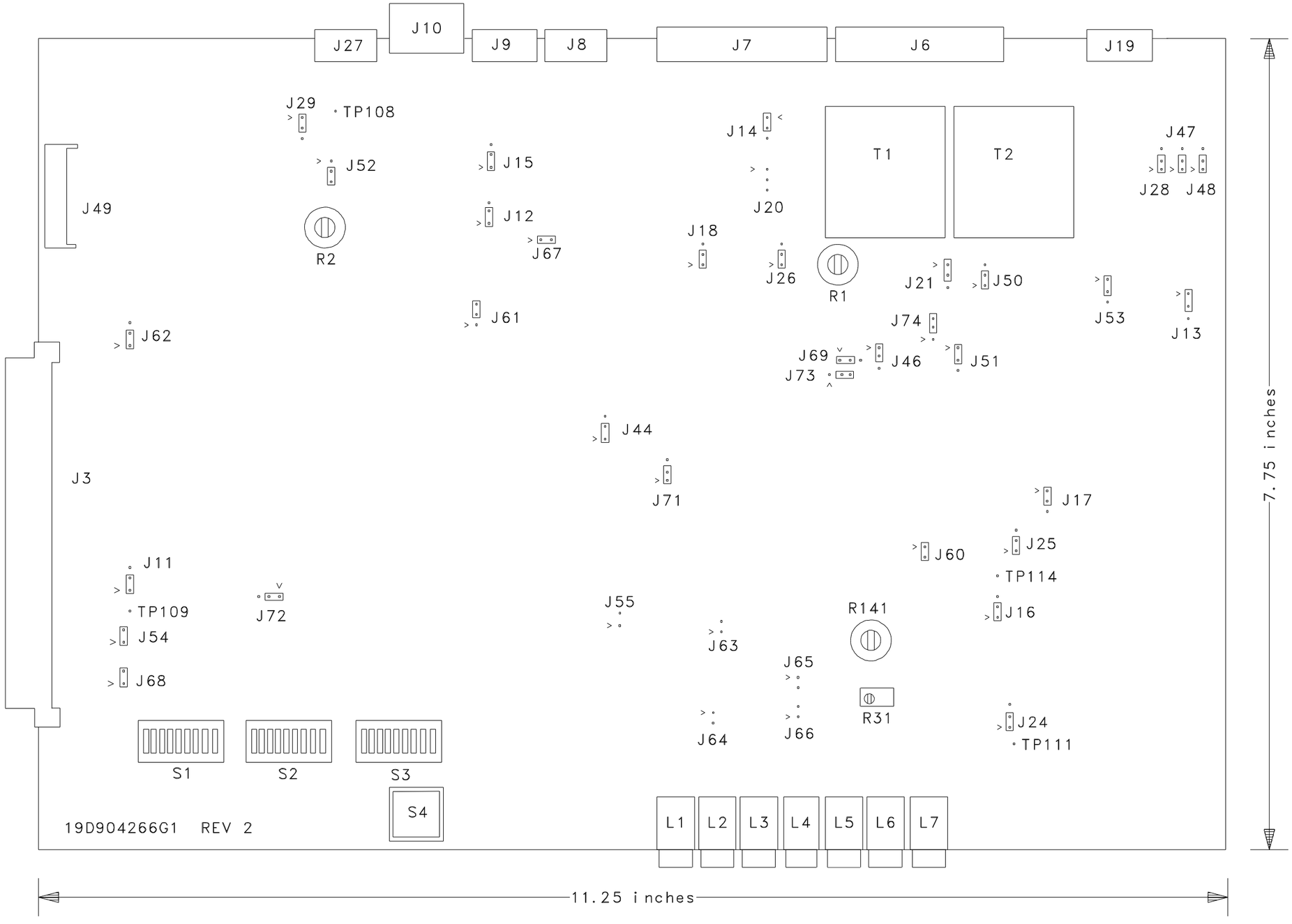
Legend: C = Closed, O = Open

Table 5 - Downlink and Uplink (19D901868) Front Panel Indication

Downlink	L1	L2	L3	L4	L5	L6	L7
Failsoft Trunking	●	●	❍	❍	❍	❍	❍
Full-Featured Trunking	❍	●	❍	❍	❍	❍	❍
Invalid Configuration (Check Dip Switches)	❍	*	❍	❍	❍	❍	❍
Backup Serial Link is Active	❍	❍	❍	●	❍	❍	❍
Rx Data From Phone Modem	❍	❍	❍	❍	*	❍	❍
Rx Data From Serial Port	❍	❍	❍	❍	❍	*	❍
Personality Programming Mode	❍	❍	●	●	●	❍	❍

Uplink	L1	L2	L3	L4	L5	L6	L7
This Uplink is in Standby Mode	❍	●	❍	❍	❍	❍	❍
This Uplink is Active	❍	●	❍	❍	❍	❍	●
Invalid Configuration (Check Dip Switches)	❍	*	❍	❍	❍	❍	❍
Backup Serial Link is Active (MSC I Only)	❍	❍	❍	●	❍	❍	❍
Rx Data From Phone Modem	❍	❍	❍	❍	*	❍	❍
Rx Data From Serial Port	❍	❍	❍	❍	❍	*	❍
Personality Programming Mode	❍	❍	●	●	●	❍	❍

Legend: ● = OFF ❍ = ON * = FLASHING



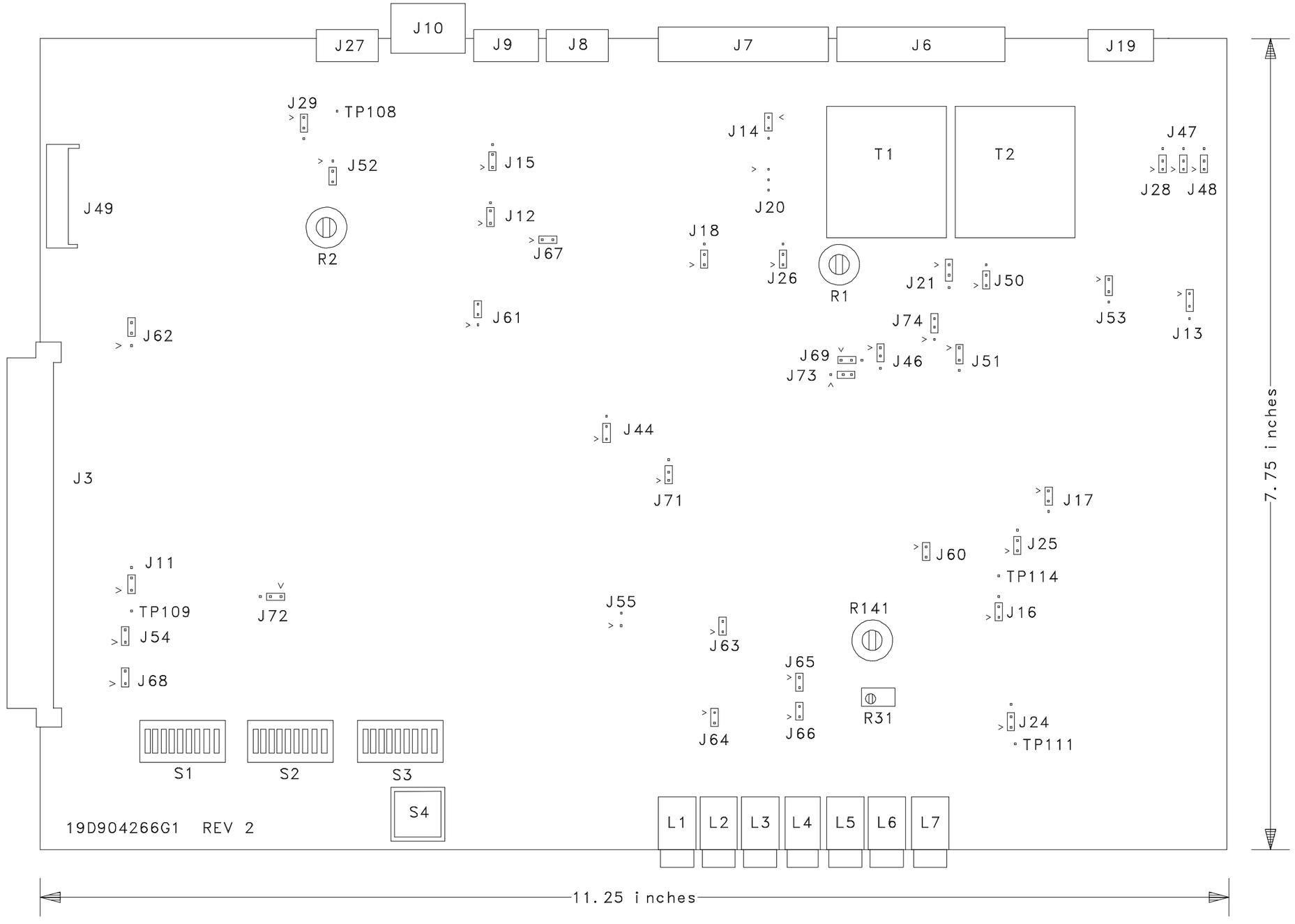
NOTES:

1. The Symbol (>) denotes pin 1.
2. This diagram is drawn to scale, copy to the dimensions indicated when making a plastic jumper overlay.

EDACS WIDE BAND DOWNLINK & UPLINK GETC JUMPERS

NOTES:

1. The Symbol (>) denotes pin 1.
2. This diagram is drawn to scale, copy to the dimensions indicated when making a plastic jumper overlay.



EDACS NARROW BAND DOWNLINK
GETC JUMPERS

LBI-38896

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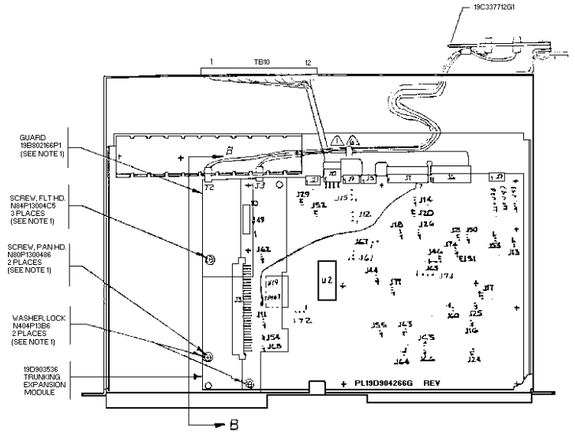
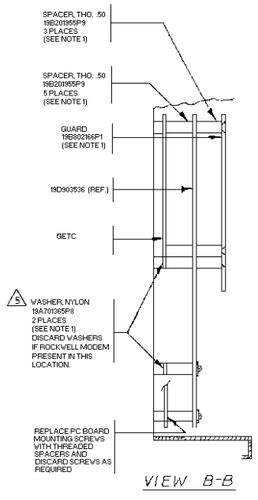
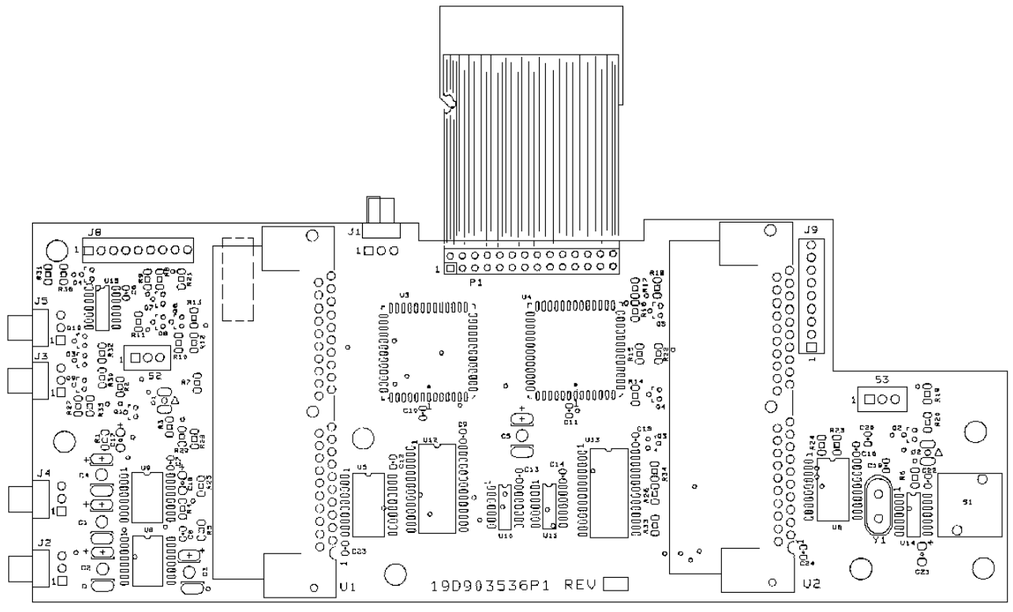
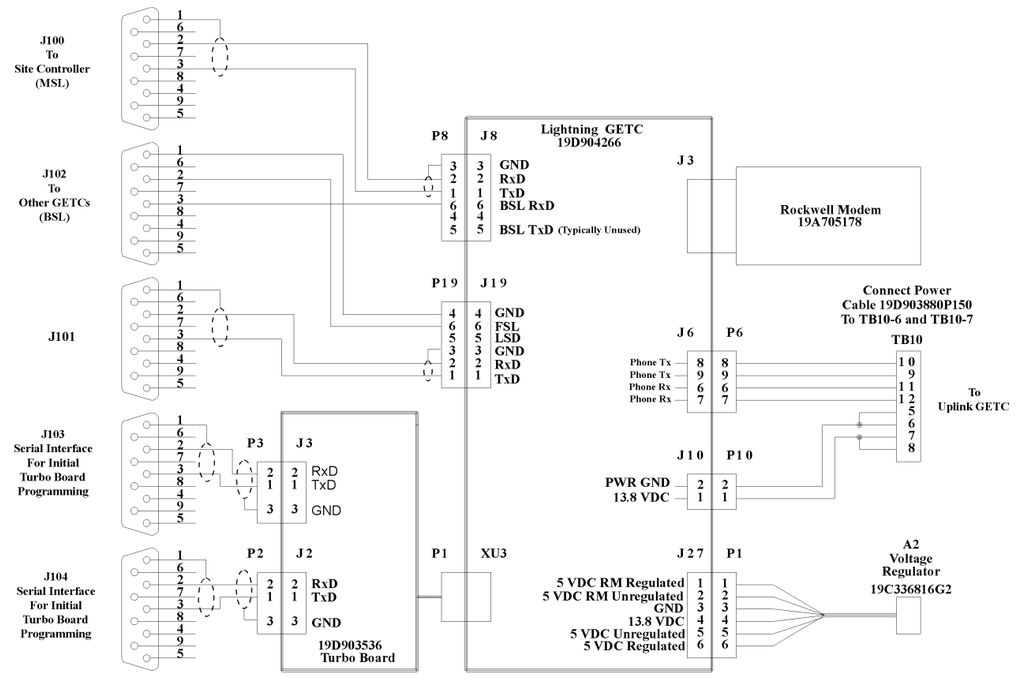






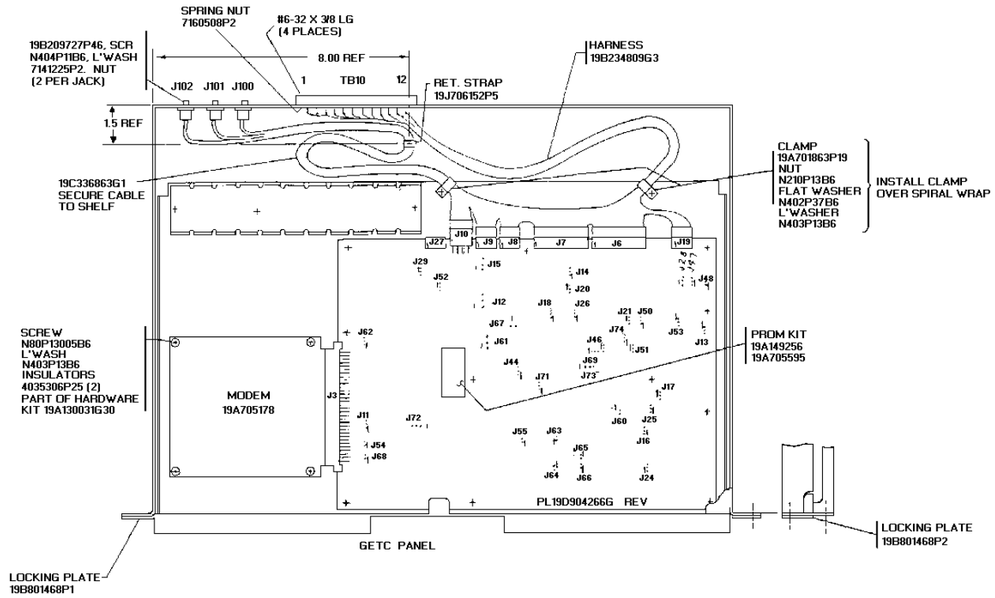
GETC 1E

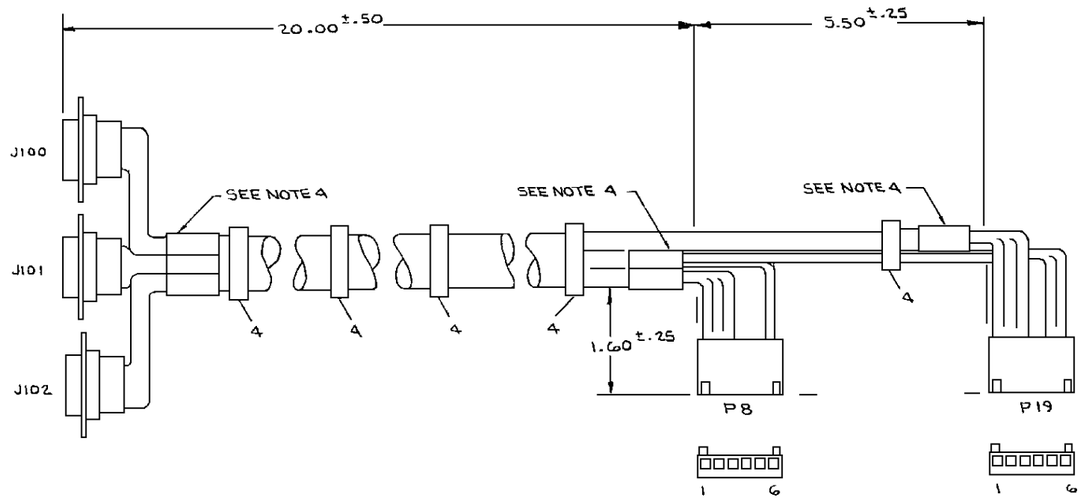
1. PART OF HARDWARE KIT 344A4019G1.
2. REMOVE U3 FROM GETC BOARD AND PLUG 19D903536 BOARD INTO XU3. U3 TO BE HANDLED AS STATIC SENSITIVE DEVICE AND RETURNED TO STOCK IN STATIC-FREE TUBE.
3. SOLDER ST26-0 WIRE FROM TP107 TO J7-7. ROUTE APPROXIMATELY AS SHOWN.
4. BEND OVER ELECROLYTIC CAPACITORS ON GETC BOARD TO AVOID INTERFERENCE WITH M MODULE.
5. IF MODULE IS LOCATED IN THIS LOCATION, REMOVE LOCKWASHERS AND SCREWS FROM THIS END OF MODULE AND INSTALL THREADED INSERTS. LEAVE LOCKWASHERS ON FAR END OF MODULE.
6. TIE CABLE TO EXISTING HARNESS WITH 19J706152P5.
7. IN SIMULCAST SYSTEM, MOUNT 19C337712G1, 1RU BELOW GETC AFTER MOVING ANTENNA MOUNT DOWN 1 RU. USE 7K0080P33 SPRING NUTS AND 19A1349P1 SCREWS PROVIDED.



DOWNLINK SHELF CONFIGURATION 19D901868G3, 19D438125P12

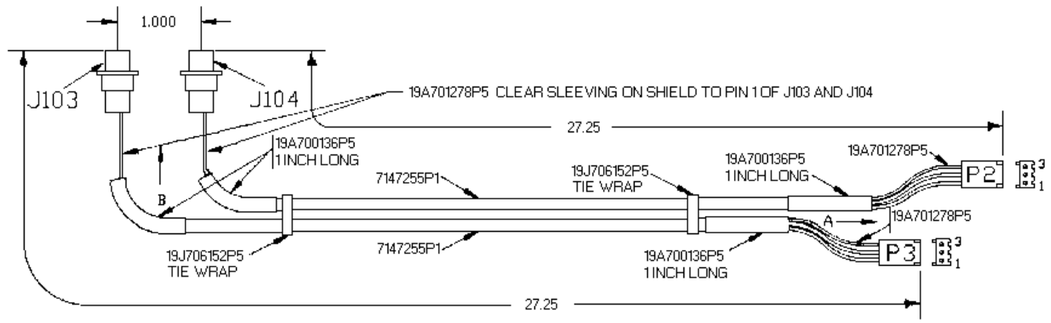
(19D438125, Sh. 3, Rev. 7 19D903536, Sh. 1, Rev. 1)

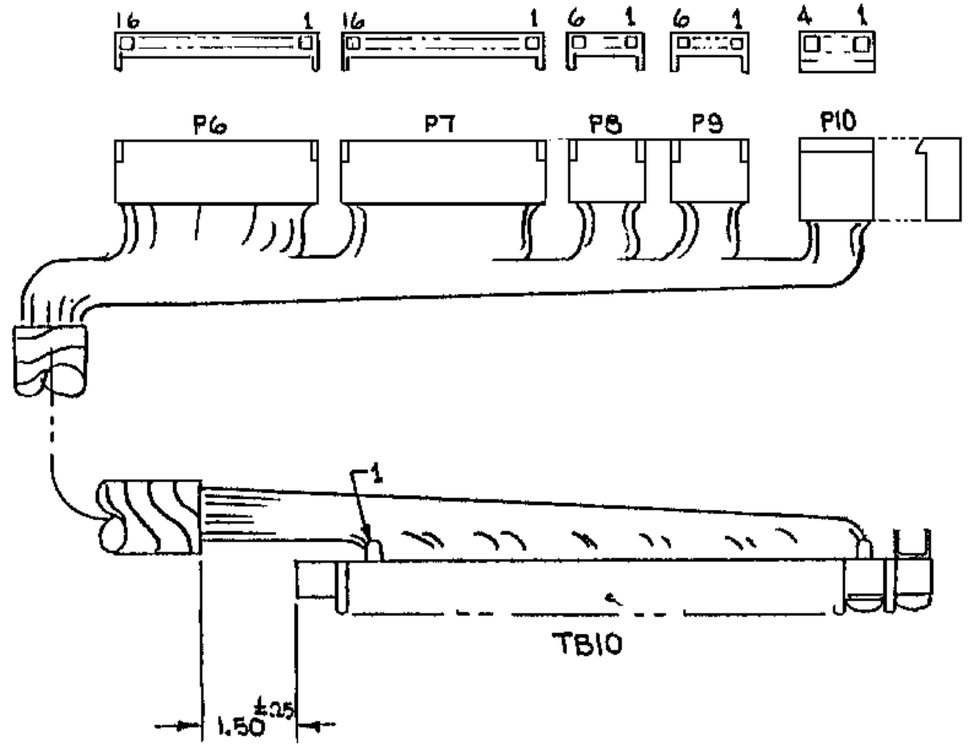




UPLINK SHELF CONFIGURATION
19D901868G3, 19D902535P5

(19D902535, Sh. 4, Rev. 9)





DOWNLINK AND UPLINK
CABLES AND HARNESS
19B234809G3, 19C336863G1,19C337712G1

(19B234809, Sh.1, Rev 4 19D904442, Sh. 1, Rev 0 19C336863, Sh. 1, Rev 3)