MAINTENANCE MANUAL FOR MASTR III T/R SHELF 19D902839G1

TABLE OF CONTENTS	
	Page
SPECIFICATIONS	2
DESCRIPTION	2
BACKPLANE BOARD	2
INTERFACE BOARD	2
SYSTEM MODULE	2
POWER MODULE	3
HARNESS	3
SYSTEM OPERATION	3
CHANNEL GUARD	
Tone Channel Guard	
Digital Channel Guard	
BATTERY ALARM TONE	3
MORSE CODE ID	3
DC REMOTE CONTROL	3
Control Current Signalling	4
Transmit Functions	4
Channel Guard Monitor	4
Repeat Function	4
Auxiliary Receiver	5
TONE REMOTE CONTROL	5
Function Tones	5
Tone Remote Functions	5
Repeat Enable (disable)	6 6
Channel Guard Enable (disable)	6
One-Four Frequencies	6

Ericsson Inc. Private Radio Systems Mountain View Road Lynchburg, Virginia 24502 1-800-528-7711 (Outside USA, 804-528-7711)



Printed in U.S.A.

TABLE OF CONTENTS (CONT)

Transmit Functions	
Intercom Function	
Auxiliary Receiver	
Scan Function	
REPEAT FUNCTION	
Carrier Control Timer	
Drop-Out Delay Timer	
PROGRAMMING	
PROGRAMMABLE FEATURES	
Enable (disable) Parameters	
System Parameters	
SYSTEM INTERFACES	
TRANSMITTER SYNTHESIZER	
RECEIVER SYNTHESIZER	
RECEIVER INTERFACES	
GETC INTERFACES	
STATION POWER SUPPLY	
Power Supply Inputs	
Power Supply Module Outputs	
CONTROLS AND INDICATORS	
Controls	
Indicators	
Local MIC Interface	
Line Interface	
Programming/Diagnostics Serial Port	
Miscellaneous Interfaces	
CIRCUIT ANALYSIS	
INTERFACE BOARD	
Line Interconnect	
DC Control	
E & M Signalling	
Audio Amplifier	

TABLE OF CONTEN

Serial Communications	10
PA Control Functions	10
PA Fan Controller	10
Flag Status Register	10
Output Register	11
Microphone/Handset Interface	11
Circulator Connector	11
Squelch Adjustment	11
Relay Options (SXSU3D)	11
T/R SHELF ALIGNMENT	11
MAINTENANCE	11
STATION METERING	11
Returning the MASTR III station	11
800 MHz stations	11
UHF stations	11 12
	12
PARTS LIST	12
PRODUCTION CHANGES	13
IC DATA	14
ASSEMBLY DIAGRAM	15
OUTLINE DIAGRAM	
T/R SHELF BACKPLANE (A1)	16
T/R SHELF INTERFACE BOARD (A2)	22
T/R SHELF INTERFACE BOARD (A2), REV. C & LATER	23
SCHEMATIC DIAGRAM	
T/R SHELF BACKPLANE (A1)	17
T/R SHELF INTERFACE BOARD (A2)	24
INTERCONNECTION DIAGRAM	20
T/R SHELF BACKPLANE (A1), Sh. 1	20
T/R SHELF BACKPLANE (A1), Sh. 2	21
	-

Copyright © March 1992, Ericsson GE Mobile Communications Inc.

LBI-38637F

NTS	(CONT)

SPECIFICATIONS*

POWER Input Voltage Current Drain	13.8 Vdc nominal (20%)4 Amperes maximum
AUDIO RESPONSE Receiver To Line	+1, -3 dB from -6 dB per octave response for 300 to 3000 Hz referenced to 1 kHz
Line to Transmitter	+1, -3 dB from -6 dB per octave response for 300 to 3000 Hz referenced to 1 kHz
Receiver To Speaker	+2, -8 dB from -6 dB per octave response for 300 to 3000 Hz referenced to 1 kHz
Line Output Level	-19 dBm to +11 dBm
Line Input Level	-19 dBm to +11 dBm
LINE LOOP IMPEDANCE	11K ohm maximum (8k ohm line, and 3K ohm matching)
LINE TERMINATING IMPEDANCE	600 ohms
NOTCH FILTER RESPONSE	-45 dB @ 2175 Hz
CARRIER CONTROL TIMER	Programmable from zero to 10 minutes
DROP-OUT DELAY TIMER	Programmable from zero to 10 seconds
OPERATING TEMPERATURE	-30° C to +60° C (-22° F to 140° F)
DISTORTION	Less Than 2%
SERVICE SPEAKER	1 watt into 8 ohms
PANEL DIMENSIONS (H x W)	8.75 x 19.0 inches (5 Rack Units)

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

DESCRIPTION

The MASTR III station control electronics are designed for dc/tone remote, remote/repeater, or repeater only applications. The station control electronics, also referred to as the Control Section, consists of a Backplane Board, Power Module, System Module, and an Interface Board. The backplane also connects the RF Section which consists of the Receiver Synthesizer Module, Receiver Front End Module, Receiver IF Module, and the Transmit Synthesizer Module. The Control Section and the RF Section combine into one assembly to form the T/R Shelf.

The Power Module, System Module, and the Interface Board connect to the backplane and thus to one another via 96 pin connectors. The Control Section contains five backplane slots with 3 presently unused. The Interface Board provides interconnection for a local microphone or handset, RS-232 programming or diagnostics, transmitter PA control, transmitter PA fan, auxiliary function relays, optional antenna switch, and optional circulator. Two connectors (terminal block and modular phone) are provided for telephone line connections to the MASTR III Station. Additional connectors are provided on the backplane for connection to GETCs used with systems such as EDACS, VOICE GUARD, GE-MARC, etc.

The Control Section uses programmable microcomputer technology to control the base station's transmitter, receiver, and audio processor. The System Module contains a Digital Signal Processor (DSP) Module used for audio processing and tone generation and detection. The basic Control Section can provide one or two transmit and receive frequencies in DC control applications, and up to four transmit and receive frequencies in tone control applications. Options pro-vided by the Control Section include a transmitter drop-out delay (DOD) timer, Carrier Control Timer (CCT), Channel Guard, and Squelch Operated Relay output (SOR). Additional station options include:

- Battery alarm tone
- Type 90 or DTMF tone decoding
- 2/4 wire audio
- Morse code station identification
- Auxiliary control

BACKPLANE BOARD

The Backplane Board (A1), 19D902947G1 (see Assembly Diagram 19D902839 sheet 1), is a purely passive printed wiring board (pwb) that mounts to the T/R shelf 19D902839G1. The backplane is functionally and physically segmented into two sections. When viewed from the front, the four slots to the left

front of the station):

- Aux 1
- Aux 2
- Aux 3

INTERFACE BOARD

SYSTEM MODULE

The System Module 19D902590G3 contains all audio processing and control electronics. The System Module is equipped with a DSP board that rides "piggyback" on the 19D903771G1 System Board. Refer to Maintenance Manual LBI-38764 for complete information on the System Module.

connect the RF Modules. The five slots on the right connect the Control Section modules. The horizontal slot above the five Control Section slots is occupied by the Interface Board (A2). The slots are assigned as follows from left to right (as viewed from the

• Transmitter Synthesizer Module (19D902780)

• Receiver Synthesizer Module (19D902781)

• Receiver Front End Module (19D902782)

• Receiver IF Module (19D902783)

• System Module (19D902590)

• Power Module (19D902589)

The Interface Board (A2), 19D902975G1 (see assembly Diagram 19D902839 sheet 1), mounts horizontally above the 5 backplane slots of the Control Section. The Interface Board provides the following functions:

• Rx and Tx Synthesizer loading

• Telephone line interface with current level detection for remote control

Audio PA for local speaker

• Transmitter power output level and control

• Manual adjustment with front panel access of receiver squelch and local speaker volume

• LED indication of PA Alarm

 Various connectors including RS232 programming port and Mic/Handset port.

• Alarm and monitor junctions of PA output power for MASTR III EDACS applications.

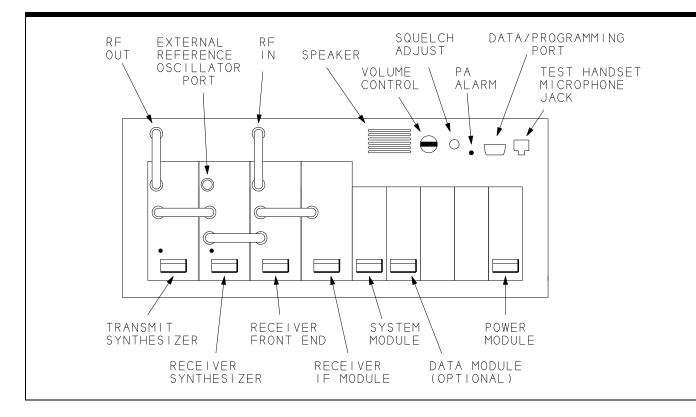


Figure 1 - T/R Shelf Layout

POWER MODULE

The Power Module 19D902589G2 contains switching regulators for the +5V, +12V, and -12V DC supplies. The output of the +12V and -12V supplies are further regulated to provide +5V and -5V required by the analog components. See Maintenance Manual LBI-38752 for complete information on the power module.

HARNESS

Station wiring for the MASTR III Base Station has been minimized due to the modular architecture. However, a small amount of wiring is necessary for interconnection of some station components. All cables connecting to the Control Section of the T/R Shelf terminate at the Interface Board. See LBI-38636 for Application Drawings and Interconnection Drawings for identification of these cables.

SYSTEM OPERATION

The MASTR III T/R Shelf can be programmed for operation as a DC remote, tone remote, remote re-peater, or repeater only application.

The T/R Shelf control section is equipped with control and status indicators for test purposes. The controls allow the service technician to disable the transmit function, simulate a remote PTT

to open up the line, select the station Channel Guard monitor function, and reset the T/R Shelf.

Status indicators available in the T/R Shelf control section include transmit, transmit disable, and CG mon-itor indicators.

There are several common options available for use in the T/RShelf that are applicable to DC remote control, tone remote control or repeater applications. These options are described in the following paragraphs.

CHANNEL GUARD

There are two types of Channel Guard (CG) available: tone and digital. The T/R Shelf can decode either tone or digital CG information from received audio, and can generate CG tones or digital codes for transmission.

One of many CG tones can be programmed into the T/R Shelf through the personality EEPROM. Different CG tones can be used for decode and encode. The T/R Shelf can be programmed for encode only CG, decode only CG, or to both encode and decode CG.

In addition, both digital codes and tone codes can be used in a station. For example, the station receiver can be programmed for tone codes, and the transmit frequency programmed for a digital code.

Prior to any transmission, the CG monitor function can unmute the receiver when any on-frequency signal is received, allowing all on-frequency activity to be mon-itored.

When in the MONITOR mode, the transmitter is activated only if programmed as a repeater, and the proper CG information (tone or digital CG) is present. The monitor function is activated by the local CG Mon-itor switch, or by a remote console.

Tone Channel Guard

Standard CG tone frequencies range from 67 Hz to 210.7 Hz (see Table 1). Extended CG tones are available, but can cause some degradation in specifications.

The T/R Shelf detects a 135-degree phase shift in the CG tone to determine when to mute the receiver in order to eliminate the squelch tail (STE). In addition, the T/R Shelf generates a 135-degree phase shift in the CG tone, and continues to send the phase shifted CG tone for 160 milliseconds after the transmitter is unkeyed (PTT button released).

NOTE —

- 1. Do not use 179.9 Hz or 118.8 Hz in areas served by 60 Hz power distribution systems (or 100.0 Hz or 151.4 Hz in areas supplied with 50 Hz power) Hum modulation of co-channel stations may "false" Channel Guard decoders.
- Do not use adjacent Channel Guard tone frequen-2. cies in systems emplying multiple Channel Guard tones. Avoid same-areas co-channel use of adjacent Channel guard tones whenever possible. As stated in EIA Standard RS-220, there is a possibility of decoder falsing.
- To minimize receiver turn-on time delay, espe-3. cially in system using Channel Guard repeaters or receiver voting, choose the highest usable Channel Guard tone frequency. Do not use tones below 100 Hz when it is necessary to meet the receiver response time requirements of EIA Standard RS-220.

Digital Channel Guard

The T/R Shelf also encodes and decodes digital CG. There are 83 digital codes available. Any of the digital codes can be assigned to any of the transmit or receive channels. A list of the octal codes (and their equivalent codes) is shown in Table 2.

The encoding function provides continuous, repetitive digital word modulation to the transmitter. The decode function controls receiver muting to eliminate all calls that are not digitally coded with the assigned CG code.

BATTERY ALARM TONE

Whenever the station is operating on battery stand-by power, the station power supply applies a battery standby signal to the T/R Shelf. The T/R Shelf then generates a 1200 Hz alert tone and adds it to the transmit audio for transmission. The 1200 Hz tone is also sent down the line to any remote control unit in the system.

– NOTE –

The station has to be keyed or unsquelched for the alarm tone to be heard at the remote control unit.

The repetition rate and on-time rate are programmable through the personality **EEPROM**. The repetition rate sets the time from the beginning of a tone to the beginning of the next tone, and is programmable from zero (0) to 25 seconds in increments of 1 second. The on-time rate sets the duration of the tone burst, and is programmable from zero (0) to one (1) second in increments of 0.1 second.

If the battery standby signal is not connected to the input of the T/R Shelf, the option must be disabled in the T/R Shelf personality to prevent alarm tones from being generated.

MORSE CODE ID

Morse code identification can be programmed into the T/R Shelf personality. The code is transmitted according to FCC publication 47 CFR, Chapter 1 (10-1-87 Edition), paragraph 90.425 for non-trunked communications; and paragraph 90.380 for trunked communications. Up to 12 characters in only one word can be programmed into the T/R Shelf. This feature can be enabled or disabled in the programming, as required.

A 5 second transmitter quiet time is required before starting the Morse code sequence. A 1000 Hz tone is used, with an element time of 50 milliseconds for 20 word-per-minute transmissions. The Morse code ID is sent every interval time. The interval time is programmable, but defaults to every thirty minutes. The ID may be programmed to be transmitted either with or without Channel Guard.

DC REMOTE CONTROL

The T/R Shelf can be remotely controlled by DC control currents. A Block Diagram of a T/R Shelf with a remote interface is shown in Figure 2. Refer to the INSTALLATION section as listed in the Table of Contents of this Manual for the different methods of connecting a DC remote control unit to the T/R Shelf.

A DC remote control unit can initiate a transmission. listen to received audio, and select or deselect certain T/R Shelf functions. The different current levels used and the control functions are described below.

			Ta	ble 1 - Stan	dard Tone	Frequencie	es (Hz)			
67.0	71.9	74.4	77.0	79.7	82.5	85.4	88.5	91.5	94.8	97.4
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	203.5	210.7
1. Do no	t use 179.9 Hz	or 118.8 Hz in	areas served b	by 60 Hz powe	er distribution	systems (or 10	0.0 Hz or 151.4	Hz in areas s	upplied with 5	0Hz power).

Hum modulation of co-channel stations may "false" Channel Guard decoders.

Do not use adjacent Channel Guard tone frequencies in systems employing multiple Channel Guard tones. Avoid same-areas co-channel use of adjacent Channel Guard tones whenever possible. As stated in EIA Standard RS-220, there is a possibility of decoder falsing.

To minimize receiver turn-on time delay, especially in system using Channel Guard repeaters or receiver voting, choose the highest usable Channel Guard tone frequency. Do not use tones below 100 Hz when it is necessary to meet the receiver response time requirements of EIA Standard RS-220.

Table 2 - Digital Channel Guard Codes

PRIMARY CODE	EQUIVALENT CODE	PRIMARY CODE	EQUIVALENT CODE	PRIMARY CODE	EQUIVALENT CODE
023	340 766	251	236 704 742	632	123 657
025		261	227 567	565	307 362
026	566	263	213 736	654	163 460 607
031	374 643	265	171 426	662	363 436 443 444
032		271	427 510 762	664	344 471 715
043	355	306	147 303 761	703	150 256
047	375 707	311	330 456 561	712	136 502
051	520 771	315	321 673	723	235 611 671
054	405 675	331	372 507	731	447 473 474 744
065	301	343	324 570	732	164 207
071	603 717 746	346	616 635 724	734	066
072	470 701	351	353 435	743	312 515 663
073	640	364	130 641	754	076 203
074	360 721	365	107	036	137
114	327 615	371	217 453 530	053	
115	534 674	411	117 756	122	535
116	060 737	412	127 441 711	145	525
125	173	413	133 620	212	253
131	572 702	423	234 563 621 713	225	536
132	605 634 714	431	262 316 730	246	542 653
134	273	432	276 326	252	661
143	333	445	222 457 575	255	425
152	366 415	464	237 642 772	266	655
155	233 660	465	056 656	274	652
156	517 741	466	144 666	325	550 626
162	416 553	503	157 322	332	433 552
165	354	506	224 313 574	356	521
172	057	516	067 720	446	467 511 672
174	142 270	532	161 345	452	524 765
205	135 610	546	317 614 751	454	513 545 564
223	350 475 750	606	153 630	455	533 551
226	104 557	612	254 314 706	462	472 623 725
243	267 342	624	075 501	523	647 726
244	176 417	627	037 560	526	562 645
245	370 554	631	231 504 636 745		

Control Current Signalling

Control current signalling from a DC remote control unit consists of applying different current levels on a wire pair having DC continuity. The six control current levels used in the remote T/R Shelf are:

- 11 milliamperes
- 6 milliamperes
- -2.5 milliamperes
- 0 milliamperes

Station functions which can be controlled by these control currents are:

- Repeater Disable
- Channel Guard Monitor
- Transmit Frequency Selection
- Receive Frequency Selection
- Scan
- Receiver Selection (Auxiliary Receiver selection)

See Table 3 for a list of DC Control Currents and their corresponding functions.

Channel Guard Monitor

The requirement for correct CG tones to initiate a repeat of received signals is not removed when the CG Monitor function is activated. This allows received audio to be passed down the line to a remote control unit regardless of CG content, allowing the remote operator to monitor all frequency activity prior to transmitting. This function is automatically reset when a remote control unit keys the transmitter.

Repeat Function

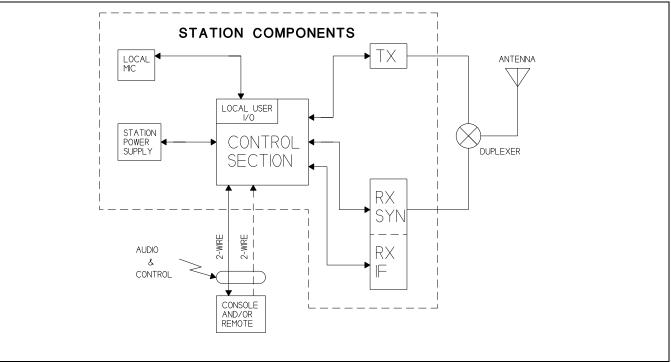


Figure 2 - DC/Tone Remote, DC/Tone Remote/Repeat

Transmit Functions

When a transmit frequency select control current is received from a remote, the T/R Shelf initiates a transmission of received line audio on the selected transmit frequency. The transmission continues until the transmit control current is no longer detected.

When the CG Monitor function control current is received from a remote control unit, the T/R Shelf does not require the correct CG before unmuting the receiver.

When the T/R Shelf receives a repeater disable control current, it disables the repeater function if the repeater function was previously enabled. If the repeater functiomnhas been disabled, a repeater disable control current will enable the repeater. When the repeat function is enabled, the base station re-transmits the

FUNCTION CONTROL CURRENT IN MILLIAMPS +11-11 -2.5 0 +6-6 1 FREQ TX 1 FREQ RX RECEIVE TRANSMIT 2 FREQ TX 2 FREQ RX RX-F2 TX-F1 TX-F2 RX-F1 2 FREO TX SCAN 2 FREQ RX TX-F1 TX-F2 WITH SCAN RX-F1 RX-F2 1 FREQ TX CG RECEIVE TRANSMIT 1 FREQ RX DISABLE WITH CG WITH CHANNEL **GUARD DISABLE** 2 FREQ TX 2 FREQ RX RX-F2 RX-F2 RX-F1 RX-F1 WITH CHANNEL CG WITH CG TX-F1 TX-F2 WITH GUARD DISABLE DISABLE CG DISABLE CG REPEATER REPEATER RECEIVE TRANSMIT DISABLE DISABLE REPEATER REPEATER REPEATER CG RECEIVE **DISABLE &** DISABLE TRANSMIT CHANNEL & CG DISABLE DISABLE WITH GUARD DISABLE DISABLE CG RX-F1 1 FREO TX **2 SEPARATE** & TRANSMIT RECEIVERS RX-F2 RX-F1 RX-F2 (AUX RX)

Table 3 - DC Control Currents and Functions

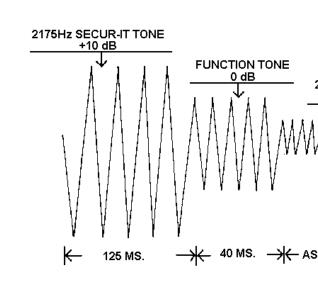
TONE REMOTE CONTROL

In tone remote applications, the T/R Shelf uses its Digital The frequency of the "Function" tone determines the func-Signal Processor (DSP) to interface with a tone remote control tion selected by a tone remote control unit. "Function" tones unit through a two- or four-wire phone line. A Block Diagram range from 1050 Hz to 2050 Hz, and are spaced 100 Hz apart. of the T/R Shelf remote interface is shown in Figure 2.

A tone remote control unit can initiate a transmission, listen to received audio, and select or deselect T/R Shelf functions. Functions selected by the different available tones can be programmed so that a 1450 Hz "Function" tone, for example, can be used for different functions in different control shelves.

Signalling from a tone remote control unit consists of a high level "Secur-it" tone, followed by the appro-priate medium level "Function" tone (as well as a "Hold" tone if the transmitter is keyed). The tone control sequence is shown in Figure 3.

The "Secur-it" tone is $a+10 \, dB$, 2175 Hz tone that is present for 125 milliseconds. The "Secur-it" tone is followed by a 40 millisecond, 0 dB "Function" tone. The "Function" tone can be followed by a -20 dB, 2175 Hz "Hold" tone if PTT is selected. The "Hold" tone is present as long as the PTT is pressed.



received (incoming) signal when a valid CG tone or code is present. When the repeat function is disabled, the T/R Shelf does not initiate transmission of received signals.

Auxiliary Receiver

With an auxiliary receiver connected to the T/R Shelf using wiring harness 19B802398P1, audio from this auxiliary (second) receiver may be routed to the telephone line connecting a remote control unit. A separate 600 ohm balanced output is also provided by the second receiver for applications requiring audio at a second remote location.

A remote control unit may apply DC control currents to select which receiver audio is heard at the remote as listed below:

- Main receiver audio only, 1.
- 2. Auxiliary receiver audio only, or
- 3. Both main receiver and auxiliary receiver audio.

For Channel Guard applications, CG Monitor monitors the traffic on the auxiliary receiver frequency and the main receiver frequency.

Figure 3 - Tone Control Sequence

Function Tones

Tone Remote Functions

Station functions that can be controlled by tone signalling from a remote control unit are:

- Repeater Enable (disable)
- Channel Guard Decode Enable (disable)
- Channel Guard Monitor
- Transmit Frequency Selection
- Receive Frequency Selection
- Scan
- Receiver Selection (Auxiliary Receiver selection)
- Auxiliary Output Enable (disable) (Auxiliary Control)

See Table 4 for a list of "Function" tones and their corresponding function.

2175Hz TRANSMIT HOLD TONE - 20 dB WWWWWWWW/

- + 40 MS. + AS LONG AS PTT SWITCH DEPRESSED →

Table 4 - Tone Control Function and Frequency

FUNCTION	TONE
RX Channel Guard Disable (Reset by PTT)	2050 Hz
TX-Freq. No. 1	1950 Hz
TX-Freq. No. 2	1850 Hz
TX-Freq. No. 1 or Receiver No. 1	1750 Hz
TX-Freq. No. 2 or Receiver No. 2	1650 Hz
Channel Guard Decode On or Repeater Enable*	1550 Hz
Channel Guard Decode Off or Repeater Disable*	1450 Hz
TX-Freq. No. 3 or Aux. Function 1 On	1350 Hz
TX-Freq. No. 4 or Aux. Function 1 Off	1250 Hz
Repeater Enable*	1150 Hz
Repeater Disable* or Scan or Simultaneous Monitor	1050 Hz
* Repeater Enable (disable) is 1150/1050 only Channel Guard Op/Off is present	y when

Channel Guard On/Off is present.

Repeat Enable (disable)

When a repeater enable (disable) "Function" tone is received on the line from a remote, the T/R Shelf enables (disables) the repeater function. When the repeat function is disabled, the T/R Shelf will not initiate a re-transmission of received signals. However, the audio is still routed to the remote control unit if the transmitter is not keyed.

Channel Guard Monitor

When a CG Monitor "Function" tone is received from a remote control unit, received audio is sent down the line to a remote control unit and the local speaker regardless of CG content. This allows the operator to monitor all frequency activity prior to transmitting. The requirement for a correct CG tone or code to initiate a repeat of received signals is NOT removed.

The monitor function is disabled when a remote control unit keys the transmitter.

Channel Guard Enable (disable)

This function is the same as CG Monitor except that the Monitor function is not deselected by a remote PTT. The Monitor function is deselected only by a CG enable "Function" tone.

One-Four Frequencies

The T/R shelf receives "Function" tones to select one of four channels (frequencies). The Control Section then loads the Tx and Rx synthesizers with a 32 bit serial word that contains the appropriate frequency information.

Transmit Functions

When a transmit frequency select "Function" tone is received from a remote, the T/R Shelf filters out the "Hold" tone and initiates a transmission of received line audio. The transmission continues until the "Hold" tone is no longer detected.

Intercom Function

The T/R Shelf intercom function allows a service technician at the station to communicate with a remote control unit without keying the transmitter.

When no valid signal is present, the T/R Shelf routes the line audio to the local speaker. A remote control unit can then select the intercom function and send audio (no control tones) over the line. This remote audio will be heard only at the station speaker, and will not be transmitted.

The service technician can communicate with the remote control unit by placing the T/R Shelf transmit disable switch in the disable position. The local microphone at the station can then be keyed and audio sent only down the remote lines to the remote control unit. This audio is not transmitted by the station.

While in the intercom mode, receiver audio will continue to have priority over line audio to the local speaker, and local (station) mic audio will have priority over receiver audio to the remote line.

Auxiliary Receiver

A remote control unit can control the state of the RX 2 MUTE output line using "Function" tones. The "Function" tones allow the T/R Shelf to send the main receiver audio only, the auxiliary receiver audio only, or both the main receiver and auxiliary receiver audio output to a remote control unit.

Scan Function

The scan function allows the user to scan multiple frequencies using the station receiver.

When no signal is being received on any channel, the scan function sequentially selects and monitors each channel. If a signal is detected, the T/R Shelf locks onto the channel for the duration of the message and discontinues scanning. The default sample time for each channel is 80 milliseconds. A channel with the receiver unsquelched will be locked on.

REPEAT FUNCTION

The T/R Shelf performs a basic repeat function in which received signals are re-transmitted after filtering and level adjustments. Figure 4 is a block diagram of the T/R Shelf interface in a repeat only system.

Received signals are applied to the VOL/SQ HI line from the receiver, and are routed to the transmitter on the TX AUDIO OUT line for re-transmission. If Channel Guard is present, the received Channel Guard information is filtered out and the transmit Channel Guard, if enabled, is encoded and summed with received audio and then re-transmitted.

Some repeater stations have timing restraints mandated by the FCC. Two timing circuits are available for use in these applications. The timing circuits are a Carrier Control Timer (CCT), and a Drop-out Delay Timer (DOD).

Carrier Control Timer

The Carrier Control Timer (CCT) limits the time the station transmitter remains keyed for a single transmission. The time limit can be preprogrammed from zero (0) seconds to 600 seconds (10 minutes) in one-second steps. All control shelves equipped with the CCT are shipped with the timer programmed for three minutes.

NOTE

Timing restraints apply to local and remote transmissions as well as the repeat function. Local, remote, and repeat PTT timers are each programmed separately and are completely independent timers.

The timing cycle begins when the transmitter is keyed by pressing the PTT button on the local microphone, or the PTT button of a remote or mobile radio generating the signal, activating the repeater. If the station is equipped with Channel Guard, the remote signal must contain the proper Channel Guard tone. Timing ends and the timer is reset when the transmitter is unkeyed.

other keying source.

Drop-Out Delay Timer

In repeater applications, the Drop-Out Delay Timer (DOD) is designed to decrease the number of transmitter on/off cycles. This is achieved by keeping the transmitter keyed for a predetermined period after a repeat transmission has ended. This period can be programmed for zero (0) to ten (10) seconds in 100-millisecond (0.1 second) steps. All stations equipped with the DOD are shipped from the factory with the timer set for three seconds.

The timer starts whenever a repeat transmission ends. The transmitter is not de-energized through the TX OSC CONTROL and ANT RELAY outputs until the timer runs out.

If a new transmission is initiated before the timer runs out, the transmitter remains energized and the new transmission completed. If no new transmission is initiated, the transmitter will remain on until the DOD times out.

PROGRAMMING

All input and output levels to/from the Control Section are adjusted by electronic potentiometers. These potentiometers are adjusted by the Utility Handset SPK9024 connected to the Mic/Handset port or by a personal computer (PC) connected to the Programming/Diagnostic port, both accessible from the front of the T/R shelf.

The T/R shelf contains an Electrically Erasable Programmable Read Only Memory (EEPROM) whose contents define the personality of the station. The contents of this EEPROM may only be modified through the handset or by running the appropriate software and a PC connected to the programming port.

If the timing limit is exceeded, the T/R Shelf will turn off the transmitter through the ANT RELAY and TX OSC CONTROL outputs. The Carrier Control Timer function is reset whenever a PTT switch is released, whether it is at the remote control unit or

Whenever the timing cycle is exceeded by a repeat PTT, the stations will not activate another repeat until the PTT is released from any source. However, the T/R Shelf will re-transmit from another source (such as a remote control unit) whenever the time limit has expired on a repeat PTT.

— NOTE –

The Drop-Out Delay Timer is used primarily for repeater functions. Other transmissions, including those originating from the local microphone, typically do not use a DOD timer.

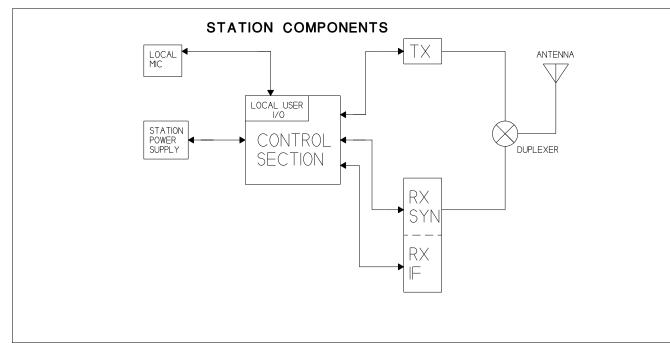


Figure 4 - Repeat Only

For complete instructions on the station personality definitions see TQ-3353, Programming Manual and software for MASTR III. If the T/R Shelf has not been programmed or has lost its personality, it must be reprogrammed.

PROGRAMMABLE FEATURES

The T/R Shelf personality programming parameters include:

Enable (disable) Parameters

- Channel Guard Encode (per channel)
- Channel Guard Decode (per channel)
- STE (Encode) (per channel)
- Repeat Function (per channel)
- CCT (per channel)
- DOD Timer (per channel)
- Simplex/Duplex (per channel)
- Auxiliary Control
- Scan
- Battery Alarm Tone
- DC Remote

- Tone Remote
- 2nd Receiver Simplex (per channel)
- Morse code parameters (per channel)
- Circulator
- Logic Standby
- Intercom
- External Reference Oscillator
- Sidetone

System Parameters

- DSP Line In
- DSP Line Cancellation
- DSP Compressor Gain
- Two/Four Wire Remote
- Battery Alarm Tone "on time"
- Battery Alarm Tone
- Battery Alarm Repetition Rate
- Morse Code ID (per channel)
- Morse Code ID Interval (per channel)

- Morse Code Wait Time (per channel)
- Morse Code Transmit Level
- Line Out level
- Line In level
- Transmit Audio output level (per channel)
- Channel Guard output level (per channel)
- Channel Guard Encode Frequency (per channel)
- Channel Guard Decode Frequency (per channel)
- Type 90 Decode
- Carrier Control Time (per channel)
- Drop-out Delay Time (per channel)
- DTMF Decode
- Transmitter Frequency (per channel)
- Receiver Frequency (per channel)
- Repeat Audio Output Level
- Reference Frequency
- DSP Repeater Gain
- DSP Compressor Threshold
- PA Power Level (per channel)
- Auxiliary 1 Relay Power Up Default State

SYSTEM INTERFACES

This section contains a description of the interfaces to the Control section, transmitter, receiver and operator. Also, interfaces to the GETC board, programming/diagnostics serial port and other miscellaneous interconnections are described.

TRANSMITTER SYNTHESIZER

TRANSMIT AUDIO HI - The Control Section drives the Transmit Synthesizer with this AC coupled signal. The backplane provides the necessary connection.

TRANSMIT AUDIO LO - The common line for the TRANSMIT AUDIO HI output. It is grounded at the T/R Shelf.

TX OSC CONTROL (PA KEY) - The Control Section generates this digital control signal which keys the RF Power

Amplifier. The backplane routes this signal to the PA via connections on the Interface Board.

SERIAL_CLK - This digital signal provides a clock for loading the Tx and Rx Synthesizers. This signal originates at the System Module and is routed by the backplane to the RF Section and the Interface Board.

RXF4/AUX2 - This digital signal provides DATA for loading the Tx and Rx Synthesizers. RXF4/AUX2 originates at the System Module and is routed by the backplane to the RF Section and the Interface Board.

RXF2 - This digital signal provides an ENABLE pulse to the Tx and Rx Synthesizers. RXF2 originates at the System Module and is routed by the backplane to the RF Section and the Interface Board.

TXF1,TXF2,RXF1 - These digital signals provide addresses A0, A1, and A2 for the Tx and Rx Synthesizers. These signals originate at the System Module and are routed by the backplane to the RF Section and the Interface Board.

RECEIVER SYNTHESIZER

SERIAL_CLK - This digital signal provides a clock for loading the Tx and Rx Synthesizers. This signal originates at the System Module and is routed by the backplane to the RF Section and the Interface Board.

RXF4/AUX2 - This digital signal provides data for loading the Tx and Rx Synthesizers. RXF4/AUX2 originates at the System Module and is routed by the backplane to the RF Section and the Interface Board.

RXF2 - This digital signal provides an enable pulse to the Tx and Rx Synthesizers. RXF2 originates at the System Module and is routed by the backplane to the RF Section and the Interface Board.

TXF1,TXF2,RXF1 - These digital signals provide addresses A0, A1, and A2 for the Tx and Rx Synthesizers. These signals originate at the System Module and are routed by the backplane to the RF Section and the Interface Board.

INT_OSC - This digital signal is an output from the Interface Board. The Receiver Synthesizer uses to signal to select either the internal or external reference oscillator. A logic high selects the internal reference oscillator.

RECEIVER INTERFACES

VOL SQ HI - Audio from the station receiver is output on this line. The audio range is from 0 to 1.5 Volts rms. This output can consist of audio, Channel Guard, or data.

VOL SQ LO - This is the common line for the VOL SQ HI input. It is grounded in the T/R Shelf.

CAS (Carrier Activity Sensor) - A TTL high on this input indicates an on-frequency signal is being received. A TTL low on this input indicates an on-frequency signal is not being received. This input is independent of the presence of a proper CG tone.

RX 1 MUTE - The T/R Shelf presents a low (≤ 0.3 Vdc @ \leq 30 milliamperes) on this open collector output when the audio from receiver one is muted.

AUX RX MUTE - The T/R Shelf presents a low (≤ 0.3 Vdc $@ \leq 30$ milliamperes) on this open collector output when the audio from receiver two is muted. This output is only used when an auxiliary receiver is connected to the T/R Shelf through the SECOND RCVR input.

INTERCOM AUDIO - If an on-frequency signal is present, and the receiver is not muted (**RX 1 MUTE** = open collector), de-emphasized audio with no CG present is routed to this output.

If the receiver is muted, the local microphone not keyed, and no RF signal, "Secur-it" tone or "Function" tone is present, audio received from the line is routed to the INTERCOM AUDIO output.

RUS IN - This RUS output from the second receiver indicates to the T/R shelf that the second receiver is unsquelched with the proper channel guard.

CG MON - This output from the T/R shelf to the second receiver causes the second receiver to drive its' audio output whenever it receives an on-frequency signal of sufficient strength to unsquelch the receiver (RUS is active).

2ND RCVR - This T/R shelf input is driven by the second receiver's line driver monitor output. Using this output instead of the balanced 600 ohm output allows the audio from the second receiver to drive both the remote line pair in addition to a seperate line pair at another remote site.

GETC INTERFACES

RCVR VOL/SO HI - Receiver audio is routed to the GETC for recovery of 9600 bps digital data and recovery of 150 bps subaudible signalling data.

LINE A, LINE B - This 600 ohm balanced pair from the GETC connects to the T/R Shelf transmit pair telephone line. This provides a 9600 bps downlink from the GETC to a second remote GETC.

DPLX LINE A, DPLX LINE B - This 600 ohm balanced pair to the GETC connects to the T/R Shelf receive pair telephone line. This provides a 9600 bps uplink from a remote GETC to the station's GETC.

DELAYED PTT IN - When active this GETC output keys the station's transmitter.

TX CG EN - This GETC output is only used in Voice Guard End-to-End stations. When a guarded transmission is done, the GETC pulses the 1950 DIS line. The station then mutes the 1950 Hz voting tone. The GETC should then activate the TX CG EN line. If it does not activate it within a second of pulsing the 1950 DIS, the voting tone will come back on.

DETECT DIS - This T/R Shelf input from the GETC signals the T/R shelf whether receive audio or high speed data should be transmitted.

REPEAT PTT IN - This GETC output causes the station to perform a RUS PTT in Voice Guard and is used in back-toback repeater applications to key the transmitter.

VG PTT IN - This open collector output from the T/R shelf is not used.

REPEAT PTT OUT - This T/R shelf output is true when the station is repeating or doing a guarded remote PTT in Voice Guard End-to-End. In the EDACS MASTR III station, this output is active low when the station is configured for EDACS System Module fault alarms and a T/R shelf module is indicating a fault.

GETC DATA - This T/R shelf input from the GETC provides a path to the transmitter for high speed data transmission.

COMB PTT OUT - This T/R shelf output signals to the GETC that the transmitter is keyed by any PTT except for Morse Code. In the EDACS MASTR III station, this output is active low when the station is configured for EDACS System Low PA alarms and the MASTR III PA output power is above a programmable threshold value. The output is high when the PA output power falls below the threshold. The status of this line is read by the GETC during EDACS operation of the station.

LOCAL PTT - This signal is an input to the T/R shelf and the GETC that indicates that PTT on the local mic port is true.

REMOTE PTT OUT - This T/R shelf output is true when a remote PTT function is being executed. However, turning on the REM PTT switch on the front of the System Module will not activate this output.

CAS - This T/R shelf output is driven true when the receiver is unsquelched.

COMB PTT IN - This T/R shelf input is currently not used.

RUS IN - This T/R shelf input is driven true by the GETC's RUS OUT or by an auxiliary receiver when it becomes unsquelched.

CG MONITOR - This T/R shelf output signals to the GETC that the station is operating in Channel Guard Monitor state.

EXT LSD - This T/R shelf input provides a path for subaudible signalling data from the GETC to the transmitter.

1950 DIS - This T/R shelf input from the GETC signals the T/R shelf to mute the 1950 Hz voting tone in Voice Guard End-to-End applications. In Voice Guard Encrypt/Decrypt stations, the 1950 DIS is used to toggle the station between guarded and clear modes.

RX 1 MUTE (SYS RUS OUT) - This T/R shelf output is true when CAS is true along with a valid CG or CG Monitor. In the case of a simplex station, this signal is false during a transmit.

VG MIC HI - This T/R shelf audio output provides a path from the station's mic to the VG-9600 used in Voice Guard applications.

SYS VOL SQ HI - This signal is normally hardwired to RCVR VOL SO HI and is the signal routed to the System Module in the T/R shelf. In Voice Guard Encryp/Decrypt applications, the printed wire trace JP1 on the T/R shelf backplane is cut and SYS VOL SQ HI is driven by the VG-9600 Module.

VG PTT OUT - This T/R shelf output is true during a remote or local PTT, morse code ID, or drop out delay. Active for Voice Guard Encrypt/Decrypt applications only. **Controls**

VG ALERT - This T/R shelf audio input from the VG-9600 provides a path for an alert tone to be heard at the station's local speaker and on the remote line.

VG SQ DSBL - This T/R shelf input is used in Voice Guard Encrypt/Decrypt repeater applications. The VG-9600 activates this input when it detects a valid key.

TXF3/DATA (VG CLR SEL) - This T/R shelf output signals the VG-9600 Module that clear voice is being transmitted. This is done only in Voice Guard Encrypt/Decrypt stations.

stations.

Power Supply Inputs

13.8VDC (A+) -

+5 VDC -

+12V VDC -

-12 VDC -

-5 VDC -

+5VDC

TXF4/ENBL (VG GRD SEL) - This T/R shelf output signals the VG-9600 Module that guarded (encrypted) voice is being transmitted. This is done only in Voice Guard Encrypt/Decrypt

STATION POWER SUPPLY

The station power supply generates a nominal 13.6 Vdc @ 33 Amps, 4 amperes of which are budgeted to the T/R Shelf. 13.8 Vdc is used by the Power Module to provide the regulated voltages for the T/R Shelf. Power is connected to the T/R shelf at the Interface Board which supplies a connector to mate with the station's power supply cable.

Power Supply Module Outputs

Supplies a +12 Vdc 0.6 Vdc output rated at 100 milliamperes.

Supplies a +5 Vdc 0.25 Vdc output rated at 1000 milliamperes.

Supplies a -12 Vdc 0.6 Vdc output at 100 milliamperes.

Supplies a -5 Vdc 0.25 Vdc output rated at 40 milliamperes for T/R Shelf operation only.

Supplies a +5 Vdc 0.25 Vdc output rated at 40 milliamperes for analog circuitry.

CONTROLS AND INDICATORS

- **TX DISABLE -**Activating this switch disables the transmitter by turning off the TX OSC CON-TROL output, and de-energizing the antenna relay. When the transmitter is disabled, the station operates in the intercom mode.
- **REMOTE PTT -**Activating this switch causes the station to react as though a PTT command has been received from a remote.

CG MONITOR -	This switch selects the station Channel Guard Monitor function. When activated, all CG requirements on the receiver portion of the station are removed. This means all received transmissions will be heard re- gardless of their CG contents. However, the transmitter still requires the proper CG to be present before it will repeat the audio.	LOCAL MIC LO	 a nominal 100 millivolt rms audio signal into the T/R Shelf's 600 ohm input impedance through this line. This is the AC reference for the LOCAL MIC HI audio. It is grounded in the System Module. 	functions as a Tx Synthesizer power switch control. The Tx Synthesizer oscillator power is switched off when the station is not transmitting and back on when the station is transmitting. The ANT RELAY signal originates at the System Module and is routed by the backplane to the RF Section and the Interface Board. TX OSC CONTROL (PA KEY) - This digital output gates
	When the CG Monitor function is not activated, the receiver requires the proper CG to be present prior to unmuting and the	GND - <u>Line Interface</u>	This is the ground supply to the micro- phone.	the RF Power Amplifier on and off. TX OSC CONTROL will not become active unless the Tx Synthesizer indicates it is locked onto the programmed frequency. TX OSC CONTROL originates at the System Module and is routed by the backplane
	transmitter requires the proper CG to be present prior to repeating any transmission.	LINE -	Receive audio is sent on this output pair to	to the RF Section.
Indicators			the remote control device. Transmit audio is also received from the remote control on	MASTR III STATUS - This digital output provides data that indicates the status of the RF modules' fault flags. Each of the RF modules routes its fault status indicator (FLAG 0-FLAG
TX -	This LED indicates the transmitter is on.		this line pair if the station is configured for two wire audio. The T/R Shelf has an out- put impedance of 600 ohms, and can drive	4) to the Interface Board. This data is then transmitted to the System Module over the same serial bus that loads the synthe-
CG MONITOR -	This LED indicates the station is in the CG MONITOR mode.		a 600-ohm line with an adjustable signal level from -19 to 11 dBm.	sizers.
TX DISABLE -	This LED indicates the T/R Shelf is in the TX DISABLE mode, and cannot initiate a transmission.	DUPLEX AUDIO	- Transmit audio is received from the remote control on this wire pair in a four wire system.	BATT STBY - A high (22-23 Vdc) on this input indicates the station AC power supply is powering the station. A low on this input indicates the battery backup system is supplying power to the station, and that power should be conserved.
PA ALARM -	This LED indicates that the PA has detected an Alarm condition.	Programming/I	Diagnostics Serial Port	When the transmitter is energized and operating from the battery backup system, the T/R Shelf provides an alert tone in the TX AUD output signal. The alert tone is also heard at the
Local MIC Inte	erface	purpose port that is	ng/diagnostics RS-232 serial port is a multi- s used to communicate with a personality ated test equipment during manufacture and	remote control unit.
LOCAL PTT -	A low (1 volt or less) on this input indicates the local microphone is keyed. The T/R	other system composite the T/R Shelf must	nents. When the Utility Handset is connected, be reset while depressing a volume button.	CIRCUIT ANALYSIS
	Shelf establishes an audio path from the LOCAL MIC HI input to the LINE and TX AUDIO outputs. The T/R Shelf also	uses 300 baud data a	nunication from handset to shelf. The handset and the PC programmer uses 9600 baud data. dset, toggle the RESET switch on the Power	INTERFACE BOARD
	activates the transmitter oscillator and en- ergizes the antenna relay if the transmitter	Module to reset the	serial port to 9600 baud.	Line Interconnect
	has not been disabled by the TX DISABLE switch. Normally, LOCAL PTT is the highest pri-	PGM TXD -	The T/R Shelf transmits 300 or 9600 baud RS-232 data on this line. When the Utility Handset is connected to the auxiliary Inter- face Board, the T/R Shelf must be reset to	Audio and control currents from a remote unit are con- nected to the T/R shelf via TB101 or J101 located on the Interface Board. TB101 is a terminal board and J101 is a 6 pin modular phone jack. TB101 and J101 carry identical pin assign-
	ority PTT function. Local PTT will preempt all other PTT functions including		perform the autobaud function.	ments and are connected in parallel on the pwb.
	REPEAT and REMOTE PTT, and will con- tinue to transmit on the currently selected frequency.	PGM RXD -	The T/R Shelf receives 300 or 9600 baud RS-232 data on this line.	Line audio from the base station to a remote unit is coupled onto the line via transformer T101 over signals LINE_A and LINE_B. T101 is designed for a termination impedance of 600
		<u>Miscellaneous I</u>	<u>nterfaces</u>	ohms, which should be provided by the remote unit. In two wire applications, line audio from the remote unit is coupled to the

LOCAL MIC HI - This input line is DC biased at +12 Vdc by the station T/R Shelf to supply power to the microphone. The microphone AC couples **ANT RELAY** - This digital output controls the antenna switch in stations so equipped. This output becomes active 15 milliseconds before the PA is keyed to allow time for the mechanical switch to operate before RF power is applied. This output also

LBI-38637F

nals DPLX_LINE_A and DPLX_LINE_B. The T/R shelf provides the appropriate 600 ohm line termination for T101 and T102.

DC Control

The current detection electronics indicate the following conditions:

1. No current

System Module by T101, also, over signals LINE_A and

LINE B. For 4 wire systems, line audio from the remote is

coupled to the System Module by transformer T102 over sig-

- 2. Negative current (in excess of 2 mA)
- 3. Current magnitude in excess of 5 mA
- 4. Current magnitude in excess of 10 mA.

Control current passes through a full wave bridge rectifier consisting of diodes D109, D110, D111, and D112. Negative current is directed through U101, D111, through the 6 mA and 12 mA detectors and then out through D110. This negative current causes the photo-transistor of U101 to saturate and thus pull the output DC_CNTRL_3 low.

Positive current flows through D112 of the bridge into the current level sense portion of the circuit which consists of Q101, U102, Q102, U103, D113, and D114. At current levels below 6 mA, Q101 and Q102 are "on" and act as current hogs preventing optoisolators U102 and U103 from turning "on". As the current level approaches 6 mA, the voltage developed across the parallel combination of R117 and R118 exceeds the sum of the zener voltage across D113 and the base-emitter voltage of Q102 which forces Q102 into cutoff. With no current flow through Q102, the 6 mA is forced through U103 which turns it on. As the current level continues to increase toward 11 mA, the same switching action occurs with Q101 and U102 but at a point set by D114. With 11 mA of current DC_CNTRL_1 is true (active low) as well as DC_CNTRL_2 (because 11 mA is greater than 6 mA).

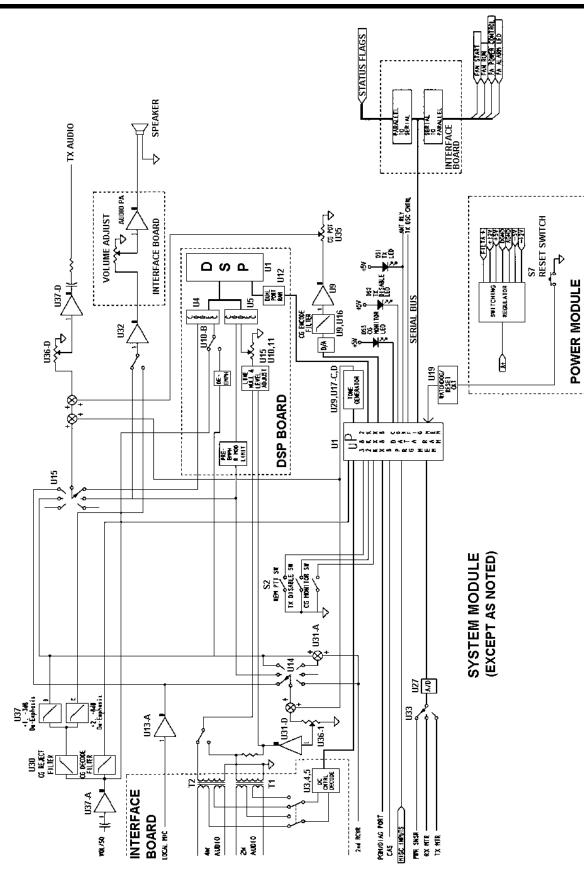


Table 5 - Decoding Truth Table

CONTROL CURRENT (mA)	DC CTRL 1	DC CTRL 2	DC CTRL 3
0	High	High	High
-11	Low	Low	Low
+11	Low	Low	High
-2.5	High	High	Low
-6	High	Low	Low
+6	High	Low	High

E & M Signalling

For E & M signalling applications, the E & M voltage is applied at TB101 pins 1 and 6 (or J101) which connect to the DC current detection circuit. For 24V signalling, about 8 mA of current is detected as 6 mA by U103 and output on DC_CNTRL_2. For 48V signalling, R105 and R106 should be removed in order to maintain 8 mA of E & M current. Remove P104 and P105 jumpers located on the Interface Board.

Audio Amplifier

Station Control Section Block Diagram

5 -

Figure

Audio power amplifier U104 provides 1 watt of audio to the local service speaker. For convenience, the volume adjust pot R101 is accessible from the front of the station. Resistors R126 and R127 form the gain setting feedback network and C109 and R128 provide compensation for loop stability.

Serial Communications

The T/R shelf may be connected to a PC through the front panel connector J103 or it may be connected to the Utility Handset, also front panel accessible through J102. Serial TTL data from the handset (KEYPAD_SERIAL) is converted to RS-232 levels by comparator U110.2 and zener diodes D117 and D118. RS-232 data transmitted from the PC (PC PGM RXD) and the level converted data from the handset are switched by D101, D103, and R123 to form signal PGM RXD. This signal is routed to a RS-232 receiver on the System Module where the UART is located.

Serial data transmitted by the T/R shelf to the PC through J103 (PGM TXD) is RS-232 compatible and requires no processing. Data transmitted by the T/R shelf to the handset is first inverted and level shifted by Q103 then connected to the handset by signal DISPLAY_SERIAL.

PA Control Functions

The PA control harness connects to the Interface Board at P103. Flag_4 from the PA is the status bit for indicating a PA fault condition. This signal is connected to shift register U105 where it will be read by the System Module. PA_KEY (TX_OSC_CNTRL) is routed directly from the System Module to the PA and is used to key the PA on and off. PA_PWR_CNTRL is a dc voltage from 4 to 8 volts that sets the power output of the PA. This voltage is developed by electronic potentiometer U108 and is level shifted and buffered by U110.1 and U110.3. Electronic pot U108 is controlled by the System Module using RXF1,TXF2,TXF1 (A2,A1,A0), SERIAL CLK (Clock), and RXF2 (Enable). The System Module first outputs address bits A2,A1, and A0. Then chooses whether to increment or decrement the pot by the logic state of ENABLE. With this done, the pot voltage is incremented or decremented on pulses from CLOCK.

PA Fan Controller

Flag Status Register

Shift register U105 acts as a parallel to serial converter that holds the flag status of the 5 RF modules (TX SYN, RX SYN, RXFE, IF, and PA). U105 is controlled by the System Module using RXF1,TXF2,TXF1 (A2,A1,A0), SERIAL_CLK (Clock), RXF2 (Enable), and M3 STATUS. The System Module first outputs A2,A1, and A0. Then the flag bits are loaded into the shift register by setting ENABLE high followed by a low to high to low pulse on CLOCK. The flag bits are then shifted out (with EN-ABLE low) on M3_STATUS on succeeding CLOCK pulses. Since the register shifts right (LSB first), the first three bits out are don't cares with the fourth bit out being FLAG 4 and the eighth bit out being FLAG 0.

The DC fan mounted onto the RF Power Amplifier is rated at 12 Vdc and draws about 600 mA of current. Amplifier U110.4 with its associated feedback network along with Q108 and Q109 provide a closed loop current regulator. Since motor torque is proportional to current and motor speed is proportional to torque, we have a fan speed regulator. The circuit provides a constant 600 mA of current for the fan which is drawn from supply A+. This current is maintained constant as A+ varies form 15.6V to below 13.5V (as occurs when the station is transmitting). Two fan speeds are provided, one for start-up (to overcome any friction due to dust, aging, cold, etc.) and another for normal operation. Upon reset or power-up, the System Module sets the fan speed at high (FAN_RUN=1, FAN START=1), then after 10 seconds sets the speed to normal (FAN_RUN=1, FAN_START=0).

Output Register

Shift register U106 acts as a serial to parallel converter that expands the System Module's output bits. U105 is controlled by the System Module using RXF1,TXF2,TXF1 (A2,A1,A0), SE-RIAL CLK (Clock), RXF2 (Enable), and RXF4/AUX2 (DATA). The System Module first outputs A2,A1, and A0. Next, data is presented by the System Module on the signal DATA and is shifted into U106's buffer on the leading edge of CLOCK. After 8 bits of data have been shifted into U106's buffer, ENABLE is driven high and with the next CLOCK pulse, the 8 bits are loaded into U106's output register. The bits are shifted out of the System Module with the MSB first. The bits are defined as:

D7: NOT USED D6: NOT USED D5: NOT USED D4: NOT USED D3: PA ALARM - drives PA ALARM LED through inverter O104 D2: FAN START - input to PA fan current regulator. Provides max fan speed. D1: FAN RUN - input to PA fan current regulator. Provides normal fan speed. D0: INT OSC - input to Receiver Syntehsizer. Selects internal or external reference.

Microphone/Handset Interface

J102 provides an interface for either Microphone option SXMC3B (19B801398P11) or Utility Handset SPK9024. The Utility Handset not only provides serial communication with the T/R shelf, but also provides audio into MIC HI from the handset mic and audio from the T/R shelf (INTRCM AUDIO) to the handset speaker. Thus, when using the handset a local mic and service speaker are not required.

Circulator Connector

SMA type connector P108 connects the optional circulator power sense signal to the Interface Board and through the backplane to the System Module via signal PWR_SNSR. This signal is sampled by the System Module while the station is transmitting and if the voltage exceeds a predefined limit (indication of fault in antenna system) the System Module will unkey the transmitter and the PA ALARM LED will flash. The transmitter will be disabled until a system reset occurs.

Squelch Adjustment

The station provides for local squelch adjustment through front panel accessible R102 or remote adjustment via handset or remote/diagnostic ports. Signal RCVR_VOL_SQ_HI is con-

nected to two separate voltage divider's formed by R102-R162 and U112-R197. U112 is a digitally programmable potentiometer that is adjusted in a manner similar to U108, the PA power adjustment potentiometer. The output of each divider is connected to analog switch U114. Thus the signal SQUELCH WIPER, which is fed back to the IF Module, can be selected from either source. It is important to note that if digital (remote) adjustment is selected, the manual adjustment via R102 is disabled.

Relay Options (SXSU3D)

Stations equipped with REV A or higher interface boards, are designed to accept optional relays. The relays include a SOR (Squelch Operated Relay) and two AUX relays, AUX1 and AUX2.

The SOR (K3) contains four form "C" contacts and is rated for 2 amps at 20 Vdc. The relay operates under control of signal RX 1 MUTE, which is derived from CAS, with the coil of K3 being picked up by transistor switch Q110.

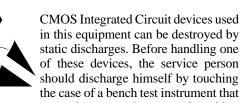
AUX1 relay (K1) and AUX2 relay (K2) each contain two form "C" contacts and operate under remote control. When AUX1 function is started via remote control, the system microprocessor sets signal RXF3/AUX1 to logic high which turns on transistor switch Q112 picking up the coil of K1. When AUX2 function is started, the system microprocessor sets bit 4 of output register U106 high, turning on transistor switch Q112 picking up the coil of K2. When the AUX functions are stopped, the control bits are toggled, and the relay coil drops out.

T/R SHELF ALIGNMENT

Instructions for system alignment, including the T/R Shelf, are contained in LBI-38636 for conventional systems. For EDACS systems refer to LBI-39074.

MAINTENANCE

CAUTION



in this equipment can be destroyed by static discharges. Before handling one of these devices, the service person should discharge himself by touching the case of a bench test instrument that has a 3-prong power cord connected to an outlet with a

known good earth ground. When soldering or de-soldering a CMOS device, the soldering iron should also have a 3-prong power cord connected to a outlet with a known good earth ground. A battery operated soldering iron may be used in place of the regular soldering iron.

STATION METERING

The MASTR III station monitors certain DC voltages in the station and displays them. These voltages are used as follows:

PWR - Circular voltage which is proportional to the Reflected power at the output of the optional MASTR III Circulator.

RX - Receiver RSSI (DC voltage proportional to the strength of the signal into the receiver).

TX - Transmitter forward power (DC voltage proportional to the power output of the station). This feature available only on MASTR III Stations with UHF PAs (19D902797G3, 7, 9, 11) or the 800 MHz M3 PA (19D902797G5) and T/R shelf must have the 19D902947G1 Rev C Backplane and the 19D902975G1 Rev C Interface Board.

EXT - VCO tuning voltage (also can be used to monitor an external DC level).

EXT - VCO Tuning voltage from the 2nd slot from the left on the T/R shelf (also can be used to monitor an external DC voltage by cutting JMP3 on the backplane). This feature requires the 19D902947G1 Rev C Backplane. Note: To use the EXT metering function to tune the station VCOs requires the 19D902590G6 System modules 19D902590G3-4, remove R184 (19B800607P104, 100K Ω) on the 19D903771 board.

Returning the MASTR III station

— NOTE —

The following procedures may be used in the field to retune a station if a plug in module has been repaired or replaced or the station frequency has been changed. The preferred method is to use the RF Test fixture and the module alignment found in the specific RF module maintenance manual.

Tx and RX Synthesizers can be tuned using the metering functions available with the Utility handset SPK9024, MAS-TRUTL (TQ-0619), or MSEDIT (TQ-0653). The VCO tune voltage from the RX Synthesizer slot in the T/R shelf is connected to the external metering jack (EXT JCK) in the system module. The synthesizers can be tuned using the Ext Metering function of the Utility handset, MASTRUTL, or MSEDIT. If one desires to use the EXT_JCK input on P4 pin 3 of the Metering plug on the station backplane to monitor an external voltage, jumper JMP3 on the backplane must be cut and the signal to be measured must be connected to P4 pin 3.

800 MHz stations:

Synthesizers

1) Program the station for the desired RX and TX frequencies or a frequency pair that is in the center of the desired frequencies. Programmable bandLBI-38637F

width is \pm 500 kHz.

2) Place the RX Synthesizer on an extender card. Alternately, one can remove RX FE and RX IF modules from the T/R shelf gain access to the trimmer slug on the Synthesizer module.

3) Adjust the RX Synthesizer trimmer until the LED on the front of the module goes "out".

4) Monitor the EXT metering field and adjust the trimmer slug for a reading of 5 Vdc on the EXT meter. Alternately, adjust the trimmer slug for a reading of 5 Vdc on J3 pin 23A.

5) Remove the RX Synthesizer module and the TX Synthesizer module and place the RX Synthesizer module in the slot farthest to the left. Place the TX Synthesizer module in the next slot to the right. Connect the Ref In/Out U-link.

6) Key the station with the REM PTT switch on the System module (or by grounding the DPTT output from the GETC on Simulcast stations).

7) Monitor the EXT metering field and adjust the trimmer slug on the TX Synthesizer for a reading of 5 Vdc on the EXT meter. Alternately, adjust the trimmer slug for a reading of 5 Vdc on J3 pin 23A.

Front End

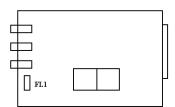
No Tuning required for Front End or IF.

UHF stations:

Synthesizers:

TX Synthesizer: No tuning is required for the TX Synthesizer.

RX Synthesizer: Same as 800 MHz for the RX Synthesizer with one addition. The cover must be removed and two slugs (FL1) must be tuned for peak output level using a spectrum analyzer or RF voltmeter. Programmable bandwidth is ± 1 MHz.



Continued

PARTS LIST

UHF stations: - Cont.

Front End: Cont.

The preferred method of tuning for the RX Front End is using the MASTR III module test fixture and associated procedures. This is required to sweep tune stations for more than one RX frequency. However, when using one frequency, one can peak tune the RX Front End as follows (reference alignment procedure in LBI-38673): 1) Place the RX FE on an extender card and connect the LO out of the RX Synthesizer and the IF out of the Front End to the IF module with 50Ω coax.

2) Preset the Front End tuning slugs per the appropriate RX FE LBI.

3) Using an RF signal generator, put in an "on channel" RF signal into the RF In on the Front End module.

4) While monitoring the RSSI metering function, adjust the RF level of the generator to the responsive range of the meter.

5) Tune the Front End tuning slugs for a peak on the RSSI meter, reduce the input signal level as necessary to keep the meter in the responsive reading range.

The IF requires no tuning.

VHF stations:

Synthesizers:

TX Synthesizer: Tuning is not required for the TX Synthesizer but the Dip switches must be set as follows:

Freq. Range (MHz)	SW1A	SW1B	SW1C	SW1D
160-174	OPEN	OPEN	OPEN	OPEN
150-162	CLOSED	OPEN	CLOSED	OPEN
142-152	OPEN	CLOSED	OPEN	CLOSED
136-144	CLOSED	CLOSED	CLOSED	CLOSED

RX Synthesizer: Same as 800 MHz for the RX Synthesizer. Programmable bandwidth is ± 1 MHz.

Front End:

Same as UHF.

CVMDOI		DESCRIPTION
SYMBOL	PART NO.	DESCRIPTION
A1		BACKPLANE BOARD 19D902947G1
		JACKS
J1 thru J9	19B801587P8	Connector, DIN: 96-position; sim to AMP 650963-4.
J10	19B801587P11	Connector, DIN: 96-position, right angle mounting; sim to AMP 650895-4.
		PLUGS
P1	19A704852P135	Printed Wiring Board Connector.
P2	19A704852P146	Connector, printed wire, two part: 16 contacts; sim to Dupont Berg 22-12-2164.
P3	19A704852P148	Connector, printed wire, two part: 16 contacts; sim to Dupont Berg 22-12-2164.
P4	19A704852P136	Printed Wiring Board Connector.
P5	19A704852P155	Printed Wiring Board Connector.
A2		INTERFACE BOARD 19D902975G1
		CAPACITORS
C101 and C102	7486445P5	Electrolytic, non polarized: 4 μF -10 + 100%, 150 VDCW.
C103	19A700121P106	Ceramic: 0.1 μF ±20%, 50 VDCW.
C104	19A701225P3	Electrolytic: 220 μF, -10+50%, 25 VDCW.
C105	19A700121P106	Ceramic: 0.1 μF ±20%, 50 VDCW.
C106	19A701534P5	Tantalum: 2.2 μF, ±20%, 35 VDCW.
C107	19A701225P3	Electrolytic: 220 µF, -10+50%, 25 VDCW.
C108	19A701534P7	Tantalum: 10 μF ±20%, 16 VDCW.
C109	162B3688P422K	Ceramic: 0.22 μF ±20%, 50 VDCW.
C112 and C113	19A701534P5	Tantalum: 2.2 μF, ±20%, 35 VDCW.
C113 C114	19A701534P8	Tantalum: 22 μF ±20%, 16 VDCW.
C115 thru	19A700121P106	Ceramic: 0.1 µF ±20%, 50 VDCW.
C119 C121	19A701534P6	Tantalum: 4.7 μF ±20%, 35 VDCW.
C124	19A701534P5	
C125	19A701354F3	Tantalum: 2.2 μF, ±20%, 35 VDCW. Electrolytic: 220 μF -10 +50%, 25 VDCW.
C126	T644ACP310K	
0120		Polyester: 0.01 μF, 50 VDCW.
D101 thru D103	19A700028P1	Silicon: 75 mA, 75 PIV; sim to 1N4148.
D103	19A703595P10	Optoelectronic LED: Red; sim to HP HLMP-1301-010.
D105 thru D108	344A3799P9	Zener: 6.8 volts; sim to 1N4736A.
D109 thru	T324ADP1041	Silicon: Rectifier; sim to 1N4004.
D112	10470002500	
D113 D114	19A700025P8	Silicon, zener: 400 mW max; sim to BZX55-C6V8.
D114 D115	19A700025P11 T324ADP1041	Silicon, zener: 400 mW max; sim to BZX55-C12.
and D116		Silicon: Rectifier; sim to 1N4004.
D117 and D118	19A700025P9	Silicon, zener: 400 mW max; sim to BZX55-C8V2.
D119	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.

SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION
D121	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.	R113	H212CRP315C	Deposited carbon: 15K ohms ±5%, 1/4 w.
D123	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.	and R114		
D125	19A700025P4	Silicon, Zener: 400 mA max; sim to BZX55-C3V9.	R115	19A700113P74	Composition: 3.0K ohms ±5%, 1/2 w.
D126 and	19A700028P1	Silicon, 75 mA, 75 PIV; sim to 1N4148.	thru R118		
D127			R119	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
		FUSES	R120	H212CRP510C	Deposited carbon: 1M ohms ±5%, 1/4 w.
F101 thru	19A702169P3	Enclosed link, .375 Amps @ 125 volts; sim to Littlefuse 255.375.	R121	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
F106			R122	H212CRP510C	Deposited carbon: 1M ohms ±5%, 1/4 w.
		JACKS	R123	H212CRP322C	Deposited carbon: 22K ohms ±5%, 1/4 w.
J101	344A3288P1	Modular jack: 6-position; sim to AMP 520425-3.	R124	H212CRP247C	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
J102	19J706197P3	Connector: 8 contacts; sim to AMP Type 520251-4.	R125	H212CRP356C	Deposited carbon: 56K ohms ±5%, 1/4 w.
J103	19B209727P43	Connector: Plug.	R126	H212CRP118C	Deposited carbon: 180 ohms ±5%, 1/4 w.
J104 and	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).	R127	H212CRP015C	Deposited carbon: 15 ohms ±5%, 1/4 w.
J105	400000000000		R128	H212CRP910C	Deposited carbon: 1 ohm ±5%, 1/4 w.
J107 J108	19B209727P17 19B209727P43	Connector: 25 contacts; sim to AMP 205738-2. Connector: Plug.	R129	19A700113P162	Composition: 1.0 ohms $\pm 5\%$, 1/2 w.
J108	19B209727P43 344A3288P3	Connector: Plug. Telephone: 6 positions, 6 contacts, right angle.	R130	H212CRP410C	Deposited carbon: 100K ohms ±5%, 1/4 w.
3103	J447J200TJ	relephone: 6 positions, 6 contacts, right angle.	R131	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
P101	19B801587P6	Connector, DIN: 96 male contacts; sim to AMP 531796-1.	R132	H212CRP315C	Deposited carbon: 15K ohms ±5%, 1/4 w.
P102	19A705822P1	Power connector, 4 positions; sim to Amp Cat. #641737-	R133	H212CRP510C	Deposited carbon: 1M ohms $\pm 5\%$, 1/4 w.
	10/11/00/02/21	1.	R134	H212CRP220C	Deposited carbon: 2.0K ohms ±5%, 1/4 watt.
P103	19A704852P32	Printed wire, two part: 6 contacts, sim to Molex 22-29-	R135	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
P104	40470405000	2061.	R136	H212CRP310C	•
and	19A704852P2	Connector: 3 Pin Male Header.	R137		Deposited carbon: 22K ohms ±5%, 1/4 w.
P105 P106	19A700072P28	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex	R138	H212CRP127C	Deposited carbon: 270 ohms \pm 5%, 1/4 w.
1 100	134700072120	22-27-2021.		H212CRP247C	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
P107	19A704852P29	Connector; sim to: Molex 22-29-2031.	R139	H212CRP210C	Deposited carbon: 1K ohms ±5%, 1/4 w.
P108	19A705512P1	Connector, RF SMB Series: sim to AMP No. 221111-1.	R144 thru	H212CRP210C	Deposited carbon: 1K ohms ±5%, 1/4 w.
P109	19A700072P28	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex	R150 R151	H212CRP191C	Dependent of the stress 15% (1/4 m
P110	4047040500400	22-27-2021.	R152	H212CRP191C	Deposited carbon: 910 ohms ±5%, 1/4 w.
P110 P111	19A704852P132	Connector: 2 circuits; sim to Molex 22-12-2024.	R152		Deposited carbon: 100 ohms \pm 5%, 1/4 w.
PIII	19A700072P28	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex 22-27-2021.	R153	H212CRP191C	Deposited carbon: 910 ohms $\pm 5\%$, 1/4 w.
		TRANSISTORS		H212CRP251C	Deposited carbon: 5.1K ohms ±5%, 1/4 w.
Q101 and	19A705953P1	Silicon, NPN: sim to MPSA43.	R155	H212CRP239C	Deposited carbon: 3.9K ohms ±5%, 1/4 w.
Q102			R156	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
Q103 and	19A700023P2	Silicon, NPN: sim to 2N3904.	R157	H212CRP282C	Deposited carbon: 8.2K ohms ±5%, 1/4 w.
Q104			R158	H212CRP147C	Deposited carbon: 470 ohms ±5%, 1/4 w.
Q108	19A700023P2	Silicon, NPN: sim to 2N3904.	R162	H212CRP247C	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
Q109	19A700054P1	Silicon, NPN, 60 w; sim to BD-201.	R163	H212CRP315C	Deposited carbon: 15K ohms ±5%, 1/4 w.
Q110 thru	19A700023P2	Silicon, NPN: sim to 2N3904.	R164	H212CRP412C	Deposited carbon: 0.12M ohms \pm 5%, 1/4 w.
Q113			R165	H212CRP312C	Deposited carbon: 12K ohms ±5%, 1/4 w.
D. (a)		RESISTORS	R166	19A700050P11	Wirewound: 0.68 ohms $\pm 10\%$, 2 w.
R101	19B235632P1	Variable, conductive plastic: 1000 ohms.	R167	H212CRP220C	Deposited carbon: 2.0K ohms ±5%, 1/4 watt.
R102	19B235632P2	Variable, conductive plastic: 10K ohms.	R168	H212CRP420C	Deposited carbon: 200K ohms \pm 5%, 1/4 w.
R103 and R104	H212CRP022C	Deposited carbon: 22 ohms ±5%, 1/4 w.	R175 thru R178	H212CRP210C	Deposited carbon: 1K ohms \pm 5%, 1/4 w.
R105 and R106	H212CRP910C	Deposited carbon: 1 ohm ±5%, 1/4 w.	R179 thru R182	H212CRP147C	Deposited carbon: 470 ohms $\pm 5\%$, 1/4 w.
R107 thru R110	19A700113P74	Composition: 3.0K ohms ±5%, 1/2 w.	R183	H212CRP247C	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
R111	H212CRP410C	Deposited carbon: 100K ohms ±5%, 1/4 w.	R184	H212CRP312C	Deposited carbon: 12K ohms ±5%, 1/4 w.
R112	H212CRP510C	Deposited carbon: 100 r cmmb $\pm 5\%$, 1/4 w.	R185	H212CRP147C	Deposited carbon: 470 ohms ±5%, 1/4 w.
			R186	H212CRP210C	Deposited carbon: 1K ohms ±5%, 1/4 w.

SYMBOL	Part No.	DESCRIPTION
R188	H212CRP210C	Deposited carbon: 1K ohms \pm 5%, 1/4 w.
R189 and R190	H212CRP356C	Deposited carbon: 56K ohms $\pm 5\%,1/4$ w.
R191	H212CRP247C	Deposited carbon: 4.7K ohms $\pm 5\%$, 1/4 w.
R192	H212CRP356C	Deposited carbon: 56K ohms $\pm 5\%,1/4$ w.
R193	H212CRP247C	Deposited carbon: 4.7K ohms \pm 5%, 1/4 w.
R194	H212CRP356C	Deposited carbon: 56K ohms \pm 5%, 1/4 w.
R195	H212CRP510C	Deposited carbon: 1M ohms $\pm 5\%$, 1/4 w.
R196	H212CRP156C	Deposited carbon: 560 ohms \pm 5%, 1/4 w.
R197	H212CRP247C	Deposited carbon: 4.7K ohms \pm 5%, 1/4 w.
R198	H212CRP322C	Deposited carbon: 22K ohms \pm 5%, 1/4 w.
R199	H212CRP324C	Ceramic film: 24K ohms, .2 w.
R200	H212CRP510C	Deposited carbon: 1M ohms ±5%, 1/4 w.
R201	H212CRP356C	Deposited carbon: 56K ohms $\pm 5\%,1/4$ w.
R202	H212CRP247C	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
R203 thru R205	H212CRP051C	Ceramic film: 51 ohms, .2 w.
R206	H212CRP147C	Deposited carbon: 470 ohms ±5%, 1/4 w.
R207	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
R208	H212CRP322C	Deposited carbon: 22K ohms ±5%, 1/4 w.
SG101 thru SG106	19A701783P3	Arrester, electrical surge (MOV): sim to V150La20A.
		TRANSFORMERS
T101 and T102	19A705947P2	Audio: 600 ohm impedance.
		TERMINAL BOARDS
TB101	19A705820P5	Terminal Block.
TP1 thru TP3	344A3367P1	Test point.
		INTEGRATED CIRCUITS
U101 thru U103	19A705952P1	Optoisolator; sim to 4N38.
U104	19A701830P1	Linear: Audio AMPLIFIER; sim to TDA 2003.
U105	19A703987P21	Digital: CMOS Shift resister with parallel I/O; sim to 74HC299.
U106	19A703987P24	Digital: CMOS 8-Bit shift register with tri-state outputs; sim to 74HC595
U107	19A704445P1	Digital: CMOS 1-of-8 Decoder/Demulti- plexer; sim to 74HC138.
U108	19A705180P2	Digitally Controlled Potentiometer: 40 - 10K ohms; sim to X9103P.
U109	19A703483P11	Digital: CMOS Quad 2-Input OR Gate; sim to 74HC32.
U110	19A701789P1	Linear: Quad Op Amp; sim to LM324.
U111 U112	19A703483P11	Digital: CMOS Quad 2-Input OR Gate; sim to 74HC32.
0112	19A705180P2	Digitally Controlled Potentiometer: 40 - 10K ohms; sim to X9103P.
U113	19A701789P1	Linear: Quad Op Amp; sim to LM324.
U114	19A700029P38	Digital: CMOS Triple 2 Channel Multiplexer.
		SOCKETS

XK1

and XK2 19A700156P9

Socket, IC: 16 Pins, Tin Plated.

SYMBOL

ХКЗА

ХКЗВ

5

6

7

8

9

and J2

LS1

2

3

4

5

6

7

8

PART NO.

19A700156P7

19A700156P7

19A702917P7

19A700032P5

19A700034P4

19A705469P1

19A115938P13

344A3136P1

19D902721P1

19B801732P1

19B801706P1

19A700032P5

19A123224P10

19A702381P506

19A700034P4

19A702364P308

DESCRIPTION

Socket, IC: 14 Pins, Tin Plated.

----- MISCELLANEOUS -----

Heat Sink, Transistor: Sim to Thermalloy Cat 6030B-TT.

Machine screw, TORX Drive: No. M3-0.5 x 8.

Lockwasher, internal tooth: No. 3MM.

----- JACKS -----

----- LOUDSPEAKERS ------

----- MISCELLANEOUS -----

Lockwasher, internal tooth: No. 3MM.

Nut, hex: No. M3 x 0.5MM

Insulator Plate, TO-220.

Connector, receptacle.

Chassis.

Knob.

Speaker cloth.

Button plug.

Screw, threaded,

Nut, hex: No. M3 x 0.5MM.

Speaker, permanent magnet.

Socket, IC: 14 Pins, Tin Plated.

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter" which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the descriptions of parts affected by these revisions.

REV. A - INTERFACE BOARD 19D902975G1

To add new features to board including SOR and DSP. New board is backward compatible. Added C125, D119-D127, R132-R134 and R186-R205, Q110-Q113 and I111-U114. Changed C103, C105, C109, C115-C119, D105-D108, R111, R158, R179-R182 and R185. C103, C105, C109 and C115-C119 were: Tantalum: 0.1 μ F $\pm 20\%$, 35 VDCW. D105-D108 were: 19J706030P2. R111 was: H212CRP310C - 10K ohms $\pm 5\%$, 1/4 w. R158 was: H212CRP247C - 4.7K ohms $\pm 5\%$, 1/4 w. R179-R182 were: H212CRP247C - 4.7K ohms $\pm 5\%$, 1/4 w. R185 was: H212CRP247C - 10K ohms $\pm 5\%$, 1/4 w.

REV. B - INTERFACE BOARD 19D902975G1

To make RX_1_MUTE Logic Level compatible with GETC level requirement. Added R206 and buffer U111 between RX_1_MUTE and the base of Q110.

REV. A - BACKPLANE BOARD 19D902947G1

To support GETC and 2nd receiver applications, the printed wire board was changed. Also connectors P1, P3 and P6 changed.

REV. B - BACKPLANE BOARD 19D902947G1

To correct errors on printed wire board, the board was changed. Connections to J6, J7, J8 and J9, pin 7 were renamed.

REV. C - INTERFACE BOARD 19D902975G1

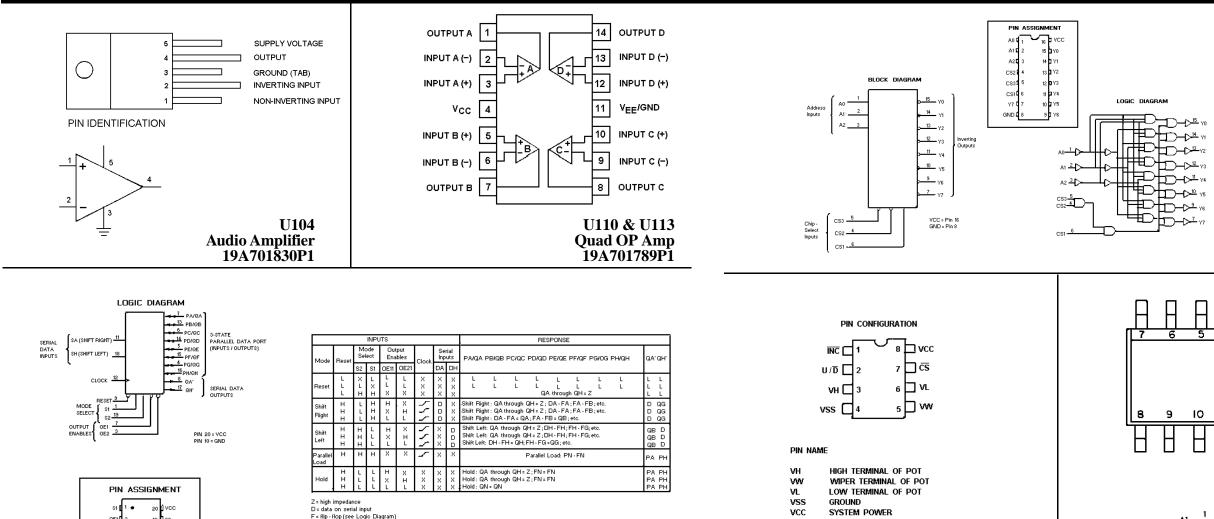
Adds alarm capabilities for EDACS configuration. Permits alarm capabilities of Power Monitor Unit functions. Added J108, J109, P110, P111 and R207. **REV. C - <u>BACKPLANE BOARD 19D902947G1</u>**

Add alarm capability in EDACS configuration. New PWB.

REV. D - INTERFACE BOARD 19D902975G1

To eliminate high frequency oscillation. C109 was $0.1\mu F$ (19A700121P106) C126 added - $0.01\mu F$ (T644ACP310K) R208 added - 22K ohms (H212CRP322C).

LBI-38637F



PIN ASSIGNMENT					
\$1	1 • 20	l) vcc			
OE1	2 19	52			
OE2	3 18	зн			
PG/QG	4 17	3 QH			
PE/QE	5 16	PH/QH			
PC/QC	6 15	PF/QF			
PA/QA	7 14	PD/QD			
QA' (8 13	PB/QB			
RESET	9 12	CLOCK			
GND (10 11) SA			
1					

									hear Unide				
Mode	Reset		ode lect		tput ibles	Clock	Inn	rial uts	PAIQA PBIQB PCIQC PDIQD PEIQE PFIQF PGIOG PHIQH	QA'QH'			
		S2	S1	OE11	OE21	0.001		DH					
Reset		хгн	L×н	L L X	L L X	×××	×××	××××	LLLLLLL LLLLLL QAthrough QH≖Z				
Shift Right	ттт		нтт	H X L	. X H L	$\{\cdot, \cdot\}$		××××	-Shift Bight: QA through QH = Z; DA - FA; FA - FB; etc. -Shift Bight: QA through QH = Z; DA - FA; FA - FB; etc. Shift Bight: DA - FA = QA; FA - FB = QB; etc.	D QG D QG D QG			
Shift Left	ттт	ΙΙΙ	L L L	НХL	хнL	$\langle \cdot \rangle \langle$	×××		Shift Left: QA through QH = Z;DH - FH;FH - FG;etc. Shift Left: QA through QH = Z;DH - FH;FH - FG;etc. Shift Left: DH - FH = QH;FH - FG = QG;etc.	QB D QB D QB D			
Parallel Load	т	Η	н	×	х	~	х	х	Parallel Load: PN - FN	PA PH			
Hold	ттт		L L	H X L	ХHL	×××	×××	××××	Hold: QA through QH = Z;FN = FN Hold: QA through QH = Z;FN = FN Hold: QN = QN	PA PH PA PH PA PH			
- Z - hiah	imnedar												

Z = high impedance D = data on serial input F = filp -flog-(see Logic Diagram) tWhen one or both output controls are high the eight input/output terminals are disabled to the high-impedance state; however, sequential operation or clearing of the registar is not affected.





WIPER

TRANSFER

.\^

GROUND SYSTEM POWER

COUNTER

UP / DOWN CONTROL WIPER MOVEMENT CONTROL

FUNCTIONAL DIAGRAM

CHIP SELECT

U/D

INC CS

U/D

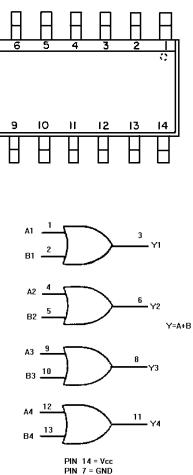
INC CS

FUNCTION TABLE

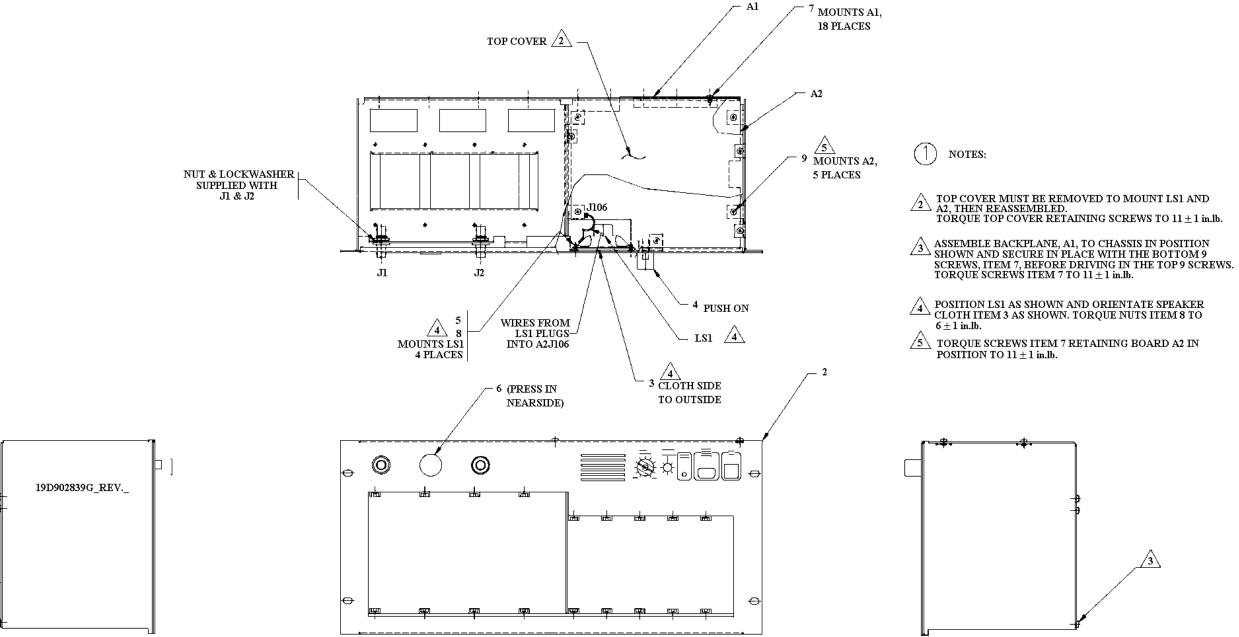
	h	nputs							0	utpu	ts		
	CS2	CS3	A2	A1	A0	Y0	Y1	Y2	Υ3	Y4	Y5	Y6	Y7
	хнх	H ××	×××	×××	×××	ΠΞΞ	ннн	ннн	ΗHΗ	ΗII	ннн	ΤIΙ	ннн
	L L L	L L L		L L H H	L H L H	LIII	HLHH	HHLH	HHHL	TITI	TTTT	TTTT	нннн
		L L L	ΤΤΤΤ	L L H H	L H L H H	III I	I I I I	нннн	HHH H	LHHH	HLHH	H H L H	HHHL

H = High Level (steady state L = Low Level (steady state) X = Don't Care

U107 1-of-8 Decoder/Demultiplexer 19A704445P1



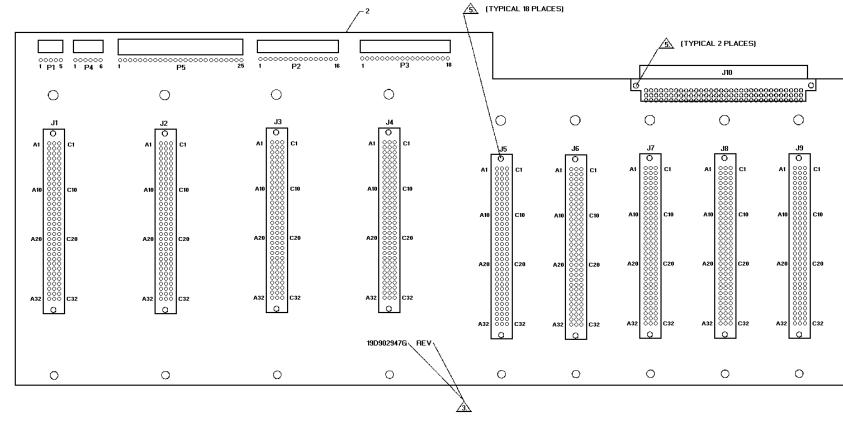
U109 & U111 Quad 2-input or Gate 19A703483P11 ASSEMBLY DIAGRAM



LBI-38637F

MASTR III T/R SHELF 19D902839G1

(19D902839 Sh.1 Rev.2)



1. SOLDER ALL ELECTRICAL CONNECTIONS.

2. Component leads to protrude .06 Max. Below Solder Side of Board.

ARK APPLICABLE GROUP NUMBER AND REVISION LETTER CHARACTERS .09 HIGH, COLOR BLACK.

4. CLEAN PER 19A701294.

 $\underline{\raiselines} \text{ solder connector boardlocks farside}.$

(19D902947, Rev. 5)

T/R SHELF BACKPLANE (A1) 19D902947G1

SCHEMATIC DIAGRAM

TX SYNTHESIZER

		10	
J1.1 > 1A	-O INT_OSC	J1.33	
J12	-O AGND	J1.34) 2B	
.112 3 <u>38</u>	-O LAN 1	J1.35	
J1.4 > 4A	-O AGND	J1.36) 4B	
HEN OA	-O LAN 2	J1.37 > 5B	
J1.6 > 6A		J1.38 > 6B	
H 7 Y 10	-O AGND	J1.39> 7B	
J1.8 > 8A		J1.40≻ 8B	
J1.9≯9A		J1.41> 9B	
J1.10		J1.42	
J1.11 > 11A	-	110	
J1.12 12A	ORF_SPARE_4	J1.43	-
J1.125	O RF_SPARE_5	J1.44>	-O AGND
J1.13 > 14 A	-O ANT_REL	01.40 /- 14 D	
J1.14 > 14A	-O AGND	J1.46> 15B	-O AGND
J1.15 > 15A	O +12V	J1.47 2 16 D	
J1.162		J1.48 > 10B	-0+13.8VF
	Ó AGND	J1.49 > 18B	-O AGND
J1.18>18A		J1.50)	
J1.19	-O AGND	J1.51 > 19B	-O AGND
.1120x20A		J1.52 > 20B	-Q AGND
		J1.53) 21B	-O AGND
J122		J1.54 > 22B	-O AGND
.11.23 23A		J1.55 > 23B	-O AGND
1124 × 24A	-O RF_SPARE_6	J1.56 > 24B	-O AGND
	-O RE SPARE 1	J1.57) 25B	-O AGND
J1.26	Q <u>_</u> <u></u> .	J1.58> 26B	-O AGND
J1.27		J1.59) 27B	
J1.28		J1.60	
J1.29	-ORF_SPARE_2	29B	
J1.30		J1.61 > 20B	
J1.30 > 31A		01.627	
			-O AGND
J1.32		J1.64	

1C	
J1.65 >	O AGND
J1.66 > 2C	-O CLOCK
J1.67	-O DATA
J1.68 > 4C	-O ENABLE
J1.69 5C	
J1.70 > 6C	
J1.71) 7C	O A1
J1.72) 8C	O A2
J1.73 9C	-O AGND
J1.742 10C	-OFLAG 0
J1.752 11C	-OFLAG 1
J1.762 12C	-OFLAG 2
J1.772 13C	-O FLAG_3
J1.78> 14C	-ORF SPARE 3
J1.79> 15C	-O +12V
J1.80	-0+120 -0+13.8VF
J1.81	
180	
J1.82 > 19C	O+5V
J1.83 > 100 H out 200	
J1.84 > 21C	-O BX_MTR+
J1.85 22C	
J1.86 23C	-OTX_AUDIO_LO
J1.87) 24C	O TX_AUDIO_HI
J1.88>	Ö AGND
J1.89 > 26C	-O AGND
J1.90 >	-O CAS
J1.91 > 27C	-O SQ-ARM
J1.92 > 28C	-O AGND
J1.93 > 29C	-O AGND
J1.94> 30C	-O VOLISQ_LO
J1.95> 31C	-O ROVR VOLISQ HI
J1.96> 32C	
·	-

J2.1 > 1A	-O INT OSC	J2.33) 1B	
J2.2 > 2A		J2.34 2B	
J2.3 > 3A	-OLAN 1	J2.35	
J2.4 > 4A			
	-	02.30 J	
J2.5 > 6A	-O LAN_2	J2.37 P	
	-O AGND	02.30	
J2.7 > 7A	-O AGND	02.33 J OD	
J2.8 > 90		J2.40 2 OD	-O AGND
J2.9 2 10 0	-O AGND	J2.41 2 10D	-O AGND
J2.10 > 110		110	-O AGND
J2.11) 12.5	-ORF_SPARE_4	J2.43) 11B	-O AGND
J2.12) 12.6	-O RF_SPARE_5	J2.44 7 12B	-O AGND
J2.13 > 13A	-O ANT_REL	J2.45 13B	
J2.14 > 14A	-O AGND	J2.46 14B	-O AGND
J2.15 > 15A	O+12V	J2.47 > 15B	
J2.16 > 16A		J2.48 16B	0 +13.8VF
J2.17 3 17A	-O AGND	J2.49	
J2. 18 > 18A		J2.50 > 18B	
J2.19 > 19A	-O AGND	J2.51 2 19B	-O AGND
J2.20 > 20A		J2.52 20B	-O AGND
J2.21 > 214		12.53 21B	-O AGND
J2.22 22A		J2.54 22B	-O AGND
J2.23 23A	-O VTEST	J2.55 23B	
J2.24 24A	-ORF_SPARE_6	J2.56 24B	
J2.25 25A	ORF_SPARE_1	J2.57> 25B	
J2.26 26A	Contraction Contraction	J2.58	
J2.27 27A		J2.587 J2.597	-
200		J2.03 28B	O AGND

RX SYNTHESIZER

J2.60 > 28B J2.60 > 29B J2.61 > 29B

J2.62

J2.63

J2.64

-O AGND

-O AGND

-O AGND

-O AGND

J2.65 > 1C O AGND J2.65 > 2C O CLOCK J2.67 > 3C O DATA J2.68 > 4C O ENABLE 5C O DATA

J2.69

J2.70 5 6C

J2.71) 7C

J2.72

J2.74 > 10C J2.74 > 11C J2.75 > 10C

J2.76 > 12C

J2.76

J2.79

J2.81 > 17C

J2.82

J2.83> 19C

J2.84) 20C

J2.85 21C

J2.85 } 22C J2.86 } 23C J2.87 > 24C J2.88 > 25C J2.89 > 26C J2.30 > 27C

J2.91 27C

J2.92

J2.93

J2.95

J2.96

J2.94> 30C

J2.80 > 16C

-O ENABLE

-0 A0

-O A1

-O AGND

-O FLAG_0

-O FLAG_1

-O FLAG_2

-O FLAG_3

-O AGND

-O AGND

-O AGND

-O CAS

-O SQ-ARM

-O AGND

-O AGND

----- RCVR_VOLISQ_HI

-O BX_MTB+

TX_AUDIO_LO

-O RF_SPARE_3

RX FRONT END

J3.1 > 1A O INT_OSC J3.2 > 2A O AGND J3.3 > 3A O LAN_1 J3.4 > 4A O AGND J3.5 > 5A D LAN_2 J3.6 > 6A O AGND J3.7 > 7A O AGND J3.9 > 9A O AGND J3.10 > 10A O AGND J3.11 > 11A O FF_SPARE_4 J3.12 > 12A O FF_SPARE_5 J3.13 > 13A O ANT_REL J3.14 > 14A O AGND J3.15 > 15A +12V J316 > 16A J3.16 > 16A +138VF J319 > 13A J3.17 > 17A O AGND J3.18 > 19A O AGND J3.20 > 20A - 12V J321 > 21A J3.21 > 21A O AGND J3.22 > 22A J324 > 24A O J3.23 > 23A O FF_SPARE_6 J3.24 > 24A O FF_SPARE_6 J3.25 > 25A O AGND J3.29 > 23A O FF_SPARE_2	J3.33 1B J3.34 2B J3.35 3B J3.35 3B J3.37 5B J3.37 5B J3.37 5B J3.37 5B J3.37 5B J3.38 6B J3.39 7B J3.40 8B C J3.41 9B C J3.42 10B C J3.43 11B C AGND J3.43 12B C AGND J3.45 14B C AGND J3.45 14B C AGND J3.45 17B C +12V J3.49 17B C +12V J3.49 17B C AGND J3.51 19B C AGND J3.51 19B C AGND J3.51 12B C AGND J3.55 22B C AGND J3.55 23B C AGND <t< th=""><th>J3.65 1C ◆ AGND J3.66 3C ◆ CLOCK J3.68 4C ◆ ENABLE J3.69 6C ◆ AGND J3.70 7C ◆ AGND J3.71 7C ◆ AGND J3.73 6C ◆ AQ J3.71 7C ◆ AQ J3.73 6C ◆ AQ J3.73 C AGND J3.74 10C ◆ FLAG_0 J3.75 12C ◆ FLAG_1 J3.76 12C ◆ FLAG_2 J3.77 13C ◆ FLAG_3 J3.78 15C ◆ FLAG_3 J3.79 15C • FLAG_2 J3.79 15C • FLAG_3 J3.79 15C • FLAG_1 J3.81 17C • AGND J3.82 19C • AGND J3.84 20C • 75V J3.85 21C • AGND J3.84 20C TX_AUDIO_LD J3.85 22C AGND J3.89 28C • AGND <t< th=""></t<></th></t<>	J3.65 1C ◆ AGND J3.66 3C ◆ CLOCK J3.68 4C ◆ ENABLE J3.69 6C ◆ AGND J3.70 7C ◆ AGND J3.71 7C ◆ AGND J3.73 6C ◆ AQ J3.71 7C ◆ AQ J3.73 6C ◆ AQ J3.73 C AGND J3.74 10C ◆ FLAG_0 J3.75 12C ◆ FLAG_1 J3.76 12C ◆ FLAG_2 J3.77 13C ◆ FLAG_3 J3.78 15C ◆ FLAG_3 J3.79 15C • FLAG_2 J3.79 15C • FLAG_3 J3.79 15C • FLAG_1 J3.81 17C • AGND J3.82 19C • AGND J3.84 20C • 75V J3.85 21C • AGND J3.84 20C TX_AUDIO_LD J3.85 22C AGND J3.89 28C • AGND <t< th=""></t<>
---	--	--

RX IF

J4.1 > 1A	O INT_OSC	1B
J4.2 2A		J4.33 2B
J4.2 J4.3 >3A	-Ó AGND	J4.34
J4.3 > 4A	OLAN_1	J4.35
J4.4 ≻ 5A	-O AGND	J4.36
J4.5 > 6A	-OLAN_2	J4.37 2 6B
J4.6 > 7A	-O AGND	J4.38 > 7B
J4.7) (0	-O AGND	J4.39
J4.8 > 9A	-O AGND	J4.400 9B
J4.9 > 10A	-O AGND	J4.41 ≻ 10B
J4.10 >		J4.42 3
J4.11 > 11A J4.12 > 12A	-ORF SPARE 4	J4.43
J4.12) 12A	O RF SPARE 5	J4.44
J4.13	O ANT_REL	J4.45 13B
.14 14 14A	-O AGND	14 46 14B
15A	-0+12V	15B
J4.16	-0+13.8VF	J4 48 \ 16B
14.17 17A	-O AGND	J4.49
J4.17 > 17A J4.18 > 18A J4.18 > 40.1	-0.+5V	J4.50
	-	19B
J4.19 > 20A		J4.51 > 100
J4.20 20A	- O -12V	J4.52> 21B
J9.21		J4.53
J4.22		J4.54) 23B
J4.23 23A		J4.55
J4.24 24A	-ORF_SPARE_6	J4.56) 24B
J4.25 25A	-ORF_SPARE_1	J4.57 > 25B
J4.26 > 26A		J4.58 <mark>≻ 26B</mark>
J4.27 >27A		J4.59 27B
J4.28 3 28A	-O AGND	J4.60 28B
.14.29 29A	-ORF SPARE 2	J4.61 29B
M 20 30A	Q	J4.62
J4.31 31A		J4.63
J4.32 32A		220
07.02 J		J4.64> 320

J4.65	-O AGND
J4.66 ≻2C 3C	-O CLOCK
.14.67	-O DATA
J4.68 > 4C	-Q ENABLE
J4.69 > 5C	-Q AGND
J4.70 > 6C	-O A0
J4.71> 7C	-O A1
J4.72> 8C	-0 A2
J4.73 > 9C	-O AGND
J4.74 > 10C	-O FLAG_0
J4.75 > 11C	-O FLAG 1
J4.76 > 12C	-O FLAG_2
130	-OFLAG_3
J4.77 > 14C	-ORF_SPARE_3
J4.78 > 15C	
J4.79 > 16C	-O +12V
J4.80 >	-O +13.8VF
J4.81 >	
J4.82 > 19C	- O +5V
J4.83 > 20C	- AGND
J4.84 > 21C	-O BX_MTR+
J4.85 > 22C	
J4.86 > 23C	TX_AUDIO_LO
J4.87 > 24C	TX_AUDIO_HI
J4.88 >	
J4.89) 25C	-O AGND
J4.90 > 26C	-O CAS
J4.91 27C	-O SQ-ARM
J4.92 > 28C	-O AGND
J4.93	
J4.94) 30C	
. 31C	
J4.80 / 32C	-O ROVR_VOLISQ_H
J4.96 > 520	-•• Agnd

J4.65 ≻^{1C}

---Ó AGND -O AGND -O AGND -O AGND -O AGND -O AGND

-Q+12V -Q+13.8VF -O AGND -**O**+5V -O AGND -O AGND -O AGND -O AGND

-O AGND -O AGND -O AGND -O AGND -O AGND -O AGND -O AGND O AGND -O AGND

-O AGND

SYSTEM MODULE

-ORF_SPARE_2

J2.28 > <u>28A</u> O AGND J2.29 > <u>29A</u> O RF_SPA

J2.29 <u>30A</u> J2.30 <u>30A</u> J2.31 <u>31A</u> J2.32 <u>32A</u>

J5.1 ≻ 1A	Ö AGND	J5.33	-O AGND	J5.65 > 1C	-O AGND
152 2A	- VOLISQ_LO	JE 34 20	LA eve Voltien LI	IF CC & ZU	-O+13.8VF
IE 2 3A		J5 35	-O MIC_LO	IE 07	-O 2ND RCVR
J5.4 > ***	-O LINE_B	J5 36 > +D	-O LINE_A	J5.68)	-O-MDM_LINE_TXD
.155	-O DPLX_LINE_A	J5 37 > 00	OPLX_LINE_B	15 CON **	O TX_AUDIO_HI
J5.6 > 6A	-O VG_ALERT	J5.38	-O CG_HI	J5.70) 6C	-O TX_AUDIO_LO
J5.7 ≻ 7A	-O INTROM_AUDIO	J5 39 7 CD		J5.71)	- O +12V
.15.8 > 8A		J5 40 > 00	- O -5V	J5.72	-O +12V
J5.9 ≻ ^{9A}		JE 41 30		J5.73 > 9C	- O -12V
J5.10 > 10A		J5.42 > 10D	- O +5VA	J5.74) 10C	- O -12V
J5.11) 11A	-O MDM_LINE_RXD	J5 43 N	-Q EXT_JCK(VCO_VOLT)	J5.75 2	-O REPEAT_PTT_IN
J5.12) 12A	O (COMB_PTT_OUT (LO_PA_PVR)	J5.44 3	O DETECT_DIS	J5.76 > 12C	-O TX_CG_EN
J5.13 2 13A	-O DGND	J5 45 V 100	-O DGND	J5.77 13C	
J5.14) 14A		J5.46 14B	- O • 5V	J5.78 > 14C	-O +5∀
J5.I5 > 15A	-O LIM_CG		O RUS_IN	J5.79 15C	O RX_1_MUTE
J5.16 > 16A J5.16 > 17A	-O REMOTE_PTT_IN	J5.48 16B	-C DELAYED_PTT_IN	J5.80 > 16C	COMB_PTT_IN
		J5.49 17B		J5.81) 17C	-O REMOTE_PTT_OUT
J5.18 > 19A	-O REPEAT_PTT_IN		-O CG_MON	J5.82) 18C	-O RESET
	OC_CNTRL_1	J5.51 19B	OC_CNTRL_2	J5.83 > 19C	O DC_CNTRL_3
J5.20) 20A J5.20) 21A	-O BATT_STOBY	J5 52 200	-O CAS	J5.84 \	-O LOCAL PTT
		J5.53 >21B	-O a.	J5.85 21C	-O A+
15 22 22A	-O SERIAL_CLK	J5.53 21B J5.54 22B	-O WALSH_1	J5.86 >	-O VG_SQ_DSBL (RPTR_STBY_IN)
JE 23 X 23A	O ANT_REL	J5.55 > 23B	O PA_KEY	J5.87 23C	-O AUX_RX_MUTE
J5 24 24M	-O PWR_SNSR	J5.56 y 240			
IE DE N COM	-O BX_MTR+	J5 57 25B	-O BX_MTB-	J5.89 25C	-O +5V
J5.26 26A	-O EXT_LSD	J5.58>26B	-O EXT_HSD	J5 90 N	- O +5V
J5.27 } 27 A		J5 59 > 27B	▲ M2 STATUS	15.91 2 210	-O PGM_TXD
.15.28 <u>28A</u>		J5 60 200	OGETC_RESET	IE 02 \$ 200	
15 oo x 298		JE 61 230	_	J5.93 29C J5.93 30C J5.94	-O BXF1
J5.30 > 30A	O RXF2	15.62	-O RXF3/AUX1	J5.94) 30C	O BXF4/AUX2
J5.31 >	-••••13.8VF	J5.63≻ ^{31B}	-O TXF1	IE 95 31C	-O TXF2
J5.32 > 32A	O TXF3	J5.64 32B	-O TXF4	J5.96 > 32C	-O +13.8VF

LBI-38637F

THIS SCHEMATIC DIAGRAM APPLIES TO			
MODEL NO.	REV LETTER		
PL19D902947G1	С		

T/R SHELF BACKPLANE (A1) 19D902947G1

(19D902949 Sh.1 Rev.4)

SPARE 1

		J6.33)	- AGND
J6.2 > 2A OE	XT_JCK (VCO_VOLT)	00.34	-O SYS_VOLISQ_HI
4.0	X_MTR+	4B	-O DPLX_LINE_A
J6.4 > Q L	INE_B	J6.36) 5B	-O LINE_A
00.07 60 000	G_SQ_DSBL	J6.37) EP	O STATUS
70	CVR_VOL\SQ_HI	30.30	-Ó TX_MTR+
J6.7 > O U	G_MON (BT DSBLE)	36.39) SB	•• INTROM_AUDIO
J6.8		J6.40 > 9P	-O -5V
J6.9 - OA	UX_SPARE_8	J6.41 > 30	-O AUX_SPARE_9
J6.107 11A	5VA	J6.42	-O +5VA
J6.11) (O A	UX_SPARE_10	J6.43> 11B	-Q AUX_SPARE_11
J6.12 - O A	UX_SPARE_13	J6.443 12B	-O AUX_SPARE_14
J6.13>	IGND	J6.45> 13B	🗘 DGND
J6.14≻ 14AO +!	5V	J6.46 > 14B	- ♀ •5V
J6.15 > 15A O A	UX_SPARE_16	J6.47 > 15B	-O AUX_SPARE_17
J6.16) 16A O IF	F/AUX-SPARE_2	J6.48 > 16B	-O IF/AUX-SPARE_3
J6.17 ≻ 17A O IF	FAUX-SPARE_5	J6.49 7 17B	O IF/AUX-SPARE_6
J6.18 - 18A O IF	FAUX-SPARE_8	J6.50 > 18B	• AUX SPARE 18
J6.19 > 19A O A	UX_SPARE_19	J6.51) 19B	-O AUX_SPARE_20
J6.20 20A 0 A	UX_SPARE_22	J6.52> 20B	-0 1950_DIS
J6.21 > 21A O A	۱+	J6.53> 21B	-O A+
	UX_SPARE_24	J6.54) 22B	O AUX_SPARE_25
J6.23) 23A O A	NT_REL	J6.55 <u>23B</u>	• AUX_SPARE_27
J6.24) 24A O A	UX_SPARE_29	J6.56 24B	O AUX SPARE 30
J6.25) 25A O A	UX_SPARE_32	J6.57> 25B	OAUX_SPARE_33
J6.26) 26A O E	XT_LSD	J6.58> 26B	OEXT HSD
J6.27) 27A OR	XF3/AUX1	J6.59> 27B	♥RFX4/AUX2
	G_PTT_OUT	J6.60> 28B	OREMOTE PTT OUT
- J6.29) 29A O C	OMM-	J6.612 29B	ORX 1 MUTE
J6.30	OMB_PTT_IN	J6.62	OREPEAT_PTT_IN
J6.31) 31A Q +	13.8VF	J6.633	OREMOTE PTT IN
J6.32	GM_RXD	328	OPGM TXD

JB 65 2 1C	
JE 66 2C	-0 +13.8VF
J6.67) 3C	-O DPLX LINE B
J6 683 4C	- O AUX SPARE 52
J6.692 5C	
J6.70> 6C	
J6.71>7C	-
J6.72	
90	
J6.73 / 10C	-O -12V
J6.74> 10C	
J6.75) 12C	-O AUX_SPARE_12
J6.762 13C	-O AUX_SPARE_15
J6.//) 14C	O DGND
J6.78> 15C	O + 5V
J6.79) 16C	-Q IF/AUX-SPARE_1
J6.80 > 17C	O IF/AUX-SPARE_4
J6.81 > 1/C	-O IF/AUX-SPARE_7
J6.82	-O RESET
J6.837 19C	-O AUX SPARE 21
J6.84) 20C	-O AUX SPARE 23
J6.85 21C	O A+
J6.86 22C	-O AUX SPARE 26
J6.87) 23C	-O AUX SPARE 28
J6.88> 24C	-Q AUX SPARE 31
J6.89 25C	-Q AUX SPARE 34
J6.90 26C	
J6.91> 27C	
J6.92> 28C	
J6.932 29C	
J6.94 30C	-O AUX_SPARE_ 35
210	
J6.95 > 32C	-O LOCAL_PTT
J6.96> 320	-0 +13.8VF

SPARE 2

J7.1 > 1A	J7.33 2 1B	- O AGND	J7.65	-O AGND
UZ 2 Y 48 OF EXT. JCKO/CO. YOLT)	J7.34 2B	-O SYS_VOLISQ_HI	JZ 66 2C	-Q +13.8VF
	J7.35 } 3B	-O DPLX LINE A	.17.67	-O DPLX_LINE_B
	J7.36 > 4B	-OLINE_A	17.68 AC	-O AUX_SPARE_52
J75 >O VG SQ DSBL	J7.37	_O STATUS	J7.69	
J7.6 > 6A O ROVR_VOLISO_HI	J7.38) 6B	-O TX_MTB+	.17 70	
J7.7 > 7A OCG_MON (BT DSBLE)	J7.39> 7B		J7.71	-0 _{+12V}
J7.8 > 8A Q -5V	J7.40> 8B	o -5V -	J7.72> 8C	-0.12V
J7.9) 3A O AUX_SPARE_8	J7.41) 9B	_OAUX_SPARE_9	J7.73	O -12V
17.10 N 1900 O 15V A	J7.42	O+ 5VA	J7.74 10C	
J7.11 >O AUX_SPARE_10	J7.43> 11B	-OAUX_SPARE_11	J7.75	-O AUX_SPARE_12
J7.12 > 12.0 O AUX_SPARE_13	J7.44	-O AUX_SPARE_14	J7.76	-O AUX_SPARE_15
J7.13 > 13A O DGND	J/.45 2 14 D	O DGND	31.112 140	-O DGND
J7.14 > 14A	J7.46/	— ○ + 5V	J7.78> 14C	-O₊5γ
	J7.47 > 19B 17.40 > 16B	-O AUX_SPARE_17	J7.797 10C	-O IF/AUX-SPARE_1
J7.16 V IF/AUX-SPARE_2	170	-O IF/AUX-SPARE_3	J7.80 > 16C	-O IF/AUX-SPARE_4
JAN THAUX-SPARE_D	J7.432	-O IF/AUX-SPARE_6	J7.81> 18C	-O IF/AUX-SPARE_7
	J7.50)	C AUX_SPARE_18	J7.82	-O RESET
	J7.51) 19B	AUX_SPARE_20	37.837 000	-O AUX_SPARE_21
J7.20) 20A () AUX_SPARE_22	01.02 J	•• 1950_DIS	210	-O AUX SPARE 23
J7.21) (J A+	07.03) 22B	O A+	J7.897 22C	-O A+
J7.22	J7.542 22D	O AUX_SPARE_25	230	-O AUX_SPARE_26
J7.23 24A V ANT_REL	37.957 24P	-O AUX_SPARE_27	J7.87) 24C	-O AUX_SPARE_28
J7.242-256 OFAUX_SPARE_29	J7.567 25D	QAUX_SPARE_30	J7.887 25C	-O AUX_SPARE_31
J7.257 O AUX_SPARE_32	J7.577 20D	- QAUX_SPARE_33	J7.897 20C	-O AUX_SPARE_34
J7.267 07 0 EXI_LSD	270	-OEXT_HSD	270	-O PA_KEY
200	J7.592 20D	-O RFX4/AUX2	J7.91> 28C	-O COMB_PTT_OUT
01.207 00 0 00 F11_001	J7.607 20D	REMOTE_PTT_OUT	J7.92 > 29C	→ COMM+
37.29 30A	J7.61 / 2010	-O RX_1_MUTE	J7.93> 30C	→ AUX_SPARE_35
J7.307 310 O COMB_PTI_IN	37.62 7 21B	- Q REPEAT_PTT_IN	J7.94>	
07.31 / 22A 0 +13.8VF	37.63	-O REMOTE_PTT_IN	J7.95> 32C	-O LOCAL_PTT
J7.32)	J7.64 > 328	-O PGM_TXD	J7.96 > 520	- O 13.8VF

-O AGND

----Ö DGND

SPARE 3

J8.1>1A O AGND J8.2>2A O AGND J8.2>2A O EXT_JCK(VCO_VOLT) J8.3>3A O RX_MTR+ J8.4>5A O LINE_B J8.5>5A O VG_SQ_DSBL J8.6>7A O CG_MON(BT DSBLE) J8.8>3A O 5V J8.9>3A O AUX_SPARE_8 J8.10>10A O 5VA J8.11>11A O 40V, SPARE_10 J8.12>12A O AUX_SPARE_10 J8.12>13A O DGND J8.13>14A O 45V J8.15>16A O IF/AUX_SPARE_16 J8.16>16A O IF/AUX_SPARE_16 J8.16>16A O IF/AUX_SPARE_16 J8.16>16A O IF/AUX_SPARE_16 J8.16>16A O IF/AUX_SPARE_18 J8.19>20A O AUX_SPARE_19 J8.2>22A O AUX_SPARE_22 J8.2>22A O AUX_SPARE_22 J8.2>22A O AUX_SPARE_23 J8.2>22A O AUX_SPARE_23 J8.2>22A O COMM- J8.3>30A O COMB_PTT_IN J8.3>30A O COMB_PTT_IN J8.3>32A O AUX_SPA	18.33 18 J8.33 28 J8.35 38 J8.35 48 J8.35 48 J8.35 48 J8.35 68 J8.39 68 J8.39 78 J8.39 78 J8.40 88 J8.41 98 J8.42 108 J8.44 128 J8.45 138 J8.55 238 J8.55 238 J8.55 248 J8.59 268 J8.61 238 J8.62 308 J8.62 328 J8.63 328	O AGND O SYS_VOL/SQ_HI O DPLX_LINE_A O IDPLX_LINE_A O INTRCM_AUDIO O TX_MTR+ O INTRCM_AUDIO O AVX_SPARE_9 O AVX_SPARE_1 O AVX_SPARE_11 O AVX_SPARE_11 O AVX_SPARE_12 O AVX_SPARE_17 O IF/AUX-SPARE_3 O IF/AUX-SPARE_3 O IF/AUX-SPARE_6 O AVX_SPARE_18 O AVX_SPARE_18 O AVX_SPARE_12 O AVX_SPARE_20 O 1950_DIS O AVX_SPARE_20 O AVX_SPARE_20 O AVX_SPARE_20 O AVX_SPARE_23 O AVX_SPARE_23 O AVX_SPARE_33 O EXT_HSD O RFX4/AUX2 O REMOTE_PTT_UN O REMOTE_PTT_IN O REMOTE_PTT_IN O REMOTE_PTT_IN	J8.65 IC J8.65 2C J8.68 4C J8.69 5C J8.70 6C J8.71 7C J8.73 9C J8.74 18.73 J8.75 12C J8.75 12C J8.78 16C J8.78 16C J8.78 16C J8.78 16C J8.78 16C J8.83 19C J8.84 20C J8.85 21C J8.88 24C J8.89 25C J8.91 27C J8.92 28C J8.93 30C J8.94 30C	 AGND 13.8VF DPLX_LINE_B AUX_SPARE_52 DETECT_DIS IRM_SFR 12V 12V 12V 12V AUX_SPARE_12 AUX_SPARE_15 OBND 45V IFAUX-SPARE_16 FRAUX-SPARE_21 AUX_SPARE_21 FRAUX-SPARE_23 AUX_SPARE_23 AUX_SPARE_23 AUX_SPARE_23 AUX_SPARE_23 AUX_SPARE_23 AUX_SPARE_23 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_35 AUX_SPARE_34 AUX_SPARE_34 AUX_SPARE_35 AUX_SPARE_35 AUX_SPARE_36
J8.31 > 31AO +13.8VF	J8.63 31B		31C	O LOCAL_PTT O+13.8VF

POWER MODULE

J9.1 ≻ <u>1A</u>		J9.33>1B		J9.65
.192) 28	-O EXT_JCK (VCO_VOLT)	1.19.24	-O SYS_VOLISQ_HI	J9.6
193338	-Q BX_MTR+	J9.35	-O DPLX_LINE_A	J9.6
	-O LINE_B	J9.36>	-O LINE_A	J9.6
.19.50 OA	-O VG_SQ_DSBL	J9.37 > 5B	-O STATUS	J9.69
10 ch 6A	-Q ROVR_VOLISQ_HI	J9.38 > 6B	-O TX_MTR+	J9.7
19.7	-OCG_MON(BT DSBLE)	J9 39 2 10	-O INTROM AUDIO	J9.7
19.0	- Q -5V	.19.40 × 8B	-0 ^{-5V}	J9.72
	-OAUX_SPARE_8	J9.41≻ ^{9B}	-O AUX_SPARE_9	J9.7:
J9.10 2 10A		J9.42	-0+5VA	J9.7
J9.11 > ""	O AUX SPARE 10	J9.43	-O AUX_SPARE_11	J9.75
J9.123 12A	-O AUX_SPARE_13	J9.44> 12B	-O AUX_SPARE_14	J9.7
J9.13	-Q DGND	J9.45≻ 13B	-O DGND	J9.77
.19.14 2 14 M	O +5V	J9.46≻	-O+5V	J9.78
J9.15 > 15A	-O AUX_SPARE_16	J9.47>	_O AUX_SPARE_17	J9.79
J9.16> 16A	-Ó IF/AUX-SPARE 2	J9.48) 16B	-O IF/AUX-SPARE_3	J9.80
J9.175 17A	-O IF/AUX-SPARE_5	J9.49> 17B	-Q IF/AUX-SPARE_6	J9.81
J9.18) 18A	Q IF/AUX-SPARE_8	J9.50 > 18B	-O AUX_SPARE_18	J9.82
J9.19> 19A	-Q AUX_SPARE_19	J9.51 > 19B	-O AUX_SPARE_20	J9.80
J9.207 20A	-O AUX_SPARE_22	J9.52 > 20B	-O 1950_DIS	J9.84
10.21 5 510	-0 A+	J9.53 > 21B	-0 A+	J9.85
	-O AUX_SPARE_24	J9.54 > 22B	-O AUX_SPARE_25	J9.86
	-O ANT_REL	J9.55 ≻ 23B	-O AUX_SPARE_27	J9.87
	-O AUX SPARE 29	J9.56> 24B	-O AUX_SPARE_30	J9.88
	-O AUX_SPARE_32	J9.57> 25B	-O AUX_SPARE_33	J9.89
	-O EXT_LSD	J9.58> 26B	-O EXT_HSD	J9.90
J9.27	-Ó RXF3/AUX1	J9.59> 27B	-O RFX4/AUX2	J9.91
19 20 3 288	-O VG_PTT_OUT	J9.60> 28B	-O REMOTE_PTT_OUT	J9.92
19.29 ~ 238	-Ф сомм-	J9.61> 29B	-O RX_1_MUTE	J9.93
19 20 N 30A	-O COMB_PTT_IN	J9.62> 30B	-O REPEAT_PTT_IN	J9.9
10.045 910	-Q +13.8VF	J9.63 > 31B		J9.95
J9.32 > 32A	-O PGM_RXD	J9.64> 32B		J9.96
	-		-	

10	
J9.65	O AGND
J9.66>2C	-Q +13.8VF
J9.672 3C	-O DUPLEX LINE B
J9.68>4C	-O AUX SPARE 52
J3 63 €C	
J9.70) 6C	
J9.712 7C	-0 .12V
J9.72	-Q +12V
J9.73> 9C	-O -12V
J9.74) 10C	-0-12V -0-12V
J9.75) 11C	
100	-O AUX_SPARE_12
130.762	-O AUX_SPARE_15
J9.777 14C	-O DGND
J9.78> 15C	Q +5V
J9.79 19C	-O IF/AUX-SPARE_1
J9.80) 17C	-O IF/AUX-SPARE_4
J9.81 > 18C	-O IF/AUX-SPARE_7
J9.82)	-O RESET
J9.83 > 19C	-O AUX_SPARE_21
J9.84) 20C	-O AUX SPARE 23
J9.85 > 21C	O A+
J9.86 > 22C	-O AUX SPARE 26
J9.87 23C	-O AUX_SPARE_28
J9.88> 24C	-O AUX_SPARE_31
J9.89 > 25C	-O AUX SPARE 34
J9.90 26C	-O PA KEY
J9.91> 27C	
19 92 28C	
J9.93≻ 29C	O AUX SPARE 35
J9.94) 30C	✓ AUA_SPARE_30
J9.94/31C	-O LOCAL PTT
J9.96 32C	-0 +13.8VF
03.367	Q +13.0VF

INTERFACE BOARD

J10.33) 1B J10.2 - 2A O SQ-ARM J10.2 > _____ O SQ-ARIM J10.3 > ____ A O MIC_HI J10.4 > ____ O LINE_B J10.5 > ____ A O DELX_LINE_A J10.35 J10.30) 4B O LINE_A J10.36) 5B O DPLX LINE_B J10.6 5 6A J10.38 > 6B J10.38 → 05 J10.39 → 7B J10.40 → 8B J10.41 → 9B J10.41 → 105 J10.7 > 7A O INTROM AUDIO J10.8 > 8A O INTE J10.8 > 9A O -5V J10.9 > 9A J10.42> 10B Q +5VA J10.10 - 10A +5VA J10.43 J10.11 > 11A J10.44 J10.122 12A J10.44 > 13B O DGND J10.45 > 14B O DGND J10.46 > 16B O +5V J10.13) 13A O DGND 0 DGN. J10.14 - 0 +5V J10.15 - 15A J10.15) 16A O IF/AUX-SPARE_2 J10.16) 17A O IF/AUX-SPARE_5
 J0.17
 III.A. O. FIAUX-SPARE_5

 J0.18
 IBA. O. FIAUX-SPARE_8

 J0.19
 IBA. O. FIAUX-SPARE_8

 J0.19
 20A. O. BATT_STDBY

 J0.21
 21A. O. BATT_STDBY

 J0.21
 22A. O. BATT_STDBY

 J0.22
 22A. O. RX (_MUTE)
 J10.50 J10.51 J10.51 J10.52 J10.52 J10.52 J10.53 J10.54 J10.55 J10.22> 23A O RX 1_MUTE J10.23> 23A O ANT_REL J10.24> 24A O RX 1_REL J10.25> 25A O PWR_SNSR J10.25> 26A O RXF1 J10.26> 26A O M3_STATUS J10.54 > _____O FLAG_1 J10.55 > _____3B O PA_KEY J10.56 > ____4B O TXF1 J10.57 > ____5B O SERIAL_CLK 0 SERIAL_CLK J10.58> 26B O SERIAL_CLK J10.58> 27B O RXF4/AUX2 J10.59> 27B J10.27> 27A O PGM BXD J10.27) → OPGM_RXD J10.28) → 28A → OCOMB_PTT_OUT J10.29) → 29A → OCOMM-J10.30) → 30A → OA1 J10.31) → 31A → A1 J10.31 → 32A → 13.8VF J10.60> 28B O FLAG_0 J10.60> _____O FLAG_0 J10.61> _____O FLAG_3 J10.62> _____O A2 J10.63> _____O DATA J10.32 32A O INT_OSC J10.64 32B

J10.66> 2C O+13.8VF J10.66> 3C J10.67> 4C J10.68> 4C J10.69 5C J10.72> 8C • +12V J10.72> 9C • +12V J10.73> 400 • -12V J10.74 - 10C - 12V J10.75 11C 0 +5VA J10.75) 11C O -5VA J10.75) 12C O DGND J10.77 3C O J5V J10.77 14C O 45V J10.79 15C O F/AUX-SPARE_1 J10.89 15C O F/AUX-SPARE_4 J10.81 17C O F/AUX-SPARE_7 J10.82 18C O FAUX-SPARE_7 J10.82 19C O CALETT J10.84 20C Q LOCAL_PTT

 20C
 Q LOCAL_PTT

 J10.85>
 21C
 Q A.

 J10.85>
 22C
 Q FLAG_2

 J10.87>
 23C
 Q FLAG_2

 J10.87>
 24C
 Q TKF2

 J10.89>
 25C
 Q RXF2

 J10.90>
 28C
 Q FK72

 J10.91>
 27C
 Q FCMTX0

 J10.92>
 28C
 Q COMM+

 J10.93>
 29C
 Q A0

 J10.94>
 30C
 Q A0

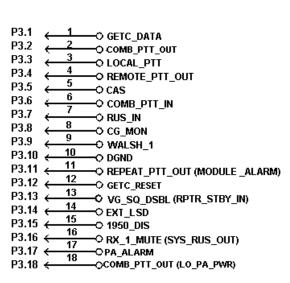
 J10.95>
 31C
 Q ENABLE

 J10.96>
 32C
 CLOCK

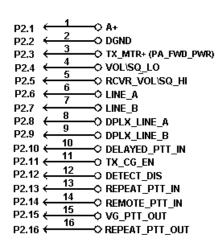
T/R SHELF BACKPLANE (A1) 19D902947G1

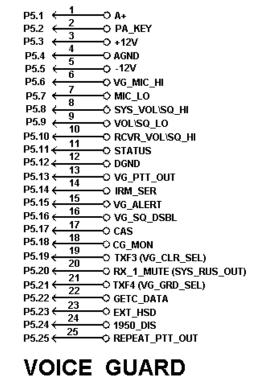
(19D902949 Sh.2 Rev.4)

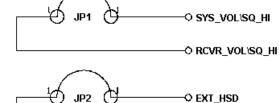
GETC

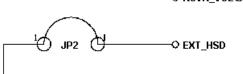










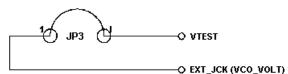












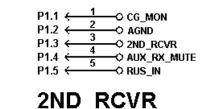
NOTE: CUT PWB RUNS TO USE VCO_VOLT











EXTERNAL METERING/RIC

P4.1 ← P4.2 ←	<u>2</u>	MIC_HI Agnd
P4.3 ← P4.4 ←	4 <u></u> 0	EXT_JCK (VCO_VOLT) TX_MTR+
P4.5 ← P4.6 ←	h	LOCAL_PTT INTRCN_AUDIO

LBI-38637F

TO MEASURE AN EXTERNAL VOLTAGE

T/R SHELF BACKPLANE (A1) 19D902947G1

(19D902949 Sh.3 Rev.5)

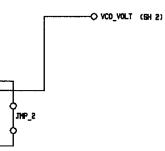
J1 TX SYNTH J5 SYSTEM MODULE J6 SPARE 1 J10 INTERFACE BOARD P1 2ND RCVR J7 SPARE 2 J2 RX SYNTH P2 GETC **J3 RX FRONT END** J8 SPARE 3 P3 GETC J9 POWER MODULE P4 EXT. METERING / RIC J4 RX IF P5 VOICE GUARD 2C,31A +12V -----> -CI +12V > -12V D--< 20A -< 16A, B, C > > +-< P5.5 > -+-+13.8VF D-< 2C, 31A, 32C > -CI +13.8VF --CI +5VA --CI +5V +5VA < 10A.B > 1 < 18A, B, C > (14A, B, C, 25C, 26C> +57 🗅 -57 🗖 < 8A, 3 -**I**-< 8A, B +< 8A,B >-+ -0 -5V >_ -CI (950_DIS(IRM/SRH_CNTL) 1950 DIS(IRM/SRM CNTL) 12A 208 -CI 2ND_RCVR 2NŪ_RCVR 🗅 30 < P1.3 P2.1,P5.1 L< 21A, B, C < 21A, B, C > -< 21A, 8, C >--> >+ -CI A0 42 -< 308 ⊥ → iA,B,C L PI.2, P4.2, P5.4 -< 1A, B, C ⊥< 1A, B, C -CI AGNO AGND D-ANT_REL. D-Aux_rx_nute D-+< 23A 5-1 +< 23A >+ --- P1.4 AUX_SPARE_0 D-AUX_SPARE_0 D-AUX_SPARE_10 D-AUX_SPARE_10 D-AUX_SPARE_11 D-<u>ST</u> -I-< 11A > μ AUX_SPARE_12 D-AUX_SPARE_13 D-AUX_SPARE_14 D-+< 128 AUX_SPARE_15 D-AUX_SPARE_16 D-12C 2-1-AUX_SPARE_17 D-AUX_SPARE_18 D-AUX_SPARE_19 D--CI AUX_SPARE_17 -CI AUX_SPARE_18 -CI AUX_SPARE_18 -< 158 +-< 188 \rightarrow + >⊤ AUX_SPARE_20 AUX_SPARE_20 AUX_SPARE_21 AUX_SPARE_22 AUX_SPARE_22 AUX_SPARE_23 AUX_SPARE_24 ≥± - 1 -+-< 20A 5-+ 20C 22A 22B ALM, SPARE 24 () ALM, SPARE 25 () ALM, SPARE 25 () ALM, SPARE 27 () ALM, SPARE 27 () ALM, SPARE 29 () ALM, SPARE 23 () ALM, SPARE 24 () ALM, SPARE 25 () ALM, SPARE 24 () ALM, SPARE 25 () ALM, SPARE 25 () ALM, SPARE 26 () ALM, SPARE 27 () ALM, SPARE 27 () ALM, SPARE 28 () ALM, S +< 220 238 23C 24A 2 +< 248 `**≻**_ 1 24C ⊥~ 258 -+-< 250 -< 40 >-BAT_STNŪBY (C)-Cas (C)--< 20A < 200 > 1 -< 26C >---< 20B < P3.5, P5, 17 > -CI (AS < 68 -+ Ę -CI CG_MON(BT_DSBLE) -CI CLOCK CG_HON(BT_DSBLE) < P1.1, P3.8, P5.18 >-**-< 18B** ____< 2C ـلــــ ____ 31C ⊥< 16C - 1 COMB_PTT_IN C> +-< 304 +-< P3.6 -CI COMB PTT IN > > 28A 28C 29A CONB_PTT_OUT(LO_PA_PHR) CO-27C 28C 28A +< 12A -< P3.2, P3.18 -CI COMB_PTT_OUT(LO_PA_PHR) Ц <u>}</u> < 28C > _ < 29A DATA D --< 3C \rightarrow +< 318 CI DATA +< 19A -CIDC CNTRL > >----CI DC CNTRL 2 **~ 19**8 <u>}</u> < 19C -CI DC_CNTRL_3 +-< P2.10 DETECT_DIS(RPT_AUD_HUTE) +< 128 T < 5C Ц < 13A, 8, C > DGND 🕞 < 13A.B.C -CI DGND I__ 38 $-\mathbf{r}$ _____ 5A JPLX_LINE_A CD--< P2.8 - O DPLX LINE A < 5A 59 DPLX_LINE_B --+-< 3C >+ ----< 58 +-< P2.9 CI DPLX_LINE_B >+-< 4C ___< 39C Ē BNABĒE 🖂 -CIENABLE ~ >---1 < 269 | ____< P5.23 ____< P4.3 __+_< P3.14 -< 269 EXT_HSD C> - (DXT_H50 > < 118 1**~ 26**A - 1 5--+ < 26A > \geq 12 22C +--< 13C >+ + < 298 >+-CI GETC DATA GETC_RESET D < 288 _____ > -CI GETC_RESET ____ _____ J6 SPARE 1 J1 TX SYNTH J5 SYSTEM MODULE J10 INTERFACE BOARD P1 2ND RCVR J7 SPARE 2 J8 SPARE 3 P2 GETC P3 GETC J2 RX SYNTH **J3 RX FRONT END** P4 EXT. METERING ∕ RIC P5 VOICE GUARD J4 RX IF **J9 POWER MODULE T/R SHELF BACKPLANE (A1)**

INTERCONNECT DIAGRAM

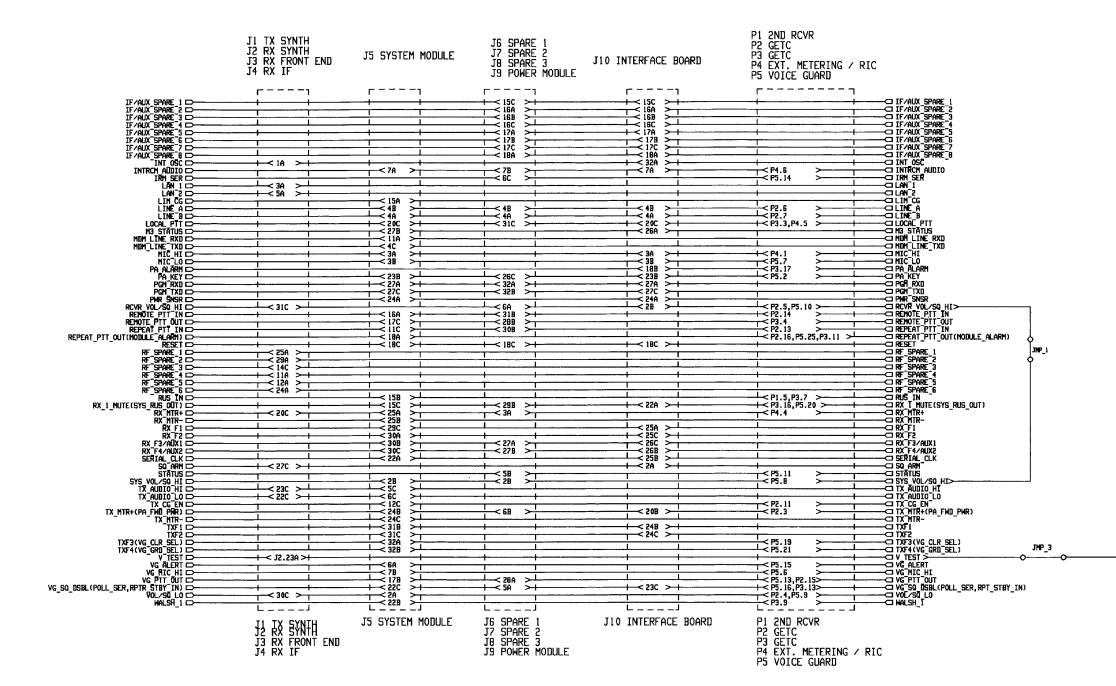
19D902947G1

(Sh.1)

NOTE 1: AGND PI	NS ON RF MODULES
IC	194,8,0
2A	208
4A	21A,B,C
5C	228
6A	230
7A	24B,C
8A,B	250,C
9A, B, C	260
E,AQ1	278
118	28A,B,C
129	290,C
138	300
14A, 9	31B
17A, B, C	328,C



INTERCONNECT DIAGRAM



LBI-38637F

-> EXT_JACK (VCO_VOLT) (SH I)

T/R SHELF BACKPLANE (A1) 19D902947G1

(Sh.2)

P104 OR P105-

J104 OR J105-

(P181)

OUTLINE DIAGRAM

COMPONENT SIDE

0

U106

U107

0000

0000

000 R138

P107

D104 🗆 O

to

(121

0000000

10000000

þþi

00

000000

U111

цф

82 U113 1□0000000

0000

-U108-

0000

R193 R191 R194 R194 R194 R145 R145 R149 R149 R145

00000000000

000000

P103

U105

0000

5 Ū112

10000

 \odot

J103

0000

0000

 $\overline{\mathbf{n}}$

C 101

 ~ 0

O^{\$6106}O

O⁵⁶¹⁰⁴O

-O^{SG 103}O

O^{\$6101}O

O⁵⁶¹⁰⁵O

O^{SG102}O

C102

-O.

000000

TB101

0

0

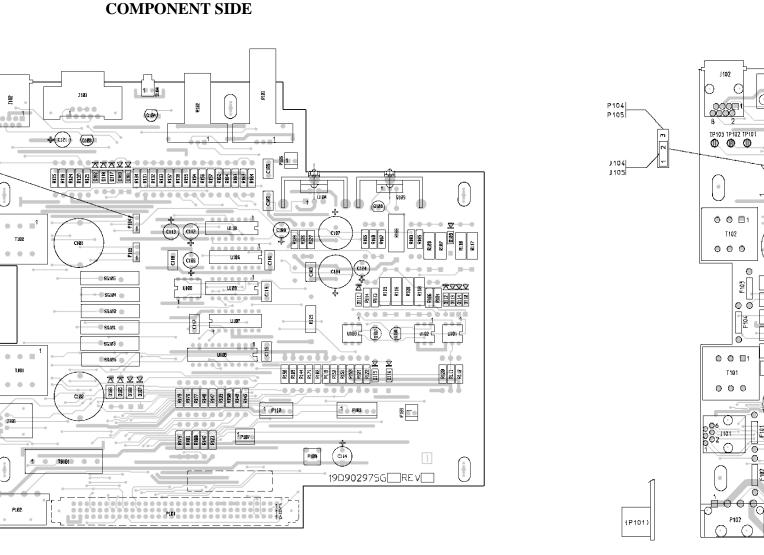
92

iO)

9

00000

R136 R136 R124 R125

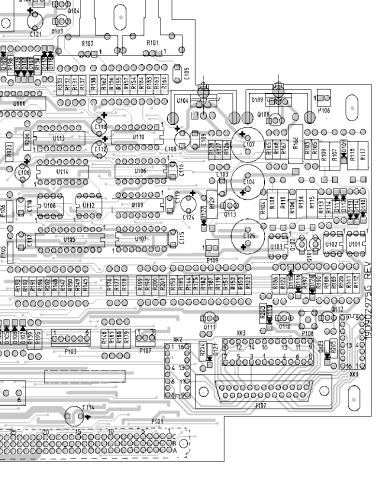


(19D902975, Rev. 4)

(19D902975, Sh. 1, Rev. 2) (19D902976, Rev. 1)

T/R SHELF INTERFACE BOARD (A2) 19D902975G1

T/R INTERFACE BOARD (Rev. A and later) (A2) 19D902975G1



LEAD IDENTIFICATION FOR Q101, Q102, Q103, Q104 & C102

FLAT

IN-LINE TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

COMPONENT SIDE щQ, i Milional M 000⊡ 0000 R101 R102 00000 TP103 TP102 TP101 <u>EE 0000 0 00000000 m</u>e 6228882 0000000 0000000 U111 0000 0 000000000 (s2) _____O $\bigcirc \bigcirc$ O 0000000 (113))<u>000000</u>1 ∎ ^{U110} 5 U113 1□000000 000000 0001 (112 R123 0000000 T102 <u>, 00000000</u> 0 (106 C101 000 Офс U114 00000000 O /E 0-0 00000001 U109 E O^{SG106}O F103 L U108 J U112 0000 0000000 0^{SG104}0 -0 [10] C125 00000 Ĭ 0^{SG103}0 100 о 0^{S6101}0 00000000000 O^{SG105}O 0001 R193 R192 R194 R194 R194 R194 R148 R148 R147 R149 R149 R145 R176 R177 R178 R204 R199 R199 R199 R700 0^{SG102}0 T101 ာဝဝုဂ္လဝဝ 0000000000 000 ᡥᡂᢛᠬᢛ 0000 P103 C101 00 <u>100000</u>0 0000000 0 R207 2 PP1 0 50 10005 20006 J109 0 0 0 0 0 0 Ο ၀၀၀၀ 0 F102 **S1** 08 n 90 0 c114 6 0)+

P104 P105

J104 J105

(P101)

(19D902975, Rev. 6)

ADD BAR CODE LABEL IN THIS AREA NEARSIDE

10000000 C

J.



OUTLINE DIAGRAM

⊿

REMOVE ADHESIVE LINER AND POSITION ITEM 9 AS SHOWN.

TORQUE SCREWS (ITEM 6) TO 7 LB./IN.

1 NOTES:

MOUNT AS SHOWN. TWIST LEADS OF C105 AND R208 TOGETHER AND SOLDER. WRAP LEADS OF C126 AROUND LEADS OF R127 AS SHOWN AND SOLDER. KEEP ALL LEADS AS SHORT AS POSSIBLE.

> LEAD IDENTIFICATION FOR Q101, Q102, Q103, Q104 AND Q108

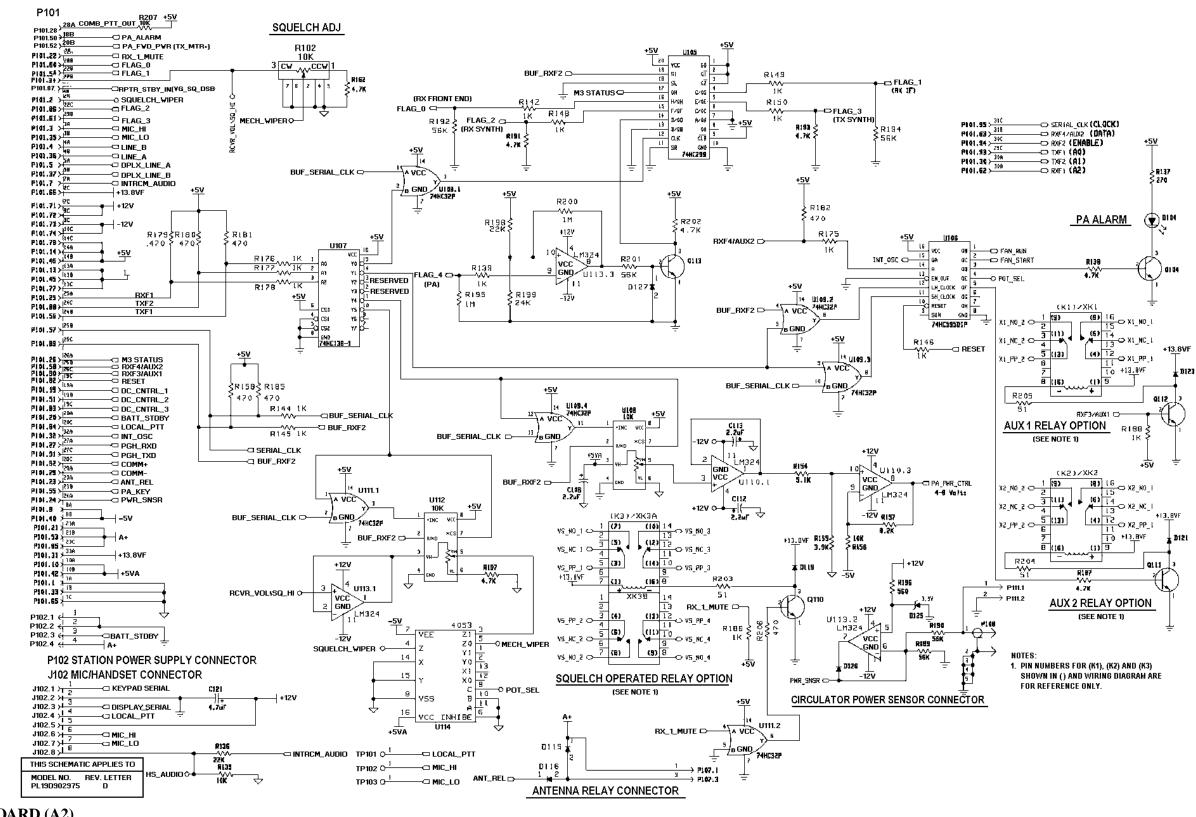
FLA1 IN-LINE TOP VIEW NOTE:

CASE SHAPE IS DETERMING FACTOR FOR LEAD IDENTIFICATION

LBI-38637F

T/R INTERFACE BOARD (Rev. C and later) (A2) 19D902975G1

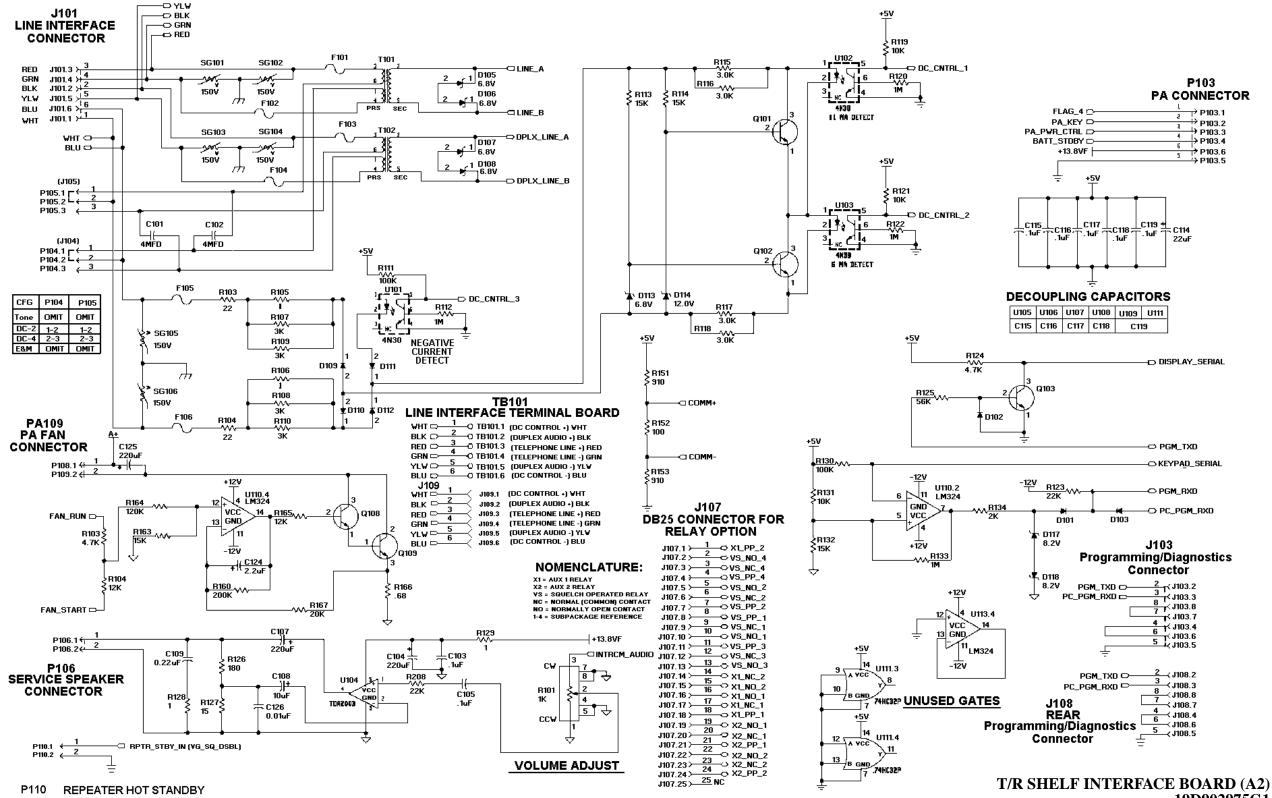
SCHEMATIC DIAGRAM



T/R SHELF INTERFACE BOARD (A2)

19D902975G1 (19D902977 Sh.1 Rev. 10)

24



19D902975G1

(19D902977 Sh.2 Rev. 10)