MOBILE RADIO

MASTR® II MAINTENANCE MANUAL

EACOM BASE STATION TONE REMOTE CONTROL SHELF

Maintenance Manual LBI 30623
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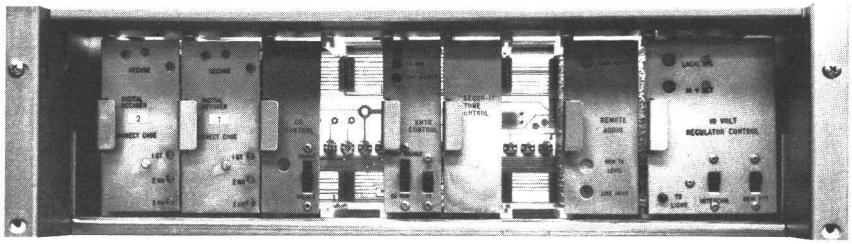

SPECIFICATIONS *

LINE TERMINATING IMPEDANCE	600 ohms
AUDIO LINE OUTPUT	-20 dBm to +11 dBm
FREQUENCY RESPONSE	±3 dB from 300 to 3000 Hz
NOTCH FILTER RESPONSE	2175 Hz
NOTCH DEPTH (MINIMUM, TONE LEVEL IS 20 dB BELOW VOICE LEVEL)	-45 dB
TEMPERATURE RANGE	-30°C to +60°C (-22°F to +140°F)
DISTORTION	Less than 3%

ese specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

EACOM STATION TONE REMOTE CONTROL SHELF

GENERAL ELECTRIC

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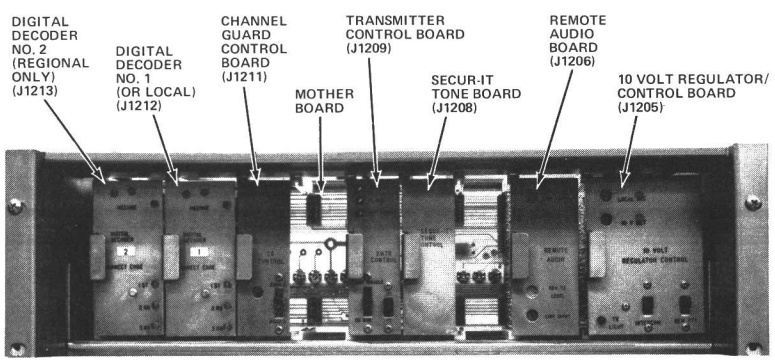
TONE CONTROL SHELF



WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS!

DESCRIPTION

The General Electric MASTR® II Emergency and Administrative Communication (EACOM) Tone Remote Control Shelf is used with a EACOM remote control console for either local or regional station applications. The local area station permits radio communication with local hospital mobile units and with other hospitals in the area. The regional station permits radio communication with local hospital mobile units, with other hospitals in the area and with regional hospitals within the coverage area.

A Mother Board is utilized on the control shelf to interconnect the plug-in function modules. This Mother Board provides the function module jacks, the station interconnect jacks and the printed wiring runs between these jacks. External connections are made to terminal board TB1201 located on the rear of the Mother Board.

The different remote control functions performed by the Tone Control Shelf are accomplished by applying a series of tones in sequence at the prescribed level to the transmission medium for detection at the Control Shelf.

Tone Control Sequence

When a transmit function is selected at the remote control console, the Secur-it tone frequency of 2175 Hz is transmitted for a period of 125 milliseconds at a level equal to normal voice peaks. In the case of a zero VU line level, the Secur-it tone is transmitted at a level of +10 dBm. At the end of this 125 milliseconds, the tone is changed to that of the function frequency selected. The function tone is transmitted for a period of 40 milliseconds at a level of 10 dB below the Secur-it tone burst.

The function tone burst is then followed by a 2175 Hz tone transmitted at a level 30 dB below its initial Secur-it burst level. This low level 2175 Hz tone remains on in the presence of voice as long as the PTT switch is operated at the remote Control Console.

When the Channel Guard and decoder disable function or the Channel Guard and decoder enable function is selected at the remote control console, the Secur-it tone is transmitted for 125 milliseconds followed by the function tone for 40 milliseconds. The low-level 2175 Hz tone is not transmitted for these functions.

LOCAL EACOM Control Functions

The control tone frequencies selected at the remote control console for performing each function in a Local Area EACOM Base Station are listed in Table 1.

TABLE 1
Local EACOM Control Function

FUNCTION	TONE FREQ.
F1 TRANSMIT Select	1950 Hz
Channel Guard Encode Disable & TX F1	2050 Hz
Secur-it tone (CG Encoder Enabled when tone removed)	2175 Hz
Disable CG Decoder and Digital Decoder	1450 Hz
Enable CG Decoder and Digital Decoder	1550 Hz

REGIONAL EACOM Control Functions

The control tone frequencies selected at the remote control console for performing each function in a Regional Area EACOM Base Station are listed in Table 2.

TABLE 2
Regional EACOM Control Functions

FUNCTION	TONE FREQ.
F1 TRANSMIT Select	1950 Hz
Channel Guard Encode Disable and TX F1	2050 Hz
F2 TRANSMIT Select and CG Encode Disable	1850 Hz
Disable Decoders on both receivers	1450 Hz
Enable Decoders on both receivers	1550 Hz

ADJUSTMENTS

Before making adjustments on the Base Station Control Shelf, make sure that all power line, phone line and ground connections have been completed at the remote control console and at the Base Station. Also, the remote control console and Base Station should have been properly aligned.

A. TEST EQUIPMENT REQUIRED

1. Audio Oscillator. Hewlett Packard Model 401C or equivalent.

2. VOM. Simpson Model 260 or equivalent.

3 AC VTVM. Heathkit Model IM-38 or equivalent.

B. LINE INPUT

1. Feed a 1000 Hz tone at the required level into the microphone jack of the remote control console having the largest line loss. Adjust the remote control console line output control for 2.7 Volts RMS as measured across the audio pair at the remote control console.

2. Key the Base Station Transmitter from the remote control console* and adjust LINE INPUT control R39 on the Remote Audio Board for threshold of compression as indicated by a 1 dB drop on an AC VTVM connected between the emitter of Q20 and ground.

C. XMIT LEVEL

1. Key the Base Station transmitter from the remote control console.* Adjust the XMIT LEVEL control R50 on the Remote Audio Board for 4.5 kHz system deviation as measured on a deviation meter.

D. LINE OUTPUT

1. Connect a signal generator to the Base Station receiver adjusted to the receiver frequency and modulated at 3.0 kHz deviation by a 1000 Hz signal. Disable Channel Guard if present.

2. Adjust the LINE OUT control R14 on the Remote Audio Board for a reading of 2.7 Volts RMS as measured at the Base Station audio pair.

* The station may also be adjusted by connecting the audio generator across the audio pair at the station and keying the transmitter by holding the REMOTE PTT switch on the 10-Volt Regulator/Control Board in the REMOTE PTT position.

MAINTENANCE

The Tone Remote Control shelf is designed for ease of servicing and minimum maintenance. All circuit modules can be easily removed for routine inspection. An Extender Board (19A417458G1, Option 9544) is recommended for servicing any of the modules out of the shelf while maintaining circuit connections. Refer to the Troubleshooting Procedure (see Table of Contents) when maintenance becomes necessary.

CIRCUIT ANALYSIS

Audio Board 19A129924G3

The 19A129924G3 Audio Board is used in Remote Control applications. This board consists of a high-pass filter, audio amplifiers, a de-emphasis network, a line driver for feeding the receive audio to the telephone line, a compressor amplifier for controlling the line audio fed to the transmitter modulator, and audio and RUS switches for switching the transmit and receive audio paths.

Audio from the station receiver discriminator is coupled to emitter follower Q1 through the high-pass filter consisting of C2-C3 and R1-R2. This filter attenuates 60 and 120 Hertz to reduce the hum and noise. The output of the emitter follower is passed through a de-emphasis network C5 and R6. This network provides a 6 dB/octave rolloff. The signal is then amplified by Q2 and fed to another emitter follower Q3. The LINE OUT Control R14 is connected in the emitter circuit of Q3 and allows feeding the audio to the line driver at the proper level.

The audio is coupled through C10 to the RX NOTCH FILTER OUTPUT lead D14. This lead is connected to the Transmitter Control Board where the 2175 Hz tone components are notched out of the receiver audio. Resistor R16 and the jumper between H7 and H8 are removed in tone control systems.

When the audio is returned from the Transmitter Control Board via RCVR NOTCH FILTER INPUT lead D13, the signal is coupled to the line driver. Q6 and Q8 amplify the signal. Q7 serves as an audio switch controlled by the RUS circuit. As long as the RUS switch (Q11) is turned off (receiver squelched), CR5 is forward biased allowing Q7 to conduct. Conduction of Q7 grounds the audio path between Q6 and Q8, preventing the audio from being passed to the line. When the receiver unsquelches, the RUS lead goes high. This turns Q11 on, turning off CR5 and Q7. The audio is now allowed to pass to the output amplifier Q9 and to the line transformer T1. CR2, CR3 and VR1 are provided for line surge protection.

In stations with Channel Guard, the RUS lead is connected to the Channel Guard Board. When the received signal is modu-

lated by the correct Channel Guard tone, Q7 is turned off, allowing the audio to pass to the line.

Audio from the telephone pair is coupled to the input of the transmitter compressor amplifier which consists of Q15-Q19. The proper audio level for the compressor amplifier is adjusted by LINE INPUT control R39. R41 and the AC impedance of transistor Q15 act as a voltage divider for the AC input signal. The output of Q15 is amplified by a four stage, direct-coupled amplifier (Q16-Q19). Both AC and DC feedback in the amplifier circuit provides for stable operation.

One portion of the amplified output is fed through R50 (REM TX LEVEL) to the XMTR AUDIO HI lead to modulate the transmitter. The remaining portion of the signal is rectified by detector CR6-CR7, filtered by C29, and amplified by DC current amplifier Q20. This DC output is fed back to the base of gain control transistor Q15.

The amount of DC feedback to Q15 determines the AC impedance of this transistor. When the input level rises, the AC amplifier output starts to increase. The output is detected, amplified, and fed back to the base of Q15. The increase in feedback reduces the AC impedance of Q15 which decreases the audio voltage to the AC amplifiers, keeping the output constant.

When the input decreases, the output of the AC amplifier starts to decrease, reducing the feedback to Q15. This raises the AC impedance of Q15 and increases the audio voltage to the AC amplifier, keeping the output constant.

The compressor amplifier resets when switching from the receive to transmit mode. Resetting the compressor amplifier prevents losing the first portion of a weak line signal due to the compressor release time. When the RUS lead returns to ground, Q11 is turned off. This allows the Receiver Unsquelch Sensor Operating Switch (RUSOS) lead to go high. Transistor Q14 is turned on, grounding the base of Q20. This shorts capacitor C29 for approximately 10 milliseconds. This resets the compressor amplifier.

Transmit audio is coupled from the REM TX LEVEL control R50 to the source terminal of FET Q21. Q22 is normally conducting, grounding the gate terminal of Q21 and preventing the audio from passing through the FET. Applying ground to the REMOTE PTT terminal D3 forward biases CR10, turning Q22 off. Q21 is now allowed to conduct, passing the audio signal to the TRANSMITTER AUDIO HI lead D14 and to the station transmitter modulator.

When the Intercom Kit is used in the station, audio from the local microphone is connected from the Intercom Board via D9 to the base of Q8 and, after amplification, the local audio is fed to the line transformer.

Line audio, after passing through the compressor amplifier is connected via B10 to the Intercom Board. Receiver audio overrides the intercom audio. Instructions for the Intercom Kit are provided in the maintenance manual for Option 9508.

When Secur-it Tone is detected, +10 VDC is applied to the AUDIO MUTE lead D2 f from the Secur-it Tone Board. This turns Q10 on, grounding the base of Q11. Q7 is now allowed to conduct and prevent the receive audio from reaching the line and masking the function tone. The RX 1 MUTE lead turns the receiver off during transmit, causing the RUS lead to go low. This turns off the receiver audio to the line.

Secur-it Tone Board 19D424051G1

The 19D424051 Secur-it Tone Board is used in the base Station Tone Control Shelf to detect the Secur-it tone when present on the audio pair and to enable the function control ciruits. When the Secur-it tone is transmitted from the remote control console, the signal is connected to the LINE AUDIO path A8. The line audio is passed through an active high-pass filter composed of AR1-A, R3, R4, C1 and C2. This filter eliminates AC hum present in the signal and rejects the low-frequency components of line noise.

The output of AR1-A is coupled through C3 to the Pre-filter composed of AR1-B, R6, R7, L1 and C31. The filter is broadly tuned to the 2175 Hz Secur-it tone frequency. AR2-A is a gain stage with feedback limiting to prevent saturation of the stage when high level signals are present. AR2-B and its associated components (C36, CR14, CR15, R8, R9, R93, VR4 and VR5) form a precision limiter which provides a symmetrical signal with controlled amplitude for the input to the HI-Q Filter.

Before Secur-it tone detection occurs, Q7 is conducting and the gain of AR2-B is determined by R9 in parallel with R10. After Secur-it tone detection, Q8 switches Q7 off. This allows the gain of AR2-B to increase so that the transmit hold tone (which is sent on the line from the remote control console at 30 dB below the Secur-it tone level) may be detected. The HI-Q Filter, operating at a Q of approximately 300, discriminates against other signals and high-level noise on the line.

The Secur-it tone detector is composed of Q2, Q3 and Q5. Q2 begins conducting when

peaks of the HI-Q Filter output signal exceed the reference voltage at the base of Q3. Conduction of Q3 operates Q5. The collector of Q5 rises to near the positive supply voltage, indicating the presence of the Secur-it tone on the line.

The output of AR1-A is coupled to AR4-A by C21. AR4-A and AR4-B amplify all line signals and these stages provide symmetrical limiting. The output of AR4-B is connected to the Activity Check circuit through C24. Q9, Q10 and Q12 function in the same manner as the tone detector. The output at the collector of Q12 is inverted by Q11, providing a low at its collector. Feedback from Q11 through R72 to Q10 provides snap action for this detector.

When the Secur-it tone is detected, the output from Q5 is applied through R48 and CR5 to the base of Q16, forcing its collector low. This low is applied to Q20, turning Q20 off. The resulting high at the collector of Q20 is connected to the AUDIO MUTE lead D2.

The low at the output of Q16 is applied to CR7 through R52. When the collector of Q16 is low, the collector of Q11 is also low. The low at Q11 is applied to CR8 through R53. Under these conditions, C17 is turned off. The high is also applied to pin 1 of U1-A. Conduction of Q4 shifts the reference voltage at the base of Q3 to provide hysteresis in the tone detection function. Conduction of Q8 turns off Q7, increasing the gain of AR2-B.

DETECTOR DISABLE lead D11 is normally high and is connected to pin 2 of U1-A. The resultant low output of NAND gate U1-A triggers the Window One-Shot (U1-B, U1-C and U1-D). Operation of the One-Shot provides the low DET output at D7, keying the transmitter. Q18 is turned off and the resultant high at the collector of Q18 is inverted by U1-D, applying a low to the base of Q14. Turning Q14 off unclamps the Limited Audio Amplifier (Q13, Q15 and Q21), allowing audio to pass through the amplifier to the LIMITED AUDIO lead A10.

The LIMITED AUDIO is connected to the tone detectors in the tone function modules. A positive output from the Window One-Shot at pin 6 of U1-B is fed back to Q16, holding on the 2175 Hz detect signal during the 40 ms function tone period.

The Window One-Shot period last for approximately 180 milliseconds. The Secur-it tone will be followed by a function tone during this period. If a transmit function is selected at the remote control console the 40 ms function tone period will be followed by the low level 2175 Hz hold tone. The increased gain of AR2-B insures that the hold tone will be detected, providing a continuous output at D7 and allowing the transmitter to remain keyed.

When the remote control function is complete, all tones will be removed from the line. The Activity Check circuit will drop out within approximately 25 ms, returning the AUDIO MUTE lead D2 and the DET lead D7 to their initial condition. The tone detector will drop out within 200 ms, returning the Secur-it Tone Board to its quiescent state.

FET Q6, together with switch Q16, form an audio phase cancellation circuit. LINE AUDIO is taken from the primary of the line transformer on the Audio Board. If the station receiver is active when the remote control audio is applied to the line, the 180 degree phase difference at the base of the line driver transistor on the Audio Board is used to help cancel received audio into the Secur-it Tone Board. This makes it easier to detect the speaker line audio. When Q16 is turned on, Q6 is turned off. This eliminates the phase cancellation signal.

Transmitter Control Board 19D416660G3 & G4

The 19D416660 Transmitter Control Board is available in two versions for the EACOM Tone Control System. Transmitter Control Board 19D416660G4 is used in single-frequency transmit (LOCAL) stations. Transmitter Control Board 19D416660G3 is used in two-frequency transmit (REGIONAL) stations. A Channel Guard encoder disable function is also provided on both of these boards. Both boards contain the RCVR NOTCH FILTER and the TX NOTCH FILTER for removing the 2175 Hz Secur-it tone from the audio path. The receive audio path is connected from the Audio Board via RCVR NOTCH FILTER OUTPUT lead D14 to the Transmitter Control Board. The filter is composed of series-resonant shunts L6-C10 and L4-C7 along with parallel resonant trap C9-L5. The filter notches out the 2175 Hz components from the receiver audio and returns the audio via RX NOTCH OUT lead D13 to the Audio Board.

The 2175 Hz tone is notched from the transmit audio path by the TX NOTCH FILTER, composed of series-resonant shunts L7-C11 and L9-C14 together with parallel-resonant trap L8-C13. The transmit audio is connected to the filter via LINE AUDIO path A8 and returned to the Audio Board via NOTCHED AUDIO path A9.

In single-frequency transmit applications, a function tone frequency of 1950 Hz is applied to the audio pair at the remote control console. This tone is connected to the 19D416660G4 Transmitter Control Board on the LIMITED AUDIO lead A10. An LC filter, composed of L1-C1 tuned to the 1950 Hz function tone, turns off diode CR1 on the positive peaks and allows Q1 to turn on through R2. Conduction of Q1 applies a low to the input of gate U1-D.

The grounded Secur-it DET lead D7 is connected to inverted U3-C, applying a high to the input of U1-A. The low output of U1-A is connected back to U1-D, latching the flip-flop. The low putput of U1-A is also inverted by U1-C and applied to NAND gate U1-B. The inverted high Secur-it DET lead is also connected to the input of U1-B. The resultant low output of U1-B is inverted by U3-B and the high turns on Q3. Conduction of Q3 grounds the PTT lead (D3) to key the station transmitter.

The high output of U1-D forward biases CR17, operating Q4. Conduction of Q4 selects the F1 transmitter oscillator. The high output of U1-C turns on Q15, grounding the LIMITED AUDIO path as long as the flip-flop remains latched. Unkeying the transmitter removes the ground from the DET lead D7, applying a low to pin 2 of U1-A. This unlatches the flip-flop.

Operating the XMIT DISABLE switch S2 to the DISABLE position opens the PTT path and applies ground to the XMIT DISABLE indicator LED CR11, turning it on.

Two-Frequency Transmit Control

Transmit Control Board 19D416660G3 is required for two-frequency transmit applications. The 1950 Hz tone frequency detector operates in the same manner as described for the G4 board. The PTT path is connected in the same configuration.

When TX F2 tone (1850 Hz) is selected at the remote control console, the tone is detected at the F2 filter (L2-C3), reverse biasing CR6 and turning on Q6. This latches flip-flop U2-A, U2-D, applying a low to gate U1-C. The transmitter is keyed as previously described. The high output of U2-D forward biases CR16 and turns on Q8 which, in turn, grounds the XMIT F2 lead A2 to select the transmit F2 oscillator. The high from the output of U2-D also turns on Q7, applying ground to XMIT F2 indicator LED CR9, turning it on.

In local PTT operation, with no function tone present on the LIMITED AUDIO path, the Secur-it DET lead D7 is high. Grounding the PTT lead D6 with the local PTT microphone turns on Q13 which, in turn, operates Q14 and forward biases CR3. The low input to U2-C is inverted and applied to NAND gate U2-B. The DET lead, which is high, is also connected to the input of NAND gate U2-B. The resultant low output turns off Q17 and selects the transmitter oscillator through F1-F2 service switch S1. The position of S1 determines which transmitter oscillator is selected.

Transmit Channel Guard Disable

The Transmit Channel Guard Disable detector circuit (2050 Hz) consists of the filter (13-C5) which, when it detects the presence of 2050 Hz, reverse biases CR7 and turns on Q10. Flip-flop U3-A, U3-D is latched and the low output of U3-A is applied via H29 to the base of Q1 on the EACOM Control Board. Q1 is turned off, allowing Q2 to conduct. The low at the collector of Q2 is connected (via H72) to the 1950 Hz detector circuit, selecting the TX F1 transmitter oscillator and keying the transmitter.

The high at the output of U3-D is connected via H28 to the base of Q3 on the EACOM Control Board, turning the transistor on. Conduction of Q3 applies a ground to lead D12 (TX CG DISABLE) via H71. The high output of U3-D is also applied to the base of Q12, turning the transistor on. Conduction of Q12 operates the CG DISABLE indicator LED CR10.

When TX F2 (1850 Hz) is selected, the XMIT F2 output is connected via H16 to the EACOM Control Board. Q3 on this board is turned off, forward biasing CR1. The ground at H16 is thus connected via H17 to the TX CG DISABLE lead D12 to disable the Channel Guard Encoder.

Channel Guard Control Board 19D416702G7

Channel Guard Control Board 19D416702G7 is used in EACOM systems to turn Channel Guard on and off and to enable or disable the digital decoders.

Applying 1450 Hz to the LIMITED AUDIO lead latches flip-flop U1-C, U1-B and resets flip-flop U1-C, U1-D. The resultant high output of U1-C turns on Q3, A4 and Q5. Conduction of Q4 applies ground to the CG INTERCONNECT lead A11 which turns Q11 off and Q16 on at the Transmitter Control Board. CG DISABLE is grounded, disabling the Channel Guard decoder. If digital decoder No. 1 decodes, a ground is also applied to the CG DISABLE path to disable the Channel Guard decoder. The high output of U1-C operates Q5. Conduction of Q5 turns on the CG DISABLE indicator LED CR5.

The high at the output of U1-B turns on Q7. Conduction of Q7 turns on Q8. Conduction of Q8 applies a ground to the DECODER RESET lead D12, resetting the digital decoders. The low at the output of U1-A is connected to NOR gate U3A. The resultant high is applied to the RX 2 MUTE lead A1 to unmute receiver No. 2. If digital decoder No. 2 decodes, a low is applied to DECODER OUTPUT lead A8 and to the other input of U3A. This function also unmutes receiver No. 2.

Applying 1550 Hz to the LIMITED AUDIO lead results in detection of the tone and turning Q1 on. Flip-flop U1-C and U1-D is latched and flip-flop U1-A, U1-B is reset. The low output of U1-C turns off Q3 and Q4, applying a high to the CG INTERCONNECT

lead A11. This high turns on Q11 and turns off Q16 on the Transmitter Control Board. The CT DISABLE lead is now high, enabling Channel Guard. The resultant high output of U1A is connected to the input of U3A. The resultant low output of U3A mutes receiver No. 2. The low at the output of U1B turns off Q7 and Q8, applying a high to the DECODER RESET lead D12.

10-Volt Regulator-Control Board 19D417401G1

This board consists of a 10-Volt, 1/2 Ampere regulator; a 10-Volt, 2 Ampere regulator; a 20-dB preamplifier for providing the proper audio level for the transmitter exciter when using a local microphone; a keying switch for sequencing the antenna relay; a receiver muting circuit.

The 13.8 Volts DC from the station power supply low current filter is applied to terminal D5 of the regulator. This current is filtered by choke L1 and applied to the 10-Volt, 1/2 Amp hybrid regulator consisting of A1-Q1 and integrated circuit U1. This regulator feeds the receiver and transmitter oscillators, providing the close tolerance (+1%) required by these modules.

The 13.8 VDC input is also applied to the 10-Volt, 2 Amp regulator consisting of A3-Q1, Q3, Q4 and zener diode VR1. When the output of the regulator starts to increase, Q4 conducts harder. Q3 conducts less, causing A3-Q1 to conduct less. This increases the voltage drop across A3-Q1, keeping the output voltage constant. Potentiometer R4 is used to set the base voltage of Q4 for the desired 10-Volt output. This regulator supplies the station exciter, the receiver control circuits and the station accessories.

Diodes CR2-CR5 form a PTT OR gate. Applying a ground to any one of the PTT inputs forward biases the diode connected to that input, turning on Q5. Conduction of Q5 operates Q6, applying ground to the antenna relay lead A10. This ground is also applied to the cathode of the Light Emitting Diode (LED) CR15 (TX LIGHT), turning the light on. Pin 8 on the regulator bybrid U1 is also grounded. Capacitor C1 starts to charge. In 15 milliseconds C1 is charged to a voltage high enough to allow the time delay switch in U1 to turn on.

Operation of the time delay switch causes the transmitter oscillator control switch in U1 to turn on. +10 Volts is applied via pin 14 of U1 to the transmitter. ICOM(s), keying the transmitter. The 15 millisecond delay in the transmitter oscillator keying circuit allows the antenna relay to energize before RF is applied to the relay. When the PTT is released, CR6 delays the antenna relay from de-energizing until the RF is removed from the contacts.

When one of the PTT input leads is grounded, CR8 is also forward biased, turning on Q11. Conduction of Q11 operates Q1 and Q12, applying ground to the RX 1 MUTE and RX 2 MUTE leads. If REPEATER PTT (D3) is grounded, CR9 is forward biased, preventing Q12 from conducting to allow the normal repeater system to function.

When a local microphone is used with the station, the microphone audio is connected via B1 to the input of the MIC PRE AMP, consisting of Q2, Q7, Q8 and Q9. The audio is amplified by Q7 and the amplified audio level is adjusted by MIC GAIN control R14. The audio is further amplified by Q2 and Q8 and applied to the source lead of FET Q9. Q10 is normally conducting, keeping the gate of Q9 grounded and preventing the audio from passing. When the LOCAL PTT switch is operated, CR7 is forward biased, turning off Q10. FET Q9 is now allowed to conduct, passing the local audio to the transmitter modulator.

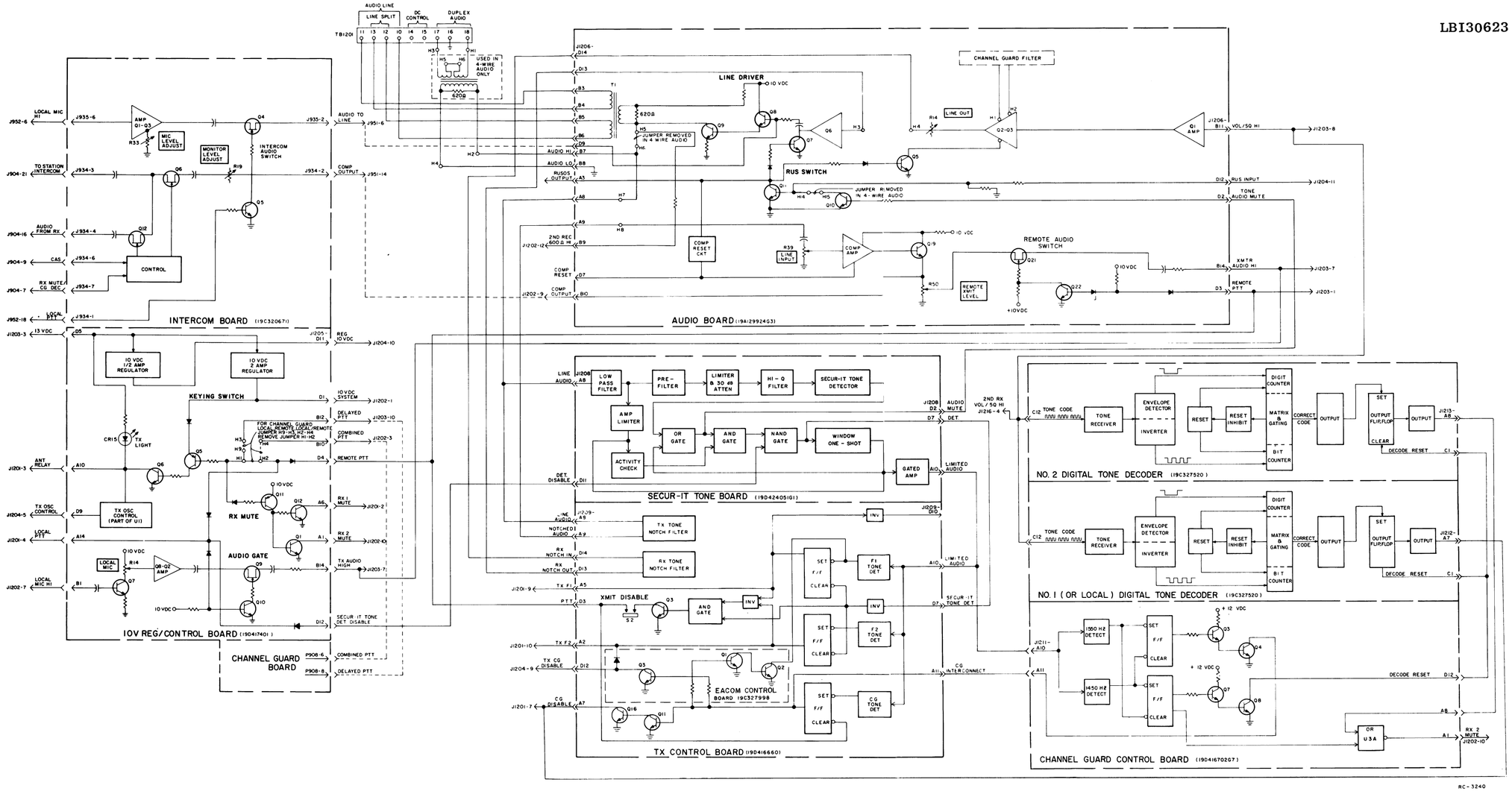
Service switches provided on the Regulator include the TX DISABLE/INTERCOM switch S1 which grounds the TX DISABLE path to permit the serviceman to use the intercom without keying the transmitter; the REMOTE PTT switch S2 which allows the adjustment of remote line levels by keying the remote PTT path in remote control systems.

Channel Guard Filter 19C320627G1

The Channel Guard Filter attenuates frequencies below 203.5 Hertz to prevent the Channel Guard tone from being applied to the line. The filter board is plugged into the Audio Board at J3 and J4.

Audio and tone are applied to the Channel Guard Filter input (J1-1) from the Audio Board. The audio is coupled to the 187 Hertz NOTCH FILTER composed of Q1, Q2 and associated circuitry. Negative feedback for the NOTCH FILTER is connected from the collector of Q2 to the junction of C2-R2.

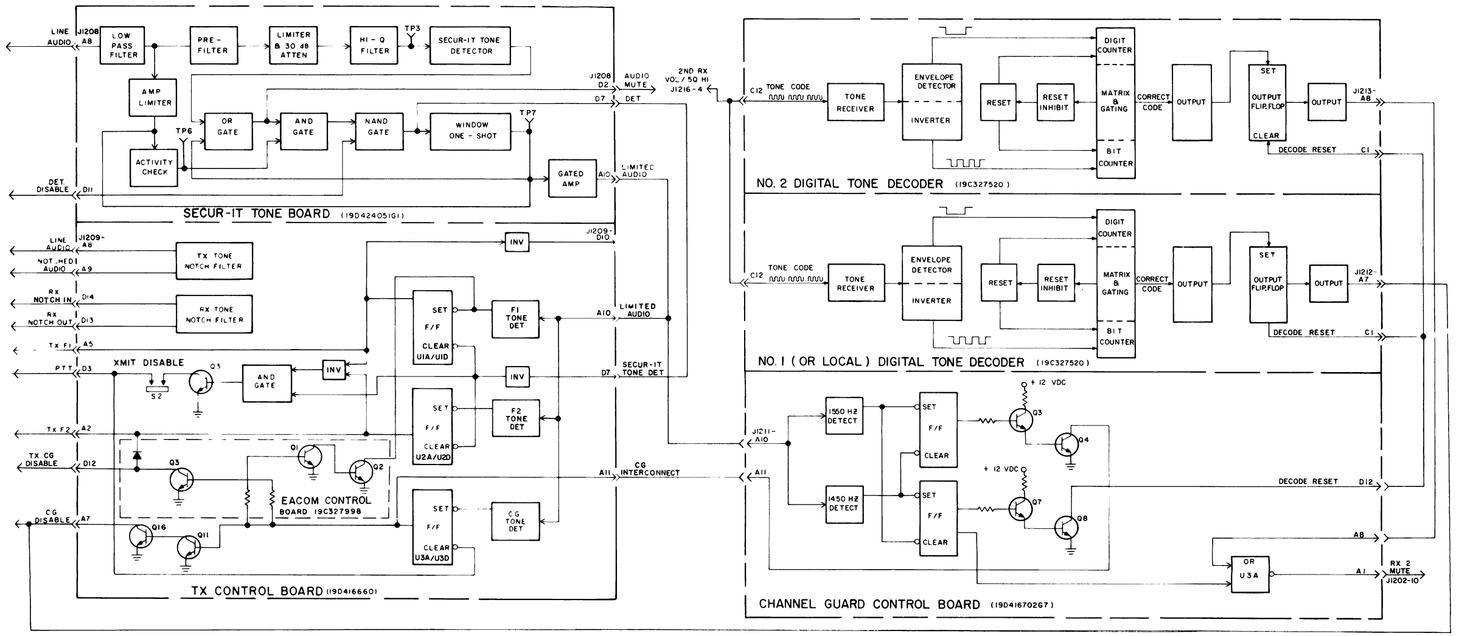
The NOTCH FILTER output is applied to a LOW-PASS FILTER consisting of Q3 and Q4. Negative feedback is developed across R12. The output of Q2 is coupled to the output lead J2-3 through C9 and returned to the Audio Board.



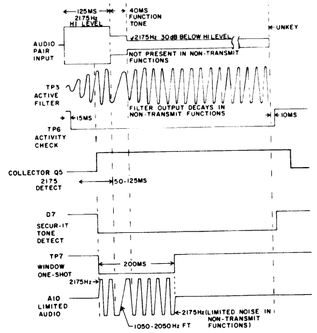
SYSTEM DIAGRAM

EACOM TONE REMOTE CONTROL

Issue 1



SECUR-IT TONE WAVEFORM CHART



SYMPTOM	PROCEDURE
NO SECUR-IT TONE DETECT	1 CHECK FOR 2175 Hz TONE AT LINE AUDIO TERMINAL J1208 A8. 2 CHECK FOR TONE AT OUTPUT OF ACTIVE FILTER (TP3). REFER TO WAVEFORM CHART. 3 CHECK FOR PROPER WAVEFORM AT ACTIVITY CHECK (CIRCUIT (TP6). REFER TO WAVEFORM CHART. IF PROPER WAVEFORM IS NOT OBTAINED, CHECK OPERATION OF AR4, Q9 - Q12. 4 CHECK FOR PROPER WAVEFORM AT 2175 DETECT (Q5 COLLECTOR). REFER TO WAVEFORM CHART. IF PROPER WAVEFORM CANNOT BE OBTAINED, CHECK Q2 - Q5.
NO LIMITED AUDIO OUTPUT	1 CHECK WAVEFORM OF WINDOW ONE-SHOT (TP7). 2 CHECK WAVEFORM AT Q7 (A10).
NO AUDIO MUTE FUNCTION	1 CHECK OPERATION OF Q20. THIS TRANSISTOR SHOULD BE TURNED OFF DURING SECUR-IT TONE DETECT.

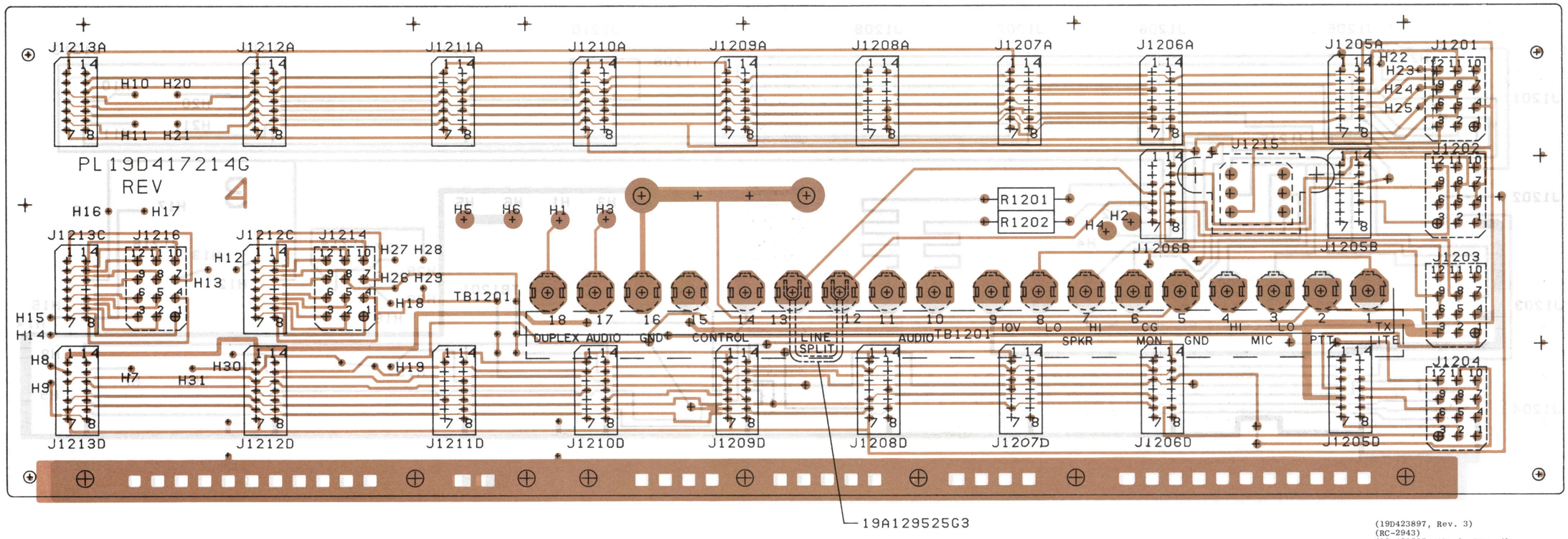
SYMPTOM	PROCEDURE
NO PTT FUNCTION	1 CHECK FOR 2175 Hz TONE AT OUTPUT OF HI-Q FILTER (TP3). 2 CHECK FOR LOW AT PIN 3 OF U1A ON TRANSMITTER CONTROL BOARD. 3 CHECK OPERATION OF Q3 ON TRANSMITTER CONTROL BOARD. (REFER TO SCHEMATIC DIAGRAM FOR CORRECT VOLTAGE READINGS.)
NO TX F1 FUNCTION	1 CHECK FOR 1950 Hz TONE (TX F1) AT LIMITED AUDIO (A10) WHEN THE TX F1 FUNCTION IS SELECTED. 2 CHECK FOR LOW AT PIN 3 OF U1A ON TRANSMITTER CONTROL BOARD. 3 CHECK FOR OPERATION OF Q3 ON TRANSMITTER CONTROL BOARD.
NO TX F2 FUNCTION	1 CHECK FOR 1850 Hz TONE (TX F2) AT LIMITED AUDIO (A10) WHEN THE TX F2 FUNCTION IS SELECTED. 2 CHECK FOR LOW AT PIN 3 OF U2A ON TRANSMITTER CONTROL BOARD. 3 CHECK OPERATION OF Q8 AND Q9 ON TRANSMITTER CONTROL BOARD.
NO CHANNEL GUARD TX DISABLE FUNCTION	1 CHECK FOR 2050 Hz (CG TX DISABLE) TONE AT LIMITED AUDIO (A10). 2 CHECK FOR LOW AT PIN 3 OF U3A ON TRANSMITTER CONTROL BOARD. 3 CHECK OPERATION OF Q3 ON THE EACOM CONTROL BOARD.

SYMPTOM	PROCEDURE
NO CHANNEL GUARD MONITOR FUNCTION	1 CHECK FOR 1450Hz (CG DISABLE) TONE AT LIMITED AUDIO (A10) WHEN MONITOR FUNCTION IS SELECTED. 2 CHECK FOR LOW AT PIN 3 OF U3A ON TRANSMITTER CONTROL BOARD. 3 CHECK OPERATION OF Q11 AND Q16 ON TRANSMITTER CONTROL BOARD.

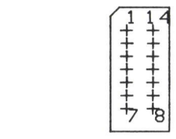
RC-3255

TROUBLESHOOTING DIAGRAM

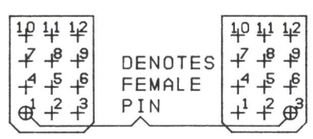
EACOM TONE CONTROL SYSTEM



(19D423897, Rev. 3)
(RC-2943)
(19D423597, Sh. 1, Rev. 4)
(19D423597, Sh. 2, Rev. 3)

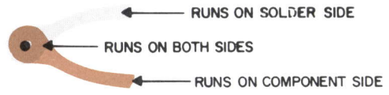


TYP. MOUNTING
FOR J1205-J1213



TYP. MOUNTING
FOR J1201, J1203,
J1214, J1216
FARSIDE VIEW

TYP. MOUNTING
FOR J1202&1204
FARSIDE VIEW

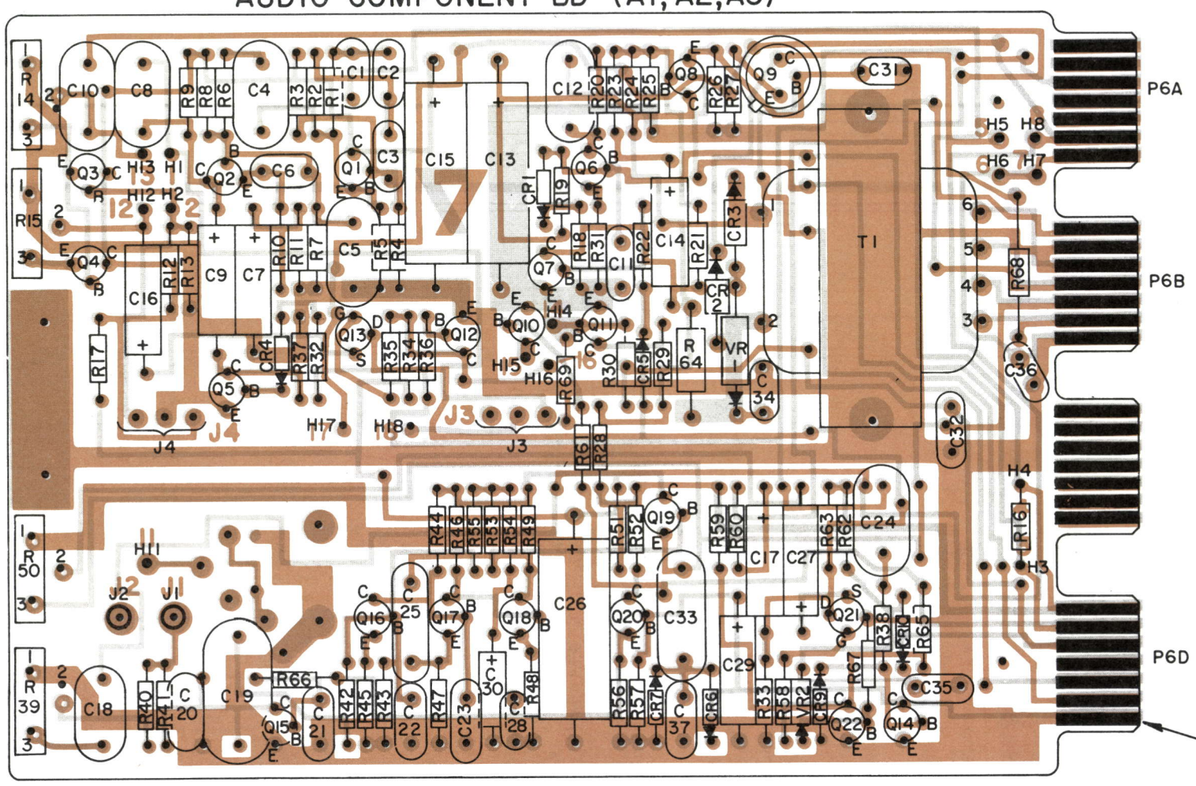


OUTLINE DIAGRAM

CONTROL SHELF MOTHER BOARDS
19D417214G1 & G2

Issue 1

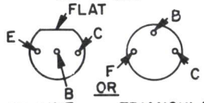
AUDIO COMPONENT BD (A1, A2, A3)



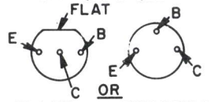
REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTION			
FROM	TO	WIRE	GROUP
H1	H2	DA	G1, G2, G3
H5	H6	DA	G2, G3
H7	H8	DA	G2, G3
H12	H13	DA	G1
H17	H18	DA	G2, G3

NOTE:
THIS DIAGRAM IS INTENDED TO SHOW COMPONENT LOCATIONS FOR ALL GROUPS OF THE BOARD. REFER TO APPROPRIATE SCHEMATIC DIAGRAM OR PARTS LIST FOR COMPONENTS USED IN A SPECIFIC GROUP.

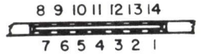
LEAD IDENTIFICATION FOR Q1, Q2, Q5-Q9, Q11 Q15 & Q20



LEAD IDENTIFICATION FOR Q3, Q4, Q10, Q12, Q14, Q16-Q19 & Q22



NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

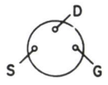


SOLDER SIDE

DETAIL "A"

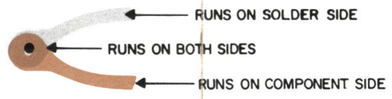
TYP. NUMBERING OF CONT. FINGERS

LEAD IDENTIFICATION FOR Q13 & Q21



NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

(19D423136, Rev. 3)
(19D417083, Sh. 2, Rev. 7)
(19D417083, Sh. 3, Rev. 7)

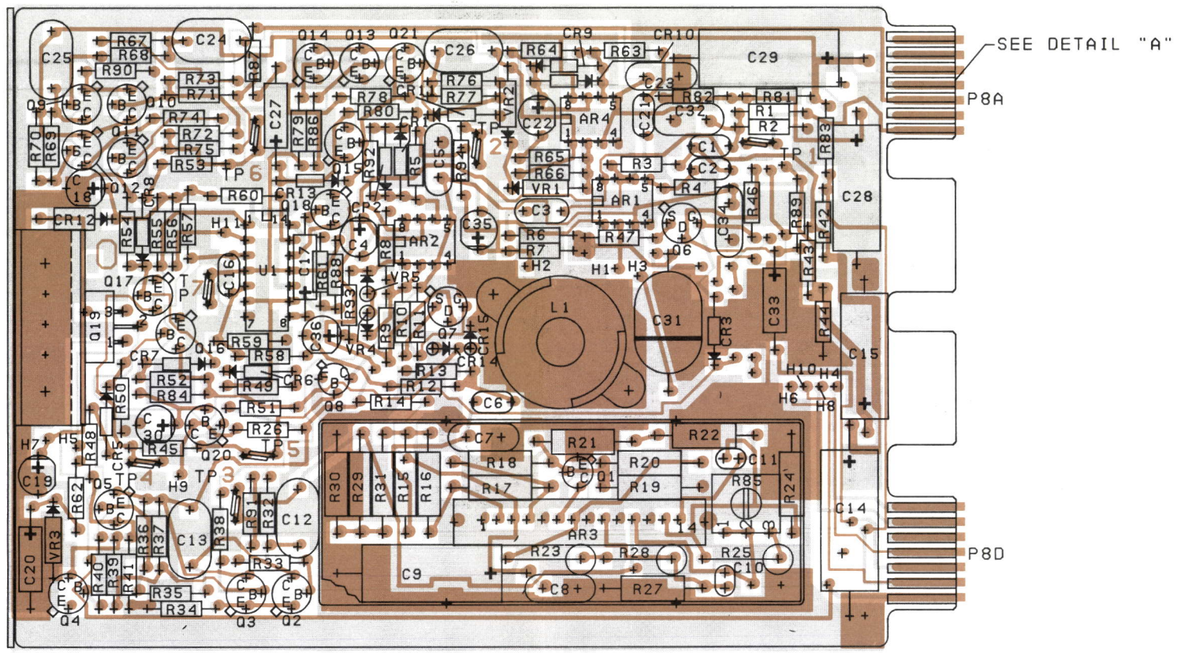


OUTLINE DIAGRAM

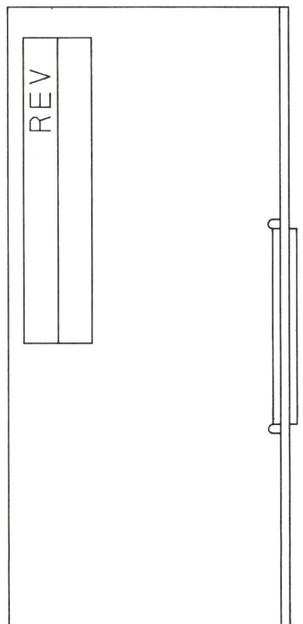
AUDIO BOARD 19A129924

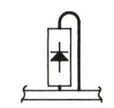
10 Issue 1

SECUR-IT
TONE
CONTROL



(19D424053, Rev. 2)
(19B227495, Sh. 1, Rev. 0)
(19B227495, Sh. 2, Rev. 0)

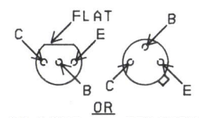




MOUNTING FOR
VR4, VR5,
CR14, AND CR15

REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS		
FROM	TO	WIRE
L1-BI	H1	
L1-GY OR R	H2	
L1-Y	H3	
H4	H5	SN22-W
H6	H7	SN22-O
H8	H9	SN22-BR
H10	H11	SN22-G

LEAD IDENTIFICATION
FOR Q1-Q5 & Q8-Q21

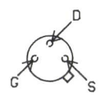


IN-LINE TRIANGULAR

TOP VIEW

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

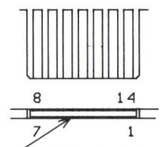
LEAD IDENTIFICATION
FOR Q6 & Q7



TRIANGULAR

TOP VIEW

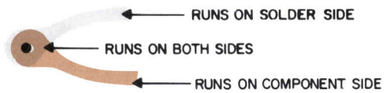
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



SOLDER SIDE
TYP. NUMBERING OF
CONTACT FINGERS.

DETAIL "A"

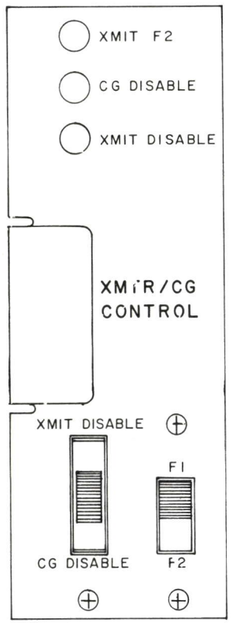
ROTATED 90 DEG.
CLOCKWISE



OUTLINE DIAGRAM

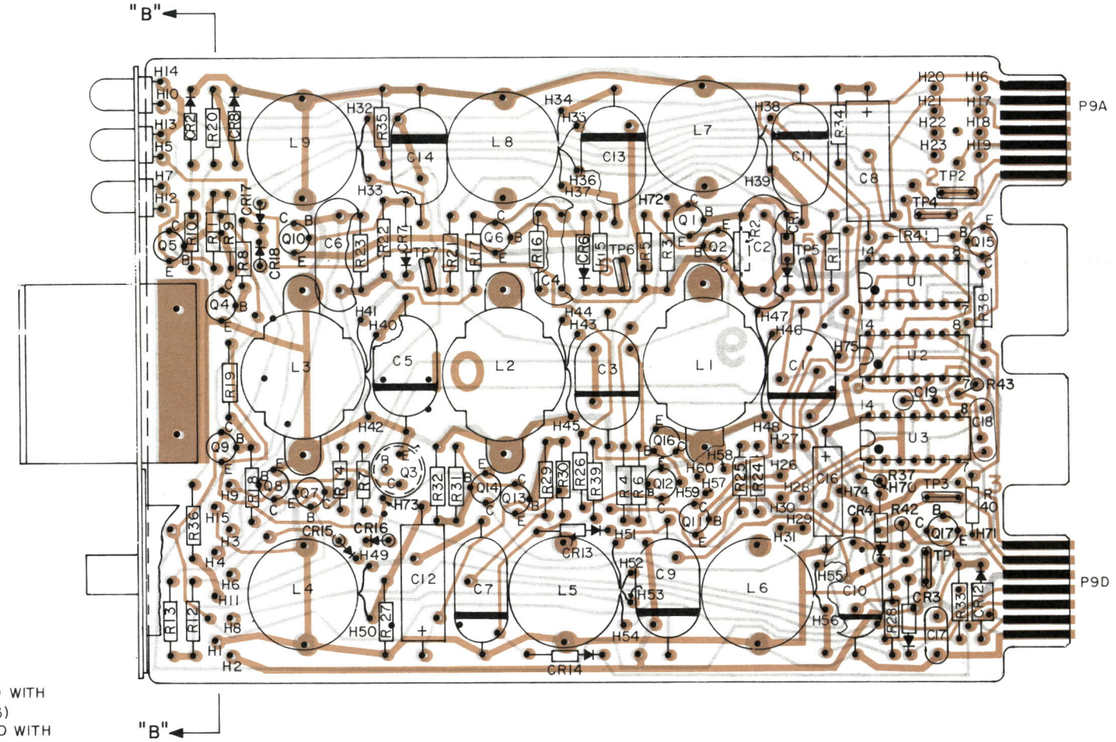
SECUR-IT TONE BOARD 19D424051G1

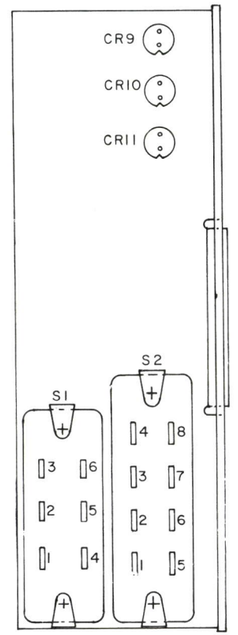
Issue 1



FRONT PANEL: 19B219702P1 (USED WITH 19D416660G2 & G3)
19B219702P2 (USED WITH 19D416660G1 & G4)
HANDLE: 19B219690G1

FRONT PANEL SUPPLIED WITHOUT ELECTRICAL COMPONENTS OR LABELS



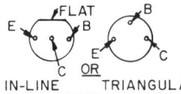


SECTION "B-B"

REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS:

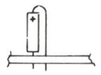
FROM	TO	GP. 1	GP. 2	GP. 3	GP. 4
H17	H21		X	X	
H19	H23		X	X	
H26	H27			X	X
H58	H60			X	X
H30	H31			X	X
L1-Y	H46	X	X	X	X
L1-GY OR R	H47	X	X	X	X
L1-BK	H48	X	X	X	X
L2-Y	H43		X	X	
L2-GY OR R	H44		X	X	
L2-BK	H45		X	X	
L3-Y	H40			X	X
L3-GY OR R	H41			X	X
L3-BK	H42			X	X
L4-BK	H49	X	X	X	X
L4-Y	H50	X	X	X	X
L5-BK	H51	X	X	X	X
L5-NO COLOR	H52	X	X	X	X
L5-GY OR R	H53	X	X	X	X
L5-Y	H54	X	X	X	X
L6-BK	H55	X	X	X	X
L6-Y	H56	X	X	X	X
L7-Y	H38	X	X	X	X
L7-BK	H39	X	X	X	X
L8-Y	H34	X	X	X	X
L8-GY OR R	H35	X	X	X	X
L8-NO COLOR	H36	X	X	X	X
L8-BK	H37	X	X	X	X
L9-Y	H32	X	X	X	X
L9-BK	H33	X	X	X	X
CR9-ANODE	H14		X	X	
CR9-CATHODE	H10		X	X	
CR10-ANODE	H13			X	X
CR10-CATHODE	H5			X	X
CR11-ANODE	H7	X	X	X	X
CR11-CATHODE	H12	X	X	X	X
S1-3	H3		X	X	
S1-2	H8		X	X	
S1-1	H6		X	X	
S2-1	H4			X	X
S2-2	S2-3			X	X
S2-3	H15	X	X	X	X
S2-4	H11	X	X	X	X
S2-5	S2-7	X	X	X	X
S2-5	H9	X	X	X	X
S2-6	H2	X	X	X	X
H57	H59			X	X
S1-2	S1-3		X	X	

LEAD IDENTIFICATION FOR Q1,Q2,Q4,Q6-Q8 & Q10-Q14,Q16



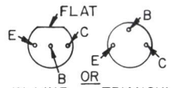
IN-LINE TRIANGULAR
VIEW FROM LEAD END

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



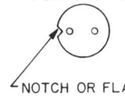
MTG FOR C19

LEAD IDENTIFICATION FOR Q3,Q5,Q9,Q15,Q17

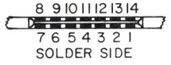


IN-LINE TRIANGULAR
VIEW FROM LEAD END

LEAD IDENTIFICATION FOR CR9-CR11

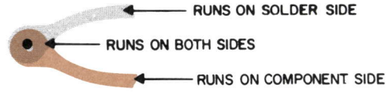


NOTCH OR FLAT IN FLANGE TO DENOTE CATHODE (NEG.) LEAD.



TYP. NUMBERING OF CONT. FINGERS

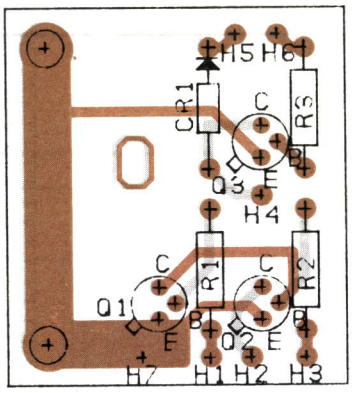
(19D417466, Rev. 7)
(19D416625, Sh. 2, Rev. 9)
(19D416625, Sh. 3, Rev. 10)



OUTLINE DIAGRAM

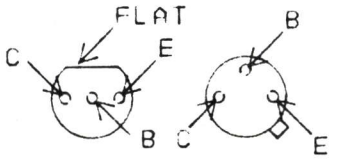
TRANSMITTER CONTROL BOARD 19D416660

12 Issue 1



CONNECTIONS CHART		
FROM	TO	WIRE
H1	LET HANG	SF24-O
H2	↑	SF24-R
H3		SF24-BR
H4		SF24-BL
H5		SF24-G
H6	↓	SF24-Y
H7	LET HANG	SF24-BK

LEAD IDENTIFICATION
FOR Q1-Q3



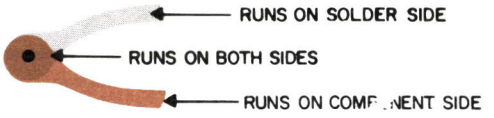
OR

IN-LINE TRIANGULAR

TOP VIEW

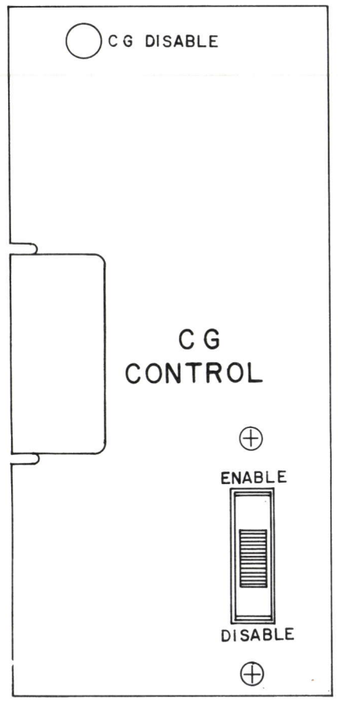
NOTE: LEAD ARRANGEMENT, AND NOT, CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

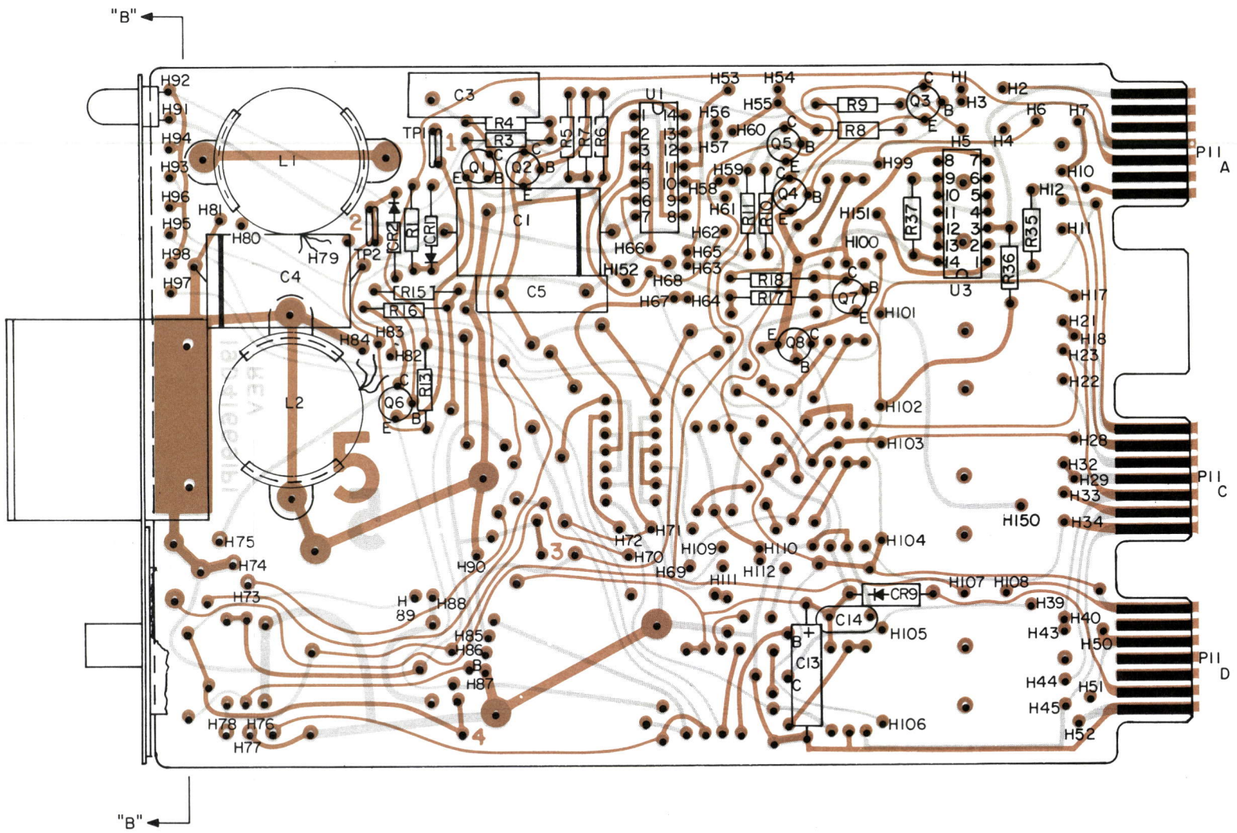
(19B232284, Rev. 0)
(19B232283, Sh. 1, Rev. 0)
(19B232283, Sh. 2, Rev. 0)

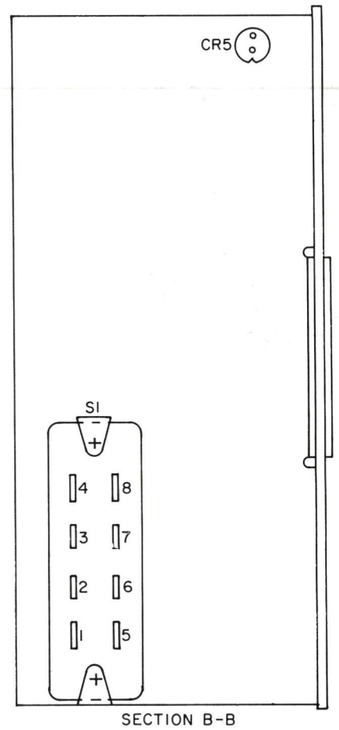


OUTLINE DIAGRAM

EACOM CONTROL BOARD
19C327998G1







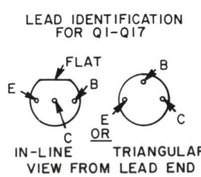
REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONN.		
FROM	TO	GP.7
H1	H2	X
H3	H4	
H4	H5	
H6	H7	
H8	H9	
H17	H18	
H19	H20	
H28	H29	
H39	H40	
H53	H54	
H55	H56	X
H57	H58	X
H59	H60	
S1-4	H73	X
S1-2	H74	X
S1-1	H75	X
S2-4	H76	
S2-2	H77	
S2-1	H78	
L1-Y	H79	X
L1-GY/R	H80	X
L1-BK	H81	X
L2-Y	H82	X
L2-GY/R	H83	X
L2-BK	H84	X
L3-Y	H85	
L3-GY/R	H86	
L3-BK	H87	
L4-Y	H88	
L4-GY/R	H89	
L4-BK	H90	
CR5-CATHODE	H91	X
CR5-ANODE	H92	X
CR6-CATHODE	H93	
CR6-ANODE	H94	
CR7-CATHODE	H95	
CR7-ANODE	H96	
CR8-CATHODE	H97	
CR8-ANODE	H98	
S1-2	S1-3	X
S2-2	S2-3	
H61	H62	X
H65	H66	X
H69	H70	
H71	H72	
H107	H108	
H109	H110	
H111	H112	
H50	H150	X
H151	H152	X

FRONT PANEL: 19B219702P3

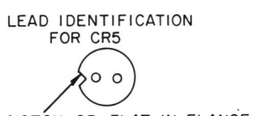
HANDLE: 19B219690G1

FRONT PANEL SUPPLIED WITHOUT ELECTRICAL COMPONENTS OR LABELS

TYP. NUMBERING OF CONT. FINGERS



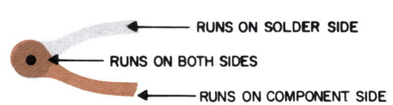
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



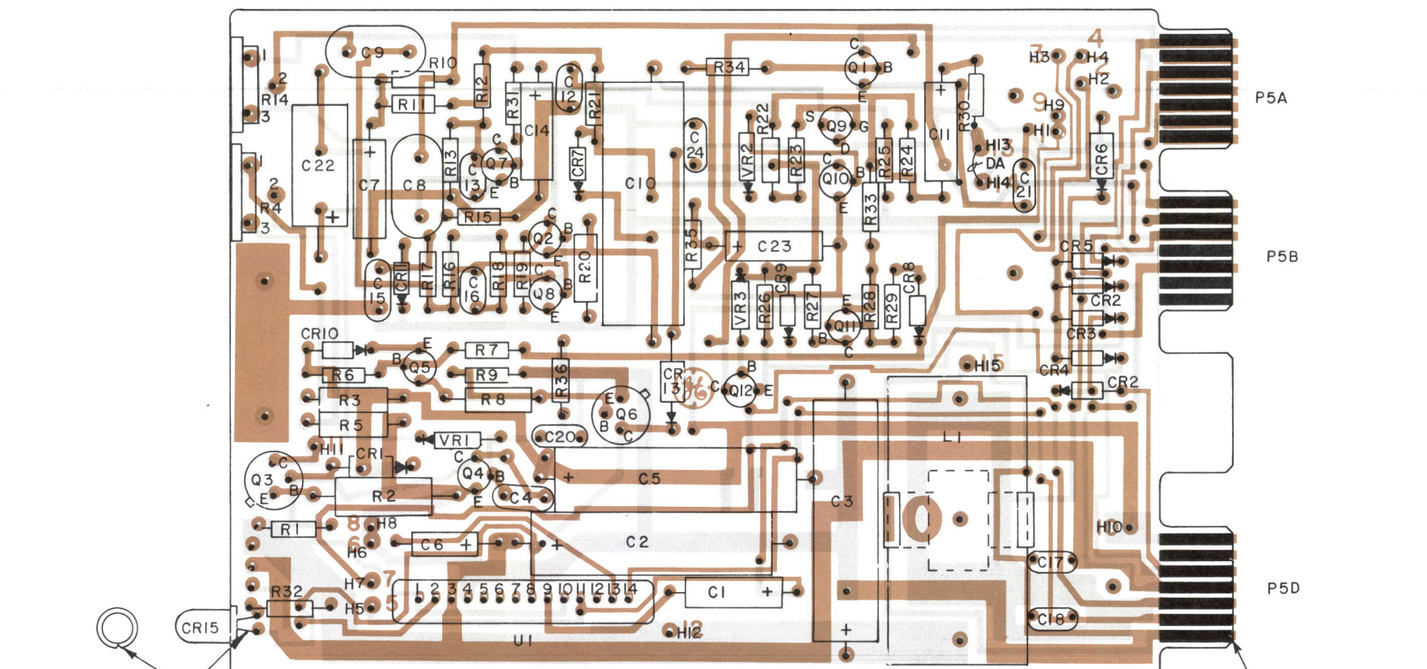
OUTLINE DIAGRAM

CHANNEL GUARD CONTROL BOARD
19D416702G7

(19D429070, Rev. 1)
(19D416691, Sh. 2, Rev. 5)
(19D416691, Sh. 3, Rev. 5)

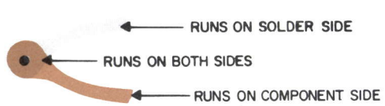


COMPONENT BOARD A2

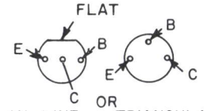


(19D423132, Rev. 7)
(19D417241, Sh. 2, Rev. 11)
(19D417241, Sh. 3, Rev. 10)

REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS.	
FROM	TO
H2	H1
H3	H9



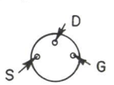
LEAD IDENTIFICATION FOR Q1 - Q8, Q10 - Q12



IN-LINE OR TRIANGULAR
VIEW FROM LEAD END

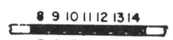
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION FOR Q9



TRIANGULAR
VIEW FROM LEAD END

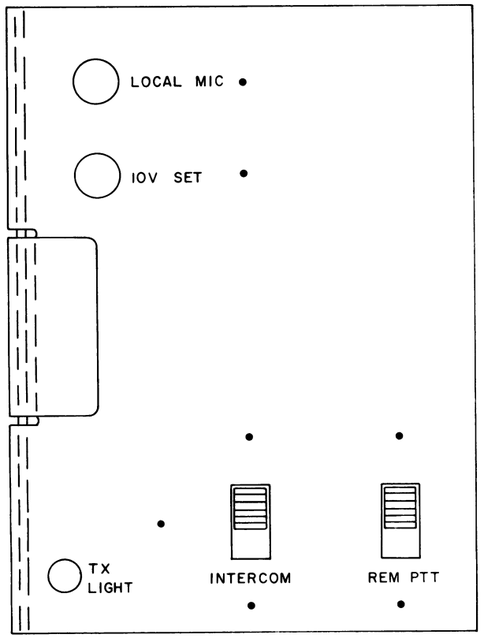
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



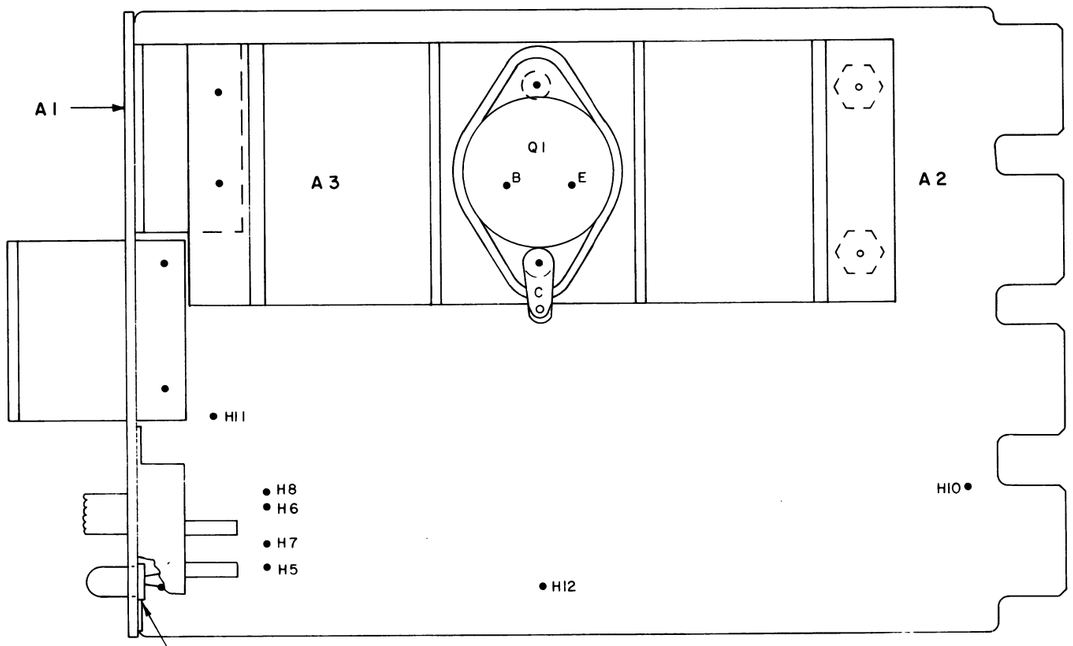
DETAIL "A"
TYP. NUMBERING OF CONT. FINGERS

OUTLINE DIAGRAM

10 VOLT REGULATOR/CONTROL
COMPONENT BOARD A2



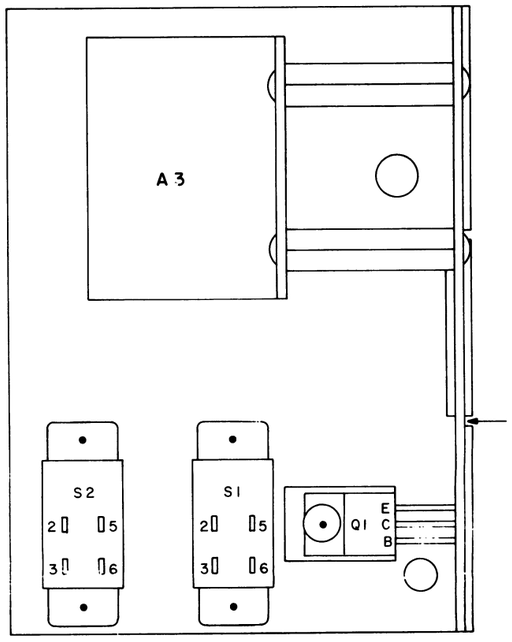
FRONT PANEL (A1)



(19D423128, Rev. 0)

FLANGE OF DIODE MUST BE MOUNTED FLUSH AGAINST PANEL

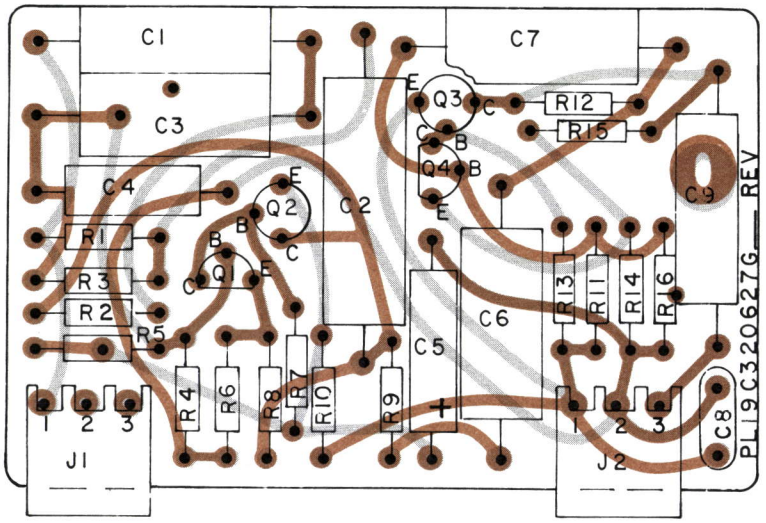
REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS.	
FROM	TO
A3-Q1-B	A2-H11
A3-Q1-C	A2-H10
A3-Q1-E	A2-H12
A1-S1-3	A2-H5
A1-S1-2	A2-H6
A1-S2-3	A2-H7
A1-S2-2	A2-H8



FRONT PANEL (A1)
REAR VIEW

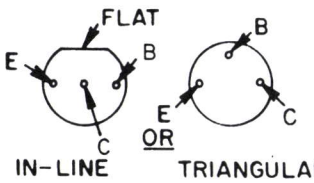
OUTLINE DIAGRAM

10 VOLT REGULATOR/CONTROL BOARD
19D417401G1



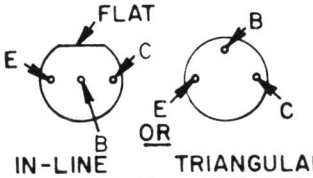
(19C321338, Rev. 0)
(19C320625, Sh. 2, Rev. 0)
(19C320625, Sh. 3, Rev. 0)

LEAD IDENTIFICATION FOR Q2 & Q3

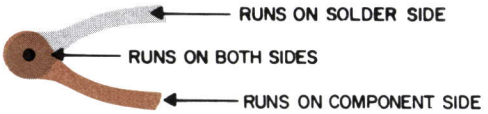


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION FOR Q1 & Q4

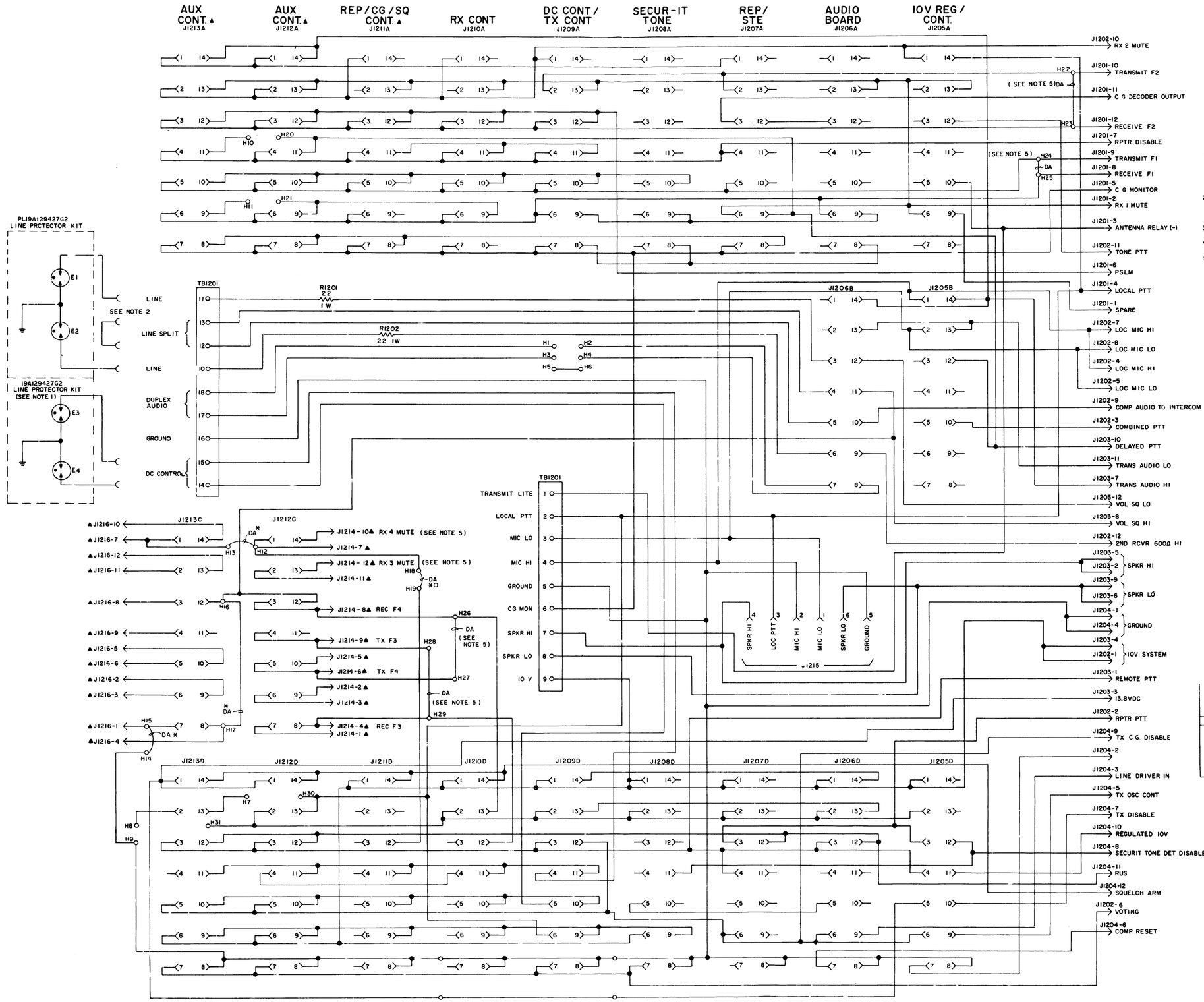


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



OUTLINE DIAGRAM

CHANNEL GUARD FILTER
19C320627G1



▲PRESENT IN GROUP 1 ONLY

NOTES:

1. THE TELEPHONE LINE PROTECTORS CONNECTED TO TB1201-15 AND 14 ARE NEEDED ONLY WHEN SEPARATE AUDIO AND CONTROL PAIRS ARE USED.
2. JUMPER PRESENT IN ALL TONE REMOTE SYSTEMS AND IN DC CONTROL SYSTEMS USING SEPARATE AUDIO AND CONTROL PAIRS.
3. □ JUMPERS PRESENT FOR LOCAL EACOM.
4. * JUMPERS PRESENT FOR REGIONAL EACOM
5. JUMPERS PRESENT FOR 4 FREQ. TONE REMOTE, 4 FREQ. TONE REMOTE/REPEAT, 4 FREQ. TX WITH 4 RECEIVERS. RX 3 & 4 MUTE USED WITH 4 TX WITH 4 RECEIVERS.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

MODEL NO.	REV LETTER
19D417214G1	C
19D417214G2	C

SCHEMATIC DIAGRAM

CONTROL SHELF MOTHER BOARD 19D417214G1 & G2

Issue 1

PARTS LIST

LBI-4811A

CONTROL SHELF MOTHER BOARD
19D417214G1, G2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1201	19A116647P4	Connector, printed wiring: 12 terminals, sim to Molex 09-18-5121.
J1202	19A116647P6	Connector, printed wiring: 12 terminals, sim to Molex 09-18-5927.
J1203	19A116647P4	Connector, printed wiring: 12 terminals, sim to Molex 09-18-5121.
J1204	19A116647P6	Connector, printed wiring: 12 terminals, sim to Molex 09-18-5927.
J1205A	19A116446P5	Connector, printed wiring: 14 contacts.
J1205B	19A116446P5	Connector, printed wiring: 14 contacts.
J1205D	19A116446P5	Connector, printed wiring: 14 contacts.
J1206A	19A116446P5	Connector, printed wiring: 14 contacts.
J1206B	19A116446P5	Connector, printed wiring: 14 contacts.
J1206D	19A116446P5	Connector, printed wiring: 14 contacts.
J1207A	19A116446P5	Connector, printed wiring: 14 contacts.
J1207D	19A116446P5	Connector, printed wiring: 14 contacts.
J1208A	19A116446P5	Connector, printed wiring: 14 contacts.
J1208D	19A116446P5	Connector, printed wiring: 14 contacts.
J1209A	19A116446P5	Connector, printed wiring: 14 contacts.
J1209D	19A116446P5	Connector, printed wiring: 14 contacts.
J1210A	19A116446P5	Connector, printed wiring: 14 contacts.
J1210D	19A116446P5	Connector, printed wiring: 14 contacts.
J1211A	19A116446P5	Connector, printed wiring: 14 contacts.
J1211D	19A116446P5	Connector, printed wiring: 14 contacts.
J1212A	19A116446P5	Connector, printed wiring: 14 contacts.
J1212C	19A116446P5	Connector, printed wiring: 14 contacts.
J1212D	19A116446P5	Connector, printed wiring: 14 contacts.
J1213A	19A116446P5	Connector, printed wiring: 14 contacts.
J1213C	19A116446P5	Connector, printed wiring: 14 contacts.
J1213D	19A116446P5	Connector, printed wiring: 14 contacts.
J1214	19A116647P4	Connector, printed wiring: 12 terminals, sim to Molex 09-18-5121.
J1215	19B219627G1	Connector: 6 contacts.
J1216	19A116647P4	Connector, printed wiring: 12 terminals, sim to Molex 09-18-5121.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1201* and R1202*	3R78P220J	Composition: 22 ohms ±5%, 1 w. Added by REV A.
		- - - - - - - TERMINAL BOARDS - - - - - - - -
TB1201	19A116667P3	Plate nut. (Quantity 18).
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	19A129525G3	Cable: approx 3 inches long.

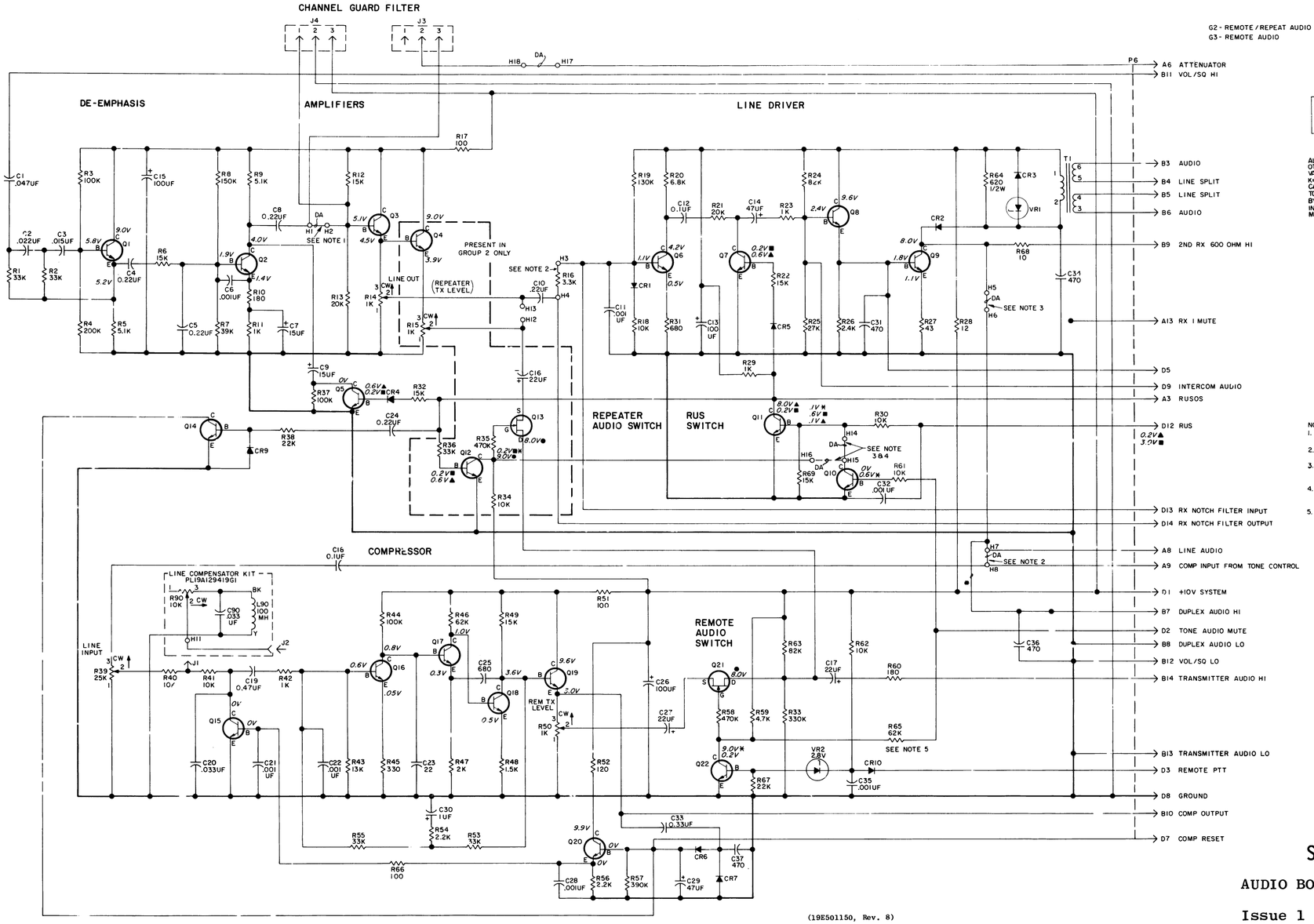
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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 descriptions of parts affected by these revisions.

REV. A - To provide line surge protection and change polarity of DC control leads. Added R1201 and R1202. Reversed connections to J1209-4 and J1209-5.

REV. B - Changed printed board to provide outputs for EACOM Systems.



(19E501150, Rev. 8)

SCHEMATIC DIAGRAM

AUDIO BOARD 19A129924G2 & G3

Issue 1

PARTS LIST

LBI-4804C

REMOTE AUDIO BOARD
19A129924G2 REMOTE/REPEAT AUDIO
19A129924G3 REMOTE AUDIO

SYMBOL	GE PART NO.	DESCRIPTION
A2 and A3		COMPONENT BOARD A2 19D417210G2 REMOTE/REPEAT AUDIO A3 19D417210G3 REMOTE AUDIO
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C2	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
C3	19A116080P102	Polyester: 0.015 µf ±10%, 50 VDCW.
C4 and C5	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C6	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C8	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C9	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C10	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C11	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C12	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C13	19A115680P7	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TTX.
C14	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C15	19A115680P7	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TTX.
C16	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C17	19A115680P7	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TTX.
C18	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C19	19A116080P111	Polyester: 0.47 µf ±10%, 50 VDCW.
C20*	19A116080P104	Polyester: 0.33 µf ±10%, 50 VDCW. Change incorporated in original shipment.
	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C21 and C22	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C23	7489162P111	Silver mica: 22 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C24	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C25	4029003P104	Silver mica: 680 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-20.
C26	19A115680P7	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TTX.
C27	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C28	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C29	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C30	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C31	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C32	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C33	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C34	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C35	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C36 and C37	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A115250P1	Silicon.
CR2 and CR3	4037822P7	Silicon.
CR4 thru CR7	19A115250P1	Silicon.
CR9 and CR10	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 and J2	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J3 and J4	19A116779P1	Contact, electrical: sim to Molex 08-54-0404. (Quantity 3 each connector).
		- - - - - - - - - - PLUGS - - - - - - - - - -
P6		Connector. (Part of printed board 19D417083P1).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q3 and Q4	19A115889P1	Silicon, NPN.
Q5	19A129184P1	Silicon, NPN.
Q6	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q7	19A129184P1	Silicon, NPN.
Q8	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q9	19A115300P4	Silicon, NPN.
Q10	19A115889P1	Silicon, NPN.
Q11	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q12	19A115889P1	Silicon, NPN.
Q13	19A134137P1	N Type, field effect; sim to Type 2N3458.
Q14	19A115889P1	Silicon, NPN.
Q15	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q16 thru Q19	19A115889P1	Silicon, NPN.
Q20	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q21	19A134137P1	N Type, field effect; sim to Type 2N3458.
Q22	19A115889P1	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1 and R2	3R152P333J	Composition: 33,000 ohms ±5%, 1/4 w.
R3	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R4	3R152P204J	Composition: 0.20 megohm ±5%, 1/4 w.
R5	3R152P512K	Composition: 5100 ohms ±10%, 1/4 w.
R6	3R152P153K	Composition: 15,000 ohms ±10%, 1/4 w.
R7	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R8	3R152P154J	Composition: 0.15 megohm ±5%, 1/4 w.
R9	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
R10	3R152P181K	Composition: 180 ohms ±10%, 1/4 w.
R11	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w.
R12	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R13	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R14 and R15	19B209358P103	Variable, carbon film: approx 50 to 1000 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R16	3R152P332K	Composition: 3300 ohms ±10%, 1/4 w.
R17	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R18	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R19	3R152P134J	Composition: 0.13 megohm ±5%, 1/4 w.
R20	3R152P682K	Composition: 6800 ohms ±10%, 1/4 w.
R21	3R152P203K	Composition: 20,000 ohms ±10%, 1/4 w.
R22	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R23	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w.
R24	3R152P823J	Composition: 82,000 ohms ±5%, 1/4 w.
R25	3R152P273J	Composition: 27,000 ohms ±5%, 1/4 w.
R26	3R152P242J	Composition: 2400 ohms ±5%, 1/4 w.
R27	3R152P430J	Composition: 43 ohms ±5%, 1/4 w.
R28	3R152P120J	Composition: 12 ohms ±5%, 1/4 w.
R29	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R30	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R31	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
R32	3R152P153K	Composition: 15,000 ohms ±10%, 1/4 w.
R33	3R152P334J	Composition: 0.33 megohms ±5%, 1/4 w.
R34	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R35	3R152P474J	Composition: 0.47 megohms ±5%, 1/4 w.
R36	3R152P333J	Composition: 33,000 ohms ±5%, 1/4 w.
R37	3R152P104K	Composition: 0.10 megohms ±10%, 1/4 w.
R38	3R152P223K	Composition: 22,000 ohms ±10%, 1/4 w.
R39	19B209358P107	Variable, carbon film: approx 800 to 25,000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
R40 and R41	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R42	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R43	3R152P133J	Composition: 13,000 ohms ±5%, 1/4 w.
R44	3R152P104K	Composition: 0.10 megohms ±10%, 1/4 w.
R45	3R152P331K	Composition: 330 ohms ±10%, 1/4 w.
R46	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R47	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R48	3R152P152K	Composition: 1500 ohms ±10%, 1/4 w.
R49	3R152P153K	Composition: 15,000 ohms ±10%, 1/4 w.
R50	19B209358P103	Variable, carbon film: approx 50 to 1000 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R51	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R52	3R152P121K	Composition: 120 ohms ±10%, 1/4 w.
R53	3R152P333K	Composition: 33,000 ohms ±10%, 1/4 w.
R54	3R152P222K	Composition: 2200 ohms ±10%, 1/4 w.
R55	3R152P333K	Composition: 33,000 ohms ±10%, 1/4 w.
R56	3R152P222K	Composition: 2200 ohms ±10%, 1/4 w.
R57	3R152P394K	Composition: 0.39 megohm ±10%, 1/4 w.
R58	3R152P474J	Composition: 0.47 megohms ±5%, 1/4 w.
R59	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R60	3R152P181K	Composition: 180 ohms ±10%, 1/4 w.
R61	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R62	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R63	3R152P823J	Composition: 82,000 ohms ±5%, 1/4 w.
R64	3R77P621J	Composition: 620 ohms ±5%, 1/2 w.
R65	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R66	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R67	3R152P223J	Composition: 22,000 ohms ±5%, 1/4 w.
R68	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R69	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19A116736P1	Audio: 300-6000 Hz, Pri: 30 ohms ±15% DC res, Sec 1: 15 ohms ±15% DC res, Sec 2: 15 ohms ±15% DC res.
		- - - - - - - - - VOLTAGE REGULATORS - - - - - -
VR1	19A116325P4	Silicon, Zener; sim to Type 1N5349.
VR2	4036887P2	Silicon, Zener.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4036555P1	Insulator, washer: nylon. (Used with Q8).

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 descriptions of parts affected by these revisions.

C20 was changed before initial shipment from .047 µF(19A116080P105) to .033 µF(19A116080P104).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

MODEL NO	REV LETTER
PL19D424051	

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS.

NOTES:
1. PIN 4 - AR1 CONNECTS TO GROUND
   PIN 4 - AR2 CONNECTS TO GROUND
   PIN 4 - AR4 CONNECTS TO GROUND
   PIN 7 - U1 CONNECTS TO GROUND
2. IN APPLICATIONS INVOLVING CONTINOUS KEYING OF THE STATION, IT MAY BE ADVANTAGEOUS TO DEFEAT THE ACTION OF THE ACTIVITY CHECKER CIRCUIT TO PREVENT ERRONEOUS UNKEYING DUE TO LINE FLUCTUATIONS. THIS MAY BE ACCOMPLISHED BY GROUNDING TP6.
3. DC VOLTAGE MEASUREMENTS MADE WITH HIGH IMPEDANCE VOLTMETER (AT LEAST 10 MEGOHMS) WITH RESPECT TO GROUND WITH NO SIGNALS APPLIED.

(19R622235, Rev. 2)

SCHEMATIC DIAGRAM

SECUR-IT TONE BOARD 19D424051G1

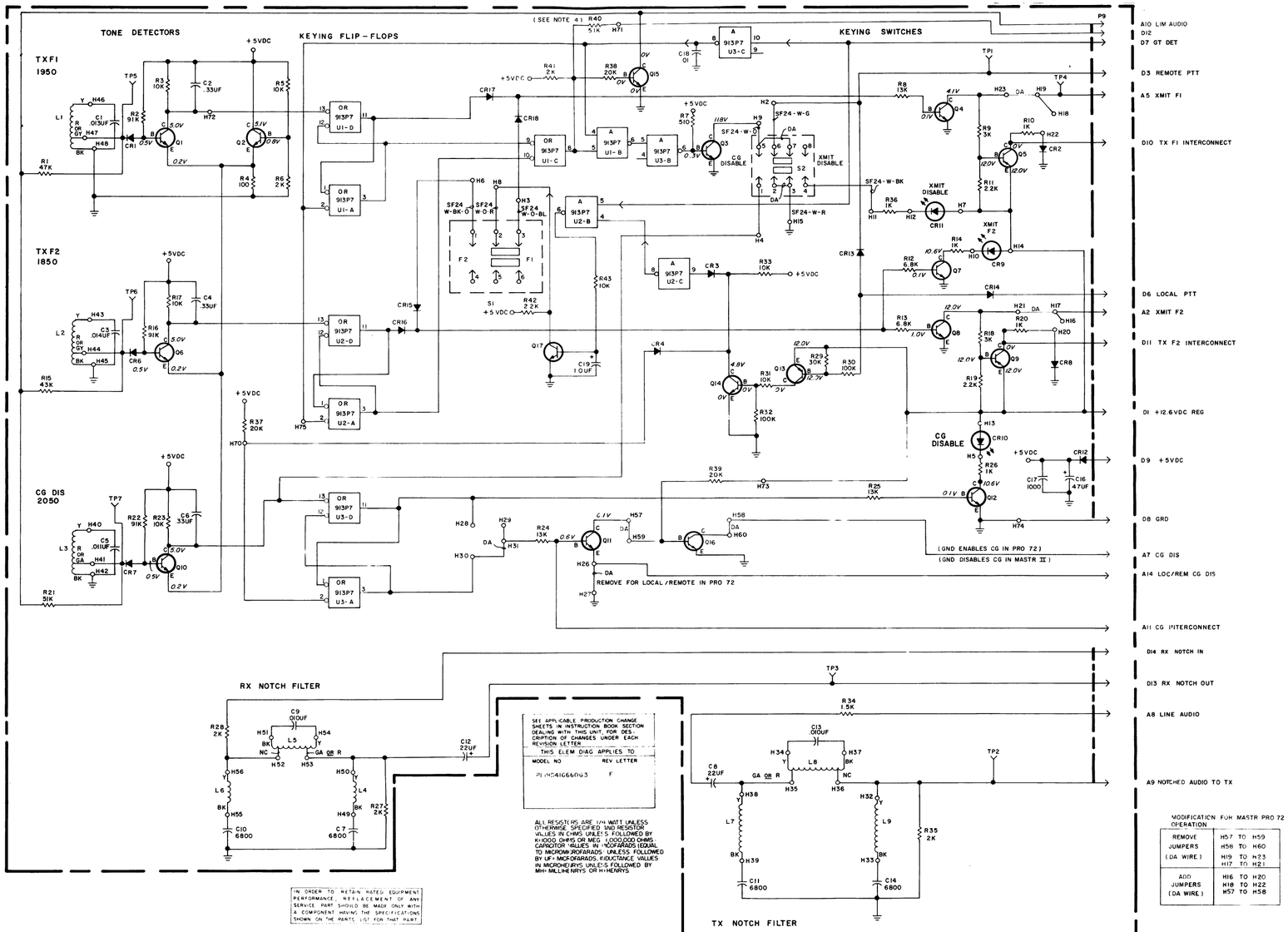
PARTS LIST

LBI-30276

SECUR-IT TONE BOARD
19D424051G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
AR1 and AR2	19A116754P1	Linear: Dual In-Line 8- Pin Minidip package; sim to T1, SN72558 NSC.
AR3	19D416710G1	Hybrid Amplifier.
AR4	19A116754P1	Linear: Dual In-Line 8- Pin Minidip package; sim to T1, SN72558 NSC.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C3	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
C4	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
C5	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C6	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C7 and C8	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C9	5496267P12	Tantalum: 150 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C10 and C11	19B209475P1	Ceramic: 1000 pf ±1%, 100 VDCW; sim to Erie 8121-W100 COG-102F.
C12 and C13	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C14	5496267P12	Tantalum: 150 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C15	5496267P3	Tantalum: 150 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C16	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C17	5496267P409	Tantalum: 3.3 µf ±5%, 15 VDCW; sim to Sprague Type 150D.
C18 and C19	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C20	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C21	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C22	19A134202P7	Tantalum: 2.2 µf ±20%, 20 VDCW.
C23	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C24	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C25	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
C26	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C27	5496267P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C28	5496267P3	Tantalum: 150 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C29	5496267P12	Tantalum: 150 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C30	19A134202P1	Tantalum: 6.8 µf ±20%, 6 VDCW.
C31	19A116738P3	Polystyrene: 10,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C32	7489162P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C33	5496267P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C34	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C35 and C36	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR11	19A115250P1	Silicon.
CR12	4037822P1	Silicon.
CR13 thru CR15	19A115250P1	Silicon.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19B205354G6	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P8		(Part of printed board 19D424052P1).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q2 thru Q4	19A116755P1	Silicon, NPN; sim to Type 2N3947.
Q5	19A115779P1	Silicon, PNP; sim to Type 2N3251.
Q6 and Q7	19A134137P3	N Type, field effect.
Q8 thru Q11	19A116755P1	Silicon, NPN; sim to Type 2N3947.
Q12	19A115779P1	Silicon, PNP; sim to Type 2N3251.
Q13 thru Q18	19A116755P1	Silicon, NPN; sim to Type 2N3947.
Q19	19A116118P1	Silicon, NPN.
Q20 and Q21	19A116755P1	Silicon, NPN; sim to Type 2N3947.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	19C314256P27321	Metal film: 7320 ohms ±1%, 1/4 w.
R2	19C314256P21782	Metal film: 17,800 ohms ±1%, 1/4 w.
R3	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R4	3R152P243J	Composition: 24,000 ohms ±5%, 1/4 w.
R5	19C314256P23011	Metal film: 3010 ohms ±1%, 1/4 w.
R6	19C314256P21742	Metal film: 17,400 ohms ±1%, 1/4 w.
R7	19C314256P25112	Metal film: 51,100 ohms ±1%, 1/4 w.
R8	19C314256P29090	Metal film: 909 ohms ±1%, 1/4 w.
R9	19C314256P21103	Metal film: 110,000 ohms ±1%, 1/4 w.
R10	19C314256P22611	Metal film: 2610 ohms ±1%, 1/4 w.
R11	3R152P684J	Composition: 680,000 ohms ±5%, 1/4 w.
R12	19C314256P21002	Metal film: 10,000 ohms ±1%, 1/4 w.
R13	19C314256P23011	Metal film: 3010 ohms ±1%, 1/4 w.
R14	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R15	19C314256P39092	Metal film: 90,900 ohms ±1%, 1/2 w.
R16	19C314256P35112	Metal film: 51,100 ohms ±1%, 1/2 w.
R17	19C314256P31472	Metal film: 14,700 ohms ±1%, 1/2 w.
R18	19C314256P36192	Metal film: 61,900 ohms ±1%, 1/2 w.
R19	19C314256P31471	Metal film: 1470 ohms ±1%, 1/2 w.
R20	19C314256P31782	Metal film: 17,800 ohms ±1%, 1/2 w.
R21	19C314256P32152	Metal film: 21,500 ohms ±1%, 1/2 w.
R22	19C314256P31782	Metal film: 17,800 ohms ±1%, 1/2 w.
R23	19C314256P2612	Metal film: 6100 ohms ±1%, 1/4 w.
R24	19C314256P36191	Metal film: 6190 ohms ±1%, 1/2 w.
R25	19A116793P4422	Metal film: 44,200 ohms ±1%, 1/4 w.
R26	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R27	19C314256P36811	Metal film: 6810 ohms ±1%, 1/2 w.
R28	19A116793P2612	Metal film: 26,100 ohms ±1%, 1/4 w.
R29	19C314256P35622	Metal film: 56,200 ohms ±1%, 1/2 w.
R30	19C314256P34221	Metal film: 4220 ohms ±1%, 1/2 w.
R31	19C314256P35622	Metal film: 56,200 ohms ±1%, 1/2 w.
R32 and R33	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R34	3R152P562J	Composition: 5600 ohms ±5%, 1/4 w.
R35 and R36	3R152P104J	Composition: 100,000 ohms ±5%, 1/4 w.
R37	19C314256P23832	Metal film: 38,300 ohms ±1%, 1/4 w.
R38	19C314256P24871	Metal film: 4870 ohms ±1%, 1/4 w.
R39	3R152P683J	Composition: 68,000 ohms ±5%, 1/4 w.
R40	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R41	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R42	3R152P390J	Composition: 39 ohms ±5%, 1/4 w.
R43 and R44	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R45	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R46	3R152P684J	Composition: 680,000 ohms ±5%, 1/4 w.
R47	3R152P822J	Composition: 8200 ohms ±5%, 1/4 w.
R48	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R49	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R50	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R51	3R152P392J	Composition: 3900 ohms ±5%, 1/4 w.
R52	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R53	3R152P123J	Composition: 12,000 ohms ±5%, 1/4 w.
R54	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R55	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R56	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R57	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R58	3R152P392J	Composition: 3900 ohms ±5%, 1/4 w.
R59	3R152P752J	Composition: 7500 ohms ±5%, 1/4 w.
R60	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R61	19C314256P26982	Metal film: 69,800 ohms ±1%, 1/4 w.
R62	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R63	19C314256P24991	Metal film: 4990 ohms ±1%, 1/4 w.
R64	19C314256P24122	Metal film: 41,200 ohms ±1%, 1/4 w.
R65	19C314256P22000	Metal film: 200 ohms ±1%, 1/4 w.
R66	19C314256P22002	Metal film: 20,000 ohms ±1%, 1/4 w.
R67 and R68	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R69 and R70	3R152P104J	Composition: 100,000 ohms ±5%, 1/4 w.
R71	19C314256P23922	Metal film: 39,200 ohms ±1%, 1/2 w.
R72	3R152P124J	Composition: 120,000 ohms ±5%, 1/4 w.
R73	19C314256P28251	Metal film: 8250 ohms ±1%, 1/4 w.
R74	3R152P223J	Composition: 22,000 ohms ±5%, 1/4 w.
R75	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R76	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R77 and R78	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R79	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R80	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R81 and R82	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R83	3R152P390J	Composition: 39 ohms ±5%, 1/4 w.
R84	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R85	19A116559P102	Variable, cermet: 5000 ohms ±20%, .5 w; sim to CTS Series 360.
R86	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R87	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R88	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R89	3R152P684J	Composition: 680,000 ohms ±5%, 1/4 w.
R90	3R152P154J	Composition: 150,000 ohms ±5%, 1/4 w.
R91	3R152P272J	Composition: 2700 ohms ±5%, 1/4 w.
R92	19C314256P28451	Metal film: 8450 ohms ±1%, 1/4 w.
R93	3R152P752J	Composition: 7500 ohms ±5%, 1/4 w.
R94	3R152P272J	Composition: 2700 ohms ±5%, 1/4 w.
		- - - - - - - - - - TEST POINTS - - - - - - - - - -
TP1 thru TP7	19B211379P1	Spring (Test Point).
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A115913P7	Digital: Quad 2-Input Gate; sim to Fairchild DTL 946.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1 and VR2	4036887P1	Silicon, Zener.
VR3	4036887P6	Silicon, Zener.
VR4 and VR5	4036887P3	Silicon, Zener.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B219690G1	Handle assembly.
	19A129383P1	Heat sink. (Used with Q19).
	19A116023P3	Insulator, plate. (Used with Q19).
	19A134016P1	Insulator, bushing. (Used with Q19).
	19B201074P204	Tap screw, Phillips POZIDRIV®: No. 4-40 x 1/4. (Secures L1).
	7141225P2	Hex nut: No. 4-40. (Secures heat sink for Q19).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



NOTES:
1. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR II OPERATION.
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION.
5. CR14 USED ONLY IN MASTR II OPERATION.

(19E501112, Rev. 10)

SCHEMATIC DIAGRAM

TRANSMITTER CONTROL BOARD
19D416660G3

PARTS LIST

LBI-4506D

TRANSMITTER CONTROL BOARD
19D416660G3

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116738P4	Polystyrene: 13,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C2	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C3	19A116738P5	Polystyrene: 14,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C4	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C5	19A116738P13	Polystyrene: 11,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C6	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C7	19A116738P2	Polystyrene: 6800 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C8	5496267P19	Tantalum: 22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C9	19A116738P3	Polystyrene: 10,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C10 and C11	19A116738P2	Polystyrene: 6800 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C12	5496267P19	Tantalum: 22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C13	19A116738P3	Polystyrene: 10,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C14	19A116738P2	Polystyrene: 6800 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C15*	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW. Deleted by REV D.
C16	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C17	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C18*	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180. Added by REV B.
C19*	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Added by REV D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR4	19A115250P1	Silicon.
CR6 thru CR8	19A115250P1	Silicon.
CR9 thru CR11	19A134146P4	Diode, optoelectronic: red; sim to Opcoa LSM-6L.
CR12	4037822P1	Silicon.
CR13 and CR14	19A115250P1	Silicon.
CR15* thru CR18*	19A115250P1	Silicon. Added by REV D.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1 thru L3	19B205354G6	Coil.
L4	19B205354G5	Coil.
L5	19B205354G4	Coil.
L6 and L7	19B205354G5	Coil.
L8	19B205354G4	Coil.
L9	19B205354G5	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P9		(Part of printed wiring board 19D416625P1).
		- - - - - - - - - - TRANSISTORS - - - - - - - -
Q1 and Q2	19A115889P1	Silicon, NPN.
Q3	19A115300P4	Silicon, NPN.
Q4	19A115889P1	Silicon, NPN.
Q5	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q6 thru Q8	19A115889P1	Silicon, NPN.
Q9	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q10 thru Q12	19A115889P1	Silicon, NPN.
Q13	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q14	19A115889P1	Silicon, NPN.
Q15	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q16	19A115889P1	Silicon, NPN.
Q17*	19A115910P1	Silicon, NPN; sim to Type 2N3904. Added by REV D.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R2	3R152P913J	Composition: 91,000 ohms ±5%, 1/4 w.
R3	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R4	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R5	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R6	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R7	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R8	3R152P133J	Composition: 13,000 ohms ±5%, 1/4 w.
R9	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R10	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R11	3R152P222J	Composition: 2200 ohms ±5%, 1/4 w.
R12 and R13	3R152P682J	Composition: 6800 ohms ±5%, 1/4 w.
R14	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R15	3R152P433J	Composition: 43,000 ohms ±5%, 1/4 w.
R16	3R152P913J	Composition: 91,000 ohms ±5%, 1/4 w.
R17	3R152P103J	Composition: 2000 ohms ±5%, 1/4 w.
R18	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R19	3R152P222J	Composition: 2200 ohms ±5%, 1/4 w.
R20	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R21	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R22	3R152P913J	Composition: 91,000 ohms ±5%, 1/4 w.
R23	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R24 and R25	3R152P133J	Composition: 13,000 ohms ±5%, 1/4 w.
R26	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R27 and R28	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R29*	3R152P303J	Composition: 30,000 ohms ±5%, 1/4 w.
		In REV B and earlier:
	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R30	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R31	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R32	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R33	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R34	3R152P152J	Composition: 1500 ohms ±5%, 1/4 w.
R35	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R36	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R37 thru R39	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R40*	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w. (Added for Tone/Repeater Applications). Added by REV B.
R41*	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w. Added by REV B.
R42*	3R152P222J	Composition: 2200 ohms ±5%, 1/4 w. Added by REV D.
R43*	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w. Added by REV D.
		- - - - - - - - - - SWITCHES - - - - - - - - -
S1	19B209261P8	Slide: DPDT, 2 poles, 2 positions, .5 amp VDC or 3 amps VAC at 125 v; sim to Switchcraft 46206LR.
S2	19B209261P17	Slide: 2PTT,SR, 2 poles, 3 positions, .5 amp VDC or 3 amp VAC at 125 v; sim to Switchcraft 4613TDH.
		- - - - - - - - - TEST POINTS - - - - - - - - -
TP1 thru TP7	19B211379P1	Spring (Test Point).
		- - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1 thru U3	19A115913P7	Digital, Quad 2- Input Gate; sim to Fairchild DTL 946.
		- - - - - - - - - MISCELLANEOUS - - - - - - -
	4036555P1	Insulator, washer: nylon. (Used with Q3).
	4032480P1	Nut, sheet spring: sim to Vector Electronic Co. No. 440. (Used with S1 and S2).

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 descriptions of parts affected by these revisions.

REV. A - Incorporated into initial shipment.

REV. B - To prevent retransmission of function tone by remote/repeat stations. Added C18, R40 & R41.

REV. C - To increase the saturation of Q14. Changed R29.

REV. D - To prevent intermittent erroneous receiver selection. Deleted C15. Added C19, CR15 thru CR18, Q17, R42 and R43.

REV. E - Board changed to accomodate EACOM Control Board.

REV. F - Changed board to facilitate manufacturing.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SCHEMATIC DIAGRAM

TRANSMITTER CONTROL BOARD 19D416660G4

Issue 1

TONE DETECTORS

TXFI 1950

KEYING FLIP – FLOPS

KEYING SWITCHES

CG DIS 2050

RX NOTCH FILTER

TX NOTCH FILTER

CG DISABLE

XMIT DISABLE

REMOVED FOR LOCAL/REMOTE IN PRO 72

(GND ENABLES CG IN PRO 72)

(GND DISABLES CG IN MASTR II)

AIO LIM AUDIO

DI2

D7 GT DET

D3 REMOTE PTT

D6 LOCAL PTT

DI +12.6VDC REG

D9 +5VDC

D8 GND

A7 CG DIS

A14 LOC/REM CG DIS

AII CG INTERCONNECT

DI4 RX NOTCH IN

DI3 RX NOTCH OUT

A8 LINE AUDIO

A9 COMP INPUT FROM TX NOTCH FILTER

MODIFICATION FOR MASTR PRO 72 OPERATION

REMOVE JUMPERS (DA WIRE)	H57 TO H59 H58 TO H60
ADD JUMPERS (DA WIRE)	H57 TO H58

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN MICROFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

NOTES:
1. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR PRO 72 OPERATION.
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION
5. CR14 USED ONLY IN MASTR II OPERATION.

(19E501106, Rev. 10)

PARTS LIST

LBI-4507B

TRANSMITTER CONTROL BOARD
19D416660G4

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116738P4	Polystyrene: 13,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C2	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C5	19A116738P13	Plystyrene: 11,000 pf ±2.5%, 33 VDCW; sim to
C6	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C7	19A116738P2	Polystyrene: 6800 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C8	5496267P19	Tantalum: 22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C9	19A116738P3	Polystyrene: 10,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C10 and C11	19A116738P2	Polystyrene: 6800 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C12	5496267P19	Tantalum: 22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C13	19A116738P3	Polystyrene: 10,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C14	19A116738P2	Polystyrene: 6800 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C16	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C17	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C18*	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180. Added by REV B.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115250P1	Silicon.
CR4	19A115250P1	Silicon.
CR7	19A115250P1	Silicon.
CR10 and CR11	19A129291P1	Diode, red light emitting.
CR12	4037822P1	Silicon.
CR13 and CR14	19A115250P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B205354G6	Coil.
L3	19B205354G6	Coil.
L4	19B205354G5	Coil.
L5	19B205354G4	Coil.
L6 and L7	19B205354G5	Coil.
L8	19B205354G4	Coil.
L9	19B205354G5	Coil.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P9		(Part of printed wiring board 19D416625P1).
		- - - - - - - - - - TRANSISTORS - - - - - - - -
Q1 and Q2	19A115889P1	Silicon, NPN.
Q3	19A115300P4	Silicon, NPN.
Q10 thru Q12	19A115889P1	Silicon, NPN.
Q13	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q14	19A115889P1	Silicon, NPN.
Q15	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q16	19A115889P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R2	3R152P913J	Composition: 91,000 ohms ±5%, 1/4 w.
R3	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R4	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R5	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R6	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R7	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R21	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R22	3R152P913J	Composition: 91,000 ohms ±5%, 1/4 w.
R23	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R24 and R25	3R152P133J	Composition: 13,000 ohms ±5%, 1/4 w.
R26	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R27 and R28	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R29*	3R152P303J	Composition: 30,000 ohms ±5%, 1/4 w.
		In REV B and earlier:
	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R30	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R31	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R32	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R33	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R34	3R152P152J	Composition: 1500 ohms ±5%, 1/4 w.
R35	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R36	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R37 thru R39	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R40*	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w. (Added for Tone/Repeater Applications). Added by REV B.
R41*	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w. Added by REV B.
		- - - - - - - - - - SWITCHES - - - - - - - - -
S2	19B209261P17	Slide: 2 poles, 3 positions, .5 amp VDC or 3 amp VAC at 125 v; sim to Switchcraft 46313TDH.
		- - - - - - - - - TEST POINTS - - - - - - - - -
TP1 thru TP3	19B211379P1	Spring (Test Point).
TP5	19B211379P1	Spring (Test Point).
TP7	19B211379P1	Spring (Test Point).
		- - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1	19A115913P7	Digital, Quad 2- Input Gate; sim to Fairchild DTL 946.
U3	19A115913P7	Digital, Quad 2- Input Gate; sim to Fairchild DTL 946.
		- - - - - - - - - MISCELLANEOUS - - - - - - -
	4036555P1	Insulator, washer: nylon. (Used with Q3).
	4032480P1	Nut, sheet spring: sim to Vector Electronic Co. No. 440. (Used with S2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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 descriptions of parts affected by these revisions.

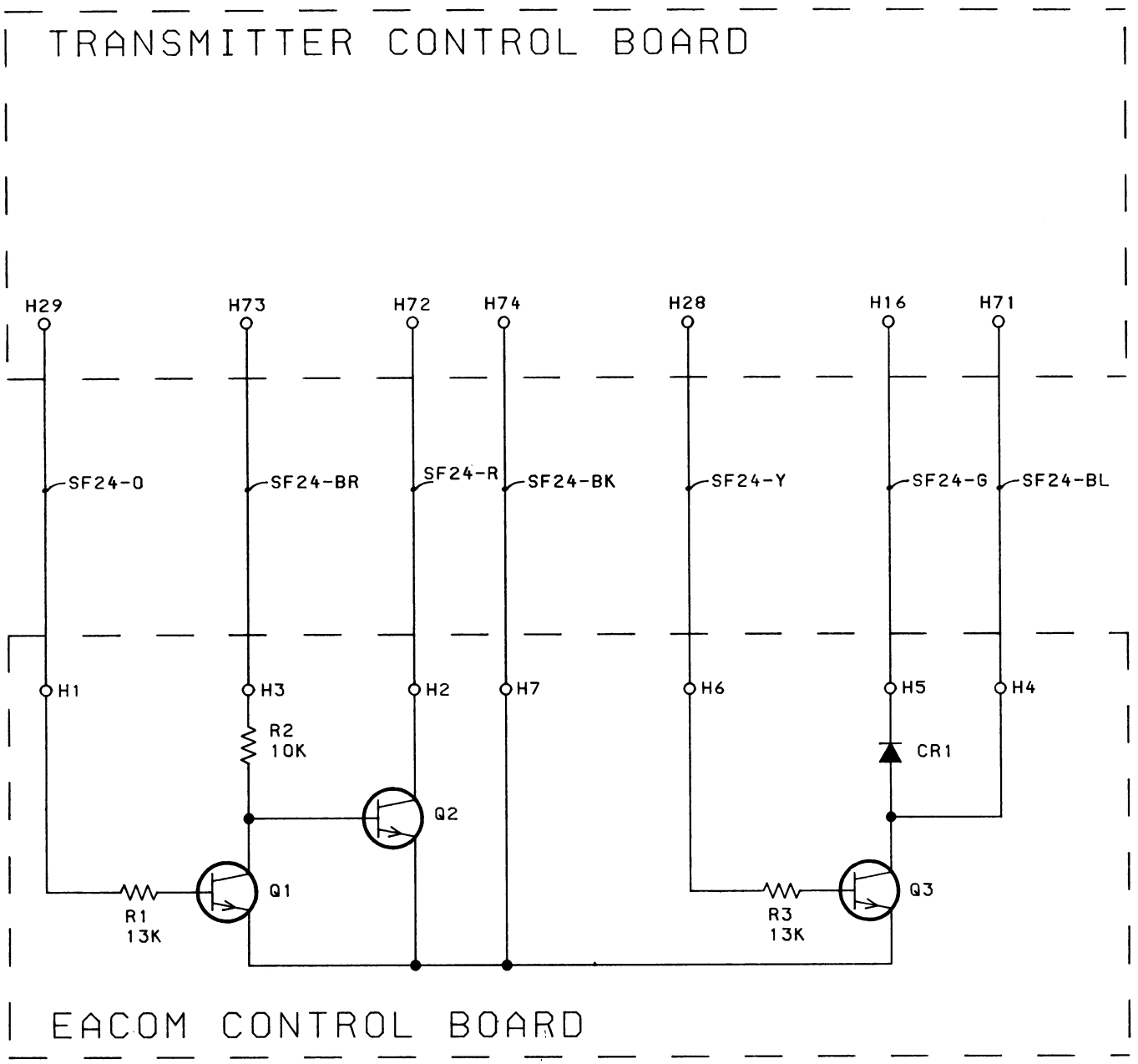
REV. A - Incorporated into initial shipment.

REV. B - To prevent retransmission of function tone by remote/repeat stations. Added C18, R40 & R41.

REV. C - To increase the saturation of Q14. Changed R29.

REV. D - Board changed to accomodate EACOM Control Board.

REV. E - Changed board to facilitate manufacturing.



NOTES:

1. ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS.

(19C327999, Rev. 1)

SCHEMATIC DIAGRAM

EACOM CONTROL BOARD
19C327998G1

PARTS LIST

LBI30645

EACOM CONTROL BOARD
19C327998G1

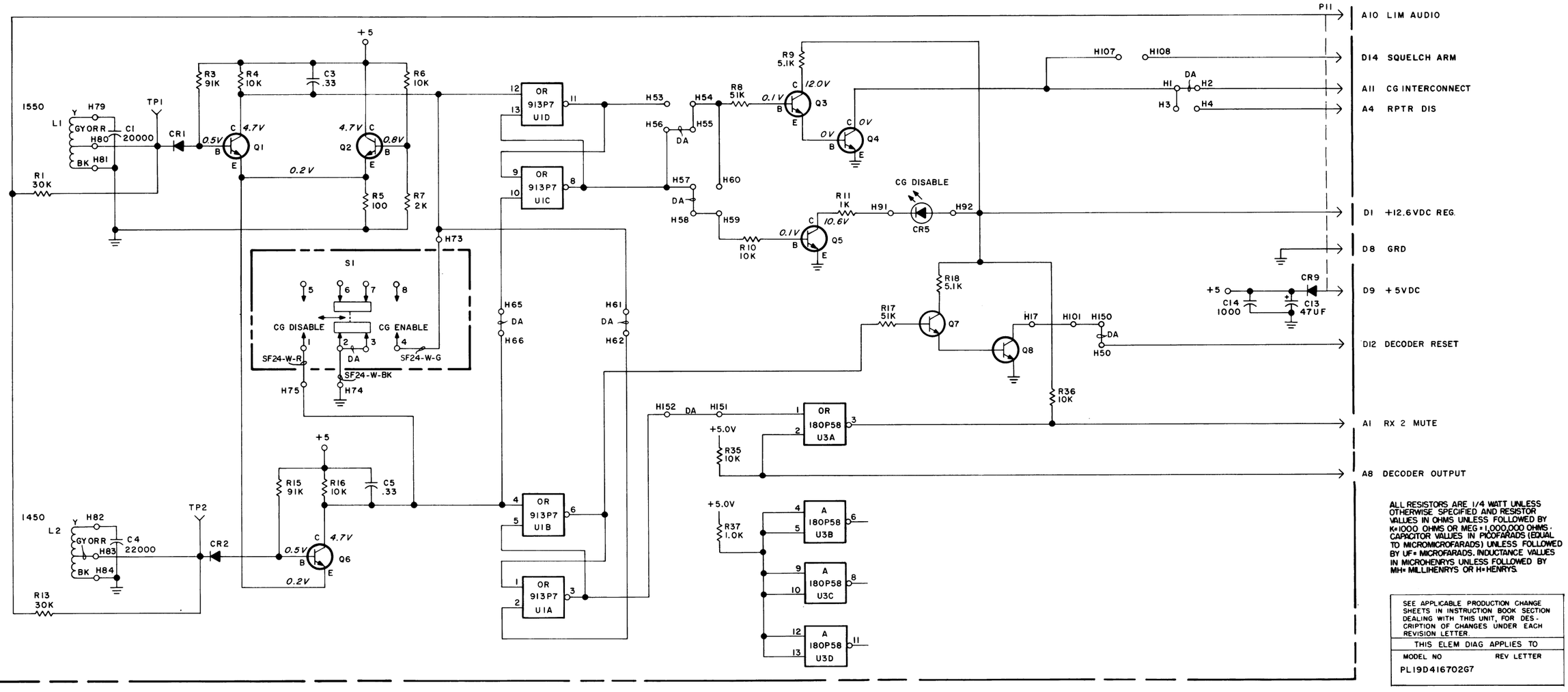
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	19A115250P1	Silicon.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q3	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R2	3R152P103K	Composition: 10K ohms ±10%, 1/4 w.
R3	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7142162P116	Spacer, hex, threaded: No. 4-40 x .25.

TONE DETECTORS

FUNCTION FLIP-FLOPS

FUNCTION SWITCHES

PRINTED WIRING



ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19D416702G7	

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

NOTES:
1. PIN 7 OF ALL U'S ARE CONNECTED TO GROUND.
   PIN 14 OF ALL U'S ARE CONNECTED TO +5V.
2. ALL VOLTAGES MEASURED WITH SECUR-IT TONE UNDETECTED.

(19R622325, Rev. 0)

SCHEMATIC DIAGRAM

CHANNEL GUARD CONTROL BOARD 19D416702G7

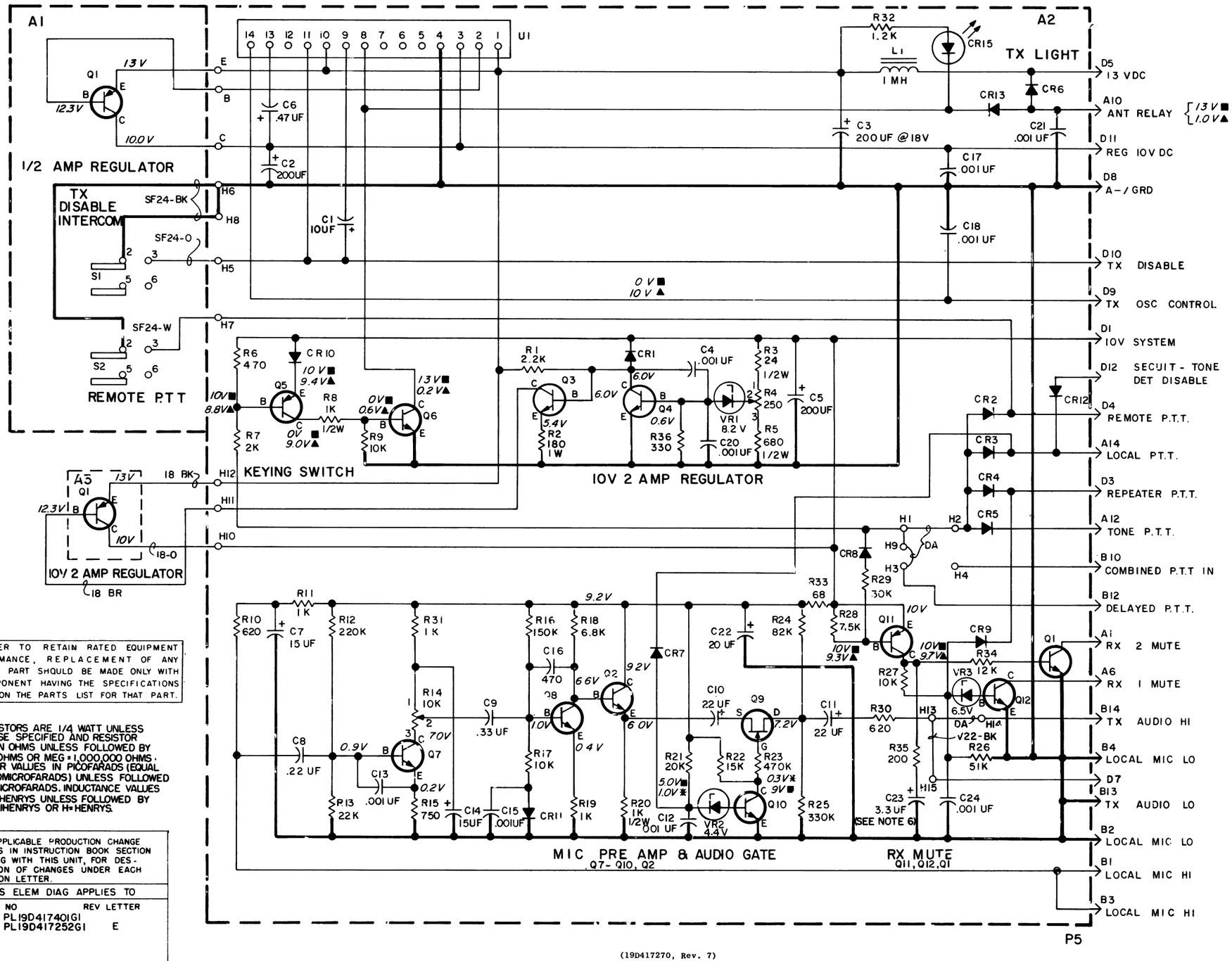
PARTS LIST

LBI30646

CHANNEL GUARD CONTROL BOARD
19D416702G7

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116738P14	Polystyrene: 20,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C3	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C4	19A116738P9	Polystyrene: 22,000 pf ±2.5%, 33 VDCW; sim to Mial Series 617.
C5	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C13	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C14	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	19A115250P1	Silicon.
CR5	19A134146P4	Diode, optoelectronic: red; sim to Opcoa LSM-6L.
CR9	4037822P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 and L2	19B205354G6	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P11		(Part of printed board 19D416691P1).
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q8	19A115889P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P303J	Composition: 30K ohms ±5%, 1/4 w.
R3	3R152P913J	Composition: 91K ohms ±5%, 1/4 w.
R4	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R5	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R6	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R7	3R152P202J	Composition: 2K ohms ±5%, 1/4 w.
R8	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.
R9	3R152P512J	Composition: 5.1K ohms ±5%, 1/4 w.
R10	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R11	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R13	3R152P303J	Composition: 30K ohms ±5%, 1/4 w.
R15	3R152P913J	Composition: 91K ohms ±5%, 1/4 w.
R16	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R17	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.
R18	3R152P512J	Composition: 5.1K ohms ±5%, 1/4 w.
R35 and R36	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R37	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B209261P12	Slide: 2 poles, 3 positions, spring return to center both direction (2PTT,SR); .5 amp VDC or 3 amps VAC at 125 v; sim to Switchcraft 46313MDR.
		- - - - - - - - - - TEST POINTS - - - - - - - - - -
TP1 and TP2	19B211379P1	Spring (Test Point).
		- - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1	19A115913P7	Digital, Quad 2-Input Gate; sim to DTL Series 946.
U3	19A116180P58	Digital, Quad 2-Input High-Voltage Interface Nand Gate; sim to TTL Series 7426.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B219690G1	Handle.
	4032480P1	Nut, sheet spring: sim to Vector Electronic 440.
	19B201074P204	Tap screw, Phillips POZIDRIV®: No. 4-40 x 1/4.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



NOTES:

10 V REG / CONTROL BD

1. FOR CARRIER SQUELCH (NON-CHANNEL GUARD) STATIONS, JUMPER H1-H2 & H3-H9 ARE PRESENT.
2. FOR CHANNEL GUARD LOCAL, REMOTE OR LOCAL/REMOTE STATIONS JUMPER H9-H3 & H2-H4 ARE PRESENT.
3. FOR CHANNEL GUARD REPEATERS USING DECODE ONLY (NO ENCODE), JUMPER H1-H2 IS PRESENT.
   FOR CHANNEL GUARD REPEATERS USING BOTH ENCODE AND DECODE, JUMPER H2-H4 AND H3-H9 ARE PRESENT.
4. FOR DUPLEX OPERATION OTHER THAN REPEATERS, Q12 IS NOT PRESENT.
5. WHEN SECOND RECEIVER MUTE ON TRANSMIT IS NOT DESIRED, CUT OUT Q1.
6. IN REPEAT, REMOTE/REPEAT AND LOCAL/REPEAT STATIONS, C23 IS NOT PRESENT.
7. WHEN OPTIONS 9555, 9556, AND 9589 (BACK TO BACK REPEATERS) ARE APPLIED, JUMPER FROM H13 TO H14 IS REMOVED AND A JUMPER FROM H13 TO H15 IS ADDED.

VOLTAGE READINGS

ALL READINGS MADE WITH 20,000 OHMS-PER-VOLT METER. ALL READINGS TYPICAL.

▲ TRANSMITTER KEYED

■ TRANSMITTER UNKEYED

✕ LPTT KEYED

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PLI9D417401G1	
PLI9D417252G1	E

(19D417270, Rev. 7)

SCHEMATIC DIAGRAM

10 VOLT REGULATOR/CONTROL BOARD
19D417401G1

PARTS LIST

LBI-4802E

10-VOLT REGULATOR/CONTROL
19D417401G1

SYMBOL	GE PART NO.	DESCRIPTION
A1		PANEL 19C320809G1
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116375P1	Silicon, PNP.
		- - - - - - - - - - SWITCHES - - - - - - - - -
S1 and S2	19B209261P11	Slide: 4PDT, 4 poles, 2 positions, .5 amp VDC or 3 amps VAC at 125 v; ; sim to Switchcraft XW-1712A.
A2		REGULATOR BOARD 19D417252G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19B200240P10	Tantalum: 10 µf ±5%, 15 VDCW.
C2 and C3	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTX.
C4	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C5	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTX.
C6	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C7	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C8	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C9	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C10	19B209233P1	Electrolytic, non-polarized: 25 µf ±20%, 25 VDCW; sim to Sprague 41D.
C11	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C12 and C13	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C14	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C15	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C16	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C17 and C18	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C19*	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Deleted by REV D.
C20 and C21	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C22	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C23	5496267P209	Tantalum: 3.3 µf ±10%, 15 VDCW; sim to Sprague Type 150D.
C24	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	4037822P1	Silicon.
CR2 thru CR5	19A115250P1	Silicon.
CR6	4037822P1	Silicon.
CR7 thru CR12	19A115250P1	Silicon.
CR13	4037822P1	Silicon.
CR15	19A134146P4	Diode, optoelectronic: red; sim to Opcoa LSM-6L.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A115894P1	Audio freq: 1.0 mh ind., 0.35 ohms DC res.
		- - - - - - - - - - PLUGS - - - - - - - - -
P5		(Part of printed board 19D417241P1).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A115889P1	Silicon, NPN.
Q3	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q4	19A115889P1	Silicon, NPN.
Q5	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q6	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q7 and Q8	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q9	19A134137P1	N Type, field effect; sim to Type 2N3458.
Q10	19A115889P1	Silicon, NPN.
Q11	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q12	19A115889P1	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.
R2*	3R78P181J	Composition: 180 ohms ±5%, 1 w.
		In REV A and earlier:
	3R77P301J	Composition: 300 ohms ±5%, 1/2 w.
R3*	3R77P240J	Composition: 24 ohms ±5%, 1/2 w.
		Earlier than REV A:
	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R4	19B209358P101	Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R5	3R77P681K	Composition: 680 ohms ±10%, 1/2 w.
R6	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R7	3R152P202J	Composition: 2K ohms ±5%, 1/4 w.
R8	3R77P102K	Composition: 1K ohms ±10%, 1/2 w.
R9	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R10	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R11	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R12	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R13	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R14	19B209358P106	Variable, carbon film: approx 300 to 10K ohms ±10%, 0.25 w; sim to CTS Type X-201.
R15	3R152P751J	Composition: 750 ohms ±5%, 1/4 w.
R16	3R152P154J	Composition: 150K ohms ±5%, 1/4 w.
R17	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R18	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R19	3R152P102K	Composition: 1K ohms ±10%, 1/4 w.
R20	3R77P102K	Composition: 1K ohms ±10%, 1/2 w.
R21	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R22	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
R23	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R24	3R152P823J	Composition: 82K ohms ±5%, 1/4 w.
R25	3R152P334J	Composition: 330K ohms ±5%, 1/4 w.
R26	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.
R27	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R28	3R152P752J	Composition: 7.5K ohms ±5%, 1/4 w.
R29	3R152P303J	Composition: 30K ohms ±5%, 1/4 w.
R30	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R31	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R32	3R152P122J	Composition: 1.2K ohms ±5%, 1/4 w.
R33	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R34	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R35	3R152P201J	Composition: 200 ohms ±5%, 1/4 w.
R36*	3R152P331J	Composition: 330 ohms ±5%, 1/4 w. Added by REV A.
		- - - - - - - INTEGRATED CIRCUITS - - - - - -
U1*	19D416564G4	10-Volt Regulator.
		In REV D and earlier:
	19D416564G3	10-Volt Regulator.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1	4036887P40	Silicon, Zener.
VR2	4036887P4	Silicon, Zener.
VR3	4036887P6	Silicon, Zener.
A3		HEAT SINK ASSEMBLY 19B226114G2
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116758P1	Silicon, PNP; sim to Type 2N4399.
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	19B219690G1	Handle assembly.
	19A116023P1	Insulator, plate. (Used with Q1 on A1).
	19A134016P1	Insulator, bushing. (Used with Q1 on A1).
	4036555P1	Insulator, washer: nylon. (Used with Q3 and Q6 on A2).
	7118719P10	Clip, spring tension: sim to Prestole E-50019-003. (Used with L1 on A2).
	4029974P1	Insulator, plate. (Used with Q1 on A3).
	19A121882P1	Washer, shield. (Used with Q1 on A3).
	4036994P1	Terminal, solderless. (Used with Q1 on A3).
	19B226013P1	Heat sink. (Used with Q1 on A3).
	19A121175P11	Insulator. (Used with C10 on A2).

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 descriptions of parts affected by these revisions.

REV. A - Regulator Board 19D417252G1

To correct noisy Regulator.
Changed R3 and added R36.

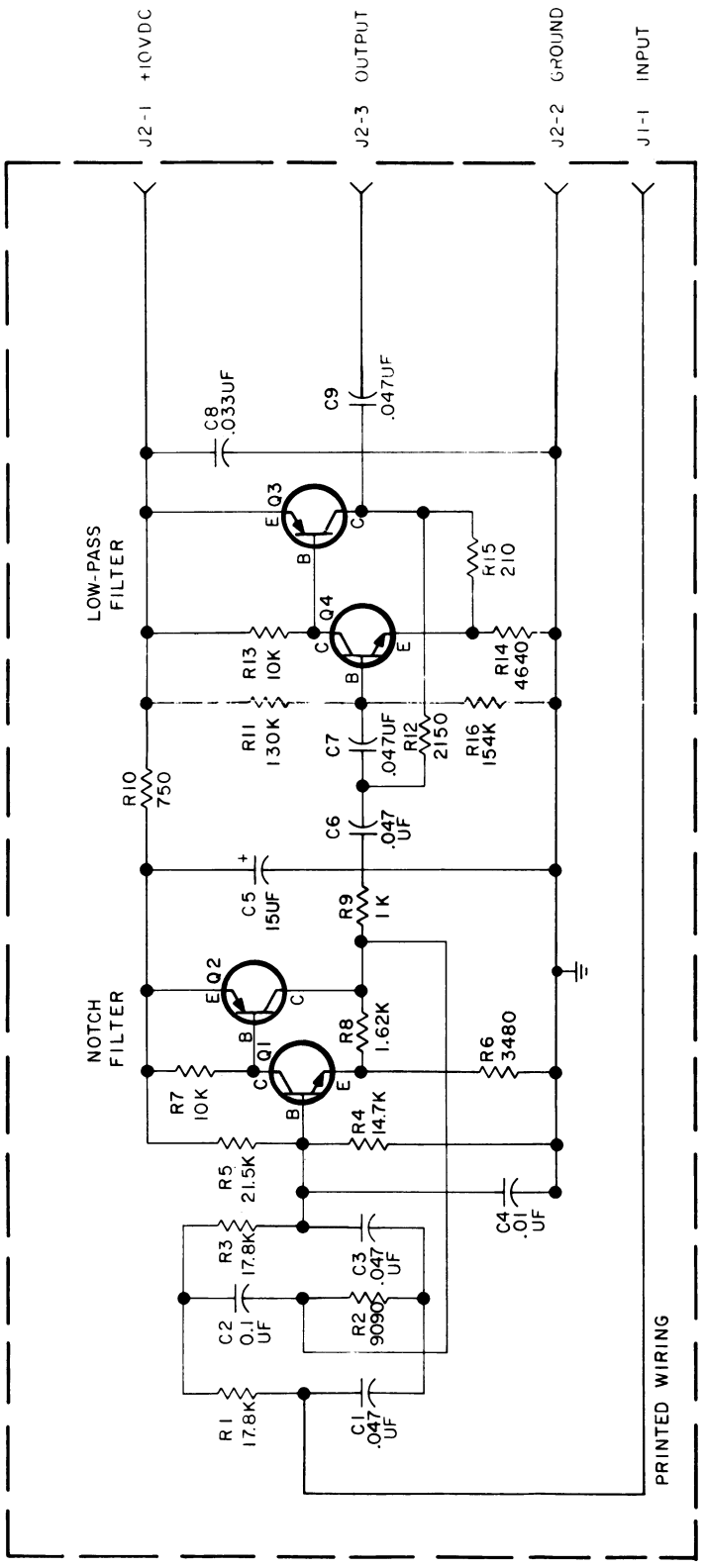
REV. B - To optimize the regulator bias.
Changed R2.

REV. C - To prevent local Mic audio from going to the wrong transmitter in back-to-back repeaters.
Added H13, H14, H15 and D7.

REV. D - To eliminate 150 MHz oscillation in Regulator.
Deleted C19.

REV. E - To prevent Regulator from sending transmit pulse during switch-off delay period. Changed V1.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	**REV LETTER**
PL19C320627G1	

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

(19C320628, Rev. 0)

SCHEMATIC DIAGRAM

CHANNEL GUARD FILTER 19C320627G1

Issue 1

PARTS LIST

LBI-4813

CHANNEL GUARD FILTER BOARD
19C320627G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19C300075P47001G	Polyester: 47,000 pf ±2%, 100 VDCW; sim to GE Type 61F.
C2	19C300075P10002G	Polyester: 100,000 pf ±2%, 100 VDCW; sim to GE Type 61F.
C3	19C300075P47001G	Polyester: 47,000 pf ±2%, 100 VDCW; sim to GE Type 61F.
C4	19C300075P10001G	Polyester: 10,000 pf ±2%, 100 VDCW; sim to GE Type 61F.
C5	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C6 and C7	19C300075P47001G	Polyester: 47,000 pf ±2%, 100 VDCW; sim to GE Type 61F.
C8	19A116080P4	Polyester: 0.033 µf ±20%, 50 VDCW.
C9	19C300075P47001G	Polyester: 47,000 pf ±2%, 100 VDCW; sim to GE Type 61F.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 and J2	19A116659P5	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3031.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q2 and Q3	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q4	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		- - - - - - - - - RESISTORS - - - - - - - - - -
R1	19C314256P21782	Metal film: 17,800 ohms ±1%, 1/4 w.
R2	19C314256P29091	Metal film: 9090 ohms ±1%, 1/4 w.
R3	19C314256P21782	Metal film: 17,800 ohms ±1%, 1/4 w.
R4	19C314256P21472	Metal film: 14,700 ohms ±1%, 1/4 w.
R5	19C314256P22152	Metal film: 21,500 ohms ±1%, 1/4 w.
R6	19C314256P23481	Metal film: 3480 ohms ±1%, 1/4 w.
R7	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R8	19C314256P21621	Metal film: 1620 ohms ±1%, 1/4 w.
R9	19C314256P21001	Metal film: 1000 ohms ±1%, 1/4 w.
R10	3R152P751J	Composition: 750 ohms ±5%, 1/4 w.
R11	19C314256P21303	Metal film: 130,000 ohms ±1%, 1/4 w.
R12	19C314256P22151	Metal film: 2150 ohms ±1%, 1/4 w.
R13	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R14	19C314256P24641	Metal film: 4640 ohms ±1%, 1/4 w.
R15	19C314256P22100	Metal film: 210 ohms ±1%, 1/4 w.
R16	19C314256P21543	Metal film: 154,000 ohms ±1%, 1/4 w.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

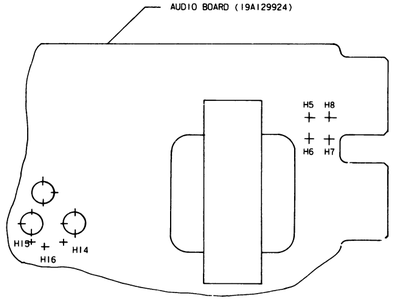
PARTS LIST

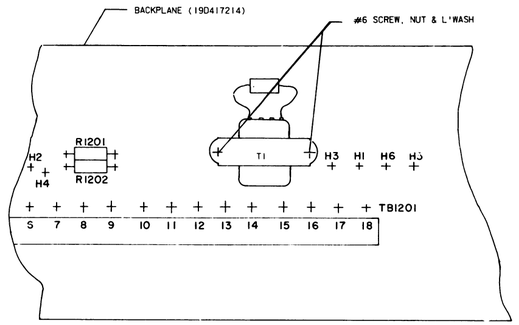
LBI-4567

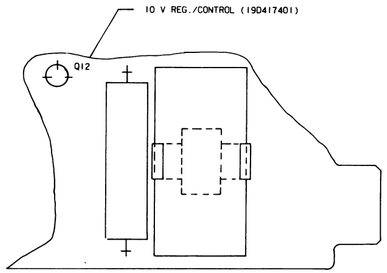
4 WIRE AUDIO KIT
19A129508G1

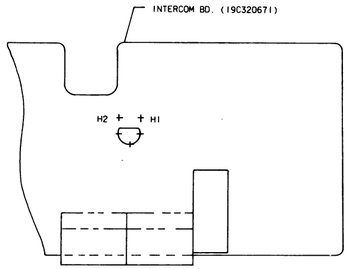
SYMBOL	GE PART NO.	DESCRIPTION
	19B209260P103	Terminal, solderless. (Used with T1).
	N80P13005C6	Screw: No. 6-32 x 5/16.
	7141225P3	Hex nut: No. 6-32.
	N404P13C6	Lockwasher, internal tooth: No. 6.
		TRANSFORMER ASSEMBLY 19A129500G1
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P621J	Composition: 620 ohms ±5%, 1/2 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	19A115731P1	Audio freq: 300 to 6000 Hz. Pri (1-4): 22 ohms ±15% DC res, Pri (2-3): 12.5 ohms ±15% DC res, Sec 1: 13 ohms ±15%, Sec 2: 13 ohms ±15%.

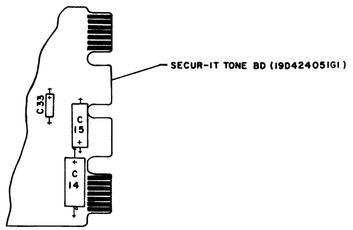
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.











(19D417439, Rev. 5)

THESE INSTRUCTIONS COVER THE INSTALLATION OF THE 4 WIRE AUDIO KIT PL19A129508.

(1) INSTRUCTIONS FOR INSTALLATION ON 19D417214G1 BACK PLANE FOR D.C. REMOTE SYSTEM.

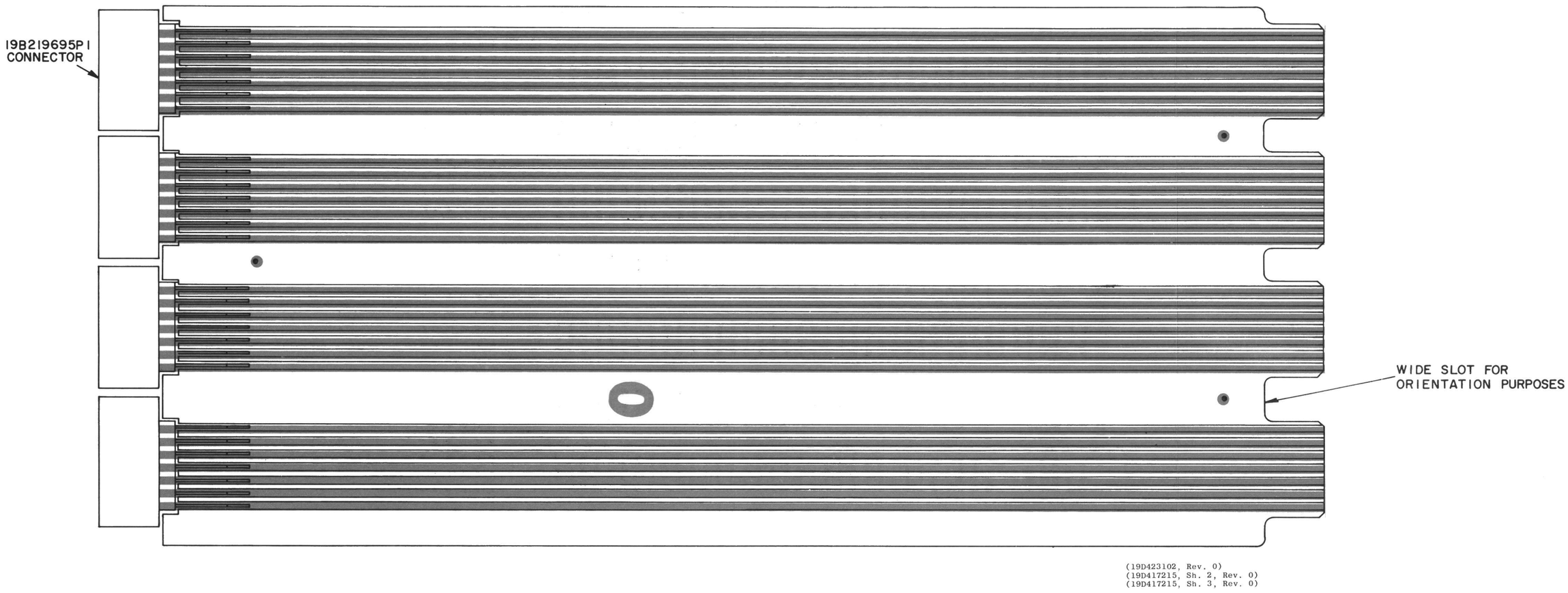
1. MOUNT T1 TO BACK PLANE AS SHOWN.
2. SOLDER BLACK LEAD IN HOLE 1.
3. SOLDER BROWN LEAD IN HOLE 3.
4. SOLDER ORANGE LEAD IN HOLE 2.
5. SOLDER RED LEAD IN HOLE 4.
6. CONNECT GREEN LEAD TO TB1201-15.
7. CONNECT YELLOW LEAD TO TB1201-14.
8. REMOVE JUMPER BETWEEN HOLES 5 & 6 ON AUDIO BOARD 19A129924.
9. MOVE JUMPER FROM HOLE 14 TO HOLE 16 ON AUDIO BD 19A129924.
10. REMOVE Q12 ON 10V REG/CONTROL BD. (19D417401)
11. IF INTERCOM BD. (19C320671) IS PRESENT, ADD A JUMPER (D.A. WIRE) FROM H1 TO H2.
12. TEST PER 19A129945.

(2) INSTRUCTIONS FOR INSTALLATION ON 19D417214G1 BACK PLANE FOR TONE CONTROL SYSTEM.

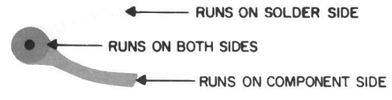
1. MOUNT T1 TO BACK PLANE AS SHOWN.
2. SOLDER BLACK LEAD IN HOLE 1.
3. SOLDER BROWN LEAD IN HOLE 3.
4. SOLDER ORANGE LEAD IN HOLE 2.
5. SOLDER RED LEAD IN HOLE 4.
6. CLIP TERMINAL OFF OF GREEN LEAD & SOLDER LEAD IN HOLE 5.
7. CLIP TERMINAL OFF OF YELLOW LEAD & SOLDER LEAD IN HOLE 6.
8. REMOVE JUMPER BETWEEN HOLES 5 & 6 ON AUDIO. BOARD 19A129924.
9. MOVE JUMPER FROM HOLE 14 TO HOLE 16.
10. REMOVE Q12 ON 10V REG/CONTROL BD. (19D417401)
11. IF INTERCOM BD. (19C320671) IS PRESENT ADD A JUMPER (D.A. WIRE) FROM H1 TO H2.
12. REMOVE C33 ON SECUR-IT TONE BD. 19D424051G1.
13. TEST PER 19A129945.

SERVICE SHEET

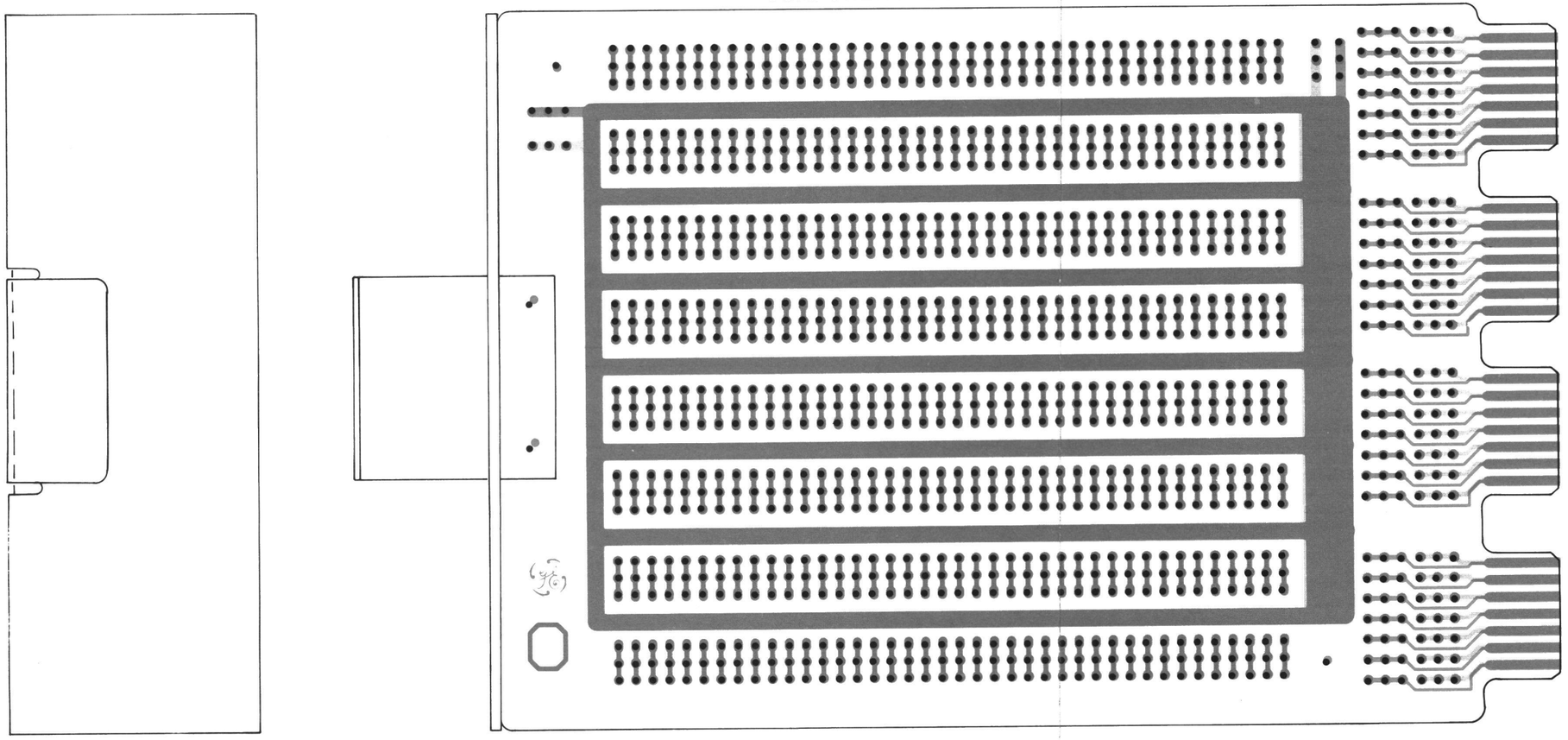
4-WIRE AUDIO KIT 19A129508 (OPTION 9507)



(19D423102, Rev. 0)
(19D417215, Sh. 2, Rev. 0)
(19D417215, Sh. 3, Rev. 0)

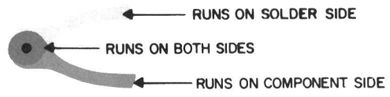


COMPONENT BOARD 19C320912P1



FRONT PANEL: 19D417384P5
HANDLE: 19B219690G1

(19C321422, Rev. 0)
(19B226246, Sh. 1, Rev. 0)
(19B226246, Sh. 2, Rev. 0)



SERVICE SHEET

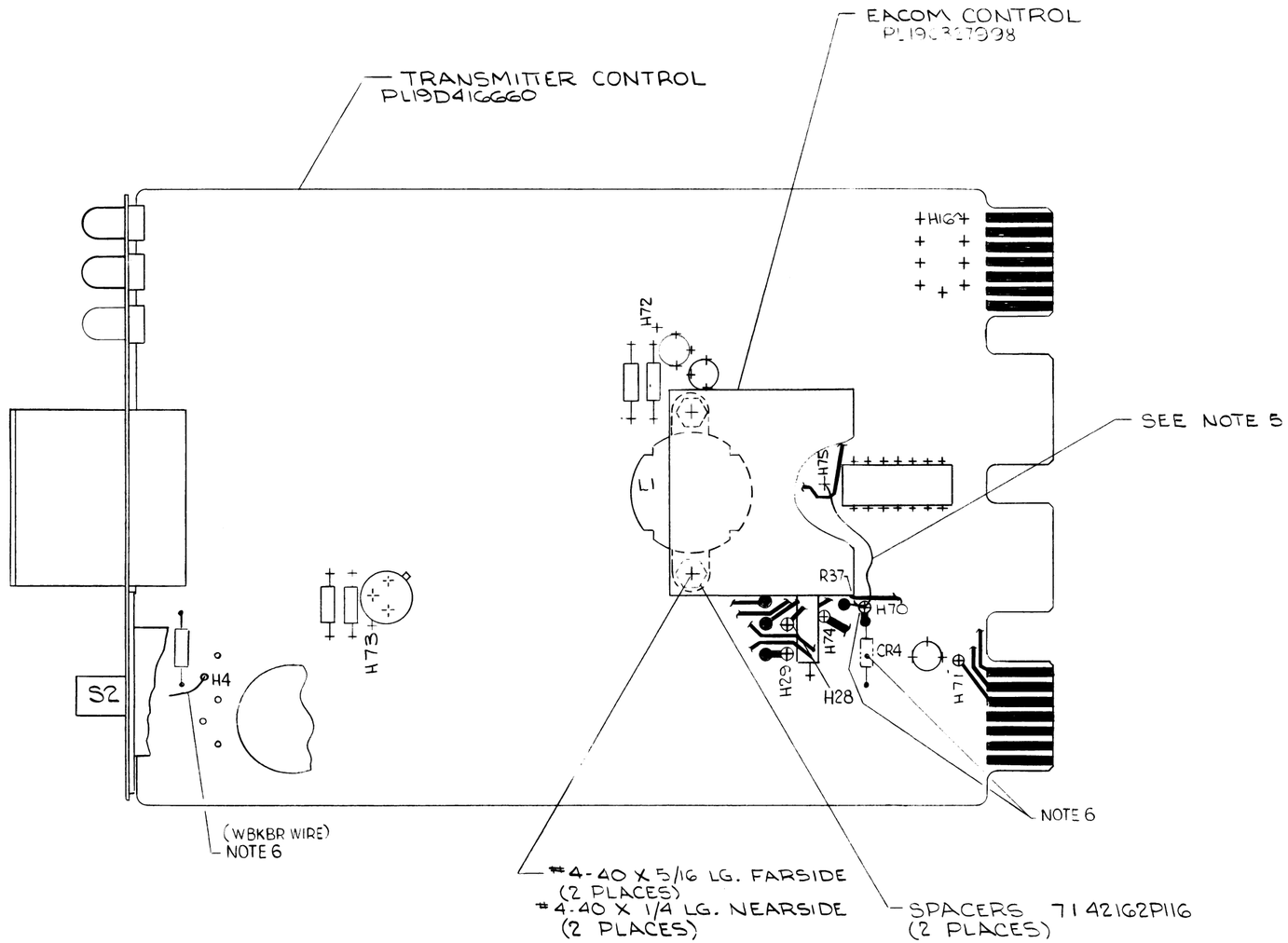
FIELD APPLICATION MODULE
19D417941G1

THESE INSTRUCTIONS COVER THE MODIFICATION OF THE 19D416660G3 & G4 TRANSMITTER CONTROL BOARD USING PL19C327998 CONTROL BD FOR USE IN EACOM APPLICATIONS.

(1)

1. REMOVE & DISCARD 2 #4-40 X 3/16 LG. SCREWS SECURING L1.
2. INSTALL 2 #4-40 X 5/16 LG. SCREWS TO SECURE L1.
3. INSTALL 2 A7142162P116 HEX SPACERS TO SCREWS SECURING L1.
4. INSTALL EACOM CONTROL BOARD PL19C327998 ON SPACERS USING 2 #4-40 X 1/4 LG. SCREWS.
5. ON THE TRANSMITTER CONTROL BOARD 19D416660G3 OR G4 ADD JUMPER FROM H70 TO H75 USING SLEEVED DA JUMPER.
6. CUT WIRE FROM S2-1 TO H4, REMOVE R37 AND CR4.
7. MAKE THE FOLLOWING CONNECTIONS FROM THE EACOM CONTROL BOARD TO THE TRANSMITTER CONTROL BOARD.

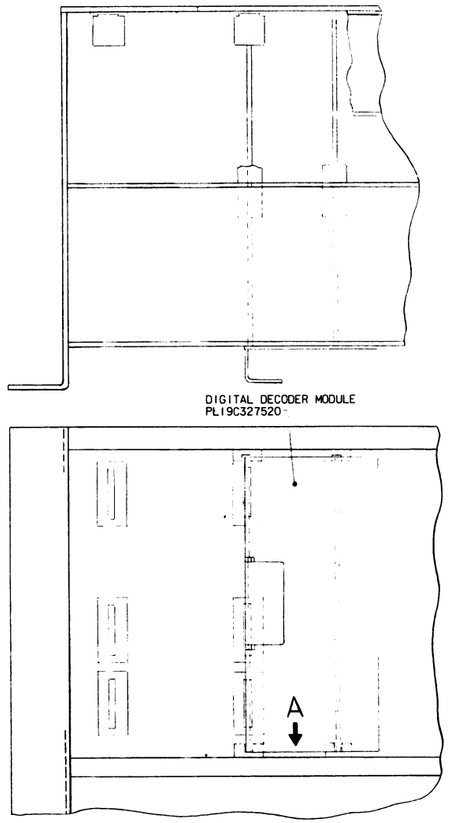
SF24-O	TO: H29
SF24-R	TO: H72
SF24-BR	TO: H73
SF24-BL	TO: H71
SF24-G	TO: H16
SF24-Y	TO: H28
SF24-BK	TO: H74



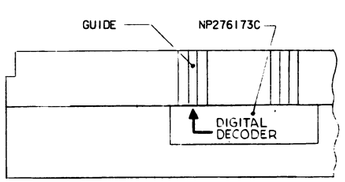
(19D424997, Rev. 0)

THESE INSTRUCTIONS COVER THE INSTALLATION OF DIGITAL DECODER MODULE IN THE CONTROL SHELF FOR 'EACOM' LOCAL APPLICATIONS.

1. ATTACH NAMEPLATE TO SHELF AS SHOWN IN VIEW 'A'. ALIGN ARROW WITH CENTER OF GUIDE WITHIN .06.
2. PLUG MODULE IN SHELF.



FRONT VIEW
CONTROL SHELF



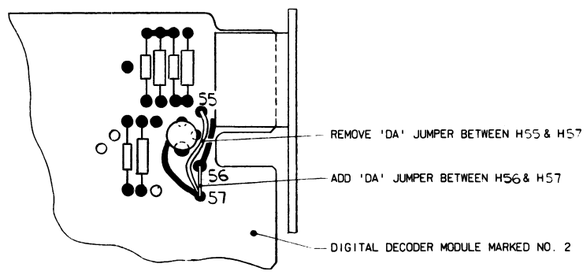
VIEW 'A'

THESE INSTRUCTIONS COVER THE INSTL & MOD INSTRUCTIONS OF DIGITAL DECODER MODULES IN THE CONTROL SHELF FOR 'EACOM' REGIONAL APPLICATIONS.

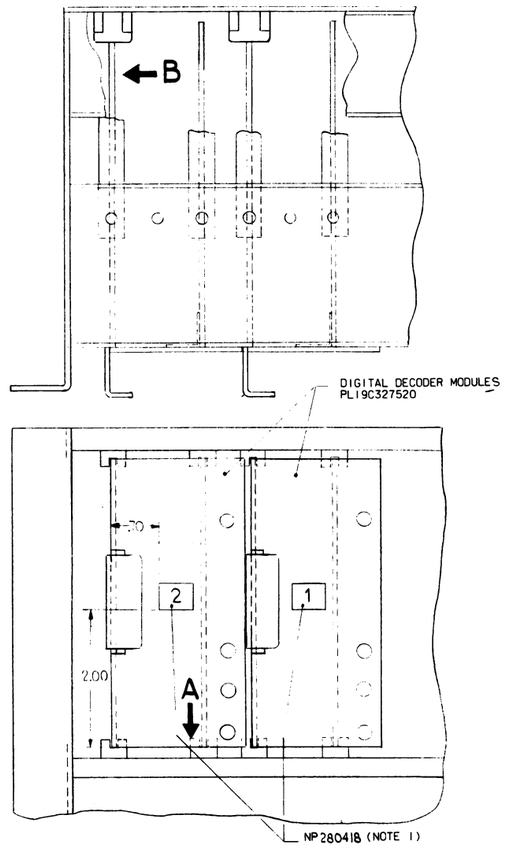
NOTE 1: DESIGNATED ITEMS ARE PART OF HARDWARE KIT PLI9A137196G1.

MODIFICATION INSTRUCTIONS AS FOLLOWS:

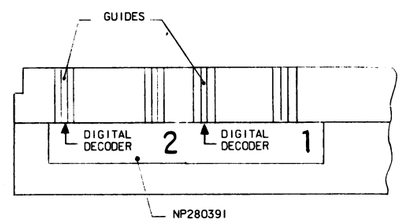
1. MODIFY DIGITAL DECODER MODULE IDENTIFIED NO. 2 TO VIEW 'B'.
2. ATTACH NO. 1 & 2 NAMEPLATES AS SHOWN IN FRONT VIEW.
3. ATTACH NAMEPLATE TO SHELF AS SHOWN IN VIEW 'A'. ALIGN ARROWS WITH CENTER OF GUIDES WITHIN .06.



VIEW 'B'
ENLARGED & ROTATED 90°CW



FRONT VIEW
CONTROL SHELF



VIEW A

INSTALLATION INSTRUCTIONS

DIGITAL DECODERS