MOBILE RADIO

MAINTENANCE MANUAL

DESKON Remote Control Unit
Models 4EC78A15 & 16

DESK TOP

WALL MOUNT

SPECIFICATIONS *

Audio Output Speaker	500 milliwatts with less than 3% distortion, 117 VAC, ±10% (-12 to +18 dBm).
Line	+18 dBm maximum with less than 3% distortion, with compression, 117 VAC, ±10%.
Compression Range	With audio input increase of 30 dB beyond start of compression, output level increases less than 3 dB.
Frequency Response	±3 dB from 300 to 3000 Hz, reference 1000 Hz.
Power Requirement	10 watts, 117 volts AC, 50/60 Hz
Dimensions (HxWxD)	4-1/8" x 9-1/4" x 7-7/8" (less hook-switch)

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

GENERAL ELECTRIC

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FIGURES

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.

COMBINATION NOMENCLATURE

1ST & 2ND DIGITS	3RD DIGIT	4TH DIGIT	5TH DIGIT	6TH DIGIT	7TH DIGIT	8TH & 9TH DIGITS
MC MINIATURE CONSOLE	**3** DESK TOP (HANDSET & SPKR-MIC)	**1** STANDARD	**A** 1-FREQUENCY TRANSMITTER & RECEIVER	**S** STANDARD	**B** BEIGE	**11** STANDARD
	4 WALL MOUNT (HANDSET & SPKR-MIC)	**2** CHANNEL GUARD	**B** 2-FREQ. TRANS. & 1-FREQ. RCVR.		**G** GREY	
			C 2-FREQ. TRANS. & 2-FREQ. RCVR.			
			D 1-FREQ. TRANS. & 2-FREQ. RCVR.			
			R 1-FREQ. TRANS. & SEARCH LOCK MONITOR (OR 2 RECEIVERS)			
			S 2-FREQ. TRANS. & SEARCH LOCK MONITOR (OR 2 RECEIVERS)			

OPTION CHART

5196	SUPERVISORY CONTROL (1-FREQ. TRANS. & REC) WITH PARALLEL TRANSMIT INDICATOR
5197	SUPERVISORY CONTROL (MULTI-FREQ. OR CHANNEL GUARD WITH 1-FREQ. TRANS & REC) WITH PARALLEL TRANSMIT INDICATOR
5198	REPEATER DISABLE

DESCRIPTION

The General Electric DESKON Remote Control Unit (Models 4EC78A15-16) is used with Remote Control Panel Model 4KC16A10 to provide up to five remote control functions in two-way radio systems. DESKON is also compatible with systems using Remote Control Unit EC-28-A and Remote Control Panel KC-7-C. The DESKON Remote Control Unit is fully transistorized -- utilizing silicon transistors for added reliability.

An executive type telephone case is used to package the control unit and is available for Desk Top or Wall Mount installation. Both mounting configurations are provided with a combination speaker-microphone and handset and hookswitch. Table 2 lists the control unit model numbers and their application.

Table 2 - DESKON Model Numbers

MODEL	APPLICATION
4EC78A15	Wall Mount with Speaker-Microphone and Handset
4EC78A16	Desk Top with Speaker-Microphone and Handset

The audio section contains a compression-amplifier for equalizing audio output levels over a wide range of microphone or line input signals. When sending messages, the compression-amplifier helps compensate for variations in speech levels. When receiving messages, the compression-amplifier also prevents speaker "blasting" -- large differences in speaker volume resulting from signals arriving at different levels from stations or parallel control units. A compression-amplifier accessory is available for use with the 4KC16A10 Remote Control Panel for simplifying or eliminating line level settings in parallel operations.

Intercom is provided as a standard feature to permit communication between paralleled remote control units without keying the transmitter. It also permits intercommunication between the control unit and the base station when the remote control panel (4KC16A10) is equipped with the intercom accessory.

Refer to the Combination Nomenclature and Option Chart (Table 1) for a complete listing of available accessory application kits and options which are designed to meet the different requirements of individual two-way radio systems.

TELEPHONE LINE CHARACTERISTICS

As a result of propagation conditions, ambient noise levels, space limitations or other conditions, the most advantageous location for the dispatcher may not be the best location to originate or receive transmissions. The DESKON Remote Control Unit permits the dispatcher to transmit, receive, select transmitter and receiver frequencies, etc. over telephone lines. Control currents applied to the telephone lines from the control unit are normally translated into the desired operation at the base station by the remote control panel.

The key link in a remote control installation is the telephone pair between control unit and the base station. To obtain the most satisfactory service over this link, some general knowledge of the capabilities of such lines is required.

A telephone pair is simply a pair of wires, normally ranging from AWG #19 to #26 in size. These wires, furnished by the local telephone company, pass through overhead cables, underground cables, through junction points, and switchboards. To the user, however, they may be considered a simple pair of wires. Equipment that is designed to operate with such a pair should have nominal impedance of 600 ohms. A telephone pair will normally have a maximum length of about 12 miles before amplification is added by the telephone company to make up for line losses. There is an inherent loss in any telephone line installation due to the series inductance and resistance and the shunt capacitance of the wires. This loss is a direct function of the length of the line, and varies with the wire size used. As an example, with AWG #19 wire, a distance of six miles may be covered before one-half the input voltage of a 1,000 Hz tone is lost. With AWG #26 wire, only two and one-quarter miles may be covered before one-half the input voltage is lost. Line losses as high as 30dB can be tolerated in operating a transmitter from the control unit, but such high losses should be avoided whenever possible. Although the telephone pair is fairly well balanced, some noise will be induced into the line, especially if an unshielded run has to be made in a fluorescent-lighted building.

The amount of noise pickup is a function of the length of the line and the environment through which it passes. Assume, for instance, that 0.01 volt of noise is picked up in a particular installation. If the audio output of the control unit is 1 volt and the line loss is 10:1 the audio signal at the base station is 0.1 volt, only 10 times (20 dB) higher than the noise.

This relatively high background noise would greatly reduce the intelligibility of the system and, consequently, the maximum working range. Now, consider a short line in which the noise pick-up is only 0.002 volt and the line loss only 2:1. The signal at the receiving end would then be 250 times (48 dB) greater than the noise. For the best signal-to-noise ratio, the shortest, lowest loss line available is desired.

The DC resistance of any telephone pair will affect the control circuits between the control unit and the base station. The control unit normally operates with a total control line loop resistance as great as 2500 ohms. There is a possibility, however, that stray currents, due to leakage, noise, faults, earth currents, etc., may cause faulty operation of the control relays on such long lines.

CONTROL METHODS

For DC Control voltage circuits, the telephone company can supply a pair of wires that will have DC continuity. This type of connection is commonly called a metallic pair. Not every telephone line used for audio work will necessarily be a metallic pair and, if it is desired to use the audio line for DC control circuits, a metallic pair should be specified. In general, these are three methods of connecting the audio and control circuits to the telephone lines (see Figure 1).

Method 1 - Uses one metallic pair for both audio and control. The control current is simplexed from one line to the other by splitting the output transformer with a capacitor.

Method 2 - Uses one metallic pair for both audio and control and simplexes the control current from the center tap of the output transformer to an earth ground.

Method 3 - Uses two telephone pairs; one for audio and one metallic pair for control.

In choosing one of these methods, consider both cost and performance. The relative cost of leasing lines for use of one of the three methods will vary between local telephone companies, but one of the methods will usually have a decidedly lower rate. Method 3 will provide the best performance. Since the control circuits are separate from the audio circuit, parallel unit installations will be free from key clicks caused by the DC control circuits.

Method 2 saves on the number of telephone pairs used, but still minimizes key clicks from the control circuits, since any surge currents are balanced out in the audio transformer. The only disadvantage of this method is the problem of obtaining an earth ground. In installations near power company sub-stations where high potentials and currents are present, earth ground currents may cause false operation of the relays. In most applications, such extreme conditions will not exist.

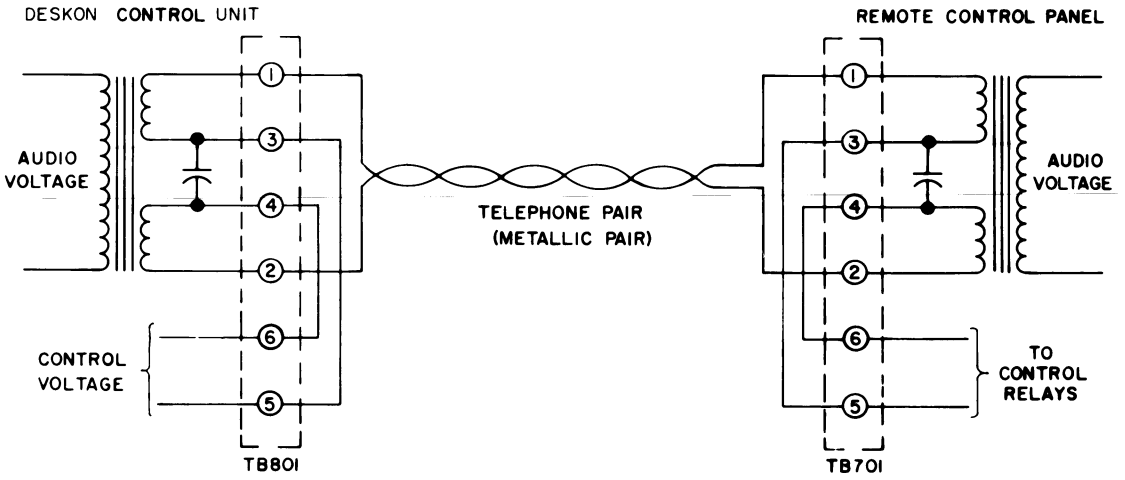
Method 1 provides dependable operation in locations where earth currents may be large. However, key clicks will be heard at all paralleled remote control units whenever one control unit is keyed or unkeyed.

Local telephone companies will sometimes offer no choice of these methods, but will provide an audio pair and one control pair, as in Method 3. This does not necessarily mean that there are two individual pairs of wires between the remote control unit and the transmitter. The two pairs provided may have been simplexed, as in Method 1 or 2, by telephone company circuits. When two pairs are provided in this way, the connections may be considered virtually similar to those under Method 3.

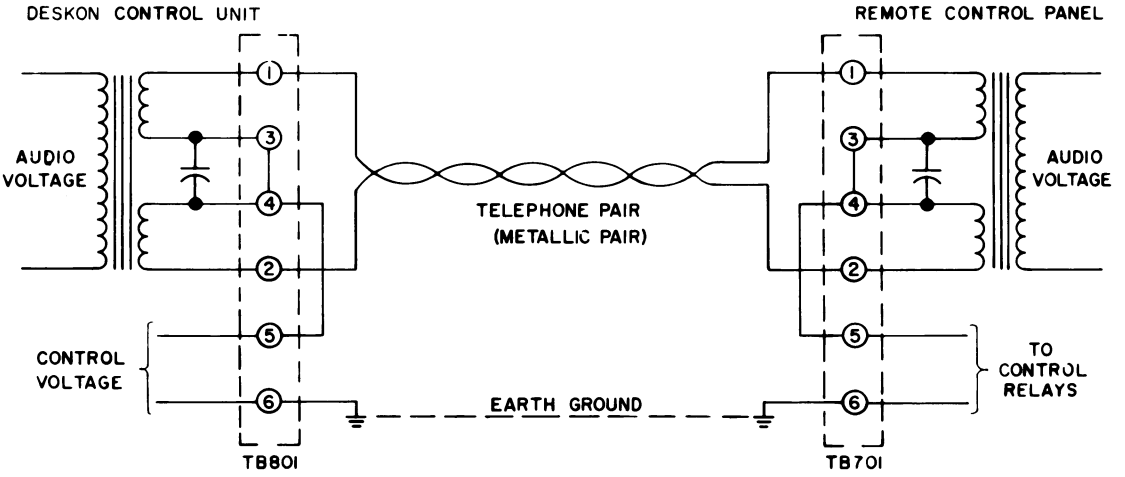
Standards have been set up by the telephone companies for the use of their lines. To minimize cross modulation (i.e., audio being inductively or capacitively coupled from one pair of wires to another pair), a limit of +8 VU is usually set as the maximum level of speech or program material that should be placed on the telephone line. VU is the abbreviation for volume units, as read on a VU meter connected across a 600-ohm line.

Since VU meters are not common in the field, a second standard for maximum telephone line signals is often used. Speech at a level of +8 VU contains peak values which correspond to the peak value of a sine wave at a signal level of +18 dBm across a 600-ohm line. +18 dBm is equal to 18 dBm above 1 milliwatt, in 600 ohms, or 6.2 volts rms across 600 ohms. In this equipment, the peaks which represent the maximum signal of 100% modulation will be equivalent to the peaks of a sine-wave signal at the +18 dBm level. In adjusting the system, a tone of no more than +18 dBm may be used in establishing the 100% modulation point. If an adequate signal-to-noise ratio can be obtained at lower outputs, the control unit output level may be reduced to minimize cross-talk.

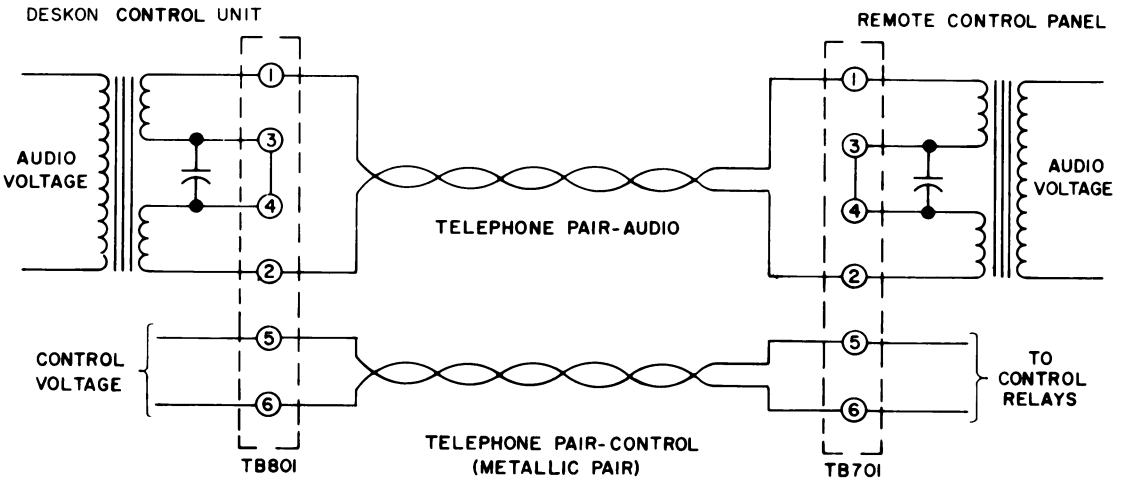
Limits also exist on the maximum DC voltages that may be applied across telephone lines. These are usually 270 volts from line to line and 135 volts from either line to ground. The maximum current obtainable under short circuit conditions in the line must be less that one ampere. Both limits must be met, even when the telephone line is open or short-circuited.



METHOD 1 - SINGLE TELEPHONE PAIR WITH CONTROL SIMPLEXED LINE TO LINE



METHOD 2 - SINGLE TELEPHONE PAIR WITH CONTROL SIMPLEXED BETWEEN CENTER TAP AND GROUND



METHOD 3 - SEPARATE CONTROL AND AUDIO PAIRS

RC-1722

Figure 1 - Telephone Line Connections

CONNECTIONS

All connections to the control unit except microphone and power connections are made at terminal board TB801 on the rear of the chassis. To gain access to TB801, open the DESKON as shown in Figure 6 of the Maintenance Section. Then make the following connections.

1. For proper operation of the DC control circuit, the polarity of the telephone pair carrying the control voltages must be the same at both the DESKON Control Unit and the Remote Control Panel (KC-16-A). Make sure that each control line is connected to corresponding terminals on the control unit and the remote control panel (i.e., TB801-1 to TB701-1 and TB801-2 to TB701-2). To identify the wires at each location, remove them from the equipment and temporarily connect one of the wires at the remote control panel to a good earth ground. Then, measure the resistance of each wire to earth ground at the DESKON Control Unit. The ungrounded wire will appear as an open circuit, while the grounded wire will show a resistance. After determining line polarity, remove ground connection and connect the telephone lines to terminal board TB801, using one of the following methods (see Figure 1).

Method 1 - Single Telephone Pair (Control Voltage Simplexed Line-to-Line)

   a. Connect telephone pair to TB801-1 and TB801-2.
   b. Connect jumper between TB801-3 and TB801-5.
   c. Connect jumper between TB801-4 and TB801-6.

Method 2 - Single Telephone Pair (Control Voltage Simplexed Line-to-Ground)

   a. Connect telephone pair to TB801-1 and TB801-2.
   b. Connect jumper between TB801-3 and TB801-4
   c. Connect jumper between TB801-4 and TB801-5.
   d. Connect jumper between TB801-6 and TB801-10.

Method 3 - Separate Control and Audio Pairs

   a. Connect audio pair to TB801-1 and TB801-2.
   b. Connect control pair to TB801-5 and TB801-6.
   c. Connect jumper between TB801-3 and TB801-4.

2. Connect terminal 10 of terminal board TB801 to a good earth ground, such as a cold water pipe or an electrical conduit. It is essential to have a good ground, regardless of the method of telephone line control used, as a safety measure for the dispatcher.

3. Connect the power cable (W801) to a 117-volt 50/60 Hz AC line.

After the necessary connections have been made to the DESKON Remote Control Unit, a few adjustments are needed before placing the unit in service. Before applying power to the unit, be sure that the station installation and adjustment have been completed and that the telephone lines have been connected to the remote control panel (KC-16-A). All adjustments for the DESKON Remote Control Unit are shown on the Adjustment Procedure (page 11).

OPERATION

The DESKON Control Unit is provided with both a handset and speaker-microphone. With the handset "on hook", the operator has the convenience of speaker-microphone operation. Taking the handset "off hook" mutes the speaker to insure privacy or to facilitate communication in noisy areas.

Switches and controls required for remote control operation are located on the front of the DESKON Control Unit. Typical control procedures for transmit and receive operation follow.

TO RECEIVE A MESSAGE

1. Turn the OFF-ON switch on the side of the control unit to the ON position.

2. For a two-frequency unit, select the desired channel by depressing the R-F1 or R-F2 push button. Search-lock monitor of a two-frequency receiver or simultaneous monitoring of two receivers is accomplished when both buttons are pressed or when both buttons are released. (After monitoring a secondary channel, remember to switch the control unit back to the main operating channel).

3. You are now ready to receive messages from other radios in your system. When you receive the first call, adjust the VOLUME control for the desired listening level.

TO TRANSMIT A MESSAGE

1. Turn the OFF-ON switch on the side of the control unit to the ON position.

2. For a two-frequency unit, select the desired channel by depressing the T-F1 or T-F2 push button.

3. Listen briefly to make sure no one else is using the channel.

4. Press the push-to-talk transmit button on the handset, or hold down the TRANSMIT switch on the control unit. (The red signal light on the control unti will glow each time the transmit function is selected). Then, speak into the microphone using a normal speaking voice.

ACCESSORIES & OPTIONS

Channel Guard

If your remote control station is equipped with Channel Guard, you will hear only those calls that are coded with your Channel Guard frequency. Channel Guard minimizes the nuisance of listening to conversations between all mobiles and stations on the same frequency.

Press the MON button on the control unit before transmitting to be sure that no one is using the channel. Then press the push-to-talk switch on the handset or hold down the TRANSMIT switch on the control unit to send your message. After completing the message release the button. Your station will automatically return to Channel Guard operation.

Supervisory Control Switch

The Supervisory Control Switch gives you full supervisory control over all transmissions from other remote control units in your system. You can terminate unauthorized transmissions by pressing in the Supervisory (SUPV) push button.

Intercom

The Intercom accessory lets you talk to a maintenance technician at the base station or to other remote control units in your system without energizing the transmitter. Press the INTCM switch and while holding it down, press the TRANSMIT switch. Hold both switches down and talk into the microphone. After finishing the conversation, release the TRANSMIT switch before releasing the INTCM switch.

CIRCUIT ANALYSIS

The control unit circuitry consists of audio stages, a self-contained power supply, and controls for selecting the desired remote control functions (see Figure 2).

Audio stages include microphone preamplifier Q1 and compressor-amplifier Q2-Q7 on the Audio-Compressor Board, and the Audio PA (Q2-Q4) on the Power Supply Board.

The power supply provides the control currents for the switching functions, and supply voltages for the audio stages, transmit relay (K1) and transmit indicator light.

Mounted on the front of the control unit are the VOLUME control, push-button switches and transmit indicator light.

AUDIO CIRCUITS

The audio circuits consist of Audio Board A806 and Audio PA Q2-Q4 on the Power Supply Board (A801-A803). The audio board is used as a mike-to-line amplifier in the transmit or intercom mode, and as a line-to-speaker amplifier in the receive mode.

Transmit Mode

Keying the microphone energizes relay K1. In speaker-microphone applications, the speaker is muted and audio from the speaker/microphone is applied through the common-emitter preamplifier (Q1) and MIC GAIN Control R10 to compressor-amplifier (Q2-Q7). In handset applications, audio is applied from the handset through HANDSET GAIN Control R39 to the compressor-amplifier. (In this case, the speaker is muted when the handset is taken "off hook").

The output of the compressor-amplifier is connected by the relay through LINE OUTPUT Control R32 to audio PA transistors Q2-Q4 on the power supply board. Following the audio PA stage, audio voltage is coupled through line matching transformer T802 to the telephone pair.

Receive Mode

Audio from the telephone pair is coupled through line-matching transformer T802 to the audio board (A806). The audio input (from J7) is connected through the normally closed relay contact to LINE INPUT control R13 and then to the compressor-amplifier. Following the compressor-amplifier, the audio voltage is connected by the relay through VOLUME control R801 to the audio PA, and then connected to the speaker high lead or handset earpiece by means of jumpers on TB801.

Audio-Compressor

The compressor-amplifier circuit consists of gain control stage Q2, high gain audio amplifiers Q3 through Q6, and DC amplifier Q7.

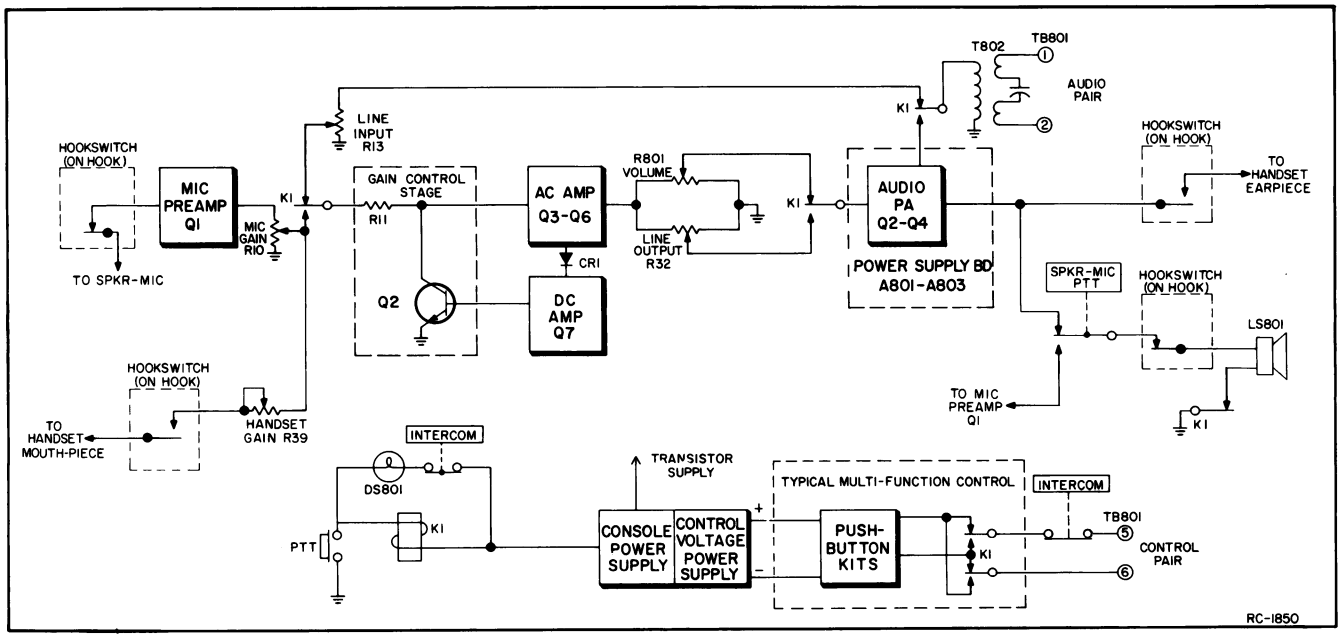


Figure 2 - Block Diagram of Model 4EC78A15&16 Control Unit

When audio is applied to the compressor-amplifier, resistor R11 and the AC impedance of transistor Q2 act as a voltage divider for the AC input signal. The output of Q2 is amplified by a four stage, direct-coupled amplifier (Q3 through Q6). Both AC and DC feedback in the amplifier circuit provide for extremely stable operation.

One portion of the amplified output is fed through LINE OUTPUT control R32 to the audio PA stage. The remaining portion is rectified by detector CR1, filtered by C10 and amplified by DC current amplifier Q7. This DC output is fed back to the base of gain control transistor Q2.

The amount of DC feedback to the gain control stage determines the AC impedance of Q2. When the input level rises, the AC amplifier output starts to increase. The output is detected, amplified, and fed back to the base Q2. The increase in feedback reduces the AC impedance of Q2 which decreases the audio voltage to the AC amplifier, keeping the amplifier output constant.

When the audio input decreases, the output of the AC amplifier starts to decrease, reducing the feedback to Q2. This raises the AC impedance of Q2 and increases the audio voltage to the AC amplifier, keeping the amplifier output constant.

POWER SUPPLY

Three power supply boards (A801-A803) are available for use with the control unit. The DC control functions determine which power supply board is required (see Table 3). The following text pertains to the common circuits of the power supply, while variations are described with the applicable CONTROL CIRCUIT description.

Table 3 - Power Supply Board Applications

POWER SUPPLY BOARD	DC CONTROL APPLICATION
A801 (19C311787-G1)	1-Freq Trans - 1-Freq Rec 1-Freq Trans - 2-Freq Rec
A802 (19C311787-G2)	2-Freq Trans - 1-Freq Rec 2-Freq Trans - 2-Freq Rec 1-Freq Trans & Search-Lock Monitor or Simultaneous Monitoring 2-Freq Trans & Search-Lock Monitor or Simultaneous Monitoring
A803 (19C311787-G3)	1-Freq Trans - 1-Freq Rec with Channel Guard

Turning OFF-ON switch S801 to the ON position, applies 117 volts AC to the primary of power transformer T801. The primary is fused by F801. The power supply contains two rectifier circuits in the secondary of T801 to provide control and operating voltages for the control unit.

Full-wave bridge rectifiers CR1 through CR4 supply the control current for function selection. Zener diodes VR2 and VR3 regulate the output voltage at 124 VDC. This is to comply with telephone company regulations which require a maximum line-to-ground voltage of 135 volts DC.

Full-wave bridge rectifiers CR5 through CR8 supply four operating voltages for the transistorized audio stages, indicator light and switching relay (K1). An unregulated voltage output operates the indicator light and relay K1. Three regulated outputs supply the microphone preamplifier, the AC and DC amplifiers, and the audio PA circuits. The voltage regulator consists of Q1, R4 and zener diode VR1.

CONTROL CIRCUITS

Through the use of accessory kits and options, the DESKON Control Unit can perform a maximum of five different control functions. This is accomplished by applying two different levels and polarities of control current to activate up to four relays on the station remote control panel. The control current required to select each function is listed in Table 4. Instructions for setting control currents are shown on the Adjustment Procedure Diagram on Page 11.

Single-Frequency Transmit and Receive

When no accessory kits or options are used, the control unit provides a single, non-regulated DC control output of approximately 6 milliamps into a 7,500 ohm load (the equivalent of a 2,500 ohm line in series with a 5,000 ohm station control panel).

Multi-Frequency Switching

Whenever two polarities are required for switching functions, connections from the power supply to the control pair are transposed by the push-button switch kit and relay K1 as shown in Figure 3.

When two levels of the same polarity are required, current regulator transistor Q801 and variable resistor R802 are provided in the power supply circuit as shown by Figure 4. The variable resistor is switched into the circuit to set the low level control current for 6 milliamps. This assures proper pickup of the 6 mA relay, as well as the dropout of the 15 mA relay at the station control panel. The high level control current is not adjustable since the 15 mA relay will operate satisfactorily at levels above 15 mA.

Table 4 - Control Current and Function Chart

FUNCTION	CURRENT AT TB801-5 (relative to TB801-6)				
	0	+6mA	+15mA	-6mA	-15mA
One Frequency Transmit and 1 Frequency Receive (P)	Receive	Transmit			
Two Frequency Transmit and 1 Frequency Receive (P)	Receive	Transmit (Tx - F1)	Transmit (Tx - F2)		
One Frequency Transmit and 2 Frequency Receive	Receive (Rx-F1)	Transmit		Receive (Rx-F2)	
Two Frequency Transmit and 2 Frequency Receive	Receive (Rx-F1)	Transmit (Tx - F1)	Transmit (Tx - F2)	Receive (Rx-F2)	
One Frequency Transmit and SLM or 2 separate receivers	Receive (Rx-F1 & F2)	Transmit		Receive (Rx-F1)	Receive (Rx-F2)
Two Frequency Transmit and SLM or 2 separate receivers	Receive (Rx-F1 & F2)	Transmit (Tx - F1)	Transmit (Tx - F2)	Receive (Rx-F1)	Receive (Rx-F2)
One Frequency Transmit and receive with Channel Guard(P)	Channel Guard Receive	Monitor (noise squelch)	Transmit		
Repeater Disable (Option 5198)	Receive	Transmit		Repeater Disable	

NOTE

Only those functions followed by the symbol (P) can be used in parallel control units.

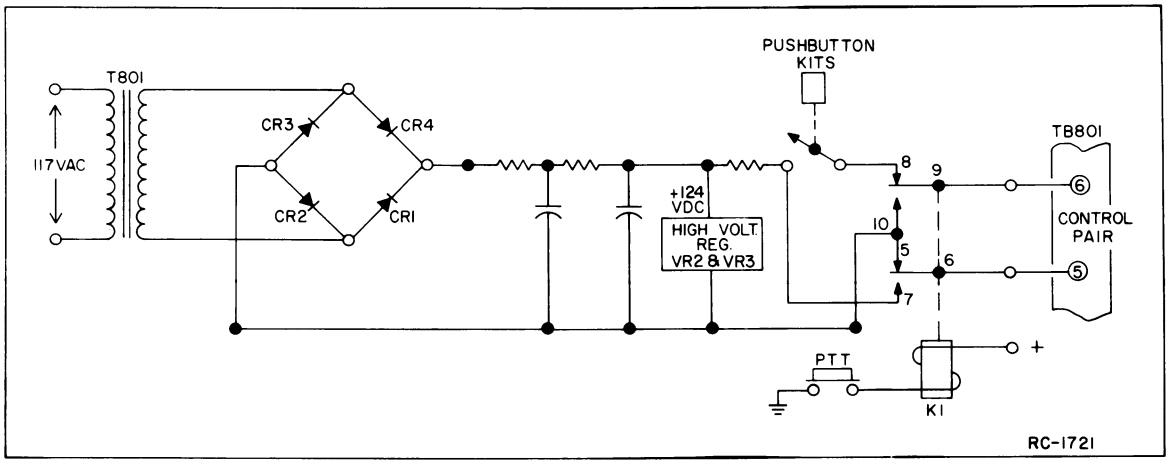


Figure 3 - Simplified Polarity Switching Diagram

Channel Guard

In Channel Guard applications, a Channel Guard Monitor (MON) push-button switch is provided on the front of the control unit. In addition, high voltage regulator (VR2 and VR3) and series current regulator (Q801) are used. The current regulator is set for 6 milliamps into the line during Channel Guard monitor (see Figure 5).

When the microphone is unkeyed and the MON push button is not pressed, bias for series regulator Q801 is grounded through contacts of PTT relay K1 and the MON push button. Q801 is turned off and no control current is applied to the control pair. This selects Channel Guard operation at the base station, and only those transmissions coded by the proper Channel Guard tone will be heard at the control unit.

Pressing the MON button removes ground from Q801, allowing it to conduct. The bias at Q801 is controlled by R11 and is adjusted to provide 6 mA output to the control pair. This disables the station Channel Guard so that all transmissions on the receiver frequency can be heard.

Pressing the TRANSMIT button operates relay K1. This changes the bias at the base of Q801, allowing it to conduct harder and apply 15 mA to the control pair for keying the station transmitter.

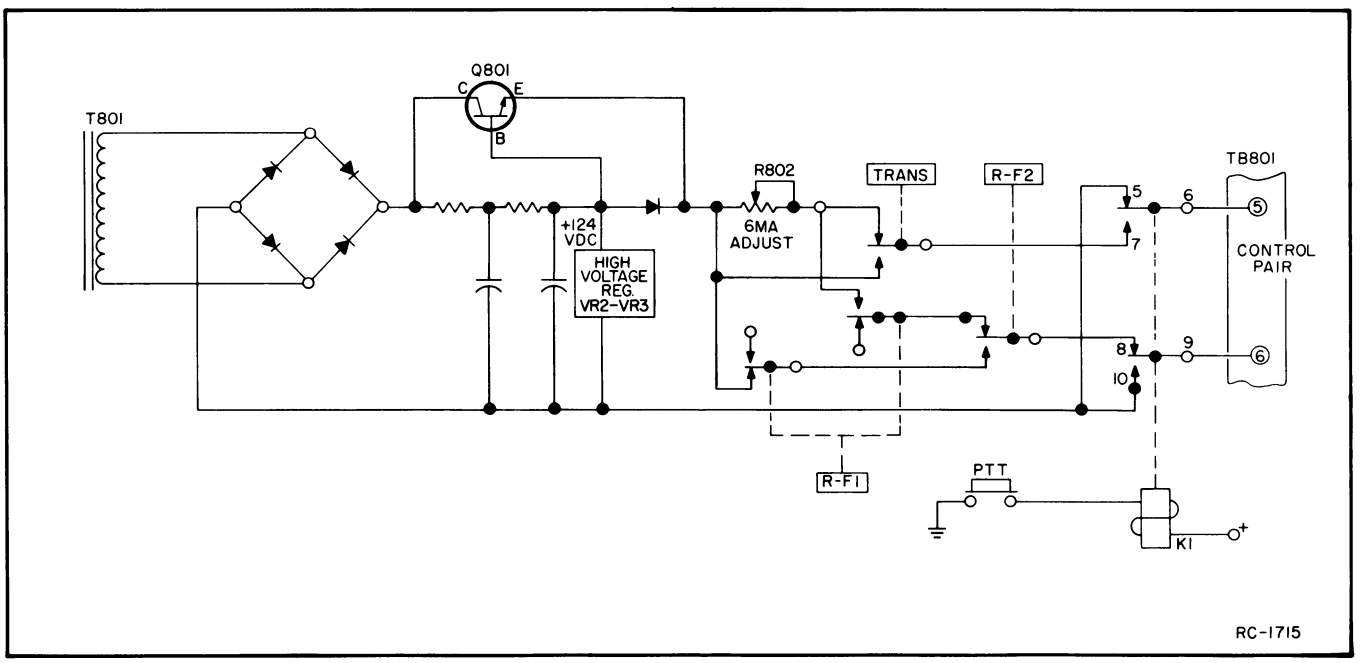


Figure 4 - Simplified Control Current Switching Diagram

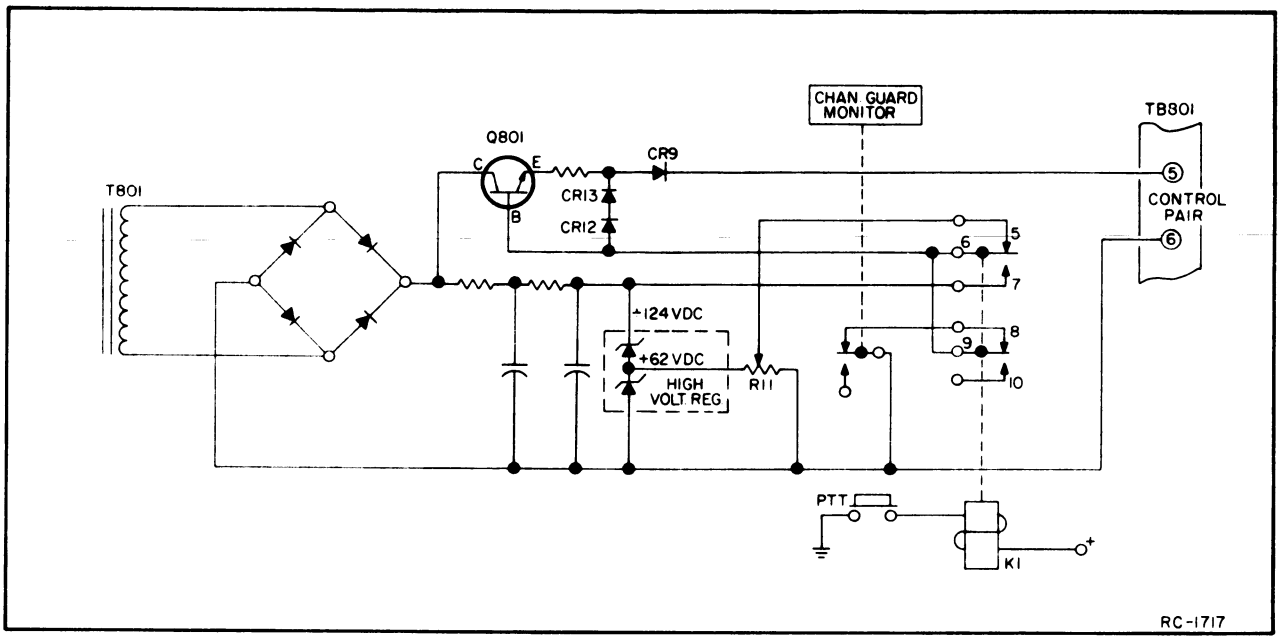


Figure 5 - Channel Guard Control Circuits

Handset and Hookswitch

Handset Models 4EM22B40 (Beige) and 4EM22B41 (Grey) are available with the Desk Top or Wall Mount control unit. When the handset is on hook, audio is connected through the hookswitch to the loudspeaker of the control unit. Taking the handset off hook mutes the speaker and applies audio to the handset earpiece.

Intercom Switch

The Intercom Switch opens the control current path and disables the transmit light to permit communication between paralleled control units without keying the transmitter. It also permits intercommunication between the control unit and the base station when the remote control panel (4KC16A10) has been equipped with the Intercom accessory.

Remote/Repeater Control

In Remote/Repeater applications, the station transmitter may be keyed by either an incoming RF signal (repeater operation), or by a control current from the control unit. Two different methods may be employed to give the dispatcher priority over repeater operations.

1. Without Repeater Disable Option: When the Repeater Disable option is not used, keying the microphone applies +6 milliamps to the control pair. This energizes the transmit relay on the remote control panel, which opens the ground return of the Carrier Operated switch on the repeater panel. The station will operate as a remote only as long as the microphone at the control unit remains keyed.

2. Repeater Disable (Option 5198): With the Repeater Disable option, pressing in the push-button marked SUPV applies -6 milliamps to the control pair. This energizes an optional relay on the remote control panel, which opens the ground return to the Carrier Operated switch on the repeater panel. The station will operate as a remote as long as the SUPV push-button remains depressed.

Supervisory Control (Options 5196 & 5197)

According to FCC regulations, if other parallel remote control units are employed in the system and their number and location are not specified on the station license, the dispatcher must be able to cut any conversation off the air that he judges unfit for transmission.

Pressing the Supervisory Control push-button (marked SUPV) shorts the control pair, terminating the transmission. The dispatcher can use the Intercom to prevent a recurrence of the unauthorized transmission before releasing the short on the control pair.

Parallel Transmit Indicator (Options 5196 & 5197)

The Parallel Transmit option is used in systems with paralleled remote control units to provide a visual indication when any control unit is in the transmit condition.

Keying the microphone at any paralleled control unit applies a positive voltage to the control pair (TB801-5 and TB801-6). This voltage is dropped through voltage

dividers R1 and R2 and applied to the base of Q1 and Q2, turning them on. This turns on Q3, and the positive voltage at the collector of Q3 turns on Q4. When Q4 is conducting, its collector voltage drops to ground potential. This completes the ground path for the transmit indicator lamp, turning it on.

NOTE

If a control unit that contains the parallel transmit option is keyed, the indicator lamp ground path is completed through CR4 and contacts of the local transmit switch.

In Channel Guard systems where a higher keying voltage is required, the jumper bypassing zener diode VR1 is removed. The diode now prevents Q1 and Q2 from turning on when a low voltage is applied to the control pair.

MAINTENANCE

DISASSEMBLY

To remove the cover, follow the procedure shown in Figure 6. To gain access to the components mounted beneath the power supply board, remove power to the control unit. Then remove the three Phillips-head screws holding the board to the chassis.

TROUBLESHOOTING PROCEDURE

A step-by-step Troubleshooting Procedure is provided by Table 6 to help the serviceman quickly isolate and correct any problem that may arise.

RELEASE TIME ADJUSTMENT

The release time of the compressor-amplifier circuit (on Audio Board A806) is the time required for the unit to restore full gain after an input signal that has driven the unit into compression is removed.

The release time is determined by the value of R28 which was selected at the factory for average operating conditions. When overall system requirements indicate that a shorter release time is needed, R28 may be replaced with a different value resistor as shown in Table 5.

Table 5 - Compressor Release Time

Value of R28	Release Time
100K-ohms (standard)	2 seconds
27K-ohms	1 second
16K-ohms	0.5 second

Reducing the release time, however, will result in an increase in background noise picked up during pauses in transmissions.

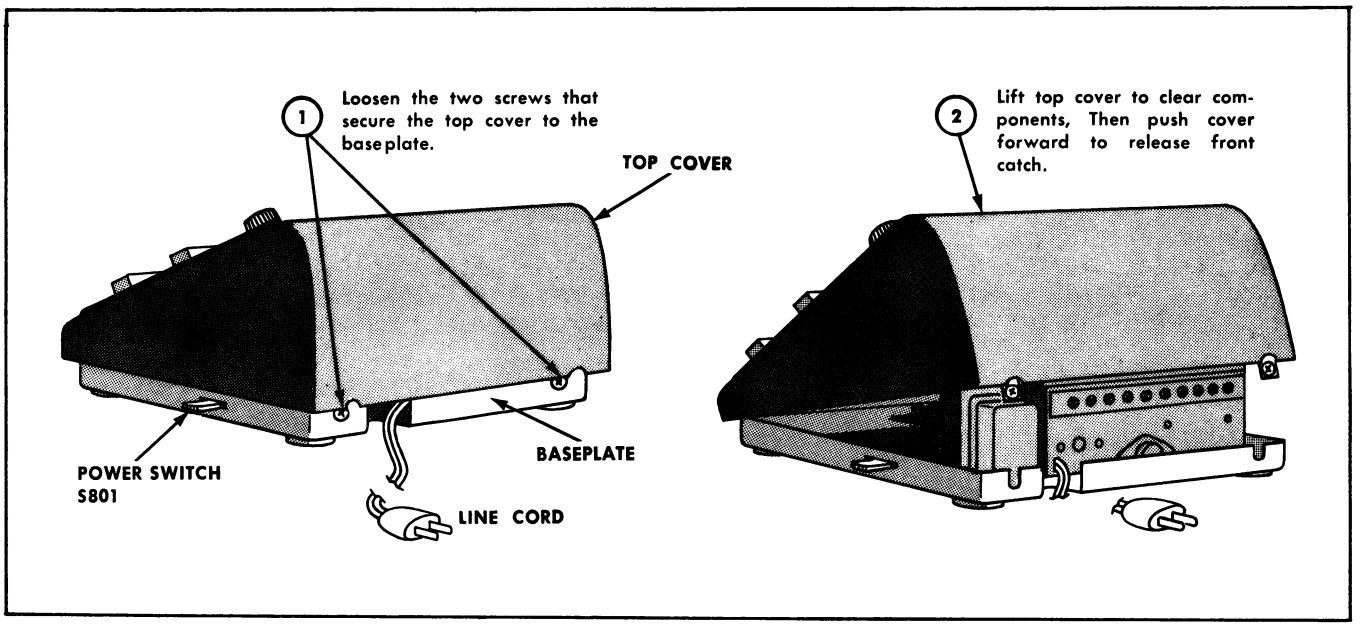


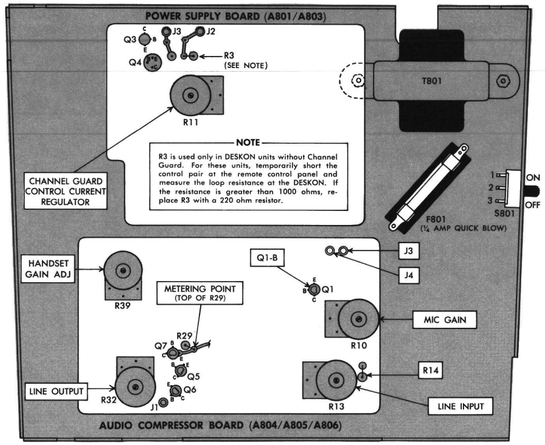
Figure 6 - Disassembly of the DESKON Control Unit

TABLE 6 TROUBLESHOOTING PROCEDURE

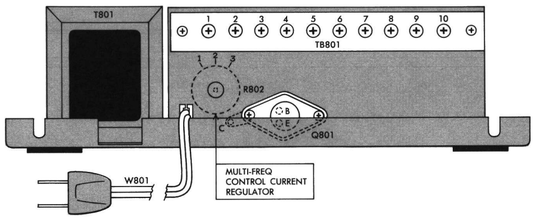
SYMPTOM	PROCEDURE
No audio from the speaker.	1. Check the audio input with an AC-VTVM across TB801-1 & 2. 2. Make sure that VOLUME control R801 is not set at Minimum (fully counterclockwise). 3. Check to see that the control unit is not in the transmit mode (red transmit light on). If the light is on, check for a short in the push-to-talk circuit. 4. Check the audio input with an AC-VTVM at A806-J7. If no audio, check T802 and C803. 5. Check the setting of LINE INPUT control R13 (refer to the Adjustment Procedure). If R13 cannot be adjusted for the correct reading, check relay contacts K1-11, -12 and -13. 6. Check the audio output of A806 at J6. If no output, check supply voltage at J1 and the DC voltages on Q3 thru Q7 (refer to the Schematic Diagram). 7. Check PA audio output at TB801-9. If no output, check DC voltages on Q2 thru Q4 on Power Supply Board A801-A803.
No audio on the line from either handset or speaker-mic. when keyed.	1. Check relay contacts K1-11 thru -22. 2. Check the setting of LINE OUTPUT R32 (refer to the Adjustment Procedure).
No control current at the control pair. Refer to Table 4 for control currents and functions.	1. Check to see that relay K1 energizes when the microphone is keyed. If the relay doesn't energize, check for 24 volts DC at A806-J30. If 24 volts is present, check the relay ground return circuit at A806-J29. (When the transmit button is pressed, J29 should be at ground potential). 2. With the microphone unkeyed, check for a reading of 150 to 200 volts DC between H6 (on A801-A803) and ground. 3. Check for a reading of 124 volts DC between H10 (on A801-A803) and ground. 4. Check function switches and relay contacts K1-5 thru -10 for DC control voltages.

COMPLETE ADJUSTMENT PROCEDURE

CHASSIS VIEW



REAR VIEW



LINE INPUT

The LINE INPUT has been adjusted at the factory for an input of 180 millivolts RMS (-12 dBm for threshold of compression). Use of excessive compression will accent background and line noise during pauses in transmission.

PROCEDURE

1. Feed a 1000 Hz signal onto the audio pair from the source with the largest line loss (this may be the base station or another DESKON). Adjust audio generator to produce +18 dBm on the audio pair. However, if the source has been adjusted for less than +18 dBm on the line, set audio generator of this lower level.

2. Adjust the LINE INPUT control R13 for threshold of compression as indicated by a reading of 0.4 volt DC on a 20,000 ohm-per-volt meter connected from the emitter of Q7 (or top of R29) to ground.

SPEAKER-MICROPHONE AND HANDSET GAIN SPACE CONTROLS

Speaker-Microphone gain is adjusted by R10 (MIC GAIN) while handset gain is adjusted by R39 (HANDSET GAIN). R10 has been set at the factory so that 1 millivolt from the speaker-microphone produces threshold of compression. R39 has been set at the factory so that the output from the handset produces the same level of compression. Use of excessive compression will accent background and line noise during pauses in transmission.

SPEAKER-MICROPHONE GAIN (R10)

1. Press the transmit button and talk into the speaker-microphone from a normal distance.

2. Adjust R10 for threshold of compression as indicated by a reading of 0.4 volt DC on a 20,000 ohm-per-volt meter connected from the emitter of Q7 (or top of R29) to ground.

HANDSET GAIN

1. Remove the handset from its hookswitch and talk into the mouth-piece from a normal distance.

2. Adjust R39 for threshold of compression as indicated by a reading of 0.4 volt DC on a 20,000 ohm-per-volt meter connected from the emitter of Q7 (or top of R29) to ground.

LINE OUTPUT

The DESKON has been set at the factory for a line output of 6 volts RMS (+18 dBm). The line output may be reduced when required by local telephone company regulations or whenever line losses and noise pickup permit an adequate signal to noise ratio.

1. Apply a 1000 Hz, 3 millivolt signal through a series connected 100K resistor and 50 µF capacitor into the base of Q1 and J4 (ground) of A806. (Leave handset "on hook" while adjusting Line Output).

2. Connect an AC-VTVM across the audio pair. Use a 0.5 mFd capacitor in series with the meter if DC is being simplexed line-to-line.

3. <u>For single DESKON or paralleled DESKONS (with compression-amplifier or Intercom accessory at the station)</u>: Adjust LINE OUTPUT control R32 on each DESKON for 6 volts RMS (or as required by local regulations).

4. <u>For paralleled DESKONS (and no compression-amplifier or Intercom accessory at the station)</u>: Set the DESKON with the highest line loss for 6 volts RMS (or as required by local regulations) as described in preceding steps 2 and 3. Measure the RMS voltage at the station with an AC-VTVM. Then set LINE OUTPUT control R32 on the remaining DESKONS to produce the same level at the station as the first DESKON.

CONTROL VOLTAGES

<u>Two-Frequency Transmit</u>

1. Connect a DC milliammeter in series with the control line (positive lead of meter to TB801-5).

2. Push in the TX-F1 push button. Key the transmitter and set CONTROL CURRENT regulator R802 for 6 milliamps.

<u>Two Separate Receivers or Receiver with Search-Lock Monitor</u>

1. Connect a DC milliammeter in series with the control line (negative lead to TB801-5.

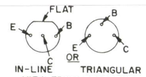
2. Push in RX-F1 push button and set R802 for 6 milliamps.

<u>Channel Guard</u>

1. Connect a DC milliammeter in series with the control line (positive lead to TB801-5).

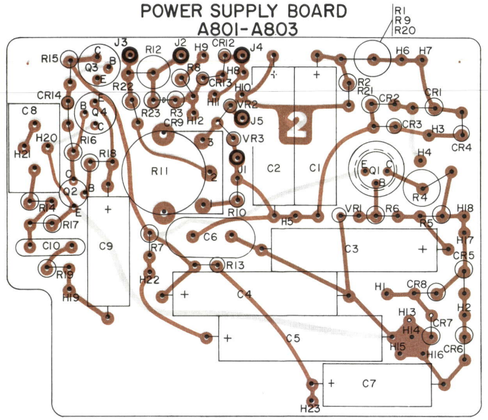
2. Hold down the MONITOR switch on the DESKON, and adjust the CONTROL CURRENT regulator R11 on A803 for 6 milliamps.

TRANSISTOR LEAD IDENTIFICATION

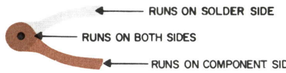


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

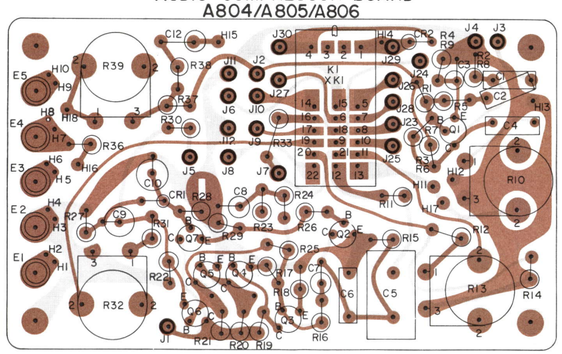
POWER SUPPLY BOARD
A801-A803



(19C311785, Sh. 1, Rev. 2)
(19C311785, Sh. 2, Rev. 2)

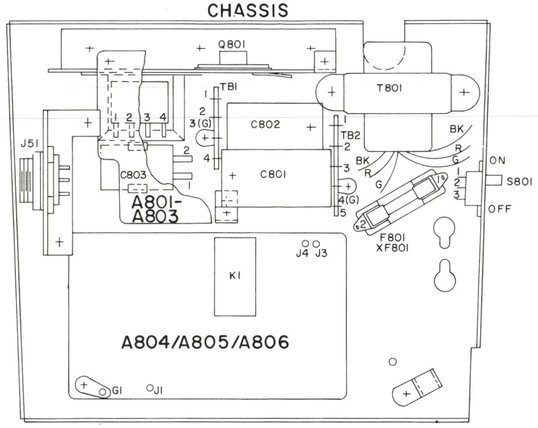


AUDIO-COMPRESSOR BOARD
A804/A805/A806

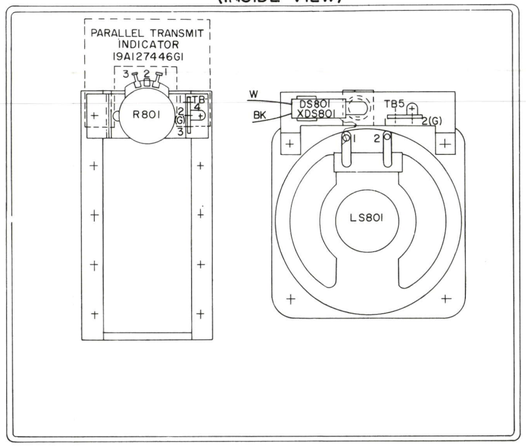


(19C311742, Sh. 1, Rev. 1)
(19C311742, Sh. 2, Rev. 1)

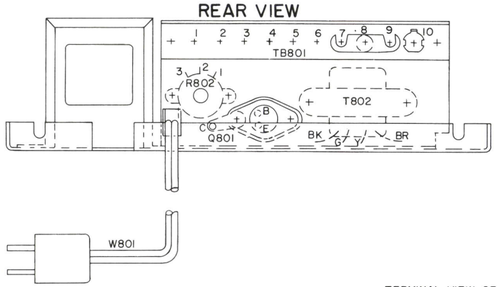
CHASSIS



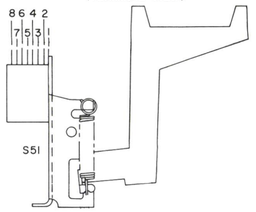
COVER
(INSIDE VIEW)



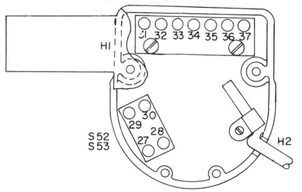
REAR VIEW



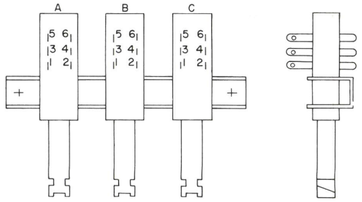
HOOKSWITCH
FOR DESK TOP UNIT
(TERMINAL VIEW)



HOOKSWITCH
FOR WALL MOUNT UNIT
(TERMINAL VIEW)



TERMINAL VIEW OF PUSHBUTTON SWITCHES

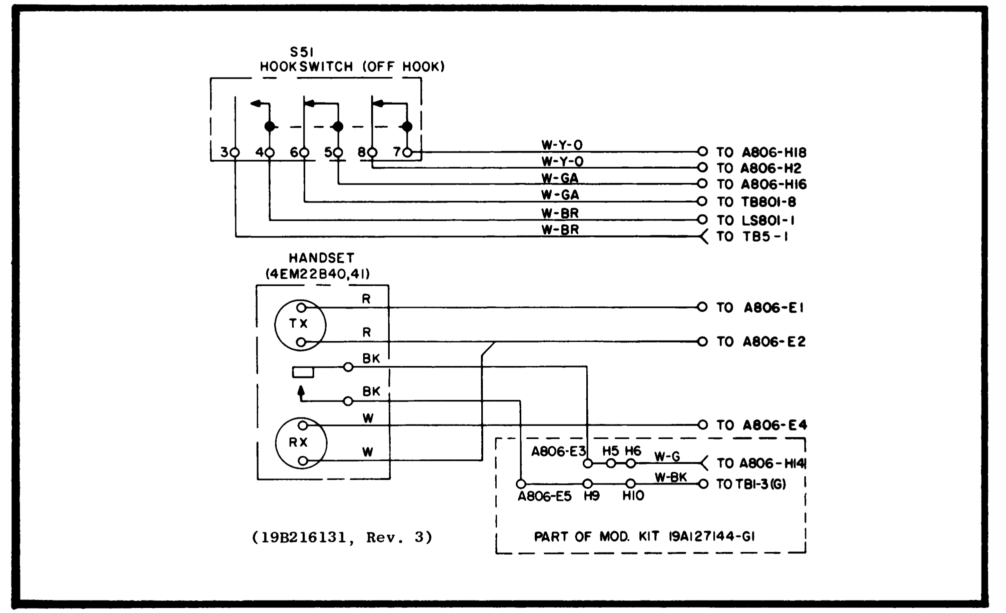


(19E500887, Rev. 5)

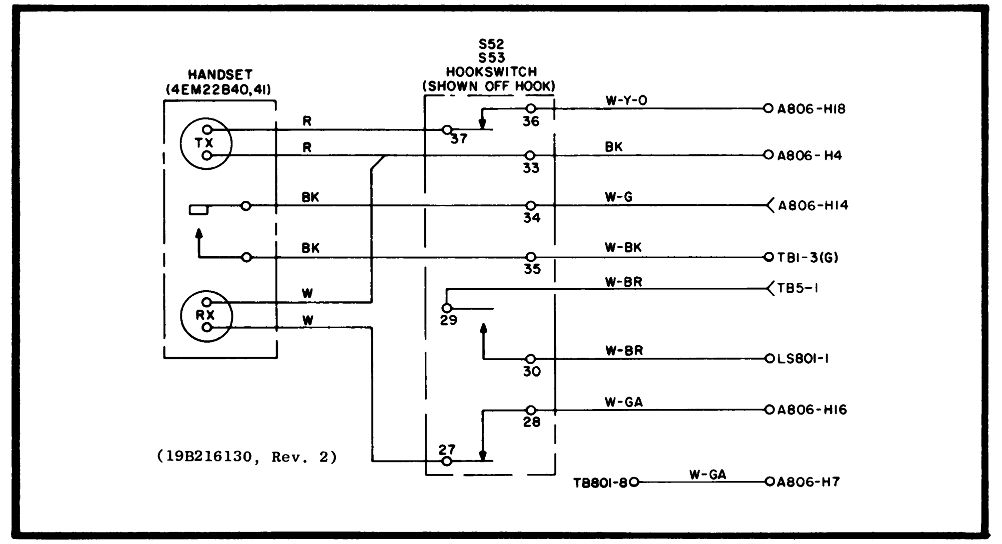
OUTLINE DIAGRAM

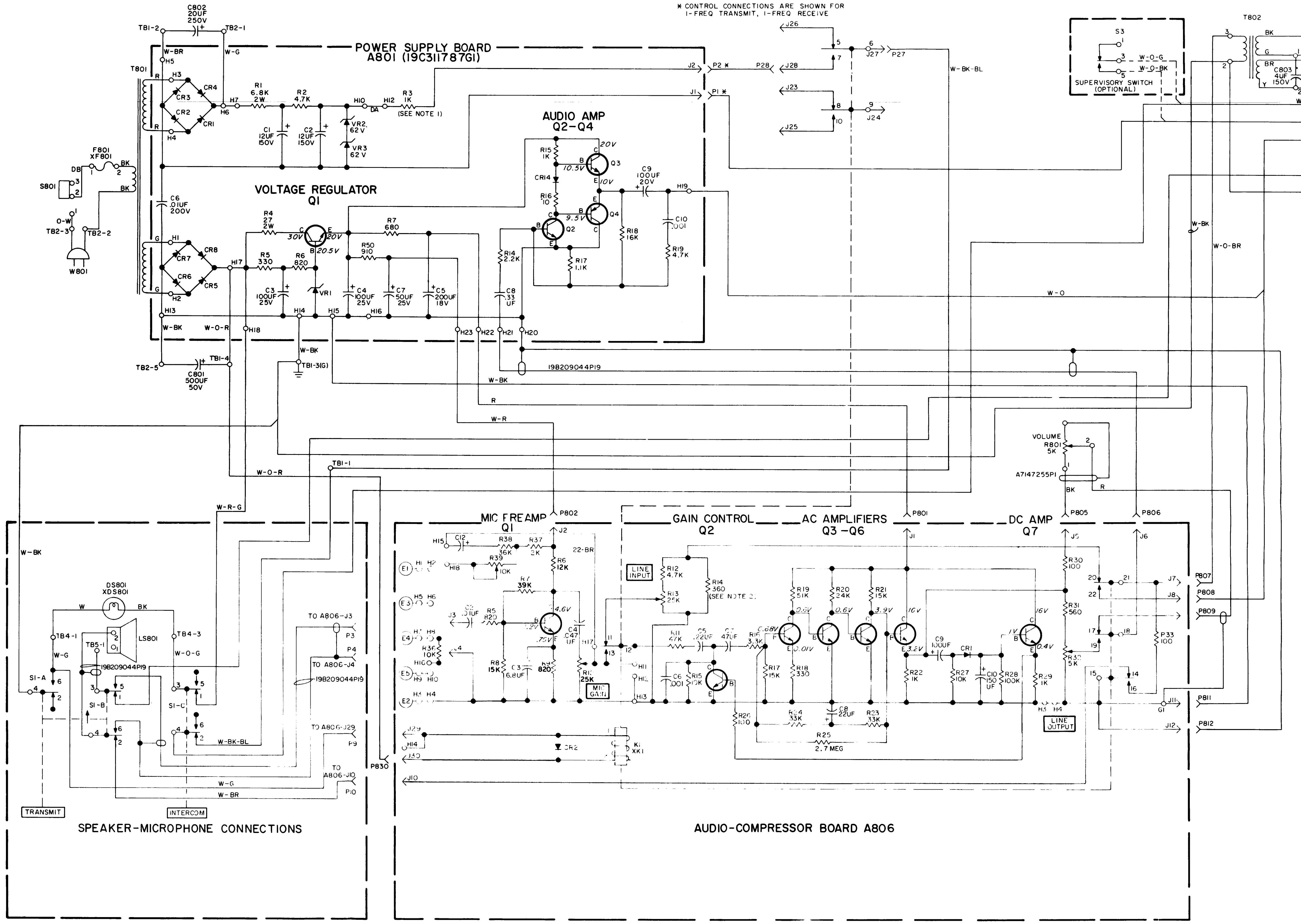
DESKON CONTROL UNIT
MODELS 4EC78A15 & 16

HANDSET FOR DESK TOP UNIT



HANDSET FOR WALL MOUNT UNIT





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 1/2 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.

VOLTAGE READINGS

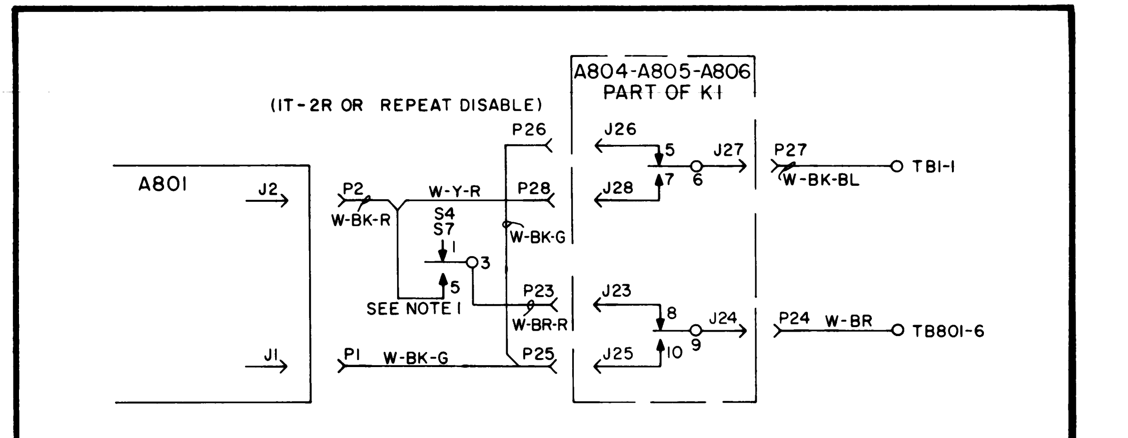
ALL READINGS ARE DC VOLTAGES TAKEN WITH A 20,000 OHM-PER-VOLT METER, AND MEASURED FROM THE TRANSISTOR PIN TO GROUND WITH NO SIGNAL APPLIED TO THE CONTROL UNIT. READING AT EMITTER OF Q7 INDICATES THRESHOLD OF COMPRESSION.

NOTES:

1. IF THE LOOP RESISTANCE OF THE TELEPHONE PAIR IS 1000 OHMS OR GREATER, REMOVE R3 AND REPLACE WITH A 220 OHM RESISTOR.
2. FOR PARALLEL OPERATION, REMOVE RESISTOR R14 FROM BOARD A806 IN ALL PARALLELED UNITS EXCEPT MASTER UNIT.

(19E500889, Rev. 5)

1 FREQ TRANSMIT - 2 FREQ RECEIVE OR REPEAT DISABLE



NOTES:

1. FOR REPEAT DISABLE OPTION S4 REPLACES S7. WIRING IS THE SAME.
2. ALL WIRES SF24 UNLESS OTHERWISE SPECIFIED.

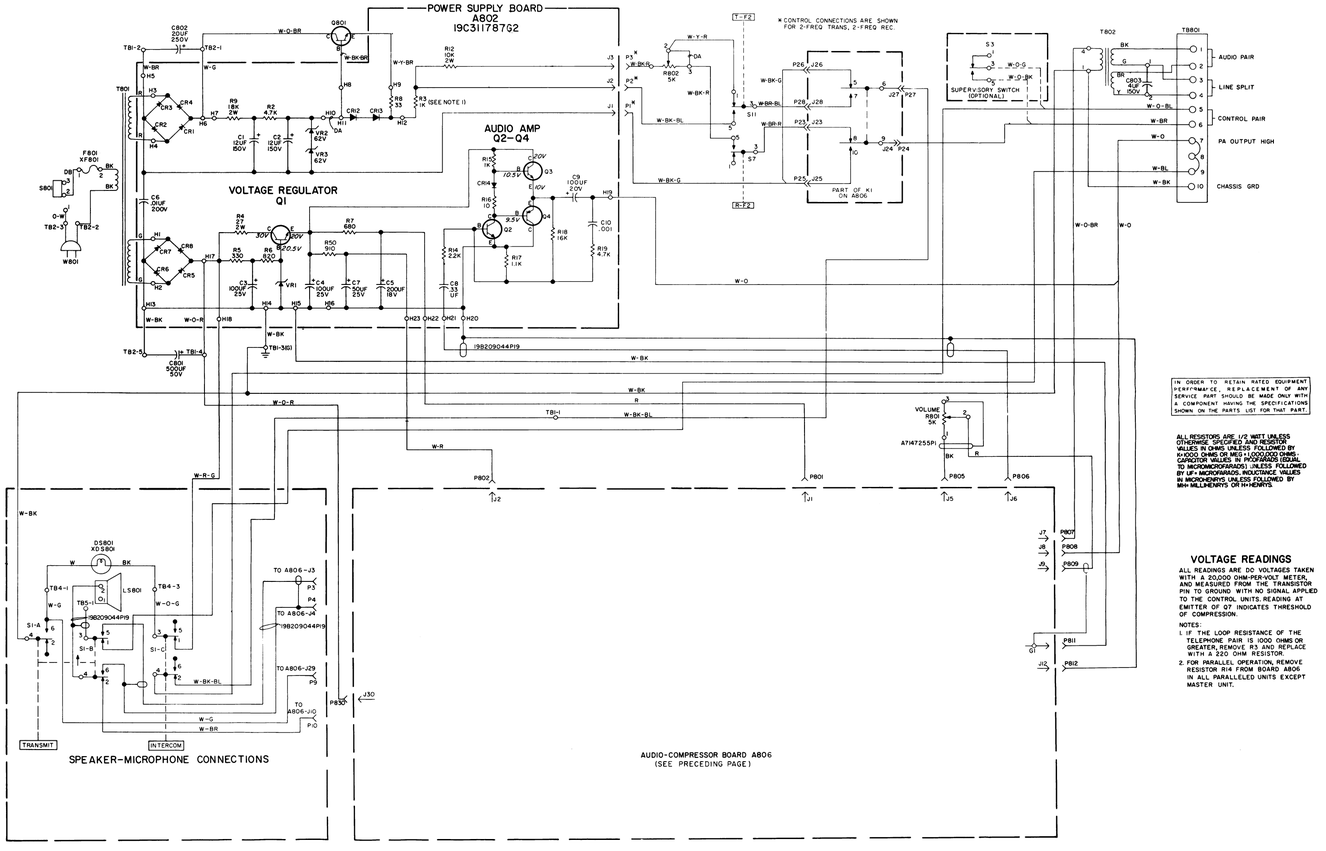
(19B216136, Rev. 3)

SCHEMATIC DIAGRAM

DESKON WITH SINGLE-FREQ TRANSMIT
(POWER SUPPLY BOARD 19C311787-G1)

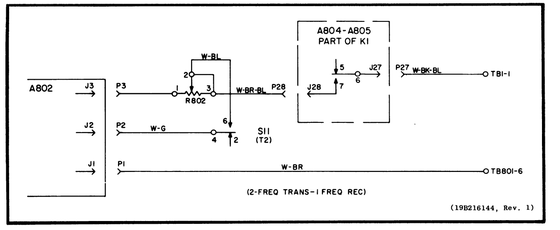
SCHEMATIC DIAGRAM

DESKON WITH 2-FREQ TRANS OR
1-FREQ TRANS WITH SEARCH LOCK MONITOR
(POWER SUPPLY BOARD 19C311787-G2)



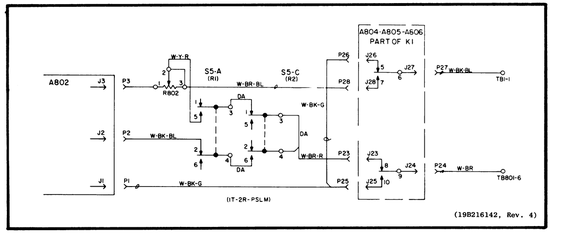
(19B500890, Rev. 4)

2 FREQ TRANSMIT — 1 FREQ RECEIVE



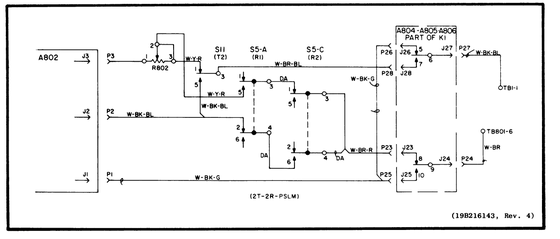
(19B216144, Rev. 1)

1 FREQ TRANSMIT — 2 FREQ RECEIVE (PSLM)

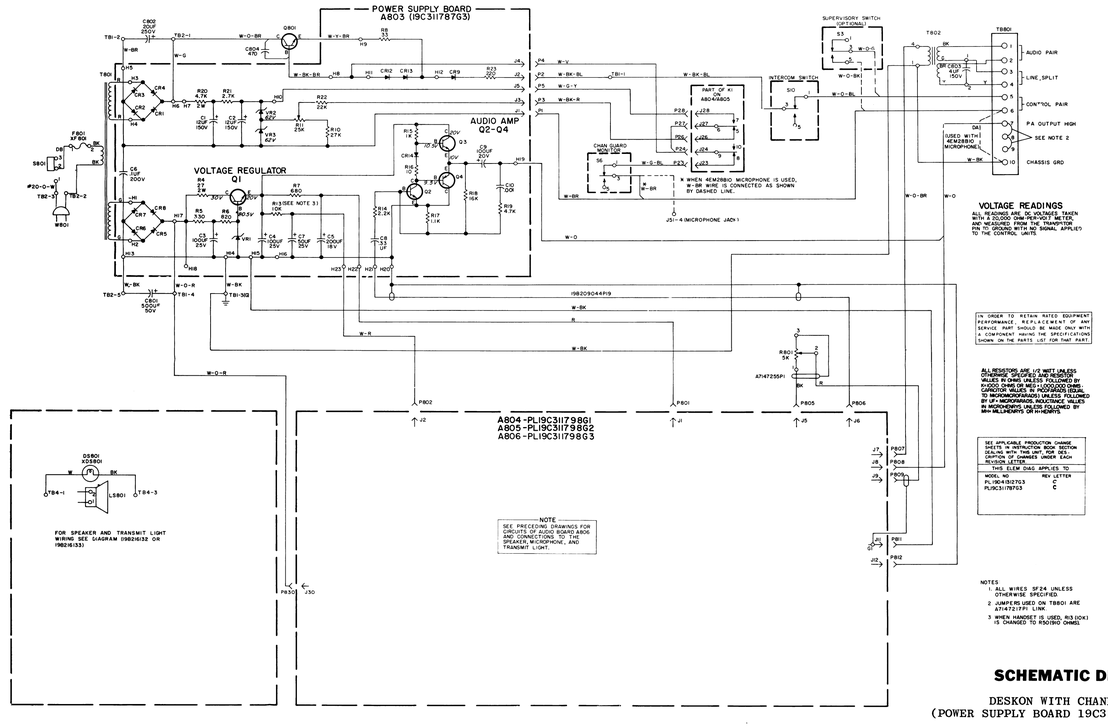


(19B216142, Rev. 4)

2 FREQ TRANSMIT — 2 FREQ RECEIVE (PSLM)



(19B216143, Rev. 4)



(19E500870, Rev. 10)

SCHEMATIC DIAGRAM

DESKON WITH CHANNEL GUARD
(POWER SUPPLY BOARD 19C311787-G3)

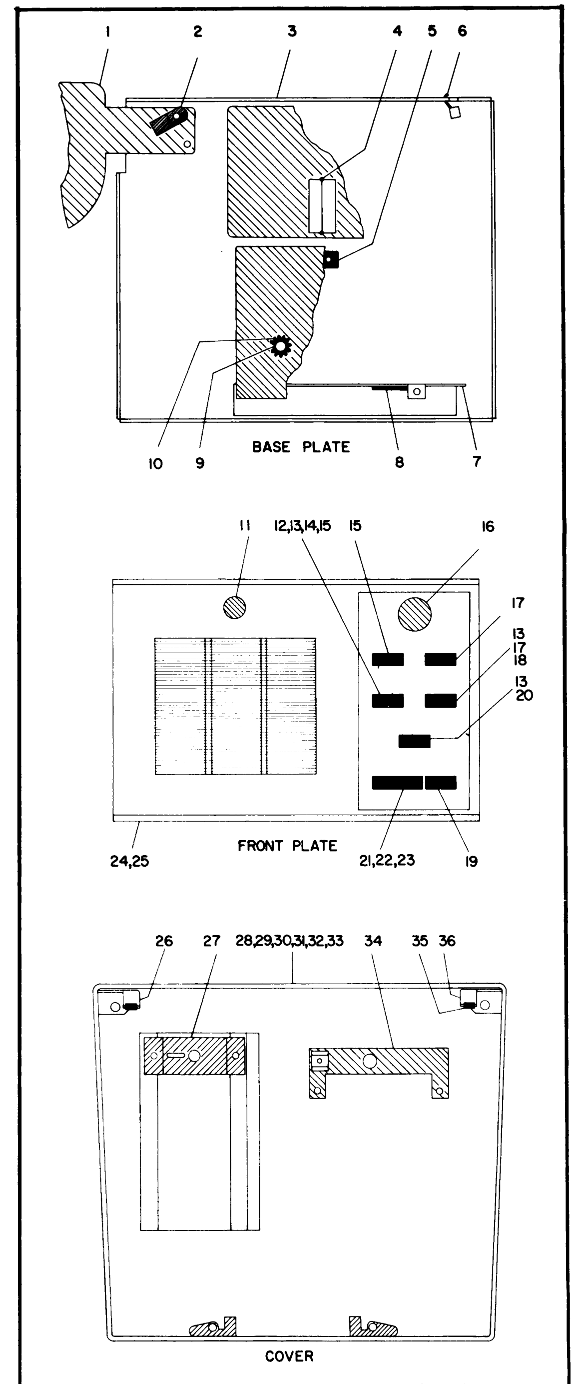
PARTS LIST

LBI-4042C

DESKON CONTROL UNIT
MODELS 4EC78A15, 16

SYMBOL	GE PART NO.	DESCRIPTION
		19D413127-G1 1 FREQ TRANSMIT REV A 19D413127-G2 MULTI-FREQ TRANSMIT OR SLM REV B 19D413127-G3 CHANNEL GUARD REV C
A801 thru A803		POWER SUPPLY BOARD A801 19C311787-G1 REV C A802 19C311787-G2 REV C A803 19C311787-G3 REV C
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A115680-P15	Electrolytic: 12 µf +150% -10%, 150 VDCW; sim to Mallory Type TT.
C3 and C4	19A115680-P5	Electrolytic: 100 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C5	19A115680-P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT.
C6	19A115028-P114	Polyester: 0.1 µf ±20%, 200 VDCW.
C7	19A115680-P4	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C8	5491189-P109	Polyester: 0.33 µf ±20%, 50 VDCW.
C9	5496267-P16	Tantalum: 100 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C10*	5494481-P111 5494481-P127	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV C: Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR9	4037822-P1	Silicon.
CR12 and CR13	19A115775-P1	Silicon.
CR14	19A115250-P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J5	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115300-P2	Silicon, NPN; sim to Type 2N3053.
Q2*	19A115362-P1 19A115720-P1	Silicon, NPN; sim to Type 2N2925. Earlier than REV A: Silicon, NPN.
Q3*	19A115300-P2 19A115720-P1	Silicon; NPN; sim to Type 2N3053. Earlier than REV A: Silicon, NPN.
Q4	19A115562-P2	Silicon, PNP.
		- - - - - - - - - - - RESISTORS - - - - - - - - - - -
R1	3R79-P682K	Composition: 6800 ohms ±10%, 2 w.
R2	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R3	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R4	3R79-P270K	Composition: 27 ohms ±10%, 2 w.
R5	3R77-P331K	Composition: 330 ohms ±10%, 1/2 w.
R6*	3R77-P821K 3R77-P470K	Composition: 820 ohms ±10%, 1/2 w. Earlier than REV B: Composition: 47 ohms ±10%, 1/2 w.
R7	3R77-P681K	Composition: 680 ohms ±10%, 1/2 w.
R8	3R77-P330K	Composition: 33 ohms ±10%, 1/2 w.
R9	3R79-P183K	Composition: 18,000 ohms ±10%, 2 w.
R10	3R77-P273K	Composition: 27,000 ohms ±10%, 1/2 w.
R11	19B209115-P6	Variable, carbon film: 25,000 ohms ±20%, 0.5 w; sim to CTS Type UPE-70.
R12	3R79-P103K	Composition: 10,000 ohms ±10%, 2 w.
R13	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R14	3R77-P222K	Composition: 2200 ohms ±10%, 1/2 w.
R15	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R16	3R77-P100K	Composition: 10 ohms ±10%, 1/2 w.
R17	3R77-P112J	Composition: 1100 ohms ±5%, 1/2 w.
R18	3R77-P163J	Composition: 16,000 ohms ±5%, 1/2 w.
R19 and R20	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R21	3R77-P272K	Composition: 2700 ohms ±10%, 1/2 w.
R22	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R23	3R77-P221K	Composition: 220 ohms ±10%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1*	4036887-P17 4036887-P15	Silicon, Zener. Earlier than REV B: Silicon, Zener.
VR2 and VR3	4036887-P29	Silicon, Zener.
A806		AUDIO COMPRESSOR BOARD 19C311798-G3 REV C
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2*	7491930-P8 19B209243-P5 19B209243-P101	Polyester: .047 µf ±20%, 100 VDCW; sim to GE Type 61F. Earlier than REV C: Polyester: 0.047 µf ± 20%, 50 VDCW. Earlier than REV A: Polyester: 0.01 µf ±10%, 50 VDCW.
C3	5496267-P1	Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C4	19B209243-P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C5	19A115028-P116	Polyester: 0.22 µf ±20%, 200 VDCW.
C6*	5494481-P111 19B209243-P101	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV C: Polyester: 0.01 µf ±10%, 50 VDCW.
C7	5496267-P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C8	5496267-P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C9	5496267-P107	Tantalum: 100 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C10	5496267-P103	Tantalum: 150 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C12	5496267-P14	Tantalum: 15 µf ±20%, 20VDCW; sim to Sprague Type 150D.
C13*	7491930-P10	Polyester: .22 µf ±20%, 100 VDCW; sim to GE Type 61F. Added by REV C.
C14*	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW. Added by REV C.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A115250-P1	Silicon.
CR2	4037822-P1	Silicon.
CR3* thru CR5*	19A115250-P1	Silicon. Added by REV C.
CR7* thru CR9*	19A115250-P1	Silicon. Added by REV C.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 thru E5	4035656-P7	Contact, electrical.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J12	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
J23 thru J30	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
J31* and J32*	4033513-P4	Contact, electrical: sim to Bead Chain L93-3. Added by REV C.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	19C307010-P14	Armature: 24 VDC nominal, 1.5 w max operating, 430 ohms ±15% coil res, 6 form C contacts; sim to Allied Control T154.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115889-P1	Silicon, NPN; sim to Type 2N2712.
Q2	19A115362-P1	Silicon, NPN; sim to Type 2N2925.
Q3 thru Q7	19A115889-P1	Silicon, NPN; sim to Type 2N2712.
Q8*	19A115768-P1	Silicon, PNP; sim to Type 2N3702. Added by REV C:
Q9*	19A115362-P1	Silicon, NPN; sim to Type 2N2925. Added by REV C:
Q10*	19A115123-P1	Silicon, NPN; sim to Type 2N2712. Added by REV C:
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R77-P821K	Composition: 820 ohms ±10%, 1/2 w.
R6*	3R77-P123K 3R77-P393K	Composition: 12,000 ohms ±10%, 1/2 w. Earlier than REV C: Composition: 39,000 ohms ±10%, 1/2 w.
R7*	3R77-P393K 3R77-P104K	Composition: 39,000 ohms ±10%, 1/2 w. Earlier than REV C: Composition: 0.10 megohms ±10%, 1/2 w.
R8*	3R77-P153K 3R77-P473K	Composition: 15,000 ohms ±10%, 1/2 w. Earlier than REV C: Composition: 47,000 ohms ±10%, 1/2 w.
R9*	3R77-P821K 3R77-P272K	Composition: 820 ohms ±10%, 1/2 w. Earlier than REV C: Composition: 2700 ohms ±10%, 1/2 w.
R10*	19B209358-P7 19B209358-P9	Variable Carbon film: approx 75 to 25,000 ohms ohms ±20%, 0.25 w; sim to CTS Type U-201. Earlier than REV C: Variable Carbon film: approx 200 to 100,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R11	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R12	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R13	19B209358-P7	Variable, carbon film: approx 75 to 25,000 ohms ±20%, 0.25w; sim to CTS Type U-201.
R14	3R77-P361J	Composition: 360 ohms ±5%, 1/2 w.
R15	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R16	3R77-P332J	Composition: 3300 ohms ±5%, 1/2 w.
R17	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R18	3R77-P331J	Composition: 330 ohms ±5%, 1/2 w.
R19	3R77-P513J	Composition: 51,000 ohms ±5%, 1/2 w.
R20	3R77-P243J	Composition: 24,000 ohms ±5%, 1/2 w.
R21	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R22	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R23 and R24	3R77-P333J	Composition: 33,000 ohms ±5%, 1/2 w.
R25	3R77-P275J	Composition: 2.75 megohms ±5%, 1/2 w.
R26	3R77-P101J	Composition: 100 ohms ±5%, 1/2 w.
R27	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R28	3R77-P104K	Composition: 0.10 megohms ±10%, 1/2 w.
R29	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R30	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R31	3R77-P561K	Composition: 560 ohms ±10%, 1/2 w.
R32	19B209358-P5	Variable, carbon film: approx 75 to 5000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R33	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R36	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R37	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R38	3R77-P363J	Composition: 36,000 ohms ±5%, 1/2 w.
R39	19B209358-P6	Variable, carbon film: approx 75 to 10,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R40* and R41*	3R152-P393J	Composition: 39,000 ohms ±5%, 1/4 w. Added by REV C:
R42* and R43*	3R152-P623J	Composition: 62,000 ohms ±5%, 1/4 w. Added by REV C:
R44*	3R152-P393J	Composition: 39,000 ohms ±5%, 1/4 w. Added by REV C:
R46*	3R152-P392J	Composition: 3900 ohms ±5%, 1/4 w. Added by REV C:
R47*	3R152-P103J	Composition: 10,000 ohms ±5%, 1/4 w. Added by REV C:
R48*	3R152-P104J	Composition: 0.10 megohms ±5%, 1/4 w. Added by REV C:
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XK1	19B209172-P1	Relay, phen: 22 contacts; sim to Allied Control 30054-24.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C801	5493132-P7	Electrolytic: 500 µf +150-10%, 50 VDCW.
C802	7774786-P24	Electrolytic: 20 µf +100% -10%, 250 VDCW; sim to Mallory Type TC.
C803	7486445-P1	Electrolytic, non polorized: 4 µf +100% -10%, 150 VDCW.
C804*	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added to 19D413127-G2 by REV B, 19D413127-G3 by REV C.
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS801	19C307037-P5	Lamp, incandescent: 28 v; sim to GE 1829.
		- - - - - - - - - - - FUSES - - - - - - - - - - -
F801*	1R16-P13 1R16-P1	Quick blowing: 1/4 amp at 250 v; sim to Littelfuse 312.250 or Bussmann AGC-1/4. In 19D413127-G1,G2 earlier than REV A: In 19D413127-G3 of REV A and earlier: Quick blowing: 1/2 amp at 250 v; sim to Littelfuse 312.500 or Bussman AGC-1/2.
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS801	19A115964-P1	Permanent magnet: 3.5 inch, 18 ohms ±10% imp, 15 to 19 ohms ±20% DC res, resonant frequency 290 Hz; sim to Oaktron S-9847.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P801 thru P803	4029840-P2	Contact, electrical: sim to Amp 42827-2.
P805 thru P809	4029840-P2	Contact, electrical: sim to Amp 42827-2.
P811	4029840-P2	Contact, electrical: sim to Amp 42827-2.
P812	4029840-P1	Contact, electrical: sim to AMP 41854.
P830	4029840-P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q801	19A115783-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R801	5496870-P11	Variable, carbon film: 5000 ohms ±20%; sim to Mallory LC(5K).
R802	19B209244-P2	Variable, wirewound: 5000 ohms ±20%, 2 w; sim to CTS Type 117.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S801	19B209040-P4	Slide: SPDT, 0.5 amp at 125 v; sim to Continental-Wirt Type 126.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T801	19A116007-P1	Power, step-down, step-up: Pri: 117 VRMS, 50/60 Hz, Sec 1: approx 29 VDC, Sec 2: approx 145 VDC.
T802	19A115731-P1	Audio: 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% DC res, Sec 2: 13 ohms ±15% DC res.
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1	7775500-P10	Phen: 4 terminals.
TB2	7775500-P9	Phen: 5 terminals.
TB4	7487424-P10	Miniature, phen: 2 terminals.
TB801	7117710-P10	Phen: 10 terminals; sim to Cinch 1799.
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W801	4036441-P7	Power: approx 7 feet long, with 2-contact plug.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XDS801	4032220-P1	Lampholder, miniature: sim to Drake N517.
XF801	7141008-P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.
		MECHANICAL PARTS (SEE RC-1719)
1	19B209415-P3	Support. (Holds Handset S52 and S53).
2	7763541-P5	Clip, spring tension.
3	19C311791-G1	Base plate.
4	19A115368-P1	Retainer. (Used with K1).
5	19A127124-P1	Support. (Secures A801-A803).
6	19A115725-P1	Bushing, strain relief. (Used with W801).
7	19C311789-P1	Support. (Secures A801-A803).
8	7147217-P1	Link. (Located on TB801).
9	4036555-P1	Insulator disc. (Used with Q1 and Q4 on A801 thru A803).
10	4035439-P1	Heat sink. (Used with Q1 on A801-A803).
11	19B205216-P1	Jewel. (Used with DS801).
12	19B216127-P3	Button. (R-F1).
13	19B216127-G8	Button. (DUMMY).
14	19B216127-G6	Button. (MON).
15	19B216127-G1	Button. (T-F1).
16	19A115679-P2	Knob. (Used with R801).
17	19B216127-G2	Button. (T-F2).
18	19B216127-G4	Button. (R-F2).
19	19B216127-G7	Button. (INTCM).
20	19B216127-G5	Button. (SUPV).
21	19B216127-G10	Button. (DUMMY).
22	19B216127-G9	Button, Desk Mount. (TRANSMIT).
23	19B216127-G11	Button, Wall Mount. (TRANSMIT).
24	19D413125-P1	Front Plate, brown.
25	19D413125-P2	Front Plate, gray.
26	19B216115-P2	Support. (Right rear).
27	19B216116-P1	Support. (Mount R801).
28	19C311795-P3	Cover. (Wall Mount, beige).
29	19C311795-P4	Cover. (Wall Mount, gray).
30	19C311795-P1	Cover. (Desk Mount, beige).
31	19C311795-P2	Cover. (Desk Mount, gray).
32	19C311795-P5	(Not Used).
33	19C311795-P6	(Not Used).
34	19A127126-G1	Support. (Mounts XDS801).
35	7160861-P15	Nut, sheet spring. (Secures Cover to Base Plate)
36	19B216115-P1	Support. (Left rear).
		PARALLEL TRANSMIT INDICATOR 19A127446-G1
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	4037822-P1	Silicon.
CR3	19A115250-P1	Silicon.
CR4	4037822-P1	Silicon.
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1	19C307037-P20	Lamp, incandescent: 28 v; sim to GE 757.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q2 and Q3	19A115768-P1	Silicon, PNP; sim to Type 2N3702.
Q4	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - - RESISTORS - - - - - - - - - - -
R1	3R77-P105J	Composition: 1.0 megohms ±5%, 1/2 w.
R2	3R77-P334J	Composition: 0.33 megohm ±5%, 1/2 w.
R3	3R77-P244J	Composition: 240,000 ohms ±5%, 1/2 w.
R4	3R77-P104J	Composition: 100,000 ohms ±5%, 1/2 w.
R5	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2w.
R6	3R77-P392J	Composition: 3900 ohms ±5%, 1/2 w.
R7	3R77-P473J	Composition: 47,000 ohms ±5%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	4036887-P7	Silicon, Zener.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XDS1	4032220-P5	Lamp: miniature bayonet base, plastic insulating sleeve, 2.625-inch leads; sim to Drake Mfg Co N517.
		ASSOCIATED ASSEMBLIES
		- - - - - - - - - FUNCTION SWITCHES - - - - - - - - -
S1	19A116009-P5	Push: (3) DPDT, momentary action. (Transmit and Intercom).
S3	19A116009-P4	Push: (1) DPDT, momentary action. (Supervisory)
S4	19A116009-P8	Push: (1) DPDT, alternate action. (Repeater Disable)
S5	19A116009-P3	Push: (2) DPDT, alternate action. (Search Lock Monitor)
S6	19A116009-P12	Push: (1) DPDT, alternate action. (Channel Guard)
S7	19A116009-P2	Push: (1) DPDT, alternate action. (2 Frequency Receive)
S8	19A116009-P9	Push: dummy. (Single Dummy)
S9	19A116009-P10	Push: dummy. (Double Dummy)
S10	19A116009-P7	Push: (1) DPDT, momentary action. (Intercom)
S11	19A116009-P2	Push: (1) DPDT, alternate action. (2 Frequency Transmit)
		- - - - - - - - - - HOOKSWITCHES - - - - - - - - - -
S51	19B215125-G1	Desk top.
S52	19B209415-P1	Wall Mount (Beige).
S53	19B209415-P2	Wall Mount (Gray).
		- - - - - - - - - - - HANDSETS - - - - - - - - - - -
		MODEL 4EM22B40 5493739-P40 BEIGE MODEL 4EM22B41 5493739-P64 GRAY
		Cartridge, Receiver. ITT-75547.
		Cartridge, Transmitter, carbon. ITT-75555.
		Switch Assembly. ITT-80032.
		Case, Beige. ITT-84495-13.
		Case, Gray. ITT-84495-14.
		Cap, Receiver, Beige. ITT-79289-13.
		Cap, Receiver, Gray. ITT-79289-14.
		Cap, transmitter, Beige. ITT-79290-13.
		Cap, transmitter, Gray. ITT-79290-14.
		Plunger Bar, Beige. ITT-84498-13.
		Plunger Bar, Gray. ITT84498-14.
		Cord, Beige. ITT-101913( )650.
		Cord, Gray. ITT-101914( )650.
		* *

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



RC-1719

4EC78A10-14 DESKON

PRODUCTION CHANGES

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

CHASSIS 19D413127-G1, G2 & G3

REV. A - 19D413127-G3 ONLY
Incorporated in initial shipments.

REV. A - 19D413127-G1, G2
REV. B - 19D413127-G3
To improve circuit protection and prevent overloading of power transformer in case of internal short. Changed F801.

POWER SUPPLY AMPLIFIER BOARD 19C311787-G1, G2 & G3 (A801-A803)

REV. A - To facilitate procurement of parts. Changed Q2 and Q3.

AUDIO BOARD 19C311798-G3 (A806)

REV. A - To increase gain of Audio Board. Changed C2.
REV. B - To incorporate new transistor. Changed Q2.
REV. C - To improve audio frequency response. Changed R6 thru R10 and C6.

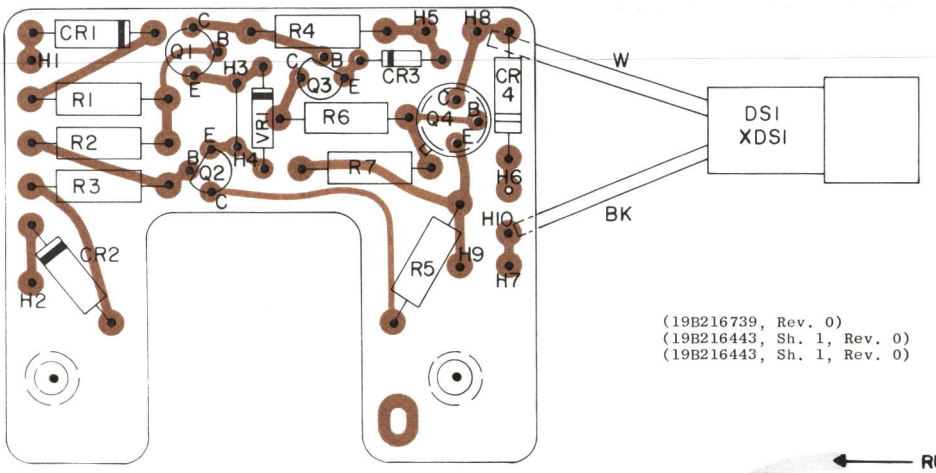
CHASSIS 19D413127-G2 & G3

REV. B - 19D413127-G2
REV. C - 19D413127-G3
To prevent oscillation of power regulator. Added C804.

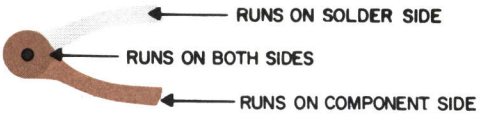
POWER SUPPLY AMPLIFIER BOARD 19C311787-G1, G2 & G3 (A801-A803)

REV. B - To improve power regulator circuit by using a higher voltage zener diode. Changed VR1 and R6.
REV. C - To improve audio frequency response. Changed C10.

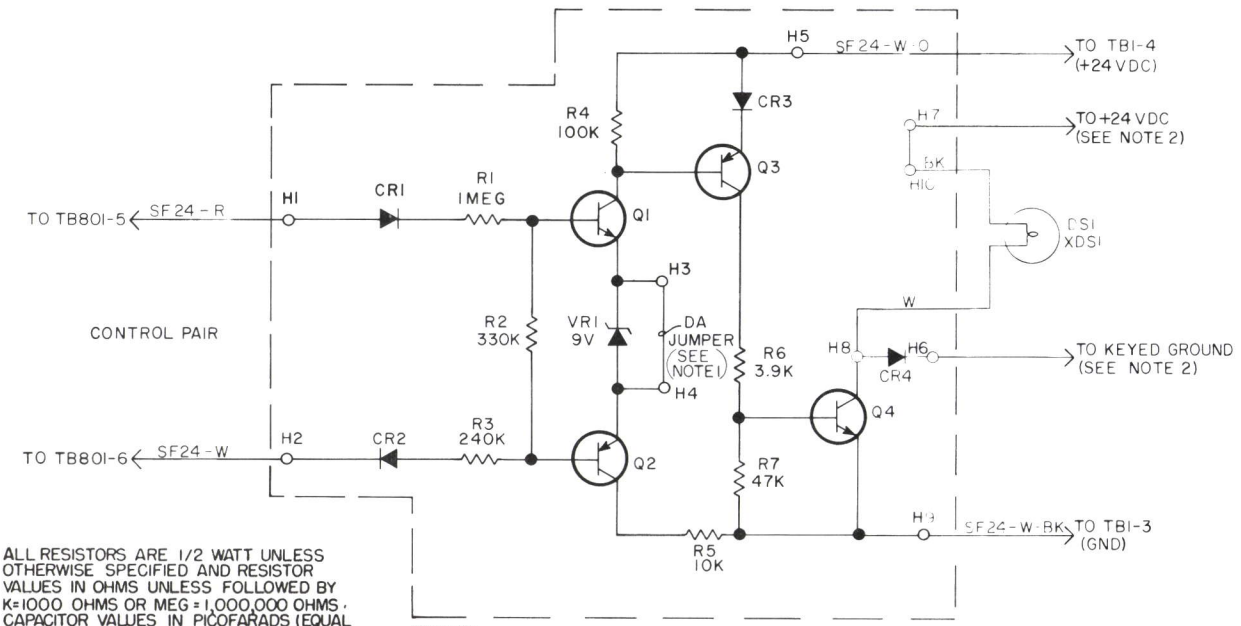
OUTLINE DIAGRAM



(19B216739, Rev. 0)
(19B216443, Sh. 1, Rev. 0)
(19B216443, Sh. 1, Rev. 0)



FUNCTIONAL DIAGRAM



ALL RESISTORS ARE 1/2 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.

NOTES:
1. JUMPER REMOVED FOR CHANNEL GUARD.
2. NORMALLY CLOSED CONTACTS OF THE INTERCOM SWITCH ARE CONNECTED IN SERIES WITH LAMP CIRCUIT.

(19B216445, Rev. 1)

SERVICE SHEET

PARALLEL TRANSMIT INDICATOR

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorizes GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-4040

DF-4085

GENERAL ELECTRIC

MOBILE RADIO DEPARTMENT LYNCHBURG, VIRGINIA 24502 CABLE GECOMPROD

(In Canada, Canadian General Electric Company, Ltd., 100 Wingold Ave., Toronto 19, Ontario)

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