MOBILE RADIO

MAINTENANCE MANUAL

DIGITAL DECODER

MODELS 4EJ18A10-12 AND 4EJ18B10-12

Maintenance Manual LBI-4035D
OF-5036

EJ-18-A & B

SPECIFICATIONS *

Model Numbers	
±12-Volt Mobile 120-VAC, 50/60-Hz Station	4EJ18A10, 11 & 12 4EJ18B10, 11 & 12
Input Frequencies	590 Hz, 1500 Hz or 2805 Hz
Pulsing Speed	8 to 16 PPS (approx 10 PPS)
Input Impedance	3000 ohms minimum
Temperature Range	-30°C to +60°C
Audio Sensitivity	
590 & 1500 Hz 2805 Hz	.02 to 6.0 volts at 10 dB Sinad .02 to 6.0 volts at 14 dB Sinad
Input Voltage (Nominal)	
Mobile Station	12 VDC at 360 milliamps 120 VAC at 100 milliamps

COMBINATION NOMENCLATURE

S Digital Decoder	**2** 12 VDC	**0** Standard	**4** 590 Hz
	4 120 VAC		**5** 1500 Hz
			6 2805 Hz

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

GENERAL ELECTRIC

TABLE OF CONTENTS

OPTIONS

Description	Option No.
Sounder	4101
Speaker Muting	4103
Hookswitch	4092
Military Microphone	4094
7-Digit Counter	4102
External Alarm Relay	4097

WARNING

Under no circumstances should any person 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

General Electric Tone Decoder Models 4EJ18A10-12 and 4EJ18B10-12 are transistorized single-tone digital decoders for mobile and station application. The model number and application of each decoder is shown in the following chart.

DECODER	TONE FREQUENCIES		
	590 Hz	1500 Hz	2805 Hz
Mobile	4EJ18A10	4EJ18A11	4EJ18A12
Station	4EJ18B10	4EJ18B11	4EJ18B12

The decoders are activated by a tone that is interrupted by a telephone-type dial to form a series of pulses that agree with the digits dialed. Dialing the proper code turns on the CALL light, provides a momentary connection to battery negative for an external alarm, and momentarily energizes a sounder (optional in Mobile decoders).

The mobile decoder is supplied in a compact housing equipped with a mounting bracket for installation in 12-volt vehicles. The station decoder is supplied with a larger housing which contains a 120-VAC power supply.

INSTALLATION

The decoder is normally shipped from the factory set for the following codes:

- All Call: 8
- Group Call: 56
- Individual Call: 595

New code assignments and code settings should be made before the decoder is installed. Refer to the Code Setting Procedure (see Table of Contents) for complete information.

MOBILE DECODER

Install the mobile decoder where it will be within convenient reach of the operator, and where it will not interfere with the safe operation of the vehicle. Use the mounting bracket as a template, and drill pilot holes with a #29 (9/64-inch) drill. Attach the bracket to the mounting surface with the two #10 x 5/8-inch self-tapping screws provided.

Connections for different mobile installations are shown on the appropriate Application Kit as listed in the Table of Contents.

STATION DECODER

The station decoder should be located near a 120-VAC, 50/60-Hz source, and where the control cable will reach the station. Connections for the different station installations are shown on the appropriate Application Kit as listed in the Table of Contents.

OPERATION

Operating controls for the mobile and station decoder are located on the front panel. The controls consist of a RESET button, a CALL lamp, and an EXTERNAL ALARM switch market LIGHT-OFF-HORN.

MOBILE DECODER

Applying a properly coded tone sequence to the basic mobile decoder activates a transistor switching circuit, which turns on the CALL light. The light will remain on until the RESET button is pressed. If desired, the decoder may also be used to activate an external alarm. The position of the EXT ALARM switch determines whether the LIGHT or HORN will operate. The light will remain on until the RESET button is pressed. The horn will remain activated until a "1" is dialed at the encoder, or until the tone from the encoder stops (in approximately four seconds).

An optional sounder is available for the mobile decoder. The sounder is activated when a properly coded tone is applied to the decoder. The sounder will remain on until a "1" is dialed or the tone is removed.

Other options include a speaker muting relay, and a hookswitch for either a handset or military microphone.

With the speaker muting option, the speaker is normally muted. An incoming tone code energizes the relay, which applies the output of the receiver to the speaker.

The hookswitch options require the use of the speaker muting relay. With the microphone or handset on-hook, the speaker is normally muted. An incoming code energizes the CALL light, unmutes the speaker, and activates the applicable external alarm circuit. Pressing the RESET button turns off the CALL light and mutes the speaker.

Taking the microphone or handset off-hook turns off the CALL light and keeps the speaker on.

NOTE

If a code is received when using MASTR Professional and Executive handset hookswitch options, the speaker and CALL light will remain on until the RESET button is pressed.

STATION DECODER

Applying a properly coded tone sequence to the basic station decoder activates a switching circuit, which turns on the CALL light and activates a sounder. The light will remain on until the RESET button is pressed. The sounder will remain on until either a "1" is dialed or the tone is removed. If desired, the decoder may also be used to activate an external alarm. The position of the EXT ALARM switch determines whether the LIGHT or HORN will operate. The light will remain on until the reset button is pressed. The horn will remain activated until either a "1" is dialed at the encoder, or the tone is removed from the decoder.

Other options include a speaker muting relay, and a hookswitch for either a handset or military microphone.

With the speaker muting option, the speaker is normally muted. An incoming tone code energizes the relay, which applies the output of the receiver to the speaker.

The hookswitch options require the use of the speaker muting relay. With the microphone or handset on hook, the speaker is normally muted. An incoming code energizes the CALL light, unmutes the speaker, and activates the applicable external alarm circuit. Pressing the RESET button turns off the CALL light and mutes the speaker. Taking the microphone or handset off-hook turns off the CALL light and keeps the speaker on.

NOTE

If a code is received when using MASTR Professional and Executive handset hookswitch options, the speaker and CALL light will remain on until the RESET button is pressed.

LOGIC CIRCUITS

This section contains a detailed description of all of the logic circuits used in the decoder. It is suggested that the serviceman study the following information carefully, as a good understanding of the basic decoder circuitry is essential for servicing the decoder.

SOLID STATE SWITCHES

An ideal switch has infinite resistance when open and zero resistance when closed. The transistor and semiconductor diode can be made to approach these conditions while operating at a much higher rate than conventional switches. Logic circuits are primarily switching devices which are either in a state of full conduction (saturated) or turned off. These devices can be switched from one state to the other as rapidly as required by the circuit function.

DIODE SWITCH (Figure 1)

A semiconductor diode presents maximum resistance to the circuit when the diode is reversed biased or there is no difference of potential between the cathode or anode. Applying a negative potential to the cathode of the diode (with respect to the anode), or a positive potential (with respect to the cathode) to the anode of sufficient amplitude to overcome the series resistance of the diode, forward biases the diode causing it to conduct. The diode now switches from maximum to minimum resistance.

The resulting current flow in the diode circuit increases from near zero to the

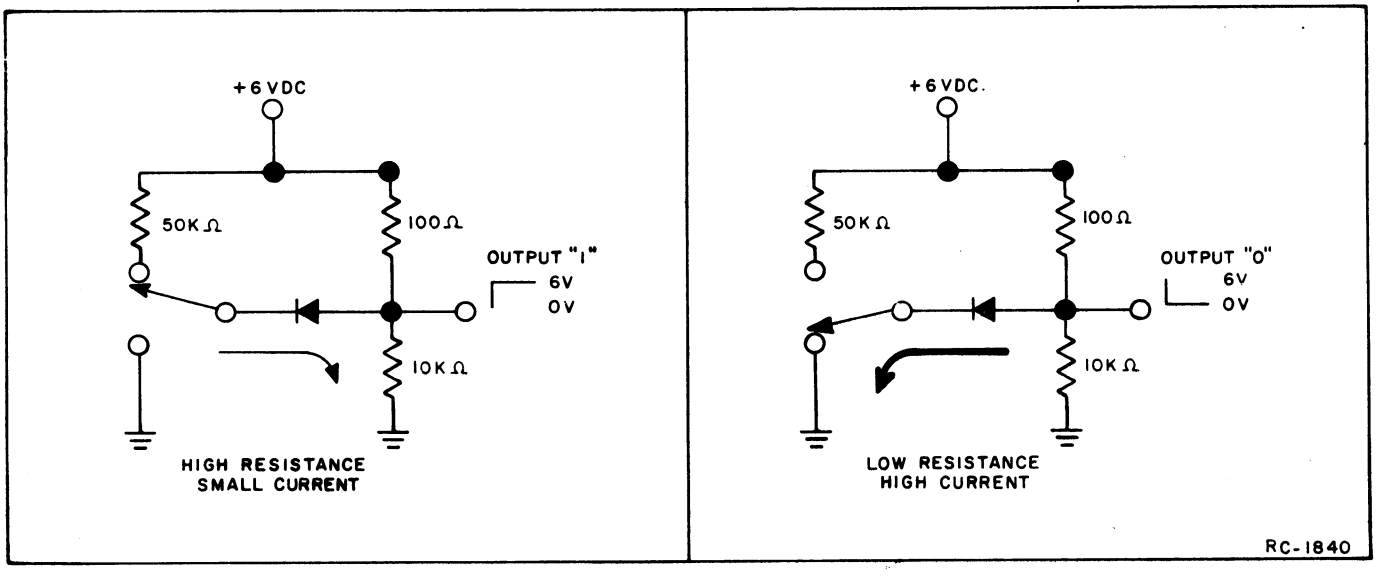


Figure 1 - Diode Switching Circuit

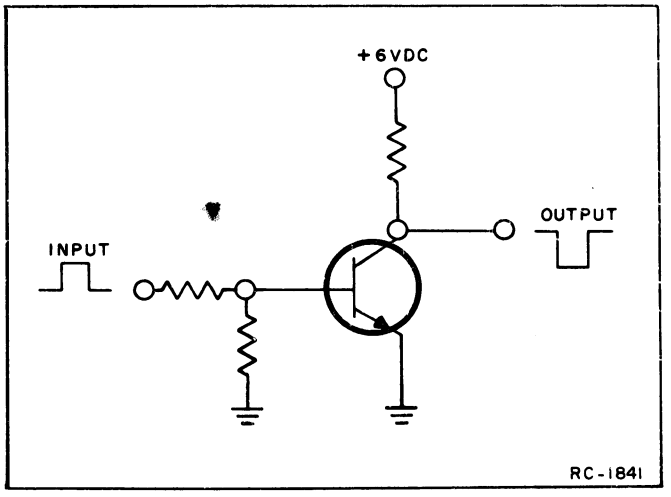


Figure 2 - Transistor Switching Circuit

maximum value allowed by the amplitude of the switching voltage and the series resistance of the circuit.

TRANSISTOR SWITCH & INVERTER (Figure 2)

The high value of "off" resistance and the low value of "on" resistance make the transistor invaluable for switching applications. When no base current is applied to the transistor switch shown in Figure 2, and the collector has the proper voltage applied, the open-circuit resistance of the transistor approaches several megohms. If sufficient base current is suddenly applied to drive the transistor into saturation (turned ON), the collector-emitter resistance will drop to as low as 1.0 ohm. Voltage across the transistor under these conditions may be only a few tenths of a volt.

The transistor stage shown in Figure 2 can also be used as an inverter for reversing the polarity of the input signal. A positive signal applied to the base-emitter junction will cause the collector voltage to drop from +6 volts to near ground potential.

GATING CIRCUITS

Formal logic requires that a statement be either true or false; no other condition can exist for the statement. A logic circuit is basically a switch or gate that is either closed or open; no other condition can exist for the circuit. By logical arrangement of these gating circuits, electrical functions can be performed in a predetermined sequence by opening or closing the gates at the proper time.

A single-pole, single-throw switch is equivalent to a binary device with only two possible operating conditions: either open

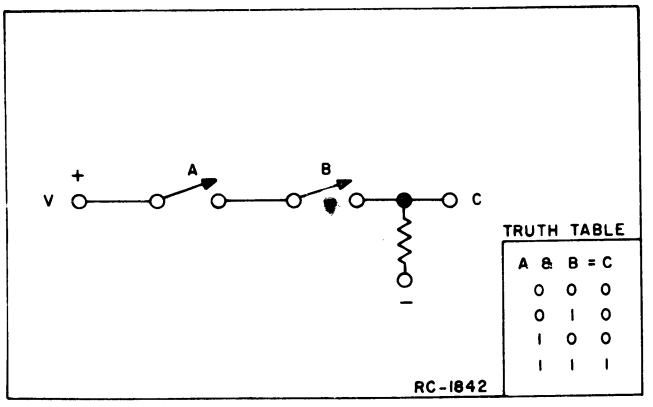


Figure 3 - Simple AND Gate

or closed. If point "C" of Figure 3 is to be made equal to potential V, switches A and B must be closed. It can then be said that A AND B = C. If switches A and B are considered as gates, then potential V is said to be gated to "C" when both gates are closed. By representing the closed state of a switch or gate as "1" and the open state of a switch or gate as "0", then all possible conditions for the AND gate are shown in the Truth Table in Figure 3.

In Figure 4, if point "C" is to be made equal to potential V, either switch A or B (or both) may be closed. It can then be said A OR B = C. All possible conditions for the OR gate are shown in the Truth Table in Figure 4.

DIODE GATING CIRCUITS

In gating circuits, the desired state of the gate may be represented by either "0" or "1". In this section, "1" will be used to represent a positive potential (approximately +6 volts) and "0" will be used to represent a low potential (near zero volts).

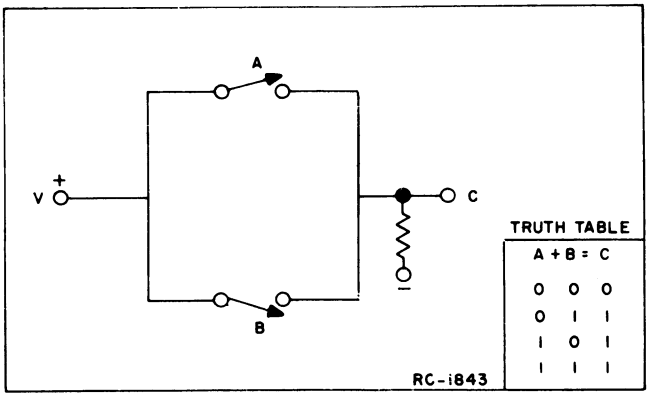


Figure 4 - Simple OR Gate

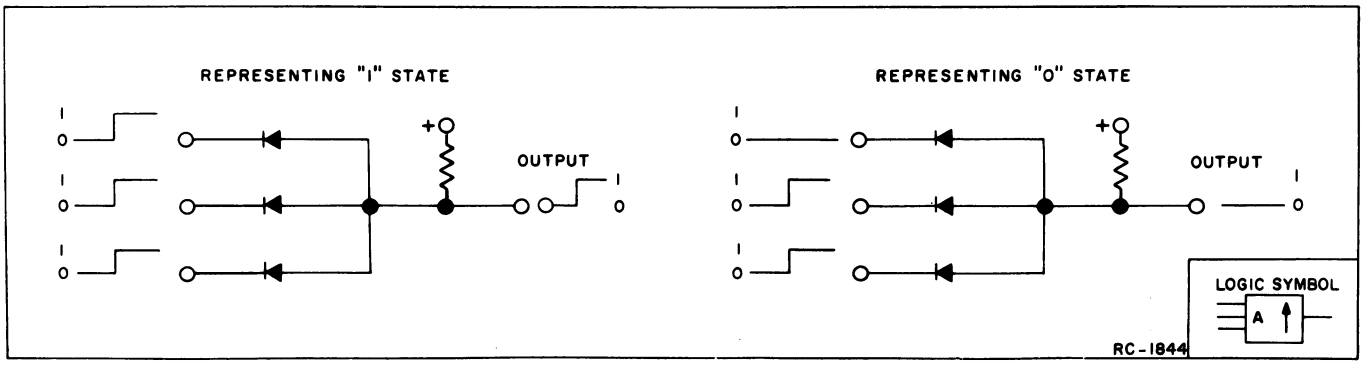


Figure 5 - Diode AND Gate

Logic Symbols

The use of logic symbols in this manual provides a simple method of showing the function of complicated logic circuits without drawing each diode, resistor and transistor in the circuit. The individual symbols can be tied together to form a logic diagram of a complete unit (decoder, encoder, etc.). Logic symbols of circuits used in the decoder are shown in the following simplified diagrams.

AND Gate

A simple diode AND gate is shown in Figure 5. The same conditions exist in this circuit as in the switch gate of Figure 3. Application of a positive potential to the diodes at all inputs will result in a positive potential at the output. This represents the "1" state of the gate. Application of a positive potential to one or two terminals will result in no potential developed, representing the "0" state of the gate.

OR Gate

A simple diode OR gate is shown in Figure 6. The same conditions exist in this circuit as the switch gate of Figure 4. Application of a positive potential of any of the inputs will result in an output of the same polarity, representing the "1" state.

NAND Gate

The basic logic circuitry used in the decoder is the NAND gate (NOT-AND). A NAND gate is simply an AND gate with a transistor inverter (NOT) stage added (see Figure 7).

Applying a positive potential to inputs A and B back biases diodes CR1 and CR2, permitting inverter Q1 to conduct. When conducting, the collector of Q1 drops to near ground potential.

Additional buffer or amplifier stages are usually added to the NAND gate to provide better isolation and increased gain. These additional stages are connected so that the logical output of the inverter is not changed

NAND gates may also be used to provide the OR function. Assume that inputs A and B are all at a positive potential. Grounding either A or B turns off the inverter, so that the output (C) rises to approximately 6 volts.

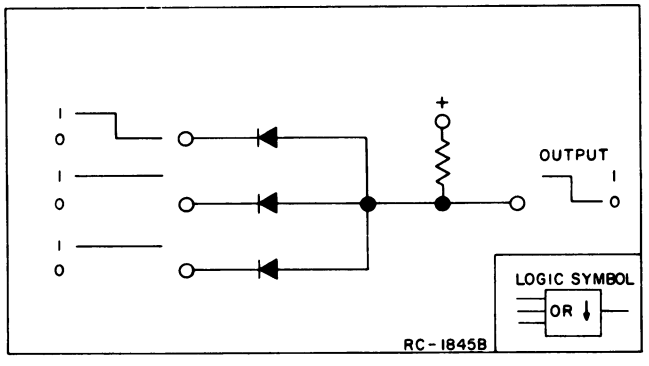


Figure 6 - Diode OR Gate

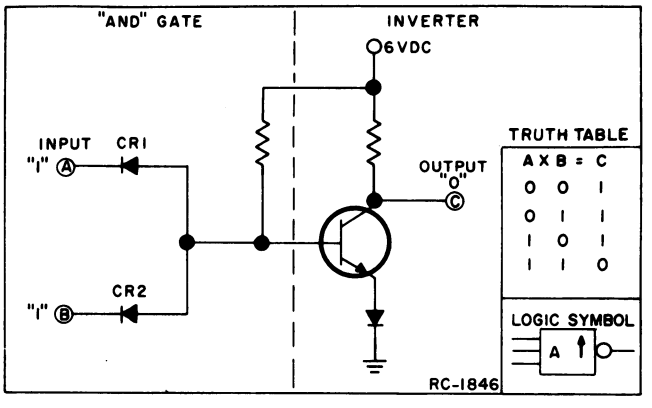


Figure 7 - Simplified NAND Gate

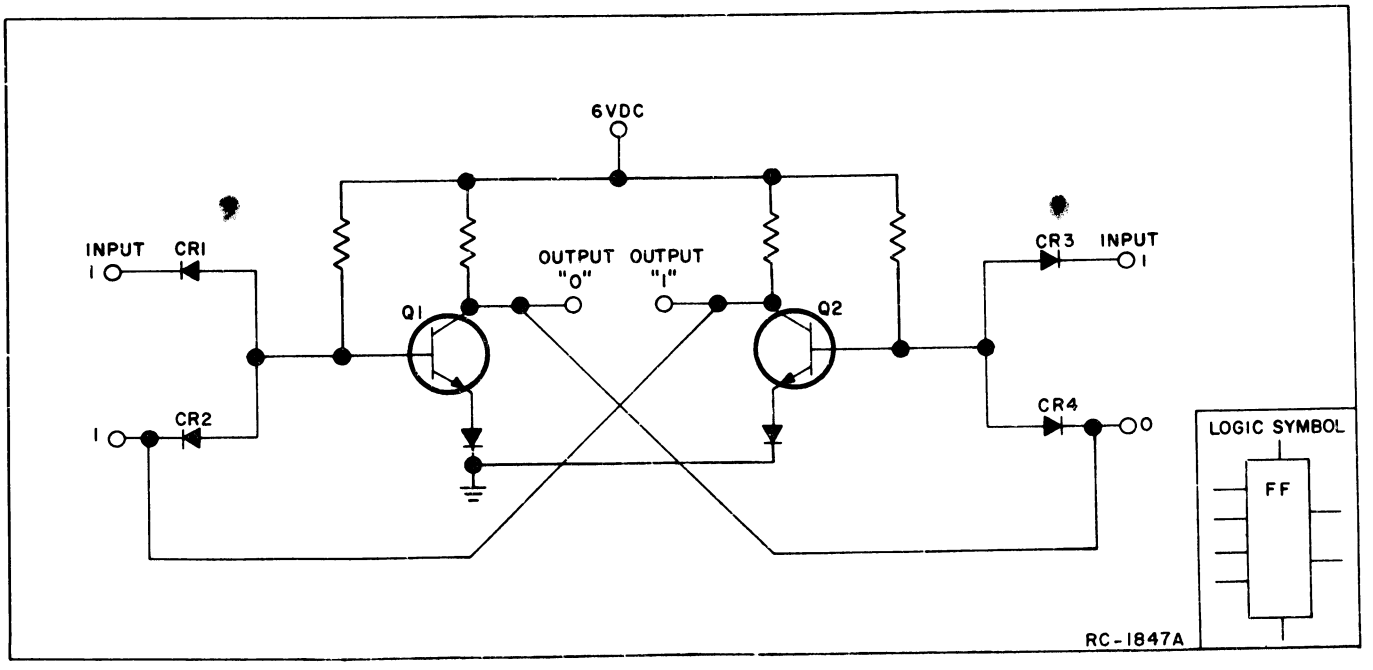


Figure 8 - NAND Gate Flip-Flop

FLIP-FLOPS

Two NAND gates connected as shown in Figure 8 will provide the same logic functions as the conventional flip-flop (bistable multivibrator).

Assume that a positive potential is applied to all inputs. Momentarily grounding the cathode of CR3 or CR4 turns off Q2, causing its collector voltage to rise to approximately +6 volts. This turns on Q1, causing its collector voltage to drop to near ground potential, keeping Q2 turned off. The flip-flop will remain in this state until either CR1 or CR2 is grounded.

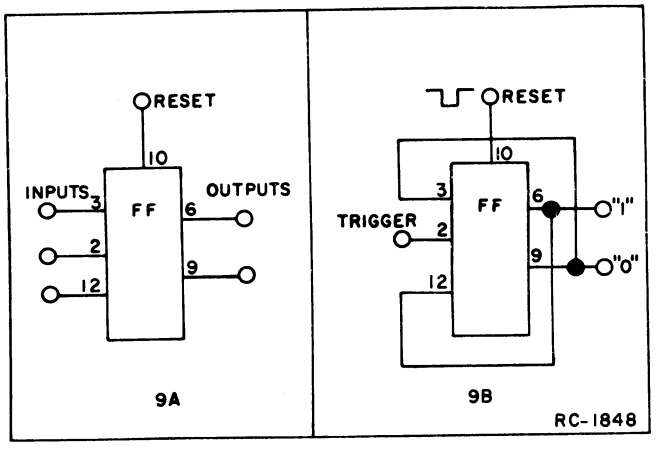


Figure 9 - Flip-Flop Terminal Identification

Usually, two or more of the flip-flops are connected in a "master-slave" configuration (one flip-flop driving the other) for additional flexibility. Terminal identification for the flip-flop is shown in Figure 9A. However, the flip-flops used in the decoder are actually connected as shown in Figure 9B, with external connections from input terminal 3 to output terminal 9, and from input terminal 12 to output terminal 6. This leaves terminal 2 as the input terminal or "trigger". A flip-flop connected in this manner (J-K connected) will change state each time a negative-going pulse is applied to the trigger (terminal 2).

Terminal 10 of the flip-flop is the reset terminal. Applying a negative-going pulse to the reset terminal shifts the output of the flip-flop to a "1" at terminal 6 and a "0" at terminal 9, even when a pulse is being applied to the trigger.

COUNTERS

Two or more flip-flops may be connected to form a counter. The counter circuit in Figure 10 uses three flip-flops for counting up to eight pulses.

A reset pulse switches all three flip-flops to a "1" at terminal 6 (and a "0" at terminal 9). The first negative-going pulse applied to the trigger of A switches all of the flip-flops to the "0" state at terminal 6. The second pulse switches A back to the "1" state at terminal 6 while B and C do not change state.

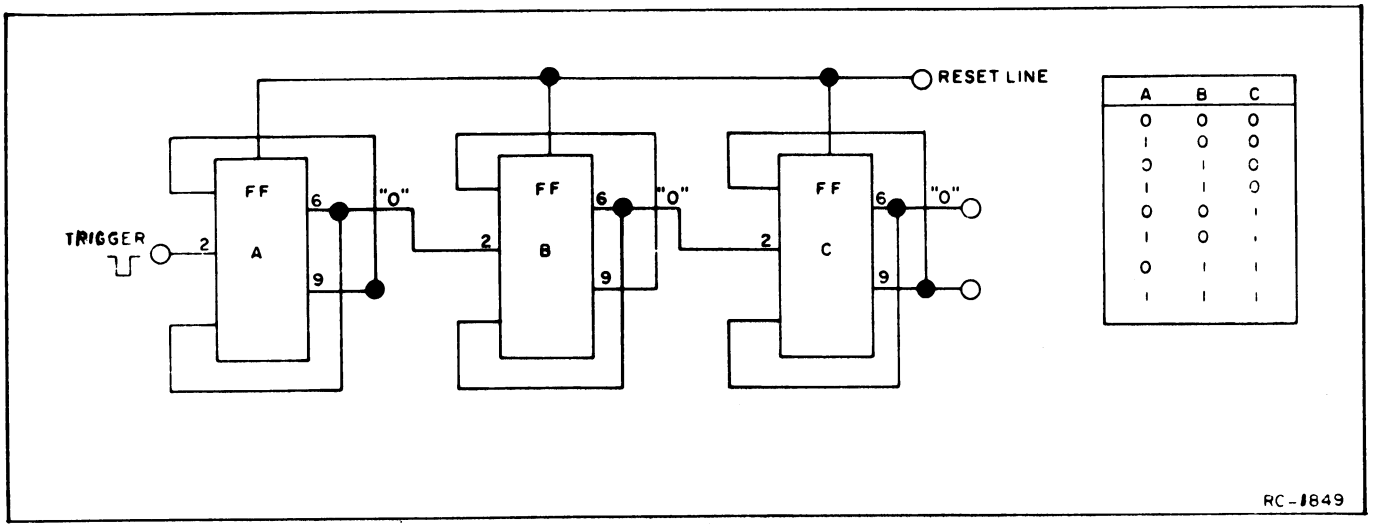


Figure 10 - Simplified Counter

Applying third pulse switches terminal 6 of A back to a "0". This switches terminal 6 of B to a "1", which does not change the state of C. The application of four more pulses to the trigger of A will shift the outputs at terminal 6 of A, B and C as shown in the truth table in Figure 10. Note that each flip-flop changes state only when the preceeding flip-flop goes from a "1" to a "0".

A NAND gate diode matrix connected to the outputs of the counter flip-flops is used to detect a unique set of outputs. In effect, the counter and matrix provides a simple method of recognizing (decoding) a correctly coded input signal. A simplified bit counter and digit counter with a decode matrix are shown in Figure 11.

The digit counter is triggered by a pulse for each digit dialed, while the bit counter is triggered by a pulse for each interruption in the coded tone. The matrix is shown connected for an individual calling code of 3 - 2 - 2.

Assume that this code is being dialed at the encoder. Tone applied to the decoder at the start of dialing resets all of the flip-flops to a "1" at terminal 6. The first pulse of the dialed code applied to the counters switches all of the flip-flops to "0" at terminal 6.

In the digit counter, terminal 9 of flip-flops A and B are now positive. This back biases diodes CR1 and CR2, removing the ground on input 4 of NAND gate 1. As terminal 6 of A and B is "0", CR3 and CR6 are forward biased, grounding input 4 of NAND gates 2 and 3. This disables gates 2 and 3 while the first digit is counted.

In the bit counter, the second and third pulses switch terminal 6 of flip-flop C to a "1" and back to a "0". The "0" at the trigger of D switches its output to a 1, while E remains on "0". Terminal 9 of C and E are now positive, removing the ground on inputs 1 and 3 of NAND gate 1. Terminal 6 of D is positive, removing the ground on input 2 of NAND gate 1. All positive inputs activates the NAND gate and its output goes negative. This negative output activates the OR gate and its output goes positive. The positive OR gate output prevents the reset circuit from resetting the counters so that they remain ready for the next digit in the code.

In the digit counter, applying the second digit of the code switches flip-flop A to a "1" at terminal 6 while B remains a "0". This reverse bias CR3 and CR4, removing the ground to input 4 of NAND gate 2. The two pulses applied to the bit counter switch flip-flop C from "0" at the trigger of D switches its output from "1" to "0", which switches E to "1". Now all of the inputs to NAND gate 2 are positive, activating the gate. This again activates the OR gate, so that its output goes positive to preventing resetting.

Applying the last digit of the code switches digit counter flip-flop A to "0" and B to "1". This reverse biases CR5 and CR6, removing the ground to input 4 of NAND gate 3. The two pulses applied to the bit counter shifts terminal 6 of flip-flop C from "0" to "1" and from "1" to "0". The "0" output switches D from "0" to "1", and output of E remains a "1". This activates NAND gate 3 and the OR gate to prevent resetting. The negative-going output of the NAND gate also is applied to the output

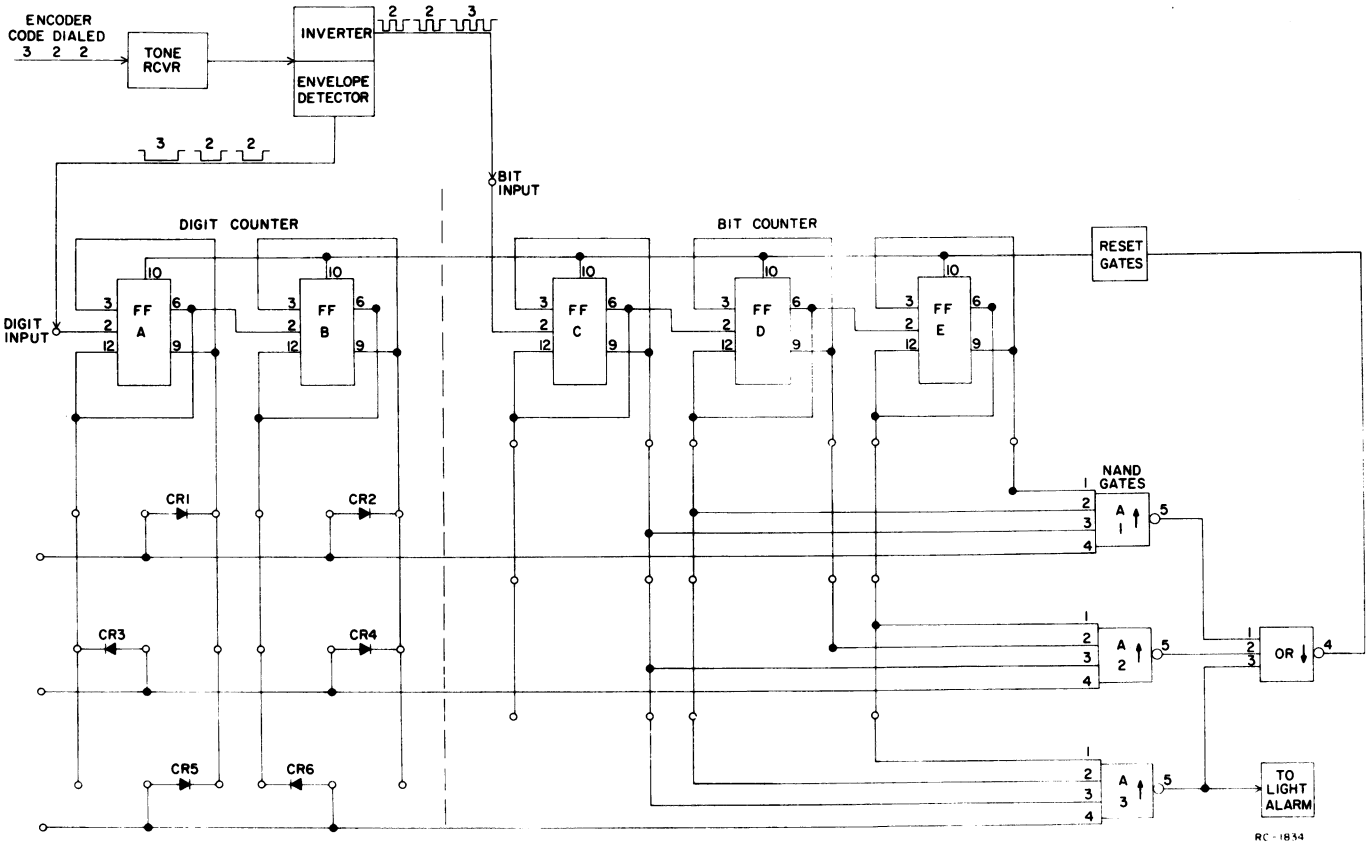


Figure 11 - Simplified Counter and Matrix

circuitry which lights the CALL light and energizes the alarm circuit.

When the tone is removed from the decoder for over 150 milliseconds, the counters reset and remain in the reset condition until tone is applied to the decoder.

CIRCUIT ANALYSIS

The basic decoder consists of a tone receiver board, a pulse routing board, a counter board. A 120-volt AC power supply is added for station applications.

The decoder is fully transistorized, using both discrete components and Integrated Circuit Modules (IC's) for increased reliability. Typical schematic and logic diagrams of the IC's used in the decoder are listed in the Table of Contents.

The decoder is normally shipped from the factory strapped for three-digit operations. This provides 1000 individual three digit calling codes plus group call and all call. An optional modification is available for seven digit operation.

Complete instructions for setting the codes is contained in the Code Setting Procedures as listed in the Table of Contents.

References to symbol numbers mentioned in the following text may be found on the applicable Schematic Diagram, Outline Diagram and Parts List (see Table of Contents).

TONE RECEIVER

Three different tone receiver boards are available for use in the decoder, depending on the system frequency. The operating frequency of each board is as follows:

- A1701-590 Hz
- A1702-1500 Hz
- A1703-2805 Hz

Each tone receiver board consists of an amplifier-limiter, a tuned circuit, a detector and regulator, and an output switch.

A coded tone from the mobile or station receiver is coupled through DC blocking capacitor C12 to amplifier-limiters Q1 and Q2. A negative feedback path from the collector of Q1 to diode limiters CR3 and CR4 limits the signal applied to the base of Q2. Diodes CR1 and CR2 provide large-signal protection for Q1. The output of

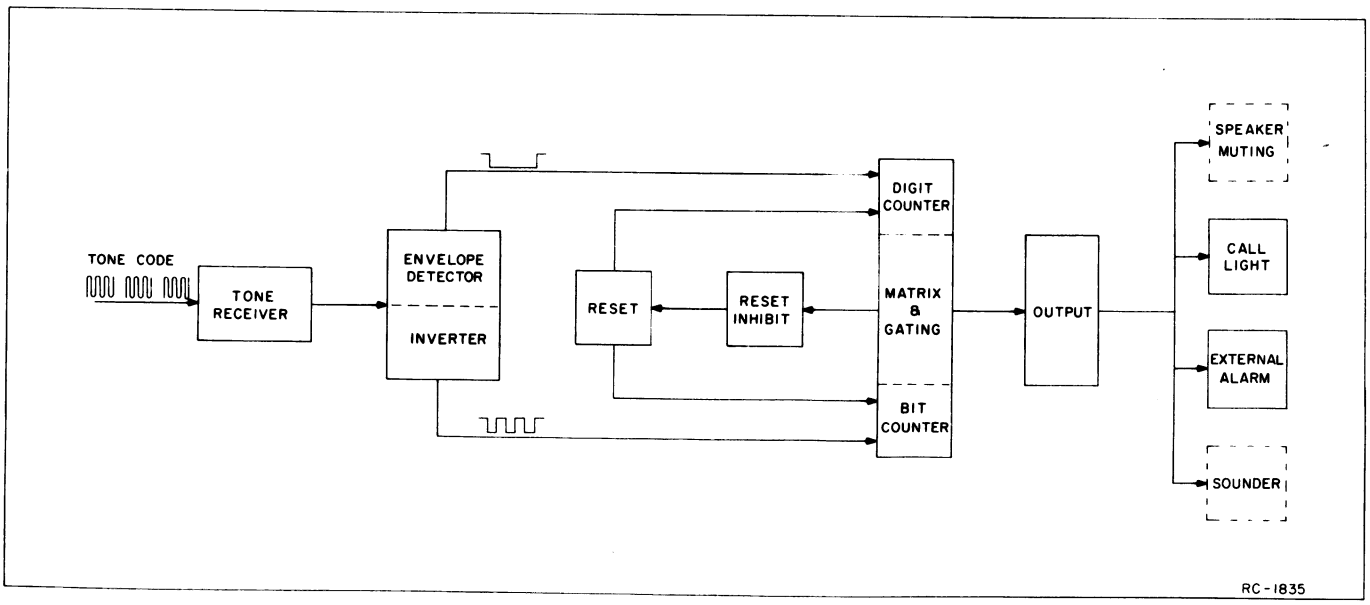


Figure 12 - Decoder Block Diagram

Q2 is applied to a tuned circuit consisting of C5/C6, C7/C8/C9 and L1/L2. (See Figure 12).

When an incorrect tone (or no tone) is applied to the tuned circuit, diode CR5 is forward biased by current through L1/L2. With CR5 conducting, detector Q3 is turned off. This allows diode CR6 to conduct, keeping output switch Q5 turned off.

Applying the correct tone to the tuned circuit increases the impedance of L1/L2, removing the bias on CR5. The diode now conducts only on the positive half-cycles of tone, and is cut off (reverse biased) on the negative half cycles. When a negative half cycle turns CR5 off, Q3 turns on. Turning on Q3 turns off CR6, which forward biases CR7 and CR8 and turns on output switch Q5. When a positive half cycle turns CR5 on (and Q3 off), C10 starts discharging through R17 and R18, keeping CR6 off and Q5 on. The output of Q5 is a positive pulse for each interruption in the tone code. Q4 acts as a regulator, keeping the emitter voltage of Q3 constant over the temperature range.

PULSE ROUTING BOARD

The pulse routing board contains tye 6-volt regulator, inverters, envelope detector, tone-off reset, reset, and output stages. Multiple input Integrated Circuits, (IC's) are used for the inverters, envelope detectors and reset circuits. Discrete transistors are used for the regulator, tone-off reset and output stages, and in the envelope detector.

Figure 13 contains a complete set of decoder timing waveforms. It is recommended that these waveforms be used in conjunction with the circuit analysis for a better understanding of the decoder circuitry.

6-VOLT REGULATOR

Operating voltage for the decoder is supplied by the 6-volt regulator. +13 volts from the vehicle battery or station power supply is applied to the zener diode-emitter follower regulator (CR8 and Q2). The +6-volt, 250-milliamp output is taken from the emitter of Q2.

1ST INVERTER

The output of the tone receiver board is connected to input terminal 1 of the 1st inverter (U12).

When no tone is applied to the decoder, the output of the tone receiver board is high (positive) and the output of the inverter is low (zero). When tone is first applied the inverter output goes positive. The positive-going pulses (one for each interruption in the tone) from the tone receiver are changed to negative-going pulses by the inverter. These negative-going pulses are applied to the trigger of the first flip-flop in the bit counter.

The inverter output is also applied to the input of the envelope detector and the tone-off reset circuits.

ENVELOPE DETECTOR

With no tone applied, the zero inverter output is applied to terminal 1 of the

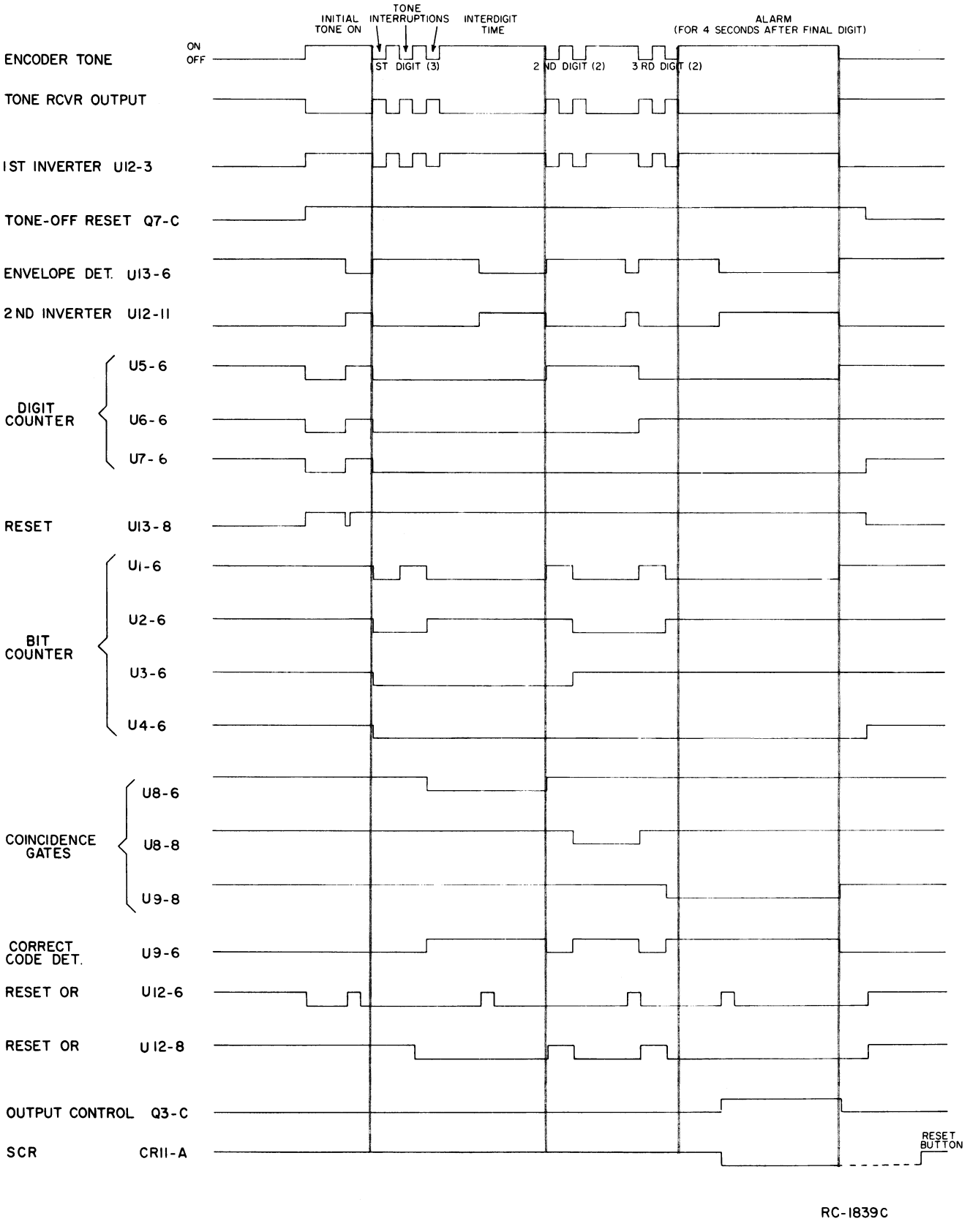


Figure 13 - Decoder Timing Waveforms

envelope detector OR gate, resulting in a positive output.

When tone is first applied to the decoder, the inverter output goes positive. This positive potential is applied to terminal 1 of the OR gate, and also turns on Q1 so that its collector drops to zero. This keeps the OR gate output positive for as long as Q1 conducts. Q1 conducts until C1 is fully charged, and then turns off. This causes the OR gate output to drop to zero.

The first negative-going pulse in the pulse train from the inverter switches the OR gate output to positive, and also causes C1 to rapidly discharge through CR1 and CR2. The trailing edge of the first pulse (now positive-going) turns on Q1, keeping the OR gate output positive. This cycle is repeated until the end of the digit pulse train and results in a positive pulse envelope for the digit pulses. The pulse envelope is inverted by U13 and the negative-going pulse triggers the first flip-flop in the digit counter.

TONE-OFF RESET

When tone is first applied, the positive inverter output of the first inverter turns on Q6, and also charges C9 through CR14. Turning on Q6 turns off normally-on transistor Q7 so that its collector goes positive.

The negative-going digit pulses applied to the tone-off reset circuit causes C9 to discharge through R20 and the base-emitter junction of Q6, which keeps Q6 on. The output of Q7 remains positive until tone is removed from the decoder and C9 discharges. The output of Q7 is applied to the reset circuit.

RESET

The reset circuit consists of two NAND gates utilized as negative OR gates (IC12) driving a NAND gate (U13). A simplified reset circuit and the truth table for all of the gates is shown in Figure 14. When both OR gate outputs are positive, the NAND gate output goes negative, resetting the counter flip-flops.

With no tone applied to the decoder, input A to each OR gate is at zero potential, holding the NAND gate in the reset condition.

When tone is applied, the positive output of Q7 keeps terminal A of both OR gates positive. Terminal B of the first OR gate is kept positive through R4, and the output of OR gate is "0". In the second OR gate, terminal A is positive and terminal B is held at "0" by the correct code detector so that the second OR gate output is positive. The zero and positive inputs to the NAND gate keep its output high, preventing the counters from resetting.

At the end of the first digit, a negative pulse from the envelope detector is coupled through C3 to terminal 4 of the OR gate, causing its output to go positive momentarily. At the same time, if a correct

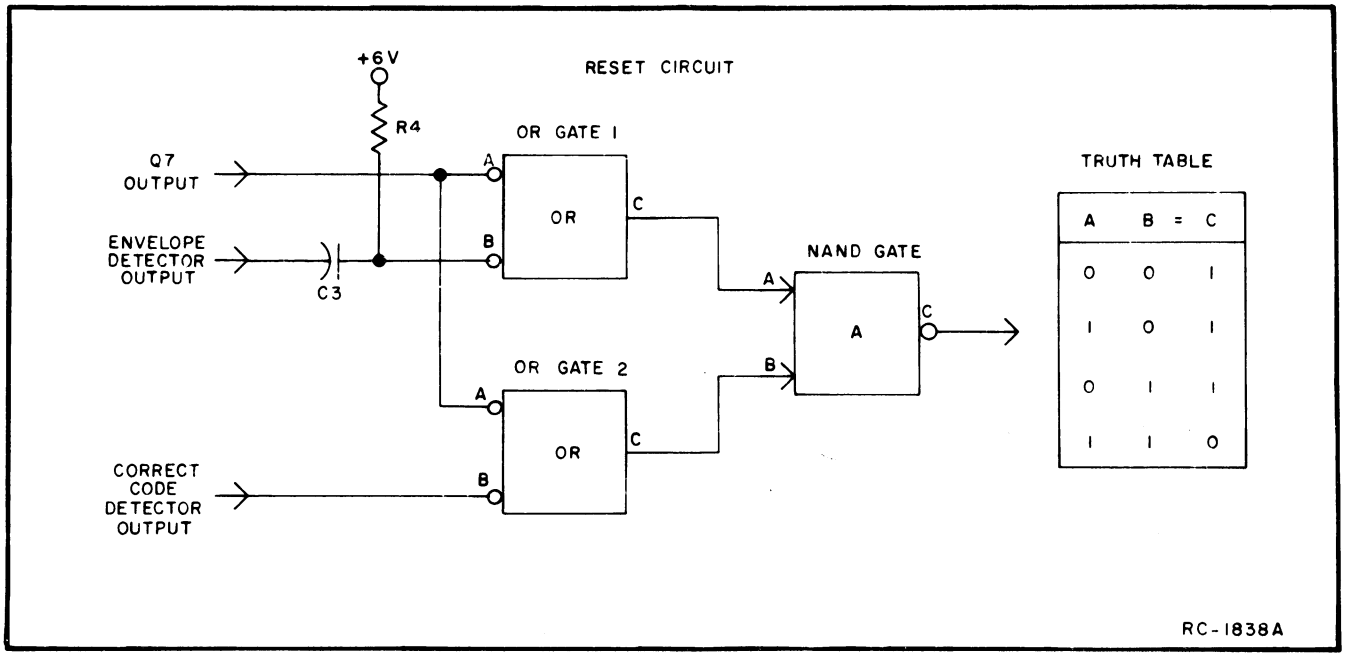


Figure 14 - Reset Circuit

code has been applied to the counters, the output of correct code detector (OR gate) goes positive and is applied to terminal B of the second OR gate. Now, the output of the first reset OR gate is positive, and the second OR gate is zero, keeping the NAND gate output positive (no reset).

If an incorrect code is dialed, the correct code detector output remains at zero and both OR gate outputs go positive at the end of the incorrect digit. This switches the NAND gate output to zero, resetting the counters.

OUTPUT

The output transistors are controlled by the envelope detector and three of the coincidence gates on the counter board.

With no tone applied, the positive output of the coincidence gates is coupled through R6, R7 and R8 to the base of PNP transistor Q3. The positive voltage keeps Q3 turned off, which keeps output transistor Q5 turned off.

When a tone code is applied to the decoder, the positive output of the envelope detector is applied to the anode of CR4. If the correct individual call, group call or all call code was dialed, one of the coincidence gate outputs will drop to zero. The output of the envelope detector also drops to zero, and Q3 turns on.

When conducting, the collector of Q3 goes positive, turning on Q5. When Q5 is conducting, its collector drops to zero and provides a path to battery negative to activate the CALL light, EXTERNAL ALARM circuit and sounder option.

Turning on Q3 also applies a positive voltage to the gate of silicon controlled rectifier CR11, causing it to conduct. When conducting, CR11 provides a path to battery negative for the CALL light and EXTERNAL ALARM light. CR11 continues to conduct (keeping the lights on) until the RESET button is pressed.

When tone is removed from the decoder or a clearing pulse (1) is dialed, the counters reset and the output of the coincidence gate and envelope detector go positive. This turns off Q3, which turns off Q5, and the decoder is now ready to receive another tone code.

COUNTER BOARD

The counter board consists of 11 IC's in the counters and gating circuits. The digit counter consists of three master-slave flip-flops U5, U6 and U7 whose outputs are connected to the coincidence gates through a discrete diode matrix. The bit counter consists of four master-slave flip-flops U1, U2, U3 and U4 whose outputs are connected to the coincidence gate inputs by screws located in the various holes in the counter board. The screws are positioned in holes 1 through 8 on lines A through G according to the code setting information as listed in the Table of Contents.

The decoder Schematic Diagram is shown strapped (by dotted lines in the matrix) for an individual call code of 5-9-5, a group call code of 5-6, and an all call code of 8. The Truth Table on the Schematic Diagram shows all possible states of the flip-flop outputs (at terminal 6) while counting.

Assume that the code 5-9-5 is dialed at the encoder. When the first digit is received at the decoder, one pulse is applied to the digit counter and five pulses are applied to the bit counter.

The pulse applied to the digit counter switches all of the flip-flops from the reset condition (all "1"s at terminal 6) to a "0" at terminal 6 and a "1" at terminal 9. This back biases diodes CR1, CR2 and CR3, removing the ground on terminal 3 of NAND coincidence gate "A".

The five pulses applied to the bit counter sequentially switches the flip-flop outputs at terminal 6 from the reset condition (all "1"s at terminal 6) to a "0" - "0" - "1" - "0" as shown on line 5 of the Truth Table. Now all of the inputs to coincidence gate "A" are positive, and its output goes to ground. The ground activates the correct code detector OR gate, and its output goes positive. The positive output (reset inhibit) is applied to the reset circuit to prevent the counters from resetting.

When the second digit (9) is applied to the decoder, another pulse is applied to the digit counter and nine pulses are applied to the bit counter.

The pulse applied to the digit counter switches the flip-flops to a "1" - "0" - "1" at terminal 6. This back biases CR4, CR5 and CR6, removing the ground on terminal 11 of coincidence gate "B".

The nine pulses applied to the bit counter switches the flip-flop outputs at terminal 6 to a "1" - "0" - "1" - "1" as shown on line 14 of the Truth Table. Now all of the inputs to coincidence gate "B" are positive, and its output goes to ground. This activates the correct code detector and its output goes positive. The positive reset inhibit is applied to the reset circuit to prevent the counters from resetting.

Applying the third digit (5) to the decoder applies one more pulse to the digit counter and 5 more pulses to the bit counter.

The pulse applied to the digit counter switches the flip-flops to "0" - "1" - "0" at terminal 6. This back biases CR7, CR8 and CR9, removing the ground on terminal 11 of coincidence gate "C".

The five pulses applied to the bit counter switches the flip-flops to "0" - "1" - "0" - "0" at terminal 6 as shown on line 3 of the Truth Table. Note that after the counter counts 16 bits, it recycles (i.e., starts counting over again from the first link on the Truth Table). Now all of the inputs to coincidence gate "C" are positive. The output of the coincidence gate goes to ground, activating the correct code detector. The ground is also applied to the base of output control transistor Q3, turning it on. Turning on Q3 turns on Q5, energizing the alarm circuits.

After the code is completed, the counters are reset and the decoder is ready to receive another code.

Dialing the group call code (56) applies two pulses to the digit counter and 11 pulses to the bit counter (5 + 6).

The pulses from the two digits switch the digit counter flip-flops to a "1" - "0" - "0" at terminal 6. This back biases CR10, CR11 and CR12, removing the ground on terminal 3 of coincidence gate "D".

The 11 pulses applied to the bit counter switches the flip-flops to a "0" - "1" - "0" - "1" so that all inputs to the coincidence gate go positive. The output of the gate goes to ground, energizing the alarm circuit.

Dialing the all call code (8) applies one pulse to the digit counter and 8 pulses to the bit counter.

The pulse applied to the digit counter back biases CR13, CR14 and CR15, removing the ground on terminal 11 of coincidence gate "E".

The eight pulses applied to the bit counter switch the flip-flops to a "1" - "1" - "1" - "0" at terminal 6. This activates coincidence gate "E", energizing the alarm circuit.

STATION POWER SUPPLY

Station decoder Models 4EJ18B10-12 are equipped with a 120-volt, 50/60 Hz power supply. Connecting P501 to a voltage source applies 120 volts to the primary of step-down transformer T501. The AC voltage developed across the secondary windings of T501 is rectified by full-wave bridge rectifiers CR1 through CR4. The rectified output is filtered by C501 and R501, and the 13-volt output is applied to the 6-volt regulator circuit on the pulse routing board.

OPTIONS

The mobile and station decoders may be equipped with the following options.

- Sounder (mobile option only)
- Speaker Muting
- Handset or Microphone hookswitches
- 7-Digit Counter board
- External Alarm Relay

SOUNDER

The sounder option consists of a circuit board and speaker assembly that mounts on the tone receiver board.

Audio oscillator, Q1 and Q2, produces a squarewave output at approximately 1000 Hz. The frequency is determined by feedback circuit C1 and R2.

A positive supply voltage is connected to H1. The emitter of Q1 is connected to H4. Applying the correct code to the decoder connects the emitter of Q1 to system negative turning the Sounder on.

SPEAKER MUTING

The speaker muting option consists of relay K1 and 10-ohm resistor R1 mounted on the pulse routing board. The relay provides a form C contact for switching the receiver audio output.

When the relay is un-energized, audio high is connected through R1 to audio low by contacts K1-8 and -9. R1 is used as the speaker load. A correct code applied to the decoder turns on output transistor Q5, energizing K1. With K1 energized, audio from the receiver is connected to the speaker through K1-9 and -10. The relay will remain energized until the RESET button is pressed, or until the handset or microphone is replaced in the hookswitch.

HOOKSWITCHES

The handset and microphone hookswitch options require the use of the speaker muting kit.

With no code applied to the decoder and the handset or microphone on-hook, the speaker is muted. A correct code applied to the decoder lights the CALL light and unmutes the speaker. Taking the handset or microphone off-hook turns off the CALL light and audio is heard at the speaker and handset earpiece. Replacing the handset or microphone on-hook mutes the speaker.

NOTE

If a code is received when using MASTR Professional and Executive handset hookswitch options, the speaker and CALL light will remain on until the RESET button is pressed.

7-DIGIT COUNTER

The 7-digit option provides an increase in the number of individual calling codes. When group call and all call are not used, the 7-digit counter provides up to ten million individual calling codes. When group call and all call codes are used, the counter provides nearly 100,000 individual calls. The modifications required for the 7-digit counter are shown on the decoder Outline and Schematic diagrams as listed in the Table of Contents.

Whenever the 7-digit counter is used, refer to the Code Setting Procedure for 7-digit strapping.

EXTERNAL ALARM RELAY

An optional heavy duty relay kit is available for use with the decoder whenever an external alarm (horn, light, etc.) is used that exceeds the 1/2-ampere rating of the decoder output transistor. The relay provides two normally open contacts rated at 10 amperes at 12 Volts DC. A diode is connected across the relay coil to suppress voltage "spikes" produced across the relay when it operates.

When used in the horn circuit, the relay connects from J1701-1 to battery plus. This circuit provides a timed switching path of approximately four seconds duration.

When used in the light circuit, the relay connects from J1701-4 to battery plus. This circuit will remain operative until the RESET button is pressed.

MAINTENANCE

DISASSEMBLY

To gain access to the decoder assembly, remove the four #6 screws in the back of the decoder and slide the housing. The counter board is at the top of the decoder for ease of code strapping.

To gain access to the tone receiver and pulse routing boards, remove the single screw on one end of the hinged tone receiver board, and swing the board up.

TROUBLESHOOTING

Procedures for troubleshooting the decoder include DC readings and waveforms (with and without tone applied) for the tone receiver, pulse routing and counter boards. Refer to the Troubleshooting Procedure as listed in the Table of Contents.

ADJUSTMENT

Coil L1/L2 on the tone receiver board is the only adjustment on the decoder. This coil is set at the factory and will normally require no further adjustment unless it is necessary to replace L1/L2, C5/C6 or C7/C8/C9. If any of these components are replaced, adjust L1/L2 as follows:

1. Connect a VTVM across C5/C6 or C7/C8/C9.
2. Apply a continuous tone to the decoder at the proper operating frequency (590 Hz, 1500 Hz or 2805 Hz).
3. Tune L1/L2 for maximum meter reading.

CODE SETTING

4-DIGIT INDIVIDUAL CALL CODE

Set the code according to the following procedure:

1. Remove the white-black-brown wire connected to H17 (see Figure 15).

2. Move CR11 to the dotted position (see Figure 15).

3. The codes used as examples are:

   Individual Call - 5956
   Group Call - 57 } only one may be used --
   All Call - 8 } either group call or all call.

4. Write the complete 4-digit code number in box below.

CODE	EXAMPLE
	5956

5. Place the first digit beside the letter A in the column of letters below. Next, add the second digit to the first and put this sum beside B. Add the third digit to the figure placed at B, and place this sum at C. Add the fourth digit to the figure placed at C, and place this sum at D.

   NOTE: Zero on the telephone dial actually provides 10 pulses. When a zero is used in a code number, it must be added as a 10.

EXAMPLE: 5 9 5 6

A	First Digit	A 5	First Digit
+	Second Digit	+ 9	Second Digit
B	Sub Total	B 14	Sub Total
+	Third Digit	+ 5	Third Digit
C	Sub Total	C 19	Sub Total
+	Fourth Digit	+ 6	Fourth Digit
D	Total	D 25	Total

6. Write each letter beside its corresponding subtotal in the columns at right.

7. Read the screw positions for each subtotal, and move the four screws for each letter to their proper positions.

8. If Group Call or All Call is not desired, add a jumper from H11 to H12 (see Figure 15).

9. Group Call

a. If Group Call is desired, it is connected for second digit operation. The first digit of the Group Call code and the Individual Call code must be the same. The second digit of the Group Call code must be different from the second digit of the Individual Call code.

b. Move CR13 to the dotted position (see Figure 15).

c. To determine the screw position for Group Call, write in the first digit of the Individual Call code at A. Then add the Group Call second digit value to the value of the first digit shown at A. Enter this total at E and place E beside its corresponding subtotal in the column at right.

EXAMPLE 57

A	First Digit	A 5	First Digit
+	Second Digit	+ 7	Second Digit
E	Total	E 12	Total

d. Read the screw position for D and move the screws to their corresponding holes.

10. All Call

a. If All Call is desired, place E beside the single digit value of the All Call code in the column of subtotals.

b. Place the screws at Row E according to the screw placement.

LETTERS	SUBTOTALS	SCREW POSITIONS
	1	2 4 6 8
	2	1 4 6 8
	3	2 3 6 8
	4	1 3 6 8
A	(5)	(2 4 5 8)
	6	1 4 5 8
	7	2 3 5 8
Either All Call or Group Call — E (All Call)	(8)	(1 3 5 8)
	9	2 4 6 7
	10	1 4 6 7
	11	2 3 6 7
E (Grp. Call)	(12)	(1 3 6 7)
	13	2 4 5 7
B	(14)	(1 4 5 7)
	15	2 3 5 7
	16	1 3 5 7
	17	2 4 6 8
	18	1 4 6 8
C	(19)	(2 3 6 8)
	20	1 3 6 8
	21	2 4 5 8
	22	1 4 5 8
	23	2 3 5 8
	24	1 3 5 8
D	(25)	(2 4 6 7)
	26	1 4 6 7
	27	2 3 6 7
	28	1 3 6 7
	29	2 4 5 7
	30	1 4 5 7
	31	2 3 5 7
	32	1 3 5 7
	33	2 4 6 8
	34	1 4 6 8
	35	2 3 6 8
	36	1 3 6 8
	37	2 4 5 8
	38	1 4 5 8
	39	2 3 5 8
	40	1 3 5 8

3-DIGIT INDIVIDUAL CALL CODE

Set the code according to the following procedure. The codes used as examples in this procedure are:

Individual Call - 595
Group Call - 56
All Call - 8

1. Write the complete 3-digit code number in the box below.

CODE	EXAMPLE
	595

2. Place the first digit beside the letter A in the column of letters below. Next add the second digit to the first and put this sum beside B. Add the third digit to the figure placed at B and place this sum at C. NOTE: Zero on the telephone dial actually provides 10 pulses. When a zero is used in a code number, it must be added as a 10.

EXAMPLE: 595

A	First Digit	A 5	First Digit
+	Second Digit	+ 9	Second Digit
B	Subtotal	B 14	Subtotal
+	Third Digit	+ 5	Third Digit
C	Total	C 19	Total

3. Write each letter beside its corresponding subtotal in the columns at right.

4. Read the screw positions for each subtotal and move the four screws for each letter to their proper positions.

5. Group Call

a. If Group Call is not desired, add a jumper from H13 to H14 (see Figure 15).

b. If Group Call is desired, it is connected for second digit operation. The first digit of the Group Call code and the Individual Call code must be the same. The second digit of the Group Call code must be different from the second digit of the Individual Call code. The sequence of any Group Call code may not be used in any Individual Call code.

c. To determine the screw position for Group Call write in the first digit of the Individual Call code at A. Then add the Group Call second digit value to the value of the first digit shown at A. Enter this total at D and place D beside its corresponding subtotal in the column at right.

EXAMPLE: 56

A	First Digit	A 5	First Digit
+	Second Digit	+ 6	Second Digit
D	Total	D 11	Total

d. Read the screw position for D and move the screws to their corresponding holes.

6. All Call

a. If All Call is not desired, add a jumper from H11 to H12 (see Figure 15).

b. If All Call is desired, place E beside the single digit value of the All Call code in the column of subtotals.

c. Place the screws at row E according to the screw placement chart.

LETTERS	SUBTOTALS	SCREW POSITIONS
	1	2 4 6 8
	2	1 4 6 8
	3	2 3 6 8
	4	1 3 6 8
A	(5)	(2 4 5 8)
	6	1 4 5 8
	7	2 3 5 8
E	(8)	(1 3 5 8)
	9	2 4 6 7
	10	1 4 6 7
D	(11)	(2 3 6 7)
	12	1 3 6 7
	13	2 4 5 7
B	(14)	(1 4 5 7)
	15	2 3 5 7
	16	1 3 5 7
	17	2 4 6 8
	18	1 4 6 8
C	(19)	(2 3 6 8)
	20	1 3 6 8
	21	2 4 5 8
	22	1 4 5 8
	23	2 3 5 8
	24	1 3 5 8
	25	2 4 6 7
	26	1 4 6 7
	27	2 3 6 7
	28	1 3 6 7
	29	2 4 5 7
	30	1 4 5 7

CODE SELECTION

The decoder is normally shipped from the factory set for the following codes:

- All Call: 8
- Group Call: 56
- Individual Call: 595

New codes should be assigned, strapped in and checked before the decoder is installed. For proper operation of the system, carefully study the Code Selection and Code Setting information before assigning and strapping in the new codes.

ALL CALL

The All Call code is assigned on the first digit. It is recommended that a high number be selected to minimize falsing (i.e., 8, 9, 10). In the following example, the digit 9 is selected for the All Call code. The number 9 can never be assigned to any individual code as all of the decoders will respond to the single digit 9 at any time.

GROUP CALL

The Group Call code is assigned on the second digit as the first digit must be the same as the first digit in the individual call. When Group Call and All Call are used, a maximum of nine Group Call codes are available without seriously reducing the number of Individual Call codes available. The more Group Call codes that are used, the fewer individual calls are available. For maximum system security, use the higher number pairs when selecting the Group Call codes.

NOTE

Whenever more Group Call codes are required, up to 90 codes are available by connecting Group Call for third digit operation. For example: codes 979, 989 and 999 may be used for Group Call, while codes 971 thru 978, 981 thru 988 and 991 thru 998 may be used for Individual Call. For third digit Group Call, move diodes CR10 and CR11 to the dotted position as shown in Figure 15. Next, add the Group Call digit to the first two Individual Call digits as shown in the Code Setting Procedure, and place the screws at row D according to the screw placement chart.

INDIVIDUAL CALL

All Individual Call codes must have the same first digit as the Group Call code. The sequence of any Group Call code may not be used in any Individual Call code.

In the following example, 9 has been chosen as the All Call code, and 11, 22, 33, 44, 55, 66, 77, 88 and 00 have been assigned as the Group Call codes.

Group Calls	Permissable 1st two digits of the 55 groups	Permissable 3rd ca'ls of 57 sub-group of the 55 groups
11	51	571
22	52	572
33	53	573
44	54	574
55 —	(b)	575
66	56	576
77	57 —	(c)
88	58	578
(a)	(a)	(a)
00	50	570

a - Not available because of nine assigned as All Call.
b - Not available because of 55 being an assigned Group Call
c - Not available because of 77 in the sequence is assigned as a Group Call.

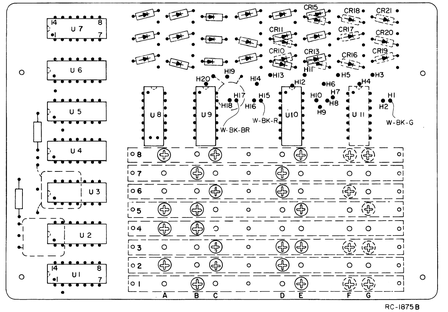
The total number of Individual Call codes in the example are 576. Each of the nine groups has a possible eight combinations of the first two digits, and each of these has eight possible three digit Individual Codes (9 x 8 x 8 = 576).

NOTE

If a "1" is used in the system as a reset digit, make sure that the All Call code plus 1 does not equal the total of the two Group Call digits.

NOTE

The letters A through G used in the Code Setting Procedure correspond to a line of screw positions on The Counter Board. The numerals 1 through 8 represent the position of each screw in the selected screw line.



RC-1875B

Figure 15 - Counter Board

CODE SELECTION & CODE SETTING PROCEDURE

DIGITAL DECODER
MODELS 4EJ18A10-12 & 4EJ18B10-12

CODE SETTING

5-DIGIT INDIVIDUAL CALL CODE

Set the code according to the following procedure. The code 59568 is used as an example.

1. Remove the white-black-brown wire connected to H17 (see Figure 15).
2. Remove the white-black-red wire connected to H15 (see Figure 15).
3. Move CR11 and CR15 to the dotted position (see Figure 15).
4. Write the complete 5-digit code number in the box below.

CODE: ____ EXAMPLE: 59568

5. Place the first digit beside the letter A in the column of letters below. Next, add second digit to the first and put this sum beside B. Add the third digit to figure placed at B and place this sum at C. Continue adding successive digits to previous subtotals until all 5 digits have been totaled.

NOTE: Zero on the telephone dial actually provides 10 pulses. If a zero is used in a code number, it must be added as a 10.

EXAMPLE: 5 9 5 6 8

A	First Digit	A	5	First Digit
+	Second Digit		+ 9	Second Digit
B	Sub Total	B	14	Sub Total
+	Third Digit		+ 5	Third Digit
C	Sub Total	C	19	Sub Total
+	Fourth Digit		+ 6	Fourth Digit
D	Sub Total	D	25	Sub Total
+	Fifth Digit		+ 8	Fifth Digit
E	Total	E	33	Total

6. Write each letter beside its corresponding subtotal in the columns at right.
7. Read the screw positions for each subtotal, and move the four screws for each letter to their proper positions.

LETTERS	SUBTOTALS	SCREW POSITIONS
	1	2 4 6 8
	2	1 4 6 8
	3	2 3 6 8
	4	1 3 6 8
A	(5)	(2 4 5 8)
	6	1 4 5 8
	7	2 3 5 8
	8	1 3 5 8
	9	2 4 6 7
	10	1 4 6 7
	11	2 3 6 7
	12	1 3 6 7
	13	2 4 5 7
B	(14)	(1 4 5 7)
	15	2 3 5 7
	16	1 3 5 7
	17	2 4 6 8
	18	1 4 6 8
C	(19)	(2 3 6 8)
	20	1 3 6 8
	21	2 4 5 8
	22	1 4 5 8
	23	2 3 5 8
	24	1 3 5 8
D	(25)	(2 4 6 7)
	26	1 4 6 7
	27	2 3 6 7
	28	1 3 6 7
	29	2 4 5 7
	30	1 4 5 7
	31	2 3 5 7
	32	1 3 5 7
E	(33)	(2 4 6 8)
	34	1 4 6 8
	35	2 3 6 8
	36	1 3 6 8
	37	2 4 5 8
	38	1 4 5 8
	39	2 3 5 8
	40	1 3 5 8
	41	2 4 6 7
	42	1 4 6 7
	43	2 3 6 7
	44	1 3 6 7
	45	2 4 5 7
	46	1 4 5 7
	47	2 3 5 7
	48	1 3 5 7
	49	2 4 6 8
	50	1 4 6 8

6-DIGIT INDIVIDUAL CALL CODE

The 6-digit Individual Call can be used only when the decoder is equipped with the optional 7-digit counter board.

Set the code according to the following procedure. The Code 595683 is used as an example.

1. Move the white-black-green wire from H1 to H7 (see Figure 15).
2. Connect a jumper from H3 to H4 (see Figure 15).
3. Write the complete 6-digit code number in the box below.

CODE: ____ EXAMPLE: 595683

4. Place the first digit beside the letter A in the column of letters below. Next, add the second digit to the first and put this sum beside B. Add the third digit to the figure placed at B and place this sum at C. Continue adding successive digits to previous subtotals until all 6 digits have been totaled.

NOTE: Zero on the telephone dial actually provides 10 pulses. If a zero is used in a code number, it must be added as a 10.

EXAMPLE: 5 9 5 6 8 3

A	First Digit	A	5	First Digit
+	Second Digit		+ 9	Second Digit
B	Sub Total	B	14	Sub Total
+	Third Digit		+ 5	Third Digit
C	Sub Total	C	19	Sub Total
+	Fourth Digit		+ 6	Fourth Digit
D	Sub Total	D	25	Sub Total
+	Fifth Digit		+ 8	Fifth Digit
E	Sub Total	E	33	Sub Total
+	6th Digit		+ 3	6th Digit
F	Total	F	36	Total

5. Write each letter beside its corresponding subtotal in the columns at right.
6. Read the screw positions for each subtotal, and move the four screws for each letter to their proper positions.

LETTERS	SUBTOTALS	SCREW POSITIONS
	1	2 4 6 8
	2	1 4 6 8
	3	2 3 6 8
	4	1 3 6 8
A	(5)	(2 4 5 8)
	6	1 4 5 8
	7	2 3 5 8
	8	1 3 5 8
	9	2 4 6 7
	10	1 4 6 7
	11	2 3 6 7
	12	1 3 6 7
	13	2 4 5 7
B	(14)	(1 4 5 7)
	15	2 3 5 7
	16	1 3 5 7
	17	2 4 6 8
	18	1 4 6 8
C	(19)	(2 3 6 8)
	20	1 3 6 8
	21	2 4 5 8
	22	1 4 5 8
	23	2 3 5 8
	24	1 3 5 8
D	(25)	(2 4 6 7)
	26	1 4 6 7
	27	2 3 6 7
	28	1 3 6 7
	29	2 4 5 7
	30	1 4 5 7
	31	2 3 5 7
	32	1 3 5 7
E	(33)	(2 4 6 8)
	34	1 4 6 8
	35	2 3 6 8
F	(36)	(1 3 6 8)
	37	2 4 5 8
	38	1 4 5 8
	39	2 3 5 8
G	(40)	(1 3 5 8)
	41	2 4 6 7
	42	1 4 6 7
	43	2 3 6 7
	44	1 3 6 7
	45	2 4 5 7
	46	1 4 5 7
	47	2 3 5 7
	48	1 3 5 7
	49	2 4 6 8
	50	1 4 6 8
	51	2 3 6 8
	52	1 3 6 8
	53	2 4 5 8
	54	1 4 5 8
	55	2 3 5 8
	56	1 3 5 8
	57	2 4 6 7
	58	1 4 6 7
	59	2 3 6 7
	60	1 3 6 7

7-DIGIT INDIVIDUAL CALL CODE

The 7-digit Individual Call can be used only when the decoder is equipped with the Optional 7-digit counter board. Set the code according to the following procedure. The code 5956834 is used as an example.

1. Write the complete 7-digit number in the box below:

CODE: ____ EXAMPLE: 5956834

Place the first digit beside the letter A in the column of letters below. Next, add the second digit to the first and put this sum beside B. Add the third digit to figure placed at B and place this sum at C. Continue adding successive digits to the previous subtotals until all 7 digits have been totaled.

NOTE: Zero on the telephone dial actually provides 10 pulses. If a zero appears in a code number, it must be added as a 10.

EXAMPLE: 5 9 5 6 8 3 4

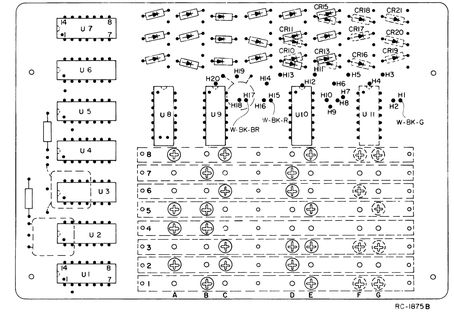
A	First Digit	A	5	First Digit
+	Second Digit		+ 9	Second Digit
B	Sub Total	B	14	Sub Total
+	Third Digit		+ 5	Third Digit
C	Sub Total	C	19	Sub Total
+	Fourth Digit		+ 6	Fourth Digit
D	Sub Total	D	25	Sub Total
+	Fifth Digit		+ 8	Fifth Digit
E	Sub Total	E	33	Sub Total
+	6th Digit		+ 3	6th Digit
F	Sub Total	F	36	Sub Total
+	7th Digit		+ 4	7th Digit
G	Total	G	40	Total

3. Write each letter beside its corresponding subtotal in the columns at right.
4. Read the screw positions for each subtotal, and move the four screws for each letter to their proper positions.

LETTERS	SUBTOTALS	SCREW POSITIONS
	1	2 4 6 8
	2	1 4 6 8
	3	2 3 6 8
	4	1 3 6 8
A	(5)	(2 4 5 8)
	6	1 4 5 8
	7	2 3 5 8
	8	1 3 5 8
	9	2 4 6 7
	10	1 4 6 7
	11	2 3 6 7
	12	1 3 6 7
	13	2 4 5 7
B	(14)	(1 4 5 7)
	15	2 3 5 7
	16	1 3 5 7
	17	2 4 6 8
	18	1 4 6 8
C	(19)	(2 3 6 8)
	20	1 3 6 8
	21	2 4 5 8
	22	1 4 5 8
	23	2 3 5 8
	24	1 3 5 8
D	(25)	(2 4 6 7)
	26	1 4 6 7
	27	2 3 6 7
	28	1 3 6 7
	29	2 4 5 7
	30	1 4 5 7
	31	2 3 5 7
	32	1 3 5 7
E	(33)	(2 4 6 8)
	34	1 4 6 8
	35	2 3 6 8
F	(36)	(1 3 6 8)
	37	2 4 5 8
	38	1 4 5 8
	39	2 3 5 8
G	(40)	(1 3 5 8)
	41	2 4 6 7
	42	1 4 6 7
	43	2 3 6 7
	44	1 3 6 7
	45	2 4 5 7
	46	1 4 5 7
	47	2 3 5 7
	48	1 3 5 7
	49	2 4 6 8
	50	1 4 6 8
	51	2 3 6 8
	52	1 3 6 8
	53	2 4 5 8
	54	1 4 5 8
	55	2 3 5 8
	56	1 3 5 8
	57	2 4 6 7
	58	1 4 6 7
	59	2 3 6 7
	60	1 3 6 7
	61	2 4 5 7
	62	1 4 5 7
	63	2 3 5 7
	64	1 3 5 7
	65	2 4 6 8
	66	1 4 6 8
	67	2 3 6 8
	68	1 3 6 8
	69	2 4 5 8
	70	1 4 5 8

NOTE

The letters A through G used in the Code Setting Procedure correspond to a line of screw positions on The Counter Board. The numerals 1 through 8 represent the position of each screw in the selected screw line.



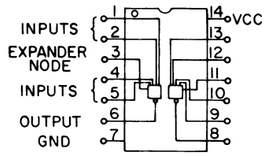
RC-1875B

Figure 15 - Counter Board

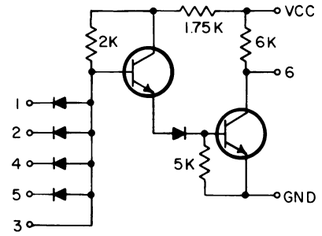
CODE SELECTION & CODE SETTING PROCEDURE

DIGITAL DECODER
MODELS 4EJ18A10-12 & 4EJ18B10-12

DUAL 4-INPUT GATES
19A115913-P1

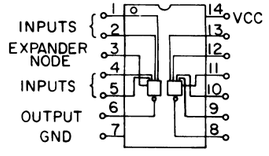


LOGIC DIAGRAM

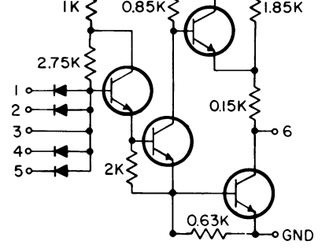


TYPICAL SCHEMATIC DIAGRAM
(ONE GATE ONLY)

DUAL, 4-INPUT BUFFERED GATES
19A115913-P3

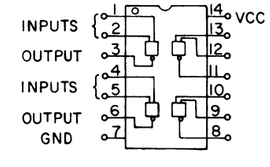


LOGIC DIAGRAM

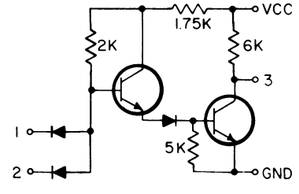


TYPICAL SCHEMATIC DIAGRAM
(ONE GATE ONLY)

QUADRUPLE 2-INPUT GATES
19A115913-P7

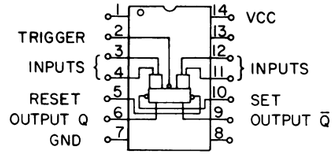


LOGIC DIAGRAM

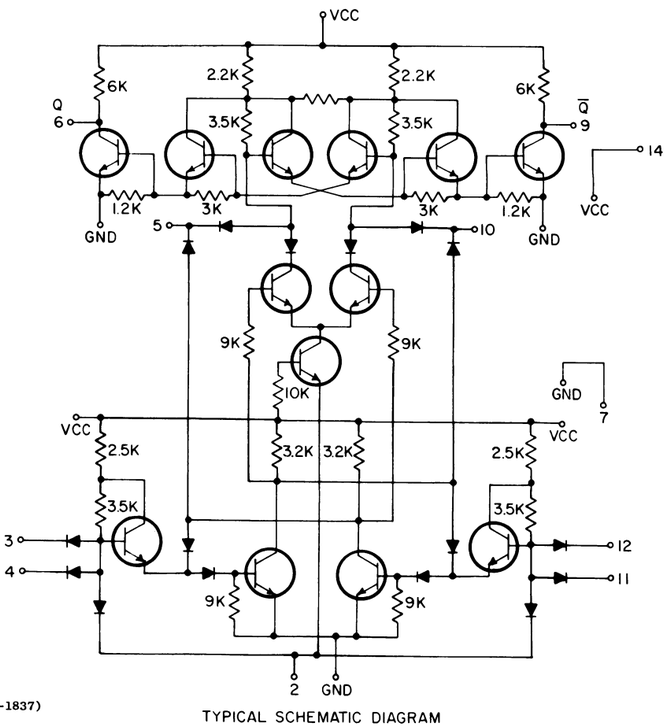


TYPICAL SCHEMATIC DIAGRAM
(ONE GATE ONLY)

MASTER-SLAVE FLIP-FLOP
19A115913-P6



LOGIC DIAGRAM



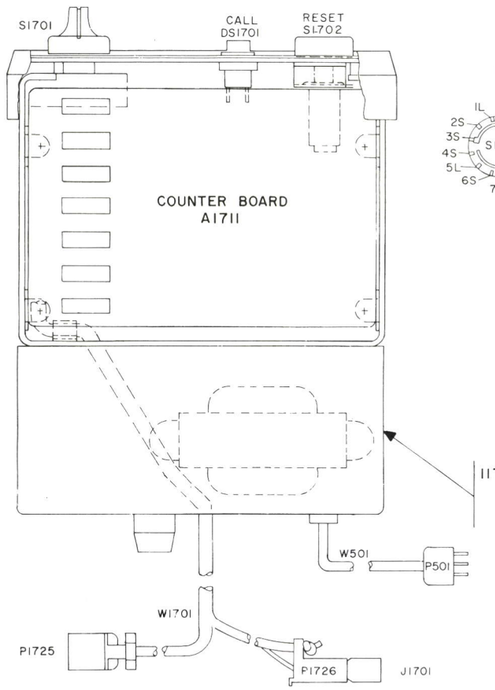
(RC-1837)

TYPICAL SCHEMATIC DIAGRAM

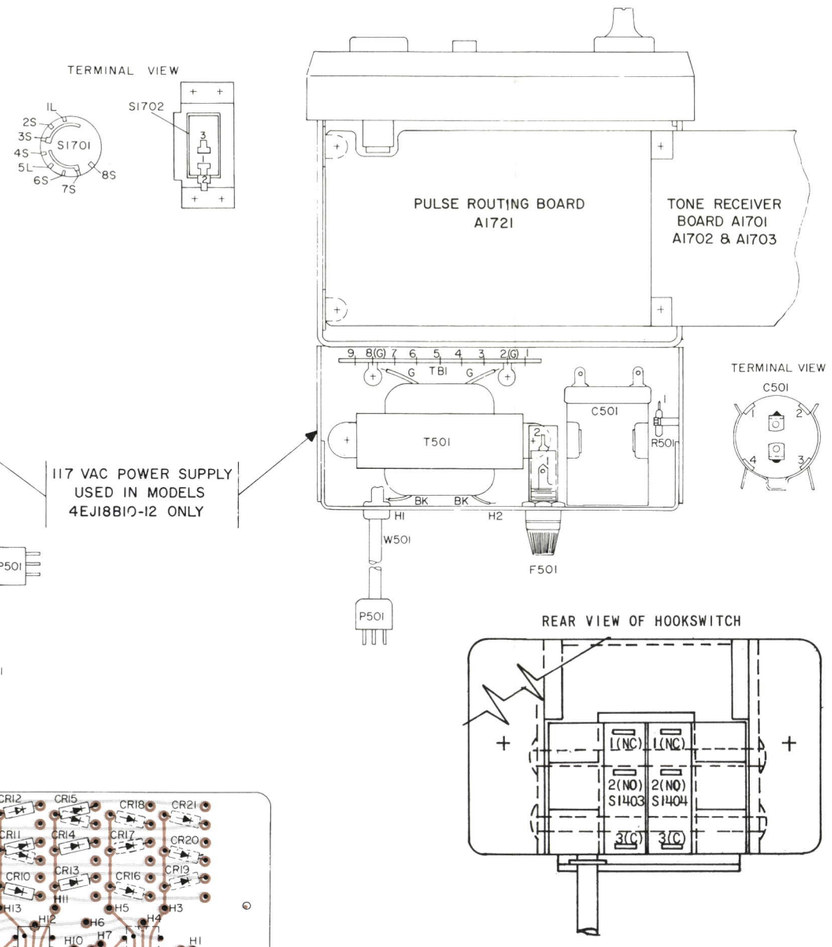
TYPICAL LOGIC & SCHEMATIC DIAGRAMS

FOR INTERGRATED CIRCUIT MODULES
DIGITAL DECODER MODELS 4EJ18A10-12 & B10-12

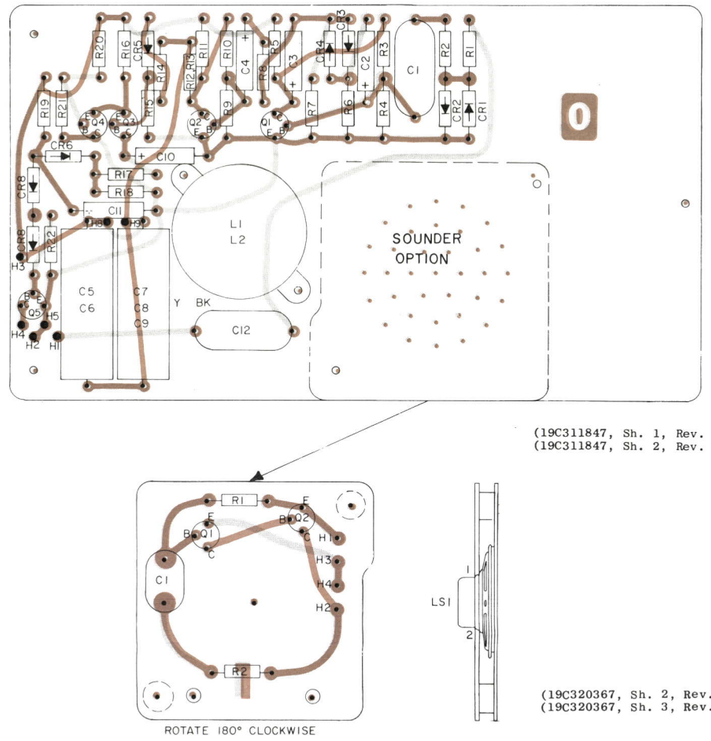
TOP VIEW



BOTTOM VIEW



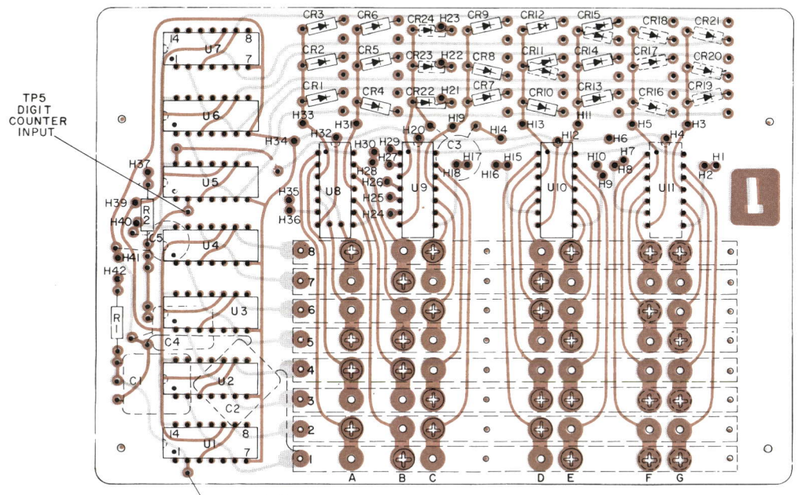
TONE RECEIVER BOARD
A1701, A1702 & A1703



(19C311847, Sh. 1, Rev. 0)
(19C311847, Sh. 2, Rev. 0)

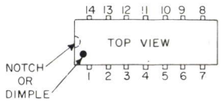
(19C320367, Sh. 2, Rev. 1)
(19C320367, Sh. 3, Rev. 1)

COUNTER BOARD
A1711

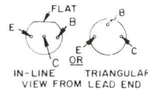


(19C311840, Sh. 1, Rev. 1)
(19C311840, Sh. 2, Rev. 1)

INTEGRATED CIRCUIT LEAD IDENTIFICATION

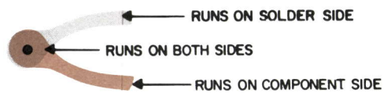


TRANSISTOR LEAD IDENTIFICATION

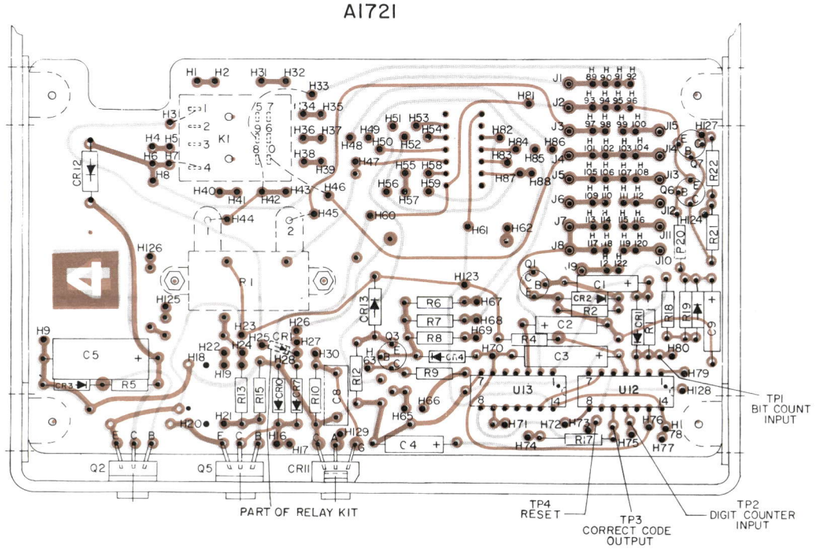


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

(19E500900, Rev. 10)



PULSE ROUTING BOARD
A1721



OUTLINE DIAGRAM

DIGITAL DECODER
MODELS 4EJ18A10-12 & 4EJ18B10-12

TRUTH TABLES

THE TRUTH TABLES SHOW THE STATE OF THE FLIP-FLOPS AT TERMINAL 6 OF THE DIGIT AND BIT COUNTERS. IN THE TRUTH TABLES, A "1" INDICATES A VOLTAGE OF FROM +3 TO +6 VOLTS, AND A "0" INDICATES A VOLTAGE OF 0.5 VOLT OR LESS.

BIT COUNTER

0	0	0	0
1	0	0	0
0	1	0	0
1	1	0	0
0	0	1	0
1	0	1	0
0	1	1	0
1	1	1	0
0	0	0	1
1	0	0	1
0	1	0	1
1	1	0	1
0	0	1	1
1	0	1	1
0	1	1	1
1	1	1	1

← RESET

DIGIT COUNTER

0	0	0
1	0	0
0	1	0
1	1	0
0	0	1
1	0	1
0	1	1
1	1	1

RESET →

RC-1930

SCHEMATIC DIAGRAM

MOBILE AND STATION DECODERS
MODELS 4EJ18A10-12 & 4EJ18B10-12

(19B640734, Rev. 15)

PARTS LIST

LBI-4036D

DIGITAL DECODER
MODELS 4EJ18A10-12 (MOBILE)
MODELS 4EJ18B10-12 (STATION)

SYMBOL	GE PART NO.	DESCRIPTION
A1701 thru A1703		TONE RECEIVER A1701 19C311852G1 590 Hz A1702 19C311852G2 1500 Hz A1703 19C311852G3 2805 Hz
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19B209243P14	Polyester: 0.33 µf ±20%, 250 VDCW.
C2 and C3	5496267P1	Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C4	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C5	19C300075P47001G	Polyester: 0.047 µf ±2%, 100 VDCW; sim to GE Type 61F.
C6	5496249P25000G	Polystyrene: 25,000 pf ±2-1/2%, 125 VDCW.
C7	19C300075P22002G	Polyester: 0.22 µf ±2%, 100 VDCW; sim to GE Type 61F.
C8	5496249P16000G	Polystyrene: 16,000 pf ±2-1/2%, 125 VDCW.
C9	5496249P20000G	Polystyrene: 20,000 pf ±2-1/2%, 125 VDCW.
C10	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C11	5496267P13	Tantalum: 2.2 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C12	19B209243P14	Polyester: 0.33 µf ±20%, 250 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR8	19A115250P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B205354G2	Coil.
L2	19B205354G3	Coil.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q2	19A115123P1	Silicon, NPN.
Q3 and Q4	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q5	19A115123P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R3	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R4	3R152P123J	Composition: 12,000 ohms ±5%, 1/4 w.
R5	3R152P242J	Composition: 2400 ohms ±5%, 1/4 w.
R6 and R7	3R152P223J	Composition: 22,000 ohms ±5%, 1/4 w.
R8	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R9	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R10	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R11	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R12	3R152P243J	Composition: 24,000 ohms ±5%, 1/4 w.
R13	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R14	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R15	3R152P204J	Composition: 200,000 ohms ±5%, 1/4 w.
R16	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
R17 and R18	3R152P822J	Composition: 8200 ohms ±5%, 1/4 w.
R19	3R152P753J	Composition: 75,000 ohms ±5%, 1/4 w.
R20	3R152P242J	Composition: 2400 ohms ±5%, 1/4 w.
R21	3R152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R22	3R152P104J	Composition: 100,000 ohms ±5%, 1/4 w.
		DECODER 19D413162G1
A1711		COUNTER BOARD 19D412160G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C2*	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
		Earlier than REV A:
	19B209243P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C3	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4*	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW. Added by REV B.
C5*	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV B.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR15	19A115250P1	Silicon.
CR22	19A115250P1	Silicon.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
		- - - - - - - - - TEST POINTS - - - - - - - - -
TP5 and TP6	N503P304C13	Cotter Pin.
		- - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1 thru U7	19A115913P6	Digital, Clocked Flip-Flop; sim to Fairchild DTL 945.
U8 thru U10	19A115913P1	Digital, Dual 4-Input Gate; sim to Fairchild DTL 930.
A1721		PULSE ROUTING BOARD 19D413158G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C2	5496267P1	Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C3	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C4	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C5	5496267P15	Tantalum: 47 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C8	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C9	5496267P13	Tantalum: 2.2 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	19A115250P1	Silicon.
CR3	4036887P6	Silicon, Zener.
CR4	19A115250P1	Silicon.
CR7	4037822P1	Silicon.
CR10*	4037822P1	Silicon.
		In Models earlier than REV A:
	19A115250P1	Silicon.
CR11	19A115916P2	Silicon.
CR12	4037822P1	Silicon.
CR13	4036887P1	Silicon, Zener.
CR14	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J15	4033513P15	Contact, electrical: sim to Bead Chain R40-1A.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q2	19A116118P1	Silicon, NPN.
Q3	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q5	19A116118P1	Silicon, NPN.
Q6	19A115889P1	Silicon, NPN.
Q7	19A115123P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P333J	Composition: 33,000 ohms ±5%, 1/4 w.
R2	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R4	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R5	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
R6 thru R8	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R9*	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
		In REV B and earlier:
	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R10*	3R152P822J	Composition: 8200 ohms ±5%, 1/4 w.
		In REV C and earlier:
	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
R12	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R14*	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
		In REV A and earlier:
	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R15*	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
		In REV A and earlier:
	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R17	3R152P240J	Composition: 24 ohms ±5%, 1/4 w.
R18	3R152P332J	Composition: 3300 ohms ±5%, 1/4 w.
R19	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R20	3R152P104J	Composition: 100,000 ohms ±5%, 1/4 w.
R21	3R152P303J	Composition: 30,000 ohms ±5%, 1/4 w.
R22	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R26*	3R152P822J	Composition: 8200 ohms ±5%, 1/4 w.
		In REV C and earlier:
	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
		- - - - - - - - - - TEST POINTS - - - - - - - - - -
TP1 thru TP4	N503P304C13	Cotter Pin.
		- - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U12	19A115913P7	Digital, Quad 2-Input Gate; sim to Fairchild DTL 946.
U13	19A115913P3	Digital, Dual Buffer; sim to Fairchild DTL 932.
		- - - - - - - - - INDICATING DEVICES - - - - - - -
DS1701	19B201122P1	Lamp, indicator: 6 v; sim to GE 1768.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1701	3R79P680J	Composition: 68 ohms ±5%, 2 w.
		- - - - - - - - - - SWITCHES - - - - - - - - -
S1701	5495454P23	Rotary: 1 section, 2 poles, 3 positions, non-shorting contacts, 2 amps at 25 VDC or 1 amp at 110 VAC; sim to Oak Type "A" or Centralab Series 100.
S1702	19B209292P2	Push: 10 amps at 250 VAC; sim to Micro Switch 13DM1-B1.
S1703		MICROPHONE HOOKSWITCH 19C303571G1
		- - - - - - - - - - - CABLES - - - - - - - - - -
W1703	19B204731G1	Approx. 50 inches long.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P1720 thru P1724	4036634P1	Contact, electrical; sim to AMP 42428-2.
S1704		HANDSET HOOKSWITCH 19B204970G1
		- - - - - - - - - - - CABLES - - - - - - - - - -
W1702	19B204731G1	Approx. 50 inches long.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P1715 thru P1719	4036634P1	Contact, electrical; sim to AMP 42428-2.
		- - - - - - - - - - - CABLES - - - - - - - - - -
W1701	19B204739G1	Approx. 63 inches long.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1701	5492497P24	Shell, connector: 4 circuits; sim to Amp 480134-1.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1725	7489183P10	Plug: 9 pin, 7.5 amps at 900 VRMS; sim to Winchester M9P-LS-H19C.
P1726	5492497P14	Shell, connector: 4 circuits; sim to Amp 480135-1.
P1727 thru P1735	4036634P1	Contact, electrical; sim to AMP 42428-2.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	5492497P1	Contact, crimp: with lock spring; sim to Amp 42485-1. (Used with J1701 and P1726).
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1701	19B201122P2	Lamp: sim to Drake Series 121.
		ASSOCIATED ASSEMBLIES
		STATION POWER SUPPLY 19C311855G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C501	7770994P28	Electrolytic: 500-500 µf -10% + 200%, 25-25 VDCW; sim to Mallory Type WP.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR501 thru CR504	4037822P1	Silicon.
		- - - - - - - - - - - FUSES - - - - - - - - - - -
F501	7487942P1	Slow blowing: 1/4 amp at 250 v; sim to Bussmann MDL-1/4.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P502 and P503	4036634P1	Contact, electrical; sim to AMP 42428-2.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R501	5496941P23	Wirewound: 16 ohms ±5%, 15 w; sim to Tru-Ohm Type MOR-15.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T501	5493743P1	Power: step down: Pri: 117 v, 50/60 Hz, Sec 1: 12.6 v ±3%, 2 amps.
		- - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7775500P25	Phen: 9 terminals.
		- - - - - - - - - - - CABLES - - - - - - - - - -
W501*	19A116740P2	Power: 3 conductor, approx 8 feet long; sim to Belden 17239.
		Earlier than REV A:
	4036441P8	Cable, power: 2 conductor, with 2 contact molded plastic plug. (Includes P501).
		- - - - - - - - - - SOCKETS - - - - - - - - - - -
XF501	19B209005P1	Fuseholder, post type, phen: 15 amps at 250 v; sim to Littelfuse 342012.
		SOUNDER KIT 19A129489G1
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS1	19A116090P1	Permanent magnet: 2.00 inch, 8 ohms ±10% voice coil imp, 450 Hz ±112 Hz resonant; freq range 400 to 3000 Hz.
		SOUNDER BOARD 19C320369G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
		- - - - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A115889P1	Silicon, NPN.
Q2	19A115768P1	Silicon, PNP; sim to Type 2N3702.
		- - - - - - - - - - RESISTORS - - - - - - - -
R1	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R2	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
		SPEAKER MUTING KIT 19A127298G1
		- - - - - - - - DIODES AND RECTIFIERS - - - - -
CR1	4037822P1	Silicon.
		- - - - - - - - - - - - RELAYS - - - - - - - - - - -
K1	5491595P12	Armature: 1.5 w operating, 520 ohms ±15% coil res, 2 form C contacts; sim to Allied Control T154-X186.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	5496941P21	Wirewound: 10 ohms ±5%, 15 w; sim to Tru-Ohm Type MOR-15.
		7 DIGIT MODIFICATION KIT 19A127299G1
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR16 thru CR21	19A115250P1	Silicon.
CR23 and CR24	19A115250P1	Silicon.
		- - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U11	19A115913P1	Digital, Dual 4-Input Gate; sim to Fairchild DTL 930.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A121902G1	Mounting bracket (MOBILE).
	19A121891G1	Case (MOBILE).
	19A121928G1	Case (STATION).
	19B205054P1	Front cap.
	19B201122P6	Lens: panel light, red.
	19B205111G1	Knob. (Used with S1701).
	NP257776	Nameplate.
	4035656P1	Spacer, threaded: sim to C.T.C. X1246B1/4. (Used with SOUNDER KIT).
	N80P13004C6	Machine screw: No. 6. (Used with SOUNDER KIT).
	N404P13C6	Lockwasher: No. 6. (Used with SOUNDER KIT).
	19B219776P1	Insulator. (Used with SOUNDER KIT).

*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 - Pulse Routing Board 19D413158-G1
To incorporate a diode with a higher rating.
Changed CR10.

REV. B - To improve switching action of Q5.
Changed R14 and R15.

REV. A - Decoder Board 19D413162-G1
To improve the threshold of the input stages of the bit and digit counters.
Deleted C2.
Added C3.

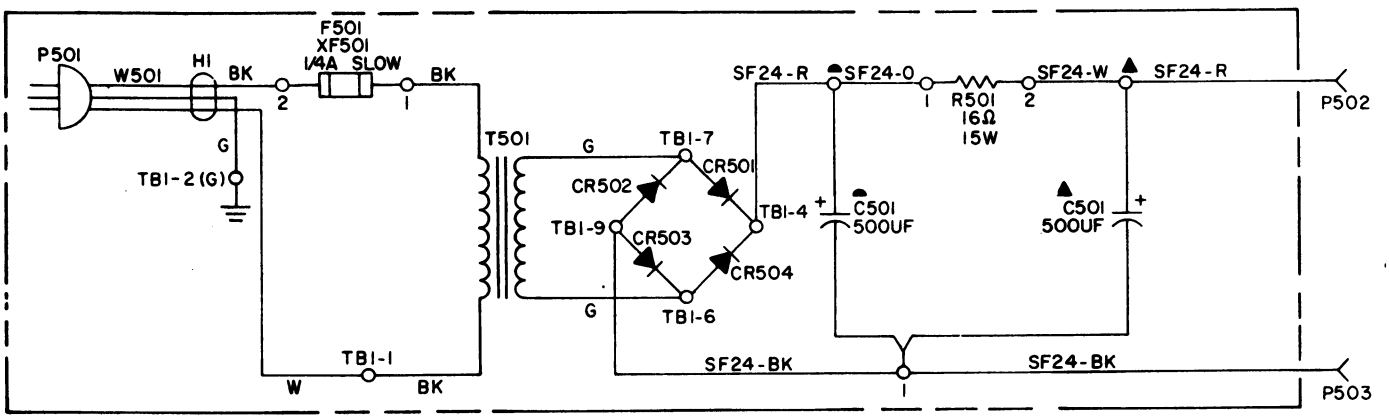
REV. B - To prevent recognition of ignition noise and other stray pulses.
Added C4 and C5.

REV. A - Sounder Board 19C320369-G1
To improve keying.
Changed R1 and C1.

REV. A - Station Power Supply 19C311855G1
To add 3-wire power cable.
Changed W501.

REV. C - Pulse Routing Board 19D413158G1
To insure complete turn off of Q5.
Changed R9.

REV. D - Pulse Routing Board 19D413158G1
To improve operation of SCR CR11.
Changed R26.



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.

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.

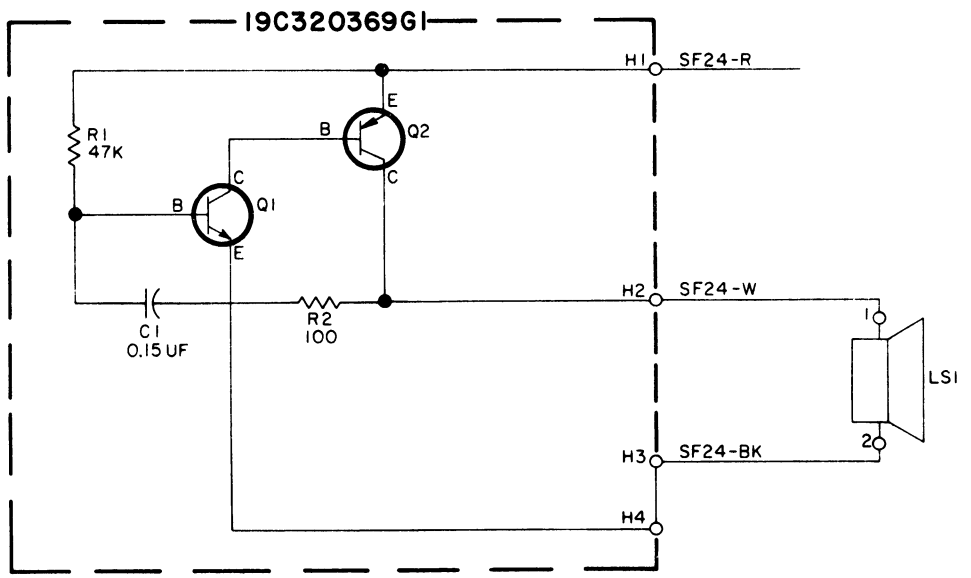
THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
19C311855G1	A

(19B216280, Rev. 3)

SCHEMATIC DIAGRAM

STATION POWER SUPPLY
19C311855G1



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.

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.

(19B219777, Rev. 2)

SCHEMATIC DIAGRAM

SOUNDER OPTION KIT
19A129489G1

TROUBLESHOOTING PROCEDURE

EQUIPMENT REQUIRED

- DC-triggered oscilloscope
- AC and DC VTVM
- A tone generator of the proper frequency and a telephone-type dial, or a TGS-735 or TGS-740 encoder on the proper frequency
- A 12-volt, DC power supply

PRELIMINARY INSTRUCTIONS

1. All waveforms shown are with the proper tone applied and the digit 5 dialed. Note: the digit 6 was dialed for the incorrect code reset waveform shown in Figure 16.
2. The oscilloscope setting for all waveforms is 5 volts/division vertical and 100 milliseconds/division horizontal except where noted.
3. Before starting the procedure, check for +6 volts DC at the emitter of regulator transistor Q2 (see Fig. 16). Then check for +6 volts on the Counter and Tone Receiver Boards (see Figs. 17 and 18).

SYMPTOM	PROCEDURE
	PULSE ROUTING AND COUNTER BOARDS
CALL light doesn't light	1. Unscrew CALL light lens cover and check bulb DS1701. 2. Check contacts on RESET switch S1702. 3. Check silicon-controlled rectifier CR11 (see Fig. 16). 4. Check Q3 (see Fig. 16). 5. Check contacts of EXT ALARM switch S1701.
Sounder option doesn't operate	1. Check to see that S1701 is not in the HORN position. 2. Connect the collector of Q5 to battery negative (see Fig. 16). If the sounder operates, check Q5 and Q3. If the sounder doesn't operate, check the components on the sounder board.
Decoder responds to a wrong code	1. Check the screw placement on the counter board (refer to the Code Setting Procedure as listed in the Table of Contents). 2. Check to see that no screws are missing (one screw in each pad). 3. If All-Call or Group-Call are not used, make sure that a jumper is installed from H11 to H12 to disable All-Call, or a jumper is installed from H13 to H14 to disable Group-Call (refer to the Code Setting Procedure as listed in the Table of Contents). 4. Check diode CR4 (see Fig. 16).
Decoder doesn't respond to correct code	1. Check the screw placement on the counter board (refer to the Code Setting Procedure as listed in the Table of Contents). At no time should two screws be located in any one screw pad (see Figure 17). 2. Dial a "5" and check the wavefroms at TP1 and TP2 (see Fig. 16). If the proper waveforms are not present, refer to Tone Receiver Board Checks. If proper waveform is present, continue with Step 3. 3. Dial a correct first digit and keep the tone on after dialing. All of the screw heads in row A should measure approximately +6 volts DC, which indicates that the first digit was counted correctly. Dial a correct second digit and keep the tone on after dialing. All of the screw heads in row B should be at +6 volts, indicating the second digit was counted correctly. Dial a correct third digit and keep the tone on after dialing. All of the screw heads in row C should measure +6 volts, indicating that the third digit was counted correctly. If all of the digits are counted correctly, check the alarm output of Q3 at H63 (see Fig. 16) and check the output circuit (Q3, Q5, CR15, etc.). If the screw heads do not go to +6 volts during the digit checks, continue with Step 4.

SYMPTOM	PROCEDURE
Decoder dosen't respond to correct code (cont'd)	4. Connect the reset disable jumper to battery negative to prevent re-setting while dialing (see Fig. 16). Dial the correct first digit again, keeping the tone on after dialing. Check the screw heads in row A again for +6 volts. If all of the screw heads are at +6 volts, check for a positive voltage at the cathode of CR1, CR2 and CR3. If the screw heads or cathodes are not positive, check the flip-flops as instructed in Step 5. If the screw heads and cathodes are positive (indicating a correct count), dial the second and third correct digits to check the screw heads in rows B and C, and the cathode of diodes CR4, CR5, CR6 and CR7, CR8, CR9. If all codes are counted correctly and the cathode of the diodes are positive, this indicates a fault in the reset circuit. Check the correct code, incorrect code reset and reset inhibit waveforms shown in Figure 16, and refer to the circuit analysis section for detailed operation and Truth Table for the reset circuitry. 5. With the reset disable jumper connected, dial a "5" and check the input waveforms at TP5 and TP6 (see Fig. 17). If the waveforms are not correct, check the Tone Receiver Board or the envelope detector circuitry. If the waveforms are correct, check to see if the flip-flops are switching (one output terminal at +6 volts ("1") and the other at zero ("0"). Refer to the circuit analysis of the Counter Board and the Truth Table on the Schematic Diagram (see Table of Contents). 6. If the flip-flops are not switching properly (both output terminals at zero volts or both at +6 volts), remove all of the screws in the bit counter flip-flop or unsolder all of the diodes in the output of the digit counter and re-check the flip-flop output. If the flip-flop does not switch correctly, replace the IC module. NOTE To remove an IC module, clip off all of the leads as close as possible to the body of the module. Then unsolder and remove one lead at a time, being careful not to pull the printed wiring away from the board.
	TONE RECEIVER BOARD
No tone output	1. While applying 100 millivolts of on-frequency tone, dial a "5" and check the waveform at C3 (see Fig. 18). If the proper waveform is not present, check the Tone Receiver input circuitry. 2. With tone applied, dial a "5" and check the waveform at C10 (see Fig. 18). If the proper waveform is present, check CR6, CR7, CR8 and Q5. If the waveform is not correct, check for a sine wave across L1/L2. 3. If the sine wave is present across L1/L2, connect a jumper across L1/L2 and check for a near zero reading at the positive end of C10. If the reading is not near zero, check CR5, Q3 and Q4.
No tone output at high input levels, but operates normally at low input levels	Check C2, C3, CR3, CR4, R6 and R7 in the limiter circuitry.

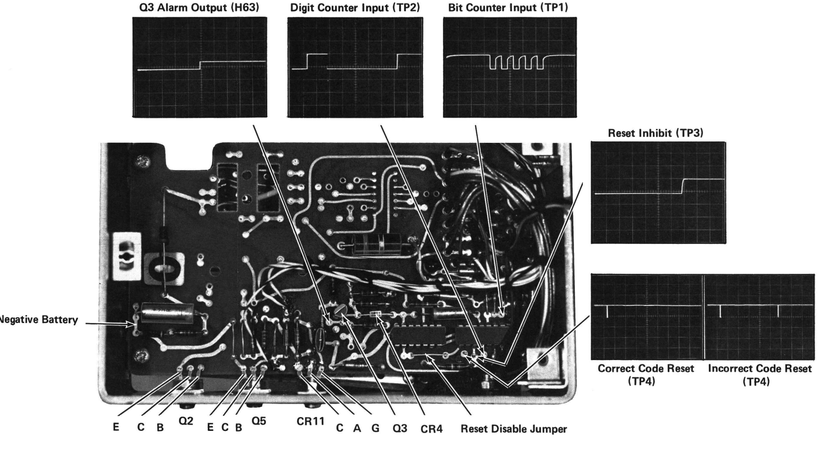
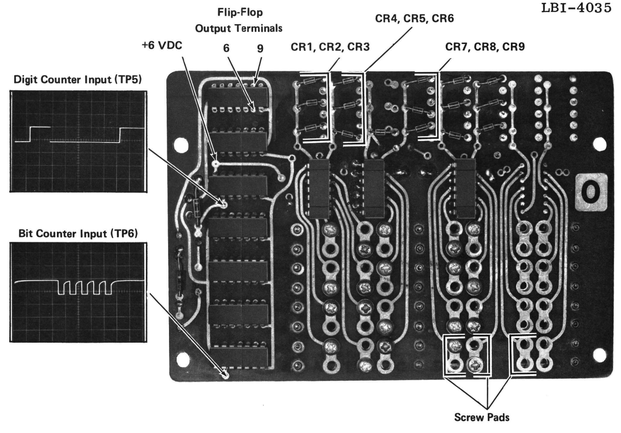


Figure 16 - Pulse Routing Board



Note:
Vertical Scope Setting of 0.1 Volt/Div

Figure 17 - Counter Board

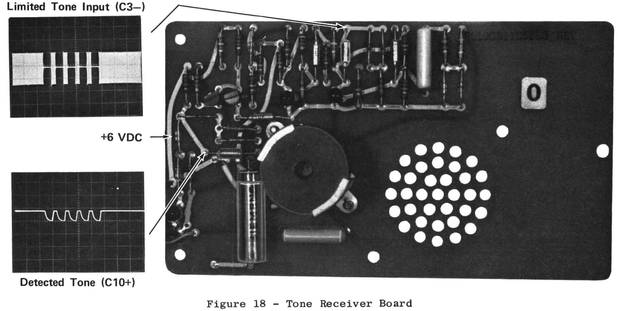


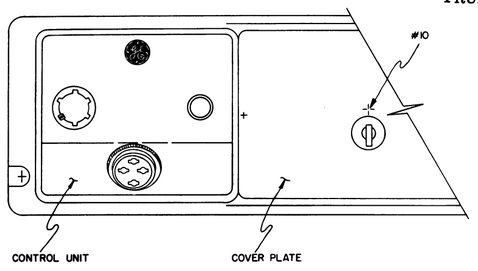
Figure 18 - Tone Receiver Board

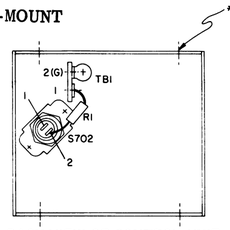
TROUBLESHOOTING PROCEDURE

DIGITAL DECODER
MODELS 4EJ18A10-12 & 4EJ18B10-12

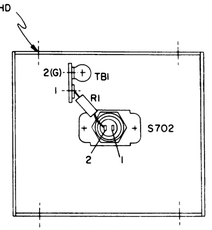
MASTR EXECUTIVE SERIES
MOBILE APPLICATION KIT 19A122352-G2

TRUNK-MOUNT





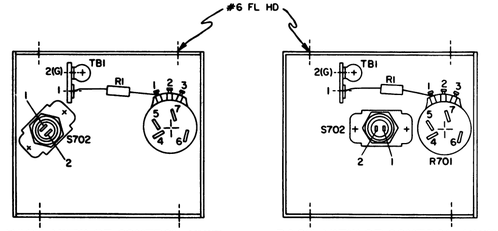
BACK VIEW OF CONTROL UNIT
4EC68A10



BACK VIEW OF CONTROL UNIT
4EC68A11 & A12

INSTRUCTIONS FOR 4EC68A10-12:

1. REMOVE COVER PLATE.
2. REMOVE #10 SCREW & REMOVE FRONT CASTING FROM FRAME.
3. REMOVE CONTROL UNIT & SWING TOWARD OUTSIDE TO EXPOSE BACK SIDE.
4. CLIP OUT DA JUMPER BETWEEN TB1-1 & S702 2 AND SOLDER R1 (22Ω) RESISTOR IN ITS PLACE.
5. REASSEMBLE CONTROL UNIT.
6. REASSEMBLE FRONT CASTING.
7. REASSEMBLE COVER PLATE.
8. ASSEMBLE ADAPTER CABLE (PLI98205H1N6I) BETWEEN SPEAKER & SPEAKER JACK ON UNIT.
9. PLUG TONE DECODER INTO ADAPTER CABLE.



BACK VIEW OF CONTROL UNIT
4EC68B10

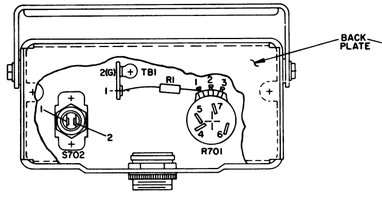
BACK VIEW OF CONTROL UNIT
4EC68B11 & B12

INSTRUCTIONS FOR 4EC68B10-12:

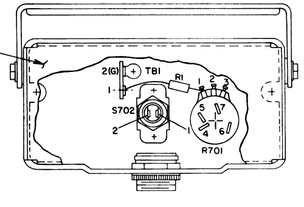
1. STEPS 1-3 ABOVE.
2. REMOVE N22 BK WIRE FROM R701-1 TO TB1-1 SOLDER R1 BETWEEN THESE POINTS.
3. STEPS 5-9 ABOVE.

(19C311064, Rev. 3)

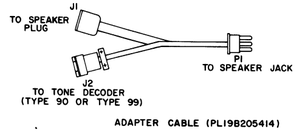
FRONT-MOUNT



BACK VIEW OF CONTROL UNIT
4EC67A10



BACK VIEW OF CONTROL UNIT
4EC67A11 & A12



ADAPTER CABLE (PLI98205414)

INSTRUCTIONS:

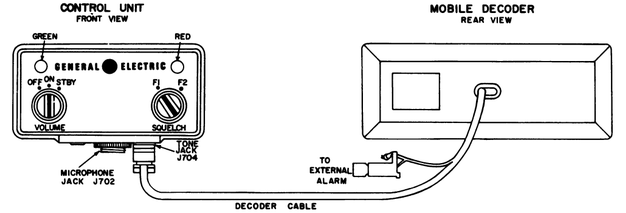
1. REMOVE BACK PLATE FROM CONTROL UNIT TO GAIN ACCESS TO TB1 & S702.
2. DISCONNECT SHIELD OF TWISTED PAIR CABLE FROM R701-1 AND CONNECT TO TB1-1.
3. SOLDER R1 (22Ω) FROM R701-1 TO TB1-1.
4. REASSEMBLE BACK PLATE.
5. ASSEMBLE ADAPTER CABLE (PLI98205H1N6I) BETWEEN SPEAKER & SPEAKER JACK ON CONTROL UNIT.
6. PLUG TONE DECODER INTO ADAPTER CABLE.

(19C311065, Rev. 3)

(DF-5031)

MASTR PROFESSIONAL SERIES

MOBILE APPLICATION



CONNECT PLUG ON DECODER CABLE TO TONE JACK J704 ON MASTR CONTROL UNIT.

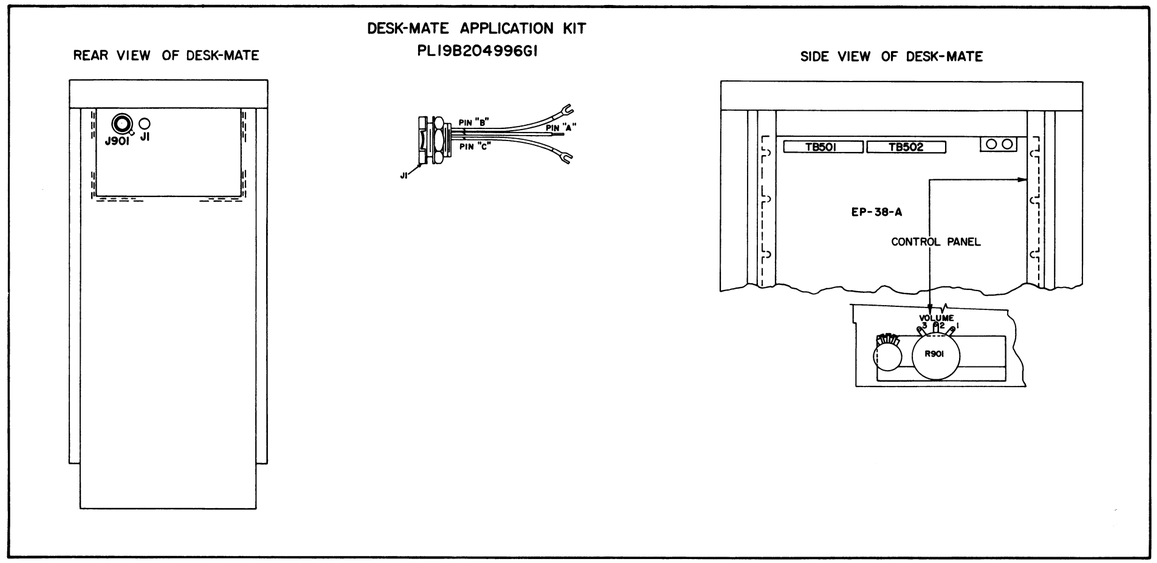
INSTALLATION INSTRUCTIONS

TONE APPLICATION KITS FOR
MASTR PROGRESS LINE MOBILES
PROFESSIONAL & EXECUTIVE SERIES

(RC-1285D)

LBI-4035

MASTR DESK MATE
APPLICATION KIT 19B204996-G1



DM AND DT LOCAL CONTROL STATIONS

STEP 1 Mount J1 in cutout beside mike jack (J901) in the cabinet rear grill using hardware furnished.

STEP 2 Remove harness wire 20 between TB502-5 on EP-38A and R901-1 on Control Panel.

STEP 3 Connect green-white wire (from Pin B on J1) to TB502-5 on EP-38-A.

STEP 4 Solder brown-white wire (from Pin A on J1) to R901-1 on Control Panel.

STEP 5 Connect black-white wire (from Pin C on J1) to TB501-12 on EP-38-A.

STEP 6 Dress these wires alongside existing harness and spot tie as required for neat cable dress.

STEP 7 Connect cable from Decoder to J1.

DM LOCAL/REMOTE STATIONS

STEP 1 Mount J1 in cutout beside mike jack (J901) in the cabinet rear grill using hardware furnished.

STEP 2 Remove harness wire 59 between TB701-7 on the KC-16-A and R901-1 on Control Panel.

STEP 3 Connect the green-white wire (from Pin B on J1) to TB701-7 on the KC-16-A.

STEP 4 Solder brown-white wire (from Pin A on J1) to R901-1 on Control Panel.

STEP 5 Connect black-white wire (from Pin C on J1) to TB501-12 on EP-38-A.

STEP 6 Dress these wires alongside existing harness and spot tie as required for neat cable dress.

STEP 7 Connect cable from Decoder to J1.

DT LOCAL/REMOTE STATIONS

STEP 1 Mount J1 in cutout beside mike jack (J901) in the cabinet rear grill using hardware furnished.

STEP 2 Remove harness wire 59 between P902-7 of the station harness and R901-1 on Control Panel.

STEP 3 Install terminal 5496809P17 on the green-white wire (from Pin B on J1) and insert terminal into P902-7 in the same location that wire 59 was previously located.

STEP 4 Solder brown-white wire (from Pin A on J1) to R901-1 on Control Panel.

STEP 5 Connect black-white wire (from Pin C on J1) to TB501-12 on EP-38-A.

STEP 6 Dress these wires adjacent to existing harness and spot tie as required for next cable dress.

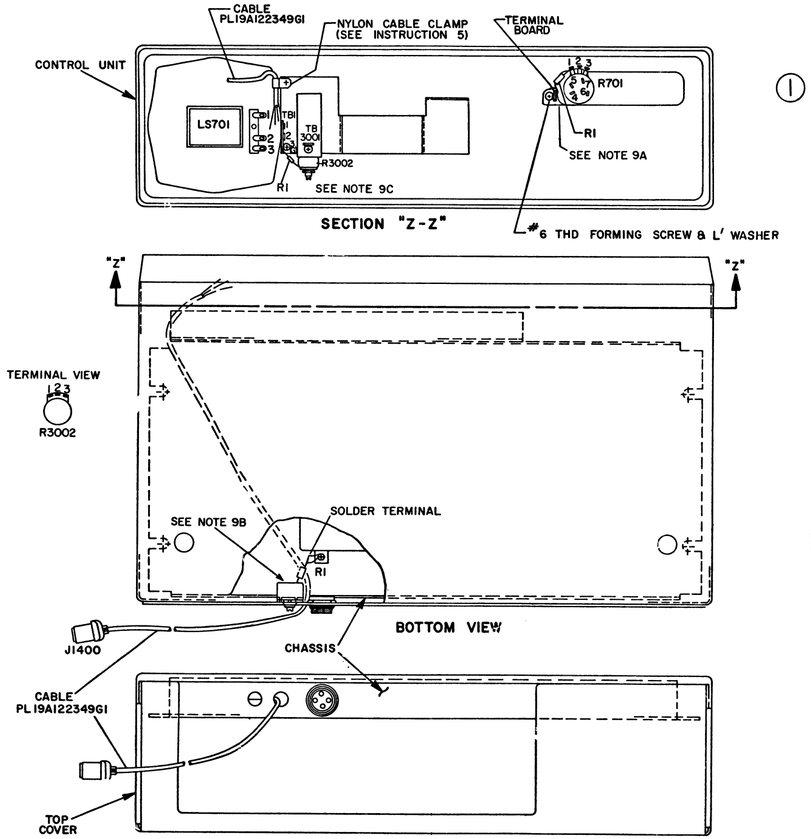
STEP 7 Connect cable from Decoder to J.

INSTALLATION INSTRUCTIONS

TONE APPLICATION KIT FOR
MASTR PROGRESS LINE
DESK MATE & DESK TOP STATIONS

(RC-1286F)

MASTR DESK TOP
APPLICATION KIT 19A122352-G1



(19C311066, Rev. 7)

INSTRUCTIONS FOR TONE DECODER OPTION:

1. REMOVE TOP COVER.
2. REMOVE CONTROL UNIT FROM BOTTOM COVER (5 SCREWS) & LAY FACE DOWN.
3. REMOVE CHASSIS MOUNTING HARDWARE.
4. INSERT CABLE THROUGH HOLE IN REAR OF CHASSIS & RAISE CHASSIS SO THAT CABLE CAN BE ROUTED UNDER BOTTOM SIDE & UP TO CONTROL UNIT AS SHOWN.
5. ASSEMBLE CABLE CLAMP TO CABLE & MOUNT CLAMP UNDER HARDWARE THAT MOUNTS SUPPORT AS SHOWN.
6. REASSEMBLE CHASSIS.
7. IN CONTROL UNIT REMOVE DA JUMPER BETWEEN LS701-2 & LS701-3 WHEN HOOKSWITCH MUTE IS DESIRED.
8. FROM CABLE (PL19A122349G1): SOLDER RED WIRE TO LS701-3; SOLDER BLACK WIRE TO LS701-2; AND SOLDER SHIELD WIRE TO LS701-1.

9A. FOR LOCAL CONTROL ONLY. (FM__L____OR FK__L____) IN CONTROL UNIT DISCONNECT SHIELD WIRE & N22-G-W-R WIRE FROM R701-1 & CONNECT TO TERMINAL BOARD (WHICH IS TO BE ASSEMBLED AS SHOWN). SOLDER RI (22Ω) RESISTOR FROM TERMINAL BOARD TO R701-1 AS SHOWN (N22 G-W-R WIRE IS IN TUBED STATION ONLY).

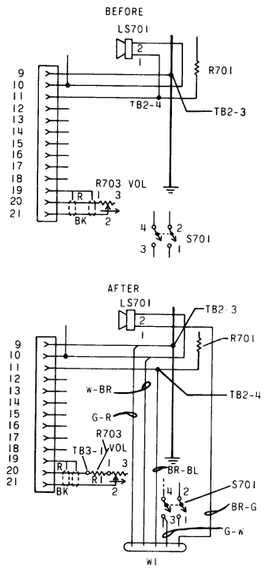
9B. FOR TUBE REMOTE ONLY (FM__R____) IN POWER SUPPLY MOUNT SOLDER TERMINAL UNDER NUT HOLDING PRE AMP AS SHOWN. DISCONNECT SHIELD FROM R3002-1 AND CONNECT TO SOLDER TERMINAL. CONNECT RI (22Ω) FROM R3002-1 TO SOLDER TERMINAL.

9C. FOR ROYAL REMOTE CONTROL ONLY (FK__R____) IN CONTROL UNIT DISCONNECT SHIELD AND CONNECT TO TB1-3 (G). CONNECT RI (22Ω) FROM R3002-1 TO TB1-3 (G).

10. REASSEMBLE CONTROL UNIT TO BOTTOM COVER.
11. REASSEMBLE TOP COVER.
12. PLUG TONE DECODER INTO CABLE.

PROGRESS LINE APPLICATIONS

FRONT-MOUNT APPLICATION KIT
PL-19A121863-G1
(MODEL 4EC29A2 CONTROL UNIT)

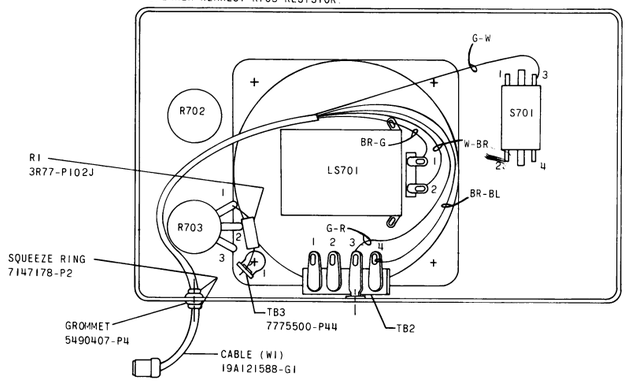


MOBILE APPLICATION KITS

STEP 1: REMOVE EXISTING GROMMENT FROM HOLE JUST BEHIND POWER CABLE HOLE ON CONTROL UNIT. ASSEMBLE GROMMET FROM KIT INTO THIS HOLE AND INSERT CABLE (WI) THRU GROMMET LEAVING APPROXIMATELY 2.5 INCHES BETWEEN END OF PLUG & GROMMET.

STEP 2: ATTACH SQUEEZE RINGS ON EITHER SIDE OF GROMMET FOR MINIMUM PLAY. OVERLAP ENDS OF RINGS TO INSURE TIGHT FIT.

STEP 3: ASSEMBLE TB3 TO SPEAKER, USING #4-40 HARDWARE OF SPEAKER NEAREST R703 RESISTOR.



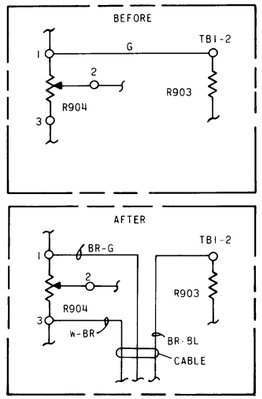
STEP 4: UNSOLDER RED WIRE AT R703-1 AND SOLDER TO TB3-1. SOLDER R1 (1000Ω) FROM TB3-1 TO R703-1. REMOVE BLACK WIRE BETWEEN TB2-4 & LS701-1.

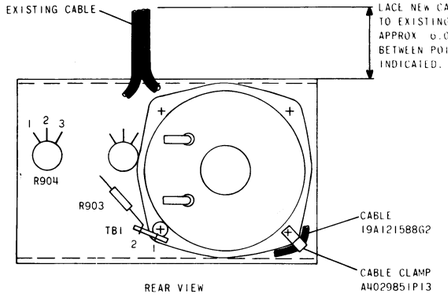
STEP 5: SOLDER ALL WIRES FROM CABLE W1 AND MAKE ALL OTHER CONNECTIONS AS SHOWN IN DIAGRAM AT LEFT.

STATION APPLICATION KITS

DO STATION APPLICATION KIT
PL-19A121914-G1

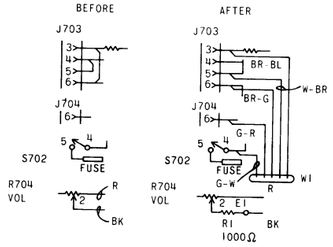
STEP 1: MOUNT CABLE CLAMP UNDER BOLT HOLDING SPEAKER AND INSERT CABLE 12 INCHES FROM WIRE ENDS.





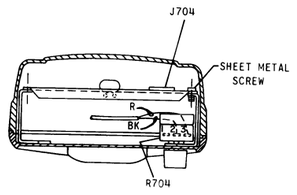
STEP 2: SOLDER CONNECTIONS AS FOLLOWS (SEE DIAGRAM AT LEFT)
BR-G WIRE TO R904-1
BR-BL WIRE TO TB1-2
W-BR WIRE TO R904-3
REMOVE GREEN WIRE BETWEEN R904-1 & TB1-2.

TRUNK-MOUNT APPLICATION KIT
PL-19A121840-G1
(MODEL 4EC27A CONTROL UNIT)

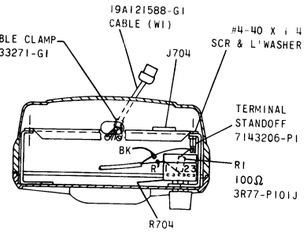


STEP 1: REMOVE SHEET METAL SCREW NEAREST J704-3, USING #4-40 X 1 1/4 SCREW & LOCKWASHER MOUNT TERMINAL STANDOFF IN HOLE VACATED BY SHEET METAL SCREW.

STEP 2: UNSOLDER BLACK WIRE FROM TERMINAL #2 OF R704 AND SOLDER TO TERMINAL STANDOFF. SOLDER R1 (1000Ω) BETWEEN TERMINAL #2 OF R704 AND TERMINAL STANDOFF.



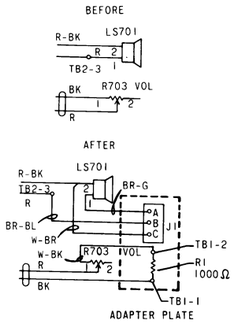
STEP 3: ATTACH CABLE CLAMP TO CABLE WI AT END OF BRAIDED AREA. RUN WI THRU CABLE-ENTRANCE HOLE IN CASE AND ATTACH CABLE-CLAMP HOOK THRU SMALL HOLE.

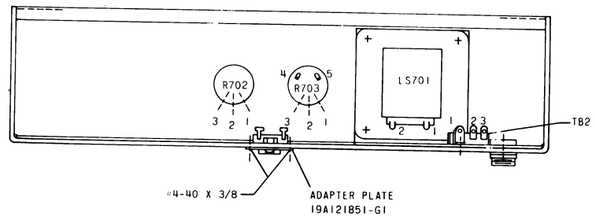


STEP 4: REMOVE JUMPER WIRE BETWEEN J703-3 & J703-6 AND SOLDER WIRES FROM WI AS SHOWN IN DIAGRAM AT LEFT.

TI STATION APPLICATION KIT
PL-19A121855-G1
(MODEL 4EC39A10 CONTROL UNIT)

STEP 1: PLACE ADAPTER PLATE OVER RECTANGULAR CUTOUT NEAR CENTER BOTTOM OF CONTROL UNIT, WITH TERMINAL STRIP TB1 TO REAR OF UNIT AND ASSEMBLE WITH #4-40 HARDWARE AS SHOWN.





STEP 2: REMOVE RED WIRE BETWEEN LS701-1 & TB2-3.

STEP 3: UNSOLDER BLACK WIRE FROM R703-1 AND SOLDER TO TB1-1 OF ADAPTOR PLATE.

STEP 4: SOLDER ALL WIRES FROM ADAPTER PLATE AS SHOWN IN DIAGRAM AT LEFT.

INSTALLATION INSTRUCTIONS

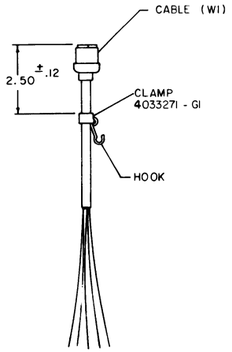
TONE APPLICATION KITS FOR
PROGRESS LINE

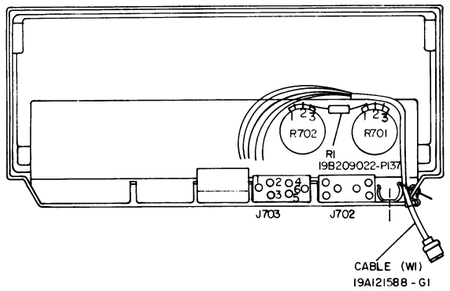
(RC-1150A)

(DF-5031)

TRANSISTORIZED PROGRESS LINE APPLICATIONS

TPL- FRONT - MOUNT APPLICATION KIT
PL-19A121841 - G1





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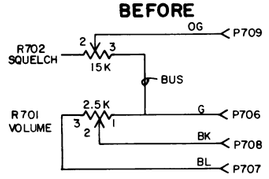

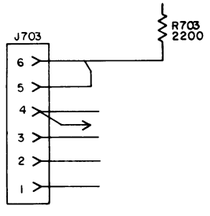

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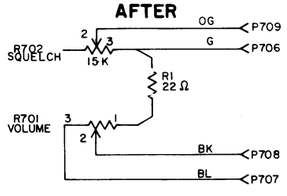
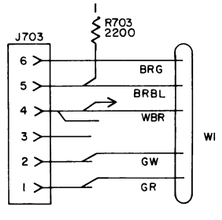




STEP 1: PREPARE CABLE (W1) BY ASSEMBLING CLAMP TO IT AS SHOWN.

STEP 2: ATTACH CABLE TO CONTROL UNIT BY INSERTING HOOK (FROM INSIDE) THROUGH SMALL HOLE IN UNIT.

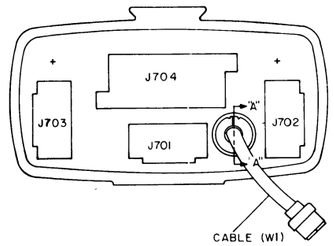
STEP 3: ROUTE CABLE AROUND R701 & R702 AS INDICATED AND SOLDER WIRES TO J703 AS SHOWN BY WIRING DIAGRAM.

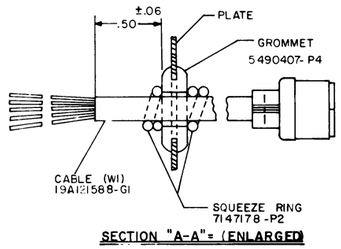
STEP 4: REMOVE JUMPER BETWEEN R701-1 & R702-3 AND TRANSFER GREEN WIRE FROM R701-1 TO R702-3. SOLDER R1 (22Ω) FROM R701-1 TO R702-3.

STEP 5: REMOVE JUMPER BETWEEN J703-5 & J703-6. UNSOLDER R703 FROM J703-6 & SOLDER TO J703-5.

STEP 6: MAKE ALL OTHER WIRING CHANGES AS SHOWN BY WIRING DIAGRAM. SOLDER ALL ELECTRICAL CONNECTIONS.

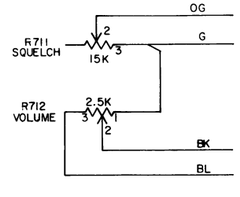
TPL TRUCK - MOUNT APPLICATION KIT
PL-19A121845 - G1

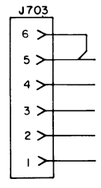




SECTION "A-A" = (ENLARGED)

BEFORE





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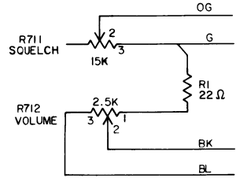
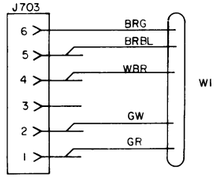




STEP 1: REMOVE PLUG BUTTON FROM HOLE (WHERE CABLE IS NOW SHOWN) AND DISCARD. PLACE GROMMET IN HOLE VACATED BY BUTTON. INSERT CABLE THROUGH GROMMET AND ATTACH SQUEEZE RINGS FOR MINIMUM PLAY ON EITHER SIDE OF GROMMET. OVERLAY ENDS OF RINGS TO INSURE TIGHT FIT.

STEP 2: REMOVE JUMP WIRE BETWEEN R711-3 & R712-1 AND SOLDER R1 (22Ω) RESISTOR IN ITS PLACE AS SHOWN IN WIRING DIAGRAM.

STEP 3: REMOVE JUMPER BETWEEN J703-5 & J703-6 AND SOLDER WIRES OF CABLE (W1) TO J703 AS SHOWN BY WIRING DIAGRAM.

INSTALLATION INSTRUCTIONS

TONE APPLICATION KITS FOR TPL

(RC-1151A)

PACER & ACCENT 450 APPLICATIONS

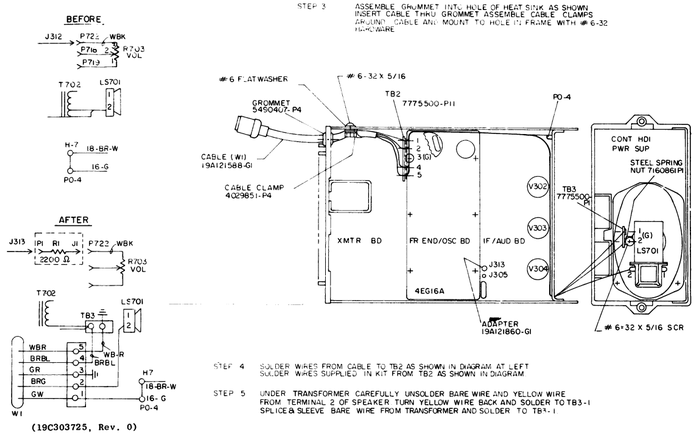
MOBILE APPLICATION KITS

PACER MOBILE APPLICATION KIT
PL-19A121861-GI

STEP 1 MOUNT TB1 TO OSCILLATOR BOARD (1) POSITION SHOWN BELOW WITH SCREW THAT IS USED TO MOUNT BOARD TO THE FRAME.

STEP 2 PLACE STEEL SPACING NUT UNDER HOLE OF SPEAKER LS701 AND MOUNT TB3 TO LUG WITH 6-32 HARDWARE AS SHOWN

STEP 3 ASSEMBLE GROMMET INTO HOLE OF HEAT SINK AS SHOWN. INSERT CABLE THRU GROMMET ASSEMBLE CABLE CLAMPS AROUND CABLE AND MOUNT TO HOLE IN FRAME WITH #6-32 HARDWARE.

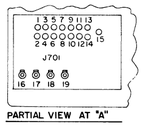


STEP 4 SOLDER WIRES FROM CABLE TO TB2 AS SHOWN IN DIAGRAM AT LEFT SOLDER WIRES SUPPLIED IN KIT FROM TB2 AS SHOWN IN DIAGRAM

STEP 5 UNDER TRANSFORMER CAREFULLY UNSOLDER BARE WIRE AND YELLOW WIRE FROM TERMINAL 2 OF SPEAKER TURN YELLOW WIRE BACK AND SOLDER TO TB3-1 SPLICE & SLEEVE BARE WIRE FROM TRANSFORMER AND SOLDER TO TB1-1

(19C303725, Rev. 0)

ACCENT 450 MOBILE APPLICATION KIT
PL-19A121874-GI



PARTIAL VIEW AT "A"

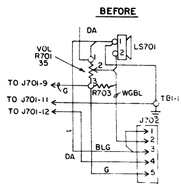
STEP 1 UNSOLDER ALL WIRES FROM J702 AND REMOVE JACK FROM CONTROL UNIT. ASSEMBLE ADAPTER PLATE (1) IN PLACE OF J702 USING #4-40 HARDWARE AS SHOWN.

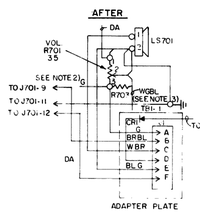
STEP 2 UNSOLDER GREEN WIRE FROM J701-9 AND TAPE BACK

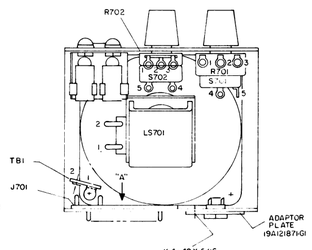
STEP 3 UNSOLDER W-G-BL WIRE FROM R701-2 AND TAPE BACK

STEP 4 SOLDER DIODE (CR1) BETWEEN ADAPTER PLATE & S702-4

STEP 5 MAKE ALL OTHER WIRING CONNECTIONS AS SHOWN IN DIAGRAM BELOW. SOLDER ALL CONNECTIONS.



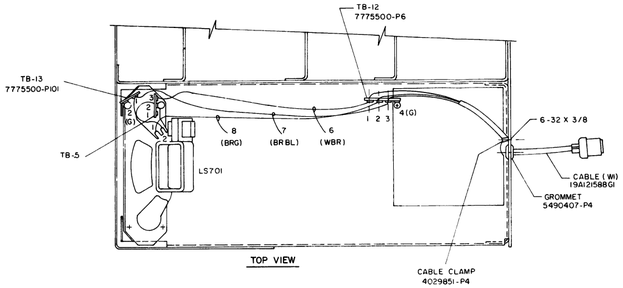




(19C303734, Rev. 1)

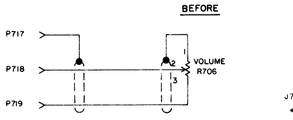
STATION APPLICATION KITS

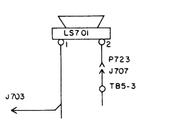
PACER STATION APPLICATION KIT
PL-19A121903-GI

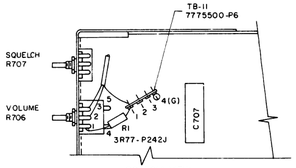


TOP VIEW

BEFORE

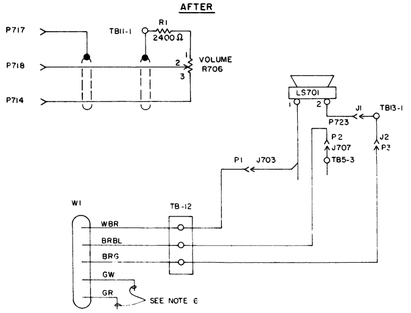






BOTTOM VIEW

AFTER



(19D402541, Rev. 0)

STEP 1 ON BOTTOM SIDE OF POWER SUPPLY, DIRECTLY IN FRONT OF C707 INSTALL TB11 USING #6-32 HARDWARE THAT MOUNTS L701. MOUNT TB11 SO THAT TERMINAL 1 IS NEAR VOLUME CONTROL R706.

STEP 2 UNSOLDER SHIELD FROM TERMINAL 1 OF R706 AND SOLDER TO TB11-1. SOLDER R1 (2400Ω) FROM TB11-1 TO R706-1.

STEP 3 LOOKING AT BACK PANEL, INSERT GROMMET INTO 6TH HOLE FROM LEFT. INSERT CABLE W1 THRU GROMMET LEAVING APPROXIMATELY 3 INCHES OF THE CABLE OUTSIDE THE UNIT. SLIP NYLON CABLE CLAMP ON CABLE AND ASSEMBLE TO SMALL HOLE JUST BELOW GROMMET USING 6-32 X 3/8 HARDWARE.

STEP 4 MOUNT TB12 IN POSITION AS SHOWN USING #6 SCREW THAT MOUNTS PLATE.

STEP 5 ROUTE CABLE AROUND EDGE OF POWER SUPPLY AND SOLDER CONNECTIONS TO TB12 AS SHOWN IN DIAGRAM.

STEP 6 TAPE BACK G-R & G-W WIRES OF CABLE.

STEP 7 USING UFER 6-32 HARDWARE OF SPEAKER (DIRECTLY ABOVE TB7-1) MOUNT TB13 WITH SLIGHT DOWNWARD ANGLE. SOLDER 2 PIECES OF DB WIRE APPROXIMATELY 0.75 INCHES LONG TO TB13-1.

STEP 8 DISCONNECT GREEN WIRE FROM LS701-2 AND CONNECT TO DB WIRE AT TB13-1.

STEP 9 MAKE ALL CONNECTIONS AS SHOWN ON WIRING DIAGRAM AT LEFT, SOLDER ALL CONNECTIONS

ACCENT 450 STATION APPLICATION KIT
PL-19A121864-GI

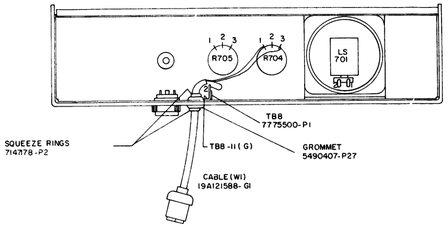
STEP 1 REMOVE PLUG BUTTON FROM HOLE LOCATED NEAR CONNECTOR J703. ASSEMBLE GROMMET INTO THIS HOLE AND INSERT CABLE W1 THRU GROMMET, LEAVING APPROXIMATELY 6.00 INCHES BETWEEN END OF PLUG AND GROMMET.

STEP 2 ATTACH SQUEEZE RINGS ON EITHER SIDE OF GROMMET FOR MINIMUM PLAY. OVERLAP ENDS OF RINGS TO INSURE TIGHT FIT.

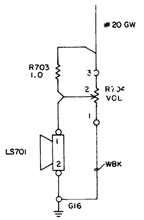
STEP 3 MOUNT TB8 USING #6-32 HARDWARE (NEAR SQUELCH CONTROL R705) THAT MOUNTS GRILLE TO FRAME.

STEP 4 SOLDER BR-BL, BR-G & W-BR WIRES FROM CABLE AS SHOWN IN DIAGRAM. TIE BACK & TAPE G-W & G-R WIRES.

STEP 5 UNSOLDER #20 G-W WIRE FROM R704-3 AND SOLDER TO TB8-2



BEFORE



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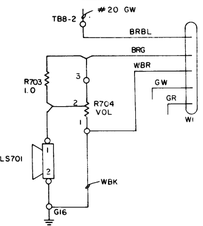


INSTALLATION INSTRUCTIONS

TONE APPLICATION KITS FOR
GE PACER & ACCENT 450

(RC-1152B)

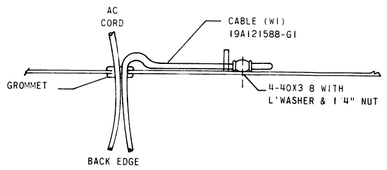
(DF-5031)

TERMINAL BOARD TB3
TORS R1, R2 AND R3
ITH JUMPERS ON THE
NDER SCREW HOLDING
ER T802 (NEAR VOLUME

RC4 APPLICATION KIT
PL-19A121908-G1
(REMOTE CONTROL UNIT MODEL 4EC28A1)

STEP 2: DISCONNECT BLACK WIRE (2) FROM VOLUME CONTROL (R809) AND ATTACH TO TOP TERMINAL OF BOARD (TB3).

STEP 3: RUN CABLE THRU GROMMET WITH AC WIRE.



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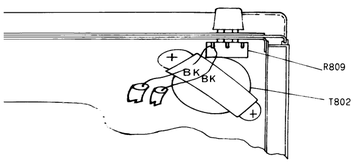

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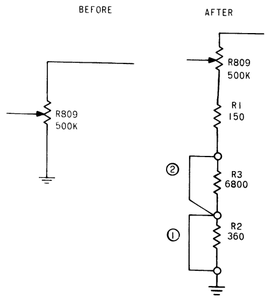

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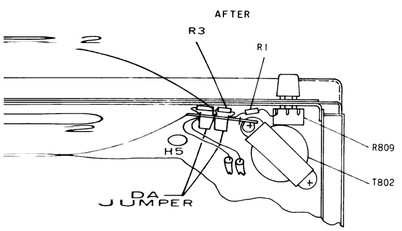
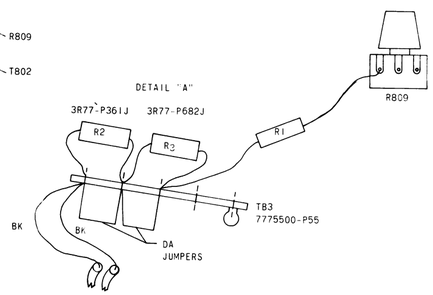
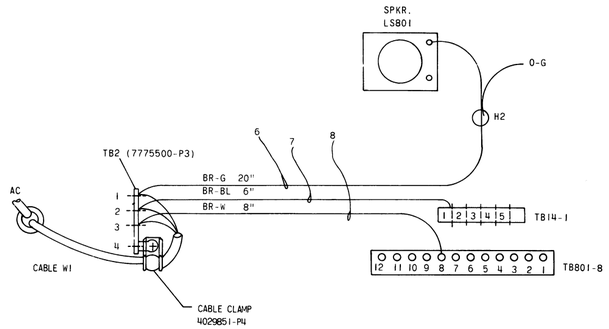


DETAIL "A"



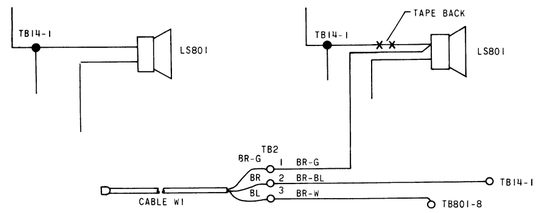
INPUT LEVEL	CLIP JUMPER
+ 10 & ABOVE	NONE
0 TO + 10	①
-12 TO 0	①&②

STEP 4: REMOVE SCREW NEAREST GROMMET AND INSTALL TERMINAL BOARD TB2 AND CABLE CLAMP. INSERT END OF BRAIDED PORTION IN CLAMP AND TIGHTEN. CUT WIRE TO LENGTH, FOLDING AND TAPING REMAINING WIRE.



STEP 5: ATTACH WIRE TO TERMINAL OF BOARD TB2 AS SHOWN. ATTACH SAME COLOR WIRE TO APPROPRIATE TERMINAL. DISCONNECT ORANGE AND BLUE WIRE AT SPEAKER TERMINAL AND TAPE BACK TO THIS TERMINAL ON SPEAKER SOLDER THE BR-G WIRE. CONNECT THE BR-BL WIRE TO TB14-1 & THE BR-W WIRE TO T8801-8.

BEFORE AFTER

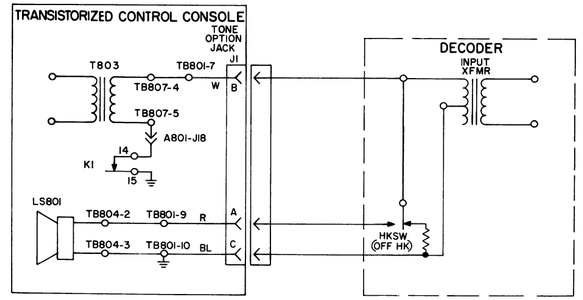


(19D402545, Rev. 2)

ATION INSTRUCTIONS

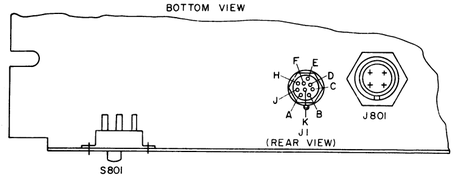
ICATION KIT
RC4

TRANSISTORIZED CONTROL CONSOLE
APPLICATION KIT PL-19A122250-G17
(MODEL 4EC71A10)



(19B205380, Rev. 2)

CHASSIS
BOTTOM VIEW



CONNECTIONS CHART		
FROM	TO	LEAD COLOR
J1	T8801-7	WHITE
J1	T8801-9	RED
J1	T8801-10	BLUE

(19B205381, Rev. 2)

PACER & ACCENT 450 APPLICATIONS

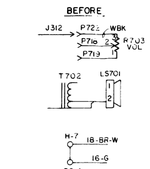
MOBILE APPLICATION KITS

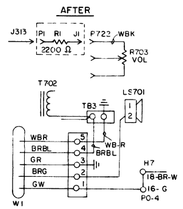
PACER MOBILE APPLICATION KIT
PL-19A121861-G1

STEP 1 MOUNT TB-1 TO OSCILLATOR BOARD IN POSITION SHOWN BELOW WITH SCREW THAT IS USED TO MOUNT BOARD TO THE FRAME.

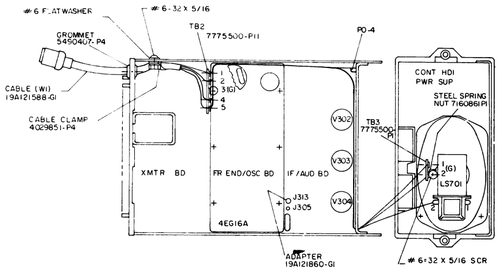
STEP 2 PLACE STEEL SPRING NUT ON LUG OF SPEAKER LS701 AND MOUNT TB3 TO LUG WITH 6-32 HARDWARE AS SHOWN

STEP 3 ASSEMBLE GROMMET INTO HOLE OF HEAT SINK AS SHOWN INSERT CABLE THRU GROMMET ASSEMBLE CABLE CLAMPS AROUND CABLE AND MOUNT TO HOLE IN FRAME WITH #6-32 HARDWARE





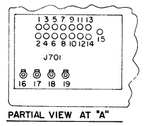
(19C303725, Rev. 0)



STEP 4 SOLDER WIRES FROM CABLE TO TB2 AS SHOWN IN DIAGRAM AT LEFT SOLDER WIRES SUPPLIED IN KIT FROM TB2 AS SHOWN IN DIAGRAM.

STEP 5 UNDER TRANSFORMER CAREFULLY UNSOLDER BARE WIRE AND YELLOW WIRE FROM TERMINAL 2 OF SPEAKER TURN YELLOW WIRE BACK AND SOLDER TO TB3-1 SPLICE & SLEEVE BARE WIRE FROM TRANSFORMER AND SOLDER TO TB1-1.

ACCENT 450 MOBILE APPLICATION KIT
PL-19A121874-G1



PARTIAL VIEW AT "A"

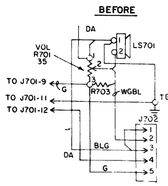
STEP 1 UNSOLDER ALL WIRES FROM J702 AND REMOVE JACK FROM CONTROL UNIT. ASSEMBLE ADAPTER PLATE (W) IN PLACE OF J702 USING #4-40 HARDWARE AS SHOWN.

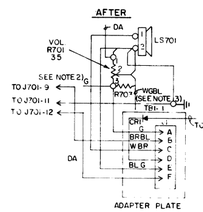
STEP 2 UNSOLDER GREEN WIRE FROM J701-9 AND TAPE BACK

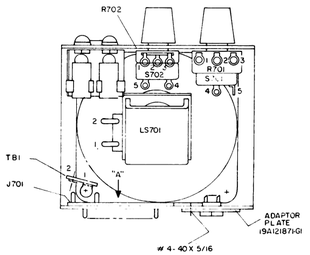
STEP 3 UNSOLDER WG-BL WIRE FROM R701-2 AND TAPE BACK

STEP 4 SOLDER DIODE (CR1) BETWEEN ADAPTER PLATE & S702-4.

STEP 5 MAKE ALL OTHER WIRING CONNECTIONS AS SHOWN IN DIAGRAM BELOW SOLDER ALL CONNECTIONS





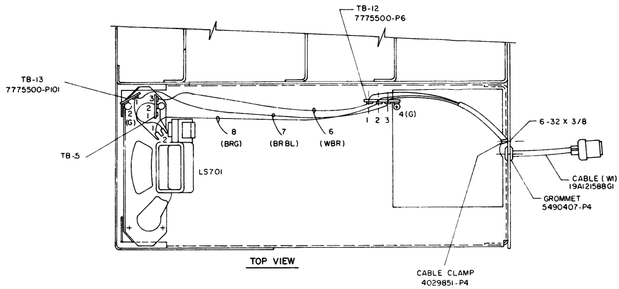


(19C303734, Rev. 1)

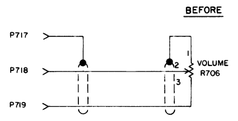
(DF-5031)

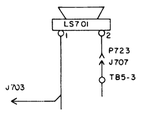
STATION APPLICATION KITS

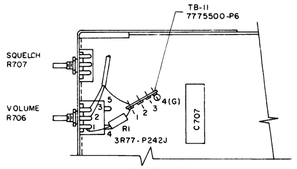
PACER STATION APPLICATION KIT
PL-19A121903-G1



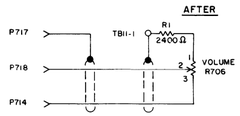
TOP VIEW

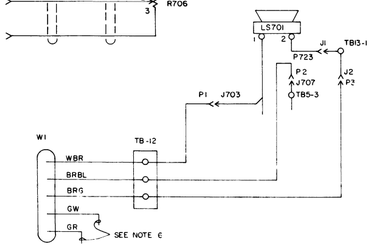






BOTTOM VIEW





(19D402541, Rev. 0)

STEP 1 ON BOTTOM SIDE OF POWER SUPPLY, DIRECTLY IN FRONT OF C707 INSTALL TBII USING #6-32 HARDWARE THAT MOUNTS L701. MOUNT TBII SO THAT TERMINAL 1 IS NEAR VOLUME CONTROL R706.

STEP 2 UNSOLDER SHIELD FROM TERMINAL 1 OF R706 AND SOLDER TO TBII-1. SOLDER R1 (2400Ω) FROM TBII-1 TO R706-1.

STEP 3 LOOKING AT BACK PANEL, INSERT GROMMET INTO 6TH HOLE FROM LEFT. INSERT CABLE W THRU GROMMET LEAVING APPROXIMATELY 3 INCHES OF THE CABLE OUTSIDE THE UNIT. SLIP NYLON CABLE CLAMP ON CABLE AND ASSEMBLE TO SMALL HOLE JUST BELOW GROMMET USING 6-32 X 3/8 HARDWARE.

STEP 4 MOUNT TBI2 IN POSITION AS SHOWN USING #6 SCREW THAT MOUNTS PLATE.

STEP 5 ROUTE CABLE AROUND EDGE OF POWER SUPPLY AND SOLDER CONNECTIONS TO TBI2 AS SHOWN IN DIAGRAM.

STEP 6 TAPE BACK GR & G-W WIRES OF CABLE.

STEP 7 USING UPPER 6-32 HARDWARE OF SPEAKER (DIRECTLY ABOVE TB7-1) MOUNT TB13 WITH SLIGHT DOWNWARD ANGLE. SOLDER 2 PIECES OF DB WIRE APPROXIMATELY 0.75 INCHES LONG TO TBI3-1.

STEP 8 DISCONNECT GREEN WIRE FROM LS701-2 AND CONNECT TO DB WIRE AT TBI3-1.

STEP 9 MAKE ALL CONNECTIONS AS SHOWN ON WIRING DIAGRAM AT LEFT, SOLDER ALL CONNECTIONS

ACCENT 450 STATION APPLICATION KIT
PL-19A121864-G1

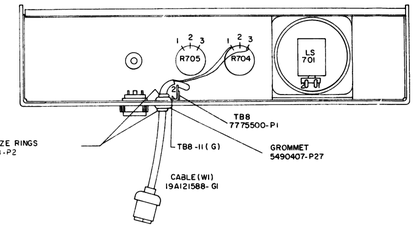
STEP 1 REMOVE PLUG BUTTON FROM HOLE LOCATED NEAR CONNECTOR J703. ASSEMBLE GROMMET INTO THIS HOLE AND INSERT CABLE W THRU GROMMET LEAVING APPROXIMATELY 6.00 INCHES BETWEEN END OF PLUG AND GROMMET.

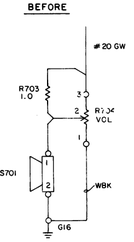
STEP 2 ATTACH SQUEEZE RINGS ON EITHER SIDE OF GROMMET FOR MINIMUM PLAY. OVERLAP ENDS OF RINGS TO INSURE TIGHT FIT.

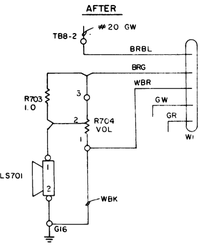
STEP 3 MOUNT TB8 USING #6-32 HARDWARE (NEAR SQUELCH CONTROL R705) THAT MOUNTS GRILLE TO FRAME.

STEP 4 SOLDER BR-BL, BR-G & W-BR WIRES FROM CABLE AS SHOWN IN DIAGRAM. TIE BACK & TAPE G-W & G-R WIRES

STEP 5 UNSOLDER #20 G-W WIRE FROM R704-3 AND SOLDER TO TB8-2







INSTALLATION INSTRUCTIONS

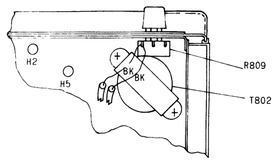
TONE APPLICATION KITS FOR
GE PACER & ACCENT 450

(RC-1152B)

RC4 APPLICATION KIT
PL-19A121908-G1
(REMOTE CONTROL UNIT MODEL 4EC28A1)

STEP 1: ASSEMBLE TERMINAL BOARD TB3 AND RESISTORS R1, R2 AND R3 INSTALL WITH JUMPERS ON THE OUTSIDE UNDER SCREW HOLDING TRANSFORMER T802 (NEAR VOLUME CONTROL)

BEFORE



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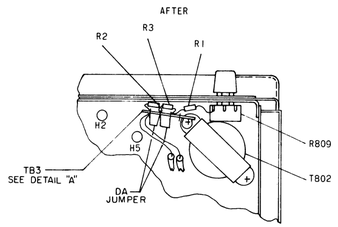
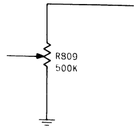


STEP 2: DISCONNECT BLACK WIRE (2) FROM VOLUME CONTROL (R809) AND ATTACH TO TOP TERMINAL OF BOARD (TB3).

BEFORE



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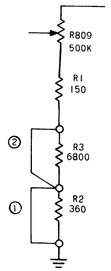
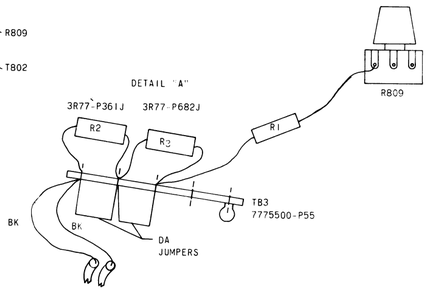
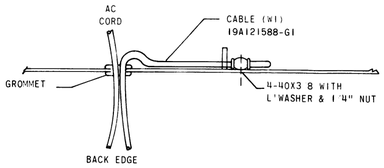


DETAIL "A"

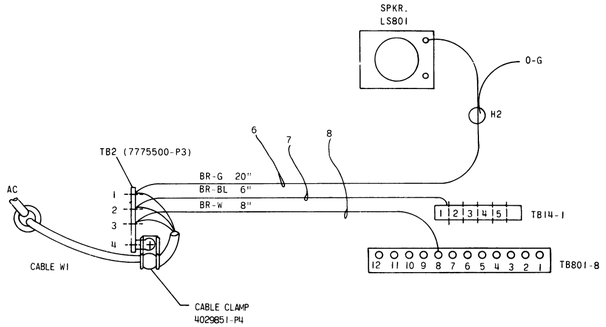


INPUT LEVEL	CLIP JUMPER
+ 10 & ABOVE	NONE
0 TO + 10	①
-12 TO 0	①&②

STEP 3: RUN CABLE THRU GROMMET WITH AC WIRE.

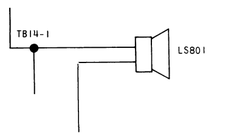


STEP 4: REMOVE SCREW NEAREST GROMMET AND INSTALL TERMINAL BOARD TB2 AND CABLE CLAMP. INSERT END OF BRAIDED PORTION IN CLAMP AND TIGHTEN. CUT WIRE TO LENGTH FOLDING AND TAPING REMAINING WIRE.



STEP 5: ATTACH WIRE TO TERMINAL OF BOARD TB2 AS SHOWN. ATTACH SAME COLOR WIRE TO APPROPRIATE TERMINAL. DISCONNECT ORANGE AND BLUE WIRE AT SPEAKER TERMINAL AND TAPE BACK TO THIS TERMINAL ON SPEAKER SOLDER THE BR-G WIRE. CONNECT THE BR-BL WIRE TO TB14-1 & THE BR-W WIRE TO TB801-8.

BEFORE



AFTER

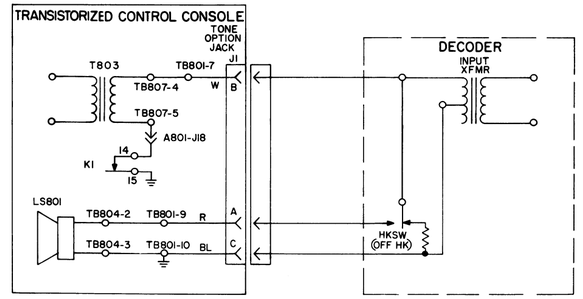
(19D402545, Rev. 2)

INSTALLATION INSTRUCTIONS

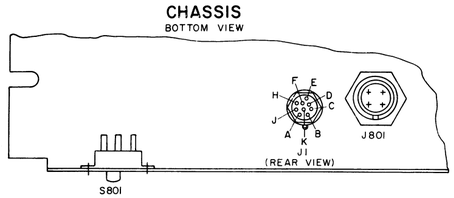
TONE APPLICATION KIT
FOR TCC & RC4

(RC-1149B)

TRANSISTORIZED CONTROL CONSOLE
APPLICATION KIT PL-19A122250-G17
(MODEL 4EC71A10)



(19B205380, Rev. 2)

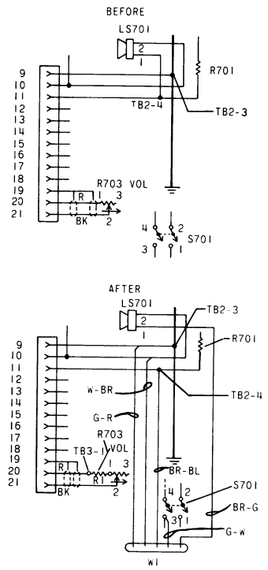


CONNECTIONS CHART		
FROM	TO	LEAD COLOR
J1	TB801-7	WHITE
J1	TB801-9	RED
J1	TB801-10	BLUE

(19B205381, Rev. 2)

PROGRESS LINE APPLICATIONS

FRONT-MOUNT APPLICATION KIT
PL-19A121863-G1
(MODEL 4EC29A2 CONTROL UNIT)

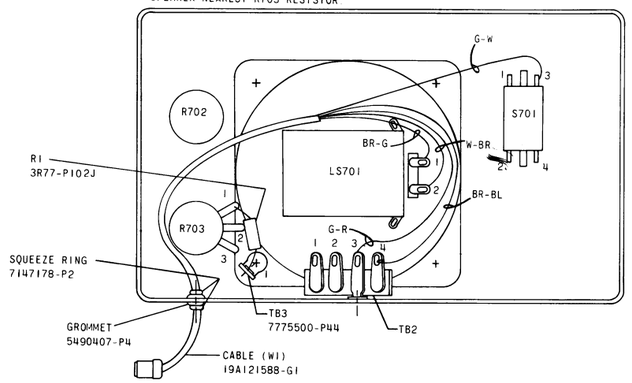


MOBILE APPLICATION KITS

STEP 1: REMOVE EXISTING GROMMENT FROM HOLE JUST BEHIND POWER CABLE HOLE ON CONTROL UNIT. ASSEMBLE GROMMET FROM KIT INTO THIS HOLE AND INSERT CABLE (W1) THRU GROMMET LEAVING APPROXIMATELY 2.5 INCHES BETWEEN END OF PLUG & GROMMET.

STEP 2: ATTACH SQUEEZE RINGS ON EITHER SIDE OF GROMMET FOR MINIMUM PLAY. OVERLAP ENDS OF RINGS TO INSURE TIGHT FIT.

STEP 3: ASSEMBLE TB3 TO SPEAKER, USING #4-40 HARDWARE OF SPEAKER NEAREST R703 RESISTOR



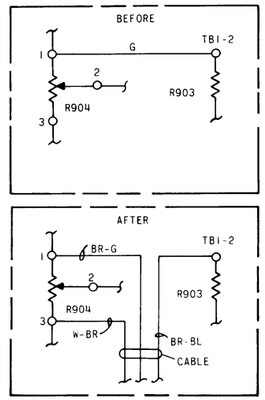
STEP 4: UNSOLDER RED WIRE AT R703-1 AND SOLDER TO TB3-1. SOLDER R1 (1000Ω) FROM TB3-1 TO R703-1. REMOVE BLACK WIRE BETWEEN TB2-4 & LS701-1.

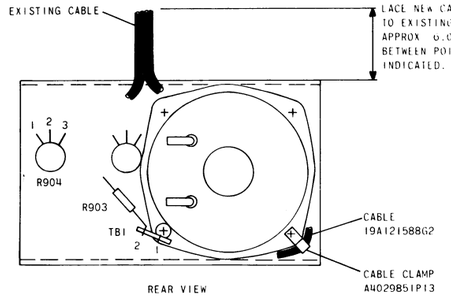
STEP 5: SOLDER ALL WIRES FROM CABLE W1 AND MAKE ALL OTHER CONNECTIONS AS SHOWN IN DIAGRAM AT LEFT.

STATION APPLICATION KITS

DO STATION APPLICATION KIT
PL-19A121914-G1

STEP 1: MOUNT CABLE CLAMP UNDER BOLT HOLDING SPEAKER AND INSERT CABLE 12 INCHES FROM WIRE ENDS.



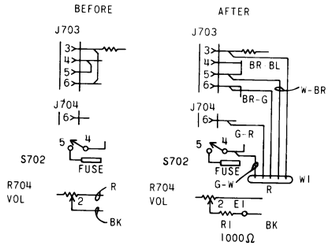


STEP 2: SOLDER CONNECTIONS AS FOLLOWS (SEE DIAGRAM AT LEFT)
BR-G WIRE TO R904-1
BR-BL WIRE TO TB1-2
W-BR WIRE TO R904-3
REMOVE GREEN WIRE BETWEEN R904-1 & TB1-2.

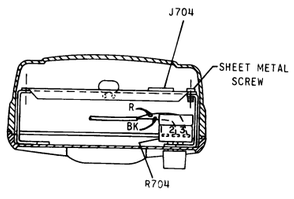
TRUNK-MOUNT APPLICATION KIT
PL-19A121840-G1
(MODEL 4EC27A CONTROL UNIT)

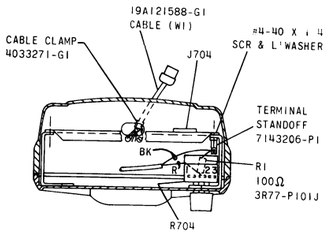
STEP 1: REMOVE SHEET METAL SCREW NEAREST J704-3, USING #4-40 X 1/4 SCREW & LOCKWASHER MOUNT TERMINAL STANDOFF IN HOLE VACATED BY SHEET METAL SCREW.

STEP 2: UNSOLDER BLACK WIRE FROM TERMINAL #2 OF R704 AND SOLDER TO TERMINAL STANDOFF. SOLDER R1 (1000Ω) BETWEEN TERMINAL #2 OF R704 AND TERMINAL STANDOFF.



STEP 3: ATTACH CABLE CLAMP TO CABLE W1 AT END OF BRAIDED AREA. RUN W1 THRU CABLE-ENTRANCE HOLE IN CASE AND ATTACH CABLE-CLAMP HOOK THRU SMALL HOLE.

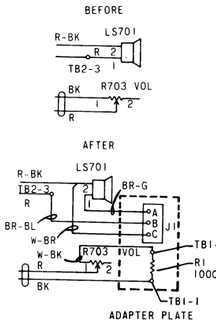


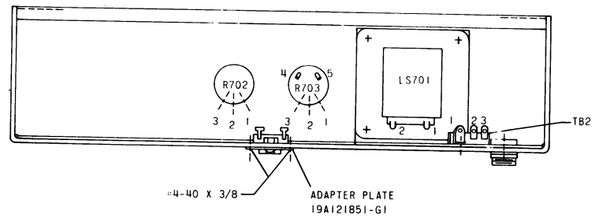


STEP 4: REMOVE JUMPER WIRE BETWEEN J703-3 & J703-6 AND SOLDER WIRES FROM W1 AS SHOWN IN DIAGRAM AT LEFT.

TI STATION APPLICATION KIT
PL-19A121855-G1
(MODEL 4EC39A10 CONTROL UNIT)

STEP 1: PLACE ADAPTER PLATE OVER RECTANGULAR CUTOUT NEAR CENTER BOTTOM OF CONTROL UNIT. WITH TERMINAL STRIP TB1 TO REAR OF UNIT AND ASSEMBLE WITH #4-40 HARDWARE AS SHOWN.





STEP 2: REMOVE RED WIRE BETWEEN LS701-1 & TB2-3.

STEP 3: UNSOLDER BLACK WIRE FROM R703-1 AND SOLDER TO TB1-1 OF ADAPTOR PLATE.

STEP 4: SOLDER ALL WIRES FROM ADAPTER PLATE AS SHOWN IN DIAGRAM AT LEFT.

INSTALLATION INSTRUCTIONS

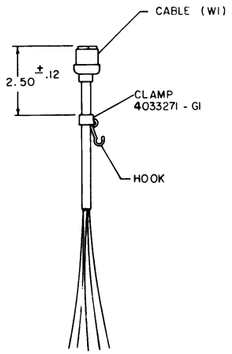
TONE APPLICATION KITS FOR
PROGRESS LINE

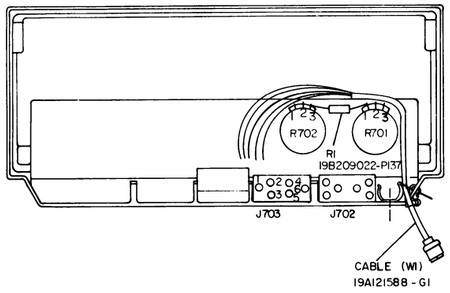
(RC-1150A)

(DF-5031)

TRANSISTORIZED PROGRESS LINE APPLICATIONS

TPL- FRONT - MOUNT APPLICATION KIT
PL-19A121841 - G1





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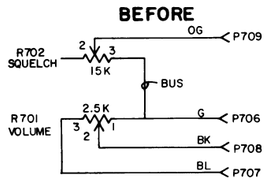

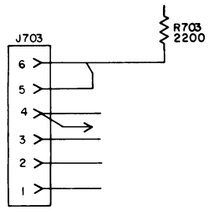

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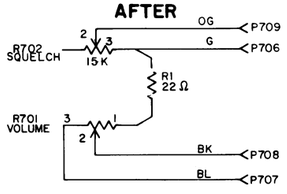
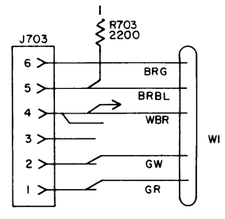




STEP 1: PREPARE CABLE (W1) BY ASSEMBLING CLAMP TO IT AS SHOWN.

STEP 2: ATTACH CABLE TO CONTROL UNIT BY INSERTING HOOK (FROM INSIDE) THROUGH SMALL HOLE IN UNIT.

STEP 3: ROUTE CABLE AROUND R701 & R702 AS INDICATED AND SOLDER WIRES TO J703 AS SHOWN BY WIRING DIAGRAM.

STEP 4: REMOVE JUMPER BETWEEN R701-1 & R702-3 AND TRANSFER GREEN WIRE FROM R701-1 TO R702-3. SOLDER RI (22 Ω) FROM R701-1 TO R702-3.

STEP 5: REMOVE JUMPER BETWEEN J703-5 & J703-6. UNSOLDER R703 FROM J703-6 & SOLDER TO J703-5.

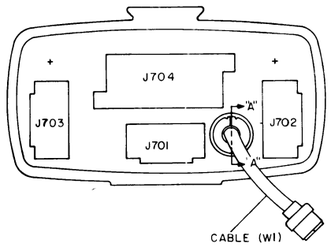
STEP 6: MAKE ALL OTHER WIRING CHANGES AS SHOWN BY WIRING DIAGRAM. SOLDER ALL ELECTRICAL CONNECTIONS.

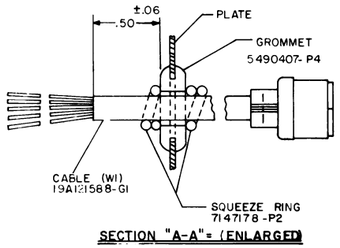
INSTALLATION INSTRUCTIONS

TONE APPLICATION KITS FOR TPL

(RC-1151A)

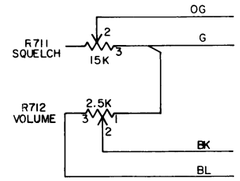
TPL TRUCK - MOUNT APPLICATION KIT
PL-19A121845 - G1

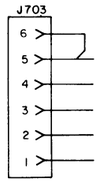




SECTION "A-A" = (ENLARGED)

BEFORE





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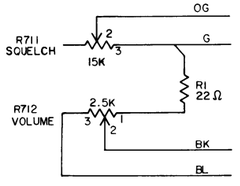
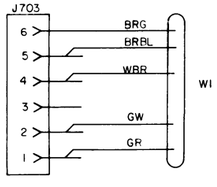


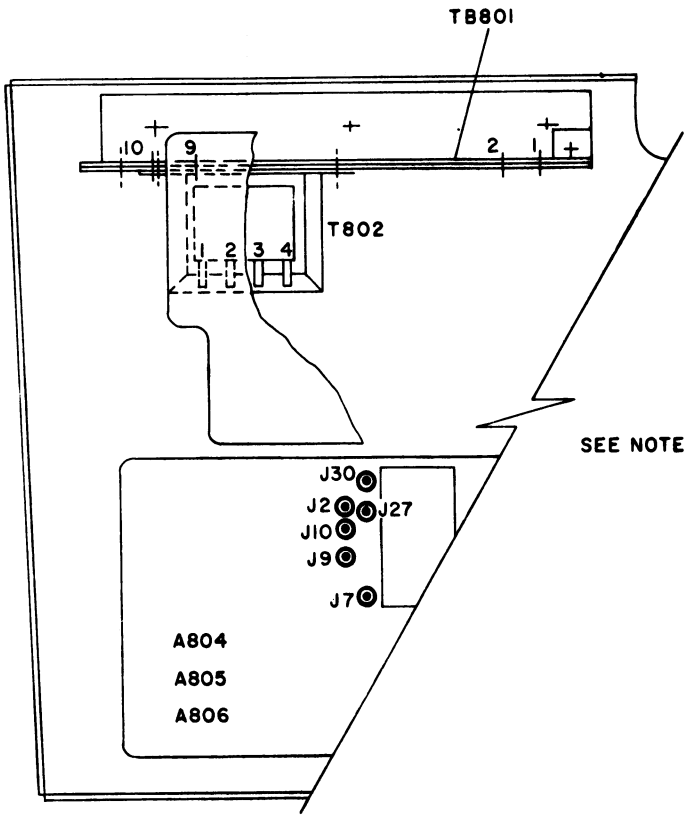


STEP 1: REMOVE PLUG BUTTON FROM HOLE (WHERE CABLE IS NOW SHOWN) AND DISCARD. PLACE GROMMET IN HOLE VACATED BY BUTTON. INSERT CABLE THROUGH GROMMET AND ATTACH SQUEEZE RINGS FOR MINIMUM PLAY ON EITHER SIDE OF GROMMET. OVERLAY ENDS OF RINGS TO INSURE TIGHT FIT.

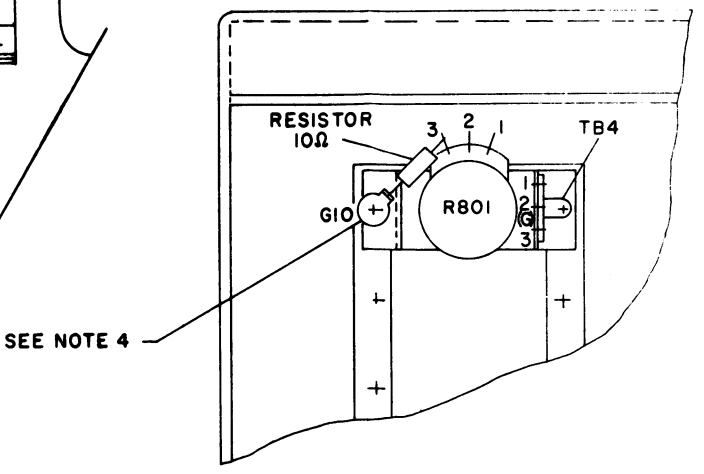
STEP 2: REMOVE JUMP WIRE BETWEEN R711-3 & R712-1 AND SOLDER RI (22 Ω) RESISTOR IN ITS PLACE AS SHOWN IN WIRING DIAGRAM.

STEP 3: REMOVE JUMPER RETWEEN J703-5 & J703-6 AND SOLDER WIRES OF CABLE (W1) TO J703 AS SHOWN BY WIRING DIAGRAM.

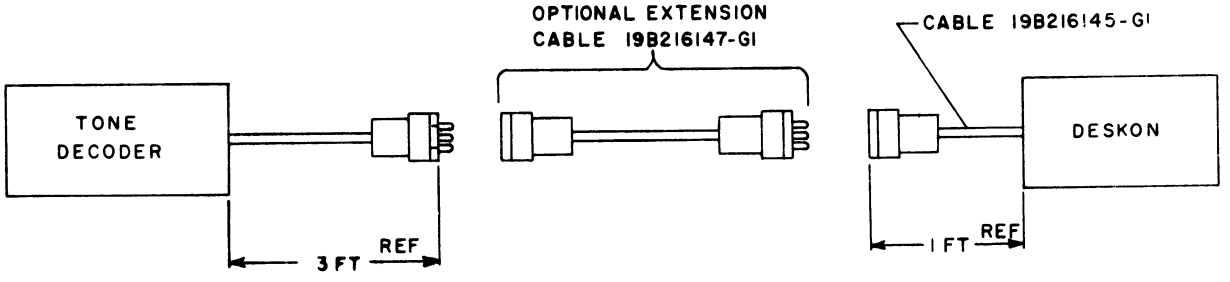
DESKON REMOTE CONTROL UNIT
TONE APPLICATION KIT 19A127156G1



BASE VIEW – HOUSING REMOVED
(PARTIAL)



INSIDE VIEW OF HOUSING
(PARTIAL)



INSTRUCTIONS:

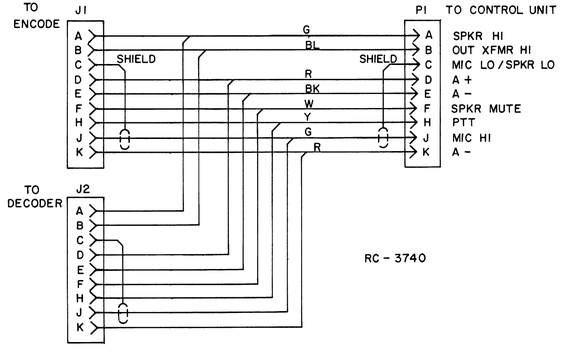
1. CLIP OUT WHITE-BLACK WIRE BETWEEN TB801-10 AND T802-2.
2. ASSEMBLE WHITE-BLACK WIRE (19A127155G1) FROM TB801-10 TO A804-A805-A806-J10.
3. ASSEMBLE CABLE (19B216145G1) RED LEAD TO TB801-7 AND BLACK LEAD TO TB801-10.
4. ASSEMBLE G10 (A4036835P4) AS SHOWN
5. REMOVE SHIELD FROM R801 (VOLUME CONTROL) AND CONNECT TO G10.
6. ASSEMBLE 10Ω RESISTOR (C3R77P100K) BETWEEN G10 AND R801-3 (VOLUME CONTROL).
7. RE-ASSEMBLE HOUSING TO BASE & ROUTE CABLE THRU SLOT AT REAR OR END OF HOUSING

INSTALLATION INSTRUCTIONS

(19C311814, Rev. 5)

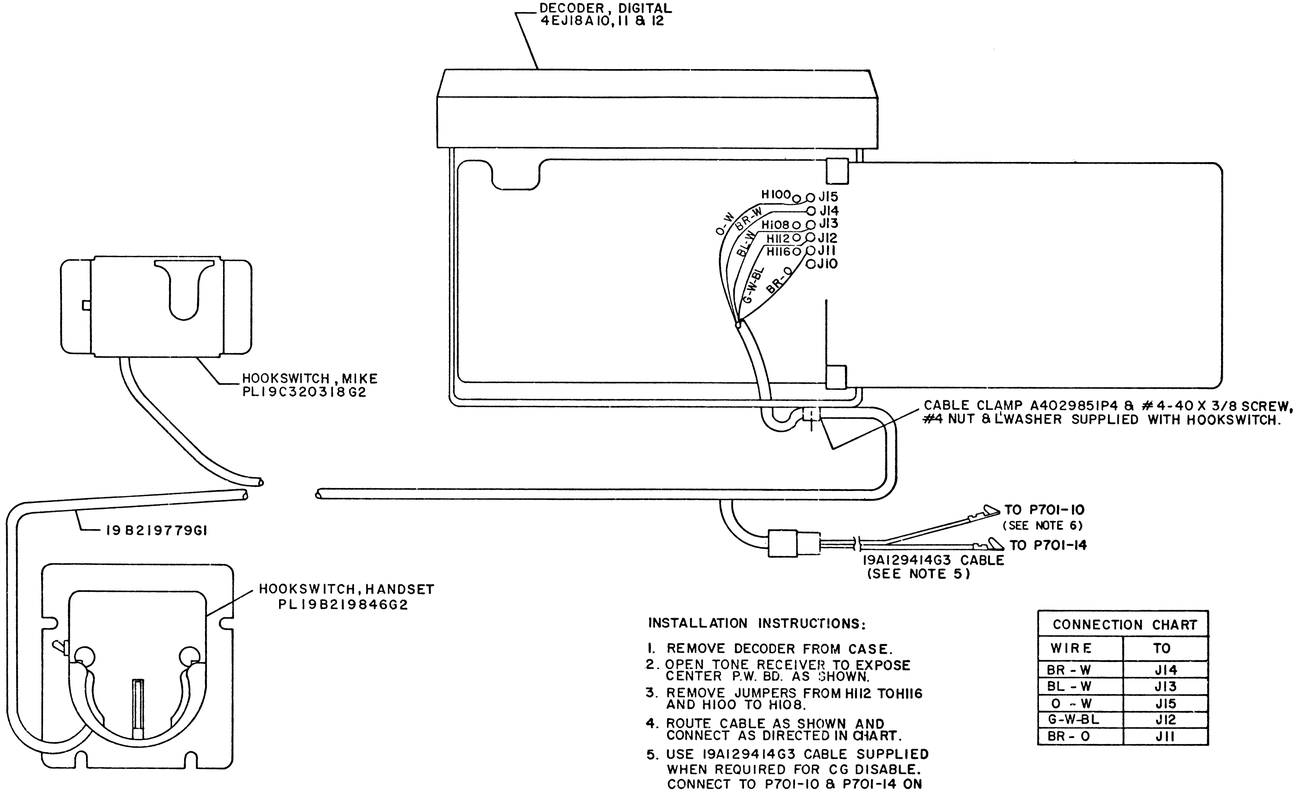
DESKON REMOTE CONTROL UNIT

RC-1833A



DF-5036

OPTION 7468
EXTERNAL ENCODER/DECODER
CABLE ASSEMBLY 19D417126



INSTALLATION INSTRUCTIONS:

1. REMOVE DECODER FROM CASE.
2. OPEN TONE RECEIVER TO EXPOSE CENTER P.W. BD. AS SHOWN.
3. REMOVE JUMPERS FROM H112 TOH116 AND H100 TO H108.
4. ROUTE CABLE AS SHOWN AND CONNECT AS DIRECTED IN CHART.
5. USE 19A129414G3 CABLE SUPPLIED WHEN REQUIRED FOR CG DISABLE. CONNECT TO P701-10 & P701-14 ON MASTR II CONTROL UNIT.
6. WHEN USED WITH CUSTOM MVP AND CHANNEL GUARD, REMOVE CONTACTS FROM CABLE (414G3) AND REPLACE WITH TWO CONTACTS SUPPLIED. CONNECT TO P1-6 & P1-8.

CONNECTION CHART	
WIRE	TO
BR-W	J14
BL-W	J13
O-W	J15
G-W-BL	J12
BR-O	J11

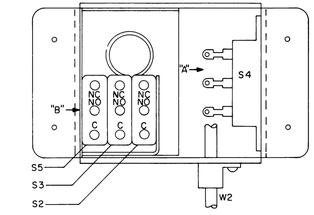
(19C320494, Sh. 1, Rev. 4)

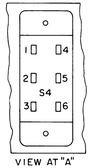
INSTALLATION INSTRUCTIONS

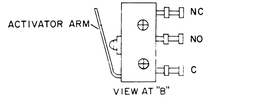
MICROPHONE HANDSET/HOOKSWITCH

(RC-2674B)

OUTLINE DIAGRAM

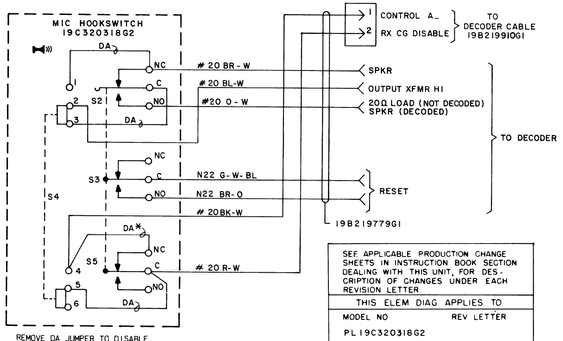






(19B226125, Rev. 1)

SCHEMATIC DIAGRAM

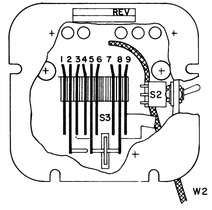


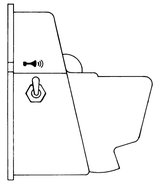
SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19C320318G2	

(19B219897, Rev. 1)

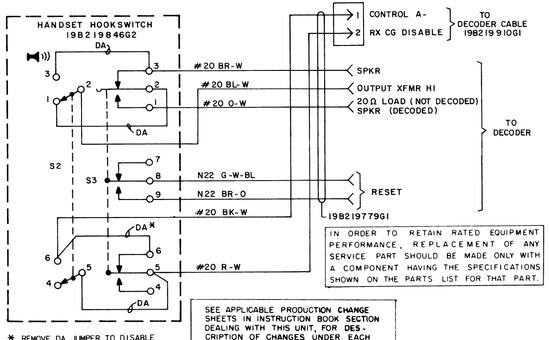
OUTLINE DIAGRAM





(19B226656, Rev. 0)

SCHEMATIC DIAGRAM



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.

* REMOVE DA JUMPER TO DISABLE AUTOMATIC CHANNEL GUARD MONITOR.

S3 SHOWN OFF HOOK
S2 SHOWN OFF MONITOR

NOTE 1.
CUT PRINTED WIRE RUNS C AND H IN CONTROL UNIT.

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
PL19B219846G2	

(19B219843, Rev. 1)

PARTS LIST

LBI-4741

MICROPHONE HOOKSWITCH 19C320318G2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S2 and S3	19A116676P1	Switch, sensitive: SPDT, 5 amp at 24 VDC or 5 amp at 250 VRMS; sim to Microswitch 111SW1-T2.
S4	19B219698G2	Slide: DPDT, 3 amp at 125 VAC, 2.2 amp at 14 VAC; sim to Switchcraft 46206LM. (S1 includes switch and housing).
S5	19A116676P1	Switch, sensitive: SPDT, 5 amp at 24 VDC or 5 amp at 250 VRMS; sim to Microswitch 111SW1-T2.
		- - - - - - - - - - CABLES - - - - - - - - - -
W2	19B219779G1	Cable: approx 50 inches long. Includes (5) 4036634P1 electrical contacts.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B219694P1	Base plate.
	N193P1410C	Tap screw: No. 8-16 x 5/8. (Secures base plate to mounting surface).
	7147223P2	Clip, loop. (External strain relief).
	19B201074P304	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/4. (Secures external strain relief).
	4029851P4	Cable clip; sim to Weckesser Co. 3/16-4-128. (Strain relief for W2).
	N80P9005C6	Machine screw: No. 4-40 x 5/16. (Secures cable clip).
	N404P11C6	Lockwasher: No. 4. (Used with internal cable clip).
	7141225P2	Hexnut: No. 4-40. (Used with internal cable clip).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

LBI-4742

HANDSET HOOKSWITCH 19B219846G2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S2	19A116877P5	Toggle: DPDT, 1 ma at 6 VDC; sim to C and K Components Series Type 7201G. (CHANNEL GUARD DISABLE).
S3	19A129585P2	Hookswitch, Handset: black, 3 form C contacts.
		- - - - - - - - - - CABLES - - - - - - - - - -
W2	19B219779G1	Cable: approx 50 inches long. Includes (5) 4036634P1 electrical contacts.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	N190P1312C	Tap screw, Phillips POZIDRIV: No. 6 x 3/4. (Secures lower housing to base plate).
	N84P13014C6	Machine screw, phillips: No. 6-32 x 7/8. (Secures upper housing to base plate).
	N84P15016C6	Machine screw, phillips: No. 8-32 x 7/8. (Secures bumpers).
	N101P1510P	Tap screw, phillips head: No. 8-15 x 5/8. (Secures plate to mounting surface).
	19B219852P1	Base plate.
	19A129586P1	Bumper, rubber.
	4029851P4	Cable clip; sim to Weckesser Co. 3/16-4-128. (Strain relief for W2).
	N80P9003C6	Machine screw: No. 4-40 x 5/16. (Secures cable clip).
	N404P11C6	Lockwasher: No. 4. (Used with cable clip).
	7141225P2	Hex nut: No. 4-40. (Used with cable clip).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SERVICE SHEET

MASTR II MICROPHONE HANDSET/HOOKSWITCH

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 Authorized 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 installtion, 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-4035

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

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DF-5036