RCA

Mobile Communication Equipment

Servicing Information

MI-559412-2

Control Termination Panel

DL 748M

IB-8028417

N3LKL

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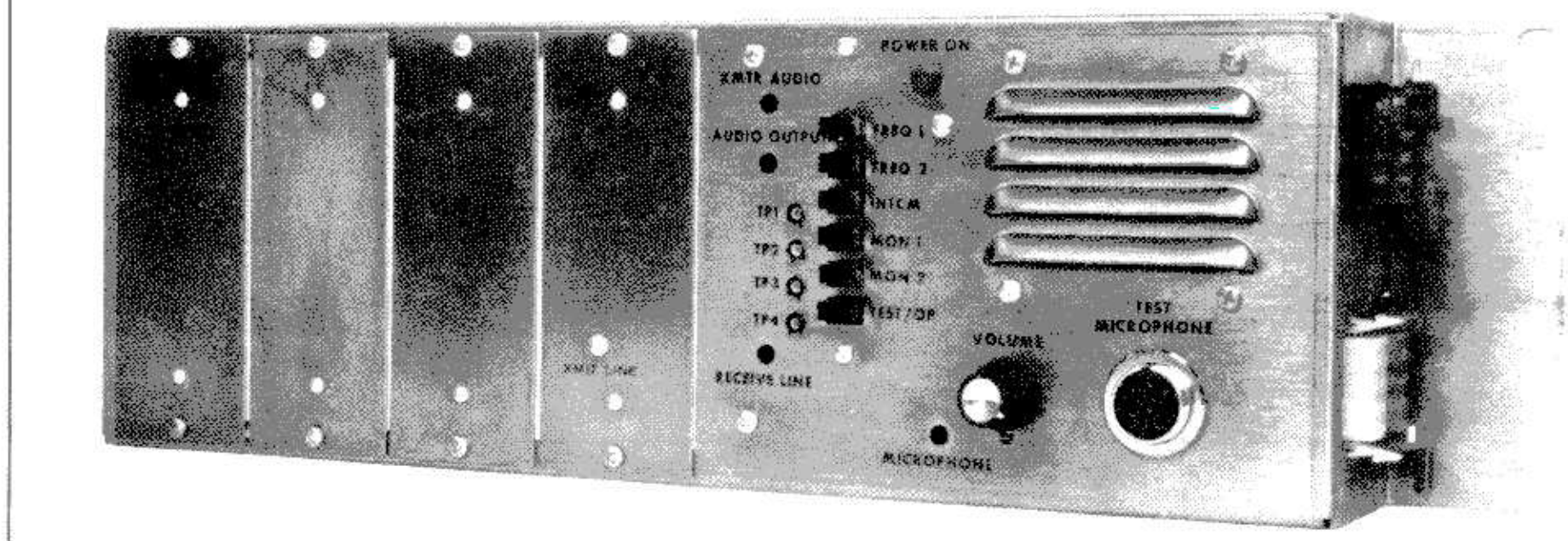

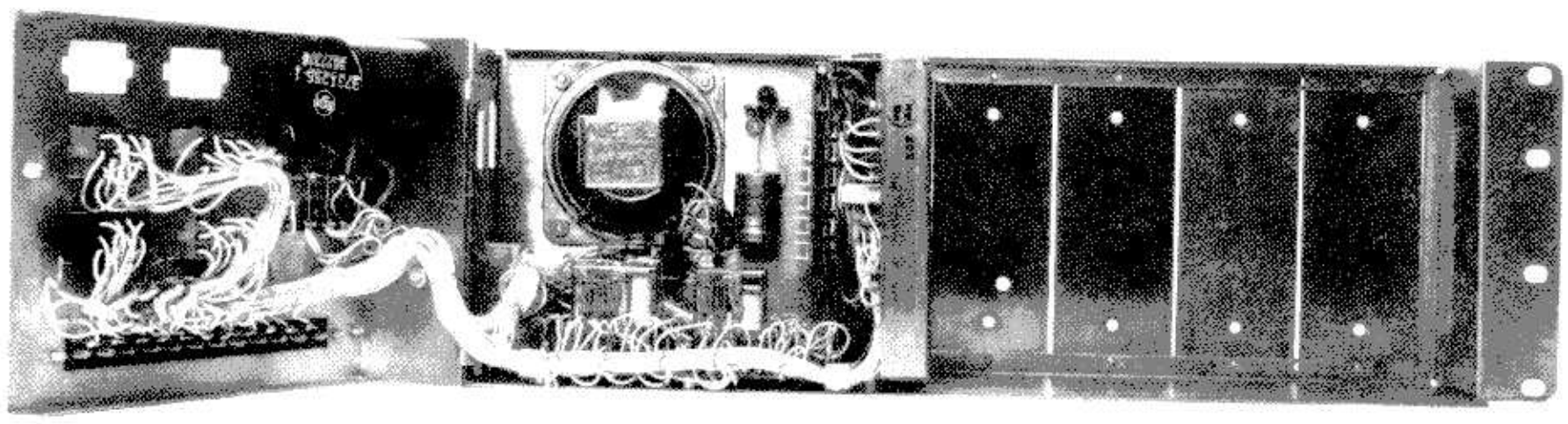

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Figure 1. Basic Control Termination Panel

EQUIPMENT DESCRIPTION

GENERAL

The Control Termination Panel provides circuitry essential to the control of a base station. It is composed of a loud speaker, front panel control devices, a group of basic modules, optional modules for adapting the system to a specific application, and the wiring necessary for interconnecting the system.

The most common applications of the Control Termination Panel are: remote control simplex base station, single channel repeater, and control repeater. Control of the station may be local, extended local, remote with DC signalling, remote with tone signalling, or certain combinations of these. Various operating and control configurations are shown in table 1, along with an indication of the add-on equipment required for each arrangement.

Table 2, Technical Data, lists the electrical specifications for the basic Control Termination Panel.

TABLE 1. LIST OF EQUIPMENT

Control Termination Panel MI-559412-2

BASIC EQUIPMENT

3457943-510	Control Termination Panel
3457943-502	Control Termination Module
3457943-504	Receive/Transmit Amplifier Module
3457943-509	5-Watt Amplifier Module
3731264-001	Switch Module

ADD-ON EQUIPMENT

MI-559416	Latching Relay
MI-559416-A	10mA Relay (for extra DC Command Signals)
MI-559416-B	5mA Relay (for extra DC Command Signals)

MI-559613 Series Function Tone Decoder Modules:

MI Number	Decoder Frequency
MI-559613	2050 Hz
MI-559613-A	1950 Hz
MI-559613-B	1850 Hz
MI-559613-C	1750 Hz
MI-559613-D	1650 Hz
MI-559613-E	1550 Hz
MI-559613-F	1450 Hz
MI-559613-G	1350 Hz
MI-559613-H	1250 Hz
MI-559613-J	1150 Hz
MI-559613-K	1050 Hz

MI-559696	Control Panel (Extra space for mounting modules)
MI-559443	Matrix Module
MI-559448	Matrix Diode
MI-559274-L	Cable (connects Matrix Module to Basic Control Termination Panel and Repeater Module)
MI-559446-1	Driver Module
MI-559447	Multiple Driver Mother Board
MI-559449-1	Hardware Kit (Used to mount Function Tone Decoder Modules)
MI-559520	Receive/Transmit Amplifier Module
MI-559521	5-Watt Audio PA Module
MI-559541-1	4-Wire Audio Adapter Module
MI-559608	Telephone Line Surge Suppressor

TABLE 1- LIST OF EQUIPMENT (Continued)

ADD-ON EQUIPMENT FOR EXTENDED LOCAL, DC REMOTE, OR TONE REMOTE CONTROL

NOTE: The equipment added to the Basic Control Termination Panel depends upon its systems application, as shown by the following:

Extended Local Control Of Simplex Base Station	DC Remote Control of Simplex Base Station	Tone Remote Control of Simplex Base Station	Extended Local Control of Single Channel Repeater	DC Remote Control of Single Channel Repeater	Tone Remote Control of Single Channel Repeater	Extended Local Control of Control Repeater	DC Remote Control of Control Repeater	Tone Remote Control of Control Repeater	
	X			X			X		MI-559415-1 DC Line Termination Module consists of: 3457943-505 DC Comparator Module MI-559658 Remote Simplex Module
		X			X			X	MI-559692 Tone Line Termination Module consists of: MI-559614 Dual Notch Filter MI-559658 Remote Simplex Module
		X			X			X	MI-559612 Guard Tone Decoder Module
		X			X			X	MI-559613 Series of Function Tone Decoder Modules (One for each command)
		X			X			X	MI-559811 Tone Cable Kit - Interconnects Guard Tone Decoder, Function Tone Decoder and Tone Line Termination Modules
			X	X	X	X	X	X	MI-559419 Repeater Module (with one Driver Module MI-559446-1)
						X	X	X	MI-559446-1 Driver Module (add-on)
						X	X	X	MI-559690 Steering Diode Network Kit
X	X	X	X	X	X	X	X	X	MI-559274-E Cable Assy. - Connects basic Control Termination Panel to 1st Receiver
						X	X	X	MI-559274-F Cable Assy. - Connects basic Control Termination Panel to 2nd Receiver/Exciter
	X	X							MI-559274-H Cable Assy. - Connects DC or Tone Line Termination Module to Basic Control Termination Panel

TABLE 1. LIST OF EQUIPMENT (Continued)

Extended Local Control of Simplex Base Station	DC Remote Control of Simplex Base Station	Tone Remote Control of Simplex Base Station	Extended Local Control of Single Channel Repeater	DC Remote Control of Single Channel Repeater	Tone Remote Control of Single Channel Repeater	Extended Local Control of Control Repeater	DC Remote Control of Control Repeater	Tone Remote Control of Control Repeater	
			X			X			MI-559274-J Cable Assy. - Connects Repeater Module to Basic Control Termination Panel.
				X	X		X	X	MI-559274-K Cable Assy. - Connects DC or Tone Line Termination Module and Repeater Module to basic Control Termination Panel
						X	X	X	MI-559274-S Cable Assy. - Connects Steering Diode Network Kit and Repeater Module to basic Control Termination Panel
X			X			X			MI-559418 Connector Assy. - Provides for Connection of Telephone Line Transformer in Basic Control Termination Panel.

TABLE 2. TECHNICAL DATA

Nominal Input Impedances
Microphone: 1000 ohms
Telephone Line Remote Terminals: 600 ohms, source and load.
Receiver Audio: 1500 ohms source; 100 ohms Control Termination Panel Input

Nominal Speaker Impedances
Internal: 50 ohms
Extended Local: 8 ohms

Telephone Line Level Output Capability
+18dBm (+8VU), maximum

Maximum Deviation Sensitivity (Telephone Line Input)
100mV @ 5kHz
63mV @ 3kHz

Residual Hum and Noise
Telephone Line Remote Input: 1.5mV, maximum, at 6TP4 with input at transformer and phone line disconnected.
Repeater Input: 1.2mV, maximum, with receiver inputs at 4J2 and 6J2 disconnected.

Total Harmonic Distortion
Receive/Transmit Amplifier: 2% maximum
5 Watt Audio Amplifier: 5% maximum

Audio Frequency Response
Remote Mode: 300 - 3000 Hz, ±1dB
Repeat Mode: 300 - 3000 Hz, within +1, -3dB of 6dB/octave demphasis, with 1.0mV input and +3.0 kHz deviation.

Power Requirements

+13.8 VDC at 6J1, pin 11	+13.8 VDC at 6J1, pin 3
150mA (receive mode)	250 to 750mA
280mA (transmit mode)	(5-watt audio amplifier)

BASIC CONTROL TERMINATION PANEL

The basic Control Termination Panel includes a loud speaker with a front-panel-mounted volume control, a Control Termination Module, a Switch Module, a Receive/Transmit Amplifier Module, and a 5-Watt Audio Amplfier Module. These basic items are common to all applications of the panel, but the selection and wiring of add-on equipment from the list in table 1 determines the specific application to be used. Wiring of the Control Termination Panel is shown in Figure 9.

Descriptive and servicing information for each module used in the Control Termination Panel is covered in individual instruction books. Both the Tone Remote Control and the DC Remote Control applications, described in the following paragraphs, produce command signals for controlling the transmitter/receiver unit in a base or repeater station. Signals which control transmitter keying and frequency selection are called "transmit" commands; those controlling receiver muting, Quiet Channel disabling, and other functions not directly related to transmitter operation are called "non-transmit" commands. Descriptions of how these command signals work are covered in both the DC and the Tone Remote Control System Description and Servicing Information books.

TONE REMOTE CONTROL APPLICATIONS

All remote control applications using tone signalling require the addition of a Tone Line Termination Module, a Guard Tone Decoder Module, and one or more Function Tone Decoder Modules.

The Tone Line Termination Module includes a Dual Notch Filter Module that removes the control tones from the receive and transmit audio signals, and a Remote Simplex Module that switches base station audio circuits to either the transmit or the receive mode of operation and establishes control priority.

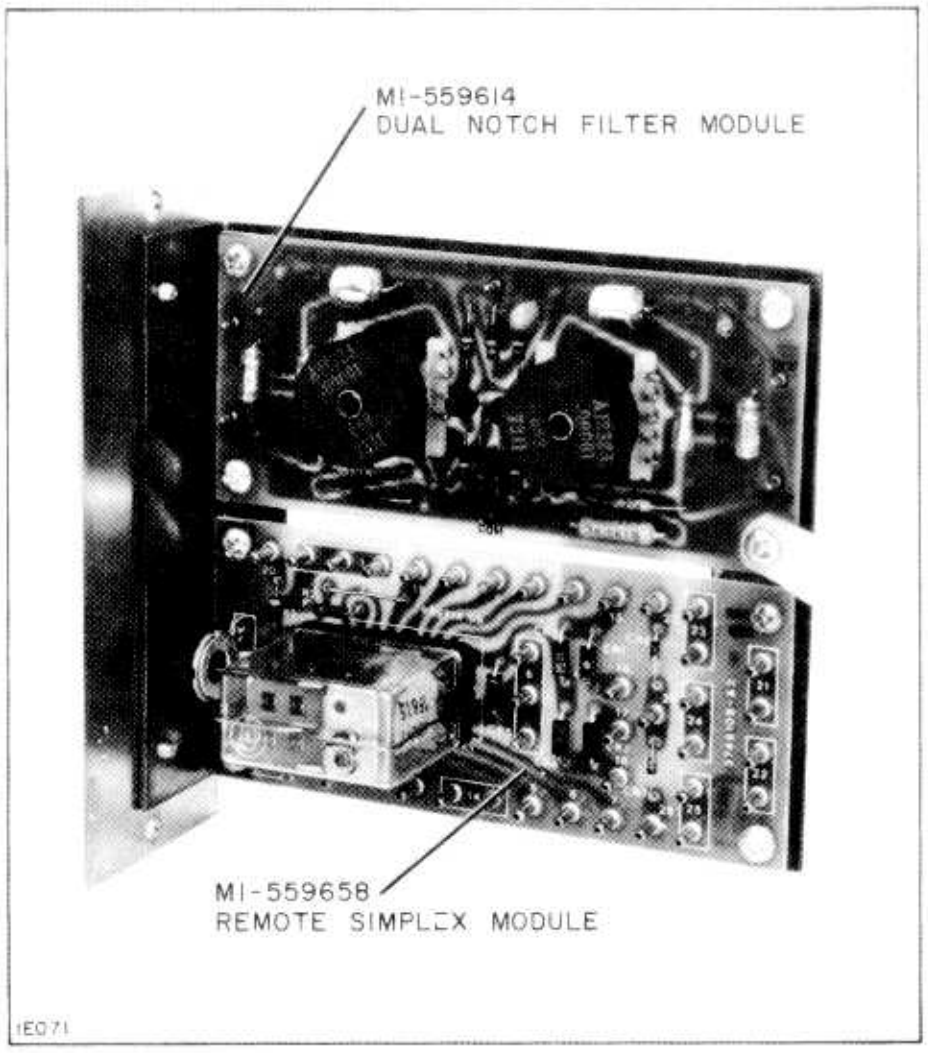


Figure 2. Tone Line Termination Module

The Guard Tone Decoder Module converts the 2175 Hz guard tone to a DC control voltage that preconditions the tone control circuits for processing a function control tone. A mechanical filter makes the circuit extremely selective so that it is insensitive all other audio frequencies.

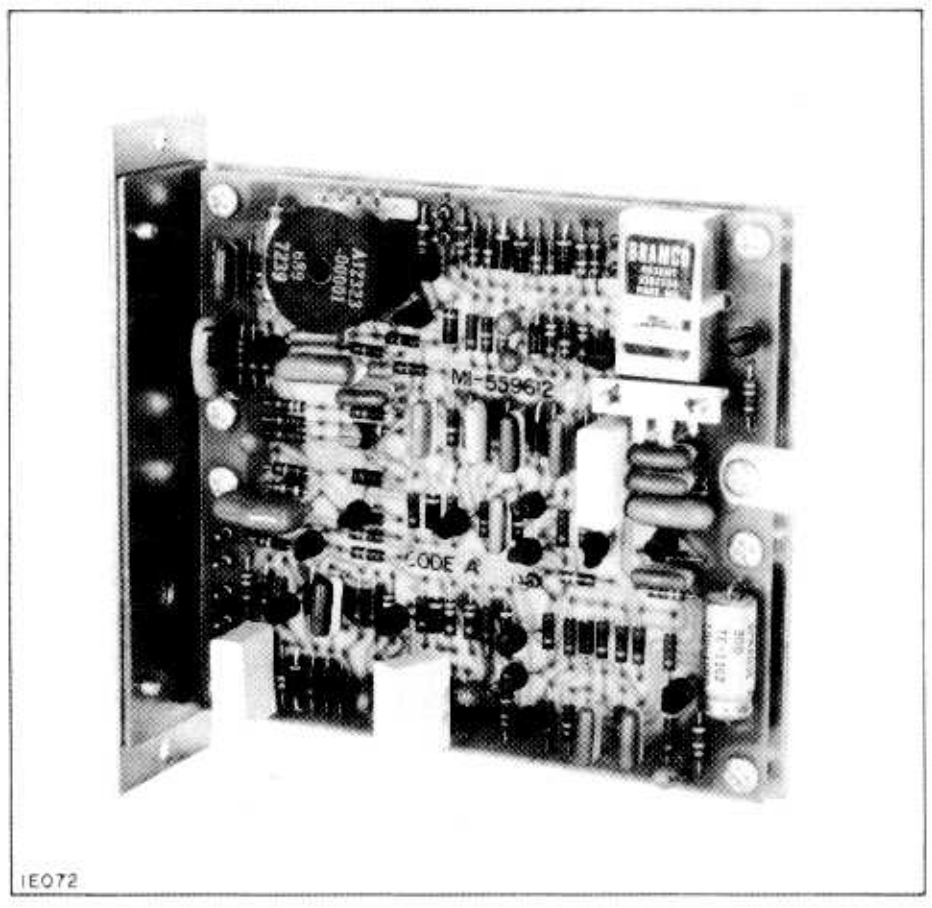


Figure 3. Guard Tone Decoder Module

The Function Tone Decoder Module can hold one or two decoder circuit boards. Each circuit board includes an audio filter to select a specific frequency and a detector which converts the tone to a DC voltage. The DC voltage is used to control the desired function.

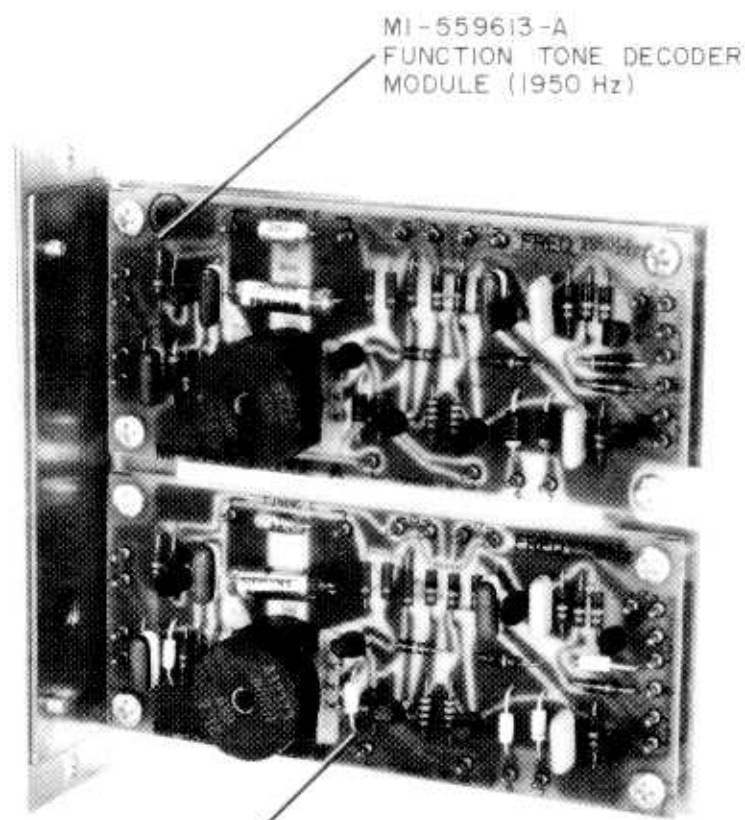


Figure 4. Function Tone Decoder Module

DC REMOTE CONTROL APPLICATIONS

All remote control applications using DC signalling require the addition of a DC Line Termination Module. Mounted on the DC Line Termination Module are the DC Comparator Module and the Remote Simplex Module.

Using polarity selecting diodes and optional current sensitive relays, the DC Comparator Module can distinguish between and distribute as many as four separate control signals. A relay on the Remote Simplex Module switches base station audio circuits to either the transmit or receive mode of operation and establishes control priority.

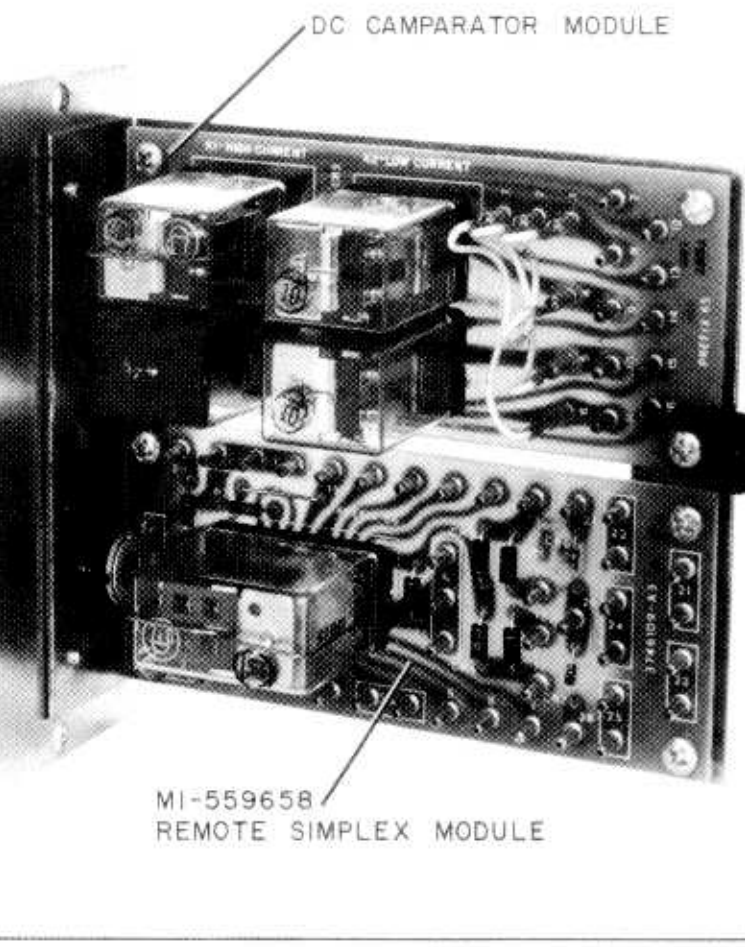


Figure 5. DC Line Termination Module

REPEATER CONTROL APPLICATIONS

Repeater-operation of a base station requires the addition of a Repeater Module to the Control Termination Panel. Mounted on the Repeater Module are a 3-Minute Timer Module with one or two Driver Modules. By including other options, the control capability of the repeater can be expanded. Optional items include: the 4-Driver Mother Module, additional Driver Modules, the Steering Diode Network Module, and the Diode Matrix Module.

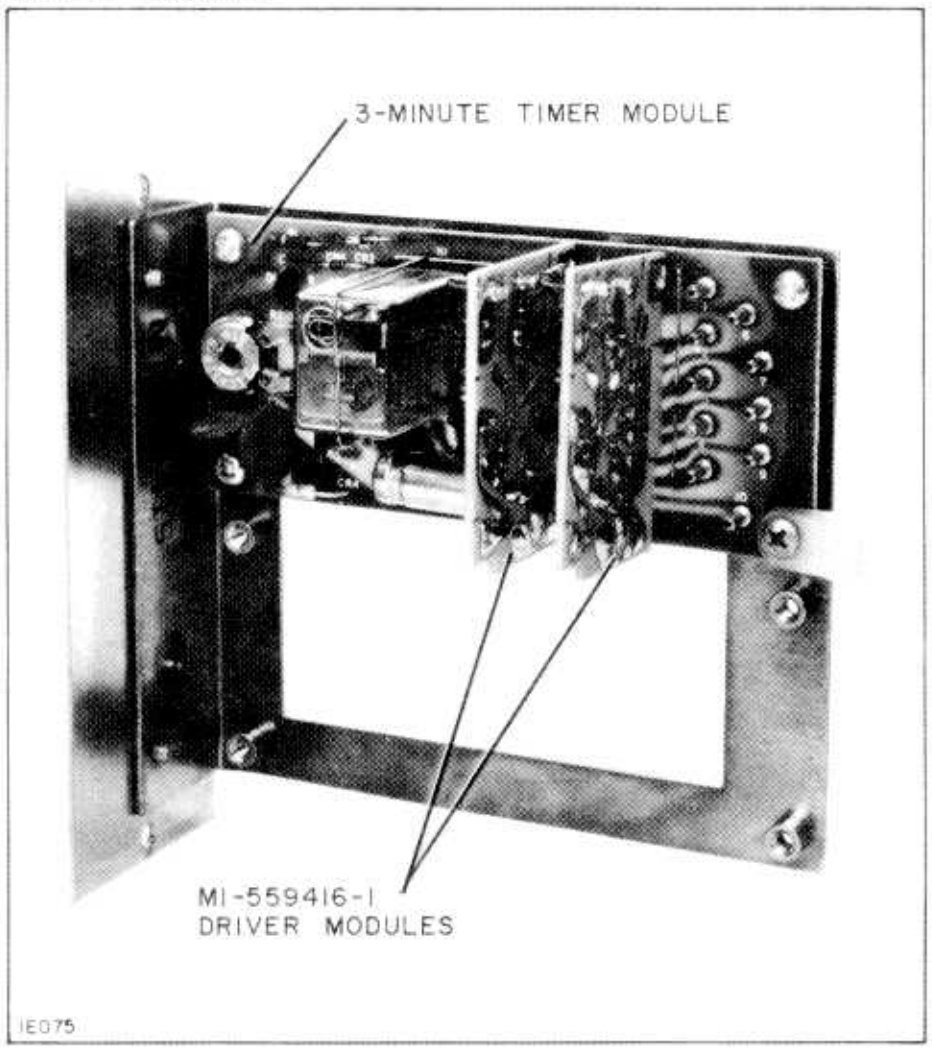


Figure 6. Repeater Module

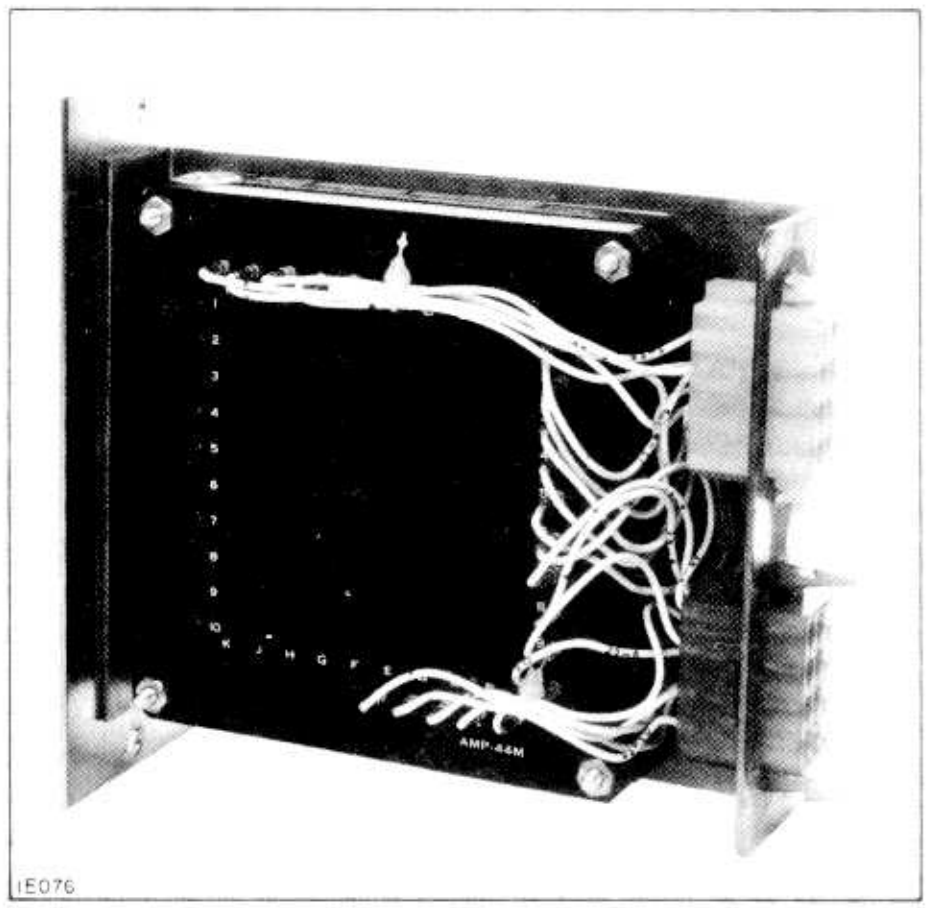


Figure 7. Diode Matrix Module

OPERATION

The Control Termination Panel, with its wide variety of options, lends a broad dimension of adaptability to a two-way radio base station system. Applications range from an unattended repeater link to a multipoint-controlled base station withvirtually unlimited freedom of operator location.

Control of the transmitter/receiver unit can be accomplished locally from the Control Termination Panel itself, from an Extended Local Control Unit (up to 200 feet away), or at any convenient remote point via telephone line, using a Remote Control Unit with either DC or tone signalling.

Operation descriptions for system applications depend on the intended use of the equipment. This type of information is provided in separate system instruction books. Individual instruction books are also provided to cover descriptive and servicing information for each module used in the Control Termination Panel. The controls and indicators built into the Control Termination Panel are listed and described in table 3.

TABLE 3. CONTROL TERMINATION PANEL

CONTROLS AND INDICATORS	
Control or Indicator	Function
TEST/OP Pushbutton	Selects the operating point of the station: Not depressed (Operate Mode) - Control Termination Panel pushbuttons and test microphone are not operative; the station is controlled by the normal station operating controls. Depressed (Test Mode) - Control Termination Panel pushbuttons and test microphone control the operation of the station; normal station operating controls are not operative.
FREQ 1 pushbutton FREQ 2 pushbutton (interlocked)	FREQ 1 pushbutton selects transmit command #1 when it is depressed and the test microphone PTT button is pushed. FREQ 2 pushbutton selects transmit command #2 when it is depressed and the test microphone PTT button is pushed. NOTE: The function of these commands depends on the type of T-R system and control system equipment employed. Refer to Control System Description and Servicing Information book.
INTCM Pushbutton (push-push type)	Selects the Intercom mode of operation. When depressed, it allows audio from the test microphone to be sent to the Remote Control Unit (if used).
MON 1 pushbutton (momentary contact type)	Selects non-transmit command #1 NOTE: The function of this command depends on the type of T-R System and control system equipment used. Refer to Control System Description and Servicing Information Book.

TABLE 3. CONTROL TERMINATION PANEL (Continued)

CONTROLS AND INDICATORS (Continued)	
Control or Indicator	Function
MON 2 pushbutton (momentary contact type)	Selects non-transmit command #2. NOTE: The function of this command depends on the type of T-R System and control system equipment used. Refer to Control System Description and Servicing Information book.
VOLUME control	Controls volume at Control Termination Panel Speaker.
XMTR AUDIO (Screwdriver adjustment)	Controls the level of the speech audio output to the transmitter(s).
AUDIO OUTPUT (screwdriver adjustment)	Sets maximum speech audio level for the speaker and to the speaker circuit of the extended local control unit.
RECEIVE LINE (screwdriver ajdustment)	Controls the level of the speech audio applied to the telephone line in remote control systems.
MICROPHONE (screwdriver adjustment)	Sets the level of the speech audio from the test microphone and extended local control unit.
POWER ON indicator	Lights when power is applied to the station.
Audio Test Points: TP1 TP2 TP3 TP4	 Monitors audio input from receiver(s) Monitors output of telephone Line Amplifier Monitors audio output to transmitter(s) Monitors audio output to speaker and extended Local Control Unit

SERVICE AND MAINTENANCE

GENERAL

This section applies only to the Control Termination Panel in general. Service and maintenance information for all modules is covered in individual instruction books.

DISASSEMBLY PROCEDURES

Instructions are given here for removing the Control Termination Panel from the base station cabinet and for removing panel-mounted components, standard modules, and add-on modules from the Control Termination Panel. Refer to the Control Termination Panel Assembly illustration (figure 8) and the Repalcement Parts List to locate and identify specific items.

REMOVING CONTROL TERMINATION PANEL

1. Disconnect all 12-position color-coded connectors (6J1 through 6J6 and 4J1 through 4J4).

2. Disconnect the test microphone (6J7).

3. Disconnect telephone line at terminal board 6TB1, terminals 1 and 4 (also, at terminal board TB1, terminals 1 and 4, of the 4-Wire Audio Adapter module, if a second phone line is used).

4. Remove mounting screws at both ends of the Control Termination Panel and lift the assembly out of the cabinet.

REMOVING PANEL MOUNTED COMPONENTS

Panel mounted components (6LS1, 6T1, 6R1, etc.) have solder terminals. To remove any of these items, unsolder and disconnect leads on terminals and remove mounting hardware, if used.

REMOVING STANDARD MODULES

The standard modules are interconnected with leads terminating in push-on connectors. To remove any of these modules, lift the push-on connectors from the circuit board and remove mounting hardware.

When removing the Control Termination Module, the Switch Module must also be removed. The Switch Module plugs into the Control Termination Module and is secured to the front panel with two screws, two nuts, and two tubular standoffs. First, remove the hardware from the Switch Module, and then, lift the module out of its socket on the Control Termination Module.

REMOVING ADD-ON MODULES

The add-on modules are interconnected with 12-position color-coded connectors and, in some cases, screw-type terminal boards. To remove an add-on module, disconnect the interconnecting wiring and remove the two screws that secure the module to the front panel.

REPLACEMENT PARTS

The Replacement Parts List in this section includes only those items found in the basic Control Termination Panel assembly (see assembly illustration, figure 8). A Replacement Parts List for each module (standard or add-on) will be found in the Servicing Information book covering that module.

To purchase replacement parts: Locate the desired part in the Replacement Parts List; supply all listed information for each required item with the order (stock number, drawing number, and description); place order by one of the methods shown below.

Regular Orders

For mail orders, send to:

RCA Parts and Accessories
P.O. Box 100
Deptford, N.J. 08096

For telephone orders, call:

(609) 963-8000, extension PT-274, PT-275, PT-276, or PT-277

Emergency Orders

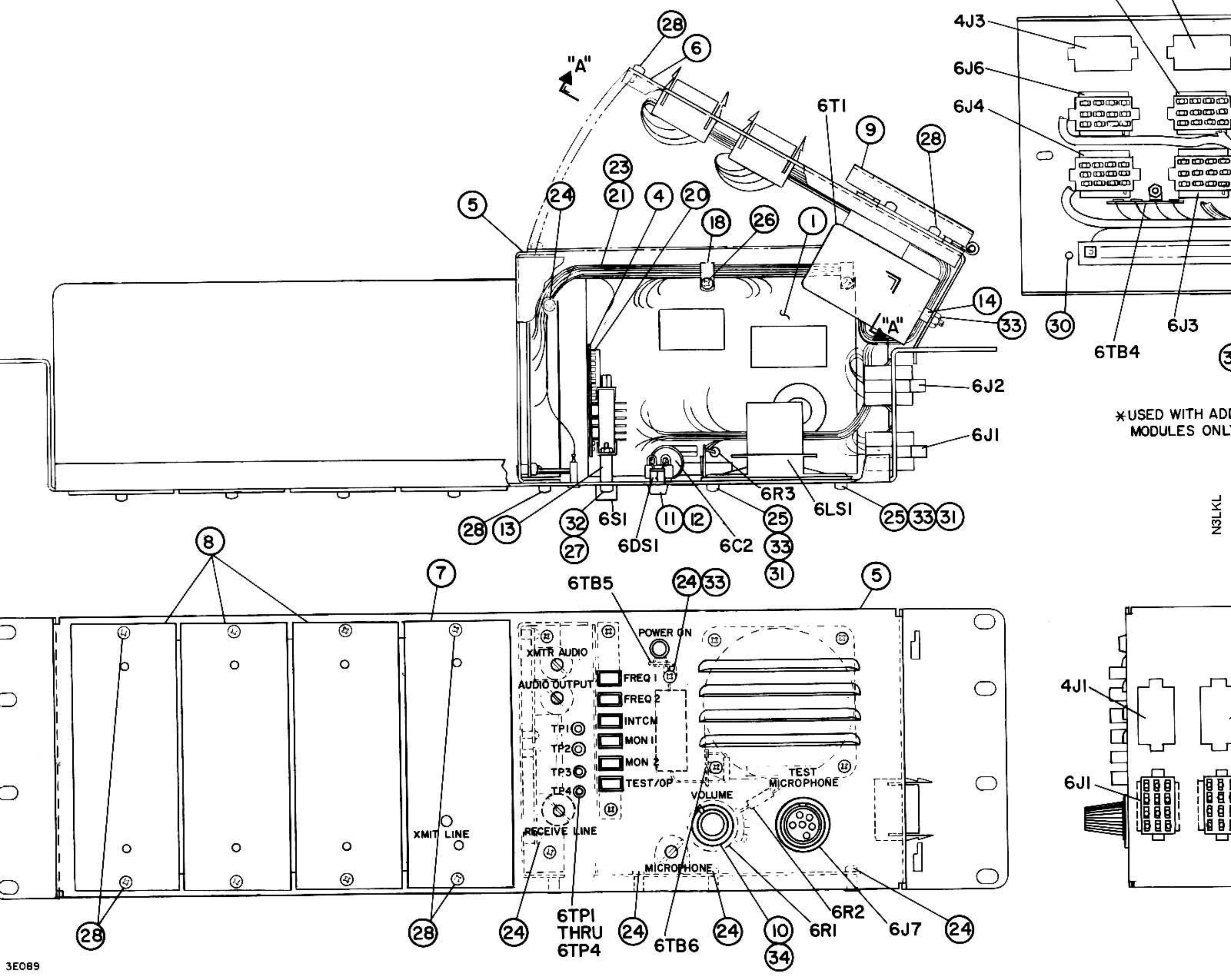
TWX: 510-686-8982 Telephone: (609) 848-5900 or (609) 963-8000, ext. PT-567

NOTE: Place emergency orders only by TWX or telephone. Do not send an emergency order by mail. Emergency orders are always shipped via premium transportation as specififed by the customer. When placing an emergency order, ask for the RCA Control Number assigned to the transaction. Furnishing this number with any future inquiries about the order will help provide answers to your questions more quickly.

REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
			MI-559412-2 CONTROL TERMINATION PANEL P/L 3457943-510
(1)	419267	3457943-502	CONTROL TERMINATION MODULE
(2)	419140	3457943-504	RECEIVE/TRANSMIT AMPLIFIER MODULE
(3)	419141	3457943-509	5-WATT AMPLIFIER MODULE
(4)	431655	3472604-001	SWITCH MODULE PRINTED CIRCUIT BOARD
(5)	------	3471601-001	CHASSIS
(6)	------	3468324-001	TERMINAL STRIP MOUNTING PLATE
(7)	------	3457957-002	MODULE PLATE, LINE TERMINATION MODULE
(8)	------	3457957-001	MODULE PLATE, ADD-ON MODULE
(9)	------	3457970-001	COVER (FOR 6TB1)
(10)	425746	3464563-002	KNOB
(11)	244053	3457763-002	LENS, GREEN
(12)	425223	3457766-001	SPEED CLIP FASTENER
(13)	------	3457204-396	SPACER, #6-32 X .5 LG (FOR 6S1)
(14)	------	3457204-404	SPACER, #10-32 X .38 LG (FOR 6T1)
(15)	------	3457312-006	SPACER (FOR 6S1)
(16)	------	3452570-004	STAND-OFF RIVET
(17)	253292	8811154-002	CABLE CLAMP, 3/16 INCH
(18)	209861	8811154-004	CABLE CLAMP, 5/16 INCH
(19)	210391	8811154-005	CABLE CLAMP, 3/7 INCH
(20)	247817	3457931-202	RECEPTACLE
(21)	228192	3450825-001	RECEPTACLE
(22)	241513	3464559-301	SOCKET
(23)	249161	3450825-005	RECEPTACLE
(24)	------	990106-105	SCREW, MACH. #6-32 X .25 LG
(25)	248550	990106-107	SCREW, MACH. #6-32 X .31 LG
(26)	------	990106-109	SCREW, MACH. #6-32 X .38 LG
(27)	------	990104-117	SCREW, MACH, #4-40 X .75 LG
(28)	248538	3454702-001	SCREW, TAPTITE #6-32 X .25 LG
(29)	427669	3454702-002	SCREW, TAPTITE #6-32 x .38 LG.
(30)	248540	3454702-104	SCREW, TAPTITE #6-32 X .31 LG
(31)	------	82278-104	WASHER, PLAIN #6
(32)	95864	57435-103	NUT, HEX #4-40
(33)	103891	57435-104	NUT, HEX #6-32
(34)	------	1510063-055	NUT, HEX 3/8-32

Symbol	*Stock No.*	*Drawing No.*	*Description*
6C1	244695	3457572-042	CAPACITOR, 1.5 UF 200V
6C2	233576	3464636-002	CAPACITOR, 1000 UF 15V
6DS1	245486	3452410-003	LAMP, 14V
6J1	241521	3464559-140	CONNECTOR, NATURAL
6J2	245487	3464559-147	CONNECTOR, VIOLET
6J3	245480	3464559-146	CONNECTOR, BLUE
6J4	245492	3464559-149	CONNECTOR, BLACK
6J5	245490	3464559-145	CONNECTOR, GREEN
6J6	245484	3464559-142	CONNECTOR, RED
6J7	229595	3453338-001	CONNECTOR, MICROPHONE
6LS1	218883	8434458-001	SPEAKER, 50 OHM
6R1	246851	3457946-001	RESISTOR, VARIABLE 500 OHM
6R2	522047	99126-046	RESISTOR, 47 OHM ±10% 2W
6R3	502047	82283-046	RESISTOR, 47 OHM ±10% ½W
6S1	246564	3731264-001	SWITCH
6T1	246565	3731255-001	TRANSFORMER, AUDIO
6TB1	------	3457757-004	TERMINAL STRIP
6TB2	------	3457757-012	TERMINAL STRIP
6TB3	------	99156-001	TERMINAL BOARD
6TB4	------	99154-003	TERMINAL BOARD
6TB5	------	99152-006	TERMINAL BOARD
6TB6	------	99153-002	TERMINAL BOARD
6TP1 THRU 6TP4	246571	3457918-003	TIP JACK


4J3
6J6
6J4
6TI
9
28
"A"
23
24
21
4
20
18
26
1
5
14
33
30
6TB4
6J3
6J2
6J1
*USED WITH ADD
MODULES ONL
6R3
6LSI
25 33 31
28
13
32
27
6SI
6DSI
11
12
6C2
25
33
31
N3LKL
8
7
6TB5
24 33
5
POWER ON
XMTR AUDIO
AUDIO OUTPUT
FREQ 1
FREQ 2
INTCM
MON 1
MON 2
TEST/OP
TP1
TP2
TP3
TP4
TEST MICROPHONE
VOLUME
XMIT LINE
RECEIVE LINE
MICROPHONE
4J1
6J1
28
28
24
6TP1 THRU 6TP4
24
6TB6
24
10
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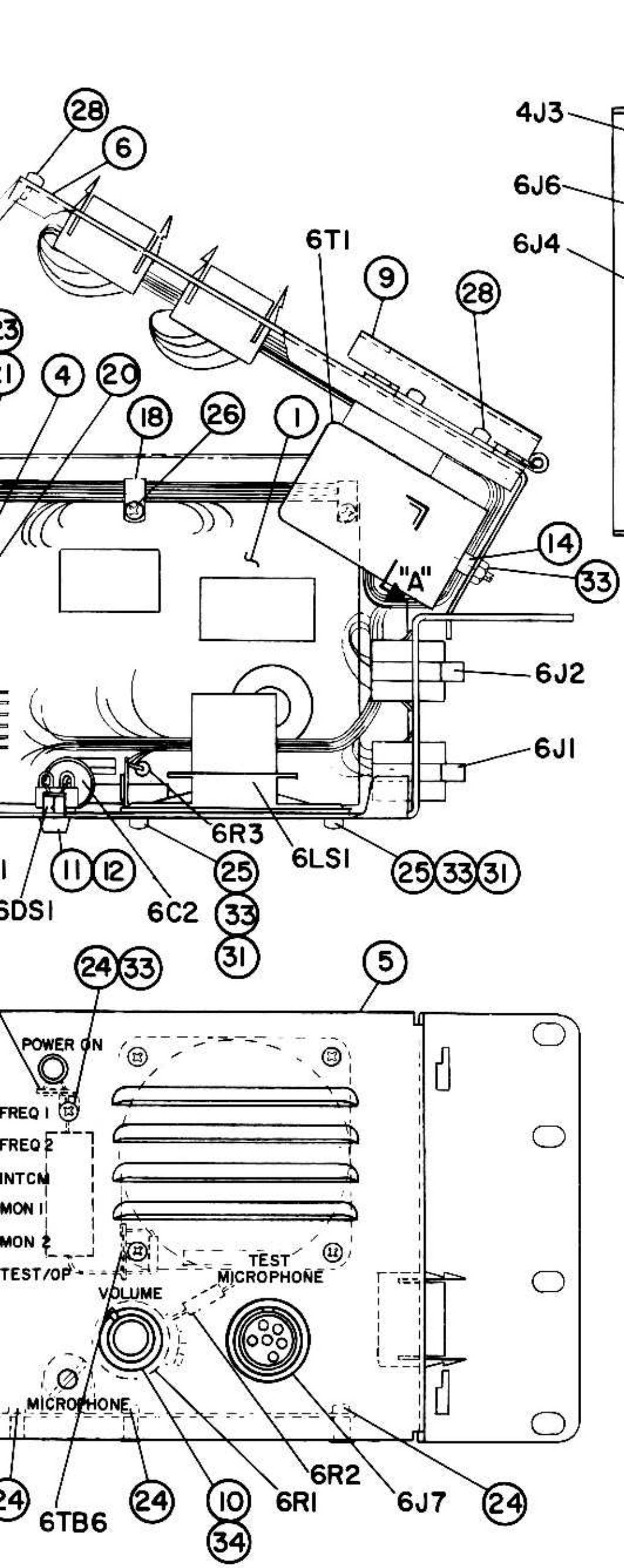
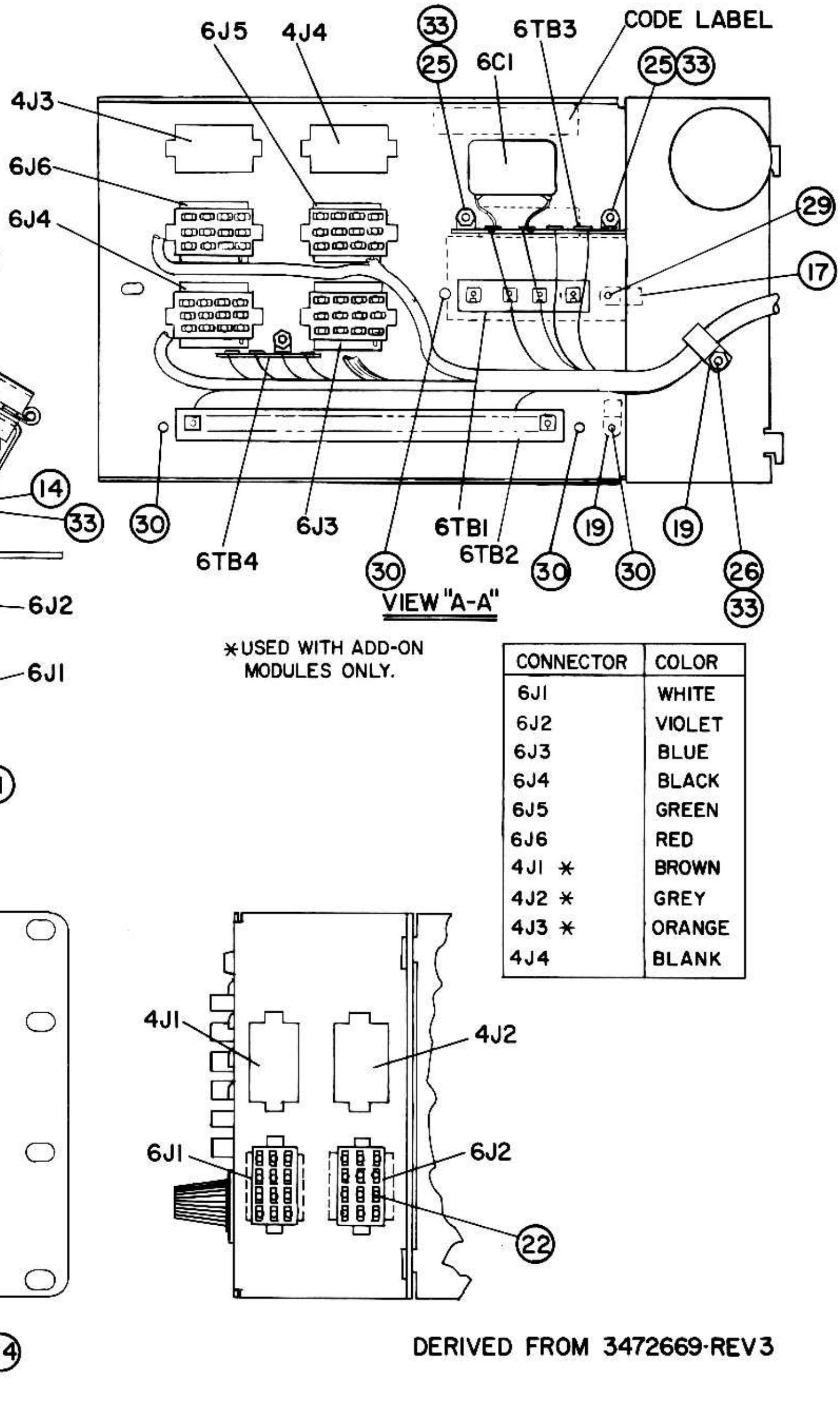
6R2
6J7
24
3E089





*USED WITH ADD-ON MODULES ONLY.

CONNECTOR	COLOR
6J1	WHITE
6J2	VIOLET
6J3	BLUE
6J4	BLACK
6J5	GREEN
6J6	RED
4J1 *	BROWN
4J2 *	GREY
4J3 *	ORANGE
4J4	BLANK

DERIVED FROM 3472669-REV3

Figure 8. Control Termination Panel Assembly

CONNECTOR	CONNECTS TO
6J1 NATURAL	1J6 BLACK ON FIRST REC.
6J2 VIOLET	1J5 YELLOW ON FIRST REC.
6J3 BLUE	REPEATER MODULE
6J4 BLACK	REMOTE CONTROL MODULE
6J5 GREEN	TRANS 1 CONTROL
6J6 RED	REC. 1 CONTROL
6J7	TEST MICROPHONE
6TB2	EXTENDED LOCAL

CONNECTOR

SOLDER

NOTE:

1. THE WIRE CONNECTED BETWEEN 6TB6-3 AND 6J6-4 IS INCLUDED IN MI-559412-2 ONLY. FOR TONE CONTROL SYSTEMS, THIS WIRE MUST BE ADDED TO MI-559412-1. ALSO, BOTH PANELS (MI-559412-1 AND MI-559412-2) HAVE AUDIO INPUT CONNECTED FOR DC CONTROL ONLY (WIRE CONNECTED BETWEEN 72-10 AND 60-2). FOR TONE CONTROL, THE AUDIO INPUT MUST BE CONNECTED AS SHOWN BY THE DASHED LINES. JUMPERS REQUIRED ARE PART OF MI-559811.

2. DEPENDING UPON SPECIFIC CONTROL SYSTEM REQUIREMENTS, CHANGES TO THE CONTROL TERMINATION MODULE WIRING MAY HAVE TO BE MADE. THESE CHANGES ARE ITEMIZED IN THE FOLLOWING TABLE:

COMMAND OPTION SUFFIX ①				
SUFFIX	LATCH RELAY MI-559416 61K2	INPUT CONTROL WIRING ②	OUTPUT WIRING ③	JUMPER FROM 41 TO 23
	QTY. REQ'D	NO MATERIAL REQUIRED		
A	1	T	F1F2	RETAIN
B	1	N	F1F2	RETAIN
C	1	N	RPT. DIS.	RETAIN
D	1	N	QT ON/OFF	RETAIN
M	1	T	F1F2	REMOVE
N	1	N	F1F2	REMOVE
O	1	N	RPT. DIS.	REMOVE
P	1	N	QT ON/OFF	REMOVE
X	0	T	F1F2	REMOVE
Y	0	T	F1F2	RETAIN

① APPLICABLE TO COMMAND OPTIONS B01 THRU B13 ONLY

② "T" DENOTES OPERATION OF THE LATCH RELAY BY "TRANSMIT" COMMANDS AND SHOULD HAVE CONNECTIONS 61-25 TO 61-38 AND 61-24 TO 61-20. "N" DENOTES OPERATION OF THE LATCH RELAY BY "NON-TRANSMIT" COMMANDS AND SHOULD HAVE CONNECTIONS 61-25 TO 61-4 AND 61-24 TO 61-2.

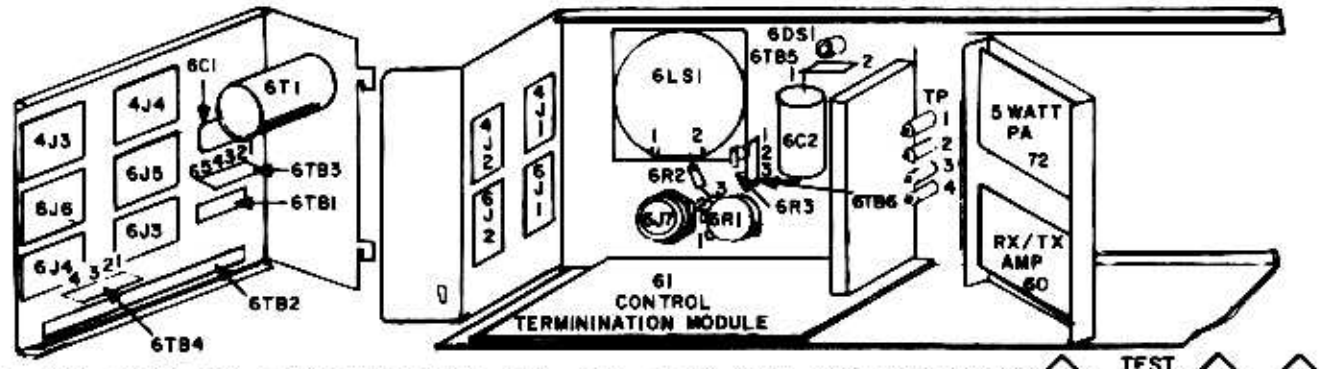
③ THE "F1F2" NOTATION REQUIRES NO WIRING CHANGES. THE "REPEAT DISABLE" AND "QT ON/OFF" NOTATIONS REQUIRE THAT RECEPTACLES 61-32, -33, AND -37 BE REMOVED AND TAPED.

STANDARD INTERNAL WIRING

(2) MI-559412-1 WIRING DIAGRAM BASE STATION USING 5W AMPLIFIER. FOR L/P SEE 3457943-508.

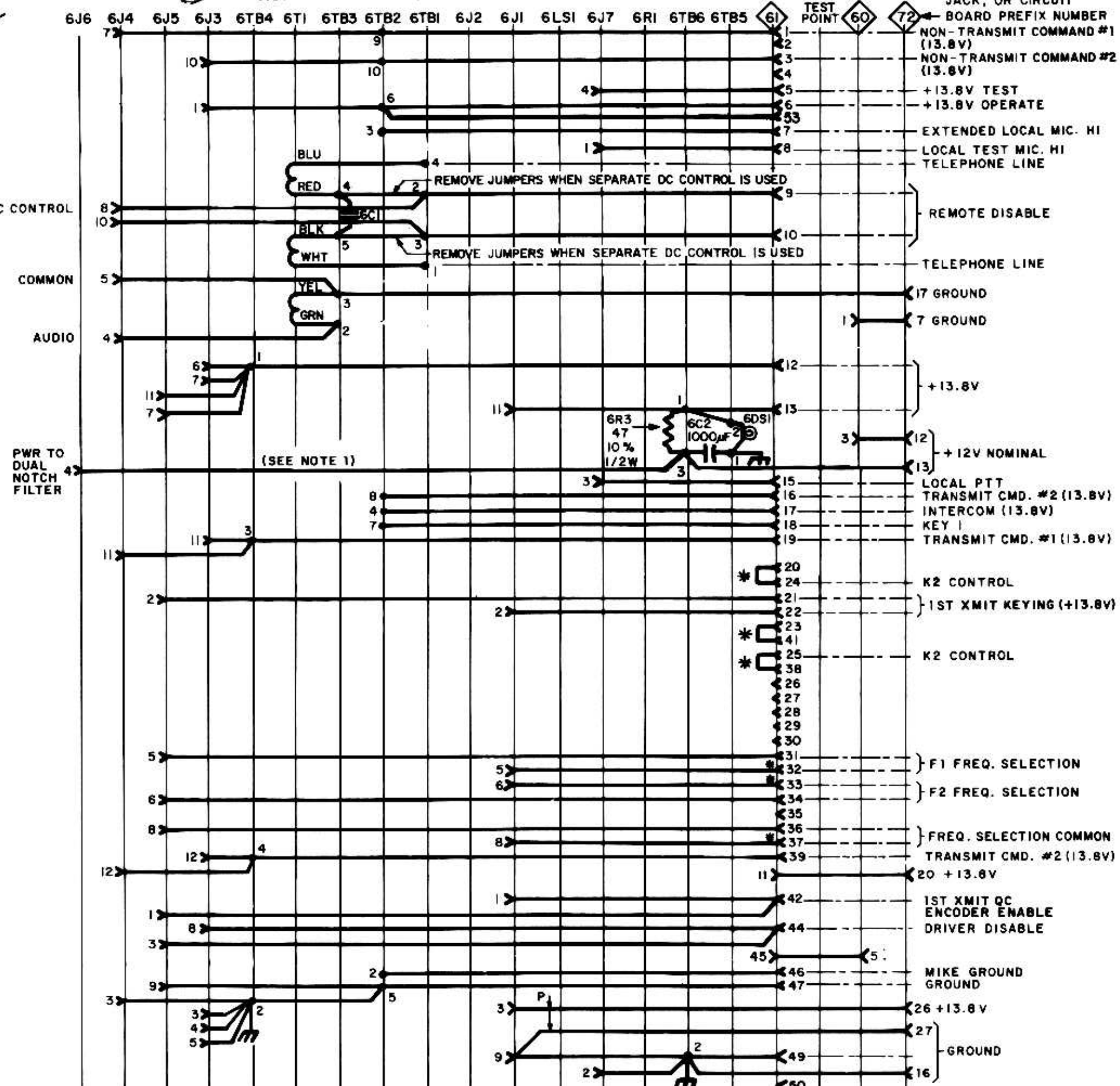
(8) MI-559412-2 WIRING DIAGRAM BASE STATION USING 5W AMPLIFIER. FOR L/P SEE 3457943-510.

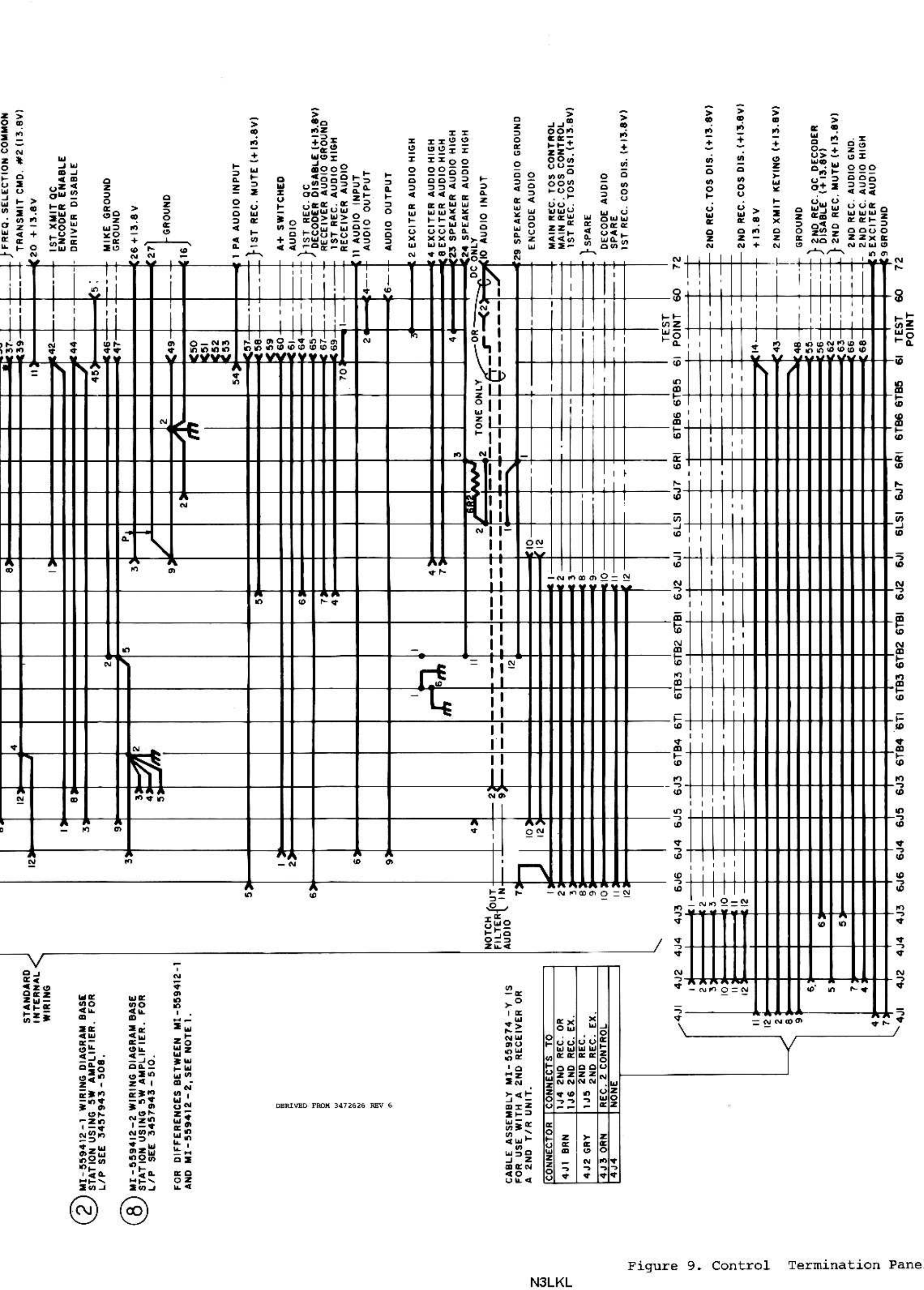
FOR DIFFERENCES BETWEEN MI-559412-1 AND MI-559412-2, SEE NOTE 1.



6J7
TEST
MICROPHONE

FRONT VIEW





CONNECTOR	CONNECTS TO
4J1 BRN	1J4 2ND REC. OR 1J6 2ND REC. EX.
4J2 GRY	1J5 2ND REC. 2ND REC. EX.
4J3 ORN	REC. 2 CONTROL
4J4	NONE

Figure 9. Control Termination Panel Wiring

RCA

Basic Modules
Control Termination Panel

GENERAL INFORMATION

The modules in this group are used in all standard RCA Control Termination Panels. Each module instruction book contains the following information:

1. Circuit Description
2. Pathfinder Diagram
3. Schematic Diagram
4. Replacement Parts List
5. Table of emergency substitutes for solid-state devices.

INSTRUCTION BOOK INDEX

RCA

Servicing Information
3457943-502
Control Termination Module
and
Switch Module

MODULE DESCRIPTIONS

CONTROL TERMINATION MODULE

The Control Termination Module provides mounting space for one or two plug-in relays (K1 and K2) and for the 3731264-1 Switch Module. The Switch Module is mounted on a printed circuit board that plugs into J1 and is described in a separate section of this instruction book. Only the operation of relays K1 and K2 is described below. For local or extended local operation, control R4 may be used to adjust microphone output level and for repeater operation, network C1/C2/R1/R5/L1 provides de-emphasis.

The Local Simplex relay (K1) is energized by a transmit or non-transmit command from either the control unit or the local test facility. Contacts of K1 disable the remote or repeater control circuitry (if used) and make the proper audio connections for local or extended local operation. In combination control systems, local control has priority over remote or repeater control; therefore, relay K1 will pick up whether a remote or repeater command is being received or not. F1 commands are applied thru CR9, F2 commands thru CR8, and INTERCOM commands thru CR10.

Latching relay K2 may be used for F1-F2 control or other latching control functions, as required. The relay is shown reset on the schematic diagram. If +13.8 VDC is applied to pin 25 of the Control Termination Module, the relay will latch in the set position. To reset the relay, +13.8 VDC is applied to pin 24 of the Control Termination Module, the relay will latch in the set position. To reset the relay, +13.8 VDC is applied to pin 24 of the Control Termination Module.

SWITCH MODULE

The Switch Module consists of six 4PDT push-button switches soldered to a printed circuit board. The circuit board plugs into the Control Termination Module. On switches S1A and S1B, only two poles are used; on S1-C, S1-D, and S1-1, one pole is used; on S1-F, three poles are used.

The six switches are of three functionally different types: S1-A and S1-B are mechanically interlocked (pressing one switch in returns other switch to out position); S1-C and S1-F are push-push types (must be pressed a second time to return switch to out position); S1-D and S1-E are momentary types (return to out position when released).

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES (Control Termination Module)

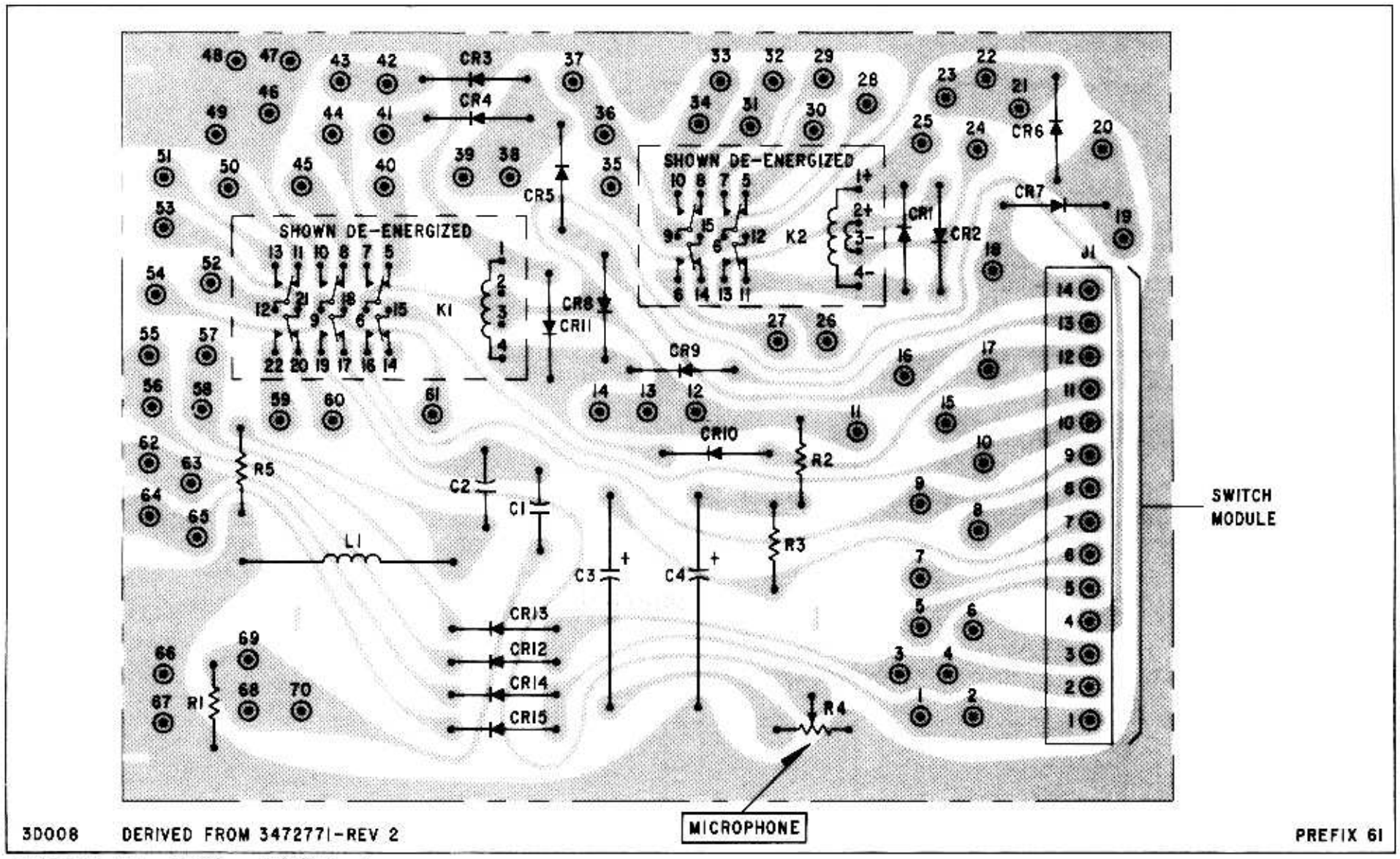
In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be used temporarily. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute
61CR1 - 61CR15	1N5059

REPLACEMENT PARTS

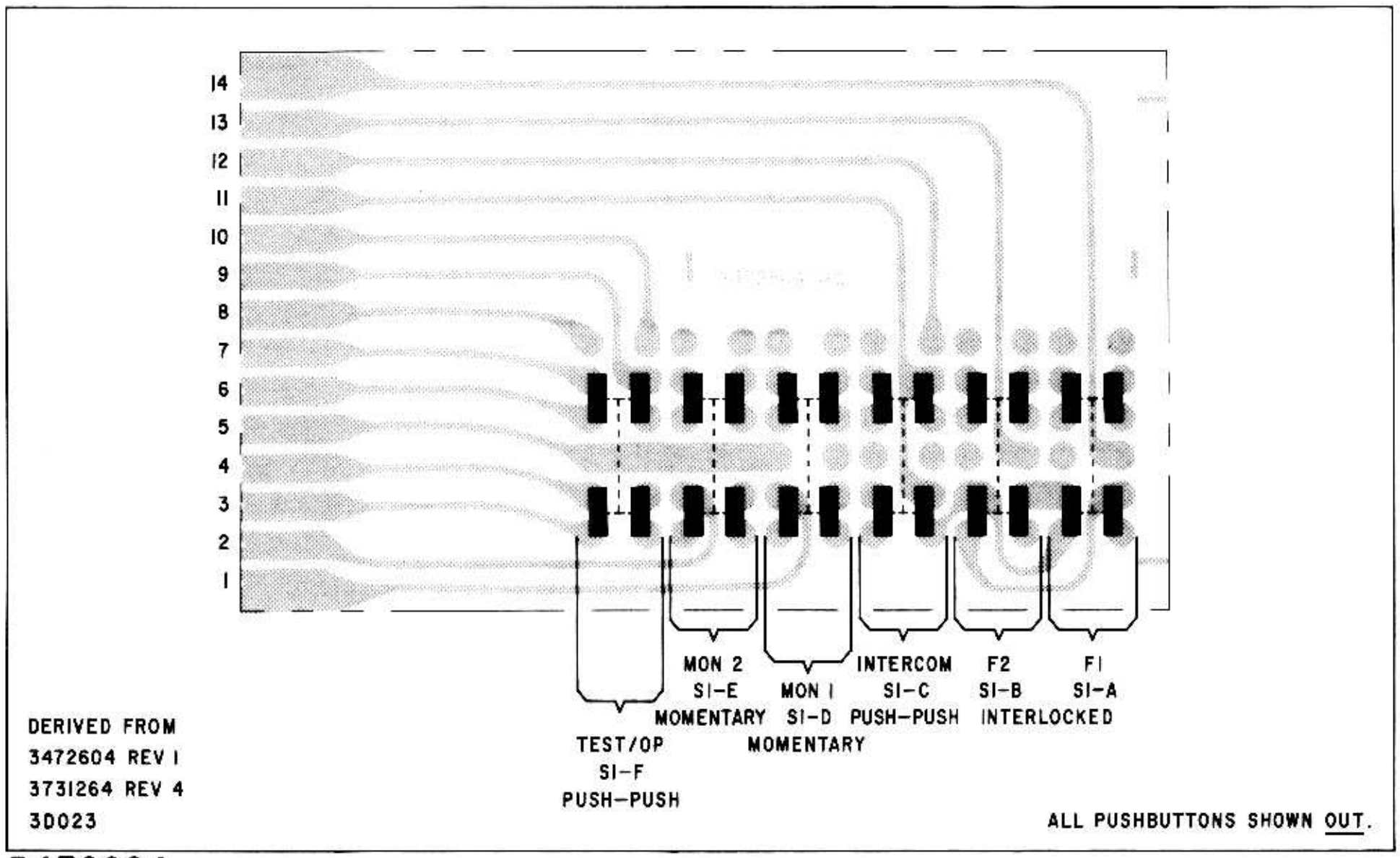
Symbol	*Stock No.*	*Drawing No.*	*Description*
----	419267*	3457943-502 *	**CONTROL TERMINATION MODULE** P/L 3457943-502 REV 24 CODE A
61C1	242744	3457081-147	FILM, .068 MF 10% 100V
61C2	242744	3457081-147	FILM, .068 MF 10% 100V
61C3	221890	3453563-001	1 MF 15V DC
61C4	233827	3452563-009	ELECTROLYTIC, 22 MF 15V
61CR1 TO 61CR15	246572	3731229-001	RECTIFIER - SILICON
61J1	246563	3457934-114	POST CONNECTOR
61K1	247998	3467322-012	RELAY
61K2	431411	3467365-116	RELAY
61L1	246562	3731271-001	COIL - 180 MH
61R1	108861	99206-050	100 OHMS 5% 1/4W
61R2	113524	99206-067	2700 OHMS 5% 1/4W
61R3	108865	99206-062	1000 OHMS 5% 1/4W
61R4	246576	3463187-015	VARIABLE, 25,000 OHMS 1/8W
61R5	108866	99206-066	2200 OHMS 5% 1/4W
61XK1	231436	3467276-017	SOCKET - RELAY
61XK2	231435	3467276-011	SOCKET - RELAY
73	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5
			SWITCH MODULE CONSISTING OF:
------	------	3472604-001	PRINTED CIRCUIT BOARD
6S1	246564	3731264-001	SWITCH ASSEMBLY

* Does not include 61K2



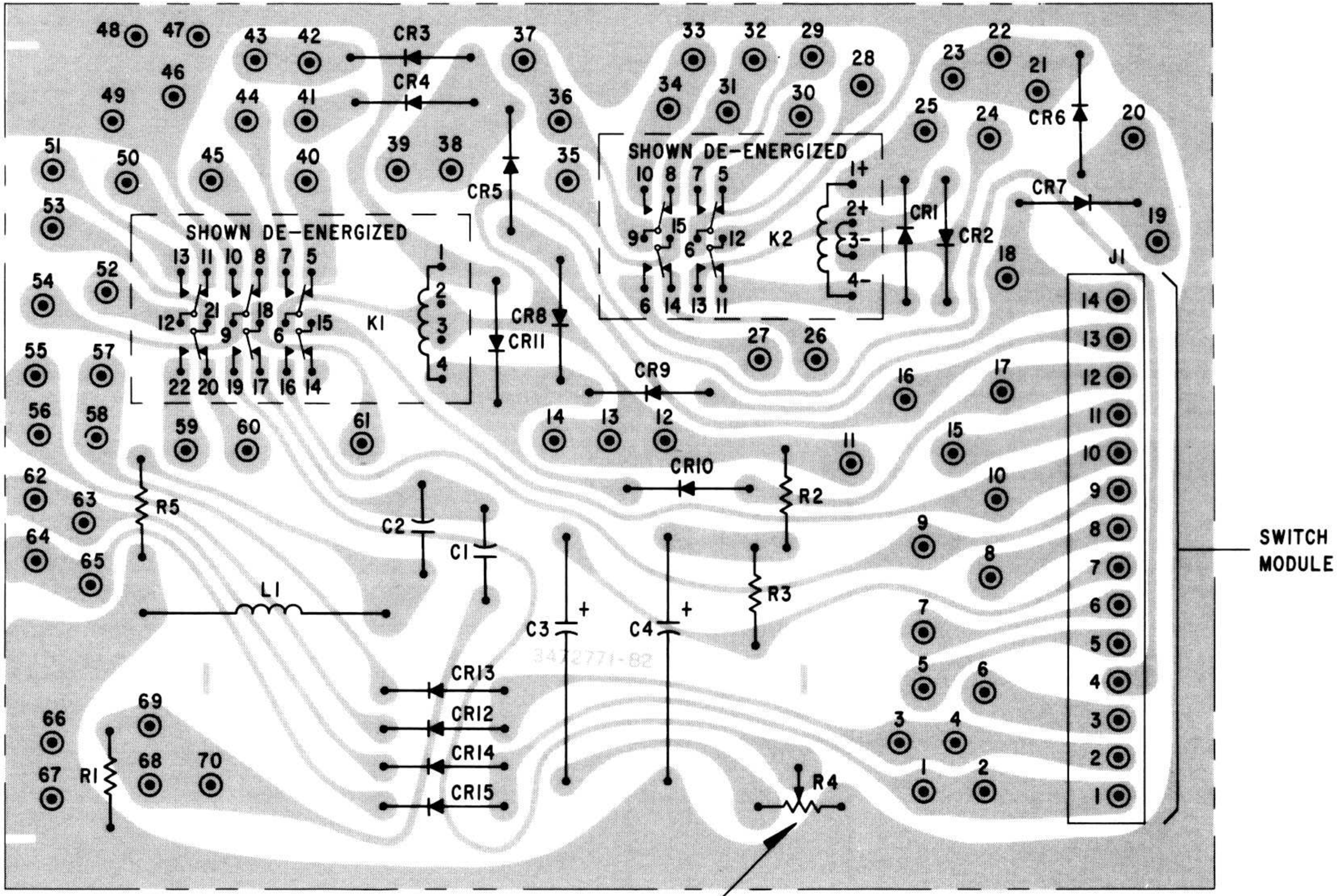
3457943-502 CODE A

Control Termination Module Pathfinder Diagram



3472604

Switch Module Pathfinder Diagram



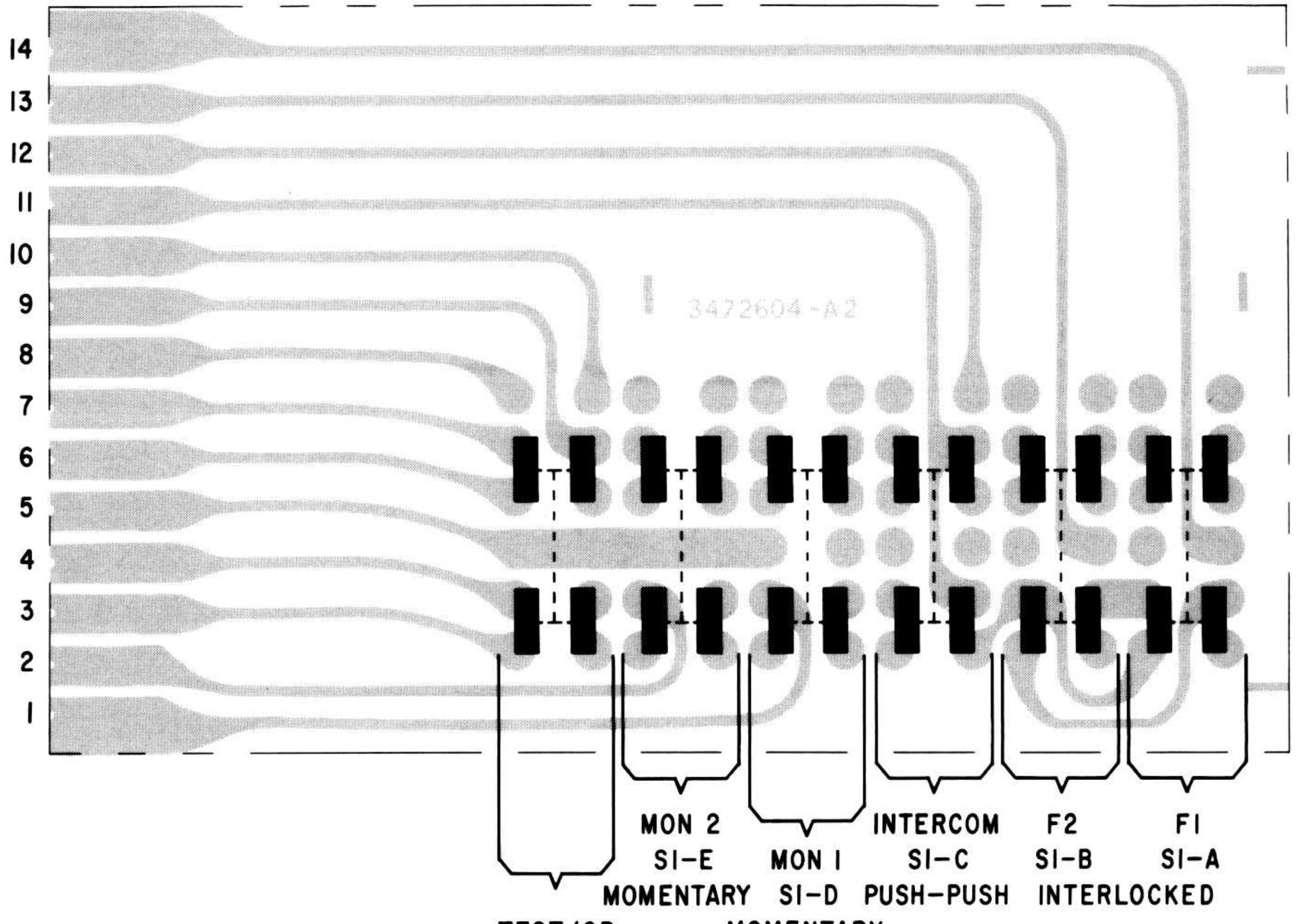
3D008 DERIVED FROM 3472771-REV 2

PREFIX 61

3457943-502 CODE A

Control Termination Module Pathfinder Diagram

N3LKL

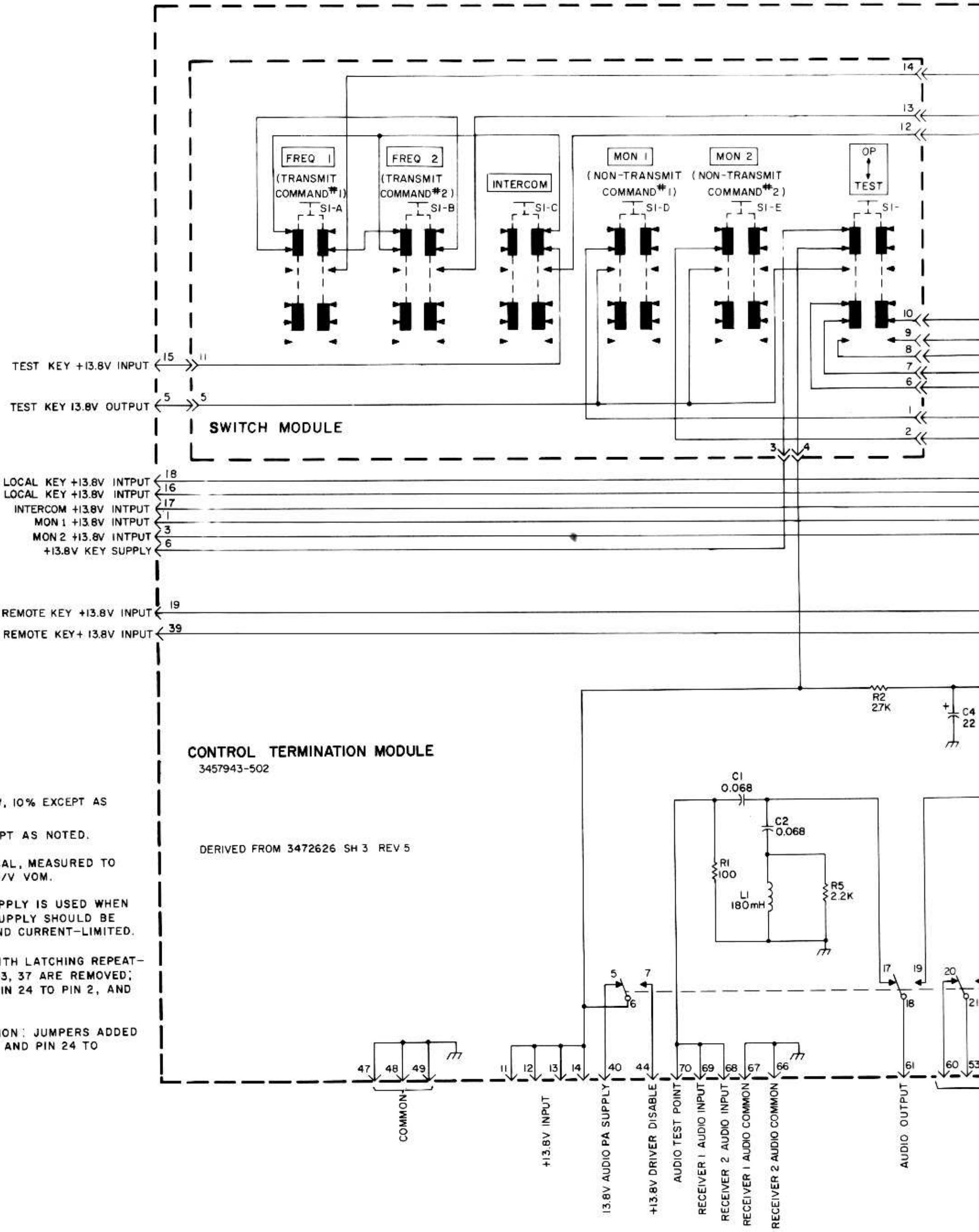


DERIVED FROM
3472604 REV 1
3731264 REV 4
3D023

ALL PUSHBUTTONS SHOWN OUT.

3472604

N3LKL



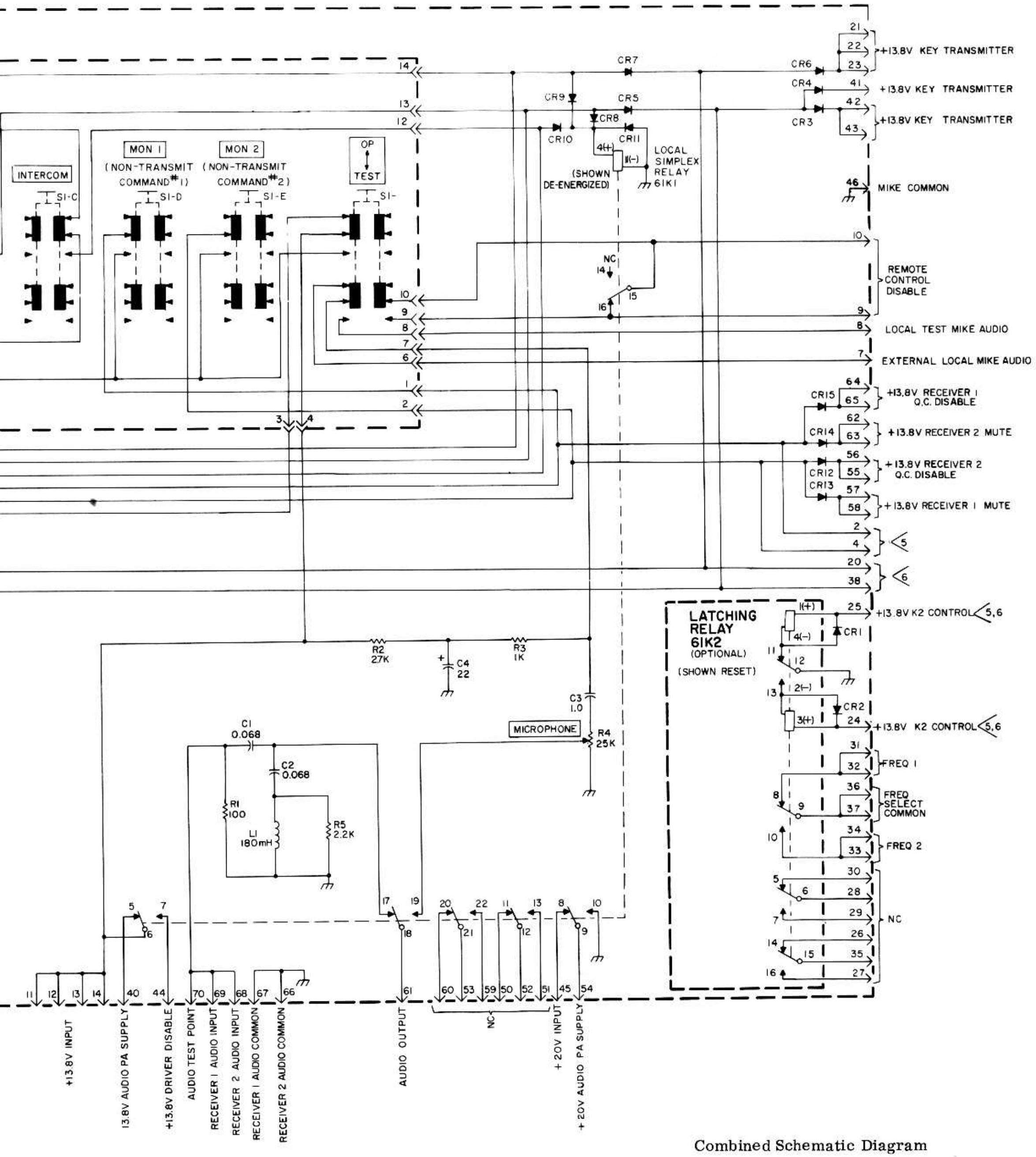
NOTES:

1. RESISTORS IN OHMS. 1/2W, 10% EXCEPT AS NOTED.
2. CAPACITORS IN μF EXCEPT AS NOTED.
3. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 O/V VOM.
4. IF EXTERNAL POWER SUPPLY IS USED WHEN TESTING THIS BOARD, SUPPLY SHOULD BE VOLTAGE-REGULATED AND CURRENT-LIMITED.

5 REPEATER SYSTEMS WITH LATCHING REPEATER DISABLE: PINS 32, 33, 37 ARE REMOVED; JUMPERS ADDED FROM PIN 24 TO PIN 2, AND PIN 25 TO PIN 4.

6 2-FREQUENCY OPERATION: JUMPERS ADDED FROM PIN 25 TO PIN 38, AND PIN 24 TO PIN 20.

30061



Combined Schematic Diagram

Control Termination Module/Switch Module

RCA

Servicing Information

MI-559520 (3457943-504)

Receive/Transmit Amplifier Module

CIRCUIT DESCRIPTION

The audio input to the Receive/Transmit Amplifier Module is amplified first by conventional amplifiers Q1 and Q2 and then by complementary-symmetry amplifer Q3/Q4. To reduce distortion, negative feedback is applied from the emitters of Q3 and Q4 to the emitter of Q1 through network R18/R19/C12. The approximate gain of each stage may be deduced from the typical audio voltages shown on the schematic.

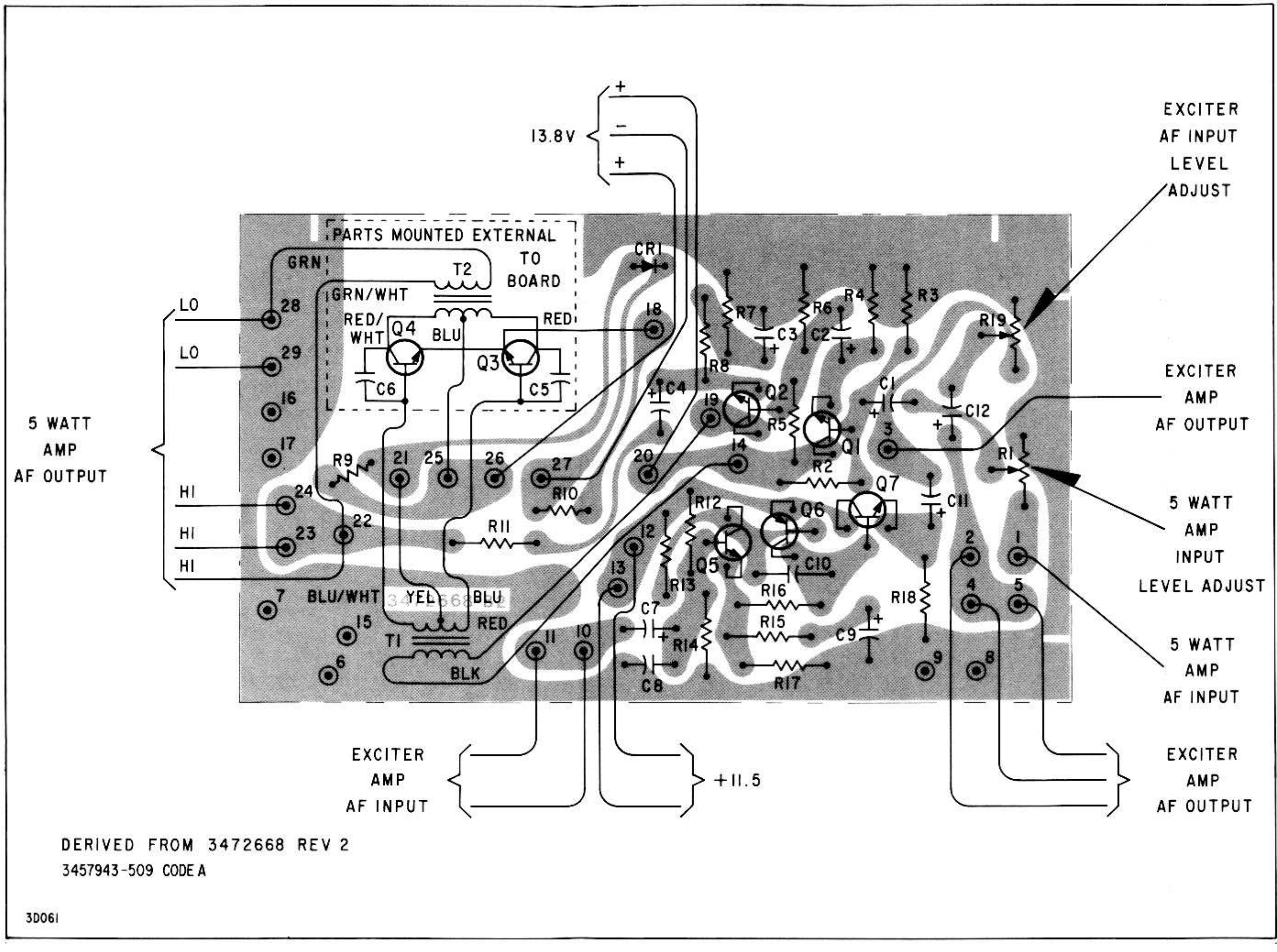
EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be used temporarily. However, use of these substitutes may result in degraded system performance.

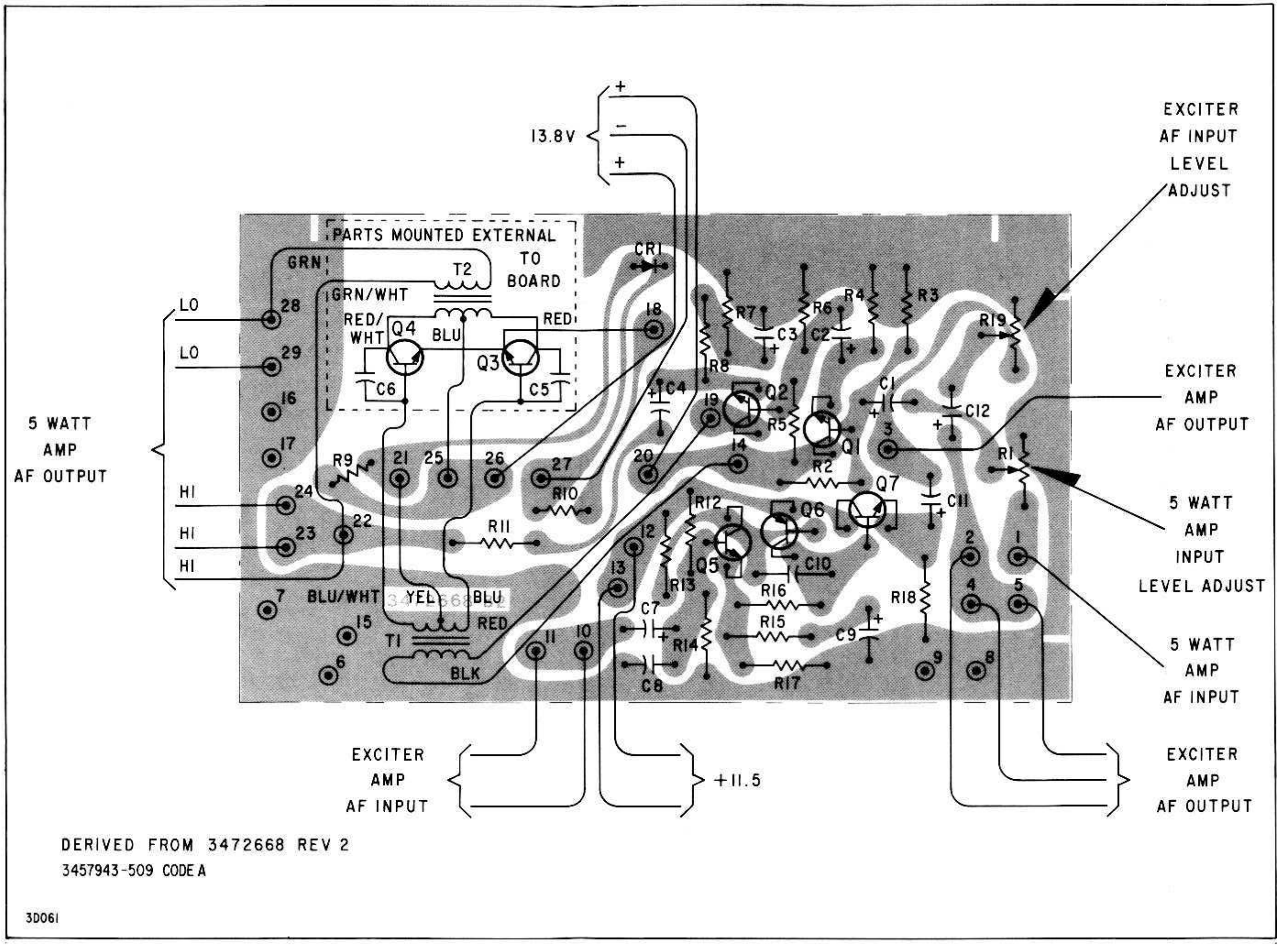
Component Designation	Emergency Substitute
60Q1	2N5088
60Q2	2N4250
60Q3, 60Q4	T1S60M, T1S61M (Matched pair)

REPLACEMENT PARTS

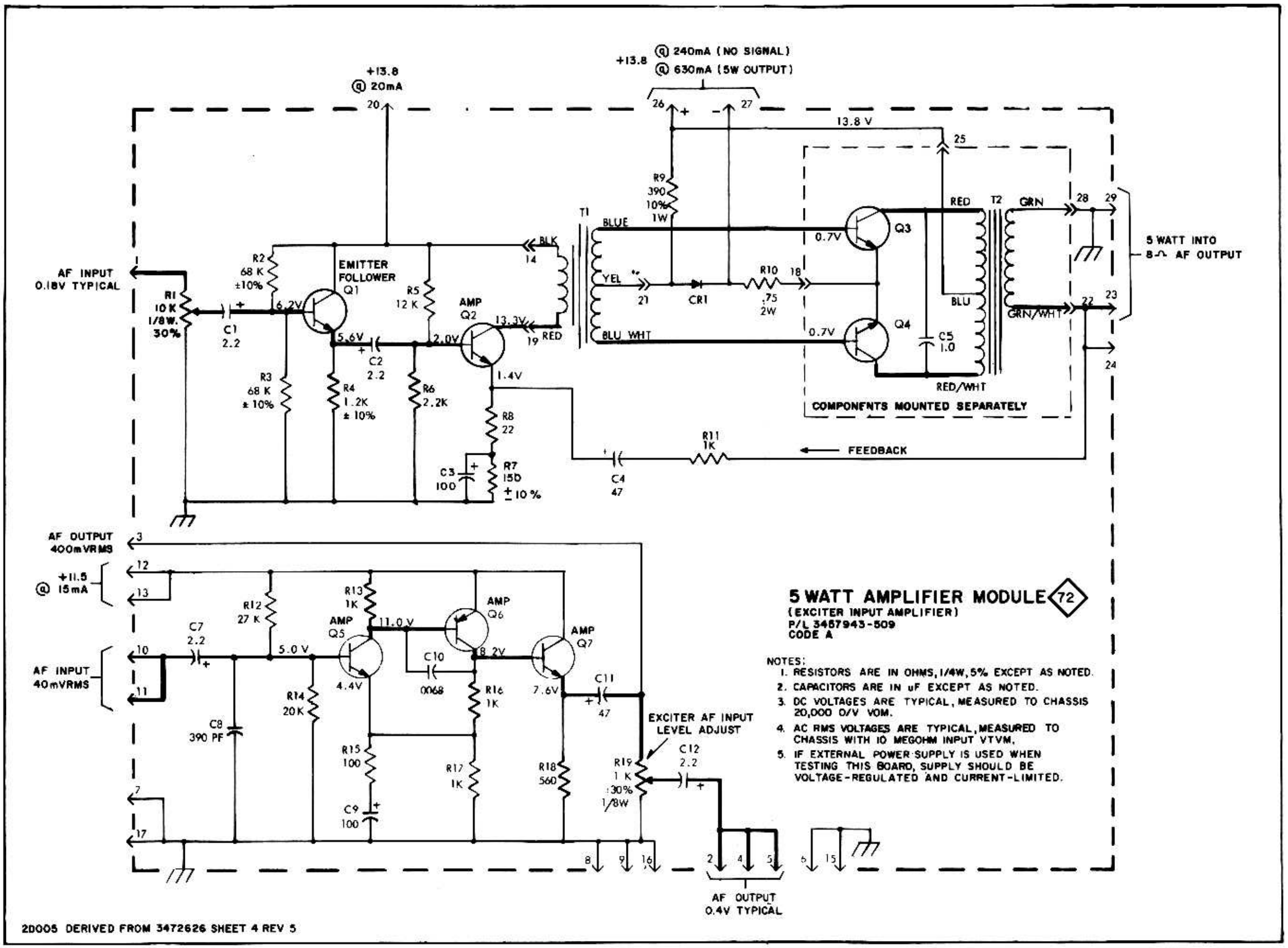
Symbol	*Stock No.*	*Drawing No.*	*Description*
-----	419140	3457943-504	**RECEIVE/TRANSMIT AMPLIFIER MODULE** P/L 3457943-504 REV 24 CODE A
60C1	242746	3457081-152	FILM, 0.10 MF 10% 100V
60C2	249159	3453563-103	ELECTROLYTIC, 2.2 MF 15V
60C3	249159	3453563-103	ELECTROLYTIC, 2.2 MF 15V
60C4	218459	8978533-003	CERAMIC, 820 PF 20% 1000V
60C5	243595	3457081-143	FILM, .047 MF 10% 100V
60C6	233827	3453563-109	ELECTROLYTIC, 22 MF 15V
60C7	218459	8978533-003	CERAMIC, 820 PF 20% 1000V
60C8	242033	3457537-004	VARIABLE, MICA, 100 MF 20% 6V
60C9	242737	3457537-018	VARIABLE, MICA, 3.3 MF 20% 35V
60C10	233827	3453563-109	ELECTROLYTIC, 22 MF 15V
60C11	233827	3453563-109	ELECTROLYTIC, 22 MF 15V
60C12	233827	3453563-109	ELECTROLYTIC, 22 MF 15V
60C13	234543	3463453-017	CERAMIC, .01 MF 25V
60C14	242742	3457081-139	FILM, .033 MF 10% 100V
60C15	242742	3457081-139	FILM, .033 MF 10% 100V
60C16	234543	3463453-017	CERAMIC, .01 MF 25V
60C17	233827	3453563-109	ELECTROLYTIC, 22 MF 15V
60Q1	243585	3468242-001	TRANSISTOR
60Q2	242958	3457936-001	TRANSISTOR
60Q3 AND 60Q4	246578	3457937-003	TRANSISTOR - MATCHED PAIR
60R1	246575	3463187-014	VARIABLE, 15,000 OHMS 30% 1/8W
60R2	218499	99206-074	10,000 OHMS 10% 1/4W
60R3	108867	99206-072	6800 OHMS 10% 1/4W
60R4	218761	99206-204	75,000 OHMS 5% 1/4W
60R5	285421	99206-191	22,000 OHMS 5% 1/4W
60R6	108865	99206-062	1000 OHMS 10% 1/4W
60R7	285258	99206-182	9100 OHMS 5% 1/4W
60R8	108865	99206-062	1000 OHMS 10% 1/4W
60R9	219465	99206-073	8200 OHMS 10% 1/4W
60R10	269897	99206-131	68 OHMS 5% 1/4W
60R11	233931	99206-123	33 OHMS 5% 1/4W
60R12	300688	99206-152	510 OHMS 5% 1/4W
60R13	300598	99206-161	1200 OHMS 5% 1/4W
60R14	108867	99206-179	6800 OHMS 5% 1/4W
60R15	108867	99206-179	6800 OHMS 5% 1/4W
60R16	300598	99206-161	1200 OHMS 5% 1/4W
60R17	285573	99206-038	10 OHMS 10% 1/4W
60R18	285421	99206-078	22,000 OHMS 10% 1/4W
60R19	285421	99206-078	22,000 OHMS 10% 1/4W
60R20	285573	99206-038	10 OHM 10% 1/4W
73	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5



Pathfinder Diagram



Pathfinder Diagram



Schematic Diagram

Servicing Information
MI-559521 (3457943-509)
5-Watt Amplifier Module

CIRCUIT DESCRIPTION

The 5-Watt Amplifier Module has two separate amplifier circuits: a 5-watt amplifier to drive a 50-ohm speaker, and an exciter input amplifier to drive the transmitter exciter. The exciter input amplifier consists of ampliers Q5, Q6, Q7. The 5-watt amplifier consists of emitter follower Q1, amplifier Q2, and push-pull amplifier Q3/Q4. To reduce distortion, negative feedback is applied from the push-pull amplifier output, through R11 and C4, to the emitter of Q2. Components C5, Q3, Q4 and T2 are mounted on the module bracket; all other components are mounted on the printed circuit board.

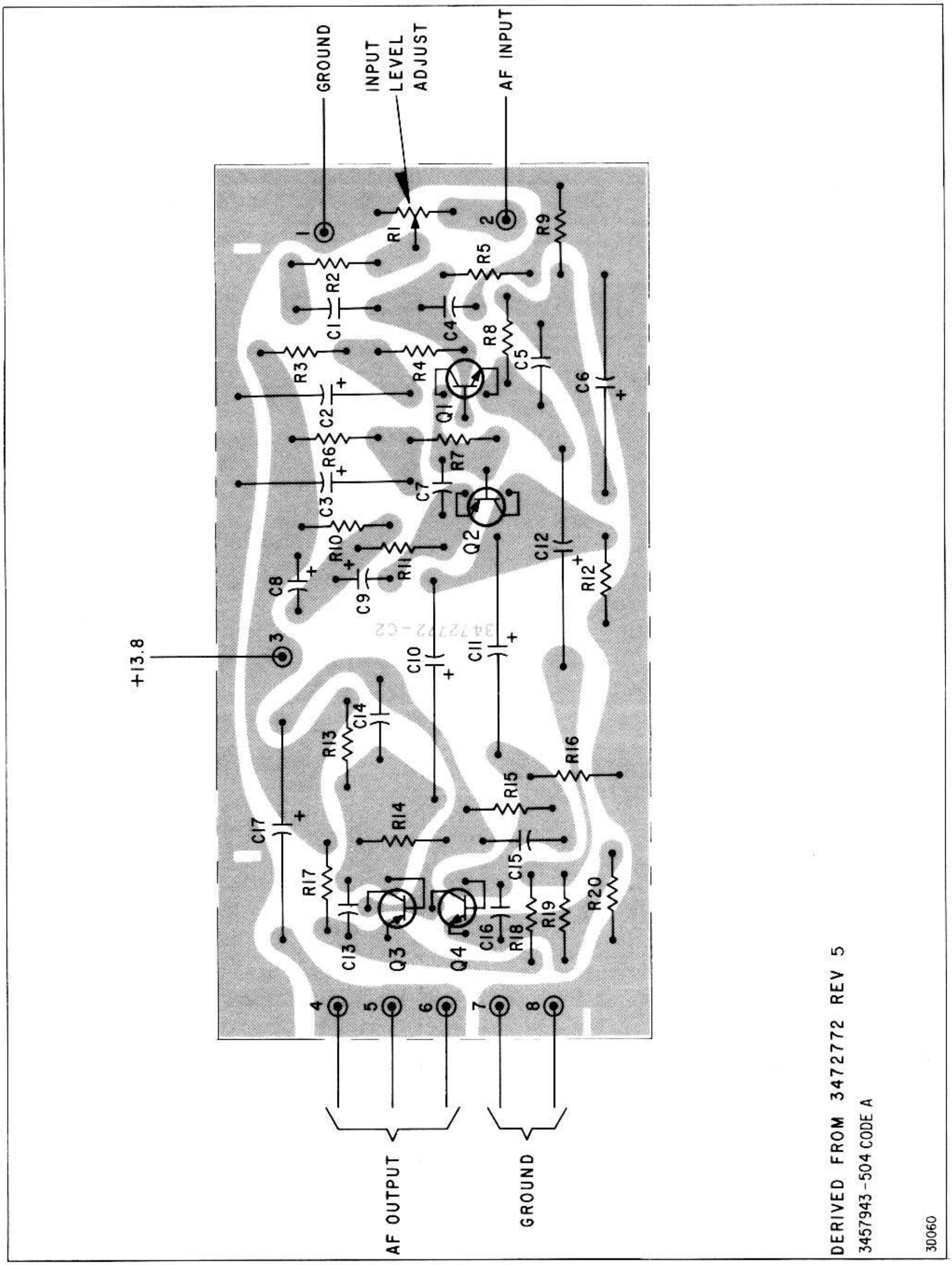
EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipmentdowntime, the following common semiconductor types may be used temporarily. However, use of these substitutes may result in degraded system performance.

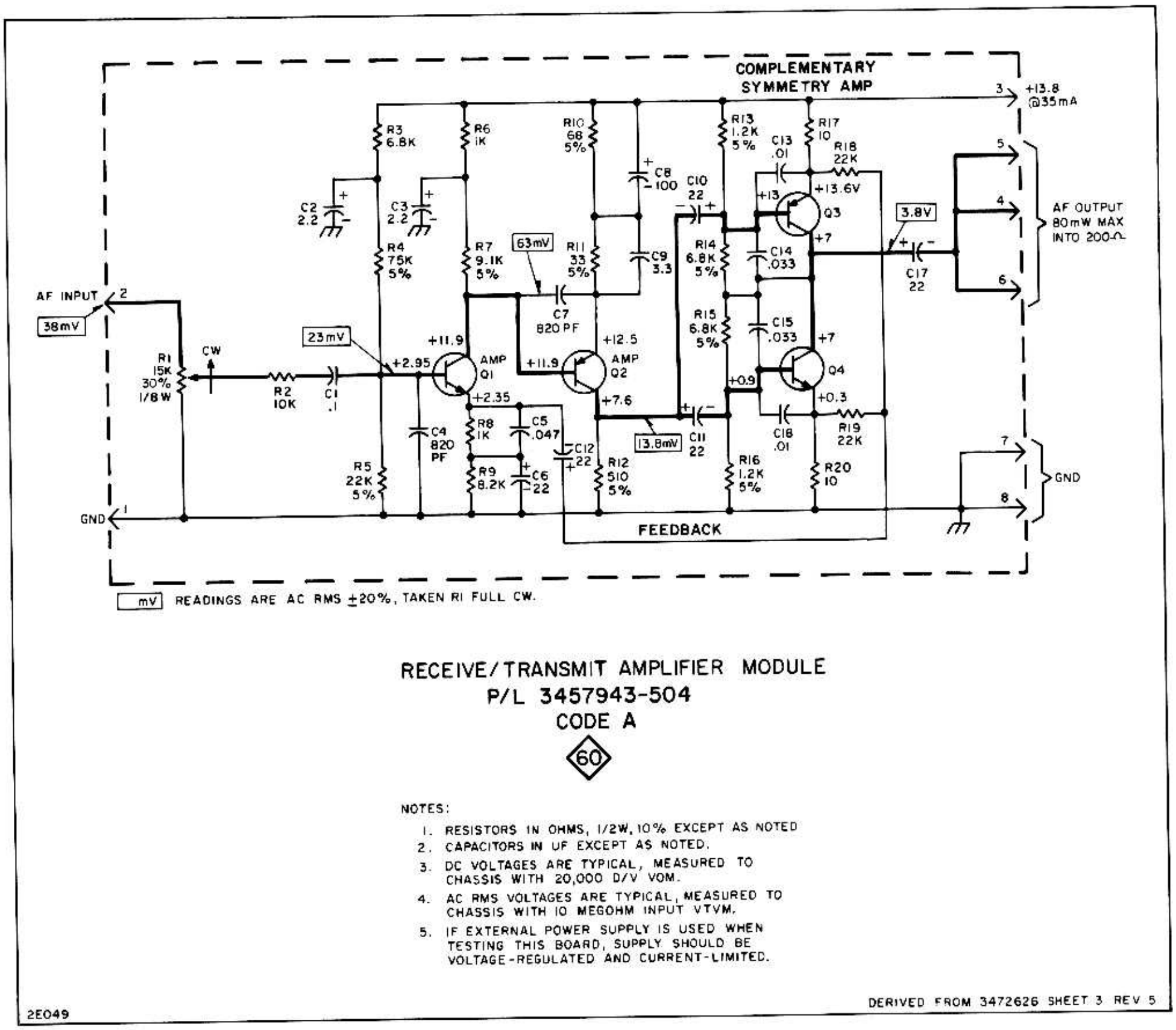
Component Designation	Emergency Substitute
72CR1	1N3754
72Q1	40231
72Q3	2N2222A
72Q4	2N5036
72Q5	2N5088
72Q6	2N4125
72Q7	40231

REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
-----	419141	3457943-509	5-WATT AMPLIFIER MODULE P/L 3457943-509 REV 25 CODE A
72C1	246570	3457537-011	TANTALUM, 2.2 MF 20% 20V
72C2	246570	3457537-011	TANTALUM, 2.2 MF 20% 20V
72C3	242033	3457537-004	TANTALUM, 100 MF 20% 6 V
72C4	244090	3457537-010	TANTALUM, 47 MF 20% 20V
72C5	303196	3457572-015	FILM, 1.0 MF 10% 100V
72C7	246570	3457537-011	TANTALUM, 2.2 MF 20% 20V
72C8	105310	3463041-216	CERAMIC, 390 PF 10% 200V
72C9	245168	3457537-043	TANTALUM, 100 MF 20% 20V
72C10	249160	3463041-231	CERAMIC, .0068 MF 10% 200V
72C11	244090	3457537-010	TANTALUM, 47 MF 20% 15V
72C12	246570	3457537-011	TANTALUM, 2.2 MF 20% 20V
72CR1	242039	3460758-002	DIODE
72Q1	244095	3468071-001	TRANSISTOR
72Q2		3723382-010	TRANSISTOR
72Q3	241888	3464648-002	TRANSISTOR
72Q4	241888	3464648-002	TRANSISTOR
72Q5	243585	3468242-001	TRANSISTOR
72Q6	242760	3468183-001	TRANSISTOR
72Q7	244095	3468071-001	TRANSISTOR
72R1	235408	3463187-006	VARIABLE, 10,000 OHMS 30% 1/8W
72R2	285447	99206-084	68,000 OHMS 10% 1/4W
72R3	285447	99206-084	68,000 OHMS 10% 1/4W
72R4	300598	99206-063	1200 OHMS 10% 1/4W
72R5	108868	99206-185	12,000 OHMS 5% 1/4W
72R6	108866	99206-167	2200 OHMS 5% 1/4W
72R7	227744	99206-052	150 OHMS 10% 1/4W
72R8	258841	99206-119	220 OHMS 5% 1/4W
72R9	512139	90496-057	390 OHMS 10% 1W
72R10	241260	993022-013	WIREWOUND, 0.75 OHMS 5% 2 W
72R11	108865	99206-159	1000 OHMS 5% 1/4W
72R12	219467	99206-193	27,000 OHMS 5% 1/4W
72R13	108865	99206-159	1000 OHMS 5% 1/4W
72R14	219466	99206-190	20,000 OHMS 5% 1/4W
72R15	108861	99206-135	100 OHMS 5% 1/4W
72R16	108865	99206-159	1000 OHMS 5% 1/4W
72R17	108865	99206-159	1000 OHMS 5% 1/4W
72R18	227741	99206-153	560 OHMS 5% 1/4W
72R19	245482	3463187-003	VARIABLE, 1000 OHMS 30% 1/8 W
72T1	246966	3464575-002	TRANSFORMER - AUDIO DRIVER
72T2	241890	3464574-001	TRANSFORMER - AUDIO OUTPUT
72XQ3	241887	3731144-001	SOCKET - TRANSISTOR
72XQ4	241887	3731144-001	SOCKET - TRANSISTOR
72	228192	3450825-001	PUSH-ON CONNECTOR (ACCEPTS #22 WIRE), .093 DIA. - PACKAGE OF 5
73	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5
77	249161	3450825-005	PUSH-ON CONNECTOR (ACCEPTS 72T2 LEADS), .093 DIA



Pathfinder Diagram



Schematic Diagram

Tone Remote Control Modules

GENERAL INFORMATION

The modules in this group are used in RCA remote control stations employing tone commands. A separate instruction book for each module contains the following information:

1. Technical Data
2. General Description
3. Circuit Description
4. Pathfinder Diagram
5. Replacement Parts List
6. Schematic Diagram
7. Table of emergency substitutes for solid-state devices

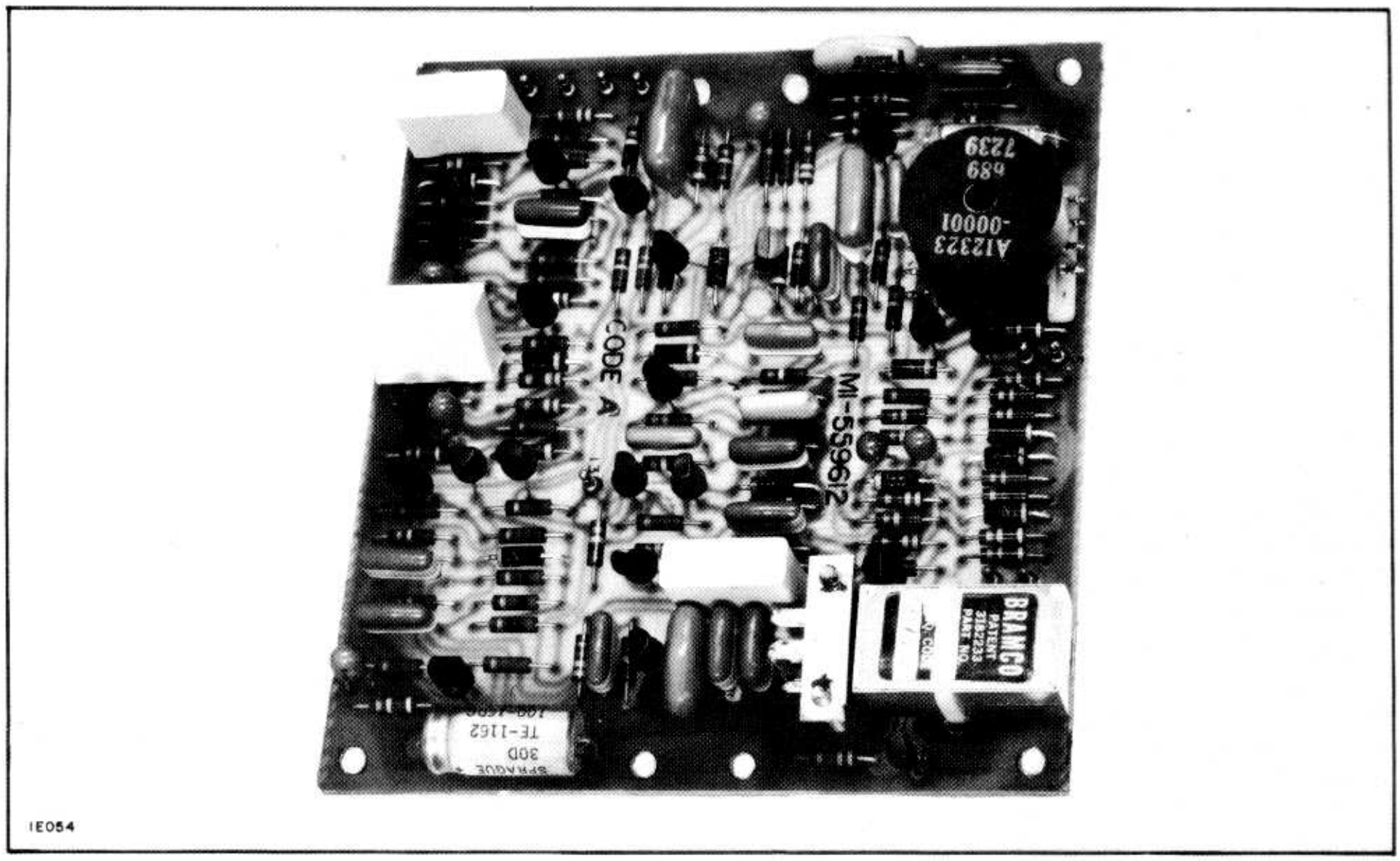
INSTRUCTION BOOK INDEX

RCA

Servicing Information

MI-559612

Guard Tone Decoder Module



1E054

Guard Tone Decoder Module

TECHNICAL DATA

Power Requirements (pin 12)
9 to 12.5 VDC,
negative common (pin 1)

Input Tone Signal Frequency (pin 9)
2175 Hz ±8 Hz

Guard Tone Detector Output (pin 13)
Uncommitted NPN collector,
100 mA capacity, saturated
during output

Interfering Signal (pin 9)
Speech + noise peaks of
+18 dBm

A02319-00001 REV 2
3723151 REV 5

Operating Temperature Range
-30°C to +65°C

Input Tone Signal Dynamic Range (pin 9)
Must Operate: +18 dBm (maximum),
-41 dBm (minimum)
Must Hold: -55 dBm

Enable One-Shot Output (pin 15)
Uncommitted NPN collector, 100 mA
capacity, saturated during output,
approximately 350 msec duration

Function Tone Output (pin 11)
Emitter follower, load
impedance: 1000 ohms

GENERAL DESCRIPTION

The Guard Tone Decoder Module is used in Tone Remote Control systems to detect a 2175 Hz guard tone signal from a remote control source and cause a control signal to appear at the Guard Tone Detector Output (pin 13). In addition, the module amplifies and distributes received function tones to other decoders (pin 11) and generates a function tone decoder accepance time "window" to control the operation of external function decoders (pin 15).

Two types of command (control) signals are generated by the Tone Remote Control system: Transmit commands (maintained) and Non-Transmit commands (not maintained). Both types of signals employ a 2175 Hz guard tone and a function tone of a different frequency transmitted in sequence. In addition, the Transmit command signals employ a low-level guard tone transmitted after the function tone to maintain the function.

CIRCUIT DESCRIPTION

Refer to the Guard Tone Decoder Module Schematic Diagram while reading the following descriptions.

A burst of guard tone received from a remote control station will enter the module through the decoder input (pin 9). Components L1 and C3 will prefilter the incoming signal providing selectivity and protection against undesired signals and noise. Transistors Q1, Q2, Q3, and Q4 amplify the signal and couple it to the RF20 drive coil. The RF20 resonant reed filter will pass only 2175 Hz signals. The first burst of guard tone is then further amplified by Q5 and Q6. Q15 driving Q16 and Q17 will change the guard tone to a switched DC output (pin 13) toward 0 volts DC. When this occurs Q19 is cut off which raises the gain of the guard tone portion of the decoder module 30 db, causing a snap action output at pin 13. Transistors Q20 and Q21 are cut off by this negative-going transient voltage. Q20 switches L1 and C3 out of the circuit so that all associated function decoders may receive function tones. The output at pin 15 of one-shot Q21 (350 msec) is used for the function tone decoder acceptance time window by the function tone decoders.

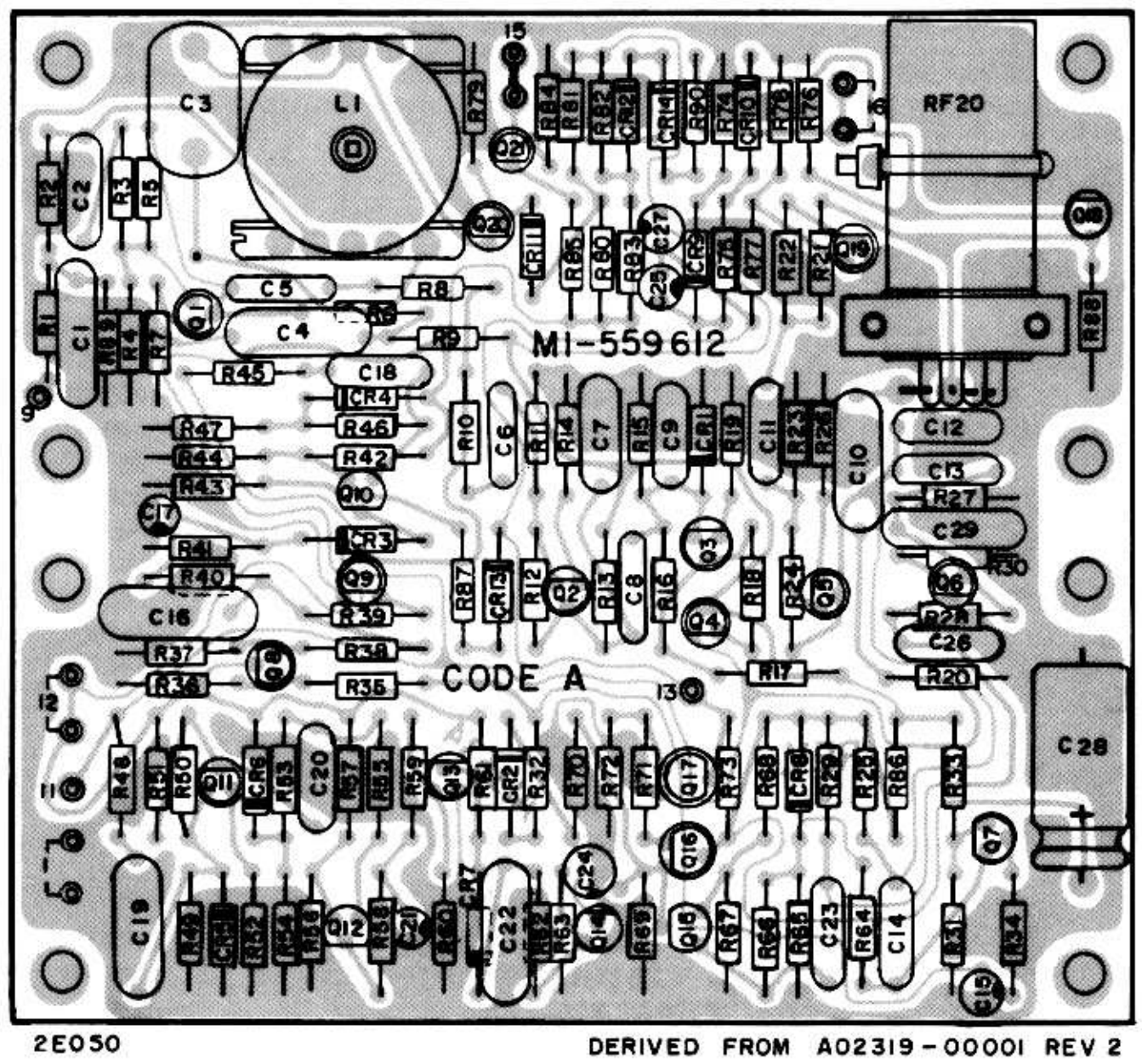
All of the abve events have taken place in approximately 50 milliseconds. Now the unit is ready to receive function tone inputs. At the end of the first guard tone burst (130 milliseconds approximately) a 38 millisecond function tone is transmitted by the remote control unit. Transistors Q1 through Q4 amplify and then distribute the signal to all function tone decoders. If a transmission is occurring at the end of the function tone, the guard tone resumes, causing Q17 to provide an output for the rest of the transmission.

Upon completion of transmission, the activity checker (Q12) causes Q14 to conduct and reset the unit in less than 100 milliseconds. Upon receiving very strong audio signals the line AGC stage (Q10) will reduce the module gain. The guard tone detector stage (Q15) and the activity checker (Q12) are kept within their dynamic range by the slow responding gated AGC stage Q7 for any line loss from 0 to 30 db. When the 2175 Hz tone ceases, Q18 conducts, thus damping the RF20's output.

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
CR1 through CR11	1N4004	Q13	2N2923
Q1 through Q6	2N2925	Q14	2N2923
Q7	2N3702	Q15	2N3702
Q8	2N2923	Q16	2N2923
Q9	2N2925	Q17	2N2925
Q10	2N3702	Q18	2N2923
Q11	2N2925	Q19	2N2925
Q12	2N3702	Q20	2N2923
		Q21	2N2923



Pathfinder Diagram

INPUT POWER
30 mA

TONE INPUT

1ST AMPLIFIER

2ND AMPLIFIER

3RD AMPLIFIER

REED DRIVER

2175Hz REED

RF-20

PRE-FILTER

AGC ATTENUATOR

AGC ISOLATOR

LINE AGC DETECTOR

GATED AGC DETECTOR

REED SQUELCH

ACTIVITY AMPLIFIER

BOOTSTRA

COMMON

NOTE:
UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, ±5%, 1/4W
CAPACITANCE VALUES ARE IN MICROFARADS.

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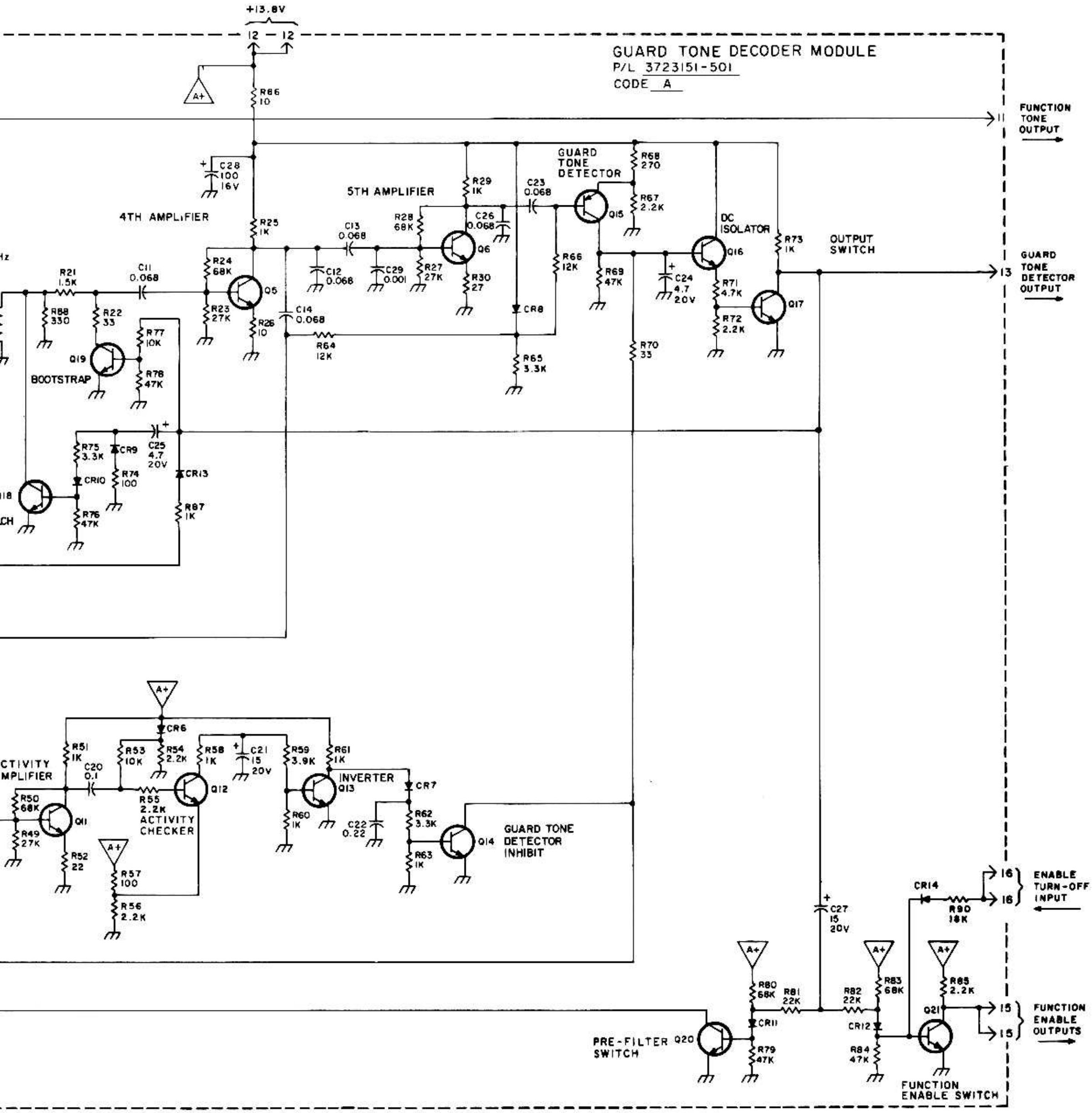


Schematic Diagram
Guard Tone Decoder Module

REPLACEMENT PARTS

Symbol	Stock No.	Description
		GUARD TONE DECODER MODULE MI-559612
C1	428658	MYLAR, .0047 MF 10% 100V
C2	428653	MYLAR, 0.1 MF 10%
C3	428666	POLYSTYRENE, 5600 PF 2.5%
C4	428655	MYLAR, 0.22 MF 10%
C5	428654	MYLAR, .022 MF 10% 250V
C6	428654	MYLAR, .022 MF 10% 250V
C7	428656	MYLAR, .0033 MF 10% 250V
C8	428654	MYLAR, .022 MF 10% 250V
C9	428652	MYLAR, .01 MF 10%
C10	428655	MYLAR, 0.22 MF 10%
C11 TO C14	428659	MYLAR, .068 MF 10% 250V
C15	428648	TANTALUM, 15 MF 20V
C16	421935	MYLAR, .047 MF 10% 250V
C17	428648	TANTALUM, 15 MF 20V
C18	428659	MYLAR, .068 MF 10% 250V
C19	428655	MYLAR, 0.22 MF 10%
C20	428653	MYLAR, 0.1 MF 10%
C21	428648	TANTALUM, 15 MF 20V
C22	428655	MYLAR, 0.22 MF 10%
C23	429659	MYLAR, .068 MF 10% 250V
C24	428660	TANTALUM, 4.7 MF 20V
C25	428660	TANTALUM, 4.7 MF 20V
C26	428659	MYLAR, .068 MF 10% 250V
C27	428648	TANTALUM, 15 MF 20V
C28	227419	ELECTROLYTIC, 100 MF 16V
C29	428651	MYLAR, .001 MF 10% 250V
CR1 TO CR14	426115	DIODE
L1	428650	TRANSFORMER
Q1 TO Q6	234304	TRANSISTOR
Q7	242422	TRANSISTOR
Q8	248023	TRANSISTOR
Q9	234304	TRANSISTOR
Q10	242422	TRANSISTOR
Q11	234304	TRANSISTOR
Q12	242422	TRANSISTOR
Q13	248023	TRANSISTOR
Q14	248023	TRANSISTOR
Q15	242422	TRANSISTOR
Q16	248023	TRANSISTOR
Q17	234304	TRANSISTOR
Q18	248023	TRANSISTOR
Q19	234304	TRANSISTOR
Q20	248023	TRANSISTOR
Q21	248023	TRANSISTOR
RF20	428685	RESONANT REED - 2175 HZ
R1	218499	10,000 OHMS 5% 1/4W
R2	108867	6800 OHMS 5% 1/4W
R3	426112	22,000 OHMS 5% 1/4W
R4	223769	100,000 OHMS 5% 1/4W
R5	227755	220,000 OHMS 5% 1/4W
R6	218499	10,000 OHMS 5% 1/4W
R7	108865	1000 OHMS 5% 1/4W
R8	108869	15,000 OHMS 5% 1/4W
R9	426112	22,000 OHMS 5% 1/4W
R10	107972	3300 OHMS 5% 1/4W

Symbol	Stock No.	Description
R11	223770	150,000 OHMS 5% 1/4W
R12	246396	680,000 OHMS 5% 1/4W
R13	218499	10,000 OHMS 5% 1/4W
R14	426215	680 OHMS 5% 1/4W
R15	232687	270,000 OHMS 5% 1/4W
R16	246396	680,000 OHMS 5% 1/4W
R17	218499	10,000 OHMS 5% 1/4W
R18	426215	680 OHMS 5% 1/4W
R19	108864	470 OHMS 5% 1/4W
R20	219458	330 OHMS 5% 1/4W
R21	219459	1500 OHMS 5% 1/4W
R22	233931	33 OHMS 5% 1/4W
R23	219467	27,000 OHMS 5% 1/4W
R24	427566	68,000 OHMS 5% 1/4W
R25	108865	1000 OHMS 5% 1/4W
R26	426632	10 OHMS 5% 1/4W
R27	219467	27,000 OHMS 5% 1/4W
R28	427566	68,000 OHMS 5% 1/4W
R29	108865	1000 OHMS 5% 1/4W
R30	230605	27 OHMS 5% 1/4W
R31	108866	2200 OHMS 5% 1/4W
R32	233931	33 OHMS 5% 1/4W
R33	218758	220 OHMS 5% 1/4W
R34	108871	47,000 OHMS 5% 1/4W
R35	229965	120,000 OHMS 5% 1/4W
R36	223769	100,000 OHMS 5% 1/4W
R37	426112	22,000 OHMS 5% 1/4W
R38	427566	68,000 OHMS 5% 1/4W
R39	218499	10,000 OHMS 5% 1/4W
R40	108871	47,000 OHMS 5% 1/4W
R41	245871	82,000 OHMS 5% 1/4W
R42	108864	470 OHMS 5% 1/4W
R43	108866	2200 OHMS 5% 1/4W
R44	108866	2200 OHMS 5% 1/4W
R45	426210	1200 OHMS 5% 1/4W
R46	108868	12,000 OHMS 5% 1/4W
R47	107972	3300 OHMS 5% 1/4W
R48	219458	330 OHMS 5% 1/4W
R49	219467	27,000 OHMS 5% 1/4W
R50	427566	68,000 OHMS 5% 1/4W
R51	108865	1000 OHMS 5% 1/4W
R52	426233	22 OHMS 5% 1/4W
R53	218499	10,000 OHMS 5% 1/4W
R54	108866	2200 OHMS 5% 1/4W
R55	108866	2200 OHMS 5% 1/4W
R56	108866	2200 OHMS 5% 1/4W
R57	108861	100 OHMS 5% 1/4W
R58	108865	1000 OHMS 5% 1/4W
R59	427563	3900 OHMS 5% 1/4W
R60	108865	1000 OHMS 5% 1/4W
R61	108865	1000 OHMS 5% 1/4W
R62	107972	3300 OHMS 5% 1/4W
R63	108865	1000 OHMS 5% 1/4W
R64	108868	12,000 OHMS 5% 1/4W
R65	107972	3300 OHMS 5% 1/4W
R66	108868	12.000 OHMS 5% 1/4W
R67	108866	2200 OHMS 5% 1/4W
R68	108863	270 OHMS 5% 1/4W
R69	108871	47,000 OHMS 5% 1/4W
R70	233931	33 OHMS 5% 1/4W
R71	426213	4700 OHMS 5% 1/4W
R72	108866	2200 OHMS 5% 1/4W

REPLACEMENT PARTS (Continued)

Symbol	Stock No.	Description
R73	108865	1000 OHMS 5% 1/4W
R74	108861	100 OHMS 5% 1/4W
R75	107972	3300 OHMS 5% 1/4W
R76	108871	47,000 OHMS 5% 1/4W
R77	218499	10,000 OHMS 5% 1/4W
R78	108871	47,000 OHMS 5% 1/4W
R79	108871	47,000 OHMS 5% 1/4W
R80	427566	68,000 OHMS 5% 1/4W
R81	426112	22,000 OHMS 5% 1/4W
R82	426112	22,000 OHMS 5% 1/4W
R83	427566	68,000 OHMS 5% 1/4W
R84	108871	47,000 OHMS 5% 1/4W
R85	108866	2200 OHMS 5% 1/4W
R86	426632	10 OHMS 5% 1/4W
R87	108865	1000 OHMS 5% 1/4W
R88	219458	330 OHMS 5% 1/4W
R89	107972	3300 OHMS 5% 1/4W
	428649	SOCKET - FOR RF20

RCA Mobile Communications Systems
Meadow Lands, Pennsylvania 15347, U.S.A.
N3LKL

Printed in U.S.A.

Servicing Information

MI-559613

Function Tone Decoder Module

TECHNICAL DATA

Power Requirements (pin 12)
9 to 12.5V DC,
negative common (pin 1)

Operating Frequencies

MI Number	Frequency
MI-559316	2050 Hz
MI-559613-A	1950 Hz
MI-559613-B	1850 Hz
MI-559613-C	1750 Hz
MI-559613-D	1650 Hz
MI-559613-E	1550 Hz
MI-559613-F	1450 Hz
MI-559613-G	1350 Hz
MI-559613-H	1250 Hz
MI-559613-J	1150 Hz
MI-559613-K	1050 Hz

Function Output (pin 3)
Uncommitted PNP
collector, saturated during
output

Isolated Function Output (pin 16)
isolated from pin 3 by a
diode

Inverted Function Output (pin 5)
NPN collector, high resistance
to A+ during off, low resistance
to ground during output.

Operating Temperature Range
-30°C to +65°C

Tone Input Dynamic Range
(pin 11) ±30 Hz for 2050 Hz module
1.0 V RMS (minimum)
3.0 V RMS (maximum)

Pickup Time
25 mS (maximum)
20 mS (nominal)

Enable Input (pin 15)
+12V at pin 15 enables tone detector
stage

Reset Inputs (pins 6 and 7)
Grounding pin 6 or pin 7
resets decoder

Inhibit Input (pin 17)
+12V at pin 17 holds the decoder in the
reset mode

GENERAL DESCRIPTION

The Function Tone Decoder modules are used in Tone Remote Control systems to detect a function tone signal and cause a control signal to appear at the output. The function tone frequency of each module is controlled by an external resistor and capacitor mounted on pins on the module.

CIRCUIT DESCRIPTION

The function tone decoder modules are normally used in conjunction with the MI-559612 guard tone decoder. The function tone audio output of the guard tone decoder is fed into the function tone audio input (pin 11) of the function tone decoder. The enable one shot output of the guard tone decoder is fed into the enable input (pin 15) of the function tone decoder.

Signals fed into pin 11 are amplified by Q1 and then are coupled to the filter section (L1 and C3) and the tone detector Q2. If Q3 is not conducting, Q2 is biased into cut-off. When the guard tone is received Q3 conducts for 350 ms enabling Q2 to respond to function tones passed by L1 and C3. When Q2 conducts, Q5 is caused to conduct, producing an output either momentary, latching, or pulsed depending upon the hook-up of the reset inputs (pins 6 and 7) and the inhibit input (pin 17).

The function output (pin 3) will switch to approximately 12 VDC if a function is present at pin 11, pin 15 is enabled and pin 17 is not inhibited (0 potential). Either reset (pin 6 or pin 7) applied to ground potential will cause the decoder to reset (pin 3 goes to 0 VDC).

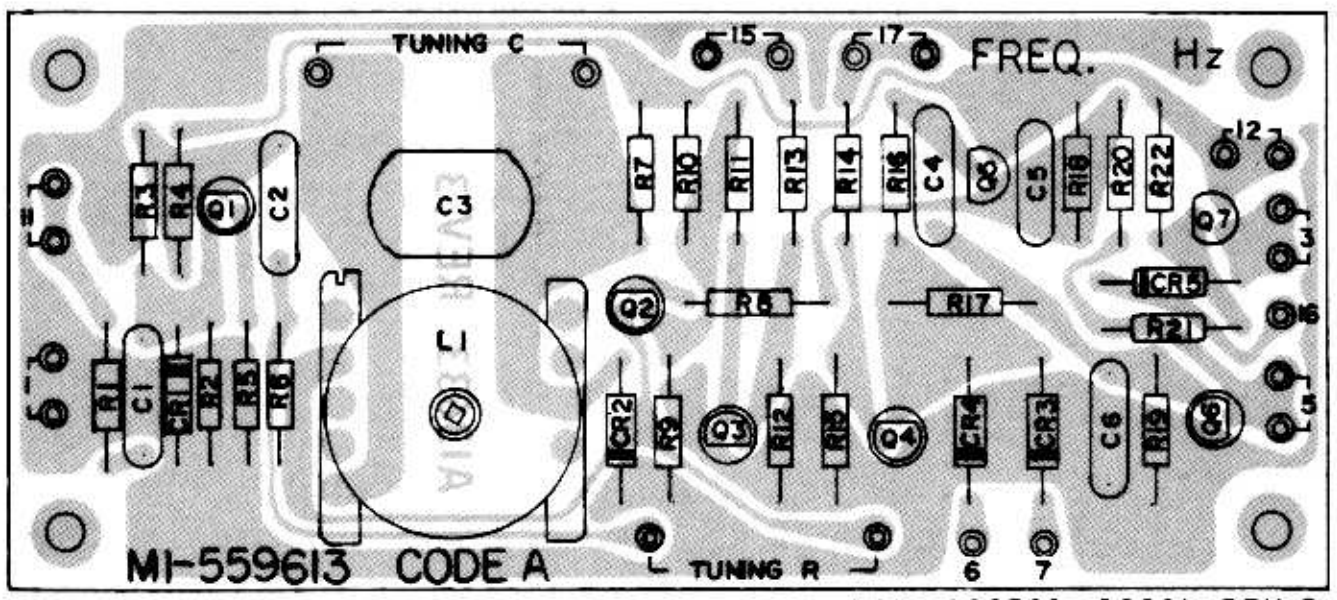
When the inhibit input (pin 17) is switched to a positive potential Q4 will conduct and the decoder will reset. The function output (pin 5) is the inverse of the function output (pin 3). Pin 16 provides an output signal isolated from pin 3 by diode CR5.

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

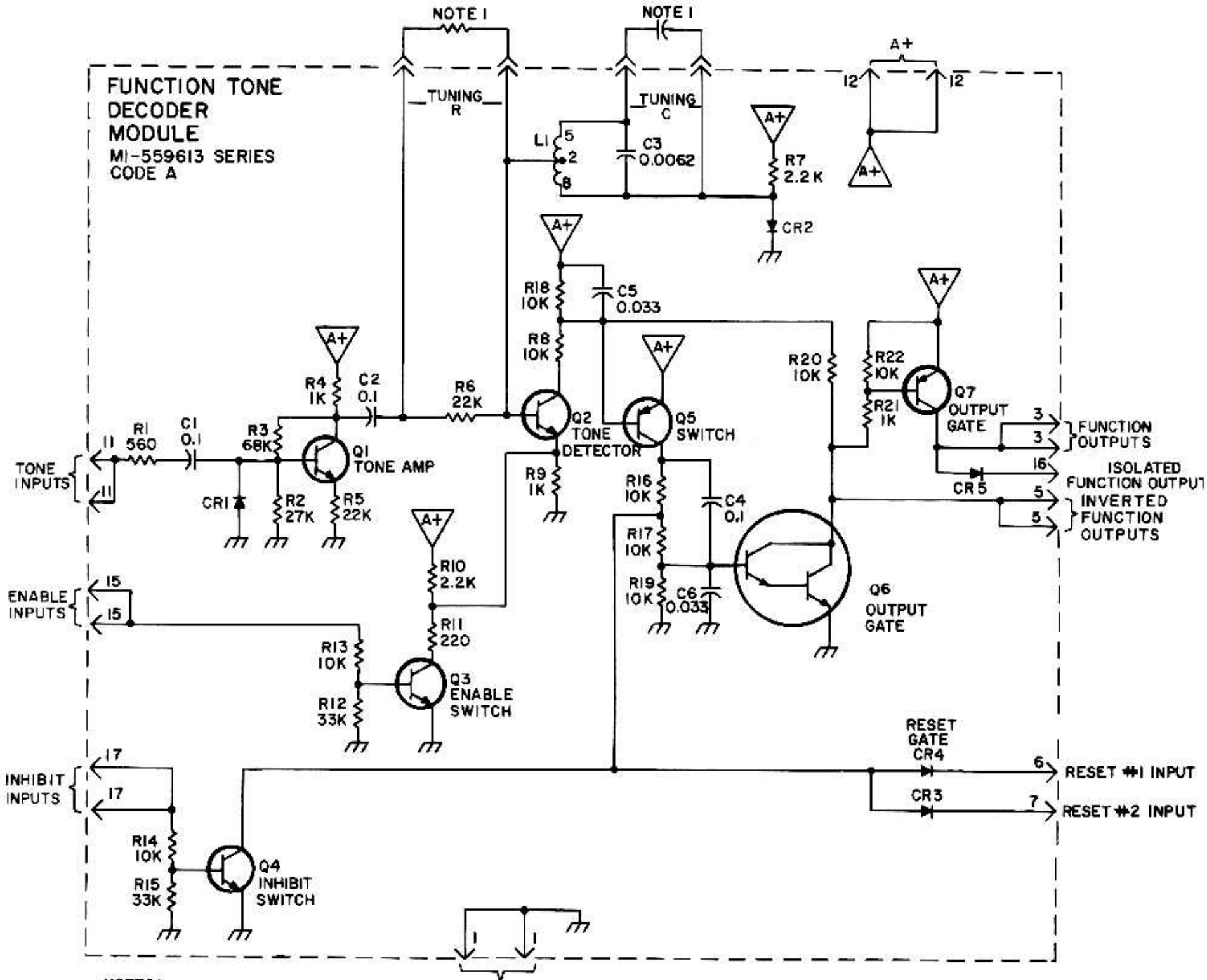
In the event of a semiconductor failure, the exact replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
CR1 through CR5	1N4004	Q4	2N2923
Q1	2N2923	Q5	2N3702
Q2	2N2923	Q6	2N5306
Q3	2N2923	Q7	2N3702

Symbol	*Stock No.*	*Description*
		FUNCTION TONE DECODER MODULE MI-559613
C1	428653	MYLAR, 0.1 MF 10%
C2	428653	MYLAR, 0.1 MF 10%
C3	428662	POLYSTYRENE, 6200 PF 2.5%
C4	428653	MYLAR, 0.1 MF 10%
C5	428657	MYLAR, .033 MF 10%
C6	428657	MYLAR, .033 MF 10%
CR1 TO CR4	426115	DIODE
L1	428650	TRANSFORMER
Q1 TO Q4	248023	TRANSISTOR
Q5	242422	TRANSISTOR
Q6	418608	TRANSISTOR
Q7	242422	TRANSISTOR
R1	227741	560 OHMS 5% 1/4 W
R2	219467	27,000 OHMS 5% 1/4 W
R3	427566	68,000 OHMS 5% 1/4 W
R4	108865	1000 OHMS 5% 1/4 W
R5	426233	22 OHMS 5% 1/4 W
R6	426112	22,000 OHMS 5% 1/4 W
R7	108866	2200 OHMS 5% 1/4 W
R8	218499	10,000 OHMS 5% 1/4 W
R9	108865	1000 OHMS 5% 1/4 W
R10	108866	2200 OHMS 5% 1/4 W
R11	218758	220 OHMS 5% 1/4 W
R12	426219	33,000 OHMS 5% 1/4 W
R13	218499	10,000 OHMS 5% 1/4 W
R14	218499	10,000 OHMS 5% 1/4 W
R16 TO R22	218499	10,000 OHMS 5% 1/4 W
R15	426219	33,000 OHMS 5% 1/4 W



N3LKL Pathfinder Diagram



NOTES:

1. FREQUENCY DETERMINING COMPONENT VALUES

FREQUENCY	MI-NUMBER	TUNING R	TUNING C
2050 Hz	MI-559613	NOT USED	NOT USED
1950Hz	MI-559613-A	NOT USED	600pF
1850Hz	MI-559613-B	NOT USED	1430pF
1750Hz	MI-559613-C	NOT USED	2330pF
1650Hz	MI-559613-D	100K	3400pF
1550Hz	MI-559613-E	100K	4700pF
1450Hz	MI-559613-F	100K	6300pF
1350Hz	MI-559613-G	47K	8200pF
1250Hz	MI-559613-H	47K	10,700pF
1150Hz	MI-559613-J	27K	13,700pF
1050Hz	MI-559613-K	18K	17,700pF

2. ALL RESISTOR VALUES IN OHMS, 5%, 1/4 W EXCEPT AS NOTED.
3. ALL CAPACITOR VALUES IN MICROFARADS, EXCEPT AS NOTED.

3723152 REV 3
813575-00001 REV 3
2D067

Schematic Diagram

Servicing Information

MI-559614

Dual Notch Filter Module

TECHNICAL DATA

Power Requirements 9 to 12.5 VDC, negative common	Operating Temperature Range -30°C to +65°C
Frequency to be elimiated 2175 Hz ±12 Hz	Notch Center Frequency 2175 Hz
Attenuation at Center Frequency 50 dB, 38dB over temperature range	Attenuation at 1000 Hz 1dB (maximum)
30dB Bandwidth ±10Hz (minimum	Temperature Drift ±0.5% of center frequency (maximum)
Source Voltage 1 VRMS (maximum)	Source Impedance 1000 ohms (maximum)
Load Impedance 1000 ohms (minimum)	Amplifier Distortion 1% (maximum)

A02321-00001 REV 1
3723153 REV 3

GENERAL DESCRIPTION

The Dual Notch Filter Module is used in Tone Remote Control Systems to notch (remove) a 2175 Hz guard tone signal from the speech audio circuits of the system.

The module contains two independent 2175 Hz bandstop filters, each with an emitter follower stage, that share a common power source.

CIRCUIT DESCRIPTION

Input 1 feeds a "bridged T" network consisting of L1, C2, C3, C4, R1, and Rx (selected value) and is coupled to an emitter follower Q1 and then fed to Output 1. Input 2 is filtered in the same manner.

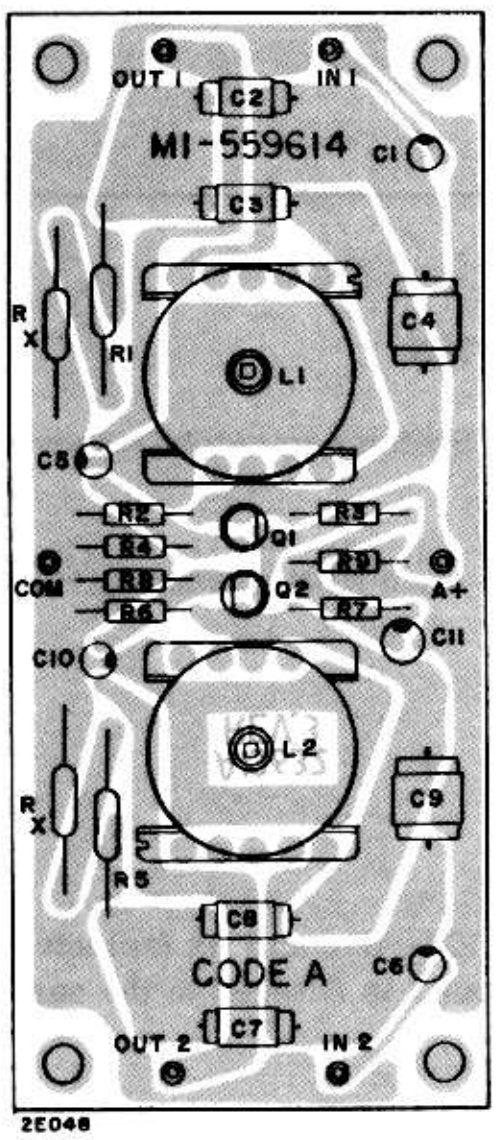
EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute
Q1	2N2923
Q2	2N2923

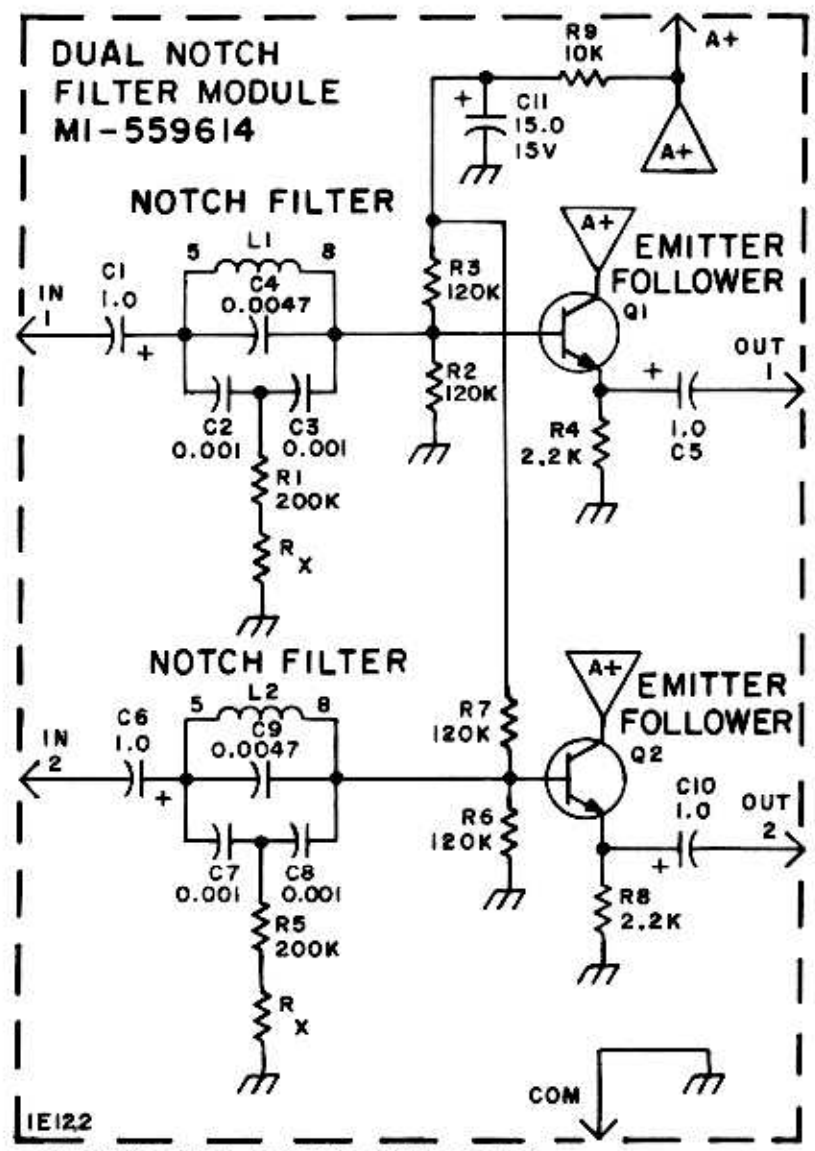
REPLACEMENT PARTS

Symbol	*Stock No.*	*Description*
		DUAL NOTCH FILTER MODULE MI-559614
C1	428661	TANTALUM, 1 MF 35 V
C2	428663	POLYPROPELENE, .001 MF 2.5%
C3	428663	POLYPROPELENE, .001 MF 2.5%
C4	428664	POLYPROPELENE, .0047 MF 2.5%
C5	428661	TANTALUM, 1 MF 35 V
C6	428661	TANTALUM, 1 MF 35 V
C7	428663	POLYPROPELENE, .001 MF 2.5%
C8	428663	POLYPROPELENE, .001 MF 2.5%
C9	428664	POLYPROPELENE, .0047 MF 2.5%
C10	428661	TANTALUM, 1 MF 35 V
L1	428650	TRANSFORMER
L2	428650	TRANSFORMER
Q1	248023	TRANSISTOR
Q2	248023	TRANSISTOR
R1	223767	200,000 OHMS 5% 1/4 W
R2	229965	120,000 OHMS 5% 1/4 W
R3	229965	120,000 OHMS 5% 1/4 W
R4	108866	2200 OHMS 5% 1/4 W
R5	223767	200,000 OHMS 5% 1/4 W
R6	229965	120,000 OHMS 5% 1/4 W
R7	229965	120,000 OHMS 5% 1/4 W
R8	108866	2200 OHMS 5% 1/4 W
RX		1% SELECTED VALUE



DERIVED FROM A02321-00001 REV 2

Pathfinder Diagram



DERIVED FROM A02321-00001 REV 2

Schematic Diagram

RCA Mobile Communications Systems
Meadow Lands, Pennsylvania 15347, U.S.A.

Servicing Information
MI-559658 (3457658-502)
Remote Simplex Module

TECHNICAL DATA

SIMPLEX RELAY	
Coil Data (nominal) 12 volts 133 mA 90 ohms	Contact Data 6 "FORM C" (SPDT) Contacts 2A resistive 29V DC, 115V AC

GENERAL DESCRIPTION

The Simplex Module contains remote simplex relay 66K1, a relay having six sets of "form C" (SPDT) contaxts. A transmit command from the remote unit will energize the relay, connecting remote audio to the Control Termination Panel audio circuits and disconnecting local audio. If the station has repeat capability, the remote simplex relay also removes power from the Repeater Module, thereby disabling the repeater circuit during remote operation.

CIRCUIT DESCRIPTION

With the remote simplex relay not energized, local receive or transmit audio is routed through pin 2, contacts 14/15 of K1, pin 4, and ultimately to transmitter audio preamp and line amplifier circuits. The line amplifier output is routed to pin 3 of the Simplex Module, through K1 contacts 17/18/20/21, and out pin 10 to the telephone line termination, permitting the remote control point to monitor receiver audio as well as transmit audio originating at the local control points.

The simplex relay is normally energized by a transmit command signal received from the remote control point. The presence of this command will place +12 VDC (nominal) on either pin 15 or pin 18, causing K1 to energize. When K1 energizes, the local receive or transmit audio is removed from the transmit audio preamp and line amplifier inputs by the operning of contacts 14/15 and the output of the line amplifier is removed from the telephone line by the opening of contacts 17/18 and 20/21. Remote transmit audio from the telephone line is routed through pin 10, relay contacts 21/22, TRANSMIT LINE control R1, contacts 16/15, and pin 4 to the input of the line amplifier and transmit audio preamp. If a notch filter is required, such as in tone remote control systems, it is connected between pins 19 and 20, and jumper JU1 is removed. For stations having repeat capability, the opening of contacts 11/12 is used to remove dc power from the Repeater Module, disabling the repeater circuitry during remote operation.

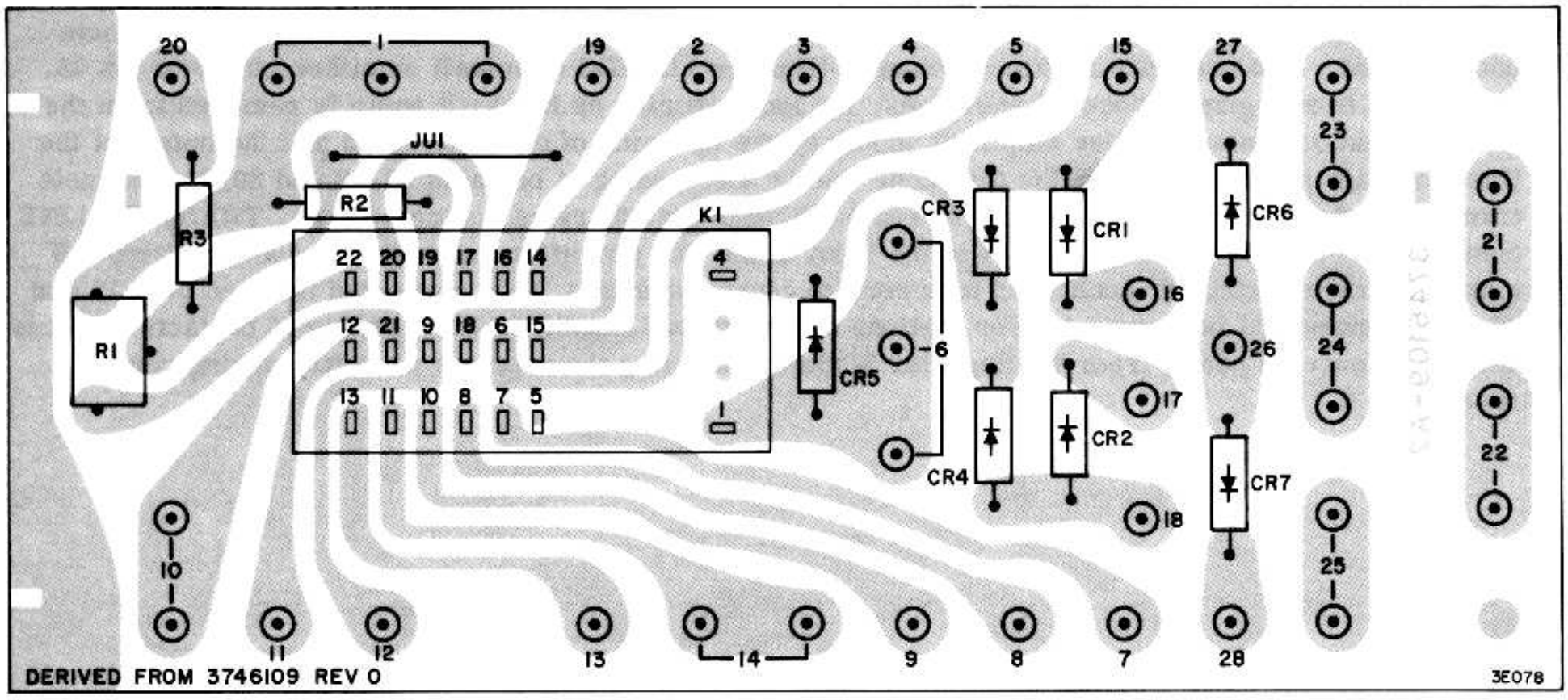
EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

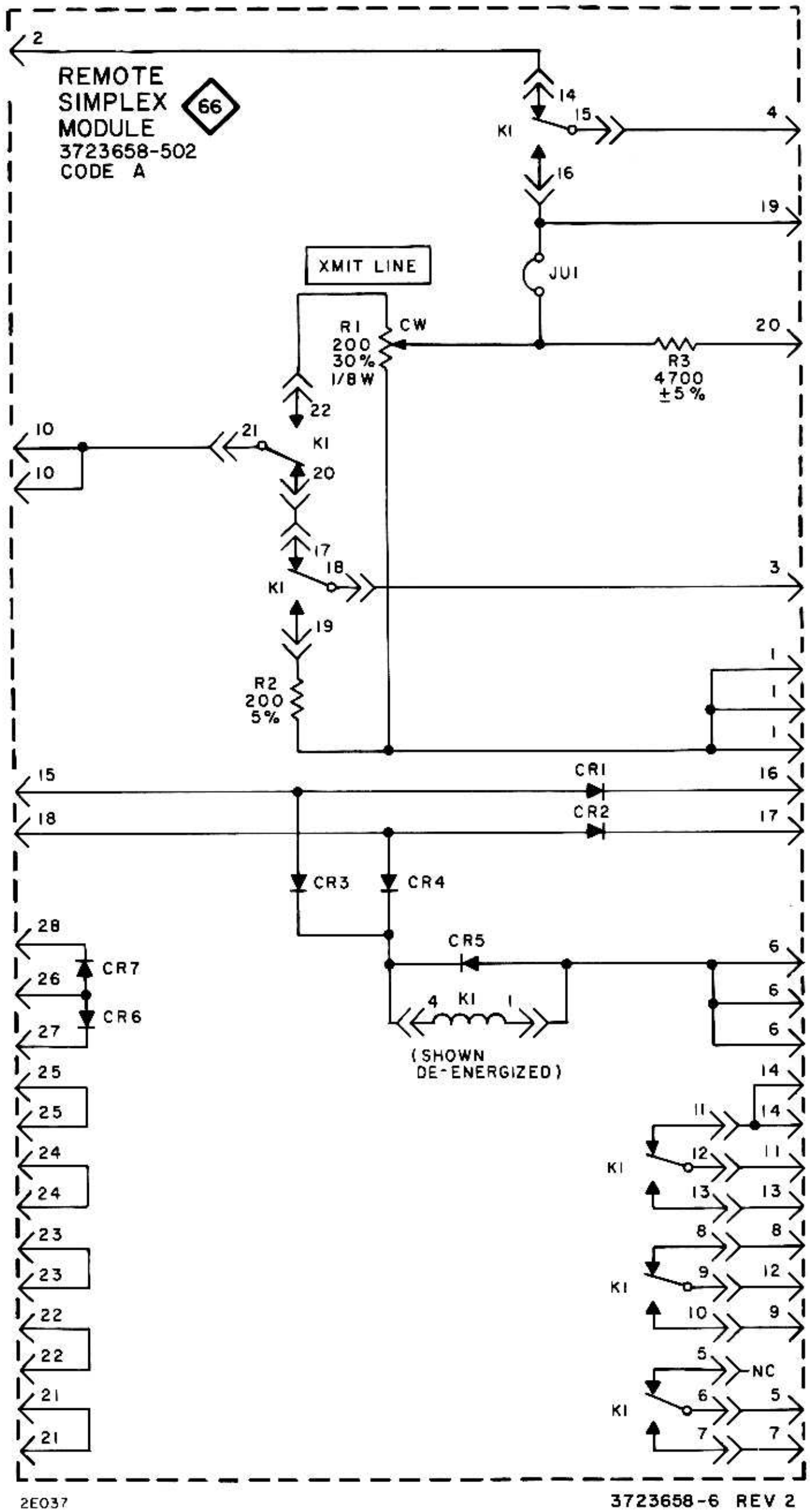
Component Designation	Emergency Substitute
CR1	1N5059
CR2	1N5059
CR3	1N5059
CR4	1N5059
CR5	1N5059
CR6	1N914
CR7	1N914

REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
			SIMPLEX MODULE - CODE A P/L 3723658-502 - REV 2
66CR1 TO 66CR5	419657	3731229-001	DIODE
66CR6 & 66CR7	242522	3464611-001	DIODE
66K1	247998	3467322-012	RELAY - 6 PDT 12V
66R1	246574	3463187-013	VARIABLE, 200 OHMS ±30% 1/8W
66R2	230616	99206-142	200 OHMS ±5% 1/4W
66R3	300739	99206-175	4700 OHMS ±5% 1/4W
66XK1	231436	3467276-017	SOCKET, RELAY
39	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5



N3LKL Pathfinder Diagram



Schematic Diagram

Remote Simplex Module

N3LKL

DC Remote Control Modules

GENERAL INFORMATION

The modules in this group are used in RCA remote control stations employing DC commands. Each module instruction book contains the following information:

1. Technical Data
2. General Description
3. Circuit Description
4. Replacement Parts List
5. Pathfinder Diagram
6. Schematic Diagram
7. Table of emergency substitutes for solid-state devices

INSTRUCTION BOOK INDEX

RCA

Servicing Information
3457943-505
DC Comparator Module

GENERAL DESCRIPTION

The DC Comparator Module can contain up to 4 plug-in type relays. These relays are essential to dc remote control. They translate current level commands from the remote control unit into control signals in the Control Termination Panel.

CIRCUIT DESCRIPTION

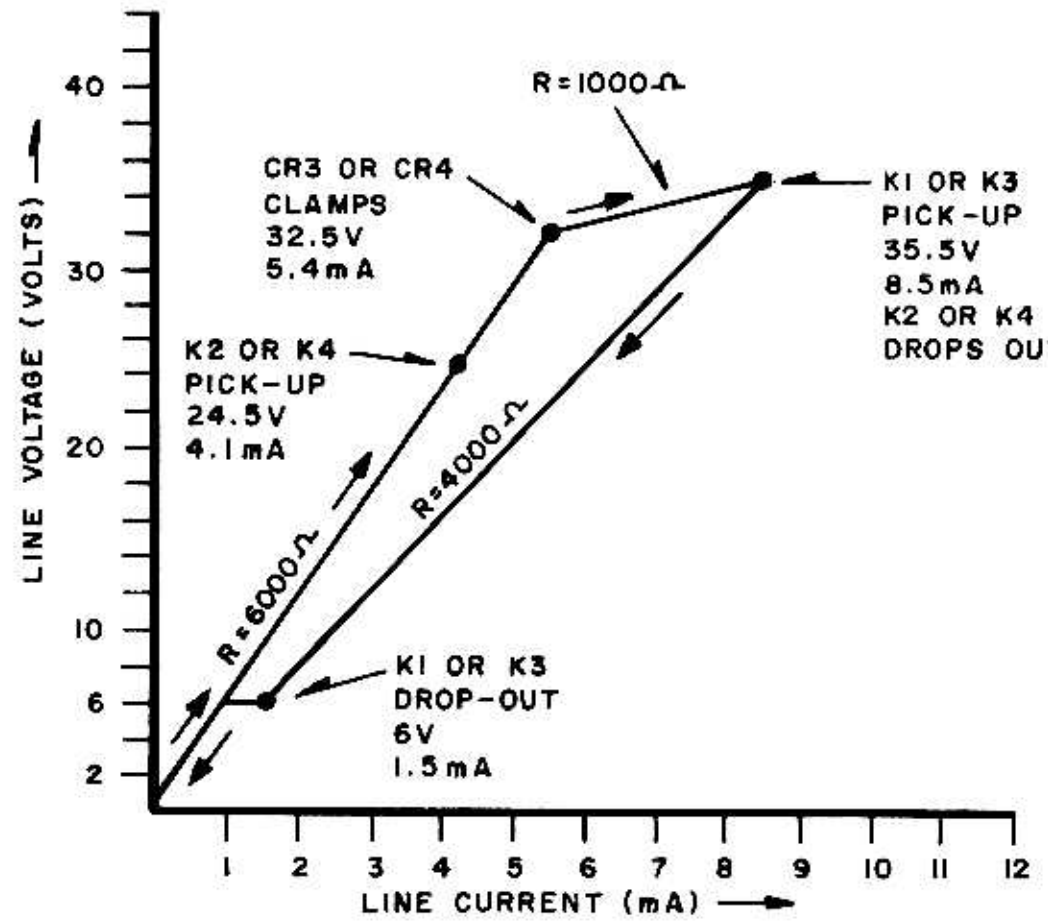
The commands from the remote control unit are in the form of current levels. The commands enter the board at pins 7 and 16 (from the telephone line). If the polarity is positive at pin 7 and negative at pin 16, the current is said to be positive. If the polarity is positive at pin 16 and negative at pin 7, the current is said to be negative.

When a current source is applied to pins 7 and 16, the current flow will be through the energizing coils of either relays K1 and K2 or K3 and K4, depending on whether the current is positive or negative. A positive current will be shunted around K3 and K4 by diode CR2, and a negative current will be shunted around K1 and K2 by diode CR1.

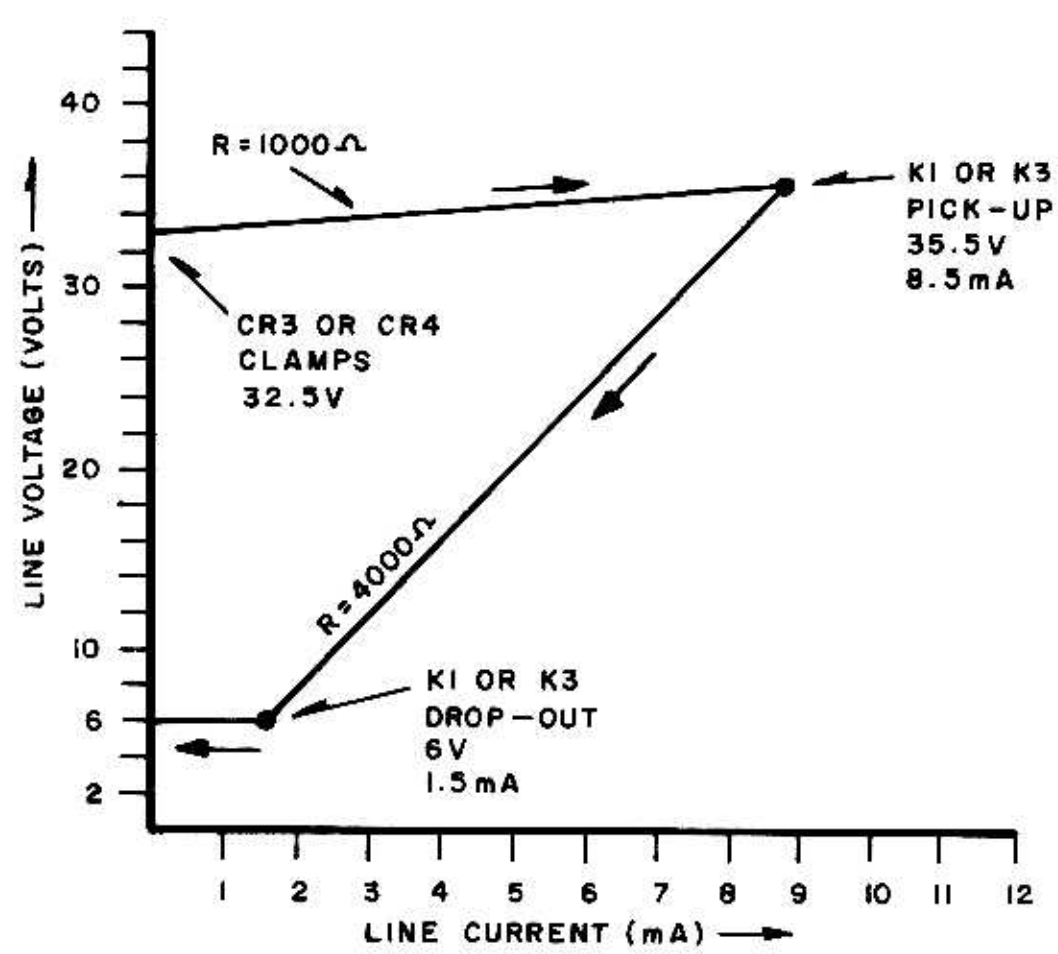
Consider the case when the current flow is positive (positive polarity at pin 7). Relay K2 will pick up at approximately 5 ma; whereas, relay K1 requires approximately 10 ma to energize. If a +5 ma control signal is applied, relay K2 will energize giving Transmit Command #2 Output. If a +10ma control signal is applied, relay K1 will energize, breaking contacts 9 to 8 so that relay K2 is de-energized. Relay K1 gives Transmit Command #1 Output. Zener diode CR3 prevents the loss of relay K1 energizing current when contacts 9 to 8 break. The zener completes the circuit and provides continuity until contacts 9 to 10 are closed.

If the polarity of the remote current source is reversed (positive at pin 16 and negative at pin 7), relay K4 (-5 ma) and K3 (-10mA) operation is similar to the explanation just given for relays K1 and K2. Relay K4 gives Non-Transmit Command #1, and relay K3 gives Non-Transmit Command #2.

The DC Remote Control Relay Response, on a following page, illustrates graphically the relay operation. Note that the 10 ma relay can be either K1 or K3 and the 5 ma relay can be either K2 or K4. The upper graph shows input resistance between pins 7 and 16 as the relays are energized in sequence (follow the arrows) and then de-energized in sequence. The lower graph shows the case where only the 10 ma relay is used.



FUNCTION RELAY RESPONSE
WITH
10mA AND 5mA RELAYS INSTALLED



FUNCTION RELAY RESPONSE
WITH
10mA RELAY ONLY

1E124

DC Remote Control Relay Response

PRODUCTION VARIATIONS

The production level of the module is indicated by a legend (example: CODE C) stamped on the module near the identifying drawing number. The following table lists the differences between the various production levels. To determine the difference between a given production level and the CODE E level, note the differences tabulated for the desired level and all subsequent levels.

Code Level Differences	Instruction Book Reference	Changes for Code Level Differences
A-B	Parts List	No electrical change
B-C	Parts List Pathfinder Diagram Schematic Diagram	65R1 and 65R2 added. Resistors not used on CODE B or CODE A.
C-D	Parts List	Part values were: Symbol Stock No. Drawing No. Description 65K1 246554 3467471-006 Relay 65K3 246554 3467471-006 Relay Part values now: Symbol Stock No. Drawing No. Description 65K1 431410 3741023-001 Relay 65K3 431410 3741023-001 Relay
D-E	Parts List	65K1 was included as part of module. 65K1 now optional item. 65K1 thru 65K4 purchased as needs require.

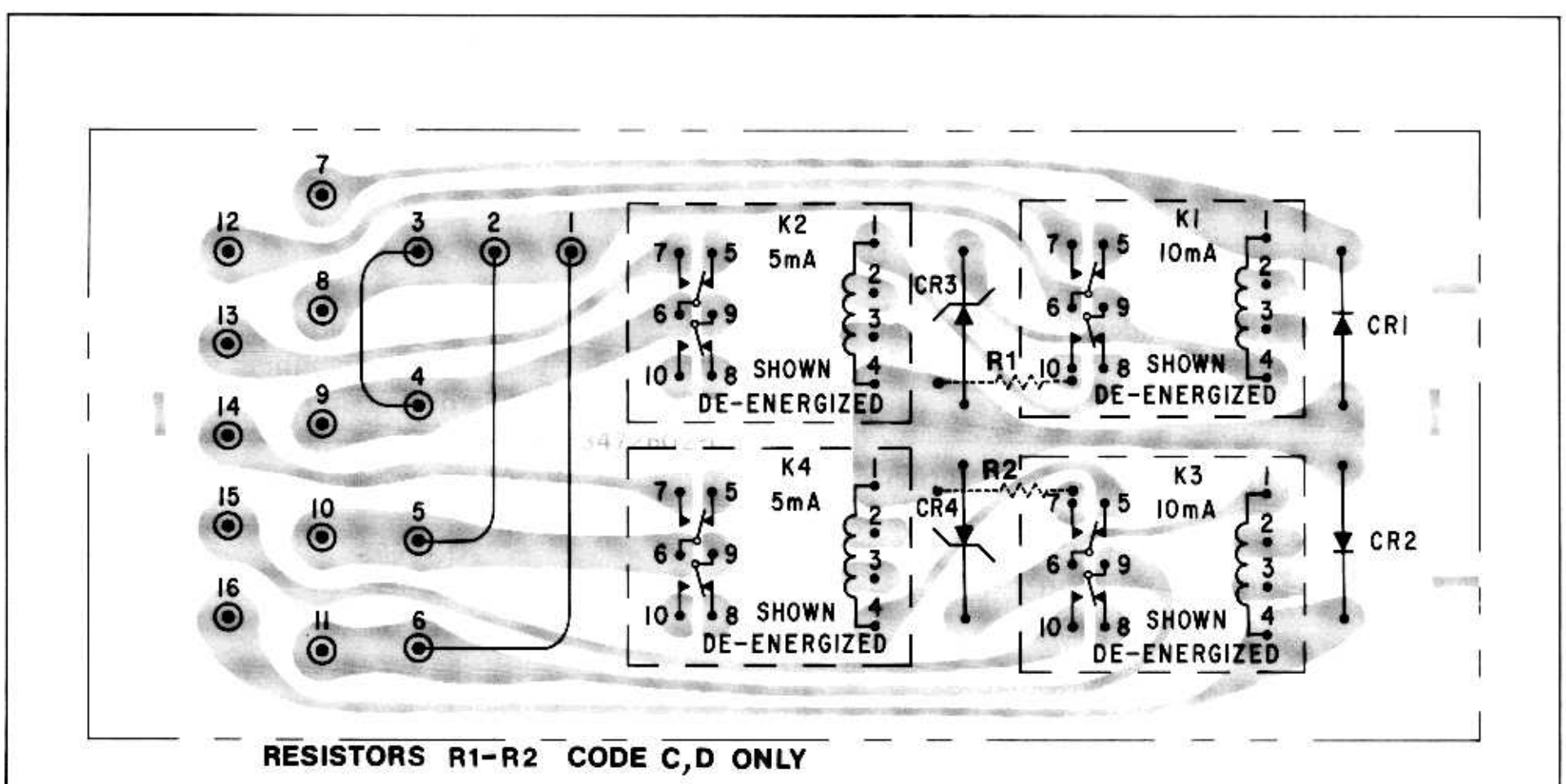
EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of substitutes may result in degraded system performance.

Component Designation	Emergency Substitute
65CR1	1N5059
65CR2	1N5059
65CR3	27V Zener 5%
65CR4	27V Zener 5%

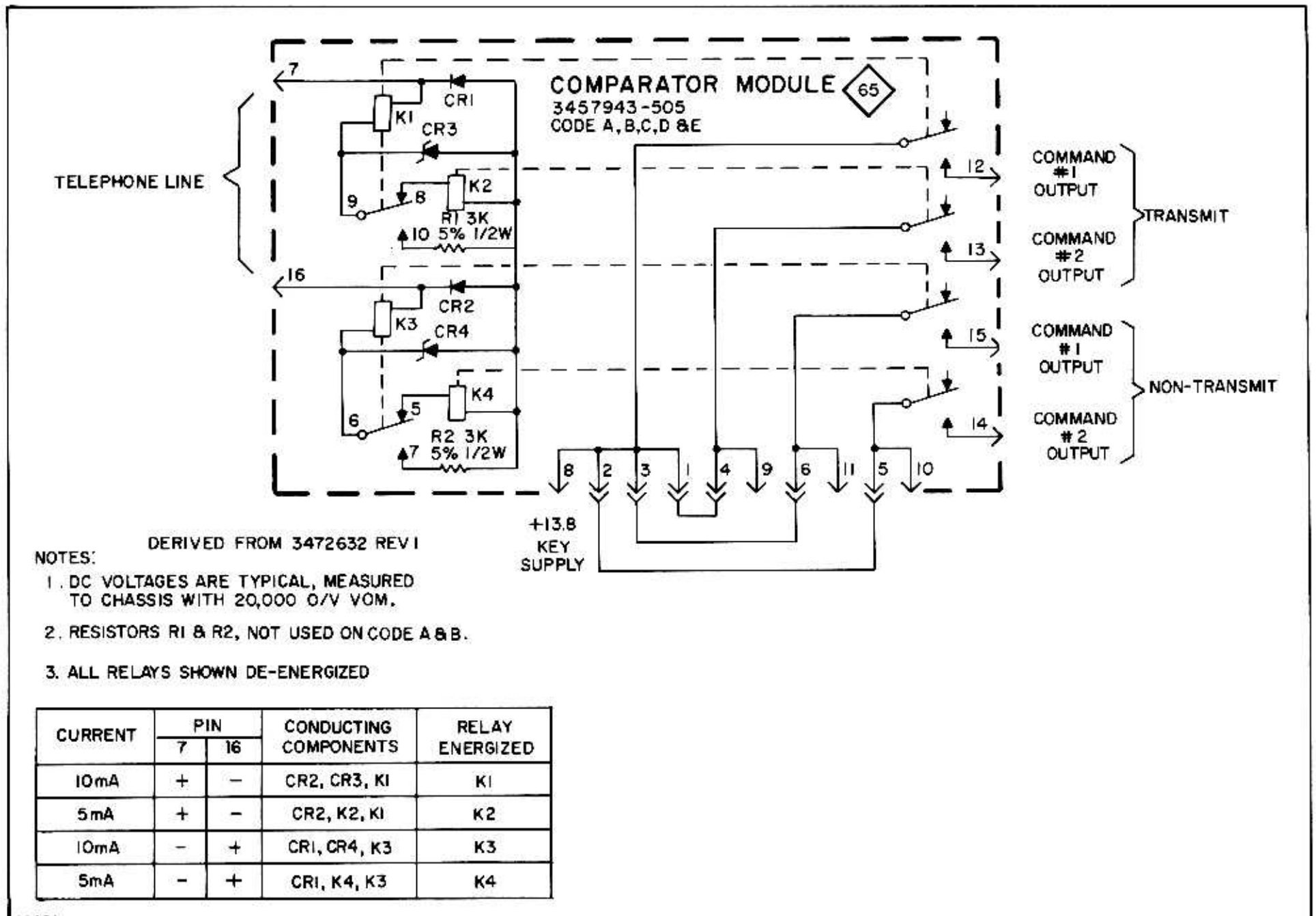
REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
			DC COMPARATOR MODULE - CODE E P/L 3457943-505 REV 2 5
65CR1	246572	3731229-001	DIODE
65CR2	246572	3731229-001	DIODE
65CR3	246573	3463863-023	DIODE - ZENER, 27V 5%
65CR4	246573	3463863-023	DIODE - ZENER, 27V 5%
65R1	502230	82283-170	RESISTOR - 3K 5% 1/2W
65R2	502230	82283-170	RESISTOR - 3K 5% 1/2W
65K1	431410	3741023-001	RELAY - 10 mA
65K2	243690	3467471-008	RELAY - 5 mA
65K3	431410	3741023-001	RELAY - 10 mA
65K4	243690	3467471-008	RELAY - 5 mA
65XK1 TO 65XK4	231434	3467276-003	SOCKET - RELAY
73	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5



Pathfinder Diagram

DC Comparator Module



DERIVED FROM 3472632 REV I

NOTES:

1. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 O/V VOM.
2. RESISTORS R1 & R2, NOT USED ON CODE A & B.
3. ALL RELAYS SHOWN DE-ENERGIZED

CURRENT	PIN		CONDUCTING COMPONENTS	RELAY ENERGIZED
	7	16		
10mA	+	−	CR2, CR3, K1	K1
5mA	+	−	CR2, K2, K1	K2
10mA	−	+	CR1, CR4, K3	K3
5mA	−	+	CR1, K4, K3	K4

20076

Schematic Diagram

DC Comparator Module

Servicing Information
MI-559658 (3457658-502)
Remote Simplex Module

TECHNICAL DATA

SIMPLEX RELAY	
Coil Data (nominal) 12 volts 133 mA 90 ohms	Contact Data 6 "FORM C" (SPDT) Contacts 2A resistive 29V DC, 115V AC

GENERAL DESCRIPTION

The Simplex Module contains remote simplex relay 66K1, a relay having six sets of "form C" (SPDT) contaxts. A transmit command from the remote unit will energize the relay, connecting remote audio to the Control Termination Panel audio circuits and disconnecting local audio. If the station has repeat capability, the remote simplex relay also removes power from the Repeater Module, thereby disabling the repeater circuit during remote operation.

CIRCUIT DESCRIPTION

With the remote simplex relay not energized, local receive or transmit audio is routed through pin 2, contacts 14/15 of K1, pin 4, and ultimately to transmitter audio preamp and line amplifier circuits. The line amplifier output is routed to pin 3 of the Simplex Module, through K1 contacts 17/18/20/21, and out pin 10 to the telephone line termination, permitting the remote control point to monitor receiver audio as well as transmit audio originating at the local control points.

The simplex relay is normally energized by a transmit command signal received from the remote control point. The presence of this command will place +12 VDC (nominal) on either pin 15 or pin 18, causing K1 to energize. When K1 energizes, the local receive or transmit audio is removed from the transmit audio preamp and line amplifier inputs by the operning of contacts 14/15 and the output of the line amplifier is removed from the telephone line by the opening of contacts 17/18 and 20/21. Remote transmit audio from the telephone line is routed through pin 10, relay contacts 21/22, TRANSMIT LINE control R1, contacts 16/15, and pin 4 to the input of the line amplifier and transmit audio preamp. If a notch filter is required, such as in tone remote control systems, it is connected between pins 19 and 20, and jumper JU1 is removed. For stations having repeat capability, the opening of contacts 11/12 is used to remove dc power from the Repeater Module, disabling the repeater circuitry during remote operation.

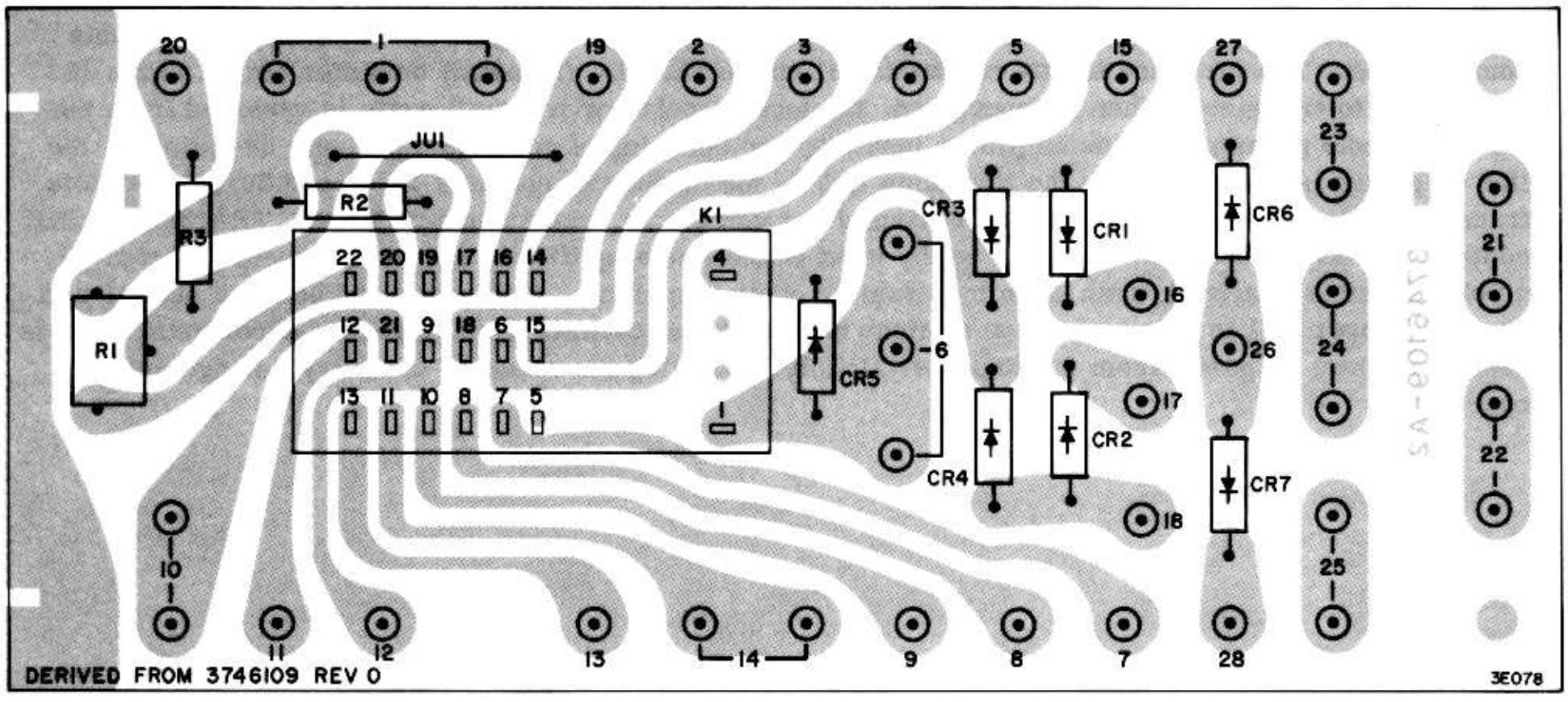
EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

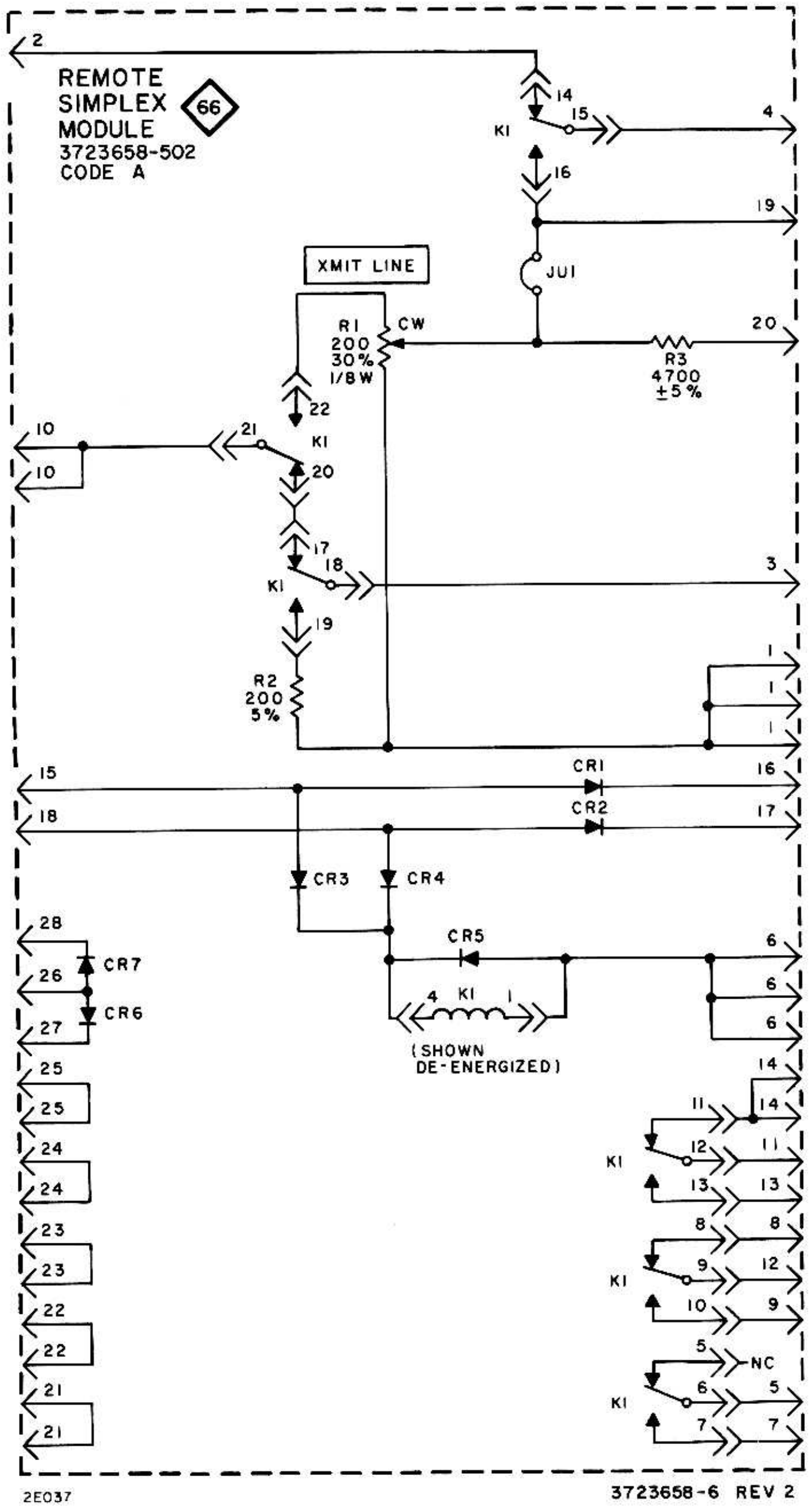
Component Designation	Emergency Substitute
CR1	1N5059
CR2	1N5059
CR3	1N5059
CR4	1N5059
CR5	1N5059
CR6	1N914
CR7	1N914

REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
			SIMPLEX MODULE - CODE A P/L 3723658-502 - REV 2
66CR1 TO 66CR5	419657	3731229-001	DIODE
66CR6 & 66CR7	242522	3464611-001	DIODE
66K1	247998	3467322-012	RELAY - 6 PDT 12V
66R1	246574	3463187-013	VARIABLE, 200 OHMS ±30% 1/8W
66R2	230616	99206-142	200 OHMS ±5% 1/4W
66R3	300739	99206-175	4700 OHMS ±5% 1/4W
66XK1	231436	3467276-017	SOCKET, RELAY
39	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5



Pathfinder Diagram N3LKL



Schematic Diagram

Remote Simplex Module

N3LKL

RCA

Repeater Modules

GENERAL INFORMATION

The modules in this group are used in RCA repeater base stations. For a brief explanation of their application, see the description of the Repeater Module on page 2 of this instruction book. A separate instruction book for each module contains the following details:

1. Technical Data
2. Description
3. Replacement Parts List
4. Pathfinder Diagram
5. Schematic Diagram
6. Table of emergency substitutes for solid-state devices

INSTRUCTION BOOK INDEX

Repeater Module
3457996-501

GENERAL

The repeater module includes a mounting frame a 3-Minute Timer Module, and at least one Driver Module. The 3-Minute Timer Module and the Driver Module are described in separate instruction books, as indicated on page 1 of this publication.

MODULE APPLICATIONS

Single command repeater-operation of a base station requires the addition of a Repeater Module to the Control Termination Panel. The 3-Minute Timer Module and the Driver Module provide the timing control and repeat transmitter keying drive-control necessary for repeater operation. The repeat transmitter may be keyed by a COS (Carrier Operated Switch) or a TOS (Tone Operated Switch).

The 3-Minute Timer Module limits continuous keying of the repeat transmitter to a maximum of 3-minutes. After 3-minutes, the timer relay removes A+ voltage from the keying Driver Module.

The Driver Module provides keying control for the repeat transmitter. When a control signal is applied simultaneously to the 3-Minute Timer Module and a Driver Module, a keying signal appears at the output of the Driver Module.

If the control signal is applied continuously for longer than 3 minutes, the timer relay removes A+ from the Driver Module, and the keying signal drops-out instantaneously. When the control signal is removed before the lapse of 3-minutes, the keying signal has a delayed drop-out, adjustable from 0 to 6 seconds.

With the addition of one more Driver Module, two-command repeater-operation is possible. Including a 4-Driver Mother Module provides a capability of adding four more Driver Modules, hence, four more control commands. To ensure DC isolation between control signal sources when two or more commands are used, either a Steering Diode Network Module or a Matrix Module must be employed. These modules are described in separate instruction books as indicated on page 1 of this publication.

RCA Mobile Communications Systems
Meadow Lands, Pennsylvania 15347, U.S.A.
Printed in U.S.A.
N3LKL

RCA

Servicing Information

3457996-502

3-Minute Timer Module

TECHNICAL DATA

Power Requirements 13.6 VDC ±20% 2.0 mA, K1 de-energized 20.0 mA, K1 energized Control Power Requirements 13.6 VDC ±20% 2.0 mA Operating Temperature Range -30°C to +65°C	Cycle Timing 150 S. (Minimum) 180 S. (Maximum) Output Relay Form C contact. 1A at 29 VDC N.C. contact. controlled timing circuit N.O. contact. accessory or alarm purposes

CIRCUIT DESCRIPTION

The 3-Minute Timer Module establishes a time limit on continuous keying of the repeat transmitter. A COS or TOS (Carrier or Tone Operated Switch) signal is applied to the timer turn-on terminal, pin 1. Emitter follower Q1 and regulator diode CR4 develop a regulated voltage for the timer circuit (about 8.5 volts).

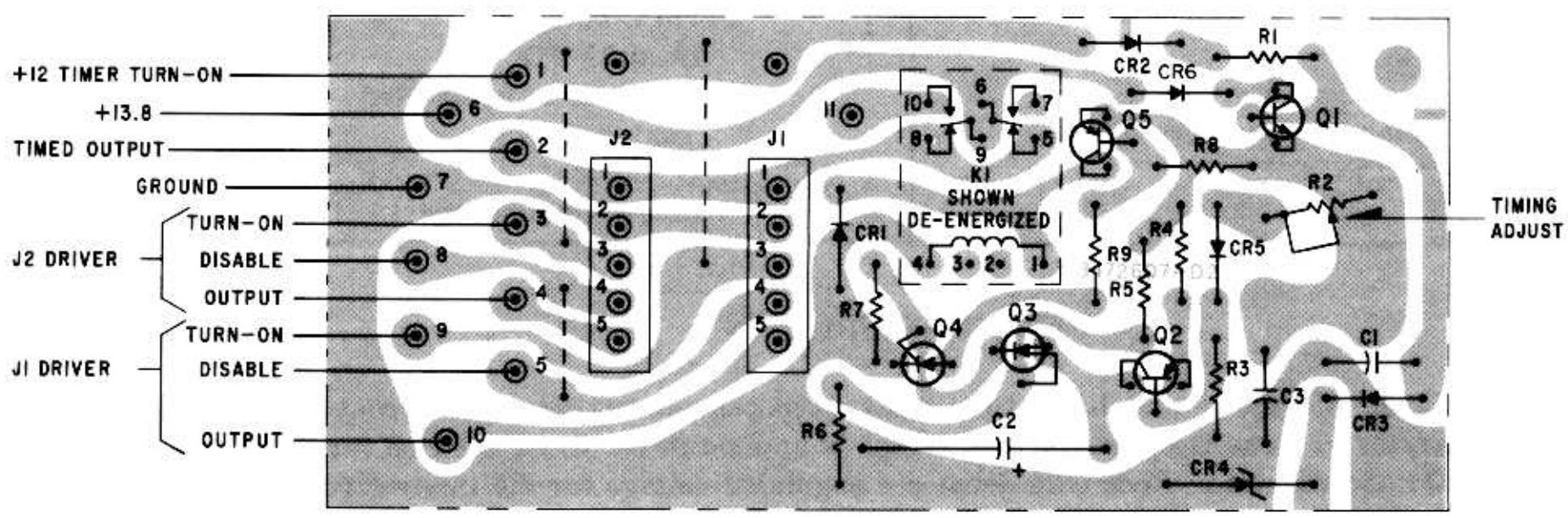
Switch transistor Q2 turns on, charging timing capacitor C2. Over a period of 3-minutes, C2 charges to about 6 volts. At this point, programmable unijunction transistor Q3 fires, applying a gate signal to semiconductor controlled rectifier Q4.

When Q4 fires, bias is applied to relay driver transistor Q5; relay K1 is energized. Contacts of K1 break the A+ line to the Driver Module which controls repeat transmitter keying.

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

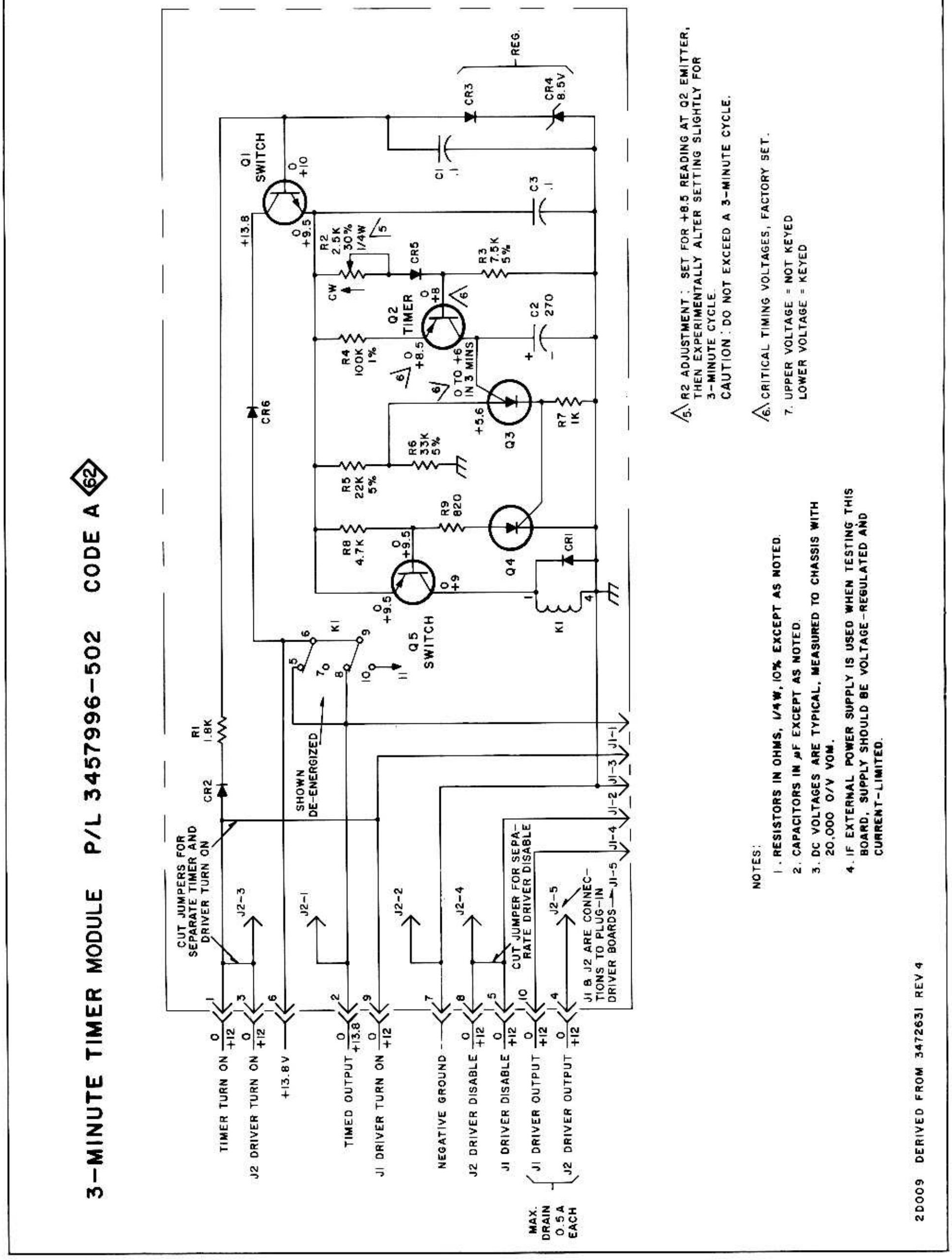
In the event of semi-conductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of substitutes may result in degraded system performance and th exact replacement part should be used as soon as possible.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
CR1, CR2	1N914	Q1	2N4124
CR3	1N4830	Q2	2N4126
CR4	8.5V Zener, 5%	Q3	D13T2
CR5	1N4828	Q4	2N5060
CR6	1N914	Q5	2N4126



3457996-502 CODE A

Pathfinder Diagram



5. R2 ADJUSTMENT: SET FOR +8.5 READING AT Q2 EMITTER, THEN EXPERIMENTALLY ALTER SETTING SLIGHTLY FOR 3-MINUTE CYCLE.
   CAUTION: DO NOT EXCEED A 3-MINUTE CYCLE.

6. CRITICAL TIMING VOLTAGES, FACTORY SET.

7. UPPER VOLTAGE = NOT KEYED
   LOWER VOLTAGE = KEYED

NOTES:

1. RESISTORS IN OHMS, 1/4 W, 10% EXCEPT AS NOTED.
2. CAPACITORS IN μF EXCEPT AS NOTED.
3. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 Ω/V VOM.
4. IF EXTERNAL POWER SUPPLY IS USED WHEN TESTING THIS BOARD, SUPPLY SHOULD BE VOLTAGE-REGULATED AND CURRENT-LIMITED.

Schematic Diagram

3-Minute Timer Module

Symbol	*Stock No.*	*Drawing No.*	*Description*
----	425752	3457996-502	3-MINUTE TIMER MODULE P/L 3457996-502 REV 10 CODE A
62C1	227444	3460490-002	CERAMIC, 0.1 MF 25 W VDC
62C2	247819	3731243-103	TANTALUM, 270 MF 10% 10 W VDC
62C3	227444	3460490-002	CERAMIC, 0.1 MF 25 W VDC
62CR1	242522	3464611-001	DIODE
62CR2	242522	3464611-001	DIODE
62CR3	242721	3731160-001	DIODE
62CR4	242755	3464597-001	DIODE
62CR5	244093	3731193-004	DIODE
62CR6	242522	3464611-001	DIODE
62J1		3457934-105	POST
62J2		3457934-105	POST
62K1	246554	3467471-006	RELAY - 8.5 MA 85 MW 1000 OHMS
62Q1	242759	3468182-002	TRANSISTOR
62Q2	241884	3468183-002	TRANSISTOR
62Q3	245047	3457852-002	TRANSISTOR
62Q4	245048	3457853-001	TRANSISTOR
62Q5	241884	3468183-002	TRANSISTOR
62R1	219460	99206-065	1800 OHMS 10% 1/4W
62R2	247820	3464828-008	VARIABLE, 2500 OHMS 1/4W
62R3	218760	99206-180	7500 OHMS 5% 1/4 W
62R4	235491	990478-501	FILM, 100,000 OHMS 1% 1/8W
62R5	285421	99206-191	22,000 OHMS 5% 1/4W
62R6	285404	99206-195	33,000 OHMS 5% 1/4W
62R7	108865	99206-062	1000 OHMS 10% 1/4W
62R8	300739	99206-070	4700 OHMS 10% 1/4W
62R9	300689	99206-061	820 OHMS 10% 1/4W
62XK1	231434	3467276-003	SOCKET - RELAY
30	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5

Servicing Information

MI-559446-1 (3457996-506)

Driver Module

TECHNICAL DATA

Power Requirements 13.6VDC ±20% Current up to 0.5A Control Power Requirements 13.6 VDC ±20% 1.0 mA maximum Disable Power Requirements 13.6 VDC ±20% 2.0 mA Operating Temperature Range -30°C to +65°C	Output Power 13.6 VDC ±20% 0.5 A maximum Drop-out Time Delay Resistor (R2) — Delay (±20%) 15K — 0.1 Sec. 68K — 1 Sec. 150K — 2 Sec. 240K — 3 Sec. 680K — 6 Sec.

The Driver Module provides drive power for keying the repeat transmitter. The module can be operated from the 3-Minute Timer Module turn-on signal or from a separate keying source.

When a turn-on voltage is applied at pin 3, transistor switch Q1 conducts, providing turn-on bias for transistors Q2 and Q3. Transistors Q2 and Q3 are connected as a solid-state DC switch. The switched output at pin 5 provides a keying signal for the repeat transmitter.

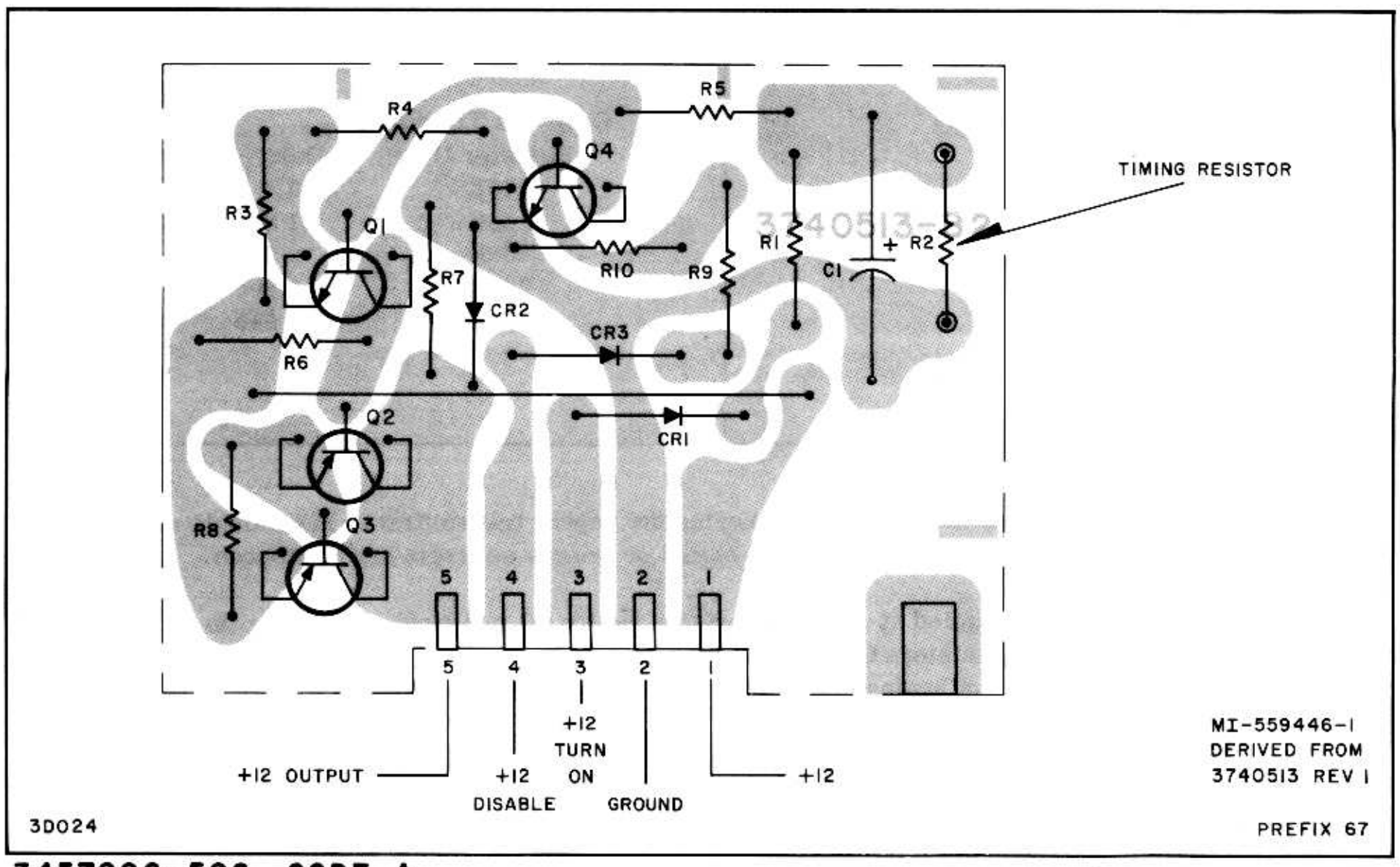
A signal applied to pin 4 of the module tuns-on Q4 which disables the driver. This disable function allows for selective keying in Multiple Driver Module operations.

The driver circuit has two modes of drop-out. When the 3-Minute Timer Module removes A+ from the Driver Module, the drop-out is instantaneous. However, if the control signal is removed within the three minute period, the drop-out can be from 0 to 6 seconds. This drop-out delay is determined by the selected value of resistor R2.

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of semi-conductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of substitutes may result in degraded system performance and the exact replacement part should be used as soon as possible.

Component Designation	Emergency Substitute
CR1 through CR3	1N914
Q1	2N4124 EG3 123AP
Q2	2N4126 — 159
Q3	43062 — 177
Q4	2N4124



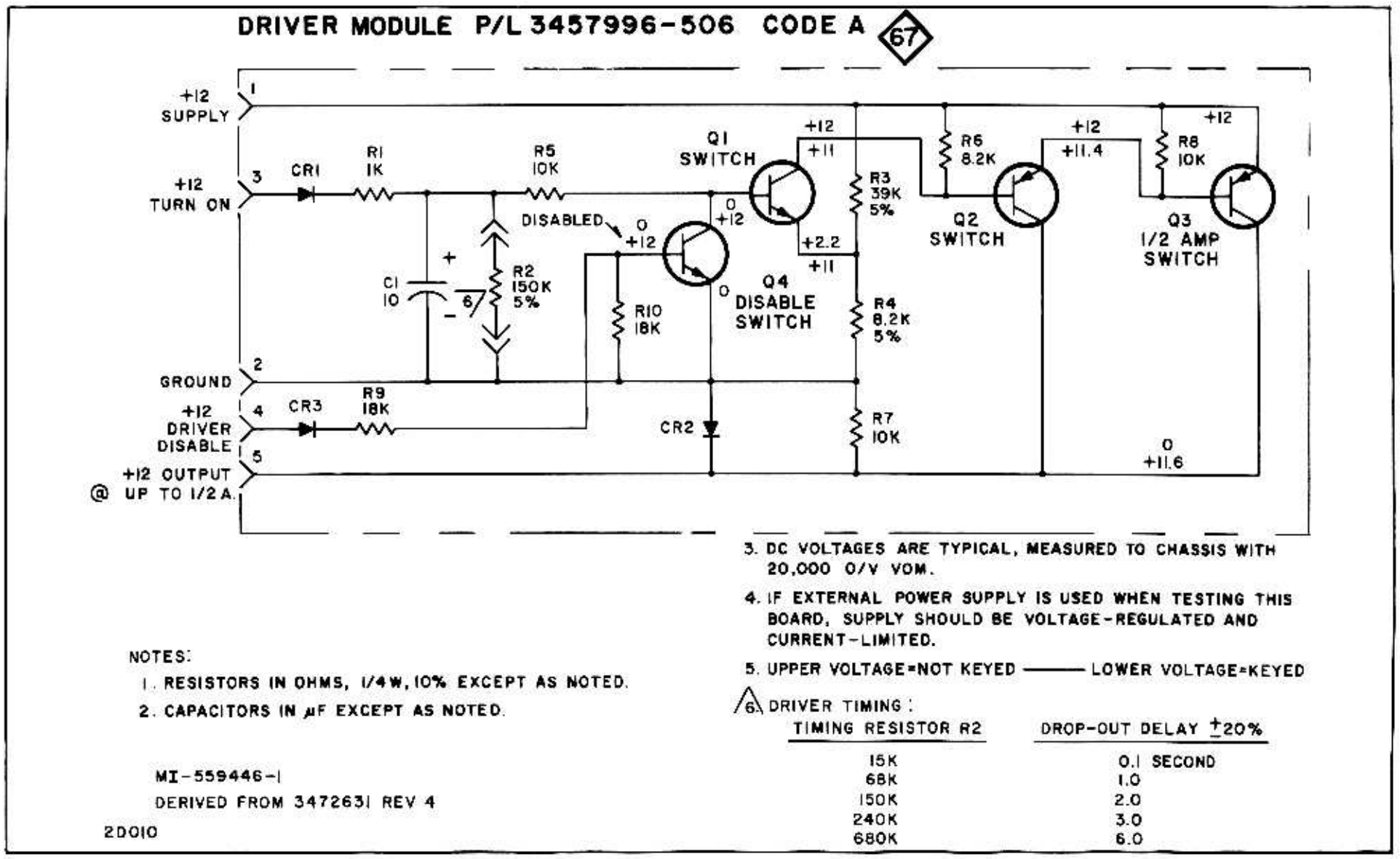
3457996-506 CODE A

Pathfinder Diagram

Driver Module

N3LKL

Symbol	*Stock No.*	*Drawing No.*	*Description*
			DRIVER MODULE P/L 3457996-506 REV 10 CODE A
67C1	226675	3457333-499	TANTALUM, 10 MF 10%
67CR1	242522	3464611-001	DIODE
67CR2	242522	3464611-001	DIODE
67CR3	242522	3464611-001	DIODE
67Q1	242759	3468182-002	TRANSISTOR
67Q2	241884	3468183-002	TRANSISTOR
67Q3	241052	3464623-001	TRANSISTOR
67Q4	242759	3468182-002	TRANSISTOR
67R1	108865	99206-062	1000 OHMS 10% 1/4 W
67R2	223770	99206-211	150,000 OHMS 5% 1/4W
67R3	218500	99206-197	39,000 OHMS 5% 1/4W
67R4	219465	99206-181	8200 OHMS 5% 1/4W
67R6	219465	99206-073	8200 OHMS 10% 1/4W
67R5	218499	99206-074	10,000 OHMS 10% 1/4W
67R7	218499	99206-074	10,000 OHMS 10% 1/4W
67R8	218499	99206-074	10,000 OHMS 10% 1/4W
67R9	108870	99206-077	18,000 OHMS 10% 1/4W
67R10	108870	99206-077	18,000 OHMS 10% 1/4W
29	247818	3781286-005	CONTACT, LARGE - FEMALE
32	247817	3457931-202	CONTACT, SMALL - FEMALE



Schematic Diagram

Servicing Information

MI-559447 (3457996-504)

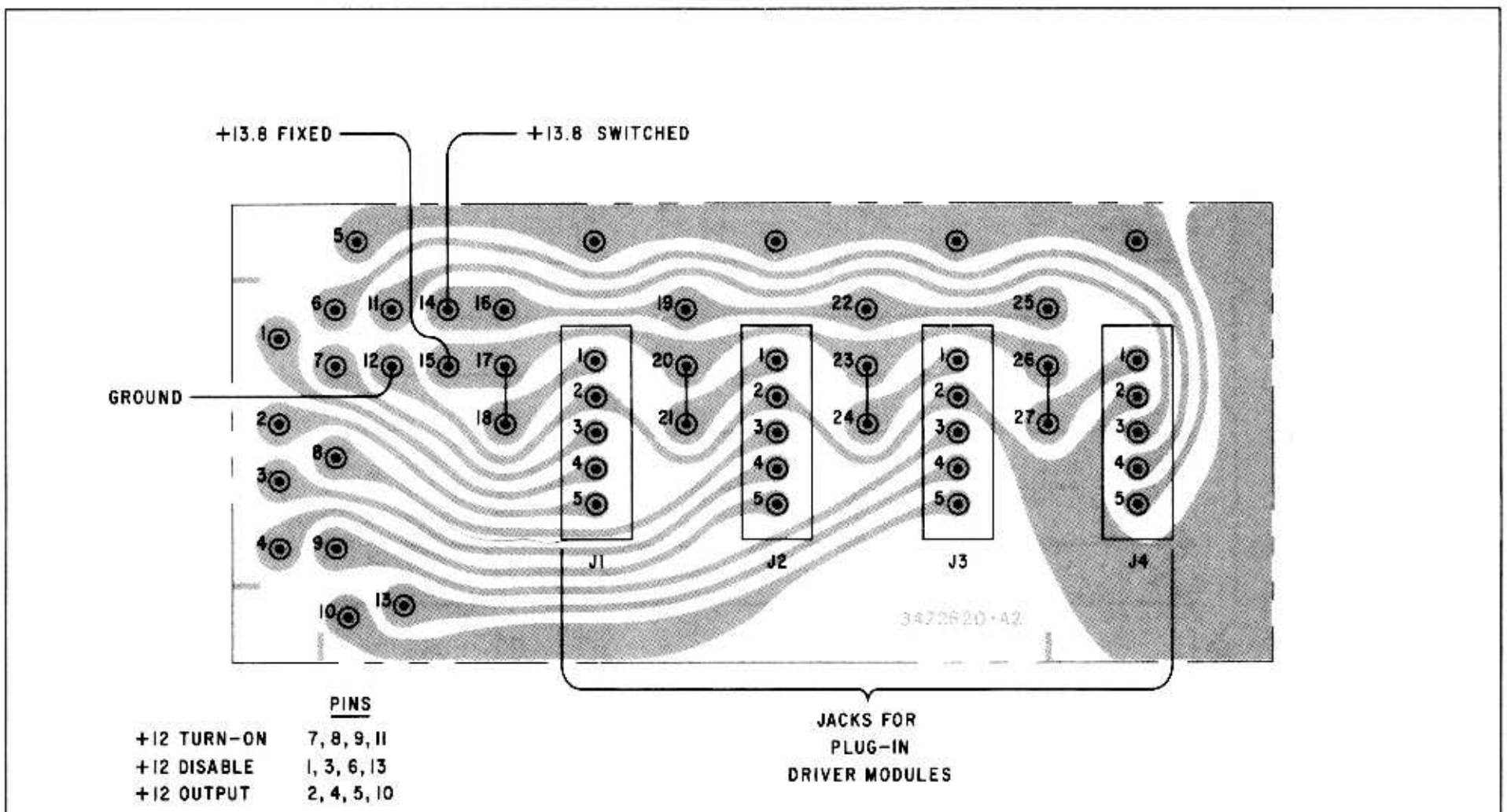
4-Driver Mother Module

GENERAL DESCRIPTION

The 4-Driver Mother Module is a printed circuit board which provides mounting connectors and wiring interconnections for up to four Driver Modules. Space is provided on the Repeater Module for mounting a 4 Driver Mother Module adjacent to the 3 Minute Timer Module.

REPLACEMENT PARTS

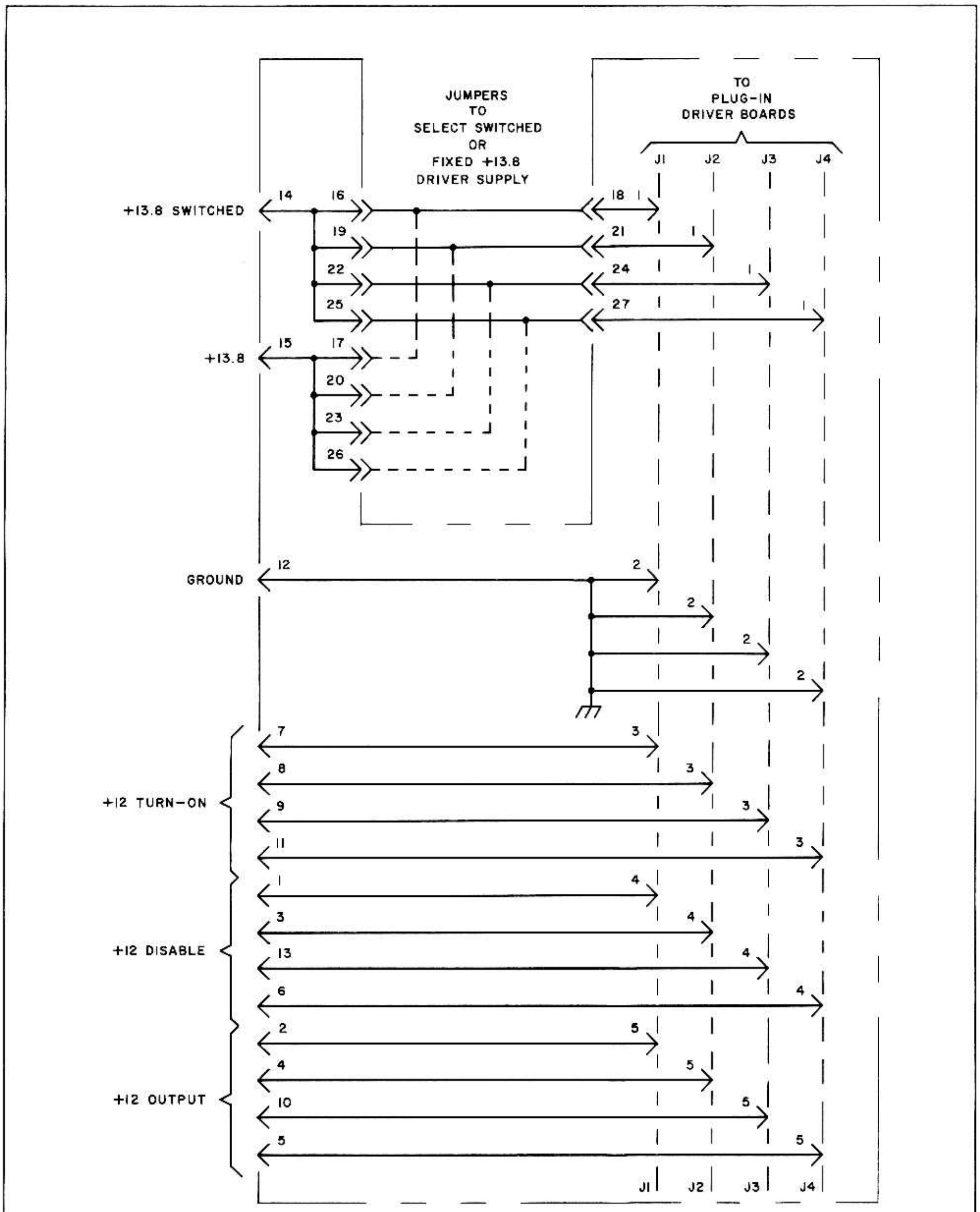
Symbol	*Stock No.*	*Drawing No.*	*Description*
			4-DRIVER MOTHER MODULE P/L 3457996-504 REV 10 CODE A
70J1 THROUGH 70J4		3457934-105	CONNECTOR
30	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5
34	228192	3450825-001	PUSH-ON CONNECTOR, .093 DIA. - PACKAGE OF 5



3457996-504 CODE A

Pathfinder Diagram

N3LKL



4-DRIVER MOTHER MODULE
P/L 3457996-504
CODE A 70

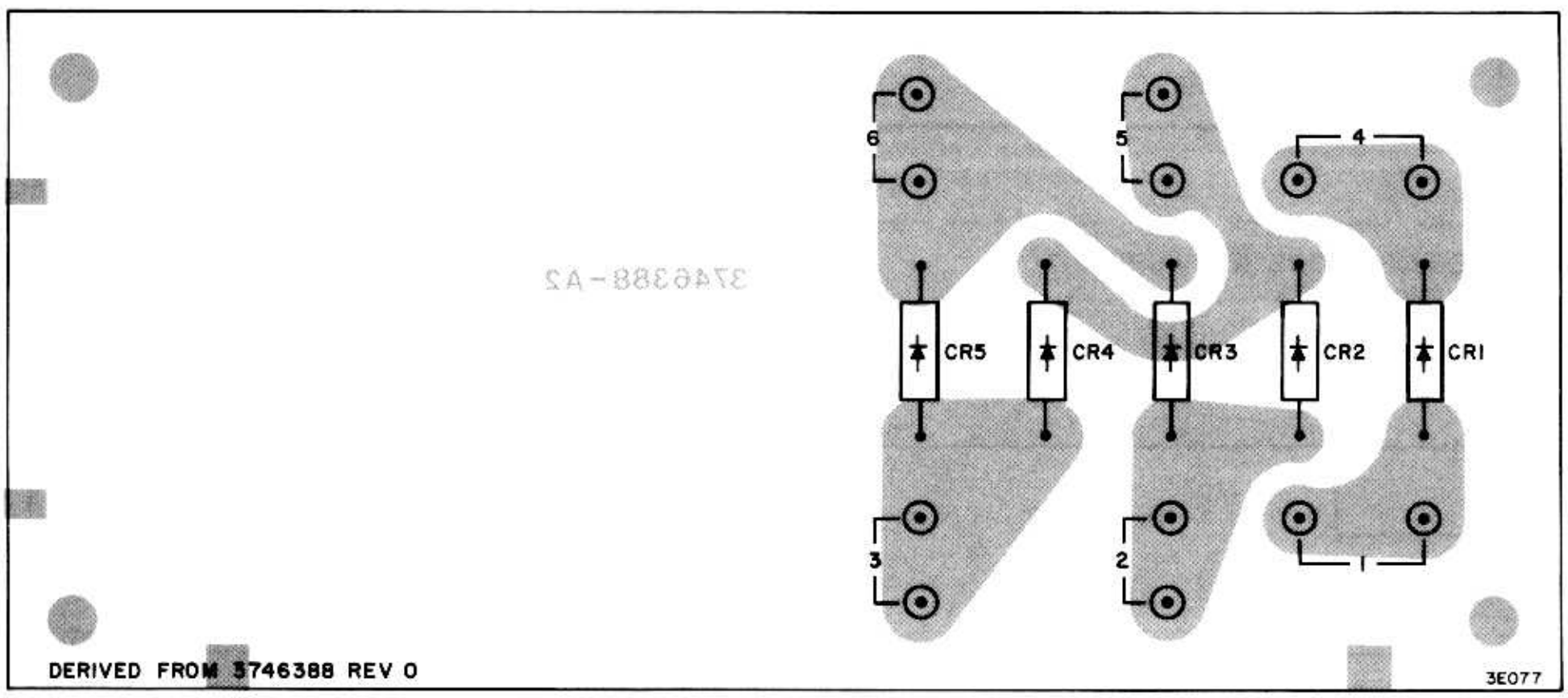
2D018

DERIVED FROM 3720609 REV 0

Schematic Diagram

REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
			STEERING DIODE NETWORK KIT P/L 3720604-510 REV 11 CODE A
CR1 THROUGH CR5	246572	3731229-001	DIODE
35	228124	3450797-003	PIN CONTACT, .093 DIA. - PACKAGE OF 5



Pathfinder Diagram

RCA Mobile Communications Systems
Meadow Lands, Pennsylvania 15347, U.S.A.
Printed in U.S.A.
N3LKL

Servicing Information
MI-559690 (3720604-510)
Steering Diode Network Module

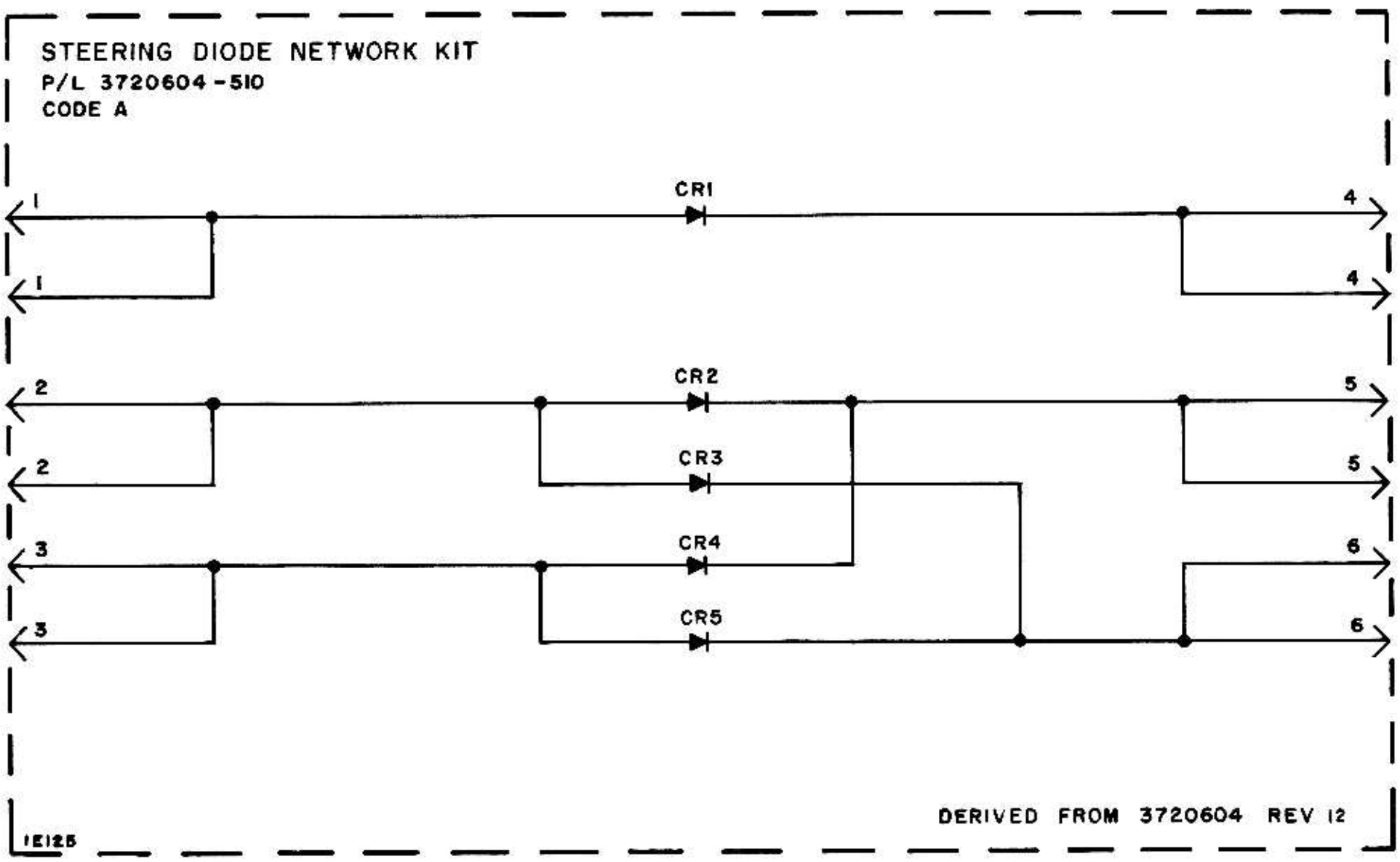
GENERAL DESCRIPTION

The Steering Diode Network Module is a printed circuit board using diodes to provide DC isolation between incoming repeater control signals. This module is used in single-frequency repeater systems requiring either COS or TOS control, but not both. In systems requiring the use of both COS and TOS control, the Matrix Module must be used.

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of substitutes may result in degraded system performance and the exact replacement part should be used as soon as possible.

COMPONENT DESIGNATION	EMERGENCY SUBSTITUTE
CR1 THROUGH CR5	1N5059



Schematic Diagram

Servicing Information

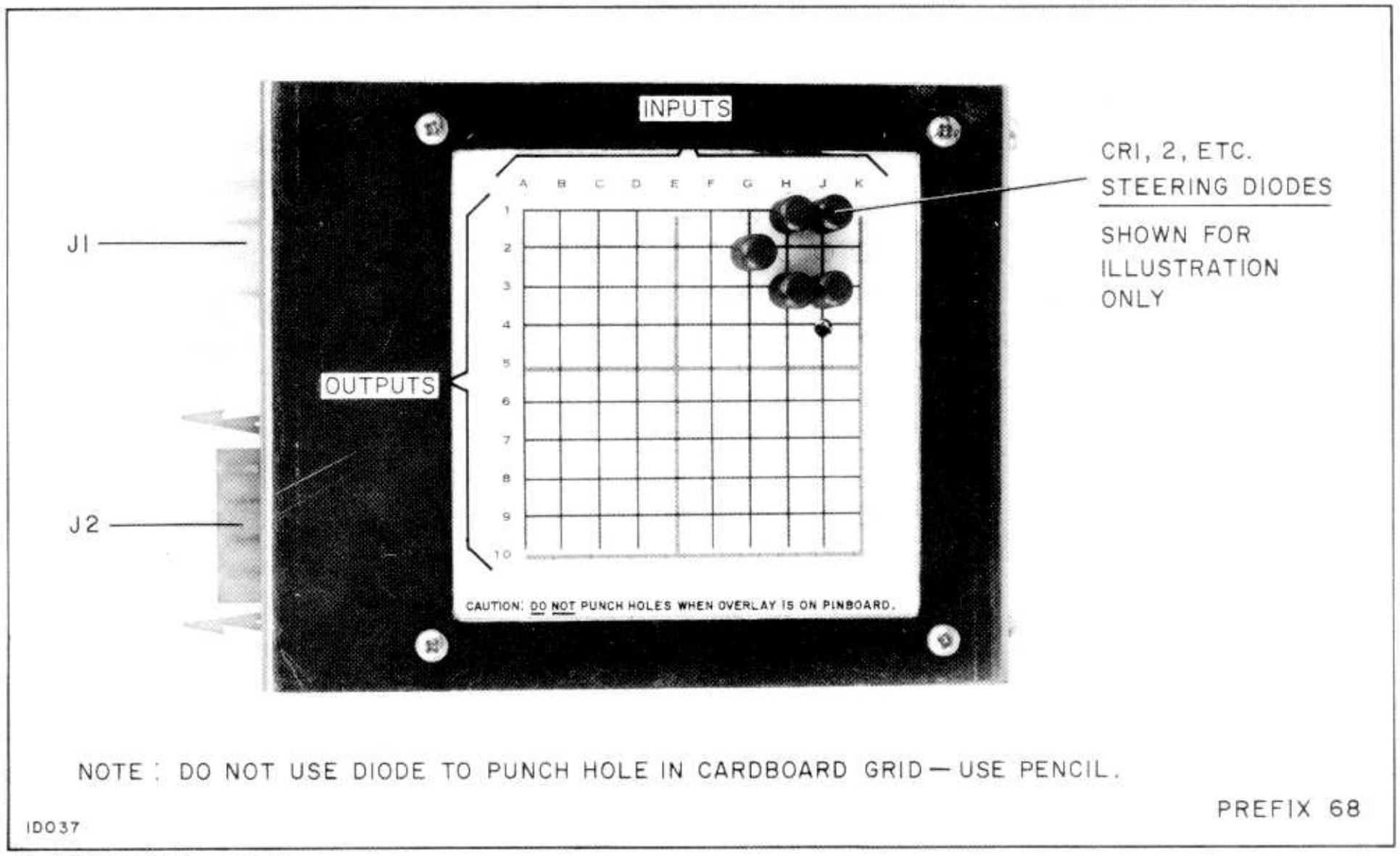
MI-559443 (3468345-501)

Matrix Module

GENERAL DESCRIPTION

The Matrix Module is a device for interconnecting repeater control signals to the 3-Minute Timer Module and two or more Driver Modules. Connections are made between any of the ten input and ten output termination points simply by inserting plug-in steering diodes (MI-559448). The diodes are properly polarized to maintain DC isolation between control signals.

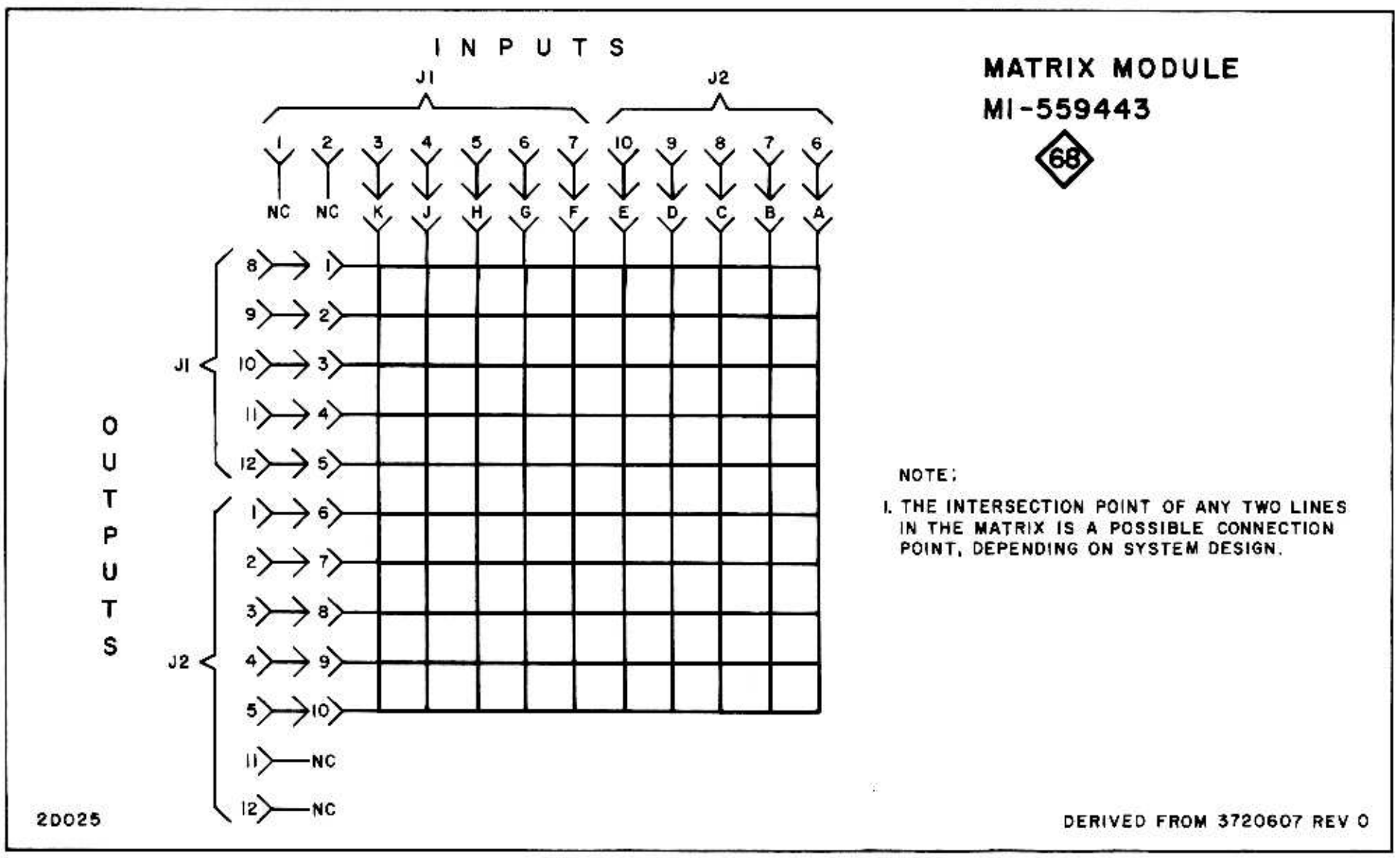
As shown in the illustration below, a printed grid on the cardboard overlay indicates the points of possible interconnection. Where a connection is to be made, the precut locating hole is punched out, and the diode is inserted into the pinboard at that point. To avoid damage to the module or to the diodes, remove the overlay and punch out the selected locating holes with the point of a pencil.



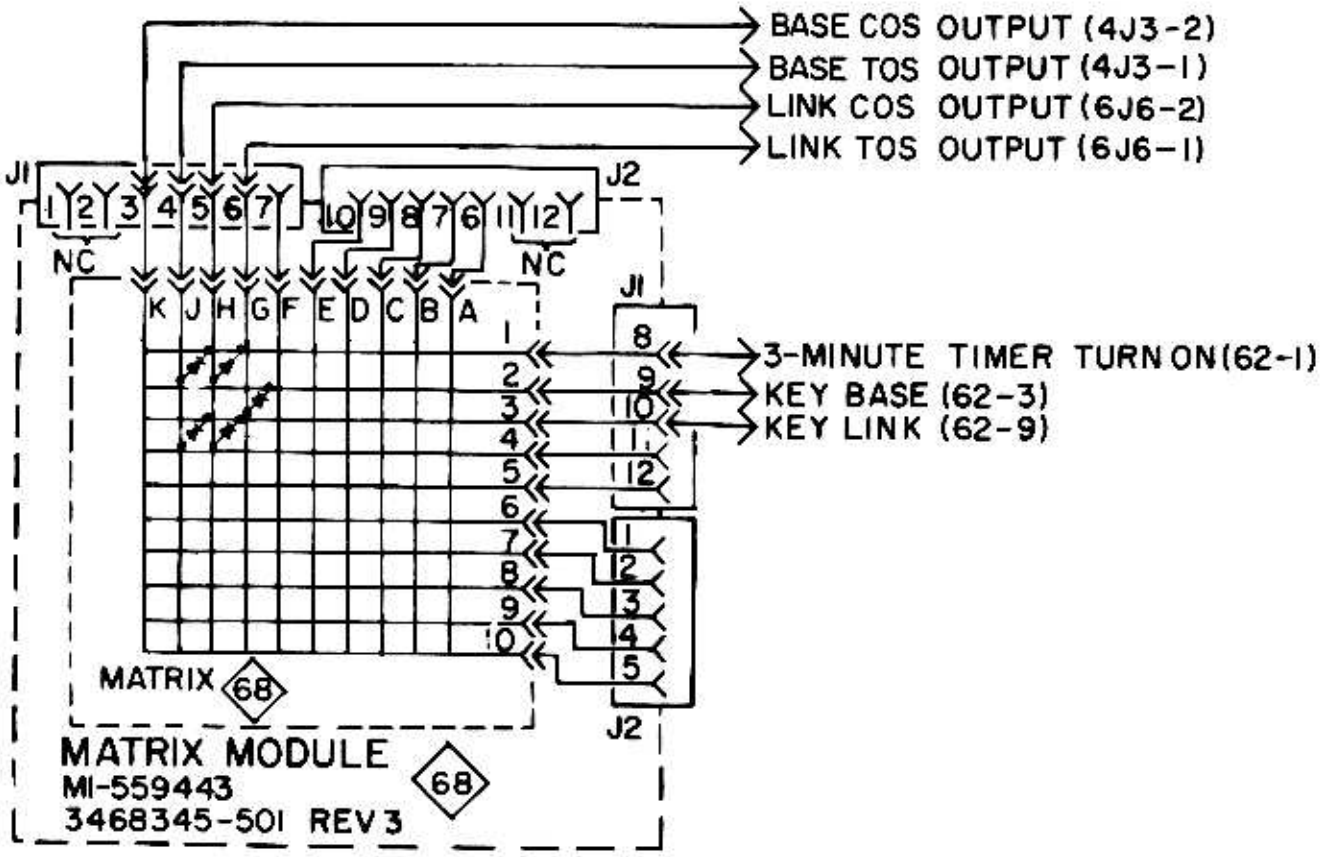
3468345-501 Matrix Module

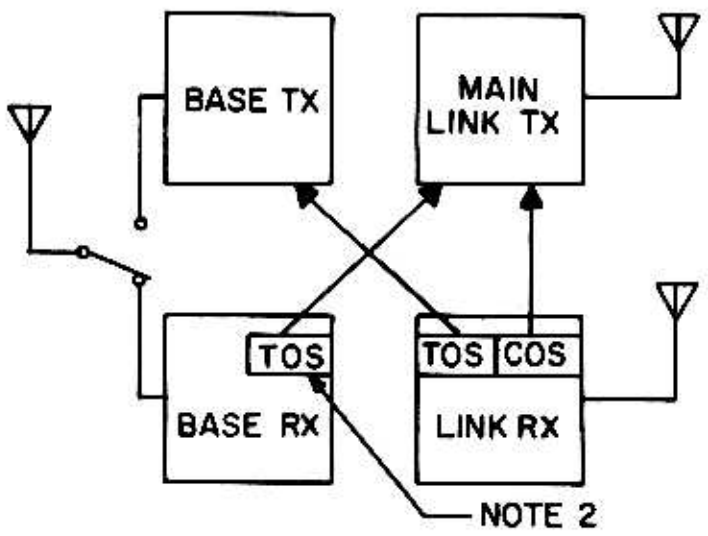
REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
			MATRIX MODULE P/L 3468345-501 REV 3
68J1	241521	3464559-140	CONNECTOR - 12 SOCKET, NATURAL
68J2	245487	3464559-147	CONNECTOR - 12 SOCKET, VIOLET
6	241513	3464559-301	SOCKET (USED IN 68J1 and 68J2) - PACKAGE OF 25
5	247908	3457978-408	SOLDER PIN ON MATRIX BOARD
----	247909	3457978-202	DIODE - 3MA CAPABILITY

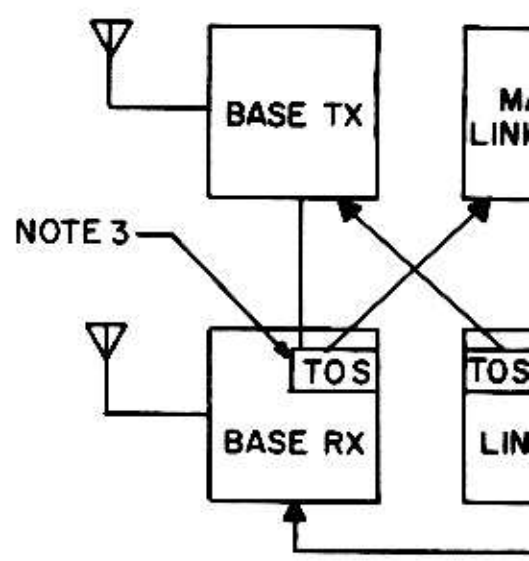


Schematic Diagram



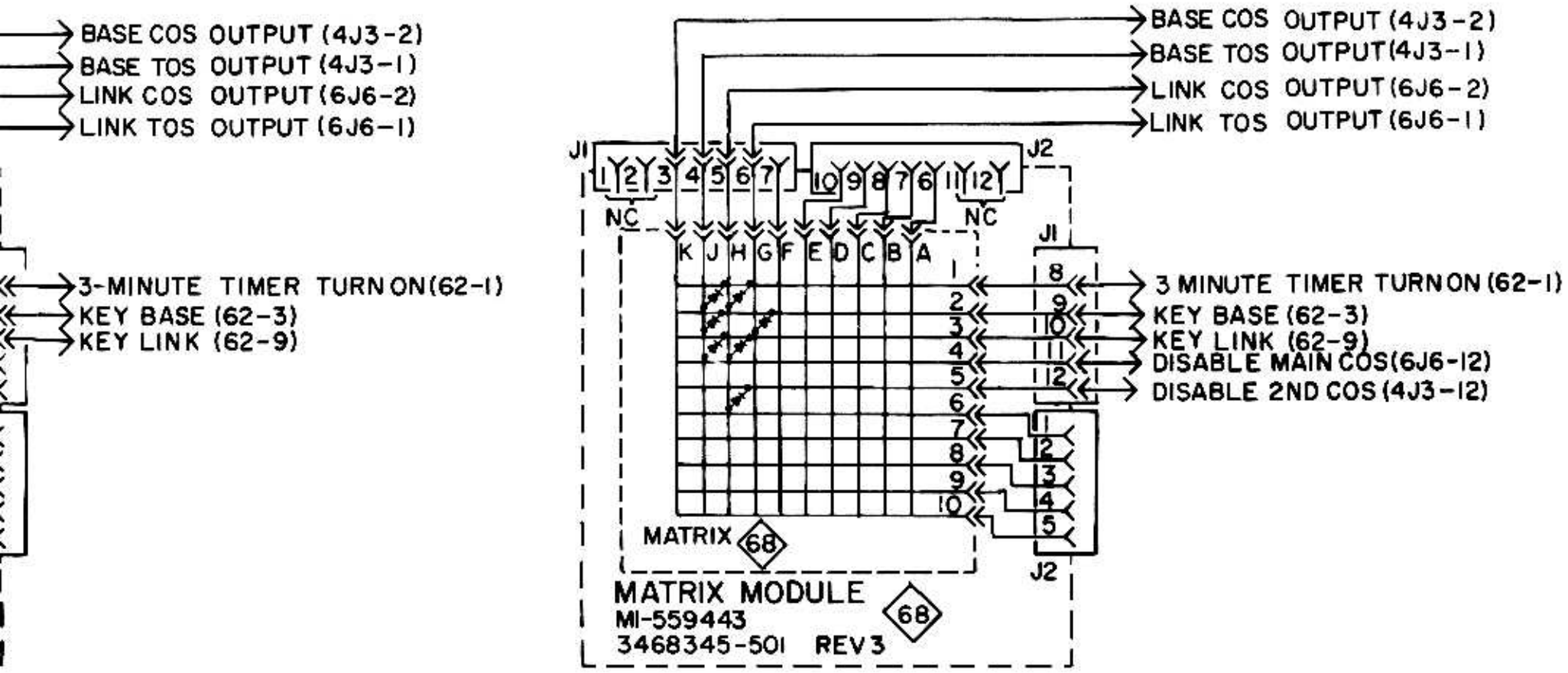


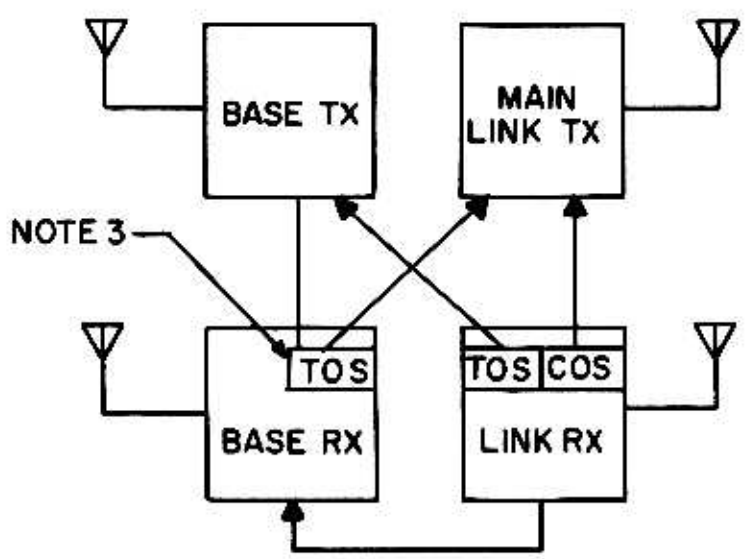
APPLICATION 1
NO PRIORITY INTERLOCK



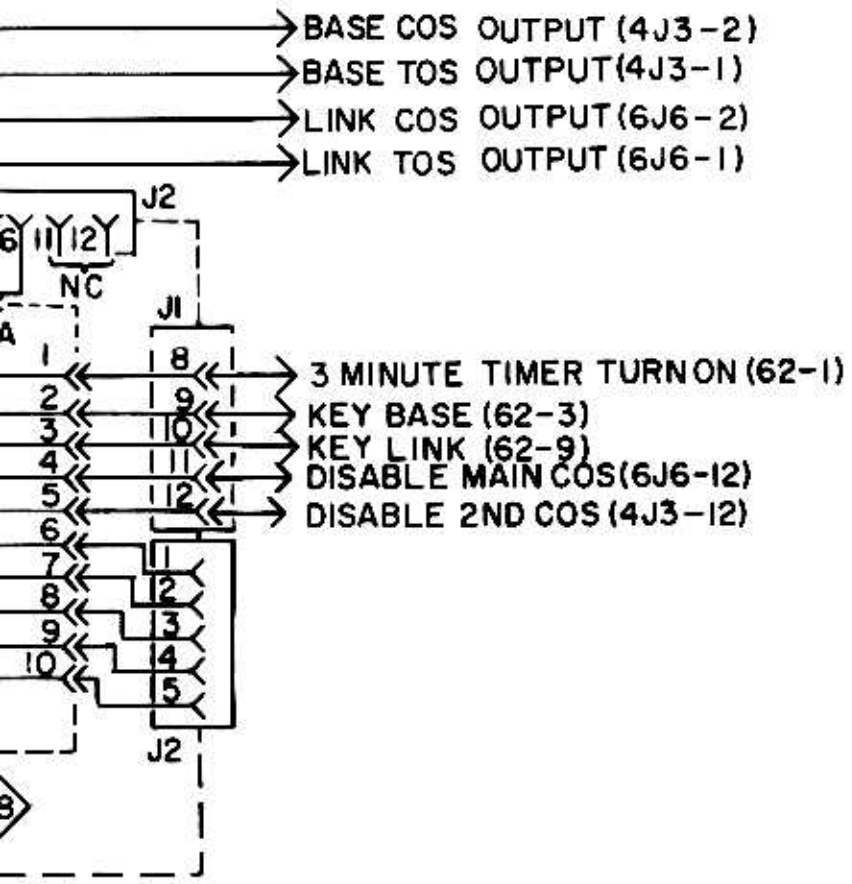
APPLICATION 2
LINK PRIORITY INTELOCK

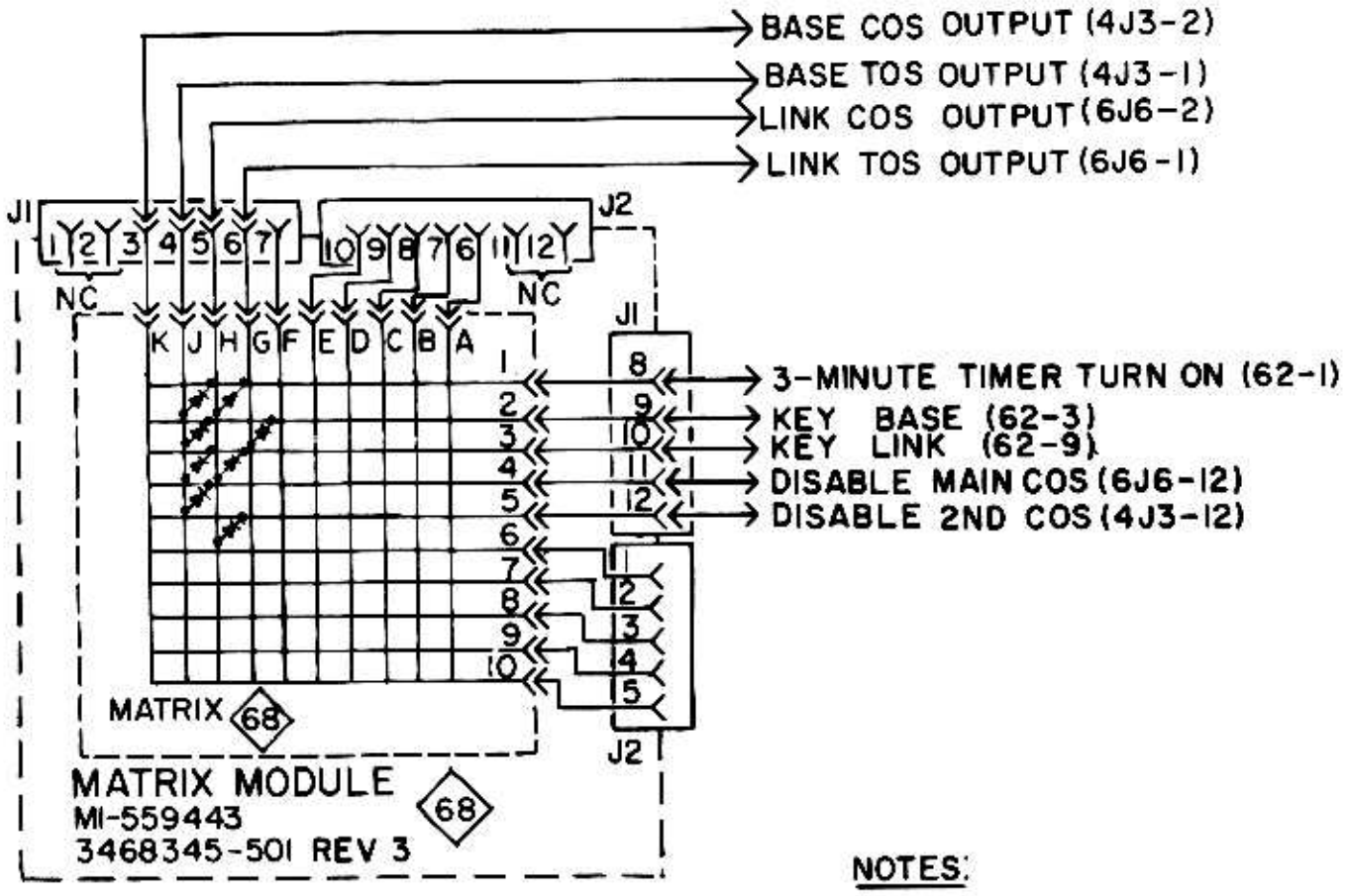
3S034

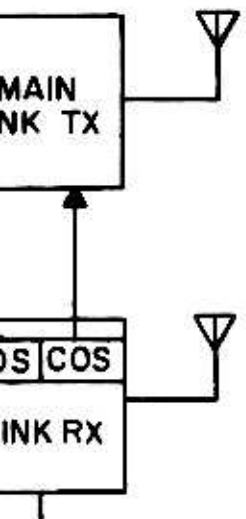


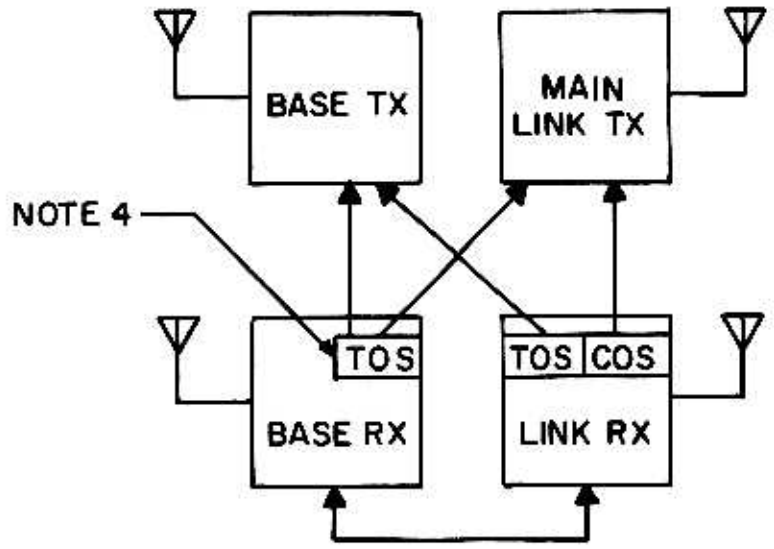


APPLICATION 2
LINK PRIORITY INTELOCK









NOTES:

1. MATRIX INPUTS ARE A THROUGH K, OUTPUTS ARE 1 THROUGH 10.
2. FOR COS OPERATION MOVE DIODE J1 TO K1 AND DIODE J3 TO K3.
3. FOR COS OPERATION MOVE DIODE J1 TO K1, DIODE J3 TO K3 & DIODE J2 TO K2.
4. FOR COS OPERATION MOVE DIODE J1 TO K1, DIODE J3 TO K3, DIODE J2 TO K2, & DIODE J4 TO K4.

DERIVED FROM 3720607 REV 1

APPLICATION 3
FIRST-COME – FIRST-SERVED
PRIORITY INTER LOCK

Servicing Information
MI-559541 and MI-559541-1
4-Wire Audio Adapter Module

GENERAL INFORMATION

The 4-Wire Audio Adapter Module is an optional accessory for use in the Control Termination Panel. The module consists of a mounting frame with an audio transformer, a screw-type terminal board, and space for mounting a 4-Wire Audio Adatper printed circuit board and a Receive/Transmit Amplifier printed circuit board. (MI-559541-1 includes all items listed; MI-559541 includes all items except the Receive/Transmit Amplifier.)

Depending on system requirements, the 4-Wire Audio Adapter Module can be wired to provide connections for separate receive/transmit telephone lines or for a separate second receiver line. In applications requiring audio amplification, the Receive/Transmit Amplifier provides a gain of 18 dBm and an audio level control.

CIRCUIT DESCRIPTION

The basic module consists of: transformer T1, for providing a balanced 600 ohm output; terminal board TB1, for providing system interconnections; and the adapter and amplifier printed circuit boards.

4-Wire Audio Adapter Printed Circuit Board

Part of this board consists of terminal pins for interconnecting the various components of the module. Resistor R1 and capacitor C1 provide supply voltage filtering for the Receive/Transmit Amplifier when used.

The purpose of resistor/capacitor network R2/R3/C2 is to provide a properly equalized interface between the receiver output load resistor (bridging 12 ohms) and the input of the Receiver/Transmit Amplifier. The network improves high frequency response to 3KHz.

Relay K1 may be used in applications requiring a contact closure when keying the transmitter from a COS or a TOS signal.

Receive/Transmit Amplifier

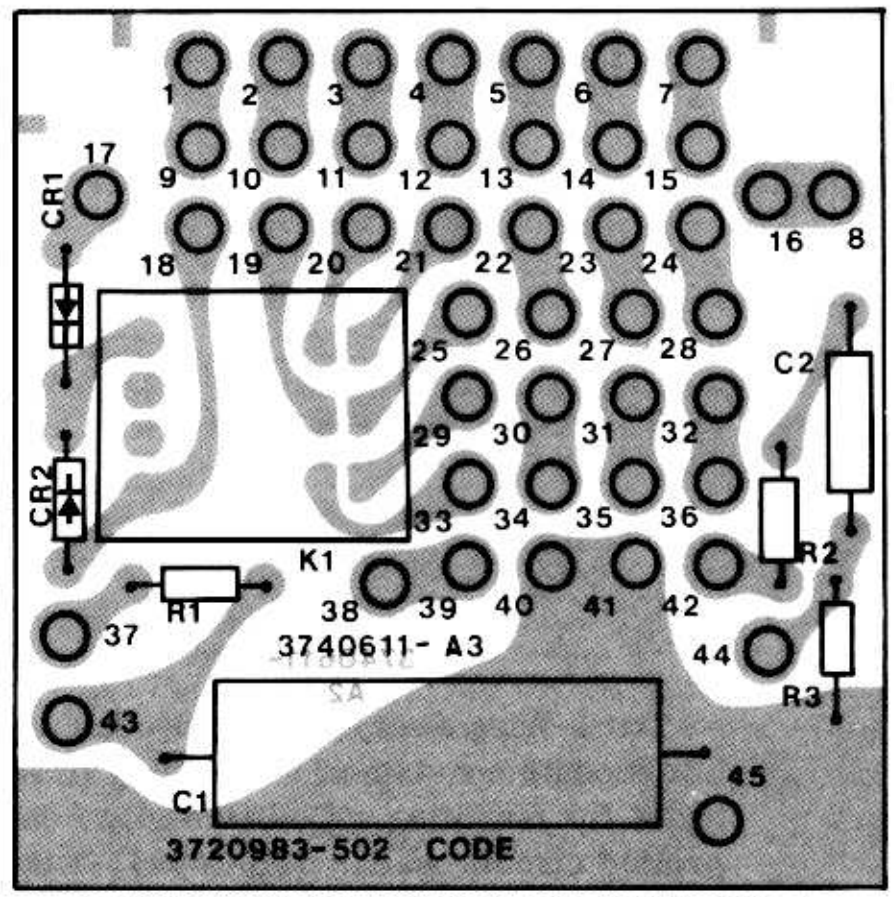
This circuit board is identical to the Receive/Transmit Amplifier Module used in the basic Control Termination Panel. Refer to the instruction book covering that module for description and servicing information on this amplifier.

EMERGENCY SUBSTITUTES–SOLID-STATE DEVICES*

In the event of a semiconductor failure, the exact replacement part found in the replacement parts list should be used. In an emergency, to minimize equipment downtime, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute
CR1 & CR2	1N5059

* For 4-Wire Adapter circuit board only. For servicing information regarding the Receive/ Transmit Amplifier, refer to the instruction book coverage of the Receive/Transmit Amplifier Module in the basic Control Termination Panel.

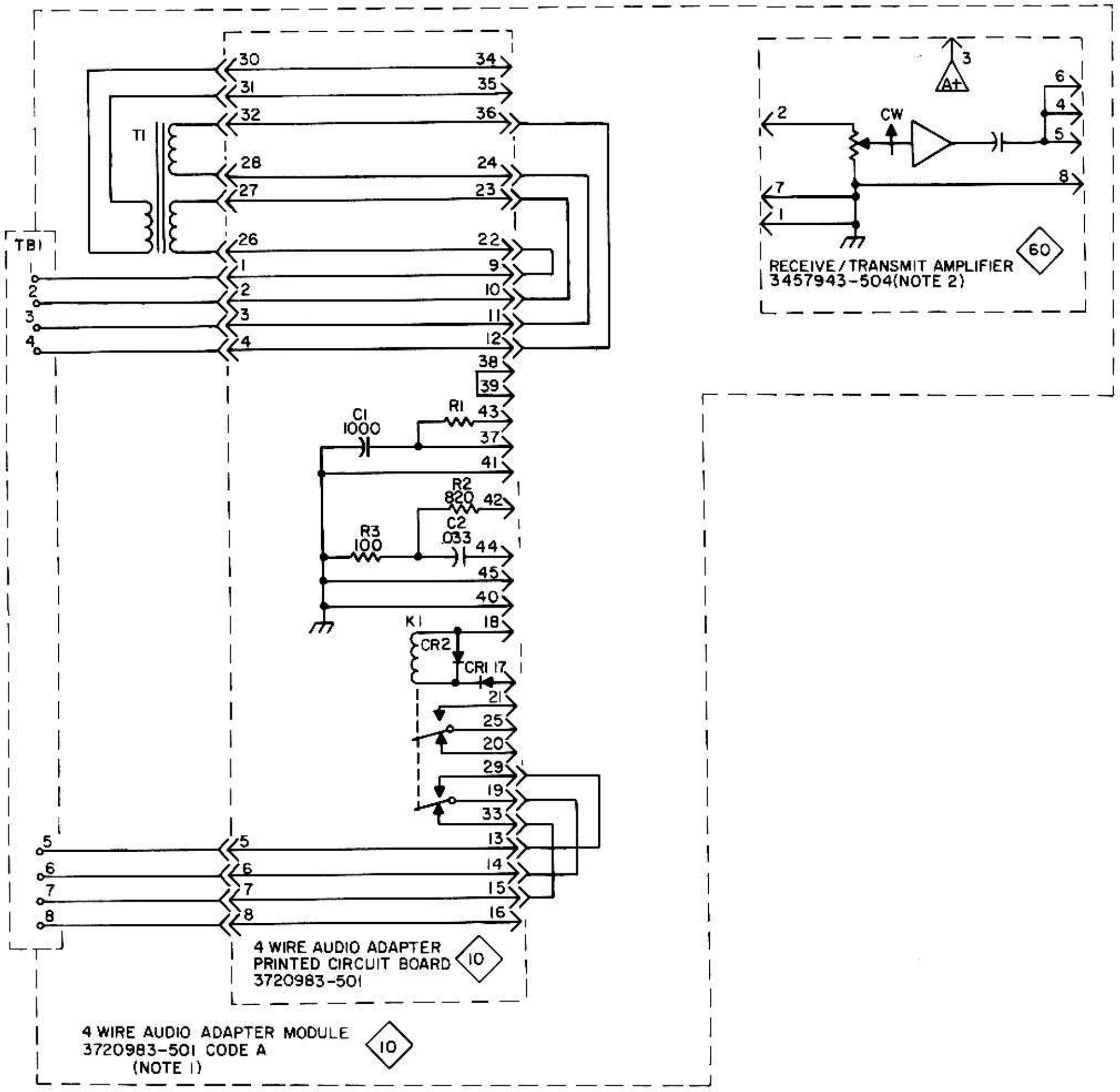


DERIVED FROM P/L 3720983-501 REV 4 CODE A

Pathfinder Diagram

REPLACEMENT PARTS

Symbol	*Stock No.*	*Drawing No.*	*Description*
			4 - WIRE AUDIO ADAPTER MODULE P/L 3720983-501 REV 4 CODE A
		3720983-502	AUDIO ADAPTER BOARD
102C1	233576	3464636-002	CAPACITOR, 1000 uf 16V
102C2	240132	3462014-223	CAPACITOR, .033 uf ±5%
102CR1	246572	3731229-001	DIODE
102CR2	246572	3731229-001	DIODE
102K1	246554	3467471-006	RELAY
102R1	108860	99206-127	47 OHMS 1/4W
102R2	300690	99206-157	820 OHMS 1/4W
102R3	108861	99206-135	100 OHMS 1/4W
102T	246565	3731255-001	AUDIO TRANSFORMER
102XK1	231434	3467276-003	RELAY SOCKET
	228124	3450797-003	CONTACT PIN
	228192	3450825-001	RECEPTACLE



NOTE:
1. WIRING BETWEEN ADAPTER PRINTED CIRCUIT BOARD AND OTHER COMPONENTS IS TYPICAL.
2. RECEIVE/TRANSMIT AMPLIFIER USED IN MI-559541-1 ONLY. FOR SERVICING INFORMATION SEE INSTRUCTION BOOK FOR THE BASIC CONTROL TERMINATION PANEL MODULES.

22079

Schematic Diagram

RCA

Mobile Communication Equipment

Servicing Information

MI-559412-2

Control Termination Panel