SPECIFICATIONS

General

Frequency range	2 to 29.9999 MHz, 100-Hz steps.
Channels	280,000.
Frequency stability	±0.8 ppm, -40 to +65 °C; ±1.0 ppm, -54 to -40 °C.
Modes	USB, LSB, AME with voice, CW modulation. (Line audio input for data transmission is available.)
Environmental	Temperature: -54 to +65 °C operation; -65 to +71 °C storage. Immersion up to 1 m (3 ft) in water. Altitude up to 3000 m (10,000 ft) operating.
Transceiver size	36.2 cm w, 14.0 cm d, 37.5 cm h (14.3 in w, 5.5 in d, 14.8 in h) overall.
Transceiver weight	12.5 kg (27.7 lb).

Transmitter

Audio input	-56 to -26 dBm, 600 ohms voice input. 0 dBm, 600 ohms data input (-6 to +10 dBm).
Power output	150 watts pep/average +.5 dB -2.0 dB into 50-ohm load.
Intermodulation distortion	Third and higher orders, 25 dB below either of two test tones at 150 watts pep.
Carrier suppression	45 dB below 150-watt pep.
Harmonic output	45 dB below 150-watt pep.
Tuning time	1 second nominal, 5 seconds maximum.
Antenna tuner	Automatically tunes 4.6 to 10.7 m (15 to 30 ft) whip, Collins 637K-1, dipoles from 2 to 30 MHz, plus selected long wires.

Receiver

Sensitivity	SSB — 0.5 μV input for 10 dB signal-plus-noise-to-noise ratio; AM — 2.0-μV input (30% modulated) for 10-dB signal-plus-noise-to-noise ratio.
Selectivity	SSB — +0, -3 dB, 600 to 2700 Hz; +0, -6 dB, 300 to 3200 Hz; -60 dB min, less than -300 Hz and more than +6700 Hz. AM — ±2 dB, carrier frequency ±2 kHz; -60 dB min at greater than ±11.5 kHz from carrier frequency.
Image rejection	60 dB.
If rejection	70 dB.
Audio output	10 mW into 600-ohm load (adjustable by volume control); 0 dBm nominal into 600-ohm load in data mode.

POWER REQUIREMENTS

Voltage	25 volts nominal. Full specification performance from 22 volts to 30 volts input.
Nominal power consumption	Receive 15 watts; transmit 424 watts with single tone.

Specifications subject to change without notice.

Collins Telecommunications Products Division
Defense Electronics Operations/Rockwell International
Cedar Rapids, Iowa 52498

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Rockwell
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instruction book

150-Watt
HF Communication System

Collins Defense Communications
Rockwell International Corporation
Cedar Rapids, Iowa 52498

Printed in the United States of America

NOTICE: This instruction book replaces first edition dated 1 February 1983.

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

Please be advised that completion and return of the enclosed Customer Service Information sheet to Rockwell International ensures you of manual revisions and service bulletin modifications to your equipment. Without the return of this sheet, Rockwell International bears no responsibility to forward this information to you.

Caution

The material in this manual is subject to change. Before attempting any maintenance operation on the equipment covered in this manual, verify that you have a complete and up-to-date publication applicable to your equipment.

We welcome your comments concerning this instruction book. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the instruction book part number, paragraph or figure number, and page number.

Send your comments to: Logistics
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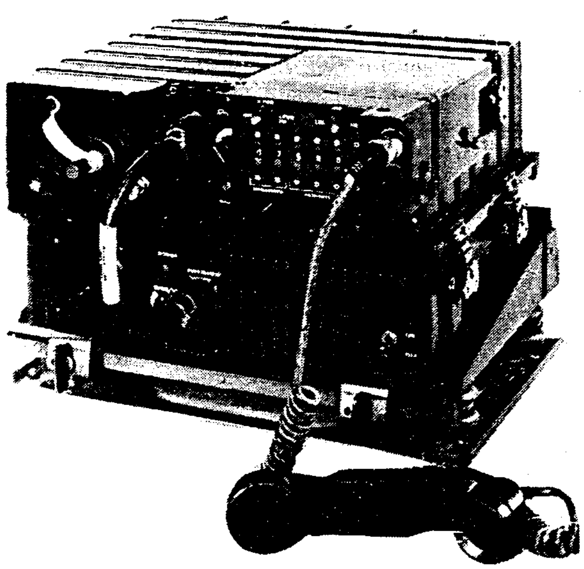
introduction

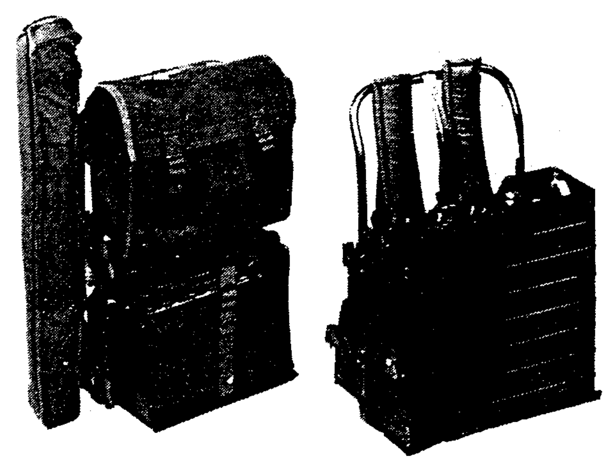
DESIGN FEATURES

The 150-Watt HF Communication System is a rugged, versatile, lightweight, 150-watt system designed to provide communication in the 2.0000- to 29.9999-MHz range in the USB, LSB, AM, CW, and data modes of operation in all types of terrain. Each 150-watt hf system configuration includes the 719D-15 Radio Receiver-Transmitter which is the nucleus of the system and is fully compatible with existing equipment. The 150-watt hf system has the flexibility of being configured as a teampack, portable, or vehicle transportable communications base. The capabilities of the system will allow it to use 15- or 32-foot whip, NVIS (637K), long-wire, or dipole antennas. A complement of available accessories allows the system to be matched to all tactical situations.

The 719D-15 Radio Receiver-Transmitter provides the functional unit of the 150-watt hf system. It consists of a 671V-2 Receiver-Transmitter, 377L-2 Receiver-Transmitter Control, and 549C-1 Amplifier-Coupler. The amplifier-coupler is a high performance, solid-state, broadband, 150-watt power amplifier and a fully automatic, high-speed, digital-controlled antenna coupler. Control of the power amplifier and antenna coupler is accomplished with a self-contained microprocessor. The combination of receiver-transmitter and receiver-transmitter control will give the user a frequency range of 2.0000- to 29.9999 MHz in 100-Hz increments, in any one of five modes (LSB, USB, AM, CW, or FSK). As a package, the 150-watt hf system is one of the most versatile, rugged, reliable, state-of-the-art field communication systems available.



VC-120
VEHICULAR COMMUNICATION STATION



MP-150
MAN-PACK

TPA-5916-017

150-Watt HF Communication System Configurations

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

The part numbers of the following 150-watt system components have military nomenclature assigned.

VC-120	622-6203-001	AN/GRC-220
377L-2	622-2553-016	C-11635/GRC-220
671V-2	622-2148-001	RT-1499/GRC-220
549C-1	622-5365-001	AM-7292/GRC-220
998W-1	622-6309-001	MX-10692/GRC-220
AS-1320	522-2431-001	AS-1320/PRC-47
637K-1	758-3377-001	AS-2259/GR

SERVICE BULLETINS/SERVICE INFORMATION LETTERS

All service bulletins and service information letters are issued for the individual units that make up the 150-Watt HF Communication System. Refer to the unit instruction books for service bulletins/service information letters issued to date.

CONFIGURATION EFFECTIVITY

The latest revision identifier covered in this manual can be found in the parts list.

SCHEMATIC CHANGES

When schematic changes are required, an arrow with a revision identification (eg, A1 , A2 , B1 , C1) will point to the area of the schematic that is changed. The revision identification will be listed on the schematic change page that precedes the schematic. For each revision identification listed, a description of revision and reason for change, effectivity, and a service bulletin number, if applicable, will be included.

PART NUMBERS

Unless otherwise specified, all part numbers that appear in text or tables or on illustrations will be Rockwell International part numbers.

section 1
description

1.1 GENERAL

The purpose of the 150-Watt HF Communication System is to provide voice and data information transference through the air in all types of terrain. The 150-watt hf system can be deployed, used to establish communications, and redeployed rapidly. Full coverage of the 2- to 30-MHz frequency range, fast automatic coupler tuning of the most effective antennas, and 150-watt power output make the system ideally suited for modern tactical needs. Two available configurations are the VC-120 Vehicular Communication System and the MP-150 Man-Pack.

1.2 EQUIPMENT SUPPLIED

Table 1-1 lists the equipment supplied as part of the system. Refer to figure 1-1 for the man-pack configuration and figure 1-2 for the vehicular communication system configuration.

Table 1-1. Equipment Supplied.

UNIT			150-WATT HF COMMUNICATION SYSTEM		DESCRIPTION/FUNCTION
TITLE	COMMON NAME	PART NUMBER*	MP-150	VC-120	
377L-2 Receiver-Transmitter Control	Control C-11635/GRC 220	622-2553-002 or 622-2553-016	X	X	Control providing LSB, USB, AM, CW, data, and high/low power
671V-2 Receiver-Transmitter	Receiver-transmitter RT-1499/GRC 220	622-2148-001	X	X	Interfaces with the control and amplifier coupler. Provides transmit and receive functions.
549C-1 Amplifier-Coupler	Amplifier-coupler AM-7292/GRC 220	622-5365-001	X	X	Power amplifier and automatic antenna coupler. Provides 150-W pep and average rf power and impedance match to antenna.
Power Cable		651-7430-001	X		Connects battery adapter and amplifier-coupler.
MX-4430 Battery Adapter	Battery adapter	549-6253-004	X		Adapts battery for use with power cable.
998W-1 Power Conditioner	Power conditioner MX-10692/GRC 220	622-6309-001		X	Interfaces between the mount and the amplifier-coupler.
Power Cable		651-7432-001		X	Connects between power conditioner and amplifier-coupler.

* Unless otherwise indicated, all part numbers are Rockwell International.

Table 1-1. Equipment Supplied (Cont).

UNIT			150-WATT HF COMMUNICATION SYSTEM		DESCRIPTION/FUNCTION
TITLE	COMMON NAME	PART NUMBER*	MP-150	VC-120	
MT-1029 Mount	Mount	651-8504-001		X	Provides mounting base for radio and power conditioner.
CX-4720 Power Cable Assembly	Power cable assembly	426-0114-010		X	Connects between vehicle power source and mount.
958J-2 Antenna Base	Antenna base	622-6338-001 or 622-6338-002		X	Provides for mounting of antenna on either armor (622-6338-001) or thin skin (622-6338-002) surface.
Insulator for AT-1011/U		553-6841-004		X	Provides personnel protection from high rf voltage on the antenna.
963A-2 Pack Frame	Pack frame	622-6307-001	X		Lightweight tubular pack frame for transceiver portaging
963A-3 Pack Frame	Pack frame	622-6308-001	X		Lightweight tubular pack frame for battery and antenna transportation
AS-5095X Counterpoise	Counterpoise	629-5896-001	X		Lightweight electrical ground plane cable on self-storing bobbin for use in terrain unsuited for radio transmitting.
AS-1320 Whip Antenna	Antenna	522-2431-001	X		4.6-m (15-ft) whip antenna
AT-1011/U Whip Antenna	Antenna	553-6725-000		X	4.9- to 9.75-m (16- to 32-ft) whip antenna
H-189/GR Handset	Handset	792-6534-001	X	X	Handheld microphone, speaker, and transmit switch for voice communication
BB-451 Battery	Battery	221-0032-000	X		Portable silver zinc rechargeable storage battery

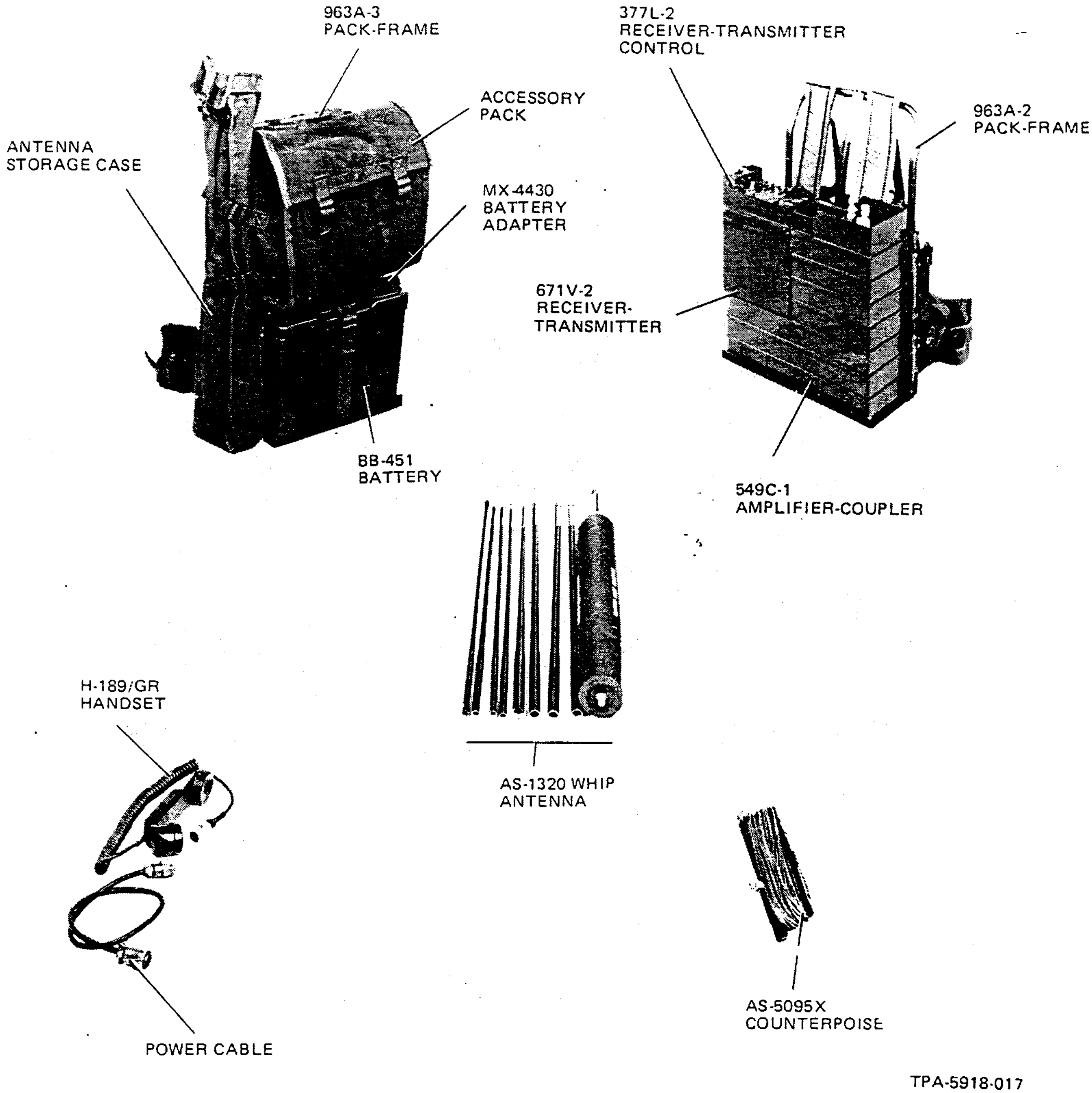
* Unless otherwise indicated, all part numbers are Rockwell International.

1.3 ASSOCIATED EQUIPMENT

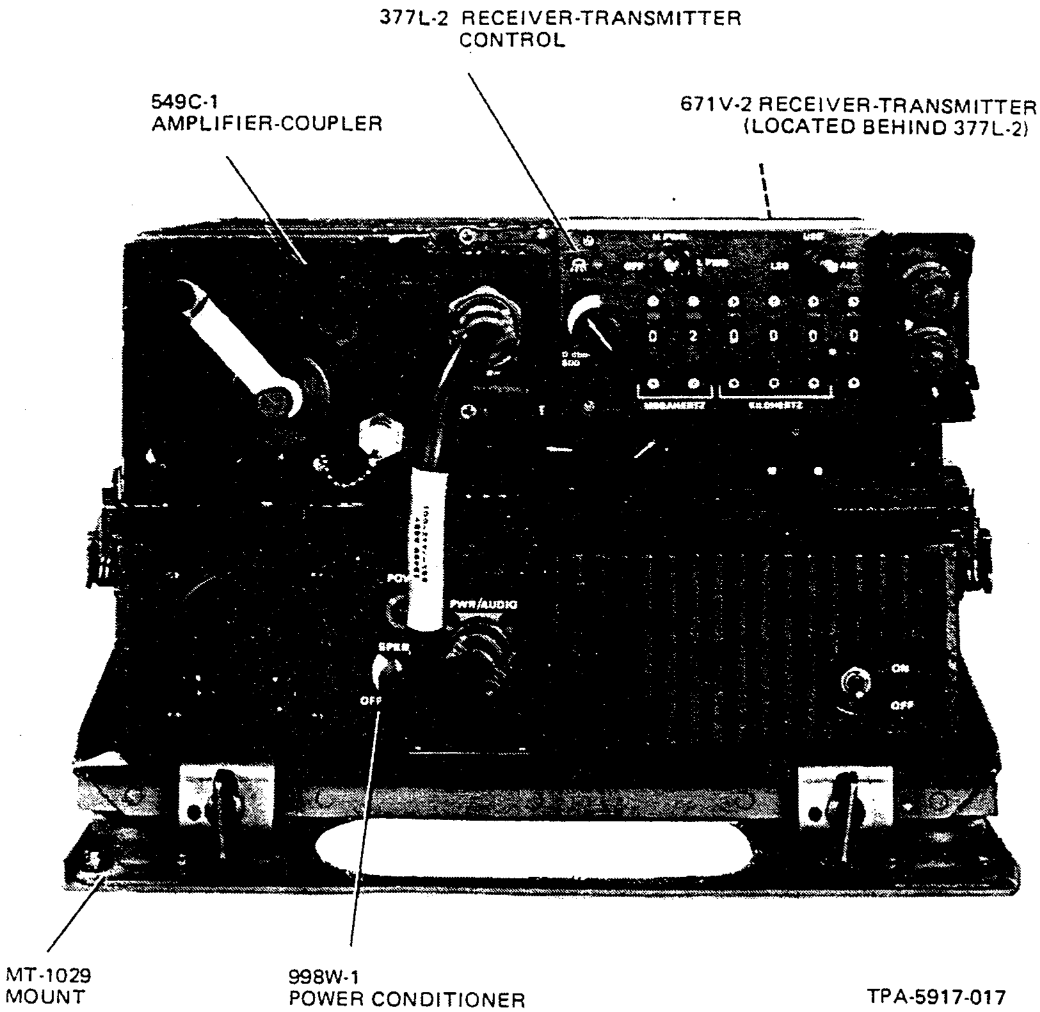
No associated equipment is required for use with the 150-watt hf system.

1.4 ACCESSORIES

Table 1-2 lists accessories available for the 150-watt hf system.



MP-150 Man-Pack, Typical Equipment
Figure 1-1



VC-120 Vehicular Communication System, Typical Equipment
Figure 1-2

Table 1-2. Accessories.

EQUIPMENT	PART NUMBER*	FUNCTION	CHARACTERISTICS
Telegraph key	629-5895-001	Data input	A hand-operated key with strap for securing to thigh
H-5016 Headset	635-5148-001	Audio reproduction	An adjustable headset and microphone system with coiled cord and jack.
998Y-1 Receiver-Transmitter Adapter	622-6527-001	Remote operation of control	Interfaces between the receiver-transmitter and control using remote cable.
Remote cable (30 ft)	641-4060-001	Remote operation of control	Allows the control to be remoted for easier operation.
998Y-2 Remote Control Adapter	622-6528-001	Provides a mount for control during remote operation	Provides remote operation of control and a loudspeaker.
Adapter mount	647-3104-001	Provides mount for remote control adapter	Plate that can be mounted remote to the vehicular communication system configuration
540K-1 Control Extender	629-3419-001	Remote cable	Allows remoting of the control during man-pack use for a distance of 965.2 mm (38 in).
938A-1 Dipole Antenna	622-3073-001	Provide optional receiver input	A straight radiator usually fed from the center. Length is determined by frequency at which the antenna is being used.
AGK-1 Guy Kit	628-3965-001	Stabilize antenna	Quick-connect snap to antenna, stake attached for ground connection
637K-3 NVIS Antenna	777-1816-001	Provide better reception in some situations	For vehicular communication system application only
637K-1 NVIS Antenna	758-5377-001	Provide better reception in some situations	For man-pack application only
AS-1321 Long-Wire Antenna	548-9099-003	Provide better reception in some situations	Long-wire antenna to improve reception and transmission
KY-116/U CW Key	274-0003-030	Data input	A CW key, with leg clamp
Antenna	659-6071-001	Vehicular antenna	Whip antenna, 16 ft in length

* Unless otherwise indicated, all part numbers are Rockwell International.

1.5 EQUIPMENT SPECIFICATIONS

Table 1-3 lists the equipment specifications.

1.6 RELATED PUBLICATIONS

Table 1-4 will list those unit instruction books applicable to the system.

Table 1-3. Equipment Specifications.

CHARACTERISTIC	SPECIFICATIONS
Electrical	
Power requirements	22 to 30 V dc. 16.5 amperes maximum at 26.5 V dc. 3 to 5 amperes for typical voice operation.
Frequency range	2 to 29.9999 MHz (100-Hz increments)
Number of channels	280 000
Modes	USB, LSB, CW, AM, and FSK
Rf power output	150-watts pep and average
Duty cycle	1 minute transmit, 9 minutes receive free convection: continuous with 100 CFM of supplied cooling air
Tuning time	1.0 second nominal and 5 seconds maximum after initiation by ptt or CW key
Warmup time	Within 30 seconds with temperature between −40 and +55 °C (−40 and 131 °F)
Audio input	
Voice	−55 to −26 dB mW (600-ohm input)
Data	0 dB mW nominal (−6 ±2 dB to +10 dB mW) level (600-ohm input)
Intermodulation distortion	At least 25 dB below pep of two tones modulating equipment to rated power of 150-W pep
Carrier suppression	45 dB below the output level of a single tone modulating the transmitter to 150-W pep
Harmonic suppression	40 dB below the output level of signal tone modulating the transmitter to 150-W pep
Receive sensitivity	
USB/LSB	−113 dB mW, 50-ohm rf input for a signal + noise/noise ratio of not less than 10 dB
AM	−100 dB mW, 30% modulation, 50-ohm rf input for a signal + noise/noise ratio of not less than 10 dB
Receive selectivity	
USB	Not less than −3 dB or more than 0 dB at +600 to +2700 Hz Not less than −6 dB or more than 0 dB at +350 to +3200 Hz Not more than −60 dB at −450 to +6700 Hz
LSB	Same as USB
AM	F_o ±2 kHz: 0 to −3 dB F_o ±2.75 kHz: 0 to −9 dB F_o ±11.5 kHz: −60 dB
CW	Same as USB and LSB
Data	Same as USB and LSB
If rejection	Not less than 70 dB below the response to a desired −113-dB mW signal

Table 1-3. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATIONS
Image rejection	Not less than 60 dB below the response to a desired −113-dB mW signal
Cross modulation	In the AME mode, 50-μV desired signal from a 0.5-volt undesired signal ±10% from operating frequency produces NMT −10 dB cross modulation.
Audio output	
Voice and CW	Minimum of +10 dB mW into a 600-ohm load (adjustable at control unit)
Data	0 dB mW ±3 dB into 600 ohms at −67-dB mW rf input in USB or LSB
Environmental	
Temperature	
Operating	−40 to +55 °C (−40 to +131 °F)
Nonoperating	−65 to +71 °C (−85 to +159.8 °F)
Operating altitude	3048 metres (10 000 feet)
Operating humidity	99 percent relative humidity at any temperature up to 30 °C
Physical	
Size	
377L-2 Receiver-Transmitter Control	104.9 mm (4.13 in) high (cover open); 161.9 mm (6.375 in) wide; 66.5 mm (2.62 in) deep
671V-2 Receiver-Transmitter	168.4 mm (6.63 in) high; 77.7 mm (3.059 in) wide; 174.8 mm (6.85 in) deep
549C-1 Amplifier-Coupler	127 mm (5.25 in) high; 356 mm (14.25 in) wide; 362 mm (15.75 in) deep
998W-1 Power Conditioner	381 mm (15 in) wide; 104.78 mm (4.125 in) high; 325.88 mm (12.83 in) deep
998Y-1 Receiver-Transmitter Adapter	57.15 mm (2.25 in) high; 76.2 mm (3.0 in) wide; 166.8 mm (6.57 in) deep
998Y-2 Remote Control Adapter	101.6 mm (4.0 in) high; 193.68 mm (7.625 in) wide; 192.41 mm (7.575 in) deep
MT-1029 Mount	406 mm (16.0 in) wide; 146 mm (5.75 in) high; 381 mm (15 in) deep
Antenna Base	Max diameter 5.50 in, 406 mm (16.0 in) high
Weight	
377L-2 Receiver-Transmitter Control	0.73 kg (1.6 lb)
671V-2 Receiver-Transmitter	2.0 kg (4.41 lb)
549C-1 Amplifier-Coupler	9.5 kg (21 lb)
998W-1 Power Conditioner	11.4 kg (25 lb)

Table 1-3. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATIONS
998Y-1 Receiver-Transmitter Adapter	0.5 kg (1.1 lb)
998Y-2 Remote Control Adapter	2.04 kg (4.5 lb)
963A-2 Pack Frame with transceiver	15 kg (33 lb)
963A-3 Pack Frame with accessories	15.5 kg (35 lb)

Table 1-4. Related Publications.

INSTRUCTION BOOK TITLE	PUBLICATION PART NUMBER
377L-2 Receiver-Transmitter Control Instruction Book	523-0772049
671V-2 Receiver-Transmitter Instruction Book	523-0772057
549C-1 Amplifier-Coupler Instruction Book	523-0772280

section 2
installation

2.1 GENERAL

This section provides sufficient information and instruction to install the 150-Watt HF Communication System and make it completely operational, from initial receipt of equipment to the postinstallation test.

2.2 UNPACKING AND INSPECTING

Unbox and unwrap each piece of equipment carefully. Inspect each unit for evidence of damage due to shipping. All claims for damage in shipment should be filed promptly with the transportation company involved. If claims for damage are to be filed, save the original packing cases and materials.

Inspect each item for damaged case, loose connectors, broken lights and switches, frayed cables, and other physical defects. Refer to equipment supplied, table 1-1, and figures 1-1 and 1-2 of description section.

2.3 PREINSTALLATION CHECK

The equipment has been properly aligned and tested before delivery. However, to ensure proper functioning of the equipment prior to installation, a complete preinstallation test should be accomplished.

The customer acceptance test described in the maintenance section of each equipment instruction book provides a series of tests to be performed. Successful completion of the tests indicates that the equipment is functioning within acceptable limits (refer to table 1-4 of description section for titles of associated equipment).

2.4 CABLING

2.4.1 General

Cabling of the system will depend upon the intended transportation method. Refer to paragraph 2.4.2 for cabling of the MP-150 Man-Pack and to paragraph 2.4.3 for cabling of the VC-120 Vehicular Communication System. No cabling will be supplied to the 719D-15 Radio Receiver-Transmitter since it is functionally a single unit.

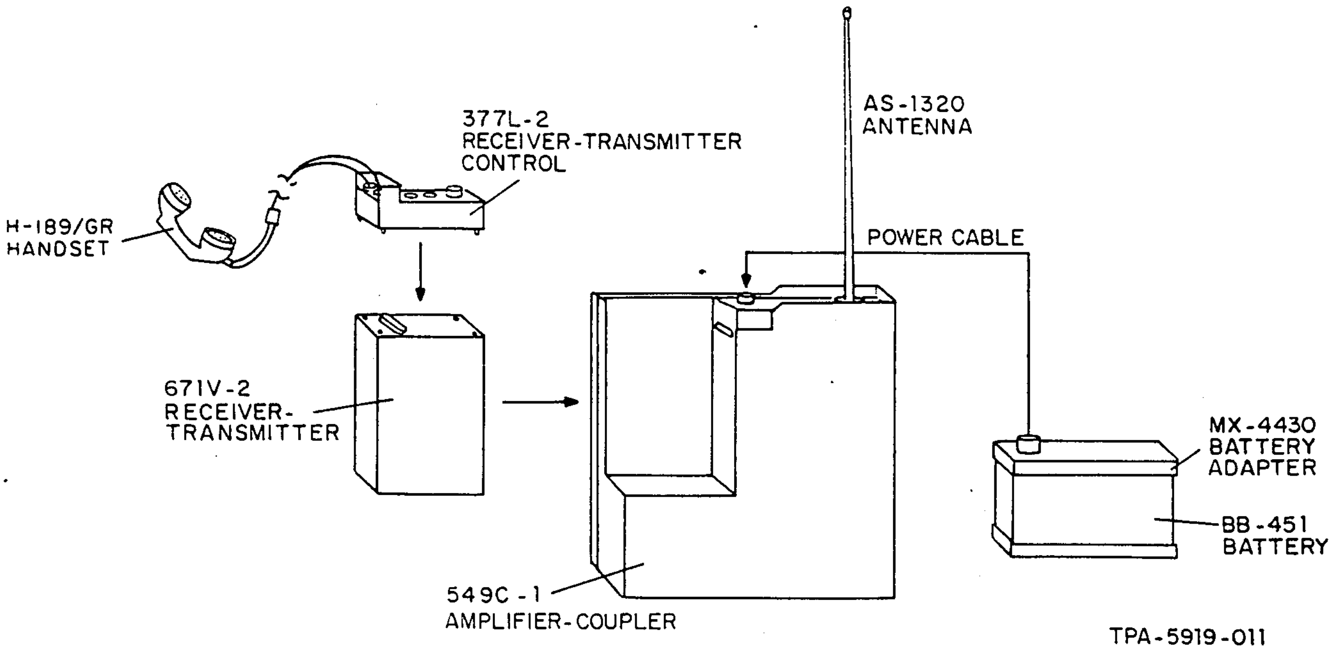
2.4.2 MP-150 Man-Pack Cabling

Refer to the man-pack interconnect diagram (figure 2-1) for electrical interface information between the 671V-2 Receiver-Transmitter, 377L-2 Receiver-Transmitter Control, and the 549C-1 Amplifier-Coupler, and auxiliary equipment.

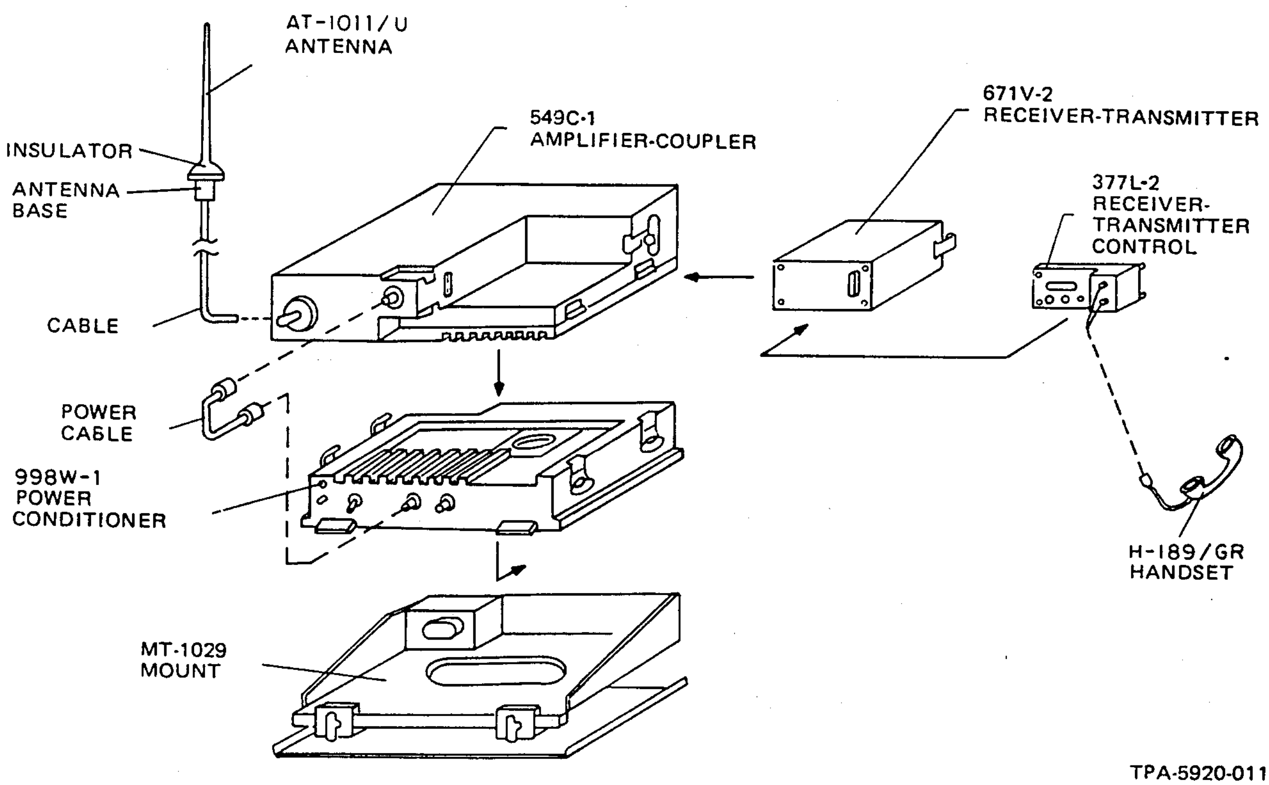
When cabling the man-pack, be sure to leave enough slack in the cables to permit free operation of the radio without placing a tension on the cables. Refer to figure 7-1 of the diagrams section for diagram of power cable.

2.4.3 VC-120 Vehicular Communication System Cabling

Refer to the vehicular communication system interconnect diagram (figure 2-2) for electrical interface information between the receiver-transmitter, control, and the amplifier-coupler, and auxiliary equipment.



MP-150 Man-Pack, Interconnect Diagram
Figure 2-1



VC-120 Vehicular Communication System, Interconnect Diagram
Figure 2-2

When cabling the vehicular communication system, be sure to leave enough slack in the cables to permit free sway of the equipment in the mount and to keep the cables from breaking due to vibration. Route connecting cables away from circuits carrying heavy currents, equipment transmitting pulses, or other sources of interference. Refer to figure 7-2 of diagrams section for diagram of power cable.

2.5 INSTALLATION PROCEDURES

The installation of the system depends solely upon which configuration is to be used. Paragraph 2.5.1 will cover installation of the units to make the 719D-15 Radio Receiver-Transmitter. Paragraph 2.5.2 will cover installation of the vehicular communication system. Refer to the figures specified for illustration of procedure.

2.5.1 Installation of the 719D-15 Radio Receiver-Transmitter

a. Attach the control to the receiver-transmitter utilizing the four Phillips-head screws at the corners of the control. Ensure proper mating of the plug and jack for electrical connection.
b. Attach the combination to the amplifier-coupler by engaging the jack on the receiver-transmitter to the plug on the amplifier-coupler.
c. Secure the units by fastening the two adjustable catches, one at the top front and one at the bottom front, of the receiver-transmitter. It may be necessary to adjust the catches for a tight connection. Then fasten the luggage catch at the rear of the receiver-transmitter.

2.5.2 Installation of the MP-150 Man-Pack

The man-pack installation will be covered in two parts. Paragraph 2.5.2.1 will cover installation of the man-pack for transport and paragraph 2.5.2.2 will cover installation for operation. Separate paragraphs will cover the various antenna installation procedures.

2.5.2.1 Installation for Transport

a. Attach the control to the receiver-transmitter utilizing the four Phillips-head screws at the corners of the control.
b. Attach the combination to the amplifier-coupler by engaging the jack on the receiver-transmitter to the plug on the amplifier-coupler. Secure the units by fastening the two adjustable catches, one at the top front and one at the bottom front, of the receiver-transmitter. It may be necessary to adjust the catches for a tight connection. Then fasten the luggage catch at the rear of the receiver-transmitter.
c. Mount the complete assembly (control, receiver-transmitter, and amplifier-coupler) to the 963A-2 Pack Frame by fastening the four luggage catches of the pack frame to the amplifier-coupler base (two on each side).
d. Mount the battery with battery adapter to the 963A-3 Pack Frame with the nylon webbing strap provided.
e. Disassemble the antenna and place the parts into the canvas pouch on the side of pack frame.
f. Place all other accessories into canvas pack on back of 963A-3 Pack Frame. Secure two pack straps.
g. Adjust pack frame belts and straps for individual fit.

2.5.2.2 Installation for Operation

The procedures for installation will be covered with respect to the type of antenna to be used. Paragraph 2.5.2.2.1 will cover the whip antenna installation; paragraph 2.5.2.2.2 will cover the long-wire and NVIS antennas; paragraph 2.5.2.2.3 will cover the dipole antenna.

2.5.2.2.1 Installation With Whip Antenna

a. Remove pack frames from back of operators.
b. Removal of battery with battery adapter from 963A-3 Pack Frame is optional.
c. Remove antenna from canvas pouch on side of 963A-3 Pack Frame.
d. Assemble antenna by screwing the sections together starting with top section and ending with insulated bottom section.
e. Position the packs to form a right angle for support of the receiver-transmitter.
f. Make sure the transceiver (control, receiver-transmitter, and amplifier-coupler) is solidly positioned. Thread the antenna into the antenna jack on the amplifier-coupler.
g. Connect power cable between battery adapter and power jack on amplifier-coupler.
h. Select the type of input device desired (handset, headset, telegraph key, data link), and connect it to the audio jack on the control.
i. Remove all unnecessary equipment from the immediate area. Refer to operation section for operation procedures.
j. If transmission/reception is not adequate, then the counterpoise must be used. Unwind wire from bobbin. Extend wire outward from man-pack in a (+) pattern. Stake end of wires to ground. Connect counterpoise to amplifier-coupler 50-ohm BNC connector.

2.5.2.2.2 Installation With the Long-Wire or NVIS Antenna

a. Remove pack frames from back of operators.
b. Removal of battery with battery adapter from 963A-3 Pack Frame is optional.
c. Remove wire to be used as antenna from canvas pack on 963A-3 Pack Frame.
d. Extend wire to be used as antenna and secure it between two stable mounting surfaces in position required.
e. If NVIS antenna is to be used, erect the antenna as directed by the instructions provided with the antenna.
f. Position packs to form a right angle for support of the receiver-transmitter.
g. Thread end of antenna wire into antenna jack.
h. Connect power cable between the battery adapter and the power jack on the amplifier-coupler.
i. Select the type of input device desired and connect to audio jack of control.
j. Remove all unnecessary equipment from the immediate area. Refer to operation section for operation procedures.

2.5.2.2.3 Installation With Dipole Antenna

a. Remove pack frames from back of operators.
b. Removal of battery with battery adapter from 963A-3 Pack Frame is optional.
c. Remove bobbins containing dipole antenna and dipole connector from canvas pack on 963A-3 Pack Frame.
d. Unwind antenna from bobbins until proper length for frequency desired has been unwound.
e. Form loop in antenna wire and insert through thumbscrew on bobbin. Tighten thumbscrew to hold antenna wire.
f. Connect lug end of antenna wire to dipole center connector and tighten terminal lug.
g. Unwind rf cable from bobbin and connect it to dipole center connector utilizing the snap hook. Thread the rf connector onto the dipole center connector.
h. Unwind the throwing cord from the bobbins and pass the cord over the selected mounting fixture. Draw the dipole antenna into the air utilizing the cords. Secure in place.
i. Connect the BNC connector on the rf cable to the 50-ohm antenna jack on the amplifier-coupler. Select the 50-ohm antenna position using the antenna switch of the amplifier-coupler.
j. Connect the power cable between the battery adapter and the input power jack on the amplifier-coupler.
k. Select the desired input device and connect it to the audio jack on the control.
l. Remove all unnecessary equipment from the immediate area. Refer to operation section for operation procedures.

2.5.3 Installation of the VC-120 Vehicular Communication System

a. Install the mount on the jeep in desired location. Mount antenna base to rear of jeep within cabling distance of the mount.
b. Connect cable for dc power from mount to the vehicle dc source.
c. Slide the power conditioner into the mount, ensuring proper mating of jack and plug. Secure the power conditioner to the mount using the two clips and wing screws at the front of the mount.
d. Place the amplifier-coupler on top of the power conditioner and secure the units together using the four luggage catches on the power conditioner.
e. Place the control on top of the receiver-transmitter and ensure proper mating of jacks. Secure the control to the receiver-transmitter using the four Phillips-head screws in the control.
f. Slide the combined unit (control/receiver-transmitter) into the recess on the amplifier-coupler. Ensure proper mating of plug and jack.
g. Secure the units by fastening the two adjustable catches, one at the top front and one at the bottom front, of the receiver-transmitter. It may be necessary to adjust the catches for a tight connection. Then fasten the luggage catch at the rear of the receiver-transmitter.
h. Assemble antenna to the antenna base. Place insulator over the antenna base and first section of antenna. When using 9.75-m (32-ft) whip antenna, AGK-1 Guy Kit must be used for antenna support.
i. Connect desired input device (handset, headset, telegraph key, data modem) to the audio jack on the control.
j. Screw in the adapter for the long-wire antenna into the antenna jack on the amplifier-coupler. Connect a high-voltage wire from the antenna base to the long-wire antenna adapter on the amplifier-coupler.
k. Connect the power cable from the power conditioner to the amplifier-coupler. Refer to diagrams section for cable schematic.
l. If the dipole antenna is to be used at a stationary position, erect the dipole antenna and connect the BNC connector of the rf cable to the 50-ohm antenna jack on the amplifier-coupler. Select the 50-ohm antenna jack using the antenna switch on the amplifier-coupler.

2.6 POSTINSTALLATION CHECK

The postinstallation check consists of operation of the configuration for communications. Refer to operation section for operation instructions.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

Section 3

Operation

section 3
operation

3.1 GENERAL

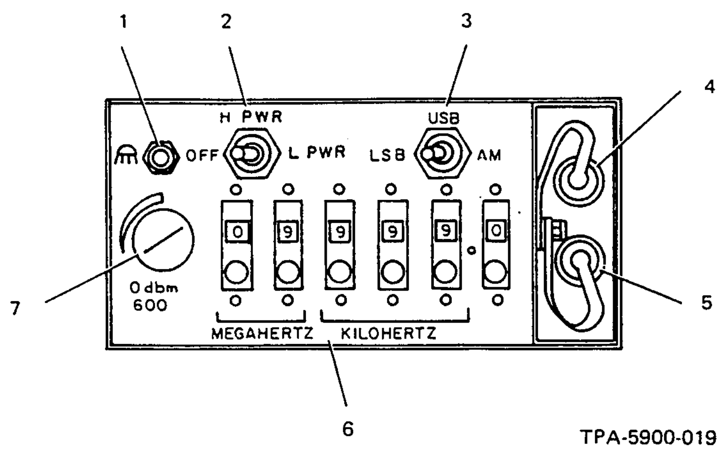
Operation of any configuration of the 150-Watt HF Communication System is exactly the same once power has been applied; therefore, the generalized operation will begin in paragraph 3.3.3 with paragraph 3.3.1 covering the turn on of the MP-150 Man-Pack configuration and paragraph 3.3.2 covering the power application to the VC-120 Vehicular Communication System configuration. Please refer to the appropriate paragraph and then to paragraph 3.3.3 for complete operational instructions.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

3.2 CONTROLS AND INDICATORS

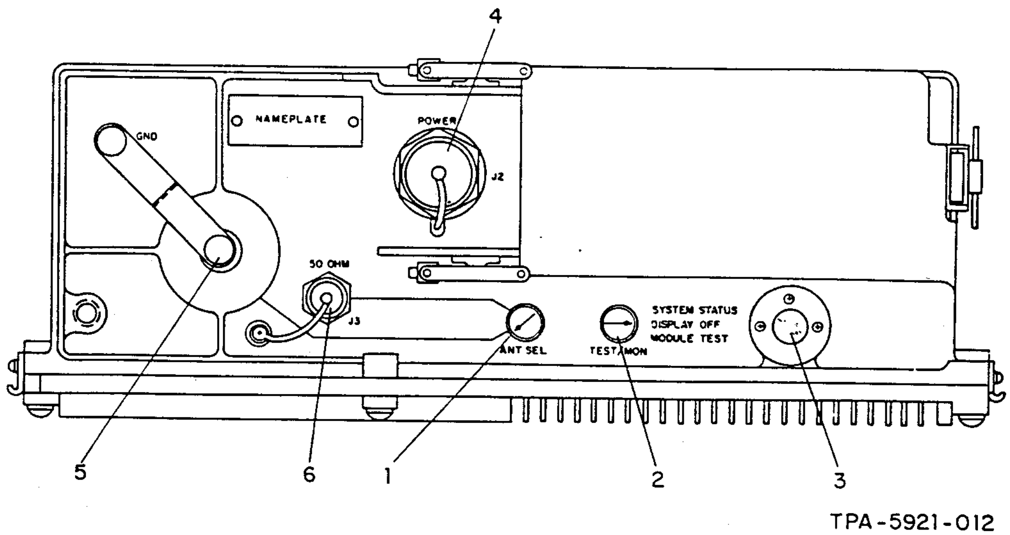
All controls for the system are listed in tables 3-1, 3-2, and 3-3. Control locations are shown in figure 3-4 for the man-pack and in figure 3-5 for the vehicular communication system. Individual units are shown in figure 3-1 (377L-2 Receiver-Transmitter Control), figure 3-2 (549C-1 Amplifier-Coupler), and figure 3-3 (998W-1 Power Conditioner). Use figure 3-4 for reference if using the 719D-15 Radio Receiver-Transmitter separately.



377L-2 Receiver-Transmitter Control, Controls and Indicators
Figure 3-1

Table 3-1. 377L-2 Receiver-Transmitter Control, Controls and Indicators.

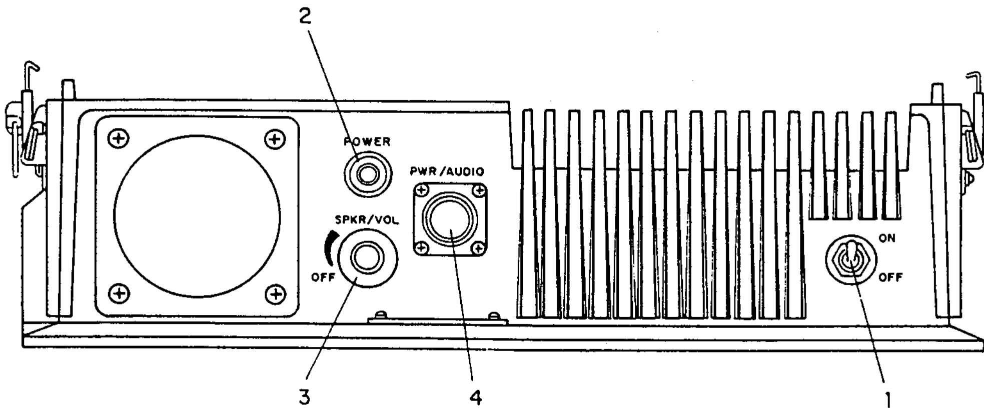
INDEX NO	CONTROL/INDICATOR	FUNCTION
1	Panel lighting (S7)	This momentary-contact, pushbutton switch completes the circuit path for the lamps in the frequency selector switches.
2	Function selector (S8)	This toggle switch permits the operator to select one of three functions: OFF, H PWR (high transmit power, 150-W pep), or L PWR (low transmit power, 37.5-W pep).
3	Mode selector (S9)	This toggle switch permits the operator to select one of three modes: LSB (lower sideband), USB (upper sideband), or AM (amplitude modulation).
4	Audio input jack (J1)	Permits connection of an input data device for input and output of data or a handset/headset for input and output of voice communications.
5	Aux audio input jack (J2)	Performs the same function as J1 when additional inputs and outputs are required.
6	Frequency selector (S1 thru S6)	Six momentary pushbutton-activated rotary selector switches permit the operator to select an operating frequency from 2.0000 to 29.9999 MHz in 100-Hz increments.
7	Af gain control (R1)	This potentiometer/switch permits the operator to set the audio output. In maximum ccw position, the control establishes a constant gain of 0 dBm into 600 ohms for data modem use.



549C-1 Amplifier-Coupler, Controls and Indicators
Figure 3-2

Table 3-2. 549C-1 Amplifier-Coupler, Controls and Indicators.

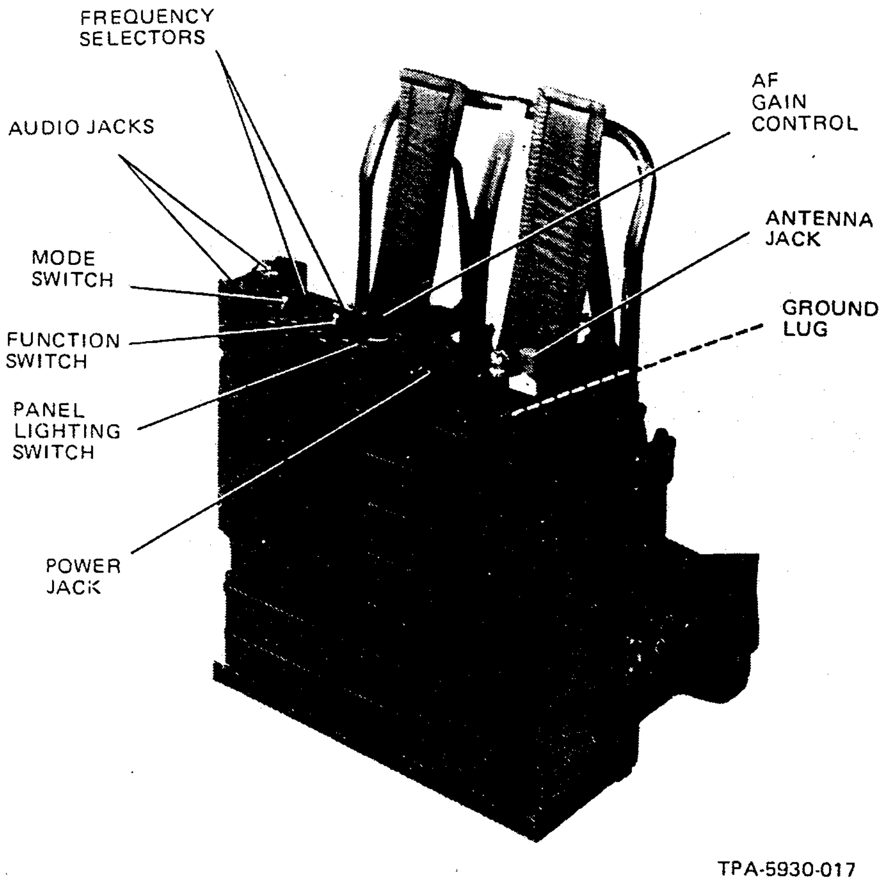
INDEX NO	CONTROL/INDICATOR	FUNCTION
1	ANT SEL switch	This rotary switch connects the receiver/transmit function to either the whip/NVIS or 1:3:1 vswr antenna (50 ohms).
2	TEST/MON switch	This rotary switch has three positions. In SYSTEM STATUS position, fault/display circuits are selected to display system status. In DISPLAY OFF, the display is deenergized. In MODULE TEST, the test routine is initiated and the results are displayed.
3	Status/fault display	The 7-segment, single-character, red LED display provides illuminated numbers, letters, and symbols which are decoded by the operator to indicate a specific defective unit (SYSTEM STATUS position) or module (MODULE TEST position).
4	POWER jack (J2)	Provides for connection to battery or power conditioner
5	Antenna jack	Connection point for untuned whip antenna
6	50 OHM jack (J3)	Connection point for 50-ohm coaxial fed tuned antenna



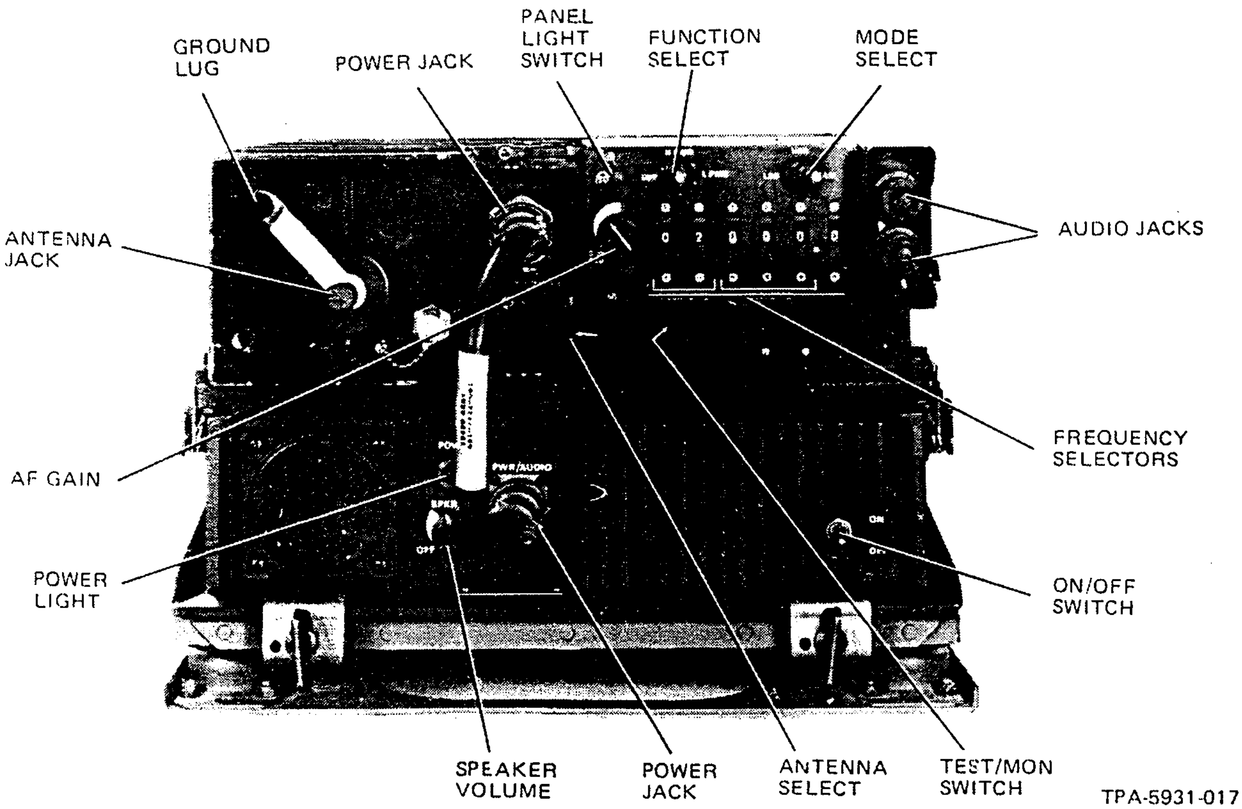
998W-1 Power Conditioner, Controls and Indicators
Figure 3-3

Table 3-3. 998W-1 Power Conditioner, Controls and Indicators.

INDEX NO	CONTROL/INDICATOR	FUNCTION
1	ON/OFF switch	This circuit breaker applies power to the power conditioner and thereafter the control.
2	POWER light	When lit, indicates that power has been applied to the power conditioner.
3	SPKR/VOL	This potentiometer/switch permits the operator to control the volume of the speaker in the power conditioner.
4	PWR/AUDIO jack	Permits connection of power conditioner to amplifier-coupler by use of power cable.



MP-150 Man-Pack, Controls and Indicators
Figure 3-4



VC-120 Vehicular Communication System, Controls and Indicators
Figure 3-5

3.3 OPERATING PROCEDURES

Preliminary procedures consist of unsnapping the cover latch assembly and raising the control cover.

3.3.1 Applying Power to the MP-150 Man-Pack

a. Ensure that the equipment is cabled properly and that the battery being used is fully charged.
b. Set mode selector on control to mode desired (AM, LSB, or USB).
c. Set frequency selectors to desired operating frequency.
d. Place the function selector switch on the control to H PWR.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

e. Refer to paragraph 3.3.3 for continued operation instructions.

3.3.2 Applying Power to the VC-120 Vehicular Communication System

a. Ensure that the equipment is interconnected properly.
b. Set the power ON/OFF circuit breaker on the power conditioner to the ON position. POWER light should be energized.
c. Set the mode selector on the control to the mode desired (AM, LSB, or USB).
d. Set frequency selectors to desired operating frequency.
e. Place the function selector switch on the control to H PWR.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

f. Refer to paragraph 3.3.3 for continued operation instructions.

3.3.3 Operation of the Radio Receiver-Transmitter, Man-Pack, and Vehicular Communication System

a. Set power ON/OFF circuit breaker on the power conditioner to the ON position. POWER light should be energized.
b. Place the function selector switch on the control to H PWR.
c. Set the TEST/MON selector on the amplifier-coupler to SYSTEM STATUS.
d. Check that the status/fault display momentarily indicates an 8, then a 0, and finally blank after the system is turned on.

Note

Use the maintenance section if any other indication is obtained.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

e. Tune receiver-transmitter by momentarily pressing ptt key on handset or headset. (Set af gain control for desired audio level in headset.) A constant tone will be heard from earpiece during tuning (8 seconds maximum). After completion of tuning, tone will cease and receiver noise will be heard.

Note

If tuning process cannot be completed, an interrupt tone (beeping) will be heard in the earpiece.

f. Adjust gain control to desired level of audio. If a clicking sound is heard, battery is low and needs recharging.
g. If the preceding steps are completed without a fault indication, voice transmission may be made. Press ptt key on handset or headset, and speak into microphone. Sidetone will be heard in earpiece during transmission.

Note

The lack of sidetone during transmission is an indication that the transmitter is not functioning properly.

h. If a new frequency is desired, perform step d of paragraph 3.3.2 through step g of paragraph 3.3.3.

3.3.4 CW Communications

Perform the procedures for voice communications except use a telegraph key instead of the handset or headset ptt key.

3.3.5 Data Communications

Perform the procedures for voice communications, except set gain control to 0 dBm 600 (maximum ccw position) and use data modem to key the receiver-transmitter.

Section 4 Theory

section 4
theory

4.1 GENERAL

The principles of operation of the 150-Watt HF Communication System are given on a functional level. Diagrams are referenced as required. A more extensive theory of operation is provided in the description and operation sections of each unit instruction book. The power conditioner will be covered completely in this instruction book.

4.2 SYSTEM THEORY

The 150-watt hf system has five operating functions (power, control, receive, tune, and transmit) which will be discussed in paragraph 4.3. The 150-watt hf system can be divided into four functional blocks (power, control, receiver-transmitter, and amplifier-coupler). The generalized signal and voltages of each block and the interrelation of the block can be seen in figure 4-1, 150-Watt HF Communication System, Functional Block Diagram.

Power for the system can originate in one of two ways. If the man-pack configuration is being used, the power is supplied by the battery through the battery adapter and power cable (see figure 7-1 of diagrams section) to the jack on the amplifier-coupler. The power is then sent to the control where it is controlled by the function switch. If in the H PWR or L PWR position, the power is sent to the appropriate circuitry of the control, receiver-transmitter, and amplifier-coupler. In the vehicular communication system configuration, the dc power originates at the vehicle's dc storage cells and is connected to the mount by way of a power cable. The mount passes the power to the power conditioner. The power conditioner regulates the input power and provides protection from over or undervoltage conditions. The power leaves the power conditioner on a power cable (see figure 7-2 of diagrams section) and enters the amplifier-coupler at J2. From this point, the power path is identical to the man-pack as detailed above. The 719D-15 Radio Receiver-Transmitter must be supplied some value of dc voltage between 22 and 30 volts at the J2 receptacle on the amplifier-coupler; the path is then identical to the one detailed for the man-pack.

Control of the 719D-15 Radio Receiver-Transmitter is performed by the use of the switches and pushbuttons on the control and amplifier-coupler. The control regulates the dc power, the frequency selection, the mode of operation and, with the connection of a handset, initiates the transmit or operates in the receive function. The amplifier-coupler will control the selection of the type of antenna used and monitor the system operation. The control signals pass to the receiver-transmitter for selection of mode of operation, function to be performed, and frequency of operation. The control signals pass on to the amplifier-coupler for antenna tuning and fault indications.

Receive is initiated by the interception of a radio signal of the proper frequency by the antenna. The signal is coupled through the amplifier-coupler to the receiver-transmitter where the signal is heterodyned into an if frequency and then detected into an audio frequency and passed to the control unit. From the control unit, it is passed to an audio output device, such as a handset or headset, to be transduced into sound for the operator.

Tuning is started by the manual selection of a frequency using the pushbuttons on the control. The selection produces digital code that is sent to the receiver-transmitter. This code selects the frequencies that will be used to heterodyne outgoing and incoming signals. Part of this digital information is passed on to the amplifier-coupler to enable selection of the appropriate filters for antenna tuning. Tuning of the antenna occurs once a transmit function is initiated. Tuning time is nominally 1 second but may take as long as 5 seconds. If the tuning does not result in an acceptable vswr in an acceptable amount of time, a tuning fault signal will be initiated to alert the operator to the problem.

Transmit signals originate typically in the handset of the operator. The switch of the handset provides the logic needed to start all transmit circuits. The audio information goes to the control and is passed on to the receiver-transmitter. In the receiver-transmitter, it is heterodyned into the if frequency and then heterodyned into the selected rf frequency. The rf frequency is amplified and passed on to the amplifier-coupler. The amplifier-coupler continues to amplify the rf signal and sends it to the antenna at 150-watt average power. The antenna transmits the signal into the air and the operation is complete. The amplifier-coupler will monitor the power out, the reflected power, and the vswr; if any of these are not appropriate, it will register a fault.

4.3 FUNCTIONAL THEORY

The text discussion of the functional theory will refer to the detailed block diagram, figure 4-2.

4.3.1 DC Power Distribution

The dc power distribution for the system is dependent on the type of configuration that is being examined; therefore, paragraph 4.3.1.1 will discuss the application of power to man-pack up to power jack A5J2 of the amplifier-coupler. Paragraph 4.3.1.2 will discuss application of power to the vehicular communication system up to A5J2 of the amplifier-coupler. Then paragraph 4.3.1.3 will discuss the distribution of power from A5J2 of the amplifier-coupler to the circuits. The distribution will be common for all configurations of the system.

4.3.1.1 MP-150 Man-Pack Power Distribution

Power distribution in the man-pack configuration begins at the battery. The battery supplies the dc voltage and current through chemical action to the terminals of each cell. The cells are ganged together in series to form one large voltage and current source. The battery adapter connects the end terminals to a connector jack for use with the power cable. The power cable transfers the dc voltage and current to power jack A5J2 on the amplifier-coupler. Further power theory will be covered in paragraph 4.3.1.3.

4.3.1.2 VC-120 Vehicular Communication System Power Distribution

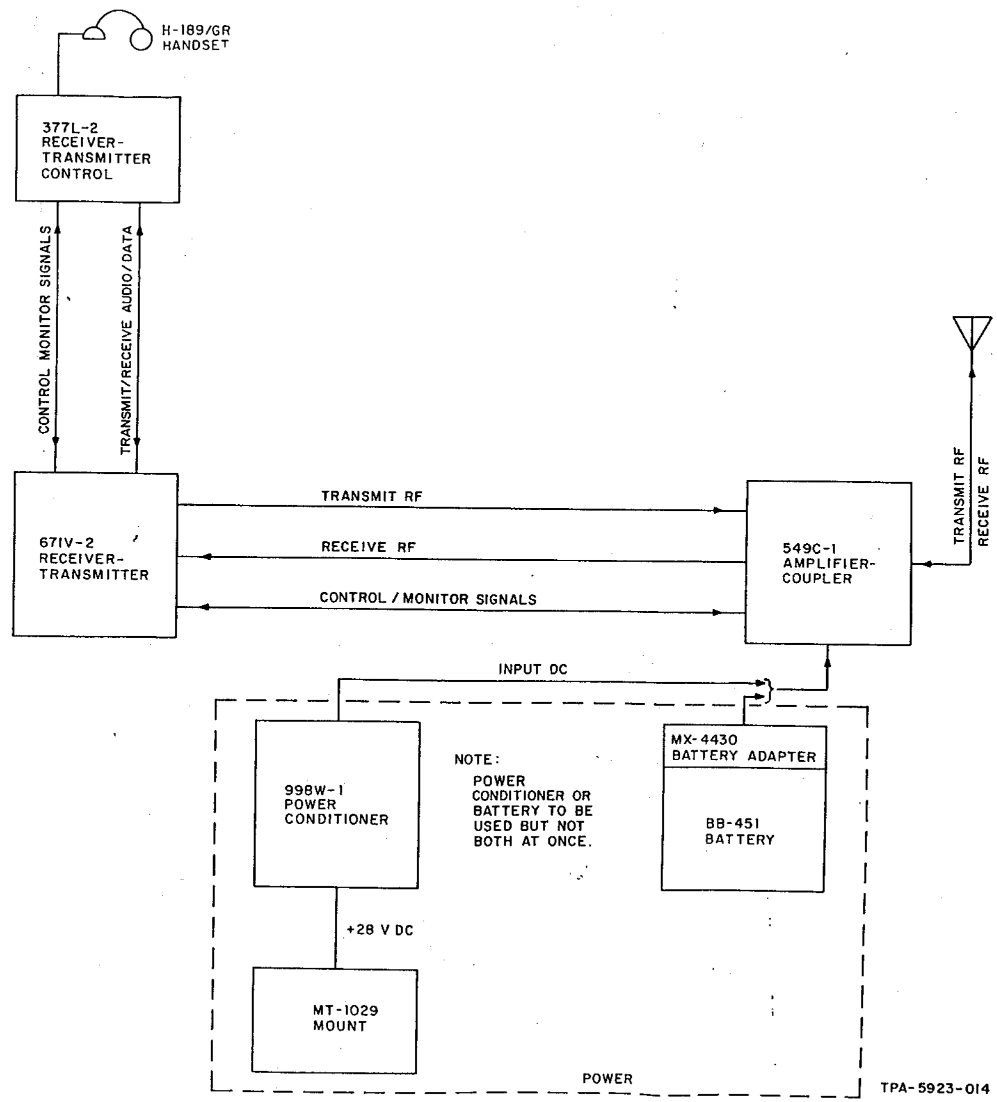
Power distribution in the vehicular communication system configuration originates at the vehicle's dc power source. The dc voltage and current are brought to the mount by the power cable. From the connector on the mount, dc power enters the power conditioner. The power conditioner's function is to condition the input power and to protect the vehicular communication system from electrical transients.

4.3.1.2.1 998W-1 Power Conditioner Circuits (Figures 7-3, 7-4, and 7-5 of diagrams section)

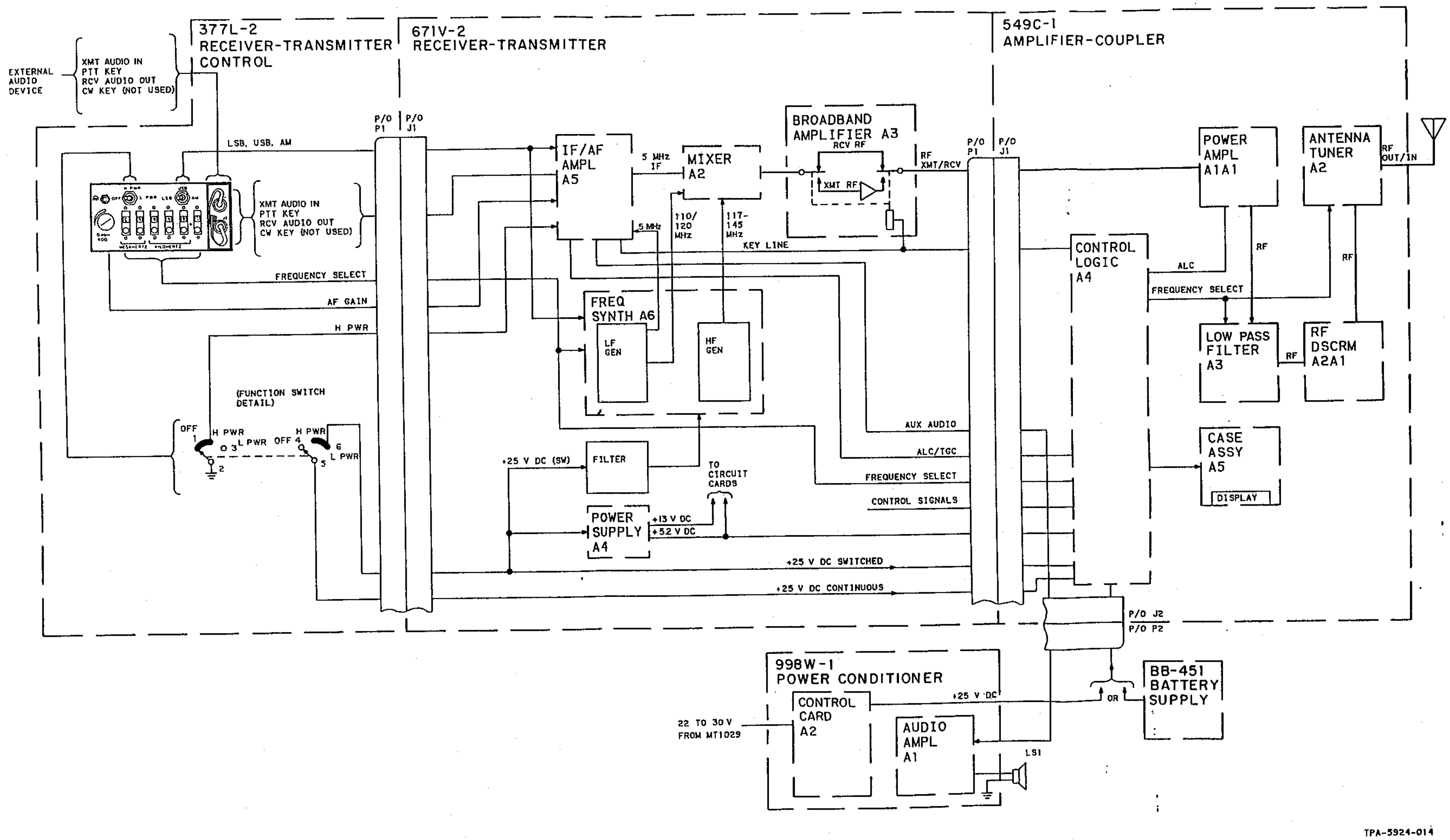
The power conditioner circuits consist of a circuit card for control, a filter, a series regulator, and an audio amplifier. The power for the vehicular communication system configuration is applied through J2 on the rear panel. It passes through an LC circuit for filtering and on to two MOSFET's for regulating. There are two transorbs that will cut any transients to 45 to 55 volts which allows the MOSFET's to regulate the output voltage. The transorbs also provide polarity protection.

Control card A2 monitors the input and output voltages, and controls the bias to the MOSFET's. The MOSFET's form a floating series regulator. This regulator will hold the output voltage to a maximum of 26.5 V dc, but if the input drops below 26.5 V dc, then the output will also drop. If the input drops below 18 V dc, then low-voltage monitor U3C will shut down the vehicular communication system.

The MOSFET's Q1 and Q2 operate as master and slave elements. Q2 is adjusted to pass a level of current that is 500 mA less then the current of Q1. This current sharing is monitored and controlled by the U1A and U1B circuitry of control card A2.



150-Watt HF Communication System,
Functional Block Diagram
Figure 4-1



150-Watt HF Communication System,
Detailed Block Diagram
Figure 4-2

Voltages used as the reference on control card A2 are produced right on the board. The 555 timer chip, U2, operates as an oscillator along with transformer T1 at about 20 kHz. The output of the oscillator is rectified and provides a constant +15 V dc, even if the input voltage to the system varies. This +15 V dc is used to develop a reference voltage of +6.2 V dc for the rest of the power conditioner circuits.

Also mounted in the power conditioner is audio amplifier A1. The audio amplifier drives a loudspeaker to allow for monitoring a frequency without the use of a handset or headset. The audio signal is applied through the VOLUME/OFF control potentiometer to a switching transistor. The VOLUME/OFF control determines the amount of audio drive used, if any. The switching transistor is controlled by the keyline and mutes the amplifier in the transmit mode. The first amplifier provides large voltage gain and couples the audio to the second amplifier through a resistive-capacitive network. The second amplifier provides additional voltage gain and drives the output transistors. A sample of the audio signal is fed back to the second amplifier for gain control. The output transistors operate in push/pull configuration and provide the current gain required to drive the loudspeaker.

After the power conditioner has conditioned the power, the power is sent to the amplifier-coupler A5J2. Paragraph 4.3.1.3 will continue the dc power theory.

4.3.1.2.2 Remote Control Adapter 998Y-2 (Figure 7-7 of diagrams section)

The remote control adapter consists of mechanical and electrical interfaces for 377L-2 Receiver-Transmitter Control, mating connector for the remote cable, and a speaker driven by a 1-watt speaker amplifier.

Power for the remote control adapter is supplied by the control through connector J2-j.

When ptt is activated on the control, a ground is applied to mute transistor A1Q1 through Q1 and Q2. Transistor A1Q1 is turned off thus interrupting the audio path to speaker LS1 while transmitting.

In receive mode, audio volume is controlled by potentiometer R2. This is the only control on the remote control adapter.

4.3.1.3 Power Continuation for the System

Continuation of dc power distribution from the A5J2 connector of the amplifier-coupler divides and goes to two places. One place where the dc power is applied is to amplifier-coupler control logic A4. The power supply circuits on control logic A4A2 consist of a +26.5-V dc power source, a standby +5-V dc zener-regulated supply, a switched +5-V dc IC-regulated supply, a switched +26.5-V dc source, and a −0.6-V dc inverter supply. The standby supply is activated and remains on as long as the receiver-transmitter is on. Any time a control command is received from the receiver-transmitter (such as change of frequency, key activation, etc), the switched supplies are turned on. These supplies provide the higher current requirement for all circuits except the relay drivers. The relay drivers operate off the dc power source voltage. The switched supplies remain on only long enough for completion of the desired operation and are then switched off to reduce current drain. A power supply sample voltage output is provided for the power amplifier control circuits and BITE fault diagnosis. Short-circuit protection is included in all power supplies.

The second place that the dc voltage is applied is through the receiver-transmitter to the control function switch. When the equipment is turned on at the control, the 25 dc voltage becomes 25 dc voltage switched and is applied to receiver-transmitter power supply card A4, the broadband amplifier, and the 25-V dc filter network of the receiver-transmitter. The 25 V dc switched is also applied to amplifier-coupler control logic A4.

In the receiver-transmitter, the output of the 25-V dc filter network becomes 25 V dc filtered and is applied to frequency synthesizer A6. The 25 V dc switched applied to power supply card A4 is converted to a regulated 5.2 V dc and 13 V dc, which is applied to if/af cards A5 and frequency synthesizer A6.

4.3.2 Control Application and Circuitry

The primary control of both the man-pack and the vehicular communication system configurations resides in the control. The following are located in the receiver-transmitter: the function switch, the mode selection switch, the af gain control, and the frequency selection switches. When the control function switch is set to H PWR or L PWR, appropriate circuits are energized for high transmit power or low transmit power. The mode selection switch applies a logic to be used by the receiver-transmitter if/af amplifier and the frequency synthesizer to set the selected mode of operation. The af gain control adjusts the amount of audio to the handset or headset. The frequency selection switches generate a bcd logic that is applied to the frequency synthesizer of the receiver-transmitter and to the control logic of the amplifier-coupler. The /OFF pushbutton on the control provides operator-controlled illumination of the frequency indicators.

The handset normally supplies the ptt signal required to initiate transmit and the audio information that will be transmitted. The audio signals and control functions, except frequency select functions, are interfaced with the if/af amplifier of the receiver-transmitter.

Systems controls are located on the amplifier-coupler. The ANT SEL switch permits selection of either a whip/NVIS or 1:3:1 vswr (50 ohms) antenna. The TEST/MON switch selects either system status display or initiates the test routine and displays the results.

The power conditioner controls the application of power to the vehicular communication system.

4.3.3 Receive Function

Receive function of the system begins at the antenna. The receive signals from the installed antenna are passed through the amplifier-coupler's antenna tuner A2 and rf discriminator A2A1 to the low-pass filter A3. Here the signal is immediately passed through a transmit/receive (T/R) relay to another T/R relay mounted on chassis A1. Both relays are in the normally closed position in the receive mode. Pressing a ptt switch or a telegraph key initiates a transmit function that causes the relay coils to be energized and, therefore, the receive signal path to be interrupted (half-duplex operation). From the chassis T/R relay, the receive signal is connected through the chassis/case interface connector to the receiver-transmitter via A5J1. When the amplifier-coupler is in the receive mode, the control logic A4 is placed in the standby mode (powered down) so that inherent system noise does not appear in the receive circuits.

During receive operation, the contacts of the T/R relay are in the receive position in the receiver-transmitter so the incoming signal is coupled to the first of two receive mixer stages of mixer A2. The received rf is heterodyned with the variable injection frequency supplied by the frequency synthesizer. The variable injection frequency is determined by the frequency selection at the control. The mixing of the received and variable injection frequencies results in the up conversion of the received signal to 115 MHz, which is passed through a filter to the second mixer stage.

At the second mixer, the 115 MHz is heterodyned with one of two fixed injection frequencies. If the mode selected is USB or AM, the injected frequency will be 110 MHz. If the selected mode is LSB, the injected frequency will be 120 MHz. Mixing the 115 MHz with either injection frequency will result in the 5-MHz difference frequency.

The difference frequency is coupled to the receive if circuits of if/af amplifier A5. If USB or LSB is selected on the control, the 5-MHz signal is applied to the single sideband filter, amplified, and then passed on to the demodulator. At the demodulator, the 5-MHz signal is mixed with a 5-MHz signal from the frequency synthesizer. The result is an audio output that is applied to the audio amplifier section of if/af amplifier A5 where the level of amplification is controlled by the af gain control of the control, if the voice mode is being used.

With the AM mode selected, the −5-MHz signal from mixer A2 is applied to an AM filter through a switched amplifier, then amplified by the if amplifier stages and passed to the AM detector. The audio output of the detector is filtered and passed to the audio amplifier in the SSB section. The AM detector also functions as a peak detector for the automatic gain control circuitry. The output of the AGC detector is amplified and passed through circuitry to control mixer A2 as well as the if amplifiers in if/af amplifier A5.

The output of the audio amplifier in the SSB section is forwarded to the control for interface with the appropriate device. The auxiliary audio signal is sent through the amplifier-coupler to the power conditioner. In the power conditioner, the auxiliary audio signal is amplified and applied to the loudspeaker. The gain of the amplifier is controlled by the volume control on the power conditioner.

4.3.4 Tune Function

Tuning of the system will occur whenever power is turned on or a new frequency is selected. The control applies a rechannel pulse to the if/af amplifier. The if/af amplifier processes the rechannel pulse and applies a logic pulse to the frequency synthesizer and the control logic of the amplifier-coupler. The frequency synthesizer generates a new variable injection frequency based on binary coded decimal information received from the frequency selector on the control unit. During synthesizer frequency changing, the transmit circuit is disabled. When the frequency changing is complete, the receive circuits are operational, but the transmit circuits will continue to be inhibited. Final tuning will not be accomplished until the ptt key or telegraph key is momentarily depressed by the operator.

The automatic antenna tuning of the amplifier-coupler begins with the tune start pulse arriving from the receiver-transmitter. The tune start pulse is derived from the rechannel pulse generated in the control, whenever the operator powers up or changes frequencies. The pulse sets a flip-flop on control logic A4 which causes a logic 1 to be passed to the microprocessor. Also, the tune start pulse turns on a voltage switch transistor to enable the RAM in the microprocessor, reset the tuning counter, and reset the 8-bit addressable latches on control logic A4. If the ptt or CW key is pressed, the ANT SEL switch setting is changed, or the TEST/MON switch is set to MODULE TEST, a pulse is generated to provide the same functions as the tune start pulse.

After receiving a tune start, the microprocessor program actuates the tune-in-progress (TIP) relay, which bypasses the rf from the filter network while the relays are being switched. These relays select the inductors and capacitors needed for antenna tuning. Which ones will be used is determined by the binary-coded decimal information from the frequency selection switches. Also as a result of the tune start logic, a tune-in-progress logic is sent to the receiver-transmitter to cause an audio tone to be heard in the handset or headset.

Impedance matching of the amplifier-coupler to the antenna is accomplished by the selection of a T-section matching network in antenna tuner A2. The antenna tuner contains protective circuits to prevent damage due to abnormal operating conditions such as an open or short circuit at the antenna terminals. If tuning is not accomplished within 8 seconds, the output of control logic A4 causes a fault which changes the audio tone being heard into a pulsating tone (beeping).

4.3.5 Transmit Function

Transmit functions will originate at the operator's ptt key or telegraph key. During CW operation, a delay circuit in the if/af amplifier maintains the transmit mode during normal CW key open periods (1 second maximum). The transmitter is capable of emission of USB/LSB voice, CW, and data. The data mode will transmit narrowband secure voice signals using either USB or LSB. In AM transmission, the transmitter amplitude modulation equivalent (AME) output will be a USB signal with reinserted carrier frequency.

In voice operation, the transmit audio signal is passed through a filter in the control unit to if/af amplifier A5, where the voice signal is amplified and applied to a balanced modulator. The balanced modulator uses a 5-MHz injection signal from the frequency synthesizer to produce a 5-MHz double-sideband signal, which is passed through an SSB filter to produce a single-sideband signal. In AM, the 5-MHz carrier is reinserted after the SSB filter to produce an equivalent AME signal consisting of the SSB signal and a 5-MHz carrier.

In CW operation, the CW keyline is filtered in the control and applied to the if/af amplifier. A CW keying circuit in the if/af amplifier applies a keyed 1-kHz signal to the input of the balanced modulator. The 1-kHz signal is obtained from the frequency synthesizer.

The rf mixer converts the 5-MHz voice or CW if signal to an rf signal of the desired frequency. The rf mixer consists of two mixers and a 115-MHz bandpass filter. In the first mixer circuit, the 5-MHz if signal is mixed with a 110/120-MHz injection signal from the frequency synthesizer. The output of this mixer is fed through a 115-MHz bandpass filter to the second mixer. In the second mixer, the 115-MHz signal is mixed with a variable injection frequency (115 to 145 MHz) from the frequency synthesizer to produce the desired rf signal frequency. The variable injection frequency is controlled by frequency selector switches on the control. The output of the rf mixer is amplified to approximately 250 mW by broadband amplifier A3 and applied to the amplifier-coupler.

The receiver-transmitter is equipped to monitor transmission by sidetone in all transmission modes. During transmit, the sidetone is supplied to the headset or handset via the audio circuits. There are three conditions when the sidetone is present: (1) when tuning is in progress, a 1-kHz tone is heard; (2) when a tuning fault occurs, a pulsating 1-kHz tone is heard; (3) when there is a forward power output from the amplifier-coupler, audio is heard. In USB/LSB mode, the sidetone gate remains on for approximately 1 second after the absence of voice.

When a ptt button or a telegraph key is pressed, a modulated rf signal from the receiver-transmitter is passed through the chassis assembly T/R relay contacts to the input of power amplifier A1A1 of the amplifier-coupler. When the microprocessor in control logic A4 determines that a ptt or key has been actuated, it sets a logic 1 that is ANDed with the TUN DLY signal from the TIP timer circuit to cause the PA KEY to be a logic level 1. This logic is inverted and causes the two transmit-receive relays to energize which disconnects the receive circuit path and connects the transmit circuit path to power amplifier A1A1.

Circuits in the power amplifier include an input resistor, gain control attenuator, four stages of broadband rf amplification, and various control circuits. The input amplifier stage provides isolation and a flat gain response across the frequency range. The input amplifier and predriver amplifier drives the predriver. The driver amplifier provides 16 watts of rf drive for the final stage. The final amplifier stage reduces all even-order harmonics and provides approximately 10-dB gain for a 150-watt nominal output. The output from the power amplifier is fed through the coaxial cable to low-pass filter A3.

Low-pass filter A3 includes seven 1/2-octave band filters to cover the 2.0000- to 29.9999-MHz frequency range. The band filters are switched by relays controlled by digital logic signals from control logic A4. After passing through one of the selected filters, the rf signal is connected to the input of rf discriminator A2A1. Rf discriminator A2A1 senses magnitude and phase angle relationship of the rf voltage and current on the coaxial line between the power amplifier and antenna tuner. Circuits in the discriminator develop five analog dc voltages that are applied to control logic A4. The rf signal, after passing through the discriminator, is conducted to antenna tuner A2.

Impedance matching of power amplifier A1A1 to the antenna is accomplished by automatic selection of a T-section matching network in the antenna tuner. The antenna tuner contains protective circuits to prevent damage due to abnormal operating conditions such as an open or short circuit at the antenna terminals. After passing through the relay selected T-section or the 50-ohm bypass, the rf signal arrives at the antenna for radiation through the airways.

section 5 maintenance

5.1 GENERAL

Maintenance of the 150-Watt HF Communication System will be limited to the isolation of faults to a major unit and the testing of the system performance as a complete unit. Fault isolation in the individual units and individual unit testing is covered in the instruction book for each unit; refer to table 1-4 of the description section for publication title and part number. The 998W-1 Power Conditioner (power conditioner) and 998Y-2 Remote Control Adapter (remote control adapter) will be covered completely in this publication.

5.2 TEST EQUIPMENT AND TOOLS

All test equipment required for system performance testing and fault isolation are listed in table 5-1.

5.3 PREVENTIVE MAINTENANCE

5.3.1 General

The 150-Watt HF Communication System should be inspected and cleaned periodically to ensure proper operation. The length of time between inspections/cleaning will be governed by the conditions under which the equipment is operated. Table 5-2 will list conditions to be inspected, which configuration checked, and corrective action to be taken.

5.3.2 Cleaning

Clean the equipment by performing paragraphs 5.3.2.1 through 5.3.2.9, using the cleaning material called out in the procedure.

5.3.2.1 Cases and Covers

Warning

> Goggles should be worn when using air jet to blow dust and dirt from equipment parts. Other persons should be warned away from hazardous area or working enclosure.

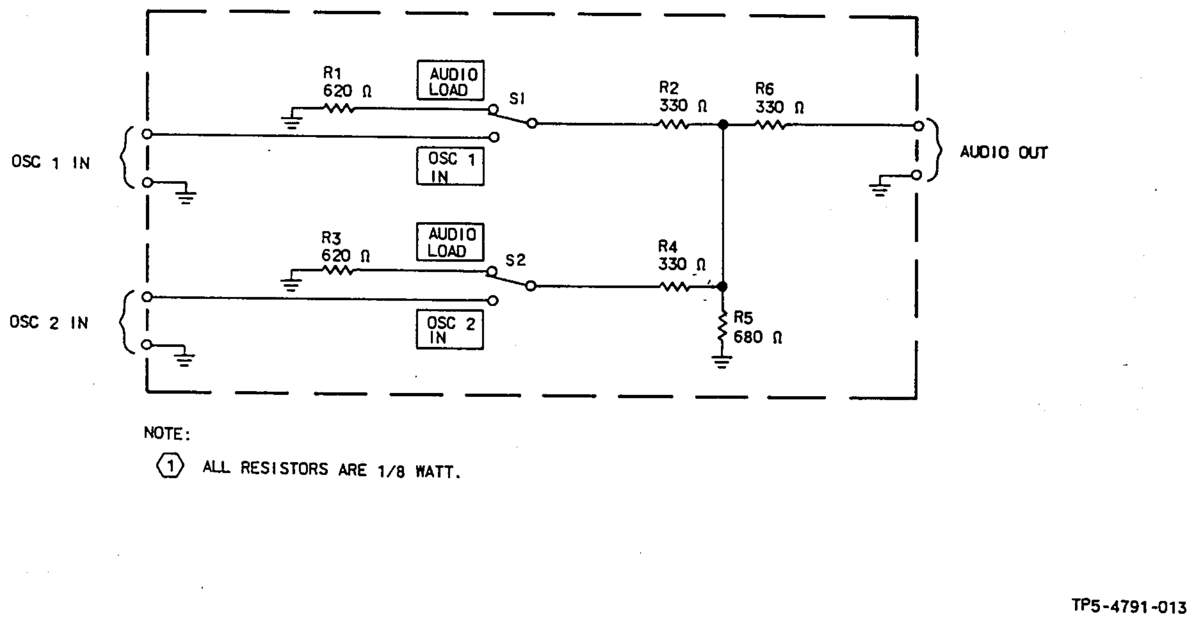
a. Blow dust from surfaces, holes, and recessions with a hand-controlled air jet supplied with dry compressed air at a pressure of 175 to 193.05 kPa maximum.
b. Wipe surfaces using soft chamois skin that has been slightly moistened with solvent.
c. When clean, dry surfaces with lintless cloth.

5.3.2.2 Insulators

a. Wipe clean with solvent-moistened, clean, lintless cloth.
b. Dry with clean, dry, lintless cloth.

Table 5-1. Test Equipment Required.

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE TYPE
Rf wattmeter	2 to 1000 MHz, 250-watt element	Bird 43 with 250 H plug-in
Oscilloscope		Tektronix 464
Antenna simulator	2 to 30 MHz; 1250 watts average. Simulate impedance of 16-ft-long wire antenna.	Rockwell International 172H-21
Voltmeter	50 mV to 300 V rms, 20 Hz to 700 MHz, 15 mV to 1500 V dc, 1.5 μA to 150 mA	Hewlett-Packard 410B
Dc supply	20 to 32 V dc at 25 A	Sorenson DCR40-25B
Signal generator	5 to 512 MHz AM and FM, 2 V rms into 50 ohms	Hewlett-Packard 8640B with 001 and 003 options
Audio oscillator (2 required)	1 Hz to 20 kHz, sine-wave output	Hewlett-Packard 204C
Spectrum analyzer	20 Hz to 40 GHz, 50-ohm input	Hewlett-Packard 141T with 8552B if section and 8553 rf section
Probe coaxial T-connector		Hewlett-Packard 11042A
Mixer attenuator	Customer fabricated; refer to figure 5-1	
30-dB if attenuator (2 required)	30 dB dc to 500 MHz, 200 W CW 500 ohm	Bird 8322
Frequency counter	5 Hz to 500 MHz, sensitivity 15 V rms high resolution	Hewlett-Packard 5345L
Digital multimeter	200 mV to 1200 V dc, ac, 200 ohms to 20 megohms, 1200 V rms, maximum resolution 10 μV	Fluke 8600A
Distortion analyzer	5- to 600-kHz frequency high input impedance, distortion levels from 0.1 to 100% dB scale	Hewlett-Packard 334A
Ammeter	0 to 25 A dc	Weston 901
Load resistor	0.04 to 4.0 ohms, 1000 watts	Biddle JAGA81 Rheostat
Connector		Cannon part number MDNB96555-17, Rockwell International part number 426-0075-010
Load	250 watt, 50 ohm	Bird 8141



Mixer Attenuator (600-Ohm), Schematic Diagram
Figure 5-1

Table 5-2. Inspection Requirements.

WHAT TO INSPECT/FOR WHAT	CONFIGURATION TO CHECK		ACTION TO BE TAKEN
	MP-150	VC-120	
Cables			
Broken, frayed, cracked insulation/wires; broken, loose connectors; broken, bent pins	X	X	Replace defective cable.
Cases			
Broken, dented, cracked surface areas	X	X	Replace defective unit.
Rusted, corroded surface areas	X	X	Repair/repaint defective unit.
Lights			
Broken, inoperative bulbs	X	X	Replace defective bulb.
Lens			
Broken, scratched, cloudy lens	X	X	Replace defective lens.
Insulators			
Cracked, split, crumbling, brittle insulators		X	Replace defective insulator.
Antennas			
Broken, bent, chipped, cracked	X	X	Replace antenna.
Broken, bent mount		X	Replace mount.
Case connectors			
Broken, bent, crooked, inoperative	X	X	Replace unit to which connector is attached.
Battery			
Dented, leaking, corroded, discharged	X		Replace battery.
Mount cushions			
Broken, inflexible, cracked, crumbling cushions		X	Replace mount.
Pack frames			
Bent, cracked frame; frayed, worn straps; torn, frayed canvas; bent, cracked plate form	X		Replace pack frame.
Counterpoises			
Frayed, broken cables; broken bobbins; loose, broken terminals	X		Replace defective counterpoise.
Handset/headset			
Broken, cracked case; broken connector	X	X	Replace defective handset/headset.

5.3.2.3 Lens

a. Clean exteriors by wiping with solvent-moistened, lintless cloth.
b. Dry and polish with clean, dry, lintless cloth.

5.3.2.4 Plastic Parts

a. Blow dust and dirt from surfaces.
b. Wipe clean using solvent-moistened, lintless cloth.
c. Dry and polish with clean, dry, lintless cloth.

5.3.2.5 Connector and Receptacles

a. Wipe dust and dirt from shells and cable clamps using solvent-moistened, lintless cloth.
b. Wipe dry with clean, dry, lintless cloth.
c. Remove dust from inserts using a small, soft-bristle brush in conjunction with a hand-controlled air jet.
d. Wash dirt and any trace of lubricant from insert, insulation, and contacts with solvent applied sparingly with a small, camel-hair brush.

5.3.2.6 Canvas Straps and Containers

a. Brush dirt from canvas using stiff-bristled brush.
b. Remove stains using mild detergent and lintless cloth.
c. Air-dry in the sunlight.

5.3.2.7 Handset/Headset

a. Blow dust and dirt from surfaces
b. Wipe clean using solvent-moistened, lintless cloth.
c. Dry using clean, dry, lintless cloth.

5.3.2.8 Antennas

a. Wipe clean using solvent-moistened, lintless cloth.
b. Dry using clean, dry, lintless cloth.

5.3.2.9 Counterpoise

a. Remove dirt from cable by drawing cable through a solvent-moistened cloth.
b. Dry by drawing cable through dry, clean, lintless cloth.
c. Rewind cable about bobbin.

5.4 TESTING/TROUBLESHOOTING

5.4.1 General

Fault isolation at the system level will be limited to determining what unit is defective and replacing that unit. For further troubleshooting of the units, refer to the instruction book for that unit (see table 1-4 of description section for publication titles). System testing will be covered in paragraph 5.4.4 and complete testing and troubleshooting of the power conditioner will be covered in paragraph 5.4.4.1. In paragraph 5.4.3, all test-point voltage and signal levels that can be obtained from the power conditioner will be listed. Static voltage and resistance reading for the power conditioner will be listed in figure 5-10. Testing and troubleshooting of the remote control adapter will be covered in paragraph 5.4.4.2.

5.4.2 Fault Isolation

In order to perform fault isolation at the system level, it is necessary to perform the procedures in the installation section for joining the 377L-2 Receiver-Transmitter Control to the 671V-2 Receiver-Transmitter to the 549C-1 Amplifier-Coupler and, if for a VC-120 Vehicular Communication System configuration, to the power conditioner. After all necessary units have been installed and cabled according to the installation section, refer to table 5-3 for fault isolation procedures.

Table 5-3. Fault Isolation Procedures.

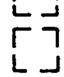
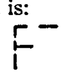
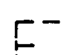
STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	Note		
	Set the switches on the 150-watt hf system configuration to these positions to start.		
	Control		
	Function switch	OFF position	
	Mode switch	USB position	
	Frequency selectors	29.9999	
	Af gain	Fully counterclockwise	
	Amplifier-coupler		
	ANT SEL switch	To appropriate position for antenna used	
	TEST/MON switch	OFF	
	Power conditioner		
	Power switch	OFF	
	SPKR/VOL switch	OFF	
1	Apply power to system.		
	a. For vehicular communication system only, place ON/OFF switch on power conditioner to ON position.	POWER light on power conditioner lights.	Check dc source and cablings. Replace power conditioner.
	b. For radio receiver-transmitter, manpack, and vehicular communication system, place H PWR/ L PWR/OFF switch to L PWR position on control.	No indication	
2	Place TEST/MON switch on amplifier-coupler to SYSTEM STATUS position.	Momentary  then  then blank.	If indication has not gone blank within 2 seconds, do the following.
		If indication is:	Remedy:
			Select frequency between 2.0 and 29.995 MHz.
			Replace battery or power conditioner, depending upon configuration.
			Replace receiver-transmitter.
(Cont)		(Center bar) —	Replace amplifier-coupler.

Table 5-3. Fault Isolation Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2 (Cont)			Replace amplifier-coupler.
		This is normal indication of low power in SSB without modulation.	Run module test, refer to publication on amplifier-coupler.
		If amplifier-coupler is OK . .	Replace antenna. If not, replace amplifier-coupler.
		(Decimal point dark) ■	If decimal point is lit, replace the power conditioner.
	Place TEST/MON switch to OFF position.		
3	Momentarily press the pushbutton.	Six lights in the frequency digits will light.	If lights do not light, replace the control.
4	Listen to handset, turn af gain clockwise slowly until hiss is heard.	Hiss is heard in earpiece.	Connect handset to other audio jack. Replace in order handset, control, receiver-transmitter, and amplifier-coupler.
5	Place mode switch in LSB and then AM position.	Hiss is heard in earpiece at each position.	If hiss is not heard, connect handset to other jack. Replace in order the handset, control, receiver-transmitter, and amplifier-coupler.
6	While listening to hiss in handset, slowly turn af gain control to maximum counterclockwise (but not off).	Hiss decreases to lower level.	Replace in order control, receiver-transmitter.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7	Set frequency select to 02.0000, af gain to midrange, and press the ptt switch on handset.	Tuning cycle is initiated as indicated by a tone in the earpiece for duration of cycle. Then no tone.	If tone is not heard or if tone does not go away, replace in order receiver-transmitter, amplifier-coupler, control, and then antennna.
8	On frequency select switch, select each of the following frequencies and press the ptt switch. 03.0000 06.0000 08.0000 16.0000 24.0000 29.9000	Tone should be heard for each frequency.	Replace in order receiver-transmitter, amplifier-coupler, control, and antenna.

Table 5-3. Fault Isolation Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9	While pressing the ptt switch on handset, speak into handset.	Sidetone and audio will be heard in earpiece.	Replace in order handset, amplifier-coupler, receiver-transmitter, and control.
10	If another operational radio is within vicinity, perform a radio check on these frequencies MHz. 02.0000 03.0000 06.0000 08.0000 16.0000 24.0000 29.9000	Audio transmission is possible on all frequencies and in modes.	Replace in order receiver-transmitter, amplifier-coupler, and control.

5.4.3 Test-Point Voltage and Signal Levels

Refer to table 5-4 for a listing of test-point voltages and signal levels for the power conditioner. Voltages and signals were taken in a static condition with 28.02 volts applied and with a load drawing 5 amperes connected.

5.4.4 Testing and Troubleshooting Procedures

The testing and troubleshooting of the 150-watt hf system will be divided into two tables. Table 5-5 will list those steps for testing/troubleshooting the control, receiver-transmitter, and amplifier-coupler at the system level. More detailed testing and troubleshooting of any one unit can be found in the publication covering that unit (refer to table 1-4 of description section). Table 5-6 will list the steps for testing and troubleshooting the power conditioner to the component level. Figure 5-10 will list static voltage and resistance measurements for the power conditioner. Table 5-7 will list the steps for testing and troubleshooting the remote control adapter.

5.4.4.1 Testing and Troubleshooting the 998W-1 Power Conditioner

Table 5-6 will list steps for testing and troubleshooting the power conditioner to the component level. Care should be exercised while testing the power conditioner not to short the output terminals suddenly. Figure 5-10 will list the static voltages and resistance for the power conditioner. Static conditions will be with an input voltage of 28.02 volts and a load drawing 5 amperes attached. No audio signal will be applied in the static condition.

Table 5-4. 998W-1 Power Conditioner Test-Point Voltages and Signal Levels.

CARD/MODULE	TEST POINT	SIGNAL DESCRIPTION
Audio amplifier A1	TP1	0 V dc
	TP2	0 V dc
	TP3	11.59 V dc
	TP4	27.03 V dc
	TP5	11.88 V dc
	TP6	0 V dc
	TP7	13.46 V dc
	TP8	12.24 V dc
Power conditioner control card A2	TP1	28.02 V dc
	TP2	27.02 V dc
	TP3	1.75 V dc
	TP4	28.02 V dc
	TP5	16.63 V dc
	TP6	0.34 V dc
	TP7	0.03 V dc
	TP8	6.30 V dc
	TP9	33.48 V dc
	TP10	6.31 V dc
	TP11	42.60 V p-p square wave
	TP12	609 V p-p square wave
	TP13	310 to 390 V p-p square wave

Table 5-5. Testing and Troubleshooting 150-Watt HF System.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Input power	a. Connect test equipment as shown in figure 5-2.		
	b. Set controls on equipment as follows. Function switch — OFF Mode switch — USB Frequency selectors — 02.0000 Af gain — Midrange ANT SEL — 50 OHM TEST/MON switch — SYSTEM STATUS		
	c. Set the test equipment controls as follows. Antenna simulator ON/OFF — ON		
	Dc supply ON/OFF — ON Voltage — 25 V dc Current — 20 A max	Voltage or current can be monitored on meter.	

Table 5-5. Testing and Troubleshooting 150-Watt HF System (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. (Cont)	d. Turn function switch to TR.	Observe status display. An should appear then a , then the display should go blank.	For any other indication, see table 5-3 step 2.
	e. Adjust dc supply to 22 volts.	Operation should appear normal.	
	f. Slowly decrease supply while watching the status monitor and listening to handset with ptt key depressed.	At approximately 21.5 volts, the display should present a and a clicking should be present in the handset.	If status does not display, replace the amplifier-coupler; if no clicking is heard, replace handset, then receiver-exciter.
	g. Restore dc supply to 25-volt level.	Status should restore, clicking should stop.	
2. Power output	a. Apply an audio signal of 1000 Hz at −26 dBm volts to J2. Press the ptt key on handset.	Wattmeter should read about 150 watts.	
	b. Set the frequency selector to each of the following frequencies and press the ptt key on handset. 03.0000 06.0000 08.0000 12.0000 16.0000 20.0000 24.0000 29.9000	Wattmeter should read about 150 watts at each frequency.	If output is not sufficient, replace amplifier-coupler.
	c. Place the mode switch in LSB; check output at each frequency with modulation applied.		Same as step 2.b
	d. Place the mode switch in AM. Do not modulate; check output at each frequency listed.		Same as step 2.b
	e. Place the function switch to OFF and disconnect test equipment.		
3. Frequency output	a. Connect test equipment as shown in figure 5-3.		
	b. Set controls on equipment as follows. Function switch — OFF Mode switch — AM Frequency selectors — 02.0000 Af gain — Midrange ANT SEL — 50 OHM TEST/MON switch — SYSTEM STATUS		
(Cont)			

Table 5-5. Testing and Troubleshooting 150-Watt HF System (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	c. Set controls on test equipment as follows. Dc supply ON/OFF — ON Voltage — 25 V Current — 20 A max Frequency counter Power on — ON Function — Frequency A Gate time/display — 1 ms Sample rate — Midrange Channel A Level — Preset 50 ohm/1 megohm — 50 ohm Atten — X1 Ac/dc — Ac		
	d. Set function switch to L PWR.	Observe status display. An then a , then a blank should be observed.	For any other indication, see table 5-3 step 2.
	e. While monitoring frequency counter, press the ptt key on handset.	Frequency counter should read 02.0000 MHz ±1.6 Hz.	If frequency is off, replace in order receiver-transmitter, then control.
	f. Set the frequency selectors to each frequency listed below and press ptt key.	Frequency counter should read frequency selected within limits.	If any frequency does not correspond to setting, replace the control. If any frequency is out of tolerance, replace the receiver-transmitter.
	02.9999	±2.4 Hz	
	03.8888	±3.1	
	04.7777	±3.8	
	05.6666	±4.5	
	06.5555	±5.2	
	07.4444	±5.9	
	08.3333	±6.6	
	09.2222	±7.4	
	10.1111	±8.0	
	21.0000	±16.8	
	24.9999	±20.0	
	26.9999	±21.6	
	29.9999	±24.0 Hz	
	g. Set the function switch to OFF and disconnect all test equipment.		

Table 5-5. Testing and Troubleshooting 150-Watt HF System (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. Audio output and receiver sensitivity	a. Connect the equipment as shown in figure 5-4.		
	b. Set controls on equipment as follows. Function switch — OFF Mode switch — AM Frequency selectors — 02.0000 MHz Af gain — Maximum ccw but not in 0/600-dBm position ANT SEL — 50 OHM Display switch — OFF		
	c. Set controls on test equipment as follows. Dc supply ON/OFF — ON Voltage — 25 V Current — 20 A max Analog voltmeter ON/OFF — ON Function — AC-V Range — 5 V Distortion analyzer ON/OFF — ON Controls — As required Signal generator ON/OFF — ON Output level — −130 dBm AM — Int Modulation — Fully ccw Modulation frequency — 1 kHz FM — OFF Peak deviation — Fully ccw Frequency — 02.0000 MHz		
	d. Set the function switch to RCV.	Voltmeter should indicate 0 volt out.	
	e. Set signal generator output level to −50 dBm. Increase modulation to 30%.	Voltmeter should indicate voltage output.	If no voltage is present, replace receiver-transmitter, then amplifier-coupler.
(Cont)	f. Measure the signal-to-noise ratio.	Signal discernible on distortion analyzer.	

Table 5-5. Testing and Troubleshooting 150-Watt HF System (Cont).

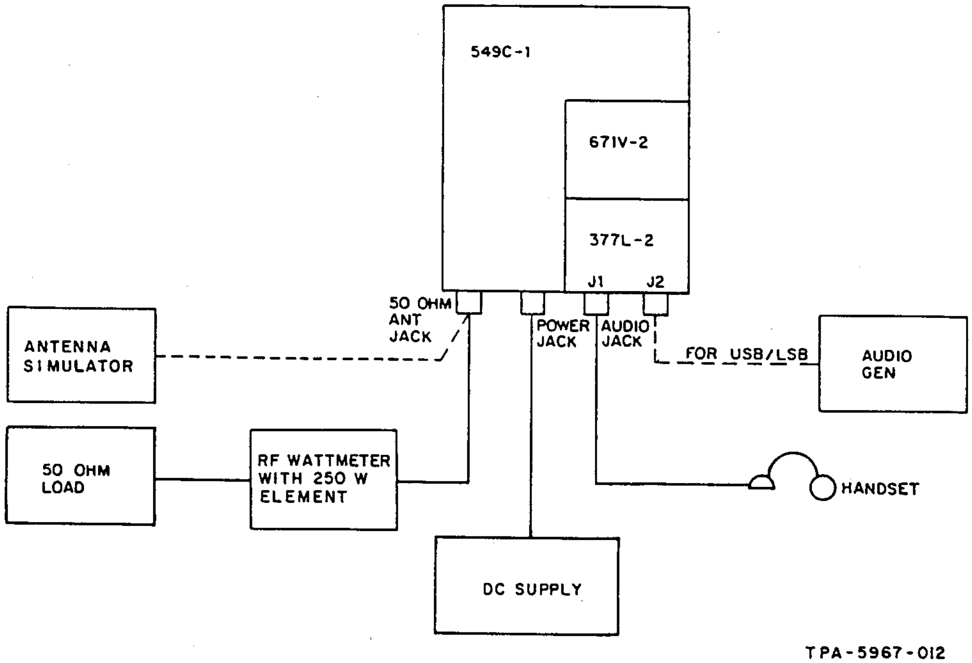
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	g. Decrease output of signal generator to −100 dB. Measure signal-to-noise ratio.	Signal-to-noise ratio is not less than 10 dB.	If minimum is not met, replace the receiver-transmitter, then the amplifier-coupler.
	h. Set output of signal generator to −130 dBm. Turn modulation off. Set frequency of signal generator to 2.001 00 MHz.		
	i. Set mode switch to USB.		
	j. Increase output of signal generator to −50 dB.	Voltmeter should indicate some voltage.	If no reading on voltmeter, replace the receiver-transmitter.
	k. Decrease output of signal generator to −113 dB and measure signal-to-noise ratio on distortion analyzer.	Signal-to-noise ratio not less than 10 dB.	If minimum is not met, replace the receiver-transmitter, then the amplifier-coupler.
	l. Set output of signal generator to −130 dBm. Set frequency of signal generator to 1.999 00 MHz.		
	m. Set mode switch to LSB.		
	n. Increase output of signal generator to −50 dBm.	Voltmeter should indicate voltage.	If no reading on voltmeter, replace the receiver-transmitter.
	o. Decrease the output of the signal generator to −113 dBm and measure signal-to-noise ratio.	Signal-to-noise ratio not less than 10 dB.	If minimum is not met, replace receiver-transmitter, then amplifier-coupler.
	Caution The next test will place the radio receiver-transmitter in the L PWR function. Take care not to initiate a ptt switch because transmitting will harm the signal generator.		
	p. Set the function switch to L PWR.		
	q. Repeat steps 4.h through 4.o.		
	r. Set the function switch to OFF and disconnect all test equipment.		

Table 5-5. Testing and Troubleshooting 150-Watt HF System (Cont).

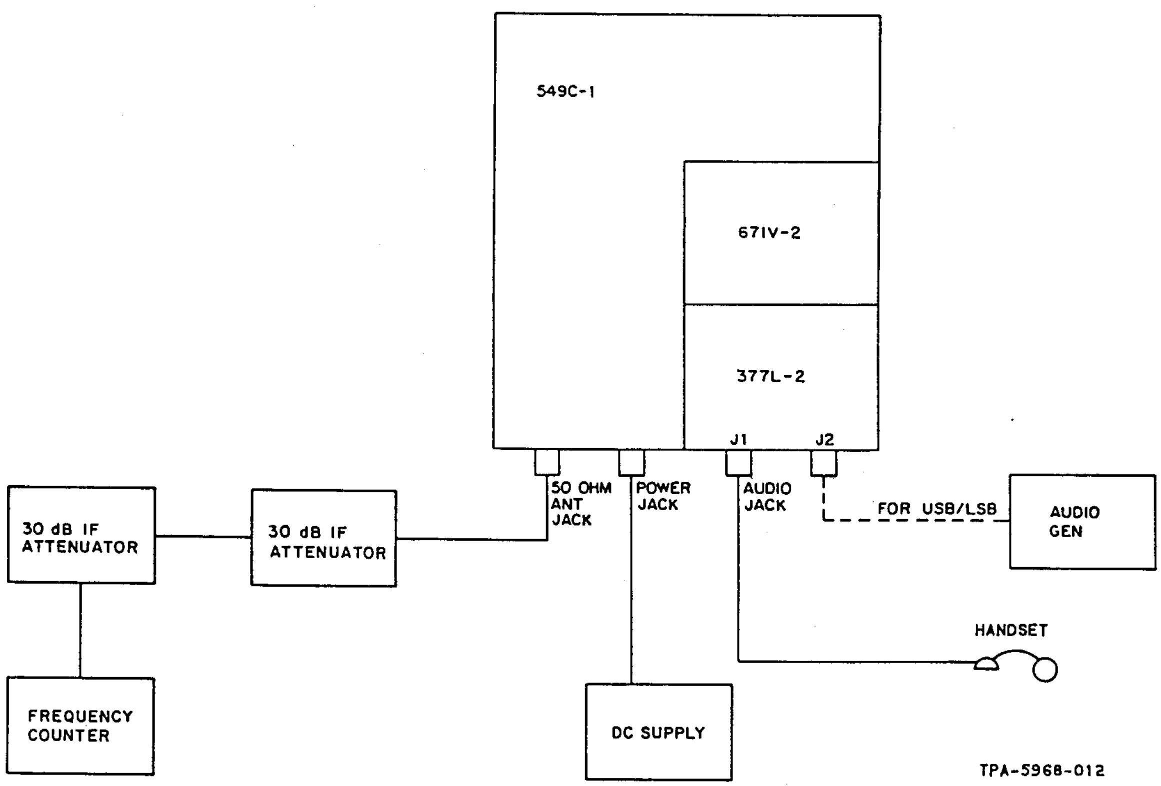
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Intermodulation distortion test	a. Connect the equipment as shown in figure 5-5.		
	b. Set controls on equipment as follows. Function switch — OFF Mode switch — USB Frequency selectors — 02.0000 MHz Af gain — Midrange ANT SEL — 50 OHM TEST/MON switch — OFF		
	c. Set controls on test equipment as follows. Audio oscillator no 1 Range — As required Amplitude — As required Frequency dial — 1600 Hz Audio oscillator no 2 Range — As required Amplitude — As required Frequency dial — 1000 Hz Dc supply Voltage — 25 V Current — 20 A ON/OFF — ON Spectrum analyzer with if section and rf section Intensity — Clockwise until visible Focus — To suit operator Video filter — 10 MHz Scan mode — Int Scan trigger — Auto Scan time — 5 ms Log ref level — −10 Frequency — As required Bandwidth — 5 kHz Scan width — 10 M Input attenuator — 10 dB		
	d. On mixer attenuator, set AUDIO LOAD/ OSC 1 IN to OSC 1 IN and AUDIO LOAD/ OSC 2 IN to AUDIO LOAD.		
(Cont)	Set oscillator number 1 for 1000 Hz and an input level to the receiver-transmitter group of −32 dBm measured on the ac vtvm.	−32 dBm on the ac vtvm	Replace in order oscillator, mixer attenuator, and audio attenuator.

Table 5-5. Testing and Troubleshooting 150-Watt HF System (Cont).

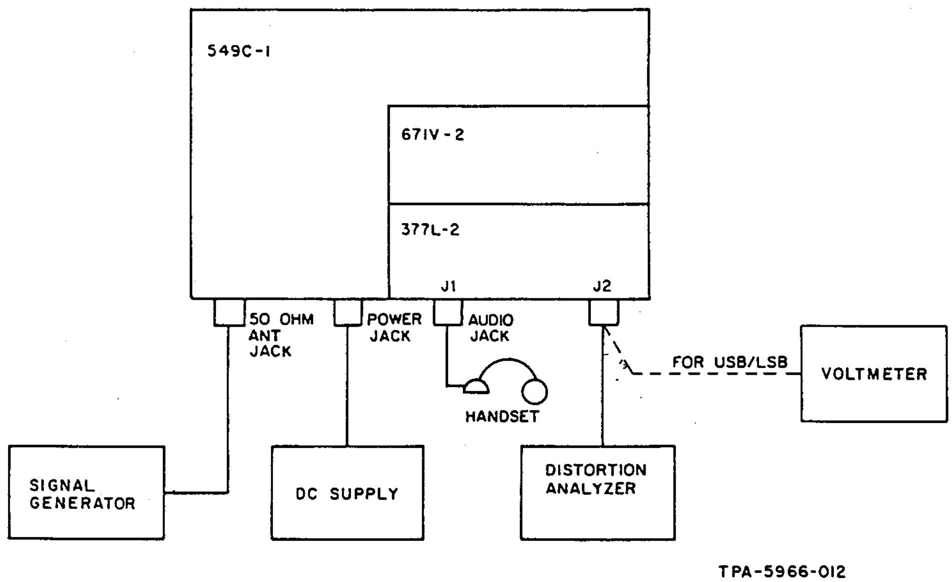
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	e. Set AUDIO LOAD/OSC 1 IN to AUDIO LOAD. Set AUDIO LOAD/OSC 2 IN to OSC 2 IN. Set oscillator number 2 for 1600 Hz and an input level to the receiver-transmitter group of −32 dBm, measured on the ac vtvm.	−32 dBm on the ac vtvm	Replace in order oscillator 2, mixer attenuator, and audio attenuator.
	f. Set AUDIO LOAD/OSC 1 IN to OSC 1 IN (both oscillators will now be connected to the input of the receiver-transmitter group).		
	g. Set function switch to L PWR. Press the ptt switch on the handset and observe the third and fifth order intermodulation products on the spectrum analyzer.	About 70 watts on wattmeter and distortion −25 dB relative to 2-tone signal.	Replace in order receiver-transmitter, amplifier-coupler, and control.
	h. Release the ptt switch, set frequency selector to 16.0000 MHz, and press the ptt switch to observe intermodulation distortion.	Same as step 5.g	Same as step 5.g
	i. Release the ptt switch, set frequency selector to 29.0000 MHz, and press the ptt switch to observe the intermodulation distortion.	Same as step 5.g	Same as step 5.g
	j. Perform the same test with mode switch set to LSB.	Same as step 5.g	Same as step 5.g
6. Transmit CW operation	a. Connect the test equipment as shown in figure 5-6.		
	b. Set equipment controls as follows. Function switch — OFF Mode switch — USB Frequency selectors — 02.0000 MHz Af gain — Midrange ANT SEL — 50 OHM TEST/MON switch — OFF		
	c. Set controls on test equipment as follows. Oscilloscope ON/OFF — ON Controls — As required Dc supply ON/OFF — ON Voltage — 25 V dc Current — 20 A		
	d. Set function switch to L PWR, press the telegraph key, and note that tuning tone is heard.		
	e. Measure the CW hang time on oscilloscope from point when key is pressed to point where rf first appears.	0.75 to 1.25 seconds hang time	Replace in order receiver-transmitter, control, amplifier-coupler, then telegraph key.



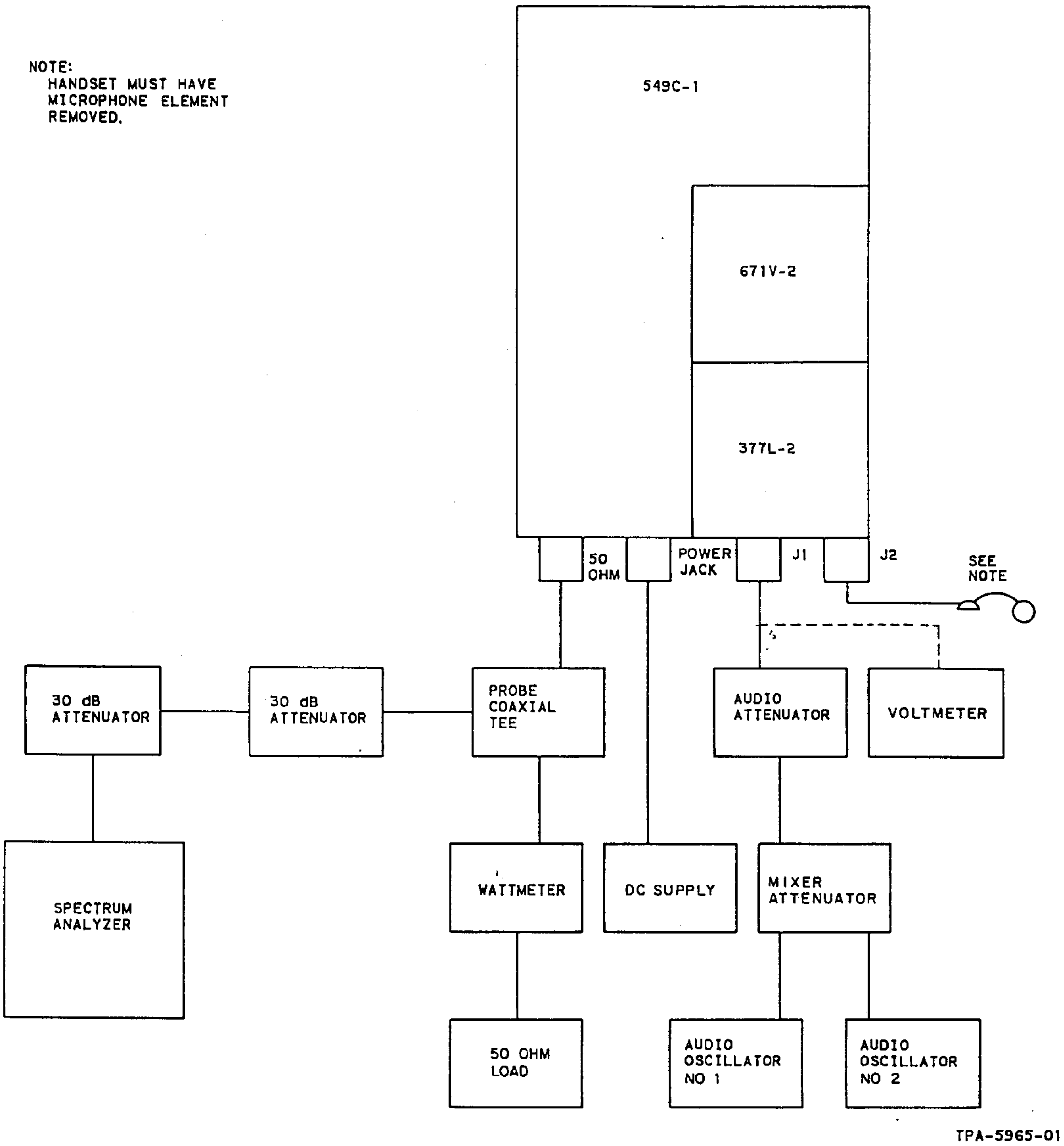
Power Input/Output Test Setup
Figure 5-2



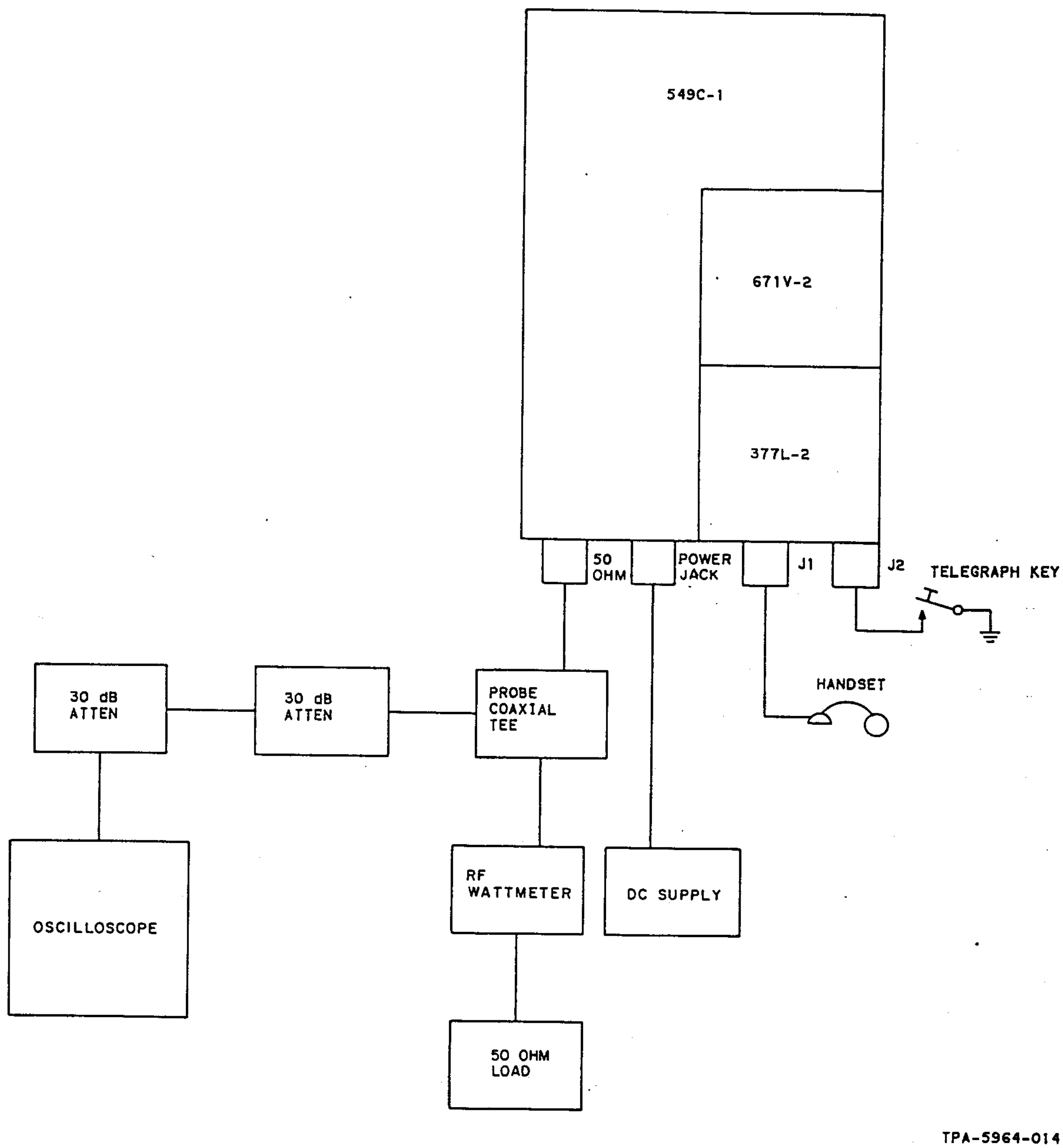
Frequency Test Setup
Figure 5-3



Receiver Sensitivity/Audio Output Test Setup
Figure 5-4



Intermodulation Distortion Test Setup
Figure 5-5

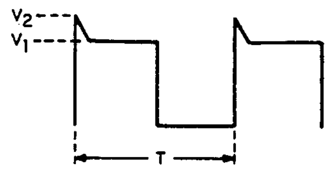


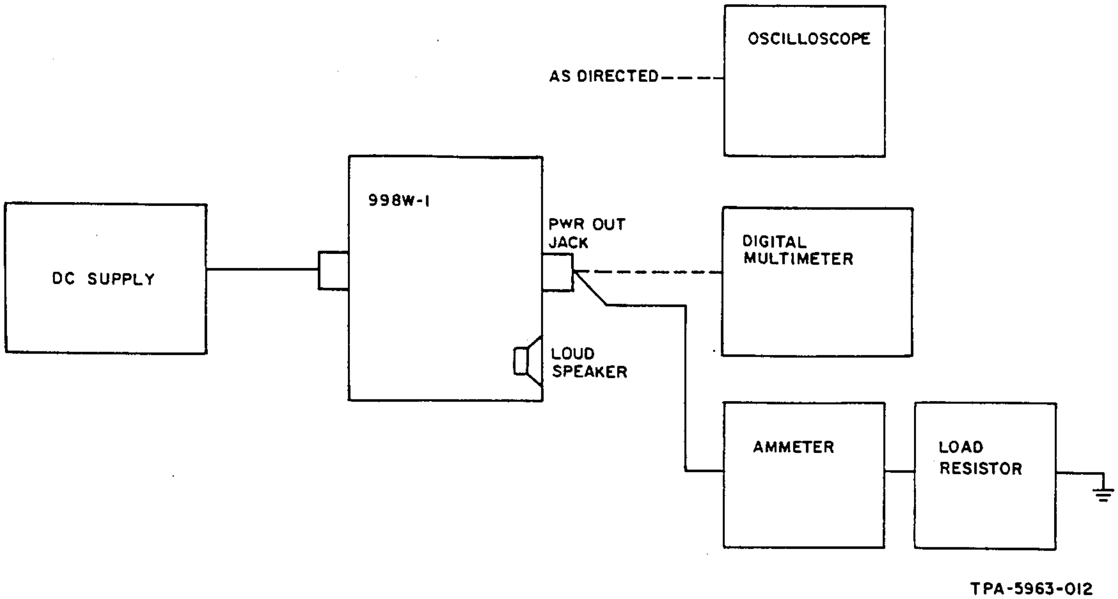
CW Operation Test Setup
Figure 5-6

Table 5-6. Testing and Troubleshooting the 998W-1 Power Conditioner.

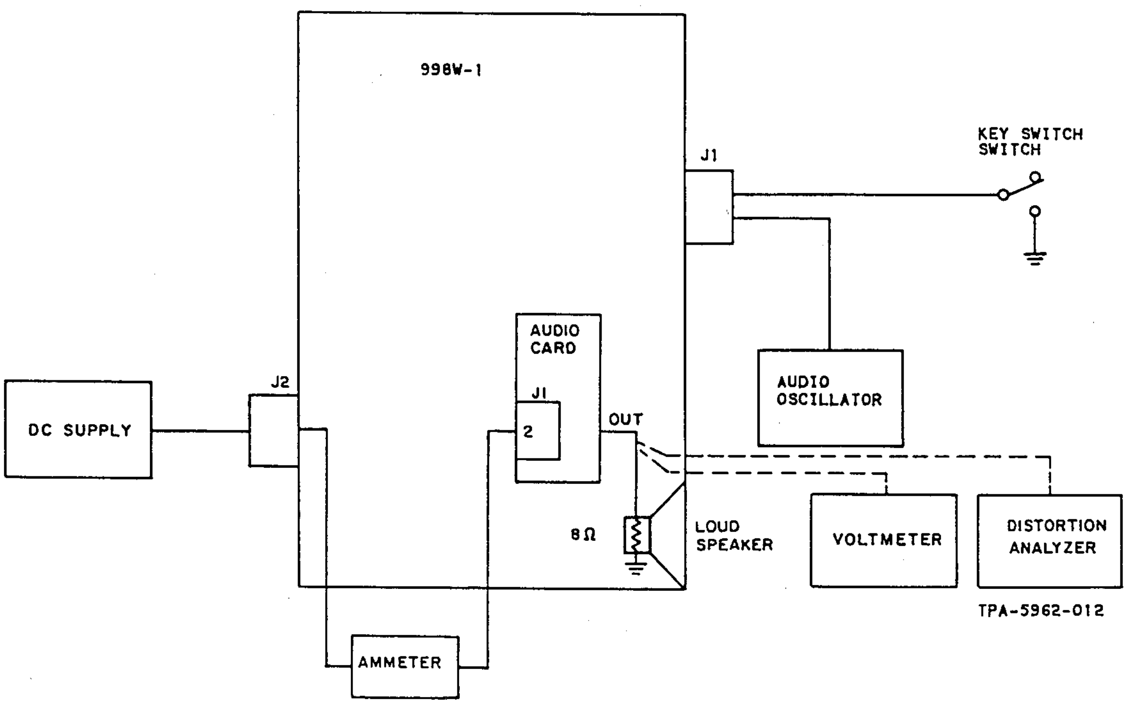
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Undervoltage shutdown	a. Connect the test equipment as shown in figure 5-7.		
	b. Set the controls on equipment as follows. ON/OFF switch — OFF SPKR/VOL — Fully ccw		
	c. Set the controls on test equipment as follows. Dc supply ON/OFF — ON Voltage — 25 V Current — 20 A Multimeter Function — Dc volts Range — 50 volt ON/OFF — ON		
	d. Adjust the dc power source downward until multimeter indicates the output has shut down.		
	e. Measure the input voltage.	Dc input should be between 18 to 19 volts.	Replace or repair control card A2, then chassis assembly.
2. Overvoltage shutdown	a. Set up equipment the same as steps 1.a through 1.c (undervoltage test).		
	b. Adjust the dc power source upward until multimeter indicates a shutdown.		
	c. Measure the input voltage.	Dc input should be from 30.5 to 31.5 V dc.	Replace or repair R51 and R62 of control card A2 or repair chassis electronic components.
Control Card A2 Testing			
3. Oscillator testing	a. Connect test equipment as shown in figure 5-7.		
	b. Set input to 22.4 to 22.6 V dc. Measure voltage across C2 (floating voltage).	24.70 to 25.30 V dc	Perform adjustment of R4 or repair oscillator U2 on control card A2.
	c. Using oscilloscope, measure frequency of oscillator at C2.	Time for 1 cycle is 34 to 46 µs.	Repair oscillator U2 on control card A2.
	d. Set dc input to 29.5 to 30.5 V dc.		

Table 5-6. Testing and Troubleshooting the 998W-1 Power Conditioner (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont)	e. Observe waveform of oscilloscope. Waveform should be  	V1: 65 V maximum V2: 110 V maximum	Repair oscillator U2 on control card A2.
	f. Measure voltage across C2.	Voltage should be 32 V max.	Repair rectifier circuit of control card A2.
4. Bias testing	Measure the voltages on VR1 VR3 VR4 VR5	 5.7 to 6.7 V dc 13.8 to 16.2 V dc 5.7 to 6.7 V dc 13.8 to 16.2 V dc	Repair bias circuits around VR1 thru VR5.
5. Short circuit test and current maximum	Momentarily short load resistor. Verify that the following current occurs at output. 3.5 to 6.5 A current max at foldback with input at 22.5 V dc.		Perform current adjustments or repair MOSFET's Q1 and Q2 and chip U1 circuits.
6. Audio amplifier A1 testing	a. Connect test equipment as shown in figure 5-8.		
	b. Set audio generator for 1000 Hz at 0.866 V rms.		
	c. Turn power conditioner ON/OFF control to ON. Place SPKR/VOL control to ON and vary the audio output of speaker.	Loudspeaker volume should vary as potentiometer is varied.	Repair or replace audio amplifier A1, volume control, or loudspeaker.
	d. Ground pin A of J1; audio should be muted. Remove ground from pin A; audio should return.		Repair or replace mute circuits on audio amplifier A1.
	e. Adjust audio oscillator for 0.26 ±0.01 V rms at the following frequencies. Measure output voltage across an 8-ohm load. FREQUENCY (Hz) — OUTPUT VOLTAGE LIMITS (RMS) 300 — 2.7 ±0.3 V 1000 — 1.45 ±0.3 V 3000 — 0.80 ±0.2 V		
	f. Adjust audio oscillator for 300 Hz at 0.866 V rms. Measure output of 2.88 ±0.05 V rms.		
	g. Measure the harmonic distortion with above signal applied. Distortion not greater than 5%.		



Input Power Test on 998W-1 Power Conditioner, Test Setup
Figure 5-7



A1 Audio Test for 998W-1 Power Conditioner, Test Setup
Figure 5-8

5.4.4.2 Testing and Troubleshooting the 998Y-2 Remote Control Adapter

Table 5-7 will list steps for testing and troubleshooting the remote control adapter to the component level. A customer fabricated test plug (figure 5-9) will be needed for connecting test equipment as required.

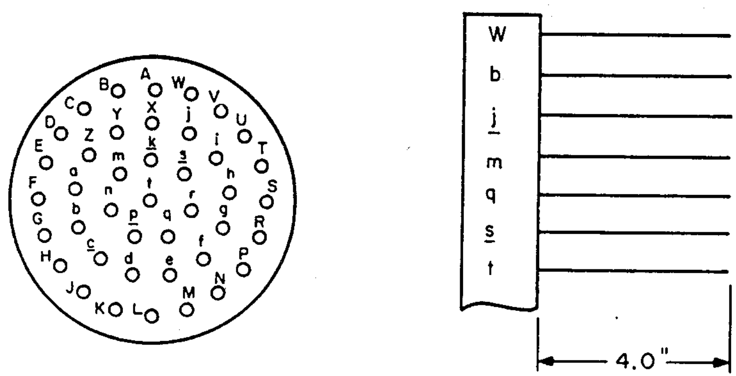
5.5 ALIGNMENT/ADJUSTMENT

The alignment and adjustment procedures of the control, receiver-transmitter, and amplifier-coupler are covered in the instruction book for the individual unit. Refer to the appropriate manual for further alignment/adjustment. The power conditioner alignment/adjustment will be covered in table 5-8. The remote control adapter alignment/adjustment will be covered in paragraph 5.5.1.

5.5.1 998Y-2 Remote Control Adapter Alignment/Adjustment

Potentiometer A1R12 is used to set the bias current of the audio amplifier output stage with no audio input applied. If A1R12 is incorrectly adjusted when primary power is applied, the output transistors could be damaged.

a. Remove cover from remote control adapter.
b. Turn potentiometer A1R12 fully clockwise (maximum resistance between U1-7 and Q5-B).
c. Connect a dc power supply to remote control adapter connector J2-j.
d. Set dc power supply on and adjust for +26 ±0.5 V dc, current limited to 50 mA.
e. With no audio applied, adjust A1R12 such that 20 mA ±1 mA is drawn from the power source.
f. Turn dc power supply off and disconnect from remote control adapter.
g. Secure cover to remote control adapter.



PARTS:

CONNECTOR, 41 CONTACT, SOCKET INSERT, MINATURE QUICK DISCONNECT, BAYONET COUPLING, CABLE MOUNTING, PLUG CONNECTOR.

WIRE, NO 22 AWG TEFLON INSULATED HOOK-UP.

TPB-0245-011

998Y-2 Remote Control Adapter Test Plug, Schematic Diagram
Figure 5-9

Table 5-7. Testing and Troubleshooting the 998Y-2 Remote Control Adapter.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Input power	a. Connect J1 mating connector assembly (Rockwell International part number 426-0075-010) to J1.		
	b. Connect customer fabricated test plug (figure 5-9) to J2.		
	c. Connect dc supply to pin j (+) and pin b (−).		
	d. Set power supply controls as follows. ON/OFF — ON Voltage — 26.5 V dc Current — 5 mA max		
2. Speaker amplifier operation	a. Connect audio oscillator to test plug pins q (high) and s (low). Set oscillator for 1000 Hz at 0 dBm.		
	b. Turn volume control clockwise.	Volume increases.	Repair or replace audio amplifier A1, volume control, or speaker.
	c. Turn volume control counterclockwise.	Volume decreases.	Same as step 2.b
	d. Set volume control off (detent position).	No audio is present.	Same as step 2.b
3. Speaker mute	a. Set volume control to a comfortable level.		
	b. Connect test fixture pin m to ground.	Audio is muted.	Repair or replace mute circuits on audio amplifier A1.
	c. Remove ground from pin m.	Audio returns.	Same as step 3.b
4. Modulation	a. Adjust audio oscillator for 1000 Hz at 0 dBm J1 mating connector pin 20 lead (white-black-brown) (high) and pin 26 lead (white-black-violet) (low).		
	b. Measure output at test plug pins W (high) and t (low).	0 ±1 dB	Replace T1.

Table 5-8. 998W-1 Power Conditioner Alignment/Adjustment.

ADJUSTMENT	PROCEDURE	IF UNABLE TO ADJUST
1. Oscillator voltage adjust	a. Set up equipment as shown in figure 5-7. b. Set input voltage to 22.5 ±0.1 V dc.	
	c. Adjust A2R4 for 25 ±0.03 V dc across C2.	Check 555 timer and chip U1.
2. Preliminary adjust of V-out limiter	a. Set up equipment as shown in figure 5-7. b. Set input voltage to 30 ±0.5 V dc.	
	c. Adjust A2R3 for output voltage of 27 ±1 V dc.	
	d. Check output for ac ripple.	
3. Current sharing adjust	a. Set up equipment as shown in figure 5-7. Set input voltage at 30 ±0.02 V dc.	
	b. Adjust load rheostat for output current of 5 A.	
	c. Measure voltage across R1 and R2 of chassis components.	
	Note Make connections as close to body of resistor as possible.	
	d. Adjust A2R2 for a difference between the readings of 5 ±5 mV with the reading across R1 being the larger.	
	e. Increase the output current to 16.5 to 17.5 A by decreasing the load rheostat.	
	f. Measure the voltages across R1 and R2 again. Readjust A2R2 until the difference is 5 ±0.1 mV with voltage across R1 being larger.	
4. Maximum current adjust	a. Set up equipment as shown in figure 5-7 with input voltage of 22.5 volts.	
	b. Adjust A2R1 for 20 A maximum out.	
	c. Momentarily short load rheostat. Current out should drop to 3.5 to 6.5 A.	
	d. Remove short and set input voltage to 30 volts.	
	e. Measure output current. Maximum allowable current is 24.5 A.	
5. Regulator adjust	a. Set up equipment as shown in figure 5-7.	
	b. Set input voltage to 27 ±0.02 V dc with output current at 17 A dc.	
	c. Adjust A2R5 for 25 ±0.1-V dc output.	Check chassis circuitry and oscillator circuitry on control card A2.
	d. Set input to 22.5 ±0.1 V. Output should be greater than 21.5 V dc.	

Table 5-8. 998W-1 Power Conditioner Alignment/Adjustment (Cont).

ADJUSTMENT	PROCEDURE	IF UNABLE TO ADJUST
6. Audio bias adjust	a. Set up equipment as shown in figure 5-8. b. Adjust R12 for maximum resistance between pin 7 of U1 and base of Q5. c. Apply 26.5 ±0.5 V dc to input. d. With no audio applied, adjust R12 for 20 ±1 mA which is drawn from power supply.	

5.6 DISASSEMBLY/ASSEMBLY

The disassembly/assembly of the control, receiver-transmitter, and amplifier-coupler is covered in the instruction book for each unit. Refer to the appropriate instruction book if disassembly/assembly of those units is required. The disassembly of the power conditioner and remote control adapter will be covered in paragraphs 5.6.1 and 5.6.2. The assembly of the power conditioner and remote control adapter is covered in paragraphs 5.6.3 and 5.6.4.

5.6.1 Power Conditioner Disassembly

a. Turn power conditioner so bottom of case is up.
b. Remove the 12 screws attaching bottom plate to case.
c. Remove bottom plate from case.
d. Remove the wires connected to loudspeaker terminal. Label and annotate all leads removed.
e. Remove the four screws in front of loudspeaker and gently pull loudspeaker assembly from front of case.
f. Remove the five screws on audio amplifier A1 and disconnect P2 from its jack. Carefully lift audio amplifier A1 up and out of the unit.
g. Remove the four screws in the corners of control card A2 and disconnect P1 from its jack. Move control card A2 forward and then lift upward out of the unit.
h. Remove, label, and annotate the leads going to E20 and E21 from the blower.
i. Remove the four nuts from the corners of the blower and lift blower assembly from the case.
j. Further disassembly is one part at a time. Each time a part is to be removed, label and anotate each lead as it is disconnected.

5.6.2 Remote Control Adapter Disassembly

a. Remove the eight screws attaching cover to chassis.
b. Remove cover from chassis.
c. Remove four screws attaching audio amplifier A1 to chassis and disconnect P1 from J1.
d. Remove audio amplifier A1 from chassis.
e. Remove four screws in front of loudspeaker and pull loudspeaker out far enough to gain access to loudspeaker wires.
f. Label, annotate, and unsolder loudspeaker wires.

g. Remove loudspeaker from chassis.
h. Further disassembly is one part at a time. Each time a part is to be removed, label and annotate each lead as it is disconnected.

5.6.3 Power Conditioner Assembly

a. Turn power conditioner so bottom of case is up.
b. Replace all individual items, referring to annotated wiring labels for proper wiring connections.
c. Place blower onto four bolts in recessed area and fasten in place using four self-locking nuts.
d. Connect blower wires to E20 and E21.
e. Place control card A2 onto side of case recess, ensuring proper mating of P1 to J1.
f. Fasten control card A2 in place with the four screws, one in each corner, and tighten securely.
g. Place audio amplifier A1 on flat bottom of case, ensuring proper mating of P2 to J2.
h. Fasten control card A2 in place with five screws and tighten securely.
i. Gently pass the loudspeaker assembly through the front of the case and fasten in place using four screws. Tighten securely.
j. Connect the annotated, labeled speaker wires to loudspeaker connections C10 and C9.
k. Place the bottom cover on the unit and fasten securely, using 12 screws.
l. Unit is now assembled.

5.6.4 Remote Control Adapter Assembly

a. Replace all individual items, referring to annotated labels for proper wiring connections.
b. Solder the annotated loudspeaker wires to terminals E1 and E2.
c. Fasten loudspeaker in place using four screws.
d. Connect audio amplifier connector J1 to chassis connector P1 and secure audio amplifier A1 to chassis using four screws.
e. Place cover on chassis and secure using eight screws.

5.7 REPAIR

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be utilized to prevent equipment damage. Refer to paragraph 5.7.2, Electrostatic Discharge Sensitive Devices Precautions, before performing maintenance on the equipment.

5.7.1 General

Use standard shop repair practices to remove and replace chassis-mounted components or subassemblies. Make adequate notes to enable restoration of wire location and lead dress to original position.

Caution

Avoid use of excessive heat when soldering to solid-state devices or the circuit board. Otherwise, the devices may be damaged or the copper circuit foil may lift from the board.

Use standard solid-state device and circuit card repair techniques to remove and replace components on the circuit cards. The following paragraphs provide special information for handling ESDS devices, and for removing and replacing postcoating on circuit cards.

5.7.2 Electrostatic Discharge Sensitive Devices Precautions

A static charge is produced by friction between, and separation of, dissimilar materials. Potentials of 1 to 20 kilovolts are commonly generated on the human body or insulated surfaces. Voltages of this magnitude can produce both immediate and latent failure in electrostatic discharge sensitive (ESDS) devices.

Note

Dry weather (relative humidity less than 30 percent) multiplies the accumulation of static charges on a surface. In a low-humidity environment, the handling procedures specified are of greater importance and should be adhered to without exception.

5.7.2.1 Handling of ESDS Devices

Caution

Do not use nylon or other synthetic material gloves when handling ESDS devices. Excessive static can build up on this type of material. Handle ESDS devices by their case whenever possible. Avoid touching the leads or contacts even though grounded.

The transport of ESDS devices at the component level requires that all device leads be effectively shorted together. This can be accomplished by one of the following methods.

a. Insert device in high-density conductive foam.
b. Insert device in aluminum foil-lined individual package.
c. Insert device in a dual-in-line carrier tube made of aluminum or specially coated plastic (must be labeled as static charge dissipative).

The label shown below shall be shown on all individual part containers.

CAUTION CAUTION
ELECTROSTATIC
SENSITIVE DEVICES
OBSERVE PRECAUTIONS
FOR HANDLING

Caution

This component can be damaged by static electricity. Special handling methods and materials must be utilized.

Antistatic protection is required for ESDS devices from the time they are received until they are terminated in a protective subassembly. If ESDS devices are in subassemblies that do not provide adequate ESDS device protection, they are still vulnerable to static damage.

The transport of circuit board or module subassemblies containing ESDS devices requires that contact with exposed subassemblies be prevented. Conductive plastic bags, not clear polyvinyl, are well suited to this purpose. After the subassembly containing ESDS devices is installed in the top level unit, normal ESDS devices handling is adequate.

5.7.2.2 Storage of ESDS Devices

The methods of handling described in paragraph 5.7.2.1 are acceptable methods of storage.

5.7.2.3 Testing of Subassemblies Containing ESDS Devices

Observe the following precautions when testing any subassembly containing ESDS devices.

a. Remove power from test fixtures of equipment before inserting/removing any ESDS device or subassembly containing an ESDS device.
b. Ground all test equipment.
c. Apply dc source power to ESDS device or subassembly containing an ESDS device before applying any signal voltages.
d. Remove signal voltages from ESDS device or subassembly containing an ESDS device before removing dc source power.
e. Do not make dielectric strength or insulation resistance checks for any ESDS device or subassembly containing an ESDS device.

5.7.2.4 Replacement of ESDS Devices

Caution

Protective carriers for ESDS devices should be placed on grounded conductive work-station surfaces.

It is recommended that an ionized air blower be used in the work area where personnel are handling ESDS devices and that personnel work in the path of the ionized air. The blower should be operated for 3 minutes before handling an ESDS device so that residual static charges may be removed. In lieu of an ionized air blower, a grounded wrist strap in contact with bare skin can be used.

Warning

If a grounded wrist strap is used, take all necessary precautions to make sure the wrist strap and/or ground lead cannot make contact with any voltage sources in the area of the work station.

Observe the following precautions when replacing an ESDS device.

a. Ground soldering iron tips, special tools, and handtools.
b. Use only uninsulated metal handtools. Place all handtools on conductive work-station surface when they are not in use.
c. Keep leads of ESDS devices in contact with conductive material, except when being installed, to avoid buildup of static charge.
d. Do not install (insert) or remove ESDS devices from circuits with power on. Transient voltages may cause damage.
e. Connect all unused input leads of ESDS device to circuit ground or ESDS device supply, whichever is applicable for logic circuit involved.

5.7.3 Postcoating

5.7.3.1 General

Some circuit cards have areas coated with either Dennis 1169 or HumiSeal 1B31 postcoating upon completion of manufacture to protect from damage and humidity. The coating must be removed from the circuit card if the area is to be repaired. To restore protection from humidity, repostcoat the area.

5.7.3.2 Dennis 1169 Removal

Remove the Dennis 1169 postcoating from the defective component leads and mounting pads (on both sides of the circuit card) with a hot soldering iron. Replace the Dennis 1169 postcoating as specified in paragraph 5.7.3.4.

5.7.3.3 HumiSeal 1B31 Removal

Remove the HumiSeal 1B31 postcoating from the defective component leads and mounting pads (on both sides of the circuit card) by using a small brush or pipe cleaner and applying solvent (Freon TMC or equivalent) to the area. Replace the HumiSeal 1B31 postcoating as specified in paragraph 5.7.3.5.

5.7.3.4 Dennis 1169 Replacement

a. After component removal and replacement, apply solvent to resoldered areas on both sides of circuit card. Wipe cleaned area to remove excessive solvent and dissolved flux.
b. Dennis 1169 (Rockwell International part number 821-0166-000) consists of two ingredients, Dennis 1169A and Dennis 1169B. For small areas to be repostcoated, mix equal amounts of both liquids together in a clean paper cup. Use separate measuring spoon for each one. Mix thoroughly with stirring stick.
c. Use small brush and apply Dennis 1169 mixture to newly soldered joints, covering all areas (on both sides of card) where original coating was removed. Brush may be cleaned in solvent before coating material hardens.
d. Allow newly coated areas to air-dry 7 days at room temperature or bake 3 hours at 50 °C (122 °F).
e. If replaced component must be rebonded to circuit card, use Dow Corning RTV 3140 (Rockwell International part number 005-1692-001). Apply a thin coating around the component and allow to dry for 2 hours.

5.7.3.5 HumiSeal 1B31 Replacement

Warning

Postcoating should be performed only in a well-ventilated area.

Note

Instead of HumiSeal, an alternate postcoating is Dow Corning RTV 3140. This may be used to postcoat if temperature and humidity permit curing in a practical length of time.

a. After component removal and replacement, apply solvent to resoldered areas on both sides of circuit card. Allow card to air-dry 4 hours at room temperature or bake it for 20 minutes at 71 °C (160 °F) before applying postcoating. This prevents bubbles from occurring in newly applied postcoating.
b. Use small brush and apply HumiSeal 1B31 liberally (but not excessively) to replaced component in area of circuit card from which it was removed (mounting pads, holes, and adjacent areas of board). Ensure that coverage is complete and new coating overlays any existing coating on adjacent areas of board.

Note

HumiSeal 1B31 is runny when first applied and somewhat soft when hot. Be careful not to damage postcoating during the drying or cool-down period.

c. Air-dry the circuit card for 4 hours at room temperature.

TEST CONDITIONS

1. Test Equipment

a. Digital multimeter	Fluke 8600A
b. Oscilloscope	Tektronix 464
c. Power Supply	Sorenson
d. Ammeter	Weston 901
e. Load rheostat	Biddle JAGA81 Rheostat

2. Test Setup

a. Set all switches to OFF.
b. Set all volume controls to OFF.
c. Remove six screws from bottom plate and remove bottom plate.
d. Connect power supply positive to J2 pin B and negative to J2 pin C.
e. Connect ammeter and rheostat to J1 pins L and M, and to J1 pins J and K.
f. Connect the return lead probe of the digital multimeter to circuit card ground.

CIRCUIT CARD	GROUND AT
A1	TP-4
A2	A2J1-11

Note

Voltage and resistance values listed in the charts were measured on the 200-volt scale for voltage and on the 200-kilohm scale for resistance. Values are nominal and may vary because of component aging, temperature, or tolerance differences.

3. Voltage Measurements

a. Set the power supply switch to ON.
b. Set the voltage at 28.2 volts dc.
c. Set the power ON switch of power conditioner to ON. Output voltage should be 27.03 volts dc.
d. Adjust load rheostat for a 5-ampere current output.
e. Proceed with the voltage measurements listed.

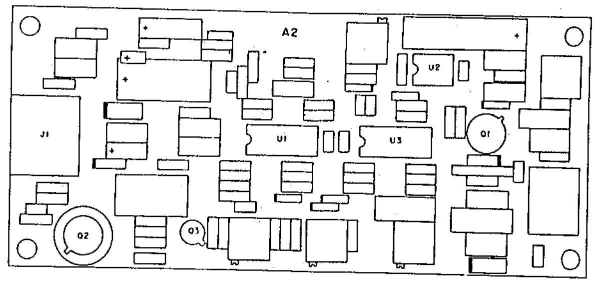
4. Resistance Measurements

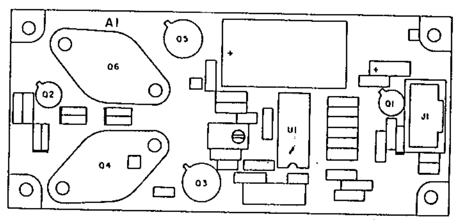
a. Set all power switches to OFF.
b. Disconnect all cables from the power conditioner.
c. Disconnect the jacks from each circuit card.

Note

Resistance values in the chart are disconnected measurements. Values may change if subassemblies are interconnected. An asterisk (*) indicates a resistance changing towards infinity (charging capacitance).

d. Proceed with resistance measurements identified in the charts.





PIN	PRMTR	TRANSISTORS A1Q1	A1Q2	A1Q3	A1Q4	A1Q5	A1Q6	A2Q1	A2Q2	A2Q3
E	OHM	•	0.13	•	0.35	•	•	•	•	0
	VOLT	12.24	0.6	12.23	0.01	12.83	0.02	0.01	1.13	0.02
B	OHM	0	•	•	0	•	•	•	1.01	0.99
	VOLT	12.72	1.23	11.6	0.01	13.45	0.02	0.44	1.75	0.17
C	OHM	•	•	0.35	•	10.87	•	•	0.29	42.35
	VOLT	0	11.59	0.6	0.02	27.03	27.03	27.86	31.65	31.65

CONN	PRMTR	CONNECTOR CONTACTS 1	2	3	4	5	6	7	8	9	10	11	12	13	14
A1J1	OHM	•	•	∞	∞	∞	0.01	0	∞						
	VOLT	11.88	27.04	0	0	0	0	0	0						
A2J1	OHM	•	•	•	∞	∞	91.83	∞	26.26	∞	77.12	0	18.12		
	VOLT	28.05	0	16.63	28.05	0	31.66	26.52	27.10	27.05	27.04	0	27.04		

CONN	PRMTR	CONNECTOR CONTACTS A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
J1	OHM				∞					0	0	0.02	0.02								
	VOLT				0					0	0	27.03	27.03								
J2	OHM	0	•	0					∞									•		∞	
	VOLT	0	28.16	0					0									11.88		0	

PIN	PRMTR	INTEGRATED CIRCUITS A1U1	A2U1	A2U2	A2U3
1	OHM	•	91.98	•	37.74
	VOLT	12.24	41.38	0	6.29
2	OHM	11.39	26.16	•	•
	VOLT	12.26	26.97	8.02	6.69
3	OHM	•	78.37	•	14.76
	VOLT	12.21	27.14	7.51	6.69
4	OHM	•	89.93	•	•
	VOLT	26.78	42.58	16.27	16.64
5	OHM	•	26.34	•	•
	VOLT	12.24	27.08	10.83	5.68
6	OHM	•	∞	•	•
	VOLT	12.24	27.03	8.02	6.30
7	OHM	•	∞	•	39.25
	VOLT	12.22	26.51	7.93	0
8	OHM	75.72	147.83	•	1.95
	VOLT	0	41.41	16.27	0.34
9	OHM	•	88.31		5.06
	VOLT	12.24	27.00		9.32
10	OHM	0	99.46		•
	VOLT	0	33.43		6.11
11	OHM	0	78.29		0
	VOLT	0	27.02		0
12	OHM	0	99.90		4.32
	VOLT	0	33.44		7.18
13	OHM	0	88.53		∞
	VOLT	12.24	27.01		7.18
14	OHM	•	156.80		•
	VOLT	0	41.42		7.65
15	OHM				
	VOLT				
16	OHM				
	VOLT				

TPA-6063-014

998W-1 Power Conditioner, Voltage and Resistance Measurements
Figure 5-10

Section 6

Parts List

section 6
parts list

6.1 INTRODUCTION

6.1.1 General

The purpose of this parts list, prepared by Collins Defense Communications, Rockwell International, is for identification and requisition of parts.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

6.1.2 Group Assembly Parts List

FIG-ITEM Column — Digits preceding the dash are figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column — Listed are MIL standard and vendor part numbers.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: Manufacturer Control Number (MCN) 101 and up; Configuration Identifier (CI) 5-digit number; Revision Identifier (REV) dash (—) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service bulletins are identified by SB 1, SB 2, etc.

UNITS PER ASSY Column — Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

6.1.3 Numerical Index

PART NUMBER Column — Part numbers are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash are figure numbers. Digits following the dash are item numbers.

TTL REQ Column — Listed is the total quantity of parts or assemblies covered in the Group Assembly Parts List.

6.1.4 Reference Designation Index

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash are figure numbers. Digits following the dash are item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

6.1.5 How To Use This Parts List

To locate a part number if the assembly in which the part is used is known, turn to the List of Illustrations and find the page number for the assembly in which the part is used. Locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

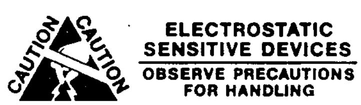
To locate the illustration for a part if the number is known, refer to the Numerical Index and find the part number. Turn to the Group Assembly Parts List and find the first figure and index number indicated in the Numerical Index for that part. If this figure shows the part in a section or system of the equipment other than the one desired, refer to the other figure numbers listed in the Numerical Index.

To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.



6.1.6 Manufacturer's Code, Name, and Address

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
A1879	MICRODOT PRODUCTS 2530 CRESCENS DRIVE BROADVIEW IL
00414	COLUMBIA PRODUCTS 6111 SHAKESPEARE RD P O BOX 4470 COLUMBIA SC 29240
00779	AMP INC 2800 FULLING MILL P O BOX 3608 HARRISBURG PA 17105
02310	ABSCOA INDUSTRIES INC AN AAR CO 3160 W EL SEGUNDO BLVD HAWTHORNE CA 90250-4842

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR 5005 E MCDOWELL RD PHOENIX AZ 85008-4229
05411	DU PAGE MFG CO 2250 CURTISS AVE DOWNERS GROVE IL 60515-4009
05820	EG AND G WAKEFIELD ENGINEERING 60 AUDUBON RD WAKEFIELD MA 01880-1203
08289	BLINN DELBERT CO INC THE 1678 E MISSION BLVD P O BOX 2007 POMONA CA 91769
08501	EASTERN CANVAS PRODUCTS INC 17 LOCUST ST HAVERHILL MA 01830-5617
09922	BURNDY CORP RICHARDS AVE NORWALK CT 06856
11402	HISONIC INC 249 N TROOST P O BOX 1130 OLATHE KS 66061-3154
11769	ELCO/DYNATECH DIV OF ELCO CORP A GULF AND WESTERN MFG CO 1225 E WAKEHAM AVE P O BOX 1019 SANTA ANA CA 92702
12040	NATIONAL SEMICONDUCTOR CORP COMMERCE DR P O BOX 443 DANBURY CT 06810
12294	MURATA ERIE NORTH AMERICAN INC DIV OF MURATA ERIE 5 FRASER AVE TRENTON ONT CAN K8V 5S1
12697	CLAROSTAT MFG CO INC LOWER WASHINGTON ST DOVER NH 03820
12954	MICROSEMI CORP-SCOTTSDALE 8700 E THOMAS RD P O BOX 1390 SCOTTSDALE AZ 85252
12969	UNITRODE CORP 5 FORBES RD LEXINGTON MA 02173-7305
12998	QUALITY NAME PLATE INC MILL ROAD EAST GLASTONBURY CT 06025

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
14099	SEMTECH CORP 652 MITCHELL ROAD NEWBURY PARK CA 91320-2211
16037	SPRUCE PINE MICA CO INC P O BOX 219 SPRUCE PINE NC 28777-0219
17117	ELECTRONIC MOLDING CORP 96 MILL ST WOONSOCKET RI 02895-8418
23657	SHAKESPEARE CO ELECTRONICS AND FIBERGLASS DIV OF ANTHONY INDUSTRIES INC RFD 3 P O BOX 733 NEWBERRY SC 29108-9803
23936	PAMOTOR DIV WILLIAM J PURDY CO 770 AIRPORT BLVD BURLINGAME CA 94010-1927
24444	GENERAL SEMICONDUCTOR INDUSTRIES INC SUB OF SQUARE D CO 2001 W 10TH PL P O BOX 3078 TEMPE AZ 85281-5104
25330	GENERAL CONNECTOR CORP SUB OF THE UNION CORP 80 BRIDGE ST NEWTON MA 02158-1119
27014	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051-0606
27735	F-DYNE ELECTRONICS 449 HOWARD AVE BRIDGEPORT CT 06605-1831
28499	CHEMLEC PRODUCTS INC 22 SPRINGDALE RD P O BOX 3310 CHERRY HILL NJ 08034
31433	UNION CARBIDE CORP ELECTRONICS DIV HWY 276 SE P O BOX 5928 GREENVILLE SC 29606
49956	RAYTHEON CO EXECUTIVE OFFICES 141 SPRING ST LEXINGTON MA 02173-7801

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
50558	ELECTRONIC CONCEPTS INC 526 INDUSTRIAL WAY WEST EATONTOWN NJ 07724-2212
50870	ASSOCIATED INDUSTRIES A DIV OF ARNOLD A SEMLER INC 6855 TUNJUNGA AVE NORTH HOLLYWOOD CA 91605-6312
52177	CAROLINA DIELECTRICS INC RED BANK MILL P O BOX 565 LEXINGTON SC 29072
57010	TELEX COMMUNICATIONS INC HY-GAIN/TURNER DIV 8601 NE HWY 6 LINCOLN NE 68505
70318	ALLMETAL SCREW PRODUCTS CO INC 821 STEWART AVE GARDEN CITY NY 11530-4810
71279	MIDLAND-ROSS CORP CAMBION DIV ONE ALEWIFE PLACE CAMBRIDGE MA 02140-2310
71468	ITT CANNON DIV OF ITT CORP 10550 TALBERT AVE P O BOX 8040 FOUNTAIN VALLEY CA 92728
72619	DIALIGHT DIV AMPEREX ELECTRONIC CORP 203 HARRISON PL BROOKLYN NY 11237-1510
72656	TITAN CORP THE INDIANA GENERAL FERRITE COMPONENT PRODUCTS DIV CROWS MILL ROAD KEASBY NJ 08832
72962	ELASTIC STOP NUT A DIV OF HARVARD INDUSTRIES INC 2330 VAUXHALL RD UNION NJ 07083-5038
72982	MURATA ERIE NORTH AMERICA INC ERIE OPRATIONS 645 W 11TH ST ERIE PA 16512
77147	PATTON-MACGUYER CO DIV OF AVID CORP 17 VIRGINIA AVE PROVIDENCE RI 02905-4441
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV 5700 W ROOSEVELT RD CHICAGO IL 60650-1156

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
77820	ALLIED AMPHENOL PRODUCTS BENDIX CONNECTOR OPERATIONS 40-60 DELAWARE ST SIDNEY NY 13838
79807	WROUGHT WASHER MFG INC 2100 S BAY ST MILWAUKEE WI 53207-1208
79963	ZIERICK MFG CO RADIO CIRCLE MT KISCO NY 10549
80058	JOINT ELECTRONICS TYPE DESIGNATION SYSTEM
80063	US ARMY COMMUNICATIONS AND ELECTRONICS MATERIEL READINESS COMMAND LOGISTICS ENGINEERING DIRECTORATE FORT MONMOUTH NJ 07703
80205	NATIONAL AEROSPACE STANDARDS COMMITTEE AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA INC 1725 DE SALES ST WASHINGTON DC
80294	BOURNS INSTRUMENTS INC 6135 MAGNOLIA AVE RIVERSIDE CA 92506-2521
81095	TRIAD-UTRAD DIV LITTON SYSTEMS INC 118 W 35TH ST NATIONAL CITY CA 92050
81349	MILITARY SPECIFICATIONS
81350	JOINT ARMY-NAVY SPECIFICATIONS
81483	INTERNATIONAL RECTIFIER 9220 SUNSET BLVD P O BOX 2321 TERMINAL ANNEX LOS ANGELES CA 90454
81855	EAGLE-PICHER INDUSTRIES INC ELECTRONICS DIV COUPLES DEPT C AND PORTER STS P O BOX 47 JOPLIN MO 64801
82240	SIMMONS FASTENER CORP AN AMFAST CORP 1765 N BROADWAY ST P O BOX 1985 ALBANY NY 12201
82879	ITT ROYAL ELECTRIC DIV 95 GRAND AVE PAWTUCKET RI 02862

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
84792	HEPPNER MFG CO RT 120 AND KEARNS RD P O BOX Q ROUND LAKE IL 60073-9771
88245	WINCHESTER ELECTRONICS LITTON SYSTEMS-USECO DIV 13536 SATICOY ST VAN NUYS CA 91409
91314	LEWIS SPRING AND MFG CO 2652 W NORTH AVE CHICAGO IL 60647-5249
91637	DALE ELECTRONICS INC 2064 12TH AVE P O BOX 609 COLUMBUS NE 68601-3632
95105	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
96906	MILITARY STANDARDS
97539	APM-HEXSEAL CORP 44 HONECK ST ENGLEWOOD NJ 07631-4134
98330	POLYPHASE INSTRUMENT CO 175 COMMERCE DR FORT WASHINGTON PA 19034-2401
98978	INTERNATIONAL ELECTRONIC RESEARCH CORP 135 W MAGNOLIA BLVD P O BOX 7704 BURBANK CA 91510

6.1.7 Usable On Codes

The following usable on codes have been assigned in this manual:

USABLE ON CODE	UNIT PART NUMBER	FIG-ITEM
A	622-6338-001	6-1-27
B	622-6338-002	6-1-27

6.1.8 Reference Designation Prefixes

The following prefixes have been assigned this manual:

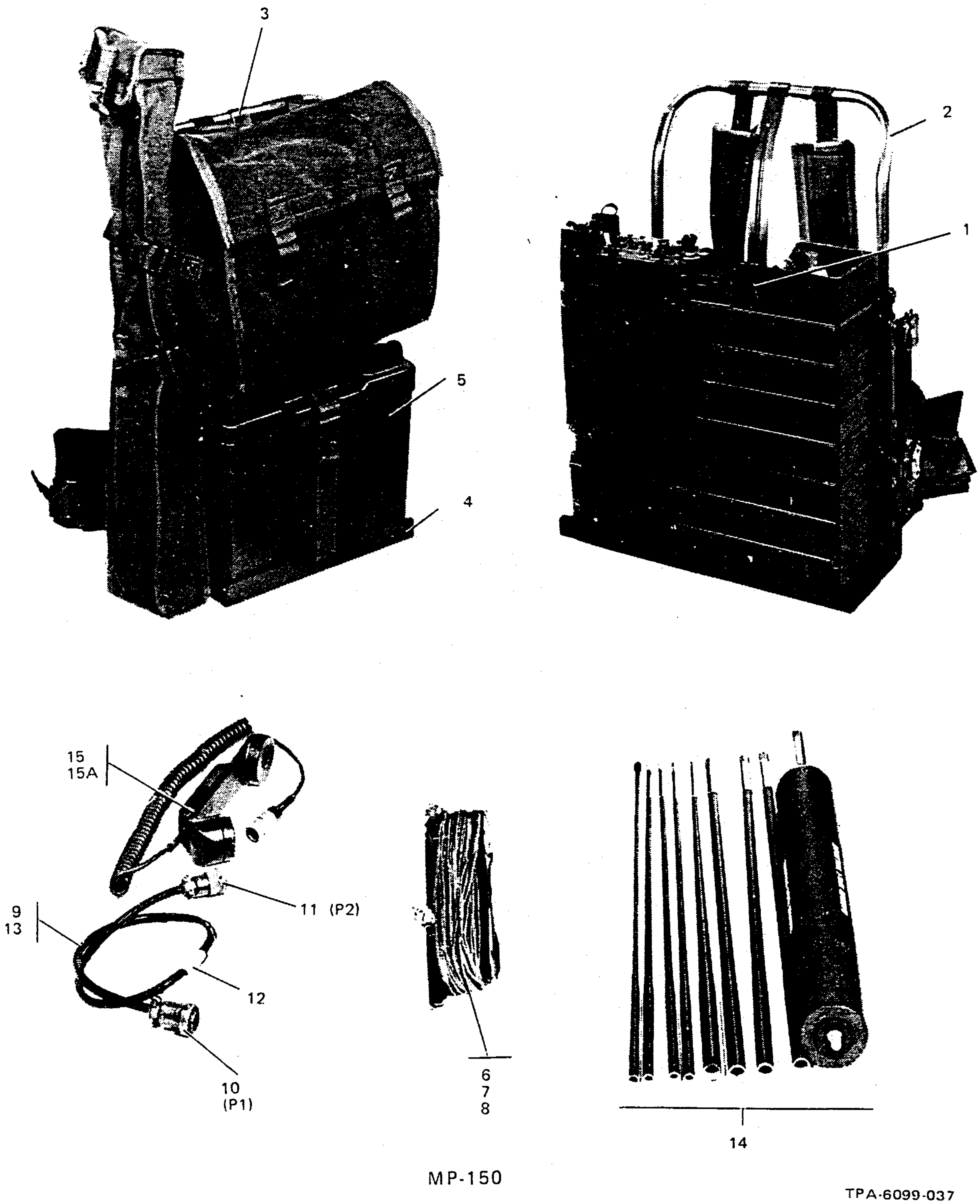
PREFIX	UNIT PART NUMBER	FIG-ITEM
A1	646-5619-001	6-7-26
A1	646-5619-002	6-7-26
A2	646-5831-001	6-7-20
A2	646-5831-002	6-7-20

6.1.9 Configuration Identifiers

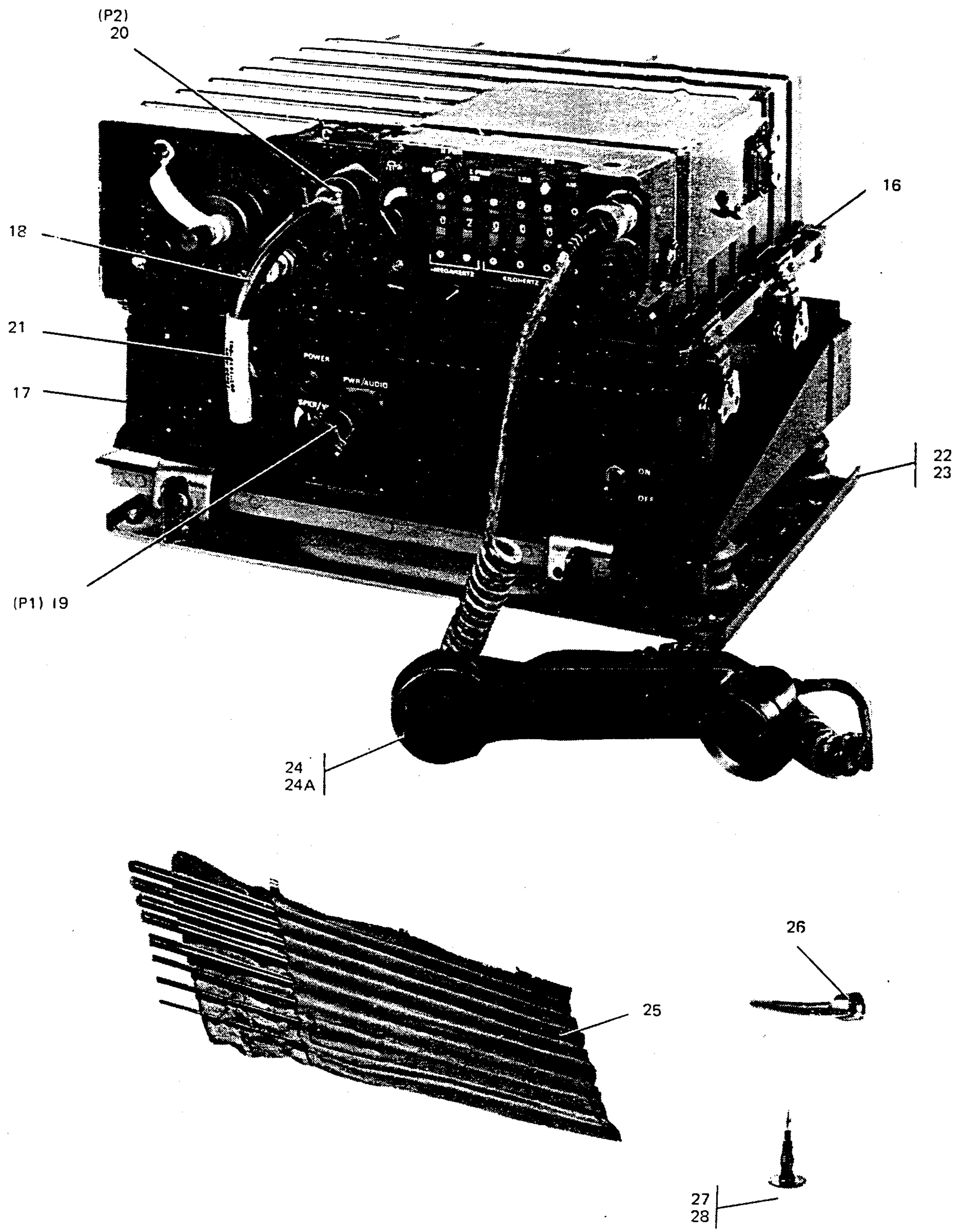
The following CI's/REV LTR's were used in compiling data for this manual:

CI/REV LETTER	UNIT PART NUMBER	FIG-ITEM
–	622-6307-001	6-3-
–	622-6308-001	6-4-
Y	549-6253-004	6-5-
D	522-2431-001	6-6-
D	622-6309-001	6-7-
N	646-5619-001	6-8-
N	646-5619-002	6-8-
T	646-5831-001	6-9-
T	646-5831-002	6-9-
A	553-6725-001	6-10-
B	622-6527-001	6-11-
B	622-6528-001	6-12-

6.2 GROUP ASSEMBLY PARTS LIST



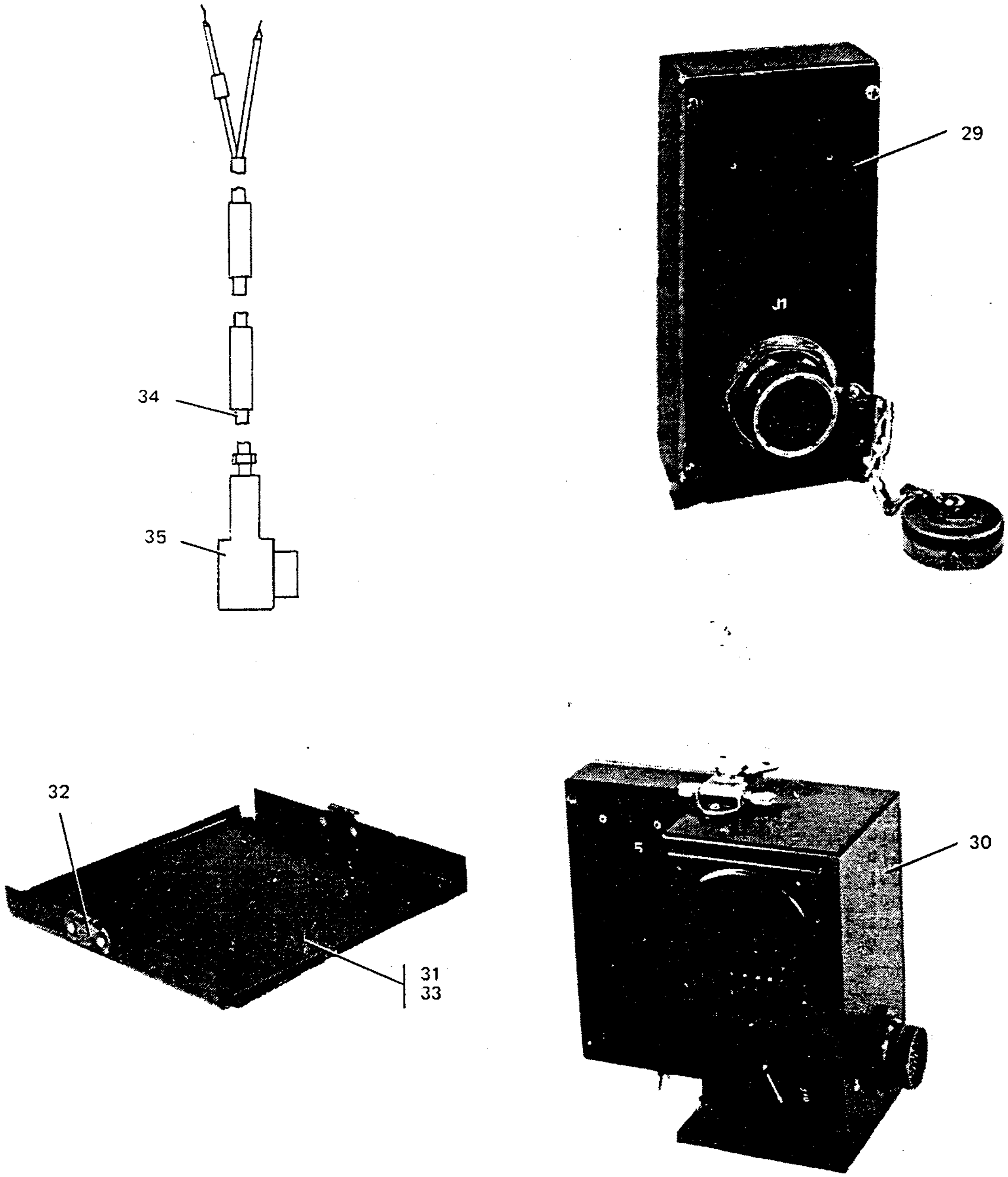
150-Watt HF Communication System, Parts Location Diagram
Figure 6-1 (Sheet 1 of 3)



VC-120

TPA-6099-037

150-Watt HF Communication System, Parts Location Diagram
Figure 6-1 (Sheet 2)



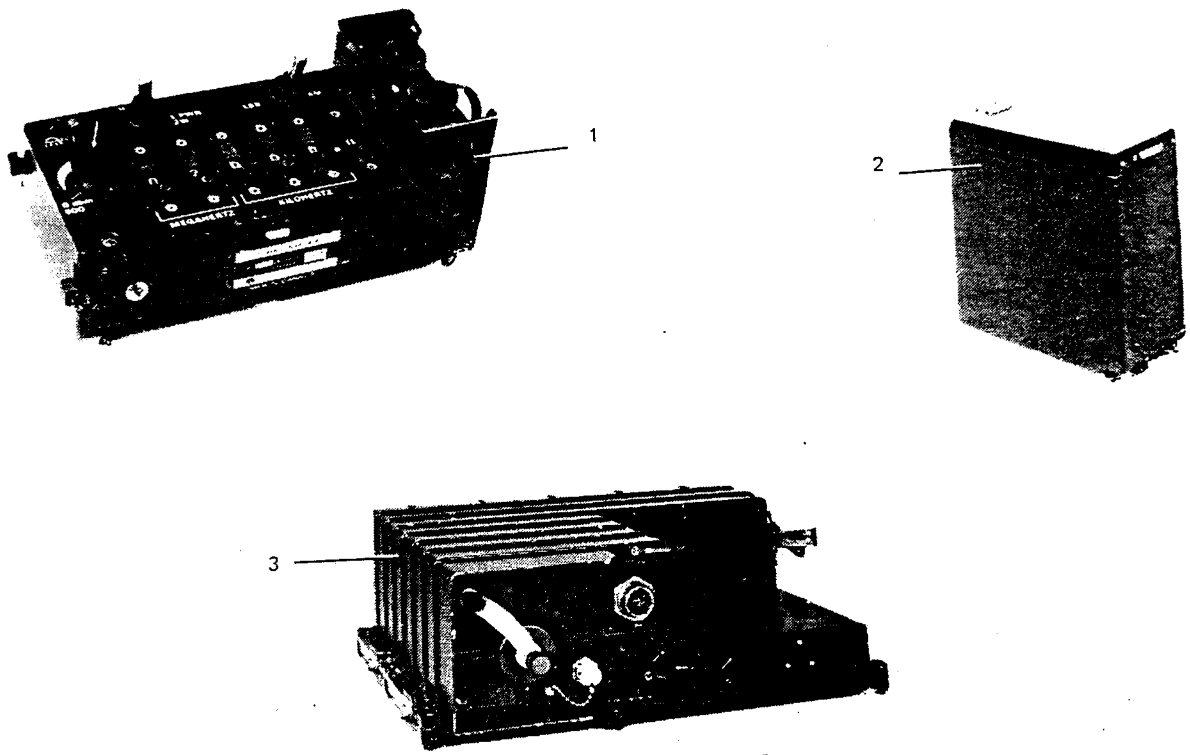
VC-120

TPA-6099-037

150-Watt HF Communication System, Parts Location Diagram
Figure 6-1 (Sheet 3)

GROUP ASSEMBLY PARTS LIST

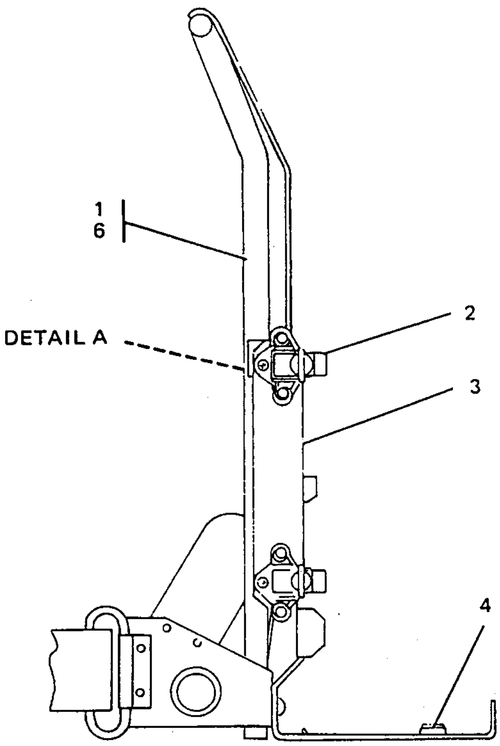
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-1-		1	HF COMMUNICATION SYSTEM, 150 WATT	1	
		2	MANPACK, MP-150	1	
1	NO NUMBER	3	RECEIVER- TRANSMITTER, RADIO, 719D-15 (SEE FIG 6-2)	1	
2	622-6307-001	3	PACK FRAME, 963A-2 (SEE FIG 6-3)	1	
3	622-6308-001	3	PACK FRAME, 963A-3 (SEE FIG 6-4)	1	
4	549-6253-004	3	ADAPTER, BATTERY, MX-4430 (80058) (SEE FIG 6-5)	1	
5	BB451U	3	BATTERY, BB-451 (81855) 221-0032-000	1	
6	629-5896-001	3	COUNTERPOISE, AS-5095X	1	
7	635-1748-000	4	NAMEPLATE	1	
8	013-1582-010	4	COUNTERPOISE (57010)	1	
9	651-7430-001	3	CABLE, POWER	1	
10	MS3116F14-5P	4	CONNECTOR,PLUG ELEC (96906) 371-8067-000 P1	1	
11	MS3116F14-12S	4	CONNECTOR,PLUG ELEC (96906) 371-8372-060 P2	1	
12	634-8103-088	4	MARKER, CABLE	1	
13	424-1730-000	4	CABLE,POWER,ELEC (82879)	1	
14	522-2431-001	3	ANTENNA, WHIP, AS-1320 (SEE FIG 6-6)	1	
15	792-6534-001	3	HANDSET, WATERPROOF	1	
15A	H-189/GR	4	HANDSET, H-189/GR (80063) 977-0019-010	1	
		2	VEHICULAR COMMUNICATION SYSTEM, VC-120		
16	NO NUMBER	3	RECEIVER - TRANSMITTER, RADIO, 719D-15 (SEE FIG 6-2)		
17	622-6309-001	3	POWER CONDITIONER, 998W-1 (ESDS) (SEE FIG 6-7)	1	
18	651-7432-001	3	CABLE, POWER	1	
19	MS3116F14-12P	4	CONNECTOR,PLUG ELEC (96906) 371-8609-010 P1	1	
20	MS3116F14-12S	4	CONNECTOR,PLUG ELEC (96906) 371-8372-060 P2	1	
21	634-8103-089	4	MARKER, CABLE	1	
22	651-8504-001	3	MOUNT, MT-1029	1	
23	MT-1029/VRC	4	TRAY,MOUNTING (50870) 200-2518-010	1	
24	792-6534-001	3	HANDSET, WATERPROOF	1	
24A	H-189/GR	4	HANDSET, H-189/GR (80063) 977-0019-010	1	
25	553-6725-001	3	ANTENNA, WHIP, AT-1011/U (SEE FIG 6-10)	1	
26	553-6841-004	3	INSULATOR	1	
27	622-6338-001	3	ANTENNA BASE, 958J-2 OR	1	A
27	622-6338-002	3	ANTENNA BASE, 958J-2	1	B
28	013-1649-010	4	ANTENNA BASE (52177)	1	A
28	013-1649-020	4	ANTENNA BASE (52177)	1	B
29	622-6527-001	3	ADAPTER, RECEIVER-TRANSMITTER, 998Y-1 (SEE FIG 6-11)	1	
30	622-6528-001	3	ADAPTER, REMOTE CONTROL, 998Y-2 (ESDS) (SEE FIG 6-12)	1	
31	647-3104-001	3	MOUNT, ADAPTER	1	
32	015-1913-000	4	KEEPER PLATE (82240)	2	
	MS20426AD4-4	4	RIVET,SOLID AL, 1/8 DIA X 1/4 (96906) 305-1373-000 (AP)	4	
33	647-3104-002	4	MOUNT	1	
34	426-0114-010	3	CABLE ASSEMBLY, POWER, CX-4720	1	
35	MW10FMA17	4	CONNECTOR,PLUG ELEC (11769) 371-0394-010	1	

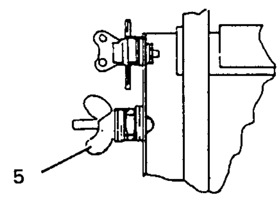


719D-15 Radio Receiver-Transmitter, Parts Location Diagram
Figure 6-2

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-	NO NUMBER	1	RECEIVER- TRANSMITTER, RADIO, 719D-15 (SEE FIG 6-1-1, 6-1-16 FOR NHA)	REF	
1	622-2553-002	2	CONTROL, RECEIVER-TRANSMITTER, 377L-2 (REF PUB 523-0772049) OR	1	
1	622-2553-016	2	CONTROL, RECEIVER-TRANSMITTER, 377L-2 (REF PUB 523-0772049)	1	
2	622-2148-001	2	RECEIVER- TRANSMITTER, 671V-2 (REF PUB 523-0772057)	1	
3	622-5365-001	2	AMPLIFIER-COUPLER, 549C-1 (REF PUB 523-0772280)	1	



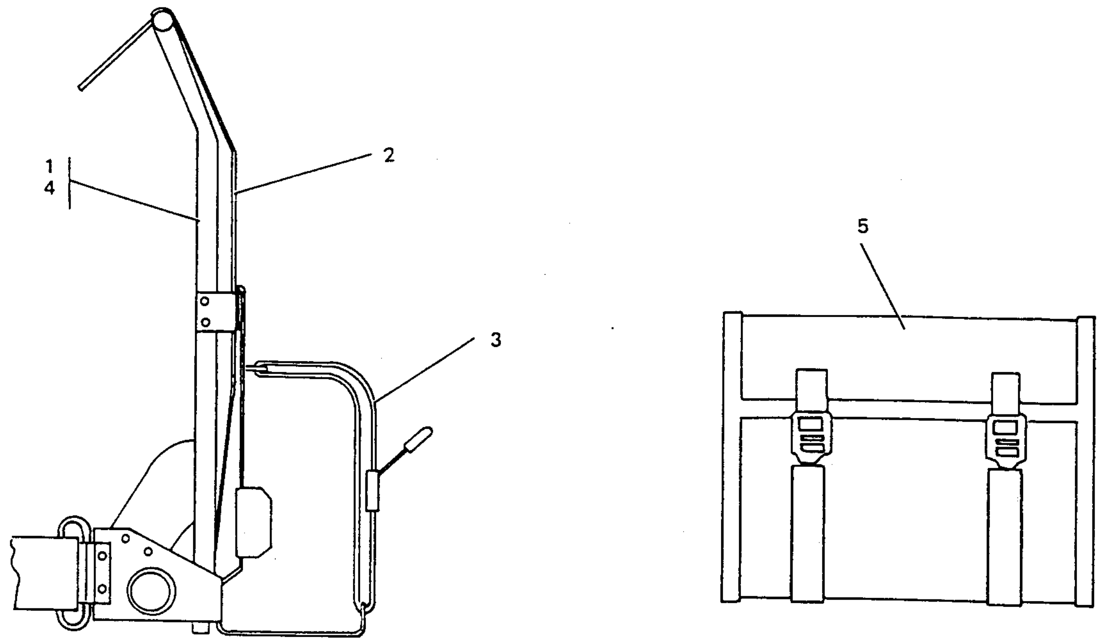


TPA-6101-019

963A-2 Pack Frame, Parts Location Diagram
Figure 6-3

GROUP ASSEMBLY PARTS LIST

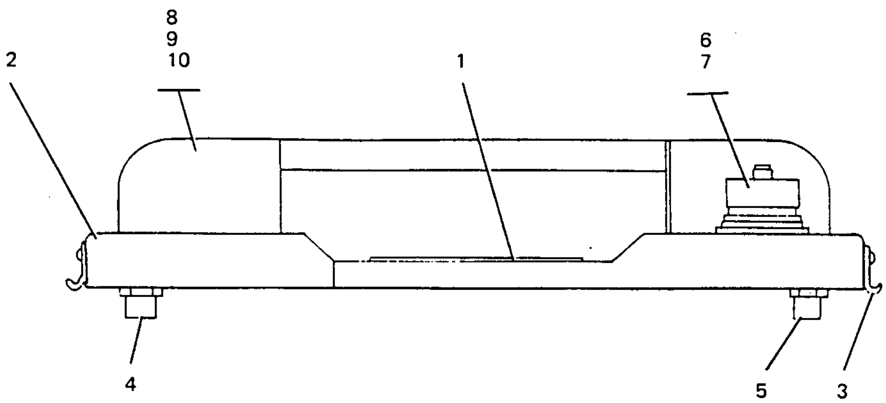
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-3-	622-6307-001	1	PACK FRAME, 963A-2 (SEE FIG 6-1-2 FOR NHA)	REF	
1	651-8512-001	2	FRAME, ACCESSORIES	1	
2	651-8510-001	3	RETAINER, AMPLIFIER-COUPLER	1	
	P313-0083-000	3	NUT,PLAIN,HEX SST, 1/4-28 (77250) 313-0083-000 (AP)	2	
	MS35338-139	3	WASHER,LOCK SST, 0.255 ID X 0.489 OD (96906) 310-0288-000 (AP)	2	
	MS15795-810	3	WASHER,FLAT CRES, 0.296ID X 0.640 OD (96906) 310-0779-100 (AP)	2	
	MS51958-80	3	SCREW, MACH SST, 1/4-28 X 5/8 (96906) 343-0836-000 (AP)	2	
3	SL3	3	CATCH, LUGGAGE (82240) 015-1859-000	4	
	MS35649-244	3	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP)	8	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	8	
	MS51957-15	3	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	8	
4	651-8522-001	3	SPACER	2	
	MS51959-13	3	SCREW,MACH SST, 4-40 X 1/4 (96906) 342-0044-000 (AP)	2	
5	16666Z1000	3	NUT,WING NP BRS, 10-32 (70318) 334-0042-000	1	
	MS35650-304	3	NUT,PLAIN,HEX SST, 10-32 (96906) 313-0019-000 (AP)	1	
	MS35335-60	3	WASHER,LOCK SST, 0.204 ID X 0.410 OD (96906) 373-8040-000 (AP)	2	
	MS15795-808	3	WASHER,FLAT CRES, 0.227ID X 0.533 OD (96906) 310-0779-080 (AP)	2	
	MS51958-66	3	SCREW,MACH SST, 10-32 X 7/8 (96906) 343-0230-000 (AP)	1	
6	LC-2	3	FRAME (08501) 021-0658-010 (EFF TO REV LTR A)	1	
6	LC-2	3	FRAME (08501) 021-0527-030 (EFF REV LTR A)	1	



963A-3 Pack Frame, Parts Location Diagram
Figure 6-4

GROUP ASSEMBLY PARTS LIST

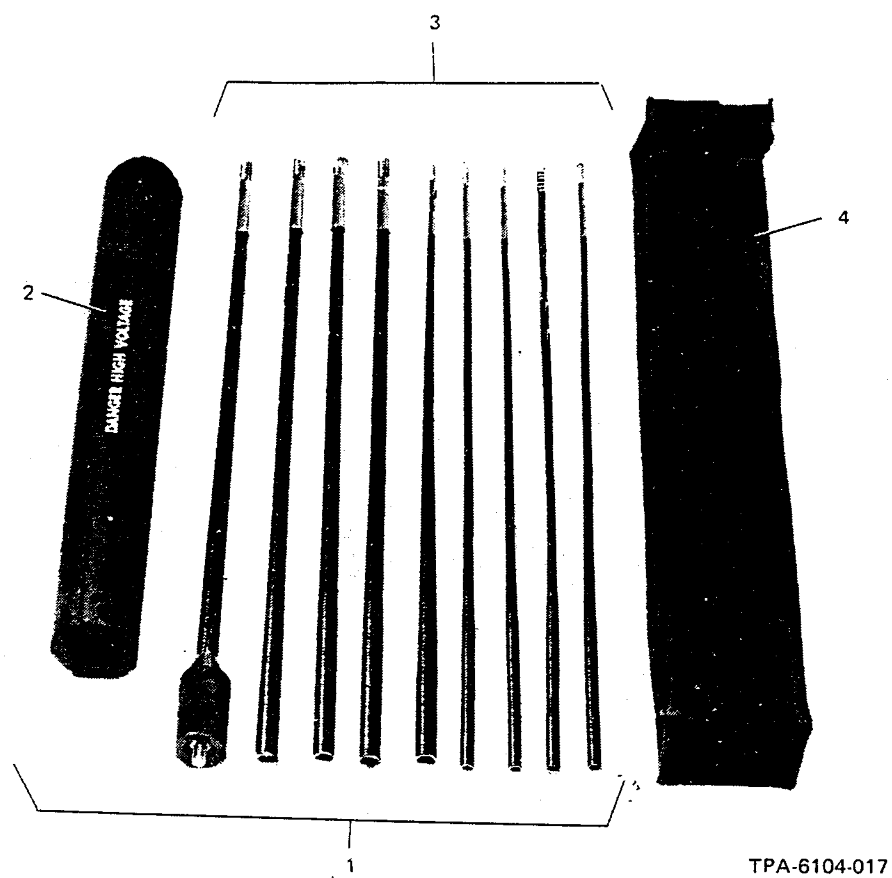
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-4-	622-6308-001	1	PACK FRAME, 963A-3 (SEE FIG 6-1-3 FOR NHA)	REF	
1	651-8511-001	2	FRAME, ACCESSORIES	1	
2	651-8509-001	3	RETAINER, BATTERY	1	
	P313-0083-000	3	NUT,PLAIN,HEX SST, 1/4-28 (77250) 313-0083-000 (AP)	2	
	MS35338-139	3	WASHER,LOCK SST, 0.255 ID X 0.489 OD (96906) 310-0288-000 (AP)	2	
	MS15795-810	3	WASHER,FLAT CRES, 0.296ID X 0.640 OD (96906) 310-0779-100 (AP)	2	
	MS51958-80	3	SCREW, MACH SST, 1/4-28 X 5/8 (96906) 343-0836-000 (AP)	2	
3	549-6282-002	3	STRAP, WEBBING	1	
4	LC-2	3	PACK FRAME (08501) 021-0658-010 (EFF TO REV LTR A)	1	
4	LC-2	3	PACK FRAME (08501) 021-0527-030 (EFF REV LTR A)	1	
5	651-8499-001	3	BAG, ACCESSORIES	1	



MX-4430 Battery Adapter, Parts Location Diagram
Figure 6-5

GROUP ASSEMBLY PARTS LIST

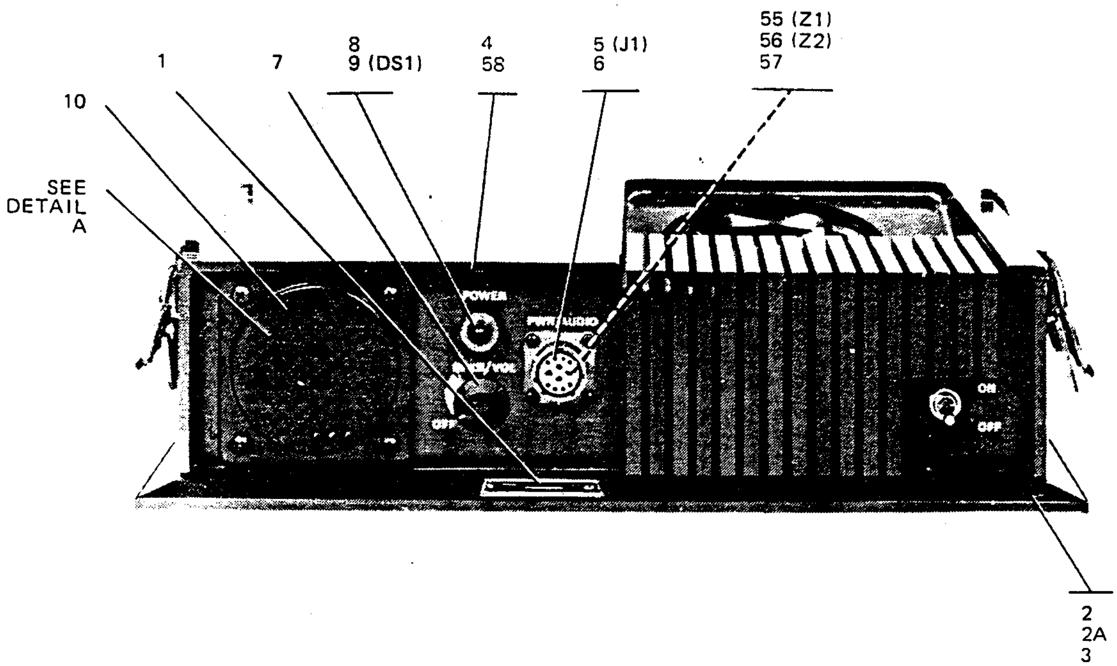
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-	MX4430PRC47	1	ADAPTER, BATTERY, MX-4430 (80058) 549-6253-004 (SEE FIG 6-1-4 FOR NHA)	REF	
1	757-4765-000	2	PLATE, IDENT	1	
2	549-6250-003	2	COVER	1	
3	549-6247-002	2	STRIKE, CATCH - MODIFIED	2	
	549-6246-002	2	SCREW, MODIFIED (AP)	4	
4	549-6242-002	2	PIN, LOCATING	1	
	P334-0284-000	2	NUT,PLAIN,HEX SST, 7/16-28 (77250) 334-0284-000 (AP)	1	
5	549-6245-002	2	CONN, RCPT ELEC	2	
	P334-0284-000	2	NUT,PLAIN,HEX SST, 7/16-28 (77250) 334-0284-000 (AP)	2	
	549-6244-002	2	WASHER, FLAT (AP)	2	
6	10-243964-143	2	COVER,ELEC CONN (77820) 357-8755-000	1	
7	PT07E14-5S	2	CONNECTOR,RCPT ELEC (77820) 371-2183-000	1	
8	549-6252-003	2	BRACKET	1	
9	M45938/5-6	3	NUT,SLFLKG,CLINCH CD PL STL, 6-32 (81349) 333-0842-000	4	
10	549-6251-003	3	BRACKET, COVER	1	

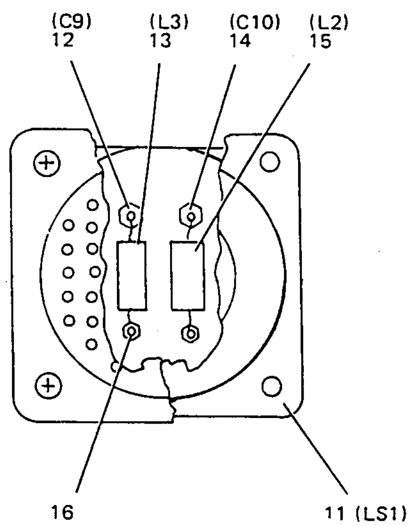


AS-1320 Whip Antenna, Parts Location Diagram
Figure 6-6

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-6-	522-2431-001	1	ANTENNA, WHIP, AS-1320 (SEE FIG 6-1-14 FOR NHA)	REF	
1	548-9095-002	2	ANTENNA SUBASSEMBLY, WHIP	1	
2	548-9097-003	3	BOOT, ANTENNA	1	
3	X187	3	ANTENNA (23657) 013-1223-000	1	
4	548-9101-004	2	CASE, ANTENNA	1	



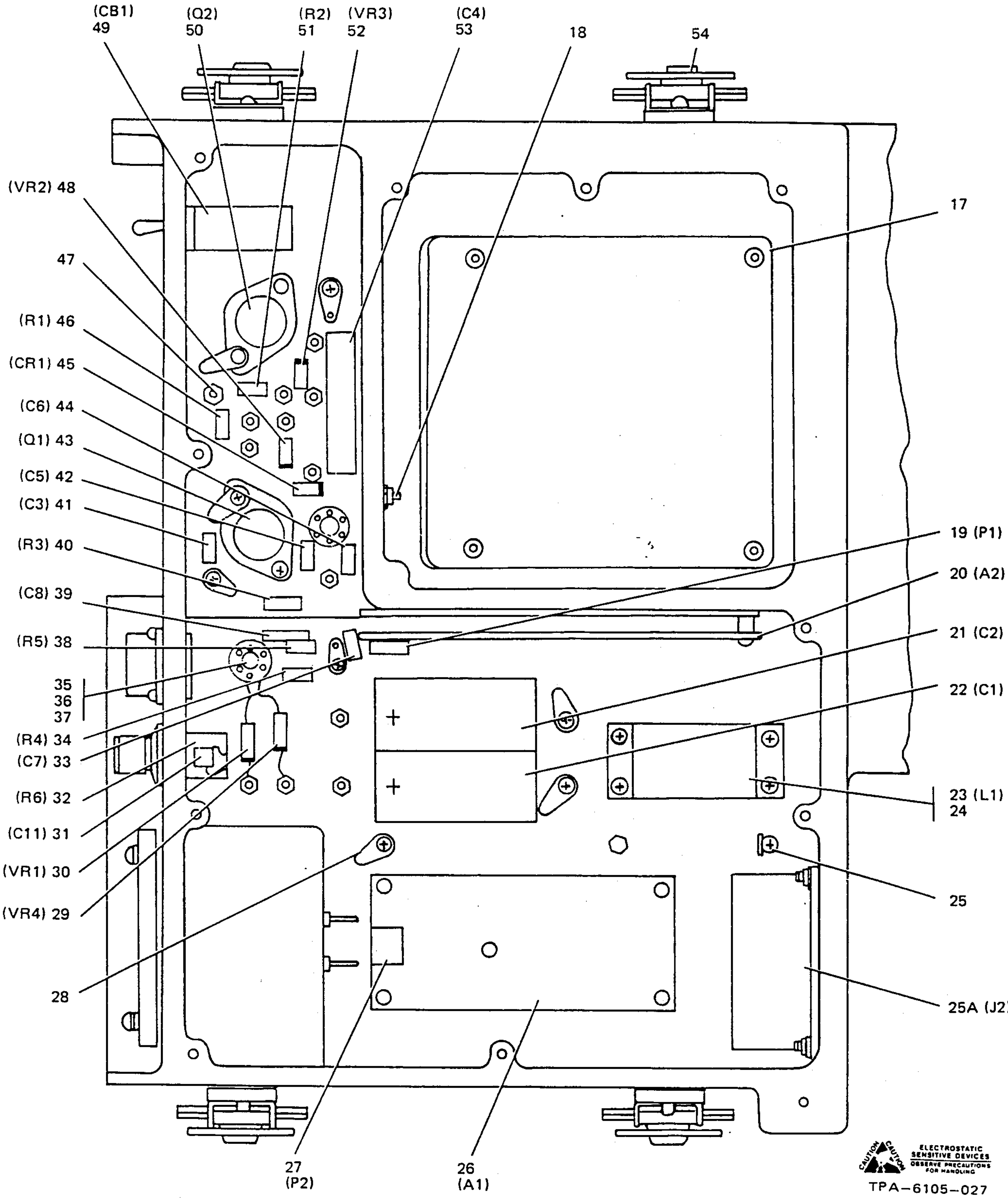


DETAIL A

CAUTION ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-6105-027

998W-1 Power Conditioner, Parts Location Diagram
Figure 6-7 (Sheet 1 of 2)



998W-1 Power Conditioner, Parts Location Diagram
Figure 6-7 (Sheet 2)

GROUP ASSEMBLY PARTS LIST

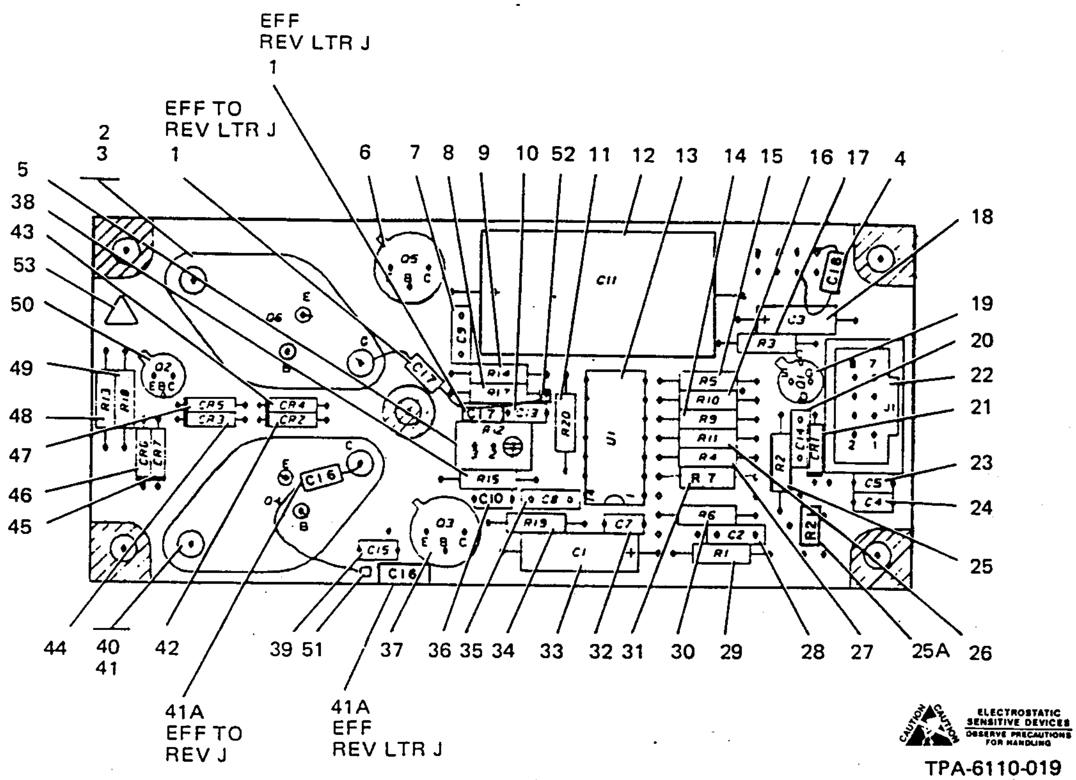
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-7-	622-6309-001	1	POWER CONDITIONER, 998W-1 (ESDS) (SEE FIG 6-1-17 FOR NHA)	REF	
1	642-0154-000	2	PLATE, IDENT	1	
	MS51957-13B	2	SCREW,MACH SST, 4-40 X 1/4 (96906) 343-0019-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
2	647-3088-001	2	BASE, VEHICULAR	1	
	R8-32X5-8	2	SCREW,SEAL SST, 8-32 X 5/8 (97539) 330-4031-160 (AP)	12	
	340-0642-000	2	SLEEVE,SPRING (91314) (AP)	12	
2A	200-2502-080	2	SEAL,SQUARE RING (A1879) (EFF REV LTR A)	1	
3	641-4072-001	3	BASE	1	
4	647-3087-001	2	CHASSIS, ELEC EQPT	1	
5	MS3112E14-12S	3	CONNECTOR,RCPT ELEC (96906) 371-8510-080 J1	1	
6	10-101949-14	3	GASKET,FLANGE (77820) 371-8504-000	1	
	MS51957-13B	3	SCREW,MACH SST, 4-40 X 1/4 (96906) 343-0019-000 (AP FOR 5,6)	4	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 5,6)	4	
7	MS91528-0F1B	3	KNOB (96906) 281-0388-000	1	
8	MS25237-387	3	LAMP,INCANDESCENT (96906) 262-0179-010	1	
9	174-8430-0111-203	3	LIGHT,INDICATOR (72619) 262-1385-010 DS1	1	
10	HG 321	3	GRILL (84792) 271-0268-020	1	
	MS51957-45B	3	SCREW,MACHINE SST, 8-32X1/2 (96906) 343-0093-000 (AP)	4	
	MS35338-137	3	WASHER,LOCK CRES, 0.171 ID X 0.293 OD (96906) 310-0072-000 (AP)	4	
11	M12606-01	3	LOUDSPEAKER (81349) 271-0268-010 LS1	1	
12	2425-033-W5T-202AA	3	CAPACITOR,FIXED CER DIEL, 2000PF, GMV 100V (72982) 913-0155-040 C9	1	
13	MS75088-4	3	COIL,RF 1.80UH (96906) 240-2715-160 L3	1	
14	2425-033-W5T-202AA	3	CAPACITOR,FIXED CER DIEL, 2000PF, GMV 100V (72982) 913-0155-040 C10	1	
15	MS75088-4	3	COIL,RF 1.80UH (96906) 240-2715-160 L2	1	
16	1495-C	3	TERMINAL,STANDOFF (88245) 306-1101-000	2	
17	4124X	3	FAN,AXIAL (23936) 009-1958-010	1	
	MS21044C04	3	NUT,SLFLKG,HEX SST, 4-40 (96906) 333-1299-000 (AP)	4	
	P343-1918-000	3	SCREW,MACH BRS, 4-40 X 2 (77250) 343-1918-000 (AP)	4	
18	69001-0600	3	TERMINAL,FEEDTH (28499) 306-1861-000	2	
	310-0419-000	3	WASHER,FLAT SST, 0.260 ID X 0.438 OD (79807) (AP) (EFF REV LTR D)	2	
19	87631-7	3	HOUSING,CONN,ELEC (00779) 372-0044-040 P1	1	
20	646-5831-001	3	CONTROL CARD (ESDS) A2 (EFF TO REV LTR E) (SEE FIG 6-9)		
20	646-5831-002	3	CONTROL CARD (ESDS) A2 (EFF REV LTR E) (SEE FIG 6-9)	1	
	MS51957-30	3	SCREW,MACH SST, 6-32 X 1/2 (96906) 343-0171-000 (AP) (EFF TO REV LTR C)	4	
	NAS671C6	3	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP) (EFF REV LTR C)	4	
	MS35338-136	3	WASHER,LOCK SST, 0.141 ID X 0.250 OD (96906) 310-0282-000 (AP)	4	
	MS15795-805	3	WASHER,FLAT CRES, 0.164ID X 0.320 OD (96906) 310-0779-050 (AP)	4	
	541-6004-002	3	SPACER,SLV (AP)	4	
	P312-0078-000	3	STUD,CONT THD STL, 8-32 X 3/4 (77250) 312-0078-000 (AP) (EFF REV LTR C)	4	
21	M39018/03-0741	3	CAPACITOR,FIXED ELCTLT, 1000UF, P75%M10%, 50VDC (81349) 184-5102-070 C2	1	
22	M39018/03-0741	3	CAPACITOR,FIXED ELCTLT, 1000UF, P75%M10%, 50VDC (81349) 184-5102-070 C1	1	
23	C103471	3	INDUCTOR 110UH (98330) 678-0265-010 L1	1	
24	651-8451-001	3	PLATE, INDUCTOR	1	
	MS51957-13	3	SCREW,MACH STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	4	
	MS51959-12	3	SCREW,MACH SST, 4-40 X 3/16 (96906) 342-0043-000 (AP)	4	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-7-	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	4	
25	324915	3	TERMINAL,LUG (00779) 304-1081-000 (EFF TO REV LTR B)	1	
25	403	3	TERMINAL,LUG (79963) 304-1089-000 (EFF REV LTR B)	1	
	MS51957-12	3	SCREW,MACH STL, 4-40 X 3/16 (96906) 343-0132-000 (AP)	1	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	1	
25A	SM-C-454808	3	CONNECTOR,RCPT ELEC (25330) 371-0517-010 J2	1	
	647-3089-001	3	STRIP, NUT (AP)	2	
	R8-32X3-4	3	SCREW,SEAL SST, 8-32 X 3/4 (97539) 330-4031-170 (AP)	4	
26	646-5619-001	3	AMPLIFIER, AUDIO (ESDS) A1 (SEE FIG 6-8) (EFF TO REV LTR E)	1	
26	646-5619-002	3	AMPLIFIER, AUDIO (ESDS) A1 (SEE FIG 6-8) (EFF REV LTR E)	1	
	MS51957-17	3	SCREW,MACH STL, 4-40 X 1/2 (96906) 343-0137-000 (AP) (EFF TO REV LTR C)	5	
	MS51957-17	3	SCREW,MACHINE STL, 4-40 X 1/2 (96906) 343-0137-000 (AP) (EFF REV LTR C)	4	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP) (EFF TO REV LTR C)	5	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP) (EFF REV LTR C)	4	
	MS15795-803	3	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP) (EFF TO REV LTR C)	5	
	MS15795-803	3	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP) (EFF REV LTR C)	4	
	541-5979-002	3	SPACER,SLEEVE (AP) (EFF TO REV LTR C)	5	
	541-5979-002	3	SPACER,SLEEVE (AP) (EFF REV LTR C)	4	
27	87631-3	3	HOUSING,CONN,ELEC (00779) 372-0044-020 P2	1	
28	304-0015-010	3	TERMINAL, LUG	7	
	4810-1-0516	3	TERMINAL,STUD (71279) 306-2513-010 (AP)	2	
	MS51957-12	3	SCREW,MACH STL, 4-40 X 3/16 (96906) 343-0132-000 (AP)	5	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	7	
29	15KP36A	3	SEMICOND DEVICE (24444) 353-0221-860 VR4	1	
30	15KP36A	3	SEMICOND DEVICE (24444) 353-0221-860 VR1	1	
31	M39014-01-1237	3	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 C11	1	
32	CM41208-010	3	RESISTOR,VARIABLE 1000 OHMS, 20%, 1W (12697) 376-0268-010 R6	1	
33	M39014-02-1230	3	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 C7	1	
34	RWR89S1540FR	3	RESISTOR,FXD WW, 154 OHMS, 1%, 3W (81349) 747-2169-190 R4	1	
35	651-7639-001	3	PLATE, TERMINAL	2	
36	3331-53-1	3	TERMINAL,STANDOFF (17117) 306-2679-020	2	
37	MS77068-2	3	TERMINAL,LUG (96906) 304-3120-010	5	
	MS51957-25	3	SCREW,MACH SST, 6-32 X 3/16 (96906) 343-0166-000 (AP FOR 35-37)	2	
	MS35338-136	3	WASHER,LOCK SST, 0.141 ID X 0.250 OD (96906) 310-0282-000 (AP FOR 35-37)	4	
38	RWR89S1540FR	3	RESISTOR,FXD WW, 154 OHMS, 1%, 3W (81349) 747-2169-190 R5	1	
39	M39014-02-1230	3	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 C8	1	
40	RWR89S1331FR	3	RESISTOR,FXD WW, 1.33K, 1%, 3W (81349) 747-2170-130 R3	1	
41	MC32B684K	3	CAPACITOR,FIXED PLSTC DIEL, 0.68UF, 10%, 50V (50558) 933-1081-180 C3	1	
42	M39014-02-1230	3	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 C5	1	
43	IRF150	3	TRANSISTOR (ESDS) (81483) 352-8021-010 Q1	1	
	MS51957-16	3	SCREW,MACH STL, 4-40 X 7/16 (96906) 343-0136-000 (AP)	2	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-7-	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	MS15795-803	3	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP)	2	
	547-8177-003	3	BUSHING,INSULATED (AP) (EFF TO REV LTR K)	2	
	547-8177-012	3	BUSHING, INSULATED (95105) (AP) (EFF REV LTR K)	2	
	MS77068-2	3	TERMINAL,LUG (96906) 304-3120-010 (AP)	1	
	111	3	INSULATOR,PLATE (16037) 352-9882-010 (AP)	1	
44	M39014-02-1230	3	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 C6	1	
45	SC5615	3	SEMICOND DEVICE (14099) 353-6496-020 CR1	1	
46	RS2B00FR0111F	3	RESISTOR,FIXED WW, 0.0111 OHMS, PORM1%, 3W (91637) 747-1988-080 R1	1	
47	3122-87-1	3	TERMINAL,STUD (17117) 306-1088-000	12	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	11	
48	1N4114	3	SEMICOND DEVICE (04713) 353-3591-160 VR2	1	
49	M39019-01-258	3	CIRCUIT BREAKER 20 AMP (81349) 260-4051-310 CB1	1	
50	IRF150	3	TRANSISTOR (ESDS) (81483) 352-8021-010 Q2	1	
	MS51957-16	3	SCREW,MACH STL, 4-40 X 7/16 (96906) 343-0136-000 (AP)	2	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	MS15795-803	3	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP)	2	
	547-8177-003	3	BUSHING,INSULATED (AP) (EFF TO REV LTR K)	2	
	547-8177-012	3	BUSHING, INSULATED (95105) (AP) (EFF REV LTR K)	2	
	MS77068-2	3	TERMINAL,LUG (96906) 304-3120-010 (AP)	1	
	111	3	INSULATOR,PLATE (16037) 352-9882-010 (AP)	1	
51	RS2B00FR0111F	3	RESISTOR,FIXED WW, 0.0111 OHMS, PORM1%, 3W (91637) 747-1988-080 R2	1	
52	1N4114	3	SEMICOND DEVICE (04713) 353-3591-160 VR3	1	
53	M39018-01-1137M	3	CAPACITOR,FXD AL DIEL, 150UF, P75%M10%, 50V (81349) 184-0480-370 C4	1	
54	SL3	3	CATCH,LUGGAGE (82240) 015-1859-000	4	
	MS51957-15B	3	SCREW,MACH SST, 4-40 X 3/8 (96906) 343-0021-000 (AP)	8	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	8	
55	F2652-1	3	CORE,FERRITE (72656) 288-1306-030 Z1	1	
56	F2652-1	3	CORE,FERRITE (72656) 288-1306-030 Z2	1	
57	86015-2	3	CONTACT,ELECTRICAL (00779) 372-2501-050 (EFF TO REV LTR B)	11	
57	86015-2	3	CONTACT,ELECTRICAL (00779) 372-2501-050 (EFF REV LTR B)	3	
57	86016-2	3	CONTACT,ELECTRICAL (00779) 372-2501-040 (EFF REV LTR B)	12	
58	647-3084-001	3	CHASSIS (EFF TO REV LTR K)	1	
58	647-3084-003	3	CHASSIS (EFF REV LTR K)	1	



Audio Amplifier A1, Parts Location Diagram
Figure 6-8

GROUP ASSEMBLY PARTS LIST

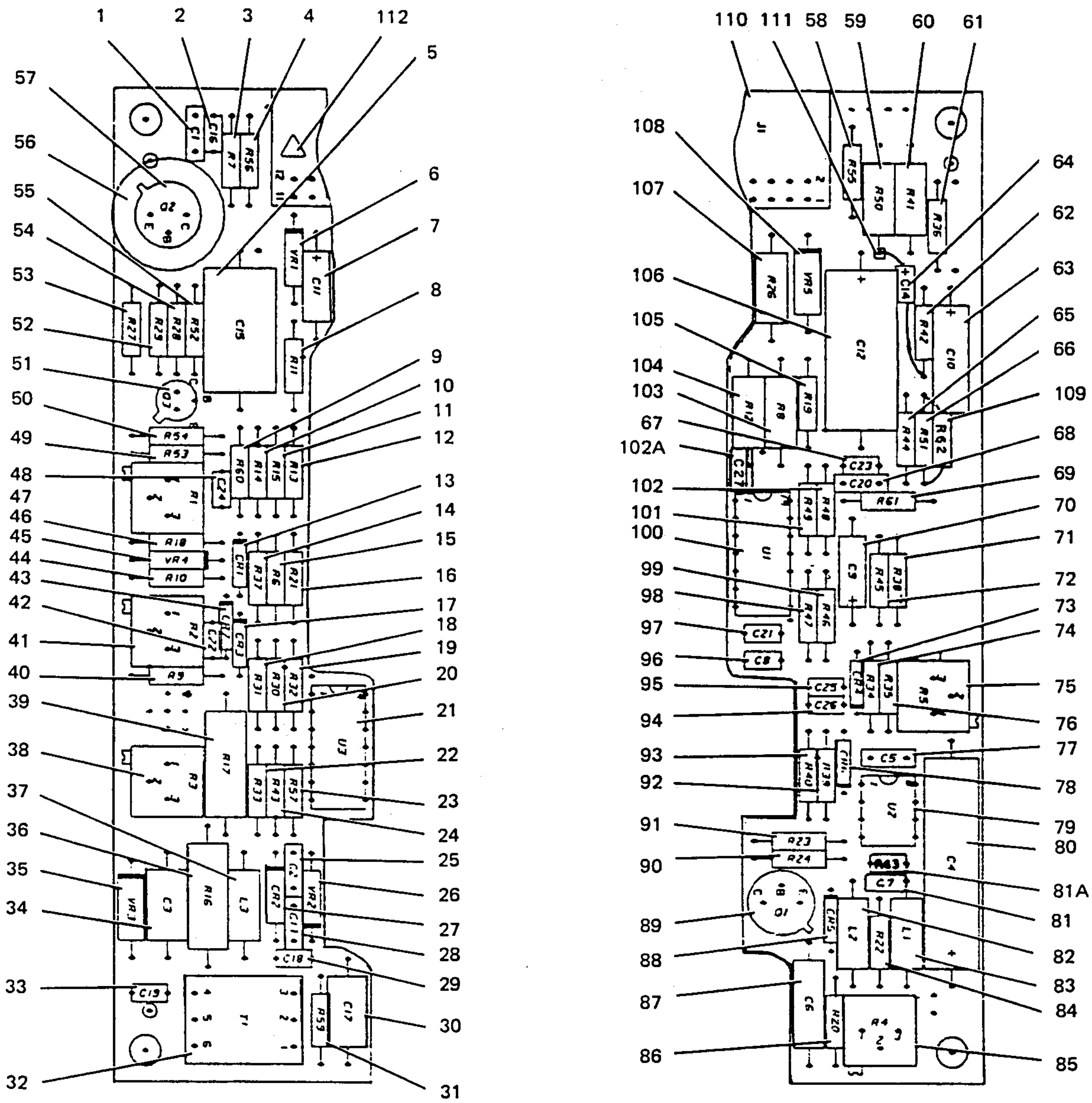
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-8-	646-5619-001	1	AMPLIFIER, AUDIO (ESDS) (95105) A1 (SEE FIG 6-7-26 OR 6-12-15 FOR NHA)	REF	
	646-5619-002	1	AMPLIFIER, AUDIO (ESDS) A1 (SEE FIG 6-7-26 FOR NHA)	REF	
1	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A1C17	1	
2	JANTX2N3879	2	TRANSISTOR (81349) 352-8011-540 A1Q6	1	
3	4007-6HT	2	TERMINAL,LUG (77147) 304-0016-000 (EFF TO REV LTR K)	1	
3	MS0035431-3	2	TERMINAL,LUG (96906) 304-1465-030 (EFF REV LTR K)	1	
	MS35649-244	2	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP FOR 2 AND 3)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 2 AND 3)	2	
	MS15795-803	2	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP FOR 2 AND 3)	4	
	547-8177-012	2	BUSHING, INSULATOR (AP FOR 2 AND 3)	2	
	TA-2402-A	2	INSULATOR,PLATE (08289) 352-9570-020 (AP FOR 2 AND 3)	1	
	MS51957-16	2	SCREW,MACH STL, 4-40 X 7/16 (96906) 343-0136-000 (AP FOR 2 AND 3)	2	
4	M39014-02-1230	2	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 A1C18	1	
5	RT22C2W102	2	RESISTOR,VARIABLE WW, 1K, PORM5%, 3/4W (81349) 381-1721-280 A1R12	1	
6	JANTX2N2219A	2	TRANSISTOR (81349) 352-8011-010 A1Q5	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-8-7	M39014-02-1230	2	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 A1C9	1	
8	RCR07G122KS	2	RESISTOR,FIXED CMPSN, 1.2K, 10%, 1/4W (81349) 745-0752-000 A1R17	1	
9	RCR07G331KS	2	RESISTOR,FIXED CMPSN, 330 OHMS, 10%, 1/4W (81349) 745-0731-000 A1R14	1	
10	M39014-01-1231	2	CAPACITOR,FXD CER DIEL, 470PF, 10%, 200V (81349) 913-9008-310 A1C13	1	
11	RCR07G183KS	2	RESISTOR,FXD CMPSN, 18K, 10%, 1/4W (81349) 745-0794-000 A1R20	1	
12	M39018/03-0735	2	CAPACITOR,FIXED ELCTLT, 100UF, P75%M10%, 50VDC (81349) 184-5102-010 A1C11	1	
13	LM124J/883B	2	INTEGRATED CIRCUIT AMPLIFIER,QUAD OPRTNL (12040) 351-1141-012 A1U1 (EFF TO REV LTR K)	1	
13	M38510/11005BCB	2	MICROCIRCUIT (ESDS) (81349) 351-7901-180 A1U1 (EFF REV LTR K)	1	
14	RCR07G272KS	2	RESISTOR,FIXED CMPSN, 2.7K, 10%, 1/4W (81349) 745-0764-000 A1R9	1	
15	RCR07G822KS	2	RESISTOR,FIXED CMPSN, 8.2K, 10%, 1/4W (81349) 745-0782-000 A1R5	1	
16	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A1R10	1	
17	RCR07G104KS	2	RESISTOR,FIXED CMPSN, 0.10MEGO, 10%, 1/4W (81349) 745-0821-000 A1R3	1	
18	M39003/01-2353	2	CAPACITOR,FIXED ELCTLT, 0.68UF, 10%, 50V (81349) 184-9087-400 A1C3	1	
19	JANTX2N4416A	2	TRANSISTOR (81349) 352-8011-240 A1Q1	1	
20	M39014-02-1240	2	CAPACITOR,FXD CER DIEL, .47UF, 10%, 50V (81349) 913-9008-760 A1C14	1	
21	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A1CR1	1	
22	3-87478-4	2	HOUSING,CONN,EL (00779) 372-0043-650 A1J1	1	
23	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A1C5	1	
24	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A1C4	1	
25	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A1R2	1	
25A	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A1R21 (EFF REV LTR F)	1	
26	RCR07G470KS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 10%, 1/4W (81349) 745-0701-000 A1R11	1	
27	RCR07G472KS	2	RESISTOR,FIXED CMPSN, 4.7K, 10%, 1/4W (81349) 745-0773-000 A1R4	1	
28	M39014-02-1230	2	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 A1C2	1	
29	RCR07G562KS	2	RESISTOR,FIXED CMPSN, 5.6K, 10%, 1/4W (81349) 745-0776-000 A1R1	1	
30	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A1R6	1	
31	RCR07G473KS	2	RESISTOR,FIXED CMPSN, 47K, 10%, 1/4W (81349) 745-0809-000 A1R7	1	
32	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A1C7	1	
33	M39003/01-2286	2	CAPACITOR,FIXED ELCTLT, 10UF, 10%, 20V (81349) 184-9086-460 A1C1	1	
34	RCR07G472KS	2	RESISTOR,FIXED CMPSN, 4.7K, 10%, 1/4W (81349) 745-0773-000 A1R19	1	
35	M39014-02-1230	2	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 A1C8	1	
36	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A1C10	1	
37	JANTX2N2905A	2	TRANSISTOR (81350) 352-8008-040 A1Q3	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-8-38	RCR07G331KS	2	RESISTOR,FIXED CMPSN, 330 OHMS, 10%, 1/4W (81349) 745-0731-000 A1R15	1	
39	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A1C15	1	
40	JANTX2N3879	2	TRANSISTOR (81349) 352-8011-540 A1Q4	1	
41	4007-6HT	2	TERMINAL,LUG (77147) 304-0016-000 (EFF TO REV LTR K)	1	
41	MS0035431-3	2	TERMINAL,LUG (96906) 304-1465-030 (EFF REV LTR K)	1	
	MS35649-244	2	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP FOR 40 AND 41)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 40 AND 41)	2	
	MS15795-803	2	WASHER,FLAT CRES, 0.125ID X 0.250 OD (96906) 310-0779-030 (AP FOR 40 AND 41)	4	
	547-8177-012	2	BUSHING, INSULATOR (AP FOR 40 AND 41)	2	
	TA-2402-A	2	INSULATOR,PLATE (08289) 352-9570-020 (AP FOR 40 AND 41)	1	
	MS51957-16	2	SCREW,MACH STL, 4-40 X 7/16 (96906) 343-0136-000 (AP FOR 40 AND 41)	2	
41A	M39014-01-1237	2	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 A1C16	1	
42	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A1CR2	1	
43	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A1CR4	1	
44	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A1CR3	1	
45	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A1CR7	1	
46	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A1CR6	1	
47	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A1CR5	1	
48	RCR07G121KS	2	RESISTOR,FIXED CMPSN, 120 OHMS, 10%, 1/4W (81349) 745-0716-000 A1R13	1	
49	RCR07G123KS	2	RESISTOR,FIXED CMPSN, 12K, 10%, 1/4W (81349) 745-0788-000 A1R18	1	
50	JANTX2N2222A	2	TRANSISTOR (81349) 352-8000-040 A1Q2	1	
51	372-2601-048	2	CONTACT,ELECTRICAL	2	
52	372-2601-037	2	CONTACT,ELECTRICAL (EFF TO REV LTR F)	1	
52	372-2601-037	2	CONTACT,ELECTRICAL (EFF REV LTR F TO REV LTR J)	3	
52	372-2601-037	2	CONTACT,ELECTRICAL (EFF REV LTR J TO REV LTR N)	4	
52	372-2601-037	2	CONTACT,ELECTRICAL (EFF REV LTR N)	5	
53	280-2745-040	2	LABEL,WARNING (12998) (EFF REV LTR J)	1	



ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-6109-019

Control Card A2, Parts Location Diagram
Figure 6-9

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-9-	646-5831-001	1	CONTROL CARD (ESDS) A2 (SEE FIG 6-7-20 FOR NHA)	REF	
	646-5831-002	1	CONTROL CARD (ESDS) A2 (SEE FIG 6-7-20 FOR NHA)	REF	
1	M39014-02-1405	2	CAPACITOR,FXD CER DIEL, .68UF, 10%, 50V (81349) 913-9008-780 A2C1	1	
2	M39014-01-1233	2	CAPACITOR,FXD CER DIEL, 560PF, 10%, 200V (81349) 913-9008-330 A2C16	1	
3	RNC55H1402FS	2	RESISTOR,FIXED FILM, 14K, 1%, 1/10W (81349) 724-0640-060 A2R7	1	
4	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A2R56	1	
5	MC32B225K	2	CAPACITOR,FIXED PLSTC DIEL, 2.2UF, 10%, 50V (50558) 933-1081-250 A2C15 (EFF TO REV LTR L)	1	
5	CFR05ARA255GM	2	CAPACITOR,FIXED PLSTC DIEL, 2.5UF, 2%, 50V (81349) 933-1412-260 A2C15 (EFF REV LTR L)	1	
6	1N825A	2	SEMICOND DEVICE (12954) 353-3262-000 A2VR1 (EFF TO REV LTR L)	1	
6	JANTX1N827	2	SEMICOND DEVICE (81349) 353-9016-140 A2VR1 (EFF REV LTR L)	1	
7	M39003/01-2356	2	CAPACITOR,FIXED ELCTLT, 1UF, 10%, 50V (81349) 184-9087-430 A2C11	1	
8	RNC55H1000FS	2	RESISTOR,FIXED FILM, 100 OHMS, 1%, 1/10W (81349) 724-0637-970 A2R11	1	
9	RCR07G101KS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 10%, 1/4W (81349) 745-0713-000 A2R60	1	
10	RNC55H1000FS	2	RESISTOR,FIXED FILM, 100 OHMS, 1%, 1/10W (81349) 724-0637-970 A2R14	1	
11	RNC55H2612FS	2	RESISTOR,FIXED FILM, 26.1K, 1%, 1/10W (81349) 724-0640-320 A2R15	1	
12	RNC55H1000FS	2	RESISTOR,FIXED FILM, 100 OHMS, 1%, 1/10W (81349) 724-0637-970 A2R13	1	
13	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR1 (EFF TO REV LTR L)	1	
13	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A2CR1 (EFF REV LTR L)	1	
14	RNC55H3092FS	2	RESISTOR,FIXED FILM, 30.9K, 1%, 1/10W (81349) 724-0640-390 A2R37	1	
15	RNC55H1000FS	2	RESISTOR,FIXED FILM, 100 OHMS, 1%, 1/10W (81349) 724-0637-970 A2R6	1	
16	RNC55H1000FS	2	RESISTOR,FIXED FILM, 100 OHMS, 1%, 1/10W (81349) 724-0637-970 A2R21	1	
17	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR3 (EFF TO REV LTR L)	1	
17	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A2CR3 (EFF REV LTR L)	1	
18	RNC55J1003FS	2	RESISTOR,FIXED FILM, 100K, 1%, 1/10W (81349) 724-0640-880 A2R31	1	
19	RNC55H1002FS	2	RESISTOR,FIXED FILM, 10K, 1%, 1/10W (81349) 724-0639-910 A2R32	1	
20	RNC55H1001FS	2	RESISTOR,FIXED FILM, 1K, 1%, 1/10W (81349) 724-0638-940 A2R30	1	
21	LM124J	2	INTEGRATED CIRCUIT AMPLIFIER,QUAD OPRTNL (12040) 351-1141-010 A2U3 (EFF TO REV LTR L)	1	
21	M38510/11005BCB	2	MICROCIRCUIT (ESDS) (81349) 351-7901-180 A2U3 (EFF REV LTR L)	1	
22	RNC55H1002FS	2	RESISTOR,FIXED FILM, 10K, 1%, 1/10W (81349) 724-0639-910 A2R33	1	
23	RCR07G475KS	2	RESISTOR,FXD CMPSN, 4.7MEGO, 10%, 1/4W (81349) 745-0881-000 A2R57	1	
24	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A2R43	1	
25	M39014-02-1405	2	CAPACITOR,FXD CER DIEL, .68UF, 10%, 50V (81349) 913-9008-780 A2C2	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-9-26	JANTX1N4131	2	SEMICOND DEVICE (81349) 353-9016-420 A2VR2 (EFF TO REV LTR P)	1	
26	JANTX1N4982	2	SEMICOND DEVICE (81349) 353-9023-290 A2VR2 (EFF REV LTR P)	1	
27	SC5615	2	SEMICOND DEVICE (14099) 353-6496-020 A2CR2 (EFF TO REV LTR L)	1	
27	JANTX1N5615	2	SEMICOND DEVICE (81349) 353-9019-110 A2CR2 (EFF REV LTR L)	1	
28	M39014-02-1405	2	CAPACITOR,FXD CER DIEL, .68UF, 10%, 50V (81349) 913-9008-780 A2C13	1	
29	M39014-01-1237	2	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 A2C18 (EFF TO REV LTR P)	1	
29	M39014/1-1446	2	CAPACITOR,FIXED CER DIEL, 3300PF, 10%, 100V (81349) 913-9011-080 A2C18 (EFF REV LTR P)	1	
30	MC32B104K	2	CAPACITOR,FIXED PLSTC DIEL, 0.1U , 10%, 50V (50558) 933-1081-080 A2C17 (EFF TO REV LTR L)	1	
30	CFR05ARA104GM	2	CAPACITOR,FIXED PLSTC DIEL, 0.10UF, 2%, 50VDC (81349) 933-1412-010 A2C17 (EFF REV LTR L)	1	
31	RCR07G101KS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 10%, 1/4W (81349) 745-0713-000 A2R59 (EFF TO REV LTR T)	1	
31	RWR81S1000FR	2	RESISTOR,FIXED WW, 100 OHMS, 1%, 1W (81349) 747-2183-010 A2R59 (EFF REV LTR T)	1	
32	06-2215-00	2	TRANSFORMER,POWER (11402) 672-0552-010 A2T1	1	
33	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A2C19	1	
34	MC32B104K	2	CAPACITOR,FIXED PLSTC DIEL, 0.1UF, 10%, 50V (50558) 933-1081-080 A2C3 (EFF TO REV LTR T)	1	
34	CFR05ARA104GM	2	CAPACITOR,FIXED PLSTC DIEL, 0.10UF, 2%, 50VDC (81349) 933-1412-010 A2C3 (EFF REV LTR T)	1	
35	1N4962	2	SEMICOND DEVICE (12969) 353-6522-090 A2VR3 (EFF TO REV LTR L)	1	
35	JANTX1N4962	2	SEMICOND DEVICE (81349) 353-9023-090 A2VR3 (EFF REV LTR L)	1	
36	RW69V271	2	RESISTOR,FXD WW, 270.0 OHMS, 5%, 3W (81349) 747-5349-000 A2R16	1	
37	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A2L3	1	
38	3292P-CE8-RC102	2	RESISTOR,VARIABLE NON-WW,1K,10% (80294) 382-0052-070 A2R3 (EFF TO REV LTR L)	1	
38	RJR24FP102M	2	RESISTOR,VARIABLE 1K, 10%, 1/2W (81349) 380-9084-140 A2R3 (EFF REV LTR L)	1	
39	RNC65H1001FS	2	RESISTOR,FXD FILM, 1K, 1%, 1/4W (81349) 724-0652-270 A2R17	1	
40	RNC55H4421FS	2	RESISTOR,FIXED FILM, 4.42K, 1%, 1/10W (81349) 724-0639-570 A2R9	1	
41	3292P-CE8-RC254	2	RESISTOR,VARIABLE NON-WW,250K, 10% (80294) 382-0052-160 A2R2 (EFF TO REV LTR L)	1	
41	RJR24FP254M	2	RESISTOR,VARIABLE 250K, 10%, 1/2W (81349) 380-9084-200 A2R2 (EFF REV LTR L)	1	
42	M39014-01-1237	2	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 A2C22	1	
43	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR7 (EFF TO REV LTR L)	1	
43	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A2CR7 (EFF REV LTR L)	1	
44	RN55D2741F	2	RESISTOR,FXD FILM, 2.74K, 1%, 1/8W (81349) 705-1017-000 A2R10 (EFF TO REV LTR L)	1	
44	RNC55H2741FS	2	RESISTOR,FIXED FILM, 2.74K, 1%, 1/10W (81349) 724-0639-370 A2R10 (EFF REV LTR L)	1	
45	1N825A	2	SEMICOND DEVICE (12954) 353-3262-000 A2VR4 (EFF TO REV LTR L)	1	
45	JANTX1N827	2	SEMICOND DEVICE (81349) 353-9016-140 A2VR4 (EFF REV LTR L)	1	

GROUP ASSEMBLY PARTS LIST

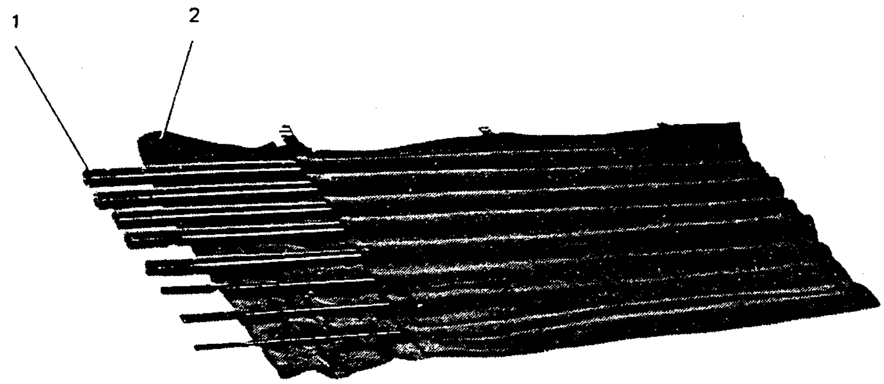
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-9-46	RNC55H2742FS	2	RESISTOR,FIXED FILM, 27.4K, 1%, 1/10W (81349) 724-0640-340 A2R18	1	
47	3292P-CE8-RC102	2	RESISTOR,VARIABLE NON-WW,1K,10% (80294) 382-0052-070 A2R1 (EFF TO REV LTR L)	1	
47	RJR24FP102M	2	RESISTOR,VARIABLE 1K, 10%, 1/2W (81349) 380-9084-140 A2R1 (EFF REV LTR L)	1	
48	M39014-01-1237	2	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 A2C24	1	
49	RWR81S1001FR	2	RESISTOR,FXD WW, 1K, 1%, 1W (81349) 747-2183-970 A2R53	1	
50	RNC55H1001FS	2	RESISTOR,FIXED FILM, 1K, 1%, 1/10W (81349) 724-0638-940 A2R54	1	
51	2N3700	2	TRANSISTOR (49956) 352-0734-020 A2Q3 (EFF TO REV LTR L)	1	
51	JANTX2N3700	2	TRANSISTOR (81349) 352-8011-040 A2Q3 (EFF REV LTR L)	1	
52	RNC55H1001FS	2	RESISTOR,FIXED FILM, 1K, 1%, 1/10W (81349) 724-0638-940 A2R29	1	
53	RN55D2800F	2	RESISTOR,FIXED FILM, 280 OHMS, 1%, 1/8W (81349) 705-3600-700 A2R27 (EFF TO REV LTR L)	1	
53	RNC55H2800FS	2	RESISTOR,FIXED FILM, 280 OHMS, 1%, 1/10W (81349) 724-0638-410 A2R27 (EFF REV LTR L)	1	
54	RNC55H2261FS	2	RESISTOR,FIXED FILM, 2.26K, 1%, 1/10W (81349) 724-0639-290 A2R28	1	
55	RNC55H1002FS	2	RESISTOR,FIXED FILM, 10K, 1%, 1/10W (81349) 724-0639-910 A2R52	1	
56	204-CB	2	HEAT SINK,ELEC CMPN (05820) 352-9571-060	1	
57	2N3019	2	TRANSISTOR (49956) 352-0734-010 A2Q2 (EFF TO REV LTR L)	1	
57	JANTX2N3019	2	TRANSISTOR (81349) 352-8011-020 A2Q2 (EFF REV LTR L)	1	
58	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A2R55	1	
59	RNC55K2213FS	2	RESISTOR,FIXED FILM, 221K, 1%, 1/10W (81349) 724-0641-220 A2R50	1	
60	RNC60H1212FS	2	RESISTOR,FXD FILM, 12.1K, 1%, 1/8W (81349) 724-0648-610 A2R41	1	
61	RNC55H1402FS	2	RESISTOR,FIXED FILM, 14K, 1%, 1/10W (81349) 724-0640-060 A2R36	1	
62	RNC55H6041FS	2	RESISTOR,FIXED FILM, 6.04K, 1%, 1/10W (81349) 724-0639-700 A2R42	1	
63	M39003/01-2271	2	CAPACITOR,FIXED ELCTLT, 22UF, 10%, 15V (81349) 184-9086-310 A2C10	1	
64	M39003/01-2289	2	CAPACITOR,FIXED ELCTLT, 15UF, 10%, 20V (81349) 184-9086-490 A2C14	1	
65	RNC55H1002FS	2	RESISTOR,FIXED FILM, 10K, 1%, 1/10W (81349) 724-0639-910 A2R44	1	
66	RNC55H5362FS	2	RESISTOR,FIXED FILM, 53.6K, 1%, 1/10W (81349) 724-0640-620 A2R51	AR	
66	RNC55H5492FS	2	RESISTOR,FIXED FILM, 54.9K, 1%, 1/10W (81349) 724-0640-630 A2R51	AR	
66	RNC55H5622FS	2	RESISTOR,FIXED FILM, 56.2K, 1%, 1/10W (81349) 724-0640-640 A2R51	AR	
66	RNC55H5762FS	2	RESISTOR,FIXED FILM, 57.6K, 1%, 1/10W (81349) 724-0640-650 A2R51	AR	
66	RNC55H5902FS	2	RESISTOR,FIXED FILM, 59K, 1%, 1/10W (81349) 724-0640-660 A2R51	AR	
66	RNC55H6042FS	2	RESISTOR,FIXED FILM, 60.4K, 1%, 1/10W (81349) 724-0640-670 A2R51	AR	
67	M39014-01-1237	2	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 A2C23	1	
68	M39014-02-1230	2	CAPACITOR,FXD CER DIEL, 100,000PF, 10%, 100V (81349) 913-9008-680 A2C20	1	
69	RNC55H1002FS	2	RESISTOR,FIXED FILM, 10K, 1%, 1/10W (81349) 724-0639-910 A2R61	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-9-70	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A2C9	1	
71	RNC55H4421FS	2	RESISTOR,FIXED FILM, 4.42K, 1%, 1/10W (81349) 724-0639-570 A2R38	1	
72	RNC55J1003FS	2	RESISTOR,FIXED FILM, 100K, 1%, 1/10W (81349) 724-0640-880 A2R45	1	
73	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR4 (EFF TO REV LTR L)	1	
73	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A2CR4 (EFF REV LTR L)	1	
74	RCR07G564KS	2	RESISTOR,FIXED CMPSN, 0.56MEGO, 10%, 1/4W (81349) 745-0848-000 A2R34	1	
75	3292P-CE8-RC102	2	RESISTOR,VARIABLE NON-WW,1K,10% (80294) 382-0052-070 A2R5 (EFF TO REV LTR L)	1	
75	RJR24FP102M	2	RESISTOR,VARIABLE 1K, 10%, 1/2W (81349) 380-9084-140 A2R5 (EFF REV LTR L)	1	
76	RCR07G564KS	2	RESISTOR,FIXED CMPSN, 0.56MEGO, 10%, 1/4W (81349) 745-0848-000 A2R35	1	
77	M39014-02-1405	2	CAPACITOR,FXD CER DIEL, .68UF, 10%, 50V (81349) 913-9008-780 A2C5	1	
78	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR6 (EFF TO REV LTR L)	1	
78	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A2CR6 (EFF REV LTR L)	1	
79	LM555J	2	INTEGRATED CIRCUIT TIMER (27014) 351-1137-050 A2U2 (EFF TO REV LTR L)	1	
79	M38510/10901BPB	2	MICROCIRCUIT (ESDS) (81349) 351-7901-110 A2U2 (EFF REV LTR L)	1	
80	M39018-01-1131M	2	CAPACITOR,FXD AL DIEL, 22UF, P75%M10%, 50V (81349) 184-0480-310 A2C4	1	
81	M39014/01-1455	2	CAPACITOR,FIXED CER DIEL, 10,000PF, 10%, 100V (81349) 913-9011-170 A2C7	1	
81A	RNC55H1431FS	2	RESISTOR,FIXED FILM, 1.43K, 1%, 1/10W (81349) 724-0639-100 A2R63 (EFF REV LTR P)	1	
82	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A2L2	1	
83	MS75089-3	2	COIL,RF 22UH (96906) 240-2715-290 A2L1	1	
84	RNC55H1002FS	2	RESISTOR,FIXED FILM, 10K, 1%, 1/10W (81349) 724-0639-910 A2R22 (EFF TO REV LTR P)	1	
84	RNC55H1102FS	2	RESISTOR,FIXED FILM, 11K, 1%, 1/10W (81349) 724-0639-950 A2R22 (EFF REV LTR P)	1	
85	3292P-CE8-RC502	2	RESISTOR,VARIABLE NON-WW,5K, 10% (80294) 382-0052-090 A2R4 (EFF TO REV LTR L)	1	
85	RJR24FP502M	2	RESISTOR,VARIABLE 5K, 10%, 1/2W (81349) 380-9084-160 A2R4 (EFF REV LTR L TO REV LTR P)	1	
85	RJR24FP503P	2	RESISTOR,VARIABLE 50K, 10%, 1/2W (81349) 380-9084-190 A2R4 (EFF REV LTR P)	1	
86	RNC55H7871FS	2	RESISTOR,FIXED FILM, 7.87K, 1%, 1/10W (81349) 724-0639-810 A2R20 (EFF TO REV LTR G)	1	
86	RN55D3011F	2	RESISTOR,FIXED FILM, 3.01K, 1%, 1/8W (81349) 705-1019-000 A2R20 (EFF REV LTR G TO REV LTR L)	1	
86	RNC55H3011FS	2	RESISTOR,FIXED FILM, 3.01K, 1%, 1/10W (81349) 724-0639-410 A2R20 (EFF REV LTR L TO REV LTR P)	1	
86	RNC55H7502FS	2	RESISTOR,FIXED FILM, 75K, 1%, 1/10W (81349) 724-0640-760 A2R20 (EFF REV LTR P)	1	
87	PE1X-.0022-80-10	2	CAPACITOR,FIXED PLSTC DIEL, 0.0022UF, 10%, 80V (27735) 933-1039-130 A2C6 (EFF TO REV LTR L)	1	
87	CFR05ARA222GM	2	CAPACITOR,FIXED PLSTC DIEL, 0.0022UF, 2%, 50V (81349) 933-1412-220 A2C6 (EFF REV LTR L)	1	
88	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR5 (EFF TO REV LTR L)	1	
88	JANTX1N4454-1	2	SEMICOND DEVICE (81349) 353-8501-010 A2CR5 (EFF REV LTR L)	1	

GROUP ASSEMBLY PARTS LIST

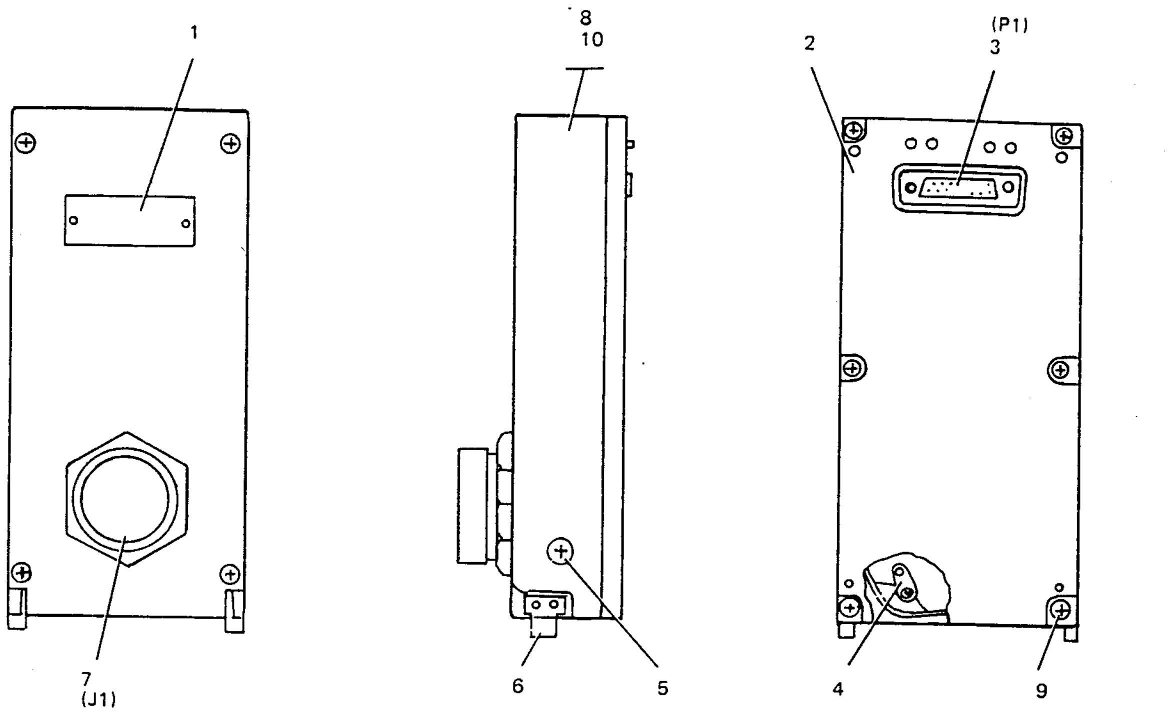
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-9-89	2N3019	2	TRANSISTOR (49956) 352-0734-010 A2Q1 (EFF TO REV LTR L)	1	
89	JANTX2N3019	2	TRANSISTOR (81349) 352-8011-020 A2Q1 (EFF REV LTR L)	1	
90	RCR07G471KS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 10%, 1/4W (81349) 745-0737-000 A2R24	1	
91	RWR81S4640FR	2	RESISTOR,FIXED WW, 464 OHMS, 1%, 1W (81349) 747-2183-650 A2R23	1	
92	RNC55H3092FS	2	RESISTOR,FIXED FILM, 30.9K, 1%, 1/10W (81349) 724-0640-390 A2R39	1	
93	RNC55H1001FS	2	RESISTOR,FIXED FILM, 1K, 1%, 1/10W (81349) 724-0638-940 A2R40	1	
94	M39014-01-1209	2	CAPACITOR,FXD CER DIEL, 27PF, 10%, 200V (81349) 913-9008-090 A2C26	1	
95	M39014-01-1209	2	CAPACITOR,FXD CER DIEL, 27PF, 10%, 200V (81349) 913-9008-090 A2C25	1	
96	M39014-01-1228	2	CAPACITOR,FXD CER DIEL, 330PF, 10%, 200V (81349) 913-9008-280 A2C8	1	
97	M39014-01-1237	2	CAPACITOR,FXD CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 A2C21	1	
98	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A2R47	1	
99	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A2R46	1	
100	LM124J	2	INTEGRATED CIRCUIT AMPLIFIER,QUAD OPRTNL (12040) 351-1141-010 A2U1 (EFF TO REV LTR L)	1	
100	M38510/11005BCB	2	MICROCIRCUIT (ESDS) (81349) 351-7901-180 A2U1 (EFF REV LTR L)	1	
101	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A2R49	1	
102	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A2R48	1	
102A	M39014/1-1455	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 10%, 100V (81349) 913-9011-170 A2C27 (EFF REV LTR J)	1	
103	RNC60H1004FS	2	RESISTOR,FIXED FILM, 1MEGO, 1%, 1/8W (81349) 724-0650-470 A2R8	1	
104	RNC60H1004FS	2	RESISTOR,FIXED FILM, 1MEGO, 1%, 1/8W (81349) 724-0650-470 A2R12	1	
105	RNC55H1001FS	2	RESISTOR,FIXED FILM, 1K, 1%, 1/10W (81349) 724-0638-940 A2R19	1	
106	M39003/01-2312	2	CAPACITOR,FIXED ELCTLT, 47UF, 10%, 35V (81349) 184-9086-720 A2C12	1	
107	RNC60H1001FS	2	RESISTOR,FXD FILM, 1K, 1%, 1/8W (81349) 724-0647-560 A2R26	1	
108	1N4962	2	SEMICOND DEVICE (12969) 353-6522-090 A2VR5 (EFF TO REV LTR L)	1	
108	JANTX1N4962	2	SEMICOND DEVICE (81349) 353-9023-090 A2VR5 (EFF REV LTR L)	1	
109	RCR07G225KS	2	RESISTOR,FIXED CMPSN, 2.2MEGO, 10%, 1/4W (81349) 745-0869-000 A2R62	AR	
109	RCR07G335KS	2	RESISTOR,FXD CMPSN, 3.3MEGO, 10%, 1/4W (81349) 745-0875-000 A2R62	AR	
109	RCR07G475KS	2	RESISTOR,FXD CMPSN, 4.7MEGO, 10%, 1/4W (81349) 745-0881-000 A2R62	AR	
109	RCR07G685KS	2	RESISTOR,FXD CMPSN, 6.8MEGO, 10%, 1/4W (81349) 745-0887-000 A2R62	AR	
109	RCR07G106KS	2	RESISTOR,FIXED CMPSN, 10MEGO, 10%, 1/4W (81349) 745-0893-000 A2R62	AR	
110	1-87476-1	2	HOUSING,CONN,EL (00779) 372-0043-020 A2J1	1	
111	372-2601-037	2	CONTACT,ELECTRICAL (EFF TO REV LTR J)	4	
111	372-2601-037	2	CONTACT,ELECTRICAL (EFF REV LTR J TO REV LTR K)	6	
111	372-2601-037	2	CONTACT,ELECTRICAL (EFF REV LTR K TO REV LTR L)	8	
111	372-2601-037	2	CONTACT,ELECTRICAL (EFF REV LTR L TO REV LTR P)	4	
111	372-2601-037	2	CONTACT,ELECTRICAL (EFF REV LTR P)	14	
112	280-2745-040	2	LABEL,WARNING (12998) (EFF REV LTR K)	1	



AT-1011/U Whip Antenna, Parts Location Diagram
Figure 6-10

GROUP ASSEMBLY PARTS LIST

FIG- ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-10-	553-6725-001	1	ANTENNA, WHIP, AT-1011/U (SEE FIG 6-1-25 FOR NHA)	REF	
1	120-31	2	ANTENNA (00414) 013-1560-020	1	
2	546-7935-004	2	CASE, ANTENNA	1	



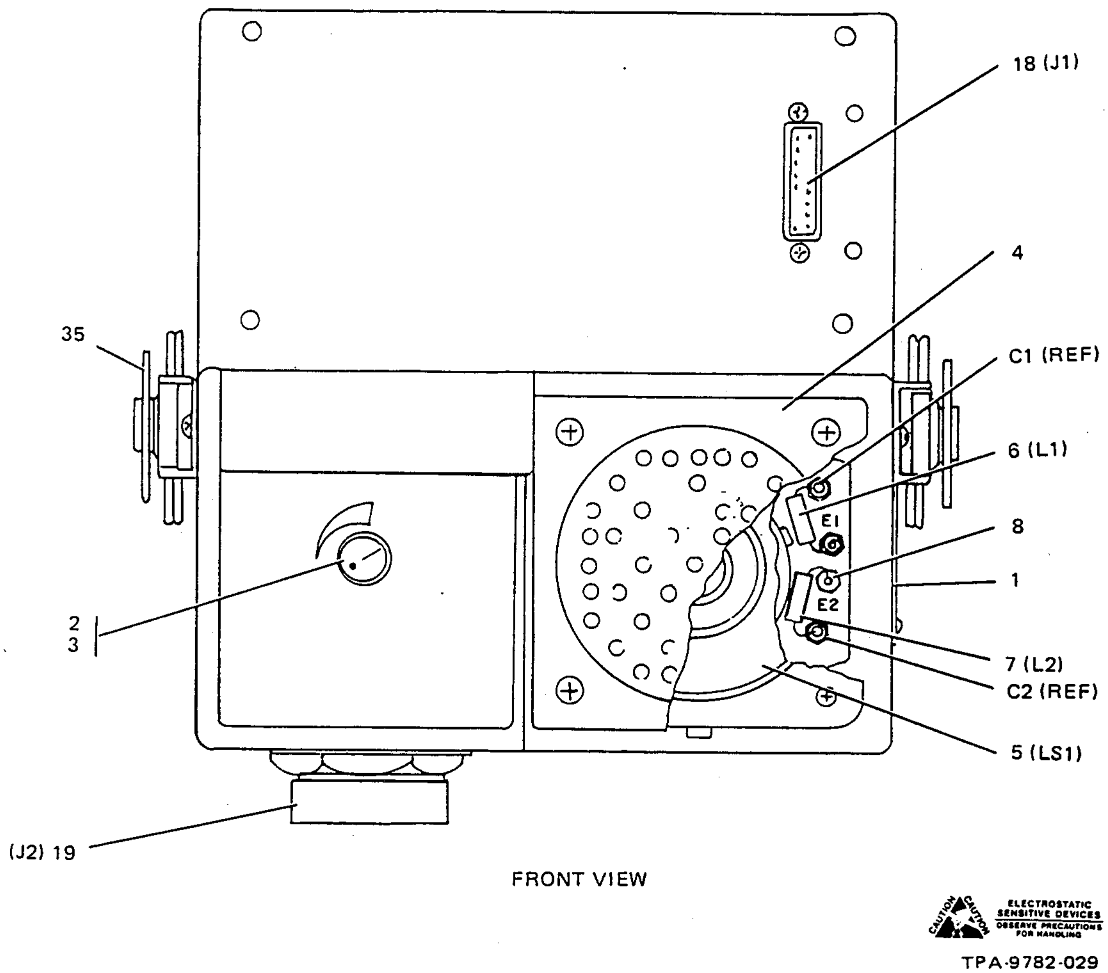
998Y-1 Receiver-Transmitter Adapter, Parts Location Diagram
Figure 6-11

GROUP ASSEMBLY PARTS LIST

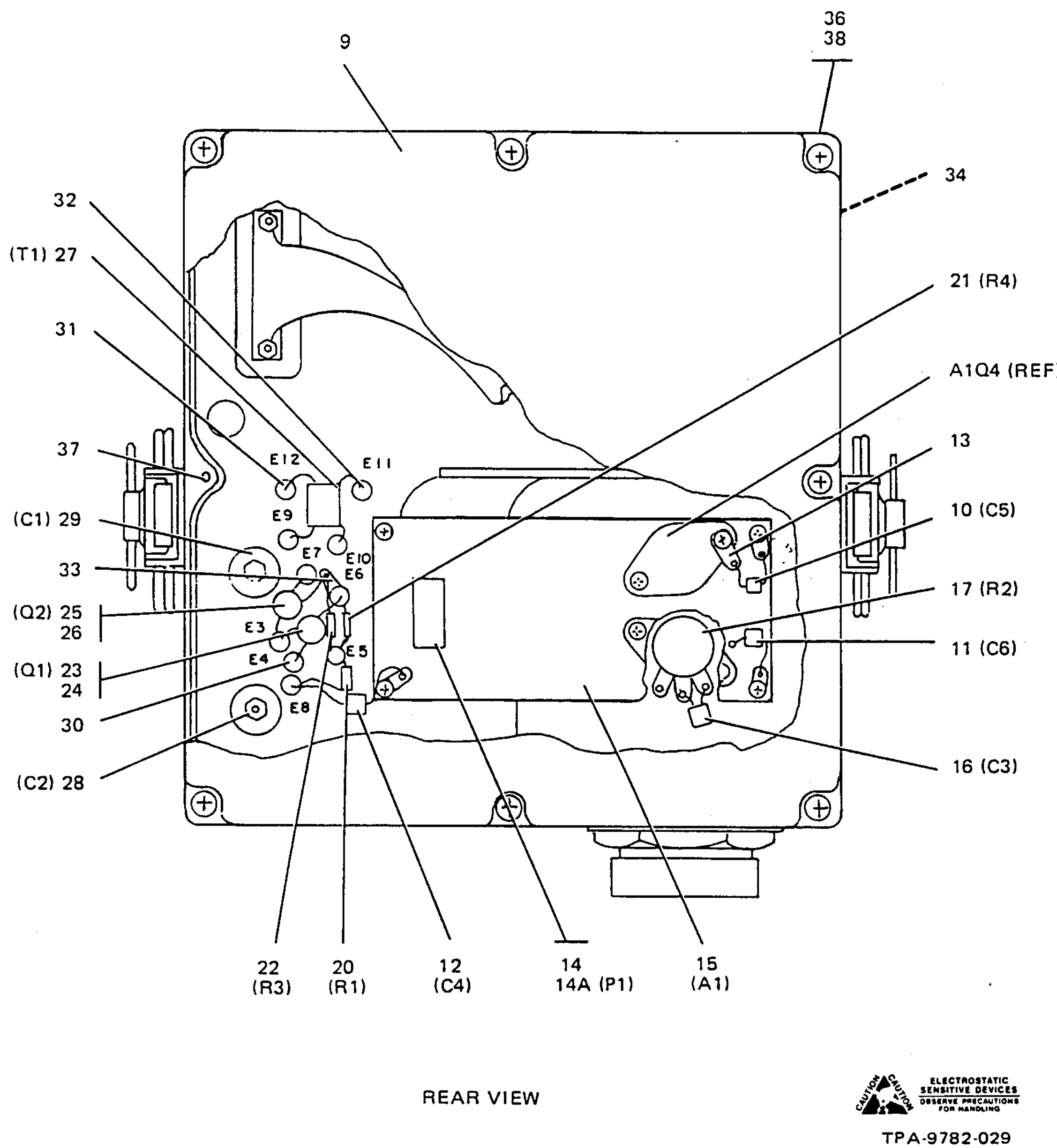
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-11-	622-6527-001	1	ADAPTER, RECEIVER-TRANSMITTER, 998Y-1 (SEE FIG 6-1-29 FOR NHA)	REF	
1	642-0201-000	2	NAMEPLATE	1	
	MS51957-1B	2	SCREW,MACHINE SST, 2-56 X 1/8 (96906) 343-0667-000 (AP)	2	
2	635-8254-001	2	COVER	1	
	MS51957-27B	2	SCREW,MACHINE CHEM BLK CRES, 0.138-32 X 5/16 (96906) 343-0033-000 (AP)	6	
	MS15795-805B	2	WASHER,FLAT CRES, 0.164ID X 0.320 OD (96906) 310-0779-310 (AP)	6	
3	MDNB96555-17	2	CONNECTOR,CABLE (71468) 426-0075-010 P1	1	
	68-1660-26	2	NUT,SLFLKG,HEX AL, 2-56 (72962) 333-0604-000 (AP)	2	
	MS51959-7	2	SCREW,MACHINE CRES, 2-56 X 1/2 (96906) 342-0137-000 (AP)	2	
	MS28775-024	2	PACKING,PREFORMED (96906) 200-2338-450 (AP)	2	
4	4007-6HTD	2	TERMINAL,LUG (77147) 304-0016-000	1	
	MS51957-26	2	SCREW,MACHINE CRES, 0.138-32 X 0.250IN (96906) 343-0167-000 (AP)	1	
	MS35338-136	2	WASHER,LOCK SST, 0.141 ID X 0.250 OD (96906) 310-0282-000 (AP)	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-11-5	NT352R0832AC4	2	SCREW MACHINE,SEG PSVT CRES, 0.164-32 X 0.250 (C2310) 330-4042-060	1	
6	635-5350-001	2	STRIKE, LATCH	2	
	MS51959-3B	2	SCREW,MACH SST, 2-56 X 1/4 (96906) 342-1840-000 (AP)	4	
7	MS3114E20-41S	2	CONNECTOR,RCPT ELEC (96906) 371-8573-000 J1	1	
8	647-3096-001	2	HOUSING	1	
	P347-0044-000	2	SCREW,MACHINE SST, 6-32 X 1-3/8 (77250) 347-0044-000 (AP)	4	
	BRYLM COP, 0.155 DX0.125L	2	SLEEVE,SPRING (91314) 340-0641-000 (AP)	4	
9	M45932/2A112	3	INSERT,SCREW THREAD CRES, 6-32 X 0.210 (81349) 012-4990-020	6	
10	647-3096-002	3	HOUSING	1	



998Y-2 Remote Control Adapter, Parts Location Diagram
Figure 6-12 (Sheet 1 of 2)



998Y-2 Remote Control Adapter, Parts Location Diagram
Figure 6-12 (Sheet 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-12-	622-6528-001	1	ADAPTER, REMOTE CONTROL, 998Y-2 (ESDS) (SEE FIG 6-1-30 FOR NHA)	REF	
1	642-0200-000	2	NAMEPLATE	1	
	MS51957-1B	2	SCREW,MACHINE SST, 2-56 X 1/8 (96906) 343-0667-000 (AP)	2	
2	777-0614-001	2	KNOB	1	
	MS51963-9	2	SETSCREW CD PL STL, 4-40 X 1/8 (96906) 328-5020-000 (AP)	2	
3	MIL-B-5423/09-03	2	BOOT,DUST,MSTR SEAL CRES, 1/4-32 (81349) 334-1266-000	1	
4	HG321	2	GRILL (84792) 271-0268-020	1	
	MS51957-31B	2	SCREW,MACHINE CHEM BLK CRES, 0.138-32 X 5/8 (96906) 343-0037-000 (AP)	4	
	MS15795-805B	2	WASHER,FLAT CRES, 0.164ID X 0.320 OD (96906) 310-0779-310 (AP)	4	
5	M12606-01	2	LOUDSPEAKER (81349) 271-0268-010 LS1	1	
6	MS75088-4	2	COIL,RF 1.80UH (96906) 240-2715-160 L1	1	
7	MS75088-4	2	COIL,RF 1.80UH (96906) 240-2715-160 L2	1	
8	1495-C	2	TERMINAL,STANDOFF (88245) 306-1101-000	2	
9	647-3100-002	2	COVER	1	
	MS51957-27B	2	SCREW,MACHINE CHEM BLK CRES, 0.138-32 X 5/16 (96906) 343-0033-000 (AP)	8	
10	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 C5	1	
11	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 C6	1	
12	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 C4	1	
13	MS0035431-3	2	TERMINAL,LUG (96906) 304-1465-030	2	
14	372-2601-040	2	CONTACT,ELECTRICAL	5	
14A	87631-3	2	HOUSING,CONNECTOR ELEC (00779) 372-0044-020 P1	1	
15	646-5619-001	2	AMPLIFIER, AUDIO (ESDS) A1 (SEE FIG 6-8)	1	
	343-0299-000	2	SCREW,MACHINE NP BRS, 0.086-56 X 0.250IN (AP)	4	
	MS35338-96	2	WASHER,SPRING CD PL BRZ, 0.088 ID X 0.172 OD (96906) 310-0093-000 (AP)	4	
	BRS0.089IDX0.188 ODX0.016	2	WASHER,FLAT BRS, 0.089 ID X 0.188 OD (05411) 310-0129-000 (AP)	4	
	4007-4HTD	2	TERMINAL,LUG (77147) 304-0015-000 (AP)	3	
16	M39014/01-1237	2	CAPACITOR,FIXED CER DIEL, 1000PF, 10%, 200V (81349) 913-9008-370 C3	1	
17	CM41208-010	2	RESISTOR,VARIABLE 1000 OHMS, 20%, 1W (12697) 376-0268-010 R2	1	
18	MDW1-51PH2	2	CONNECTOR,CA ASSY (71468) 426-0073-020 J1	1	
	68-1660-26	2	NUT,SLFLKG,HEX AL, 2-56 (72962) 333-0604-000 (AP)	2	
	MS28775-024	2	PACKING,PREFORMED (96906) 200-2338-450 (AP)	1	
	MS51959-5	2	SCREW,MACHINE CRES, 2-56 X 3/8 (96906) 342-0135-000 (AP)	2	
19	BT07C20-41P	2	CONNECTOR,RCPT ELEC (09922) 371-8604-010 J2	1	
20	RCR07G393KS	2	RESISTOR,FIXED CMPSN, 39K, 10%, 1/4W (81349) 745-0806-000 R1	1	
21	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 R4	1	
22	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 R3	1	
23	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q1	1	
24	TX31807R	2	HEAT SINK,ELEC (98978) 352-9604-060	1	
25	2N2222A	2	TRANSISTOR (49956) 352-0661-020 Q2	1	
26	TX31807R	2	HEAT SINK,ELEC (98978) 352-9604-060	1	
27	SP67	2	TRANSFORMER, AUDIO (81095) 677-1684-000 T1	1	
28	CSK15045	2	CAPACITOR,FIXED CER DIEL, 2000PF, GMV 100V (12294) 913-0155-040 C2	1	
29	CSK15045	2	CAPACITOR,FIXED CER DIEL, 2000PF, GMV 100V (12294) 913-0155-040 C1	1	
30	1495-C	2	TERMINAL,STANDOFF (88245) 306-1101-000	5	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-12-31	3122-87-1	2	TERMINAL,STUD (17117) 306-1088-000	4	
32	547-5305-002	2	TERMINAL LUG	1	
33	4007-4HTD	2	TERMINAL,LUG (77147) 304-0015-000	1	
34	NT352R0832AC4	2	SCREW MACHINE,SEG PSVT CRES, 0.164-32 X 0.250 (02310) 330-4042-060	1	
35	015-1859-000	2	CATCH,LUGGAGE (82240)	2	
	MS51957-13B	2	SCREW,MACH SST, 4-40 X 1/4 (96906) 343-0019-000 (AP)	4	
36	647-3098-001	2	HOUSING	1	
37	M45932/2A112	3	INSERT,SCREW THREAD CRES, 6-32 X 0.210 (81349) 012-4990-020	12	
38	647-3098-002	3	HOUSING	1	

6.3 NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ
BB451U	6-1-5	1
BRS0.089IDX0.188 ODX0.016	6-12-15	4
BRYLM COP, 0.155 DX0.125L	6-11-8	4
BT07C20-41P	6-12-19	1
CFR05ARA104GM	6-9-30	
	6-9-34	2
CFR05ARA222GM	6-9-87	1
CFR05ARA255GM	6-9-5	1
CK06BX104K	6-12-10	
	6-12-11	
	6-12-12	3
CM41208-010	6-7-32	
	6-12-17	2
CSK15045	6-12-28	
	6-12-29	2
C103471	6-7-23	1
F2652-1	6-7-55	
	6-7-56	2
H-189/GR	6-1-15A	
	6-1-24A	2
HG 321	6-7-10	1
HG321	6-12-4	1
IRF150	6-7-43	
	6-7-50	2
JANTX1N4131	6-9-26	1
JANTX1N4454-1	6-8-21	
	6-8-42	
	6-8-43	
	6-8-44	
	6-8-45	
	6-8-46	
	6-8-47	
	6-9-13	
	6-9-17	
	6-9-43	
	6-9-73	
	6-9-78	
	6-9-88	13
JANTX1N4962	6-9-35	
	6-9-108	2
JANTX1N4982	6-9-26	1
JANTX1N5615	6-9-27	1
JANTX1N827	6-9-6	
	6-9-45	2
JANTX2N2219A	6-8-6	1
JANTX2N2222A	6-8-50	1
JANTX2N2905A	6-8-37	1
JANTX2N3019	6-9-57	
	6-9-89	2
JANTX2N3700	6-9-51	1
JANTX2N3879	6-8-2	
	6-8-40	2
JANTX2N4416A	6-8-19	1

PART NUMBER	FIG-ITEM	TTL REQ
LC-2	6-3-6	
	6-3-6	
	6-4-4	
	6-4-4	4
LM124J	6-9-21	
	6-9-100	2
LM124J/883B	6-8-13	1
LM555J	6-9-79	1
MC32B104K	6-9-30	
	6-9-34	2
MC32B225K	6-9-5	1
MC32B684K	6-7-41	1
MDNB96555-17	6-11-3	1
MDW1-51PH2	6-12-18	1
MIL-B-5423/09-03	6-12-3	1
MS0035431-3	6-8-3	
	6-8-41	
	6-12-13	4
MS15795-803	6-7-26	
	6-7-26	
	6-7-43	
	6-7-50	
	6-8-3	
	6-8-41	21
MS15795-805	6-7-20	4
MS15795-805B	6-11-2	
	6-12-4	10
MS15795-808	6-3-5	2
MS15795-810	6-3-2	
	6-4-2	4
MS20426AD4-4	6-1-32	4
MS21044C04	6-7-17	4
MS25237-387	6-7-8	1
MS28775-024	6-11-3	
	6-12-18	3
MS3112E14-12S	6-7-5	1
MS3114E20-41S	6-11-7	1
MS3116F14-12P	6-1-19	1
MS3116F14-12S	6-1-11	
	6-1-20	2
MS3116F14-5P	6-1-10	1
MS35335-60	6-3-5	2
MS35338-135	6-3-3	
	6-7-1	
	6-7-6	
	6-7-24	
	6-7-25	
	6-7-26	
	6-7-26	
	6-7-28	
	6-7-43	
	6-7-47	
	6-7-50	
	6-7-54	
	6-8-3	
	6-8-41	62

NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ
MS35338-136	6-7-20	
	6-7-37	
	6-11-4	9
MS35338-137	6-7-10	4
MS35338-139	6-3-2	
	6-4-2	4
MS35338-96	6-12-15	4
MS35649-244	6-3-3	
	6-8-3	
	6-8-41	12
MS35650-304	6-3-5	1
MS51957-1B	6-11-1	
	6-12-1	4
MS51957-12	6-7-25	
	6-7-28	6
MS51957-13	6-7-24	4
MS51957-13B	6-7-1	
	6-7-6	
	6-12-35	10
MS51957-15	6-3-3	8
MS51957-15B	6-7-54	8
MS51957-16	6-7-43	
	6-7-50	
	6-8-3	
	6-8-41	8
MS51957-17	6-7-26	
	6-7-26	9
MS51957-25	6-7-37	2
MS51957-26	6-11-4	1
MS51957-27B	6-11-2	
	6-12-9	14
MS51957-30	6-7-20	4
MS51957-31B	6-12-4	4
MS51957-45B	6-7-10	4
MS51958-66	6-3-5	1
MS51958-80	6-3-2	
	6-4-2	4
MS51959-12	6-7-24	4
MS51959-13	6-3-4	2
MS51959-3B	6-11-6	4
MS51959-5	6-12-18	2
MS51959-7	6-11-3	2
MS51963-9	6-12-2	2
MS75088-4	6-7-13	
	6-7-15	
	6-12-6	
	6-12-7	4
MS75089-23	6-9-37	
	6-9-82	2
MS75089-3	6-9-83	1
MS77068-2	6-7-37	
	6-7-43	
	6-7-50	7
MS91528-0F1B	6-7-7	1
MT-1029/VRC	6-1-23	1
MW10FMA17	6-1-35	1
MX4430PRC47	6-5-	REF
M12606-01	6-7-11	
	6-12-5	2
M38510/10901BPB	6-9-79	1
M38510/11005BCB	6-8-13	
	6-9-21	
	6-9-100	3
M39003/01-2271	6-9-63	1
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RCR07G106KS	6-9-109	AR
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RCR07G122KS	6-8-8	1
RCR07G123KS	6-8-49	1
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549-6245-002	6-5-5	2
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647-3104-002	6-1-33	1
651-7430-001	6-1-9	1
651-7432-001	6-1-18	1
651-7639-001	6-7-35	2
651-8451-001	6-7-24	1
651-8499-001	6-4-5	1
651-8504-001	6-1-22	1
651-8509-001	6-4-2	1

NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ
651-8510-001	6-3-2	1
651-8511-001	6-4-1	1
651-8512-001	6-3-1	1
651-8522-001	6-3-4	2
672-0552-010	6-9-32	1
677-1684-000	6-12-27	1
678-0265-010	6-7-23	1
68-1660-26	6-11-3	
	6-12-18	4
69001-0600	6-7-18	2
705-1017-000	6-9-44	1
705-1019-000	6-9-86	1
705-3600-700	6-9-53	1
724-0637-970	6-9-8	
	6-9-10	
	6-9-12	
	6-9-15	
	6-9-16	5
724-0638-410	6-9-53	1
724-0638-940	6-9-20	
	6-9-50	
	6-9-52	
	6-9-93	
	6-9-105	5
724-0639-100	6-9-81A	1
724-0639-290	6-9-54	1
724-0639-370	6-9-44	1
724-0639-410	6-9-86	1
724-0639-570	6-9-40	
	6-9-71	2
724-0639-700	6-9-62	1
724-0639-810	6-9-86	1
724-0639-910	6-9-19	
	6-9-22	
	6-9-55	
	6-9-65	
	6-9-69	
	6-9-84	6
724-0639-950	6-9-84	1
724-0640-060	6-9-3	
	6-9-61	2
724-0640-320	6-9-11	1
724-0640-340	6-9-46	1
724-0640-390	6-9-14	
	6-9-92	2
724-0640-620	6-9-66	AR
724-0640-630	6-9-66	AR
724-0640-640	6-9-66	AR
724-0640-650	6-9-66	AR
724-0640-660	6-9-66	AR
724-0640-670	6-9-66	AR
724-0640-760	6-9-86	1
724-0640-880	6-9-18	
	6-9-72	2
724-0641-220	6-9-59	1
724-0647-560	6-9-107	1
724-0648-610	6-9-60	1
724-0650-470	6-9-103	
	6-9-104	2
724-0652-270	6-9-39	1
745-0701-000	6-8-26	1
745-0713-000	6-9-9	
	6-9-31	2
745-0716-000	6-8-48	1
745-0731-000	6-8-9	
	6-8-38	2
745-0737-000	6-9-90	1
745-0752-000	6-8-8	1
745-0764-000	6-8-14	1
745-0773-000	6-8-27	
	6-8-34	2
745-0776-000	6-8-29	1
745-0782-000	6-8-15	1
745-0785-000	6-8-16	
	6-8-25	
	6-8-25A	
	6-8-30	
	6-9-4	
	6-9-24	
	6-9-58	
	6-9-98	
	6-9-99	
	6-9-101	
	6-9-102	
	6-12-21	
	6-12-22	13
745-0788-000	6-8-49	1
745-0794-000	6-8-11	1
745-0806-000	6-12-20	1
745-0809-000	6-8-31	1
745-0821-000	6-8-17	1
745-0848-000	6-9-74	
	6-9-76	2
745-0869-000	6-9-109	AR
745-0875-000	6-9-109	AR
745-0881-000	6-9-23	1
	6-9-109	AR
745-0887-000	6-9-109	AR
745-0893-000	6-9-109	AR
747-1988-080	6-7-46	
	6-7-51	2
747-2169-190	6-7-34	
	6-7-38	2
747-2170-130	6-7-40	1
747-2183-010	6-9-31	1
747-2183-650	6-9-91	1
747-2183-970	6-9-49	1
747-5349-000	6-9-36	1
757-4765-000	6-5-1	1
777-0614-001	6-12-2	1

NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ
792-6534-001	6-1-15	
	6-1-24	2
86015-2	6-7-57	
	6-7-57	14
86016-2	6-7-57	12
87631-3	6-7-27	
	6-12-14A	2
87631-7	6-7-19	1
913-0155-040	6-7-12	
913-0155-040	6-7-14	
	6-12-28	
	6-12-29	4
913-5019-440	6-12-10	
	6-12-11	
	6-12-12	3
913-9008-090	6-9-94	
	6-9-95	2
913-9008-280	6-9-96	1
913-9008-310	6-8-10	1
913-9008-330	6-9-2	1
913-9008-370	6-7-31	
	6-8-41A	
	6-9-29	
	6-9-42	
	6-9-48	
	6-9-67	
	6-9-97	
	6-12-16	8
913-9008-680	6-7-33	
	6-7-39	
	6-7-42	
	6-7-44	
	6-8-4	
	6-8-7	
	6-8-28	
	6-8-35	
	6-9-68	9
913-9008-760	6-8-20	1
913-9008-780	6-9-1	
	6-9-25	
	6-9-28	
	6-9-77	4
913-9011-080	6-9-29	1
913-9011-170	6-8-1	
	6-8-23	
	6-8-24	
	6-8-32	
	6-8-36	
	6-8-39	
	6-9-33	
	6-9-81	
	6-9-102A	9
933-1039-130	6-9-87	1
933-1081-080	6-9-30	
	6-9-34	2

PART NUMBER	FIG-ITEM	TTL REQ
933-1081-180	6-7-41	1
933-1081-250	6-9-5	1
933-1412-010	6-9-30	
	6-9-34	2
933-1412-220	6-9-87	1
933-1412-260	6-9-5	1
977-0019-010	6-1-15A	
	6-1-24A	2

6.4 REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1	6-7-26	646-5619-001	A2	6-7-20	646-5831-001
A1	6-7-26	646-5619-002	A2	6-7-20	646-5831-002
A1	6-8-	646-5619-001	A2	6-9-	646-5831-001
A1	6-8-	646-5619-002	A2	6-9-	646-5831-002
A1	6-12-15	646-5619-001	A2CR1	6-9-13	1N4454-1
A1CR1	6-8-21	JANTX1N4454-1	A2CR1	6-9-13	JANTX1N4454-1
A1CR2	6-8-42	JANTX1N4454-1	A2CR2	6-9-27	SC5615
A1CR3	6-8-44	JANTX1N4454-1	A2CR2	6-9-27	JANTX1N5615
A1CR4	6-8-43	JANTX1N4454-1	A2CR3	6-9-17	1N4454-1
A1CR5	6-8-47	JANTX1N4454-1	A2CR3	6-9-17	JANTX1N4454-1
A1CR6	6-8-46	JANTX1N4454-1	A2CR4	6-9-73	1N4454-1
A1CR7	6-8-45	JANTX1N4454-1	A2CR4	6-9-73	JANTX1N4454-1
A1C1	6-8-33	M39003/01-2286	A2CR5	6-9-88	1N4454-1
A1C10	6-8-36	M39014/01-1455	A2CR5	6-9-88	JANTX1N4454-1
A1C11	6-8-12	M39018/03-0735	A2CR6	6-9-78	1N4454-1
A1C13	6-8-10	M39014-01-1231	A2CR6	6-9-78	JANTX1N4454-1
A1C14	6-8-20	M39014-02-1240	A2CR7	6-9-43	1N4454-1
A1C15	6-8-39	M39014/01-1455	A2CR7	6-9-43	JANTX1N4454-1
A1C16	6-8-41A	M39014-01-1237	A2C1	6-9-1	M39014-02-1405
A1C17	6-8-1	M39014/01-1455	A2C10	6-9-63	M39003/01-2271
A1C18	6-8-4	M39014-02-1230	A2C11	6-9-7	M39003/01-2356
A1C2	6-8-28	M39014-02-1230	A2C12	6-9-106	M39003/01-2312
A1C3	6-8-18	M39003/01-2353	A2C13	6-9-28	M39014-02-1405
A1C4	6-8-24	M39014/01-1455	A2C14	6-9-64	M39003/01-2289
A1C5	6-8-23	M39014/01-1455	A2C15	6-9-5	MC32B225K
A1C7	6-8-32	M39014/01-1455	A2C15	6-9-5	CFR05ARA255GM
A1C8	6-8-35	M39014-02-1230	A2C16	6-9-2	M39014-01-1233
A1C9	6-8-7	M39014-02-1230	A2C17	6-9-30	MC32B104K
A1J1	6-8-22	3-87478-4	A2C17	6-9-30	CFR05ARA104GM
A1Q1	6-8-19	JANTX2N4416A	A2C18	6-9-29	M39014-01-1237
A1Q2	6-8-50	JANTX2N2222A	A2C18	6-9-29	M39014/1-1446
A1Q3	6-8-37	JANTX2N2905A	A2C19	6-9-33	M39014/01-1455
A1Q4	6-8-40	JANTX2N3879	A2C2	6-9-25	M39014-02-1405
A1Q5	6-8-6	JANTX2N2219A	A2C20	6-9-68	M39014-02-1230
A1Q6	6-8-2	JANTX2N3879	A2C21	6-9-97	M39014-01-1237
A1R1	6-8-29	RCR07G562KS	A2C22	6-9-42	M39014-01-1237
A1R10	6-8-16	RCR07G103KS	A2C23	6-9-67	M39014-01-1237
A1R11	6-8-26	RCR07G470KS	A2C24	6-9-48	M39014-01-1237
A1R12	6-8-5	RT22C2W102	A2C25	6-9-95	M39014-01-1209
A1R13	6-8-48	RCR07G121KS	A2C26	6-9-94	M39014-01-1209
A1R14	6-8-9	RCR07G331KS	A2C27	6-9-102A	M39014/1-1455
A1R15	6-8-38	RCR07G331KS	A2C3	6-9-34	MC32B104K
A1R17	6-8-8	RCR07G122KS	A2C3	6-9-34	CFR05ARA104GM
A1R18	6-8-49	RCR07G123KS	A2C4	6-9-80	M39018-01-1131M
A1R19	6-8-34	RCR07G472KS	A2C5	6-9-77	M39014-02-1405
A1R2	6-8-25	RCR07G103KS	A2C6	6-9-87	PE1X-.0022-80-10
A1R20	6-8-11	RCR07G183KS	A2C6	6-9-87	CFR05ARA222GM
A1R21	6-8-25A	RCR07G103KS	A2C7	6-9-81	M39014/01-1455
A1R3	6-8-17	RCR07G104KS	A2C8	6-9-96	M39014-01-1228
A1R4	6-8-27	RCR07G472KS	A2C9	6-9-70	M39003/01-2283
A1R5	6-8-15	RCR07G822KS	A2J1	6-9-110	1-87476-1
A1R6	6-8-30	RCR07G103KS	A2L1	6-9-83	MS75089-3
A1R7	6-8-31	RCR07G473KS	A2L2	6-9-82	MS75089-23
A1R9	6-8-14	RCR07G272KS	A2L3	6-9-37	MS75089-23
A1U1	6-8-13	LM124J/883B	A2Q1	6-9-89	2N3019
A1U1	6-8-13	M38510/11005BCB	A2Q1	6-9-89	JANTX2N3019

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REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A2Q2	6-9-57	2N3019	A2R48	6-9-102	RCR07G103KS
A2Q2	6-9-57	JANTX2N3019	A2R49	6-9-101	RCR07G103KS
A2Q3	6-9-51	2N3700	A2R5	6-9-75	3292P-CE8-RC102
A2Q3	6-9-51	JANTX2N3700	A2R5	6-9-75	RJR24FP102M
A2R1	6-9-47	3292P-CE8-RC102	A2R50	6-9-59	RNC55K2213FS
A2R1	6-9-47	RJR24FP102M	A2R51	6-9-66	RNC55H5362FS
A2R10	6-9-44	RN55D2741F	A2R51	6-9-66	RNC55H5492FS
A2R10	6-9-44	RNC55H2741FS	A2R51	6-9-66	RNC55H5622FS
A2R11	6-9-8	RNC55H1000FS	A2R51	6-9-66	RNC55H5762FS
A2R12	6-9-104	RNC60H1004FS	A2R51	6-9-66	RNC55H5902FS
A2R13	6-9-12	RNC55H1000FS	A2R51	6-9-66	RNC55H6042FS
A2R14	6-9-10	RNC55H1000FS	A2R52	6-9-55	RNC55H1002FS
A2R15	6-9-11	RNC55H2612FS	A2R53	6-9-49	RWR81S1001FR
A2R16	6-9-36	RW69V271	A2R54	6-9-50	RNC55H1001FS
A2R17	6-9-39	RNC65H1001FS	A2R55	6-9-58	RCR07G103KS
A2R18	6-9-46	RNC55H2742FS	A2R56	6-9-4	RCR07G103KS
A2R19	6-9-105	RNC55H1001FS	A2R57	6-9-23	RCR07G475KS
A2R2	6-9-41	3292P-CE8-RC254	A2R59	6-9-31	RCR07G101KS
A2R2	6-9-41	RJR24FP254M	A2R59	6-9-31	RWR81S1000FR
A2R20	6-9-86	RNC55H7871FS	A2R6	6-9-15	RNC55H1000FS
A2R20	6-9-86	RN55D3011F	A2R60	6-9-9	RCR07G101KS
A2R20	6-9-86	RNC55H3011FS	A2R61	6-9-69	RNC55H1002FS
A2R20	6-9-86	RNC55H7502FS	A2R62	6-9-109	RCR07G225KS
A2R21	6-9-16	RNC55H1000FS	A2R62	6-9-109	RCR07G335KS
A2R22	6-9-84	RNC55H1002FS	A2R62	6-9-109	RCR07G475KS
A2R22	6-9-84	RNC55H1102FS	A2R62	6-9-109	RCR07G685KS
A2R23	6-9-91	RWR81S4640FR	A2R62	6-9-109	RCR07G106KS
A2R24	6-9-90	RCR07G471KS	A2R63	6-9-81A	RNC55H1431FS
A2R26	6-9-107	RNC60H1001FS	A2R7	6-9-3	RNC55H1402FS
A2R27	6-9-53	RN55D2800F	A2R8	6-9-103	RNC60H1004FS
A2R27	6-9-53	RNC55H2800FS	A2R9	6-9-40	RNC55H4421FS
A2R28	6-9-54	RNC55H2261FS	A2T1	6-9-32	06-2215-00
A2R29	6-9-52	RNC55H1001FS	A2U1	6-9-100	LM124J
A2R3	6-9-38	3292P-CE8-RC102	A2U1	6-9-100	M38510/11005BCB
A2R3	6-9-38	RJR24FP102M	A2U2	6-9-79	LM555J
A2R30	6-9-20	RNC55H1001FS	A2U2	6-9-79	M38510/10901BPB
A2R31	6-9-18	RNC55J1003FS	A2U3	6-9-21	LM124J
A2R32	6-9-19	RNC55H1002FS	A2U3	6-9-21	M38510/11005BCB
A2R33	6-9-22	RNC55H1002FS	A2VR1	6-9-6	1N825A
A2R34	6-9-74	RCR07G564KS	A2VR1	6-9-6	JANTX1N827
A2R35	6-9-76	RCR07G564KS	A2VR2	6-9-26	JANTX1N4131
A2R36	6-9-61	RNC55H1402FS	A2VR2	6-9-26	JANTX1N4982
A2R37	6-9-14	RNC55H3092FS	A2VR3	6-9-35	1N4962
A2R38	6-9-71	RNC55H4421FS	A2VR3	6-9-35	JANTX1N4962
A2R39	6-9-92	RNC55H3092FS	A2VR4	6-9-45	1N825A
A2R4	6-9-85	3292P-CE8-RC502	A2VR4	6-9-45	JANTX1N827
A2R4	6-9-85	RJR24FP502M	A2VR5	6-9-108	1N4962
A2R4	6-9-85	RJR24FP503P	A2VR5	6-9-108	JANTX1N4962
A2R40	6-9-93	RNC55H1001FS	CB1	6-7-49	M39019-01-258
A2R41	6-9-60	RNC60H1212FS	CR1	6-7-45	SC5615
A2R42	6-9-62	RNC55H6041FS	C1	6-7-22	M39018/03-0741
A2R43	6-9-24	RCR07G103KS	C1	6-12-29	CSK15045
A2R44	6-9-65	RNC55H1002FS	C10	6-7-14	2425-033-W5T-202
A2R45	6-9-72	RNC55J1003FS			AA
A2R46	6-9-99	RCR07G103KS	C11	6-7-31	M39014-01-1237
A2R47	6-9-98	RCR07G103KS	C2	6-7-21	M39018/03-0741

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REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
C2	6-12-28	CSK15045
C3	6-7-41	MC32B684K
C3	6-12-16	M39014/01-1237
C4	6-7-53	M39018-01-1137M
C4	6-12-12	CK06BX104K
C5	6-7-42	M39014-02-1230
C5	6-12-10	CK06BX104K
C6	6-7-44	M39014-02-1230
C6	6-12-11	CK06BX104K
C7	6-7-33	M39014-02-1230
C8	6-7-39	M39014-02-1230
C9	6-7-12	2425-033-W5T-202AA
DS1	6-7-9	174-8430-0111-203
J1	6-7-5	MS3112E14-12S
J1	6-11-7	MS3114E20-41S
J1	6-12-18	MDW1-51PH2
J2	6-7-25A	SM-C-454808
J2	6-12-19	BT07C20-41P
LS1	6-7-11	M12606-01
LS1	6-12-5	M12606-01
L1	6-7-23	C103471
L1	6-12-6	MS75088-4
L2	6-7-15	MS75088-4
L2	6-12-7	MS75088-4
L3	6-7-13	MS75088-4
P1	6-1-10	MS3116F14-5P
P1	6-1-19	MS3116F14-12P
P1	6-7-19	87631-7
P1	6-11-3	MDNB96555-17
P1	6-12-14A	87631-3
P2	6-1-11	MS3116F14-12S
P2	6-1-20	MS3116F14-12S
P2	6-7-27	87631-3
Q1	6-7-43	IRF150
Q1	6-12-23	2N2907A
Q2	6-7-50	IRF150
Q2	6-12-25	2N2222A
R1	6-7-46	RS2B00FR0111F
R1	6-12-20	RCR07G393KS
R2	6-7-51	RS2B00FR0111F
R2	6-12-17	CM41208-010
R3	6-7-40	RWR89S1331FR
R3	6-12-22	RCR07G103KS
R4	6-7-34	RWR89S1540FR
R4	6-12-21	RCR07G103KS
R5	6-7-38	RWR89S1540FR
R6	6-7-32	CM41208-010
T1	6-12-27	SP67
VR1	6-7-30	15KP36A
VR2	6-7-48	1N4114
VR3	6-7-52	1N4114
VR4	6-7-29	15KP36A
Z1	6-7-55	F2652-1
Z2	6-7-56	F2652-1

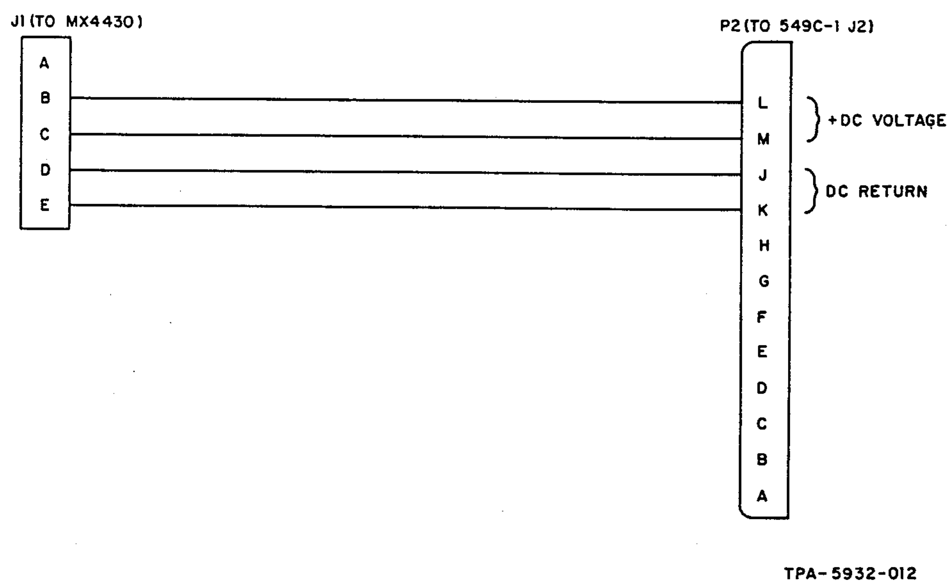
section 7
diagrams

7.1 GENERAL

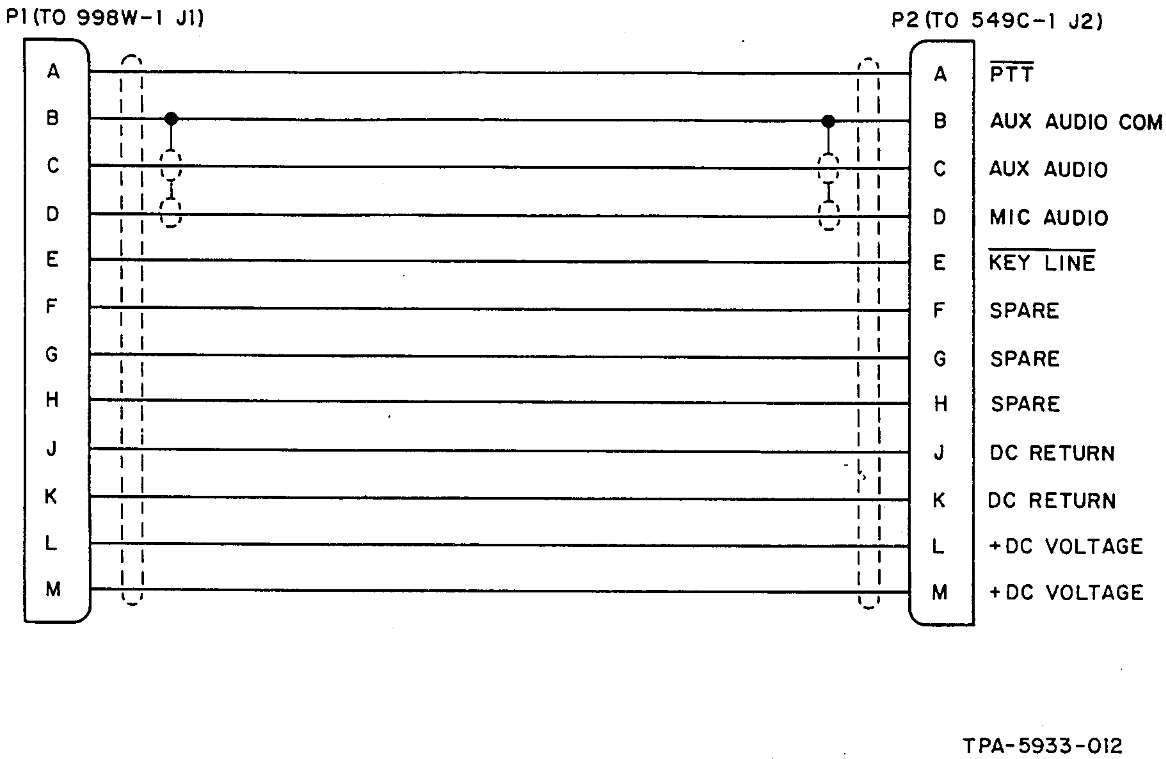
The diagrams in this section will aid in the troubleshooting and maintenance of the 150-Watt HF Communication System.

7.2 EFFECTIVITIES

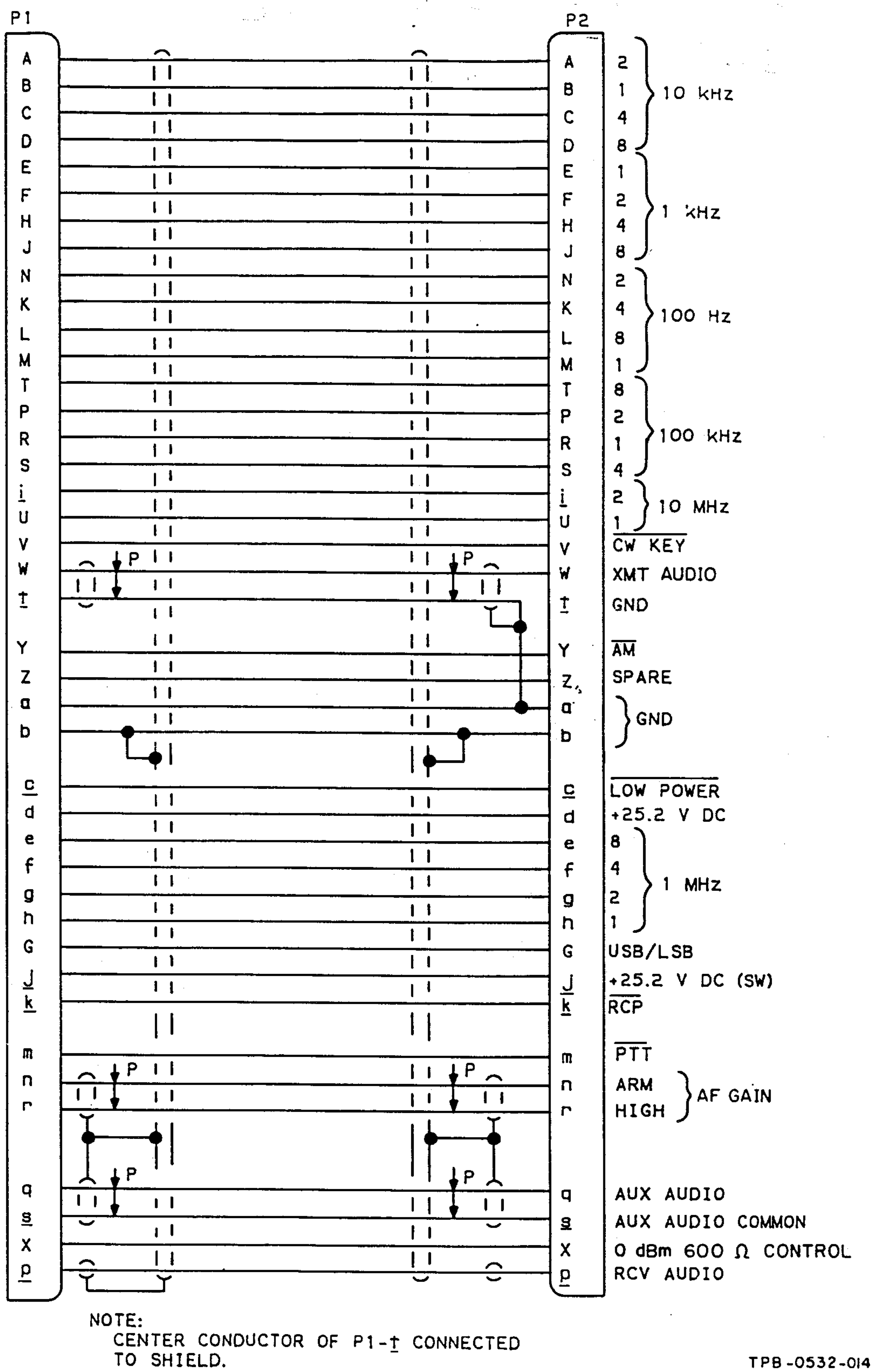
The procedure for identification of equipment design changes is described in section 6, parts list. When schematic changes are required, an arrow with a revision identification (eg, A1 , A2 , B1 , C1) will point to the area of the schematic that is changed. The revision identification will be listed in the modification history following the parts list. For each revision identification listed, the modification history will include: (1) description of revision and reason for change and (2) effectivity.



Power Cable From MX-4430 Battery Adapter to Amplifier-Coupler, Schematic Diagram
Figure 7-1

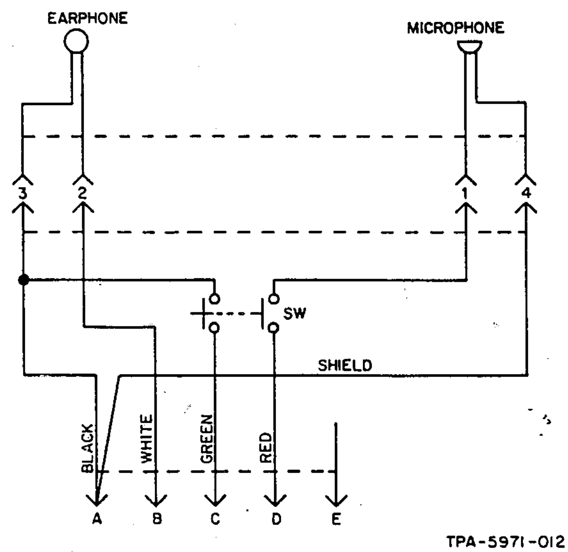


Power Cable From Power Conditioner to Amplifier-Coupler, Schematic Diagram
Figure 7-2



Interconnect Cable From 998Y-1 Receiver-Transmitter Adapter to 998Y-2 Remote Control Adapter, Schematic Diagram
Figure 7-8

System Test - Red Orange
Module Test - Brown Blue
Brown Red - Common



H-189/GR Handset, Schematic Diagram
Figure 7-9

523-0772057-00121A

Rockwell International

Collins instruction book

671V-2 Receiver-Transmitter

This instruction book includes:

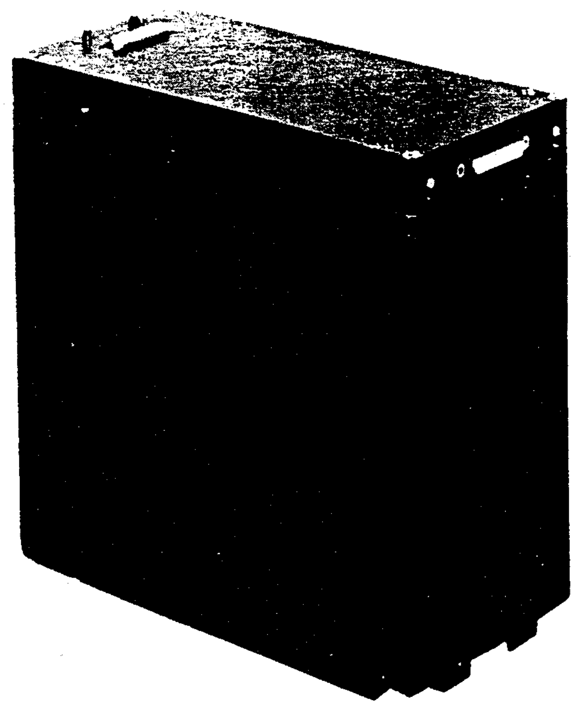
Collins Telecommunications
Products Division
Defense Electronics Operations
Rockwell International
Cedar Rapids, Iowa 52498

Printed in the United States of America

DESIGN FEATURES

The 671V-2 Receiver-Transmitter is an hf SSB receiver-transmitter. The receiver-transmitter operates in the frequency range of 2.0000 to 29.9999 MHz, which is tunable in 100-Hz increments over its entire range. In its basic configuration, it includes the following modulation modes of operation: upper sideband (USB) voice or cw, lower sideband (LSB) voice or CW, AME voice, USB/LSB NB secure voice data and RCV only (keyline function) with 250 mW pep/average output on USB.

- Meets a full range of tactical communication requirements.
- Operates from either vehicle electrical systems or a battery pack.
- Operates efficiently in arctic, desert, or tropic climates.
- Rapid configuration change from backpack to vehicle mount.
- May be used in high power vehicular or fixed station radio systems, with the proper ancillary equipment.
- Operates with the receiver-transmitter control either mounted directly to or remote from (via an extender cable) the receiver-transmitter.


TPA-5155-017

671V-2 Receiver-Transmitter

SERVICE BULLETINS/SERVICE INFORMATION LETTERS

The following listed service bulletins (SB) and service information letters (SIL) are those that are applicable to the unit and are included in the text of this instruction book. Other applicable SB/SIL released before the instruction book was shipped are included in the front of the instruction book.

Note

Service bulletin/service information letters are written in numerical sequence.

Service bulletins are numbered in sequence for the life of the equipment. Service information letters are numbered in sequence starting at 1 for each calendar year.

SB/ SIL	DESCRIPTION	ISSUE DATE

Description

671V-2 Receiver-Transmitter

Rockwell International

description

Collins Telecommunications Products Division

Printed in USA

523-0772058-001218
1 November 1982

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description

1. GENERAL

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

The 671V-2 Receiver-Transmitter, 622-2148-001 (hereinafter referred to as receiver-transmitter), provides 280 000 communication channels, spaced at 100-Hz increments, in the hf band (2.0000 to 29.9999 MHz). Modes of operation include upper sideband (USB), lower sideband (LSB), amplitude modulation equivalent (AME), and continuous wave (CW) modes. In data mode, the receiver-transmitter will transmit/receive narrow-band secure voice signals in either USB or LSB over the entire frequency range. The receiver-transmitter may be used for simplex data and voice communications, using an external power amplifier and antenna.

The receiver-transmitter is suitable for airborne, transportable, and fixed-station application when a suitable rack and power source are available. The unit requires +22 to +30 V dc with nominal use of 25.2 V dc. (Refer to table 3.)

2. RECEIVER-TRANSMITTER SUBASSEMBLY COMPLEMENT

The subassemblies supplied as a part of the receiver-transmitter are listed in table 1. Refer to figure 1 for location and identification of the subassemblies.

3. ASSOCIATED EQUIPMENT

Associated equipment required for operation but not supplied as a part of the receiver-transmitter is listed in table 2.

4. EQUIPMENT SPECIFICATIONS

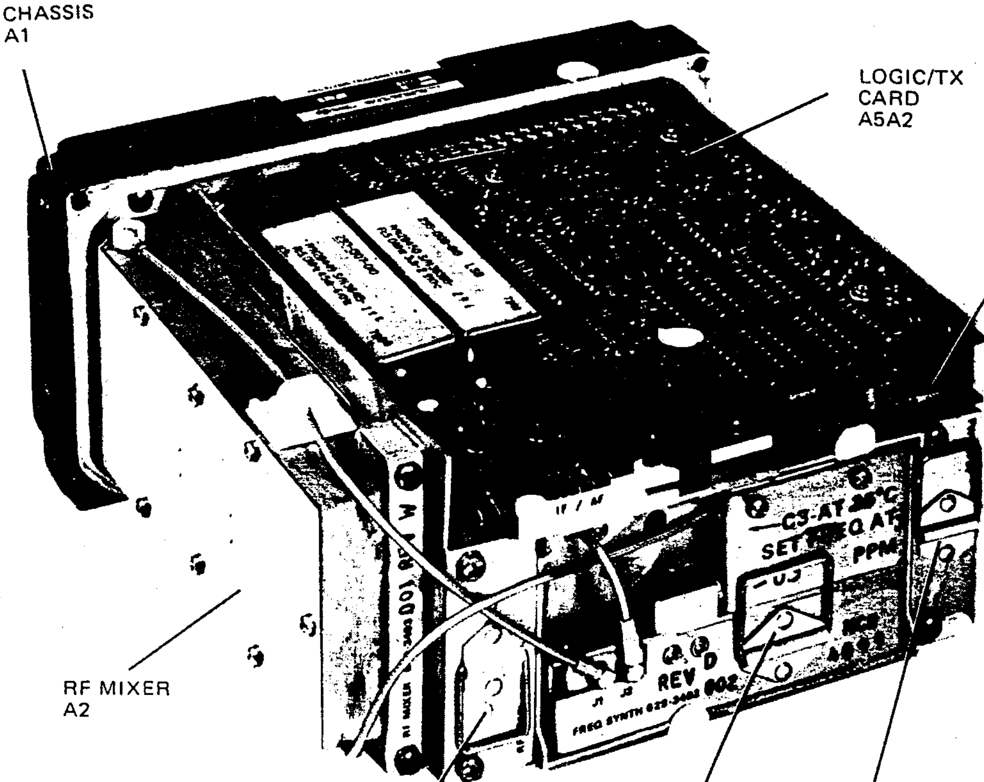
Specifications for the receiver-transmitter are listed in table 3.

5. RELATED PUBLICATIONS

Table 4 lists related publications.

Table 1. Receiver-Transmitter/Subassembly Complement.

TITLE	COLLINS PART NUMBER
Receiver-transmitter chassis A1	629-3406-001
Sideboard assembly	635-5157-001
Sideboard	601-3667-001
Rf mixer A2	629-3403-001
Broadband amplifier A3	601-3671-001
Power supply A4	601-3670-001
If/af amplifier A5	629-3405-001
Electrical components assembly	635-4676-001
If/af card A5A1	601-3668-001
Logic/Tx card A5A2	601-3669-001
Frequency synthesizer A6	629-3402-001
Frequency generator A6A1	609-2467-001
Frequency standard A6A1A1	601-3877-001
Fixed frequency divider A6A1A2	601-3876-001
Lf phase-lock loop A6A1A3	601-3879-001
Frequency converter A6A1A4	601-3878-001
Hf generator A6A2	609-2469-001
Voltage regulator A6A2A1	601-3874-002
Variable frequency divider A6A2A2	601-3875-002
Hf phase-lock loop A6A2A3	635-8154-001



Receiver-Transmitter Subassembly Location
Figure 1

Table 2. Associated Equipment.

EQUIPMENT	TYPE	FUNCTION
Receiver-transmitter control	377L-2	Selects frequency and mode of operation.
Power amplifier-coupler	548S-1	Provides 100 watts +1.0 - 3 dB pep or average into 50 ohms with 1.3:1 vswr.
Amplifier-coupler	549A-2	Provides 20 or 2 watts/average ±1.5 dB into 50-ohm load.
Amplifier-coupler	549C-1	Provides 150 watts pep and average.

Table 3. Receiver-Transmitter Equipment Specifications.

CHARACTERISTIC	SPECIFICATION
Electrical	
Primary power input	22 to 30 V dc (25.2 V dc nominal), 60 watts nominal on transmit and 1.5 watts nominal on receive
Frequency range	2.0000 to 29.9999 MHz (100-Hz increments)
Number of channels	280 000
Frequency stability	±0.8 ppm at −40 to +65 °C (−40 to +149 °F); ±1.0 ppm at −54 to −40 °C (−65.2 to −40 °F)
Tuning	Automatic (3 seconds nominal)
Operational modes	USB (voice or cw), LSB (voice or cw), AME (USB voice), data (USB/LSB NB secure voice), and RCV only (keyline function)
Warm-up time	Within 30 seconds with temperature between −54 and +65 °C (−65.2 and +149 °F).
Duty cycle	Continuous operation with single tone modulation at rated pep.
Transmit	
Power output	250 mW pep into a 50-ohm resistive load.
Audio input (voice)	−56 to −26 dB mW (600-ohm input)
Audio input (data)	0 dB mW nominal (−6 ±2 dB to +10 dB mW) level (600-ohm input)
Intermodulation distortion	At least 33 dB below pep of two tones modulating equipment to rated power of 250 mW pep.
Carrier suppression	45 dB below the output level of a single tone modulating the transmitter to 250 mW pep
Harmonic suppression	25 dB below the output level of a single tone modulating the transmitter to 250 mW pep
Sidetone	Transmit sidetone audio supplied to headset via receive audio circuits, 6 dB below receiver audio level
Receive	
Sensitivity	
USB/LSB	−113 dB mW, 50-ohm rf input for a signal+noise/noise ratio of not less than 10 dB
AM	−102 dB mW, 30% modulation, 50-ohm rf input for a signal+noise/noise ratio of not less than 10 dB
Selectivity	
USB	Not more than −3 dB at +600 to +2700 Hz Not more than −6 dB at +350 to +3200 Hz Not less than −60 dB at −450 and +6700 Hz
LSB	Not more than −3 dB at −600 to −2700 Hz Not more than −6 dB at −350 to −3200 Hz Not less than −60 dB at −450 and −6700 Hz

Table 3. Receiver-Transmitter Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
AM	±1.5 dB, F_o ±2 kHz; ±4.5 dB, F_o ±2.75 kHz; -60 dB min, F_o ±11.5 kHz
Data/CW	Same as USB and LSB
If rejection	Not less than 70 dB
Image rejection	Not less than 60 dB
AGC (automatic gain control)	Not more than 3 dB variation with input range 3 μV to 100 mV
Cross modulation	In the AME mode, 50 μV desired signal, a 0.5-volt undesired signal ±10% from operating frequency produces NMT -10 dB cross modulation.
Audio output (voice and CW)	Minimum of 10 mW into 600-ohm (adjustable at control unit)
Audio output (data)	0 dB mW ±3 dB into 600 ohm, USB or LSB
Environmental	
Temperature	
Operating	-54 to +65 °C (-65.2 to +149 °F)
Storage	-60 to +75 °C (-76 to +167 °F)
Operating altitude	3 048 metres (10 000 feet)
Operating humidity	95% relative humidity
Physical	
Length	174.8 mm (6.85 in)
Width	77.7 mm (3.059 in)
Height	168.4 mm (6.63 in)
Weight	2.0 kg (4.41 lb)

Table 4. Related Publications.

PUBLICATION	PART NUMBER
377L-2 Receiver-Transmitter Control	523-0772049

Rockwell International

671V-2 Receiver-Transmitter

installation

Collins Telecommunications Products Division

Printed in USA

523-0772059-001218
1 November 1982

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1. UNPACKING AND INSPECTION

The equipment should be handled with care when unpacking. Carefully remove the equipment from its container. Inspect the equipment for possible damage that may have occurred in shipment. If damage is found, notify the hearest Rockwell-Collins agency. Check the equipment against the packing list. Save the original container, fillers, and packing material for use when the equipment is repacked for storage or reshipment.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

2. PREPARATION FOR STORAGE/RESHIPMENT

Pack the equipment in its original container (if available). Brace the equipment in the same manner used for original shipment. Pack the container with filler for protection of the equipment during storage or shipping. Include desiccant in the packing to absorb moisture.

3. PREINSTALLATION CHECK

The equipment has been properly aligned and tested before delivery. However, to ensure proper functioning of the equipment prior to installation, a preinstallation test should be performed. Refer to performance test procedures in the maintenance section. Successful completion of the tests indicates that the equipment is functioning within acceptable limits.

4. CABLING

Control cabling may be required from the receiver-transmitter to the system power amplifier and the system control. Observe the following precautions when installing interconnecting wiring.

a. For audio and microphone line connections, use twisted shielded wire for minimum pickup of electrostatic and magnetic fields.
b. Keep connecting cables away from circuits carrying pulses or other sources of potential interference.
c. Leave sufficient slack in wires to prevent damage due to vibration and to provide for disconnecting the cables when removing an equipment item.
d. Avoid sharp bends in all cables.

5. INSTALLATION PROCEDURES

The following procedures are basic to attaining a good operational installation for the receiver-transmitter. Refer to figure 1 for outline and mounting dimensions.

5.1 Location Considerations

The receiver-transmitter and its associated equipment should be located where the temperature range will not exceed -54 to +65 °C (-65.2 to +149 °F). Consideration should be given to ease of access to the equipment for maintenance purposes.

The receiver-transmitter should be located as far away as possible from electrostatic and magnetic field generating equipment to prevent unwanted noise pickup.

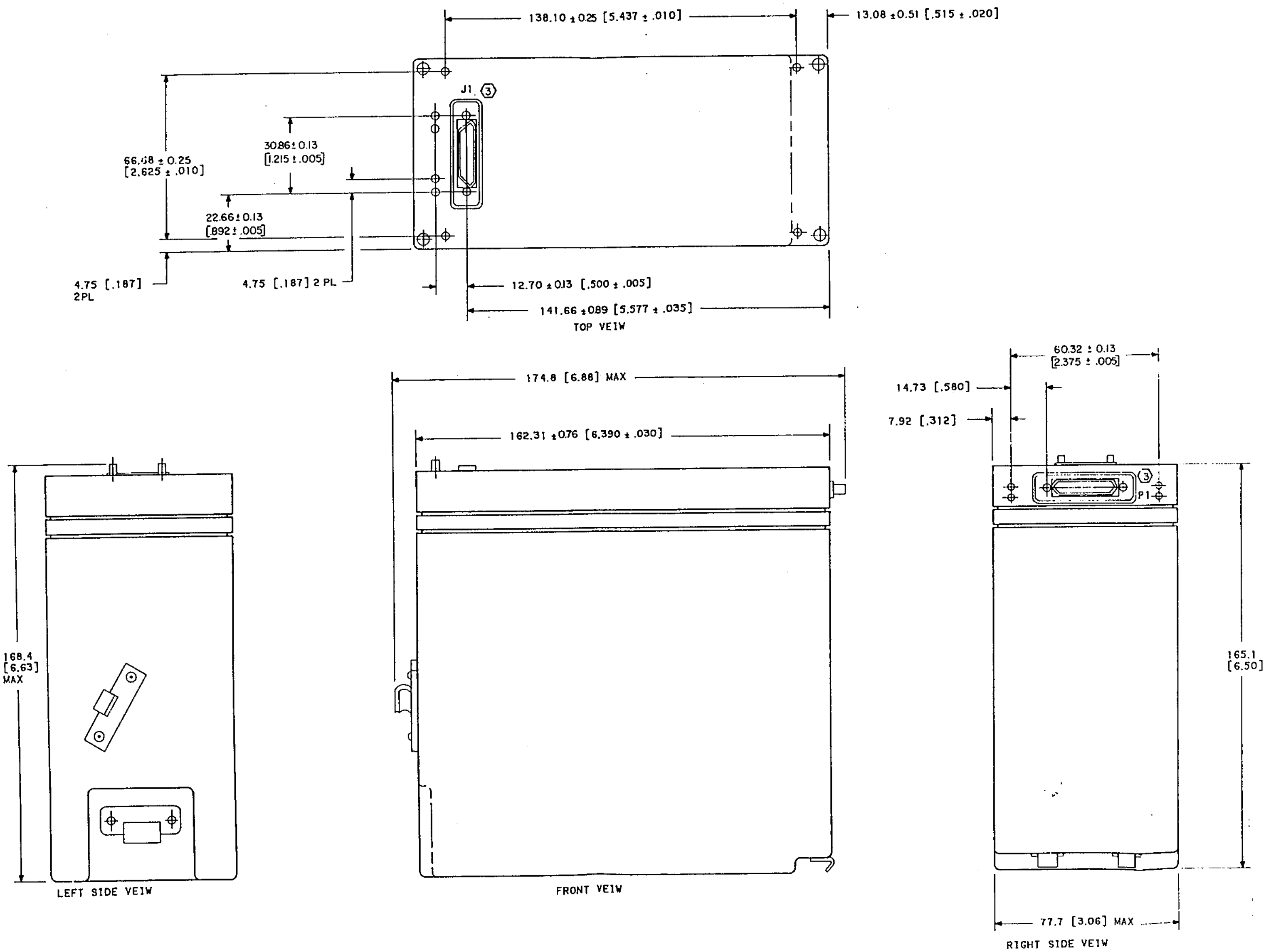
Additionally, consideration must be given to keeping the wiring/cabling lengths as short as possible.

5.2 Receiver-Transmitter Installation

Caution

Use care when mating the receiver-transmitter to the control and other associated equipment to avoid damage to the pin contacts on the connectors of the receiver-transmitter.

a. Carefully align the guide pins of the receiver-transmitter to their matching guide holes on the control.
b. Push the receiver-transmitter and control together carefully until the connector of the receiver-transmitter mates with the connector of the control.
c. Secure the control to the receiver-transmitter by tightening the four captive screws (one at each corner) located on top of the control.
d. The receiver-transmitter/control assembly may now be attached to a number of different pieces of equipment. The same care should be taken in mating to these components. Refer to an applicable hf communication system instruction book for a typical installation procedure.



NOTES:

1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. WEIGHT: 2.0 kg [4.41 LB].
3. CONNECTOR DATA

REF DES	CONN PART NO.
J1	426-0073-010
P1	426-0073-010

TPA-5934-014

Outline and Mounting Dimensions
Figure 1

671V-2
Receiver-Transmitter

Rockwell International

operation

Collins Telecommunications Products Division

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1 November 1982

The 671V-2 Receiver-Transmitter has no external operating controls or indicators; therefore, the operation section is not required.

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671V-2 Receiver-Transmitter

Rockwell International

theory

Collins Telecommunications Products Division

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1. GENERAL

This section provides functional theory of the 671V-2 Receiver-Transmitter to the circuit card/module/subassembly level. Functional and detailed theory for the individual circuit cards/modules/subassemblies is presented in the subassembly section of this instruction book.

2. FUNCTIONAL THEORY

The receiver-transmitter has two main functions: frequency translation and amplification. In receive operation, the receiver-transmitter translates incoming rf signals to audio; in transmit operation, it converts audio signals to rf.

2.1 Receive Function

Refer to figure 1, block diagram. The receiver-transmitter is capable of receiving USB voice and CW, LSB voice or CW, and AME voice over the entire frequency range. If the control has a receive only mode, the receiver-transmitter uses the keyline function making transmit impossible. The receiver-transmitter is capable of receiving narrow-band secure voice data signals in either USB or LSB over the frequency range of 2.0000 to 29.9999 MHz.

The receive rf signal from the antenna input circuits is applied to the receive-transmit relay in the broadband amplifier. In receive, this relay bypasses the amplifier and connects the antenna rf signal to the rf mixer where it is converted to a 5-MHz if signal.

The rf mixer consists of two mixer circuits and a 115-MHz filter. The first mixer circuit mixes the rf signal with a variable injection signal (117 to 144.9999 MHz) from the frequency synthesizer. The variable injection frequency is controlled by frequency selectors on the control. The output of the first mixer is passed through a 115-MHz bandpass filter to the second mixer. In the second mixer, the 115-MHz if signal is mixed with a 110-MHz injection signal to produce a 5-MHz if signal. The 5-MHz if signal is fed to the if/af amplifier where it is converted to an audio signal.

The if/af amplifier performs USB, LSB, or AM detection depending on the position of the MODE selector on the control. The detection circuits receive a 5-MHz injection signal from the frequency synthesizer. The volume control on the control sets the audio input level of the if/af amplifier. The receive audio in the if/af amplifier is then applied to the I/O device(s) at the control.

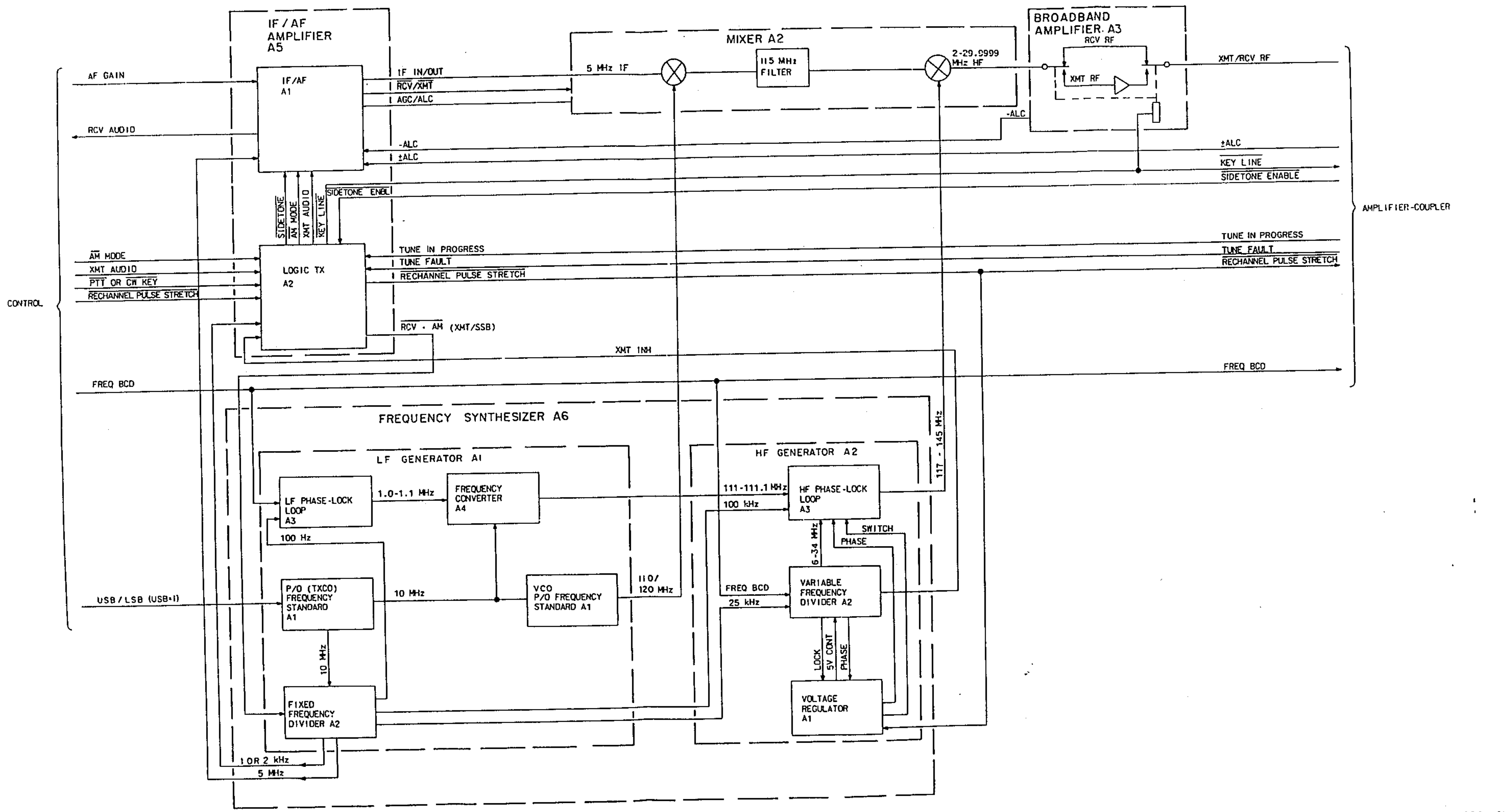
2.2 Transmit Function

Refer to figure 1, block diagram. The receiver-transmitter is in the transmit mode whenever the ptt or CW keyline is closed. During CW operation, a delay circuit in the if/af amplifier maintains the transmit mode during normal CW key open periods (1 second maximum).

The transmitter is capable of emission of USB/LSB voice, CW, and data. The data mode will transmit narrow-band secure voice signals using either USB or LSB. In AM transmission, the transmitter AME output will be a USB signal with reinserted carrier frequency.

In voice operation, the transmit audio signal is passed through a filter in the control to the if/af amplifier where the voice signal is amplified and applied to a balanced modulator. The balanced modulator uses a 5-MHz injection signal from the frequency synthesizer to produce a 5-MHz double-sideband signal, which is passed through a SSB filter to produce a single-sideband (SSB) signal. In AM, the 5-MHz carrier is reinserted after the SSB filter to produce an equivalent AME signal consisting of the SSB signal and a 5-MHz carrier.

In CW operation, the CW keyline is filtered in the control and applied to the if/af amplifier in the receiver-transmitter. A CW keying circuit in if/af amplifier applies a keyed 1- or 2-kHz signal to the input of the balanced modulator. The 1- or 2-kHz signal is obtained from the frequency synthesizer.



671V-2 Receiver-Transmitter, Block Diagram
Figure 1

The rf mixer converts the 5-MHz voice or CW if signal to an rf signal of the desired frequency. The rf mixer consists of two mixers and a 115-MHz bandpass filter. In the first mixer circuit, the 5-MHz if signal is mixed with a 110/120-MHz injection signal from the frequency synthesizer. The output of this mixer is fed through a 115-MHz bandpass filter to the second mixer. In the second mixer, the 115-MHz if signal is mixed with a variable injection frequency (117 to 145 MHz) from the frequency synthesizer to produce the desired rf signal frequency. The variable injection frequency is controlled by frequency selectors on the control. The output of the rf mixer is amplified to approximately 250 mW by the broadband amplifier and applied to an amplifier-coupler.

The receiver-transmitter is equipped to monitor transmission by sidetone in all transmission modes. During transmit, the sidetone transmit is supplied to the headset or handset via the receive audio circuits. There are three conditions when the sidetone gate is biased on: when (1) tuning is in progress (TIP), a 1-kHz tone is heard; (2) an amplifier-coupler fault occurs, a pulsating 1-kHz tone is heard or (3) when there is a forward-power output from amplifier-coupler, audio is heard. In USB/LSB mode, the sidetone gate remains on for approximately 1 second after the absence of voice.

2.3 Tuning Functional Theory

Whenever power is turned on or a new frequency is selected, the control applies a rechannel pulse to the if/af amplifier of the receiver-transmitter. The if/af amplifier processes the rechannel pulse and applies it to the frequency synthesizer. The frequency synthesizer generates a new variable injection frequency based on binary coded decimal (bcd) information received from the frequency selector on the control. During synthesizer frequency changing, the transmit circuit is disabled. When the frequency changing is complete, the receive circuits are operational, but the transmit circuits are disabled. Final tuning is initiated by momentarily pressing the ptt switch or the CW key at the control. A 1- or 2-kHz audio tone is applied to the operator's headset indicating that tuning is completed.

2.4 RF/IF/AF Signal Path

2.4.1 Receive Signal Path

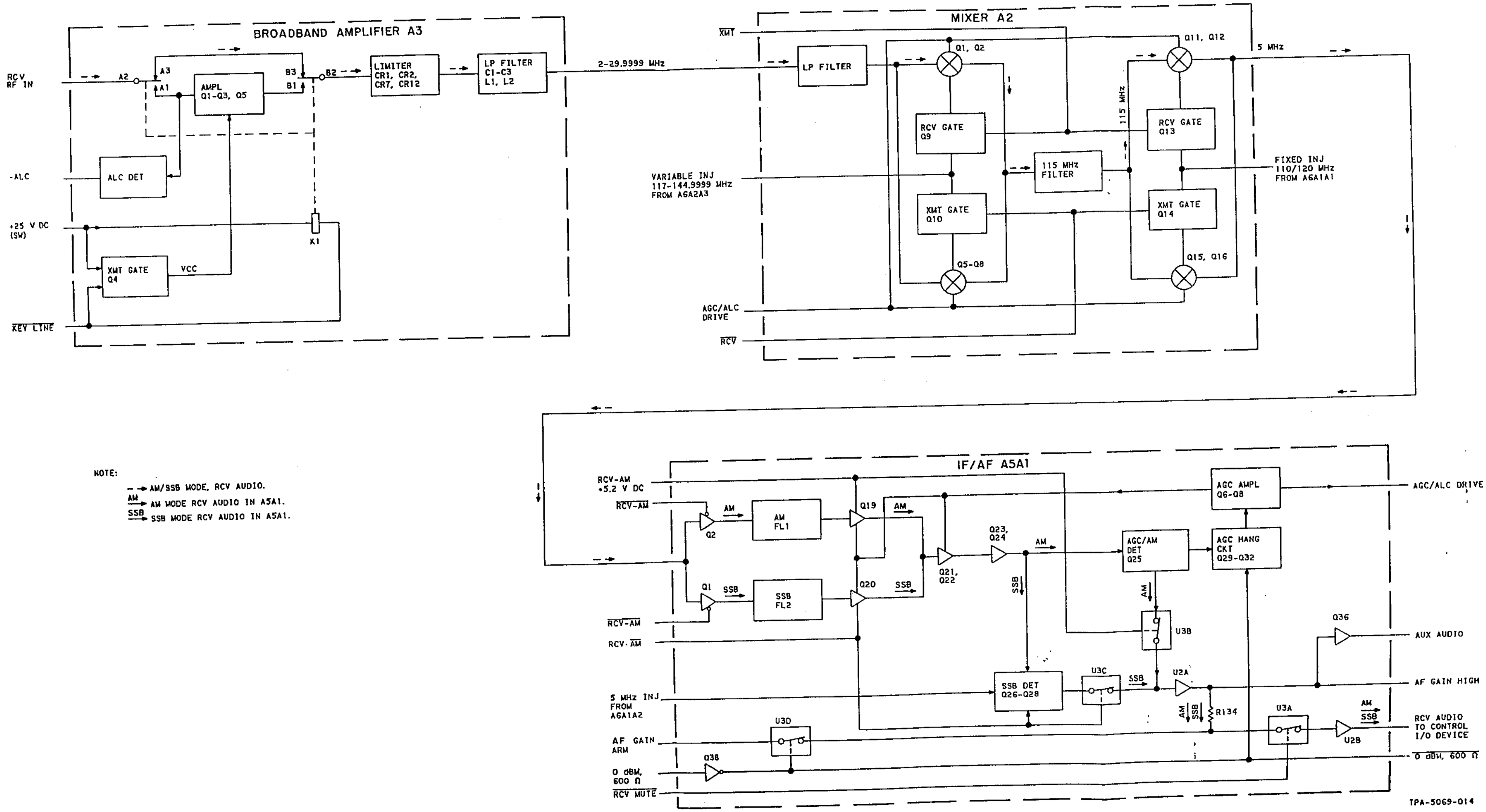
Refer to figure 2, block diagram. At the control for the receiver-transmitter, the operator will select the mode of operation and the operating frequency. With the control turned on, tuning is completed within 3 seconds, and the receiver-transmitter is unkeyed and ready for receive operation.

The received signal is coupled from an amplifier-coupler through the chassis to relay K1 in the broadband amplifier. In receive operation, the relay is de-energized and routes the received rf through the limiter and low-pass filter network to the rf mixer.

In the rf mixer, the rf signal from the broadband amplifier passes through a filter network into mixer Q1 and Q2. Here the received rf signal is mixed with a 117- to 144.9999-MHz variable injection frequency to obtain the 115 MHz if. The 115-MHz if is passed through a 115-MHz filter and applied to second mixer Q11 and Q12. Here the 115 MHz-if is mixed with one of two fixed injection frequencies. For USB or AM mode, the injected frequency will be 110 MHz; whereas, if in LSB mode, the injected frequency will be 120 MHz, producing the 5-MHz difference frequency. The 5 MHz-if signal is then coupled to the if/af amplifier.

The if signal from the rf mixer is applied to switching amplifiers Q1 and Q2. In AM mode, the 5-MHz if signal is applied to AM filter FL1 through switching amplifier Q2, amplified by Q19, Q21-Q24 and applied to AGC/AM detector Q25. The output of AGC/AM detector Q25 is applied to first audio amplifier U2A through AM switch U3B. The output of audio amplifier U2A passes through an af gain control circuit controlled by a variable resistor (af gain) on the control. The receive signal is then applied to audio amplifier U2B through audio mute gate U3A. The amplified receive audio signal from U2B is coupled through the chassis for routing to audio I/O device(s) connected to the control.

In USB/LSB mode, the 5-MHz receive if enters the if/af amplifier on the same signal path as the AM receive if. The receive if is applied to SSB filter FL2 via switching amplifier Q1, amplified by Q19, Q21-Q24 and applied to SSB detector Q26-Q28. Here the receive if is mixed with a 5-MHz injection signal from the frequency synthesizer. The resultant USB/LSB af output from Q27 is applied to first audio amplifier U2A via SSB switch U3C. The USB/LSB audio amplifiers are the same as discussed in AM receive mode.



Receiver Signal Path, Block Diagram
Figure 2

2.4.2 Transmit Signal Path

Refer to figure 3, block diagram. The mode of operation, USB/LSB or AM and function, transmit-receive (T/R), will be selected at the receiver-transmitter's control. The receiver-transmitter input audio will be from the control audio input device, handset, headset, key or data terminal.

In transmit, the audio is applied to the logic/tx card for audio compression amplification. XMT audio is coupled through attenuator Q12 to rf amplifier U8B and applied to the if/af card. The af output is also applied to af amplifier U8A, AGC detector Q11, AGC attenuators Q12, Q15 to maintain a constant level of audio output. In CW, the 1-kHz audio is coupled through gate/filters (Q5, Q6, Q16) to af amplifier U8B and then is applied to the if/af card. In voice/data mode, 0 dB mW 600 ohm, the af is applied to gain change stage Q13 and Q14 prior to attenuator Q12 as in XMT audio input.

The output audio from the logic/tx card is applied to balance modulator U1 in the if/af card. Here it is mixed with a 5-MHz injection signal to produce a double-sideband suppressed carrier output signal. The signal is then applied to SSB filter FL2 which passes only the lower sideband.

In USB/LSB mode, the signal is amplified (Q3) and coupled to the rf mixer. If in AM mode, filter FL2 output is applied to carrier insert gate Q4. This allows the 5-MHz carrier to be added to the SSB output of amplifier Q3, producing an AM equivalent (AME) signal. The AM mode output is then coupled to the rf mixer. Transmit audio sidetone is supplied to the headset via receive audio circuits as previously discussed in paragraph 2.2.

The output audio from the if/af card is applied to the first mixer stage (Q15, Q16) of the rf mixer. The receive and transmit mixers are controlled by switching logic ($\overline{RCV}/\overline{XMT}$). Here the 5-MHz AME or SSB signal is mixed with the fixed injection frequency from the frequency standard. In LSB mode, the injection frequency is 120 MHz; in USB or AM modes, the injection frequency is 110 MHz. The 115-MHz output is applied to the 115-MHz filter and applied to the second mixer Q5 and Q8. The 115-MHz signal is mixed with the variable 117- to 144.9999-MHz injection frequency from hf phase-lock loop to produce the operating rf frequency of 2 to 29.999 MHz. The operating rf signal is passed through a low-pass filter and coupled to the broadband amplifier.

The output from the rf mixer is applied to a low-pass filter network in the broadband amplifier and then to limiter CR1. In transmit, keying relay K1 is energized routing the rf signal to rf amplifier Q1-Q3 and Q5. Here it is amplified to approximately 250 mW and applied to an amplifier-coupler.

2.5 Frequency Synthesis

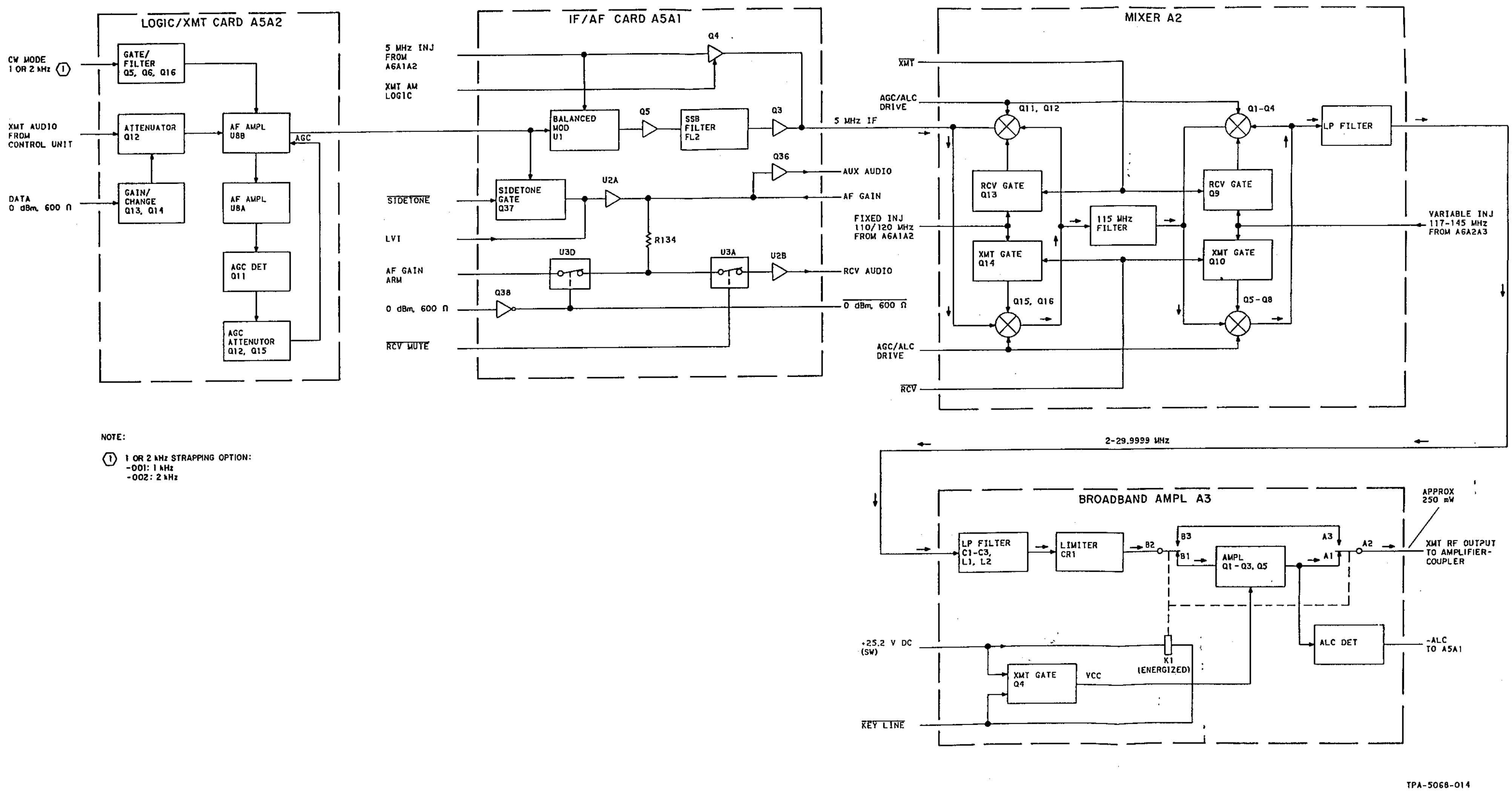
2.5.1 General

All fixed and variable injection signals used in the receiver-transmitter are generated within the frequency synthesizer. The module consists of seven subassemblies divided into two major functional categories: the lf generator and hf generator subassemblies.

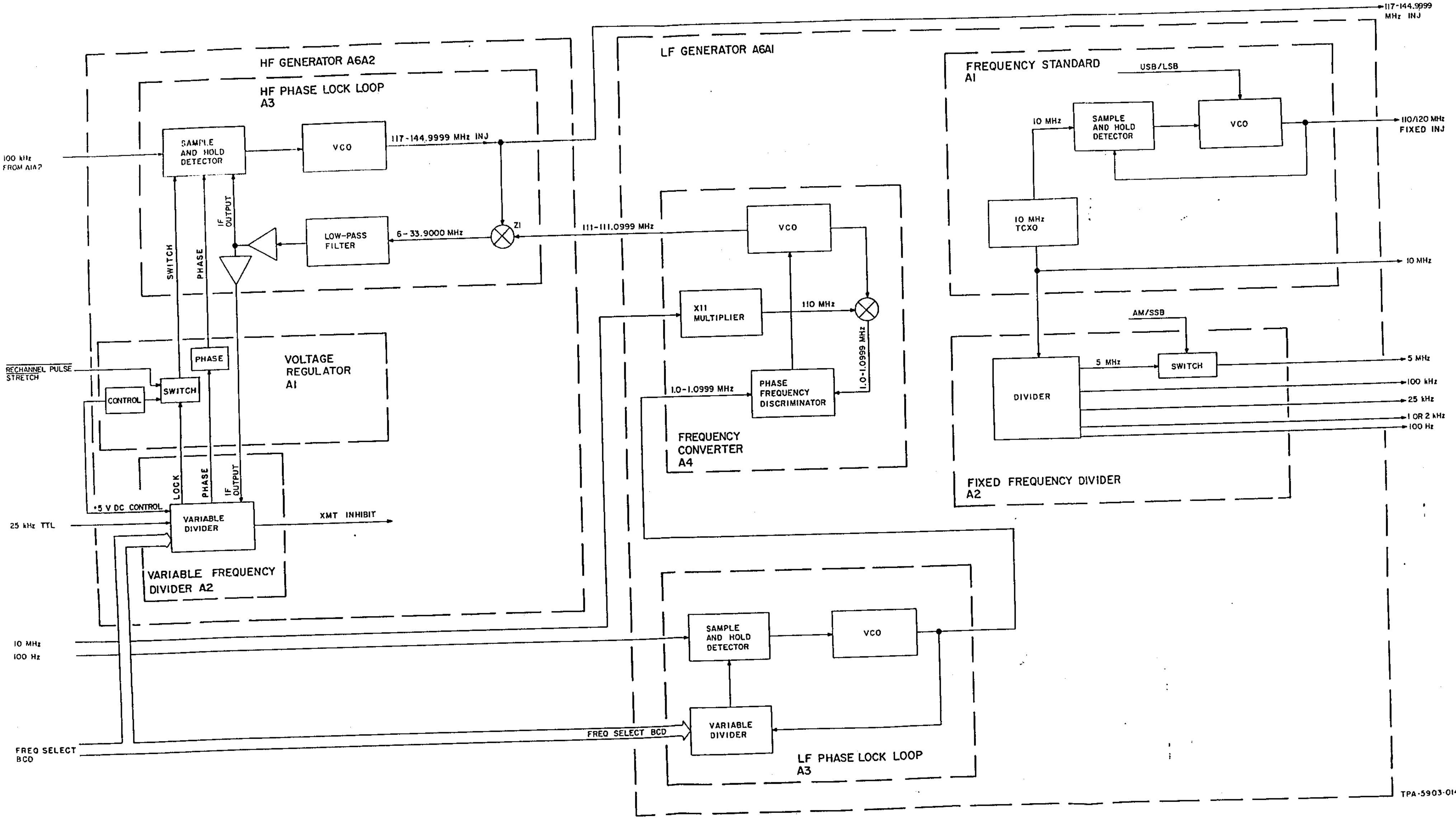
2.5.2 Frequency Synthesizer

Refer to figure 4, block diagram, for the following discussion. The purpose of the frequency synthesizer is to provide the following: a variable frequency to the rf mixer that will be of a frequency in the 117- to 144.999-MHz range in 100-Hz increments; two fixed frequencies of 110 and 120 MHz to the rf mixer; a 5-MHz fixed frequency to the if/af amplifier; and either a 1- or 2-kHz frequency (selected by hardwired strapping) to the if/af amplifier. The variable frequency is controlled by bcd control information and the rechannel signal. The selection of 110 or 120 MHz is controlled by a single logic line, as is the on/off switching of the 5-MHz signal.

The synthesizer uses four phase-locked loops. One phase-locked loop is used to generate the 110/120-MHz fixed injection frequency. The remaining phase-locked loops are used to develop the 117- to 144.9999-MHz variable injection frequency. Of this group, low frequency (lf) phase-locked loop A1A3 provides the 1.0 to 1.0999 MHz to frequency converter A1A4. The frequency converter is a phase-locked loop for frequency translation of the variable 1.0 to 1.0999 MHz to the variable higher frequency, ranging from 111.0 to 111.0999 MHz. Variable frequency divider A2A2 controls high-frequency (hf) phase-locked loop A2A3. The variable divider operates only during frequency acquisition to provide frequency-phase discrimination control to a voltage-controlled oscillator (vco) until digital phase lock is completed. Once digital phase lock has been achieved, control of the vco is transferred to the sample-and-hold phase detector and the digital phase-locked loop is turned off. The variable divider, controlled by the frequency bcd inputs from the control, generate a divider input



Transmit Signal Path, Block Diagram
Figure 3



Frequency Synthesizer, Block Diagram
Figure 4

frequency within the 6- to 34-MHz range as an output of the mixer stage of the high-frequency phase-locked loop. The high-frequency phase-locked loop vco output frequency (117 to 144.9999 MHz) is combined with the variable output frequency of the converter (111 to 111.0999 MHz) in the mixer to provide the variable divider input frequency of 6 to 33.999 MHz. The variable divider provides the transmit inhibit signal to the if/af amplifier during a rechanneling cycle. Voltage regulator A2A1 circuits provide stable dc voltages to the frequency synthesizer circuits.

The lf phase-locked loop (A1A3), controlled by the bcd frequency data selected at the control and the 100-Hz signal from fixed frequency divider A1A2, generates and supplies to frequency converter A1A4, a phase-locked frequency that can be varied from 1.0 to 1.0999 MHz. Frequency standard A1A1 uses a temperature-compensated crystal oscillator (tcxo) to generate a stable 10-MHz frequency that is applied to frequency converter A1A4 and fixed frequency divider A1A2 circuits of the low-frequency generator. The 10-MHz input to the frequency converter is multiplied to 110 MHz and combined with the output frequency of the lf phase-locked loop in the mixer circuits of the frequency converter. This produces a frequency between 111 and 111.0999, depending on the output frequency of the lf phase-locked loop. The 111- to 111.0999-MHz signal is applied to the high-frequency (hf) phase-locked loop of the high-frequency generator. The 10-MHz input to the fixed frequency divider from the frequency standard is divided by 2 to provide a stable 5-MHz output and further divided to provide either a 1- or 2-kHz output and the 100-Hz lf phase-locked loop. The 1- or 2-kHz output is supplied to logic/tx card A2 of the if/af amplifier as a tone signal for CW keying or tuning indication. The 10-MHz tcxo output is applied to the pulse shaper which forms the reference for the 110/120-MHz phase-locked loop. The 110/120-MHz signal is required as an injection frequency for the rf mixer circuits. The 110-MHz signal is selected when in USB mode and 120 MHz is selected for the LSB mode. The 110/120-MHz signal is used as the fixed injection frequency referred to during the discussion of the operation of the rf mixer. The 5-MHz signal applied to the if/af amplifier is used by the SSB modulate/demodulate circuits and as the reinserted carrier in the AM circuits. It is switched on and off by the AM/SSB logic signal.

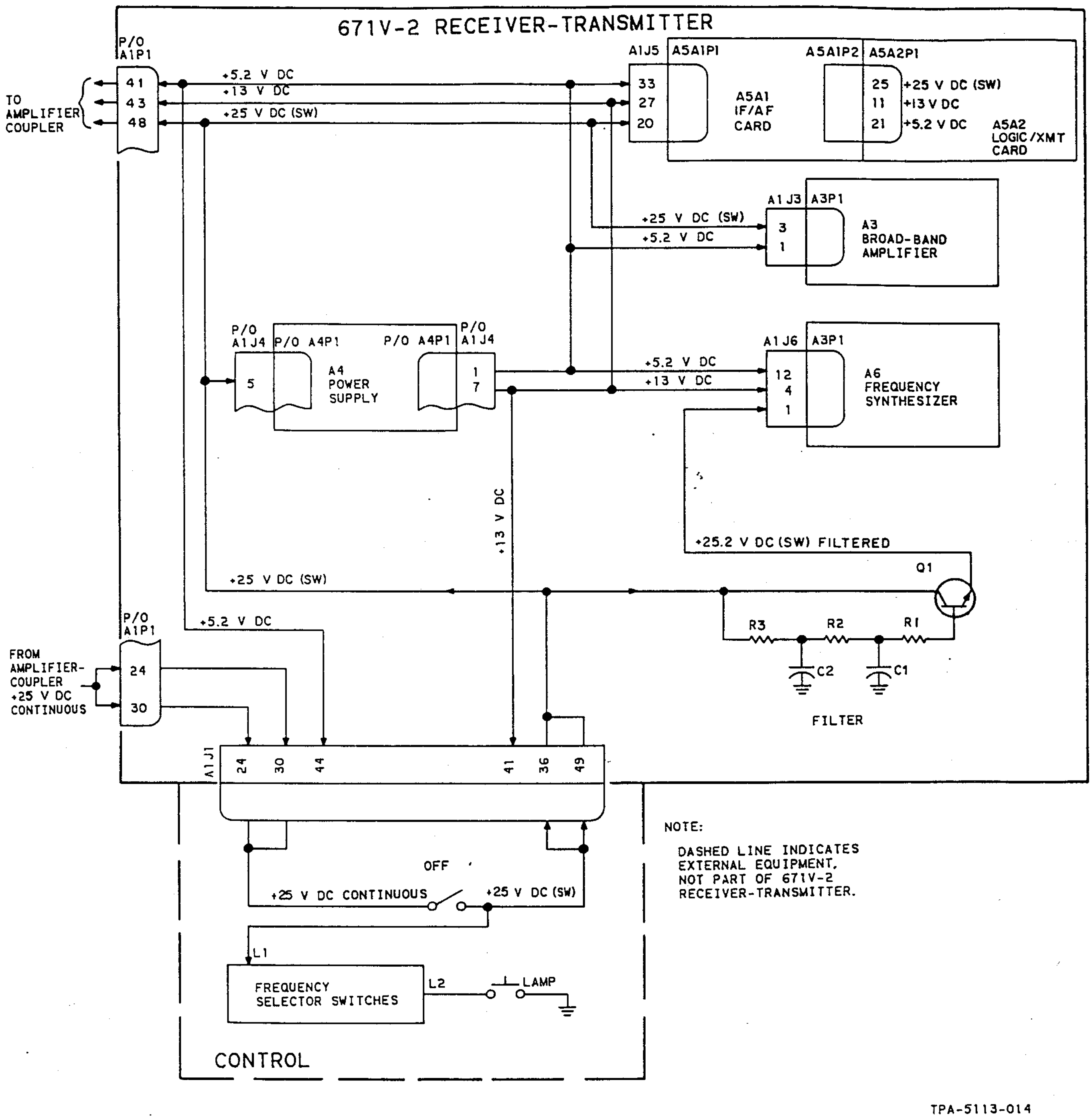
2.6 Power Distribution

Refer to figure 5. The +25.2-V dc continuous voltage from an amplifier-coupler is applied through chassis P1-24 and 30 to the control via J1-24 and 30. When the equipment is turned on at the control, the +25.2-V dc continuous voltage becomes +25.2-V dc switched (SW) and is applied to chassis J1-26 and 49 for distribution to the following receiver-transmitter circuits: power supply, broadband amplifier, if/af amplifier, 25.2-V dc filter network, and chassis P1-48 to the amplifier-coupler. The output of the 25.2-V dc filter circuit becomes +25.2 V dc (SW and FLTR) and is applied to the frequency synthesizer via chassis J6-1.

The +25.2 V dc (SW) applied to the power supply via chassis J4-5 is converted to regulated +5.2 V dc and +13 V dc. The +5.2 and +13 V dc is applied to the if/af amplifier, and frequency synthesizer, while +5.2 V dc is applied to the broadband amplifier. The +25.2 V dc (SW), +5.2 V dc and +13 V dc are also routed to the amplifier coupler through A1P1-41-43-48.

2.7 Receiver-Transmitter Chassis

Refer to the chassis schematic diagram in the diagrams section. The chassis has eight connectors, J1 through J7, and P1, and a number of filtering capacitors. The eight connectors provide interconnection between modules A2 through A6, the control and the amplifier-coupler. A dc filter circuit for +25.2 V dc (SW) is also provided. The filter circuit, Q1, capacitors C1 and C2, and resistors R1 through R3 are energized when the +25.2 V dc (SW) is switched on at the control. The +25.2 V dc (SW) turns on Q1. This results in a +25.2-V dc (SW and FLTR) output from the filter network, C1, C2, and R1 through R3 to connector J6 of the chassis. When the +25.2 V dc (SW) is switched off at the control, transistor Q1 is turned off, cutting off the +25.2 V dc (SW and FLTR) to chassis J6.



DC Power Distribution, Block Diagram
Figure 5

671V-2
Receiver-Transmitter

Rockwell
International

maintenance

Collins Telecommunications Products Division

Printed in USA

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1. GENERAL

This section contains information necessary to maintain the receiver-transmitter. Testing and troubleshooting procedures isolate malfunctions to the circuit card/module or chassis-mounted components. Figure 1 shows the subassembly locations.

Warning

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be utilized to prevent equipment damage. Refer to paragraph 6.3, Electrostatic Discharge Sensitive Devices Precautions, before performing maintenance on the equipment.

This section also includes disassembly/assembly procedures and circuit card postcoating information.

2. TEST EQUIPMENT

Table 1 lists all test equipment required to test and troubleshoot the receiver-transmitter. If the specified test equipment is not available, equivalent items may be substituted. All circuit card repair procedures are presented in this section. All test equipment required for testing the circuit cards are presented in this section. Table 2 presents a usage table for test equipment.

3. TESTING/TROUBLESHOOTING

3.1 General

The following paragraphs contain information on test setups, performance testing, and troubleshooting.

The minimum performance test/troubleshooting procedures in table 3 determine the overall operational quality of the receiver-transmitter. These tests should be performed upon initial installation of the equipment, after equipment has been repaired, or any time degradation of performance is suspected.

The tests can be performed in any sequence, but the steps within each test must be followed in sequence. Each test may be performed as an individual test or as part of the overall system test. For any test in table 3 that does not meet or exceed the requirements of the NORMAL INDICATION column, follow the directions listed in the IF INDICATION IS ABNORMAL column.

3.2 Testing/Troubleshooting Procedures

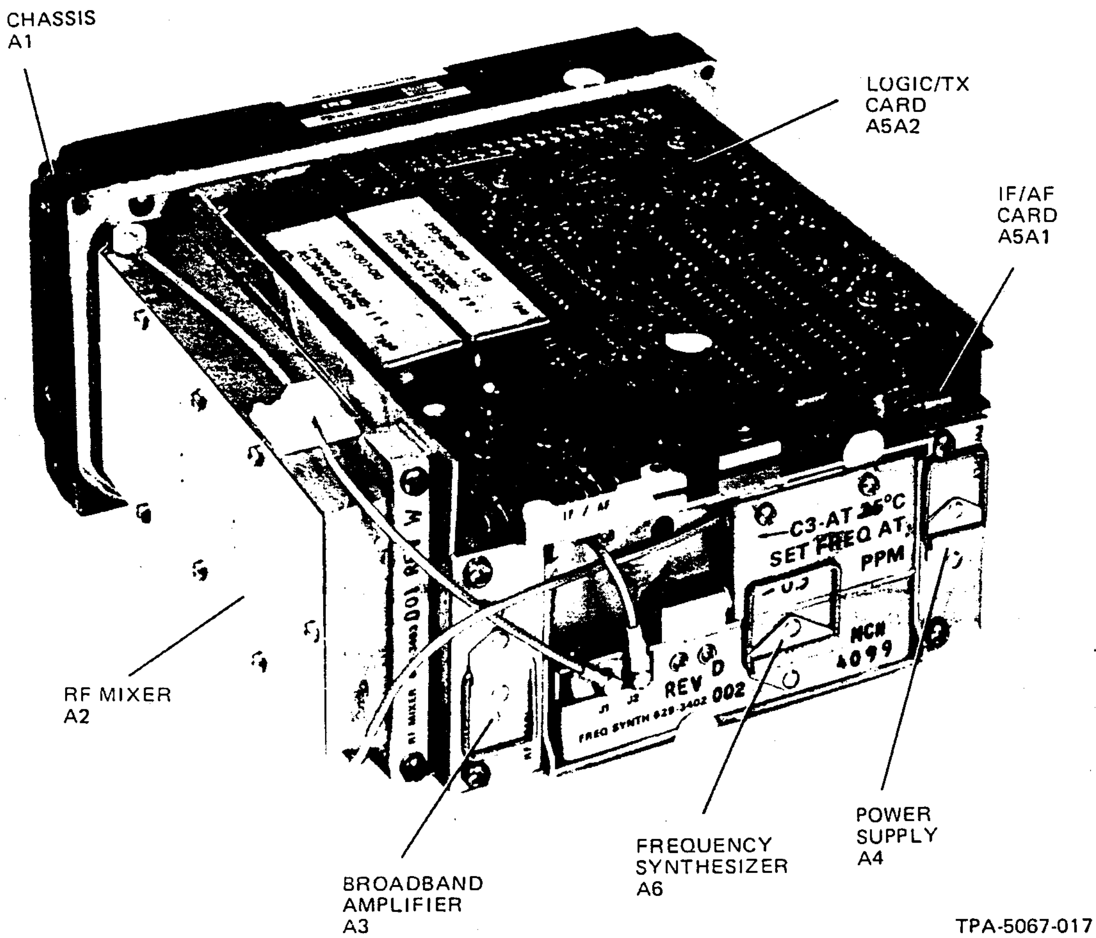
The test procedures in table 3 may also be used for isolating a malfunction in the receiver-transmitter. Perform the necessary tests in the sequence given and follow the directions listed in the IF INDICATION IS ABNORMAL column.

Testing and troubleshooting of the receiver-transmitter is accomplished in its operational environment; connected as shown in test setups, figures 2 and 3. Control of the receiver-transmitter for operation and self-test is provided by a system control. When performing the tests, it is assumed that all other system equipment is fully operational. All testing starts with system power applied to the receiver-transmitter. When a defective subassembly is replaced, the procedures should be repeated to verify all faults have been corrected.

Caution

Always set the receiver-transmitter PRI POWER ON switch to off position before removing or replacing any cards/modules.

Refer to figure 1 for identification and location of all card/modules. When it is determined that a specific card/module is malfunctioning, it will be necessary to replace the defective card/module. Refer to paragraph 4 for disassembly/assembly procedures.



Receiver-Transmitter Subassembly Location
Figure 1

Table 1. Test Equipment Required.

ITEM	MINIMUM SPECIFICATION	REPRESENTATIVE TYPE
969J-2 Radio Test Set		MFR PN 622-2775-001
969J-3 Radio Test Set		MFR PN 622-2778-001
970B-1 (power supply test adapter)		MFR PN 622-2781-001
970B-2 (broadband amplifier test adapter)		MFR PN 622-2782-001
970B-8 (if/af test adapter)		MFR PN 622-2788-001
970B-12 (frequency synthesizer test adapter)		MFR PN 622-2792-001
942B-1 (electrical frequency synthesizer)		MFR PN 622-2780-001
970B-13 (mixer test adapter)		MFR PN 622-2793-001
970B-14 (logic/tx test adapter)		MFR PN 622-3686-001
639W-1 (power supply)		MFR PN 622-2779-001
Attenuator (2 required)	6 dB	Weinschel 1506A measurements 80-ZH3
Attenuator, audio		HP-350B
Attenuator, audio	0-110 dB/5-watt/600 ohm	HP-350D
Attenuator, rf (2 required)	20 dB/20-watt/50 ohm	Weinschel 9214-20
Digital voltmeter	200 mV to 1200 V dc, ac, 200 ohm to 20 MΩ, 1200 V rms, maximum resolution 10 μV	Fluke 8600A
Distortion analyzer	5 to 600 kHz frequency high-input impedance, distortion levels from 0.1 to 100% dB scale	HP-334A
Frequency counter	5 Hz to 500 MHz, sensitivity 15 V rms high resolution	Fluke 1920A
Handset	600 ohm	MFR PN 635-5148-001
If load	500 ohm	Refer to item 10, figure 8 if/af card A5A1 test setup
Isolation transformer	600 ohm	HP-11005A
Mixer-attenuator	600 ohm	Customer fabricated; refer to figure 5.
Oscillator	1 Hz to 20 kHz, square-wave out	HP-204C
Oscilloscope		Tektronix 464

Table 1. Test Equipment Required (Cont).

ITEM	MINIMUM SPECIFICATION	REPRESENTATIVE TYPE
Power divider		Weinschel 1506A
Power supply	22 to 30 V dc (5 amp)	HP-6266B
Power supply	0 to 40 V dc (0.5 amp)	HP-6102A
Receiver-transmitter control	Mode - USB/LSB/AM Function - TR/RCV/0 dB mW 600 ohm (data)	377L-2
Resistor decade box (2 required)	0 to 100 000 ohms	Clarostat 240C
RMS voltmeter		HP-3400A
Rf voltmeter	With 50-ohm adapter	Boonton 92B-C-D/ 91-8B
Signal generator (2 required)	5 to 512 MHz AM and FM, 2 V rms into 50 ohms	HP-8640B with 001 and 003 option or fuse-holder 11509A
Spectrum analyzer	If section and 1-kHz to 120-MHz rf section required	HP-141T with 8552B if section, 8553B rf section, 8554B rf section
Voltage divider	100:1	Boonton 91-7C
Wave analyzer		HP-3581A

Table 2. Usage Table for Test Equipment.

TEST EQUIPMENT \ ASSEMBLY OR CARD USED ON	671V-2 RECEIVER/XMT	671V-2 CHASSIS A1	RF MIXER A2	BB AMPLIFIER A3	POWER SUPPLY A4	IF/AF CARD A5A1	LOGIC/TX CARD A5A2	FREQUENCY SYNTHESIZER A6
969J-2 Radio Test Set	X							
969J-3 Radio Test Set			X	X	X	X	X	X
970B-1 (power supply test adapter)					X			
970B-2 (broadband amplifier test adapter				X				
970B-8 (if/af test adapter)						X		
970B-12 (frequency synthesizer test adapter)								X
942B-1 (electrical frequency synthesizer)			X			X		
970B-13 (mixer test adapter)			X					
970B-14 (logic/tx test adapter)							X	
639W-1 (power supply)			X	X	X	X	X	X
Attenuator (2 required) 6 dB Weinschel 1506A	*		X	X		X		
Attenuator, audio, HP-350B	X							
Attenuator, audio, HP-350D						X	X	
Attenuator, rf (2 required) Weinschel 9214-20	X							
Digital voltmeter, Fluke 8000A	X	X	X	X	X	X	X	X
Distortion analyzer HP-333A/331	X		X			X		
Frequency counter, HP-5245L	X					X		X
Handset, 600 ohm	X							
If load, see table 1						X		
Isolation transformer HP-11005A	X					X	X	
Mixer-attenuator, 600 ohm	X					X	X	
Oscillator (2), HP-204C	X					X	X	
Oscilloscope, see table 1					X	X	X	

Table 2. Usage Table for Test Equipment (Cont).

TEST EQUIPMENT \ ASSEMBLY OR CARD USED ON	671V-2 RECEIVER/XMT	671V-2 CHASSIS A1	RF MIXER A2	BB AMPLIFIER A3	POWER SUPPLY A4	IF/AF CARD A5A1	LOGIC/TX CARD A5A2	FREQUENCY SYNTHESIZER A6
Power divider, Weinschel 1506A			X	X		X		
Power supply, HP-6266B	X							
Power supply, HP-6102A						X		
RCV/XMT control unit, 377L-2	X							
Resistor decade box (2 required), Clarostat-240C					X			
RMS voltmeter, HP-3400A						X	X	X
Rf voltmeter, Boonton 92B-C-D/91-8B			X	X		X		X
Signal generator (2 required) Refer to table 1	X		X	X		X		
Spectrum analyzer Refer to table 1	X		X	X		X		X
Voltage divider (100:1) Boonton 91-7C				X				
Wave analyzer, HP-3581A	X					X		

*Only one attenuator required for this test

Table 3. Receiver-Transmitter, Testing/Troubleshooting.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Test setup	a. Connect the test equipment as shown in figure 2 test setup A. b. On test fixture, set controls as follows: PWR to OFF CPLR PWR to R/E R/E PWR to EXT C/H-004 to OFF BAND INFO to R/E AUX AF to OFF RF GAIN control (adjust to maximum counterclockwise) RF GAIN switch to disable (up position) ALC switch to EXT EXT ALC switch to +13V EXT ALC control (ALC ADJ) to maximum counterclockwise AM-USB-LSB to USB $\overline{\text{KEY}}$, $\overline{\text{PTT}}$, $\overline{\text{CWK}}$, ST, FLT, $\overline{\text{RCL}}$, $\overline{\text{TIP}}$, $\overline{\text{RX MUTE}}$, and $\overline{\text{LP}}$ to disable (down position) $\overline{\text{RX}}$ $\overline{\text{ONLY}}$ to ENABLE ***Note*** L and C switches have no effect and can be in any position. c. On control, set MEGAHERTZ KILOHERTZ to 02.0000, function to RCV, MODE to USB, 0 dB mW 600 ohm to maximum ccw (but not to 0 dB mW 600 ohm). ***Note*** 0 dB mW 600 ohm control is the audio volume control hereafter referred to as volume control. On test fixture, set PWR to ON.		

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. Power check	a. Adjust 22 to 30 V dc power supply for 28 ±0.1 V dc and observe line current reading on 22 to 30 V dc power supply ammeter.	55 to 80 mA	If less than 55 mA, perform step b. If greater than 70 mA, replace in order, power supply, logic/tx card A2, if/af card A1, rf mixer, frequency synthesizer and broadband amplifier.
	b. Measure voltage at 24V test point on test fixture.	+28.0 to +28.4 V dc	Replace in order, power supply, broadband amplifier, and chassis A1.
	c. Measure voltage at +13V test point on test fixture.	+12.9 to +13.1 V dc	Replace in order, power supply, logic/tx card A2, if/af card A1, and frequency synthesizer.
	d. Measure voltage at +5V test point on test fixture.	+5.1 to +5.3 V dc	Same as above.
	e. On test fixture, set CWK to ENABLE and observe line current reading on 22 to 30 V dc power supply ammeter. Return CWK to down position.	55 to 75 mA	Replace logic/tx card A2. Check chassis A1 wiring.
	f. On test fixture, set RX ONLY to down position and CWK to ENABLE; on control, set function to T/R, and observe line current reading on 22 to 30 V dc power supply ammeter. Return RX ONLY to ENABLE and CWK to down position.	235 to 280 mA	Replace in order, broadband amplifier and logic/tx card A2. Check chassis A1 wiring.
3. Tune start	On control, change each digit of the MEGAHERTZ KILOHERTZ control one digit at a time, and observe line current reading on 22 to 30 V dc power supply ammeter. Return MEGAHERTZ KILOHERTZ to 02.0000.	Current rises to 130 to 190 mA for approximately 3 seconds after each frequency change.	Replace frequency synthesizer. Check chassis wiring.
4. Receive audio	On control, set function to RCV, volume control to maximum clockwise and listen to handset.	Hiss is heard in earpiece.	Replace in order, rf mixer and if/af card A1. Check chassis wiring.
5. Receive audio tone	Set signal generator for 2.0010 MHz at a level of 5000 μV and listen to handset.	1000-Hz tone is heard in earpiece.	Replace in order, rf mixer, if/af card A1, and frequency synthesizer. Check chassis wiring.
6. Receive audio level (Cont)	a. While listening to 1000-Hz tone in earpiece, turn volume control from maximum clockwise to maximum counterclockwise (but not to 0 dB mW 600 ohm).	1000-Hz tone heard in earpiece decreases to low level.	Replace if/af card A1. Check chassis wiring.

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6. (Cont)	b. Set volume control to midrange.		
7. Receive rf gain	a. Connect multimeter (dc probe) to RF GAIN test point (VOLTS) on the test fixture. On test fixture, set RF GAIN switch to ENABLE (down) and turn RF GAIN control (ADJUST) from maximum counterclockwise to maximum clockwise while monitoring the handset and the multimeter. Disconnect multimeter. On test fixture, set RF GAIN switch to up position and RF GAIN control to maximum counterclockwise.	1000-Hz tone heard in earpiece decreases and multimeter indicates a voltage change.	Replace if/af card A1. Check chassis wiring.
8. Receive mute	a. On test fixture, set $\overline{\text{RX MUTE}}$ to ENABLE while monitoring the handset. b. On test set, set $\overline{\text{RX MUTE}}$ to down position.	The 1000-Hz tone is not heard in earpiece.	Replace if/af card A1. Check chassis wiring.
9. Receive AGC	Remove the rf attenuator between the signal generator and the R/E connector (BNC) on the test fixture. On control, set MEGAHERTZ KILOHERTZ to 16.0100, MODE to USB. Set signal generator for 16.0110 MHz at a level of 100 μV. Record the receiver output on the distortion analyzer (establishes a 0-dB reference point). Measure the dB change in receiver output on the distortion analyzer while changing the signal generator to several output levels between 3 and 100 μV and between 100 and 100,000 μV. Replace the rf attenuator between the signal generator and the R/E connector on the test fixture.	Less than 3 dB	Replace in order, if/af card A1, rf mixer, and frequency synthesizer. Check chassis wiring.
10. Receive sensitivity	a. On control, set MEGAHERTZ KILOHERTZ to 02.0000 MODE to USB. Set signal generator for 2.0010 MHz at level of 10 μV. On the distortion analyzer, measure the signal-plus-noise to noise ratio ((s+n/n) by nulling out the 1000-Hz audio.	Not less than 10 dB	Replace in order, rf mixer, if/af card A1, frequency synthesizer, and power supply.
	b. On control, set MODE to LSB. Repeat step a.	Not less than 10 dB	Same as above.
(Cont)	c. On control, set MODE to AM. Set signal generator for 2.0000 MHz, modulated 30% at 1000 Hz at a level of 35 μV. Measure the (s+n)/n ratio by turning off the AM modulation.	Not less than 10 dB	Same as above.

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	d. On control, set MEGAHERTZ KILOHERTZ to 16.0000 and MODE to USB. Set signal generator for 16.0010 MHz at a level of 10 μV. Measure the (s+n)/n ratio as in step a.	Not less than 10 dB	Same as above.
	e. On control, set MODE to LSB. Repeat step d.	Not less than 10 dB	Same as above.
	f. On control, set MODE to AM. Set signal generator for 16.0000 MHz, modulated 30% at 1000 Hz at a level of 35 μV. Measure the (s+n)/n ratio as in step c.	Not less than 10 dB	Same as above.
	g. On control, set MEGAHERTZ KILOHERTZ to 29.0000 and MODE to USB. Set signal generator for 29.0010 MHz at a level of 10 μV. Measure the (s+n)/n ratio as in step a.	Not less than 10 dB	Same as above.
	h. On control, set MODE to LSB. Repeat step g.	Not less than 10 dB	Same as above.
	i. On control, set MODE to AM. Set signal generator for 29.0000 MHz, modulated 30% at 1000 Hz at a level of 35 μV. Measure the (s+n)/n ratio as in step c.	Not less than 10 dB	Same as above.
11. Receive if and image rejection	On control, set MEGAHERTZ KILOHERTZ to 16.0000 and MODE to USB. Set signal generator for 16.0010 MHz at a level of 10 μV. Record the receiver output on the distortion analyzer (establishes a reference level).	Reference	
	a. Set signal generator to 4.9990 MHz (2nd if) and adjust the output level until the reference level is obtained on the distortion analyzer.	At least 60 dB above the reference level.	Replace in order, rf mixer and if/af card A1.
	b. Set signal generator to 114.9990 MHz (1st if) and adjust the output level until the reference level is obtained on the distortion analyzer.	At least 60 dB above the reference level.	Same as above.
	c. Set signal generator to 245.9990 MHz (1st if image) and adjust the output level until the reference level is obtained on the distortion analyzer.	At least 50 dB above the reference level.	Same as above.
	d. Set signal generator to 25.9990 MHz (2nd if image) and adjust the output level until the reference level is obtained on the distortion analyzer.	At least 50 dB above the reference level.	Same as above.
	e. On control, set MODE to LSB. Repeat step a, b, c, and d.	Same indication as each step.	Same as above.

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12. Receive harmonic distortion	Set receiver to 16.0100 MHz, MODE to USB. Set signal generator for 16.0110 MHz at a level of 10 000 μV. On control, set MODE to USB, adjust the volume control for a receiver output of +10 dB mW on the distortion analyzer. On the distortion analyzer, measure the harmonic distortion.	Less than 10%	Replace in order, if/af card A1, rf mixer, frequency synthesizer, and power supply.
13. Receive selectivity	a. Set signal generator for 16.0110 MHz at a level of 10 μV. Adjust signal generator frequency for maximum receiver output on the distortion analyzer (establishes a reference level). Increase signal generator output level to 20 μV. Change the signal generator to the reference frequency plus 350 Hz and observe the distortion analyzer. Change the signal generator to 16.0032 MHz and observe the receiver output on the distortion analyzer.	Equal to or greater than the reference level.	Replace in order, if/af card A1, rf mixer, and frequency synthesizer.
	b. Increase signal generator output level to 10 000 μV. Change the signal generator to the frequency for maximum receive output on the distortion analyzer. Record the receiver output on the distortion analyzer (establishes a reference level). Change the signal generator to the reference frequency plus 6700 Hz and observe the receiver output on the distortion analyzer. Change the signal generator to the reference frequency minus 300 Hz and observe the receiver output on the distortion analyzer.	Equal to or less than the reference level.	Same as above.
	c. On control, set MODE to AM (frequency 16.0100 MHz), set signal generator to 16.0100 MHz, at a level of 1000 μV modulated 30% at 1000 Hz.		
	d. Adjust modulation frequency for maximum receive output on distortion analyzer (establishes a reference level).		
	e. Increase modulation frequency to 2750 Hz and measure receive output.	Within ±4.5 dB of reference in step d.	Same as step a.
14. Receive in-band intermodulation (Cont)	a. Connect test equipment as shown in figure 2, test setup B. Set controls as specified in step 1.b. On control, set MEGAHERTZ KILOHERTZ to 2.0000, volume control to midrange, function to RCV, MODE to USB. On test fixture, set PWR to ON.		

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14. (Cont)	b. Set one signal generator to 2.00100 MHz and the other signal generator to 2.00111 MHz with an output level of 200 mV from each signal generator. Observe the third-order intermodulation products on the wave analyzer.		
	c. Tune the wave analyzer to obtain peak response near 890 Hz and 1220 Hz.	No less than -30 dB.	Replace in order, if/af card A1 and rf mixer.
15. Receive front-end intermodulation	a. On control, set MEGAHERTZ KILOHERTZ to 16.0100, MODE to USB. On test fixture, disconnect jumper cable connected to R/E. Connect one of the signal generators to the R/E connector. Set this signal generator for 16.0010 MHz at a level of 2 μV. Observe the receiver output on the wave analyzer (establishes a reference level). Return test setup to the original configuration.		
	b. Set one signal generator to 7.0000 MHz and the other signal generator to 9.0110 MHz with an output level of 2000 μV from each rf signal generator. Observe the receiver output on the wave analyzer.	Less than the reference level.	Replace in order, if/af card A1 and rf mixer.
	c. Set one signal generator to 10.0000 MHz and the other signal generator to 13.0055 MHz with an output level of 2000 μV from each signal generator. Observe the receiver output on the wave analyzer.	Less than the reference level.	Same as above.
16. Receive desensitization	Disconnect the wave analyzer from the isolation transformer and connect the distortion analyzer in its place. On control, set MEGAHERTZ KILOHERTZ to 02.0000, MODE to USB.		
	a. Set one signal generator to 2.0010 MHz at an output level of 2 μV and the other signal generator to 2.0500 MHz at an output level of 2 μV.	Reference level	
	b. Increase the output level on the signal generator tuned to 2.0500 MHz by 70 dB (to 6320 μV). Measure the signal-plus-noise to noise ratio ((s+n)/n) by nulling out the 1000-Hz audio.	Not less than 9 dB	Replace in order, rf mixer, if/af card A1, frequency synthesizer, and power supply.
	c. On the signal generator tuned to 2.0500 MHz, set the frequency for 1.9500 MHz with the same output level as in step b. Measure the (s+n)/n ratio as in step b.	Not less than 9 dB	Same as above.

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
17. Receive discrete single signal spurious	On control, set MEGAHERTZ KILOHERTZ to 16.0100, MODE to USB. Set one signal generator to off. Set the other signal generator to 16.0110 MHz at a level of 2 μV. Observe the receiver output on the distortion analyzer (establishes a reference level). Set the signal generator to 16.1110 MHz at a level of 2000 μV. Observe the receiver output on the distortion analyzer.	Less than the reference level.	Replace in order, if/af card A1, rf mixer, frequency synthesizer, and power supply.
18. Receive cross modulation	On control, set MODE to AM at 16.0100 MHz. Set the other signal generator to 16.0100 MHz modulated 30% at 1000 Hz at a level of 20 μV. Observe the receiver output on the distortion analyzer (establishes a reference level).		
	Remove the 1000-Hz modulation. Turn on the other signal generator and set it for 14.4100-MHz modulated 30% at 1000 Hz at a level of 200 mV. Observe the receiver output on the distortion analyzer.	Not less than 10 dB below the reference level.	Replace in order, if/af card A1, rf mixer, frequency synthesizer, and power supply.
19. Transmit sidetone and power output	a. Connect test equipment as shown in figure 3, test setup A, except connect the frequency counter to the 20-dB attenuator. b. On test fixture, set controls as follows: PWR to OFF CPLR PWR to R/E R/E PWR to EXT C/H-004 to OFF BAND INFO to R/E AUX AF to OFF RF GAIN control (ADJUST) to maximum counterclockwise RF GAIN switch to disable (up position) ALC switch to EXT EXT ALC switch to +13V EXT ALC control (ALC ADJ) to maximum counterclockwise, AM-USB-LSB to USB $\overline{\text{KEY}}$, $\overline{\text{PTT}}$, $\overline{\text{CWK}}$, ST, FLT, $\overline{\text{RCL}}$, $\overline{\text{TIP}}$, $\overline{\text{RX ONLY}}$, $\overline{\text{RX MUTE}}$, and LP to disable (down position). On control, set MODE to USB, function to TR.		
(Cont)			

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
19. (Cont)	*Note* L and C switches have no effect and can be in any position. On audio adapter, set PTT and CW KEY to OFF. On test fixture, set PWR to ON.		
	c. On test fixture, set $\overline{\text{TIP}}$ to ENABLE and listen to hand set.	1000-Hz tone heard in earpiece.	Replace in order, broadband amplifier, logic/tx card A2, if/af card A1, rf mixer, frequency synthesizer. Check chassis wiring.
	d. Measure rf voltage output level on the rms voltmeter.	3.5 to 4.7 V rms	Same as above.
20. Transmit fault	a. On test fixture, leave $\overline{\text{TIP}}$ set to ENABLE and set FLT to ENABLE. Measure rf voltage output level on the rms voltmeter.	Rf voltage output level falls to zero.	Replace logic/tx card A2.
	b. On test fixture, set $\overline{\text{TIP}}$ to down position while listening to the handset. On test fixture, set FLT to down position.	Pulsed tune fault tone (beeping) in the earpiece.	Same as above.
21. Transmit frequency	a. On control, set MEGAHERTZ KILOHERTZ to 29.9999, function to TR, volume control to midrange, and MODE to AM. On test fixture, set AM-USB-LSB to AM and $\overline{\text{PTT}}$ to ENABLE. Observe the frequency output on the frequency counter.	29.999876 to 29.999924 MHz	Replace in order, frequency synthesizer, if/af card A1, rf mixer, and broadband amplifier. Check +25.2-V dc filtered circuits on chassis.
	b. Repeat step a for the following frequencies: 18.8888, 7.7777, and 2.0000 MHz. On test fixture, set $\overline{\text{PTT}}$ to down position. Disconnect the frequency counter from the rf attenuator and connect the spectrum analyzer in its place.	18.888780 to 18.888820 MHz, 7.777690 to 7.777710 MHz, and 1.999995 to 2.000005 MHz	Same as above.
22. Transmit CW key and sidetone	a. On test fixture, set $\overline{\text{CWK}}$ to ENABLE. Observe rf output on the rms voltmeter.	Rf output present	Replace in order, broadband amplifier, logic/tx card A2, rf mixer, and frequency synthesizer. Check chassis wiring.
	b. On test fixture, set ST to ENABLE. Monitor sidetone on the headset.	1000-Hz tone heard in the headset.	Replace in order, logic/tx card A2 and frequency synthesizer. Check chassis wiring.
	c. On test fixture, set ST and $\overline{\text{CWK}}$ to down position.		

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
23. Transmit frequency response	a. On control, set MEGAHERTZ KILOHERTZ to 02.0000 and MODE to USB. Volume control to 0 dB mW 600 ohm. b. Set oscillator for 1000 Hz, and an input to the receiver-transmitter of -20 dB mW measured on the ac vtvm. On test fixture, set $\overline{\text{PTT}}$ to ENABLE and AM/USB/LSB to USB. Establish an rf output reference on the spectrum analyzer. **Note** The spectrum analyzer BANDWIDTH, SCAN WIDTH, and SCAN TIME PER DIV must be the same for all frequencies.		
	c. Repeat step b for the following frequencies on control: 15.0000 MHz, 24.0000 MHz, and 29.9000 MHz.	Not more than 5 dB variation in the readings for the four frequencies.	Replace in order, broadband amplifier, rf mixer, logic/tx card A2, frequency synthesizer, if/af card A1, and power supply.
	d. On test fixture, set $\overline{\text{PTT}}$ to down position.		
24. Transmit intermodulation distortion	Connect test equipment as shown in figure 3, test setup B. On control, set MEGAHERTZ KILOHERTZ to 02.0000, volume control to voice, MODE to USB. On mixer-attenuator, set AUDIO LOAD/OSC 1 IN to OSC 1 IN and AUDIO LOAD/OSC 2 IN to AUDIO LOAD. Set oscillator no 1 for 1000 Hz and an input level to the receiver-transmitter of -32 dB mW measured on the rms voltmeter. Set AUDIO LOAD/OSC 1 IN to AUDIO LOAD and AUDIO LOAD/OSC 2 IN to OSC 2 IN. Set oscillator no 2 for 1600 Hz and an input level to the receiver-transmitter of -32 dB mW measured on the rms voltmeter. Set AUDIO LOAD/OSC 1 IN to OSC 1 IN (both oscillators will now be connected to the input of the receiver-transmitter). a. On test fixture, set $\overline{\text{PTT}}$ ENABLE and EXT ALC control (ALC ADJ) for 3.5 V rms on the digital voltmeter. **Note** EXT ALC switch must be set to +13V and ALC switch must be set to EXT.		
	b. Observe the third order intermodulation products on the spectrum analyzer.	-33 dB minimum	Replace in order, broadband amplifier, rf mixer, if/af card A1, logic/tx card A2, frequency synthesizer, and power supply.

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

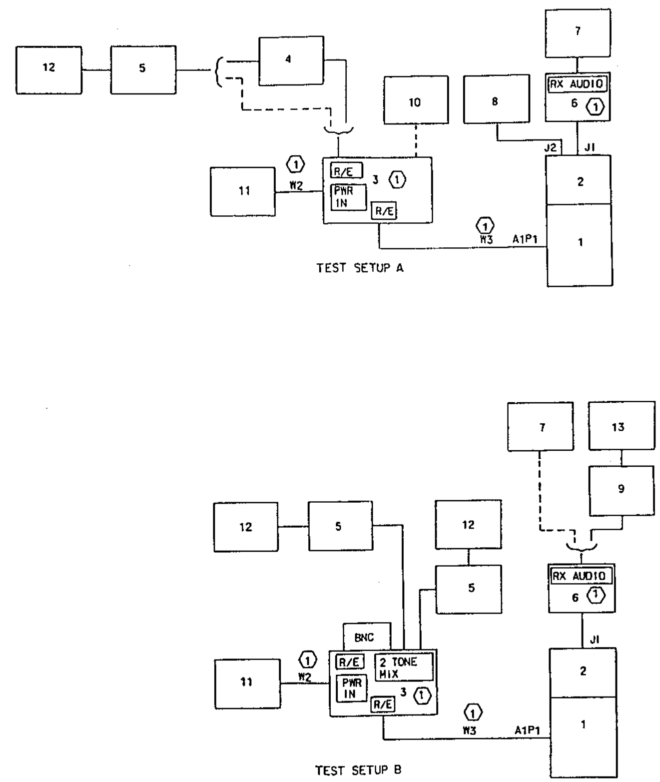
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
24. (Cont)	c. On control, set MEGAHERTZ KILOHERTZ to 16.0000. Check that oscillators have -32 dB mW outputs and ALC ADJ on the test fixture is set for 3.5 V rms on the multimeter. Observe the third order intermodulation products on the spectrum analyzer.	-33 dB minimum	Same as above.
	d. Repeat step c for 29.9000 MHz.	-33 dB minimum	Same as above.
	e. On test fixture, set $\overline{\text{PTT}}$ down.		
25. Transmit carrier and opposite sideband suppression	a. Connect test equipment as shown in figure 3, test setup A. On control, set MEGAHERTZ KILOHERTZ to 16.0000, MODE to USB.		
	b. On test fixture, set $\overline{\text{CWK}}$ to ENABLE and observe the carrier and lower sideband suppression on the spectrum analyzer.	-55 dB minimum	Replace if/af card A1.
	c. On control, set MODE to LSB. Repeat step b and observe upper sideband suppression.	-55 dB minimum	Same as above.
	d. On test fixture, set $\overline{\text{CWK}}$ down. **Note** If necessary to locate the carrier, set MODE switch on control and AM-USB-LSB on the test fixture to AM.		
26. Transmit modulation and audio compression	a. On control, set MODE to AM, volume control to voice. On test fixture, set AM-USB-LSB to AM.		
	b. Set oscillator for 1000 Hz and an input level to the receiver-transmitter of -54 dB mW.		
	c. On test fixture, set $\overline{\text{PTT}}$ to ENABLE and observe the carrier and sideband levels on the spectrum analyzer. Adjust the oscillator frequency for peak output level of the sideband on the spectrum analyzer.	Carrier and sideband levels nearly equal (+2 dB).	Increase audio oscillator output level to -53 dB mW and repeat step c. If the correct indication is still not obtained, replace in order, if/af card A1 and logic/tx card A2.
	d. Repeat steps b and c with an oscillator input level to the receiver-transmitter of -26 dB mW.	Carrier and sideband levels nearly equal (±2 dB).	Same as above.
	e. On test fixture, set $\overline{\text{PTT}}$ down.		

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
27. Transmit second harmonic and spurious	a. On control, set MEGAHERTZ KILOHERTZ to 02.0000 and MODE to USB. On test fixture, set AM-USB-LSB to USB.		
	b. On test fixture, set $\overline{\text{CWK}}$ to ENABLE and EXT ALC control (ALC ADJ) for 3.5 V rms on the digital voltmeter.		
	c. Observe the second harmonic on the spectrum analyzer.	-25 dB minimum	Replace in order, frequency synthesizer, if/af card A1, logic/tx card A2, rf mixer, broadband amplifier, and power supply.
	d. On control, set MEGAHERTZ KILOHERTZ to 16.0000. Check that ALC ADJ on test fixture is set for 3.5 V rms on the digital voltmeter. Observe the second harmonic on the spectrum analyzer.	-25 dB minimum	Same as above.
	e. Repeat step d for a frequency of 29.9000 MHz.	-25 dB minimum	Same as above.
	f. On control, set MEGAHERTZ KILOHERTZ to 02.0100 and repeat step b.		
	g. Observe spurious outputs at 10 kHz (SB), 100 kHz (SB), 1 MHz, and 7 MHz on the spectrum analyzer. Tune spectrum analyzer to 1 MHz and 7 MHz to observe spurious outputs (if any) at those frequencies.	-50 dB minimum	Replace in order, frequency synthesizer, if/af card A1, rf mixer, broadband amplifier, logic/tx card A2, and power supply.
	h. On control, set MEGAHERTZ KILOHERTZ to 16.0000 and repeat step b.		
	i. Observe spurious outputs at 100 kHz, 5 MHz, and 21 MHz in same manner as step g.	-50 dB minimum	Same as above.
	j. On control, set MEGAHERTZ KILOHERTZ to 29.9000 and repeat step b.		
	k. Observe spurious outputs at 100 kHz and 24.9 MHz in same manner as step g.	-50 dB minimum	Same as above.
	l. On control, set MEGAHERTZ KILOHERTZ to 02.0000 and MODE to LSB. On test fixture, set AM-USB-LSB to LSB.		
(Cont)	m. On test fixture, set $\overline{\text{CWK}}$ to ENABLE and EXT ALC control (ALC ADJ) for 3.5 V rms on the digital voltmeter.		

Table 3. Receiver-Transmitter, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
27. (Cont)	n. Observe the second harmonic on the spectrum analyzer.	-25 dB minimum	Replace in order, frequency synthesizer, if/af card A1, logic/tx card A2, rf mixer, broadband amplifier and power supply.
	o. Repeat step d.	-25 dB minimum	Same as above.
	p. Repeat step d for a frequency of 29.9000 MHz.	-25 dB minimum	Same as above.
	q. On control, set MEGAHERTZ KILOHERTZ to 02.0100 and repeat step m.		
	r. Observe spurious outputs at 10 kHz (SB), 100 kHz (SB), and 3 MHz on the spectrum analyzer. Tune spectrum analyzer to 3 MHz to observe spurious outputs (if any) at this frequency.	-50 dB minimum	Replace in order, frequency synthesizer, if/af card A1, rf mixer, broadband amplifier, logic/tx card A2, and power supply.
	s. On control, set MEGAHERTZ KILOHERTZ to 16.0000 and repeat step m.		
	t. Observe spurious outputs at 100 kHz (SB), and 11 MHz in same manner as step r.	-50 dB minimum	Same as above.
	u. On control, set MEGAHERTZ KILOHERTZ to 29.9000 and repeat step b.		
	v. Observe spurious outputs at 100 kHz (SB) and 24.9 MHz in same manner as step g.	-50 dB minimum	Same as above.
	w. On test fixture, set $\overline{\text{CWK}}$ to down position and ALC ADJ to maximum counterclockwise position.		
28. Transmit ALC	a. On control, set MODE to USB, volume control to data mode (0 dB mW 600 ohm), MEGAHERTZ KILOHERTZ to 16.0100.		
	b. Set oscillator for 1000 Hz and input level to the receiver-transmitter of -20 dB mW.		
	c. On test fixture, set $\overline{\text{PTT}}$ to ENABLE, (ALC ADJ) for Ø V dc, and observe the rf output on the spectrum analyzer (establishes a reference level).		
	d. Adjust EXT ALC control (ALC ADJ) for +6 V dc at ALC test point (VOLTS). Observe the rf output on the spectrum analyzer.	Not less than 30 dB below the reference level.	Replace in order, broadband amplifier, rf mixer, if/af card A1, and power supply.
29. Chassis A1 continuity check	a. Remove all cards/modules using procedures in paragraph 4.1.	Meter should read short on connecting pins.	Locate and repair or replace the defective wire.
	b. Refer to figure 1 in diagrams section.		
	c. Using the digital voltmeter, perform continuity checks between pins on connectors J1, J2, J3, J4, J5, J6, J7, and P1.		



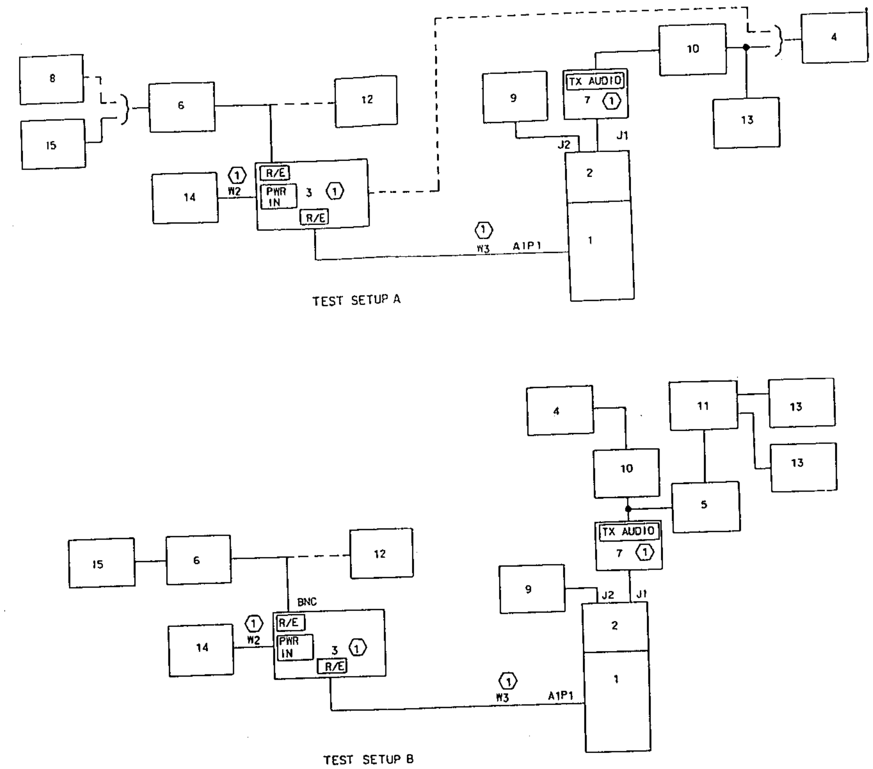
1. RECEIVER-TRANSMITTER
2. CONTROL
3. TEST FIXTURE
4. ATTENUATOR, RF
5. ATTENUATOR, 6 dB
6. AUDIO ADAPTER
7. DISTORTION ANALYZER
8. HANDSET
9. ISOLATION TRANSFORMER
10. DIGITAL VOLTMETER
11. POWER SUPPLY, 22-30 V DC
12. SIGNAL GENERATOR (2 REQUIRED)
13. WAVE ANALYZER

NOTES:

1. PART OF RADIO TEST SET 969J-2.
2. DASHED LINE IS ALTERNATE CONNECTION DESCRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.

TPA-6029-014

Receive Test Setup
Figure 2



NOTES:

(1) PART OF RADIO TEST SET 969J-2.

(2) DASHED LINE IS ALTERNATE CONNECTION DESCRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.

1. RECEIVER-TRANSMITTER
2. CONTROL
3 TEST FIXTURE
4 RMS VOLTMETER
5. ATTENUATOR, AUDIO
6. ATTENUATOR, RF
7. AUDIO ADAPTER
8. FREQUENCY COUNTER
9. HANDSET
10. ISOLATION TRANSFORMER, 600Ω
11. MIXER ATTENUATOR, 600Ω
12. MULTIMETER
13. OSCILLATOR (2 REQUIRED)
14. POWER SUPPLY, 22-30 V DC
15. SPECTRUM ANALYZER

TPA-6051-014

Transmit Test Setup
Figure 3

4. DISASSEMBLY/ASSEMBLY

The following paragraphs describe the disassembly and assembly procedures for the receiver-transmitter. Disassembly and assembly procedures down to card/module level have been included to provide access to card-mounted components that are identified and located in the parts list. Standard tools, techniques, and procedures are used to remove and replace components on the chassis and subassemblies. Refer to figure 1 for location of plug-in cards/modules and to parts list for other assemblies.

4.1 Disassembly

Disassembly should be performed only when repair is required. Do not perform the disassembly as a part of routine maintenance. Mark or otherwise identify all disconnected electrical wiring. Make note of color coding, placement of components, and method of applying insulation (if any) before unsoldering or removing any electrical parts.

Caution

Disconnect all power before attempting disassembly of any portion of the equipment.

4.1.1 Dust Cover Removal

a. Place the receiver-transmitter in an upright position. Locate the four holddown screws on top of the case.

Note

The case is sealed for water tightness. Care must be exercised during removal of dust cover to prevent damage to the ridge formed by the sealing compound.

b. Remove the holddown screws. Hold the dust cover in one hand, grasp the top part of the chassis with the other hand, and carefully pull the receiver-transmitter out of the case.

4.1.2 Logic/Tx Card Removal

a. Complete procedure 4.1.1.
b. Remove the four holddown screws.
c. Carefully disconnect the logic/tx connectors from the underlying if/af connectors and remove.

4.1.3 IF/AF Card Removal

a. Complete procedure 4.1.1.
b. Loosen the holddown screw at the end of the board.
c. Use the plastic handle to loosen the board from the chassis connector and to slide the board out until free of the guides on the chassis.

4.1.4 RF Mixer Removal

a. Complete procedure 4.1.1.
b. Disconnect and tag the two miniature coaxial cables.
c. Remove the two holddown screws.
d. Carefully pull the mixer away from the chassis until disconnected from the chassis connector and remove.

4.1.5 Broadband Amplifier Removal

a. Complete procedure 4.1.1.
b. Disconnect and tag the mixer miniature coaxial cables.
c. Remove the two holddown screws. Carefully pull the broadband amplifier until disconnected from the chassis connector and remove.

4.1.6 Power Supply Removal

a. Complete procedure 4.1.1.
b. Remove the two holddown screws. Carefully pull the power supply away from the chassis until disconnected from chassis connector and remove.

4.1.7 Frequency Synthesizer Removal

a. Complete procedure 4.1.1.
b. Disconnect and tag the two miniature coaxial cables from the mixer.
c. Remove the three holddown screws. Carefully pull the frequency synthesizer away from the chassis until disconnected from chassis connector and remove.

4.2 Assembly

4.2.1 Power Supply Replacement

a. Align the power supply with the correct slot and carefully push into place, making sure the connectors of the chassis and the supply are properly mated.

b. Tighten down with two holddown screws.
c. Complete procedure 4.2.7.

4.2.2 Frequency Synthesizer Replacement

a. Align the frequency synthesizer with its slot and carefully push into place, making sure the connector pins are properly mated.
b. Secure with the holddown screws.
c. Reconnect the two miniature coaxial cables to the mixer.
d. Complete procedure 4.2.7.

4.2.3 RF Mixer Replacement

a. Connect the mixer to the chassis connector.
b. Secure with the two holddown screws.
c. Connect the two miniature coaxial cables.
d. Complete procedure 4.2.7.

4.2.4 Broadband Amplifier Replacement

a. Align the broadband amplifier with its slot and carefully push into place, making sure the connector pins are properly mated.
b. Secure with two holddown screws.
c. Complete procedure 4.2.7.

4.2.5 IF/AF Card Replacement

a. Using the plastic handle on the end of the board, align the if/af card with the guides on the sides of the chassis slot. Push the board until the connector pins are properly mated with the chassis connector.
b. Secure with the single holddown screw.

4.2.6 Logic/Tx Card Replacement

a. Align the logic/tx connector pins with the connectors on the if/af card and carefully press the board until the pins are properly seated.
b. Secure with the four holddown screws.
c. Complete the next procedure.

4.2.7 Dust Cover Replacement

a. Hold the receiver-transmitter dust cover in an upright position (open end at the top).

Note

If watertight seal ridge has been damaged, repair with Dow RTV 3145 or equivalent.

b. Align the receiver-transmitter with the cover opening and slide into place.
c. Secure with the four holddown screws replaced in the holes in the top of the chassis.

5. ALIGNMENT/ADJUSTMENTS

a. Rf mixer adjustments are covered in the subassembly section, testing/troubleshooting table 1, test steps 1 and 8.
b. Power supply resistor (R9 and R23) test selection is covered in the subassembly section, testing/troubleshooting table 1, test step 13.
c. If/af card adjustments are covered in the subassembly section, testing/troubleshooting table 1, test steps 2, 3, 16, and 18.

6. CIRCUIT CARD REPAIR

6.1 General

The following paragraphs provide information for repair and replacement of components mounted on subassemblies or circuit cards.

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be utilized to prevent equipment damage. Refer to paragraph 6.3, Electrostatic Discharge Sensitive Devices Precautions, before performing maintenance on the equipment.

6.2 Postcoat Removal

6.2.1 General

All circuit cards are coated with HumiSeal 1B31 postcoating material upon completion of manufacture to protect them from damage and humidity. The coating must be removed from both sides of the circuit card in the area to be repaired. To restore protection from humidity, repostcoat the circuit card as specified in paragraph 6.4.

Note

Some components may be bonded to the circuit card with a silicone adhesive compound to protect them from vibration damage. Carefully cut the silicone adhesive away from area to be repaired. Remove sufficient adhesive to expose component and its mounting pads.

6.2.2 HumiSeal 1B31 Removal

Use small brush or pipe cleaner and apply solvent (Freon TMC or equivalent) to remove the HumiSeal 1B31 postcoating from the component leads and mounting pads on both sides of the circuit card. Replace the HumiSeal 1B31 as specified in paragraph 6.4.2.

6.3 Electrostatic Discharge Sensitive Devices Precautions

A static charge is produced by friction between, and separation of, dissimilar materials. Potentials of 1 to 20 kilovolts are commonly generated on the human body or insulated surfaces. Voltages of this magnitude can produce both immediate and latent failure in electrostatic discharge sensitive (ESDS) devices.

Note

Dry weather (relative humidity less than 30 percent) multiplies the accumulation of static charges on a surface. In a low-humidity environment, the handling procedures specified are of greater importance and should be adhered to without exception.

6.3.1 Handling of ESDS Devices

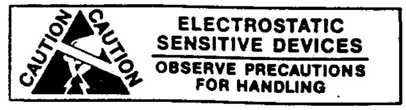
Caution

Do not use nylon or synthetic gloves when handling ESDS devices. Excessive static can build up on this type of material. Handle ESDS devices by their case whenever possible. Avoid touching the leads or contacts even though grounded.

The transport of ESDS devices at the component level requires that all device leads be effectively shorted together. This can be accomplished by one of the following methods.

a. Insert device in high-density conductive foam.
b. Insert device in aluminum foil-lined individual packages.
c. Insert device in a dual-in-line carrier tube made of aluminum or specially coated plastic (must be labeled as static charge dissipative).

The label shown below shall be shown on all individual part containers:



Caution

This component can be damaged by static electricity. Special handling methods and materials must be utilized.

Antistatic protection is required for ESDS devices from the time they are received until they are terminated in a protective subassembly. If ESDS devices are in subassemblies that do not provide adequate ESDS device protection, they are still vulnerable to static damage.

The transport of circuit board or module subassemblies containing ESDS devices requires that contact with exposed subassemblies be prevented. Conductive plastic bags, not clear polyvinyl, are well suited to this purpose. After the subassembly containing ESDS devices is installed in the top level unit, normal ESDS devices handling is adequate.

6.3.2 Storage of ESDS Devices

The methods of handling described in paragraph 6.3.1 are acceptable methods of storage.

Caution

Lead corrosion may result if the device or assembly is stored in a high-temperature/high-humidity environment.

6.3.3 Testing of Subassemblies Containing ESDS Devices

Observe the following precautions when testing any subassembly containing ESDS devices.

a. Remove power from test fixtures of equipment before inserting/removing any ESDS device or subassembly containing an ESDS device.
b. All test equipment is well grounded.
c. Apply dc source power to ESDS device or subassembly containing an ESDS device before applying any signal voltages.

d. Remove signal voltages from ESDS device or subassembly containing an ESDS device before removing dc source power.
e. Dielectric strength or insulation resistance checks are not recommended for any ESDS device or subassembly containing an ESDS device.

6.4 Postcoat Application

6.4.1 General

All areas of the circuit card having the postcoating material removed for component replacement must be repostcoated to prevent humidity damage. Postcoating material must be applied to both sides of the card.

6.4.2 HumiSeal 1B31 Replacement

a. After component removal and replacement, apply solvent to resoldered areas on both sides of circuit card. Allow card to air dry 4 hours at room temperature or bake it for 20 minutes at 71 °C (160 °F) before applying postcoating. This prevents bubbles from occurring in newly applied postcoating.

Warning

Postcoating should be performed only in a well-ventilated area.

b. Use small brush and apply HumiSeal 1B31 liberally (but not excessively) to replaced component and both sides of circuit card (mounting pads, holes, and adjacent areas of board). Ensure that coverage is complete and new coating overlays existing coating on adjacent areas of board.

Note

HumiSeal 1B31 is runny when first applied and somewhat soft when hot. Be careful not to damage postcoating during the drying or cool-down period.

c. If only a small area of the circuit card has been repostcoated, air dry for 4 hours at room temperature. If entire circuit card has been repostcoated, bake it for 45 minutes at 80 to 100 °C (176 to 212 °F).
d. If replaced component must be rebonded to circuit card, use Dow Corning RTV-3140 (Rockwell-Collins part number 005-1692-000). Apply a thin coating around the component and allow to dry for 2 hours.

6.5 General Repair Practices and Precautions

The general practices and precautions for printed circuits and microelectronic components apply to repair and replacement of components mounted on circuit cards. Use the procedures to remove or replace components or to make repairs. Use a 40-watt (maximum) soldering iron with a pointed tip and one flat side. Keep the tip well tinned at all times.

Caution

When unsoldering or soldering solid-state devices, attach a heat sink to the lead near the body of the device.

To unsolder connections at a terminal, use the flat side of the soldering iron tip to apply heat at the connection. Apply heat to the lead until the solder just melts; then use the tip or a pointed tool to separate the lead from the terminal. Exercise care to avoid overheating. Do not use force to pry the lead from the terminal.

Caution

Do not apply heat at a pad or thru hole for longer than 4 seconds.

To unsolder connections at a pad or thru hole, use the point of the soldering iron tip. Apply heat at the side opposite the component until the solder just melts; then use tweezers or needle-nose pliers to extract the lead from the thru hole. Exercise care to avoid overheating. Do not use force to remove the lead from the thru hole.

When the lead has been removed, allow the point to cool before reapplying heat. When the point has cooled, reheat the terminal or pad and remove all excess solder.

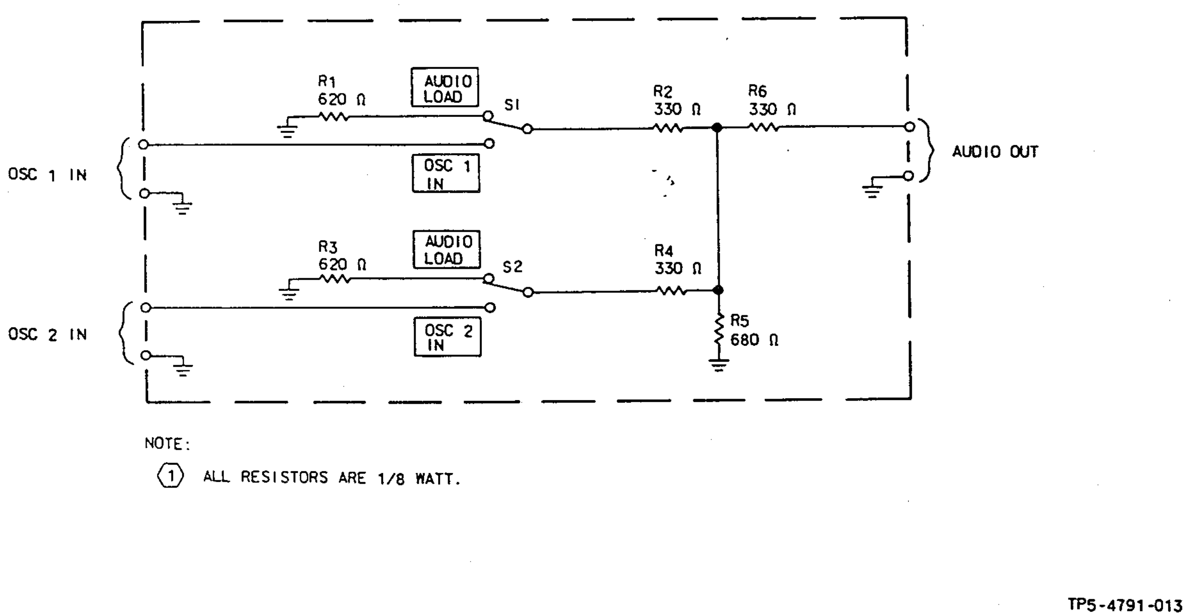
Warning

Use cleaning solvent under a ventilated hood. Avoid breathing solvent vapor and fumes. Wear a suitable mask when necessary. Avoid continuous contact with solvent. Use goggles, gloves, and apron to prevent irritation from prolonged contact. Change clothing upon which solvents have been spilled. Observe all fire precautions for flammable materials. Use flammable solvents only in a well-ventilated area, or in a hood provided with explosion-proof electrical equipment, and an exhaust fan with sparkproof blades. Warn other persons to keep away from hazardous area or working enclosure.

Note

When necessary to disturb dress of wiring and cables, note dress of wiring and cables and restore to dress after cleaning.

When connections have been unsoldered and the component has been removed, use a cotton swab or small brush dipped in solvent to clean the mounting area. Remove all flux residue, dirt, corrosion, and film deposits.



Mixer Attenuator, 600-Ohm, Schematic Diagram
Figure 4

671V-2
Receiver-Transmitter

Rockwell International

parts list

Collins Telecommunications Products Division
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list of illustrations

List of Effective Pages

*Zero in this column indicates an original page

Record of Changes

CHG NO	CHANGE DATE	CHG NO	CHANGE DATE	CHG NO	CHANGE DATE	CHG NO	CHANGE DATE
1st Ed	1 Nov 82						

1. INTRODUCTION

1.1 General

The purpose of this parts list is for identification and requisition of parts.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

1.2 Group Assembly Parts List

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column — Listed are MIL standard, vendor, or Collins part numbers. Collins part numbering system consists of 10 digits as follows: a 3-digit family number, a 4-digit serial number, and a 3-digit dash number.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Lists the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: MCN (Manufacturer Control Number) 101 and up; CI (Configuration Identifier) 5-digit number; REV (Revision Identifier) dash (—) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB 1, SB 2, etc.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

UNITS PER ASSY Column — Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

1.3 Numerical Index

PART NUMBER Column — Part numbers are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

TTL REQ Column — Listed is the total quantity of parts or assemblies covered in the Group Assembly Parts List.

1.4 Reference Designation Index

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

1.5 How To Use This Parts List

To locate a part number if the assembly in which the part is used is known, turn to the List of Illustrations and find the page number for the assembly in which the part is used. Locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

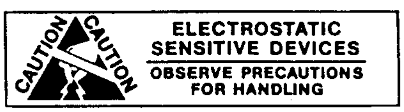
To locate the illustration for a part if the part number is known, refer to the Numerical Index and find the part number. Turn to the Group Assembly Parts List and find the first figure and index number indicated in the Numerical Index for that part. If this figure shows the part in a section or system of the equipment other than the one desired, refer to the other figure numbers listed in the Numerical Index.

To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.



1.6 Manufacturer's Code, Name, and Address

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
02310	ABSCOA INDUSTRIES INC AN AAR CO 3160 W EL SEGUNDO BLVD HAWTHORNE CA 90250
22599	ESNA DIV OF AMERACE CORP 16150 STAGG ST P O BOX 7707 VAN NUYS CA 91409
49956	RAYTHEON CO EXECUTIVE OFFICES 141 SPRING ST LEXINGTON MA 02173
71468	ITT CANNON ELECTRIC DIV OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORP 10550 TALBERT AVE P O BOX 8040 FOUNTAIN VALLEY CA 92708
72982	ERIE TECHNOLOGICAL PRODUCTS INC 645 W 11TH ST ERIE PA 16512
81349	MILITARY SPECIFICATIONS
91314	LEWIS SPRING AND MFG CO 2652 W NORTH AVE CHICAGO IL 60647
96906	MILITARY STANDARD
98278	MICRODOT MANUFACTURING INC MALCO SOUTH PASADENA DIV 220 PASADENA AVE SOUTH PASADENA CA 91030

1.7 Reference Designation Prefixes

The following prefixes have been assigned in this manual:

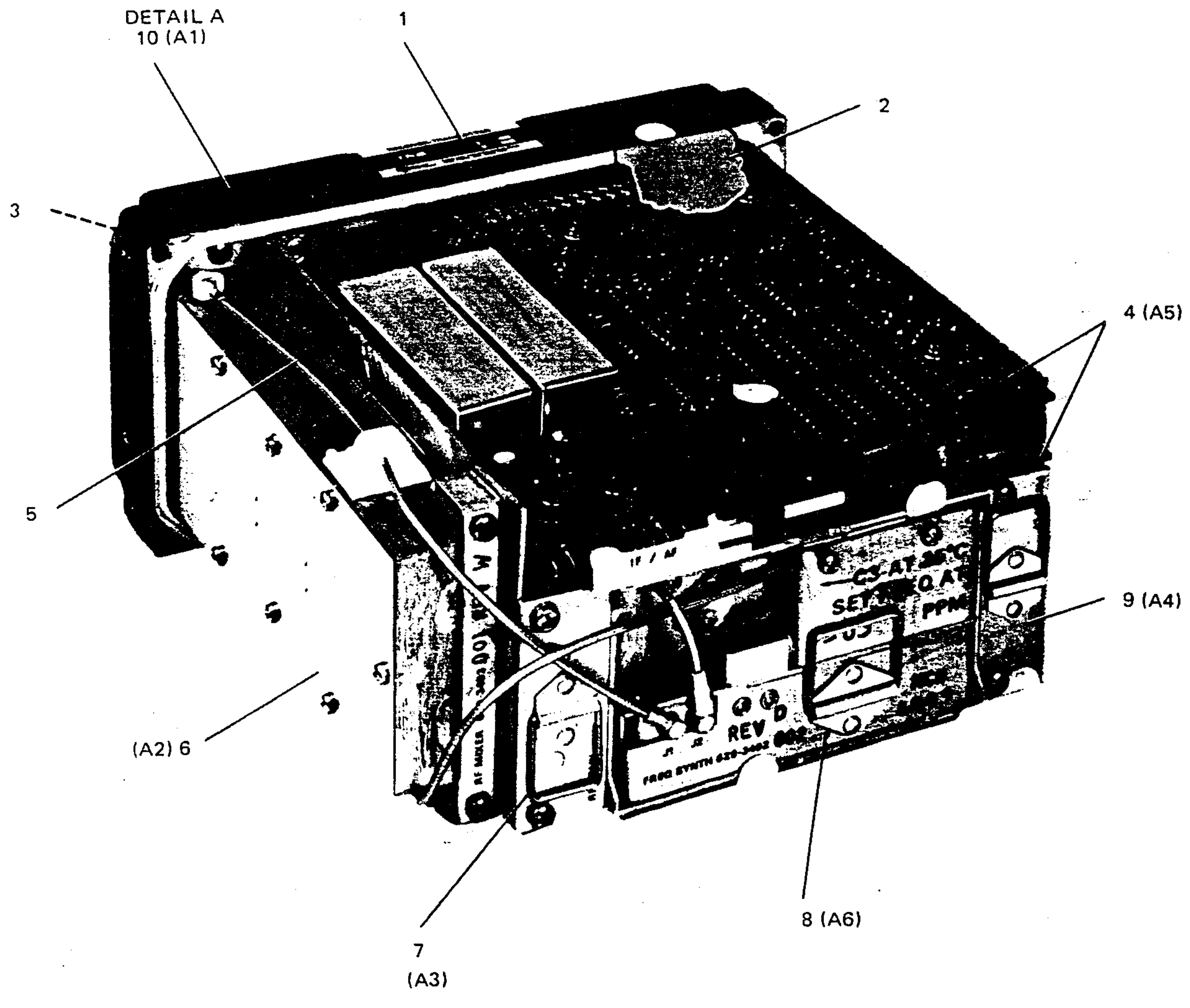
PREFIX	UNIT PART NUMBER	FIG-ITEM
A1	629-3406-001	1-10
A2	629-3403-001	1-6
A3	601-3671-001	1-7
A4	601-3670-001	1-9
A5	629-3405-001	1-4
A6	629-3402-001	1-8

1.8 Configuration Identifiers

The following CI's/REV LTR's were used in compiling data for this manual:

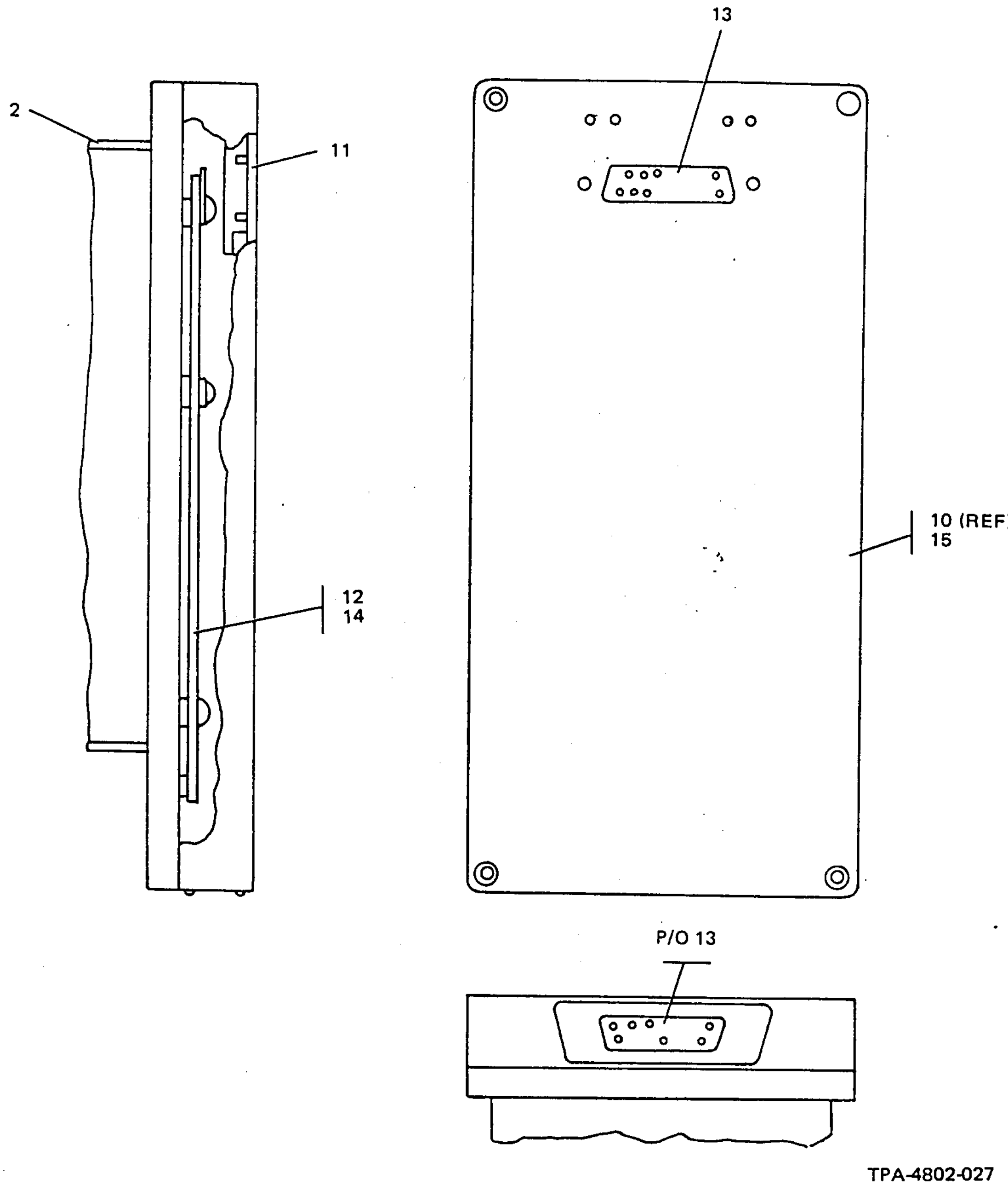
CI/ REV LTR	UNIT PART NUMBER	FIG-ITEM
S	622-2148-001	1-
J	629-3406-001	1-10
F	635-5157-001	1-12
K	601-3667-001	2-

2. GROUP ASSEMBLY PARTS LIST



671V-2 Receiver-Transmitter
Figure 1 (Sheet 1 of 2)

GROUP ASSEMBLY PARTS LIST

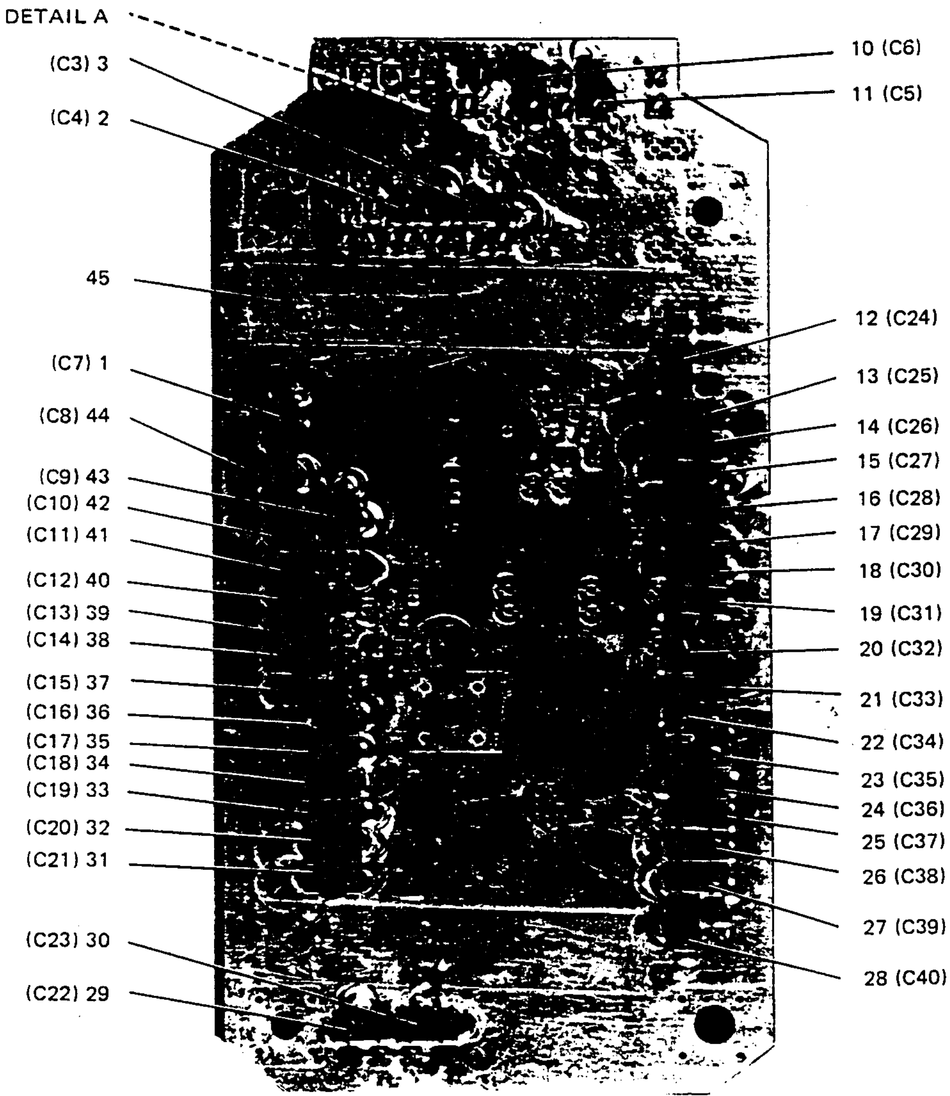


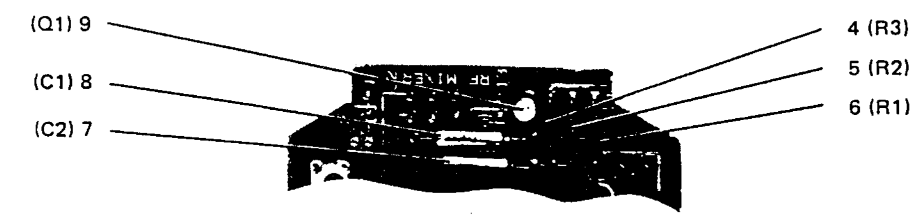
671V-2 Receiver-Transmitter
Figure 1 (Sheet 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-2148-001	1	RECEIVER-TRANSMITTER 671V-2	1	
1	635-1507-000	2	PLATE,IDENT	1	
2	629-5859-005	2	COVER	1	
	330-1732-020	2	SCREW,SLFLKG SST, 4-40 X 3/16 (22599) (AP)	2	
	330-1732-090	2	SCREW,SLFLKG SST, 4-40 X 3/4 (22599) (AP)	1	
3	NT352R0832VC3L	2	SCREW,MACH CRES, 8-32 X 3/16 (02310) 330-4042-130 (AP)	1	
4	629-3405-001	2	IF/AF AMPLIFIER (ESDS) A5	1	
5	140-0530-3022	2	CABLE PLUG (98278) 426-5435-670	1	
6	629-3403-001	2	RF MIXER (ESDS) A2	1	
7	601-3671-001	2	RF AMPLIFIER A3	1	
	MS51957-15	2	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
8	629-3402-001	2	FREQUENCY SYNTHESIZER (ESDS) A6	1	
9	601-3670-001	2	POWER SUPPLY A4	1	
	MS51957-15	2	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
10	629-3406-001	2	CHASSIS A1	1	
	MS51957-20	2	SCREW,MACH STL, 4-40 X 7/8 (96906) 343-0140-000 (AP)	4	
	340-0644-000	2	SLEEVE,SPRING (91314) (AP)	4	
11	635-8251-001	3	COVER	1	
	MS51959-6	3	SCREW,MACH SST, 2-56 X 7/16 (96906) 342-0136-000 (AP)	4	
	MS28775-024	3	PACKING,PREFORM (96906) 200-2338-450 (AP)	3	
12	635-5157-001	3	SIDEBOARD ASSY, COAXIAL	1	
	MS51957-12	3	SCREW,MACH STL, 4-40 X 3/16 (96906) 343-0132-000 (AP)	5	
13	MDNB97294-85	4	CONN,CA ASSY (71468) 426-0073-010	1	
14	601-3667-001	4	SIDEBOARD (SEE FIG 2)	1	
15	629-3488-001	3	CHASSIS	1	
	MS51957-15	3	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	4	
	340-0644-000	3	SLEEVE,SPRING (91314) (AP)	4	

GROUP ASSEMBLY PARTS LIST





DETAIL A
REAR TOP

TPA-4803-017

Sideboard
Figure 2

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	601-3667-001	1	SIDEBOARD P/O A1 (SEE FIG 1-14 FOR NHA)	REF	
1	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C7	1	
2	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C4	1	
3	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C3	1	
4	RCR07G123KS	2	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W (81349) 745-0788-000 A1R3	1	
5	RCR07G123KS	2	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W (81349) 745-0788-000 A1R2	1	
6	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R1	1	
7	M39003-01-2304	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 10%, 35V (81349) 184-9086-640 A1C2	1	
8	M39003-01-2304	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 10%, 35V (81349) 184-9086-640 A1C1	1	
9	2N2222A	2	TRANSISTOR (49956) 352-0661-020 A1Q1	1	
10	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C6	1	
11	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C5	1	
12	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C24	1	
13	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C25	1	
14	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C26	1	
15	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C27	1	
16	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C28	1	
17	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C29	1	
18	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C30	1	
19	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C31	1	
20	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C32	1	
21	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C33	1	
22	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C34	1	
23	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C35	1	
24	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C36	1	
25	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C37	1	
26	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C38	1	
27	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C39	1	
28	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C40	1	
29	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C22	1	
30	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C23	1	
31	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C21	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-32	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C20	1	
33	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C19	1	
34	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C18	1	
35	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C17	1	
36	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C16	1	
37	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C15	1	
38	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C14	1	
39	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C13	1	
40	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C12	1	
41	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C11	1	
42	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C10	1	
43	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C9	1	
44	D03AAAAEAWR113AA	2	CAPACITOR,FXD CER DIEL, 10,000PF, 200V (72982) 913-3288-020 A1C8	1	
45	635-5220-001	2	STRIP,CONTACT	2	

3. NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ
D03AAAAEAWR113AA	2-1	
	2-2	
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	2-13	
	2-14	
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	2-44	38
MDNB97294-85	1-13	1
MS28775-024	1-11	3
MS35338-135	1-7	
	1-9	4
MS51957-12	1-12	5
MS51957-15	1-7	
	1-9	
	1-15	8
MS51957-20	1-10	4
MS51959-6	1-11	4
M39003-01-2304	2-7	
	2-8	2
NT352R0832VC3L	1-3	1
RCR07G102KS	2-6	1
RCR07G123KS	2-4	
	2-5	2
140-0530-3022	1-5	1
184-9086-640	2-7	

PART NUMBER	FIG-ITEM	TTL REQ
184-9086-640	2-8	2
2N2222A	2-9	1
200-2338-450	1-11	3
310-0279-000	1-7	
	1-9	4
330-1732-020	1-2	2
330-1732-090	1-2	1
330-4042-130	1-3	1
340-0644-000	1-10	
	1-15	8
342-0136-000	1-11	4
343-0132-000	1-12	5
343-0135-000	1-7	
	1-9	
	1-15	8
343-0140-000	1-10	4
352-0661-020	2-9	1
426-0073-010	1-13	1
426-5435-670	1-5	1
601-3667-001	1-14	1
	2-	REF
601-3670-001	1-9	1
601-3671-001	1-7	1
622-2148-001	1-	1
629-3402-001	1-8	1
629-3403-001	1-6	1
629-3405-001	1-4	1
629-3406-001	1-10	1
629-3488-001	1-15	1
629-5859-005	1-2	1
635-1507-000	1-1	1
635-5157-001	1-12	1
635-5220-001	2-45	2
635-8251-001	1-11	1
745-0749-000	2-6	1
745-0788-000	2-4	
	2-5	2
913-3288-020	2-1	
	2-2	
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NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ	PART NUMBER	FIG-ITEM	TTL REQ
913-3288-020	2-26				
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	2-44	38			

4. REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1	1-10	629-3406-001			
A1C1	2-8	M39003-01-2304			
A1C10	2-42	D03AAAAEAWR113AA			
A1C11	2-41	D03AAAAEAWR113AA			
A1C12	2-40	D03AAAAEAWR113AA			
A1C13	2-39	D03AAAAEAWR113AA			
A1C14	2-38	D03AAAAEAWR113AA			
A1C15	2-37	D03AAAAEAWR113AA			
A1C16	2-36	D03AAAAEAWR113AA			
A1C17	2-35	D03AAAAEAWR113AA			
A1C18	2-34	D03AAAAEAWR113AA			
A1C19	2-33	D03AAAAEAWR113AA			
A1C2	2-7	M39003-01-2304			
A1C20	2-32	D03AAAAEAWR113AA			
A1C21	2-31	D03AAAAEAWR113AA			
A1C22	2-29	D03AAAAEAWR113AA			
A1C23	2-30	D03AAAAEAWR113AA			
A1C24	2-12	D03AAAAEAWR113AA			
A1C25	2-13	D03AAAAEAWR113AA			
A1C26	2-14	D03AAAAEAWR113AA			
A1C27	2-15	D03AAAAEAWR113AA			
A1C28	2-16	D03AAAAEAWR113AA			
A1C29	2-17	D03AAAAEAWR113AA			
A1C3	2-3	D03AAAAEAWR113AA			
A1C30	2-18	D03AAAAEAWR113AA			
A1C31	2-19	D03AAAAEAWR113AA			
A1C32	2-20	D03AAAAEAWR113AA			
A1C33	2-21	D03AAAAEAWR113AA			
A1C34	2-22	D03AAAAEAWR113AA			
A1C35	2-23	D03AAAAEAWR113AA			
A1C36	2-24	D03AAAAEAWR113AA			
A1C37	2-25	D03AAAAEAWR113AA			
A1C38	2-26	D03AAAAEAWR113AA			
A1C39	2-27	D03AAAAEAWR113AA			
A1C4	2-2	D03AAAAEAWR113AA			
A1C40	2-28	D03AAAAEAWR113AA			
A1C5	2-11	D03AAAAEAWR113AA			
A1C6	2-10	D03AAAAEAWR113AA			
A1C7	2-1	D03AAAAEAWR113AA			
A1C8	2-44	D03AAAAEAWR113AA			
A1C9	2-43	D03AAAAEAWR113AA			
A1Q1	2-9	2N2222A			
A1R1	2-6	RCR07G102KS			
A1R2	2-5	RCR07G123KS			
A1R3	2-4	RCR07G123KS			
A2	1-6	629-3403-001			
A3	1-7	601-3671-001			
A4	1-9	601-3670-001			
A5	1-4	629-3405-001			
A6	1-8	629-3402-001			

Diagrams

671V-2 Receiver-Transmitter

Rockwell International

diagrams

Collins Telecommunications Products Division

Printed in USA

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1 November 1982

list of illustrations

List of Effective Pages

*Zero in this column indicates an original page.

Record of Changes

CHG NO	CHANGE DATE	CHG NO	CHANGE DATE	CHG NO	CHANGE DATE	CHG NO	CHANGE DATE
1st Ed	1 Nov 82						

1. CONFIGURATION STATUS CONTROL

Collins Telecommunications Products Division of Rockwell International Uses a 2-character (maximum) alphabetic identifier for configuration identification. The alphabetic identifier is preceded by the letters REV (revision) and starts with — (dash) if no changes have been made. The first change is identified as A, the second as B, continuing through Z to AA, AB, and ultimately to ZZ.

Note

The alphabetic identifier is not a serial number; therefore, many units or subassemblies may exist with the same identifier.

Incorporation of design changes in a unit or subassembly that has been returned to Rockwell-Collins for repair or has been removed from the company's finished goods inventory is defined as rework. At the time of rework, the unit or subassembly is marked again to reflect the design level to which it is being upgraded. This is done by leaving the original marking and adding the letters RWK (rework) followed by the alphabetic identifier of the latest change incorporated in the rework. For example, unit one may be marked REV B-RWK F and unit two may be marked REV F. A reworked unit may not contain all design changes made prior to the reworked alphabetic identifier, but does contain all changes required to make unit operation identical to a newly manufactured unit having the same alphabetic identifier. Therefore, a unit reworked to a specific alphabetic identifier may not have the exact components and/or the same physical appearance as a newly manufactured unit having the same alphabetic identifier.

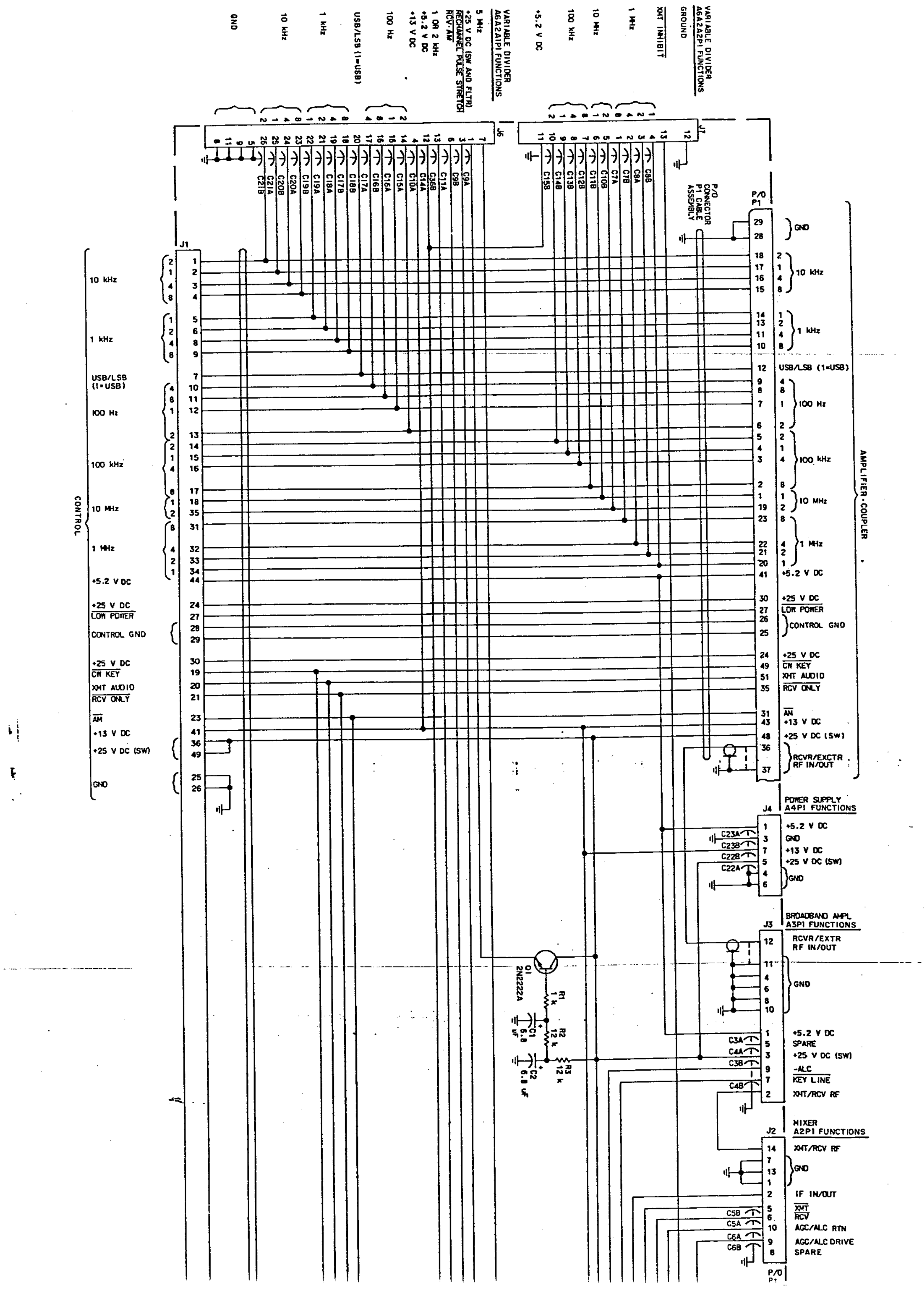
Only alphabetic identifiers that result in schematic changes are covered in this section. Therefore, if a unit or subassembly has an alphabetic identifier that falls between identifiers on the schematic changes page, or after the last identifier on the schematic changes page up to and including the latest effectivity listed below, the electrical configuration is represented by the earlier alphabetic identifier listed on the schematic changes page.

2. CONFIGURATION EFFECTIVITY

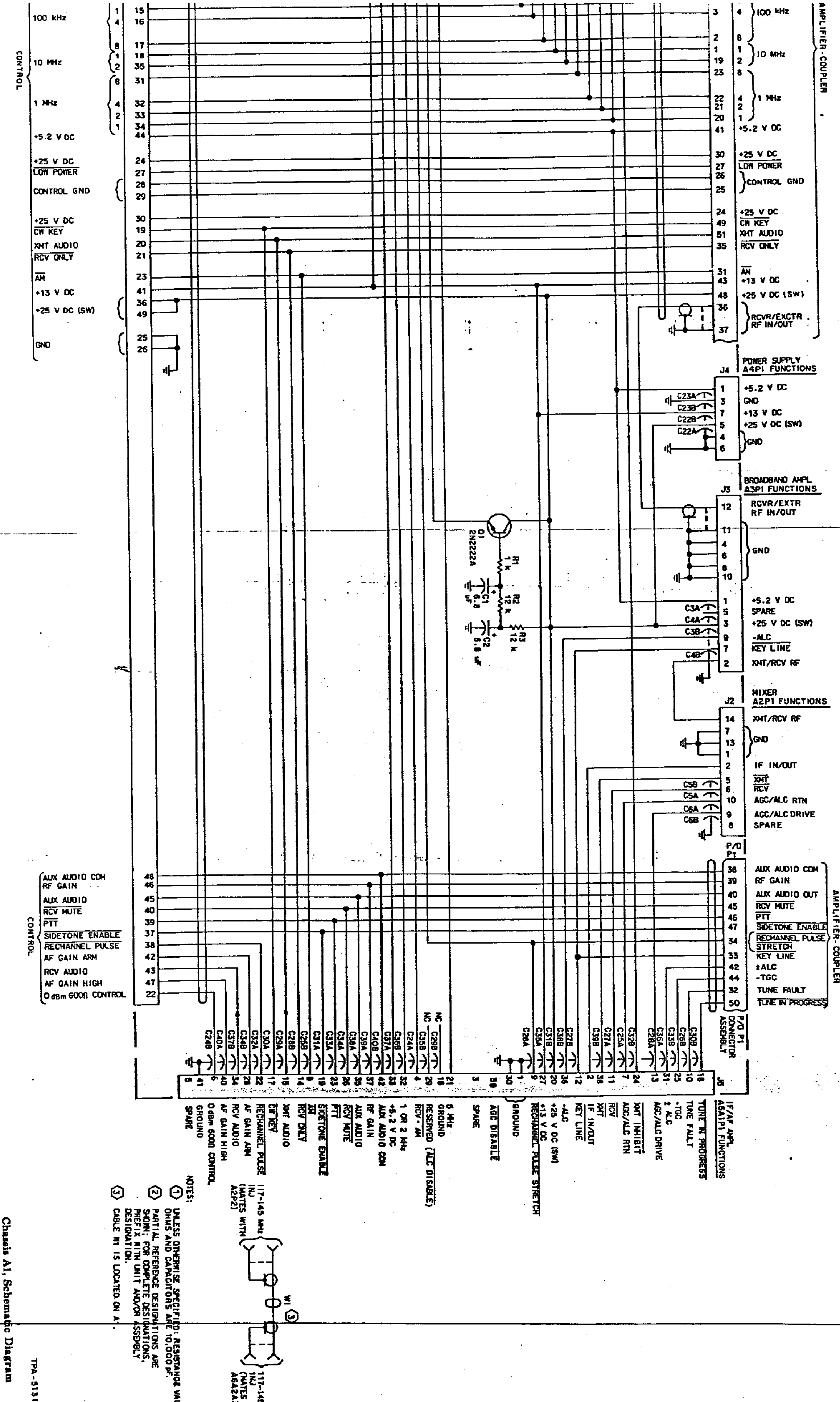
Refer to the schematic changes page preceding each subassembly schematic for any changes that may have occurred and the corresponding alphabetic identifier covering each change.

Listed below are the units/subassemblies with the latest alphabetic identifier covered by this document.

UNIT/SUBASSEMBLY	ROCKWELL-COLLINS PART NUMBER	LATEST EFFECTIVITY
671V-2 Receiver-Transmitter	622-2148-001	REV S
Receiver-Transmitter Chassis A1	629-3406-001	REV J
Sideboard Assembly	635-5157-001	REV F
Sideboard	601-3667-001	REV L
Rf Mixer A2	629-3403-001	REV AB
Broadband Amplifier A3	601-3671-001	REV V
Power Supply A4	601-3670-001	REV Y
If/af Amplifier A5	629-3405-001	REV A
Electronic Components Assembly	635-4676-001	REV A
If/af Card A5A1	601-3668-001	REV AA
Logic/tx Card A5A2	601-3669-001	REV U
Frequency Synthesizer A6	629-3402-001	REV D
Lf Generator A6A1	609-2467-001	REV F
Frequency Standard A6A1A1	601-3877-001	REV U
Fixed Frequency Divider A6A1A2	601-3876-001	REV V
Lf Phase-Lock Loop A6A1A3	601-3879-001	REV M
Frequency Converter A6A1A4	601-3878-001	REV L
Hf Generator A6A2	609-2469-001	REV D
Voltage Regulator A6A2A1	601-3874-002	REV Y
Variable Frequency Divider A6A2A2	601-3875-002	REV M
Hf Phase-Lock Loop A6A2A3	635-8154-001	REV M



VARIABLE DIVIDER A6A2A2P1 FUNCTIONS
GROUND
XMT INHIBIT
1 MHz
10 MHz
100 kHz
+5.2 V DC
VARIABLE DIVIDER A6A2A1P1 FUNCTIONS
5 MHz
+25 V DC (SW AND FLTR)
RECHANNEL PULSE STRETCH
RCV-AM
1 OR 2 kHz
+5.2 V DC
+13 V DC
100 Hz
USB/LSB (1=USB)
1 kHz
10 kHz
GND
J6
J7
J1
P/O CONNECTOR P1 CABLE ASSEMBLY
P/O P1
CONTROL
10 kHz
1 kHz
USB/LSB (1=USB)
100 Hz
100 kHz
10 MHz
1 MHz
+5.2 V DC
+25 V DC
LOW POWER
CONTROL GND
+25 V DC
CW KEY
XMT AUDIO
RCV ONLY
AM
+13 V DC
+25 V DC (SW)
GND
AMPLIFIER-COUPLER
GND
10 kHz
1 kHz
USB/LSB (1=USB)
100 Hz
100 kHz
10 MHz
1 MHz
+5.2 V DC
+25 V DC
LOW POWER
CONTROL GND
+25 V DC
CW KEY
XMT AUDIO
RCV ONLY
AM
+13 V DC
+25 V DC (SW)
RCVR/EXCTR RF IN/OUT
POWER SUPPLY A4P1 FUNCTIONS
J4
+5.2 V DC
GND
+13 V DC
+25 V DC (SW)
GND
BROADBAND AMPL A3P1 FUNCTIONS
J3
RCVR/EXTR RF IN/OUT
GND
+5.2 V DC
SPARE
+25 V DC (SW)
-ALC
KEY LINE
XMT/RCV RF
Q1 2N2222A
R1 1 k
R2 12 k
R3 12 k
C1 6.8 uF
C2 6.8 uF
MIXER A2P1 FUNCTIONS
J2
XMT/RCV RF
GND
IF IN/OUT
XMT
RCV
AGC/ALC RTN
AGC/ALC DRIVE
SPARE
P/O P1



Chassis A1, Schematic Diagram
Figure 1

TPA-5131-015

RF Mixer (629-3403-001)

Rockwell International

instructions

Collins Telecommunications Products Division

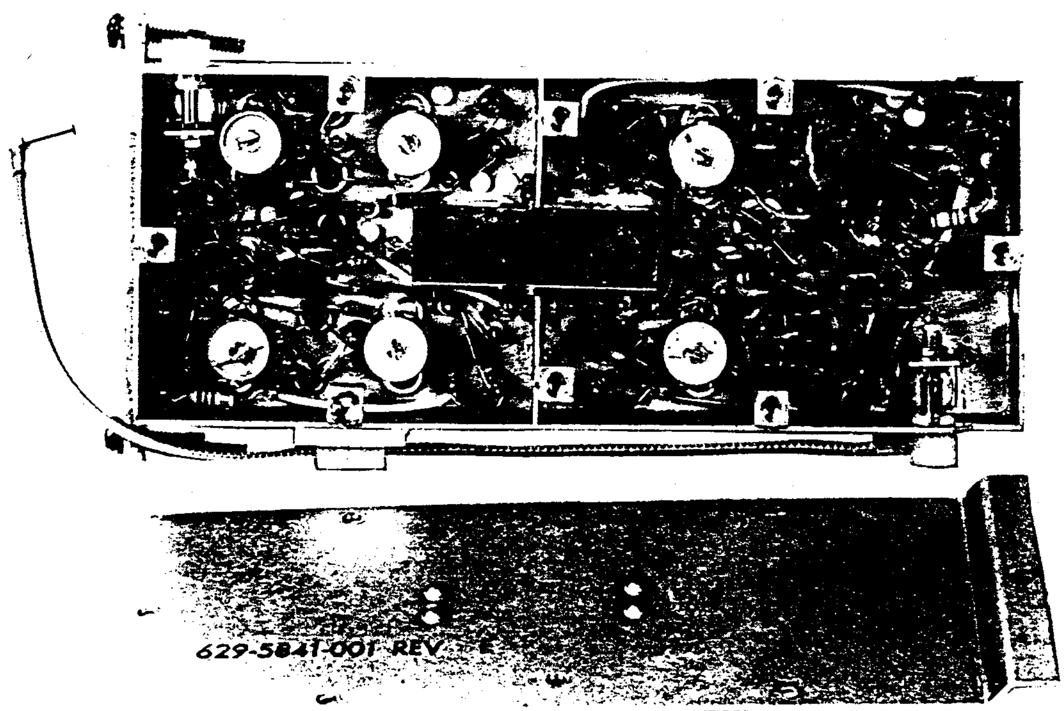
Printed in USA

523-0772065-001211
1 November 1982

1. DESCRIPTION

RF Mixer 629-3403-001, shown in figure 1, is a plug-in circuit card that interconnects with other receiver-transmitter circuits through one multipin and two coaxial connectors.

The rf mixer provides two basic functions: provides up and down conversion for the received and transmitted signals.



RF Mixer
Figure 1

2. PRINCIPLES OF OPERATION

2.1 Functional Theory

2.1.1 Receive Functional Theory

Refer to figure 2 (simplified schematic diagram) for the functional theory. The receive rf signal (2 to 29.9999 MHz) is coupled to the first of two receive mixer stages of the rf mixer. The receive rf is mixed with the variable injection frequency supplied by the frequency synthesizer through P2. The variable injection frequency is determined by the frequency selected at the control. The mixing of the receive rf and variable injection frequency results in the up conversion of the received signal to 115-MHz if, which is passed through the 115-MHz filter on to the second mixer stage. The 115-MHz if is mixed with one of two fixed injection frequencies supplied by the frequency synthesizer through P3. If the mode selected at the control is USB or AM, the injected frequency will be 110 MHz; whereas, if the selected mode is LSB, the injected frequency will be 120 MHz. The output of the rf mixer is a 5-MHz difference frequency. The rf mixer output is coupled through P1-2 to the if/af amplifier.

2.1.2 Transmit Functional Theory

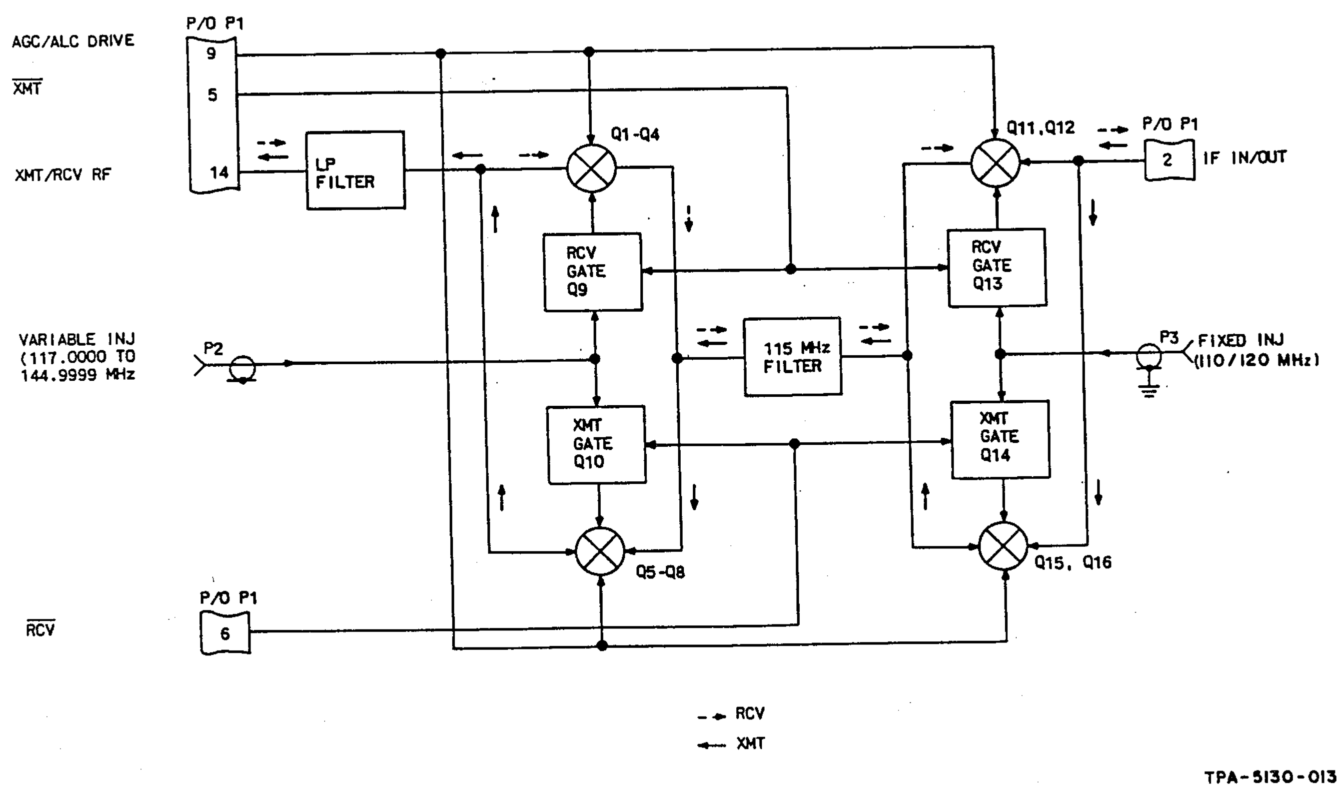
The 5-MHz if is coupled from the if/af amplifier to the first transmit mixer stage through P1-2 (figure 2). The 5-MHz if is mixed with the fixed injection frequency. If USB or AM is selected, the injection frequency is 110 MHz; whereas, if the selected mode is LSB, the injected frequency will be 120 MHz.

The output of the first mixer is 115 MHz, which is passed on to the second transmit mixer through the 115-MHz filter. The 115-MHz if is mixed by the second mixer with the variable injection frequency to produce the operating rf frequency between 2.0000 to 29.9999 MHz selected at the control. The rf output of the second mixer is coupled through P1-14 to the broadband amplifier.

2.2 Detailed Theory

2.2.1 Receive Mode

Refer to figure 2 (simplified schematic diagram) and figure 5 (schematic diagram) for detailed theory. The



RF Mixer (Receive or Transmit), Simplified Schematic Diagram
Figure 2

receive rf is routed by chassis wiring from the broadband amplifier to chassis J2/rf mixer P1-14. The control inputs supplied to the rf mixer are $\overline{\text{XMT}}$ and $\overline{\text{RCV}}$ logic, and the AGC/ALC DRIVE from the if/af amplifier. During receive mode, RCV $(\overline{\text{XMT}})$ logic at P1-5 is high and the XMT $(\overline{\text{RCV}})$ logic at P1-6 is low. The RCV logic is applied to injection amplifier transistors Q9 and Q13, which in turn switches on diodes CR2, CR3, CR6, and CR8. The fixed and variable injection frequencies are now applied to the receive-up conversion mixer Q1 and Q2 and the receive-down conversion mixer Q11 and Q12. The XMT logic switches Q10 and Q14 are off, which disables both transmit mixers.

The receive rf (2 to 29.9999 MHz) from P1-14 passes through the low-pass LC filter, switching diode CR2, transformer T1, and on to the gates of up conversion mixer FET's Q1 and Q2. FET's Q3 and Q4 neutralize the gate-to-drain capacity of Q1 to Q2. The receive rf is mixed with the variable injection frequency (117 to 144.9999 MHz) to obtain 115-MHz if, which is applied to the 115-MHz filter through diode CR3. The 115-MHz if out of the filter passes through diode CR6 and transformer T5 to the bases of down conversion mixer transistors Q11 and Q12. The 115-MHz if is mixed with fixed injection 110/120 MHz to produce a 5-MHz if. The 5-MHz if (with upper and lower sidebands reversed) is coupled by transformer T6 through diode CR8 to P1-2 (IF OUT).

When the receive rf input signals are below AGC threshold, the electron flow is through inductors L3 and L16, bypassing diodes CR1 and CR7. As the rf input signal increases, the AGC/ALC DRIVE voltage at P1-9 decreases, permitting conduction by diodes CR1 and CR7. As the current of diodes CR1 and CR7 increases, the rf and if signals are shunted to ground, reducing the signal gain.

2.2.2 Transmit Mode

During transmit, the switching logic at P1-5 and P1-6 (figures 2 and 5) switches the transmit mixers on and the receive mixers off. The IF IN (5-MHz AME or SSB) signal is coupled by diode CR10 and transformer T8 to the up conversion mixer, transistors Q15 and Q16. The sum of 110- and 5-MHz frequencies, AM or USB mode, or difference of 120- and 5-MHz frequencies, LSB mode, (115 MHz) is coupled through transformers T7 and diode CR9 to the 115-MHz filter.

The filtered output is coupled to the down conversion mixer, FET's Q5 and Q8, by diode CR5 and transformer T4. Here the 115-MHz signal is mixed with 117- to 144.9999-MHz variable injection signal from P2 to obtain the 2- to 29.9999-MHz output. FET's Q7 and Q8 neutralize the gate-to-drain capacity of FET's Q5 and Q6. The rf output of the down conversion mixer is coupled through low-pass filter inductors L1 and L2 and capacitors C1 and C2, to P1-14 (XMT RF) by transformer T3, diode CR4, and capacitor C4. If the rf output is too high (as noted in ALC discussion), the ALC/AGC DRIVE at P1-9 decreases, permitting diodes CR1 and CR7 to conduct, reducing the rf output.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the rf mixer are listed below. Refer to the maintenance section of this instruction book for minimum specifications, representative types, and usage of test equipment.

a. Mixer adapter
b. Electrical frequency synthesizer
c. Power supply
d. Attenuator, 6-dB (2 required)
e. Voltmeter
f. Distortion analyzer
g. Power divider
h. Rf voltmeter, with 50-ohm adapter
i. Signal generator (2 required)
j. Spectrum analyzer (if section and 1-kHz to 120-MHz rf section required)

3.2 Testing

The test procedures in table 1 check total performance of the rf mixer. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault. When a defective subassembly has been repaired, the procedures should be repeated to verify all faults have been corrected.

The procedures are to be performed in sequence given. If an individual test is to be performed, review prior tests to ensure proper test setup and control settings.

4. ALIGNMENT/ADJUSTMENTS

Rf mixer alignment/adjustments are performed in conjunction with testing/troubleshooting table 1.

a. C10, C30, and C35 - test step 1, e.(3).
b. C25, C44, and C47 - test step 8, c.(4).

Table 1. RF Mixer, Testing/Troubleshooting.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary setup	a. On test adapter, set POWER to OFF. b. Install rf mixer on test adapter and connect power supply as shown in figure 3, test setup A. Set power supply POWER to ON. c. On test adapter, set MODE to RCV, AGC to OFF and POWER to ON. d. On electrical frequency synthesizer, set POWER to ON, MODE to SSB and USB and FREQUENCY SELECT-MHz to 15.0000 MHz. e. Receive adjustments 1. On test adapter, connect signal generator through 6-dB attenuator to RF IN/OUT test point and connect rf voltmeter to MIXER OUTPUT LOAD RF OUT test point as shown in figure 3, test setup A. Connect rf jumper cable between MIXER IN/OUT and MIXER OUTPUT LOAD RF IN test points. *Note* Hard volts is defined as open circuit voltage obtained by adding the 6-dB attenuator in series with the signal generator rf output. Unless otherwise noted, hard volts will be used for these procedures. 2. Set signal generator for 15.0 MHz at a level of 10 mV. 3. Monitor rf out on rf voltmeter and adjust C10, C30 and C35 (see figure 4, sheet 1) for maximum rf output.		
2. Receive gain	a. Set signal generator for 15.0 MHz at 10-mV output and measure rf out on rf voltmeter connected to MIXER OUTPUT LOAD RF OUT test point. b. Repeat step a at 2.0 MHz and 29.999 MHz; set the electrical frequency synthesizer to the required frequency (2.0 or 29.999 MHz) for each test.	50 to 95 mV Same as step a.	Check the following: Q1, Q2, T1, Q11, Q12, T5, FL1, T6, CR7. Same as step a.

Table 1. RF Mixer, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. Receive bandpass	a. Set signal generator for 15.0 MHz at 10-mV output (applied to RF IN/OUT test point on test adapter) and set electrical frequency synthesizer to 15.0000 MHz.		
	b. Measure rf output on rf voltmeter connected to MIXER OUTPUT LOAD RF OUT test point. Note level as reference.	Reference	
	c. On signal generator, increase output level to raise rf output by 0.6 dB; then increase signal generator frequency to obtain voltage reference level noted in step b (measured on rf voltmeter). Note frequency variation above 15.000 MHz.	No less than 3.0 kHz	Check the following: FL1, Q1-Q2, Q11-Q12, L1-L2, and C1-C2.
	d. Repeat steps a, b, and c for frequency variation below 15.0000 MHz.	Same as step c.	Same as step c.
4. Receive sensitivity	a. On test adapter, connect distortion analyzer to RCVR AF OUT test point as shown in figure 3, test setup A. Disconnect rf jumper from MIXER OUTPUT LOAD RF IN test point and connect to IF IN/OUT test point.		
	b. Set signal generator for 15.0010 MHz at a level of 0.7 μV, applied to RF IN/OUT test point on test adapter.		
	c. On the distortion analyzer measure the signal-plus-noise to noise ratio ((s+n)/n) by nulling out the 1000-Hz audio.	Not less than 12 dB	Check the following: Q1-Q2, T1, Q11-Q12, T5, FL1, T6, CR7.
	d. Set electrical frequency synthesizer for 2.0000 MHz and adjust signal generator for 2.0010 MHz at a level of 0.7 μV and repeat step c.	Same as step c.	Same as step c.
	e. Set electrical frequency synthesizer for 29.9990 MHz and adjust signal generator for 30.0000 MHz and repeat step c.	Same as step c.	Same as step c.
5. Receive AGC	a. Set electrical frequency synthesizer for 15.0000 MHz and adjust signal generator for 15.0010 MHz at a level of 0.7 μV applied to RF IN/OUT test point on test adapter.		
	b. Set reference on distortion analyzer (RCVR AF OUT test point).	Reference	
(Cont)	c. On test adapter, set AGC to ON.		

Table 1. RF Mixer, Testing/Troubleshooting (Cont).

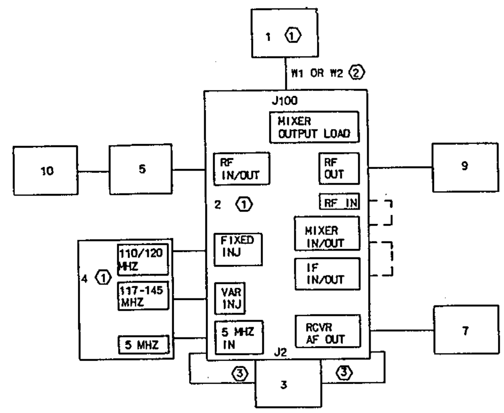
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	d. Increase output level of signal generator until reference level, step b, is obtained on distortion analyzer. Measure increase in signal generator output level.	45 ±7 dB above reference	Check the following: CR7, Q1-Q2, T1-T2, Q11-Q12, T5-T6, CR3, CR5, CR6, and CR9.
6. Receive if rejection	a. On test adapter, set AGC to OFF.		
	b. Set signal generator for 15.0010 MHz at 1.0 µV, applied to RF IN/OUT test point on test adapter.		
	c. Set reference on distortion analyzer (RCVR AF OUT test point).	Reference	
	d. Reset signal generator for 114.9990 MHz, then increase output level of signal generator until reference level, step c, is obtained on distortion analyzer. Measure increase in signal generator output level.	Not less than 38 dB above reference	Check the following: FL1, Q1-Q2, Q11-Q12, T1-T2, T5-T6, CR3, and CR6.
	e. Disconnect test equipment.		
7. Receive current	a. On test adapter, connect digital voltmeter to T/R CURRENT MV/MA test points and set AGC to ON.		
	b. Measure dc voltage (current) on digital voltmeter.	Not more than 15 mV (15 mA)	Check the following: L1, R1, C6, R3, C15, L9, C28, CR7, L16, C27, L8, R4, C14, and L4.
	c. Disconnect digital voltmeter.		
8. Transmit gain	a. On test adapter, set MODE to XMT and assure that AGC is OFF. On electrical frequency synthesizer, assure that POWER is ON, MODE is in SSB and USB, and FREQUENCY SELECT-MHZ is set to 15.0000 MHz.		
	b. On test adapter, connect signal generator through 6-dB attenuator to MIXER INPUT LOAD RF IN test point. Refer to figure 3, test setup B. Disconnect the rf jumper and connect between MIXER INPUT LOAD RF OUT and MIXER IN/OUT test points.		
	c. Transmit Adjustments		
(Cont)	1. Connect rf voltmeter (unterminated) to MIXER INPUT LOAD MV IN test point.		

Table 1. RF Mixer, Testing/Troubleshooting (Cont).

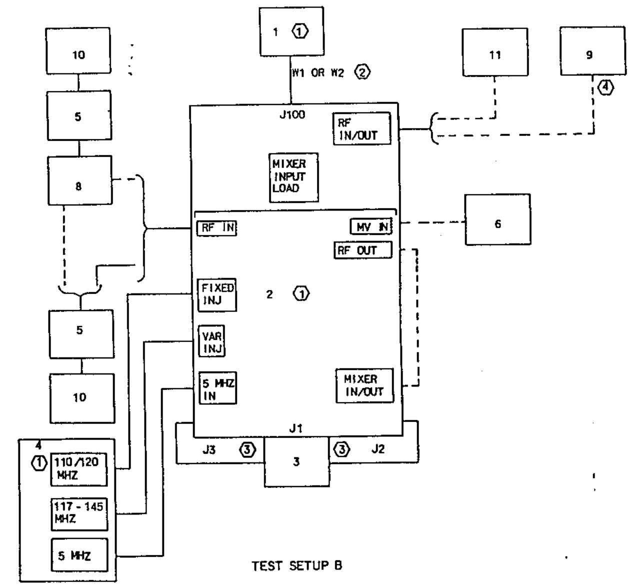
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)	2. Set signal generator for 5.0000 MHz and adjust output for 60 mV measured on rf voltmeter.		
	3. Remove rf voltmeter from MIXER INPUT LOAD MV IN test point and connect thru the 50-ohm BNC adapter, to RF IN/OUT test point.		
	4. Monitor rf voltmeter and adjust C25, C44, and C47 (see figure 4, sheet 1) for maximum rf output.		
	d. Measure rf output at RF IN/OUT test point on rf voltmeter.	70 ±25 mV.	Check the following: Q15-Q17, T8, Q5-Q6, T3, FL1, T7, CR9 and CR5.
	e. Set electrical frequency synthesizer to 2.0000 MHz. (Signal generator remains at 5.0000 MHz at 60 mV output applied to MIXER IN/OUT test point on test adapter).		
	f. Repeat step d.	Same as step d.	Same as step d.
	g. Repeat step d with electrical frequency synthesizer set to 29.9999 MHz.	Same as step d.	Same as step d.
9. TGC	a. Set electrical frequency synthesizer FREQUENCY SELECT-MHZ to 15.0000 MHz and assure that signal generator is at 5.0000 MHz at 60 mV output.		
	b. On test adapter connect spectrum analyzer to RF IN/OUT jack. Measure output for reference.	Reference	
	c. On test adapter, set AGC to ON and measure output on spectrum analyzer. Set AGC to OFF.	Not less than 35 dB or more than 55 dB down from reference, step b.	Same as test 7, step b.
10. Transmit intermodulation	a. On test adapter, connect two signal generators through 6-dB attenuators and power divider to MIXER INPUT LOAD RF IN test point. Connect spectrum analyzer to RF IN/OUT test point.		
(Cont)	b. With one signal generator off, set the other for 5.0000 MHz and adjust output for 30 mV measured on rf voltmeter (unterminated) connected to MIXER INPUT LOAD MV IN test point on test adapter. Set signal generator to OFF.		

Table 1. RF Mixer, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	c. Turn on the other signal generator and set for 5.00011 MHz and output for 30 mV measured on rf voltmeter (unterminated). Turn on the first signal generator.		
	d. Measure the third order products on the spectrum analyzer.	No less than 40 dB	Check the following: Q15-Q16, Q5-Q6, Q10, Q14.
11. Transmit current	a. On test adapter, connect digital voltmeter to T/R CURRENT MV/MA test points and disconnect signal generators.		
	b. On test adapter, set AGC to ON and measure voltage (current) on digital voltmeter. Set AGC to OFF.	Not more than 16.5 mV (16.5 mA)	Check the following: L1, R1, C6, R3, C15, L9, C28, CR7, L16, C27, L8, R4, C14, and L4.



TEST SETUP A



TEST SETUP B

1. POWER SUPPLY
2. MIXER TEST ADAPTER
3. MIXER
4. ELECTRICAL FREQUENCY SYNTHESIZER
5. ATTENUATOR, 6-dB (2 REQUIRED)
6. DIGITAL VOLTMETER
7. DISTORTION ANALYZER
8. POWER DIVIDER
9. RF VOLTMETER
10. SIGNAL GENERATOR (2 REQUIRED)
11. SPECTRUM ANALYZER

NOTES:

(1) PART OF RADIO TEST SET 969J-3.

(2) PART OF POWER SUPPLY.

(3) PENDANT CABLE; PART OF MIXER TEST ADAPTER.

(4) USE 50-OHM BNC ADAPTER.

(5) DASHED LINE IS ALTERNATE CONNECTION DESCRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.

TPA-5129-014

RF Mixer, Test Setup
Figure 3

5. REPAIR

Repair of the rf mixer is accomplished using standard maintenance and circuit card repair procedures. Refer to the maintenance section of this instruction book for general maintenance precautions, procedures and postcoating information.

6. PARTS LIST

6.1 Introduction

The purpose of this parts list is for identification and requisition of parts. A parts location illustration, parts list, and schematic diagram are included.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

6.2 Group Assembly Parts List

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column — Listed are MIL standard, vendor, or Collins part numbers. Collins part numbering system consists of 10 digits as follows: a 3-digit family number, a 4-digit serial number, and a 3-digit dash number.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: MCN (Manufacturer Control Number) 101 and up; CI (Configuration Identifier) 5-digit number; REV (Revision Identifier) dash (—) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB 1, SB 2, etc.

UNITS PER ASSY Column — Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

6.3 Reference Designation Index

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

6.4 How To Use This Parts List

To locate a part number, locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

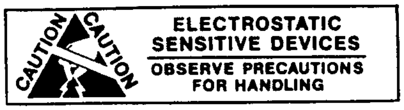
To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

On multiple sheet illustrations, each index number is given the applicable sheet number of the illustration where the item appears.

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.



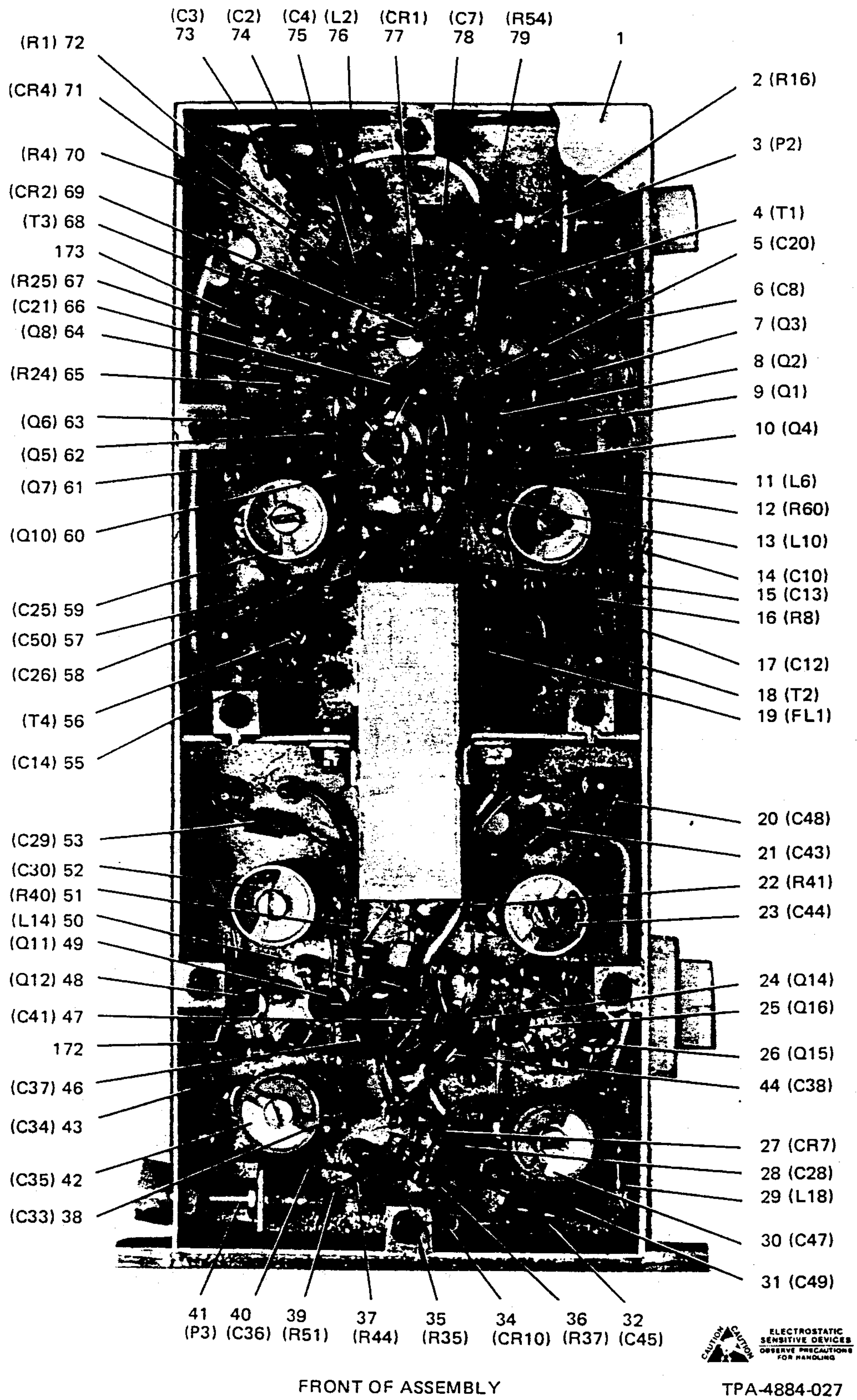
6.5 Manufacturer's Code, Name, and Address

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00136	MCCOY ELECTRONICS CO WATTS AND CHESTNUT ST MT HOLLY SPRINGS PA 17065
02768	ILLINOIS TOOL WORKS INC FASTEX DIVISION 195 ALGONQUIN ROAD DES PLAINES IL 60016
04713	MOTOROLA INC SEMICONDUCTOR GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
05411	DU PAGE MFG CO 2250 CURTISS AVE DOWNERS GROVE IL 60515
12615	U S TERMINALS INC 7504 CAMARGO ROAD CINCINNATI OH 45243
13499	ROCKWELL INTERNATIONAL CORP COLLINS TELECOMMUNICATIONS PRODUCTS DIV 855 35TH ST NE P O BOX 728 CEDAR RAPIDS IA 52498
27014	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051
28480	HEWLETT-PACKARD CO CORPORATE HQ 3000 HANOVER ST PALO ALTO CA 94304
56866	QUALITY THERMISTOR 2096 SOUTH COLE RD SUITE 7 BOISE ID 83705
72962	ESNA DIV OF AMERACE CORP 2330 VAUXHALL ROAD UNION NJ 07083
72982	ERIE TECHNOLOGICAL PRODUCTS INC 645 W 11TH ST ERIE PA 16512
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV 5700 W ROOSEVELT RD CHICAGO IL 60650
79807	WROUGHT WASHER MFG INC 2100 S BAY ST MILWAUKEE WI 53207
81349	MILITARY SPECIFICATIONS
91314	LEWIS SPRING AND MFG CO 2652 W NORTH AVE CHICAGO IL 60647
93790	CORNELL-DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO 1605 RODNEY FRENCH BLVD NEW BEDFORD MA 02741
96906	MILITARY STANDARD
98278	MICRODOT MANUFACTURING INC MALCO SOUTH PASADENA DIV 220 PASADENA AVE SOUTH PASADENA CA 91030
98291	SEALECTRO CORP 225 HOYT MAMARONECK NY 10544

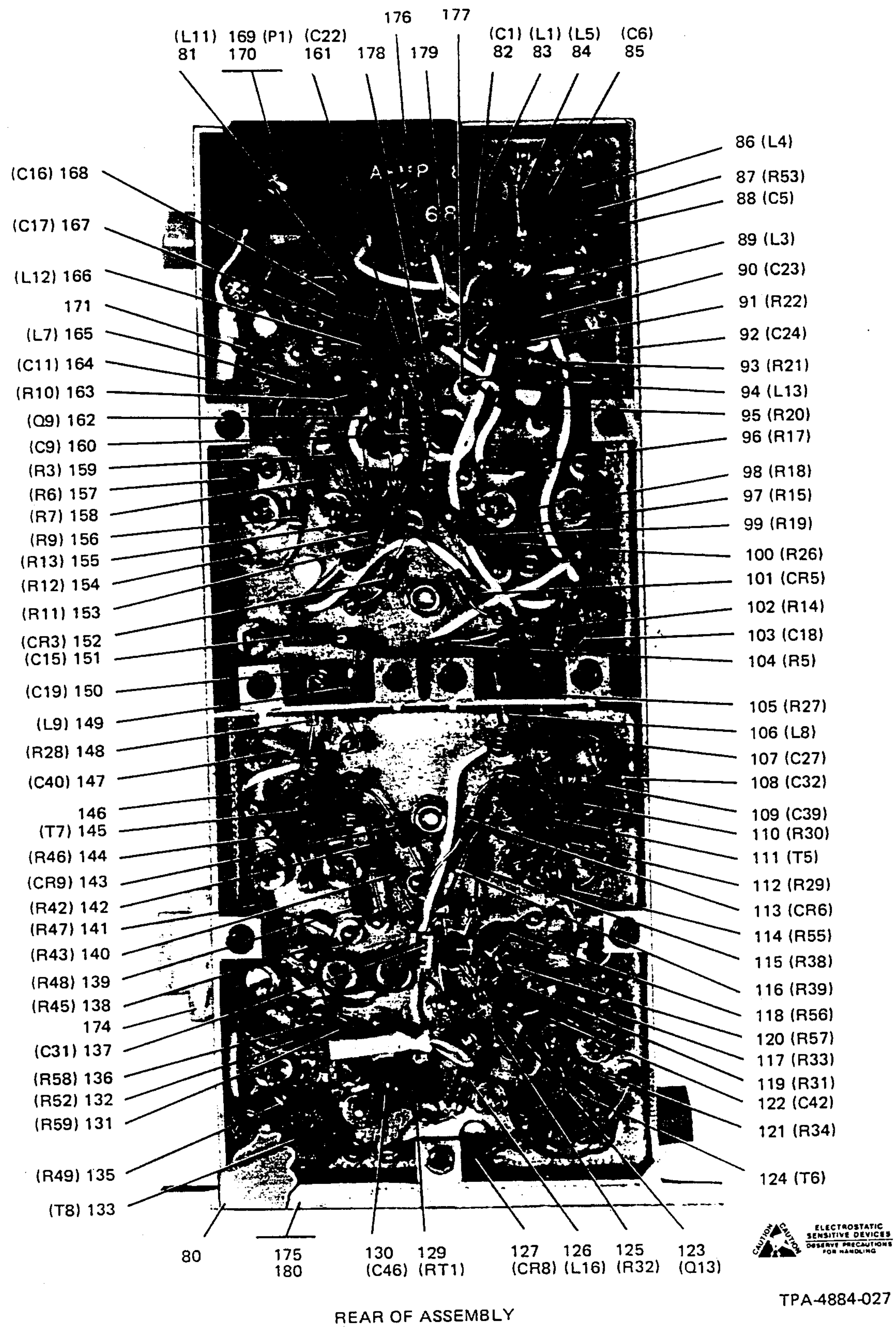
6.6 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
RF Mixer	629-3403-001	AB



RF Mixer, Parts Location
Figure 4 (Sheet 1 of 4)



RF Mixer, Parts Location
Figure 4 (Sheet 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-	629-3403-001	1	RF MIXER (ESDS)	1	
/1 1	629-5841-001	2	COVER,TOP	1	
	MS51957-2	2	SCREW,MACH SST, 2-56 X 3/16 (96906) 343-0123-000 (AP)	8	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	8	
	310-6320-000	2	WASHER,FLAT SST, 0.092 X 0.219 OD (79807) (AP)	1	
/1 2	RCR05G151JS	2	RESISTOR,FXD CMPSN, 150 OHMS, 5%, 1/8W (81349) 745-1863-290 R16	1	
/1 3	141-1002-0002	2	CONNECTOR,RCPT ELEC (98278) 357-7353-010 P2	1	
	618-3367-001	2	BUSHING (AP)	1	
/1 4	628-2336-001	2	TRANSFORMER T1	1	
/1 5	C05FY101J0	2	CAPACITOR,FXD MICA DIEL, 100PF, 5%, 50V (93790) 912-4141-050	1	
/1 6	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720	1	
/1 7	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030	1	
/1 8	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030	1	
/1 9	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030	1	
1 /1 10	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030	1	
/1 11	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000	1	
/1 12	RCR05G182JS	2	RESISTOR,FXD CMPSN, 1.8K, 5%, 1/8W (81349) 745-1863-550	1	
/1 13	MS75084-04	2	COIL,RADIO FREQUENC 2.20UH (96906) 240-2027-000	1	
/1 14	538002C0P089R	2	CAPACITOR,VAR CER DIEL, 2 TO 8PF, 350V (72982) 917-1228-000	1	
/1 15	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000	1	
/1 16	RCR05G330KS	2	RESISTOR,FXD CMPSN, 33 OHMS, 10%, 1/8W (81349) 745-2206-000	1	
/1 17	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000	1	
/1 18	628-2335-001	2	TRANSFORMER	1	
/1 19	2Q25	2	FILTER,BANDPASS (00136) 293-1306-010	1	
	92-1660-26	2	NUT,SLFLKG,HEX CD PL BRS, 2-56 (72962) 333-1405-030 (AP)	2	
	MS51957-3	2	SCREW,MACH CD PL STL, 2-56 X 1/4 (96906) 343-0124-000 (AP)	2	
/1 20	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000	1	
/1 21	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C43	1	
/1 22	RCR05G392JS	2	RESISTOR,FXD CMPSN, 3.9K, 5%, 1/8W (81349) 745-1863-630 R41	1	
/1 23	538002C0P089R	2	CAPACITOR,VAR CER DIEL, 2 TO 8PF, 350V (72982) 917-1228-000 C44	1	
/1 24	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q14	1	
/1 25	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q16	1	
/1 26	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q15	1	
/1 27	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR7	1	
/1 28	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C28	1	
/1 29	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L18	1	
/1 30	538002E2P094R	2	CAPACITOR,VAR CER DIEL, 9 TO 35PF, 200V (72982) 917-1235-000 C47	1	
/1 31	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C49	1	
/1 32	C05FY331J0	2	CAPACITOR,FXD MICA DIEL, 330PF, 5%, 50V (93790) 912-4141-490 C45	1	
33		2	NOT USED		
/1 34	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR10	1	
/1-35	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R35	1	
/1 36	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R37	1	
/1 37	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R44	1	
/1 38	C05FY331J0	2	CAPACITOR,FXD MICA DIEL, 330PF, 5%, 50V (93790) 912-4141-490 C33	1	
/1 39	RCR05G151JS	2	RESISTOR,FXD CMPSN, 150 OHMS, 5%, 1/8W (81349) 745-1863-290 R51	1	
/1 40	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C36	1	
/1 41	141-1002-0002	2	CONNECTOR,RCPT ELEC (98278) 357-7353-010 P3	1	
	618-3367-001	2	BUSHING (AP)	1	
/1 42	538002E2P094R	2	CAPACITOR,VAR CER DIEL, 9 TO 35PF, 200V (72982) 917-1235-000 C35	1	
/1 43	C05FY331J0	2	CAPACITOR,FXD MICA DIEL, 330PF, 5%, 50V (93790) 912-4141-490 C34	1	
/1 44	C05FY101J0	2	CAPACITOR,FXD MICA DIEL, 100PF, 5%, 50V (93790) 912-4141-050 C38	1	
45		2	NOT USED		
/1 46	C05FY101J0	2	CAPACITOR,FXD MICA DIEL, 100PF, 5%, 50V (93790) 912-4141-050 C37	1	
/1 47	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C41	1	
/1 48	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q12	1	
/1 49	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q11	1	
/1 50	MS75084-04	2	COIL,RADIO FREQUENC 2.20UH (96906) 240-2027-000 L14	1	

1 FOR PROPER NEUTRALIZING ITEMS 7-10 MUST HAVE SAME VENDOR.

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4/1 51	RCR05G392JS	2	RESISTOR,FXD CMPSN, 3.9K, 5%, 1/8W (81349) 745-1863-630 R40	1	
/1 52	538002C0P089R	2	CAPACITOR,VAR CER DIEL, 2 TO 8PF, 350V (72982) 917-1228-000 C30	1	
/1 53	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C29	1	
54		2	NOT USED		
/1 55	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C14	1	
/1 56	628-2335-001	2	TRANSFORMER T4	1	
/1 57	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C50	1	
/1 58	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C26	1	
/1 59	538002C0P089R	2	CAPACITOR,VAR CER DIEL, 2 TO 8PF, 350V (72982) 917-1228-000 C25	1	
/1 60	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q10	1	
/1 61	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030 Q7	1	
/1 62	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030 Q5	1	
/1 63	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030 Q6	1	
1 /1 64	SPF554M4	2	TRANSISTOR (ESDS) (04713) 352-1068-030 Q8	1	
/1 65	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R24	1	
/1 66	C05FY101J0	2	CAPACITOR,FXD MICA DIEL, 100PF, 5%, 50V (93790) 912-4141-050 C21	1	
/1 67	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R25	1	
/1 68	628-2336-001	2	TRANSFORMER T3	1	
/1 69	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR2	1	
/1 70	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R4	1	
/1 71	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR4	1	
/1-72	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R1	1	
/1 73	C05EY270J0	2	CAPACITOR,FXD MICA DIEL, 27PF, 5%, 50V (93790) 912-4141-180 C3	1	
/1 74	C05FY161J0	2	CAPACITOR,FXD MICA DIEL, 160PF, 5%, 50V (93790) 912-4141-410 C2	1	
/1 75	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C4	1	
/1 76	MS75083-08	2	COIL,RF 0.39UH (96906) 240-2018-000 L2	1	
/1 77	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR1	1	
/1 78	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C7	1	
/1 79	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R54	1	
/2 80	629-5840-001	2	COVER,BOTTOM	1	
	MS51959-2	2	SCREW,MACH SST, 2-56 X 3/16 (96906) 342-0132-000 (AP)	9	
/2 81	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L11	1	
/2 82	C05EY820J0	2	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 50V (93790) 912-4141-350 C1	1	
/2 83	MS75083-08	2	COIL,RF 0.39UH (96906) 240-2018-000 L1	1	
/2 84	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L5	1	
/2 85	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C6	1	
/2 86	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L4	1	
/2 87	RCR07G4R7JS	2	RESISTOR,FXD CMPSN, 4.7 OHMS, 5%, 1/4W (81349) 745-4382-000 R53	1	
/2 88	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C5	1	
/2 89	MS75089-11	2	COIL,RF 100UH (96906) 240-2715-370 L3	1	
/2 90	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C23	1	
/2 91	RCR05G330KS	2	RESISTOR,FXD CMPSN, 33 OHMS, 10%, 1/8W (81349) 745-2265-000 R22	1	
/2 92	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C24	1	
/2 93	RCR05G332JS	2	RESISTOR,FXD CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 R21	1	
/2 94	MS75083-03	2	COIL,RADIO FREQUENC 0.15UH (96906) 240-2013-000 L13	1	
/2 95	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R20	1	
/2 96	RCR05G332JS	2	RESISTOR,FXD CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 R17	1	
/2 97	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R15	1	
/2 98	RCR05G332JS	2	RESISTOR,FXD CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 R18	1	
/2 99	RCR05G121JS	2	RESISTOR,FXD CMPSN, 120 OHMS, 5%, 1/8W (81349) 745-1863-270 R19	1	
/2 100	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R26	1	
/2 101	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR5	1	
/2 102	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R14	1	
/2 103	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C18	1	
/2 104	RCR05G220JS	2	RESISTOR,FXD CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 R5	1	

1 FOR PROPER NEUTRALIZING ITEMS 61-64 MUST HAVE SAME VENDOR.

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY
4/2 105	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R27	
/2 106	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L8	
/2 107	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C27	
/2-108	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C32	
/2 109	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C39	
/2 110	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R30	
/2 111	628-2333-001	2	TRANSFORMER T5	
/2 112	RCR05G271JS	2	RESISTOR,FXD CMPSN, 270 OHMS, 5%, 1/8W (81349) 745-1863-350 R29	
/2 113	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR6	
/2 114	RCR05G302JS	2	RESISTOR,FXD CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 R55	
/2 115	RCR05G271JS	2	RESISTOR,FXD CMPSN, 270 OHMS, 5%, 1/8W (81349) 745-1863-350 R38	
/2 116	RCR05G562JS	2	RESISTOR,FXD CMPSN, 5.6K, 5%, 1/8W (81349) 745-1863-670 R39	
/2 117	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R33	
/2 118	RCR05G150JS	2	RESISTOR,FXD CMPSN, 15 OHMS, 5%, 1/8W (81349) 745-1863-050 R56	
/2 119	RCR05G222JS	2	RESISTOR,FXD CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 R31 (TEST SELECT)	[illegible]
/2 119	RCR05G272JS	2	RESISTOR,FXD CMPSN, 2.7K, 5%, 1/8W (81349) 745-1863-590 R31 (TEST SELECT)	[illegible]
/2 119	RCR05G332JS	2	RESISTOR,FXD CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 R31 (TEST SELECT)	[illegible]
/2 120	RCR05G150JS	2	RESISTOR,FXD CMPSN, 15 OHMS, 5%, 1/8W (81349) 745-1863-050 R57	
/2 121	RCR05G470KS	2	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/8W (81349) 745-2292-000 R34	
/2 122	C05EY270J0	2	CAPACITOR,FXD MICA DIEL, 27PF, 5%, 50V (93790) 912-4141-180 C42	
/2 123	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q13	
/2 124	628-2337-001	2	TRANSFORMER T6	
/2 125	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R32	
/2 126	MS75085-07	2	COIL,RF 100UH (96906) 240-2047-000 L16	
/2 127	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR8	
128		2	NOT USED	
/2 129	714-1138-060	2	RESISTOR,THERMAL 1K, 10%, 2.6MW (56866) RT1	
/2 130	C05FY331J0	2	CAPACITOR,FXD MICA DIEL, 330PF, 5%, 50V (93790) 912-4141-490 C46	
/2 131	RCR05G220JS	2	RESISTOR,FXD CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 R59	
/2 132	RCR05G821JS	2	RESISTOR,FXD CMPSN, 820 OHMS, 5%, 1/8W (81349) 745-1863-470 R52 (TEST SELECT)	A
/2 132	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R52 (TEST SELECT)	A
/2 132	RCR05G122JS	2	RESISTOR,FXD CMPSN, 1.2K, 5%, 1/8W (81349) 745-1863-510 R52 (TEST SELECT)	A
/2 132	RCR05G152JS	2	RESISTOR,FXD CMPSN, 1.5K, 5%, 1/8W (81349) 745-1863-530 R52 (TEST SELECT)	A
/2 133	628-2337-002	2	TRANSFORMER T8	
134		2	NOT USED	
/2 135	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R49	
/2 136	RCR05G220JS	2	RESISTOR,FXD CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 R59	
/2 137	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C31	
/2 138	RCR05G153JS	2	RESISTOR,FXD CMPSN, 15K, 5%, 1/8W (81349) 745-1863-770 R45	
/2-139	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R48	
/2 140	RCR05G271JS	2	RESISTOR,FXD CMPSN, 270 OHMS, 5%, 1/8W (81349) 745-1863-350 R43	
/2 141	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R47	
/2 142	RCR05G562JS	2	RESISTOR,FXD CMPSN, 5.6K, 5%, 1/8W (81349) 745-1863-670 R42	
/2 143	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR9	
/2 144	RCR05G220JS	2	RESISTOR,FXD CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 R46	
/2 145	628-2334-001	2	TRANSFORMER T7	1
/2 146	RG178BU	2	CABLE,RF (81349) 425-1538-000	AR
/2 147	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C40	1
/2 148	RCR05G102JS	2	RESISTOR,FXD CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 R28	1
/2 149	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L9	1
/2 150	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C19	1
/2 151	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C15	1
/2 152	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 CR3	1

RF Mixer, Parts Location
Figure 4 (Sheet 3)

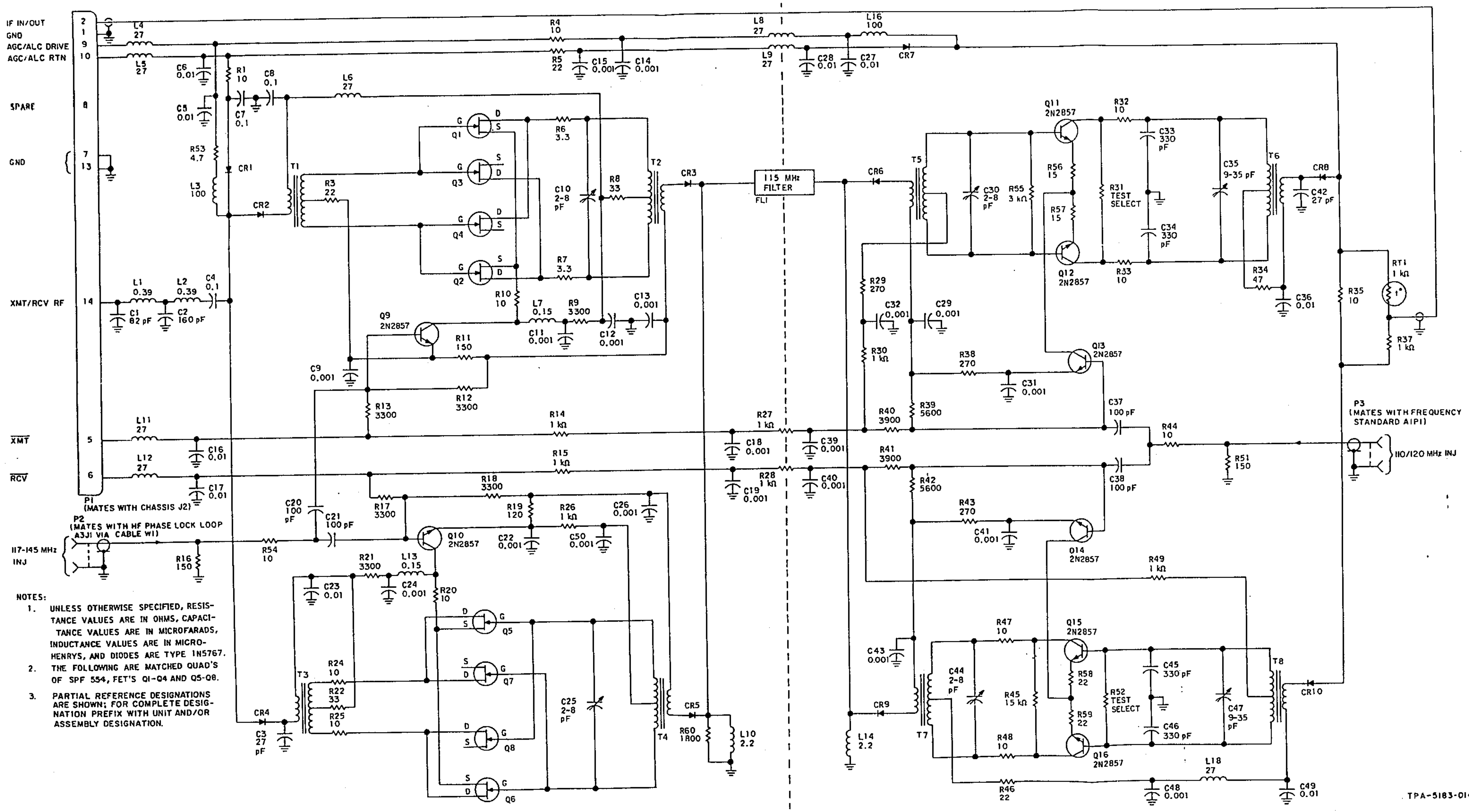
GROUP ASSEMBLY PARTS LIST

	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
/2 153	RCR05G151JS	2	RESISTOR,FXD CMPSN, 150 OHMS, 5%, 1/8W (81349) 745-1863-290 R11	1	
/2 154	RCR05G332JS	2	RESISTOR,FXD CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 R12	1	
/2 155	RCR05G332JS	2	RESISTOR,FXD CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 R13	1	
/2 156	RCR05G332JS	2	RESISTOR,FXD CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 R9	1	
/2 157	RCR05G3R3JS	2	RESISTOR,FXD CMPSN, 3.3 OHMS, 5%, 1/8W (81349) 745-0907-130 R6	1	
/2 158	RCR05G3R3JS	2	RESISTOR,FXD CMPSN, 3.3 OHMS, 5%, 1/8W (81349) 745-0907-130 R7	1	
/2 159	RCR05G220JS	2	RESISTOR,FXD CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 R3	1	
/2 160	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C9	1	
/2 161	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C22	1	
/2 162	2N2857	2	TRANSISTOR (27014) 352-0792-010 Q9	1	
/2 163	RCR05G100JS	2	RESISTOR,FXD CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 R10	1	
/2 164	CK12BX102M	2	CAPACITOR,FXD CER DIEL, 1000PF, 20%, 100V (81349) 913-3019-000 C11	1	
/2 165	MS75083-03	2	COIL,RADIO FREQUENC 0.15UH (96906) 240-2013-000 L7	1	
/2 166	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L12	1	
/2 167	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C17	1	
/2 168	CK12BX103M	2	CAPACITOR,FXD CER DIEL, 10000PF, 20%, 100V (81349) 913-3021-000 C16	1	
/2 169	629-5839-001	2	CONNECTOR P1	1	
/2 170	372-2255-020	2	CONTACT,ELEC	9	
/2 171	229-5000-000550	2	TERMINAL,FEEDTHRU (98291) 306-1313-000	2	
	P313-0484-010	2	NUT,PLAIN,HEX NP BRS, 2-56 (77250) 313-0484-010 (AP)	2	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	2	
	310-0129-000	2	WASHER,FLAT BRS, 0.089 ID X 0.188 OD (05411) (AP)	2	
/1 172	229-5002-000550	2	TERMINAL,FEEDTHRU (98291) 306-1312-000	4	
/1 173	229-5001-000550	2	TERMINAL,FEEDTHRU (98291) 306-1314-000	12	
	P313-0484-010	2	NUT,PLAIN,HEX NP BRS, 2-56 (77250) 313-0484-010 (AP FOR 172,173)	16	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP FOR 172,173)	16	
/2 174	8511-01-00	2	CLIP,SPR THSN (02768) 150-0775-010	1	
/2 175	629-5920-001	2	CHASSIS	1	
	635-8223-004	2	SCREW (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	340-0644-000	2	SLEEVE,SPRING (91314) (AP)	2	
/2 176	011-6809-000599	3	TERMINAL,FEEDTH (98291) 306-2297-000	12	
/2 177	SL354-351WHT	3	TERMINAL,FEEDTH (12615) 306-2474-010	49	
/2 178	119-0507-000009	3	RETAINER,TRANSISTOR (98291) 352-9509-000	2	
/2 179	SL441-434WHT	3	TERMINAL,STDF (12615) 306-2222-100	54	
/2 180	629-5820-002	3	CHASSIS	1	

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
CR1	4/1-77	1N5767	Q14	4/1-24	2N2857
CR10	4/1-34	1N5767	Q15	4/1-26	2N2857
CR2	4/1-69	1N5767	Q16	4/1-25	2N2857
CR3	4/2-152	1N5767	Q5	4/1-62	SPF554M4
CR4	4/1-71	1N5767	Q6	4/1-63	SPF554M4
CR5	4/2-101	1N5767	Q7	4/1-61	SPF554M4
CR6	4/2-113	1N5767	Q8	4/1-64	SPF554M4
CR7	4/1-27	1N5767	Q9	4/2-162	2N2857
CR8	4/2-127	1N5767	RT1	4/2-129	714-1138-060
CR9	4/2-143	1N5767	R1	4/1-72	RCR05G100JS
C1	4/2-82	CD5EY820J0	R10	4/2-163	RCR05G100JS
C11	4/2-164	CK12BX102M	R11	4/2-153	RCR05G151JS
C14	4/1-55	CK12BX102M	R12	4/2-154	RCR05G332JS
C15	4/2-151	CK12BX102M	R13	4/2-155	RCR05G332JS
C16	4/2-168	CK12BX103M	R14	4/2-102	RCR05G102JS
C17	4/2-167	CK12BX103M	R15	4/2-97	RCR05G102JS
C18	4/2-103	CK12BX102M	R16	4/1-2	RCR05G151JS
C19	4/2-150	CK12BX102M	R17	4/2-96	RCR05G332JS
C2	4/1-74	CD5FY161J0	R18	4/2-98	RCR05G332JS
C21	4/1-66	CD5FY101J0	R19	4/2-99	RCR05G121JS
C22	4/2-161	CK12BX102M	R20	4/2-95	RCR05G100JS
C23	4/2-90	CK12BX103M	R21	4/2-93	RCR05G332JS
C24	4/2-92	CK12BX102M	R22	4/2-91	RCR05G330KS
C25	4/1-59	538002C0P089R	R24	4/1-65	RCR05G100JS
C26	4/1-58	CK12BX102M	R25	4/1-67	RCR05G100JS
C27	4/2-107	CK12BX103M	R26	4/2-100	RCR05G102JS
C28	4/1-28	CK12BX103M	R27	4/2-105	RCR05G102JS
C29	4/1-53	CK12BX102M	R28	4/2-148	RCR05G102JS
C3	4/1-73	CD5EY270J0	R29	4/2-112	RCR05G271JS
C30	4/1-52	538002C0P089R	R3	4/2-159	RCR05G220JS
C31	4/2-137	CK12BX102M	R30	4/2-110	RCR05G102JS
C32	4/2-108	CK12BX102M	R31	4/2-119	RCR05G222JS
C33	4/1-38	CD5FY331J0	R31	4/2-119	RCR05G272JS
C34	4/1-43	CD5FY331J0	R31	4/2-119	RCR05G332JS
C35	4/1-42	538002E2P094R	R32	4/2-125	RCR05G100JS
C36	4/1-40	CK12BX103M	R33	4/2-117	RCR05G100JS
C37	4/1-46	CD5FY101J0	R34	4/2-121	RCR05G470KS
C38	4/1-44	CD5FY101J0	R35	4/1-35	RCR05G100JS
C39	4/2-109	CK12BX102M	R37	4/1-36	RCR05G102JS
C4	4/1-75	CK05BX104M	R38	4/2-115	RCR05G271JS
C40	4/2-147	CK12BX102M	R39	4/2-116	RCR05G562JS
C41	4/1-47	CK12BX102M	R4	4/1-70	RCR05G100JS
C42	4/2-122	CD5EY270J0	R40	4/1-51	RCR05G392JS
C43	4/1-21	CK12BX102M	R41	4/1-22	RCR05G392JS
C44	4/1-23	538002C0P089R	R42	4/2-142	RCR05G562JS
C45	4/1-32	CD5FY331J0	R43	4/2-140	RCR05G271JS
C46	4/2-130	CD5FY331J0	R44	4/1-37	RCR05G100JS
C47	4/1-30	538002E2P094R	R45	4/2-138	RCR05G153JS
C49	4/1-31	CK12BX103M	R46	4/2-144	RCR05G220JS
C5	4/2-88	CK12BX103M	R47	4/2-141	RCR05G100JS
C50	4/1-57	CK12BX102M	R48	4/2-139	RCR05G100JS
C6	4/2-85	CK12BX103M	R49	4/2-135	RCR05G102JS
C7	4/1-78	CK05BX104M	R5	4/2-104	RCR05G220JS
C9	4/2-160	CK12BX102M	R51	4/1-39	RCR05G151JS
L1	4/2-83	MS75083-08	R52	4/2-132	RCR05G821JS
L11	4/2-81	MS75084-17	R52	4/2-132	RCR05G102JS
L12	4/2-166	MS75084-17	R52	4/2-132	RCR05G122JS
L13	4/2-94	MS75083-03	R52	4/2-132	RCR05G152JS
L14	4/1-50	MS75084-04	R53	4/2-87	RCR07G4R7JS
L16	4/2-126	MS75085-07	R54	4/1-79	RCR05G100JS
L19	4/1-29	MS75084-17	R55	4/2-114	RCR05G302JS
L2	4/1-76	MS75083-08	R56	4/2-118	RCR05G150JS
L3	4/2-89	MS75089-11	R57	4/2-120	RCR05G150JS
L4	4/2-86	MS75084-17	R58	4/2-136	RCR05G220JS
L5	4/2-84	MS75084-17	R59	4/2-131	RCR05G220JS
L7	4/2-165	MS75083-03	R6	4/2-157	RCR05G3R3JS
L8	4/2-106	MS75084-17	R7	4/2-158	RCR05G3R3JS
L9	4/2-149	MS75084-17	R9	4/2-156	RCR05G332JS
P1	4/2-169	629-5839-001	T1	4/1-4	628-2336-001
P2	4/1-3	141-1002-0002	T3	4/1-68	628-2336-001
P3	4/1-41	141-1002-0002	T4	4/1-56	628-2335-001
Q10	4/1-60	2N2857	T5	4/2-111	628-2333-001
Q11	4/1-49	2N2857	T6	4/2-124	628-2337-001
Q12	4/1-48	2N2857	T7	4/2-145	628-2334-001
Q13	4/2-123	2N2857	T8	4/2-133	628-2337-002

RF Mixer, Parts Location
Figure 4 (Sheet 4)



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, INDUCTANCE VALUES ARE IN MICROHENRYS, AND DIODES ARE TYPE 1N5767.
2. THE FOLLOWING ARE MATCHED QUAD'S OF SPF 554, FET'S Q1-Q4 AND Q5-Q8.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.

RF Mixer, Schematic Diagram
Figure 5

Broadband Amplifier (601-3671-001)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0772066-001211
1 November 1982

(601-3671-001)

1. DESCRIPTION

Broadband Amplifier 601-3671-001, shown in figure 1, is a plug-in circuit card that interconnects with other receiver-transmitter circuits through one multipin connector. It contains rf amplifier, filter, and limiter circuits, ALC circuit, and a keying relay.

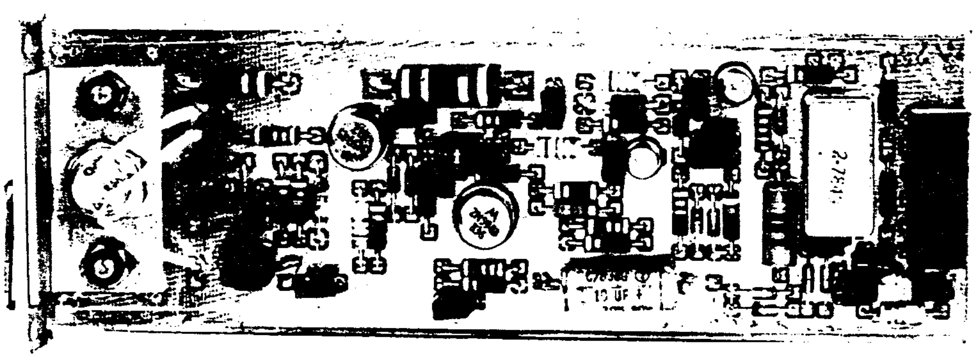
The broadband amplifier provides two basic functions: amplifies the transmit rf signal to approximately a 250-mW level to drive the power amplifier circuits of an amplifier-coupler; and direct-couples the received rf signal from the amplifier-coupler to the mixer.

2. PRINCIPLES OF OPERATION

2.1 Functional Theory

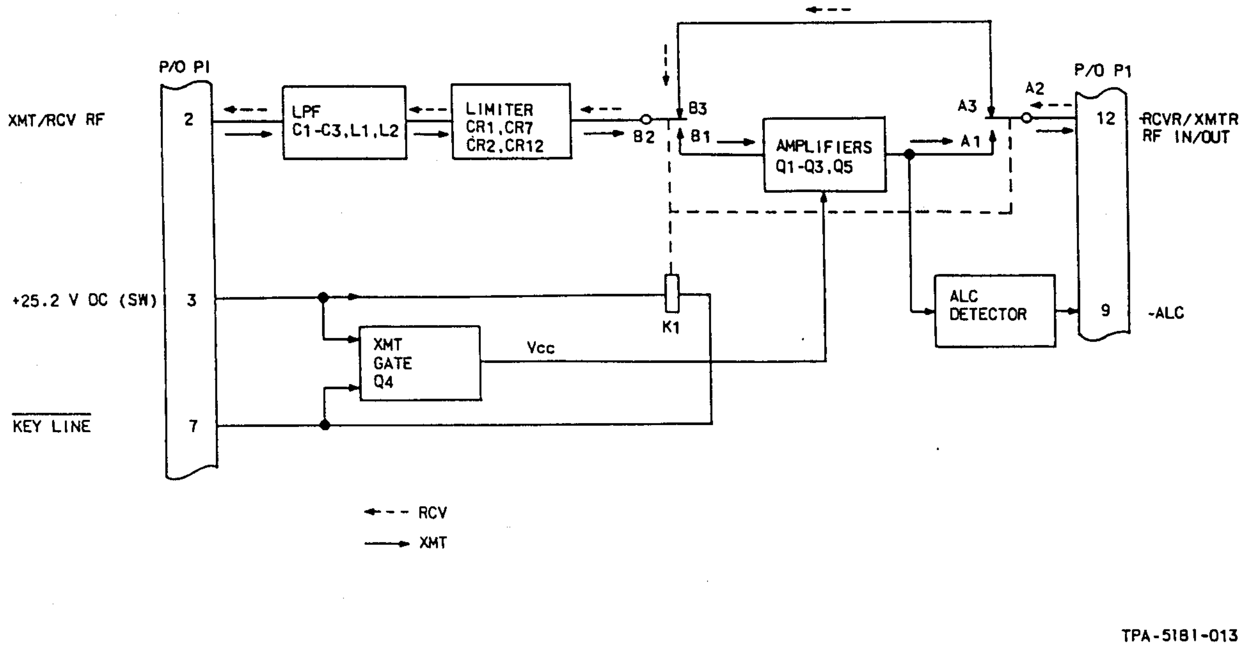
Refer to figure 2 (simplified schematic diagram) for functional theory. In receive mode, the broadband amplifier keying relay K1 is deenergized (receive position). The receive rf signal at P1-12 is routed by K1 to the rf mixer through P1-2.

In transmit mode, keying relay K1 is energized and the +25.2 V dc (SW) is applied to the amplifier. The incoming low-level rf at P1-2 is amplified and applied to the power amplifier circuits of an amplifier-coupler through K1 and P1-12. An ALC loop,



TPA-5156-017

Broadband Amplifier
Figure 1



Broadband Amplifier (Receive or Transmit), Simplified Schematic Diagram
Figure 2

internal to the receiver-transmitter, limits the receiver-transmitter output to approximately 250 mW.

2.2 Detailed Theory

2.2.1 Receive Mode

Refer to figure 2 (simplified schematic diagram) and figure 5 (schematic diagram) for detailed theory. The received signal is coupled from an amplifier-coupler through chassis connector P1-36 and J3-12 to broadband amplifier P1-12 and on to relay K1-A2. With the receiver-transmitter unkeyed, relay K1 is deenergized and relay contacts A2/A3 and B2/B3 are closed. This routes the received rf from P1-12 through the limiter and LC filter network to P1-2.

2.2.2 Transmit Mode

The transmit rf output of the rf mixer is applied to the broadband amplifier via chassis connectors J2-14 and J3-2 to broadband amplifier P1-2 (figures 2 and 5). With the receiver-transmitter turned on at the control, +25.2 V dc (SW) is applied to the broadband amplifier. With the key line enabled by the ptt switch, keying relay K1 is energized and the +25.2 V dc (SW) is switched to the amplifier circuits by Q4. The incoming rf at P1-2 is passed through the LC filter network, a limiter circuit and on to the emitter follower stage Q1 through closed relay contacts B1 and B2. The emitter follower couples the rf to rf amplifiers Q2, Q3, and Q5. The 250-mW rf output of Q5 is transformer coupled by T1 through the closed relay contacts A1 and A2 to P1-12.

The ALC detector, VR2 and CR8, provides a protective ALC bias to the if/af amplifier ALC circuits that limits the rf output to approximately 300 mW should the amplifier-coupler ALC fail. This ALC OUT signal at P1-9 is routed through chassis connectors J3-9 and J5-36 to if/af card A1P1-36.

The transmit rf output from the broadband amplifier (P1-12) is supplied to the amplifier-coupler through chassis connectors J3-12 and P1-36.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the broadband amplifier are listed below. Refer to the maintenance section of this instruction book for minimum specifications, representative type, and usage of test equipment.

a. Broadband amplifier test adapter
b. Power supply
c. Voltmeter
d. Power divider
e. Rf voltmeter
f. Signal generator (2 required)
g. Spectrum analyzer (if section and 1-kHz to 120-MHz rf section required)
h. Voltage divider 100:1
i. Attenuator, 6-dB (2 required)

3.2 Testing

The test procedures in table 1 check total performance of the broadband amplifier. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault. When a defective subassembly has been repaired, the procedures should be repeated to verify all faults have been corrected.

The procedures are to be performed in sequence given. If an individual test is to be performed, review prior tests to ensure proper test setup and control settings.

4. ALIGNMENT/ADJUSTMENT

Alignment/adjustment of the broadband amplifier is performed in conjunction with testing/troubleshooting.

5. REPAIR

Repair of the broadband amplifier is accomplished using standard maintenance and circuit card repair procedures. Refer to the maintenance section of this instruction book for general maintenance precautions, procedures, and postcoating information.

Table 1. Broadband Amplifier Testing/Troubleshooting.

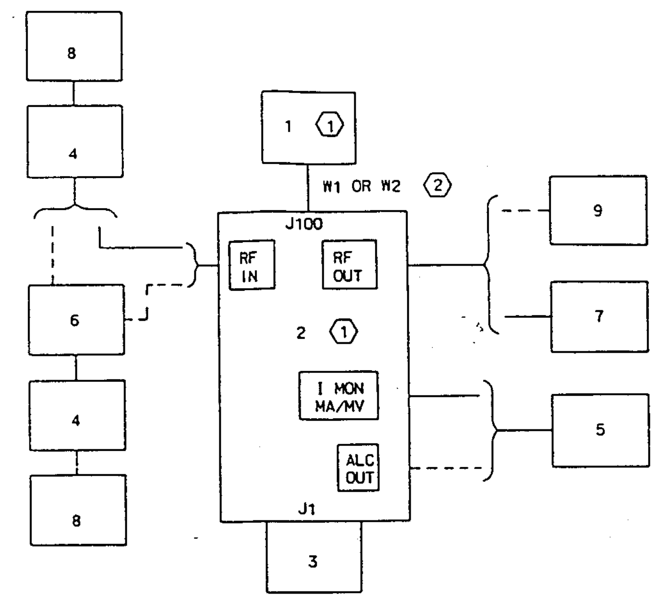
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary setup	a. On test adapter, set POWER and KEY to OFF. b. Install the broadband amplifier on test adapter and connect power supply as shown in figure 3. c. On power supply, set POWER to ON. Connect digital voltmeter (H) to I MON MA/MV, (L) to GND test points. d. On test adapter, set POWER to ON. e. On power supply, adjust OUTPUT VOLTAGE control for +28 V dc on the digital voltmeter.		
2. Keyline open	On test adapter, connect digital voltmeter to I MON MA/MV test points and observe voltage (1 mV equals 1 mA).	0 mV (0 mA)	Check the following: K1, Q4, C9-C11, and C17.
3. Keyline close	On test adapter, set KEY to ON. Observe voltage on digital voltmeter. Set KEY to OFF.	170 to 210 mV (170 to 210 mA)	Check the following: Q4, VR2, Q1-Q3, and Q5.

Table 1. Broadband Amplifier Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. Gain	a. On test adapter, connect rf voltmeter with 50-ohm adapter to RF OUT connector and signal generator (through 6-dB attenuator) to RF IN connector.		
	b. On test adapter, set KEY to ON.		
	c. Set signal generator for 15.0000 MHz, unmodulated, at -14 dB mW.		
	d. Measure rf output on rf voltmeter.	+21 to +25 dB mW (gain equals 41 to 46 dB)	Check the following: VR1, C1-C3, CR1, CR2, CR7 and CR12.
5. Frequency response	a. Set signal generator for 2.0000 MHz and adjust for +20 dB mW output measured on the rf voltmeter.	Reference of +20 dB mW	
	b. Change signal generator frequency to 15.0000 MHz (do not change its output level). Measure rf output on rf voltmeter.	+19.5 dB mW to +24.5 dB mW	Check the following: C1-C3, L1, L2, CR1, CR2, CR7, CR12, and Q1-Q5.
	c. Change signal generator frequency to 30.0000 MHz. Measure rf output on rf voltmeter.	Same as step a.	Same as above.
	d. Change signal generator frequency to 115.0000 MHz. Measure rf output on rf voltmeter.	Not less than 50 dB down from output measured in step 4.d.	Same as above.
	e. Disconnect signal generator, set test adapter POWER and KEY to OFF.		
6. Intermodulation distortion	a. Connect two signal generators (through 6-dB attenuators) and power divider to RF IN connector on test adapter.		
	b. On test adapter, set POWER and KEY to ON.		
	c. Adjust the two signal generators for 1-kHz separation at 2.0000 MHz and an output from each signal generator of +5 dB mW.		
	d. Disconnect rf voltmeter, connect spectrum analyzer to RF OUT connector on test adapter.		
	e. Use the rf input with the highest frequency tone as the reference. Measure third order intermodulation product in dB below the reference.	No less than 40 dB down	Check the following: C1-C3, L1, L2, CR1, CR2, CR7, CR12, and Q1-Q5.

Table 1. Broadband Amplifier Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	f. Repeat steps c and e at 15.0000 and 30.0000 MHz.	No less than 40 dB down	Same as above.
	g. Disconnect spectrum analyzer, two signal generators and power divider from test adapter.		
	h. On test adapter, set POWER and KEY to OFF.		
7. Harmonic output	a. Connect signal generator (through 6-dB attenuator) to RF IN connector on test adapter.		
	b. Connect rf voltmeter, with 50-ohm adapter, to RF OUT connector on test adapter.		
	c. On test adapter, set POWER and KEY to ON.		
	d. Set signal generator for 2.0000 MHz and adjust a +20-dB mW output measured on the rf voltmeter.		
	e. Disconnect rf voltmeter and connect spectrum analyzer to RF OUT connector on test adapter.		
	f. Measure second and third order harmonics with spectrum analyzer.	Second order: No less than 25 dB down. Third order: No less than 35 dB down.	Check the following: C1-C3, L1, L2, CR1, CR2, CR7, CR12, and Q1-Q5.
	g. Disconnect spectrum analyzer and connect rf voltmeter to RF OUT connector on test adapter.		
	h. Repeat steps d through g at 15.0000 and 30.0000 MHz.	Same as step f.	Same as above.
8. ALC	a. Connect rf voltmeter through 100:1 divider and 50-ohm adapter to RF OUT connector on test adapter.		
	b. Set signal generator for 15.0000 MHz and adjust for 50 mV (equivalent to 5 V rms) measured on rf voltmeter.		
	c. With digital voltmeter, measure dc voltage at ALC OUT test point.	-1.3 to -2.4 V dc	Check the following: VR2, CR8, C13, and Q4.



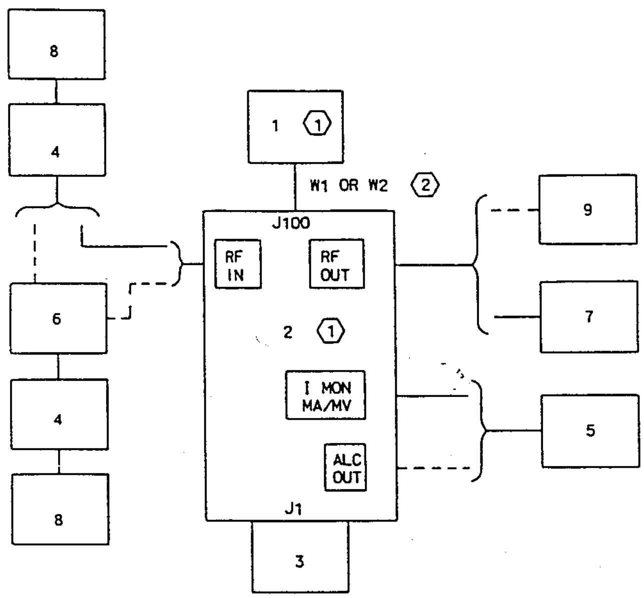
1. POWER SUPPLY
2. BROADBAND AMPLIFIER TEST ADAPTER
3. BROADBAND AMPLIFIER
4. ATTENUATOR, 6 dB (2 REQUIRED)
5. DIGITAL VOLTMETER
6. POWER DIVIDER
7. RF VOLTMETER
8. SIGNAL GENERATOR (2 REQUIRED)
9. SPECTRUM ANALYZER

NOTES:

1. PART OF RADIO TEST SET 969J-3.
2. PART OF POWER SUPPLY.
3. DASHED LINE IS ALTERNATE CONNECTION DESCRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.

TPA-5182-014

Broadband Amplifier, Test Setup
Figure 3



1. POWER SUPPLY
2. BROADBAND AMPLIFIER TEST ADAPTER
3. BROADBAND AMPLIFIER
4. ATTENUATOR, 6 dB (2 REQUIRED)
5. DIGITAL VOLTMETER
6. POWER DIVIDER
7. RF VOLTMETER
8. SIGNAL GENERATOR (2 REQUIRED)
9. SPECTRUM ANALYZER

NOTES:

1. PART OF RADIO TEST SET 969J-3.
2. PART OF POWER SUPPLY.
3. DASHED LINE IS ALTERNATE CONNECTION DESCRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.

TPA-5182-014

Broadband Amplifier, Test Setup
Figure 3

6. PARTS LIST

6.1 Introduction

The purpose of this parts list is for identification and requisition of parts.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

6.2 Group Assembly Parts List

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column — Listed are MIL standard, vendor, or Collins part numbers. Collins part numbering system consists of 10 digits as follows: a 3-digit family number, a 4-digit serial number, and a 3-digit dash number.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: MCN (Manufacturer Control Number) 101 and up; CI (Configuration Identifier) 5-digit number; REV (Revision Identifier) dash (—) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB 1, SB2, etc.

UNITS PER ASSY Column — Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

6.3 Reference Designation Index

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

6.4 How To Use This Parts List

To locate a part number if the assembly in which the part is used is known, turn to the List of Illustrations and find the page number for the assembly in which the part is used. Locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

6.5 Manufacturer's Code, Name, and Address

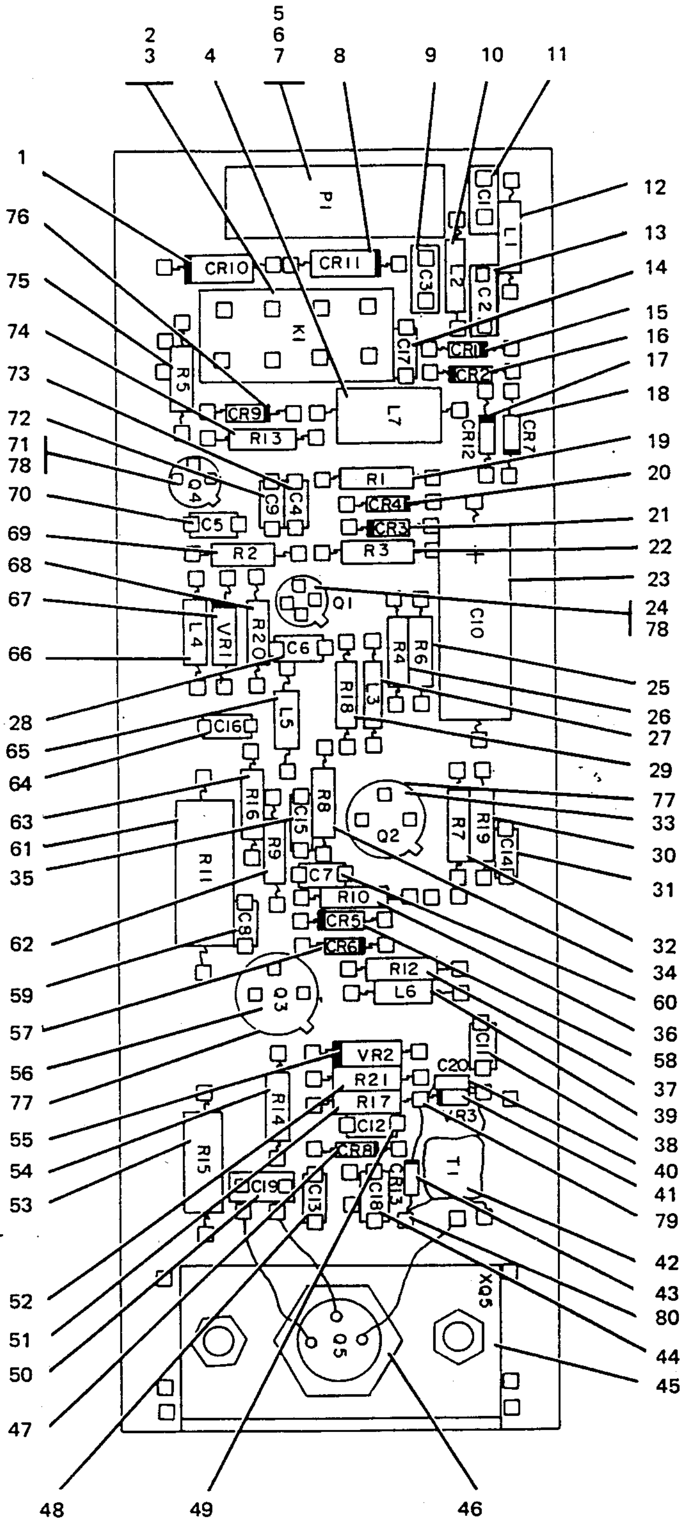
MFR CODE	MANUFACTURER'S NAME AND ADDRESS
A1350	COLUMBIA NUT AND BOLT CORP 41 MURRAY ST NEW YORK NY 10803
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
04713	MOTOROLA INC SEMICONDUCTOR GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
12615	U S TERMINALS INC 7504 CAMARGO ROAD CINCINNATI OH 45243
13103	THERMALLOY CO INC 2021 W VALLEY VIEW LANE P O BOX 340839 DALLAS TX 75234

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
13499	ROCKWELL INTERNATIONAL CORP COLLINS TELECOMMUNICATIONS PRODUCTS DIV 855 35TH ST NE P O BOX 728 CEDAR RAPIDS IA 52498
15238	ITT SEMICONDUCTORS A DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORP 500 BROADWAY P O BOX 168 LAWRENCE MA 01841
15818	TELEDYNE INC TELEDYNE SEMICONDUCTOR 1300 TERRA BELLA AVE MOUNTAIN VIEW CA 94043
31433	UNION CARBIDE CORP ELECTRONICS DIV HWY 276 SE P O BOX 5928 GREENVILLE SC 29606
32559	BIVAR INC 1617 E EDINGER AVE SANTA ANA CA 92705
70318	ALLMETAL SCREW PRODUCTS CO INC 821 STEWART AVE GARDEN CITY NY 11530
71482	CLARE C P AND CO SUB OF GENERAL INSTRUMENT CORP 3101 W PRATT AVE CHICAGO IL 60645
79807	WROUGHT WASHER MFG INC 2100 S BAY ST MILWAUKEE WI 53207
81349	MILITARY SPECIFICATIONS
93790	CORNELL-DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO 1605 RODNEY FRENCH BLVD NEW BEDFORD MA 02741
96906	MILITARY STANDARD

6.6 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Broadband Amplifier	601-3671-001	V



TPA-5250-019

Broadband Amplifier, Parts Location
Figure 4 (Sheet 1 of 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-	601-3671-001	1	BROADBAND AMPLIFIER	1	
1	1N645	2	SEMICOND DEVICE (15238) 353-2607-000 CR10	1	
2	HFW1501509	2	RELAY,ARMATURE (71482) 974-1065-170 K1	1	
3	635-4765-001	2	INSULATOR	1	
4	MS75101-7	2	COIL,RF 10UH (96906) 240-1600-000 L7	1	
	638-1091-015	2	HOUSING,CONN	1	
5	372-2234-010	3	CONTACT,ELEC	6	
6	372-2234-020	3	CONTACT,ELEC	6	
7	372-2423-013	3	HOUSING,CONN,EL P1	1	
8	1N645	2	SEMICOND DEVICE (15238) 353-2607-000 CR11	1	
9	CD5EY820J0	2	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 50V (93790) 912-4141-350 C3	1	
10	MS75083-08	2	COIL,RF 0.39UH (96906) 240-2018-000 L2	1	
11	CD5EY820J0	2	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 50V (93790) 912-4141-350 C1	1	
12	MS75083-08	2	COIL,RF 0.39UH (96906) 240-2018-000 L1	1	
13	CD5FY161J0	2	CAPACITOR,FXD MICA DIEL, 160PF, 5%, 50V (93790) 912-4141-410 C2	1	
14	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C17	1	
15	DA1701GE	2	SEMICOND DEVICE (03508) 353-3644-040 CR1	1	
16	DA1701GE	2	SEMICOND DEVICE (03508) 353-3644-040 CR2	1	
17	DA1701GE	2	SEMICOND DEVICE (03508) 353-3644-040 CR12	1	
18	DA1701GE	2	SEMICOND DEVICE (03508) 353-3644-040 CR7	1	
19	RCR07G510JS	2	RESISTOR,FXD CMPSN, 51 OHMS, 5%, 1/4W (81349) 745-0702-000 R1	1	
20	1N4454	2	SEMICOND DEVICE (31433) 353-3644-010 CR4	1	
21	1N4454	2	SEMICOND DEVICE (31433) 353-3644-010 CR3	1	
22	RCR07G103KS	2	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 R3	1	
23	M39003-01-2375	2	CAPACITOR,FIXED ELCTLT, 10UF, 20%, 50V (81349) 184-9087-620 C10	1	
24	2N918	2	TRANSISTOR (15818) 352-0440-000 Q1	1	
25	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R6	1	
26	RCR07G4R7JS	2	RESISTOR,FXD CMPSN, 4.7 OHMS, 5%, 1/4W (81349) 745-4382-000 R4	1	
27	MS75084-02	2	COIL,RF 1.50UH (96906) 240-2025-000 L3	1	
28	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C6	1	
29	RCR07G471KS	2	RESISTOR,FXD CMPSN, 470 OHMS, 10%, 1/4W (81349) 745-0737-000 R18	1	
30	RCR07G221KS	2	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W (81349) 745-0725-000 R19	1	
31	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C14	1	
32	RCR07G4R7JS	2	RESISTOR,FXD CMPSN, 4.7 OHMS, 5%, 1/4W (81349) 745-4332-000 R7	1	
33	2N5943	2	TRANSISTOR (04713) 352-0991-010 Q2	1	
34	RCR07G221KS	2	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W (81349) 745-0725-000 R8	1	
35	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C15	1	
36	RN55D6810F	2	RESISTOR,FXD FILM, 681 OHMS, 1%, 1/8W (81349) 705-0998-000 R10	1	
37	RCR07G820KS	2	RESISTOR,FXD CMPSN, 82 OHMS, 10%, 1/4W (81349) 745-0710-000 R12	1	
38	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C11	1	
39	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L6	1	
40	CK05BX103K	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 10%, 100VDC (81349) 913-5019-200 C20	1	
41	1N4742A	2	SEMICOND DEVICE (04713) 353-6481-290 VR3	1	
42	629-6144-001	2	TRANSFORMER T1	1	
43	1N4454	2	SEMICOND DEVICE (31433) 353-3644-010 CR13	1	
44	CK05BX103K	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 10%, 100VDC (81349) 913-5019-200 C18	1	
45	629-5501-001	2	PANEL,TRANSISTOR XQ5	1	
	MS35649-244	2	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP)	2	
	310-0278-000	2	WASHER,LOCK SST, 0.115 ID X 0.202 OD (70318) (AP)	2	
	310-6340-000	2	WASHER,FLAT SST, 0.125 ID X 0.281 OD (79807) (AP)	2	
	MS51957-15	2	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	2	
46	629-3490-001	3	TRANSISTOR, MODIFIED 2N3375 Q5	1	
	334-1008-000	3	NUT,HEX,SPCL NP BPS, 10-32 (A1350) (AP)	1	
	MS35333-107	3	WASHER,LOCK CD PL BRZ, 0.204 ID X 0.381 OD (96906) 373-3040-000 (AP)	1	
47	1N4454	2	SEMICOND DEVICE (31433) 353-3644-010 CR8	1	
48	CK05BX103K	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 10%, 100VDC (81349) 913-5019-200 C13	1	
49	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C12	1	
50	CD5CC050D0	2	CAPACITOR,FIXED MICA DIEL, 5PF, PORM 0.5PF, 300V (93790) 912-4141-010 C19	1	
51	RCR07G182JS	2	RESISTOR,FXD CMPSN, 1.8K, 5%, 1/4W (81349) 745-0757-000 R17	1	
52	RCR07G103JS	2	RESISTOR,FXD CMPSN, 10K, 5%, 1/4W (81349) 745-0784-000 R21	1	
53	RCR20G150KS	2	RESISTOR,FXD CMPSN, 15 OHMS, 10%, 1/2W (81349) 745-1275-000 R15	1	
54	RCR07G4R7JS	2	RESISTOR,FXD CMPSN, 4.7 OHMS, 5%, 1/4W (81349) 745-4392-000 R14	1	
55	1N4626	2	SEMICOND DEVICE (04713) 353-3591-500 VR2	1	

GROUP ASSEMBLY PARTS LIST

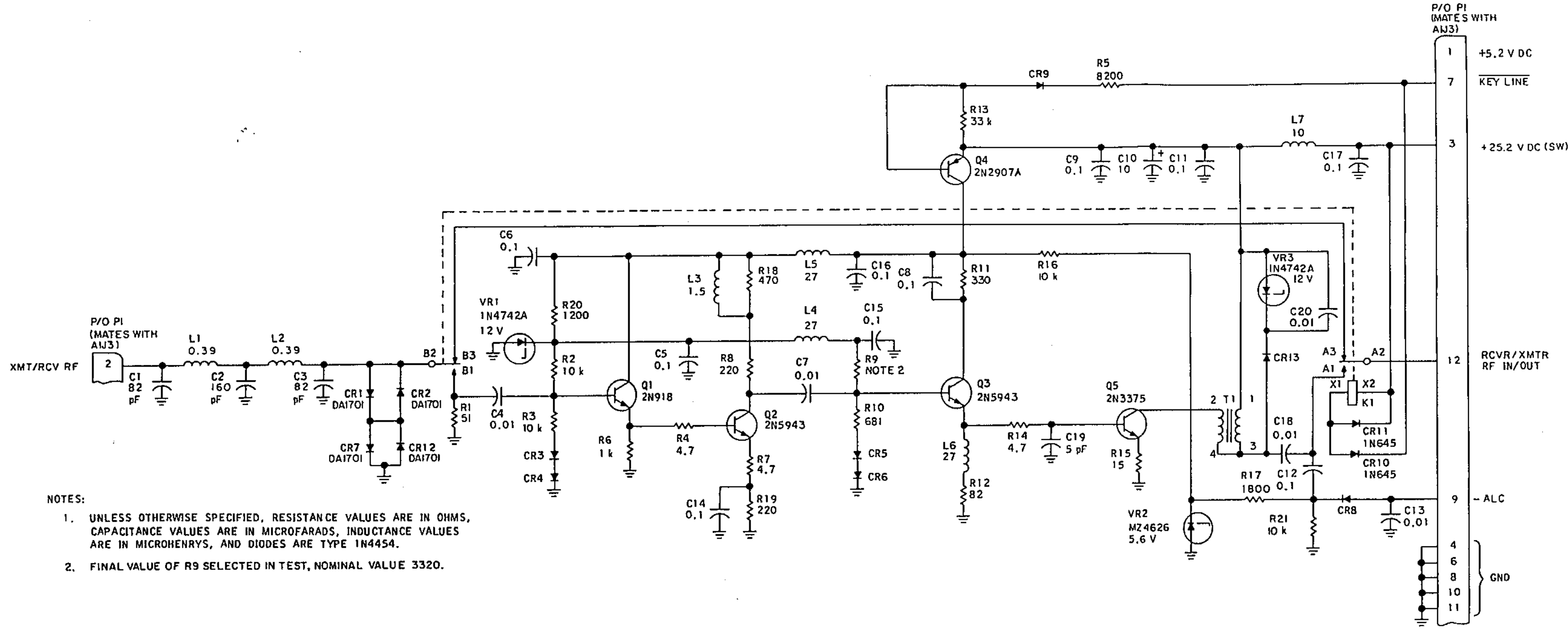
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-56	2N5943	2	TRANSISTOR (04713) 352-0991-010 Q3	1	
57	1N4454	2	SEMICOND DEVICE (31433) 353-3644-010 CR6	1	
58	1N4454	2	SEMICOND DEVICE (31433) 353-3644-010 CR5	1	
59	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C8	1	
60	CK05BX103K	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 10%, 100VDC (81349) 913-5019-200 C7	1	
61	RCR32G331KS	2	RESISTOR,FXD CMPSN, 330 OHMS, 10%, 1W (81349) 745-3331-000 R11	1	
	630-1689-001	2	RESISTOR,TEST SELECT R9	1	
62	RN55D3321F	3	RESISTOR,FXD FILM, 3.32K, 1%, 1/8W (81349) 705-1021-000 R9 (NOMINAL VALUE)	1	
62	RN55D2741F	3	RESISTOR,FXD FILM, 2.74K, 1%, 1/8W (81349) 705-1017-000 R9	AR	
63	RCR07G103KS	2	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 R16	1	
64	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C16	1	
65	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L5	1	
66	MS75084-17	2	COIL,RF 27UH (96906) 240-2040-000 L4	1	
67	1N4742A	2	SEMICOND DEVICE (04713) 353-6481-290 VR1	1	
68	RCR07G122KS	2	RESISTOR,FXD CMPSN, 1.2K, 10%, 1/4W (81349) 745-0752-000 R20	1	
69	RCR07G103KS	2	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 R2	1	
70	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C5	1	
71	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q4	1	
72	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C9	1	
73	CK05BX103K	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 10%, 100VDC (81349) 913-5019-200 C4	1	
74	RCR07G333KS	2	RESISTOR,FXD CMPSN, 33K, 10%, 1/4W (81349) 745-0803-000 R13	1	
75	RCR07G822KS	2	RESISTOR,FXD CMPSN, 8.2K, 10%, 1/4W (81349) 745-0782-000 R5	1	
76	1N4454	2	SEMICOND DEVICE (31433) 353-3644-010 CR9	1	
77	7717-114N	2	INSULATOR,DISK (13103) 352-9552-550	2	
78	7717-198N	2	INSULATOR,DISK (32559) 352-9552-580	2	
79	SL441-434WHT	2	TERMINAL,STDF (12615) 306-2222-100	1	
80	372-2601-033	2	CONTACT,ELEC	2	

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
CR1	4-15	DA1701GE	L5	4-65	MS75084-17
CR10	4-1	1N645	L6	4-39	MS75084-17
CR11	4-8	1N645	L7	4-4	MS75101-7
CR12	4-17	DA1701GE	P1	4-7	372-2623-013
CR13	4-43	1N4454	Q1	4-24	2N918
CR2	4-16	DA1701GE	Q2	4-33	2N5943
CR3	4-21	1N4454	Q3	4-56	2N5943
CR4	4-20	1N4454	Q4	4-71	2N2907A
CR5	4-58	1N4454	Q5	4-46	629-3490-001
CR6	4-57	1N4454	R1	4-19	RCR07G510JS
CR7	4-18	DA1701GE	R10	4-36	RN55D6810F
CR8	4-47	1N4454	R11	4-61	RCR32G331KS
CR9	4-76	1N4454	R12	4-37	RCR07G820KS
C1	4-11	CD5EY820J0	R13	4-74	RCR07G333KS
C10	4-23	M39003-01-2375	R14	4-54	RCR07G4R7JS
C11	4-38	CK05BX104M	R15	4-53	RCR20G150KS
C12	4-49	CK05BX104M	R16	4-63	RCR07G103KS
C13	4-48	CK05BX103K	R17	4-51	RCR07G182JS
C14	4-31	CK05BX104M	R18	4-29	RCR07G471KS
C15	4-35	CK05BX104M	R19	4-30	RCR07G221KS
C16	4-64	CK05BX104M	R2	4-69	RCR07G103KS
C17	4-14	CK05BX104M	R20	4-68	RCR07G122KS
C18	4-44	CK05BX103K	R21	4-52	RCR07G103JS
C19	4-50	CD5CC050D0	R3	4-22	RCR07G103KS
C2	4-13	CD5FY161J0	R4	4-26	RCR07G4R7JS
C20	4-40	CK05BX103K	R5	4-75	RCR07G822KS
C3	4-9	CD5EY820J0	R6	4-25	RCR07G102KS
C4	4-73	CK05BX103K	R7	4-32	RCR07G4R7JS
C5	4-70	CK05BX104M	R8	4-34	RCR07G221KS
C6	4-28	CK05BX104M	R9	4-62	630-1689-001
C7	4-60	CK05BX103K	R9	4-62	RN55D3321F
C8	4-59	CK05BX104M	R9	4-62	RN55D2741F
C9	4-72	CK05BX104M	T1	4-42	629-6144-001
K1	4-2	HFW1501509	VR1	4-67	1N4742A
L1	4-12	MS75083-08	VR2	4-55	1N4626
L2	4-10	MS75083-08	VR3	4-41	1N4742A
L3	4-27	MS75084-02	XQ5	4-45	629-5501-001
L4	4-66	MS75084-17			

Broadband Amplifier, Parts Location
Figure 4 (Sheet 2)

(601-3671-001)



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, INDUCTANCE VALUES ARE IN MICROHENRYS, AND DIODES ARE TYPE 1N4454.
2. FINAL VALUE OF R9 SELECTED IN TEST, NOMINAL VALUE 3320.

TPA-5184-014

Broadband Amplifier, Schematic Diagram
Figure 5

Power Supply (601-3670-001)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0772067-001211
1 November 1982

1. DESCRIPTION

Power supply 601-3670-001, shown in figure 1, is a plug-in module that interconnects with other receiver-transmitter circuits through one multipin connector. The module contains one circuit card.

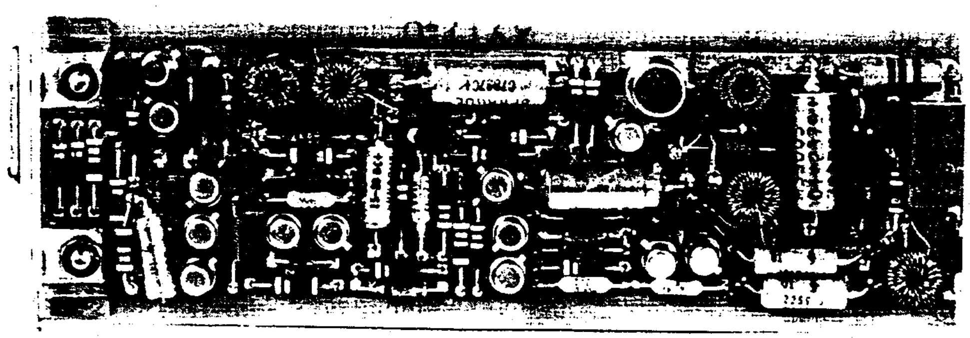
2. PRINCIPLES OF OPERATION

2.1 Functional Theory

Refer to figure 2, simplified schematic diagram. The power supply requires a +25.2-V dc (SW) input and develops continuous voltages of +5.2 and +13 V dc. The +25.2 V dc (SW) is applied to the power supply through the receiver-transmitter control. The +25 V dc (SW) enters the power supply through P1-5 and is converted to a regulated +13 and +5.2 V dc. The regulated +13 V dc and +5.2 V dc leaves the power supply through P1-7 and 1 respectively for distribution to the other modules.

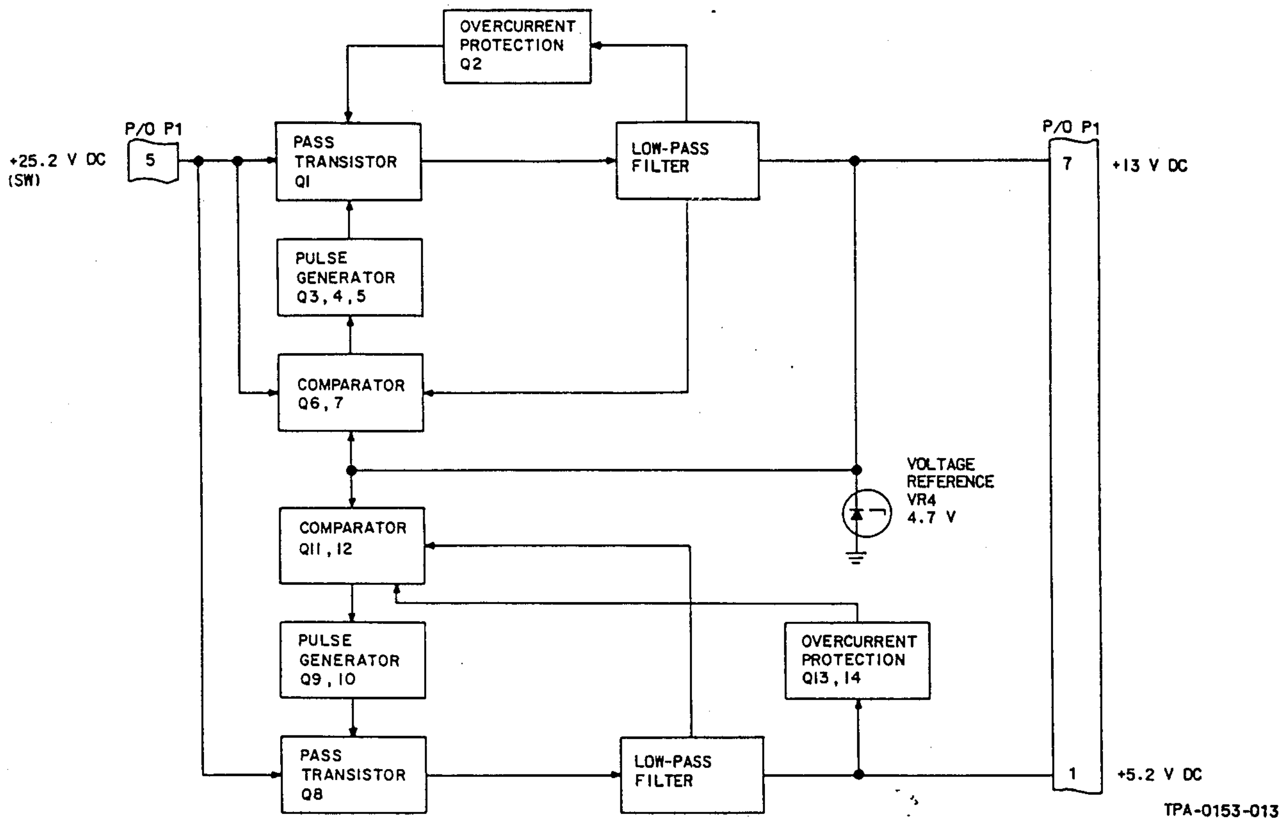
2.2 Detailed Theory

Refer to figure 2 (simplified schematic diagram and figure 5 (schematic diagram) for detailed theory. The



TPA-5178-017

Power Supply
Figure 1



Power Supply, Simplified Schematic Diagram
Figure 2

power supply provides regulated +13 and +5.2 V dc outputs from a +25.2 V dc (SW) source. The routing of the voltages is shown on the dc power distribution block diagram, figure 5 in the theory section.

The +13 V dc regulator circuits consist of series switch transistor Q1, fly back diode CR1, control transistors Q3, Q4, and Q5, comparator transistors Q6 and Q7, reference voltage regulator VR4, filter network L1, L2, C5 and C6, and voltage regulator VR2. Transistor Q1 conducts in 14- to 35-μs intervals in response to bias changes effected by the comparator circuit, Q6 and Q7. If the sampled output voltage applied to Q6 is high compared to the VR4 reference voltage applied to Q6, the series switch transistor Q1 is saturated for shorter periods of time during its operating interval by the reduced on-time of the control transistor Q3. The on time of Q3 is reduced by increased bias voltage from the Darlington pair of transistors, Q4 and Q5, which reflects the voltage error (high voltage) determined by comparator Q6. During the conduction cycle of series switch Q1, the reduced current flow causes the output voltage to decrease toward the reference level until the correct output of +13 V dc is reached. Conversely, if the output voltage decreases, the effective bias reverses to increase the conduction time of Q1 and raise the output voltage to +13 V dc. Transistor Q2 provides overcurrent protection for the +13-V dc regulator network. The final +13-V dc regulator is VR2, which regulates it to a level of +13 V dc.

The +5.2-V dc regulator circuits consist of series switch transistor Q8, flyback diode CR5, control transistors Q9 and Q10, comparator transistors Q11 and Q12, reference voltage regulator VR4, filter network L4, L5, C13, and C14, and voltage regulator VR6. The operation of the +5.2-V dc regulator is similar to the operation of the +13 V dc-regulator. Transistors Q13 and Q14 circuits provide overcurrent protection for the +5.2-V dc regulator network.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the power supply are listed below. Refer to the maintenance section of this instruction book for minimum specifications, representative type, and usage of test equipment.

a. Power supply test adapter
b. Power supply
c. Digital voltmeter
d. Oscilloscope
e. Resistor decade box (2 required)

3.2 Testing

The test procedures in table 1 check the total performance of the power supply. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault. When a defective subassembly has been repaired, the test procedures should be repeated to verify all faults have been corrected.

The procedures are to be performed in sequence given. If an individual test is to be performed, review prior tests to ensure proper test setup and control settings.

4. ALIGNMENT/ADJUSTMENT

Power supply alignment/adjustments are performed in conjunction with testing/troubleshooting table 1.

a. Resistors R9 and R23, test selection — test 13.

5. REPAIR

Repair of the power supply is accomplished using standard maintenance and circuit card repair procedures. Refer to the maintenance section of this instruction book for general maintenance precautions, procedures, and postcoating information.

Table 1. Power Supply, Testing/Troubleshooting.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary setup	a. On test adapter, set POWER to OFF. b. Install power supply on test adapter and connect power supply and the digital voltmeter as shown in figure 3. c. On power supply, set POWER to ON. On test adapter, set POWER to ON, LOAD +5.2V to OPEN, LOAD +13V to OPEN, and DVM SELECT to +25.2V. On power supply, adjust OUTPUT VOLTAGE control for +28 V dc on the digital voltmeter.		
2. +13V-output voltage	a. On test adapter, set LOAD +13V to 270 OHMS and DVM SELECT to +13V.		
	b. Observe voltage on digital voltmeter at DVM test points.	+12.9 to +13.1 V dc	Check the following: Q6/Q7, Q4/Q5, VR4/VR2, CR1, Q1/Q3, R9 (Refer to step 13 of this procedure.) C5/C6.
(Cont)			

Table 1. Power Supply, Testing/Troubleshooting (Cont).

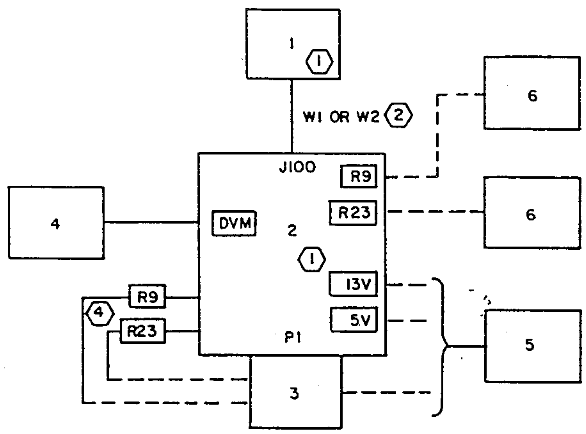
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. +13V-output voltage (Cont)	c. On test adapter, return LOAD +13V to OPEN.		
3. +5.2V-output voltage	a. On test adapter, set LOAD +5.2V to 100 OHMS, and DVM SELECT to +5.2V. b. Observe voltage on digital voltmeter at DVM test points. c. On test adapter, return LOAD +5.2 V to OPEN.	+5.1 to +5.3 V dc	Check the following: Q8/Q9, Q11/Q12, Q10, VR6, C13/C14, R23 (Refer to step 13 of this procedure.)
4. +25.2V current	a. On test adapter, ensure that LOAD +5.2V and LOAD +13V are set to OPEN. b. Set DVM SELECT to +25.2V CUR .1 MA/MV. c. Hold 25.2 V CURRENT in MONITOR position while observing current on digital voltmeter at DVM test points.	Not more than 60 mV (6 mA)	Check the following: Q2, Q1/Q3, VR2, VR4, VR6, Q8/Q9, Q13/Q14, CR1, C7/C8, C13/C14, R9/R23 (Refer to step 13 of this procedure.)
5. +13V-operating period	a. Connect the oscilloscope to the collector of Q1 (casing). b. On test adapter, set LOAD +13V to 270 OHMS. Observe the operating period (time for one switching cycle) on the oscilloscope.	14 to 35 μs on time of Q1	Check the following: C15, L1, R14, CR1, Q1, Q4/Q5.
6. +5.2V-operating period	a. Connect the oscilloscope to collector of Q8 (casing). b. On test adapter, set LOAD +5.2V to 100 OHMS. Observe the operating period (time for one switching cycle) on the oscilloscope.	13 to 35 μs on time of Q8	Check the following: C13, L4, R31, Q8, CR5, Q11/Q12.
7. +13V ripple	a. Connect the oscilloscope to +13V connector on test adapter. b. On test adapter, ensure that LOAD +13V is set to 270 OHMS. Observe the peak-to-peak ripple voltage on the oscilloscope.	15 mV peak-to-peak maximum	Check the following: L1/C5, L2/C6, VR2, VR4, CR1.
8. +5.2V ripple	a. Connect the oscilloscope to +5.2V connector on test adapter. b. On test adapter, ensure that LOAD +5.2V is set to 100 OHMS. Observe peak-to-peak ripple voltage on the oscilloscope.	20 mV peak-to-peak maximum	Check the following: L4/C13, L5/C14, CR5, VR6, L3, C12.

Table 1. Power Supply, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. +13V regulation	a. On test adapter, set DVM SELECT to +13V and LOAD +13V to 270 OHMS. Observe voltage on digital voltmeter. b. On test adapter, set LOAD +13V to 560 OHMS. Observe voltage on digital voltmeter. c. On test adapter, return LOAD +13V to OPEN.	No more than 0.05-V dc variation between readings of steps a and b.	Check the following: Q6/Q7, Q4/Q5, Q3, VR4, C9, CR1, Q1.
10. +5.2V regulation	a. On test adapter, set DVM SELECT to +5.2V and LOAD +5.2V to 15 OHMS. Observe voltage on digital voltmeter. b. On test adapter, set LOAD +5.2V to 100 OHMS. Observe voltage on digital voltmeter. c. On test adapter, return LOAD +5.2V to OPEN.	No more than 0.08-V dc variation between readings of steps a and b.	Check the following: Q11/Q12, Q9/Q10, VR6, C12, CR5.
11. +5.2V-overcurrent protection	a. On test adapter, set DVM SELECT to I SHORT CIRCUIT 10 MA/MV. b. Hold SHORT CIRCUIT CURRENT in +5.2V position while observing current on digital voltmeter at DVM test points. c. Repeat step 3.	b. 500 to 650 mA (50 to 65 mV) c. +5.1 to +5.3 V dc	b. Check the following: Q11/Q12, Q13/Q14, C11/VR6. c. Same as for step 3.
12. +13V overcurrent protection	a. On test adapter, set DVM SELECT switch to I SHORT CIRCUIT 10 MA/MV. b. Hold SHORT CIRCUIT CURRENT in +13V position while observing digital voltmeter at DVM test points. c. Repeat step 2. **Note** Step 13 is the procedure for adjusting +5.2-V dc and +13-V dc output. Perform this procedure only when referenced in steps 2 thru 4.	b. Not more than 400 mA (40 mV) c. +12.9 to +13.1 V dc	b. Check the following: Q2, C4, C2, Q4/Q5, Q3/Q1. c. Same as for step 2.
13. Resistor R9 and R23 test selection	a. On test adapter, set POWER to OFF, 25.2 V CURRENT to MONITOR, LOAD +13V to OPEN, LOAD +5.2V to OPEN, SHORT CIRCUIT CURRENT to center position, and DVM SELECT to +25.2V. b. Remove R9 and R23 from power supply circuit card.		

Table 1. Power Supply, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	c. Connect one resistor decade box to TEST SELECT R9 jacks on test adapter and set for 100 kΩ. Connect pendant test leads labelled R9 across resistor mounting terminals on power supply card.		
	d. Connect second resistor decade box to TEST SELECT R23 jacks on test adapter and set for 100 kΩ. Connect pendant test leads labelled R23 across resistor mounting terminals on power supply card.		
	e. On test adapter, set DVM SELECT to +25.2V CUR .1MA/MV and POWER to ON. Hold 25.2V CURRENT in the MONITOR position and observe input current with digital voltmeter.	Not more than 6 mA (60 mV)	
	f. On test adapter, set LOAD +13V to 270 OHMS and DVM SELECT to +13V.		
	g. Select the R9 resistance value on resistor decade box that provides a reading of +13 ±0.1 V dc on digital voltmeter.	+12.9 to +13.1 V dc	Replace R9 with test value selected on decade box.
	h. Set LOAD +13V to OPEN, LOAD +5.2V to 100 OHMS, and DVM SELECT to +5.2V.		
	i. Select R23 resistance value on resistance decade box for a +5.2 ±0.1 V dc reading on the digital voltmeter.	+5.1 to +5.3 V dc	Replace R23 with test value selected on decade box.



1. POWER SUPPLY
2. POWER SUPPLY TEST ADAPTER
3. POWER SUPPLY
4. DIGITAL VOLTMETER
5. OSCILLOSCOPE
6. RESISTOR DECADE BOX (2 REQUIRED)

NOTES:

1. PART OF RADIO TEST SET 969J-3.
2. PART OF POWER SUPPLY
3. DASHED LINE IS ALTERNATE CONNECTION DESRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.
4. PENDANT TEST LEADS. PART OF POWER SUPPLY TEST ADAPTER.

TPA-5179-013

Power Supply, Test Setup
Figure 3

6. PARTS LIST

6.1 Introduction

The purpose of this parts list is for identification and requisition of parts. A parts location illustration, parts list, and schematic diagram are included.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

6.2 Group Assembly Parts List

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column — Listed are MIL standard, vendor, or Collins part numbers. Collins part numbering system consists of 10 digits as follows: a 3-digit family number, a 4-digit serial number, and a 3-digit dash number.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: MCN (Manufacturer Control Number) 101 and up; CI (Configuration Identifier) 5-digit number; REV (Revision Identifier) dash (—) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB 1, SB2, etc.

UNITS PER ASSY Column — Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

6.3 Reference Designation Index

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

6.4 How To Use This Parts List

To locate a part number locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

6.5 Manufacturer's Code, Name, and Address

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
04713	MOTOROLA INC SEMICONDUCTOR GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV SUB OF SCHLUMBERGER LTD NORTH AMERICAN SALES MAIL STOP 14-1053 401 ELLIS ST P O DRAWER 7284 MOUNTAIN VIEW CA 94042
12615	U S TERMINALS INC 7504 CAMARGO ROAD CINCINNATI OH 45243

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
13103	THERMALLOY CO INC 2021 W VALLEY VIEW LANE P O BOX 340839 DALLAS TX 75234
13499	ROCKWELL INTERNATIONAL CORP COLLINS TELECOMMUNICATIONS PRODUCTS DIV 855 35TH ST NE P O BOX 728 CEDAR RAPIDS IA 52498
32559	BIVAR INC 1617 E EDINGER AVE SANTA ANA CA 92705
56289	SPRAGUE ELECTRIC CO 87 MARSHALL ST NORTH ADAMS MA 01247
56866	QUALITY THERMISTOR 2096 SOUTH COLE RD SUITE 7 BOISE ID 83705
70318	ALLMETAL SCREW PRODUCTS CO INC 821 STEWART AVE GARDEN CITY NY 11530
79807	WROUGHT WASHER MFG INC 2100 S BAY ST MILWAUKEE WI 53207
81349	MILITARY SPECIFICATIONS
96906	MILITARY STANDARD

6.6 Equipment Covered

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Power Supply	601-3670-001	Y

GROUP ASSEMBLY PARTS LIST

FIG. ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-	601-3670-001	1	POWER SUPPLY	1	
1	RN55D3831F	2	RESISTOR,FXD FILM, 3.03K, 1%, 1/8W (81349) 705-1024-000 R12	1	
2	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q4	1	
3	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q5	1	
4	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q2	1	
5	M39003-01-2368	2	CAPACITOR,FXD ELCTLT, 4.7UF, 10%, 50V (81349) 184-9007-550 C4	1	
6	RCR07G473KS	2	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W (81349) 745-0809-000 R3	1	
7	RCR07G472KS	2	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W (81349) 745-0773-000 R8	1	
8	629-3396-004	2	HANDLE	1	
	MS35649-244	2	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP)	2	
	310-6340-000	2	WASHER,FLAT SST, 0.125 ID X 0.281 OD (79807) (AP)	2	
	310-0270-000	2	WASHER,LOCK SST, 0.115 ID X 0.202 OD (70318) (AP)	2	
	MS51957-15	2	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	2	
9	629-3492-001	3	HANDLE	1	
10	629-3493-001	3	RETAINER,HANDLE	1	
	MS16535-54	3	RIVET,TUBULAR CS, 0.089 DIA X 0.188 (96906) 305-1733-000 (AP)	2	
11	629-3396-001	3	BRACKET	1	
12	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R2	1	
13	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R4	1	
14	RCR07G473KS	2	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W (81349) 745-0809-000 R1	1	
15	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R5	1	
16	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V (81349) 913-5019-720 C1	1	
17	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q3	1	
18	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q1	1	
19	1N4934	2	SEMICOND DEVICE (04713) 353-6518-020 CR1	1	
20	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100V (81349) 913-5019-200 C3	1	
21	RCR07G101KS	2	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W (81349) 745-0713-000 R6	1	
22	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V (81349) 913-5019-720 C2	1	
23	567-8390-001	2	COIL L1	1	
	601-3988-001	2	RESISTOR, TEST SELECT (NON-PROCURABLE ITEM)	1	
24	RN55D1002F	3	RESISTOR,FXD FILM, 10K, 1%, 1/8W (81349) 705-1044-000 R9	AR	
24	RN55D1052F	3	RESISTOR,FXD FILM, 10.5K, 1%, 1/8W (81349) 705-1045-000 R9	AR	
24	RN55D1102F	3	RESISTOR,FXD FILM, 11K, 1%, 1/8W (81349) 705-1046-000 R9	AR	
24	RN55D1152F	3	RESISTOR,FXD FILM, 11.5K, 1%, 1/8W (81349) 705-1047-000 R9	AR	
24	RN55D1212F	3	RESISTOR,FXD FILM, 12.1K, 1%, 1/8W (81349) 705-1048-000 R9	AR	
24	RN55D1272F	3	RESISTOR,FXD FILM, 12.7K, 1%, 1/8W (81349) 705-1049-000 R9	AR	
24	RN55D1332F	3	RESISTOR,FXD FILM, 13.3K, 1%, 1/8W (81349) 705-1050-000 R9	AR	
24	RN55D1402F	3	RESISTOR,FXD FILM, 14K, 1%, 1/8W (81349) 705-1051-000 R9	AR	
24	RN55D1472F	3	RESISTOR,FXD FILM, 14.7K, 1%, 1/8W (81349) 705-1052-000 R9	AR	
24	RN55D1542F	3	RESISTOR,FXD FILM, 15.4K, 1%, 1/8W (81349) 705-1053-000 R9	AR	
24	RN55D1022F	3	RESISTOR,FXD FILM, 10.2K, 1%, 1/8W (81349) 705-3605-480 R9	AR	
24	RN55D1072F	3	RESISTOR,FXD FILM, 10.7K, 1%, 1/8W (81349) 705-3605-490 R9	AR	
24	RN55D1132F	3	RESISTOR,FXD FILM, 11.3K, 1%, 1/8W (81349) 705-3605-500 R9	AR	
24	RN55D1182F	3	RESISTOR,FXD FILM, 11.8K, 1%, 1/8W (81349) 705-3605-510 R9	AR	
24	RN55D1242F	3	RESISTOR,FXD FILM, 12.4K, 1%, 1/8W (81349) 705-3605-520 R9	AR	
24	RN55D1372F	3	RESISTOR,FXD FILM, 13.7K, 1%, 1/8W (81349) 705-3605-540 R9	AR	
24	RN55D1432F	3	RESISTOR,FXD FILM, 14.3K, 1%, 1/8W (81349) 705-3605-550 R9	AR	
24	RNC55H1302FS	3	RESISTOR,FXD FILM, 13K, 1%, 1/10W (81349) 724-0640-030 R9	AR	
25	RCR07G475KS	2	RESISTOR,FXD CMPSN, 4.7MEGO, 10%, 1/4W (81349) 745-0881-000 R14	1	
26	PWR81S2R37FR	2	RESISTOR,FXD,WW 2.37 OHMS, 1%, 1W (81349) 747-2179-370 R7	1	
27	629-3491-001	2	COIL 130UH L2	1	
28	1760866	2	CAPACITOR,FXD ELCTLT, 15UF, 10%, 20V (56289) 184-6334-170 C5	1	
29	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R15	1	
30	M39003-01-2255	2	CAPACITOR,FXD ELCTLT, 4.7UF, 20%, 10V (81349) 184-9086-150 C9	1	
31	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V (81349) 913-5019-720 C10	1	

GROUP ASSEMBLY PARTS LIST

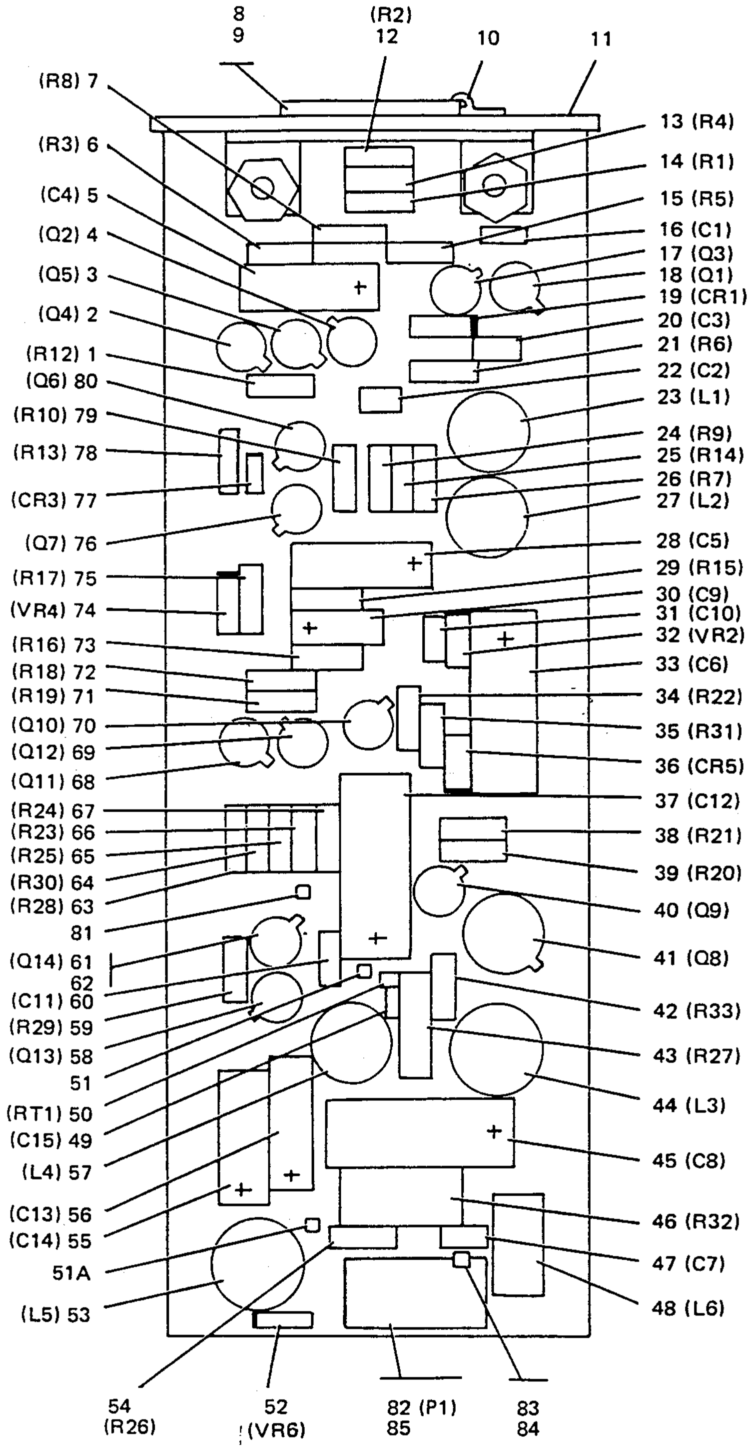
FIG. ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-32	1N4744A	2	SEMICOND DEVICE (04713) 353-6481-330 VR2	1	
33	1760863	2	CAPACITOR,FXD ELCTLT, 47UF, 10%, 20V (56289) 184-6334-140 C6	1	
34	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R22	1	
35	RCR07G155KS	2	RESISTOR,FXD CMPSN, 1.5MEGO, 10%, 1/4W (81349) 745-0863-000 R31	1	
36	1N4934	2	SEMICOND DEVICE (04713) 353-6518-020 CR5	1	
37	1760863	2	CAPACITOR,FXD ELCTLT, 47UF, 10%, 20V (56289) 184-6334-140 C12	1	
38	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R21	1	
39	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R20	1	
40	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q9	1	
41	2N5323	2	TRANSISTOR (07263) 352-0982-020 Q8	1	
	7717-114N	2	INSULATOR,DISK (13103) 352-9552-550 (AP)	1	
42	RCR07G272KS	2	RESISTOR,FXD CMPSN, 2.7K, 10%, 1/4W (81349) 745-0764-000 R33	1	
43	RWR81S1R00FR	2	RESISTOR,FXD WW, 1.00 OHM , 1%, 1W (81349) 747-2179-010 R27	1	
44	629-6163-001	2	COIL .4UH L3	1	
45	M39003-01-2379	2	CAPACITOR,FXD ELCTLT, 18UF, 10%, 50V (81349) 184-9037-660 C8	1	
46	RW69V2R2	2	RESISTOR,FXD WW, 2.2 OHMS, 5%, 3W (81349) 747-5307-000 R32	1	
47	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100V (81349) 913-5019-200 C7	1	
48	MS75101-7	2	COIL,RF 10UH (96906) 240-1600-000 L6	1	
49	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 C15	1	
50	714-1138-080	2	RESISTOR,THERMAL 2K, 10%, 1.8MW (56866) RT1	1	
51	SL441-434WHT	2	TERMINAL,STDF (12615) 306-2222-100	1	
51A	372-2601-037	2	CONTACT,ELEC	5	
52	1N4734A	2	SEMICOND DEVICE (04713) 353-6481-130 VR6	1	
53	629-3491-001	2	COIL L5	1	
	630-2203-001	2	RESISTOR, TEST SELECT R26 (NON-PROCURABLE ITEM)	1	
54	RCR07G100KS	3	RESISTOR,FXD CMPSN, 10 OHMS, 10%, 1/4W (81349) 745-0677-000 R26	AR	
54	RCR07G150KS	3	RESISTOR,FXD CMPSN, 15 OHMS, 10%, 1/4W (81349) 745-0683-000 R26	AR	
54	RCR07G220KS	3	RESISTOR,FXD CMPSN, 22 OHMS, 10%, 1/4W (81349) 745-0689-000 R26	AR	
54	RCR07G330KS	3	RESISTOR,FXD CMPSN, 33 OHMS, 10%, 1/4W (81349) 745-0695-000 R26	AR	
54	RCR07G470KS	3	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W (81349) 745-0701-000 R26	AR	
54	RCR07G560KS	3	RESISTOR,FXD CMPSN, 56 OHMS, 10%, 1/4W (81349) 745-0704-000 R26	AR	
54	RCR07G680KS	3	RESISTOR,FXD CMPSN, 68 OHMS, 10%, 1/4W (81349) 745-0707-000 R26	AR	
54	RCR07G820KS	3	RESISTOR,FXD CMPSN, 82 OHMS, 10%, 1/4W (81349) 745-0710-000 R26	AR	
54	RCR07G101KS	3	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W (81349) 745-0713-000 R26	AR	
55	M39003-01-2259	2	CAPACITOR,FXD ELCTLT, 39UF, 10%, 10V (81349) 184-9006-190 C14	1	
56	M39003-01-2259	2	CAPACITOR,FXD ELCTLT, 39UF, 10%, 10V (81349) 184-9006-190 C13	1	
57	629-3491-001	2	COIL 130UH L4	1	
58	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q13	1	
59	RN55D2742F	2	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W (81349) 705-1065-000 R29	1	
60	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100V (81349) 913-5019-200 C11	1	
61	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q14	1	
62	7717-198N	2	INSULATOR,DISK (32559) 352-9552-580	13	
63	RN55D3322F	2	RESISTOR,FXD FILM, 33.2K, 1%, 1/8W (81349) 705-1069-000 R28	1	
64	RCR07G152KS	2	RESISTOR,FXD CMPSN, 1.5K, 10%, 1/4W (81349) 745-0755-000 R30	1	
65	RN55D2612F	2	RESISTOR,FXD FILM, 26.1K, 1%, 1/8W (81349) 705-1064-000 R25	1	
	601-3987-001	2	RESISTOR, TEST SELECT (NON-PROCURABLE ITEM)	1	
66	RN55D1102F	3	RESISTOR,FXD FILM, 11K, 1%, 1/8W (81349) 705-1046-000 R23	AR	
66	RN55D1212F	3	RESISTOR,FXD FILM, 12.1K, 1%, 1/8W (81349) 705-1048-000 R23	AR	
66	RN55D1332F	3	RESISTOR,FXD FILM, 13.3K, 1%, 1/8W (81349) 705-1050-000 R23	AR	
66	RN55D1472F	3	RESISTOR,FXD FILM, 14.7K, 1%, 1/8W (81349) 705-1052-000 R23	AR	
66	RN55D1962F	3	RESISTOR,FXD FILM, 19.6K, 1%, 1/8W (81349) 705-1058-000 R23	AR	
66	RN55D2152F	3	RESISTOR,FXD FILM, 21.5K, 1%, 1/8W (81349) 705-1060-000 R23	AR	
66	RN55D2372F	3	RESISTOR,FXD FILM, 23.7K, 1%, 1/8W (81349) 705-1062-000 R23	AR	
66	RN55D2742F	3	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W (81349) 705-1065-000 R23	AR	
66	RN55D3012F	3	RESISTOR,FXD FILM, 30.1K, 1%, 1/8W (81349) 705-1067-000 R23	AR	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-	601-3670-001	1	POWER SUPPLY	1	
1	RN55D3831F	2	RESISTOR,FXD FILM, 3.83K, 1%, 1/8W (81349)	1	
			705-1024-000 R12		
2	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q4	1	
3	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q5	1	
4	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q2	1	
5	M39003-01-2368	2	CAPACITOR,FXD ELCTLT, 4.7UF, 10%, 50V (81349)	1	
			184-9007-550 C4		
6	RCR07G473KS	2	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W (81349)	1	
			745-0809-000 R3		
7	RCR07G472KS	2	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W (81349)	1	
			745-0773-000 R8		
8	629-3396-004	2	HANDLE	1	
	MS35649-244	2	NUT,PLAIN,HEX SST, 4-40 (96906) 313-0043-000 (AP)	2	
	310-6340-000	2	WASHER,FLAT SST, 0.125 ID X 0.281 OD (79807) (AP)	2	
	310-0278-000	2	WASHER,LOCK SST, 0.115 ID X 0.202 OD (70318) (AP)	2	
	MS51957-15	2	SCREW,MACH STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	2	
9	629-3492-001	3	HANDLE	1	
10	629-3493-001	3	RETAINER,HANDLE	1	
	MS16535-54	3	RIVET,TUBULAR CS, 0.089 DIA X 0.188 (96906)	2	
			305-1733-000 (AP)		
11	629-3396-001	3	BRACKET	1	
12	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349)	1	
			745-0749-000 R2		
13	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349)	1	
			745-0749-000 R4		
14	RCR07G473KS	2	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W (81349)	1	
			745-0809-000 R1		
15	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349)	1	
			745-0749-000 R5		
16	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V (81349)	1	
			913-5019-720 C1		
17	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q3	1	
18	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q1	1	
19	1N4934	2	SEMICOND DEVICE (04713) 353-6518-020 CR1	1	
20	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100V (81349)	1	
			913-5019-200 C3		
21	RCR07G101KS	2	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W (81349)	1	
			745-0713-000 R6		
22	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V (81349)	1	
			913-5019-720 C2		
23	567-8390-001	2	COIL L1	1	
	601-3988-001	2	RESISTOR, TEST SELECT (NON-PROCURABLE ITEM)	1	
24	RN55D1002F	3	RESISTOR,FXD FILM, 10K, 1%, 1/8W (81349)	AR	
			705-1044-000 R9		
24	RN55D1052F	3	RESISTOR,FXD FILM, 10.5K, 1%, 1/8W (81349)	AR	
			705-1045-000 R9		
24	RN55D1102F	3	RESISTOR,FXD FILM, 11K, 1%, 1/8W (81349)	AR	
			705-1046-000 R9		
24	RN55D1152F	3	RESISTOR,FXD FILM, 11.5K, 1%, 1/8W (81349)	AR	
			705-1047-000 R9		
24	RN55D1212F	3	RESISTOR,FXD FILM, 12.1K, 1%, 1/8W (81349)	AR	
			705-1048-000 R9		
24	RN55D1272F	3	RESISTOR,FXD FILM, 12.7K, 1%, 1/8W (81349)	AR	
			705-1049-000 R9		
24	RN55D1332F	3	RESISTOR,FXD FILM, 13.3K, 1%, 1/8W (81349)	AR	
			705-1050-000 R9		
24	RN55D1402F	3	RESISTOR,FXD FILM, 14K, 1%, 1/8W (81349)	AR	
			705-1051-000 R9		
24	RN55D1472F	3	RESISTOR,FXD FILM, 14.7K, 1%, 1/8W (81349)	AR	
			705-1052-000 R9		
24	RN55D1542F	3	RESISTOR,FXD FILM, 15.4K, 1%, 1/8W (81349)	AR	
			705-1053-000 R9		
24	RN55D1022F	3	RESISTOR,FXD FILM, 10.2K, 1%, 1/8W (81349)	AR	
			705-3605-480 R9		
24	RN55D1072F	3	RESISTOR,FXD FILM, 10.7K, 1%, 1/8W (81349)	AR	
			705-3605-490 R9		
24	RN55D1132F	3	RESISTOR,FXD FILM, 11.3K, 1%, 1/8W (81349)	AR	
			705-3605-500 R9		
24	RN55D1182F	3	RESISTOR,FXD FILM, 11.8K, 1%, 1/8W (81349)	AR	
			705-3605-510 R9		
24	RN55D1242F	3	RESISTOR,FXD FILM, 12.4K, 1%, 1/8W (81349)	AR	
			705-3605-520 R9		
24	RN55D1372F	3	RESISTOR,FXD FILM, 13.7K, 1%, 1/8W (81349)	AR	
			705-3605-540 R9		
24	RN55D1432F	3	RESISTOR,FXD FILM, 14.3K, 1%, 1/8W (81349)	AR	
			705-3605-550 R9		
24	RNC55H1302FS	3	RESISTOR,FXD FILM, 13K, 1%, 1/10W (81349)	AR	
			724-0640-030 R9		
25	RCR07G475KS	2	RESISTOR,FXD CMPSN, 4.7MEGO, 10%, 1/4W (81349)	1	
			745-0801-000 R14		
26	PWR8152R37FR	2	RESISTOR,FXD,WW 2.37 OHMS, 1%, 1W (81349)	1	
			747-2179-370 R7		
27	629-3491-001	2	COIL 130UH L2	1	
28	1760866	2	CAPACITOR,FXD ELCTLT, 15UF, 10%, 20V (56289)	1	
			184-6334-170 C5		
29	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349)	1	
			745-0749-000 R15		
30	M39003-01-2255	2	CAPACITOR,FXD ELCTLT, 4.7UF, 20%, 10V (81349)	1	
			184-9086-150 C9		
31	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50V (81349)	1	
			913-5019-720 C10		

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-32	1N4744A	2	SEMICOND DEVICE (04713) 353-6481-330 VR2	1	
33	1760863	2	CAPACITOR,FXD ELCTLT, 47UF, 10%, 20V (56289)	1	
			184-6334-140 C6		
34	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349)	1	
			745-0749-000 R22		
35	RCR07G155KS	2	RESISTOR,FXD CMPSN, 1.5MEGO, 10%, 1/4W (81349)	1	
			745-0863-000 R31		
36	1N4934	2	SEMICOND DEVICE (04713) 353-6518-020 CR5	1	
37	1760863	2	CAPACITOR,FXD ELCTLT, 47UF, 10%, 20V (56289)	1	
			184-6334-140 C12		
38	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349)	1	
			745-0749-000 R21		
39	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349)	1	
			745-0749-000 R20		
40	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q9	1	
41	2N5323	2	TRANSISTOR (07263) 352-0982-020 Q8	1	
	7717-114N	2	INSULATOR,DISK (13103) 352-9552-550 (AP)	1	
42	RCR07G272KS	2	RESISTOR,FXD CMPSN, 2.7K, 10%, 1/4W (81349)	1	
			745-0764-000 R33		
43	RWR81S1R00FR	2	RESISTOR,FXD WW, 1.00 OHM , 1%, 1W (81349)	1	
			747-2179-010 R27		
44	629-6163-001	2	COIL .4MH L3	1	
45	M39003-01-2379	2	CAPACITOR,FXD ELCTLT, 18UF, 10%, 50V (81349)	1	
			184-9037-660 C8		
46	RW69V2R2	2	RESISTOR,FXD WW, 2.2 OHMS, 5%, 3W (81349)	1	
			747-5307-000 R32		
47	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100V (81349)	1	
			913-5019-200 C7		
48	MS75101-7	2	COIL,RF 10UH (96906) 240-1600-000 L6	1	
49	CK05BX104M	2	CAPACITOR,FXD CER DIEL, 0.1UF, 20%, 50VDC (81349)	1	
			913-5019-720 C15		
50	714-1138-080	2	RESISTOR,THERMAL 2K, 10%, 1.8MW (56866) RT1	1	
51	SL441-434WHT	2	TERMINAL,STDF (12615) 306-2222-100	1	
51A	372-2601-037	2	CONTACT,ELEC	5	
52	1N4734A	2	SEMICOND DEVICE (04713) 353-6481-130 VR6	1	
53	629-3491-001	2	COIL L5	1	
	630-2203-001	2	RESISTOR, TEST SELECT R26 (NON-PROCURABLE ITEM)	1	
54	RCR07G100KS	3	RESISTOR,FXD CMPSN, 10 OHMS, 10%, 1/4W (81349)	AR	
			745-0677-000 R26		
54	RCR07G150KS	3	RESISTOR,FXD CMPSN, 15 OHMS, 10%, 1/4W (81349)	AR	
			745-0683-000 R26		
54	RCR07G220KS	3	RESISTOR,FXD CMPSN, 22 OHMS, 10%, 1/4W (81349)	AR	
			745-0689-000 R26		
54	RCR07G330KS	3	RESISTOR,FXD CMPSN, 33 OHMS, 10%, 1/4W (81349)	AR	
			745-0695-000 R26		
54	RCR07G470KS	3	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W (81349)	AR	
			745-0701-000 R26		
54	RCR07G560KS	3	RESISTOR,FXD CMPSN, 56 OHMS, 10%, 1/4W (81349)	AR	
			745-0704-000 R26		
54	RCR07G680KS	3	RESISTOR,FXD CMPSN, 68 OHMS, 10%, 1/4W (81349)	AR	
			745-0707-000 R26		
54	RCR07G820KS	3	RESISTOR,FXD CMPSN, 82 OHMS, 10%, 1/4W (81349)	AR	
			745-0710-000 R26		
54	RCR07G101KS	3	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W (81349)	AR	
			745-0713-000 R26		
55	M39003-01-2259	2	CAPACITOR,FXD ELCTLT, 39UF, 10%, 10V (81349)	1	
			184-9086-190 C14		
56	M39003-01-2259	2	CAPACITOR,FXD ELCTLT, 39UF, 10%, 10V (81349)	1	
			184-9086-190 C13		
57	629-3491-001	2	COIL 130UH L4	1	
58	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q13	1	
59	RN55D2742F	2	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W (81349)	1	
			705-1065-000 R29		
60	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100V (81349)	1	
			913-5019-200 C11		
61	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q14	1	
62	7717-198N	2	INSULATOR,DISK (32559) 352-9552-580	13	
63	RN55D3322F	2	RESISTOR,FXD FILM, 33.2K, 1%, 1/8W (81349)	1	
			705-1069-000 R28		
64	RCR07G152KS	2	RESISTOR,FXD CMPSN, 1.5K, 10%, 1/4W (81349)	1	
			745-0755-000 R30		
65	RN55D2612F	2	RESISTOR,FXD FILM, 26.1K, 1%, 1/8W (81349)	1	
			705-1064-000 R25		
	601-3987-001	2	RESISTOR, TEST SELECT (NON-PROCURABLE ITEM)	1	
66	RN55D1102F	3	RESISTOR,FXD FILM, 11K, 1%, 1/8W (81349)	AR	
			705-1046-000 R23		
66	RN55D1212F	3	RESISTOR,FXD FILM, 12.1K, 1%, 1/8W (81349)	AR	
			705-1048-000 R23		
66	RN55D1332F	3	RESISTOR,FXD FILM, 13.3K, 1%, 1/8W (81349)	AR	
			705-1050-000 R23		
66	RN55D1472F	3	RESISTOR,FXD FILM, 14.7K, 1%, 1/8W (81349)	AR	
			705-1052-000 R23		
66	RN55D1962F	3	RESISTOR,FXD FILM, 19.6K, 1%, 1/8W (81349)	AR	
			705-1058-000 R23		
66	RN55D2152F	3	RESISTOR,FXD FILM, 21.5K, 1%, 1/8W (81349)	AR	
			705-1060-000 R23		
66	RN55D2372F	3	RESISTOR,FXD FILM, 23.7K, 1%, 1/8W (81349)	AR	
			705-1062-000 R23		
66	RN55D2742F	3	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W (81349)	AR	
			705-1065-000 R23		
66	RN55D3012F	3	RESISTOR,FXD FILM, 30.1K, 1%, 1/8W (81349)	AR	
			705-1067-000 R23		



Power Supply, Parts Location
Figure 4 (Sheet 1 of 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-66	RN55D3162F	3	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W (81349) 705-1068-000 R23	AR	
66	RN55D3322F	3	RESISTOR,FXD FILM, 33.2K, 1%, 1/8W (81349) 705-1069-000 R23	AR	
66	RN55D3482F	3	RESISTOR,FXD FILM, 34.8K, 1%, 1/8W (81349) 705-1070-000 R23	AR	
66	RN55D4022F	3	RESISTOR,FXD FILM, 40.2K, 1%, 1/8W (81349) 705-1073-000 R23	AR	
66	RN55D4422F	3	RESISTOR,FXD FILM, 44.2K, 1%, 1/8W (81349) 705-1075-000 R23	AR	
66	RN55D5622F	3	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W (81349) 705-1080-000 R23	AR	
66	RN55D1003F	3	RESISTOR,FXD FILM, 100K, 1%, 1/8W (81349) 705-1092-000 R23	AR	
66	RN55D3013F	3	RESISTOR,FXD FILM, 301K, 1%, 1/8W (81349) 705-1115-000 R23	AR	
66	RN55D1742F	3	RESISTOR,FXD FILM, 17.4K, 1%, 1/8W (81349) 705-3605-590 R23	AR	
66	RN55D3922F	3	RESISTOR,FXD FILM, 39.20K, 1%, 1/8W (81349) 705-3605-760 R23	AR	
67	RN55D7870F	2	RESISTOR,FXD FILM, 787 OHMS, 1%, 1/8W (81349) 705-0991-000 R24	1	
68	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q11	1	
69	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q12	1	
70	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q10	1	
71	RCR07G104KS	2	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W (81349) 745-0821-000 R19	1	
72	RCR07G473KS	2	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W (81349) 745-0809-000 R18	1	
73	RCR07G273KS	2	RESISTOR,FXD CMPSN, 27K, 10%, 1/4W (81349) 745-0800-000 R16	1	
74	MZ4624	2	SEMICOND DEVICE (04713) 353-3591-480 VR4	1	
75	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R17	1	
76	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q7	1	
77	1N4454	2	SEMICOND DEVICE (03508) 353-3644-010 CR3	1	
78	RCR07G472KS	2	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W (81349) 745-0773-000 R13	1	
79	RN55D1472F	2	RESISTOR,FXD FILM, 14.7K, 1%, 1/8W (81349) 705-1052-000 R10	1	
80	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q6	1	
81	372-2601-132	2	CONTACT,ELEC	4	
82	638-1091-013	2	CONNECTOR ASSY P1	1	
83	372-2234-010	3	CONTACT,ELEC	4	
84	372-2234-020	3	CONTACT,ELEC	4	
85	372-2623-013	3	HOUSING,CONN,EL	1	

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
CR1	4-19	1N4934	R23	4-66	RN55D2152F
CR3	4-77	1N4454	R23	4-66	RN55D2372F
CR5	4-36	1N4934	R23	4-66	RN55D2742F
C1	4-16	CK05BX104M	R23	4-66	RN55D3012F
C10	4-31	CK05BX104M	R23	4-66	RN55D3162F
C11	4-60	CK05BX103K	R23	4-66	RN55D3322F
C12	4-37	1760863	R23	4-66	RN55D3482F
C13	4-56	M39003-01-2259	R23	4-66	RN55D4022F
C14	4-55	M39003-01-2259	R23	4-66	RN55D4422F
C15	4-49	CK05BX104M	R23	4-66	RN55D5622F
C2	4-22	CK05BX104M	R23	4-66	RN55D1003F
C3	4-20	CK05BX103K	R23	4-66	RN55D3013F
C4	4-5	M39003-01-2368	R23	4-66	RN55D1742F
C5	4-28	1760866	R23	4-66	RN55D3922F
C6	4-33	1760863	R24	4-67	RN55D7870F
C7	4-47	CK05BX103K	R25	4-65	RN55D2612F
C8	4-45	M39003-01-2379	R26	4-54	630-2203-001
C9	4-30	M39003-01-2255	R26	4-54	RCR07G100KS
L1	4-23	567-8390-001	R26	4-54	RCR07G150KS
L2	4-27	629-3491-001	R26	4-54	RCR07G220KS
L3	4-44	629-6163-001	R26	4-54	RCR07G330KS
L4	4-57	629-3491-001	R26	4-54	RCR07G470KS
L5	4-53	629-3491-001	R26	4-54	RCR07G560KS
L6	4-48	MS75101-7	R26	4-54	RCR07G680KS
P1	4-82	638-1091-013	R26	4-54	RCR07G820KS
Q1	4-18	2N2907A	R27	4-43	RWR81S1R00FR
Q10	4-70	2N2222A	R28	4-63	RN55D3322F
Q11	4-68	2N2907A	R29	4-59	RN55D2742F
Q12	4-69	2N2907A	R3	4-6	RCR07G473KS
Q13	4-58	2N2222A	R30	4-64	RCR07G152KS
Q14	4-61	2N2907A	R31	4-35	RCR07G155KS
Q2	4-4	2N2222A	R32	4-46	RW69V2R2
Q3	4-17	2N2907A	R33	4-42	RCR07G272KS
Q4	4-2	2N2222A	R4	4-13	RCR07G102KS
Q5	4-3	2N2222A	R5	4-15	RCR07G102KS
Q6	4-80	2N2222A	R6	4-21	RCR07G101KS
Q7	4-76	2N2222A	R7	4-26	RWR81S2R37FR
Q8	4-41	2N5323	R8	4-7	RCR07G472KS
Q9	4-40	2N2907A	R9	4-24	RN55D1002F
RT1	4-50	714-1138-080	R9	4-24	RN55D1052F
R1	4-14	RCR07G473KS	R9	4-24	RN55D1102F
R10	4-79	RN55D1472F	R9	4-24	RN55D1152F
R12	4-1	RN55D3831F	R9	4-24	RN55D1212F
R13	4-78	RCR07G472KS	R9	4-24	RN55D1272F
R14	4-25	RCR07G475KS	R9	4-24	RN55D1332F
R15	4-29	RCR07G102KS	R9	4-24	RN55D1402F
R16	4-73	RCR07G273KS	R9	4-24	RN55D1472F
R17	4-75	RCR07G102KS	R9	4-24	RN55D1542F
R18	4-72	RCR07G473KS	R9	4-24	RN55D1022F
R19	4-71	RCR07G104KS	R9	4-24	RN55D1072F
R2	4-12	RCR07G102KS	R9	4-24	RN55D1132F
R20	4-39	RCR07G102KS	R9	4-24	RN55D1182F
R21	4-38	RCR07G102KS	R9	4-24	RN55D1242F
R22	4-34	RCR07G102KS	R9	4-24	RN55D1372F
R23	4-66	RN55D1102F	R9	4-24	RN55D1432F
R23	4-66	RN55D1212F	R9	4-24	RNC55H1302FS
R23	4-66	RN55D1332F	VR2	4-32	1N4744A
R23	4-66	RN55D1472F	VR4	4-74	MZ4624
R23	4-66	RN55D1962F	VR6	4-52	1N4734A

Power Supply, Parts Location
Figure 4 (Sheet 2)

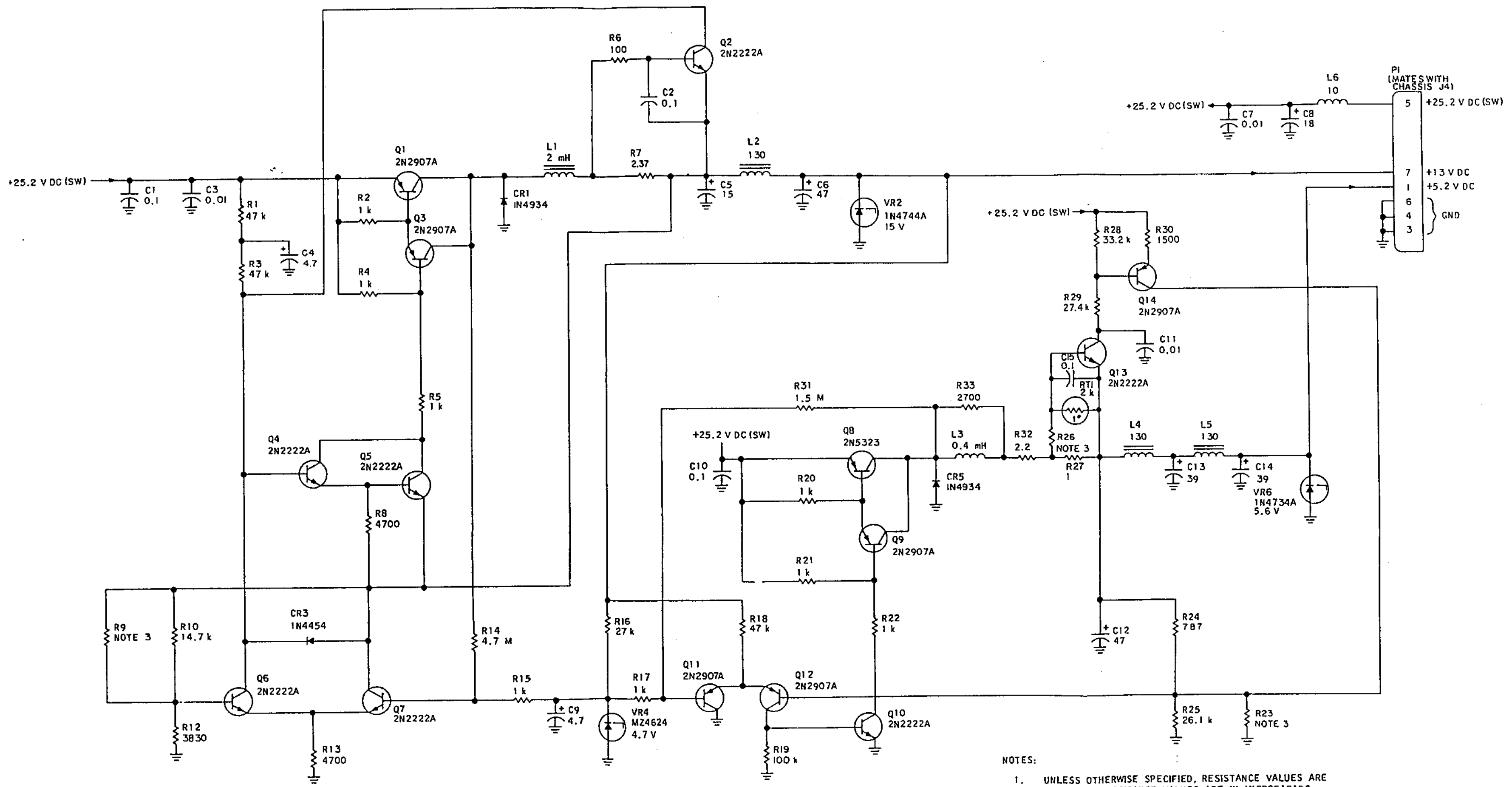
GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-66	RN55D3162F	3	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W (81349) 705-1068-000 R23	AR	
66	RN55D3322F	3	RESISTOR,FXD FILM, 33.2K, 1%, 1/8W (81349) 705-1069-000 R23	AR	
66	RN55D3482F	3	RESISTOR,FXD FILM, 34.8K, 1%, 1/8W (81349) 705-1070-000 R23	AR	
66	RN55D4022F	3	RESISTOR,FXD FILM, 40.2K, 1%, 1/8W (81349) 705-1073-000 R23	AR	
66	RN55D4422F	3	RESISTOR,FXD FILM, 44.2K, 1%, 1/8W (81349) 705-1075-000 R23	AR	
66	RN55D5622F	3	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W (81349) 705-1080-000 R23	AR	
66	RN55D1003F	3	RESISTOR,FXD FILM, 100K, 1%, 1/8W (81349) 705-1092-000 ~~[illegible]~~ R23	AR	
66	RN55D3013F	3	RESISTOR,FXD FILM, 301K, 1%, 1/8W (81349) 705-1115-000 R23	AR	
66	RN55D1742F	3	RESISTOR,FXD FILM, 17.4K, 1%, 1/8W (81349) 705-3605-590 R23	AR	
66	RN55D3922F	3	RESISTOR,FXD FILM, 39.20K, 1%, 1/8W (81349) 705-3605-760 R23	AR	
67	RN55D7870F	2	RESISTOR,FXD FILM, 787 OHMS, 1%, 1/8W (81349) 705-0991-000 R24	1	
68	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q11	1	
69	2N2907A	2	TRANSISTOR (04713) 352-0551-010 Q12	1	
70	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q10	1	
71	RCR07G104KS	2	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W (81349) 745-0821-000 R19	1	
72	RCR07G473KS	2	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W (81349) 745-0809-000 R18	1	
73	RCR07G273KS	2	RESISTOR,FXD CMPSN, 27K, 10%, 1/4W (81349) 745-0800-000 R16	1	
74	MZ4624	2	SEMICOND DEVICE (04713) 353-3591-480 VR4	1	
75	RCR07G102KS	2	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 R17	1	
76	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q7	1	
77	1N4454	2	SEMICOND DEVICE (03508) 353-3644-010 CR3	1	
78	RCR07G472KS	2	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W (81349) 745-0773-000 R13	1	
79	RN55D1472F	2	RESISTOR,FXD FILM, 14.7K, 1%, 1/8W (81349) 705-1052-000 R10	1	
80	2N2222A	2	TRANSISTOR (07263) 352-0661-020 Q6	1	
81	372-2601-132	2	CONTACT,ELEC	4	
82	638-1091-013	2	CONNECTOR ASSY P1	1	
83	372-2234-010	3	CONTACT,ELEC	4	
84	372-2234-020	3	CONTACT,ELEC	4	
85	372-2623-013	3	HOUSING,CONN,EL	1	

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
CR1	4-19	1N4934	R23	4-66	RN55D2152F
CR3	4-77	1N4454	R23	4-66	RN55D2372F
CR5	4-36	1N4934	R23	4-66	RN55D2742F
C1	4-16	CK05BX104M	R23	4-66	RN55D3012F
C10	4-31	CK05BX104M	R23	4-66	RN55D3162F
C11	4-60	CK05BX103K	R23	4-66	RN55D3322F
C12	4-37	1760863	R23	4-66	RN55D3482F
C13	4-56	M39003-01-2259	R23	4-66	RN55D4022F
C14	4-55	M39003-01-2259	R23	4-66	RN55D4422F
C15	4-49	CK05BX104M	R23	4-66	RN55D5622F
C2	4-22	CK05BX104M	R23	4-66	RN55D1003F
C3	4-20	CK05BX103K	R23	4-66	RN55D3013F
C4	4-5	M39003-01-2368	R23	4-66	RN55D1742F
C5	4-28	1760866	R23	4-66	RN55D3922F
C6	4-33	1760863	R24	4-67	RN55D7870F
C7	4-47	CK05BX103K	R25	4-65	RN55D2612F
C8	4-45	M39003-01-2379	R26	4-54	630-2203-001
C9	4-30	M39003-01-2255	R26	4-54	RCR07G100KS
L1	4-23	567-8390-001	R26	4-54	RCR07G150KS
L2	4-27	629-3491-001	R26	4-54	RCR07G220KS
L3	4-44	629-6163-001	R26	4-54	RCR07G330KS
L4	4-57	629-3491-001	R26	4-54	RCR07G470KS
L5	4-53	629-3491-001	R26	4-54	RCR07G560KS
L6	4-48	MS75101-7	R26	4-54	RCR07G680KS
P1	4-82	638-1091-013	R26	4-54	RCR07G820KS
Q1	4-18	2N2907A	R27	4-43	RWR81S1R00FR
Q10	4-70	2N2222A	R28	4-63	RN55D3322F
Q11	4-68	2N2907A	R29	4-59	RN55D2742F
Q12	4-69	2N2907A	R3	4-6	RCR07G473KS
Q13	4-58	2N2222A	R30	4-64	RCR07G152KS
Q14	4-61	2N2907A	R31	4-35	RCR07G155KS
Q2	4-4	2N2222A	R32	4-46	RW69V2R2
Q3	4-17	2N2907A	R33	4-42	RCR07G272KS
Q4	4-2	2N2222A	R4	4-13	RCR07G102KS
Q5	4-3	2N2222A	R5	4-15	RCR07G102KS
Q6	4-80	2N2222A	R6	4-21	RCR07G101KS
Q7	4-76	2N2222A	R7	4-26	RWR81S2R37FR
Q8	4-41	2N5323	R8	4-7	RCR07G472KS
Q9	4-40	2N2907A	R9	4-24	RN55D1002F
RT1	4-50	714-1138-080	R9	4-24	RN55D1052F
R1	4-14	RCR07G473KS	R9	4-24	RN55D1102F
R10	4-79	RN55D1472F	R9	4-24	RN55D1152F
R12	4-1	RN55D3831F	R9	4-24	RN55D1212F
R13	4-78	RCR07G472KS	R9	4-24	RN55D1272F
R14	4-25	RCR07G475KS	R9	4-24	RN55D1332F
R15	4-29	RCR07G102KS	R9	4-24	RN55D1402F
R16	4-73	RCR07G273KS	R9	4-24	RN55D1472F
R17	4-75	RCR07G102KS	R9	4-24	RN55D1542F
R18	4-72	RCR07G473KS	R9	4-24	RN55D1022F
R19	4-71	RCR07G104KS	R9	4-24	RN55D1072F
R2	4-12	RCR07G102KS	R9	4-24	RN55D1132F
R20	4-39	RCR07G102KS	R9	4-24	RN55D1182F
R21	4-38	RCR07G102KS	R9	4-24	RN55D1242F
R22	4-34	RCR07G102KS	R9	4-24	RN55D1372F
R23	4-66	RN55D1102F	R9	4-24	RN55D1432F
R23	4-66	RN55D1212F	R9	4-24	RNC55H1302FS
R23	4-66	RN55D1332F	VR2	4-32	1N4744A
R23	4-66	RN55D1472F	VR4	4-74	MZ4624
R23	4-66	RN55D1962F	VR6	4-52	1N4734A

Power Supply, Parts Location
Figure 4 (Sheet 2)



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, AND INDUCTANCE VALUES ARE IN MICROHENRYS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX UNIT AND/OR ASSEMBLY DESIGNATION.
3. VALUES ARE SELECTED IN TEST.

TPA-5210-014

Power Supply, Schematic Diagram
Figure 5

IF/AF Amplifier (601-3668-001, 601-3669-001)

Rockwell International

instructions

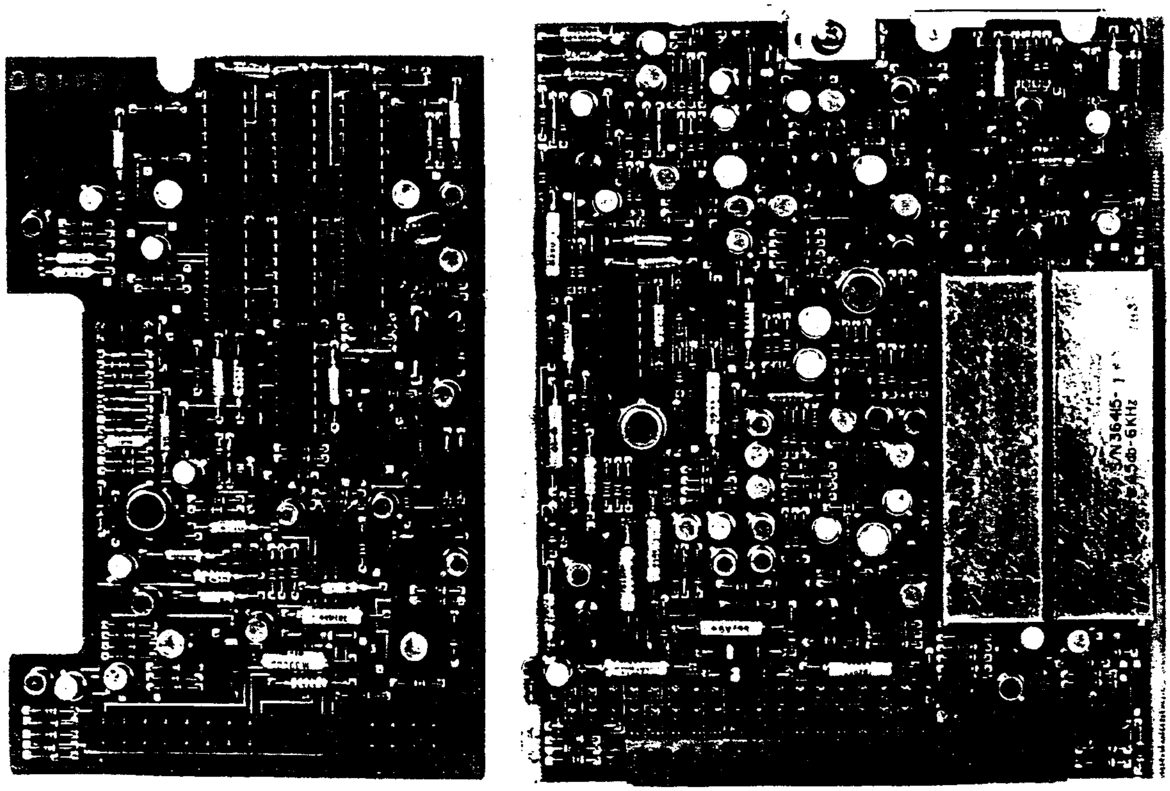
Collins Telecommunications Products Division

Printed in USA

523-0772068-001211
1 November 1982

1. DESCRIPTION

If/af card 601-3668-001 and logic/tx card 601-3669-001, shown in figure 1, are plug-in circuit cards that interconnect with each other and other circuits of the receiver-transmitter through two multipin connectors. The if/af amplifier provides audio amplification, modulation/demodulation functions, if selectivity, and logic processing of the control signals.



IF/AF Amplifier
Figure 1

2. PRINCIPLES OF OPERATION

2.1 Functional Theory

2.1.1 Receive Mode

Refer to figure 2 (simplified schematic diagram). When in the USB or LSB mode, the 5-MHz if receive signal is applied to the SSB filter through switch amplifier Q1, then amplified by the if amplifier stages of if/af card A1, and passed to the SSB detector.

A 5-MHz injection frequency, supplied by the frequency synthesizer, is also applied to the detector and mixed with the 5-MHz SSB if. The resultant SSB audio output is applied to the audio amplifier stage and amplified to a level controlled by the af gain control on the control if the voice mode has been selected. If the 0-dB mW, 600-ohm data mode has been selected, the audio output is fixed at a 0-dB mW nominal (±3 dB) level and the af gain control has no effect.

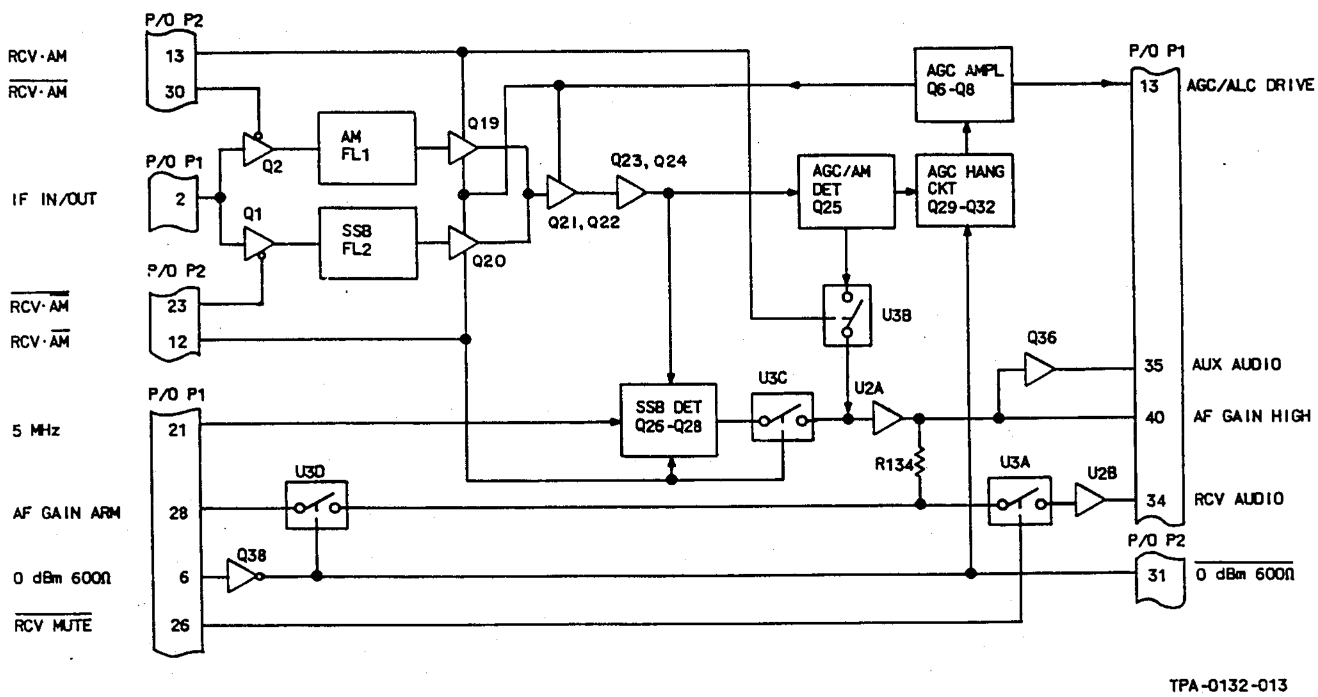
In AM mode, the 5-MHz if receive signal from the rf mixer is applied to the AM filter through switch amplifier Q2, then amplified by the if amplifier stage of if/af A1 and applied to the AM detector. The audio output of the detector is filtered and passed to the audio amplifier as in SSB.

The AM detector also functions as a peak detector for the AGC circuitry. The output of the AGC detector is amplified and passed through circuitry that determines AGC time constants. The AGC control output is applied to the rf mixer as well as the if/af A1 circuits.

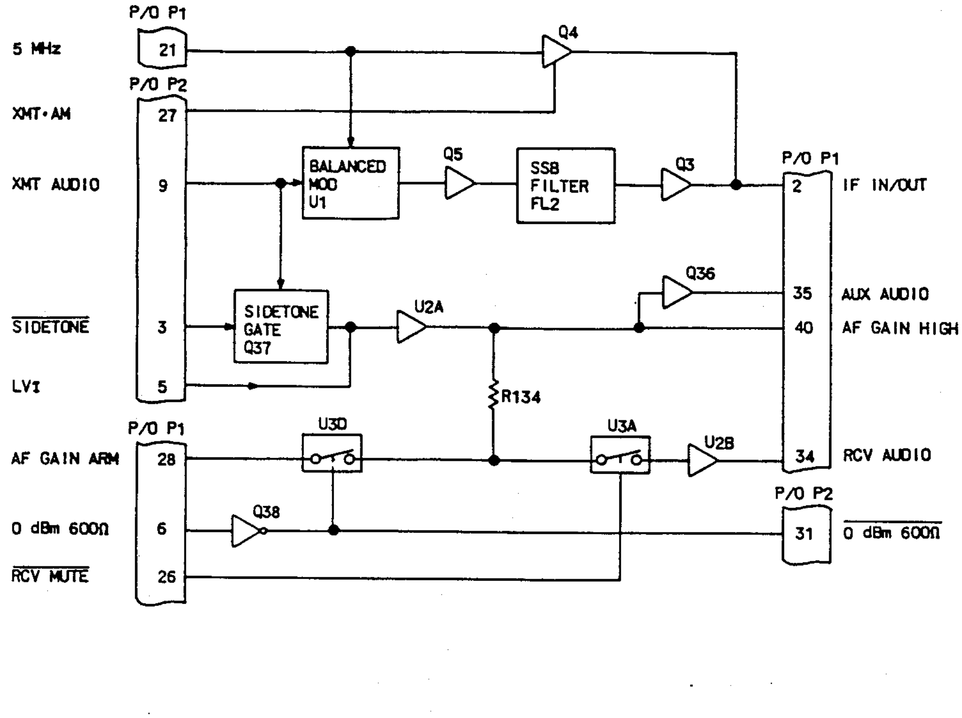
The output of the audio amplifier stage of the if/af amplifier is applied to the control for interface with the appropriate audio output device(s).

2.1.2 Transmit Mode

Refer to figure 3 (simplified schematic diagram) and figure 4 (simplified schematic diagram). The audio from the audio device, handset, key, or data terminal



IF/AF A1 (Receive), Simplified Schematic Diagram
Figure 2



IF/AF A1 (Transmit), Simplified Schematic Diagram
Figure 3

is interfaced by the control with logic/tx card A2 of the if/af amplifier. As previously discussed, the mode of operation and operating frequency is selected at the control. USB, LSB, or AM modes can be singularly selected with the RCV only function being selectable for use with the selected mode. If the RCV only function is selected, the logic circuits of logic/tx A2 process the RCV only signal and supply a transmit inhibit signal to the transmit circuits.

With the RCV only function not selected, the audio applied to logic/tx A2 is amplified by the audio compression amplifier. In the voice mode, the amplifier accepts inputs in the range of -56 to -26 dB mW and -6 to+10 dB mW in the 0-dB, 600-ohm data mode. The output of the compression amplifier remains constant with the range of inputs specified. The output of the compression amplifier is coupled to the balanced modulator which, along with the 5-MHz injection from the frequency synthesizer, generates a 5-MHz double-sideband suppressed carrier signal. This signal is applied to the SSB filter which passes only the lower sideband. If SSB is selected on the control, the output is applied to the rf mixer. If AM is selected, the LSB output from the filter is connected to a stage that reinserts the 5-MHz carrier. This AM output then goes to the rf mixer.

During transmit, the sidetone transmit audio is supplied to the headset or handset via the receive audio circuits when the sidetone gate is enabled.

When a new frequency is selected, a rechannel signal from the control is processed by the logic circuits of logic/tx A2 and passed to the frequency synthesizer and amplifier-coupler.

A TIP signal places the receiver-transmitter circuitry into transmit and holds it there until the amplifier-coupler completes its tune cycle. During the tune cycle, the 1-kHz signal from the frequency synthesizer is heard as the tune tone. At the end of the tune cycle, the amplifier-coupler releases the TIP line and the receiver-transmitter goes into receive. If a tuning fault occurs, logic/tx A2 circuits receive and process the fault signal into a tune-tone interrupter

(4-pulse-per-second square wave) signal to alert the operator. This fault is cleared by rechanneling or turning the power off and on. If the AM mode is selected, logic/tx A2 provides gating signals to route the received signals through the AM filter and detector circuits and to turn on the carrier reinsert circuit of if/af card A1.

When the CW key is used, the 1-kHz CW sidetone from the frequency synthesizer is gated on and off by the key. The 1-kHz sidetone is processed as an audio input to the balanced modulator similar to a voice signal.

The ALC control signal received from the amplifier-coupler is connected to the if/af amplifier where it is combined with the receive AGC circuitry to control the transmit output.

2.2 Detailed Theory

2.2.1 Receive Mode

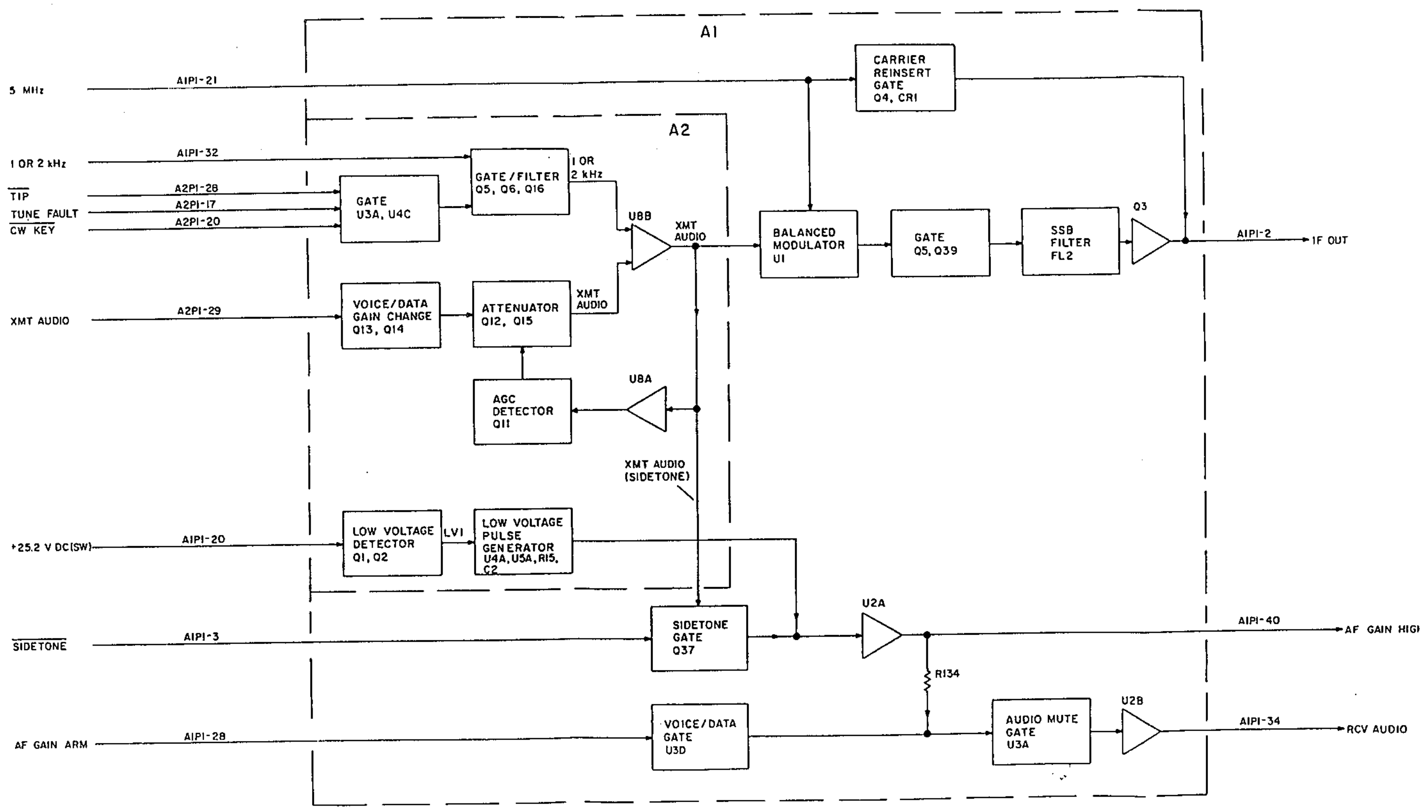
Refer to figure 2 (simplified schematic diagram) and figure 12 (schematic diagram). The receive IF IN signal is applied to the if/af amplifier through chassis J2-2 to chassis J5/(if/af) A1P1-2. When in AM mode, the 5-MHz if signal is coupled from if/af A1P1-2 (IF IN), to the base of amplifier switch transistor Q2. With the receiver-transmitter in AM mode, $\overline{\text{RCV·AM}}$ logic (ground) at if/af A1P2-30 is applied to the base of transistor Q2, biasing it on and allowing the AM receive if to be applied to AM filter FL1 and then on to amplifier switch transistor Q19, which is also biased on by +5.2-volt logic (RCV·AM) at A1P2-13. Transistors Q1 and Q20 are biased off during AM mode.

The receive if output of transistor Q19 passes through if amplifier transistors Q21 through Q24 on to AGC/AM audio detector transistor Q25. The detected af output of transistor Q25 is applied to the input of AM switch U3B and to the AGC hang circuit, transistors Q29 through Q32. As the collector current of transistor Q32 increases to transistor Q8 of the ALC/AGC DRIVE circuit, the output voltage of transistor Q6 decreases. This decrease in voltage to inductors L1, L2, and L3 permits diodes CR6, CR7, and CR8 to conduct, which maintains the gain of transistors Q19, Q21, and Q22 proportionate to the received signal level. The dc voltage output of transistor Q6 is also supplied to the rf mixer via chassis J5-13.

The presence of RCV·AM logic at the control element of switch U3B switches the AM receive audio to the output element of the switch. This audio is then coupled by capacitor C55 to the first audio amplifier U2A. The output of audio amplifier U2A is applied to R134, and to if/af A1P1-40 (AF GAIN HIGH), which connects to a variable resistor (af gain) of the control. The audio level at the input to audio mute gate, switch U3A, is controlled by the control af gain control and voice/data gate, switch U3D. Switch U3A is gated by RCV MUTE logic. With the radio in normal receive operation, no tuning occurring, the $\overline{\text{RCV MUTE}}$ logic enables switch U3A and the audio is coupled by capacitor C61 to the second af amplifier U2B. The receive audio is amplified and coupled through if/af A1P1/chassis J5-34 to chassis J1-43 (RCV AUDIO) for routing to the audio I/O device(s) connected to the control. When in USB/LSB mode, the 5-MHz SSB receive if is applied to if/af A1 on the same signal line that AM receive if is applied. The receive if is coupled to switch transistors Q1 and Q2. With Q1 gated on the $\overline{\text{RCV·AM}}$ logic (P2-23), the receive if output of Q1 is direct coupled to SSB filter FL2 (the sidebands are inverted in the control so the lower sideband is the upper sideband). Then the receive if passes through transistor Q20 when RCV·$\overline{\text{AM}}$ gating logic is present. This couples the 5-MHz if to if amplifier transistors Q21 through Q24. The gain of transistors Q20 through Q22 is controlled by AGC/ALC DRIVE in the same manner as noted in AM receive mode of operation. The if output of transistor Q24 is sent to AGC/AM audio detector, transistor Q25. Also, the if signal at the emitter of Q24 is coupled to transistor Q28 of the SSB detector, which is comprised of transistors Q26, Q27, and Q28. The SSB detector is switched on during USB/LSB mode by RCV·$\overline{\text{AM}}$ logic (P1-12) which is applied to the base of transistor Q27. The 5-MHz injection signal from P1-21 is coupled to the base of Q26. Mixing the injection frequency with the receive if produces the resultant USB/LSB af output from Q27 which is then coupled by capacitor C54 to switch U3C. During USB/LSB receive mode, switch U3C is closed by RCV·$\overline{\text{AM}}$ logic and the audio output of U3C is coupled to the audio amplifiers by capacitor C55. The USB/LSB audio amplifiers are the same ones that are used for AM operation.

2.2.2 Transmit Mode

Refer to figure 14 (schematic diagram) and figure 12 (schematic diagram). The XMT AUDIO signal is supplied to logic/tx amplifier card A2 from the control



TPA-5219-014

IF/AF A1 and Logic/TX A2 (Transmit),
Simplified Schematic Diagram
Figure 4

through the following route: chassis J1-20, through chassis wiring to chassis J5(if/af) A1P1-15, and through A1 board wiring to A1P2/(logic/tx) A2P1-29. The signal is coupled through FET Q12 to af amplifier U8B. Transistor Q14 and FET Q13 serve as a voice/data gain change stage. The af output from amplifier U8B is applied to logic/tx A2P1-9 and to af amplifier U8A. The audio to U8A is amplified and applied to AGC detector Q11. The AGC detector output voltage is applied to attenuators Q12 and Q15 to maintain the audio output at A2P1-9 at a constant level.

The CW KEY signal is supplied to logic/tx amplifier card A2 from the control through the following route: chassis J1-19, through chassis wiring to chassis J5/(if/af) A1P1-17 and through A1 board wiring to A1P3/(logic/tx) A2P1-20. The 1-kHz audio from the frequency synthesizer is routed through A2P1-10 and gated on and off by the CW key. The 1 kHz passes through gate/filter stage, FET's Q5, Q6, and Q16, and through af amplifier U8B with attenuators Q12 and Q15 at full attenuation. RC network C1 and R4 provides a delay to hold the receiver-transmitter in transmit mode for approximately one second after CW key is released. Figures 5 and 6 of this section provide logic tables for various transmit-receive functions.

The PTT signal in voice operation is supplied to logic/tx card A2 from the control through the following route: chassis J1-39, through chassis wirng to chassis J5/(if/af) A1P1-23, and through A1 board wiring to A1P2/(logic/tx) A2P1-26. The rechannel pulse signal at A2P1-24 is momentary ground, causing capacitors C4 and C24 to be discharged by transistors Q3 and Q4, respectively. The output pulse at A2P1-33 ($\overline{\text{RCP STRETCH}}$) is delayed by the time constant of C4 and R18 and the pulse width is determined by C24 and R69.

The logic in transmit turns on balance modulator U1 and transistor Q3, while biasing off transistor Q39. The XMT AUDIO from logic/tx card A2P1/(if/af) A1P2-9 is applied to balanced modulator U1 where it is mixed with 5 MHz from chassis J5/A1P1-21 to produce a double-sideband suppressed carrier output signal. The U1 output signal passes through transistor Q5, diode CR2 and SSB filter FL2. The if output from FL2 is amplified by transistor Q3 and coupled through A1P1/chassis J5-2 (IF IN/OUT) to the rf mixer. If AM mode is selected at the control, the carrier reinsert gate, Q4 and CR1, is gated on by logic XMT·AM·$\overline{\text{TIP}}$. The logic signal is supplied by logic/tx card A2 through A2P1/A1P2-27. This allows the 5-MHz carrier to be reinserted to the SSB output of if amplifier Q3, producing an AM equivalent (AME) signal to the rf mixer via A1P1/chassis J5-2 (IF IN/OUT).

2.2.2.1 Sidetone and Low-Voltage Input

During transmit operation, the sidetone transmit audio is supplied to the headset or the handset via the receive audio circuits previously discussed. Refer to figures 12 and 14.

There are three conditions when sidetone gate FET Q37 (if/af card A1) is biased on: When (1) tuning is in progress (TIP) a 1-kHz tone is heard; when (2) an amplifier-coupler fault occurs, a pulsating 1-kHz tone is heard; or, when (3) there is forward power output from the amplifier-coupler, audio sidetone is heard. In USB/LSB mode, FET A1Q37 remains on after the absence of voice (approximately 1 second) for the time constant of capacitor C3 and resistor R14 located on logic/tx card A2.

2.2.2.2 ALC

Refer to figure 7 (simplified schematic diagram) and figure 12 (schematic diagram). During transmit operation, the ALC stages of if/af card A1 are enabled by XMT logic ($\overline{\text{RCV}}$) from logic/tx A2 via A2P1/A1P2-32 to switch transistor Q11. When transmitting, ±ALC voltage from an amplifier-coupler is applied through chassis J5/A1P1-31 to the emitter of transistor Q17. If the broadband amplifier exceeds approximately 300 mW, it develops a negative (-) ALC voltage which is applied to the emitter of transistor Q16 through chassis J5/A1P1-36. The output of Q16 or Q17 causes transistor Q13 to start discharging capacitor C22, which causes transistor Q9 to begin conduction. As the conduction of Q9 increases, the output of transistor Q6 (ALC/AGC DRIVE to the rf mixer) decreases. This decrease in voltage effect is routed through A1P1/chassis J5-13 and chassis J2-9 to rf mixer P1-9, permitting CR1 and CR7 in the rf mixer to conduct. This decreases the rf output from the rf mixer and amplifier-coupler until the broadband amplifier has the proper output level and is not overdriven.

PI PIN	INPUTS PTT 26	TIP 28	CW KEY 20	RCV ONLY 15	XMT INH 22	TUNE FAULT 17	OUTPUTS RCV 6	XMT 32
	X	X	X	X	X	0	X	0
	0	X	X	X	X	0	0	X
	X	0	X	X	X	0	0	X
	0	X	X	0	X	0	X	0
	0	X	X	X	0	0	X	0
	0	X	X	X	X	X	X	0
	X	X	0	X	X	0	0	X
	X	X	0 TO X	X	X	0	NOTE	NOTE

NOTE: WHEN CW KEY IS DISABLED THE OUTPUT STAYS AT ZERO AT PI-6 FOR APPROX. 1 SECOND.

X = MORE THAN +4.5 V
0 = LESS THAN +0.5 V

PI PIN	INPUTS PTT 26	AM 19	TIP 28	OUTPUTS 13	30	27	12	23
	X	X	X	0	X	0	X	0
	0	X	X	0	X	0	0	X
	X	0	X	X	0	0	0	X
	0	0	X	0	X	X	0	X
	X	0	0	X	0	0	0	X

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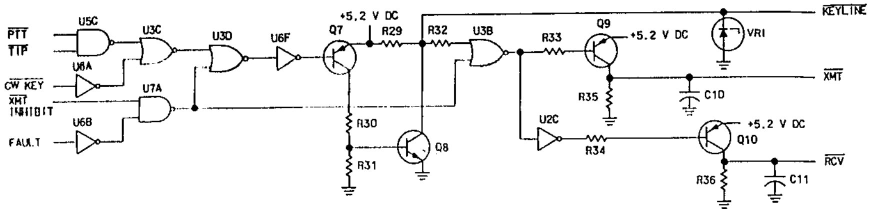
Logic/TX A2, Logic Tables
Figure 5



INPUTS				
$\overline{PTT}$	$\overline{TIP}$	$\overline{CW\ KEY}$	$\overline{XMT}$ INHIBIT	FAULT
0	0	0	0	0
0	0	0	0	1
0	0	0	1	0
0	0	0	1	1
0	0	1	0	0
0	0	1	0	1
0	0	1	1	0
0	0	1	1	1
0	1	0	0	0
0	1	0	0	1
0	1	0	1	0
0	1	0	1	1
0	1	1	0	0
0	1	1	0	1
0	1	1	1	0
0	1	1	1	1
1	0	0	0	0
1	0	0	0	1
1	0	0	1	0
1	0	0	1	1
1	0	1	0	0
1	0	1	0	1
1	0	1	1	0
1	0	1	1	1
1	1	0	0	0
1	1	0	0	1
1	1	0	1	0
1	1	0	1	1
1	1	1	0	0
1	1	1	0	1
1	1	1	1	0
1	1	1	1	1

OUTPUTS		
$\overline{KEYLINE}$	$\overline{XMT}$	$\overline{RCV}$
1	1	0
1	1	0
0	0	1
1	1	0
1	1	0
1	1	0
0	0	1
1	1	0
1	1	0
1	1	0
0	0	1
1	1	0
1	1	0
1	1	0
0	0	1
1	1	0
1	1	0
1	1	0
0	0	1
1	1	0
1	1	0
1	1	0
0	0	1
1	1	0
1	1	0
1	1	0
0	0	1
1	1	0
1	1	0
1	1	0
1	1	0
1	1	0

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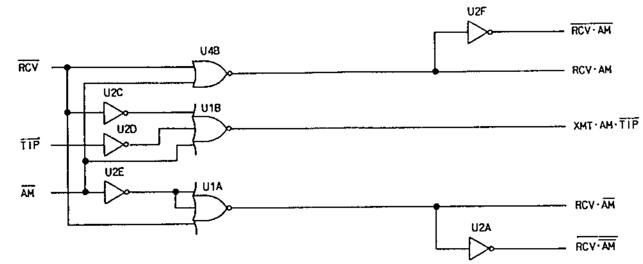

INPUTS		
$\overline{AM}$	$\overline{TIP}$	$\overline{RCV}$
0	0	0
0	0	1
0	1	0
0	1	1
1	0	0
1	0	1
1	1	0
1	1	1

OUTPUTS				
$\overline{RCV \cdot AM}$	RCV·AM	XMT·AM·$\overline{TIP}$	RCV·$\overline{AM}$	$\overline{RCV \cdot \overline{AM}}$
0	1	0	0	1
1	0	0	0	1
0	1	0	0	1
1	0	1	0	1
1	0	0	1	0
1	0	0	0	1
1	0	0	1	0
1	0	0	0	1

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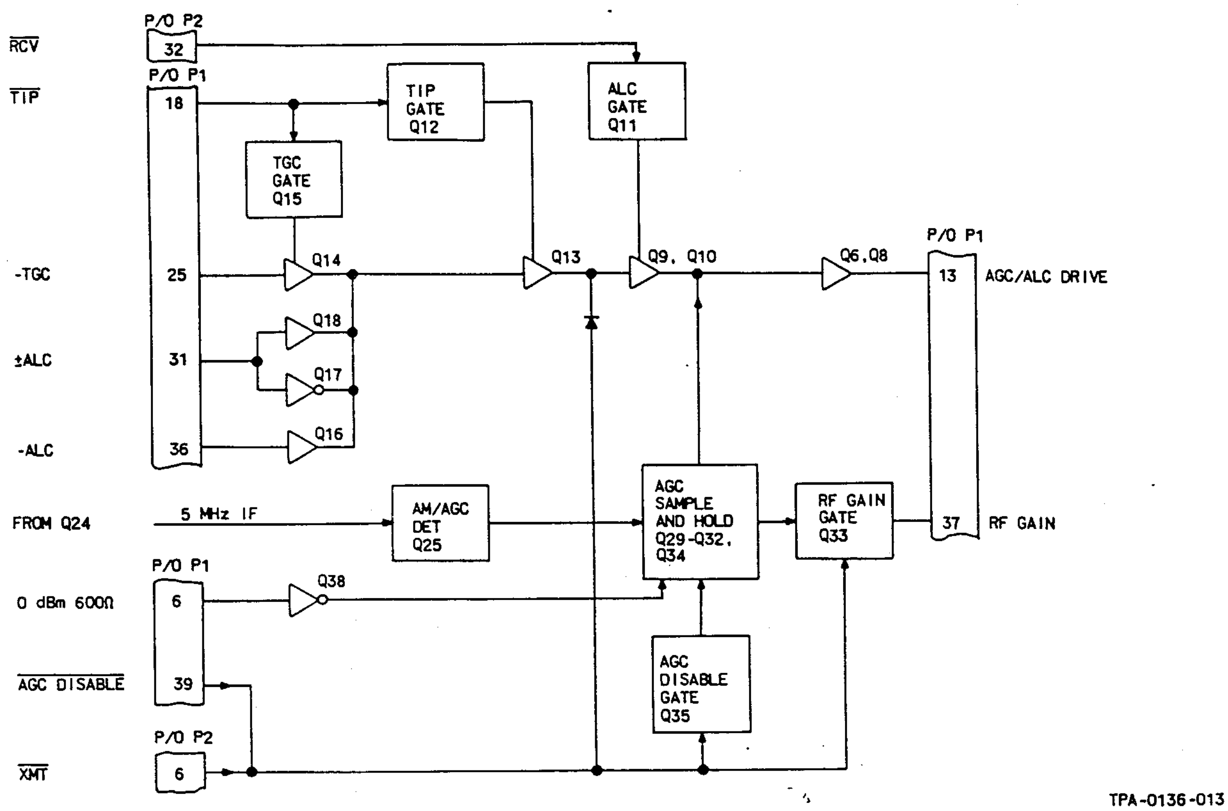
Logic/TX A2, Simplified Schematic Diagram and Logic Tables
Figure 6



AGC/ALC, Simplified Schematic Diagram
Figure 7

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the if/af amplifier are listed below. The list includes the test equipment for the if/af card A1 and logic/tx card A2. Refer to the maintenance section of this instruction book for minimum specifications, representative types, and usage of test equipment.

Test equipment for if/af A1 card

a. If/af test adapter
b. Power supply
c. Electrical frequency synthesizer
d. Attenuator, audio 0 through 110 dB
e. Attenuator, 6-dB (2 required)
f. Digital voltmeter
g. Distortion analyzer
h. Frequency counter
i. If load, 500 ohms (0.1-μF capacitor and 500-ohm resistor)
j. Isolation transformer
k. Mixer attenuator, 600 ohms
l. Oscillator (2 required)
m. Oscilloscope (storage function required)
n. Power divider
o. Power supply, 0-40 V dc
p. Rms voltmeter
q. Rf voltmeter
r. Signal generator (2 required)
s. Spectrum analyzer (if section and 1-kHz to 120-MHz rf section required)
t. Wave analyzer

Test equipment for logic/tx card A2

a. Logic/tx test adapter
b. Power supply
c. Attenuator, audio 0 to 110 dB
d. Digital voltmeter
e. Isolation transformer
f. Mixer attenuator, 600 ohms

g. Oscillator (2 required)
h. Oscilloscope (storage function)
i. Rms voltmeter
j. Selective voltmeter/wave analyzer

3.2 Testing

The test procedures in table 1 check total performance of the if/af card A1 and table 2 checks total performance of logic/tx card A2. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault. When a defective subassembly has been repaired, the procedures should be repeated to verify all faults have been corrected.

The procedures are to be performed in sequence given. If an individual test is to be performed, review prior tests to ensure proper test setup and control settings.

4. ALIGNMENT/ADJUSTMENT

If/af A1 alignment/adjustments are performed in conjunction with testing/troubleshooting table 1.

a. R30 and R154 — test 18
b. R149 — test 16
c. R150 — test 2
d. R151 — test 3

There are no alignment/adjustments for logic/tx A2

5. REPAIR

Repair of if/af amplifier cards A1 and A2 is accomplished using standard maintenance and circuit card repair procedures. Refer to the maintenance section of this instruction book for general maintenance precautions, procedures, and postcoating information.

Table 1. IF/AF A1, Testing/Troubleshooting.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary setup	a. On test adapter set POWER to OFF.		
	b. Install if/af card A1 on test adapter and connect power supply as shown in figure 8 test setup A.		
	c. On power supply, set power to ON; on test adapter, set AGC to ATTACK, +25 VDC control fully clockwise. AM-SSB to SSB, VOICE-DATA to DATA, POWER to ON, AGC to ENBL, all other switches to DSBL and RF GAIN control to maximum clockwise position.		
	d. Connect digital voltmeter to +25 VDC P1-20 test point on test adapter and adjust the power supply OUTPUT VOLTAGE for 29 V dc indication on digital voltmeter.		
	e. On test adapter, adjust +25 VDC control for a +28 V dc indication on digital voltmeter.		
	f. On frequency synthesizer, set POWER to ON and connect to 5 MHZ injection jack on test adapter.		
2. SSB receive audio	a. On test adapter, connect signal generator to IF IN/OUT jack and rms voltmeter to RCV AUDIO test points.		
	b. Adjust signal generator for 4.9990 MHz at 100 μV, measure RCV AUDIO on rms voltmeter.	720 to 840 mV rms	Adjust A1R150 (figure 11, sheet 3). Check the following: Q26-Q28, Q21-Q24, and U2, and U3.
	c. Connect rms voltmeter to AUX AUDIO test point on test adapter and measure audio level.	700 to 860 mV rms	Check Q36 and associated components.
3. AM receive audio	a. On test adapter, set AM-SSB to AM, disconnect 5 MHZ injection (from frequency synthesizer test set) and connect rms voltmeter to RCV AUDIO jacks.		
	b. Adjust signal generator for 5.0 MHz at 100 μV modulated 100% at 1000 Hz applied to IF IN/OUT jack on test adapter.		
	c. Measure RCV AUDIO with rms voltmeter.	720 to 840 mV rms	Adjust A1R151 (figure 11, sheet 3). Check the following: Q21-Q24, Q25, U2, U3, and Q29-Q32.
4. Receive sensitivity (Cont)	a. Adjust signal generator for 5.0 MHz at 3.5 μV, modulation 30% at 1000 Hz applied to IF IN/OUT jack on test adapter.		

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	b. Connect distortion analyzer to RCV AUDIO test point on test adapter and measure the signal-plus-noise to noise ratio ((s+n)/n) by turning off the AM modulation.	Not less than 11 dB.	Check the following: Q2, FL1, U2, U3, Q21-Q25, and Q19.
	c. On test adapter, set AM-SSB to SSB, reconnect the 5 MHz injection from frequency synthesizer to 5 MHZ jack.		
	d. Adjust signal generator for 4.9990 MHz at 1.0 μV applied to IF IN/OUT jack on test adapter.		
	e. Measure the signal-plus-noise (s+n)/n ratio by nulling out the 1000-Hz audio.	Not less than 11 dB.	Check the following: Q1, FL2, Q26-Q28, U2, U3, and Q20-Q24.
5. Audio volume control	a. On test adapter, set VOICE-DATA to VOICE. Connect rms voltmeter to RCV AUDIO jack and set VOLUME control fully clockwise.		
	b. Adjust signal generator for 4.9999 MHz at 100 μV, applied to IF IN/OUT jack on test adapter and measure RCV AUDIO with rms voltmeter.	Not less than 2.8 V rms.	Check the following: U3 and U2.
	c. On test adapter, set VOLUME control fully counterclockwise and measure RCV AUDIO with rms voltmeter.	Not more than 27 mV rms.	Check the following: U3 and U2.
	d. On test adapter, set RCV MUTE to ENBL, VOLUME control fully clockwise and measure RCV AUDIO with rms voltmeter.	Not more than 3 mV rms.	Check U3.
6. SSB receive distortion	a. On test adapter, set RCV MUTE to DSBL and connect distortion analyzer to RCV AUDIO jack.		
	b. Adjust signal generator for 4.9990 MHz at 100 μV applied to IF IN/OUT on test adapter and adjust VOLUME control for 2.7-V rms audio output at RCV AUDIO jack on test adapter (use rms voltmeter portion of distortion analyzer).		
	c. With distortion analyzer, measure the percent of distortion of the audio output at the RCV AUDIO jack.	Not more than 1 percent.	Check the following: Q21, Q24, U2, and Q26-28.
7. AM receive distortion	a. On test adapter, set AM-SSB to AM and disconnect the 5 MHZ injection signal from the 5 MHz jack.		
(Cont)	b. Adjust signal generator for 5.0 MHz at 100 μV, modulated 100% at 1000 Hz; applied to IF IN/OUT jack on test adapter. Adjust VOLUME control for		

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont)	2.7-V rms audio output at RCV AUDIO jack on test adapter (use rms voltmeter portion of distortion analyzer).		
	c. With distortion analyzer measure percent of distortion of the audio output at the RCV AUDIO jack.	Not more than 7 percent.	Check the following: Q21-Q24, U2, and Q25.
8. Receive intermodulation	a. On test adapter, set AM-SSB to SSB, connect the 5-MHz injection signal from the frequency synthesizer to 5 MHZ jack. Connect rms voltmeter to RCV AUDIO test point.		
	b. Connect two signal generators through 6-dB attenuators and power divider to IF IN/OUT jack on test adapter as shown in figure 8, test setup A.		
	c. Turn one signal generator off and adjust the other for 4.99900 MHz at 10 mV.		
	d. On test adapter, adjust VOLUME control for 2.0 V rms measured with rms voltmeter connected to RCV AUDIO.		
	e. Turn on the other signal generator and turn first one off, adjust second signal generator 4.99889 MHz at 10 mV.		
	f. Turn on both signal generators and connect wave analyzer to RCV AUDIO test point on test adapter.		
	g. Measure the distortion products below the 1000 and 1110-Hz tones on the wave analyzer.	110 Hz - not less than 38 dB. 890 Hz - not less than 38 dB. 1220 Hz - not less than 38 dB.	Check the following: Q26-Q28, U3, and U2.
9. SSB bandpass	a. On test adapter, set AGC to DSBL and reconnect the rms voltmeter to RCV AUDIO test point.		
	b. Disconnect the two signal generators from test adapter and connect one signal generator through the 6-dB attenuator to IF IN/OUT jack on test adapter.		
	c. Adjust signal generator for 4.9999 MHz, 3 μV applied to IF IN/OUT jack on test adapter.		
(Cont)	d. Vary frequency of signal generator for peak audio output on rms voltmeter and note as reference (both frequency and voltage).	Reference	

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9. (Cont)	e. Increase signal generator frequency until the audio output (measured on rms voltmeter) decreases to the 2 dB-point of the reference frequency.		
	f. Disconnect rms voltmeter and connect frequency counter to RCV AUDIO test point on test adapter and measure audio frequency. Disconnect frequency counter and reconnect rms voltmeter to RCV AUDIO test point.	Not more than 600 Hz.	Check the following: FL2, Q21-Q24, Q26-Q28, and U2.
	g. Increase signal generator frequency until audio output (measured on rms voltmeter) decreases to the 3.5-dB point of the reference frequency, then repeat step f.	Not more than 300 Hz.	Same as step f.
	h. Readjust signal generator to the reference frequency then decrease frequency until audio output (measured on rms voltmeter) decreases to the 2-dB point of the reference frequency.		
	i. Repeat step f.	Not less than 2700 Hz.	Check the following: FL1, Q21-Q24, and Q25.
	j. Decrease signal generator frequency until audio output (measured on rms voltmeter) decreases to the 3.5-dB point, then repeat step f.	Not less than 3200 Hz.	Same as step i.
10. AM bandpass	a. On test adapter, set AM-SSB to AM, AGC to ENBL and disconnect 5 MHZ injection from the 5 MHZ jack.		
	b. Adjust signal generator for 5.0000 MHz at 100 μV, modulated 5% at 1000 Hz.		
	c. Vary the 1000-Hz modulating frequency for peak audio output at RCV AUDIO test point on test adapter (measured on rms voltmeter). Note both modulating frequency and audio output as reference. **Note** If necessary, use frequency counter to measure modulating frequency (audio).	Reference	
(Cont)	d. Increase modulating frequency on signal generator until audio output (measured on rms voltmeter) decreases to 2-dB point from reference. Note audio frequency.	Not less than 2000 Hz.	Check the following: FL1, Q21-Q24, and Q25.

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	e. Continue to increase modulating frequency until audio output (measured on rms voltmeter) decreases to 5.0-dB point from reference. Note audio frequency.	Not less than 2750 Hz or more than 3200 Hz.	Same as step d.
11. Audio rise	a. On test adapter, set AM-SSB to SSB, VOICE-DATA to DATA and connect 5 MHZ injection frequency (from the frequency synthesizer) to the 5 MHz jack.		
	b. Adjust signal generator for 4.9990 MHz at 10 μV applied to IF IN/OUT jack on test adapter.		
	c. With rms voltmeter measure level at RCV AUDIO jack on test adapter.	Not less than 600 mV.	Check the following: Q25, Q6-Q8, and Q29-Q32.
	d. Adjust signal generator for 4.9990 MHz at 100 μV and repeat step c.	720 to 840 mV	Same as step c.
	e. Adjust signal generator for 4.9990 MHz at 10 mV and repeat step c.	Not more than 950 mV.	Same as step c.
12. AGC attack/ decay	a. Ensure that signal generator is adjusted for 4.9990 MHz at 10 mV, applied to IF IN/OUT jack on test adapter.		
	b. On test adapter, connect oscilloscope to RCV ADUIO jack and synchronize oscilloscope with the output of the SYNC jack.		
	c. On test adapter, set AGC to DECAY then to ATTACK (repeat as necessary) and on oscilloscope measure the time required for RCV AUDIO output to be within 3 dB of final level (AGC attack time).	Not more than 4 milliseconds.	Check the following: Q29-Q32, C51-C53, and Q25.
	d. On test adapter, set AGC to ATTACK then to DECAY (repeat as necessary to sync oscilloscope and obtain measurement) and on oscilloscope measure the time required for RCV AUDIO output to be within 3 dB of final value (AGC decay time).	40 to 100 milliseconds.	Same as step c.
	e. On test adapter, set DATA-VOICE to VOICE and repeat step d.	250 to 750 milliseconds.	Same as step c.
13. Rf gain (Cont)	a. On test adapter, set DATA-VOICE to DATA and AGC to ATTACK and adjust signal generator for 4.9990 MHz and -10 dB mW (1000-Hz tone) indicated on rms voltmeter at RCV AUDIO test point.	250 to 750 milliseconds.	Same as step c.

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13. (Cont)	b. Adjust RF GAIN on test adapter for maximum RCV AUDIO output, then readjust signal generator level for -10 dB mW RCV AUDIO output. Note signal generator output level in dB for reference.		
	c. Reduce RF GAIN on test adapter to obtain minimum RCV AUDIO output.		
	d. Increase signal generator output to obtain -10 dB mW RCV AUDIO output and observe dB increase of signal generator output level.	Not less than 30 dB.	Check the following: Q33 and Q34.
14. Receive currents	a. On test adapter, disconnect signal generator from IF IN/OUT jack and connect digital voltmeter to CURRENT MONITOR MV/MA +5.2V test points and measure voltage (current).	Not more than 7.5 mV (7.5 mA).	Check the following: L4 and C72, then check +5.2 V dc distribution in if/af A1.
	b. On test adapter, connect digital voltmeter to CURRENT MONITOR MV/MA +13V test points and measure voltage (current).	Not more than 25 mV (25 mA).	Check the following: L5 and C65, then check +13 V dc distribution in if/af A1.
15. Transmit output level	a. On test adapter, set AGC to DSBL, connect oscillator through isolation transformer to TX AUDIO, and connect rf voltmeter across a 500-ohm load to IF IN/OUT jacks (as shown in figure 8, test setup B).		
	b. Adjust oscillator for 1000 Hz at 120 mV.		
	c. On test adapter, set PTT to ENBL and measure output at IF IN/OUT jack with rf voltmeter. Set PTT to DSBL.	45 to 75 mV	Check the following: Q13-Q14, U1, Q12, Q15, Q11, and U8.
16. Transmit carrier reinsert	a. On test adapter, set AM-SSB to AM and connect spectrum analyzer across a 500-ohm load to IF IN/OUT jack.		
	b. Adjust oscillator for 1000 Hz at 120 mV, set PTT to ENBL and measure the dB difference between the carrier and the 1000-Hz sideband. Set PTT to DSBL.	Not more than 0.5 dB.	Adjust A1 R149 (figure 11, sheet 1). Check the following: Q4, CR1, Q3, and C3.
	Note For steps 17 and 18, if necessary to locate the carrier, set AM/SSB to AM, disconnect oscillator and set PTT to ENBL.		

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
17. Opposite sideband suppression	a. On test adapter, set AM-SSB to SSB and adjust oscillator for 400 Hz at 120 mV applied to TX AUDIO test point.		
	b. On test adapter, set PTT to ENBL and measure the level of the opposite sideband in dB down from the desired sideband at IF IN/OUT jack on the spectrum analyzer. Set PTT to DSBL.	Not less than 60 dB down.	Check the following: U1, FL2, Q5, C1-C2, C4, and Q1.
18. Carrier suppression	a. Adjust oscillator for 1000 Hz at 12 mV applied to TX AUDIO test points on test adapter.		
	b. On test adapter, set PTT to ENBL and measure in dB the carrier level below the lower sideband on spectrum analyzer connected to IF IN/OUT jack. Set PTT to DSBL.	Not less than 50 dB down.	Adjust A1R30 and A1R154 as many times as necessary (figure 11, sheet 2). Check the following: U1, FL2, and Q5.
19. Transmit intermodulation	a. Connect two oscillators through the mixer attenuator, and connect mixer output to TX AUDIO jack on test adapter as shown in figure 8, test setup B.		
	b. On mixer-attenuator, set AUDIO LOAD/ OSC 1 IN to OSC 1 IN and AUDIO LOAD/ OSC 2 IN to AUDIO LOAD. Set oscillator no 1 for 1000 Hz and an input level to the TX AUDIO jack of 60 mV (use the rms voltmeter to measure at the TX AUDIO jack).		
	c. On mixer-attenuator, set AUDIO LOAD/ OSC 1 IN to AUDIO LOAD. Set AUDIO LOAD/OSC 2 IN to OSC 2 IN. Set oscillator no 2 for 1150 Hz and an input level to the TX AUDIO jack of 60 mV.		
	d. On mixer-attenuator, set AUDIO LOAD/ OSC 1 IN to OSC 1 IN (both oscillators will now be connected to the TX AUDIO jack on the test adapter).		
	e. Connect spectrum analyzer through 500-ohm load (item 10, figure 8) to IF IN/ OUT jack on test adapter. Set PTT to ENBL.		
	f. Measure the level of the 850- and 1300-Hz products in dB below the desired tones. On test adapter, set PTT to DSBL.	850 and 1300 Hz not less than 45 dB down.	Same as test 17, step b.
20. Sidetone (Cont)	a. On test adapter, set SDT to ENBL, connect rms voltmeter to RCV AUDIO test points. Connect oscillator to TX AUDIO		

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
20. (Cont)	test point and adjust for 1000 Hz at 120-mV input to TX AUDIO test point.		
	b. On test adapter, set PTT to ENBL and measure the RCV AUDIO on rms voltmeter. Set PTT to DSBL.	-4.8 to -7.2 dB mW	Check the following: U2 and C76.
21. Low-voltage fault	a. On test adapter, set SDT to DSBL, VOICE-DATA to DATA, disconnect oscillator from TX AUDIO test point, connect digital voltmeter to +25 VDC P1-20 test point.		
	b. On test adapter, set PTT to ENBL and reduce +25-V dc control to +20 V dc indicated on digital voltmeter. Monitor RCV AUDIO on rms voltmeter. Set PTT to DSBL and readjust +25-V dc control for 25 V dc indicated on digital voltmeter.	-7.0 to -11 dB mW	Check the following: U2 and C76.
22. ALC	a. On test adapter, connect digital voltmeter with negative lead to AGC DRIVE and positive lead to AGC COM test points. Connect 0-40 V dc power supply with negative lead to BB AMP-ALC and positive lead to GND test points. Measure the voltage at AGC DRIVE test point with 0 V dc applied to BB AMP-ALC test point.	Reference	
	b. On test adapter, set PTT and TGC to ENBL. Adjust 0-40 V dc power supply for -1.5 V dc applied to BB AMP-ALC test point. Measure the voltage increase at AGC DRIVE test point.	Not less than 0.5 V dc.	Check the following: Q16, Q18, Q6, Q11, Q9, Q10, C22, and CR16.
	c. On test adapter, set TIP to ENBL and connect 0-40 V dc power supply to TGC (negative terminal) and GND (positive terminal) test points. Adjust 0-40 V dc power supply output for +0.3-V dc indication on digital voltmeter. Note the 0-40 V dc power supply voltage output.		
	d. Adjust 0-40 V dc power supply output for 0.65-V dc output indicated on digital voltmeter, note 0-40 V dc power supply voltage.	-4.6 to -5.9 V dc	Same as step c.
	e. Connect oscilloscope to AGC DRIVE test point.		
(Cont)	f. Adjust 0-40 V dc power supply to apply a -5.0 V dc to TGC test point on test adapter and note AGC DRIVE output on oscilloscope for reference.	Reference	

Table 1. IF/AF A1, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
22. (Cont)	g. Set TIP to DSBL and measure the time for the output to decrease to within 10 percent of final value (TIP decay time).	0.2 to 0.6 seconds	Same as step c.
	h. Connect 0-40 V dc power supply to ±ALC (negative terminal) and GND (positive terminal) test points on test adapter. Connect digital voltmeter as in step a.		
	i. Adjust 0-40 V dc power supply for a 0.3-V dc AGC DRIVE voltage indicated on digital voltmeter. Adjust 0-40 V dc power supply to increase voltage applied to +ALC test point by -2 V dc and note AGC DRIVE voltage on digital voltmeter.	Not more than -0.65 V dc.	Same as step c.
	j. Adjust 0-40 V dc power supply to increase voltage applied to ±ALC test point by an additional -1.0 V dc and note AGC DRIVE voltage on digital voltmeter.	Not less than 0.65 V dc.	Same as step c.

Table 2. Logic/Tx A2, Testing/Troubleshooting.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary setup	a. On test adapter, set POWER to OFF. b. Install logic/tx card A2 on test adapter and connect power supply as shown in figure 9, test setup A. c. On power supply set POWER to ON. On test adapter, connect digital voltmeter to 25 VDC P1-25 test point and rotate the 25 VDC fully clockwise. d. On test adapter, set POWER to ON, $\overline{SK}$ +40 V to OFF, SET to DIRECT, R/C TRIGGER to OFF, STD, PTT, TIP, CWK, RCV ONLY, AM, VOICE, and TX INHIBIT to DSBL. e. On power supply, adjust OUTPUT VOLTAGE for 29 V dc indication on digital voltmeter. f. On test adapter adjust 25 VDC control for 28-V dc indication on digital voltmeter.		
2. $\overline{TX}$, TX logic with functions disabled	a. Measure voltage at $\overline{TX}$ test point on test adapter with digital voltmeter.	Not less than +4.5 V dc (logic 1).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U2, Q10.
	b. Measure voltage at TX test point.	Not more than +0.5 V dc (logic 0).	Same as step a.
3. $\overline{TX}$, TX logic with PTT enabled	a. On test adapter, set PTT to ENBL and measure voltage at $\overline{TX}$ test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10.
	b. Measure voltage at TX test point.	Not less than +4.5 V dc (logic 1).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U2, Q10.
4. $\overline{TX}$, TX logic with TIP enabled	a. On test adapter, set PTT to DSBL and TIP to ENBL. Measure voltage at $\overline{TX}$ test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10.
	b. Measure voltage at TX test point.	Not less than +4.5 V dc (logic 1).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U2, Q10.
5. $\overline{TX}$, TX logic with PTT, and RCV ONLY enabled	a. On test adapter, set TIP to DSBL and PTT and RCV ONLY to ENBL. Measure voltage at $\overline{TX}$ test point with digital voltmeter.	Not less than +4.5 V dc (logic 1).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U7, CR2.
	b. Measure voltage at TX test point.	Not more than +0.5 V dc.	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U2, Q10, U7.

Table 2. Logic/Tx A2, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6. $\overline{TX}$, TX logic with PTT and TX INHB enabled	a. On test adapter, set RCV ONLY to DSBL and TX INHB to ENBL. Measure voltage at $\overline{TX}$ test point with digital voltmeter.	Not less than +4.5 V dc (logic 1).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U7, CR2.
	b. Measure voltage at TX test point.	Not more than +0.5 V dc.	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U2, Q10, U7.
7. $\overline{TX}$, TX logic with PTT and FAULT enabled	a. On test adapter, set TX INHB to DSBL and FAULT to ENBL. Measure voltage at $\overline{TX}$ test point with digital voltmeter.	Not less than +4.5 V dc (logic 1).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10.
	b. Measure voltage at TX test point.	Not more than +0.5 V dc (logic 0).	Check the following: U3, Q9, U5-U6, Q7-Q8, C10, U2, Q10.
8. TX, TX logic with CWK enabled	a. On test adapter, set PTT and FAULT to DSBL. Set CWK to ENBL and measure voltage at $\overline{TX}$ test point with digital voltmeter.	Not more than +0.5 V dc.	Check the following: U6, U3, Q7-Q8-Q9, C10.
	b. Measure voltage at TX test point.	Not less than +4.5 V dc.	Check the following: U6, U2, U3, Q7, Q8-Q10, C11.
9. $\overline{TX}$, TX logic switching CWK from ENBL to DSBL	a. On test adapter, connect oscilloscope input to $\overline{TX}$ jack and trigger with signal from $\overline{CWK}$ test point. Switch CWK from ENBL to DSBL and monitor $\overline{TX}$ output with digital voltmeter and oscilloscope.	Output stays below +1.0 V dc 0.6 to 1.3 seconds, then rises to not less than +4.5 V dc (logic 1).	Check the following: C1, R4, CR1.
	b. Measure voltage at TX test point.	Not more than +0.5 V dc (logic 0).	Check the following: U6, U2, U3, Q7-Q8, Q10, C11.
10. RCV.AM $\overline{RCV.AM}$ logic with switches disabled	a. On test adapter, set CWK to DSBL and measure voltage at RCV.AM test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check the following: U3, U4, U5, U2, Q7-Q8.
	b. Measure voltage at $\overline{RCV.AM}$ test point.	Not less than +4.5 V dc (logic 1).	Check the following: U3, U4, U5, U2, Q7-Q8.
11. RCV.AM $\overline{RCV.AM}$ logic with PTT enabled	a. On test adapter, set PTT to ENBL and measure voltage at RCV.AM test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check the following: U3, U4, U5, U2, Q7-Q8.
	b. Measure voltage at $\overline{RCV.AM}$ test point.	Not less than +4.5 V dc (logic 1).	Check the following: U3, U4, U5, U2, Q7-Q8.
12. RCV.AM $\overline{RCV.AM}$ logic with AM enabled (Cont)	a. On test adapter, set PTT to DSBL and set AM to ENBL. Measure voltage at RCV.AM test point with digital voltmeter.	Not more than +4.5 V dc (logic 1).	Check U4.

Table 2. Logic/Tx A2, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12. (Cont)	b. Measure voltage at $\overline{\text{RCV.AM}}$ test point.	Not more than +0.5 V dc (logic 0).	Check U4, U2.
13. TX.AM.$\overline{\text{TIP}}$ logic with switches disabled	a. On test adapter, set AM to DSBL and measure voltage at TX.AM.$\overline{\text{TIP}}$ test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check U1, U2, U3.
14. TX.AM.$\overline{\text{TIP}}$ logic with PTT enabled	a. On test adapter, set PTT to ENBL. b. Measure voltage at TX.AM. $\overline{\text{TIP}}$ test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check U1, U2, U3.
15. TX.AM.$\overline{\text{TIP}}$ with PTT and AM enabled	a. On test adapter, set AM to ENBL. b. Measure voltage at TX.AM. $\overline{\text{TIP}}$ test point with digital voltmeter.	Not less than +4.5 V dc (logic 1).	Check U1, U2, U3.
16. TX.AM.$\overline{\text{TIP}}$ with AM and TIP enabled	a. On test adapter set TIP to ENBL and PTT to DSBL. b. Measure voltage at TX.AM. $\overline{\text{TIP}}$ test point with digital voltmeter.	Not more than 0.5 V dc (logic 0).	Check U1, U2, U3.
17. RCV.AM, RCV.$\overline{\text{AM}}$ logic with switches disabled	a. On test adapter, set TIP and AM to DSBL and measure voltage at RCV.$\overline{\text{AM}}$ test point with digital voltmeter. b. Measure voltage at $\overline{\text{RCV.AM}}$ test point.	Not less than +4.5 V dc (logic 1). Not more than +0.5 V dc (logic 0).	Check U1, U3. Check U1, U2, U3.
18. RCV.AM, RCV.$\overline{\text{AM}}$ logic with PTT enabled	a. On test adapter, set PTT to ENBL and measure voltage at RCV.$\overline{\text{AM}}$ test point with digital voltmeter. b. Measure voltage at $\overline{\text{RCV.AM}}$ test point.	Not more than +0.5 V dc (logic 0). Not less than +4.5 V dc (logic 1).	Check U1, U2, U3. Check U2.
19. RCV.AM, RCV.$\overline{\text{AM}}$ logic with AM enabled	a. On test adapter, set PTT to DSBL and AM to ENBL. b. Measure voltage at RCV.$\overline{\text{AM}}$ test point with digital voltmeter. c. Measure voltage at $\overline{\text{RCV.AM}}$ test point.	Not more than +0.5 V dc (logic 0). Not less than +4.5 V dc (logic 1).	Check U1, U2, U3. Check U2.
20. RCV.AM · RCV.$\overline{\text{AM}}$ logic with PTT and AM enabled	a. On test adapter, set PTT and AM to ENBL and measure voltage at RCV.$\overline{\text{AM}}$ test point with digital voltmeter. b. Measure voltage at $\overline{\text{RCV.AM}}$ test point.	Not more than +0.5 V dc (logic 0). Not less than +4.5 V dc (logic 1).	Check U1, U2, U3. Check U2.
21. ST (sidetone) logic with switches disabled	a. On test adapter, set PTT and AM to DSBL. b. Measure voltage at ST test point on test adapter with digital voltmeter.	Not less than +4.5 V dc (logic 1).	Check the following: U1, U6, C3, U2.

Table 2. Logic/Tx A2, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
22. ST logic with TIP enabled	a. On test adapter, set TIP to ENBL.		
	b. Measure voltage at ST test point on test adapter with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check U2, U1.
23. ST logic with fault enabled	a. On test adapter, set TIP to DSBL and FAULT to ENBL.		
	b. Measure voltage at ST test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check U1.
24. ST logic with STD enabled	a. On test adapter, set FAULT to DSBL and STD to ENBL.		
	b. Measure voltage at ST test point with digital voltmeter.	Not more than +0.5 V dc (logic 0).	Check U6, CR3.
25. ST logic with STD switched from ENBL to DSBL (ST delay)	a. On test adapter, connect oscilloscope to ST test point and trigger oscilloscope from STD test point.		
	b. Monitor ST output and switch STD from ENBL to DSBL. Measure time in seconds; ST stays below 1.0 V dc.	1.0 to 2.0 seconds	Check the following: R14, C3, CR3.
26. LVI-fault	a. On test adapter, set STD to DSBL. Connect oscilloscope to LVI jack.		
	b. Monitor LVI while decreasing voltage with 25-V DC control until LVI signal appears.	LVI output is a square wave, 5 V peak to peak.	Check the following: U7, Q1-Q2, U4.
	c. On test adapter, measure voltage at 25 VDC P1-25 test point with digital voltmeter.	P1-25 output 20.5 to 22.5 V dc.	Check the following: U7, Q1-Q2, U4.
	d. On test adapter, set FAULT to ENBL.	Oscilloscope displays not less than +4.5 V dc (logic 1).	Check the following: U4, U3.
27. AF compressor logic	a. On test adapter, set FAULT to DSBL. Readjust 25 VDC control for +25.2 V dc at P1-25 test point. Set PTT to ENBL and ensure SET is set to DIRECT.		
	b. On test adapter, connect oscillator to TX AUDIO IN and the rms voltmeter to TX AUDIO OUT jack.		
	c. Set oscillator for 1000 Hz at +10-dB mW input to TX AUDIO IN and measure audio output level with rms voltmeter at TX AUDIO OUT.	110 to 130 mV	
(Cont)	d. On test adapter, set TIP to ENBL and measure audio level at TX AUDIO OUT test jack with rms voltmeter.	Not more than 0.5 mV.	Check the following: Q13-Q14, U8, Q15-Q12, U7.

Table 2. Logic/Tx A2, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
27. (Cont)	e. On test adapter, set TIP to DSBL and CWK to ENBL. Measure audio at TX AUDIO OUT with rms voltmeter.	Not more than 0.5 mV.	Check U6, U7.
	f. On test adapter, set PTT and CWK to DSBL. Measure audio at TX AUDIO OUT with rms voltmeter.	Not more than 0.5 mV.	
28. System key	a. On test adapter, set $\overline{SK}$ +40 V to ON and measure voltage at $\overline{SK}$P1-16 test point with digital voltmeter.	+34 to +38 V dc	Check Q7-Q8 VR1.
	b. On test adapter, set PTT to ENBL and measure voltage at $\overline{SK}$P1-16 test point with digital voltmeter.	Not more than 0.3 V dc.	Check U3, U5.
29. Rechannel pulse	a. On test adapter, set PTT to DSBL and $\overline{SK}$ +40V to OFF. Connect oscilloscope to R/C OUT test point and synchronize the oscilloscope with signal from R/C SYNC test jack.		
	b. On test adapter, set R/C TRIGGER momentarily to ON and measure the delay and pulse width of R/C OUT signal.	Delay: 5 to 15 milliseconds. Pulse width: 50 to 150 milliseconds.	Check: Q3, R18-19, C4. Check: Q4, C24-R69.
30. Voice mode gain	a. On test adapter, set PTT and VOICE to ENBL. Ensure SET is set to DIRECT.		
	b. Set oscillator for 1000 Hz at -26-dB mW input to TX AUDIO IN jack and measure output at TX AUDIO OUT jack with rms voltmeter.	110 to 130 mV	Check the following: U8, Q13-Q14, Q12-Q15, C12, C13.
	c. Adjust oscillator to apply a 1000-Hz tone at -46 dB mW to TX AUDIO IN jack and measure TX AUDIO OUT with rms voltmeter.	108 to 128 mV	Check the following: U8, Q13-Q14, Q12-Q15, C12, C13.
	d. Adjust oscillator to apply a 1000-Hz tone at -60 dB mW to TX AUDIO IN jack and measure TX AUDIO OUT with rms voltmeter.	65 to 95 mV	Check the following: U8, Q13-Q14, Q12-Q15, C12, C13.
31. Data mode gain	a. On test adapter, set PTT to ENBL, VOICE to DSBL. Ensure SET is set to DIRECT.		
	b. Set oscillator for 1000 Hz at +10-dB mW input to TX AUDIO IN jack and measure output at TX AUDIO OUT jack with rms voltmeter.	110 to 130 mV	Check the following: U8, Q13-Q14, Q12-Q15, C12, C13, U7.
(Cont)	c. Adjust oscillator to apply a 1000-Hz tone at 0 dB mW to TX AUDIO IN jack and measure TX AUDIO OUT with rms voltmeter.	105 to 130 mV	Check the following: U8, Q13-Q14, Q12-Q15, C12, C13, U7.

Table 2. Logic/Tx A2, Testing/Troubleshooting (Cont).

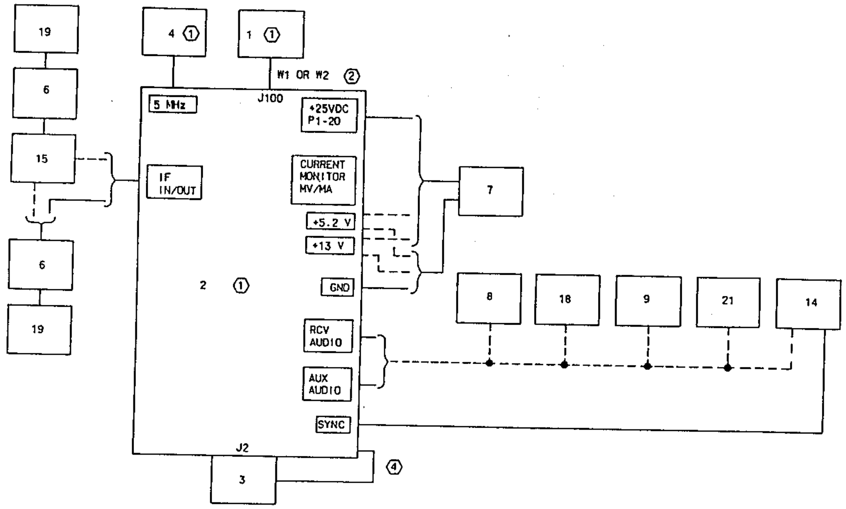
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
31. (Cont)	d. Adjust oscillator to apply a 1000-Hz tone at -10 dB mW to TX AUDIO IN jack and measure TX AUDIO OUT with rms voltmeter.	65 to 130 mV	Check the following: U8, Q13-Q14, Q12-Q15, C12, C13, U7.
32. CW KEY mode	a. On test adapter, set PTT and VOICE to DSBL and CWK to ENBL.		
	b. Connect oscillator through isolation transformer to 1 OR 2 KHZ jack on test adapter and adjust oscillator for 1000 Hz at 100-mV input to 1 OR 2 KHZ jack.		
	c. Measure audio output at TX AUDIO OUT jack with rms voltmeter.	90 to 110 mV	Check the following: U8, Q5-Q6, C9, C17.
	d. Adjust oscillator for 2 kHz at 100 mV to 1 OR 2 KHZ jack and measure TX AUDIO OUT on rms voltmeter.	87 to 107 mV	Check the following: U8, Q5-Q6, C9, C17.
	e. Adjust oscillator for 3 kHz at 100 mV to 1 OR 2 KHZ jack and measure TX AUDIO OUT on rms voltmeter.	Not more than 35 mV.	Check the following: U8, Q5-Q6, C9, C17.
33. Fault pulse	a. On test adapter, set CWK to DSBL.		
	b. Adjust oscillator for 1000 Hz at 100 mV to 1 OR 2 KHZ jack.		
	c. On test adapter, connect oscilloscope to TX ADUIO OUT test jack.		
	d. While monitoring TX AUDIO OUT on oscilloscope, set test adapter FAULT switch to ENBL and measure pulse width (on time) of TX AUDIO OUT signal.	60 to 120 milliseconds	Check the following: R22, C5, U4, Q16, C17.
34. Compression amplifier	a. On test adapter, set FAULT to DSBL, PTT and VOICE to ENBL and SET to ATTACK.		
	b. Adjust oscillator for 1000 Hz at -26 dB mW to TX AUDIO IN test jack.		
	c. On test adapter connect TX/AF SYNC jack to trigger the oscilloscope connected to TX AUDIO OUT jack. Positive trigger for attack and negative trigger for decay.		
(Cont)	**Note** INITIATE switch should be left in DECAY for 15 seconds between each positioning of INITIATE switch in ATTACK direction.		

Table 2. Logic/Tx A2, Testing/Troubleshooting (Cont).

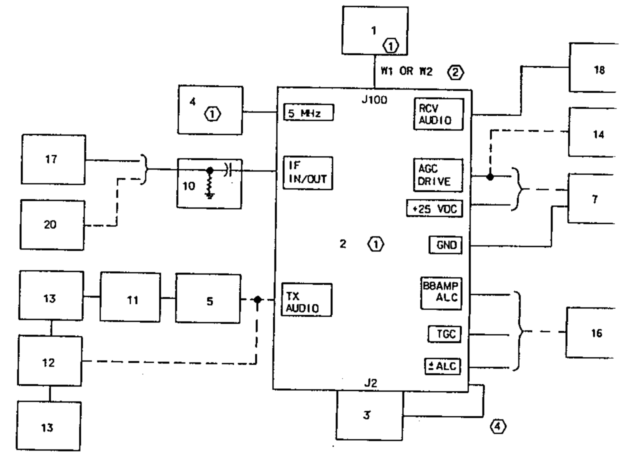
TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
34. (Cont)	d. On test adapter, move INITIATE switch in direction of ATTACK arrow and measure the attack time (time from application of signal until TX AUDIO OUT reaches 3 dB mW of final value) on oscilloscope.	No more than 8 milliseconds.	Check the following: U8, Q12-Q15, C21, Q13-Q14.
	e. On test adapter, place SET switch to DECAY and move INITIATE switch in DECAY direction. Measure decay time of TX AUDIO OUT signal, time from a 30-dB decrease (-26 to -56 dB mW due to 30 dB attenuation in test adapter) in TX AUDIO IN until TX AUDIO OUT has recovered to within 3 dB mW of final level.	No less than 500 milliseconds.	Check the following: U8, Q12-Q15, C21, Q13-Q14.
35. Intermodulation	a. On test adapter, place SET to DIRECT, PTT and VOICE to ENBL.		
	b. Connect two oscillators through the mixer-attenuator and connect mixer output to TX AUDIO IN jack on test adapter as shown in figure 9, test setup B.		
	c. On mixer-attenuator, set AUDIO LOAD/OSC 1 IN to OSC 1 IN and AUDIO LOAD/OSC 2 IN to AUDIO LOAD. Set oscillator no 1 for 1000 Hz and an input level to the TX AUDIO IN jack of -32 dB mW.		
	d. On mixer-attenuator, set AUDIO LOAD/OSC 1 IN to AUDIO LOAD and AUDIO LOAD/OSC 2 IN to OSC 2 IN. Set oscillator no 2 for 1300 Hz and in input level to the TX AUDIO IN jack of -32 dB mW.		
	e. On mixer-attenuator, set AUDIO LOAD/OSC 1 IN to OSC 1 IN (both oscillators will now be connected to the TX AUDIO IN jack on the test adapter).		
	f. On test adapter, connect wave analyzer to TX AUDIO OUT jack and measure the products in dB below the desired tones.	700 and 1600 Hz not less than 34 dB down.	Check the following: U8, Q13, Q14, Q15, Q12.
	g. On test adapter, place VOICE to DSBL.		
	h. Repeat step c and d with OSC 1 AND OSC 2 input level to TX AUDIO IN jack of 0 dB mW.		
	i. Repeat step e.		
	j. Repeat step f.	700, 1600, 2000, and 2600 Hz not less than 40 dB down.	Check the following: U6, U7, Q13, Q14, Q15, Q12, U8.

Table 2. Logic/Tx A2, Testing/Troubleshooting (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
36. Power requirements	a. On test adapter, disconnect oscillators and set switches as outlined in test 1, step d, and connect digital voltmeter to CURRENT MONITOR MV/MA +13V test points.		
	b. On test adapter, set PTT to ENBL and measure dc voltage (current) on digital voltmeter.	Not more than 2.5 mV (2.5 mA).	Check the following: C22, R64, and +13-volt circuit.
	c. On test adapter, set PTT to DSBL, RCV ONLY to ENBL, and measure dc voltage (current) on digital voltmeter.	Not more than 2.5 mV (2.5 mA).	Check the following: C22, R64, and +13-volt circuit.
	d. On test adapter, connect digital voltmeter to CURRENT MONITOR MV/MA +5.2V test points. Measure dc voltage (current) on digital voltmeter.	Not more than 5.5 mV (5.5 mA).	Check the following: C18, L1, and +5.2-volt circuit.
	e. On test adapter, set RCV ONLY to DSBL and PTT to ENBL and measure dc voltage (current) on digital voltmeter.	Not more than 25 mV (25 mA).	Same as above.



TEST SETUP A



TEST SETUP B

1. POWER SUPPLY
2. IF/AF TEST ADAPTER
3. IF/AF AMPLIFIER A1
4. ELECTRICAL FREQUENCY SYNTHESIZER
5. ATTENUATOR, AUDIO
6. ATTENUATOR, 6-dB (2 REQ)
7. DIGITAL VOLTMETER
8. DISTORTION ANALYZER
9. FREQUENCY COUNTER
10. IF LOAD, 500 OHMS (0.1 uF CAP AND 500 OHM RESISTOR)
11. ISOLATION TRANSFORMER
12. MIXER-ATTENUATOR, 600 OHM
13. OSCILLATOR
14. OSCILLOSCOPE
15. POWER DIVIDER
16. POWER SUPPLY, 0-40 V DC
17. RF VOLTMETER
18. RMS VOLTMETER
19. SIGNAL GENERATOR (2 REQ)
20. SPECTRUM ANALYZER
21. WAVE ANALYZER

NOTES:

① PART OF RADIO TEST SET 969J-3.

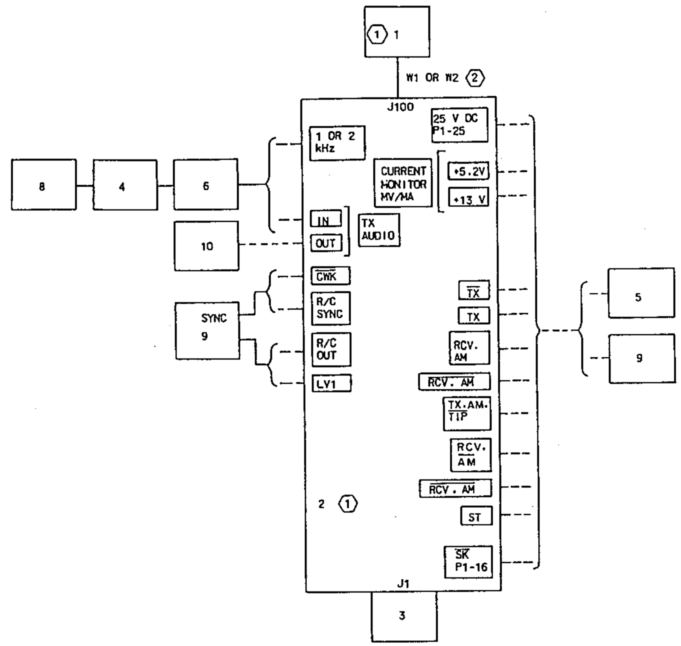
② PART OF POWER SUPPLY.

③ DASHED LINES ARE ALTERNATE CONNECTIONS DESCRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.

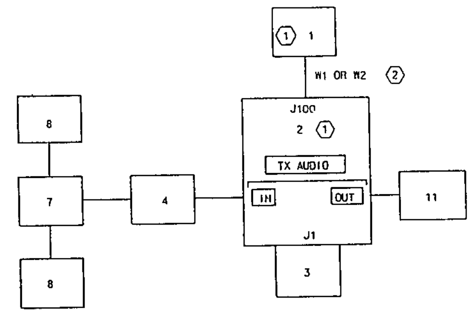
④ PENDANT CABLE, PART OF IF/AF TEST ADAPTER.

TPA-5218-014

IF/AF A1, Test Setup
Figure 8



TEST SETUP A



TEST SETUP B

1. POWER SUPPLY
2. LOGIC/TX TEST ADAPTER
3. LOGIC/TX A2
4. ATTENUATOR, AUDIO
5. DIGITAL VOLTMETER
6. ISOLATION TRANSFORMER, 600 OHM
7. MIXER-ATTENUATOR, 600 OHMS
8. OSCILLATOR (2 REQUIRED)
9. OSCILLOSCOPE
10. RMS VOLTMETER
11. WAVE ANALYZER

NOTES:

(1) PART OF RADIO TEST SET 969J-3.

(2) PART OF POWER SUPPLY.

(3) DASHED LINE IS ALTERNATE CONNECTION DESCRIBED IN A PROCEDURE STEP. DO NOT MAKE THIS CONNECTION UNTIL SO INSTRUCTED.

TPA-5220-014

Logic/TX A2, Test Setup
Figure 9

6. PARTS LIST

6.1 Introduction

The purpose of this parts list is for identification and requisition of parts. A parts location illustration, parts list, and schematic diagram are included. Parts listed meet critical equipment design specification requirements. Use only part number specified in this parts list for replacement of parts.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

6.2 Group Assembly Parts List

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column — Listed are MIL standard, vendor, or Collins part numbers. Collins part numbering system consists of 10 digits as follows: a 3-digit family number, a 4-digit serial number, and a 3-digit dash number.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: MCN (Manufacturer Control Number) 101 and up; CI (Configuration Identifier) 5-digit number; REV (Revision Identifier) dash (—) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB 1, SB 2, etc.

UNITS PER ASSY Column — Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column — Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

6.3 Reference Designation Index

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column — Digits preceding the dash refer to figure numbers. Digits following the dash are item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

6.4 How To Use This Parts List

To locate a part number locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

On multiple sheet illustrations, each index number is given the applicable sheet number of the illustration where the item appears.

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

6.5 Manufacturer's Code, Name, and Address

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00106	BATORI COMPUTER COMPANY INC 72-81 113TH ST FOREST HILLS NY 11375
00136	MCCOY ELECTRONICS CO WATTS AND CHESTNUT ST MT HOLLY SPRINGS PA 17065
02735	RCA CORP SOLID STATE DIVISION ROUTE 202 SOMERVILLE NJ 08876
04713	MOTOROLA INC SEMICONDUCTOR GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV SUB OF SCHLUMBERGER LTD NORTH AMERICAN SALES MAIL STOP 14-1053 401 ELLIS ST P O DRAWER 7284 MOUNTAIN VIEW CA 94042
12040	NATIONAL SEMICONDUCTOR CORP COMMERCE DR P O BOX 443 DANBURY CT 06810
13499	ROCKWELL INTERNATIONAL CORP COLLINS TELECOMMUNICATIONS PRODUCTS DIV 855 35TH ST NE P O BOX 728 CEDAR RAPIDS IA 52498
27014	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051
28480	HEWLETT-PACKARD CO CORPORATE HQ 3000 HANOVER ST PALO ALTO CA 94304
31039	NATIONAL SCREW PRODUCTS CO INC 14401 W 11 MILE RD P O BOX 3815 OAK PARK MI 48237
31433	UNION CARBIDE CORP ELECTRONICS DIV HWY 276 SE P O BOX 5928 GREENVILLE SC 29606
32559	BIVAR INC 1617 E EDINGER AVE SANTA ANA CA 92705
49956	RAYTHEON CO EXECUTIVE OFFICES 141 SPRING ST LEXINGTON MA 02173

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
57863	NORTH AMERICAN SPECIALTIES CORP 120-12 28TH AVE FLUSHING NY 11354
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV 5700 W ROOSEVELT RD CHICAGO IL 60650
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIVISION ST CHARLES ROAD ELGIN IL 60120
80294	BOURNS INSTRUMENTS INC 6135 MAGNOLIA AVE RIVERSIDE CA 92506
81349	MILITARY SPECIFICATIONS
91314	LEWIS SPRING AND MFG CO 2652 W NORTH AVE CHICAGO IL 60647
93790	CORNELL-DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO 1605 RODNEY FRENCH BLVD NEW BEDFORD MA 02741
96906	MILITARY STANDARD

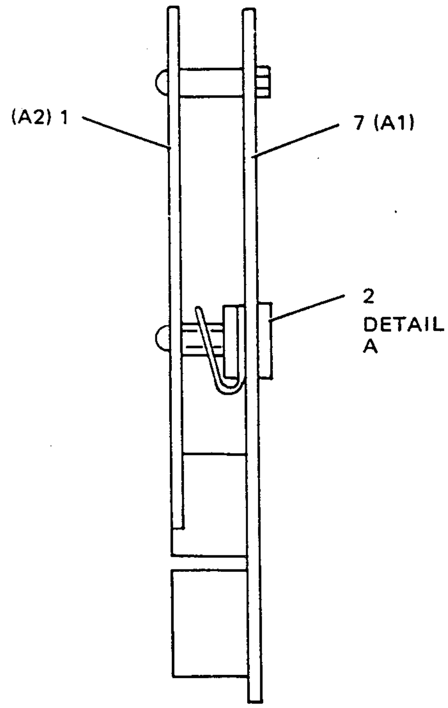
6.6 Reference Designation Prefixes

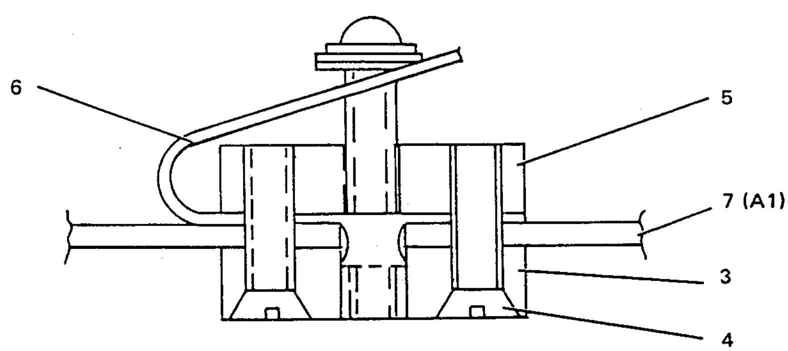
PREFIX	UNIT PART NUMBER	FIG-ITEM
A1	601-3668-001	11-
A2	601-3669-001	13-

6.7 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
IF/AF Amplifier	629-3405-001	A
IF/AF Card A1	601-3668-008	AA
Logic/TX Card A2	601-3669-001	U





DETAIL A (OVERSIZE)

TPA-4847-019

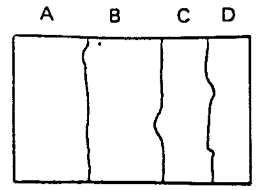
IF/AF Amplifier, Parts Location
Figure 10 (Sheet 1 of 2)

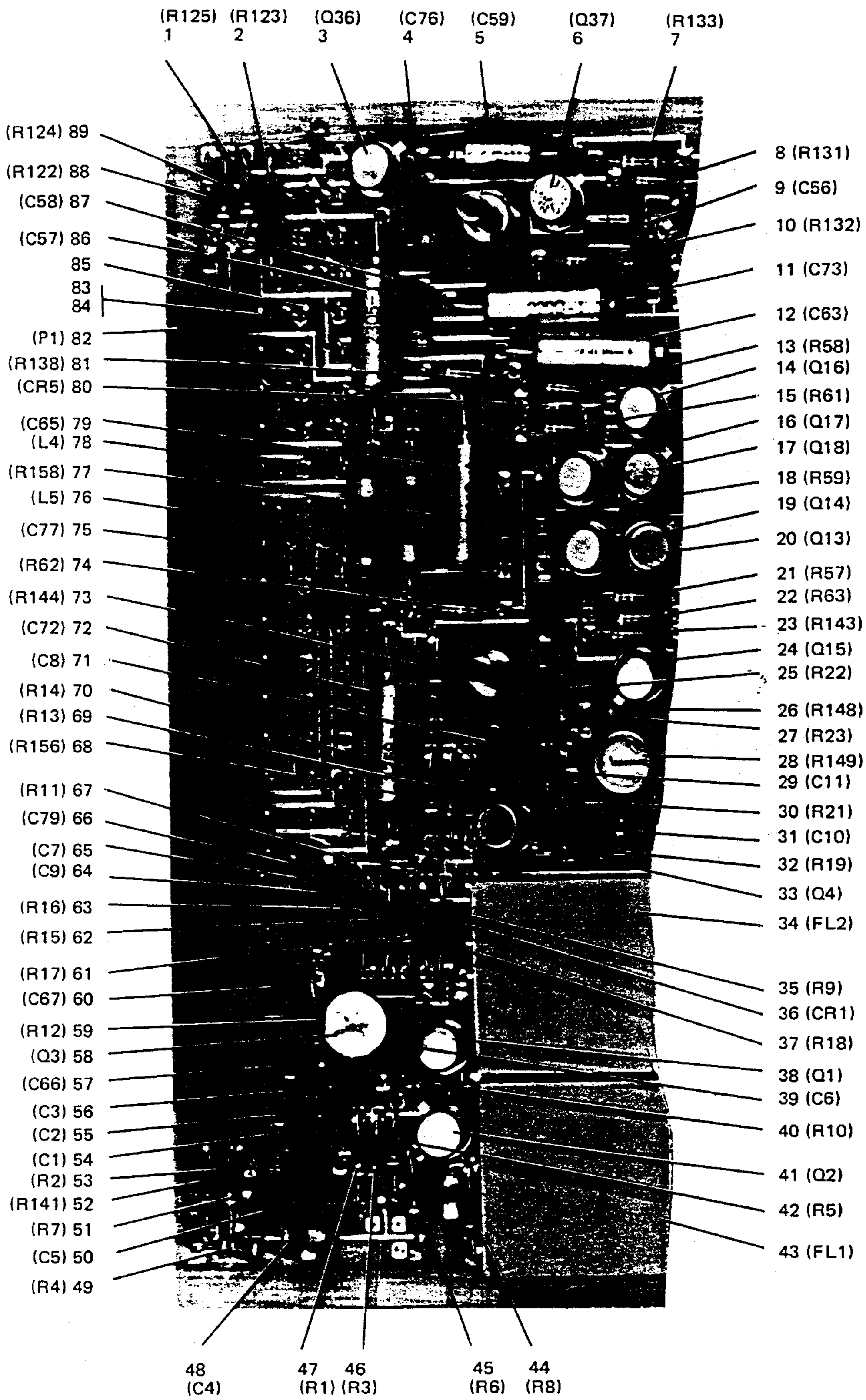
GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
10-	629-3405-001	1	IF/AF AMPLIFIER	1	
1	601-3669-001	2	LOGIC/TX CARD (ESDS) A2 (SEE FIG 13)	1	
	MS51957-3	2	SCREW,MACH CD PL STL, 2-56 X 1/4 (96906) 343-0124-000 (AP)	4	
2	635-4676-001	2	ELECTRONIC COMPONENTS ASSY (ESDS)	1	
3	629-3485-001	3	STRIP,RETAINER	1	
4	MS51959-4	3	SCREW,MACH SST, 2-56 X 5/16 (96906) 342-0134-000 (AP)	2	
5	629-5853-001	3	STRIP,RETAINER	1	
6	629-6147-001	3	RETAINER,SCREW	1	
	MS51957-17	3	SCREW,MACH STL, 4-40 X 1/2 (96906) 343-0137-000 (AP FOR 5,6)	1	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 5,6)	1	
	502-1515-002	3	WASHER,FLAT (AP FOR 5,6)	2	
	340-0644-000	3	SLEEVE,SPRING (91314) (AP FOR 5,6)	1	
7	601-3668-001	3	IF/AF CARD (ESDS) A1 (SEE FIG 11)	1	

IF/AF Amplifier, Parts Location
Figure 10 (Sheet 2)

DETAIL



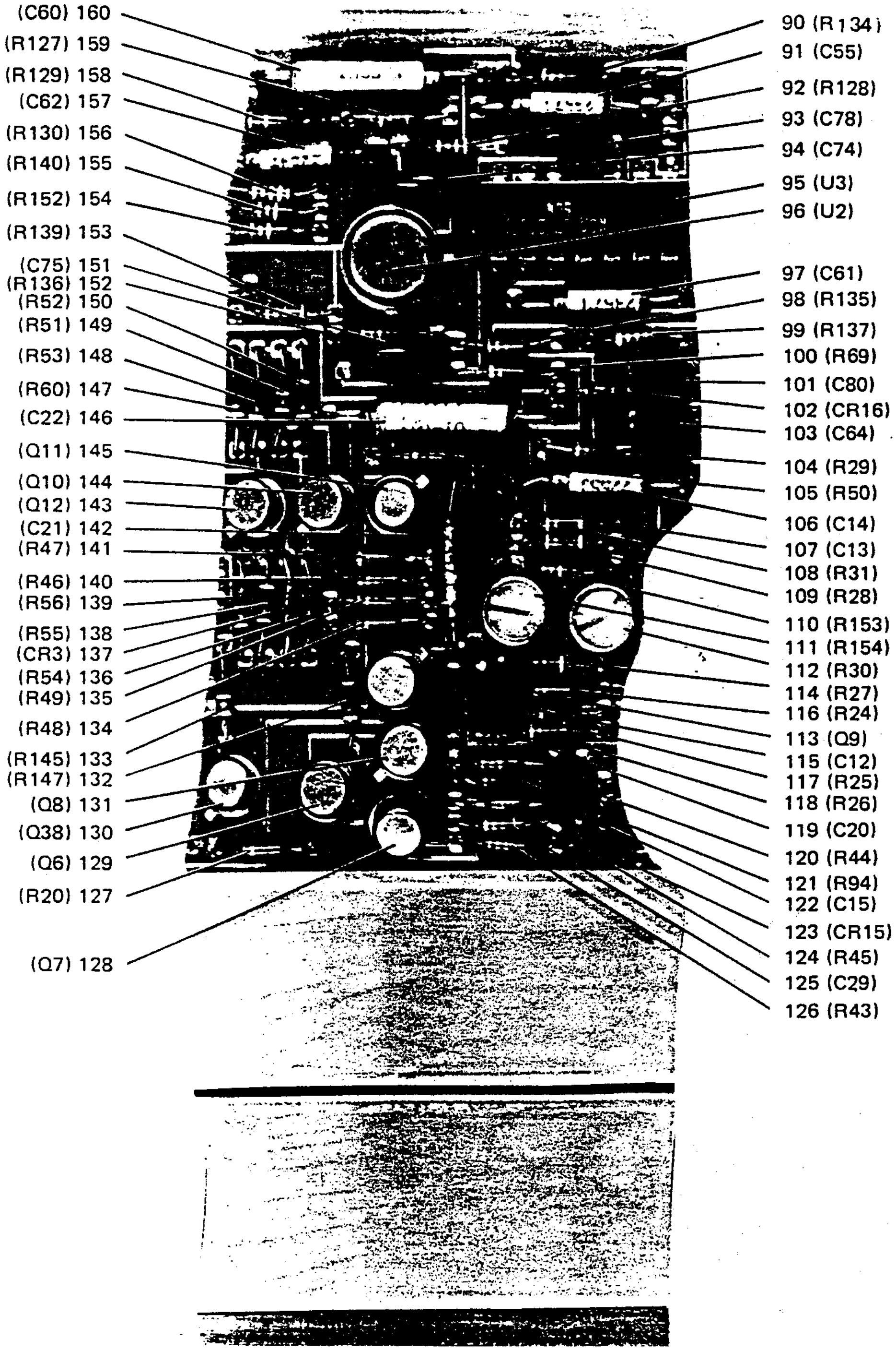


DETAIL A

ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-4845-047

IF/AF A1, Parts Location
Figure 11 (Sheet 1 of 6)

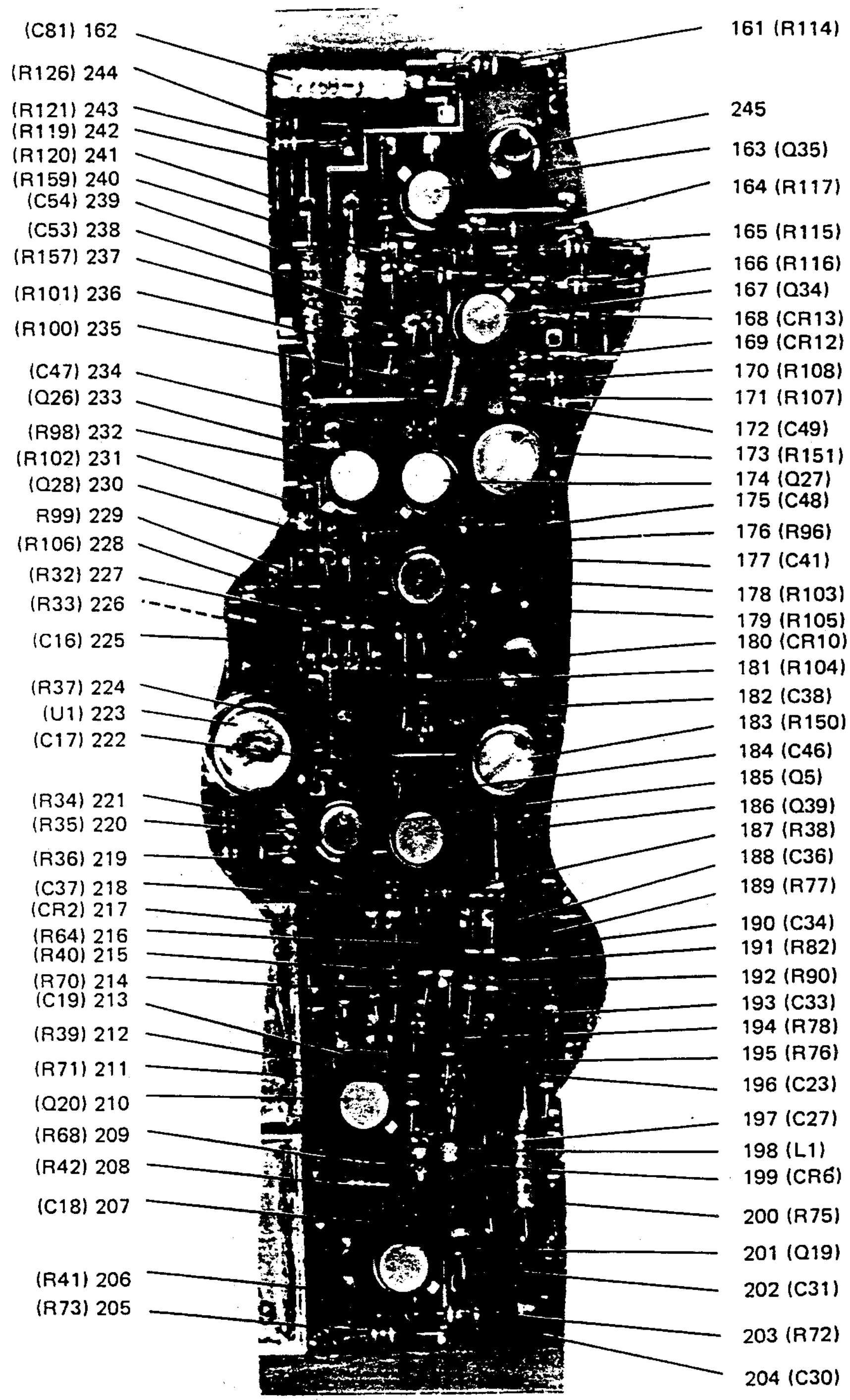


DETAIL B

ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-4845-047

IF/AF A1, Parts Location
Figure 11 (Sheet 2)

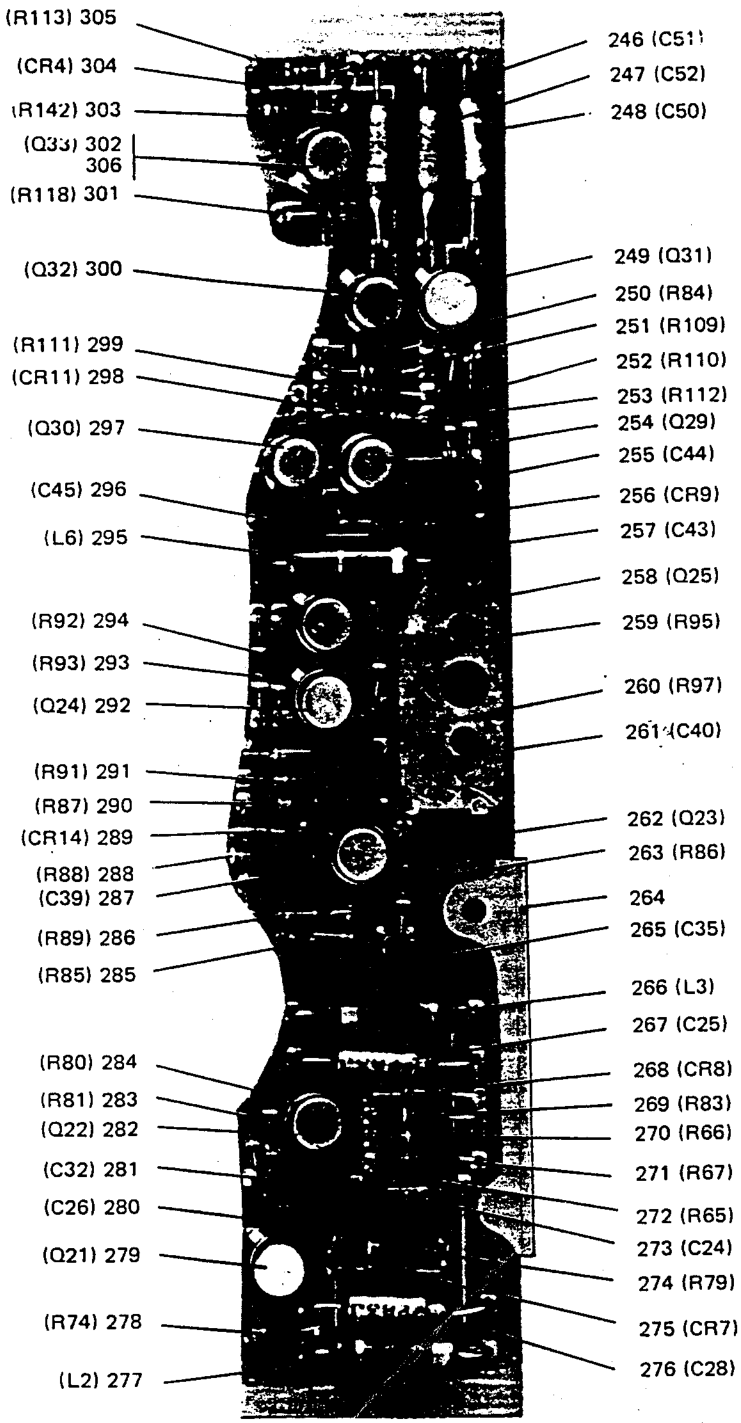


DETAIL C

CAUTION ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-4845-047

IF/AF A1, Parts Location
Figure 11 (Sheet 3)



DETAIL D

ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-4845-047

IF/AF A1, Parts Location
Figure 11 (Sheet 4)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/1 53	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R2	1	
/1 54	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C1	1	
/1 55	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C2	1	
/1 56	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C3	1	
/1 57	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C66	1	
/1 58	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q3	1	
/1 59	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R12	1	
/1 60	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C67	1	
/1 61	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R17	1	
/1 62	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R15	1	
/1 63	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R16	1	
/1 64	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C9	1	
/1 65	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C7	1	
/1 66	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C79	1	
/1 67	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R11	1	
/1 68	RCR05G560JS	2	RESISTOR,FIXED CMPSN, 56 OHMS, 5%, 1/8W (81349) 745-1863-190 A1R156	1	
/1 69	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R13	1	
/1-70	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R14	1	
/1 71	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C8	1	
/1 72	M39003/01-2258	2	CAPACITOR,FIXED ELCTLT, 33UF, 20%, 10V (81349) 184-9086-180 A1C72	1	
/1 73	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R144	1	
/1 74	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R62	1	
/1 75	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C77	1	
/1 76	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1L5	1	
/1 77	RCR05G101JS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 5%, 1/8W (81349) 745-1863-250 A1R158	1	
/1 78	MS75089-11	2	COIL,RF 100UH (96906) 240-2715-370 A1L4	1	
/1 79	M39003/01-2290	2	CAPACITOR,FIXED ELCTLT, 15UF, 20%, 20V (81349) 184-9086-500 A1C65	1	
/1 80	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR5	1	
/1 81	RCR05G100JS	2	RESISTOR,FIXED CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 A1R138	1	
	638-1091-030	2	CONN ASSY	1	
/1 82	372-2623-030	3	HOUSING,CONNECTOR A1P1	1	
/1 83	372-2234-010	3	CONTACT,ELECTRICAL (57863)	21	
/1 84	372-2234-020	3	CONTACT,ELECTRICAL (57863)	21	
/1 85	372-2601-072	2	CONTACT,ELECTRICAL	34	
/1 86	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C57	1	
/1 87	M39003/01-2305	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 20%, 35V (81349) 184-9086-650 A1C58	1	
/1 88	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R122	1	
/1 89	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R124	1	
/2 90	RCR05G823JS	2	RESISTOR,FIXED CMPSN, 82K, 5%, 1/8W (81349) 745-1863-950 A1R134	1	
/2 91	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C55	1	
/2 92	RCR05G394JS	2	RESISTOR,FIXED CMPSN, 390K, 5%, 1/8W (81349) 745-1864-150 A1R128	1	
/2 93	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C78	1	
/2 94	CD5EY270J0	2	CAPACITOR,FIXED MICA DIEL, 27PF, 5%, 50V (93790) 912-4141-180 A1C74	1	
/2 95	CD4066BF	2	INTEGRATED CIRCUIT SWITCH (2505) (02735) 351-8252-020 A1U3	1	
/2 96	UA1558HMQ	2	INTEGRATED CIRCUIT OPRTNL AMPLIFIER (07263) 351-1071-020 A1U2	1	
/2 97	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C61	1	
/2 98	RCR05G153JS	2	RESISTOR,FIXED CMPSN, 15K, 5%, 1/8W (81349) 745-1863-770 A1R135	1	
/2 99	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R137	1	
/2 100	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R69	1	
/2 101	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C80	1	
/2 102	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR16	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/2 103	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C64	1	
/2 104	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R29	1	
/2-105	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R50	1	
/2 106	M39003/01-2255	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 20%, 10V (81349) 184-9086-150 A1C14	1	
/2 107	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C13	1	
/2 108	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (81349) 745-1863-170 A1R31	1	
/2 109	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (81349) 745-1863-170 A1R28	1	
/2 110	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R153	1	
/2 111	3329H-CY3-503	2	RESISTOR,VARIABLE 50K, 10%, 0.5W (80294) 382-0027-120 A1R154	1	
/2 112	3329H-CY3-501	2	RESISTOR,VARIABLE 500 OHMS, 10%, 0.5W (80294) 382-0027-060 A1R30	1	
/2 113	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q9	1	
/2 114	RCR05G392JS	2	RESISTOR,FIXED CMPSN, 3.9K, 5%, 1/8W (81349) 745-1863-630 A1R27	1	
/2 115	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C12	1	
/2 116	RCR05G202JS	2	RESISTOR,FIXED CMPSN, 2K, 5%, 1/8W (81349) 745-1863-560 A1R24	1	
/2 117	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R25	1	
/2 118	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R26	1	
/2 119	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C20	1	
/2 120	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R44	1	
/2 121	RCR05G273JS	2	RESISTOR,FIXED CMPSN, 27K, 5%, 1/8W (81349) 745-1863-830 A1R94	1	
/2 122	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C15	1	
/2 123	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR15	1	
/2 124	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R45	1	
/2 125	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C29	1	
/2 126	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R43	1	
/2 127	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R20	1	
/2 128	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q7	1	
/2 129	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q6	1	
/2 130	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q38	1	
/2 131	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q8	1	
/2 132	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R147	1	
/2 133	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R145	1	
/2 134	RCR05G203JS	2	RESISTOR,FIXED CMPSN, 20K, 5%, 1/8W (81349) 745-1863-800 A1R48	1	
/2 135	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R49	1	
/2 136	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R54	1	
/2 137	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR3	1	
/2 138	RCR05G473JS	2	RESISTOR,FIXED CMPSN, 47K, 5%, 1/8W (81349) 745-1863-890 A1R55	1	
/2 139	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R56	1	
/2-140	RCR05G153JS	2	RESISTOR,FIXED CMPSN, 15K, 5%, 1/8W (81349) 745-1863-770 A1R46	1	
/2 141	RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W (81349) 745-1863-930 A1R47	1	
/2 142	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C21	1	
/2 143	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q12	1	
/2 144	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q10	1	
/2 145	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q11	1	
/2 146	M39003/01-2271	2	CAPACITOR,FIXED ELCTLT, 22UF, 10%, 15V (81349) 184-9086-310 A1C22	1	
/2 147	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R60	1	
/2 148	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R53	1	
/2 149	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W (81349) 745-1864-110 A1R51	1	
/2 150	RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W (81349) 745-1863-930 A1R52	1	
/2 151	CD5EY360J0	2	CAPACITOR,FIXED MICA DIEL, 36PF, 5%, 50V (93790) 912-4141-240 A1C75	1	
/2 152	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W (81349) 745-1864-110 A1R136	1	
/2 153	RCR05G913JS	2	RESISTOR,FIXED CMPSN, 91K, 5%, 1/8W (81349) 745-1863-960 A1R139	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/2 154	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W (81349) 745-1864-110 A1R152	1	
/2 155	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R140	1	
/2 156	RCR05G394JS	2	RESISTOR,FIXED CMPSN, 390K, 5%, 1/8W (81349) 745-1864-150 A1R130	1	
/2 157	M39003/01-2254	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 10%, 10V (81349) 184-9086-140 A1C62	1	
/2 158	RCR05G154JS	2	RESISTOR,FIXED CMPSN, 150K, 5%, 1/8W (81349) 745-1864-050 A1R129	1	
/2 159	RCR05G243JS	2	RESISTOR,FIXED CMPSN, 24K, 5%, 1/8W (81349) 745-1863-820 A1R127	1	
/2 160	M39003/01-2305	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 20%, 35V (81349) 184-9086-650 A1C60	1	
/3 161	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R114	1	
/3 162	M39003/01-2258	2	CAPACITOR,FIXED ELCTLT, 33UF, 20%, 10V (81349) 184-9086-180 A1C81	1	
/3 163	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q35	1	
/3 164	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R117	1	
/3 165	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R115	1	
/3 166	RCR05G822JS	2	RESISTOR,FIXED CMPSN, 8.2K, 5%, 1/8W (81349) 745-1863-710 A1R116	1	
/3 167	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q34	1	
/3 168	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR13	1	
/3 169	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR12	1	
/3 170	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R108	1	
/3 171	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (81349) 745-1863-170 A1R107	1	
/3 172	CK05BX472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 100VDC (81349) 913-5019-640 A1C49	1	
/3 173	3329H-CY3-101	2	RESISTOR,VARIABLE 100 OHMS, 10%, 0.5W (80294) 382-0027-040 A1R151	1	
/3 174	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q27	1	
/3-175	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C48	1	
/3 176	RCR05G391JS	2	RESISTOR,FIXED CMPSN, 390 OHMS, 5%, 1/8W (81349) 745-1863-390 A1R96	1	
/3 177	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C41	1	
/3 178	RCR05G822JS	2	RESISTOR,FIXED CMPSN, 8.2K, 5%, 1/8W (81349) 745-1863-710 A1R103	1	
/3 179	RCR05G331JS	2	RESISTOR,FIXED CMPSN, 330 OHMS, 5%, 1/8W (81349) 745-1863-370 A1R105	1	
/3 180	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR10	1	
/3 181	RCR05G392JS	2	RESISTOR,FIXED CMPSN, 3.9K, 5%, 1/8W (81349) 745-1863-630 A1R104	1	
/3 182	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C38	1	
/3 183	3329H-CY3-103	2	RESISTOR,VARIABLE 10K, 10%, 0.5W (80294) 382-0027-100 A1R150	1	
/3 184	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C46	1	
/3 185	2N4208	2	TRANSISTOR (27014) 352-0959-020 A1Q5	1	
/3 186	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q39	1	
/3 187	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R38	1	
/3 188	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C36	1	
/3 189	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R77	1	
/3 190	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C34	1	
/3 191	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R82	1	
/3 192	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R90	1	
/3 193	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C33	1	
/3 194	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R78	1	
/3 195	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R76	1	
/3 196	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C23	1	
/3 197	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A1C27	1	
/3 198	MS75089-7	2	COIL,RF 47UH (96906) 240-2715-330 A1L1	1	
/3 199	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR6	1	
/3 200	RCR05G272JS	2	RESISTOR,FIXED CMPSN, 2.7K, 5%, 1/8W (81349) 745-1863-590 A1R75	1	
/3 201	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q19	1	
/3 202	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C31	1	
/3 203	RCR05G241JS	2	RESISTOR,FIXED CMPSN, 240 OHMS, 5%, 1/8W (81349) 745-1863-340 A1R72	1	
/3 204	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C30	1	

IF/AF A1, Parts Location
Figure 11 (Sheet 5)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/1 53	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R2	1	
/1 54	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C1	1	
/1 55	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C2	1	
/1 56	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C3	1	
/1 57	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C66	1	
/1 58	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q3	1	
/1 59	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R12	1	
/1 60	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C67	1	
/1 61	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R17	1	
/1 62	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R15	1	
/1 63	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R16	1	
/1 64	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C9	1	
/1 65	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C7	1	
/1 66	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C79	1	
/1 67	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R11	1	
/1 68	RCR05G560JS	2	RESISTOR,FIXED CMPSN, 56 OHMS, 5%, 1/8W (81349) 745-1863-190 A1R156	1	
/1 69	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R13	1	
/1-70	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R14	1	
/1 71	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C8	1	
/1 72	M39003/01-2258	2	CAPACITOR,FIXED ELCTLT, 33UF, 20%, 10V (81349) 184-9086-180 A1C72	1	
/1 73	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R144	1	
/1 74	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R62	1	
/1 75	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C77	1	
/1 76	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1L5	1	
/1 77	RCR05G101JS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 5%, 1/8W (81349) 745-1863-250 A1R158	1	
/1 78	MS75089-11	2	COIL,RF 100UH (96906) 240-2715-370 A1L4	1	
/1 79	M39003/01-2290	2	CAPACITOR,FIXED ELCTLT, 15UF, 20%, 20V (81349) 184-9086-500 A1C65	1	
/1 80	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR5	1	
/1 81	RCR05G100JS	2	RESISTOR,FIXED CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 A1R138	1	
	638-1091-030	2	CONN ASSY	1	
/1 82	372-2623-030	3	HOUSING,CONNECTOR A1P1	1	
/1 83	372-2234-010	3	CONTACT,ELECTRICAL (57863)	21	
/1 84	372-2234-020	3	CONTACT,ELECTRICAL (57863)	21	
/1 85	372-2601-072	2	CONTACT,ELECTRICAL	34	
/1 86	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C57	1	
/1 87	M39003/01-2305	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 20%, 35V (81349) 184-9086-650 A1C58	1	
/1 88	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R122	1	
/1 89	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R124	1	
/2 90	RCR05G823JS	2	RESISTOR,FIXED CMPSN, 82K, 5%, 1/8W (81349) 745-1863-950 A1R134	1	
/2 91	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C55	1	
/2 92	RCR05G394JS	2	RESISTOR,FIXED CMPSN, 390K, 5%, 1/8W (81349) 745-1864-150 A1R128	1	
/2 93	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C78	1	
/2 94	CO5EY270J0	2	CAPACITOR,FIXED MICA DIEL, 27PF, 5%, 50V (93790) 912-4141-180 A1C74	1	
/2 95	CD4066BF	2	INTEGRATED CIRCUIT SWITCH (ESDS) (02735) 351-8252-020 A1U3	1	
/2 96	UA1558HMG	2	INTEGRATED CIRCUIT OPRTNL AMPLIFIER (07263) 351-1071-020 A1U2	1	
/2 97	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C61	1	
/2 98	RCR05G153JS	2	RESISTOR,FIXED CMPSN, 15K, 5%, 1/8W (81349) 745-1863-770 A1R135	1	
/2 99	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R137	1	
/2 100	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R69	1	
/2 101	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C80	1	
/2 102	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR16	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/2 103	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C64	1	
/2 104	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R29	1	
/2-105	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R50	1	
/2 106	M39003/01-2255	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 20%, 10V (81349) 184-9086-150 A1C14	1	
/2 107	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C13	1	
/2 108	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (81349) 745-1863-170 A1R31	1	
/2 109	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (81349) 745-1863-170 A1R28	1	
/2 110	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R153	1	
/2 111	3329H-CY3-503	2	RESISTOR,VARIABLE 50K, 10%, 0.5W (80294) 382-0027-120 A1R154	1	
/2 112	3329H-CY3-501	2	RESISTOR,VARIABLE 500 OHMS, 10%, 0.5W (80294) 382-0027-060 A1R30	1	
/2 113	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q9	1	
/2 114	RCR05G392JS	2	RESISTOR,FIXED CMPSN, 3.9K, 5%, 1/8W (81349) 745-1863-630 A1R27	1	
/2 115	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C12	1	
/2 116	RCR05G202JS	2	RESISTOR,FIXED CMPSN, 2K, 5%, 1/8W (81349) 745-1863-560 A1R24	1	
/2 117	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R25	1	
/2 118	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R26	1	
/2 119	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C20	1	
/2 120	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R44	1	
/2 121	RCR05G273JS	2	RESISTOR,FIXED CMPSN, 27K, 5%, 1/8W (81349) 745-1863-830 A1R94	1	
/2 122	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C15	1	
/2 123	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR15	1	
/2 124	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R45	1	
/2 125	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C29	1	
/2 126	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R43	1	
/2 127	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R20	1	
/2 128	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q7	1	
/2 129	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q6	1	
/2 130	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q38	1	
/2 131	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q8	1	
/2 132	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R147	1	
/2 133	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R145	1	
/2 134	RCR05G203JS	2	RESISTOR,FIXED CMPSN, 20K, 5%, 1/8W (81349) 745-1863-800 A1R48	1	
/2 135	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R49	1	
/2 136	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R54	1	
/2 137	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR3	1	
/2 138	RCR05G473JS	2	RESISTOR,FIXED CMPSN, 47K, 5%, 1/8W (81349) 745-1863-890 A1R55	1	
/2 139	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R56	1	
/2-140	RCR05G153JS	2	RESISTOR,FIXED CMPSN, 15K, 5%, 1/8W (81349) 745-1863-770 A1R46	1	
/2 141	RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W (81349) 745-1863-930 A1R47	1	
/2 142	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C21	1	
/2 143	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q12	1	
/2 144	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q10	1	
/2 145	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q11	1	
/2 146	M39003/01-2271	2	CAPACITOR,FIXED ELCTLT, 22UF, 10%, 15V (81349) 184-9086-310 A1C22	1	
/2 147	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R60	1	
/2 148	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R53	1	
/2 149	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W (81349) 745-1864-110 A1R51	1	
/2 150	RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W (81349) 745-1863-930 A1R52	1	
/2 151	CO5EY360J0	2	CAPACITOR,FIXED MICA DIEL, 36PF, 5%, 50V (93790) 912-4141-240 A1C75	1	
/2 152	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W (81349) 745-1864-110 A1R136	1	
/2 153	RCR05G913JS	2	RESISTOR,FIXED CMPSN, 91K, 5%, 1/8W (81349) 745-1863-960 A1R139	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/2 154	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W (81349) 745-1864-110 A1R152	1	
/2 155	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R140	1	
/2 156	RCR05G394JS	2	RESISTOR,FIXED CMPSN, 390K, 5%, 1/8W (81349) 745-1864-150 A1R130	1	
/2 157	M39003/01-2254	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 10%, 10V (81349) 184-9086-140 A1C62	1	
/2 158	RCR05G154JS	2	RESISTOR,FIXED CMPSN, 150K, 5%, 1/8W (81349) 745-1864-050 A1R129	1	
/2 159	RCR05G243JS	2	RESISTOR,FIXED CMPSN, 24K, 5%, 1/8W (81349) 745-1863-820 A1R127	1	
/2 160	M39003/01-2305	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 20%, 35V (81349) 184-9086-650 A1C60	1	
/3 161	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R114	1	
/3 162	M39003/01-2258	2	CAPACITOR,FIXED ELCTLT, 33UF, 20%, 10V (81349) 184-9086-180 A1C61	1	
/3 163	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q35	1	
/3 164	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R117	1	
/3 165	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A1R115	1	
/3 166	RCR05G822JS	2	RESISTOR,FIXED CMPSN, 8.2K, 5%, 1/8W (81349) 745-1863-710 A1R116	1	
/3 167	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q34	1	
/3 168	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR13	1	
/3 169	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR12	1	
/3 170	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R108	1	
/3 171	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (81349) 745-1863-170 A1R107	1	
/3 172	CK05BX472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 100VDC (81349) 913-5019-640 A1C49	1	
/3 173	3329H-CY3-101	2	RESISTOR,VARIABLE 100 OHMS, 10%, 0.5W (80294) 382-0027-040 A1R151	1	
/3 174	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q27	1	
/3-175	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C48	1	
/3 176	RCR05G391JS	2	RESISTOR,FIXED CMPSN, 390 OHMS, 5%, 1/8W (81349) 745-1863-390 A1R96	1	
/3 177	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C41	1	
/3 178	RCR05G822JS	2	RESISTOR,FIXED CMPSN, 8.2K, 5%, 1/8W (81349) 745-1863-710 A1R103	1	
/3 179	RCR05G331JS	2	RESISTOR,FIXED CMPSN, 330 OHMS, 5%, 1/8W (81349) 745-1863-370 A1R105	1	
/3 180	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR10	1	
/3 181	RCR05G392JS	2	RESISTOR,FIXED CMPSN, 3.9K, 5%, 1/8W (81349) 745-1863-630 A1R104	1	
/3 182	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C38	1	
/3 183	3329H-CY3-103	2	RESISTOR,VARIABLE 10K, 10%, 0.5W (80294) 382-0027-100 A1R150	1	
/3 184	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-460 A1C44	1	
/3 185	2N4208	2	TRANSISTOR (27014) 352-0959-020 A1Q5	1	
/3 186	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q19	1	
/3 187	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R38	1	
/3 188	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C36	1	
/3 189	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R77	1	
/3 190	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C34	1	
/3 191	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R82	1	
/3 192	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R90	1	
/3 193	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C33	1	
/3 194	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R78	1	
/3 195	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R76	1	
/3 196	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C23	1	
/3 197	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A1C27	1	
/3 198	MS75089-7	2	COIL,RF 47UH (96906) 240-2715-330 A1L1	1	
/3 199	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR6	1	
/3 200	RCR05G272JS	2	RESISTOR,FIXED CMPSN, 2.7K, 5%, 1/8W (81349) 745-1863-590 A1R75	1	
/3 201	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q19	1	
/3 202	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C31	1	
/3 203	RCR05G241JS	2	RESISTOR,FIXED CMPSN, 240 OHMS, 5%, 1/8W (81349) 745-1863-340 A1R72	1	
/3 204	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C30	1	

IF/AF A1, Parts Location
Figure 11 (Sheet 5)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11-	601-3460-001	1	IF/AF CARD (ESDS) A1 (SEE FIG 10-7 FOR NHA)	REF	
/1 1	RCR05G101JS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 5%, 1/8W (81349) 745-1863-250 A1R125	1	
/1 2	RNC55H6040FS	2	RESISTOR,FIXED FILM, 604 OHMS, 1%, 1/10W (81349) 724-0638-730 A1R123	1	
/1 3	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q36	1	
/1 4	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C76	1	
/1 5	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A1C59	1	
/1 6	2N2608	2	TRANSISTOR (04713) 352-0605-010 A1Q37	1	
/1 7	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R133	1	
/1 8	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R131	1	
/1 9	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C56	1	
/1 10	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R132	1	
/1 11	M39003/01-2295	2	CAPACITOR,FIXED ELCTLT, 47UF, 10%, 20V (81349) 184-9086-550 A1C73	1	
/1 12	M39003/01-2305	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 20%, 35V (81349) 184-9086-650 A1C63	1	
/1 13	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R58	1	
/1 14	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q16	1	
/1 15	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R61	1	
/1 16	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q17	1	
/1 17	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q18	1	
/1 18	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R59	1	
/1 19	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q14	1	
/1 20	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q13	1	
/1 21	RCR05G184JS	2	RESISTOR,FIXED CMPSN, 180K, 5%, 1/8W (81349) 745-1864-070 A1R57	1	
/1 22	RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W (81349) 745-1863-930 A1R63	1	
/1 23	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R143	1	
/1 24	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q15	1	
/1 25	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R22	1	
/1 26	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R148	1	
/1 27	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R23	1	
/1 28	3329H-CY3-103	2	RESISTOR,VARIABLE 10K, 10%, 0.5W (80294) 382-0027-100 A1R149	1	
/1 29	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C11	1	
/1 30	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R21	1	
/1 31	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C10	1	
/1 32	RCR05G121JS	2	RESISTOR,FIXED CMPSN, 120 OHMS, 5%, 1/8W (81349) 745-1863-270 A1R19	1	
/1 33	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q4	1	
/1 34	2B450	2	FILTER,BP XTAL 5.0MHZ (00106) 293-1308-010 A1FL2	1	
/1 35	RCR05G132JS	2	RESISTOR,FIXED CMPSN, 1.3K, 5%, 1/8W (81349) 745-1863-520 A1R9	1	
/1 36	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR1	1	
/1-37	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R18	1	
/1 38	2N4208	2	TRANSISTOR (27014) 352-0959-020 A1Q1	1	
/1 39	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C6	1	
/1 40	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R10	1	
/1 41	2N4208	2	TRANSISTOR (27014) 352-0959-020 A1Q2	1	
/1 42	RCR05G820JS	2	RESISTOR,FIXED CMPSN, 82 OHMS, 5%, 1/8W (81349) 745-1863-230 A1R5	1	
/1 43	2B449	2	FILTER,BP,XTAL (00136) 293-1307-010 A1FL1	1	
/1 44	RCR05G112JS	2	RESISTOR,FIXED CMPSN, 1.1K, 5%, 1/8W (81349) 745-1863-500 A1R8	1	
/1 45	RCR05G822JS	2	RESISTOR,FIXED CMPSN, 8.2K, 5%, 1/8W (81349) 745-1863-710 A1R6	1	
/1 46	RCR05G822JS	2	RESISTOR,FIXED CMPSN, 8.2K, 5%, 1/8W (81349) 745-1863-710 A1R3	1	
/1 47	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-790 A1R1	1	
/1 48	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C4	1	
/1 49	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R4	1	
/1 50	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C5	1	
/1 51	RCR05G560JS	2	RESISTOR,FIXED CMPSN, 56 OHMS, 5%, 1/8W (81349) 745-1863-190 A1R7	1	
/1 52	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R141	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/1 53	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R2	1	
/1 54	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C1	1	
/1 55	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C2	1	
/1 56	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C3	1	
/1 57	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C66	1	
/1 58	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q3	1	
/1 59	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R12	1	
/1 60	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C67	1	
/1 61	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R17	1	
/1 62	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R15	1	
/1 63	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R16	1	
/1 64	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C9	1	
/1 65	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C7	1	
/1 66	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C79	1	
/1 67	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R11	1	
/1 68	RCR05G560JS	2	RESISTOR,FIXED CMPSN, 56 OHMS, 5%, 1/8W (81349) 745-1863-190 A1R156	1	
/1 69	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R13	1	
/1-70	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W (81349) 745-1863-430 A1R14	1	
/1 71	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C8	1	
/1 72	M39003/01-2258	2	CAPACITOR,FIXED ELCTLT, 33UF, 20%, 10V (81349) 184-9086-180 A1C72	1	
/1 73	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R144	1	
/1 74	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R62	1	
/1 75	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C77	1	
/1 76	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1L5	1	
/1 77	RCR05G101JS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 5%, 1/8W (81349) 745-1863-250 A1R158	1	
/1 78	MS75089-11	2	COIL,RF 100UH (96906) 240-2715-370 A1L4	1	
/1 79	M39003/01-2290	2	CAPACITOR,FIXED ELCTLT, 15UF, 20%, 20V (81349) 184-9086-500 A1C65	1	
/1 80	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR5	1	
/1 81	RCR05G100JS	2	RESISTOR,FIXED CMPSN, 10 OHMS, 5%, 1/8W (81349) 745-1863-010 A1R138	1	
	436-1091-030	2	CONN ASSY	1	
/1 82	372-2623-030	3	HOUSING,CONNECTOR A1P1	21	
/1 83	372-2234-010	3	CONTACT,ELECTRICAL (57863)	21	
/1 84	372-2234-020	3	CONTACT,ELECTRICAL (57863)	34	
/1 85	372-2601-072	2	CONTACT,ELECTRICAL	1	
/1 86	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C57	1	
/1 87	M39003/01-2305	2	CAPACITOR,FIXED ELCTLT, 6.8UF, 20%, 35V (81349) 184-9086-650 A1C58	1	
/1 88	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R122	1	
/1 89	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R124	1	
/2 90	RCR05G823JS	2	RESISTOR,FIXED CMPSN, 82K, 5%, 1/8W (81349) 745-1863-950 A1R134	1	
/2 91	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C55	1	
/2 92	RCR05G394JS	2	RESISTOR,FIXED CMPSN, 390K, 5%, 1/8W (81349) 745-1864-150 A1R128	1	
/2 93	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C78	1	
/2 94	CD5EY270J0	2	CAPACITOR,FIXED MICA DIEL, 27PF, 5%, 50V (93790) 912-4141-180 A1C74	1	
/2 95	CD4066BF	2	INTEGRATED CIRCUIT SWITCH (ESDS) (02735) 351-8252-020 A1U3	1	
/2 96	UA1558HMG	2	INTEGRATED CIRCUIT OPRTNL AMPLIFIER (07263) 351-1071-020 A1U2	1	
/2 97	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C61	1	
/2 98	RCR05G153JS	2	RESISTOR,FIXED CMPSN, 15K, 5%, 1/8W (81349) 745-1863-770 A1R135	1	
/2 99	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R137	1	
/2 100	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R69	1	
/2 101	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C80	1	
/2 102	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR16		

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION
11/2 103	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V 913-3989-000 A1C64
/2 104	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R29
/2-105	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R50
/2 106	M39003/01-2255	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 20%, 10V (813 184-9086-150 A1C14
/2 107	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VD (81349) 913-5019-660 A1C13
/2 108	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (813 745-1863-170 A1R31
/2 109	RCR05G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1/8W (81 745-1863-170 A1R28
/2 110	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349 745-1864-010 A1R153
/2 111	3329H-CY3-503	2	RESISTOR,VARIABLE 50K, 10%, 0.5W (80294) 382-0027-120 A1R154
/2 112	3329H-CY3-501	2	RESISTOR,VARIABLE 500 OHMS, 10%, 0.5W (802 382-0027-060 A1R30
/2 113	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q9
/2 114	RCR05G392JS	2	RESISTOR,FIXED CMPSN, 3.9K, 5%, 1/8W (8134 745-1863-630 A1R27
/2 115	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VD 913-5019-720 A1C12
/2 116	RCR05G202JS	2	RESISTOR,FIXED CMPSN, 2K, 5%, 1/8W (81349) 745-1863-560 A1R24
/2 117	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R25
/2 118	RCR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R26
/2 119	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 10 (81349) 913-5019-660 A1C20
/2 120	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (813 745-1864-010 A1R44
/2 121	RCR05G273JS	2	RESISTOR,FIXED CMPSN, 27K, 5%, 1/8W (8134 745-1863-830 A1R94
/2 122	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 1 (81349) 913-5019-660 A1C15
/2 123	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1C
/2 124	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (813 745-1863-730 A1R45
/2 125	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 1 (81349) 913-5019-660 A1C29
/2 126	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (813 745-1863-730 A1R43
/2 127	RCR05G561JS	2	RESISTOR,FIXED CMPSN, 560 OHMS, 5%, 1/8W 745-1863-430 A1R20
/2 128	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q7
/2 129	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q6
/2 130	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q38
/2 131	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q8
/2 132	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W 745-1863-410 A1R147
/2 133	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81 745-1864-010 A1R145
/2 134	RCR05G203JS	2	RESISTOR,FIXED CMPSN, 20K, 5%, 1/8W (81 745-1863-800 A1R48
/2 135	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81 745-1863-810 A1R49
/2 136	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81 745-1863-850 A1R54
/2 137	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1
/2 138	RCR05G473JS	2	RESISTOR,FIXED CMPSN, 47K, 5%, 1/8W (81 745-1863-890 A1R55
/2 139	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (8 745-1864-010 A1R56
/2-140	RCR05G153JS	2	RESISTOR,FIXED CMPSN, 15K, 5%, 1/8W (81 745-1863-770 A1R46
/2 141	RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W (81 745-1863-930 A1R47
/2 142	M39003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V 184-9087-440 A1C21
/2 143	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q12
/2 144	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q10
/2 145	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q11
/2 146	M39003/01-2271	2	CAPACITOR,FIXED ELCTLT, 22UF, 10%, 15V 184-9086-310 A1C22
/2 147	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W 745-1863-790 A1R60
/2 148	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W 745-1863-570 A1R53
/2 149	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W 745-1864-110 A1R51
/2 150	RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W 745-1863-930 A1R52
/2 151	CD5EY360J0	2	CAPACITOR,FIXED MICA DIEL, 36PF, 5%, 912-4141-240 A1C75
/2 152	RCR05G274JS	2	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W 745-1864-110 A1R136
/2 153	RCR05G913JS	2	RESISTOR,FIXED CMPSN, 91K, 5%, 1/8W 745-1863-960 A1R139

GROUP ASSEMBLY PARTS LIST

PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
R05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R73	1	
R05G112JS	2	RESISTOR,FIXED CMPSN, 1.1K, 5%, 1/8W (81349) 745-1863-500 A1R41	1	
05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C18	1	
R05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R42	1	
R05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R68	1	
918	2	TRANSISTOR (04713) 352-0440-000 A1Q20	1	
R05G241JS	2	RESISTOR,FIXED CMPSN, 240 OHMS, 5%, 1/8W (81349) 745-1863-340 A1R71	1	
R05G122JS	2	RESISTOR,FIXED CMPSN, 1.2K, 5%, 1/8W (81349) 745-1863-510 A1R39	1	
05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C19	1	
R05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A1R70	1	
R05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A1R40	1	
R05G220JS	2	RESISTOR,FIXED CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 A1R64	1	
4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR2	1	
05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C37	1	
R05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R36	1	
R05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R35	1	
R05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R34	1	
05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C17	1	
1596G	2	INTEGRATED CIRCUIT MODULATOR (ESDS) (04713) 351-0043-010 A1U1	1	
R05G821JS	2	RESISTOR,FIXED CMPSN, 820 OHMS, 5%, 1/8W (81349) 745-1863-470 A1R37	1	
05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C16	1	
30-1544-001	2	RESISTOR,TEST SELECT (NON-PROCURABLE ITEM)	1	
CR05G621JS	3	RESISTOR,FIXED CMPSN, 620 OHMS, 5%, 1/8W (81349) 745-1863-440 A1R33	AR	
CR05G681JS	3	RESISTOR,FIXED CMPSN, 680 OHMS, 5%, 1/8W (81349) 745-1863-450 A1R33	AR	
CR05G751JS	2	RESISTOR,FIXED CMPSN, 750 OHMS, 5%, 1/8W (81349) 745-1863-460 A1R33	AR	
CR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R32	1	
CR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R106	1	
CR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R99	1	
N918	2	TRANSISTOR (04713) 352-0440-000 A1Q28	1	
CR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R102	1	
CR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R98	1	
N918	2	TRANSISTOR (04713) 352-0440-000 A1Q26	1	
K05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C47	1	
CR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R100	1	
CR05G302JS	2	RESISTOR,FIXED CMPSN, 3K, 5%, 1/8W (81349) 745-1863-600 A1R101	1	
CR05G821JS	2	RESISTOR,FIXED CMPSN, 820 OHMS, 5%, 1/8W (81349) 745-1863-470 A1R157	1	
139003/01-2357	2	CAPACITOR,FIXED ELCTLT, 1UF, 20%, 50V (81349) 184-9087-440 A1C53	1	
139003/01-2348	2	CAPACITOR,FIXED ELCTLT, 0.33UF, 20%, 50V (81349) 184-9087-350 A1C54	1	
RCR05G220JS	2	RESISTOR,FIXED CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 A1R159	1	
RCR05G683JS	2	RESISTOR,FIXED CMPSN, 68K, 5%, 1/8W (81349) 745-1863-930 A1R120	1	
RCR05G273JS	2	RESISTOR,FIXED CMPSN, 27K, 5%, 1/8W (81349) 745-1863-830 A1R119	1	
RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R121	1	
RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A1R126	1	
768-3177-023	2	POST,HEX	4	
P313-0156-000	2	NUT,PLAIN,HEX NP BRS, 4-40 (77250) 313-0156-000 (AP)	4	
M39003/01-2254	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 10%, 10V (81349) 184-9086-140 A1C51	1	
M39003/01-2254	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 10%, 10V (81349) 184-9086-140 A1C52	1	
M39003/01-2254	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 10%, 10V (81349) 184-9086-140 A1C50	1	
JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A1Q31	1	
RCR05G562JS	2	RESISTOR,FIXED CMPSN, 5.6K, 5%, 1/8W (81349) 745-1863-670 A1R84	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/4 251	RCR05G101JS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 5%, 1/8W (81349) 745-1863-250 A1R109	1	
/4 252	RCR05G114JS	2	RESISTOR,FIXED CMPSN, 110K, 5%, 1/8W (81349) 745-1864-020 A1R110	1	
/4 253	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R112	1	
/4 254	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q29	1	
/4 255	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C44	1	
/4 256	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR9	1	
/4 257	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C43	1	
/4 258	2N4208	2	TRANSISTOR (27014) 352-0959-020 A1Q25	1	
/4 259	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R95	1	
/4 260	RCR05G822JS	2	RESISTOR,FIXED CMPSN, 8.2K, 5%, 1/8W (81349) 745-1863-710 A1R97	1	
/4 261	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C40	1	
/4 262	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q23	1	
/4 263	RCR05G332JS	2	RESISTOR,FIXED CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 A1R86	1	
/4 264	601-3629-001	2	HANDLE	1	
	3515-20-13	2	WASHER,SPR TNSN CD PL STL, 0.363 ID X 0.510 OD (78189) 310-0355-000 (AP)	1	
/4 265	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C35	1	
/4 266	MS75089-8	2	COIL,RF 56UH (96906) 240-2715-340 A1L3	1	
/4 267	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A1C25	1	
/4 268	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR8	1	
/4 269	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R83	1	
/4 270	RCR05G220JS	2	RESISTOR,FIXED CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 A1R66	1	
/4 271	RCR05G220JS	2	RESISTOR,FIXED CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 A1R67	1	
/4 272	RCR05G220JS	2	RESISTOR,FIXED CMPSN, 22 OHMS, 5%, 1/8W (81349) 745-1863-090 A1R65	1	
/4 273	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C24	1	
/4-274	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A1R79	1	
/4 275	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A1CR7	1	
/4 276	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A1C28	1	
/4 277	MS75089-7	2	COIL,RF 47UH (96906) 240-2715-330 A1L2	1	
/4 278	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A1R74	1	
/4 279	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q21	1	
/4 280	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A1C26	1	
/4 281	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C32	1	
/4 282	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q22	1	
/4 283	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R81	1	
/4 284	RCR05G272JS	2	RESISTOR,FIXED CMPSN, 2.7K, 5%, 1/8W (81349) 745-1863-590 A1R80	1	
/4 285	RCR05G272JS	2	RESISTOR,FIXED CMPSN, 2.7K, 5%, 1/8W (81349) 745-1863-590 A1R85	1	
/4 286	RCR05G432JS	2	RESISTOR,FIXED CMPSN, 4.3K, 5%, 1/8W (81349) 745-1863-640 A1R89	1	
/4 287	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A1C39	1	
/4 288	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R88	1	
/4 289	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR14	1	
/4 290	RCR05G472JS	2	RESISTOR,FIXED CMPSN, 4.7K, 5%, 1/8W (81349) 745-1863-650 A1R87	1	
/4 291	RCR05G183JS	2	RESISTOR,FIXED CMPSN, 18K, 5%, 1/8W (81349) 745-1863-790 A1R91	1	
/4 292	2N918	2	TRANSISTOR (04713) 352-0440-000 A1Q24	1	
/4 293	RCR05G471JS	2	RESISTOR,FIXED CMPSN, 470 OHMS, 5%, 1/8W (81349) 745-1863-410 A1R93	1	
/4 294	RCR05G221JS	2	RESISTOR,FIXED CMPSN, 220 OHMS, 5%, 1/8W (81349) 745-1863-330 A1R92	1	
/4 295	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1L6	1	
/4 296	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A1C45	1	
/4 297	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q30	1	
/4 298	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR11	1	
/4 299	RCR05G113JS	2	RESISTOR,FIXED CMPSN, 11K, 5%, 1/8W (81349) 745-1863-740 A1R111	1	
/4 300	2N2484	2	TRANSISTOR (49956) 352-0549-000 A1Q32	1	
/4 301	RCR05G682JS	2	RESISTOR,FIXED CMPSN, 6.8K, 5%, 1/8W (81349) 745-1863-690 A1R118	1	
/4 302	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A1Q33	1	
/4 303	RCR05G203JS	2	RESISTOR,FIXED CMPSN, 20K, 5%, 1/8W (81349) 745-1863-800 A1R142	1	
/4 304	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A1CR4	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/4 305	RCR05G473JS	2	RESISTOR,FIXED CMPSN, 47K, 5%, 1/8W (81349) 745-1863-890 A1R113	1	
/4 306	7717-198N	2	INSULATOR,DISK (32559) 352-9552-500	30	

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1	11-	601-3668-001	A1C66	11/1-57	CK05BX103M
A1CR1	11/1-36	1N5767	A1C67	11/1-60	CK05BX103M
A1CR10	11/3-180	1N4454-1	A1C7	11/1-65	CK05BX104M
A1CR11	11/4-298	1N4454-1	A1C72	11/1-72	M39003/01-2258
A1CR12	11/3-169	1N4454-1	A1C73	11/1-11	M39003/01-2295
A1CR13	11/3-168	1N4454-1	A1C74	11/2-94	CD5EY270J0
A1CR14	11/4-289	1N4454-1	A1C75	11/2-151	CD5EY360J0
A1CR15	11/2-123	1N5767	A1C76	11/1-4	CK05BX103M
A1CR16	11/2-102	1N5767	A1C77	11/1-75	CK05BX103M
A1CR2	11/3-217	1N4454-1	A1C78	11/2-93	CK05BX103M
A1CR3	11/2-137	1N4454-1	A1C79	11/1-66	CK05BX104M
A1CR4	11/4-304	1N4454-1	A1C8	11/1-71	CK05BX103M
A1CR5	11/1-80	1N4454-1	A1C80	11/2-101	CK05BX103M
A1CR6	11/3-199	1N5767	A1C81	11/3-162	M39003/01-2258
A1CR7	11/4-275	1N5767	A1C9	11/1-64	CK05BX103M
A1CR8	11/4-268	1N5767	A1FL1	11/1-43	28449
A1CR9	11/4-256	1N5767	A1FL2	11/1-34	28450
A1C1	11/1-54	CK05BX103M	A1L1	11/3-198	MS75089-7
A1C10	11/1-31	CK05BX103M	A1L2	11/4-277	MS75089-7
A1C11	11/1-29	CK05BX102M	A1L3	11/4-266	MS75089-8
A1C12	11/2-115	CK05BX104M	A1L4	11/1-78	MS75089-11
A1C13	11/2-107	CK05BX103M	A1L5	11/1-76	MS75089-23
A1C14	11/2-106	M39003/01-2255	A1L6	11/4-295	MS75089-23
A1C15	11/2-122	CK05BX103M	A1P1	11/1-82	372-2623-030
A1C16	11/3-225	CK05BX103M	A1Q1	11/1-38	2N4208
A1C17	11/3-222	CK05BX103M	A1Q10	11/2-144	2N2484
A1C18	11/3-207	CK05BX102M	A1Q11	11/2-145	JAN2N2222A
A1C19	11/3-213	CK05BX102M	A1Q12	11/2-143	JAN2N2907A
A1C2	11/1-55	CK05BX103M	A1Q13	11/1-20	JAN2N2907A
A1C20	11/2-119	CK05BX103M	A1Q14	11/1-19	JAN2N2222A
A1C21	11/2-142	M39003/01-2357	A1Q15	11/1-24	JAN2N2222A
A1C22	11/2-144	M39003/01-2271	A1Q16	11/1-14	JAN2N2222A
A1C23	11/3-196	CK05BX104M	A1Q17	11/1-16	JAN2N2222A
A1C24	11/4-273	CK05BX103M	A1Q18	11/1-17	JAN2N2222A
A1C25	11/4-267	M39003/01-2283	A1Q19	11/3-201	2N918
A1C26	11/4-280	CK05BX104M	A1Q2	11/1-41	2N4208
A1C27	11/3-197	M39003/01-2283	A1Q20	11/3-210	2N918
A1C28	11/4-276	M39003/01-2283	A1Q21	11/4-279	2N918
A1C29	11/2-125	CK05BX103M	A1Q22	11/4-282	2N918
A1C3	11/1-56	CK05BX103M	A1Q23	11/4-262	2N918
A1C30	11/3-204	CK05BX103M	A1Q24	11/4-292	2N918
A1C31	11/3-202	CK05BX102M	A1Q25	11/4-258	2N4208
A1C32	11/4-281	CK05BX102M	A1Q26	11/3-233	2N918
A1C33	11/3-193	CK05BX103M	A1Q27	11/3-174	2N918
A1C34	11/3-190	CK05BX104M	A1Q28	11/3-230	2N918
A1C35	11/4-265	CK05BX102M	A1Q29	11/4-254	JAN2N2222A
A1C36	11/3-188	CK05BX103M	A1Q3	11/1-58	2N918
A1C37	11/3-218	CK05BX104M	A1Q30	11/4-297	JAN2N2222A
A1C38	11/3-182	CK05BX102M	A1Q31	11/4-249	JAN2N2907A
A1C39	11/4-287	CK05BX103M	A1Q32	11/4-300	2N2484
A1C4	11/1-48	CK05BX103M	A1Q33	11/4-302	JAN2N2222A
A1C40	11/4-261	CK05BX102M	A1Q34	11/3-167	2N2484
A1C41	11/3-177	CK05BX103M	A1Q35	11/3-163	JAN2N2222A
A1C43	11/4-257	CK05BX104M	A1Q36	11/1-3	JAN2N2222A
A1C44	11/4-255	CK05BX104M	A1Q37	11/1-6	2N2608
A1C45	11/4-296	CK05BX102M	A1Q38	11/2-130	JAN2N2222A
A1C46	11/3-184	CK05BX103M	A1Q39	11/3-186	2N918
A1C47	11/3-234	CK05BX103M	A1Q4	11/1-33	2N918
A1C48	11/3-175	CK05BX104M	A1Q5	11/3-185	2N4208
A1C49	11/3-172	CK05BX472M	A1Q6	11/2-129	JAN2N2907A
A1C5	11/1-50	CK05BX104M	A1Q7	11/2-128	2N2484
A1C50	11/4-248	M39003/01-2254	A1Q8	11/2-131	2N2484
A1C51	11/4-246	M39003/01-2254	A1Q9	11/2-113	2N2484
A1C52	11/4-247	M39003/01-2254	A1R1	11/1-47	RCR05G183JS
A1C53	11/3-238	M39003/01-2357	A1R10	11/1-40	RCR05G222JS
A1C54	11/3-239	M39003/01-2348	A1R100	11/3-235	RCR05G302JS
A1C55	11/2-91	M39003/01-2357	A1R101	11/3-236	RCR05G302JS
A1C56	11/1-9	CK05BX103M	A1R102	11/3-231	RCR05G102JS
A1C57	11/1-86	CK05BX104M	A1R103	11/3-178	RCR05G822JS
A1C58	11/1-87	M39003/01-2305	A1R104	11/3-181	RCR05G392JS
A1C59	11/1-5	M39003/01-2283	A1R105	11/3-179	RCR05G331JS
A1C6	11/1-39	CK05BX103M	A1R106	11/3-228	RCR05G221JS
A1C60	11/2-160	M39003/01-2305	A1R107	11/3-171	RCR05G470JS
A1C61	11/2-97	M39003/01-2357	A1R108	11/3-170	RCR05G302JS
A1C62	11/2-157	M39003/01-2254	A1R109	11/4-251	RCR05G101JS
A1C63	11/1-12	M39003/01-2305	A1R11	11/1-67	RCR05G561JS
A1C64	11/2-103	CK05BX102M	A1R110	11/4-252	RCR05G114JS
A1C65	11/1-79	M39003/01-2290	A1R111	11/4-299	RCR05G113JS

REFERENCE DESIGNATION
A1R112
A1R113
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A1R34
A1R35

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IBLY PARTS LIST

DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
:MPSN, 100 OHMS, 5%, 1/8W (81349)	1	
.1R109		
MPSN, 110K, 5%, 1/8W (81349)	1	
.1R110		
MPSN, 1K, 5%, 1/8W (81349)	1	
1R112		
9) 352-7500-280 A1Q29	1	
CER DIEL, 0.1UF, 20%, 50VDC (81349)	1	
1C44		
(28480) 922-6119-010 A1CR9	1	
CER DIEL, 0.1UF, 20%, 50VDC (81349)	1	
1C43		
4) 352-0959-020 A1Q25	1	
:MPSN, 2.2K, 5%, 1/8W (81349)	1	
1R95		
:MPSN, 8.2K, 5%, 1/8W (81349)	1	
1R97		
CER DIEL, 1000PF, 20%, 200V (81349)	1	
1C40		
3) 352-0440-000 A1Q23	1	
:MPSN, 3.3K, 5%, 1/8W (81349)	1	
1R86		
	1	
CD PL STL, 0.363 ID X 0.510 OD	1	
355-000 (AP)		
CER DIEL, 1000PF, 20%, 200V (81349)	1	
1C35		
9906) 240-2715-340 A1L3	1	
ELCTLT, 2.2UF, 10%, 20V (81349)	1	
1C25		
(28480) 922-6119-010 A1CR8	1	
:MPSN, 1K, 5%, 1/8W (81349)	1	
1R83		
:MPSN, 22 OHMS, 5%, 1/8W (81349)	1	
1R66		
:MPSN, 22 OHMS, 5%, 1/8W (81349)	1	
1R67		
:MPSN, 22 OHMS, 5%, 1/8W (81349)	1	
A1R65		
CER DIEL, 0.01UF, 20%, 100VDC	1	
019-660 A1C24		
CMPSN, 1K, 5%, 1/8W (81349)	1	
A1R79		
(28480) 922-6119-010 A1CR7	1	
ELCTLT, 2.2UF, 10%, 20V (81349)	1	
A1C28		
6906) 240-2715-330 A1L2	1	
CMPSN, 2.2K, 5%, 1/8W (81349)	1	
A1R74		
13) 352-0440-000 A1Q21	1	
CER DIEL, 0.1UF, 20%, 50VDC (81349)	1	
A1C26		
CER DIEL, 1000PF, 20%, 200V (81349)	1	
A1C32		
13) 352-0440-000 A1Q22	1	
CMPSN, 220 OHMS, 5%, 1/8W (81349)	1	
A1R81		
CMPSN, 2.7K, 5%, 1/8W (81349)	1	
A1R80		
CMPSN, 2.7K, 5%, 1/8W (81349)	1	
A1R85		
CMPSN, 4.3K, 5%, 1/8W (81349)	1	
A1R89		
CER DIEL, 0.01UF, 20%, 100VDC	1	
019-660 A1C39		
CMPSN, 220 OHMS, 5%, 1/8W (81349)	1	
A1R88		
(31433) 353-3644-010 A1CR14	1	
CMPSN, 4.7K, 5%, 1/8W (81349)	1	
A1R87		
CMPSN, 10K, 5%, 1/8W (81349)	1	
A1R91		
'13) 352-0440-000 A1Q24	1	
CMPSN, 470 OHMS, 5%, 1/8W (81349)	1	
A1R93		
CMPSN, 220 OHMS, 5%, 1/8W (81349)	1	
A1R92		
(96906) 240-2715-490 A1L6	1	
) CER DIEL, 1000PF, 20%, 200V (81349)	1	
A1C45		
349) 352-7500-280 A1Q30	1	
E (31433) 353-3644-010 A1CR11	1	
CMPSN, 11K, 5%, 1/8W (81349)	1	
A1R111		
956) 352-0549-000 A1Q32	1	
CMPSN, 6.8K, 5%, 1/8W (81349)	1	
A1R118		
349) 352-7500-280 A1Q33	1	
CMPSN, 20K, 5%, 1/8W (81349)	1	
A1R142		
E (31433) 353-3644-010 A1CR4	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11/4 305	RCR05G473JS	2	RESISTOR,FIXED CMPSN, 47K, 5%, 1/8W (81349) 745-1863-890 A1R113	1	
/4 306	7717-198N	2	INSULATOR,DISK (32559) 352-9552-580	39	

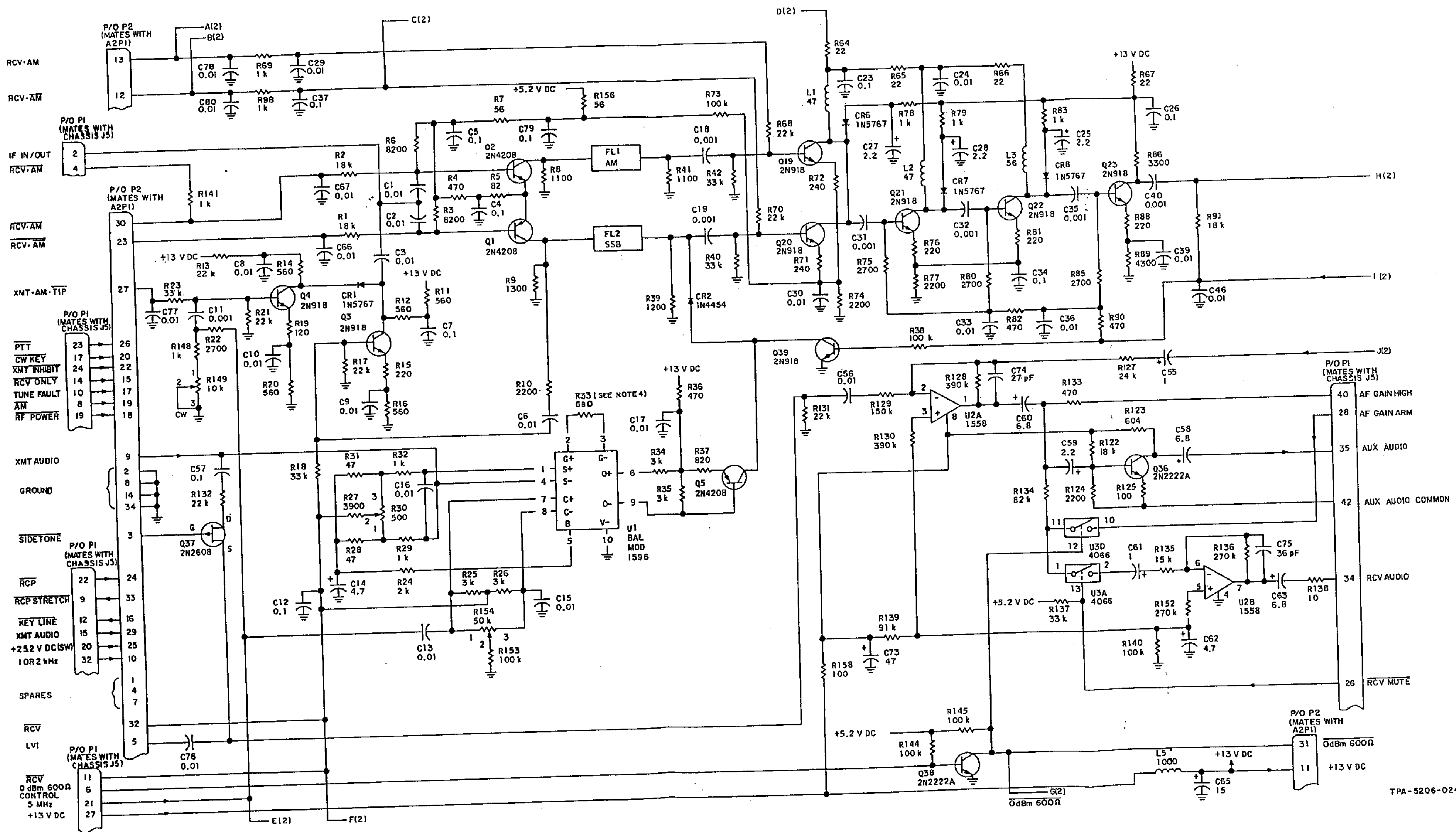
REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1	11-	601-3668-001	A1C66	11/1-57	CK05BX103M
A1CR1	11/1-36	1N5767	A1C67	11/1-60	CK05BX103M
A1CR10	11/3-180	1N4454-1	A1C7	11/1-65	CK05BX104M
A1CR11	11/4-298	1N4454-1	A1C72	11/1-72	M39003/01-2258
A1CR12	11/3-169	1N4454-1	A1C73	11/1-11	M39003/01-2295
A1CR13	11/3-168	1N4454-1	A1C74	11/2-94	CD5EY270J0
A1CR14	11/4-289	1N4454-1	A1C75	11/2-151	CD5EY360J0
A1CR15	11/2-123	1N5767	A1C76	11/1-4	CK05BX103M
A1CR16	11/2-102	1N5767	A1C77	11/1-75	CK05BX103M
A1CR2	11/3-217	1N4454-1	A1C78	11/2-93	CK05BX103M
A1CR3	11/2-137	1N4454-1	A1C79	11/1-66	CK05BX104M
A1CR4	11/4-304	1N4454-1	A1C8	11/1-71	CK05BX103M
A1CR5	11/1-80	1N4454-1	A1C80	11/2-101	CK05BX103M
A1CR6	11/3-199	1N5767	A1C81	11/3-162	M39003/01-2258
A1CR7	11/4-275	1N5767	A1C9	11/1-64	CK05BX103M
A1CR8	11/4-268	1N5767	A1FL1	11/1-43	28449
A1CR9	11/4-256	1N5767	A1FL2	11/1-34	28450
A1C1	11/1-54	CK05BX103M	A1L1	11/3-198	MS75089-7
A1C10	11/1-31	CK05BX103M	A1L2	11/4-277	MS75089-7
A1C11	11/1-29	CK05BX102M	A1L3	11/4-266	MS75089-8
A1C12	11/2-115	CK05BX104M	A1L4	11/1-78	MS75089-11
A1C13	11/2-107	CK05BX103M	A1L5	11/1-76	MS75089-23
A1C14	11/2-106	M39003/01-2255	A1L6	11/4-295	MS75089-23
A1C15	11/2-122	CK05BX103M	A1P1	11/1-82	372-2623-030
A1C16	11/3-225	CK05BX103M	A1Q1	11/1-38	2N4208
A1C17	11/3-222	CK05BX103M	A1Q10	11/2-144	2N2484
A1C18	11/3-207	CK05BX102M	A1Q11	11/2-145	JAN2N2222A
A1C19	11/3-213	CK05BX102M	A1Q12	11/2-143	JAN2N2907A
A1C2	11/1-55	CK05BX103M	A1Q13	11/1-20	JAN2N2907A
A1C20	11/2-119	CK05BX103M	A1Q14	11/1-19	JAN2N2222A
A1C21	11/2-142	M39003/01-2357	A1Q15	11/1-24	JAN2N2222A
A1C22	11/2-146	M39003/01-2271	A1Q16	11/1-14	JAN2N2222A
A1C23	11/3-196	CK05BX104M	A1Q17	11/1-16	JAN2N2222A
A1C24	11/4-273	CK05BX103M	A1Q18	11/1-17	JAN2N2222A
A1C25	11/4-267	M39003/01-2283	A1Q19	11/3-201	2N918
A1C26	11/4-280	CK05BX104M	A1Q2	11/1-41	2N4208
A1C27	11/3-197	M39003/01-2283	A1Q20	11/3-210	2N918
A1C28	11/4-276	M39003/01-2283	A1Q21	11/4-279	2N918
A1C29	11/2-125	CK05BX103M	A1Q22	11/4-282	2N918
A1C3	11/1-56	CK05BX103M	A1Q23	11/4-262	2N918
A1C30	11/3-204	CK05BX103M	A1Q24	11/4-292	2N918
A1C31	11/3-202	CK05BX102M	A1Q25	11/4-258	2N4208
A1C32	11/4-281	CK05BX102M	A1Q26	11/3-233	2N918
A1C33	11/3-193	CK05BX103M	A1Q27	11/3-174	2N918
A1C34	11/3-190	CK05BX104M	A1Q28	11/3-230	2N918
A1C35	11/4-265	CK05BX102M	A1Q29	11/4-254	JAN2N2222A
A1C36	11/3-188	CK05BX103M	A1Q3	11/1-58	2N918
A1C37	11/3-218	CK05BX104M	A1Q30	11/4-297	JAN2N2222A
A1C38	11/3-182	CK05BX102M	A1Q31	11/4-249	JAN2N2907A
A1C39	11/4-287	CK05BX103M	A1Q32	11/4-300	2N2484
A1C4	11/1-48	CK05BX103M	A1Q33	11/4-302	JAN2N2222A
A1C40	11/4-261	CK05BX102M	A1Q34	11/3-167	2N2484
A1C41	11/3-177	CK05BX103M	A1Q35	11/3-163	JAN2N2222A
A1C43	11/4-257	CK05BX104M	A1Q36	11/1-3	JAN2N2222A
A1C44	11/4-255	CK05BX104M	A1Q37	11/1-6	2N2608
A1C45	11/4-296	CK05BX102M	A1Q38	11/2-138	JAN2N2222A
A1C46	11/3-184	CK05BX103M	A1Q39	11/3-186	2N918
A1C47	11/3-234	CK05BX103M	A1Q4	11/1-33	2N918
A1C48	11/3-175	CK05BX104M	A1Q5	11/3-185	2N4208
A1C49	11/3-172	CK05BX472M	A1Q6	11/2-129	JAN2N2907A
A1C5	11/1-50	CK05BX104M	A1Q7	11/2-128	2N2484
A1C50	11/4-248	M39003/01-2254	A1Q8	11/2-131	2N2484
A1C51	11/4-246	M39003/01-2254	A1Q9	11/2-113	2N2484
A1C52	11/4-247	M39003/01-2254	A1R1	11/1-47	RCR05G103JS
A1C53	11/3-238	M39003/01-2357	A1R10	11/1-40	RCR05G222JS
A1C54	11/3-239	M39003/01-2348	A1R100	11/3-235	RCR05G302JS
A1C55	11/2-91	M39003/01-2357	A1R101	11/3-236	RCR05G302JS
A1C56	11/1-9	CK05BX103M	A1R102	11/3-231	RCR05G102JS
A1C57	11/1-86	CK05BX104M	A1R103	11/3-178	RCR05G822JS
A1C58	11/1-87	M39003/01-2305	A1R104	11/3-181	RCR05G392JS
A1C59	11/1-5	M39003/01-2283	A1R105	11/3-179	RCR05G331JS
A1C6	11/1-39	CK05BX103M	A1R106	11/3-228	RCR05G221JS
A1C60	11/2-160	M39003/01-2305	A1R107	11/3-171	RCR05G470JS
A1C61	11/2-97	M39003/01-2357	A1R108	11/3-170	RCR05G302JS
A1C62	11/2-157	M39003/01-2254	A1R109	11/4-251	RCR05G101JS
A1C63	11/1-12	M39003/01-2305	A1R11	11/1-67	RCR05G561JS
A1C64	11/2-103	CK05BX102M	A1R110	11/4-252	RCR05G114JS
A1C65	11/1-79	M39003/01-2290	A1R111	11/4-299	RCR05G113JS

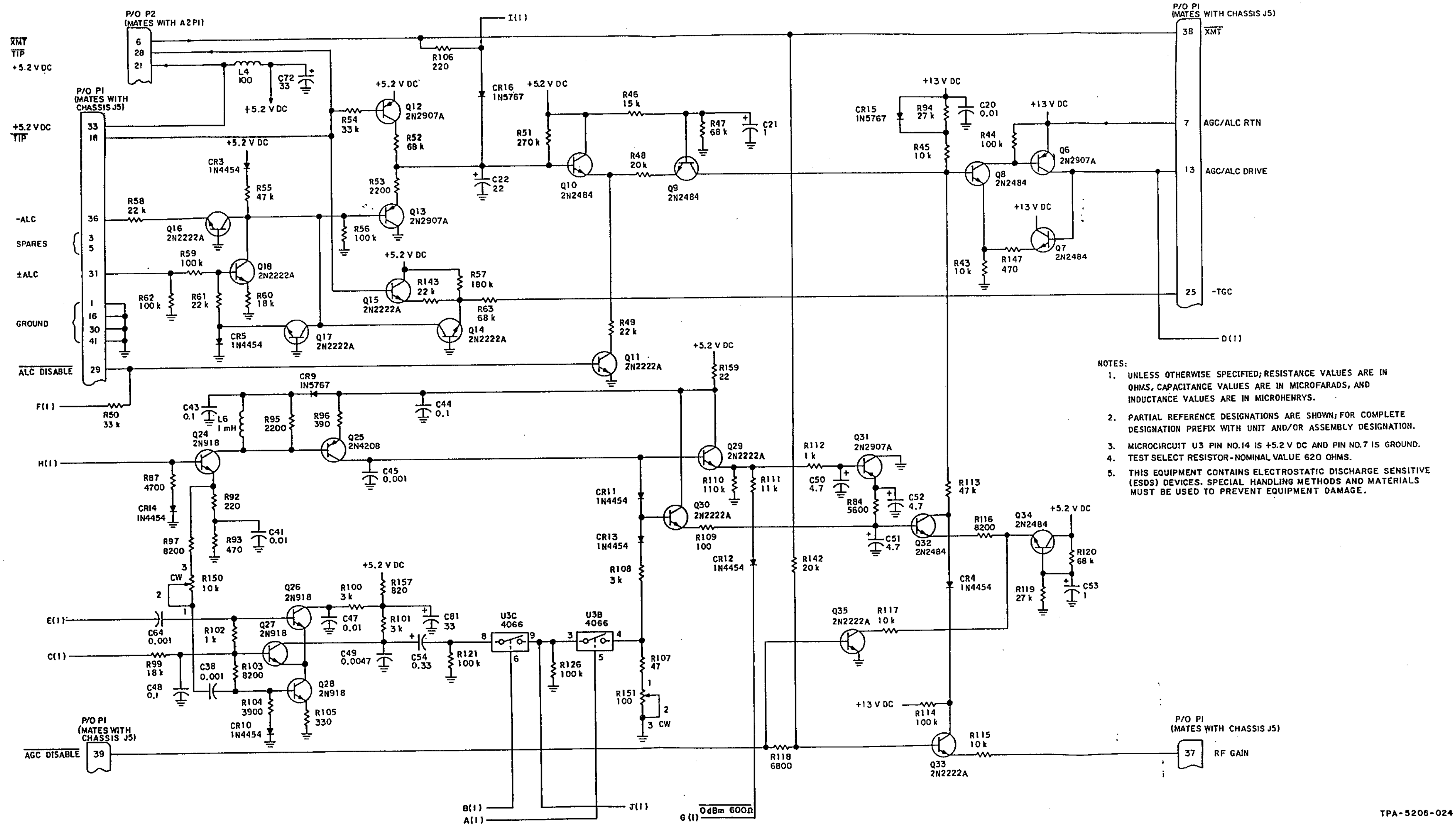
REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1R112	11/4-253	RCR05G102JS	A1R36	11/3-219	RCR05G471JS
A1R113	11/4-305	RCR05G473JS	A1R37	11/3-224	RCR05G821JS
A1R114	11/3-161	RCR05G104JS	A1R38	11/3-187	RCR05G104JS
A1R115	11/3-165	RCR05G103JS	A1R39	11/3-212	RCR05G122JS
A1R116	11/3-166	RCR05G822JS	A1R4	11/1-49	RCR05G471JS
A1R117	11/3-164	RCR05G103JS	A1R40	11/3-215	RCR05G333JS
A1R118	11/4-301	RCR05G682JS	A1R41	11/3-206	RCR05G112JS
A1R119	11/3-242	RCR05G273JS	A1R42	11/3-208	RCR05G333JS
A1R12	11/1-59	RCR05G561JS	A1R43	11/2-126	RCR05G103JS
A1R120	11/3-241	RCR05G683JS	A1R44	11/2-120	RCR05G104JS
A1R121	11/3-243	RCR05G104JS	A1R45	11/2-124	RCR05G103JS
A1R122	11/1-88	RCR05G183JS	A1R46	11/2-140	RCR05G153JS
A1R123	11/1-2	RNC55H6040FS	A1R47	11/2-141	RCR05G683JS
A1R124	11/1-89	RCR05G222JS	A1R48	11/2-134	RCR05G203JS
A1R125	11/1-1	RCR05G101JS	A1R49	11/2-135	RCR05G223JS
A1R126	11/3-244	RCR05G104JS	A1R5	11/1-42	RCR05G820JS
A1R127	11/2-159	RCR05G243JS	A1R50	11/2-105	RCR05G333JS
A1R128	11/2-92	RCR05G394JS	A1R51	11/2-149	RCR05G274JS
A1R129	11/2-158	RCR05G154JS	A1R52	11/2-150	RCR05G683JS
A1R13	11/1-67	RCR05G223JS	A1R53	11/2-148	RCR05G222JS
A1R130	11/2-156	RCR05G394JS	A1R54	11/2-136	RCR05G333JS
A1R131	11/1-8	RCR05G223JS	A1R55	11/2-138	RCR05G473JS
A1R132	11/1-10	RCR05G223JS	A1R56	11/2-139	RCR05G104JS
A1R133	11/1-7	RCR05G471JS	A1R57	11/1-21	RCR05G184JS
A1R134	11/2-90	RCR05G823JS	A1R58	11/1-13	RCR05G223JS
A1R135	11/2-98	RCR05G153JS	A1R59	11/1-18	RCR05G104JS
A1R136	11/2-152	RCR05G274JS	A1R6	11/1-45	RCR05G822JS
A1R137	11/2-99	RCR05G333JS	A1R60	11/2-147	RCR05G183JS
A1R138	11/1-81	RCR05G100JS	A1R61	11/1-15	RCR05G223JS
A1R139	11/2-153	RCR05G913JS	A1R62	11/1-74	RCR05G104JS
A1R14	11/1-70	RCR05G561JS	A1R63	11/1-22	RCR05G683JS
A1R140	11/2-155	RCR05G104JS	A1R64	11/3-216	RCR05G220JS
A1R141	11/1-52	RCR05G102JS	A1R65	11/4-272	RCR05G220JS
A1R142	11/4-303	RCR05G203JS	A1R66	11/4-270	RCR05G220JS
A1R143	11/1-23	RCR05G223JS	A1R67	11/4-271	RCR05G220JS
A1R144	11/1-73	RCR05G104JS	A1R68	11/3-209	RCR05G223JS
A1R145	11/2-133	RCR05G104JS	A1R69	11/2-100	RCR05G102JS
A1R147	11/2-132	RCR05G471JS	A1R7	11/1-51	RCR05G560JS
A1R148	11/1-26	RCR05G102JS	A1R70	11/3-214	RCR05G223JS
A1R149	11/1-28	3329H-CY3-103	A1R71	11/3-211	RCR05G241JS
A1R15	11/1-62	RCR05G221JS	A1R72	11/3-203	RCR05G241JS
A1R150	11/3-183	3329H-CY3-103	A1R73	11/3-205	RCR05G104JS
A1R151	11/3-173	3329H-CY3-101	A1R74	11/4-278	RCR05G222JS
A1R152	11/2-154	RCR05G274JS	A1R75	11/3-200	RCR05G272JS
A1R153	11/2-110	RCR05G104JS	A1R76	11/3-195	RCR05G221JS
A1R154	11/2-111	3329H-CY3-503	A1R77	11/3-189	RCR05G222JS
A1R156	11/1-68	RCR05G560JS	A1R78	11/3-194	RCR05G102JS
A1R157	11/3-237	RCR05G821JS	A1R79	11/4-274	RCR05G102JS
A1R158	11/1-77	RCR05G101JS	A1R8	11/1-44	RCR05G112JS
A1R159	11/3-240	RCR05G220JS	A1R80	11/4-284	RCR05G272JS
A1R16	11/1-63	RCR05G561JS	A1R81	11/4-283	RCR05G221JS
A1R17	11/1-61	RCR05G223JS	A1R82	11/3-191	RCR05G471JS
A1R18	11/1-37	RCR05G333JS	A1R83	11/4-269	RCR05G102JS
A1R19	11/1-32	RCR05G121JS	A1R84	11/4-250	RCR05G562JS
A1R2	11/1-53	RCR05G183JS	A1R85	11/4-285	RCR05G272JS
A1R20	11/2-127	RCR05G561JS	A1R86	11/4-263	RCR05G332JS
A1R21	11/1-30	RCR05G223JS	A1R87	11/4-290	RCR05G472JS
A1R22	11/1-25	RCR05G222JS	A1R88	11/4-288	RCR05G221JS
A1R23	11/1-27	RCR05G333JS	A1R89	11/4-286	RCR05G432JS
A1R24	11/2-116	RCR05G202JS	A1R9	11/1-35	RCR05G132JS
A1R25	11/2-117	RCR05G302JS	A1R90	11/3-192	RCR05G471JS
A1R26	11/2-118	RCR05G302JS	A1R91	11/4-291	RCR05G183JS
A1R27	11/2-114	RCR05G392JS	A1R92	11/4-294	RCR05G221JS
A1R28	11/2-109	RCR05G470JS	A1R93	11/4-293	RCR05G471JS
A1R29	11/2-104	RCR05G102JS	A1R94	11/2-121	RCR05G273JS
A1R3	11/1-46	RCR05G822JS	A1R95	11/4-259	RCR05G222JS
A1R30	11/2-112	3329H-CY3-501	A1R96	11/3-176	RCR05G391JS
A1R31	11/2-108	RCR05G470JS	A1R97	11/4-260	RCR05G822JS
A1R32	11/3-227	RCR05G102JS	A1R98	11/3-232	RCR05G102JS
A1R33	11/3-226	RCR05G621JS	A1R99	11/3-229	RCR05G183JS
A1R33	11/3-226	RCR05G681JS	A1U1	11/3-223	MC1596G
A1R33	11/3-226	RCR05G751JS	A1U2	11/2-96	UA1558HMQ
A1R34	11/3-221	RCR05G302JS	A1U3	11/2-95	CD4066BF
A1R35	11/3-220	RCR05G302JS			

IF/AF A1, Parts Location
Figure 11 (Sheet 6)

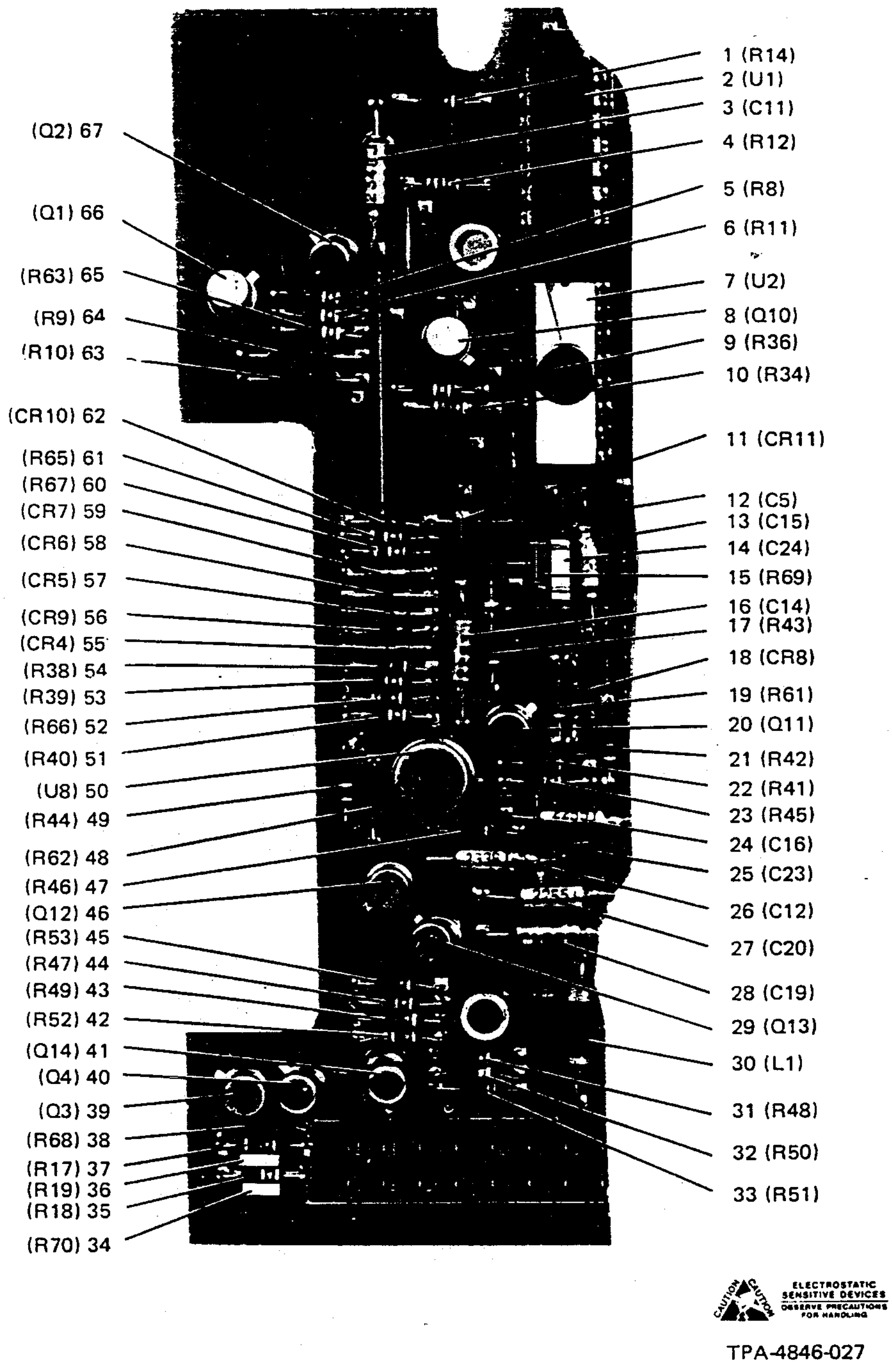


IF/AF A1, Schematic Diagram
Figure 12 (Sheet 1 of 2)

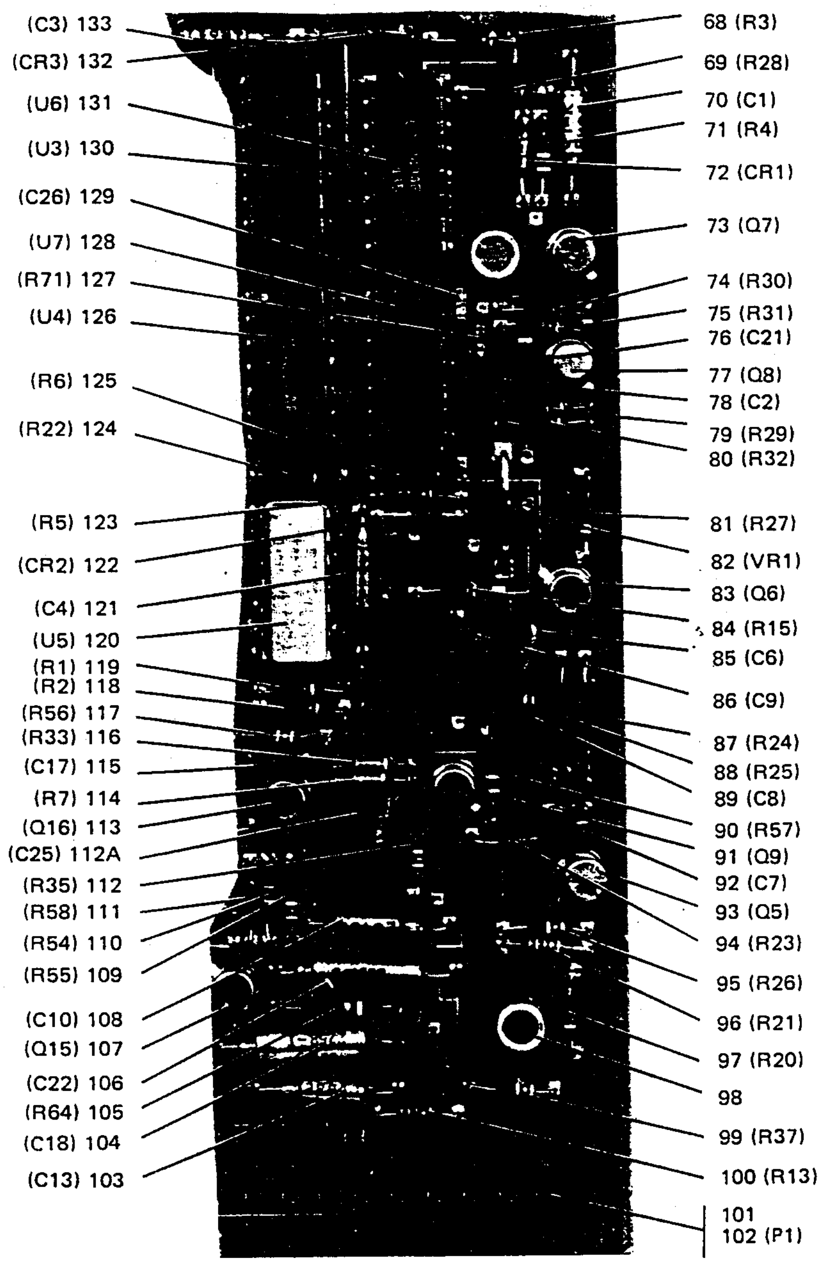


NOTES:
1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, AND INDUCTANCE VALUES ARE IN MICROHENRYS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. MICROCIRCUIT U3 PIN NO.14 IS +5.2 V DC AND PIN NO.7 IS GROUND.
4. TEST SELECT RESISTOR-NOMINAL VALUE 620 OHMS.
5. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE.

IF/AF A1, Schematic Diagram
Figure 12 (Sheet 2)



Logic/TX A2, Parts Location
Figure 13 (Sheet 1 of 3)



CAUTION ELECTROSTATIC SENSITIVE DEVICES OBSERVE PRECAUTIONS FOR HANDLING

TPA-4846-027

Logic/TX A2, Parts Location
Figure 13 (Sheet 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
13-	601-3669-001	1	LOGIC/TX CARD (ESDS) A2 (SEE FIG 10-1 FOR NHA)	REF	
/1 1	RCR05G125JS	2	RESISTOR,FIXED CMPSN, 1.2MEGO, 5%, 1/8W (81349) 745-1864-270 A2R14	1	
/1 2	CD4025UBF	2	INTEGRATED CIRCUIT GATE (ESDS) (02735) 351-8163-010 A2U1	1	
/1 3	M39003/01-2348	2	CAPACITOR,FIXED ELCTLT, 0.33UF, 20%, 50V (81349) 184-9087-350 A2C11	1	
/1 4	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A2R12	1	
/1 5	RCR05G104KS	2	RESISTOR,FIXED CMPSN, 100K, 10%, 1/8W (81349) 745-2413-000 A2R8	1	
/1 6	RCR05G224JS	2	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R11	1	
/1 7	CD4049UBF	2	INTEGRATED CIRCUIT BUFFER (ESDS) (02735) 351-8197-010 A2U2	1	
/1 8	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A2Q10	1	
/1 9	RCR05G104KS	2	RESISTOR,FIXED CMPSN, 100K, 10%, 1/8W (81349) 745-2413-000 A2R36	1	
/1 10	RCR05G333KS	2	RESISTOR,FIXED CMPSN, 33K, 10%, 1/8W (81349) 745-2395-000 A2R34	1	
/1 11	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A2CR11	1	
/1 12	CK05BX102M	2	CAPACITOR,FIXED CER DIEL, 1000PF, 20%, 200V (81349) 913-3989-000 A2C5	1	
/1 13	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A2C15	1	
/1 14	M39003/01-2348	2	CAPACITOR,FIXED ELCTLT, 0.33UF, 20%, 50V (81349) 184-9087-350 A2C24	1	
/1 15	RCR05G684JS	2	RESISTOR,FIXED CMPSN, 680K, 5%, 1/8W (81349) 745-1864-210 A2R69	1	
/1 16	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A2C14	1	
/1 17	RCR05G681JS	2	RESISTOR,FIXED CMPSN, 680 OHMS, 5%, 1/8W (81349) 745-1863-450 A2R43	1	
/1 18	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR8	1	
/1 19	RCR05G105JS	2	RESISTOR,FIXED CMPSN, 1MEGO, 5%, 1/8W (81349) 745-1864-250 A2R61	1	
/1 20	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A2Q11	1	
/1 21	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A2R42	1	
/1 22	RCR05G224JS	2	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R41	1	
/1 23	RCR05G824JS	2	RESISTOR,FIXED CMPSN, 820K, 5%, 1/8W (81349) 745-1864-230 A2R45	1	
/1 24	M39003/01-2255	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 20%, 10V (81349) 184-9086-150 A2C16	1	
/1 25	CD5CC100D0	2	CAPACITOR,FIXED MICA DIEL, 10PF, PORM 0.5PF, 300V (93790) 912-4141-020 A2C23	1	
/1 26	M39003/01-2338	2	CAPACITOR,FIXED ELCTLT, 0.1UF, 10%, 50V (81349) 184-9087-250 A2C12	1	
/1 27	M39003/01-2255	2	CAPACITOR,FIXED ELCTLT, 4.7UF, 20%, 10V (81349) 184-9086-150 A2C20	1	
/1 28	M39003/01-2284	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 20%, 20V (81349) 184-9086-440 A2C19	1	
/1 29	2N2608	2	TRANSISTOR (04713) 352-0605-010 A2Q13	1	
/1 30	MS75089-11	2	COIL,RF 100UH (96906) 240-2715-370 A2L1	1	
/1 31	RCR05G680JS	2	RESISTOR,FIXED CMPSN, 68 OHMS, 5%, 1/8W (81349) 745-1863-210 A2R48	1	
/1 32	RCR05G682JS	2	RESISTOR,FIXED CMPSN, 6.8K, 5%, 1/8W (81349) 745-1863-690 A2R50	1	
/1 33	RCR05G621JS	2	RESISTOR,FIXED CMPSN, 620 OHMS, 5%, 1/8W (81349) 745-1863-440 A2R51	1	
/1 34	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A2R70	1	
/1-35	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A2R18	1	
/1 36	RCR05G223JS	2	RESISTOR,FIXED CMPSN, 22K, 5%, 1/8W (81349) 745-1863-810 A2R19	1	
/1 37	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A2R17	1	
/1 38	RCR05G103JS	2	RESISTOR,FIXED CMPSN, 10K, 5%, 1/8W (81349) 745-1863-730 A2R68	1	
/1 39	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A2Q3	1	
/1 40	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A2Q4	1	
/1 41	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A2Q14	1	
/1 42	RCR05G332JS	2	RESISTOR,FIXED CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 A2R52	1	
/1 43	RCR05G682JS	2	RESISTOR,FIXED CMPSN, 6.8K, 5%, 1/8W (81349) 745-1863-690 A2R49	1	
/1 44	RCR05G303JS	2	RESISTOR,FIXED CMPSN, 30K, 5%, 1/8W (81349) 745-1863-840 A2R47	1	
/1 45	RCR05G101JS	2	RESISTOR,FIXED CMPSN, 100 OHMS, 5%, 1/8W (81349) 745-1863-250 A2R53	1	
/1 46	2N2608	2	TRANSISTOR (04713) 352-0605-010 A2Q12	1	
/1 47	RCR05G105JS	2	RESISTOR,FIXED CMPSN, 1MEGO, 5%, 1/8W (81349) 745-1864-250 A2R46	1	
/1 48	RCR05G335JS	2	RESISTOR,FIXED CMPSN, 3.3MEGO, 5%, 1/8W (81349) 745-1864-370 A2R62	1	
/1 49	RCR05G824JS	2	RESISTOR,FIXED CMPSN, 820K, 5%, 1/8W (81349) 745-1864-230 A2R44	1	
/1 50	UA1558HMG	2	INTEGRATED CIRCUIT OPRTNL AMPLIFIER (07263) 351-1071-020 A2U8	1	
/1 51	RCR05G224JS	2	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R40	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
13/1 52	RCR05G332JS	2	RESISTOR,FIXED CMPSN, 3.3K, 5%, 1/8W (81349) 745-1863-610 A2R66	1	
/1 53	RCR05G824JS	2	RESISTOR,FIXED CMPSN, 820K, 5%, 1/8W (81349) 745-1864-230 A2R39	1	
/1 54	RN55D2742F	2	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W (81349) 705-1065-000 A2R38	1	
/1 55	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR4	1	
/1 56	1N5767	2	SEMICOND DEVICE (28480) 922-6119-010 A2CR9	1	
/1 57	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR5	1	
/1 58	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR6	1	
/1 59	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR7	1	
/1 60	RCR05G474JS	2	RESISTOR,FIXED CMPSN, 470K, 5%, 1/8W (81349) 745-1864-170 A2R67	1	
/1 61	RCR05G474JS	2	RESISTOR,FIXED CMPSN, 470K, 5%, 1/8W (81349) 745-1864-170 A2R65	1	
/1 62	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR10	1	
/1 63	RN55D3013F	2	RESISTOR,FIXED FILM, 301K, 1%, 1/8W (81349) 705-1115-000 A2R10	1	
/1 64	RN55D1963F	2	RESISTOR,FXD FILM, 196K, 1%, 1/8W (81349) 705-1106-000 A2R9	1	
/1 65	RCR05G104KS	2	RESISTOR,FIXED CMPSN, 100K, 10%, 1/8W (81349) 745-2413-000 A2R63	1	
/1 66	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A2Q1	1	
/1 67	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A2Q2	1	
/2 68	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (81349) 745-1863-490 A2R3	1	
/2 69	RCR05G682JS	2	RESISTOR,FIXED CMPSN, 6.8K, 5%, 1/8W (81349) 745-1863-690 A2R28	1	
/2 70	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A2C1	1	
/2 71	RCR05G824JS	2	RESISTOR,FIXED CMPSN, 820K, 5%, 1/8W (81349) 745-1864-230 A2R4	1	
/2 72	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR1	1	
/2-73	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A2Q7	1	
/2 74	RCR05G331JS	2	RESISTOR,FIXED CMPSN, 330 OHMS, 5%, 1/8W (81349) 745-1863-370 A2R30	1	
/2 75	RCR05G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/8W (81349) 745-2377-000 A2R31	1	
/2 76	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A2C21	1	
/2 77	JAN2N2222A	2	TRANSISTOR (81349) 352-7500-280 A2Q8	1	
/2 78	CK05BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A2C2	1	
/2 79	RCR05G224JS	2	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R29	1	
/2 80	RCR05G105JS	2	RESISTOR,FIXED CMPSN, 1MEGO, 5%, 1/8W (81349) 745-1864-250 A2R32	1	
/2 80A	CK05BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A2C27	1	
/2 81	RCR05G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/8W (81349) 745-2377-000 A2R27	1	
/2 82	1N4753A	2	SEMICOND DEVICE (04713) 353-6481-510 A2VR1	1	
/2 83	2N4416	2	TRANSISTOR (12040) 352-0756-010 A2Q6	1	
/2 84	RCR05G684JS	2	RESISTOR,FIXED CMPSN, 680K, 5%, 1/8W (81349) 745-1864-210 A2R15 (EFF TO REV LTR M)	1	
/2 85	CD5FY401J0	2	CAPACITOR,FIXED MICA DIEL, 400PF, 5%, 50V (93790) 912-4141-520 A2C6	1	
/2 86	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A2C9	1	
/2 87	RN55D2613F	2	RESISTOR,FXD FILM, 261K, 1%, 1/8W (81349) 705-1112-000 A2R24	1	
/2 88	RN55D1213F	2	RESISTOR,FXD FILM, 121K, 1%, 1/8W (81349) 705-1096-000 A2R25	1	
/2 89	CD5FY201J0	2	CAPACITOR,FIXED MICA DIEL, 200PF, 5%, 50V (93790) 912-4141-440 A2C8	1	
/2 90	RCR05G224JS	2	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R57	1	
/2 91	JAN2N2907A	2	TRANSISTOR (81349) 352-7500-190 A2Q9	1	
/2 92	CD5FY201J0	2	CAPACITOR,FIXED MICA DIEL, 200PF, 5%, 50V (93790) 912-4141-440 A2C7	1	
/2 93	2N2608	2	TRANSISTOR (04713) 352-0605-010 A2Q5	1	
/2 94	RN55D2613F	2	RESISTOR,FXD FILM, 261K, 1%, 1/8W (81349) 705-1112-000 A2R23	1	
/2 95	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A2R26	1	
/2 96	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A2R21	1	
/2 97	RCR05G222JS	2	RESISTOR,FIXED CMPSN, 2.2K, 5%, 1/8W (81349) 745-1863-570 A2R20	1	
/2 98	778-9422-020	2	SLEEVE,SPACER	4	
/2 99	RCR05G154JS	2	RESISTOR,FIXED CMPSN, 150K, 5%, 1/8W (81349) 745-1864-050 A2R37	1	
/2 100	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A2R13	1	
/2 101	372-2252-010	2	CONTACT,ELECTRICAL (57863)	34	
/2 102	372-2624-026	2	HOUSING,CONN A2P1	1	
/2 103	M39003/01-2284	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 20%, 20V (81349) 184-9086-440 A2C13	1	
/2 104	M39003/01-2258	2	CAPACITOR,FIXED ELCTLT, 33UF, 20%, 10V (81349) 184-9086-180 A2C18	1	
/2 105	RCR07G100KS	2	RESISTOR,FIXED CMPSN, 10 OHMS, 10%, 1/4W (81349) 745-0677-000 A2R64	1	

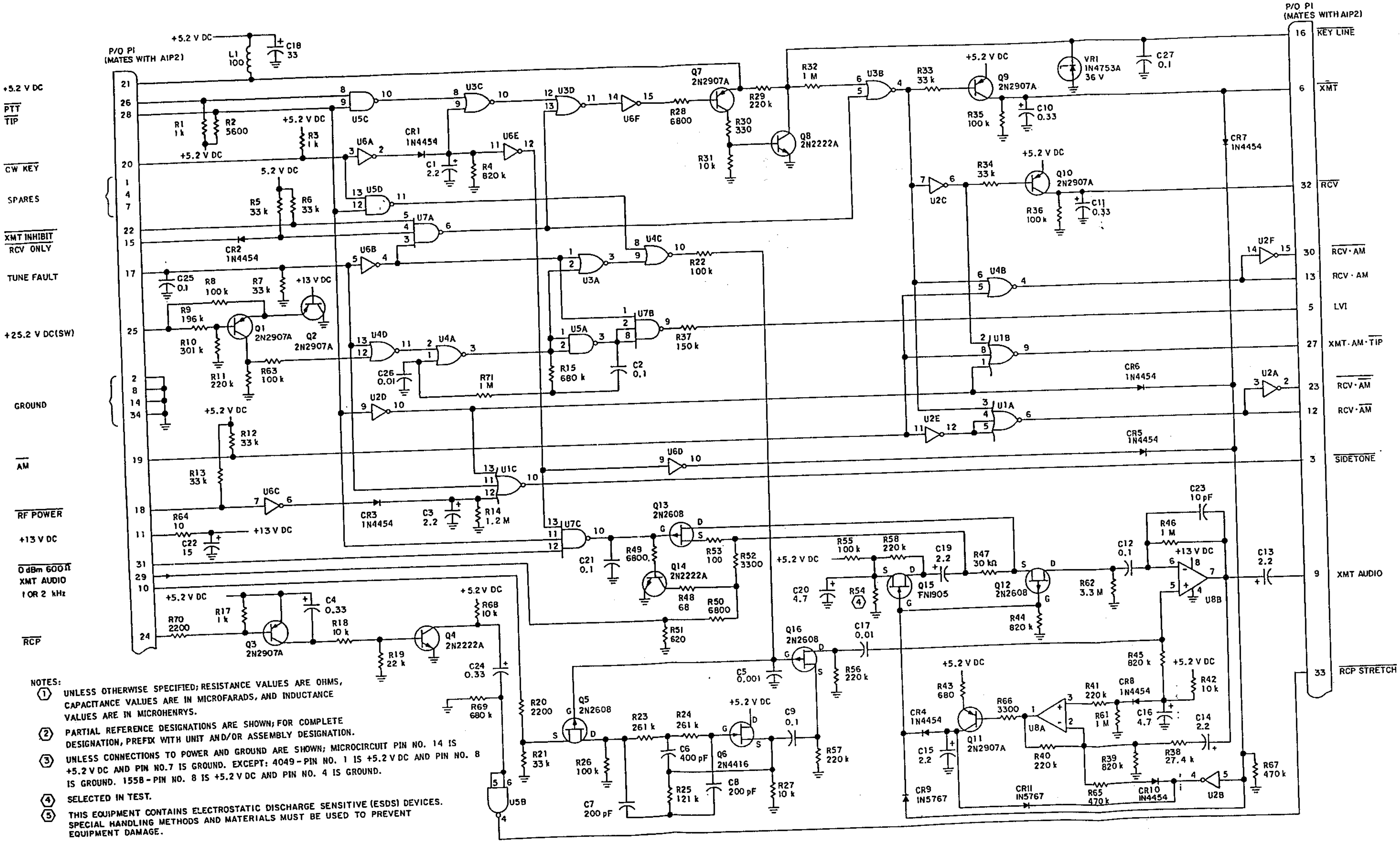
GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
13/2 106	M39003/01-2290	2	CAPACITOR,FIXED ELCTLT, 15UF, 20%, 20V (81349) 184-9086-500 A2C22	1	
/2 107	SF50095	2	TRANSISTOR (12040) 352-0756-050 A2Q15	1	
/2-108	M39003/01-2348	2	CAPACITOR,FIXED ELCTLT, 0.33UF, 20%, 50V (81349) 184-9087-350 A2C10	1	
/2 109	RCR05G104JS	2	RESISTOR,FIXED CMPSN, 100K, 5%, 1/8W (81349) 745-1864-010 A2R55	1	
	646-5530-001	2	RESISTOR,TEST SELECT (NON-PROCURABLE ITEM)	1	
/2 110	RCR05G154JS	3	RESISTOR,FIXED CMPSN, 150K, 5%, 1/8W (81349) 745-1864-050 A2R54	AR	
/2 110	RCR05G184JS	3	RESISTOR,FIXED CMPSN, 180K, 5%, 1/8W (81349) 745-1864-070 A2R54	AR	
/2 110	RCR05G224JS	3	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R54	AR	
/2 110	RCR05G274JS	3	RESISTOR,FIXED CMPSN, 270K, 5%, 1/8W (81349) 745-1864-110 A2R54	AR	
/2 110	RCR05G334JS	3	RESISTOR,FIXED CMPSN, 330K, 5%, 1/8W (81349) 745-1864-130 A2R54	AR	
/2 110	RCR05G394JS	3	RESISTOR,FIXED CMPSN, 390K, 5%, 1/8W (81349) 745-1864-150 A2R54	AR	
/2 110	RCR05G474JS	3	RESISTOR,FIXED CMPSN, 470K, 5%, 1/8W (81349) 745-1864-170 A2R54	AR	
/2 110	RCR05G564JS	3	RESISTOR,FIXED CMPSN, 560K, 5%, 1/8W (81349) 745-1864-190 A2R54	AR	
/2 110	RCR05G684JS	3	RESISTOR,FIXED CMPSN, 680K, 5%, 1/8W (81349) 745-1864-210 A2R54	AR	
/2 110	RCR05G824JS	3	RESISTOR,FIXED CMPSN, 820K, 5%, 1/8W (81349) 745-1864-230 A2R54	AR	
/2 110	RCR05G105JS	3	RESISTOR,FIXED CMPSN, 1MEGO, 5%, 1/8W (81349) 745-1864-250 A2R54	AR	
/2 111	RCR05G224JS	2	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R58	1	
/2 112	RCR05G104KS	2	RESISTOR,FIXED CMPSN, 100K, 10%, 1/8W (81349) 745-2413-000 A2R35	1	
/2 112A	CK05BX104M	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 20%, 50VDC (81349) 913-5019-720 A2C25	1	
/2 113	2N2608	2	TRANSISTOR (04713) 352-0605-010 A2Q16	1	
/2 114	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A2R7	1	
/2 115	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A2C17	1	
/2 116	RCR05G333KS	2	RESISTOR,FIXED CMPSN, 33K, 10%, 1/8W (81349) 745-2395-000 A2R33	1	
/2 117	RCR05G224JS	2	RESISTOR,FIXED CMPSN, 220K, 5%, 1/8W (81349) 745-1864-090 A2R56	1	
/2 118	RCR05G562JS	2	RESISTOR,FIXED CMPSN, 5.6K, 5%, 1/8W (81349) 745-1863-670 A2R2	1	
/2 119	RCR05G102JS	2	RESISTOR,FIXED CMPSN, 1K, 5%, 1/8W (813491 745-1863-490 A2R1	1	
/2 120	CD4093BMJ	2	INTEGRATED CIRCUIT TRIGGER GATE (ESDS) (27014) 351-8332-020 A2U5	1	
/2 121	M39003/01-2348	2	CAPACITOR,FIXED ELCTLT, 0.33UF, 20%, 50V (81349) 184-9087-350 A2C4	1	
/2 122	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR2	1	
/2 123	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A2R5	1	
/2 124	RCR05G104KS	2	RESISTOR,FIXED CMPSN, 100K, 10%, 1/8W (81349) 745-2413-000 A2R22	1	
/2 125	RCR05G333JS	2	RESISTOR,FIXED CMPSN, 33K, 5%, 1/8W (81349) 745-1863-850 A2R6	1	
/2 126	SCL4001UBC	2	INTEGRATED CIRCUIT MOS (ESDS) (31039) 351-8160-010 A2U4	1	
/2 127	RCR05G105JS	2	RESISTOR,FIXED CMPSN, 1MEGO, 5%, 1/8W (81349) 745-1864-250 A2R71	1	
/2 128	CD4023UBF	2	INTEGRATED CIRCUIT GATE (ESDS) (02735) 351-8184-010 A2U7	1	
/2-129	CK05BX103M	2	CAPACITOR,FIXED CER DIEL, 0.01UF, 20%, 100VDC (81349) 913-5019-660 A2C26	1	
/2 130	SCL4001UBC	2	INTEGRATED CIRCUIT MOS (ESDS) (31039) 351-8160-010 A2U3	1	
/2 131	CD4049UBF	2	INTEGRATED CIRCUIT BUFFER (ESDS) (02735) 351-8197-010 A2U6	1	
/2 132	1N4454-1	2	SEMICOND DEVICE (31433) 353-3644-010 A2CR3	1	
/2 133	M39003/01-2283	2	CAPACITOR,FIXED ELCTLT, 2.2UF, 10%, 20V (81349) 184-9086-430 A2C3	1	
/2 134	372-2601-026	2	CONTACT,ELECTRICAL	5	
/2 135	372-2601-010	2	CONTACT,ELECTRICAL	2	
/2 136	7717-198N	2	INSULATOR,DISK (32559) 352-9552-580	16	

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A2	13-	601-3669-001	A2R24	13/2-87	RN55D2613F
A2CR1	13/2-72	1N4454-1	A2R25	13/2-88	RN55D1213F
A2CR10	13/1-62	1N4454-1	A2R26	13/2-95	RCR05G104JS
A2CR11	13/1-11	1N5767	A2R27	13/2-81	RCR05G103KS
A2CR2	13/2-122	1N4454-1	A2R28	13/2-69	RCR05G682JS
A2CR3	13/2-132	1N4454-1	A2R29	13/2-79	RCR05G224JS
A2CR4	13/1-55	1N4454-1	A2R3	13/2-68	RCR05G102JS
A2CR5	13/1-57	1N4454-1	A2R30	13/2-74	RCR05G331JS
A2CR6	13/1-58	1N4454-1	A2R31	13/2-75	RCR05G103KS
A2CR7	13/1-59	1N4454-1	A2R32	13/2-80	RCR05G105JS
A2CR8	13/1-18	1N4454-1	A2R33	13/2-116	RCR05G333KS
A2CR9	13/1-56	1N5767	A2R34	13/1-10	RCR05G333KS
A2C1	13/2-70	M39003/01-2283	A2R35	13/2-112	RCR05G104KS
A2C10	13/2-108	M39003/01-2348	A2R36	13/1-9	RCR05G104KS
A2C11	13/1-3	M39003/01-2348	A2R37	13/2-99	RCR05G154JS
A2C12	13/1-26	M39003/01-2338	A2R38	13/1-54	RN55D2742F
A2C13	13/2-103	M39003/01-2284	A2R39	13/1-53	RCR05G824JS
A2C14	13/1-16	M39003/01-2283	A2R4	13/2-71	RCR05G824JS
A2C15	13/1-13	M39003/01-2283	A2R40	13/1-51	RCR05G224JS
A2C16	13/1-24	M39003/01-2255	A2R41	13/1-22	RCR05G224JS
A2C17	13/2-115	CK05BX103M	A2R42	13/1-21	RCR05G103JS
A2C18	13/2-104	M39003/01-2258	A2R43	13/1-17	RCR05G681JS
A2C19	13/1-28	M39003/01-2284	A2R44	13/1-49	RCR05G824JS
A2C2	13/2-78	CK05BX104K	A2R45	13/1-23	RCR05G824JS
A2C20	13/1-27	M39003/01-2255	A2R46	13/1-47	RCR05G105JS
A2C21	13/2-76	CK05BX104M	A2R47	13/1-44	RCR05G303JS
A2C22	13/2-106	M39003/01-2290	A2R48	13/1-31	RCR05G680JS
A2C23	13/1-25	CD5CC100D0	A2R49	13/1-43	RCR05G682JS
A2C24	13/1-14	M39003/01-2348	A2R5	13/2-123	RCR05G333JS
A2C25	13/2-112A	CK05BX104M	A2R50	13/1-32	RCR05G682JS
A2C26	13/2-129	CK05BX103M	A2R51	13/1-33	RCR05G621JS
A2C27	13/2-80A	CK05BX104K	A2R52	13/1-42	RCR05G332JS
A2C3	13/2-133	M39003/01-2283	A2R53	13/1-45	RCR05G101JS
A2C4	13/2-121	M39003/01-2348	A2R54	13/2-110	RCR05G154JS
A2C5	13/1-12	CK05BX102M	A2R54	13/2-110	RCR05G184JS
A2C6	13/2-85	CD5FY401J0	A2R54	13/2-110	RCR05G224JS
A2C7	13/2-92	CD5FY201J0	A2R54	13/2-110	RCR05G274JS
A2C8	13/2-89	CD5FY201J0	A2R54	13/2-110	RCR05G334JS
A2C9	13/2-86	CK05BX104M	A2R54	13/2-110	RCR05G394JS
A2L1	13/1-30	MS75089-11	A2R54	13/2-110	RCR05G474JS
A2P1	13/2-102	372-2624-026	A2R54	13/2-110	RCR05G564JS
A2Q1	13/1-66	JAN2N2907A	A2R54	13/2-110	RCR05G684JS
A2Q10	13/1-8	JAN2N2907A	A2R54	13/2-110	RCR05G824JS
A2Q11	13/1-20	JAN2N2907A	A2R54	13/2-110	RCR05G105JS
A2Q12	13/1-46	2N2608	A2R55	13/2-109	RCR05G104JS
A2Q13	13/1-29	2N2608	A2R56	13/2-117	RCR05G224JS
A2Q14	13/1-41	JAN2N2222A	A2R57	13/2-90	RCR05G224JS
A2Q15	13/2-107	SF50095	A2R58	13/2-111	RCR05G224JS
A2Q16	13/2-113	2N2608	A2R6	13/2-125	RCR05G333JS
A2Q2	13/1-67	JAN2N2907A	A2R61	13/1-19	RCR05G105JS
A2Q3	13/1-39	JAN2N2907A	A2R62	13/1-48	RCR05G335JS
A2Q4	13/1-40	JAN2N2222A	A2R63	13/1-65	RCR05G104KS
A2Q5	13/2-93	2N2608	A2R64	13/2-105	RCR07G100KS
A2Q6	13/2-83	2N4416	A2R65	13/1-61	RCR05G474JS
A2Q7	13/2-73	JAN2N2907A	A2R66	13/1-52	RCR05G332JS
A2Q8	13/2-77	JAN2N2222A	A2R67	13/1-60	RCR05G474JS
A2Q9	13/2-91	JAN2N2907A	A2R68	13/1-38	RCR05G103JS
A2R1	13/2-119	RCR05G102JS	A2R69	13/1-15	RCR05G684JS
A2R10	13/1-63	RN55D3013F	A2R7	13/2-114	RCR05G333JS
A2R11	13/1-6	RCR05G224JS	A2R70	13/1-34	RCR05G222JS
A2R12	13/1-4	RCR05G333JS	A2R71	13/2-127	RCR05G105JS
A2R13	13/2-100	RCR05G333JS	A2R8	13/1-5	RCR05G104KS
A2R14	13/1-1	RCR05G125JS	A2R9	13/1-64	RN55D1963F
A2R15	13/2-84	RCR05G684JS	A2U1	13/1-2	CD4025UBF
A2R17	13/1-37	RCR05G102JS	A2U2	13/1-7	CD4049UBF
A2R18	13/1-35	RCR05G103JS	A2U3	13/2-130	SCL4001UBC
A2R19	13/1-36	RCR05G223JS	A2U4	13/2-126	SCL4001UBC
A2R2	13/2-118	RCR05G562JS	A2U5	13/2-120	CD4093BMJ
A2R20	13/2-97	RCR05G222JS	A2U6	13/2-131	CD4049UBF
A2R21	13/2-96	RCR05G333JS	A2U7	13/2-128	CD4023UBF
A2R22	13/2-124	RCR05G104KS	A2U8	13/1-50	UA1558HMG
A2R23	13/2-94	RN55D2613F	A2VR1	13/2-82	1N4753A

Logic/TX A2, Parts Location
Figure 13 (Sheet 3)



NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, AND INDUCTANCE VALUES ARE IN MICROHENRYS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. UNLESS CONNECTIONS TO POWER AND GROUND ARE SHOWN; MICROCIRCUIT PIN NO. 14 IS +5.2 V DC AND PIN NO. 7 IS GROUND. EXCEPT: 4049 - PIN NO. 1 IS +5.2 V DC AND PIN NO. 8 IS GROUND. 1558 - PIN NO. 8 IS +5.2 V DC AND PIN NO. 4 IS GROUND.
4. SELECTED IN TEST.
5. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE.

TABLE 1: MICROCIRCUIT TYPES

TENS	0	1	2	3	4	5	6	7	8	9
0		14025AL	4049	4001	4001	4093	4049	4023	1558	
1										

Logic/TX A2, Schematic Diagram
Figure 14

(629-3402-001)