

UNCLASSIFIED

NAVSHIPS 0967-051-2010

TECHNICAL MANUAL

for

**SINGLE SIDEBAND
CONVERTER
CV-591A/URR**

DEPARTMENT OF THE NAVY
NAVAL SHIP SYSTEMS COMMAND

UNCLASSIFIED

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FOREWORD

NAVSHIPS 0967-051-2010 describes and provides instructions for the installation, operation, and maintenance of Single Sideband Converter CV-591A/URR.

The technical content of this manual reflects the installation of the following changes, performed in the field in the listed equipment.

Single Sideband Converter CV-591A/URR	Field Change
All	No. 1
All	No. 2
All	No. 3
Shipboard Only	No. 4
Shipboard Only	No. 5
All	No. 6

NAVSHIPS 0967-051-2010 comprises eight chapters:

CHAPTER 1 - GENERAL INFORMATION

CHAPTER 2 - OPERATION

CHAPTER 3 - FUNCTIONAL DESCRIPTION

CHAPTER 4 - SCHEDULED MAINTENANCE

CHAPTER 5 - TROUBLESHOOTING

CHAPTER 6 - CORRECTIVE MAINTENANCE

CHAPTER 7 - PARTS LIST

CHAPTER 8 - INSTALLATION

This Technical Manual is in effect upon receipt and supersedes NAVSHIPS 93210. Extracts from this publication may be made to facilitate preparation of other Department of Defense publications.

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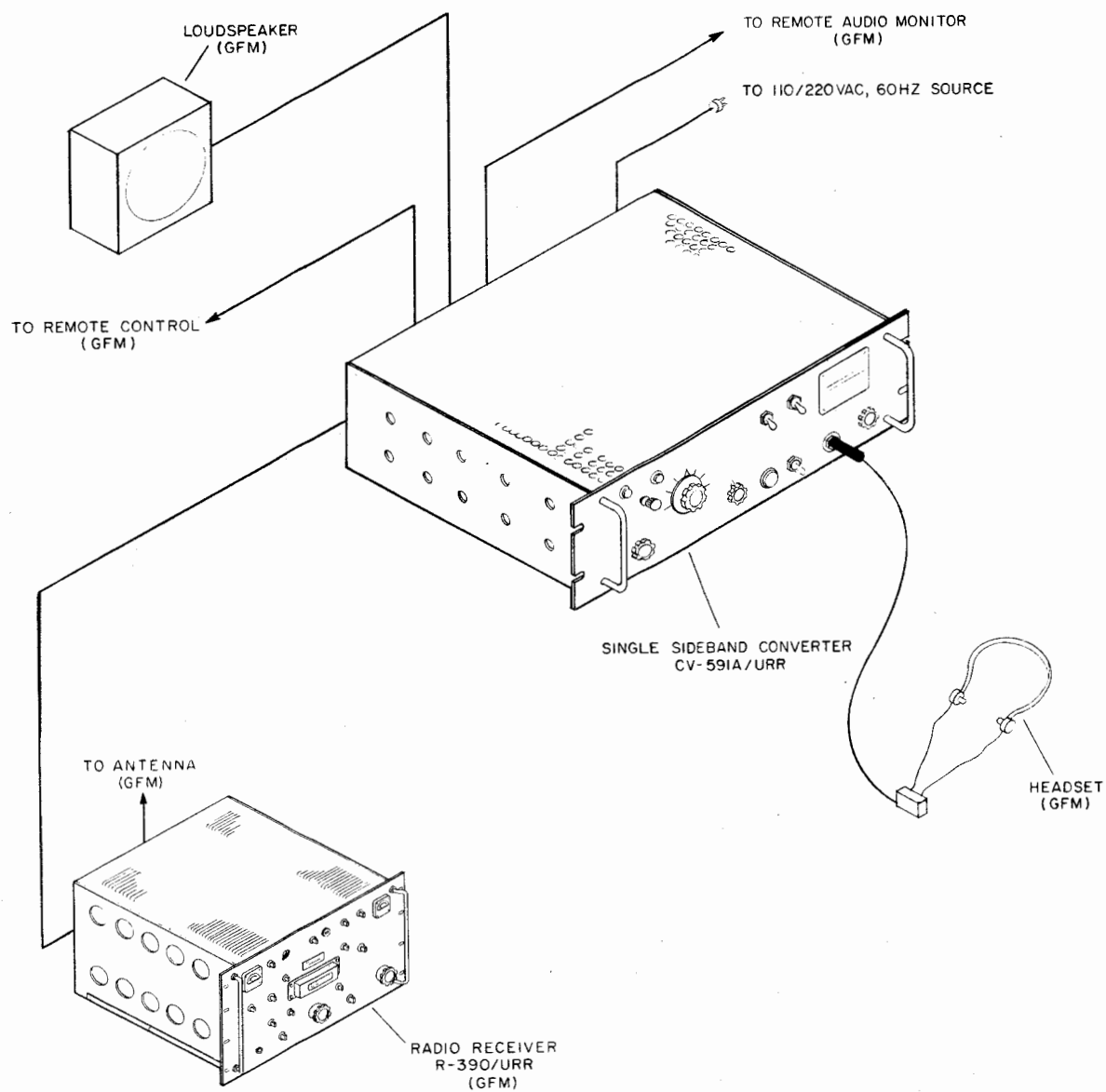


Figure 1-1. Single Sideband Converter CV-591A/URR, Typical Receiving System Interconnection

CHAPTER 1

GENERAL INFORMATION

1.1 PURPOSE

1.1.1 Single Sideband Converter CV-591A/URR (figure 1-1) operates in conjunction with a compatible 455-kHz IF frequency AM receiver to extract intelligence from any upper sideband (USB), lower sideband (LSB), frequency shift (FS), amplitude modulated (AM), continuous wave (CW), or modulated continuous wave (MCW) input signal. The converter can be operated locally or controlled from a remote control, and is normally used with an R-390A/URR receiver.

1.2 PHYSICAL DESCRIPTION

1.2.1 The converter (figure 1-2) is a single, rack-mounted chassis weighing 24 pounds. Overall dimensions are 5-1/4 inches in height, 19 inches in width, and 13-1/2 inches in depth. All controls and indicators used during operation are mounted on the front panel. Handles secured to the front panel facilitate handling of the converter. Connectors and a terminal board, located at the rear of the converter provide for interconnection between the converter and associated equipments (see figure 1-3).

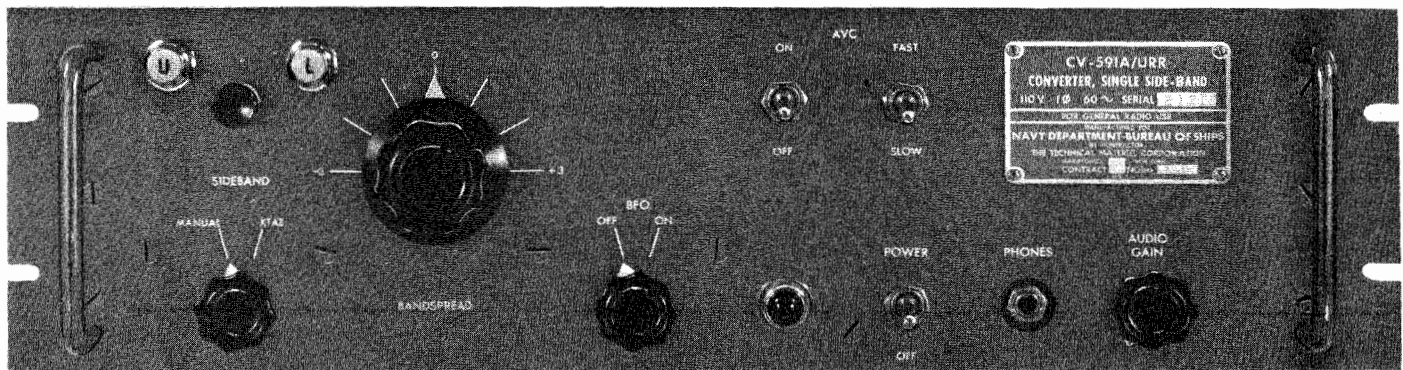


Figure 1-2. Single Sideband Converter CV-591A/URR, Front View

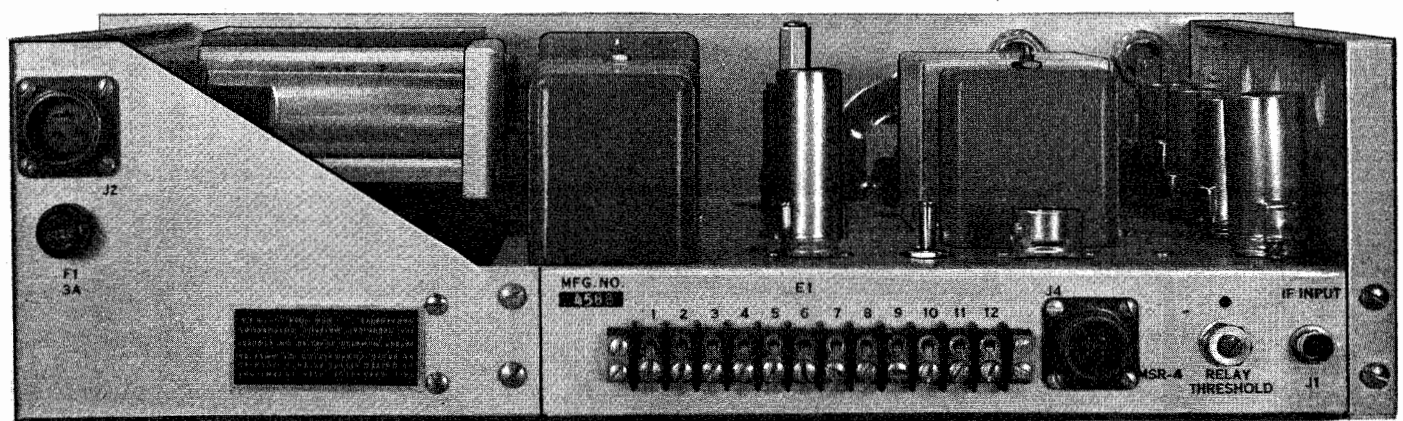


Figure 1-3. Single Sideband Converter CV-591A/URR, Rear View

1.3 OPERATIONAL DESCRIPTION

1.3.1 The converter will improve operation of R-390A/URR radio receivers for CW and AM modes of operation. The overall selectivity of the receiver is greatly sharpened, rejecting unwanted adjacent signals or interference. The tuning of single sideband signals is simplified because final tuning is done at the converter. A mechanical and electrical bandspread tunes over the IF bandpass. This effective vernier tunes SSB signals within cycles of correct frequency. Either sideband is selectable, either with the bandpass tuning feature or inverting the oscillator separation. For extreme stability, the first oscillator may be switched to crystal control for both upper and lower sideband signals.

1.3.2 Terminals at the rear of the converter chassis provide connection for remote control of the converter. The locally or remotely tuned beat frequency oscillator (BFO) permits operation of the converter with any receiver having an intermediate frequency centered at 455 kHz. However, with use of the proper crystal, the converter is also compatible with receivers having an intermediate frequency of 225 kHz to 1.5 MHz.

1.3.3 Audio output of the converter can be monitored locally or remotely by headphones or a loudspeaker. Impedances of 8 ohms and 600 ohms are available with power outputs of 1 milliwatt, 150 milliwatts, and 2 watts.

1.4 FUNCTIONAL DESCRIPTION

1.4.1 Receiver IF signals are amplified and then injected into the converter's first mixer and are heterodyned with an output from the first oscillator whose frequency is equal to the input IF carrier frequency ± 17 kHz (figure 5-1). A bandpass filter limits the resultant signals passed to 17.3 to 20.5 kHz before applying them to the second mixer where it is mixed with an output of the 17-kHz oscillator. Low-pass filters limit the signals passed to 3500 Hz, attenuating any signals above 3500 Hz. The output is fed to an audio amplifier where it is amplified to the desired level for use with phones, loudspeakers, or into a telephone line.

1.4.2 Either sideband can be selected for amplification by the sideband selector relay. A lamp on the front panel indicates the sideband in use. Frequency shift (FS) signals (2125 to 2975 Hz) are detected and amplified through the converter by correctly centering the BANDSPREAD control to produce a 2550-Hz tone. Frequency shift signals are 425 Hz either side of center frequency (2550 Hz) and are passed through the low-pass filter to the output.

1.4.3 Continuous wave signals can be utilized through the converter by using the BFO to control a stable 17-kHz oscillator for carrier reinsertion, thus generating the CW tone for proper reception.

1.4.4 Audio outputs developed by the converter for external use are:

1. 2 watts at 8 or 600 ohms (High Level).
2. 150 milliwatts at 8 or 600 ohms (Low Level).
3. 1 milliwatt (0 DBM) at 600 ohms.

High or low level outputs (1 and 2) may be used with a Navy standard type loudspeaker, or Navy standard type headphones, and the 600 ohm 0 DBM output (3) is used with a telephone line.

1.4.5 The power supply of the converter supplies +300 volts and regulated +150 volts required for circuit operation. Regulated +150 volts is used in circuits requiring stability (i.e., first and second oscillators, reactance modulator).

1.5 EQUIPMENT CHARACTERISTICS

1.5.1 Information relating to equipment capabilities, input requirements, equipment outputs, major internal signals, equipment identification and physical characteristics, and field change data is contained in Tables 1-1 through 1-6.

TABLE 1-1. EQUIPMENT CAPABILITIES

CAPABILITY	PARAMETERS
Types of Reception	SSB - Single Sideband CW MCW AM FS

TABLE 1-1 (Cont)

CAPABILITY	PARAMETERS
Sideband Selection	Upper or lower sideband by means of an internal oscillator, crystal controlled or manual bandspread.
Remote Control Features (Shore Stations only)	Selection of upper or lower sideband ± 3 kHz bandspread tuning BFO ON/OFF control
Filter Characteristics	3.2 kHz at 3 DB points 5.2 kHz at 45 DB points
AVC	With 40 DB change at input, output remains constant within 9 DB. Selectable slow or fast response time.
Temperature Range Operating	149°F to -40°F
Humidity	97%

TABLE 1-2. INPUT REQUIREMENTS

INPUT	REQUIREMENTS
Signal	
Frequency Range	452 to 458 kHz (when oscillator is variable or normal crystal is used) 225 kHz to 1.5 MHz (when oscillator is crystal controlled only)
Level	0.1 to 10 volts RMS
Impedance	240K ohms
Primary Power	
Shipboard	110 vac, 50/60 Hz, 65 watts
Shore Station	110/220 vac, 50/60 Hz, 65 watts

TABLE 1-3. EQUIPMENT OUTPUTS

OUTPUT	REQUIREMENTS
Power	
High Level	2 watts (8 or 600 ohms)
Low Level	150 milliwatts (8 or 600 ohms)
Telephone Line	1 milliwatt (600 ohms)
Impedance	
Loudspeaker	8 ohms
Phone Line	600 ohms
Headset	600 ohms

TABLE 1-4. MAJOR INTERNAL SIGNALS

SIGNAL	CHARACTERISTICS
1st Oscillator	
Crystal Controlled	Lower - 438 kHz Upper - 472 kHz
Manually Tunable	Lower - 435 kHz to 441 kHz Upper - 469 kHz to 475 kHz
2nd Oscillator	17 kHz

TABLE 1-5. REFERENCE DATA

NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH	WEIGHT (lb)
Single Sideband Converter	CV-591A/URR	5-1/4	19	13-1/2	24
Technical Manual for CV-591A/URR	NAVSHIPS 0967-051-2010				
Cable Assembly W1	TMC No. CA 385				
Connector P2	MS3106A16S-5S				
Connector P4	MS3106A14S-2S				

TABLE 1-6. FIELD CHANGE DATA

CHANGE	AUTHORIZATION	APPLICABILITY	IDENTIFICATION
No. 1	EIB 555	All	2K ohm, 2 watt resistor soldered across terminals 5 and 6 of terminal board E1.
No. 2	EIB 618	All	Protective strap installed over terminal 10 of terminal board E1.
No. 3	EIB 654	All	Pins A and C of connector J2 and P2 connected to AC source and pin B connected to ground.
No. 4	EIB 672	Shipboard installation only.	Momentary removal of power does not cause sideband switching. Connection removed between K3 and S6.
No. 5	NAVSHIPS 0967-051-2060	Shipboard installation only.	Rectifier 1N2389 installed in V10 socket and V8 and V9 removed.
No. 6	NAVSHIPS 0967-051-2070	All	Presence of new choke L3 and two new capacitors C58 and C59 mounted on underside of chassis.

1.6 SAFETY REQUIREMENTS

1.6.1 A potential of 300 VDC exists at terminal No. 10 of terminal strip E1 when BFO switch S5 is in OFF position. Field Change No. 2 provided for a nylon cable strap to be modified and attached to the chassis rear to cover terminal No. 10. Make sure that the strap is in place before applying primary power to the converter.

1.7 LOGISTICS DATA

1.7.1 Table 1-7 lists the material required for scheduled maintenance, and Table 1-8 lists all test equipments needed to perform required maintenance tasks.

TABLE 1-7. MATERIALS REQUIRED FOR SCHEDULED MAINTENANCE

ITEM	PURPOSE
Soft-bristled brush	Remove dust from converter.
Lint-free cloth	Wipe converter surfaces.
Cleaning solvent (Federal Specification P-S-661)	Remove grease and smudges from converter surfaces.

TABLE 1-8. TEST EQUIPMENT REQUIRED

CATEGORY	RECOMMENDED	ALTERNATE	PARAMETERS
RF Signal Generator	AN/URM-25D	AN/URM-25()	17 kHz to 475 kHz .1 microvolts to .1 volt 400 Hz modulation
Audio Oscillator	AN/URM-127	TS-382/U	425 Hz to 3500 Hz 100 millivolts
Electronic Multimeter	AN/USM-116()	CAQI-410B	2.5 VAC to 345 VAC 0 to 300 VDC
Oscilloscope	AN/USM-117()	AN/USM-105	.2 VDC/CM to 2 VDC/CM
Frequency Counter	AN/USM-207	CAQI-524D	425 Hz to 475 kHz 0.1 V RMS
Multimeter	AN/PSM-4()	CSV-260	0 to inf. ohms
DC Source	CAQI-721A		0 to 10 VDC

CHAPTER 2
OPERATION

2.1 INTRODUCTION

2.1.1 The operator shall be responsible for selecting and tuning required signals for operation of Converter CV-591A/URR and the associated receiver. Because the converter is not an independent unit, it must always be used with a receiver having an IF output within the limits specified in Table 1-2. Since the converter is dependent upon the receiver for the IF signal, the receiver must always be tuned before the converter. During tuning of the converter, the operator may select either sideband and the tone of the output signal.

2.1.2 Deteriorating performance of the converter can be observed through daily operation of the equipment. It shall be the duty of the operator to isolate such troubles as low performance, poor selectivity, or loss of signal, and determine whether these troubles are occurring in the receiver or converter by connecting the converter to a known operating receiver. The operator is also responsible for replacing defective lamps, fuses, and tubes. Other troubles that cannot be remedied by replacement of a lamp, fuse, or tube should be referred to maintenance technicians.

2.1.3 Figure 2-1 shows physical location and name of controls and indicators on the front panel of the converter. Table 2-1 lists names of controls and indicators, and their positions and functions.

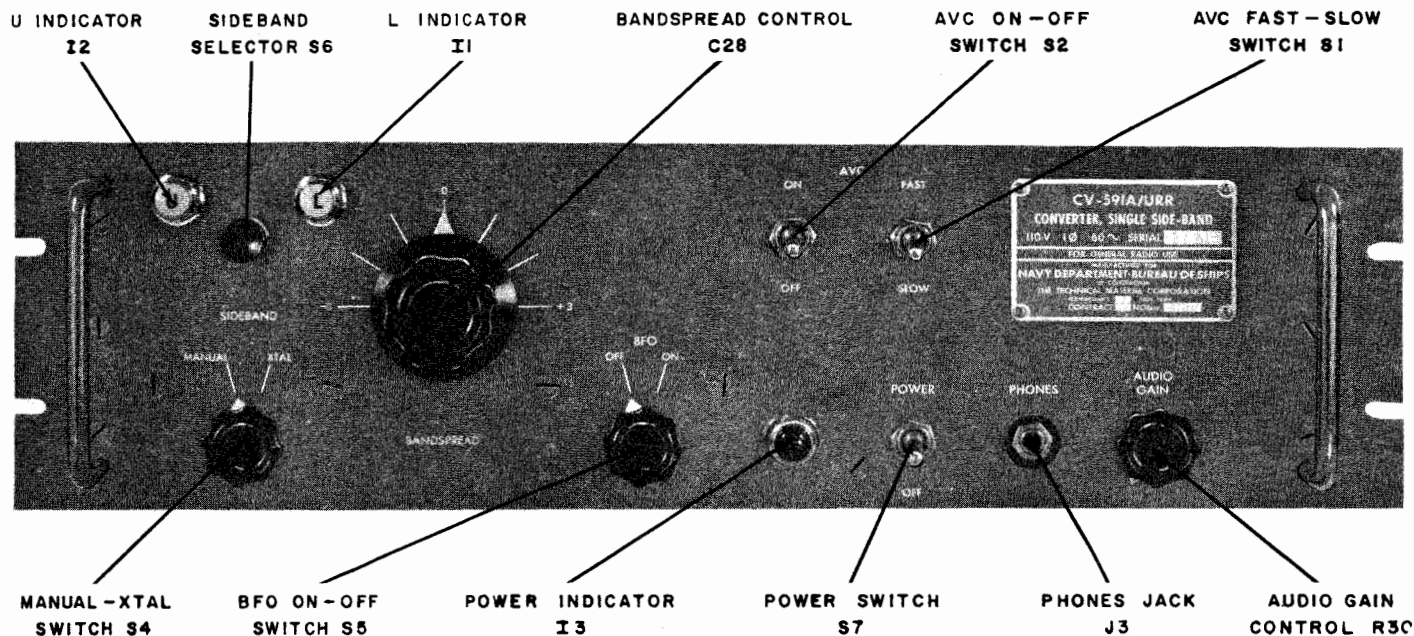


Figure 2-1. Single Sideband Converter CV-591A/URR, Controls and Indicators

2.2 CONTROLS AND INDICATORS

2.2.1 All operator controls and indicators, with the exception of OUTPUT LEVEL switch S8, are located on the front panel of the converter; switch S8 is located on the top rear of the chassis. Fuse F1 together with input and output connections are also located on the rear of the chassis.

TABLE 2-1. CONTROL AND INDICATORS

NAME & REF. DESIG.	POSITIONS	FUNCTION
U Indicator Light I2	Illuminated or extinguished	Illuminates when upper sideband is selected.
L Indicator Light I1	Illuminated or extinguished	Illuminates when lower sideband is selected.
SIDEBAND Selector Switch S6	Depressed	Selects either upper or lower sideband operation.
SIDEBAND Switch S4	MANUAL - XTAL	MANUAL - Provides for control of bandspread oscillator by BANDSPREAD control C28. XTAL - Provides for crystal-controlled operation of bandspread oscillator.
BANDSPREAD Control C28	-3 to +3	Allows a ± 3 kHz variation in bandspread oscillator frequency.
BFO Switch S5	ON - OFF	Enables or disables the beat frequency oscillator.
AVC Switch S2	ON - OFF	Enables or disables automatic volume-control capability.
AVC Switch S1	FAST - SLOW	FAST - Selects a fast time constant to control AM, MCW, and FS signals. SLOW - Selects a slow time constant for control of SSB and CW signals.
POWER Switch S7	POWER - OFF	Controls application or removal of primary power to converter.
Power Indicator I3	Illuminated or extinguished	Illuminates when primary power is applied to converter.
PHONES Jack J3		Provides for monitoring output of converter with a headset.
AUDIO GAIN Control R30	CW through CCW	Adjust level of converter audio output signal.
OUTPUT LEVEL Switch S8	HIGH - LOW	HIGH - Selects full output level of converter. LOW - Selects reduced output level of converter.
Fuse F1 3A or 1-1/2 A See Note		Provides overload protection for the converter.
Connector J2		AC input power connection.
Terminal Board E1		Remote control and output signal connections.
Connector J4		Output signal connection.
Connector J1		Input signal connection.

Note: 3A for 110 VAC operation; 1-1/2 A for 220 VAC operation.

2.3 OPERATING INSTRUCTIONS AND CONTROL SETTINGS

2.3.1 PREOPERATIONAL SETTINGS

2.3.1.1 If a loudspeaker is not permanently connected to converter unit, insert a set of standard Navy high-impedance headphones in jack on front of converter. Place front panel controls to the following positions:

1. Converter BANDSPREAD control to 0 (center of range).
2. Converter MANUAL/XTAL switch to required position.
3. Converter BFO switch to OFF.
4. Converter AVC switch to OFF.
5. Converter POWER switch to POWER. Allow approximately 30 seconds for equipment warmup.
6. Advance converter AUDIO GAIN control clockwise until a rushing noise is detected in loudspeaker or headphones. If noise is not present, the converter may be defective. Notify maintenance personnel.

2.3.2 OPERATING PROCEDURES

2.3.2.1 Normal Tuning of Receiver to Signal Frequency. Normal tuning is used when receiver bandwidth is sufficient to pass the sideband with no decrease in sideband amplitude. Employ the normal oscillator frequency equations (as described in the applicable receiver instruction manual) to tune the receiver to the signal frequency. If receiver bandwidth is 5 kHz or less and unimpaired passage of the desired sideband is required, the receiver must be tuned off frequency as described in step 7.

2.3.2.1.1 Reception of Upper Sideband Signal. To receive upper sideband signals, proceed as follows:

1. Tune receiver to signal frequency.
2. Set converter and receiver AVC switches to ON and SLOW.
3. Set converter BFO switch to ON.
4. Set converter MANUAL/XTAL switch to MANUAL.
5. Set converter SIDEBAND selector switch to UPPER.
6. Set converter BANDSPREAD control to 0(center) and adjust for intelligibility.
7. If greater bandwidth is needed, tune receiver 2 kHz above signal frequency and set converter BANDSPREAD control to +2 kHz and adjust for intelligibility.
8. For crystal operation, set converter MANUAL/XTAL switch to XTAL and tune receiver for intelligibility.

2.3.2.1.2 Reception of Lower Sideband Signal. To receive lower sideband signals, proceed as follows:

1. Tune receiver to signal frequency.
2. Set converter and receiver AVC switches to ON and SLOW.
3. Set converter BFO switch to ON.
4. Set converter MANUAL/XTAL switch to MANUAL.
5. Set converter SIDEBAND selector switch to LOWER.
6. Set converter BANDSPREAD control to 0(center) and adjust for intelligibility.
7. If greater bandwidth is needed, tune receiver 2 kHz below signal frequency and set converter BANDSPREAD control to -2 kHz and adjust for intelligibility.
8. For crystal operation, set converter MANUAL/XTAL switch to XTAL and tune receiver for intelligibility.

2.3.2.1.3 Reception of AM Signals. This procedure tunes the AM signal to the center frequency of the bandpass filter in the converter. Since the bandpass filter has a bandwidth of 3400 Hz it will limit the sideband frequencies of an AM signal to 1700 Hz above and 1700 Hz below the center frequency.

1. Tune receiver to signal frequency.
2. Set converter and receiver AVC switches to ON and FAST.
3. Set converter BFO switch to OFF.
4. Set converter MANUAL/XTAL switch to MANUAL.
5. Set converter SIDEBAND selector switch to UPPER.
6. Set converter BANDSPREAD control to +2 kHz above 0 center.
7. Tune receiver for intelligibility.

2.3.2.1.4 Reception of CW and FS Signals. To receive CW and FS signals, proceed as follows:

1. Tune receiver to signal frequency.
2. Set converter and receiver AVC switches to ON and SLOW.
3. Set converter BFO switch to ON.
4. Set converter MANUAL/XTAL switch to MANUAL.
5. Tune converter BANDSPREAD control to obtain desired signal pitch.
6. For crystal operation, set converter SIDEBAND selector switch to UPPER: Set converter MANUAL/XTAL switch to XTAL. Tune receiver to obtain desired beat note.

2.4 OPERATOR MAINTENANCE

2.4.1 Operator maintenance consists of normal cleaning of the equipment, both inside and outside, replacing defective indicator lamps, blown fuses, and defective tubes.

2.4.2 Sideband indicator lamps light when either sideband is selected. Alternate switching of the sideband relay can determine if a lamp is defective. Power indicator lamp can be determined to be defective if normal reception occurs and the lamp does not glow. The lamp can be replaced by removing the red lens, removing defective lamp and replace with a new one, and replacing the lens. The red lens cover is of the screw-on type.

2.4.3 Fuse F1 may fail occasionally because of power surges or momentary overloads. The fuse can be replaced by placing converter POWER switch to OFF, removing fuse holder cap and the defective fuse. Insert replacement fuse in fuse cap and return cap to holder. Restore power to the equipment. If fuse fails a second time, notify maintenance personnel.

2.4.4 Loss of signals through the converter may often result from failure of a vacuum tube. A quick observation through the top of the chassis will determine whether failure has occurred through loss of filament power to a tube. Replace tubes that are cold to the touch. If all tubes are observed with filaments lit, other defects may exist. Inform maintenance personnel of problems.

NOTE

A DISCONNECTED CONVERTER IF INPUT
CABLE FROM RECEIVER OUTPUT WILL
RESULT IN A LOSS OF SIGNAL INDICATION.
CHECK RECEIVER OPERATION.

CHAPTER 3

FUNCTIONAL DESCRIPTION

3.1 **Functional Description (Figure 5-2).** The receiver IF signal of 455 kHz is fed through the IF input jack J1 to the IF amplifier and also to the AVC amplifier. In the AVC circuit the signal is first amplified by tube V1A and then rectified by V1B so that a DC voltage is produced that has a value proportional to the amplitude of the IF signal. This DC voltage is applied as a negative bias to the control grid of IF amplifier tube V2. IF amplifier V2 is a variable MU tube through which the gain is controlled by the AVC bias voltage changes.

3.1.1 The AVC voltage is developed by charging a capacitor and the rate at which this capacitor charges and discharges determines the time lag between the IF signal and the AVC voltage. The AVC FAST-SLOW switch changes the resistance in the charging circuit of the capacitor so we have a fast or slow AVC action. Fast AVC is used to control signals with an ever-present signal component (i.e., AM, MCW, and FS). Slow AVC, or slow time constant, will hold the amplifier gain constant for the longer duration of time required for reception of SSB or CW. When the AVC is turned OFF, the gain of the IF amplifier is maximum.

3.2 The first oscillator V7 provides the frequencies that are mixed in the first mixer with the output of the IF amplifier. The first oscillator utilizes a Hartley oscillator tank circuit (Z3) when the MANUAL-XTAL switch S4 is positioned to MANUAL. When MANUAL-XTAL switch S4 is in the XTAL position, tank circuit Z3 is grounded and upper and lower sideband crystals Y1 and Y2 determine the output frequency of the first oscillator. In the manual position the frequency of the first oscillator is controlled by BANDSPREAD control C28 and is variable between 435-441 kHz for lower sideband reception and between 469-475 kHz for upper. The variable frequency may also be controlled by a remote bandspread control using the reactance modulator tube V8 for shore installations. In either the crystal position or manual position the frequency of the first oscillator is controlled by sideband selector relay K2. The lower sideband crystal frequency is 438 kHz while the upper is 472 kHz. Crystals for these frequencies are supplied with each converter. Other crystals may be substituted so that input IF frequencies ranging from 250 kHz to 1.5 MHz may be handled by the converter.

3.2.1 Sideband selector relay K2 is a mechanical self-latching relay. Depressing SIDEBAND selector switch S6 momentarily energizes relay K2 and the contacts latch in the upper sideband position selecting the 472 kHz crystal Y2 and illuminating USB indicator light (U) I2. When LSB operation is desired, SIDEBAND selector switch S6 is again depressed. This action momentarily energizes relay K2 causing the relay armature to unlatch the USB contacts and to latch the contacts to the LSB position. In this position LSB indicator light (L) I1 is illuminated and 438 kHz crystal Y1 controls the first oscillator frequency.

3.3 The output of first mixer tube V3 is fed to bandpass filter Z1 which passes only frequencies between 17.3 and 20.5 kHz. The filter is designed to provide sharpness in rejecting adjacent signals. The filter output is applied to the second mixer.

3.4 The output of bandpass filter Z1 is fed to grid terminal 1 of second mixer tube V4 when the BFO is off. When the BFO is ON the BFO relay K1 connects the output of filter Z1 to grid terminal 7 of the second mixer. When grid 1 is used, the second mixer acts as a standard rectifier type detector for AM, MCW, and FS reception. During SSB or CW reception, the BFO is turned on and generates the reinserted carrier signal which is applied to the second mixer where it is heterodyned with the output of filter Z1.

3.4.1 The BFO is a standard Hartley oscillator which oscillates at a frequency of 17 kHz when the BFO ON-OFF switch S5 is turned ON. There is a provision for shore station installations to turn the BFO on from a remote location.

3.4.2 During SSB and CW reception, a sideband tone generator supplies a 16.5 kHz or 19.5 kHz signal, depending upon the sideband selected, to the input of the second mixer. This is heard in the audio output as a 500 or 2500 Hz note. The sidetone generator is generally for shore station installations. Field Change 5 removed all remote control capabilities for shipboard installations.

3.5 The output of the second mixer is fed to low-pass filter Z2 and Pi-network filter L3, C58, and C59. Filter Z2 attenuates all signals passed above 3500 Hz. Low-pass Pi-network filter L3, C50, and C59 was installed by Field Change 6 to further limit the frequencies passed to 2600 Hz and below.

3.6 The output of the low-pass filters is amplified by audio amplifiers V5B and V6 to produce up to 2 watts of audio power. The OUTPUT LEVEL switch S8 connects degenerative feedback into the cathode of the first audio amplifier which reduces the output and also reduces distortion.

3.7 Three audio power levels are available at output terminals on E1 or jack J4. When the OUTPUT LEVEL switch S8 is in the LOW position, it supplies 1 milliwatt of power through a 20-DB pad at terminals 2 and 3 on E1 and terminals A and D on jack J4. Depending upon the position of the OUTPUT LEVEL switch S8, either 2 watts or 150 milliwatts are present at terminals 4, 5, and 6 on E1 and B, C, and D on J4 when the proper impedance loads are connected (figure 5-2). Terminals 3 and 5 of output transformer T1 also supply a 600-ohm output to PHONE jack J3 for use with standard NAVY type headphones.

3.8 The power supply is self-contained and supplies the necessary AC filament voltages, 300 VDC B+, and a regulated +150 DC voltage required for stabilizing the first oscillator and BFO.

CHAPTER 4
SCHEDULED MAINTENANCE

4.1 INTRODUCTION

4.1.1 Scheduled maintenance of converter CV-591A/URR, or any item of electronic equipment, is a means by which major breakdowns and extensive downtimes are greatly reduced. Scheduled maintenance includes cleaning the equipment, lubricating moving parts, alignment and performance checks, and when necessary, sensitivity checks. Inadequate ventilation, moisture, and dust are the greatest causes of equipment breakdown or component malfunction. Heat and frequency drift, two major problems to the operator and technician, are caused by inadequate ventilation. Heat dissipated by vacuum tubes and transformers in close proximity may cause breakdown of related or closely associated components. Stability may also be affected because alignment is accomplished with units open and with adequate ventilation. Moisture causes corrosion of bearing surfaces of potentiometers, variable capacitors, and tuning controls. Sufficient moisture may cause an arc-over to other points, where a difference of potential exists. Dust causes short circuits and arcing between points or terminals. As B+ voltage is increased, the possibility of breakdown increases.

4.1.2 Scheduled maintenance is divided into two main parts. One part includes scheduled tests for daily, weekly, monthly, and semiannual accomplishment; the other part includes procedures required to perform the scheduled tests. A maintenance program can be effective if it is properly scheduled and followed. Scheduled maintenance may best be performed if it is done on the same day each week or month, depending on the procedure involved.

4.2 MAINTENANCE REQUIREMENT INDEX

DAILY TESTS	TIME	PERSONNEL REQUIRED	REFERENCE	
			PROCEDURE	PARAGRAPH
Equipment turn-on and equipment operation.	0.25 hrs	1	1	4.3.1
WEEKLY TESTS				
Clean equipment. Inspect vacuum tubes for firm seating.	0.5 hrs	1	2	4.3.2
Performance test only one converter available.	0.6 hrs	1	4	4.3.4
MONTHLY TESTS				
Clean equipment as prescribed under WEEKLY TESTS.	0.5 hrs	1	2	4.3.2
Performance tests.	0.6 hrs	1	3 or 4	4.3.3* or 4.3.4
SEMIANNUAL TESTS				
Check Converter alignment.	2.0 hrs	1	5	4.3.5 6.2.1
Lubricate BANDSPREAD control shaft.	0.5 hrs	1	6	4.3.6

SEMIANNUAL TESTS (Cont)	TIME	PERSONNEL REQUIRED	REFERENCE	
			PROCEDURE	PARAGRAPH
Inspect terminals on terminal boards for tightness.	0.5 hrs	1	7	4.3.7

*Use Procedure No. 3 when two converters are available.

*Use Procedure No. 4 when only one converter is available.

4.3 SCHEDULED MAINTENANCE PROCEDURES

4.3.1 Equipment Turn-On and Equipment Operation.

1. Procedure No. - 1
2. Periodicity - DAILY
3. Related procedure - Chapter 2, paragraph 2.3.2
4. Recommended Rate - Operator
5. Man-hours required - 0.25 hrs
6. Elapsed time for procedure - 0.25 hrs
7. Safety precautions - None
8. Tools, parts, materials, and test equipment - Manual for Converter CV-591A/URR Manual for associated receiver
9. Step-by-step procedure:
 - a. Tune converter and receiver to selected frequency.
 - b. Check audio outputs for desired signal, signal strength, and tone.
 - c. Operate SIDEBAND relay K1. Tone output in headphone or loudspeaker should reverse.
 - d. Rotate BANDSPREAD control CW or CCW. Sideband tone should vary.
10. Values and tolerance - None
11. Referenced diagrams - Figures 5-2 and 5-3

4.3.2 Cleaning and Inspection.

1. Procedure number - 2
2. Periodicity - WEEKLY
3. Related procedure - None
4. Recommended rate - Operator
5. Man-hours required - 0.5 hr
6. Elapsed time for procedure - 0.5 hr
7. Safety precautions - 110 VAC, 60 Hz at terminals 2 and 3 of E2
8. Tools, parts, materials, and test equipment - Screwdriver, soft-bristle paint brush, lint-free cloth
9. Step-by-step procedure:
 - a. Remove power to converter by placing POWER switch in OFF position.

- b. Remove the four panel screws and slide converter out until top and bottom plates are accessible.
- c. Unlock the four retaining screws holding upper and lower cover. Remove covers.
- d. Using a soft brush, carefully brush interior surfaces, components, and terminal boards to remove dust from unit.
- e. Wipe surface of front panel.
- f. Check seating of vacuum tubes by gently pressing down.
- g. Replace covers, return converter to rack, and replace panel retaining screws.
- h. Return converter to normal use as required.

10. Values and tolerances - None
11. Referenced diagrams - Figures 6-2 and 6-3

4.3.3 Performance Tests Using One Receiver and Two Converters.

1. Procedure number - 3
2. Periodicity - MONTHLY
3. Related procedure - None
4. Recommended Rate - Operator
5. Man-hours required - 0.6 hrs
6. Elapsed time for procedure - 0.6 hrs
7. Safety precautions - None
8. Tools, parts, materials, and test equipment - Output meter, screwdriver
9. Step-by-step procedure:
 - a. Tune receiver and converter to desired signal frequency (SSB or AM).
 - b. Reduce RF GAIN of receiver and AUDIO GAIN of converter to zero.
 - c. Disconnect speaker from output terminals 5 and 6 of E1. Connect output meter to terminals 5 and 6 of E1. (This may be accomplished without turning equipment off.)
 - d. Advance AUDIO GAIN approximately one-third. Advance RF GAIN until signal level on output meter reads 0 DB. Occasional positive peaks are acceptable. Record dial setting of RF GAIN control.
 - e. Reduce RF and AUDIO GAIN controls to zero.
 - f. Disconnect output meter from converter No. 1 and reconnect speaker. Remove IF input from converter No. 1 and insert in IF INPUT jack of converter No. 2.
 - g. Repeat steps 1 through 5.
 - h. Disconnect output meter from converter and reconnect speaker.
10. Values and tolerances - Converters are within tolerance if RF GAIN control setting is 2 divisions for the two tests.
11. Referenced diagrams - Figures 5-2 and 5-3.

4.3.4 Performance Tests Using One Receiver and One Converter.

1. Procedure number - 4
2. Periodicity - WEEKLY
3. Related procedure - None
4. Recommended Rate - Operator
5. Man-hours required - 0.6 hrs
6. Elapsed time for procedure - 0.6 hrs
7. Safety precautions - None
8. Tools, parts, materials and test equipment - Output meter (Receiver)
9. Step-by-step procedure:
 - a. Tune converter and receiver to desired frequency. Reduce RF GAIN of receiver and AUDIO GAIN of converter to zero.
 - b. Disconnect speaker from converter terminals and connect output meter to speaker terminals.
 - c. Rotate AUDIO GAIN control CW one-third of range (note this position). Advance RF GAIN until output meter reads 0 DB.
 - d. Record position of the RF and AUDIO GAIN dials after each weekly reading is taken. Any large increase in RF GAIN setting of receiver may be an indication of degrading performance of the converter.
 - e. To eliminate possibilities of receiver troubles, check sensitivity of converter with another receiver of the same type.
10. Values and tolerances - Converter is within tolerance if RF GAIN control setting is within two divisions for the test.
11. Referenced diagrams - Figures 5-2 and 5-3.

4.3.5 Converter Alignment.

1. Procedure number - 5
2. Periodicity - SEMIANNUALLY
3. Related procedure - Chapter 6, paragraph 6.2.1
4. Recommended Rate - ET3 or ET2
5. Man-hours required - 2.0 hrs
6. Elapsed time for procedure - 2.0 hrs
7. Safety procedures - 110 VAC, 60 Hz on terminals 2 and 3 of E2
8. Tools, parts, materials, and test equipment - AN/USM-207, screwdriver
9. Step-by-step procedure:
 - a. Energize converter and allow a warmup period of approximately 30 minutes.
 - b. Refer to paragraph 6.2.1 for related steps and adjustments.
10. Values and tolerances - See paragraph 6.2.1
11. Referenced diagrams - Figures 5-3 and 6-1

4.3.6 Bandspread Control Shaft Lubrication.

1. Procedure number - 6
2. Periodicity - SEMIANNUAL
3. Related procedure - Paragraph 4.3.2
4. Recommended Rate - Operator
5. Man-hours required - 0.5 hrs
6. Elapsed time for procedure - 0.5 hrs
7. Safety precautions - None
8. Tools, parts, materials and test equipment - Dow Corning No. 4 lubricant, lint-free cloth
9. Step-by-step procedure:
 - a. Remove power from converter by placing POWER switch to OFF position.
 - b. Remove the four front panel screws and slide converter out of rack.
 - c. Disconnect IF input cable, speaker cables, and telephone line cable.
 - d. Place converter on work bench with front panel up.
 - e. Remove knob from shaft of BANDSPREAD control.
 - f. Apply small amount of lubricant (DC-4) to shaft and bearing junction.
 - g. Rotate shaft back and forth, working lubricant into bearing.
 - h. Remove excess lubricant with lint-free cloth.
 - i. Replace knob on BANDSPREAD shaft.
 - j. Return converter to rack and reconnect all cables. Replace the front panel screws.
10. Values and tolerances - None
11. Referenced diagrams - Figure 1-2

4.3.7 Terminal Board Inspection.

1. Procedure number - 7
2. Periodicity - SEMIANNUAL
3. Related procedure - Paragraph 4.3.6
4. Recommended Rate - Operator
5. Man-hours required - 0.5 hrs
6. Elapsed time for procedure - 0.5 hrs
7. Safety precautions - None
8. Tools, parts, materials and test equipment - Screwdriver
9. Step-by-step procedure:
 - a. Remove power to converter by placing POWER switch in OFF position.
 - b. Remove the four front panel screws and slide converter out of rack.

- c. Using appropriate screwdriver, check all terminal connections on terminal boards E1 and E2.
 - d. Return converter to rack and replace front panel screws.
10. Values and tolerances - None
11. Referenced diagrams - Figures 1-3 and 6-3

CHAPTER 5
TROUBLESHOOTING

5.1 INTRODUCTION

5.1.1 The following logical steps should be followed when troubleshooting Single Sideband Converter CV-591A/URR.

5.1.2 Symptom recognition is the first step in the troubleshooting procedure and is based on a complete knowledge and understanding of equipment operating characteristics. One of the first things to be determined is whether the associated receiver is performing properly. Table 5-2 gives a maintenance turn-on procedure which will aid in recognizing symptoms. Substitution of another receiver or converter may help to determine that trouble is present in the converter.

5.1.3 After converter trouble has been recognized, all the available aids designed into the equipment should be used to further elaborate on the original trouble symptom. Use of front panel controls as given in Table 5-2 should provide better identification of the original trouble symptom. Also, checking or otherwise manipulating the operating controls may eliminate the trouble.

5.1.4 The next step in logical troubleshooting is to determine the section in which the trouble is located. The converter can be logically broken down into three general sections: the audio, the mixers, and the IF amplifier. The overall description (paragraph 3-1) and overall block diagram (figure 5-2) should be referred to when selecting possible faulty functional sections.

5.1.5 The best method to pinpoint the faulty section is to connect an output meter to the audio output (figure 5-2) and insert an appropriate signal frequency into the grid of second mixer V4. A correct output (Table 5-1) indicates the audio section and the second mixer of the mixers section are not faulty. Inserting the IF frequency of 455 kHz into the first mixer and then the input of the IF amplifier and observing the output meter, will pinpoint the faulty section. If all sections appear to be faulty, a logical common circuit to check is the power supply.

5.1.6 After the faulty functional section has been isolated, it is often necessary to make additional "logical choices" as to which circuit or group of circuits (within the functional section) is at fault. A signal flow diagram (figure 5-2) provides the signal flow path and test location information needed to bracket, and then isolate the faulty circuit.

5.1.7 After the trouble (faulty component, misalignment, etc) has been located (but prior to performing corrective action), the procedures followed up to this point should be reviewed to determine exactly why the fault affected the equipment in the manner it did. This review is usually necessary to make sure that the fault discovered is actually the cause of the malfunction, and not just the result of the malfunction.

5.1.8 The troubleshooting index lists the major outputs of the converter and is contained in Table 5-1.

TABLE 5-1. TROUBLESHOOTING CHART

OUTPUT	REFERENCE DIAGRAM
High Level: 2W (8 or 600 ohms)	Figures 5-2 and 5-3
Low Level: 150 mW (8 or 600 ohms)	Figures 5-2 and 5-3
Telephone Line: 1 mW (600 ohms, 0 DBM)	Figures 5-2 and 5-3

5.2 MAINTENANCE TURN-ON PROCEDURE

5.2.1 The maintenance turn-on procedure is a step-by-step procedure in tabular form (Table 5-2) that should be used as an aid for the unexperienced operator in bringing the equipment to an operating condition from a completely secured condition. Abnormal conditions are noted along with steps to be followed and reference diagrams to be used.

TABLE 5-2. MAINTENANCE TURN-ON PROCEDURE

STEP	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP	REFERENCE
1	Set POWER switch to ON.	POWER lamp should glow. POWER lamp extinguished. POWER lamp extinguished.	Proceed to step 2. Lamp defective. Fuse defective. Inform main-tenance person-nel.	 Figure 5-3 Figure 5-3
2	Advance AUDIO GAIN control.	Rushing or hissing noise.	Proceed to step 3. Check for de-fective tube V2 thru V6.	 Figure 5-2
3	Tune converter and as-sociated receiver to desired frequency.	Tone or audible signal heard in output. Signals absent. No signals.	Proceed to step 4. Check input con-nected to IF jack J1. Check for de-fective tube V7.	 Figure 5-2 Figure 5-2
4	Rotate BANDSPREAD control CW or CCW approximately 1 kHz.	Tone output should vary. Tone constant.	Proceed to step 5. Check defective tube V5A.	 Figure 5-2
5	Converter ready for normal operation.			

5.3 RELAYS, LAMPS, AND OVERLOAD DEVICES

5.3.1 Relays, lamps, and overload devices are listed in Table 5-3.

TABLE 5-3. RELAYS, LAMPS, AND OVERLOAD DEVICES

REF. DESIG.	FUNCTIONAL NAME	ENERGIZING VOLTAGE	DIAGRAM REF.
RELAYS			
K1	BFO Relay	80 VDC	Figure 5-2, 5-3
K2	Sideband Selector Relay	110 VAC	Figure 5-2, 5-3
K3	Sidetone Selector Relay	80 VDC	Figure 5-2, 5-3

TABLE 5-3 (Cont)

REF. DESIG.	FUNCTIONAL NAME	ENERGIZING VOLTAGE	DIAGRAM REF.
LAMPS			
I1	Lower Sideband Indicator	6.3 VAC	Figure 5-3
I2	Upper Sideband Indicator	6.3 VAC	Figure 5-3
I3	POWER ON Indicator	6.3 VAC	Figure 5-3
FUSE			
F1	Primary Power Fuse	110 VAC - 3A 220 VAC - 1-1/2	Figure 5-3

5.4 TROUBLESHOOTING INFORMATION

5.4.1 Power Supply Circuitry. Troubles occurring within the power supply are generally more obvious than troubles occurring elsewhere in the converter, and may be isolated by using associated components of another circuit.

5.4.1.1 Failure of lamp I3 to glow (figure 5-3) indicates loss of AC voltage. A quick check to determine whether fuse F1 is defective may be made by depressing SIDEBAND switch S6. Relay K2 is connected across the AC line and should cause the opposite Upper or Lower indicator lamp to light when depressed. If switching occurs, probable trouble could be a defective lamp. Failure of K2 to switch indicates loss of AC input, which could occur through failure of F1 or a disconnected line cord. Therefore, F1 and the line cord should be checked before further troubleshooting takes place. In the event F1 fails the second time, further troubleshooting becomes necessary. Power should be removed from the converter and a suitable multimeter should be used to check the power supply circuitry for possible short circuit of a component.

5.4.2 Signal Receiving Circuits. Loss of output signals may result from a number of troubles within the converter, but systematic and logical observations can isolate the trouble to a particular circuit or area. The following steps may be used to isolate the problem:

1. Check AC input in accordance with paragraph 5.4.1.1. If lamp I3 is lit, proceed to step 2.
2. Advance AUDIO GAIN control. Normal noise in converter indicates presence of B+. Tubes V2 through V6 should be checked and replaced if defective.
3. With a suitable VTVM, measure regulated 150-volt supply at terminal 8 of E2, and 300-volt supply at terminal 7 of E2. A defective regulator, power rectifiers, or open load component will cause a loss of B+ voltage.
4. Refer to figure 5-1 and measure tube socket terminals to obtain indicated readings. Measuring resistance and voltage values will often isolate the trouble.

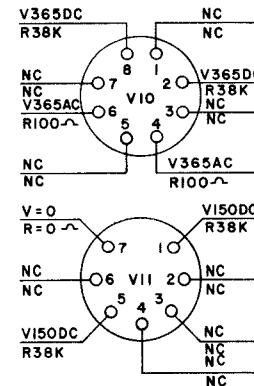
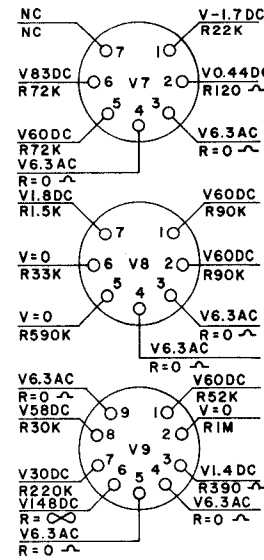
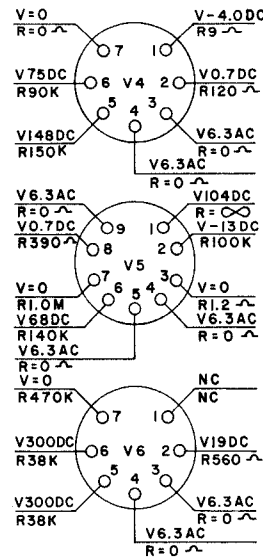
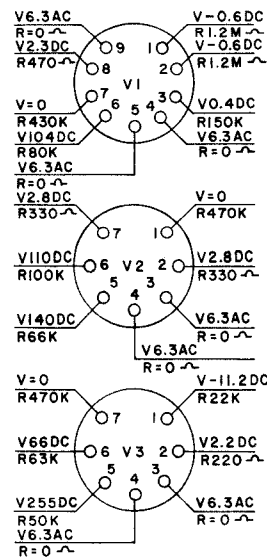
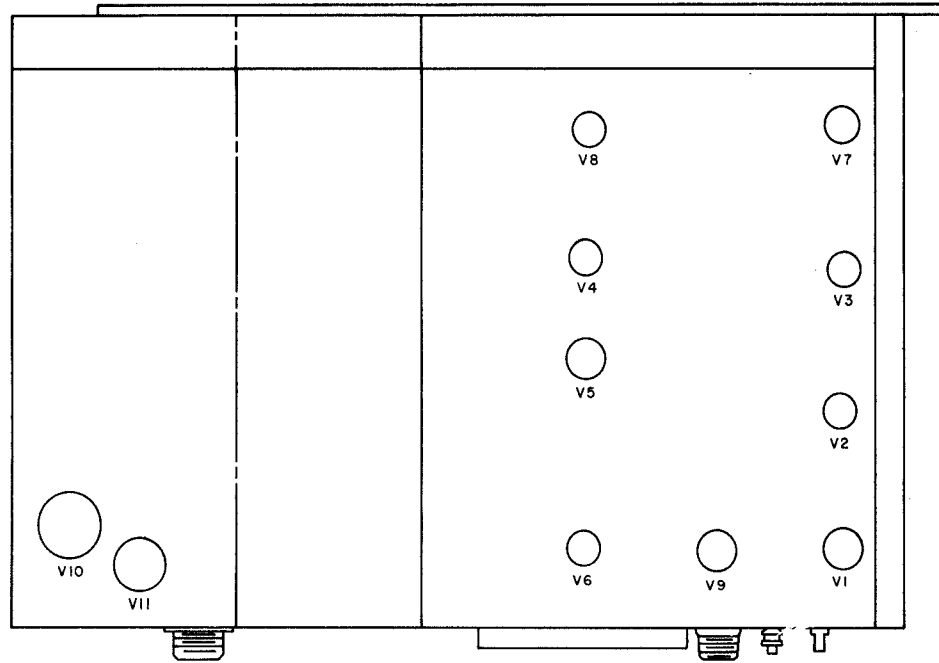
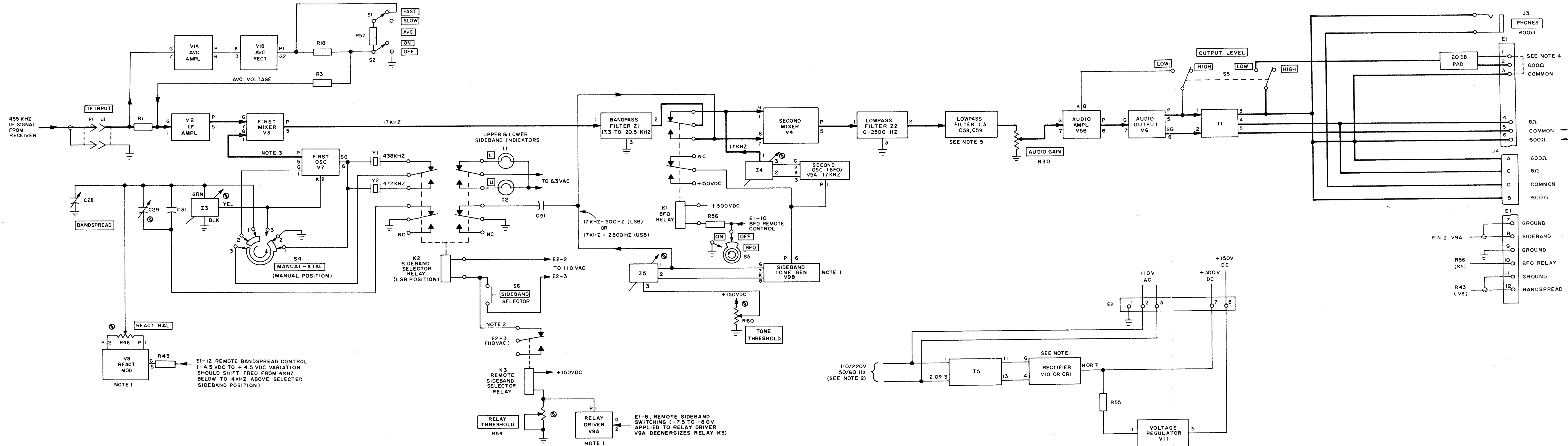


Figure 5-1. Single Sideband Converter CV-591A/URR, Voltage and Resistance Measurements

Figure 5-2. Single Sideband Converter CV-591A/URR,
Signal Flow Diagram

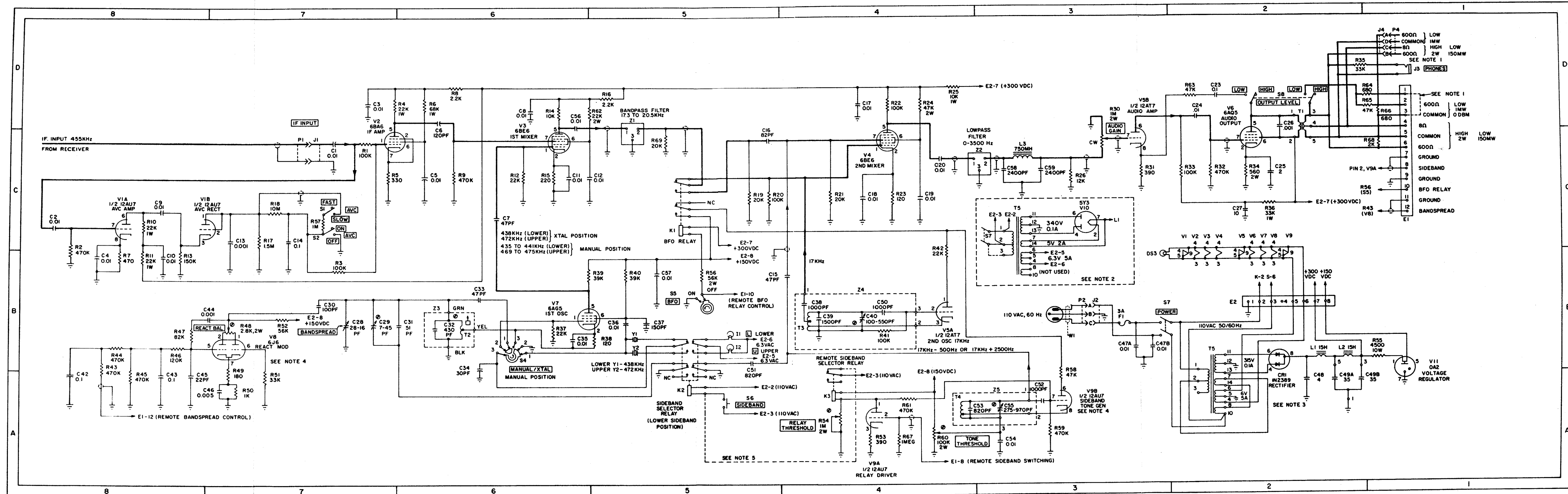
SPECIFIC NOTES:

1. FOR SHIPBOARD INSTALLATION, TUBES V8 AND V9 ARE REMOVED.
2. CONNECTION BETWEEN K3 AND S6 REMOVED FOR SHIPBOARD INSTALLATION ONLY.
3. OUTPUT OF FIRST OSCILLATOR IS AS FOLLOWS:
S4 IN ☐ XTAL ☐ POSITION
(LOWER) 438 KHZ OR (UPPER) 472 KHZ
S4 IN ☐ MANUAL ☐ POSITION
435 TO 441 KHZ OR 469 TO 475 KHZ
4. WHEN NO LOAD IS CONNECTED ACROSS TERMINALS 4 AND 5 OF E1 OR PINS C AND D OF P4.
5. THIS LOW-PASS FILTER ADDED BY F.C. #6 TO REDUCE 17 KHZ FEEDTHROUGH.

ZONING FOR SCHEMATIC DIAGRAM FIGURE 5-3

REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC
C1	7C	C47	3B	R14	6D	R60	4A
C2	8C	C48	2A	R15	6C	R61	4A
C3	7D	C49	2A	R16	5D	R62	6D
C4	8B	C50	4B	R17	7C	R63	2D
C5	6C	C51	5A	R18	7C	R64	1D
C6	6D	C52	3A	R19	5C	R65	1D
C7	6C	C53	4A	R20	5C	R66	1D
C8	6D	C54	3A	R21	4C	R67	4A
C9	8C	C55	3A	R22	4D	R68	1C
C10	8B	C56	6D	R23	4C	R69	5C
C11	6C	C57	5B	R24	4D	S1	7C
C12	6C	C58	3C	R25	4D	S2	7C
C13	7D	C59	3C	R26	3C	*S3	--
C14	7C	CR1	2A, 2B	*R27	--	S4	6B
C15	4B	E1	1C, 1D	*R28	--	S5	5B
C16	5C	E2	2C	*R29	--	S6	5A
C17	4D	F1	3B	R30	3C	S7	3B
C18	4C	I1	5B	R31	3C	S8	2D
C19	4C	I2	5B	R32	2C	T1	2D
C20	4C	I3	3B	R33	2C	T2	6B
*C21	--	J1	7C	R34	2C	T3	4B
*C22	--	J2	3B	R35	2D	T4	4A
C23	2D	J3	1D	R36	2C	T5	2A
C24	2D	J4	1D	R37	6B	V1	8C
C25	2C	K1	5C	R38	5B	V2	7C
C26	2D	K2	5A	R39	6B	V3	6C
C27	2C	K3	4A	R40	5B	V4	4C
C28	7B	L1	2B	R41	4B	V5A	4B
C29	7B	L2	2B	R42	4B	V5B	3C
C30	7B	L3	3C	R43	8A	V6	2C
C31	6B	P1	7C	R44	8B	V7	6B
C32	6B	P2	3B	R45	8A	V8	7B
C33	6B	P4	1D	R46	8B	V9A	4A
C34	6A	R1	7C	R47	8B	V9B	3A
C35	6B	R2	8B	R48	7B	V10	3C
C36	5B	R3	7B	R49	7A	V11	1A
C37	5B	R4	7D	R50	7A	W1	3B
C38	4B	R5	7C	R51	7A	Y1	5B
C39	4B	R6	6D	R52	7B	Y2	5B
C40	4B	R7	8B	R53	4A	Z1	5C
*C41	--	R8	6D	R54	4A	Z2	4C
C42	8A	R9	6C	R55	1B	Z3	6B
C43	8A	R10	8C	R56	5B	Z4	4B
C44	7B	R11	8B	R57	7C	Z5	3A
C45	8A	R12	6C	R58	3A		
C46	7A	R13	8B	R59	3A		

*Not Used.



**Figure 5-3. Single Sideband Converter CV-591A/URR,
Schematic Diagram**

GENERAL NOTES:

- A. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2 WATT.
- B. UNLESS OTHERWISE SPECIFIED ALL CAPACITIVE VALUES ARE IN MICROFARADS.
- C. TUBE PINS VOLTAGE & RESISTANCE VALUES - FIGURE 5-3.

SPECIFIC NOTES:

- 1. WHEN NO LOAD IS CONNECTED ACROSS TERMINALS 4 AND 5 OF E1 OR PINS C AND D OF P4, CONNECT JUMPER ACROSS TERMINALS 1 AND 3 OF E1.
- 2. POWER INPUT CONFIGURATION FOR SHORE-BASED INSTALLATIONS ONLY. FOR 230 VOLT OPERATION REMOVE S7 CONNECTION AT T5-2 AND CONNECT TO T5-3. REMOVE FUSE F1 AND REPLACE WITH 1-1/2A FUSE.
- 3. POWER IN CONFIGURATION FOR SHIPBOARD INSTALLATION ONLY. NO PROVISION FOR 230 VOLT OPERATION.
- 4. V8 AND V9 REMOVED FOR SHIPBOARD INSTALLATION ONLY.
- 5. CONNECTION BETWEEN K3 AND S6 REMOVED FOR SHIPBOARD INSTALLATION ONLY.

CHAPTER 6

CORRECTIVE MAINTENANCE

6.1 INTRODUCTION

- 6.1.1 The information contained in Corrective Maintenance is subdivided into two sections: Alignment and Repair.
- 6.1.2 The alignment section describes the recommended method by which the equipment is set up, test equipment is connected and used, and necessary adjustments are made to ensure proper equipment performance.
- 6.1.3 The repair section outlines the methods necessary for disassembly, cleaning, repairing, and reassembly required to replace a faulty component within the converter.

6.2 ALIGNMENT

6.2.1 Alignment of Converter Using a Frequency Counter. The oscillators have been aligned to their correct frequencies at the factory. Readjustment will be required only if the performance of the converter is impaired (i.e., when the bandspread oscillator is off scale with a signal centered on 455 kHz). The oscillators may be aligned with either a frequency counter or with a receiver as the signal source. Refer to figure 6-1 for location of converter adjustment points.

6.2.1.1 Equipment Required:

1. DC Source 0 to 10 Volts CAQI-721A.
2. Frequency Counter AN/USM-207.

6.2.1.2 Alignment of Bandspread Oscillator.

1. Apply power to converter and allow 30-minute warmup.
2. Connect the AC input of Frequency Counter AN/USM-207 to the bottom end of C7 located on TB3 (figure 6-4). Set counter SENSITIVITY control to 10 V (RMS) and TIME BASE control to 1 second.
3. Depress SIDEBAND switch so that the lamp to the right of the switch is lit (normally upper sideband (U)).
4. Jumper terminal 11 to terminal 12 on terminal board E1 (figure 6-2).
5. Set BANDSPREAD control to zero, MANUAL - XTAL switch to MANUAL and BFO and AVC switches OFF.
6. Adjust core of T2 (p/o Z3) until counter reads 472.000 kHz $\pm$ 15 Hz.
7. Depress SIDEBAND switch so that the lamp on the left of the switch is lit (normally lower sideband (L)).
8. Adjust variable capacitor C29 (figure 6-1) until counter reads 438.000 kHz $\pm$ 15 Hz.
9. Disconnect counter from C7 and remove jumper from terminals 11 and 12 of E1.

6.2.1.3 Alignment of 17 kHz Oscillator.

1. Connect the AC input of Frequency Counter AN/USM-207 to pin 1 of V4 (figure 6-3) and set SENSITIVITY control of counter to 1 V range.
2. Turn BFO switch ON.
3. Adjust C40 (p/o Z4) (figure 6-1) until counter reads 17 kHz $\pm$ 10 Hz.
4. Disconnect frequency counter from pin 1 of V4.

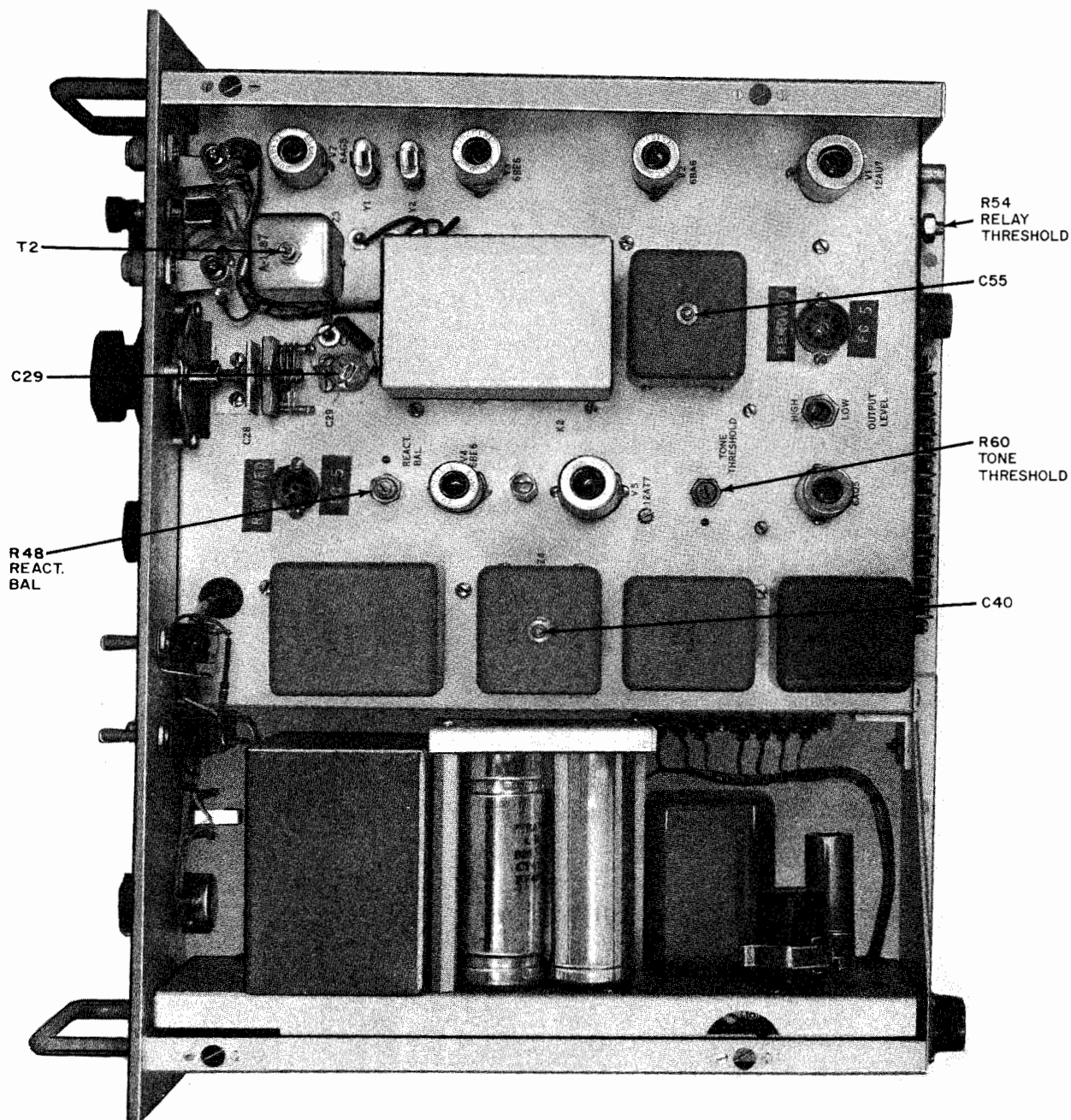


Figure 6-1. Single Sideband Converter CV-591A/URR, Alignment Setup

NOTE

Alignment procedures in paragraphs 6.2.1.4, 6.2.1.5, and 6.2.1.6 are not applicable to equipments with Field Change No. 5.

6.2.1.4 Bandspread Oscillator Remote Control Adjustments.

1. Set variable DC source to 0 to 10 volt range and OUTPUT control to 0 volts.
2. Connect the positive output of the DC supply CAQI-721A to terminal 12 of E1 and the negative output to terminal 11 of E1.
3. Connect Frequency Counter AN/USM-207 to bottom terminal of C7.
4. Set BANDSPREAD control to zero and depress SIDEBAND selector switch until lamp to right (U) of switch is lit.
5. Increase the output of the DC source to +4.5 VDC.
6. Make a note of the counter reading.
7. Depress SIDEBAND selector switch so that left lamp (L) is lit and note the counter reading.
8. Reduce output of DC source to zero.
9. Reverse the DC source connections at terminals 11 and 12 on E1 so that the positive output of DC source connects to terminal 11 and negative to terminal 12.
10. Increase the output of the DC source to -4.5 VDC and note the counter reading.
11. Depress SIDEBAND selector switch so that right lamp (U) is lit and note the counter reading.

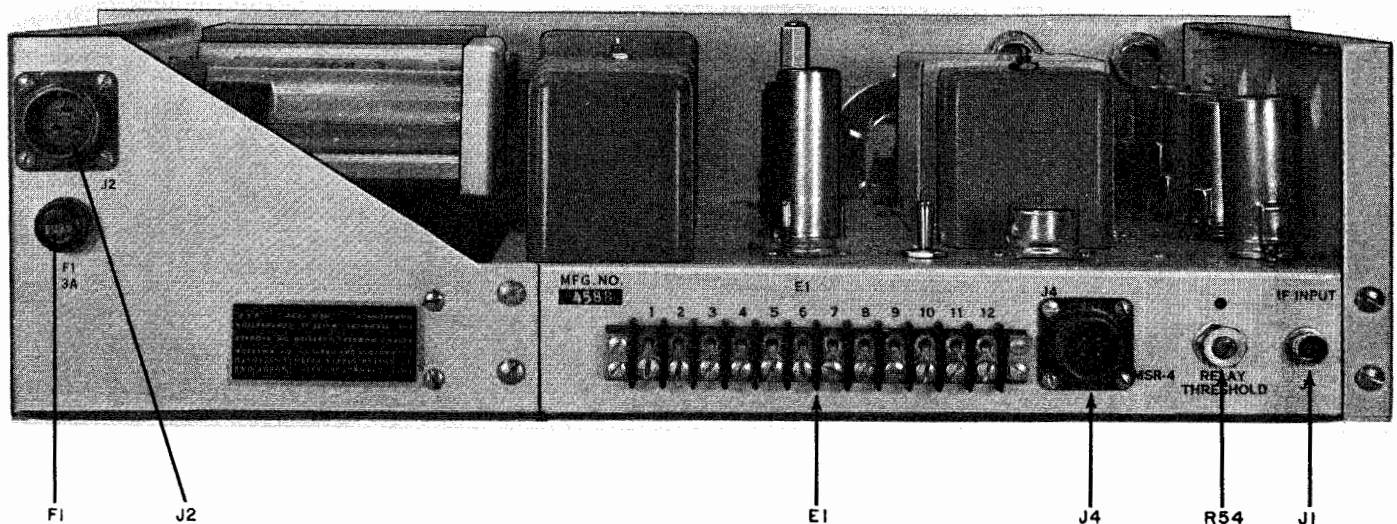
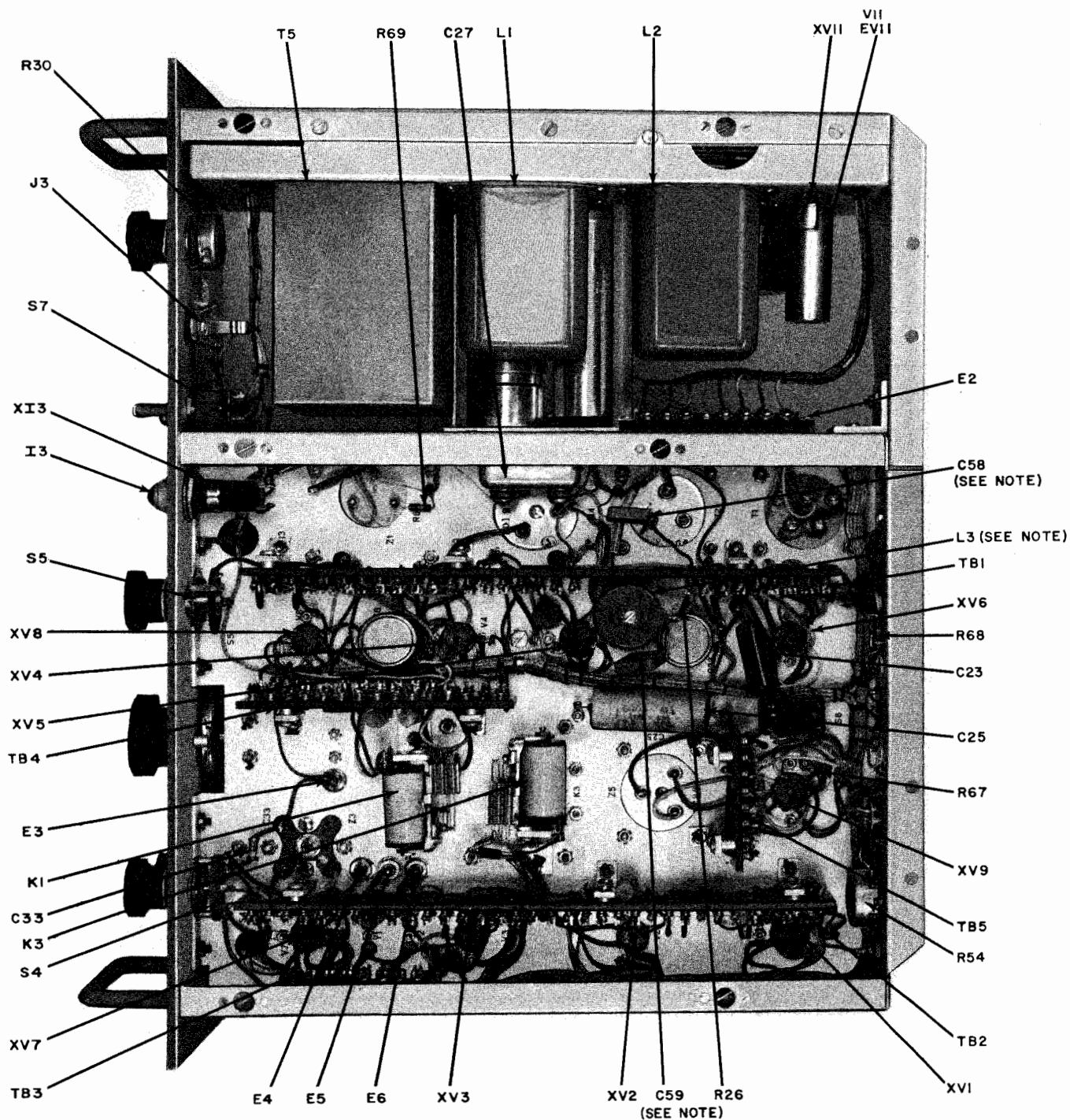


Figure 6-2. Single Sideband Converter CV-591A/URR, Rear View, Parts Location



NOTE: C58, C59, AND L3 ADDED BY FIELD CHANGE NO. 6

Figure 6-3. Single Sideband Converter CV-591A/URR, Bottom View, Parts Location

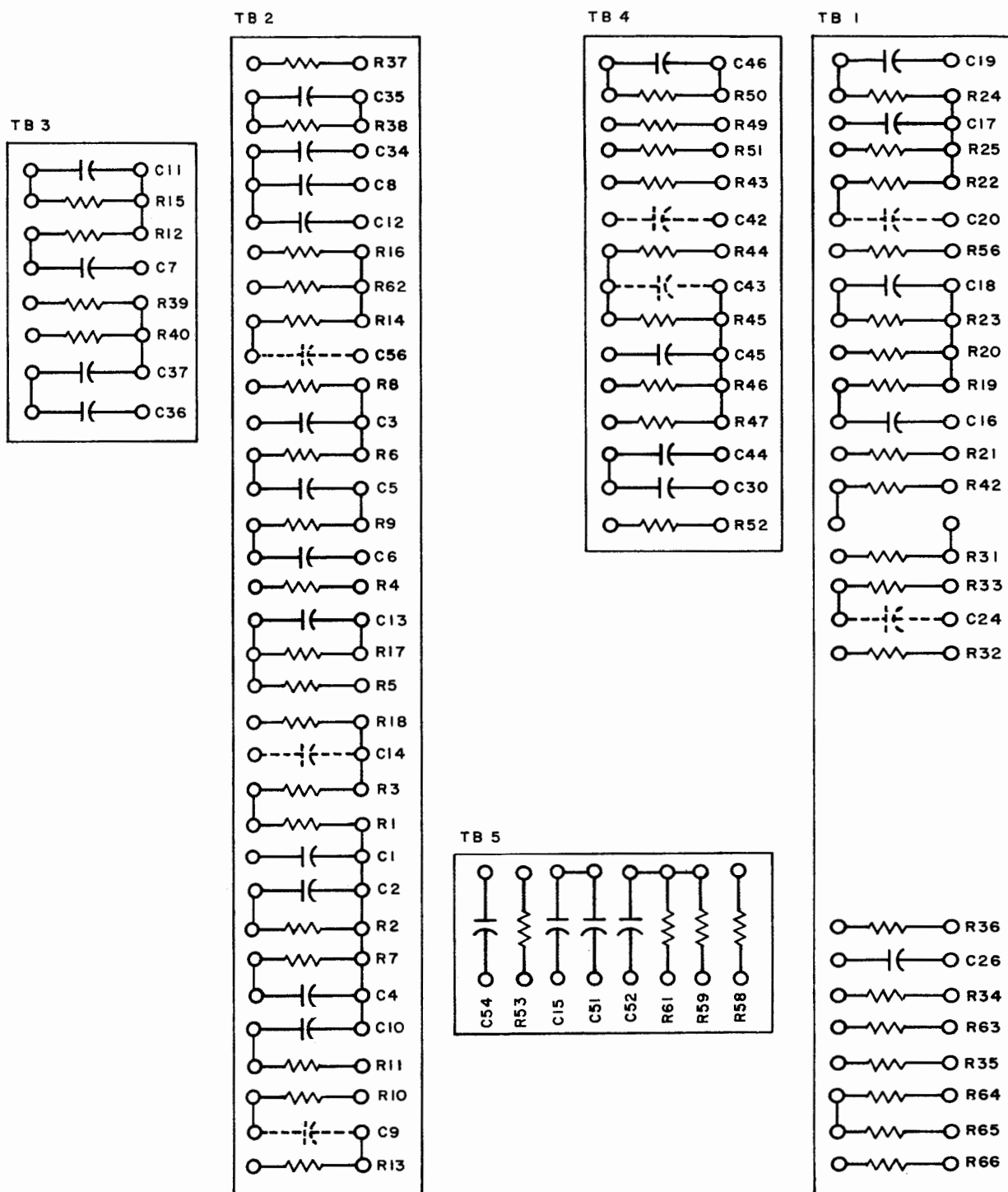


Figure 6-4. Single Sideband Converter CV-591A/URR, Parts Location on Terminal Boards



Figure 6-5. Single Sideband Converter CV-591A/URR, Top View, Parts Location

12. Compare the counter readings noted in steps 6, 7, 10, and 11. They should be 4 kHz above and 4 kHz below the upper (472.000 kHz) and lower (438.000 kHz) sideband frequencies. If these readings are off more than 500 Hz, adjust REACT BAL control R48 (figure 6-1) for proper balance.
13. Set variable DC source output to zero, remove connecting leads from terminals 11 and 12 of E1, and disconnect counter from C7.

6.2.1.5 Sideband Selector Remote Operation Alignment.

1. Set variable DC supply CAQI-721A to 0 to 10 volt range and OUTPUT control to 0 volts.
2. Connect the positive output of DC source to terminal 7 of E1 and negative to terminal 8.
3. Increase the output of the DC source and adjust RELAY THRESHOLD control R54 (figure 6-2) so that sideband selector relay K2 operates when the output of the DC source is between 7.5 and 8.5 volts. Observe the L and U SIDEBAND indicator lamps to determine operation of the relay.

6.2.1.6 Alignment of Side Tone Generator.

1. Set variable DC supply CAQI-721A to 0 to 10 volt range and OUTPUT control to 0 volts.
2. Connect the positive output of DC source to terminal 7 of E1 and negative to terminal 8.
3. Turn the converter BFO switch to ON and SIDEBAND selector switch so that right lamp is lit.
4. Set OUTPUT LEVEL switch S8 to LOW.
5. Connect Frequency Counter AN/USM-207 to grd and terminal 2 of E1 and set SENSITIVITY to 1 volt range.
6. Set variable DC source output to -9 volts.
7. Adjust TONE THRESHOLD control R-60 (figure 6-1) to mid range then turn a little on either side of mid range until counter begins to count and adjust for the highest frequency reading on the counter that is stable.
8. Adjust C55 on top of Z5 (figure 6-1) for a reading of 2500 ± 100 Hz.
9. Depress SIDEBAND selector switch so that the left lamp is lit.
10. Adjust C55 until the counter reads 500 ± 50 Hz.
11. Repeat steps 3, 8, 9, and 10 until both readings are within tolerance. It may be necessary to adjust TONE THRESHOLD control R-60 slightly to obtain correct readings.

6.2.2 Alignment Procedure Using a Receiver. This procedure is not as accurate as using a frequency counter but it can be used in an emergency situation to provide operation until a frequency counter can be obtained.

1. Tune the receiver for a stable CW signal.
2. Set receiver BANDWIDTH control to the narrowest bandwidth setting and any filter switch to the narrowest position.
3. Set BFO switch on receiver to OFF.
4. Set SIDEBAND switch on converter to XTAL.
5. Set converter BFO switch to ON.
6. Depress SIDEBAND selector switch so that the right lamp is lit.
7. Set BANDSPREAD control to zero.
8. Plug headphones into the converter and adjust C40 (p/o Z4) to obtain a zero beat.
9. Set SIDEBAND switch to MANUAL.
10. Adjust T2 (p/o Z3) to obtain a zero beat.

11. Depress SIDEBAND selector switch so that the left lamp is lit.
12. Adjust C29 for a zero beat.

6.3 PARTS LOCATION

6.3.1 Physical location of major components is illustrated in figure 6-2 through 6-5. Schematic location of parts may be obtained from zoning located on the schematic diagram or preceding page.

CHAPTER 7

PARTS LIST

7.1 INTRODUCTION

7.1.1 This chapter provides reference data on the parts comprising Single Sideband Converter CV-591A/URR. The data is in tabular form and is intended to supplement the troubleshooting, maintenance, and repair information in other chapters.

7.1.2 Reference designations have been assigned to identify all maintenance parts of the equipment. They are used for marking the equipment (adjacent to the part they identify) and are included on drawings, diagrams, and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, electron tube, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as an electron tube or a fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for fuse F1 is designated XF1.

7.1.3 Table 7-1 lists the parts required to maintain the converter. The maintenance parts are listed alphanumerically by class of part. The following information is provided by Table 7-1: (1) reference designation of the part; (2) reference to explanatory notes (see paragraph 7.1.6); (3) description of the part with part number and manufacturer's code; and (4) identification of the illustration which pictorially locates the part. In addition, the attaching hardware for each part is listed following the listing of the associated part.

7.1.4 Table 7-2 lists the manufacturers of parts used in the equipment. The table includes the manufacturer's code used in Table 7-1. The code is contained in Federal Supply Code for Manufacturers, H4-1.

7.1.5 The Allowance Parts List (APL) issued by the Electronics Supply Office (ESO) includes Federal Stock Numbers and Source Maintenance Recoverability Codes. Therefore, reference should be made to the APL prepared for the equipment for stock numbering information.

7.1.6 The following provides information as referenced in the NOTES column of Table 7-1.

Note 1: Used only on shipboard installation in place of V10. Added by Field Change No. 5.

Note 2: Not used on shipboard installation. Removed by Field Change No. 5.

Note 3: Used in place of CR1 for shore station installations. Changed by Field Change No. 5.

7.2 PARTS LIST

TABLE 7-1. PARTS LIST

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
		CONVERTER, SINGLE SIDEBAND, CV-591A/URR: Model No. MSR-4 (82679), consisting of:	
C1		CAPACITOR, FIXED: ceramic; 0.01 mfd + 80% - 20%; 500 vdcw; part No. CC-100-16 (82679).	6-4
C2 thru C5 C6		Same as C1.	6-4
		CAPACITOR, FIXED: ceramic; 120 pf $\pm$ 24 pf; 500 vdcw; part No. CC-101-4 (82679).	6-4
C7		CAPACITOR, FIXED: ceramic; 47 pf $\pm$ 10%; 500 vdcw; CC21SL470K.	6-4
C8		Same as C1.	6-4
C9		CAPACITOR, FIXED: plastic; 0.01 mfd + 40% - 10%; 400 vdcw; part No. CN-100-1 (82679).	6-4

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
C10 thru C12 C13		Same as C1. CAPACITOR, FIXED: ceramic; 0.001 mfd $\pm$ 200 pf; 500 vdcw, part No. CC-100-9 (82679).	6-4 6-4
C14 C15 C16 C17 thru C19 C20 C21 C22 C23		CAPACITOR, FIXED: plastic; 0.1 mfd $\pm$ 5%; 200 vdcw; CN108C1003J. Same as C7. CAPACITOR, FIXED: ceramic; 82 pf $\pm$ 5%; 500 vdcw; CC26SL820J. Same as C1. Same as C9. Not Used. Not Used. CAPACITOR, FIXED: ceramic; 0.1 mfd +40% -10%; 400 vdcw; part No. CN-100-4 (82679).	6-4 6-4 6-4 6-4 6-4 6-4 6-3
C24 C25 C26 C27		Same as C9. CAPACITOR, FIXED: plastic; 2 mfd $\pm$ 10%; 200 vdcw; CN108C2004K. Same as C13. CAPACITOR, FIXED: electrolytic; 10 mfd; 300 vdcw; CE64C100N. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, 6-32 by 5/16 in. lg (2 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (2 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 thd (2 required). - - - * - - -	6-4 6-3 6-4 6-3
C28		CAPACITOR, VARIABLE: air; 2.8 - 16 pf; 1200 vrms; part No. CB-135-4 (82679). (Attaching Parts) SCREW, SET: Allen type, steel, 6-32 x 1/4 in. lg (2 required). NUT, PLAIN: hexagon; brs, nickel plated, 3/8 - 32 NEF thd, 1/2 in. across flts (1 required). WASHER, FLAT: brs, nickel plated, 3/8 in. I.D. (1 required). - - - * - - -	6-5
C29		CAPACITOR, VARIABLE: ceramic; 7-45 pf; 500 vdcw; CV11C450. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 4-40 by 9/16 in. lg (2 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 4 (2 required). WASHER, PLAIN: fiber, No. 6 (2 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 4-40 UNF thd (2 required). - - - * - - -	6-5
C30 C31 C32 C33 C34 C35 C36 C37		CAPACITOR, FIXED: ceramic; 100 pf $\pm$ 5%; 500 vdcw; CC32CH101J. CAPACITOR, FIXED: mica; 51 pf $\pm$ 5%; 500 vdcw; CM20E510J. CAPACITOR, FIXED: mica; 430 pf $\pm$ 2%; 500 vdcw; CM20D431G. P/O Z3. CAPACITOR, FIXED: ceramic; 47 pf $\pm$ 5%; 500 vdcw; CC32CH470J. CAPACITOR, FIXED: ceramic; 30 pf $\pm$ 5%; 500 vdcw; CC21SL300J. Same as C1. Same as C1. CAPACITOR, FIXED: ceramic; 150 pf $\pm$ 10%; 500 vdcw; part No. CC-101-2 (82679).	6-4 6-5 6-5 6-3 6-4 6-4 6-4 6-4
C38 C39 C40 C41 C42 C43 C44		CAPACITOR, FIXED: mica; 0.001 mfd $\pm$ 2%; 500 vdcw; CM20D102G. P/O Z4. CAPACITOR, FIXED: mica; 1500 pf $\pm$ 2%; 500 vdcw; CM20D152G. P/O Z4. CAPACITOR, VARIABLE: mica; 100-550 pf; 250 vdcw; part No. CV-100-304 (82679). P/O Z4. Not Used. Same as C14. Same as C14. Same as C13.	6-5 6-5 6-5 6-4 6-4 6-4 6-4

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. No.
C45	See Note 1	CAPACITOR, FIXED: ceramic; 22 pf $\pm$ 5%; 500 vdcw; CC21SL220J.	6-4
C46		CAPACITOR, FIXED: ceramic; 0.005 mfd; 500 vdcw; part No. CC-100-15 (82679).	6-4
C47		CAPACITOR, FIXED: ceramic; two section; 0.01 mfd; 500 vdcw each section; part No. CC-100-23 (82679).	6-5
A, B		CAPACITOR, FIXED: paper; 4 mfd $\pm$ 20% -10%, 600 vdcw; CP41B1FF405V.	6-5
C48		CAPACITOR, ELECTROLYTIC: 35 - 35 mfd; CE52F350R.	6-5
C49		Same as C38. P/O Z4.	6-5
A, B		CAPACITOR, FIXED: mica; 8100 pf $\pm$ 2%; 500 vdcw; CM20D812G.	6-4
C50		Same as C38.	6-4
C51		CAPACITOR, FIXED: mica; 820 pf $\pm$ 2%, 500 vdcw; CM20D821G. P/O Z5.	6-5
C52		Same as C1.	6-4
C53		CAPACITOR, VARIABLE: mica; 100-500 pf; 250 vdcw; part No. VC-100-306 (82679). P/O Z5.	6-5
C54		Same as C9.	6-4
C55		Same as C1.	6-4
C56		CAPACITOR, FIXED: mica; 2400 pf $\pm$ 5%; 500 vdcw; CM30E242J.	6-3
C57		Same as C58.	6-3
C58		SEMICONDUCTOR DEVICE, DIODE: full-wave; octal base; 1N2389.	6-5
C59		BOARD, TERMINAL: barrier type, 12 terminals, screw w/feedthru solder lugs; plastic; part No. TM-100-12 (82679).	6-2
CR1		(Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 4-40 by 7/16 in. lg (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 4 (4 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 4-40 UNF thd (4 required). - - - * - - -	
E1		BOARD, TERMINAL: barrier type, 8 terminals, screw w/feedthru solder lugs, plastic; part No. TM-100-8 (82679). (Attaching Parts) Same as E1. - - - * - - -	6-3
E2		TERMINAL, FEEDTHRU: solder lug each end, 7/8 in. lg, 1/4-28 UNF thd. (Attaching Parts) NUT, PLAIN: hexagon, brs, nickel plated, 1/4-28 NEF thd, 3/8 in. across flats (2 required). WASHER, INTERNAL TOOTH: brs, nickel plated, 1/4 in. I. D. (1 required). - - - * - - -	6-3
E3		Same as E3.	6-3
E4 thru E6		SHIELD, TUBE: 9 pin medium.	6-5
EV1		SHIELD, TUBE: 7 pin medium.	6-5
EV2		Same as EV2.	6-5
EV3		Same as EV2.	6-5
EV4		Same as EV1.	6-5
EV5		SHIELD, TUBE: 7 pin long FSN 9N5960-729-8150.	6-5
EV6		Same as EV2.	6-5
EV7		Same as EV2.	6-5
EV8		Same as EV1.	6-5
EV9		Same as EV6.	6-3
EV11		FUSE, CARTRIDGE: 3A; 250v; part No. FU-100-3 (82679).	6-2
F1		LAMP, INCANDESCENT: 6-8V; 150 ma; T-3-1/4 clear bulb; bayonet base; part No. GE-47 (24455).	6-5
I1		Same as I1.	6-5
I2		Same as I1.	6-3
I3			

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
J1		CONNECTOR, RECEPTACLE: electrical; 1 female contact; BNC type, UG-625/U.	6-2
J2		CONNECTOR, RECEPTACLE: electrical; 3 male contacts, MS3102A165-5P. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 4-40 by 1/4 in. lg (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 4 (4 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 4-40 thd (4 required). - - - * - - -	6-2
J3		JACK, TELEPHONE: tip and sleeve; bushing mounted; JJ-034.	6-3
J4		CONNECTOR, RECEPTACLE: electrical; 4 male contacts; MS3102A14S-2P. (Attaching Parts) Same as J2. - - - * - - -	6-2
K1		RELAY, ARMATURE: dpdt; 80 vdc; .32w; 20,000 ohms; part No. RL-105 (82679). (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 1/4 in. lg (2 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (2 required). - - - * - - -	6-3
K2		RELAY, ARMATURE: 4 pdt; impulse-type; 115 vac, 60 Hz; part No. RL-118-17A115-60-A (82679). (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 3/8 in. lg (2 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (2 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 UNF thd (2 required). - - - * - - -	6-5
K3		Same as K1.	6-3
L1		REACTOR, FIXED: 15 henries; 85 ma dc; 285 ohms; 2500 vrms test; part No. TF-5000 (82679). (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 3/8 in. lg (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (4 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 UNF thd (4 required). - - - * - - -	6-3
L2		Same as L1.	6-3
L3		CHOKE, RADIO-FREQUENCY: 750 mh; part No. P94-38 (07388). (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 1 in. lg (1 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (1 required). - - - * - - -	6-3
P2		CONNECTOR, PLUG: electrical; 3 female contacts; MS3106A16S-5S.	6-4
P4		CONNECTOR, PLUG: electrical; 4 female contacts; MS3106A14S-2S.	
R1		RESISTOR, FIXED: composition; 100,000 ohms $\pm$ 10%; 1/2 w; RC20GF104K.	
R2		RESISTOR, FIXED: composition; 470,000 ohms $\pm$ 10%; 1/2 w; RC20GF474K.	6-4
R3		Same as R1.	6-4
R4		RESISTOR, FIXED: composition; 22,000 ohms $\pm$ 10%; 1w; RC30GF223K.	6-4
R5		RESISTOR, FIXED: composition; 330 ohms $\pm$ 10%; 1/2 w, RC20GF331K.	6-4
R6		RESISTOR, FIXED: composition; 68,000 ohms $\pm$ 10%; 1w; RC30GF683K.	6-4
R7		RESISTOR, FIXED: composition; 470 ohms $\pm$ 10%; 1/2 w; RC20GF471K.	6-4
R8		RESISTOR, FIXED: composition; 2200 ohms $\pm$ 10%; 1/2 w; RC20GF222K.	6-4

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
R9		Same as R2.	6-4
R10		Same as R4.	6-4
R11		Same as R4.	6-4
R12		RESISTOR, FIXED: composition; 22,000 ohms $\pm$ 10%; 1/2 w; RC20GF223K.	6-4
R13		RESISTOR, FIXED: composition; 150,000 ohms $\pm$ 10%; 1/2 w; RC20GF154K.	6-4
R14		RESISTOR, FIXED: composition; 10,000 ohms $\pm$ 10%; 1/2 w; RC20GF103K.	6-4
R15		RESISTOR, FIXED: composition; 220 ohms $\pm$ 10%; 1/2 w; RC20GF221K.	6-4
R16		Same as R8.	6-4
R17		RESISTOR, FIXED: composition; 1.5 megohm $\pm$ 10%; 1/2 w; RC20GF155K.	6-4
R18		RESISTOR, FIXED: composition; 10 megohms $\pm$ 10%; 1/2 w; RC20GF106K.	6-4
R19		RESISTOR, FIXED: composition; 20,000 ohms $\pm$ 5%; 1/2 w; RC20GF203J.	6-4
R20		Same as R1.	6-4
R21		Same as R19.	6-4
R22		Same as R1.	6-4
R23		RESISTOR, FIXED: composition; 120 ohms $\pm$ 10%; 1/2 w; RC20GF121K.	6-4
R24		RESISTOR, FIXED: composition; 47,000 ohms $\pm$ 10%; 2 w; RC42GF473K.	6-4
R25		RESISTOR, FIXED: composition; 10,000 ohms $\pm$ 10%; 1 w; RC30GF103K.	6-4
R26		RESISTOR, FIXED: composition; 12,000 ohms $\pm$ 10%; 1/2 w; RC20GF123K.	6-3
R27 thru R29		Not Used.	
R30		RESISTOR, VARIABLE: composition; 1 megohm $\pm$ 20%; 2 w; log taper; RV4ATRD105D.	6-3
R31		RESISTOR, FIXED: composition; 390 ohms $\pm$ 10%; 1/2 w; RC20GF391K.	6-4
R32		Same as R2.	6-4
R33		Same as R1.	6-4
R34		RESISTOR, FIXED: composition; 560 ohms $\pm$ 10%; 2w; RC42GF561K.	6-4
R35		RESISTOR, FIXED: composition; 3900 ohms $\pm$ 10%; 1/2 w; RC20GF392K.	6-4
R36		RESISTOR, FIXED: composition; 33,000 ohms $\pm$ 10%; 1 w; RC30GF333K.	6-4
R37		Same as R12.	6-4
R38		Same as R23.	6-4
R39		RESISTOR, FIXED: composition; 39,000 ohms $\pm$ 10%; 1/2 w; RC20GF393K.	6-4
R40		Same as R39.	6-4
R41		Same as R1. P/O Z4.	6-5
R42		Same as R12.	6-4
R43 thru R45		Same as R2.	6-4
R46		RESISTOR, FIXED: composition; 120,000 ohms $\pm$ 10%; 1/2 w; RC20GF124K.	6-4
R47		RESISTOR, FIXED: composition; 82,000 ohms $\pm$ 10%; 1/2 w; RC20GF823K.	6-4
R48		RESISTOR, VARIABLE: composition; 2500 ohms $\pm$ 10%; 2 w; linear taper; RV4ATSA252A.	6-5
R49		RESISTOR, FIXED: composition; 180 ohms $\pm$ 10%; 1/2 w; RC20GF181K.	6-4

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
R50		RESISTOR, FIXED: composition; 1000 ohms $\pm$ 10%; 1/2 w; RC20GF102K.	6-4
R51		RESISTOR, FIXED: composition; 33,000 ohms $\pm$ 10%; 1/2 w; RC20GF333K.	6-4
R52		RESISTOR, FIXED: composition; 56,000 ohms $\pm$ 10%; 1/2 w; RC20GF563K.	6-4
R53		Same as R31.	6-4
R54		RESISTOR, VARIABLE: w/locking shaft; composition; 1 megohm $\pm$ 20%; 2 w; linear taper; RV4ATXA105B.	6-2
R55		RESISTOR, FIXED: wire wound; 4500 ohms $\pm$ 5%; 10 w; part No. 109-47. (Attaching Parts) SCREW, MACHINE: flat hd, slotted hd, brs, nickel plated, No. 6-32 by 2-1/4 in. lg (1 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (1 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 UNF thd (1 required). - - - * - - -	6-5
R56		RESISTOR, FIXED: composition; 56,000 ohms $\pm$ 10%; 2 w; RC42GF563K.	6-4
R57		RESISTOR, FIXED: composition; 1 megohm $\pm$ 10%; 1/2 w; RC20GF105K.	6-5
R58		RESISTOR, FIXED: composition; 47,000 ohms $\pm$ 10%; 1/2 w; RC20GF473K.	6-4
R59		Same as R2.	6-4
R60		RESISTOR, VARIABLE: composition; 100,000 ohms $\pm$ 10%; 2 w; linear taper; RV4ATSA104B.	6-5
R61		Same as R2.	6-4
R62		RESISTOR, FIXED: composition; 22,000 ohms $\pm$ 10%; 2 w; RC42GF223K.	6-4
R63		Same as R58.	6-4
R64		RESISTOR, FIXED: composition; 680 ohms $\pm$ 10%; 1/2 w; RC20GF681K.	6-4
R65		RESISTOR, FIXED: composition; 2700 ohms $\pm$ 10%; 1/2 w; RC20GF272K.	6-4
R66		Same as R64.	6-4
R67		Same as R57.	6-3
R68		RESISTOR, FIXED: composition; 2000 ohms $\pm$ 10%; 2 w; RC42GF202K.	6-3
R69		Same as R19.	6-3
S1		SWITCH, TOGGLE: spst; 3A; 250 v; ST-12A.	6-5
S2		Same as S1.	6-5
S3		Not Used.	
S4		SWITCH, ROTARY: 1 section; 2 positions; 2 wipers; 6 fixed contacts; part No. SW-226 (82679).	6-3
S5		SWITCH, ROTARY: 1 section; 2 positions; 1 wiper; 2 fixed contacts; part No. SW-194 (82679).	6-3
S6		SWITCH, PUSHBUTTON: momentary contact; normally open; 3A; 250 v; part No. SW-168SPST-2-NOBB (82679).	6-5
S7		SWITCH, TOGGLE: dpdt; 2A; 250 v; ST-22K.	6-3
S8		Same as S7.	6-5
T1		TRANSFORMER, AUDIO FREQUENCY: plate coupling type; 1 primary, 5000 ohms, 35 ma; 1 secondary, 600 ohms, tapped at 8 ohms; 5 w max output; part No. TF-100 (82679). (Attaching Parts) NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 UNF thd (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (4 required). - - - * - - -	6-5
T2		TRANSFORMER, RADIO FREQUENCY: 225 microhenries, Q = 75; tapped at 115 microhenries, Q = 50; tuning core included; P/O Z3. Part No. A-1387 (82679).	6-5
T3		TRANSFORMER, AUDIO FREQUENCY: input type; 43.5 millihenries, Q = 20; 10.5 ohms; 2 taps; part No. A-1382 (82679). Part of Z4.	6-5
T4		TRANSFORMER, AUDIO FREQUENCY: input type; 43.5 millihenries; Q = 20; 10.5 ohms; tapped; part No. A-1383 (82679). P/O Z5.	6-5
T5		TRANSFORMER, POWER: stepdown and stepup; primary; 110 or 220 v, 50 to 60 Hz; secondary; 5 v at 2 amps, center tapped; 6.3 v at 5 amps, center tapped; 340 at 100 ma dc, center tapped; part No. TF-101 (82679). (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 10-32 by 3/8 in. lg (4 required).	6-3

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
TB1		WASHER LOCK: ext tooth, brs, nickel plated, No. 10 (4 required). - - - * - - - BOARD, TERMINAL: 56 terminal lugs, phenolic. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 3/8 in. lg (6 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (6 required) - - - * - - -	6-3
TB2		BOARD, TERMINAL: 68 terminal lugs, phenolic. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 3/8 in. lg (6 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (6 required). - - - * - - -	6-3
TB3		BOARD, TERMINAL: 18 terminal lugs, phenolic. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 5/16 in. lg (1 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (1 required). - - - * - - -	6-3
TB4		BOARD, TERMINAL: 30 terminal lugs, phenolic. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 3/8 in. lg (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (4 required). - - - * - - -	6-3
TB5		BOARD, TERMINAL: 16 terminal lugs, phenolic. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 5/16 in. lg (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (4 required). - - - * - - -	6-3
V1		TUBE, ELECTRON: medium-mu duo-triode; 9 pin miniature; 12AU7.	6-5
V2		TUBE, ELECTRON: remote cutoff RF pentode; 7 pin miniature; 6BA6.	6-5
V3		TUBE, ELECTRON: heptode converter; 7 pin miniature; 6BE6.	6-5
V4		Same as V3.	6-5
V5		TUBE, ELECTRON: duo-triode; 9 pin miniature; 12AT7.	6-5
V6		TUBE, ELECTRON: beam power amplifier; 7 pin miniature; 6AQ5.	6-5
V7		TUBE, ELECTRON: sharp cutoff RF pentode; 7 pin miniature 6AG5.	6-5
V8	2	TUBE, ELECTRON: duo-triode; 7 pin miniature; 6J6.	6-5
V9	2	Same as V1.	6-5
V10	3	TUBE, ELECTRON: full-wave rectifier; octal base; 5Y3GT.	6-5
V11		TUBE, ELECTRON: voltage regulator; 7 pin miniature; OA2.	6-3
W1		CABLE ASSEMBLY, POWER: electrical; 3 conductor; 6 ft lg w/integral male plug w/pigtail ground lead one end, and MS3106A16S-5S with MS-3057-8 clamp on other end; part No. CA-385 (82679).	
XC49		SOCKET, ELECTRON TUBE: octal; TS101P01. (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 6-32 by 5/16 in. lg (2 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (2 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 UNF thd (2 required). - - - * - - -	6-5
XI1		SOCKET ASSEMBLY, INDICATOR LIGHT: consisting of socket and bracket w/lens assembly; part No. TS-133 (82679).	6-5
XI2		Same as XI1.	6-5
XI3		SOCKET ASSEMBLY, INDICATOR LIGHT: consisting of socket and lens; part No. TS-106-1 (82679).	6-3
XF1		FUSEHOLDER: extractor post type; two solder lugs; 15 A; 250 v; part No. FH-100-2 (82679).	6-2
XV1		SOCKET, ELECTRON TUBE: 9 pin miniature; TS103P01.	6-3

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
XV2		(Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 4-40 by 5/16 in. lg (2 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 4 (2 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 4-40 UNF thd (2 required). - - - * - - - SOCKET, ELECTRON TUBE: 7 pin miniature; TS102P01.	6-3
XV3		(Attaching Parts) Same as XV1. - - - * - - -	6-3
XV4		Same as XV2.	6-3
XV5		Same as XV2.	6-3
XV6 thru XV8		Same as XV1.	6-3
XV9		Same as XV2.	6-3
XV10		Same as XV1. SOCKET, ELECTRON TUBE: octal; TS101P01.	6-3 6-5
XV11		(Attaching Parts) Same as XC49. - - - * - - -	6-3
XY1		Same as XV2. SOCKET, CRYSTAL: 2 contact; 0.486 in. spacing for 0.05-in. pin dia; steatite body; part No. TS-104-1 (82679).	6-5
		(Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 4-40 by 3/8 in. lg (1 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 4 (1 required).	
XY2		Same as XY1.	6-5
Y1		CRYSTAL, QUARTZ: 438 kHz $\pm$ 0.01%; includes holder HC-6/U; part No. CR-46/U - .4380-P (82679).	6-5
Y2		CRYSTAL, QUARTZ: 472 kHz $\pm$ 0.01%; includes holder HC-6/U; part No. CR-46/U - .4720-P (82679).	6-5
Z1		FILTER, BANDPASS: 19.1 kHz; 3.4 kHz bandwidth, 10,000 ohms impedance; part No. FX-153 (82679).	6-5
		(Attaching Parts) NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 UNF thd (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (4 required). - - - * - - -	
Z2		FILTER, LOW PASS: 3500-Hz cutoff frequency; part No. FX-152 (82679).	6-5
		(Attaching Parts) Same as Z1. - - - * - - -	
Z3		OSCILLATOR NETWORK, RADIO FREQUENCY: 790 Hz; consists of C32 and T2; part No. A-1387 (82679).	6-5
		(Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, 6-32 by 7/16 in. lg (1 required). SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, 6-32 by 5/8 in. lg (1 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (4 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 6-32 UNF thd (2 required). - - - * - - -	
Z4		OSCILLATOR NETWORK, AUDIO FREQUENCY: 17 kHz; consists of C38, C39, C40, C50, R41, and T3; part No. A-1381 (82679).	6-5
		(Attaching Parts) NUT, PLAIN: hexagon, brs, nickel plated, 6-32 UNF thd (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 6 (4 required). - - - * - - -	

TABLE 7-1 (Cont)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	FIG. NO.
Z5		OSCILLATOR NETWORK, AUDIO FREQUENCY: 43.5 millihenries, consists of C53, C55, and T4; part No. A-1384 (82679). (Attaching Parts) SCREW, MACHINE: pan hd, slotted hd, brs, nickel plated, No. 4-40 by 5/16 in. lg (4 required). WASHER, LOCK: ext tooth, brs, nickel plated, No. 4 (4 required). NUT, PLAIN: hexagon, brs, nickel plated, No. 4-40 UNF thd (4 required).	6-5

7.3 LIST OF MANUFACTURERS

7.3.1 Table 7-2 contains the names, addresses, and code symbols of all manufacturer's supply parts for the converter.

TABLE 7-2. LIST OF MANUFACTURERS

<u>Mfr Code</u>	<u>Name</u>	<u>Address</u>
07388	Torotel, Inc.	Kansas City, Mo.
24455	General Electric Corp., Lamp Division	Cleveland, Ohio
82679	Technical Material Corp.	Mamaroneck, N. Y.

CHAPTER 8

INSTALLATION

8.1 UNPACKING

8.1.1 Single Sideband Converter CV-591A/URR is packed in a single shipping container and must be carefully unpacked. Because the converter is a calibrated instrument, caution must be exercised when handling to prevent damage. Handles are provided on the front panel for lifting or carrying the converter. A close visual inspection should be made to determine any physical damage that might have occurred during shipment. Report any damage or missing parts.

8.1.2 Packing for reshipment is the reverse of unpacking.

8.2 SITE INFORMATION

8.2.1 The converter is designed for mounting in a standard 19-inch rack or cabinet. Refer to figure 8-2 for outline and mounting dimensions. An installation kit is available for mounting the converter in a CY-4516A/S-type equipment cabinet. Figure 8-3 shows the installation kit and identifies the parts supplied.

8.3 MATERIAL REQUIRED FOR INSTALLATION IN CY-4516A/S

8.3.1 The following materials are needed for installation of the converter.

- a. Installation kit MK-977/URR (figure 8-3).
- b. Coaxial cable, RG-58C/U. (Length determined by distance from receiver to converter.)
- c. Hand tools - as required.
- d. 1/4-20 x 3/4 inch screws (4 each).
- e. Cable type TSGA-3.
- f. Cable type TTRSA-2.

8.4 INPUT REQUIREMENTS

8.4.1 The converter is designed for operation from 110 volts, 50/60 Hz source, unless specifically ordered for 220 volts, 50/60 Hz. A simple wire change in the tapped primary circuit of power transformer T5 is necessary to modify the converter for 220 volts, 50/60 Hz operation. This change is made directly on the power transformer lugs as follows:

1. Remove switch lead from terminal 2 of T5 and connect it to terminal 3 of T5.
2. Change fuse value of F1 from 3A to 1-1/2 A.

CAUTION

Converters having Field Change No. 5 installed cannot be converted to 220 volts, 50/60 Hz operation.

8.5 INSTALLATION PROCEDURES

8.5.1 The converter is shipped as a complete unit. No assembly of units is required other than checking protective covers for tightness before installing.

8.5.2 The converter may be installed by one man, requiring approximately two hours to complete the installation. Slide the converter into the rack or cabinet previously designated. Insert the four 1/4 - 20 x 3/4 inch screws into cabinet or rack holes matching the cutouts on converter face plate. Tighten the four screws.

8.5.2.1 Measure as accurately as possible, the length of coaxial cable (RG-58C/U) needed between the converter and designated receivers. This length must include turns and bends usually found within the cable way. Add an additional 24-inch measurement to each end of cable to permit unit to be slid out for maintenance.

8.5.2.2 Fabricate coaxial fitting to both ends of cable using ELECTRONICS INFORMATION AND MAINTENANCE BOOK INSTALLATION STANDARDS NAVSHIPS 0967-000-0110, SECTION 3 as reference. After completion of cable connection fabrication, measure from shield to center conductor with a multimeter set on R x 1000 scale. Reading obtained should be infinity. Any reading less than 500 K ohms should be investigated for improper fabrication of coaxial fitting.

8.5.2.3 Connect the coax cable between IF output jack on receiver and IF INPUT jack J1 on converter.

8.6 INSTALLATION CHECKOUT

8.6.1 After the converter has been installed in the designated rack or cabinet, and IF cable and power cables are connected, very little is required for checkout. When it has been determined that all external connections have been correctly made (i.e., remote features if these are to be used), set POWER switch to on position and observe that the following occurs:

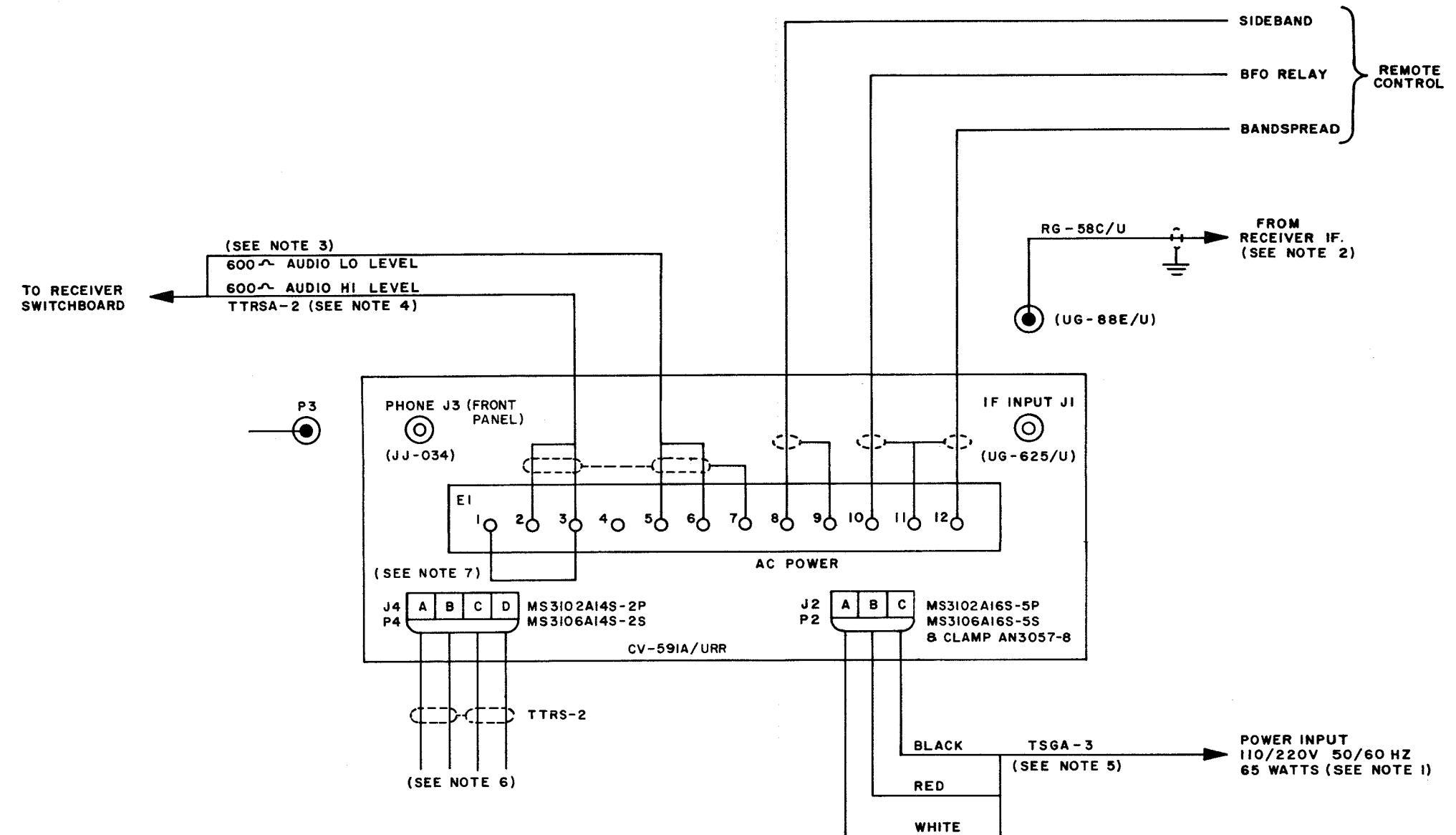
1. Power on indicator lamp I3 is lit.
2. Either U (upper) or L (lower) sideband indicator lamp I1 or I2 lights. (U (I2) on left - L (I1) on right) (Refer to figure 2-1.)
3. Tubes have filament power applied. (This can be verified by observing filaments through top cover of converter.)
4. After approximately 30 seconds, advance AUDIO GAIN control in clockwise direction. A rushing noise should be heard in headphones or loudspeaker.

8.6.2 To tune receiver to desired signal, refer to Operating Procedures (paragraph 2.3.2).

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SPECIFIC NOTES:

1. THE CONVERTER CV-591A/URR MAY BE CONVERTED TO 220 VOLT OPERATION FOR SHORE STATION INSTALLATION BY DISCONNECTING THE SWITCH LEAD (SWITCH S7) FROM TERMINAL 2 OF TRANSFORMER T5 AND CONNECTING IT TO TERMINAL 3. CHANGE FUSE F1 FROM 3A TO 1-1/2A. (SEE PARA 8.4.1)
2. THE CONVERTER CAN BE USED WITH ANY RECEIVER HAVING AN IF NORMALLY CENTERED AT 455 KHZ. WHEN THE "NORMAL-CRYSTAL" CONTROL ON THE FRONT PANEL IS SWITCHED TO "CRYSTAL" AND THE PROPER CRYSTAL INSERTED; THEN OTHER RECEIVER IF'S CAN BE ACCOMMODATED.
3. THE LOW LEVEL LINE CONNECTIONS FROM CONVERTER CV-591A/URR ARE MADE AT TERMINALS 2 AND 3 WHILE THE HIGH LEVEL LINE MAY BE CONNECTED SIMULTANEOUSLY AT TERMINALS 5 AND 6, IF ONLY THE LOW LEVEL LINE IS REQUIRED, THEN CONNECT A JUMPER BETWEEN TERMINALS 1 AND 3 TO PROPERLY LOAD OUTPUT TRANSFORMER. TERMINALS 4 AND 5 PROVIDE 8 OHM TAP FOR SPEAKER OPERATION.
4. USE TTRSA-2 FOR AUDIO CABLE RUNS BETWEEN COMPARTMENTS.
5. THREE CONDUCTOR CABLE TSGA-3 WILL BE USED TO SUPPLY POWER TO THE CONVERTER.
6. THE 600 OHM LOW LEVEL CONNECTIONS FROM CONVERTER CV-591A/URR ARE PINS A & D OF P4, WHILE THE 600 OHM HIGH LEVEL LINE MAYBE CONNECTED SIMULTANEOUSLY AT PINS B & D OF P4. PINS C & D OF P4 PROVIDE 8 OHM AUDIO OUTPUT FOR SPEAKER OPERATION.
7. WHEN NO LEAD IS CONNECTED ACROSS TERMINALS 4 AND 5 OF E1, OR PINS C AND D OF P4, CONNECT A JUMPER BETWEEN TERMINALS 1 AND 3 OF E1.

Figure 8-1. Single Sideband Converter CV-591A/URR
Interconnecting Cabling Diagram

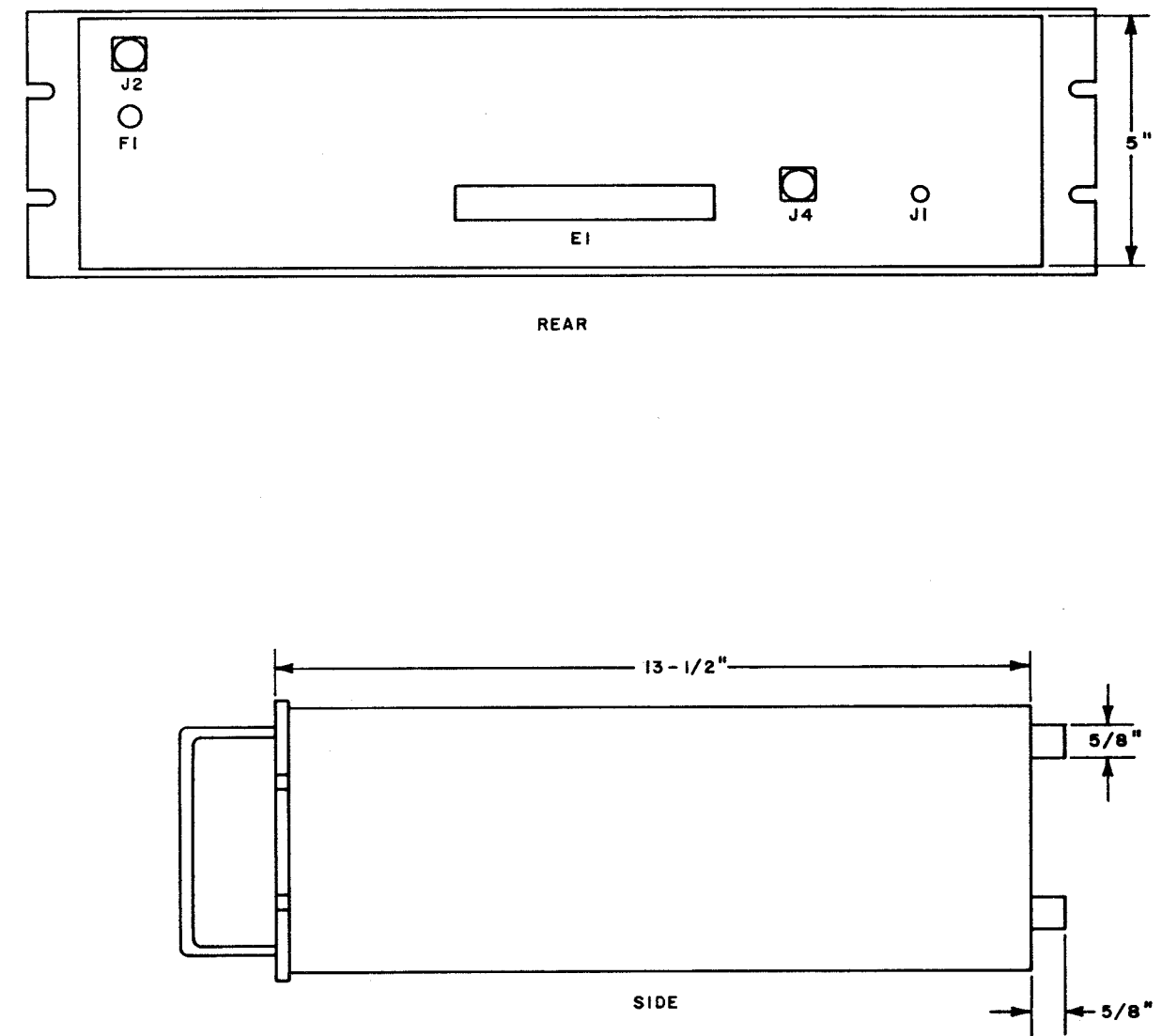
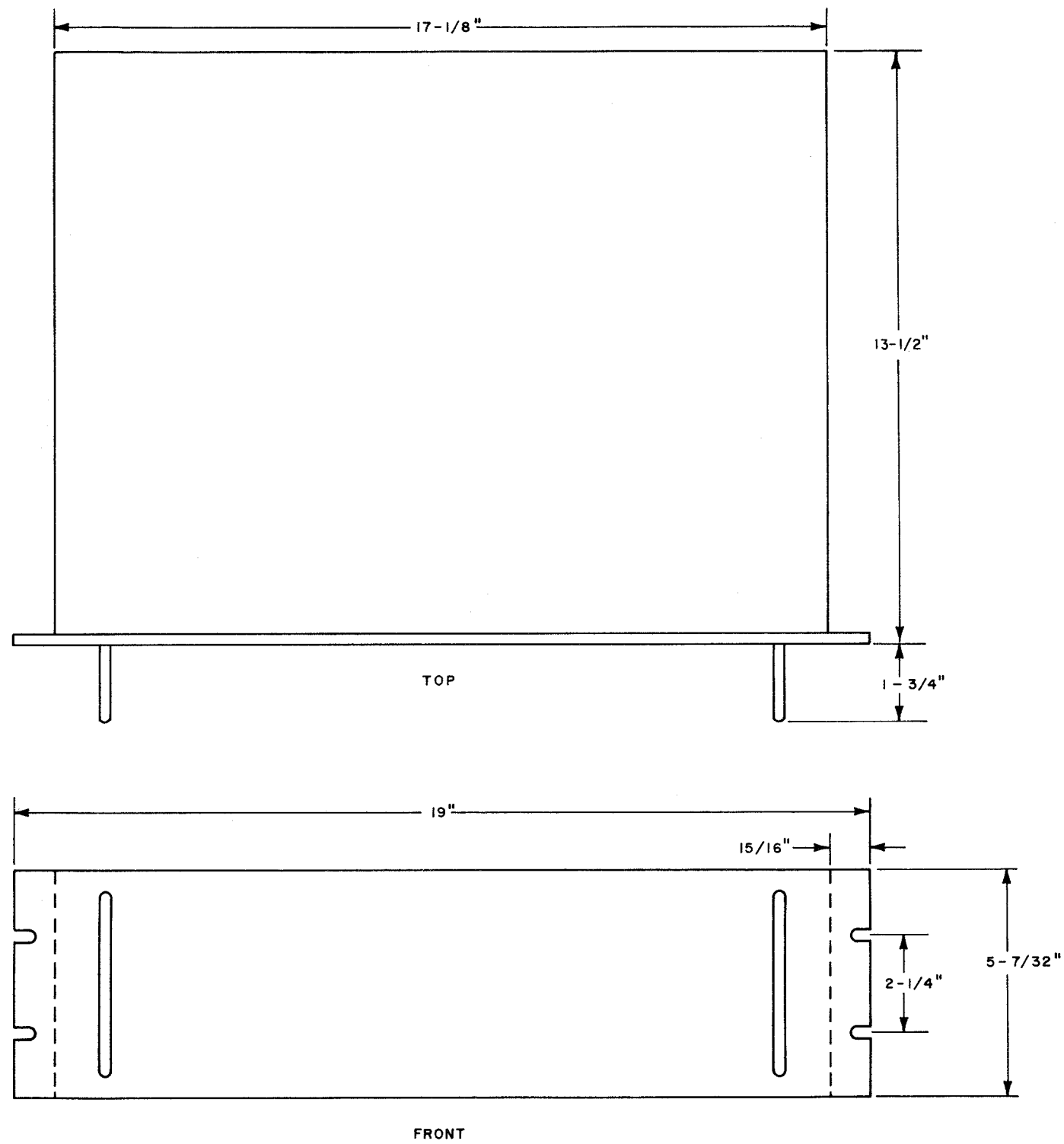
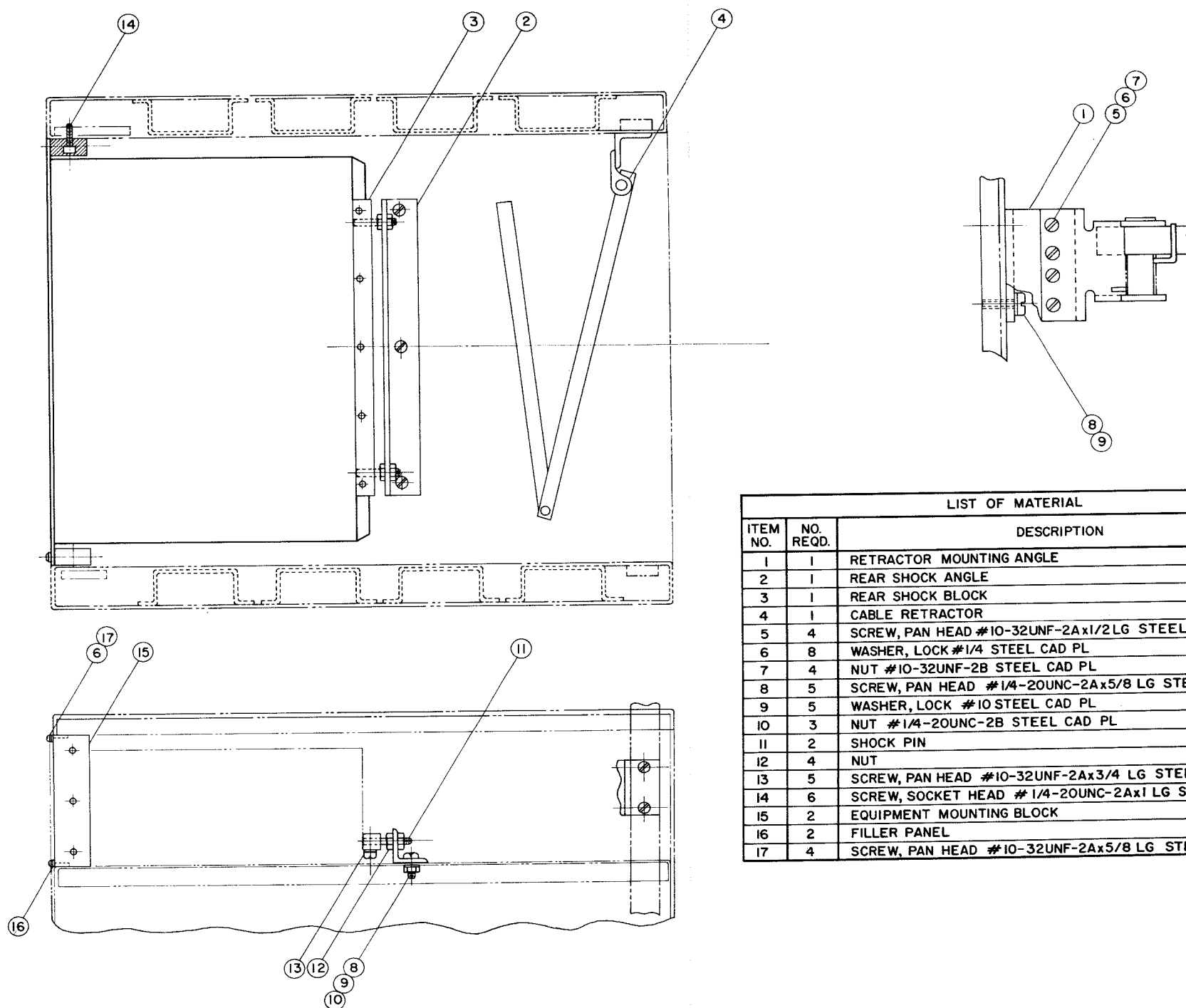


Figure 8-2. Single Sideband Converter CV-591A/URR
Outline and Dimension Data



LIST OF MATERIAL		
ITEM NO.	NO. REQD.	DESCRIPTION
1	1	RETRACTOR MOUNTING ANGLE
2	1	REAR SHOCK ANGLE
3	1	REAR SHOCK BLOCK
4	1	CABLE RETRACTOR
5	4	SCREW, PAN HEAD #10-32UNF-2A x 1/2 LG STEEL CAD PL
6	8	WASHER, LOCK #1/4 STEEL CAD PL
7	4	NUT #10-32UNF-2B STEEL CAD PL
8	5	SCREW, PAN HEAD #1/4-20UNC-2A x 5/8 LG STEEL CAD PL
9	5	WASHER, LOCK #10 STEEL CAD PL
10	3	NUT #1/4-20UNC-2B STEEL CAD PL
11	2	SHOCK PIN
12	4	NUT
13	5	SCREW, PAN HEAD #10-32UNF-2A x 3/4 LG STEEL CAD PL
14	6	SCREW, SOCKET HEAD #1/4-20UNC-2A x 1 LG STEEL CAD PL
15	2	EQUIPMENT MOUNTING BLOCK
16	2	FILLER PANEL
17	4	SCREW, PAN HEAD #10-32UNF-2A x 5/8 LG STEEL CAD PL

Figure 8-3. Installation Kit Mk-977/URR