

**SECTION I**

**GENERAL DESCRIPTION**

**1.1 PURPOSE OF INSTRUCTION BOOK**

Control Unit 48A-1SW and/or Mobile Type Remote Control Unit 48B2-SW.

This instruction book provides information for installation, operation and maintenance of Transceiver 32MS-1A equipment.

**1.2 PURPOSE OF EQUIPMENT**

Transceiver 32MS-1A equipment is a complete station for amplitude-modulated or single-sideband, high frequency communications in the range of 1.6 to 15 megacycles. The unit operates on either upper or lower sideband during single-sideband operation. During amplitude modulation operation, the unit operates on upper sideband with reinserted carrier. Local and semiremote operation of Transceiver 32MS-1A is provided by Desk Type Remote

**1.3 EQUIPMENT SUPPLIED**

The equipment is available as a fixed station utilizing a primary power source of 115 or 230 volts 50-400 cps, single phase, or as a fixed or mobile station utilizing a primary power source of 12 or 28 volts dc. The transceiver is fully controlled by either the desk type or mobile type control unit. Both control units feature a handset with a push-to-talk switch, a speaker amplifier with volume control, a pushbutton switching circuit which provides on-off control, mode selection, and channel selection at the transceiver. Overall views of the transceiver, control units power supplies and shockmount are shown in Figures 1-1 through 1-7. Table 1-1 lists equipment supplied.

UNIT	COLLINS PART NUMBER	DIMENSIONS (in.)		
		Length	Width	Height
Transceiver, 32MS-1A	522-2425-00	22-1/32	15-3/8	7-1/2
NOTE: Weight ranges are:  36-1/2 lbs. with 12 Volts d-c Supply 36-3/4 lbs. with 28 Volts d-c Supply 48-3/4 lbs. with 115/230 VAC Supply				

Table 1-1 Equipment Supplied

**1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED**

Equipment required but not supplied is listed in Table 1-2.

ITEM	QUANTITY PER TRANSCEIVER	DESCRIPTION
Antenna and antenna feed system	One required (separate antennas may be used for each channel if desired).	50 ohm characteristic impedance antenna and 50 ohm unbalanced feed system with swr not to exceed 2.5 to 1.

Table 1-2 Equipment Required but not Supplied

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ITEM	QUANTITY PER TRANSCEIVER	DESCRIPTION
Power Source	One	115 or 230 volts ac, 50 to 400 cps, single phase, or 12 or 28 volts dc.
Crystals	One per channel	CR-36/U as required by frequency assignment.
Coil Sets	One set of 6 each per channel	As required by frequency assignment.
Crystal Ovens	One oven for two crystals	Stability of $\pm 1$ part per million.
Power Supply	547-3991-00 or 547-3992-00 or 547-3993-00	For 115 Volts a-c operation.  For 28 Volts d-c operation  For 12 Volts d-c operation
Power Cable	547-3012-003 or	For 115/230 Volts d-c operation.
Power Cable	547-3014-003 or	For 28 Volts d-c operation
Power Cable	547-3013-003	For 12 Volts d-c operation
Desk Control Unit 48A1-SW Mobile Control Unit 48B2-SW	522-6240-00 or 522-6275-00	Desk Type Remote Control  Mobile Type Remote Control
Cable (for 48B2-SW only)	547-3114-003	48B2-SW Control Unit Cable
Shockmount 390L-1A	522-2573-005	For Transceiver 32MS-1A

Table 1-2 Equipment Required but not Supplied (Cont'd)

## 1.5 ACCESSORIES

Accessories available for use with Transceiver 32MS-1A are listed in Table 1-3.

ITEM	COLLINS PART NUMBER	DESCRIPTION
Antenna Coupler 180V-2	547-3931-00	Reversible L-type for coupling to single wire or whip antennas
Antenna Coupler Control Cable	547-3015-003	Control Cable for 180V-2
Automatic Gain Control	528-0127-00	Noise actuated gain control circuit circuit board
Antenna	013-1133-00	Centre Loaded Mobile Whip
Mounting Insulator	013-1132-00	Ball Type Mount for Mobile Use
Antenna	567-4491-004	Dipole and Balun Kit made up and cut to frequency
Antenna	097-4865-00	35 Foot Aluminum Whip
Antenna	097-4866-00	35 Foot Stainless Steel Whip
Mounting Insulator	097-4867-00	Stand-off Base Mount Type
Mounting Insulator	097-4868-00	Rooftop - Feed Through Type
Directional Coupler 302E-2	522-1462-00	For forward and reflected power measurements
Shockmount 39ON-1	522-1961-00	For 180V-2 Coupler

Table 1-3 Accessories

**1.6 COMPONENTS OF SPARE PARTS KIT**

Components of spare parts kit for 32MS-1A system are listed in Table 1-4.

QUANTITY PER KIT	DESCRIPTION	COLLINS PART NUMBER
32MS-1A TRANSCEIVER		
1	Tube V12, V13 (6660-6BZ6)	257-0185-00
1	Tube V11 ( 6BA7)	255-0209-00
1	Tube V3 ( 6DC6)	255-0226-00
2	Tube V17 ( 6AV6)	255-0307-00
1	Tube V5, 6 (6146 )	256-0101-00
1	Tube V18 (6663-6AL5)	257-0186-00
1	Tube V4 (6677-6CL6)	257-0188-00
1	Tube V1, 7, 10 (6678-6U8A)	257-0189-00
1	Tube V2, 14,15 (6679-12AT7)	257-0190-00
1	Fuse F1	264-0289-00
1	Diode CR8, 20, 21	353-0204-00
2	Diode CR2, 3, 4, 5, 6, 7 (IN 1492)	353-1661-00
1	Diode CR22	353-1546-00
1	Diode CR9, 10	353-1662-00
1	Diode CR1	353-1665-00
1	Diode CR1, 2 (Wattmeter)	353-2542-00
1	Diode CR19	353-2780-00
1	Diode matched Pair CR13, 14, 15, 16	353-0127-00
A.G.C. BOARD		
1	Transistor Q1	352-0276-00
1	Transistor Q2	352-0276-00
12 V D-C SUPPLY		
1	Fuse 4F <sub>2</sub>	264-0731-00
1	Fuse 4F <sub>1</sub>	264-0732-00
2	Transistor 4Q <sub>1, 2, 3, 4, 5, 6</sub>	352-0290-00
1	Diode 4CR <sub>5</sub>	353-1526-00
1	Diode 4CR <sub>1, 2, 3, 4</sub>	353-1662-00
28 V. D-C POWER SUPPLY		
2	Fuse 3F <sub>2, 3</sub>	264-0723-00
1	Fuse 3F <sub>1</sub>	264-0732-00
1	Transistor 3Q <sub>5</sub>	352-0065-00
1	Transistor 3Q <sub>1, 2, 3, 4</sub>	352-0290-00
1	Transistor 3Q <sub>6, 7</sub>	352-0297-00
1	Diode 3CR <sub>1</sub>	353-1537-00
1	Diode 3CR <sub>2</sub>	353-1600-00
1	Diode 3CR <sub>3, 4, 5, 6</sub>	353-1662-00

Table 1-4 Components of Spare Parts Kit

QUANTITY PER KIT	DESCRIPTION	COLLINS PART NUMBER
115 V A-C SUPPLY		
2	Fuse 2F <sub>2, 3</sub> Fuse 2F <sub>1</sub> Diode 2CR <sub>1</sub> Diode 2CR <sub>2, 3, 4, 5</sub>	264-0724-00 264-0727-00 353-1665-00 353-1766-00
48A1-SW CONTROL		
1	Transistor Q <sub>1, 2, 3, 4</sub>	352-0117-00
48B2-SW CONTROL		
1	Transistor Q <sub>1, 2, 3, 4</sub>	352-0117-00

Table 1-4 Components of Spare Parts Kit (Cont'd)

### 1.7 EQUIPMENT SPECIFICATIONS

Frequency range .....	1.6 to 15.0 mc
Modes .....	SSB or AM (one sideband plus carrier.)
Stability .....	± 1 part per million with crystal oven, Collins Part Number 292-0227-00.
Transmitter Power Output .....	SSB, 100 watts PEP with two-tone input, using the a-c power supply, or 80 watts PEP with two-tone input, using d-c power supplies.  AM, 50 watts average with single tone input, using ac power supply, or 40 watts average with single tone input, using d-c power supplies.
Transmitter Output Impedance .....	52 ohms resistive, capable of tuning SWR of 2.5:1
Spurious radiation.....	Measured with reference to 100 watts PEP output into a 52-ohm load.
Second harmonic .....	At least -45 db.
Unwanted sideband .....	At least -60 db.
Carrier .....	At least -50 db.
Two tone distortion products .....	At least -31 db.
All other spurious radiation.....	At least -50 db.

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### General Description

Transmitter audio frequency response . . . . .	± 3 db from 400 to 3000 cps.
Automatic Load Control . . . . .	Capable of at least 6 db of compression.
Speech clipping threshold . . . . .	-3 dbm on AM or +8 dbm on SSB with 0 dbm nominal input level.
Hum and noise level . . . . .	With open circuited microphone input, hum and noise is more than 40 db below rated power output
Keying characteristics . . . . .	All transmit-receive switching may be accomplished by a keying button on the handset or the button on front of the 32MS-1A
Audio input . . . . .	Telephone handset at the control unit, 600 ohm balanced, 0-dbm input level at 32MS-1A
Power Sources . . . . .	115/230 volts, 50 to 400 cps, single phase, 300 volt amperes max. 22 to 30 volts d-c, 300 watts max. 11 to 14 volts d-c, 300 watts max.
Receiver bandwidth . . . . .	SSB, 3 kc determined by mechanical filter; AM, 6 kc
Receiver sensitivity . . . . .	SSB less than 1.0 microvolt for 10 db signal noise-to-noise ratio. AM less than 3 microvolts 30 per cent modulated at 1000 cps for 10 db signal-to-noise ratio.
Receiver image rejection . . . . .	1.6 to 12.0 mc, 60 db 12.0 to 15.0 mc, 50 db minimum.
Automatic gain control and automatic loading control . . . . .	"Fast attack" with 0.5 second time constant release.
Receiver audio output . . . . .	Balanced 600 ohm output to the voice amplifier in the control unit. Output power 0 dbm for 2.5 microvolt input on SSB, or 2.5 microvolts input, 30 percent modulated at 400 cps on AM.
Receiver audio frequency response . . . . .	± 3 dbm, from 400 to 3000 cps.
Receiver audio distortion . . . . .	Less than 10 percent harmonic distortion.

## 1.8 TUBE, FUSE AND SEMICONDUCTOR COMPLEMENT

Table 1-5 lists tubes, fuses and semiconductors of Transceiver 32MS-1A, alternate power supplies, automatic receiver gain control and control units.

SYMBOL	TYPE	FUNCTION
V1	6678/6U8A	455 kc crystal oscillator and isolation amplifier
V2	6679/12AT7	Balanced mixer
V3	6DC6	R-f amplifier
V4	6677/6CL6	R-f driver
V5, V6	6146	Power amplifier
V7	6678/6U8A	Transmit audio amplifier and cathode follower
V10	6678/6U8A	Channel oscillator and phase inverter
V11	6BA7	Receiver Mixer
V12	6660/6BZ6	1st i-f amplifier
V13	6660/6BZ6	2nd i-f amplifier
V14	6679/12AT7	SSB product detector
V15	6679/12AT7	Receiver audio amplifier
V17	6AV6	Agc Amplifier
V18	6663/6AL5	Alc rectifier
CR1	1N1695	Bias rectifier
CR2, CR3	1N1492	High voltage rectifier - voltage doubler
CR4, CR5		
CR6, CR7		
CR8	1N457	Agc gate
CR9, CR10	1N1498	Low Voltage rectifier - voltage - doubler
CR11, CR12	1N34AS/HD2120	Transmitter audio clipper
CR13, CR14	1N67A	Balanced Modulator
CR15, CR16		
CR17	1N34AS/HD2120	Agc Rectifier
CR18	1N34AS/HD2120	AM detector
CR19	1N34AS/HD2120	Phase inverter T/R gate
CR20, CR21	1N457	Mode selector gates
CR22	1N540	Blower motor gate
AUTOMATIC RECEIVER GAIN CONTROL		
Q1	2N652A	Amplifier
Q2	2N652A	Amplifier
CR1, CR2	1N645	Audio rectifiers
CR3	PS6465A	Nonlinear time constant diode
CR4	1N753A	Agc output limiter
CR5	PS6465A	Agc delay
A - c POWER SUPPLY		
2CR1	1N1695	Relay solenoid rectifier
2CR2, 2CR3	1N1124R	28 volt rectifiers: spike clippers
2CR4, 2CR5		
2F1	6 amp	Low and high voltage common
2F2	3 amp	Low voltage
2F3	3 amp	High voltage

Table 1-5 Tube, Fuse, and Semiconductor Complement

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SYMBOL	TYPE	FUNCTION
3Q1, 3Q2 3Q3, 3Q4 3Q5 3Q6, 3Q7 3CR1 3CR2 3CR3, 3CR4, 3CR5, 3CR6 3F1 3F2 3F3	1556 1556 2N375 1559 HZPR-32A 1N248 1N1487  20 amp 7.5 amp 7.5 amp	High voltage oscillators Low-voltage oscillators Transient amplifier Transient control Transient reference diode Gate Spike clippers  Main Power fuse Low-voltage primary fuse High-voltage primary fuse
12-VOLT POWER SUPPLY		
4Q1, 4Q2 4Q3, 4Q4 4Q5, 4Q6 4CR1, 4CR2 4CR3, 4CR4 4CR5 4F1 4F2	2N1556  2N1556 1N1487  1N538 20 amp 15 amp	High-voltage oscillators  Low voltage oscillators 28 - volt rectifiers and spike clippers  12 - volt rectifier Low - voltage fuse High - voltage fuse
CONTROL UNIT 48A1-SW and 48B2-SW		
Q1, Q2 Q3, Q4	2N671 2N671	Phase inverter Push-pull amplifiers

Table 1-5 Tube, Fuse, and Semiconductor Complement (Cont'd)



Figure 1-1 Transceiver 32MS-1A, Overall View



Figure 1-2 Control Unit 48A1-SW, Overall View

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Figure 1-3 Control Unit 48B2-SW, Overall View

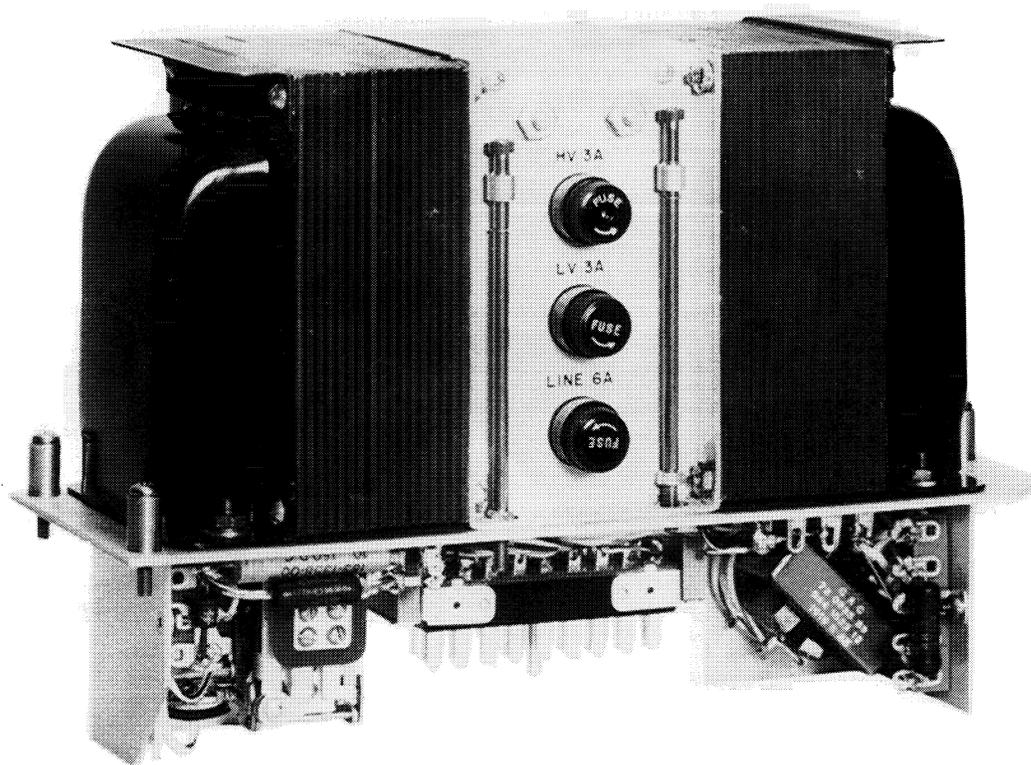


Figure 1-4 115 Volt A-C Power Supply, Overall View

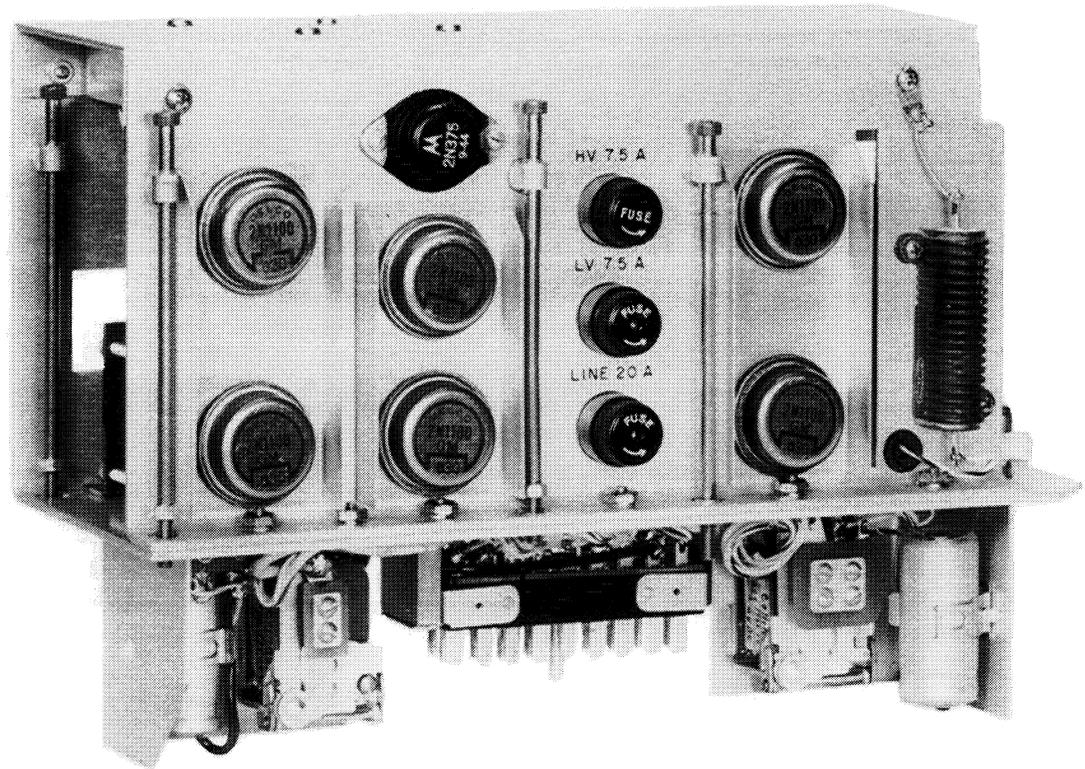


Figure 1-5 28 Volt D-C Power Supply, Overall View

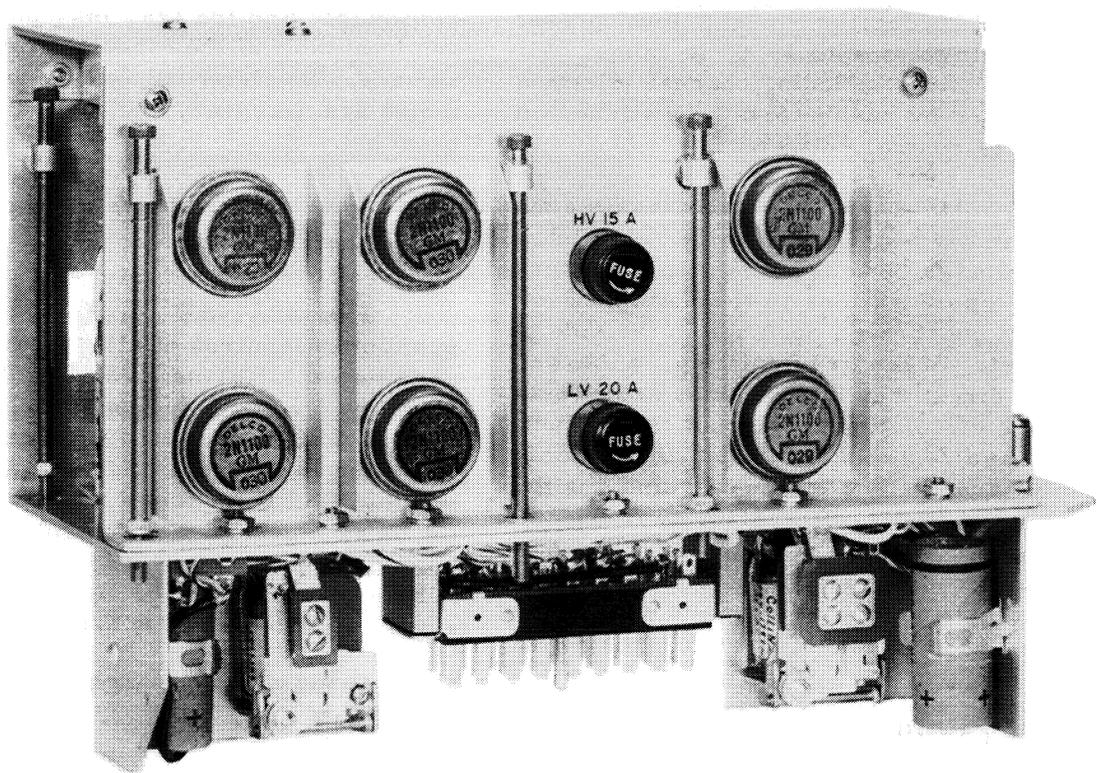


Figure 1-6 12 Volt D-C Power Supply, Overall View

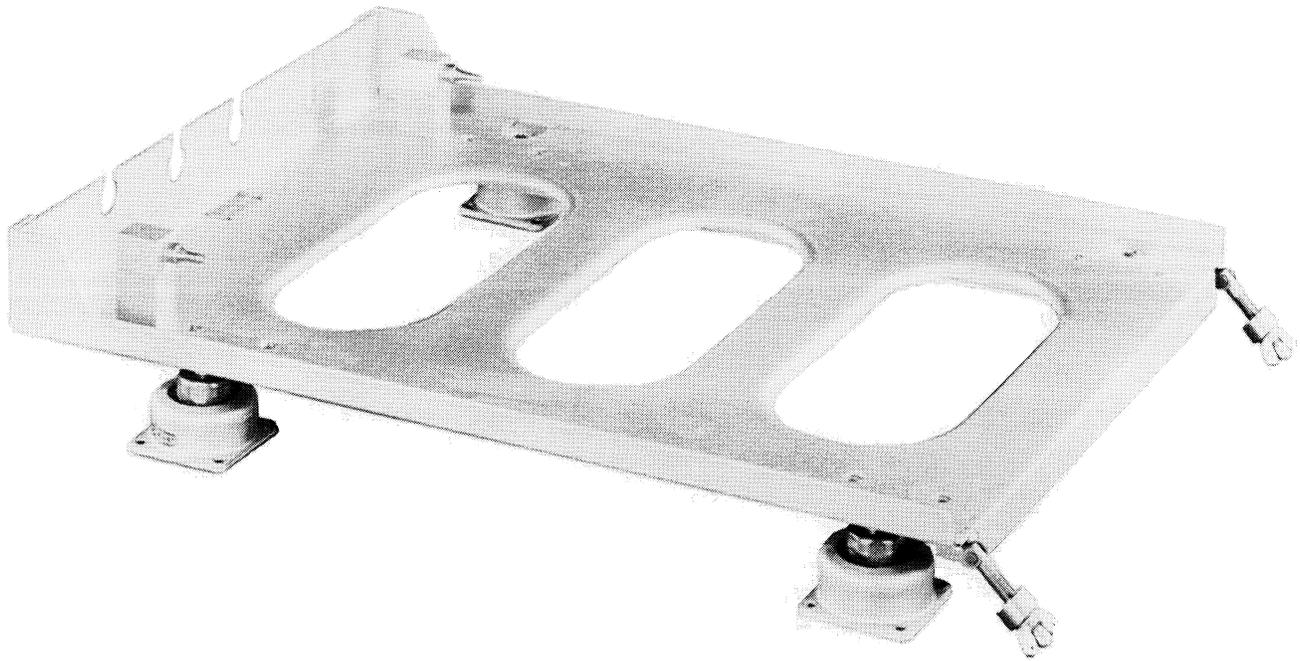


Figure 1-7 Shockmount 390L-1A, Overall View

### 1.9 TRANSCEIVER 32MS-1A

The 32MS-1A Transceiver and its associated accessory equipment permits a choice of either single sideband or compatible AM transmission and reception on any four preset frequencies in the 1.6 to 15.0 mc range. All operating functions including channel selection are controlled by pushbuttons or switches on the separate control unit.

The 32MS-1A is of panel chassis construction and is housed in a welded aluminum case. Cooling is by convection with air entering through perforations in the bottom cover and flowing out through openings in the side of the cabinet. When transmitting, a blower forces air directly on the PA tubes and effects general air circulation throughout the cabinet. All tubes and controls for initial adjustments and tuning are easily reached by removing the top and bottom covers. High stability frequency generation circuits are common to the transmitter and receiver sections to simplify overall circuitry and operation, and to ensure transmission and reception on signals on identical frequencies.

### 1.10 SHOCKMOUNT 390L-1A

The 390L-1A provides a crash proof mount for Transceiver 32MS-1A for mobile

installations. Screw down wing nuts at the front and guide pins at the rear ensure rapid detachment of the transceiver for service. Four aircraft type vibration mounts ensure vibration isolation. The vibration mounts are readily removable and the tray may be used in conventional table of shelf mounting in fixed station service. No electrical interconnections to the mount are necessary and grounding straps are provided.

### 1.11 DESK TYPE REMOTE CONTROL UNIT 48A1-SW

The 48A1-SW Control Unit provides pushbutton control of all operating functions associated with the 32MS-1A Transceiver, including channel selection and choice of either AM or SSB mode of operation. A monitor amplifier employing transistors and a separate volume level control are located in the base of the unit. Push-to-talk control of the transmit function is provided by a switch in the handset. All connections to the transceiver are made by a single attached cable with a plug-in connector.

### 1.12 MOBILE TYPE REMOTE CONTROL UNIT 48B2-SW

The 48B2-SW Control Unit provides the same control as the 48A1-SW Control Unit of

all operating functions associated with the 32MS-1A Transceiver. An adjustable mounting bracket permits the control unit to be positioned for maximum ease of use. All connections to the transceiver are made by means of a separate control unit cable.

### **1.13 ANTENNA COUPLER 180V-2**

The 180V-2 antenna coupler is a preset, automatically switched four channel tuner for coupling the 32MS-1A Transceiver to an antenna.

It will load single wire or whip antennas longer than 50 feet over the 1.6 to 15.0 mc range, or longer than 30 feet over the 2.5 to 15.0 mc range. The circuit design is a modified reversible L-type matching network, which allows the use of either low or high impedance antennas. A directional wattmeter located in the transceiver permits rapid adjustment for a minimum of reflected power. The 180V-2 is housed in a weather-proof cabinet which may be located directly at the antennas base in fixed installations to provide maximum radiation efficiency.

