

TECHNICAL MANUAL
RADIO SET PRC1099
TW-PRC1099-TM1



WARRANTY

Trans World Communications, Inc. (TWC) warrants that new TWC equipment has been manufactured free of defects in design, material and workmanship. If the equipment does not give satisfactory service due to defects covered by this warranty, TWC will, at its option, replace or repair the equipment free of charge.

The warranty is for a period of 90 days from the date of installation. In the event that the equipment is not installed within 90 days of factory shipment, satisfactory evidence of the installation date must be submitted.

LIMITATIONS:

This warranty does not cover physical damage caused by impact, liquids or gases. Defects caused by lightning, static discharge, voltage transients, or application of incorrect supply voltages are specifically excluded from this warranty.

RETURN OF EQUIPMENT - USA:

The equipment shall be returned freight prepaid to the Service Department, Trans World Communications, Inc., 304 Enterprise Street, Escondido, California 92025. The equipment should be packed securely, as TWC will not be responsible for damage incurred in transit. Please include a letter containing the following information:

1. Model, serial number, and date of installation.
2. Name of dealer or supplier of equipment.
3. Detailed explanation of problem.
4. Return shipping instructions.

TWC will return the equipment prepaid by United Parcel Service, Parcel Post or truck. If alternate shipping is specified, freight charges will be made collect.

RETURN OF EQUIPMENT - FOREIGN:

Write for specific instructions. Do not return equipment without authorization. It is usually not possible to clear equipment through U.S. Customs without the correct documentation. If equipment is returned without authorization, the sender is responsible for all taxes, customs duties and clearance charges.

LIMITED PARTS WARRANTY:

This warranty shall cover all parts in the equipment for a period of 12 months from the date of installation, subject to the previous conditions and limitations. The parts will be replaced free of cost. The labor charges will be made at the current TWC hourly service rate.

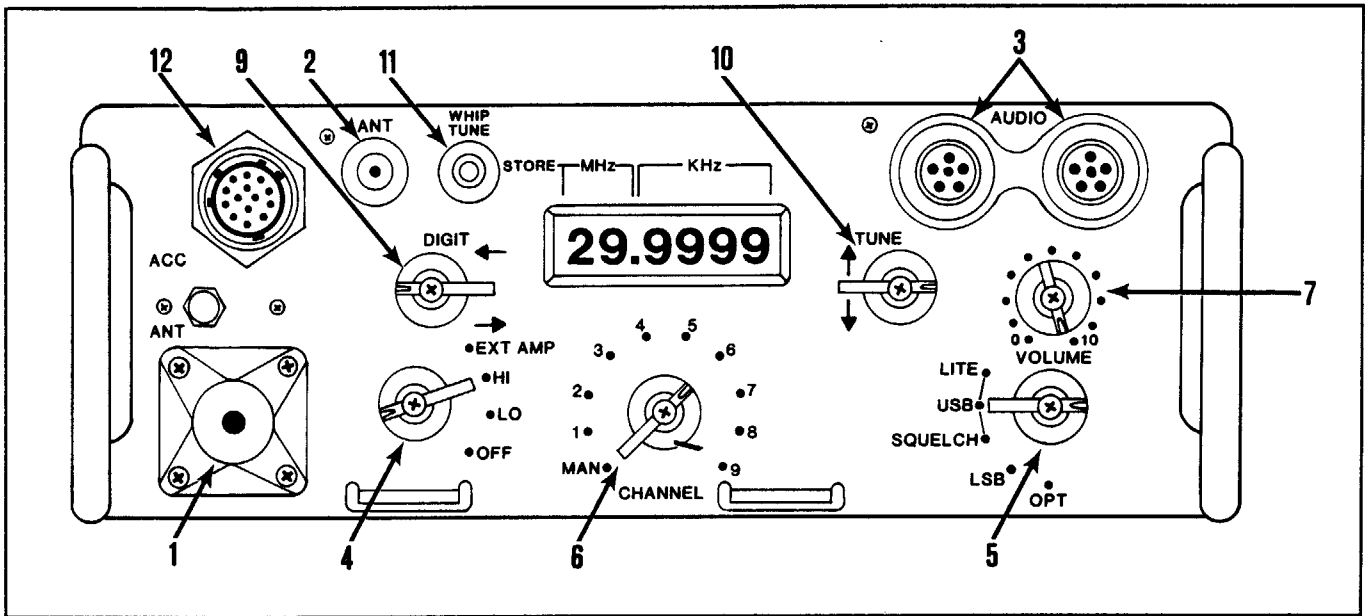
PARTS REPLACEMENT:

If it is not practical, or the purchaser does not want to return the equipment to the factory, this warranty is limited to the supply of replacement parts for a period of 12 months from the date of equipment installation. The following instructions for the supply of replacement parts should be followed:

1. Return defective parts prepaid to: Parts Replacement, Trans World Communications, Inc., 304 Enterprise Street, Escondido, California 92025.
2. Include a letter with the following information:
 - a) Part number(s).
 - b) Serial number and model of equipment.
 - c) Date of installation.

Parts returned without this information will not be replaced. In the event of a dispute over the age of the replacement part, components date coded over 24 months prior will be considered out of warranty.

CONDENSED OPERATING INSTRUCTIONS FOR RADIO SET PRC1099



1. TO OPERATE SET

- A. Install the whip antenna in the antenna socket (1) OR attach 50-ohm antenna feedline to BNC antenna connector (2).
- B. Attach the handset to either audio connector (3). NOTE: Remote handset attaches to the right audio connector only.
- C. Turn the power switch (4) to the power level for the type of operation desired. (HI gives maximum range.)
- D. Turn the function switch (5) to USB.
- E. Select the desired channel number (6). NOTE: Front-panel CHANNEL switch must be in "MAN" to use remote channel switch.
- F. Turn the VOLUME control (7) to 5.
- G. Press the handset push-to-talk switch and talk into handset. Release to listen.
- H. Adjust volume control (7) for desired sound level.

2. TO RETUNE ANTENNA

- A. Depress the WHIP TUNE (11) button (Do not hold down). The antenna-tuning information is updated and stored in memory.

3. TO CHANGE CHANNEL FREQUENCIES

- A. Set CHANNEL switch (6) to "MAN".
- B. Turn the DIGIT switch (9) UP or DOWN to select the desired digit. The selected digit will flash.
- C. Turn the TUNE switch (10) UP or DOWN to select the correct number.
- D. To change the frequencies in channels 1-8, set the control (6) to the desired channel number, press and hold the store button and repeat steps 3A-3C.

4. TRANSADAPT OPERATION

- A. To install Selcall Code, hold the DIGIT switch (9) down until a three-digit number is displayed, enter the code using the TUNE switch (10).
- B. To enter TRANSADAPT Mode 1, hold DIGIT switch (9) down and press WHIP TUNE (11).
- C. To enter TRANSADAPT Mode 2, select channel 9 and press WHIP TUNE (11).
- D. To enter TRANSADAPT Mode 3, press WHIP TUNE (11). NOTE: must already be linked in TRANSADAPT Mode 2 to utilize Mode 3.

5. MEMORY DUMP FEATURE

- A. Hold the WHIP TUNE (11) button in, hold DIGIT Switch (9) up, switch radio on.

NOTES

1. LOW BATTERY - Display flashes.
2. ACCESSORY CONNECTOR (12) - Cap must be connected whenever accessory connector is not in use.
3. RF OUTPUT NORMAL - Transmit sidetone is heard.

OPERATOR'S & ORGANIZATIONAL MAINTENANCE MANUAL
RADIO SET PRC1099

	Paragraph	Page
CHAPTER 1. INTRODUCTION		
Section I. General	1-1	1-1
Section II. Description and Data	1-2 - 1-6	1-1 - 1-4
CHAPTER 2. INSTALLATION	2-1 - 2-6	2-1 - 2-4
3. OPERATING INSTRUCTIONS	3-1 - 3-16	3-1 - 3-5
4. OPERATOR'S MAINTENANCE INSTRUCTIONS	4-1 - 4-8	4-1 - 4-2
5. FIELD MAINTENANCE INSTRUCTIONS	5-1 - 5-9	5-1 - 5-4
6. HF COMMUNICATIONS & SINGLE SIDEBAND	6-1 - 6-3	6-1 - 6-2
7. ANTENNA SYSTEMS	7-1	7-1 - 7-4
APPENDIX A. ORGANIZATIONAL REPAIR PARTS	A-1 - A-3	A-1 - A-2
APPENDIX B. OPTIONAL ACCESSORY EQUIPMENT	B-1 - B-2	B-1 - B-12
APPENDIX C. BATTERY TYPES AND ACCESSORY CABLES		C-1-C2
INDEX		I-1 - I-2



FIGURE 1-1.

Radio Set PRC1099 in Manpack Operation with Antenna AT-271A and Support AB-591 installed.

CHAPTER 1 INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Radio Set PRC1099 and covers its installation, operation, and operator's organizational maintenance.

b. Items comprising an operable equipment (Para. 1-6).

c. Information on technical service and the maintenance of the PRC1099 is contained in the technical manual TW-PRC1099-MS1.

Section II. DESCRIPTION & DATA

1-2 Purpose and Use (Figure 1-1)

a. Radio Set PRC1099 is a high-frequency, manpack-portable, single-sideband (SSB) transceiver used to provide long-range, two-way, voice, CW, and data communication.

b. The Radio Set PRC1099 may also be used as part of the Transworld RA100, RA400/5 or RA1000/5 high power fixed, portable and mobile stations.

c. The Radio Set PRC1099 can communicate with most HF SSB radios operating within the 1.6- to 30-MHz range.

d. The PRC1099 can be used in conjunction with the other equipment (1) through (8) below.

(1) Long-wire antennas can be used in place of the whip antennas, using the internal tuner to extend the communication range.

(2) Coaxial-fed 50-ohm antennas such as resonant dipoles, broadband antennas and directional antennas can be used in place of the whip antenna for extended range, or where directional transmission/reception is desired.

(3) The antenna tuner RAT100 can be used with the PRC1099 in mobile installations and other applications where the antenna must be located away from the transceiver.

(4) The PRC1099 can be operated from the ac power supply PRC-PS in place of the internal battery.

(5) The PRC1099 can be used with high power amplifiers RA100 (100 W), RA400/5 (400 W), or RA1000/5 (1000 W) and can provide automatic control of these amplifiers.

(6) Remote control of the PRC1099 can be provided by radio set control groups GRA-39.

(7) Loudspeaker, electromagnetic LS-549/PRC can be used with the PRC1099 to monitor radio reception.

(8) The PRC1099 can be used with the morse key KY562 for telegraphy.

(9) The PRC1099 can be used with secure voice equipment designed for HF SSB operation.

(10) The PRC1099 can be used for digital data (burst or RTTY) transmission and reception.

1-3. Technical Characteristics

Frequency Range: 1.6-30 MHz.

Number of Channels: 284,000.

Memory Channels: 10.

Channel Spacing: 100 Hz.

Types of Transmission and Reception:

Transmission - Voice - (300-2700 Hz) SSB, USB/LSB.
CW - semi break-in.

Reception - Data - with external modem.
Voice - (no squelch, noise immune squelch).
CW
Data - with external modem.

Security Equipment: Equipment must be designed for HF/SSB.

Transmission and Reception Power Requirements:

Transmission - 12.0 - 15 Vdc.
High Power - Avg. voice 1.5 A.
Low Power - Avg. voice 1.0 A.
Reception - 12.0 - 15 Vdc.
Squelched 100 mA typical.
Unsquelched 130 mA typical.

Type of Modulation: Single Sideband - USB/LSB.

Transmitter Power Output: Selectable - 5 W, 20 W.

Type of Squelch: Noise immune.

Types of Antennas:

Whip Antenna - Antenna AT-271A, 10-ft long, multisection whip with AB591 Flexible Support.
Long Wire - 25-ft, 50-ft, 100-ft or random length long wire.
50- Ω Antenna - 50- Ω coaxial fed antennas with VSWR 3:1 or less.

Power Source:

Lithium battery, sealed lead-calcium battery (rechargeable), or PRC-PS ac power supply.

Battery Life:

High power 50 hours (9:1 receive-transmit ratio) with BA6598/U.

1-4. Items Used with PRC1099 (Figure 1-2)

The following components are normally used with the PRC1099 in the manpack configuration. Dimensions and

weights of components are provided in paragraph 2-1. A battery is required to operate the PRC1099. Suitable battery types and their characteristics are shown in Table C-1 of Appendix C.

<u>Trans World Part No.</u>	<u>Item</u>
PRC1099	Radio Set PRC1099 (includes battery box)
	Antenna AT-271A/PRC
	Bag Cotton Duck CW-503
	Handset H-250/U
	Harness Electrical Equipment ST-138
	Support, Antenna AB-591

1-5. General Description (Figure 1-2)

Radio Set PRC1099 consists of the transceiver and battery box described in (a). The normal accessory components are described in (b).

a. TRANSCEIVER, RADIO PRC1099.

The PRC1099 consists of the transceiver, the transceiver case, and the Battery Box CY-2562.

(1) The transceiver is held in the case by four captive screws. The battery box is attached to the case by two clamps. The complete PRC1099 is watertight when assembled. All controls are on the front panel. The battery connector projects from the bottom of the case and plugs into the battery which is contained in the battery box.

(2) The CY-2562 battery box is a lightweight metal case that protects and houses the battery. The battery sits on a foam pad that is attached to the bottom of the case which prevents battery movement.

(3) A pressure relief valve is installed in the battery case to vent the hydrogen gas (a by-product of the magnesium battery discharge action), thus preventing the gas from accumulating in the transceiver case and exploding. It is important that battery cases have the pressure relief valve when using magnesium batteries.

b. ACCESSORY COMPONENTS (Figure 1-2)

(1) Antenna AT-271A/PRC

The AT-271A is composed of six sections; each section fits into the end of a wider section. A braided plastic cord, under spring tension, is threaded through the sections to keep them together in the operating condition. When the sections are folded, the cable keeps them together as a

group and prevents the loss of individual sections. Spring tension is provided by a spiral spring in the base section.

(2) Support, Antenna AB-591

The AB-591, which has semi-flexible, tubular construction, is used as the main support for the AT-271A. The pin at the base of the support activates the internal antenna tuner.

(3) Harness, Electrical Equipment ST-138.

The ST-138 is used to secure the PRC1099 so that it can be carried on the operator's back.

(4) Bag, Cloth CW-503

The CW-503 is sectionalized into several pockets which are used to store the antennas, the antenna support, and the handset (Figure 1-3).

(5) Handset H-250/U

The H-250/U contains a dynamic microphone and receiver for transmitting and receiving signals (Figure 1-4). A push-to-talk switch is mounted in the handle. The connecting cord is retractile and terminates in a five pin connector.

The PRC1099 may also be used with Handset H-189/GR.

1-6. Battery (Figure 2-1)

a. Battery, Lithium BA5598/U or BA6598 may be used to operate the PRC1099. The battery is provided with a female connector to mate with the male connector on the PRC1099. The battery case will hold a spare BA5598/U or BA6598 battery.

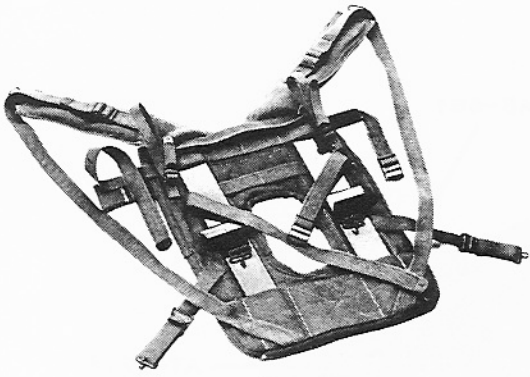
b. Battery, Sealed Lead-calcium BB-LA6 12V, 6AH may also be used with the PRC1099. This battery can be recharged after use.

c. Battery, Dry BA4386/U may also be used with the PRC1099. Because of the limited current capability, restrict the power output to 5 W when using this battery.

CAUTION

Never recharge the lithium or dry batteries. This could cause an explosion resulting in severe damage to the transceiver and danger to personnel.

d. The PRC1099 may be used with other types of batteries, such as NiCad, with an output voltage of 12-15 Vdc.

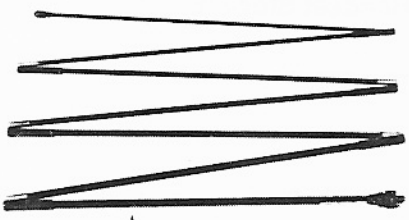
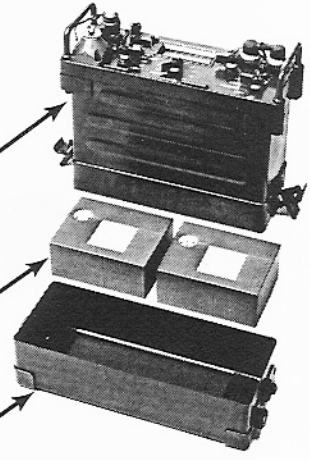


HARNESS, ELECTRICAL EQUIPMENT ST-138

TRANSCEIVER

BATTERY

BATTERY BOX, CY-2562



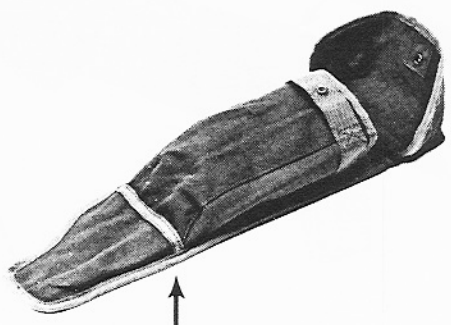
ANTENNA AT-271A



SUPPORT, ANTENNA AB-591



HANDSET H-250/U



BAG, COTTON DUCK CW-503

FIGURE 1-2.
Radio Set PRC1099, Components.

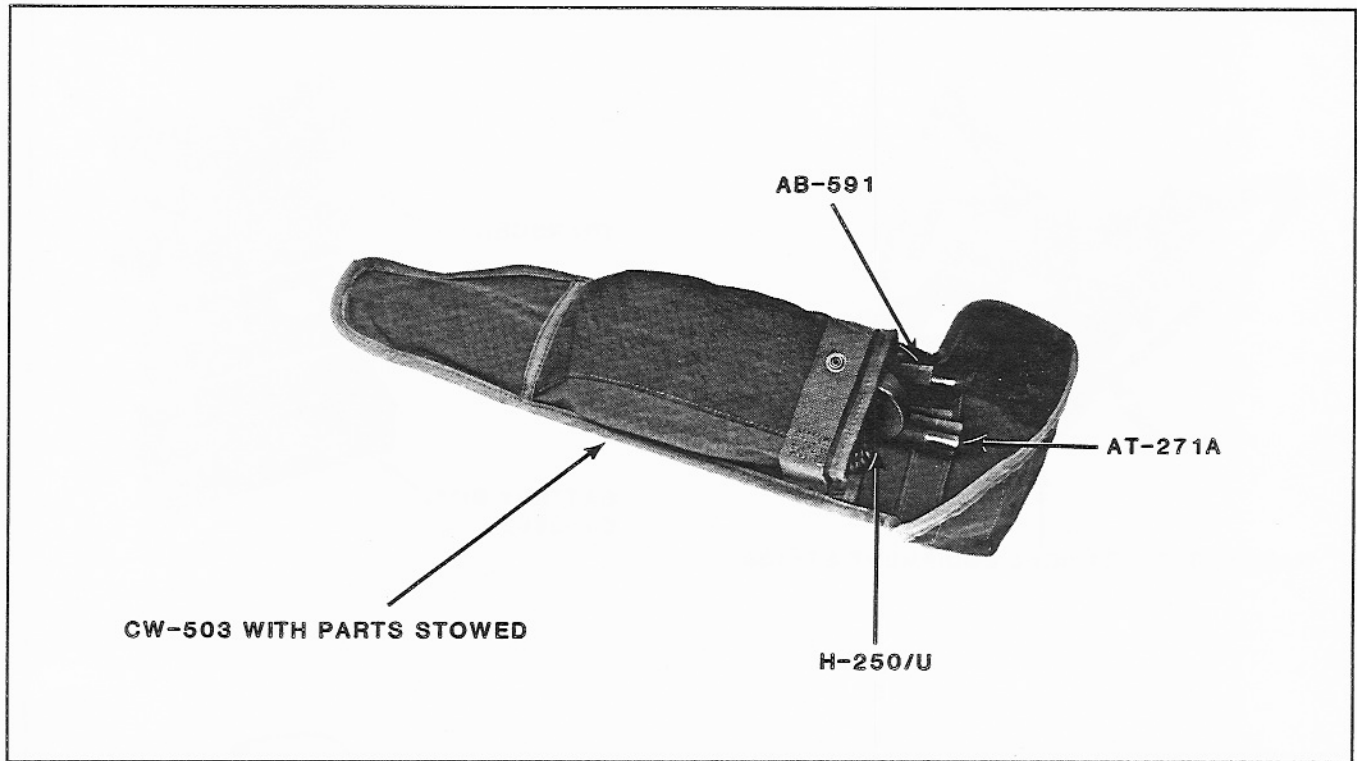


FIGURE 1-3.
Bag, Cotton Duck CW-503, with Antennas and Handset Stowed.

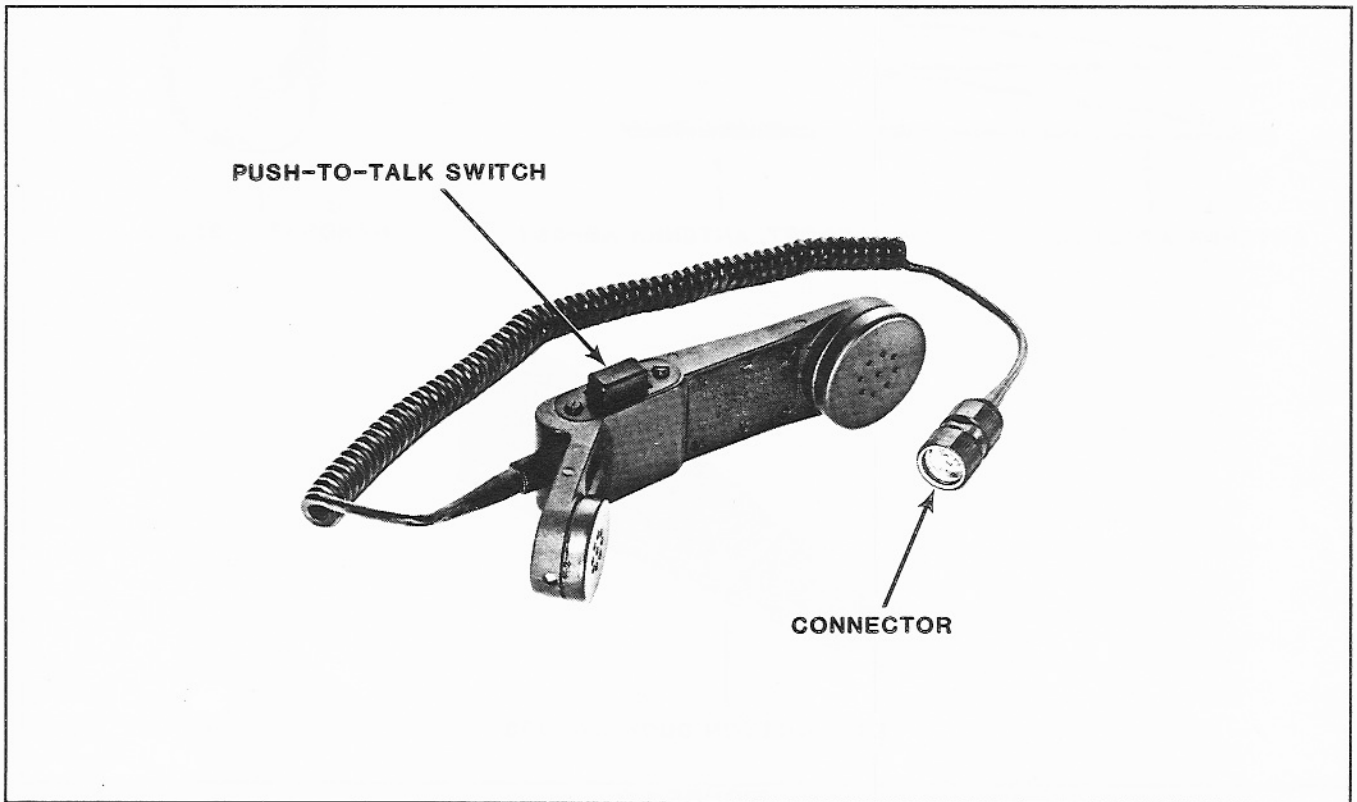


FIGURE 1-4.
Handset H-250/U.

CHAPTER 2 INSTALLATION

2-1. Unpacking

a. **Packaging Data.** The PRC1099 is packed in a heavy duty, corrugated cardboard carton. The accessories are packed in a separate carton. The cartons and packing

materials should be retained in case the equipment is reshipped.

b. **Component Dimensions** (See table below).

Component	Overall Dimensions (in.)			Volume (cu in.)	Weight (lb)
	Height	Width	Depth		
Transceiver, Radio PRC1099	4.00	11.00	9.50	418	9.72
Battery Box CY-2562	4.00	11.00	3.00	132	0.82
Support, Antenna AB-591	9.00	0.75	0.75	50	0.75
Antenna AT-271A	17.00	0.75	0.75	9	0.75
Harness, Electrical Equipment ST-138	19.00	6.00	5.00	520	3.00
Bag, Cotton Duck CW-503	19.00	4.00	5.00	456	0.75
Handset H-250/U	7.75	2.00	3.50	54	0.55

2-2. Checking Unpacked Equipment

Inspect the equipment for possible damage during shipment. Check all accessories against the packing list.

f. Install the battery case and tighten the clamps.

2-3. Siting

The PRC1099 operates in the high frequency spectrum where the signals are reflected by the ionosphere and line-of-sight is not required. Since the signal may be absorbed by tall buildings or vegetation, the operating site should be clear of obstacles directly in the line of communication. A good ground or counterpoise will extend the operating range, and it is preferable to site the transceiver where a ground can be connected to the ground terminal. If possible, avoid locations near sources of electrical interference, such as power or telephone lines, electric motors or gasoline engines.

CAUTION

Remove the battery when the transceiver is not in use for more than one day.

2-4. Installation of Battery (Figure 2-1)

a. Stand the PRC1099 on a level surface with the front panel facing down.

b. Release the two clamps by pushing down.

c. Remove the battery box.

d. Check the battery connector; if it is damaged, the transceiver must be repaired. Check that the pressure test screw and relief valve are tight.

e. Position the battery so that the connectors are aligned and then mate the connectors.

2-5. Assembly and Installation for Man-Pack Operation (Figure 2-2)

a. Attach the transceiver to the harness as instructed in (1) through (4).

(1) Place the harness flat on a level surface with the metal braces facing up.

(2) Place the transceiver on the harness with the front panel to the top and the battery case resting on the metal braces.

(3) Fasten the transceiver to the harness with the two retaining straps; feed the metal-tipped strap from below, through the center slot on the buckle, and then down through the end slot on the buckle.

(4) Clip the Bag CW-503 to the harness.

b. Mount the transceiver and harness on the operator as follows:

(1) Install the desired antenna (Para. 2-6).

(2) Connect the handset to one of the audio connectors on the front panel of the transceiver.

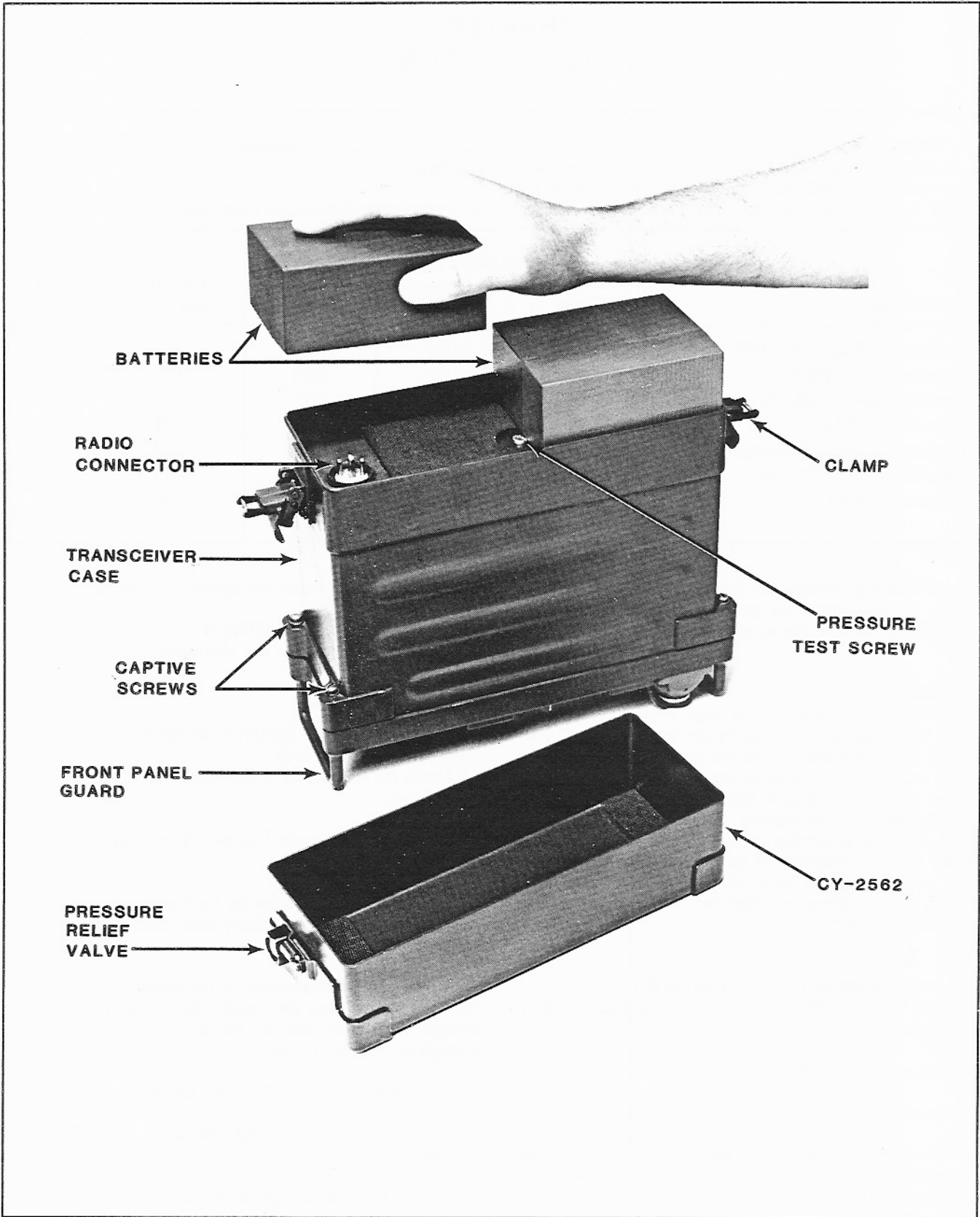


FIGURE 2-1.
Installation of Battery in Transceiver.

(3) Place the harness, with the transceiver attached, on the operator's back. Place the shoulder straps over the operator's shoulders.

(4) Feed the end of the lower strap through the right shoulder strap ring. Feed the metal tip of the strap from below, through the center slot in the buckle, and then down through the end slot. (Figure 2-2).

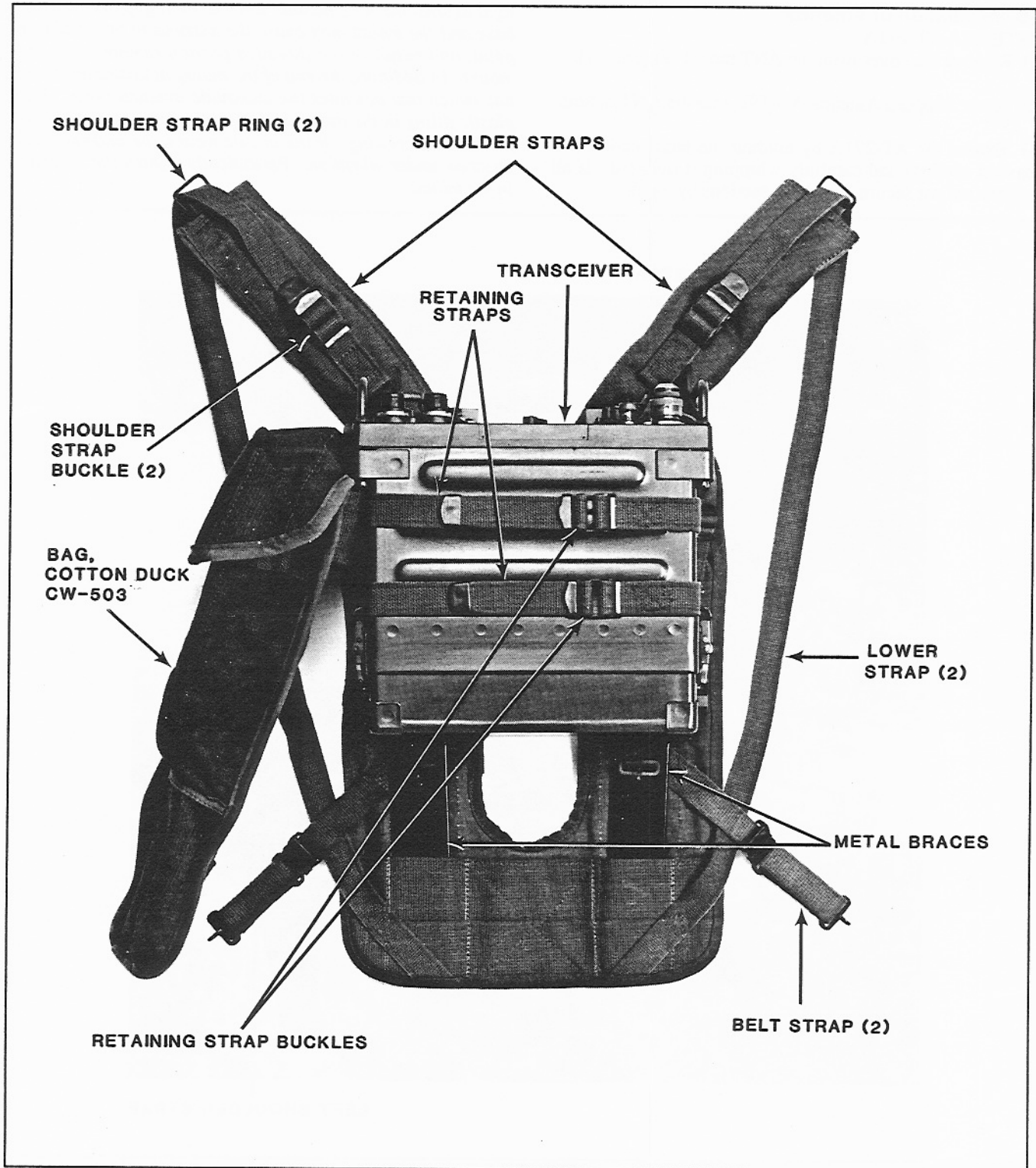


FIGURE 2-2.
Installation of Transceiver in ST-138.

(5) Install the left shoulder strap in a similar manner.

(4) Secure the extended AT-271A into the AB-591.

(6) Hook the two belt straps to the combat belt (Figure 2-3).

2-6 Installation of Antenna

ANTENNA AT-271A

(1) Remove the cover from the ANT mount (Figure 3-1).

(2) Screw Support, Antenna AB-591, into the ANT mount.

(3) Extend the AT-271A by holding the base section (the heaviest section) and carefully whipping it outward. If all sections are not secure, insert the sections by hand.

CAUTION

The antenna must always be tightened so that the base is tight against the ANT mount. Even a small gap between the base and the mount may cause the antenna to break at this point, and result in the threaded portion remaining in the mount. In addition, the end of the mount activates an internal switch that activates the automatic antenna tuner. The plastic filling in the thread is designed to prevent the antenna from unscrewing. If the plastic wears, the antenna may unscrew under vibration. Periodically tighten the antenna in the mount.

LEFT LOWER STRAP



LEFT SHOULDER STRAP

FIGURE 2-3.
Installing PRC1099 for Manpack Operation.

CHAPTER 3 OPERATING INSTRUCTIONS

CAUTION

Battery power should be between 12.0 V and 15 Vdc, with positive (+) applied to the B terminal on the battery connector (at the back of the transceiver) and negative (-) applied to the A terminal. Do not change the battery polarity or the transceiver will be seriously damaged.

3-1. Transceiver, Radio PRC1099, Controls, Indicators and Connectors (Figure 3-1)

Control, Indicator, or Connector	SW Position	Function/Action
POWER Switch	OFF	Turns transceiver off.
	LO	Turns transceiver on - Low Power, 5W.
	HI	Turns transceiver on - High Power, 20W.
	EXT AMP	Turns on the external amplifier when connected.
FUNCTION Switch	USB	Transceiver operates on the normal (upper) sideband, no squelch. Receiver squelched — no background noise. Opens when signal received. USB operation.
	SQUELCH	Receiver squelched — no background noise. Opens when signal received. USB operation.
	LSB	Transceiver operates on opposite (lower) sideband.
	LITE	Spring loaded position backlights frequency display. USB operation.
	OPT	Normally data mode. AME option — Transceiver operates in compatible AM (AME) mode, no squelch.
CHANNEL Switch	MAN	Selects the manual tune position. Front-panel channel switch must be in the MAN position to use optional remote handset channel switch.
	1-9	Selects pre-set channel frequencies.
Remote CHANNEL Switch (Remote handset only)	IC	Selects the manual tune position. Remote channel switch must be in the IC position to use front-panel channel switch.
	1-9	Selects preset channel frequencies.
DIGIT Selection	←	Spring Loaded - selects digit to be tuned; right to left.
	→	Spring Loaded - selects digit to be tuned; left to right.
TUNE Control	↑	Spring Loaded - increments frequency higher in 100 Hz* steps.
	↓	Spring Loaded - increments frequency lower in 100 Hz* steps.
		* Larger tuning steps if selected by DIGIT switch.
WHIP Tune	DEPRESS (momentarily)	Activates automatic antenna tuner to tune whip or long wire antennas.
STORE	DEPRESS (Hold)	Permits resetting frequency on channels 1-9.
BITE	DEPRESS (Hold) (while turning transceiver on)	Activates BITE (Built-In-Test-Equipment) (Refer to 3-7).
Liquid Crystal Display		Displays channel frequency.
VOLUME Control		Varies receiver and sidetone volume.
Remote VOLUME Control		Varies receiver and sidetone volume to earphone. Lowest setting turns earphone off.
AUDIO Connector (2)		Provides connection for handset or audio device.
ANT Mount		Provides connection for antenna AT-271A or Long Wire Adaptor.
ANT Connector		Provides connection for fixed base or 50Ω vehicular antenna, or external power amplifier.
POWER Connector		Provides connection for external power supply when PRC1099 is used as part of vehicular radio set configurations. When the connector cover is removed, the PRC1099 is disconnected from the battery pack. Rechargeable batteries may be recharged through this connector. Provides control for external accessories such as power amplifiers.



FIGURE 3-1.
Transceiver Radio PRC1099, Controls, Indicators, and Connectors.

3-2 Presetting Channel Frequencies

The PRC1099 will store up to 10 different frequencies. These frequencies remain in memory even if the battery pack is disconnected. Channels 1-9 are usually used to store preset channels; however, the last frequency entered in the "MAN" channel will also be retained in memory.

a. PRESETTING CHANNELS 1 TO 9

- (1) Select the desired channel number.
- (2) Depress switch STORE and hold down while setting the new frequency. This switch prevents accidental change of the channel frequencies during normal operation of the transceiver.
- (3) Turn the DIGIT switch until the desired digit flashes.
- (4) Turn the TUNE switch either "UP" or "DOWN" until the correct number appears.
- (5) Repeat steps 3 and 4 until all digits are correctly selected.
- (6) Release the STORE switch. The new frequency is now entered in memory.

b. PRESETTING MAN CHANNEL

Follow the preceding procedure except that it is not necessary to depress the STORE switch.

c. MEMORY DUMP FEATURE

To erase the frequencies stored in memory, simply hold the WHIP-TUNE button in, hold the DIGIT switch up, and turn the radio from OFF to LO. This will cause the radio to reset all programmed frequencies to 2.0000 MHz.

3-3. Receiver Fine Tune

On channels 1-9 the receiver only may be fine tuned by incrementing the last digit by using the TUNE control (do not press the STORE switch). The receiver frequency offset is deleted from memory when a new channel is selected.

3-4. Operating Procedure

The audio accessories may be plugged into the following audio jacks:

<u>Accessory</u>	<u>AUD-L</u>	<u>AUD-R</u>
RCH Remote Control Handset		X
H-250/U Handset	X	X
H-189/U Handset	X	X
H3M Headset Boom Microphone	X	X
KYR CW Key	X	
PRC-Selcall	X	
Data Terminal	X	

- a. If BITE is to be activated, hold down the WHIP TUNE/STORE button while performing step b. (refer to section 3-7).
- b. Set the Power Switch to HI or LO (refer to 3-4h).
- c. Set the Function Switch to USB. A background noise should be heard in the handset.
- d. Set the Channel Switch to the desired channel (refer to Section 3-2 if a new frequency, not previously entered into memory, is needed).
- e. Set the VOLUME control to the desired sound level.
- f. Transmit as follows: