

This Information Is Provided By
CBTricks.com

Toshiba ZS-7222A Service Manual

Liability of damages to any equipment is the sole responsibility of the user! Downloading, viewing, or using any information provided on these pages automatically accepts the user to the terms of this agreement!

Modifications are provided for information purposes only!

Supporters of CBTricks.com paid for the hosting so you would have this file.

CBTricks.com is a non-commercial personal website was created to help promote the exchange of service, modification, technically oriented information, and historical information aimed at the Citizens Band, GMRS (CB "A" Band), MURS, Amateur Radios and RF Amps.

CBTricks.com is not sponsored by or connected to any Retailer, Radio, Antenna Manufacturer or Amp Manufacturer, or affiliated with any site links shown in the links database. The use of product or company names on my web site is not endorsement of that product or company.

The site is supported with donations from users, friends and selling of the Site Supporters DVD's to cover some of the costs of having this website on the Internet instead of relying on banner ads, pop-up ads, commercial links, etc. Thus I do not accept advertising banners or pop-up/pop-under advertising or other marketing/sales links or gimmicks on my website.

ALL the money from donations is used for CBTricks.com I didn't do all the work to make money (I have a day job). This work was not done for someone else to make money also, for example the ebay CD sellers.

All Trademarks, Logos, and Brand Names are the property of their respective owners.

This information is not provided by, or affiliated in any way with any radio or antenna Manufacturers.

Thank you for any support you can give.

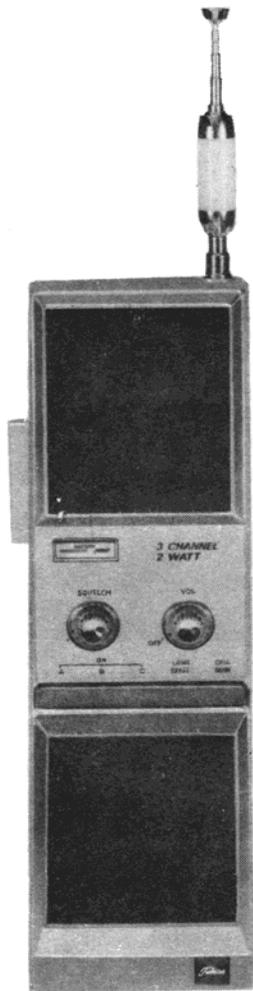
For information on how to Support CBTricks.com

<http://www.cbtricks.com/support/>

Toshiba

SERVICE DATA

TRANSCEIVER



MODEL

ZS-7222A

TOKYO SHIBAURA ELECTRIC CO., LTD.

2-1, 5-CHOME, GINZA, CHUO-KU, TOKYO, JAPAN

GENERAL

The TOSHIBA 2W Transceiver ZS-7222A is a hand held 3-channel transceiver designed to operate with an input of 2 watts to the final RF power stage.

It is intended for use in class D Citizens Radio Service under conditions prescribed in Part 95 of the FCC Rules and Regulations. This requires a simple licensing procedure and permits operation on channel 1 through 23.

Housed in a metal case, the ZS-7222A is designed easy to operate with push-button 3-CHANNEL selector, CALL SIGN and LONG RANGE switches.

The multi stage transmitter is equipped with DYNAMIC MICROPHONE, CALL and LONG RANGE circuitry for greater "talk power".

The sensitive superheterodyne receiver with RF amplifier includes many features such as an efficient squelch control circuit which quiets the receiver when a signal is not being received, Automatic Gain Control to prevent overloading on strong signals and maintain uniform sound output, and Automatic Noise Limiter to reject electrical noise from being heard in the speaker.

SPECIFICATIONS

REGULATION	Meets F. C. C. & D. O. T.
FREQUENCY RANGE	26.965 to 27.255 MHz (channel 1-23)
NUMBER OF CHANNELS	3
FREQUENCY TOLERANCE	Within 0.005%
OPERATING FREQUENCY	Supplied with one set of crystals for channel 11, (27.085 MHz) in position A. May be operated on any other channel by inserting crystals in position B and C.
TRANSMITTER	Crystal controlled, amplitude collector modulated.
POWER INPUT	2 Watt input to final RF power amplifier.
MODULATION	High level push-pull modulator with LONG RANGE.

CALL	Tone frequency 2 kHz												
RECEIVER	Crystal controlled superheterodyne with RF amplifier and Noise Limiter												
SENSITIVITY	50 mW or more at 1 μ V input 1 μ V for 10 dB $\frac{S+N}{N}$ or better												
BAND WIDTH	More than 6 kHz at -6 dB												
SELECTIVITY	More than 20 dB at +10 kHz												
SQUELCH RANGE	1 μ V to 50 μ V												
AGC FIGURE OF MERIT	More than 60 dB												
AUDIO OUTPUT	Maximum more than 500 mW												
ANTENNA	48 inch center-loaded telescoping antenna												
POWER SUPPLY	12 volts D.C												
BATTERY DRAIN	<table> <tr> <td rowspan="2">On Transmitter</td> <td rowspan="2">{</td> <td>unmodulated</td> <td>300 mA</td> </tr> <tr> <td>100% modulated</td> <td>500 mA</td> </tr> <tr> <td rowspan="2">On Receiver</td> <td rowspan="2">{</td> <td>Squelch on</td> <td>20 mA</td> </tr> <tr> <td>maximum volume</td> <td>130 mA</td> </tr> </table>	On Transmitter	{	unmodulated	300 mA	100% modulated	500 mA	On Receiver	{	Squelch on	20 mA	maximum volume	130 mA
On Transmitter	{			unmodulated	300 mA								
		100% modulated	500 mA										
On Receiver	{	Squelch on	20 mA										
		maximum volume	130 mA										
SEMI-CONDUCTORS	2SC371 Transmit oscillator 2SC482 Transmit driver 2SC502 Transmit final RF power amplifier 2SA518 Receiver RF amplifier 2SA518 Mixer 2SA468 Local oscillator 2SA49 1st IF amplifier 2SA53 2nd IF amplifier 2SB54 1st Squelch amplifier 2SB54 2nd Squelch amplifier 2SB54 1st AF amplifier 2SB54 2nd AF amplifier 2SB415 } AF power amplifier / modulator 2SB415 } 1N60 Receiver Detector / AGC												

1N60 Squelch
1N60 LONG RANGE
1S34 Automatic Noise Limiter
D91A Temperature compensating thermistor
D33A Temperature compensating thermistor

DIMENSION

10 3/64"H x 3 15/64" W x 3 49/64" D max

WEIGHT

2.8 lbs (including 10 batteries)

TO REMOVE CONTROL KNOBS, loosen the set screw (b) on the control knobs (a).

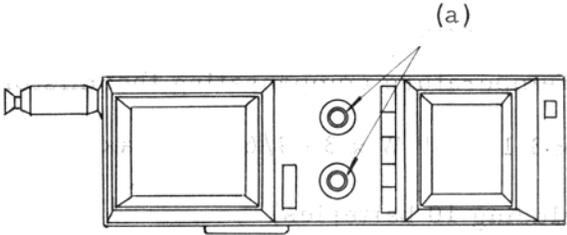


Fig. 1-1

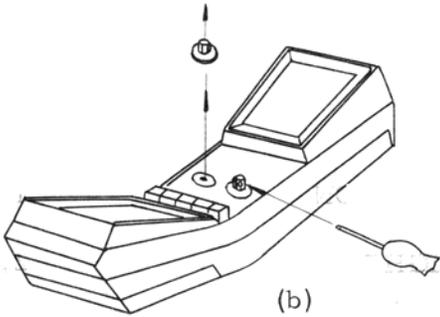


Fig. 1-2

TO REMOVE ELASTIC HAND STRAP, loosen holdfast (a) as shown in Fig.2-2.

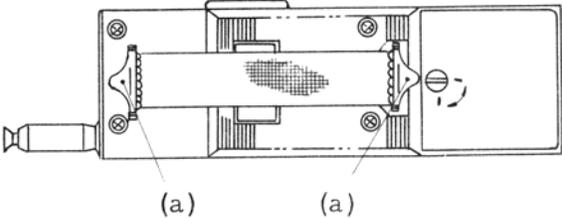


Fig. 2-1

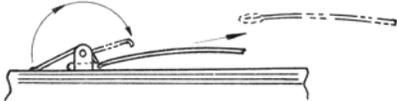


Fig. 2-2

TO OPEN CABINET, remove rear cover by loosening screw (a) as shown in Fig. 3-1 and Fig. 3-2.

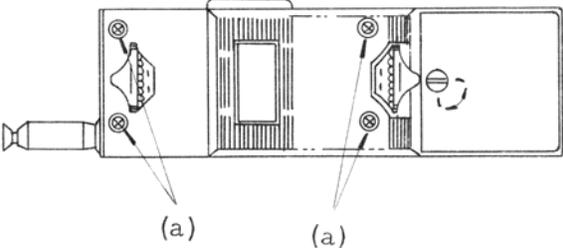


Fig. 3-1

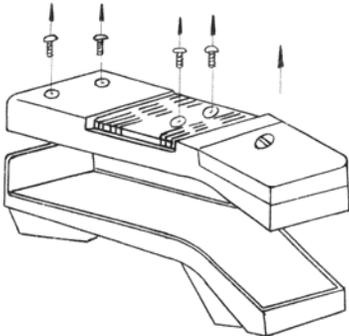


Fig. 3-2

TO REMOVE BATTERY CONNECTOR, unsnap the battery connector (a) from the battery holder (b) as shown in Fig. 4-1 and Fig. 4-2.

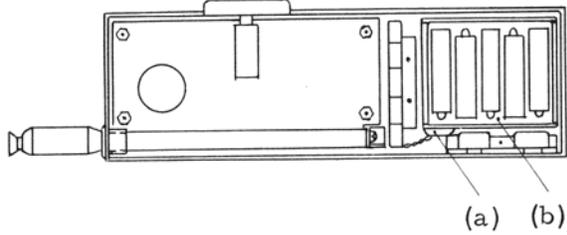


Fig. 4-1

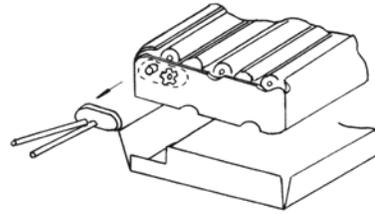


Fig. 4-2

TO REMOVE THE TELESCOPING ANTENNA, take out the antenna mounting-fixture screw (a) and antenna holding screw (b), then pull out the telescoping antenna as shown in Fig. 5-2.

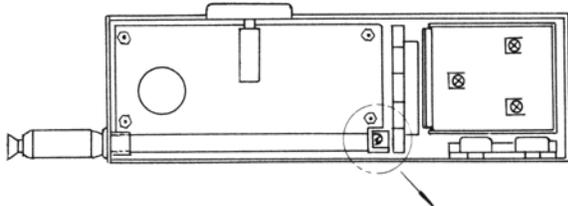


Fig. 5-1

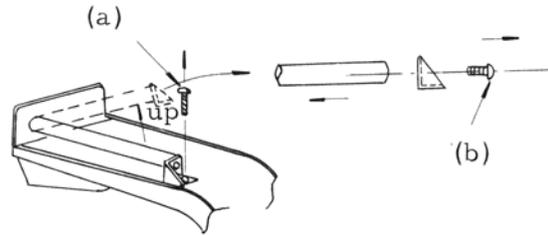


Fig. 5-2

TO REMOVE BATTERY COMPARTMENT HOLDER, remove the three screws (a) on battery compartment holder.

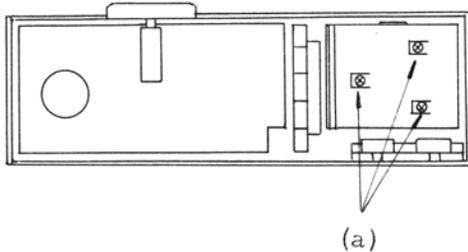


Fig. 6-1

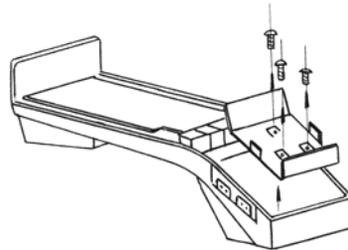


Fig. 6-2

TO REMOVE PRINTED CIRCUIT BOARD, remove five screws (a. and b.) on the printed circuit board.

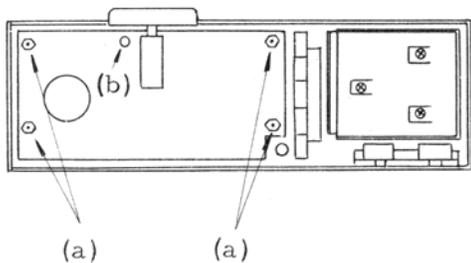


Fig. 7-1

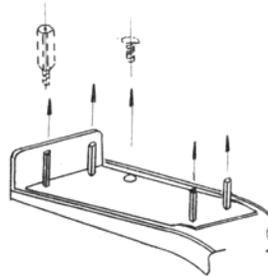


Fig. 7-2

TO REMOVE THE PUSHBUTTON SWITCH, remove two screws (a) on the switch holder.

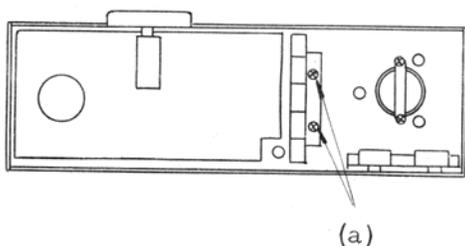


Fig. 8-1

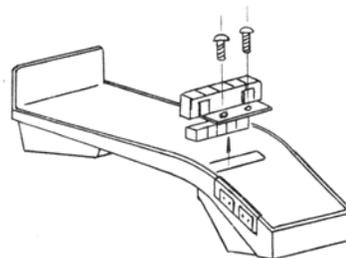


Fig. 8-2

TO REMOVE THE JACKS, remove two screws (a) on the jack holder.

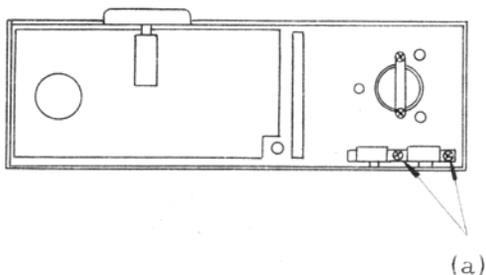


Fig. 9-1

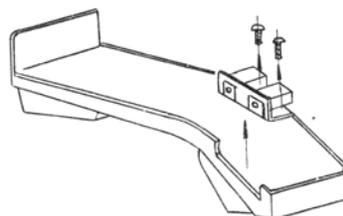


Fig. 9-2

TO REMOVE THE PRINTED CIRCUIT BOARD (a), PUSHBUTTON SWITCH (b) AND JACKS (c) FROM THE CABINET as shown in Fig. 10.

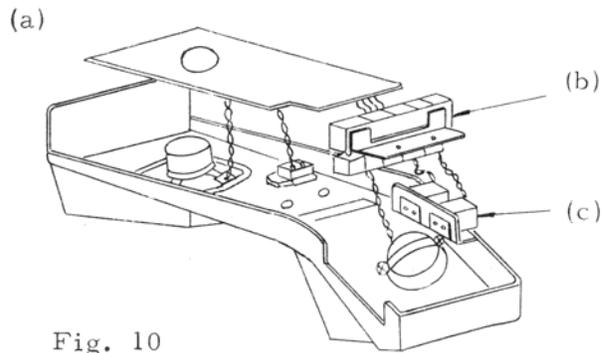


Fig. 10

TO REMOVE THE BATTERY METER,

- (1) remove the screw (a) on the battery meter clamp,
- (2) take off battery meter clamp (b) and pull out battery meter as shown in Fig. 11-2.

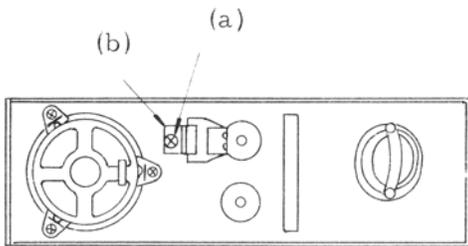


Fig. 11-1

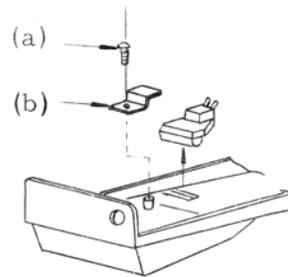


Fig. 11-2

TO REMOVE THE SPEAKER,

- (1) remove three screws (a) as shown in Fig. 12-1,
- (2) take off three speaker clamps (b) and pull out speaker as shown in Fig. 12-2.

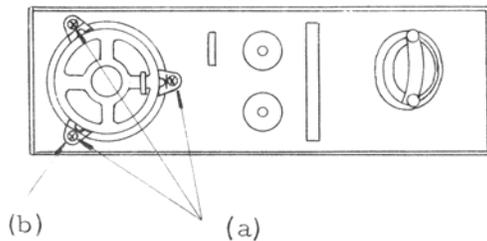


Fig. 12-1

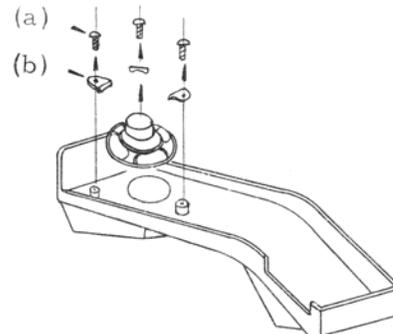


Fig. 12-2

TO REMOVE DYNAMIC MICROPHONE,

- (1) remove two screws (a) as shown in Fig. 13-1,
- (2) take off microphone clamp (b) and pull out dynamic microphone as shown in Fig. 13-2.

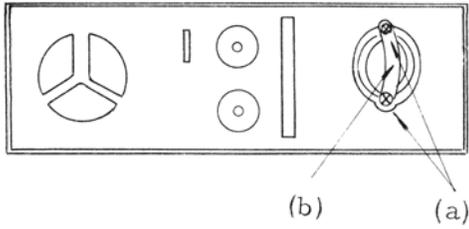


Fig. 13-1

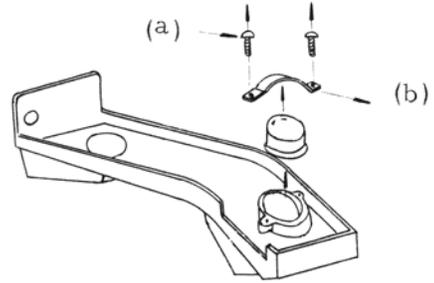
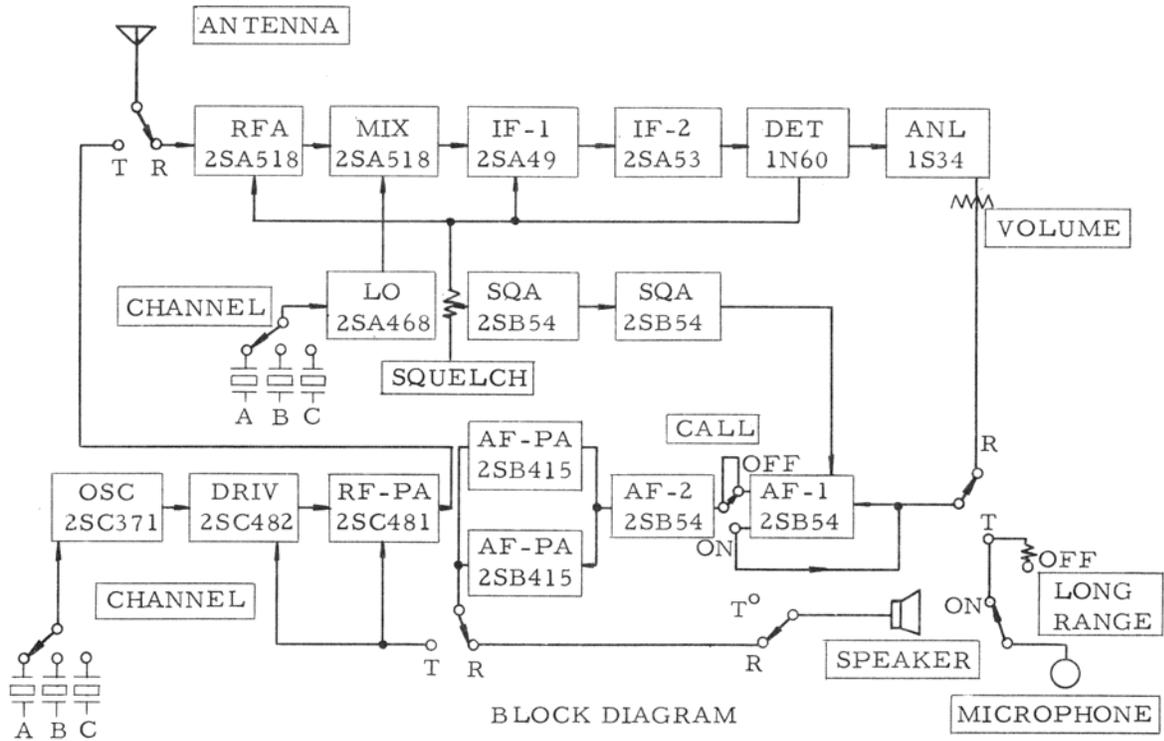


Fig. 13-2



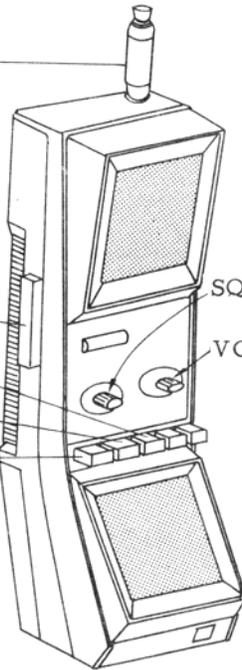
CENTER-LOADED
TELESCOPING ANTENNA

PUSH-TO-TALK switch

CHANNEL SELECTOR (C)

CHANNEL SELECTOR (B)

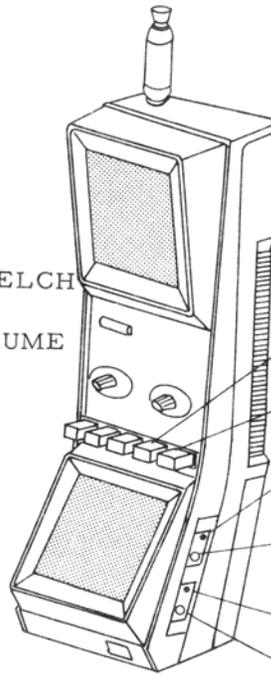
CHANNEL SELECTOR (A)



SQUELCH

VOLUME

OUTSIDE VIEW



LONG RANGE
ON-OFF switch

CALL switch

EXTERNAL
ANTENNA
jack

EXTERNAL
POWER
jack

EARPHONE
jack

CHARGER jack

TROUBLE SHOOTING

Precautions in trouble shooting

1. Power supply is 12V DC.
2. When an external power source is used, care must be taken to observe proper polarity and voltage.
3. The power supply circuit of the set is designed for positive and negative ground system. Red lead is positive and black lead is negative.
4. Before checking the current and voltage, examine for disconnected leads and damage to any of the parts.

Measurement of total current

Measure total current by inserting an ammeter in series in either one of the power supply leads. Connect a dummy load or a 50 ohm power meter to the antenna jack (J1) on the set.

No signal total current at receiving 18 mA ——— 25 mA
(squelch-on)

No signal total current at transmitting 250 mA ——— 350 mA
(no modulation)

	TRANSISTOR VOLTAGE					
	E		B		C	
	R	T	R	T	R	T
TR 1	-0.45V	0	-0.67V	0	-8.8V	0
TR 2	-1.7V	0	-2.0V	0	-8.4V	0
TR 3	-0.5V	0	-0.7V	0	-9.2V	0
TR 4	-2.8V	0	-3.0V	0	-7.6V	0
TR 5	-1.8V	0	-2.0V	0	-5.5V	0
TR 6	0	0	0	0	-0.2V	0
TR 7	0	0	-0.2V	0	-0.04V	0
TR 8	0	-8V	0	-7.2V	0	0
TR 9	0	-12V	0	-12V	0	0
TR10	0	-12V	0	-12V	0	0
TR11	-0.9V	-0.9V	-1.0V	-1.0V	-6V	-6V
TR12	-1.2V	-1.2V	-1.4V	-1.4V	-10.8V	-10.8V
TR13	-0.02V	-0.01V	-0.14V	-0.14V	-12V	-12V
TR14	-0.02V	-0.01V	-0.14V	-0.14V	-12V	-12V

- NOTES:
1. Voltage are negative with respect to ground.
 2. Voltage readings are taken with the volume control minimum and crystal removed.
 3. Squelch OFF.

Transmitting condition

SYMBOL	CHECK FOR
No current flow	Bad contact of battery or power source and power supply lines, bad contact of switch and faults in the power supply circuits.
Excessive current flow (short-circuited)	Short-circuit in the power supply circuits, grounded or short-circuited output transformer (T-15), defective electrolytic capacitors in the power supply circuits, or defective TR10, 13 or 14.
Current normal but no modulation	Defective speaker-microphone or bad contact in PUSH-TO-TALK switch S1b or S1c.
Insufficient current flow	Bad contact in PUSH-TO-TALK switch S1a, S1d, S1e or SELECTOR switch S2-1a, S2-2a, S2-3a, defective TR8, TR9, TR10 or crystal.

Receiving condition

SYMBOL	CHECK FOR
No current flow	Bad contact of battery or power source circuits, bad contact of switch and faults in the power supply circuits.
Excessive current flow (short-circuited)	Short-circuit in the wiring of the power supply circuits, grounded or layer short of output transformer (T15), defective electrolytic capacitors in the power supply circuits or grounding of the power supply switch.
Excessive current flow	Grounding of the primary side of T3, T4, T5, T6, T7 or T14, defective TR13 and TR14.
Normal current but no sound	Defective receiver crystal, shorted or open secondary of output transformer (T15-8 Ω), short-circuit in the primary of the output transformer (T15-50 Ω), speaker lead wires disconnected, open speaker voice coil, defective contacts in volume circuit, PUSH-TO-TALK switch S1c, or earphone jack J2, CALL switch S2-5b, defective diode CD1 or CD3, SQUELCH control R28 disconnected.
Insufficient flow (less than 15mA)	Defective resistor R22, bad contact in PUSH-TO-TALK switch S1d.

DETAILS OF TROUBLE SHOOTING

OSCILLATOR STAGE

1. Voltage of various points

ITEM OF CHECK	Normal voltage	Abnormal voltage	Causes of trouble	Signs of trouble
TR8 collector to ground.	0 V	Too high	T8 disconnected	No oscillation
TR8 base to ground.	-7.2V	Zero or too low	R41 short-circuited or the resistance of R42 large.	No oscillation
		Too high	R41 disconnected, the resistance of R42 small, Defective TR8.	No oscillation
TR8 emitter to ground.	-8 V	Zero or too low	R43 disconnected or its resistance too high, C41 short-circuited, Bad contact in PUSH-TO-TALK switch S1e or T15, defective TR8.	No oscillation

NOTE: Voltage readings are taken with the crystals removed. If the voltage is measured with the crystal in place, inverse bias voltage will appear between the base and emitter.

Therefore, the crystal should be removed at the time of measuring voltage.

2. Trouble at the normal voltage

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Base side.	Bad contact in CHANNEL switch S2-1a, S2-2a, S2-3a, defective crystal.	No oscillation
Emitter side.	C41 disconnected.	Insufficient output
Collector side.	TR8 disconnected, ferrite core of T8 broken or cracked, detuned T8.	Insufficient output or no oscillation

TRANSMIT DRIVER STAGE

1. Voltage of various points

ITEM OF CHECK	Normal voltage	Abnormal voltage	Causes of trouble	Signs of trouble
TR9 emitter to ground.	-12V	Zero or too low	Bad contact in PUSH-TO-TALK switch S1d, T15 disconnected, defective TR9.	No oscillation, insufficient output

2. Trouble at the normal voltage

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Base side.	Secondary of the T8 disconnected or short-circuited, defective oscillator stage, detuned T8.	No output or insufficient output
Emitter side.	C43 disconnect.	Insufficient output
Collector side.	L1 short-circuited, C44 disconnected, Disconnected or detuned T9.	No output or insufficient output.

TRANSMIT POWER AMPLIFIER STAGE

1. Voltage of various points

ITEM OF CHECK	Normal voltage	Abnormal voltage	Causes of trouble	Sings of trouble
TR10 emitter to ground.	-12V	0	Bad contact in PUSH-TO-TALK switch S1d, T15 disconnected, disconnected TP4.	No oscillation, insufficient output

2. Trouble at the normal voltage

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Base side.	Secondary of the T9 disconnected or short-circuited, defective driver stage, detuned T9.	No output or insufficient output
Emitter side.	C45, C47, C48, C49 disconnected or short-circuited. Disconnected or detuned T11 and T12.	No output or insufficient output

RF AMPLIFIER STAGE

1. Voltage of various points.

ITEM OF CHECK	Normal voltage	Abnormal voltage	Causes of trouble	Signs of trouble
TR1 collector to ground.	-8.8V	0	T3 or R3 disconnected.	No sound
TR1 base to ground.	-0.67V	Zero or too low	R1 disconnected or its resistance too high, C4 short-circuited.	Low sensitivity or no sound
		Too high	Defective TR1	
TR1 emitter to ground.	-0.45V	Zero or too low	R2 disconnected or its resistance too low, C5 short-circuited.	Low sensitivity or no sound
		Too high	Defective TR1, R2 resistance too high.	

2. Trouble at the normal voltage

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Collector side.	T3 short-circuited. T3 ferrite core broken or cracked, detuned T3.	Low sensitivity
Base side.	T2 short-circuited or its ferrite core broken or cracked, detuned T2, Disconnected or insufficient capacity of C4.	Low sensitivity or abnormal sound
Emitter side.	Disconnected or insufficient capacity of C5.	Low sensitivity

MIXER STAGE

1. Voltage of various points

ITEM OF CHECK	Normal voltage	Abnormal voltage	Causes of trouble	Signs of trouble
TR2 collector to ground.	-8.4V	0	T4 or R8 disconnected	No sound
TR2 base to ground.	-2.0V	Zero or too low	R7 disconnected, C8 short-circuited	No sound
		Too high	R4 disconnected, resistance of R7 too low, defective TR2.	Tone quality abnormal or no sound
TR2 emitter to ground.	-1.7V	Zero or too low	R5 disconnected or its resistance too low, C9 short-circuited.	No sound
		Too high	Defective TR2, R5 resistance is too high.	Tone quality abnormal

2. Trouble at the normal voltage.

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Base side.	Insufficient capacity of C8, C8 disconnected, T3 short-circuited, T3 ferrite core broken or cracked, detuned T3. Defective local oscillator stage.	Low sensitivity or no sound.
Emitter side.	C28 disconnected, defective T7 or defect in TR5.	Low sensitivity or no sound.
Collector side.	T4 short-circuited.	No sound.

NOTE: For checking local oscillation, insert high-frequency vacuum tube voltmeter (AC 1 V range) between the test point TP3 on the secondary side of T7 and ground.

If the oscillating voltage is between 0.1V to 0.2V, this stage is operating.

LOCAL OSCILLATOR STAGE

For checking local oscillator, insert high-frequency vacuum-tube voltmeter (about AC 0.5V range) between the check point TP3 on the secondary side of T7 and the ground. If the oscillating voltage measures from AC 0.1 V to 0.2V this stage is operating properly.

1. Voltage of various points.

Note: If the voltage is measured with the crystal inserted, inverse voltage will appear between the base and emitter.

Therefore the crystal should be removed when measuring voltage.

ITEM OF CHECK	Normal voltage	Abnormal voltage	Causes of trouble	Signs of trouble
TR5 collector to ground.	-5.5V	0	T7 disconnected	No sound
TR5 base to ground.	-2.0V	Too high	R23 disconnected, R25 small or short-circuited, defective TR5	No sound
		Too low	R23 small R25 large	No sound
		0 V	R23 short-circuited, R25 disconnected or C26 short-circuited	No sound
TR5 emitter to ground.	-1.8V	Zero or too low	R24 short-circuited or small, defective TR5	No sound
		Too high	R24 disconnected or large	No sound

2. Trouble at the normal voltage.

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Base side.	Disconnected or, insufficient capacity of C20.	Sensitivity
	Defective crystal, trouble in S2b.	No sound
Emitter side.	Defective C27.	Insufficient sensitivity or no sound
Collector side.	T7 short-circuited, ferrite core of T7 broken or cracked, C28 short-circuited or disconnected.	No sound or insufficient sensitivity

I.F. AMPLIFIER STAGE (1ST, 2ND I.F. AMP)

1. Voltage of various points

ITEM OF CHECK	Normal voltage	Abnormal voltage	Causes of trouble	Signs of trouble
TR4 collector to ground.	-7.6V	0	T6 disconnected	No sound
TR4 base to ground.	-3.0V	Zero or too low	T5 disconnected, R14 disconnected, C16 short-circuited	No sound
		Too high	R12 disconnected, R14 too low, C18 short-circuited, defective TR4.	Tone quality abnormal or no sound
TR4 emitter to ground.	-2.8V	Too low	C19 short-circuited. R13 too low, defective TR4	No sound or Low sensitivity
		Too high	Defective TR4, R13 too high	Tone quality abnormal or no sound
TR3 collector to ground.	-9.2V	0	T5 disconnected	No sound
TR3 base to ground.	-0.7V	0	T4 disconnected, R9 disconnected, C12 or C13 short-circuited	No sound
		Too high	R11 disconnected, C14 short-circuited, R9 too low, defective TR3	Tone quality abnormal or no sound
TR3 emitter to ground.	-0.5V	Too low	Defective TR3, R10 too small, C15 short-circuited	Low sensitivity
		Too high	Defective TR3, R10 resistance too high	Tone quality abnormal or no sound

2. Trouble at the normal voltage

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Base side.	T4, T5 short-circuited.	No sound
	Faults in C13, C14, C16, C18.	Low sensitivity or oscillation at I.F. stage
Emitter side.	Faults in C15, C19 (open circuit)	Low sensitivity
Collector side.	T5, T6 short-circuited.	No sound

DETECTOR STAGE

ITEM OF CHECK	CAUSES OF TROUBLE	SIGNS OF TROUBLE
Input side.	T6 disconnected or short-circuited.	No sound
Output side.	Defective variable resistor contact. (R21)	Noise generated
	Defective C22, CD1.	Tone quality abnormal and sensitivity lowered

NOTE: Disconnect one terminal of diode CD1 and measure its resistance. Exact diagnosis of the diode is difficult, but the ratio of reverse to forward direction should be greater than 100:1.

AUTOMATIC NOISE LIMITER

Disconnect one terminal of diode CD-2 and measure its resistance. The ratio of reverse to forward direction should be greater than 100:1. Next, check the constants of the circuit. Then, if R19 is open or if R18 is small or short-circuited sensitivity will be low.