

OPERATING & ASSEMBLY INSTRUCTION  
MIZUHO MX-2 & MX-6Z TRANSCEIVER

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SECTION 1  
GENERAL DESCRIPTION

The MX-2 and MX-6Z VHF/SSB-CW transceiver is a compact unit for use in the 2m(MX-2) and 6m(MX-6Z) amateur band. It has the variable tuning capability up to 100kHz in the band. It will operate from its internal dry-cell batteries or from an external DC source. The MX-2 and MX-6Z uses a shortened rubber helix whip which may be easily replaced by an external 50-ohm antenna. The receiver section employs a dual-gate MOS-FET and single conversion design minimizes intermodulation interference.

The MX-2 and MX-6Z are the semi-knock-down kit form, however, major circuits are factory assembled and tested to insure performance of the unit.

This manual contains important information regarding the assembly and operation of the unit. Reading the instruction will result in maximum performance and enjoyment of your radio. Refer any questions regarding the MX-2 and MX-6Z, or information contained in this manual to the address shown on the back cover.

SECTION 2  
PARTS LIST

Remove the unit from its packing pack and make certain that all of the items have been included. Before you proceed to assembly, locate the parts that came with this kit and check them against the parts list in this section. Also get your tools together. Be sure that you have:

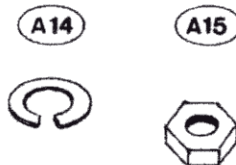
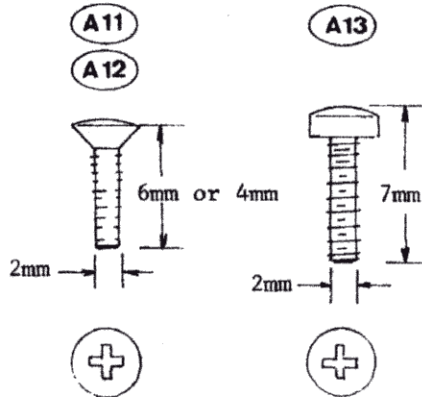
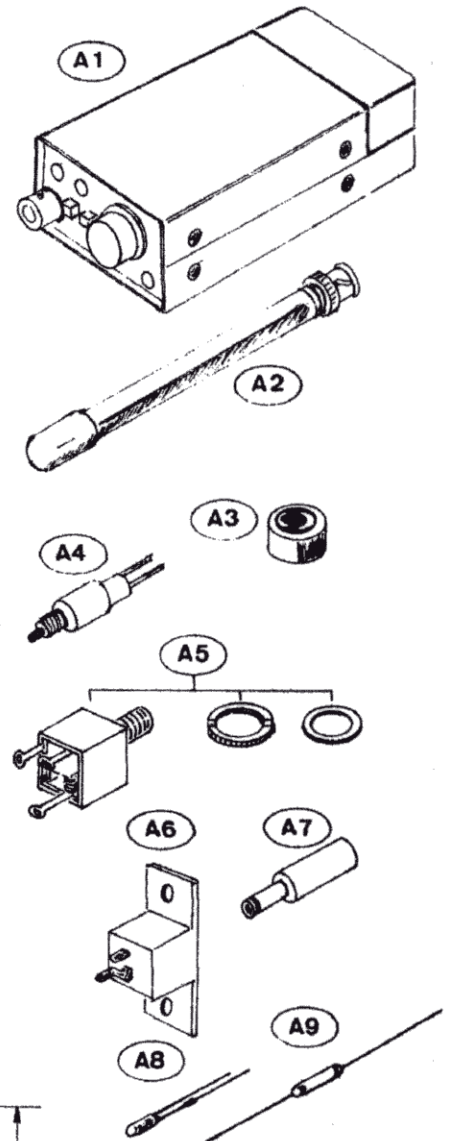
- \* Long-Nose Pliers
- \* Diagonal Cutters
- \* Phillips type Screwdriver, No. 1 Pt.
- \* Pencil Soldering Iron (25 - 40W)
- \* Glue
- \* Multimeter (if available)
- \* Tweezers (if available)

To order a replacement parts, always include the PART NUMBER. If one is not available, see "Replacement Parts" inside the rear cover of this manual. For price information, refer to the separate "MIZUHO Parts Price List."

**PARTS LIST**

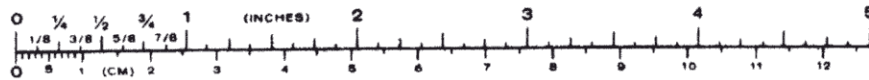
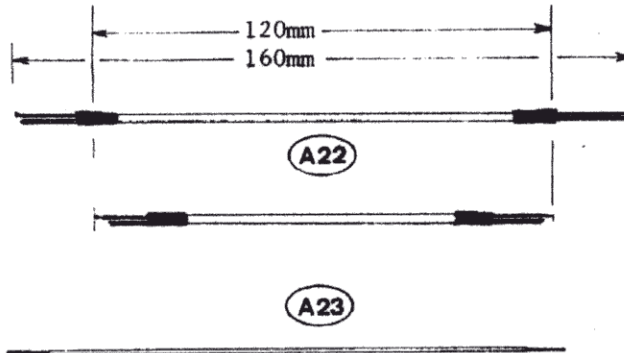
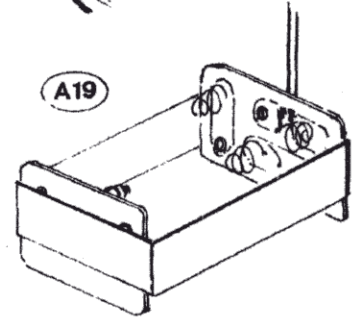
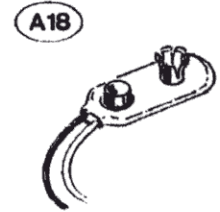
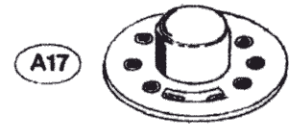
NOTE: The "Key" Numbers correspond to the numbers on the Parts pictorial.

KEY No.	PART No.	QTTY.	DESCRIPTION
A 1	1-000	1 ✓	Transceiver main unit
A 2	2-000	1 ✓	Helical whip antenna
A 3	1-161	1 ✓	Microphone element
A 4	1-151	1 ✓	Push button switch
A 5	1-152	1 ✓	Phone Jack, External key
A 6	1-153	1 ✓	Jack, External DC
A 7	1-154	1 ✓	Plug, External DC
A 8	1-171	1 ✓	LED, Red
A 9	1-172	1 ✓	Diode
A 10	1-231	1 ✓	Speaker Support
A 11	1-211	2	Screw, Oval head (2 x 6mm)
A 12	1-212	2	Screw, Oval head (2 x 4mm)
A 13	1-213	2	Screw, Pan head (2 x 7mm)
A 14	1-221	4	Spring Washer (2mm)



PARTS LIST

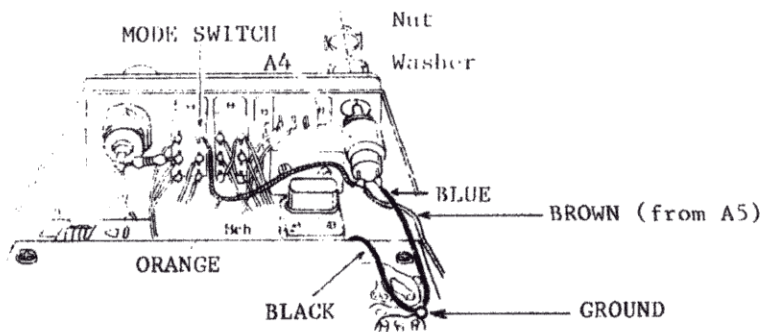
<u>KEY No.</u>	<u>PART No.</u>	<u>QTTY</u>	<u>DESCRIPTION</u>
A 15	1-222	4	Nut (2mm)
A 16	1-241	1 ✓	Speaker Grill cloth
A 17	1-162	1 ✓	Speaker unit, 8-ohm
A 18	1-155	1 ✓	Battery Connector (for 9V battery)
A 19	1-156	1 ✓	Battery Holder, AAA size dry-cell
A 20	1-331	2 ✓	Insulation tube (Small)
A 21	1-332	2 ✓	Insulation tube (Large)
A 22	1-341	2 ✓	Shield wire (120mm, 160mm)
A 23	1-311	7	Wire (BLACK, BROWN, RED, YELLOW, ORANGE, WHITE, BLUE)
	1-312	1 ✓	DC Power cord (Black/Red)
	4-000	1	ALMIT KR-19 Solder



STEP-2 Built-in CW Key

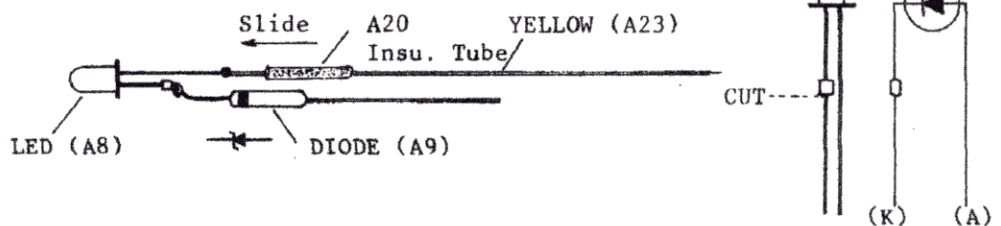
- ✓ \* Mount the push button switch (A4) to the front panel.
- ✓ \* Connect BROWN wire from the external key jack(A5) to the switch (A4).
- ✓ \* Connect ORANGE wire between push button switch (A4) and mode switch.
- ✓ \* Connect BLUE wire between push button switch (A4) and ground.

NOTE: The switch A4 has no polarity.

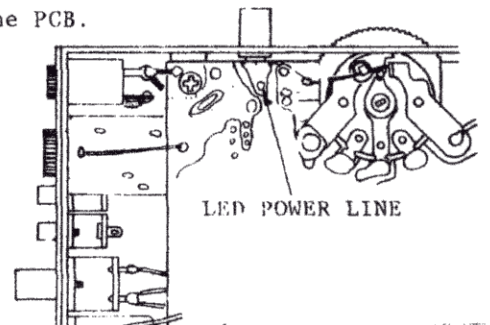
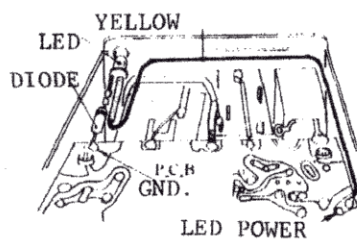


STEP-3 LED, Microphone Jack, External Speaker Jack

- ✓ \* Before mounting the LED (A8) to the front panel, solder YELLOW wire and diode (A9) to the leads of LED lamp as illustrated below. Be sure their polarities before soldering.

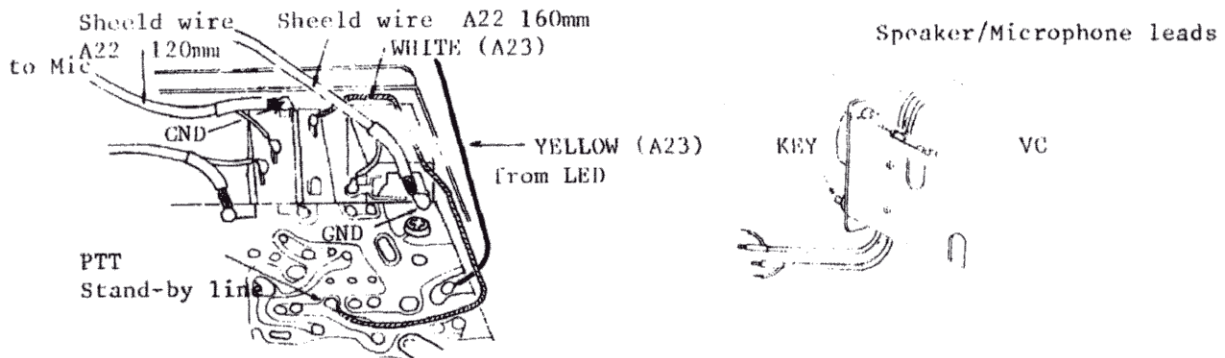


- ✓ \* Mount the LED (A8) to the front panel.
- ✓ \* Solder lead from the diode(A9) to ground.
- ✓ \* Connect yellow wire to LED power line on the PCB.



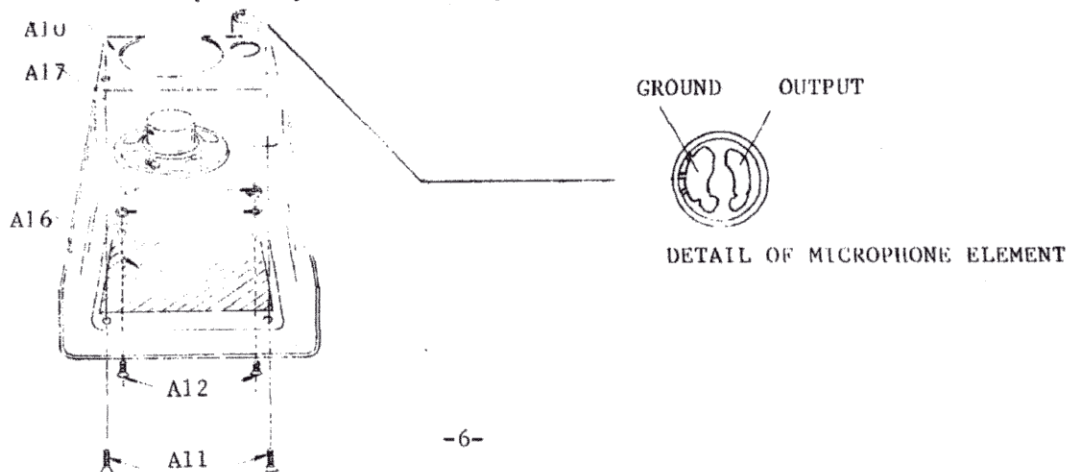
STEP-3 LED, Microphone Jack, External Speaker Jack (Cont'd)

- ✓\* Connect shield wire (A22, 120mm) to Microphone Jack.
  - ✓\* Connect WHITE wire (A23) between Microphone Jack and Stand-by PTT line of the PCB.
  - ✓\* Connect shield wire (A22, 160mm) to external speaker jack.
- \* Refer to wire connection and layout as illustrated below.



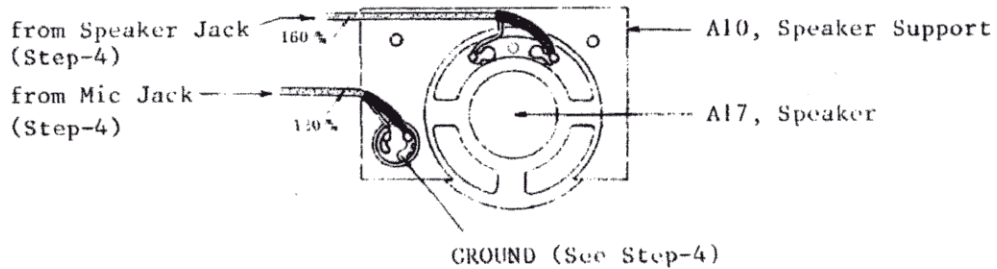
STEP-4 Speaker, Microphone

- ✓\* Cut the speaker grill cloth (A16) to a 50mm x 45mm square and using glue or double adhesive tape, stick the cloth to the front panel at the position of the speaker from the inside of the case.
- ✓\* Mount the speaker (A17) using a speaker support metal sheet (A10) to the front panel.
- ✓\* Mount the speaker support metal sheet (A10) to the front panel using 2x6mm screws (A11). Mount 2x4mm screws (A12) to the blank holes of the speaker grill.
- ✓\* Mount the microphone element (A3) to the speaker support metal sheet (A10). Be sure the polarity of the microphone element.



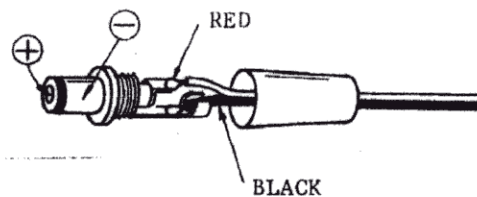
STEP-5 Wiring of Speaker and Microphone element

- ✓ Solder center conductor of shield wire from the microphone jack to the output terminal of the microphone element. Solder the braid to ground.
- ✓ \* Solder shield wire to speaker unit as illustrated below.



STEP-6 External Power Cable

- \* Solder the RED/BLACK parallel cord to the pin-plug (A7) supplied as illustrated below. A poor or cold solder connection will result shorting of the connector.



SECTION 4  
CHECK-UP PROCEDURE

Now check the transceiver carefully, Be sure each connection is smooth and shiny. To make sure you have assembled your transceiver properly, you can check it according to the following procedures.

- (1) All wirings directly soldered on the foil side of the printed circuit board are as follows:

<u>External DC jack (A6)</u> to system ground.	BLACK
<u>External DC jack (A6)</u> to power switch.	RED
<u>Microphone jack</u> to PTT line.	WHITE
<u>Braid</u> of shield wire to system ground.	A22 Microphone/Speaker
<u>LED (A8)</u> to LED power line.	YELLOW
<u>LED (A8)</u> to system ground via the diode (A9).	
<u>Key (A4)</u> to system ground.	BLUE



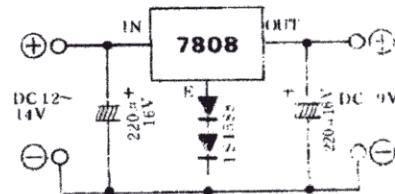
SECTION 4 (Cont'd)  
CHECK-UP PROCEDURE

- (2) Check wirings to the Jack, Switch, Microphone and Speaker, particularly check porality of sheeld wire and connectors.
- (3) Connect multimeter between B+ line (Power switch) and system ground, and measure the resistance value. The value should be;
  - \* Infinity at SWITCH OFF.
  - \* Approx 150-ohm at SWITCH ON.
- (4) If the above (1) - (3) are OK, then apply regulated DC 9 volts to exteranal power jack. If the power supply is not available, use 9 volts transistor battery or 6pcs. of AAA batteries as power source. Install the battery to the battery holder.
- (5) Connect an antenna to the antenna jack and check the function of receiver by receiving local station. Check the transmitter function by the monitor receiver if you have.
- (6) If the above (5) is OK, close the housing and fasten the screws.

SECTION 5  
OPERATION

(1) POWER REQUIRMENT

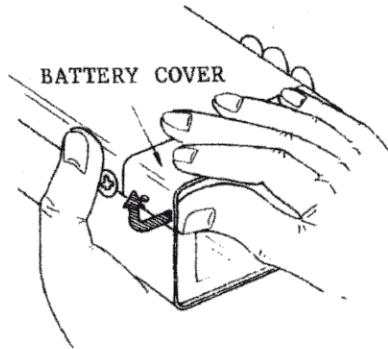
The MX-2 (MX-6Z) may be operated from its internal batteries or from an external power source capable of supplying 9 volts DC at 200mA. The DC cable furnished with the kit is used for this purpose. When the DC power cord is plugged into the unit, the internal batteries are disable. For external 12 volts power source operation such as car battery and base power supply, an external DC-DC converter is necessary. The 2M-2 is designed for this application. If you wish to built yourself, following circuit may be used.



The MX-2 (MX-6Z) may be operated on six AAA carbon zinc cells or 9 volts transistor battery if desired. Do not leave discharged dry cells in the unit. Do not store the unit for long perioades with the dry cells installed and use only leakproof dry cells in the unit.

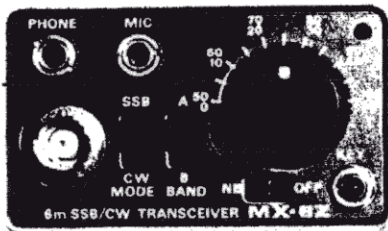


OPENING THE BATTERY COVER



(2) OPERATING CONTROLS & CONNECTIONS

**\*\*1\*\* TUNING KNOB** - Adjust frequency of both transmit and receive.  
The knob is calibrated in 5kHz increments. The operating frequency is the sum of the frequencies indicated by the channel crystal and the tuning knob. The tuning knob illustrated is read as follows:



TUNING KNOB ..... 25kHz      0.025

CRYSTAL FREQUENCY  
(144.20MHz - 144.25MHz)      144.200

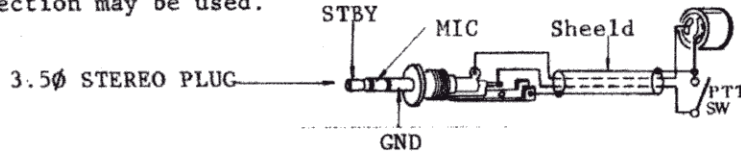
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144.225MHz

**\*\*2\*\* BAND SWITCH** - Selects the desired band of operation within a range.  
Select this knob to the "A" position at normal operation. If you install an optional crystal, slide this switch to the "B" position for optional frequency operation. 144.20MHz - 144.25MHz (MX-2) and 50.20MHz - 50.25MHz (MX-6Z) are equipped at the A position.

**\*\*3\*\* MODE SWITCH** - Selects the desired mode of operation.

**\*\*4\*\* EXTERNAL MICROPHONE & PTT** - This phono jack allows use of the accessory M-4 speaker/microphone. If you desire to use external microphone, following connection may be used.



**\*\*5\*\* EARPHONE JACK** - This phone jack allows use of the accessory M-4 speaker/microphone or earphone in an optional 2M-2 accessory pack.

**\*\*6\*\* ANTENNA CONNECTOR** - This twist off radio frequency connector mates with the

**\*\*6\*\* ANTENNA CONNECTOR (Cont'd)**

rubber flex antenna supplied with the unit. Connect the antenna by gently pushing it on to the radio and twisting it clockwise until it locks. Remove the antenna by gently pushing it on to the radio, twisting it counter-clockwise until it unlocks, and pulling the antenna away from the unit. With the flex antenna removed, connect the unit to an external antenna system.

**\*\*7\*\* NOISE BLANKER SWITCH** - Enables the operation of built-in noise blanker. For normal operation, slide this switch to OFF position.

**\*\*8\*\* BUILT-IN CW KEY** - Provides CW operation while operating in the field.

**\*\*9\*\* STAND-BY SWITCH** - This is a self-lock type stand-by switch. When it is depressed, it locks for transmit. When it is depressed again, it will return for receive.

**\*\*10\*\* VOLUME CONTROL/POWER ON-OFF SWITCH** - Rotate this control clockwise to turn the unit ON. You will hear a click when the radio is turned ON. Turn the control for desired audio level from the speaker. To turn the radio OFF, turn the control counter-clockwise until you feel the click of the switch.

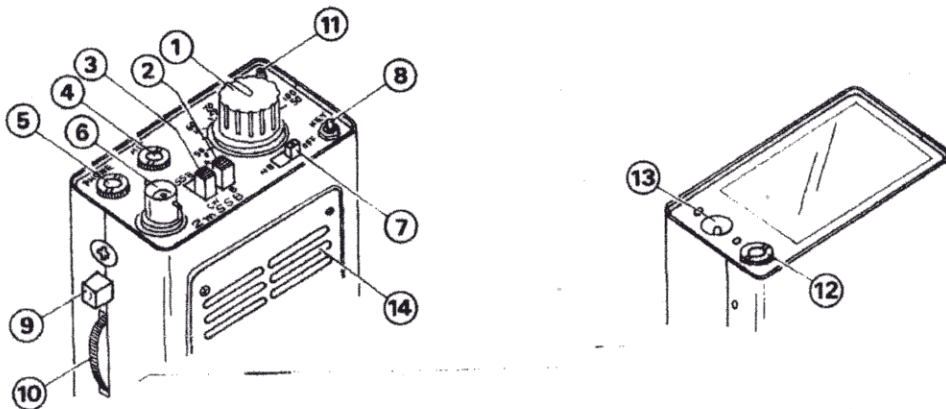
**\*\*11\*\* LED BATTERY INDICATOR** - This red LED indicates continuously when the unit is operating. It also indicates whenever the battery voltage drops to a point where the operation of the radio becomes marginal. When the battery voltage is low, the LED will dark, and if the voltage drops below 6 volts the LED will turn off.

**\*\*12\*\* EXTERNAL KEY JACK** - This jack allows use of the external key for CW operation. Refer to the following diagram for connection.

**\*\*13\*\* EXTERNAL POWER JACK** - This jack allows use of external DC source. Refer to section 5 (POWER REQUIREMENT) of this manual.

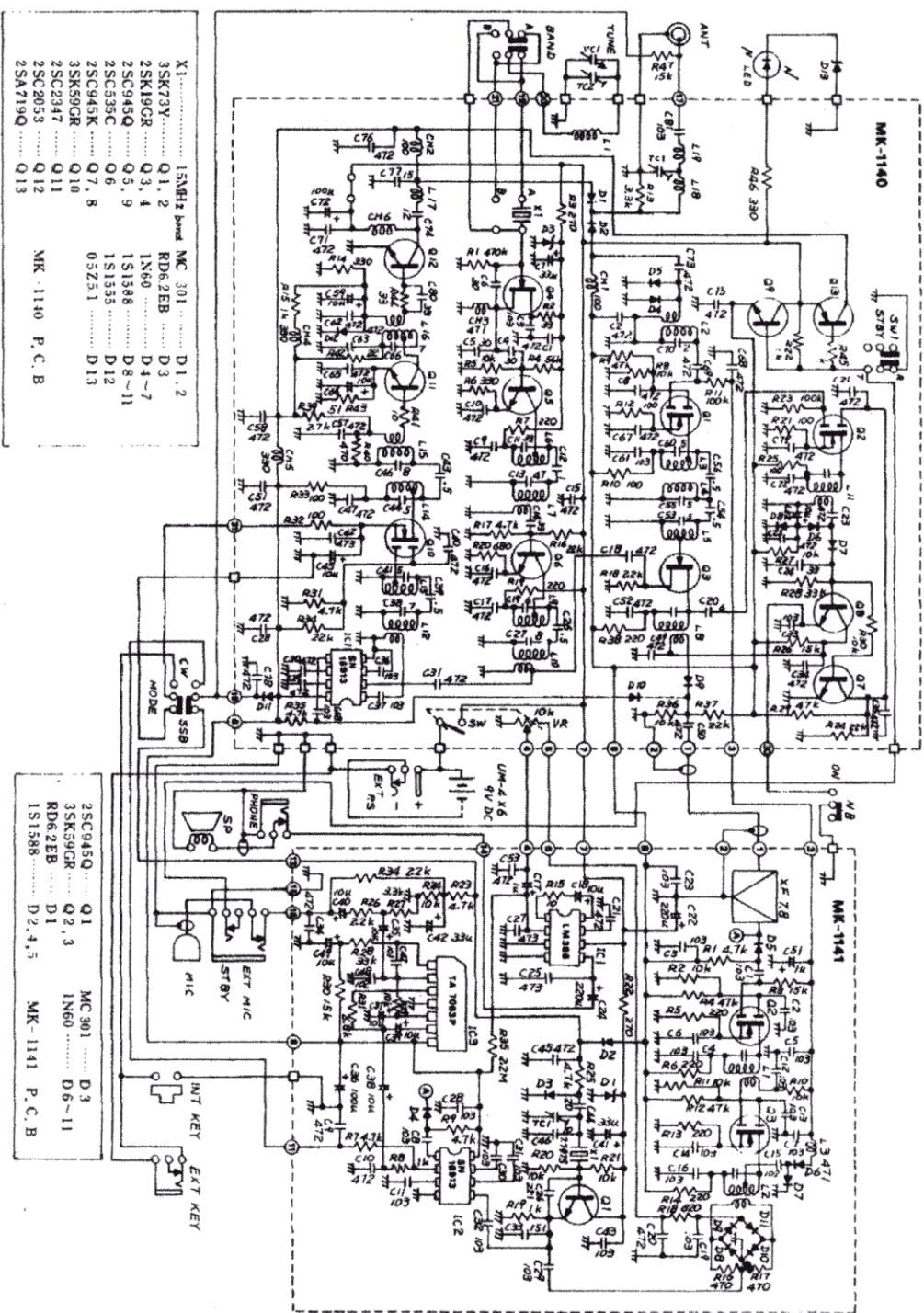
**\*\*14\*\* SPEAKER & MICROPHONE**

CONTROLS & CONNECTIONS



SCHEMATIC DIAGRAM

MX-2 (144MHz BAND)



X1.....	15MHz band	MC 301	D 1, 2
3SK73Y.....	Q 1, 2	RD62EB	D 3
2SK19GR.....	Q 3, 4	1N60	D 4-7
2SC945Q.....	Q 5, 9	1S1588	D 8-11
2SC535C.....	Q 6	1S1535	D 12
2SC945K.....	Q 7, 8	05251	D 13
3SK59GR.....	Q 10		
2SC2347.....	Q 11		
2SC2053.....	Q 12		
2SK719Q.....	Q 13		

MK-1140 P.C.B

2SC945Q.....	Q 1	MC 301	D 3
3SK9GR.....	Q 2, 3	1N60	D 6-11
RD62EB.....	D 1		
1S1588.....	D 2, 4, 5	MK-1141	P.C.B

CRYSTAL SPECIFICATIONS

Special channel crystals for MX-2 and MX-6Z can be ordered from us. However, if you must order crystals from another source, the following information should be supplied to the crystal manufacturer.

CRYSTAL SPECIFICATIONS (MX-2 & MX-6Z)

Holder Type : HC-25/U  
 Mode of Vibration : Fundamental  
 Frequency Range : 12MHz - 15MHz  
 Circuit : VXO (Variable Crystal Oscillator)  
 Test Equipment : TS-683/TSM  
 Finishing(Calibration)Tolerance: +/-0.002% of the specified frequency when measured at 25°C (+1, -1°C)  
 Operating Temperature Range : -10°C to +50°C  
 Drift Tolerance(Stability) : +/-0.004% from the frequency measurement made at room ambient when measured over the operating temperature range.  
 Drive Level : 2mW  
 Load Capacitance : 60pF  
 Equivalent Resistance : 25-ohm, maximum, when measured over the operating temperature range.  
 Shunt Capacitance : 6.0 to 7.5pF

FREQUENCY FORMULA

Model MX-2 (144MHz band)  $f_x = \frac{(f_o - 7.7975)}{9} - 0.004444$

Where  $f_x$  = Crystal frequency in MHz.  
 $f_o$  = Highest operating frequency in MHz.

Example: 144.20MHz - 144.25MHz

$f_x = \frac{(144.25 - 7.7975)}{9} - 0.004444 = \underline{15.156944\text{MHz}}$

Model MX-6Z (50MHz band)  $f_x = \frac{(f_o + 0.05 - 7.7975)}{3} - 0.0005$

Where  $f_x$  = Crystal frequency in MHz.  
 $f_o$  = Lowest operating frequency in MHz.

Example: 50.10MHz - 50.15MHz

$f_x = \frac{(50.10 + 0.05 - 7.7975)}{3} - 0.0005 = \underline{14.11700\text{MHz}}$

HOLDER SIZE & MARKING

