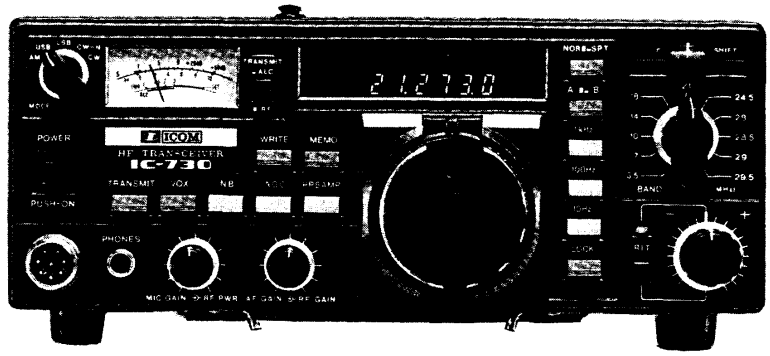
IC-730

HF ALL BAND TRANSCEIVER

INSTRUCTION MANUAL



ICOM

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

GENERAL

Number of Semi-Conductors:

Transistors	71
FET	15
IC (Includes CPU)	25
Diodes	212

Frequency Coverage:

3.5MHz ~ 4.0 MHz
7.0MHz ~ 7.3 MHz
10.0MHz ~ 10.5 MHz (Receive Only)
14.0MHz ~ 14.35MHz
18.0MHz ~ 18.5 MHz (Receive Only)
21.0MHz ~ 21.45MHz
24.5MHz ~ 25.0 MHz (Receive Only)
28.0MHz ~ 29.7 MHz

Frequency Control:
CPU based 10Hz step Pre-mixed synthesizer.
Independent Transmit-Receive Frequency Available on same band.

Frequency Readout:
6 digit 100Hz readout.

Frequency Stability:
Less than 500Hz after switch on 1 min to 60 mins, and less than 100Hz after 1 hour. Less than 1KHz in the range of −10°C to +60°C.

Power Supply Requirements:
DC 13.8V ±15% Negative ground Current drain 20A max. (at 200W input)
AC power supply is available for AC operation.

Antenna Impedance:
50 ohms Unbalanced

Weight:
6.4 Kg

Dimensions:
94mm(H) x 241mm(W) x 275mm(D)

TRANSMITTER

RF Power:

SSB (A_3J)	200 Watts PEP input
CW (A_1)	200 Watts input

Continuously Adjustable Output power 10 Watts ~ Max.

AM (A_3)	40 Watts output

Continuously Adjustable Output power 10 Watts ~ 40 Watts

Emission Mode:

A_3J	SSB (Upper sideband and Lower sideband)
A_1	CW
A_3	AM

Harmonic Output:
More than 50dB below peak power output

Spurious Output:
More than 50dB below peak power output

Carrier Suppression:
More than 50dB below peak power output

Unwanted Sideband:
More than 55dB down at 1000Hz AF input

Microphone:
Impedance 1300 ohms
Input Level 120 millivolts typical
Dynamic or Electret Condenser Microphone with Preamplifier

RECEIVER

Receiving System:
Quadruple Conversion Superheterodyne with continuous Pass-Band Shift Control.

Receiving Mode:
A_1, A_3J (USB, LSB), A_3

IF Frequencies:

1st	39.7315MHz
2nd	9.0115MHz
3rd	455KHz
4th	9.0115MHz

with continuous Pass-Band Shift Control.

Sensitivity:

SSB, CW	Less than 0.3 microvolts for 10dB S+N/N
AM	Less than 0.6 microvolts for 10dB S+N/N

Selectivity:

SSB, CW	2.4KHz at −6dB
	4.8KHz at −60dB
AM	6.0KHz at −6dB
	18.0KHz at −60dB

CW-N
(when optional crystal filter installed)
600Hz at −6dB
1.5KHz at −60dB
(when optional AF filter installed)
150Hz at −6dB
1100Hz at −40dB

Spurious Response Rejection Ratio:
More than 60dB

Audio Output:
More than 2 Watts

Audio Output Impedance:
8 ohms

Specifications are approximate and are subject to change without notice or obligation.

SECTION 2 FEATURES

ALL BAND, ALL MODE, ALL SOLID STATE

The IC-730 covers all the Amateur HF frequencies from 3.5MHz to 29.9999MHz, including the new three bands of 10MHz, 18MHz and 24MHz. It offers not only SSB, but also AM and CW. All of the circuits in the IC-730, including the driver and final power stages are completely solid state, and provide about 100 watts output.

In addition, the low-pass filters switched by the BAND switch and the band-pass filters selected by an electronic signal from the CPU, make a no tune-up system.

OUTSTANDING RECEIVER PERFORMANCE

The IC-730 employs the ICOM DFM (Direct Feed Mixer) system and up-conversion system to improve a high receiver performance.

The ICOM DFM system is a system the incoming signals are directly fed to the first mixer, and the mixer is a high level Double Balanced Mixer developed by ICOM.

The up-conversion system uses a high side IF i.e., 39.7315MHz and high performance third over-tone crystal filters provide excellent image and IF rejection ratio.

These advanced devices and system give higher spurious response rejection ratio, higher sensitivity and wider dynamic range.

PASS BAND SHIFT CONTROL

The IC-730 has a built-in Pass Band Shift system that allows you to continuously adjust the center frequency of the IF pass-band. By moving the control, you can eliminate interference from a nearby signal, thus providing clear reception. It can also be used as a tone control.

When installed the optional crystal filter, FL-30, this system acts as a pass-band tuning system that allows you to continuously adjust the pass-band up to 800Hz from the upper or lower side in SSB and CW. It gives more performance to eliminate interference.

VARIOUS STEPS DUAL DIGITAL VFO

The dual digital VFO consists of a digital Phase-Locked-Loop by which controlled the Microcomputer Control System, and a pre-mixing circuit.

Three tuning frequency resolutions of 10Hz, 100Hz and 1KHz steps are selectable with the TUNING RATE switches.

Two separate VFO's can be used independently in the NORMAL (NOR) operation, and any desired in-band frequencies split transmit/receive in the SPLIT (SPT) operation.

MEMORY CHANNELS

The IC-730 has a frequency memory for each band. Any in-band frequency of the VFO A can be stored into the memory, and it can be recalled at any time.

ADDITIONAL CIRCUITS

The IC-730 has a built-in Noise Blanker, VOX, CW Monitor, APC, SWR detector, and many other circuits for your convenience.

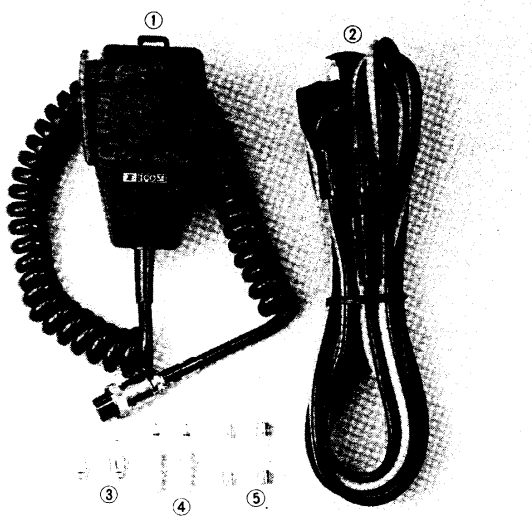
The IC-730 has everything you need to really enjoy HF operation, in an extremely compact, rugged transceiver.

SECTION 3 INSTALLATION

BE SURE TO READ THE FOLLOWING INSTRUCTIONS BEFORE USE.

3 - 1 UNPACKING

Carefully remove your transceiver from the packing carton and examine it for signs of shipping damage. Should any be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended you keep the shipping cartons. In the event storage, moving, or reshipment becomes necessary they will be handy. Accessory cables, plugs, etc., are packed with the transceiver. Make sure you have not overlooked anything.



1. Microphone (IC-HM7) 1
2. DC Power Cord 1
3. Pin Plugs 2
4. External Speaker Plugs 2
5. Spare Fuses (20 Amp) 2

3 - 2 RECOMMENDATIONS FOR INSTALLATION

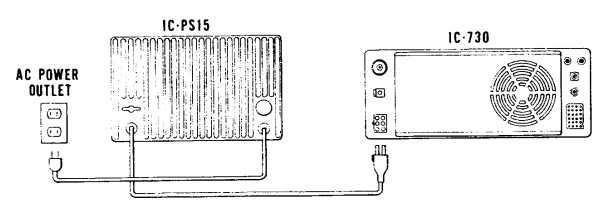
1. Avoid placing the IC-730 in direct sunlight, high temperature, dusty or humid places.
2. The temperature of the set will usually become relatively warm during transmission. Any equipment should be at least 1 inch (3cm) away from the unit so as to provide good ventilation. Be sure that nothing is on and just behind the rear PA heatsink to ensure good ventilation. Also avoid places near outlets of heaters, air conditioners etc.
3. Place the unit so that the controls and switches can easily be handled and the frequency indication and meter can easily be read.
4. For mobile installation, an optional mounting bracket is available. Select the best location that can stand the weight of the unit and that does not interfere with your driving in any way.
5. Use the Ground Lug!

3 - 3 POWER SUPPLY

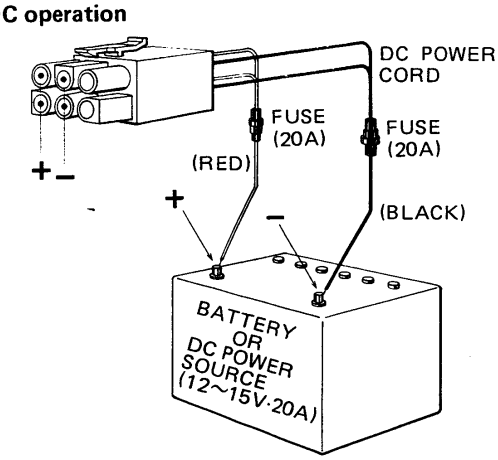
For AC operation, use the special power supply IC-PS15. If you would like to use your car battery or any other DC power supply, be sure that its output voltage is 12-15 Volts and the current capacity is at least 20 Amps. The maximum power consumption of the set during transmission runs from 16-20 Amps, so keep that in mind if the unit is installed in your automobile, and turn it on after you have started the engine. Attention should also be paid to the condition of the battery and electrical system.

The connection of the DC power cord supplied with the IC-730 is done in the following way: First make sure that the power switch of the unit is in the OFF position and the T/R switch is in the receive position. Connect the cord to the DC power supply with the RED lead to the positive terminal and the BLACK lead to the negative terminal. (Reverse connection will cause the protection circuit to operate and blow the fuse.) Connect the DC plug to the socket on the rear panel of the IC-730. Refer to the drawing below.

For AC operation



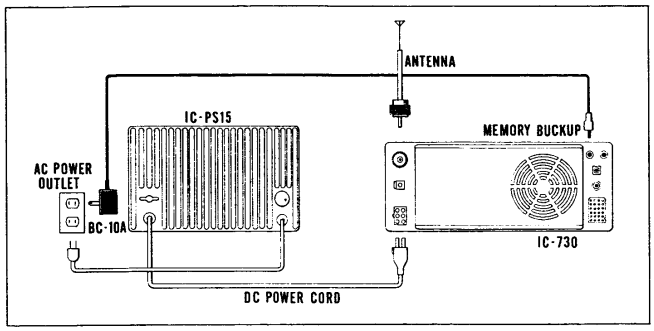
For DC operation



3 - 4 MEMORY BACK-UP

To retain the memory in the CPU, keeping the operating frequencies of the VFOs even when the main Power Switch is turned OFF, connect a power source of 9 to 12 Volts DC to the Memory Back-Up terminal on the rear panel. For mobile installation this can be accomplished by direct connection to the car battery, since the current drain is low.

For AC operation it is recommended that the optional BC-10A be used.



3-5 ANTENNA

Antennas play a very important role in radio communication. If the antenna is inferior, your transceiver cannot give you the best performance. With a good antenna and feeder cable having 50 ohm impedance, you should easily get the desired matching and performance. Carefully install a high performance antenna that suits the frequency band(s) you wish to operate on and place it as high as possible. Be especially carefull of the condition of the connectors as loose connections will deteriorate the performance. Be sure to connect the ground terminal of a whip antenna, if used, to the body of your car.

As the output is quite high, avoid connecting the antenna connector to open lines and do not transmit under mismatched conditions. Otherwise the final stage could be overloaded and cause a malfunction of the unit.

3-6 GROUND

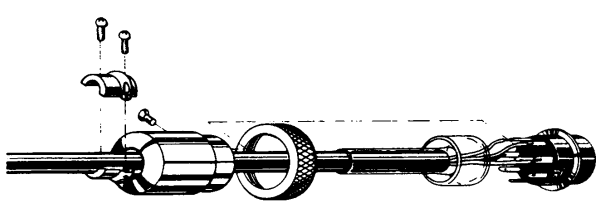
In order to prevent electrical shocks, TVI, BCI and other problems, be sure to connect a heavy wire ground, as short as possible, from a good earth point to the ground terminal on the rear panel.

3-7 MICROPHONE

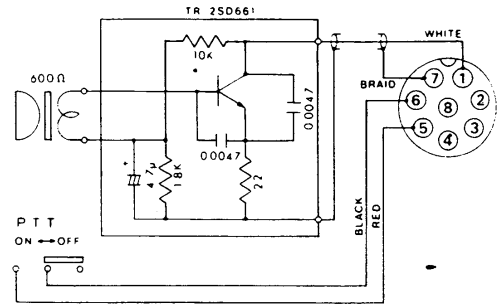
The microphone supplied with the IC-730 is the IC-HM7 which contains a preamplifier. The optional electret condenser type stand microphone IC-SM5 can be used. Their circuit diagrams are shown.

Should you wish to use a different microphone, make certain it has a proper preamplifier.

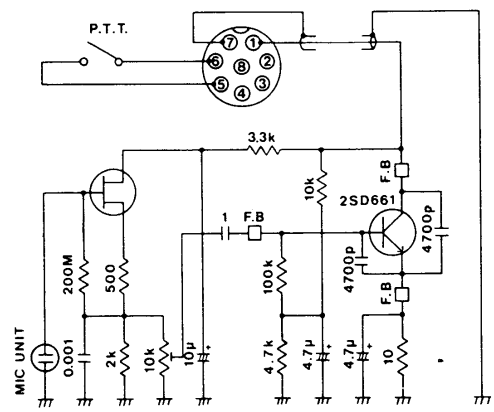
Microphone plug exploded view



Schematic diagram of IC-HM7



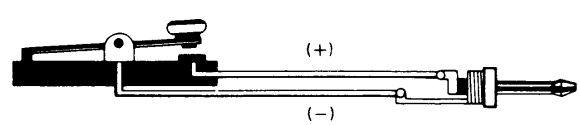
Schematic diagram of IC-SM5



3-8 CW KEY

When operating CW, connect the Key to the Key Jack with a 1/4 inch plug. The connection of the plug is shown below.

Key Wiring Diagram



If the terminals have polarity, be sure to make the correct connection. Note that the keyed voltage when switching with semiconductors or relays with resistors in the circuit, should be adjusted to be below 0.4 Volts!

3-9 EXTERNAL SPEAKER

The IC-730 contains an internal speaker, and is also designed so that it can drive an external speaker from the external (EXT) speaker jack on the rear panel. Be sure the impedance of the external speaker is 8 ohms, and remember that with the external speaker connected, the internal speaker is disabled.

3 - 10 HEADPHONES

Any good headphone set, including stereo type, that have 4-16 ohms impedance can be used. With the plug inserted halfway into the PHONES jack, both the headphone and speaker will operate. This is convenient when others wish to listen in on the station, or you wish to record contacts using a tape recorder connected to the headphone jack. With a stereo headphone set inserted this way, however, the headphone will lose the sound on one side. With the plug inserted completely, only the headphone works.

3 - 11 COOLING FAN

The rear of the PA unit is designed to provide for adequate cooling, but with 200 Watt input the final stage produces quite a bit of heat, and its temperature may rise during prolonged transmissions. The fan is connected to a temperature monitoring circuit which monitors the temperature of the final stage. The fan operates as follows:

1. The fan does not operate in the receive mode.
2. When the temperature rises to a point (75°C) detected by the monitor curcuit the fan will operate during both transmit and receive and much more rapidly to provide additional cooling. At this time stop transmitting and investigate the cause of overheating i.e., antenna mismatch, etc. Correct the cause of the overheating before starting to transmit again.

3 - 12 POWER SUPPLY

It is recommended that you use the IC-PS15 as a power supply for base operation. If you wish to use another type power supply make sure that it meets the voltage, current requirements. Note carefully the overvoltage protection, for a runaway regulator can destroy the IC-730; be especially careful that more than 16 Volts cannot be supplied to the transceiver. Do not connect the power supply, antenna, accessory plug, or microphone with the Power Switch in the ON position. Be especially careful not to transmit without an antenna or dummy load hooked up. If the fuse blows replace it with a 20A Amp fuse, only after fixing the cause. Do not turn the Power Switch ON and OFF repeatedly for this way cause the readout to mis-display. Should this occur, turn the set OFF and wait for approximately 30 seconds before turning it back ON.

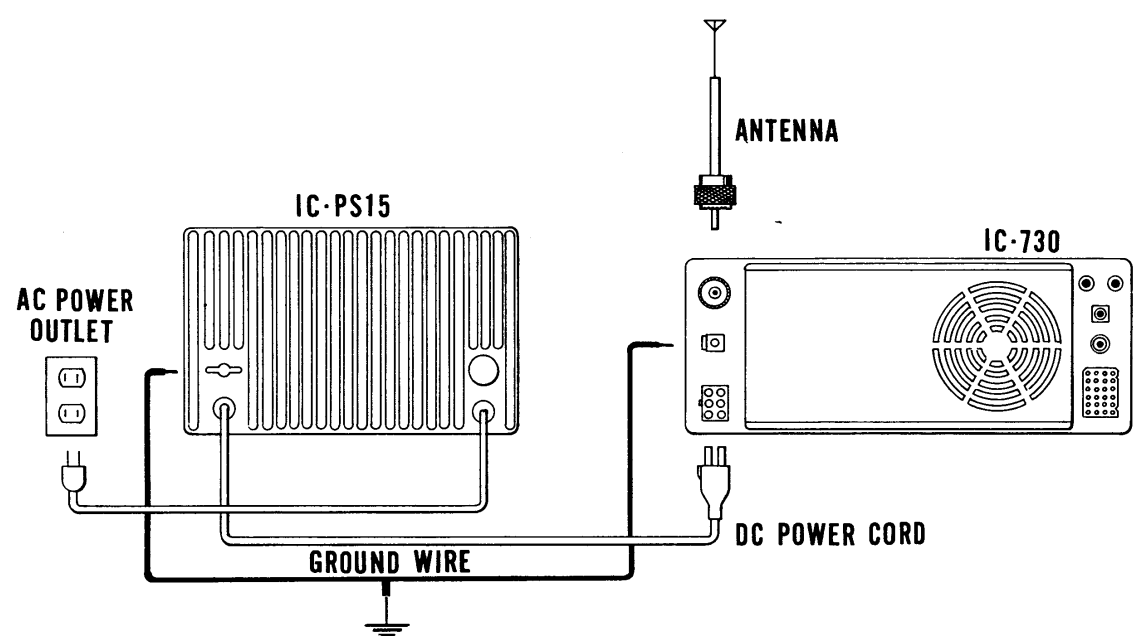
3 - 13 CAUTIONS

As the unit has already been closely adjusted with highly sophisticated measuring instruments, never taper with the turnable resistors, coils, trimmers, etc.

C-MOS is used in the Logic unit as well as the PLL. C-MOS ICs are very susceptible to excessive static charges and over current and care must be used when handling them. Therefore, avoid touching the Logic unit and the nearby circuitry unless absolutely necessary. When it is necessary to check the circuitry, observe the following points.

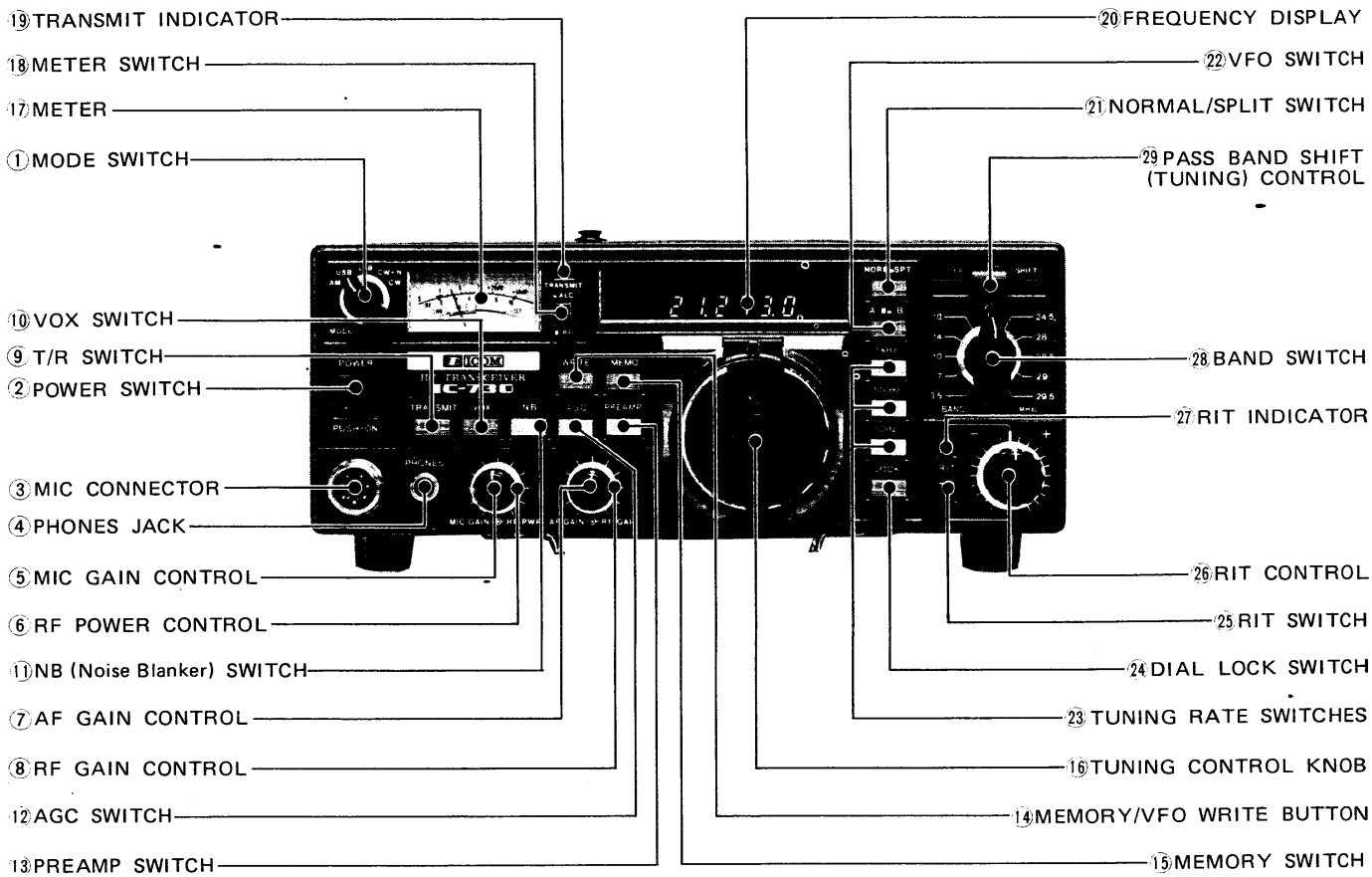
Ground all measuring instruments, the soldering iron, and other tools. Do not connect or disconnect the C-MOS IC from its socket, or solder it when the power is on. Do not apply voltage of less than –0.5 or more than +5 Volts to the input terminals of the IC. DO NOT MEASURE WITH AN OHMMETER.

Cable connections



SECTION 4 OPERATING CONTROLS

4 - 1 FRONT PANEL



1. MODE SWITCH

This switch selects the mode of operation for both transmit and receive.

- USB Upper Sideband, mainly for 10, 14, 18, 21, 24 and 28MHz bands.
- LSB Lower Sideband, mainly for 3.5 and 7MHz bands.
- CW Continuous Wave, for CW operation on all bands.
- CW-N Narrow CW. The narrow crystal filter is automatically turned ON in this position to improve selectivity when receiving. (When optional crystal filter installed)
- AM Amplitude Modulation.

2. POWER SWITCH

The POWER SWITCH is a push-lock type switch which controls the input DC power to the IC-730. When the external AC power supply (IC-PS15) is used, the switch also acts as the AC power supply switch. When the switch is pushed in and locked, power is supplied to the set. When the switch is pushed again and released, power is cut to all circuits except the PA unit. (When the BC-10A is used, power will also be supplied to the CPU. (Refer to page 3.)

3. MIC CONNECTOR

Connect the supplied microphone or optional microphone, IC-SM5 or IC-HM10 to this jack. If you wish to use a different microphone, refer to the drawing on page 4.

4. PHONES JACK

Accepts a standard 1/4 inch headphone plug for headphones of 4 ~ 16 ohms. Stereo phones can be used without modification.

5. MIC GAIN CONTROL

Adjusts the level of modulation according to the input of the microphone. Clockwise rotation increases the microphones gain. As the input will vary with different microphones and different voices, the knob should be turned until the Meter needle, in the ALC mode, begins to move slightly within the ALC zone. In SSB and AM modes, when the speech processor is in use, the MIC GAIN CONTROL sets the clipping limits, while the RF POWER CONTROL sets the RF drive level to the maximum power level, where ALC starts at the saturation point of the amplifiers.

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1-6-19, KAMIKURATSUKURI HIRANO-KU,
OSAKA JAPAN

A-0325
Printed in Japan