WARRANTY

This Transceiver is sold under a 90 day warranty, which warrants it to be free from defects in material and workmanship. We agree to repair or replace at the point of manufacture, without charge, all parts showing such defects, provided the unit is delivered to us, intact for our examination, with all transportation charges prepaid to our factory, within 90 days from the date of sale to the original purchaser, and provided such examination discloses in our final judgement, that it is thus defective. Pilot lights, tubes, vibrator, fuses and diodes shall be covered by the manufacturer's standard EIA warranty and such items shall be excluded from the provisions of this warranty.

This warranty does not apply if the Transceiver has been subjected to misuse, neglect, accidents, incorrect wiring not our own, improper installation, or put to use in violation of instructions furnished by us, nor to Transceivers that have been damaged by lightning, excess current, repaired or altered outside our factory, nor to the Transceiver that has had its serial number altered or removed.

CHANGES

The Company reserves the right to modify or change the equipment, in whole or in part, at any time prior to delivery in order to include refinements deemed appropriate by the Company, but without incurring any liability to modify or change any equipment previously delivered, or to supply new equipment in accordance with earlier specifications.

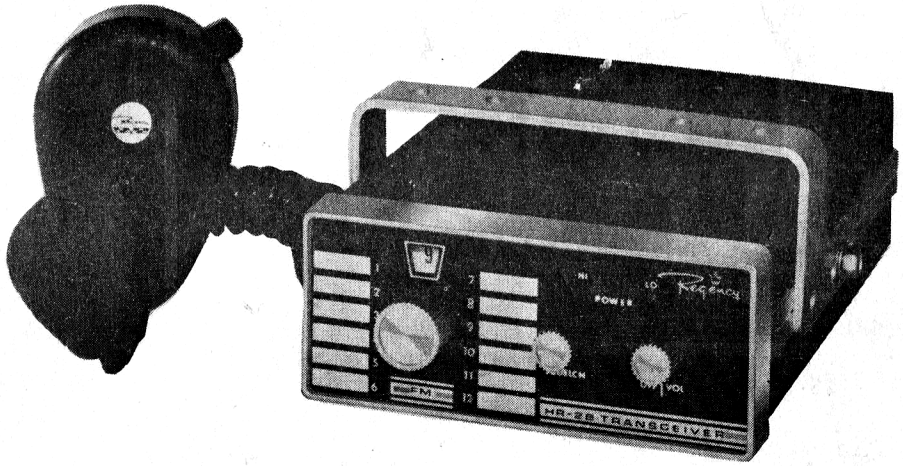
WARNING

ALL TRANSMITTER FINAL ADJUSTMENTS ARE SEALED AT THE FACTORY. IF ANY OF THESE SEALS ARE BROKEN, THE WARRANTY ON ALL POWER SEMICONDUCTORS IS VOIDED.

IS-10-467 5-73 Printed In U.S.A.

Regency

TWO METER AMATEUR TRANSCEIVER



MODEL HR-2B

INSTRUCTION MANUAL

UNPACKING

1 - Transceiver Unit

1 - Microphone Assembly

1 - DC Power Cord with Fuse Holder

1 - Mobile Mounting Bracket

1 - Security Bracket (See page 17 for Installation)

1 - Instruction Manual

1 - Warranty Card

To be filled out and returned to:

Regency Electronics, Inc.

7707 Records Street

Indianapolis, Indiana 46226

MAINTENANCE

It is recommended that the services of a qualified electronic technician be used for troubleshooting.

CAUTION

The TRANSMIT crystals for the HR-2B are NOT the same as those used in the HR-2, HR-2A, HR-2S, HR-2MS and HR-212. Please refer to the section on Crystal Specifications (page 9) for specific details.

DESCRIPTION

The Regency HR-2B is a 12-channel, all-transistor, narrowband FM transceiver designed for use in the 2 Meter (144-148 MHz) Amateur Band. Its receiver section is a double-conversion, super-hetrodyne type with plug-in

crystal-controlled frequency selection.

The transmitter section is also crystal-controlled on each channel. The transmitter employs phase modulation, using varactor diodes. Internal controls are provided for adjusting the deviation from 0 to 10 KHz. This control is factory adjusted for approximately 5 KHz deviation.

The transmitter and receiver sections both employ band-pass circuitry so that maximum transmitter power and receiver sensitivity are maintained across the entire band (144-148 MHz).

The HR-2B utilizes silicon transistors (24) throughout for dependability. The use of two Integrated Circuits provides for compactness and circuit reliability. In addition, a narrowband ceramic filter employed in the receiver's second I.F. ensures optimum performance in areas of the country where numerous channels are closely grouped together.

The transmitter employs two ruggedized, Balanced Emitter RF power transistors for high power output (15 watts). A large, copper heat sink plus a SWR bridge limiting circuit ensures maximum protection even under long periods of "key down" operation and open or shorted antenna conditions. Also, there is virtually no power drop off during lengthy transmissions. In addition, the attenuation of spurious emissions from the transmitter exceed the FCC limits as would be required for Type Acceptance. The receiver section is Certified under Part 15, Subpart C of the FCC Rules and Regulations.

Some EXTRA features include:

1. A HI-LO Power Switch (approximately 1 Watt RF output in LO position.)

2. Provision for connection of an external or remote speaker (such as Regency's MA-8).

3. A Mobile Mounting Bracket for easy installation in a car or truck.

4. A Security Bracket, which will help minimize the possibility of theft. See page 17 for installation illustration.

5. A plug-in, high-impedance microphone with a right-angle connector.

SPECIFICATIONS

RECEIVER

Antenna Impedance	50 Ohms
Frequency Range	144-148 MHz
Sensitivity	0.35μv (nom.), 20 DB Quieting
Selectivity	6 DB Down ±7 KHz 50 DB Down ±20 KHz
Image Rejection	50 DB
Spurious Rejections	60 DB
Modulation Acceptance	±7.5 KHz
Audio Output (3-4Ω Speaker)	3 Watts @ 10%, or less, Distortion; 5 Watts Maximum
Squelch System	"Noise" Operated
I.F. Frequencies	10.7 MHz & 455 KHz

Channels ..... 12; Crystal Controlled

Crystal Installed ..... 146.94 MHz in Channel 1

TRANSMITTER

Antenna Impedance ..... 50 Ohms

Frequency Range ..... 144-148 MHz

Power Output (HI Power) ..... 15 Watts (min.) @ 13.8 VDC

Power Output (LO Power) ..... 1 Watt (approx.) @ 13.8 VDC

Power Bandwidth ..... 15 Watts from 144-148 MHz

Power Amp Protection ..... SWR Bridge Limiting Circuit

Harmonic and Spurious Emissions ..... 58 DB, or more, below carrier

Modulation ..... Phase Modulation with automatic deviation limiting

Deviation ..... Factory adjusted to 5 KHz; internal adjustment of 0-10 KHz deviation

Mike Pre-Amp ..... FET Input with Internal Level Control

Microphone ..... Plug-in, hand held; high-Z ceramic

Channels ..... 12; Crystal Controlled with individual trimmer capacitors for Frequency netting

Crystal Mutliplication 18

Crystal Installed ..... 146.94 MHz in Channel 1

POWER

Voltage Requirements. 11.5 VDC (min.) — 14.5 VDC (max.)

Current Requirements ..... @ 13.8 Volts

Receive (Squelched) ..... 180 MA.

Receive (Max. audio output) ..... 800 MA.

Transmit (HI power) ..... 3.0 Amps (max.)

Transmit (LO power) ..... 0.6 Amps (approx.)

Fuse Size ..... 4 Amp. 3AG

SEMICONDUCTORS

Integrated Circuits 2

Silicon Transistors (Total) 24

Silicon BET Power Transistors 2

Field Effect Transistors 2

Diodes (Total) 9

Zener Diodes 2

Varactor Diodes 2

Signal Diodes 4

Rectifier Diodes 1

INSTALLATION

Mobile (12 VDC) Installation:

The HR-2B transceiver may be used in any car, truck, boat, etc. that has a 12 VDC negative ground system. The RED lead with the fuse holder must be connected to the positive terminal side of the battery. The BLACK lead should be connected to the chassis or negative terminal of the battery.

To reduce the possibility of theft, the Security Bracket should be installed (as shown on page 17). The padlock used should be of substantial construction and can be either a key or combination operated type.

For a quick and easier mobile installation, an accessory 12 VDC power cord with a cigarette lighter plug (Regency MA-10) can be used. In this case, the unit can be operated from on the front seat of the vehicle.

The "mobile" antenna used should be adjusted as closely as possible to present a 50Ω load to the transceiver. The adjustments recommended by the antenna's manufacturer should be carefully followed to insure that the lowest possible SWR is achieved. It is recommended that any final adjustment to the antenna be made with a reliable SWR indicator in the feedline and with the HR-2B operating. If the SWR is too high, the built-in SWR bridge limiting circuit of the HR-2B will reduce the RF power out, or may even shut off the transmitter entirely.

Base Station (117 VAC) Installation:

The HR-2B may be used with any regulated or well filtered DC power supply that can supply at least 3 amperes at 12 to 14.5 VDC. The regulation of the power supply should be

such that its output voltage does not get over 14.5 VDC when the transceiver is in the receive mode and is squelched off. Damage to various components may occur if the unit's input voltage exceeds 15 volts for any length of time.

The power supply and/or the power connection to the HR-2B should be properly fused. In addition, the ripple on the supply's output voltage should be less than 1%. It is recommended that Regency's regulated power supply, the P107, be utilized for base station operation of the HR-2B.

The antenna impedance should be adjusted or matched as closely as possible for use with 50 ohm coaxial cable. Use of RG-58/U should be considered only if the length of coax needed is 30 feet or less. For longer runs of feedline, it is recommended that a lower-loss cable, such as RG-8/U (especially of the "foam" type) should be used.

OPERATION

Volume Control/Off-On Switch:

This control varies the audio output level for the external speaker connection. Clockwise rotation of this control turns the receiver on and increases the volume.

Squelch Control:

This control eliminates background noise in the absence of a signal. Full clockwise rotation removes all squelch action. Turning this control counter-clockwise until the noise disappears permits the receiver to be "quiet" until an actual signal is received. Even if the squelch control is set full counter-clockwise, the receiver will still operate properly and not be locked-out or prevented from receiving a signal.

Channel Selector:

This is a twelve-position rotary switch which enables the operator to select any one of twelve crystal-controlled transmit-receive channels. Each switch position pairs up a specific transmit crystal with its respective receive crystal. For example, position 1 connects Transmit crystal No. 1 and receive crystal No. 1 to their respective oscillator circuits.

HI-LO Power Switch:

The HI-LO Power Switch provides the operator with the capability of selecting either one of two RF output power levels. With the switch in the HI position, the transmitter will develope its full rated power output. This power level is useful for mobile-to-mobile and repeater fringe areas. The LO power position limits the transmitter's output to approximately 1 watt. This power level is generally adequate for working through most repeaters.

Crystal Specifications:

Due to the numerous frequencies or channels involved, only one pair of crystals is installed by the factory. Miniature, plug-in crystals are simply installed by inserting them in the receptacles on the circuit board. Because of the accuracy required, Shepherd Industries' crystals are recommended. They are usually available at the source from which the radio was purchased. A table of the more common Transmit crystal frequencies is on page 14.

If desired, the crystals may be purchased from other manufacturers. The following information must be included in the order:

Receive Crystal

1. Crystal frequency, determined as follows:
   $$\text{Crystal Frequency} = \frac{\text{Receive Freq. (MHz)} - 10.7 \text{ MHz}}{3}$$

   Example:
   $$\text{Crystal frequency} = \frac{146.94 \text{ MHz} - 10.7 \text{ MHz}}{3} = \frac{136.24 \text{ MHz}}{3} = 45.41333 \text{ MHz}$$

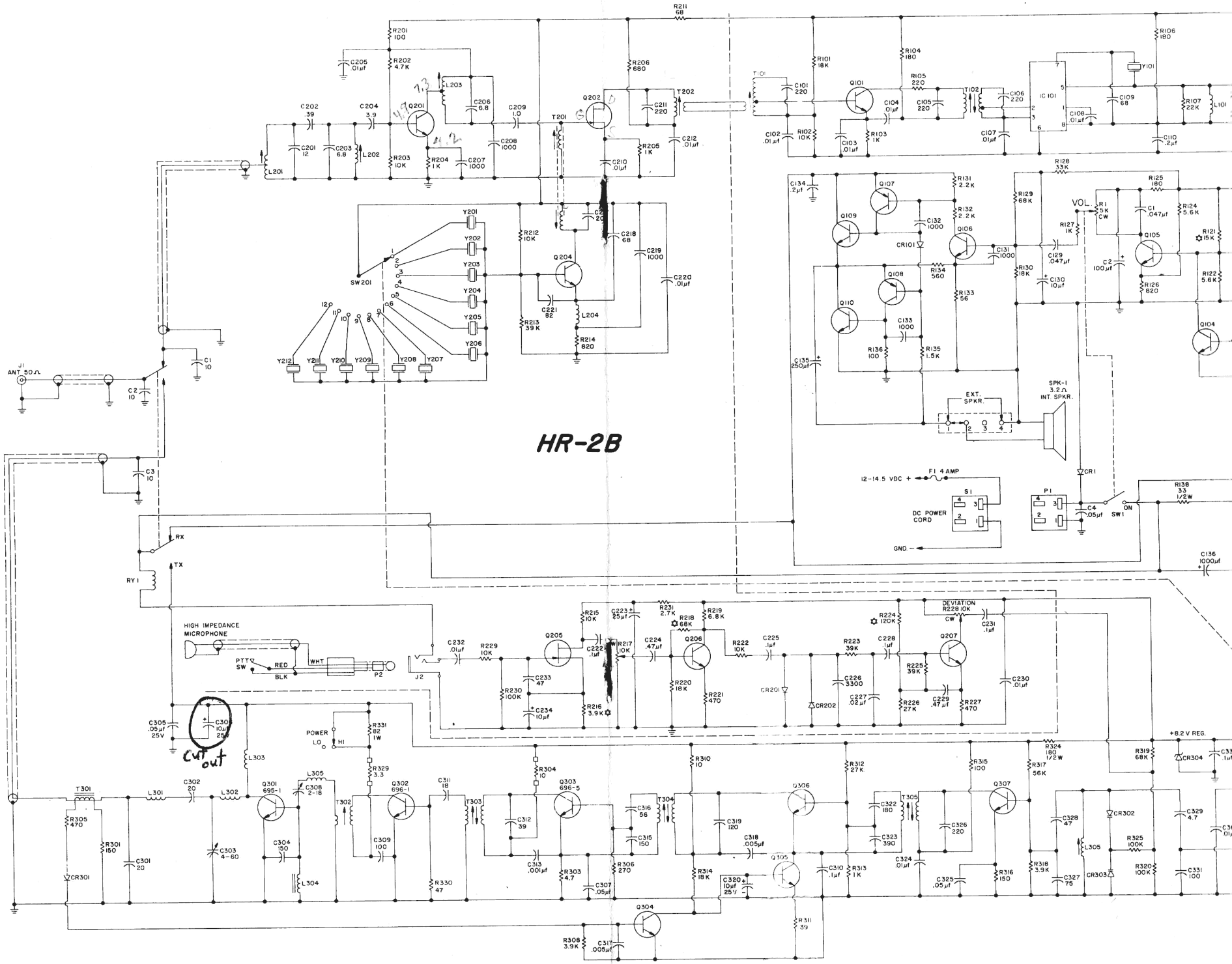
2. 3rd Overtone
3. Series resonance – 250 Hz
4. Maximum equivalent series resisnace: 35 Ohms
5. Drive level: 2 MW
6. Holder: HC-25/U
7. Frequency tolerance: ±.001%

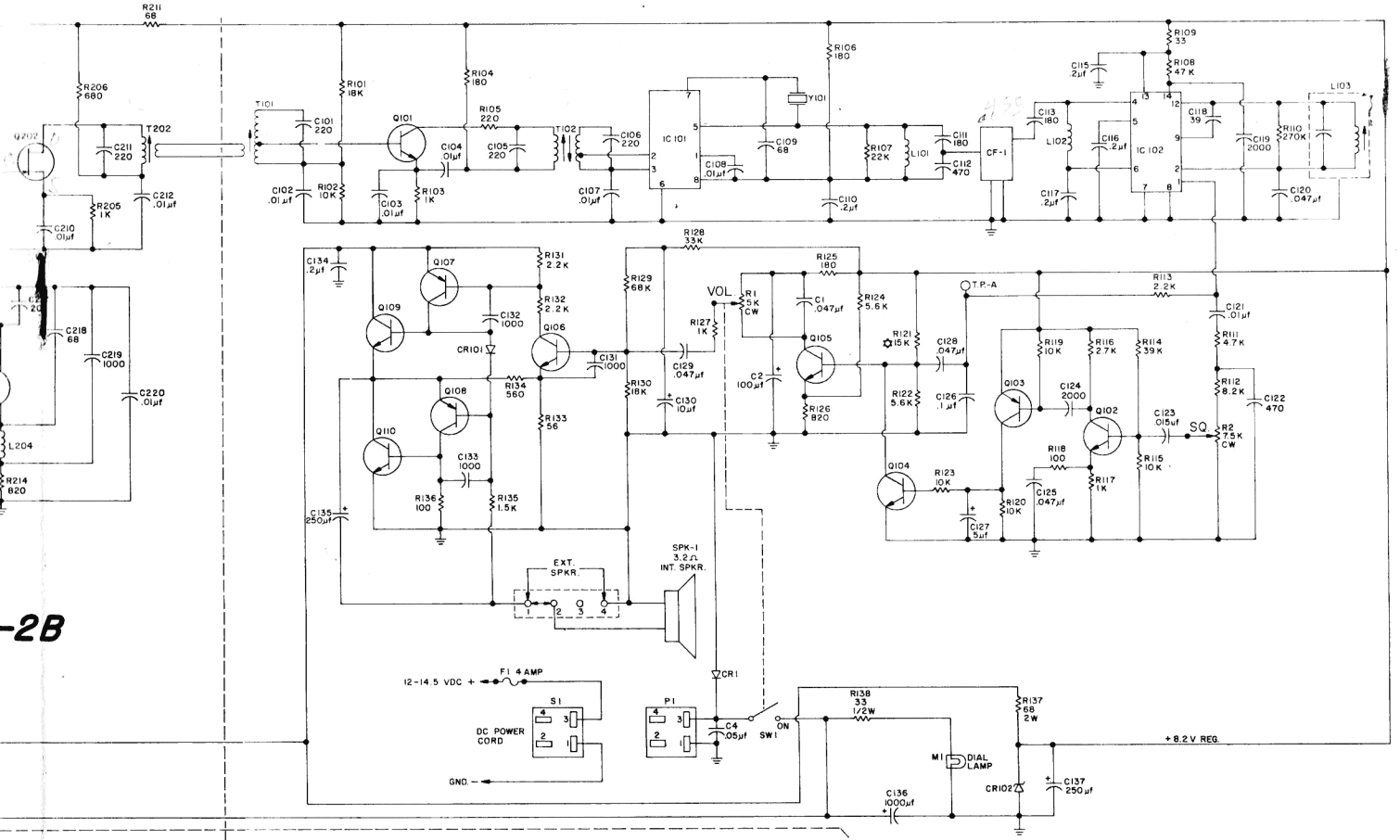
Transmit Crystal:

1. Crystal frequency, determined as follows:
   $$\text{Crystal Frequency} = \frac{\text{Transmit Frequency (MHz)}}{18}$$

   Example:
   $$\text{Crystal frequency} = \frac{146.94 \text{ MHz}}{18} = 8.163333 \text{ MHz}$$

2. Fundamental mode
3. Load capacitance: 32 PF


HR-2B
ANT 50Ω
J1
C1 10
C2 10
C3 10
RX
TX
RY1
SW201
Y201
Y202
Y203
Y204
Y205
Y206
Y207
Y208
Y209
Y210
Y211
Y212
Q201
Q202
Q204
T201
T202
L201
L202
L203
L204
R201 100
R202 4.7K
R203 10K
R204 1K
R205 1K
R206 680
R211 68
R212 10K
R213 39K
R214 820
C201 12
C202 39
C203 6.8
C204 3.9
C205 .01μf
C206 6.8
C207 1000
C208 1000
C209 1.0
C210 .01μf
C211 220
C212 .01μf
C217 20
C218 68
C219 1000
C220 .01μf
C221 82
HIGH IMPEDANCE MICROPHONE
PTT SW
RED
WHT
BLK
P2
J2
R215 10K
R216 3.9K
R217 10K
R218 68K
R219 6.8K
R220 18K
R221 470
R222 10K
R223 39K
R224 120K
R225 39K
R226 27K
R227 470
R229 10K
R230 100K
R231 2.7K
C222 .1μf
C223 25μf
C224 .47μf
C225 .1μf
C226 3300
C227 .02μf
C228 .1μf
C229 .47μf
C230 .01μf
C231 .1μf
C232 .01μf
C233 47
C234 10μf
Q205
Q206
Q207
CR201
CR202
DEVIATION R228 10K
CW
T301
L301
L302
L303
L305
T302
T303
T304
T305
Q301 695-1
Q302 696-1
Q303 696-5
Q304
Q305
Q306
Q307
R301 150
R303 4.7
R304 10
R305 470
R306 270
R307 .05μf
R308 3.9K
R309 100
R310 10
R311 39
R312 27K
R313 1K
R314 18K
R315 100
R316 150
R317 56K
R318 3.9K
R319 68K
R320 100K
R324 180 1/2W
R325 100K
R330 47
R331 82 1W
R329 3.3
C301 20
C302 20
C303 4-60
C304 150
C305 .05μf 25V
C306 10μf 25V
C307 .05μf
C308 2-18
C309 100
C311 18
C312 39
C313 .001μf
C315 150
C316 56
C317 .005μf
C318 .005μf
C319 120
C320 10μf 25V
C322 180
C323 390
C324 .01μf
C325 .05μf
C326 220
C327 75
C328 47
C329 4.7
C331 100
CR301
CR302
CR303
CR304
POWER
LO
HI
Cut out
IC 101
Y101
T101
T102
C101 220
C102 .01μf
C103 .01μf
C104 .01μf
C105 220
C106 220
C107 .01μf
C108 .01μf
C109 68
C110 .2μf
R101 18K
R102 10K
R103 1K
R104 180
R105 220
R106 180
R107 22K
L101
Q101
R128 33K
C134 .2μf
Q107
Q109
Q106
Q108
Q110
R131 2.2K
R132 2.2K
R133 56
R134 560
R135 1.5K
R136 100
C131 1000
C132 1000
C133 1000
CR101
C135 250μf
R129 68K
R130 18K
R127 1K
C129 .047μf
C130 10μf
VOL.
R1 5K CW
C1 .047μf
C2 100μf
R125 180
R124 5.6K
R121 15K
R122 5.6K
R126 820
Q105
Q104
EXT. SPKR.
SPK-1 3.2Ω INT. SPKR.
12-14.5 VDC +
F1 4 AMP
S1
DC POWER CORD
GND
P1
C4 .05μf
SW1
ON
CR1
R138 33 1/2W
C136 1000μf
+8.2 V REG.



-2B

NOTES:

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS. ALL RESISTORS NOT SPECIFIED OTHERWISE ARE 1/4 WATT.
2. ✡ NOTED VALUES ARE FACTORY SELECTED. NOMINAL VALUES SHOWN.
3. —□— DENOTES A FERRITE BEAD PLACED ON THE COMPONENT LEAD.

4. Maximum series resistance: 30 Ohms

5. Drive level: 2MW

6. Holder: HC-25/U

7. Frequency calibration: ±.001% @ 25°C

8. Frequency tolerance: ±.0015% from -10° to +60°C

NOTE: TRANSMIT crystals that were manufactured for use with the HR-2, HR-2A, HR-2S, HR-2MS and the HR-212 will NOT operate properly in the HR-2B. Improper or spurious emissions may occur if these 6 MHz crystals (Part No. 301-608) are used. Only 8 MHz TRANSMIT crystals (Part No. 301-120) should be used in the HR-2B.

Crystal Installation:

Prior to installing a crystal, the transceiver's cover should be removed. To remove the cover, unscrew the two large bolts located at the sides of the unit. The cover may then be slipped off by sliding it toward the rear of the unit.

Next, the speaker should be removed. Unscrew the two small metal screws (one located on each side) holding the speaker brackets in place. Then carefully place the speaker assembly along side of the unit.

The unit is shipped from the factory with the transmit and receive crystals for 146.94 MHz installed in channel 1.

Insert the crystal, or crystals, in the proper socket pins as indicated on the crystal location drawing. (See page 16). The number by each pair of sockets matches the dial and channel block designation. For each transmit crystal, there

is a variable capacitor that can be used for adjusting each transmit crystal to the exact frequency. This adjustment should be made with a frequency counter or by utilizing a receiver which is known to be "on frequency".

Reinstall the speaker; position the speaker assembly so that the cut-off corner is adjacent to the relay lugs. Carefully reinstall the cover.

The channel, or frequency, blocks on the front panel will accept 1/4" wide embossing tape with up to 5 digits, letter, or other characters. These blocks are to be used for identifying the channel frequencies installed in the unit.

Jumpering Example:

An example of some typical transmit-receive combinations, utilizing a minimum number of crystals, will be demonstrated. Suppose the following TRANSMIT-RECEIVE combinations are to be set up in your HR-2B:

Channel Selector Position	Transmit Frequency (MHz)	Receive Frequency (MHz)
1	146.94	146.94
2	146.16	146.76
3	146.22	146.82
4	146.28	146.88
5	146.34	146.76
6	146.34	146.94

Install the proper transmit and receive crystals in the appropriate crystal positions as indicated below. See the Crystal Location and Adjustment diagram on page 16.

Transmit Crystal	Initial Position	Receive Crystal	Initial Position
146.94	1	146.94	1
146.16	2	146.76	2
146.22	3	146.82	3
146.28	4	146.88	4
146.34	5		

To easily determine where jumpers are to be installed, add to the crystal's Initial Position all of the other positions desired. Thus, to continue on with the example, the following table would be compiled:

Transmit Crystals	Total Positions	Receive Crystals	Total Positions
146.94	1	146.94	1-6
146.16	2	146.76	2-5
146.22	3	146.82	3
146.28	4	146.88	4
146.34	5-6		

As can readily be seen in the preceeding table, only one Transmit position and two Receive positions have to be jumpered.

NOTE: It is recommended that no more than three additional positions be jumpered to the original (Initial) crystal position. Also, the jumpering should be worked out so as to keep the continuous jumper length to a minimum.

To jumper the two Receive crystals, solder two insulated wires on the copper side of the RECEIVE switch deck (No. 500-753) as illustrated in Figure 1 on page 15.

Connect the jumper on the copper side of the TRANSMIT switch deck (No. 500-753) as illustrated in Figure 2 on page 15: Position 5 to Position 6. For jumpers that are not connecting adjacent positions, it is recommended that insulated No. 22 or 23 gauge wire should be used to avoid a possible short circuit. In some cases, it would be easier to add jumpers if the crystals are not actually installed until all of the jumpers are soldered in place.

NOTE: Adding a jumper will slightly lower the Transmit crystal frequency. Adjust the associated trimmer capacitor on the transmitter board for correction.

This illustration was shown to demonstrate the versatility incorporated in your HR-2B. With the example worked out above, your HR-2B would be capable of working more than 300 of the single band 2 Meter FM repeaters, as listed in a recently published directory. Only three additional Receive crystals and four Transmit crystals are required plus, of course, the necessary jumpers.

HR-2B TRANSMIT CRYSTAL FREQUENCY (MHz) TABLE

Transmit Frequency	Crystal Frequency	Transmit Frequency	Crystal Frequency
146.01	8.111667	146.43	8.135000
146.04	8.113333	146.46	8.136667
146.07	8.115000	146.49	8.138333
146.10	8.116667	146.52	8.140000
146.13	8.118333	146.70	8.150000
146.16	8.120000	146.73	8.151667
146.19	8.121667	146.76	8.153333
146.22	8.123333	146.79	8.155000
146.25	8.125000	146.82	8.156667
146.28	8.126667	146.85	8.158333
146.31	8.128333	146.88	8.160000
146.34	8.130000	146.91	8.161667
146.37	8.131667	146.94	8.163333
146.40	8.133333	146.97	8.165000

RECEIVE SWITCH DECK

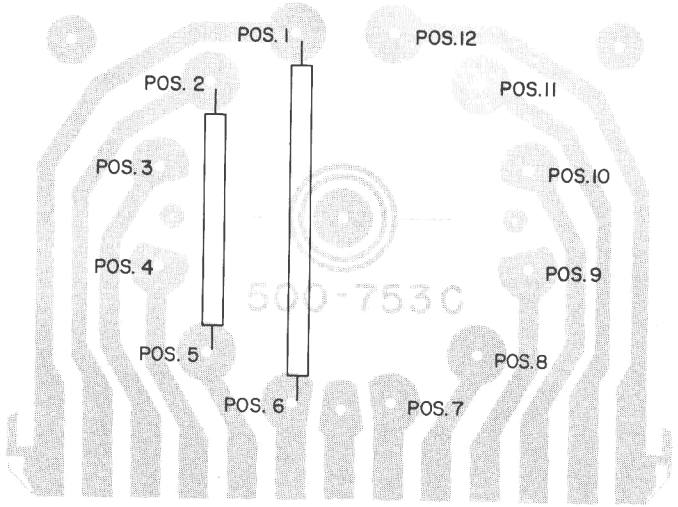


FIGURE 1

TRANSMIT SWITCH DECK

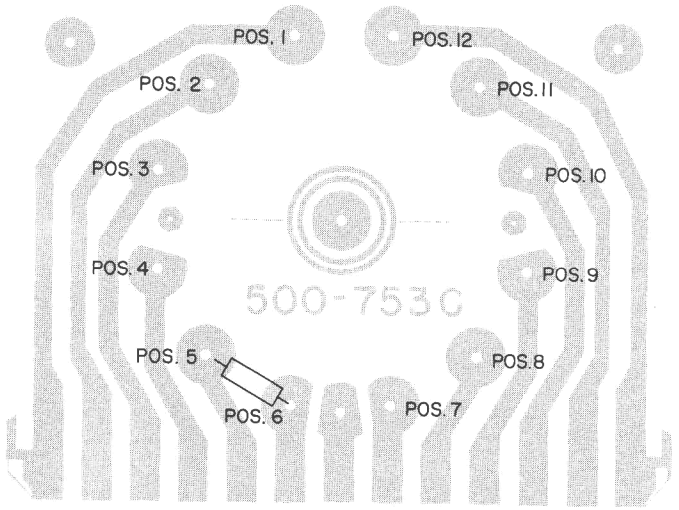
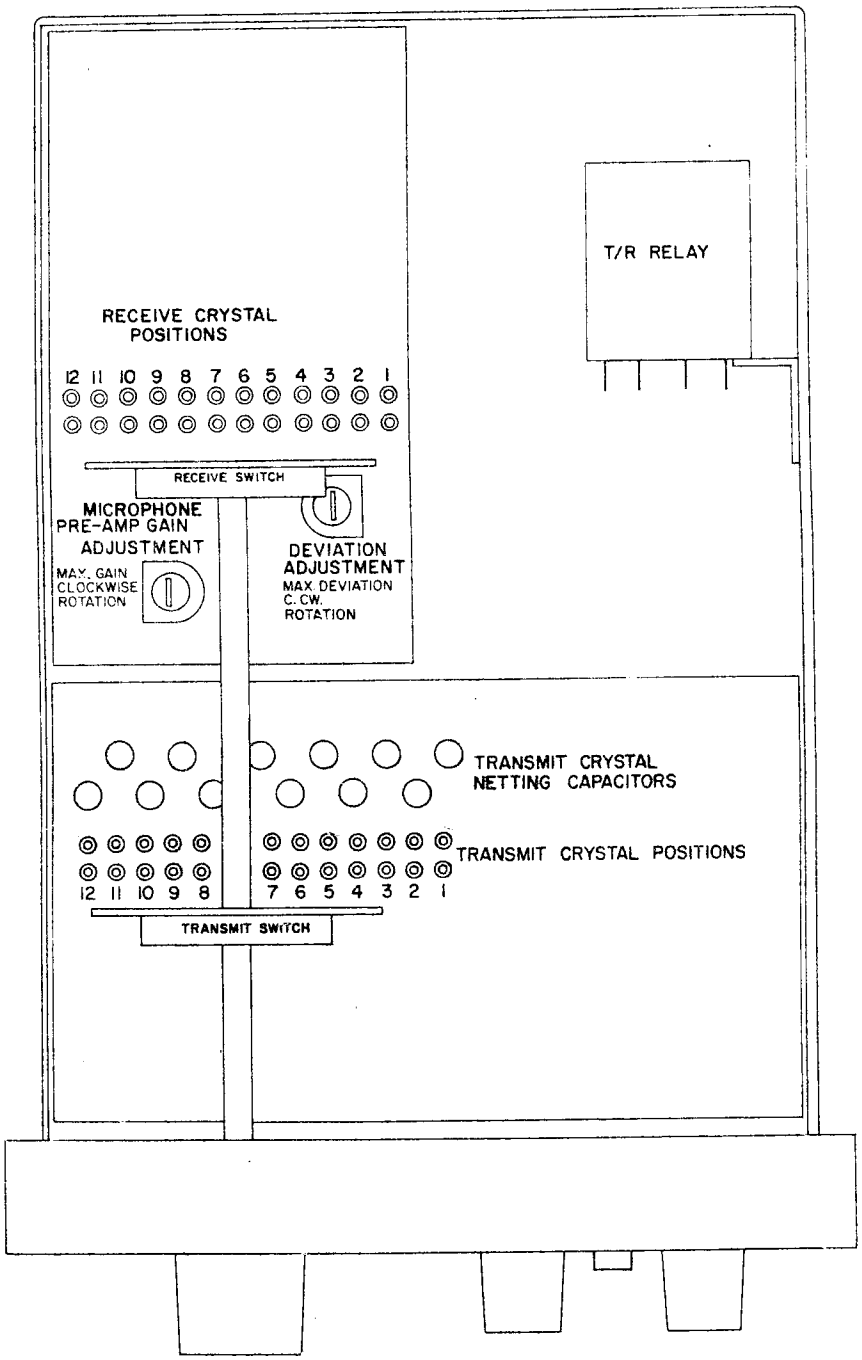
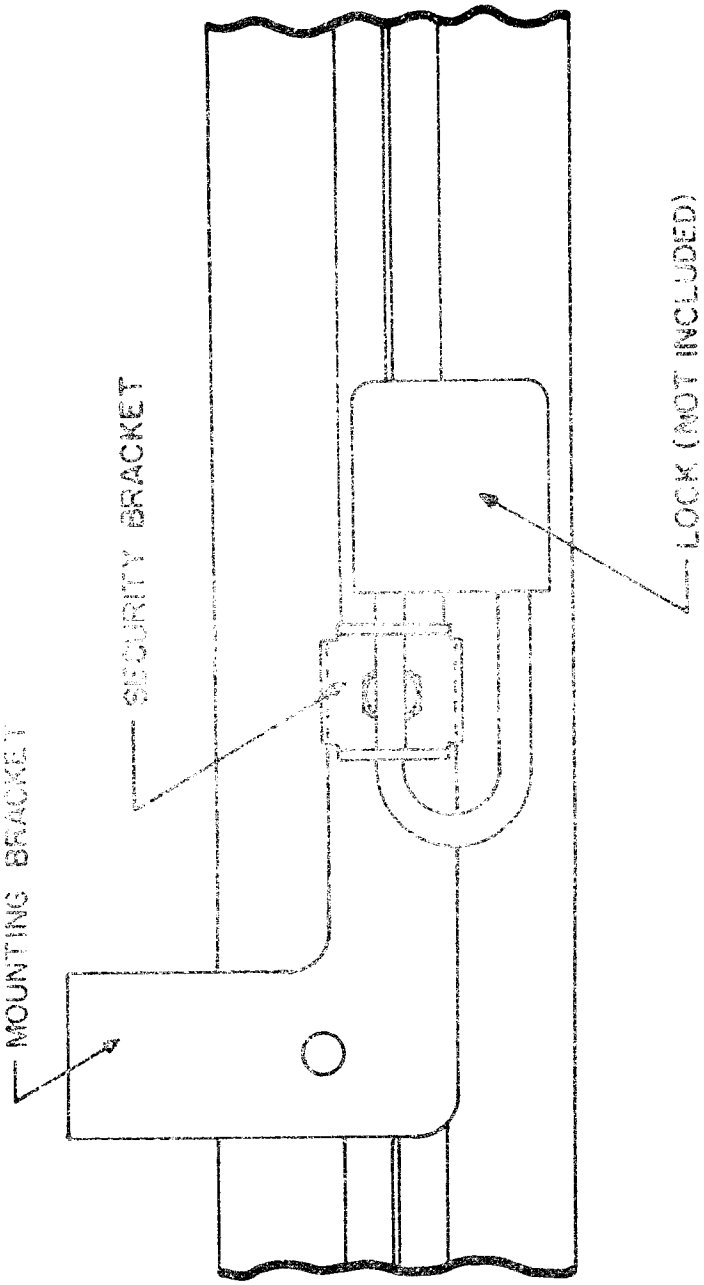


FIGURE 2

CRYSTAL LOCATION AND ADJUSTMENT DIAGRAM





SIDE VIEW SHOWING SECURITY BRACKET INSTALLATION