

JENNEN – TRIO

JR-101

## TECHNICAL SPECIFICATIONS

FREQUENCY RANGES..... BAND A 550 - 1600 Kcs  
BAND B 1.6 - 4.8 Mcs  
BAND C 4.8 - 14.5 Mcs  
BAND D 10.3 - 30 Mcs

BANDSPREAD..... Calibrated Electrical Bandspread  
80 and 40 meters, 5 Kcs per division  
20 and 15 meters, 20 Kcs per division  
10 meters, 50 Kcs per division

ANTENNA INPUT..... 50 - 400 ohms impedance

AUDIO POWER OUTPUT..... 1.5 watts

SENSITIVITY..... 1  $\mu$ v for 10 db S/N Ratio

SELECTIVITY.....  $\pm$  10 Kc at -60 db ( $\pm$  2 Kc at -6 db) without Q-Multiplier  
 $\pm$  0.8 Kcs at -6 db with Q-Multiplier

SPEAKER OUTPUT..... 4 or 8 ohms

HEADPHONE OUTPUT..... Low Impedance

POWER CONSUMPTION..... 50 watts at 117 volts AC, 60 cps

TUBE COMPLEMENT..... V1 - 6BA6 RF Amplifier  
V2 - 6BE6 Mixer  
V3 - 6BE6 HF Oscillator  
V4 - 6AV6 Q-Multiplier-BFO  
V5 - 6BA6 1st IF Amplifier  
V6 - 6BA6 2nd IF Amplifier  
V7 - 6AV6 Detector, 1st AF Amplifier, ANL, AVC  
V8 - 6AQ5 Audio Output  
V9 - 5Y3 Rectifier

DIMENSIONS..... 7" H x 15" W x 10" D

WEIGHT..... 21 lbs

# UNPACKING INSTRUCTIONS

After unpacking the receiver, carefully check for possible damage which may have occurred in transit. Should any signs of damage be apparent (tubes broken, case dented, etc.), notify the store from which it was purchased. If the unit was shipped to you, also file a claim with the carrier.

The following accessories should be included in the carton:

- 1 Standard Phone Plug
- 1 Jumper Plug (for the auxiliary control socket)

## INSTALLATION

### POWER SOURCE

The receiver is designed to operate from a 90 — 125 volt, 50 — 60 cycle AC power source. **DO NOT OPERATE FROM A DC SOURCE.** The receiver is equipped with a voltage selector switch (located within the unit). This switch should normally be left in the 117V position.

### SPEAKER CONNECTION

A three-terminal strip marked **OUTPUT** is provided at the rear of the receiver for speaker connections. Any PM speaker with either 4 or 8 ohm impedance can be used. Simply connect

one lead to the ground terminal "O" and the other lead to the terminal that corresponds to the speaker impedance. The output power of the receiver is sufficient to drive a 4 — 12 inch PM speaker adequately.

### HEADPHONES

A standard phone jack is provided on the front panel of the receiver for headphone reception. Low impedance (8 — 16 ohms) headphones are recommended for optimum results. Insertion of a phone plug into the jack automatically disconnects any speaker attached to the 8 ohm output terminal.

## ANTENNAS

The terminals marked "A1", "A2", and "E" at the rear of the receiver are for antenna and ground connections. Either of the following two types of connections can be used to obtain satisfactory results.

### INVERTED L ANTENNA

The inverted L type of antenna will provide satisfactory performance over the entire tuning range. Simply short A2 and E with a jumper wire, and connect one end of the antenna wire to A1. For good reception, the antenna wire should be placed as high as possible and 50 — 100 feet long (see Fig. 1). In some instances, a wire connected from terminal "E" to a water pipe may improve reception.

### DOUBLET ANTENNA

A doublet antenna will give excellent results, especially on amateur bands. A 75 ohms balanced transmission line should be used (as shown in Fig. 2). Since the doublet antenna provides optimum performance only at a given frequency, it should be cut to the length for the most often used band of frequencies. The overall length of a doublet antenna can be determined by using the following formula:

Since the doublet antenna displays directional properties broadside to its length, it should be oriented in such a manner that maximum signal pickup can be realized.

$$L \text{ (Length in feet)} = \frac{468}{\text{Frequency in megacycles}}$$

When using either a balanced transmission line or a twisted pair, the leads connect to terminals "A1" and "A2" respectively, and the jumper wire between "A2" and "E" is removed. A height of 30 — 50 feet is recommended for good reception of weak signals.

### FUSE

A 2 amp fuse is located at the rear of the receiver. To remove it, unscrew the spring loaded cap. Replace only with one of a similar rating.

### AUXILIARY CONTROL

A socket in the back of the receiver allows simultaneous control of this receiver with a transmitter. An external switching device can be constructed so that the receiver will be inoperative during periods of transmission. In this case, the **FUNCTION** switch is placed in the

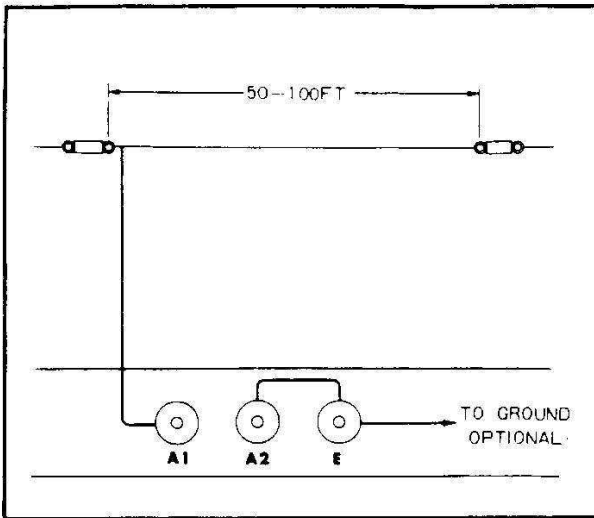


Figure 1. Single Wire Antenna (Inverted L)

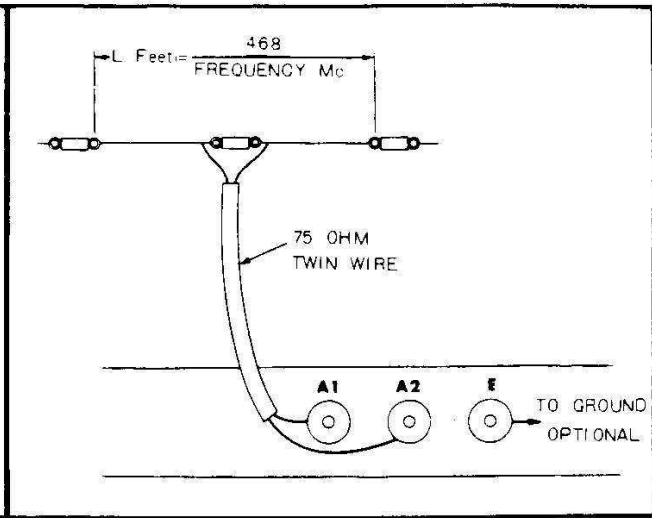


Figure 2. Doublet Antenna

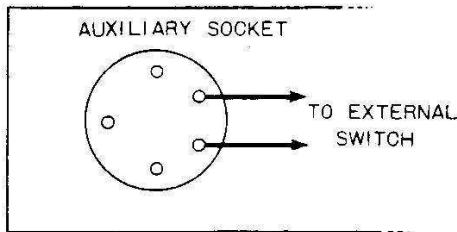


Figure 3. Auxiliary Control Socket

SEND position. The external switch is attached to the 5-pin plug so that pins 3 and 2 (see Fig. 3) will be connected when signal reception is de-

sired. This plug is then inserted into the socket in place of the jumper plug. In this manner, signal reception will be instantaneous, as plate voltage will be applied to the RF stages when the switch is closed accordingly.

For normal operating conditions with no external switching, the jumper plug provided must be inserted into the socket. Pins 3 and 2 of the plug are shorted, thus providing plate voltage to the RF stages. To disable the receiver under these conditions, set the FUNCTION switch to the SEND position. In this position plate voltages to the RF stages are cut off. Returning the switch to REC AM will provide instantaneous signal reception.

## THE Q-MULTIPLIER CIRCUIT

A Q-Multiplier provides the additional selectivity often required for optimum reception of signals in the congested short-wave bands. In your receiver, the Q-Multiplier circuit serves a dual function — Q-Multiplier and BFO. For CW and SSB reception, the circuit is employed as a BFO.

THE CIRCUIT MAY BE EMPLOYED AS A Q-MULTIPLIER ONLY DURING PHONE RECEPTION.

A little experience in using the Q-Multiplier will be necessary for optimum results under different receiving conditions. In the hands of an experienced operator, the Q-Multiplier is a very handy tool, and will greatly enhance the performance of the receiver.

The controls associated with the Q-Multiplier

circuit are the SELECTIVITY and BFO-Q-MULT FREQUENCY controls. They are not operative unless the Function switch is in the Q-MULT position.

### SELECTIVITY CONTROL

When the SELECTIVITY control is in the AM-CW-SSB position, the circuit oscillates, thus providing the beat signal necessary for CW or SSB reception. Off the AM-CW-SSB position, the circuit is connected to the IF stage and now acts as a narrow gate through which the IF signals must pass. The width of the "gate" is determined by the position of the SELECTIVITY control. Advancing the control from the fully counter-clockwise position serves to peak the signal increasingly until a point of oscillation is

reached. Sharpest selectivity is reached just prior to oscillation.

### **BFO-Q-MULT FREQUENCY CONTROL**

The action of this control is determined by the position of the SELECTIVITY control. When the Selectivity control is set to AM-CW-SSB, the BFO-Q-MULT FREQUENCY control is used to apply pitch for CW reception or to provide clarity of signal for SSB reception.

When the Selectivity control is used to increase selectivity during Q-Multiplier operation, (as described previously), the sharp peak produced can be moved around within the IF pass band by means of the BFO-Q-MULT FREQUENCY CONTROL to reduce or eliminate interference from adjacent signals.

### **USING THE CIRCUIT AS A Q-MULTIPLIER**

Initially, all controls on the receiver should be

set to the positions indicated in the chart for AM settings. Tune in desired station. Set SELECTIVITY to the fully counter-clockwise position and FUNCTION to "Q-Mult". Increase AF gain if necessary. Advance the SELECTIVITY control until the desired degree of selectivity is obtained. The point of maximum selectivity is reached just before the circuit breaks into oscillation. The BFO-Q-MULT FREQUENCY control may now be adjusted to provide a reduction, or to eliminate, any adjacent channel interference.

### **USING THE CIRCUIT AS A BFO**

Initially, all controls should be set as indicated in the chart for CW or SSB operation. Under these conditions the BFO-Q-MULT FREQUENCY control is used to vary the pitch (CW) or for clarity of signal (SSB). The SELECTIVITY control remains permanently in the AM-CW-SSB position for CW or SSB reception.

## **TUNING**

The main tuning and bandsread dials are calibrated in megacycles and contain special markings to simplify tuning. The major amateur radio bands are contained in the 1.6 to 4.8, 4.8 to 14.5 and 10.3 to 30.00 megacycle bands. The location of each amateur band is indicated by heavy white scale lines on the main tuning dial. The circled letter or letters which appear with each band indicate the bandsread scale to be used. Calibration of the main tuning scales is correct when the bandsread pointer is set at 100 on the LOGGING SCALE.

Bandsreading on the amateur bands is carried out in the following manner: Set the bandsread pointer initially to 100 and the main tuning pointer directly over the circled letter for the band to be tuned. In some cases the band is split between two such letters. For example, B1 and B2 together cover the range of 7.0 to 7.35 megacycles — B1 from 7.0 to 7.17, B2 from 7.17 to 7.35 megacycles. The calibrated bandsread scale which is used is indicated to the right and left-hand side. Thus, if the main tuning pointer is set over B1, the bandsread scale in use is the one marked B1, the fourth one down. Tuning is then accomplished solely with the BANDSPREAD control.

Short-wave bandsreading, for other than amateur bands, is accomplished by setting the bandsread pointer at 100 on the Logging Scale and the main tuning pointer at the high end of the short-wave band to be tuned. Rotate the bandsread control to tune over the band. Mov-

ing the bandsread pointer towards 0 on the logging scale subtracts from the frequency indicated on the main tuning scale. Logging of short-wave stations is possible by noting the readings on both the Main Tuning and Logging Scales.

### **S - METER READINGS**

The S-Meter provides a means of measuring the relative strength of incoming AM signals. Relative readings are only correct when the IF GAIN control is fully clockwise. Measurements are read in S units from 1 to 9 and in decibels above S9 from 0 to 40 db. The circuit is disabled when the MVC/AVC switch is in the MVC position.

A ZERO ADJ control at the rear of the receiver is provided for zeroing the S-Meter electrically. This adjustment is made with the antenna disconnected, IF GAIN control at maximum and AVC on.

### **ANTENNA TRIMMER**

The ANT TRIM control, adjustable from the front panel, acts as a compensating capacitor to permit optimum matching of the receiver to the antenna at all frequencies. Initially, the control should be set to its mid-position (the dot on the front surface of the knob at 12 o'clock position). The control should always be adjusted for maxi-

imum background noise. Each setting will be good only over a limited range of frequencies. The trimmer should therefore always be readjusted after tuning to the general area where the expected signal is to be found.

### AM OPERATION

For the reception of broadcast stations, short-wave listening, etc., place all controls in the positions indicated in the Initial Control Settings chart. Tune in station, using Main and Bandspread tuning controls as indicated in the section under "TUNING". Adjust ANT TRIM for highest "S" meter reading on signal. This antenna control setting is satisfactory while operating over a limited frequency range. If excessive spurious noises such as those caused by auto ignition make reception difficult, place the ANL OFF switch to the ON position. The automatic noise limiter should be used only when necessary, since it tends to reduce the overall efficiency of the receiver.

If interference from nearby stations makes reception difficult, the Q-Multiplier may be employed to minimize or eliminate the interference. Since the use of the Q-Multiplier results

in a narrower bandwidth it should only be employed when interference is severe and where maximum fidelity is not required.

### CW OPERATION

The control settings required for the reception of code signals are indicated in the chart. AVC is switched off and the IF GAIN control is used as a volume control. Tune signal to zero beat. The BFO-Q-MULT FREQUENCY control should then be adjusted on either side of white dot for desired pitch.

### SINGLE SIDE BAND OPERATION

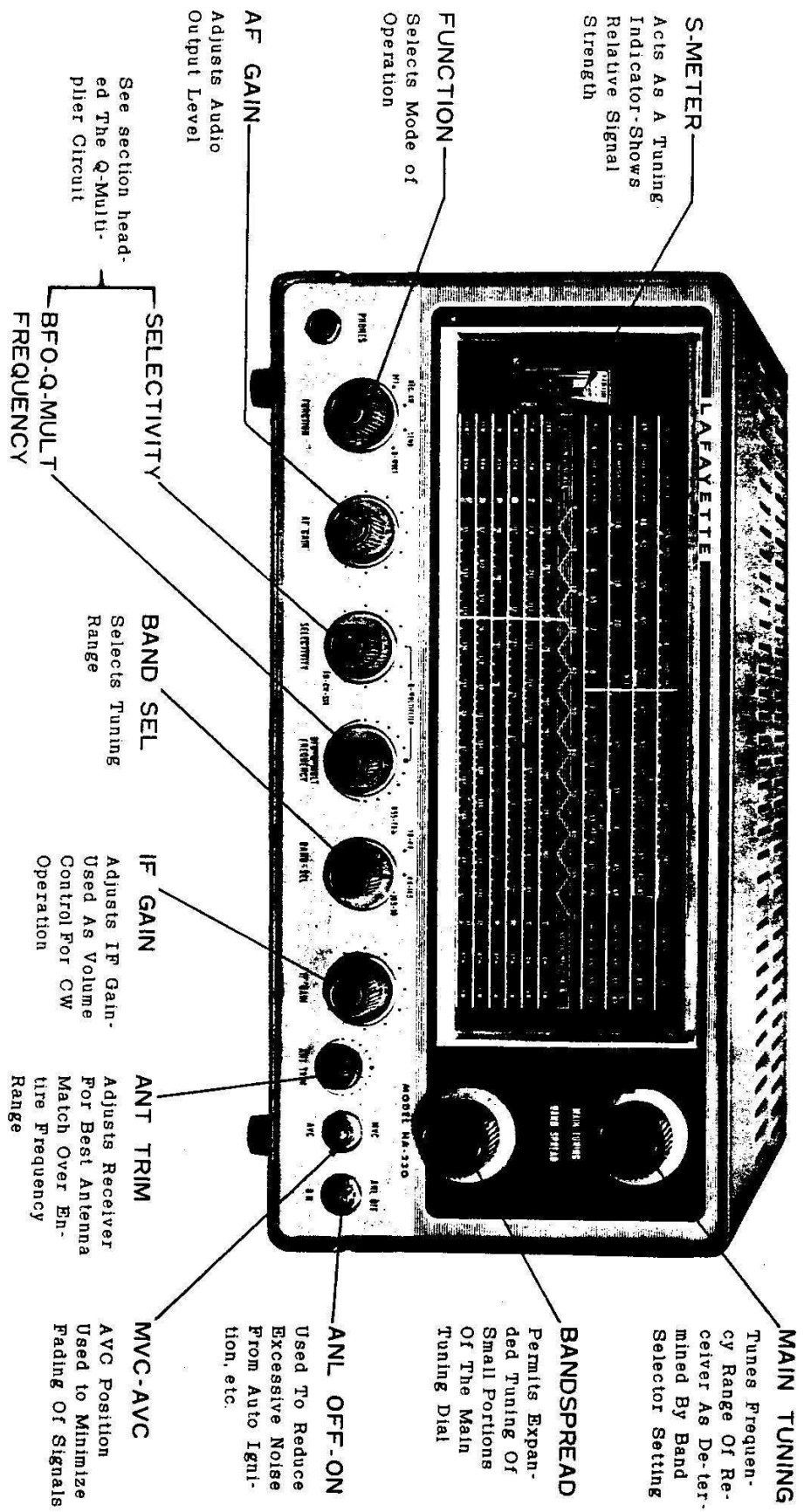
The settings of controls for SSB reception is essentially the same as for CW (see chart). The BFO frequency however, is used in this case for carrier reinsertion. AVC is switched off and the IF GAIN control used to adjust the level. Tune station in with BANDSPREAD control and then adjust BFO-Q-MULT FREQUENCY control for clarity of speech. Slight readjustment of the BANDSPREAD may be necessary to provide best audio quality.

## INITIAL CONTROL SETTINGS

CONTROL	AM SETTINGS	CW SETTINGS	SSB SETTINGS
FUNCTION	REC AM	Q-MULT	Q-MULT
BAND SEL	Set for desired range	Set for desired range	Set for desired range
SELECTIVITY	AM-CW-SSB*	AM-CW-SSB	AM-CW-SSB
BFO-Q-MULT FREQUENCY	Mid-position	Mid-position	Mid-position
IF GAIN	Maximum	Adjust for desired audio level	Adjust for desired audio level
ANT TRIM	12 o'clock position	12 o'clock position	12 o'clock position
MVC-AVC	AVC	MVC	MVC
ANL OFF-ON	Optional	Optional	OFF
BANDSPREAD	Set to 100 on Logging Scale	Set to 100 on Logging Scale	Set to 100 on Logging Scale
AF GAIN	Adjust for desired audio level	2/3 to 3/4 clockwise	2/3 to 3/4 clockwise

\* Setting the SELECTIVITY control to AM-CW-SSB with the FUNCTION switch in REC AM disconnects the Q-Multiplier from the IF, allowing normal IF band pass.

# LOCATION AND FUNCTION OF CONTROLS



# SHORT WAVE LISTENING

On the short-wave frequencies are to be found radio stations transmitting from all over the world. Many of these stations provide English-language broadcasts. The frequencies on which the majority of shortwave broadcast stations operate are found in the two upper bands of your receiver (4.8 to 14.5 megacycles and 10.5 to 30 megacycles). A characteristic of short-wave is that reception varies with the time of day, the season of the year and with weather condi-

tions. In order to know just when and where to listen, a listening chart which lists English language broadcast stations best heard in North America is included in this manual. "Better Shortwave Reception" by William I. Orr (available from Lafayette Radio as BK1032) is recommended to the short-wave listener and amateur alike. It provides an introduction to short-wave radio for the beginner and presents some of the practical aspects and helpful advice for the more experienced listener.

## CIRCUIT THEORY

### ANTENNA STAGE

The RF amplifier V1 provides the necessary gain and preselection required for high sensitivity and rejection of image frequencies. Individual antenna input coils are used for either a balanced or unbalanced input (depending on method of antenna connection).

The ANT TRIM control, adjustable from the front panel, acts as a compensating capacitor to permit matching of the input circuits to any antenna.

### MIXER STAGE

The use of a separate high-frequency oscillator, V3, results in a more stable receiver, particularly at the higher frequencies. The output signal from V1 is electronically mixed with the output of V3 in the mixer tube V2. V3 provides a signal 455 KC higher than the incoming signal on all frequency ranges. Because current is applied to the filaments of V2 and V3 at all times (even with receiver switched off), no frequency drift is experienced at any time during the operation of this receiver — a high degree of stability is assured from the moment the unit is switched on.

### Q-MULTIPLIER AND BFO

The Q-Multiplier circuit (V4) serves as both BFO and Q-Multiplier in this receiver. Used as a BFO for CW and SSB operation, the circuit, which acts as an oscillator, is coupled to the IF stage (via stray coupling) and provides the signal necessary for producing a beat note, or for carrier reinsertion during SSB operation. When the SELECTIVITY control, comprising R26 and S4, is in the AM-CW-SSB position during this operation, R26 is in its maximum position. The frequency of the signal is varied by means of C31, the BFO-Q-MULT FREQUENCY control. This adjusts the pitch during CW operation or clarity of speech during SSB operation. For Q-Multiplier

operation, S4 is switched away from the AM-CW-SSB position, thus connecting the circuit directly to the IF stage through a coupling capacitor C9. The circuit serves as a positive feedback device having a highly selective tuned circuit which acts as a narrow "gate" for IF frequencies. The width of this gate is adjusted by means of R26 which controls the gain of V4. The resultant narrow peak can be moved around in the IF pass-band by adjustment of C31. The selectivity thus becomes adjustable and, in addition, the portion of the signal which contains the least amount of adjacent signal interference can be selected.

### IF STAGES

Two stages of IF amplification, V5 and V6, provide sufficient gain and selectivity for good performance. For maximum selectivity, double-tuned transformers, T2, T3 and T4, are used for interstage coupling. High-Q permeability-tuned transformers improve performance and add to ease of tuning. R24 varies the gain of V6 and therefore acts as the IF GAIN control.

The S-meter is placed in the circuit in such a manner that readings increase with signal strength. R28, the ZERO ADJ control, is adjusted for zero current through the meter with no signal input. The S-meter is only accurate when the IF gain control is at maximum, nor does the meter function properly when AVC is off.

### DETECTOR, AVC, ANL, 1st AUDIO

One diode of V7 (pin 5) serves as both detector and AVC rectifier. The rectified AVC voltage is applied to RF stage V1 and IF stage V5 to keep the output level of the receiver constant regardless of input signal variations. In the MVC position of S6, the AVC is grounded and is not in operation. The other diode (pin 6) acts as an automatic noise limiter by cutting noise peaks (caused by auto ignition, etc.) during reception.



# JR-101 COMMUNICATION RECEIVER SCHEMATIC DIAGRAM

