

# INSTRUCTION MANUAL

*Clegg*

**22'er**

## Y. INTRODUCTION

### A. UNPACKING

The 22'er has been packed with adequate internal carton bracing and cushioning to withstand normal handling in shipment on common carriers. Examine the carton exterior for signs of severe damage (crushing, piercing, etc.) In the event of obvious serious damage, examine the equipment carefully to determine the extent of internal damage, save packing material and make claim against transportation company.

Check all front panel controls for freedom of action and observe that all tubes and crystals are firmly seated in their sockets. Complete and mail the equipment registration card, to insure validation of warranty.

Many customers have found that saving the shipping carton and the internal cushioning is a great convenience in the event of subsequent need for re-shipment or prolonged storage.

### B. GENERAL

The Clegg 22'er has been specifically designed to provide consistent communication on the 2 meter band. This band includes frequencies used by the radio amateur as well as by Military Affiliate Radio Systems, Civilian Defense, and Civil Air Patrol. The 22'er transceiver contains a stable and sensitive receiver and a dependable 20 watt transmitter in one package.

#### CIVIL DEFENSE Accessories

In addition to the characteristics which make the 22'er outstanding for Civil Defense the following accessories are available for use under all Civil Defense requirements:

Crystal Receive Adapter: Available separately as #300-02A, provides crystal receive operation on an assigned C.D. frequency and assures constant on frequency operation.

Special C.D. Case: Utilizes a heavy duty carrying handle, trap door for the crystal rec. adapter and heavy duty feet.

Transmit Crystal Modification: Allows for exact frequency control of the crystal by the use of a padding capacitor.

Tuning Controls: Transmitter controls and shafts can be quickly removed after tuning to eliminate accidental mistuning by unauthorized personnel.

In order to familiarize yourself with the 22'er and its many features it is suggested that you read the instruction book completely before attempting to operate your new transceiver.

### C. SPECIFICATIONS

#### RECEIVER:

1. Unique new triple conversion design.
2. KUVISTOR RF stage and low noise first mixer provide, .5 uv sensitivity (6db S + N to N.)
3. Selectivity 10 KC at 6 db, 20 KC at 20 db.
4. Panel Meter doubles as calibrated S Meter on receiver and "relative output" meter for transmitter tune up.
5. Freq. 143.8 MC to 148.2 MC coverage with tuning dial calibrated 1/4 to 148 MC and band markers for MARS and CAP.
6. Adjustable Squelch from .5 uv to several hundred uv.
7. Excellent AXC performance.

## SPECIFICATIONS (Cont'd.)

8. Receiver drift for 2 volt variation on DC input is less than 5 KC typically. After warm up of 20 minutes, drift is less than 1 KC for the next 40 minutes.
9. Band pass filter for elimination of birdies and spurious FM and TV responses.
10. 2 watts audio output available with self contained high efficiency speaker for operation in high ambient noise associated with mobile operation.
11. Effective switchable Automatic NOISE LIMITER.

## TRANSMITTER

1. High efficiency straight through final amplifier with crystal controlled 20 WATT input.
2. High level plate and screen modulation of the driver and final for typical Clegg "HIGH TALK POWER" performance, 300-3500 cps.
3. Broadband exciter stages to simplify rapid QSY.
4. PUSH TO TALK with provisions to switch external LINEAR and VFO.
5. Input socket for 8, 12, or 24 MC crystals, HC-6/U type or external VFO of 1 to 3 v. rms. 8, 12, or 24 MC outputs.
6. TRANSMITTER frequency SPOTTING SWITCH.
7. Bandpass filter for TVI suppression.
8. Tube line-up:

6CW4 RF Amplifier	12AX7 AF Amplifier
6KE8 Tripler/1st Mixer	6AQ5 Rec. Audio/Modulator
6EJ7 2nd Mixer	6KE8 VLO/Buffer
6BA6 10.7 MC IF Amplifier	6AQ5 Modulator
6BE6 3rd Mixer	6KE8 OSC/Tripler
6BA6 456 KC Amplifier	12BY7 72 MC Amplifier
6AL5 Diode Detector/ Noise Limiter	12BY7 Doubler
	2E26 Power Amplifier

## POWER SUPPLY

1. Built-in 117 v.<sub>±5</sub> 50-60 cy. supply utilizes power transformer, solid state rectifiers and heavy filtering.
2. Built-in 13.8 V.D.C. supply with a DC to AC solid state convertor.
3. Separate fusing and power connectors for AC and DC operation. Power ratings are 50 w. receive and 85 w. transmit nominally.

## ACCESSORIES

22'er Push-to-talk Ceramic Microphone	#551-001
22'er Mobile Mount, Adjustable	#800-802
22'er Crystal Receive Adapter (less crystal)	#800-024
22'er C. D. Cabinet (Special Order)	#800-805

## II. INSTALLATION

### A. PRELIMINARY

It is recommended that initial operation of the 22'er be with 117 VAC until the user may familiarize himself with the tune-up and other operating procedures.

The 22'er is supplied with a pre-wired power plug for 117 VAC operation. A Jones plug is supplied for DC operation but this must be wired by you for either positive or negative ground systems. (See Fig. 2)

### B. CRYSTAL INFORMATION

Transmitting crystals are available from your local electronic distributor or by special order from Squires-Sanders, Inc. The following information will be helpful for purchasing your crystals:

Type:	Fundamental cut HC-6/U Holder
Frequency:	8.0 to 8.22, 12.0 to 12.33, or 24.0 to 24.4 MC
Capacitance:	15 pf.
Tolerance:	$\pm .005\%$

### C. OPERATION (117 VAC)

117 VAC installations are straightforward. The appropriate power plug is inserted at the rear receptacle and a suitable antenna with less than 2:1 VSWR is connected to the UHF coax connector. Either the internal speaker or an external 3-8 ohm speaker may be used. In the former case make certain that the short patch cable with phono connectors is in place between the 4 ohm chassis output jack on the rear of the cabinet. (See Fig. 1.)

### D. OPERATION (13.8 VDC)

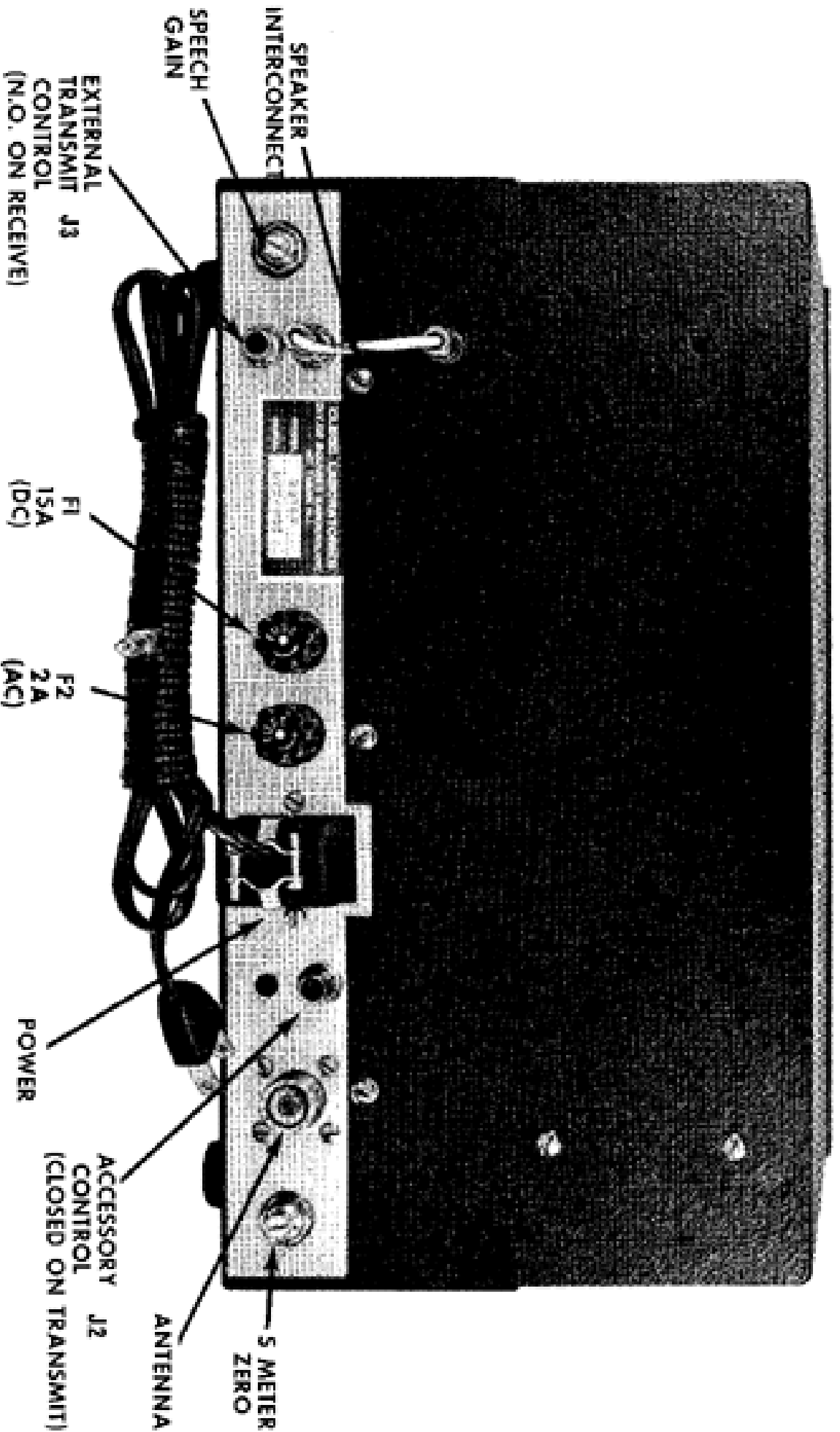
1. Wire the 12 volt cord for either negative or positive ground system according to the diagram. (See Fig. 2)
2. With either polarity the user must also supply the two primary leads for 13.8 VDC operation. They should be connected to pins 3 and 6. Where the length of the leads between the 22'er and the 12 volt source is less than 4 feet, #14 wire can be employed. Should the length exceed 4 feet a heavier gauge wire is recommended.
3. Remove the AC fuse.
4. Operate your 22'er according to the operation procedures in Section III, P. 7.

### E. EXTERNAL V.F.O. INSTALLATION

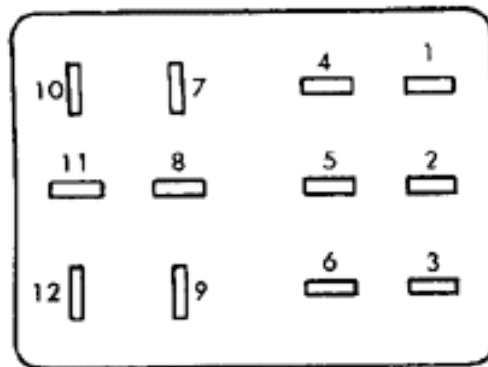
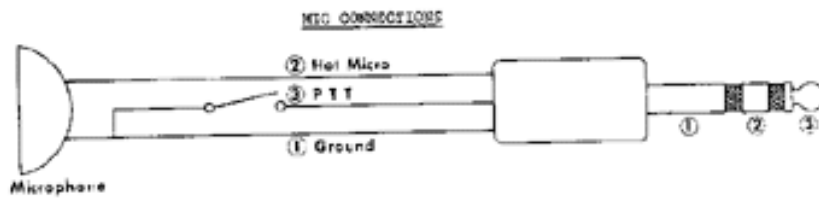
To operate the 22'er with an external V.F.O., be sure the V.F.O. has an output of 1 to 3 v. rms. at 8, 12, or 24 mc. Connect the V.F.O. output to the 22'er crystal socket. The upper socket pin as viewed from the front is the grounded terminal. Keying of the V.F.O. may be accomplished for example, by connecting the keying circuit to J2 of the 22'er, which will ground the circuit on transmit position.

### F. EXTERNAL LINEAR AMPLIFIER INSTALLATION

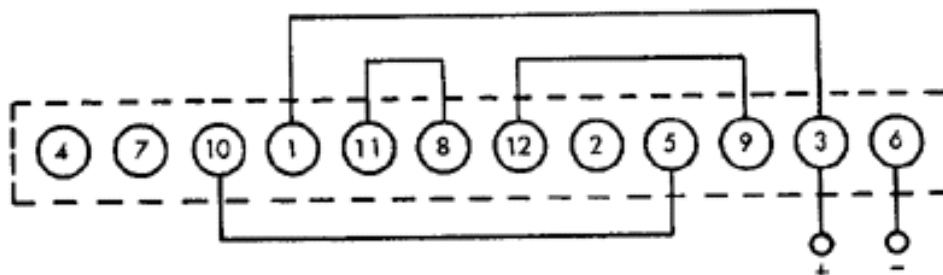
To operate the 22'er with an external linear amplifier simply connect the antenna output of the 22'er to the linear antenna input. Antenna switching must provide bypassing the linear in receive mode. (This is normally provided within the linear.) The 22'er provides approximately 8 watts at 50 ohms output for linear operation. Amplifier switching may be done by utilizing J2 of the 22'er which completes your linear switching circuit to ground.



226r TWO METER TRANSCEIVER - REAR VIEW



PIA - FOR 13.8 VDC POS. GND. OPERATION



PIB - FOR 13.8 VDC NEG. GND. OPERATION

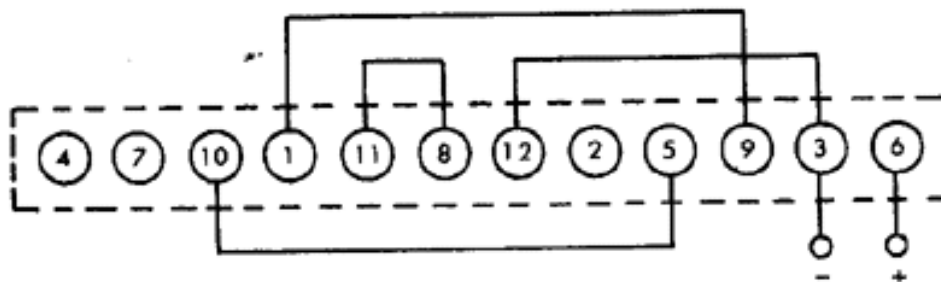


Fig. #2



FIG. #3 22'er FRONT VIEW

### III. OPERATION

#### A. RECEIVER SECTION

1. Plug in proper Power Connector as shown in Section II and connect a 50 ohm 2 meter antenna to the antenna connector. See p. 4 for locations.
2. Advance the RECEIVER AUDIO control from the AC OFF position and allow 1-2 minutes for warm up time.
3. Turn the SQUELCH control toward full clockwise position.
4. Set SPOT-NORMAL-ANL to NORMAL. Proceed with tuning of signals.
5. After 5-10 minute operation, the S-Meter ZERO ADJUST may be set by adjusting this control on the rear of your 22'er. See p. 4 for location.\*
6. Insert an 8.0 to 8.22mc, 12.0 to 12.33mc, or 24.0 to 24.4mc. crystal into the panel crystal holder. Use HC-6/U size, 15 pf. cap., fundamental cut crystals. These may be purchased at your local distributor or mail order house. Turn the SPOT-NORMAL-ANL switch to SPOT. The 2 meter frequency of the crystal may now be tuned in on the receiver. To determine the exact frequency multiply the crystal fundamental by 18 (if 8 mc type). For example: 8.045 mc. X 18 = 144.810 mc.
7. Where ignition or other impulse noise becomes objectionable, such noise may be reduced appreciably by placing the SPOT-NORMAL-ANL switch to the ANL position. During mobile operation, remove the AC fuse to reduce the noise level. See p. 4 for location.
8. The 22'er has a sensitive, stable squelch system. Threshold sensitivity can be varied from less than .5 uv to several hundred uv by means of the panel SQUELCH control. Where squelch operation is not desired, this control should be set in the upper 1/3 of its range. Where only strong signals are to operate the squelch system, the SQUELCH control should be set near the lower portion of the range.

Typical units will unmute at 10 microvolts with the SQUELCH set at 4-5 and at 100 microvolts with the SQUELCH at 2 - 3.

The squelch circuit is intentionally of the "leaky" type in which some receiver audio output can always be heard. When a station is received at sufficient strength to activate the squelch, output will increase from a low level to a suitable comfortable level approximately 20db louder.

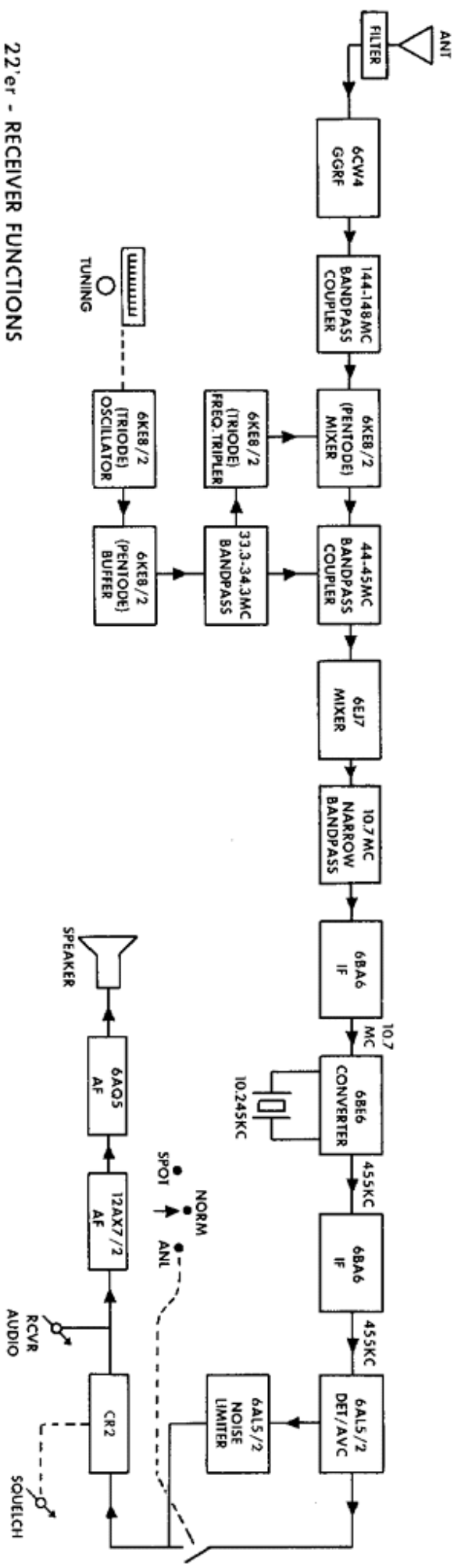
#### B. TRANSMITTER SECTION

1. Install a suitable crystal into the panel crystal socket. Be sure the crystal meets the specifications shown above in Step 6, Receiver Section and Section B. of page 3.
2. Connect a high impedance push-to-talk microphone with a properly wired plug into the MIC jack. See the diagram on page 5 for connections. A suitable microphone is available from Squires-Sanders as #551-001 through your local electronics distributor.
3. Set the SPEECH GAIN control to minimum(full counter clockwise) position. See page 4 for location.
4. Depress the push-to-talk button on the microphone and adjust the DRIVER, TUNE and LOAD controls for maximum reading on the S-Meter. The S-Meter will read near midscale with 8 watts or more output if the antenna VSWR is near unity.
5. Speak into the microphone and advance the SPEECH GAIN control until a slight flicker of the S-Meter is observed. This completes the transmitter tuneup and operation.

\* Temporarily remove the antenna for this adjustment.

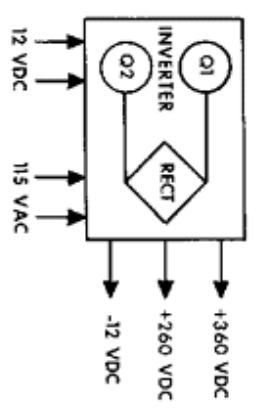
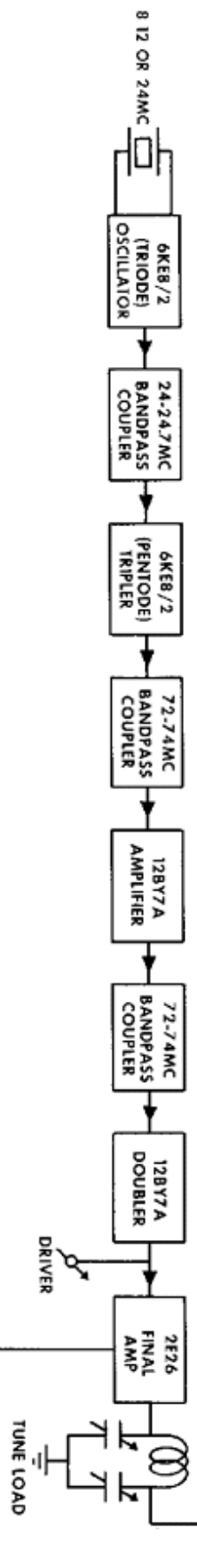


# 22'er FUNCTIONAL BLOCK DIAGRAMS



## 22'er - RECEIVER FUNCTIONS

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## 22'er - TRANSMITTING FUNCTIONS

## IV. THEORY OF OPERATION

### A. RECEIVER SYSTEM

#### 1. Receiver Functions

V1 is a 6CW4 Nuvistor, grounded grid RF Stage with band pass coupling to the pentode section of V2, a 6KE8. The triode section of V2 serves as a frequency tripler to furnish 100 - 103 MC injection. The mixer plate is band pass coupled at  $44.5 \pm .5$  MC to V4 (6EJ7) serving as the second mixer with 10.7 output. Injection for this mixer (as well as drive for the tripler stage) is derived from the tuneable 33.3 - 34.3 MC oscillator V3A via the buffer stage V3B. V3 is a 6KE8. V5 (6BA6) is a 10.7 MC IF amplifier. The inductively coupled pair between V4 and V5 provide immunity from secondary images and other spurious receiver responses.

V6 functions are the third frequency conversion stage. Self excitation at 10,245 KC is accomplished by the crystal. The 455 KC output is transformer coupled into and out of V7 (6BA6) where additional gain and selectivity are achieved.

V8A (6AL5) serves as a combination diode detector/AVC diode while V8B provides automatic noise limiting in a series diode configuration.

AVC derived from V8A is supplied to both 6BA6 IF stages.

The second 6BA6 V6 also serves as a DC amplifier for the AVC voltage in such a manner that small increases in negative voltage on the AVC bus produce larger changes in the positive screen voltage on V6. This voltage is utilized to open or close the squelch diode, CR2.

One half of 12AX7, V9A is utilized as an audio stage ( on both receive and transmit) feeding V10 (6AQ5) as the receiver power output amplifier driving either the internal or an external speaker.

M1, on receiver functions as a calibrated S Meter actuated by the DC amplifier characteristics of V7.

### B. TRANSMITTER OPERATION

The frequency scheme of the 22'er has been chosen to yield stable, spurious free operation with 8, 12, and 24 MC crystals. All stages up to the final amplifier grid incorporate band-pass couplers to provide ease of frequency change. V12A is designed to oscillate with either 8, 12 or 24mc range crystals and furnishes 24 MC energy via band-pass coupling to V12B. V12B serves as a frequency tripler to 72 MC. V13 (12BY7) is a straight through amplifier at 72 MC and drives V14 (also 12BY7) as a frequency doubler to 144 MC. The selective impedance matching network between V14 and V15 is controlled by the DRIVER control on the panel.