

# **INSTRUCTION MANUAL FOR IC-700R**

## **1. SUMMARY**

This set is all transistorized receiver for amateur ham station and the best quality on sensitivity, selectivity and stability. Furthermore, this set adapts FET (Field Effect Transistor) so that spurious sensitivity and cross modulation are so small.

Circuit component is single conversion superheterodyne system which may be converted the local oscillation, but, obtainable fully selectivity and stability by VFO which is used 9 MHz crystal filter and FET.

Each amateur band of 3.5 to 28 MHz are covered by 500 kHz range, and available to receive fixed frequency owing to inserted suitable crystal pieces.

When the case you use this set with transmitting equipment of IC-700T type, transceive operation can be done by receiving frequency it is as transmitting frequency. Moreover, receiving frequency can be moved by RIT circuit without any change of transmitting frequency. So this set is to be used very smoothly as communication equipment.

## **2. RATING**

Receiving Modulation: AM, SSB (3.5, 7 MHz band are LSB, 14, 21, 28 MHz are USB), CW

Receiving Frequency Range: 3.5 MHz - 4.0 MHz  
7.0 MHz - 7.5 MHz  
14.0 MHz - 14.5 MHz  
21.0 MHz - 21.5 MHz  
28.0 MHz - 28.5 MHz  
28.5 MHz - 29.0 MHz  
29.0 MHz - 29.5 MHz  
10.0 MHz - 10.5 MHz

Sensitivity: CW, SSB  
Minimum AF Output: 50 mW = 1  $\mu$ V S+N/N 10 dB  
AM

Selectivity: Minimum AF Output: 50 mW = 1  $\mu$ V S/N 10 dB  
6 dB Band Width: 2.4 kHz  
60 dB Band Width: 4.5 kHz  
(When using AF Filter)  
6 dB Band Width: 0.5 kHz

Spurious Sensitivity: Image Ratio = more than 60 dB  
Internal spurious signal = under noise level

Frequency Stability: Within  $\pm$  100 Hz after warmed up

Antenna Impedance: 50 Ohm - 100 Ohm

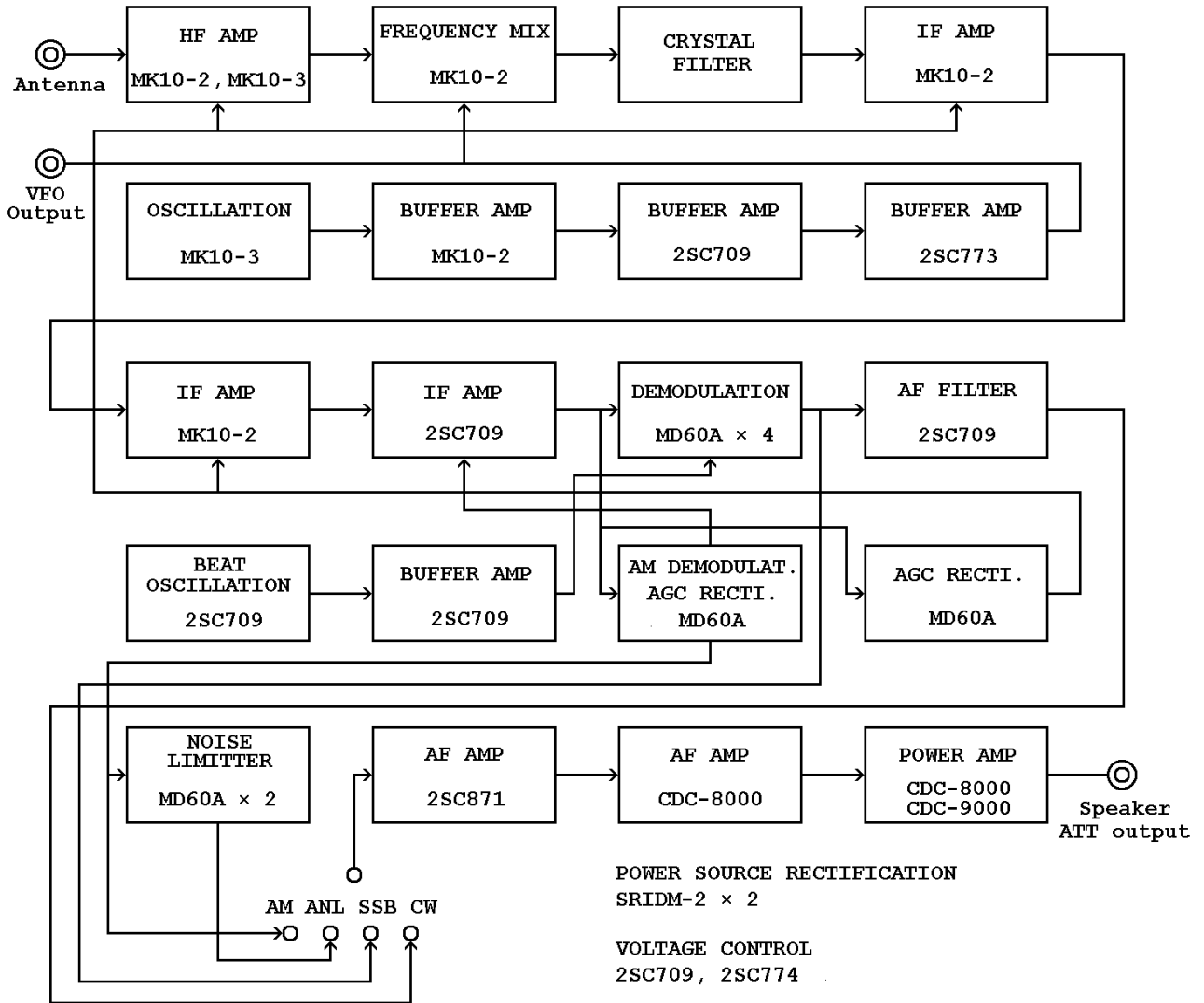
Audio Output: Maximum 1 W, 8 Ohm

Power Source: AC 117 V / 220 V or DC 12 V - 15 V

Measurement: 270 mm (wide)  $\times$  160 mm (high)  $\times$  235 mm (deep)

Weight: 6 kg

### 3. COMPONENT



#### **4. DESCRIPTION OF CIRCUIT**

##### **1) RE AMP. CIRCUIT**

As this circuit has FET (Field Effect Transistor) MK10, low noise, high sensitivity, image disturbance character and cross modulation character, very good AGC character by cascade connection can be obtained. Tuning circuit is characteristic component of only one coil which covered all bands and disturb complicationize of circuit and damages occurable from switch.

##### **2) FREQUENCY MIXED CIRCUIT**

As this circuit has FET MK10 just same as RF Amp. circuit, then every characters are improved. Local oscillation voltage are injected into MK10 source.

##### **3) VFO CIRCUIT**

This part having been put in a shielding case as VFO unit. For oscillation, FET MK10 are used and metal core is used for coil so that fully stability can be obtained. Output power is carried out through Buffer MK10 and emitter floor of transistor 2SC709 and 2SC773, and lead to shorten the variation of frequency caused by fluctuating load. Frequency oscillation is to be changed 50 kHz per one rotate of Subdial, that 1 graduate of the meter is equivalent for 1 kHz.

Frequency oscillation of each band are as follows:

3.5 MHz Band	12.5 MHz - 13.0 MHz
7 MHz Band	16.0 MHz - 16.5 MHz
14 MHz Band	5.0 MHz - 5.5 MHz
28 MHz Band	19.0 MHz - 20.5 MHz
10 MHz Band	19.0 MHz (Used at the position of 28 MHz)

##### **4) FILTER**

Filter is the best quality of 9 MHz Crystal Filter of Shape Factor of under 1.8, so that selectivity can be obtained fully enough.

##### **5) IF AMP. CIRCUIT**

Signal passed through 9 MHz Crystal Filter is amplified by MK10, 2nd stage and SC709, 1st stage of IF AMP. part. 1st stage and 2nd stage use FET which has very few noise. Source circuit of 1st stage connect to S meter, available to adjust by variable resistor as to the indicator show 0 point while no current input. If add the AGC voltage by input signal, drain current will be decreased, indicator show its decreasing degree.

##### **6) AM DETECTIVE CIRCUIT AND NOISE LIMITER CIRCUIT**

Signal of AM wave is detected by MD60A. Automatic Noise Limiter circuit (ANL) by two MD60A operate efficiently for pulse noise. ANL circuit can be inserted any time when necessary by function switch on panel plate side.

##### **7) SSB AND CW CIRCUIT OF DETECTION**

Receiving of SSB and CW wave is made by ring demodulation circuit which has very few distortion. Crystal control circuit by 2SC709 is used for BFO oscillation which oscillate 8998.5 kHz. Voltage of BFO oscillation is added to ring demodulation circuit passed through buffer.

##### **8) AGC CIRCUIT**

AGC circuit is divided into two systems for MK10 and for SC709, and for MK10, take out minus voltage for AM detective from MD60A and add to gate of MK10 for RF AMP. and IF Amp. For 2SC709, rectified by another MD60A to add minus voltage on the base of 2SC709.

**9) AF FILTER CIRCUIT**

On the case of CW wave, inserted by function switch. Ordinary, band width is narrow at 500 Hz, eliminated the noise and receive easily. Center frequency is about 1000 Hz.

**10) AF AMP. CIRCUIT**

Output detection is selected by function switch, and added to low noise transistor of 2SC871 and further amplified electrically by CDC-8000 and CDC-900 p.p. after amplified by CDC-8000.

**11) POWER SOURCE PART**

AC 117 or 220 V and DC 12 V can be used by changing the plug. Except AF output stage, stabilized voltage by constant voltage circuit are gained, operate safely even though power source voltage is fluctuated.

**12) MUTE CIRCUIT**

Operate on cut off the power source for RF, IF, AF Amp. circuit by relay installed. At the same time, change the RIT circuit, not to operate RIT when transmitting. Installed relay is to operate on both of external power source and internal power source. In addition, output for anti-trip, DC 12 V, 9 V of constant voltage can be taken out, not only to operate transceiver but also can be used for power source of converter, calibrator, etc.

## 5. OPERATING INSTRUCTION

### 1) POWER SUPPLY

- A. Power should be available to 12 VDC from 117 V/220 V according to replace the plug. Make sure that lead wires with plug for AC and two cords of red and blue for DC. Especially, be careful that the pole of which have to connect red lead wire to positive (+) and blue lead wire to negative (-) ground. Also chassis is to be connected to (-) earth.
- B. Switch off to turn over the left AF GAIN before the power cord connect. Confirm the voltage must be shown 12 - 15 V, when it is used by DC power supply and be sure the pole.
- C. Connect the power cord to the power supply and turn AF GAIN dial clockwise, then dial should be lighted and showed it is switched on.

### 2) ANTENNA

Antenna impedance is designed for 50 - 75 Ohm, so using of same impedance antenna is recommended. In the case of using inverted L type antenna and high impedance, used antenna coupler and lead in with coaxial cable.

### 3) SPEAKER

Output impedance of speaker terminal is 8 Ohm, connect the cord to attached plug and insert to rear side terminal. When using a headphone, connect the cord to attached plug and insert to PHONE jack of the panel, then speaker output will be automatically cut off.

### 4) AM RECEPTION

- |    |             |                                       |
|----|-------------|---------------------------------------|
| A. | <u>Knob</u> | <u>Set position</u>                   |
|    | FUNCTION    | AM                                    |
|    | RIT         | 0                                     |
|    | AF GAIN     | Reasonable voice                      |
|    | RF GAIN     | Set at full clockwise (max.) position |
|    | BAND SELECT | Desired receiving band                |
|    | PRE SELECT  | Near the desired receiving band       |
- B. Set all switch as above mentioned, turn over the tuning dial to catch desired signal. Adjust the PRE SELECT knob as to S meter will be maximum.
  - C. Subdial is the tuning knob, one revolution of which over a range of 50 kHz. The flange indicator on the knob side can be moved to the left or right while holding the knob itself steadily. Thus it can be adjusted to read "0" when the dial is set to "0". Black indication are provided range for 0 - 50 kHz and red for 50 - 100 kHz.
  - D. RIT switch would be available for fine adjustment of frequency when use this set with other SSB transmitter than IC-700T and also use receiver only.
  - E. When catching pulse noise like car ignition, set the FUNCTION switch at ANL position then noise will be eliminated remarkably according to the work of noise limiter.

### 5) SSB RECEPTION

Positioning all switches as same as AM reception, but set FUNCTION switch at SSB position.

3.5 MHz and 7 MHz for LSB  
14 MHz to 28 MHz for USB

It is easy to be ZERO in for tuning dial is to be fully decreased.

## **6) CW RECEPTION**

Set all switches as same as AM reception, it can be received at either position of SSB and CW by FUNCTION switch, but CW position is much better than SSB position because of the passing band width will be narrowed at the CW position according to enter AF filter into the circuit.

## **7) FIXED FREQUENCY RECEPTION**

- A.** Insert 3 different crystals like A., B. and C., and it will be able to receive an optional frequency from 3.5 MHz to 29.5 MHz (except 8.5 MHz - 9.5 MHz).
- B.** Crystal should be used the type of HC-25U (HC-18/U pin type) for actual frequency. Receiving frequency of  $\pm 9$  MHz in fundamental wave should be acceptable.
- C.** Be careful that, when SSB reception, using the receiving crystal of (-) 9 MHz is for USB and receiving crystal of (+) 9 MHz is for LSB.
- D.** When insert a crystal, undo the cover of VFO box and insert a crystal at socket on the coil base.
- E.** Crystal socket is designed in order for A., B. and C. from top side.

## **6. INSTRUCTION FOR INTERLOCKING WITH TRANSMITTER**

This IC-700R is to be designed for interlocking with transmitter of IC-700T.

- 1)** Combine both sets as shown in figure 1.
- 2)** Connect coaxial cables to VFO cables. Coaxial cable which as short as possible is better.
- 3)** When combine with the transmitter other than IC-700T, connect as shown in figure 2. TR & RC changing switch must be a different for each set.

## **7. HOW TO TRANSMIT**

- 1)** Turn the RIT knob to the left, then receiving frequency will coincide with transmitting frequency. When call with the same frequency as receiving, turn the RIT knob fully to the left and adjust the tuning dial.
- 2)** When call by high frequency more than receiving frequency, set RIT on (-) position, and when call by low frequency more than receiving, set RIT on (+) position. Then adjust tuning dial.
- 3)** In the case of CQ call to find a partner station, do not touch the tuning dial but adjust by RIT button only.
- 4)** Be sure, do not move the tuning dial for CQ call, because transmitting frequency will also move at the same time.

## **8. ADJUSTMENT**

### **1) RIT FREQUENCY ADJUSTMENT**

RIT is adjusted to coincide with receiving and transmitting frequency at the point of "0", however, when it is not coincide these two frequencies, adjust it as following method:

- A.** In case of having a frequency counter and/or heterodyne Frequency counter:  
Connect a frequency counter and/or heterodyne frequency counter to the VFO output terminal, rear side of the set, and positioning RIT knob at "0" and measure the frequency. Next, make the set at transmitting condition (connect control socket of (5) and

(7)) and adjust the frequency as to be restored frequency by turning with a screw driver the variable resistor, right side of the VFO box.

**B.** In case of no counter:

Positioning RIT knob at "o" point, receive the JJY or radio broadcasting. Next, connect relay as shown in figure 3 and turn the variable resistor, right side of the VFO box to adjust to catch signal of the same station. Now, it is coincided with frequency of receiving and transmitting, restore the relay connection.

## **2) VFO FREQUENCY ADJUSTMENT**

**A.** In the case of frequency gap is a few kHz, settle the tuning dial, then, adjust to be turned over subdial.

**B.** In the case of frequency gap is to big, adjust as following method (coil of VFO is shown in figure 4):

Frequency goes up when put in coil core and goes down when put out. Further, when put in core of A coil, displacement of frequency range will be narrowed and expanded when put out. Frequency counter is recommended for adjustment. First, oscillate low frequency and set the tuning dial to match with the same frequency. Turning either A or B core to receive this frequency. (It had better to set FUNCTION switch to SSB and adjust to be zero beat.)

And next, oscillate high frequency and receive it. In that time, when it will be able to receive at high position of indicator than its normal frequency, displacement range must be limited, so that. adjust to put out A core and put in B core as to be able to receive at the indicator position of oscillating frequency.

And also, when it will be able to receive at low position, its range must be expanded so put in A core and put out B core. Likewise, oscillate low frequency and receive it. When it will be able to receive at high position of indicator than its frequency, displacement range must be expanded and receive at low position of indicator must be limited. Therefore, adjust as above mentioned way.

Repeat as above mentioned again and again until oscillated frequency and dial indication will be matched.

## **3) ZERO POINT ADJUSTMENT OF S METER**

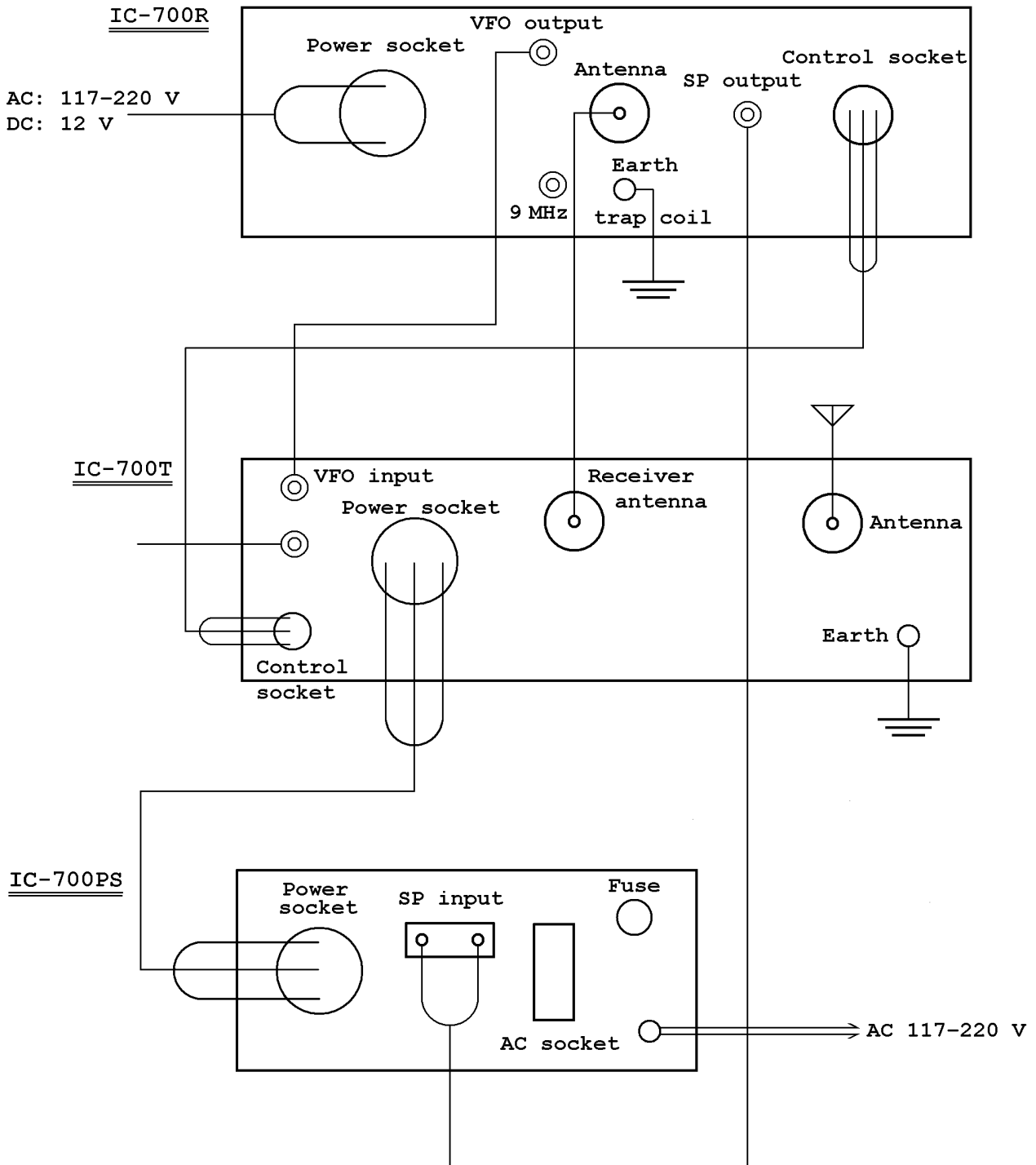
Adjust as to be "o" point when no signal incoming by turning with screw driver the semi-fixed variable resistor, where is in center of IF Amp.

## **4) 9 MHz TRAPs ADJUSTMENT**

When set is packed, 9 MHz trap at rear side of the chassis is protected to short by jumper cable, however, if disturbance wave of 9 MHz is strong, cut off the jumper cable and set on the most feeble position of disturbance wave by turning the core.

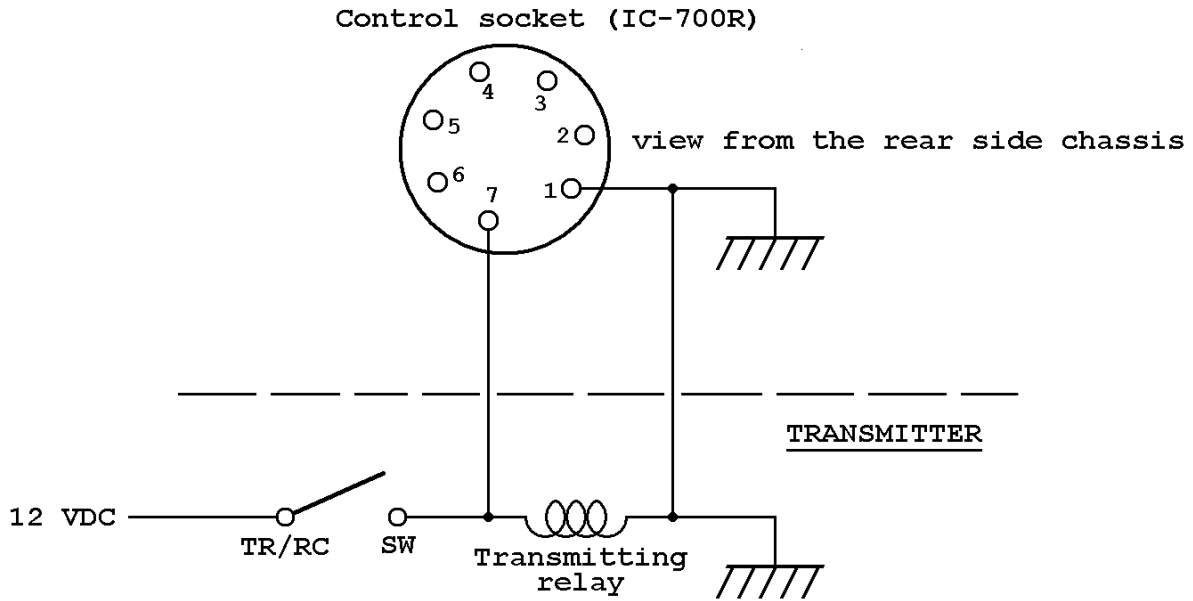
HOW TO COMBINE WITH IC-700T

Connect as follow:





1. In the case of combine to use transmitting relay power (12 VDC)



2. In the case of combine to use transmitting SW (both pole are not earth)  
Control socket (IC-700R)

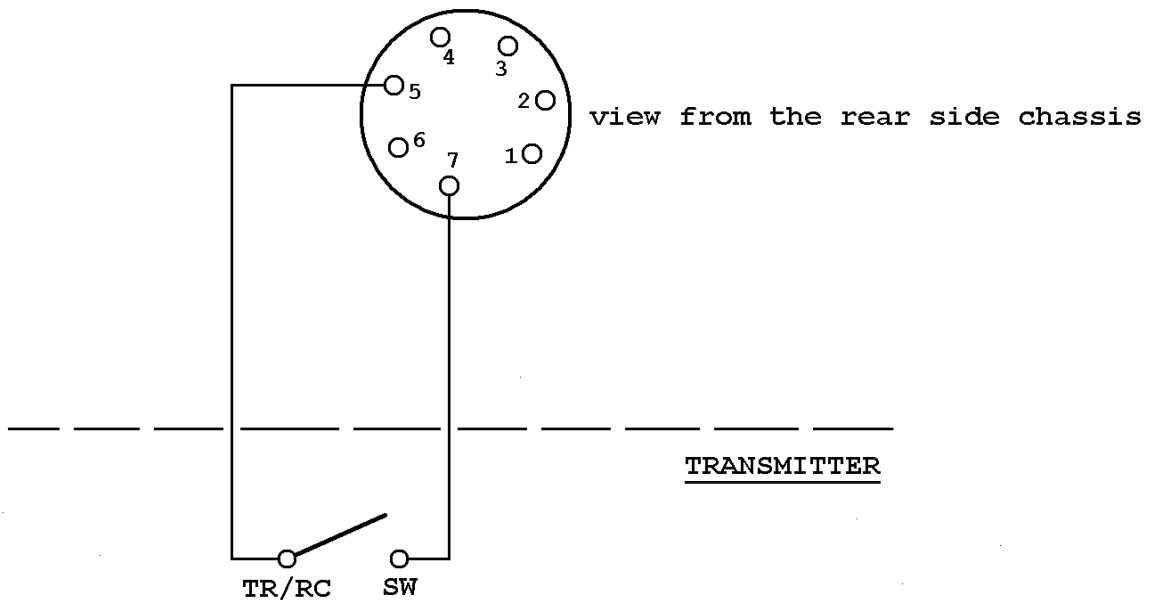


Fig. 2

Fig. 3

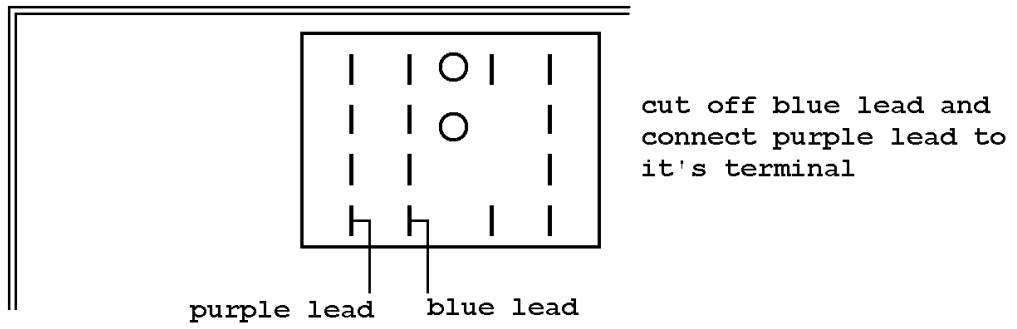
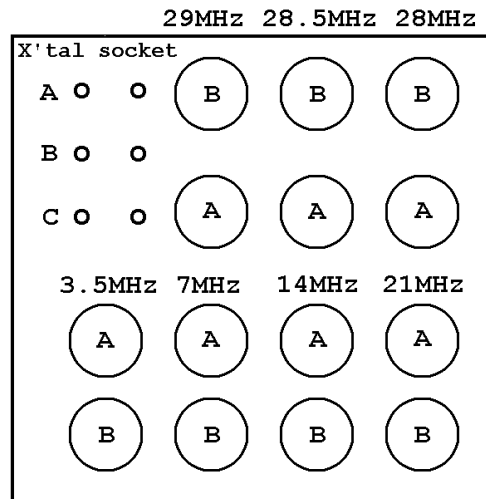
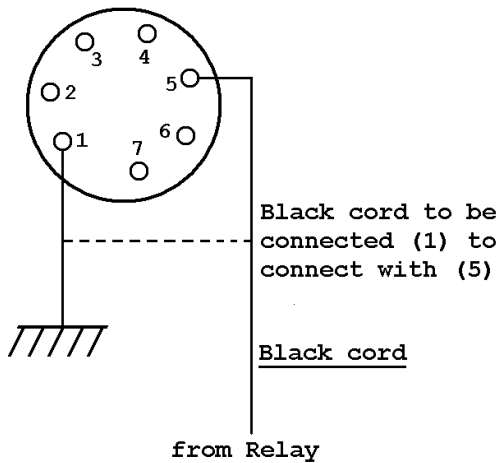


Fig. 4



View from rear side of chassis

Control socket (IC-700R)  
view from the inside chassis



Control socket (IC-700R)  
view from the rear side chassis

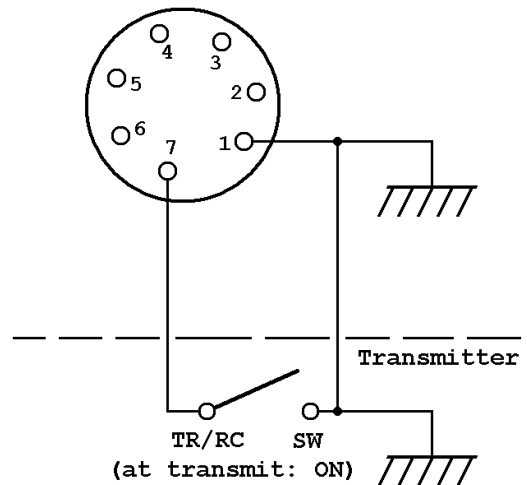


FIG. 5

