



**INSTRUCTION  
MANUAL  
FC-107**

**YAESU MUSEN CO., LTD.**

TOKYO JAPAN.







# YAESU FC-107 ANTENNA COUPLER



The FC-107 antenna coupler is designed for low and medium power applications in the HF amateur bands from 160 through 10 meters. The FC-107 is designed to minimize the effects of high SWR on a coaxial line or wire antenna which may cause power reduction in the FT-107M or similar transceiver.

The FC-107 is styled to match the FT-107M line, and it comes equipped with three UHF type female coax receptacles, in addition to a threaded terminal for a single-wire antenna.

High-quality, low-loss components are used throughout the FC-107 antenna coupler, and the matching function it performs means your transmitter will always "see" the resistive termination it was designed for. The inherent selectivity of the FC-107 also provides added selectivity, thus reducing harmonic-related TVI or out-of-band emissions generated by older equipment.

We recommend that you read this manual in its entirety, so as to become better acquainted with the FC-107 antenna coupler, another quality accessory from the world's leader in top-performance amateur equipment.



## SPECIFICATIONS

**Frequency coverage:**

160mL	1.8–2.0 MHz
160mH	1.9–2.4 MHz
80m	3.5–4.0 MHz
40m	7.0–7.5 MHz
20m	14.0–14.5 MHz
15m	21.0–21.5 MHz
10m	28.0–29.7 MHz

**Input impedance:**

50–75 ohms

**Max. variation in load impedance:**

50 ohm in:	10–250 ohms
75 ohm in:	18–300 ohms

**Maximum transmitter power:**

250 W PEP @ 50 ohms

**Power meter calibration scales:**

25 W, 250 W

**Insertion loss:**

0.5 dB max.

**Rear panel antenna connections:**

3 coaxial “UHF” type  
1 wire terminal

**Dimensions:**

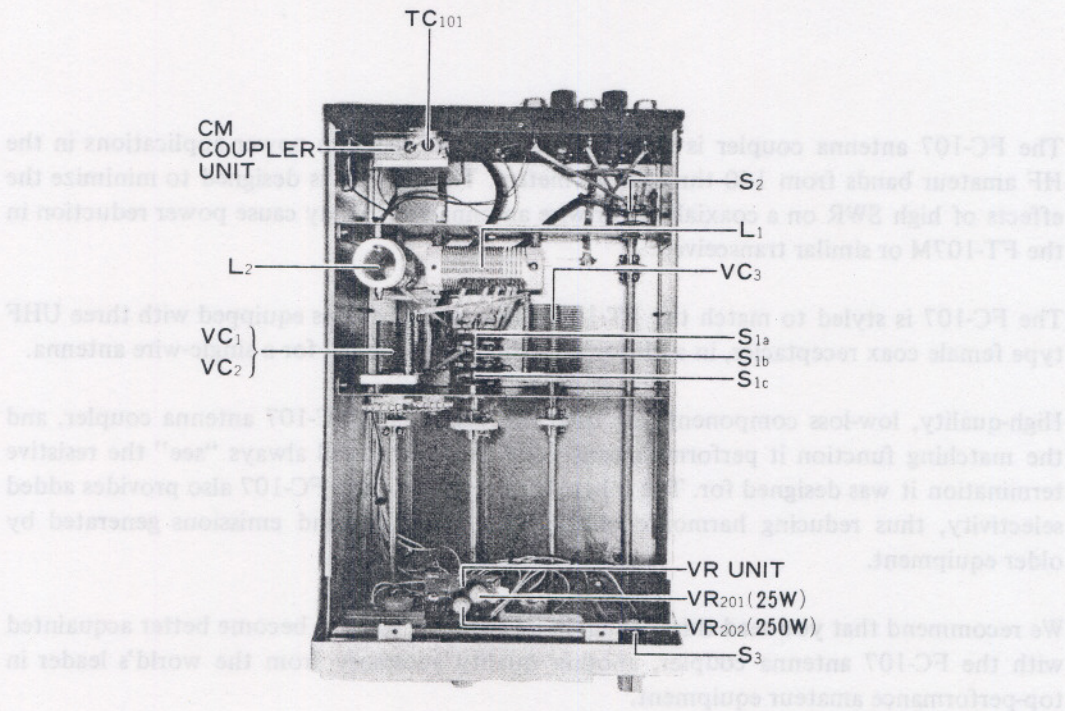
216 (L) x 129 (H) x 330 (D) mm.

**Weight:**

3.4 kg.

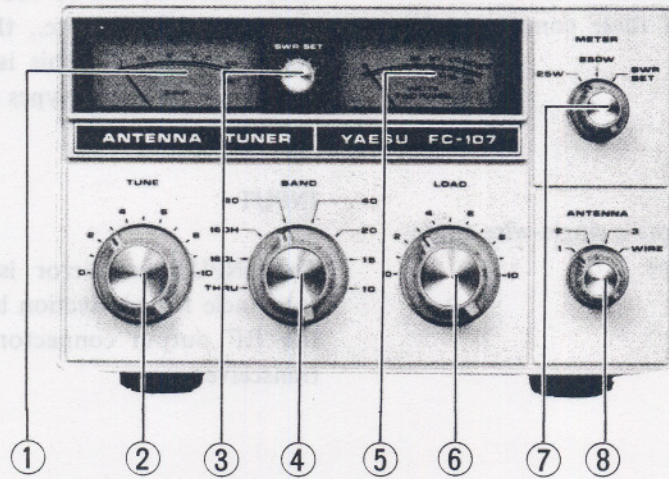
**SWR calibration:**

To 4:1 SWR





## FRONT PANEL CONTROLS AND SWITCHES



### (1) SWR METER

When calibrated, this meter provides accurate measurement of SWR for the purpose of adjusting the LOAD and TUNE controls for the best match.

### (2) TUNE

The TUNE control is geared to two variable capacitors, providing capacitive adjustment of the coupling between the transmitter and the impedance established by the BAND switch and the LOAD control. The TUNE and LOAD controls are adjusted for minimum SWR.

### (3) SWR SET

This control is used to calibrate the SWR meter.

### (4) BAND

The BAND switch selects the inductance required to accomplish matching on the desired band. The THRU position of the BAND switch connects the transmitter directly to the antenna, bypassing the matching circuitry, while allowing measurement of the SWR on the feedline.

### (5) FWD POWER meter

The FWD POWER meter reads the input power on two ranges: 25 watts or 250 watts.

### (6) LOAD

The LOAD control is connected to a variable capacitor which adjusts the coupling between the antenna feedline and the impedance presented by the BAND switch and the TUNE control.

### (7) METER switch

This switch is used to select the proper power scale for the FWD POWER meter. Selection of the SWR alignment position is also provided.

### (8) ANTENNA

The ANTENNA switch selects the antenna to be used. The operator has the choice of three coax-fed antennas and one random wire antenna.



## REAR PANEL CONNECTIONS

### ANT 1, ANT 2, ANT 3

These three female UHF-type connectors will accept the coaxial feedline from the antenna. As well, a dummy load such as the YAESU YP-150 may be attached to one of these connectors for tuning or test purposes.

### WIRE

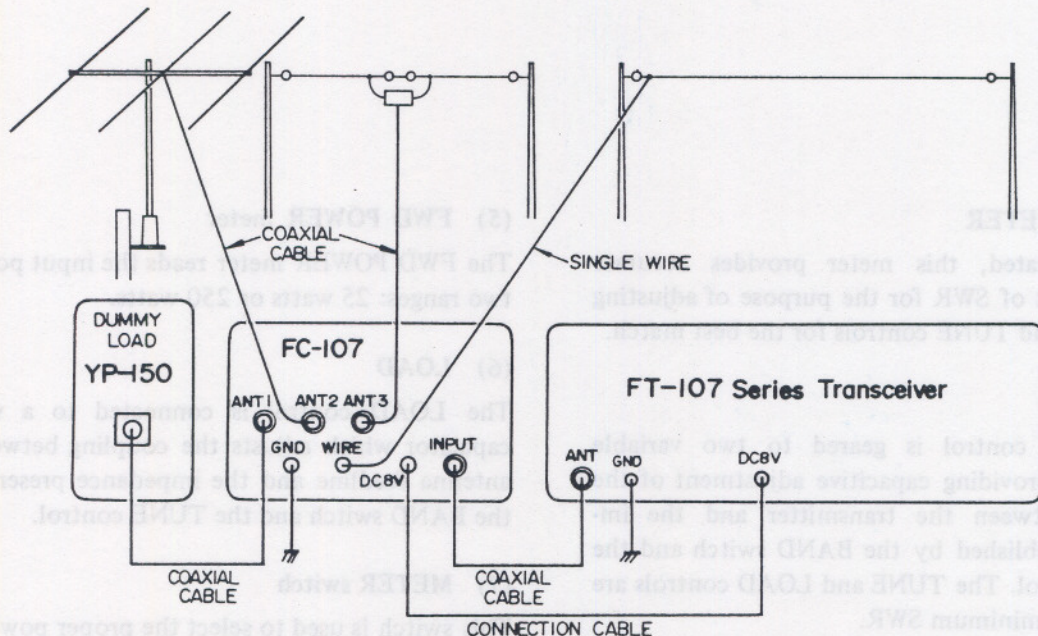
This threaded terminal accepts a single-wire antenna such as the "Windom" type.

### GND

This terminal should be connected to a good earth ground so as to provide a DC path to ground for stray currents, and to reduce "RF in the shack" and ground loops, etc., that may make antenna matching difficult. This is particularly important in the case of certain types of single-wire antennas.

### INPUT

The INPUT connector is another female UHF receptacle for connection between the FC-107 and the RF output connector of the transmitter or transceiver.



### BOTTOM PANEL FEET

The feet on the bottom panel may be changed, if it is desired to change the viewing angle for the unit. In the accessory kit for your FC-107, there are two extender feet with mounting pads. These may be installed either in front or in back, according to the requirements of your station. Refer to Figure 1 for mounting details.

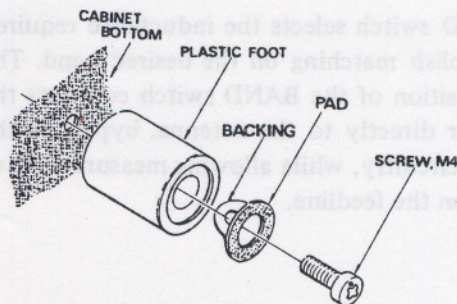


Figure 1



IT IS STRONGLY RECOMMENDED THAT THE FOLLOWING SECTION BE READ IN ITS ENTIRETY BEFORE ANY MATCHING OF ANTENNAS IS ATTEMPTED. WHILE A STRAIGHTFORWARD PROCEDURE, ANTENNA MATCHING WITH A COUPLER SUCH AS THE FC-107 INVOLVES A LOGICAL PROGRESSION OF STEPS, AND FAMILIARITY WITH THE TOTALITY OF THE FOLLOWING SECTION WILL CLARIFY THE PROCEDURE IMMENSELY.

To summarize the procedure that is followed in using the FC-107 antenna coupler to match a feedline to the transmitter, the following process takes place:

- 1) The proper inductance is chosen using the Band switch.
- 2) The LOAD and TUNE controls are adjusted to secure a minimum SWR. These two controls should be adjusted one at a time, so as to avoid confusion as to the effect of any particular adjustment. A typical procedure to follow would be to apply power, adjust the TUNE control for minimum SWR, then adjust the LOAD direction either to the right or left.

Once the LOAD control has been changed, the TUNE control should again be adjusted for minimum SWR; if this procedure improves the SWR, it should be continued by further moving the LOAD control in the same direction, but if the initial change in the LOAD control worsens the SWR, one should try moving the LOAD control in the opposite direction. It will be clear to the operator when the LOAD control is being adjusted in the right direction.

The reader is referred to Fig. 2, which contains the approximately correct positions of the BAND, LOAD, and TUNE controls for a 50 ohm load impedance, such as that presented by a dummy load. A dummy load is extremely useful for tuning up a transmitter in preparation for adjustment of matching of an antenna. If the control positions shown in Fig. 1 are utilized in conjunction with a 50 ohm dummy load, only very minor adjustments of the TUNE and LOAD controls will be necessary

for a perfect match. Of course, a 50-ohm dummy load should require no matching for a perfect match to a 50-ohm transmitter output, but this information is presented because the control positions in Fig. 2 represent useful starting points for matching unknown impedances.

The following, then, is a step-by-step procedure to follow for the matching of an antenna feedline that has not been matched previously.

- 1) Tune up the transmitter in the normal way into a 50-ohm dummy load (if 50 ohm coax is used between the transmitter and the FC-107) or other resistive 50 ohm termination. Reduce the gain control on the transmitter to a minimum, and place the transmitter in "standby" for the moment.
- 2) Place the BAND, LOAD, and TUNE controls in the positions indicated in Fig. 2 for the frequency at which the line is to be matched. Place the ANTENNA switch in the position which corresponds to the rear panel connector of the antenna to be matched. Place the METER switch in the SWR SET position, and place the SWR SET knob in the 12:00 position.

	BAND	TUNE	LOAD
1.8MHz	160L	8.0	5.0
1.9MHz	160L	7.0	5.0
2.0MHz	160L	7.0	6.0
1.8MHz	160H	10.0	3.5
1.9MHz	160H	10.0	4.5
2.0MHz	160H	8.0	5.0
3.5MHz	80	5.5	6.0
4.0MHz	80	4.5	7.0
7.0MHz	40	4.5	7.0
7.5MHz	40	4.0	7.0
14.0MHz	20	4.0	8.0
14.5MHz	20	4.0	8.0
21.0MHz	15	5.5	8.0
21.5MHz	15	5.5	8.0
28.0MHz	10	5.5	8.5
29.7MHz	10	4.5	8.5

Figure 2



- 3) It is desirable to make preliminary matching adjustments with as little transmitter output power as possible. Place the transmitter in the "transmit" condition, and slowly advance the output level until deflection of the FWD POWER meter is observed. Adjust the SWR SET control to line up the meter needle of the SWR meter with the SET position at the far right end of the meter scale, using the minimum power necessary to accomplish this. With the needle at the SET mark of the SWR meter, set the METER switch to the 250 W or 25 W position to read the SWR on the meter.
- 4) Adjust the TUNE control for minimum reading on the SWR meter. If necessary, adjust the SWR SET control and/or transmitter power to ensure proper calibration. Once the "dip" has been found using the TUNE control, move the LOAD control either to the left or right, by a small amount. Adjust the TUNE control for a "dip" again, and if the SWR improves (again, make sure that you are reasonably well calibrated) move the LOAD control slightly more in the same direction. Again "dip" the TUNE control, and continue this procedure until no further improvement is noted. If the initial direction of adjustment of the LOAD control worsened the SWR, move it an equal direction from the starting point IN THE OPPOSITE DIRECTION and follow the above procedure with successive adjustment of the TUNE and LOAD controls.
- 5) Once the initial procedure has been followed to yield a near-perfect match, the METER switch may be placed in the position which most closely corresponds to the transmitter output power expected. The transmitter may then be adjusted for full power, and the FC-107 LOAD and TUNE controls may be adjusted to yield zero deflection of the SWR meter. When the SWR meter is not calibrated with the SWR SET controls, the SWR meter will not accurately read the SWR, but it will indicate minimum reflected power.

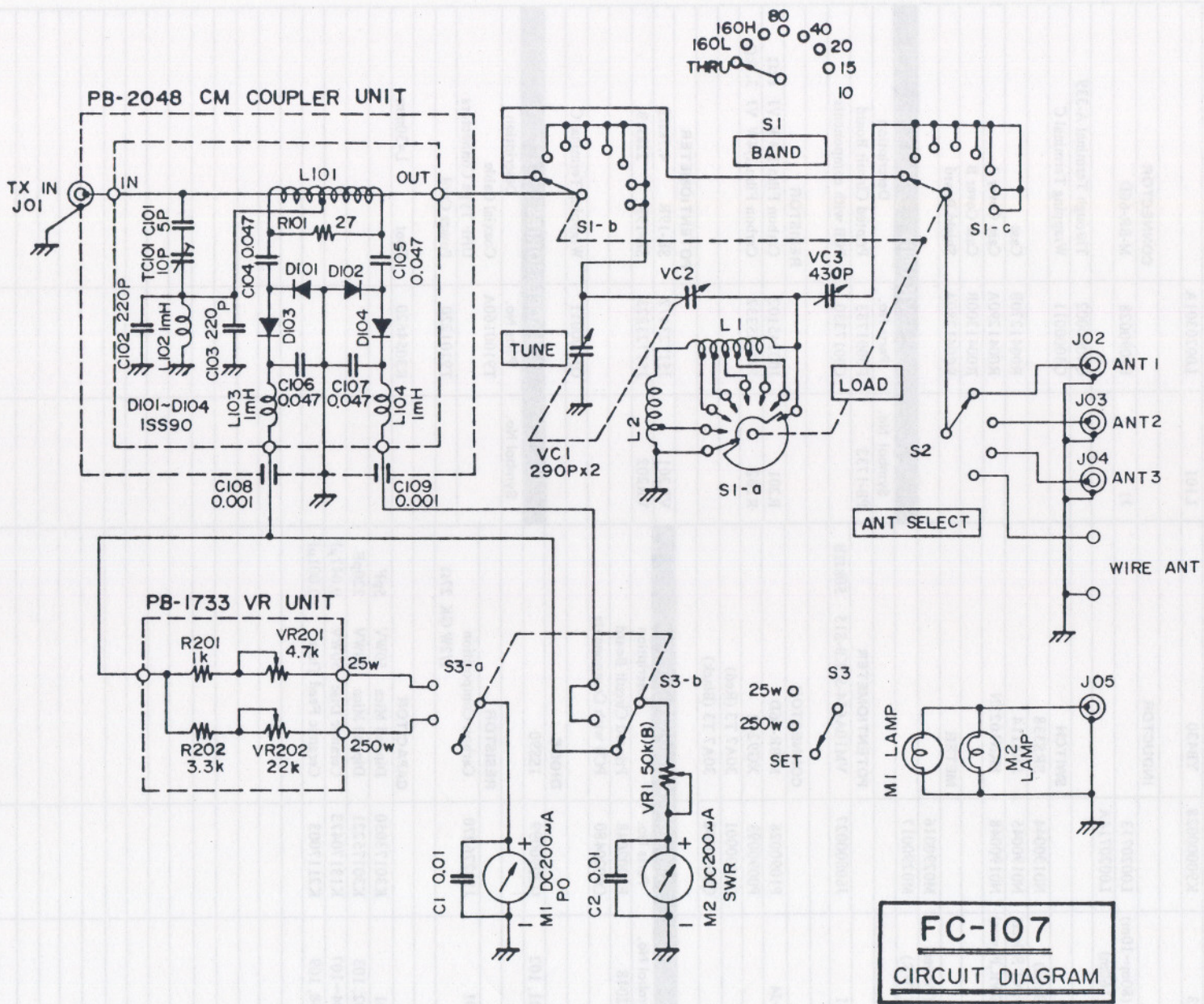
## NOTES ON ANTENNA MATCHING

- 1) It is very important that the maximum time limits during tune-up conditions for the transmitter are not exceeded. This is particularly important when the transmitter is being used at full power.
- 2) It should be noted that any matching performed by the FC-107 in the shack will have no effect on the losses due to SWR on the coaxial line between the FC-107 coupler and the antenna. The operator should consult one of the popular antenna handbooks to determine whether or not matching between the coaxial line and the antenna must be performed at the antenna. For example, a 100-foot length of RG8A/U coax typically has a loss (with 1:1 SWR between it and antenna) of less than 1 dB at 21 MHz. If this line is operated with a 3:1 SWR due to a low or high antenna impedance, the loss due to SWR will increase roughly 0.5 dB, an imperceptible degradation as compared to the 1:1 condition. In this case, attempts to reduce the 3:1 SWR at the antenna end would serve no useful purpose as far as reducing losses in the coax, though matching with the FC-107 would improve the impedance presented to the transmitter output circuitry. However, if a 500-foot length of the above coax were used instead of only 100 feet, somewhat more than 1 dB of loss would occur in the coax due to the 3:1 SWR, possibly justifying further matching attempts at the antenna.
- 3) When using a transceiver such as the FT-107M which has protection for the output transistors against high SWR, it can be seen that the matching action of the FC-107 will ensure that a 50 ohm load is presented to the output circuitry, thus ensuring full transmitter power.
- 4) It may be useful for the operator to record in a notebook the proper TUNE and LOAD positions for a particular antenna for quick reference. Alternatively, appropriate labels may be fabricated and applied to the FC-107 front panel showing the proper positions of the TUNE and LOAD controls.











#### **IMPORTANT NOTE**

Your Yaesu equipment is backed by a warranty that guarantees your set to be free of defects. Take a few minutes to read the warranty card carefully. Make certain that you fill out the card completely, and mail it at once, in order to qualify for warranty service.

Warranty service is to be performed by the dealer from whom the equipment was purchased. Do not return the equipment to Yaesu for servicing without first getting a service authorization from the Yaesu Service Center. Estimates of the approximate cost to repair are available upon request.



IMPORTANT NOTE

... your set  
... a few minutes to read the warranty card  
... the card completely, and mail it  
... from whom the equip-  
... to Yaesu for servicing  
... from the Yaesu Service Center.  
... are available upon request.

