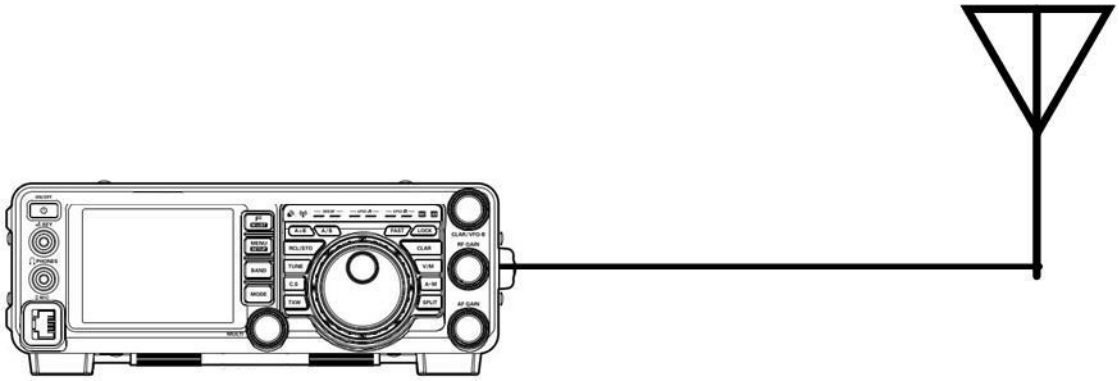
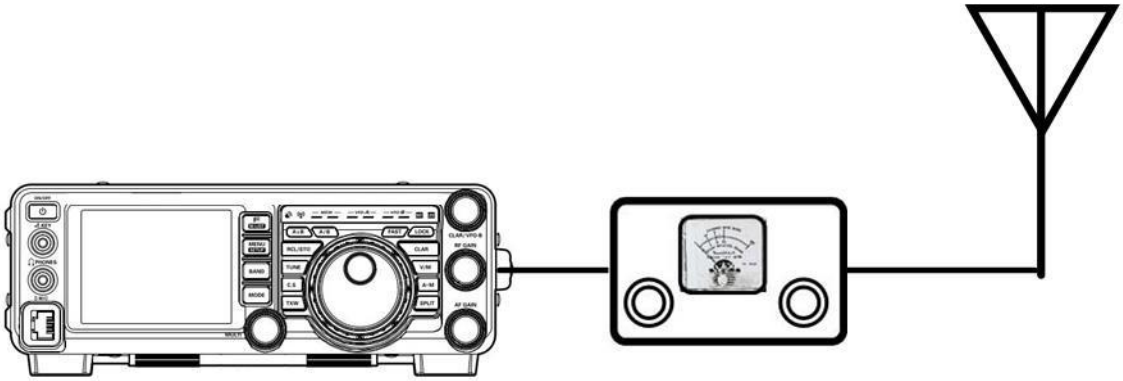
DIY Build instructions
RF System Antenna Dummy Load
Coastal and SLV ARES Amateur Radio Emergency Service

RF System Antenna Dummy Load (what is it, how is it used)

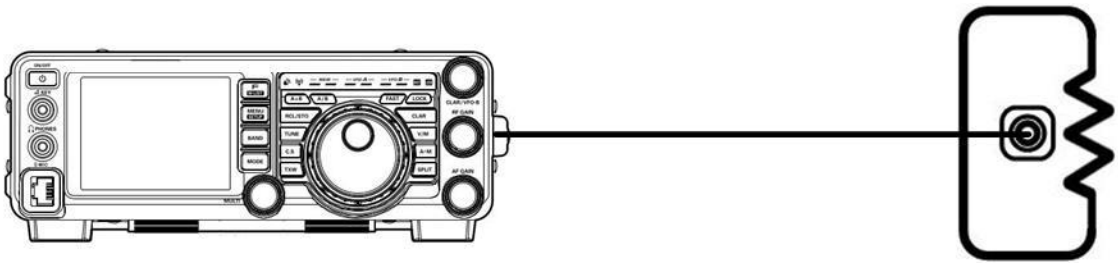
A dummy load is a device also known as a dummy antenna or a radio frequency termination. This device is used to simulate an electrical load of an resonate antenna, usually for testing purposes. Many consider a dummy load a "key piece of test equipment in your Ham Shack". The dummy load will enable the testing of your radio transceiver power output, audio levels, RF gain, ALC settings, and sections of test coax cable used in portable applications. The significant value of a dummy load is that ensures that while testing you do not interfere with shared amateur band resources. The illustrations below illustrate typical radio usage with and out a dummy load connected.



Typical radio operation transceiver connected to antenna
Station is transmitting to amateur band resources

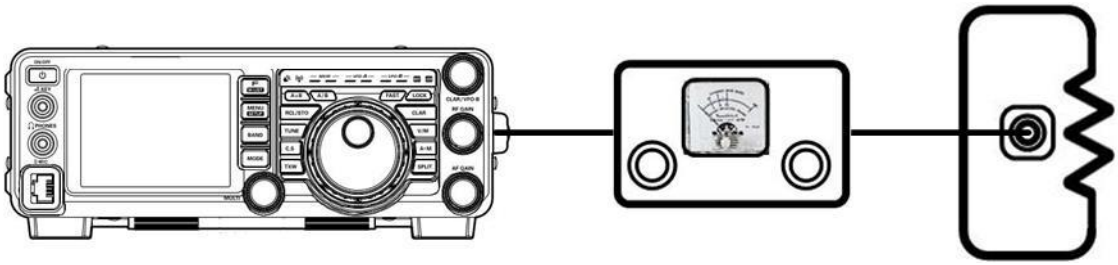


Radio station testing SWR /Power Out connected to antenna
Station is transmitting to amateur band resources



Radio station testing connected to RF dummy load adjust of for Audio levels, RF gain, ALC settings without interfering with shared amateur band resources

Note: While transmitting into the dummy load from a 100-watt transceiver the dummy load aluminum enclosure will get as hot as a 100-watt incandescent bulb



Radio station testing connected to RF dummy load SWR /Power Out testing or of for Audio levels, RF gain, ALC settings without interfering with shared amateur band resources

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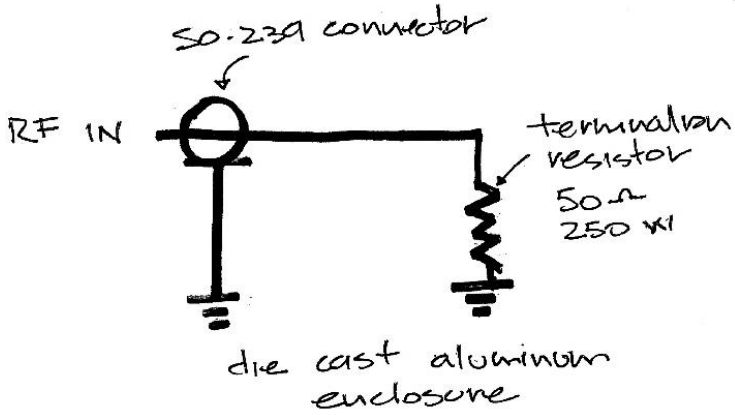
DIY RF System Antenna Dummy Load

The Dummy Load design selected for this DIY project is a 50 ohm 250-watt microwave termination resistor and S0-239 chassis mount connector mounted to die cast aluminum enclosure. The is a simple and cost-effective RF test equipment for radios up the 100-watt RF output.

Completed DIY RF System Antenna



Schmetatic DIY RF System Antenna Load

Components, Tools and Consumables

Components

Component Description	Quantity
SO-239 4-hole chassis mount connector for PL-259 Male Plug Amazon: UHF SO-239 4-hole chassis mount connector solder cup Pack of 2 $ 6.89	1 each
50 ohm 250-watt microwave termination resistor Amazon: RF Termination Microwave Resistor Flange Mount Dummy Load RFP 250N50 $ 9.34	1 each
Hammond 1590A Die Cast Aluminum Enclosure Amazon: Hammond 1590A Die Cast Aluminum enclosure $ 7.49	1 each
Stranded Coper Wire 10-awg	6 inches
Flat Head Machine Screws 6-32 x 3/8	4 each
Machine Nut 6-32	4 each
Flat Washer 6-32	4 each
Lock washer 6-32	4 each
Flat Head Machine Screws 4-40 x 3/8	2 each
Machine Nut 4-40	2 each
Flat Washer 4-40	2 each
Lock washer 4-40	2 each

Tools

Tool Description	Quantity
Soldering Iron 60 watt / 440 degrees C	1 each
Side cutting pliers / Wire Cutters	1 each
Needle Nose pliers	1 each
3/16-inch drill bit	1 each
1/2-inch drill bit or step drill bit	1 each
45-degree counter sink bit	1 each
Philips's screwdriver	1 each
Spring Center Punch	1 each

Consumables

Consumables Description	Quantity
Solder	AR
Blue Painter Tape	AR
Thermal Compound Paste	AR

Amazon: Thermal Paste SYY 2 grams CPU Paste Thermal Compound Heatsink thermal interface material $ 5.98

Component location layout on aluminum enclosure

The die cast aluminum enclosure provides a mounting structure for the SO-239 connector and resistor, as well as a heat sink to dissipate the heat generated by the 50-ohm 250-watt termination resistor. Note: while transmitting into the dummy load from a 100-watt transceiver the dummy load aluminum enclosure will get as hot as a 100-watt incandescent bulb.

The use of the blue painter tape protects the surface to the enclosure during the layout, and drilling of the mounting holes. The blue painter tape with hole layout for the SO-239 connector the flange resistor as illustrated in Figures 1 and 2, respectively.

Bottom of the aluminum enclosure
Figure 1

End of the aluminum enclosure
Figure 2

With the hole locations marked use the spring center punch tool to make an indentation in the aluminum enclosure. Drill the thru holes using the 3/16 drill bit for the SO-239 connector the flange resistor mounting holes. Use the ½ drill bit or step drill bit to enlarge the thru hold for the S0-239 connector as illustrated in Figures 3 and 4, respectively.

SO-239 4-hole chassis mount connector holes
Figure 3

Flange resistor mounting holes
Figure 4

The flange mount microwave termination resistor will be attached using flat head machine screws. The holes for the resistor need to be counter bored to accept the flat head machine screws. Using the 45-degree counter sink bit, counter sink the resistor mounting holes as illustrated in Figure 5.

Counter sink added to the resistor mounting holes
Figure 5

Removing the blue painter tape reveals clean thru holes and an unmarred enclosure surface as illustrated in Figures 6 and 7, respectively.

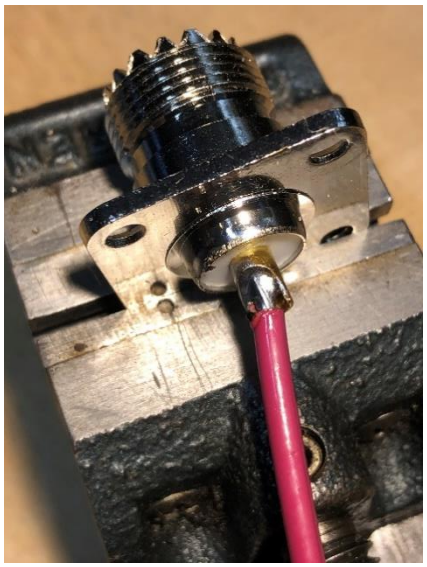
SO-239 4-hole chassis mount connector holes
Figure 6

Flange resistor counter sink mounting holes
Figure 7

Electrical Component Assembly

The electrical connection will be inside the enclosure cavity which will create some difficulty to the wire soldering. The SO-239 chassis mount connector will have the feed line wire that will connect to the termination resistor assembled outside the enclosure and then assembled. Position the SO-239 chassis mount connector and stripped length of the feed line wire as illustrated in Figure 8. Trim the copper wire so that it will fit inside the S0-239 connector solder cup and solder the wire in place as illustrated in Figure 9.

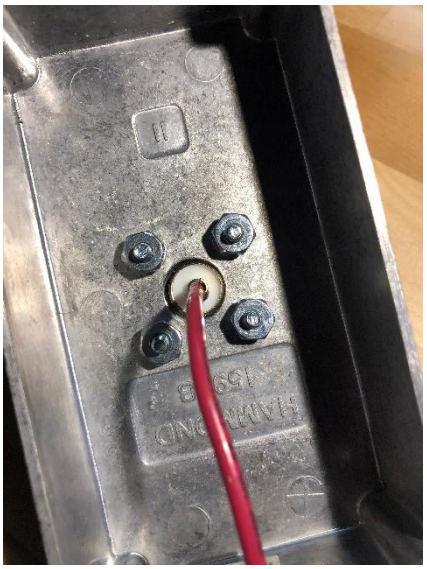
SO-239 chassis mount connector with stripped length of the feed line wire
Figure 8



Feed line wire soldered in S0-239 connector solder cup
Figure 9

Route the feed wire into the ½ inch hole and attach the S0-239 chassis mount connector using the 6/32 flat head machine screws, washers, and nuts as illustrated in Figure 10.

S0-239 chassis mount connector attached to the outside view of the aluminum enclosure

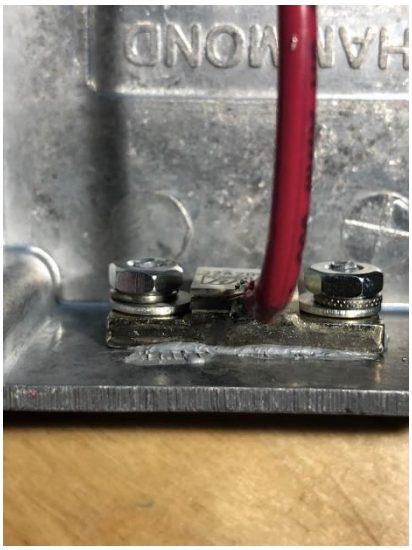


S0-239 chassis mount connector attached to the inside view of the aluminum enclosure

Figure 10

The flange mount microwave termination resistor is correctly installed with a thin layer of thermal compound paste between the resistor mounting flange and aluminum enclosure. The thermal compound paste can be applied using the dispenser as illustrated in Figure 11. The flange mount termination resistor is then mechanically attached the aluminum enclosure using 4/40 flat head machine screws, washers, and nuts as illustrated in Figure 12. Attach the feed line from the S0-239 connector to the tab on the flange mount microwave termination resistor as illustrated in Figure 13.

The sequence od assembly steps are listed in sequence Figures 11, 12, and 13, respectively.



thin layer of thermal compound paste between the resistor mounting flange and aluminum enclosure
Figure 11

4/40 flat head machine screws, washers, and nuts

Figure 12

feed line from the S0-239 connector to the tab on the flange mount microwave termination resistor
Figure 13

Aluminum enclosure cover / completed DIY RF System Antenna Dummy Load

Add the aluminum enclosure cover to the aluminum enclosure, using the provided flat head Philips machine screws, as illustrated in Figure 14. The remaining pictures of the completed DIY RF System Antenna Dummy Load in Figure 15.

Installed aluminum enclosure cover
Figure 14

Completed DIY RF System Antenna Dummy Load

SO-239 connector

Enclosure side view

Enclosure end view resistor mounting screws

Figure 15