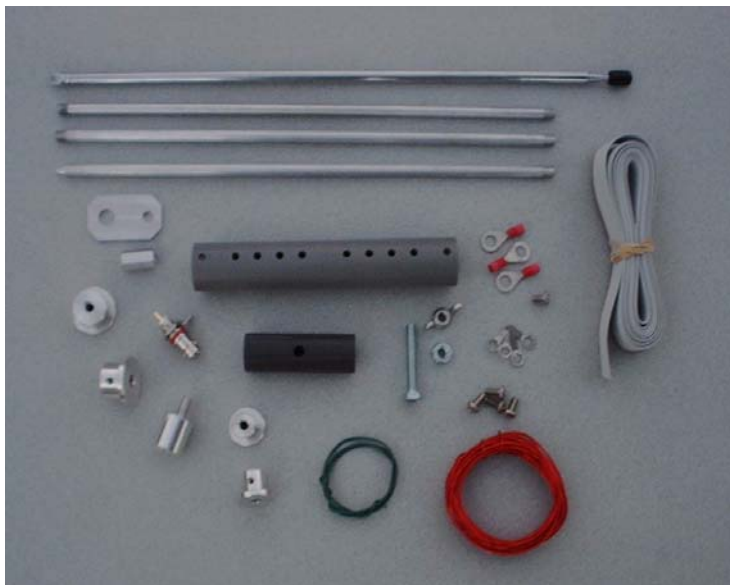




## PAC-12 Kit Contents

<u>Part</u>	<u>Quantity</u>
Screws: 8/32 x 3/8"	8
Screws: 8-32 x 5/16"	2
Screw: 8-32 x 1/4"	1
#8 internal tooth washers	8
#8 solder lug ring terminals	6
Bolt: Aluminum, 1/4-20 x 1.5"	1
1/4" internal tooth washer	1
Nut: Aluminum hex, 1/4-20	1
Stainless wing nut, 1/4-20	1
1/4" ring terminals	3
BNC connector	1
BNC mounting plate	1
Wire, PVC insulated stranded	12"
Wire, 18AWG enamel copper	1
14 conductor ribbon cable roll	1
Feedpoint insulator PVC tube	1
Feedpoint insulator end caps	2
6" Coil form, PVC	1
3.5" Coil form, PVC	1
Coil form end caps	4
Aluminum Rods 12"	2
Aluminum hex coupling nuts	1
72" telescoping antenna	1
Antenna whip adapter	1
Aluminum ground spike	1



### Tools Needed

Soldering iron  
 Phillips screwdriver  
 Wire stripper  
 Wrenches, 7/16" and 1/2"  
 Terminal crimp tool  
 Pliers  
 Solder

## Feed point insulator assembly

### Parts:

- PVC base tube (1)
- Aluminum end caps (2)
- 8-32 x 5/16" Phillips head screws (2)
- #8 Size solder lugs (2)
- BNC mounting plate (1)
- BNC connector (1)
- Green stranded wire (12")
- Stainless wing Nut (1)



Start by inserting the 2 smaller aluminum end caps into the ends of the PVC tube. Align the holes and secure using the two 8-32 x 5/16" stainless screws with a solder lug placed under each screw. Be sure to use the correct screws, as the longer 3/8" screws supplied for the loading coil will interfere with the threaded sections screwing into the end caps. The screws should start smoothly and should not require much effort to tighten. If otherwise, make sure the threads are aligned properly. Be careful not to over tighten as the end cap metal is aluminum and is it possible to strip the threads.



Using the 1/4 -20 x 1.5" bolt, lock washer and nut, attach the BNC mounting plate to the feed point insulator PVC tube by inserting the bolt through the PVC tube and then through the aluminum bnc mounting plate. Secure with a lock washer and the 1/4-20 nut. Tighten from the bolt head side while holding the BNC plate in position.



Mount the bnc in the plate and secure using its nut. The BNC connectors may be supplied with a red rubber gasket that should be removed before installation.

Once the BNC is securely installed, cut small lengths of the insulated stranded wire (green) from the 12" section provided. Tin the ends and solder between the bnc fitting and the solder lugs under each screw. Be sure to sufficiently heat all connections so that the solder flows smoothly and a good physical and electrical bond is formed.



Install the stainless wing nut screw onto the end of the 1/4-20 bolt in the center. It is used to secure the ring terminals for connection of the radials.

This completes the assembly of the feed point insulator. Check for continuity using an ohmmeter between the center and shell of the BNC and the end caps of the antenna. Resistance readings should be no more than one or two ohms including the meter lead resistance. Also verify that there is no short by checking resistance between the end caps or across the BNC. Resistance should read very large or infinite here.

Note that the feed point insulator is symmetric. This feature allows the antenna to be used as a dipole as well as a vertical. When used as a dipole, the bolt in the center serves as the antenna support point for attaching to a mast. When using the antenna as a vertical, make sure to install the feed point insulator with the center conductor of the bnc connected to the antenna and the shell to the radials.

## Loading coil assembly

### Parts:

- PVC coil form, light gray (1)
- Aluminum end caps (2)
- 8-32 x 3/8" stainless Phillips screws (4)
- #8 internal tooth lock washers (2)
- #8 ring solder lugs (2)
- #18 Enamel insulated copper wire



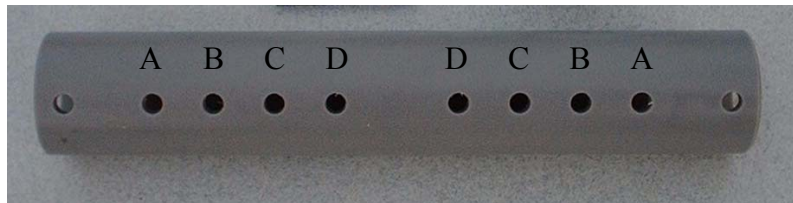
The loading coils are assembled using the 2 larger end caps, the larger light gray PVC coil form and 4 of the 8-32 x 3/8" screws. Two #8 lock washers and 2 #8 solder lugs are used. The two lock washers go on one side to secure the screws and the 2 solder lugs go on the other side and are used for connecting the coil windings. Insert the end caps, align the screw holes and insert the screws.



The assembly process for the loading

coil end caps and screws.

Once the coil form is assembled, it is ready for winding the loading coil. The coil form has a series of holes used to secure the ends of the winding. Depending on which band you plan to construct the coil for, you will use different sets of the holes.



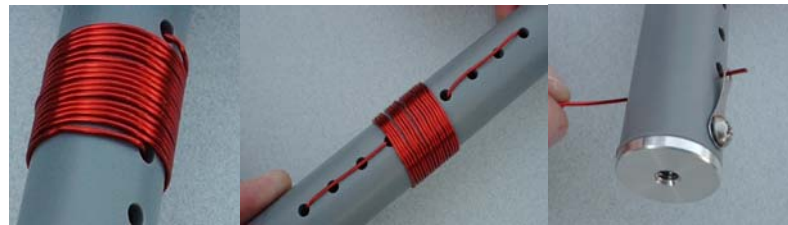
The coil form tube showing the holes used to secure the ends of the coils. Pairs of holes are labeled with letters that are used in the winding chart below.

<b>Band Meters</b>	<b>Turns to wind</b>	<b>Hole set(see photo)</b>
<b>10</b>	<b>1 or jumper</b>	<b>D</b>
<b>12</b>	<b>4</b>	<b>D</b>
<b>15</b>	<b>8</b>	<b>D</b>
<b>17</b>	<b>11</b>	<b>D</b>
<b>20</b>	<b>17</b>	<b>D</b>
<b>30</b>	<b>29</b>	<b>C</b>
<b>40</b>	<b>57</b>	<b>B</b>
<b>60</b>	<b>93</b>	<b>A</b>



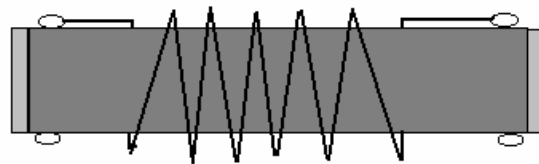
A complete set of coils for 60, 40, 30, 20, 17, 15, and 12M. For 10M you can use the 15 or 12M coil with the whip collapsed for tuning or use a short jumper across any of the lower frequency coils.

First, tin the end of the enamel wire by heating with a blob of solder. Feed extra solder in as necessary and you will see the enamel begin to peel off and the solder will coat the bare end. Tin approximately 0.5" of the wire to prepare it for connection at the solder lug later. Determine hole pair from the winding chart and pass the end of the enameled wire through one of the holes so that it passes through the coil form from one side to the other. Pull enough extra wire to loop back through hole set A and to pass through the hole in the solder lug on the end of the form.



This photo set illustrates how the wires are routed through the holes at the ends of the coil. For example, for the 20M coil, pass the end of the wire through the coil form in one of holes labeled **D**. From the other side of the coil, pull enough wire to lie along the coil form and pass back through the coil through hole set **A**. Hole set **A** will be used in this fashion for all coils except the 60M one. In that case, the wires at the end of the coil just pass through hole set **A** and connect to the solder lugs. In all other cases they form a loop from one side to the other and back again. This helps to strain relief the end connections.

Note in the photos of the entire coil set how the wires pass into the form on one side and along the form on the opposite side to secure the coils. From one side you should have the coil ends disappearing into the coil form and from the other, the wires emerge, lie along the coil form and re-enter at hole set A, pass through and connect at the solder lugs. If using the inner hole sets, you can loop the wire back and forth through the unused hole sets to prevent a long run down the coil form on one side.



Secure the terminal and fold the wire down to lie flat along the terminal. If you do not wish to permanently connect the coil, you may rather just loop the wire under the screw and the lug and connect by tightening. Otherwise, solder the wire to the terminal. You may find it best to remove the terminal while soldering to avoid melting the PVC form.



Begin by winding the coil by turning the form while feeding the wire onto it. Using the thumb and forefinger will work to guide the wire. Each time the wire passes around the form and back past the point where it enters the hole in the PVC counts as one turn. Continue winding until the specified number of turns has been applied. If you need to stop during the process, secure the windings using adhesive tape until you are ready to continue. While winding, you may find it necessary to occasionally push the turns together for a tighter coil. On most coils except for 60M, there is extra space and this is not strictly necessary, it just improves the appearance.

Once the required number of turns has been applied, cut the wire with approximately 6" extra. Pass the end of the wire through the PVC tube using the adjacent set of holes and then back through the next set. Pull the wire tight during this step to secure the coil.

Measure the length of wire to reach the screw and cut it, leaving enough to loop around the screw. Strip the insulation from the end as before and tin with solder. A blob of solder on the tip of the soldering iron will usually remove the insulation and tin the wire.

Form the wire around the screw under the terminal but not soldered to it and tighten to secure. This is a temporary connection for testing of the antenna. Once the resonant point is checked, the wire may be soldered to the terminal as was done on the opposite end. Or, if you plan to rewind the coil for another band at some point, just secure both ends of the wire under a screw with a loop as shown in the last photo below.

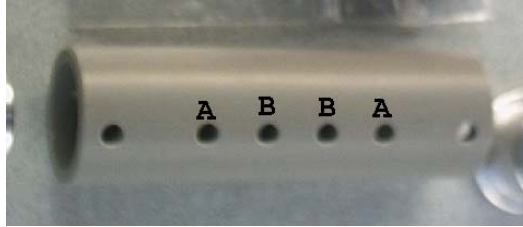


A completed coil. Note the wire routing and one end left unsoldered for testing.

Once complete, check the end-to-end resistance of the coil using an ohmmeter. It should be no more than one or two ohms or less for any of the coils. If a resistance value higher than this is noted, recheck the tightness of the screws and that the solder joint and loop make good contact.

### 3.5" Compact Coil Instructions:

For winding the Compact coils, use the same technique and winding chart as for the full size 6" coils. There is sufficient space on the form for winding coils for 30M and higher. The coil forms have 4 holes used for securing the ends of the coils during and after winding. See the photos and chart below for information:



Band Meters	Turns to wind	Hole set (see photo)
10	1 or jumper	B
12	4	B
15	8	B
17	11	B
20	17	B
30	29	A

As with the full size coils, start by passing the end of the wire through the coil and attach a solder lug or strip the wire and loop under the screw at one end of the coil. Wind as with



the full size coils, counting the turns each time it passes back past the start point. I recommend just stripping or tinning the other end and looping it under the screw for testing.

Assemble the antenna and test for lowest swr. You may need to collapse up to one full section or more of the whip to achieve a low swr at the low end of the band. The coil turns specified above will put the swr minimum at or near the low end of each band. To go higher, you simply collapse the whip. You may need to collapse up to one full section or more of the whip to achieve a low swr at the low end of the band. If more than one section is collapsed, remove a turn from the coil and retest. Once you are happy with the coil, you can solder the end to a solder lug or just leave it looped under the screw.



## Whip assembly.

**Parts:**

**72" telescoping whip (1)**

**Aluminum whip adapter (1)**

**8-32 x 1/4" Phillips head screw (1)**

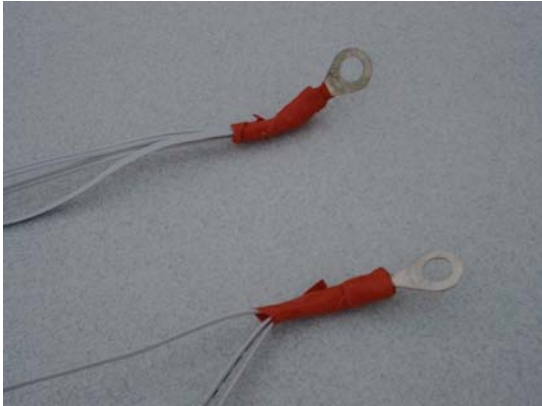


To assemble the whip, slip it into the whip adapter until it hits bottom. If the fit is tight, it may require rotating the whip slightly while inserting. Once in place, secure using the 8-32 x 1/4" Phillips head screw. This completes the whip assembly.



## Radial Ground coupling system

**Parts:**  
**14-conductor ribbon cable**  
**1/4" ring terminals**



The ribbon cable supplied is used to produce a set of short radials. These are intended for operation when the antenna is ground mounted as an earth coupling system. If the antenna is to be mounted above ground, a set of at least 3 or 4-quarter wave radials should be used for each band.

Simply separate the 14-conductor ribbon cable into 2-conductor sections giving a total of 7 wires. While you can separate into single wires, I do not recommend this, as the wires are somewhat fragile alone. Strip the ends of the

wires back a half-inch or so, and twist them together. You should be able to put 3 or 4 twisted sets into one ring terminal. Crimp the terminal and use electrical tape or heat shrink tubing to strain relief the connection.

## Assembling the antenna

### Caution

**As with any antenna, do not use near electrical wires either overhead or buried.**

**Use caution whenever using the ground spike to make sure the area is clear of buried plumbing or electric wires. If in doubt, do not use the ground spike.**

**Also, use caution with the ground spike as the end is sharp and can cause injury. Do not allow children to play with the antenna.**

## Assembly

To assemble the antenna, gather the parts that have been prepared. In addition to the components that you have already assembled, you will need the 2- 12" aluminum rod sections, coupling nuts and the ground spike (if ground mounting the antenna). If it is available, some aluminum antioxidant grease will make assembly and disassembly of the antenna easier as well as maintain good conductivity between the sections. Small tubes of a suitable material can be found in the electrical sections of most hardware stores where it is sold for use with aluminum house wiring and interconnects.

Screw the ground spike into the grounded side (BNC shell) of the feed point adapter. Screw a 12" rod section into the other end. Place a coupling nut on this rod and add the second section of rod. The loading coil screws onto the end of the second rod. Tighten all connections securely but do not over tighten as the threads may be damaged.

Connect the whip to the other end of the coil by screwing the adapter into the threaded opening in the coil. This completes assembly of the antenna.



For operation, connect the radial wires or counterpoise to the 1/4" bolt in the center of the feed point using the supplied wing nut to secure the ring terminals on the radial wires.

The antenna will also mount on any standard camera tripod using a 1/4-20 thread.

If mounted much above ground, it may be necessary to use resonant radial wires for best performance. The radial kit supplied is intended for close ground mounting and is designed for coupling to the ground under these conditions. When the ground is not present, longer radial wires will improve performance.

Thank you for purchasing the PAC-12 antenna kit, please contact us via email if we can help in any way.

The latest version of this manual will also be posted on our website.

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