

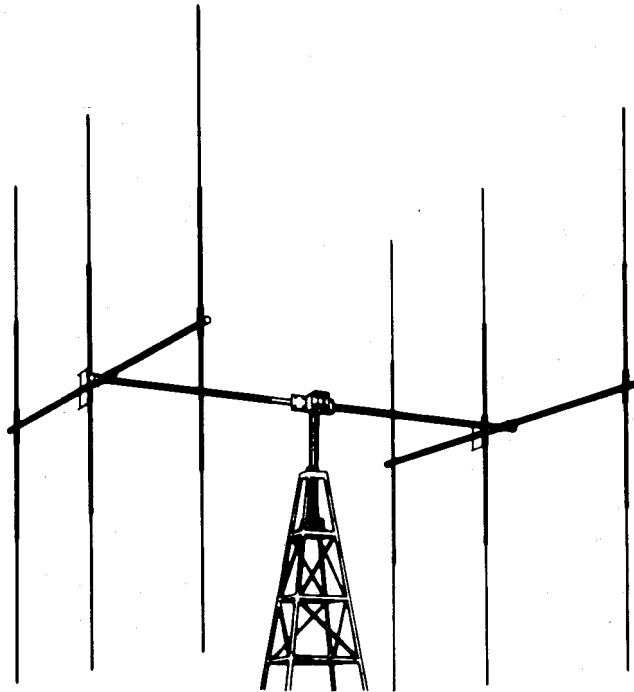
# INSTRUCTION MANUAL

**ORDER NO. 542**

**Model SDB6  
"Super Duo-Beam" antenna**

PN 801254

AO-0542-A-001



## **General Description**

The Hy-Gain Model SDB6 is a twin-driven antenna system that multiplies the effective radiated power of any efficient 5-watt CB transceiver to 93 watts. The antenna system consists of two 3-element beams stacked and connected with a phasing harness to obtain maximum gain and directivity. It can be rotated with any heavy-duty rotator.

## **Construction**

Taper-swaged, seamless, aluminum tubing gives maximum mechanical strength and durability. The compression clamps used at the tubing joints will not vibrate loose in the wind. All hardware is iridite treated to prevent rust and corrosion. The Model SDB6 is built to give years of trouble free service.

## **Theory of Operation**

The Model SDB6 consists of two antennas, each with a reflector, driven element and director. The antennas are optimum spaced and fed with a pre-assembled phasing harness. This enables the signal from one antenna to reinforce the signal from the other antenna. The overall effect is a tremendous gain in effective radiated power and maximum front-to-back ratio.

## Specifications

### **Electrical**

|                            |                 |
|----------------------------|-----------------|
| Gain .....                 | 12.7 dB         |
| Front-to-back ratio .....  | 23 dB           |
| SWR at resonance .....     | less than 1.4:1 |
| Coaxial feedline .....     | 52 ohms         |
| Lightning protection ..... | DC ground       |

### **Mechanical**

|                                 |              |
|---------------------------------|--------------|
| Boom length .....               | 12' 2"       |
| Cross boom length .....         | 14'          |
| Longest element .....           | 18' 6½"      |
| Boom diameter .....             | 1¼"          |
| Cross boom diameter .....       | 2"           |
| Element diameter (tapers) ..... | ⅞" to ⅞"     |
| Turning radius .....            | 9' 6"        |
| Mast bracket accommodates ..... | 1¼" to 2½"   |
| Maximum wind survival .....     | 75 mph       |
| Net weight .....                | 33.2 lbs.    |
| Wind surface area .....         | 6.10 sq. ft. |
| Wind load (80 mph) .....        | 120 lbs.     |

## Feedline

The input impedance to the antenna is 52 ohms. RG-8/u coaxial cable is recommended. For improved performance, an RF choke may be constructed as shown in Figure 5.

## Step-by-Step Assembly

( ) Unpack the antenna and check the parts against the Parts List. Familiarize yourself with the parts and drawings. Read all instructions before assembling the antenna.

**NOTE:** When unpacking your antenna, check the inside of all tubing for parts (clamps, insulators, smaller tubing, etc.). To conserve space, these smaller articles are sometimes put inside larger pieces.

( ) Select the two cross support booms (2" x 84"), the cast aluminum bracket, the casting-to-boom bracket, and the boom-to-bracket clamp. Assemble them as shown in Figure 2. Attach the 10-24 x 1" flat head screw to the boom-to-bracket clamp prior to assembly of the boom and bracket.

( ) Assemble the driven element and reflector boom (1¼" x 72") as shown in Figure 2. Adjust the boom spacing to 13' 8" (measured from center) and tighten the boom-to-boom cross support brackets securely.

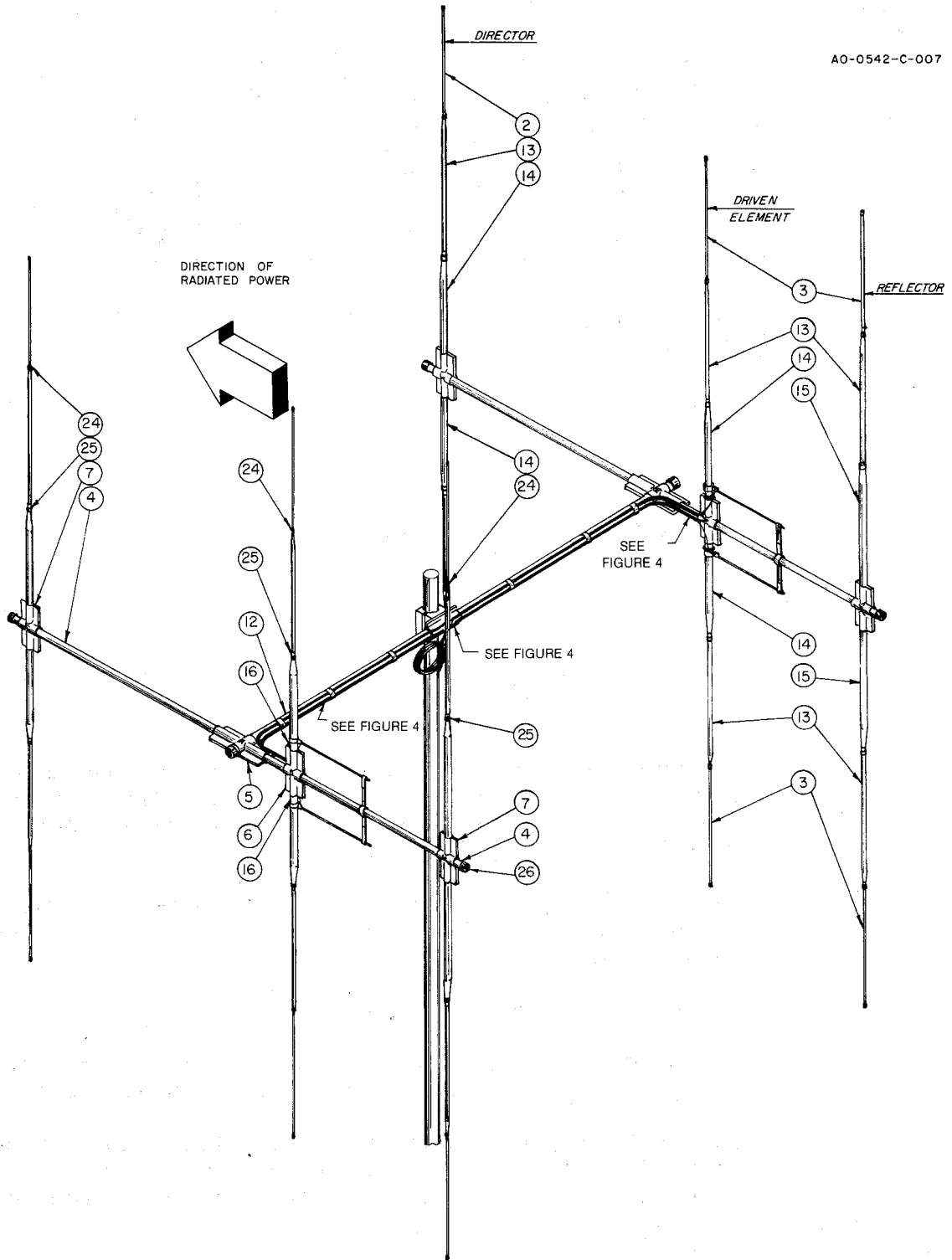
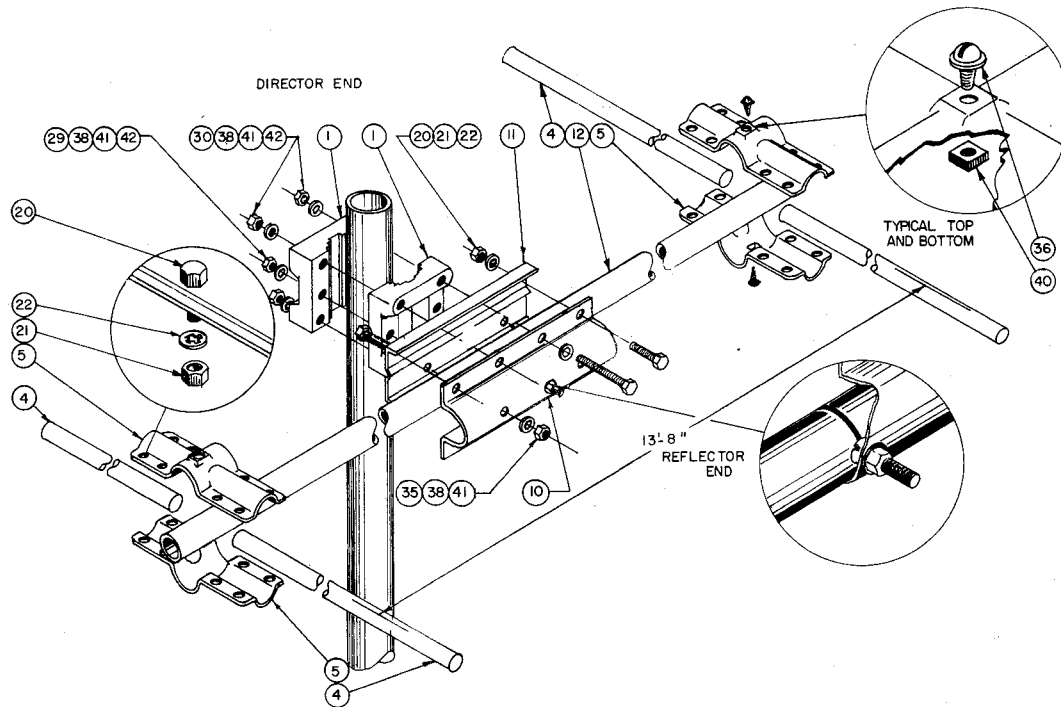


Figure 1. Overall View



**Figure 2. Boom and Cross Support Assembly**

( ) Assemble the elements as shown in Figure 3. It is recommended that the reflector be assembled first and spaced  $2\frac{3}{8}$ " from the end of the boom. Assemble the driven element and director and space as shown in Figure 6. All dimensions are measured center to center.

**NOTE:** When assembling the elements, install the top elements first. Support the antenna on a 10' ladder or some similar support and install the bottom elements. The elements will not support the weight of the antenna.

( ) Install the beta match as shown in Figure 3.

( ) Place the  $\frac{7}{16}$ " caplugs with holes on the bottom of each element and  $\frac{7}{16}$ " caplugs without holes on the top of each element. Place a  $1\frac{1}{4}$ " caplug on each end of the boom.

( ) Select the feedpoint insulator and the two phasing harnesses. Install them as shown in Figure 4. Connect the large solder lug on the end of the braid at one end of the phasing harness to the driven element bracket. Attach the other end of the phasing harness to the feedpoint insulator.

( ) Connect the top driven element to the *top* phasing line center conductor. Attach the other end of the *top* phasing line center conductor to the *top* hole in the feedpoint insulator. Attach the center conductor of the *bottom* phasing line to the *bottom* driven element and the *bottom* hole in the feedpoint insulator. Install both phasing harnesses in this manner. Refer to Figures 4 and 5.

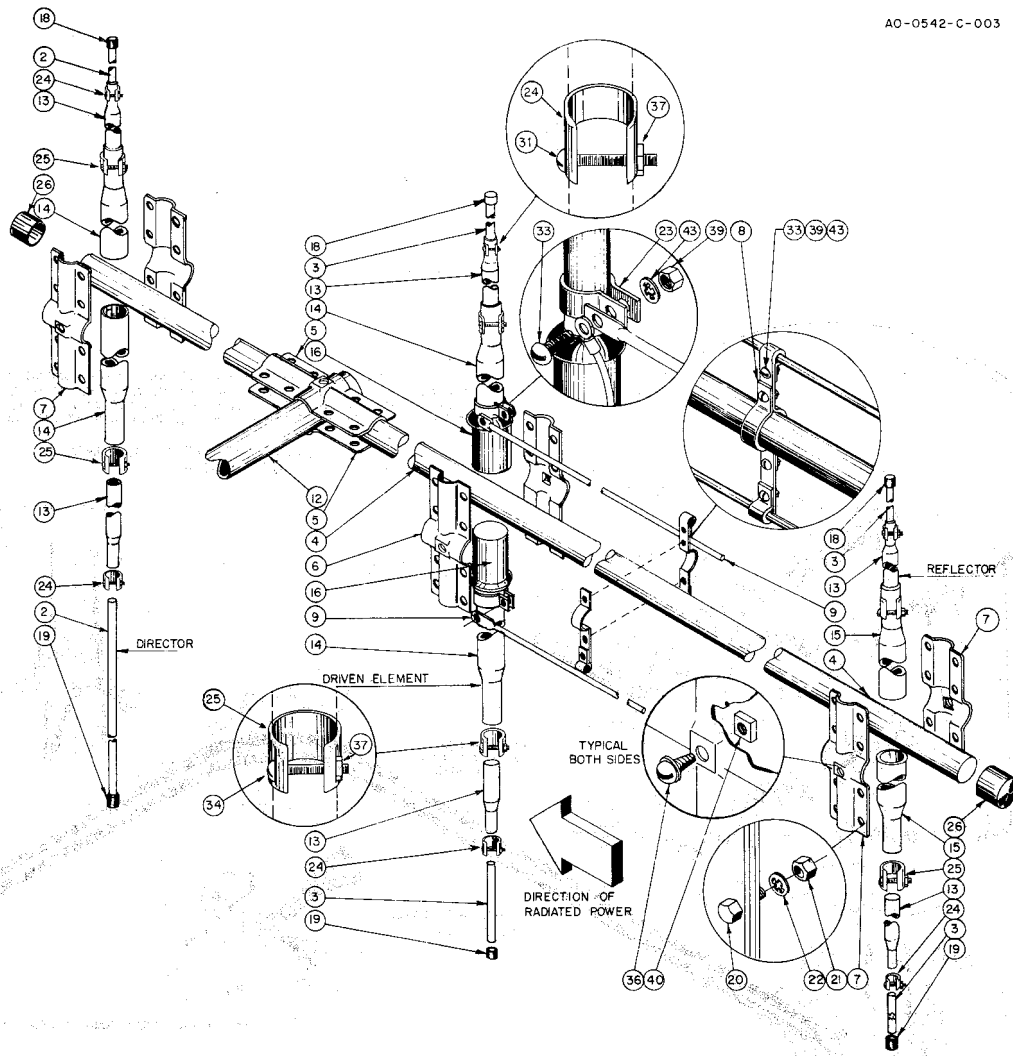
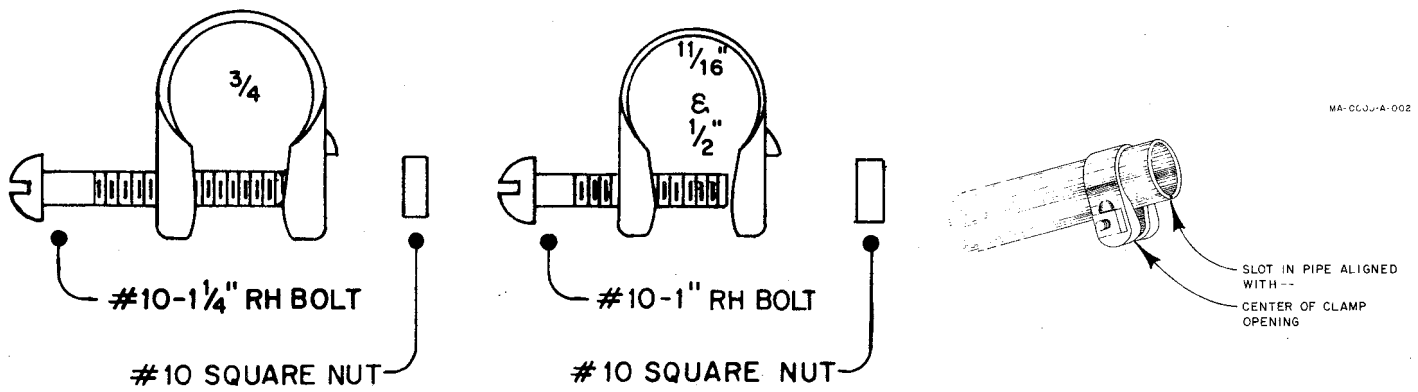


Figure 3. Element Assembly



**Compression Clamps**

When installing compression clamps, move the clamp to the end of the tubing with the joint of the clamp even with the slot in the tubing.



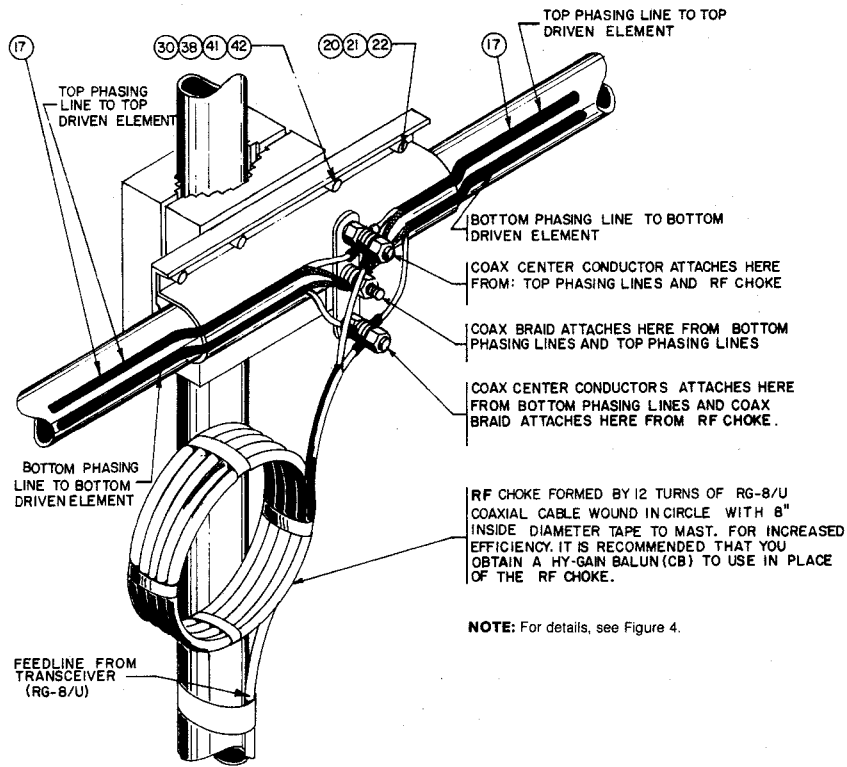


Figure 5. Feedline and RF Choke Installation

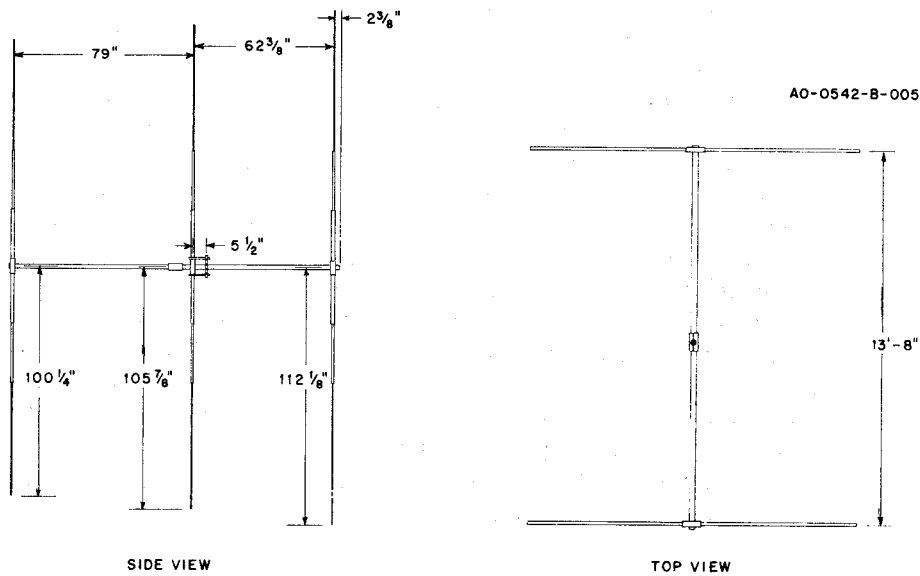


Figure 6. Element Spacings and Dimensions

( ) Securely tape the phasing harness to the boom using weatherproof tape.

( ) Wind an RF choke and attach to the phasing harness as shown in Figure 5. The choke should consist of 12 turns of RG-8/u coaxial cable wound in a circle with an 8" side diameter. Attach the center conductor of the choke to the center conductor of the *top* phasing line. Attach the choke braid to the center conductor of the *bottom* phasing line. Attach the other end of the RF choke to the transceiver.

For optimum band pass and signal gain, it is recommended that a Hy-Gain Model BN-27A balun be used.

( ) Securely tape all exposed portions of the coaxial braid to prevent it from shorting out on the antenna. Weatherproof all coaxial connections with Pli-O-Bond, Neoprene or some similar substance.

( ) Mount the antenna on a 1 5/8" O.D. mast. Be sure to leave enough slack in the coaxial cable to allow 360° rotation.

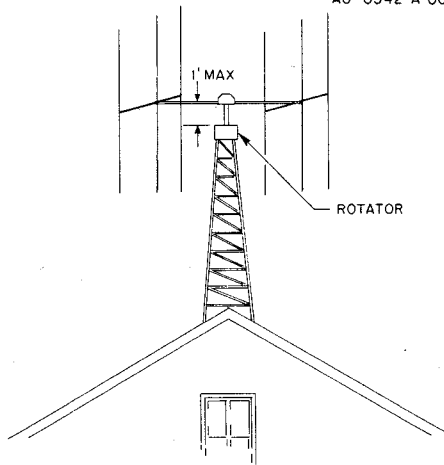
## Installation Procedures

When installing the assembled Model SDB6, there are several items to consider. The close proximity of metallic objects can seriously deteriorate the performance of any antenna. For best results, mount the antenna *at least* 20 feet away from power lines, TV antennas or any existing metallic objects. The recommended installation method, using a self-supporting tower, is shown in Figure 7. If the tower requires guy wires, they must be broken up with strain insulators every three feet. As an alternate method, the antenna may be mounted on the roof-top as shown in Figure 8. (Optimum results may not be obtained due to metallic objects such as rain gutters, house wiring, etc.) If this method of installation is used, the mast material must be 1 5/8" *heavy walled* material. Mount the antenna a maximum of one foot above the rotator and guy the mast directly below the rotator. Use three guy wires equally spaced and be *sure* to break them up every 3 feet with strain insulators. Install the guy wires so there is a minimum of 2 feet of clearance between the guys and the lower tip of the antenna element. This minimum of 2 feet of clearance and the use of strain insulators applies to *all* installation methods using guy wires.

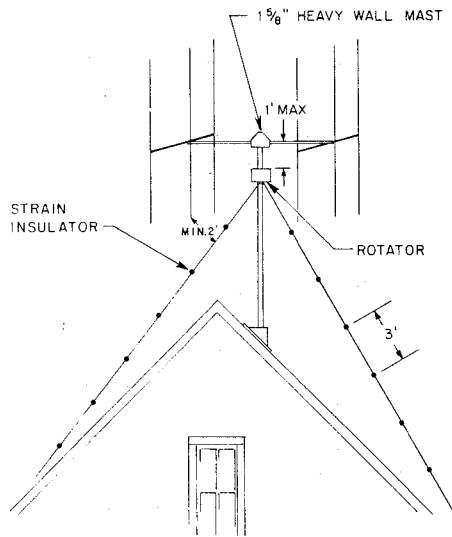
For proper lightning protection and to insure noise free performance, the supporting structure must be properly grounded. Use a 1/2" x 8" ground rod driven into the ground as close as possible to the base of the supporting structure. Connect the ground rod to the supporting structure using #10 or larger copper or aluminum wire.

**NOTE:** The boom-to-mast brackets have a hole through their centers to allow securing to the mast with the 5/16"-18 x 3 1/2" bolt. It is recommended that the mast be removed and an 1 1/32" hole be drilled at the desired mast position, then reinstall the mast. If this is not possible, the clamp will hold its position on the mast in all but the most severe weather conditions.





**Figure 7. Typical Self-supporting Tower Installation**



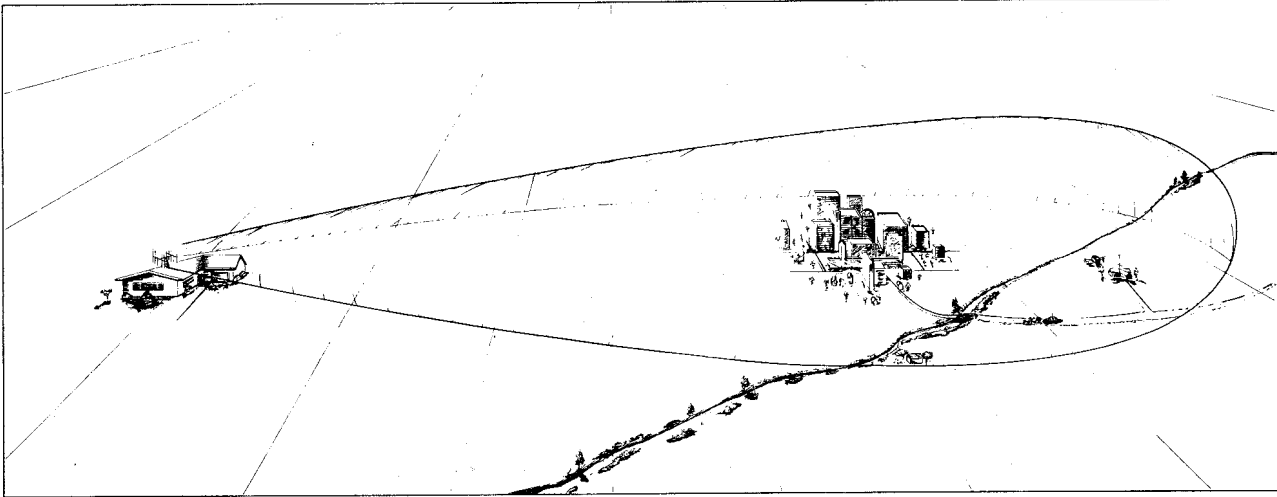
**Figure 8. Typical Roof Top Installation**

**WHAT TO EXPECT**

**Directivity**

The Duo-Beam concentrates the transmission of signal energy in one main direction and in the receive function is much more sensitive to signals in that same direction. What this means to you is shown in Figure 9. Since CB stations are usually liberally scattered in all directions, it is easy to see that the Duo-Beam with its narrow pattern can be rotated or oriented to maximize transmission to, and reception of, any one station or group of stations with which we wish to communicate. This greatly reduces interference from other stations on the same channel. In addition, other man-made interference (such as motors, ignition noise, diathermy, etc.) is minimized by the directivity of a Duo-Beam. Here, too, these unwanted noises come from all directions, — The Duo-Beam “hears” them only faintly while remaining sensitive to everything in its path.

If your Duo-Beam is on a rotator, a good check of its directivity is to rotate the beam while listening to, or observing the S-meter reading of, another CB station. You will notice the signal fades as the Duo-Beam turns. You can probably still hear the received signal, all the way around, but with much less strength.



**Figure 9. Duo-Beam Performance Pattern**

### **Gain**

As a direct result of the directivity of the Duo-Beam, a tremendous amount of gain is produced. Gain, of course, means increased signal strength — both transmitting and receiving — in the “power path” of the antenna.

### **Checking the Gain**

To check the gain, observe the S-meter reading or signal to background noise ratio of another CB station. Remember, you cannot compare loudness alone!! This is true because your CB transceiver has a built in AVC circuit (automatic volume control). This circuit automatically adjusts the volume so that you need not manually adjust to maintain a nearly equal loudness for all signals. At this point it is interesting to note that the human ear is non-linear in response to changes in power or energy levels. For the ear to sense a doubling of power, an actual increase of power by 10 times is required. For the ear to sense and increase of 4 times, the power must be increased by 1000 times. If you are trying to evaluate the Duo-Beam without an S-meter — the best way is to see how much additional range you can get — base to mobile or base to base. When checking the performance with an S-meter, be sure that one S unit on your meter is equal to at least 6dB or four times the power. On many CB S-meters — especially on the low end of the scale, this unit may represent as much as ten times the power!!

### **Performance**

So — here's what to expect from your Duo-Beam:

1. More consistent contacts under varying atmospheric conditions.
2. Reduction of unwanted interference.
3. Greater range where terrain permits.
4. Clearer, crisper signals with less background noise or hiss (better signal to noise ratio).

## Parts List

| Item | Part No. | Description                              | Qty | Item | Part No. | Description                  | Qty |
|------|----------|--|-----|------|----------|------------------------------|-----|
| 1    | 102734   | bracket, cast aluminum                   | 2   |      | 879249   | parts pack A                 | 1   |
| 2    | 177134   | tube, 7/16" x 56"                        | 4   | 23   | 163312   | tubing clamp, 7/8" tubing    | 4   |
| 3    | 174997   | tube, 7/16" x 60"                        | 8   | 24   | 380284   | compression clamp, 1/2"      | 12  |
| 4    | 174992   | boom, 1 1/4" x 72"                       | 4   | 25   | 380285   | compression clamp, 3/4"      | 12  |
| 5    | 165919   | bracket, #13, cross support-to-boom      | 4   | 26   | 455630   | caplug, 1 1/4"               | 4   |
| 6    | 165138   | bracket #1, driven element-to-boom       | 4   | 27   | 465410   | feedpoint insulator          | 1   |
| 7    | 165141   | bracket #2, director & reflector-to-boom | 8   | 28   | 501093   | screw, 10-24 x 1" flat head  | 1   |
| 8    | 166084   | clamp, beta-to-boom                      | 4   | 29   | 501541   | screw, 5/16"-18 x 3 1/2"     | 3   |
| 9    | 172997   | beta rod, 1/4" x 6"                      | 4   | 30   | 501543   | screw, 5/16"-18 x 5"         | 4   |
| 10   | 172732   | clamp, boom-to-bracket                   | 1   | 31   |          | (not used)                   |     |
| 11   | 172735   | bracket, casting-to-boom                 | 1   | 32   | 506455   | screw, 10-24 x 1" round head | 14  |
| 12   | 178411   | boom cross support, 2" x 84"             | 2   | 33   | 506460   | screw, 10-24 x 3/4"          | 12  |
| 13   | 190006   | tubing, 5/8" x 26"                       | 12  | 34   | 506450   | screw, 10-24 x 1 1/4"        | 12  |
| 14   | 190204   | tubing, 7/8" x 24"                       | 8   | 35   | 509173   | screw, 5/16"-18 x 2 1/2"     | 2   |
| 15   | 190207   | tubing, 7/8" x 32"                       | 4   | 36   | 505540   | screw, 1/4"-20 x 3/8"        | 16  |
| 16   | 473767   | driven element insulator                 | 4   | 37   | 555362   | nut, 10-24 square            | 24  |
| 17   | 873805   | coax assembly                            | 2   | 38   | 556945   | nut, 5/16"-18 hex            | 9   |
|      | 873882   | parts pack B                             | 1   | 39   | 556970   | nut, 10-24 hex               | 18  |
| 18   | 455644   | caplug, 7/16"                            | 6   | 40   | 558685   | nut, 1/4"-20 square          | 16  |
| 19   | 575639   | caplug, 7/16" w/hole                     | 6   | 41   | 567080   | lockwasher, 5/16" split      | 9   |
| 20   | 506325   | screw, 1/4"-20 x 3/4"                    | 68  | 42   | 567085   | washer, 5/16" flat           | 7   |
| 21   | 556960   | nut, 1/4"-20 hex                         | 70  | 43   | 567125   | lockwasher, #10 internal     | 18  |
| 22   | 567110   | lockwasher, 1/4"                         | 70  | 44   | 567130   | washer, #10 or 3/16" flat    | 3   |

### 90-DAY LIMITED WARRANTY

Hy-Gain Electronics Corporation warrants each new product manufactured to be free from defects in material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit which under normal installation, use, and service, discloses such defect within the ninety-day term of this warranty, dated from the date of purchase by the original owner. This warranty applies only to the original purchaser.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us. Nor does it extend to units which have been repaired or altered outside of our factory, nor to accessories used therewith not of our own manufacture.

Upon receipt of equipment, the purchaser is responsible for checking the contents for damage. Any shipping damage should be referred to the carrier.

Hy-Gain Electronics Corporation reserves the right to make any changes deemed necessary or desirable without advance notice or incurring any obligation to make like changes in units previously manufactured or sold.

This warranty does not cover transportation costs that may be incurred. Hy-Gain Electronics Corporation's sole liability is the remedy of any defect for the ninety-day period of this warranty. Hy-Gain Electronics Corporation is not responsible for

personal injury or property damage resulting from improper or careless installation, or usage not intended by the manufacturer.

No person is authorized to assume for us any other liability in connection with the sale of our products.

All warranties are void and terminated one year after the last unit of its type and design has been manufactured by us.

All claims of defect or shortage should be addressed to:

Hy Gain Warranty Service  
Hy-Gain Electronics Corporation  
4900 Superior Ave.  
Lincoln, Nebraska 68504

You must furnish model number, date, place, and proof of purchase, such as a copy of the sales receipt to establish warranty. Your letter should include all pertinent details along with part or item numbers involved. Do not return anything until requested to do so. No warranty card is furnished; you must supply the above information.

Any returned items must have prior authorization. Unexpected returns are greatly delayed in handling. These delays can be avoided by writing in advance and furnishing the necessary information.