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DX-77A
7-Band HF Vertical
10, 12, 15, 17, 20, 30, 40-Meter

INSTRUCTION MANUAL

General Description

The "DX-77-A" is an omnidirectional, self-supporting, automatic-bandswitching vertical radiator which operates on the 10, 12, 15, 17, 20, 30 and 40 meter Amateur bands. No ground radials are used with the DX-77-A. The DX-77-A design is based upon an off-center-fed dipole, sometimes called a "Windom" antenna. High-efficiency high-power traps are used to isolate the active sections of this antenna.

The DX-77-A uses a heavy-duty tiltable mast clamp which will accept masts of up to 2 1/8" inches O.D. The entire antenna may be easily raised and lowered for tuning purposes and for recreational - vehicle (RV) installations. The DX-77-A also features an overall length of 29 feet (8.8 m), which contributes to exceptional bandwidths on 40 and 20 meters.

Specifications

Electrical.

Frequency	Bands:	2:1 VSWR Bandwidth
40m	7.0 - 7.3 MHz	100 KHz min.; 150' KHz typ.
30m	10.1 - 10.15 MHz	100' KHz min., 150 KHz typ.
20m	14.0 - 14.35 MHz	200 KHz min., 250 KHz typ.
17m	18.068 - 18.168 MHz	200 KHz min., 250: KHz typ.
15m	21.0 - 21.45 MHz	400 KHz min., 500 KHz typ.
12m	24.89 - 24.99 MHz	300 KHz min., 400 KHz typ.
10m	28.0 - 29.7 MHz	1500 KHz min., 1700 KHz typ.

VSWR' of Resonance.....	less than. 1.5:1
Maximum Power (at 95° F)	750 watts ave., 1500 watts PEP
Gain.....	unity gain (compared to half-wave vertical dipole)
Input Impedance.....	50 ohms

Mechanical:

Total Height.....	29 feet (8.8' m)
Bottom Radial Elements	4 each, 5 feet (1.5 m)
Allowable Mast O.D.	1.75 - 2.125 inches (44.53 mm)
Recommended Masts (8 to 10 foot length)	Aluminum, 2 inch O.D., .125 wall min
Steel, 2 inch O.D., .058 wall min.	

Weight.....	25 lbs. (11.35 kg:)
Wind Area	1.9 sq. ft. (.1767 sq. m.)
Maximum Wind Speed (unguyed)	60 mph (96.77 Kmph)

Choose Location

Choose a location for the DX-77-A in the clear, away from trees, buildings, power-lines and other metallic objects. The DX-77-A should be attached to a steel mast or heavy aluminum mast which is capable of supporting a structure of this size. The DX-77-A does NOT utilize a ground radial system, and the addition of ground radials will NOT improve the performance. However, high-conductivity ground in the immediate vicinity will increase the gain by decreasing ground losses.

WARNING: *Installation of this product near power lines is dangerous! For your safety, follow the installation instructions. Failure to do so could result in serious or fatal injury!*

The mast height can be from 4 feet (1.2 m) to 10 feet (3 m). The recommended height is approximately 7 feet (2.1 m) . This puts the bottom radials above eye-level and out-of-reach of most children! A 10 foot (3 m) 2" O.D. steel mast set 3 feet (1 m) into concrete makes an ideal support. The DX-77-A may also be mounted on a roof tripod or on a tower structure, however, tuning should be performed prior to installation. Since wind survival is 60 mph, tower mounting is discouraged. If you guy the support mast or tripod, use non-metallic guy ropes.

A ground wire may be connected to the mounting brackets (Item 15) for lightning protection.

Tools Required:

Tape Measure, 12 feet
for assembly, and tuning
Nut Driver, 3/8 inch
for tuning and for assembly' of matching unit
Nut Driver, 5/16 inch
for tightening of tubing clamps
2 each 'Open-End Wrench, 1/2 inch *for base bracket assembly*
2 each Open-End Wrench, 7/16 inch
for assembly of matching unit

An adjustable wrench may be used in place of the open-end wrenches.

Pre-Assembly

When unpacking your antenna, check all parts against the parts list in the rear of this manual. Read the instructions and study the illustrations before beginning your assembly and installation.

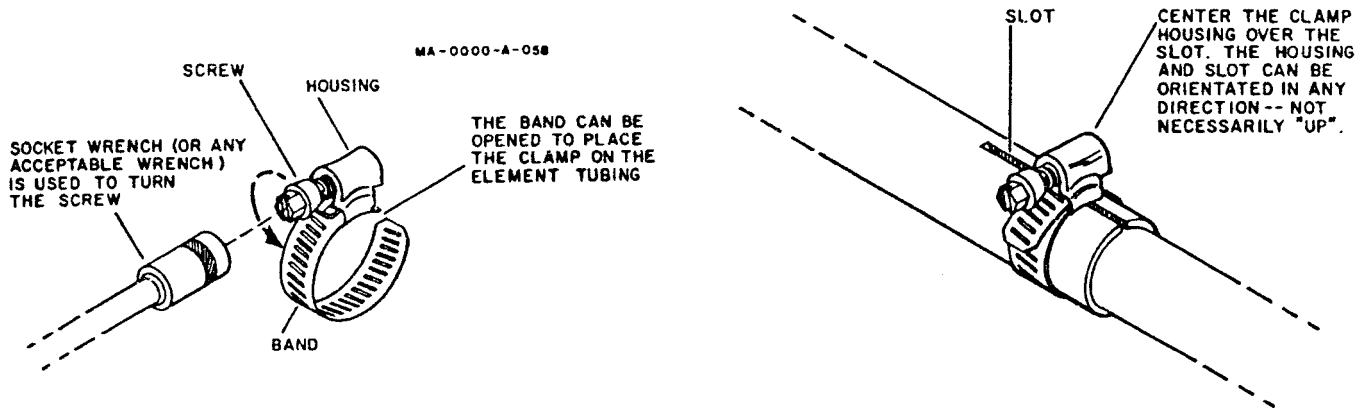
The DX-77-A has been partially pre-assembled for your convenience. Each trap assembly is marked with a label: this label also indicates the depth of insertion into the adjacent assembly. The trap assemblies have frequency labels that you can use as an approximate guide to tune your DX-77-A to its resonant frequencies. If these labels have worn off, or are missing, the normal insertion depth is 3 inches (76mm)

The DX-77-A incorporates several improvements over the original DX-77. Rain-caps are included with the 17, 20, and 30 meter traps to prevent detuning from rain, ice, and snow accumulation.

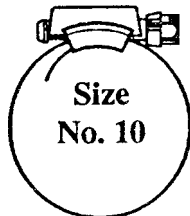
Installation of Tubing Clamps

Select the proper size tubing clamp as shown in the chart. When installing the clamps, place the clamp near the tube end with the top of the clamp over the slot in the tube as shown in Figure 1.

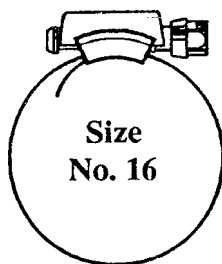
After adjustment of the tubing lengths, tighten the clamp with a 5/16 inch nut driver, socket, or open end wrench until the tubing will not twist or telescope.



Part Number	Description	Fits Tubing Sizes
	Clamp, Size #6	
358756	all stainless steel	1/2 and 3/4"
	5/6" hex head screw	

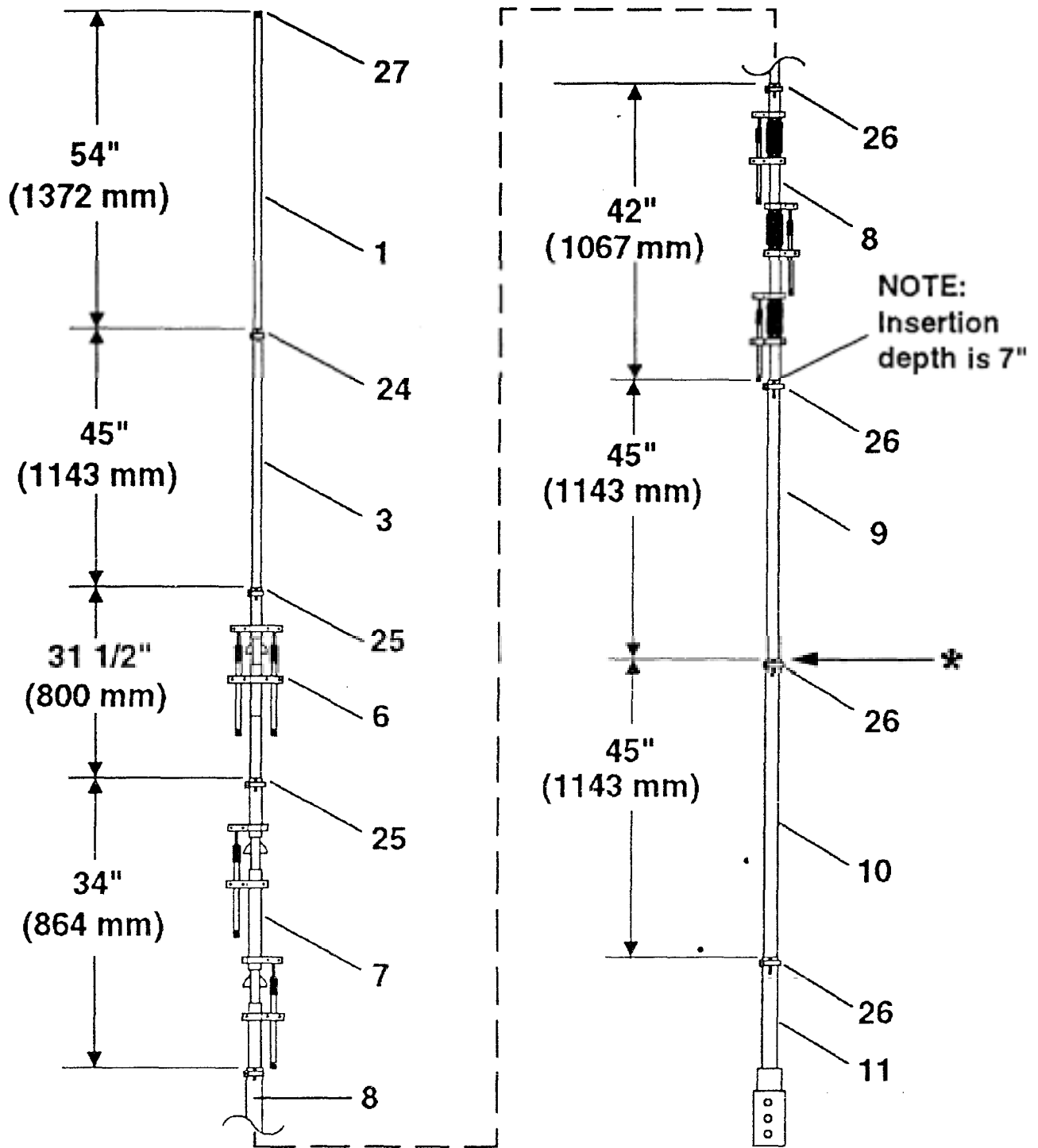


Part Number	Description	Fits Tubing Sizes
	Clamp, Size #10	
358757	all stainless steel	1"
	5/6" hex head screw	



Part Number	Description	Fits Tuubing Sizes
	Clamp, Size #16	
358758	all stainless steel	1 1/4"
	5/6" hex head screw	

Figure 1
Clamp Assembly



NOTE Tubing insertion depth is 3" (76 mm) unless otherwise noted.

Item No.	Description	Item No.	Description
1	Tube, 7/16" x 62"	10	Tubing Section #2, 1 1/4" x 48"
3	Tube, 5/8" x 48" swaged	11	Tubing Section #1
6	Trap Assembly #3, 30 meter	24	Clamp, #6 tube
7	Trap Assembly #2, 17-20 meter	25	Clamp, #10 tube
8	Trap Assembly #1, 10-12-15 meter	26	Clamp, #16 tube
9	Tubing Section #3, 1 1/8" x 48"	27	Caplug, 7/16" black

Figure 2
Overall View of DX77-A

Assembly of Antenna

If available, place two saw-horses approximately 15 feet (4.6m) apart. These will be used to support the antenna during assembly.

Select Tubing Sections #1, #2, and #3 (Items 11, 10, and 9). Insert Section #2 into the top of Section #1. Place a size #16 tubing clamp over the slot in Section #1 and tighten. Insert Section #3 into the top of Section #2. Place a size #16 tubing clamp over the slot in Section #2 and tighten. See Figure 2 for dimensions.

Select Trap Assembly # 1 (10-12-15 meter) and a size #16 tubing clamp. Place the tubing clamp over the top of Section #3 and insert the Trap Assembly #1 into the top of Section #3 to the label. Tighten the clamp.

Select Trap Assembly #2 (17-20 meter) and a size #16 tubing clamp. Place the tubing clamp over the top of the #1 Trap Assembly and insert the #2 Trap Assembly to the label. Rotate the #2 Trap Assembly so that the lower capacitor does not touch any part of the #1 Trap Assembly.

Select Trap Assembly #3 (30 meter) and a size #10 tubing clamp. Place the tubing clamp over the top of the #2 Trap Assembly and insert the #3 Trap Assembly to the label. Tighten the clamp.

NOTE: One radial element shown folded for transport.

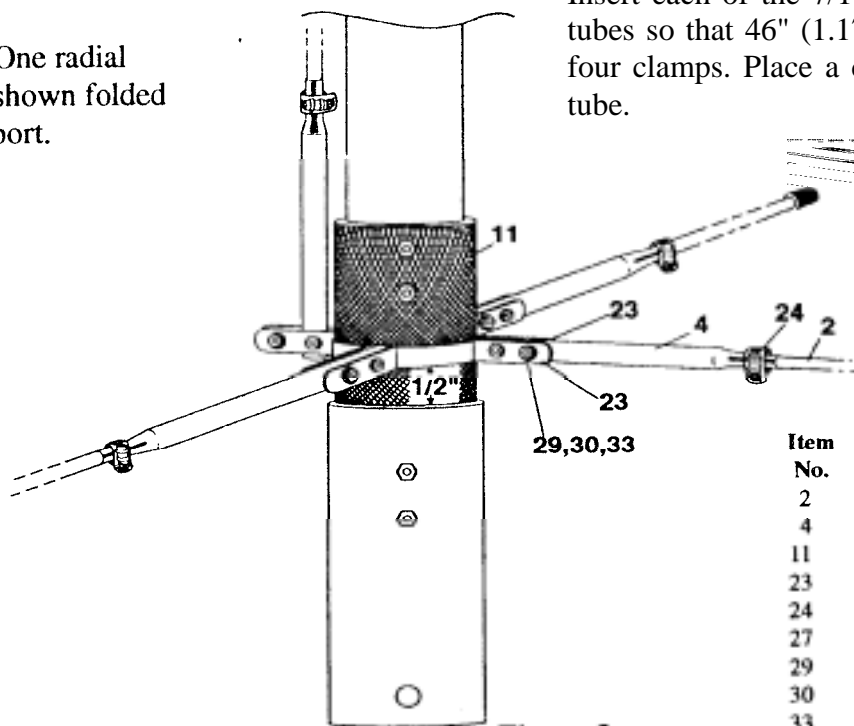


Figure 3

Radial Bracket Assembly

Select the 5/8 x 48 inch swaged tube and #10 tubing clamp. Place the tubing clamp over the top of the #3 Trap Assembly and insert the tube 3 inches, so that 45 inches is exposed. Tighten the clamp. Select the 7/16 x 55 inch tube and #6 tubing clamp. Install this tube in the same manner so that 54 inches is exposed. Tighten the clamp.

Refer to Figures 1 and 2 for assistance.

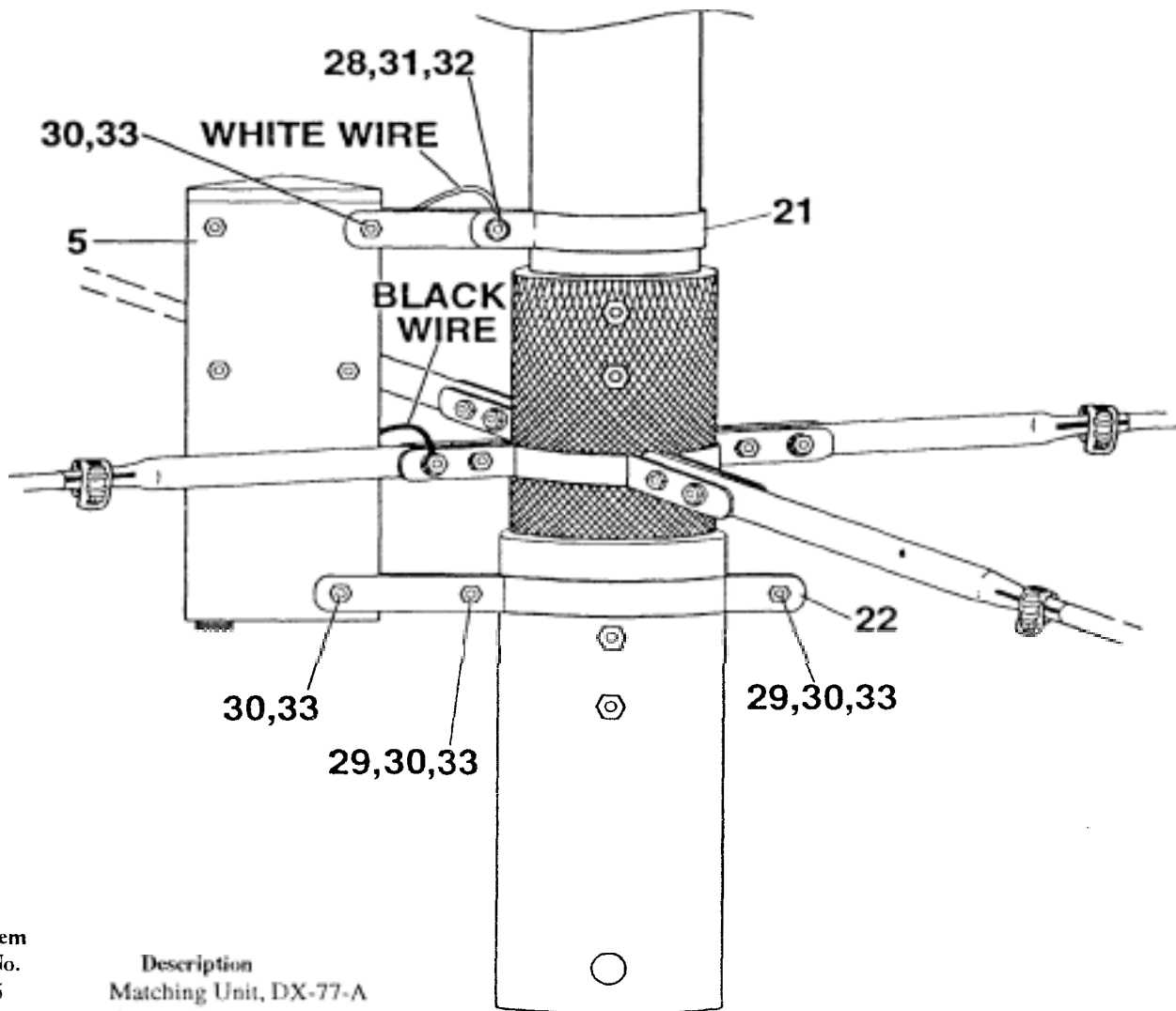
Select the four (4) radial brackets, 10-24 x 1 inch screws, #10 internal lockwashers, 10-24 nuts, and four (4) 5/8" x 7 1/2" tubes. Loosely preassemble the brackets and only 3 tubes on a flat surface first. Place this assembly on the fiberglass portion of Base Section #1, and finish assembling as shown in Figure 3. The bottom of this bracket assembly should be 1/2" above the 2" OD tubing part of **Section #1**.

NOTE: To fold this assembly for transport, remove the outer screw from each joint. Swivel the radial tubes up alongside the radiator tubing. Install the screws back into the joint holes and tighten for safekeeping. Select the four (4) 7/16" x 52" tubes and four (4) #6 tubing clamps. Place each tubing clamp over the end of each of the 5/8" x 7 1/2" radial tubes. Insert each of the 7/16" tubes into the 5/8" radial tubes so that 46" (1.17 m) is exposed. Tighten all four clamps. Place a capplug over the end of each tube.

Item No.	Description
2	Tube, 7/16" x 52"
4	Tube, 5/8" x 7 1/2" swaged
11	(Base) Tubing Section #1
23	Clamp, radial element
24	Clamp, #6 tube
27	Capplug, 7/16
29	Bolt, 10-24 x 1"
30	Nut, 10-24 Hex
33	Lockwasher, #10 internal

Mathing Unit Assembly

Select the DX-77-A matching unit, upper clamp, Assemble as shown in Figure 4. Tighten all con- two (2) bottom clamps, 10-24 x 1" screws, 10-24 nections securely. nuts and lockwashers, 1/4"- 20 x 1" bolt, 1/4"-20 nuts and lockwashers.



Item No.	Description
5	Matching Unit, DX-77-A
21	Clamp, matching unit-top
22	Clamp, matching unit-bottom
28	Bolt, 1/4"-20 x 1"
29	Bolt, #10-24 x 1"
30	Nut, #10-24
31	Nut, 1/4"-20 Hex
32	Lockwasher, 1/4" internal
33	Lockwasher, #10 internal

Figure 4
Matching Unit Assembly

Base Bracket Assembly

Select the DX-77-A Base Parts Pack. If you will be using the tilt-over feature, you will need to drill a 3/8" hole through your support mast at the mounting location. To do this easily, first install two of the base brackets on your support mast and secure.

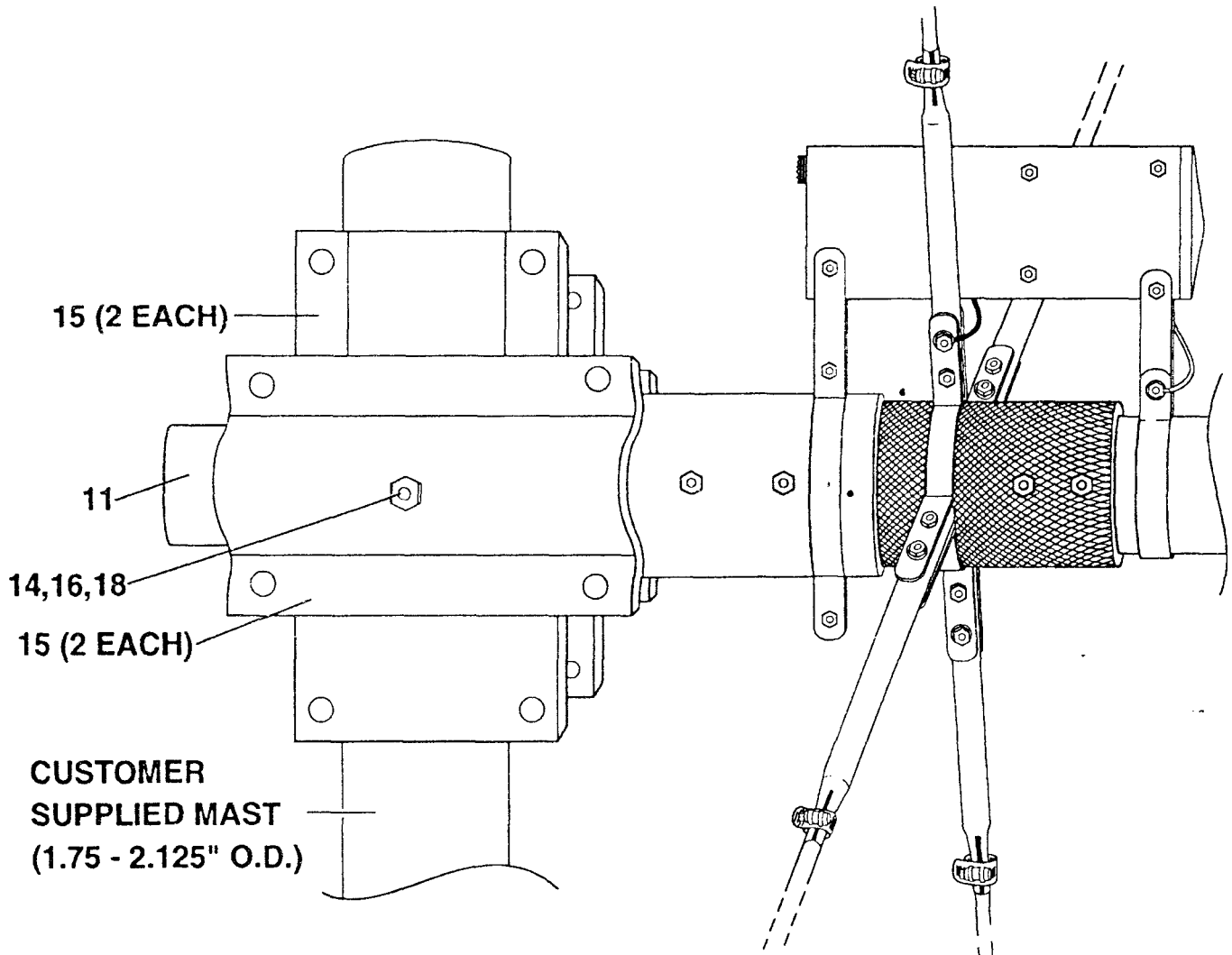
Use a 3/8" drill bit to drill through each side of the mast using the holes in the brackets as guides. Assemble the mast brackets to both the support mast and to Tubing Section # 1 Assembly as shown in Figure 5. (Temporarily remove Tubing Section #2 and above while assembling the mast brackets to the mast).

Practice swivelling Section #1 to a vertical position and installing the other bolts. With help from at least one more person, reattach the rest of the antenna, then swivel the DX-77-A to a vertical position and install all the mounting bolts as shown in Figure 6. Tighten securely!

NOTE: Tightening the pivot bolt more (Item 14) will help hold the antenna during raising and lowering.

CAUTION:

Do not attempt to raise or lower this antenna by yourself.



Item No.	Description
11	Tubing Section #1
14	Bolt, 3/8"-16 x 5 1/2"
15	Base bracket, DX-7 7

Figure 5
Base Bracket Assembly

Item No.	Description
16	Nut, 3/8"-16
18	Lockwasher, 3/8"

Tuning the DX-77-A

Each band on the DX-77-A can be independently tuned for resonance by adjusting each trap resonance on the 30-10 meter bands, and by adjusting the tip length on 40 meters. The DX-77-A radiating element length may also be adjusted slightly between the trap assemblies.

Each trap consists of one coil and at least one capacitor tube. The center conductor of each capacitor tube is attached to the top of the coil, and the outside tubing of each capacitor is attached to the bottom of the coil by an adjustable-position clamp. The DX-77-A normally comes with this adjustable clamp positioned near the bottom of the coil. This sets the resonance of each band near the top (US-phone) end. To adjust the trap lower in frequency, loosen this clamp, and slide it downward, and retighten. This adds a length of the capacitor tubing and radiator tubing in series with the coil and effectively increases the inductance, thereby lowering the trap resonance. This in turn lowers the antenna resonance on that band. this adjustment can lower the resonant frequency from 100 KHz on 30 meters to as much as 400 KHz on 10 meters.

The resonances on the DX-77-A may also be adjusted by increasing or decreasing the length of the vertical radiator. The 10, 12, and 15 meter bands can be lowered in frequency by setting the length of this trap assembly to 44 inches instead of 42 inches. The lower bands will also be affected slightly. Also, the 17 and 20 meter bands can be raised in frequency approx. 100 KHz by setting the length of the 17-20 meter trap assembly to 32 1/2 inches instead of 34 inches. The 30 and 40 meter bands will also be affected slightly. The 30 meter band can be raised in frequency approx. 50 KHz by setting the length of the 30 meter trap assembly to 29 inches instead of 31 1/2 inches. Again, 40 meters will be affected with this change. To change the resonance on 40 meters, adjust the length of the tip (nominally 54 inches),- longer to go lower, and shorter to go higher. This adjustment will not affect the other bands!

The match on all bands (lower SWR) is pre-set by the matching network in the plastic box and by the length of the radial tubes. If you find that your SWR is too high because of surrounding objects or proximity to the ground, you may try adjusting the lengths of the radial tubes. If you are close to the ground (less than 48 inches), try adjusting all of the radial tubes shorter to decrease the capacitive loading effect. If you are at least 5 feet above ground and at least 20 feet from any fence, building or vertical metallic object, and your SWR is above 1.5:1 at resonance on all bands, you may have a problem in the matching network. If ALL of the bands show high SWR, check where the black wire is connected. If the black wire is connected to ground through the mounting bracket instead of to the radial tubes, all of the bands will show resonances from 200 KHz to 1000 KHz too low! Do not allow anything to touch the radial elements except the black wire!

DX-77-A Mining Guide:

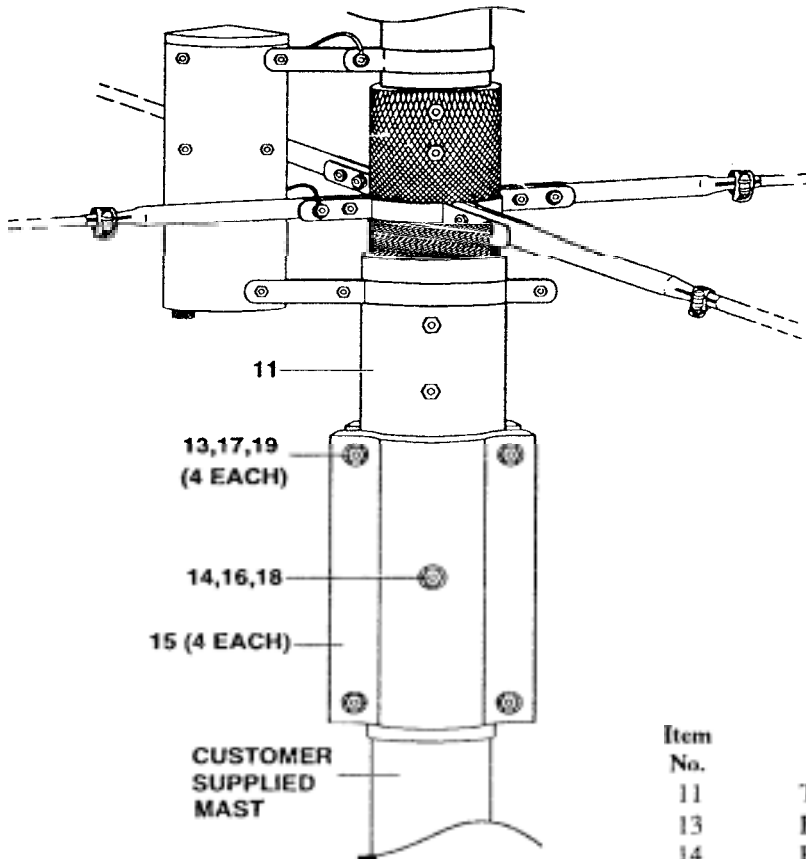
	To Lower Resonance:	To Raise Resonance:
10 meters:	Move 10m adj. clamp lower	Shorten 42" length of trap
12 meters:	Move 12m adj. clamp lower	Shorten 42" length of trap
15 meters:	Move 15m adj. clamp lower	Shorten 42" length of trap
17 meters:	Move 17m adj. clamp lower	Shorten 34" length of trap
20 meters:	Move 20 m adj. clamp lower Lengthen 34" length of trap	Shorten 34" length of trap
30 meters:	Move 30m adj. clamp lower Lengthen 31 1/2" length of trap	Shorten 31 1/2" length of trap
40 meters:	Lengthen tip dimension	Shorten tip dimension

NOTE: When lengthening trap section dimensions, allow at least 2" insertion into the 1 1/8" tubes and at least 1" insertion of the 40m tip into the next section.

Toning Guide

12	1 inch = 100-130 KHz
15	1 inch = 60-70 KHz
17	1 inch = 40-60 KHz
20	1 inch = 20-30 KHz
30	1 inch = 10-15 KHz

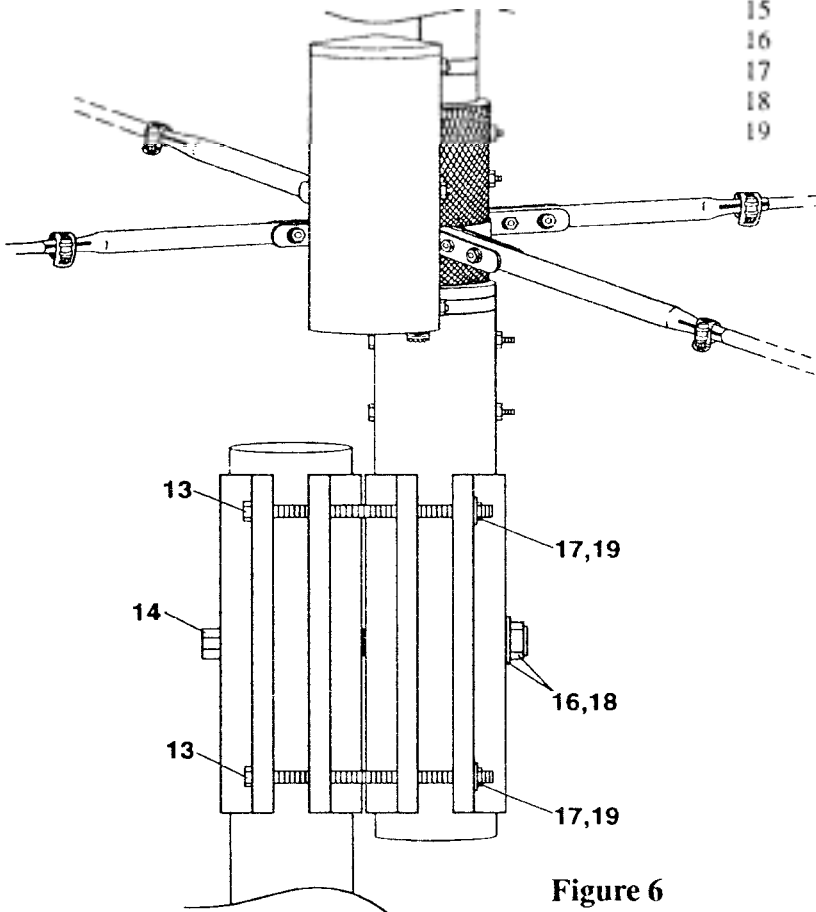
NOTE: The tuning of one band may affect the tuning of adjacent bands. Check these frequencies before proceeding to the next band.



Detail A
Front View

CUSTOMER
SUPPLIED
MAST

Item No.	Description
11	Tubing Section #1
13	Bolt, 5/16"-18 x 5"
14	Bolt, 3/8"-16 x 5 1/2"
15	Base bracket, DX-77-A
16	Nut, 3/8"-16
17	Nut, 5/16"-18
18	Lockwasher, 3/8" split
19	Lockwasher, 5/16" split



Detail B
Side View

Figure 6
Base Bracket Assembly

Service Information

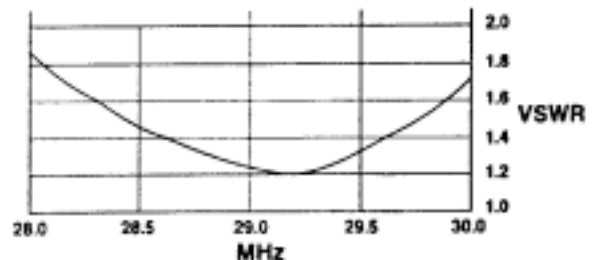
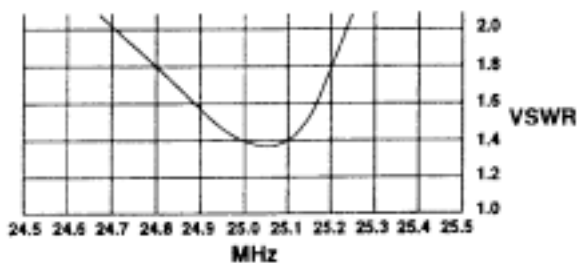
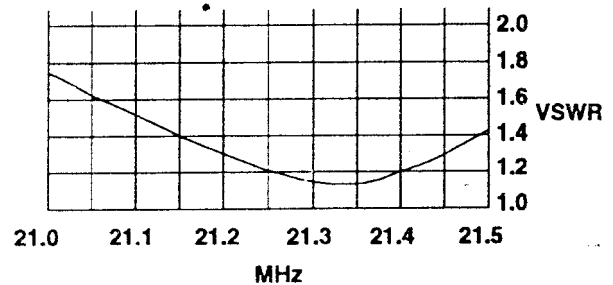
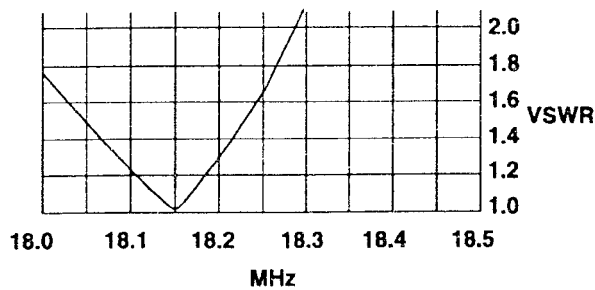
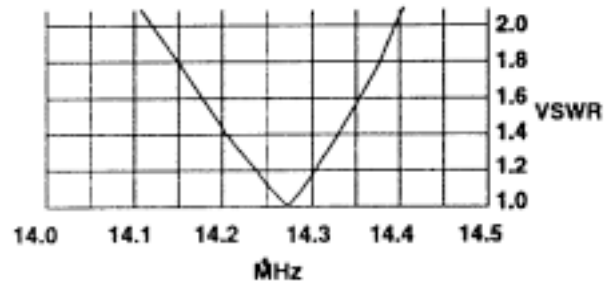
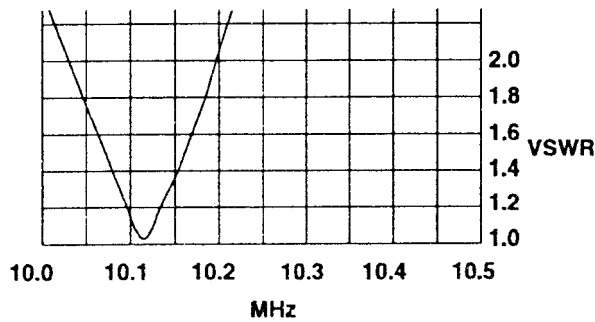
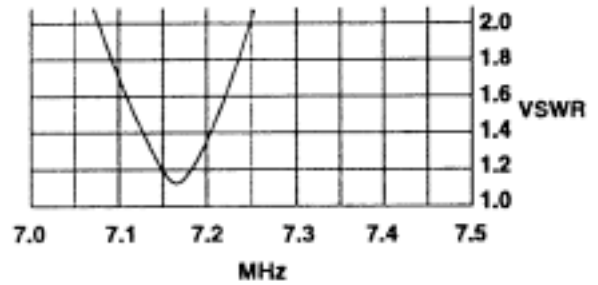
If you encounter technical problems and need assistance, you should contact Hy-Cain Customer Service Department.

All requests, inquiries, warranty claims, or for ordering replacement parts, contact:

Hy-Gain
308 Industrial Park Road
Starkville, Mississippi 39759 USA
Phone: 662-323-9538
FAX: 662-323-6551

Typical VSWR Curves:

NOTE: VSWR will vary with height above ground and location near houses, fences, masts, and other surrounding objects.



DX-77-A Parts List

Item Part

1	170495	Tube, 7/16" x 62"	1
2	175165	Tube, 7/16" x 52"	4
3	190000	Tube, 5/8" x 48" swaged	1
4	191021	Tube, 5/8" x 7 1/2" swaged	4
5	870925	Matching Unit, DX-77-A.....	1
6	870926	Trap Assembly #3, 30m	1
7	870927	Trap Assembly #2, 17-20m	1
8	870928	Trap Assembly #1, 10-12-15m.....	1
9	170501	Tubing Assembly #3, 1 1/8"x 48"	1
1	879965	Tubing Assembly #2, 1 1/4"x 48"	1
1	870930	Tubing Assembly #1 (Base)	1
1	870931	Parts Pack, DX-77-A Base.....	1
1	500387	Bolt, 5/16"- 18 x 5"	4
1	501029	Bolt, 3/8"-16 x 5 1/2".....	1
1	5137000	Base bracket, DX-77-A.....	4
1	555694	Nut, 3/8"-16	1
1	555747	Nut, 5/16"- 18	8
1	561016	Lockwasher, 3/8" split.....	1
1	564792	Lockwasher, 5/16" split	8
2	870932	Parts Pack, DX-77-A Clamps, etc.....	1
2	179983	Clamp, matching unit - top	1
2	179984	Clamp, matching unit - bottom	2
2	179982	Clamp, radial element.....	4
2	358756	Clamp, #6 tube.....	6
2	358757	Clamp, #10 tube.....	2
2	358758	Clamp, #16 tube.....	4
2	455644	Caplug, 7/16" black.....	5
2	502958	Bolt, 1/4"-20 x 1".....	1
2	504069	Bolt. 10-24 x 1".....	10
3	554071	Nut, 10-24 Hex.....	15
3	554099	Nut, 1/4"-20 Hex.....	2
3	562961	Lockwasher, 1/4" internal	2
3	565697	Lockwasher, #10 internal.....	15

DX-77-A Parts List (continued)

Item Number	Part Number	Description Qty
34	870935	Coil Assembly, 30m1
35	870938	Coil Assembly, 20m1
36	870939	Coil Assembly, 17m1
37	870942	Coil Assembly, 10-12-15m1
38	870936	Capacitor Assembly, 30m 2
39	870940	Capacitor Assembly, 20m 1
40	870941	Capacitor Assembly, 17m 1
41	870934	Capacitor Assembly, 15m 1
42	870944	Capacitor Assembly, 12m 1
43	870943	Capacitor Assembly, 10m 1

NOTE: Some extra small parts are included as spares.

hy-gain® LIMITED WARRANTY

Hy-Gain Warrants to the original owner of this product, if manufactured by **Hy-Gain** and purchased from an authorized dealer or directly from **Hy-Gain** to be free from defects in material and workmanship for a period of 12 months for rotator products and 24 months for antenna products from date of purchase provided the following terms of this warranty are satisfied.

1. The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof of-purchase to **Hy-Gain** at the time of warranty service. **Hy-Gain** shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.
2. **Hy-Gain** agrees to repair or replace at **Hy-Gain's** option without charge to the original owner any defective product under warranty, provided the product is returned postage prepaid to **Hy-Gain** with a personal check, cashiers check, or money order for \$8.00 covering postage and handling.
3. Under no circumstances is **Hy-Gain** liable for consequential damages to person or property by the use of any **Hy-Gain** products.
4. Out-of-warranty Service: **Hy-Gain** will repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are made.
5. This warranty is given in lieu of any other warranty expressed or implied.
6. **Hy-Gain** reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.
7. All **Hy-Gain** products to be serviced in-warranty or out-of-warranty should be addressed to **hy-gain, 308 Industrial Park Road, Mississippi 39759, USA** and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase.
8. This warranty gives you specific rights, and you may also have other rights which vary from state to state.