

# HEATHKIT<sup>®</sup> MANUAL



HEATH COMPANY • BENTON HARBOR, MICHIGAN



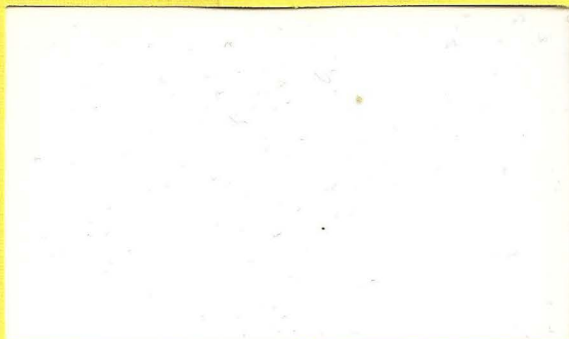
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The following telephone numbers are direct lines to the departments listed:

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Credit ..... (616) 982-3561  
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## YOUR HEATHKIT 90-DAY LIMITED WARRANTY

### Consumer Protection Plan for Heathkit Consumer Products

Welcome to the Heath family. We believe you will enjoy assembling your kit and will be pleased with its performance. Please read this Consumer Protection Plan carefully. It is a "LIMITED WARRANTY" as defined in the U.S. Consumer Product Warranty and Federal Trade Commission Improvement Act. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

#### Heath's Responsibility

**PARTS** — Replacements for factory defective parts will be supplied free for 90 days from date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period. You can obtain warranty parts direct from Heath Company by writing or telephoning us at (616) 982-3571. And we will pay shipping charges to get those parts to you . . . anywhere in the world.

**SERVICE LABOR** — For a period of 90 days from the date of purchase, any malfunction caused by defective parts or error in design will be corrected at no charge to you. You must deliver the unit at your expense to the Heath factory, any Heathkit Electronic Center (units of Veritechnology Electronics Corporation), or any of our authorized overseas distributors.

**TECHNICAL CONSULTATION** — You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

**NOT COVERED** — The correction of assembly errors, adjustments, calibration, and damage due to misuse, abuse, or negligence are not covered by the warranty. Use of corrosive solder and/or the unauthorized modification of the product or of any furnished component will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use, customer assembly, set-up time, or unauthorized service.

This warranty covers only Heath products and is not extended to other equipment or components that a customer uses in conjunction with our products.

SUCH REPAIR AND REPLACEMENT SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORSEEABLE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

#### Owner's Responsibility

**EFFECTIVE WARRANTY DATE** — Warranty begins on the date of first consumer purchase. You must supply a copy of your proof of purchase when you request warranty service or parts.

**ASSEMBLY** — Before seeking warranty service, you should complete the assembly by carefully following the manual instructions. Heathkit service agencies cannot complete assembly and adjustments that are customer's responsibility.

**ACCESSORY EQUIPMENT** — Performance malfunctions involving other non-Heath accessory equipment, (antennas, audio components, computer peripherals and software, etc.) are not covered by this warranty and are the owner's responsibility.

**SHIPPING UNITS** — Follow the packing instructions published in the assembly manuals. Damage due to inadequate packing cannot be repaired under warranty.

If you are not satisfied with our service (warranty or otherwise) or our products, write directly to our Director of Customer Service, Heath Company, Benton Harbor MI 49022. He will make certain your problems receive immediate, personal attention.



# Heathkit® Manual

for the

## 4-ELEMENT TRI-BAND ANTENNA

Model SA-7010

595-2354-01

HEATH COMPANY  
BENTON HARBOR, MICHIGAN 49022

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## INTRODUCTION

This 4-Element, Tri-Band Antenna covers 10, 15, and 20 meters with excellent performance. Some of the outstanding features of this Antenna are:

- Separate matched Hy-Q traps for each band.
- Beta Match for tapered impedance, DC ground.
- VSWR less than 1.5 at resonance.

- Accepts maximum legal power and feeds with 52 ohm coaxial cable.
- Excellent front-to-back ratio.

This easy-to-assemble design and high quality construction in addition to these features make this the right Antenna for your low band station.

### WARNING:

When you are installing your system, take extreme care so you do not accidentally contact any power lines or other overhead obstructions with any ladder or other installation equipment. Failure to exercise this care could result in serious injury.





## UNPACKING INSTRUCTIONS

For convenience in shipping, smaller diameter tubes have been inserted inside larger diameter tubes. Remove the tubes from inside larger tubes as you check the parts against the following Parts List.

## PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers on the Parts Pictorial (Illustration Booklet, page 1).

KEY	HEATH	QTY.	DESCRIPTION
No.	Part No.		

NOTE: All tubes diameter are measured outside the tubes.

### BOOM TUBING

A1	231-6	2	41" section
A1	231-7	2	57" section

### DIRECTOR TUBING

A2	231-13	2	48" section (1-1/4" diameter)
A2	231-12	2	38" section (1-1/8" diameter)
A3	231-11	2	28" section (7/16" diameter)

### DRIVEN ELEMENT TUBING

A2	231-13	2	48" section (1-1/4" diameter)
A2	231-16	2	42" section (1-1/8" diameter)
A3	231-11	2	28" section (7/16" diameter)

### 10-METER REFLECTOR TUBING

A2	231-20	2	55" section (7/8" diameter)
A2	231-19	2	26" section (5/8" diameter)
A3	231-18	2	39" section (7/16" diameter)

### 15-20-METER REFLECTOR TUBING

A2	231-23	2	83" section (1-1/4" diameter)
A2	231-22	2	52" section (1-1/8" diameter)
A3	231-45	2	37" section (7/16" diameter)

### BETA TUBING

A4	231-15	2	46" section (3/4" diameter)
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To order a replacement part, always include the Part Number. Use the Parts Order Form furnished with this kit. If one is not available, see "Replacement Parts" inside the rear cover of this Manual. For prices, refer to the separate "Heath Parts Price List."

KEY	HEATH	QTY.	DESCRIPTION
No.	Part No.		

### BRACKETS-CLAMPS

B1	231-3	2	Bracket #4
B2	231-4	4	Bracket #13
B3	231-5	2	Bracket #14
B4	231-8	1	Boom coupling bracket
B5	231-9	1	Boom coupling base
B6	231-2	2	Mast clamp
B7	231-28	8	1/2" element clamp
B7	231-73	2	3/4" element clamp
B7	231-75	14	1" element clamp
B7	231-74	6	1-1/4" element clamp
B8	231-64	2	1-1/4" plain clamp
B9	231-65	1	2" beta clamp
B10	231-66	2	Beta shorting clamp
B11	231-63	1	Beta support strap

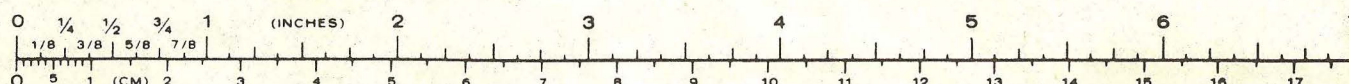
### HARDWARE

#### #6 Hardware

B12	231-76	2	6-32 × 1/2" screw
B13	231-77	2	6-32 nut

#### #10 Hardware

C1	231-34	10	10-24 × 1" screw
C2	231-40	1	10-24 × 1-1/2" hex head bolt
C3	231-41	2	10-24 × 2" screw
C4	231-42	2	10-24 × 1/2" screw
C5	231-47	12	10-24 square nut
C6	231-50	5	10-24 hex nut
C7	231-53	10	3/16" lockwasher







KEY	HEATH	QTY.	DESCRIPTION
No.	Part No.		

**1/4" Hardware**

D1	231-35	36	1/4-20 × 3/4" hex head bolt
D2	231-46	2	1/4-20 × 1-1/4" round head screw
D3	231-37	2	1/4-20 × 2-1/2" round head screw
D4	231-39	8	1/4-20 × 3/8" bolt
D5	231-78	2	1/4-20 × 1-1/4" hex head bolt
D6	231-44	21	1/4-20 × 1-1/2" hex head bolt
D7	231-49	40	1/4-20 hex nut
D8	231-51	30	1/4-20 square nut
D9	231-54	40	1/4" lockwasher

**5/16" Hardware**

E1	231-33	4	5/16-18 × 5" bolt
E2	231-36	2	5/16-18 × 2-3/4" bolt
E3	231-14	3	5/16-18 × 3-1/2" bolt
E4	231-48	9	5/16-18 nut
E5	231-52	9	5/16" split lockwasher
	231-43	7	5/16" flat washer

**TRAPS**

F1	231-24	2	15-meter trap
F1	231-25	4	15-meter trap
F1	231-26	4	10-meter trap

KEY	HEATH	QTY.	DESCRIPTION
No.	Part No.		

**INSULATORS**

G1	231-59	1	Beta bottom support
G2	231-60	1	Beta top support
G3	231-61	2	Element insulator
G4	231-58	8	7/16" plastic end cap
G5	231-57	2	2" cap

**MISCELLANEOUS**

H1	231-56	2	Cable
H2	231-67	1	1/2" spacer
H3	231-68	4	6" tube
	391-34	1	Blue and white label
	597-260	1	Parts Order Form
		1	Assembly Manual (See Page 1 for the part number)
H4	231-71	2	Solder lug
	231-72	1	Grease

NOTE: In addition to the length of coaxial cable that is needed to reach from your antenna to your station, an additional 22 feet of cable will also be needed to construct the balun at the antenna. This cable is not supplied with the antenna and should be purchased at this time. A high grade RG-8/U, 52Ω coaxial cable is recommended for this purpose. This cable is available from a Heath Service Center or from the Heath Company. Refer to your Heath catalogue.





## STEP-BY-STEP ASSEMBLY

NOTE: There is an overall view of the complete antenna on Page 2 of the Illustration Booklet. Refer to this overall view as you assemble your antenna.

Refer to Pictorial 1 (Illustration Booklet, Page 3) for the following steps.

NOTE: This Tri-Band Beam Antenna measures approximately 16 feet by 34 feet. Therefore, you should consider this large size before you begin to assemble the Antenna. Choose an area that is adequate and free of obstacles.

1	Boom coupling base
1	Boom coupling bracket
2	Mast clamp
4	1/4"-20 × 3/4" bolt
2	5/16"-18 × 2-3/4" bolt
4	5/16"-18 × 5" bolt
6	1/4"-20 hex nut
6	5/16"-18 nut
6	1/4" lockwasher
6	5/16" split lockwasher
2	1/4"-20 × 2-1/2" screw
2	2" cap

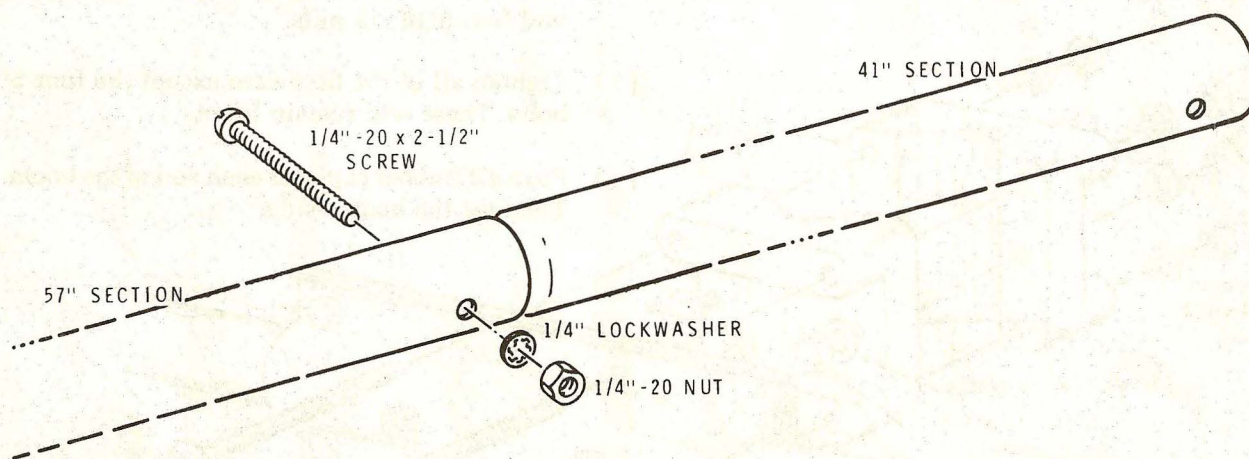
### BOOM ASSEMBLY

( ) Locate the following parts. Use these parts in the boom assembly.

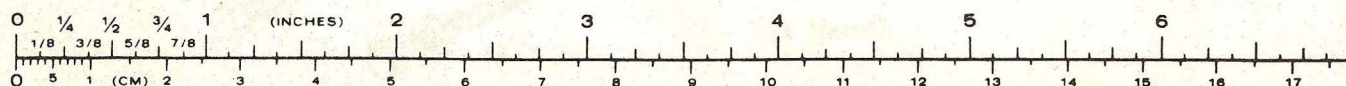
QTY	DESCRIPTION
2	57" boom section (2" diameter)
2	41" boom section (2" diameter)

( ) Refer to Detail 1A and join a 41" section and a 57" section of boom tubing together. Use a 1/4"-20 × 2-1/2" screw, a 1/4" lockwasher, and a 1/4"-20 hex nut. Temporarily set this boom half aside.

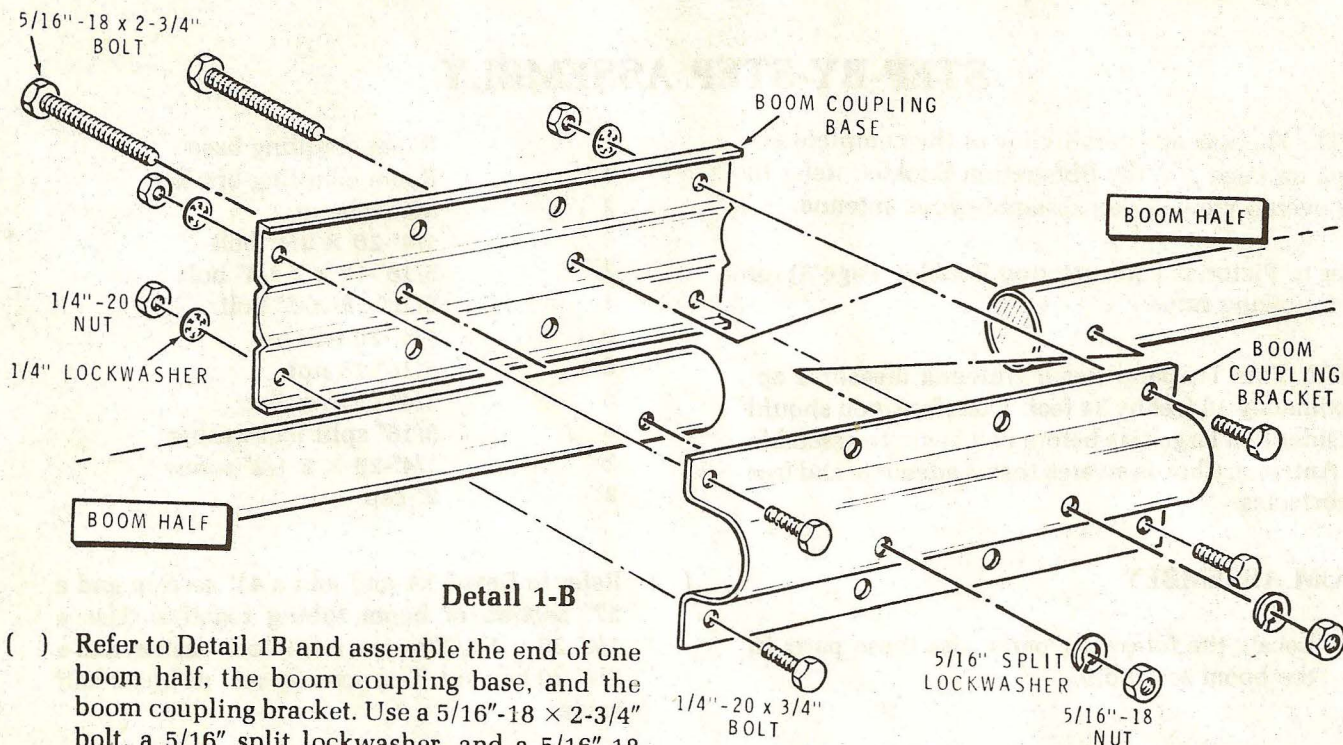
( ) In the same manner, join the other 41" section and 57" section together.



Detail 1A

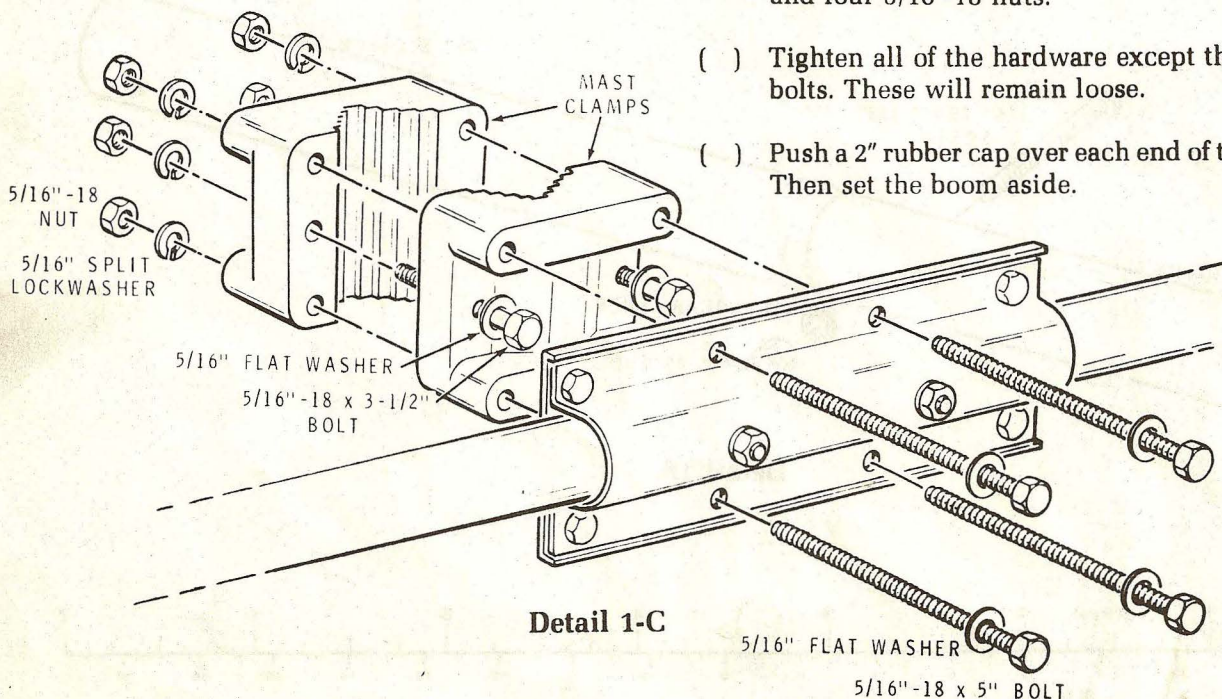






Detail 1-B

- ( ) Refer to Detail 1B and assemble the end of one boom half, the boom coupling base, and the boom coupling bracket. Use a 5/16"-18 x 2-3/4" bolt, a 5/16" split lockwasher, and a 5/16"-18 nut. Do not tighten this hardware.
- ( ) Install the other boom half in the boom coupling base and bracket. Do not tighten this hardware.
- ( ) Install a 1/4"-20 x 3/4" bolt through the boom coupling base and bracket at each corner with a 1/4" lockwasher, and a 1/4"-20 hex nut. Do not tighten this hardware.
- ( ) Refer to Detail 1C and loosely install two 5/16"-18 x 3-1/2" bolts through the side holes of the mast clamps as shown. Use two 5/16" flat washers, two 5/16" split lockwashers and two 5/16"-18 nuts.
- ( ) Refer again to Detail 1C and mount the two mast clamps to the boom coupling base with four 5/16"-18 x 5" bolts, four 5/16" split lockwashers, and four 5/16"-18 nuts.
- ( ) Tighten all of the hardware except the four 5" bolts. These will remain loose.
- ( ) Push a 2" rubber cap over each end of the boom. Then set the boom aside.



Detail 1-C





## 10-METER REFLECTOR ASSEMBLY

Refer to Pictorial 2 (Illustration Booklet, Page 3) for the following steps.

- ( ) Locate the following parts. Use these parts in the 10-meter reflector assembly.

QTY	DESCRIPTION
2	26" section (5/8" diameter)
2	39" section (7/16" diameter)
2	55" section (7/8" diameter)
2	3/4" element clamp
2	1/2" element clamp
4	1/4-20 x 1-1/2" bolt
2	1/4-20 x 1-1/4" bolt
4	1/4-20 square nut

NOTE: The grease supplied with your Antenna is a special conductive compound. Apply grease to all metal-to-metal connections such as where element sections fit together. It is not necessary to apply grease to element clamps, since they are used only to hold the sections together.

- ( ) Install a 3/4" clamp over the swaged end of the 55" section.

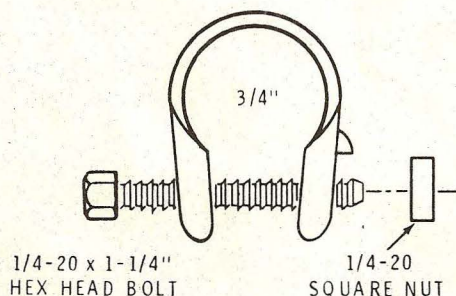
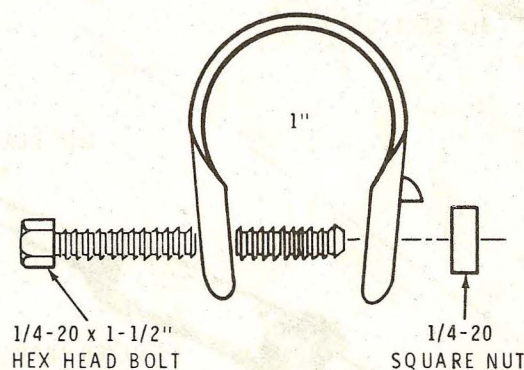
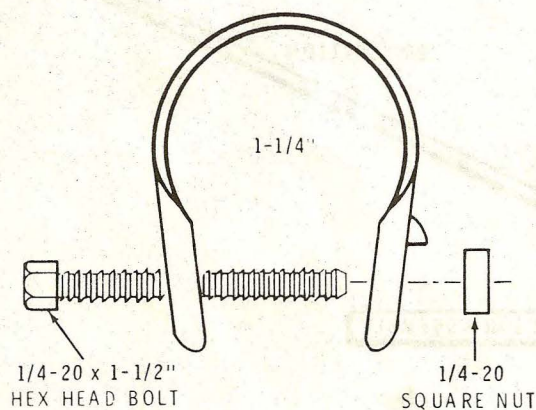
- ( ) Insert the large end of a 26" section into the small end (swaged end) of a 55" section.

NOTE: Whenever you install a clamp (as in the next step), refer to Detail 2A for the correct hardware to go with the clamp. These clamps are shown actual size to help you locate the correct clamp. Be sure to insert the screw from the smooth side as shown. Also, whenever you install a clamp, always position the open side toward the slot in the tubing as shown in the inset drawing on Pictorial 2. Tighten a clamp only moderately when you install it, as some tubes will be adjusted later.

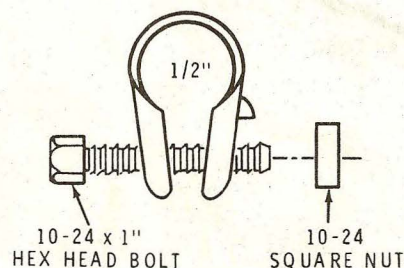
- ( ) Install either end of a 39" section into the swaged end of the 26" section with a 1/2" clamp.

- ( ) Mark this half of the 10-meter reflector with a piece of tape for identification later. Mark it "10-METER REFLECTOR."

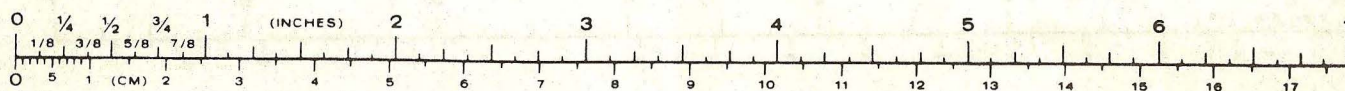
- ( ) In the same manner, assemble and mark the other half of the 10-meter reflector with the remaining parts. Then set both halves aside.



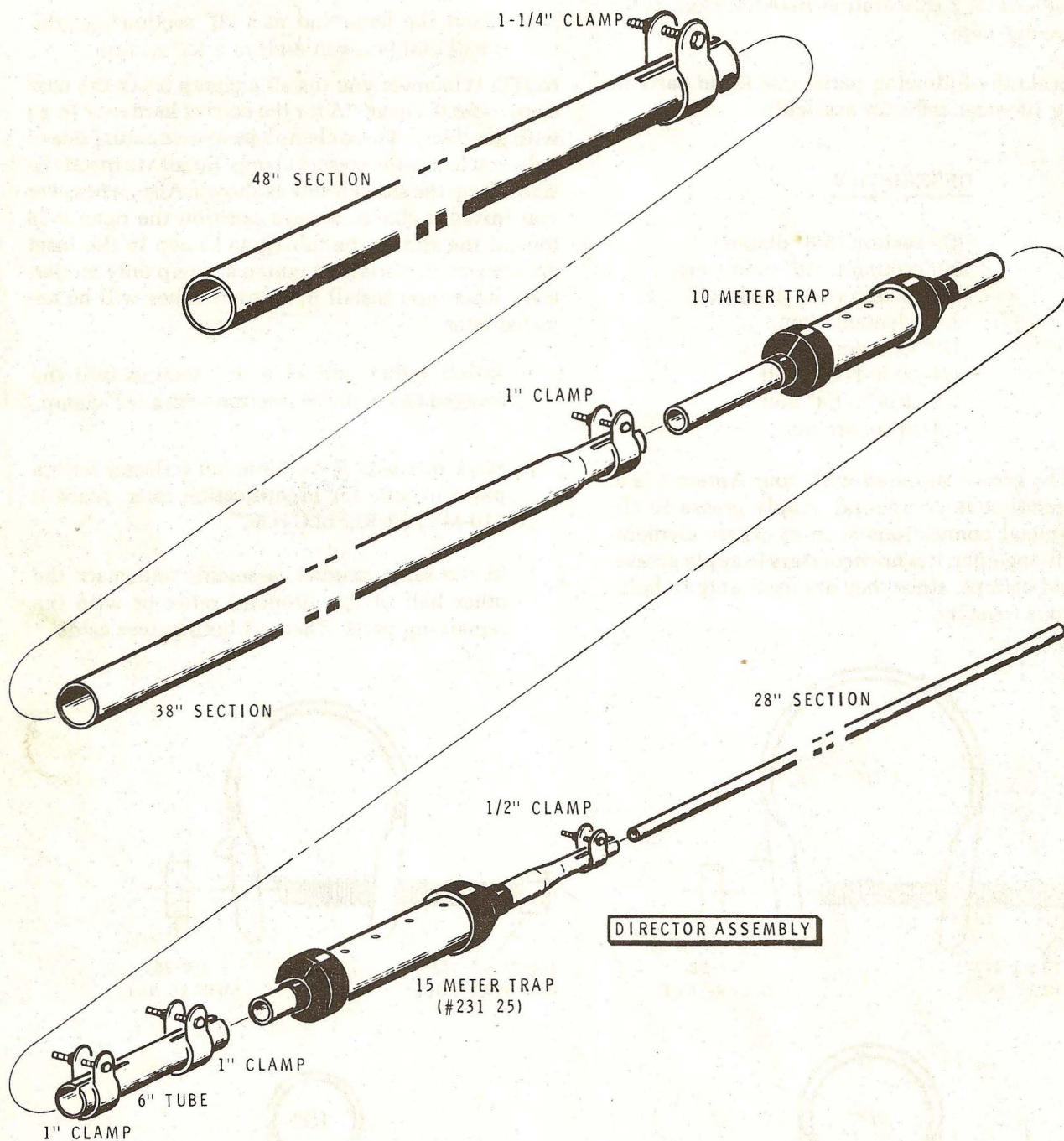
ELEMENT CLAMPS



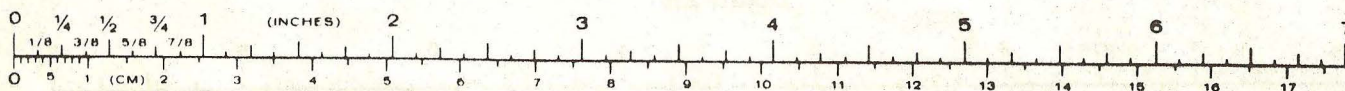
Detail 2A



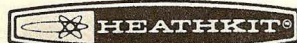




PICTORIAL 3







## DIRECTOR ASSEMBLY

Refer to Pictorial 3 for the following steps.

- ( ) Locate the following parts. Use these parts in the director assembly.

QTY	DESCRIPTION
2	48" section (1-1/4" diameter)
2	38" section (1-1/8" diameter)
2	28" section (7/16" diameter)
2	6" tube
2	1-1/4" element clamp
6	1" element clamp
2	1/2" element clamp
2	10-meter (10 M) trap
2	15-meter (15 M) trap (#231-25)
8	1/4-20 × 1-1/2" bolt
2	1/4-20 × 1" bolt
10	1/4-20 square nut

- ( ) Install the large end of a 38" section into the slotted end of a 48" section with a 1-1/4" clamp.
- ( ) Slide a 1" clamp (with hardware) over the other end of the 38" section.
- ( ) Install the long end of a 10-meter trap into the end of the 38" section with the 1" clamp.
- ( ) Install a 6" tube on the other end of the 10-meter trap with a 1" clamp.

NOTE: In the next step, position the 15-meter trap so the holes are on the same side as the 10-meter trap.

- ( ) In the same manner, install the short end of a 15-meter (15M) trap (#231-25) into the other end of the 6" tube with a 1" clamp. NOTE: There are two different 15-meter traps that look alike. Be sure you have the correct part number.
- ( ) Install a 28" section into the other end of the 15-meter trap with a 1/2" clamp.
- ( ) Mark this half of the director with a piece of tape for identification later. Mark it "DIRECTOR."
- ( ) In the same manner, assemble and mark the other half of the director with the remaining parts. Then set both halves aside.

## DRIVEN ELEMENT ASSEMBLY

Refer to Pictorial 4 (Illustration Booklet, Page 4) for the following steps.

- ( ) Locate the following parts. Use these parts in the driven element assembly.

QTY	DESCRIPTION
2	48" section (1-1/4" diameter)
2	42" section (1-1/8" diameter)
2	6" tube
2	28" section (7/16" diameter)
2	1-1/4" element clamp
6	1" element clamp
2	1/2" element clamp
2	10-meter (10 M) trap
2	15-meter (15 M) trap (#231-24)
8	1/4-20 × 1-1/2" bolt
2	1/4-20 × 1" bolt
10	1/4-20 square nut

- ( ) Install the large end of a 42" section into the slotted end of a 48" section with a 1-1/4" clamp.
- ( ) Install the long end of a 10-meter (10M) trap into the other end of the 42" section with a 1" clamp.
- ( ) Install a 6" tube on the other end of the 10-meter trap with a 1" clamp.

NOTE: In the next step, be sure to use the 15-meter trap with the copper windings inside.

- ( ) Install the short end of a 15-meter trap (#231-24) into the 6" tube with a 1" clamp. Align the holes in this trap with the holes in the 10-meter trap.
- ( ) Install a 28" section into the other end of the 15-meter trap with a 1/2" clamp.
- ( ) Mark this half of the driven element with a piece of tape for identification later. Mark it "DRIVEN ELEMENT."
- ( ) In the same manner, assemble and mark the other half of the driven element with the remaining parts. Then set both halves aside.



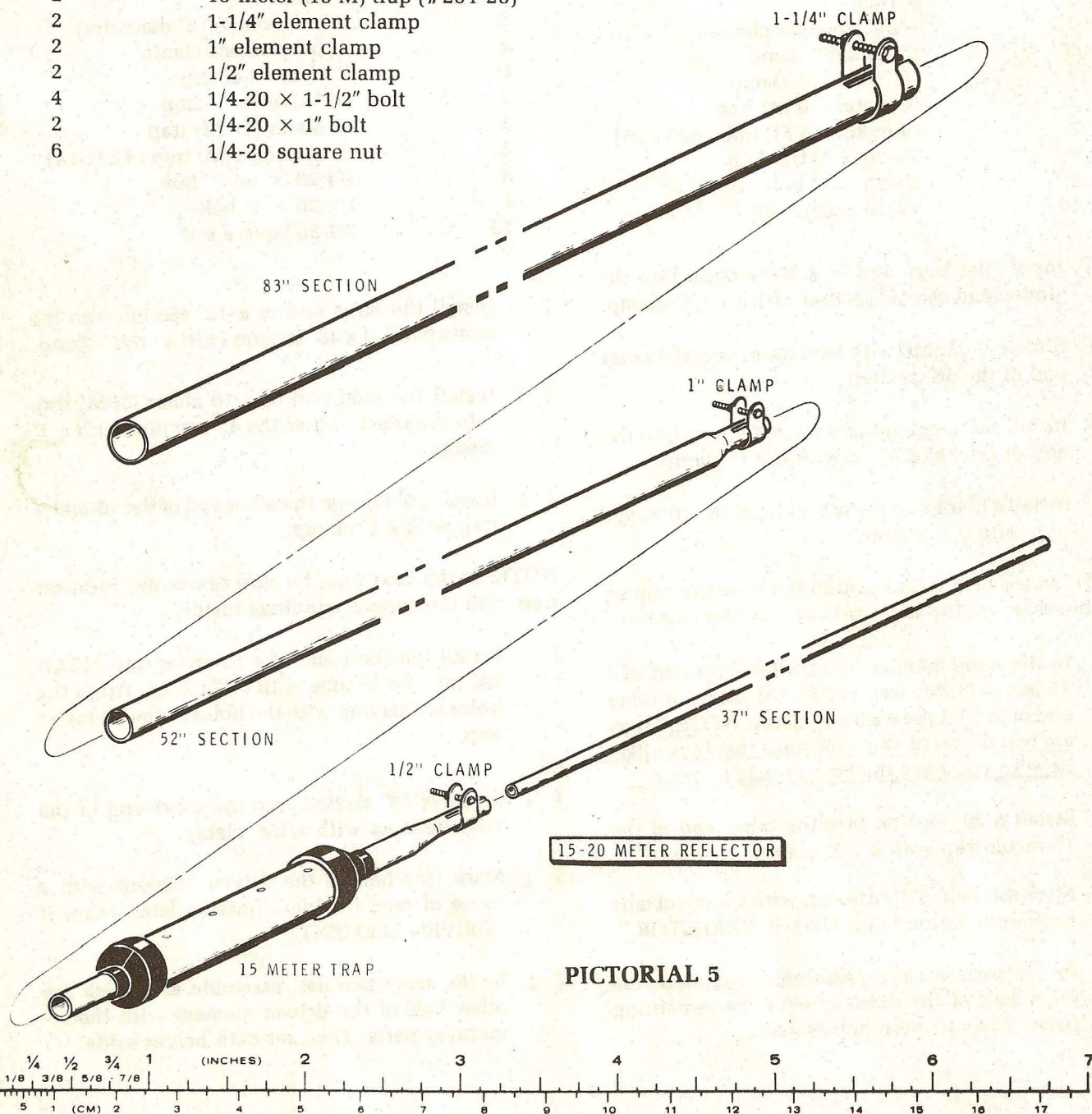
**15 - 20-METER REFLECTOR ASSEMBLY**

Refer to Pictorial 5 for the following steps.

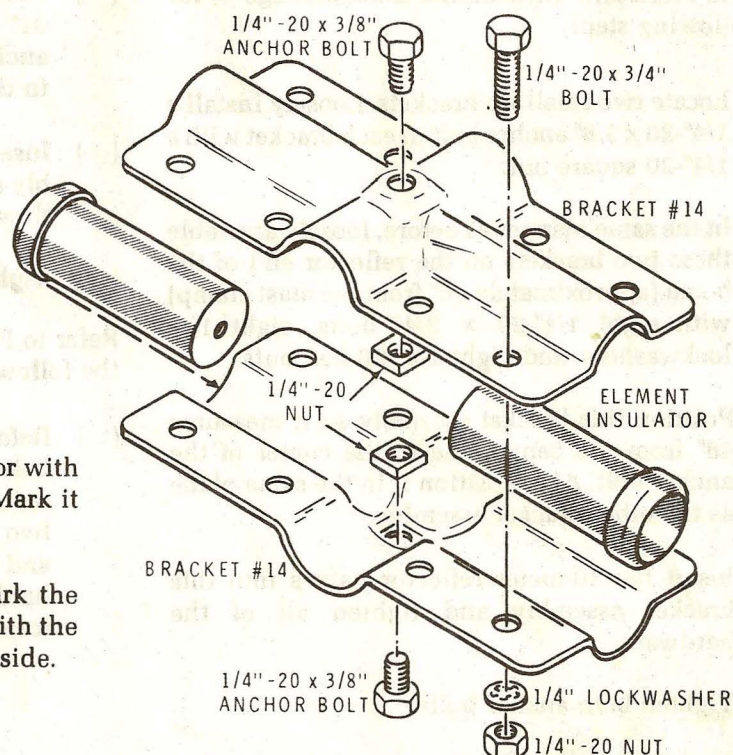
- ( ) Locate the following parts. Use these parts in the 15-20-meter reflector assembly.

QTY	DESCRIPTION
2	83" section (1-1/4" diameter)
2	52" section (1-1/8" diameter)
2	37" section (7/16" diameter)
2	15-meter (15 M) trap (#231-25)
2	1-1/4" element clamp
2	1" element clamp
2	1/2" element clamp
4	1/4-20 × 1-1/2" bolt
2	1/4-20 × 1" bolt
6	1/4-20 square nut

- ( ) Install the large end of a 52" section into the slotted end of an 83" section with a 1-1/4" clamp.
- ( ) Install a short end of a 15-meter (15M) trap (#231-25) into the 52" section with a 1" clamp.
- ( ) Install a 37" section into the other end of the 15-meter trap with a 1/2" clamp.







Detail 6A

- ( ) Mark this half of the 15-20-meter reflector with a piece of tape for identification later. Mark it "15-20-METER REFLECTOR."
- ( ) In the same manner, assemble and mark the other half of the 15-20-meter reflector with the remaining parts. Then set both halves aside.

### FINAL ASSEMBLY

Refer to Pictorial 6 (Illustration Booklet, Page 4) for the following steps.

- ( ) Position the boom with the clamp opening up as shown. Either end can be designated as the director end.
- ( ) Locate brackets #14. Then refer to Detail 6A and install a 1/4"-20 x 3/8" bolt and a 1/4"-20 square nut in the center hole of each bracket. Do not tighten this hardware. These bolts will be referred to as anchor bolts.
- ( ) Refer again to Detail 6A and loosely assemble the two brackets to the director end of the boom (approximately 14" from the mast clamp) with eight 1/4"-20 x 3/4" bolts, eight 1/4" lockwashers and 1/4"-20 hex nuts. Do not tighten any of this hardware.
- ( ) Slide the element insulators into each end of the bracket assembly so that the shoulder of the insulator is against the bracket. Tighten the bracket hardware only enough to hold the insulators.
- ( ) Mark a line on the boom coupling bracket even with the small hole in the center of this bracket. This will be called the center line.
- ( ) Position the bracket assembly so that it measures 14" from the center of the anchor bolt to the center line.
- ( ) Refer to Pictorial 6 and rotate the bracket assembly so that it is positioned 90° with respect to the mast clamp.
- ( ) Slide a 1-1/4" plain clamp (without hardware) over the large end of each driven element.
- ( ) Insert the driven element halves into the element insulators. Push these in as far as they will go. Rotate the elements so that the holes in the traps will be down. Then tighten all of the bracket hardware.
- ( ) Tighten both anchor bolts in the bracket assembly. NOTE: As you tighten these bolts, it may cause the brackets to move on the boom. After you tighten them, recheck the position of the brackets.



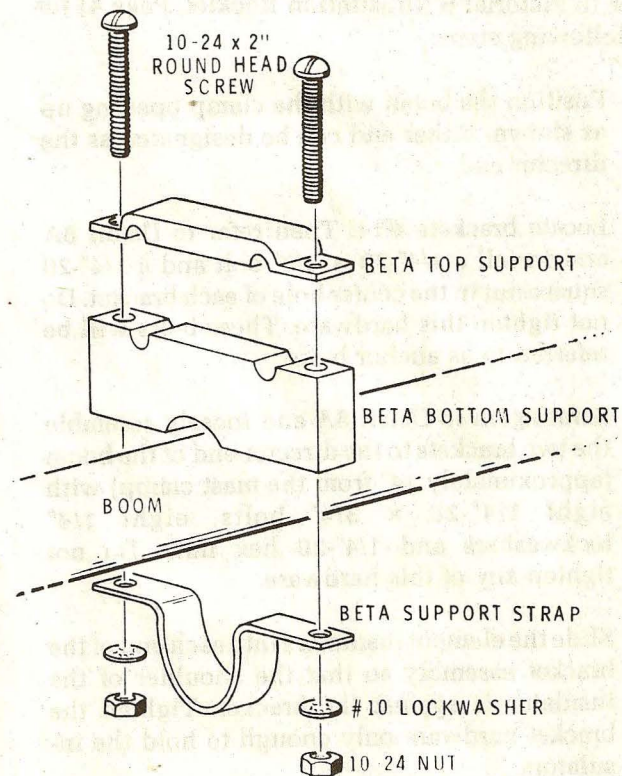
Refer to Pictorial 7 (Illustration Booklet, Page 5) for the following steps.

- ( ) Locate two small #4 brackets. Loosely install a 1/4"-20 x 3/8" anchor bolt in each bracket with a 1/4"-20 square nut.
- ( ) In the same manner as before, loosely assemble these two brackets on the reflector end of the boom (approximately 48" from the mast clamp) with eight 1/4"-20 x 3/4" bolts, eight 1/4" lockwashers, and eight 1/4"-20 hex nuts.
- ( ) Position this bracket assembly so it measures 48" from the center line to the center of the anchor bolt. Also position it in the same plane as the other bracket assembly.
- ( ) Insert the 10-meter reflector halves into this bracket assembly and tighten all of the hardware.
- ( ) Tighten both anchor bolts.
- ( ) Locate two #13 brackets. Loosely install a 1/4"-20 x 3/8" anchor bolt in each bracket with a 1/4"-20 square nut.
- ( ) Loosely assemble these two brackets near the reflector end of the boom with eight 1/4"-20 x 3/4" bolts, eight 1/4" lockwashers, and eight 1/4"-20 hex nuts.
- ( ) Position this bracket assembly so it measures 43" from the center of the anchor bolt on the #4 brackets to the center of the anchor bolt. Also position it in the same plane as the other brackets.
- ( ) Insert the 15-20 meter reflector halves into this bracket assembly and position so the holes in the traps are down. Then tighten all of the hardware.
- ( ) Tighten both anchor bolts.
- ( ) Locate the remaining #13 brackets. Loosely assemble these on the director end of the boom with two 1/4"-20 x 3/8" anchor bolts, two 1/4"-20 square nuts, eight 1/4"-20 x 3/4" bolts, and 1/4"-20 hex nuts.

- ( ) Position this bracket assembly so it measures 91" from the center line to the center of the anchor bolt. Also position the bracket assembly in the same plane as the other brackets.
- ( ) Insert the director halves in this bracket assembly and position it so the holes in the traps are down. Then tighten all hardware.
- ( ) Tighten both anchor bolts.

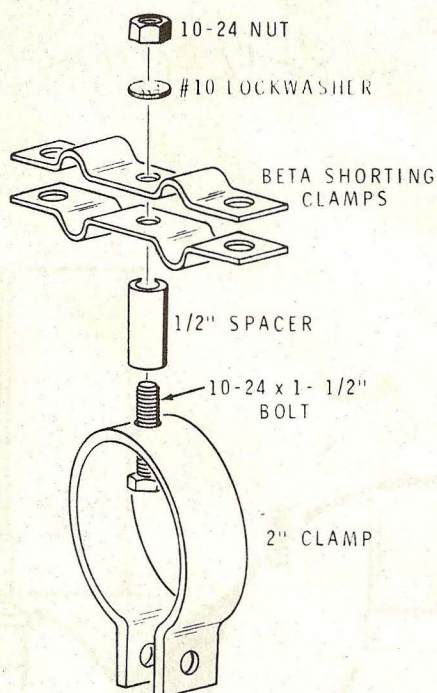
Refer to Pictorial 8 (Illustration Booklet, Page 6) for the following steps.

- ( ) Refer to Detail 8A and loosely assemble the beta bottom support and beta top support to the director half of the boom. Use a beta support strap, two 10-24 x 2" screws, two #10 lockwashers and two 10-24 hex nuts. Do not tighten this hardware. Position this approximately 3-1/2" from the driven element brackets.



**Detail 8A**





Detail 8-B

- ( ) Refer to Detail 8B and assemble the two beta shorting clamps to the 2" beta clamp with a 10-24  $\times$  1-1/2" hex head screw, a 1/2" spacer, a #10 lockwasher, and 10-24 hex nut. Make sure the holes in the shorting clamps line up with each other as you tighten the hardware.
- ( ) Loosely mount this clamp on the boom approximately 30" from the driven element on the director end. Use a 1/4"-20  $\times$  1-1/2" hex head bolt, a 1/4" lockwasher, and a 1/4"-20 hex nut.
- ( ) Use a screwdriver to pry the shorting clamp apart while you slide one end of a 46" beta tube (end with the small hole) through the beta shorting clamp and through the beta support. Position the end of the tube 1" from the driven element bracket with the small hole up.
- ( ) In the same manner, install the other 46" beta tube in the beta shorting clamp and beta support.
- ( ) Make sure the beta tubes are even at the ends and the small holes are up. Then tighten the beta support screws.
- ( ) Make a mark on the beta tubes 6" from the back end (end opposite the small holes).
- ( ) Position the shorting clamp so that the back of the clamp is on the mark. Then install two 10-24  $\times$  1/2" screws in the shorting clamp with two #10 lockwashers and two 10-24 hex nuts. Do not tighten this hardware.
- ( ) Make sure that the beta tubes are straight with the boom. Then tighten the hardware on the beta shorting clamp and the 2" clamp.
- ( ) Apply grease to the driven elements next to the insulators. Then place the 1-1/4" plain clamps over each driven element half near the insulator with the open ends toward the beta tubes.
- ( ) Mount the small end of a cable to the small hole in either beta tube with a 6-32  $\times$  1/2" screw and a 6-32 nut. Use grease on this connection.
- ( ) Mount the small end of the other cable to the other beta tube in the same manner.
- ( ) Connect the other end of the cables (from the beta tubes) to their appropriate clamp on the driven element. Use a 1/4"-20  $\times$  1-1/4" screw, and a 1/4"-20 hex nut on each clamp. Position the clamp close to the insulator and tighten the hardware.

This completes the assembly of your Antenna. You will have some parts left over at this time. Proceed to "Adjustments."



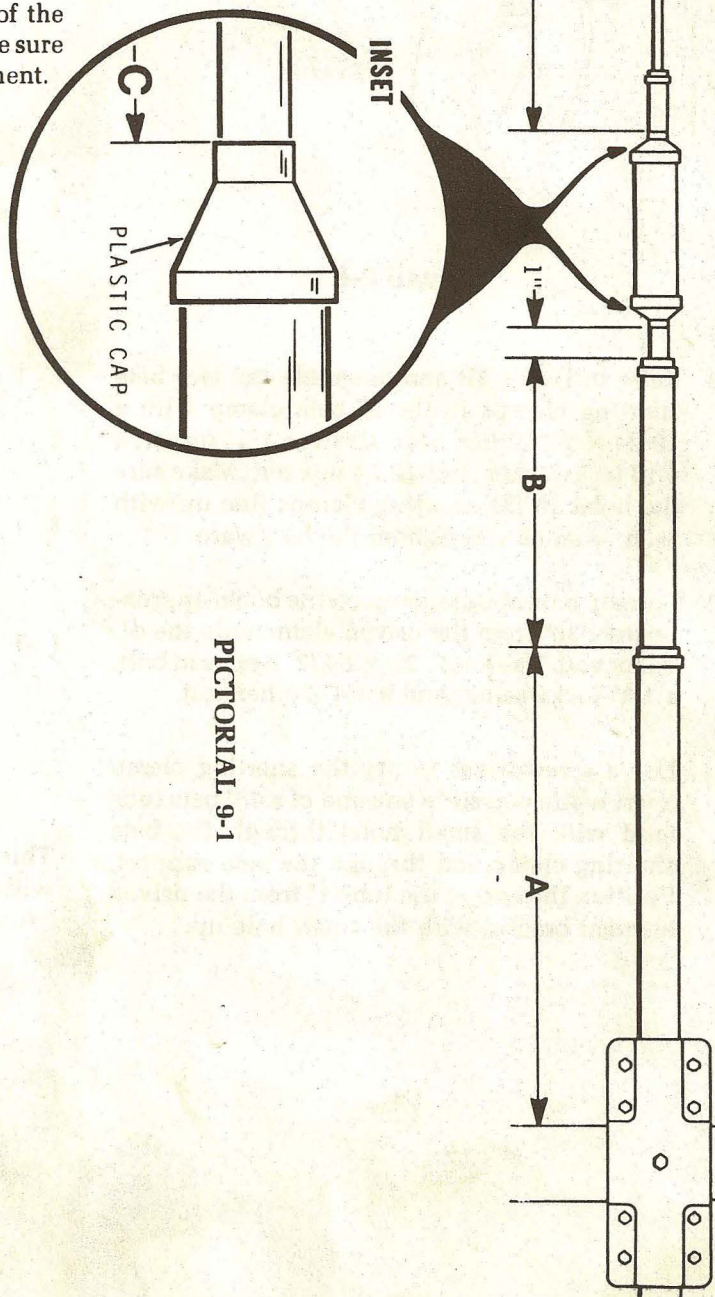
## ADJUSTMENTS

At this time, you must decide which mode of transmission (CW, HiPhone, or LoPhone) you will use. Then refer to the appropriate line in the following charts and adjust the elements accordingly. When you select a mode of transmission, you must use the same mode for the remaining measurements. DO NOT attempt to use averages or various combinations on the same element or serious deterioration in antenna performance will result.

As you adjust each section of each element, tighten the element clamp.

Refer to Pictorial 9-1 and adjust the sections of the 15-20-meter reflector as indicated in the chart. Be sure to adjust the sections on both ends of the element.

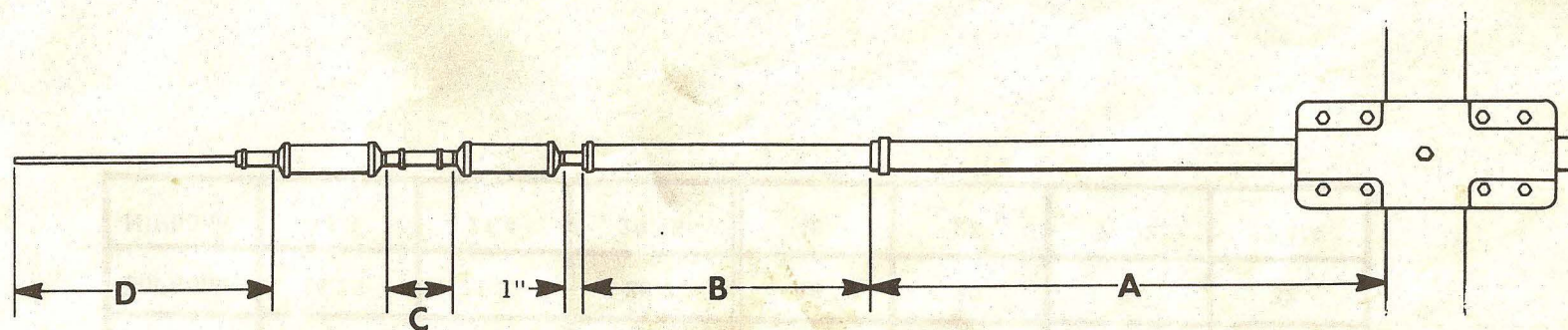
RESONANT FREQ.				ELEMENT SECTIONS (IN INCHES)		
MODE	20 METERS	15 METERS	10 METERS	A	B	C
CW	14.1	21.2	28.3	83	50	41-1/2
LoPhone	14.25	21.35	28.7	83	48	40
HiPhone	14.3	21.4	29.15	83	47	40







Refer to Pictorial 9-2 and adjust the sections of the driver element as indicated in the chart.



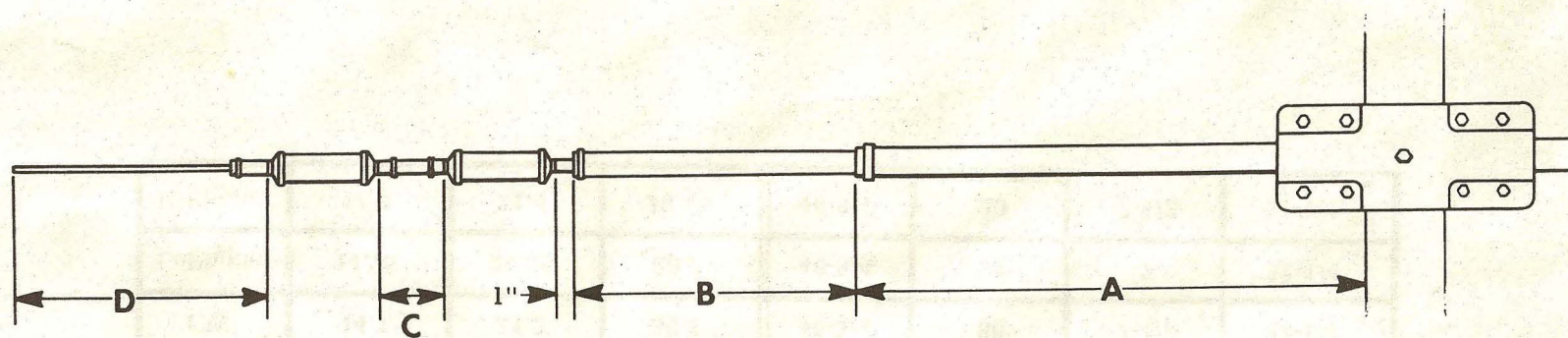
PICTORIAL 9-2

RESONANT FREQ:				ELEMENT SECTIONS (IN INCHES)			
MODE	20 METERS	15 METERS	10 METERS	A	B	C	D
CW	14.1	21.2	28.3	48-3/4	36	7-1/2	32-1/2
LoPhone	14.25	21.35	28.7	48-3/4	34	7	32-1/4
HiPhone	14.3	21.4	29.15	48-3/4	30	7-1/2	32-1/4





Refer to Pictorial 9-3 and adjust the sections of the director element as indicated in the chart.



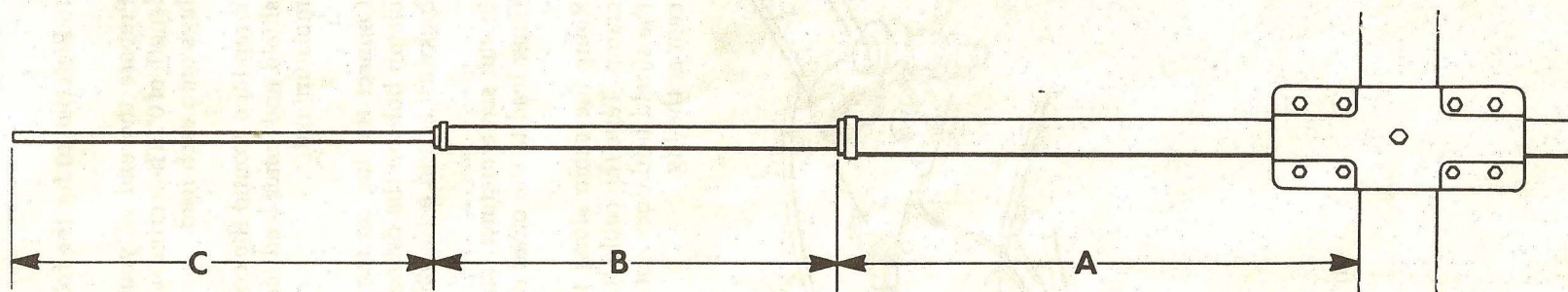
PICTORIAL 9-3

RESONANT FREQ:				ELEMENT SECTIONS (IN INCHES)			
MODE	20 METERS	15 METERS	10 METERS	A	B	C	D
CW	14.1	21.2	28.3	48	31	7-1/2	32-1/2
LoPhone	14.25	21.35	28.7	48	29	7	32
HiPhone	14.3	21.4	29.15	48	26	7-1/2	32-1/4





Refer to Pictorial 9-4 and adjust the sections of the 10-meter reflector element as indicated in the chart.



PICTORIAL 9-4

RESONANT FREQ:				ELEMENT SECTIONS (IN INCHES)		
MODE	20 METERS	15 METERS	10 METERS	A	B	C
CW	14.1	21.2	28.3	55	23-1/2	32
LoPhone	14.25	21.35	28.7	55	23-1/2	30
HiPhone	14.3	21.4	29.15	55	23-1/2	28

This completes the adjustment of your Antenna. Proceed to "Wiring."



## WIRING

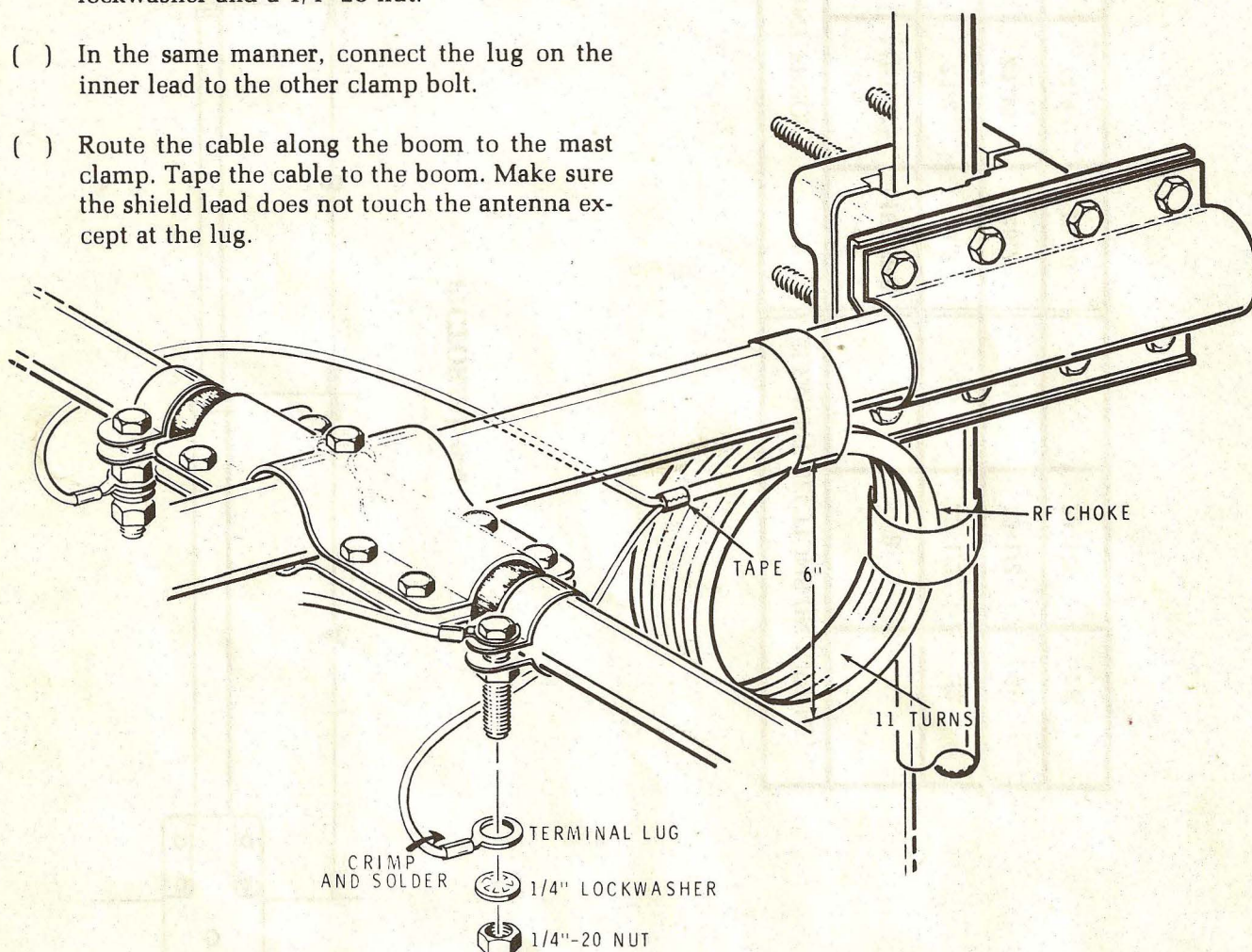
Refer to Pictorial 10 for the following steps.

- ( ) Prepare the end of your coaxial cable for a length of 6". Then crimp and solder the terminal lugs onto each lead.
- ( ) Wrap tape around the coaxial cable, where the shield and inner lead leave the cable, to keep moisture out.
- ( ) Connect the lug on the shield lead to either clamp bolt on the driven element with a 1/4" lockwasher and a 1/4"-20 nut.
- ( ) In the same manner, connect the lug on the inner lead to the other clamp bolt.
- ( ) Route the cable along the boom to the mast clamp. Tape the cable to the boom. Make sure the shield lead does not touch the antenna except at the lug.

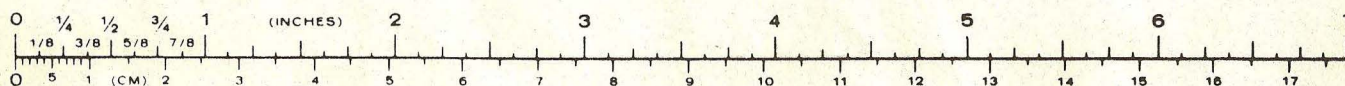
- ( ) At the mast clamp, wrap the coaxial cable eleven times around a 6" diameter. Then tape the cable. NOTE: An empty coffee can makes a good form to wrap the cable around.

- ( ) Push a 7/16" plastic end cap onto the end of each element.

This completes the Antenna wiring. Proceed to "Installation Considerations."



PICTORIAL 10







## INSTALLATION CONSIDERATIONS

### WARNING

Before you start to install your Antenna, take note of any overhead wires. Contact with an overhead wire can be FATAL.

The tower or mast that this Antenna is to be installed on must be at least twice the distance from any surrounding power line as it is from the top of the tower or mast to the ground. For Example: If your tower or mast is 40 feet high, your tower or mast must be at least 80 feet from the nearest power line.

Also, your tower or mast must be grounded for your own protection against lightning. If your mast is roof mounted, connect a copper wire securely to the mast with a clamp. Connect the other end of this wire to a copper ground rod or a well pipe. If your Antenna is mounted to a tower, the tower should be grounded to a copper ground rod.

For ground wires, use #10 AWG copper, #8 AWG aluminum or #8 AWG copper clad aluminum wire or larger.

For more information on proper grounding of the mast and supporting structure, obtain a copy of Section 810 of the National Electrical Code, NFPA 70-1975. Look for a copy at your local library or obtain one from an electrician.

The mast clamps have a hole in their center to allow you to bolt the clamps directly to your mast if you desire. To do this, you will have to mark the mast and then drill a 3/8" hole through the mast. If this is not convenient, the clamps will hold in all but the most severe weather without this bolt. If you are in an area where your antenna is subjected to strong winds, you should install this bolt. The hardware for this is supplied.





## SPECIFICATIONS

### ELECTRICAL SPECIFICATIONS

Frequency Range .....	20, 15, and 10 Meters.
Gain .....	8.3 dB
Front-to-Back Ratio .....	25 dB
Maximum Power Input .....	1 kw power to antenna
VSWR (at resonance) .....	Less than 1.5
Impedance .....	50 ohms

### MECHANICAL SPECIFICATIONS

Longest Element .....	31 ft. 945 M
Boom Length .....	15.85 ft. 483
Turning Length .....	12.5 ft. 381
Turning Radius .....	17.4 ft. 531
Maximum Wind Survival .....	80 MPH
Net Weight .....	40 lbs.
Mast Diameter .....	1-1/4" to 2-1/2"
Boom Diameter .....	2"
Surface Area .....	5.8 sq. ft.

## CIRCUIT DESCRIPTION

The Heath Tri-band Beam Antenna is a frequency sensitive array of dipole elements that is capable of generating a unidirectional radiation pattern over a narrow frequency range compromising approximately two percent of the design frequency.

The array consists of four elements, one connected directly to the transmission line (the driven element) and three others not directly connected (parasitic elements).

Detuning the parasitic elements of the beam will widen the operating range somewhat at the expense of antenna gain. Therefore, efficient operation of the simple parasitic beam antenna on more than one amateur band is out of the question.

Automatic decoupling traps are used to decouple sections of the antenna elements. This makes it possible for the antenna to operate efficiently on different bands without the loss of gain. These traps utilize the high impedance of a parallel resonant circuit to isolate or decouple unwanted portions of the antenna.

The traps are placed in the elements at the proper points to isolate the center portions of the elements to resonate at a chosen frequency. A second set of traps placed in the elements isolate a longer section of element to resonate at a lower frequency. The complete element, with the traps included, resonate at still a lower frequency. These frequencies respond to the 10, 15, and 20 meter bands.

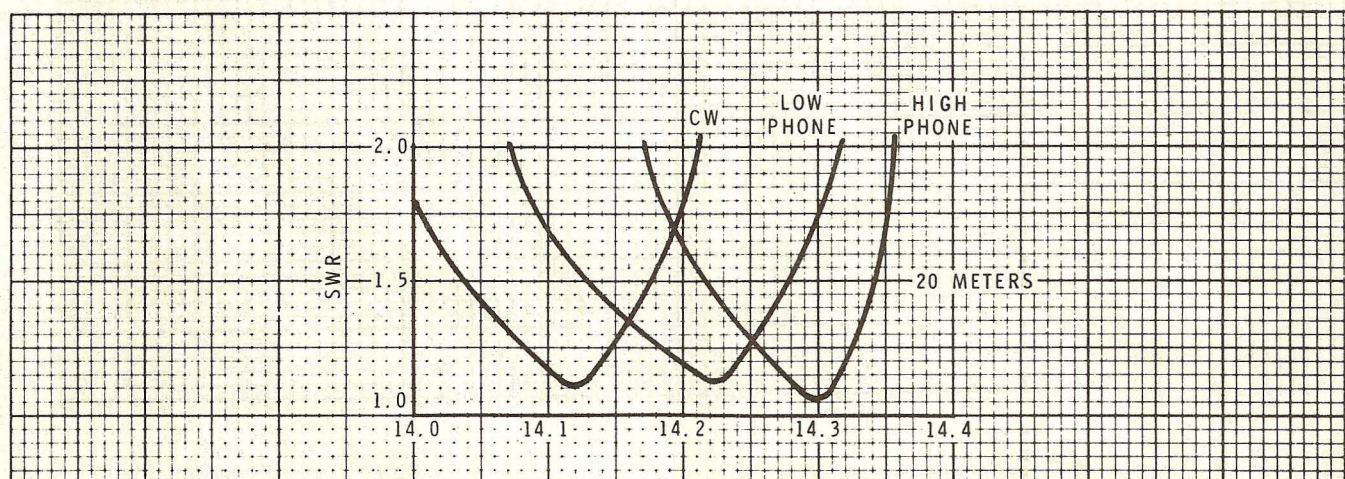
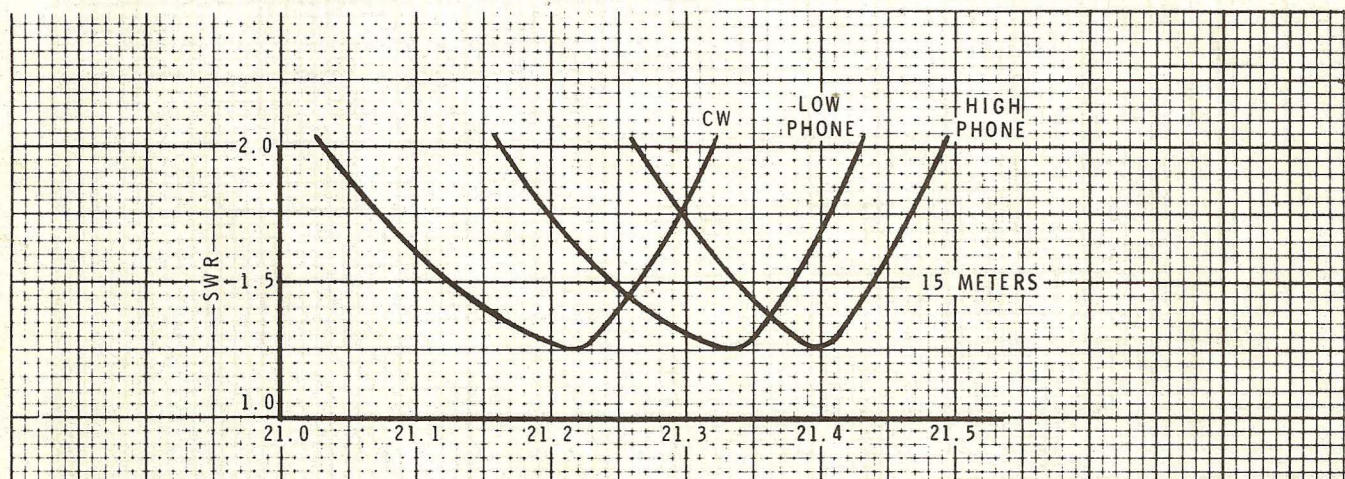
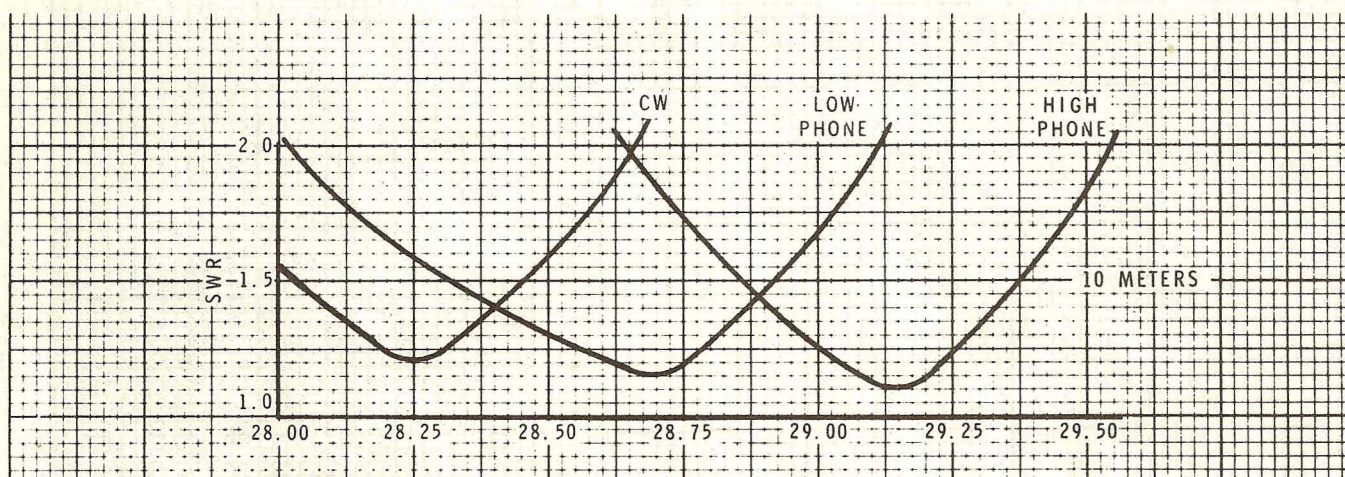
The 10-meter reflector does not contain a trap since it operates independently of the 15 and 20 meter reflector. The 15 and 20 meter reflector contains only one trap for the 15 meter portion of that element.





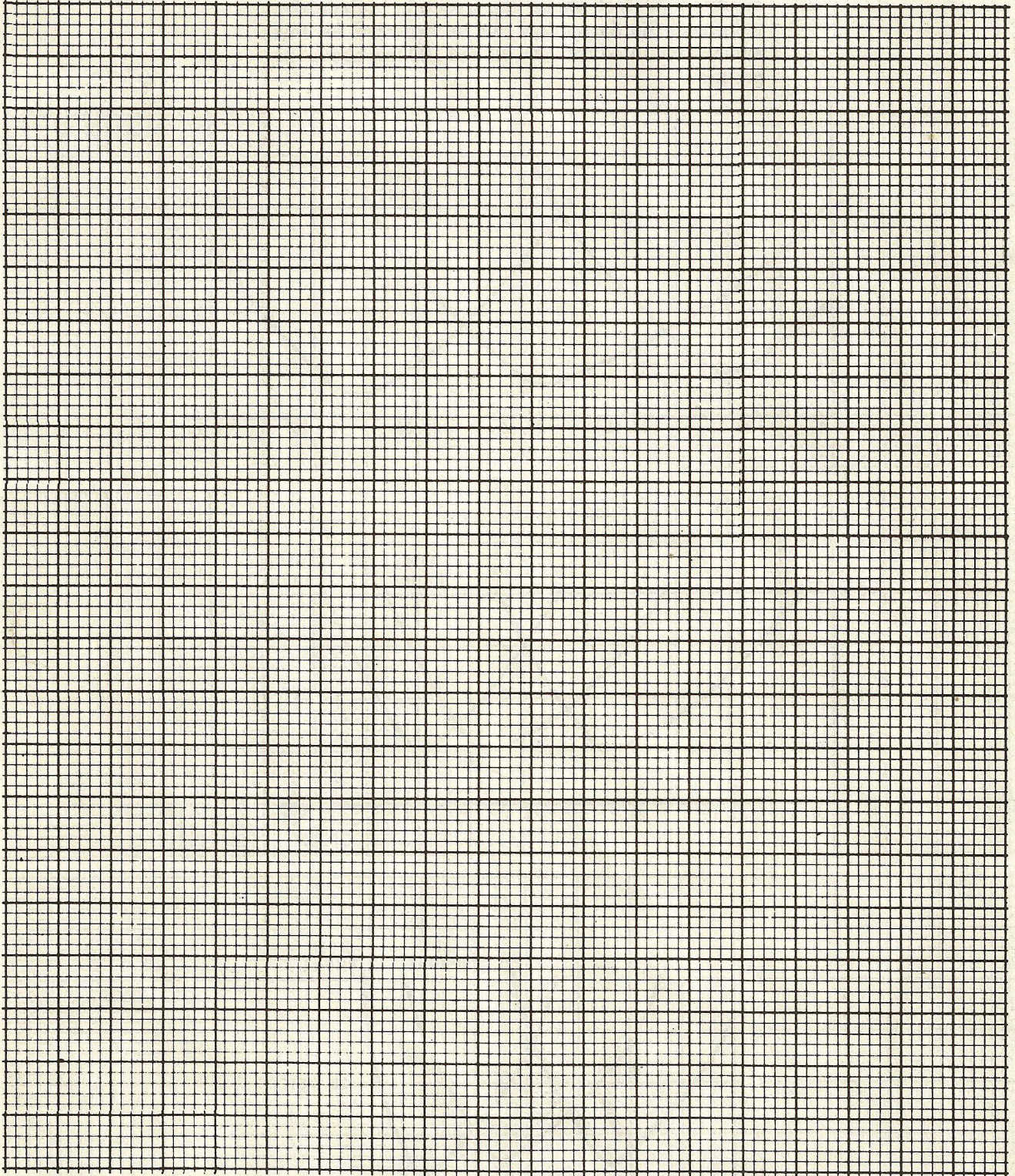
## VSWR CHARTS

These VSWR curves are typical for this antenna mounted 70 feet above the ground, horizontally polarized. Similar curves can be expected for this antenna mounted between 30 and 100 feet above the ground.





This Page is provided for you to chart the VSWR of  
your antenna if you wish.



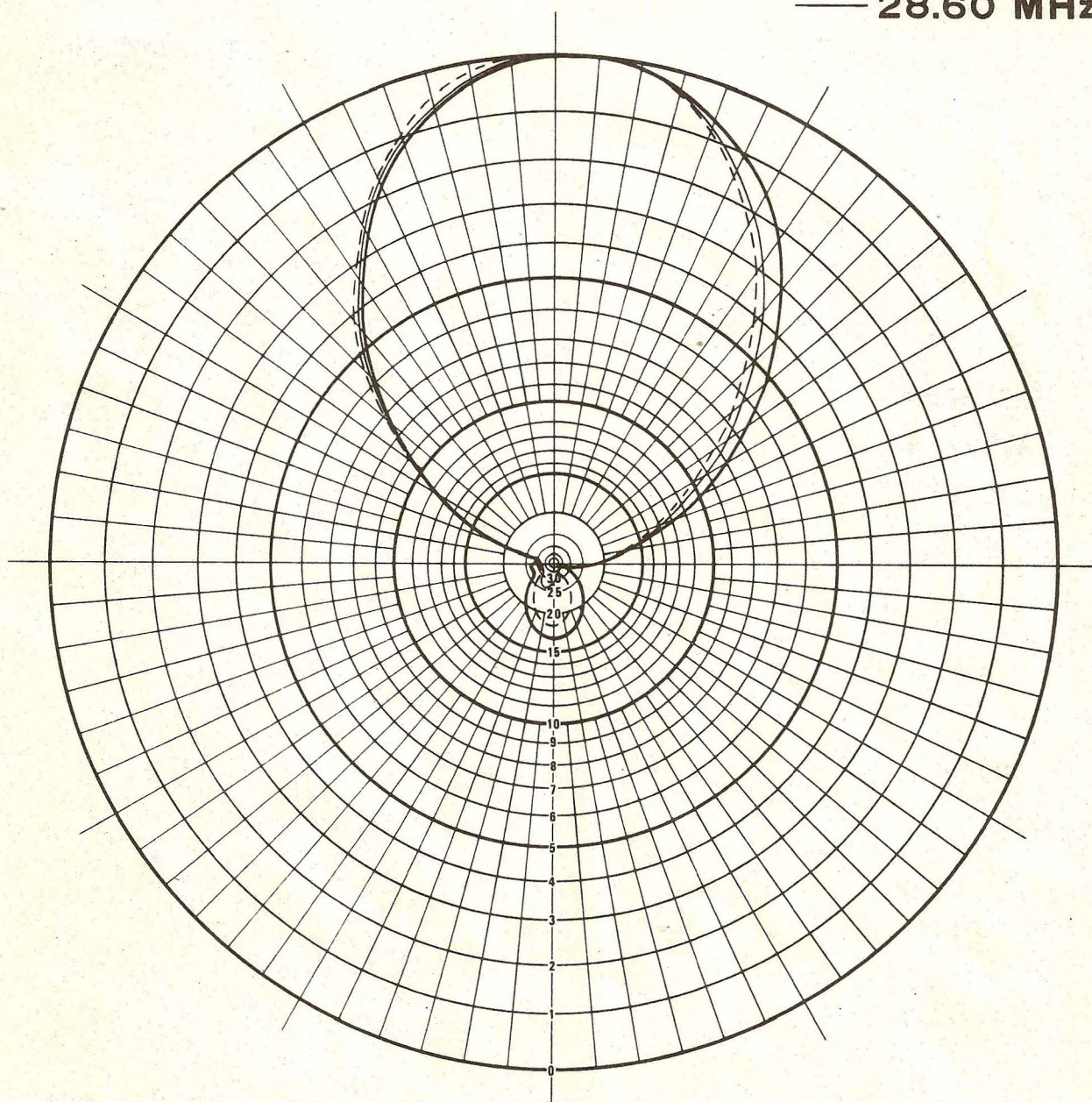


## RADIATION PATTERNS

These radiation patterns are typical for this type of antenna mounted 70 feet above the ground, horizontally polarized. Similar patterns can be expected for this antenna mounted between 30 and 100 feet above the ground.

### LEGEND

- 14.25 MHz
- 21.10 MHz
- 28.60 MHz





# CUSTOMER SERVICE

## REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

## ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company  
Benton Harbor  
MI 49022  
Attn: Parts Replacement

**Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.**

## OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

## TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

**Please do not send parts for testing**, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

## REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

**If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.**

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least **THREE INCHES** of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company  
Service Department  
Benton Harbor, Michigan 49022





**HEATH COMPANY • BENTON HARBOR, MICHIGAN**  
***THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM***

LITHO IN U.S.A.





HEATH COMPANY • BENTON HARBOR, MICHIGAN 49022  
TLX 72-9421

## IMPORTANT NOTICE

Cut the following lists from this Notice and tape them over the lists on the following Pages:

Tape the following list over the list on Page 7.

<u>QTY</u>	<u>DESCRIPTION</u>
2	26" section (5/8" diameter)
2	39" section (7/16" diameter)
2	55" section (7/8" diameter)
2	3/4" element clamp
2	1/2" element clamp
2	1/4-20 × 1-1/4" hex head bolt
2	10-24 × 1" hex head bolt
2	1/4-20 square nut
2	10-24 square nut

Tape the following list over on Page 9, left column.

<u>QTY</u>	<u>DESCRIPTION</u>
2	48" section (1-1/4" diameter)
2	38" section (1-1/8" diameter)
2	28" section (7/16" diameter)
2	6" tube
2	1-1/4" element clamp
6	1" element clamp
2	1/2" element clamp
2	10-meter (10 M) trap
2	15-meter (15 M) trap (#231-25)
8	1/4-20 / 1-1/2" hex head bolt
2	10-24 × 1" hex head bolt
8	1/4-20 square nut
2	10-24 square nut



Tape the following list over the list on Page 9, right column.

<u>QTY</u>	<u>DESCRIPTION</u>
2	48" section (1-1/4" diameter)
2	42" section (1-1/8" diameter)
2	6" tube
2	28" section (7/16" diameter)
2	1-1/4" element clamp
6	1" element clamp
2	1/2" element clamp
2	10-meter (10 M) trap
2	15-meter (15 M) trap (#231-24)
8	1/4-20 × 1-1/2" hex head bolt
2	10-24 × 1" hex head bolt
8	1/4-20 square nut
2	10-24 square nut

Tape the following list over the list on Page 10.

<u>QTY</u>	<u>DESCRIPTION</u>
2	83" section (1-1/4" diameter)
2	52" section (1-1/8" diameter)
2	37" section (7/16" diameter)
2	15-meter (15 M) trap (#231-25)
2	1-1/4" element clamp
2	1" element clamp
2	1/2" element clamp
4	1/4-20 × 1-1/2" hex head bolt
2	10-24 × 1" hex head bolt
4	1/4-20 square nut
2	10-24 square nut

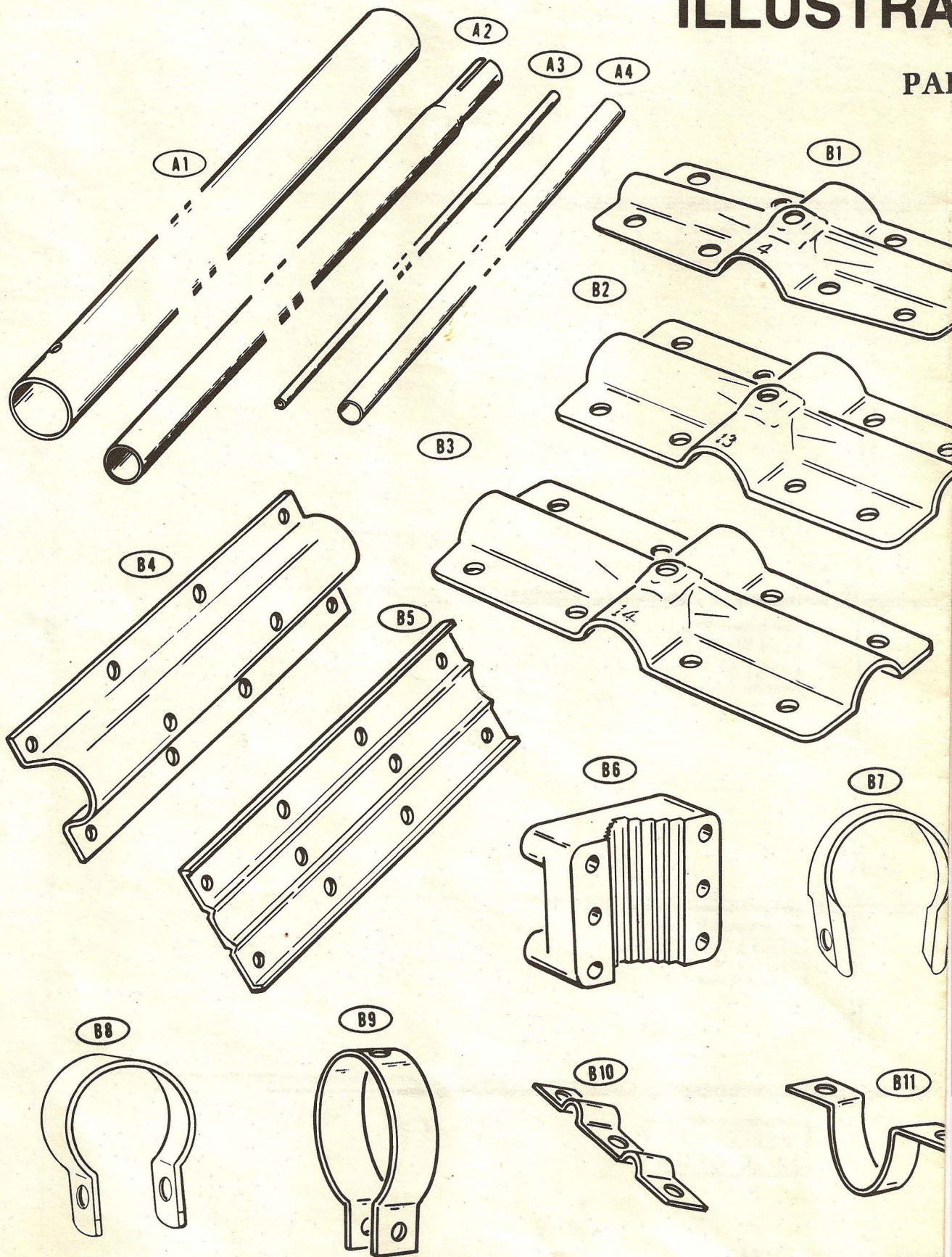
Thank you,

HEATH COMPANY



# ILLUSTRATION

PARTS



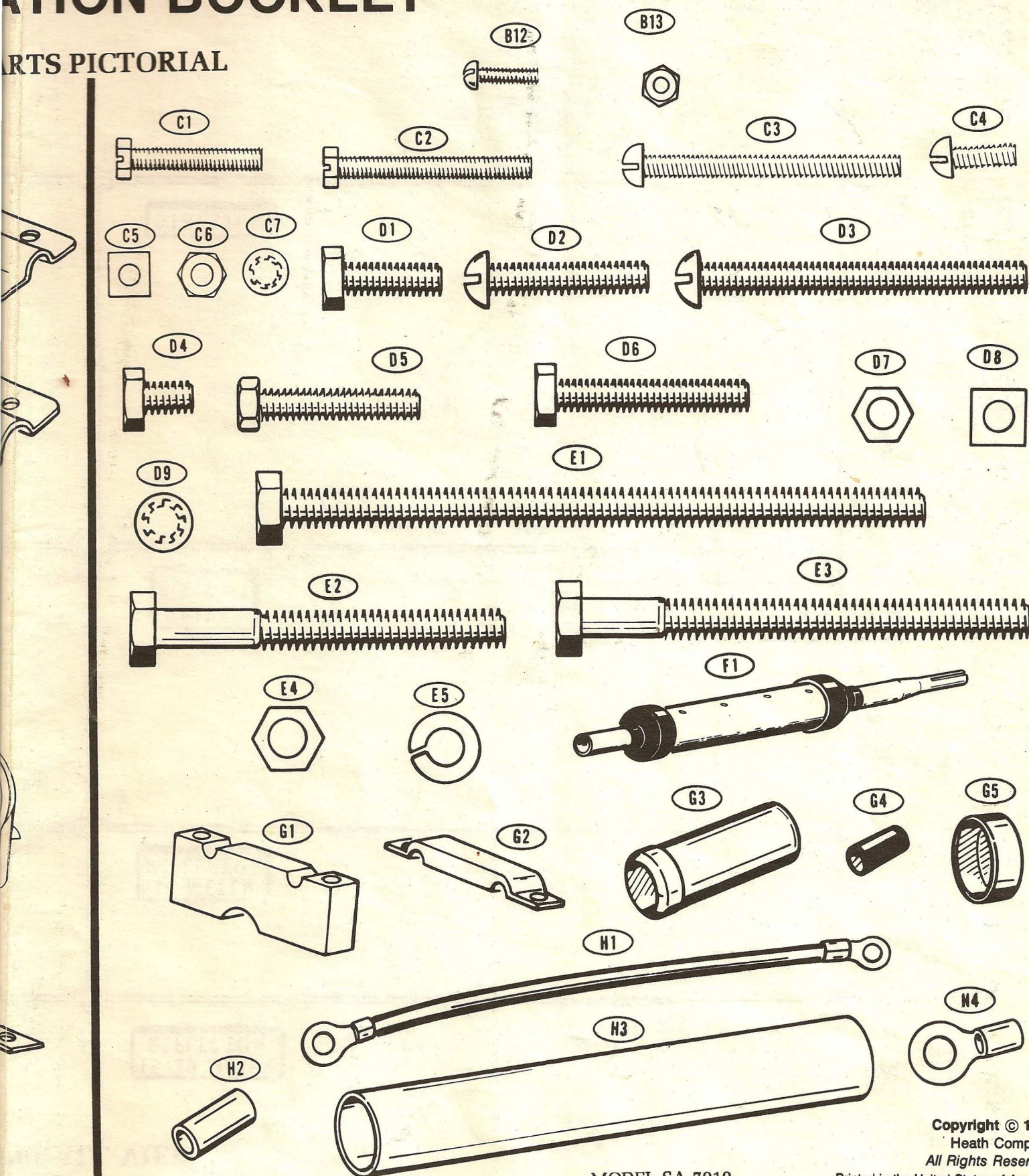
24-5070



# ATION BOOKLET

Part of 595-2354-01

## ARTS PICTORIAL



MODEL SA-7010

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- 7010

OV

#231-25

15

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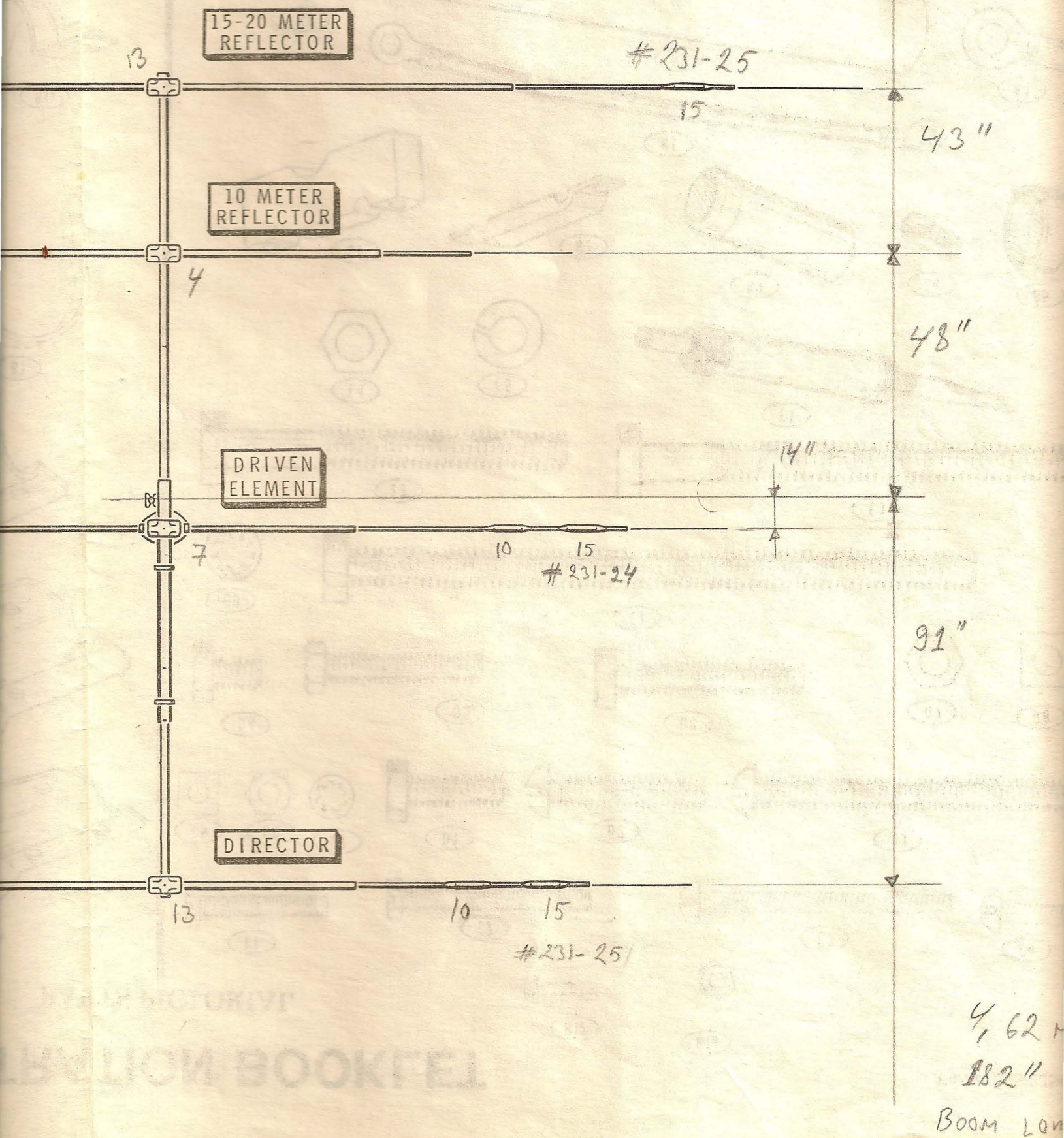
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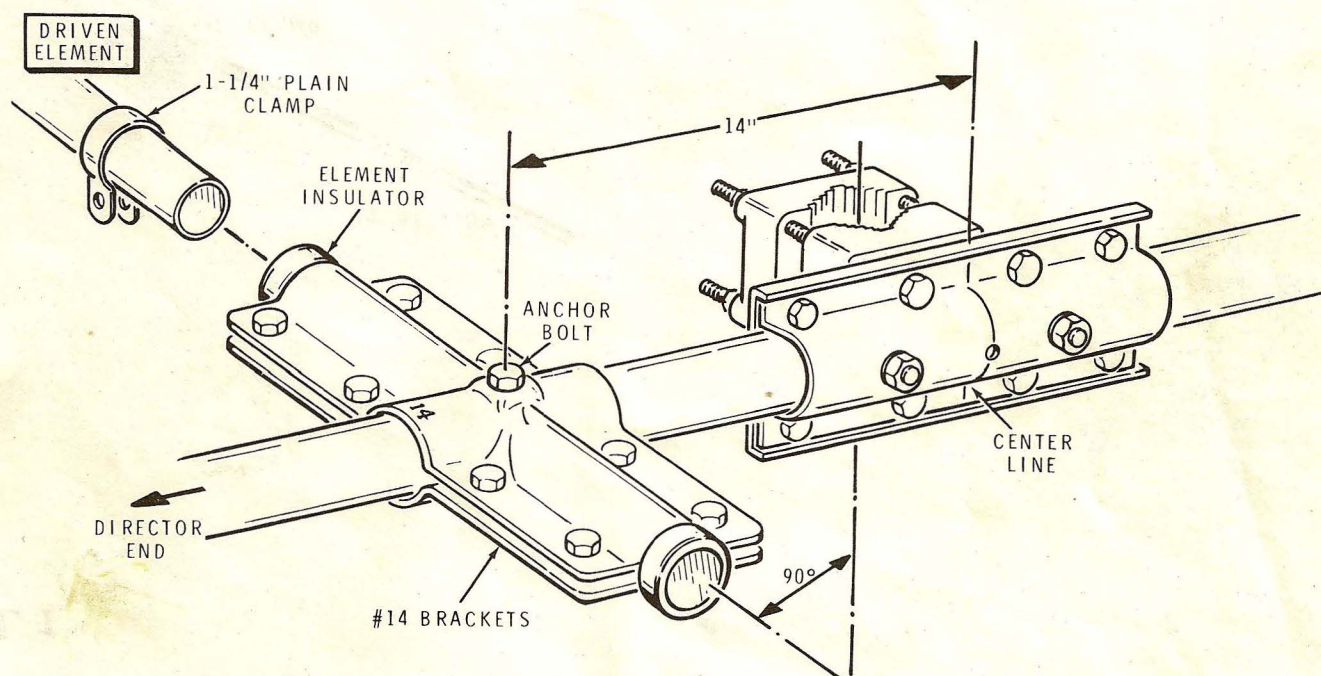
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## OVERALL VIEW

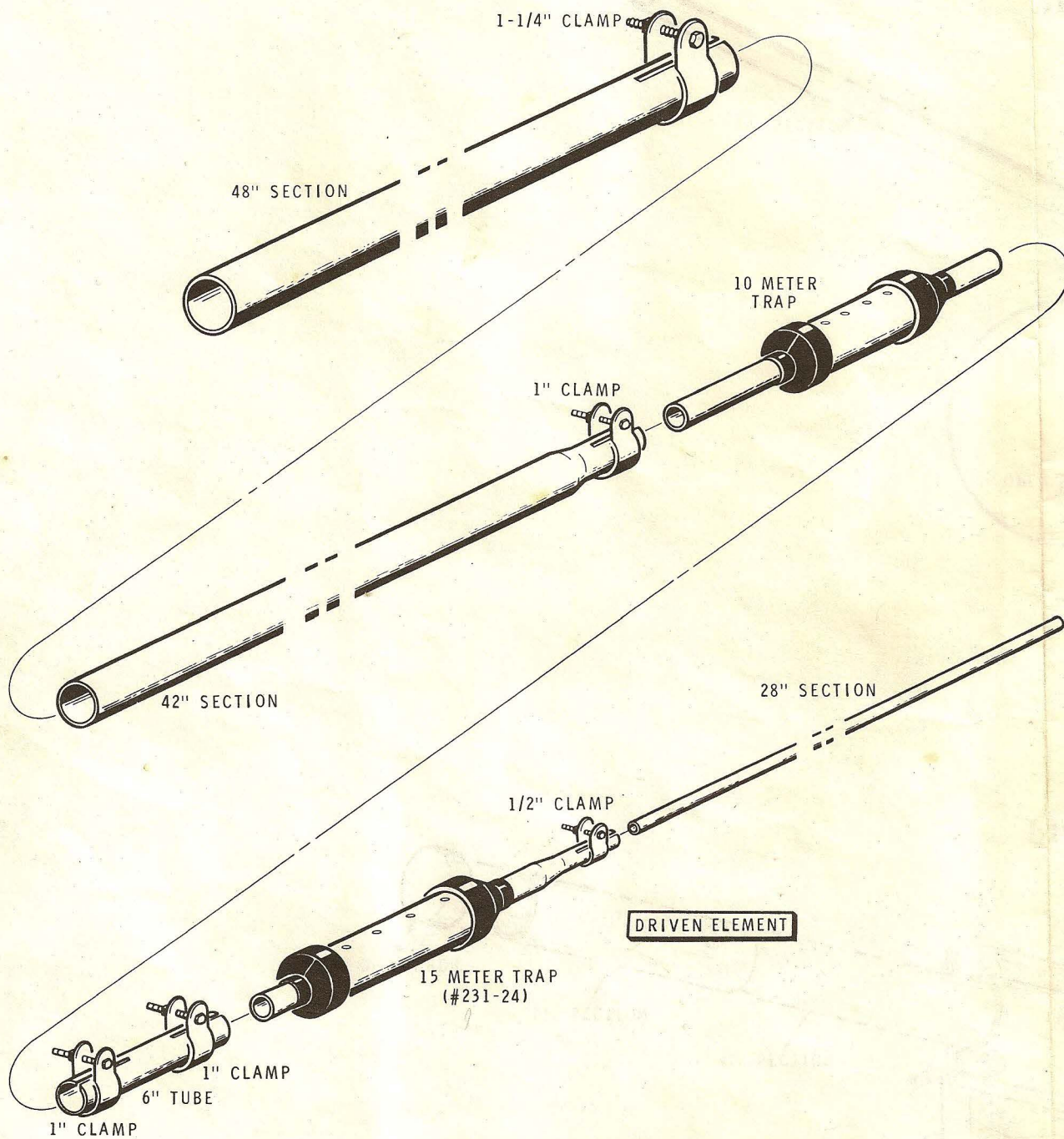






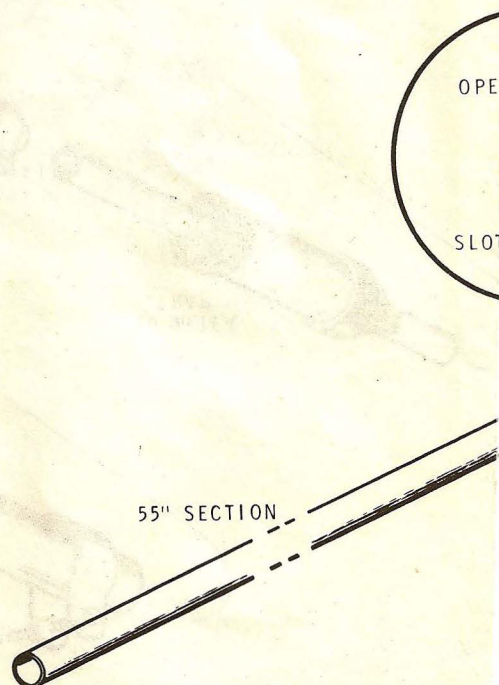
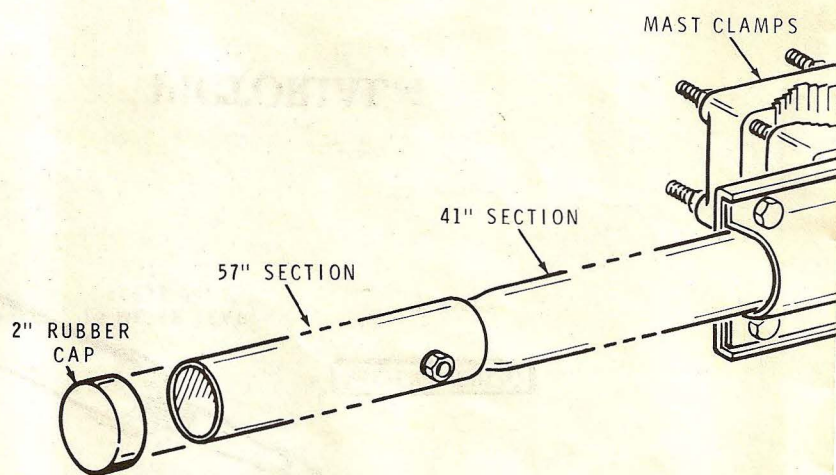
PICTORIAL 6



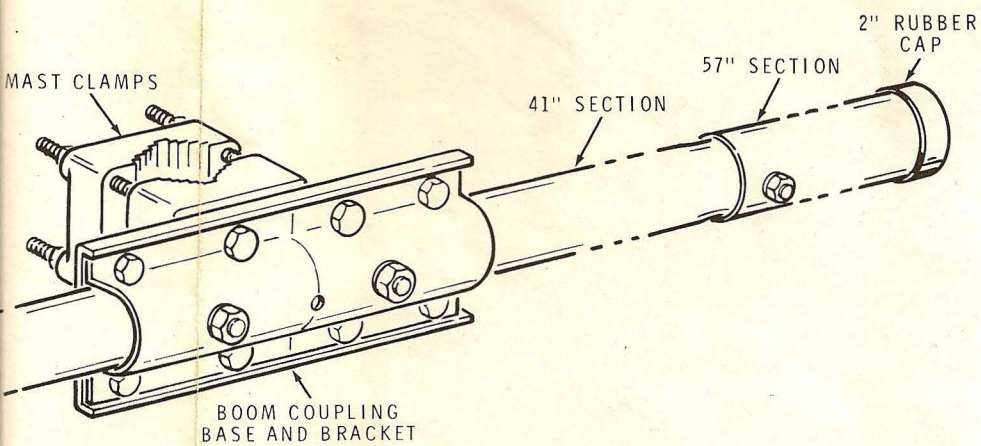


**PICTORIAL 4**

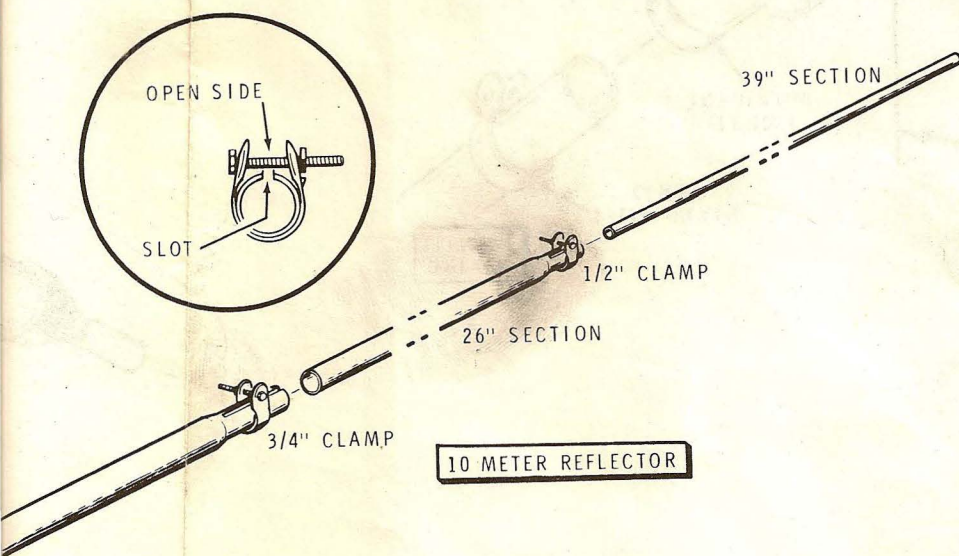






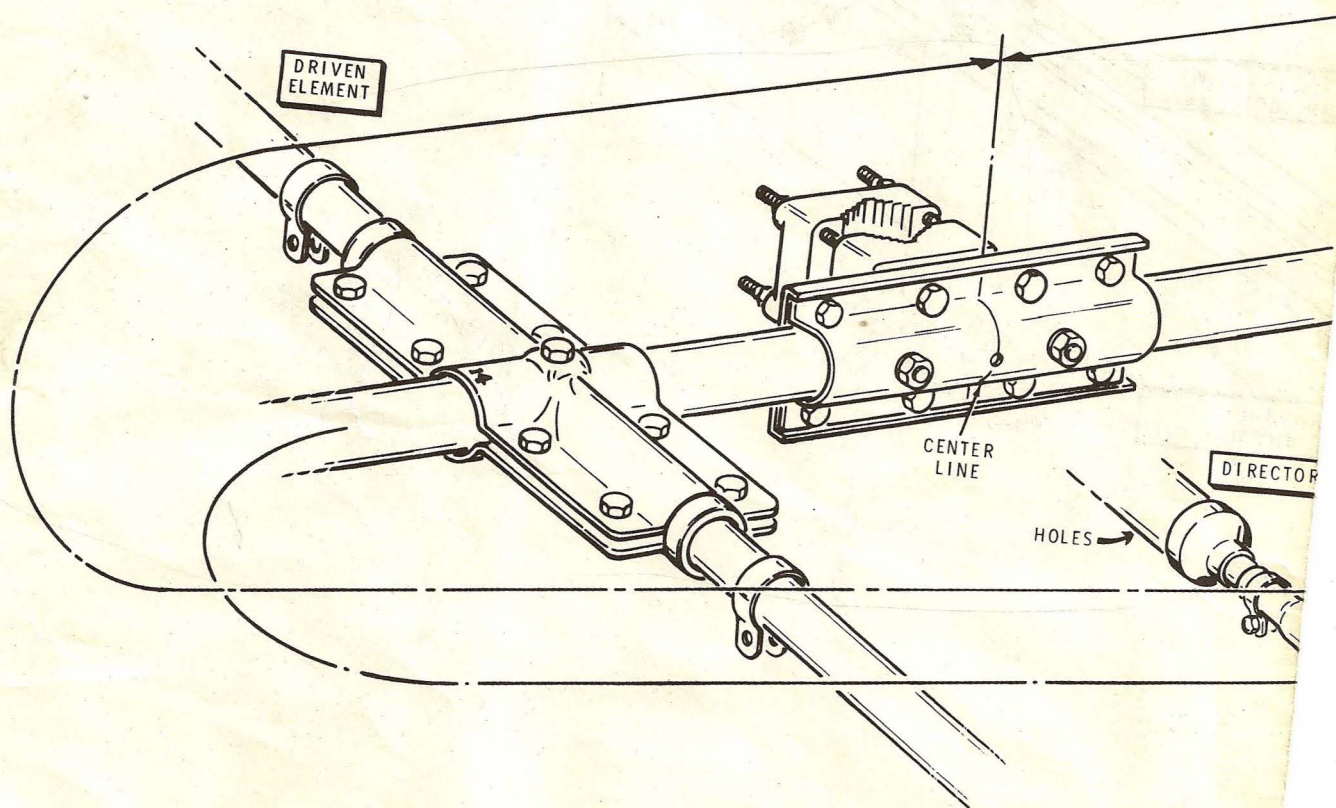


**PICTORIAL 1**

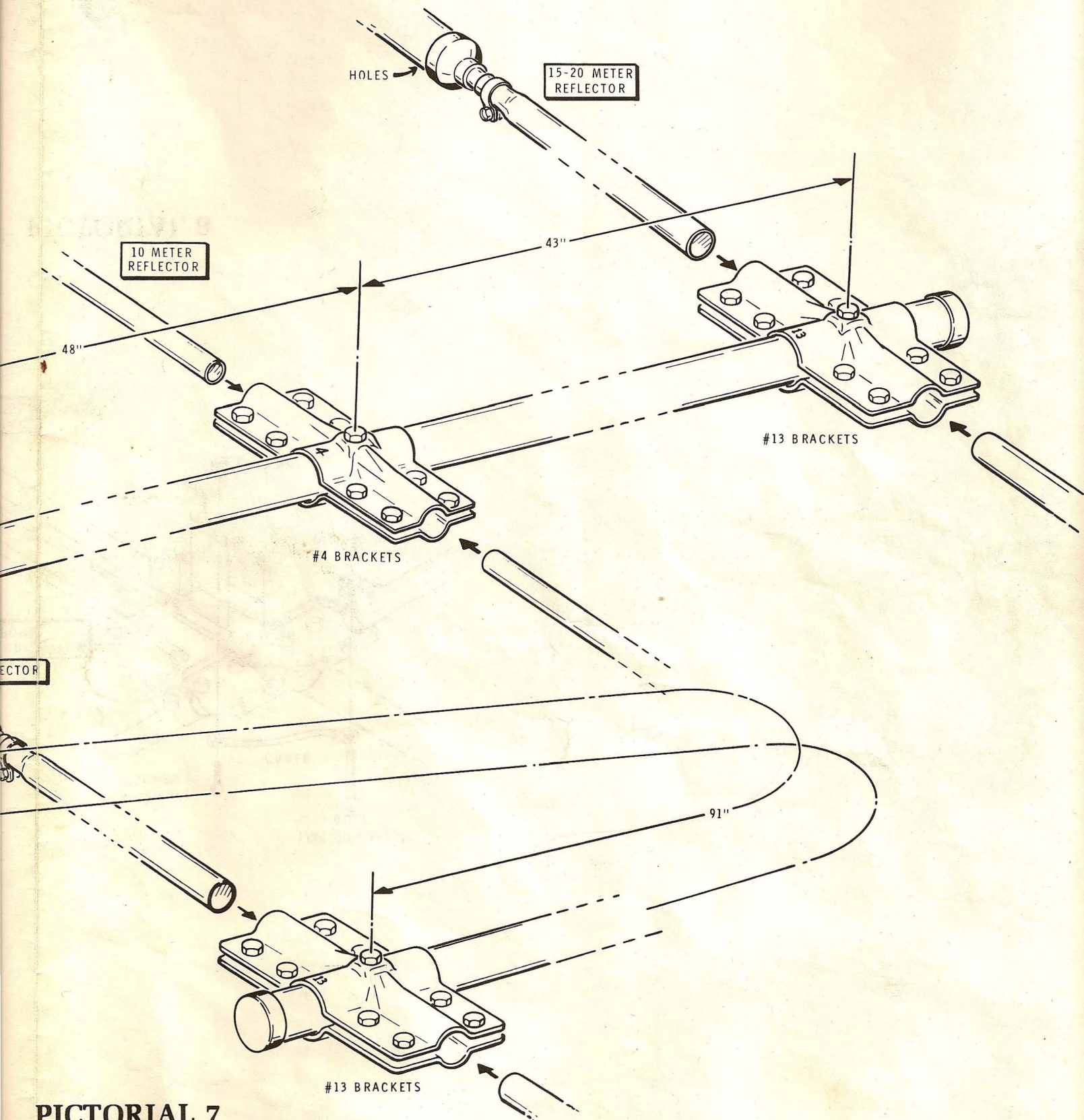


**PICTORIAL 2**









PICTORIAL 7



