

*The*

# SUPER SCANNER

27 MHz Citizens Radio Base Station Antenna

MODEL  
MS119

## instruction manual

FEATURING  
OMNI OR  
DIRECTIONAL  
GAIN !

**WARNING**

If this antenna or the mast to which it is attached touches a power line or is brought in proximity with a high voltage electrical field, there is danger of electrical shock or electrocution. For your safety, care should be taken to stay clear of electric power lines or other apparatus carrying high voltage electrical energy. The Electronic Industries Association issues this warning in the interest of public safety.



"Stripes of Quality"

**the antenna specialists co.**

a member of The Allen Group Inc.

12435 Euclid Avenue · Cleveland, Ohio 44106 · 216 791-7878

Export offices: 2200 Shames Dr., Westbury, N.Y. 11590



## FOREWORD

The Antenna Specialists Co. is very pleased and proud that you have selected our revolutionary new SCANNER Antenna System for your base station.

The SCANNER is an entirely new concept in communications antennas. It is based on principles utilized in the most sophisticated of radio-telescope systems, now developed and perfected exclusively for sub-microwave communication use by Antenna Specialists engineers to bring you outstanding gain performance, and convenience never before possible in a directional-type communication antenna.

You will find the SCANNER very simple to assemble and install, easy and enjoyable to operate, absolutely reliable and as rugged as they come.

73 !

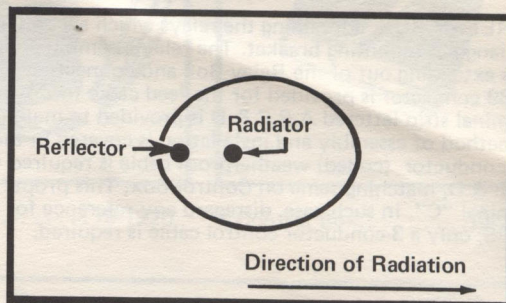
**the antenna specialists co.**



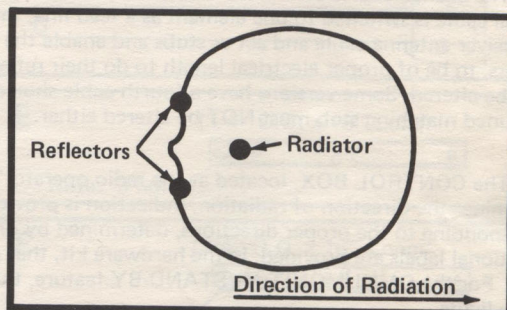
# THE "SCANNER" PRINCIPLE

The "SCANNER" is a multi-element directional antenna system especially developed to be electrically rotatable for a full  $360^\circ$  in three  $120^\circ$  steps. This accomplishes the same results ordinarily requiring mechanical rotation to point the gain pattern in a desired direction.

With a single radiator and reflector system, the pattern appears as shown at right.



By using two reflectors and one radiator, the pattern is extended and a greater gain, in the direction of radiation, results. See pattern at right.



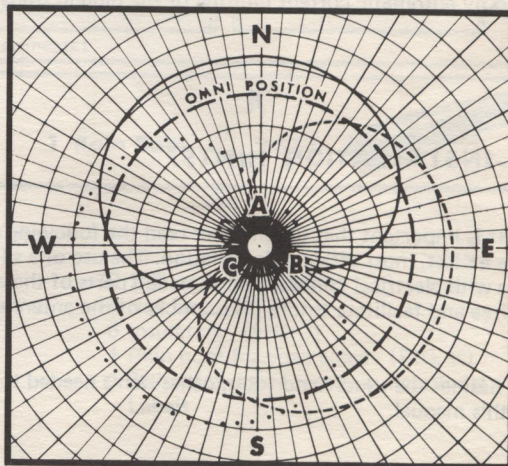
As shown in the illustrations above, both systems require a mechanical means for rotating the systems in order to change the direction of "greatest gain". This objective is reached by the "SCANNER" through an electrical system of rotation.

The system consists of three elements, mounted  $120^\circ$  apart around a circle whose center is a triangular mounting bracket. Coaxial cables of predetermined fixed lengths connect each element to a relay switching mechanism.

This switching mechanism is a relay assembly whose function is to switch the cables in such manner that one element becomes a radiator and the other two become reflectors. This produces the desired results as shown in the drawing at the right and the description that follows:

With "A" radiating, "B" and "C" become reflectors and the direction of radiation is North. With "B" radiating, "A" and "C" are the reflectors and the direction of radiation is Southeast. With "C" radiating, "A" and "B" are the reflectors and the direction of radiation is shifted Southwest.

The direction of radiation and the gain pattern is thus rotated ELECTRICALLY in three  $120^\circ$  steps.





An OMNI-DIRECTIONAL POSITION is also provided on the Super Scanner. In this position, all the lights are on indicating that all three elements plus a matching network or shorted 'OMNI-' stub cable are connected giving a stand-by monitor position resulting in a properly matched antenna suitable for receiving and transmitting.

A RELAY BOX, containing the relays which accomplish this electrical rotation, is mounted on the triangular mounting bracket. The relay assembly consists of three relays and color coded coaxial cables extending out of the Relay Box and connecting to matching color coded elements. A coaxial SO-239 connector is provided for the feed cable (not furnished) which connects with the transceiver. A terminal strip lettered A,B,C & D is provided to match a similar strip on the Control Box. The method of assembly and installation is covered in the "Installation Instructions" found in this manual. Four-conductor (coded) weatherproof cable is required (not supplied) to connect the terminal strips A,B,C & D, matching same on Control Box. This proper matching is essential. Some versions do not have a terminal "C". In such case, disregard any reference for terminal "C" on RELAY and CONTROL BOXES; only a 3-conductor control cable is required.

The coaxial cables connected to the relay assembly (Relay Box) act in dual capacities. When a coaxial cable is switched to one element as a feed line, the other two are disconnected from the transceiver antenna cable and act as stubs and enable the other two elements, which now act as reflectors, to be of proper electrical length to do their reflecting job efficiently. These lengths must NOT be altered. Some versions have a fourth cable shorted at the end and covered with a plastic cap; this tuned matching stub must NOT be altered either.

The CONTROL BOX, located at the radio operator's position, has a rotary control switch that determines the direction of radiation; indication is provided by three lights which can be labelled corresponding to the proper directions, determined by orientation at the antenna in installation. Directional labels are provided, in the hardware kit, that can be applied near the corresponding lights. For the OMNI/MONITOR/STAND-BY feature, the control is placed in the position to light all the lights.

The operator selects each  $120^{\circ}$  segment by rotating the switch to the light indicating the desired direction. To locate the direction of a received signal, rotate the switch for best signal reception while the distant station is transmitting. After an exchange of transmissions, the switch may be returned to the Monitor position for omni-directional stand-by. OFF positions are provided at the ends of the switch segments; in these positions, the antenna is in the OMNI position and can be used, but all lights are extinguished. The circuitry of the control box is protected by automatic current limiting of the plug-in transformer on the power cord.

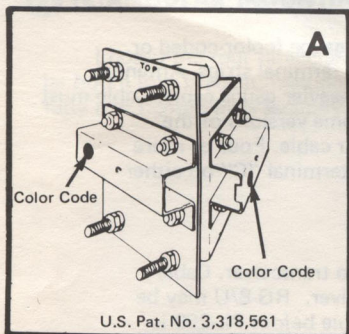
## PRE-INSTALLATION HINTS:

It is important that the installer read the following pages; suggestions and methods given will assure easiest, most efficient installation. The use of a silicone grease which protects without interfering with electrical contacts, on threaded parts of the antenna, will help in keeping joints corrosion free and facilitate future disassembly of the antenna.

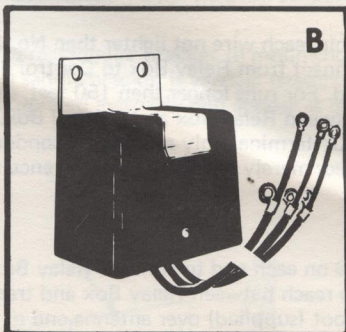
Besides the usual hand tools, other items needed to complete the installation are listed on page 6 of this manual.



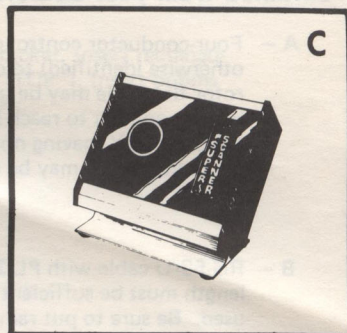
# CONTENTS OF CARTON (Letters "A", "B", etc. identify parts as used on Assembly Drawings)



1 Triangular Mounting Bracket Kit  
...19-1116-1

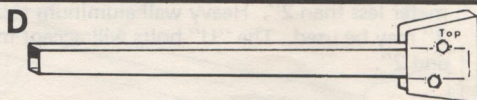


1 Relay Box.....19-1920

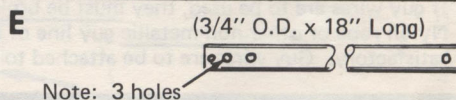


1 Control Box.....19-2425

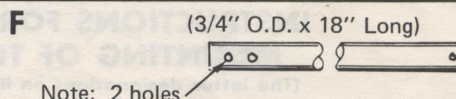
**3 Booms ... 19-1117**



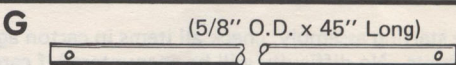
**3 Upper Elements ... 19-1099-7**



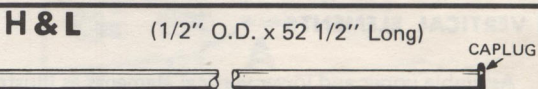
**3 Lower Elements ... 19-1099-8**



**6 Intermediate Elements ... 3-327-1**



**6 End Elements ... 19-1100-4**



(NOTE: 3 Assemblies (L) do not have plugs - used for lower elements.)

**6 Insulators ... 8-253-1**



**1 Rain Boot ... 9-52-1**

**K**



**1 Hardware Kit (misc. parts)... 19-1130**

- 26 Sheet-metal screws
- 3 Self tapping screws # 8-32x1/2" long
- 3 Internal tooth # 8 washers
- 3 Internal tooth 1/4" washers
- 12 Hex head machine screws 1/4-20x1-1/2" long

- 12 1/4" split lockwashers
- 12 Hex nuts, 1/4-20
- 6 Insulators - (FIG. J)
- 1 Rain boot for coax cable - (FIG. K)
- 1 Strip of pressure sensitive directional Labels



**The following parts are not furnished but are required. They may easily be obtained from your dealer.**

- A — Four-conductor control cable, each wire not lighter than No. 20-gauge (color-coded or otherwise identified) to connect from Relay Box to Control Box terminal strips. Antenna rotor flat cable may be used. For runs longer than 150 feet, use heavier gauge cable. Cable must be long enough to reach between Relay Box and Control Box. Some versions of the RELAY BOX, having no "C" terminal, only require a 3-conductor cable. Four or more conductor cable may be used; merely disregard any reference to terminal "C" on either box.
- B — RG-58/U cable with PL-259 on each end to connect Relay Box to transceiver. Cable length must be sufficient to reach between Relay Box and transceiver. RG-8/U may be used. Be sure to put rain boot (supplied) over antenna end of cable before PL-259 is attached.
- C — A mast is required. The mast may be galvanized 1-1/2" water pipe whose Outside Diameter less than 2". Heavy wall aluminum tubing whose outside diameter is approximately 2" may be used. The "U"-bolts will accept masts whose diameter varies between 1-1/2" and 2".
- D — If guy wires are to be used, they must be broken by insulators into 7 ft. lengths or less. Nylon rope or other non-metallic guy line of equal strength needs no insulators and is satisfactory. Guy wires are to be attached to the mast, not the elements.

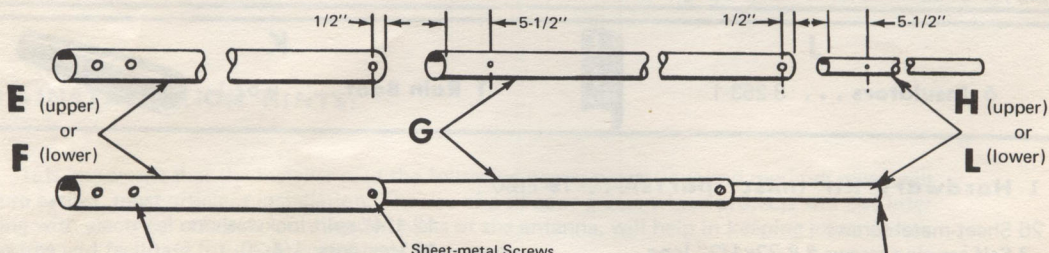
## INSTRUCTIONS FOR ASSEMBLY AND MOUNTING OF THE "SCANNER"

(The letter designations on illustrations refer to items in Contents of Carton Listing)

- 1 Before starting assembly, check all items in carton against items listed in the illustrated table of contents. No difficulty will be encountered if careful attention is paid to the instructions that follow. Sort out all items, keeping identical items together.

### 2 VERTICAL ELEMENTS

Assemble upper and lower vertical elements as illustrated below.



NOTE: Lower element illustrated;  
Upper element has three holes

NOTE: Lower element illustrated  
Upper element has plastic plug in end

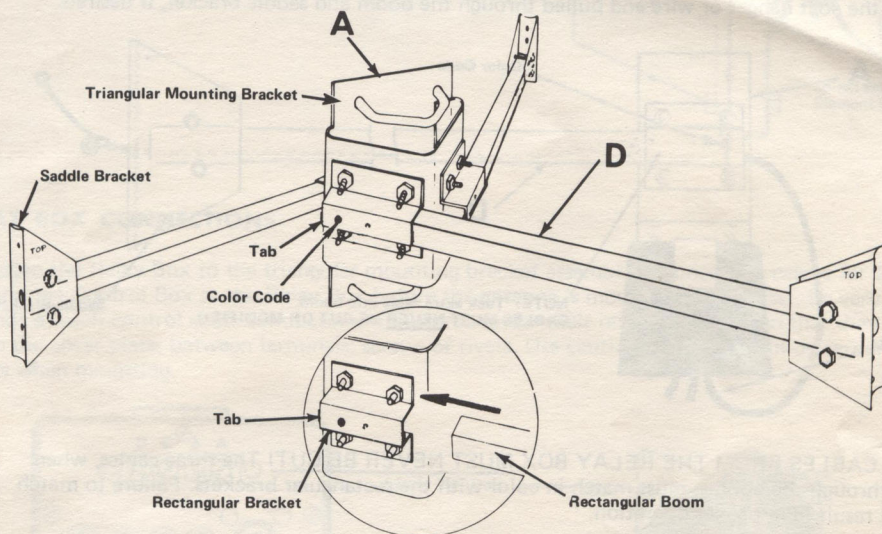
When completed, there will be three upper and three lower vertical assemblies. Lower element assemblies (F) have two holes in 3/4" diameter end tube -- upper assemblies (E) have three.

Upper Assemblies have plastic plug in smallest tube.



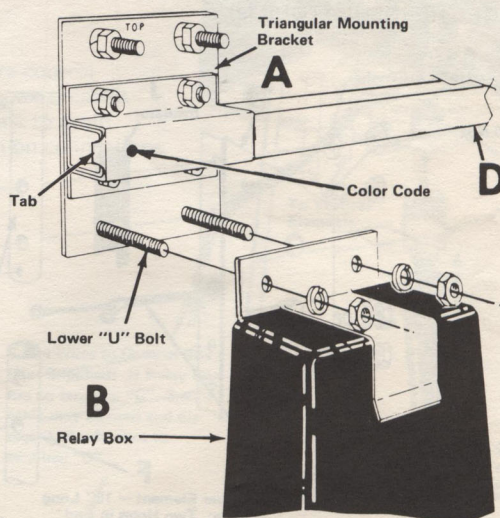
### ③ TRIANGULAR MOUNTING BRACKET AND RECTANGULAR BOOMS

Loosen the four nuts clamping rectangular bracket to mounting bracket. Insert rectangular boom into bracket, making sure saddle bracket is vertical (stamped "TOP"). Insert booms fully and tighten nuts securely. Completed assembly will appear as below.



### ④ RELAY BOX MOUNTING

The Relay Box mounts on the triangular mounting bracket, as shown at the right. It must be mounted in the position shown.



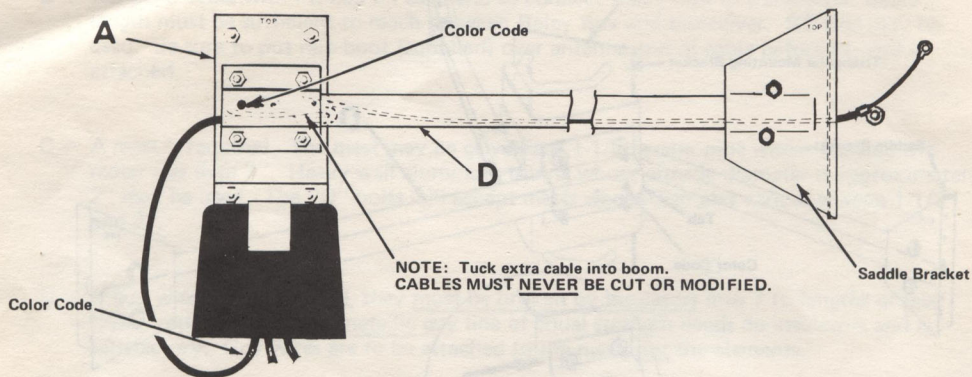
**Do Not tighten the hex nuts holding Relay Box at this time.**



## 5 THREADING OF RELAY BOX CABLES

Thread the three color coded Relay Box cables through the rectangular booms as shown. Particular care must be taken to match colors: The white coded cable through the white color coded boom, the orange through the orange and the red through the red. See below. If there is a fourth cable ('OMNI-' stub, supplied on some models), let it hang vertically down the mounting mast. It will be secured later; DO NOT remove the plastic cap from the end of the 'OMNI-' stub.

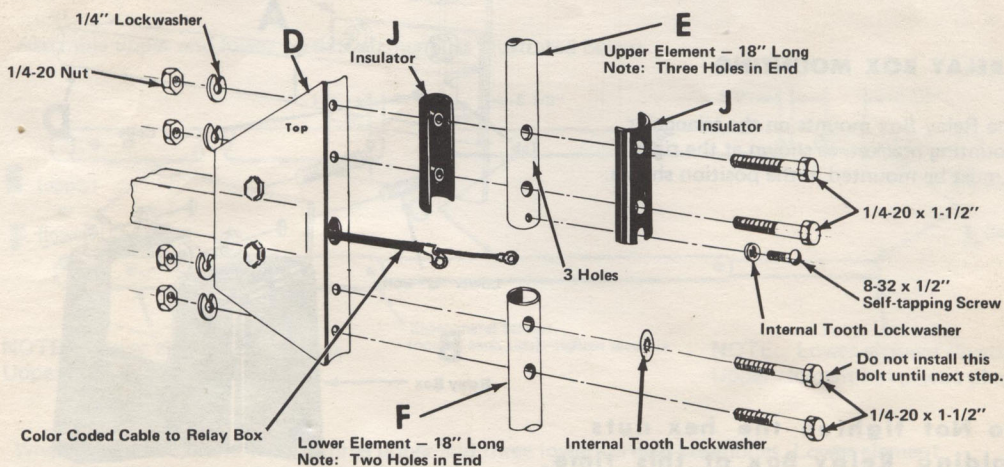
The cables may be readily pushed through the rectangular boom, with the aid of the straightened coat hanger or short piece of wire if necessary, from the saddle bracket end. The cables may be taped to the coat hanger or wire and pulled through the boom and saddle bracket, if desired.



THE CABLES FROM THE RELAY BOX MUST NEVER BE CUT! The three cables, when threaded through the booms, must match in color with the rectangular brackets. Failure to match colors will result in improper operation.


## 6 VERTICAL ELEMENT ASSEMBLIES

Assemble an upper and a lower vertical element assembly plus the parts indicated as shown below. CAUTION: EXCESSIVELY TIGHTENING THE 1/4-20 BOLTS MAY DAMAGE THE INSULATORS (J).

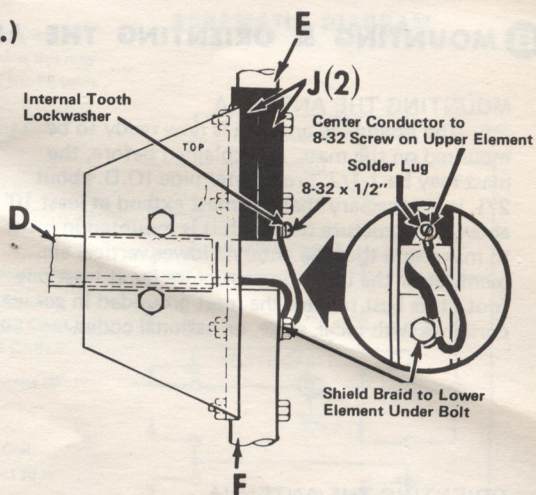




## 6 VERTICAL ELEMENT ASSEMBLIES (cont'd.)

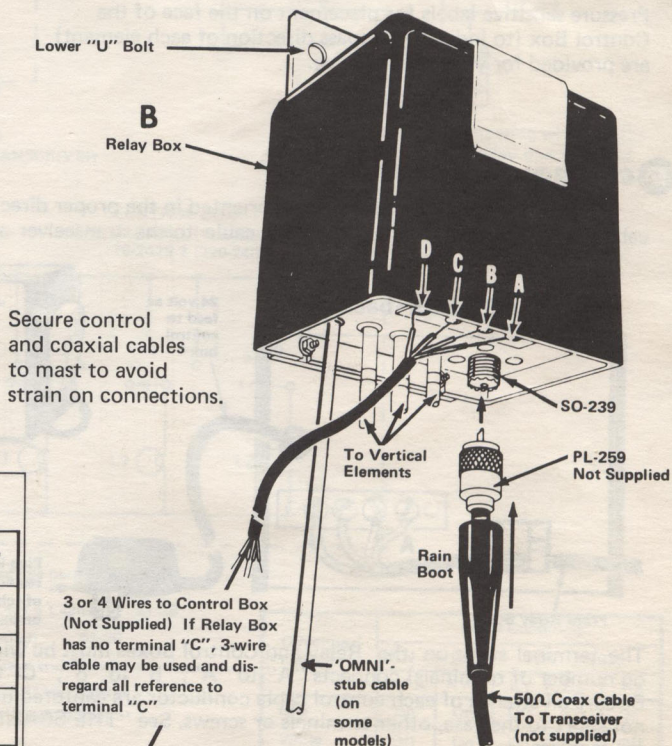
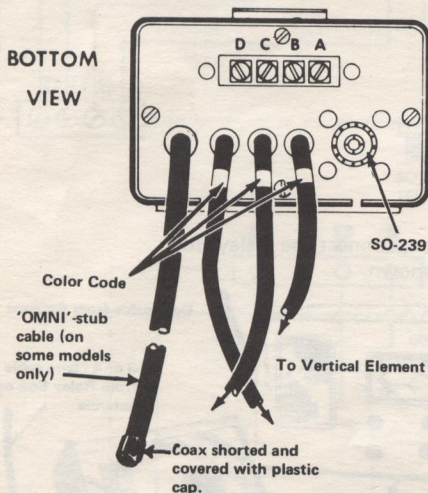
Completed assembly is shown at right. Fasten the center wire of the cable (with small terminal lug ) to upper assembly with an 8-32 self-tapping screw.

The shield braid terminates in a large terminal lug. Fasten it under head of the 1/4-20 bolt on lower element (F).

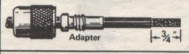

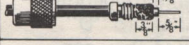




## 7 RELAY BOX CONNECTIONS

Fasten the Relay Box to the triangular mounting bracket assembly. Connect the cables for the transceiver and the Control Box at the Relay Box before the antenna is mounted on the mast. Be very sure that all strands of each control cable conductor are captured under their respective screw so that they cannot short to the cover plate, between terminals, screws or rivets. Use caution to avoid strain on terminal connections when mounting.



### Assembly of Cable to PL-259 Plug & Adapter

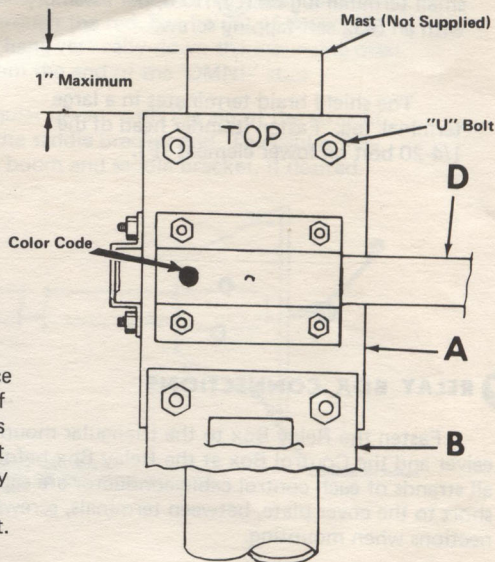
	Cut end of cable even. Remove vinyl jacket 3/4". Slide coupling ring and adapter on cable.
	Fan braid slightly and fold back as shown.
	Position adapter to dimension shown. Press braid down over body of adapter and trim to 3/8". Bare 5/8" of conductor. Tin exposed center conductor.
	Screw plug sub-assembly on adapter. Solder braid to shell through solder holes. Use enough heat to create bond of braid to shell. Solder conductor to contact.
	For final assembly, screw coupling ring of plug sub-assembly.



## B MOUNTING & ORIENTING THE ANTENNA

### MOUNTING THE ANTENNA

The assembled antenna is now ready to be mounted on the mast. As explained before, the mast may be 1-1/2" iron water pipe (O.D. about 2"). It is necessary that the mast extend at least 10' above the structure on which it is mounted in order to make sure that the antenna lower vertical elements clear the mounting structure by at least one foot. It is best to have the mast grounded in accordance with local, state, or national codes.



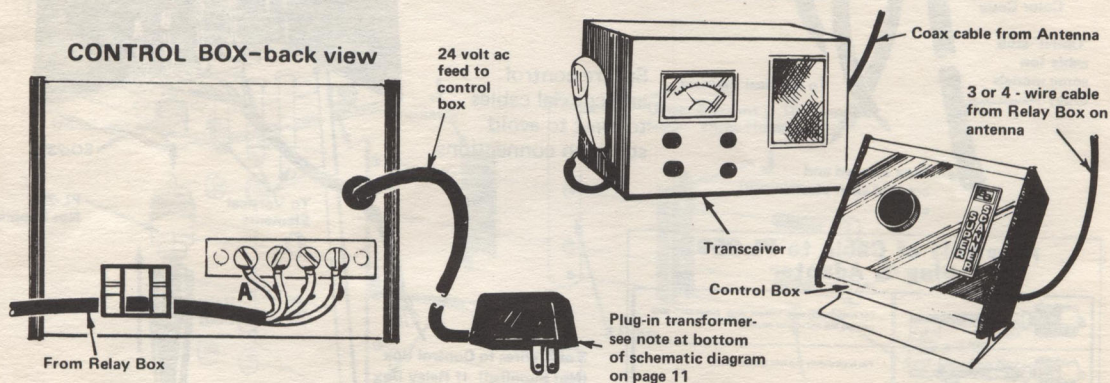
### ORIENTING THE ANTENNA

Slide the assembly over the mast allowing 1" clearance as shown in illustration. Point the orange coded portion of the antenna to the North (top light). Tighten all "U"-bolts securely. This will point the red coded assembly Southeast (lower right hand light) and the white coded assembly Southwest (lower left hand light). Obviously, you may choose any starting direction or color on mounting bracket.

Pressure sensitive labels for placement on the face of the Control Box (to indicate compass direction of each element) are provided for your convenience.

## C CONTROL BOX INSTALLATION

With the antenna mounted and oriented in the proper direction, connect the Relay Box cable to the Control Box and the coax cable to the transceiver as shown.



The terminal strips on the Relay and Control Boxes must be wired so that 3 or 4 - wire cable (depending on number of terminals) connects "A" to "A", "B" to "B", "C" to "C" (if applicable) and "D" to "D". Be sure all strands of each control cable conductor are captured under their respective screw so they can not short to the case, other terminals or screws. See "THE SCANNER PRINCIPLE" on page 3 for operating features.

**Your Super-Scanner-equipped base station is now ready for operation**



# SCHEMATIC DIAGRAM

RELAY  
BOX  
19-1920

Omni matching network.  
On some models this may  
be a piece of RG-58 cable  
approximately 9 ft. long,  
shorted on one end.

RG-58/U coaxial cables

RED CABLE  
ORANGE CABLE  
WHITE CABLE  
cable lengths 29'

Relay Coil  
dc res  $\approx 170\Omega$

SO-239  
TO TRANSCEIVER

Relay  
Box  
19-1921

Omni matching network

UHF  
Connector  
to  
Transceiver

WARNING: Tampering with circuits  
in the control or relay box will void  
warranty! See your supplier if warranty  
repair is necessary.

D B A

CONTROL BOX  
19-2425-1 (110-120V)  
19-2425-2 (220-240V)

POSISTOR

50/60 Hz  
Transformer

Replacable parts:

L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub> Lights . . . 21-38

S<sub>1</sub> Switch . . . 51-20

Line cord and Transformer Assembly  
44-11 (110-120V) or  
44-12 (220-240V)

Line Cord

This model is supplied in two versions;  
110-120V and 220-240V. Check transformer  
nameplate for rating before applying power.  
A plug adapter may be supplied with 220-240V versions.

Directional Pattern	Relay Condition				
	P/N 19-1921		P/N 19-1920		
	RY A	RY B	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>
Red	On	On	Off	On	On
White	Off	On	On	On	Off
Orange	On	Off	On	Off	On
Omni	Off	Off	Off	Off	Off



# THE ASSEMBLED SCANNER

**Labels:**

- H
- G
- E
- J
- D
- F
- A
- "U" Bolt
- B
- D
- E
- J
- F
- G
- L
- Mast (Not Supplied)
- RG 8/U or RG-58/U (Not Supplied) To Transceiver
- 3 or 4 wire cable (Not Supplied) to control box
- 'OMNI'-stub cable with plastic cap on end (on some models only)



# MOUNTING BRACKET ASSEMBLY INSTRUCTIONS

To assure beam rotation in the proper sequence, it is important to assemble the boom bracket as described. Color-coded boom brackets must be as shown in FIG. 4.

In the steps to follow, make hardware only finger tight since subsequent assembly requires that nuts and bolts be loosened.

1. Position the heavy angle plate with the word "TOP" facing you. Fasten the boom bracket, color-coded ORANGE, on the plate as shown in FIG. 1 using the two sets of hardware on the left only. Be sure the folded-over tab on the boom bracket is on the LEFT side.
2. Take the two lighter angle brackets. With the face of the bracket toward you and the angle on your left and facing away from you, secure a RED boom bracket to one and a WHITE one to the other as in FIG. 2. Again, be sure the folded-over tab is on the left (same side as the angle.)
3. Take the angle bracket with the RED boom bracket. Using two 1/4-20 nuts, bolts and washers, secure the RED angle bracket to the heavy (ORANGE) bracket as shown in FIG. 3.
4. Fasten the white angle bracket to the above assembly to complete the triangle.
5. Assemble U-bolts to heavy angle bracket as shown in FIG. 4. Mounting bracket is now ready for installation according to the Instruction Manual.
6. Compare your assembly with FIG. 4 (top view). Be sure each aspect agrees.

FIG. 1

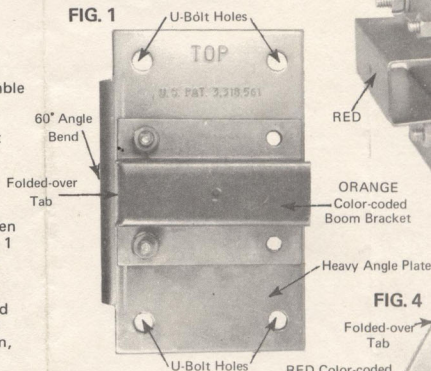
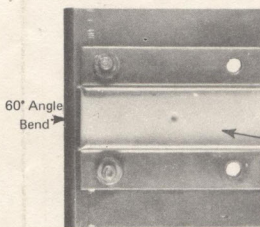


FIG. 2



Angle Plate Assembly

FIG. 3

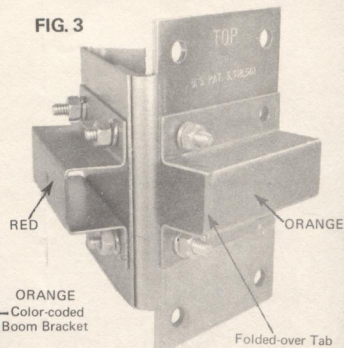
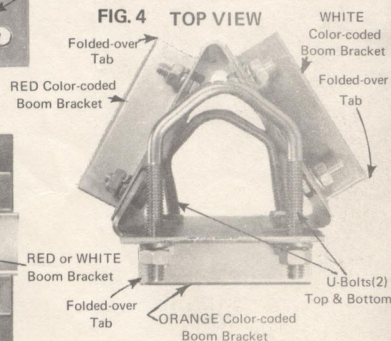


FIG. 4 TOP VIEW







12435 Euclid Avenue · Cleveland, Ohio 44106 · 216 791-7878

*MODEL MR119 "SUPER SCANNER"*  
*MODEL MS119 "SUPER SCANNER"*  
*MODEL M-119 "THE SCANNER"*  
SUPPLEMENTARY SYSTEM CHECK-OUT SHEET

It is assumed that the SCANNER Instruction Manual, 27X1299 for M-119, 27P2299 for MR119, and 27P3084 for MS119 has been correctly followed.

When making tests, the SCANNER may be dismantled from the mast for convenience. If possible, the tests should be performed after assembly and before mounting on the mast.

The following have been recurring errors in assembly:

Overtightening of the 1/4-20 bolts holding upper elements (FIG. E) to the boom assembly (FIG. D). This results in the bolts chewing through the black insulator (FIG. J) shorting the element to the boom assembly.

Reversing of the four-wire control cable. This results in the wrong element being energized or more than one element being energized at the same time. The wires on the lettered terminals must correspond on both Control Unit (FIG. C) and Relay Box (FIG. B). The SCANNER must be mounted clear of nearby obstructions to the sides and top. Large metallic objects should clear the bottom of the lower elements by two feet.

Any metallic guy wires within close proximity of the SCANNER elements must be broken with insulators in lengths of less than seven feet. Non-metallic guy wires may be used without insulators.

Strands of wire shorting between terminals of the 4-point terminal strips on the delay Box or Control Box. Use spade lugs or be very careful that all strands of the 4-wire control cable are captured under appropriate terminal screws.

In the following check-out procedure, it will be necessary to have an instrument for measuring continuity (short circuits) and voltage; about ten volts dc for the M-119 or about 28 volts ac for the MR119 and MS119.

In the absence of a volt-ohmmeter, a pilot light may be used to measure voltage. Commonly obtained lamps for voltage tests that can be used are No. 53 and No. 57. (12-16 volts) or No. 313 (24-28 volts). Two No. 53 or No. 57 lamps, connected in series, can be used for 24-28 volts. These may be obtained at most gasoline stations, hardware stores, and electronic parts distributors. Lamps rated in excess of 120 mA (milliamperes) at 12 volts are not recommended. The lamp may be inserted in a mating socket(s) and a wire about two inches long soldered (or fastened) to one terminal, or the wire may be soldered (or fastened) directly to the shell of the lamp base. The other terminal of the lamp or socket is then used to complete the test circuit.

A flashlight lamp or pilot lamp in series with a dry cell of corresponding voltage can be used for measuring continuity. Any other type of continuity checker may be used.



MODEL MR119 "SUPER SCANNER"  
MODEL MS119 "SUPER SCANNER"  
MODEL M-119 "THE SCANNER"  
SUPPLEMENTARY SYSTEM CHECK-OUT PROCEDURE

1. Disconnect coax cable from transceiver only.
2. Plug SCANNER power cord into wall socket. Turn power switch to "ON" position (M-119 only).
3. Rotate Scan Control to the full counter-clockwise position. M-119: the white (lower left corner) light should go on. A voltage should appear on the rear of Control Unit (FIG. C) from terminal "A" to "D" (common). When using a dc voltmeter, seven to nine volts should be measured. When using a pilot lamp, a dull orange glow indicates normal voltage; the intensity of the glow should be the same for Steps 3, 4, and 5. *MR119 and MS119: no lights should light and no voltage should appear on any Control Unit terminal.*
4. Rotate Scan Control to the next clockwise (center) position. M-119: the amber (center) light should go on. A voltage should appear on the rear of Control Unit (FIG. C) from terminal "B" to "D" (common). *MR119, left red light should go on; MS119, lower left light should go on. A voltage of 23-28 should appear from terminal "D" (common) to "B" and "C".*
5. Rotate the Scan Control to the next clockwise position. M-119: the red (lower right corner) light should go on. A voltage should appear on the rear of Control Unit (FIG. C) from terminal "C" to "D" (common). *MR119, center red light should go on; MS119, top light should go on. A voltage of 23-28 should appear from terminal "D" (common) to "A" and "C".*
- 5a. *MR119 & Rotate Scan Control to the next clockwise position. The right red (MS119, lower right) MS119: light should go on. A voltage of 23-26 should appear from terminal "D" (common) to "A" and "B".*
- 5b. *MR119 & Rotate Scan Control to the next clockwise position. The white (OMNI) light (MS119, all MS119: three lights) should go on and no voltage should appear on any of the Control Unit terminals.*
- 5c. *MR119 & Rotate Scan Control to the next (last) clockwise position. All lights should be extinguished and no voltage should appear on any of the Control Unit terminals.*

If Steps 3, 4, and 5 do not agree with findings; one of the following applies:

Voltage too low indicates strand of wire shorting between two terminals, short in control wires, or faulty Control Unit.

Voltage too high indicates transposition of control wires, break in control wires, or faulty Relay Unit.

No voltage indicates a short in control wires or a faulty Control Unit. (FIG. C). Some units contain a fuse on the back panel or internal; if blown be sure to replace with one of equal value.

6. Repeat Steps 3, 4, and 5, but measure the voltages at the Relay Unit terminals. If voltage is not measured as outlined, check for improper connection, broken wires, or loose strands of wire shorting across the terminals (on both Relay and Control Unit).

On the Relay Unit (FIG. B) terminal "A" should be closest to the SO-239 coax connector. On the Control Unit (FIG. C) terminals should read "A" to "D" from left to right.

Later versions of the Relay Unit do not have a terminal "C". In such case, disregard any reference to terminal "C" on both Relay and Control Units; only a 3-conductor control cable (or 3 conductors of a 4-conductor cable) is required for such versions.



7. Connect the ohmmeter or other continuity checker between the center of the PL-259 that has been removed from the transceiver, and the outer shell of the PL-259.
8. Rotate the Scan Control through all directional positions. The ohmmeter or continuity checker should indicate an open circuit in all directional positions only. If a short circuit appears in all positions, unplug the PL-259 from the Relay Unit (FIG. B); if the short remains, the coax cable is shorted and should be repaired or replaced. (Be sure to plug PL-259 back into Relay Unit for remaining tests). If a short circuit appears in only one or two directional positions, disconnect the top terminal on the element (FIG. E) of the corresponding color; if continuity remains, there is a short in the Relay Unit (FIG. B); if continuity disappears, the upper element (FIG. E) is shorted to the boom. The element should be removed and the black insulator (FIG. J) inspected for damage or improper installation. *MR119 and MS119: the above does not apply to the OMNI or OFF positions. In the OMNI and OFF positions of the Scan Control, the OMNI stub, which is a shorted length of RG-58/U cable, is connected to the antenna system. This provides the proper match, but a dc short will be measured from the center to shell of the PL-259. This is normal for the OMNI and OFF positions only. When installed, the OMNI stub merely hangs down and is to be secured to the mast; the plastic cap is to remain on the end of the stub for weather protection. In newer units, there is an internal OMNI-network rather than the piece of RG-58/U. This provides the proper match, but a dc short will be measured from the center to shell of the PL-259. This is normal for the OMNI and OFF positions only. On units that have no OMNI-stub visible, the network is inside the Relay Box.*
9. Rotate the Scan Control to any directional position. Apply a short circuit between the corresponding upper (FIG. E) and lower (FIG. F) element using a piece of wire or other metallic object or tool. Continuity should appear at the PL-259 whenever the short is applied and disappears when the short is removed.
10. Repeat Step 9 for the remaining two directional positions of the Scan Control and corresponding colored elements. Failure of continuity indicates a faulty Relay Unit (FIG. B) or broken wire in the harness of the Relay Unit.

If any defect is noted in the Relay or Control Unit, the Unit at fault should be returned for factory repair or replacement.

Tampering within these units voids the warranty. (See bottom of inside cover of Instruction Manual).

If ALL OF THE ABOVE CHECK OUT, your SCANNER is ready for mounting and operation.

Please remember that many factors are involved in the range obtained by a radio system beside the antenna. Among them are:

1. Surrounding terrain
2. Weather conditions
3. Atmospheric conditions
4. Ground resistance
5. Transmitter power
6. Receiver sensitivity
7. Antenna height and elevation
8. Ambient noises and interference
9. Losses in antenna cable and connections
10. Power line voltage

All factors must be taken into consideration when analyzing the over-all performance of a radio system.



A- RED

B- WHITE

D- BLUE

WHITE TO WHITE

ORANGE / ORANGE

RED / RED

ORANGE NORTH

RED SOUTHEAST

WHITE SOUTHWEST



Shoppers Pick  
**Walker & Lee Real Estate**  
for Total Real Estate Service



## STEREO SPEAKER SELECTOR SWITCH

This switch is designed with non-shorting contacts and ample space between positions 1, 2 and 1-2 to prevent overloading of transistor output stages when switching between individual pairs of speakers.

### INSTRUCTIONS

1. Connect speaker output terminals of left amplifier to the LEFT AMP terminals C and 8 of this switch
2. Connect speaker output terminals of right amplifier to the RIGHT AMP terminals C and 8 of this switch
3. Connect the corresponding left and right speakers of the various positions to the LEFT and RIGHT terminals.

All connections to this switch are easily made to the screw type terminals, no soldering is required.

PLEASE NOTE: when making connections with stranded wire, be sure that all strands are attached to the terminals. Loose strands can short over to the next terminal causing the system to become wholly or partially inoperative.

To operate, merely select the speakers by setting the switch knob to their corresponding position.

