

# Telenetics<sup>™</sup>

## MICROPASS<sup>®</sup>

MICROWAVE RADIO SYSTEM  
8500 SERIES

### INSTALLATION & OPERATIONS MANUAL



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Document No. 10076-007-02Rev C  
File # 8500IOC.P65  
PRINTED IN U.S.A.  
October 2001  
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## **LIMITED WARRANTY**

All Telenetics, Inc. units are warranted against defective materials and workmanship for a period of one year from date of shipment from Telenetics's factory provided the installation, adjustment and operation are in accordance with Telenetics instructions. During this period, Telenetics will repair or replace the equipment returned to the factory which is determined by Telenetics to be defective. Telenetics assumes no responsibility for costs incurred in removing, installing or shipping new or defective units.

Customer repairs, disassembly, alterations or abusive treatment will void this warranty. Telenetics does not warrant fuses or batteries.

No allowance will be given for repairs or alterations made by others unless made with Telenetics's prior written consent. Telenetics shall not be held responsible for the work done, apparatus furnished or repairs made by others. All provisions listed in Telenetics catalogs or specification sheets, working drawings or other materials are for descriptive purposes only unless expressly stated as warranties.

Telenetics reserves the right to make changes in design and additions or improvements in its equipment as shall in the sole judgement of Telenetics constitute an improvement over former practice, but Telenetics shall not be obligated to install such designs, additions or improvements in equipment previously manufactured.

## **LIMITATION OF WARRANTY & REMEDY**

Except as stated above, there are no other warranties, express or implied, including the warranties of merchantability or fitness for a particular purpose, applicable to this transaction and purchaser's sole and exclusive remedy against Telenetics shall be for the repair or replacement of defective parts as provided for herein, and the limited warranty as stated above is in lieu of any other warranty or remedy. In no event, whether due to a breach of any warranty or any other cause arising from the performance or non-performance of the goods sold hereunder, shall Telenetics be obligated or liable to purchaser in any manner for consequential or incidental damages, including, but not limited to, lost profits, loss of property due to theft, plant downtime, delays or suits by third parties.

## **RETURN FOR REPAIR PROCEDURES**

A Return Authorization number must be obtained from Telenetics before any items will be accepted for return. Please contact Telenetics Customer Service to obtain this authorization. When contacting Customer Service, you will need your Model number, Serial number, and the date of purchase. Please have this information available before you make your request for return.



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# I. INTRODUCTION

## TELENETICS MICROPASS® MICROWAVE RADIO SYSTEM

Congratulations! You have purchased one of the most sophisticated communications products available on the market today. Whether your requirements call for voice, data, or video transmission, the Micropass microwave radio system provides you with the highest degree of reliability and efficiency.

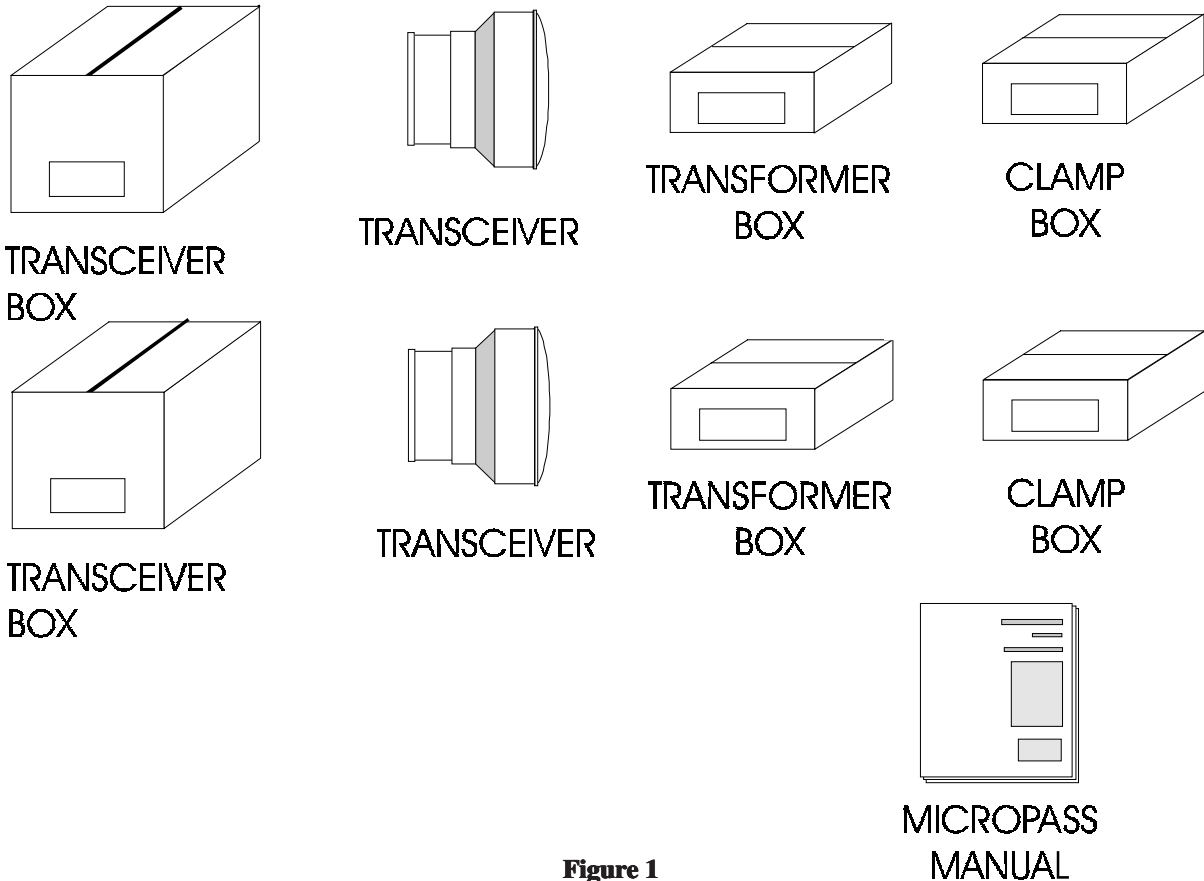
This manual is a start-to-finish installation guide and reference tool for your future use. Remember that your Micropass system has the capacity for one duplex video channel and up to two duplex subchannels for voice, data or control in each direction. Micropass systems are also field upgradable if you want to enhance your model's capabilities.

The purpose of this manual is to simplify the installation and application of this equipment. Please read this manual thoroughly before installation. If you have any questions, please contact Telenetics Technical Services Department in Rocklin, California.

Technical Support (916) 624-7316

## II. UNPACKING AND INSPECTION

Your Micropass Microwave System is shipped in two cartons. Figure 1 is an illustrated packing list for Micropass models 8500, 8505, 8525 and 8540. Verify that all parts are present. If anything is missing, contact Telenetics Microwave Group (916) 624-7316.



**Figure 1**  
**Verify all parts have been included.**

### TRANSIT DAMAGE

Although the transceiver units are carefully packed, check for possible transit damage. If any damage has occurred in shipping, leave the entire packing carton and components intact and notify your carrier. Telenetics, Inc. is not responsible for shipping damage.

### RETURN AUTHORIZATION NUMBER

If it is necessary to return equipment, you must first contact Telenetics, Inc. for a return authorization number. To obtain the necessary return authorization number and shipping information, call 1-916-624-7316 and ask for Customer Service. Be prepared to identify the product you want to return and its serial number. Include a written description of the problem with the returned equipment.

### EQUIPMENT REGISTRATION

There is no formal equipment registration. All systems shipped are kept on file at the factory with factory test data and original ship to/bill to information.



### III. SPECIFICATIONS

#### SYSTEM SPECIFICATIONS

##### General

Modulation:	FM
System Gain:	Radio without antennas: 101dB nominal Radio w/17"(43cm) ant: 177dB Radio w/27"(69cm) ant: 184dB
Frequency Band:	21.2 to 23.6GHz Common Carrier Part 21 - All channels Business Part 94 - All Channels
Channel Capacity	1 duplex video channel plus up to two duplex audio/data/control subchannels
Equipment Authorization:	FCC Type Number: B2N9CL10050 FCC Type accepted: Part 94 and 21 FCC Emission designator: 3380F9 Other worldwide authorizations granted. Contact your local Racon representative
Power Consumption:	Power On: 65 watts Operating: 40 watts
Input Voltage:	115/230VAC 50/60Hz, input to UL approved 24VAC remote transformer (included). No charge option: 240VAC 50/60Hz, input to UL approved 24VAC remote transformer.
Temperature Range:	Operating: -30°C to 55°C (-22°F to 131°F) Storage: -40°C to 60°C (-40°F to 140°F)
Dimensions:	Diameter: 19" (48.26cm) Depth: 16.25" (41.27cm)
Weight:	24 lbs (10.9 kg) per antenna assembly.
Material:	White, all-weather aluminum coated to MIL C/5541 with stainless steel mounting hardware.
Shielding:	Built-in conducted and radiated RFI shielding
Mounting:	Attachment to 3.5" (8.9cm) or 4.5" (11.5cm) O.D. vertical pipe (±10%).

## **Alarms**

Loss of Subcarrier Alarm	Alarm @ 10-15VDC No Alarm @ 2VDC Impedance: 1,000 ohms, unbalanced Connector: Terminal block
Loss of RF Alarm	Alarm @ 2VDC No Alarm @ 10-15VDC Impedance: 1,000 ohms unbalanced Connector: Terminal block

## **TRANSCEIVER SPECIFICATIONS**

### **Transmitter Section**

RF Source	Gunn diode
Power Output	Minimum: 40mW (+16dBm) Typical: 65mW (+18dBm) Maximum: 100mW (+20dBm)
Frequency Stability	Better than $\pm .03\%$ of carrier frequency (-30°C to 55°C)

### **Receiver Section**

Type:	Superheterodyne
IF Bandwidth:	30MHz
Threshold:	-83dBm
Signal to noise ratio	63dB nominal
Local Oscillator	Gunn diode
Noise Figure	12dB nominal

### **Video Interface Section**

Video Format	NTSC monochrome or full color
Video Bandwidth	4.2MHz Optional 5.5MHz or 8MHz
Input Impedance	75 ohms
Output Impedance	75 ohms
Input Level	1 Vp-p
Output Level	1 Vp-p
Connectors:	BNC

## **ANTENNA**

Size:	Shrouded 17 inch (43cm) inside diameter std. Optional 27" (69cm) and 48" (122cm) available.
Gain:	38dBi (minimum) for 17" antenna 42dBi for 27" antenna
Polarization:	Vertical or horizontal
Beam width (3dB):	1.7° for 17" antenna 1.3° for 27" antenna
Alignment:	Includes coarse and fine elevation and azimuth adjustment.
Radome:	Supplied with 17" (43cm) and 27" (69cm) antennas.

## **AUDIO SUBCHANNEL SPECIFICATIONS**

Audio Bandwidth	Model 8505: 12kHz All other models: 3kHz
Input Impedance	600 ohms
Output Impedance	600 ohms
Input Level	0dBm
Output Level	0dBm
Connection	Screw terminal

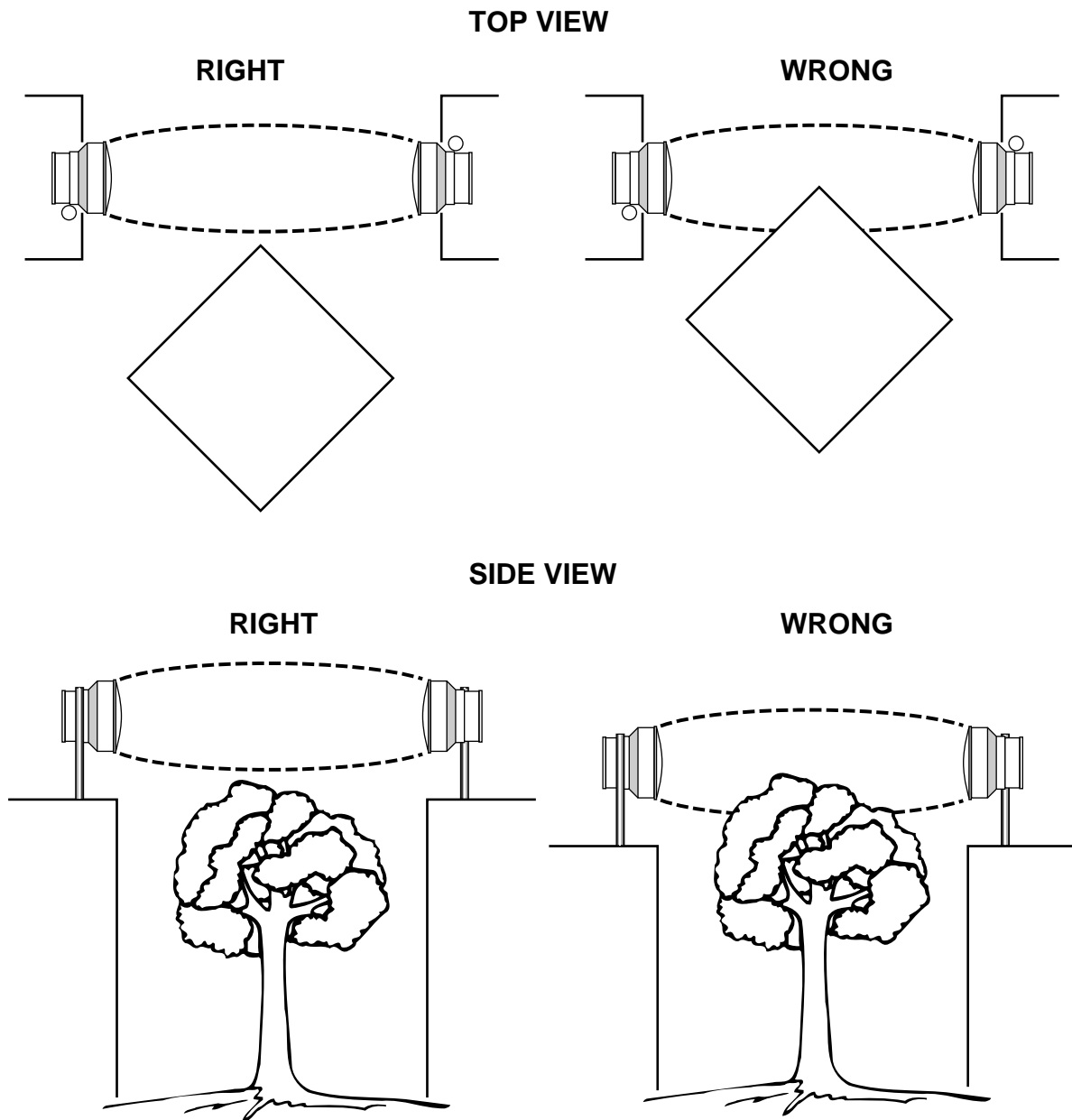
NOTE: Specifications are subject to change without notice. Performance figures and data must be confirmed in writing before they become applicable to any contract or order.

## IV. PATH REQUIREMENTS

You must observe the path considerations described in this section or your Micropass system performance may be degraded. Review this section carefully.

Both engineering assistance and path reliability analysis can be provided. Contact Racon for further information.

Micropass systems require an unobstructed path between the antenna assemblies as shown in Figure 2. Make sure your beam is not obstructed by buildings, trees (allow for tree growth), billboards, or other objects.

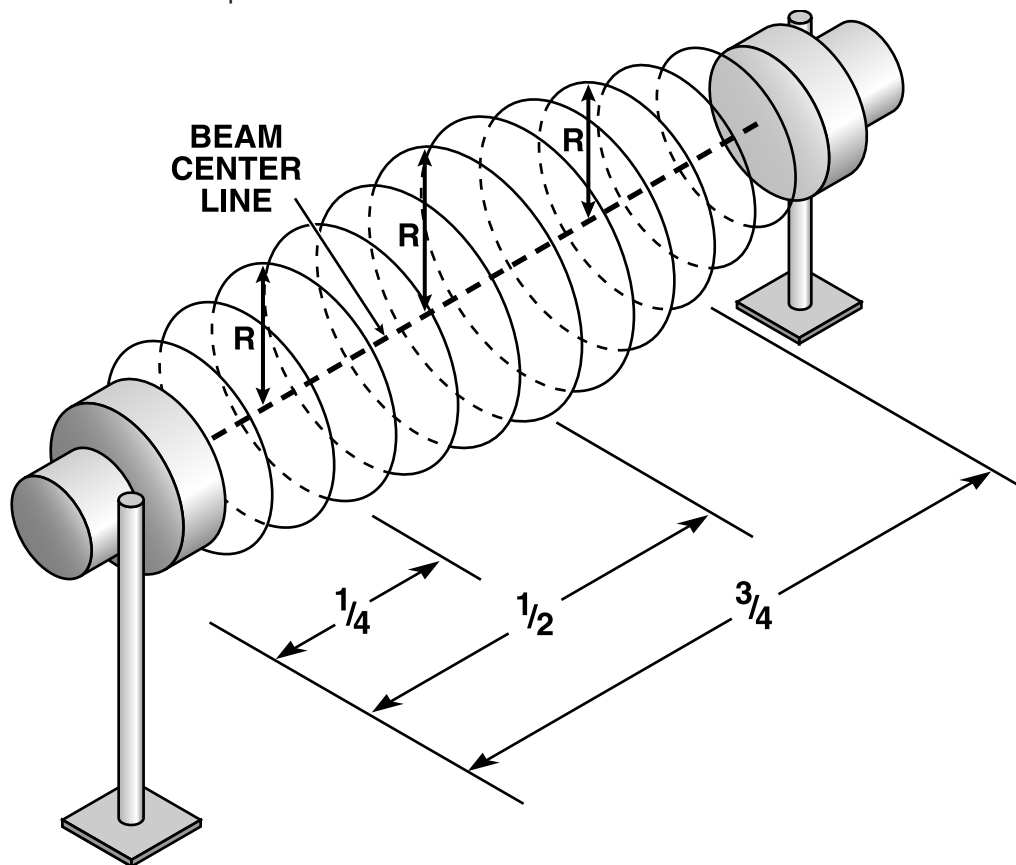


**Figure 2**  
**The microwave beam must be unobstructed.**

**TABLE 1. CLEARANCE FROM BEAM CENTER LINE**

PATH LENGTH		1/4 PATH LENGTH		1/2 PATH LENGTH		3/4 PATH LENGTH	
(MILES)	(KM)	(FT.)	(M)	(FT.)	(M)	(FT.)	(M)
0.5	0.8	6.5	2.0	7.3	2.2	6.5	2.0
1.0	1.6	9.1	2.8	10.4	3.2	9.1	2.8
2.0	3.2	12.7	3.9	14.8	4.5	12.7	3.9
3.0	4.8	15.6	4.8	18.1	5.5	15.6	4.8
4.0	6.4	18.1	5.5	20.9	6.4	18.1	5.5
5.0	8.0	20.3	6.1	23.3	7.1	20.3	6.1
6.0	9.7	22.0	6.7	26.0	7.9	22.0	6.7
7.0	11.3	28.0	8.5	33.0	10.0	28.0	8.5
8.0	12.9	34.0	10.4	40.0	12.2	34.0	10.4
9.0	14.5	40.0	12.2	47.0	14.3	40.0	12.2
10.0	16.0	47.0	14.3	56.0	17.0	47.0	14.3

Using Table 1, determine the radius of the beam that represents the beam width. This area must remain clear of any objects. For example, suppose your path length is 5.5 miles (numbers should be rounded up to the nearest mile; 5.5 is rounded to 6). At 1/4 of the path length, a clearance of 22 feet must be maintained. At midpath or 1/2 of the total path length, a clearance of 26 feet is required. Figure 3 illustrates the shape of the clearance zone.

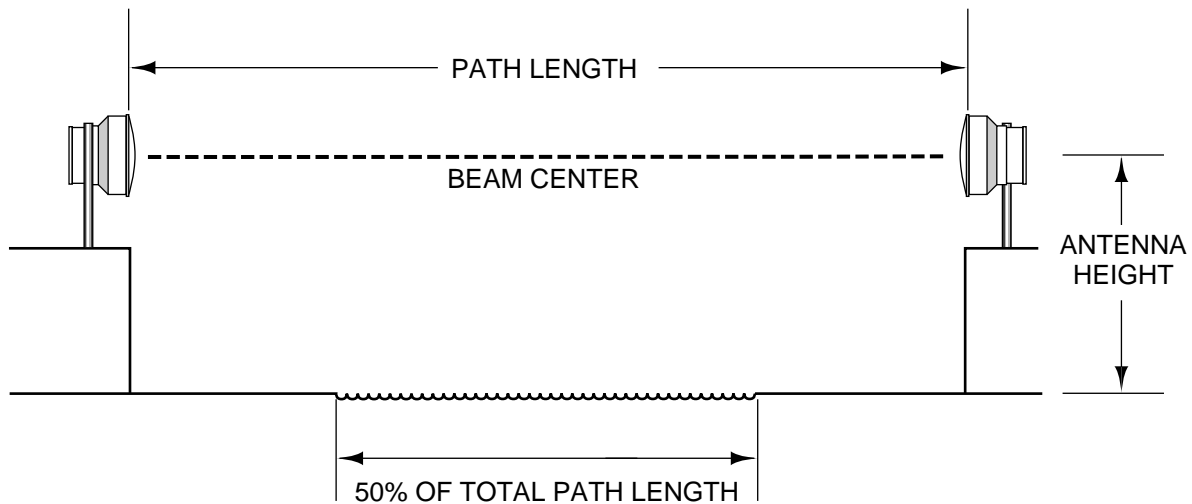


**Figure 3**  
**Determine the minimum clearance around beam center.**

**TABLE 2. MINIMUM ANTENNA HEIGHT OVER WATER OR SMOOTH SURFACE**

TOTAL PATH LENGTH		MINIMUM ANTENNA HEIGHT	
(MILES)	(KM)	(FEET)	(METERS)
0.5	0.8	19.0	5.8
1.0	1.6	37.0	11.3
2.0	3.2	75.0	22.9
3.0	4.8	111.0	33.8
4.0	6.4	150.0	45.2
5.0	8.0	186.0	56.7
6.0	9.7	227.0	69.3
7.0	11.3	266.0	81.2
8.0	12.9	306.0	93.4
9.0	14.5	345.0	105.3
10.0	16.0	385.0	117.5

If 50% or more of your path is over water or a very smooth surface (for example, flat grassland or pavement), your Micropass system should be mounted a minimum distance above the surface for optimum performance. Refer to Figure 4 and Table 2 to determine the minimum antenna height.



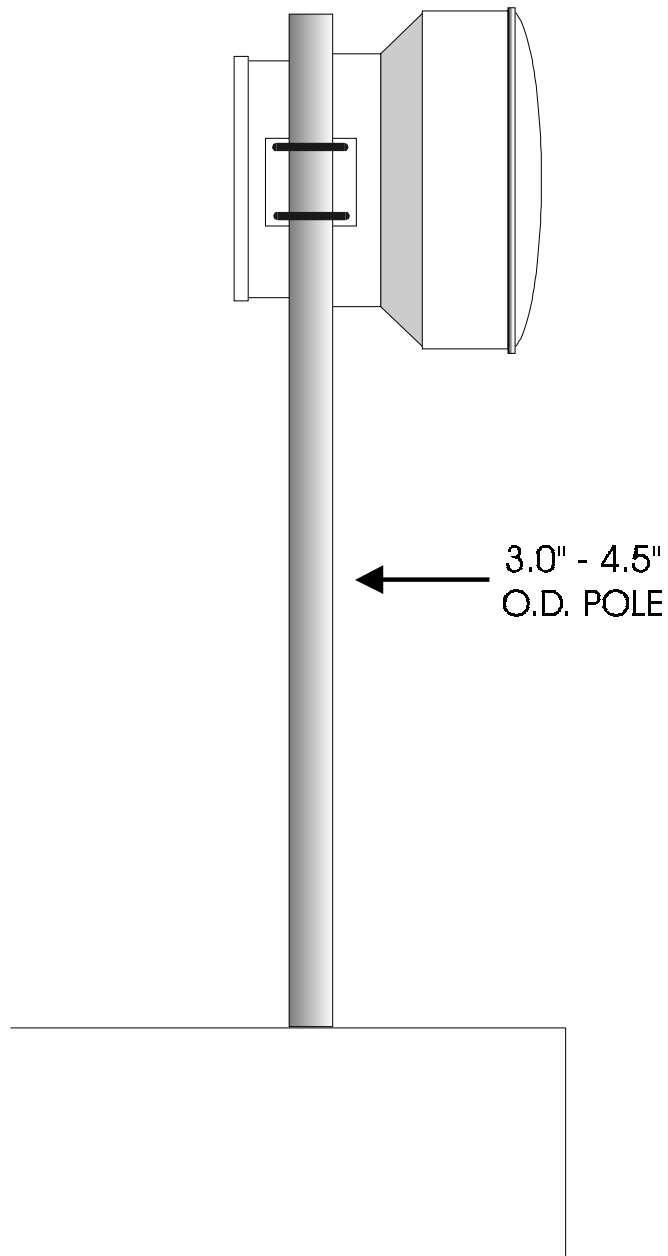
**Figure 4**  
**Paths across water require a minimum antenna height.**



## V. SITE PREPARATION

After you have selected a suitable path for your system, you must prepare the site before installing the antennas. This section provides information about installing mounting poles, locating power sources, and running cables.

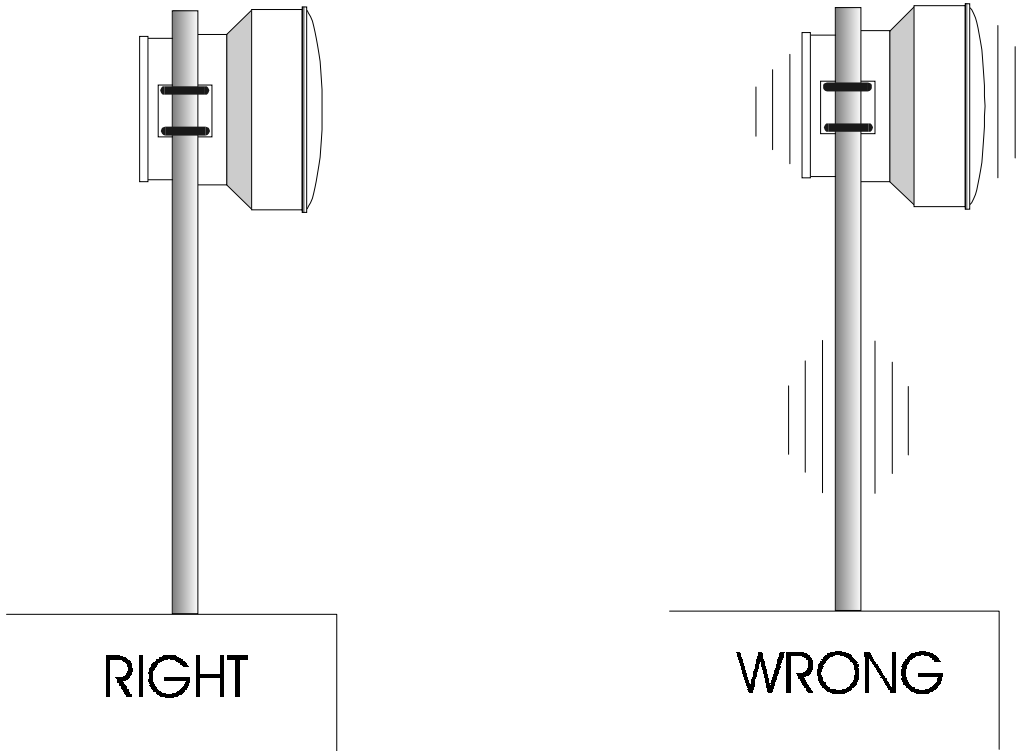
Micropass systems are designed to mount on a 3.5" (8.9cm) or 4.5" (11.5cm) O.D. pole as shown in Figure 5.



**Figure 5**  
**The antennas must be mounted on a 3.5" or 4.5" O.D. pole.**



As indicated in Figure 6, the mounting pole must be rigid to prevent antenna movement when it is windy. The pole should not vibrate, sway, or twist; guy wires or solid supports may be required to stabilize the pole.

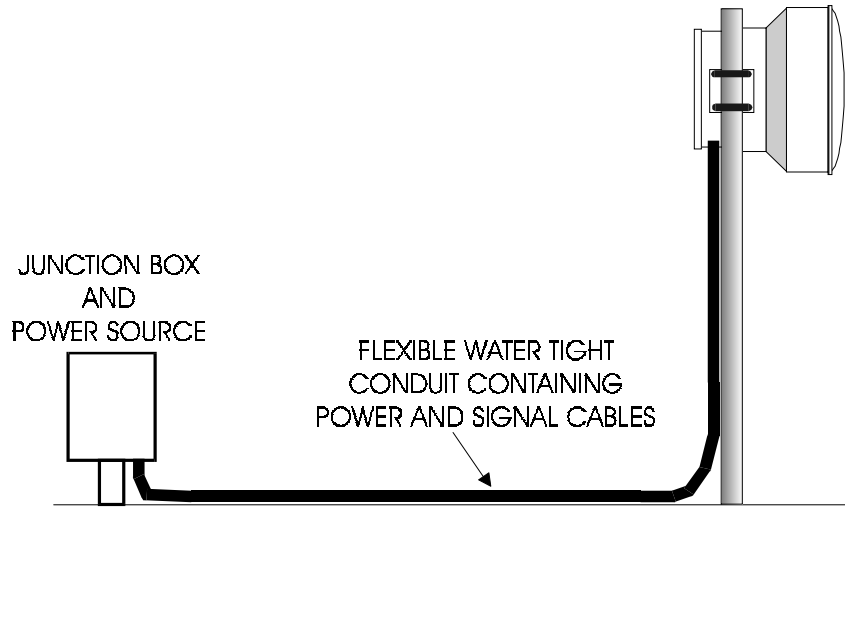


**Figure 6**  
**The mounting pole should not vibrate, sway, or twist.**

AC or DC power must be located within 300 feet (92 meters) of each antenna assembly as shown in Figure 7. (Refer to Table 3 for cable types.) Micropass systems are powered by a 24VAC transformer included with each antenna. Micropass systems also may be powered by -24VDC or -48VDC power using the optional +24VDC or -48VDC power supplies.

### **WARNING**

**Do not power more than one Micropass antenna assembly with a single transformer. Use only transformers supplied by Racon.**



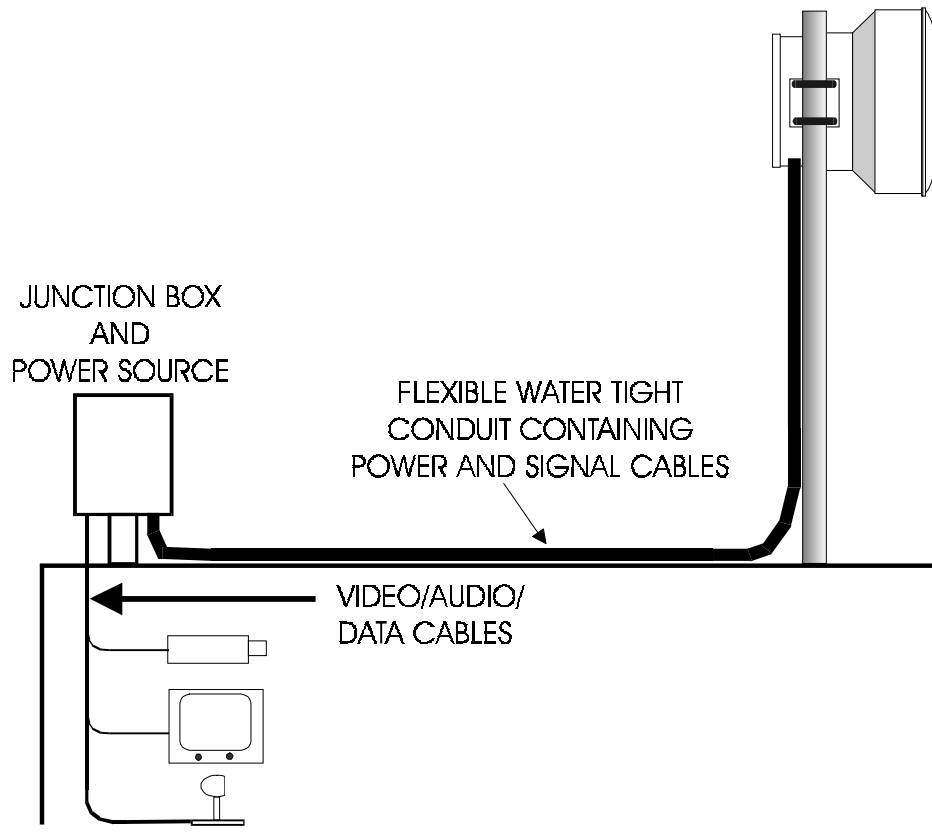
**Figure 7**

**AC or DC power must be located within 300 feet of the antenna.**

Source power should originate from a dedicated circuit, free from heavy loads generated by equipment such as elevator motors or air conditioning motors. Uninterruptable power systems and surge protectors are recommended to reduce the possibility of interrupted operation due to fluctuating power levels.

Make sure that video, audio or data sources are located within the cable driving abilities of the Micropass system as illustrated in Figure 8. (Refer to Table 3 for cable types and maximum distances.) Racon recommends using ground loop isolators to eliminate any possibility of hum-related problems.

NOTE: The maximum video cable length is the combined distance from the camera to the transceiver and the transceiver to the monitor. For example, using RG-59 coaxial cable, the maximum distance is 300 feet. If the distance from the camera to the transceiver at one end is 200 feet, the distance from the transceiver to the monitor at the other end may be 100 feet. See Figure 8.



**Figure 8**  
Baseband signal sources must be within Micropass limits.

**TABLE 3. RECOMMENDED CABLE TYPES**

	TYPE	DESCRIPTION	MAXIMUM DISTANCE
Video Cables (All models)	Belden 9274	RG-59 75 ohm coax	300 ft.* (92 m.)
	Belden 9290	RG-6 75 ohm coax	500 ft.* (153 m.)
	Belden 8238	RG-11 75 ohm coax	1000 ft.* (305 m.)
Audio <sup>1</sup>	Belden 9729	24AWG (2 pair)	1000 ft.* (305m.)
	Belden 9730	24AWG (3 pair)	1000 ft.* (305m.)
	Belden 9728	24AWG (4 pair)	1000 ft.* (305m.)
Audio/RS422 <sup>2</sup>	Belden 9731	24AWG (6 pair)	1000 ft.* (305m.)
Power Cables <sup>3</sup>	Belden 8720	14 AWG	200 ft. (61 m.)
	Belden 8718	12 AWG	300 ft. (92 m.)

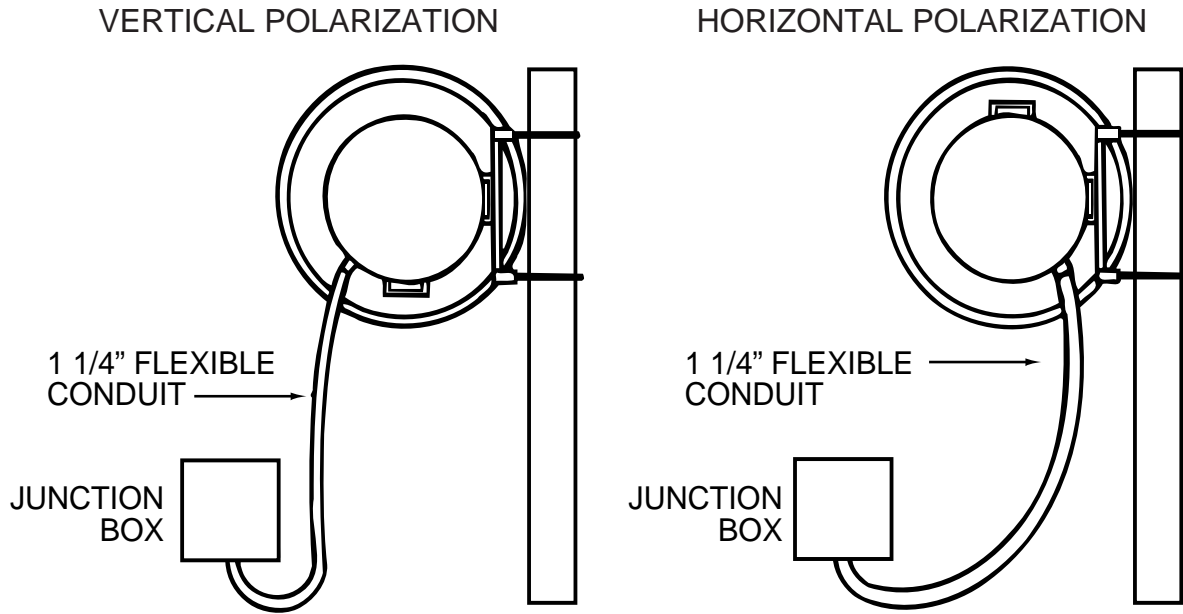
\* Combined distance between baseband to transceiver and transceiver to baseband signal source.

<sup>1</sup> Model 8505

<sup>2</sup> Models 8520 and 8540

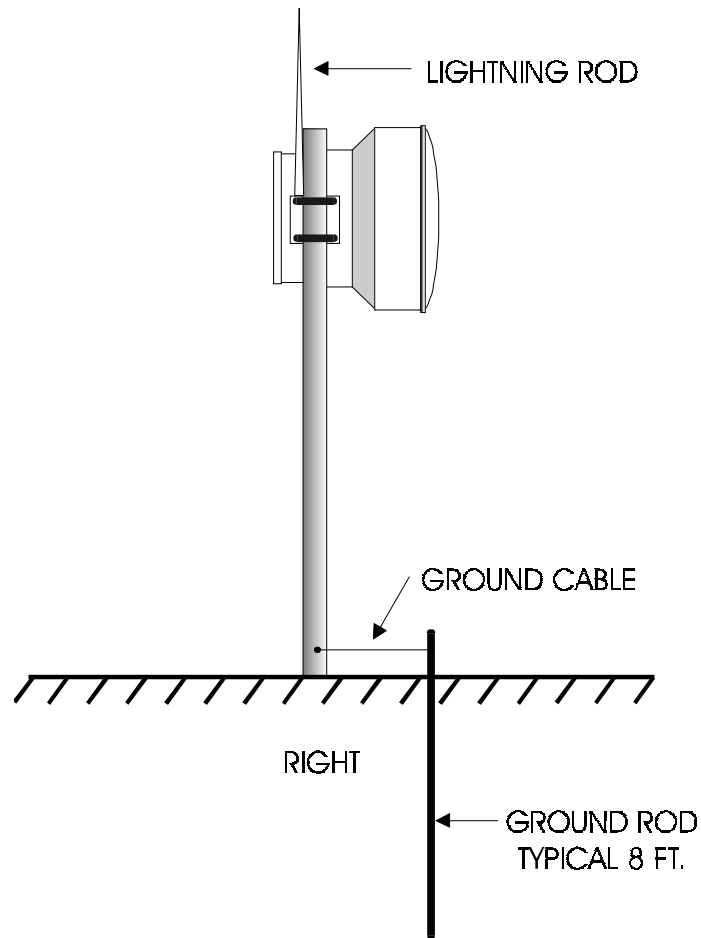
<sup>3</sup> All models - transformer to antenna

Use 1 1/4" weatherproof flexible conduit to protect the power, audio, data, and video cables from weather, electromagnetic and radio frequency interference. Micropass systems are designed to be mounted on the left side of the pole when viewed from the back as shown in Figure 9. If mounting on the right side of the pole is necessary, the existing weep holes must be sealed and new weep holes drilled in the bottom of the antenna assembly.



**Figure 9**  
**Mount the antenna on the left side of the pole and use flexible conduit to protect cables.**

Lightning protection should be considered. As illustrated in Figure 10, the lightning rod is mounted on top of the mounting pole and connected to earth ground. Surge protectors on the power and signal cables are also appropriate. If you are in an area with high lightning strike potential, you should consult a specialist in lightning protection.

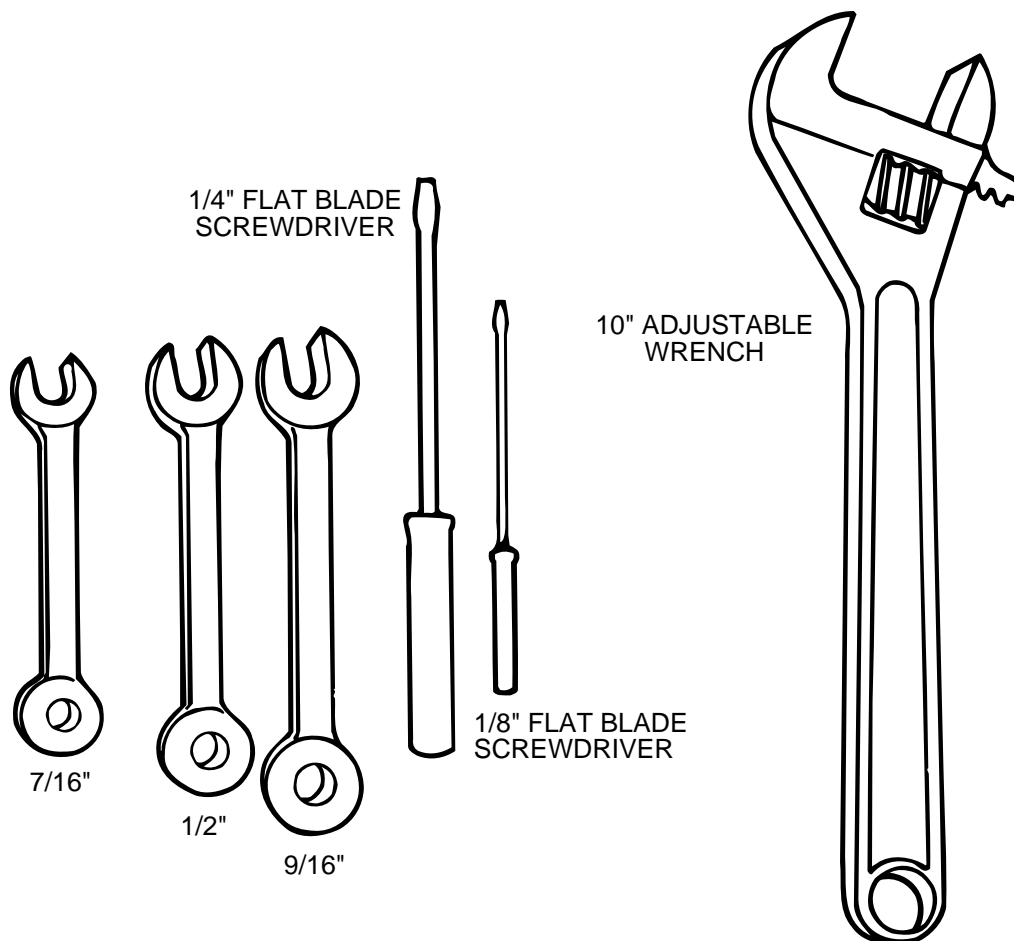


**Figure 10**  
**A lightning rod is recommended.**

## VI. INSTALLATION

Micropass antenna assemblies are easy to install. Figure 11 shows the tools required to install the antenna assemblies. Before installation, make sure your path and site meet the requirements described in the previous sections of this manual.

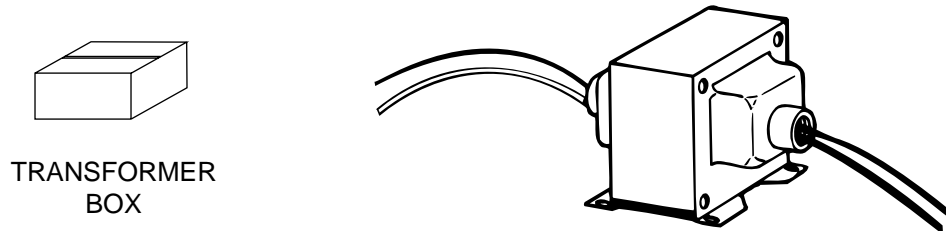
NOTE: Baseband signals are not required for antenna installation and alignment.



**Figure 11**  
**These tools are required to install the Micropass antenna assemblies.**

## INSTALLING THE TRANSFORMERS

Remove the transformer from the box as shown in Figure 12. Transformers should be installed by qualified personnel following local electrical wiring codes.



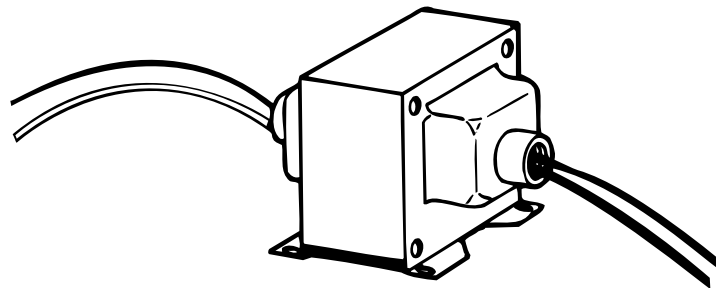
**Figure 12**  
**Unpack the transformer boxes.**

Do *not* apply 115VAC power at this time.

### **WARNING**

**The following connections should be made with 115/230VAC power disconnected.**

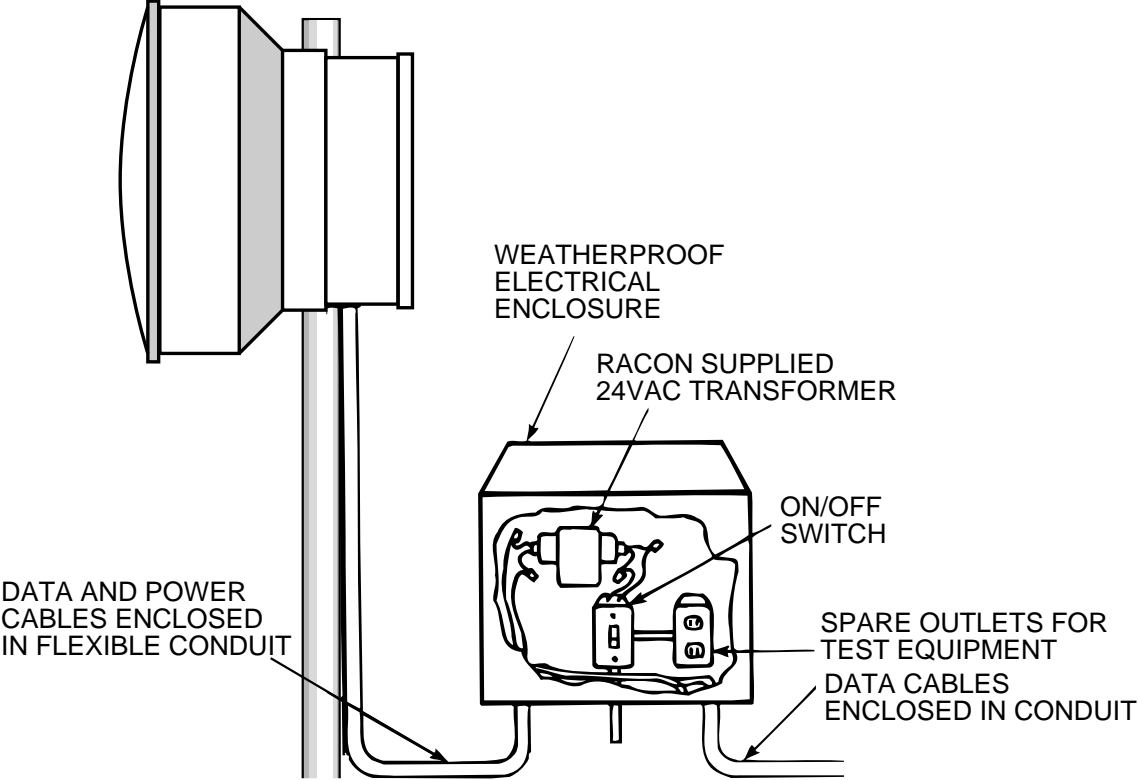
1. 115 VAC INSTALLATION. Connect 115 VAC to the black and white wires. Insulate the yellow and brown wires.
2. 230 VAC INSTALLATION. Connect 230 VAC to the white and brown wires, connect the black and yellow wires together.
3. Connect the two black wires at the opposite end of the transformer to the wires which will supply 24VAC power to the Micropass antenna assembly. The 1/2" conduit bushings provide a conduit connection which encloses the primary and secondary wires as shown in Figure 13.



Insulate yellow and brown wire ends when not in use.

**Figure 13**  
**Connect the transformer to 115VAC power and the antenna assembly.**

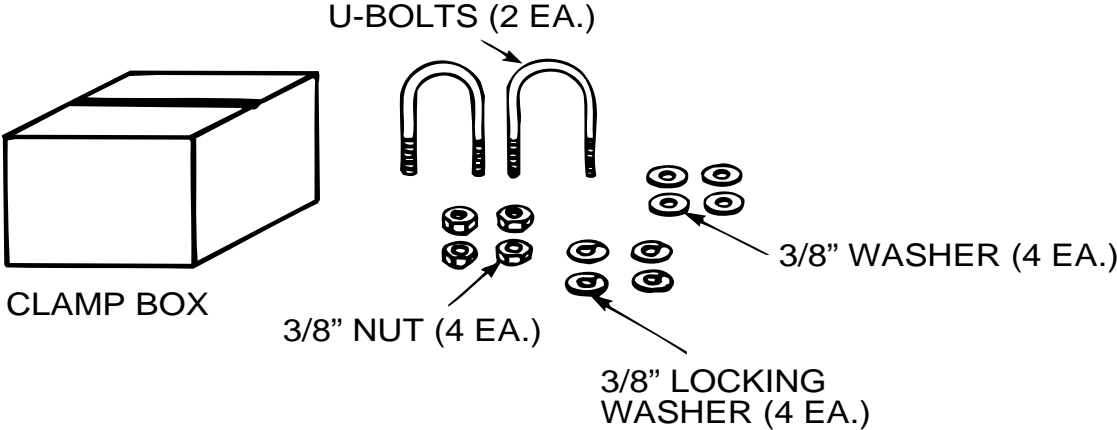
If the transformer is mounted outdoors, use a weatherproof electrical box as illustrated in Figure 14.



**Figure 14**  
**Typical transformer installation. (Illustrative purposes only.)**

**ASSEMBLING THE MOUNTING HARDWARE**

Remove the contents from the clamp boxes. Refer to Figure 15 and verify that all parts are present.

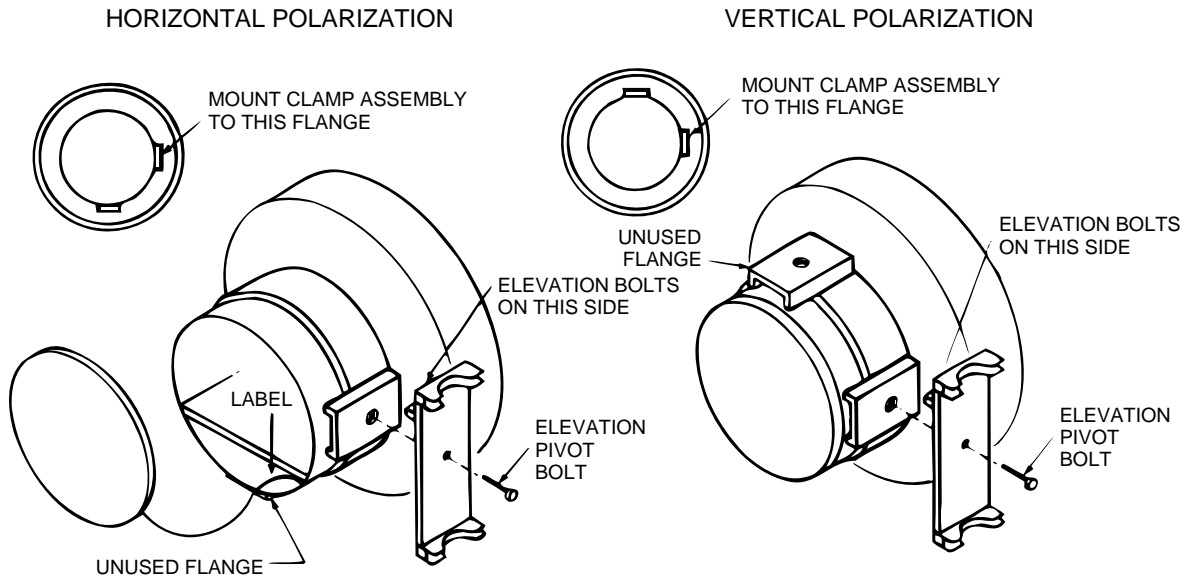


**Figure 15**  
**Unpack the clamp boxes.**



Using your FCC license(or equivalent), determine whether your system will operate on vertical or horizontal polarization. Verify that the frequency of the Micropass system

is the same as the frequency shown on your license. Look for the frequency of your Micropass system on the label located in the cable connection compartment.



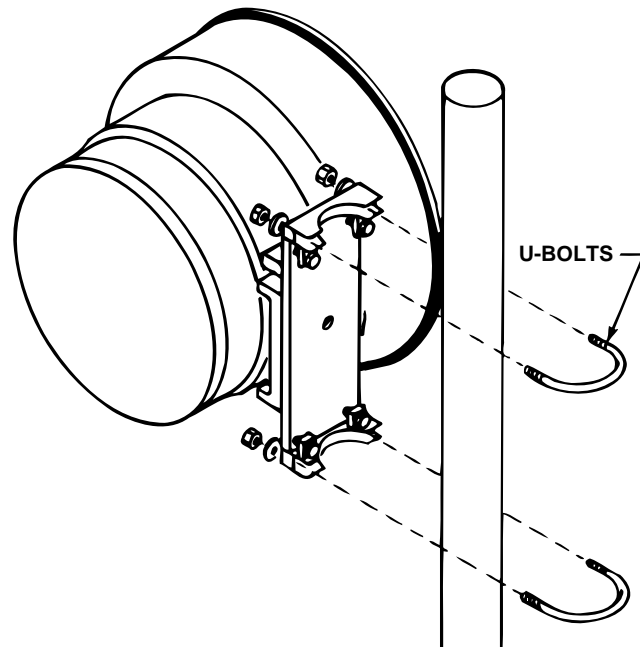
**Figure 16**  
**Attach the clamp assemblies to the transmitter and receiver.**

## MOUNTING THE ANTENNAS

Referring to Figure 16, attach the clamp assemblies to the appropriate mounting flange. The clamp assemblies may be relocated by removing the pivot bolt. If the receiver and transmitter are not installed with the same polarization, system performance will be degraded.

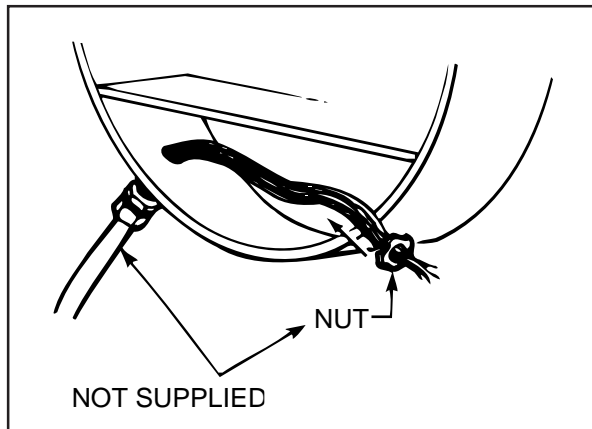
Remove the U-bolts from the clamp assembly. Referring to Figure 17, clamp the Micropass antenna assembly to the pole so that the antennas are pointed toward one another. The antenna assemblies must be located on the left side of the pole as viewed from behind.

**NOTE:** Use the FCC or other licenselicense to determine what polarization is used and where each transmitter frequency should be located.



**Figure 17**  
**Attach the antenna assemblies to the mounting poles**

Insert the cables and the flexible conduit through the conduit hole on the antenna assembly and tighten the conduit nut as shown in Figure 18. Refer to the APPENDIX section of this manual and connect the cables to the appropriate terminals for your Micropass model.

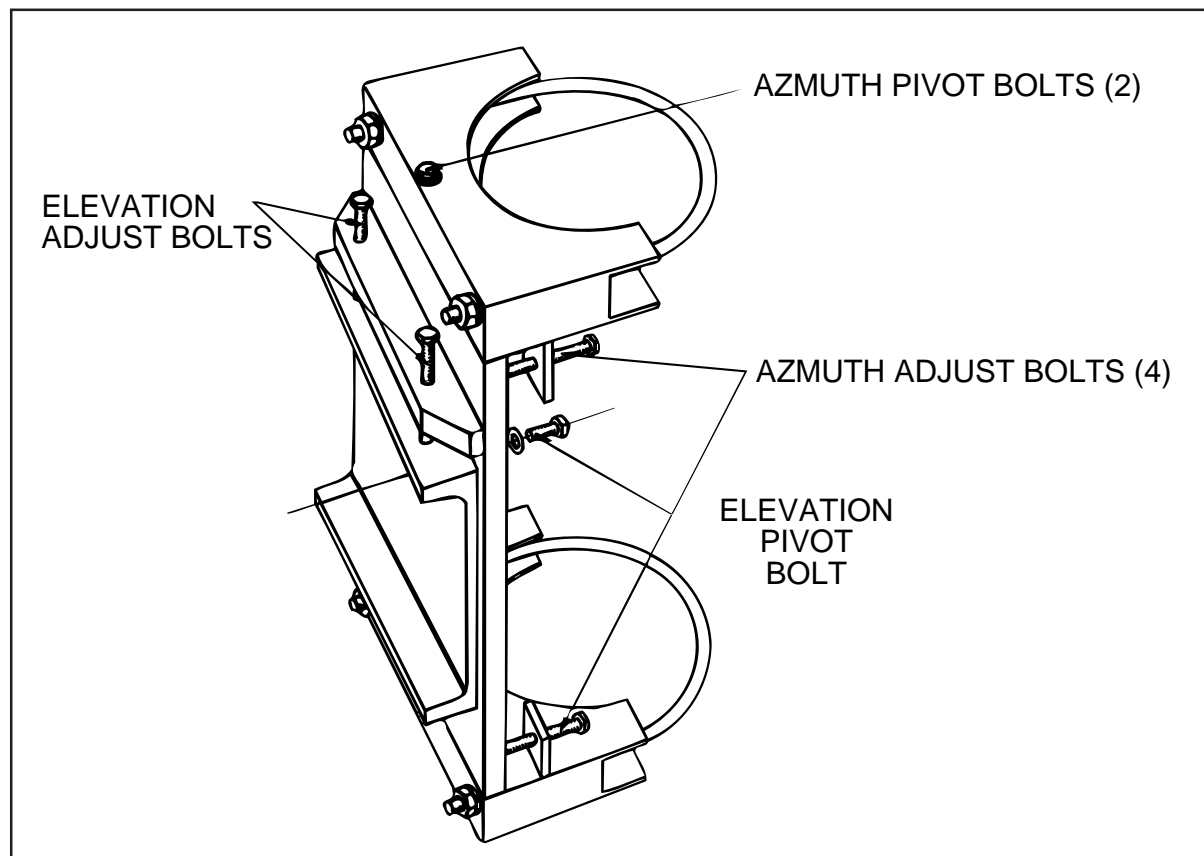


**Figure 18**  
Connect flexible conduit to the antenna assemblies.

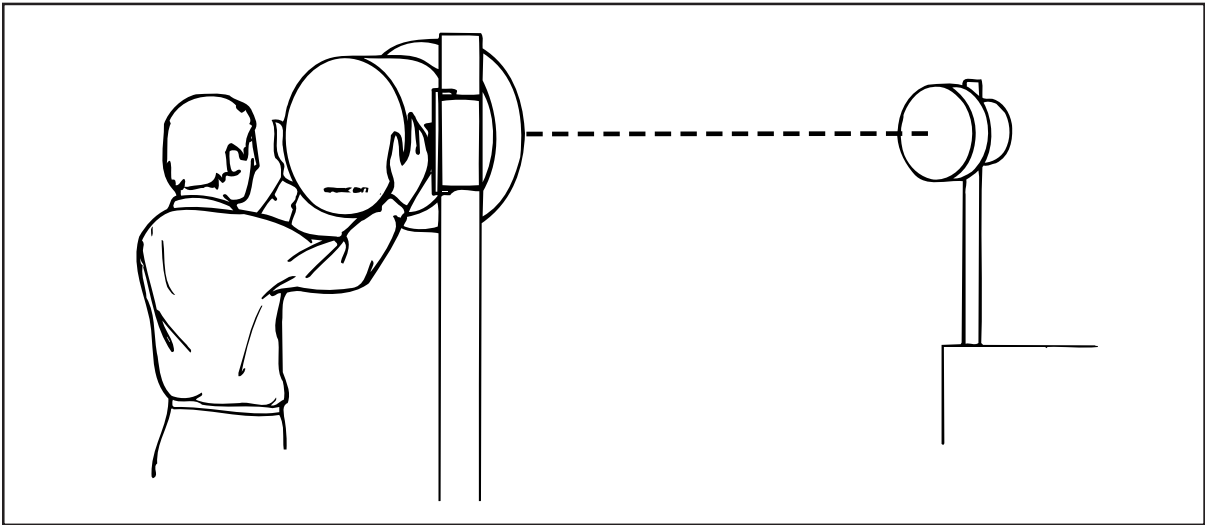
## ALIGNING THE ANTENNAS

Loosen the elevation and azimuth pivot bolts. Adjust the elevation and azimuth adjust bolts on both transceivers until the antenna assemblies are pointed toward each other as shown in Figure 20 on the next page. If you are using the OAK-II optical alignment kit, follow the instructions provided with the kit.

NOTE: Video, audio or data signals are not required to align the antenna assemblies.



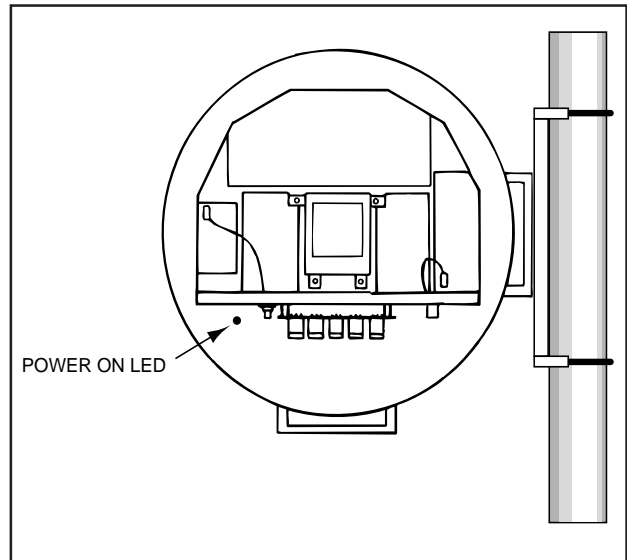
**Figure 19**  
Use the elevation and azimuth adjust bolts to aim the antennas at each other.



**Figure 20**

Apply main power (120/220/240VAC) power to the 24VAC transformers on both antenna assemblies. A green *Power On* LED should be lit as shown in Figure 21. Allow 10 minutes warm-up time before aligning the antenna assemblies.

Micropass® 4000 and 5000E systems can be aligned by one person; however, alignment with two people is much more efficient as illustrated in Figure 22. Two-way radios or telephones are also recommended. Alignment may be started at either antenna assembly. Select which antenna assembly you will align first.



**Figure 21**

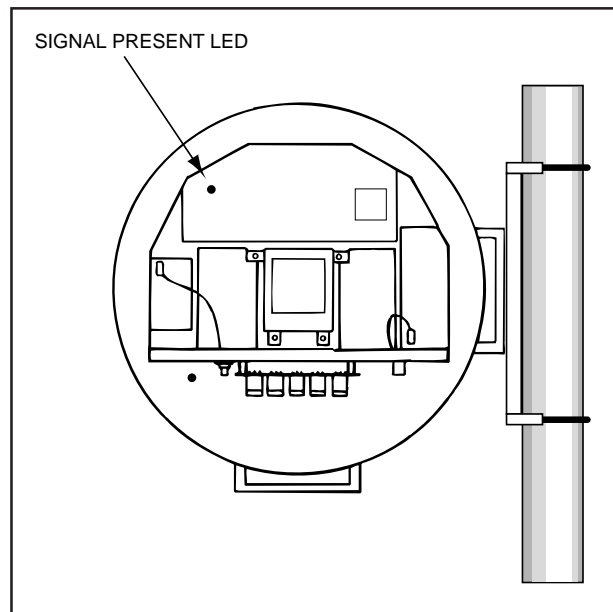
**The Power On LED should be on when power is applied to the transformers.**



**Figure 22**

**Two people are recommended for best alignment of the antenna assemblies.**

At the receiver, the *Signal Present* LED should be lit as shown in Figure 23. If not, re-aim the antenna assemblies toward each other. If the *Signal Present* LED remains off, refer to the Troubleshooting section of this manual.



**Figure 23**  
**The Signal Present LED in the transceiver should be on when the antennas are aimed at each other.**

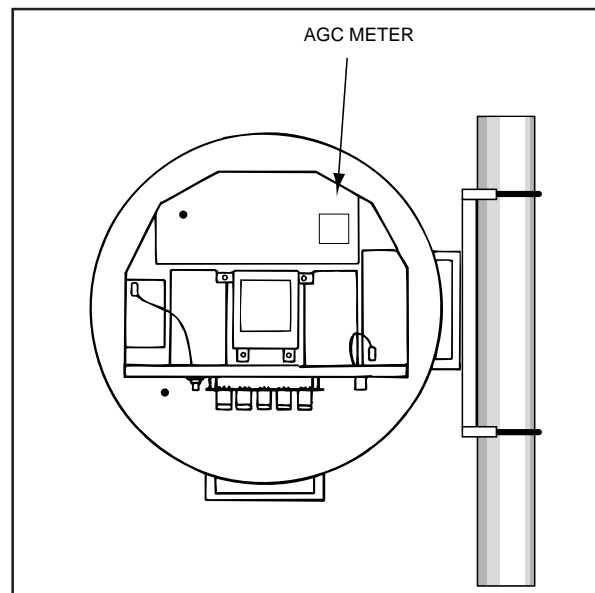
At the receiver, monitor the AGC meter and adjust the elevation and azimuth adjust bolts for a maximum AGC voltage reading as shown in Figure 24. There are three AGC voltage peaks in both the elevation and azimuth planes. Be sure to align your system on the peak that provides the greatest AGC voltage reading.

Verify the AGC voltages on both the receiver and transmitter are within .5VDC of indicated values. If the proper AGC voltage cannot be obtained, refer to the troubleshooting section of this manual.

Use the Maintenance Records on page 62 and 63 or those provided inside the radio rear covers to record all pertinent data. These Records should be updated every 6 months. The Maintenance Records with updated information should be FAXed to Telenetics at:

916-624-5943

before placing a call to Telenetics Microwave Group Technical Support.



**Figure 24**  
**Using the AGC meter, adjust the antenna for the maximum AGC voltage reading.**

The person at the transmitter antenna should adjust the elevation and azimuth adjust bolts for the maximum AGC reading at the receiver. As illustrated in Figure 25, the person at the receiver can read the AGC voltage readings over the radio or telephone to the person adjusting the transmitter assembly.

For systems with reverse subchannels requiring only one person for alignment, monitor the AGC meter on the transmitter assembly. When you have achieved optimum alignment of the transmitter, align the receiver one more time.



**Figure 25**  
**Adjust the transmitter for a maximum AGC voltage reading at the receiver**

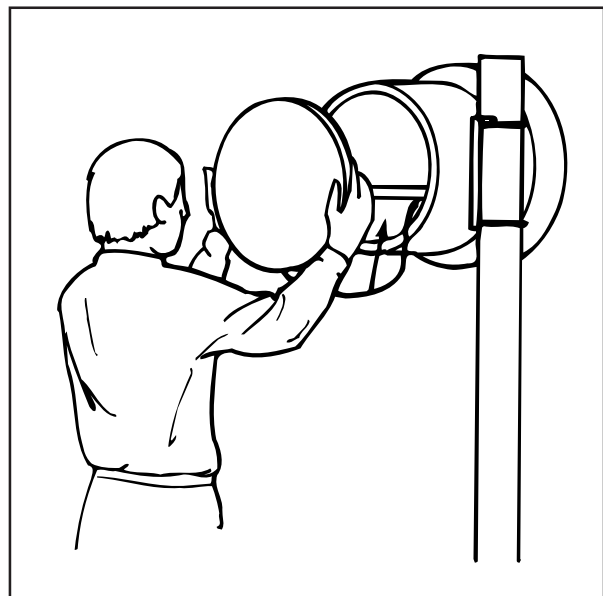
On both antenna assemblies, tighten the elevation and azimuth pivot bolts. Then, tighten the adjust bolts and lock nuts.

Make sure the AGC voltage values have not changed. If the AGC voltage changes, realignment of the antennas is required.

### **COMPLETING THE INSTALLATION**

Place the covers on the back of the antenna assemblies as shown in Figure 26. Make sure the cable strap is completely inside the antenna assembly.

Your Micropass system is now ready for operation. All that remains is to connect your data equipment to the appropriate cables already connected to the Micropass system. When completed, your entire communications system will be in operation.



**Figure 26**  
**Replace the cover on the back of both antennas.**

## VII. THEORY OF OPERATION

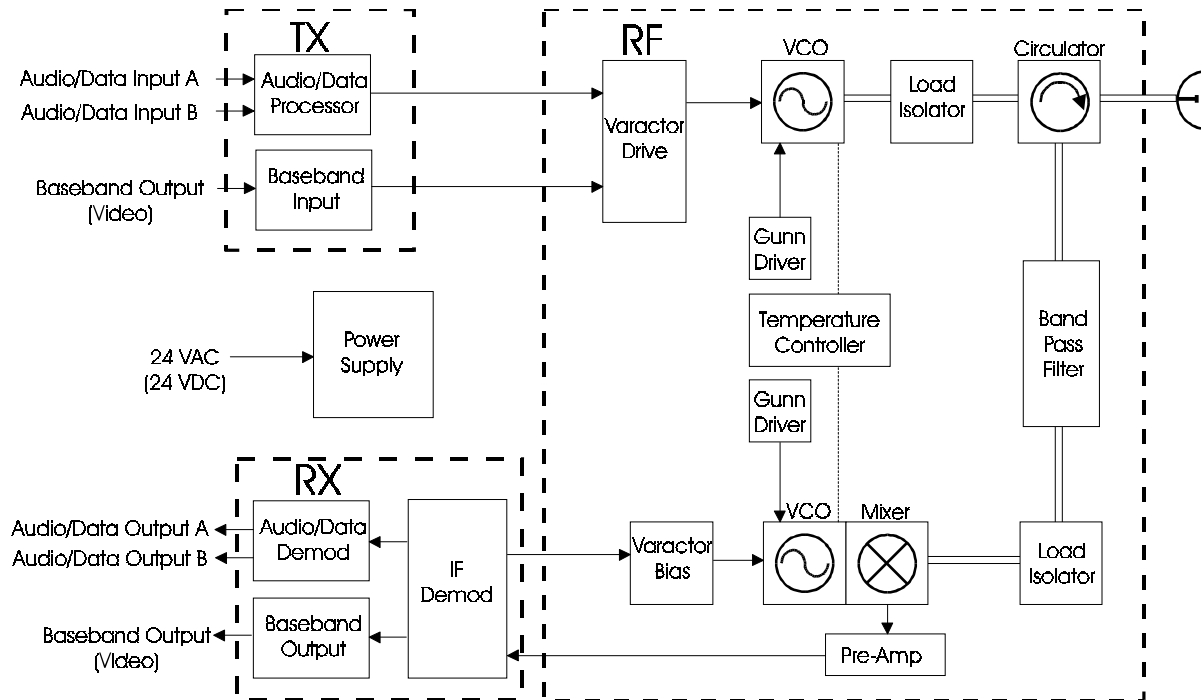
The Micropass 8500 Series is capable of transmitting duplex video and, with optional subchannels, up to two duplex audio/data channels. Each of the two antenna assemblies have identical components and operate in the same manner.

Each Micropass antenna assembly can transmit and receive radio frequency (RF) signals from 21.2 to 23.6GHz. The antenna assemblies operate on frequencies which are 1.2GHz apart as required by the Federal Communications Commission channeling plan. For example, if one antenna assembly transmits on 21.925GHz, then the corresponding antenna must transmit on 23.125GHz.

Each antenna assembly is a transceiver, containing a transmit and receive section. Video signals are transmitter by frequency modulating the RF signal. Video signals are received by converting the RF signal to a 70MHz intermediate frequency (IF), then frequency demodulating this IF signal to derive the video output.

Audio and data signals are transmitted via subcarriers. These signals are frequency modulated on a 7.4MHz carrier which is linearly added to the transmit video. Both the video and 7.4MHz subcarrier are frequency modulated on the RF signal. When received, the RF signal is converted to a 70MHz IF, then frequency demodulated. The video and subcarrier signals are separated: the subcarrier is then frequency demodulated to produce an audio output.

Figure 27 is a block diagram of an 8500 Series transceiver antenna assembly. A functional description of each block follows.



**Figure 27**  
**Transceiver Functional Block Diagram**

## **POWER SUPPLY**

The standard MICROPASS product accepts 24 VAC for power. A step down transformer is provided to convert the local power source to 24 V AC. MICROPASS products are also available with optional DC power supplies which allows connection to -24 or -48 VDC power sources.

The Power Supply Board provides regulated DC voltages to all circuit boards contained in the antenna assembly. Located on the Power Supply Board is a 5 amp fuse which protects the circuitry from excess current draw and a green "POWER ON" LED which, when lit, indicates that power has been applied to the antenna assembly.

## **RF ASSEMBLY**

The RF assembly contains circuits which produce the RF transmit signal and the IF receive signal. Circuits that directly support the generation of these signals are also included.

The transmit RF signal is produced by a solid state Gunn diode contained in a high Q cavity. A varactor diode is used to frequency modulate the RF signal when a varying voltage is impressed upon it. This assembly is called a voltage controlled oscillator (VCO). Signals to be transmitted or to vary the RF frequency are directed to the varactor drive circuits.

The VCO receives its primary power from the gunn driver circuit which produces 4.5 to 8VDC to bias the gunn diode.

The transmit VCO is temperature compensated by the temperature controller. Temperature is maintained at a constant 65°C, A sensor on the VCO provides a proportional temperature regulator with temperature information. The regulator increases or decreases a heater transistor's current accordingly!

The output of the transmit VCO is connected to a circulator which directs the RF signal to the antenna. The circulator also directs the received RF signal to the receiver section of the RF assembly. The received signal from the circulator is connected to a bandpass filter which rejects all RF signals except the desired RF signal.

Once filtered, the RF signal then passes through a load isolator. The load isolator allows the received RF signal to pass easily, but offers much resistance to RF signals in the reverse direction. The load isolator prevents the RF signal generated by the receive VCO from being radiated by the antenna.

The RF signal now passes through a mixer. The mixer beats the received signal with the RF signal generated by the receive VCO. The receive VCO is tuned 70MHz below the received RF signal. The beating of the two RF signals produces a 70MHz IF signal and is routed to the preamplifier board.

The receive VCO is identical to the transmit VCO. It contains a gunn diode to produce the RF signal and a varactor diode which is used for automatic frequency control. The receive VCO receives its power from the gunn driver circuit which provides 4.5 to 8VDC biasing. It is also temperature compensated by the temperature controller.

The IF signal is then amplified and filtered by the preamplifier. The preamplifier increases the amplitude of the IF signal to a level easily handled by other receive circuits.

## **TRANSMIT**

The Audio/Data Processor accepts up to two audio/data signals. One audio/data signal is frequency modulated on a 70MHz subcarrier and linearly added to the other audio/audio channel. The combined signals are then frequency modulated on a 7.4MHz subcarrier. This subcarrier is routed to the varactor drive circuit in the RF assembly.

The Baseband Input accepts the baseband (video) signal, filters and pre-emphasizes this signal, and routes it to the varactor drive circuit in the RF assembly.

## **RECEIVE**

The IF output from the RF assembly is directed to the IF demodulator board where it is amplified, filtered, and demodulated. The demodulated signal consists of the video and 7.4MHz subcarrier signals. These signals are then directed to both the audio demodulator and the baseband amplifier boards. The IF demodulator board also provides an automatic frequency control (AFC) signal to the varactor bias circuit. The AFC prevents the IF from drifting.

The Baseband Output Board filters the video signal and rejects the 7.4 MHz subcarrier signal. The video signal is amplified to drive a 75 Ohm output level and directed to a BNC connector.

The Audio/Data Demodulator filters the 7.4MHz subcarrier and rejects the video signal. The 7.4MHz subcarrier is demodulated resulting in an audio/data signal and a 76KHz subcarrier signal. These signals are again filtered to separate the audio/data from the 76KHz subcarrier. The 76KHz subcarrier is demodulated resulting in another audio/data channel. Both audio/data channels are filtered and amplified to drive a 600 ohm load and routed to terminal blocks for distribution.



## VIII. TROUBLESHOOTING

If you have any difficulties with your communications system, use this section to isolate the problem. This quick reference guide is designed to help you troubleshoot the Micropass system and associated equipment.

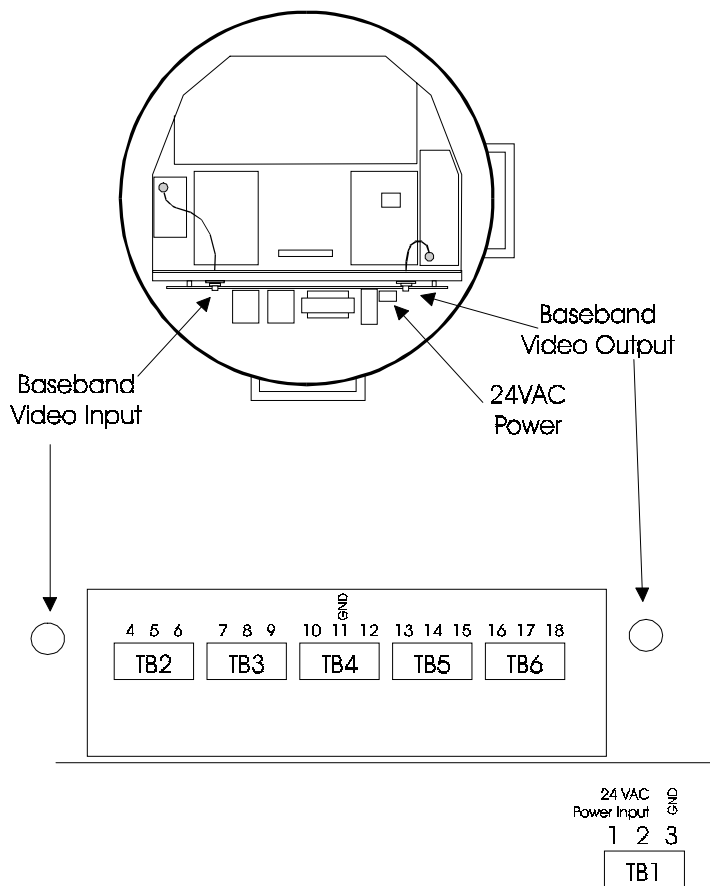
If the problem is with the Micropass system, do not return the equipment for repair without a return authorization number. Contact Racon Customer Service at 1-916-624-7313 to obtain an authorization number.

Cameras may be easily checked for proper operation by connecting a known good monitor directly to the output of the camera. In the same manner, check monitors by connecting them to a known good camera.

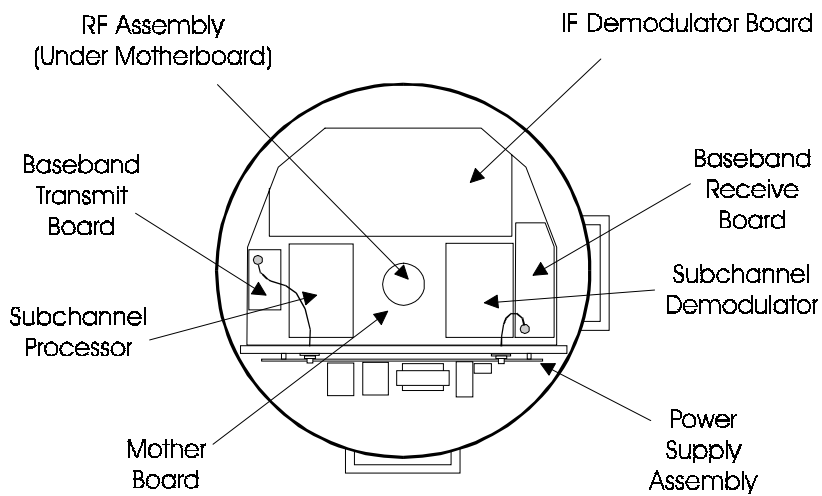
<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>
Power On LED not on	-Fuse blown	Replace fuse
Signal Present LED not on	-Fuse blown -Antenna aligned improperly  -Beam is obstructed	Replace fuse Align antennas according to manual  Remove obstruction or relocate antennas
No video and audio/data	-Fuse Blown  Antennas aligned improperly  -Beam is obstructed	Replace fuse  Align antennas according to manual.  Remove obstruction or relocate antennas
No video	-Camera or monitor defective  -Coax cable/fiber or defective  -One or both antenna assemblies not powered	Check for proper operation  Repair connectors or connectors replace cable  Check fuse and replace if necessary
Intermittant or noisy video	-Camera or monitor defective  -Coax cable/fiber or connectors defective  -Antennas aligned improperly  -Beam is obstructed  -Antenna assemblies cross polarized	Check for proper operation  Repair connectors or replace cable  Align antennas according to manual  Remove obstruction or relocate antennas  Use the same polarization for both antennas
No audio/data	-Audio/data equipment defective  -Coax cable/fiber or connectors defective  -One or both antenna assemblies not powered	Repair audio/data equipment  Repair connectors or replace cable  Check fuse and replace if necessary

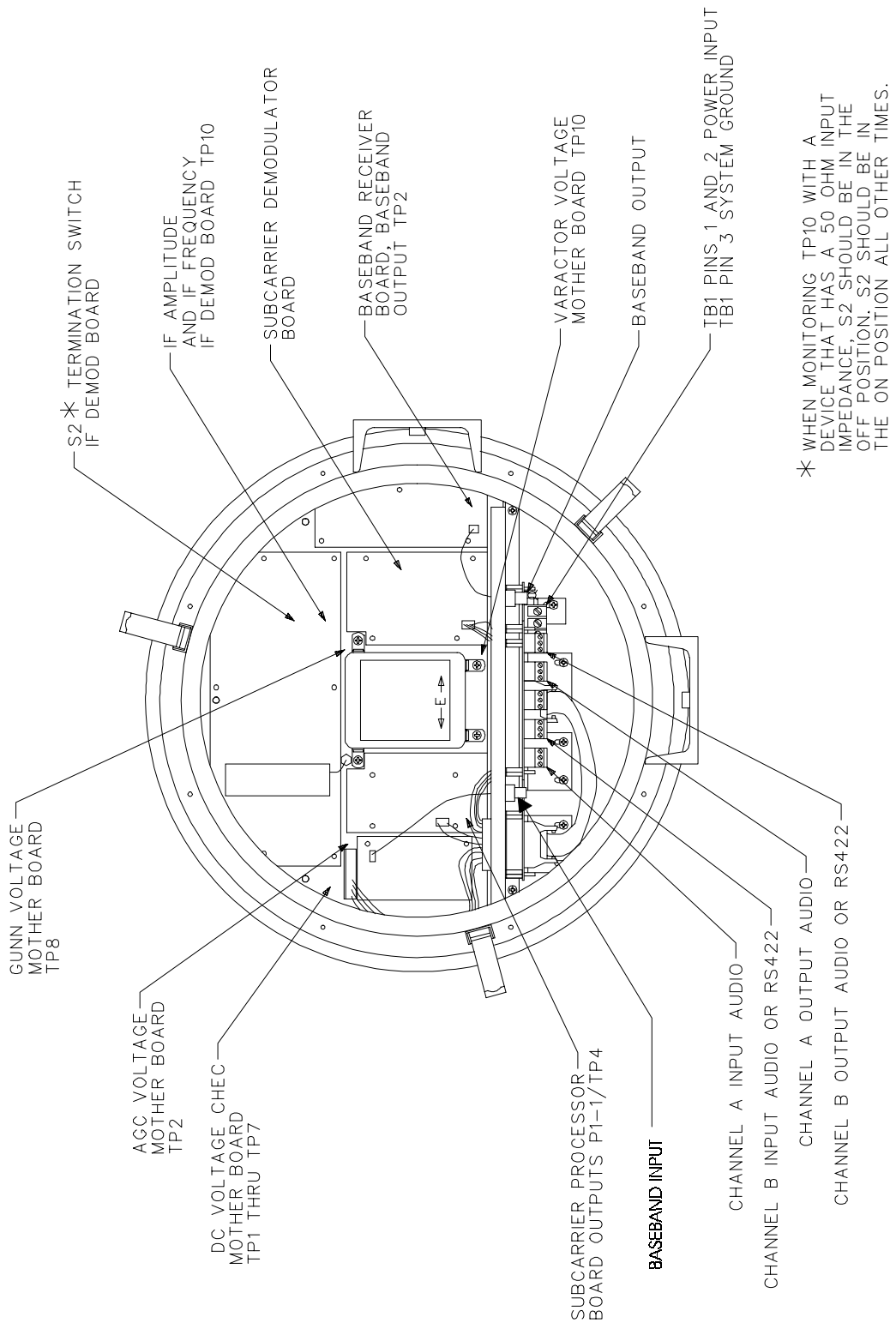
Intermittent or noisy audio/data	-Audio/data source defective	Check for proper operation
	-Coaxial cable/fiber or connectors defective	Repair connector or replace cable
	-Antennas aligned improperly	Align antennas according to manual
	-Beam is obstructed	Remove obstruction or relocate antennas
	-Antenna assemblies cross polarized	Use the same polarization for both antennas
Hum bars in video picture	-Power input to antenna assembly is low	Check AC or DC power for proper amplitude
	-Ground potential between transceiver assemblies and camera/monitor is different	Install ground loop isolators
AGC value low	-Antennas aligned improperly	Align antennas according to manual
	-Beam is obstructed	Remove obstruction or relocate antennas
	-Antenna Assemblies cross polarized	Use the same polarization for both antennas
AGC value high	-Beam reflections.	Move antennas further from reflective object or smooth surface
	-Signal being received from another microwave system on same path	Ensure frequency of radio on same path is more than 200MHz from your operating frequency

## TRANSCIEVER CONNECTOR LOCATIONS



## TRANSCIEVER BOARD IDENTIFICATION





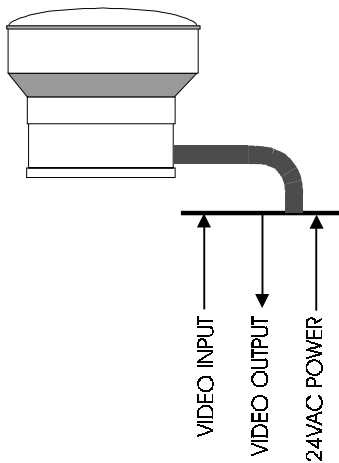
# MODEL 8500

TEST POINT LOCATIONS



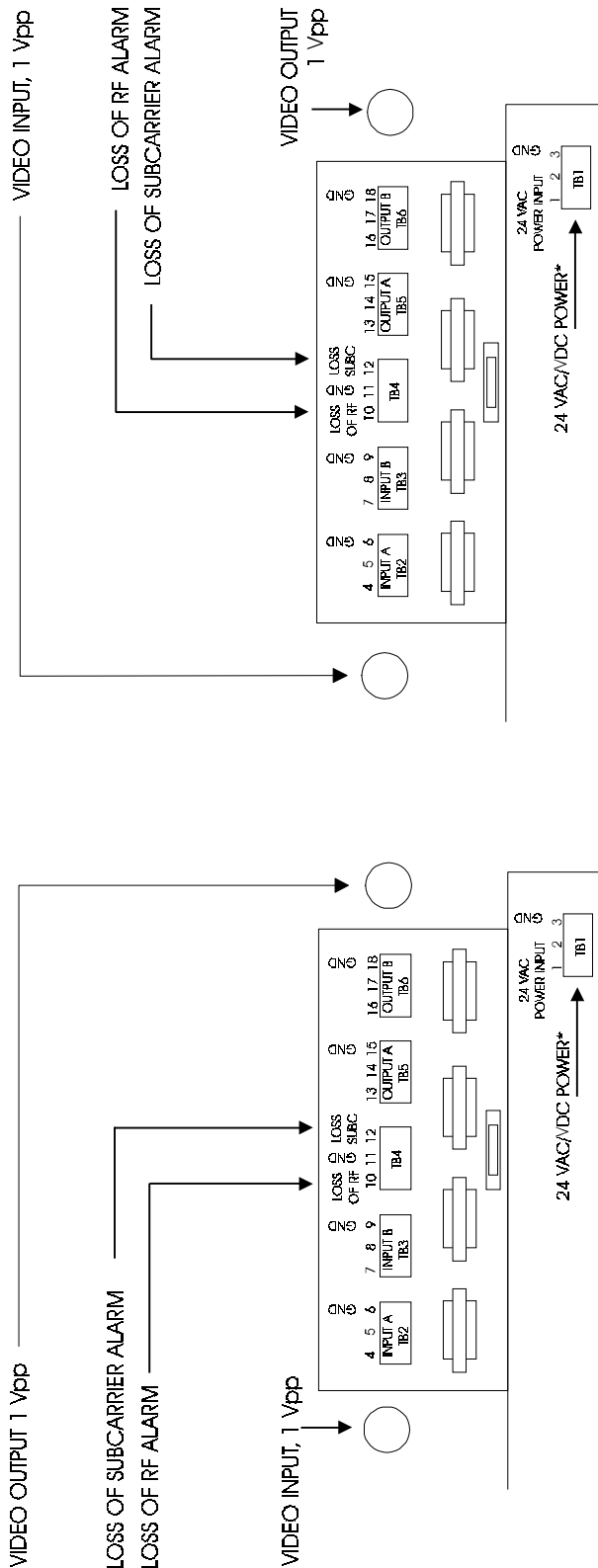
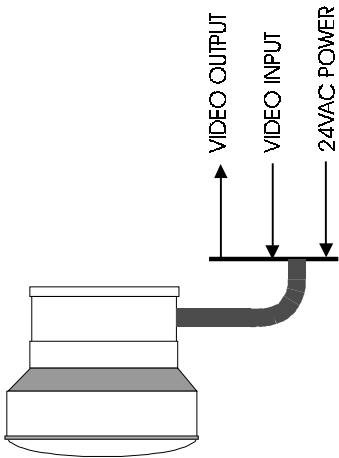
# MODEL 8500

## TRANSCIEVER



VIDEO

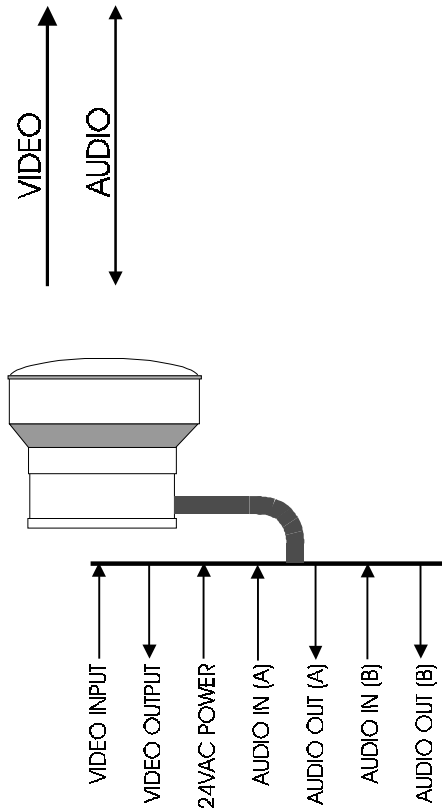
## TRANSCIEVER



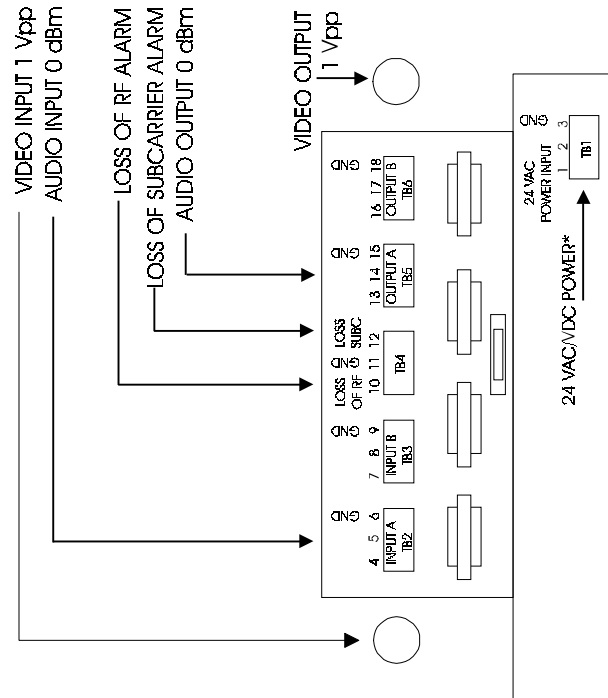
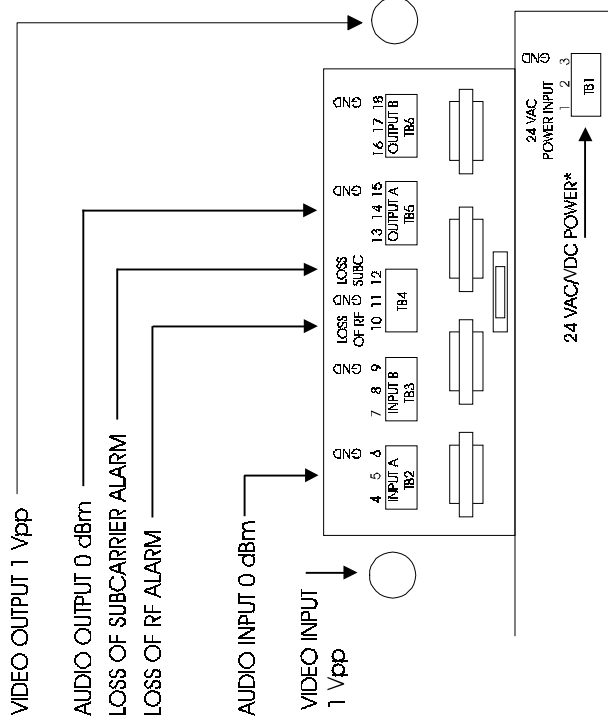
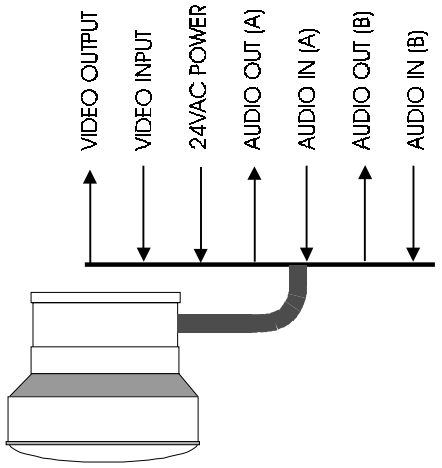
\* 24 VDC WITH DC OPTION

# MODEL 8505

## TRANSCIEVER



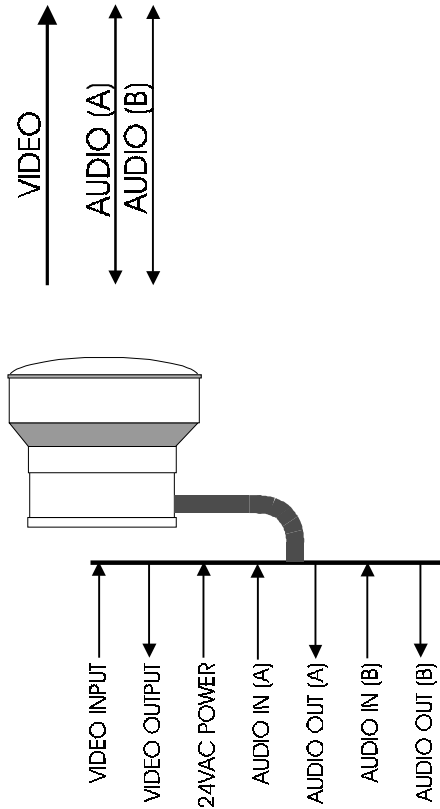
## TRANSCIEVER



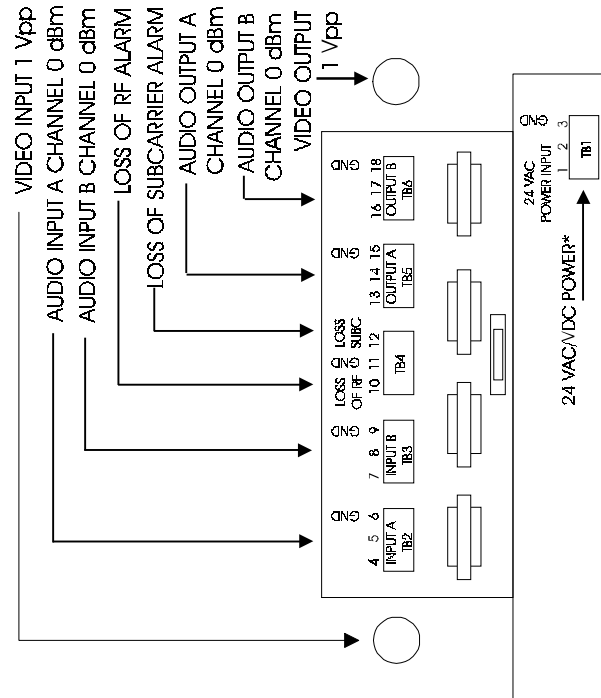
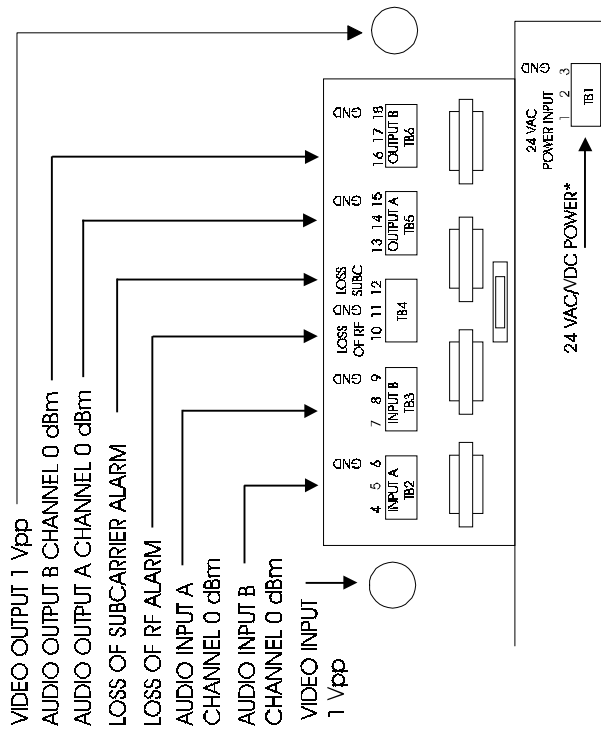
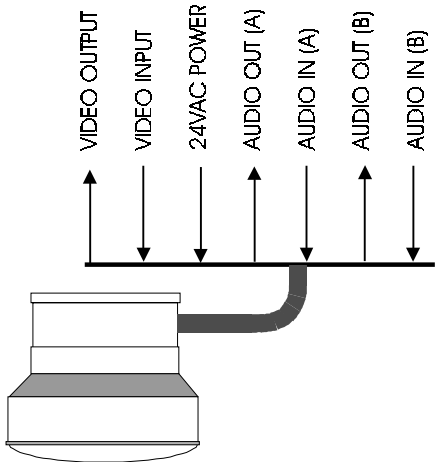
\* 24 VDC WITH DC OPTION

# MODEL 8525

## TRANSCIEVER



## TRANSCIEVER

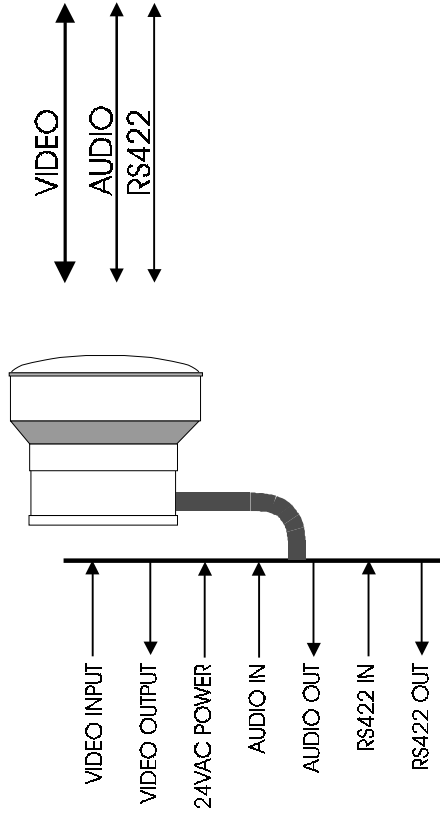


\* 24 VDC WITH DC OPTION

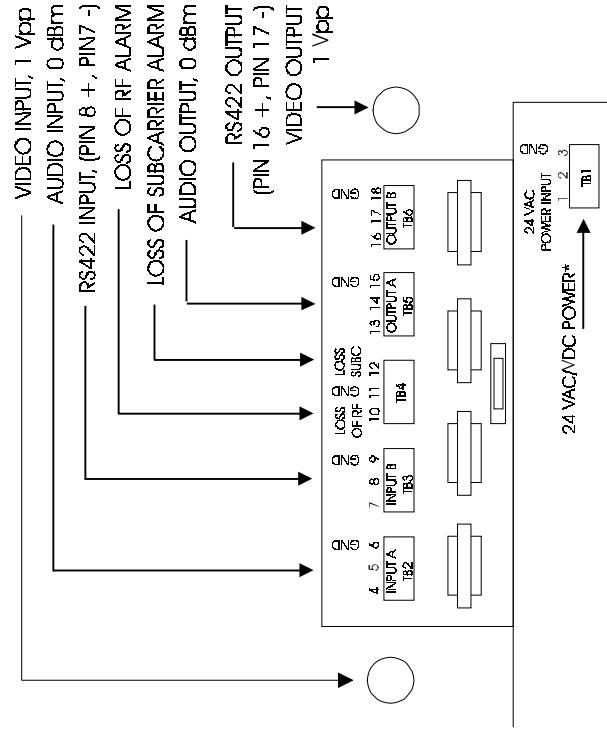
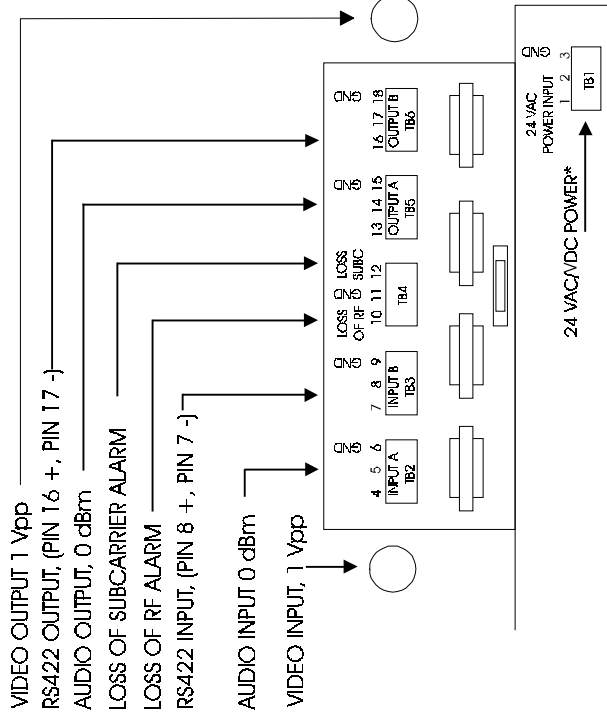
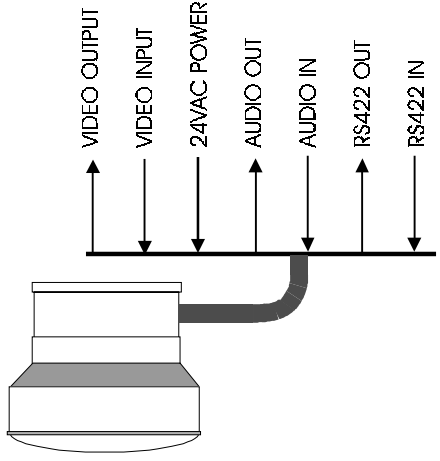


# MODEL 8540

## TRANSCIEVER



## TRANSCIEVER



\* 24 VDC WITH DC OPTION

# MICROPASS 8500 MAINTENANCE RECORD - HIGH TRANSMIT FREQUENCY

Customer: \_\_\_\_\_ Site: \_\_\_\_\_ S/N: \_\_\_\_\_ Data Rate: \_\_\_\_\_ (If Applicable)

Test Point	Description	Specification	Factory Data	Install Data	Customer Data	Customer Data	Customer Data	Customer Data	Customer Data
System Data (* Indicates Test Point on Mother Board, ** Indicates Test Point on IF Demod Board)									
TP-1	Ground	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TP-2*	AGC+	Data Receive Threshold							
TP-4*	+15 Vdc Supply	14.5 to 15.5 Vdc							
TP-5*	+5 Vdc Supply	4.85 to 5.15 Vdc							
TP-6*	-5 Vdc Supply	-4.85 to -5.15 Vdc							
TP-7*	+27 Vdc Supply	24.0 to 34.0 Vdc							
TP-8*	Rx Gunn Bias	4.0 to 7.0 Vdc							
TP-9*	Tx Gunn Bias	5.0 to 8.0 Vdc							
TP-10*	Tx Varactor Bias	7.5 to 8.5 Vdc							
TP-11*	Rx Varactor Bias	7.0 to 9.0 Vdc							
TP-10**	IF Signal level	-8.0 to -12.0 dBm							
TP-10**	IF Frequency	68.0 to 72.0 MHz							
Tx Freq	Transmitter Freq.	Fo(see label) +/- 7.0 MHz							
Rx Freq	Receiver Freq.	Fo(see label) +/- 7.0 MHz							
Base Band Levels (Test Points on Base Band Boards)									
TP2(BBTx)	Data Input Level	1.0 +/- .2 Vpp							
TP1(BBRx)	Data Output Level	1.0 +/- .2 Vpp							
Date & Technician ID									
Date Performance Measured									
Technician Performing Measurement									
Notes:									
+ Installed AGC value will vary depending upon path attenuation									

# MICROPASS 8500 MAINTENANCE RECORD - LOW TRANSMIT FREQUENCY

Customer: \_\_\_\_\_ Site: \_\_\_\_\_ S/N: \_\_\_\_\_ Data Rate: \_\_\_\_\_  
 (If Applicable)

Test Point	Description	Specification	Factory Data	Install Data	Customer Data	Customer Data	Customer Data	Customer Data	Customer Data
<b>System Data (* Indicates Test Point on Mother Board, ** Indicates Test Point on IF Demod Board)</b>									
TP-1	Ground	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TP-2*	AGC+	Data Receive Threshold							
TP-4*	+15 Vdc Supply	14.5 to 15.5 Vdc							
TP-5*	+5 Vdc Supply	4.85 to 5.15 Vdc							
TP-6*	-5 Vdc Supply	-4.85 to -5.15 Vdc							
TP-7*	+27 Vdc Supply	24.0 to 34.0 Vdc							
TP-8*	Rx Gunn Bias	4.0 to 7.0 Vdc							
TP-9*	Tx Gunn Bias	5.0 to 8.0 Vdc							
TP-10*	Tx Varactor Bias	7.5 to 8.5 Vdc							
TP-11*	Rx Varactor Bias	7.0 to 9.0 Vdc							
TP-10**	IF Signal level	-8.0 to -12.0 dBm							
TP-10**	IF Frequency	68.0 to 72.0 MHz							
Tx Freq	Transmitter Freq.	Fo(see label) +/- 7.0 MHz							
Rx Freq	Receiver Freq.	Fo(see label) +/- 7.0 MHz							
<b>Base Band Levels (Test Points on Base Band Boards)</b>									
TP2(BBTx)	Data Input Level	1.0 +/- .2 Vpp							
TP1(BBRx)	Data Output Level	1.0 +/- .2 Vpp							
<b>Date &amp; Technician ID</b>									
Date Performance Measured									
Technician performing Measurement									
Notes:									
+ Installed AGC value will vary depending upon path attenuation									

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Document # 10076-007-02  
File Name: 8500IOC.p65  
Printed in the U.S.A.  
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October 2001