SPORTCRAFT ANTENNAS

INSTALLATION INSTRUCTIONS
for
FLUSH WINGTIP VOR ANTENNAS

1.0 INTRODUCTION.

1.1GENERAL.These antennas have been designed by Bob Archer of Torrance, California, utilizing concepts common to military aircraft and space vehicles. The antenna performance is superior to most in use today in private aircraft. The only requirement for maximum performance is that the antennas must be installed in accordance with the installation instructions contained herein. The wing tips into which antennas antennas are installed must be built of dielectric (plastic) material and the internal dimensions must be at least 11 inches deep and 24 inches long.

1.2 INSTALLATION. If at any time there is a conflict in the technique of installation, this document shall take priority, unless the conflict is of a mechanical nature. If the latter is true the installation mechanic shall make the decision. Follow the rules contained herein for electrical information and for any mechanical techniques an aircraft mechanic should be consulted.

2.0 ANTENNA DESCRIPTION.

2.1 GENERAL. The SA-001 wing tip VOR antenna is designed for reception of horizontally polarized energy in the frequency range of 108 to 118 MHz. Since some types of radio equipment still use horizontally polarized antennas in the VOR and COM frequency range of 108 to 127 MHz. it was decided that the VOR antenna should cover the same range. The antenna is constructed of Alclad 2024 aluminum strips .016" thick riveted together with appropriate pieces for impedance matching. The voltage standing wave ratio (VSWR) is less than 2:1 over the frequency range of 108 to 136 MHz. and is less than 1.5:1 over the range of 108 to 127 MHz. There may be variations in VSWR due to installation variations. This type of antenna design is called a "Gamma Match". The antennas may be mounted in either the right or the left wing tip and either in the top or bottom inside surfaces depending on the tip configuration. If two VOR receivers are being installed one antenna should be installed in each wing tip and each antenna connected to a receiver. This type of installation would produce twice as much signal into each receiver and this much signal increase would mean an increase of about 25% increase in VOR range. A word of warning! NEVER connect two antennas together through a coupler thinking this would produce better all around coverage. But with the distance between the antennas and resulting phasing effects the resulting radiation pattern would have an extreme number of lobes and nulls.

3.0 INSTALLATION INSTRUCTIONS

3.1 COAXIAL CABLE. A length of coaxial cable is required for the flush mounted antennas in the fiberglass wing tips. The coaxial cable is not supplied. It is recommended that RG-58 C/U or A/U (50 ohm cable) be used for the installation. This cable has a stranded center

conductor which contributes to a longer life in a high vibration environment. Any other coaxial cable which has the same or better electrical characteristics and physical properties may be used. RG-58 C/U OR A/U cable is approximately 0.25 inches in diameter. A compatible coaxial connector for the radio end of the cable may also be required though most modern radios have the coaxial cable soldered into connector at the rear of the case. A check with the local electronics supply house should reveal all necessary information.

3.2 CABLE INSTALLATION. Run sufficient cable through the wing to reach from the radio equipment to the antenna with enough excess cable at the antenna for the cable to run forward with approximately a six inch loop. (Check the installation drawing.) Secure the cable as is possible in the tip and wing to minimize cable movement in the wing.

3.3 MOUNTING ANTENNA IN WING TIP. Before beginning this section remove the two flathead screws and clamps from the antenna strip.

1. Lay the antenna inside the wing tip with the heads of the rivets and screws toward the inner surface of the wing tip with the bottom strip (the grounding portion) toward the open end of the wing tip. The antenna may be mounted on either the top or the bottom of the tip which ever allows the antenna to lie flatter in the tip
2. While keeping the bottom (grounding) strip parallel to the open edge of wing tip slide the antenna as far forward as practical while maintaining the antenna as flat as possible and clear of wing tip light etc.
3. Temporarily tape the antenna to the wing tip in this position while marking the three mounting holes in the forward antenna strip.
4. Remove the antenna from the wing tip and drill the three mounting holes in the wing tip with a number 33 drill (clearance for a number 4 screw). countersink the two mounting holes in the outside surface of the wing tip if the flat head screws are being used.
5. Install the antenna in the wing tip with the two screws, clamps, washers and nuts. If the wing tip light wires have connectors that are too large to pass through the clamps install the wires in the clamps prior to tightening the nuts on the clamps. If the wires were allowed to get across the antenna elements the r.f. energy would tend to be shorted to ground destroying the efficiency of the antenna. The outer portion of the antenna (the part nearest the tip) may be fastened in at the installers discretion, screwed, riveted, bonded or merely taped down. The portion of the antenna nearest the open edge of the wing tip will be sandwiched between the end of the wing and the fiber glass wing tip or grounded to the end of the wing at the installers discretion. It is important that this strip be very well grounded and fastened at three points along the strip at a minimum. Check installation drawing.
6. With the antenna mounted in the wing tip position the tip on the end of the wing in the proper position use whatever means at your disposal to locate and drill the mounting holes in the wing tip and the grounding strip of the antenna mounted therein.

3.4 CONNECTION OF CABLE TO ANTENNA. Before proceeding with the connection of the cable to the antenna the installer might like to cover the end of the wing with a cloth to keep from scratching the finish. We have found that the handiest way to do this portion of the installation is to lay the wing tip with the installed antenna on the end of the wing with the open end of the tip facing outward.

1. Remove 1.25" of the outer insulation from the coaxial cable. Be careful not to cut the braid underneath.
2. Comb out the coaxial cable braid and then twist into a wire for insertion into the provided lug. Trim the braid wire to 0.75 inches.
3. Strip 0.25 inches of insulation from the coaxial cable center conductor.

4. Remove the large wire terminal from the ground side of the antenna connections and install the lug on the twisted braid by using a standard crimping tool and or soldering.

5. Remove the small wire hole terminal from the antenna and install the lug to the center conductor of the coaxial cable by using the crimping tool and or soldering.

6. Replace the terminal lugs on their respective terminals on the antenna and tighten the nuts on lock washers and lugs. Make sure the lug on the braid side of the coaxial cable goes to the ground side of the antenna.

3.5 FINAL ASSEMBLY OF WING TIP. Before continuing check all steps and procedures contained herein and check all screws and connections for tightness .

1. Place wing tip on wing being careful to get the antenna grounding strip between the wing tip and the end of the wing.

2. Make sure the coaxial cable leads run forward from the antenna and then makes a loop before going rearward and joining the wing tip light wires. (CHECK INSTALLATION DRAWING.) Try to get all wires and cables to lay smoothly against the end rib of the wing. Fasten as desired.

3. Temporarily fasten the wing tip to the end of the wing making sure the antenna is well grounded.

4. Connect the antenna cable to the radio equipment in the aircraft; turn on the equipment and do a complete check out. Check out the wing tip lights also.

5. After a complete check out making sure everything is working properly fasten the wing tip to the wing permanently.

NOTE

Make sure that the wing tip light wires follow
the leading edge of the antenna out to the lights through the provided clamps and

DO NOT! DO NOT! DO NOT!

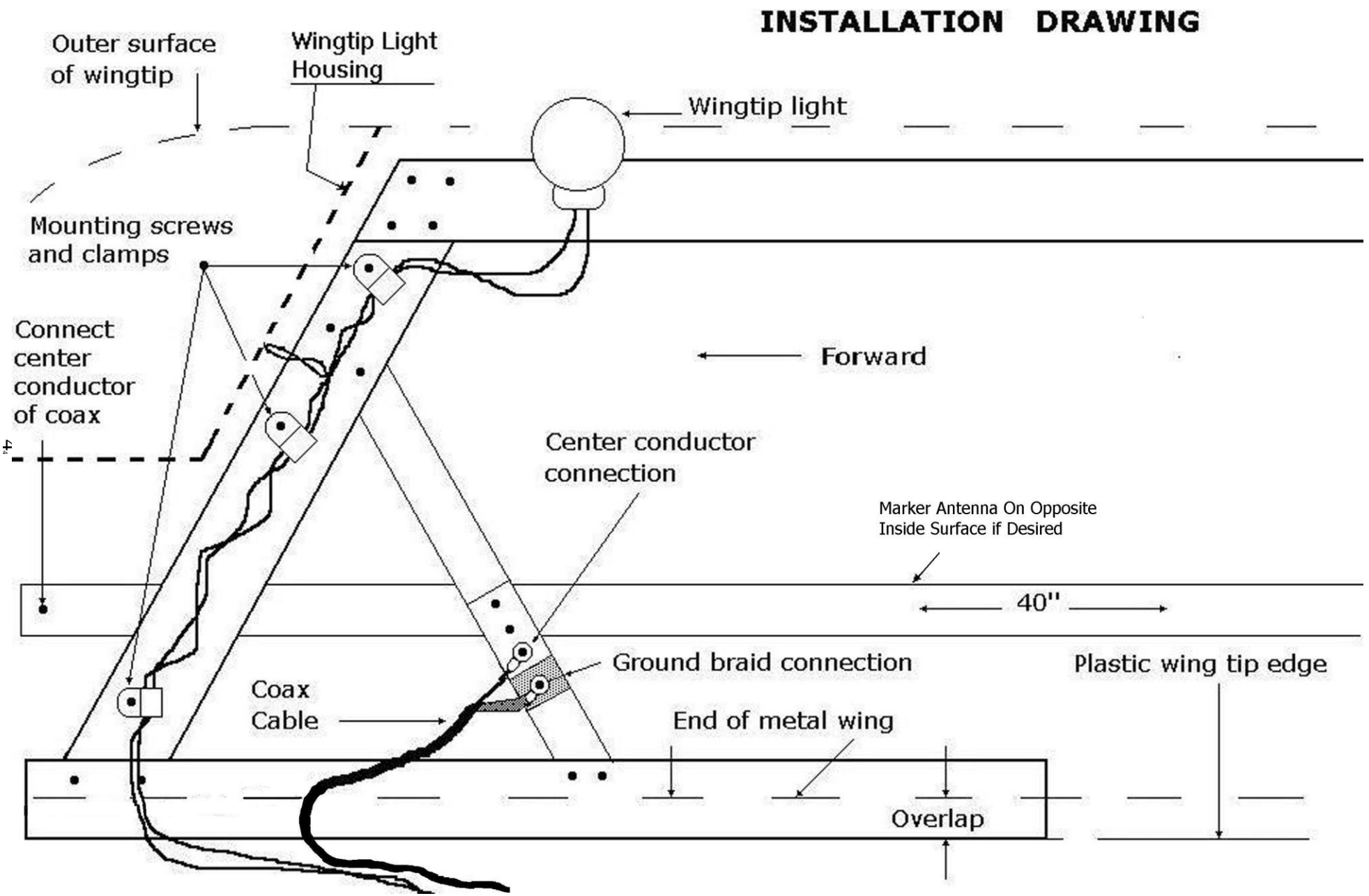
Take a short cut with the wires across the antenna enroute from the end of the wing to the wing tip light. Separate the wires from the antenna. Connect two antennas together!!!

NOTE AGAIN

These Antennas MUST be shorted to the conductive part of the wing to work Properly. When installing these antennas in RV wing tips that install inside the metal of the wing skin sandwich the antenna between the tip and the nut plates. The screws will then ground the antenna properly.

IMPORTANT NOTE / INFO!

The idea is that we want the antenna and the lights and wires to appear as one to the RF energy. That is why all the wires should go through the provided clamps and snuggle up to the lights etc. If the lights and wires are separate from the antenna they act as independent antennas and with the low impedance to ground short out a significant amount of signal to ground. I know this is counter-intuitive but that is how RF energy is sometimes. Maybe I should say usually. The bare metal of the antenna and any bare metal of light housings etc. should not be touching unless they are very well connected because if they touch intermittently from vibration it could cause noise on the system.


INSTALLATION DRAWING
Outer surface of wingtip
Wingtip Light Housing
Wingtip light
Mounting screws and clamps
Connect center conductor of coax
Forward
Center conductor connection
Marker Antenna On Opposite Inside Surface if Desired
40"
Ground braid connection
Plastic wing tip edge
Coax Cable
End of metal wing
Overlap