

SPORTCRAFT ANTENNAS

INSTALLATION INSTRUCTIONS for FLUSH WINGTIP COM ANTENNAS

1.0 INTRODUCTION.

1.1 GENERAL. 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 these 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. This antenna should be installed in the wing tip, right or left, that will provide the greatest vertical height. Communication antennas should be vertically polarized and the greater the vertical height the better the performance will be. 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. ANTENNA DESCRIPTION.

2.1 GENERAL. The SA-001A wing tip COM antenna is designed for operation of vertically polarized energy in the frequency range of 118 to 136MHz. 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 118 to 136 Mhz. There may be variations in VSWR due to installation variations. 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. It should be mounted on the inside surface that provides the greatest vertical height. A word of warning! NEVER connect two antennas together through a coupler thinking this would produce better all around coverage. Due to the distance between the antennas and resulting phasing effects the resulting radiation pattern would have an extreme number of lobes.

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 double shielded coax (50 ohm cable) be used for transmitter the installation. These cables have a lower loss and less leakage so they would be less likely to cause interference. Typical types would be RG55, RG400, RG142, etc. Any other coaxial cable which has the same or better electrical characteristics and physical properties may be used. These cables are approximately 0.20 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 a connector at the 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 three 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 generally should be mounted on the bottom of the tip or which ever provides the antenna with the greatest vertical height.

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 angle as much as possible and clear of wing tip light etc. Up close to the light housing is fine. Bend antenna up to the upper surface as shown on the installation drawing.

3. Temporarily fasten the antenna to the wing tip in this position.

4. Install the antenna in the wing tip with the rivets through the wing tip, nut plates and antenna. If the 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 RF. 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. Don't neglect to angle the antenna up to the upper inside surface and fasten.

5. 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.

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 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 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 as much as is possible and

DO NOT

Take a short cut with the wires across the antenna enroute from the end of the wing to the wing tip light **NOR** allow the RF cables or strobe or light wires flop on top of the antennas when the tip is fastened to the wing. Route the wires along the end rib.

DO NOT

Connect two antennas together!!!

NOTE AGAIN

Make sure the antenna is very well electrically grounded to the wing along the bottom edge of the antenna. Riveting the antenna to the tip or the wing under and along with the nut plates should work well. Ground in at least four locations if possible.

Install this antenna in the wing tip and in a manner that will provide the greatest amount of Vertical Height. Be sure to brace or block up in this position as shown on the installation drawing.

AND AGAIN

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. If installing in the new "sheared" type tips flex the antenna from the bottom up to the upper surface to gain the most vertical dimension possible and fix in place using formed foam blocks or a fiber glass web of some type.

MORE

It has recently been brought to my attention that some folks have experienced problems with RF interference with the late model panel devices. These new devices operate on lower voltages and when the RF energy gets on the bus wires it can travel back to the panel area and cause all kinds of problems. SO, It is recommended that the cable used for the transmitted signals be the double shielded type and the cables should be run as far from Bus wires as possible.

The double shielded types are; RG55, RG142, RG213 and RG400.

These are commonly available types but there are others.

How to Check Your Com Antenna Radiation Pattern to find Weak Areas of Signal Reception.

I strongly suggest that on any antenna installation a flight test to check the radiation

pattern should be considered. In the particular instance of the Com antenna in front of the vertical stabilizer I believe there would be a significant reduction of signal in the aft direction because of the energy being reflected forward and upwards by the vertical stabilizer. On a belly mounted antenna the landing gear legs can have a significant effect on the pattern. On a wing tip mounted COM antenna I would guess that reception would be reduced on the opposite side. I do not have an aircraft of this type so I have not done the test myself. If someone would do the test and let me know the results I would be eternally grateful.

One way to accomplish this type of test follows: Climb to an altitude of about 5000 ft. and tune in to an airport ATIS signal at some range at which the signal is readable but sort of scatchy and fly flat circles and listen for the signal fading out and back in and record the directions off the nose of the signal loss. Don't attempt this test using the volume control to set the audio level because you have to get far enough away from the station to prevent the automatic gain control of the radio from working. It would be best to have a flat surface between the transmitter and the plane because the hills and valleys and such would have an effect. Water would be good. I tried this a while back with the belly mounted antenna on my Bellanca and I had equal signal all the way around. I was about 70 miles from Palomar airport in southern California tuned to their ATIS out over the ocean south of the Palos Verdes peninsula.

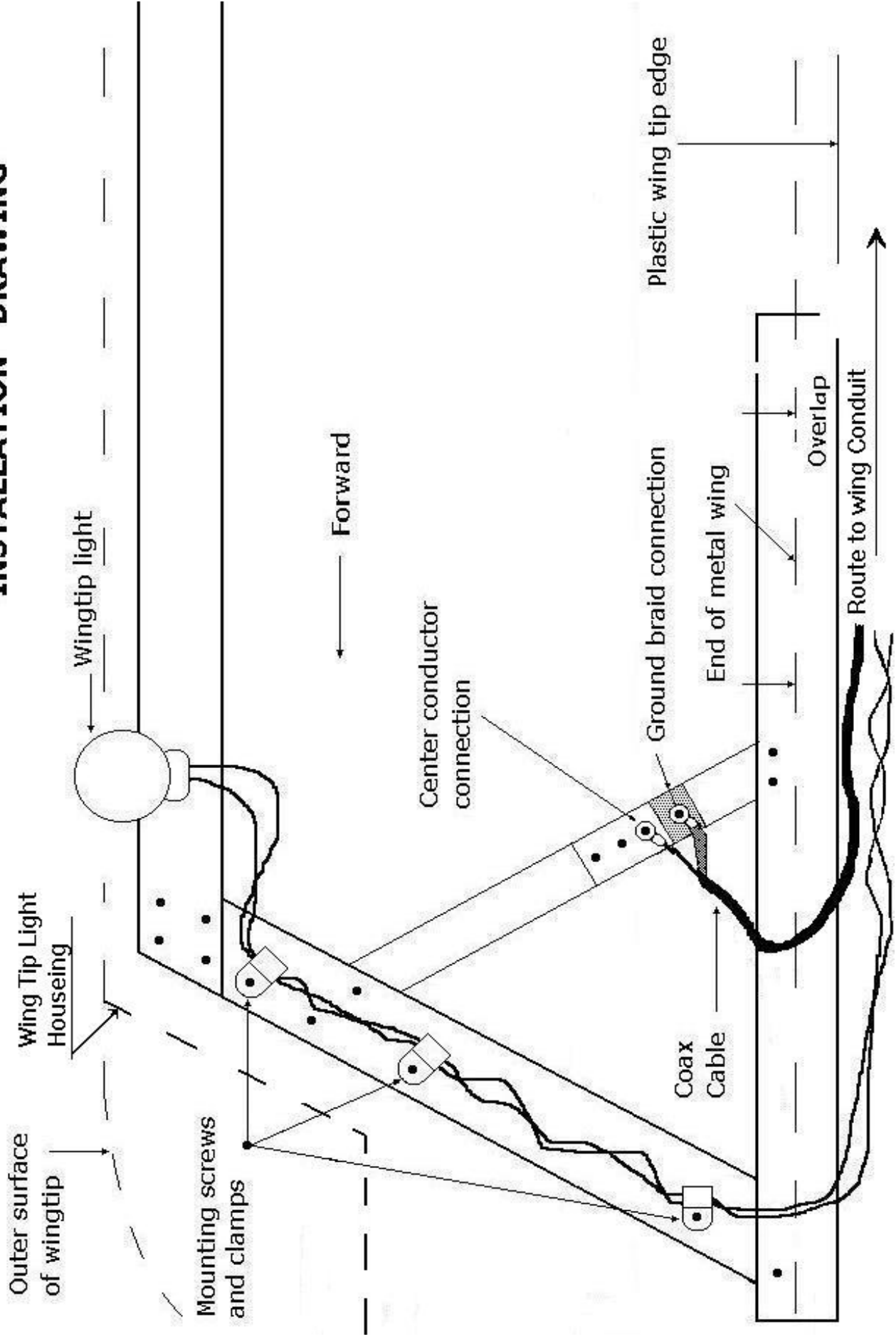
A similar test could be performed on VOR antennas by using the flag indicators on the instruments or the audio level but the audio on the VORs seems pretty weak.

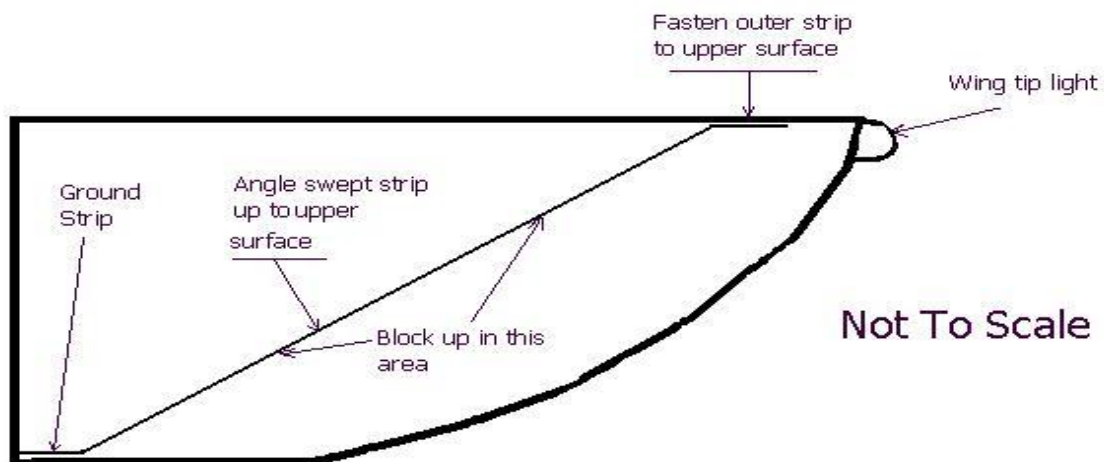
Good luck on our drag free and better performing antennas.

Regards;

Bob

INSTALLATION DRAWING





Install Com antenna this way