

Installation Guide

PCAS™ MRX™



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November 2006





Portable Collision Avoidance System (PCAS) **Model MRX Installation Guide**

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Acknowledgement

A portion of the guidelines contained in this Guide have been provided by Comant and refer to the installation of the Comant CI-series antennas. If other antennas are used, the appropriate guidelines should be followed.

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Installation Overview

Disclaimer



This Installation Guide is published for informational purposes only.

This Installation Guide is published for informational purposes only. Zaon does not warrant that the information is accurate in every respect. Zaon is not responsible for errors, omissions, or inaccuracies in this publication or the results obtained from use of the information provided herein. Installation of any system requires that the installer check and confirm the information with other sources. This Guide is not intended and should not be construed as general installation instructions. The purpose of this Guide is to provide helpful information on the specific installation of the MRX unit. Consult a professional in all matters relating to installation, particularly concerning any certified aircraft. The information obtained from this Guide cannot replace or substitute for the services of qualified personnel.

Step By Step

Follow these steps for most MRX installations:

- 1 > **Locate** a suitable area in the instrument panel for mounting **the MRX**
- 2 > Make the **cutout** for the unit
- 3 > **Locate** a suitable area for **the antenna(s)**
- 4 > **Drill holes** appropriate for the antenna(s)
- 5 > **Run the antenna coax cable(s)** to the antenna location(s) from the MRX unit location
- 6 > **Mount antenna(s)** and connect
- 7 > Connect the **power** line and fuse to the avionics bus
- 8 > Connect the **audio** line to the intercom or audio panel
- 9 > Connect and **finish installing** the MRX unit

Introduction

Zaon Flight Systems, Inc. ("Zaon") is committed to providing you with the parts and instruction necessary to install your MRX. All of the hardware needed to install your MRX is available from Zaon, and the unit can be installed with professional results. Installation will increase the sensitivity and accuracy of the unit.

Installation Options

Installing an MRX involves a Hardware Kit and antenna parts, purchased in a kit or separately as needed. This allows you to use an antenna and/or cabling you may already have and just purchase the parts you don't have, as long as all parts meet the criteria described here. The Hardware Kit is available for mounting the MRX in the panel. All necessary parts are included with the Hardware Kit for mounting the unit in the panel. For the antenna, two options exist: a single, bottom-mounted blade antenna or dual top and bottom mounted blade-style antennas. Each option is described in this chapter.

MRX installation is not approved for pressurized aircraft.

Single Antenna Installation

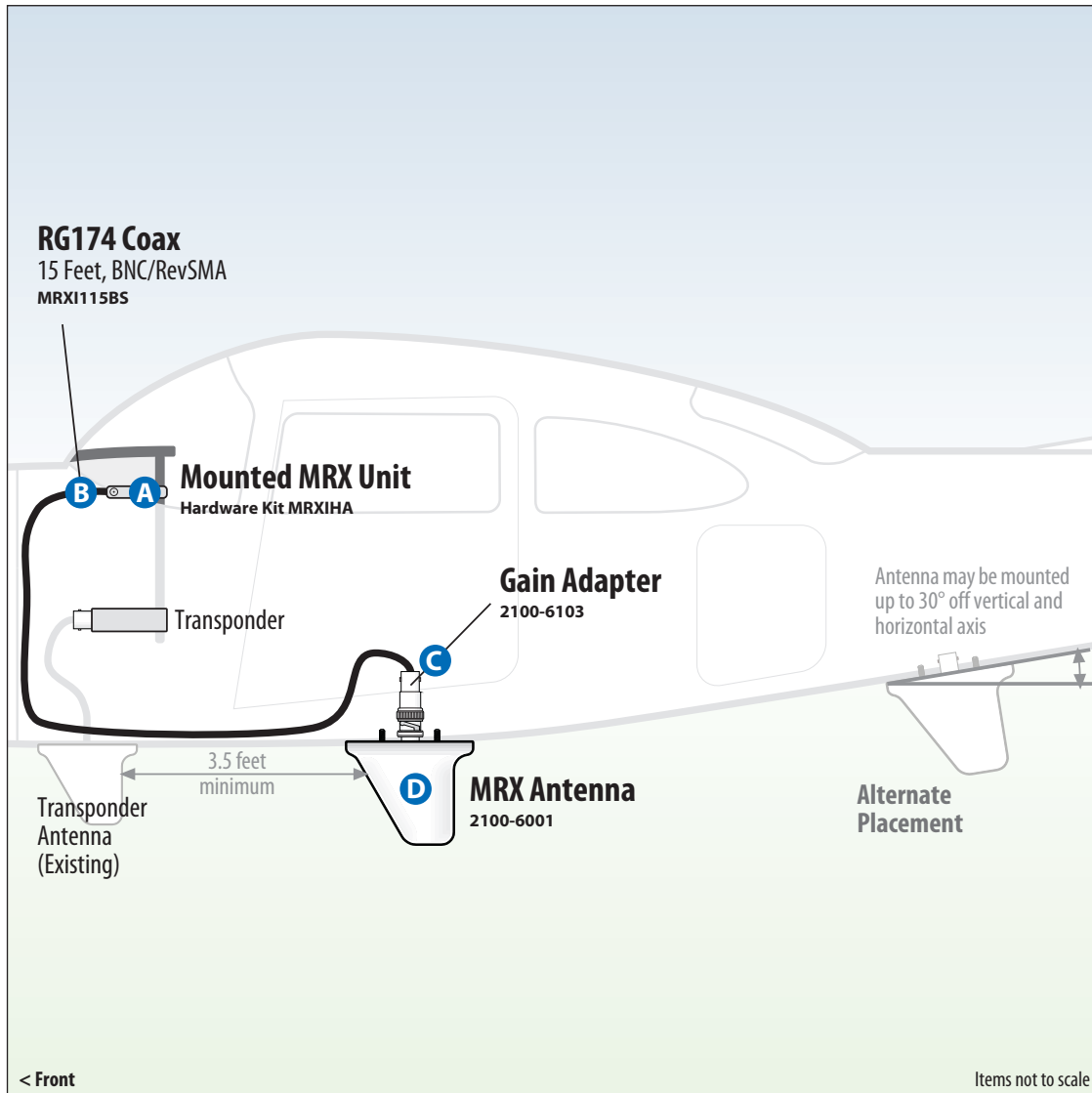


Figure A: Single Antenna Installation Diagram

Installing MRX with a single blade antenna mounted on the bottom of the aircraft is the most common type of installation. This simple system provides outstanding reception and accuracy at a minimal cost.

Item	Description	Part Number	Quantity	
A	Hardware Kit	See Next Section	MRXIHA	1
B	RG174 Coax	15 feet, BNC to Reverse SMA	MRXI115BS	1
C	Gain Adapter	Gain adaptor for MRX	2100-6103	1
D	MRX Antenna	Comant DME / Transponder Antenna, 1030-1090 MHz	2100-6001	1

Dual Antenna Installation

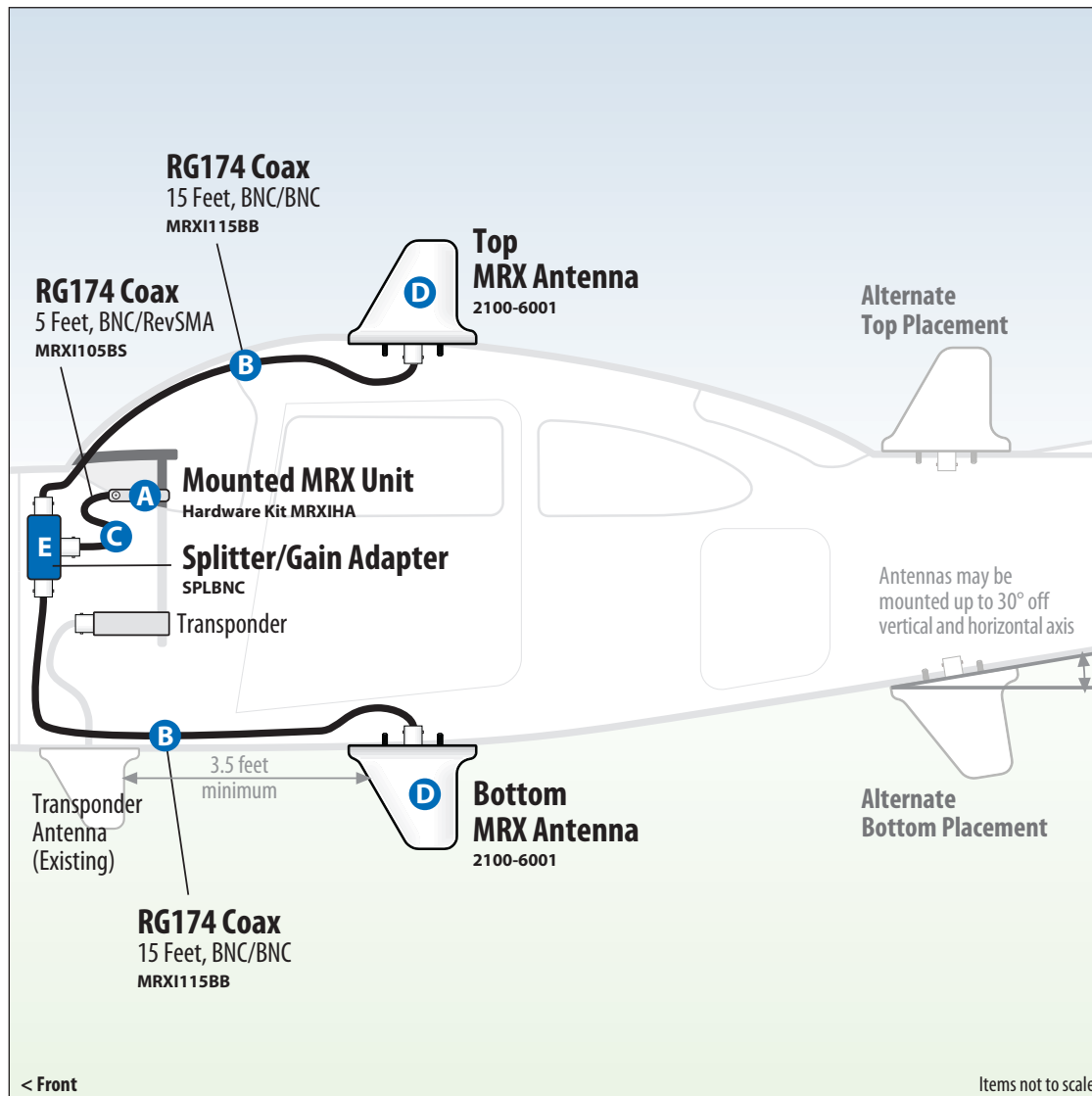









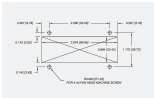



Figure B: Dual Antenna Installation Diagram

With two blade antennas installed, diversity gives the best possible signal sensitivity with absolutely no airframe shadowing. The splitter combines the signals for one output to MRX.

Item	Description	Part Number	Quantity	
A	Hardware Kit	See Next Section	MRXIHA	1
B	RG174 Coax	15 feet, BNC to BNC	MRXI115BB	2
C	RG174 Coax	5 feet, BNC to Reverse SMA	MRXI105BS	1
D	MRX Antenna	Comant DME / Transponder Antenna, 1030-1090 MHz	2100-6001	2
E	Splitter / Gain Adaptor	Dual input gain adaptor for MRX	SPLBNC	1

Hardware Kit

The MRX Hardware Kit (P/N MRXIHA) is required for mounting the unit into a rectangular cutout in the dash. Refer to the panel template for dimensions on the cutout. The hardware kit consists of the following parts:

	Item	Description	Part Number	Quantity
	Mounting Bracket	Aluminum mounting bracket, black anodized	2100-0100b	1
	Bezel	Aluminum panel bezel, black anodized	2100-0101	1
	Audio Cable	Cable assembly, right-angle 2.5mm stereo, 6 ft.	2100-2001	1
	Power Cable	Cable assembly, right-angle 0.7MM barrel plug, 6 ft., 24 AWG	2100-1005	1
	Unit Screw	Sheet Metal Screw, #2, 5/8", Stainless	2100-1104	2
	Mounting Screw	Machine Screw, 4-40 x 1/2", Stainless Black Oxide, Pan Head, Phillips	2100-1112	5
	Nut w/Teeth Washer	Nut with Tooth Washer, for 4-40 Screw, Stainless	2100-1113	5
	Panel Template	For marking the area in the panel to be cut	2100-9002	1
	Installation Guide	This document	2100-9001b	1
	Tie Wrap	Nylon Cable Tie, 4", Black	2100-1202	2
	Advisory Label	For displaying in the cockpit in plain view	2100-8001	1
	Panel Label	For identifying circuit breaker or power switch	2100-8002	1

Important things to know

PCAS™ provides advisory information only. MRX was designed as a portable unit, and its installation is the decision and responsibility of the customer, owner, and/or pilot in command.



The MRX unit must contain firmware version 2.5 or higher.

The MRX unit being installed must contain firmware version 2.5 or higher. If the firmware version is earlier than 2.5, contact Zaon to have the firmware updated.

Upgrading the Firmware

Your MRX unit can be reprogrammed to accept future firmware updates. The current firmware number will be displayed during the startup screen (i.e. 2.5). For the latest firmware version, or for instructions on how to get your firmware updated, please visit the Zaon website at:

<http://firmware.zaonflight.com>.

Firmware updating may require you to send in your unit to the factory for reprogramming and recalibrating.

Tools and parts needed

- 1 > Screwdriver, #1 Phillips
- 2 > Drill with 1/8" bit
- 3 > Appropriate tools for cutting rectangular hole in panel (jigsaw, corner nibbler, files, etc.)
- 4 > Wire cutter and stripper
- 5 > Panel-mount circuit breaker (1A)
Suggested part: Klixon 7277-2-1, available from Zaon (P/N 2100-1007)

Mounting Location

Step By Step

- 1 > **Locate** a suitable area in the instrument panel for mounting **the MRX**
- 2 > Make the **cutout** for the unit
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- 4 > **Drill holes** appropriate for the antenna(s)
- 5 > **Run the antenna coax cable(s)** to the antenna location(s) from the MRX unit location
- 6 > **Mount antenna(s)** and connect
- 7 > Connect the **power** line and fuse to the avionics bus
- 8 > Connect the **audio** line to the intercom or audio panel
- 9 > Connect and **finish installing** the MRX unit

Unit placement

The Hardware Kit was designed to allow installation of your MRX in the instrument panel. The location you choose must:

- 1 > be at least 4.25" of depth behind the panel
- 2 > allow for the rectangular cutout and mounting holes. See Panel Template for exact measurements.
- 3 > allow cable routing to the antenna(s) and power
- 4 > allow for clear visibility of the unit from the left seat. The location should not be blocked from sight by throttles, other avionics, clipboards, etc.
- 5 > not interfere with the operation or viewing of any instruments, avionics or controls

Once the location has been identified, use the Panel Template to mark the area to be cut. Use the appropriate tools for cutting the rectangular hole in the panel (jigsaw, corner nibbler, files, etc.).

Drill mounting holes in the locations indicated on the Panel Template for securing the assembly to the panel.

DO NOT INSTALL THE UNIT AT THIS TIME.

Antenna Installation

Step By Step

- ✓ **Locate** a suitable area in the instrument panel for mounting **the MRX**
- ✓ Make the **cutout** for the unit
- **Locate** a suitable area for **the antenna(s)**
- **Drill holes** appropriate for the antenna(s)
- **Run the antenna coax cable(s)** to the antenna location(s) from the MRX unit location
- **Mount antenna(s)** and connect
- Connect the **power** line and fuse to the avionics bus
- Connect the **audio** line to the intercom or audio panel
- Connect and **finish installing** the MRX unit

Installations must be made by qualified personnel, and in accordance with Federal Regulations. Refer to FAA Advisory Circular 43.13-2A for General installation guidelines. A copy of the FAA Advisory Circular can be obtained at www.faa.gov. Look for Advisory Circulars under the Regulatory/Advisory heading on the FAA home page.

Antenna Type

Zaon recommends the use of the **Comant CI-105 blade-style transponder antenna** (included with the Zaon Antenna Kits). Other antennas may be used as long as they conform to the specifications of a TSO'd transponder antenna (1030-1090 MHz) and can be properly secured to the aircraft. Other antenna types, such as the CI-101 stub monopole design may be used. However, it should be noted that such designs do not dissipate static as well as fiberglass-enclosed models. Any damage that is incurred on the unit by use of an antenna other than a CI-105 may not be covered under warranty.

Placement

The location of any antenna system on the aircraft is very important. Antenna locations on aircraft that provide unobstructed line-of-sight views of the transmitted or received signals are preferred. When possible, keep antennas at least 36" from any other antenna. On any aircraft, antennas should not be mounted in the proximity of engine exhaust.

The specific mounting location is very important due to curvatures and uneven surfaces encountered on various aircraft skins. A flat surface is the desired antenna mounting location. Minor aircraft skin curvature can be accommodated with the use of a Comant gasket. DO NOT over torque the mounting screws in an attempt to reduce gaps between the antenna base plate and aircraft mounting surface. If gaps over .020" appear between the base plate and mounting surface, use of a mounting saddle is recommended.

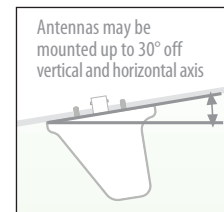


Warning! In most cases, antenna installation will involve the partial or complete removal of aircraft cabin components. Bottom antenna placement and running coax may require the removal of floor panels, seats, trim and carpeting. Top antenna placement and running coax may require the removal of the headliner and trim panels.

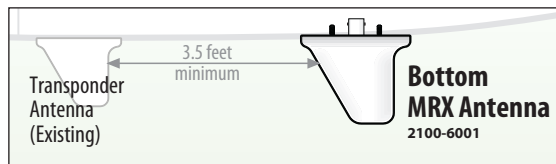
Read these instructions thoroughly and plan your installation completely with regards to cable routing and antenna placement before attempting installation.

The antenna(s) should be mounted as close to vertical as possible on both axis. The maximum off-axis angle allowed is $\pm 30^\circ$. This is especially critical when mounting the antenna on the empennage.

A single, top-mounted antenna is not permitted. A single antenna must be mounted on the bottom of the aircraft.



Bottom Mount



The bottom antenna must be placed at least 3.5" away from the existing transponder and DME antennas. Failure to do so may result in erroneous readings on the MRX, or decreased sensitivity.

For low-wing aircraft, try to mount the antenna forward or aft of the wing for minimum signal obstruction.

Top Mount

The top antenna, if used, should be placed at the greatest distance possible from existing com antennas. The antenna may be mounted on the top of the empennage, especially in the case of canopy-style airframes where mounting an antenna overhead may not be possible. However, an empennage mount may result in noticeable forward shadowing.

Mounting

Aircraft Skin Surface and Mounting Preparation

The electrical bonding of the antenna to the aircraft ground is highly important. If this is not done properly, antenna performance characteristics may become distorted and nulls may appear in the antenna radiation pattern. This, in turn, may cause erratic navigational readings or signal drop out. The electrical bonding of the antennas to the aircraft skin is best accomplished by direct metal-to-metal contact of the antenna base to the aircraft skin. To accomplish this, the aircraft paint in the mounting area will need to be removed and the surface alodined to protect aluminum against corrosion. An alternate method for providing electrical bonding is through the mounting screws, which attach to a backing plate inside the aircraft skin. Remove any interior paint in the area where the backing plate is placed to assure a good ground. Coat this area with alodine to minimize corrosion. To test the electrical bonding of the blade to the aircraft, a reading of .003 ohms between the antenna base plate and ground should be achieved. **For composite aircraft, see "Antenna Grounding for Composite Aircraft" in this chapter.**

Mechanical Installation

Installing a Comant CI-105 antenna requires the securing of an #8-32 x .41" stainless steel mounting screw. **Refer to the Footprint Diagram (Figure C) before drilling holes in aircraft skin to determine proper size.**

Use of a backing plate is highly recommended. Mounting screws should be secured with stainless steel nuts with flat washers and lock washers, or with flat washers and lock nuts to secure the antenna properly. Sandwich the aircraft skin between the antenna base plate and the internally mounted backing plate. Before securing the antenna to the aircraft be sure that all the cables are connected to the unit and fit through the connector holes, as some connector outside diameters vary in size. Gently tighten the mounting hardware so that uniform stress is placed on each side of the antenna. For #8-32 screws DO NOT exceed 20 in-lbs of torque. Refer to fastener manufacturer's torque guidelines to confirm that these recommended settings do not exceed the chosen fastener's torque limits.

Once the antenna is mounted, any minor gaps between the base plate or gasket and aircraft skin should be filled with RTV silicone adhesive sealant. Double check that a reading of .003 ohms between the antenna base plate and ground has been achieved.

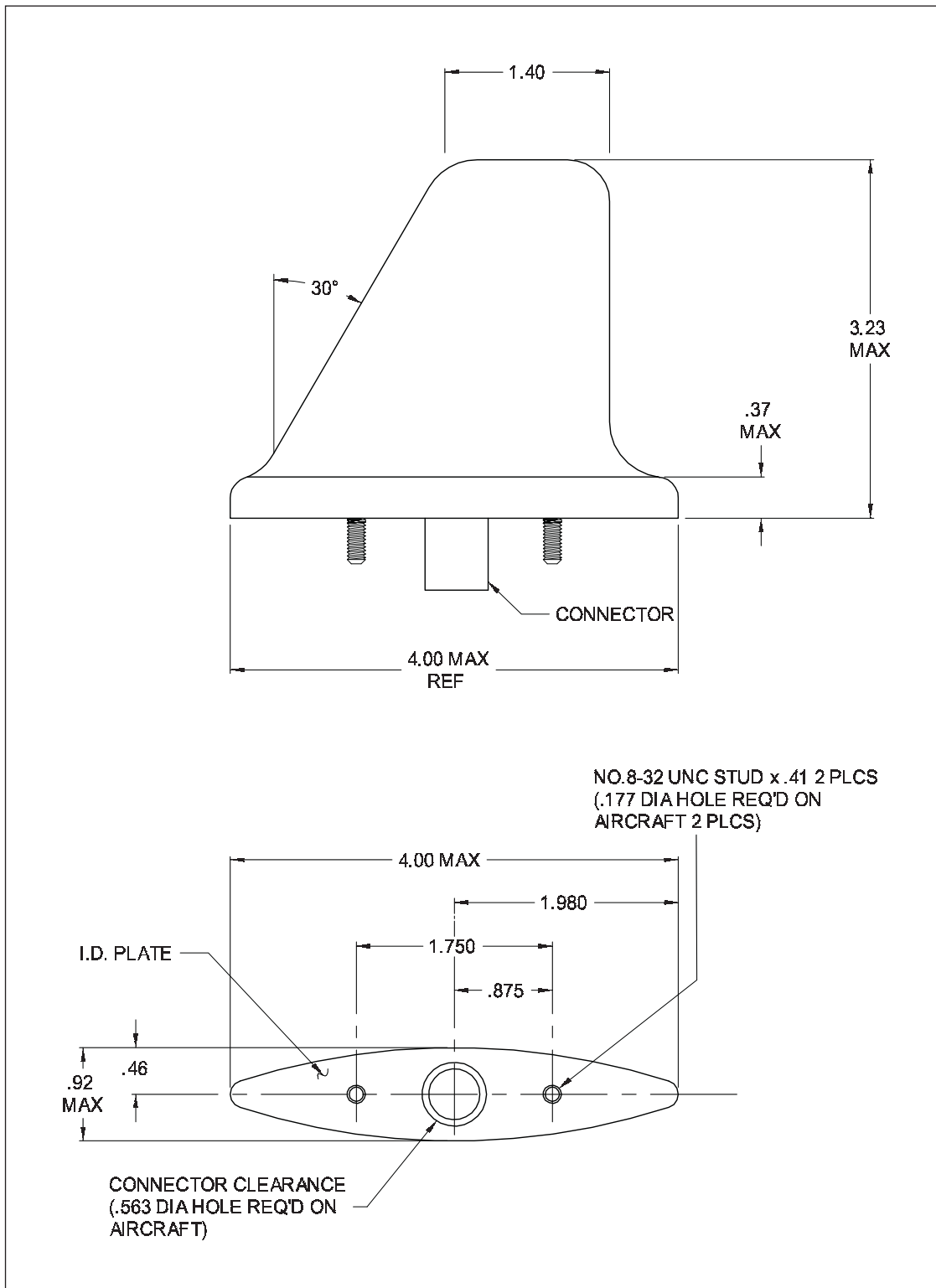


Figure C: Comant CI-105 Antenna Footprint

Important Warnings from Comant

Failure to follow Installation Instructions as provided by Comant, and/or supplemental information and guidance provided by the FAA when installing antennas could result in poor systems performance, a void in warranty, and/or damage to the aircraft. Comant is not responsible for improper installations.

Warranty

Cataloged products carry a standard 3 Year Warranty from the date of manufacture. Every Comant product contains a Manufacture Date Code and/or Serial Number that provides production tracing information. This Warranty is void if the product has been altered, abused and/or improperly installed. Warranties cannot be processed without prior approval from Comant's Customer Service Department, which will issue an RMA for the claim. Warranty claims are at the sole discretion of the Comant Customer Service Department. Custom designs may carry their own warranty, or may be subject to other limitations.

WARNING: Comant Industries, Inc. cannot be held responsible for the applicability of this Guideline for specific aircraft and/or specific antennas. It is the Installers responsibility to assure proper applicability, and, that the antenna is properly installed. Always refer to Comant's installation drawings before drilling holes and when referencing antenna performance characteristics. Installations should only be made by qualified personnel.

Antenna Grounding for Composite Aircraft

Mounting Preparation

The electrical bonding of the antenna to the aircraft ground is extremely important. If this is not done properly, antenna performance characteristics may become distorted and nulls may appear in the antenna radiation pattern. This, in turn, may cause erratic navigational readings or signal drop out. The electrical bonding of antennas to composite aircraft is best accomplished by direct metal-to-metal contact of the antenna mounting hardware to an internal ground plane. To do this, you must have the mounting screws, washers and nuts make direct contact to the internal ground plane with the use of a backing plate. The backing plate must make direct contact to the internal ground plane. Sandwich the aircraft skin and internal ground plane between the antenna base plate and internally mounted backing plate. To test the electrical bonding of the blade to the aircraft, a reading of .003 ohms between the antenna base plate and ground should be achieved.

Ground Plane Size

The MRX antenna will require a metal ground plane size of 24" by 24" (60cm x 60cm) OR LARGER. "As large as practical" will assure optimum antenna performance. With ground planes, larger is always better. After installation, double check that a reading of .003 ohms between the antenna base plate and ground has been achieved.

Antenna Wiring

It is very important that the correct cable type be used when connecting the MRX unit to the antenna. RG174 50 ohm coax is the only approved cable for installation. A maximum length of 15 feet is allowed between antenna and unit (or between antenna and splitter). A maximum of 5 feet is allowed between splitter and unit. For best results, use the cable assembly or

assemblies provided by Zaon.

Single-antenna installation

- 1 > Attach the Gain Adapter (P/N 2100-6005) to the BNC connector on the antenna. Secure the connection by twisting the lock ring clockwise until it clicks.
- 2 > Attach the 15-foot coax (P/N MRXI115BS) to the BNC connector on the Gain Adapter. Secure the connection by twisting the lock ring clockwise until it clicks.
- 3 > Run the 15-foot coax from the antenna location to the instrument panel and through the rectangular cutout. **Do not run the coax in parallel with any other RF transmission line, such as the transponder antenna coax.** Allow a 6" lead out the front of the instrument panel.
- 4 > Coil and secure any extra or loose cabling.

Dual-antenna installation

- 1 > At the top antenna, attach the 15-foot coax (P/N MRXI115BB) to the BNC connector on the antenna. Secure the connection by twisting the lock ring clockwise until it clicks. Do the same for the bottom antenna.
- 2 > Locate an area behind the instrument panel to mount the Splitter/Gain Adapter (P/N SPLBNC). Attach the Splitter/Gain Adapter to a secure location using the brackets provided.

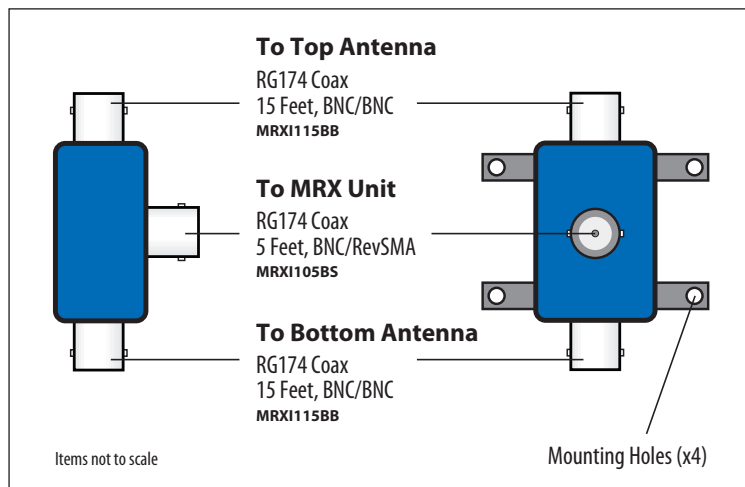


Figure D:
Splitter/Gain Adapter
(P/N SPLBNC)

- 3 > Run the coax from the antenna locations to the Splitter/Gain Adapter. **Do not run the coax in parallel with any other RF transmission line, such as the transponder antenna coax.**
- 4 > Coil and secure any extra or loose cabling.
- 5 > Secure the two coax leads from the antennas to the connectors on the sides of the Splitter/Gain Adapter.
- 6 > Attach the BNC connector on the 5-foot RG174 Coax (P/N MRXI105BS) to the top connector on the Splitter/Gain Adapter.
- 7 > Run the 5-foot coax through the rectangular cutout in the instrument panel. Allow a 6" lead out the front of the instrument panel.
- 8 > Coil and secure any extra or loose cabling.

Antenna Installation Checklist

To help ensure the proper installation of the antenna, check that each of the following items have been complied with:

- › The antenna(s) should be well removed from any projections, as well as from the engine(s) and propeller(s). It should also be clear of landing gear doors, access doors, or any other opening that may break the ground plane of the antenna.
- › The antenna(s) should be mounted such in a vertical position in level flight ($\pm 30^\circ$ max off-axis).
- › Avoid running other cables or wires near the antenna cable(s) (and vice versa).
- › Avoid mounting the antenna(s) within 3.5 feet (1 meter) of the transponder, DME, ADF or any COMM antennas. Failure to do so will cause distorted reception and could cause irreversible damage to your unit.
- › Where practical, plan the antenna location to avoid sharp bends in the cable to minimize the standing wave (VSWR).
- › A 24" x 24" (60cm x 60cm) minimum ground plane should be used on composite or fabric-skinned aircraft.
- › The antenna(s) should be kept clean, including your transponder antenna. If left dirty (oil covered), the detection range may be affected.
- › The antenna(s) should be sealed around the outside for moisture protection.
- › Bottom antenna must be placed with at least a 12" ground clearance.

For dual antenna configurations:

- › The bottom antenna should be mounted at the lowest point on the bottom of the aircraft. For low-wing aircraft, try to mount the antenna forward or aft of the wing for minimum signal obstruction.

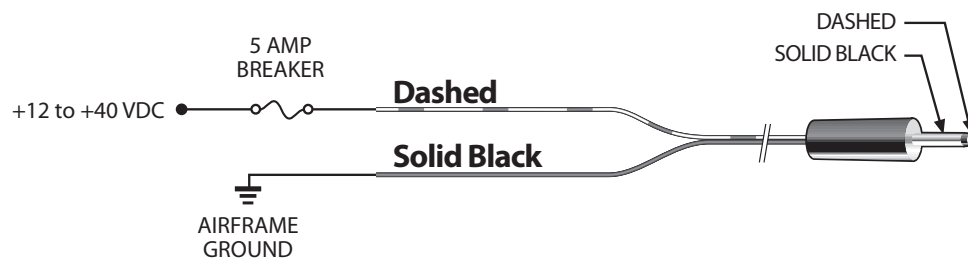
Power

Step By Step

- ✓ **Locate** a suitable area in the instrument panel for mounting **the MRX**
- ✓ Make the **cutout** for the unit
- ✓ **Locate** a suitable area for **the antenna(s)**
- ✓ **Drill holes** appropriate for the antenna(s)
- ✓ **Run the antenna coax cable(s)** to the antenna location(s) from the MRX unit location
- ✓ **Mount antenna(s)** and connect
- 7 > Connect the **power** line and fuse to the avionics bus
- 8 > Connect the **audio** line to the intercom or audio panel
- 9 > Connect and **finish installing** the MRX unit

Wiring

Power is supplied to the MRX through the power cable (P/N 2100-1005), supplied with the Hardware Kit. The MRX can be supplied with 12-40 VDC and consumes 105mA at 12V.



MRX must be powered through a separate auxiliary circuit breaker. Do not tie MRX power into an existing circuit, especially a circuit which powers required instruments or avionics, such as an attitude indicator or radios.

- 1 > **Remove the batteries from the MRX unit.** Failure to do so could cause batteries to leak and permanent damage to the MRX unit, as well as instruments inside the panel. This type of damage is not covered under warranty. MRX does not allow for a battery backup in case of power failure. Plugging in the power Adapter disconnects the power supplied by the batteries.
- 2 > Install a panel-mounted circuit breaker (1A), such as a Klixon 7277-2-1, available from Zaon (P/N 2100-1007).

- Complete the wiring of the power cable and circuit breaker to the avionics bus or other power supply. **Polarity must be observed.** The tip of the connector is positive, the shaft is negative. MRX does not contain reverse-polarity protection. Failure to connect the correct polarity will result in unit damage that is not covered under warranty.



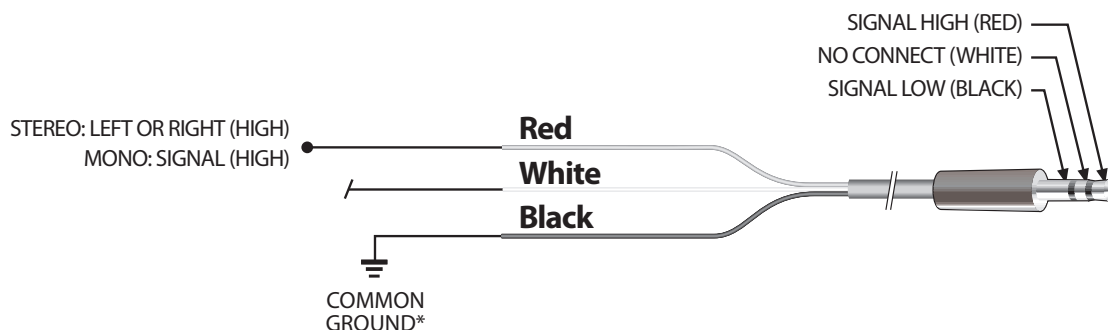
Audio

Step By Step

- ✓ **Locate** a suitable area in the instrument panel for mounting **the MRX**
- ✓ Make the **cutout** for the unit
- ✓ **Locate** a suitable area for **the antenna(s)**
- ✓ **Drill holes** appropriate for the antenna(s)
- ✓ **Run the antenna coax cable(s)** to the antenna location(s) from the MRX unit location
- ✓ **Mount antenna(s)** and connect
- ✓ Connect the **power** line and fuse to the avionics bus
- ⊞ > Connect the **audio** line to the intercom or audio panel
- ⊞ > Connect and **finish installing** the MRX unit

Wiring

Audio-enabled MRX units can be connected to an intercom or audio panel using the audio cable included with the hardware kit. The MRX unit generates an audible tone which is output through the audio jack. Refer to the audio diagram below for proper hookup.



Most audio panels or intercom systems have an auxillary input for an external audio source, such as a CD player. This is the most desired form of connection for your MRX audio. If this input is not available, MRX audio can be “spliced” into a headset audio signal.

An audio connection is completely optional. MRX will function normally with or without the audio connected. MRX will still emit an audible tone as it does in portable mode. In addition, pressing the “mute” button will mute both the audible tone as well as the signal fed through the audio jack.

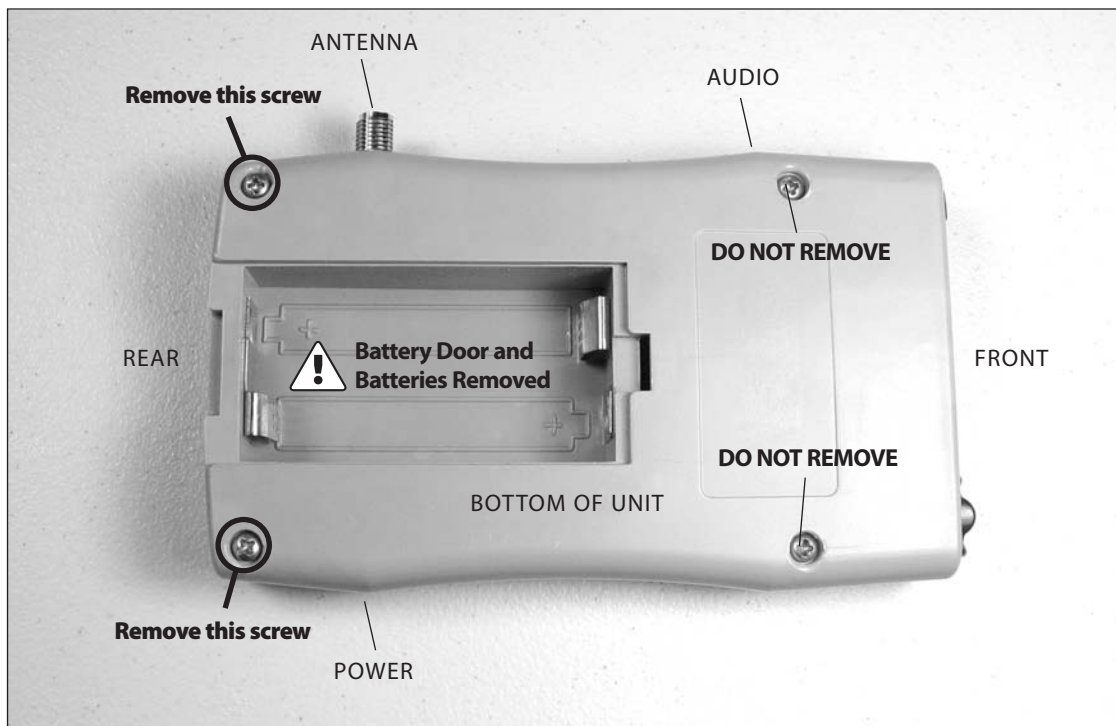
Please note the following when connecting the audio:

- › **Common Ground (*):** This refers to audio ground, not airframe ground. Do not connect the black lead to airframe ground. Doing so will cause ground loop noise problems and the system to malfunction.
- › **Mono systems:** connect the red lead (signal high) to the signal input of your audio panel or intercom auxiliary input. Connect the black lead (common ground) to the audio ground.
- › **Stereo systems:** if you are connecting MRX audio output to a dedicated independent channel in your audio system (for example, the auxiliary input for external source, CD player, etc.), you should be able to connect the red lead (signal high) to both the left and right channels. This will allow the MRX audio to be heard in both left and right channels. If your audio system does not have an available independent channel, do not connect the right and left channels. Instead, select either the right or left channel to connect the red lead (signal high) to.

Finishing Up

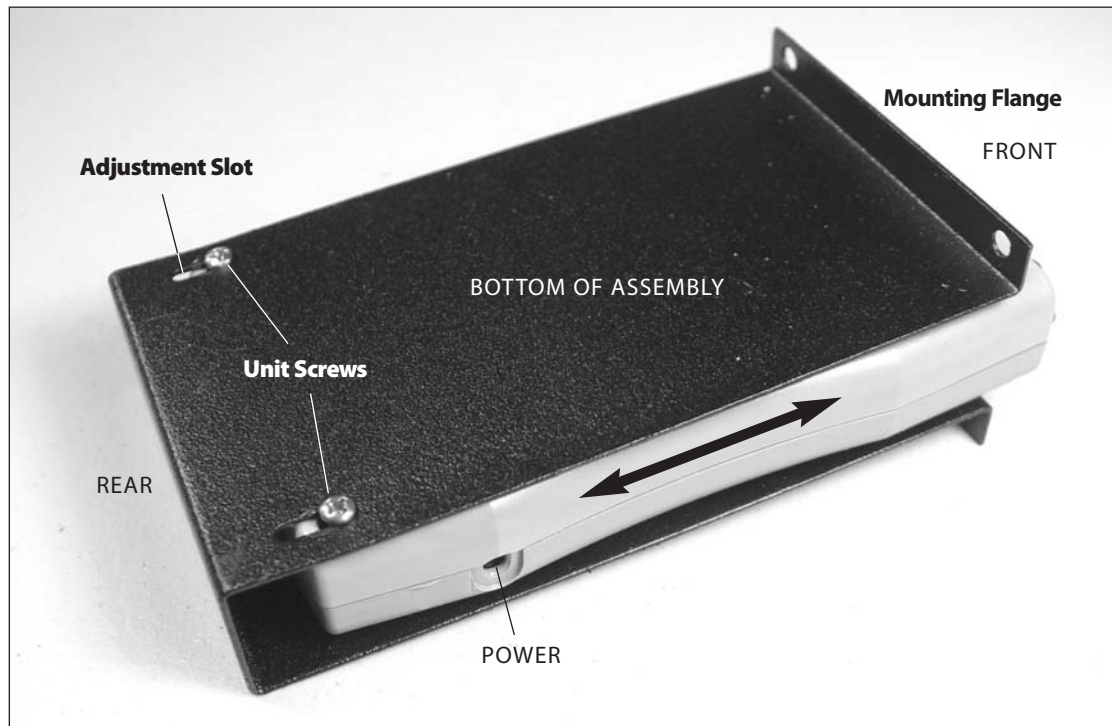
Step By Step

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- ✓ **Mount antenna(s)** and connect
- ✓ Connect the **power** line and fuse to the avionics bus
- ✓ Connect the **audio** line to the intercom or audio panel
- Connect and **finish installing** the MRX unit



Mounting bracket

Once the antenna, power and audio cables are routed to the rectangular opening in the panel, prepare the MRX unit for mounting by installing it into the mounting bracket.



- 1 > Remove battery bay lid.
- 2 > **Remove batteries from unit.** Failure to do so could cause batteries to leak and permanent damage to the MRX unit, as well as instruments inside the panel. This type of damage is not covered under warranty.
- 3 > Using a Phillips screwdriver, flip the unit over and remove the bottom rear screws (two – one on either side of the battery compartment). Set aside these screws. **Do not remove the front screws.**
- 4 > Position the unit in the mounting bracket so that the slots in the bracket line up with the two holes from the screws you just removed.
- 5 > Insert the two unit screws provided with the hardware kit into the bottom of the MRX unit through the mounting bracket slots. Finger tighten only.
- 6 > With consideration to the thickness of the instrument panel, slide the MRX unit forward or backwards until the face of the unit protrudes slightly from the instrument panel (between 1/16" and 1/8"). The unit should protrude enough to allow for the thickness of the bezel and for aesthetics.
- 7 > Once unit is positioned in bracket, tighten the two unit screws using a #1 Phillips screwdriver. Do not overtighten as this may damage the plastic case. The unit is now securely attached to the bracket.

Installing the MRX Unit

The mounting bracket/MRX assembly is secured from behind the panel with the bezel in front of the panel.

- 1 > From the rear of the instrument panel, align the top and bottom flanges with the mounting holes in the panel.
- 2 > While holding the unit behind the panel, slip the bezel over the front of the unit in front of the panel.
- 3 > Insert four 4-40 mounting screws into the bezel from the front, through the panel and the mounting flanges.
- 4 > Secure the mounting screws from behind with four nuts with tooth washers.

Cable securing

- 1 > Attach the antenna coax cable by screwing on the SMA connector to the MRX unit. Tighten securely with the cable routed in the desired direction.
- 2 > Plug in the power connector and route the cable to the antenna connector side of the MRX.
- 3 > Plug in the audio connector.
- 4 > Secure the power cable and audio cable to the antenna cable with a tie wrap.



The advisory and panel labels may be applied where necessary.

Troubleshooting

For general troubleshooting tips regarding the MRX unit, please refer to the MRX Owner's Manual.

Unit Detects Host Transponder

If the unit detects the host transponder, wrap an antenna coax cable around the transponder antenna cable to couple the signal. This will allow the MRX to better detect the host signal. Wrap the coax three times over a 6-8" span to properly couple the signals. Do not disconnect the transponder cable to couple. Instead, disconnect the MRX antenna cable from the unit (or from the Splitter/Gain Adapter in dual-antenna installations). Once coupled, securely reattach the antenna cable to the unit (or Splitter/Gain Adapter).

FAA Certification

Target Market

The MRX unit was designed primarily as a portable device to be used by sitting atop the glareshield. Because of this, MRX has not received a Supplemental Type Certificate (STC), nor does it follow a Technical Standards Order (TSO). When installing the unit into non-certified aircraft, such as homebuilts or experimental aircraft, no such certification is required. However, when installing an MRX into a certified aircraft, approval is needed. Zaon's position on this is to empower the owner and others involved with the installation with information and links to help decide how to proceed. Ultimately, it is the responsibility of the aircraft owner to follow the correct procedures. Below are a few options to pursue.

Major vs. Minor Alteration

According to Federal Air Regulations from the FAA, two kinds of alterations exist when talking about modifying a certified aircraft.

From FAR § 1.1 (Definitions and Abbreviations)

Major alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications—

- 1 > That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
- 2 > That is not done according to accepted practices or cannot be done by elementary operations.

Minor alteration means an alteration other than a major alteration.

From FAR § 21.93(a)

changes in type design are classified as minor and major. A **“minor change”** is one that has no appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of the product. All other changes are **“major changes”**

It could be argued that installing an MRX is a minor alteration. A minor alteration does not require “approved data”, inspection and approval by an IA or documentation via a Form 337 (see below). A simple logbook entry from an A&P is all that is necessary. In short, a mechanic that can define an MRX installation as a minor alteration “on his own recognizance” does not have to seek FAA approval or even notify the FAA of his actions.

Form 337

If the mechanic determines that the alteration is major, then he may only perform the alteration in accordance with approved data, such as an STC or Airworthiness Directive. If no data exists (as in the case of MRX), he will have to obtain approval of the data by going to the Flight Services District Office (FSDO) for a Field Approval or by hiring a Designated

Engineering Representative (DER) who is authorized to approve the data. Once the data is approved, the mechanic can proceed to perform the alteration, but an IA must inspect the work and verify that it complies with the approved data, and a Form 337 signed by both the installing mechanic and the inspecting IA must be submitted to the FSDO within 48 hours.

Who Decides?

Ultimately, the decision to consider the MRX installation a minor or major alteration rests on the installing mechanic, not the FSDO. It is the mechanic's job to evaluate the alteration, using the FARs and Advisory Circulars as guidance, and determine for himself whether or not the alteration is major or minor.

Helpful Links

FAA Forms

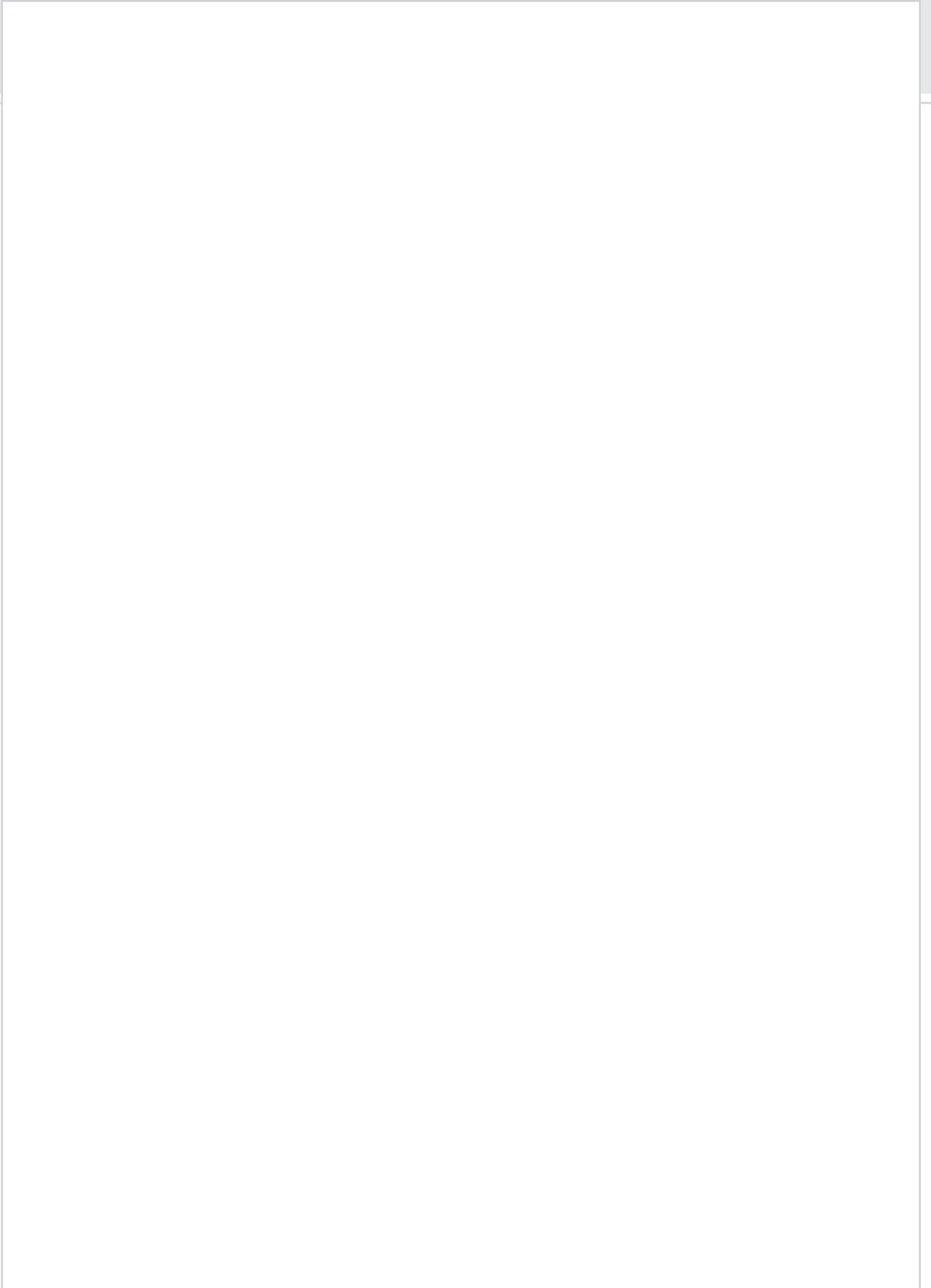
General<http://forms.faa.gov>**Form 337**<http://forms.faa.gov/forms/faa337.pdf>

FAA Personnel

FSDO Officeshttp://www.faa.gov/about/office_org/field_offices/fsdo/**DER**http://www.faa.gov/other_visit/aviation_industry/designees_delegations/designee_types/der/

Additional Reading

For a list of what the FAA considers to be major alterations, see FAR Part 43 Appendix A(a).





Portable Collision
Avoidance Systems