Stormscope®

Series II Weather Mapping Systems

WX-500 Installation Manual

This manual contains installation instructions and recommended flightline maintenance information for the WX-500 *Stormscope*®. This information is supplemented and kept current by revisions, Service Memos and Service Bulletins.

communications

009-11500-001 (Rev. E)

L-3 Communications Avionics Systems, Inc.
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23 September 2003

ABOUT THIS MANUAL

Chapter 1 – General Information

This chapter includes equipment specifications and a functional description. It describes the various hardware configurations and includes a list of items furnished and items required but not supplied with the equipment.

Chapter 2 – Installation

This chapter contains instructions for unpacking the equipment and inspection for in-shipment damage. It also includes information required to locate, assemble and install the equipment.

Chapter 3 – Installation Checkout

This chapter contains instructions for doing post-installation and return to service checkout of the WX-500 using the WX-PA Portable Analyzer Kit.

Chapter 4 – Maintenance

This chapter contains general flightline maintenance procedures. It includes periodic maintenance and troubleshooting; and instructions for the return of defective components.

Appendix A – Signal and Cable Characteristics

This appendix defines the electrical characteristics of all input and output signals.

Appendix B – Environmental Qualification Forms

Appendix C – Display Interface

This appendix lists the Multi-Function Displays (MFDs) that are compatible with the WX-500.

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REVISION E HIGHLIGHTS

Revision “E” is a republication. This republication completely replaces the existing book. Revision "E" is written to the same general style and format of the original manual. New and revised information has been added, including:

- Corrected minor typographical errors.
- Environmental qualification forms are now included in Appendix B.
- Incorporates information from errata sheet dated 03 December 2002.
- Company name change from Goodrich Avionics Systems to L-3 Avionics Systems.
- Additional information relative to locating the antenna near the battery and alternator.

Discard previous editions of the old publication..

FOREWORD

This manual provides information intended for use by persons who, pursuant to current regulatory requirements, are qualified to install this equipment. Because installations vary depending on a particular aircraft, this manual is intended as a guideline. Standard installation practices prescribed in FAA Advisory Circular No. 43.13 must be followed. If further information is required, contact:

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We welcome your comments concerning this manual. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the manual part number, the paragraph/figure/table number, and the page number. Send your comments to:

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CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION

This section contains a functional description of the *Stormscope*® model WX-500 Weather Mapping Sensor, outlines the main features of the sensor, and provides a functional block diagram.

NOTE

Appendix B lists the different MFDs that can be interfaced with the WX-500.

The WX-500 System consists of the following equipment:

- Processor P/N 805-11500-001
- NY-163 antenna P/N 805-10930-001 (White) or P/N 805-10930-002 (Black)
- Installation Kit P/N 817-11500-001
- Antenna Cable P/N 803-10950-00x (Cable Assembly w/Right Angle Backshell. See figure 1-5.)

Components supplied with the installation kit are identified in tables 1-1 and 1-2.

Table 1-1. WX-500 Installation Kit P/N 817-11500-001

QUANTITY	PART NUMBER	DESCRIPTION
1	78-8060-5979-2	Antenna Doubler Plate
1	78-8060-5977-6	Antenna Gasket
1	800-11592-001	End Panel
1	805-11590-001	Mounting Tray
1	817-11501-001	Hardware Package (see table 1-2)

Table 1-2. Hardware Package P/N 817-11501-001

QUANTITY	PART NUMBER	DESCRIPTION
2	101-10091-001	TERMINAL LOCKING BRASS
4	101-10098-001	STOP NUT ELASTIC 10-32 S.S.
4	101-10131-001	SPACER RND FF .375 X .375 ALUM
2	18-4712-8275-8	SCREW 8-32 X 1/2 MACH PAN PHIL SST
2	26-1004-1394-2	WASHER .2 ID X .325 OD S.S.
6	26-1004-9152-6	SCREW 10-32 X 1 1/2 PPH S.S.
1	26-1004-9316-7	STOP NUT ELASTIC 4-40 S.S.
2	26-1004-9826-5	NUT HEX 8-32 NYLON LOCKING SS
6	26-1006-2424-1	STANDOFF HEX 4-40 3/16 X 1/2
2	26-1010-0057-3	SCREW 10-32 X 3/8 TRUS PH S.S.
1	606-10009-001	CLAMP CABLE 3/8"
1	606-10010-001	CLAMP CABLE 7/16"
1	614A0022	CONNECTOR 9 PIN FEMALE SUB-D W/CRIMP PINS
2	M24308/2-283F	CONNECTOR SHELL 25 POSN D-SUB RECEPT
1	78-8060-5733-3	LABEL CIRCUIT BREAKER
2	MS51957-38	SCREW P P 6-32 X 2 SS MS51957-38
3	MS51958-61	SCREW P P 10-32 X .375 SS MS51958-61
50	M39029/63-368	CONNECTOR CONTACT D-SUB SOCKET 20-24 AWG CRIMP
6	101A0003-12	WASHER SPLIT RING #4 ss

1.2 FUNCTIONAL DESCRIPTION

The WX-500 is a TSO certified airborne passive thunderstorm detection sensor. The sensor maps electrical discharge activity 360 degrees around the aircraft to a distance of 200 nautical miles. The WX-500 is designed to display lightning data on an existing host multifunction display (MFD) or integrated avionics system. Appendix B lists the different MFDs that can be interfaced with the WX-500. Interface to the host display is via a standard RS-232 or RS-422 serial port.

NOTICE

All WX-500 functions are controlled through the available MFD. The many capabilities of the WX-500 allow MFD manufacturers to create screen's compatible with the various functions of their display. The display screens illustrated in this manual are intended to be characteristic of a whole group of MFDs that are configured to work with the WX-500. The examples are intended to assist in interpreting lightning data output by the WX-500. Each MFD will show the information consistent with the capabilities of that particular display. Reference Appendix B for approved display manufacturers, display models, unit configurations, and electrical connections.

Figure 1-1 is a simplified functional diagram that shows how the components are connected to each other and to other aircraft systems.

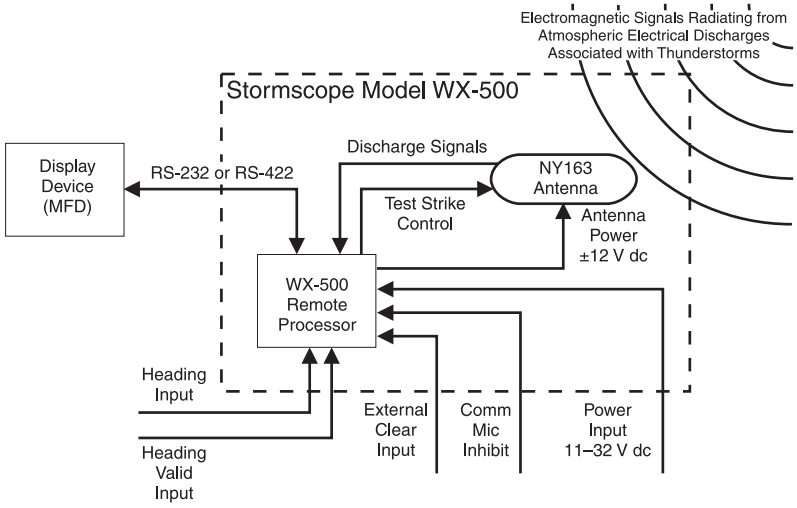


Figure 1-1. Functional Diagram

The WX-500 is a passive sensor that listens for electromagnetic signals with a receiving antenna. The antenna detects intra-cloud, inter-cloud, or cloud-to-ground electrical discharges within a 200-nmi radius of the aircraft and sends the resulting "discharge signals" to the processor. The processor digitizes, analyzes, and converts the discharge signals into range and bearing data. This information is stored in the storm buffer. The MFD shows discharges as cells and strikes depending on the display mode selected.

To maintain proper storm orientation during turns, the WX-500 can be connected to an external-heading source. The heading source may be synchro XYZ, stepper (King KCS55) or serial format.

1.3 PHYSICAL DESCRIPTION

The WX-500 Weather Mapping Sensor consists of two main components; processor and NY-163 antenna.

1.3.1 Processor P/N 805-11500-001

The processor (see figure 1-2) houses the lightning data acquisition circuitry as well as the circuitry necessary to process heading information and communicate with the host MFD. The processor is tray mounted. To accommodate different space limitations, the tray may be mounted on any of three sides. All connections to the processor are made through three D-sub connectors mounted on the tray, two DB25 and one DB9.

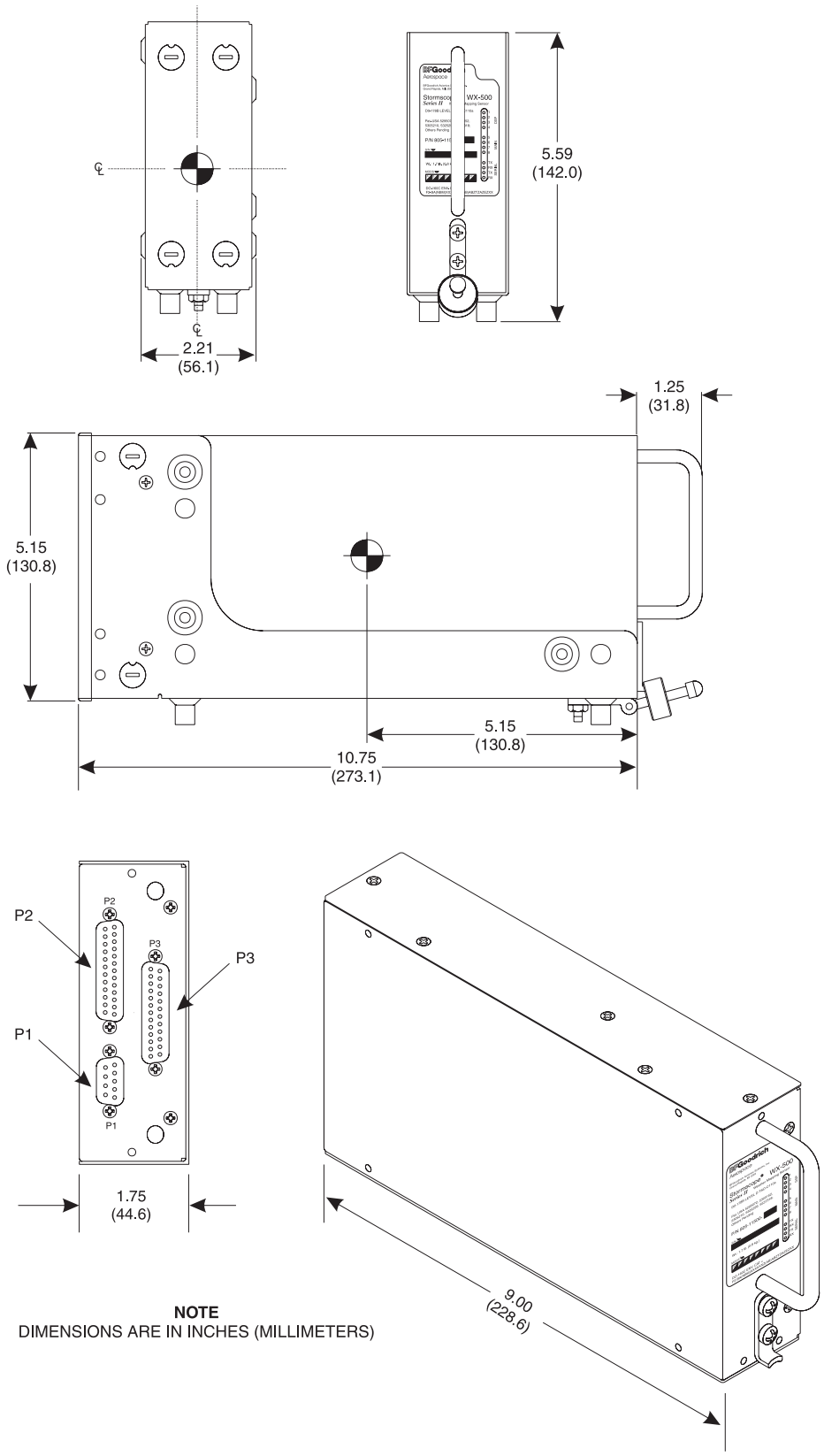


Figure 1-2. Processor Unit (P/N 805-11500-001)

1.3.2 Antenna P/N 805-10930-001 (White) or P/N 805-10930-002 (Black)

The antenna (see figure 1-3) is a combined cross-loop and sense antenna. Connection is made through a single 10-pin connector (refer to paragraph 2.10.1). It is mounted to the aircraft using a doubler plate (see figure 1-4) supplied with the installation kit (see table 1-1). The antenna is sealed against environmental extremes and is non-repairable. To inhibit the build-up of precipitation-static the antenna is coated with conductive paint and should not be repainted. Refer to paragraphs 2.4 and 2.5 for guidelines relating to mounting location and installation.

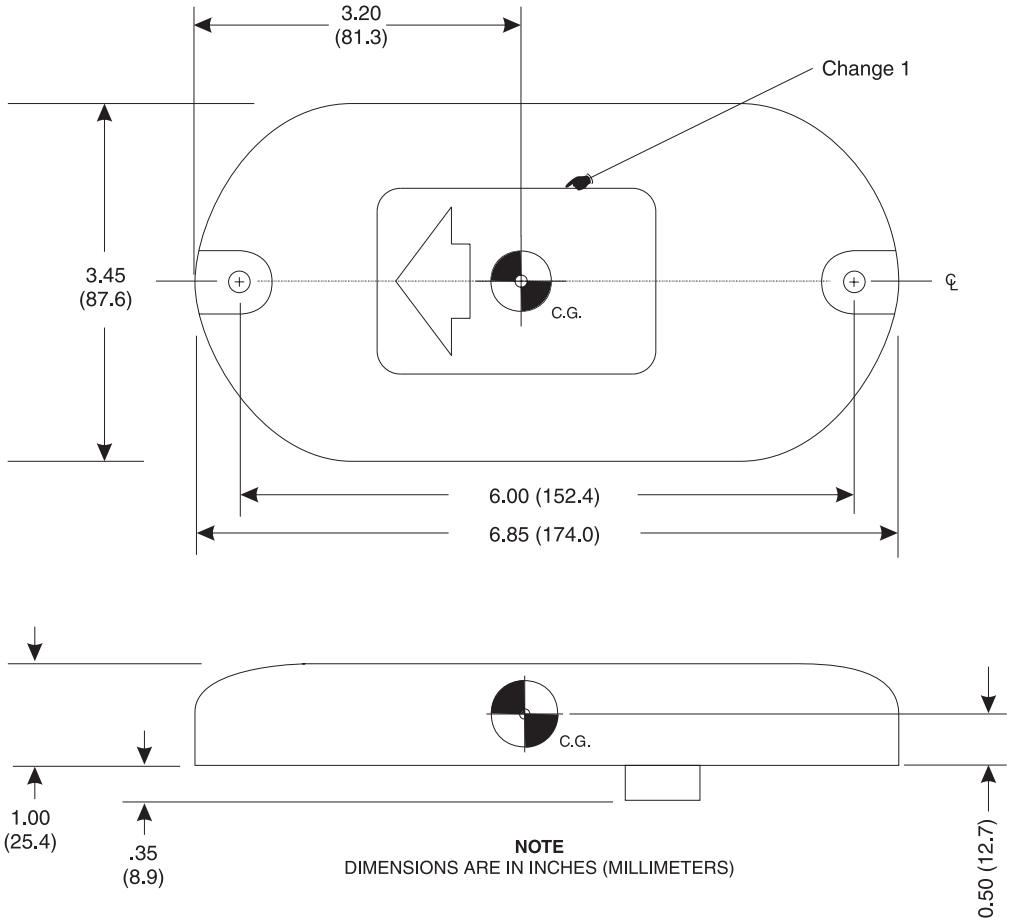


Figure 1-3. NY-163 Antenna (P/N 805-10930-001)

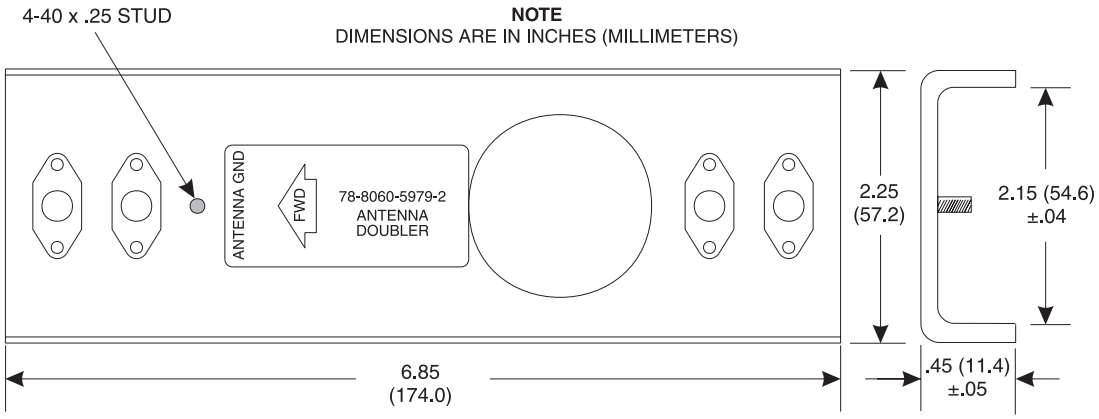
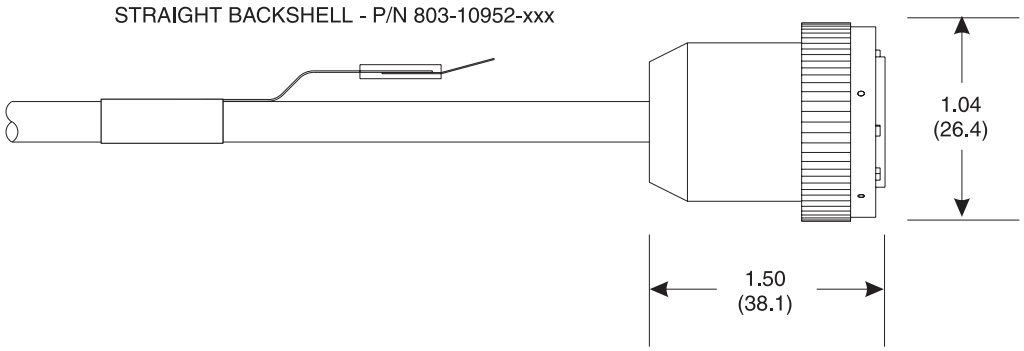


Figure 1-4. Antenna Doubler Plate (P/N 78-8060-5979-2)



P/N 803-10950-xxx or P/N 803-10952-xxx

CABLE LENGTH	
DASH NO.	LENGTH
-001	25 FT. (7.62M)
-002	50 FT. (15.24M)
-003	75 FT. (22.86M)
-004	6 FT. (1.83M)
-005	12 FT. (3.66M)

NOTE
DIMENSIONS ARE IN INCHES (MILLIMETERS)

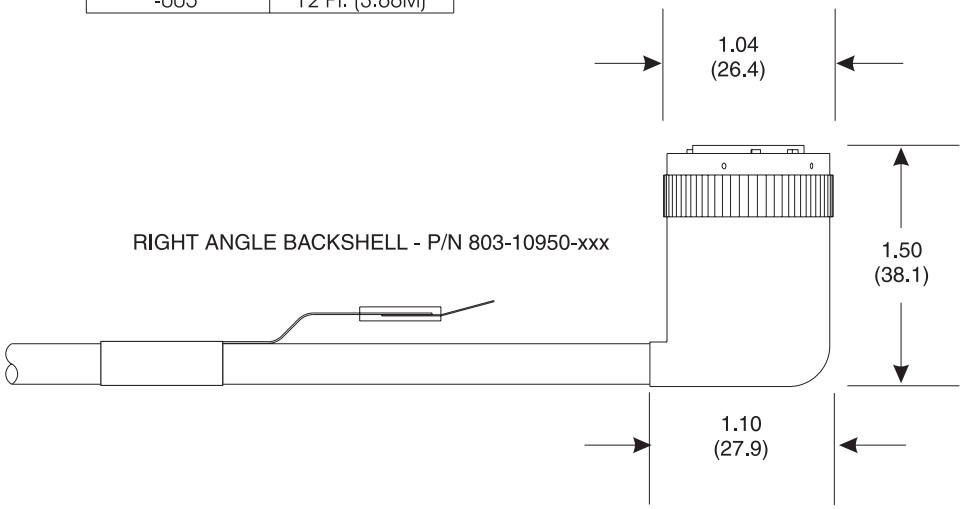


Figure 1-5. Antenna Cables

1.4 SPECIFICATIONS

SIZE:

Processor (including mounting tray and pull handle)
5.6 inches (14.22 centimeters) high
2.2 inches (5.59 centimeters) wide
12.0 inches (30.48 centimeters) deep
Antenna
1.00 inches (2.54 centimeters) high
3.45 inches (8.76 centimeters) wide
6.85 inches (17.40 centimeters) deep

WEIGHT:

Processor (including mounting tray)
2.5 lb (1.13 kg)
Antenna (without doubler)
0.84 lb (0.38 kg)

TEMPERATURE:

Processor
-55 to +70 degrees Celsius (-67 to +158 degrees Fahrenheit)
Antenna
-55 to +70 degrees Celsius (-67 to +158 degrees Fahrenheit)

ALTITUDE:

Processor
55,000 feet (Maximum)
Antenna
55,000 feet (Maximum)

RANGE:

200nmi

TSO COMPLIANCE:

Processor
TSO-C110a
Antenna
TSO-C110a, JTSO-C110a

RTCA COMPLIANCE:

Processor Environmental
DO-160C Category (For further details refer to Appendix B - Environmental Qualification Form.)
Processor Software
DO-178B Level D
Antenna
DO-160C Category (For further details refer to Appendix B - Environmental Qualification Form.)

POWER REQUIREMENTS:

Input voltage: 11 to 32 VDC
Current: 0.82 A (Maximum) @ 12 VDC
0.38 A (Maximum) @ 28 VDC

1.5 MODIFICATIONS & SOFTWARE REVISIONS

Hardware modifications (MODS) and software revisions are identified in tables 1-3, 1-4 and 1-5. MODS are identified by an entry on the S/N and I.D. tag. The WX-500 system (SYS) software version is identified (i.e., `WX-500 SOFTWARE VER x.xx 016-11502-001`) on a label positioned on the side of the unit.

Table 1-3. WX-500 Hardware Modifications

MOD	COMPLIANCE	DESCRIPTION
A	Optional	Prevent the possibility of traces shorting together by adding insulating washers between the analog PCB assembly and the four mounting standoffs. Field units need this modification only if the WX-500 has been blowing fuses or is causing the Stormscope circuit breaker to trip. (Refer so Service Bulletin #85.) New production units incorporate this MOD.
B	As required.	Provides additional protection against damage due to an excessive overvoltage condition. This condition has only been observed with units installed on aircraft with a 28 V power bus that allows spikes exceeding 50 VDC. Field units need this modification only if the WX-500 has been damaged due to excessive over voltage. (Refer to Service Bulletin #90.) New production units incorporate this MOD.
C	Optional	A production change that adds additional diode isolation to the heading flag circuitry on the digital PCB. Refer to Service Bulletin #100.
D	Optional	A productions change to improve the electrical bond between the WX-500 and airframe ground. Refer to Service Bulletin #119.
E	Optional	A production change to add a surge-voltage transient suppressor across the power input pins on the analog PCB assembly. Refer to Service Bulletin #120.

Table 1-4. WX-500 Software Revisions

VERSION				COMPLIANCE	DESCRIPTION (MAJOR ENHANCEMENTS)
SYS	Main	Main Boot	DSP		
1.01	1.01	1.01	1.01	----------	Original production release.
1.02	1.02	1.01	1.01	Optional	Ensures strikes in Noise Monitor mode are adjusted to correct (current) heading value.
1.03	1.03	1.01	1.02	Optional	Reduced processing of strikes beyond 200 nm and increased accuracy of strike rate calculations.

The system software (i.e., SYS in table 1-4) is a collective designator for all software/firmware installed within the WX-500 sensor. Main, Main Boot, and DSP software versions can be verified by entering Test Mode and selecting the System Data option (refer to paragraph 4.4).

Table 1-5. NY-163 Hardware Modifications

MOD	COMPLIANCE	DESCRIPTION
A	Optional	Indicates that antenna case has passed new testing procedures to verify that the conductive paint is working properly.
B	Optional	Improves L-Band rejection. Implemented in new production antennas only. Field units cannot be modified.

1.6 INTERFACE

The electrical characteristics of all input and output signals are detailed in Appendix A.

1.7 EQUIPMENT REQUIRED BUT NOT SUPPLIED

Circuit Breaker — The WX-500 is protected via an internal fuse (see paragraph 4.7). For external circuit breaker protection, a 5 A circuit breaker is recommended for 14 V aircraft systems and a 3 A circuit breaker for 28 V systems.

Connector Installation — Crimping Tool - M22520/2-01
Locator - M225250/2-08
Insertion/Removal - CEIT-20HD

Surface Preparation — Alodine 1001, required for installation of the *Stormscope*® antenna.

Heading Input Cable — This cable provides aircraft heading information to the WX-500. Cable, which meets the specification for Stormscope installation, is available from suppliers listed in table 1-6.

NOTE

Use of any cable not meeting specification voids all warranties.

Table 1-6. Heading Input Cable Vendors

US COMPANY	CABLE P/N
Dallas Avionics 1-800-527-2581 214-320-9776 FAX 214-320-1057	WX-5 (6.84 lbs/100 ft) 1
Electronic Cable Specialists 1-800-327-9473 414-421-5300 FAX 414-521-5301	3N6607 (7.5 lbs/100 ft)
A.E. Petsche 817-461-9473 FAX 817-277-2887	TZGYR (6.84 lbs/100 ft)
EDMO Distributors 1-800-235-3300 805-295-6689 FAX 1-800-828-0623 FAX 805-295-6703	WX-1000 SYNCHRO
PIC Wire and Cable 1-800-742-3191 262-246-0500 FAX 262-246-0450	WM25807 (7.2 lbs/100 ft)

12 to 28 VDC Power Supply — Power supply capable of providing 12 to 28 VDC at 30 Watts is required to do the pre-installation test procedure.

WX-500 Test Cable — This cable is required to do the pre-installation test procedure. The cable can be purchased (P/N 803-11501-001) or fabricated from the details provided in figure 2-1.

WX-SM Skinmapper — WX-SM Skinmapper (P/N 78-8060-5859-6 with Mod. 2 (P/N 816-10012-001) installed) is required to verify the suitability of a selected WX-500 antenna location.

WX-PA Portable Analyzer — WX-PA Portable Analyzer Kit (P/N 78-8060-5791-1) is required to do the post installation checkout.

Antenna Sealant — For pressurized aircraft, use a sealant meeting the requirements of SAE AMS-S-8802 such as Flamemaster CS3204 Class B. For non-pressurized aircraft, use a non-corrosive sealant that meets the physical requirements of MIL-A-46146 such as General Electric RTV162.

Synchro Inverter	If 400Hz synchro drive is not available.

1.8 INSTALLATION APPROVAL

The installation of *Stormscope* sensors, if not installed under a type certificate, must be treated as a major alteration on FAA form 337. Application for approval may be made at any FAA Air Carrier, General Aviation, or Flight Standards District Office.

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CHAPTER 2
INSTALLATION

2.1 INTRODUCTION

Installation must be made by qualified personnel, in conformance with applicable government regulations. The information furnished is for convenience only.

NOTE

Tolerances (unless otherwise indicated):

ANGLES ARE	± 1°
.00 TWO PLACE DECIMALS ARE	± .02
.000 THREE PLACE DECIMALS ARE	±. 010

This section describes the installation of *Stormscope*® Series II Model WX-500, in a step by step procedure. The installation activities in this section will be performed in the following order:

- Determine component locations.
- Install the cables.
- Install the sensor components.

2.2 UNPACKING AND INSPECTING

CAUTION

The processor and antenna are sensitive to electrostatic discharge (ESD) and may be damaged if not handled correctly. Do not remove protective covers from electrical connectors during unpacking. Touching an exposed connector may cause electrostatic damage to equipment.

Carefully unpack the sensor and note any damage to shipping containers or equipment. Visually inspect each component for evidence of damage. Compare the equipment received with that noted on the packing list. Immediately report any missing items or evidence of damage to the carrier making the delivery. To justify a claim, retain the original shipping container and all packing materials.

Every effort should be made to retain the original shipping containers for storage. If the original containers are not available, a separate cardboard container should be prepared that is large enough to accommodate sufficient packing material to prevent movement. The ambient temperature of the storage area should not fall below -55° C (-65° F) or rise above 70° (158° F).

2.3 PRE-INSTALLATION TEST PROCEDURE

We recommend testing each processor and antenna immediately upon receipt. The preinstallation test procedure verifies operation of the sensor and may save valuable installation time by detecting hidden damage that may have occurred during shipment.

2.3.1 Equipment Required

1. Sensor components to be tested:
   a. WX-500 Processor
   b. NY-163 Antenna
2. DC Power Supply: 12 to 28 VDC, 30W, or equivalent (not supplied).
3. WX-500 Test Cable. The bench test cable may be purchased (P/N 803-11501-001) or one may be fabricated (unterminated cable may be purchased from Electronic Cable Specialists - ECS P/N 312207) from the details provided in figure 2-1.

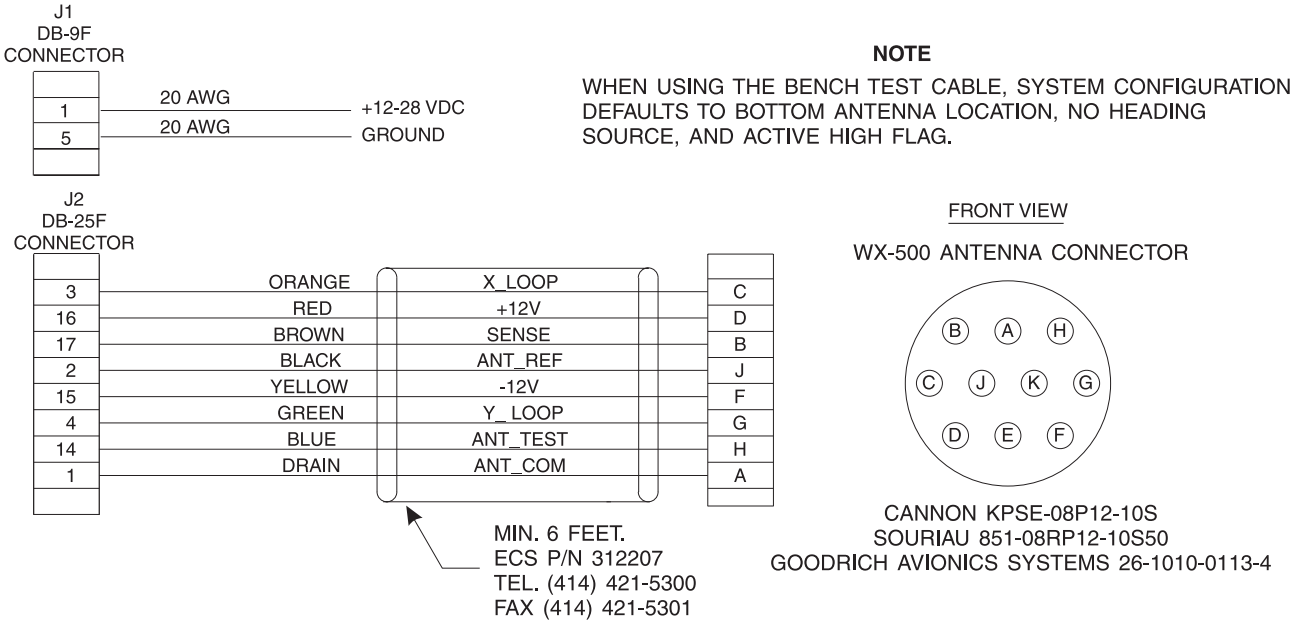


Figure 2-1. Test Cable

2.3.2 Test Procedure

CAUTION

Before connecting or disconnecting cables, ensure that all power is removed.

1. Connect the equipment as shown in figure 2-2.
2. Apply power to sensor. During initialization, the sensor runs a series of self-tests to ensure that all functions are operating properly. These tests are designed to check the antenna and processor.
3. Verify the LED pattern with table 2-1 (i.e., NORMAL OPERATION).
4. If correct LED pattern is obtained, the sensor is operating properly. Immediately report any problems to our Field Service Department at 1-800-453-0288 or 1-616-949-6600.

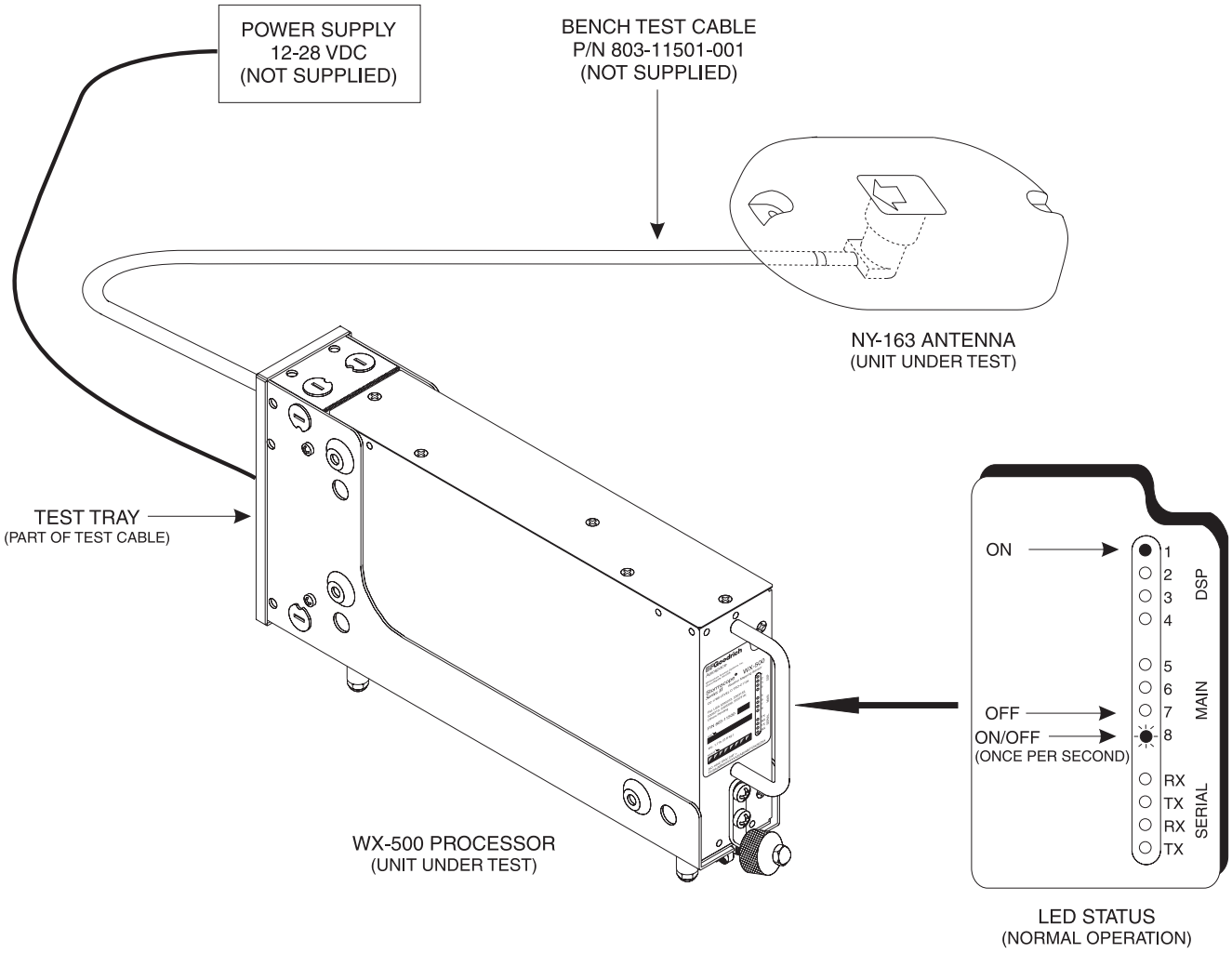


Figure. 2-2 Test Setup

Table 2-1. WX-500 LED Status

COMMUNICATION	LED	NORMAL OPERATION	FAILED OPERATION
DSP	LED 1	ON	OFF
MAIN	LED 7	OFF	ON
	LED 8	ON/OFF - ONCE PER SECOND	DOES NOT PULSE ONCE PER SECOND

*For bench test ignore operation of all other LEDs

2.4 ANTENNA LOCATION

Because *Stormscope*® weather mapping systems detect electrical discharge activity, antenna placement relative to other active electrical components is critical. The antenna must be placed at a location that is free from excessive electrical interference. The ideal location varies from aircraft to aircraft. To ensure an interference-free antenna location, every aircraft must be skimapped prior to installation of the *Stormscope*® antenna. The skinmap must be done with the engines and all electrical systems operating. Refer to the WX-SM Skinmapper Instruction Manual (P/N 78-8060-5874-5).

NOTE

The *Stormscope*® requirement for an antenna ground plane and a noise free environment complicates installation in aircraft with wood, fabric or composite construction. Each aircraft needs to be analyzed individually for the best antenna location. Before starting an installation in one of these types of aircraft, contact L-3 Avionics Systems Field Service Engineering at (800) 453-0288 or (616) 949-6600.

2.4.1 Interference Sources

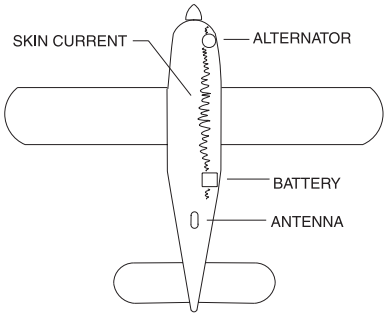
Avoid mounting the antenna near active electrical components whenever possible. General clearance guidelines are:

- Strobe lamps and power supplies - 5 ft. (1.5 meters)
- Pitch trim servos and amplifiers - 3 ft. (1 meter)
- Fluorescent lamps and ballasts - 5 ft. (1.5 meters)
- Heater ignitors - 5 ft. (1.5 meters)
- Air conditioner and heater blowers - 5 ft. (1.5 meters)
- DME/Transponder/TCAS antennas - 4 ft., Minimum (1.2 meters)
- Inflight telephone antennas - 4 ft. (1.2 meters)
- VHF comm. antennas - 1 ft. (.3 meters)
- ADF antennas - 1 ft. (.3 meters)
- Any current-carrying cable - 2 ft. (0.6 meters)

Stormscope® sensors are adversely affected by the build up of static charges. Do not mount the antenna near any composite materials (e.g., plastic covers, radomes, fiberglass housings, windows, etc.) as these devices can build up objectionable static charges.

2.4.2 Skin Current

Avoid mounting the antenna in the ground return current path around (minimum 1 ft.) and between the battery and alternator, and the battery and blower motors or other heavy current carrying equipment. Aircraft skin currents may cause antenna interference.

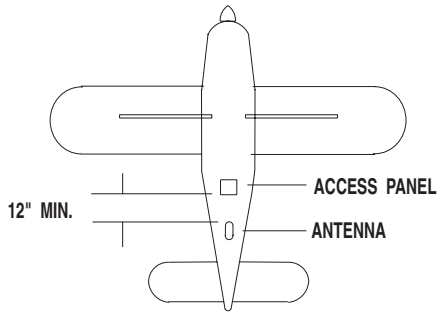


2.4.3 Skinmapping

In order to reduce potential interference problems, some of which are evident only during flight, a skinmap of the aircraft must be performed (with engines and all electrical systems operating) prior to every installation. This procedure will save installation time by avoiding the necessity for such things as antenna relocation. A WX-SM Skinmapper (P/N 78-8060-5859-6, with Mod 2 installed) must be used to verify the suitability of a selected antenna location before proceeding with the installation. This must be done even if all the other placement criteria are met.

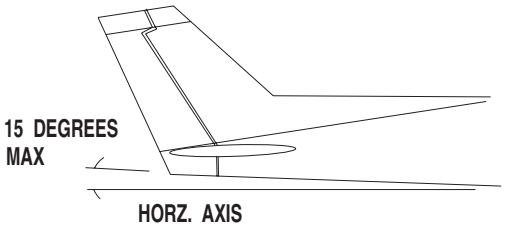
2.4.4 Ground Plane

The antenna must mount in a location with a minimum of 12 inches (30 cm) continuous aluminum ground plane in all directions. Avoid hinge lines, gear doors, and access panels by at least 12 inches (30 cm). Do not mount the antenna on an access panel.



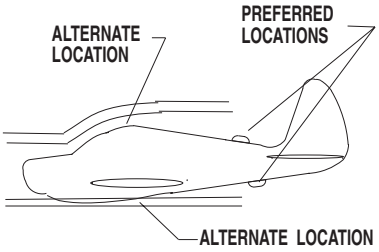
2.4.5 Alignment

The antenna need not be centered on the fuselage as long as its longitudinal axis is within 2 degrees of parallel with the aircraft longitudinal axis. The antenna should be mounted within 15 degrees of horizontal and may be mounted within 6 inches (15 cm) of a ventral fin. The antenna may mount on an upslope not to exceed 15 degrees of horizontal.



2.4.6 Slipstream

In general, the antenna should mount aft, where the slipstream boundary layer is thick, to reduce the effects of P-static. Do not mount the antenna near any composite materials (e.g., plastic covers, domes) as they can build up static charges. Top or bottom mounts provide equal performance.



2.4.7 Site Selection

Select an antenna location that satisfies the criteria outlined in the preceding paragraphs.

The ideal guidelines, of course, cannot always be met. If the installation criteria cannot be met, contact the L-3 Avionics Systems Customer Service Department at 1-800-253-9525 or 1-616-949-6600, for location assistance.

NOTE

Since L-3 Avionics Systems has no control over airframe integrity or aircraft configuration, the authorized installer is responsible for insuring a noise free installation. If additional labor is required to correct an interference problem caused by another aircraft system or component, L-3 Avionics Systems will not reimburse the installer for this labor under warranty. For this reason, the installer should anticipate extra labor when quoting the installation to the customer, depending upon aircraft type and specific configuration.

2.5 ANTENNA AND DOUBLER INSTALLATION

Figure 2-3 shows the mounting holes and dimensions for the antenna and doubler plate.

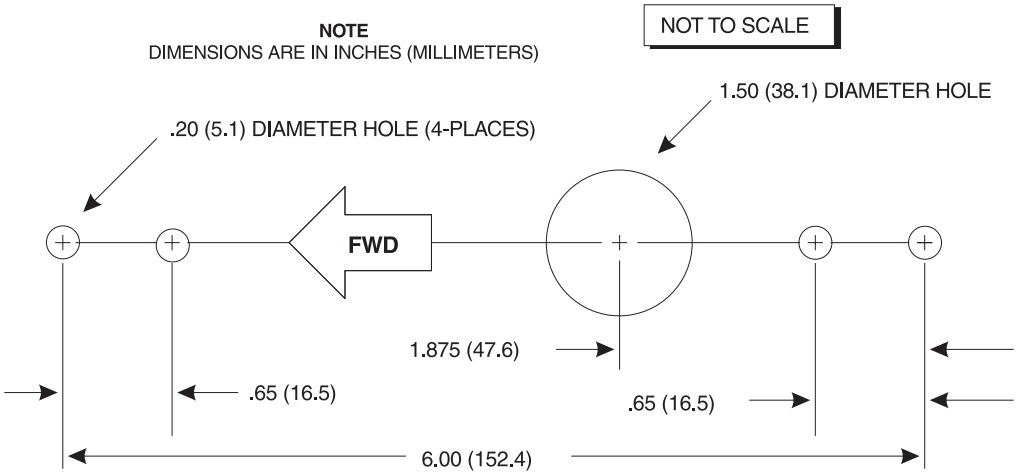


Figure 2-3. Antenna Mounting Holes

1. Use the antenna doubler plate as a template to mark hole locations on the aircraft skin.

NOTE

Ensure that the location selected allows adequate space inside the fuselage for the doubler plate to clear ribs and aircraft structure. (It may be necessary to cut the doubler plate to ensure proper fit.)

2. Attach the doubler plate to the inside of the fuselage as shown in figure 2-4.
3. Mount the antenna to the aircraft as shown in figure 2-4.

CAUTION

1. Do not paint the antenna. It has been coated with a special conductive paint to inhibit the build-up of precipitation-static.
2. Do not over-tighten the antenna mounting screws during installation on convex surfaces. Doing so may cause stress cracks and shorten the life of the antenna.
3. To ensure a good electrical ground connection (metal-to-metal contact) remove the paint from the aircraft skin under the double plate mounting screws and prepare the surface with Alodine® No. 1001. Failure to provide a good ground connection may affect system performance.

4. Seal around the entire perimeter of the antenna.

NOTE

The antenna should not be sealed until the sensor performance tests are complete.

a. For non-pressurized aircraft, use a non-corrosive sealant that meets the physical requirements of MIL-A-446146 such as General Electric RTV162
b. For pressurized aircraft, use a sealant that meets the requirements of SAE AMS-S-8802 such as Flamemaster® CS3204 class B.

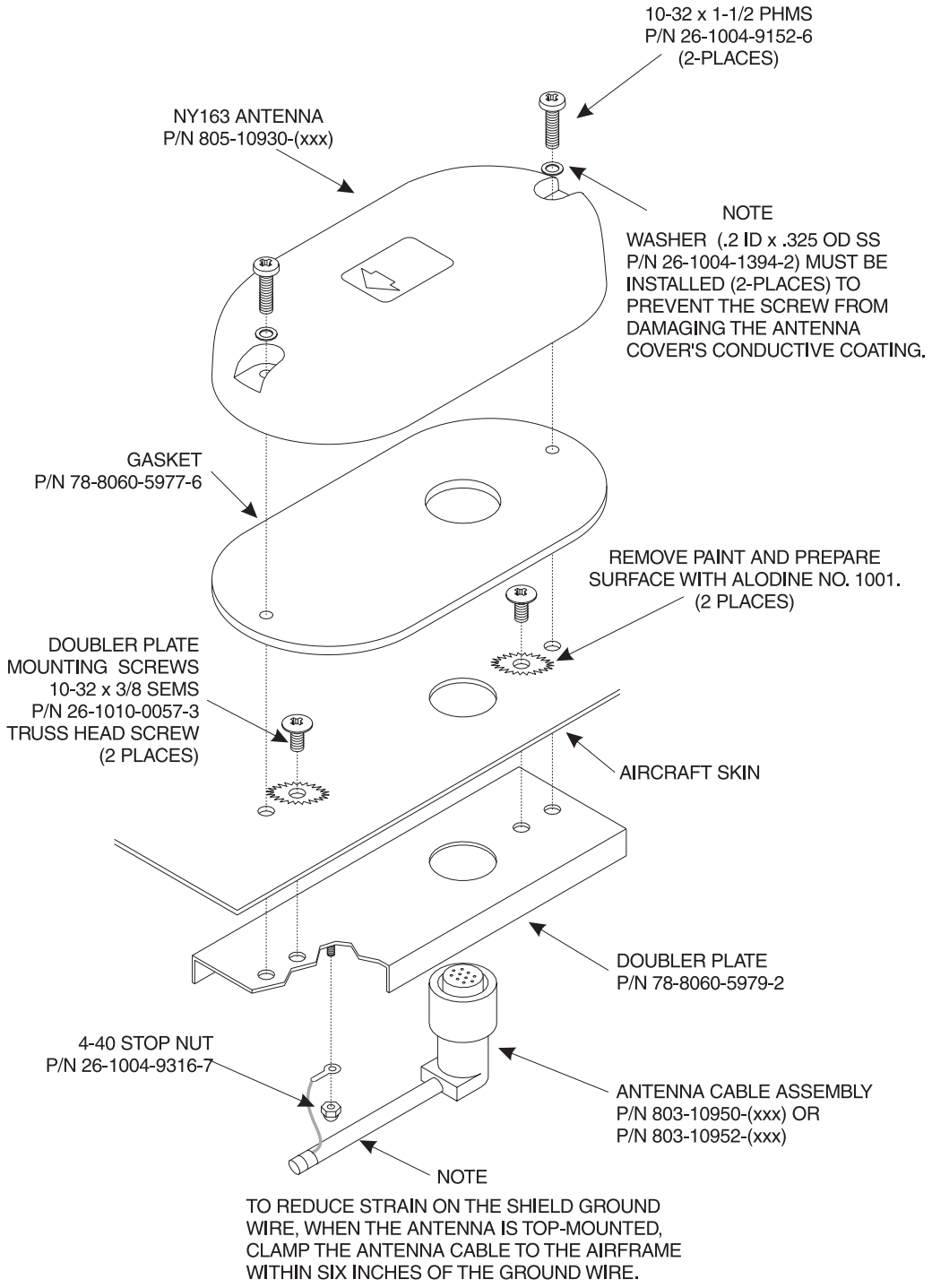


Figure 2-4. Antenna and Doubler Installation

2.6 PROCESSOR LOCATION

The processor is normally installed in the electronics bay. In selecting a location, consider the following:

Cable Length	All cable runs should be as short as practical to minimize potential electrical interference.
Cooling	While the WX-500 has no special cooling requirements, it should be mounted to permit adequate ventilation. Allow at least one inch (2.54 cm) of rear clearance and one inch of side clearance.
Pressurized Aircraft	The WX-500 may mount inside or outside the pressure vessel. The processor contains no batteries or potentially explosive components and will operate up to 55,000 ft.
Mounting	To aid in processor location, the mounting tray may be installed on any of the three sides.

2.7 HEADING INPUT & STABILIZATION

The WX-500 sensor detects the range and bearing of discharge points in relation to the aircraft's *Stormscope*® antenna. The estimated distance from the aircraft to the discharge point is reported in nautical miles (NM). The bearing represents the angle between the fore and aft axis of the antenna, which is in line with the longitudinal axis (nose) of the aircraft. The host MFD receives this information and displays the location of the associated thunderstorm activity.

When the aircraft turns, it is desirable for the MFD to maintain the storm display orientation relative to the aircraft (i.e., heading or track stabilized). Heading stabilization uses the aircraft heading source as a reference. Ground track can be used, but has limitations (e.g., delay in calculation, a slower update rate, wind related effects, etc.). Heading stabilization is always preferred.

Stabilization requires that the WX-500 be connected to an external heading (or track) source. The WX-500 can be connected directly to the aircraft synchro XYZ or KCS55 (stepper) system. Heading can also be input from the MFD via the serial port. Where possible, the WX-500 should be connected directly to the aircraft heading source (synchro preferred) and must use the same heading source as the host MFD.

Frequently, serial data from the MFD is based on the less effective ground track, as measured by a GPS receiver. Consult the MFD manufacturer documentation to determine if the serial data provided to the WX-500 is based on ground track or aircraft heading source. To correctly interpret the *Stormscope*® display, the aircraft pilot must be made aware of which stabilization system is used.

2.8 MATING CONNECTORS

All sensor cables are terminated at the mating connectors installed on the mounting tray (see figure 2-5). Jumpers to select sensor configurations are also terminated at the connectors.

Cables terminating at mating connector must be secured with a cable clamp attached to the mating connector bracket (see figure 2-5). Shields terminating at the mating connector bracket can be attached with a jumper wire and a locking terminal. The jumper wire should be as short as possible. Secure the cable clamp and locking terminals with 8-32 screws and stop nuts. Cable clamps, locking terminals, and stop nuts are supplied with the hardware package (see table 1-2).

When terminating wires observe specified color designations. After the wiring connections have been completed, use the interconnect diagram (figure 2-6) to verify continuity between each pin and its opposite end termination.

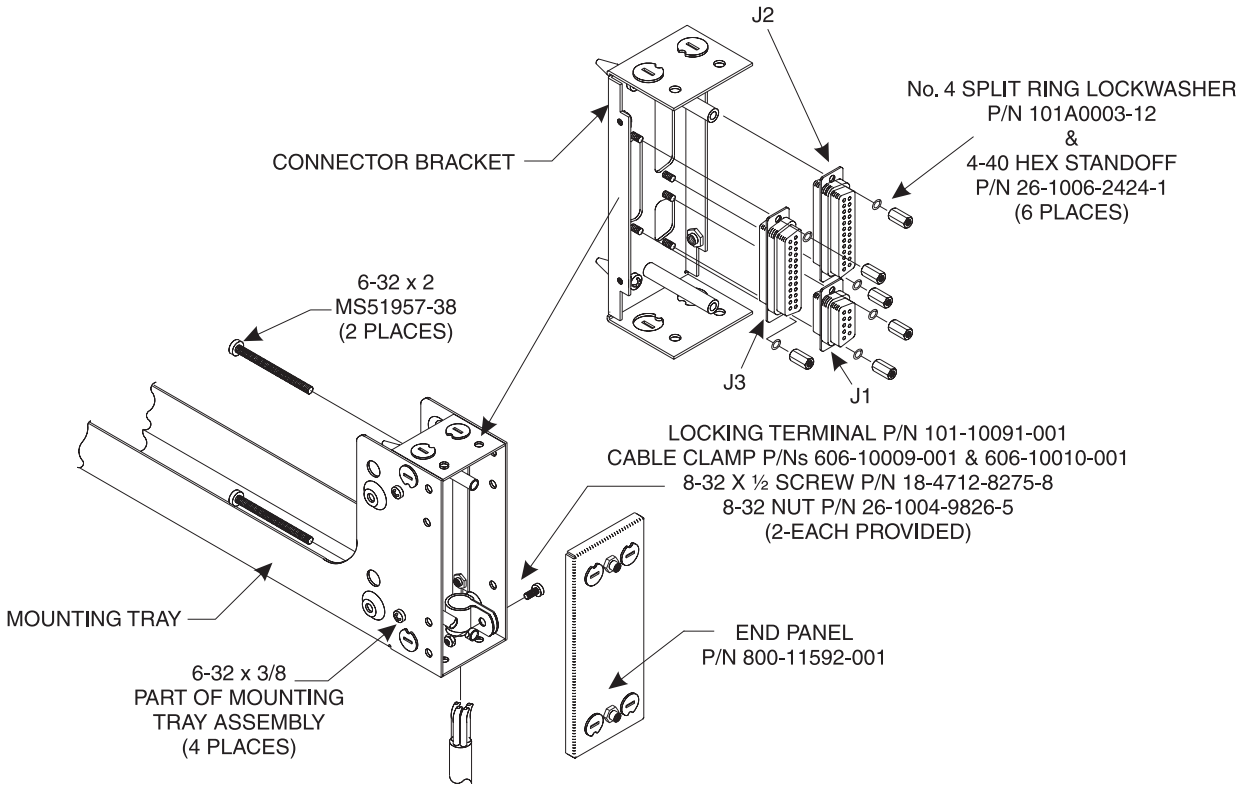


Figure 2-5. Mating Connector

Attach the connector, lock washers, and hex standoffs to the studs, and then tighten (be careful no to overtighten, do not exceed 4-inch pounds).

2.9 CONFIGURATION JUMPERS

Configuration jumpers are installed at J3. The jumpers, (22 AWG wire) are connected as detailed in table 2-2 and figure 2-6 (chart A).

Table 2-2. Configuration Jumpers

FUNCTION	CONFIGURATION JUMPER	
ANTENNA	**J3-3**	
BOTTOM POSITION	(OPEN)	
TOP POSITION	(JUMPER)	
HEADING INPUT	**J3-1**	**J3-2**
NONE	(OPEN)	(OPEN)
SYNCHRO	(JUMPER)	(OPEN)
STEPPER	(OPEN)	(JUMPER)
RS-232 or RS-422	(JUMPER)	(JUMPER)
HEADING FLAG SENSE	**J3-4**	
	(JUMPER)	> 5 VOLT ON J2-24 RELATIVE TO J2-25 INDICATES HEADING INFO IS VALID
	(OPEN)	< 1 VOLTS ON J2-24 RELATIVE TO J2-25 INDICATES HEADING INFO IS VALID

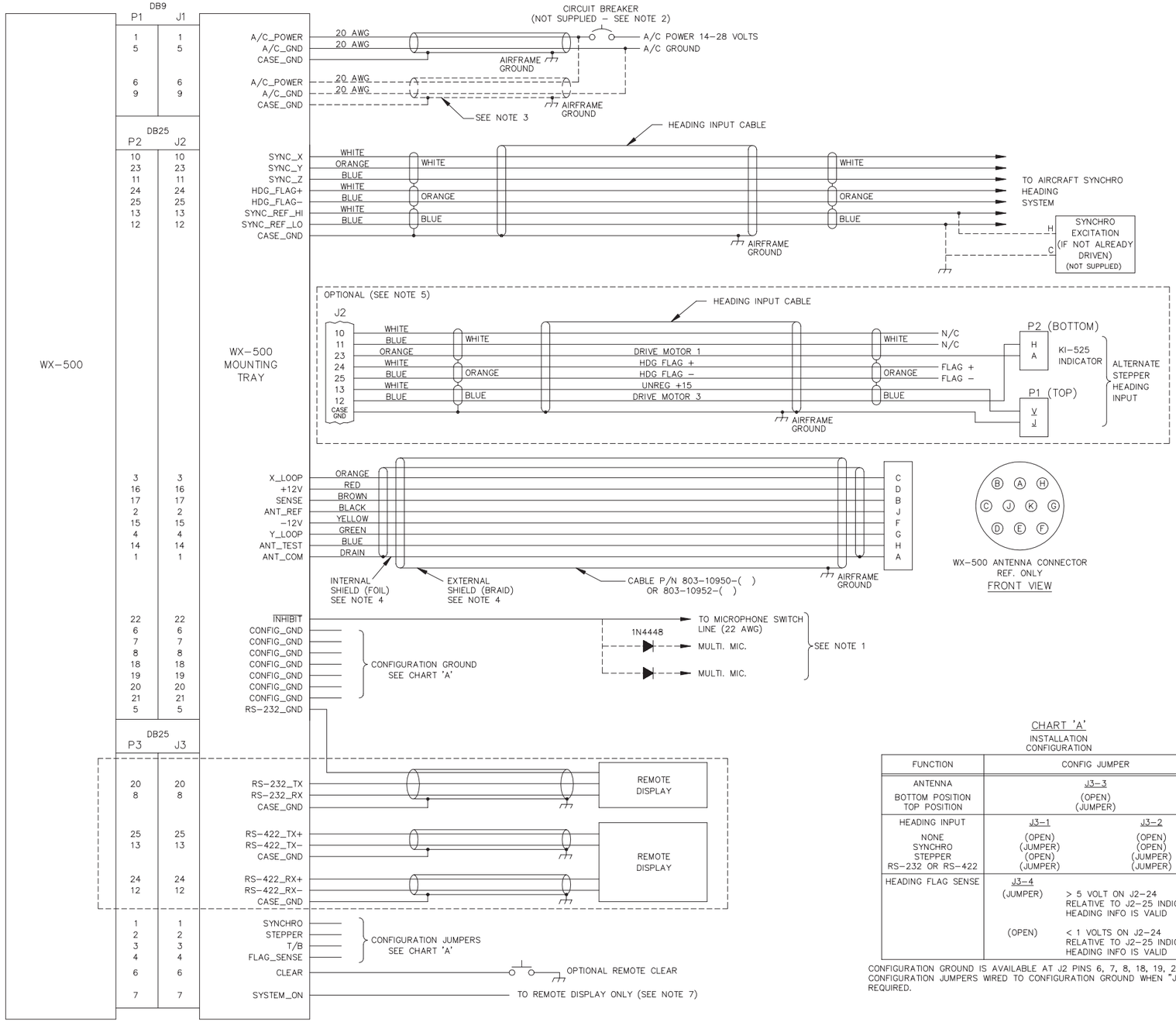
- Configuration ground is available at J2 pins 6,7,8,18,19,20 and 21
- Configuration jumpers wired to configuration ground when jumper is required
- Only one heading input should be enabled
- Figure 2-11 shows the WX-500 heading validation circuit along with a typical connection of a navigational system (such as the King KCS55) that provides a heading valid signal to the WX-500

2.10 CABLE REQUIREMENTS AND FABRICATION

NOTES

1. All wiring must be in accordance with industry-accepted methods, techniques and practices.
2. The length and routing of the external cables must be carefully studied and planned before attempting installation of the equipment.
3. Use of any cable not meeting specification voids all warranties.
4. All sensor cables are terminated at the mating connector bracket (see paragraph 2.8).

Appendix A defines the electrical characteristics of all input and output signals and identifies the cable requirements for each signal. Refer to figure 2-6 for interconnect wiring information. Wire-marking identification is at the discretion of the installer. The following paragraphs detail specific cable requirements.



NOTES:

1.) NORMALLY THE $\overline{\text{INHIBIT}}$ LINE IS NOT NEEDED IF THE STORMSCOPE® ANTENNA AND THE COMMUNICATIONS ANTENNAS ARE ON OPPOSITE SIDES OF THE AIRCRAFT FUSELAGE. IF THE $\overline{\text{INHIBIT}}$ LINE IS CONNECTED TO MULTIPLE MICROPHONE SWITCH LINES, EXTERNAL ISOLATION DIODES MUST BE INSTALLED BETWEEN THE SWITCH LINES AS SHOWN.

2.) THE WX–500 IS PROTECTED VIA AN INTERNAL FUSE. FOR EXTERNAL CIRCUIT BREAKER PROTECTION, A 5A CIRCUIT BREAKER IS RECOMMENDED FOR 14V AIRCRAFT SYSTEMS AND A 3A CIRCUIT BREAKER FOR 28V SYSTEMS.

3.) THE SECOND SHIELDED PAIR CABLE (CONNECTED TO PINS 6 AND 9) IS NECESSARY ONLY IF POWER CABLE LENGTH IS GREATER THAN 15 FEET.

4.) INTERNAL AND EXTERNAL SHIELDS ARE ISOLATED FROM EACH OTHER. DO NOT CONNECT THESE SHIELDS TOGETHER.

5.) STEPPER HEADING INPUT MAY BE USED IN PLACE OF SYNCHRO HEADING.

6.) A/C POWER IS AVAILABLE AT J1 PINS 1, 2, 3, 6, 7. A/C GROUND IS AVAILABLE AT J1 PINS 4, 5, 8, AND 9.

7.) SYSTEM_ON INDICATES THAT POWER IS APPLIED TO THE WX–500 PROCESSOR. IT IS TO BE CONNECTED ONLY TO REMOTE DISPLAYS THAT REQUIRE THIS SIGNAL. IF THIS SIGNAL IS NOT REQUIRED BY THE DISPLAY, THIS LINE MUST REMAIN UNCONNECTED.

CHART 'A'
INSTALLATION CONFIGURATION

FUNCTION	CONFIG JUMPER	
ANTENNA	J3–3	
BOTTOM POSITION	(OPEN)	
TOP POSITION	(JUMPER)	
HEADING INPUT	J3–1	J3–2
NONE	(OPEN)	(OPEN)
SYNCHRO	(JUMPER)	(OPEN)
STEPPER	(OPEN)	(JUMPER)
RS–232 OR RS–422	(JUMPER)	(JUMPER)
HEADING FLAG SENSE	J3–4	
	(JUMPER)	> 5 VOLT ON J2–24 RELATIVE TO J2–25 INDICATES HEADING INFO IS VALID
	(OPEN)	< 1 VOLTS ON J2–24 RELATIVE TO J2–25 INDICATES HEADING INFO IS VALID

CONFIGURATION GROUND IS AVAILABLE AT J2 PINS 6, 7, 8, 18, 19, 20, AND CONFIGURATION JUMPERS WIRED TO CONFIGURATION GROUND WHEN "JUMPER" REQUIRED.

Figure 2-6. Interconnect Wiring

2.10.1 Antenna Cable P/N 803-10950-( ) or P/N 803-10952-( )

Antenna cables (see figure 2-7) are shipped in 6, 12, 25, 50 or 75 foot lengths (see paragraph 1.1 and figure 1-5) with the antenna connector pre-wired to one end.

Cut cable to the desired length and prepare in accordance with the guidelines shown in figure 2-8.

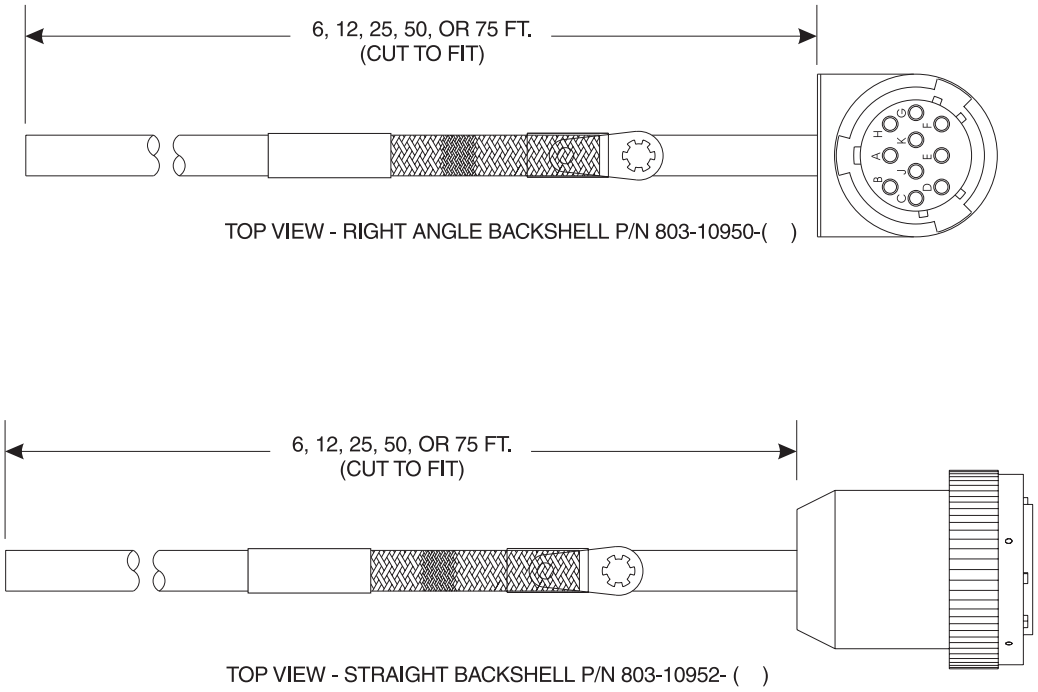


Figure 2-7. Antenna Cable

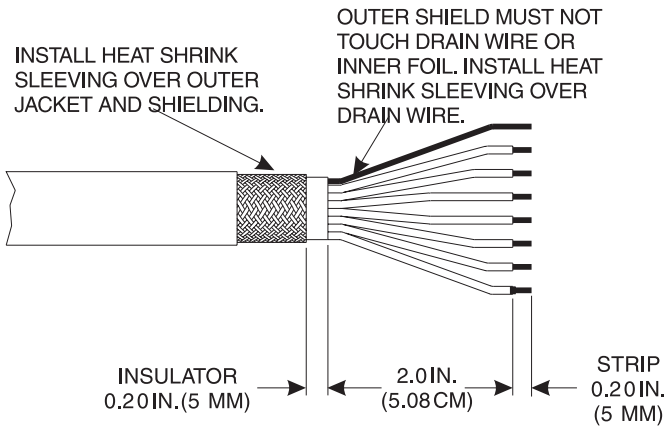


Figure 2-8. Antenna Cable Preparation

The antenna cable may be susceptible to interference from outside sources and routing is subject to the following guidelines.

- Cable routing should be kept as short and direct as practical. Do not coil excess cable.
- The cable should not be bundled with any other aircraft cable except for short distances, and then only when absolutely necessary.
- To reduce strain on the shield ground wire, when the antenna is top-mounted, clamp the antenna cable to the airframe no further than one foot (1 ft) from the antenna connector.
- If the antenna cable routes through a bulkhead connector, a dedicated connector (grounds passed through individually) must be used. (The antenna cable must not share a bulkhead connector with any other conductors).
- The antenna cable may tie to other electrical cables at right angles.
- The antenna cable overall shield is terminated at the antenna end only

After the wiring connections have been completed, use the interconnect diagram (figure 2-6) to verify continuity between each pin and its opposite end termination. Table 2-3 provides this information for the antenna inputs.

Table 2-3. Antenna Cable Connections

SIGNAL	WIRE COLOR	CONNECTOR PIN NUMBER WX-500	ANTENNA
X_LOOP	ORANGE	J2-3	C
+12V	RED	J2-16	D
SENSE	BROWN	J2-17	B
ANTREF	BLACK	J2-2	J
-12V	YELLOW	J2-15	F
Y_LOOP	GREEN	J2-4	G
ANT_TEST	BLUE	J2-14	H
ANT_COM	DRAIN	J2-1	A

Refer to paragraph 2.5 for antenna and doubler installation.

2.10.2 Power Cable

The power cable (not supplied) runs from the mating connector (J1) to the aircraft circuit breaker panel. For the power cable, use twisted shielded pair, #20 AWG. The positive wire connects to the avionics circuit breaker. The negative wire connects to airframe ground. If airframe ground is not available, run a separate wire to power ground at the battery.

CAUTION

Reversing the power leads will cause an internal fuse to blow. Fuse replacement procedures are detailed in chapter 4.

Power cable routing is generally not critical to sensor operation. Cable lengths greater than 15 feet require a second shielded twisted pair (to reduce the voltage drop) connected to pins 20 and 21 (refer to figure 2-6). Affix a circuit breaker label (P/N 78-8060-5733-3, provided with the hardware package) to the circuit breaker panel.

2.10.3 Heading Input Cable

The heading input cable connects the WX-500 processor to the aircraft heading system. This cable provides XYZ and HC aircraft heading information (or King KCS55 stepper signals) to the WX-500 processor (J2). FLAG lines are also included in the heading input cable to provide the WX-500 processor with flag status (or heading valid) information.

NOTE

If serial heading is available from the MFD, the heading input cable is not needed.

The heading input consists of the following (refer to figure 2-9):

1. Twisted, Shielded, Jacketed Triad #24 AWG
   Colors: White, Blue, Orange
   Shield: Tin Plated Copper Braid, 90% min.
   Jacket: FEP .007 in. min., White
2. Twisted, Shielded, Jacketed Pair #24 AWG
   Colors: White, Blue
   Shield: Tin Plated Copper Braid, 90% min.
   Jacket: FEP .007 in. min., Blue
3. Same as Item 2, except Orange jacket.
4. Aluminized Mylar® Wrap.
5. #34 AWG braided shield.
6. FEP Teflon® jacket .013 in. - .023 in., clear (translucent).
7. Marker tape with vendor P/N.

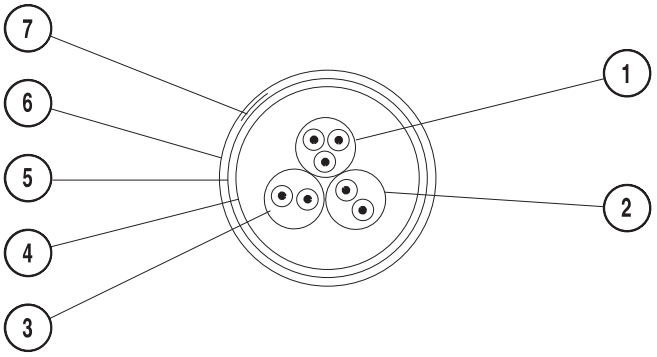


Figure 2-9. Heading Input Cable

Guidelines for preparing the cable are shown in figure 2-10.

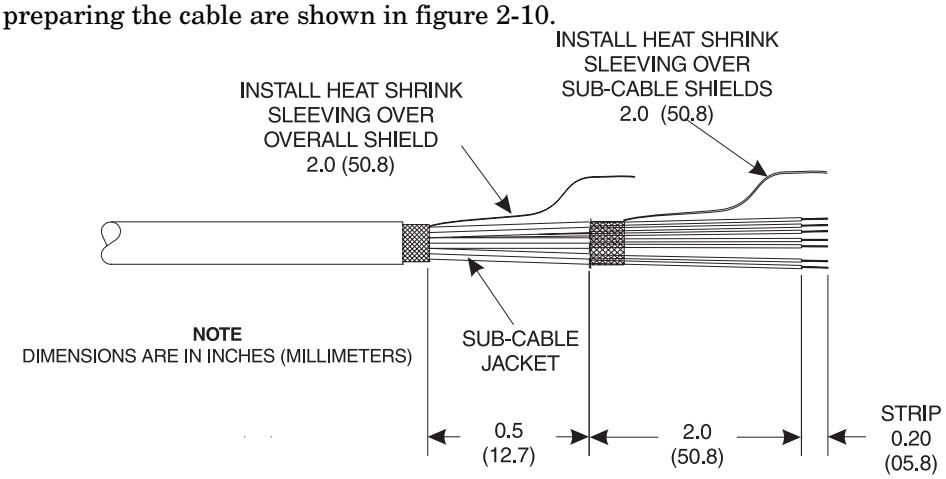


Figure 2-10. Heading Input Cable Preparation

The sub-cable color-coded jackets and shields should be left on the sub-cables as close to the connector as practical to provide the required shielding and to identify the sub-cables. Ground the overall shield at both ends. The WX-500 end should be grounded within the mating connector bracket. Ground the sub-cable shields only at the mating connector bracket. Cable routing and length are not critical to sensor operation.

Figure 2-11 shows the WX-500 heading validation circuit along with a typical connection of a navigation system (such as the King KCS55) that provides a heading valid signal to the WX-500.

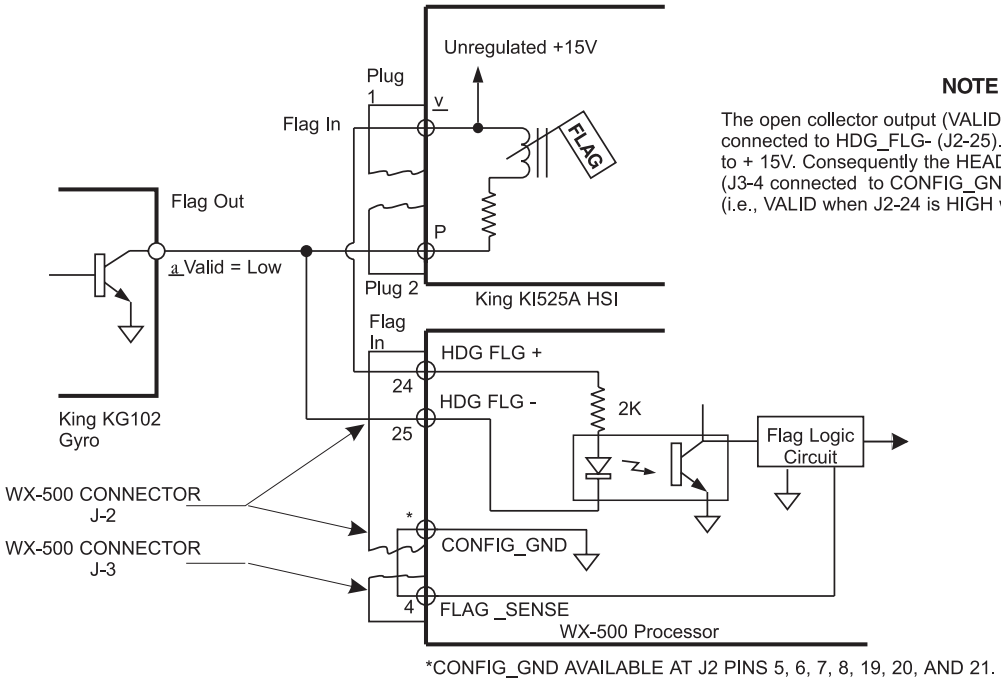


Figure 2-11. Heading Flag (KCS55) Connection

If the heading source does not have a FLAG LO (-), the heading source FLAG HI (+) input is connected to P2-24 (HDG_FLG+) and P2-25 (HDG_FLG-) is connected to ground.

If the heading system has a low-level flag between 15VDC and 2.7 VDC (when valid), P3-4 (HEADING FLAG SENSE) should not be jumpered to ground and P2-24 (HDG_FLG+) must remain unconnected.

Tables 2-4 and 2-5 provide heading source (stepper & synchro) interconnect information. Refer to the applicable manufacturer's publication for specific interconnect guidelines to be followed.

NOTE

1. Every effort has been made to correctly identify the pin numbers and signal names used by the various manufacturers. However, L-3 Avionics Systems cannot be responsible for changes made by others. Please consult the appropriate manufacturer's documentation for the latest information.
2. To prevent loading of the synchro reference signal, a separate boot strap may be necessary.

Table 2-4. Stepper Input Connections (KI-525 Indicator)

SIGNAL	WIRE COLOR		WX-500 PROCESSOR PIN NUMBER	KI-525 INDICATOR
	SUB-CABLE	WIRE		
	WHITE	WHITE	J2-10	N/C
	WHITE	BLUE	J2-11	N/C
DRIVE MOTOR 1	WHITE	ORANGE	J2-23	P2-A (BOTTOM)
HDG FLAG +	ORANGE	WHITE	J2-24	FLAG +
HDG FLAG -	ORANGE	BLUE	J2-25	FLAG -
UNREG +15	BLUE	WHITE	J2-13	P1-v (TOP)
DRIVE MOTOR 3	BLUE	BLUE	J2-12	P2-H (BOTTOM)
SIGNAL GND*			CASE GND	P1-j (TOP)

*Connect outer shield at KI-525, P1-j (TOP)

Table 2-5 Synchro Connections to Mating Connector

SYNCHRO CONNECTION TO WX-500 MATING CONNECTOR							
SIGNAL PIN SUB-CABLE WIRE COLOR	HDG FLAG + J2-24 ORANGE WHITE	HDG FLAG - J2-25 ORANGE BLUE	SYNC X J2-10 WHITE WHITE	SYNC Y J2-23 WHITE ORANGE	SYNC Z J2-11 WHITE BLUE	SYNC REF HI J2-13 BLUE WHITE	SYNC REF LO J2-12 BLUE BLUE
Cessna ARC 200-9BC	N/A	N/A	A	E	D	C	B
Cessna ARC 40840-0204	N/A	N/A	N	M	L	B	L
Cessna Slaved DG	N/A	N/A	E	D	A	C	B
AIM Type 289-1-2	N/A	N/A	E	D	A	H	C
AIM Type 2892D	N/A	N/A	M	N	K	L	K
AIM Type 2892ED	N/A	N/A	M	N	K	L	K
Collins Type 331P-1V	N/A	N/A	N	M	D	B	L
Collins Type 331P-1	N/A	N/A	N	M	D	B	L
Century NSD360/A DG & 722/755, Connector CD129	N/A	N/A	1	2	3	7	5
Century Slaved DG	N/A	N/A	N	M	L	B	L
King KCS-55 w/KI-525A-01	N/A	N/A	P2-s	P2-v	P2-t	P2-r	P2-u
King KCS-55A w/KI-525A-01	P1-v	P2-P	P2-s	P2-v	P2-t	P2-r	P2-u
Sperry C6E, C6J	N/A	N/A	39	38	40	37	36
Sperry C6, C6A, C6C	N/A	N/A	18	19	20	21	41
Sperry C-14d	e	GND	a	b	Z	X	Y

2.10.4 Inhibit Line

NOTE

Normally the inhibit line is not needed if the *Stormscope*® antenna and communications antennas are mounted on opposite sides of the fuselage.

The inhibit line (J2-22) is #22 AWG unshielded, and need be connected only if communication transmitters interfere with the WX-500 when in the weather mapping mode. This line can be included in the installation, but need be connected only if the testing of the final installation indicates transmitter interference. Inhibit line routing and length is not critical to sensor operation.

2.10.5 Remote Clear Line

When activated, the remote clear switch erases the storm information being displayed in the weather view. The remote clear line (J3-6) is #22 AWG unshielded. Remote clear line routing and length are not critical to sensor operation, nor is the location of the airframe ground point at which the remote clear switch terminates.

2.10.6 Remote Display Cable

For the display cable, use twisted shielded triad (RS-232 installations) or twisted shielded pair (RS-422 installations) #22 AWG. The display cable (not supplied) runs from the mating connector (J3 & J2) to the remote display. Connect the shield to case ground located at the connector bracket and aircraft ground at the remote display. Display cable routing is generally not critical to sensor operation. Refer to figure 2-6 for interconnect information.

The WX-500 is designed to support a single MFD. It may be possible to slave an additional display(s) by connecting it to the WX-500 TX signal lines (i.e., RS232_TX - J3-20 or RS-422_TX+ J3-25 and RS_422_TX- J3-13) in parallel with the master. The slave display must not transmit to the WX-500 (i.e., no connection to the WX-500 RX lines).

2.10.7 SYSTEM_ON Output

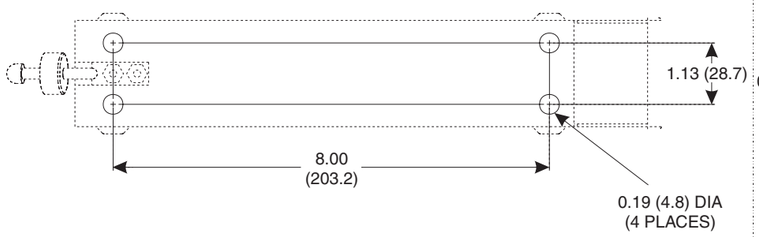
SYSTEM_ON output indicates that power is applied to the WX-500 processor. This open collector output is provided for displays that require a signal to be asserted when the lightning detection system is in a power on condition. For the SYSTEM_ON line (J3-7), use unshielded #22 AWG (minimum). If a POWER ON SIGNAL IS NOT REQUIRED, THIS OUTPUT MUST REMAIN UNCONNECTED. This output anticipates a future need. As of this writing, there are no WX-500 compatible MFDs that require a power on signal.

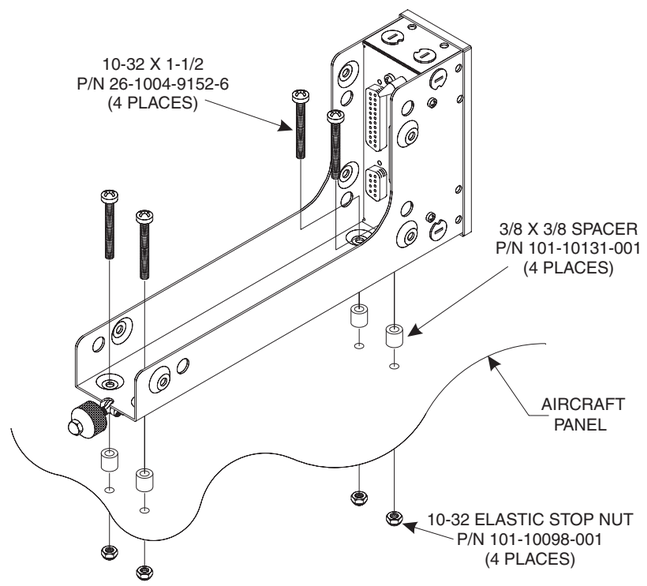
2.11 MOUNTING TRAY INSTALLATION

The mounting tray and can be positioned vertically or on either side. Install the mounting tray as shown in figure 2-12, using four 10-32 x 1½ screws and four 10-32 stop nuts provided. Ensure the mounting tray is properly grounded to airframe ground.

DRILLING DETAIL

NOT TO SCALE

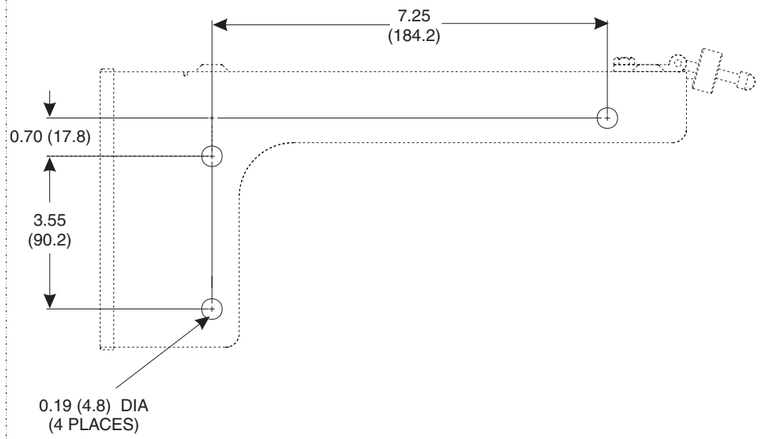


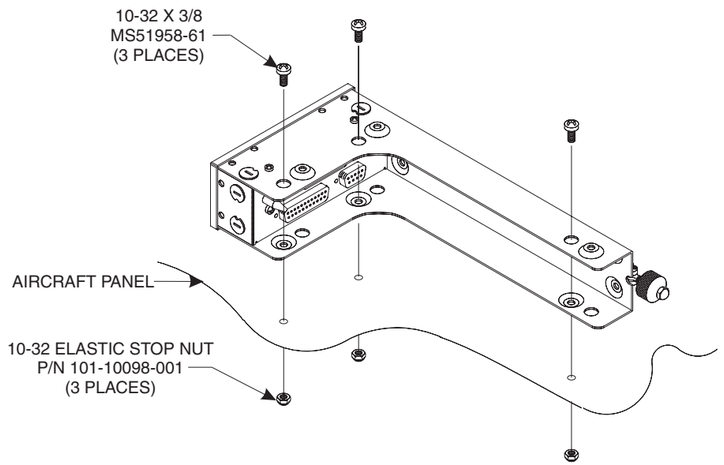


VERTICAL

DRILLING DETAIL

NOT TO SCALE

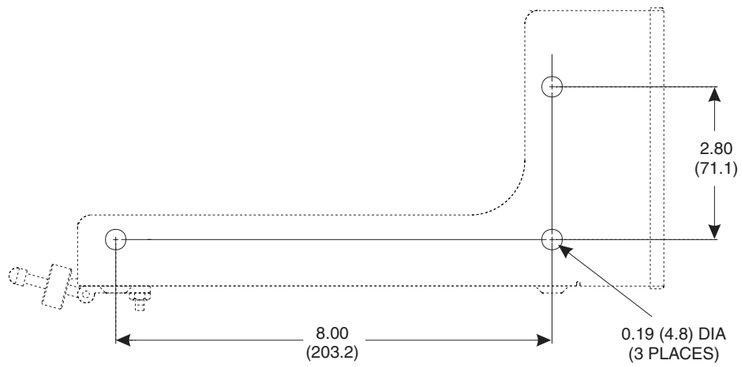


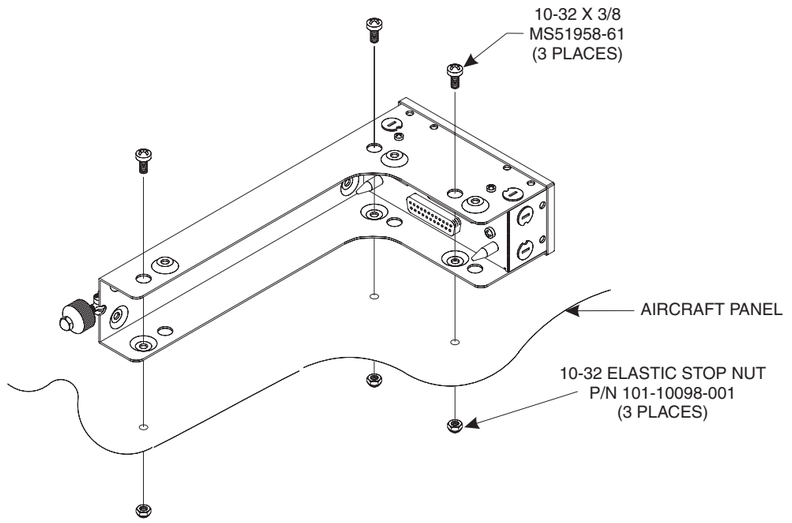


LEFT SIDE

DRILLING DETAIL

NOT TO SCALE





RIGHT SIDE

NOTE
DIMENSIONS ARE IN INCHES (MILLIMETERS)

Figure 2-12. Mounting Tray Installation

2.12 PROCESSOR INSTALLATION

CAUTION

Before placing the processor into its mounting tray, de-energize or disconnect all power and signal sources and loads used with the WX-500 sensor.

The mating connectors are attached to the mounting tray to allow for easy blind mating.

1. Simply align the processor with the guide pins at the rear of the mounting tray and slide it into place. Seat the processor with the mating connectors. See figure 2-13.

NOTE

Substantial hand pressure must be used when seating the processor into the rack. When properly seated the processor front surface will be flush with the front edge of the tray, or slightly recessed.

2. Place the front hold-down retainer cup over the processor J-hook and tighten the hold down mechanism securing the processor into the mounting tray. Secure the locking mechanism with aircraft safety wire.

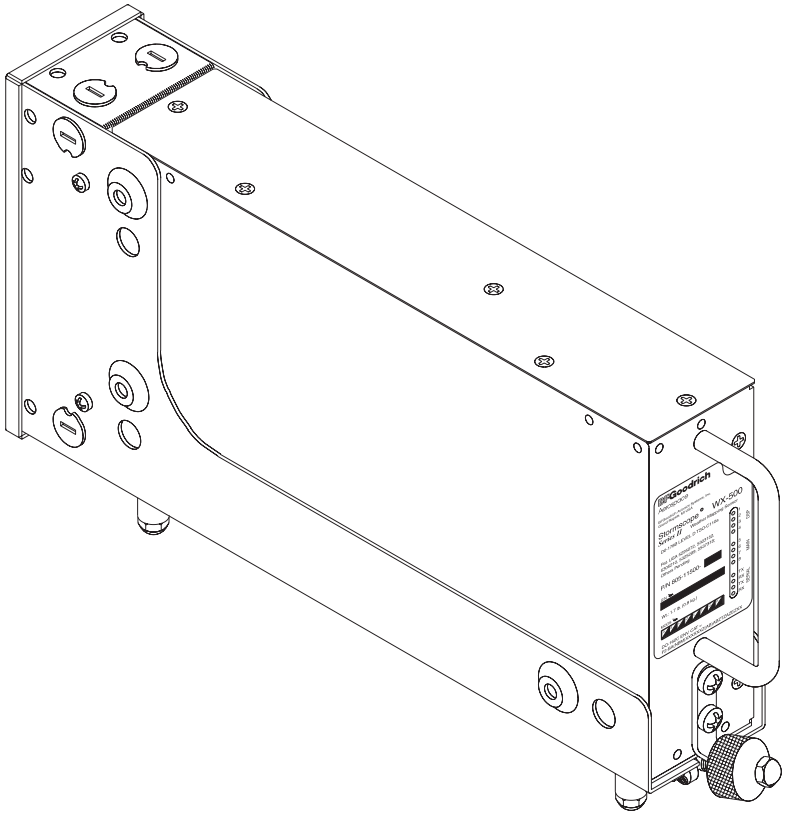


Figure 2-13. Processor Installation

2.13 PERFORMANCE TEST

After the installation is completed do the installation checkout procedures detailed in chapter 3.

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CHAPTER 3
INSTALLATION CHECKOUT

3.1 INTRODUCTION

This section contains instructions for post-installation checkout of the WX-500 Weather Mapping Sensor. For complete system operating instructions refer to the manufacturer of the Multi Function Display (MFD) supplied documentation. Theory of operation for the *Stormscope* sensor is provided in the Users Guide supplied with each WX-500 Weather Mapping Sensor.

NOTICE

All WX-500 functions are controlled through the MFD. The many capabilities of the WX-500 allow MFD manufacturers to create screens compatible with the various functions of their display. The display screens illustrated in this manual are intended to be characteristic of a whole group of MFDs that are configured to work with the WX-500. Each MFD will show the information consistent with the capabilities of that particular display.

3.2 CONTROLS

Operating instructions for each MFD are provided in the display manufacturer documentation.

NOTE

The post-installation check procedures in this chapter assumes familiarity with the set-up and operation of the WX-PA Portable Analyzer Kit (P/N 78-8060-5791-1).

3.3 POST INSTALLATION CHECKOUT

This procedure will validate the installation and return to service of the WX-500.

1. Verify MFD is turned on and setup to operate with the WX-500 sensor (baud rate, parity, etc.).
2. Apply power to the WX-500 and verify that no failed test messages appear. During initialization, the WX-500 runs a series of self-tests to ensure that all functions are operating properly. These tests are designed to check the antenna, processor, and associated hardware.
3. If no faults are detected, at completion of the self-test proceed to step 5.
4. If a fault is detected, an error will be displayed indicating which test failed and which functions may be inoperative.
   a. Recoverable faults will clear when the fault condition is resolved. Table 4-1 lists all possible errors, the probable causes and the recommended actions.
   b. Fatal faults will lock the WX-500 up and can only be cleared by cycling power to the processor. (Refer to maintenance procedures detailed in chapter 4.)

NOTE

If WX-500 is unable to display errors due to a fatal fault, view the LED's on the front of the processor. Refer to table 4-2 in chapter 4 for the probable causes and the recommended actions.

5. After successful power up, verify the following modes:
   a. Access to the 360° and 120° weather view modes.
   b. All available ranges can be displayed.
   c. Access to the cell mode and strike mode.
   d. Strike rate counter is displayed in all weather modes and ranges (strike rate counts number of strikes per minute).

6. Access the SYSTEM DATA screens and verify the information (i.e., heading source, heading flag, jumper sense, heading, inhibit line and antenna mounting location) identified in figure 3-1.

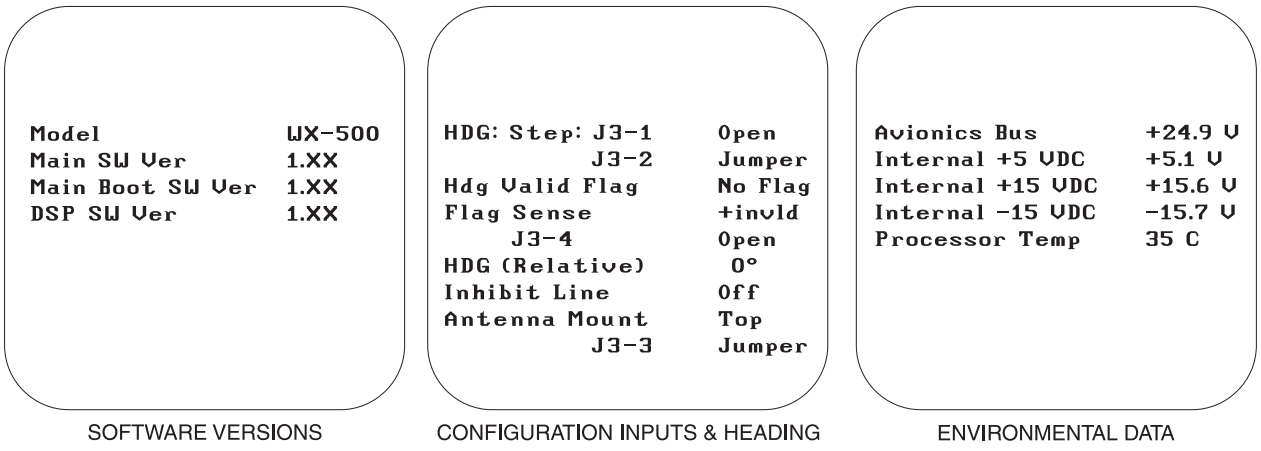


Figure 3-1. System Data Screens

NOTE

If stepper heading is used, the heading will not agree with the HSI. Stepper heading may be offset from aircraft heading.

7. Enter the noise monitor mode.
8. Repeatedly key the aircraft communications radio microphone:
   a. If keying the transmitter does not cause strike data to appear on the MFD, proceed to step 13.
   b. If strike data appears on the MFD when the transmitter is keyed, wire the inhibit line to the microphone key switch (see figure 2-6).
9. Key the transmitter, then access CONFIGURATION INPUTS & HEADING screen and verify that the state of the Inhibit Line is on. (See figure 3-1.)
10. Access the noise monitor mode.

11. Repeatedly key the aircraft communications radio microphone:

    a. If keying the transmitter does not cause strike data to appear on the MFD, proceed to step 13.

    b. If strike data appears on the MFD when the transmitter is keyed:
    - Verify separation of the NY-163 and aircraft communication system antennas.
    - Check the routing of the *Stormscope* antenna cable with respect to the aircraft communication system antenna cables.
    - Contact Field Service Department for advice and assistance at 1-800-453-0288 or 1-616-949-6600.

12. To verify antenna orientation and the integrity of the antenna wiring, an antenna phase check must be performed using at least the four cardinal headings (000, 090, 180, and 270) and using the following WX-PA ranges: 120, 75, and 30 nmi. Refer to figure 3-1 for the test setup.

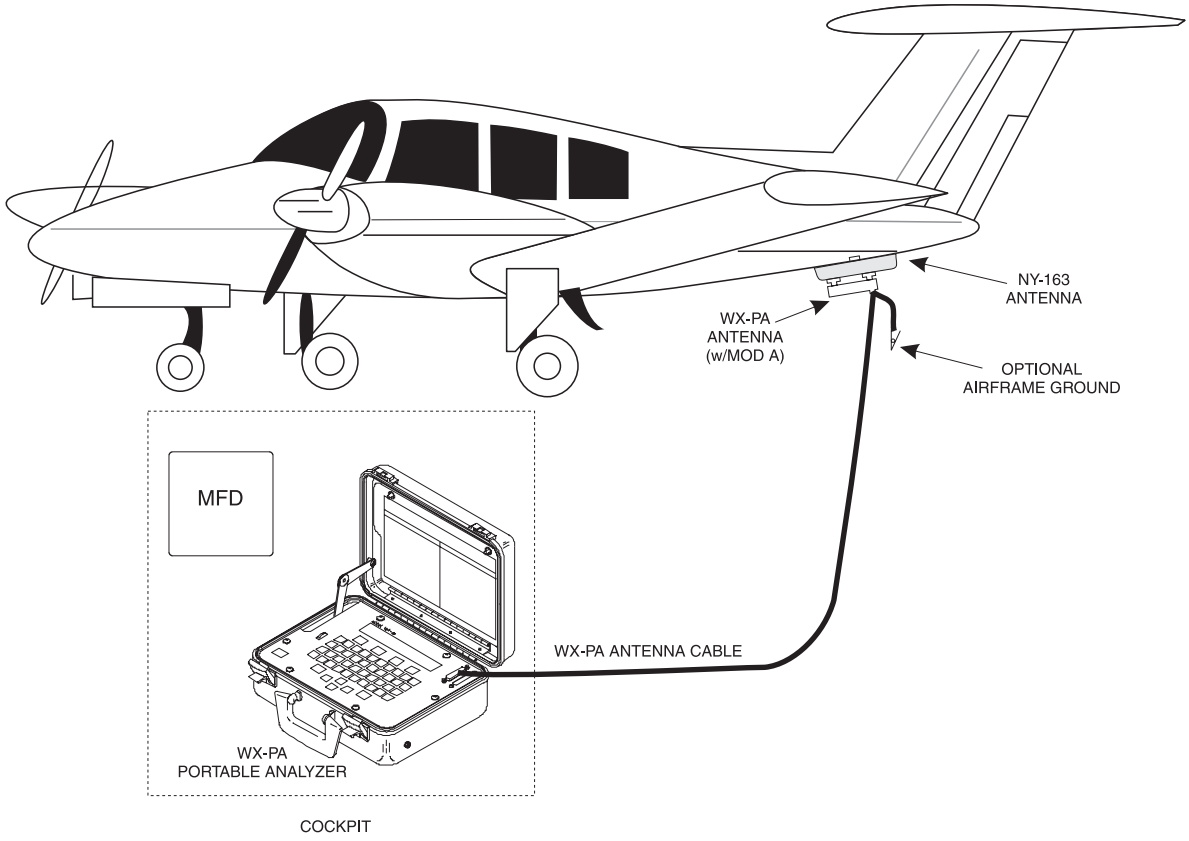
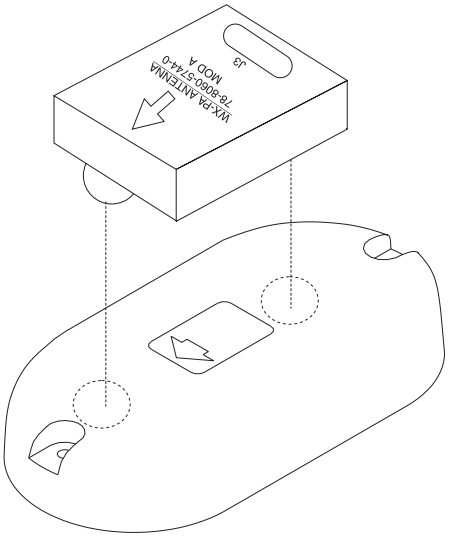


Figure 3-2. Aircraft Test Setup

    a. Connect the WX-PA cable to the WX-PA antenna.

    b. Refer to figure 3-2 and position the WX-PA antenna on the WX-500 antenna. Make sure the connection is tight. If necessary, use tape to secure the WX-PA antenna.



NOTE
ENSURE THE 'FORWARD' ARROWS ARE ALIGNED AND THE WX-PA ANTENNA SUCTION CUPS ARE POSITIONED AS SHOWN (FORWARD OF CENTER ALONG LONGITUDINAL AXIS).

Figure 3-3. WX-PA Antenna Alignment

c. Secure the WX-PA cable to the aircraft with the attached suction cup and route the cable to the cockpit.

d. Connect the remaining end of the WX-PA antenna cable to the WX-PA.

e. Power up the WX-PA.

f. Verify that the WX-500 is in the weather mapping mode (i.e., 360° Weather View at the 200 nmi range, WX-500 maximum range).

g. Set the WX-500 to the STRIKE mode; 100 nmi range (or next highest available range).

h. Select the Continuous Out mode displayed on the WX-PA menu and press MENU/ENTR.

i. Select a top mount or a bottom mount antenna configuration on the WX-PA keyboard (“A” key), as appropriate.

j. Select a cardinal bearing and a range of 120 nmi.

k. Use the F1 and F2 keys to adjust range and the F3 and F4 keys to adjust bearing.

NOTE

The WX-500 will plot data at one-half the range selected on the WX-PA.

l. Press MENU/ENTER to start the test.

m. Observe the MFD to ensure the proper positioning of the strikes, based on range and azimuth settings on the WX-PA. Change the cardinal bearings and verify correct test strikes. The strikes should be within 10 degrees of the selected azimuth and should plot at 60 nmi (½ 120 nmi). After 20 seconds of operation the strike counter should read 580 ±40.

n. After testing for all ranges and bearings indicated, press 2ND, then MENU/ENTER to return to the Main Menu.

NOTE

The WX-PA is used only to check WX-500 functions. It is not considered a calibration standard.

13. To check range and azimuth plotting accuracy set up the WX-PA to simulate a series of strikes at 30 degree increments at WX-PA ranges of 120, 55, and 15 nmi:
    a. Select Circular Pattern mode on the WX-PA Mode Menu and press MENU/ENTR.
    b. Select a top mount or a bottom mount antenna configuration on the WX-PA keyboard (“A” key), as appropriate.

NOTE

The MFD should be set at 100 nmi (or next highest available range) on the 360 degree weather screen and in strike mode.

    c. Use the F1 and F2 keys to select a 120 nmi range and press "MENU/ENTR" to start the test. The WX-500 should plot discharge points at approximately 60 nmi.
    d. Observe the MFD to ensure the proper positioning of the test strikes. The strikes should be within 10 degrees of the 30 degree azimuth increment and within 12 nautical miles (20%) of 60 nmi.
    e. When complete, set the WX-PA for 55 nmi, set the MFD for 50 nmi (or next highest available range) and repeat the test.
        1) The Sensor should plot points just outside of 25 nmi.
        2) The strikes should be within 10 degrees of the 30 degree azimuth increment and within 5 nmi of 27.5 nmi.
    f. Repeat, setting the MFD for 25 nmi (or next highest available range) and the WX-PA for 15 nmi.
    g. Again, observe the MFD to ensure the proper positioning of the test strikes within 10 degrees of azimuth and within 2 nmi of 7.5 nmi.
14. Test the heading functions (if applicable):
    a. Set the WX-500 range to 200 nmi (or next highest available range), and use the WX-PA (at any desired range and bearing) to plot continuous discharge points on the MFD. During continuous output mode, the strike counter should read 580 ±40 (after 20 seconds).
    b. With the compass sensor turned on, physically turn the aircraft 45° to the right (or manually slew the compass clockwise), and verify that the previously plotted discharge points move 45° counterclockwise.
15. Test for electrical noise and interference by running the noise monitor and strike test as detailed in paragraph 4.4.3. See figure 3-4.

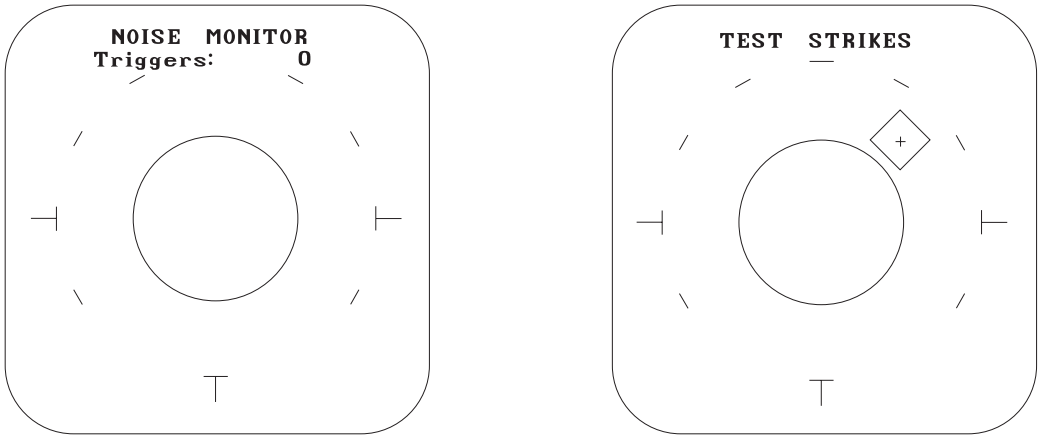


Figure 3-4. Electrical Noise Test

NOTE

This test may be performed with the aircraft in flight or on the ground, as long as it is running at high RPM with all systems powered.

An offending interference source can be isolated by shutting down one system at a time, then clearing the MFD and observing the noise monitor screen. Refer to troubleshooting electrical noise, paragraph, 4.6.

16. This completes the post installation checkout procedure.

CHAPTER 4
MAINTENANCE

4.1 INTRODUCTION

This chapter contains general flightline maintenance procedures. These procedures are intended to aid in testing an installed WX-500 sensor and isolate a fault to the processor, antenna, or cable.

4.2 CONTINUED AIRWORTHINESS

No scheduled maintenance is required to ensure continued airworthiness. Removal of components is on condition of failure.

4.3 PERIODIC MAINTENANCE

NOTE

Upon delivery to a customer, the dealer should recommend an annual checkout of the sensor, especially prior to the thunderstorm season.

At regular inspection intervals, perform the periodic maintenance procedures of paragraph 4.3.1 and 4.3.2.

4.3.1 Processor

Check to ensure unit is properly seated and secured in the mounting tray.

4.3.2 Antenna

1. Check for dents, cracks, and punctures.

CAUTION

Do not paint the antenna.
Do not use cleaning solvents on the antenna.

2. Remove all dirt and grease from surface areas. Clean with a soft cloth moistened with mild soap and water.
3. Visually inspect sealant around the antenna base. Reapply sealant if required.

4.4 TEST MODES

The test modes are intended as aids in installing, testing and troubleshooting the WX-500. These test modes are to be used only for testing and troubleshooting an installation. They are not intended to be used by the pilot during normal operation.

Refer to MFD operating instructions for instructions on how to access the various tests.

The test modes provide the following options:

- SYSTEM DATA
- FAULT LOG
- NOISE MONITOR
- TEST STRIKES

Individual tests are explained in the following paragraphs.

4.4.1 System Data

SYSTEM DATA screens (see figures 4-1 through 4-3) contain a record of setup information. If you have problems with the WX-500, have this information available when contacting Field Service. The Field Service specialist must have adequate information to diagnose a problem.

Software Versions (see figure 4-1):

- System Model (Model)
- Main Software Version (Main SW Ver)
- Main Boot Software Version (Main Boot SW Ver)
- DSP Software Version (DSP SW Ver)

NOTE

The software version identified on the case of the processor represents the WX-500 sensor software configuration (i.e., a collective designator for all software/firmware installed within the unit).

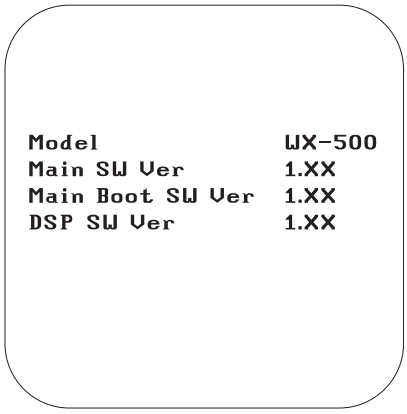


Figure 4-1. System Data, Software Versions

Configuration inputs & heading (see figure 4-2):

- Heading Type (XYZ, Step, Serial or None)*
- Heading Valid Flag (Flag, No Flag or N/A)
- Flag Sense Jumper (Open, Closed or N/A)*
- Heading Value (XYZ synchro/ stepper/serial relative in degrees, or N/A)
- State of the Inhibit Line (On or Off)
- Antenna Mounting (Top or Bottom)*

* As read from the configuration jumpers in the mating connector.

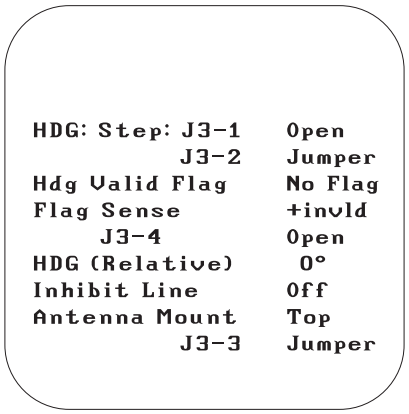


Figure 4-2. System Data, Configuration Inputs & Heading

Environmental Data (see figure 4-3):

- Avionics Bus Voltage
- Internal Voltage Values (+5.0 VDC, +15.0 VDC, and -15.0 VDC)
- Processor Temperature (degrees C)

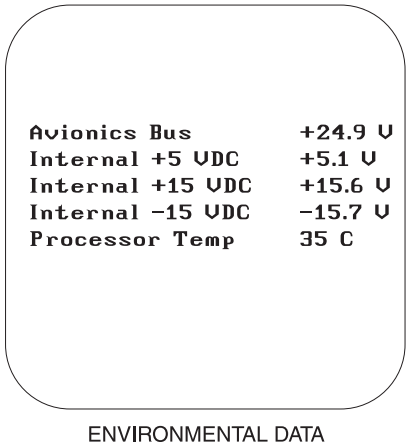


Figure 4-3. System Data, Environmental Data

4.4.2 Fault Log

The 20 most recent errors detected by the system self-test are saved in the FAULT LOG (see figure 4-4). For each error, the corresponding error code and run-time of occurrence are saved. Table 4-1 lists the WX-500 errors. Note that heading errors (i.e., error 22 (Invalid XYZ Input) and error 23 (Invalid Heading Ref.)) are not logged.

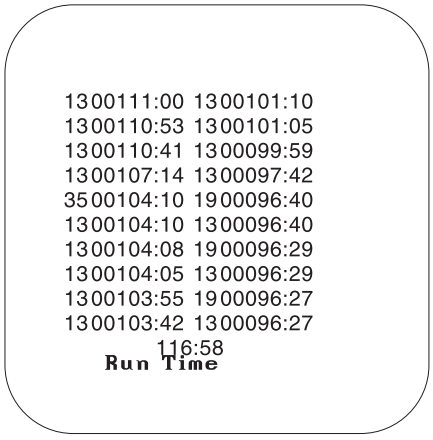


Figure 4-4. Fault Log

FAULT LOG displays the results in the following format:

HHHHH:MM

where:

##	=	Fault identifier code.
HHHHH:MM	=	Run-time (in hours and minutes) at which fault occurred.

The total elapsed run-time is shown in the lower middle portion of the figure (**Run Time HHHHH:MM**).

If fewer than 20 faults have been recorded, the portion of the screen used to display the fault data will be partially blank.

If the FAULT LOG is empty, the following message is displayed:

NO FAULTS DETECTED

If, due to a failure of non-volatile memory, the FAULT LOG cannot be displayed, the following message is displayed:

DATA NOT AVAILABLE

4.4.3 Noise Monitor

The NOISE MONITOR (see figure 4-5) displays indications of electrical noise as well as lightning/atmospheric electrical discharge activity that occurs within electrical range of the system. It is checked to see if electrical noise, that will interfere with normal system operation, is present. No compression is applied to the strikes. The circle (solid ring) provides a reference for an acceptable noise level. No range markings are displayed. Old data is removed (bumped off) after 3 minutes, or when the CLEAR button is pressed. A counter that indicates the number of triggers detected (i.e., electrical discharges including noise and/or strikes) is shown at the top of the figure. The counter rolls over at 99999, and is reset using the clear button. It should be noted that noise can cause triggers but not result in a strike symbol.

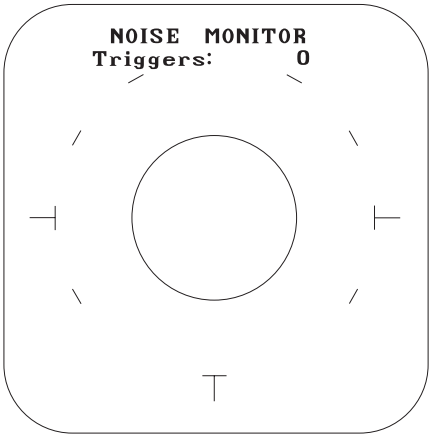


Figure 4-5. Noise Monitor

NOTE

Thunderstorm activity within 200 nmi will register on the NOISE MONITOR and may affect the TEST STRIKE display causing the test strikes to fall outside the box.

1. Access the NOISE MONITOR and verify no triggers or strikes are present.

2. Press CLEAR to erase the screen and then check for electrical noise indications. Compare your results with the PASS and FAIL instructions listed below.

   PASS There should normally be no noise indications inside the solid ring. (A small number of triggers and/or random noise points inside the displayed ring is acceptable.)

   FAIL Reoccurring and/or persistent indications of electrical noise inside the solid ring are unacceptable (i.e. strikes in same location each time). (Troubleshooting electrical noise is discussed in paragraph 4.6.)

3. If the noise monitor test is satisfactory, access TEST STRIKES, see figure 4-6.

4.4.4 Test Strikes

The TEST STRIKES (see figure 4-6) are used by installers to visually verify the operation of the internal strike test signal. No range indication is displayed. The rectangular shaped box is displayed on the screen to enclose the area in which the test strikes should appear. Test strikes are generated and sent to the antenna at a rate of one pulse per every 2 seconds. The resulting test strike received by the system is displayed on the screen, and is indicated by a single strike symbol (+). The last strike is erased before the next strike is generated.

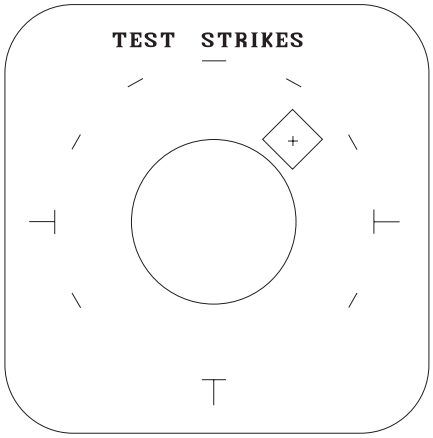


Figure 4-6. Test Strikes

1. Access the TEST STRIKES.
2. Verify the test strike is inside the box. The test strike screen verifies the processing and plotting of electrical discharge data. A strike indication ("+") should appear inside the displayed box every 2 seconds.

   PASS - A strike indication is displayed and cleared every 2 seconds, so that it appears to flash. The strike symbol should appear inside the box.

   FAIL - If the generated strike indications appear outside of the box, or do not appear at all.

   NOTE

   OCCASIONAL strikes appearing outside the box or, that do not appear at all, should not be interpreted as failing the test.

3. Switch back and forth between the TEST STRIKES and NOISE MONITOR to check for accurate plotting of the internally generated test strikes and for electrical noise that could interfere with weather mapping. (Troubleshooting electrical noise is discussed in paragraph 4.6.)

   NOTE

   The system must pass both the NOISE MONITOR and TEST STRIKES criteria to ensure proper operation.

4.5 FAULT ISOLATION

Most problems associated with the WX-500 will cause the unit to display errors. Table 4-1 lists the WX-500 errors and table 4-2 identifies the LED indications. Refer to these tables to help diagnose system problems. Do the corrective action steps in the order listed.

Guidelines for troubleshooting electrical noise are provided in paragraph 4.6.

A total power failure is indicated if the LEDS remains dark after the system is powered ON. If no signs of power are present:

1. Reset circuit breaker.
2. Check aircraft power source.
3. Check power input at mating connector.
   a. J1-1 (14-28V PWR)
   b. J1-5 GND (AIRCRAFT PWR GND)
4. Contact our Field Service Department 1-800-453-0288 or 1-616-949-6600.

Use the test modes (refer to paragraph 4.4) as an aid in fault isolation. Information available from the test modes can help identify conditions that need to be resolved.

NOTICE

All WX-500 functions are controlled through the available MFD. The many capabilities of the WX-500 allow MFD manufacturers to create screens compatible with the various functions of their display. The display screens illustrated in this manual are intended to be characteristic of a whole group of MFDs that are configured to work with the WX-500. The examples are intended to assist in interpreting lightning data output by the WX-500. Each MFD will show the information consistent with the capabilities of that particular display. Errors may be worded similarly, but not exactly.

Table 4-1. Errors

ERROR	PROBABLE CAUSE	CORRECTIVE ACTION
ERROR 01. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 05. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 06. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 07. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 08. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 09. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.
ERROR 10. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.
ERROR 11. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.

Table 4-1. Errors (Continued)

ERROR	PROBABLE CAUSE	CORRECTIVE ACTION
ERROR 12. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.
ERROR 14. Processor Fault.	DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 15. Processor Fault.	DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 16. Antenna Fault.	Antenna or Antenna wiring	Weather mapping is inhibited. a. Check antenna wiring for opens and shorts. b. Use test cable to isolate between antenna and aircraft wiring. c. Contact Field Service.
ERROR 17. Processor Fault.	No test strikes, antenna in noisy location, or faulty antenna.	Weather mapping is inhibited. a. Check antenna wiring for opens and shorts. b. Check for presence of noise using built-in NOISE MONITOR or a WX-SM skinmapper. c. If airborne near Annapolis, may be ground transmitter. d. Fault will clear automatically if interference subsides. e. Contact Field Service.
ERROR 18. Processor Fault.	Invalid test strikes, antenna in noisy location or faulty antenna.	Weather mapping is inhibited. a. Check antenna wiring for opens and shorts. b. Check for presence of noise using built-in NOISE MONITOR or a WX-SM skinmapper. c. Fault will clear automatically if interference subsides. d. Contact Field Service.
ERROR 19. Processor Fault.	Main Processor or Antenna in noisy location.	Weather mapping is inhibited. a. Check for presence of noise using built-in NOISE MONITOR or a WX-SM skinmapper. b. If airborne near Annapolis, may be ground transmitter. c. Fault will clear automatically if interference subsides. d. Contact Field Service.
ERROR 20. Configuration Changed.	Antenna location (top/bottom, determined by processor wiring) changed since system was last powered up. This may occur the first time the system is powered on in a new installation or after the configuration wiring is changed.	Select Antenna Location a. That corresponds to Stormscope system antenna location. b. If jumper does not agree with user selection, the error message remains displayed and status will change to “fatal error”. c. Check jumper selection in mating connector assembly (refer to paragraph 2.9, table 2-2). d. At MFD, select antenna location. e. Contact Field Service
ERROR 21. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.

Table 4-1. Errors (Continued)

ERROR	PROBABLE CAUSE	CORRECTIVE ACTION
ERROR 22. Invalid XYZ Input.*	The system is configured for synchro heading but the XYZ synchro signals are not present or are out of specification.	Heading stabilization is not available. a. Check wiring between heading system and WX-500 processor. b. Check configuration wiring to make sure system is set up for proper heading type (stepper, synchro or serial). c. If heading signals become valid, the system will recover automatically. d. Contact Field Service.
ERROR 23. Invalid Heading Ref.*	The system is configured for synchro heading but the heading reference (400 Hz) is not present or out of specification.	Heading stabilization is not available. a. Check wiring between heading system and WX-500 processor. b. Check configuration wiring to make sure system is set up for proper heading type (stepper, synchro or serial). c. If the reference signal become valid, the system will recover automatically. d. Contact Field Service.
ERROR 24. MIC KEY STUCK.	Mic key (inhibit line) has been asserted for at least 60 seconds.	Weather mapping is inhibited. a. Check inhibit line wiring. b. If inhibit line not used, leave it unconnected. c. Check power to comms radio; if off, the radio may be asserting the inhibit line. d. Contact Field Service.
ERROR 25 - 34. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 35. Processor Fault.	Main or DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 36. Processor Fault.	Main or DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 40. Processor Fault.	Main processor	Continue without weather mapping functions. Contact Field Service.
ERROR 41. Processor Fault.	Main or DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 42. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 43. Invalid request.	MFD	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service.
ERROR 44 - 49. Serial Communication.	MFD	Message error will clear once processed a. Improper baud rate from MFD. b. Excessive noise on communication lines, check wiring. c. If error occurs frequently, contact Field Service.

* ERROR 22 and 23 (i.e., heading errors) are not written to the Fault Log (see paragraph 4.4.2).

Table 4-1. Errors (Continued)

ERROR	PROBABLE CAUSE	CORRECTIVE ACTION
ERROR 50. Illegal Serial Heading Value.	MFD	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service.
ERROR 51. Invalid Message.	MFD	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service.
ERROR 52. Invalid Antenna Change Request.	MFD	Message error will clear once processed a. A request was received to change the antenna mount to a location that does not match the configuration jumpers. Request is ignored. b. If error occurs frequently, contact Field Service.
ERROR 53 - 54. Communications Buffer Overload.	MFD	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service.
Heading flag indicator (FLG) appears in weather screens.	Heading Flag	a. It is normal for the heading flag indicator to be present if the heading flag line is asserted b. The heading flag indicator will also be present if a heading related fault is present (Error 22,23). c. Serial heading is selected by configuration jumpers, but not being received by WX-500.

Table 4-2. LED Status

COMMUNICATION	LED	NORMAL OPERATION	FAILED OPERATION
DSP	LED 1	ON	OFF
MAIN	LED 6	TOGGLES ON/OFF - (WHEN STRIKE IS DETECTED)*	DOES NOT TOGGLE ON/OFF WHEN STRIKE IS PRESENT
	LED 7	OFF	ON
	LED 8	ON/OFF - ONCE PER SECOND	ON or OFF (DOES NOT PULSE ONCE PER SECOND)
SERIAL	TX	RESERVED FOR FUTURE USE	RESERVED FOR FUTURE USE
	RX	RESERVED FOR FUTURE USE	RESERVED FOR FUTURE USE
	TX	ON (PULSES WHEN TX OCCURS)**	OFF or ON (DOES NOT PULSE EVERY 2 SECONDS)
	RX	ON (PULSES WHEN RX OCCURS)**	OFF or ON (DOES NOT PULSE EVERY 2 SECONDS)

* Should pulse once every 10 seconds due to the internal self test strike.

** Serial communication occurs every 2 seconds, causing LEDs to rapidly pulse. Due to transmission speed, LEDs may appear not to change conditions during TX/RX operation.

- For installation troubleshooting ignore the conditions of all LEDs not listed in table 4-2.

NOTE

If WX-500 LEDs show a failed operation call Field Service Department at 1-800-453-0288 or 1-616-949-6600 for advice and assistance.

4.6 TROUBLESHOOTING ELECTRICAL NOISE

The noise (interference) source can be isolated in two ways: by switching off one system at a time (preferably at the circuit breaker); or by running a system which cannot be switched off through all its operational modes. When the proper WX-500 response or system self-test response is restored, the offending system has been identified.

Systems that are common noise sources include:

- Alternators or generators
- Autopilot systems (especially trim servos and amplifiers)
- Pulse systems (DME, transponder)
- Strobe lights or beacons
- Air conditioners or heater blowers
- Fluorescent light systems
- Windshield heat

Electrical noise can be coupled into the WX-500 system by several avenues:

- Radiation into the Antenna.
- Grounding problems due to poor airframe bonding.
- Faulty component interference source.
- Excessive ripple on the A+ line to the Processor.

The following procedures are intended to facilitate the resolution of suspected noise problems.

1. Access the NOISE MONITOR (refer to paragraph 4.4.3) to reproduce the problem on the ground.

   If a problem cannot be reproduced on the ground, schedule a flight test for further troubleshooting.

2. To check for interference radiated into the antenna or cable:
   a. Use a WX-SM Skinmapper. The Skinmapper checks for radiated noise only.
   b. To isolate noise to antenna or cable, replace the antenna with the WX-900 connector pod (P/N 78-8060-6001-4). Repeat noise check. If the noise goes away, the problem is noise radiated into the antenna.
3. Isolate the aircraft system that generates the noise by turning them off one at a time. Then clear the strikes and observe the screen.
4. Repair, replace, or relocate the offending source, or relocate the *Stormscope* antenna or cable, if necessary.
5. Check potential noise sources close to the system (cables, boxes, components).
6. It may be necessary to relocate the antenna or offending device (e.g., cables, communications antenna).
7. All grounds must conform to cabling procedures detailed in chapter 2 (Installation - refer to paragraphs 2.8 and 2.10). The interference source must be properly grounded. It may be necessary to relocate the WX-500 system airframe grounds, or airframe grounds on the interference source.
8. Powering the processor from an isolated DC power source may identify excessive ripple on the A+ line as an interference source. It may be necessary to install an in-line filter on the processor, or on the interference source.

If the noise cannot be isolated to an aircraft system, contact our Field Service Department at 1-800-453-0288 or 1-616-949-6600 for advice and assistance.

4.7 DISPOSITION OF FAILED ITEMS

Return defective components to your authorized dealer or to::

L-3 Communications Avionics Systems, Inc.
Attn: Customer Service
5353 52nd Street, S.E.
Grand Rapids, MI USA 49512

If available, pack components in their original shipping container. If the original container is not available, pack them as follows:

CAUTION

Do not use desiccant crystals when packaging electronic assemblies. Since the assembly must be packed tightly, crystals in bag form cannot be used. The use of loose crystals may cause unnecessary damage resulting in a cleaning problem.

1. Ensure that conductive covers/caps are installed on the exposed terminals of connectors on the WX-500 processor, and NY-163 antenna.
2. The WX-500 and NY-163 contain electrostatic discharge sensitive (ESDS) parts and must be wrapped in static protective materials.
3. Wrap with bubble pack. Secure bubble pack with reinforced tape.
4. Place assembly in a cardboard box.
5. Wrap any accessories in tissue and place in the box. Fill spaces with bubble pack.
6. Attach a letter to the unit. The letter must contain:
    - Your name, address, and telephone number.
    - Purchase order number.
    - Description of component including, when applicable, model and serial number.
    - A brief description of the difficulty.
7. Shut box and seal with reinforced tape.
8. Attach packing list to outside of box.

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APPENDIX A
WX-500 INTERFACE
SIGNAL & CABLE CHARACTERISTICS

This appendix defines the electrical characteristics of all input and output signals to the WX-500 Sensor. Sufficient data is included to perform an electrical load analysis for the aircraft. The interface characteristics contained in this appendix are fully compatible with ARINC specifications where noted. Connection information identifies the unit, connector-pin and signal names as they appear on the interconnect wiring diagram.

SIGNAL	CHARACTERISTICS	
Antenna I/O	Antenna cables are shipped from the factory with the antenna connector pre-wired to one end.	
	SENSE	Signal provided by the sense channel within the antenna. Bipolar signal voltage, ±11 V Peak Max., .05 to .1 V Peak @ 200nmi WX-PA Simulation Standard ±20%, 20 Ohm output impedance, single ended. CONNECTION J2-17 (SENSE) to NY163, Pin B (Brown Wire)
	ANTENNA COM.	Antenna power return. CONNECTION J2-1 (ANT_COM) to NY163, Pin A (Drain Wire)
	ANTENNA REF.	20 Ohm output impedance. Common (ground) reference level from the antenna. CONNECTION J2-2 (ANT_REF) to NY163, Pin J (Black Wire)
	ANTENNA TEST	A 1mA, or higher, positive current output signal from the WX-500 that causes the antenna to generate a test strike. CONNECTION J2-14 (ANT_TEST) to NY163, Pin H (Blue Wire)

SIGNAL	CHARACTERISTICS

Antenna I/O (Continued)

POWER — ±12VDC ±5% regulated, less than 100mA. Power output from the WX-500 to the antenna. It is used to power the active circuitry inside the antenna.

CONNECTION J2-15 (-12V) to NY163, Pin F (Yellow Wire)
J2-14 (+12V) to NY163,Pin D (Red Wire)

X-LOOP — Signal provided by the X-Loop winding within the antenna. Bipolar signal voltage, ±11 V Peak Max., .1 V Peak @ 200nmi WX-PA Simulation Standard ±20%, 20 Ohm output impedance, single ended

CONNECTION J2-3 (X_LOOP) to NY163, Pin C (Orange Wire)

Y-LOOP — Signal provided by the Y-Loop winding within the antenna. Bipolar signal voltage, ±11 V Peak Max., .1 V Peak @ 200nmi WX-PA Simulation Standard ±20%, 20 Ohm output impedance, single ended.

CONNECTION J2-4 (Y_LOOP) to NY163, Pin G (Green Wire)

XYZ Synchro Input — These connections from the aircraft heading source (ARINC Synchro Signal Practices) allow the unit to rotate the displayed storm data as the aircraft turns.

NOTE

Synchro heading input is selected via the SYNCHRO jumper located at J3-1. (See figure 2-4, chart A.)

X, Y, Z

FREQUENCY	Min: 200 Hz Max: 600 Hz
VOLTAGE	Min: 5.0 Vrms (w/reduced angular resolution.) Max: 14.0 Vrms (external padding required for higher levels.)
INPUT IMPEDANCE	>50k Ohm
CONNECTION	J2-10 (SYNC_X) J2-23 (SYNC_Y) J2-11 (SYNC_Z)

SIGNAL	CHARACTERISTICS

XYZ Synchro Input (Continued)

H and C (high and low reference)

FREQUENCY	Min: 200 Hz Max: 600 Hz
VOLTAGE	Min: 3.5 Max: 35 Vrms
INPUT IMPEDANCE	>50k Ohm
CONNECTION	J2-13 (SYNC_REF_HI) J2-12 (SYNC_REF_LO)

Stepper Heading Input (King KCS55)

These connections will accept heading information from a King KCS55 stepper drive unit.

NOTE

Stepper heading input is selected via the STEPPER jumper located at J3-2. (See figure 2-4, chart A.)

Stepper Drive Motor 1 & 3

FREQUENCY	Min: 0 Hz Max: Turn Rate Dependent (.25 degree increments per edge transition)	
VOLTAGE	Low Level:	Min: 0 V Max: 2 V
	High Level:	Min: 13 V Max: 17 V
	Max: 35 Vrms	
INPUT IMPEDANCE	>50k Ohm	
CONNECTION	J2-23 (DRIVE MOTOR 1) to KI-525 P2-A J2-12 (DRIVE MOTOR 3) to KI-525 P2-H	

Stepper Drive Motor Unregulated +15V

VOLTAGE	Min: 13 V Max: 17 V
INPUT IMPEDANCE	>50k Ohm
CONNECTION	J2-13 (UNREG +15) to KI-525 P1-V CASE GND (AIRFRAME GROUND) to KI-525 P1-J)

SIGNAL	CHARACTERISTICS

Heading Valid

Indicates that the heading source is providing valid heading information.

NOTE

The active polarity (i.e., HEADING FLAG (+) or HEADING FLAG (-)) is selected via the FLAG_SENSE jumper located at J3-4. (See figure 2-4, chart A.) The FLAG_SENSE jumper is read at power up.

CONNECTION	J2-24 (HDG_FLAG+)	
	J2-25 (HDG_FLAG-)	
VOLTAGE	High Sense (FLAGHI - FLAGLO):	
		Min: 5.0V
		Max: 30.0V
	Low Sense (FLAGHI - FLAGLO):	
		Min: -30.0V
		Max: 1.0V
INPUT IMPEDANCE	>2k Ohm	
INPUT CURRENT	Active:	Min: 1mA
		Max: 15mA

Remote Clear

This input may be connected to an external switch (normally a yoke mounted switch). When activated in weather mode, the strike buffers are cleared and all displayed lightning strikes are erased. This input is diode isolated and debounced.

CONNECTION	J3-6 (CLEAR)	
CABLE	Minimum 22 AWG wire.	
VOLTAGE	Active:	Min: 0.0V
		Max: 1.5V
	Inactive	Min: 3.5V or Open (Internal 4.7K pull-up)
		Max: 5.0V

Inhibit

This input may be connected to the switch on the microphone of the aircraft's communications transmitter. When it is active, strike processing is disabled to prevent transmitted signals from corrupting the storm data. This input is diode isolated.

NOTE

The inhibit line is not needed if the *Stormscope* antenna and communications antennas are on opposite sides of the fuselage.

CONNECTION	J2-22 ($\overline{\text{INHIBIT}}$)	
CABLE	Minimum 22 AWG wire.	
VOLTAGE	Active:	Min: 0.0V
		Max: 0.7V
	Inactive	Min: 2.4V
		Max: 28.4V

SIGNAL	CHARACTERISTICS
Power Input	11-32 VDC. The WX-500 is protected via an internal fuse (see para 4.6). For external circuit breaker protection, a 5 A circuit breaker is recommended for 14 V aircraft systems and a 3 A circuit breaker for 28 V systems.
	CONNECTION: J1-1, & J1-6 (A/C POWER 14-28 VOLTS) J1-5 & J1-9 (A/C GROUND)
	CABLE: Use twisted shielded pair cable, minimum 20 AWG.
	VOLTAGE: 11 - 32 VDC
	CURRENT: 0.82 A (Maximum) @ 12 VDC 0.38 A (Maximum) @ 28 VDC
Configuration Jumpers	The configuration jumpers are for used to identify the type of installation interface with the WX-500 sensor. (See figure 2-4, chart A.)
	SYNCHRO: CONNECTION J3-1
	STEPPER: CONNECTION J3-2
	T/B: CONNECTION J3-3 (Top or Bottom antenna location)
	FLAG_SENSE: CONNECTION J3-4
	CABLE: Minimum 22 AWG wire
	VOLTAGE: (See figure 2-4, chart A)
Configuration Ground	The configuration grounds are provided for use with the configuration jumpers.
	CONNECTION: J2-6, J2-7, J2-8, J2-18, J2-19, J2-20 & J2-21 (CONFIG_GND) See figure 2-4, chart A.
System On	This open collector output is provided for displays that require a signal to be asserted when the lightning detection system is in a power on condition. For the SYSTEM_ON. If a POWER ON SIGNAL IS NOT REQUIRED, THIS OUTPUT MUST REMAIN UNCONNECTED. This output anticipates a future need. As of this writing, there are no WX-500 compatible MFDs that require a power on signal.
	CONNECTION: J3-7 (SYSTEM_ON)
	CABLE: Minimum 22 AWG wire

SIGNAL	CHARACTERISTICS

Multifunction Display (MFD)

The WX-500 is designed to support a single MFD. It can be connected to either the RS-422 or RS-232 interface port.

NOTE

The WX-500 is designed to support a single MFD. It may be possible to slave an additional display(s) by connecting it to the WX-500 TX signal lines (i.e., RS232_TX - J3-20 or RS-422_TX+ J3-25 and RS_422_TX- J3-13) in parallel with the master. The slave display must not transmit to the WX-500 (i.e., no connection to the WX-500 RX lines).

RS-232		
CONNECTION	TX	J3-20
	RX	J3-8
	RS-232_GND	J2-5
CABLE	Twisted shielded triad 24 AWG wire	
VOLTAGE	Logic 0 (space) Min: +5V, Max: +15V	
	Logic 1 (mark) Min: -15V, Max: -5V	
BAUD RATE	9600	
LOAD IMPEDANCE	3KΩ Min.	
RS-422		
CONNECTION	TX+ J3-25, TX- J3-13	
	RX+ J3-24, RX- J3-12	
	GND CASE_GND	
CABLE	Twisted shielded pair 22 AWG	
VOLTAGE	Logic 0 (space) Min (A-B): +2V, Max (A-B) +6V	
	Logic 1 (mark) Min (A-B): -6V, Max (A-B): -2V	
BAUD RATE	9600	
LOAD IMPEDANCE	3KΩ Min.	

APPENDIX B
ENVIRONMENTAL QUALIFICATION FORMS

This appendix includes the environmental qualification forms required for the WX-500 system. Forms included are for the WX-500 and NY163 antenna.

B.1 WX-500 ENVIRONMENTAL QUALIFICATION FORM
(Reference Document 016-11521-001, Rev. B)

MODEL: WX-500 TSO NO: TSO-C110a
PART NO: 805-11500-001 APPLICABLE SPEC. NO: RTCA/DO-191

MANUFACTURER: BFGoodrich Avionics Systems, Inc.
ADDRESS: 1105 Schrock Road, Suite 800, Columbus, Ohio 43229 (614)825-2001

CONDITION	SECTION/ PARAGRAPH	TEST DESCRIPTION
Temperature and Altitude	4.0	Tested to Category F2-
Operating Low Temperature	4.5.1	-55 Degrees Celsius
Operating High Temperature	4.5.3	+70 Degrees Celsius
Short-Time Operating High Temperature	4.5.2	+70 Degrees Celsius
Loss of Cooling	4.5.4	- Not Applicable -
Ground Survival Low Temperature	4.5.1	-55 Degrees Celsius
Ground Survival High Temperature	4.5.2	+85 Degrees Celsius
Altitude	4.6	55,000 Feet MSL
Temperature Variation	5.0	Tested to Category B
Humidity	6.0	Tested to Category A
Operational Shock and Crash Safety	7.0	
Operational Shock	7.2	6 g's Peak
Crash Safety	7.3	15 g's all axes
Vibration	8.0	Tested to Categories [NBM] Instrument Panel Mount Without Vibration Isolators
Explosion Proofness	9.0	Category X - No Test Required
Waterproofness	10.0	Category X - No Test Required
Fluids Susceptibility	11.0	Category X - No Test Required
Sand and Dust	12.0	Category X - No Test Required
Fungus Resistance	13.0	Category X - No Test Required

WX-500 ENVIRONMENTAL QUALIFICATION FORM (Continued)

CONDITION	SECTION/ PARAGRAPH	TEST DESCRIPTION
Salt Spray	14.0	Category X - No Test Required
Magnetic Effect	15.0	Tested to Class Z
Power Input	16.0	Tested to Category AB
Voltage Spike	17.0	Tested to Category A
Audio Frequency Susceptibility	18.0	Tested to Category B
Induced Signal Susceptibility	19.0	Tested to Category Z
Radio Frequency Susceptibility	20.0	Tested to Category T
Radio Frequency Emission	21.0	Tested to Category Z
Lightning Induced Transient Susceptibility	22.0	Tested to Category AZEZ
Lightning Direct Effects	23.0	Category X - No Test Required
Icing	24.0	Category X - No Test Required
Other Tests		No Test Required

B.2 NY163 ANTENNA ENVIRONMENTAL QUALIFICATION FORM

(Reference Document 016-10930-001, Rev. 01)

MODEL: NY163 TSO NO: TSO-C110a
PART NO: 805-10930-001 APPLICABLE SPEC. NO: RTCA/DO-197

MANUFACTURER: BFGoodrich FlightSystems, Inc.
ADDRESS: 2001 Polaris Parkway, Columbus, Ohio 43240-2001, (614)825-2001

CONDITION	SECTION/ PARAGRAPH	TEST DESCRIPTION
Temperature and Altitude	4.0	Tested to Category F2-
Operating Low Temperature	4.5.1	-55 Degrees Celsius
Operating High Temperature	4.5.2 & 4.5.3	+70 Degrees Celsius
Loss of Cooling	4.5.4	- Not Applicable -
Ground Survival Low Temperature	4.5.1	-55 Degrees Celsius
Ground Survival High Temperature	4.5.2	+85 Degrees Celsius
Altitude	4.6	55,000 Feet MSL
Temperature Variation	5.0	Tested to Category A
Humidity	6.0	Tested to Category C
Operational Shock and Crash Safety	7.0	
Operational Shock	7.2	6 g's Peak
Crash Safety	7.3	15 g's all axes
Vibration	8.0	YLMC
Explosion Proofness	9.0	Category X - No Test Required
Waterproofness	10.0	Category S - Hermetically Sealed
Fluids Susceptibility	11.0	Category F - Ethylene Glycol
Sand and Dust	12.0	Category X - No Test Required
Fungus Resistance	13.0	Category X - No Test Required
Salt Spray	14.0	Category X - No Test Required
Magnetic Effect	15.0	Category X - No Test Required
Power Input	16.0	Category X - No Test Required
Voltage Spike	17.0	Category X - No Test Required
Audio Frequency Susceptibility	18.0	Category X - No Test Required

NY163 ANTENNA ENVIRONMENTAL QUALIFICATION FORM (Continued)

CONDITION	SECTION/ PARAGRAPH	TEST DESCRIPTION
Induced Signal Susceptibility	19.0	Tested to Category Z
Radio Frequency Susceptibility	20.0	Category X - No Test Required
Radio Frequency Emission	21.0	Tested to Category Z
Lightning Induced Transient Susceptibility	22.0	Tested to Category XXE3
Lightning Direct Effects	23.0	Category X - No Test Required
Icing	24.0	Category X - No Test Required
Other Tests		
L-Band Interference		BFGoodrich FlightSystems Defined Test

APPENDIX C
DISPLAY INTERFACE

This appendix lists the Multi Function Displays (MFDs) that are compatible with the WX-500 (for displays and interconnect information see table B-1 (RS232 interface) or B-2 (RS422 interface). For interconnect wiring diagram reference figure 2-4. Interface to the MFD is via a standard RS-232 or RS-422 serial port.

CAUTION

Every effort has been made to correctly identify the part numbers and pin numbers listed in tables B-1 and B-2. However, Goodrich Avionics Systems cannot be responsible for changes made by other manufacturers. It is the responsibility of the installer to confirm compatibility. Contact the display manufacturer for the latest information relating to their product.

Table C-1. WX-500 Compatible Displays – RS-232 Interface

		WX-500 INTERCONNECT WIRING			
MANUFACTURER/MODEL	**REMARKS**	**J3-20 RS232TX**	**J3-8 RS232RX**	**J2-5 RS232GND**	**CASE GND**
ARCHANGEL AE1002 or AE1004	Requires software version 1.1 or later. Use cable CDS901-3.	GREEN	WHITE	BLACK	N/C
ARNAV MFD 5000 SERIES	RPU: P/N 453-2530-08 Requires software V520CG or later. Connected as an RS-232 Auxiliary device (P2) via the 24 pin MFD RPU connector.	RPU-17	RPU-16	RPU-13	RPU-18
ARNAV ICDS 2000	Requires software V920AE or later	P529-12	P529-11	P529-8	
AVIDYNE MFD 5RR-MFC-XXX	Tray Assembly: P/N D98-00002 CPU/Display: P/N D98-00001-XX Software: P/N: 530-0101 release 2.0 or later. Connected via P2 located at tray assembly.	P2-2	P2-20	P2-34	P2-36
L-3 Avionics Systems RGC250/RGC350	Provides interface to various weather radar indicators Connected via J1 at RGC mating connector assembly.	J1-3	J1-4	J1-5	

Table C-1. WX-500 Compatible Displays – RS232 Interface

(Continued)

		WX-500 INTERCONNECT WIRING			
MANUFACTURER/MODEL	**REMARKS**	**J3-20 RS232TX**	**J3-8 RS232RX**	**J2-5 RS232GND**	**CASE GND**
EVENTIDE ARGUS 5000-25-xx & 5000CE ARGUS 7000-25-xx & 7000/CE	Requires software version 05.1x or later. Connected via connector 1P1.	1P1-18	1P1-19	1P1-10	1P1-12 & 1P1-24
GARMIN® GPS 400 GNC 420 GNS 430	1. When heading is available to the 4xx, it outputs serial heading to the WX-500. Where possible, the WX-500 should be connected directly to the aircraft heading source (synchro preferred). See paragraph 2.7. 2. Requires software V2.20 or higher.	CHAN 4 P4001-55 CHAN 3 P4001-42 CHAN 2 P4001-59 CHAN 1 P4001-57	CHAN 4 P4001-54 CHAN 3 P4001-4 CHAN 2 P4001-58 CHAN 1 P4001-56	Aircraft Ground	
GARMIN® GNS 530	1. When heading is available to the GNS, the GNS outputs serial heading to the WX-500. Where possible, the WX-500 should be connected directly to the aircraft heading source (synchro preferred). See paragraph 2.7. 2. Requires software V2.05 or higher.	CHAN 4 P5001-55 CHAN 3 P5001-42 CHAN 2 P5001-59 CHAN 1 P5001-57	CHAN 4 P5001-54 CHAN 3 P5001-4 CHAN 2 P5001-58 CHAN 1 P5001-56	Aircraft Ground	
SANDEL SN3308	Requires software version 1.0 or later.	P3-32	P3-30	P1-3	
L-3 Avionics Systems I-linc UPSAT MX-20	Port 1 Port 2 Port 3	J1-4 J1-21 J1-7	J1-5 J1-22 J1-6	J1-23 J1-3 J1-25	

Table C-2. WX-500 Compatible Displays – RS422 Interface

		WX-500 INTERCONNECT WIRING			
MANUFACTURER/MODEL	**REMARKS**	**J3-25 RS422TX+**	**J3-13 RS422TX-**	**J2-24 RS422RX+**	**J3-12 RS422RX-**
ARCHANGEL AE1002 or AE1004	Requires software version 1.1 or later. Use cable CDS901-3.	WHITE	BLACK	RED	GREEN
L-3 Avionics Systems I-linc UPSAT MX-20	Port 4	J1-11	J1-26	J1-8	J1-10