Stormscope®

Series II Weather Mapping Systems

WX-1000 Installation Manual

This manual contains installation instructions and recommended flightline maintenance information for the WX-1000 *Stormscope*®. This information is supplemented and kept current by revisions, Service Memos, and Service Bulletins.

communications

78-8051-9150-5 (Rev. E)

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

25 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-1000 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 Form

This appendix includes the environmental qualification forms required for the WX-1000 system.

Appendix C – RS-232/RS-422 NAVAID Option

This appendix contains information pertaining to LORAN/GPS receivers that interface with the WX-1000 RS-232/RS-422 NAVAID.

Appendix D – ARINC-429 NAVAID Option

This appendix contains information pertaining to navigation systems that interface with the WX-1000 ARINC-429 NAVAID.

Appendix E – ARINC-429 EFIS Option

This appendix contains information pertaining to display systems that interface with the WX-1000 ARINC-429 EFIS option.

LIST OF EFFECTIVE PAGES

Dates of original and changed pages are:

Original (Rev. 00) ..... 21 January 1993
Revision (01) ..... 20 August 1996
Revision (C) ..... 26 April 2000
Revision (D) ..... 13 November 2001
Revision (E) ..... 25 September 2003

Total number of pages in this publication consists of the following:

Title Page	4-1 thru 4-28
A Page	A-1 thru A-6
i thru viii	B-1 thru B-6
1-1 thru 1-16	C-1 thru C-6
2-1 thru 2-22	D-1 thru D-2
3-1 thru 3-14	E-1 thru E-4

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.
- Added information to interface with the RGC350.
- Environmental qualification forms are now included in Appendix B.
- 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. If further information is required, contact:

L-3 Communications Avionics Systems, Inc.
Attn: Customer Service
5353 52nd Street, S.E.
Grand Rapids, MI USA 49512
Tel. (800) 453-0288 or (616) 949-6600

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:

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

TABLE OF CONTENTS

Chapter 1
GENERAL INFORMATION

Chapter 2
INSTALLATION

TABLE OF CONTENTS

Chapter 2
INSTALLATION
(Continued)

Chapter 3
INSTALLATION CHECKOUT

Chapter 4
MAINTENANCE

TABLE OF CONTENTS

Chapter 4
MAINTENANCE
(Continued)

Paragraph Page

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS

(Continued)

List of Tables

This page intentionally left blank.

CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION

This section contains a functional description of the *Stormscope*® model WX-1000 Series II weather mapping systems (i.e., the WX-1000, WX-1000+, and WX-1000E), outlines the main features of each system, and provides a block diagram. The features of each system are summarized in Tables 1-1 and 1-2.

Table 1-1. WX-1000 Features

PROCESSOR P/N	FEATURES					
	WEATHER MAPPING	CRT DISPLAY	HEADING STABILIZATION	NAVAID RS232/RS422	NAVAID ARINC 429	EFIS ARINC 429
WX-1000 PROCESSOR: 78-8060-5790-3	X	X				
WX-1000+ PROCESSOR: 78-8051-9160-4	X	X	X			
WX-1000E PROCESSOR: 78-8060-5941-2 805-11000-001 805-11000-002 (Refer to Table 1-2.)	X	X	X	X		
WX-1000E PROCESSOR: 78-8060-6092-3 (Refer to Table 1-2.)	X	X	X		X	
WX-1000E PROCESSOR: 78-8060-6086-5 805-11001-001 805-11001-002 805-11001-003 805-11001-004 (Refer to Table 1-2.)	X	(OPTIONAL)	X			X

Table 1-2. WX-1000E Interface Options

INTERFACE	PROCESSOR PART NUMBER
NAVAID RS-232	78-8060-5941-2 with MOD 5 or 805-11000-001
NAVAID RS-422	78-8060-5941-2 with MOD 6 or 805-11000-002
NAVAID ARINC 429	
RX LO/TX LO	78-8060-6092-3
EFIS ARINC 429	
RX HI/TX LO	78-8060-6086-5 with MOD 5 or 805-11001-001
RX HI/TX HI	78-8060-6086-5 with MOD 6 or 805-11001-002
RX LO/TX LO	78-8060-6086-5 with MOD 7 or 805-11001-003
RX LO/TX HI	78-8060-6086-5 with MOD 8 or 805-11001-004

1.2 FUNCTIONAL DESCRIPTION

The WX-1000 is a TSO certified thunderstorm mapping system designed for airborne use. Its primary purpose is to alert the flight crew to the presence of thunderstorm activity. The object is to provide a means for the pilot to make thunderstorm avoidance decisions. The WX-1000 weather mapping systems comply with F.A.A. TSO-C110a and are approved by major governments and regulatory agencies outside the United States.

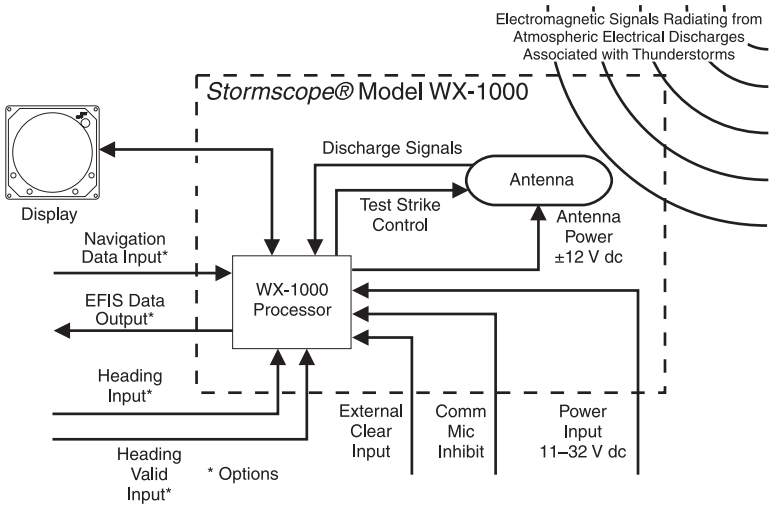


Figure 1-1. WX-1000 Functional Diagram

Figure 1-1 is a simplified functional diagram that shows how the components are connected to each other and to other aircraft systems. The processor via an external antenna assembly receives signals from electrical discharges (lightning) associated with thunderstorms. These signals are processed and the resulting data (location of the signal origin) are presented on a display. The heading input is used to adjust the position of the discharge points on the display during changes of aircraft heading.

1.2.1 WX-1000

The WX-1000 maps electrical discharge activity 360 degrees around the aircraft to a distance of 200 nautical miles. The system can be set to view electrical activity 360 degrees around the aircraft or 120 degrees forward. Range can be set to 200, 100, 50, or 25 nmi. The WX-1000 also includes provisions for six installer-programmable checklists, a real-time digital clock (time and date), elapsed-time counter and stopwatch timer.

1.2.2 WX-1000+ with Heading Stabilization

The WX-1000+ includes all the features of the WX-1000 with the addition of heading stabilization. Heading stabilization automatically adjusts the position of the discharge points on the display when the aircraft changes position.

1.2.3 WX-1000E with RS-232/RS-422 NAVAID Option

The WX-1000E with the RS-232/RS-422 NAVAID Option maintains all the features of the WX-1000 with the addition of an opto-isolated RS-232C or RS422 serial communications port to receive navigation information from a variety of LORAN and GPS receivers (see Appendix B). This enables the WX-1000 to display a comprehensive weather avoidance and navigation picture.

1.2.4 WX-1000E with ARINC 429 NAVAID Option

The WX-1000E with the ARINC 429 NAVAID Option provides the capability to receive navigation data via an ARINC 429 low speed (12.5 kHz) data bus (see Appendix C). It maintains all the features of the WX-1000E with the RS-232/RS-422 NAVAID option.

1.2.5 WX-1000E with ARINC 429 EFIS Option

The WX-1000E with the ARINC 429 EFIS Option transmits thunderstorm information to an EFIS display system or a weather radar indicator via an ARINC 429 serial data link (see Appendix D). Interface with a weather radar indicator requires the L-3 Avionics Systems RGC250 (refer to the RGC250 Installation Manual). This option also enables the WX-1000 to receive heading stabilization data from an ARINC 429 source.

The WX-1000/SKY497 display can be installed with this option or the EFIS can be the only display. If the WX-1000 display is not installed, thunderstorm information will be the only data available (e.g., features such as checklists, date/time, stopwatch, elapsed timers, etc. will not be available). Post installation checkout of the WX-1000E requires a WX-1000 display. When installing the WX-1000 processor be sure to include a display cable (minimum 2-ft.).

1.3 PHYSICAL DESCRIPTION

The WX-1000 consists of three main components; processor, display and antenna. The WX-1000 display is optional with the ARINC 429 EFIS option.

1.3.1 Processor

The processor (figure 1-2) is a 1/2 short dwarf ATR (Austin Trumbull Radio Racking) unit which is remotely mounted in the aircraft. The mounting tray is shown in figure 1-3.

Connections are made through a 50 pin D-subminiature connector on the back panel. An additional 50 pin connector is provided on the back panel for option jumpers and for the expansion boards used with the WX-1000E processors.

NOTE
DIMENSIONS ARE IN INCHES (MILLIMETERS)

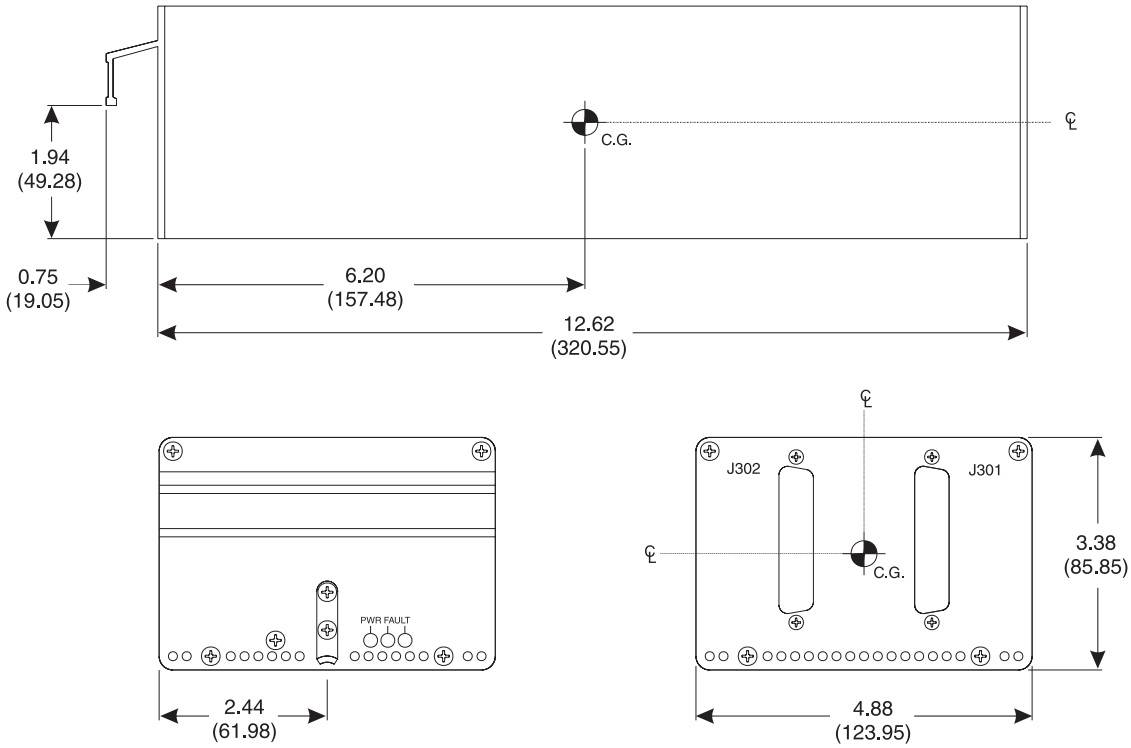


Figure 1-2. Processor Outline

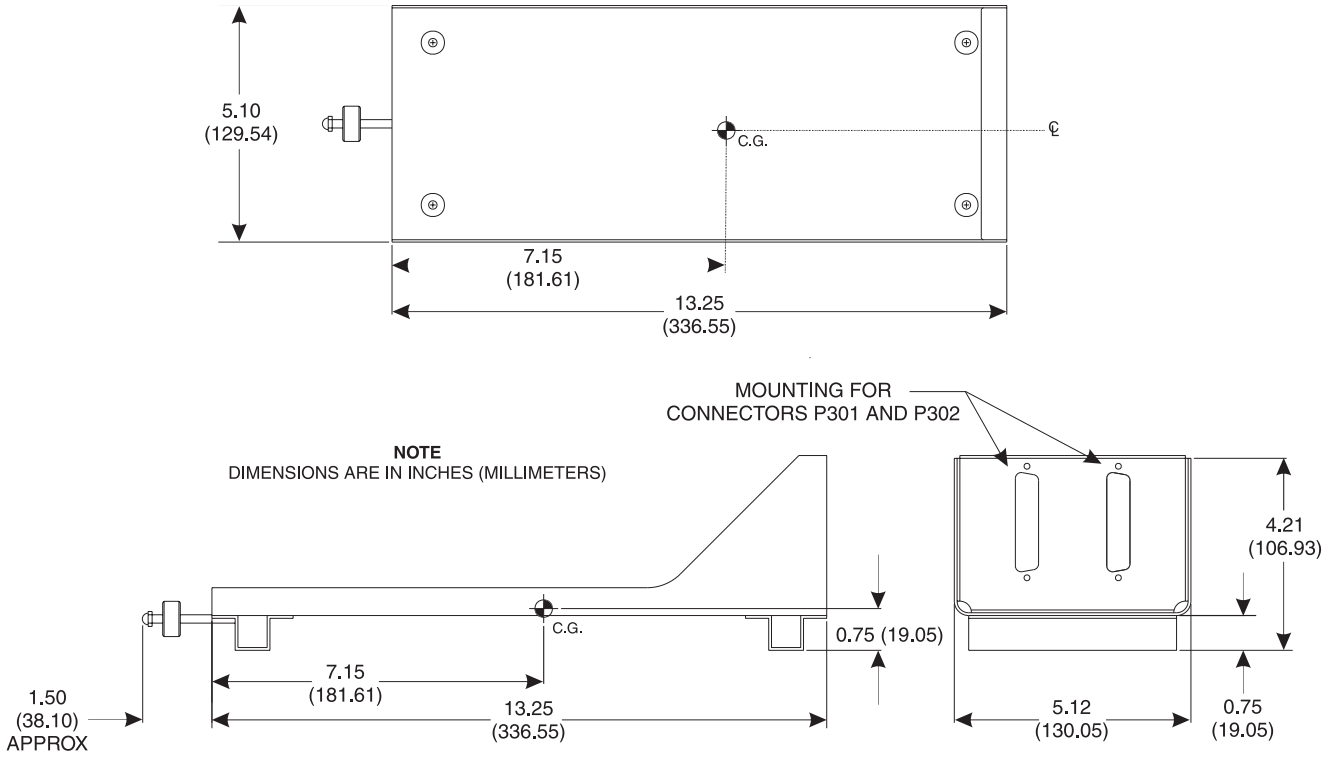


Figure 1-3. Processor Tray Outline

1.3.2 WX-1000/SKY497 Display

The display unit (figure 1-4) mounts in a standard 3ATI panel cutout. All connections to the display are made through a single 25-position male D-subminiature connector on the back panel. The display is available with either a black bezel (P/N 78-8060-5900-8) or gray bezel (P/N 78-8060-5900-9). The display does not require a mounting tray however; an optional mooring clamp is available for increased stability in high-vibration environments (see paragraph 2.12.2).

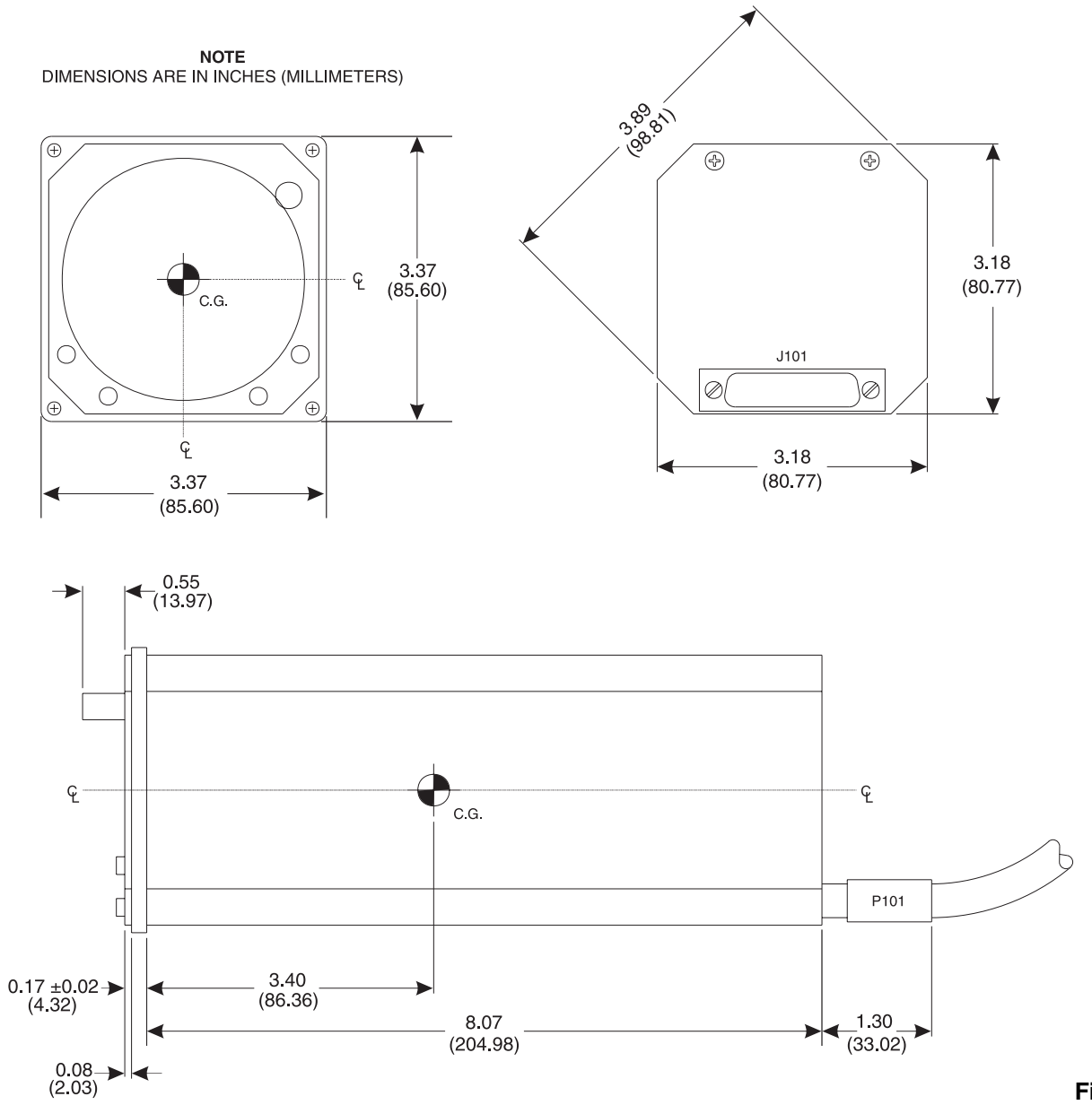


Figure 1-4. Display Outline

1.3.3 Antenna

The antenna (figure 1-5) is an aerodynamically shaped, combined crossed-loop and sense antenna, incorporating internal active circuitry. The antenna is sealed against environmental extremes and is non-repairable. It is available with either a white (P/N 78-8051-9200-8) or black (P/N 78-8051-9220-6) finish. Mounting is external to the aircraft and connections are made through a 19-pin connector. A doubler plate (figure 1-6) is supplied with each unit.

CAUTION

Do not paint the antenna! Painting the antenna may cause system failure and will void the warranty!

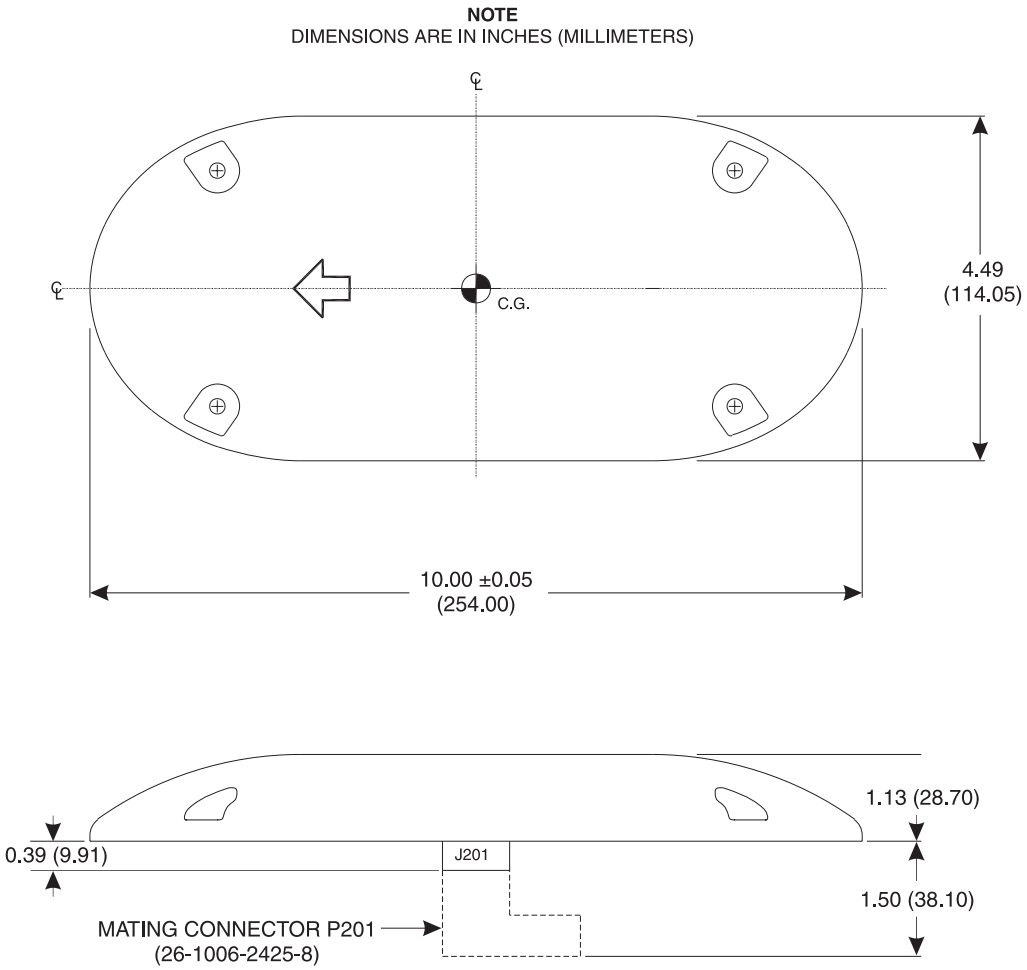


Figure 1-5. Antenna Outline

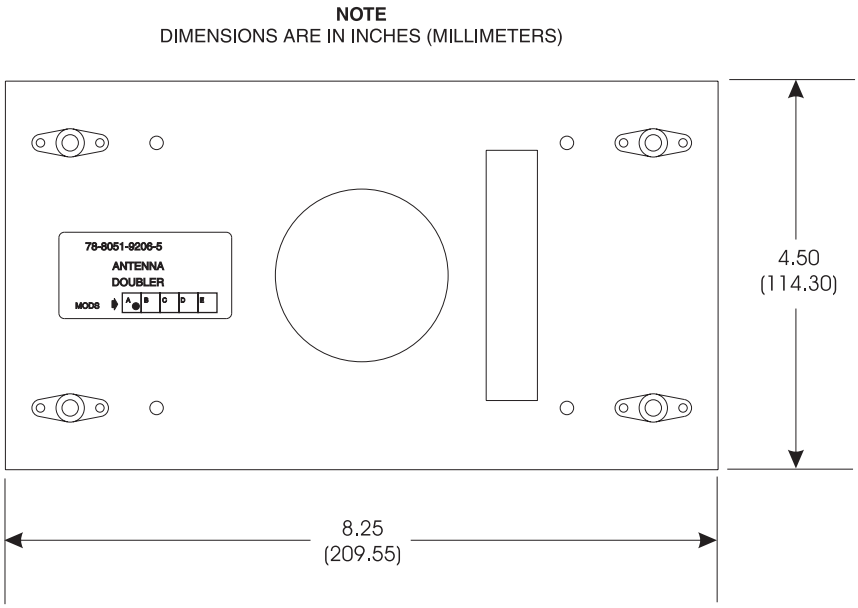


Figure 1-6. Antenna Doubler Plate Outline

1.4 SPECIFICATIONS

1.4.1 Processor

PART NUMBER DEFINITION:

78-8060-5790-3	WX-1000
78-8060-5941-2	WX-1000E (RS232/RS422 NAVAID)
78-8060-6086-5	WX-1000E (ARINC 429 EFIS)
78-8060-6092-3	WX-1000E (ARINC 429 NAVAID RX LO/TX LO)
78-8051-9160-4	WX-1000+
805-11000-001	WX-1000E (RS232 NAVAID)
805-11000-002	WX-1000E (RS422 NAVAID)
805-11001-001	WX-1000E (ARINC 429 EFIS RX HI/TX LO)
805-11001-002	WX-1000E (ARINC 429 EFIS RX HI/TX HI)
805-11001-003	WX-1000E (ARINC 429 EFIS RX LO/TX LO)
805-11001-004	WX-1000E (ARINC 429 EFIS RX LO/TX HI)

SIZE:

Processor
- Height: 3.38 inches (8.59 centimeters)
- Width: 4.88 inches (12.40 centimeters)
- Depth: 12.62 inches (32.05 centimeters)

Mounting Tray (P/N 78-8051-9180-2)
- Height: 3.38 inches (8.59 centimeters)
- Width: 4.88 inches (12.40 centimeters)
- Depth: 12.62 inches (32.05 centimeters)

WEIGHT:

Processor
- 6.5 lb (3.0 kg)
- 6.9 lb (3.2 kg) with EFIS Option
- 6.9 lb (3.2 kg) with NAVAID Option

Mounting Tray (P/N 78-8051-9180-2)
- 0.7 lb (0.3 kg)

OPERATING TEMPERATURE:

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

STORAGE TEMPERATURE:

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

OPERATING ALTITUDE:

55,000 feet (Maximum)

TSO COMPLIANCE:

C110a

RTCA COMPLIANCE:

Processor Software
- DO-178A Level 2

Processor Environmental
- DO-160B (For further details refer to Appendix B.)

POWER REQUIREMENTS:

10.5 to 32 V dc, 28 W

1.4.2 Display

PART NUMBER DEFINITION:

78-8060-5900-8 (Black Bezel)
78-8060-5900-9 (Gray Bezel)

SIZE:

Height: 3.37 inches (8.56 centimeters)
Width: 3.37 inches (8.56 centimeters)
Depth: 8.24 inches (20.92 centimeters)

WEIGHT:

2.5 ± 0.2 lb (1.1 ±0.1 kg)

OPERATING TEMPERATURE:

-20 to +55 degrees Celsius (-4 to +131 degrees Fahrenheit)

STORAGE TEMPERATURE:

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

OPERATING ALTITUDE:

55,000 feet (Maximum)

TSO COMPLIANCE:

FAA C110a & C113
JTSO C113

RTCA COMPLIANCE:

DO-160C (For further details refer to Appendix B.)

1.4.3 Antenna

PART NUMBER DEFINITION:

78-8051-9200-8 (White Finish)
78-8051-9220-6 (Black Finish)

SIZE:

Height: 1.13 inches (2.87 centimeters)
Width: 4.49 inches (11.40 centimeters)
Depth: 10.06 inches (25.60 centimeters)

WEIGHT:

1.9 lb (0.86 kg)

OPERATING TEMPERATURE:

-55 to +55 degrees Celsius (-67 to +131 degrees Fahrenheit)

STORAGE TEMPERATURE:

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

OPERATING ALTITUDE:

55,000 feet (Maximum)

TSO COMPLIANCE:

C110a

RTCA COMPLIANCE:

DO-160B (For further details refer to Appendix B.)

1.5 MODIFICATIONS AND SOFTWARE REVISIONS

Modifications (MODS) and software revisions for the WX-1000 processor are identified by an entry on the S/N & I.D. tag and listed in tables 1-3, 1-4, 1-5 and 1-6. The processor software version can be verified via the service menu.

Table 1-3. 78- Series Processor Hardware Modifications

PROCESSOR	MOD	DESCRIPTION
78-8060-5790-3 WX-1000 & 78-8051-9160-4 WX-1000+	1	Replaces op-amps on the analog PCB to preclude a potential ranging discrepancy inside of 15 nautical miles (reference SB #67 that identifies the affected serial numbers).
	2	Add weep holes and foam strips to the front and rear panels and RTV to certain components so that the processor can better endure extreme environmental conditions encountered in certain helicopter installations (reference SB #80).
	3	MOD 3 identifies units, returned for repair, that have been inspected to ensure that the failures were not caused by secondary source parts that did not perform as expected. The suspect parts were used in a limited number of units as a replacement for parts discontinued by the original manufacturer. MOD 3 is an inspection of the analog PCB assembly. It verifies and incorporates changes, if applicable, to the antenna X & Y loop input bandpass circuit. (Reference SB #96.)
	4	A production change to eliminate the need for an external isolation diode. (Reference Service Memo 115 and Service Bulletin 101.)
78-8060-5941-2 WX-1000E RS-232/RS-422 NAVAID	1	Replaces op-amps on the analog PCB to preclude a potential ranging discrepancy inside of 15 nautical miles (reference SB #67 that identifies the affected serial numbers).
	2	Add weep holes and foam strips to the front and rear panels and RTV to certain components so that the processor can better endure extreme environmental conditions encountered in certain helicopter installations (reference SB #80).
	3	MOD 3 identifies units, returned for repair, that have been inspected to ensure that the failures were not caused by secondary source parts that did not perform as expected. The suspect parts were used in a limited number of units as a replacement for parts discontinued by the original manufacturer. MOD 3 is an inspection of the analog PCB assembly. It verifies and incorporates changes, if applicable, to the antenna X & Y loop input bandpass circuit. (Reference SB #96.)
	4	A production change to eliminate the need for an external isolation diode. (Reference Service Memo 115 and Service Bulletin 101.)
	5	Identifies processor set for RS-232. (Reference Service Bulletin 114.)
	6	Identifies processor set for RS-422. (Reference Service Bulletin 114.)
78-8060-6086-5 WX-1000E ARINC 429 EFIS	1	Replaces op-amps on the analog PCB to preclude a potential ranging discrepancy inside of 15 nautical miles (reference SB #67 that identifies the affected serial numbers).
	2	Add weep holes and foam strips to the front and rear panels and RTV to certain components so that the processor can better endure extreme environmental conditions encountered in certain helicopter installations (reference SB #80).
	3	MOD 3 identifies units, returned for repair, that have been inspected to ensure that the failures were not caused by secondary source parts that did not perform as expected. The suspect parts were used in a limited number of units as a replacement for parts discontinued by the original manufacturer. MOD 3 is an inspection of the analog PCB assembly. It verifies and incorporates changes, if applicable, to the antenna X & Y loop input bandpass circuit. (Reference SB #96.)
	4	A production change to eliminate the need for an external isolation diode. (Reference Service Memo 115 and Service Bulletin 101.)
	5	Identifies processor set for ARINC 429 RX HIGH/TX LOW (Reference Service Bulletin 116.)
	6	Identifies processor set for ARINC 429 RX HIGH/TX HIGH. (Reference Service Bulletin 116.)
	7	Identifies processor set for ARINC 429 RX LOW/TX LOW. (Reference Service Bulletin 116.)
	8	Identifies processor set for ARINC 429 RX LOW/TX HIGH. (Reference Service Bulletin 116.)

Table 1-3. 78- Series Processor Hardware Modifications

(Continued)

PROCESSOR	MOD	DESCRIPTION
78-8060-6092-3 WX-1000E ARINC 429 NAVAID	1	Replaces op-amps on the analog PCB to preclude a potential ranging discrepancy inside of 15 nautical miles (reference SB #67 that identifies the affected serial numbers).
	2	Add weep holes and foam strips to the front and rear panels and RTV to certain components so that the processor can better endure extreme environmental conditions encountered in certain helicopter installations (reference SB #80).
	3	MOD 3 identifies units, returned for repair, that have been inspected to ensure that the failures were not caused by secondary source parts that did not perform as expected. The suspect parts were used in a limited number of units as a replacement for parts discontinued by the original manufacturer. MOD 3 is an inspection of the analog PCB assembly. It verifies and incorporates changes, if applicable, to the antenna X & Y loop input bandpass circuit. (Reference SB #96.)
	4	A production change to eliminate the need for an external isolation diode. (Reference Service Memo 115 and Service Bulletin 101.)

Table 1-4. WX-1000 Software Revisions

Processors: 78-8060-5790-3

VERSION	COMPLIANCE	DESCRIPTION (SIGNIFICANT ENHANCEMENTS)
1.10	----------	Production Release 9/88
1.20	Optional	Change to verify that the strike test is running.
1.21	Optional	Change to prevent vertical bars from appearing on the display during a vertical retrace.
2.0	Optional	Added: • More extensive service menu. • Provisions to self-recover from noise-induced errors. • Error numbers to error messages.
3.0	Optional	Service Menu updates.
3.10	----------	Level change to track with WX-1000+/E.
3.20	----------	Level change to track with WX-1000+/E.
3.21	Optional	In the self-test screen, changed company name from FlightSystems to Avionics Systems.
3.22	Optional	Corrected potential timing problem relating to hardware jumper configuration.

Table 1-5. WX-1000E (429 NAVAID) Software Revisions

Processors: 78-8060-6092-3

VERSION	COMPLIANCE	DESCRIPTION (SIGNIFICANT ENHANCEMENTS)
1.00	----------	Production Release 3/93
1.01	Optional	Corrected potential timing problem relating to hardware jumper configuration.

Table 1-6. WX-1000+/E/E (429 EFIS) Software Revisions

Processors: 78-8060-5941-2 805-11000-001 805-11001-002
78-8060-6086-5 805-11000-002 805-11001-003
78-8051-9160-4 805-11001-001 805-11001-004

VERSION	COMPLIANCE	DESCRIPTION (SIGNIFICANT ENHANCEMENTS)
1.10		Production Release 9/88
1.20	Optional	Change to: • Verify that the strike test is running. • Prevent a synchro fault if heading stabilization is toggled on and off during a flag condition.
1.21	Optional	Change to prevent vertical bars from appearing on the display during a vertical retrace.
2.0	Optional	Added: • More extensive service menu. • Provisions to self-recover from noise-induced errors. • Error numbers to error messages. • A jumper between P302-44 and P302-27 to program HEADING VALID FLAG.
3.0	Optional	Added: • RS232/RS422 NAVAID Option • Service Menu Updates • Additional Self-Test Functions
3.10	Optional	Expanded the LORAN/GPS interface to include: • L-3 Avionics Systems LNS616 (Foster AirData/BFG FlightSystems) • L-3 Avionics Systems LNS6000 (BFG FlightSystems) • ARNAV R50I • APPLLO 800 • APOLLO NMC2001 • GARMIN GPS100 • Trimble TNL2100 • Trimble TNC3100
3.20	Optional	Added ARINC 429 EFIS interface and NAVAID support for ARNAV 5000.
3.21	Optional	Changed the following: • NAVAID option made compatible with all versions of the LNS616 (A & B). • Corrected reset problem that occurred with some NAVAID systems. • Added NAVAID flight-plan & MSA/MESA support for the ARNAV R-5000. • Added NORTHSTAR GPS-600 to the list of compatible LORAN/GPS systems.
3.22	Optional	Changed the following: • Modified the ARINC 429 EFIS code to emulate the Honeywell LSZ-850 format (jumper selectable). This provides compatibility with the PRIMUS 2000. • Enhanced screen updates for the Northstar NAVAID interface.
3.23	Optional	Displays 32 waypoints (instead of 10) when connected to a King 90B GPS system or other GPS/Loran systems that outputs flight-plan data in the King KLN XX rs-232/422 data format.
3.24	Optional	Changed the following: • In the self-test screen, the company name changed from FlightSystems to Avionics Systems. • When the Honeywell LSZ-850 configuration jumper is installed the ARINC429 manufacture code field is set to Honeywell. • When used with a WX-1000 CRT display, the heading can be turned on or off from the options screen, regardless of the heading flag condition. • Cell calculation updated to allow for faster update of the cell information on the EFIS display.
3.25	Optional	Improved NAVAID interface (RS232) with LNS616 & added "self-test fault" output. If the self-test detects a fault condition P302-18 will go low with respect to P302-20 (429 EFIS systems only).
3.26	Optional	Corrected potential timing problem relating to hardware jumper configuration.
3.27	Optional	Permits communications loop-back test to be performed successfully when the ARINC 429 transmitter and receiver are configured to different speeds (one high and one low).

1.6 INTERFACE

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

1.7 EQUIPMENT SUPPLIED

The following equipment is supplied with each system.

- CRT Display (Optional with the WX-1000E 429 EFIS)
  P/N 78-8060-5900-8 (Black Bezel) or 78-8060-5900-9 (Gray Bezel)
- Antenna
  P/N 78-8051-9200-8 (White) or 78-8051-9220-6 (Black)
- Antenna Doubler
  P/N 78-8051-9206-5
- Antenna Gasket
  P/N 78-8051-9208-1
- Hardware Package (See table 1-7.)
  P/N 78-8060-5755-6
- Processor Tray
  P/N 78-8051-9180-2

System part numbers and the associated processor are identified in table 1-1. Items supplied with the hardware package are listed in table 1-7.

Table 1-7. Hardware Package

PART NUMBER	DESCRIPTION	QTY
78-8051-9187-7	NUT PLATE	2
77-8001-2640-9	SCREW 10-32 X 1/2 PPH SS	4
26-1006-1098-4	CONNECTOR 50POSN D-SUB RECPT	2
26-1006-2424-1	STANDOFF HEX FF 4-40 X .5 ALUM	4
M39029/63-368	CONNECTOR SOCKET SCREW MACH	100
26-1006-2425-8	CONNECTOR 19POSN RECPT W/CONT & SH	1
M24308/2-283F	CONNECTOR SHELL 25POSN D-SUB RECPT SHELL	1
26-1006-2426-6	CONNECTOR BACKSHELL DB25	1
26-1006-1089-3	CONNECTOR LOCK POST	2
26-1001-6374-5	SCREW P P 6-32 X .75 BLACK OXIDE	4
26-1004-9152-6	SCREW P P 10-32 X 1.5 SS	4
78-8060-5733-3	TAG IDENTIFICATION CIRCUIT BREAKER	1
26-1006-5217-6	WASHER FLAT .204 ID X .631 OD X .063 THK ALUM	12
26-1006-5218-4	WASHER FLAT .182 ID X .376 OD X .007 THK MYLAR	4
26-1004-1394-2	WASHER .2 ID X .325 OD SS	4

1.8 EQUIPMENT REQUIRED NOT SUPPLIED

Circuit Breaker	The WX-1000 is protected via an internal fuse. 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	Processor/Display Crimping Tool - M22520/2-01 Locator - M22520/2-08 Insertion/Removal - M81969/1-02 Antenna Crimping Tool - M22520/2-01 Locator - M22520/2-02 or Crimping Tool - M22520/1-01 Locator - M22520/2-02 Insertion Tool - MS24256A20 Extraction Tool - ms24256R20
12 to 28 VDC Power Supply	Power supply capable of providing 12 to 28 VDC at 30 Watts is required to do the bench test procedure.
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-1000 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.
Bench Test Kit	P/N 78-8060-5786-1 includes: Connector Pod P/N 78-8060-5750-7 Antenna Cable P/N 78-8060-5802-2 Display By-Pass Plug P/N 78-8060-5802-6 Expansion Test Plug P/N 78-8060-5922-2 Required to do the initial system bench test and support fault isolation.
WX-1000 Display	P/N 78-8060-5900-x. Installations with the ARINC 429 EFIS option can be configured with or without a WX-1000 display. The display is required to access the Service Menu (e.g., review the error log, execute the expansion tests, etc.), do fault isolation and bench testing.
Antenna Ground Plane	Locally fabricated (See figure 4-2). Required to do the initial system bench test.
Surface Preparation	Alodine 1001, required for installation of the *Stormscope*® antenna.
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.
System Cables	Pre-fabricated cable which meets the specification for *Stormscope* installations are available from suppliers listed in table 1-8. **NOTE** Use of any cable not meeting specification voids all warranties.

Table 1-8. Cable Vendors

US COMPANY	ANTENNA CABLE P/N	DISPLAY CABLE P/N	SYNCHRO CABLE P/N	NAVAID CABLE P/N
Dallas Avionics 1-800-527-2581 214-320-9776 FAX 214-320-1057	WX-4 (7.28 lbs/ 100 ft)	WX-3 (10.5 lbs/) 100 ft	WX-5 (6.84 lbs/ 100 ft)	22TG3T14* (2 lbs/100 ft)
Electronic Cable Specialists 1-800-327-9473 414-421-5300 FAX 414-421-5301	3N6711 (12.5 lbs/ 100 ft)	3N6715 (16 lbs/ 100 ft)	3N6607 (7.5 lbs/ 100 ft)	22TG3T14* (2 lbs/100 ft)
A.E. Petsche 1-800-777-9280 817-461-9473 FAX 817-277-2887	TZANT (10.5 lbs/ 100 ft)	TZDIS (13.1 lbs/ 100 ft)	TZGYR (6.84 lbs/ 100 ft)	22TG3T14* (2 lbs/100 ft)
EDMO Distributors 1-800-235-3300 509-535-8280 FAX 1-800-828-0623 FAX 509-535-8266	WX-1000 ANTENNA	WX-1000 DISPLAY	WX-1000 SYNCHRO	22TG3T14*
PIC Wire and Cable 1-800-742-3191 262-246-0500 FAX 262-246-0450	WM25811 (11.3 lbs/ 100 ft)	WM25815 (14.5 lbs/ 100 ft)	WM25807 (7.2 lbs/ 100 ft)	22TG3T14* (2 lbs/ 100 ft)

* 22TG2T14 may be used on RS-232 installations, but 22TG3T14 is preferred because it can accommodate both RS-232 and RS-422 instruments.

1.9 INSTALLATION APPROVAL

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

This page intentionally left blank.

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-1000, 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 system components.

2.2 UNPACKING AND INSPECTING

CAUTION

The display, 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 system 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

It is recommended that each display/processor and antenna be tested immediately upon receipt. The pre-installation test procedure verifies operation of the system and may save valuable installation time by detecting hidden damage that may have occurred during shipment. The pre-installation test includes:

1. Bench test with antenna, refer to paragraph 4.4.
2. Checklist entry (if required), refer to paragraph 3.3.4 and the WX-PA Instruction Manual (P/N 78-8060-5798-6).

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 skinmapped 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.

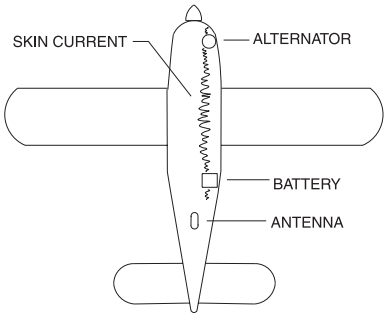
2.4.1 Interference Sources

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 igniters - 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)
- In-flight 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)

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.

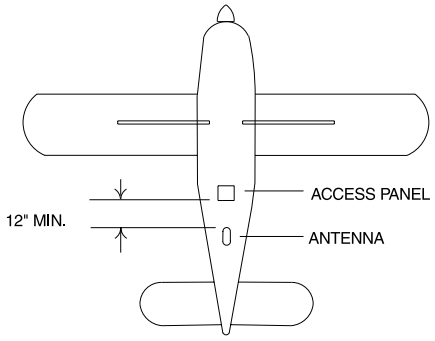


2.4.3 Skinmapping

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) 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.

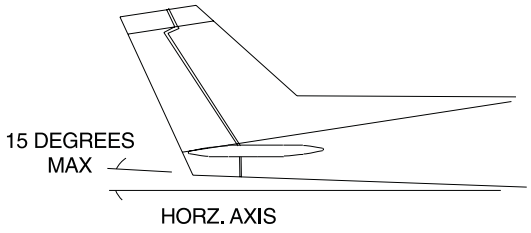
2.4.4 Ground Plane

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.



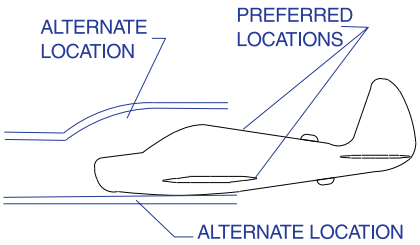
2.4.5 Alignment

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 DISPLAY LOCATION

The display should be mounted in a location easily accessible and clearly visible to the pilot. In selecting a location, consider the following:

Magnetic Effect	Avoid mounting the display within 3 inches (8 cm) of an electric turn and bank indicator, as the magnetic effect of the turn and bank motor may affect the display presentation. (A common symptom of magnetic interference is a wobbling or vibrating display raster.)
	NOTE
	If it is necessary to mount the display unit next to a device that may affect the CRT display, magnetic shielding material can be placed around the display unit. Shielding material is available from L-3 Avionics Systems. Specify P/N 78-8060-5882-8 when ordering.
Panel Depth	Adequate depth must be available behind the instrument panel to allow for the display, the display connector, and excess display cable. Remember that a service loop is necessary to allow access to the display connector when removing the display or inserting it into the instrument panel.
Cooling	While the display has no special cooling requirements, it should be mounted to permit adequate ventilation.
Viewing Angle	The viewing angle for the CRT display is not a critical factor. The most favorable mounting position would be near eye level and no more than arms length from the principle user of the instrument.

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 processor has no special cooling requirements, it should be mounted to permit adequate ventilation. Allow at least one inch of rear clearance and one inch of side clearance.
Pressurized Aircraft	The processor may mount inside or outside the pressure vessel. The processor contains no potentially explosive components and will operate up to 55,000 ft.
Orientation	Orientation of the processor is not critical. It may mount on its side, laterally, longitudinally, vertically, or inverted.
Antenna Proximity	The processor should not be mounted closer than 1.5 feet to the antenna.

2.7 DOUBLER PLATE INSTALLATION

Figure 2-1 shows the mounting holes and dimensions for the antenna and doubler plate.

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. Drill the required holes.

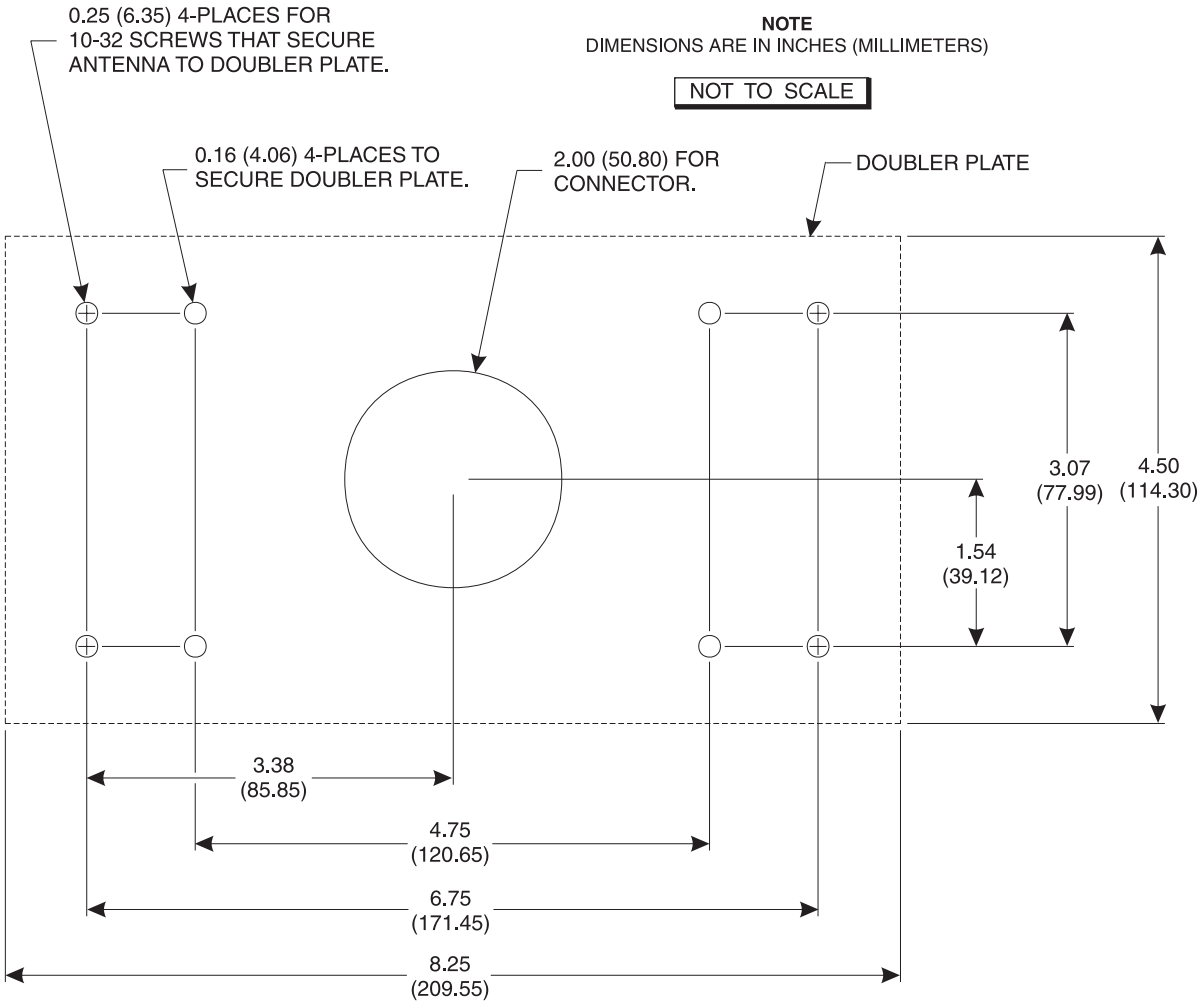


Figure 2-1. Antenna and Doubler Mounting Holes

3. Attach the doubler plate to the inside of the fuselage as shown in Figure 2-2.

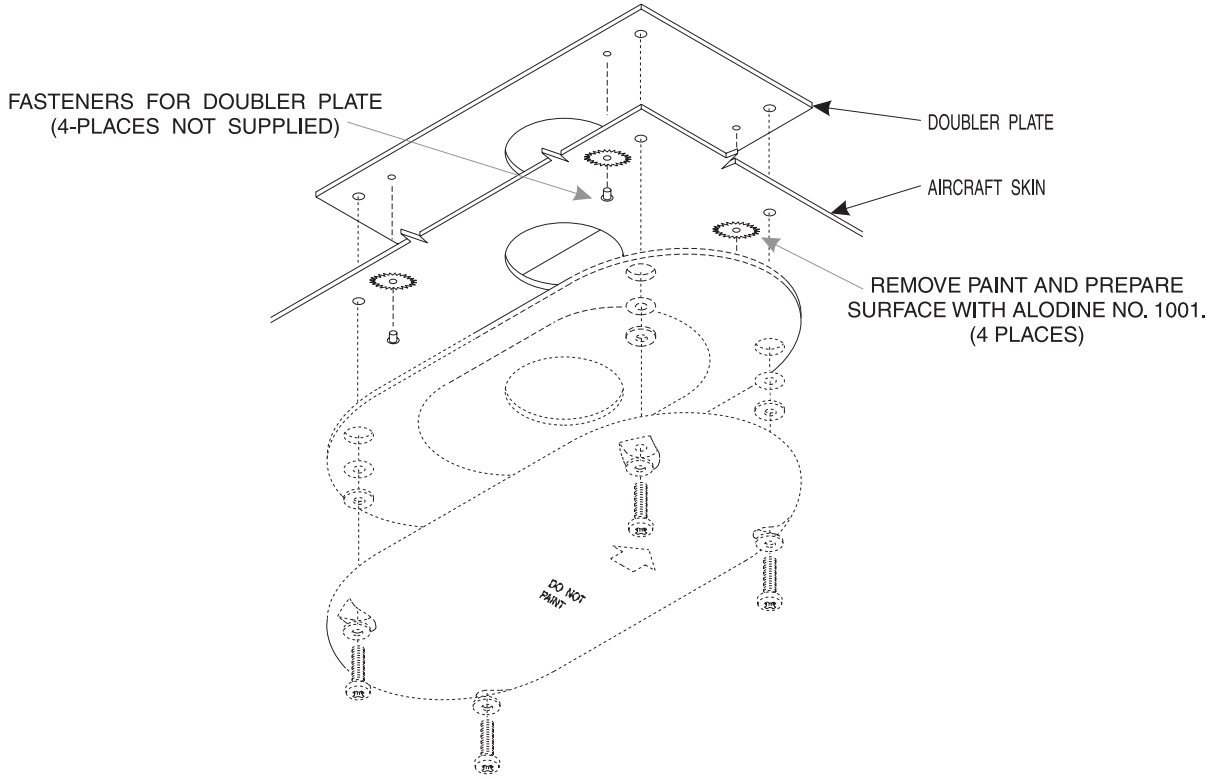


Figure 2-2. Doubler Plate Installation

2.8 ANTENNA INSTALLATION

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 fasteners and prepare the surface with Alodine® No. 1001. Failure to provide a good ground connection may affect system performance.

1. Mount the antenna to the aircraft as shown in Figure 2-3.
   a. The antenna and gasket are designed to mount to a flat, or large radius convex surface. For smaller radius contours, it may be necessary to hollow out the gasket to relieve stress in the center of the antenna (the area within the dashed line).
   b. Spacers are provided to allow for compensation of the gasket thickness and for aircraft skin contour.
2. After the post installation checkout is complete, seal around the entire perimeter of the antenna.
   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.

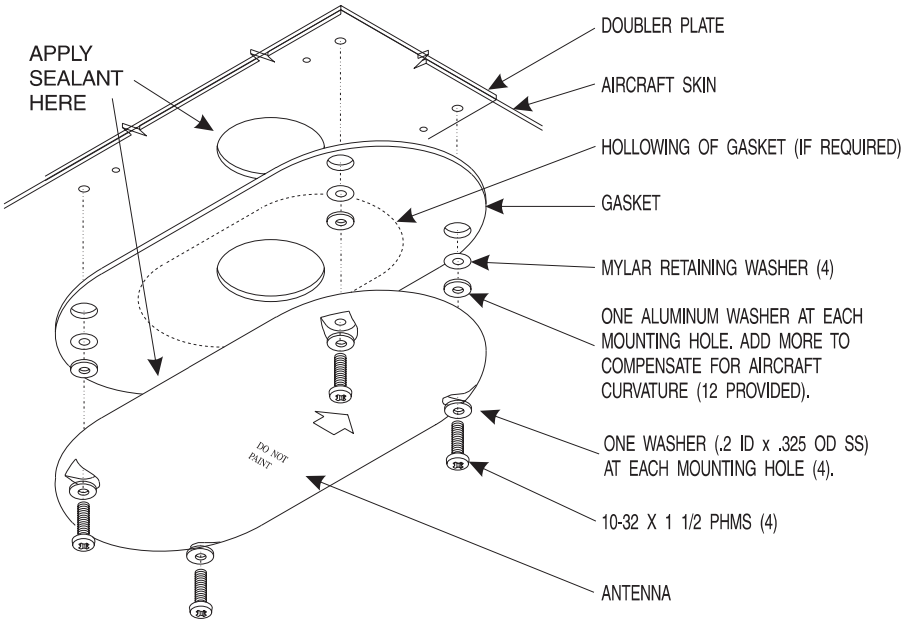


Figure 2-3. Antenna Installation

2.9 CABLE REQUIREMENTS AND FABRICATION

Each cable terminating at the processor, display, or antenna should have the braided overall shield removed several inches back from the connectors so it will not cause a strain on the connectors pins (see figure 2-4). Refer to figure 2-5 for interconnect wiring information.

NOTE
DIMENSIONS ARE IN INCHES (MILLIMETERS)

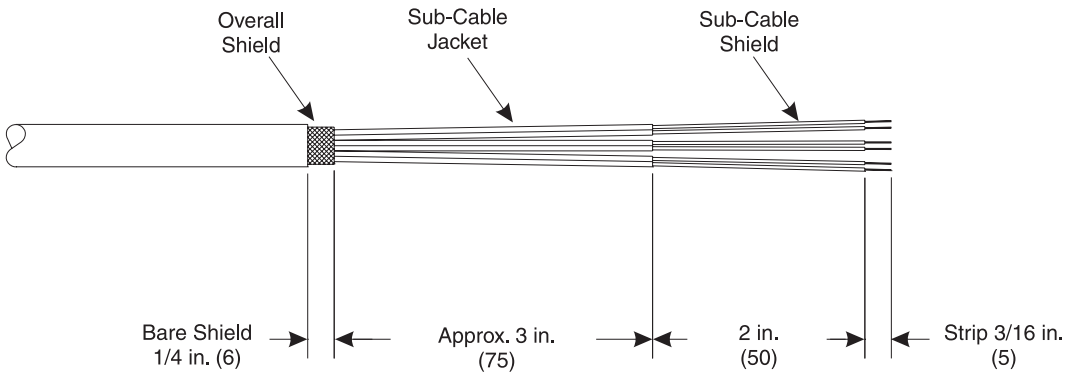


Figure 2-4. Cable Preparation

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 specifications voids all warranties.
4. Table 1-8 lists U.S. vendors who sell cable that meet the specification for *Stormscope* installations.

5. Required connectors and contact pins are supplied in the installation kit.
6. 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.
7. Wire-marking identification is at the discretion of the installer.
8. At connector P301, attach all of the outer shields to airframe ground. This can be accomplished by using one of the connector mounting studs located on the processor tray as a tie-point. Bond the mounting tray to airframe ground with braid attached to the tie-point.

2.9.1 Power Cable

CAUTION

Reversing the power leads will cause an internal fuse to blow.

For the power cable, use #20 AWG (minimum). A+ (P301 pins 34 and 35) connects to the avionics circuit breaker. Affix a circuit breaker label (P/N 78-8060-5733-3, provided with the hardware package) to the circuit breaker panel. GND (P301 pins 1 and 2) connects to airframe ground. If airframe ground is not available, run a separate wire to power ground at the battery.

The signal lines that provide ON/OFF control of the WX-1000 processor are normally connected to the WX-1000/SKY497 display. If the WX-1000 display is not part of the installation (i.e. ARINC 429 EFIS option), install an external switch or a jumper between P301-20 (PWRSWHI) and P301-21 (PWRSWLO). If a jumper is installed, ON/OFF control is accomplished via the avionics power bus.

2.9.2 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 is connected only if, in weather mapping mode, communication transmitters interfere with the WX-1000. The line (use #22 AWG - minimum) can be included in the installation, but need be connected only if the testing of the final installation indicates transmitter interference. Routing and length are not critical to system operation.

2.9.3 Remote Clear/Checklist Advance Switch

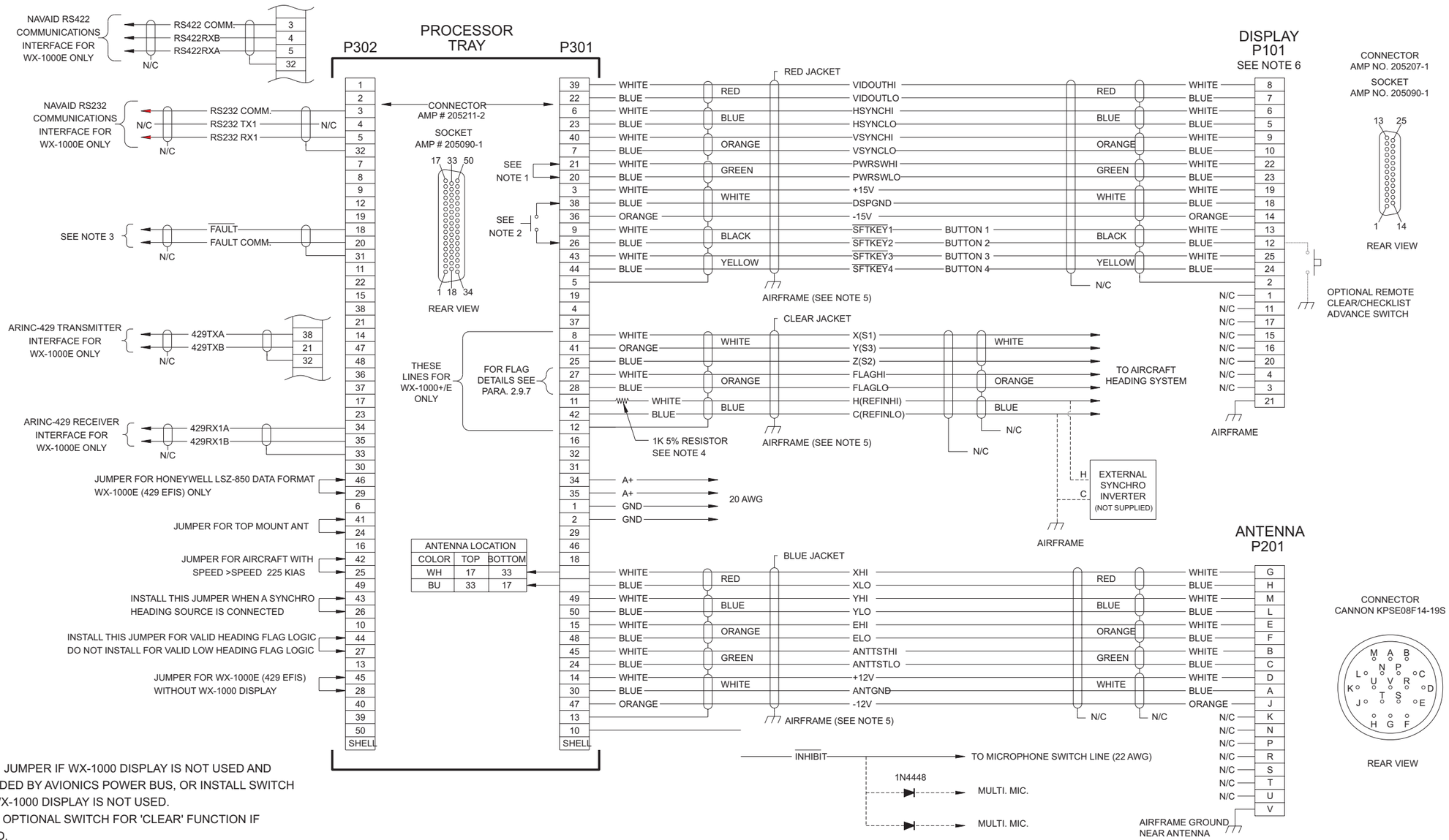
This input (display connector P301-12) may be connected to an external switch (normally a yoke switch). When activated, the remote clear/checklist advance switch performs the same function as the lower left softkey (Button 2 - SFTKEY2). In weather view, switch closure erases all displayed lightning strikes. In checklist mode, switch closure will select or scroll to the next item.

Routing and length are not critical to system operation, nor is the location of the airframe ground point at which the remote clear switch terminates.

When installing the WX-1000 with the ARINC 429 EFIS option and without a WX-1000 display, connect the clear switch at the processor P301, between pins 26 and 38.

NOTE

When the *Stormscope*® display is not part of the installation (i.e. ARINC 429 EFIS option), a jumper is installed between pins 28 and 45 of P301 (see paragraph 2.10). The jumper configures the *Stormscope*® processor to perform a memory clear whenever the clear switch (SFTKEY2 at P301-26) is pressed.



NOTES:

1.) WX-1000E (429 EFIS) ONLY: JUMPER IF WX-1000 DISPLAY IS NOT USED AND ON/OFF CONTROL IS PROVIDED BY AVIONICS POWER BUS, OR INSTALL SWITCH FOR ON/OFF CONTROL IF WX-1000 DISPLAY IS NOT USED.
2.) WX-1000E (429 EFIS) ONLY: OPTIONAL SWITCH FOR 'CLEAR' FUNCTION IF WX-1000 DISPLAY NOT USED.
3.) WX-1000E (429 EFIS) ONLY: PROCESSOR FAULT LINE (SOFTWARE V3.25 OR HIGHER).
4.) THIS RESISTOR IS REQUIRED ONLY WHEN USING A KG102 26VAC SOURCE.
5.) AT CONNECTOR P301, ATTACH ALL OF THE OUTER SHIELDS TO AIRFRAME GROUND. THIS CAN BE ACCOMPLISHED BY USING ONE OF THE CONNECTOR MOUNTING STUDS LOCATED ON THE PROCESSOR TRAY AS A TIE-POINT. BOND THE MOUNTING TRAY TO AIRFRAME GROUND WITH BRAID ATTACHED TO THE TIE-POINT.
6.) WX-1000E (429 EFIS) ONLY: FOR INSTALLATIONS WITHOUT A WX-1000 DISPLAY, A DISPLAY CABLE SHOULD BE INCLUDED FOR POST INSTALLATION CHECKOUT. THE DISPLAY CABLE SHOULD BE A MINIMUM OF 2 FEET IN LENGTH.

Figure 2-5. Interconnect Wiring

2.9.4 Antenna Cable

The antenna cable (figure 2-6) 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.
- The cable should not be bundled with any other aircraft cable except for short distances, and then only when absolutely necessary.
- To prevent undo 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 must be used. The antenna cable must not share a bulkhead connector with any other conductors including the WX-1000 display cable.
- The antenna cable may tie to other electrical cables at right angles.

The antenna cable consists of the following.

1. Twisted, shielded, jacketed triad #22 AWG
   Colors: White, Blue, Orange
   Shield: Tin-plated copper braid, 90% min.
   Jacket: FEP .007 in. min., White jacket
2. Twisted, shielded, jacketed pair #24 AWG
   Colors: White, Blue
   Shield: Tin-plated copper braid, 90% min.
   Jacket: FEP .007 in. min., Blue jacket
3. Same as 2 except Orange jacket.
4. Same as 2 except Green jacket.
5. Same as 2 except Red jacket.
6. Aluminized Mylar® wrap.
7. #34 AWG braided shield.
8. FEP Teflon® jacket .013 in. - .023 in., Red tint.
9. Marker tape with Vendor P/N.

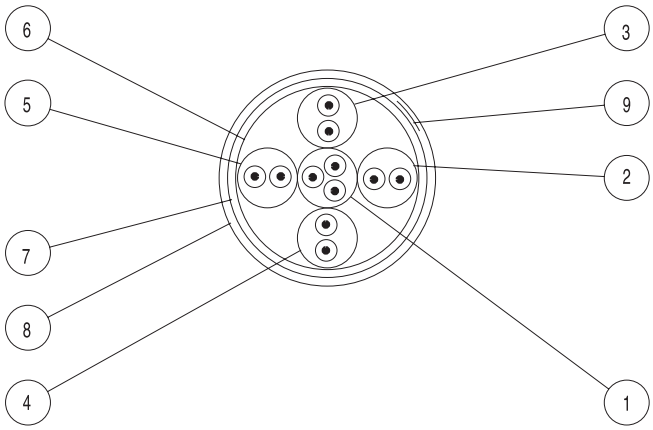


Figure 2-6. Antenna Cable

Refer to figure 2-5 for detailed interconnect wiring information. Pin-outs relating to the WX-1000 processor and display are provided in table 2-1.

Table 2-1. Antenna Cable Connections

SIGNAL	WX-1000 Processor	SUB-CABLE	WIRE	WX-1000 Antenna
(Inner-Shields)	P301-13			N/C
XHI	P301-17 (Top Mounted) P301-33 (Bottom Mounted)	RED	WHITE	P201-G
XLO	P301-33 (Top Mounted) P301-17 (Bottom Mounted)	RED	BLUE	P201-H
YHI	P301-49	BLUE	WHITE	P201-M
YLO	P301-50	BLUE	BLUE	P201-L
EHI	P301-15	ORANGE	WHITE	P201-E
ELO	P301-48	ORANGE	BLUE	P201-F
ANTTSTHI	P301-45	GREENE	WHITE	P201-B
ANTTSTLO	P301-24	GREENE	BLUE	P201-C
+12v	P301-14	WHITE	WHITE	P201-D
ANTGND	P301-30	WHITE	BLUE	P201-A
-12V	P301-47	WHITE	ORANGE	P201-J
AIRFRAME GND	P301 OUTER SHIELD			P201-V

2.9.5 Display Cable

The display cable (figure 2-7) connects the processor to the WX-1000/SKY497 Display. Routing and length of the display cable are not as critical as the antenna cable, but because of video frequencies in the cable, it should not bundle with or be routed near:

- *Stormscope* Antenna Cable
- VHF Comm Antenna Cables
- ADF, Loran, or VLF Antenna Cables

The display cable consists of the following.

1. Twisted, shielded, jacketed triad #22 AWG
   Colors: White, Blue, Orange
   Shield: Tin-plated copper braid, 90% min.
   Jacket: FEP .007 in. min., White jacket
2. Twisted, shielded, jacketed pair #24 AWG
   Colors: White, Blue
   Shield: Tin-plated copper braid, 90% min.
   Jacket: FEP .007 in. min., Blue jacket
3. Same as 2 except Orange jacket.
4. Same as 2 except Green jacket.
5. Same as 2 except Red jacket.
6. Same as 2 except Black jacket.
7. Same as 2 except Yellow jacket.
8. Aluminized Mylar® wrap.
9. #34 AWG braided shield.
10. FEP Teflon® jacket .013 in. - .023 in., Red tint.
11. Marker tape with Vendor P/N.

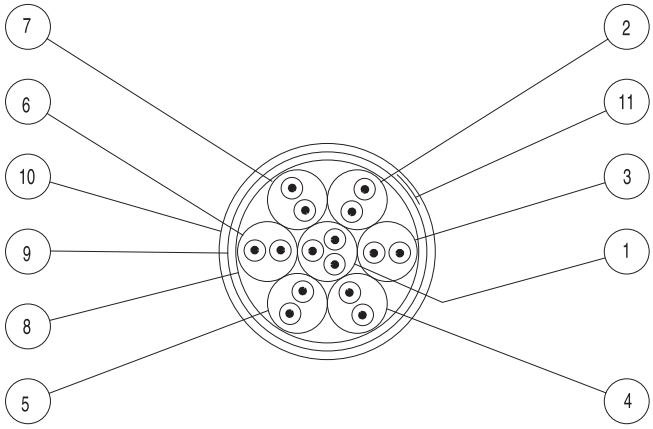


Figure 2-7. Display Cable

Refer to figure 2-5 for detailed interconnect wiring information. Pin-outs relating to the WX-1000 processor and display are provided in table 2-2.

Table 2-2. Display Cable Connections

SIGNAL	WX-1000 Processor	SUB-CABLE	WIRE	WX-1000 Display
(Inner-Shields))	P301-5			P101-2
PWRSWHI	P301-21	GREEN	WHITE	P101-22
PWRSWLO	P301-20	GREEN	BLUE	P101-23
+15	P301-3	WHITE	WHITE	P101-19
-15	P301-36	WHITE	ORANGE	P101-14
DSPGND	P301-38	WHITE	BLUE	P101-18
HSYNCHI	P301-6	BLUE	BLUE	P101-6
HSYNCLO	P301-23	BLUE	WHITE	P101-5
VSYNCHI	P301-40	ORANGE	WHITE	P101-9
VSYNCLO	P301-7	ORANGE	BLUE	P101-10
VIDEOHI	P301-39	RED	BLUE	P101-8
VIDEOLO	P301-22	RED	WHITE	P101-7
SFTKEY1	P301-9	BLACK	WHITE	P101-13
SFTKEY2	P301-26	BLACK	BLUE	P101-12
SFTKEY3	P301-43	YELLOW	WHITE	P101-25
SFTKEY4	P301-44	YELLOW	BLUE	P101-24
AIRFRAME GND	P301 OUTER SHIELD			P101-21

NOTE

The WX-1000 processor is designed to support a single display. Optionally, a second display can be used. To avoid performance degradation due to signal reflections, exercise caution when connecting to the balanced voltage video and sync signals (i.e., VIDOUT, HSYNC, & VSYNC). For additional information refer to the EIA RS-422 specification.

2.9.6 Heading Input Cable

The heading input cable (figure 2-8) connects the WX-1000 processor to the aircraft heading system. This cable provides XYZ and HC aircraft heading information to the WX-1000 processor. FLAG lines are also included in the heading input cable to provide the WX-1000 processor with flag status (or heading valid) information (see paragraph 2.9.7).

The synchro cable consists of the following (refer to figure 2-7):

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.

NOTE

When connecting to a synchro XYZ heading source, a jumper must be installed at connector P302 between pins 26 and 43 (see paragraph 2.10).

Table 2-2 provides synchro heading source interconnect information. Refer to the applicable manufacturer's publication for specific interconnect guidelines to be followed.

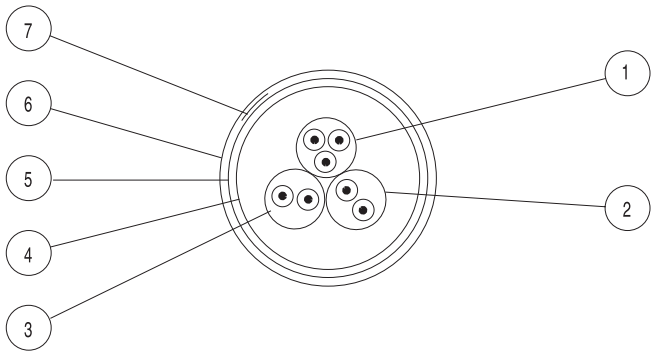


Figure 2-8. Heading Input Cable

NOTE

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.

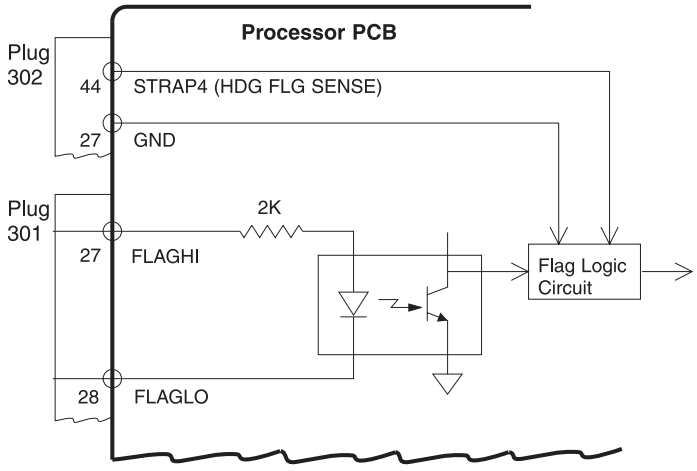
Table 2-3 Synchro Connections

	SYNCHRO CONNECTION TO P301				
SIGNAL	SYNC X	SYNC Y	SYNC Z	SYNC REF HI	SYNC REF LO
PIN	8	41	25	11	42
SUB-CABLE	WHITE	WHITE	WHITE	BLUE	BLUE
WIRE COLOR	WHITE	ORANGE	BLUE	WHITE	BLUE
Cessna ARC 200-9BC	A	E	D	C	B
Cessna ARC 40840-0204	N	M	L	B	L
Cessna Slaved DG	E	D	A	C	B
AIM Type 289-1-2	E	D	A	H	C
AIM Type 2892D	M	N	K	L	K
AIM Type 2892ED	M	N	K	L	K
Collins Type 331P-1V	N	M	D	B	L
Collins Type 331P-1	N	M	D	B	L
Century NSD360 DG & 722/755	1*	2*	3*	7*	5*
Century NSD360A DG & 722/755	1*	2*	3*	7*	5*
Century Slaved DG	N	M	L	B	L
King KCS-55 w/KI-525A-01	P2-s	P2-v	P2-t	P2-r	P2-u
King KCS-55A w/KI-525A-01	P2-s	P2-v	P2-t	P2-r	P2-u
Sperry C6E, C6J	39	38	40	37	36
Sperry C6, C6A, C6C	18	19	20	21	41
Sperry C-14d	a	b	Z	X	Y

*Connections to 722/755.

2.9.7 Heading Warning Flag

The WX-1000+ will display a heading warning flag if the navigation system (e.g., Bendix/King KCS 55) provides this output. The heading warning flag input to the WX-1000 is optically isolated in the processor. The heading valid excitation circuit is represented in figure 2-9.



NOTE

OPTO ON	PIN 27 IS < +1.0V RELATIVE TO PIN 28 (i.e., REVERSED BIASED)
OPTO OFF	PIN 27 IS > +5.0V RELATIVE TO PIN 28 (i.e., FORWARD BIASED)

Figure 2-9. Heading Valid Excitation

For processors with software version 2.00 and higher, the heading valid flag logic can be programmed (i.e., logic reversed) with a jumper between pins 44 and 27 of connector P302. This is shown in Table 2-4. For processors with software version 1.21 and lower, flag action is as shown for an open jumper.

NOTE

If a heading warning flag signal is not connected, do not jumper pins 27 and 44.

Table 2-4. Flag Action

INPUT STATE	FLAG RESPONSE	
	P302 44-27 OPEN	P302 44-27 JUMPERED
Optocoupler Energized	Flagged	Valid
Optocoupler Off	Valid	Flagged

For systems with a navigation system that provides a VALID LOW signal to the Stormscope processor (such as the Bendix/King KCS55), figure 2-10 shows the suggested connection.

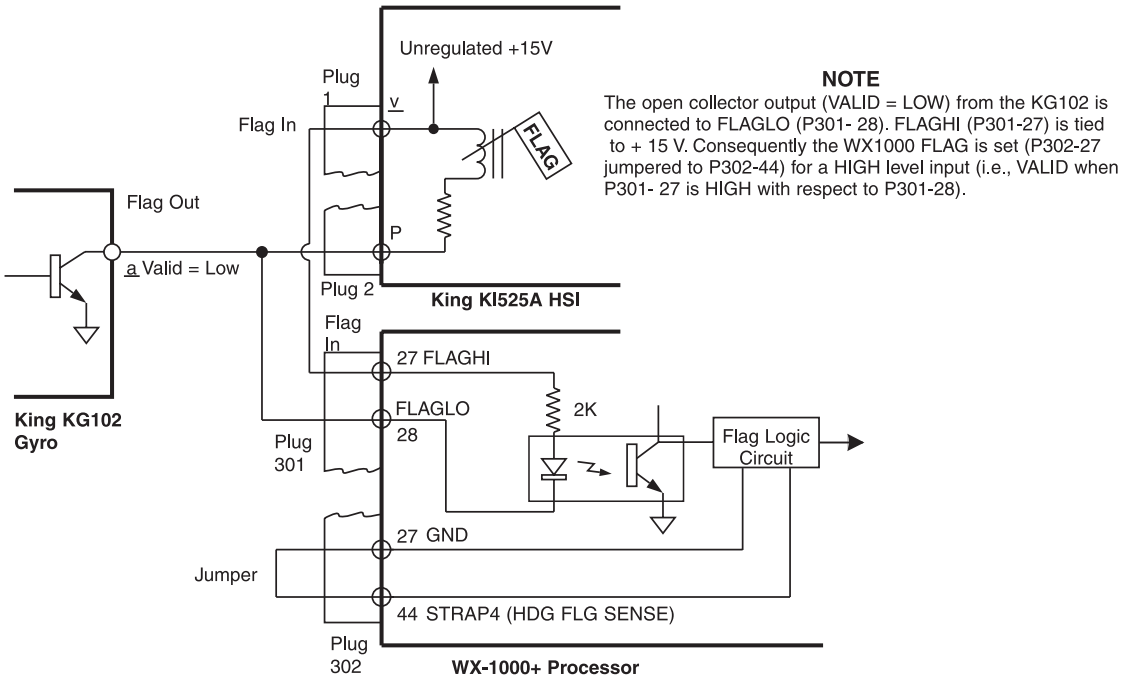


Figure 2-10. Bendix/King KCS 55 Heading Flag

Table 2-5 provides heading warning flag interconnect information. Refer to the applicable manufacturer's publication for specific interconnect guidelines to be followed.

NOTE

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.

Table 2-5. Heading Warning Flag Connections

HEADING FLAG CONNECTION TO P301		
SIGNAL PIN SUB-CABLE WIRE COLOR	FLAGHI 27 ORANGE WHITE	FLAGLO 28 ORANGE BLUE
Century NSD360A DG & 722/755	36	1
King KCS-55A w/KI-525A-01	P1-v	P2-P
Sperry C-14d	e	GND

2.9.8 Fault Output

The feature is available only with the ARINC 429 EFIS option. The FAULT output was added to the WX-1000 processor with software version 3.25. If the WX-1000 self-test detects a fault condition, P302-18 will go low (-5 to -15 Vdc) with respect to P302-20. If no faults are present, P302-18 will be high (+5 to +15 Vdc) with respect to P302-20. The fault output line can source/sink a minimum of 7 mA.

2.9.9 ARINC 429 Databus

An ARINC 429 databus is provided to support the WX-1000 EFIS and NAVAID options. The ARINC 429 data cables are #22 AWG (minimum) twisted, shielded cables (22TG2T14, or equivalent). Cable runs should be as short as practical.

Transmitter connection (used with the EFIS option):

429TXA -to- P302-38
429TXB -to- P302-21
Shield -to- P302-32

Receiver connection (used with the NAVAID and EFIS options):

429RX1A -to- P302-34
429RX1B -to- P302-35
Shield -to- P302-33

NOTES - EFIS OPTION

1. With the 429 EFIS option, the receiver connection is only required if synchro XYZ heading is not available.
2. To meet specific installation requirements, the WX-1000E ARINC 429 EFIS processor is factory configured to accommodate the various ARINC 429 bus speeds. These pre-configured processors are identified in table 1-2.

NOTES - NAVAID OPTION

1. With the 429 NAVAID option, a synchro (XYZ) heading source is required.
2. The WX-1000E ARINC 429 NAVAID receiver is set to low speed.

Refer to figure 2-5 for detailed interconnect wiring information. Connect shields at the processor end only.

2.9.10 RS-232/RS-422 Interface

This feature is available only with WX-1000 processors configured with the RS-232/RS-422 NAVAID option. An opto-isolated RS-232 or RS-422 serial communications port is provided to receive navigation information from a variety of LORAN and GPS receivers (see Appendix C).

NOTE

To meet specific installation requirements, the WX-1000E RS-232/RS-422 NAVAID processor is factory configured to accommodate either RS-232 or RS-422. These pre-configured processors are identified in table 1-2. The interface can be verified from the Service Menu by accessing the Expansion Data screen (see paragraph 4.5.5).

The RS-232/RS-422 interface cables are #22 AWG (minimum) twisted, shielded cables (22TG2T14 (RS-232) 22TG3T14 (RS-422), or equivalent). Cable runs should be as short as practical.

RS-232 connection:

RS232 COMM	-to- P302-3
RS232 RX1	-to- P302-5
Shield	-to- P302-32

RS-422 connection:

RS422 COMM	-to- P302-3
RS422B	-to- P302-4
RS422A	-to- P302-5
Shield	-to- P302-32

Refer to figure 2-5 for detailed interconnect wiring information. Connect shields at the processor end only.

2.10 INSTALLATION JUMPERS

System options/features enabled via installation jumpers installed on connector P302 are identified in table 2-6.

Table 2-6. Configuration Jumpers

OPTION/FEATURE	JUMPER
TOP MOUNT ANTENNA	P302-24 -to- P302-41
REVERSE HEADING VALID FLAG LOGIC	P302-27 -to- P302-44
SYNCHRO HEADING SOURCE CONNECTED **NOTE** If the pins 26 and 43 are left open, the WX-1000 ARINC 429 EFIS will only recognize ARINC 429 heading.	P302-26 -to- P302-43
AIRCRAFT WITH CRUISE SPEED ≥ 225 KIAS	P302-25 -to- P302-42
ARINC 429 EFIS WITHOUT THE *Stormscope*® DISPLAY **NOTE** When the ***Stormscope***® display is also part of the installation pins 28 and 45 must remain open. With the jumper installed the Stormscope® processor is configured to perform a memory clear whenever the clear switch (SFTKEY2 at P301-26) is pressed (see paragraph 2.9.3).	P302-28 -to- P302-45
ARINC429 EFIS HONEYWELL LSZ-850 DATA FORMAT	P302-29 -to- P302-46

2.11 DISPLAY INSTALLATION

The display mounts in a standard 3ATI panel cutout (figure 2-11). The unit may be mounted from the front or rear. The following paragraphs describe the installation procedure.

2.11.1 Panel Cutout

Refer to figure 2-11 for the panel cutout and mounting hole dimensions. Drill and punch the required holes. The instrument panel cutout is a standard 3ATI.

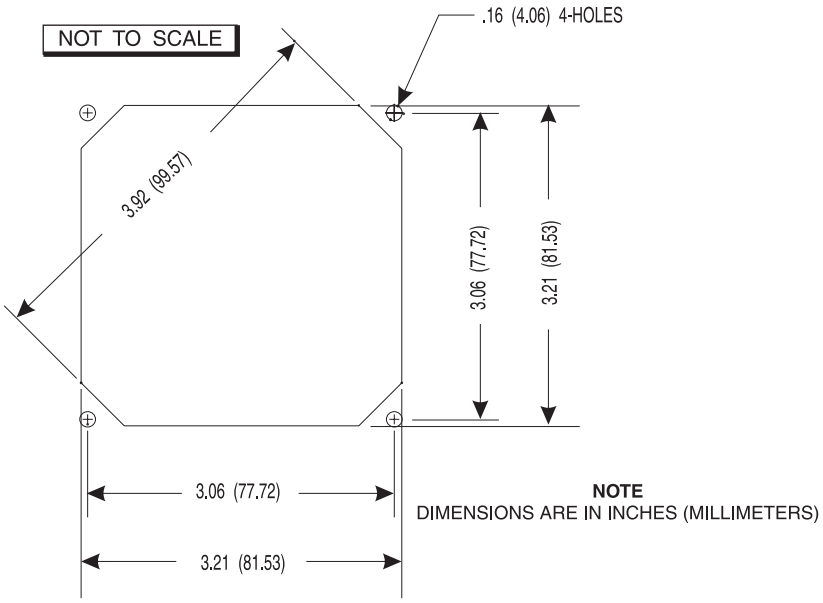


Figure 2-11. Instrument Panel Cutout and Mounting Holes

2.11.2 Display Installation

CAUTION

Before attaching the back panel connector (P101), de-energize or disconnect all power and signal sources and loads used with the *Stormscope* system.

Figure 2-12 shows a typical display installation. The display can be mounted to the instrument panel from the front or from the rear. An optional mooring clamp is available for increased stability in high-vibration environments.

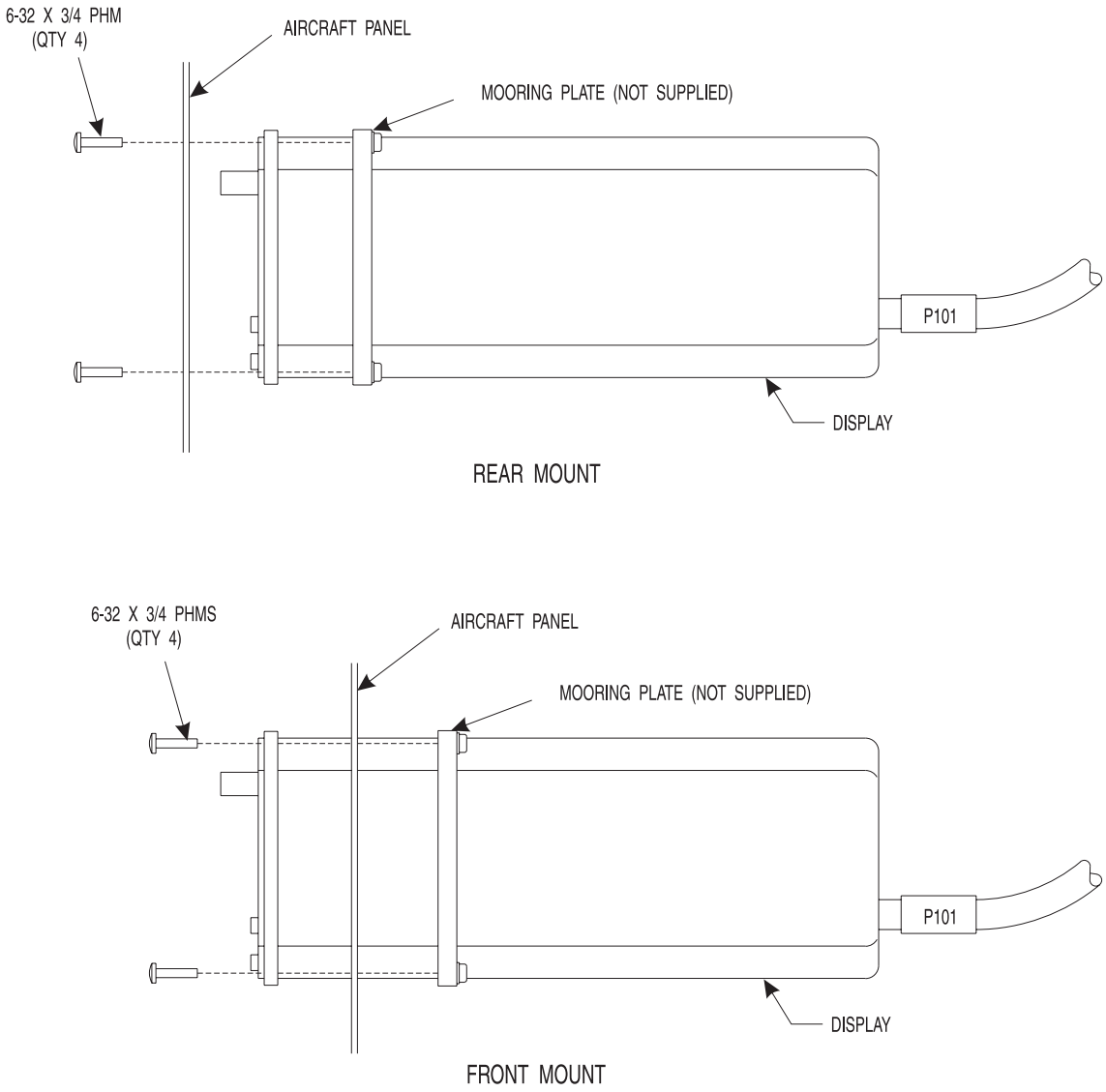


Figure 2-12. Display Installation

Use rivnuts® or a mooring clamp to secure the display to the instrument panel.

NOTE

1. The mooring clamp is not furnished with the display.
2. A mooring clamp (P/N 78-8060-5856-2) can be ordered when the order for the display is placed.
3. A 3ATI mooring clamp is also available from:

   MSP, Incorporated
   R.R. 4, Box 383A
   Nashville, Indiana 47448
   Tel. (812) 988-6623 or FAX (812) 988-6181

2.12 MOUNTING TRAY INSTALLATION

1. Position tray at installation location.
2. Refer to figure 2-13. Determine centers for mounting holes and drill for required fasteners (i.e., 10-32 screws).

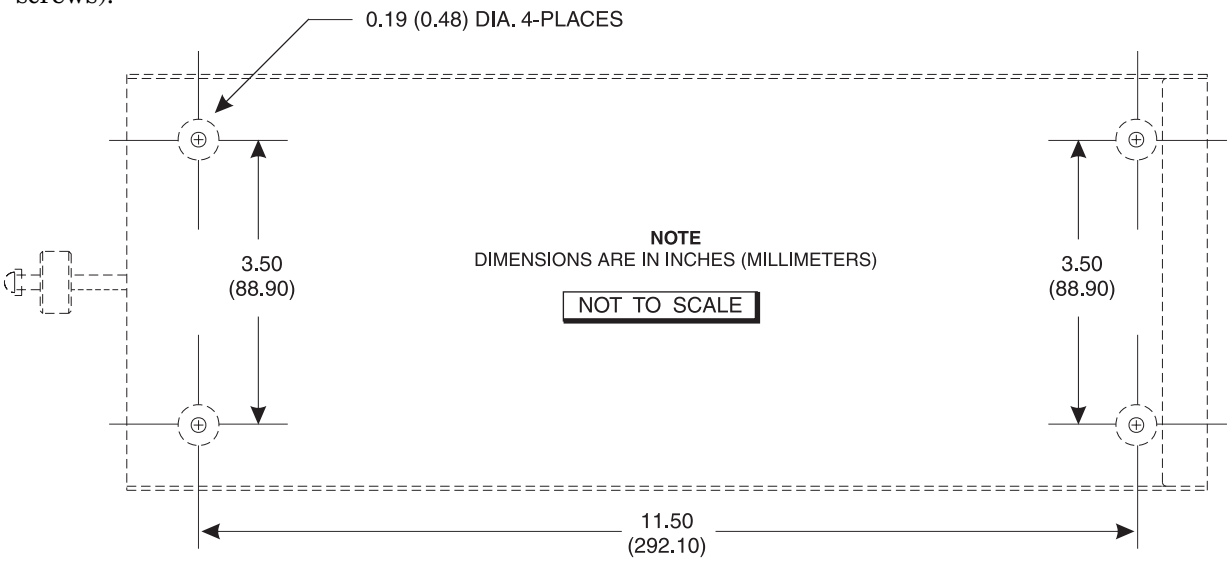


Figure 2-13. Processor Tray Mounting Holes

3. Install the mounting tray as shown in figure 2-14 using the four 10-32 x 1/2 screws and nut plates provided.

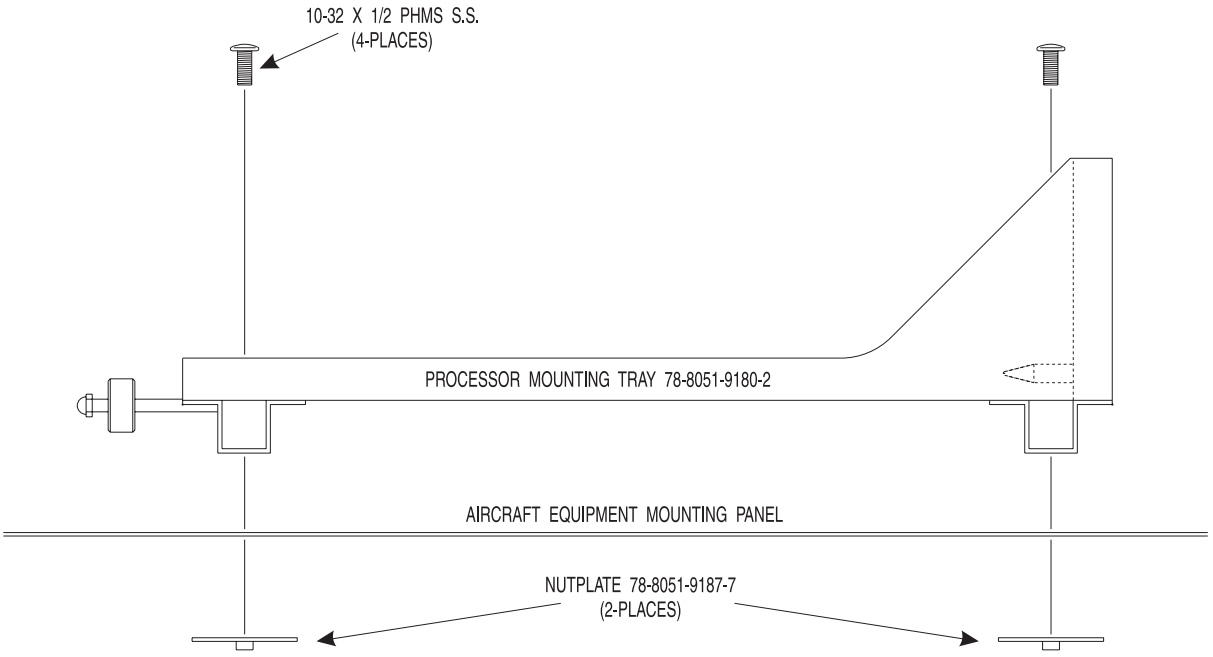


Figure 2-14. Processor Tray Installation

4. Loosely attach connectors P301 and P302 to the rear panel of the mounting tray using the 4-40 hex standoffs provided.
5. Slide the processor into the tray so that the connectors are engaged.
6. Tighten the processor tray locking mechanism, ensuring that the processor rear panel screw head contact the back plate of the tray.
7. Tighten the four 4-40 hex standoffs securing P301 and P302 connectors, thereby ensuring proper alignment of the processor connectors.
8. Connect a short braided grounding strap from the P301 shell to the airframe.
9. Install a strain relief clamp (not provided) on the jacketed area of each cable bundle. Secure the clamps to the processor tray or aircraft structure.
10. Remove the processor from the tray.

2.13 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 *Stormscope* system.

1. Slide the processor into the mounting tray to engage the connectors. Ensure that the rear alignment pins on the mounting tray are properly inserted into receptacles on the processor.

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 (up to 1/16 inch). The processor rear panel screw heads should contact the back plate of the tray.

2. Tighten the hold-down mechanism.

2.14 PERFORMANCE TEST

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

CHAPTER 3
INSTALLATION CHECKOUT

3.1 INTRODUCTION

This section contains instructions for post-installation checkout of the WX-1000. Complete operating instructions for the WX-1000 are provided in the Pilot's Guide supplied with each system.

NOTE

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

Systems with the ARINC 429 EFIS option can have the EFIS as the only display; however, post-installation checkout requires a WX-1000 display.

3.2 CONTROLS

All operating controls are located on the front of the indicator. Figure 3-1 shows the location of the controls.

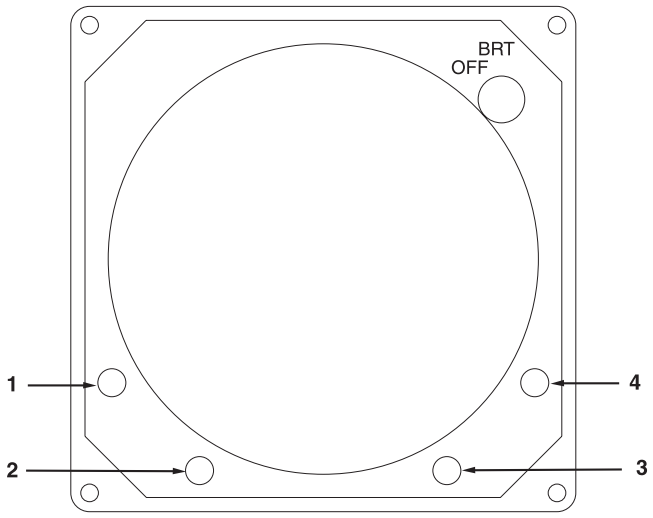


Figure 3-1. Controls

OFF/BRT Switch	Power is applied by rotating the knob clockwise past the detent. Continued clockwise rotation increases display brightness.
1, 2, 3, & 4 Pushbuttons	Also referred to as softkeys (1), (2), (3), and (4). In every operating mode a label identifying the button function will be displayed next to the button.

3.3 POST INSTALLATION CHECKOUT

This procedure will validate the installation and return to service of the WX-1000.

NOTES

1. If an EFIS display is installed, when procedures call for verification of strike presentations, check both the EFIS and WX-1000 display. When comparing strike presentations on the EFIS display, there is a delay of 6 to 12 seconds for data to appear on the EFIS. This is normal.
2. Each EFIS will show lightning data consistent with the capabilities of that particular display. Refer to the manufacturer's installation or user's manual for details.

3.3.1 Installation Jumpers

Verify that the correct system options/features have been enabled via installation jumpers on connector P302 (see paragraph 2.10).

If the processor is running software version 2.0 or higher, from the Service Menu, access System Data (see paragraphs 4.5 and 4.5.1). The system will read and display the status of the option jumpers. Verify that these options are correct.

3.3.2 Power-Up

1. Rotate the OFF/BRT knob clockwise about 180 degrees. After approximately 15 seconds, the initialization screen (see figure 3-2) will be displayed. During initialization, the system 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.

NOTE

The system SELF-TEST at power-up takes approximately 15 seconds. If the system is turned on cold, it may complete the system self-test before the CRT warms up. In this case, the initial display seen will be the Main Menu.

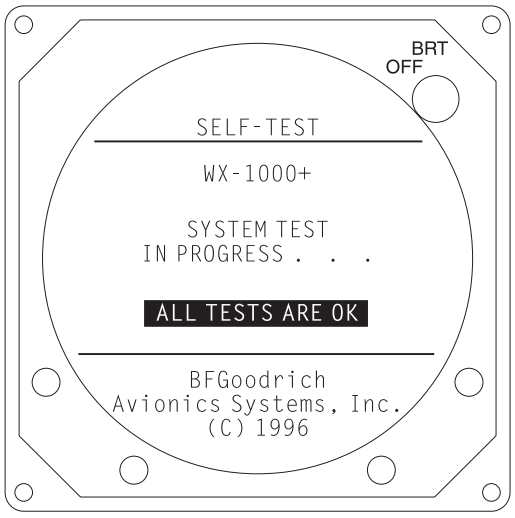


Figure 3-2. Self-Test in Progress

2. If no faults are detected, at completion of the self-test an “ALL TESTS ARE OK” message will be displayed and the system will advance to the main menu (see figure 3-3).

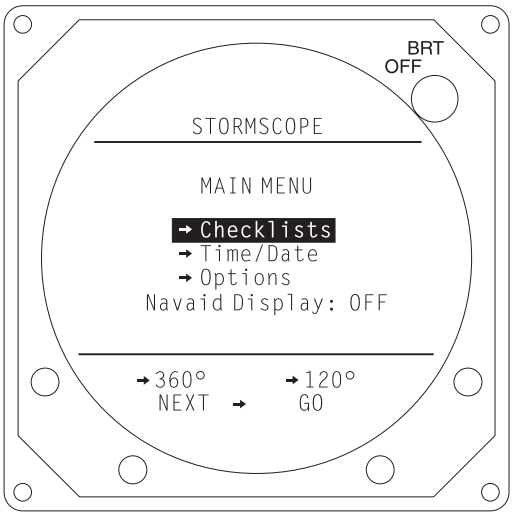


Figure 3-3. Main Menu

3. If the Main Menu does not appear, or is distorted, or if a self-test error message is displayed, refer to paragraph 4.6, Fault Isolation.

NOTE

Navaid Display will appear on the main menu only if the Navaid option is installed. This selection turns the Navaid Display on or off.

4. Verify that clockwise rotation of the OFF/BRT knob increases display brightness and counter-clockwise rotation decreases brightness. The screen should be completely dark with the control fully counter-clockwise. Adjust to a comfortable viewing level.

6. Verify operation of the pushbuttons (figure 3-1 shows location of softkeys):

   a. Press softkey (2), i.e., NEXT. Verify that the highlight bar moves from Checklist to Time/Date.

   b. Press softkey (1), i.e., 360°. Verify that the system display screen changes to the 360° Weather Mode, 200 nm range.

   c. Press softkey (4), i.e., 120°. Verify that the display changes to the 120° Weather Mode, 200 nm range.

   d. Press softkey (3), i.e., 200 nm. Verify that the display range changes from 200 nm to 100 nm.

   e. Press softkey (1), i.e., MENU. Verify that the display returns to the Main Menu.

3.3.3 NAVAID Setup (If installed.)

The NAVAID option will not function unless the correct compatible navigation system is selected. To make this selection, access the Service Menu (see paragraph 4.5) and select the LORAN Setup for the RS-232/R-422 NAVAID option (see paragraph 4.5.7) or NAV System Setup for the ARINC 429 NAVAID option (see paragraph 4.5.9).

3.3.4 Review Checklists

User defined checklists are programmed into the WX-1000 processor using the WX-PA Portable Analyzer. The checklist can contain information that pertains to emergency procedures, taxi and run-up, takeoff, climb, cruise, landing, or any other events the pilot wants programmed into the system. The checklist is programmed from a worksheet (see figure 3-4) provided to the installer. Normally the checklist is programmed after completing the initial system bench test (see paragraph 4.4). The procedure for programming the checklist is detailed in the WX-PA Instruction Manual.

WX - 1000/1000+ ***Checklist Worksheet***

78-8060-5815-8 (Rev. D)

Stormscope®
Series II Weather Mapping Systems

Checklist No. ☐ Aircraft Registration No. ☐☐☐☐☐☐

Title ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27.
28.
29.
30.

Instructions

Use this worksheet to specify desired checklist items to be programmed by your dealer in your *Stormscope®* Series II Weather Mapping System, Model WX-1000 or WX-1000+

1. Enter checklist number and title at the top.
2. Enter aircraft registration number.
3. Enter desired checklist items **in the order in which you want them entered** (one item per line).

NOTE

Use line number one to enter aircraft registration number into the checklist memory for each checklist page, even if the checklist feature of the system is not used. This relates the checklist to a specific aircraft in the event processors are exchanged between two different types of aircraft.

4. Refer to your aircraft Owner's Manual for examples of checklist items which could be utilized.
5. Once completed, keep with other important aircraft operations documents.

By copy of my signature, I acknowledge that the authorized *Stormscope®* Series II Systems dealer has properly programmed my weather mapping system according to my specific instructions and shall not be liable for any injury, loss or damage, whether direct, consequential or incidental, to persons or property arising out of purchaser's use of said system.

Signature	Date

White - Dealer Copy   Canary - Retain in Aircraft

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

L3 communications

Figure 3-4. Checklist Worksheet

To verify that the checklist has been correctly programmed, select checklists from the Main Menu (figure 3-1). Compare the checklist items with those provided on the checklist worksheet. A typical checklist menu is shown in figure 3-5.

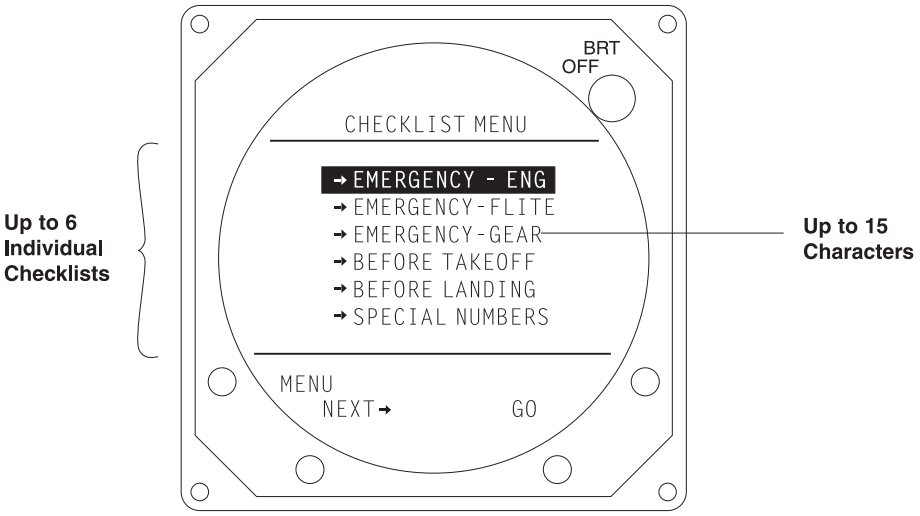


Figure 3-5. Typical Checklist Menu

The buttons perform the following operations:

- **MENU** - returns to the Main Menu (figure 3-3).
- **NEXT** steps to the next checklist.
- **GO** - selects the highlighted checklist.

Press GO to select the highlighted checklist. A typical checklist is shown in figure 3-6.

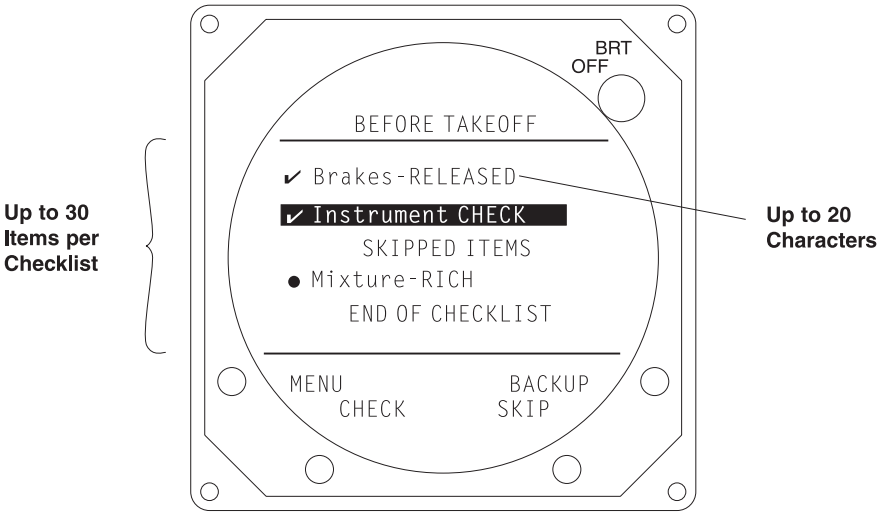


Figure 3-6. Typical Checklist

The buttons perform the following operations:

- **MENU** - returns to the Main Menu (figure 3-3).
- **CHECK** - checks off the highlighted item and steps to the next item.
- **SKIP** - skips the highlighted item, stores it for recall, and steps to the next item.
- **BACKUP** - steps to the previous item.

3.3.5 Time/Date

The TIME/DATE mode displays the time (hours, minutes, & seconds), date, and includes a simple stopwatch and elapsed timer. The TIME/DATE display is shown in figure 3-7. To access the TIME/DATE display, select Time/Date from the Main Menu (figure 3-3).

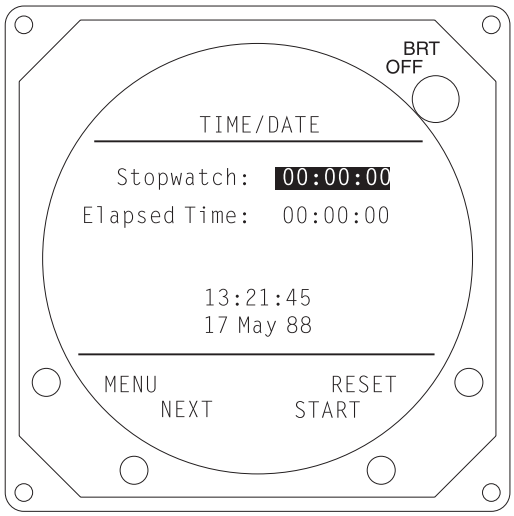


Figure 3-7. Date/Time

The buttons perform the following operations:

- **MENU** - returns to the Main Menu (figure 3-3).
- **NEXT** - steps through the stopwatch, elapsed timer, date, and time options.
- **START/STOP** - start or stop the stopwatch/elapsed timer.
- **RESET** - resets the stopwatch/elapsed timer to 00:00:00.

To set the current date/time, press the **NEXT** button to highlight the desired date/time option and then press the **UP** or **DOWN** buttons to select the date/time.

The stopwatch is automatically reset to 00:00:00 on power up.

The elapsed timer will retain its count in the absence of power (i.e., removing power will have the same effect as pressing **STOP**).

3.3.6 User Selectable Options

The OPTIONS mode displays the results of the continuous self-test, allows the operator to initiate a complete self-test and allows the user to disable the heading stabilization and heading display features. Navaid Setup, if installed, is also selected from this display. The OPTIONS display is shown in figure 3-8. To access the OPTIONS display, select Options from the Main Menu (figure 3-3).

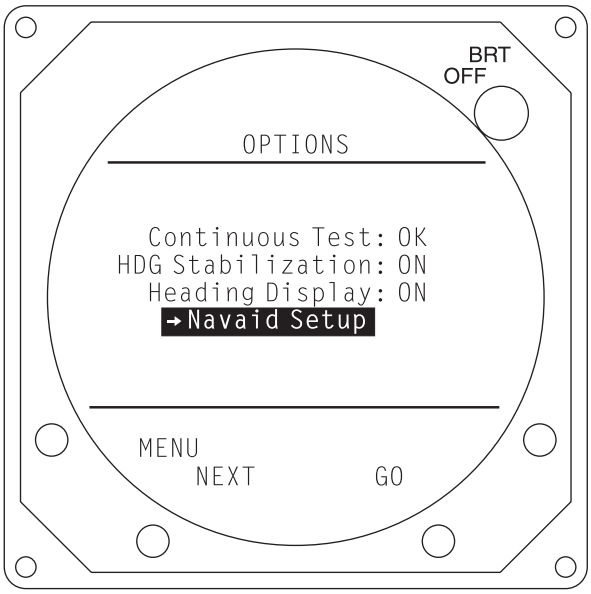


Figure 3-8. Options

The buttons perform the following operations:

- **MENU** - returns to the Main Menu (figure 3-3).
- **NEXT** - steps through the Continuous Test, Heading (HDG) stabilization, heading display, and Navaid setup (if installed).
- **TEST** - initiates the self-test, when Continuous Test is highlighted.
- **ON/OFF** - Turns heading stabilization or heading display on or off, when that option is highlighted.
- **GO** - Selects Navaid Setup, when that option is highlighted.

Figure 3-9 shows the Navaid Setup display.

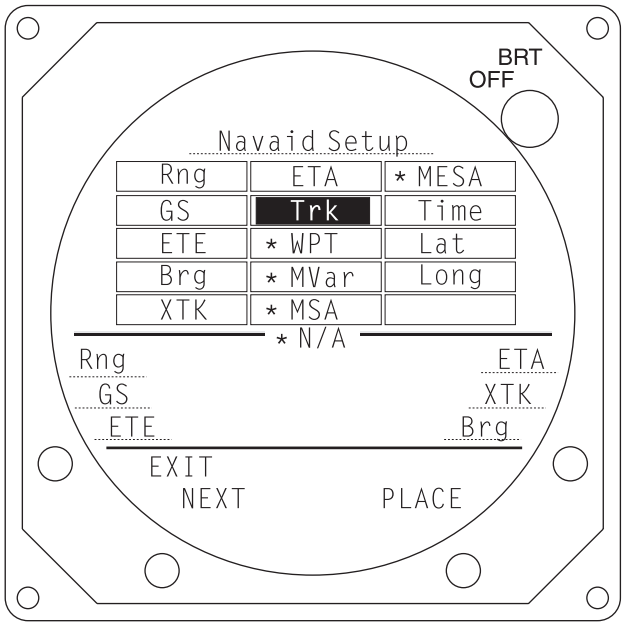


Figure 3-9. Navaid Setup

Navaid Setup permits the user to select six navigation items to be shown on the weather mapping screens. The grid at the top of the screen lists the available options. An asterisk (*) identifies those options that are not available from the navigation system. The selected options are shown in the middle portion of the screen. The abbreviations are identified in table 3-1.

The buttons perform the following operations:

- **EXIT** - returns to the Options Menu (figure 3-8).
- **NEXT** - steps through the navigational items in the grid.
- **PLACE** - places the highlighted item in the upper left position of the selected options.

When an option from the grid is PLACED, the button legend changes to that shown in figure 3-10.

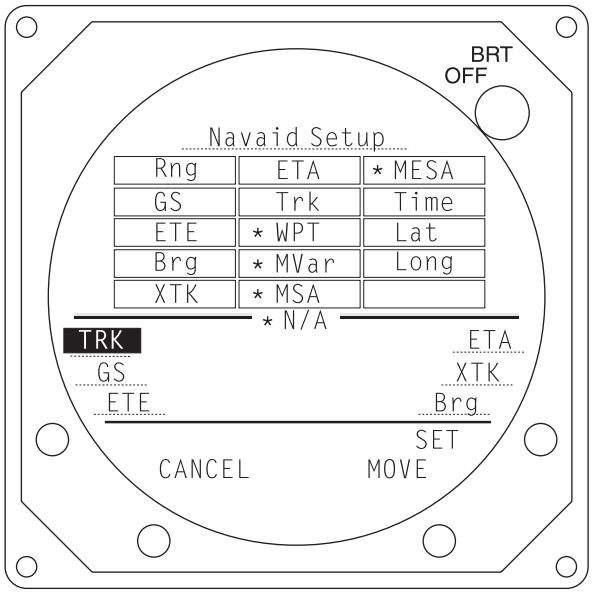


Figure 3-10. PLACED Navaid Option

The buttons perform the following operations:

- **CANCEL** - aborts the selection and returns to the Navaid Setup screen (figure 3-9).
- **MOVE** - moves these selected item next line of selected options.
- **SET** - .causes the selected item to replace the previous item at that location.

Figure 3-11 shows the 360 degree weather screen with the selected navigational data displayed. The course line, waypoint, and course deviation indicator (CDI) are also shown.

Table 3-1. NAVAID Abbreviations

Rng	Range to Active Waypoint	WPT	Waypoint Identifier
GS	Ground Speed	Mvar	Magnetic Variation at Present Position
ETE	Estimated Time Enroute	MSA	Minimum Safe Altitude
Brg	Bearing to Active Waypoint	MESA	Minimum Enroute Save Altitude
XTK	Crosstrack Error	Time	*Stormscope* Stopwatch
ETA	Estimated Time of Arrival	Lat	Latitude
TRK	Magnetic Track Angle	Long	Longitude

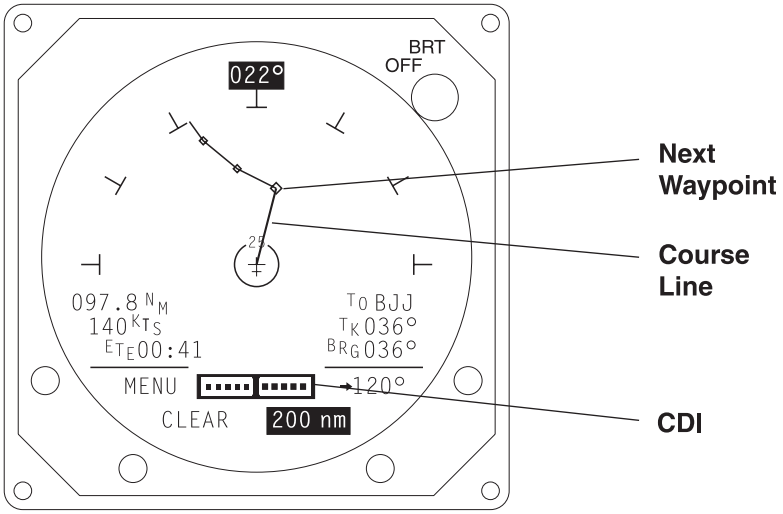


Figure 3-11. Navaid Display

When the navigation system indicates a position error greater than 1.7 nm, a highlighted "w" (warning), as shown in figure 3-12, will appear next to the affected item.

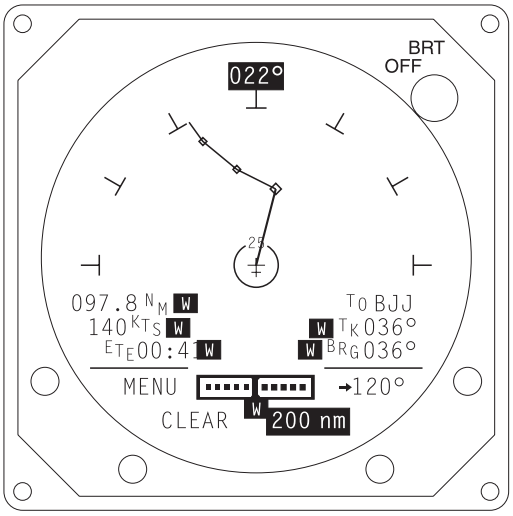


Figure 3-12. Navigational Warning

If the navigation receiver fails to acquire a consistent signal and is not certain of its position, a NAV FLAG replaces the CDI information and any navigational data will disappear. See figure 3-13.

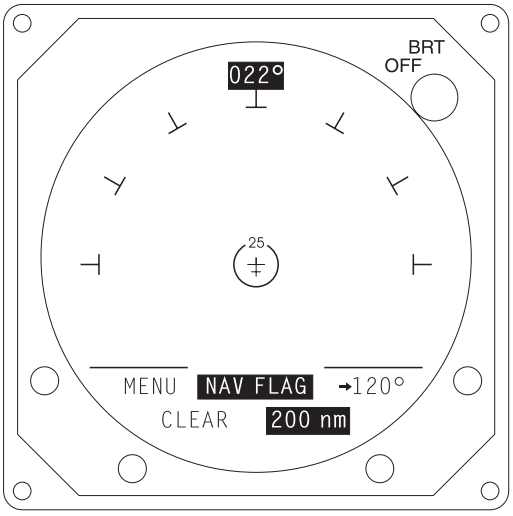


Figure 3-13. NAV FLAG

3.3.7 NAVAID Option Test (If installed.)

This procedure verifies that the WX-1000 will process and display information from the navigation receiver. Before doing this procedure, the navigation system must have been set-up to function with the WX-1000 (see paragraph 3.3.3).

1. Power-up the navigation receiver and allow it time to acquire and display the current position.
2. Select a "Direct To" to a nearby waypoint (within 50 to 100 nm).
3. Power-up the *Stormscope* system. The WX-1000 will perform a series of self-tests, and then present the Main Menu. This normally indicates that the Navaid Option has synchronized with the navigation system, and that communications between the two units is satisfactory.

NOTE

If the WX-1000 is not receiving NAVDATA, an error message is displayed 10 seconds after the self-test completes. If this occurs, refer to paragraph 4.6, Fault Isolation.

3. After the Main Menu has appeared, ensure that the Navaid Display status is "ON".
4. Press the 360 degree display button (button 1). The 360 degree weather screen should appear, with the course line, waypoint, CDI, and digital navigation data displayed.
5. Verify that the navigation data on the WX-1000 display agrees with the data displayed by the navigation system.
6. Verify that the bearing and the range of the course line and waypoint agree with the range and bearing displayed by the navigation system.

NOTE

If heading stabilization is not available due to a fault or heading FLAG condition, the course line will not be displayed.

3.3.8 Antenna Phase Check

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 WX-PA ranges of 120, 75, and 30 nmi. Refer to figure 3-14 for the test setup.

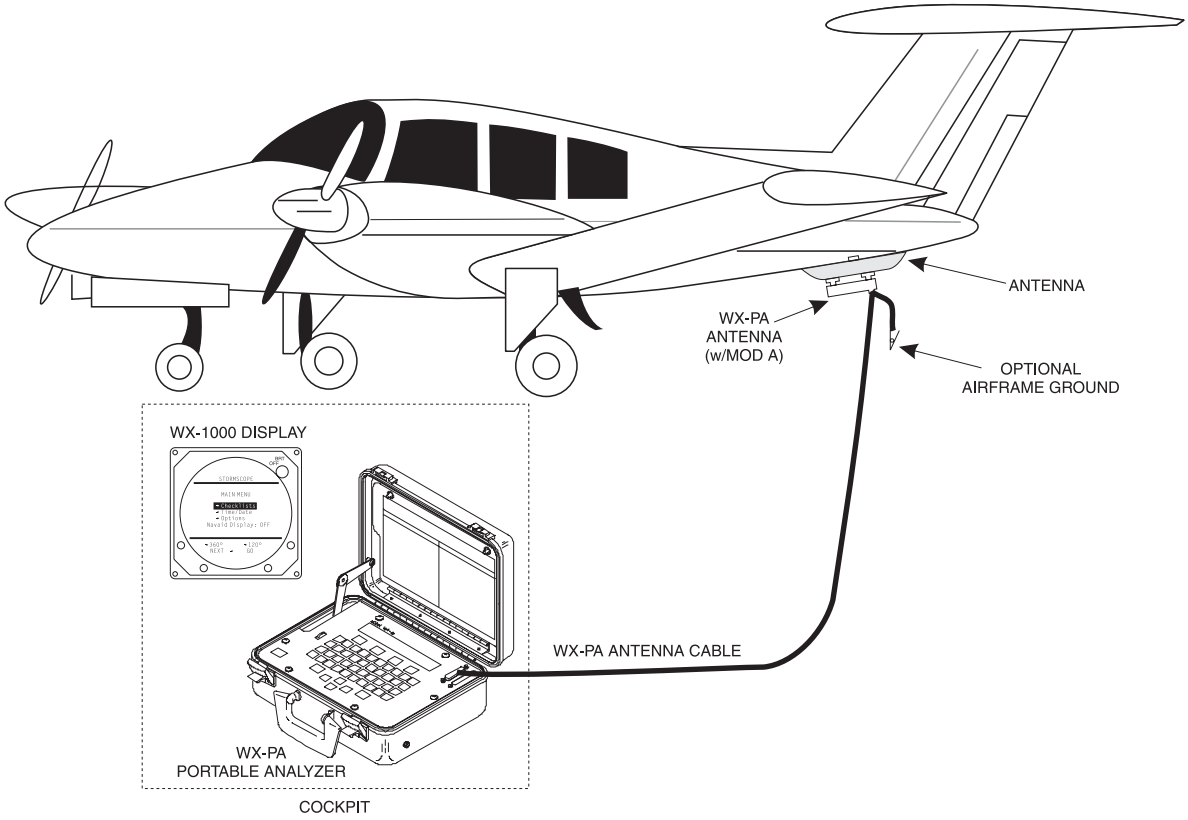
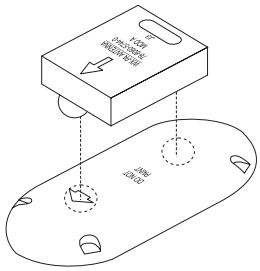


Figure 3-14. Aircraft Test Setup

1. Connect the WX-PA cable to the WX-PA antenna.
2. Refer to figure 3-15 and position the WX-PA antenna on the system antenna. Make sure the connection is tight. If necessary, use tape to secure the WX-PA antenna.



ALIGN THE FORWARD ARROWS
& POSITION SUCTIONS CUPS
DIRECTLY ON THE CENTER OF
THE ANTENNA, ALONG THE
LONGITUDINAL AXIS.

Figure 3-15. WX-PA Antenna Alignment

3. Secure the WX-PA cable to the aircraft with the attached suction cup and route the cable to the cockpit.
4. Connect the remaining end of the WX-PA antenna cable to the WX-PA.
5. Power up the WX-PA.
6. Power up the WX-1000 in Test Disable mode. Refer to paragraph 4.5.4.
7. At the WX-1000, select 360° Weather View at the 200 nmi range.
8. Select the Continuous Out mode displayed on the WX-PA menu and press MENU/ENTR.
9. Select a top mount or a bottom mount antenna configuration on the WX-PA keyboard (“A” key), as appropriate.
10. Select a cardinal bearing and a range of 120 nmi.
11. Use the F1 and F2 keys to adjust range and the F3 and F4 keys to adjust bearing.
12. Press MENU/ENTR to start the test.

NOTE

Adjustments to range and bearing can be made while the test is in progress.

13. Observe the display to ensure the proper positioning of the test strikes, based on range and azimuth settings on the WX-PA. The strikes should be within 5 degrees of the selected azimuth and within 20% of the selected range.

NOTE

THE WX-PA IS USED ONLY TO CHECK SYSTEM FUNCTIONS. IT IS NOT CONSIDERED A CALIBRATION STANDARD.

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

3.3.9 Range and Azimuth Check

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:

1. Select Circular Pattern mode on the WX-PA Mode Menu and press MENU/ENTR.
2. Select a top mount or a bottom mount antenna configuration on the WX-PA keyboard (“A” key), as appropriate.
3. At the WX-1000, select 360° Weather View at the 200 nmi range.
4. Use the F1 and F2 keys to select a 120 nmi range and press "MENU/ENTR" to start the test. The system should plot discharge points outside the 100 nm range.
5. Observe the display to ensure that a circular pattern of strikes appears at 30 degree increments and 120 nm. The strikes should be within 5 degrees of the 30 degree azimuth increment and within 24 nautical miles of 120 nm.

NOTE

THE WX-PA IS USED ONLY TO CHECK SYSTEM FUNCTIONS. IT IS NOT CONSIDERED A CALIBRATION STANDARD.

5. When complete, set the WX-PA for 15 nmi, set the WX-1000 display for 25 nmi and repeat the test.
   a. The System should plot points outside the 12 nmi range.

b. The strikes should be within 5 degrees of the 30 degree azimuth increment and within 3 nmi of 15 nmi.

6. Repeat, setting the WX-1000 for 50 nmi and the WX-PA for 25 nmi.

7. Again, observe the display to ensure the proper positioning of the test strikes within 5 degrees of azimuth and within 5 nmi (20%) of 25 nmi.

3.3.10 Interference Test

The interference test is done to verify that interference from the aircraft electrical system and components is not having a detrimental affect on strike processing.

NOTES

1. The interference test must be performed with the aircraft running at high RPM with all systems powered.
2. Strike points caused by thunderstorm activity can be verified by changing the aircraft heading and clearing the display. Strike points caused by interference will reappear at the same position on the screen. Strike points due to thunderstorm activity will reappear at a new azimuth corresponding to the location of the storm.
3. Shutting down one system at a time, then clearing the display and observing the display can isolate an offending interference source. Refer to troubleshooting electrical noise, paragraph, 4.7.

1. If running software version 2.0 or above:

   Test for electrical noise and interference by running the range and azimuth with the noise monitor and strike test as detailed in paragraph 4.5.3. These tests are accessed from the SERVICE MENU (refer to paragraph 4.5).

2. If running software version 1.21 or lower:

   Test for electrical noise and interference by running range and azimuth check (paragraph 3.3.9) with the aircraft running at high RPM with all systems powered. Excessive electrical noise will inhibit the appearance of strike clusters or may scatter the strike point cluster. Extraneous strike point clusters may be caused by electrical interference or by thunderstorm activity within 200 nm.

3.3.11. Heading Stabilization (If applicable.)

1. Set the WX-1000 range to 200 nmi, and use the WX-PA (at any desired range and bearing) to plot continuous discharge points on the CRT.

2. With the compass system 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.

3.3.12. COMM Radio Interference

1. Repeatedly key the aircraft communications radio microphone:

   If strike data appears on the CRT when the transmitter is keyed, wire the inhibit line to the microphone key switch (see figure 2-5 and paragraph 2.9.2).

2. Enter the noise monitor mode (see paragraph 4.5.3)

3. Repeatedly key the aircraft communications radio microphone:

   If strike data appears on the CRT when the transmitter is keyed:
   - Verify separation of the *Stormscope* and aircraft communication system antennas.
   - Check the routing of the *Stormscope* antenna cable with respect to the aircraft communication system antenna cables.
   - Contact customer service for advice and assistance.

CHAPTER 4
MAINTENANCE

4.1 INTRODUCTION

This chapter contains general flightline maintenance procedures. These procedures are intended to aid in testing a complete, interwired WX-1000 system and to isolate a fault to the display, processor, antenna, or cable.

4.2 CONTINUED AIRWORTHINESS

No scheduled maintenance is required to ensure continued airworthiness.

4.3 PERIODIC MAINTENANCE

NOTE

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

4.3.1 Display

1. Check that cable is properly mated and secured.
2. Check to ensure unit is properly placed and secured to the instrument panel.

CAUTION

Do not use cleaning solvents on the viewing face.

3. Check faceplate for cleanliness. Wipe the viewing face with a damp lint-free, static-free cloth. If necessary, clean with a soft cloth moistened with a mild solution of soap and water. Take care to prevent cleaning solution from running down inside the case.

4.3.2 Processor

1. Check that connectors are properly mated and secure.
2. Check that mounting tray locking clamps are secured to the processor.

4.3.3 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 SYSTEM BENCH TEST

To identify hidden damage that may occur during shipment, an initial system bench test of the processor, display, and antenna should be done immediately upon receipt of the equipment. The bench test can also be done as part of the troubleshooting process to help isolate a problem to a component or to the aircraft interconnects wiring. If, during fault isolation, the antenna has been eliminated as a cause for the malfunction, do the bench test without the antenna. The bench test is performed with the *Stormscope* system out of the aircraft. The initial bench test is also the time to enter the aircraft registration number and customer furnished checklists into the *Stormscope* system processor memory.

4.4.1 Equipment Required

WX-PA Portable Analyzer Kit	P/N 78-8060-5791-1
WX-1000/SKY497 Display	P/N 78-8060-5900-x
WX-1000 Bench Test Kit	P/N 78-8060-5786-1
Includes:	
Connector Pod	P/N 78-8060-5750-7
Antenna Cable	P/N 78-8060-5802-2
Display By-Pass Plug	P/N 78-8060-5802-6
Expansion Test Plug	P/N 78-8060-5922-2
WX-SM Skinmapper	P/N 78-8060-5859-6
DC Power Supply	12-28 Volts, 30 Watts
Antenna Ground Plane	Locally Fabricated (see figure 4-2)

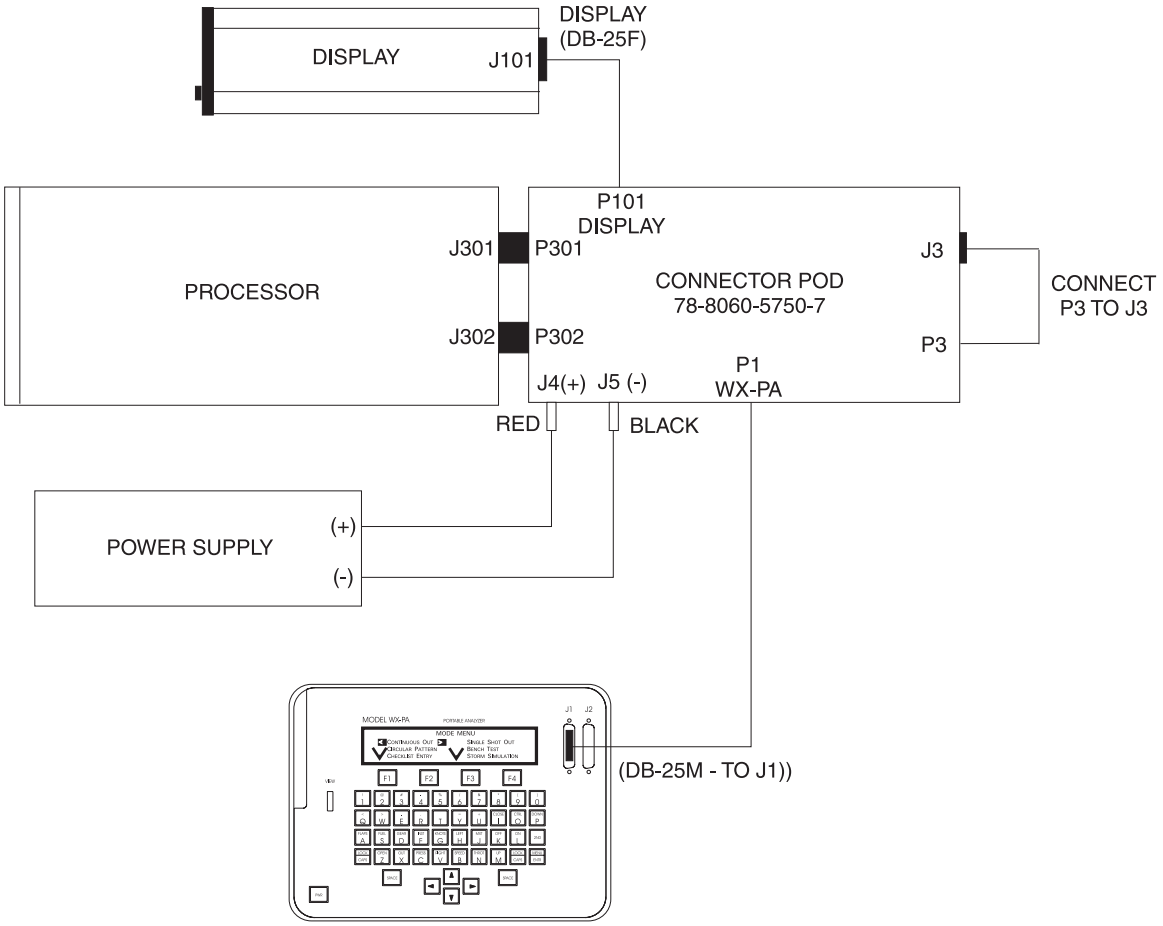
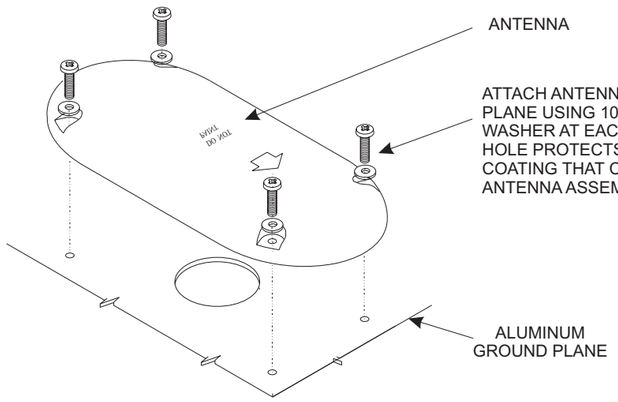
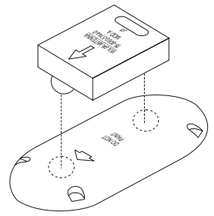


Figure 4-1. Bench Test Setup Without Antenna



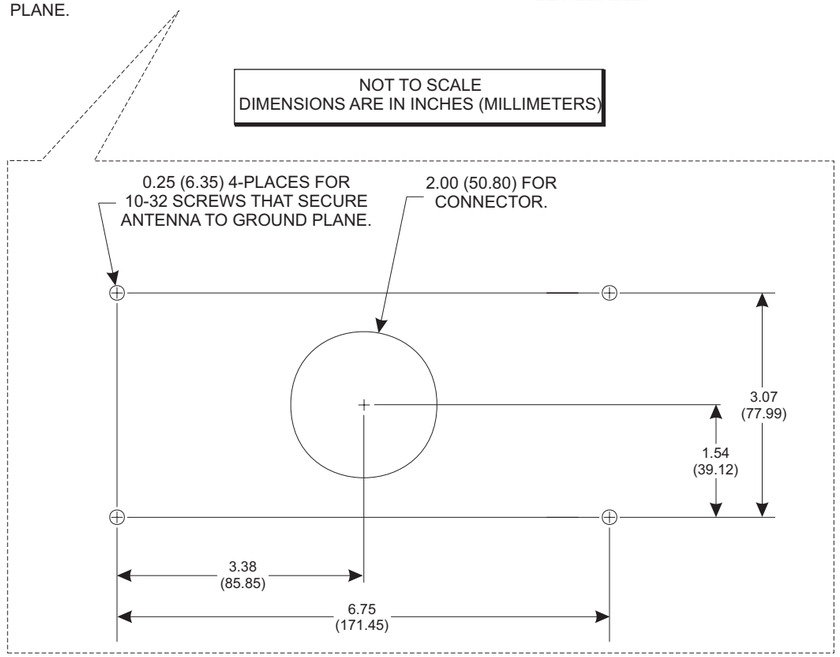
WX-PA ANTENNA ALIGNMENT



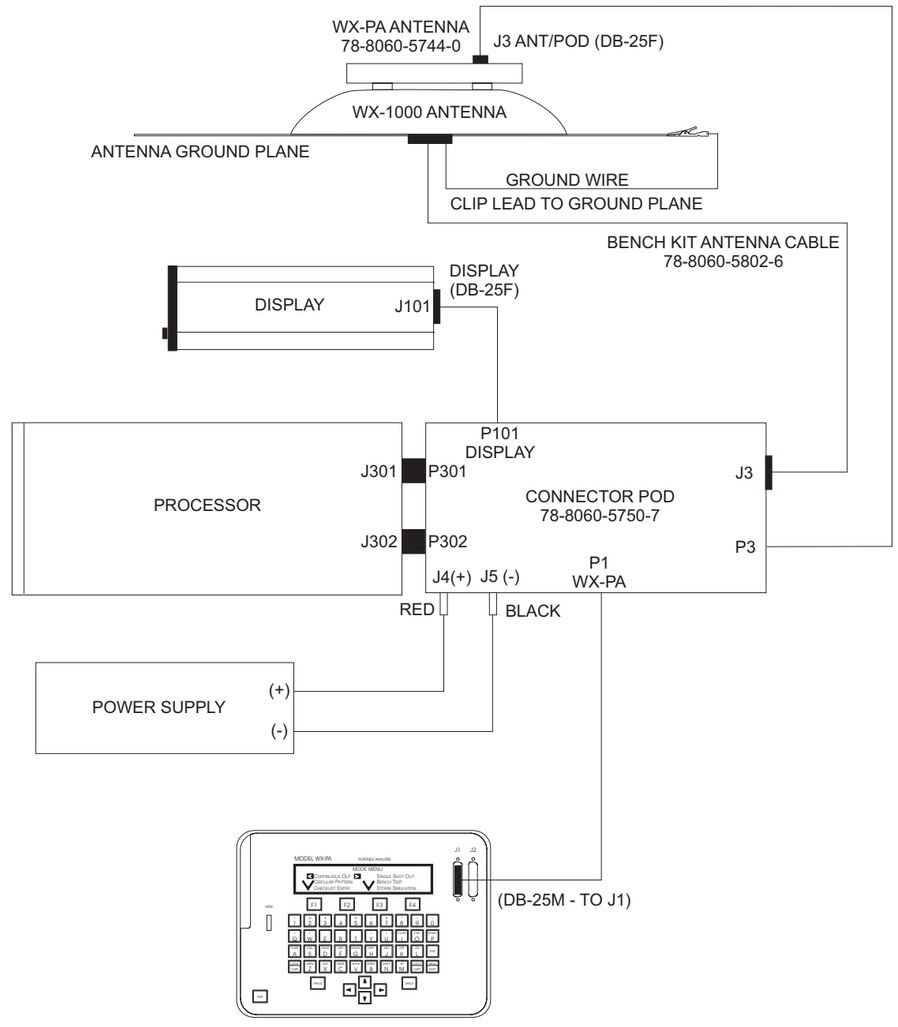
ALIGN THE FORWARD ARROWS & POSITION SUCTIONS CUPS DIRECTLY ON THE CENTER OF THE ANTENNA, ALONG THE LONGITUDINAL AXIS.

CENTER HOLES ON 1/16 (1.6) ALUMINUM GROUND PLANE 25 x 25 (635 x 635). DOUBLER PLATE CAN BE USED AS A TEMPLATE TO MARK HOLE LOCATIONS ON THE GROUND PLANE.

NOTE
IF THE ANTENNA IS NOT PROPERLY GROUNDED TEST RESULTS WILL NOT BE RELIABLE.



GROUND PLANE FABRICATION



TEST SETUP INTERCONNECT

Figure 4-2. Bench Test Setup With Antenna

4.4.2 Test Location

Select a location for testing that is free from electrical interference that may cause erroneous test results. During testing, the system antenna should be located away from known sources of electrical interference by the minimum distances shown below:

Table 4-1. Recommended Minimum Antenna Distance From Known Interference Sources

EQUIPMENT	DISTANCE
TV Monitors	20 ft. (6.1 m)
Computer Terminals	20 ft. (6.1 m)
Digital Phone Systems	5 ft. (1.5 m)
Fluorescent/Mercury Vapor Lights	5 ft. (1.5 m)
WX-1000 Processor	5 ft. (1.5 m)
Bench Power Supply	5 ft. (1.5 m)
Operational Oscilloscopes	5 ft. (1.5 m)

The skinmapper can be used to locate or verify a noise-free location for bench testing. The WX-SM skinmapper system consists of an antenna, antenna cable, and a console that emulates the processor. Refer to the WX-SM Skinmapper Instruction Manual, P/N 78-8060-5874-5 for operation and setup instructions.

4.4.3 Test Procedure

1. To do the bench tests without the antenna connect the equipment as shown in figure 4-1. To do the bench test with the antenna connect the equipment as shown in figure 4-2. Common problems encountered during bench testing include:
   a. Poor connections between the bench kit connector pod and the processor.
   b. Antenna connector ground line that is not connected to the ground plane. This will cause an error in the strike processing test.
   c. The antenna under test is close to an RF noise source.
   d. WX-PA antenna that is not properly aligned on the antenna under test.

   NOTE

   The WX-PA simulates all signals except ANTTSTHI & ANTTSTLO. The WX-PA therefore cannot simulate test strike data without the antenna connected. If the antenna is not attached to the WX-1000 and the self-test is not disabled, ERROR 45 will occur.
2. Turn on the WX-PA by pressing the PWR button.
   a. The WX-PA will perform a series of self-tests to verify that all of its functions are operating properly.
   b. The Mode Menu will appear on the screen if the WX-PA passes all the self-tests.
   c. If the WX-PA does not pass all of the self-tests, the functions that failed will be displayed.
3. Turn the DC power supply on.
4. At the display, turn the OFF/BRT knob clockwise about 180 degrees. After approximately 20 seconds verify that clockwise rotation of the knob increases display brightness and counter-clockwise rotation decreases brightness. The screen should be completely dark with the control fully counter-clockwise. Adjust to a comfortable viewing level.
5. During initialization, the system runs a series of self-tests to ensure that all functions are operating properly. If no faults are detected, the message "ALL TESTS ARE OK" will be displayed. The system will then proceed to the main menu.
6. Observe the LEDs on the front of the processor:
   a. The green LED indicates system power is ON.
   b. The red LED indicates faults detected by the system self-test. Once on, this LED will not turn off until power is recycled. If the antenna is not connected, the red LED will be lit.
   c. The yellow LED indicates a failure detected by or in the processor power supply.

7. If a fault message is displayed, power down the system (turn OFF/BRT knob off), check all connections and repeat from step 3.

NOTE

If doing the bench test without antenna, Error 45 will appear about 10 seconds after the self-test completes. This is normal, continue with step 7.

8. At the WX-PA, select Bench Test mode and then select WX-1000 or WX-1000+ (select WX-1000+ for all processors with heading stabilization, NAVAID and EFIS options). The WX-PA will test and report a pass/fail condition on the following:
   a. VIDEO
   b. ROM
   c. RAM
   d. EEPROM
   e. VRAM - During video RAM test, a series of blinking dots may appear across the display.
   f. RTC Battery
   g. Real Time Clock
   h. Inhibit Line
   i. Heading Flag - Processors with heading stabilization.
   j. Gyro Processing - Processors with heading stabilization.
   k. Strike Processing
9. When the strike processing test is complete, the WX-PA will prompt for a test of each softkey (i.e., Upper Left, Lower Left, Lower Right, & Upper Right).
10. After verifying operation of the pushbuttons, the WX-PA will prompt to disconnect the antenna for the antenna fault test.
11. After the antenna fault test, the WX-PA should report "All Tests OK". This completes the WX-PA bench test. If desired, programmable checklists can be programmed into the WX-1000 in accordance with the procedures detailed in the WX-PA Instruction Manual (P/N 78-8060-5798-6).
12. If the WX-1000 processor under test has a NAVAID or EFIS option installed (i.e., a WX-1000E), access the Service Menu and do the Expansion Test (see paragraph 4.5.6).
13. This completes the bench test.

4.4.4 Additional Tests

The WX-PA is capable of generating test signals to verify that the WX-1000 is correctly processing strike data. The WX-PA outputs signals at a selected range and bearing. The WX-1000 will process the test signals and display a pattern of dots at the selected range and bearing. The WX-PA can be set to output a continuous series of test signals (Continuous Out mode), a single test signal (Single Shot mode) and a series of test signals at a selected range and continuously incremented bearing (Circular Pattern mode). Refer to the WX-PA instruction manual for details.

4.4.5 Failed Bench Test

If the bench test fails, follow the prompts displayed on the WX-PA. If a system error is displayed on the CDU, refer to the fault isolation procedures in paragraph 4.6.

4.5 SERVICE MENU (Software Version 2.00 and Higher)

The Service Menu, added with software version 2.0, is intended only as an aid in installing, testing and troubleshooting the WX-1000. The Service Menu items are not intended to be used by the pilot during normal system operation. While in the Service Menu, the internal self-test and run-time counter are not operational; therefore, any system errors will not be detected or displayed.

The Service Menu is accessed by holding softkeys (**1**) and (**2**) (the left two buttons) depressed as the system is turned on. Hold the buttons until the Service Menu is displayed. The Service Menu is shown in figure 4-3.

NOTE

If the processor is running software version 1.21 or lower and the system is turned on with the two left buttons depressed, the display will show hexadecimal data intended for factory testing and evaluation. To recover simply cycle power off and then on.

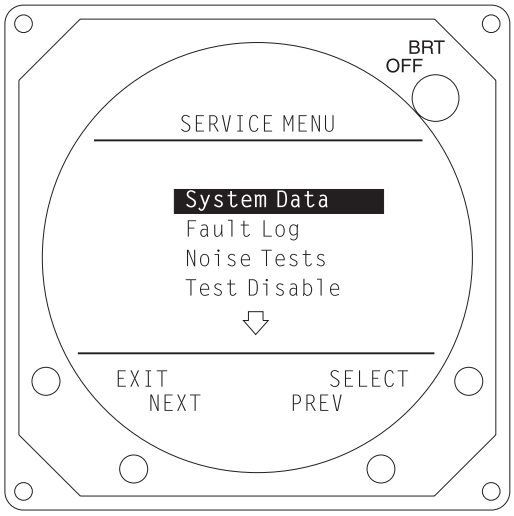


Figure 4-3. Service Menu

The buttons perform the following operations in this mode:

- **EXIT** - causes the system to exit the Service Menu and run the power on self-test.
- **SELECT** - selects the highlighted item.
- **NEXT** steps to the next item.
- **PREV** steps to the previous item.

The Service Menu provides the following choices:

- System Data
- Fault Log
- Noise Tests
- Test Disable
- Expansion Data
- Expansion Tests
- LORAN Setup
- LORAN Raw Data
- NAV System Setup
- NAV System Raw Data

The individual menu items are explained in the following paragraphs.

4.5.1 System Data

The System Data screen (see figures 4-4) contains a record of setup information. If you have problems with the WX-1000, have this information available when contacting L-3 Avionics Systems Customer Service. The Customer Service specialist must have adequate information to diagnose a problem. The System Data screen is accessed by selecting that option from the Service Menu (i.e., press **SELECT** with **System Data** high-lighted). To return to the Service Menu, press **MENU**.

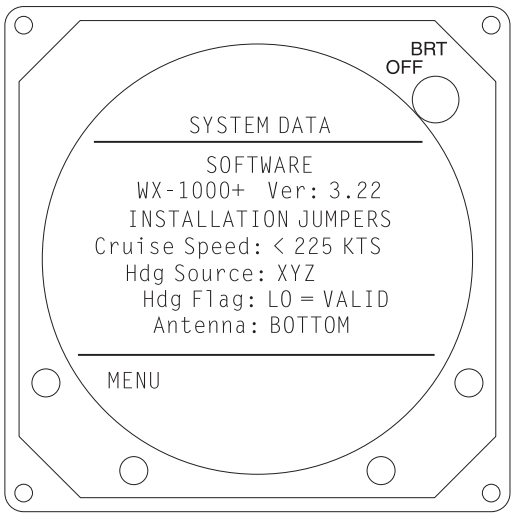


Figure 4-4. System Data

System data identifies (see figure 4-4):

- System Model (WX-1000, WX-1000+, or WX-1000E)
  (See table 1-1.)
- Processor Software Version (The System Software Version, which may differ from the Processor Software Version, is identified on a label at the back of the unit.)
- Installation Jumpers indicating (See paragraph 2.10):
  - Speed (>225KTS or <225KTS)
  - Hdg Source (XYZ, NOT CONNECTED, or ARINC 429)
  - Heading Flag Status (HI = VLAID or LO = VALID)
  - Antenna Location (TOP or BOTTOM)

When the ARINC 429 EFIS option is installed, XYZ heading source is identified if a jumper is installed between P302-26 and P302-43 (see paragraph 2.9.6 and 2.10).

4.5.2 Fault Log

The most recent errors detected by the system self-test are saved in the Fault Log. For each error, the corresponding error code and run-time of occurrence are saved. The fault log, as shown in figure 4-5, is displayed by selecting that option from the Service Menu (i.e., press **SELECT** with **Fault Log** high-lighted). Page 1 shows the 20 most recent system faults. Page 2 shows the initial run-time occurrence of an error.

The buttons perform the following operations in this mode:

- **MENU** - causes the system to exit the Service Menu and run the power on self-test.
- **Page 2** - switches the display to page 2 of the Fault Log.
- **Page 1 -** returns the display to page 1 of the Fault Log.

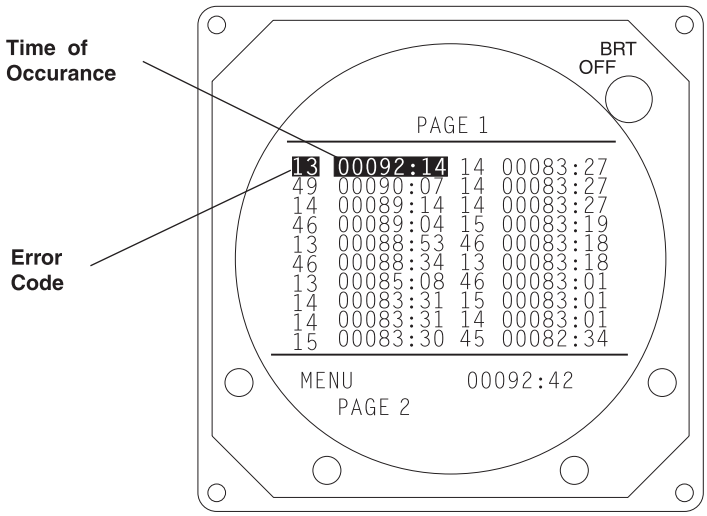


Figure 4-5. Fault Log

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 displayed in the lower right portion of the screen (**HHHHH:MM**).

NOTE

The run-time clock does not increment when the Service Menu is active.

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

Press the **EXIT** key to return to the Service Menu. Softkeys (**B**), (**C**), and (**D**) are not used.

4.5.3 Noise Tests

The noise monitor screen (see figure 4-6) 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

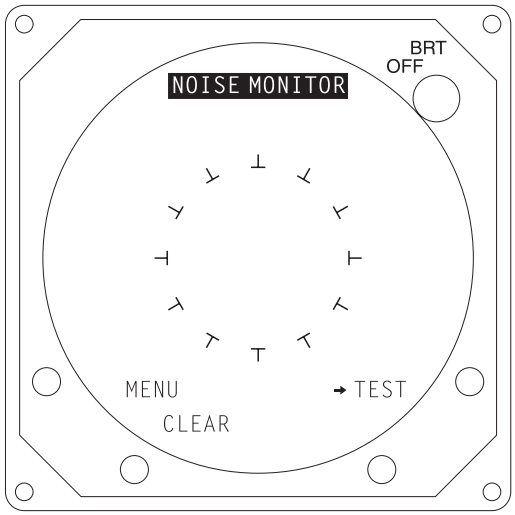


Figure 4-6. Noise Monitor

applied to the strikes. Also displayed is a circle that provides a reference for an acceptable noise level. No range markings are displayed. Old data is removed (bumped off) after 2 minutes, or when the **CLEAR** button is pressed.

NOTE

Do the noise monitor tests with the aircraft running at high RPM and all electrical items turned on (including cabin lights, transponder and DME being interrogated, etc.).

The noise monitor is displayed by selecting that option from the Service Menu (i.e., press **SELECT** with **Noise Monitor** high-lighted).

The buttons perform the following operations in this mode:

- **MENU** - returns to the Service Menu (figure 4-3).
- **CLEAR** - clears all received data from the screen.
- **TEST -** Selects the **Test Strikes** display.

NOTE

Thunderstorm activity within 400 nmi will register on the noise monitor and may affect the test strike display by causing the test strike to fall outside the box.

Press **CLEAR** to erase the screen and then check for electrical noise indications.

PASS There should normally be no noise indications inside the ring on the display. (A small number of single random noise points inside the displayed ring are acceptable.)

FAIL Significant activity (strike clusters) or persistent indications of electrical noise inside the ring are unacceptable. (Trouble-shooting electrical noise is discussed in paragraph 4.7.)

If the noise monitor test is satisfactory, press the **TEST** button to switch to the Test Strike display, see figure 4-7.

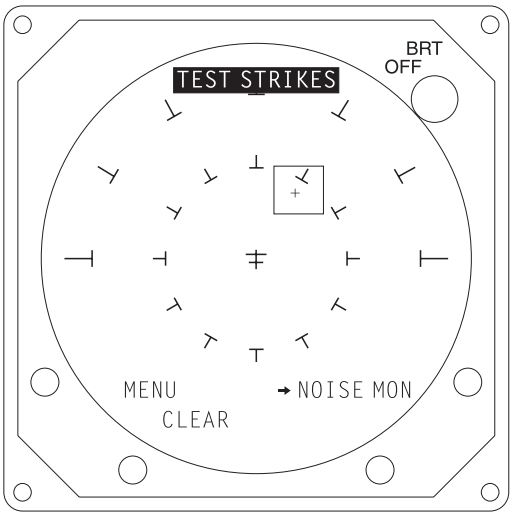


Figure 4-7. Test Strikes

Installers to visually verify the operation of the internal strike test signal use the Test Strikes display. 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 second (1 Hz rate). 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.

The buttons perform the following operations in this mode:

- **MENU** - returns to the Service Menu (figure 4-3).
- **CLEAR** - erases the noise indications.
- **NOISE MON** - returns to the Noise Monitor display (figure 4-6).
- Softkey (**3**) is not used.

The test strike screen verifies the processing and plotting of electrical discharge data. A strike indication ("+") should appear inside the displayed box each second.

PASS - With software version 3.00 or higher, a strike indication is displayed and cleared each second (1 Hz rate), so that it appears to flash. In earlier versions of software, the strike indications are superimposed and must be cleared manually. The strike symbol should appear inside the box.

FAIL - If the generated strike indications appear outside 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.

Switch back and forth between the Test Strikes and Noise Monitor displays to check for accurate plotting of the internally generated test strikes and for electrical noise that could interfere with weather mapping. (Trouble-shooting electrical noise is discussed in paragraph 4.5.)

NOTE

The system must pass both the Noise Monitor and Test Strike criteria to ensure proper operation.

4.5.4 Test Disable

CAUTION

Do not select TEST DISABLE during normal in-flight operations. In this mode the internal self-test is not operational; therefore, any system errors will not be detected or displayed.

The Test Disable mode is to be used only for testing and trouble-shooting an installation. Selecting Test Disable turns off the internal self-test and places the system into weather mapping mode. Test Disable prevents extraneous error messages from cluttering the display. This is particularly useful when the antenna is not connected (e.g., when using the WX-PA).

Test Disable is activated by selecting that option from the Service Menu (i.e., press **SELECT** with **Test Disable** high-lighted). If the processor is running software version 1.21 or lower (i.e., before the service menu was added), Test Disable is activated by holding top right button (i.e., softkey 4) depressed as the system is turned on. When the Test Disable feature is activated (self-tests turned off), a warning message will appear (see figure 4-8) on all weather mapping displays.

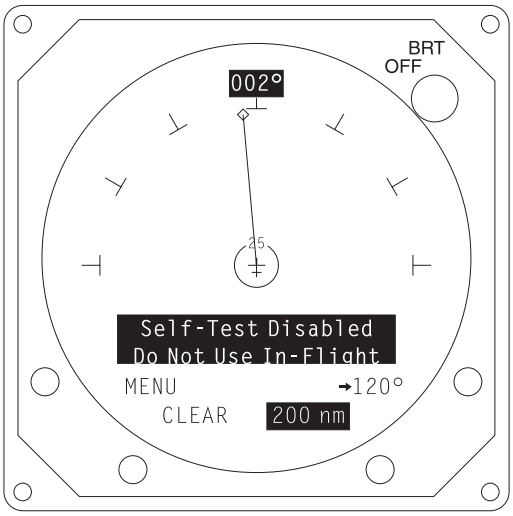


Figure 4-8. Self-Test Disabled Message

To restore all of the self-test functions, turn system power off and then back on. The test disabled warning message will disappear.

4.5.5 Expansion Data

The Expansion Data screen (figure 4-9) shows the NAVAID or EFIS interface that has been selected. The serial data type (RS-232 or RS-422) and ARINC 429 transmit and receive bus speeds are factory configured. These pre-configured processors are identified in table 1-2. The ARINC 429 EFIS output format (i.e., "BFG" or "Honeywell" LSZ-850) was added to the Expansion Data screen with software version 3.22.

Expansion Data is displayed by selecting that option from the Service Menu (i.e., press **SELECT** with **Expansion Data** high-lighted). **MENU**, the only button functional on this display, returns the system to the Service Menu display (see figure 4-3).

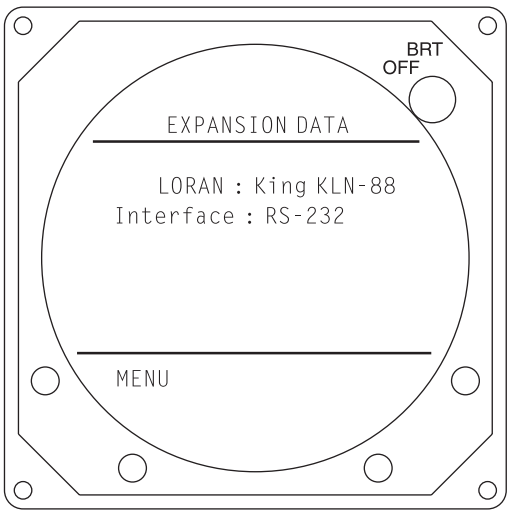


Figure 4-9. Expansion Data

4.5.6 Expansion Tests

The Expansion Test, an external loopback, verifies operation of the RS-232, RS-422 or ARINC 429 communications circuitry. The Expansion Test is displayed by selecting that option from the Service Menu (i.e., press **SELECT** with **Expansion Tests** highlighted).

The first screen (figure 4-10) prompts the operator to connect the communications test plug (i.e., expansion test plug P/N 78-8060-5925-5) to the bench test pod expansion port. If testing the RS-232/RS-422 NAVAID option, set the RS-232/RS-422 switch(SW1) on the test plug to the desired interface. Disregard this switch if testing the ARINC 429 interface or one of the pre-configured processors identified in table 1-2.

NOTE

When testing the ARINC 429 interface, if the processor has not been updated with software version 3.27, both transmit and receive must be set to the same speed (see table 1-2). Processors with software version 3.27 or higher will automatically detect different transmit and receive speeds.

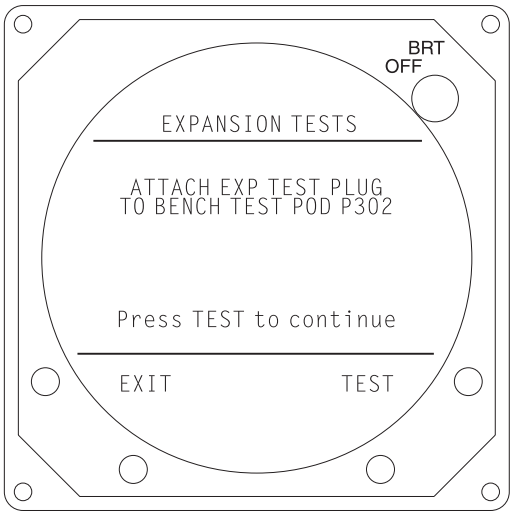


Figure 4-10. Expansion Test - Screen 1

After connecting the test plug and positioning the interface switch, press **TEST** to advance to the second screen (figure 4-11). To return to the Service Menu (figure 4-3), press **EXIT**.

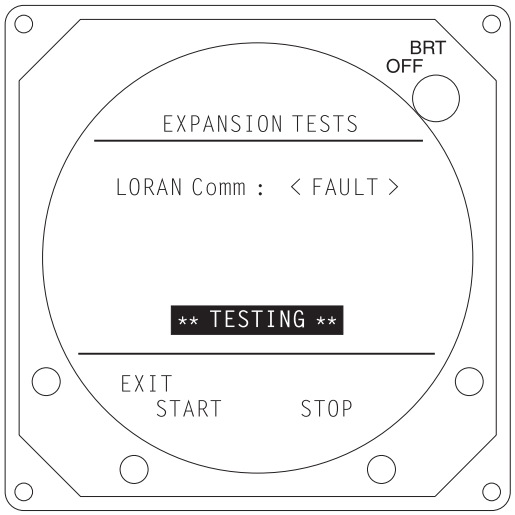


Figure 4-11. Expansion Test - Screen 2

When **START** is pressed, the loopback test will be executed at one second intervals until the **STOP** button is pressed, or until **EXIT** is pressed to return to the Service Menu (figure 4-3). The result of each test will be shown as:

LORAN Comm : <OK>
ARINC429 Comm : <OK>
LORAN Comm : <FAULT>
ARINC429 Comm : <FAULT>

If the loopback test has passed an <OK> is displayed. If the loopback test indicates a <FAULT>, the unit is inoperable and must be returned for service.

4.5.7 LORAN/GPS Setup (RS-232/RS-422 NAVAID)

LORAN Setup is used to identify the navigation system (e.g., LORAN, GPS, etc.) that will interface with the WX-1000 RS-232/RS-422 NAVAID option. The NAVAID option will not function unless the correct compatible navigation system is selected. Table 4-2 lists the available selections.

Table 4-2. LORAN/GPS Setup Selections

Apollo	604 611 612 614 618 800 NMC2001	BFG FlightSystems	F-4 F-14 LRN-500 LRN501 LNS616A LNS616B LNS6000
ARNAV	R-15 R-21 R-25 R-30 R-40 R-50 R-50I R-5000	Garmin	GPS 100
		King	KLN-88
		Northstar	GPS-600 M1
		Trmble	TNL2000/2100 TNL3000/3100

The LORAN Setup screen (figure 4-12) is displayed by selecting that option from the Service Menu (i.e., press **SELECT** with **LORAN Setup** high-lighted). A large dot is display on the left side of the navigation system that is currently selected

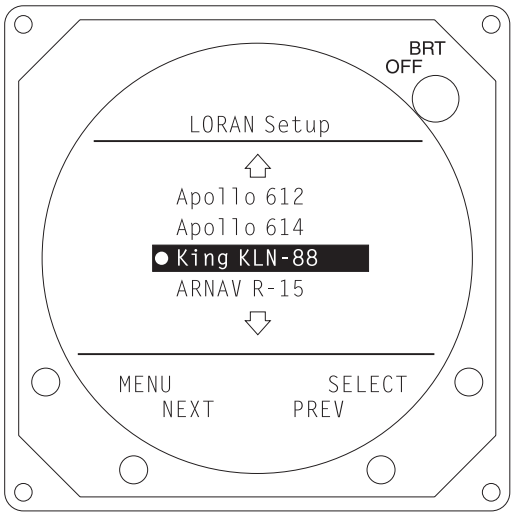


Figure 4-12. LORAN/GPS Setup

The buttons perform the following operations in this mode:

- **MENU** - returns to the Service Menu (figure 4-3).
- **SELECT** - selects the highlighted item.
- **NEXT** steps to the next item.
- **PREV** steps to the previous item.

When **SELECT** is pressed:

1. If the communications parameters (i.e., baud rate, parity and number of stop and data bits) for the selected device are fixed, the display will blink once and the large dot will appear to the left of the high-lighted device.
2. If the communications parameters for the selected device can be changed, the display will present these options (see figure 4-13).

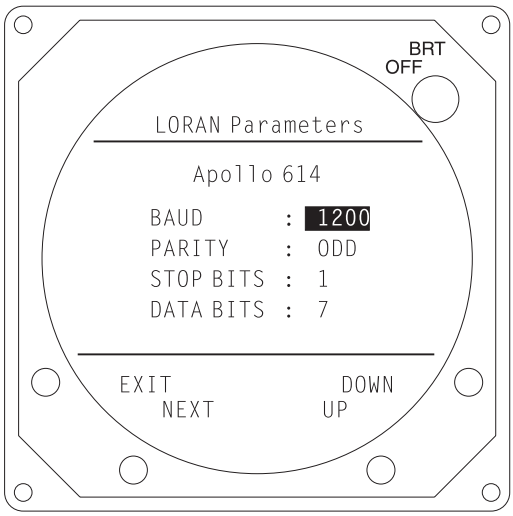


Figure 4-13. Communication Parameters

4.5.8 LORAN/GPS Raw Data (RS-232/RS-422 NAVAID)

The LORAN Raw Data screen (see figure 4-14) can be accessed to verify that valid data is being received via the RS-232/RS-422 NAVAID communications link. After pressing the **START** button, the screen simply shows data (hexadecimal characters) as it is received. When the screen fills, the oldest information is scrolled off and replaced by incoming data. Figure 4-14 shows a full screen display.

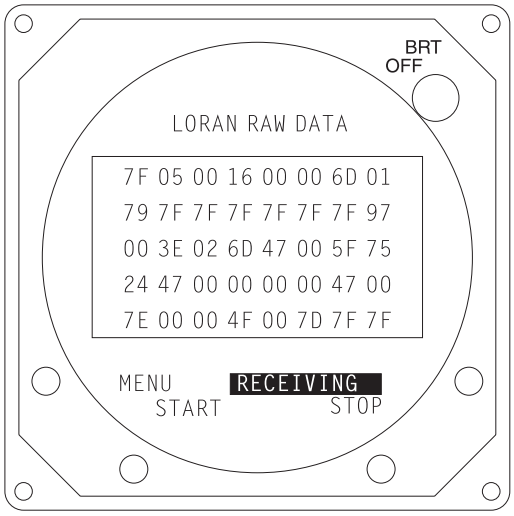


Figure 4-14. LORAN/GPS Raw Data

The buttons perform the following operations in this mode:

- **MENU** - returns to the Service Menu (figure 4-3).
- **START** - starts monitoring incoming data.
- **STOP** - stops monitoring incoming data.

4.5.9 NAV System Setup (ARINC 429 NAVAID)

ARINC 429 NAV System Setup is used to identify the navigation system that will interface with the WX-1000 ARNIC 429 NAVAID option. The NAVAID option will not function unless the correct compatible navigation system is selected. Table 4-3 lists the available selections.

Table 4-3. NAV System Setup Selections

Trimble	TNL-7880
Global	GNS-X
Universal	UNS-1 UNS-1A

The ARINC 429 NAV System Setup screen (figure 4-15) is displayed by selecting that option from the Service Menu (i.e., press **SELECT** with **NAV System Setup** high-lighted). A large dot is displayed on the left side of the navigation system that is currently selected.

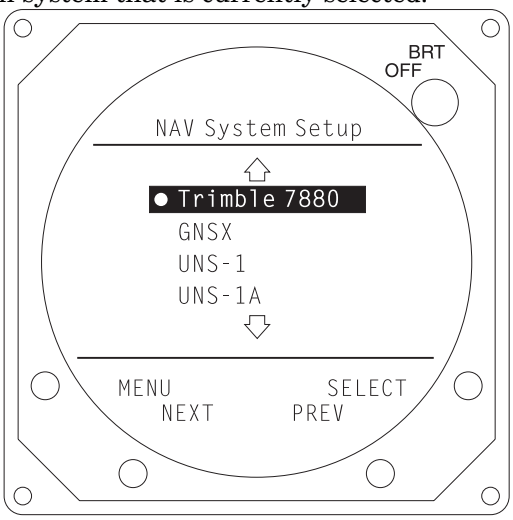


Figure 4-15. ARINC 429 NAV System Setup

The buttons perform the following operations in this mode:

- **MENU** - returns to the Service Menu (figure 4-3).
- **SELECT** - selects the highlighted item.
- **NEXT** steps to the next item.
- **PREV** steps to the previous item.

When **SELECT** is pressed the display will blink once and the large dot will appear to the left of the high-lighted device.

4.5.10 NAV Sys Raw Data (ARINC 429 NAVAID)

The ARINC 429 DATA screen (see figure 4-16) can be accessed to verify that valid data is being received via the ARINC 429 NAVAID data link. The data screen provides a list of all received ARINC 429 labels. The labels are listed in numerical order. The SSM (sign status matrix) code and data word received with each label is also displayed. Table 4-4 lists the ARINC 429 labels supported by the NAVAID option.

Table 4-4. ARINC 429 NAVAID Labels

LABEL	NAME	APPLICABLE NAV SYSTEM	LABEL	NAME	APPLICABLE NAV SYSTEM
074	Data Record Header	Global & Universal	324	Waypoint 0 Latitude or Pitch	Trimble Units
075	Active WPT	All Systems	325	Waypoint 0 Longitude or Roll	Trimble Units
113	Message Checksum	Global & Universal	326*	Waypoint 1 Latitude	Trimble Units
115*	True WPT BRG	All Systems	327*	Waypoint 1 Longitude	Trimble Units
116*	Cross TRK Dist	All Systems	330*	Waypoint 2 Latitude	Trimble Units
147*	Mag Variation	All Systems	331*	Waypoint 2 Longitude	Trimble Units
251*	Dist to WPT	All systems	332*	Waypoint 3 Latitude	Trimble Units
252*	Time to WPT	All Systems	333*	Waypoint 3 Longitude	Trimble Units
270	Status	Universal Only	334*	Waypoint 4 Latitude	Trimble Units
271	OSS Mode Cntrl or Status	Trimble Units	335*	Waypoint 4 Longitude	Trimble Units
275	Status	Global & Universal	336*	Waypoint 5 Latitude	Trimble Units
303	Message Lengthy, type, number	Global & Universal	337*	Waypoint 5 Longitude	Trimble Units
304	Message characters 1-3	Global & Universal	340*	Waypoint 6 Latitude	Trimble Units
305	Message characters 4-6	Global & Universal	341*	Waypoint 6 Longitude	Trimble Units
306*	Waypoint Latitude	Global & Universal	342*	Waypoint 7 Latitude	Trimble Units
307*	Waypoint Longitude	Global & Universal	343*	Waypoint 7 Longitude	Trimble Units
310*	Present Position (Lat)	All Systems	344*	Waypoint 8 Latitude	Trimble Units
311*	Present Position (Lon)	All Systems	345*	Waypoint 8 Longitude	Trimble Units
312*	Groundspeed	All Systems	346*	Waypoint 9 Latitude	Trimble Units
313*	Track Angle	All Systems	347*	Waypoint 9 Longitude	Trimble Units
314*	True Heading	Trimble Units			

* SSM must be "11" for information to be valid.

The ARINC 429 Data screen is displayed by selecting the **NAV Sys Raw Data** option from the Service Menu (i.e., press **SELECT** with **NAV Sys Raw Setup** high-lighted). The initial screen will be displayed with no data.

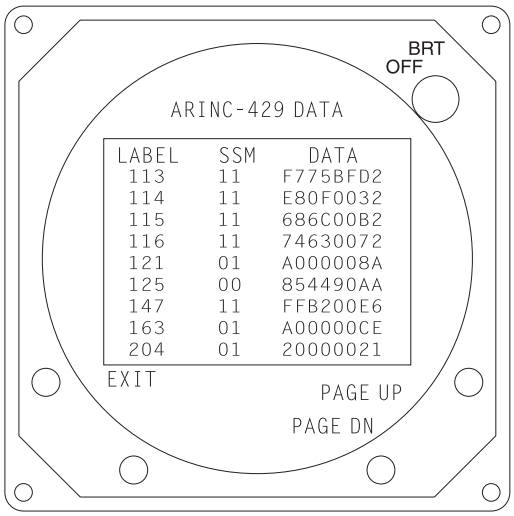


Figure 4-16. ARINC 429 NAVAID Data Screen

The buttons perform the following operations in this mode:

- **EXIT** - returns to the Service Menu (figure 4-3).
- **START** - executes the analysis routine.
- **PAGE UP** page up through the list of received ARINC 429 labels.
- **PAGE DN**. Page down through the list of received ARINC 429 labels

Press START to execute the program. The message "IN PROCESS……" will be displayed. The processor will analyze incoming data for five seconds and then display the labels as shown in figure 4-16.

4.6 FAULT ISOLATION

Most problems associated with the WX-1000 will cause the unit to display error messages. Tables 4-6 and 4-7 list the WX-1000 error messages. 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 4.5.

4.6.1 GENERAL

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

1. Check circuit breaker.
3. At front of processor, verify that the GREEN LED is dimly lit.
4. Verify that, when the power switch is turned ON, the GREEN LED goes bright.
5. Contact L-3 Avionics Systems Field Service.

If there is power, but the display is distorted:

1. Check for interference from nearby instruments.
2. Contact L-3 Avionics Systems Field Service.

Use the Service Menu (refer to paragraph 4.5) as an aid in fault isolation. Information available from the service menu can help identify conditions that need to be resolved.

The WX-1000 runs a series of detailed self-tests at power-up and on demand through the Options menu (see paragraph 3.3.6). It also continuously executes a shorter self-test program as long as the system is operating. The system self-tests are detailed in table 4-5.

Table 4-5. Self-Test Items

TEST ITEM	START UP	OPERATOR-INITIATED	CONT-INUOUS	AUTO RECOVERY	FAILURE PRECLUDES:
Antenna	X	*	F	Y	Storm Display
Analog Processing	X	X	C	Y&	Storm Display
Video Output	X	X		N	System Operation
Data Memory	X	X		N	System Operation
Video Memory	X	X		N	System Operation
Program Memory	X	X	C	N	System Operation
Software Model & Ver. Check	X			N	System Operation
Non-Volatile Memory	X	X		N	1. Checklist Operation 2. Fault Log Operation
Heading Valid Flag		*	F	Y	1. Heading Stabilization 2. Heading Display
Gyro Processing	X	X		N	1. Heading Stabilization 2. Heading Display
WX-PA Communications	X	X&		Y	Communication With Test Equipment
Inhibit Stuck		*	F	Y	Strike Processing
Clock Battery	X	X	C	N	Time/Date Display
Serial Port A	E	E		N	Navaid Option Operation
Serial Port B	E	E		N	Serial Port B Functions

X = Test performed.
C = Test performed every 15 seconds.
F = Test performed every 1 second.
* = Result of last test (by continuous self-test) is used as a result.
& = Version 2.00 or higher software only.
E = Test performed when an Expansion Interface board option is installed.

4.6.2 ERROR MESSAGES

When a self-test identifies an abnormal condition, an error message appears in the system display. The message identifies the fault, and in most cases, how it affects the system. In systems that have processor software version 2.00 or higher, the fault is identified with a number. Tables 4-6 and 4-7 list the WX-1000 error messages.

Table 4-6. Error Messages - Software Version 1.21 or Lower

MESSAGE	REMARKS
HARDWARE ERROR Continued operation is not possible.	Processor fault. Call factory service.
HARDWARE ERROR Invalid test strikes..	Processor fault. Call factory service.
HARDWARE ERROR No test strikes..	Strike processing failure. •Bench test Processor, Display and Antenna. •Check for electrical interference.
CLOCK BATTERY DEAD	Real time clock battery dead. Call factory service.
MEMORY ERROR	System memory error. Call factory service.
ANTENNA ERROR	Antenna failure. •Check Antenna cable. •Bench test processor, display and antenna.
MIC KEY STUCK	Inhibit line active over one minute. •Check mic key. •Verify that radio is switched on. •Check inhibit wiring. •Bench test processor, display and antenna.
SOFTWARE ERROR	Incompatible ROM. •Call factory service.

Table 4-7. Error Messages - Software Version 2.00 or Higher

MESSAGE	REMARKS
ERROR 01 Continued operation is not possible.	Processor fault. Call factory service.
ERROR 03 Time of day and elapsed time are not available.	Real time clock battery dead. Call factory service.
ERROR 10 & 11 Heading stabilization is not available. Press any key to continue.	Heading processing failure. •Check synchro wiring. •Check heading source. •Check 400 Hz source.
ERROR 13-15 Navaid option not available. Press any key to continue.	Faulty or missing data from Navaid. •Check Interconnect. •Check "Raw LORAN Data" mode. •Check "LORAN Setup" mode for current model and parameter selections.
ERROR 16 Expansion board fault. Navaid option not available. Press any key to continue.	Internal communications error. Call factory service.
ERROR 18 Expansion board fault. Serial port B Option not available. Press any key to continue.	Internal processor fault Call factory service.
ERROR 20-25 Continued operation is not possible.	Processor memory fault. Call factory service.
ERROR 26, 27 Checklist operation is not available. Press any key to continue.	System memory error. Call factory service.
ERROR 30-36 Continued operation is not possible.	Processor video fault. Call factory service.

Table 4-7. Error Messages - Software Version 2.00 or Higher
(Continued)

MESSAGE	REMARKS
ERROR 40 Weather mapping is inhibited. Press any key to continue.	Strike processing test failure. •Check ANTTSTHI, ANTTSTLO wiring.
ERROR 41 Weather mapping is inhibited. Press any key to continue.	Strike processing test failure. •Check XHI, XLO wiring.
ERROR 42 Weather mapping is inhibited. Press any key to continue.	Strike processing test failure. •Check YHI, YLO wiring.
ERROR 43 Weather mapping is inhibited. Press any key to continue.	Strike processing test failure. •Check EHI, ELO wiring.
ERROR 44 Weather mapping is inhibited. Press any key To continue,	Strike processing test failure. •Check for electrical interference. •Check antenna mount selection jumper. •Bench test processor, display, and antenna. •Call factory service.
ERROR 45 Weather mapping is inhibited.	Strike processing failure. •Check for electrical interference. •Bench test processor, display and antenna.
ERROR 46 Weather mapping is inhibited. Press any key to continue.	Antenna failure. •Check for electrical interference. •Check Antenna cable. •Bench test processor, display and antenna.
ERROR 47 Weather mapping is inhibited.	Strike processing test failure. •Bench test processor, display and antenna. •Check for electrical interference.
ERROR 48 Weather mapping is inhibited. Press any key to continue.	Electrical noise. •Check for electrical noise. •Call factory service.
ERROR 49 MIC KEY STUCK Weather mapping is inhibited.	Inhibit line active over one minute. •Check mic key. •Verify that radio is switched on. •Check inhibit wiring. •Bench test processor, display and antenna.

* Errors 13 through 18 appear only with processor software version 3.00 or higher.

NOTE

The WX-1000/WX-1000+ Systems with 2.00 or higher software will recover from noise-induced system errors if the noise source is removed, or if the intensity decreases below the triggering threshold. This may occur in cases of intermittent noise or in changes in distances from an external noise source (low-frequency transmitting towers, buried cables, etc.). If a noise interferes with the system long enough to cause an error, the WX-1000/WX-1000+ will display an Error 45. Weather mapping is inhibited. When a display button is pressed, a "PLEASE STAND BY" message will appear on the weather screens. This message will remain as long as the interfering noise is present. When the noise is no longer a factor, the message will disappear and the *Stormscope* System will operate normally.

4.6.3 RS-232/RS-422 NAVAID Option

A variety of LORAN and GPS receivers (see Appendix C) can be interfaced to the WX-1000 processor via an opto-isolated RS-232 or RS-422 serial communications port. To troubleshoot this option:

1. Access the Main Menu and verify that the "Navaid Display" is set to ON.
2. From the Service Menu, access Expansion Data (see paragraph 4.5.5) and verify that the correct navigation system and serial data type have been selected (refer to Appendix C, table C-1).
   a. The navigation system and communication parameters (i.e., baud rate, parity, stop bits, data bits) are selected from the LORAN Setup screen (see paragraph 4.5.7).
   b. The WX-1000E RS-232/RS-422 NAVAID processor is factory configured to accommodate either RS-232 or RS-422. These pre-configured processors are identified in table 1-2.
3. To verify operation of the WX-1000 processor RS-232/RS-422 communications circuitry, do the Expansion Test (see paragraph 4.5.6).
4. To verify that the WX-1000 processor is receiving valid data via the RS-232/RS-422 communications link, access the LORAN RAW DATA screen (see paragraph 4.5.8).
5. Check connection between the navigation system and the WX-1000 processor (refer to figure 2-5, Appendix C, table C-1, and the appropriate manufacturer's documentation).

4.6.4 ARINC 429 NAVAID Option

A variety of navigation systems (see Appendix D) can be interfaced to the WX-1000 processor via an ARINC 429 data link. To troubleshoot this option:

1. Access the Main Menu and verify that the "Navaid Display" is set to ON.
2. From the Service Menu, Access Expansion Data (see paragraph 4.5.5) and verify that the correct ARINC 429 navigation system (refer to Appendix D, table D-1) and bus speed has been selected.
   a. The navigation system is selected from the NAV System Setup screen (see paragraph 4.5.9).
   b. The WX-1000 ARINC 429 receive bus speed is factory set to low (12. kHz) The navigation system transmit bus speed must also be set to low. A higher bus speed is not supported.
3. To verify operation of the WX-1000 processor ARINC 429 communications circuitry, do the Expansion Test (see paragraph 4.5.6).
4. To verify that the WX-1000 processor is receiving valid data via the ARINC 429 communications link, access the ARINC 429 DATA screen (see paragraph 4.5.10).
5. Check connection between the navigation system and the WX-1000 processor (refer to figure 2-5, Appendix D, table D-1, and the appropriate manufacturers documentation).

4.6.5 ARINC 429 EFIS Option

A variety of display systems (see Appendix E) can be interfaced to the WX-1000 processor via an ARINC 429 data link. To troubleshoot this option a WX-1000/SKY497 display is required. The WX-1000 display is required to access the Service Menu (e.g., review the error log, execute the expansion tests, etc.).

NOTES

When comparing strike presentations on the EFIS display with the WX-1000 display, there is a delay of 6 to 12 seconds for data to appear on the EFIS. This is normal.

1. Do the Power Up procedure (see paragraph 3.3.2) to verify that the WX-1000 display is operational and then do fault isolation as detailed in paragraphs 4.6.1 and 4.6.2.
2. From the Service Menu, Access Expansion Data (see paragraph 4.5.5) and verify that the transmit and receive data rate and the ARINC 429 output format ("BFG" or "Honeywell" LSZ-850) is correct.
   a. The LSZ-850 output format is selected by installing a jumper between pins 46 and 29 of WX-1000 connector P302 (see paragraph 2.10).
   b. The WX-1000E ARINC 429 EFIS processor is factory configured to accommodate the various ARINC 429 bus speeds. These pre-configured processors are identified in table 1-2.
3. To verify operation of the WX-1000 processor ARINC 429 communications circuitry, do the Expansion Test (see paragraph 4.5.6).

4. Check connection between the ARINC 429 display and the WX-1000 processor (refer to figure 2-5, and the appropriate manufacturer's documentation).
5. To verify that the *Stormscope*® is transmitting valid data, connect an ARINC 429 Bus Analyzer to the WX-1000 processor (P302-38 - 429TXA & P302-21 - 429TXB) and monitor the bus traffic. After completion of the self-test, the WX-1000 processor will transmit labels every 2 seconds.
   a. Labels 001, 300 and 371 are always present.
   b. Labels 100 through 176 - one or more present when cell data is sent.
   c. The *Stormscope*® system fault status is contained in label 001 data. As shown in table 4-8, data bits within label 001 are set high (1) to indicate system status.

Table 4-8. ARINC 429 Label 001 Status Bits

STATUS BIT		
BFG Format	**LZ-850 Format***	**Fault Description**
bit 18 - set (1)	bit 16 - set (1)	Heading flag or no heading data
bit 19 - set (1)	bit 12 - set (1)	Mic key asserted over 1 minute - system inhibited
bit 21 - set (1)	bit 23 - set (1)	Antenna fault
bit 22 - set (1)	bit 23 - set (1)	Processor fault - recoverable (includes error codes 40-48 (except 46) in figure 5-17)
bit 23 - set (1)	bit 23 - set (1)	Processor fault - non-recoverable

* Refer to Appendix E for details relating to the Honeywell LSZ-850 compatible format.

4.7 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-PA 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-1000 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.

NOTE

Refer to L-3 Avionics Systems Service Letter #148 for additional information relating to troubleshooting electrical noise.

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

1. Access the service menu (refer to paragraph 4.5) and run the noise monitor (refer to paragraph 4.5.3) to reproduce the problem on the ground.

NOTE

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

2. Use a WX-SM Skinmapper to check for interference radiated into the antenna or cable. The Skinmapper checks for radiated noise only.
3. Isolate the aircraft system that generates the noise.
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. The interference source must be properly grounded. It may be necessary to relocate the WX-1000 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.

9. It may be necessary to bypass the WX-1000 antenna (see figure 4-17), select Test Disable (see paragraph 4.5.4) and drive the processor with the WX-PA unit (refer to the WX-PA Instruction Manual P/N 78-8060-5798-6). If the noise goes away, the problem is noise radiated into the antenna and it may be necessary to relocate the antenna.

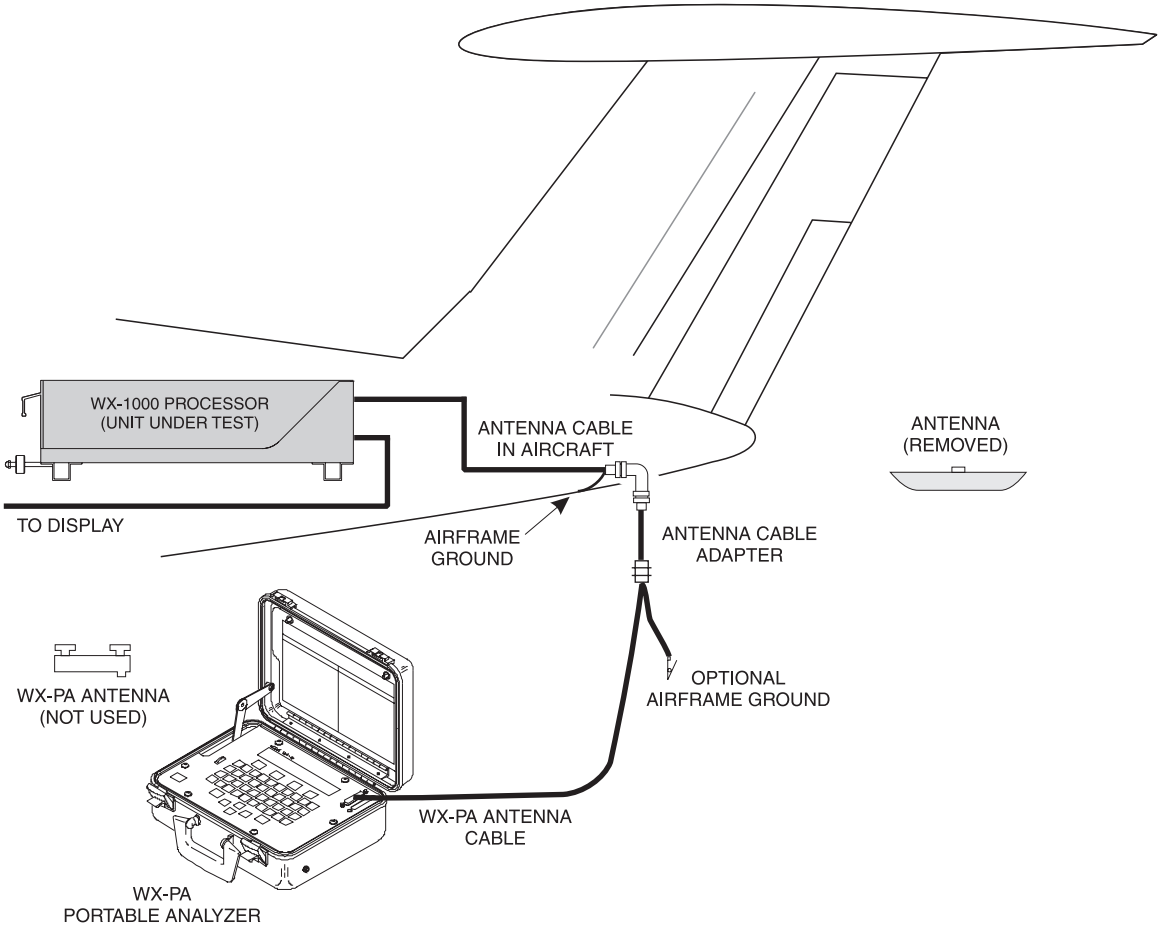


Figure 4-17. WX-1000 Antenna Bypass

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

4.8 RETURN TO SERVICE CHECK

After any repair has been made do the bench test (see paragraph 4.4). After reinstallation of the equipment in the aircraft do the post installation checkout procedure (see chapter 3). The post-installation checkout procedure is intended to verify that the system components are properly connected and that the installed system is operating correctly.

4.9 DISPOSITION OF FAILED ITEMS

Return defective components to your authorized L-3 Avionics Systems 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 cable connectors on the display, processor, and antenna.
2. The display, processor and antenna 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.

This page intentionally left blank.

APPENDIX A
WX-1000 INTERFACE
SIGNAL & CABLE CHARACTERISTICS

INTRODUCTION

This appendix defines the electrical characteristics of all input and output signals to the WX-1000 System. 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	POWER	±12VDC ±5% regulated, less than 100mA. Power output from the display/processor to the antenna. It is used to power the active circuitry inside the antenna. CONNECTION P301-47 (-12V) to P201-J P301-14 (+12V) to P201-D
	ANTENNA COM.	Antenna power return. CONNECTION P301-30 (ANTGND) to P201-A
	X-AXIS	0 to ±22 V @ <10 mA differential signal generated by the antenna in response to a lightning strike's relative b-field strength in the latitudinal axis of the antenna. The source impedance is 20 Ω. The polarity of the signal along with the polarity of the sense signal determines whether the strike is between 0-180º or 180-0º. CONNECTION TOP MOUNTED ANTENNA P301-17 (XHI) to P201-G P301-33 (XLO) to P201-H BOTTOM MOUNTED ANTENNA P301-33 (XHI) to P201-G P301-17 (XLO) to P201-H
	Y-AXIS	0 to ±22 V @ <10 mA differential signal generated by the antenna in response to a lightning strike's relative b-field strength in the longitudinal axis of the antenna. The source impedance is 20 Ω. The polarity of the signal along with the polarity of the sense signal determines whether the strike is between 270-90º or 90-270º.

SIGNAL	CHARACTERISTICS	
Antenna I/O	Y-AXIS	(Continued)
		CONNECTION P301-49 (YHI) to P201-M P301-50 (YLO) to P201-L
	SENSE	0 to ±22 V @ <100 mA differential signal generated by the antenna in response to a lightning strike's relative e-field strength. The polarity of the sense signal along with the polarity of the b-field signals determine the proper quadrant to place the strike. The source impedance is 20 Ω.
		CONNECTION P301-15 (EHI) to P201-E P301-48 (ELO) to P201-F
	ANTENNA TEST	A 4 Vdc @ 100 mA differential signal from the processor that causes a test strike to be generated at the antenna. The test strike is generated on the rising (+4V @ ANTTSTHI with respect to ANTTSTLO) and falling (-4V @ ANTTSTHI with respect to ANTTSTLO) edges.
		CONNECTION P301-45 (ANTTSTHI) to P201-B P301-24 (ANTTSTLO) to P201-C
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 SYNC jumper located in the connector back-shell.

X(S1), Y(S3), Z(S2)

FREQUENCY	Min: 50 Hz Max: 1500 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	P301-8 (SYNC_X) P301-41 (SYNC_Y) P301-25 (SYNC_Z)
CABLE	See paragraph 2.9.6.

H and C (high and low reference)

FREQUENCY	Min: 50 Hz Max: 1500 Hz
VOLTAGE	Min: 3.5 Max: 35 Vrms

SIGNAL	CHARACTERISTICS

XYZ Synchro Input

(Continued)

INPUT IMPEDANCE	>50k Ohm
CONNECTION	P301-11 (H_REFINHI) P301-42 (C_REFINLO)
CABLE	See paragraph 2.9.6.

Heading Valid

Indicates that the heading source is providing valid heading information (see paragraph 2.9.7).

NOTE

The active polarity (i.e., HEADING FLAG (+) or HEADING FLAG (-)) is selected via the FLAG jumper installed between P302-44 and P302-27. The line is debounced via software.

CONNECTION	P301-27 (FLAGHI) P301-28 (FLAGLO)	
CABLE	See paragraph 2.9.6.	
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 Advance Checklist

This input may be connected to an external switch (normally a yoke mounted switch). When activated, this switch performs the same function as the lower left softkey. When activated in weather mode, the strike buffers are cleared and all displayed lightning strikes are erased. This input is diode isolated and debounced. This input will perform any function indicated for the same lower left softkey in other modes (see paragraph 2.9.3).

CONNECTION	P301-26 ($\overline{\text{SOFTKEY 2}}$)	
	P101-12 ($\overline{\text{SOFTKEY 2}}$)	
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 (see paragraph 2.9.2). 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.

SIGNAL	CHARACTERISTICS	
Inhibit	(Continued)	
	CONNECTION	P301-10 ($\overline{\text{INHIBIT}}$)
	CABLE	Minimum 22 AWG wire.
	VOLTAGE	Active: Min: 0.0V Max: 0.7V Inactive Min: 2.4V Max: 28.4V
Display Power	Power supply to WX-1000/SKY497 display (if installed). +15/-15 V dc from the WX-1000 Processor.	
	CONNECTION	P301-3 (+15V) to P101-19 P301-36 (-15V) to P101-14 P301-38 (DSPGND) P101-18
	CABLE	See paragraph 2.9.5.
	VOLTAGE	+15/-15 V dc
	CURRENT	0.7 A input max.
Soft-keys	Soft-key inputs from the WX-1000/SKY497 display (if installed) and output to the WX-1000 processor. The pushbuttons on the front of the display are referred to as Soft-keys (**1**), (**2**), (**3**), and (**4**). In every operating mode a label identifying the button function is displayed next to the button (see paragraph 2.9.3 & 3.2).	
	CONNECTION	P301-9 (SFTKEY1) to P101-13 P301-26 (SFTKEY2) to P101-12 P301-43 (SFTKEY3) to P101-25 P301-44 (SFTKEY4) to P101-24
	CABLE	See paragraph 2.9.5.
	VOLTAGE	Active: Min: 0.0 V Max: 1.5 V Inactive: Min: 3.5 V or Open (Internal 4.7 kΩ pull-up) Max: 5.0 V
Horizontal Sync	Balanced horizontal sync from the WX-1000 Processor and output to the WX-1000/SKY497 display (if installed). Signal levels as specified in RS-422.	
	CONNECTION	P301-6 (HSYNCHI) to P101-6 P301-23 (HSYNCLO) to P101-5
	CABLE	See paragraph 2.9.5.
	VOLTAGE	0-5 V dc
	CURRENT	<100 mA
	FREQUENCY	16.4 kHz
	SOURCE Z	1 kΩ

SIGNAL	CHARACTERISTICS
Vertical Sync	Balanced vertical sync from the WX-1000 Processor and output to the WX-1000/SKY497 display (if installed). Signal levels as specified in RS-422.
	CONNECTION: P301-40 (VSYNCHI) to P101-9 P301-7 (VSYNCLO) to P101-10
	CABLE: See paragraph 2.9.5.
	VOLTAGE: 0-5 V dc
	CURRENT: <100 mA
	FREQUENCY: 60 Hz
	SOURCE Z: 1 kΩ
Video Output	Balanced video from the WX-1000 Processor and output to the WX-1000/SKY497 display (if installed). Signal levels as specified in RS-422.
	CONNECTION: P301-39 (VIDOUTHI) to P101-8 P301-22 (VIDOUTLO) to P101-7
	CABLE: See paragraph 2.9.5.
	VOLTAGE: 0-5 V
	CURRENT: <100 mA
	FREQUENCY: <15 mHz
	SOURCE Z: 1 kΩ
Fault Output	Signifies that the WX-1000 processor self-test detects a fault condition. Available only with the ARINC 429 EFIS option. This feature was added with software version 3.25.
	CONNECTION: P302-18 (FAULT) P302-20 (FAULT COMM) P302-31 (Shield)
	CABLE: Twisted Shielded Pair (22TG2T14, or equivalent)
	VOLTAGE: P302-18 with respect to P302-20. Fault Condition: -5 to -15 Vdc No Fault Condition: +5 to +15 Vdc
	CURRENT: Source/Sink Minimum 7 mA
ARINC 429 Interface	The ARINC 429 databus is provided to support the WX-1000E EFIS and NAVAID options (see paragraph 2.9.2). The ARINC 429 EFIS processor is factory configured to accommodate the various ARINC 429 bus speeds. These pre-configured processors are identified in table 1-2.. The receiver is set to low speed on the ARINC 429 NAVAID processor.
	CONNECTION: P302-38 (429TXA) P302-21 (429TXB) P302-34 (429RX1A) P302-35 (429RX1B)
RS232 NAVAID Interface	The RS-232 interface is provided to support the RS232/RS422 NAVAID option (see paragraph 2.9.10) RS232 or RS422 is selected via a dip switch located on the Expansion Interface PCB (see paragraph 2.11). RS232 is the factory default.

SIGNAL	CHARACTERISTICS	
RS232 NAVAID Interface	(Continued)	
	CONNECTION	P302-5 (RS232 RX1) P302-4 (RS232 TX1) P302-3 (RS232 COMM.) P302-32 (SHIELD)
RS422 NAVAID Interface	The RS-422 interface is provided to support the RS232/RS422 NAVAID option (see paragraph 2.9.10). The WX-1000E RS-232/RS-422 NAVAID processor is factory configured to accommodate either RS-232 or RS-422. These pre-configured processors are identified in table 1-2.	
	CONNECTION	P302-5 (RS422A) P302-4 (RS422B) P302-3 (RS422 COMM.) P302-32 (SHIELD)
Power Input	11-32 VDC. The WX-1000 is protected via an internal fuse (see paragraph 4.8). 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	P301-34 & P301-35 (A+) P301-1 & P301-2 (GND)
	CABLE	Use twisted shielded pair cable, minimum 20 AWG.
	VOLTAGE	11 - 32 VDC
	CURRENT	2.0 A ± 0.5 A @ 12 VDC 0.8 A ± 0.25 A @ 28 VDC
ON/OFF Control	Signal lines PWRSWHI and PWRSWLO provide ON/OFF control of the processor. Normally these are connected to the OFF/BRT control on the WX-1000/SKY497 display. If the WX-1000 display is not used, install an external switch or jumper PWRSWHI and PWRSWLO and control ON/OFF via the avionics bus..	
	CONNECTION	P301-21 (PWRSWHI) to P201-22 P301-20 (PWRSWLO) to P201-23
	CABLE	See paragraph 2.9.5.
Installation Jumpers	System options/features are enabled via installation jumpers installed on connector P302. Refer to paragraph 2.10 for details.	

APPENDIX B
ENVIRONMENTAL QUALIFICATION FORMS

This appendix includes the environmental qualification forms required for the WX-1000 system. Forms included are for the WX-1000, WX-1000+/E, and the WX-1000/SKY497 display.

B.1 WX-1000 ENVIRONMENTAL QUALIFICATION FORM
(Reference Document 016-10252-001, Rev. B)

NOMENCLATURE: STORMSCOPE™ WEATHER MAPPING SYSTEMS

TYPE/MODEL/PART NO.: WX-1000 TSO NUMBER C-110 A

MANUFACTURER'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION: RTCA/DO-160B; RTCA/DO-191

MANUFACTURER: GOODRICH AVIONICS SYSTEMS, INC.

ADDRESS: 5353 52ND ST SE
GRAND RAPIDS, MICHIGAN 49512

CONDITIONS	SECTION	DESCRIPTION OF CONDUCTED TESTS
TEMPERATURE	4.0	PROCESSOR AND ANTENNA TESTED -55C° TO +70C° DISPLAY TESTED -20C° TO +55C°
ALTITUDE	4.6.1	SYSTEM TESTED TO 55,000 FT.
TEMPERATURE VARIATION	5.0	ANTENNA TESTED TO CATEGORY A PROCESSOR TESTED TO CATEGORY B DISPLAY TESTED TO CATEGORY C
HUMIDITY	6.0	EQUIPMENT TESTED TO CATEGORY A
CRASH SAFETY SHOCKS (SUSTAINED)	7.3.2	DISPLAY AND PROCESSOR TESTED 15G EACH AXIS
VIBRATION	8.0	DISPLAY TESTED TO CATEGORIES P,K,S,A,B,M,N,O PROCESSOR TESTED TO CATEGORIES B,M,N,O,A,P,K,S ANTENNA TESTED TO CATEGORIES C,J,L,M,Y,A,B,C,P,K,S,O

WX-1000 ENVIRONMENTAL QUALIFICATION FORM (Continued)

EXPLOSION	9.0	EQUIPMENT IDENTIFIED AS "X"
WATERPROOFNESS	10.0	ANTENNA TESTED TO CATEGORY S
FLUIDS SUSCEPTIBILITY	11.0	ANTENNA TESTED TO CATEGORY F ETHYLENE GLYCOL
SAND AND DUST	12.0	EQUIPMENT IDENTIFIED AS "X" NO TEST REQUIRED
FUNGUS	13.0	EQUIPMENT IDENTIFIED AS "X" NO TEST REQUIRED
SALT SPRAY	14.0	EQUIPMENT IDENTIFIED AS "X" NO TEST REQUIRED
MAGNETIC EFFECT	15.0	DISPLAY TESTED TO CLASS Z PROCESSOR TESTED TO CLASS Z
POWER INPUT	16.0	EQUIPMENT TESTED TO CATEGORY A & Z ABNORMAL SURGE CATEGORY A & B
VOLTAGE SPIKE CONDUCTED	17.0	EQUIPMENT TESTED TO CATEGORY A
AUDIO FREQUENCY CONDUCTED SUSCEPTIBILITY	18.0	EQUIPMENT TESTED TO CATEGORY A & Z
INDUCED SIGNAL SUSCEPTIBILITY	19.0	EQUIPMENT TESTED TO CATEGORY Z
RADIO FREQUENCY SUSCEPTIBILITY	20.0	EQUIPMENT TESTED TO CATEGORY Z
RADIO FREQUENCY EMISSION	21.0	EQUIPMENT TESTED TO CATEGORY Z
LIGHTNING SUSCEPTIBILITY	22.0	PROCEDURE NOT DEFINED YET BY DO-160

B.2 WX-1000+/E ENVIRONMENTAL QUALIFICATION FORM
(Reference Document 016-10259-001, Rev. B)

NOMENCLATURE: STORMSCOPE™ WEATHER MAPPING SYSTEMS

TYPE/MODEL/PART NO.: WX-1000+/E TSO NUMBER C-110 A

MANUFACTURER'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION:
RTCA/DO-160B; RTCA/DO-191

MANUFACTURER: GOODRICH AVIONICS SYSTEMS, INC.

ADDRESS: 5353 52ND ST SE

GRAND RAPIDS, MICHIGAN 49512

CONDITIONS	SECTION	DESCRIPTION OF CONDUCTED TESTS
TEMPERATURE	4.0	PROCESSOR AND ANTENNA TESTED -55C° TO +70C° DISPLAY TESTED -20C° TO +55C°
ALTITUDE	4.6.1	SYSTEM TESTED TO 55,000 FT.
TEMPERATURE VARIATION	5.0	ANTENNA TESTED TO CATEGORY A PROCESSOR TESTED TO CATEGORY B DISPLAY TESTED TO CATEGORY C
HUMIDITY	6.0	EQUIPMENT TESTED TO CATEGORY A
CRASH SAFETY SHOCKS (SUSTAINED)	7.3.2	DISPLAY AND PROCESSOR TESTED 15G EACH AXIS
VIBRATION	8.0	DISPLAY TESTED TO CATEGORIES P,K,S,A PROCESSOR TESTED TO CATEGORIES B,M,N,O ANTENNA TESTED TO CATEGORIES C,J,L,M,Y
EXPLOSION	9.0	EQUIPMENT IDENTIFIED AS "X"

WX-1000+/E ENVIRONMENTAL QUALIFICATION FORM (Continued)

WATERPROOFNESS	10.0	ANTENNA TESTED TO CATEGORY S
FLUIDS SUSCEPTIBILITY	11.0	ANTENNA TESTED TO CATEGORY F ETHYLENE GLYCOL
SAND AND DUST	12.0	EQUIPMENT IDENTIFIED AS "X" NO TEST REQUIRED
FUNGUS	13.0	EQUIPMENT IDENTIFIED AS "X" NO TEST REQUIRED
SALT SPRAY	14.0	EQUIPMENT IDENTIFIED AS "X" NO TEST REQUIRED
MAGNETIC EFFECT	15.0	DISPLAY TESTED TO CLASS Z
POWER INPUT	16.0	EQUIPMENT TESTED TO CATEGORY A & Z ABNORMAL SURGE CATEGORY A & B
VOLTAGE SPIKE CONDUCTED	17.0	EQUIPMENT TESTED TO CATEGORY A
AUDIO FREQUENCY CONDUCTED SUSCEPTIBILITY	18.0	EQUIPMENT TESTED TO CATEGORY A & Z
INDUCED SIGNAL SUSCEPTIBILITY	19.0	EQUIPMENT TESTED TO CATEGORY Z
RADIO FREQUENCY SUSCEPTIBILITY	20.0	EQUIPMENT TESTED TO CATEGORY Z
RADIO FREQUENCY EMISSION	21.0	EQUIPMENT TESTED TO CATEGORY Z
LIGHTNING SUSCEPTIBILITY	22.0	PROCEDURE NOT DEFINED YET BY DO-160B

B.3 WX-1000/SKY497 DISPLAY ENVIRONMENTAL QUALIFICATION FORM

(Reference Document 016-10831-001, Rev. A)

NOMENCLATURE: *Stormscope*®
MODEL: WX-1000 TSO NO.: TSO-C113
PART NO.: 78-8060-5900-8 APPLICABLE SPEC. NO.: RTCA/DO-160C

MANUFACTURER: Goodrich Avionics Systems
ADDRESS: 5353 52nd Street SE, Grand Rapids, MI 49512
(616) 949-6600

Revision & Change Number of DO-160: DO-160C

CONDITION	SECTION/ PARAGRAPH	TEST DESCRIPTION
Temperature and Altitude	4.0	Tested to Category F1-
Operating Low Temperature	4.5.1	-20° Celsius
Operating High Temperature	4.5.3	+55° Celsius
Short-Time Operating High Temp.	4.5.2	+70° Celsius
Loss of Cooling	4.5.4	-Not Applicable-
Ground Survival Low Temp.	4.5.1	-55° Celsius
Ground Survival High Temp.	4.5.2	+85° Celsius
Altitude	4.6.1	55,000 Feet MSL
Temperature Variation	5.0	Tested to Category C
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
Salt Spray	14.0	Category X - No test required
Magnetic Effect	15.0	Tested to Class Z
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
Induced Signal Susceptibility	19.0	Tested to Category Z

WX-1000/SKY497 DISPLAY ENVIRONMENTAL QUALIFICATION FORM (Continued)

Radio Frequency Susceptibility	20.0	Tested to Category U
Radio Frequency Emission	21.0	Tested to Category A
Lightning Induced Transient Susceptibility	22.0	Category X - No test required
Lightning Direct Effects	23.0	Category X - No test required
Icing	24.0	Category X - No test required
Other Tests		X-Ray Radiation
Other Tests		U.V. Radiation
Other Tests		Thermal Shock

APPENDIX C
RS-232/RS-422 NAVAID Option

C.1 INTRODUCTION

This appendix contains information pertaining to LORAN/GPS receivers that interface with the WX-1000 RS-232/RS-422 NAVAID. Installation and checkout procedures are detailed in chapters 2 and 3. Troubleshooting is addressed in chapter 4.

C.2 LORAN/GPS Receivers

Table C-1 provides a list of LORAN/GPS receivers that have been tested with the WX-1000 RS-232/RS-422 NAVAID Option. Table C-1 also provides information relating to the communications interface, navigation data available for display, and the interconnect wiring.

NOTE

Information provided in table C-1 is believed to be complete and accurate at the time of publication. However, L-3 Avionics Systems cannot be responsible for changes made by other manufacturers. Please consult the appropriate manufacturer's documentation for the latest information. It is the responsibility of the installer to confirm compatibility.

Table C-1. Compatible LORAN/GPS Receivers

Equipment	Interface	Navigation Data List (Table C-2)	Interconnect Wiring				
			WX-1000+ Signal				
			Plug	232TX /422B	232RX /422A	232 COMM 422 COMM	These notes pertain to the assemblies identified in the Equipment column.
			P302	PIN 4	PIN 5	PIN 3	
Apollo 604, 611 612, 612A, 612B, 618, 618T	RS-232C	D	P1	N/C	6	8	
Apollo 800, 819, 820	RS-232C	A	P1	N/C	6	8	Apollo 800 - Software versions 1.13 and above. (Select 800 on LORAN setup for 819 and 820)
Apollo 612C, 618C	RS-232C	D	P1	N/C	12	14	
Apollo 614R, 618R	RS-232C	D	P1	N/C	BNC	Connector	
Apollo NMC2001	RS-232C	A	P1	N/C	Port 1: Pin 19 Port 2: Pin 37	20	Must be software configured for the appropriate output port.
ARNAV R-15, R-25, R-30	RS-232C	E	P1	N/C	3	13	
ARNAV R-21	RS-232C	E	P1	N/C	3	13	Jumper P1, pins 16-17-1.
ARNAV R-40	RS-232C	C	P1	N/C	3	13	Version 4.06 Only Jumper P1, pins 16-17.
ARNAV RDB	RS-232C	C	J2	N/C	8	9	Special Software Required

Table C-1. Compatible LORAN/GPS Receivers
(Continued)

Equipment	Interface	Navigation Data List (Table C-2)	Interconnect Wiring				
			WX-1000+ Signal				
			Plug	232TX /422B	232RX /422A	232 COMM 422 COMM	
			P302	PIN 4	PIN 5	PIN 3	These notes pertain to the assemblies identified in the Equipment column.
ARNAV R-50	RS-232C	E	P1	N/C	3	13	All except R-50I
ARNAV R-50i	RS-232C	F	P1	N/C	3	13	See para C.2.3 for setup.
ARNAV R-5000, STAR 5000, FMS 5000	RS-232C	F/B	P1	N/C	3	13	See paragraph B for setup. (Select R-5000 on WX-1000E LORAN setup for all three)
ARNAV R-60	RS-232C	E	P2	N/C	B	V	Jumper P2, pins A-G. Select R-40.
BFG Avionics Systems F4, LRN500	RS-232C	C	P5001	N/C	1	2	Requires version 1.1 of RS-232 software.
BFG Avionics Systems F14, LRN501	RS-232C	C	P5001	N/C	1	2	Requires version 1.3 of RS-232 software.
BFG Avionics Systems LNS616A/B	RS-232C	C	P2	N/C	4	11	
BFG Avionics Systems LNS6000	RS-232C	A	J4	N/C	25	27	
GARMIN GPS100	RS-232C	A	J100	N/C	13	15	Requires Garmin Aviation Rack Assembly (P/N 011-00014-00).
GARMIN GPS150	RS-232C	A	J101	N/C	24	26	Select Garmin 100 on WX-1000E set-up.
GARMIN GPS155	RS-232C	A	J101	N/C	24	26	Select Garmin 100 on WX-1000E set-up.
King KLN-88	RS-232C	A	P881	N/C	13	35	
King KLN-89/89B	RS-232C	A	P891	N/C	2	Ground Lug	Select KLN-88 on WX-1000E set-up.
King KLN-90/90A/90B	RS-232C	A	P901	N/C	13	Ground Lug	Select KLN-88 on WX-1000E set-up.
Magellan SKYNAV-5000	RS-232	A			12	7	232RX/422A Use pin 12 (port 1) or pin 25 (port 2). Select GARMIN GPS/100 or King KLN-88 on WX-1000E set-up.
Northstar GPS-600, M3	RS-422	A	P1	6	11	23	Select GPS-600 on WX-1000E setup.
Northstar M1,M2	RS-422	A	P1	6	11	23	Software version 2.03 required for flight plan display. (Select M1 for M1 and M2 on LORAN setup)
Trimble TNL-2000,3000	RS-422	B	P1	3	15	18	Select format K0 (1 Per Second).
Trimble TNL-2100,2101,3100	RS-422	B	P1	5	37	1	Select format K0 (1 Per Second).

Table C-2 details the available navigation data identified referenced in table C-1.

Table C-2. List of Navigation Data

NAVIGATION DATA	LIST A	B	C	D	E	F
Active Waypoint Identifier	x	x	x		x	x
Course Line and Waypoint	x	x	x	x	x	x
Range and Bearing to Active Waypoint	x	x	x	x	x	x
Current Track	x	x	x	x	x	x
Cross Track Error	x	x	x	x	x	x
Course Deviation Indicator	x	x	x	x	x	x
Ground Speed	x	x	x	x	x	x
Estimated Time Enroute	x	x	x	x	x	x
Estimated Time of Arrival	x	x	x	x	x	x
Magnetic Variation at Present Position	x	x	x		x	x
Digital Stopwatch/Timer	x	x	x	x	x	x
Current Latitude and Longitude	x	x	x	x	x	x
Flightplan Course Lines and Waypoints (i.e., The first 32 transmitted; first 10 for Northstar Systems.)	x	x				
Minimum Safe Altitude		x			x	
Minimum Enroute Save Altitude		x			x	

NOTES

1. List B is the same as that for A, with the addition of minimum safe altitude to the next waypoint, and minimum safe altitude enroute to the programmed destination.

2. List C is the same as that for A, except that a sequential waypoint number is provided instead of an alpha-numeric waypoint identifier, and there is no flightplan information.

3. List D is the same as that for A, except that there is no waypoint identification, magnetic variation, or flightplan information.

4. List E is the same as that for A, with the exception of minimum safe altitude to the next waypoint and minimum safe altitude enroute to the programmed destination, and the deletion of flightplan information.

5. List F is the same as that for A, except that there is no flightplan information.

The WX-1000+ Navaid system will accept a wide variety of LORAN/GPS formats. Generally, the default settings for a particular receiver will be sufficient to drive the Navaid system. There are a few exceptions, however, and these are listed below. (There is also a brief description on setting the Loran parameters to the required values.)

C.2.1 ARNAV R-40

The ARNAV R-40 allows programming of a number of communication parameters. This programming is performed in the R-40 setup mode, reached by the following sequence:

1. Press NAV on the R-40 control panel.

2. Switch the selector to the DIS/TIM display.

3. Hold the ENT button until the display changes to:

Std	SOUT
U 45	C 30
PW	40 *

4. Each of these items can be modified by pressing **ENT** and entering new data by using the keyboard (for numbers), pressing the ARROW key, or by rotating the function switch.

The Navaid system requires that the communications format be set as follows:

Item	Description	Setting
Std	Standard/Test Output	Set to Std
U	Data Output Rate	Set to 1
C	Baud Rate/10	Can be 30 to 960 (960 is best)
PW	Page Width	Set to 0

C.2.2 ARNAV-R15, R-30, R-50

These ARNAV LORAN systems also allow programming of the communication parameters. This programming is performed in the Setup mode reached by the following sequence:

1. Press CLR, and while holding it depressed, press the MDE (mode) key.

2. Switch the selector knob to sequence through the pages, until the display reads either "ELS and FC COMM" or "RS-232 SERIAL OUTPUT".

3. If the display reads "ELS and FC COMM", press ENT to flash the first line, then press the select knob to change to "RS-232 SERIAL OUTPUT".

4. Press ENT to select the RS-232 setup mode.

5. Adjust the parameters as listed below: (press ENT to flash a field, enter data using the normal data entry method, then press ENT again to select data.)

The Navaid system requires that the communications format be set as follows:

Item	Description	Setting
MDE	Standard/Test Output	Set to STD
INT	Data Output Rate	Set to 1
BAUD	Baud Rate/10	Can be 30 to 960 (960 is best)
FORMAT	Page Width	Set to 0

C.2.3 ARNAV R-50i

Software version 5500C is used for the R-50i. Original R-50i software - does not provide waypoint identifier.

C.2.4 ARNAV R-50V, R-5000

Magnetic Variation (MVAR) not available in some versions.

Requires LORAN setup as follows:

Select AUX MODE, turn to SELECT SETUP MODE PAGES, turn to RS-232, set to:
RS-232 PORT 1: SHORT
Deg: MAG XTK: NORMAL
Check Sum: Enable (if available)
EDI Output: Enable (if available)
EDI Update Rate: 3 to 8 (if available)

C.2.5 ARNAV FMS 5000

Requires LORAN setup as follows:

Select AUX MODE, turn to SELECT SETUP MODE PAGES, turn to RS-232, set to:
RS-232 PORT 1: SHORT
Deg: MAG XTK: NORMAL
Check Sum: Enable (if available)
EDI Output: Enable (if available)
EDI Update Rate: 3 to 8 (if available)

C.2.6 ARNAV STAR 5000

Requires GPS setup as follows:

Select AUX MODE, turn to SELECT SETUP MODE PAGES, turn to RS-232, set to:
RS-232 PORT 1: SHORT
Deg: MAG XTK: NORMAL
Check Sum: Enable (if available)
EDI Output: Enable (if available)
EDI Update Rate: 3 to 8 (if available)

This page intentionally left blank.

APPENDIX D
ARINC 429 NAVAID Option

D.1 INTRODUCTION

This appendix contains information pertains to navigation systems that interface with the WX-1000 ARINC 429 NAVAID. Installation and checkout procedures are detailed in chapters 2 and 3. Troubleshooting is addressed in chapter 4.

NOTES

1. For heading stabilization, a synchro (XYZ) heading source is required with the ARINC 429 NAVAID option.
2. For the NAVAID option to work, the navigation systems ARINC 429 data bus must be set to low (12.5 kHz) speed.

D.2 COMPATIBLE NAVIGATION SYSTEMS

Table D-1 provides a list of navigation systems that have been tested with the WX-1000 ARINC 429 NAVAID Option. Table D-1 also provides information relating to the interconnect wiring and communication parameters.

NOTE

The information provided in table D-1 is believed to be complete and accurate at the time of publication. However, L-3 Avionics Systems cannot be responsible for changes made by other manufacturers. Please consult the appropriate manufacturer's documentation for the latest information. It is the responsibility of the installer to confirm compatibility.

Table D-1. Compatible Navigation Systems

ARINC 429 Navigation DataSource	Interconnect Wiring		Notes
	WX-1000E P302 pin 34 (ARINC 429 A)	WX-1000E P302 pin 35 (ARINC 429 B)	
GNS-X (P/N 14141-0321)	Connector JB Pin A2	Connector JB Pin A3	Must be set to low (12.5 kHz) speed.
UNS-1A	TP 9G	TP 9H	1. Use GAMA hardware configuration not advanced EFIS. 2. Must be set to low (12.5 kHz) speed. 3. Requires software version 304 or 340.
UNS-1B	MP 4J	MP 4K	1. Use GAMA hardware configuration not advanced EFIS. 2. Must be set to low (12.5 kHz) speed. 3. Requires software version 401, 405.3 or 501. 4. Choose UNS-1 in setup menu.
UNS-1M	Port 1, P2-A	Port 1, P2-B	1. Use GAMA hardware configuration not advanced EFIS. 2. Must be set to low (12.5 kHz) speed. 3. Requires software version SCN21, SCN22 or SCN23. 4. Choose UNS-1 in setup menu.

This page intentionally left blank.

APPENDIX E
ARINC 429 EFIS Option

E.1 INTRODUCTION

This appendix contains information pertaining to display systems that interface with the WX-1000 via the ARINC 429 EFIS Option. Installation and checkout procedures are detailed in chapters 2 and 3. Troubleshooting is addressed in chapter 4.

NOTE

To meet specific installation requirements, the WX-1000E ARINC 429 EFIS processor is factory configured to accommodate the various ARINC 429 bus speeds. These pre-configured processors are identified in table 1-2.

The symbology for lightning data along with the manner in which it is displayed is a function of the display system. Each manufacturer will show the information consistent with the capabilities of that particular display. Refer to the appropriate manufacturer's documentation for information on how to correctly interpret lightning data shown on a specific display.

E.2 COMPATIBLE SYSTEMS

Table C-1 provides a list of systems that have been tested with the WX-1000 ARINC 429 EFIS Option. Table C-1 also provides information relating to the interconnect wiring and communication parameters.

NOTE

The information provided in table E-1 is believed to be complete and accurate at the time of publication. However, L-3 Avionics Systems cannot be responsible for changes made by other manufacturers. Please consult the appropriate manufacturer's documentation for the latest information. It is the responsibility of the installer to confirm compatibility.

Table E-1. Compatible Display Systems

EFIS SYSTEM	NOTES
Bendix/King EFS 40/50	Requires hardware dash numbers 11 or 12 and software version 6.0. Verify EFS 40/50 compatibility with Bendix/King.
Eventide ARGUS 5000/7000	Requires WDA 5007-05/7007-05 adapter.
Honeywell EDZ-605/805 EFIS & MDZ-605/805	WX-1000 processor must have software version 2.24 or higher.
Honeywell PRIMUS®	WX-1000 processor must have software version 3.22 or higher. To provide LSZ-850 compatible ARINC 429 output, install a jumper between pins 46 and 29 of WX-1000 connector P302.
Rockwell Collins WXR Weather Radar	Requires RTA-854 (Collins P/N 622-8440-003) and WXP-4224 (Collins P/N 622-9932-002). The WX-1000 processor ARINC 429 data speed must be set to transmit=low and receive = high (see table 1-2). For installations in the CL-600-2B16 (CL604) aircraft, refer to Bombardier Inc. CANADAIR/CHALLENGER Service Bulletin 605-24-008.
L-3 Avionics Systems RGC250/RGC350	The RGC250/RGC350 is available to interface with the WX-1000 and display lightning data on a compatible weather radar indicator. Refer to the RGC250/RGC350 Installation Manual for details.

E.3 ON/OFF CONTROL

The signal lines that provide ON/OFF control of the WX-1000 processor are normally.connected to the WX-1000/SKY497 display. If the WX-1000 display is not available, install an external switch or a jumper between P301-20 (PWRSWHI) and P301-21 (PWRSWLO). If a jumper is installed, ON/OFF control is accomplished via the avionics power bus.

E.4 REMOTE CLEAR

If the WX-1000 display is not part of the installation, it is recommended that a remote clear switch be connected to the *Stormscope*® processor between pins 26 and 38 of P301 (see paragraph 2.9.3). In this configuration, the jumper installed between pins P302-28 and P302-45 configures the *Stormscope*® processor to perform a memory clear whenever the clear switch is pressed (see paragraph 2.10).

E.5 FAULT OUTPUT

NOTE

This feature was added to the WX-1000 (ARINC 429 EFIS) processor with software version 3.25. It applies to all faults except MIC KEY STUCK and heading FLAG.

If the WX-1000 ARINC 429 EFIS self-test software detects a fault condition, P302-18 will go low (-5 to - 15 Vdc) with respect to pin P302-20. If no faults are present, pin 302-18 will be high (+5 to +15 Vdc) with respect to pin P302-20. The fault output line can source/sink a minimum of 7 mA.

E.6 HEADING INPUT

With the ARINC 429 EFIS option, if synchro XYZ heading is not available heading information can be obtained via the ARINC 429 bus. To identify a synchro XYZ heading source pin P302-26 must be jumpered to P302-43. If the jumper is not installed, the system will only recognize an ARINC 429 heading (see paragraph 2.10).

When the WX-1000 EFIS processor is configured for ARINC 429 heading, at power on the processor will look for a valid label 320 (magnetic heading). If label 320 is not present or its SSM is not set to "11" (normal operation), the processor will look for label 314 (true heading). If label 314 is not present or its SSM is not set to "11", the processor will again search for label 320. This procedure continues until a valid label is found. The *Stormscope*® processor will lock to the first valid label and if that label becomes invalid or is no longer received, the search procedure is repeated until a valid label is found.

NOTE

The heading display provided by the *Stormscope*® is not intended for navigation purposes. Due to filtering the heading may vary from other displays by up to 3 degrees.

The WX-1000 display (if installed and heading display is enabled) displays the heading value (true or magnetic) of the label the processor is locked on. When both labels are invalid or not present, a "flag" condition is indicated in the ARINC 429 output data stream and on the WX-1000 display (if installed).

E.7 HONEYWELL LSZ-850 COMPATIBLE FORMAT

The ARINC 429 EFIS WX-1000 processor can be configured to provide data compatible with that output from the Honeywell LSZ-850 Lightning Sensor System. To enable this output a jumper is installed between pins 46 and 29 of WX-1000 connector P302.

NOTE

This feature was added to the WX-1000 (ARINC 429 EFIS) processor with software version 3.22.

The following paragraphs describe some of the differences in the data output from the LSZ-850 and that output from the *Stormscope*® with the LSZ-850 output emulation enabled.

The *Stormscope*® transmits a data stream every 0.6 second as opposed to every 265 msec for the LSZ-850. This may cause symbol rotation during turns to be slightly coarser than with the LSZ-850.

LABEL 001: When in the LSZ-850 configuration, the *Stormscope*® defines the lightning ahead flag (bit 14) as activity in the forward +/- 22 degrees sector, within 75 NM of the aircraft. The LSZ-850 defines the flag as activity in the forward +/- 7.5 degrees sector, 60 - 120 NM from the aircraft. This makes no difference unless the display system is looking at this bit. The PRIMUS® 2000 does not use this bit.

The LSZ-850 sets a discrete bit in label 001 to indicate the "clear" button has been pressed so it can be annunciated on the display screen. The *Stormscope*® does not set this bit so "LX/C" will not be displayed on the screen after the clear switch is pressed.

LABELS 002 - 017, 020 - 041, 070 - 077: The LSZ-850 transmits test and fault information in these labels. The *Stormscope*® does not transmit these labels even in the LSZ-850 configuration. The PRIMUS® display system will annunciate all faults detected by either the *Stormscope*® or the LSZ-850. The fault code from an LSZ-850 system is displayed only when a fault has occurred and the system is in test mode. Fault codes from the *Stormscope*® are logged and must be read from the Stormscope system processor using a WX-1000 CRT display in the aircraft or on a test bench. Since the WX-1000 CRT display is optional, a short section of display cable connected to the processor may be desirable for use in trouble-shooting and installation verification.

LABELS 100 - 176: The LSZ-850 transmits "Flash" information in labels 100 - 102. The *Stormscope*® does not transmit labels 100 - 102 in the LSZ-850 configuration. The LSZ-850 transmits cell data in labels 103-164 (50 cells max). The *Stormscope*® transmits cell data in labels (103 - 176, 60 cells max) in the LSZ-850 configuration. When connected to a *Stormscope*® system, the display system will not display "Lightning Alert" symbols. Up to 3 lightning alert symbols may appear with the LSZ-850 system for a 5-second interval at the maximum range displayed.

The LSZ-850 defines a level 1 cell as having 2 to 15 discharges over the preceding 4 minutes, a level 2 cell as having 16 to 31 discharges over the preceding 4 minutes and a level 3 cell as having 32 or more discharges over the preceding 4 minutes. The definition of intensity levels may change with the software revision level of the LSZ-850 system. The *Stormscope*® defines a level 1 cell as having 5 or fewer discharges over the preceding 36 seconds, a level 2 cell as having 6 to 15 discharges over the preceding 36 seconds and a level 3 cell as having more than 16 discharges over the previous 36 seconds.

LABEL 371: The WX-1000 processor will, if running software earlier than version 3.24, sets the manufacturer code to 8. With later versions of software the WX-1000, if configured for the LSZ-850 format, will set the manufacturer code to 12. The LSZ-850 sets this field to 12. The PRIMUS® 2000 ignores this label.

This page intentionally left blank.