$12.00 U.S.

Pilot's Guide for the Stormscope®

Series II Weather Mapping System

Model WX-1000



BFGoodrich Aerospace

BFGoodrich Avionics Systems, Inc.

Stormscope® System Advantages

Welcome

BFGoodrich Avionics Systems, one of the world's most experienced companies in airborne thunderstorm avoidance instruments, is pleased to welcome you to the family of tens of thousands of pilots who are enjoying the benefits of safer flight with a *Stormscope*® weather mapping system.

The Original

Don't be fooled by *Stormscope* system look-alikes. There is only one *Stormscope* system, and only one company that makes the *Stormscope* line of weather mapping systems. The *Stormscope* system, the original, most accurate weather mapping system is manufactured by BFGoodrich Avionics Systems in Grand Rapids, Michigan.

Fly with Greater Confidence

You now own one of the leading instruments in the world for airborne detection and mapping of thunderstorms. Unlike any other product, your new *Stormscope* system will enable you to make better informed thunderstorm avoidance decisions so you can fly more safely and with greater confidence than ever before.

Convenient Features

The advanced, patented technology in your new *Stormscope* system was developed over many years and is so unique, so revolutionary, it surpasses all others. Here are some of its features:

- Maps electrical discharges
- Operates in 25, 50, 100, and 200 nmi ranges
- 120° forward view and 360° view of surrounding airspace
- Uses a high resolution 3-inch ATI CRT display
- Provides expansion capability for heading stabilization, navaid, and EFIS options as described in this guide

$12.00 U.S.

Pilot's Guide
for the
Stormscope®
Series II Weather Mapping System
Model WX-1000



Methods and apparatus disclosed and described herein have been developed solely on company funds of BFGoodrich Avionics Systems, Inc. No government or other contractual support or relationship whatsoever has existed which in any way affects or mitigates proprietary rights of BFGoodrich Avionics Systems, Inc. in these developments. Methods and apparatus disclosed herein may be subject to U.S. Patents existing or applied for. BFGoodrich Avionics Systems, Inc. reserves the right to add, improve, modify, or withdraw functions, design modifications, or products at any time without notice.

© Copyright 2000
BFGoodrich Avionics Systems, Inc.

STORMSCOPE® is a registered trademark of BFGoodrich Avionics Systems, Inc.

Designed and manufactured in the United States of America by

BFGoodrich Aerospace

BFGoodrich Avionics Systems, Inc.
5353 52nd Street, S.E.
P.O. Box 873
Grand Rapids, MI 49588-0873 USA
(616) 949-6600 or (800) 253-9525
Fax (616) 285-4224
www.bfgavionics.com

Safety Summary

These warnings and cautions appear later in this guide and are repeated here for emphasis:



page 4-1

Never use your Stormscope system to attempt to penetrate a thunderstorm. The FAA Advisory Circular, Subject: Thunderstorms, and the Airman's Information Manual (AIM) recommend that you "avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo."



page 4-1

Even a single discharge point may represent thunderstorm activity and should be avoided.

Table of Contents

Section Page

List of Illustrations v

List of Tables vi

Chapter 1, System Description 1-1

General Description 1-1
Antenna 1-2
Processor 1-2
Display 1-2
Functional Description 1-2
Model Definitions 1-4
Features 1-6

Chapter 2, Storm Mapping Principles 2-1

Anatomy of a Thunderstorm 2-1
Stages of a Thunderstorm 2-3
Storm Mapping Technology 2-3

Chapter 3, Operation 3-1

Introduction 3-1
Controls & Screen Elements 3-1
Turn On the Stormscope System 3-3
Adjust the Screen Brightness 3-4
Switch to a Weather View 3-5
Select the Range 3-5
Clear All Discharge Points 3-6
Check the Status of the Continuous Self Test 3-7
Run the Operator-Initiated Self Test 3-7
Use the Checklist Feature 3-8
Set the Date and Time 3-11
Time an Event 3-11
Measure Elapsed Time 3-12
Turn Off the Stormscope System 3-13
Error Messages 3-13

Chapter 4, Weather Display Interpretation 4-1

Introduction 4-1
Typical Patterns 4-2
Mapping Headings Past Thunderstorms 4-4
Special Patterns 4-6

Table of Contents (continued)

Section Page

Chapter 5, Specifications 5-1

Chapter 6, Warranty Information 6-1

Introduction 6-1
Warranty Statement 6-1
Related Policies and Procedures 6-2

Appendix A, Heading Stabilization Option ... A-1

Applicable Models A-1
General Description A-1
Heading Options A-2
Heading Error Message A-3

Appendix B, Navaid Option B-1

Applicable Models B-1
General Description B-1
Main Menu B-3
Navaid Setup Screen B-3
Data Comm Errors B-6
Warning Message B-6
NAV FLAG B-6

Appendix C, EFIS Option C-1

Applicable Models C-1
General Description C-1
EFIS Thunderstorm Symbology C-1

List of Illustrations

Figure	Title	Page
1-1	WX-1000 Major Components	1-1
1-2	Display With 360° View	1-3
1-3	Display With 120° View	1-3
1-4	WX-1000 Functional Diagram	1-3
2-1	Electrical Discharges in Thunderstorms	2-1
2-2	Discharge Rate a Function of Wind Shear	2-2
3-1	Controls & Screen Elements	3-1
3-2	System Test in Progress	3-4
3-3	All Tests Are OK	3-4
3-4	MAIN MENU Screen	3-4
3-5	360° Weather View	3-5
3-6	120° Weather View	3-5
3-7	OPTIONS Screen	3-7
3-8	WX-1000 Checklist Worksheet Sample	3-8
3-9	CHECKLIST MENU Screen	3-9
3-10	A Checklist Screen	3-10
3-11	Skipped Item	3-10
3-12	Skipped Items	3-10
3-13	TIME/DATE Screen	3-11
3-14	Error 01	3-13
3-15	Error 44	3-14
3-16	Error 46	3-15
3-17	Mic Key Stuck	3-15
4-1	Airspace Diagram	4-1
4-2	Three Clusters Within 200 nmi	4-3
4-3	Range Changed to 100 nmi	4-3
4-4	Two Clusters Within 200 nmi	4-3
4-5	Range Set at 200 nmi	4-5
4-6	Aircraft Progresses 100 nmi	4-5
4-7	Range Changes to 100 nmi	4-5
4-8	Aircraft Turns to Avoid Thunderstorms	4-5
4-9	Randomly Scattered Discharge Points	4-6
4-10	Cluster and Splattering Within 25 nmi	4-6
4-11	Discharge Points Off the Aircraft's Nose	4-7
4-12	Line of Discharge Points While Taxiing	4-7
4-13	Developing Cluster Within 25 nmi	4-8

List of Illustrations (continued)

Figure	Title	Page
4-14	Split Image Off Nose of Aircraft	4-8
A-1	Heading Display at Top of Screen	A-2
A-2	Heading Flag at Top of Screen	A-2
A-3	OPTIONS Screen With Heading Stabilization	A-3
A-4	Error 11	A-3
B-1	Typical Weather View Screen With the Navaid Option	B-2
B-2	MAIN MENU w/Navaid	B-3
B-3	OPTIONS Screen w/Navaid	B-3
B-4	Navaid Setup Screen	B-3
B-5	Error 13	B-6
B-6	Warning Messages	B-6
B-7	NAV FLAG	B-6

List of Tables

Table	Title	Page
5-1	WX-1000 Processor Specifications	5-1
5-2	WX-1000 Display Specifications	5-2
5-3	WX-1000 Antenna Specifications	5-3
B-1	Navaid Data Item Abbreviations	B-4

Chapter 1
System Description

General Description

The *Stormscope*® Series II Weather Mapping System, model WX-1000 (figure 1-1) detects electrical discharges from thunderstorms up to 200 nautical miles away and displays the thunderstorm locations relative to your aircraft. The WX-1000 also provides checklists and timing functions.

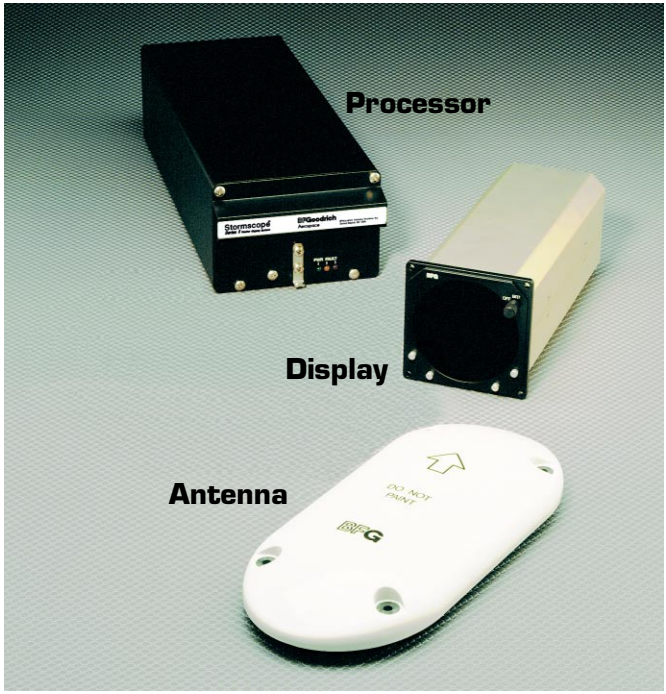


Figure 1-1. WX-1000 Major Components

The *Stormscope* system is a passive system so there is no transmitter and no harmful transmissions. The system operates as well on the ground as in the air, thereby giving the pilot important planning information before takeoff.

The following paragraphs describe the three major components of the *Stormscope* system.

Antenna

This combined loop and sense antenna is sealed in an aerodynamic flat-pack and mounted on the outside of the aircraft where it detects electrical discharges associated with thunderstorms. The antenna is available in black or white.

Processor

This compact, tray-mounted computer processor receives electrical discharge information from the antenna, processes it to determine range and azimuth, then forwards the information for presentation on the cockpit display. The processor may be installed almost anywhere in the aircraft.

Display

The display (figures 1-2 and 1-3) is a self-contained, 3-ATI-sized unit with a high resolution, green monochrome Cathode Ray Tube (CRT) display. The bezel contains four momentary contact push-button switches and an on/off/brightness knob. The display provides control and display functions for the processor. The display's bezel is available in black or gray. The display is not required if you have the EFIS option. (See appendix C.)

Functional Description

Figure 1-4 and the following paragraphs describe how the major components of the *Stormscope* system connect to each other and to other aircraft systems.

The antenna detects the electric and magnetic fields generated by intra-cloud, inter-cloud, or cloud-to-ground electrical discharges that occur within a 200 nmi radius of the aircraft and sends the resulting "discharge signals" to the processor. The processor digitizes, analyzes, and converts



Figure 1-2. Display With 360° View

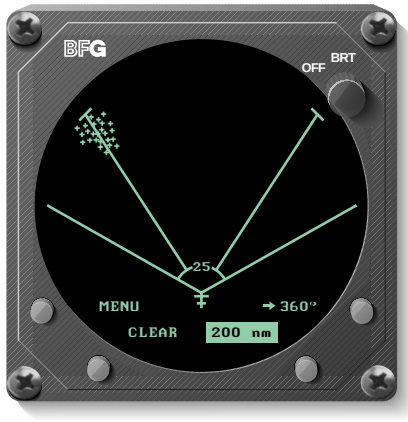


Figure 1-3. Display With 120° View

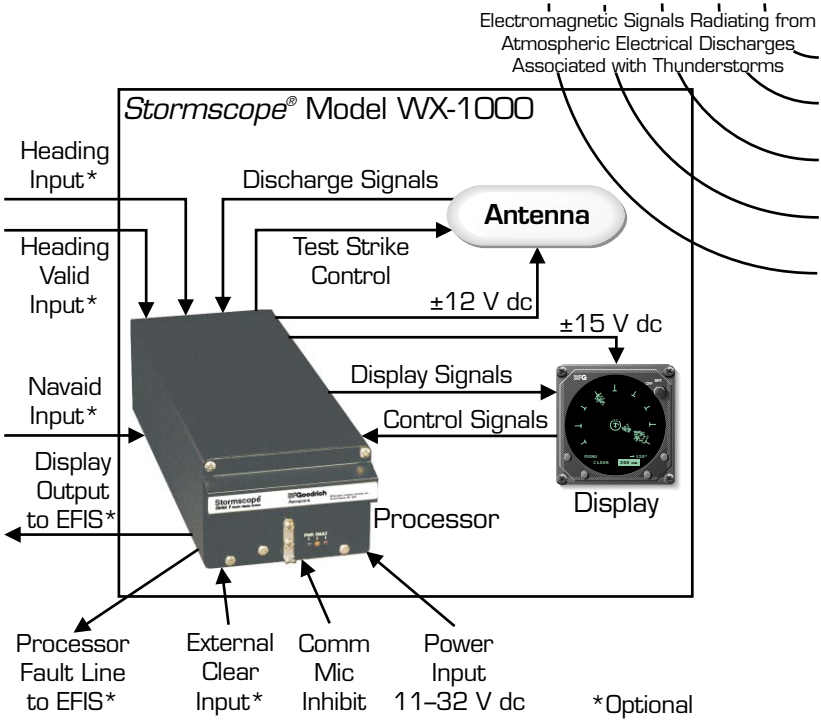


Figure 1-4. WX-1000 Functional Diagram

the discharge signals into range and bearing data then stores the data in memory. The *Stormscope* system then displays discharges as storm cells as described in the next paragraph.

The *Stormscope* system plots a "+" symbol (discharge point) on the display when it detects associated discharges within the selected range and view. The processor will plot another "+" close to the first for each additional discharge determined to be associated with the group. The processor will not plot a "+" for any discharge not associated with a group unless it's detected within a 25 nmi radius of the aircraft. The effect of this clustering algorithm is to display the location of storm cells instead of individual discharges. This "cell display mode" is most useful during periods of heavy electrical discharge activity and frees the pilot from sifting through a screen full of discharge points to determine exactly where the storm cells are located.

Model Definitions

This guide covers all variations of the WX-1000 model as listed below. Options only available on certain models are described in appendices A, B, and C.

WX-1000 Base model.

WX-1000+ Base model plus heading stabilization to accurately display discharge points relative to the "own aircraft" symbol in the middle of the screen as you make a turn.

WX-1000E

With 232/422 navaid option: Base model plus:

- Heading stabilization
- Display of navigation data from discrete inputs (RS232/RS422)

With 429 navaid option: Base model plus:

- Heading stabilization
- Display of navigation data from ARINC 429 bus inputs

With 429 EFIS option: Base model plus:

- Heading stabilization

- Display output to an EFIS display unit via ARINC 429 bus outputs, or to a radar indicator via the BFG Radar Graphics Computer model RGC250. The EFIS display unit or RGC250/ radar indicator can be in place of the standard WX-1000 display, or in addition to the WX-1000 display.

"E" Models

Installing a 232/422 navaid option, a 429 navaid option, or a 429 EFIS option into a WX-1000+ turns the system into a WX-1000E. Only one of the three options can be present at any given time inside the processor.

Determining the Unit's Model Number & Options

You can determine your unit's detailed model number and installed options by getting the part number from the tag on the back of the processor and looking up the corresponding part number definition in table 5-1. If you don't have easy access to the rear of the processor, you can determine the general model number and installed options by observing the display as follows:

Base Model: If no heading is displayed at the top of the weather screens, then you probably have a WX-1000.

Plus: If a heading is displayed at the top of the weather screens, but no graphical course deviation indicator is displayed near the bottom of the weather screens, then you have a WX-1000+.

Navaid: If a graphical course deviation indicator is displayed near the bottom of the weather screens, then you have a WX-1000E (232/422 navaid), or a WX-1000E (429 navaid).

EFIS: If you have *Stormscope* options available on your EFIS display or on your weather radar indicator, then you have a WX-1000E (429 EFIS).

This guide will hereafter use the term "WX-1000" to refer to all variations of the WX-1000 model unless otherwise indicated.

Features

- Four operator-selectable weather ranges: 25, 50, 100, and 200 nmi
- Two operator-selectable weather views: 120° forward view, and 360° view
- Three types of self test: Power-up, continuous, and operator-initiated
- Local and remote clear – allows operator to clear displayed discharge points using a button on the front of the *Stormscope* display or from a remotely-mounted "clear screen" button (not supplied)
- Mic inhibit – inhibits thunderstorm processing when the communications transmitter is keyed to prevent the processing of corrupted data (some aircraft need to use this feature, others don't)
- Power/brightness control – allows operator to adjust the CRT brightness and to turn the *Stormscope* system on and off
- Four buttons – these function keys perform various functions depending on what mode the *Stormscope* system is in and what screen is being displayed. This variability allows for flexibility and future expansion.
- Cell display mode – allows you to view groups of discharges (cells)
- Six dealer-programmable checklists, each containing a maximum of 30 lines with up to 20 characters each
- Real-time digital clock display for time, day, and date
- Stopwatch timer function
- Elapsed time counter function
- Expandable – includes an expansion board slot for adding options such as heading stabilization, navaid display, and output to an EFIS (all options are described in the appendices)

Chapter 2
Storm Mapping Principles

Anatomy of a Thunderstorm

The *Stormscope* model WX-1000 is intended to help pilots avoid the dangers associated with thunderstorms (convective wind shear, lightning, icing, tornadoes, etc.). The *Stormscope* system locates thunderstorms by detecting the electrical discharges that thunderstorms always generate. Figure 2-1 shows how thunderstorms create electrical discharges and radiate electromagnetic signals.

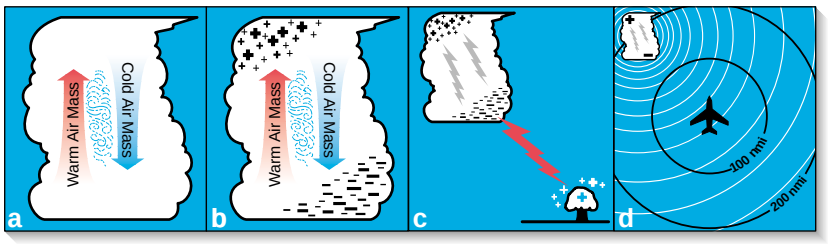


Figure 2-1. Electrical Discharges in Thunderstorms

a. The convective flow of air currents (warm air going up and cold air going down) leads to friction between the opposing air currents and wind shear in the space between the opposing air currents. The closer together the opposing air currents are, the greater the shearing force of the air currents.

b. The friction between the opposing air currents causes electrical charges in the area to separate. As positive (+) and negative (–) electrical charges are separated, they accumulate in masses of similar charges (positive charges near the top of the cloud and negative charges near the bottom).

c. Electrical discharges occur as the accumulated masses of separated positive and negative charges attempt to rejoin. These discharges continue to occur repetitively as long as the convective wind shear persists. A few of the discharges are visible as lightning, but most electrical discharges occur within a cloud or between clouds and are hidden by those clouds. Only a small percentage of discharges occurs between the clouds and the ground. Cloud to ground lightning occurs when the negatively charged lower part of a cloud induces a positive charge on an object on the ground. The immense charge separation finally breaks down the insulating air and a discharge occurs dumping negative charge from the cloud onto the object and the surrounding ground.

d. All electrical discharges radiate electromagnetic signals in all directions close to the speed of light. The electromagnetic signals have unique characteristics and varying rates of recurrence and signal strength.

Figure 2-2 shows that the rate of electrical discharges detected in an area is directly related to the amount of convective wind shear turbulence present. In fact, as

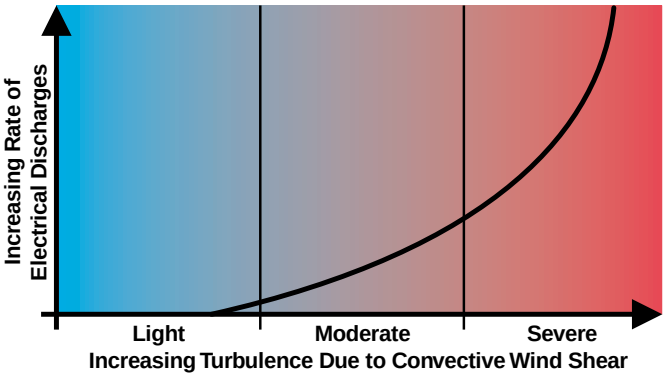


Figure 2-2. Discharge Rate a Function of Wind Shear

convective wind shear increases, the rate of electrical discharges increases at an increasing rate. This relationship means that if you find the electrical discharges, you've found the wind shear.

Stages of a Thunderstorm

All thunderstorms begin as cumulus clouds, build to an intense mature stage, and finally dissipate. Each of these stages in the life of a thunderstorm present a different set of dangers to aircraft. Your *Stormscope* system maps all stages in the life of a thunderstorm so that you won't be caught unaware by a thunderstorm that can build, mature, and dissipate in as little as 20 minutes.

Cumulus Stage

The cumulus or beginning stage of a thunderstorm is usually precipitation free. In this stage, the risks to an aircraft and its occupants include strong vertical winds, severe turbulence, icing, and convective wind shear.

Mature Stage

In the mature and most intense stage of a thunderstorm, the water droplets within the cloud collide and combine to form rain and hail and, at cooler temperatures, sleet and snow. This stage poses many hazards to aircraft including heavy precipitation, high winds, convective wind shear, severe turbulence, downbursts, hail, icing, tornadoes, and lightning.

Dissipating Stage

In the dissipating stage, the updraft weakens and at the same time, the convective wind shear and other hazardous conditions begin to subside. There may be high rainfall rates in this stage, but the severe dangers are diminishing.

Storm Mapping Technology

The *Stormscope* System and Weather Radar

The storm mapping technology used in the *Stormscope* system is fundamentally different than the technology used in weather radar. Weather radar operates by transmitting

UHF radio waves in the direction of interest and then receiving echoes from water droplets, whereas the *Stormscope* system operates by receiving signals already present in the atmosphere due to electrical discharges. The *Stormscope* system analyzes the unique characteristics of these signals, their signal strength, and their varying rates of recurrence to determine the location and intensity of the thunderstorms that generated the discharges. The *Stormscope* system can receive radiated electromagnetic signals from electrical discharges up to 200 nmi away.

One disadvantage of weather radar is that the cumulus stage of a thunderstorm (usually precipitation free) is unlikely to appear on weather radar; however, it generally does contain electrical discharges which *will* appear on your *Stormscope* display as a light but increasing cluster of discharge points.

Another disadvantage of weather radar is that due to attenuation, it may not see the "storm behind the storm" or may understate its intensity. Your *Stormscope* system is not subject to attenuation. With the *Stormscope* system, electrical discharges are mapped throughout the storm area. The size of the cluster of discharge points on your *Stormscope* system indicates the size of the storm area. The speed with which the discharge points appear indicate the intensity of the storm regardless of the size of the cluster. The more intense the storm, the faster the discharge points reappear.

Automatic Updating

The *Stormscope* system receives and processes electrical discharge information continuously and updates the screen as needed, which may be many times every second. Even though the electromagnetic signals from electrical discharges are of very short duration, the *Stormscope* system stores the resulting discharge points in memory and displays each point for a maximum of 2 minutes before it is erased from the screen and from memory.

In the 360° view, the *Stormscope* system can store and display 512 discharge points within the selected range. In the 120° view, the *Stormscope* system can store and display 256 discharge points within the selected range. When the number of electrical discharges exceeds the maximum displayable capacity in a given view within a 2-minute

interval, the oldest discharge point in memory and on the screen in that view is erased and replaced with the newest discharge point. This process continues to replace old discharge points with new ones to make sure that discharge points on the screen represent the most recent electrical discharges. In a typical thunderstorm, all the points on the screen may be replaced with new points every 1 to 2 minutes. In a severe thunderstorm, the display may be completely updated every 30 to 60 seconds.

Chapter 3
Operation

Introduction

This chapter describes the WX-1000's controls and screen elements, and then lists the operating instructions and error messages. Refer to the appendices for descriptions and instructions for options such as heading stabilization, navaid display, and display on an EFIS.

Controls & Screen Elements

Figure 3-1 and the following paragraphs describe the WX-1000's controls and major screen elements. The WX-1000 also provides connections for a remote switch that clears discharge points from the screen.

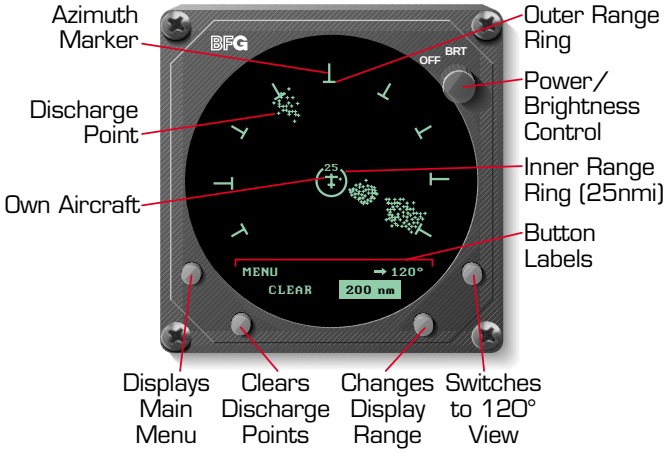
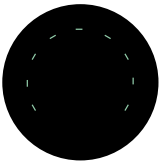


Figure 3-1. Controls & Screen Elements



Outer Range Ring The outer range ring identifies the outer boundary of the current range. In the 360° view, the outer range ring is made up of 9 arcs spaced 30° apart along a circle centered on the aircraft symbol. In the 120° view, the outer range ring is made up of 2 arcs each spaced 30° on either side of the aircraft heading along a circle centered on the aircraft symbol. If the range is set to 25 nmi in either view, the outer range ring is a solid ring instead of arcs. The numerical value of the radius of the outer range ring is displayed in the range indicator at the bottom of the screen.



Power/Brightness Control (OFF/BRT) Rotating this knob clockwise turns on the *Stormscope* system and increases the brightness of the display. Rotating this knob counterclockwise decreases the brightness of the display and turns off the *Stormscope* system when the knob reaches its fully counterclockwise position.



25 nmi Range Ring This solid ring is displayed on every range of both weather views to keep you informed of any thunderstorm activity within a 25 nmi radius of your aircraft.



Display Range Indicator This button label/indicator displays the numerical value of the current range displayed on the screen. This value corresponds to the distance from the aircraft to the outer range ring. The possibilities are 25, 50, 100, and 200 nmi.



Buttons The four gray buttons protruding from the bottom half of the bezel are momentary contact switches. The *Stormscope* system assigns them different functions depending on which screen and options are currently active.



Own Aircraft Symbol This symbol indicates the location and heading of your aircraft relative to the thunderstorm activity.



Discharge Points The position of these + symbols indicates the azimuth and range of the detected electrical discharge activity relative to your aircraft. Discharge points sometimes overlap to form clusters. A large cluster indicates that the thunderstorm covers a large area. A dense cluster indicates an intense thunderstorm. The size of the discharge points increases as the selected range decreases in order to enhance the storm clustering effect on the shorter ranges. The latest discharge points (none older than 2 minutes) are stored in memory and displayed even if you switch ranges or views and then switch back to the original range or view.



Azimuth Markers The azimuth markers help to quantify the angular location of electrical discharges relative to the aircraft. In the 360° view, 9 short radial markers are spaced 30° apart around the outside of the outer range ring. In the 120° view, 4 azimuth markers radiate out from the aircraft symbol at 30° and 60° on either side of the aircraft heading.

Turn On the *Stormscope* System

1. **Rotate the OFF/BRT knob clockwise about 180°.**

   The switch will click and the *Stormscope* system will begin the power-up self test and will display the SELF-TEST screen with the message SYSTEM TEST IN PROGRESS… (See figure 3-2.) The power-up self test takes about 15 seconds to ensure that all major *Stormscope* system functions are operating properly. Items tested include antenna reception, memory, microprocessor functions, and installed options.

   If the *Stormscope* system detects no faults, the SELF-TEST screen displays the message ALL TESTS ARE



Figure 3-2. System Test in Progress



Figure 3-3. All Tests Are OK

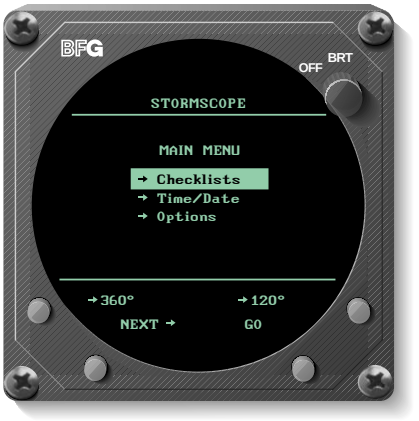


Figure 3-4. MAIN MENU Screen

OK (figure 3-3). After a few seconds, the display switches to the MAIN MENU screen (figure 3-4).

If the *Stormscope* system detects a fault, an error message is displayed. Refer to page 3-13 for more information on error messages.

NOTE

The Stormscope system may complete its power-up self test before the CRT comes on. In this case, it is possible that the first screen you see will be the MAIN MENU screen or an error message resulting from the self test.

Adjust the Screen Brightness

1. Rotate the OFF/BRT knob clockwise to increase the brightness of the display or counterclockwise to decrease the brightness of the display.

Switch to a Weather View

The arrow symbol (➞) on screen (figures 3-5 and 3-6) and in the following step means "go to."

1. **On either weather view screen or on the MAIN MENU screen (figure 3-4), press the ➞360° button to switch to the 360° weather view, or press the ➞120° button to switch to the 120° weather view.**

   When changing between views, the range remains constant, but since the 120° view provides an expanded view, the thunderstorm information is displayed in greater detail.



Figure 3-5. 360° Weather View



Figure 3-6. 120° Weather View

Select the Range

1. **Switch to one of the two weather views (figures 3-5 and 3-6).**

2. **Press the button next to the on-screen range indicator (the lower right button) repeatedly to step through the operating ranges 200, 100, 50, and 25 nmi.**

   With each press of the range button, the screen changes to display the electrical discharge activity detected within the new range. The range indicator will also change to display the numerical value of the new range (25, 50, 100, or 200 nmi). This new range

corresponds to the distance from the aircraft to the outer range ring on the screen.

The *Stormscope* system stores electrical discharge information for all ranges simultaneously to provide you with an instant, up-to-date display of electrical discharge activity when you select a new range.

As you move from one range to the next, the 25 nmi range is always indicated by a solid ring to advise you of your close proximity to thunderstorms. You may also notice that the discharge points are progressively larger on the shorter ranges and smaller on the longer ranges. This effect makes it easier to spot clusters of discharge points in any range.

Clear All Discharge Points

You should clear the existing discharge points after every heading change to ensure that any new discharge points are positioned correctly with respect to the current heading. (If you have the heading stabilization option installed and turned on [on the OPTIONS screen], you do not have to press the CLEAR button after every heading change. See appendix A for more information on the heading stabilization option.)

Clearing the discharge points periodically while you're monitoring thunderstorms is also a good way to determine if the storm is building or dissipating. Discharge points in a building storm will reappear faster and in larger numbers after you press the CLR button. Discharge points in a dissipating storm will reappear slower and in smaller numbers after you press the CLR button.

1. **To clear all discharge points, first switch to one of the two weather views (figures 3-5 and 3-6).**

2. **Press the button adjacent to the on-screen CLEAR button label (the lower left button).**

   All discharge points will be erased from the screen and from the *Stormscope* system memory. The *Stormscope* system will continue to plot any new discharge points on the cleared screen.

Check the Status of the Continuous Self Test

The *Stormscope* system uses three types of self tests: the power-up self test, the continuous self test, and the operator-initiated self test. The continuous self test continuously checks for major component failures.

1. **Press the MENU button to go to the MAIN MENU screen (figure 3-4).**

2. **Press the NEXT➡ button repeatedly if necessary until "➡ Options" is highlighted.**

3. **Press the GO button to view the OPTIONS screen (figure 3-7).**

   The Continuous Test item is listed as OK or FAULT.



Figure 3-7. OPTIONS Screen

Run the Operator-Initiated Self Test

The operator-initiated self test is more extensive than the continuous self test and is recommended to verify proper operation of your *Stormscope* system whenever thunderstorm activity is displayed.

1. **Press the MENU button to go to the MAIN MENU screen (figure 3-4).**

2. **Press the NEXT➡ button repeatedly if necessary until "➡ Options" is highlighted.**

3. **Press the GO button to view the OPTIONS screen (figure 3-7).**

4. **Press the TEST button to run the operator-initiated self test.**

   The *Stormscope* system switches to the SELF-TEST screen (figure 3-2) and begins the self test. The SELF TEST screen displays the message SYSTEM TEST IN PROGRESS… for the duration of the test (between 5 and 10 seconds).

   If the *Stormscope* system detects no faults, the SELF TEST screen displays the message ALL TESTS ARE OK (figure 3-3). After a few seconds, the display switches back to the OPTIONS screen.

   If the *Stormscope* system detects a fault, an error message is displayed. Refer to page 3-13 for more information on error messages. Once you've pressed any button to acknowledge the error message, the display switches back to the OPTIONS screen.

Use the Checklist Feature

Before you can use the checklist feature, you must fill out checklist worksheets (figure 3-8), then ask your *Stormscope* dealer to enter the checklists into your WX-1000 using specialized equipment. Keep a copy of the worksheets in your aircraft at all times. Any time you want to change your checklists, have your dealer enter the changes.

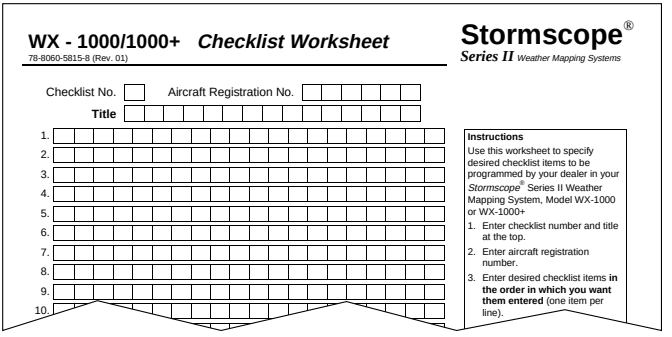

WX - 1000/1000+ *Checklist Worksheet*
78-8060-5815-8 (Rev. 01)
Stormscope®
Series II Weather Mapping Systems
Checklist No.
Aircraft Registration No.
Title
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
Instructions
Use this worksheet to specify desired checklist items to be programmed by your dealer in your *Stormscope*® 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).

Figure 3-8. WX-1000 Checklist Worksheet Sample

You can create as many as 6 separate checklists, each containing a maximum of 30 lines, with a maximum of 20 characters per line. It's solely your responsibility to select appropriate checklist items.

One of the following symbols appears in front of each checklist item:

- • (Item not yet checked)
- ✓ (Item checked)
- ● (Item skipped)

The WX-1000 stores checklist status in memory so that if you exit checklist mode and come back later, you can continue where you left off.

To Use the Checklist Feature:

1. Press the MENU button to go to the MAIN MENU screen (figure 3-4).
2. Press the NEXT➡ button repeatedly if necessary until the "Checklists" item is highlighted.
3. Press the GO button to view the CHECKLIST MENU screen (figure 3-9).



Figure 3-9. CHECKLIST MENU Screen

4. Press the NEXT➡ button repeatedly if necessary until the desired checklist title is highlighted.



Figure 3-10. A Checklist Screen

5. **Press the GO button to view the items in the selected checklist (figure 3-10).**

   The first unchecked item in the checklist is highlighted.

6. **After you accomplish the selected checklist item, press the CHECK button.**

   The list scrolls up so that the next item on the list is highlighted and a checkmark appears next to the accomplished item.

   The last item on each of the checklists is followed by the message END OF CHECKLIST.

   After all items have been checked, a confirmation message CHECKLIST COMPLETE appears and all button labels disappear except MENU.

7. **To skip the selected checklist item without checking it off the list, press the SKIP button.**

   The list scrolls up so that the next item is highlighted and a large dot appears next to the skipped item (figure 3-11). All skipped (unchecked) items appear again at the bottom of the checklist (figure 3-12).

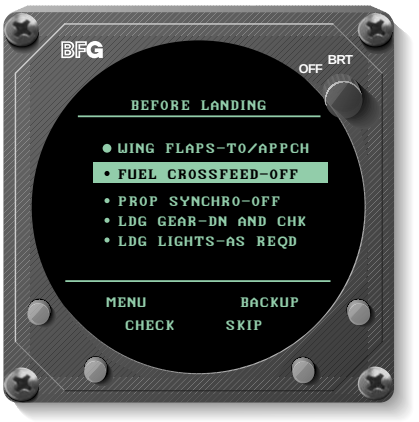


Figure 3-11. Skipped Item

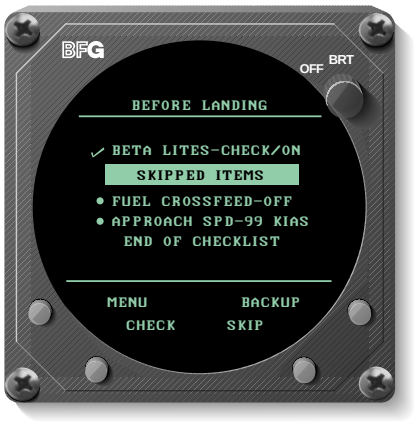


Figure 3-12. Skipped Items

8. To scroll backwards and review the checklist at any time, press the BACKUP button.

Set the Date and Time

1. Press the MENU button to go to the MAIN MENU screen (figure 3-4).

2. Press the NEXT➡ button repeatedly if necessary until the “Time/Date” item is highlighted.

3. Press the GO button to view the TIME/DATE screen (figure 3-13).

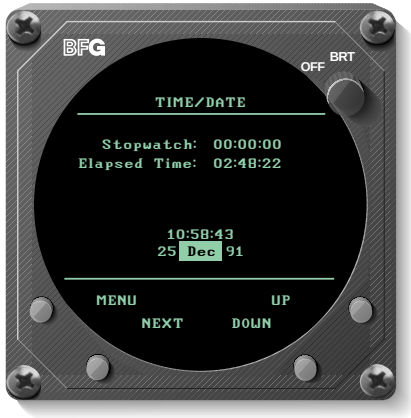


Figure 3-13. TIME/DATE Screen

4. Press the NEXT button repeatedly until the day field is highlighted.

5. Press the UP or DOWN button repeatedly to step the day field to the proper day.

6. Repeat steps 4 & 5 to set the month, year, & time.

Time an Event

The stopwatch feature allows you to time an event. If power is interrupted to the *Stormscope* system, the stopwatch resets to 00:00:00.

1. Press the MENU button to go to the MAIN MENU screen (figure 3-4).

2. Press the NEXT➡ button repeatedly if necessary until the "Time/Date" item is highlighted.

3. Press the GO button to view the TIME/DATE screen (figure 3-13).

   The stopwatch digits should be highlighted.

4. Press the START button to start the stopwatch.

5. Press the STOP button to stop the stopwatch

6. Press the RESET button to reset the stopwatch digits back to 00:00:00

Measure Elapsed Time

The elapsed time feature allows you to measure the amount of time that the Stormscope system has been turned on.

1. Press the MENU button to go to the MAIN MENU screen (figure 3-4).

2. Press the NEXT➡ button repeatedly if necessary until the "Time/Date" item is highlighted.

3. Press the GO button to view the TIME/DATE screen (figure 3-13).

4. Press the NEXT button to highlight the Elapsed Time digits.

5. Press the START button to start measuring the elapsed time.

6. Press the STOP button to stop measuring the elapsed time.

7. Press the RESET button to reset the elapsed time digits back to 00:00:00

If power to your *Stormscope* system is interrupted, the current elapsed time value is stored in memory. After power is restored, you must press the START button to continue counting elapsed time, starting from the stored value.

Turn Off the *Stormscope* System

1. **Rotate the OFF/BRT knob counterclockwise until it turns off.**

   Power turns off to the *Stormscope* display, processor, and antenna, and all discharge points are erased from memory.

Error Messages

The *Stormscope* system detects most common faults and displays error messages indicating the nature of the faults and which functions may be inoperative. In most cases, all other functions will continue to operate. If continued operation is possible, the message PRESS ANY KEY TO CONTINUE appears. Pressing any button returns you to the screen that was displayed before the error message appeared and permits operation of the remaining functions.

If you get an error message that won't go away after cycling the power off and on, write down the error message and call BFG Avionics Systems customer service (1-800-453-0288) or your authorized *Stormscope* dealer for service. The following paragraphs provide a few examples of possible error messages.

ERROR 01: Continued operation is not possible (figure 3-14)

Meaning: An error or malfunction may exist in the system hardware: circuitry, video output, data memory, program memory, video memory, etc.

Action: Continued operation of the unit is not possible. Turn the unit off and call for service.



Figure 3-14. Error 01

ERROR 44 or 45: Weather mapping is inhibited (figure 3-15)

Meaning: There may or may not be an error in the thunderstorm processing circuitry of the unit. Seventy percent of these errors are caused by aircraft noise. Other causes include flying near power transmitters, taxiing over underground cables, or operating near a hangar, power lines, or GPU cart. As you move away from these interference sources, the weather mapping functions should automatically recover. In general, when these messages occur intermittently, they are usually caused by some outside interference.

Action: Turn off different aircraft systems to try to isolate any source of noise that may be causing the error, or press any button to continue operation without thunderstorm data. If these messages display steadily, call for service.



Figure 3-15. Error 44

ERROR 46: Weather mapping is inhibited (figure 3-16)

Meaning: This error typically means that your *Stormscope* antenna is not able to receive or forward thunderstorm data; but this error could instead be caused by noise or by a faulty processor. Weather mapping functions are not available. Other functions are operable.

Action: Press any button to continue without thunderstorm data and call for service.

MIC KEY STUCK: Weather mapping is inhibited (figure 3-17)

Meaning: The microphone key may have been depressed for more than 1 minute and is inhibiting the processing and displaying of thunderstorm data, but it's more likely that there's a problem with the processor.

Action: Check your microphone key to see if it's stuck. If that's not the problem, press any button to continue without weather mapping functions and call for service.



Figure 3-16. Error 46



Figure 3-17. Mic Key Stuck

Chapter 4
Weather Display Interpretation

WARNING *Never use your Stormscope system to attempt to penetrate a thunderstorm. The FAA Advisory Circular, Subject: Thunderstorms, and the Airman's Information Manual (AIM) recommend that you "avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo."*

CAUTION *Even a single discharge point may represent thunderstorm activity and should be avoided.*

Introduction

The examples in this chapter are designed to help you relate the patterns of +'s on your *Stormscope* screen to the size and location of thunderstorms that may be near your aircraft.

A blue and white grid in the examples represents the airspace around your aircraft. (See figure 4-1.) Each square in the grid represents a 100 by 100 nmi area. A circle

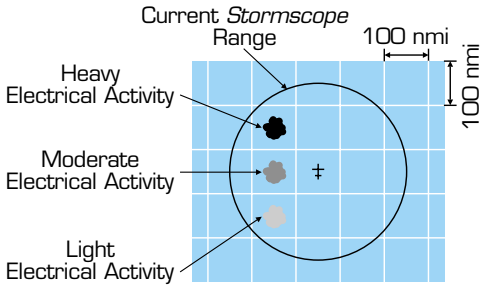


Figure 4-1. Airspace Diagram

represents the area monitored by your *Stormscope* system. Areas of gray or black indicate thunderstorms. The darker the area, the greater the rate of electrical discharge activity.

Typical Patterns

Three Clusters within the 200 nmi Range Ring

Figure 4-2 shows the *Stormscope* screen in the 360° weather view at the 200 nmi range. Using this knowledge, the outer range ring, and the azimuth markers, the three clusters of discharge points on the *Stormscope* screen can be interpreted as representing three thunderstorm cells at the following azimuth and range:

Cluster	Azimuth (clock position)	Range
1	11:00	180 nmi
2	4:00	75 nmi
3	4:00	180 nmi

The *Stormscope* screen can also tell us about the relative amount of electrical discharge activity in thunderstorm cells. Clusters 2 and 3 have more discharge points than cluster 1 indicating greater electrical discharge activity. All three clusters however must be avoided because you can't necessarily determine the severity of thunderstorms based strictly on the number of discharge points. For example, in the western United States, a severe thunderstorm may only have a few electrical discharges.

When the *Stormscope* range is changed to 100 nmi (figure 4-3), only cluster 2 remains visible. Clusters 1 and 3 are beyond the 100 nmi range and therefore no longer appear on the screen. (Clusters 1 and 3 would again be visible if the range were returned to 200 nmi.) Cluster 2 is now more defined and the discharge points are larger. The interpretation of cluster 2 remains the same: a moderately active thunderstorm at azimuth 4:00, range 75 nmi.

Two Clusters within the 200 nmi Range Ring

Figure 4-4 shows the *Stormscope* screen in the 360° weather view at the 200 nmi range. Using this knowledge, the outer range ring, and the azimuth markers, the two clusters of discharge points on the *Stormscope* screen can be interpreted as one thunderstorm cell at 5:30, about 150 nmi from the



Figure 4-2. Three Clusters Within 200 nmi



Figure 4-3. Range Changed to 100 nmi



Figure 4-4. Two Clusters Within 200 nmi

aircraft, and another cell at 1:00, about 100 nmi from the aircraft. The cluster at 1:00 has fewer discharge points than the cluster at 5:30, indicating a lower rate of electrical activity. Both clusters must be avoided.

Mapping Headings Past Thunderstorms

Figures 4-5 through 4-8 and the following paragraphs show the progression of an aircraft past several thunderstorms.

Range Set at 200 nmi

Figure 4-5 shows the *Stormscope* screen in the 360° weather view at the 200 nmi range. Two thunderstorms appear almost as one cluster of discharge points off the nose of the aircraft, centered 180 nmi away. A second cluster at 9:30 indicates a storm system containing three thunderstorms.

Aircraft Progresses 100 nmi

Figure 4-6 shows that the aircraft has maintained its heading and progressed 100 nmi. The two thunderstorms off the nose of the aircraft appear to have expanded horizontally on the screen. This effect is normal anytime you get closer to a storm. The line of thunderstorms previously at 9:30 now appears at 8:30.

Range Changes to 100 nmi

Figure 4-7 shows the *Stormscope* screen a short time later in the 120° weather view at the 100 nmi range. The thunderstorms at 8:30 are not visible in this view but the thunderstorms off the nose of the aircraft appear in greater detail as two separate thunderstorms (at 11:30 and 12:15 centered 90 nmi from the aircraft).

Aircraft Turns to Avoid Thunderstorms

Figure 4-8 shows the *Stormscope* screen a short time later after the aircraft has turned to the right to avoid the thunderstorms and the pilot has cleared all discharge points (in order to redraw them in correct position relative to the new heading.) (Systems with heading stabilization installed [appendix A] automatically rotate the existing discharge points to their correct position relative to the new heading without the pilot having to clear the discharge points.)



Figure 4-5. Range Set at 200 nmi



Figure 4-6. Aircraft Progresses 100 nmi

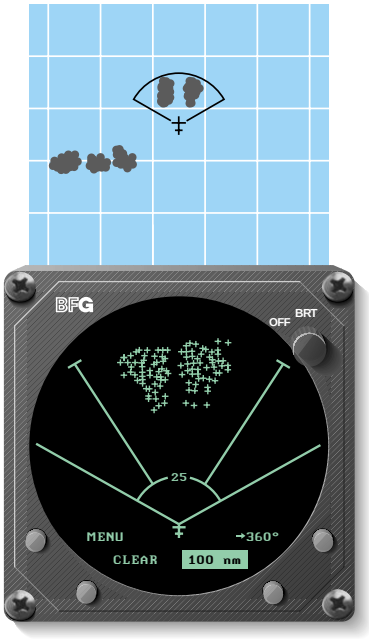


Figure 4-7. Range Changes to 100 nmi

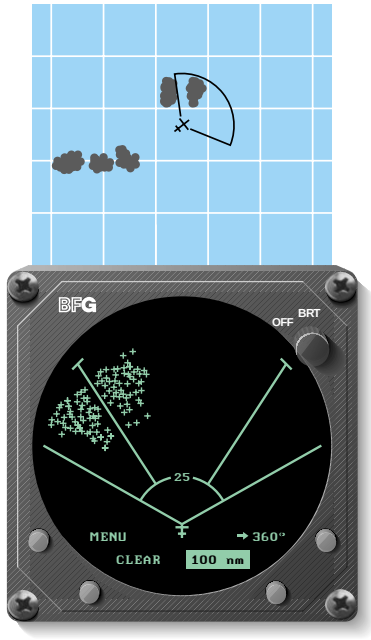


Figure 4-8. Aircraft Turns to Avoid Thunderstorms

Special Patterns

Randomly Scattered Discharge Points

Atmospheric instability associated with cumulus clouds, or developing or dissipating thunderstorms could cause randomly scattered discharge points on the *Stormscope* screen as shown in figure 4-9. If you observe random discharge points, continue to monitor the screen for developing clusters which indicate thunderstorm activity.

Cluster and Splattering Within 25 nmi

Figure 4-10 shows the *Stormscope* screen in the 360° weather view at the 25 nmi range. One moderately active thunderstorm appears as a cluster of discharge points at 8:30 centered 14 nmi away with a splattering of discharge points throughout the 25 nmi range. Such splattering is due to electrical discharges within 3 to 5 nmi of the aircraft and indicates that the aircraft is too close to the thunderstorm.

While the main cluster should be your primary concern, you should also avoid any groups of discharge points within



Figure 4-9. Randomly Scattered Discharge Points

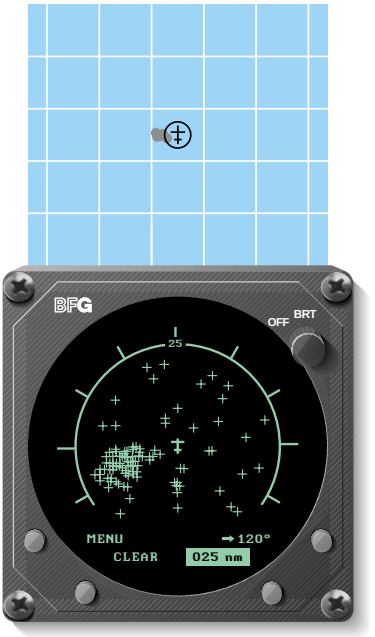


Figure 4-10. Cluster and Splattering Within 25 nmi

the 25 nmi range. Switch to the other ranges to ensure that there is no thunderstorm activity along your intended path.

Note that the *Stormscope* system plots every electrical discharge detected within the 25 nmi range at the exact location detected unless the discharge is associated with a cluster of discharges, in which case the discharge point is clustered with the associated discharge points.

Discharge Points Off Aircraft's Nose

Figure 4-11 shows the *Stormscope* screen in the 360° weather view at the 200 nmi range. The discharge points ahead of the aircraft could be caused by a strong thunderstorm just beyond the 200 nmi range. Another cause might be electrical discharge signals arriving via atmospheric skip from a distant thunderstorm well beyond the *Stormscope* range. In either case, no immediate action is required.

Line of Discharge Points While Taxiing

Passing over a cable beneath the taxiway can cause a line of discharge points across the screen. (See figure 4-12.) Similar



Figure 4-11. Discharge Points Off the Aircraft's Nose



Figure 4-12. Line of Discharge Points While Taxiing

concentrations of discharge points across the screen may appear while taxiing due to electrical signals from nearby equipment such as arc welders or subway rails. After passing the source of the interference, press the CLEAR button.

Developing Cluster Within 25 nmi Range Ring

Figure 4-13 shows a developing thunderstorm 12 nmi from the aircraft. If you see a screen such as this with a developing cluster within the 25 nmi range ring, you should change course to avoid the storm and continue to monitor the *Stormscope* screen.

Split Image Off Nose of Aircraft

A strong thunderstorm at 50–75 nmi away or a weak thunderstorm 5–25 nmi away could cause the display shown in figure 4-14. Observe the splitting activity. The strong thunderstorm tends to split much faster. Press the CLEAR button and monitor the display for activity. Deviate your course away from *any* activity within the 25 nmi ring.

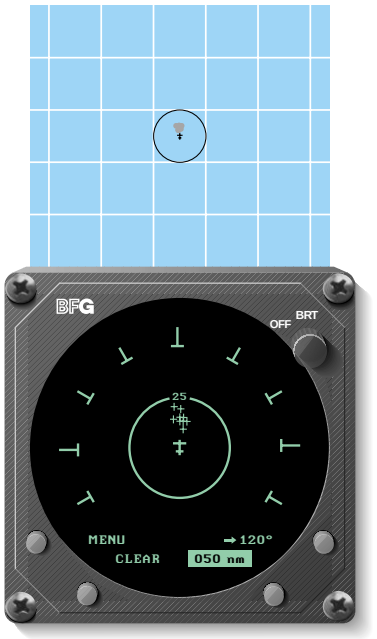


Figure 4-13. Developing Cluster Within 25 nmi



Figure 4-14. Split Image Off Nose of Aircraft

Chapter 5
Specifications

Table 5-1. WX-1000 Processor Specifications

Part Number Definition:
78-8051-9160-4 – WX-1000+
78-8060-5790-3 – WX-1000
78-8060-5941-2 – WX-1000E (232/422 navaid)
78-8060-6086-5 – WX-1000E (429 EFIS)
78-8060-6092-3 – WX-1000E (429 navaid)

Size:
3.38 in (8.59 cm) high
4.88 in (12.40 cm) wide
12.62 in (32.05 cm) deep

Weight:
6.5 lb (3.0 kg)
6.9 lb (3.2 kg) with navaid or EFIS option
Mounting tray adds 0.7 lb (0.3 kg)

Power Input Requirements:
10.5 to 32 V dc, 28 W

Operating Temperature:
-20 to +55 °C (-4 to +131 °F)

Storage Temperature:
-55 to +70 °C (-67 to +158 °F)

Operating Altitude:
55,000 ft maximum

TSO Compliance:
C110a

RTCA Compliance:
Environmental:
DO-160B F2-BA(BMNO)XXXXXXZ(AB)A(AZ)ZZZXXX
Software:
DO-178A Level 2

Table 5-2. WX-1000 Display Specifications

Part Number Definition:
78-8060-5900-8 – Black Bezel
78-8060-5900-9 – Gray Bezel

Size:
3.37 in (8.56 cm) high
3.37 in (8.56 cm) wide
8.24 in (20.92 cm) deep

Weight:
2.3 lb (1.0 kg)

Power Input Requirements:
+15/-15 V dc, 0.7 A (maximum)

Operating Temperature:
-20 to +55 °C (-4 to +131 °F)

Storage Temperature:
-55 to +70 °C (-67 to +158 °F)

Operating Altitude:
55,000 ft maximum

TSO Compliance:
C110a & C113

RTCA Compliance:
DO-160C F1-CA(NBM)XXXXXXZXXZUAXXXXXX

Table 5-3. WX-1000 Antenna Specifications

Part Number Definition:
78-8051-9200-8 – White
78-8051-9220-6 – Black

Size:
1.13 in (2.87 cm) high
4.49 in (11.40 cm) wide
10.06 in (25.60 cm) deep

Weight:
1.9 lb (0.86 kg)

Operating Temperature:
-20 to +55 °C (-4 to +131 °F)

Storage Temperature:
-55 to +70 °C (-67 to +158 °F)

Operating Altitude:
55,000 ft maximum

TSO Compliance:
C110a

RTCA Compliance:
DO-160B F2-BACXXXXXXXXXXZZZXXX

Chapter 6
Warranty Information

Introduction

The WX-1000 is warranted for 2 years from the date of installation (not to exceed 30 months from the date of shipment from BFGoodrich Avionics Systems, Inc.) subject to the following limitations.

Warranty Statement

BFGoodrich Avionics Systems, Inc. (hereinafter called BFGAS) warrants each item of new equipment manufactured or sold by BFGAS to be free from defects in material and workmanship, under normal use as intended, for a period of 30 months from date of shipment by BFGAS to an authorized facility, or 24 months from date of installation by an authorized facility, whichever occurs first. No claim for breach of warranties will be allowed unless BFGAS is notified thereof, in writing, within thirty (30) days after the material or workmanship defect is found.

The obligation of BFGAS shall be limited to replacing or repairing at its factory the equipment found defective under terms of this warranty certificate; providing that such equipment is returned in an approved shipping container, transportation charges prepaid, to BFGAS, Grand Rapids, Michigan, or such other location as BFGAS may authorize. BFGAS reserves the right to have necessary repairs performed by an authorized agency.

This warranty shall not apply to any unit or part thereof which has not been installed or maintained in accordance with BFGAS instructions, or has been repaired or altered in

any way so as to adversely affect its performance or reliability, or which has been subjected to misuse, negligence or accident.

This warranty is exclusive and is accepted by buyer in lieu of all other guaranties or warranties express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. Buyer agrees that in no event will BFGAS liability for all losses from any cause, whether based in contract, negligence, strict liability, other tort or otherwise, exceed buyer's net purchase price, nor will BFGAS be liable for any special, incidental, consequential, or exemplary damages.

BFGAS reserves the right to make changes in design or additions to or improvements in its equipment without the obligation to install such additions or improvement in equipment theretofore manufactured.

A Subsidiary of The BFGoodrich Company

Related Policies and Procedures

a. If the original registered owner of a WX-1000 sells the aircraft in which the WX-1000 is installed during the warranty period, the remaining warranty may be transferred. Written notification of the transaction must be submitted by the initial recipient of the warranty to:

ATTENTION: WARRANTY ADMINISTRATOR
BFGoodrich Avionics Systems, Inc.
5353 52nd Street, S.E.
Grand Rapids, MI 49588-0873 U.S.A.

Telephone: (800)253-9525

b. Equipment must be installed by a BFG Avionics Systems, Inc. authorized dealer or installer. Installation of equipment by facilities not specifically authorized will void the equipment warranty.

c. Notice of a claimed product defect must be given to BFG Avionics Systems, Inc. or a designated BFG Avionics Systems, Inc. service agency within the specified warranty period.

d. A product which is defective in workmanship and/or material shall be returned to BFG Avionics Systems, Inc. via any authorized dealer with transportation charges prepaid. After correction of such defects, the equipment will be returned to the dealer, transportation prepaid by BFG Avionics Systems, Inc. via surface transportation. Any other means of transportation must be paid by the customer.

   The risk of loss or damage to all products in transit shall be assumed by the party initiating the transportation of such products. All items repaired or replaced hereunder shall be warranted for the unexpired portion of the original warranty.

e. BFG Avionics Systems, Inc. is in no way obligated or responsible for supporting or participating in the costs of the installation warranty. The entire responsibility lies with the BFG Avionics Systems, Inc. authorized dealer making the installation. BFG Avionics Systems, Inc. is only responsible for the product warranties outlined in the warranty statement.

f. BFG Avionics Systems, Inc. cannot authorize warranty credit for troubleshooting of other systems in the aircraft in order to reduce noise interference with the WX-1000.

Appendix A
Heading Stabilization Option

Applicable Models

The following *Stormscope* models contain the heading stabilization option:

WX-1000+

WX-1000E (all variations)

The heading stabilization option must be installed on a WX-1000 to create a WX-1000+ before the navaid or EFIS option can be installed to create a WX-1000E.

General Description

The heading stabilization option automatically repositions discharge points relative to the latest aircraft heading, eliminating the need to clear the display after each heading change.

The heading stabilization option also includes the following features:

- The current numeric heading (figure A-1) is displayed in a box at the top of the 360° and 120° weather view screens.
- A FLAG message (figure A-2) is displayed in place of the heading if the heading source (gyro) is malfunctioning or is not yet up to speed.



Figure A-1. Heading Display at Top of Screen



Figure A-2. Heading Flag at Top of Screen

Heading Options

The heading stabilization option adds two items to the OPTIONS screen (figure A-3) as described below.

The "HDG Stabilization" item allows you to turn off the heading stabilization feature should the external heading source (gyro) fail.

The "Heading Display" item allows you to remove the heading display from the weather views without turning off the heading stabilization feature.

To Turn Heading Stabilization Off or On:

1. Press the MENU button to go to the main menu.
2. Press the NEXT➞ button repeatedly if necessary until "➞ Options" is highlighted.
3. Press the GO button to view the OPTIONS screen.
4. Press the NEXT button repeatedly if necessary until the "HDG Stabilization" ON/OFF field is highlighted.
5. Press the ON/OFF button.

   If HDG Stabilization was set to ON, it will switch to OFF. If it was set to OFF, it will switch to ON.



Figure A-3. OPTIONS Screen With Heading Stabilization



Figure A-4. Error 11

To Turn the Heading Display Off or On:

1. Press the MENU button to go to the main menu.
2. Press the NEXT➡ button repeatedly if necessary until "➡ Options" is highlighted.
3. Press the GO button to view the OPTIONS screen.
4. Press the NEXT button repeatedly if necessary until the "Heading Display" ON/OFF field is highlighted.
5. Press the ON/OFF button.

   If Heading Display was set to ON, it will switch to OFF. If it was set to OFF, it will switch to ON.

Heading Error Message

Error 11 (figure A-4) and Error 10 are specific to *Stormscope* models with heading stabilization installed using an XYZ heading source. These errors mean that there may be an error in the *Stormscope* system's processing of heading, or that there is a malfunction of the aircraft's compass system.

If you get an Error 11 or 10, turn the *Stormscope* system off then back on. If the error reappears, press any button to continue without heading information and call BFG (1-800-453-0288) or your *Stormscope* dealer for service.

Appendix B
Navaid Option

Applicable Models

The following *Stormscope* models contain the navaid option:

WX-1000E (232/422 navaid)

WX-1000E (429 navaid)

The navaid option can only be installed on a WX-1000+. Once the navaid option is installed, the model number of the unit changes to one of the above model numbers.

General Description

The navaid option enables the *Stormscope* system to display key navigational information from a qualified loran or GPS receiver directly on the *Stormsope* system's weather view screens. (See figure B-1.) Specifically, the navaid option includes the following features:

- Displays flight plan courselines and waypoints when used with the appropriate loran or GPS receivers, or an FMS
- Displays your heading-stabilized courseline and selected waypoints
- Displays a graphical course deviation indicator (CDI) with 5 nmi of deviation on each side of the courseline
- Displays up to 6 navigational data items (such as range and bearing to the active waypoint, ground speed, etc.) chosen by the user from a list of 14 items
- Displays warnings of weak and missing loran signals

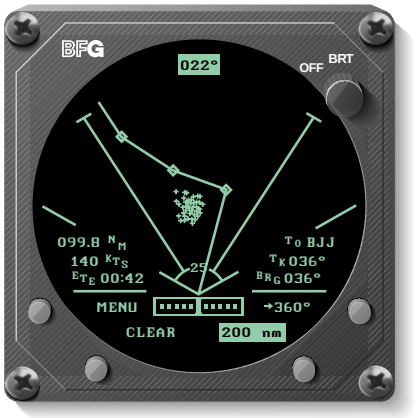


Figure B-1. Typical Weather View Screen With the Navaid Option

- Works with a wide variety of loran receivers
- Works with qualified GPS receivers
- RS-232C, RS-422, or ARINC 429 communications
- The RS-232C and RS-422 communications are fully opto-isolated to ensure the *Stormscope* system operates even when the loran is faulty
- Contains an extra RS-232C communication port for future expansion

NOTE

When used with loran or GPS receivers that transmit flight plan information, the navaid option can display flight plan waypoints within the selected nautical mile range and view. The maximum number of waypoints that can be displayed depends on the Stormscope software version and the data input format. For software version 3.23 or higher, the navaid option can display up to the first 32 waypoints for flight plan data input in the King KLN XX RS-232/422 data format, and up to the first 10 waypoints for flight plan data input in a non-King format. For software versions lower than 3.23, the navaid option can display up to the first 10 waypoints. A tag on the back of the Stormscope processor identifies the software version. Some qualified loran or GPS receivers only transmit the next waypoint regardless of the number of waypoints in the flight plan.

Main Menu

The navaid option adds the "Navaid Display" item to the main menu (figure B-2). The "Navaid Display" item allows you to remove navaid-related items from the weather views as follows:

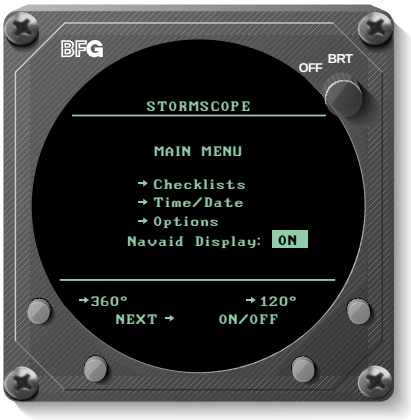


Figure B-2. MAIN MENU w/Navaid

1. Press the MENU button to go to the main menu.

2. Press the NEXT➡ button repeatedly if necessary until the "Navaid Display" ON/OFF field is highlighted.

3. Press the ON/OFF button.

If Navaid Display was set to ON, it will switch to OFF. If it was set to OFF, it will switch to ON.

Navaid Setup Screen

The navaid option adds the "➡Navaid Setup" item to the OPTIONS screen (figure B-3). Choosing the "➡Navaid Setup" item brings up the Navaid Setup screen (figure B-4).

The Navaid Setup screen allows you to change which six navaid data items are selected to be displayed on the weather view screens and where on the screen they are to be



Figure B-3. OPTIONS Screen w/Navaid

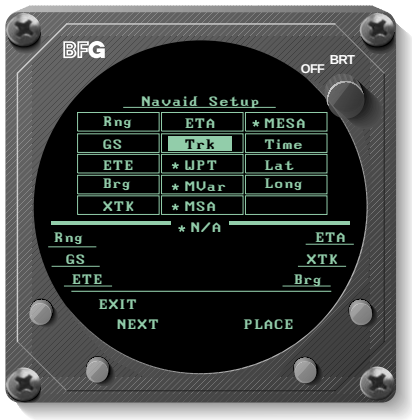


Figure B-4. Navaid Setup Screen

displayed. The navaid data items can be changed regardless of whether the Navaid Display item on the main menu is set to ON or OFF.

The six navaid data items currently selected are displayed in the middle portion of the Navaid Setup screen in the same arrangement as they would appear on the weather view screens. The navaid setup grid displayed at the top of the screen lists 14 navaid data items and a blank space. Table B-1 lists the meanings of the navaid data item abbreviations.

Table B-1. Navaid Data Item Abbreviations

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

The data items available for selection are dependent upon the specific information provided by your loran or GPS receiver. If an item on the grid is not available from your receiver, that grid space will include an asterisk (*).

To Change the Six Navaid Data Items:

1. **Press the MENU button to go to the main menu.**
2. **Press the NEXT➞ button repeatedly if necessary until "➞ Options" is highlighted.**

3. **Press the GO button to view the OPTIONS screen.**

4. **Press the NEXT button repeatedly if necessary until "➡ Navaid Setup" is highlighted.**

5. **Press the GO button to view the Navaid Setup screen.**

6. **Press the NEXT button repeatedly if necessary until the navaid data item (or blank cell) you want to insert is highlighted.**

7. **Press the PLACE button.**

   The selected item appears in the upper left position.

8. **To move the item to another position, press the MOVE button.**

   Each additional press of the MOVE button advances the item counter-clockwise. When you move a data item into a position that already has an item, the new item temporarily displays in that position. When you press the MOVE button again, the previous data item reappears.

9. **To set the position of a highlighted data item, press the SET button.**

   The highlighted data item is set into its current position and the highlighting box moves to the next data item in the grid.

10. **To move the highlighting box back to the grid without setting the position of the highlighted data item, press the CANCEL button.**

    Any data item previously occupying the position will reappear.

11. **Repeat steps 6 through 10 until all six positions are filled with the items you want displayed.**

12. **Press the EXIT button to return to the OPTIONS screen.**

Data Comm Errors

Error 13 (figure B-5) means receiving no data. Error 14 indicates a processing error. Errors 15 and 17 indicate a faulty navaid communication circuit. Press any button to continue without navaid information, then call for service.



Figure B-5. Error 13

Warning Message

If the loran or GPS receiver determines its position error to be greater than 1.7 nautical miles, a warning message in the form of a highlighted "w" will appear next to the affected data items. (See figure B-6.)



Figure B-6. Warning Messages

NAV FLAG

If the loran or GPS receiver fails to acquire a consistent signal and is not certain of its position, the highlighted message "NAV FLAG" appears. (See figure B-7.) Navigational data will not be displayed if the receiver indicates a flag condition.



Figure B-7. NAV FLAG

Appendix C
EFIS Option

Applicable Models

Only the WX-1000E (429 EFIS) model contains the EFIS option. The EFIS option can only be installed on a WX-1000+. Once the EFIS option is installed, the unit's model number changes to WX-1000E (429 EFIS).

General Description

The EFIS option enables the *Stormscope* system to display its thunderstorm data on an EFIS display unit via ARINC 429 bus outputs, or on a radar indicator via the BFG Radar Graphics Computer model RGC250. The EFIS display unit or RGC250/radar indicator can be used in place of the standard WX-1000 display, or in addition to it. Refer to your EFIS or RGC250 manuals for instructions on displaying *Stormscope* thunderstorm data.

EFIS Thunderstorm Symbology

The EFIS or RGC250 reads the *Stormscope* thunderstorm data and displays the intensity level of *areas* of detected lightning (not individual electrical discharges). Refer to your EFIS or RGC250 documentation for details on how the intensity levels are defined and displayed. Some EFISs and the RGC250 display the following symbols. Other EFISs use different colors to represent different intensity levels.


Light activity (up to 8 strikes/min)


Moderate activity (9-25 strikes/min)


Heavy activity (26 or more strikes/min)

Notes

Notes

Record of Important Information

Dealer Information

Name _____

Address _____

City, State, Zip _____

Telephone _____

Equipment Information

Date of Purchase _____

Installation Date _____

Processor:

- Model Number _____
- Part Number _____
- Serial Number _____
- Mod Letter _____
- Software Version _____

Antenna:

- Model Number _____
- Part Number _____
- Serial Number _____
- Mod Letter _____

Display:

- Model Number _____
- Part Number _____
- Serial Number _____
- Mod Letter _____

NOTE

To ensure that a new or repaired WX-1000 meets the TSO, meets foreign government certification requirements, and meets BFGoodrich Avionics Systems, Inc. performance standards, your WX-1000 must be installed and tested by a BFGoodrich Avionics Systems-authorized Stormscope dealer.

BFGoodrich
Aerospace

75-0299-7690-1 (Rev. C, 4/6/00)

BFGoodrich Avionics Systems, Inc.
5353 52nd Street, S.E.
P.O. Box 873
Grand Rapids, MI 49588-0873 USA
(800)253-9525
www.bfgavionics.com

Stormscope®
Series II ***Weather Mapping Systems***