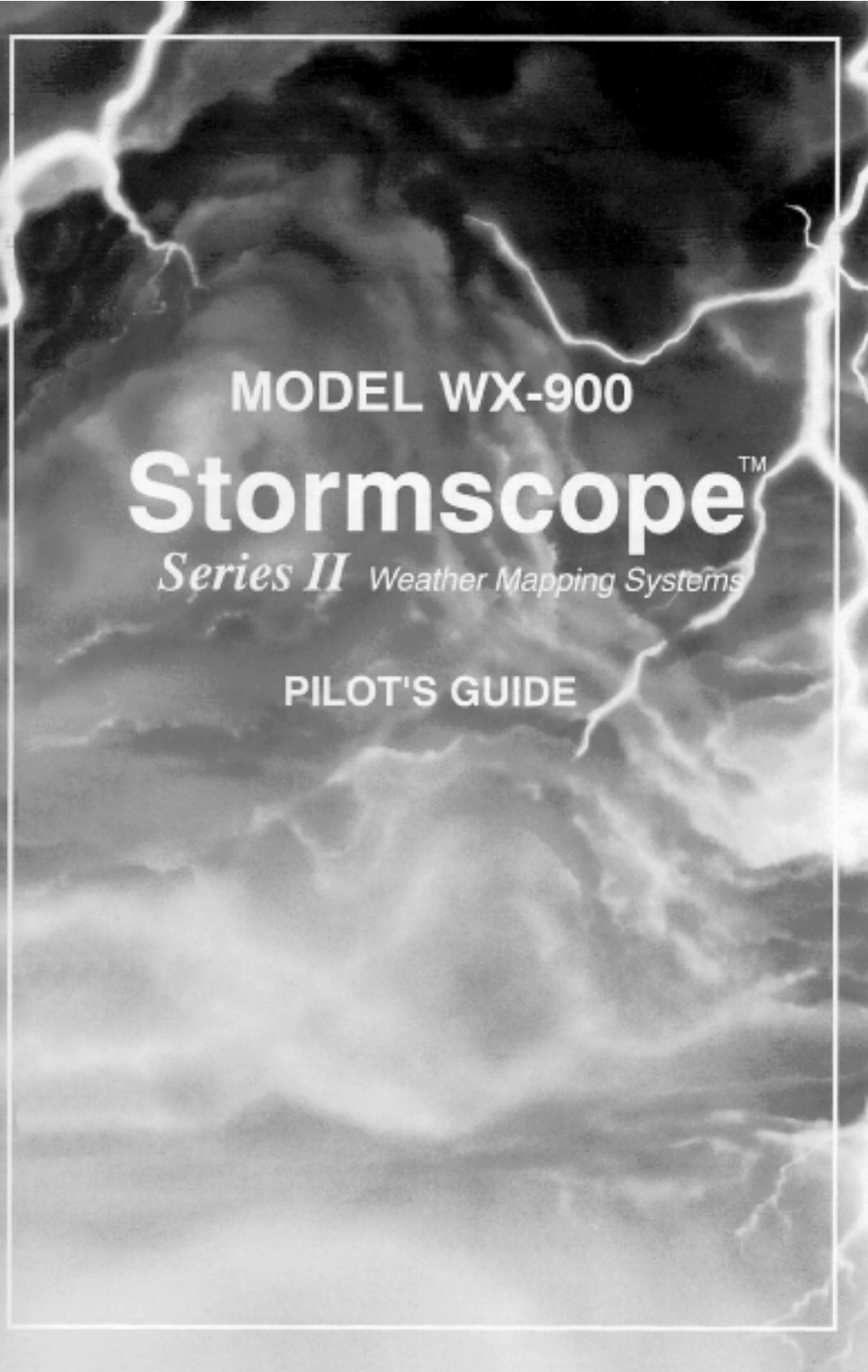

MODEL WX-900
Stormscope™
Series II Weather Mapping Systems
PILOT'S GUIDE

PILOT'S GUIDE

MODEL WX-900

Stormscope™

Series II Weather Mapping Systems

Designed and Manufactured in the United States of America by

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Model WX-900 Stormscope™ Series II Weather Mapping Systems

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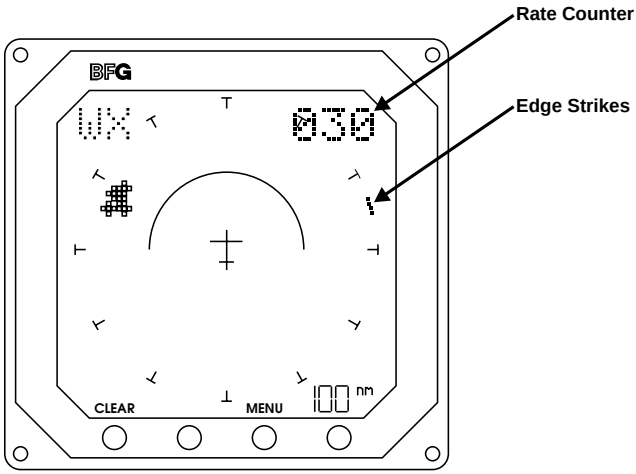
8/10/92

Rate Counter and Edge Strikes

The BFGoodrich Avionics Systems WX-900 Weather Mapping System now provides the average number of strikes detected per minute, regardless of the display range selected. The strike rate counter, as shown below, is updated every 5 seconds and will increase/decrease with thunderstorm intensity. This is useful in determining the relative intensity of all thunderstorms within the maximum range of the instrument. The counter can display a maximum of 999 strikes per minute. You can reset the counter to zero at any time by pressing the CLEAR button.

NOTE

Since the rate counter displays an average number, it is possible to have strikes showing and the rate counter displaying 000. In addition, it is possible for the rate counter to be counting with no strikes showing.



Lightning strikes detected beyond 100 miles will be plotted as a single pixel on the outer range ring at the corresponding azimuth. These strikes, as shown above, are called edge strikes. This information is provided as an aid for longer range planning. Edge strikes are included in the rate counter display.

Display Legends and Controls

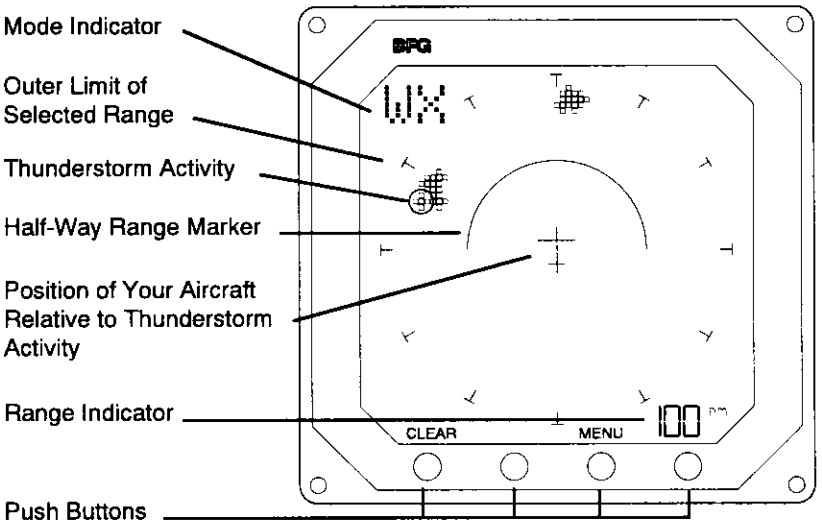


Figure 1-1: Legends and Controls in Weather Mode

Push Button Functions

CLEAR: Clears thunderstorm data. Press CLEAR when you change your heading.

MENU: Displays the Mode Menu.

Range Indicator:

In the Weather Mode, pushing the button below the range indicator changes the current range from 100 nautical miles (nm) to 50 to 25 and back to 100 nm. Your current range will display in this position. At power-up, your Model WX-900 will be set to the 100 nm range.

Legends

Mode:	Current system mode
WX:	Weather Mode
MENU:	Menu Mode
TMR:	Timer Start/Stop/Reset Mode
WX BAT:	Battery Monitor display in the Weather Mode
WX TMR:	Timer display in the Weather Mode
	Indicates thunderstorm activity

Half Way Range Marker: Indicates half of the range you have selected. For example, the semi-circle indicates 50 nm in the 100 nm range, 25 nm in the 50 nm range, and 12.5 nm in the 25 nm range.

System Start Up

At power up, your Model WX-900 will run a comprehensive series of self-tests to ensure that all functions are operating properly. When the tests are completed, the message, ALL TESTS OK, appears for approximately three seconds. The system then automatically displays the Weather Mode in the 100 nm range.

As each group of the self-tests is completed, a message such as MEMORY TEST OK appears. The Model WX-900 will continue to test itself approximately every 10 seconds. If an error is detected during any system test, a message will appear on the screen. Most errors will not affect complete operation of the system. For information about errors and what functions are affected, see the Guide section entitled Error Messages.

To continue operation of unaffected functions when an error message appears:

Press: CLEAR (labeled with a flashing ACK).

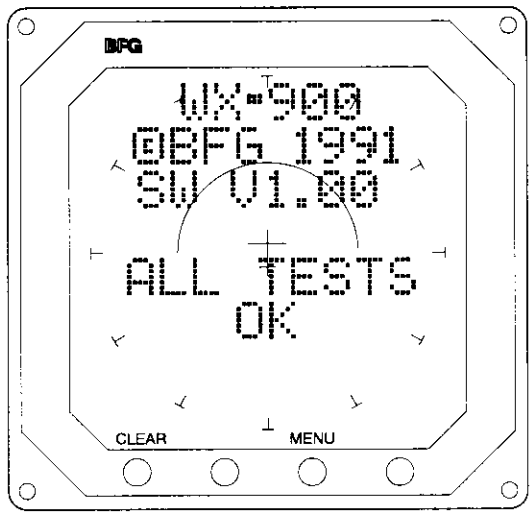


Figure 1-2: System Start Up Test Completion Message

Weather Mode

After the system self-tests are completed, your Model WX-900 displays the Weather Mode in the 100 nm range.

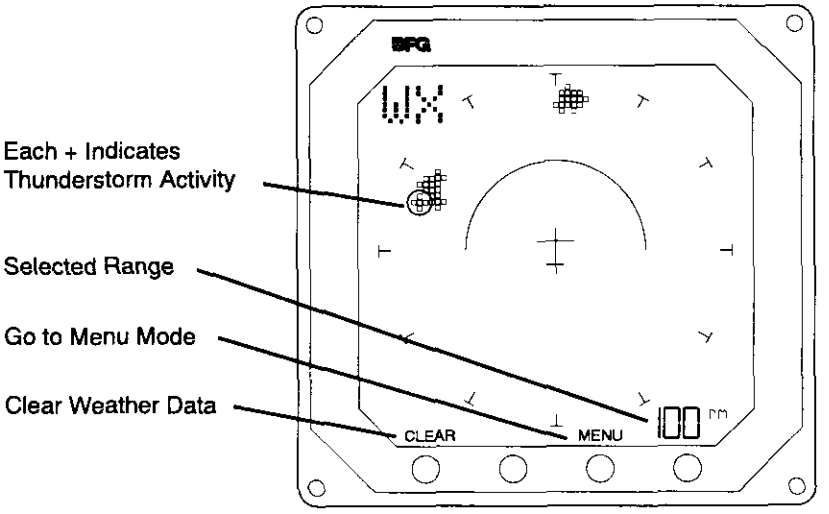


Figure 1-3: Thunderstorm Activity in the Weather Mode

Weather Mode Functions

Range Selection

You can select a 100 nm, 50 nm, or 25 nm range (360° view). Press the button currently labeled 100 nm to cycle to 50 nm. Press again to cycle to 25 nm, and again to cycle back to 100 nm. The label will display the range you have selected.

Mode Change

You can select the Mode Menu to get to five other modes:

User Test
Brightness Adjust
View Adjust
Timer
Battery Voltage Monitor

The Battery Monitor and Timer modes allow you to display elapsed time or avionics bus voltage on the Weather Display. When these modes are selected, thunderstorm activity is displayed in a 180° forward view only.

Thunderstorm Activity

Thunderstorm activity displays as a + symbol or a group of + symbols in all ranges.

Push Button Functions

CLEAR: Clears thunderstorm data. Press CLEAR when you change your heading.

MENU: Goes to the Mode Menu.

Range Selector:
Cycles range from 100 to 50 to 25 to 100 nm. The button label changes to indicate the current range.

Mode Menu

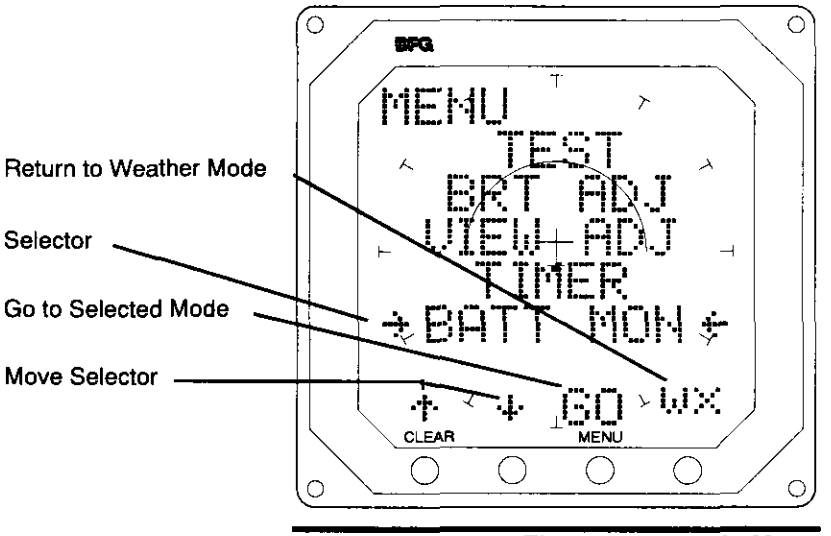


Figure 1-4: Mode Menu

The Mode Menu lets you select five other modes in addition to the Weather Display:

User Test
Brightness Adjust
View Adjust
Timer
Battery Voltage Monitor

Push Button Functions

↑ Moves the selector up the Menu list.

↓ Moves the selector down the Menu list.

GO Goes to selected mode.

WX Returns to Weather Mode.

User Test Mode

The User Test Mode lets you run the full system test that the Model WX-900 runs automatically at power up.

To run a user test from the Mode Menu:

Select: Test
Press: Go

When all tests are completed the message ALL TESTS OK appears for approximately three seconds. The system then returns to the Mode Menu.

As each group of the self-tests is completed, a message such as MEMORY TEST OK appears. The Model WX-900 will continue to test itself approximately every 10 seconds. If an error is detected during any system test, a message will appear on the screen. Most errors will not

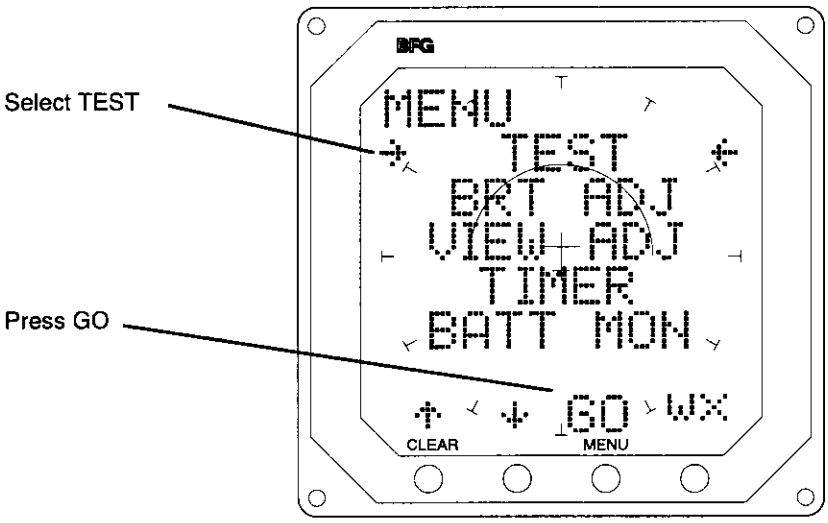


Figure 1-5: Initiating a User Test from the Mode Menu

affect complete operation of the system. For information about errors and what functions are affected, see the Guide section entitled Error Messages.

To continue operation of unaffected functions when an error message appears:

Press: CLEAR (labeled ACK)

Brightness Adjust (BRT ADJ)

The Brightness Adjust Mode lets you adjust the brightness of the backlight. Adjustments are saved in memory and will continue to display at the level you select until you change it.

Your Model WX-900 continually adjusts the brightness to current light conditions via a light sensitive photo cell. The Brightness Adjust Mode allows you to set a level you prefer. The Model WX-900 will continue to adapt itself to current light conditions.

To move to the Brightness Adjust Mode from the Mode Menu:

Select: BRT ADJ
Press: GO

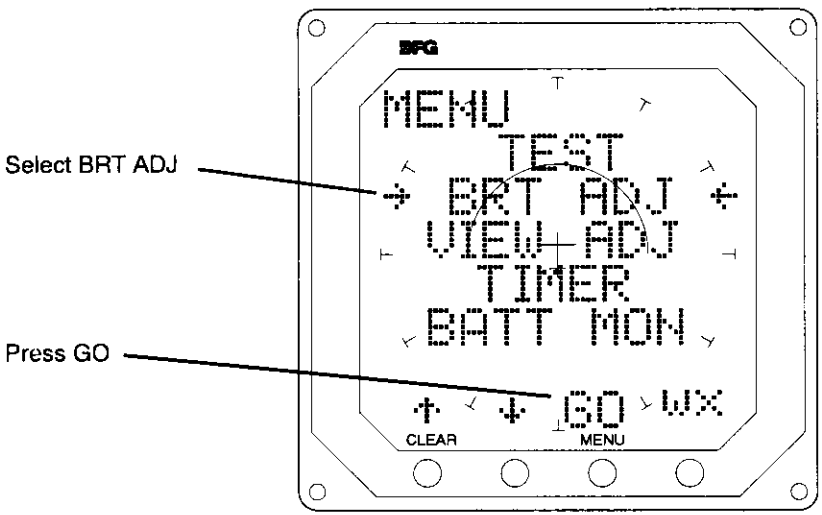


Figure 1-6: Selecting Brightness Adjust Mode

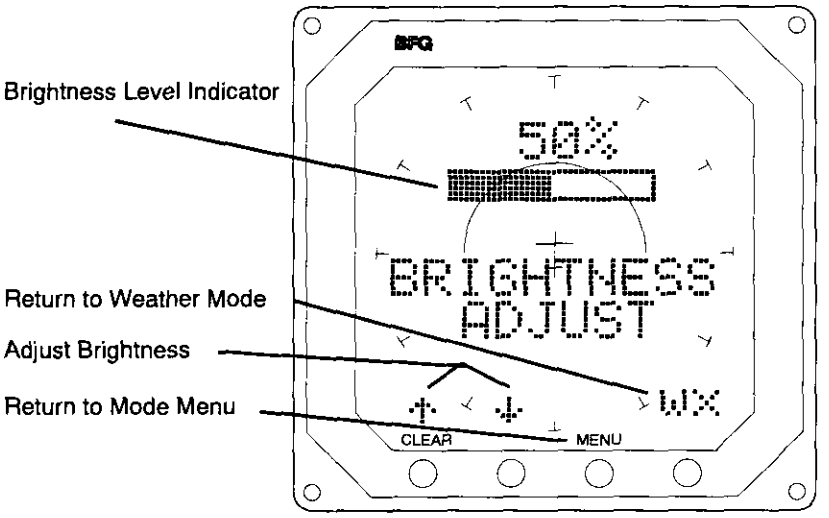


Figure 1-7: Brightness Adjust Mode

Push Button Functions

↑	Increase brightness
↓	Decrease brightness
MENU	Return to Mode Menu
WX	Return to Weather Mode

View Adjust Mode (VIEW ADJ)

The View Adjust Mode lets you adjust the viewing angle/ contrast of the liquid crystal display (LCD). Adjustments are saved in memory and will continue to display at the level you select until you change it.

To move to the View Adjust Mode from the Mode Menu:

Select: VIEW ADJ
Press: GO

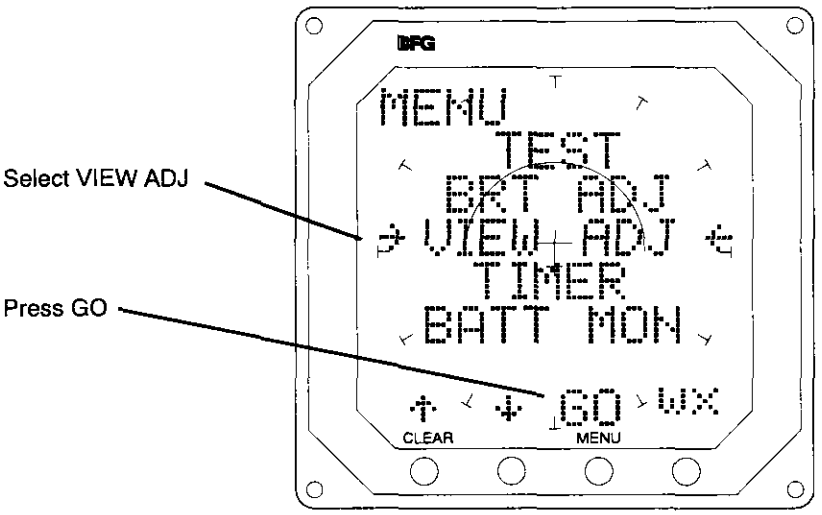


Figure 1-8: Selecting the View Adjust Mode from the Mode Menu

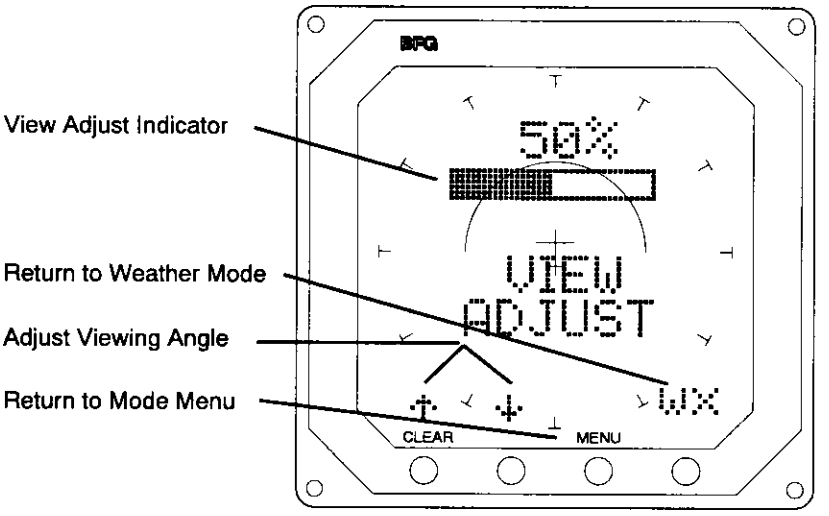


Figure 1-9: View Adjust Mode

Push Button Functions

↑	Adjust viewing angle
↓	Adjust viewing angle
MENU	Return to Menu Mode
WX	Return to Weather Mode

Timer Mode (TIMER)

The Timer Mode lets you start, stop, or reset a stopwatch timer for display in the Weather Mode. Elapsed time displays up to 99 hours, 59 minutes, 59 seconds in the Weather Mode. When the timer is selected to display in the Weather Mode, thunderstorm activity is displayed in the 180° forward view (top half of the screen) only. Pressing the button labeled 360 returns the Weather Display to a 360° view and removes the timer display. (The timer will continue to run.)

To move to the Timer Mode from the Mode Menu:

Select: TIMER
Press: GO

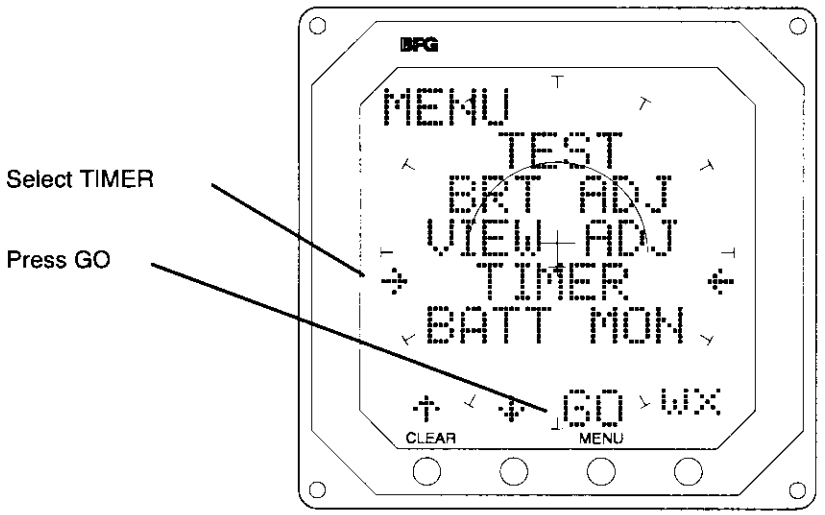


Figure 1-10: Selecting the Timer Mode from the Mode Menu

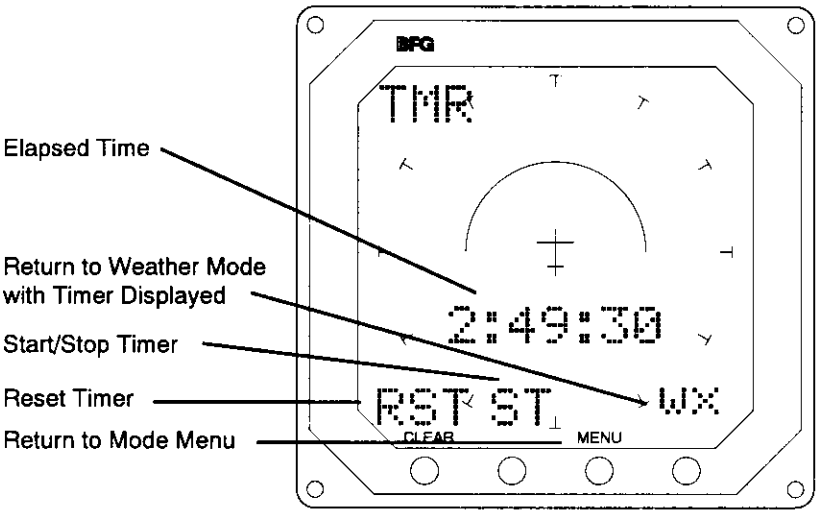


Figure 1-11: Timer Mode

Push Button Functions

RST	Reset timer to 00:00:00 (hours: minutes: seconds)
ST	Start timer. (This label displays when the timer is not running.)
SP	Stop timer. (This label displays when the timer is running.)
WX	Return to Weather Mode with Timer Display
MENU	Return to Mode Menu

Note: If a selection is not made within 20 seconds, the Model WX-900 automatically returns to the Weather Mode with the Timer displayed.

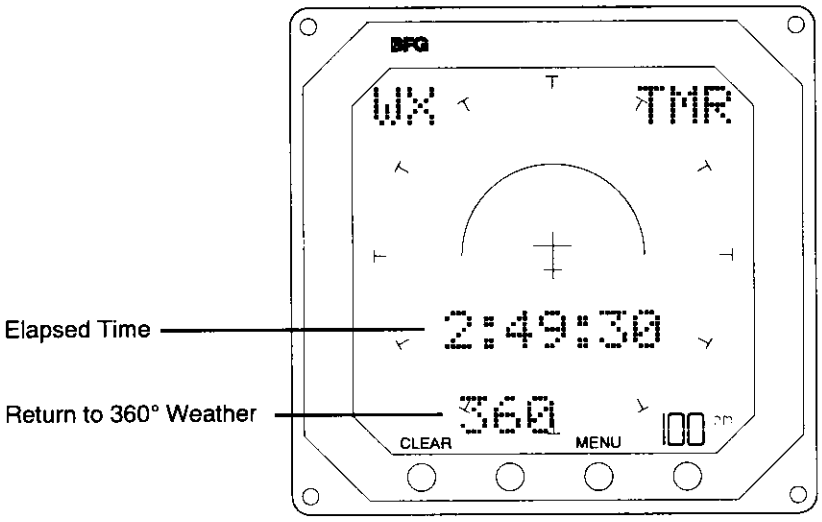


Figure 1-12: Timer Display in Weather Mode

Push Button Functions

360 — Returns to Weather Mode 360° view. Removes Timer from display. Timer continues to run.

CLEAR — Clears thunderstorm data. Press CLEAR when you change your heading.

MENU — Goes to the Mode Menu.

Range Selector — Cycles range from 100 to 50 to 25 to 100 nm. The button label changes to reflect the specific range selected.

Battery Voltage Monitor Mode (BATT MON)

The Battery Voltage Monitor Mode lets you display the avionics bus voltage on the Weather Display. When the Battery Voltage Monitor is displayed in the Weather Mode, thunderstorm activity is displayed in the 180° forward view (top half of the screen). Pressing the button labeled 360 returns the Weather Display to a 360° view and removes the battery voltage monitor.

To display the Battery Voltage Monitor in the Weather Mode:

Select: BATT MON
Press: GO

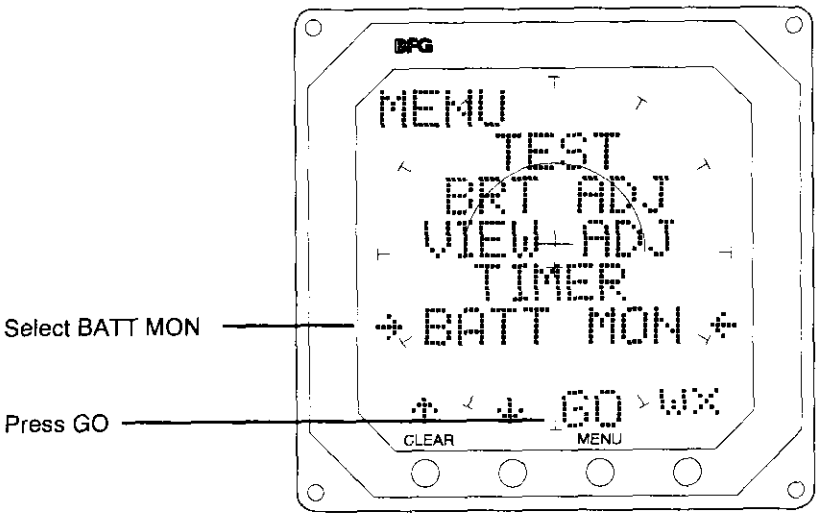


Figure 1-13: Selecting the Battery Monitor from the Mode Menu

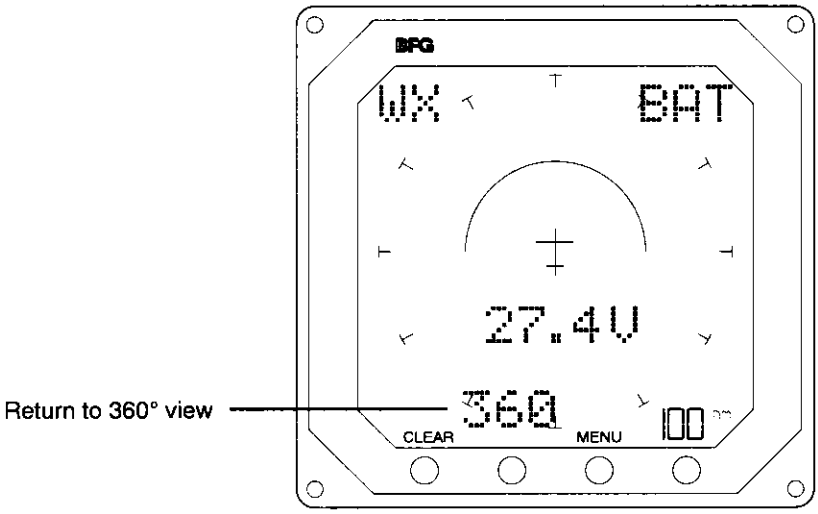


Figure 1-14: Battery Voltage Monitor Display in Weather Mode

Push Button Functions

360 — Return Weather Mode to 360° view. Remove Battery Monitor from display.

CLEAR — Clears thunderstorm data. Press CLEAR when you change your heading.

MENU — Goes to the Mode Menu.

Range Selector — Cycles range from 100 to 50 to 25 to 100 nm. The button label changes to reflect the specific range selected.

Error Messages

If a fault is discovered during any of the system tests (start-up, user, or continual), an error message will display on the Model WX-900 screen.

To continue operation of unaffected functions when an error message appears:

Press: CLEAR (ACK)

Recoverable Errors

Some error messages indicate states that can automatically recover under new conditions. If a fault recovers, the error message will disappear from the screen and the affected function will be operable. If any of these messages display, see your Stormscope Dealer.

ERROR 0	ANTENNA	Weather Display Will Not Operate
ERROR 4	MIC KEY STUCK	Weather Display Will Not Operate
ERROR 5	WX PROCESSING	Weather Display Will Not Operate
ERROR 6	WX PROCESSING	Weather Display Will Not Operate
ERROR 12	PROCESSOR	Weather Display Will Not Operate

When the weather display will not operate due to any of these error conditions, the message WX MAPPING

FAULT appears after you have acknowleged the error message by pressing CLEAR (ACK).

Non-Recoverable Errors

Other error messages indicate states that cannot recover automatically but do allow use of other functions. When these error messages are acknowledged by pressing CLEAR (ACK), the unaffected functions of the Model WX-900 remain operable. If any of these messages display, see your Stormscope Dealer.

ERROR 1	ANTENNA	Weather Display Will Not Operate
ERROR 2	PROCESSOR	New View and Brightness Adjustments Will Not Be Saved
ERROR 8	PROCESSOR	Weather Display Will Not Operate
ERROR 9	PROCESSOR	Weather Display Will Not Operate
ERROR 10	PROCESSOR	Weather Display Will Not Operate
ERROR 11	PROCESSOR	Weather Display Will Not Operate

When the weather display will not operate due to any of these error conditions, the message WX MAPPING FAULT appears after you have acknowleged the error message by pressing CLEAR (ACK).

System Lock Up Errors

Two error messages indicate faults that will not allow any of the Model WX-900 functions to operate. If any of these messages display, see your Stormscope Dealer.

ERROR 3	PROCESSOR	All Functions Inoperable
ERROR 7	PROCESSOR	All Functions Inoperable

Examples of Typical Patterns

Three Clusters Within 100 NM Of The Aircraft

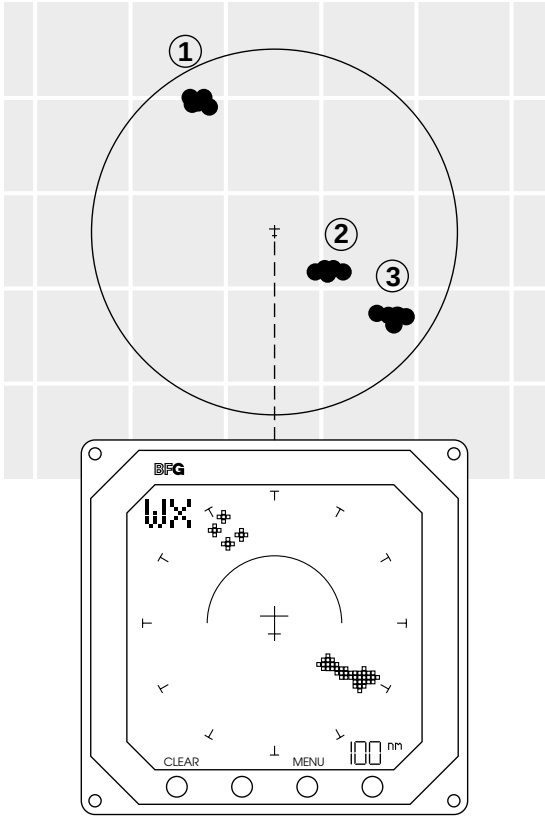


Figure 2-1: Three Clusters in Weather Mode

In this typical example of cellular activity, you are viewing three clusters of electrical discharges with the Model WX-900 Stormscope set at a range of 100 nm. The storm cells are located at the following azimuth and range.

Cluster	Azimuth	Range
1	11:00	80 nm
2	4:00	50 nm
3	4:00	80 nm

The + symbols indicate thunderstorm activity. Clusters 2 and 3 located at 4:00 are producing the greatest number of discharges. This indicates more active thunderstorms. The bridge between the two clusters at 4:00 indicates some activity between the two cells. All three clusters must be avoided.

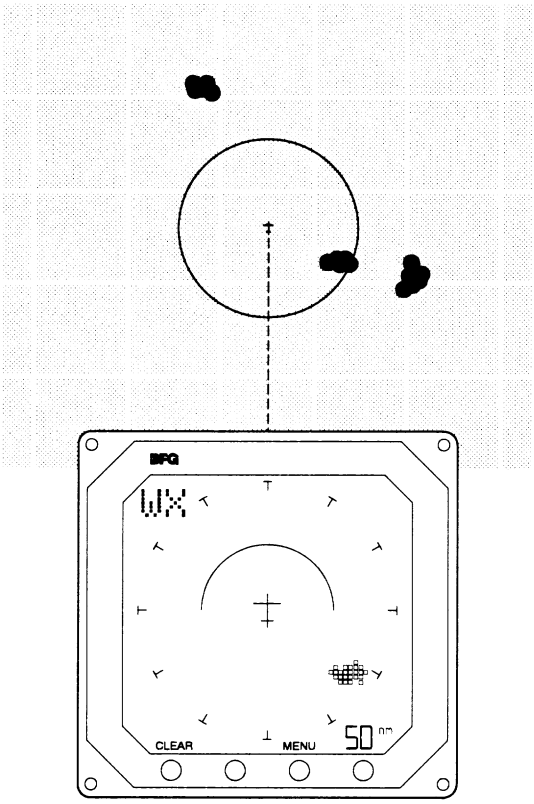


Figure 2-2: The Same Clusters Viewed in the 50 NM Range

When the Model WX-900 viewing range is changed to 50 nm, only the thunderstorm cell at 4:00 about 50 nm from

the aircraft continues to appear. The other two cells are beyond the 50 nm viewing range and, therefore, no longer appear on the display.

Two Thunderstorms Within 100 NM

In this example, a small thunderstorm cell appears at 1:00 about 60 nm from the aircraft. A second, more active cell appears at 5:30, about 75 nm from the aircraft. Fewer + symbols at the 1:00 location indicate a smaller, but not necessarily weaker, cell. Both are examples of clusters — and all clusters must be avoided.

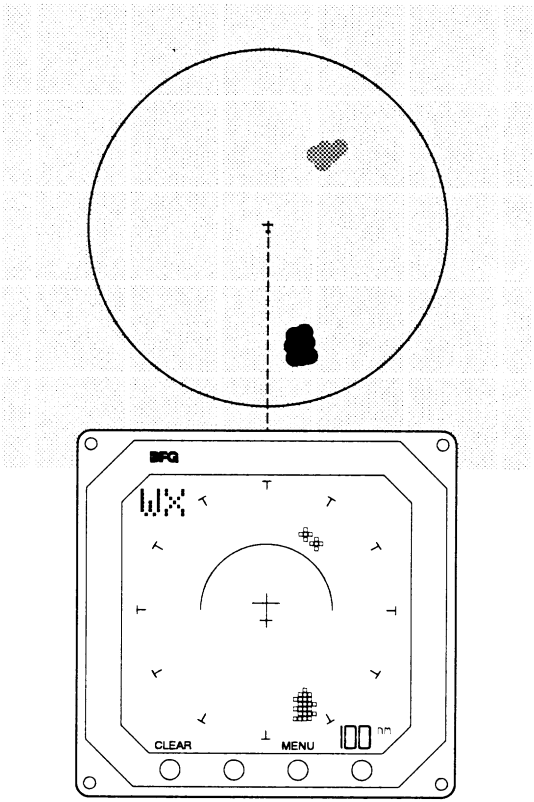


Figure 2-3: Two Thunderstorms Viewed in 100 NM Range

CAUTION **Persistent Clusters of Two or More Discharge Points Indicate Thunderstorms.**

There are several atmospheric phenomena which can cause isolated discharge points. Clusters of two or more discharge points indicate thunderstorm activity when they reappear persistently after clearing the screen. Simply avoid the clusters and you will avoid the thunderstorm and its many related weather hazards.

Mapping Headings Past Thunderstorms

IMPORTANT Remember to press CLEAR when you change your heading. Clearing the thunderstorm data from the screen allows new data at your current heading to display.

Range Set at 100 NM

In Figure 2-4 below, two severe thunderstorms appear almost as one cluster of discharge points off the nose of the aircraft, centered about 80 nm away. A second cluster at 9:30 indicates a system which contains several severe thunderstorms.

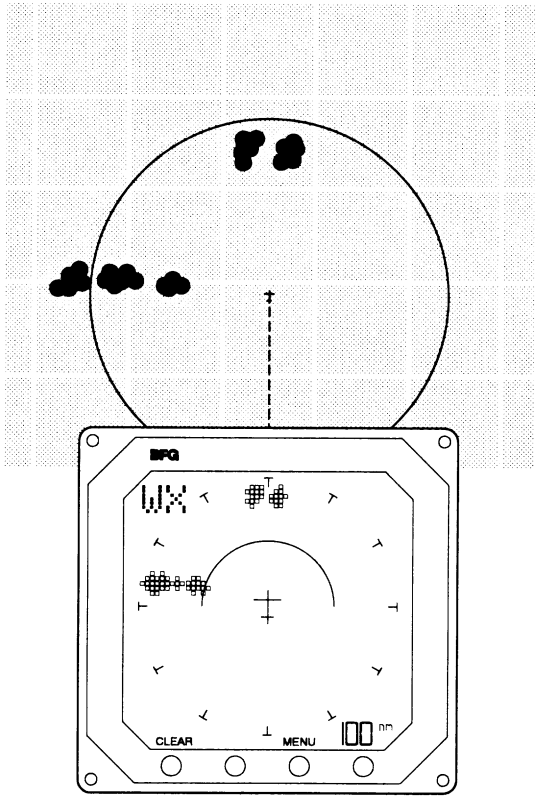


Figure 2-4: Two Thunderstorms About 80 NM Away

Aircraft Progresses 50 NM

Figure 2-5 shows the aircraft a short time later. The aircraft has maintained its heading and progressed about 50 nm. The two thunderstorms off the nose of the aircraft appear virtually as one. The line of severe thunderstorms previously at 9:30 now appears at 8:30.

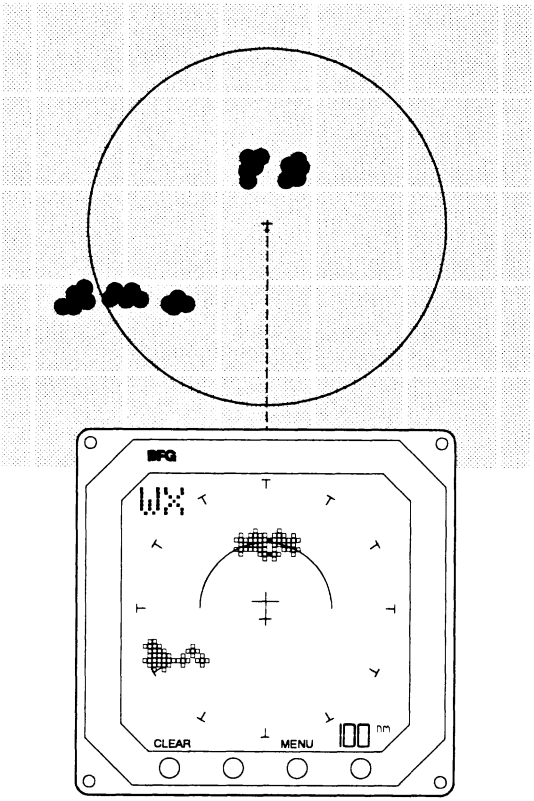


Figure 2-5: Aircraft Progresses to 50 NM

Change Range to 50 NM

The thunderstorm cells at 11:30 and 12:15 are centered about 30 nm from the aircraft. Information is sufficient to select a route to circumnavigate the thunderstorm.

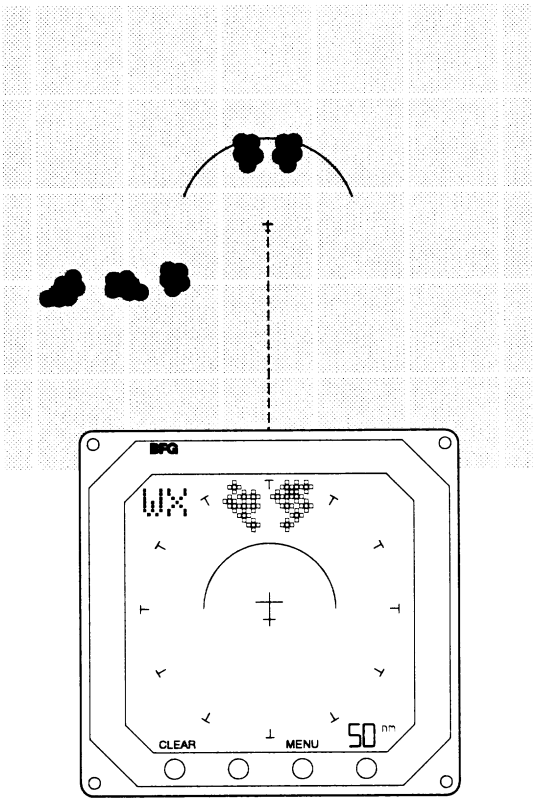


Figure 2-6: Range Changed to 50 NM

Aircraft Initiates Avoidance Turn

Upon completion of this turn, the pilot presses the CLEAR button and is now monitoring new thunderstorm data displayed relative to the new heading of the aircraft.

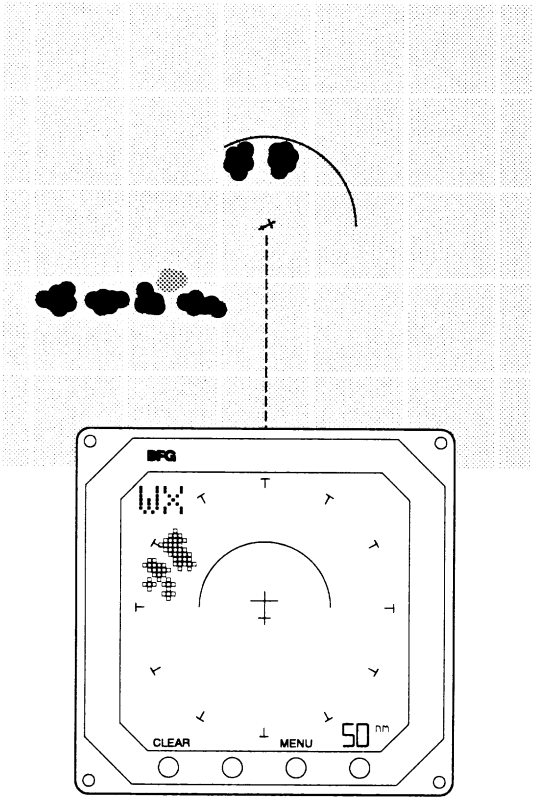


Figure 2-7: Aircraft Initiates Avoidance Turn

Special Situations on the Screen

Randomly Scattered Discharge Points (Figure 2-8)

Probable Cause: Atmospheric instability associated with cumulus clouds, developing or dissipating thunderstorms, etc.

Action: Press the CLEAR button. Continue to monitor the display for developing clusters which indicate thunderstorm activity.

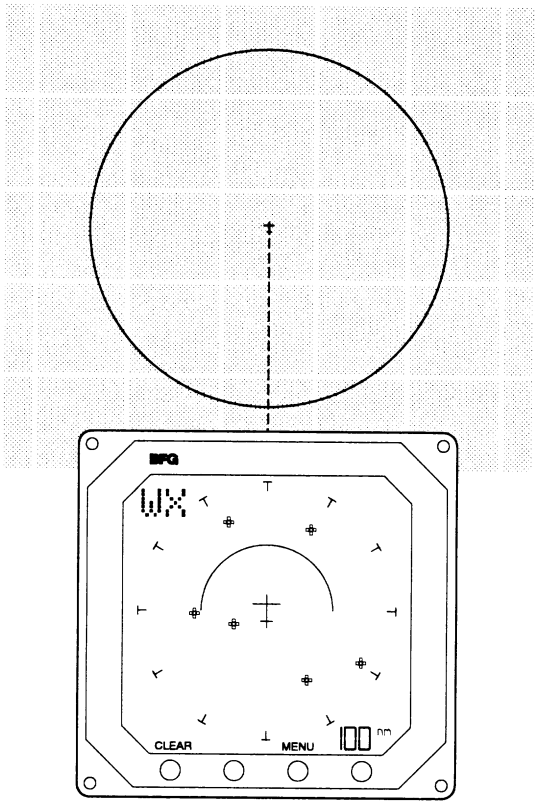


Figure 2-8: Randomly Scattered Discharge Points

Clustered and Splattering Discharge Points (Figure 2-9)

Probable Cause: Electrical discharges within 3-5 nm of the aircraft may be accompanied by splattering of discharge points. Such splattering indicates that your aircraft is too close to a thunderstorm cell.

Action: Continue heading away from the thunderstorm activity. Press the CLEAR button to monitor new discharge points which will cluster at the thunderstorm location. Check other range settings to ensure no thunderstorm activity is indicated along the intended path of travel.

Note: While the cluster is the primary concern, any grouping of discharge points within the 25 nm range is cause for immediate avoidance.

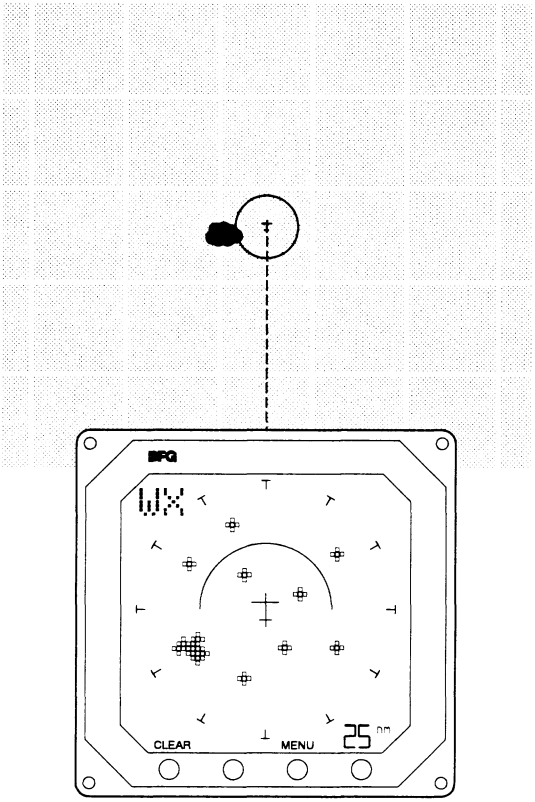


Figure 2-9: Clustered and Splattering Discharge Points

Concentrations of Discharge Points While Taxiing (Figure 2-10)

Probable Cause: Underground cables beneath the taxiway or DC generated signals (e.g., arc welders, subway rails) in close proximity to the aircraft. These patterns may extend completely across the display.

Action: After passing the source of discharges, simply press the CLEAR button.

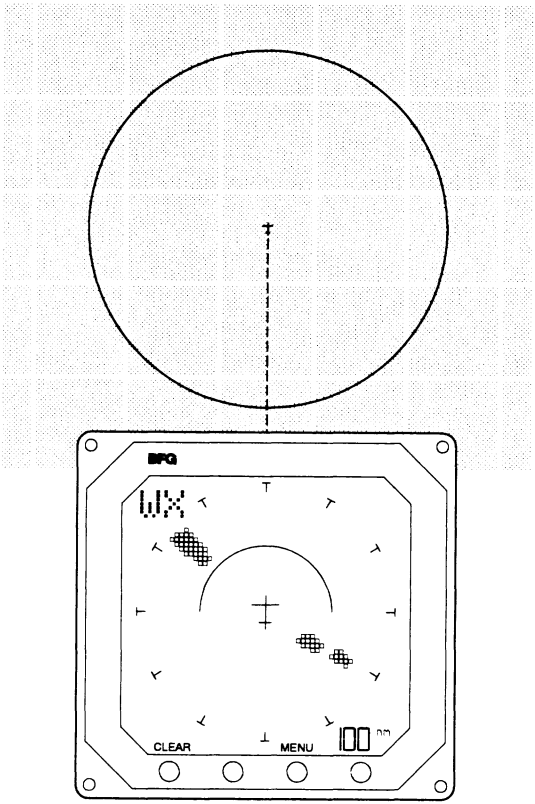


Figure 2-10: Concentrations of Discharge Points While Taxiing

Split Image of Discharge Points Just Off the Nose of the Aircraft (Figure 2-11)

Probable Cause: Strong thunderstorm at 50-75 nm or weak thunderstorm at 5-25 nm.

Action: Observe the splitting activity. The strong thunderstorm tends to split much faster. Press the CLEAR button and monitor the display for activity. Deviate course away from any activity within the 25 nm range.

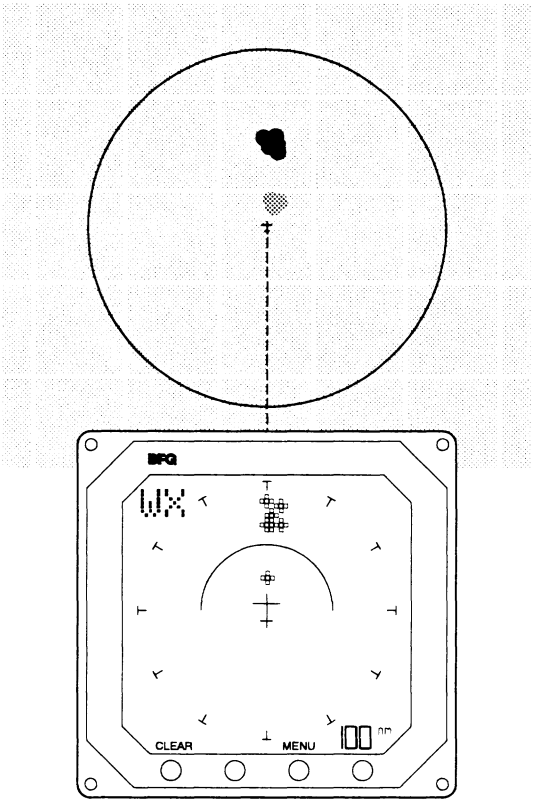


Figure 2-11: Split Image of Discharge Points

Scattered Strike Points Within 25 NM (Figure 2-12)

Probable Cause: Developing thunderstorm relatively close.

Action: Deviate course away from any activity appearing within the 25 nm range. Continue to monitor the display.

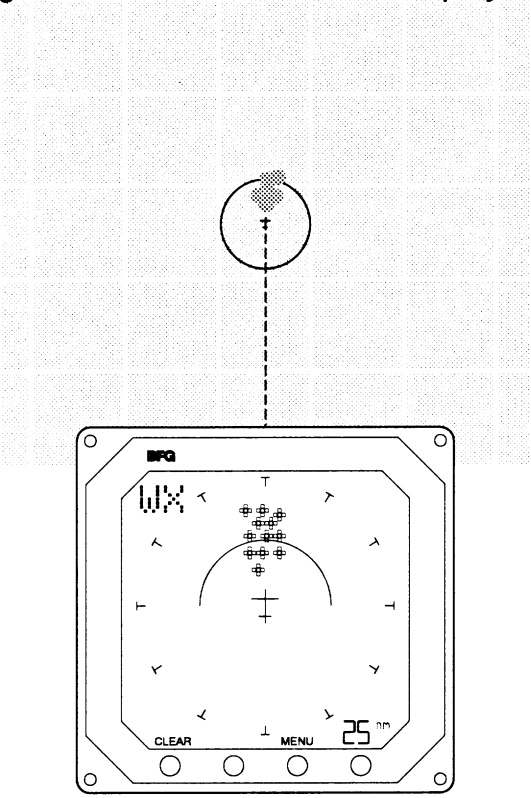


Figure 2-12: Scattered Strike Points Within 25 NM

⚠ WARNING Stormscope Series II systems should never be used to attempt thunderstorm penetration. 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."

System Specifications

General

TSO-C110a compliance
Meets RTCA/DO-191
Meets RTCA/DO-160B
Meets RTCA/DO-178A

Physical Dimensions

Indicator			
	Height	3.37 inches	(8.56 centimeters)
	Width	3.37 inches	(8.56 cm)
	Depth	7.55 inches	(19.20 cm)
Antenna			
	Height	1.00 inches	(2.54 cm)
	Width	3.45 inches	(8.46 cm)
	Length	6.58 inches	(16.70 cm)

Weight

Indicator	1.58 lbs.	(.71 kg)
Antenna	.78 lbs.	(.35 kg)
Cable (Standard Length)	2.10 lbs.	(.95 kg)

Electrical

Input Voltage	10.5 to 32 VDC
Power Consumption	8 watts maximum

Temperature Range

	Minimum	*Maximum*	*Unit*
Antenna	-55	+70	Degree C
Indicator	0	+55	Degree C

Notes

This data is provided at no charge, or at cost, to the public and is considered publicly available, No License Required (NLR) as defined in the Export Administration Regulations (EAR) Part 734.7-11.

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Series II Weather Mapping Systems