Honeywell

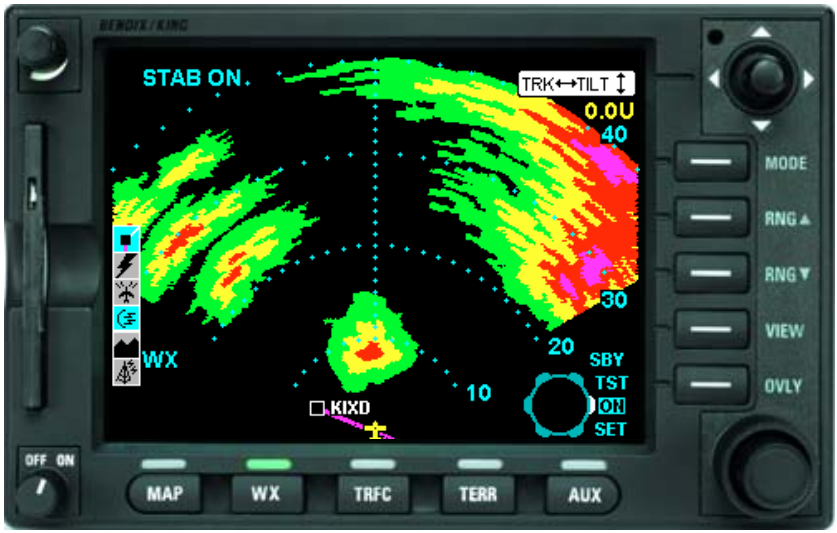
BENDIX/KING®

KMD 850

Multi-Function Display

Digital Weather Radar Function

Pilot's Guide Addendum



For Software Version 01/13 or later

Revision 3 Jun/2004

006-18235-0000

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WARNING

Prior to export of this document, review for export license requirement is needed.

Revision History

Manual	KMD 550/850 Digital Weather Radar Pilot's Guide Addendum
Revision	3, June 2004
Part Number	006-18235-0000

Summary

Auto Standby may now be disabled during system configuration

Miscellaneous corrections

Revision History

Manual	KMD 550/850 Digital Weather Radar Pilot's Guide Addendum
Revision	2, January 2002
Part Number	006-18235-0000

Summary

Complete manual revision

Miscellaneous corrections

Revision History

Manual	KMD 550/850 Digital Weather Radar Pilot's Guide Addendum
Revision	1, April 2001
Part Number	006-18235-0000

Summary

Added Stabilization function on WX Radar Page

Changed format of TILT field

Radar faults now supported

Added Auto Tilt

Added Manual Gain

Added Sector Scan

Added Automatic Range Limiting

Added 5 nm and 320 nm range settings

Revision History

Manual	KMD 550/850 Digital Weather Radar Pilot's Guide Addendum
Revision	0, October 2000
Part Number	006-18235-0000

Summary

This is the original release of this publication.

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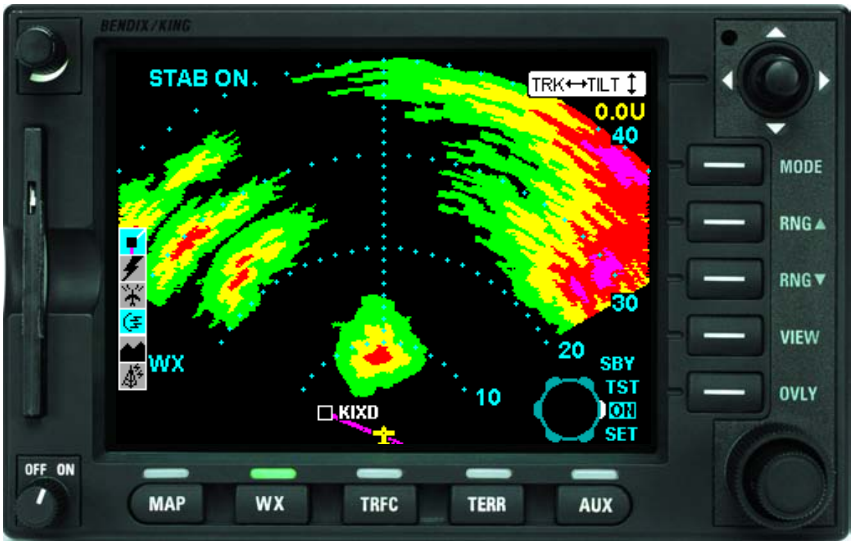
INTRODUCTION

The Weather Radar Function of the Bendix/King KMD 850 Multi Function Display allows for the display and control of several Honeywell weather radar systems. Weather Radar indicates the presence and strength of precipitation and is intended to allow the operator to avoid thunderstorms and associated turbulence.

This Pilot's Guide Addendum describes the operation of the KMD 850 display for controlling the weather radar sensor. The general operation of the KMD 850 is described in the other sections of the KMD 550/850 Pilot's Guide. For detailed information on the proper use and interpretation of the weather radar data please reference the pilot's guide that was provided with the weather radar sensor.

Note: The KMD 850 can interface with many different types of radar and the screen displays may vary compared to the examples shown in this manual.

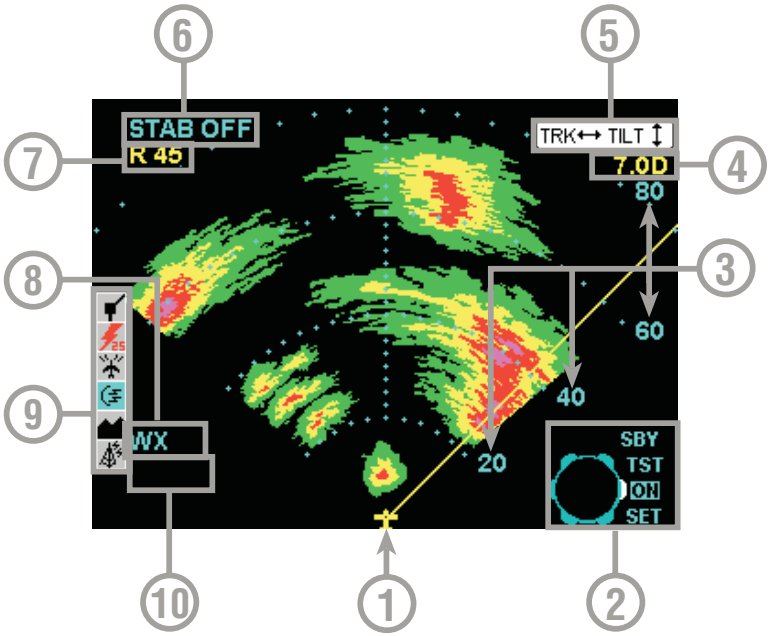
The Bendix/King KMD 850 is shown below with the Weather Radar Page selected.



NORMAL OPERATION

To display the WX Radar page press the WX button. Note that in some installations this button may have to be pushed multiple times to switch between radar and stormscope.

The following illustration defines the data that appears on the WX Radar Page when the radar is active and the horizontal view is displayed:



1 **Aircraft Symbol**
2 **Knob Function Label** - Rotating the outer knob selects between Standby (**SBY**), Test (**TST**), **ON** and **SET** modes.
3 **Display Range Indications**
4 **Tilt Angle** - XX.X Degrees up (U) or down (D).
5 **Joystick Function Label** - Moving the joystick up and down adjusts the radar tilt. Moving the joystick left and right adjusts the location of the yellow track line.
6 **Stabilization Indication**
7 **Track Angle**
8 **WX Radar Mode Indication** - **TEST**, **WX**, **WX/ARL** (Auto Range Limiting or **MAP** (Ground Mapping Mode)
9 **Available Functions** - Displays icons representing data available (black) and displayed (color)
10 **Fault Message Window** - See Error and Fault Messages

OPERATIONAL CONTROLS SUMMARY

MODE - Toggles between WX, WX/ARL (Auto Range Limiting) and MAP (ground mapping) modes.

NOTE: Not all weather radar systems support Auto Range Limiting.

RNG - Range keys clear the display and either increase or decrease the displayed range.

VIEW - Toggles between Horizontal and Vertical Profile views.

OVLY - Lit when overlays are available. Allows selection of flight plan, lightning data (if available) or traffic for overlay on the weather radar display.

Joystick - Moving the joystick up and down adjusts the antenna tilt up to 15 degrees up or down. Moving the joystick left or right displays the yellow track line and moves it left or right of centerline.

Outer Knob - Selects between Standby (SBY), Test (TST), On and SET mode of operation.

Inner Knob - Adjusts radar gain. On most installations this capability is only available when in ground mapping (MAP) mode.

Mid-range Gain

Full Gain

WEATHER RADAR OVERVIEW

The radar display has been calibrated to show five levels of target intensity: Black (level 0), Green (level 1), Yellow (level 2), Red (level 3), and Magenta (level 4). The meaning of these levels is shown in the following chart as to their approximate relationship to the Video Integration Processor (VIP) intensity levels used by the National Weather Service. These levels are valid only when; (1) the Wx mode is selected; (2) the displayed returns are within the STC range of the radar; (3) the returns are beam filling; (4) there are no intervening radar returns.

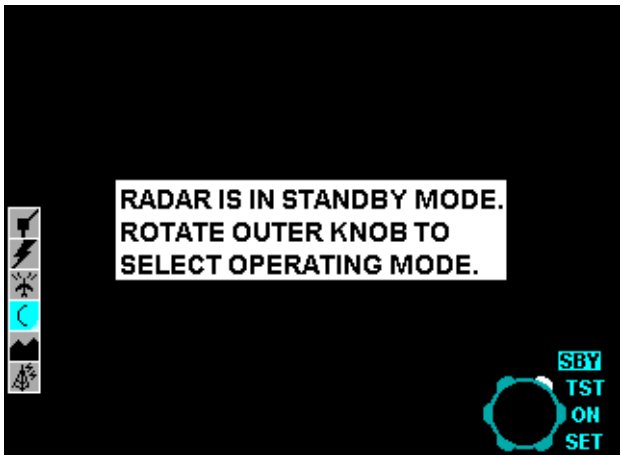
Display Level	Rainfall Rate		Video Integrated Processor (VIP) Categorizations				Remarks
			Storm Category	VIP Level	Rainfall Rate		
	mm/Hr.	In./Hr.			mm/Hr.	In./Hr.	
4 (Magenta)	Greater Than 50	Greater Than 2	Extreme	6	Greater Than 125	5	Severe turbulence, large hail, lightning, extensive wind gust, and turbulence.
			Intense	5	50-125	2-5	Severe turbulence, lightning,organized wind gusts, hail likely.
3 (Red)	12-50	0.5-2	Very Strong	4	25-50	1-2	Severe turbulence likely, lightning.
			Strong	3	12-25	0.5-1	Severe turbulence, possible lightning.
2 (Yellow)	4-12	0.17-0.5	Moderate	2	2.5-12	0.1-0.5	Light to moderate turbulence is possible with lightning.
1 (Green)	1-4	0.04-0.17	Weak	1	0.25-2.5	.01-0.1	Light to moderate turbulence is possible with lightning.
0 (Black)	Less Than 1	Less Than 0.04					

Radar Display and Thunderstorm Levels Versus Rainfall Rates

NOTE: Refer to your Weather Radar Pilot's Guide for complete details on the the proper use of weather radar.

POWER ON

When the KMD 850 is initially turned on and the WX key is pressed to select the WX Radar page the following screen will be displayed:

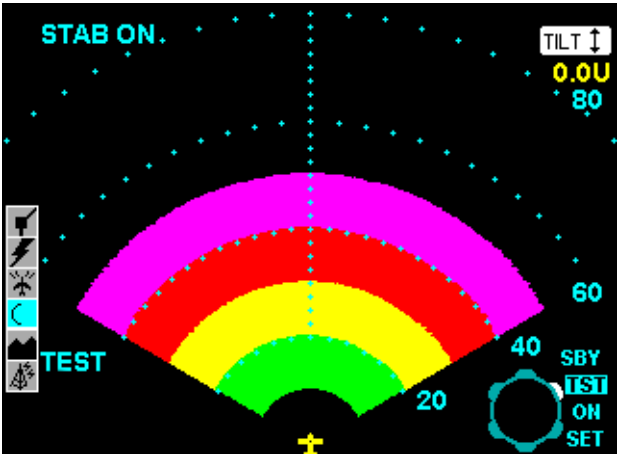


This indicates that the weather radar sensor has been energized, is in standby mode, and is communicating properly with the KMD 850 MFD. While in standby the radar is not transmitting. The radar icon on the icon bar shows a color radar dish with no energy waves being radiated from it.

NOTE: The On/Off control of the KMD 850 does not control primary power to the radar. The only way to remove primary power from the radar is to pull the radar circuit breaker.

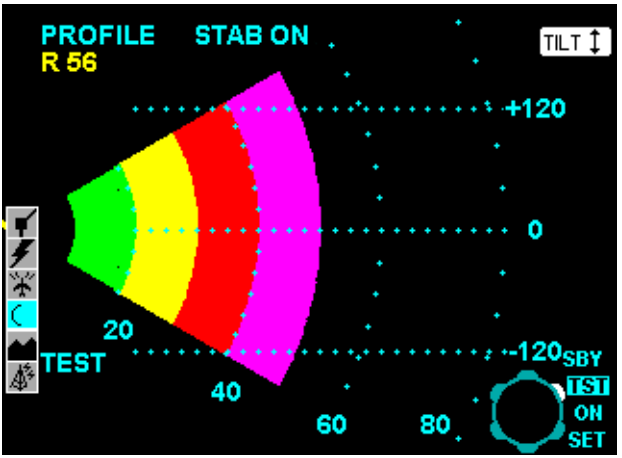
TEST MODE

Rotating the outer knob one click clockwise will put the radar in test mode which should display a test pattern similar to the following:



The display should show 4 bands of color with a green band from 10 to 20 miles, a yellow band from 20 to 30 miles, a red band from 30 to 40 miles, and a magenta band from 40 to 50 miles. The RNG keys can be used to adjust the range scale that is shown.

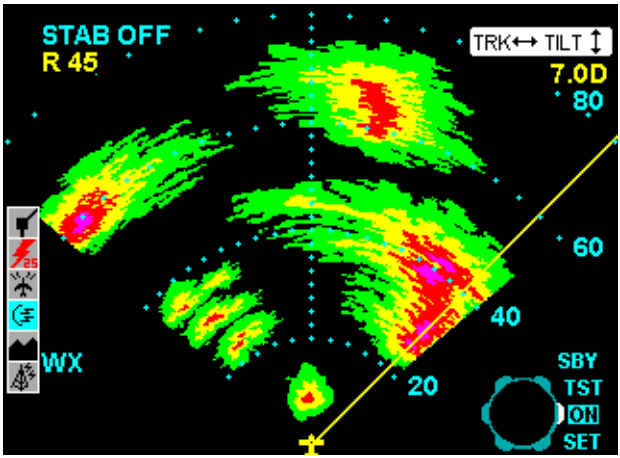
Pressing the VIEW key will display a test pattern in vertical profile view similar to the following:



ON MODE

Rotating the outer knob one more click clockwise to the ON position causes the radar to begin actively transmitting and scanning. The radar icon on the icon bar now indicates energy being transmitted by the radar dish.

NOTE: Whenever the weather radar icon is shown as then the radar is transmitting and appropriate precautions should be taken.



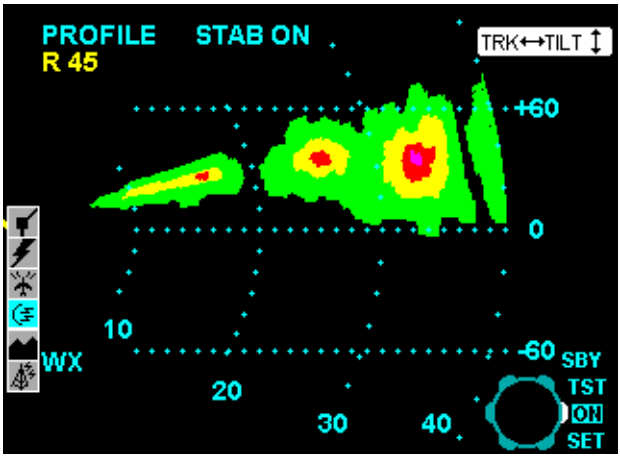
To better paint the storm we adjust the tilt angle by moving the joystick up and down to the appropriate value as described by the weather radar pilot's guide. This example shows a tilt of 7 degrees down has been selected. The tilt angle is shown in the top right corner of the display.

To determine what direction the storm cells are off the nose of the airplane we adjust location of the yellow track line by moving the joystick left or right. This example shows the track line pointing to one of the heaviest storm cells that is 45 degrees to the right. The track line angle is shown at the top left corner of the display.

VERTICAL PROFILE

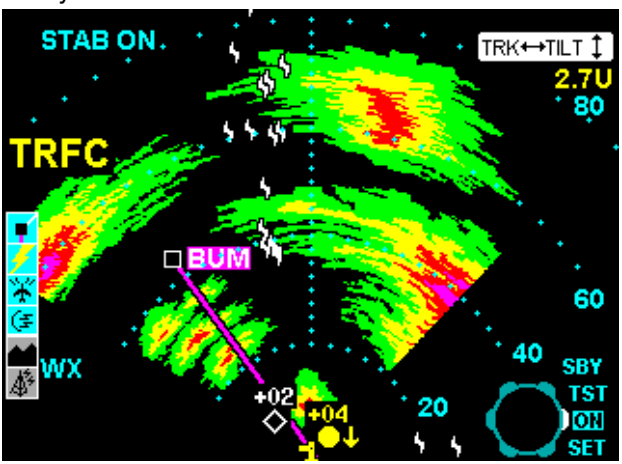
If the radar has vertical profile capability then the track line is also used to select the area of the storm to observe vertically. Once the track line is in the proper location then pushing the VIEW key will switch to vertical profile view as shown. Pressing the VIEW key again will switch back to horizontal profile view.

If the azimuth track angle is changed while the vertical profile view is active, "**WAIT**" will be displayed just below the track angle indication (in this case **R 45**) until the radar repositions the antenna.



OVERLAYS

The flightplan, lightning strikes and traffic can be overlaid on top of the radar by pressing the OVLY key and using the appropriate softkeys to turn the overlays on.

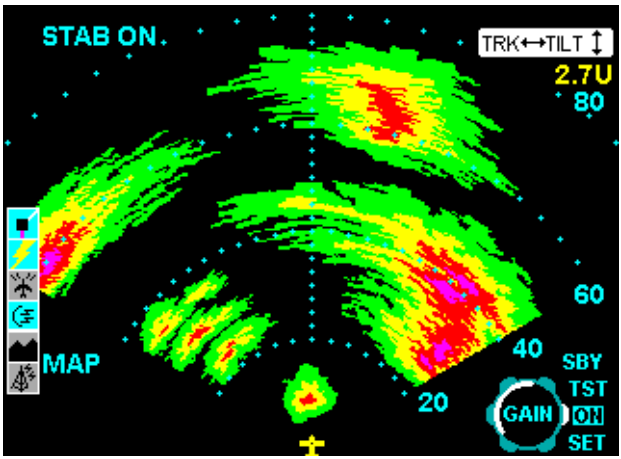


NOTE: The flightplan can only be overlaid on the radar if a heading source is available.

GROUND MAPPING (MAP) MODE

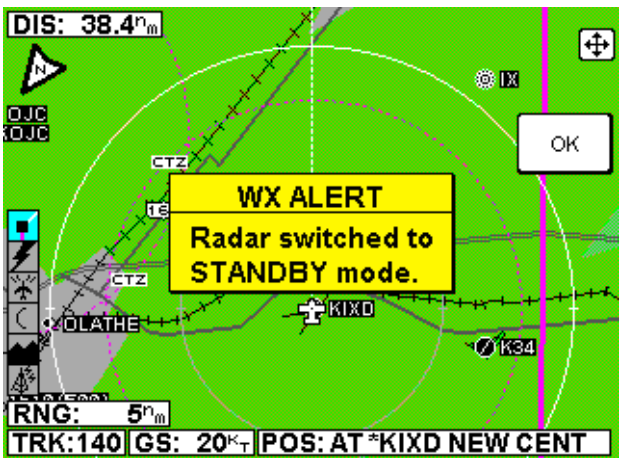
The radar can be put into Ground Mapping mode by pressing the MODE key. Ground Mapping Mode is indicated by the word MAP in the lower left corner of the display.

In Ground Mapping mode the inner knob controls the radar gain. The present setting is indicated by the white arc on the knob icon.



AUTO STANDBY

To help reduce the possibility of leaving the radar in the ON mode after landing, the KMD 850 has an Auto Standby capability. The KMD 850 will automatically put the radar into Standby when the aircraft's ground speed goes below 30 knots. The message "**WX Alert - Radar switched to STANDBY mode.**" will pop up on any page when this occurs as shown in the following figure. *Note: This feature may be enabled or disabled during system configuration only by a qualified service technician.*



SET MODE

When the Outer Control Knob is placed in the **SET** position, a display similar to Figure 1 will be displayed. These Soft Keys allow access to the functions shown. Not all these functions will be available in all weather radar installations.

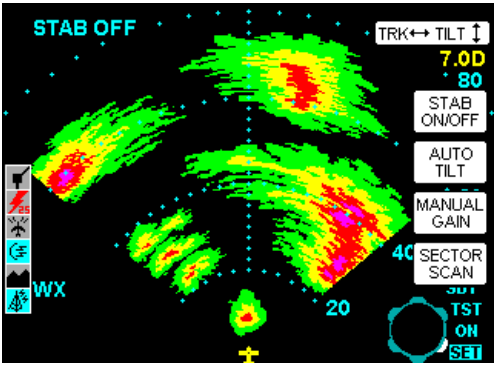


Figure 1

STAB ON/OFF

Pressing the **STAB ON/OFF** Key will toggle radar antenna stabilization on or off, which is reflected in the upper left of the display.

NOTE: The RDS 84 and RDS 86 radars do not support manual stabilization ON/OFF control and will ignore the command from the KMD 850. The annunciation in the top left of the display will always reflect the present stabilization status of the radar system.

AUTO TILT

Pressing the **AUTO TILT** Key will toggle between manual and automatic radar antenna tilt control. When in manual mode, the tilt display fields in the upper right corner of the display will be similar to Figure 1. When in automatic mode, the fields will be similar to that shown in Figure 2, with an “A” in front of the tilt value to indicate Auto Tilt Mode.

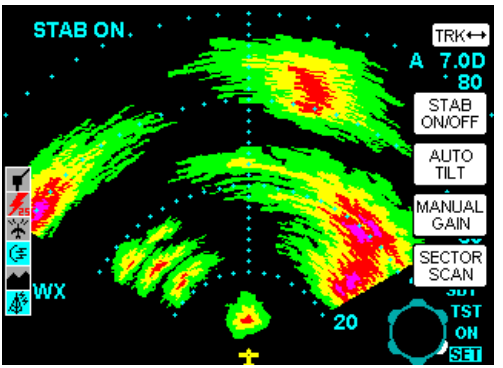


Figure 2

Manual Tilt Mode

In manual mode the radar antenna tilt angle is adjusted by moving the Joystick up or down. The antenna tilt may be adjusted up or down 15°. See the radar system operator’s manual for proper tilt management.

Auto Tilt Mode

Allows the antenna position to be automatically adjusted by radar system to maintain a common beam intercept point with the earth e.g. if the last 10% of the display is ground returns, then during ascent or decent the antenna tilt is automatically changed to maintain ground returns on 10% of the display.

MANUAL GAIN

Pressing the **MANUAL GAIN** Key will toggle between manual and automatic gain control in the WX mode. This feature must be enabled within the radar system's configuration to be functional here.

SECTOR SCAN

Pressing the **SECTOR SCAN** Key will toggle Sector Scan on or off as shown in Figure 3. Not all radar systems support this feature.

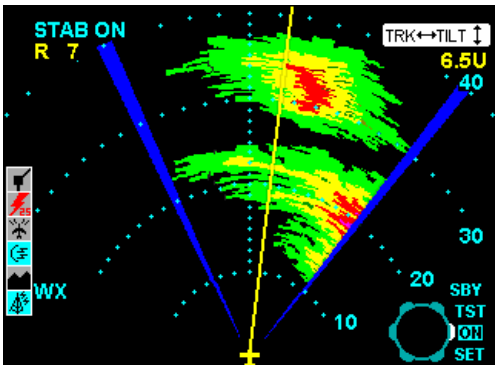
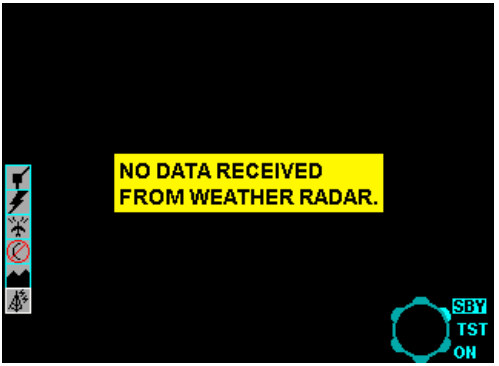


Figure 3

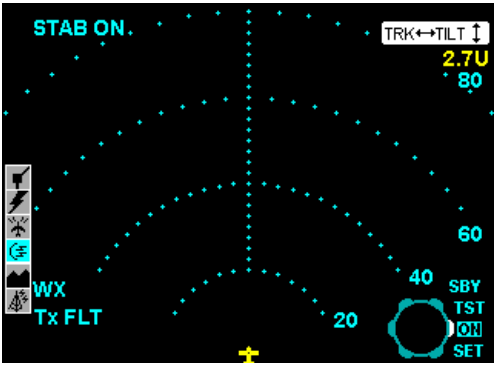
In rapidly changing areas of weather, the radar scan updates can be made faster by isolating the desired viewing area in a 60° sector. To accomplish this turn Sector Scan on as discussed in the previous paragraph. Using the Joystick, position the Track Line over the desired viewing area. The radar will now update weather only within this 60° sector.

ERROR AND FAULT MESSAGES



If the KMD 850 is not receiving any data from the weather radar sensor, the following message will be displayed and the radar icon will be shown with a red circle and slash through it.

This may indicate that the radar is not receiving primary power (e.g. an open circuit breaker), a problem in the wiring connection between the radar and the MFD display, or a faulty radar.



Any self test failures reported by the radar such as **TxFLT** will be displayed in the Fault Message Window in the bottom left corner of the display.

The following table defines the possible fault messages displayed in the Fault Message Window.

Fault/Status Indication	Slashed Legend Icon?	Description
WX FLT	**yes**	WX Radar Control fault . This probably has occurred because the R/T is not receiving the indicator's ARINC 429 control words.
RT FLT	**yes**	Receiver/Transmitter Failure
RNG FLT	no	R/T not compatible with the selected range. (5 or 320 nm was selected and the Radar R/T does not support)
BUSY VP	no	In a dual indicator installation, the other indicator is in "continuous mode" for more than 26 seconds.
ANT/Tx FLT	no	Loss of Radar Configuration data
ANT FLT	no	Loss of antenna position
Tx FLT	no	Transmitter Failure (also indicated if the R/T has turned its transmitter off because the airplane is on the ground)
429 FLT	no	Loss of ARINC 429 Attitude data (pitch or roll)
STAB LMT	no	Stabilization Limits Exceeded (pitch/roll > 30 degrees)

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