Boeing MultiScan ThreatTrack Weather Radar Frequently Asked Questions
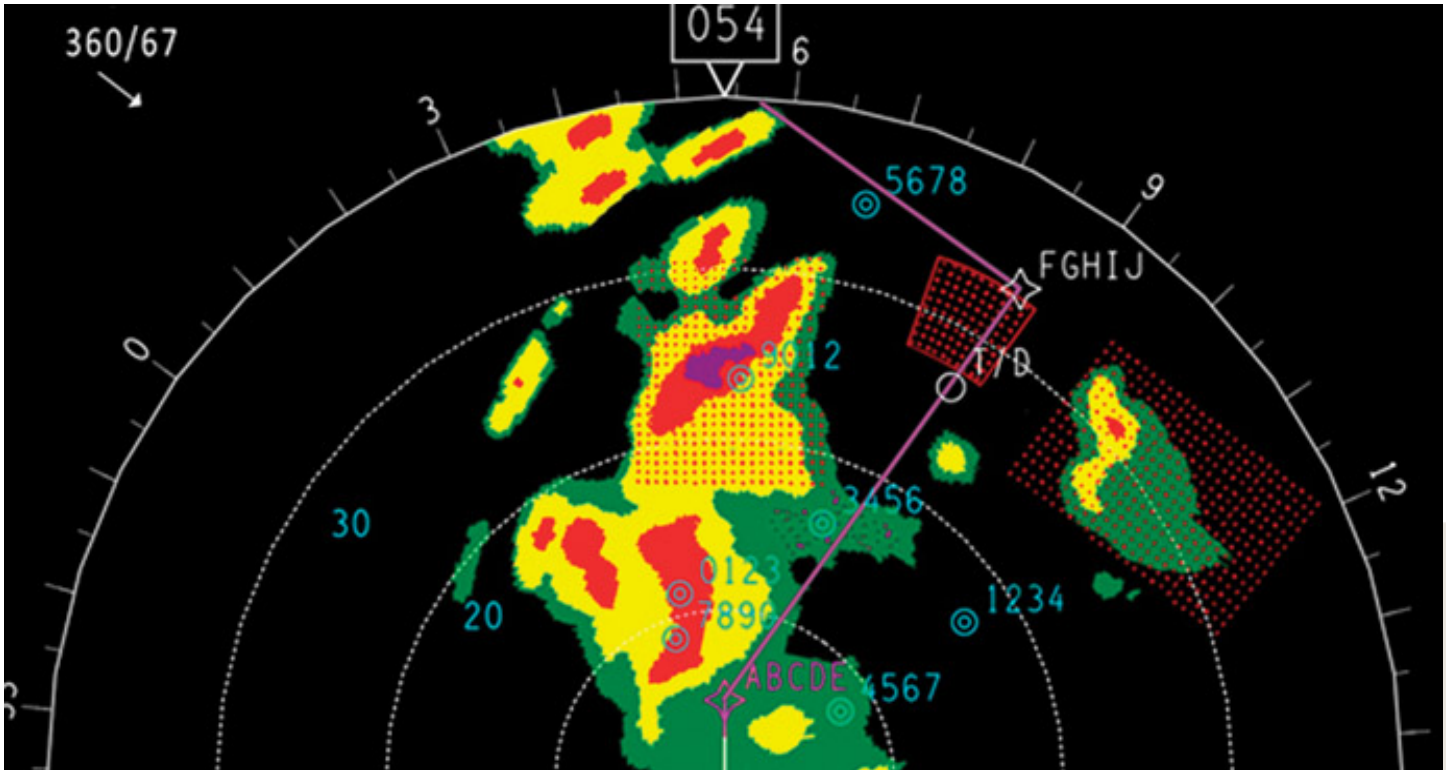

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Boeing MultiScan WXR ThreatTrack FAQs

Frequently Asked Questions Answered in This Article:

1. In AUTO Mode the radar appears to be over sensitive. Why?

2. Sometimes during cruise I see weather out the window that does not show on the display in AUTO Mode. However, I can often see it when I switch to MAN Mode. Is the radar performing properly in AUTO?

3. The radar only appears to be accurate to 40 NM. Sometimes I make deviation decisions at 80 NM, but weather will suddenly appear between two cells at around 40 NM. Can you explain?

4. When switching between AUTO and MAN Modes I get very different pictures. Why?

5. During oceanic flight cells that are below the aircraft tend to stay on the display until about 35 NM. I thought the radar was eliminating cells beneath the aircraft altitude. Why is this not happening over the ocean?

6. Sometimes at mid altitudes (10,000 - 20,000 ft.) the radar does not show convective cells that I can see out the window. Why?

7. Is the upgrade from Version 1 (non ThreatTrack) to Version 2 (ThreatTrack features) a software update or does it require new hardware?

8. Does the "terrain table" take into consideration any man made obstacles?

9. What is the range of the Predictive Overflight scan?

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1. **In AUTO Mode the radar appears to be over sensitive. Why?**

   a. In AUTO Mode the radar uses an Automatic Temperature Based Gain that increases gain as the outside air temperature decreases. This puts more energy on the non-reflective cell tops and helps prevent inadvertent cell top penetration. By the time the aircraft is at cruise altitude, AUTO CAL Gain and MAN MAX Gain are essentially the same. Automatic Temperature Based Gain provides a great deal more information to the pilots (more sensitive) than manual radar operation, but it does require that the crew learn to reinterpret the display so that they do not deviate unnecessarily.

   b. For details, refer the MulitScan ThreatTrack Boeing Pilot's Guide. (CPN: 523-0823636 Page 24-27) describes how gain works in both MAN and AUTO modes. Also refer to (Chapter 4, Radar Interpretation beginning on page 42) to better understand how to navigate the weather that is shown.

2. **Sometimes during cruise I see weather out the window that does not show on the display in AUTO Mode. However, I can often see it when I switch to MAN Mode. Is the radar performing properly in AUTO?**

   a. In AUTO Mode MultiScan uses a "Quiet, Dark Cockpit" philosophy. The radar draws a line approximately 6,000 ft. beneath the aircraft. If a storm top protrudes above this line, then the cell is displayed on the ND. If the cell top is below the 6,000 ft. line and, thus, not a threat to the aircraft, it is not displayed. During IMC or night operations the Quiet, Dark Cockpit HMI (human machine interface) helps prevent unnecessary deviations for weather that is well below the aircraft altitude.

Note, it is possible to go to MAN Mode, tilt the radar down and see this weather that is beneath the aircraft altitude.

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    b. For details on the Quiet, Dark Cockpit Philosophy refer to the MulitScan ThreatTrack Boeing Pilot's Guide. (CPN: 523-0823636 pages 28-29). An explanation of how the radar determines cell tops can also be found on (pages 56-61).

3. **The radar only appears to be accurate to 40 NM. Sometimes I make deviation decisions at 80 NM, but weather will suddenly appear between two cells at around 40 NM. Can you explain?**

    a. The radar employs a feature called Sensitivity Time Control (STC) to keep cells looking the same from 80 NM until they pass behind the aircraft. However, at about 40 NM a physical limitation is reached where the STC can no longer turn down the radar sensitivity. Thus, it is not uncommon to see green begin to grow between two cells as the aircraft gets closer to them. Essentially, at 40 NM the radar is now seeing the haze layer that is between the two cells. If a transit corridor fills with green at 40 NM this does not mean that weather has suddenly appeared in the aircraft flight path.   Rather, the existing haze between the cells is now visible and may be transited. Light to moderate chop would be expected.

    b. Please refer to the the MulitScan ThreatTrack Boeing Pilot's Guide. (CPN: 523-0823636 page 36) for details.

4. **When switching between AUTO and MAN Modes I get *very* different pictures. Why?**

    a. In MAN Mode the radar operates like a traditional radar. Tilt and gain must be controlled by the flight crew. The only automatic function is windshear alerts. IN AUTO Mode the radar incorporates many automatic functions including The Quiet, Dark Cockpit, Variable Temperature Based Gain, OverFlight Protection, Geographic Weather Correlation and Ground Clutter Elimination. So the picture in AUTO will always be very different than MAN Mode. Because of the safety features associated with AUTO operation, AUTO, CAL Gain are recommended in all phases of flight.

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Note, the Boeing FCOM requires +4 Gain below 20,000 ft. if SB 503 has not been installed.

    b.   Refer to the MulitScan ThreatTrack Boeing Pilot's Guide. (CPN: 523-0823636 Chapter 5, How the MultiScan ThreatTrack Radar Works, pages 53 and following), for details.

5. **During oceanic flight cells that are below the aircraft tend to stay on the display until about 35 NM. I thought the radar was eliminating cells beneath the aircraft altitude. Why is this not happening over the ocean?**

    a.   Oceanic cells are notoriously difficult to display properly. They are about 200 times less reflective than land based cells and tend to rain out at low altitudes, even though the cell top still reaches to the aircraft altitude. Over the ocean the radar looks low in the cell and measures the height of the reflective portion of the cell. It then uses storm models to predict if the cell top reaches the aircraft altitude or not. In general, if the cell is at the aircraft altitude it will be detectable at 120 NM and remain pretty much unchanged in appearance as it approaches the aircraft. If it is beneath the aircraft the red core will change to yellow and then to green as the aircraft gets closer and eventually fall of the display. Best practices dictate that if the cell remains unchanged from 120 to 60 NM it should be considered at the aircraft altitude and a deviation should be requested.

    b.   Refer to the MulitScan ThreatTrack Boeing Pilot's Guide. (CPN: 523-0823636 pages 51-52 and 57-61) for details.

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6. **Sometimes at mid altitudes (10,000 - 20,000 ft.) the radar does not show convective cells that I can see out the window. Why?**

   a. During the early stages of development, cells do not have enough water in them to display. This is especially true in areas with high particulate matter (i.e. pollution). The particulate matter enables the formation of clouds without significant moisture content. This is disconcerting, because these mid altitude cells do have significant bumps associated with them. When the radar shows some weather and does not show other weather, the most logical conclusion is that the cells that are not being displayed have not yet reached the water content threshold for green to be displayed.

Note, SB7 will improve detection of mid altitude weather, but it won't solve all of these problems. Sometimes these mid altitude cells, even when they look convective, are not detectable by radar.

   b. Refer to the MulitScan ThreatTrack Boeing Pilot's Guide. (CPN: 523-0823636 page 50) of the Pilot's Guide for an example.

7. **Is the upgrade from Version 1 (non ThreatTrack) to Version 2 (ThreatTrack features) a software update or does it require new hardware?**

   a. The upgrade is primarily a software update. However, there are minor updates to the receiver transmitters and the pedestal as well. This requires both of these parts to be removed and sent to the service center. Once the updates are complete, those units will be sent back to the owner/operator

8. **Does the "terrain table" take into consideration any man made obstacles?**

   a. No. The terrain table simply provides terrain elevation information. Since it is not an obstacle database such as the database used by the TAWS system, it does not require updates.

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9. What is the range of the Predictive Overflight scan?

    a. 60 to 40nm. The radar attempts to make predictions out to 60nm, however in most cases one would expect to get warnings within 40nm. The issue here is beam width. Beyond 40nm and especially beyond 60nm the beam is too wide to accurately measure cell tops.