P-3 Radar Support Guide

On the AIRCRAFT (Updated 13 September 2022)

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The TDR RVP-900 task settings should include single PRF of ~2770 Hz, 75-m range bins, first trip only, and Time Frequency Modulated (aka "short-long") pulse. Fore (master) and aft (slave) antennas should be transmitting simultaneously. Toggle between fore and aft displays to verify (icon on desktop). If necessary, verify with the AOC data tech.

****BEFORE AND SHORTLY AFTER TAKE-OFF...**

Establish comms with ground radar support: Xchat (join channels: #hrd and #radar, #tdr-status for TDR instrument messages, #hrd-status for HRD radar software status, #hrd-sweeps-status for availability of TDR sweep data, #hrd-scripts-status for data transfer scripts status)

*Note: If the scripts below are not recognized, either you have selected the wrong login at boot-up on the HRD radar workstation or you are not at the HRD radar workstation.

On #radar, allow ground radar support to step you through the following *in the order shown* below (Steps 1-8 are done ideally *before* the planeside briefing):

1. Open Xchat or HexChat at HRD (radar) workstation. Ensure the following ground situational-awareness channels were autojoined: **#hrd-status, #hrd-sweeps-status, and #hrd-scripts-status**

For AOC: If tunneling to HRD workstation, ensure 'ssh -Y' (*not* 'ssh -X') is executed to open terminals. This will ensure proper script execution.

2. Run 'diskusage'. Ground support will advise which files/dirs to remove, if necessary.

3. Run 'updateradar'. Sometimes software/script changes need to be implemented at the HRD radar workstation. As a matter of routine, typically this will be executed. *When the process returns to a command prompt, inform ground radar support.*

4. Run 'buildradaranalysis'. Compiles the radar analysis code and generates scripts, ~1 minute.

5. Run 'initialcleanup' (Start fresh: removes some old files and creates a new emcdata/)

6. Run 'checksweeps' (Monitors TDR data files on HRD workstation - opens 1 window)

7. Run 'tdrProcSend' (Controls EMC radial processing and netman transfer - opens 2 windows)

8. Run 'radarsync' preferably in a new terminal (Controls radar analysis software execution)

9. After TDR is turned on and aircraft is flying straight and level, **look** at master (fore) and slave (aft) displays (labeled TM and TS) to ensure proper radar functioning (e.g., correct radar altitude and flat surface). Make sure they are similar and both show sea-surface returns. It is normal for the side-lobe ring to appear different between the two antenna.

10. Throughout the flight **MONITOR** the status of the TDR (and MMR). Relay notable weather conditions to ground radar support for their Radar Scientist Form.

****GROUND SUPPORT CREATES ANALYSIS JOBFILES...**

Ground support will monitor #tdr-status, #hrd-sweeps-status, and #hrd-scripts-status to ensure the TDR and scripts are functioning properly prior to the IP and prior to analysis jobfile submission. It is important to **be aware of these critical times** and **be available to address issues** as needed.

Feel free to use the *Doppler_Leg_Form* document to keep an informal log of Leg start time, Center fix time/lat/lon, Leg end time, etc. Although the jobfile submitted by ground support contains the official record of parameters for each radar analysis, they may ask for confirmation in the event of an MTS outage.

After ground support notifies you that a jobfile has been sent, they will monitor #hrd-status and #hrd-scripts-status for software and script status. In the event of a comms outage, they may ask you to **report the latest message in the 'radarsync' terminal**.

****NEAR END OF FLIGHT...**

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1. Once the aircraft reaches the end point of the pattern and/or mission science is complete, the AOC data tech can **end TDR recording**.

2. Once ground support confirms that all analysis files have transmitted, you may **Ctrl-C 'radarsync'**, and close its terminal.

3. Once ground support confirms that all EMC files have left the HRD workstation, you may **close tdrProcSend** windows. All other scripts may be closed as well.

4. Run: './makearchive'. AOC will upload thumbYYMMDDAI_products.tar.gz, TDR product-raw tar.gz archive, and a zip archive of MMR Cfradial files to the SEB server.

****END OF AIRBORNE RADAR DUTIES****

****PARAMETERS THAT GROUND RADAR SUPPORT IS LOGGING…**

If a *center pass is done* (penetration), **Center Time** MUST be your best estimate of when the aircraft passed closest to storm center ... otherwise inbound and outbound profiles may fail.

Get from MTS: **Start/End 3D** and **Start/End Cross-section** times. For a penetration + downwind leg, one could set: Start 3D = Start Cross-section (inbound leg), End Cross-section = end time of out outbound leg, End 3D = end time of downwind leg.

Get via Xchat: **Center Time**, **Center Lat/Lon** (in decimal, as reported in #carcah Vortex Data Message, VDM). Center Time and Center Lat/Lon from a *fix* VDM take precedence over an estimate from HRD scientists. In any event, make sure it is a good circulation center estimate.

Frequently used back-up: Estimate **Center Time** and **Lat/Lon** from MTS flight-level wind shift.

Get the **Storm Direction/Motion** (met heading/kt) from NHC website. If actual motion based on center fixes appears significantly different from NHC estimate, you can modify the motion value during the flight. ONLY do this if you are sure the difference is not the result of transient track "wobbles". For systems with an ill-defined center, it is best to use the NHC estimate.

Click 'Draw/Save Cross-section' to **set** the **Track IN/OUT** after Start/End Cross-section and Center fix info are filled. This plots the flight track through the End Cross-section time. ALWAYS do this step since it bundles flight track data with the jobfile for use in real-time radar graphics applications. It also serves as a check on the accuracy of the storm Center Time and Lat/Lon as well as the Start/End times of a Cross-section.

Select the **Event type**: 'Invest' for invest, 'Tropical Storm' for TD or TS, 'Hurricane' for Cat 1-2, and 'Major Hurricane' for Cat 3-5 hurricane.

****POTENTIAL ISSUES…**

>>SHOULD THE WORKSTATION GO DOWN<<

If the workstation power is interrupted or the workstation needs to be restarted, then after the workstation is restarted:

1. Run 'tdrProcSend'

2. Run 'radarsync'

3. Run 'checksweeps'

If the software had been in the middle of execution, it should restart from the beginning once radarsync is executed again: In any event, ensure that all EMC files and HRD radar product files have been transmitted off the aircraft.

>>SHOULD RADAR ANALYSIS PRODUCTS NOT FULLY TRANSMIT<<

If a glitch should ever happen where analysis products are not fully transmitted from the aircraft, the following should be done:

In a terminal, **run: resendradar** (note: you can leave radarsync running while you do this)

>>SHOULD COMMUNICATIONS ON THE AIRCRAFT DROP OUT<<

Ground support will wait until comms are reestablished and then submit any outstanding jobfile. If comms goes down while the software is running, inform ground support of the last status update in the radarsync terminal when comms are reestablished.

>>SHOULD AN ANALYSIS END TOO SOON OR A JOBFILE ERROR IS QUICKLY DISCOVERED<<

If an analysis completes in far less time than "Rule of Thumb" (~1/3 analysis period)

- Ground support will submit corrected jobfile to restart the process, if possible

If a jobfile error is discovered as the summary information is being presented in #hrd-status, be prepared to quickly Ctrl-C in the radarsync terminal, then ground support will

- Correct any jobfile errors
- Have you move the bad jobfile in /home/sysop on the HRD workstation to ~/tdr/fail
- Have you run 'radarsync'
- Submit corrected jobfile to restart the process