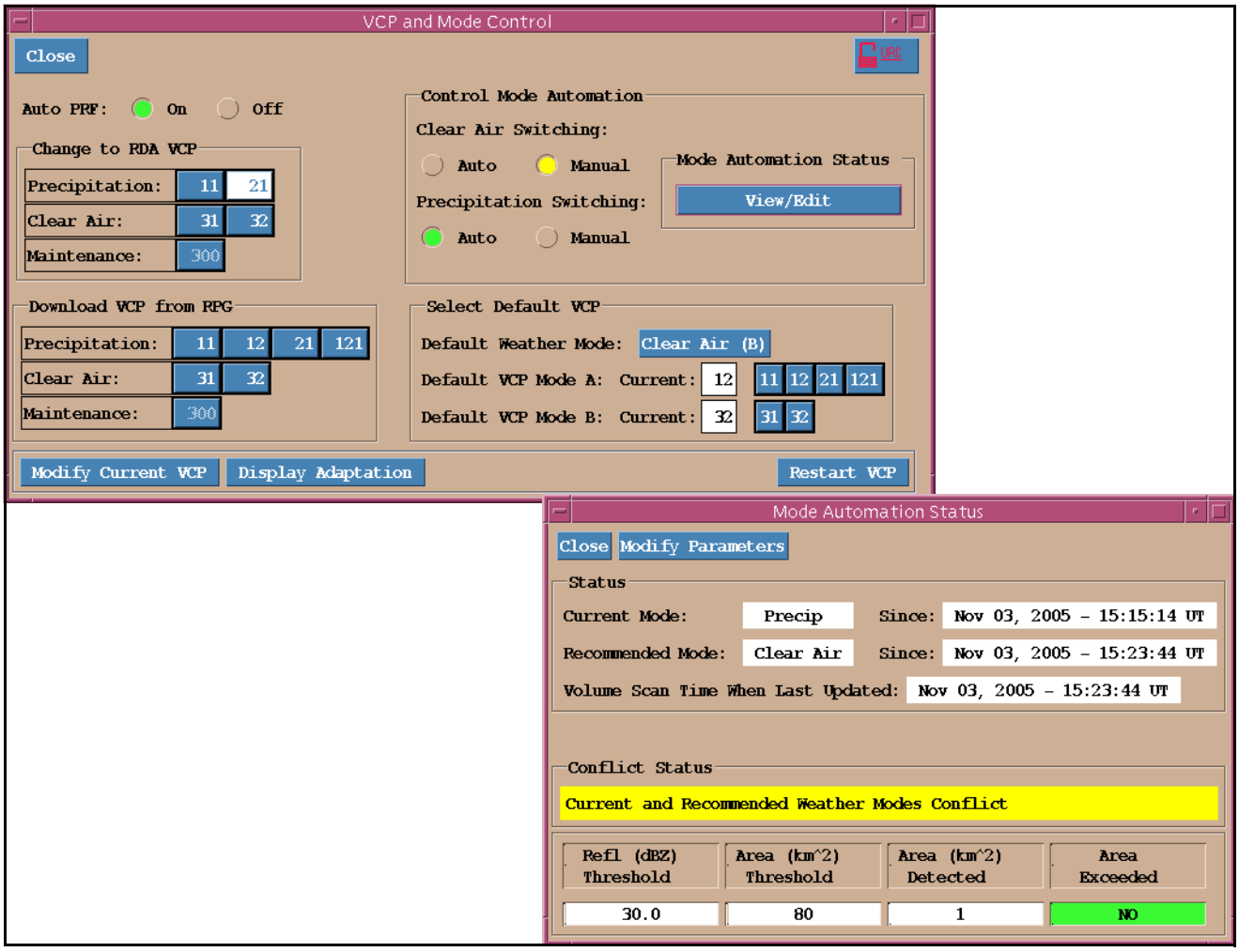
ORDA/RPG Build 8.0

Training



Presented by the

Warning Decision Training Branch

Version: 0604

Overview

ORDA/RPG Build 8.0 deployment begins in May 2006, making changes at ***both*** the RDA and RPG. The notation "ORDA" is used in the context of the initial installation, otherwise the notation "RDA" is used. The ORDA installation will continue through September 2006. The upgrade to Build 8.0 will start with those Single channel sites that already have ORDA Build 7.0 installed. For the remaining Single channel sites, the Build 8.0 upgrade will occur once the initial Build 7.0 ORDA installation is complete. Only the FAA and NWS Redundant sites will initially receive ORDA/RPG Build 8.0.

Important Prerequisite!

The material presented in this document is designed for those who have already completed the ORDA Build 7.0 training. It is assumed that you have the baseline of knowledge that was presented with the ORDA Build 7.0 training. If you have not completed the ORDA Build 7.0 training, you will find the necessary materials at:

http://wdtb.noaa.gov/buildTraining/ORDA/index.html

RPG then ORDA Impacts

This document presents the operational impacts of ORDA/RPG Build 8.0 with separate sections on the RPG and ORDA. The Build 8.0 impacts at the RPG are presented first.

URC Impacts

The Build 8.0 changes at both the RPG and the ORDA will likely impact Unit Radar Committee (URC) decision making. Coordination among URC members with respect to Build 8.0 URC impacts is encouraged.

RPG Build 8.0 Operational Impacts

The information in this section reflects the pre-deployment state of knowledge of the operational impacts of RPG Build 8.0. Each of the following impacts is presented:

1. Mode Selection Function (MSF)

2. New Design for Filtering RPG Status Messages
3. SCIT Reflectivity Data Filter
4. MDA Updates and Fixes
5. PPS Updates and Fixes
6. Fix to Allow VMI Change While in VCP 121
7. RPG/Users Communications Changes
8. RPG System Status Log Product

Electronic Performance Support System (EPSS)

The Electronic Performance Support System (EPSS) has been updated to support the Build 8.0 changes that are apparent at the RPG Human Computer Interface (HCI).

1. Mode Selection Function (MSF)

Since the original deployment of the WSR-88D there has been the capability for an automatic switch from Clear Air to Precipitation Mode. Switching back to Clear Air Mode was done manually after a mandatory one hour wait time. For the first time with Build 8.0, automatic switching to either mode is possible, as well as performing either mode switch manually.

Some History: The Precipitation Detection Function (PDF)

The legacy design for switching from one mode to the other was controlled by the Precipitation Detection Function (PDF). By looking at the areal coverage of reflectivity at or above a dBZ threshold, the PDF initiated an automatic switch to Precipitation Mode. It also allowed for a manual switch to Clear Air Mode after a one hour wait time of no significant precipitation.

The Nominal Clutter Area (NCA) parameter plus an area threshold that was fixed at 10 km^2 comprised the areal coverage threshold. The NCA was

used to account for the areal coverage of residual clutter.

The PDF also controlled the start and stop times of precipitation accumulations. Beginning with RPG Build 5.0 (Spring 2004), control of the start and stop times of precipitation accumulations was moved to the Precipitation Processing System (PPS). Since RPG Build 5.0, the PDF has ***only*** controlled mode selection, e.g. the automatic switch from Clear Air to Precipitation Mode.

Build 8.0 Changes to Precipitation Status Window

With RPG Build 8.0, the start and stop times for precipitation accumulation are ***still*** controlled within the PPS, specifically within the Enhanced Precipitation Preprocessing (EPRE) algorithm. The input for this analysis is the high resolution (8 bit) Hybrid Scan Reflectivity data, which is constructed by the EPRE algorithm. Each range bin in the Hybrid Scan contains the dBZ value that will be converted to rainfall rate and then accumulated over time to generate precipitation products.

Precipitation accumulations start when the areal coverage of dBZs within the Hybrid Scan initially meets or exceeds two thresholds:

RAINZ - minimum dBZ for significant rain; default setting is 20 dBZ

RAINA - areal coverage of dBZs of at least RAINZ; default setting is 80 km^2

Both RAINA and RAINZ are URC editable EPRE adaptable parameters. Accumulations stop once the areal coverage of dBZs (at or above RAINZ) is less than RAINA for a one hour period. ***The start***

and stop of precipitation accumulation is independent of the particular weather mode/VCP.

With RPG Build 8.0, the Precipitation Status button (Figure 1) on the RPG HCI Main Page will depict:

1. "ACCUM" with a yellow background when accumulating, or
2. "NO ACCUM" with a green background when not accumulating

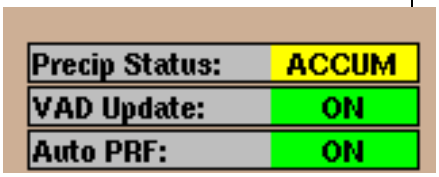


Figure 1. Precipitation Status button on the RPG HCI Main Page.

Clicking on the Precipitation Status button will open the Precipitation Status window (Figure 2).

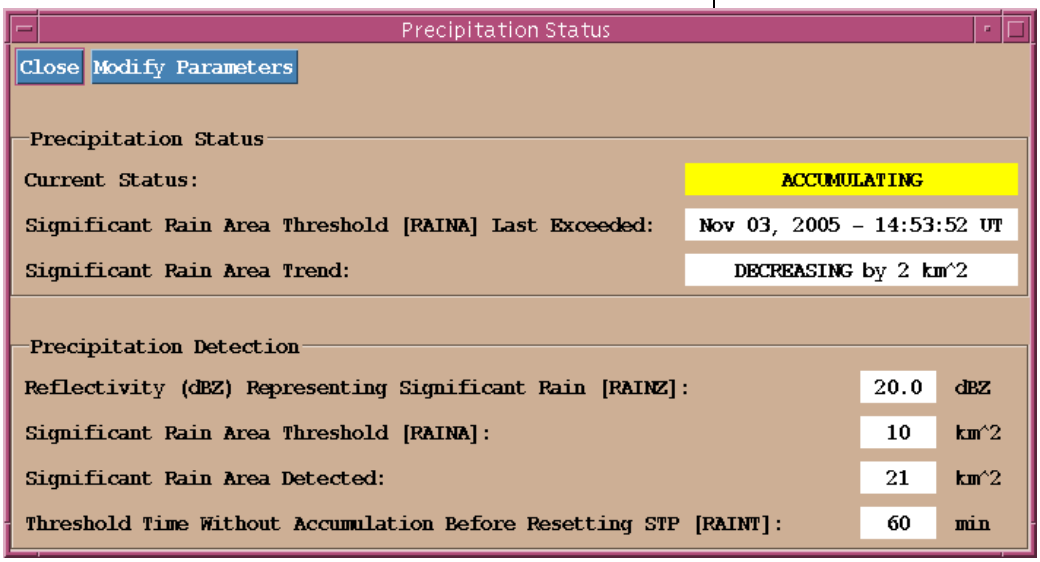


Figure 2. The Precipitation Status window.

The Precipitation Status window depicts information such as whether or not the PPS is accumulating and the current setting of RAINA and RAINZ. If precipitation is being accumulated, the date and time that RAINA was last met or exceeded is given. Also given is the trend in the detected area

of significant rain, i.e. the areal coverage of Hybrid Scan dBZ values at or above RAINZ from one volume scan to the next.

RAINA and RAINZ are URC editable and can be changed by clicking on the Modify Parameters button. This is a shortcut to the Hydromet Preprocessing algorithm window (Figure 3).

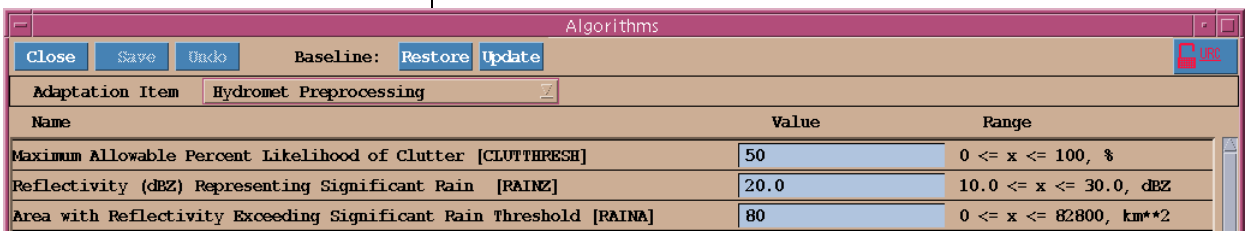


Figure 3. The Hydromet Preprocessing (EPRE) algorithm parameters window.

Legacy PDF Replaced by MSF

RPG Build 8.0 replaces the legacy PDF with the Mode Selection Function (MSF), retaining some of the logic from the PDF and adding many additional options. The MSF allows for manual or automatic switching from Clear Air to Precipitation Mode and vice versa.

Input to MSF

Each volume scan, the MSF determines a recommended mode, Precipitation or Clear Air, based on the areal coverage of dBZs at or above a threshold. Though the concept is the same, ***the MSF uses dBZ and areal coverage parameters that are different from RAINA and RAINZ***. The MSF parameters are called “Precip Mode dBZ Thresh” and “Precip Mode dBZ Areal Coverage Thresh” (see Figure 10 on page 12). Just as with precipitation accumulations, the MSF analysis begins as soon as the Hybrid Scan is generated by EPRE.

Availability of MSF Results During a Volume Scan

The elevation angles that comprise the Hybrid Scan will vary from site to site since it is constructed from range bins where clutter is unlikely and there is no beam blockage.

The timing of the availability of precipitation products and the results of the MSF during a volume scan ***both*** depend on when the Hybrid Scan is generated. A site in the central U.S. with minimal ground clutter and beam blockage could have the Hybrid Scan available after the first 2 elevations of the volume scan. However, a site with significant clutter and beam blockage due to terrain could have the Hybrid Scan available after 4, 5, or more elevations of the volume scan. Unless EPRE parameters (e.g. exclusion zones) have been adjusted, the timing of the MSF will be consistent (within 1 or 2 elevations) for any particular site.

Any automatic switch to Precipitation Mode will occur after ***the completion*** of the current Clear Air Mode volume scan. There is no longer an interruption of the current Clear Air Mode VCP (a volume scan restart) in order to facilitate the switch.

Manual VCP Changes Must be After MSF Completion

Provided that Auto PRF is set to On, any manual VCP change must be made after the MSF has run for a particular volume scan. Once the Hybrid Scan is available during a volume scan, the MSF determines the appropriate mode for the next volume scan and downloads the appropriate VCP. For example, if VCP 21 is current and Precipitation Mode is recommended, the MSF then downloads VCP 21 for the next volume scan. If VCP 12 is preferred instead, the Download command for VCP 12 must be issued ***after*** the MSF has run. If VCP 12 is manually downloaded ***before*** the MSF runs, the MSF will still download VCP 21, overwriting the manual command.

Within a volume scan, the timing of the Hybrid Scan and the execution of the MSF can be moni-

tored from the RPG Status window (Figure 25) or the Mode Automation Status window (Figure 9).

MSF Buttons on RPG HCI Main Page

There are some changes to the RPG HCI Main Page as a result of the MSF. There are three new buttons in the VCP area (Figure 4).

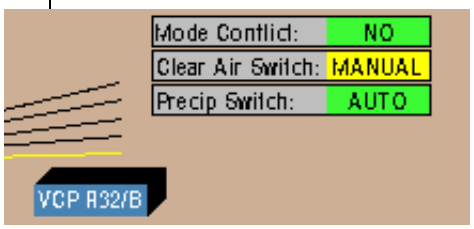


Figure 4. VCP area of RPG HCI Main Page.

These buttons tell you at a glance:

1. *Whether or not a mode conflict currently exists.* A mode conflict exists anytime the recommended mode differs from the current mode. If there is a wait time for a switch back to Clear Air Mode, the mode conflict begins after the wait time expires. Mode conflicts and wait times will be discussed in depth as part of the Possible MSF Configurations, beginning on page 14.
2. *Whether switching to Clear Air Mode is manual or automatic.* This button also allows you to toggle between the two settings.
3. *Whether switching to Precipitation Mode is manual or automatic.* This button also allows you to toggle between the two settings.

VCP and Mode Control Window

The VCP and Mode Control window (Figure 5) replaces the VCP Control window and is still accessed from the RPG HCI Main Page by clicking on the Current VCP button.

VCP Selection After MSF Has Run

The same VCP selection options (Figure 6) continue to be available. This includes the Change and Download commands, as well as the ability to turn Auto PRF On or Off.

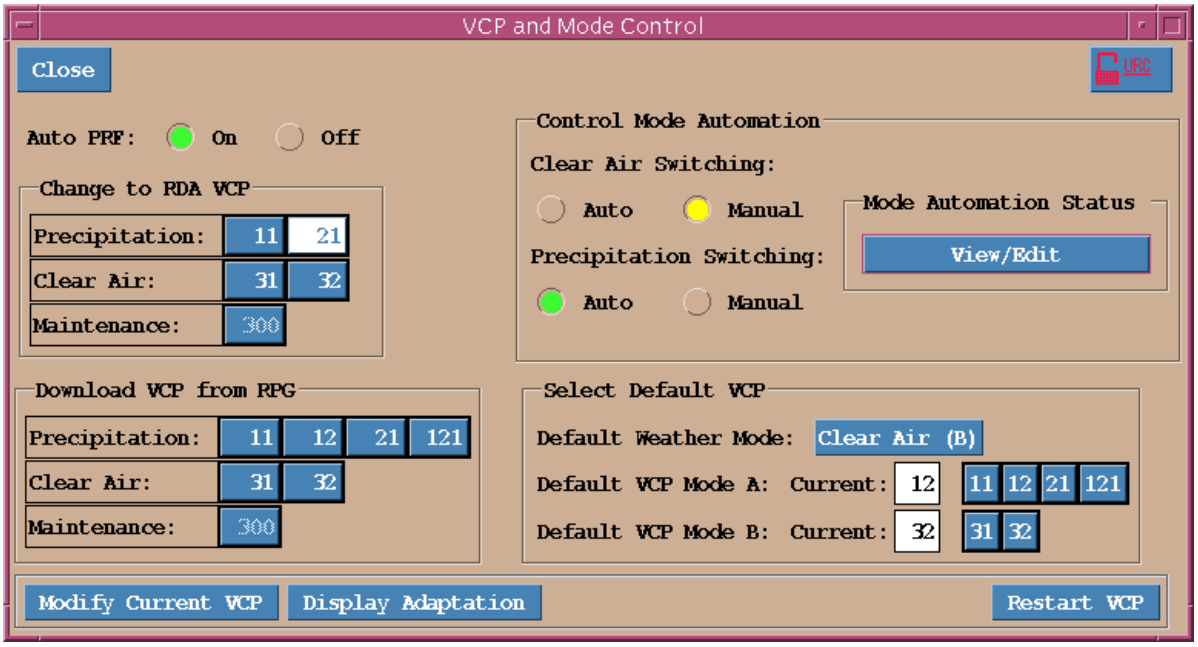


Figure 5. VCP and Mode Control window.

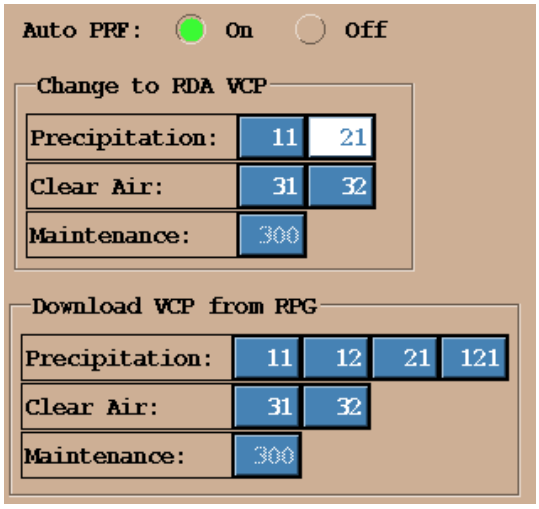


Figure 6. VCP Selection area of VCP and Mode Control window.

Since the MSF downloads a VCP each volume scan when Auto PRF is On, ***any*** Change or Download command must be performed ***after*** the MSF has run. If the Change or Download command is issued ***before*** the MSF runs, it will be overwritten by the MSF. Within a volume scan, the timing of the Hybrid Scan and thus the execution of the MSF can be monitored from the RPG Status window (Figure 25) or the Mode Automation Status window (Figure 9).

Default VCPs for Clear Air and Precipitation Mode are Selectable

Prior to Build 8.0, the automatic switch from Clear Air to Precipitation Mode resulted in VCP 21. This was because VCP 21 has always been the default VCP for Precipitation Mode (Mode A).

With RPG Build 8.0, the default VCP for each mode is URC editable from the Select Default VCP area (Figure 7) of the VCP and Mode Control window. For example, VCP 12 would be a good choice as the default for Mode A during the warm season. It is also possible to choose either VCP 31 or 32 as the default Clear Air Mode VCP. The default settings in Build 8.0 for these parameters will be VCP 21 for Mode A and VCP 32 for Mode B. In Figure 7, VCP 12 has been selected as the default for Mode A and VCP 32 has been selected as the default for Mode B.

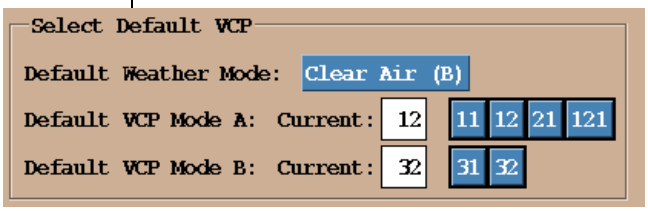


Figure 7. Select Default VCP area of VCP and Mode Control window.

Manual vs. Automatic Switching

The Control Mode Automation area (Figure 8) of the VCP and Mode Control window allows for the selection of manual or automatic switching to either mode. It also allows for access to additional information on Mode Automation Status and editing of the associated parameters.

1. Clear Air Mode Switching (manual or automatic) determines the type of switching ***to Clear Air Mode***
2. Precipitation Mode Switching (manual or automatic) determines the type of switching ***to Precipitation Mode***

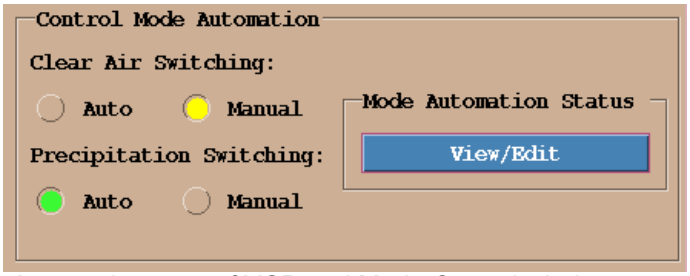


Figure 8. Control Mode Automation area of VCP and Mode Control window.

The ***default configuration*** in Build 8.0 is Clear Air Mode set to Automatic and Precipitation Mode set to Automatic. This differs from the ***legacy configuration***, which is Precipitation Mode set to Automatic and Clear Air Mode set to Manual, as depicted in Figure 8.

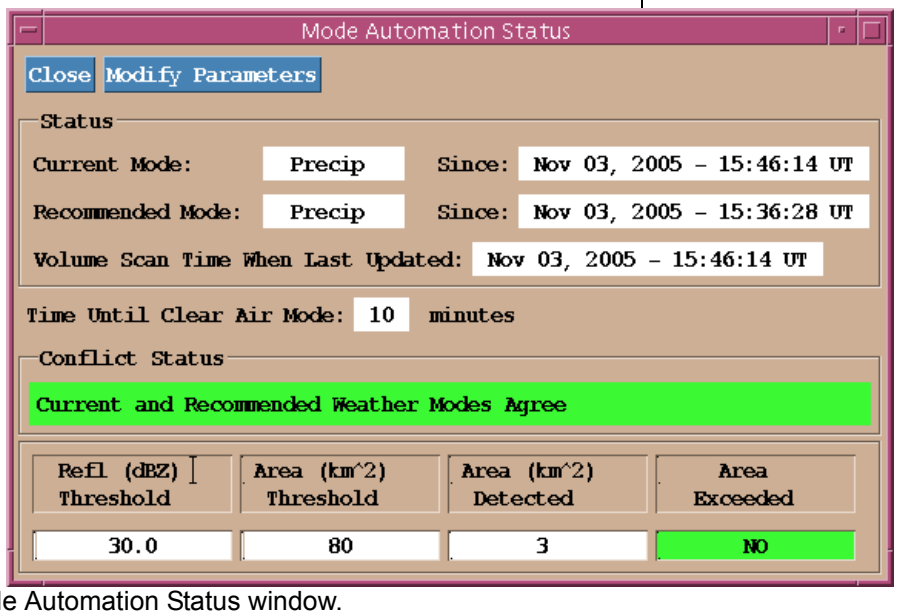


Figure 9. Mode Automation Status window.

Mode Automation Status Window

The Mode Automation Status window (Figure 9) is accessed by clicking on the View/Edit button on the Control Mode Automation area (Figure 8) of the VCP and Mode Control window. It can also be accessed by clicking on the Mode Conflict button on the RPG HCI Main Page (Figure 4). ***Both*** the Mode Conflict button and the Mode Automation Status window will dynamically change each vol-

ume scan when the MSF has executed. The Mode Automation Status window presents the:

1. current mode (Precipitation or Clear Air) and when operation in that mode began.
2. recommended mode (Precipitation or Clear Air) and when that recommendation began. The recommendation is based on whether or not the areal coverage of returns meets or exceeds the MSF thresholds.
3. volume scan time when last updated. This line will update with the current volume scan time once the MSF runs. This line can be used to determine when a manual VCP change can be made for a particular volume scan.
4. wait time for switching to Clear Air Mode, if applicable.
5. conflict status: does current mode agree with recommended mode?
6. adaptable parameter settings and whether or not the area threshold was exceeded.

Mode Selection Algorithm Window

There are five adaptable parameters for the MSF that are editable under URC guidelines (Figure 10). The Mode Selection Algorithm window is accessible by clicking on the “Modify Parameters” button on the Mode Automation Status window (Figure 9). The MSF parameters and their default settings are:

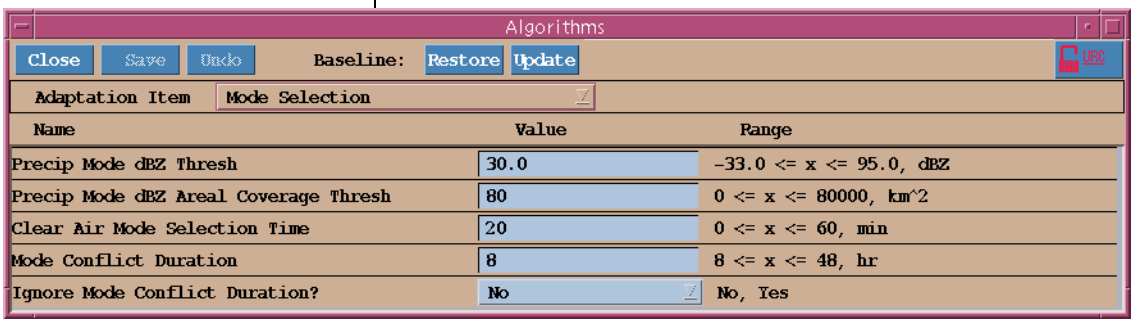


Figure 10. The Mode Selection algorithm parameters window.

1. Precip Mode dBZ Thresh - dBZs at or above this threshold are included in the computation of areal coverage to determine if Precipitation Mode is recommended; the default setting is 30 dBZ
2. Precip Mode dBZ Areal Coverage Thresh - areal coverage of dBZs at or above "Precip Mode dBZ Thresh" that determines if Precipitation Mode is recommended; the default setting is 80 km^2. Since this parameter is analogous to the NCA, the previously used NCA value may be a good initial choice for this parameter.
3. Clear Air Mode Selection Time - ***anytime*** Precipitation Mode selection is set to automatic, there will be an editable wait time for switching back to Clear Air Mode; the default setting is 20 minutes
4. Mode Conflict Duration - the number of hours that a mode conflict can persist before the recommended mode is automatically selected; the default setting is 8 hours
5. Ignore Mode Conflict Duration? - determines whether or not to ignore the mode conflict for any duration; the default setting is No

A local determination for the best settings for each of these parameters is recommended and will likely require some evaluation by the WSR-88D focal point. To support the process of determining local settings, the behaviors that these parameters produce will be presented in depth as part of the following section on Possible MSF Configurations.

Note: Both the Precipitation Status (Figure 2) and Mode Automation Status (Figure 9) windows have Modify Parameters buttons which open their corresponding RPG Algorithms windows. However, there can still be only one RPG Algorithms window

open at a time. For example, if the Algorithms window is already open (for any algorithm), clicking on the Modify Parameters button at the Mode Automation Status window will not open the Mode Selection Algorithms window. It will only bring the Algorithms window to the foreground.

Possible MSF Configurations

Since Precipitation Mode and Clear Air Mode can each be set to either Automatic or Manual, there are four possible configurations for the MSF. The first two configurations have Precipitation Mode selection set to Automatic. As has been true in the past, if Precipitation Mode switching is set to Automatic, there ***will be*** a user defined wait time for switching back to Clear Air Mode. The wait time is imposed whether Clear Air Mode switching is set to manual or automatic. The wait time is controlled by the parameter “Clear Air Mode Selection Time”. ***All*** of the following examples ***require*** that the RPG be in control of the RDA and assume that Auto PRF is set to On.

1. Precipitation Automatic and Clear Air Manual

Precipitation Mode set to Automatic and Clear Air Mode set to Manual will provide the ***legacy*** configuration. Clear Air is the initial mode for the following example.

Automatic Switch to Precipitation Mode

Using the Hybrid Scan, when the areal coverage of reflectivity at or above “Precip Mode dBZ Thesh” meets or exceeds “Precip Mode dBZ Areal Coverage Thresh”, the MSF recommends Precipitation Mode. When Precipitation Mode ***initially*** becomes the recommended mode, there is a mode conflict (Clear Air is the current mode). This will be reflected in two places, the Mode Conflict button on the RPG HCI Main Page, and on the Mode Automation Status window (Figure 11).

The Mode Conflict button is yellow to indicate that a conflict exists, but in this case it is a temporary mode conflict. “TRANS” means that the system is in transition, the default Precipitation Mode VCP has been downloaded and will initiate at the start of the ***next*** volume scan. This transition is also depicted on the Mode Automation Status window (Figure 11).

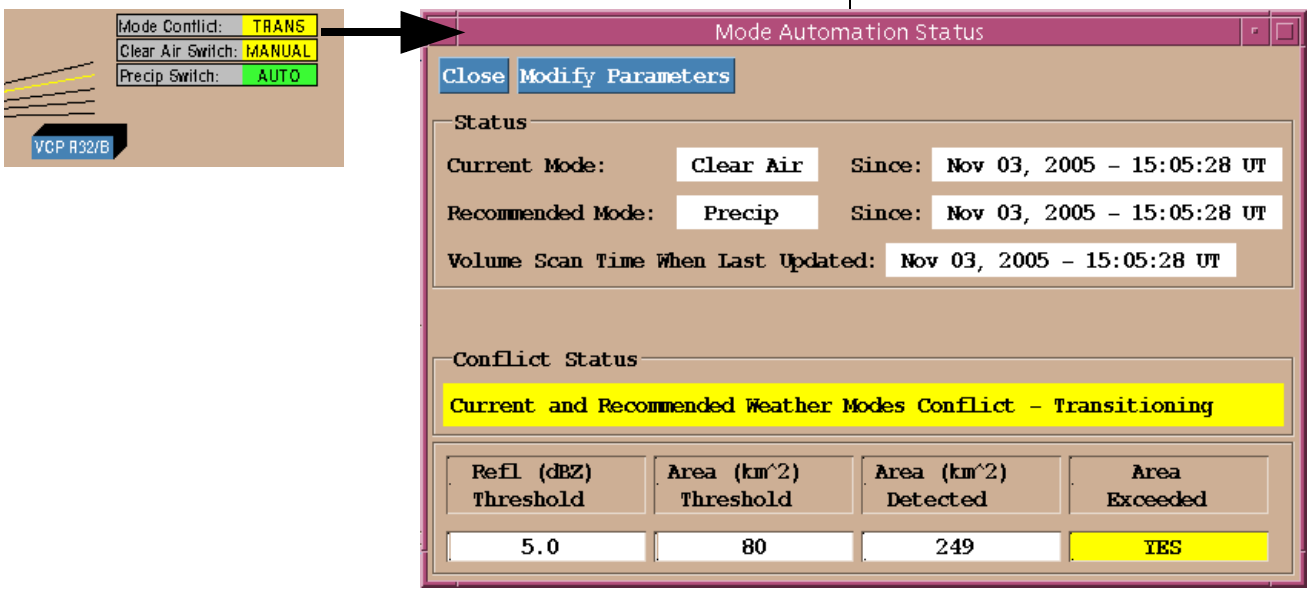


Figure 11. Mode Conflict button and Mode Automation Status window when MSF has recommended Precipitation Mode and is in transition. The default Precipitation Mode VCP will be invoked the next volume scan.

The next volume scan begins operating with the default Precipitation Mode VCP, which in this case is VCP 12. There is no longer a mode conflict as depicted on both the Mode Conflict button and the Mode Automation Status window (Figure 12).

Manual Switch to Clear Air Mode

Suppose that after some time the areal coverage of reflectivity (at or above Precip Mode dBZ) falls below the MSF threshold. Because Precipitation switching is Automatic, there is a wait time for ***any*** switch to Clear Air Mode (manual or automatic). The wait time must expire before the MSF reports a mode conflict.

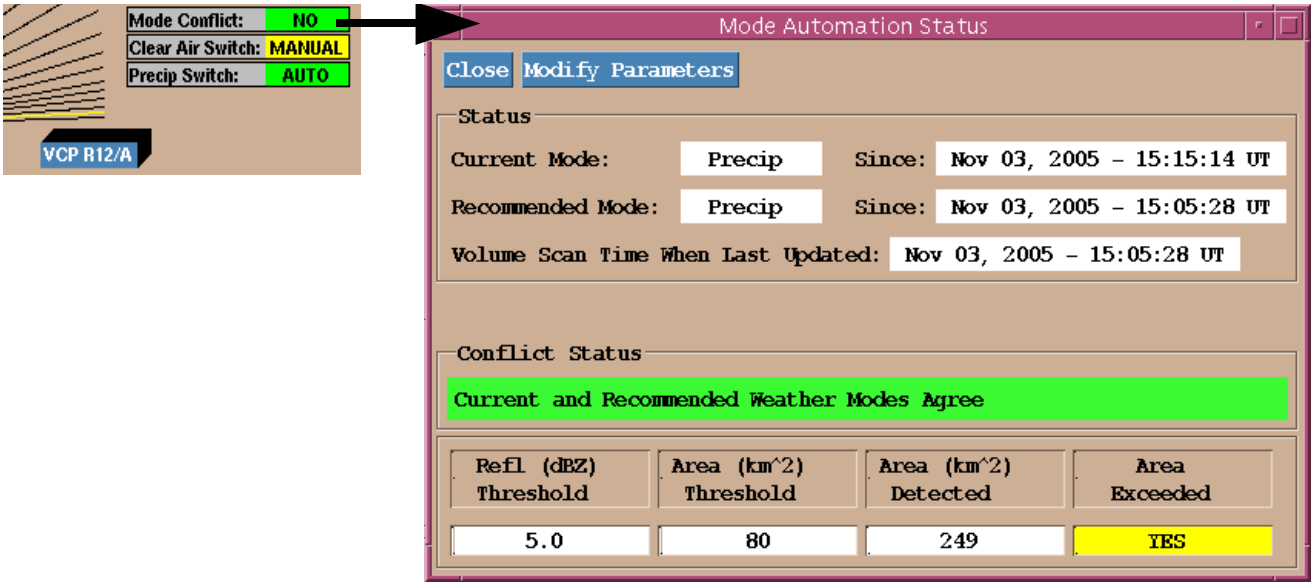


Figure 12. Mode Conflict button and Mode Automation Status window once the default Precipitation Mode VCP has begun. There is no longer a mode conflict.

If an operator selects a Clear Air Mode VCP ***before*** the wait time has expired, there will be one volume scan in Clear Air Mode with an automatic switch back to Precipitation Mode for the subsequent volume scan.

Wait Time is Editable

Compared to the legacy PDF, an important difference with the MSF is that the wait time ("Clear Air Mode Selection Time" on Figure 10) is editable, ranging from 0 to 60 minutes. Though using a setting of 0 minutes may be desirable on occasion, it is not recommended for extended use. The areal coverage may alternate just above or below the thresholds for a period of time, resulting in potential "flip-flopping" between modes. This would make a wait time of up to 60 minutes advisable.

Wait Time Example

The following example assumes that the wait time is set to the default of 20 minutes. While operating in VCP 12, the areal coverage of reflectivity (at or above Precip Mode dBZ) has fallen below the threshold. This begins a wait time period that is

not considered to be a mode conflict. The mode conflict begins once the wait time has expired.

Once the MSF has executed (Figure 13), the Mode Conflict button indicates no conflict, but does show the wait time in the white box. In this example, the wait time is now down to 16 minutes. In the Mode Automation Status window, the wait time is displayed as “Time Until Mode Conflict”. Even though the area exceeded is “No”, Precipitation is ***still*** the recommended mode because of the wait time. The mode conflict begins once the wait time has expired. Clear Air Mode ***then*** becomes the recommended mode.

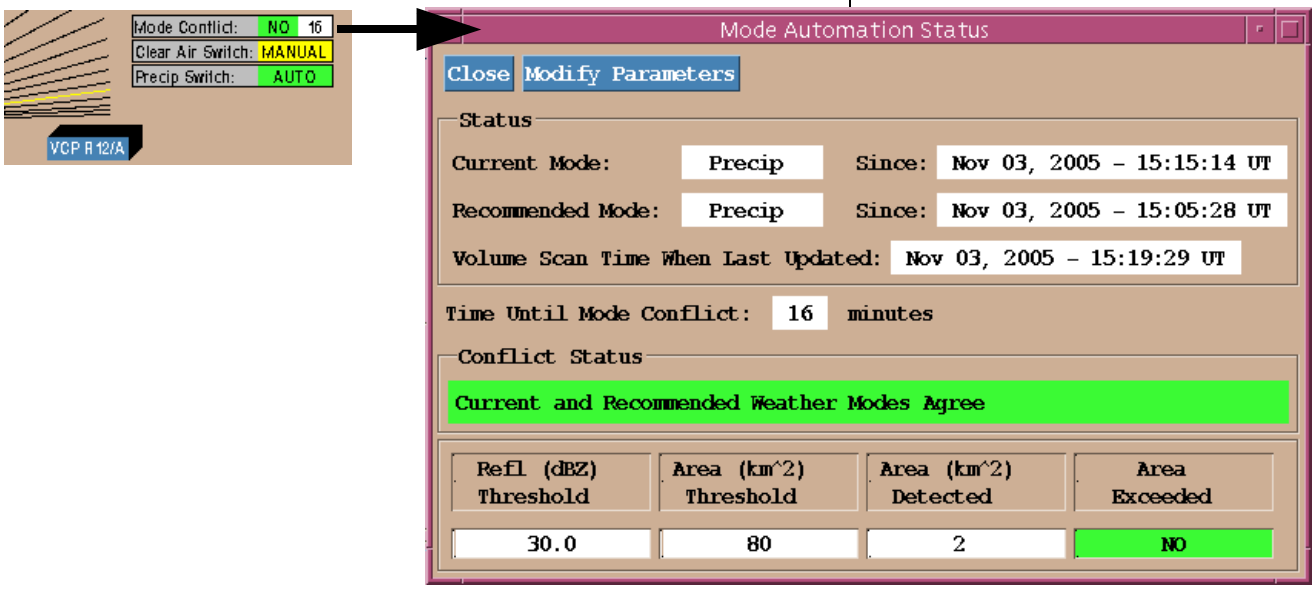


Figure 13. Mode Conflict button and Mode Automation Status window while in VCP 12 and area is no longer exceeded. Mode conflict does not begin until “Time Until Mode Conflict” is expired.

Once the “Time Until Mode Conflict” wait time has expired, the Mode Conflict button and the Mode Automation Status window will both show that a mode conflict exists (Figure 14). Though the current mode is Precipitation (VCP 12), the recommended mode is now Clear Air. Once a Clear Air Mode VCP is manually selected and begins, the mode conflict ends. Note that the manual selection of a Clear Air Mode VCP must be done ***after*** the

MSF has run for a particular volume scan. Otherwise, the MSF results will overwrite the manual selection.

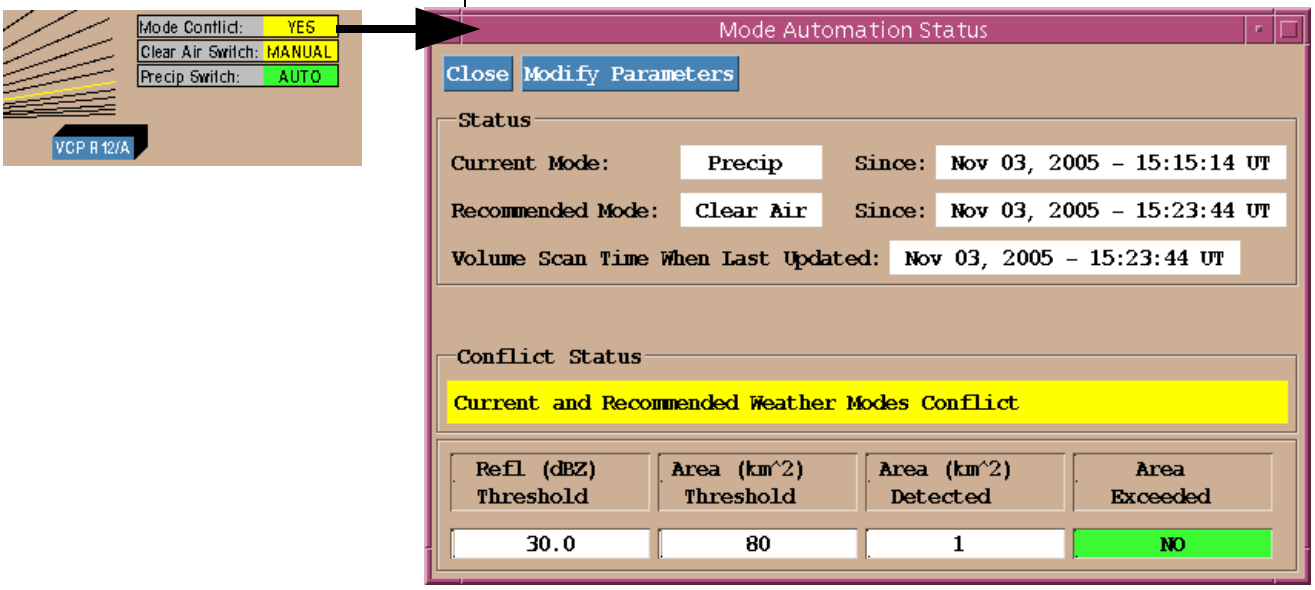


Figure 14. Mode Conflict button and Mode Automation Status window while in VCP 12 and "Time Until Mode Conflict" has been exceeded. There is now a mode conflict with Clear Air Mode recommended.

How Long Can a Mode Conflict Persist?

Now assume that it is desirable to stay in VCP 12, even though Clear Air Mode is recommended. The MSF will continue to report a mode conflict as long as the detected areal coverage of reflectivity (at or above Precip Mode dBZ) remains below the threshold. However, the length of time that a mode conflict can persist is dependent on two MSF adaptable parameters, accessible from the Mode Selection algorithm window (Figure 15).

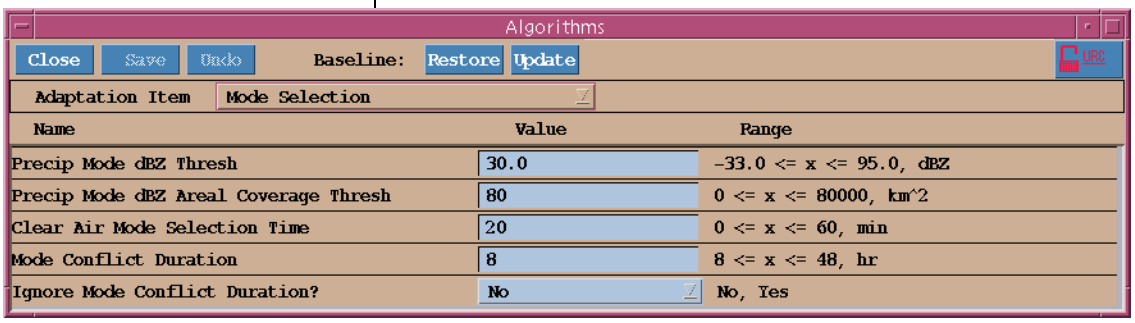


Figure 15. The Mode Selection algorithm parameters window.

Mode Conflict Duration

In Figure 15, the "Mode Conflict Duration" is the number of hours that a mode conflict can persist,

while “Ignore Mode Conflict Duration?” functions as an override. “Mode Conflict Duration” is set to 8 hours for this example and can be set for up to 48 hours. Assuming that weather conditions remain the same, the default settings of “8” and “No” would force an ***automatic*** switch to the recommended mode (in this example Clear Air) after 8 hours. Depending on how you set these 2 parameters, a mode conflict can persist from 8 to 48 hours or indefinitely. If it is desirable to allow a mode conflict to persist indefinitely, the “Ignore Mode Conflict Duration?” parameter can be set to Yes.

2. Precipitation Automatic and Clear Air Automatic

Precipitation Mode set to Automatic and Clear Air Mode set to Automatic is the ***default*** configuration for the MSF. Though this option involves an automatic switch to Clear Air mode, the wait time is still active and in this case is called “Time Until Clear Air Mode”. The only mode conflict with this configuration is temporary, occurring during transitions from one mode to the next.

Automatic Switch to Precipitation Mode

The behavior for the automatic switch to Precipitation Mode is the same as for the legacy configuration. Once the areal coverage of reflectivity (at or above Precip Mode dBZ) initially meets or exceeds “Precip Mode dBZ Areal Coverage Thresh”, the recommended mode becomes Precipitation. Recall that this occurs at some time during the volume scan, once the Hybrid Scan is generated. The Mode Conflict button on the RPG HCI Main Page will then have a yellow background and say “TRANS” for transition. The Mode Automation Status window will show “Precip” as the recommended mode with a temporary mode conflict, i.e. transition (Figure 16).

The subsequent volume scan will begin operating in the default Precipitation Mode VCP, in this

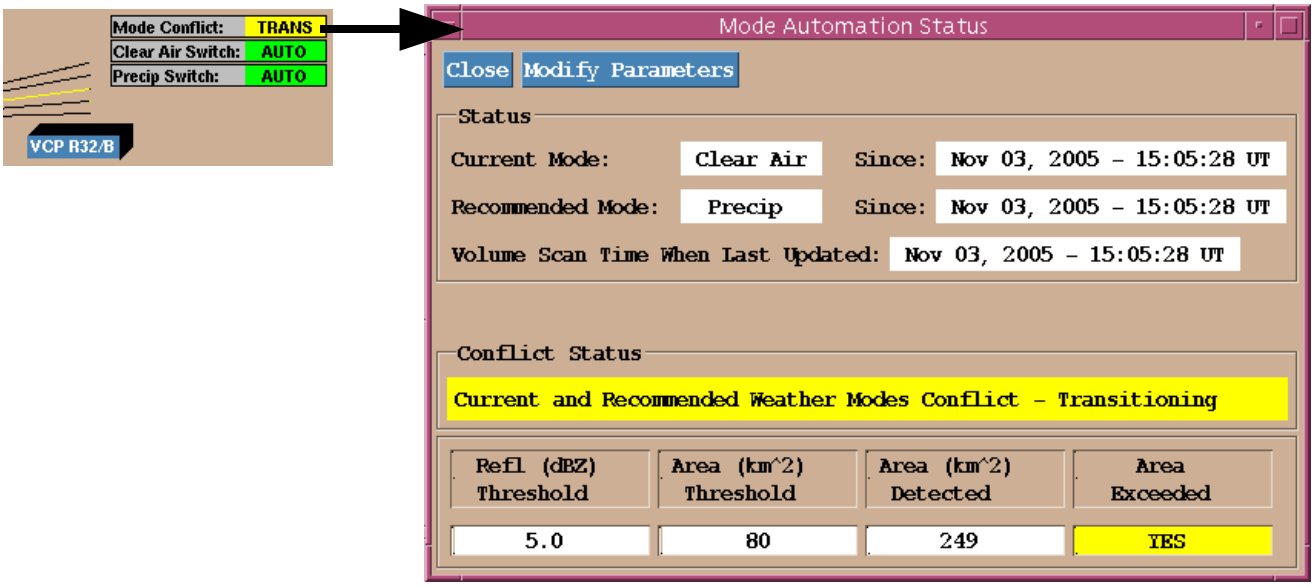


Figure 16. Mode Conflict button and Mode Automation Status window when MSF has recommended Precipitation Mode and is in transition. The default Precipitation Mode VCP will begin the next volume scan

example, VCP 12. Once VCP 12 begins, there is no longer a mode conflict depicted on either the Mode Conflict button or the Mode Automation Status window (Figure 17).

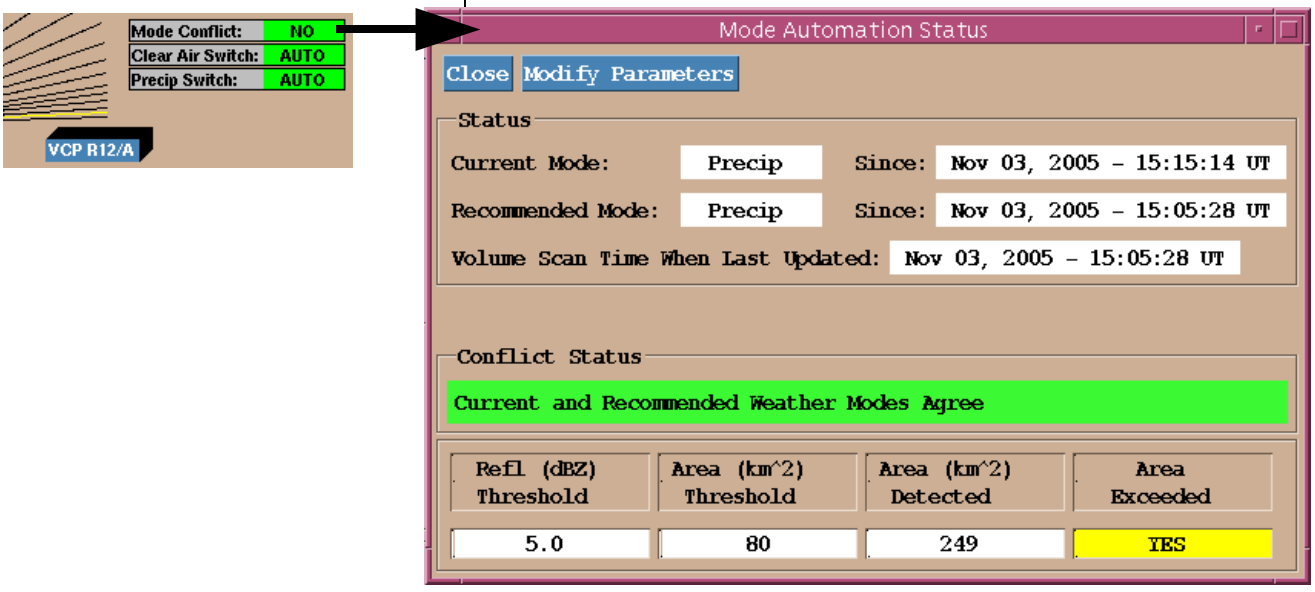


Figure 17. Mode Conflict button and Mode Automation Status window once the default Precipitation Mode VCP has begun. There is no longer a mode conflict.

Automatic Switch to Clear Air

Once the areal coverage of reflectivity (at or above Precip Mode dBZ) falls below the threshold, the wait time for the automatic switch begins. The wait

time parameter “Clear Air Mode Selection Time” is editable (Figure 15), ranging from 0 to 60 minutes. A wait time of 0 minutes is not recommended for routine use as the areal coverage may alternate just above or below the thresholds for a period of time, resulting in “flip-flopping” between the two modes.

In the previous example with Clear Air Mode switching set to Manual, the “Clear Air Mode Selection Time” counted down until a mode conflict was reported. In this example with Clear Air Mode switching set to Automatic, the “Clear Air Mode Selection Time” counts down to a temporary mode conflict, a transition period before the automatic switch occurs.

When the areal coverage of reflectivity (at or above Precip Mode dBZ) initially falls below the threshold, the Mode Conflict button will show no conflict and the associated wait time to switch to Clear Air Mode. The Mode Automation Status window will also show no conflict. However, since Clear Air Mode Selection is set to Automatic for this configuration, the wait time is titled “Time Until Clear Air Mode” (Figure 18).

Once the wait time has expired (Figure 19), Clear Air Mode becomes the recommended mode and there will be a mode conflict only while in transition. The Mode Conflict button will have a yellow background and show “TRANS”. The Mode Automation Status window will show that the recommended mode is now Clear Air and indicate a state of transition.

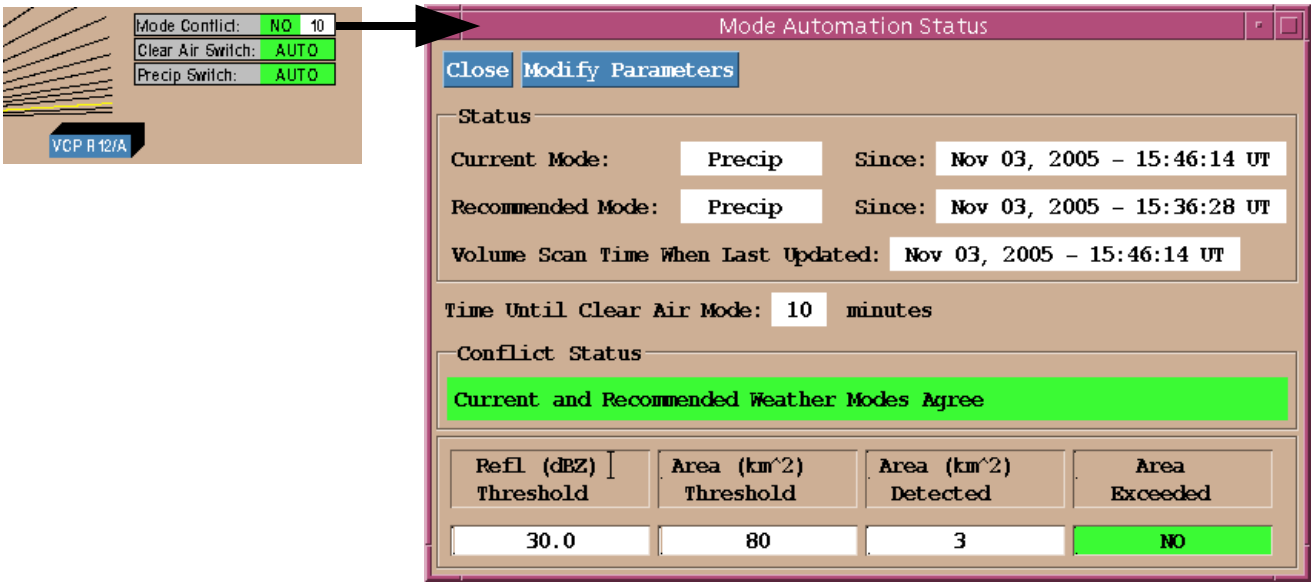


Figure 18. Mode Conflict button and Mode Automation Status window while in VCP 12 and area is no longer exceeded. Mode conflict (transition) does not begin until "Time Until Clear Air Mode" is expired.

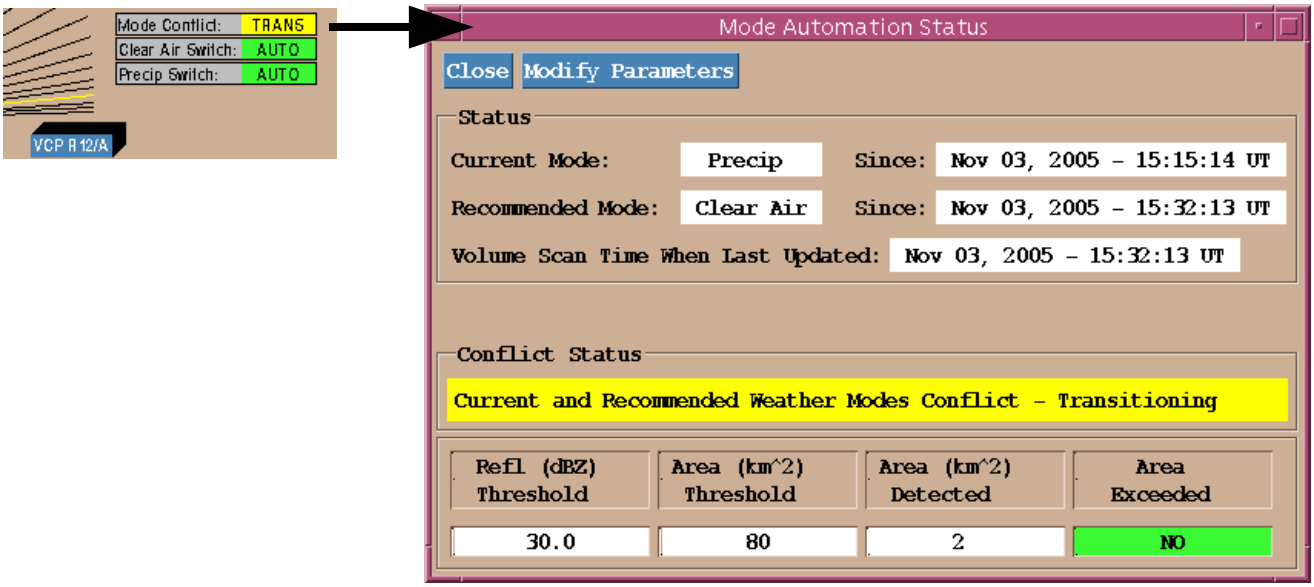


Figure 19. Mode Conflict button and Mode Automation Status window once "Time Until Clear Air Mode" has expired and transition to Clear Air Mode has begun.

The next volume scan will begin in the default Clear Air Mode VCP, in this case VCP 32 (Figure 20). The Mode Conflict button and the Mode Automation Status window show no conflict.

3. Precipitation Manual and Clear Air Manual

The most significant difference between the Precipitation Manual and Clear Air Manual configuration and the previous two is that there is ***no longer***

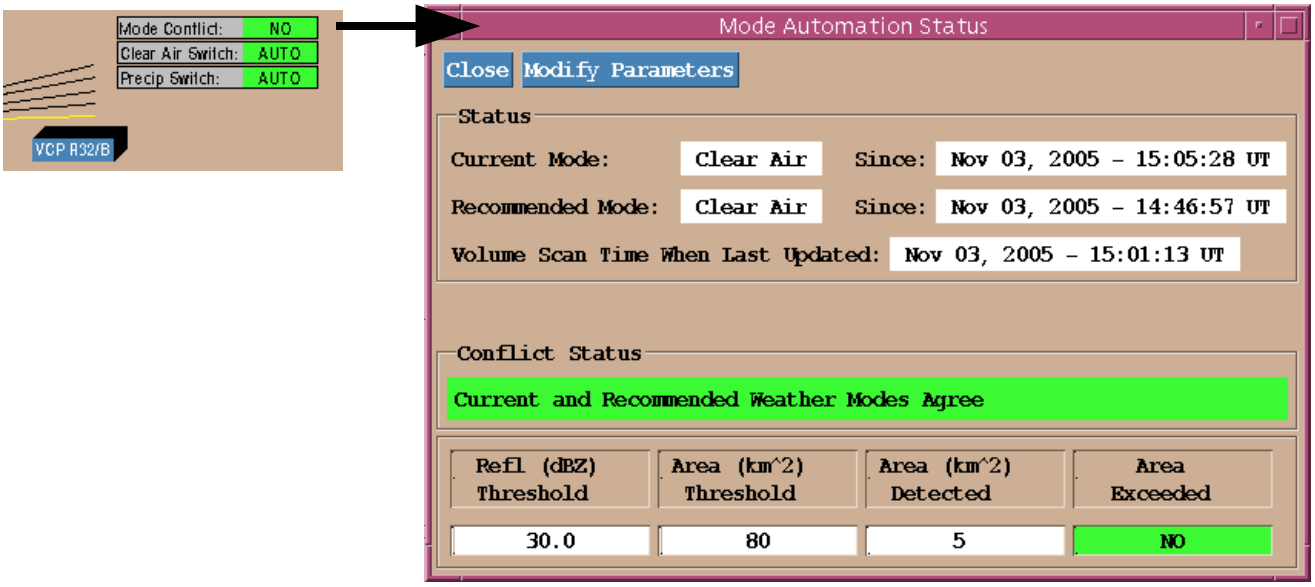


Figure 20. Mode Conflict button and Mode Automation Status window once the default Clear Air Mode VCP has begun. There is no longer a mode conflict.

a wait time for Clear Air Mode. There will also be no transitions, i.e. temporary mode conflicts. A mode conflict will exist anytime the current mode and recommended mode differ. The length of the mode conflict will depend on atmospheric conditions and the settings for "Mode Conflict Duration" and "Ignore Mode Conflict Duration?". Since there are no automatic switches, the Default Precipitation and Clear Air Mode VCPs are ***not relevant*** for this configuration. VCP selection is ***entirely*** dependent on manual commands.

Switch to Precipitation Mode VCP while Clear Air Mode is Recommended

In this example, the areal coverage of reflectivity (at or above Precip Mode dBZ) is below the threshold. Clear Air is both the current and the recommended mode (Figure 21).

Assume that a Precipitation Mode VCP has been downloaded (after the MSF has run!), VCP 12 in this example. When VCP 12 begins, both the Mode Conflict button and the Mode Automation Status window will reflect the mode conflict (Figure 22).

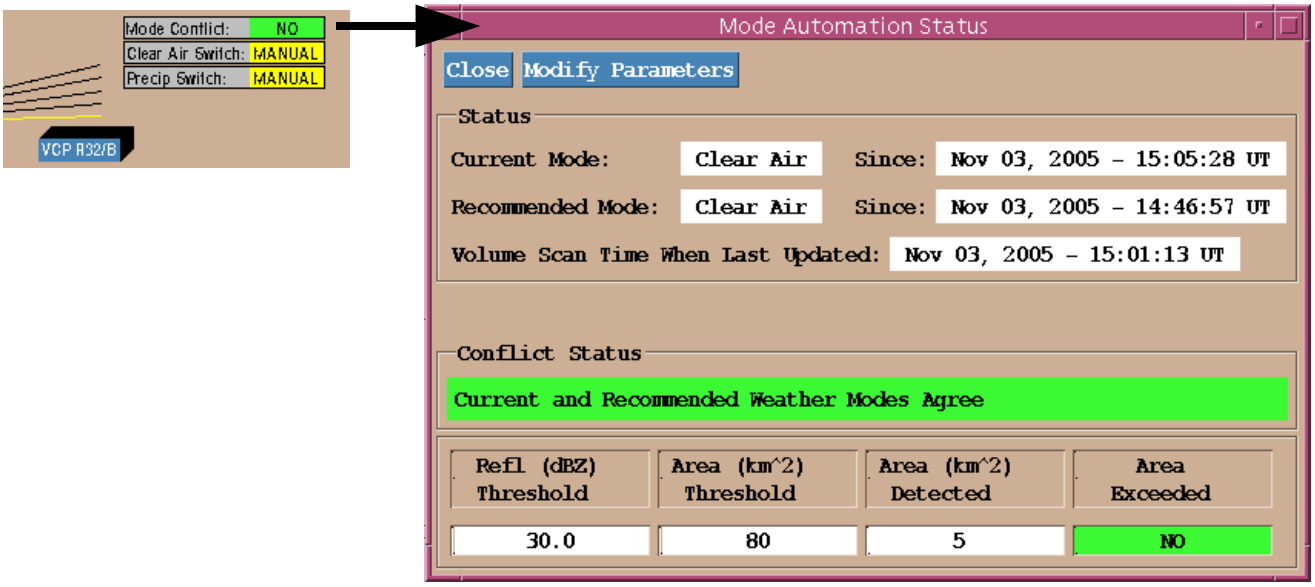


Figure 21. Mode Conflict button and Mode Automation Status window while Clear Air is the current and recommended mode.

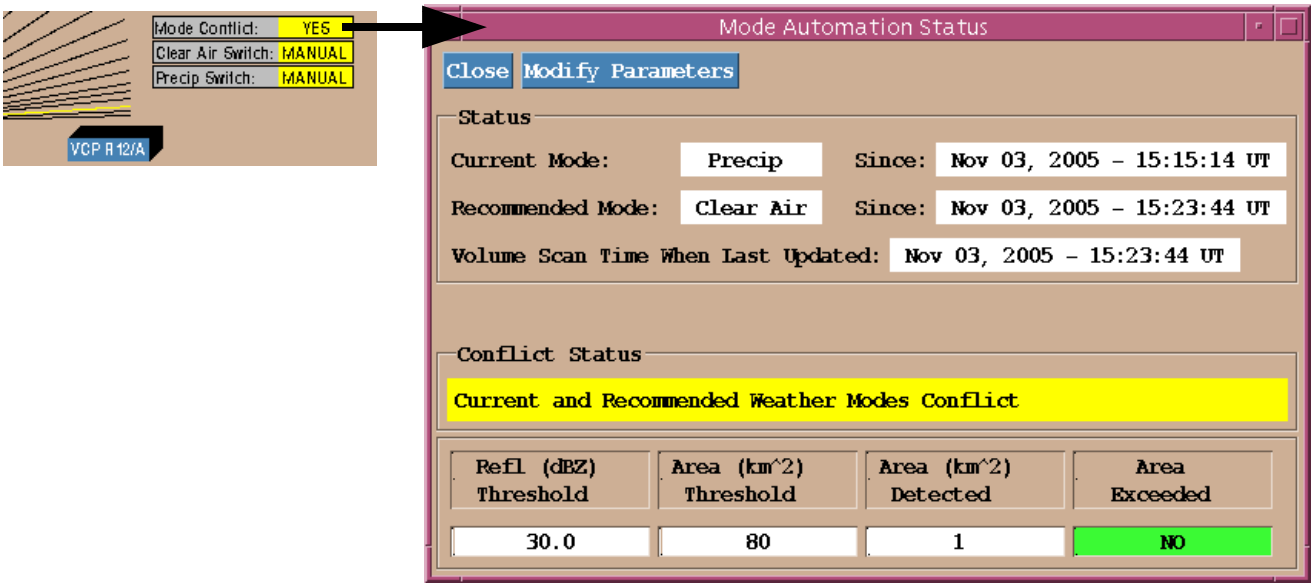


Figure 22. Mode Conflict button and Mode Automation Status window once VCP 12 begins. There is now a mode conflict.

How Long Can a Mode Conflict Persist?

The length of time that this mode conflict can persist is dependent on a number of factors. If the areal coverage of reflectivity (at or above Precip Mode dBZ) increases to above the threshold, Precipitation Mode is recommended and there is no longer a mode conflict. If the areal coverage remains below thresholds and a Clear Air Mode VCP is selected, there is no longer a mode conflict.

If the areal coverage of reflectivity remains below the threshold and the radar remains in VCP 12 for at least 8 hours, then MSF adaptable parameter settings will determine how long the mode conflict will persist. See Mode Conflict Duration on page 18 for a discussion of these parameter settings.

In this example, the areal coverage of reflectivity (at or above Precip Mode dBZ) is above the threshold. Precipitation is both the current and the recommended mode (Figure 23).

Switch to Clear Air Mode VCP while Precipitation Mode is Recommended

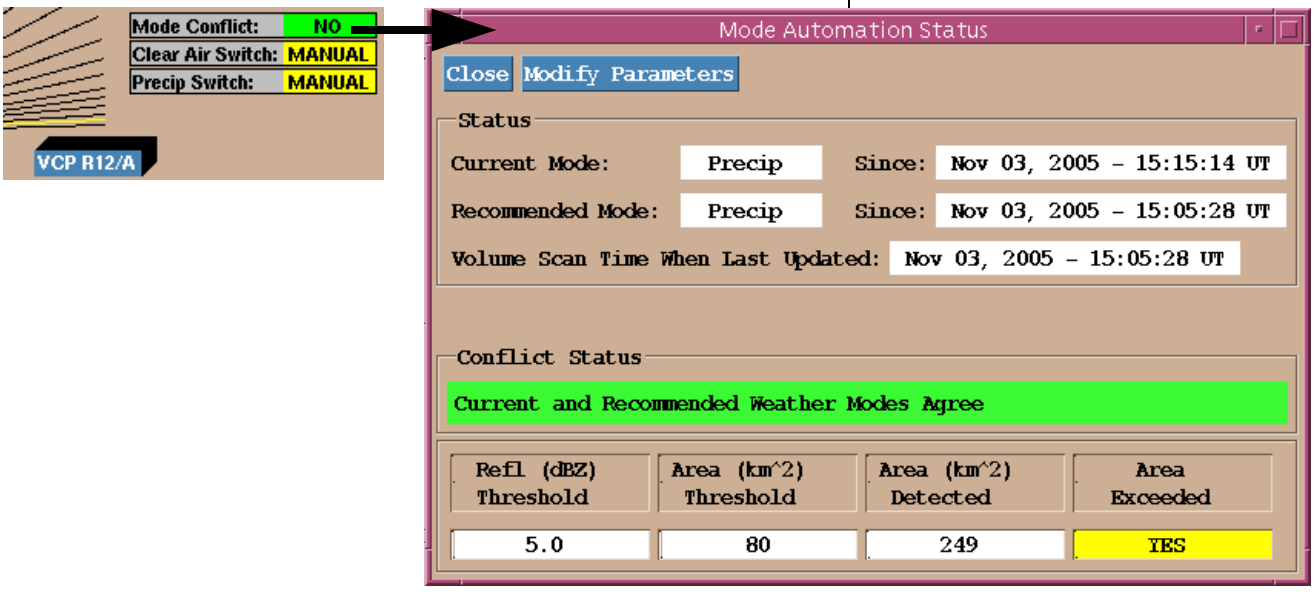


Figure 23. Mode Conflict button and Mode Automation Status window while Precipitation is the current and recommended mode.

Assume that a Clear Air Mode VCP has been downloaded (after the MSF has run!), VCP 32 in this example. When VCP 32 begins, both the Mode Conflict button and the Mode Automation Status window will reflect the mode conflict (Figure 24).

How Long Can a Mode Conflict Persist?

The length of time that this mode conflict can persist is dependent on a number of factors. If the areal coverage of reflectivity (at or above Precip Mode dBZ) decreases to below the threshold, Clear Air Mode is recommended and there is no

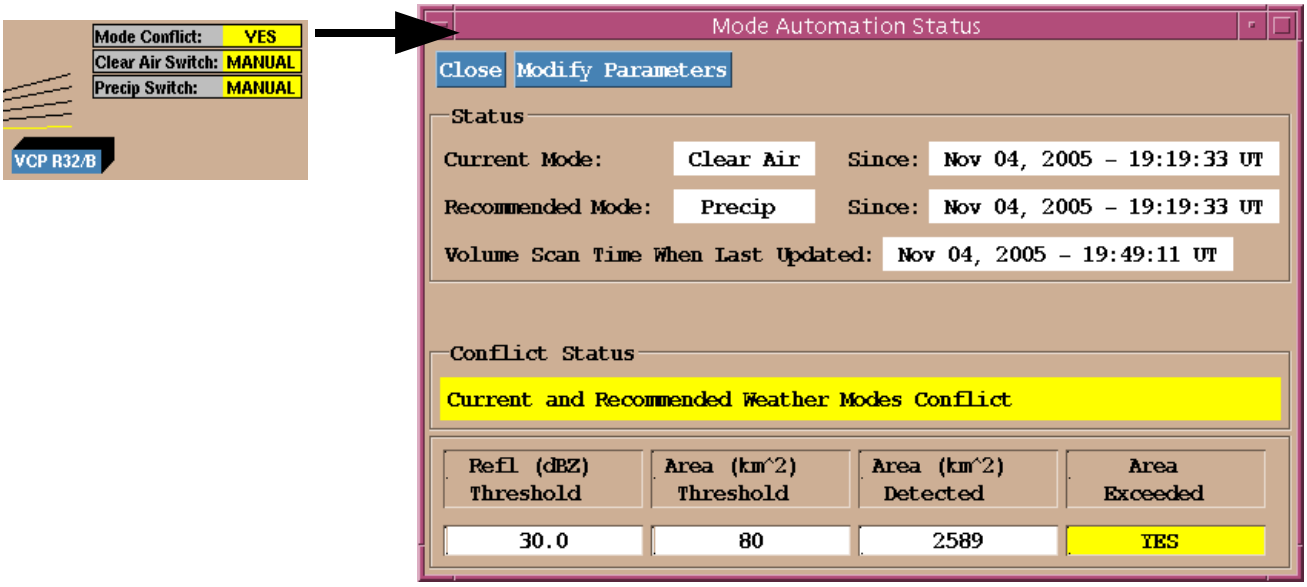


Figure 24. Mode Conflict button and Mode Automation Status window once VCP 32 begins. There is now a mode conflict.

longer a mode conflict. If the areal coverage remains above the threshold and a Precipitation Mode VCP is manually selected, there is no longer a mode conflict.

If the areal coverage of reflectivity remains above the threshold and the radar remains in VCP 32 for at least 8 hours, then MSF adaptable parameter settings will determine how long the mode conflict will persist. See Mode Conflict Duration on page 18 for a discussion of these parameter settings.

4. Precipitation Manual and Clear Air Automatic

It is not expected that this would be a frequent choice for a configuration of the MSF. Since Precipitation Mode is set to Manual, there is no wait time for the automatic switch from Precipitation to Clear Air. An automatic switch to Clear Air would occur the volume scan following the areal coverage of reflectivity (above Precip Mode dBZ) falling below the threshold. Once the areal coverage is greater than the threshold, Precipitation becomes the recommended mode. A mode conflict state

would then begin until there is a manual switch to Precipitation Mode.

MSF Considerations

Some key points to remember about the MSF:

- The wait time for Clear Air, “Clear Air Mode Selection Time”, is imposed whenever Precipitation switching is Automatic.

- Since the MSF downloads a VCP each volume scan when Auto PRF is On, any VCP Change or Download command must be issued ***after*** the MSF has run. The MSF will execute during the volume scan once the Hybrid Scan becomes available. The timing within a volume scan will vary from site to site, mainly due to the extent of terrain clutter. Unless EPRE parameters (e.g. exclusion zones) are adjusted for your radar, the timing within a volume scan of the Hybrid Scan and thus the MSF will be consistent (within 1 or 2 elevations). It is recommended that the WSR-88D focal point determine the typical MSF volume scan timing for each site. Office staff can then use this for issuing manual VCP changes.

- When Auto PRF is set to Off for a manual PRF selection, it is not necessary to wait until after the MSF has run to perform the VCP download unless the MSF detects a mode change. Thus for simplicity, it may be best to perform all VCP changes, including PRF edits, after the MSF has run.

- Local adjustment of the MSF parameters is recommended and would likely be a WSR-88D focal point function. This includes auto vs. manual selection for each mode, the dBZ and areal coverage thresholds and how long to allow a mode conflict to persist.

- Avoid switching configurations when conditions are near the areal coverage threshold. For example, while in Precipitation Mode, the MSF is adjusted from Manual/Manual to Auto/Auto ***at the same time*** that conditions fall below the thresholds. For the next volume scan with Auto/Auto, a Clear Air Mode wait time might be expected, but an automatic switch (transition) is imposed instead. There would not be a wait time because the Manual/Manual setting from the previous volume scan had no countdown timer active.

2. New Design for Filtering RPG Status Messages

The RPG Status window displays a long list of messages that are of differing types. With RPG Build 8.0, the category types for these messages are Info, Status, Warning and Alarm. There are filter buttons for each of these categories above these messages. These filter buttons can be used to control which types of messages are displayed (Figure 25).

Alarm messages are highlighted with a red background, while Warning messages are highlighted with a yellow background. Info and Status messages do not have a colored background. The Mode Selection Function (MSF) related messages are classified as Info or Warning.

In Figure 25, there are three Info messages called MSF SETUP. These MSF SETUP messages are generated every 8 hours or whenever the MSF parameters are changed. MSF STATUS messages are generated each volume scan and are of Info status if there is no mode conflict. If there is a mode conflict, the MSF STATUS message is a Warning and the background color is yellow. Since the detected area above “Precip Mode dBZ Thresh” is given, the non-conflict Info MSF STA-

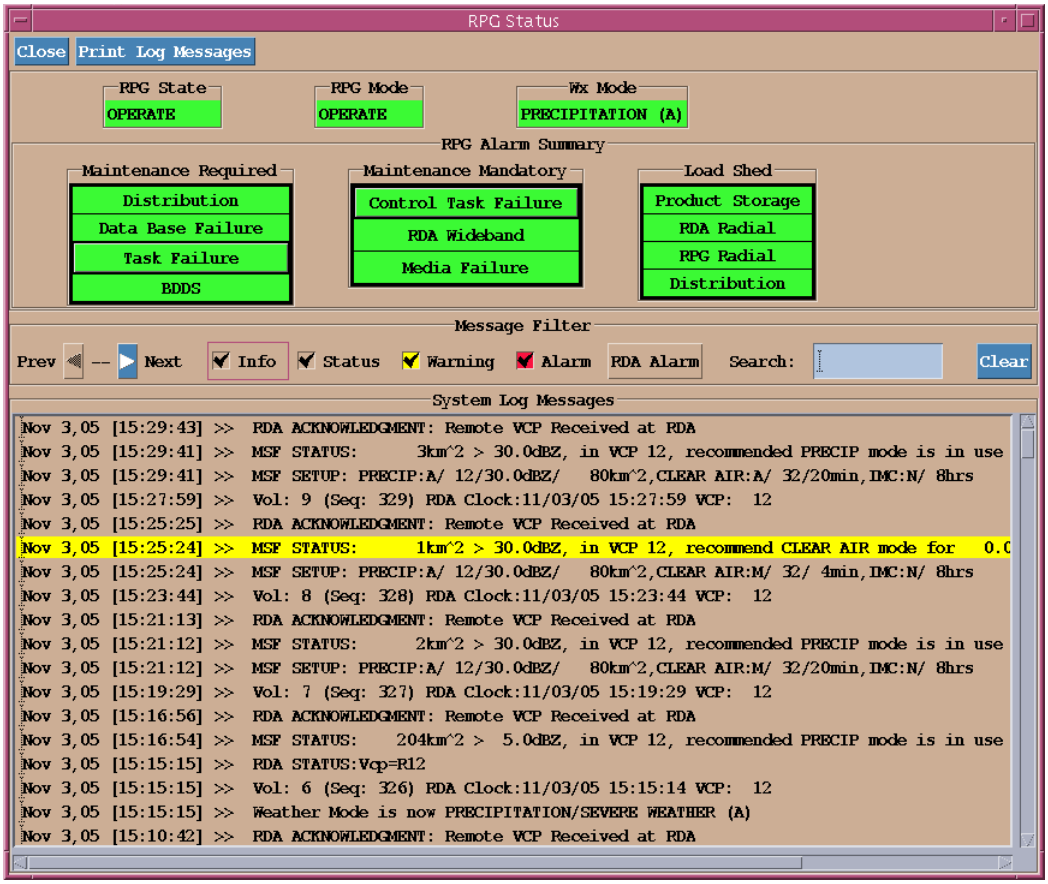


Figure 25. RPG Status window with all 4 types of messages selected to be displayed.

TUS messages could be used to determine an appropriate local setting for the “Precip Mode dBZ Areal Coverage Thresh”. Otherwise it may be desirable to filter Info messages.

Monitoring MSF Completion During a Volume Scan

The MSF STATUS message that is generated each volume scan reveals when the MSF has run for that volume scan. When Auto PRF is set to On, each MSF STATUS message is followed by “RDA ACKNOWLEDGEMENT: Remote VCP Received at RDA”, indicating that the MSF has downloaded a VCP. Any manual VCP changes can be made ***after*** these two messages.

When Auto PRF is set to Off for a manual PRF change, the MSF will not perform a VCP download unless there is a mode change. The PRF edit and

VCP download could occur anytime during the volume scan. However, for simplicity, it may be best to perform all VCP changes, including PRF edits, after the MSF has run.

In Figure 26, Info messages have been filtered and are not being displayed. Note that the MSF SETUP and non-conflict MSF STATUS messages are no longer displayed.

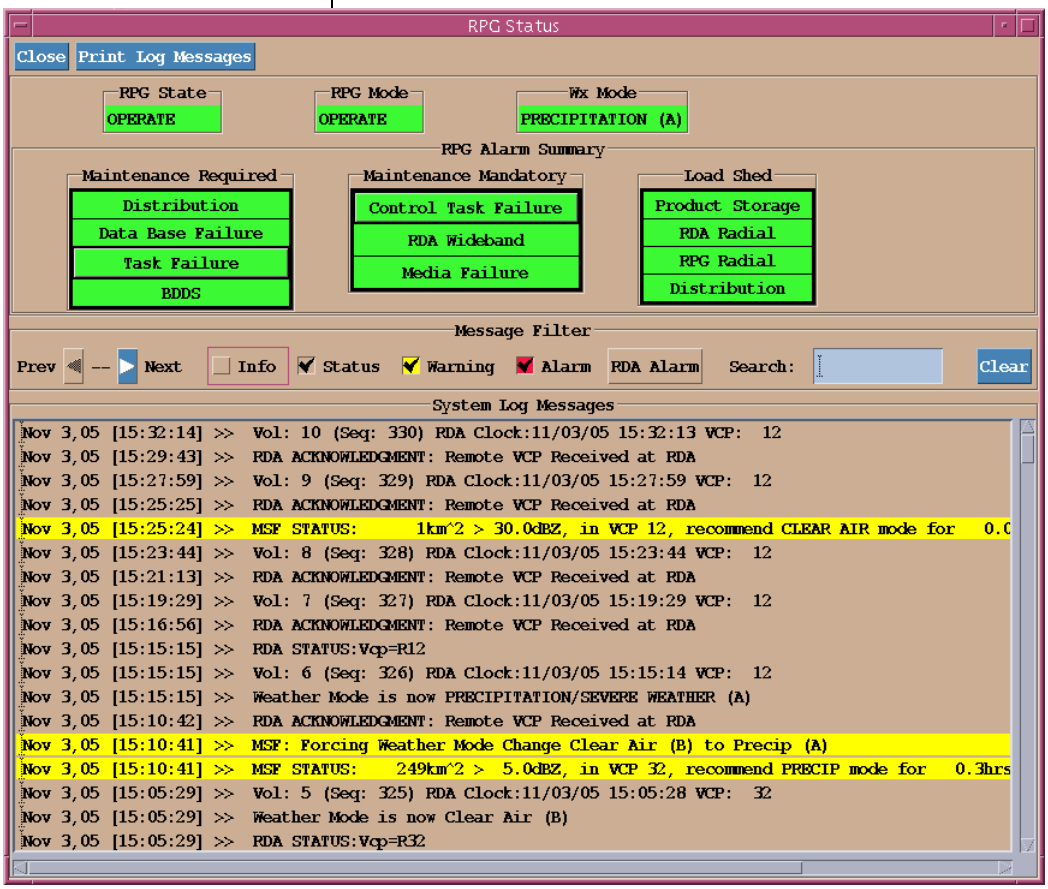


Figure 26. RPG Status window with Info messages filtered and not displayed.

3. SCIT Reflectivity Data Filter

The Storm Cell Identification and Tracking (SCIT) Reflectivity Data Filter is a technique to improve the time continuity capability of the SCIT algorithm. The filter is designed to smooth high resolution peaks in close range reflectivity data, improving the continuity of storm cell associations from one volume scan to the next. This will reduce the number of cases where a storm ID is reas-

signed from one volume scan to the next and the time-trend information is restarted. There will then be fewer storm tracks overall and they will be more stable over time.

Figure 27 shows an example of a squall line with numerous cells along the line. The reflectivity data filter is on, resulting in distinct, long forecast tracks. The past cell positions were turned off for this example, though that would not typically be done in operations. There are 22 cells identified in this case. With the reflectivity filter turned off, the same case would have resulted in 41 identified cells.

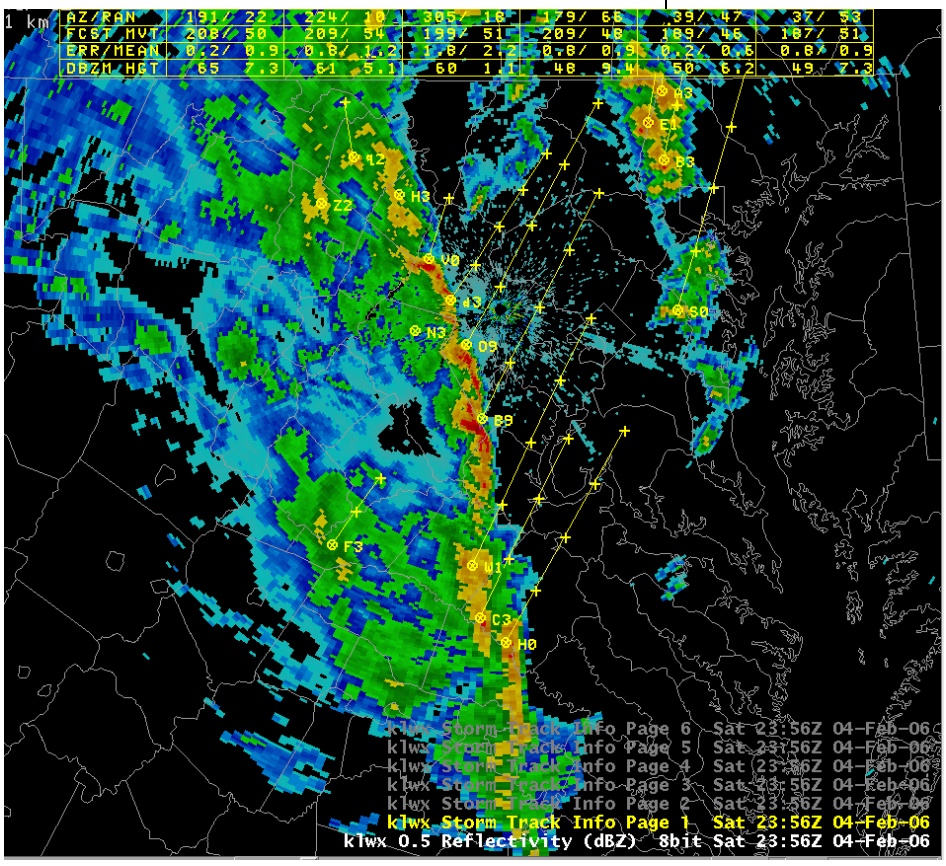


Figure 27. A squall line with the SCIT reflectivity data filter turned on.

The filtering of reflectivity data will ***not*** impact the quality of storm cell attributes. Within any identified 2D feature, the ***unfiltered*** reflectivity data are

used for determining cell attributes such as maximum reflectivity, height of maximum reflectivity and cell-based VIL.

Filter On or Off Under URC Control

The "Reflectivity Filtered" adaptable parameter has a default setting of On and can be set to Off under URC guidelines. This parameter is part of the Storm Cell Segments algorithm.

4. MDA Updates and Fixes

There are two updates to the Mesocyclone Detection Algorithm (MDA) with RPG Build 8.0.

1. On the Mesocyclone Detection (MD) product, MDA detected mesocyclones previously have not shown the associated SCIT storm ID. Build 8.0 will include the SCIT storm ID for the cell closest to each MDA detected mesocyclone as part of the MD product.
2. The Digital Mesocyclone Detection (DMD) product includes a number of attributes for each 2D component that comprises a 3D circulation. To support AWIPS OB 6.0 changes, some additional attributes related to the positioning of the 2D components (lat/lon and elevation angle) will be included in the DMD product.

There are two fixes to the MDA with RPG Build 8.0.

1. MDA requires a feature with motion of less than 2.5 m/s to be considered stationary. There was an inconsistency in the graphical vs. text display thresholds for these types of features that has been corrected.
2. In rare cases, strength ranks for circulations with elevated cores were too low. This occurred when there was a strong low level circulation and an elevated circulation with one or more weaker 2D components in between. The MDA

logic has been modified to compute a more representative strength rank in these cases.

RPG Build 8.0 and AWIPS OB 5.0 DMD Incompatibility

Changes were made to the RPG Build 8.0 DMD product to support AWIPS OB 6.0 changes. The slip in the AWIPS OB 6.0 deployment may result in some sites upgrading to RPG Build 8.0 while still using AWIPS OB 5.0. With this configuration, the DMD time-height trend display is blank on both SCAN and the Volume Browser.

If the use of DMD time-height displays is important to a region or office, the AWIPS OB 6.0 upgrade should be scheduled ***before*** RPG Build 8.0 is installed.

5. PPS Updates and Fixes

There is one update to the Precipitation Processing System (PPS) with RPG Build 8.0.

1. A Time Continuity Test (TCT) was performed as part of the Hydromet Rate Algorithm. This test compared precipitation rates from one volume scan to the next, looking for rapid changes that could be due to hardware instabilities. Experience has shown that this type of hardware problem did not occur with the WSR-88D. The TCT has been removed, reducing resource utilization. There are six Hydromet Rate Algorithm adaptable parameters associated with the TCT that are also removed. This will reduce the number of parameters listed on the alphanumeric precipitation products. Also, the notation “TIME CONT: PASSED” or “TIME CONT: FAILED” is removed from the Supplemental Precipitation Data (SPD) product (Figure 28 and Figure 29). The SPD is a text product displayable through AWIPS using the ID WSRSP-Dxxx.

There are two fixes to the Precipitation Processing System (PPS) with RPG Build 8.0.

1. The Hybrid Scan Total Rain Area is listed on the SPD product and on the alphanumeric version of some of the precipitation products. In rare cases with extensive areal coverage of returns (e.g. hurricanes) the area was greater than the 99,999.99 km^2 limit for that field, resulting in ********** listed as the area. This field now allows for areas of 100,000 km^2 or more (Figure 28).

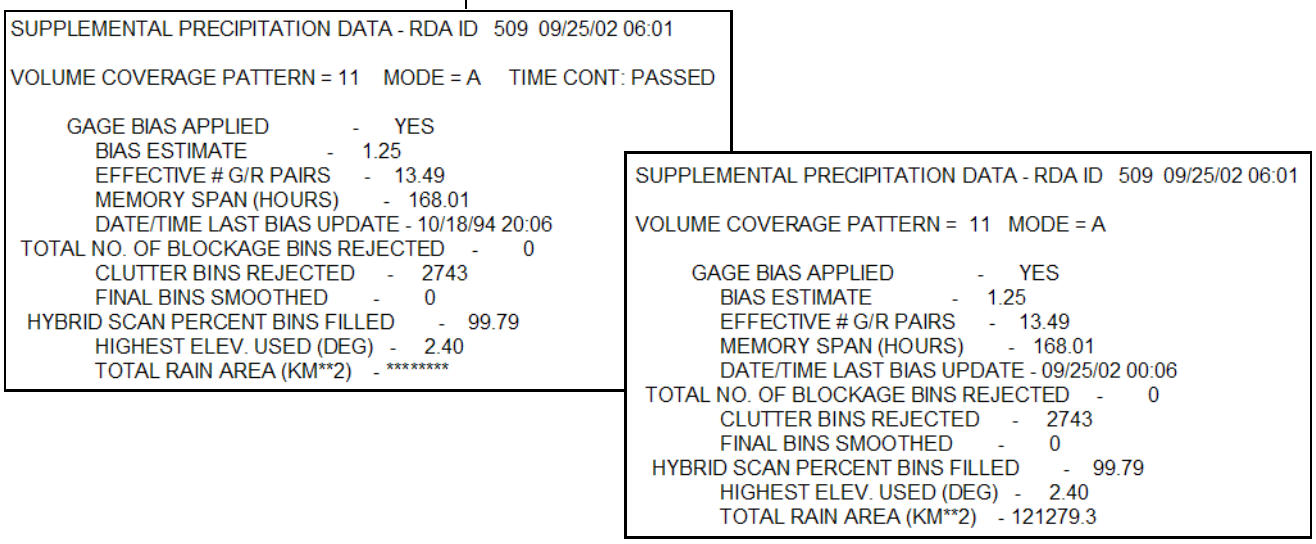


Figure 28. Build 8.0 PPS fix to allow for Total Rain Area in excess of 99,999 km^2. The pre-Build 8.0 version of the SPD is on the left with the Build 8.0 version on the right.

2. The VCP field in the SPD product was designed to accommodate two digit VCP numbers. When VCP 121 was used, there would be ** in this field. This has been corrected, allowing for VCP 121 to be displayed correctly (Figure 29).

6. Fix to Allow VMI Change While in VCP 121

Build 8.0 provides a fix for an error that has occurred when changing the Velocity Measurement Increment (VMI) while operating in VCP 121. For example, VCP 121 was the current VCP and a hurricane landfall was expected. In order to measure the associated high winds, the VMI was changed from .97 kts to 1.94 kts. If Auto PRF was

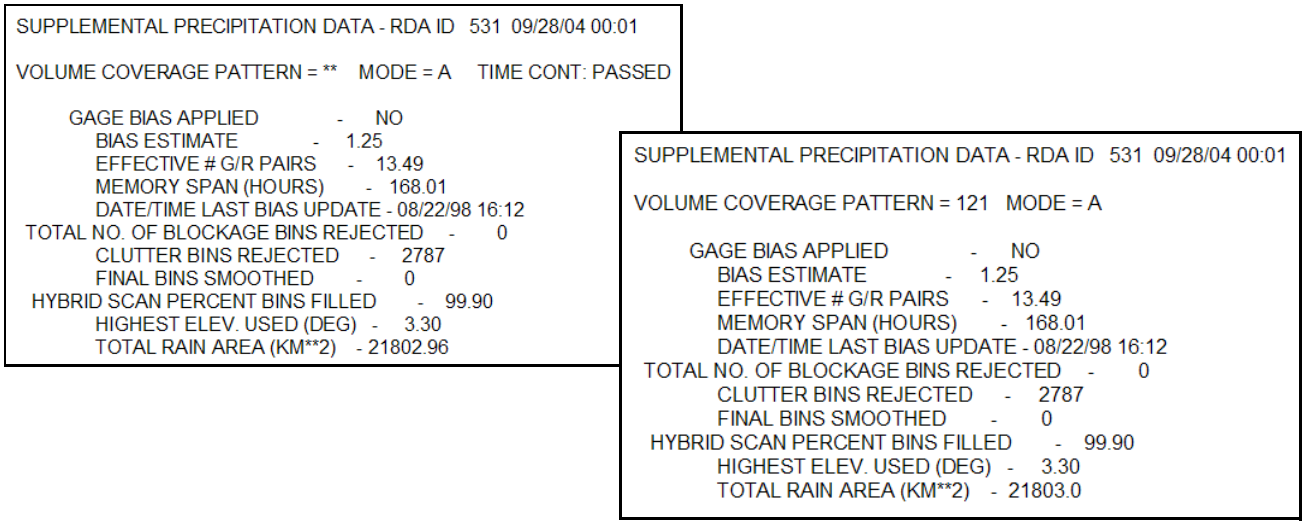


Figure 29. Build 8.0 PPS fix to allow for VCP 121. The pre-Build 8.0 version of the SPD is on the left with the Build 8.0 version on the right.

On (which it normally is), erroneous PRFs could be downloaded, reducing the effectiveness of VCP 121 to minimize range folding. A workaround for this problem was presented on the RPG Build 7.0 Training Page:

http://wdtb.noaa.gov/buildTraining/RPG7/index.html

Build 8.0 corrects this error and the VMI can be changed while operating in VCP 121.

7. RPG/Users Communications Changes

There are a number of communications changes with RPG Build 8.0 that will improve product availability for users. There are also changes to the design of the Product Distribution Comms Status (PDCS) window (Figure 30). Tasks performed at the PDCS window no longer require a password. The Dial-in Users sub-menu has been removed. Any changes to an RPG's group of dial-in users will now be managed through the WSR-88D Change Process. Any requests to change dial-in access to an RPG should be directed to the appropriate WSR-88D Regional Focal Point.

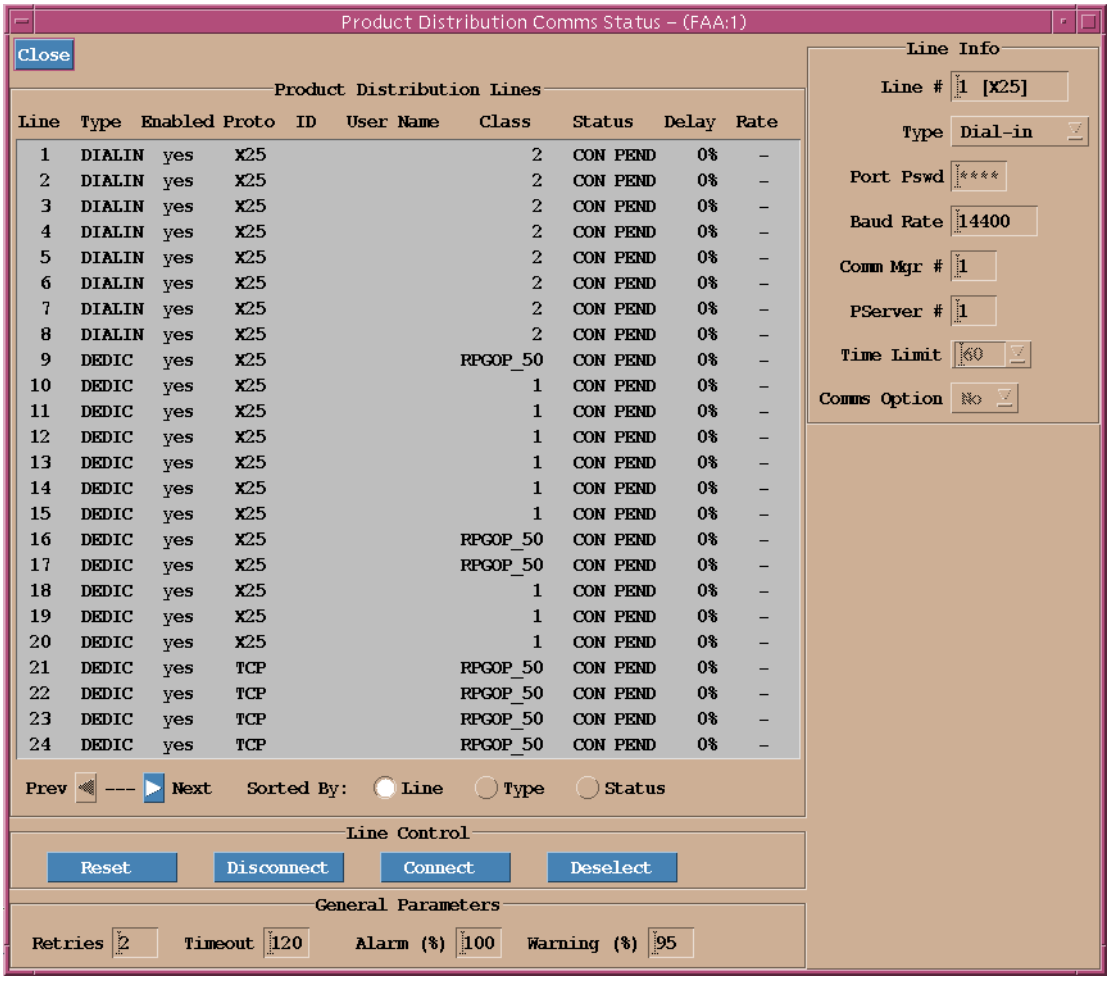


Figure 30. Page 1 of the Build 8.0 PDCS window. Note that a password is no longer required and the design has been simplified.

Improvements to AWIPS WAN Ports

There are communications changes that will improve the availability of products for non-dedicated NWS sites accessing products from an RPG through the AWIPS WAN. There are two changes related to the WAN ports:

1. At each RPG, the number of WAN OTR ports increases to four, plus there is an additional WAN port for dedicated use. The two new WAN OTR ports can be seen on the PDCS window as lines 43 and 44 (Figure 31). The new WAN dedicated port is associated with PDCS line 29. The addition of the two new WAN OTR ports will reduce problems with port contention,

increasing availability for making One Time Requests (OTR)s over the AWIPS WAN.

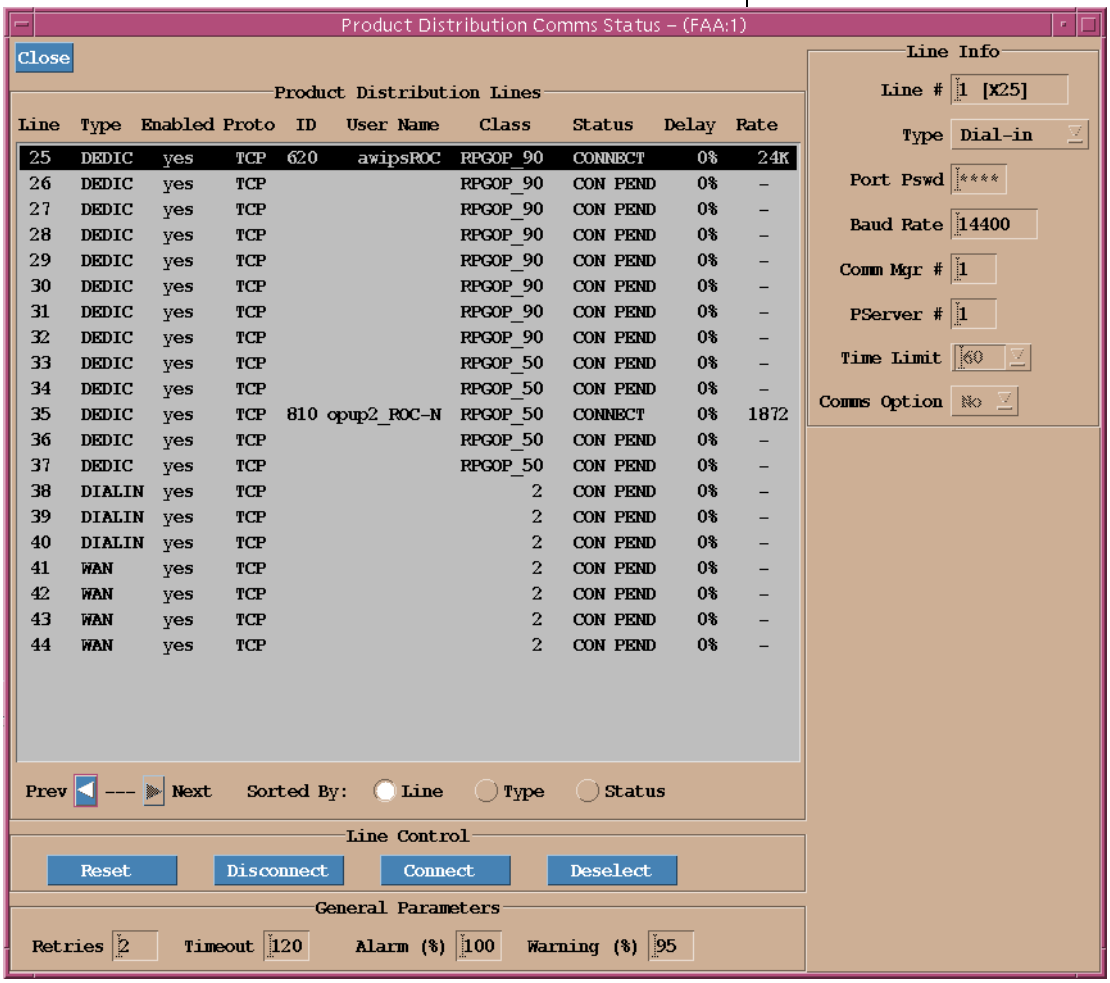


Figure 31. Page 2 of the Build 8.0 PDCS window. The new WAN OTR ports are lines 43 and 44 and the new WAN dedicated port is line 29.

2. With the increase in WAN ports per RPG, there is a need to control the overall WAN bandwidth. The limit for all five ports (four WAN OTR and one WAN dedicated) is 128 kbps on NWS RPGs and 64 kbps on DoD and FAA RPGs. As the number of users simultaneously receiving products increases, the transmission rate to each user will drop. For example, at an NWS RPG, if five users are simultaneously receiving products, the rate per line would drop to 25.6 kbps.

Access to the new RPG WAN OTR ports will continue to be prioritized to ensure adjacent WFOs, appropriate RFCs, and National Centers (SPC, TWC, etc.) have the greatest likelihood of successfully completing OTRs. In parallel with the AWIPS OB 6.0 install, each office will receive updated AWIPS radar file help sheets from ROC Field Support delineating their system's added RPG WAN OTR assignments.

Dedicated WAN Connection

Access to the new dedicated WAN port (line #29) at any particular RPG will generally be limited to one or two adjacent WFOs. Port access is determined by NWS regional directives regarding primary and secondary service backup assignments. The dedicated port will allow an adjacent non-associated WFO to establish a temporary dedicated TCP/IP connection across the AWIPS WAN to their neighboring office's RPG. Just as with other dedicated connections, RPS lists will be used to acquire radar products.

Access to this port will typically be shared by two adjacent WFOs and this port will only allow one connection at a time. Thus it is recommended that offices that share port access coordinate the conditions under which each office can use this port. ROC Field Support has received the port access assignments from each NWS region and will deploy that guidance as part of the package of AWIPS radar file help sheets delivered to each office to support the AWIPS OB 6.0 install.

Another important use of this port is during events where the associated AWIPS system is down, such as for a hardware or software upgrade. One of the adjacent non-associated WFOs with port access could then establish a connection to the

RPG. The AWIPS WAN would then be used to redistribute the radar data from the associated WFO (the office whose AWIPS is down) to radar central collection.

Finally, this port could be used to facilitate NWS service backup operations. The adjacent NWS office providing backup would be able to access radar data through the dedicated connection and redistribute that data for radar central collection.

Communications Changes for FAA FTI

This section applies to RPGs that have FAA radar display systems associated to them.

On the PDCS window, line numbers 21-24 (Figure 30) are reserved for implementation of communications improvements as part of the FAA Telecommunications Infrastructure (FTI) project. The FAA FTI project will modernize the telecommunications systems supporting the nation's air transportation system.

These lines will be upgraded from X.25 analog service to a private IP digital WAN provided by the FAA FTI contract. The timing of these transitions will vary depending on the type of FAA display system. For example, some of the lines that connect the RPG to the FAA's Weather and Radar Processor (WARP) system will transition directly from the analog service to the FTI IP WAN. For other WARP systems, the initial transition will be to an FTI analog service, with a subsequent transition to the FTI IP WAN. Other FAA systems such as the Integrated Terminal Weather System (ITWS) and the Micro-En Route Automated Radar Tracking System (MEARTS) may be initially transitioned to FTI analog, but will not be converted to the digital FTI IP WAN until a subsequent build.

As WARP systems transition to FTI digital service, the WSR-88D Comms Documentation on the ROC Web page for each system will be updated. Local office WSR-88D focal points will be advised of the change and be asked to download the updates.

Improvement in Product Availability

RPG Build 8.0 also provides a significant improvement in product availability through the WAN OTR process. The Default Generation List has been modified to add products previously not available or in some cases only available in one weather mode. With Build 8.0, the following are added to the suite of products previously available through AWIPS WAN OTRs:

4 bit Z, V, and SRM for all elevations $\leq 4.5°$ for both weather modes

8 bit Z and V for all elevations for both weather modes

DMD for all elevations in Precipitation Mode

All Snow products (#144-151) for both weather modes. The Snow products are currently scheduled to be available for display with AWIPS OB 7.0 (Fall 2006).

LRM, VIL, DVL, and DSTP for both weather modes

8. RPG System Status Log Product

There is a requirement to archive both RPG products and RPG system status information contained in the RPG System Status Log. Central collection of Level III products satisfies the need for archival of RPG products. With Build 8.0, the requirement for archiving RPG system status information is met by the creation of the RPG System Status Log

product. This product provides system status information that can be used for investigations of issues such as system performance problems.

The RPG System Status Log product, e.g. OUNRSLTLX, is centrally collected and archived at NCDC, similar to the process for Level III products.

ORDA Build 8.0 Operational Impacts

The information in this section reflects the predeployment state of knowledge of the operational impacts of ORDA Build 8.0. Each of the following impacts is presented:

1. RDA HCI at the MSCF
2. Clutter Bypass Map range placement error fixed
3. ORDA related changes to CFC and NEXRAD Unit Status products

A Fix That Did Not Make Build 8.0

An operational impact was presented in the ORDA Build 7.0 training that was expected to be fixed in Build 8.0. In the Batch elevations, there is a ring of slightly reduced reflectivities corresponding to the boundary at the end of the first trip in the associated velocity data. The fix for this impact did ***not*** get implemented with Build 8.0.

1. RDA HCI at the MSCF

With ORDA Build 8.0, the RDA HCI (Figure 32) will be accessible by clicking on the RDA HCI button at the MSCF. The RDA HCI display has a design philosophy similar to the RPG HCI. For example, the design provides a great deal of status information from the main page.

The example in Figure 32 shows the RDA HCI window appearance with no login, i.e. no password provided. It is intended for use primarily by

the technicians, though meteorological staff may occasionally use it to assess system status.

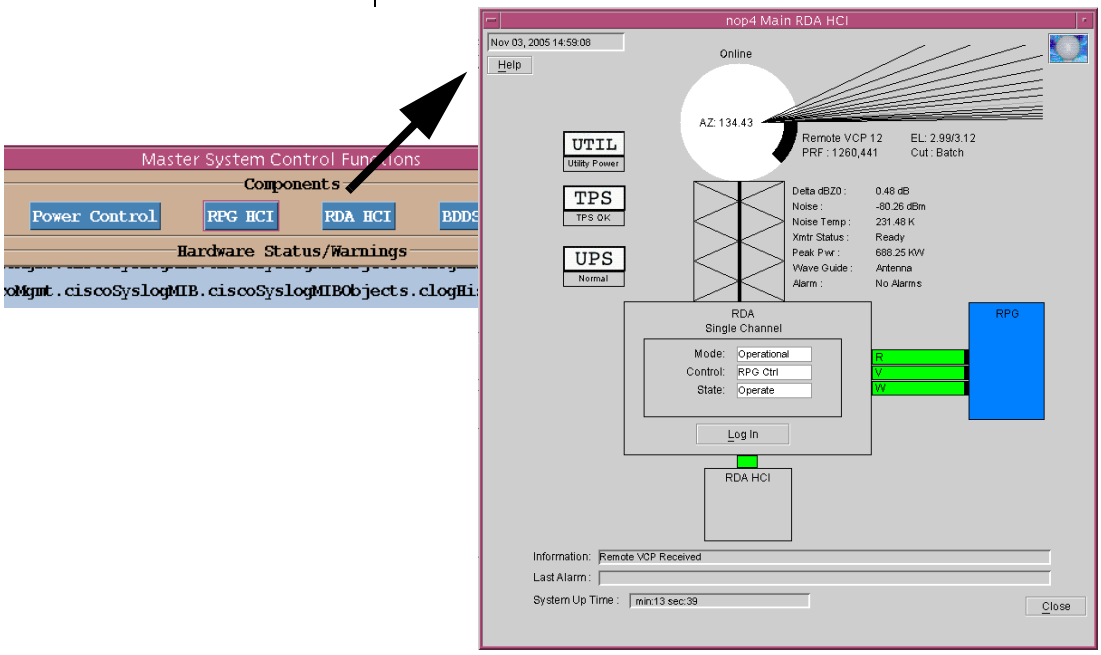


Figure 32. RDA HCI window accessed from the MSCF.

The RDA HCI can be used to generate new Clutter Filter Bypass Maps (Figure 33). This would allow a meteorologist and a technician to work together to generate and review the Bypass Maps, in order to get the best possible quality.

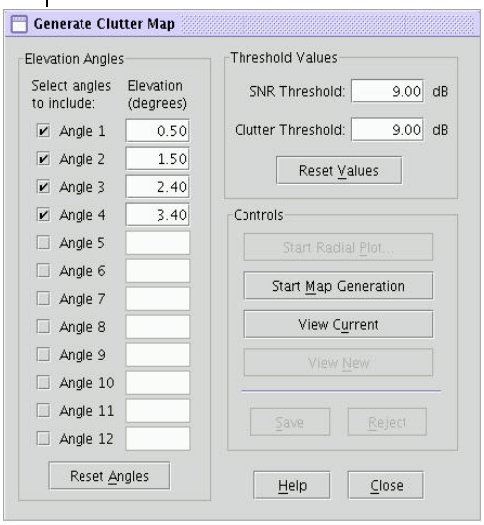


Figure 33. Bypass Map generation window from the RDA HCI.

2. Clutter Bypass Map Range Placement Error Fixed

With ORDA Build 7.0, a 1 km range placement error occurred when generating Clutter Filter Bypass Maps. Each bin identifying clutter on the map was placed 1 km closer than the actual target. On the radar products, this resulted in a small fringe of unfiltered clutter on the downrange edge of the actual clutter. This error primarily affected offices with large/hard targets outside of the immediate local RDA area, such as mountain ranges. See the “Essential Details” section on the ORDA Build 7.0 Training Page (URL on page 2 of this document) for additional information on this error.

With ORDA Build 8.0, this error has been corrected. Though all sites are ***encouraged*** to generate new Bypass Maps after Build 8.0 is installed, ***sites that have implemented the Build 7.0 workaround must generate new Bypass Maps***. For guidance on setting threshold values for the generation of Bypass Maps (Figure 33), see the “Essential Details” section on the ORDA Build 7.0 Training Page (URL on page 2 of this document).

3. ORDA Related Changes to CFC and NEXRAD Unit Status Products

AWIPS OB 6.0 will have ORDA related changes to a couple of products. The Clutter Filter Control (CFC) product will reflect the change from low and high segments (legacy RDA) to segments 1-5 (ORDA). Figure 34 has an example of the One Time Request window at AWIPS for the CFC and a sample CFC product. The elevation segment dropdown menu has been updated to include segments 1-5.

The NEXRAD Unit Status product will report the RPG and RDA Build numbers as well as the redundant RDA channel number (if applicable). See Figure 35.

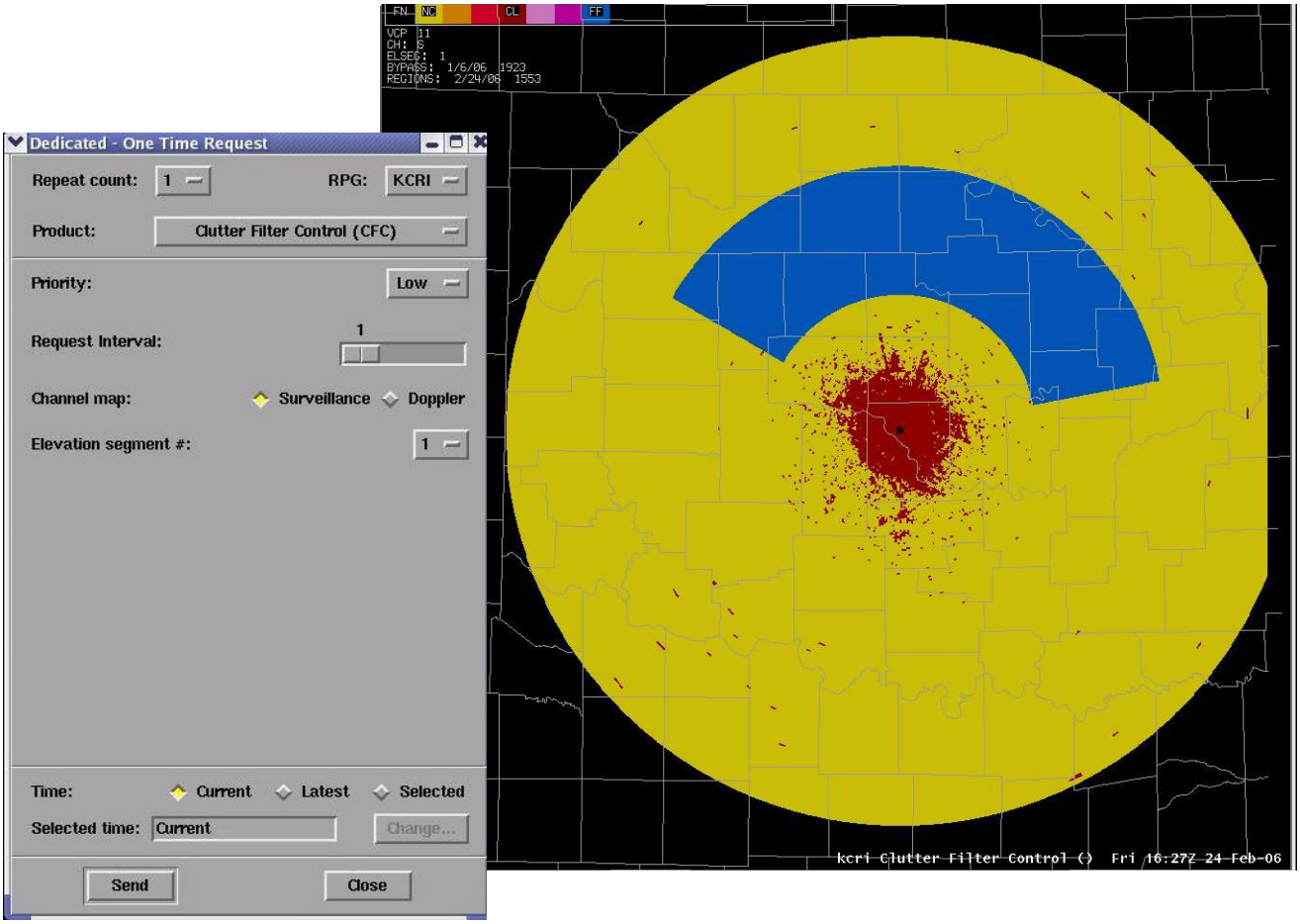


Figure 34. Updated Clutter Filter Control request screen and product.

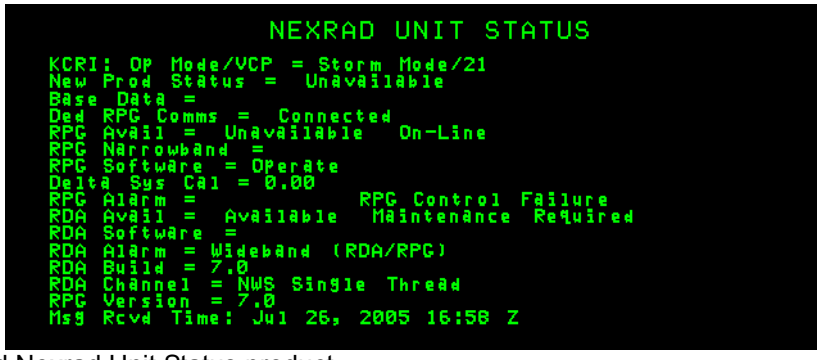


Figure 35. Updated Nexrad Unit Status product.

Summary

This document presents the pre-deployment state of knowledge of the operational impacts of ORDA/RPG Build 8.0. This build makes changes to both the RDA and RPG. The most significant impacts come from the changes at the RPG, specifically the Mode Selection Function.