

## RVP7 V23 Release Notes

These notes cover changes made to the RVP7 code since release V22 of 24 July 2001. If you are upgrading from an earlier release, please read those notes also.

### Bug Repairs

1. A bug was repaired in the *Simulate Output Rays* option of the **M+** menu. An incorrect number of data words would be output if the simulator was switched On. This bug was introduced in V22.
2. A bug was repaired in the RVP7's internal trigger generator that would sometimes cause a momentary 27ns spike to appear on a trigger output line. The triggers were fine during steady-state operation, but the spike could appear during PRF/PW changes. We would like to thank the dedicated staff at MELCO and the Hong Kong Observatory for helping track down this error, which has been present in all RVP7 releases so far.
3. A bug was repaired in which the Burst Pulse Tracker (BPT) timing offset would shift to an incorrect value when the pulsewidth was changed from within the **Mt** menu. This setup menu is the only context from which this error would occur, i.e., there was no problem with the SETPWF opcode or with external pulsewidth changes requested by IRIS.
4. A few radar sites have reported occasional problems with the RVP7 noise sampling procedure. Although we have not been able to duplicate these reports at SIGMET, some changes were made to the timing of the RVP7's noise sampling routines that may address these problems.
5. The settings for the speckle removal properties of the 2-Dimensional 3x3 filter have been adjusted to correct a problem during Dual-PRF Random-Phase processing. The filter was correctly filling in the missing reflectivity data within the Dual-PRF "gap", but it was also rejecting the valid data that are generally surrounded by a pair of rays having invalid gap bins. The result was an alternating "stitching" pattern in the reflectivity data within each of the PRF gaps. With this repair, those gaps are now very smooth and nearly invisible.

### New Features

1. The RVP7 now paces itself at its "normal" processing rate, even when the actual processing algorithms are being skipped due to an explicit skip request, or due to a configuration error. Also, the front panel red LED will flash briefly as each ray is skipped (assuming it has been setup as an activity indicator in the **M+** menu). Previously, the processor would skip rays at full I/O output speed and with no LED indication of activity.
2. The SOPRM command now has a longer parameter list and takes additional XARGS. The XDR correction (Linear Depolarization Ratio Bias) is the first new parameter to be added.

3. The RVP7 now supports a full complement of Dual-Polarization modes. In particular it can now measure *LDRH* and *LDRV* (Linear Depolarization Ratios),  $\Phi_H$ ,  $\Phi_V$ ,  $\rho_H$ , and  $\rho_V$  (Complex covariance),  $\Phi_{DP}$ , *KDP*, and  $\rho_{HV}$  (Differential phase parameters), and *ZDR* (Differential reflectivity). Polarization data are available in all four transmit modes (H-Only, V-Only, Alternating, and Simultaneous), as well in both single-receiver and dual-receiver configurations. The full polarization data set is only available in PPP mode, although *ZDR* can be requested in all modes for dual-receiver systems.
4. GPARM output word #57 now holds bits describing how (T/Z/V/W) are computed from dual-polarization data.
5. Illegal parameter requests in the PROC command are now handled in a more creative way. Individual parameters that can not be computed (e.g., *ZDR* in H-Only transmit mode) will now be output as zeros, and will cause Bit-15 of GPARM Output #9 to be set. However, the RVP7 will still process all of the valid requested parameters, even though some subset of them are illegal. Previously the entire data set would be zeroed if any of the parameters could not be computed. This change is very convenient when displaying multiple polarization parameters in **ascope** and switching freely between modes.
6. Two changes have been made in the licensing of RVP7 features.
  - The Random Phase (RPH) mode is now available to all third-party developers. Previously, RPH mode was only available within the RVP7 when the processor was attached to an IRIS system.
  - The polarization features within the RVP7 are now only available through special license. The standard ROM upgrades and releases will be for single-polarization radars only, and all setup questions related to polarization are removed for simplicity. Please contact SIGMET to obtain the polarization version of any ROM release, denoted by a "P" suffix after the version number.

## Setup Changes

1. The following polarization questions now appear in the **Mp** menu:

```
Polarization Params - Filtered:YES  NoiseCorrected:YES
PhiDP - Negate: NO ,  Offset:0.0 deg
KDP    - Length: 5.00 km
T/Z/V/W computed from:  H-Xmt:YES   V-Xmt:YES
T/Z/V/W computed from:  Co-Rcv:YES  Cx-Rcv:NO
```

This is a much simpler and orthogonal set of questions than before. The first question decides whether all polarization parameters will be computed from filtered or unfiltered data, and whether noise correction will be applied to the power measurements.

The second and third questions define the sign and offset corrections for  $\Phi_{DP}$  and the length scale for *KDP*. These are the same as they used to be.

The fourth and fifth questions control how the standard parameters (Total Reflectivity, Corrected Reflectivity, Velocity, and Width) are computed in a multiple polarization

system. Answering *YES* to *H-Xmt* and/or *V-Xmt* means that data from those transmit polarizations should be used whenever there is more than one choice available. Thus, these selections only apply to the Alternating and Simultaneous transmit modes. Likewise, answering *YES* to *Co-Rcv* and/or *Cx-Rcv* means to use the received data from the co-channel or cross-channel. The receiver question will only appear when dual simultaneous receivers have been configured.

A typical installation might use *H-Xmt:YES*, *V-Xmt:YES*, *Co-Rcv:YES*, *Cx-Rcv:NO*. This will compute (T/Z/V/W) from the co-polarized receiver using both H&V transmissions. Including both transmissions will decrease the variance of (T/Z/V/W); although some researchers prefer excluding *V-Xmt* because that is more standard in the literature. Also, if your polarizations are such that the main power is returned on the cross channel, then you will probably want *Co-Rcv:NO* and *Cx-Rcv:YES*.

2. The two questions:

**Data Polarization - 0:Horiz, 1:Vert, 2:Alternating : 0**  
**Noise Polarization- 0:Horiz, 1:Vert, 2:Alternating : 0**

have been removed from the **Mt** setup menu. These (rather confusing) questions are no longer necessary.

3. A new question has been added to the **Mc** setup menu:

**Dual-LNA/Rcvr single-channel switched mode: NO**

for dual-polarization single-receiver systems. This question decides whether you have a single LNA and IF-Amplifier that switches between H&V (the typical case); or two separate receivers, each hardwired to H and V, with switching performed after the IF amplifiers. The question affects how noise levels are measured and applied to the data.

4. The Real-Time-Monitor text for transmit polarization now reads “TxPol:H”, “TxPol:V”, “TxPol:Alt”, or “TxPol:H&V”. This emphasizes that it is the transmit polarization that is being reported.
5. The factory default for *Minimum power for valid burst pulse* in the **Mb** menu has been changed from -30dBm to -15dBm. This is more consistent with the power level that is actually required to make a good burst phase measurement. The change makes it less likely for background noise to confuse the AFC algorithms when the transmitter is off.