RVP7 V12 Release Notes

These notes cover changes made to the RVP7 code since release V11 of 14 September 1998. If you are upgrading from an earlier release, please read those notes also.

Bug Repairs

1. Repaired a bug in which the GPARM measured PRT at the start and end of each ray was not being filled in when the number of acquired pulses was less than three. This would cause the PRF readout in ASCOPE to be dead whenever timeseries versus range (and nothing else) were being plotted.
2. Repaired a bug in which dynamic angle syncing would cease functioning if several hundred input characters were received while the SIO serial line was configured for RCPXMT.

New Features

1. The RVP7 now supports FIR matched filters that can be more than twice as long as before. You may now design a 125-meter bin resolution filter that is up to 6.25 μsec (225 taps) in length. Previously, the longest filter that was possible at that resolution was 2.92 μsec long. The longer filters allow the RVP7 to work optimally with radar pulsewidths up to four or five microseconds in length.

   To run with the longer filters requires the following changes.

   - Remove the 84-pin PLCC chip at U40 (it will probably be labeled "RVP7–2–U40"), and install the upgrade chip "RVP7–3–U40". A proper extractor will make this job easier; but you can also remove the PLCC by gently tapping it out via the hole in the circuit board, using a short dowel and small hammer.
   - Install two additional 84-pin PLCC FIR filter chips at U2 and U3. These sockets will have been empty until now. If they have become dusty, clean them first with a non-residue spray contact cleaner that is approved for electronic sockets.
   - Install ROM version 12 (or higher) code at U62.

   Please contact SIGMET to obtain these upgrade parts for existing systems on an as-needed basis. All new RVP7s will now begin shipping with the upgraded parts already installed. Note that you can install ROM versions 12 and higher *without* making any changes to U40, U2, and U3. All new code, and all new features in the future, would run fine; only the longer filters would not be available.
2. Improvements were made to the algorithm for fitting the coefficients of the ideal prototype FIR matched filter into quantized integer units for the hardware chips. The RVP7 is now more likely to find a mapping that results in a lower residual DC gain. Furthermore, there is now a much more automatic search procedure for finding optimal filters (see Setup Change #1.)

3. The RVP7 now allows two separate noise measurements to be maintained at each pulsewidth for the horizontal and vertical channels of a dual-polarization receiver. Previously only one representative noise level was used for the data collected at both polarizations. This could result in a ZDR bias at low reflectivities in radars that are built with a separate low-noise-amplifier (LNA) in each polarization channel.

4. The GPARM output words related to noise levels now always refer to the results obtained for the horizontal polarization channel. In addition, GPARM output word #50 is now an indication of the ratio of horizontal noise power to vertical noise power, expressed in hundredths of dB. This word was previously unused.

Setup Changes

1. The "Ps" plotting command now supports a new "**$**" subcommand to perform an automatic search for optimal (DC gain of zero) filters in the vicinity of the current one. As an example, suppose that we wanted an optimal filter that was approximately 2.2 μsec long and 650 KHz wide. We would first use the "**I/i**" and "**W/wN/n**" subcommands to manually move to that starting point. Typing "**$**" would then print a dialog line in which the search span length and width are chosen. You may keep the indicated values or type in new ones, just as for all RVP7 setup questions. The search begins when the spans are accepted:

```
Navg:3, FIR:2.20 usec (79 Taps), BW:0.650(0.588) MHz, DC-Gain:-61.8 dB
Freq:35.975 MHz,  Pwr:-64.2 dBm(-60.8*us),  AFC:0.00% (NoBurst) $

Filter Search:  Length +/- 5 taps, Width +/- 0.50 MHz 3 .2
Filter Search:  Length +/- 3 taps, Width +/- 0.20 MHz
Trying 82 taps, 0.818 MHz... Done

Navg:3, FIR:2.17 usec (78 Taps), BW:0.662(0.615) MHz, DC-Gain:ZERO
Freq:35.975 MHz,  Pwr:-64.4 dBm(-61.0*us),  AFC:0.00% (NoBurst)
```

   The search procedure may require a few seconds to a few minutes, depending on the length and width spans that are being scanned. During this time, a progress message is printed showing the length and width currently under examination. You may type "**Q**" to abort the search and retain the original filter settings. When the search completes normally, it will print "Done" and replace the old filter setting with the best ones that could be found.

2. The following two setup questions now appear in the "**Mt**" trigger setup section in support of New Feature #3. :

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

   The first question is a rewording of one that already existed in that spot, and specifies the polarization being used for data acquisition and processing.

   The second question is new, and selects the polarization to use during noise sampling. The "0" and "1" settings will choose fixed horizontal or vertical polarization during each

noise measurement, and should be used both for non-polarization radars, and polarization radars that have only one LNA that is shared between each channel. The noise level from the single polarization will be used for all subsequent data processing in either channel.

The "2" setting will request alternating polarization during each noise measurement. The measurement itself will take twice as long to complete (512 pulses, rather than 256), and two separate noise levels will be stored. All subsequent horizontal/vertical data will be processed using the noise level specifically for that polarization.

The "**M***" manual noise setup questions have also been changed to support the two separate noise levels, and now appear as shown below. Note that only one powerup setting is supported, as that number is merely a rough approximation of the expected receiver noise.

```
PW #0 Noise – Powerup:–75.00 dBm (Current H:–77.23 V:–76.84)
PW #1 Noise – Powerup:–75.00 dBm (Current H:–75.00 V:–75.00)
PW #2 Noise – Powerup:–75.00 dBm (Current H:–75.00 V:–75.00)
PW #3 Noise – Powerup:–75.00 dBm (Current H:–75.00 V:–75.00)
```