

## RVP7 V05 Release Notes

These notes cover changes made to the RVP7 code since release V04 of 5 December 1997. If you are upgrading from an earlier release, please read those notes also.

### Bug Repairs

1. A sign reversal has been corrected in the power spectra and time series reported by the RVP7 — approaching targets were displayed in the "away" side of the spectrum, and vice versa. The velocity parameter itself was okay, however. A related repair is that ASCOPE's simulated digital time series data (supplied via the LSIMUL command) are no longer affected by the setup question "IF increases for an approaching target". It used to be that velocities computed from the simulated data would be negated by that setup question.
2. The RVP7's trigger generator hardware is no longer reinitialized when a SOPRM command is executed (since there are no trigger/timing parameters that depend on those data). This eliminates a missing trigger that would sometimes occur when the RVP7 would alternate between different types of processing within the ASCOPE utility. This was not a problem with IRIS/INGEST since the RVP7 remains in a fixed mode while those data are acquired.
3. The PWINFO and SETPWF commands have been improved so that they only make changes to the trigger waveform table when the new values in the command are different from the current operating values. This allows the RVP7 to run smoother (no interruption of triggers) when these commands are reissued with identical values.
4. A bug was repaired in which the watchdog autoreset would be activated when scope plots were paused with the "." command.
5. The residual clutter LOG noise margin setup parameter is now implemented properly. Previously it was being ignored, i.e., the LOG threshold would not be increased when corrected reflectivity was computed at bins that contained clutter.

### New Features

1. The Random Phase signal processing major modes are now fully supported in the RVP7. The various random phase spectra that are computed within the RVP7 can be viewed by the IRIS/ASCOPE utility, and the parameter modes can be used both by ASCOPE and IRIS/INGEST. The Random Phase algorithms will be shipped in all future versions of the RVP7, but the feature requires licensing through IRIS in order to be used.
2. The random phase whitening algorithm has been changed so that the SQI test that used to be performed prior to whitening a trip is no longer done. Rather, some degree of whitening will always be performed, and we then rely on an SQI test on the final spectra to choose whether the whitened or original data are better. The final SQI test has always been performed anyway; thus, the earlier SQI test prior to whitening was redundant, as we always had the option of discarding a spectrum that was made worse.

3. In a related change, the "Final Spectrum" displayed by ASCOPE in random phase mode is now the one that was actually chosen by the final SQI criterion. Previously the "Final Spectrum" used to be the cleaned alternate trip after final application of the clutter filter. Thus, the final spectrum that you see will now always match the parameter data that are plotted.
4. The algorithms for performing statistical power correction on signals that saturate the IF-Input A/D converter are now working in all parameter and time series processing modes. Previously only the noise power calculation had the statistical correction applied to it. The dBZ, dBT, time series, and power spectrum values computed by the RVP7 are now accurate over the extrapolation range specified in the "Mp" setup question "Linearized saturation headroom:". The default value is 4dB, and the limits are 0-6dB. An additional 0.20usec/bin/pulse of DSP time is required when a headroom greater than zero is selected. This additional time is small but perhaps significant in single-board systems that are already operating near their maximum limit.
5. The ENDRAY signal now toggles with a 1  $\mu$ sec active low pulse at the end of each ray whenever enabled by the OPPRM flag bit. Previously this signal was always inactive. Note that ENDRAY does not have the option of pulsing at the beginnings of rays, and that the OPPRM flag bit to request that is ignored. Flagging the ends of rays makes the most sense because the pulses contributing to each ray might overlap each other, and because the RVP7 only supports dynamic angle syncing (which triggers the endpoints of rays).
6. The RVP7 now returns a version number of 35 when the processor is configured to run in RVP6 compatability mode. This fudged value will appear in the SCSI Inquiry Command reply, and in the GPARM parameter packet. Elsewhere, the correct RVP7 code version number will always appear. The reason for doing this is so that the RVP7 appears (to the host computer) to be a modern RVP6 with all of the latest opcodes and features.
7. Some quantization errors have been removed in the computation of dBZ and dBT. These errors were less than 0.08 dB in magnitude, and could only have been detected in the 16-bit reflectivity output format.
8. The status of the burst pulse and AFC feedback loop are now reported in bits 8-10 of GPARM immediate status word #2. This is the same set of states that are reported in the AFC section of the Ps command, i.e., DISABLED, MANUAL, NOBURST, WAIT, LOCKED, and TRACK. The host computer can now monitor these AFC states so that errors could be reported.

## Setup Changes

1. The TTYOP I/O interface command has been expanded to allow monitoring of the data being displayed in the various Chat/Plot modes. The IRIS/DSPX utility will now popup a simulation of the oscilloscope screen whenever any of the plotting commands are invoked. The data continue to appear on the real oscilloscope in the usual manner; but they are also visible in the new X-window. This permits running the plot commands on a remote RVP7 via the connecting network.

2. There is a new setup question in the "M+" debugging section by which the noise level for simulated data may be set. This level is measured in decibels down from the strongest possible signal, and corresponds to the numbers on the power level slide bars of the ASCOPE digital signal simulator. The ability to set the noise level permits testing the RVP7's thresholding algorithms more thoroughly. The default noise level is -50dB.
3. You may now choose the window that is used in 1) the design of the FIR matched filter, and 2) the presentation of the power spectra for the various scope plots. The new setup question appears in the "Mb" section, and the choices are rectangular, Hamming, and Blackman. Previously only the Hamming window was available, and it is still the best overall choice. The Blackman window is useful if you are trying to see spectral components that are more than 40dB below the strongest signal present. FIR filters designed with the Blackman window will have greater stopband attenuation than those designed with the Hamming window, but the wider main lobe may be undesirable. The rectangular window is included mostly as a teaching tool, and should never be used in an operational setting.
4. The maximum update rate of the TTY in any of the plotting modes is now 5 lines per second. Previously it was 10 lines per second, which was too fast for certain terminals and chat interfaces.
5. The factory default for the setup question regarding RVP6 backward emulation is now FALSE; previously it had been TRUE. This was done because the RVP7 is beginning to support new opcodes, and because IRIS now properly recognizes the DSP type of "RVP7".