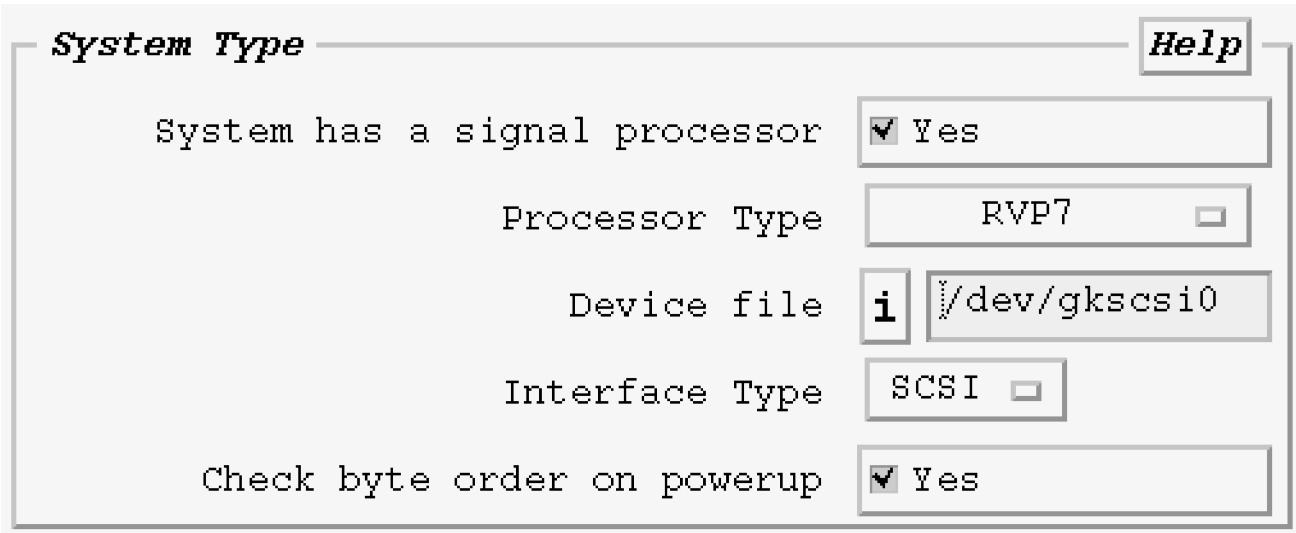
8.2 Radar Video Processor

8.2.1 System Type



- *System has processor* — Select "No" is this for an Analysis system or "Yes" if this is for a Radar system. If "Yes" is selected, the following options appear in the next section.
- *Processor type* — This question can be answered by selecting one of four options:
  - RVP6 No-AUX
  - RVP6 With AUX
  - RVP7
  - RVP8
- *Interface type* — Select either "SCSI", "Native" or "Socket".

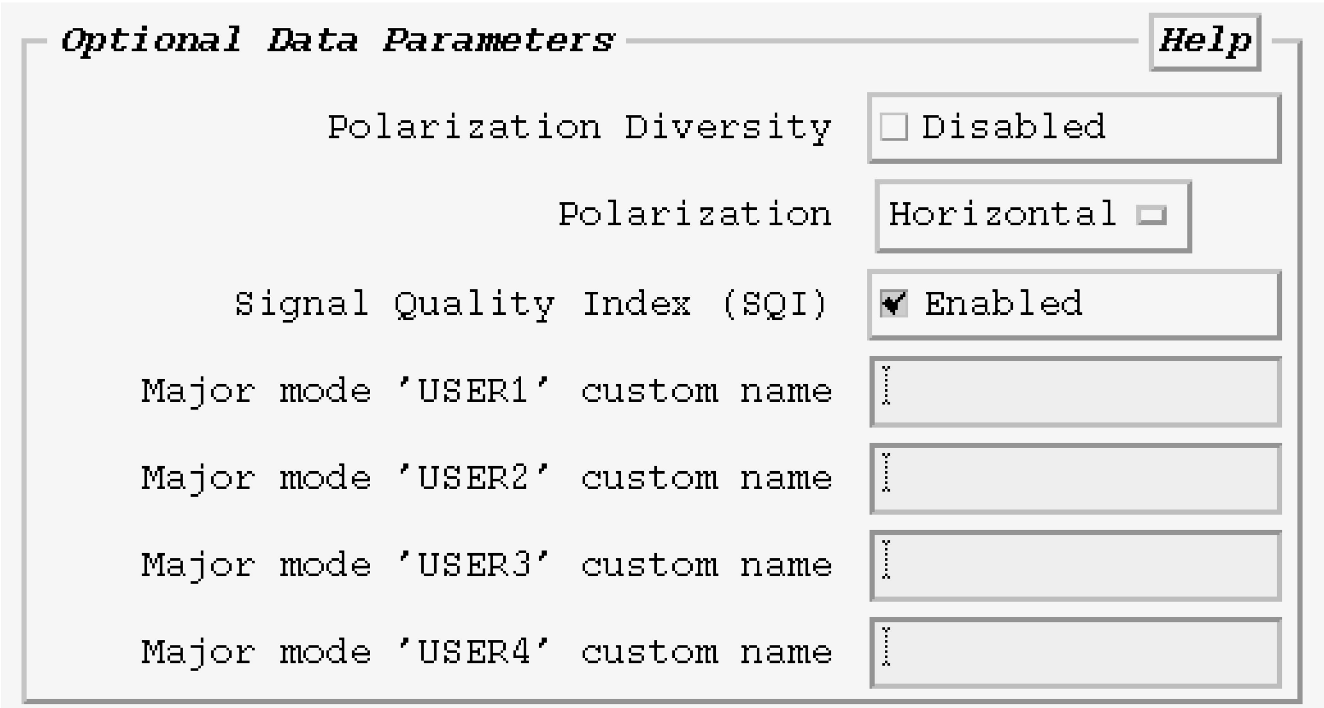
For SCSI interfaces, you will see the following question:

- *Device file* — Type in the path to your SCSI device.

For Socket interfaces, you will see the following two questions:

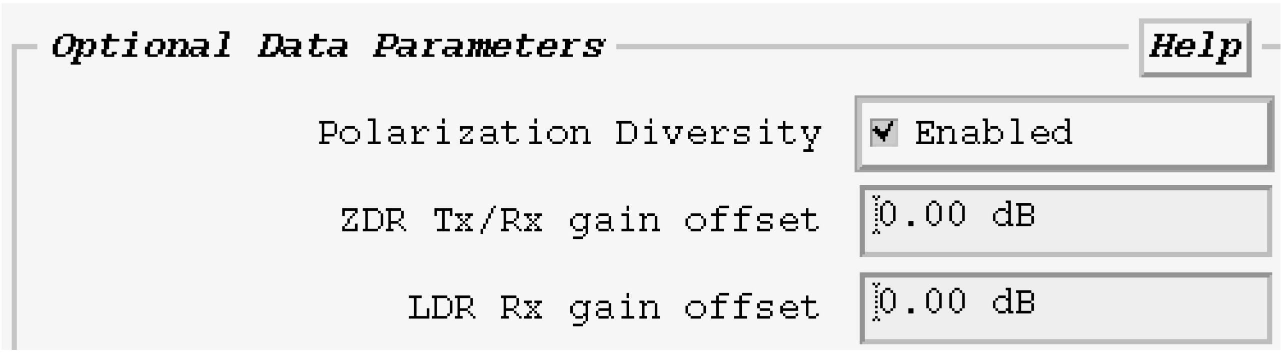
- *RVP host name or IP Address* — Set the host name with the processor.
- *RVP Port* — Set the port number, normally 30740.
- *Check byte order on powerup* — The recommended setting is "Yes" set it to "No" on systems with a preprocessor which does not support these opcodes.

8.2.2 Optional Data Parameters

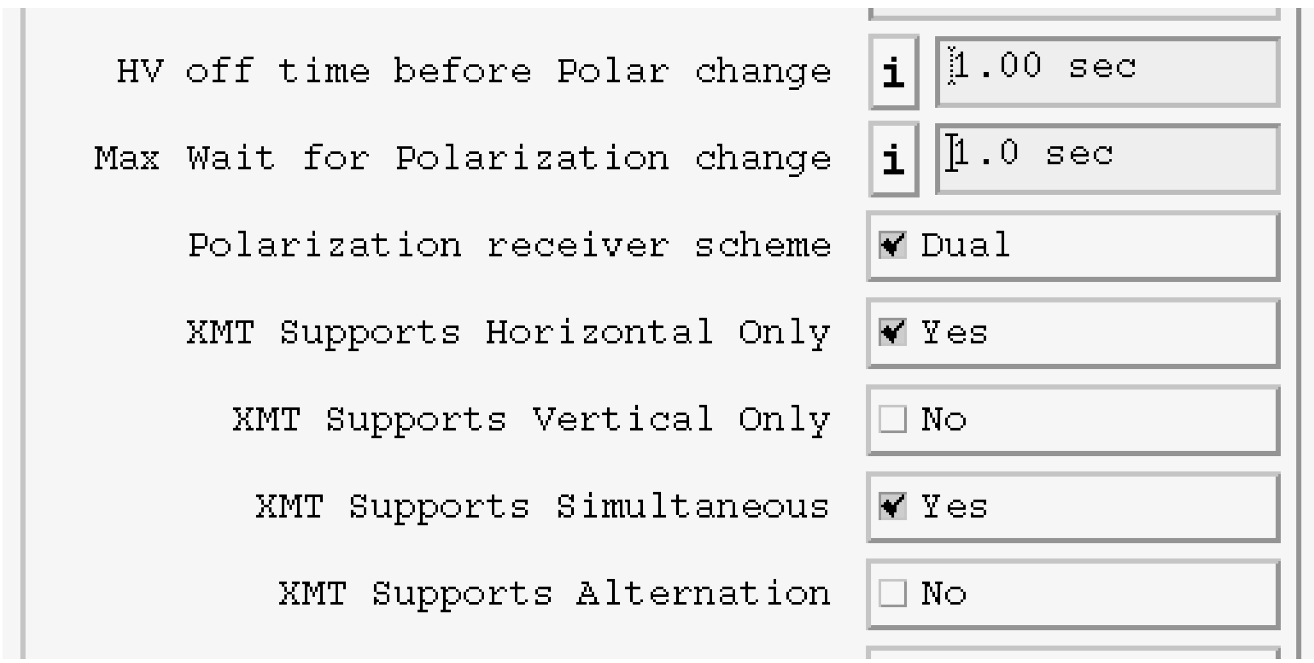


- *Polarization Diversity* — Use this to select whether your radar supports multiple polarizations. Shown above is an example with polarization diversity turned off.
- *Polarization* — For fixed polarization radars, enter the type of polarization here. Valid choices are “Horizontal” and “Vertical”.
- *Signal Quality Index* — Select here if you wish to allow the recording and display of SQI. SQI is only available on RVP7 or later processors. This will enable the SQI button in the task configuration menu, and in **ascope**.
- *Major mode ’User 1’ custom name* — These are optional fields which enable customers to take advantage of the extensibility of the RVP 8 API (application program interface) and specify customized Major modes (for more information, refer to RVP 8 Manual – Appendix F.

For radars with polarization diversity, you will see the following menu:



- *ZDR Tx/Rx gain offset* — This is an offset used on ZDR systems if there is a difference between the gain at the two different polarizations which results in a bias. This number is added to the ZDRs otherwise computed. It is stored to the nearest 1/16 of a dB.
- *LDR Rx gain offset* — This is an offset used on LDR systems if there is a difference between the gain at the two different polarization receivers which results in a bias. This number is added to the LDRs otherwise computed. It is stored to the nearest 1/100 of a dB.



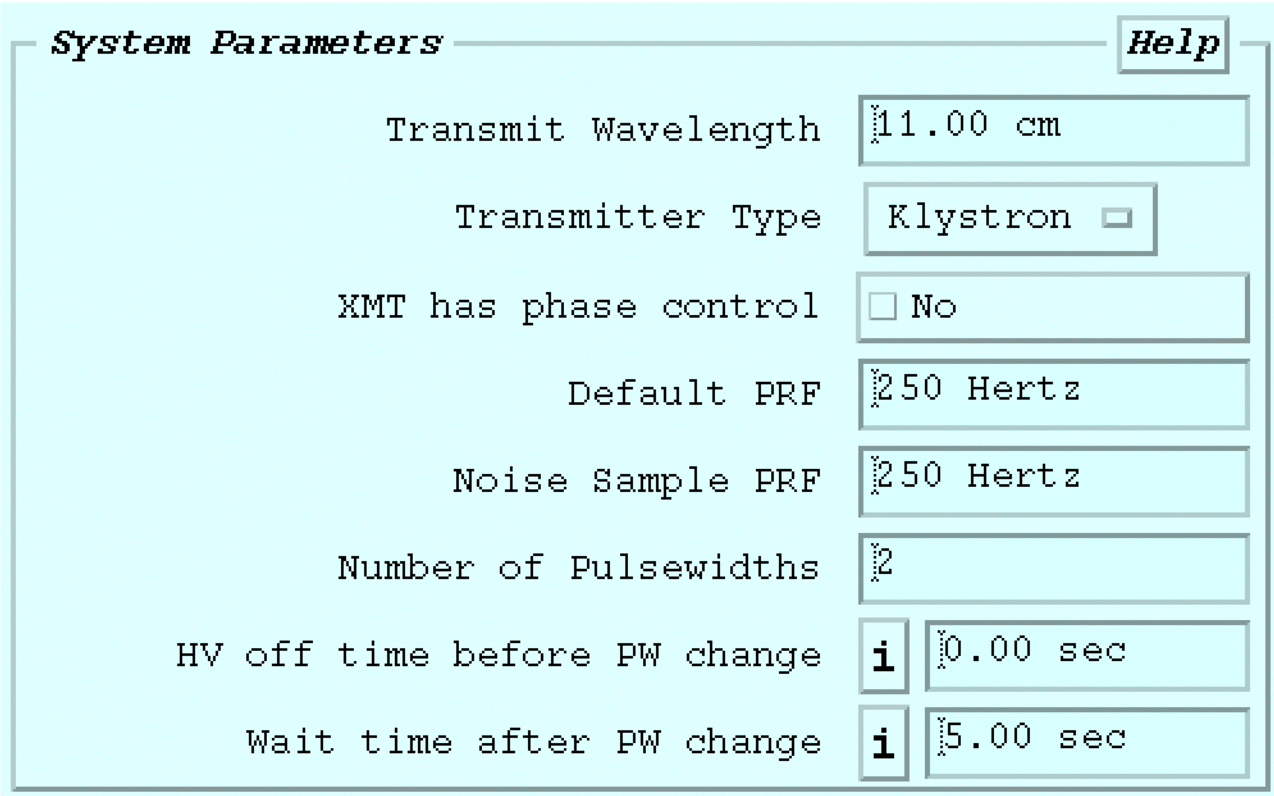
In this section, you enter the characteristics about how your radar handles polarization.

- *HV off time before Polar change* — Whenever the transmit polarization is changed, the dsp library will turn off the high voltage this much in advance of the switch. This is needed on some systems to prevent arcing while switching. Entering a value of zero disables the feature.

- *Max Wait for Polarization change* — Enter the worst case time it could take to switch polarization. The dsp library will wait for confirmation of the new polarization, up until this time is exceeded. If there is no confirmation, then this time is always waited. If the high voltage was turned off before the switch, it is turned back on after the wait.
- *Polarization receiver scheme* — Select here the type of polarization receiver system you have. Choices are “Single” and “Dual”. Dual receivers means there is a receiver on both the co– and cross–polarized channels. This allows measurement of depolarized power, for example. For details, see the discussion of Dual Polarization in the Processing Algorithms chapter of the *RVP7 User’s Manual.*
- *XMT Supports...* — In these 4 questions, select which types of polarization transmission are available on your radar.

In this section, you enter all the different polarization parameters which can be measured by your radar system. There is no question for ZDR, because that is available on most dual–pol radars.

8.2.3 System Parameters



- *Transmit Wavelength* —Enter the wavelength in centimeters.
- *Transmitter Type* — Choose the transmitter type of the radar. This example illustrates that the phase control option will be displayed if a Klystron transmitter is used.
- *Default PRF* — Enter the PRF to be used by the utilities if the PRF is otherwise unspecified. Set it below the maximum PRF for the longest pulsewidth to preserve the transmitter duty cycle regardless of the pulsewidth setting.
- *Noise Sample PRF* — Enter the PRF in Hz for noise sampling (refer to the *Signal Processor User's Manual*). Typically, a value of 200 Hz is adequate.
- *Number of Pulsewidths* — Enter a number between 1 and 4 for the number of pulsewidths that are supported.
- *HV off time before PW change*
- *Wait time after PW change*

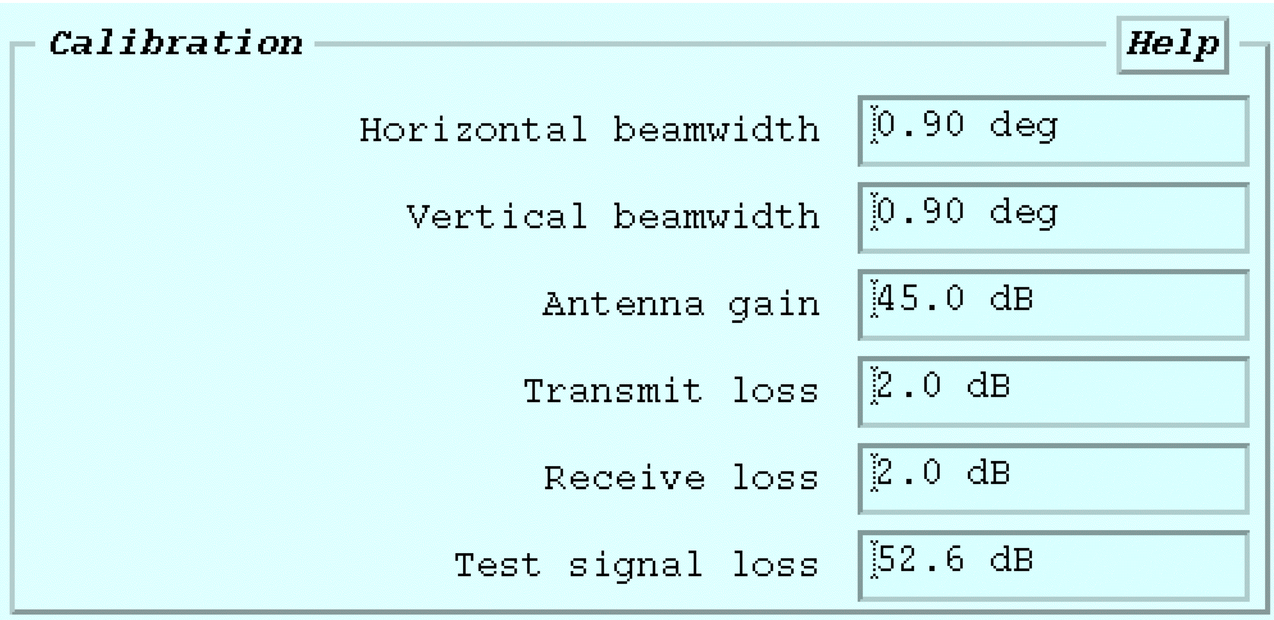
  Whenever IRIS changes the pulsewidth and PRF of the radar transmitter, it follows this procedure:

  1. Turn off the High Voltage (only if it was on, and the HV off time is nonzero).

2. Wait the time specified in *HV off time before PW change*.
3. The PRF is set to the lower of the new and old PRFs, and the pulsewidth is set to the new value.
4. Waits the time specified in *Wait time after PW change*.
5. Sets the system to the new PRF.
6. Turns high voltage back on (only if turned off in step 1).

These delays protect magnetron radar transmitters, which take some time to change their pulse forming networks, and protect systems using the RCP to control the pulse width. When the RCP controls the pulse width, there may be a small variable delay before the command takes effect. The suggested values are 0 for the HV off time, and 1.5 seconds for the Wait time. For Klystrons, TWT systems, and systems with only 1 pulse width, set these both to zero.

8.2.4 Calibration



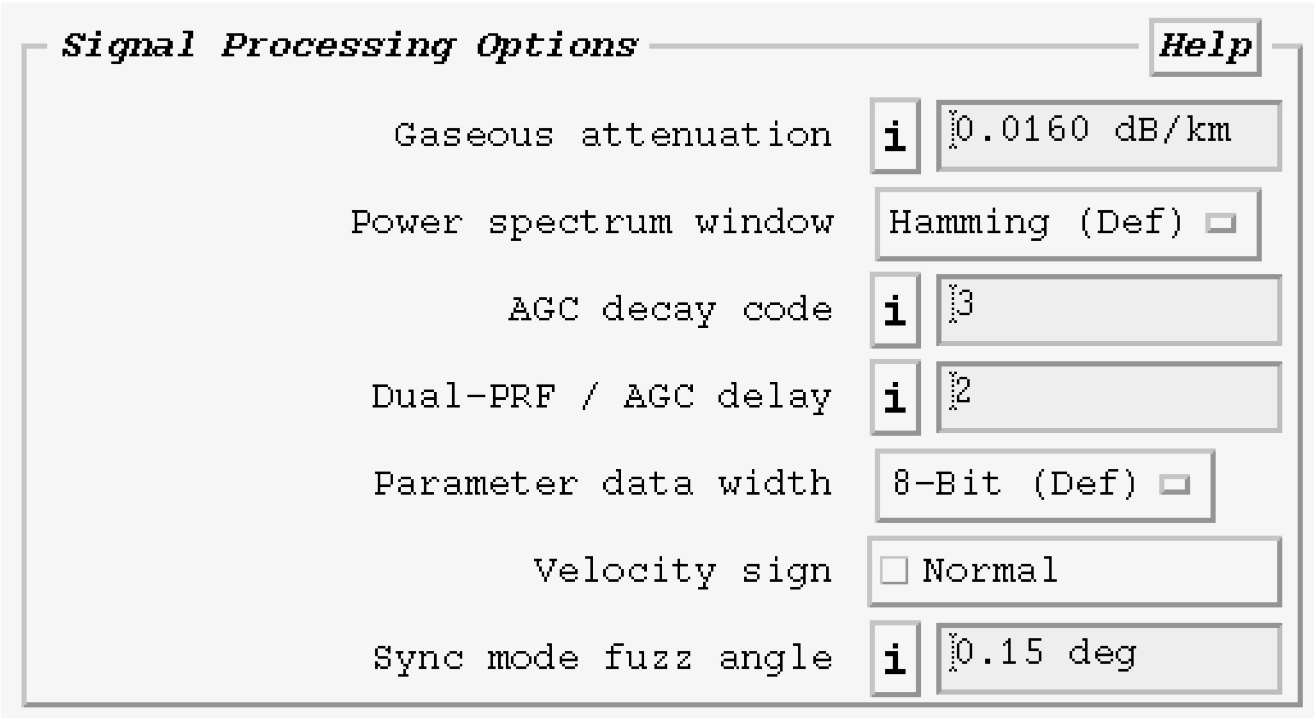
- *Horizontal beamwidth/Vertical beamwidth* — Enter the horizontal and vertical antenna half-power beamwidths in degrees.
- *Antenna gain* — Enter the antenna gain on the axis of the antenna in dB.
- *Transmit losses* — Enter the transmitter power loss in dB between the magnetron and the antenna feed.
- *Receiver losses* — Enter the receiver loss in dB from the feed to the receiver. This is usually the same as the transmitter loss.
- *Test signal losses* — In performing calibrations, a test signal generator is injected into the system. This accounts for any loss of test signal power in the connection between the test signal injection point and the receiver. Losses in the cabling and in the directional coupler are usually included here. These losses may also be calibrated out when you set up your signal generator.

For dual-polarization radars, there are more loss values to enter, as detailed below. our system may have fewer questions if it has a simpler configuration. You can enter separate numbers for the horizontal and vertical channel. You can use this to effectively deal with differences in the waveguide, as well as correcting for transmitter power effects. For example, if your vertical transmit power is larger than your horizontal, then enter the vertical power as the transmit power, and enter a larger transmit loss for horizontal to cover the lower power.

Horiz Transmit loss H Only	1.0 dB
Horiz Transmit loss H+V	4.5 dB
Horiz Receive loss	2.0 dB
Horiz Test signal loss	0.0 dB
Vert Transmit loss V Only	1.5 dB
Vert Transmit loss H+V	4.1 dB
Vert Receive loss	2.0 dB
Vert Test signal loss	0.0 dB

In the example shown above, we assume that the horizontal and vertical powers are both 200 kW, with a 1.0 dB loss in the horizontal waveguide, and a larger 1.5 dB loss in the vertical waveguide. We also assume that in H+V mode, the power splits unevenly with 90 kW to horizontal and 110 kW to vertical. This gives 3.5 and 2.6 dB losses over the full power case. This is added to the waveguide losses to get 4.5 and 4.1 dB.

8.2.5 Signal Processing Options

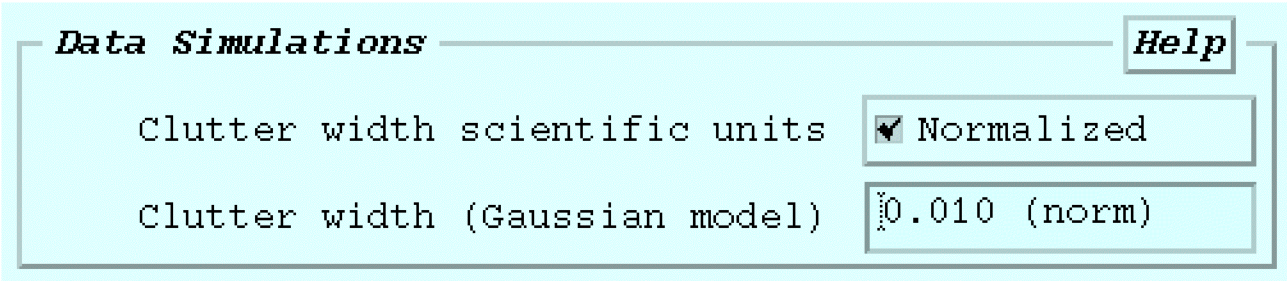


- *Gaseous Attenuation* — The gaseous attenuation constant determines the atmospheric attenuation in dB/km used by the RVP6/7 when acquiring radar data. For a 5-cm radar, a reasonable default value is 0.016 dB/km.
- *Power Spectrum Window* — Select the type of window that the signal processor should use whenever power spectra are computed. Choices are: RECTANGULAR, HAMMING, and BLACKMAN.
- *AGC decay code* — Enter the time constant of the exponential average applied to the log receiver to produce the AGC signal. This is used on the RVP6 processor only, and it is typically set to 3. For more information, see the *Signal Processor User's Manual*.
- *Dual–PRF / AGC delay* — In dual PRF and/or AGC mode, enter the number of pulses to send through the clutter filters prior to the start of each ray. These pulses stabilize the filters. Typically set to 2.
- *Parameter data width* — Choices here are “8-bit” or “8&16 bit”. In 8&16-bit mode the task configuration menu will allow the selection of data width. If you have an RVP6, you will need ROM Rev.15 and higher to support the 16-bit formats.
- *Velocity sign* — If you answer “inverted” IRIS inverts the velocities as they are read from the signal processor, and the **ascope** utility reverses the “T” and “A” signs on its display. SIGMET recommends that you set this parameter to

"normal" unless you have another computer wired up to the signal processor which displays velocities reversed and cannot be changed.

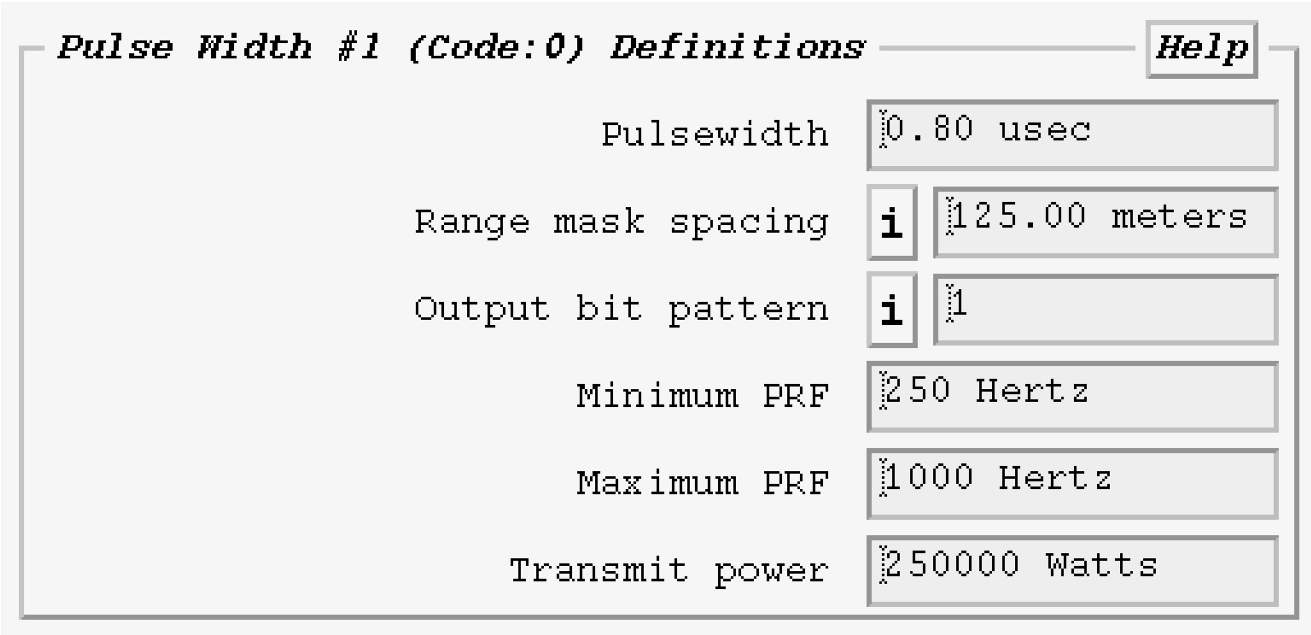
- *Sync mode fuzz angle* — The suggested value for this is 0.15 degrees. If IRIS uses angle sync mode, this controls the tolerance. See your *Signal Processor User's Manual* for details.

8.2.6 Data Simulations



- The data simulator now provides separate timeseries for every bin that is being processed. Along with advanced features of ascope, this provides a very convenient way to study the bias and uncertainty of processing algorithms on simulated data.

8.2.7 Pulsewidth Definitions

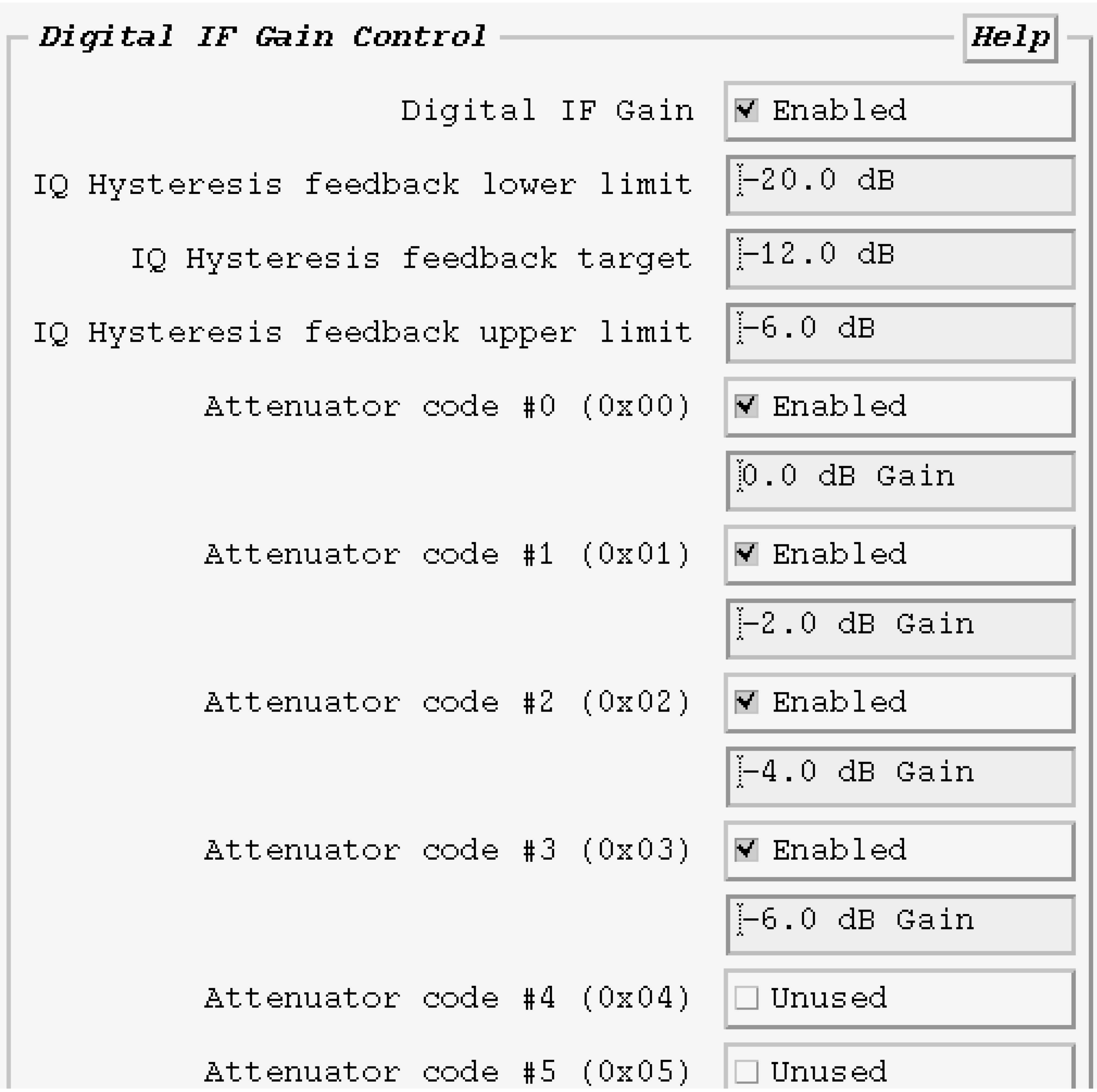


- *Pulsewidth* — Enter the first pulsewidth (usually the shortest) in microseconds. Setup prompts for the other three pulsewidths. If you have only two pulsewidths, enter the minimum pulsewidth for the other values.
- *Range Mask Spacing* — This value should be set to the spacing (in meters) between successive bins in the range mask of your signal processor. The exact value will vary with the type of signal processor, and with the choice of acquisition clock frequency. For the RVP6/7, the range mask spacing with the internal 14.390MHz acquisition clock is 125 meters, but it can be altered to 62.5 meters via the RVP6/7's TTY setups. If the RVP6/7 acquisition circuitry is driven by an external off-board clock, the range mask spacing will, of course, be different. The RVP6/7 TTY setup dialog allows you to specify the acquisition clock frequency, and whether x1 or x2 bin steps will be used. The resulting bin spacing (that should be copied into this setup slot) is also printed in the TTY dialog.
- *Output bit pattern* — Enter the base 10 value of the 4-bit output signals that the signal processor uses to control pulsewidth. Recommended values are 14, 13, 11, and 7. This has no effect on systems that do not use the signal processor to control the pulsewidth.
- *Minimum PRF* — Check with your manufacturer to see if there is any lower limit. A value of 160 Hz is usually acceptable.
- *Maximum PRF* — Enter the maximum PRF in Hz allowed for pulsewidth #1 (specified above). Setup prompts for all four pulsewidths. If fewer than four pulsewidths are specified, Setup still prompts for input for the unused

pulsewidths. For these values, use the PRF limit corresponding to the longest pulsewidth (this should be the lowest maximum PRF). This guards against cabling errors.

- *Transmit power* — Enter the peak transmit power in Watts for each of the pulsewidths. Unused pulsewidths can be set to 0.

8.2.8 Digital IF Gain Control (RVP6 REV.B)



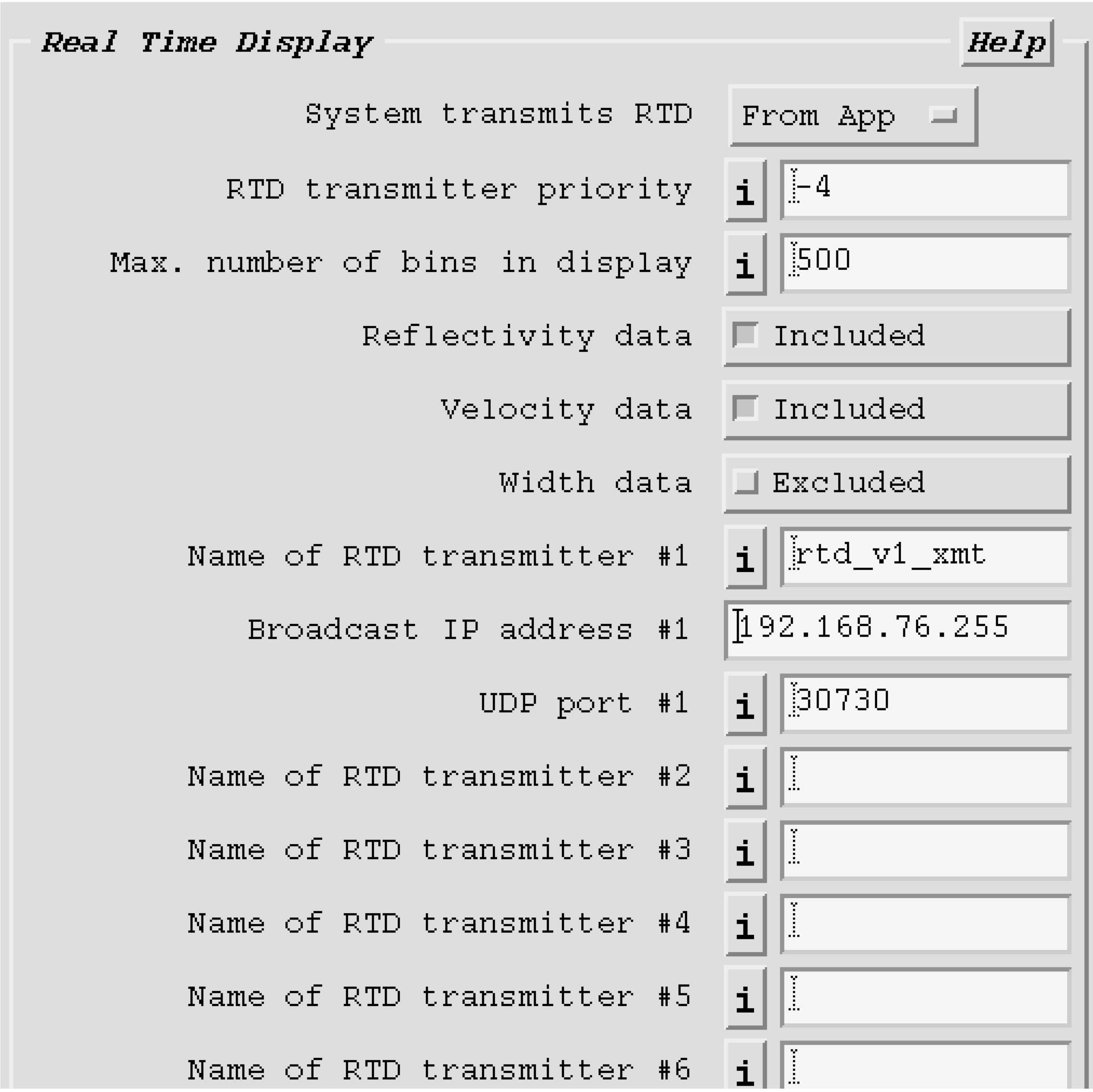
- *Digital IF Gain* — Selecting “disabled” sets the Signal Processor to normal analog STC/AGC gain control. If your signal processor has digital Instantaneous Automatic Gain Control (IAGC) select “enabled.” This feature is available only on the RVP6 processor with a REV.B auxiliary board. An “enabled” selection expands the window with the options listed below.

- I*Q Hysteresis feedback lower limit*
  IQ Hysteresis feedback target
  IQ Hysteresis feedback upper limit

  IAGC works by attempting to keep the received signal strength within the operating band defined by the lower and upper limits (entered as negative dB values, where 0dB represents the maximum intensity I and Q signal). Whenever the signal strength is outside of these limits, a new attenuator setting is chosen to try to hit the target level.

- *Attenuator code (0 – 63)* — For each of the 64 possible 6-bit codes, enter “yes” if it is used or “no” if it is unused. All 64 questions are always asked in this section.

8.2.9 Real Time Display (RTD)



- *System Transmits RTD* — This option will enable/disable the transmission of the RTD and will also show/hide the RTD setup options. When enabled you can specify up to 6 transmitter channels. Each channel can send using a different format, different IP address, and different port. Choices are “No”, “From App”, or “From RVP8”. “From App” means that an application program such as IRIS Ingest will issue RTQ library calls to supply the data stream. “From RVP8” means that the RVP8 will source the data. In such a case the host application requires no modification to support the RVP8 generating a display. A single computer cannot generate from both sources, however if you are using dspexport then both the host computer and the RVP8 can generate data.

- *Maximum number of bins in display: 512*
  Reflectivity data: Included in Display
  Velocity data: Included in Display
  Width data: Excluded

  These questions are used to limit the bandwidth of data transmitted over the network for the real time display. The display will look fine with only a few hundred range bins of data. The maximum size of a ray that can be transmitted over the network is approximately 1500 bytes. Each data type takes up 1 byte. If there are more range bins in a task than can be sent, IRIS will send out only 1 out of every N bins, where N is the smallest number possible.

- *Name of RTD transmitter #1* — Specify the name of the executable program which is run to transmit the real time display stream for this channel. SIGMET recommends the default transmitter **rtd_v1_xmt**. SIGMET also ships 2 other transmitter programs: **rtd_v2_xmt** and **rtd_nids3_xmt**. Customers who wish to customize the format and write their own program and enter it here. The API is public, and so are the existing transmitter programs.

- *Broadcast IP address #1* — Specify the broadcast addresses here. Generally only one is used, and it is your network address with the machine number set to 255. You can broadcast on up to three different networks. You can use the local loopback address 127.0.0.1 to display only locally. To find your address, type **`netstat –nr`** to list your interfaces. Suppose your interface is called “lan0”. Then type **`ifconfig lan0`**. This should show your broadcast address. If it is not there, you may need to turn on the broadcast feature.

- *UDP port #1* — Specify your port number here. Any unused port number can be used, but SIGMET suggests using 30730 as a default.