



The xir3000 plugin

The plugin acquires data from the XIR3000 USB video processor board by [Russell Technologies Inc.](#) The xir3000 plugin is available in revision 638 and later of the radR branch found [here](#). Currently, this plugin is supported only under Windows XP. Please contact Russell Technologies for information about using the XIR3000 under Windows 7.

6 Oct. 2010: Starting with revision 655, radR supplies with the minimal subset of the RTI SDK required for using the XIR3000 with radR. This resides in the `plugins/xir3000/SDK` folder. No special installation is required - the SDK is used directly from that location. Permission to redistribute these files has been kindly granted by Harvey Russell of RTI. The following instructions have been simplified from previous versions.

Configuring the xir3000 to work with your radar

The XIR3000 uses parameters from the database file

```
radR/plugins/xir3000/SDK/CANStar.ant
```

to decide how to acquire signals from your radar. For some radars (or "antennas", as the RTI software calls them), the digitizing parameters have already been determined and will be used when the correct antenna is selected from the xir3000 plugin menu. If your radar is not on that list, you have two choices:

- contact the author of radR who will be happy to add it for you
- purchase the full SDK from RTI. Then:
 - create a .CNF file for your radar, using as a template one of the files in the folder

```
RTI SDK 1.5.X.YYY/Misc/Antenna DB/CNF
```

- run the program "Antenna Console" to regenerate the file "CANStar.ant", which must be copied to the folder "RTI SDK 1.5.X.YYY/Release"
- use the program "RadarSample" program to determine and save the appropriate digitizing parameters for your radar; this will create a file called "usbvfull - YOUR_RADAR_NAME.cfg"

- copy the new files "CANStar.ant" and "usbvfull - YOUR_RADAR_NAME.cfg" to the folder

radR/plugins/xir3000/SDK

Automatically loading the XIR3000 plugin

To have this plugin automatically loaded each time you run radR:

- select "Load this plugin when radR starts" from the plugin menu (see below)
- and**
- answer "Yes" to the question "Save parameters and GUI configuration" when you exit radR. (**Note:** just saving a plugin's configuration from its menu does not save its "autoload" flag)

Choose the XIR3000 as a source

From the player window, select the plugin as a source:

select_xir3000_source.png

If this succeeds, the player window will look like this:

xir3000_source_selected.png

If it fails, an error message will be provided. Some causes for failing to open the XIR3000 device are:

- XIR3000 device not connected to computer or radar, or is not powered up
- the radar is not transmitting
- the wrong "antenna" was selected

- the digitizing parameters for the radar have not been correctly determined.

The most likely problem is that the trigger pulse is not being detected.

There are several digitizing parameters which you can control from the XIR3000 plugin menu:

xir3000_plugin_menu.png

- **antenna selection:** defaults to "Decca BridgeMaster E" and chooses a set of digitizing parameters from the RTI database. Changing this selection causes the radR XIR3000 USB port to restart. If you are playing from the device, you may need to hit

play again a few times after changing this selection.
xir3000_antenna_menu.png

- **azimuth resolution:** selects the number of pulses per sweep (or "scan") acquired from the plugin by radR. The maximum, 4096, is a limitation of the XIR3000 hardware. These pulses

are "evenly spaced" around the sweep, as much as possible.
xir3000_azimuth_resolution_menu.png

- **sampling rate:** this determines how quickly, in millions of samples per second, the analog radar video signal is converted to 8-bit digital samples. The sampling rate determines the possible sizes of range cells, which are obtained by "dividing" this sampling rate by integer values.
xir3000_sampling_rate_menu.png

- **range cell size:** this determines the radial dimension of the volume of space represented by a sample. It is derived by "dividing" the sampling rate by an integer value. If you do not see a suitable choice among these sizes, try changing the

sampling rate (above) and opening this menu again.
xir3000_range_cell_size_menu.png

- **video gain and trigger offset:** these are set by numerical "Controls", rather than by selection from a menu.
xir3000_controls_menu.png

The video gain determines how much amplification of the incoming radar video signal is performed. Please note that setting the gain too high will lead to **saturation** (i.e. sample values of 255)

The trigger offset determines the waiting time between

detection of a trigger signal and the start of video digitizing. If it is set too low, you will see a dark hole at the centre of the data. If it is set too large, you will be missing echos from very short ranges. Ideally, adjust this parameter until the dark centre hole has just disappeared. Alternatively, you can set it using a target of known range to the radar.

XIR3000 Plugin Interaction with the RTI antenna database

When you open the XIR3000 device, the digitizing parameters for the selected antenna are loaded from the file:

```
radR/plugins/xir3000/SDK/CANStar.ant
```

Most of these parameters cannot be changed with the radR GUI (they affect whether or not a signal is properly obtained, not how it is processed). However, **video gain** and **trigger offset** can be modified and, optionally, resaved to the database by using choices from the xir3000 plugin menu. You may also reload the original values for these parameters from the database (unless you have overwritten them by resaving.)

Sampling rate and azimuth resolution are not stored in the RTI database, but rather in the file:

```
radR/plugins/xir3000/xir3000.conf.R
```

Values for these parameters are resaved to the file if you either "Save this plugin's configuration" from the xir3000 plugin menu, or if you quit radR and answer "Yes" to the question "Save parameters and GUI configuration".

Changing other XIR3000 parameters

The full set of XIR3000 digitizing parameters is available via the `ant()` function in the XIR3000 plugin, and this can be accessed from the radR console once the XIR3000 has been selected as a data source. Here is an example of its use:

```
> XIR3000$ant()
```

```
## outputs a full list of digitizing parameters
```

```
> XIR3000$ant(trge = 0, negvideo = 1)
```

```
## sets digitizing to begin on rising (not falling) edge of trigger pulse  
## Note: an incorrect value of trge will result in loss of data within a  
## of the range cell size.
```

Values of parameter set with the `ant()` function are only effective during the current XIR3000 session, and will be reloaded from `radR`'s copy of the RTI antenna database whenever you:

- change the XIR3000 sampling rate from the XIR3000 plugin menu
- choose "**Reload values of video gain, ...**" from the XIR3000 plugin menu
- reload the XIR3000 plugin
- restart `radR`

To permanently save changes to parameter values you have made with the `ant()` function, choose "**Save values of video gain, ...**" from the XIR3000 plugin menu. Despite the title, this saves *all* XIR3000 digitizing parameters. The digitizing parameters are exactly those set using RTI's `RadarSample` program, and are described in the documentation accompanying the XIR3000.