RCP02 V12 Release Notes

These notes cover changes made to the RCP02 code since release V11 of 22 July 1998. If you are upgrading from an earlier release, please read those notes also.

Bug Repairs

1. There were no bugs reported in V11.

New Features

1. The RCP02 servos can now operate under the constraint of bounding the maximum acceleration (on each axis) that the antenna will experience. This new acceleration limiter is based on the RCP02's existing first-order linear differential equation antenna model. When the limiter is enabled, output drive levels are clamped within the range of voltages that would keep the antenna acceleration within the configured bounds. This results in much gentler and smoother large-scale motion of the antenna, without compromising small-scale performance in any way.

2. The RCP02 now supports the Hewlett–Packard Interface Bus (HPIB), also known as the General Purpose Interface Bus (GPIB), and IEEE 488 Bus. This capability allows the RCP02 to communicate in a uniform way with external test and measurement equipment that support the IEEE Std 488.2 command protocols.

   The first class of instruments supported are RF/IF signal generators. The RCP02 can both control and sense the signal generator's output power level, output On/Off switch, and pulse modulation selection. These parameters are then directly accessable from the IRIS/Antenna utility.

   The RCP02 keeps the signal generator in its normal "local" mode at all times, and polls its settings every 0.5 seconds. This means that the signal generator's front panel is fully functional at all times. However, whenever the RCP02 detects a change in the host computer's requested settings, then those changes are sent immediately (but just once) to the signal generator. The correct settings are thus put into place; though the user is still allowed to make further changes using the manual controls. The design philosophy is that the signal generator should simply appear to operate normally, except at those times when changes are requested by the host computer.

3. The "Monitor Control" command has been improved so that it is easier to view the requested control bits alongside the final control bits that are qualified by logic equations. The "alt" subcommand now alternates between three presentation classes: 1) primary control bits, 2) auxiliary control bits C[0:63], and 3) local variables V[0:15]. In either of the first two cases, the new "/" subcommand may be used to toggle between the requested and qualified bits in that class. This makes it easy to compare the bits, and to verify that custom logic equations are implemented correctly.

4. The RCP02 will now send BITE "interrogate" packets to the host computer whenever the RCP02 is expecting to receive BITE packets of any sort. The RCP02 "interrogate"

requests are sent every 30 seconds beginning at startup. This insures that all control bits will be valid in the RCP02 immediately upon startup, and will resume their correct states after any serial line interruptions.

5. Four new status variables have been added to the list of input variable names that can be used in Boolean equations. The variables are ”usr0”, ”usr1”, ”usr2”, and ”usr3”; corresponding to the four input lines at pins 1–4 of header H9 on the RCP02 main board. These are general purpose TTL inputs that you may assign to any purpose you wish. For example, to include an additional status bit in the RCP02’s Internal BITE packet, include an equation such as ”v13 = usr0”. Since the local variables states appear in the BITE packet, the ”usr0” line will show up in bit #6 of byte #12 as a result of this assignment.

6. The sector blanking latency has been reduced from its prior delay of 29ms, down to only 3.5ms. This latency is defined as the maximum time that can elapse between the antenna moving into or out of a blanked sector, and the RCP02’s mapped hardware output line actually responding with that indication. The speedup will only be realized when the mapped output line is AZ0 (LSB of the parallel azimuth output). All other output lines will still run with the 29ms delay; as will any optional re-mapped input line that is fed into the blanking criteria. As an example, at a 36deg/sec rotation rate, the 29ms delay might have produced a 1.04deg shift in the location of the blanked sector. The 3.5ms delay would position the edge more precisely by introducing only a 0.13deg shift.

Setup Changes

1. New setup questions in the “Axis” command to configure acceleration limiting. The limiter should be enabled only after the sustaining drives, nominal drive slopes, tachometer calibration, and moment of inertia have been properly setup.

2. The following new HPIB/GPIB questions appear in the “Site Custom” section:

```
HPIB bus interface hardware is installed: YES
  HPIB Address of RCP02 (system controller):  1
  RF/IF Signal generator is on the bus : YES
    HPIB Address of the signal generator: 19
    Signal generator has pulse modulation : NO
```

Answer the first question “Yes” if an IP488 module is plugged into the IP–E slot of the RCP02’s Platform 332 mother board. The RCP02 then acts as the system bus controller and is assigned a (rather arbitrary) default address of 1. If a signal generator is attached to the bus, then enter its HPIB address. Also tell whether it supports pulse modulation; answer “No” if the signal generator can only operate in CW mode.

Note that IEEE Std 488.2 specifies a command and query protocol that is independent of the hardware manufacturer. For this reason, it it not necessary to specify what brand of signal generator is being used (since the same minimal command set works with all 488.2 devices). The RCP02 initialization sequence reads the full identification string from the signal generator; and if you’re curious, the “Help View” command will show its contents. This string contains the manufacturer’s name, make and model numbers, serial number, software version, etc.

3. A related new question appears in the “Site Host” section:

   ```
   Maximum signal generator power level:   10 dBm
   ```

   This question standardizes the encoding of power levels in the various RCVnn and XMTnn serial protocols. The I/O formats only allocate 7–bits for the integer-valued power levels (a 127-dB span). The maximum level specified here fixes that range on a particular absolute power interval. The RCP02 maximum level should match the maximum level set in the IRIS utility SETUP–>RCP–>Control & Support.

4. The setup questions for the auxiliary control and status bits have been reorganized so that the associated host computer I/O is configured independently of the (optional) assignment of hardware electrical lines to those bits. The ”Site Host” command now asks whether the RCP02 will send/receive auxiliary status/command BITE packets to/from the host computer. The C[0:63] and S[0:63] variables have many different uses within the RCP02, so all 64 bits are always included in the 13–byte fixed–format BITE I/O packets. The ”Site Custom” command is now used only to define an optional association between C[0:63] and S[0:63], and external hardware lines supplied by additional IP–DIGITAL–48 module(s). Hardware bits are assigned to numbered variables beginning with zero. This is an improvement from the Rev.11 convention in which the control bit assignments began where the status bit numbers left off.

5. The setup questions related to sector blanking have been moved to the bottom of the ”Site Custom” menu. This way you do not have to navigate through a long list of sector definitions to get to the remainder of the questions.

6. The Boolean logic variables for controlling and sensing the signal generator and noise generator states have been renamed by prefixing a ”c” onto the control names, and an ”s” onto the status names. Also, ”trlocal” has been renamed ”local_tr”; making it easier to abbreviate ”true” and ”false” unambiguously with just the single letters ”t” and ”f”.

7. A new setup question has been added to choose the parity of the serial data transmissions for the optional Andrew–Kintec pedestal interface.