

## RCP02 V24 Release Notes

These notes cover changes made to the RCP02 code since release V23 of 28 April 2000. If you are upgrading from an earlier release, please read those notes also.

### Bug Repairs

1. A bug was repaired in the RCP02's reception of the serial stream from the host computer. The command packets would occasionally be received incorrectly when the baud rate was set to 19.2KBaud. The error rate was highest when the RCP02 was very busy, and would be approximately 1 in 2000 packets. One observable effect was that once or twice a day a control bit (such as Radiate-ON) would momentarily flip to the wrong state. We would like to thank the dedicated staff of the Hong Kong Observatory for their patience and help during the diagnosis and repair this bug.

The incorrectly received packets are due to the shallow depth of the serial port receiver FIFO, and the low interrupt priority of the UART chip. Both of these constraints are set by the hardware design of the Greenspring mother board and can not be changed. The overrun errors at 19.2KBaud can not be prevented in software; they can only be detected and discarded. This is how the RCP02 packet receiving software now operates. Note that packet transmission at 19.2KBaud has always worked fine and is not affected by these changes.

Of course, the problem with discarding an occasional overrun packet is that the data within that packet are lost forever. For the XMTnn antenna control packets, IRIS will send another transmission in 400ms to cover the missing record and there should be no real problem. The BITE control packets are sent less frequently, however. Dropping one of them could lead to a longer delay before the RCP02 eventually responds to a retransmission.

It certainly makes no sense for the RCP02 ever to act on the contents of an overrun packet; hence the bad packets should always be discarded. However, in the absence of any strong reason to run at 19.2KBaud, we recommend using 9600 Baud to reduce the likelihood of an overrun to essentially zero.

2. The question *Drive voltage is positive for positive motion* in the **axis** command has been repaired. The sense of this question has been reversed ever since the first RCP02 code release several years ago. When you upgrade to V24 you will notice that "Yes" answers will flip to "No", and vice versa. However, the operation of the RCP02 will remain exactly as it was before, because the answers to the setup questions are now being interpreted properly. If you keep printed copies of your RCP02 setups, it would be a good idea to save a new copy showing the changed answers in case they ever have to be re-entered by hand.

Often the RCP02 is configured using an experimental procedure to determine the correct answer to the *Drive Voltage* question, i.e., 1) issue an "AD 10" drive command, 2) check which direction the antenna begins moving, and 3) reverse the answer if the motion is

wrong (counter-clockwise). This method has worked successfully for years, and will continue to work just as well after V24. The only difference is that the *Yes/No* answer will now actually be correct, i.e., the sign of the drive voltage measured with a test meter will match the answer.

If you have an antenna whose azimuth axis spins in a clockwise direction when given a positive drive voltage, then Table V24–1. summarizes what you should expect to see both before and after installing the V24 release. Please completely disregard Table V24–2. in this case, since it does not describe your antenna under any circumstances.

**Table V24–1.: Antenna that moves clockwise with a positive drive voltage**

Answer to: <i>Drive voltage is positive for positive motion</i>		Azimuth Motion Command	Direction of Azimuth Motion	Drive Voltage (measured with a test meter)
Prior to V24	V24 and later			
<b>NO</b>	<b>YES</b>	<b>AD 10</b>	<b>Clockwise</b>	<b>Positive</b>

Likewise, if your antenna behaves the other way and spins clockwise in response to a negative drive voltage, then please refer to Table V24–2. and completely ignore Table V24–1..

**Table V24–2.: Antenna that moves clockwise with a negative drive voltage**

Answer to: <i>Drive voltage is positive for positive motion</i>		Azimuth Motion Command	Direction of Azimuth Motion	Drive Voltage (measured with a test meter)
Prior to V24	V24 and later			
<b>YES</b>	<b>NO</b>	<b>AD 10</b>	<b>Clockwise</b>	<b>Negative</b>

## New Features

1. The velocity servo's integral feedback term will now be forced off whenever a) the velocity servo is being invoked by the position servo, and b) the antenna has finally settled within the inner hysteresis position limits. This change prevents the integral term from periodically dislodging a stable position servo if there happens to be even a tiny non-zero bias in the tachometer's A/D converter. We would like to thank George Lobb of Canadian Met Services for suggesting this change.
2. Appendix A of the *RCP02 User's Manual* now includes complete schematic diagrams for the RCP02 mother board, plus the wrap list for the standard connections to the wire wrap backplane. We hope that this additional information will make the RCP02 easier to use and maintain by our customers.
3. The position servo requests that are transmitted by the RCP02 to the Andrew-Kintec pedestal interface are now bounded by the soft limits (if any) that have been setup for each axis. It used to be that the soft limits were ignored when position requests were formatted into the Andrew serial output stream.

4. The acceleration limit on allowable motor drive is now computed differently when the antenna is stopped or nearly stopped. It used to be that small tachometer errors in the vicinity of zero velocity would be accentuated by the discontinuous nominal drive slope curve, and could result in drive levels that were too small to start the motor. The new algorithm defines a window around zero velocity whose width is four times the *Velocity feedback deadzone*. If the tachometer is within this window, then the nominal drive will be centered on the *Motor sustaining drive* for whichever direction the antenna is trying to move.

## Setup Changes

1. The setup question that sets the sign of the motor drive voltage has been changed. See Bug Repair #2.