

# Release Notes

## RCIM IV IRIG Diagnostic Program



<i>Utility</i>	RCIM IRIG Diagnostic (730-W-IRIGTEST)	
<i>OS</i>	RedHawk Linux® ( <i>CentOS/Rocky/RHEL &amp; Ubuntu</i> ), Native Ubuntu® and Native Red Hat Enterprise Linux® <sup>1</sup>	
<i>Vendor</i>	Concurrent Real-Time	
<i>Hardware</i>	RCIM-IV IRIG Card (CPRC4-4IRG)	
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<i>Date</i>	October 29 <sup>th</sup> , 2024	Rev 2024.1



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# Table of Contents

<b>1.</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2.</b>	<b>REQUIREMENTS.....</b>	<b>2</b>
<b>3.</b>	<b>DOCUMENTATION.....</b>	<b>2</b>
<b>4.</b>	<b>SOFTWARE INSTALLATION .....</b>	<b>2</b>
<b>5.</b>	<b>SOFTWARE REMOVAL .....</b>	<b>2</b>
<b>6.</b>	<b>TESTING AND USAGE .....</b>	<b>4</b>
<b>6.1.</b>	<b>RCIM_IRIG_INPUT .....</b>	<b>5</b>
<b>6.2.</b>	<b>RCIM_IRIG_OUTPUT.....</b>	<b>6</b>
<b>6.3.</b>	<b>RCIM_TERMINATOR.....</b>	<b>8</b>
<b>6.4.</b>	<b>TEST_BOARD .....</b>	<b>11</b>
<b>6.5.</b>	<b>TEST_BOARD_INPUT.....</b>	<b>13</b>
<b>6.6.</b>	<b>TEST_BOARD_OUTPUT .....</b>	<b>14</b>
<b>6.7.</b>	<b>TEST_BOARD_TERMINATOR .....</b>	<b>14</b>
<b>6.8.</b>	<b>LOOPBACK TESTING EXAMPLES .....</b>	<b>15</b>
<b>7.</b>	<b>NOTES AND ERRATA.....</b>	<b>16</b>
	<b>APPENDIX A: RCIM-IV IRIG CABLE BNC LOOPBACK.....</b>	<b>17</b>
	<b>APPENDIX B: BNC LOOPBACK CONNECTOR PINOUT .....</b>	<b>17</b>
	<b>APPENDIX C: 730-1861337-901 LOOPBACK PLUG .....</b>	<b>18</b>
	<b>APPENDIX D: LOOPBACK PLUG CONNECTOR PINOUT .....</b>	<b>18</b>

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# 1. Introduction

This diagnostic program is specifically for the RCIM with IRIG support, however there is also a RCIM Terminator operation test which can be used with any RCIM card with or without IRIG support.



This diagnostic program is shipped with every RCIM that has IRIG support. If a user so desires, they can take advantage of this diagnostics to test and monitor the proper operation of the card. It is not an integral part of the RCIM operation or its driver which is handled by the kernel.

---

The RCIM-IV is the fourth generation of the Real-Time Clock and Interrupt Module. This is a half-size PCIe card that contains all of the same clock and interrupt functions as the RCIM-III. This includes a compatible optical synchronization cable interface.

Features of the RCIM-IV are:

- Twelve External I/O Interrupts
  - Input or Output Software Selectable
  - 3.3V or 5V TTL Signals
  - Switchable 100 Ohm Termination
  - Industry Standard DB-26 Connector
- Temperature Compensated Oscillator (TCXO)
  - +/- 1 PPM Calibration
  - +/- 100 PPB Stability
- Optional GPS Module
  - Trimble RES SMT 360 Multi-GNSS
  - Supports: GPS, GLONASS, Galileo & Beidou
- Optional IRIG Interface
  - Format: IRIG-B 124 or 004
  - AM (amplitude modulated) or DCLS (DC level shift)
  - Input Specifications:
    - AM 1 to 10V peak-to-peak (auto ranging)
    - AM 1KHz 2:1 to 6:1 ratio
    - AM 4K ohm load AC coupled
    - DCLS 3.3/5V TTL >2V high < 0.8V low
    - DCLS 100 ohm switchable termination
  - Output Specifications:
    - AM 2.5, 5 or 8V peak-to-peak (selectable) into 50 ohms
    - AM 1KHz at 3:1 ratio
    - AM Accuracy +/-10uS
    - DCLS 0.5V Vol (max) and 2V Voh (min) into 100 ohms
    - DCLS Accuracy +/-1uS
    - DCLS Up to twelve outputs
    - Reference offset adjust range 0 to -65uS (400nS resolution)

## 2. Requirements

- RCIM IRIG card with the optional IRIG support
- Concurrent Real-Time™ **rcim-irig-diagnostic** software package

## 3. Documentation

- This RCIM IRIG Diagnostic installation guide
- *rcim\_irig\_diagnostic* man page

## 4. Software Installation

Concurrent Real-Time™ **rcim-irig-diagnostic** software is distributed in RPM format for CentOS/Rocky and DEB format for Ubuntu OS on a DVD.

The software is installed in the **/usr/local/CCRT/drivers/rcim-irig-diagnostic** directory. This directory will be referred to as the “top-level” directory by this document.

```
=== as root ===
    --- on RedHawk 6.5 and below ---
# cd /media/ccrtngfc_driver
    --- or on RedHawk 7.0 and above ---
# cd /run/media/[user_name]/ccrtngfc_driver
    --- or on Ubuntu RedHawk ---
# cd /media/[user_name]/ccrtngfc_driver

# rpm -ivh rcim-irig-diagnostic_RedHawk*.rpm (on a RedHawk CentOS/Rocky based
                                           system)
    --or--
# dpkg -i rcim-irig-diagnostic_RedHawk*.deb (on a RedHawk Ubuntu based system)
    --or--
# rpm -ivh rcim-irig-diagnostic_RedHat*.rpm (on a Native RedHat based system)
    --or--
# dpkg -i rcim-irig-diagnostic_Ubuntu*.deb (on a Native Ubuntu based system)

# cd /
# eject
```

## 5. Software Removal

Concurrent Real-Time™ **rcim-irig-diagnostic** software can be removed from a system that has been installed on it as follows:



If any changes have been made to this package installed in **/usr/local/CCRT/drivers/rcim-irig-diagnostic** directory, they need to be backed up prior to invoking the removal; otherwise, all changes will be lost.

---

```
== as root ==
# rpm -e rcim-irig-diagnostic (software uninstalled, and deleted - on a RPM
                              based system)
    --or--
# dpkg -P rcim-irig-diagnostic (software uninstalled, and deleted - on a Debian
                              based system)
```



On some Debian RedHawk systems, the following message may appear and can be ignored when the package is removed. *“dpkg: warning: while removing rcim-irig-diagnostic, directory /usr/local not empty so not removed”*.

---

## 6. Testing and Usage

Build and run the test programs, if you have not already done so:

```
# cd /usr/local/CCRT/drivers/rcim-irig-diagnostic
# make test                (build the test programs)
```

Basically, there are three test programs and several test scripts to get information on the card and validate its proper functioning. Some testing will require loopback connection before it can succeed.

- rcim\_irig\_input *(validate IRIG input side of the card)*
- rcim\_irig\_output *(validate IRIG output side of the card)*
- rcim\_terminator *(validate proper operation of the RCIM card channel terminators)*
- TEST\_BOARD *(main script to test the entire card)*
- TEST\_BOARD\_INPUT *(input script to validate the IRIG input side of the card)*
- TEST\_BOARD\_OUTPUT *(output script to validate the IRIG output side of the card)*
- TEST\_BOARD\_TERMINATOR *(terminator script to validate the RCIM card channel terminators)*



## 6.1. rcim\_irig\_input

This test is useful in displaying and testing the IRIG input side of the card.

```
Usage ./rcim_irig_input [-b Board] [-d Delay] [-e InputEnable] [-v Delay]
                        [-x ExtInputType]
-b Board                (Board number -- default board is 0)
-d Delay                (Delay between screen refresh in milli-seconds -- default is 0)
-e InputEnable          (0=Disable, 1=Enable)
-v Delay                (Dump single output to 'stderr' after delay. Default is no delay)
  -v@Delay              (Dump only debug information to 'stderr')
-x ExtInputType         (a=AM, d=DCLS without terminator, t=DCLS with terminator)
  -xa                   (AM input type)
  -xd                   (DCLS input type without terminator. Default channel 10)
  -xd<#>                (DCLS input type without terminator. '#' specify channel '0..11')
  -xt                   (DCLS input type with terminator. Default channel 10)
  -xt<#>                (DCLS input type with terminator. '#' specify channel '0..11')
```

```
e.g. ./rcim_irig_input -b1 -e1 -xd
      (enable board 1 with DSCL input channel 10 without terminator)
```

### Example display:

```
# ./rcim_irig_input
```

```
Board Number           [-b]: 0 [This is a standalone (isolated) rcim:
                        ### Assigned to MasterClock ###]
Delay                  [-d]: 0 milli-seconds
Input Enable           [-e]: == option not specified ==
Dump single output     [-v]: no (use cursors)
External Input Type    [-x]: == option not specified ==
Board Info              : 0x92730101 (ID=0x9273, Type=0x1, Func=0x1)
Firmware Date          : 0x08132021
Firmware Revision      : 0x00010000
-----
Scan Count             : 3469792
RCIM Tick Count        : CSR[106] 3655109719
RCIM POSIX seconds     : CSR[106] 1643128396.286049200
PPS Snapshot seconds (IRIG) : 1643128396.9600
PPS Snapshot seconds (GPS) : 1643128396.0
Local System Time      : Tue, 25 Jan 2022 11:33:16 (025 day)
Local POSIX Time       : Tue, 25 Jan 2022 11:33:16 (025 day)
IRIG Computed Time [HHMMSS] : Tue, 25 Jan 2022 11:33:15 (025 day)
[SBS]                  : Tue, 25 Jan 2022 11:33:15 (025 day)
Input Enable           : 1 (Enabled)
RCIM Clock Frequency Adjust : 0xffff5d42 (-41662)
External Input Terminator : 0x00000000 (Chans ===NONE===)
Input Control          : 0x000100f0
  PPS Good              : 1 (Good)
  DCLS Input Select     : 15 (None)
  External Input Type   : 0 (AM)
Input Status           : 0x0000c33
  AM High Maximum      : 0x0c33 (1.17 volts)
Input Error            : 0x05100002
  PPS OK Count         : 0x05 (5)
  AM Frame Error Count : 0x10 (16)
  DCLS Frame Error Count : 0x00 (0)
  Sync Error Count     : 0x02 (2)
Input Seconds         : 0x0f (15)
Input Minutes          : 0x21 (33)
Input Hours            : 0x0b (11)
Input Days             : 0x019 (25)
Input Years            : 0x16 (22) (2022 - Not a Leap Year)
Input Control Bits     : 0x00000000 (0)
Input SBS              : 0x0000a27b (41595)
```

## 6.2. rcim\_irig\_output

This test is useful in displaying and testing the IRIG output side of the card.

```
Usage ./rcim_irig_output [-a AMAmplitude] [-A Adjust] [-b Board] [-c ControlBits]
                        [-d Delay] [-D Days] [-e OutputEnable] [-H Hours] [-i LeapSecond]
                        [-m MasterActive] [-M Minutes] [-p ProgLocalTime] [-s SBS]
                        [-S Seconds] [-t TestMode] [-T LeapSecondTime] [-v Delay]
                        [-x ExtIntRoute] [-Y Years]

-a AMAmplitude      (0=2.5V, 1=5.0V, 2=8.0V)
-A Adjust           (Adjust value 0x0..0xFFF)
  @Adjust           (Adjust value 0.000..65.520 microseconds)
-b Board            (Board number -- default board is 0)
-c ControlBits      (Control Bits. value 0x0..0xFFFF)
-d Delay            (Delay between screen refresh in milli-seconds -- default is 0)
-D Days             (Days. value 1..366)
-e OutputEnable     (0=Disable, 1=Enable)
-H Hours            (Hours. value 0..23)
-i LeapSecond       (0=No Leap Second, 1=Insert Leap Second -- whether leap second should
                    occur)
-m MasterActive     (0=Not Active, 1=Master Active)
-M Minutes          (Minutes. value 0..59)
-p ProgLocalTime    (0=Local time, 1=GMT time)
  +ProgLocalTime    (0=Local time, 1=GMT time, Add one second to time)
-s SBS              (Straight Binary Seconds. value 0x0..0xFFFF)
-S Seconds          (Seconds. value 0..59)
-t TestMode         (0=Normal Operation, 1=Test Mode)
-T LeapSecondTime  (Format: Year,Day,Hour [0..99,1..366,0..23] -- when leap second should
                    occur)
-v Delay            (Dump single output to 'stderr' after delay. Default is no delay)
  -v@Delay          (Dump only debug information to 'stderr')
-x ExtIntRoute      (External Interrupt Routing. Chans 0..11, '#'=clear, '+'=set without
                    clearing rest, '-'=range)
  -x                (Set routing only for default channel 11. Clear routing for all other
                    channels)
  -x-               (Set routing for all channels)
  -x-3,7,9          (Set routing for channels 0 through 3, 7 and 9, clear the rest)
  -x+6,10            (Set channels 6 and 10 without clearing any others)
  -x# or -x#-       (Clear routing for all channels)
  -x#3,7-9          (Clear routing for channels 3 and 7 through 9)
-Y Years            (Years. value 0..99)
```

```
e.g. ./rcim_irig_output -b0 -e1 -m1 -p1 -t0 -x11
      (enable and activate board 0 in normal mode,
       GMT time programmed and with DSCL output channel 11)
```

```
e.g. ./rcim_irig_output -b0 -e1 -m1 -p+0
      (enable and activate board 0 in normal mode,
       Local time programmed adding one second to output)
```

### Example display:

```
# ./rcim_irig_output
```

```
Output AM Amplitude  [-a]: == option not specified ==
Output Adjust        [-A]: == option not specified ==
Board Number         [-b]: 0 [This is a standalone (isolated) rcim:
                        ### Assigned to MasterClock ###]

Output Control Bits  [-c]: == option not specified ==
Delay                [-d]: 0 milli-seconds
Output Days          [-D]: == option not specified ==
Output Enable        [-e]: == option not specified ==
Output Hours         [-H]: == option not specified ==
Output Leap Second   [-i]: == option not specified ==
Output Master Active [-m]: == option not specified ==
```

```

Output Minutes          [-M]: == option not specified ==
Program Current Time   [-p]: 0 (Local Time)
Output SBS              [-s]: == option not specified ==
Output Seconds         [-S]: == option not specified ==
Output Test Mode       [-t]: == option not specified ==
Output Leap Second Time [-T]: == option not specified ==
Dump single output     [-v]: no (use curses)
External Int. Routing  [-x]: Channels Set: ===NONE=== Clear: ===NONE===
Output Years           [-Y]: == option not specified ==
Board Info              : 0x92730101 (ID=0x9273, Type=0x1, Func=0x1)
Firmware Date          : 0x08132021
Firmware Revision      : 0x00010000
-----
Scan Count              : 253104
RCIM Tick Count        : CSR[106] 3366761876
RCIM POSIX seconds     : CSR[106] 1643128280.946798000
Local System Time      : Tue, 25 Jan 2022 11:31:20 (025 day)
Local POSIX Time       : Tue, 25 Jan 2022 11:31:20 (025 day)
IRIG Computed Time [HHMMSS] : Tue, 25 Jan 2022 11:31:20 (025 day)
[SBS]                  : Tue, 25 Jan 2022 11:31:20 (025 day)
Output Enable          : 1 (Enabled)
External I/O Output Enable : 0x800 (Chans: 11)
Output Control         : 0x00000001
  Leap Year            : 0 (Not A Leap Year)
  Leap Second         : 0 (No Leap Second)
  Mode                 : 0 (Normal Operation)
  AM Amplitude        : 0 (2.5V peak-to-peak)
  Master Status       : 1 (Master Active)
Output Adjust         : 0x00 (0) (0.00 micro-seconds)
Output Leap Second Time : 0x00000000 (Year=0, Day=0, Hour=0)
Output Seconds        : 0x14 (20)
Output Minutes        : 0x1f (31)
Output Hours          : 0x0b (11)
Output Days           : 0x019 (25)
Output Years          : 0x16 (22) (2022 - Not a Leap Year)
Output Control Bits   : 0x00000000
Output SBS            : 0x0000a208 (41480)

```

## 6.3. rcim\_terminator

This test validates the proper operation of the RCIM card channel terminators. This test will work on any RCIM card, i.e. with or without IRIG support.

```
./rcim_terminator [-b Board] [-i] [-l LoopCount] [-v]
-b Board          (Board number -- default board is 0)
-i               (IRIG support check. '0' = present, '69' = not present)
-l LoopCount     (Loop count -- default is 1)
-v               (Verbose output)
```

```
e.g. ./rcim_terminator -b1
      (Test board 1 for terminator resistance presence)
     ./rcim_terminator -b0 -i
      (Test board 0 for IRIG support presence)
```

If the '-i' option is specified and the card is present, the test will return a '0' if IRIG support is present and '69' if IRIG support is not present. No further testing will be performed.

### Example display:

```
# ./rcim_terminator (No Loopback Cable Connected)

#### Terminator Test #### (Loop Count=1)
Processing Channel 0...
    Interrupt Pending Extra must be HIGH: Ch 0 = 0 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 0 = 0 (=== passed ===)
Processing Channel 1...
    Interrupt Pending Extra must be HIGH: Ch 1 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 1 = 0 (=== passed ===)
Processing Channel 2...
    Interrupt Pending Extra must be HIGH: Ch 2 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 2 = 0 (=== passed ===)
Processing Channel 3...
    Interrupt Pending Extra must be HIGH: Ch 3 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 3 = 0 (=== passed ===)
Processing Channel 4...
    Interrupt Pending Extra must be HIGH: Ch 4 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 4 = 0 (=== passed ===)
Processing Channel 5...
    Interrupt Pending Extra must be HIGH: Ch 5 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 5 = 0 (=== passed ===)
Processing Channel 6...
    Interrupt Pending Extra must be HIGH: Ch 6 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 6 = 0 (=== passed ===)
Processing Channel 7...
    Interrupt Pending Extra must be HIGH: Ch 7 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 7 = 0 (=== passed ===)
Processing Channel 8...
    Interrupt Pending Extra must be HIGH: Ch 8 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 8 = 0 (=== passed ===)
Processing Channel 9...
    Interrupt Pending Extra must be HIGH: Ch 9 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch 9 = 0 (=== passed ===)
Processing Channel 10...
    Interrupt Pending Extra must be HIGH: Ch10 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW:  Ch10 = 0 (=== passed ===)
```

```

Processing Channel 11...
    Interrupt Pending Extra must be HIGH: Ch11 = 1 (=== passed ===)
    Interrupt Pending Extra must be LOW: Ch11 = 1 (=== passed ===)

=== Test Passed ===

# ./rcim_terminator (Loopback Cable Connected: All Channels)

#### Terminator Test ### (Loop Count=1)
Processing Channel 0...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 1 #####
    Interrupt Pending Extra must be HIGH: Ch 0 = 1 (=== passed ===) (Warning Count=1)
    Interrupt Pending Extra must be LOW: Ch 0 = 0 (=== passed ===) (Warning Count=1)
Processing Channel 1...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 0 #####
    Interrupt Pending Extra must be HIGH: Ch 1 = 1 (=== passed ===) (Warning Count=2)
    Interrupt Pending Extra must be LOW: Ch 1 = 0 (=== passed ===) (Warning Count=2)
Processing Channel 2...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 3 #####
    Interrupt Pending Extra must be HIGH: Ch 2 = 1 (=== passed ===) (Warning Count=3)
    Interrupt Pending Extra must be LOW: Ch 2 = 0 (=== passed ===) (Warning Count=3)
Processing Channel 3...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 2 #####
    Interrupt Pending Extra must be HIGH: Ch 3 = 1 (=== passed ===) (Warning Count=4)
    Interrupt Pending Extra must be LOW: Ch 3 = 0 (=== passed ===) (Warning Count=4)
Processing Channel 4...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 5 #####
    Interrupt Pending Extra must be HIGH: Ch 4 = 1 (=== passed ===) (Warning Count=5)
    Interrupt Pending Extra must be LOW: Ch 4 = 0 (=== passed ===) (Warning Count=5)
Processing Channel 5...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 4 #####
    Interrupt Pending Extra must be HIGH: Ch 5 = 1 (=== passed ===) (Warning Count=6)
    Interrupt Pending Extra must be LOW: Ch 5 = 0 (=== passed ===) (Warning Count=6)
Processing Channel 6...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 7 #####
    Interrupt Pending Extra must be HIGH: Ch 6 = 1 (=== passed ===) (Warning Count=7)
    Interrupt Pending Extra must be LOW: Ch 6 = 0 (=== passed ===) (Warning Count=7)
Processing Channel 7...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 6 #####
    Interrupt Pending Extra must be HIGH: Ch 7 = 1 (=== passed ===) (Warning Count=8)
    Interrupt Pending Extra must be LOW: Ch 7 = 0 (=== passed ===) (Warning Count=8)
Processing Channel 8...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 9 #####
    Interrupt Pending Extra must be HIGH: Ch 8 = 1 (=== passed ===) (Warning Count=9)
    Interrupt Pending Extra must be LOW: Ch 8 = 0 (=== passed ===) (Warning Count=9)
Processing Channel 9...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch 8 #####
    Interrupt Pending Extra must be HIGH: Ch 9 = 1 (=== passed ===) (Warning Count=10)
    Interrupt Pending Extra must be LOW: Ch 9 = 0 (=== passed ===) (Warning Count=10)
Processing Channel 10...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch11 #####
    Interrupt Pending Extra must be HIGH: Ch10 = 1 (=== passed ===) (Warning Count=11)
    Interrupt Pending Extra must be LOW: Ch10 = 0 (=== passed ===) (Warning Count=11)
Processing Channel 11...
    ##### WARNING!!! Interrupt Pending Extra is not LOW: Ch10 #####
    Interrupt Pending Extra must be HIGH: Ch11 = 1 (=== passed ===) (Warning Count=12)
    Interrupt Pending Extra must be LOW: Ch11 = 0 (=== passed ===) (Warning Count=12)

=== Test Passed === (### 12 WARNINGS GENERATED ###)

```

```
# ./rcim_terminator -b0 -i (if RCIM does not have IRIG support - Return status is '69')
```

```
#####  
IRIG support is NOT preset on the card '/dev/rcim:0/rcim'  
#####
```

```
# ./rcim_terminator -b0 -i (if RCIM does have IRIG support - Return status is '0')
```

```
=====  
IRIG support IS preset on the card '/dev/rcim:0/rcim'  
=====
```

## 6.4. TEST\_BOARD

This test script is useful for testing the entire card. If the card does not have IRIG support, then the TEST\_BOARD\_OUTPUT and TEST\_BOARD\_INPUT tests will be skipped and only the TEST\_BOARD\_TERMINATOR test will run.

```
### Run order for TEST_BOARD:
### 1) TEST_BOARD_OUTPUT
### 2) TEST_BOARD_INPUT
### 3) TEST_BOARD_TERMINATOR
```

```
#####
TEST_BOARD_INPUT
#####
```

```
Usage: TEST_BOARD [-b|B] [-f|F] [-l|L]
```

Where:

```
-b|B #      Select Board Number (this option is mandatory)
-f|F       When loopback option '-l' is specified, run 'long' test. Default is
           'short' test
-l|L <arg> Run loopback test. Arg is required (default is no loopback)
p|P       Run all DCLS channel and AM loopback test ('Loopback Plug' must be
           connected)
a|A       Run AM loopback test ('Loopback Plug' or 'BNC b/w AM input/output' must
           be connected)
d|D       Run all DCLS channel loopback test ('Loopback Plug' must be connected)
c|C       Run DCLS channel 10/11 loopback test ('Loopback Plug' or BNC b/w Ch10 &
           Ch11 must be connected)
#         Run DCLS channel #/(#+1) loopback test ('Loopback Plug' or BNC b/w Ch# &
           Ch#+1 must be connected)
           (Valid values for the DCLS channel # specified are 0, 2, 4, 6, 8 or 10)
-n|N #     Number of times to repeat TEST_BOARD
```

```
e.g. TEST_BOARD      : run short input board test. No loopback testing performed
TEST_BOARD -l a      : run short version of AM loopback test
TEST_BOARD -l p -f   : run long version of AM and all DCLS channel loopback test
TEST_BOARD -L d      : run short version of all DCLS channels loopback test
TEST_BOARD -l 4      : run short version of DCLS channels 4/5 loopback test
TEST_BOARD -Lc       : run short version of DCLS channels 10/11 loopback test
TEST_BOARD -l 6 -la  : run short AM and DCLS channels 6/7 loopback test
TEST_BOARD -la -l10  : run short AM and DCLS channels 10/11 loopback test
```

Notes:

- 1) You cannot specify the '-f' option without specifying a '-l' option
- 2) If '-lp' is specified, you cannot specify any other '-l' option
- 3) If '-ld' is specified, you cannot specify '-lc' or '-l#' option
- 4) If multiple '-lc' and '-l#' are specified, only the last channel is selected
- 5) '-l10' option is same '-lc'
- 6) '-lp' option is same as '-la' plus '-ld'
- 7) Any loopback test will include internal loopback test of all DCLS channels
- 8) All options or arguments are case-insensitive

Duration Input Test:

```
No loopback option (default)           - 5 seconds
Loopback Short Test:
- with specific channel (-lc)           - 1 minute, 5 seconds
- with AM loopback (-la)                 - 1 minute, 25 seconds
- with specific channel (-lc) and AM (-la) - 1 minute, 35 seconds
- with all channels (-ld)                 - 1 minute, 45 seconds
- with all channels and AM (-lp)         - 2 minutes, 15 seconds
Loopback Long Test:
- with specific channel (-lc)           - 2 minute, 5 seconds
- with AM loopback (-la)                 - 6 minute, 15 seconds
- with specific channel (-lc) and AM (-la) - 6 minutes, 35 seconds
- with all channels (-ld)                 - 3 minutes, 25 seconds
```

- with all channels and AM (-lp) - 7 minutes, 55 seconds

```
#####  
TEST_BOARD_OUTPUT  
#####  
Usage: TEST_BOARD -[b|B]  
Where:  
-b|B #      Select Board Number  
-n|N #      Number of times to repeat TEST_BOARD  
  
e.g. TEST_BOARD      : run test. No loopback cable required  
  
Duration Output Test:  
Output test          - 30 seconds
```

```
#####  
TEST_BOARD_TERMINATOR  
#####  
Usage: TEST_BOARD -[b|B] -[v|V]  
Where:  
-b|B #      Select Board Number  
-v|V        Verbose option. Default is not verbose  
-n|N #      Number of times to repeat TEST_BOARD  
  
e.g. TEST_BOARD      : run test. No loopback cable required  
  
Duration Terminator Test (long test):  
Terminator test      - 4 second  
Terminator test      - 19 second (with verbose)
```

Example:

```
# ./TEST_BOARD -b0
```



## 6.5. TEST\_BOARD\_INPUT

This test script is useful for testing the IRIG input side of card

```
#####  
TEST_BOARD_INPUT  
#####  
Usage: TEST_BOARD [-b|B] [-f|F] [-l|L]  
Where:  
-b|B #       Select Board Number (this option is mandatory)  
-f|F         When loopback option '-l' is specified, run 'long' test. Default is  
             'short' test  
-l|L <arg>   Run loopback test. Arg is required (default is no loopback)  
  p|P        Run all DCLS channel and AM loopback test ('Loopback Plug' must be  
             connected)  
  a|A        Run AM loopback test ('Loopback Plug' or 'BNC b/w AM input/output' must  
             be connected)  
  d|D        Run all DCLS channel loopback test ('Loopback Plug' must be connected)  
  c|C        Run DCLS channel 10/11 loopback test ('Loopback Plug' or BNC b/w Ch10 &  
             Ch11 must be connected)  
  #          Run DCLS channel #/(#+1) loopback test ('Loopback Plug' or BNC b/w Ch# &  
             Ch#+1 must be connected)  
             (Valid values for the DCLS channel # specified are 0, 2, 4, 6, 8 or 10)
```

```
e.g. TEST_BOARD           : run short input board test. No loopback testing performed  
TEST_BOARD -l a          : run short version of AM loopback test  
TEST_BOARD -l p -f       : run long version of AM and all DCLS channel loopback test  
TEST_BOARD -l d          : run short version of all DCLS channels loopback test  
TEST_BOARD -l 4          : run short version of DCLS channels 4/5 loopback test  
TEST_BOARD -l c          : run short version of DCLS channels 10/11 loopback test  
TEST_BOARD -l 6 -la      : run short AM and DCLS channels 6/7 loopback test  
TEST_BOARD -l a -l10     : run short AM and DCLS channels 10/11 loopback test
```

Notes:

- 1) You cannot specify the '-f' option without specifying a '-l' option
- 2) If '-lp' is specified, you cannot specify any other '-l' option
- 3) If '-ld' is specified, you cannot specify '-lc' or '-l#' option
- 4) If multiple '-lc' and '-l#' are specified, only the last channel is selected
- 5) '-l10' option is same as '-lc'
- 6) '-lp' option is same as '-la' plus '-ld'
- 7) Any loopback test will include internal loopback test of all DCLS channels
- 8) All options or arguments are case-insensitive

Duration Input Test:

No loopback option (default)	- 5 seconds
Loopback Short Test:	
- with specific channel (-lc)	- 1 minute, 5 seconds
- with AM loopback (-la)	- 1 minute, 25 seconds
- with specific channel (-lc) and AM (-la)	- 1 minute, 35 seconds
- with all channels (-ld)	- 1 minute, 45 seconds
- with all channels and AM (-lp)	- 2 minutes, 15 seconds
Loopback Long Test:	
- with specific channel (-lc)	- 2 minute, 5 seconds
- with AM loopback (-la)	- 6 minute, 15 seconds
- with specific channel (-lc) and AM (-la)	- 6 minutes, 35 seconds
- with all channels (-ld)	- 3 minutes, 25 seconds
- with all channels and AM (-lp)	- 7 minutes, 55 seconds

Example:

```
# ./TEST_BOARD_INPUT -b0
```

## 6.6. TEST\_BOARD\_OUTPUT

This test script is useful for testing the IRIG output side of card

```
#####  
TEST_BOARD_OUTPUT  
#####  
Usage: TEST_BOARD_OUTPUT -[b|B]  
Where:  
    -b|B #          Select Board Number  
  
e.g. TEST_BOARD_OUTPUT          : run test. No loopback cable required  
  
Duration Output Test:  
    Output test                - 30 seconds
```

Example:

```
# ./TEST_BOARD_OUTPUT -b0
```

## 6.7. TEST\_BOARD\_TERMINATOR

This test script is useful for testing the operation of the RCIM channel terminators. This script will work on any RCIM card, i.e. with or without IRIG support.

```
#####  
TEST_BOARD_TERMINATOR  
#####  
Usage: TEST_BOARD_TERMINATOR -[b|B] -[v|V]  
Where:  
    -b|B #          Select Board Number  
    -v|V           Verbose option. Default is not verbose  
  
e.g. TEST_BOARD_TERMINATOR          : run test. No loopback cable required  
  
Duration Terminator Test (long test):  
    Terminator test                - 4 second  
    Terminator test                - 19 second (with verbose)
```

Example:

```
# ./TEST_BOARD_TERMINATOR -b0
```

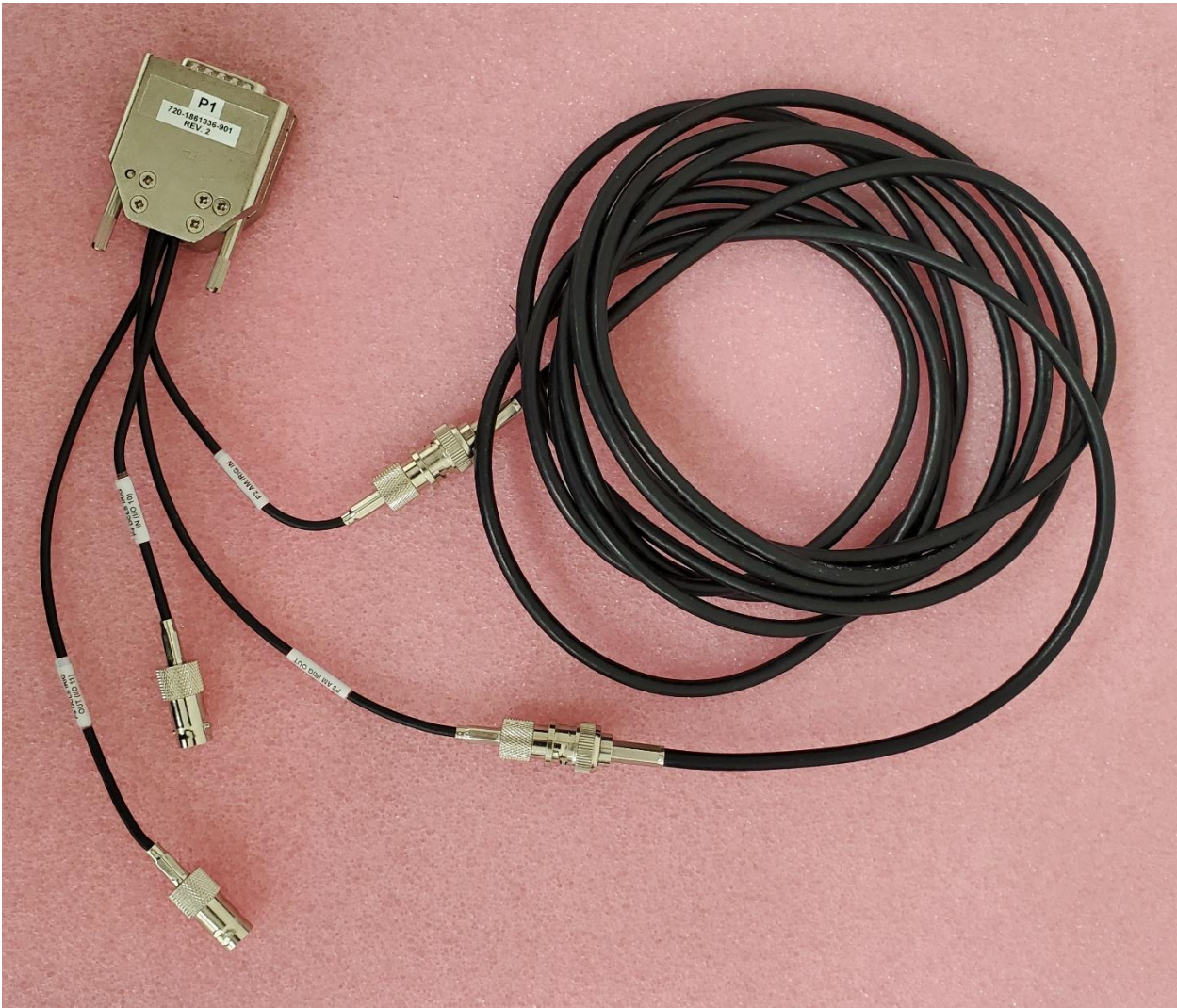
## 6.8. Loopback testing examples

1. # ./TEST\_BOARD -b0
  - run short input board test. No loopback testing performed
  - run terminator operation test
  - no loopback cable is required
2. # ./TEST\_BOARD -b0 -l a
  - run short version of AM loopback test
  - run terminator operation test
  - Use either the Loopback Plug or the BNC loopback cable with AM IRIG In connected to AM IRIG Out
3. # ./TEST\_BOARD -b0 -l p -f
  - run long version of AM and all DCLS channel loopback test
  - run terminator operation test
  - Use the Loopback Plug
4. # ./TEST\_BOARD -b0 -L d
  - run short version of all DCLS channels loopback test
  - run terminator operation test
  - Use the Loopback Plug
5. # ./TEST\_BOARD -b0 -l 4
  - run short version of DCLS channels 4/5 loopback test
  - run terminator operation test
  - Use the Loopback Plug
6. # ./TEST\_BOARD -b0 -Lc
  - run short version of DCLS channels 10/11 loopback test
  - run terminator operation test
  - Use either the Loopback Plug or the BNC loopback cable with DCLS IRIG In connected to DCLS IRIG Out
7. # ./TEST\_BOARD -b0 -l 6 -la
  - run short AM and DCLS channels 6/7 loopback test
  - run terminator operation test
  - Use the Loopback Plug
8. # ./TEST\_BOARD -b0 -la -l10
  - run short version of DCLS channels 10/11 loopback test
  - run terminator operation test
  - Use either the Loopback Plug or the BNC loopback cable with DCLS IRIG In connected to DCLS IRIG Out and the AM IRIG In connected to the AM IRIG Out.
9. # ./TEST\_BOARD\_TERMINATOR -b0 -v -l1000
  - run terminator operation test with verbose option 1000 times

## 7. Notes and Errata

- The new RCIM-IV card supports this IRIG feature
- This RCIM IRIG diagnostic program will work with all releases of RedHawk
- You may need to wait a few minutes after rebooting the system to run the diagnostics as some tests may fail while the kernel is adjusting the system time
- On some Debian systems, the following message can be ignored when the package is removed. *“dpkg: warning: while removing rcim-irig-diagnostic, directory /usr/local not empty so not removed”*
- The *rcim\_terminator* test and the *TEST\_BOARD\_TERMINATOR* script can be run on any RCIM card i.e. with or without IRIG support
- The *TEST\_BOARD* script will skip the *TEST\_BOARD\_OUT* and *TEST\_BOARD\_INPUT* tests if IRIG support is not present in the RCIM card
- You must disconnect any external IRIG network cable from the RCIM before running any of the diagnostics

## Appendix A: RCIM-IV IRIG Cable BNC Loopback



## Appendix B: BNC Loopback Connector Pinout

	Part	Signal Direction	Cable Length	I/O Channel
<b>P1</b>	720-1861336-901			
<b>P2</b>	AM IRIG	IN	short	
<b>P3</b>	AM IRIG	OUT	long	
<b>P4</b>	DCLS IRIG	IN	short	10
<b>P5</b>	DCLS IRIG	OUT	long	11

## Appendix C: 730-1861337-901 Loopback Plug



## Appendix D: Loopback Plug Connector Pinout

From		To	
Pin	I/O Channel	Pin	I/O Channel
1	Sig 0	2	Sig 1
3	Sig 2	4	Sig 3
5	Sig 4	6	Sig 5
7	Sig 6	8	Sig 7
9	Sig 8	26	Sig 9
25	Sig 10	24	Sig 11
21	AM IN	22	AM OUT

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