# Instrument Change Checklist

# ISIS

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## Revision 2.0

Description : WHT Cassegrain Spectrograph
Location : WHT Cassegrain Focus
Weight : 1500 Kg

Preparation

Team required :  3  ( 1 mechanical, 1 Detector  & 1 Optical)
Approximate time :  NA

This should be carried out at least the day before the change.

IMPORTANT : Make sure the detectors to be used are pumped and cooled down
ready to be fitted the next day.

| Tick each box when complete | Tick box |
|---|---|
| 1. The handling trolley for the instrument to be removed from the telescope must be lifted to the observing floor. | |
| 2. ISIS should be lifted up to the observing floor. The top of the handling frame can be removed so that the instrument is ready to be mounted. | |
| 3. Any electronic equipment, cabling or cryostats not on the telescope should be taken to the observing floor. | |
| 4. Any cryostats that are fitted to ISIS that are not in use elsewhere should be mounted and the micrometers set-up. | |
| 5. Remove protective dekker. Clean ISIS slit. Place protective dekker. (Only clean it if you have been trained; otherwise contact a specialist) | |
| **Preparation Complete :** | **Signature** **Date :** |

# INSTRUMENT CHANGE PROCEDURE
## ISIS SPECTROGRAPH

Team required:   2 Electronics Specialists
                 2 Mechanical Specialists
                 1 Weightlifter

Nominal  time :   6 hours

# Instrument mounting

| Tick each box when complete | Tick box |
|---|---|
| 1. IMPORTANT  Position the telescope for change: PARK ZENITH | |
| 2. Make entry in log book:        **DO NOT MOVE TELESCOPE** | |
| 3. Lock off the telescope (Control Room). | |
| 4. Turn the Cassegrain rotator to correct angle and line up the marks on ISIS and the A&G box. | |
| 5. Put telescope ties in on the GRACE side. | |
| 6. Remove all connections to the instrument to be removed. | |
| 7. Move instrument handling trolley under instrument, align & attach. | |
| 8. Unbolt and remove instrument. | |
| 9. Check that ISIS lid is open. | |
| 10. Move ISIS into place and bolt on. *ONE* person only to check all bolts are tight. | |
| 11. Lift down and store trolley. | |
| 12. Balance telescope. NB this should be done after cabling up and switching on ISIS and the CCD controllers. Pre-testing can then be carried out during balancing. | |

# Instrument Cabling

| 13. Connect the ISIS air supply. | |
|---|---|

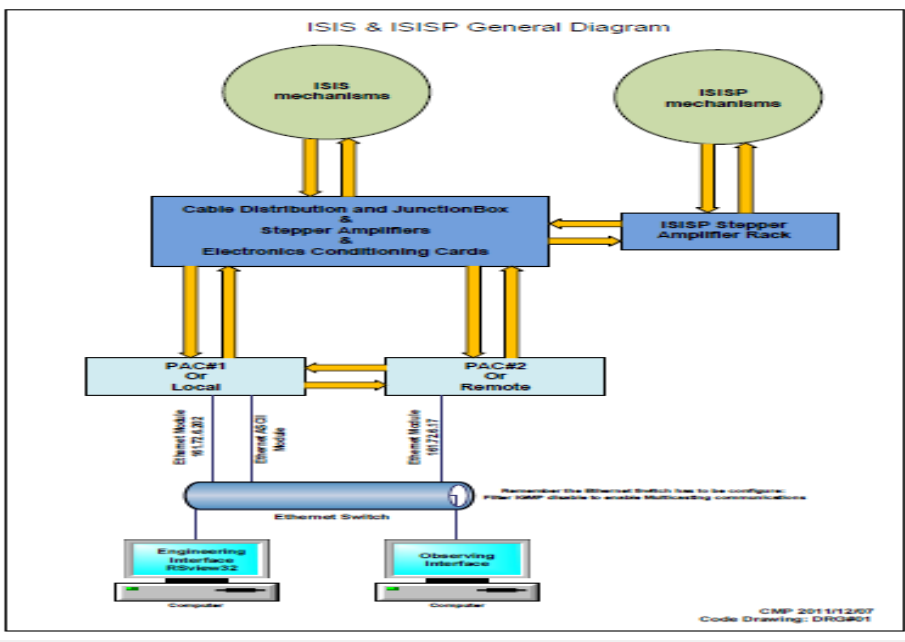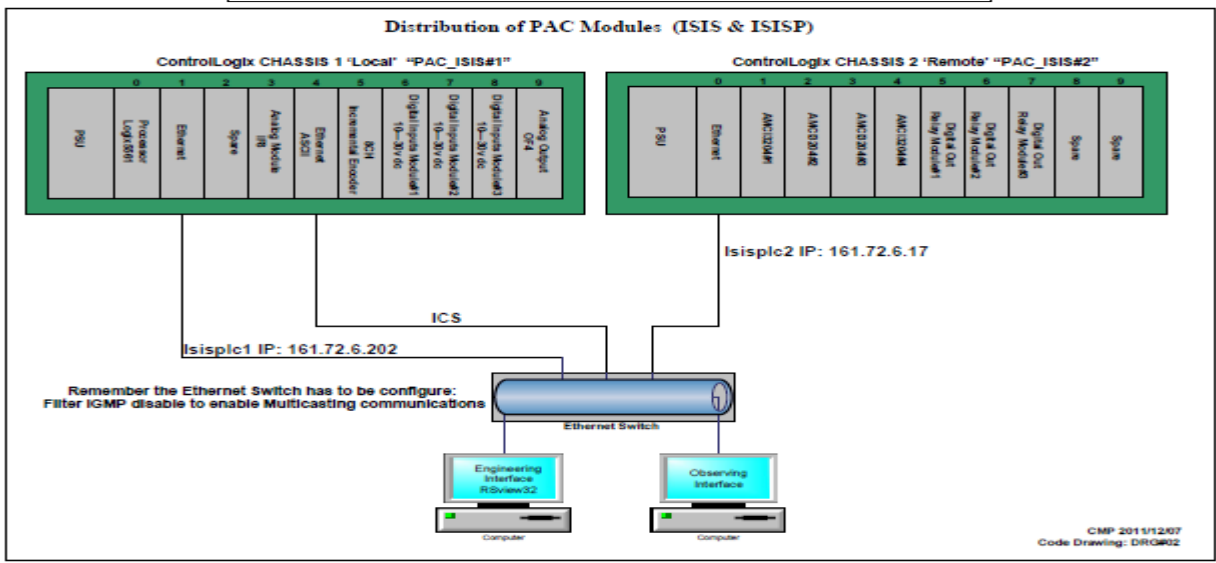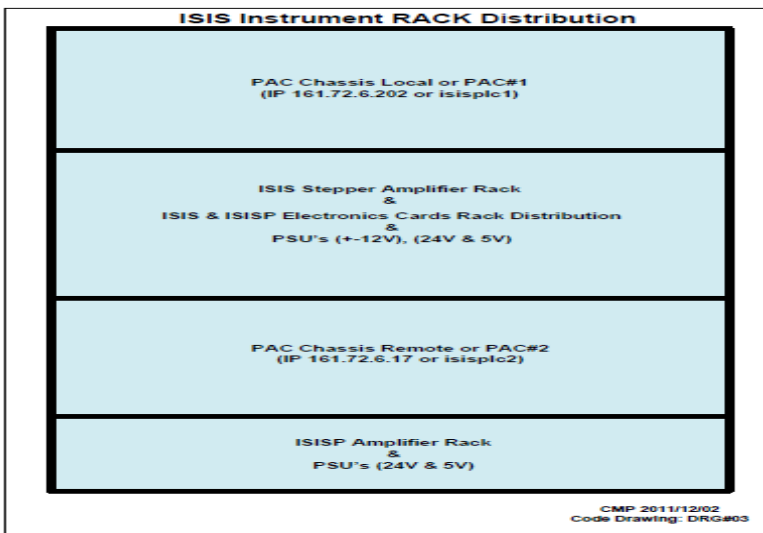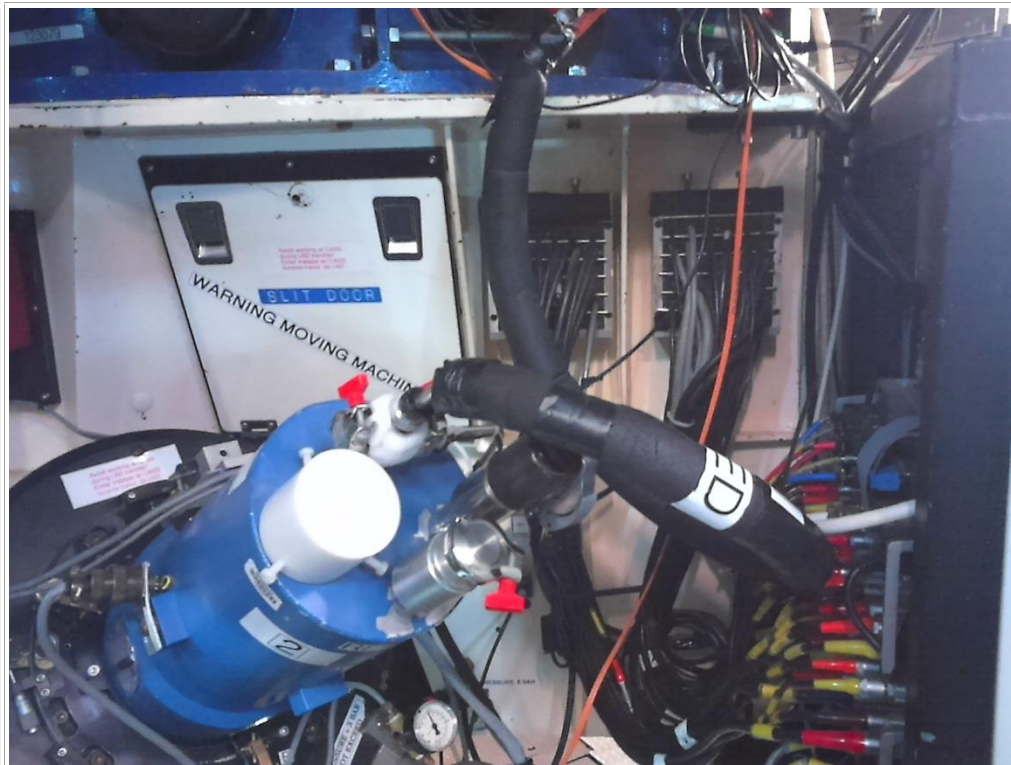| |
|---|
| 14. Connect the ISIS Network to the Ethernet Switch called "PLC's ONLY" at A&G Box Rack<br>   -PLC#1 Two connections; Module 1756-ENBT and the MVI56 Prosoft Module for ICS communication.<br>   -PLC#2 One connection Module 1756-ENBT |
| 15. Connect and switch on the ISIS mains:<br>   -ISIS 24V PSU Motors.<br>   -ISIS PLC Connector Panel Junction Box Rack & ISISP Power Amplifier Rack. (The same plug for both)<br>   -ISIS Temp. sensor PSU. (White Mains Cable)<br>   -ISIS PLC#1 and PLC#2 connected to the APC port 2 located at the A&G Box Rack. |
| 16. Switch on or check:<br>   -PLC#1 (One switch at rear and one in front)<br>   -PLC#2 (One switch at rear and one in front)<br>   -ISIS Temperature Sensor<br>   -ISIS 24V PSU Motors<br>   -ISIS Junction Box Rack<br>   -ISISP Power Amplifier Rack |
| 16.1 At the PLC's looks for any red error indications see next figures:<br>   -The CPU Key should be at REM mode<br><br> |
| 17. Photos Rack General Distribution |
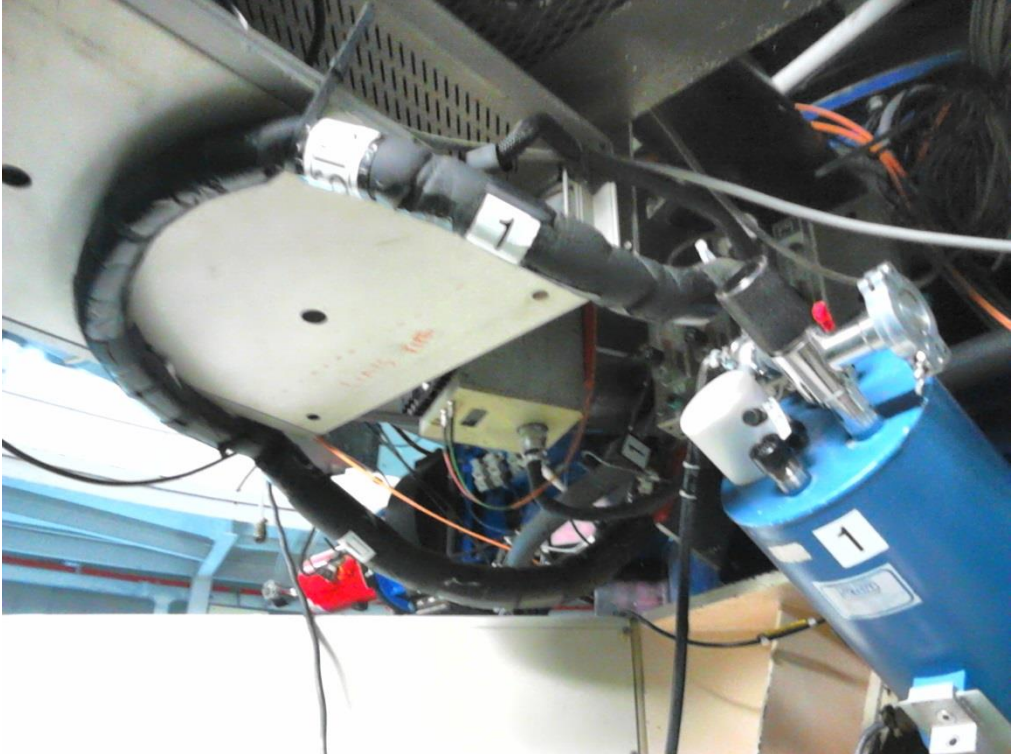
# ISIS Instrument RACK Distribution

**PAC Chassis Local or PAC#1**
**(IP 161.72.6.202 or isisplc1)**

**ISIS Stepper Amplifier Rack**
**&**
**ISIS & ISISP Electronics Cards Rack Distribution**
**&**
**PSU's (+-12V), (24V & 5V)**

**PAC Chassis Remote or PAC#2**
**(IP 161.72.6.17 or isisplc2)**

**ISISP Amplifier Rack**
**&**
**PSU's (24V & 5V)**

CMP 2011/12/02
Code Drawing: DRG#03

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## Distribution of PAC Modules (ISIS & ISISP)

**ControlLogix CHASSIS 1 'Local' "PAC_ISIS#1"**

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| PSU | Processor Logix5561 | Ethernet | Spare | Analog Module IB | Ethernet ASCII | 8CH Incremental Encoder | Digital Inputs Module#1 10~30V dc | Digital Inputs Module#2 10~30V dc | Digital Inputs Module#3 10~30V dc | Analog Output Of 4 |

**ControlLogix CHASSIS 2 'Remote' "PAC_ISIS#2"**

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| PSU | Ethernet | AMCI3204M | AMCI3204IO | AMCI3204IO | AMCI3204M | Digital Out Relay Module#1 | Digital Out Relay Module#2 | Digital Out Relay Module#3 | Spare | Spare |

Isisplc2 IP: 161.72.6.17

ICS

Isisplc1 IP: 161.72.6.202

**Remember the Ethernet Switch has to be configure:**
**Filter IGMP disable to enable Multicasting communications**

Ethernet Switch

Engineering Interface RSview32
Computer

Observing Interface
Computer

CMP 2011/12/07
Code Drawing: DRG#02

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## ISIS & ISISP General Diagram

ISIS mechanisms

ISISP mechanisms

**Cable Distribution and JunctionBox**
**&**
**Stepper Amplifiers**
**&**
**Electronics Conditioning Cards**

**ISISP Stepper Amplifier Rack**

**PAC#1 Or Local**

**PAC#2 Or Remote**

Ethernet Module 161.72.6.202

Ethernet ASCII Module

Ethernet Module 161.72.6.17

Ethernet Switch

Remember the Ethernet Switch has to be configure:
Filter IGMP disable to enable Multicasting communications

Engineering Interface RSview32
Computer

Observing Interface
Computer

CMP 2011/12/07
Code Drawing: DRG#01

# ISIS CCD mounting

| Tick each box when complete | Tick box |
|---|---|
| 18. Clean the CCD Cryostat windows. | |
| 19. Clean the camera lenses. | |
| 20. Ensure the correct length filler tube is fitted in each cryostat. HALF LENGTH tubes are needed for cryostats mounted on RED and BLUE. | |
| 21. Set the capstans A, B & C and the rotation for each cryostat using the micrometers as per the 'Capstan Settings Book'. | |
| 22. Clamp the capstans in correct order i.e.  1st  A - the hole, 2nd  B - the slot, 3rd C - the flat.<br>Then to PREVENT FORMING AN EARTH LOOP,  Ensure the micrometers including the D rotation micrometer are wound back and are not touching the frame. Also check that the clamps have insulating material fitted where they make contact with the capstan screws. CHECK isolation using a multimeter before connecting any cables to the cryostat. | |
| 23. Connect air and set cryostat window flushing to ~50 litres/hour. | |
| 24. The following photos show how the red arm filling pipe needs to be fitted to avoid blocking the slit<br><br> | |

# ISIS CCD connections

| Tick each box when complete | Tick box |
|---|---|
| 24. Connect the mains to the RED SDSU PSU. | |
| 25. Connect an SDSU power cable between the RED SDSU controller and the RED SDSU controller PSU. | |
| 26. *To be done be member of detector group taking anti-static precautions:* Connect the RED CCD main signal cable static protection box to the RED SDSU controller. | |
| 27. Connect the RED temperature cable between the RED SDSU controller and the RED cryostat. | |
| 28. Connect the RED shutter cable from ISIS RED shutter to the RED shutter control box and the other shutter cable from the the RED shutter control box to the RED SDSU controller. | |
| 29. Connect an ID cable between the RED cryostat and the RED SDSU controller. | |
| 30. Connect the 2 fibres from the RED controller back to the | |

| | |
|---|---|
| appropriate SPARC in the control room. | |
| 31. Connect the mains to the BLUE SDSU PSU. | |
| 32. Connect an SDSU power cable between the BLUE SDSU controller and the BLUE SDSU controller PSU. | |
| 33. *To be done be member of detector group taking anti-static precautions:* Connect the BLUE CCD main signal cable static protection box to the BLUE SDSU controller. | |
| 34. Connect the BLUE temperature cable between the BLUE SDSU controller and the BLUE cryostat. | |
| 35. Connect the BLUE shutter cable from ISIS BLUE shutter to the BLUE shutter control box and the other shutter cable from the the BLUE shutter control box to the BLUE SDSU controller. | |
| 36. Connect an ID cable between the BLUE cryostat and the BLUE SDSU controller. | |
| 37. Connect the 2 fibres from the BLUE controller back to the appropriate SPARC in the control room. | |
| 38. Switch on RED and BLUE SDSU controller PSUs and Shutter control PSUs. | |
| 39. At the telescope use the buttons on the front of the RED and BLUE shutter control boxes to test the operation and status from the shutters. | |

## ISIS post installation checks

| | |
|---|---|
| 39.1 Coffee Break. | |
| 40. At the instrument engineering interface RSView32, select ISIS Engineering Interface Check for correct communication.  Check if the ICS IP is connected to the PLC, see figure below: | |
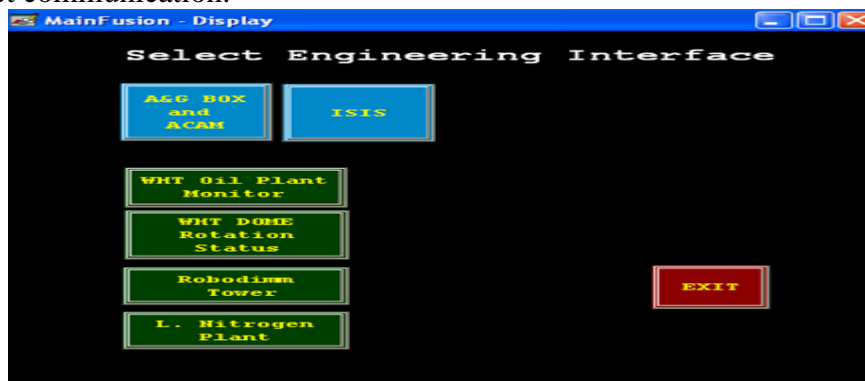
**Enable or Disable ICS**

En/Dis ICS    The ICS is Enabled

ICS IP Connected    161. 72. 6 . 24

41. At the Engineering Interface RSView32 after everything is power-up, initialise all mechanisms see next figure:



ISIS & ISISP ENGINEERING CONTROL

| MECH. | Actual Position | Demand | Move | Home | Stop | Mech. Code Error in Hex | Time Out | Init. Busy Flag | D. St. | AXIS CW CCW | Hom | HiLi SW | Detent or Brake | Pos. Code Sw | Warnings |
|-------|-----------------|--------|------|------|------|-------------------------|----------|-----------------|--------|-------------|-----|---------|-----------------|--------------|----------|
| GRB | 29999 | 0 | | | | 0 | 0 | | | | | | | | |
| COB | 6503 | 0 | | | | 0 | 0 | | | | | | | | |
| SSO | 1 | 0 | | | | 0 | 0 | | | | | | | 02 | |
| GRR | 29999 | 0 | | | | 0 | 0 | | | | | | | | |
| COR | 3984 | 0 | | | | 0 | 0 | | | | | | | | |
| FDR | 0 | 0 | | | | 0 | 0 | | | | | | | 01 | |
| FDB | 0 | 0 | | | | 0 | 0 | | | | | | | 01 | |
| BFA | 0 | 0 | | | | 0 | 0 | | | | | | | 01 | |
| BFB | 0 | 0 | | | | 0 | 0 | | | | | | | 01 | |
| DEK | 0 | 0 | | | | 0 | 0 | | | | | | | 201 | |
| FCP | 0 | 0 | | | | 0 | 0 | | | | | | | 01 | |
| RFA | 0 | 0 | | | | 0 | 0 | | | | | | | 01 | |
| RFB | 0 | 0 | | | | 0 | 0 | | | | | | | 01 | |
| BWA | 0.0 | 0.0 | | | | 0 | 0 | | | | | | In | Slide Out | |
| TWA | 0.0 | 0.0 | | | | 0 | 0 | | | | | | In | Slide Out | |
| BWR | 0.000 | 0.000 | | | | 0 | 0 | | | | | | In | Slide Out | |
| TWR | 0.000 | 0.000 | | | | 0 | 0 | | | | | | In | Slide Out | |
| SWI | 250 | 0 | | | | 0 | 0 | | | 0.00 V | | | | | |
| SDU | 0 | 0 | | | | 0 | 0 | SDV Door Locked | | | | | | | |
| HSR | 5 | 0 | L.Open | R.Open | | 0 | 0 | | | | | | | | |
| HSB | 5 | 0 | L.Open | R.Open | | 0 | 0 | | | | | | | | |
| BWS | Slide Out | 0 | | | | 0 | 0 | | | | | | | | |
| TWS | Slide Out | 0 | | | | 0 | 0 | | | | | | | | |

**Mechanisms Status**

| GDU | Grating Doors Closed |
| GCB | Grating Cell Blue Clamped |
| GCR | Grating Cell Red Clamped |
| AIR | Air Supply OK |

Click Blue Axis Name For Axis Information or Mech. Code Display for Decoding Erros

Grating Blue, Demand = 1000----110000 mdeg.

BACK Main    HELP



ISIS and ISISP ENGINEERING INTERFACE

**Select Engineering Interface**

ISIS    Error Register Display

EXIT    HELP

**Enable or Disable ICS**

En/Dis ICS    The ICS is Enabled

**GENERAL STATUS**

System Status

5V PSU ISISP
24V PSU ISISP
24V PSU Motors
24V PSU Sensors
5V PSU
+12V PSU
-12V PSU
AirPressure
Slit Door
Grating Doors
Collimator Cover
Grating Cell Blue
Grating Cell Red
Status Chassis Remote

PAG Status
OK

| | |
|---|---|
| 42. After the initialization there should be not red status shown anymore | ‖ |
| 42.1 After the grating zeroset can you write down the HOME positions:<br>Blue_Grating (GRB)=<br>Red_Grating (GRR)= | ‖ |

# Final checks though ICL and ICS

| Tick each box when complete | Tick box |
|---|---|
| 44. Edit the detector configuration (DEWARS web page).  See next Figure<br><br>**WHT CURRENT Configuration**<br><br>| Detector | Actual Temp(k) | Demand Temp(k) | DAS Station | Instrument | Noti |<br>|---|---|---|---|---|---|<br>| AG4 | 246.855 | 243 | whtdas17 | TVCASS | ✔ |<br>| AG6 | 239.92 | 243 | whtdas24 | AUTOCASS | ✔ |<br>| AUXCAM | 165.623 | 168 | whtdas8 | ACAM | ✔ |<br>| EEV12 | 161.591 | 163 | whtdas25 | BLUE | ✔ |<br>| REDPLUS | 156.215 | 158 | whtdas26 | RED | ✔ | | |
| 45. Restart the observing system. | |
| 46. Update the magnet board. | |

| Check each mechanism and tick each box when complete | Tick box |
|---|---|
| Open the grating doors and check that each set of grating clamps works correctly. Then ensure that the clamps are on before closing the door.<br><br>47. Red Grating (this should only be done after a change and not mid-run; you will be disturbing the instrument set-up). By default use the R158R grating and then use the command:<br><br>**setgrating red r158r** | |
| **inrg** | |
| **setgratingorder red 1** | |
| **cenwave red 4500** | |
| **cenwave red 6500** | |
| 48. Red Collimator (this should only be done after a change and not mid-run; you will be disturbing the instrument set-up). | |
| **rcoll 28000** | |
| **rcoll 9100** | |

| | |
|---|---|
| 49. Red Fold | |
| **Ensure the Red Fold is IN** (Position IN == 0 at the Engineering Interface) | |
| 50. Red filter A | |
| **rfilta 2**   <filter name\|filter position>   (it should be in the range of 1 to 3) | |
| **rfilta 1**   <filter name\|filter position>   (it should be in the range of 1 to 3) | |
| 51. Red Filter B | |
| **rfiltb 2**   <filter name\|filter position>   (it should be in the range of 1 to 3) | |
| **rfiltb 1**   <filter name\|filter position>   (it should be in the range of 1 to 3) | |
| 52. Red Hartmann Shutter | |
| **rhart 1------rhart 2** | |
| **rhart 0** | |
| 53. Blue Grating (this should only be done after a change and not mid-run; you will be disturbing the instrument set-up). By default use the R300B grating and then use the command:<br><br>**setgrating blue r300b** | |
| **inbg** | |
| **setgratingorder blue 1** | |
| **cenwave blue 6500** | |
| **cenwave blue 4500** | |
| 54. Blue Collimator (this should only be done after a change and not mid-run; you will be disturbing the instrument set-up ) | |
| **bcoll 28000** | |
| **bcoll 5200** | |
| 55. Blue Fold | |
| **bfold 2** | |
| 56. Blue Filter A<br>bfilta <filter name\|filter position>   (it should be in the range of 1 to 3) | |
| 57. Blue Filter B<br>bfiltb <filter name\|filter position>   (it should be in the range of 1 to 3) | |
| 58. Blue Hartmann Shutters | |
| **bhart 1 -------bhart 2** | |
| **bhart 0** | |
| 59. Slit Carriage Unit | |
| **mslit** | |
| **longslit** | |
| 60. Set Slit Width (this should only be done after a change and not mid-run; you will | |

| | |
|---|---|
| be disturbing the instrument set-up ) | |
| **slit 100** | |
| **slit 5000** | |
| **slitarc 1.0** | |
| 61. Field Lens, Calcite Block and Polaroid Tray | |
| **isis_move -m fcptray polaroid** or at the MIMIC control GUI | |
| **isis_move -m fcptray fieldlens** or at the MIMIC control GUI | |
| **isis_move -m fcptray calcite** or at the MIMIC control GUI | |
| **isis_move -m fcptray clear** or at the MIMIC control GUI | |
| 62. Slit Door ( NB the dekker must be at position 1 for access to the slit area ) | |
| **slit_door unlock** | |
| **slit_door lock** | |
| 63. Dekker Slide | |
| **dekker n** (where n = 1 ... 8; use 'dekker 8' by default)<br>1st: **dekker 1** (unlock & open the slit door; remove the protective dekker and store it in the dekker box; insert the observation dekker and close & lock the slit door)<br>2nd: **dekker 8** (default) | |
| 64. Quarter Wave Plate | |
| **isisp_move -m PQWSLIDE in** or at the MIMIC control GUI | |
| **isisp_move -m PQWSPIN 0.5** or at the MIMIC control GUI | |
| **isisp_move -m PQWSPIN 0** or at the MIMIC control GUI | |
| **isisp_move -m PQWANGLE 10** or at the MIMIC control GUI | |
| **isisp_move -m PQWANGLE 300** or at the MIMIC control GUI | |
| **isisp_move -m PQWSLIDE out** or at the MIMIC control GUI | |
| 65. half Wave Plate | |
| **isisp_move -m PHWSLIDE in** or at the MIMIC control GUI | |
| **isisp_move -m PHWSPIN 0.5** or at the MIMIC control GUI | |
| **isisp_move -m PHWSPIN 0** or at the MIMIC control GUI | |
| **isisp_move -m PHWANGLE 10** or at the MIMIC control GUI | |
| **isisp_move -m PHWANGLE 300** or at the MIMIC control GUI | |
| **isisp_move -m PHWSLIDE out** or at the MIMIC control GUI | |
| Take an arc with each arm. If arc lines are obtained then it is time to hand over to the SA to perform the final focussing. | |

| INSTRUMENT CHANGE COMPLETE<br>Signature:                              Date: | |
|---|---|
| HANDOVER TO  SUPPORT<br>ASTRONOMER          Signature:                    Date: | |

# Instrument removal

| Tick each box when complete | Tick box |
|---|---|
| 1. IMPORTANT  Position the telescope for change: PARK ZENITH | |
| 2. **setgrating red none (store grating in corresponding box)** | |
| 3. **setgrating blue none (store grating in corresponding box)** | |
| 4. **dekker 1 (or dekker out)** (unlock & open the slit door; remove the observation dekker and store it in the dekker box; insert the protective dekker and close & lock the slit door), then type:<br>    **dekker 5** (position the protective dekker to cover the slit) | |
| 5. Make entry in log book:        **DO NOT MOVE TELESCOPE** | |
| 6. Lock off the telescope (Control Room). | |
| 7. Turn the Cassegrain rotator to correct angle and line up the marks on ISIS and the A&G box. | |
| 8. Put telescope ties in on the GRACE side. | |
| 9. Remove all connections to the instrument to be removed. | |
| 10. Move instrument handling trolley under instrument, align & attach. | |
| 11. Unbolt and remove instrument. | |
| 12. Continue with mounting the new CASS instrument. | |

Revision History:
KMD Revision 1.3 clean slit added.
AWR Revision  1.4  transition from ICL to Unix ICS
AWR Revision 1.5 grating order added
RJP Revision 1.6 isisp commands updated
JR Revision 1.7 inhw added and minor corrections
JR Revision 1.8 only check red fold; don't move
CMP Revision 1.9 added PLC checks

CMP, JR Revision 2.0: LN2 auto-fill cabling; use of protective dekker included; added instrument removal