Draft Interface Control Document
For the Cassegrain ADC

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Figures and Tables

1 INTRODUCTION

This document specifies the interface between the Atmospheric Dispersion Corrector (ADC) and the Keck I telescope at the W.M. Keck Observatory.

The Cassegrain ADC will provide correction over the full Cassegrain field of view (FOV) for the Keck I telescope configured with an f/15 secondary mirror. The ADC is initially intended for use with the Low Resolution Imaging Spectrograph (LRIS) but it will also be useable with future Cassegrain instruments.

2 SCOPE AND APPLICABILITY

This document specifies all aspects of the interface between the Cassegrain ADC and the Keck I telescope.

Descriptions of Cassegrain ADC features are included for information. The requirements for these features are established in the requirements document for the Cassegrain ADC.

This is revision 1.2 of the document and it is the final draft for the preliminary design phase.

3 REVISION HISTORY

Revision	Date	Author	Reason for revision / remarks
1.0	July 23, 2003	SMA	Original Issue
1.1	July 25, 2003	SMA	Revisions after CARA internal review
1.2	Sept. 23, 2003	SMA	Revisions for PD phase, fill in some TBD's

Due to the difficulties in documents with moderately complex formatting such as this one, the Microsoft Word "Track Changes" feature is not useable. To see the changes in this document since the previous revision, use the "Tools, Track Changes, Compare Documents" drop down menu sequence and compare this document to the previous version. It is not recommended that you attempt to print the results. The file name and date for the previous version is "Cassegrain ADC Interface Document.1.1.doc", dated July 25, 2003.

4 RELATED DOCUMENTS

Cowley, David. *ADC – Preliminary Design Phase Project Plan: Revision 1.2*. Santa Cruz, California: UCO/Lick Observatory, University of California Santa Cruz, May 14, 2003.

Adkins, Sean. *Requirements for the Cassegrain ADC*, Version 1.3. Waimea, Hawaii: W.M. Keck Observatory, September 23, 2003.

TBD. *Keck I Cassegrain Position Vibration Data and Limits*. Waimea, Hawaii: W.M. Keck Observatory, TBD.

5 REFERENCED DRAWINGS

Table 1 lists the drawing numbers, revisions and date, source and title for all drawings referenced in this document.

Drawing #	Revision/Date	Source	Title
TBD	TBD	UCO/Lick	Cassegrain ADC FOV
199-06-00	E	TIW	Tertiary Tower Interface W.M. Keck Observatory
1080-C1101	TBD	CARA	Cassegrain ADC Mid Cass envelope
deleted	N/A	CARA	Cassegrain ADC electronics module envelope – now part of 1080-C1101
1080-C1102	TBD	CARA	Cassegrain ADC weight and balance requirements
1080-C1110	TBD	CARA	Cassegrain ADC defining point structural modifications
199-06-04	B	TIW	Defining Point Mechanism W. M. Keck Telescope
608-TT-00	B	Schwartz-Hautmont/TIW	W. M. Keck Telescope Tertiary Tower Elevations, sheets 1-17
199-10-02	B/11-11-90	TIW	Transfer Module, sheets 1-4
640-C0011	B / 9-25-01	CARA	Keck I Instrument Stowage Layout
1080-C1201	TBD	CARA	Cassegrain ADC Nasmyth Deck envelope
1080-C1200	TBD	CARA	Cass ADC Nasdeck Assy.
A5001	TBD	UCO/Lick	Cassegrain ADC jacking stand mounting configuration
1080-C1120	TBD	CARA	ADC electronics module glycol cooling modifications
deleted	N/A	CARA	Keck I Forward Cassegrain Module glycol supply panel – now part of 1080-C1120
110-10-07	C/6-12-03	CARA	Keck I Telescope Travel Limits
115-35-00	B/9-22-03	CARA	Cassegrain ADC one line diagram
TBD	TBD	CARA	ADC module local controls interconnection cable
TBD	TBD	UCO/Lick	ADC module control interconnection cable
TBD	TBD	UCO/Lick	ADC electronics module AC power input cable
TBD	TBD	UCO/Lick	ADC electronics module data communications interconnection cable

Table 1: Referenced Drawings

Drawing #	Revision/Date	Source	Title
TBD	TBD	UCO/Lick	ADC electronics module control interconnection cable
TBD	TBD	CARA	ADC module interconnection panel
TBD	TBD	CARA	ADC electronics module interconnection panel
TBD	TBD	CARA	Modified LRIS hatch envelope

Table 1: Referenced Drawings, Continued

6 GLOSSARY

Table 2 provides definitions for acronyms and particular terms used in this document.

Term	Definition
ADC	Atmospheric Dispersion Corrector
ADC electronics enclosure	A shielded, glycol cooled NEMA 4 enclosure containing the electronic control system and target computer for the ADC.
ADC host computer	The computer that runs the user interface for the ADC, this is the K1server computer which is a Sun workstation running Solaris.
ADC host software	The ADC host software is a DCSGUI control row, running on the ADC host computer (K1server) and which communicates with the DCS service to control and monitor the ADC.
ADC jack stand	A fixture at RT4 on Keck I that holds the ADC module when the transfer module is required for other purposes.
ADC module	The telescope mounted component of the Cassegrain ADC containing the optics.
ADC target computer	A diskless PC running the Linux operating system and located in the ADC electronics enclosure. The target computer runs the ADC target software.
ADC target software	The ADC target software implements the ADC keyword service, implements the ADC motion control system and acts as a DCS client to communicate with the DCS and DCSGUI.
CARA	California Association for Research in Astronomy
Cassegrain ADC	The complete system including the ADC module, electronics enclosure, target computer and software.
CFR	Code of Federal Regulations
Clean power	UPS backed up, power transient, and lightning protected nominally 120VAC @ 57-63Hz
Commercial power	HELCO provided power nominally 120VAC @ 57 - 63Hz
DCS	Drive and Control System
EIA	Electronic Industries Alliance
FOV	Field Of View

Table 2: Glossary of Terms

Term	Definition
IBC	International Building Code
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers
KSD	Keck Software Document
LRIS	Low Resolution Imaging Spectrograph
N/A	Not Applicable
TBD	To Be Determined
TIW	TIW Systems Inc.
UCO/Lick	University of California Observatories, Lick Observatory Technical Facilities
USGS	United States Geological Survey

Table 2: Glossary of Terms, Continued

7 DOCUMENT CONTROL PROTOCOL

This is a controlled document. The current version may be determined by asking the CARA Instrument Program Manager. A copy of each released version of this document will be provided to the Cassegrain ADC Project Manager. All changes to this document require the approval of the CARA Instrument Program Manager.

Revisions to referenced documents will cause an update to this document. The Cassegrain ADC Project Manager will be notified of revisions made to referenced documents by CARA and the reason. A notice of revision to referenced documents will be sent via email to the Cassegrain ADC Project Manager when those revisions are released. The CARA Instrument Program Manager will be notified of revisions made to referenced documents by UCO/Lick and the reason. A notice of revision to referenced documents will be sent via email to the CARA Instrument Program Manager when those revisions are released.

8 OVERALL INTERFACE

8.1 Operating Environment

The ADC operates near sea level for testing in normal laboratory environments, and at the summit of Mauna Kea during its normal operating lifetime. The expected environmental conditions for the ADC are listed in table 3.

Table 3: Operating Environment

Parameter	*Min.*	*Typ.*	*Max.*	*Units*	*Notes*
Temperature	-5	0	+30	° C	Average annual temperature at 4,205 meters is 0° C
Humidity	0	-	95	%	Relative, non-condensing
Altitude	0	4,146	4,200	M	Above sea level, the nominal Keck altitude is 4,146 M

8.2 Air Borne Contaminants

The weather conditions at the summit of Mauna Kea include frequent high winds resulting in some air borne contaminants, particularly dust and insects. The Cassegrain ADC includes protection during installation and handling against the entry of these contaminants, particularly optical surfaces, precision mechanisms and fine pitch or fiber optic connectors.

9 OPTICAL INTERFACES

9.1 Instrument

9.1.1 Configuration

The optical component of the Cassegrain ADC is provided by a module mounted in the tertiary mirror tower of the Keck I telescope prior to the focal position of a Cassegrain instrument on Keck I.

9.1.2 FOV

The ADC module does not vignette the 20 arc minute field of view (FOV) of the Keck I telescope at the Cassegrain position for an instrument at the nominal focal position. The ADC module does not vignette the science field of the LRIS instrument at any rotation angle of LRIS when LRIS is in its normal operating position at the Cassegrain focal position of the Keck I telescope. The relationship of the ADC module FOV to the telescope FOV and the LRIS science and guider fields is shown in figure 1.

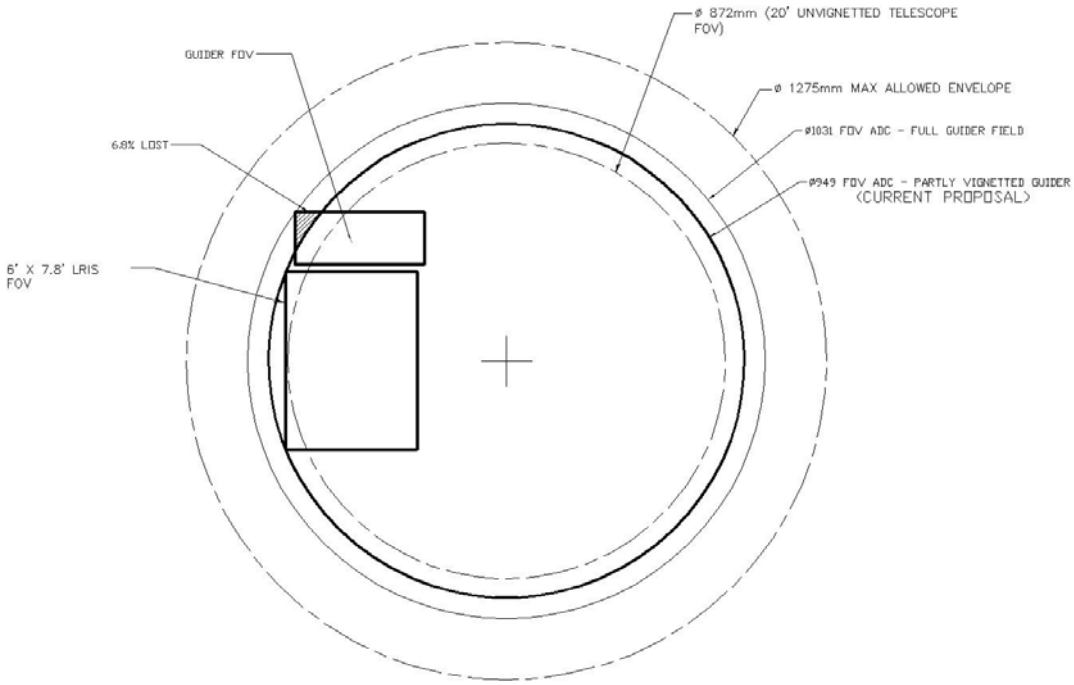

Figure 1: ADC Field of View

The FOV of the ADC module is defined in UCO/Lick drawing TBD.

9.1.3 Alignment

All adjustments required by the ADC module for optical alignment are provided as part of the module.

9.2 Telescope

9.2.1 Cassegrain Focal Position

The Cassegrain focal position of the Keck I telescope is defined on sheet 1 of TIW drawing 199-06-00, revision E, "Tertiary Tower Interface W.M. Keck Telescope".

10 MECHANICAL INTERFACES

10.1 Instrument

10.1.1 Configuration

The Cassegrain ADC consists of two major components, an optics module (the ADC module) installed in the tertiary tower of Keck I as shown in figure 2, and an electronics module located in the telescope dome at a location TBD.

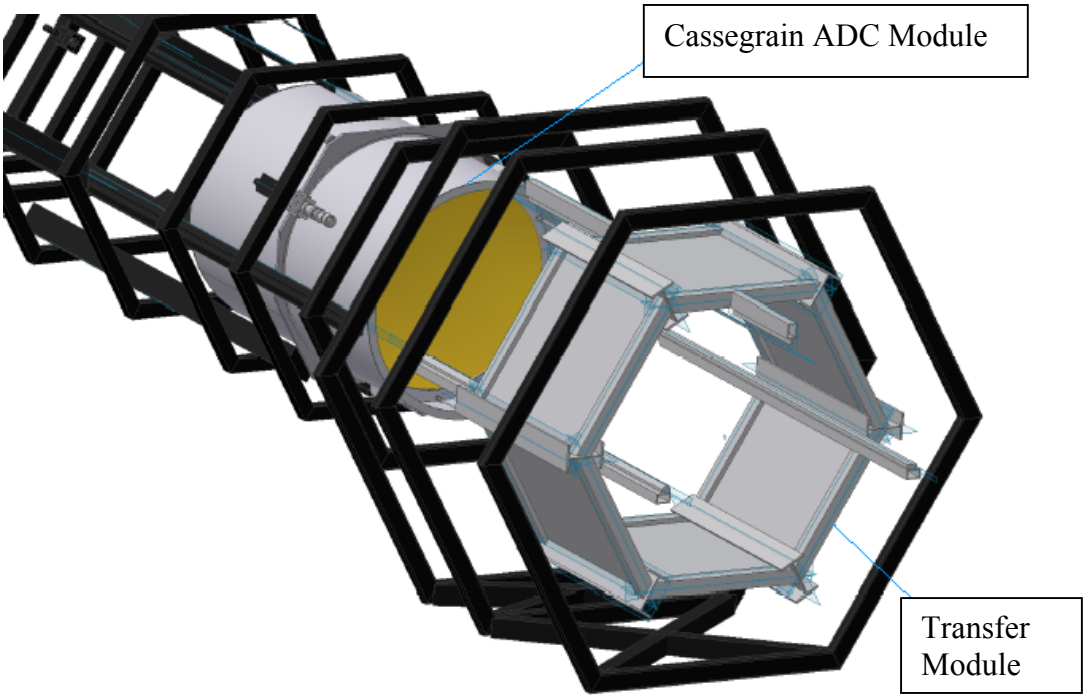

Figure 2: Cassegrain ADC Configuration

The existing Keck I transfer module is used to install and remove the ADC module from the telescope. The ADC module is stored at RT4 in the transfer module. A jack stand is provided at the back of the transfer module parking position to support and store the ADC module when the transfer module is in use for other purposes, such as serving as a counterweight for the tertiary mirror.

10.1.2 Dimensions

The ADC module envelope allowances are given in CARA drawing 1080-C1101, "Cassegrain ADC Mid-Cass envelope". The ADC module is compatible with installation in the tertiary mirror tower of the Keck I telescope prior to the focal position of a Cassegrain instrument, based on the

dimensions for the tertiary mirror tower shown in Schwartz-Hautmont/ TIW drawing 608-TT-00, revision B, sheets 1 – 17.

The ADC module is compatible with the existing Keck I tertiary transfer module shown in TIW drawing 199-10-02, revision B, sheets 1 – 4.

The ADC electronics module envelope allowances are given in CARA drawing 1080-C1101.

10.1.3 Weight and Balance

The ADC module weight and balance specifications are given in CARA drawing 1080-C1102.

The ADC module weight does not exceed 550 kg.

The ADC electronics module weight does not exceed 100 kg.

10.1.4 Defining Points

Three defining points for the ADC module are provided in the Keck I telescope tertiary mirror tower as shown in CARA drawing 1080-C1101.

The datum target on the defining point mechanisms is the intersection of the central axis of the mechanism and the plane formed by the "Points Of Contact" shown on sheet 2 of TIW drawing 199-06-04, revision B.

The X, Y and Z reference coordinates on the tertiary mirror tower are as shown on the “Key Plan” of sheet 1, Schwartz-Hautmont/ TIW drawing 608-TT-00, revision B.

The defining point mechanism mounting provides removable 5 mm think shims between each defining point mechanism and the surface on which the defining point is mounted. The shims allow adjustment of the radial position of the defining points.

The defining points use air motors and related components compatible with the other defining points on the Keck I telescope as shown in TIW drawing 199-06-04, revision B. All required valves, regulators and interconnections are provided with and are part of the ADC module.

10.1.5 Handling

The ADC module incorporates handling provisions that allow it to be transferred to and from the tertiary mirror tower using the existing Keck I transfer module. The ADC is normally stored at RT4 in the transfer module. RT4 is shown in the CARA drawing “Keck I Instrument Stowage Layout”, drawing number 640-C0011, revision B. Because the transfer module is also required to install and remove the tertiary mirror module, the ADC module is provided with a means, referred

to as the ADC jacking stand, to remove it from the transfer module and hold it at the RT4 storage position.

The envelope provided for the storage of the ADC and the installation of the ADC jacking stand is as shown in CARA drawing 1080-C1201. The mounting points on the existing Nasmyth deck are also shown.

The mechanical configuration and interface specifications for the transfer module are shown in TIW drawing 199-10-02, revision B, sheets 1 – 4. The overall Nasmyth deck assembly is shown in CARA drawing1080-C1200.

The mounting configuration and specifications for the ADC jacking stand are given in UCO/Lick drawing A5001.

The ADC module can encounter shocks in various axes, primarily vertical during handling and horizontal during installation and removal from the tertiary mirror tower, of up to 20 g for up to 10 milliseconds duration. The adjustment and operation of the ADC is not affected by shocks of these magnitudes and durations.

10.1.6 Vibration

Vibration generated by the ADC does not exceed vibration limits established by measurement of vibration at the Cassegrain position of the Keck I telescope during normal observing modes as reported in CARA document TBD.

10.1.7 Glycol Cooling

10.1.7.1 ADC Module

If glycol cooling is required the following sections define the interface for glycol cooling for the ADC module.

10.1.7.1.1 Connections

The ADC module is provided with removable connections using Parker Hannifin series FS ½" quick disconnect fittings. The instrument supply coupler is male (Parker FS-502-8FP), and the return coupler is female (Parker FS-501-8FP). Connections are located within the space provided as shown in the CARA drawing 1080-C1101.

The ADC module glycol cooling connections are made to the existing Keck I Forward Cassegrain Module glycol supply panel, CARA drawing number TBD.

10.1.7.1.2 Coolant Temperature Rise and Heat Load

The temperature rise of coolant through the ADC module is less than 3 °C. The heat load is less than 1800 watts.

10.1.7.1.3 Flow Switch

The ADC module is provided with a flow switch; Proteus Industries Inc. type 100B110 or equal, to generate a loss of coolant alarm. This flow switch interrupts power to the module unless a separate over-temperature detection system is provided to remove power from the module.

10.1.7.2 ADC Electronics Module

If glycol cooling is required the following sections define the interface for glycol cooling for the ADC electronics module.

10.1.7.2.1 Connections

The ADC electronics module is provided with permanent connections using ½" JIC 37º flare compression fittings or SAE straight thread O-ring fittings. Connections are located within the provided space shown in the CARA drawing 1080-C1101.

The ADC electronics module glycol cooling connections are made to TBD as shown in CARA drawing 1080-C1120.

10.1.7.2.2 Coolant Temperature Rise and Heat Load

The temperature rise of coolant through the electronics module is less than 3 °C. The heat load is less than 1800 watts.

10.1.7.2.3 Flow Switch

The ADC electronics module is provided with a flow switch; Proteus Industries Inc. type 100B110 or equal, to generate a loss of coolant alarm. This flow switch interrupts power to the module unless a separate over-temperature detection system is provided to remove power from the module.

10.1.7.2.4 ADC Electronics Module Interconnection Panel

The ADC electronics module glycol connections are part of the ADC electronics module interconnection panel as shown in CARA drawing TBD (see section 11.2.2).

10.2 Telescope

10.2.1 Elevation Travel

The Cassegrain ADC operates properly over the full elevation travel of the Keck I telescope as given in CARA drawing 110-10-07.

10.2.2 Shock and Vibration

The United States Geological Survey (USGS) has assigned the big island of Hawaii to seismic zone 4. The seismic zone system is defined in the "International Building Code" (IBC) published by the International Code Council (ICC) in 2003. Seismic zone 4 indicates that there is a 10% probability that over a 50 year period there will be severe ground shaking with an effective peak ground acceleration of 0.4 g or more.

Equipment and components installed at the summit of Mauna Kea are mounted or restrained so that they will remain in place when forces of 1 g are experienced in any direction.

During normal telescope operation the drive system may impart shocks of up to 1 g in any direction and of varying duration. The adjustment and operation of the ADC is not affected by shocks of these magnitudes and durations.

10.2.3 Glycol Cooling

Glycol cooling is provided for Cassegrain ADC module and electronics module cooling as described in the following four sections (10.2.3.1 through 10.2.3.4).

10.2.3.1 Coolant

The coolant is a mixture of 50% water and 50% ethylene glycol. The freezing point is – 37 °C. The mixture has a specific heat of 3198 J/kg °K (0.764 Btu/lb °R), and the density is 1067 kg/m^3 (66.5 lb/ft^3).

10.2.3.2 Pressure

Maximum system pressure at the Cassegrain instrument connect panel with the telescope at Zenith is 551 kPa (80 psig). The instrument plumbing should be able to withstand a maximum pressure of 689 kPa (100 psig) in the event of system pressure regulation failure. There is a pressure regulator on the supply side of each instrument connect panel. The pressure is adjustable, and is typically set at 207 kPa (30 psi).

10.2.3.3 Flow Rate

All instrument connect panels have a design flow rate of 9.8 L/min (2.6 gpm). Coolant flow is continuous, except in the case of equipment malfunction or power outage.

10.2.3.4 Temperature

The coolant temperature set point is 3 ºC below the dome ambient air temperature. The typical coolant temperature range is –10 ºC to +3 ºC.

11 ELECTRONIC/ELECTRICAL INTERFACES

11.1 Instrument

11.1.1 Power Dissipation

The ADC module radiates no more than 50 watts of heat into the telescope ambient environment. All heat generated by the ADC module in excess of this amount is carried away by a glycol based cooling system

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The ADC electronics enclosure radiates no more than 50 watts of heat into the telescope ambient environment. All heat generated by the ADC electronics enclosure in excess of this amount is carried away by a glycol based cooling system.

11.1.2 ADC Module Interconnections

The ADC module interconnections are shown in the Cassegrain ADC one line diagram, CARA drawing 115-35-00. The ADC module has two connectors, one for local control of the defining point system and one for connection to the ADC electronics module.

11.1.2.1 ADC Module Local Controls Connector

The ADC module local controls connector is a panel mounted PTO2SE-14-15P type connector.

The pin assignments for this connector are as follows:

Pin #	Function
B	Ball Lock AC204
A	Ball Lock Neut AN3
F	Groove Lock AC205
E	Groove Lock Neut AN3
K	Flat Lock AC206
J	Flat Lock Neut AN3
D	Ball Unlock AC207
C	Ball Unlock Neut AN3
H	Groove Unlock AC208
G	Groove Unlock Neut AN3
M	Flat Unlock AC209
L	Flat Unlock Neut AN3

The wire gauge for all interconnections to this connector is TBD.

11.1.2.2 ADC Module Local Controls Interconnection Cable

The ADC module local controls interconnection cable is per CARA drawing number TBD. The length of this cable is TBD. This cable is supplied by CARA.

11.1.2.3 ADC Module Control Connector

The ADC module control connector is a panel mounted male connector equivalent in performance to a connector conforming to military specification MIL-C-38999, part number TBD.

The control connection is from the ADC module to the ADC electronics module. The pin assignments for this connector are as follows:

[TBD]

11.1.2.4 ADC Module Control Interconnection Cable

The ADC module control interconnection cable is per UCO/Lick drawing number TBD. This cable utilizes connectors equivalent in performance to a connector conforming to military specification MIL-C-38999. The interconnection cable terminates in a female connector, part number TBD for the ADC module control connection and a male connector part number TBD for the ADC module interconnection panel control connection. The length of this cable is specified in CARA drawing 1080-C1101.

11.1.3 ADC Electronics Module Interconnections

The ADC electronics module interconnections are shown in the Cassegrain ADC one line diagram, CARA drawing number 115-35-00. The ADC electronics module has three connectors, one for AC power input, one for data communications and one for the control connection to the ADC module.

11.1.3.1 ADC Electronics Module AC Power Input Connector

The ADC electronics module AC power input connector is a panel mounted PT00SE-22-96P.

The pin assignments for this connector are as follows:

Pin #	Function
Pin A	Clean Hot
Pin B	Clean Neutral
Pin C	Clean Ground
Pin D	Commercial Hot
Pin E	Commercial Neutral
Pin F	Commercial Ground
Pin G	Telescope referenced ground

The ADC electronics module power requirements are TBD and do not exceed 12 amperes at 120 VAC, 60 Hz.

11.1.3.2 ADC Electronics Module AC Power Interconnection Cable

The ADC electronics module AC power interconnection cable is per UCO/Lick drawing number TBD. This cable terminates in a female connector, type PT00SE-22-96S for the ADC electronics module connection and a male connector, type PT00SE-22-96P for the ADC electronics module interconnection panel connection. The length of this cable is specified in CARA drawing 1080-C1101. This cable is supplied by CARA.

11.1.3.3 ADC Electronics Module Data Communications Connector

The ADC electronics module data communications connector is a panel mounted female connector equivalent in performance to a connector conforming to military specification MIL-C-38999, part number TBD.

The pin assignments for this connector are as follows:

Pin #	Function
A	TxData +
B	TxData -
C	RxData+
D	not used
E	not used
F	RxData-
G	not used
H	not used

11.1.3.4 ADC Electronics Module Data Communications Interconnection Cable

The ADC electronics module data communications interconnection cable is per UCO/Lick drawing number TBD. This cable utilizes connectors equivalent in performance to a connector conforming to military specification MIL-C-38999. This cable terminates in a male connector, part number TBD for the ADC electronics module connection and a male connector part number TBD for the ADC electronics module interconnection panel control connection. The length of this cable is specified in CARA drawing 1080-C1101.

11.1.3.5 ADC Electronics Module Control Connector

The ADC electronics module control connector is a panel mounted female connector equivalent in performance to a connector conforming to military specification MIL-C-38999, part number TBD.

The pin assignments for this connector are as follows:

[TBD]

11.1.3.6 ADC Electronics Module Control Interconnecting Cable

The ADC electronics module control interconnection cable is per UCO/Lick drawing number TBD. This cable utilizes connectors equivalent in performance to a connector conforming to military specification MIL-C-38999. This cable terminates in a male connector, part number TBD for the ADC electronics module control connection and a female connector, part number TBD for

the ADC electronics module interconnection panel control connection. The length of this cable is specified in the CARA drawing 1080-C1101.

11.2 Telescope

11.2.1 ADC Module Interconnection Panel

The ADC Module Interconnection Panel is provided by CARA for connection of the ADC module. This panel is located at TBD as shown in the CARA drawing "ADC module interconnection panel", drawing number TBD.

11.2.1.1 ADC Module Interconnection Panel ADC Local Controls Connector

The ADC module interconnection panel ADC local controls connector is a panel mounted PTO2SE-14-15S type connector. The pin assignments of this connector are as follows:

The pin assignments of this connector are as follows:

Pin #	Function
B	Ball Lock AC 204
A	Ball Lock Neut AN3
F	Groove Lock AC205
E	Groove Lock Neut AN3
K	Flat Lock AC 206
J	Flat Lock Neut AN3
D	Ball Unlock AC207
C	Ball Unlock Neut AN3
H	Groove Unlock AC208
G	Groove Unlock Neut AN3
M	Flat Unlock AC 209
L	Flat Unlock Neut AN3

The wire gauge for all interconnections to this connector is TBD.

11.2.1.2 ADC Module Interconnection Panel ADC Module Control Connector

The ADC module interconnection panel ADC module control connector is a panel mounted female connector conforming to military specification MIL-C-38999, part number TBD.

The pin assignments of this connector are as follows:

[TBD]

11.2.2 ADC Electronics Module Interconnection Panel

The ADC electronics module interconnection panel is provided by CARA for connection of the ADC electronics module. This panel is located at TBD and shown in the CARA drawing "ADC electronics module interconnection panel", drawing number TBD.

11.2.2.1 ADC Electronics Module Interconnection Panel Control Connector

The ADC electronics module interconnection panel ADC module control connector is a panel mounted male connector equivalent in performance to a connector conforming to military specification MIL-C-38999, part number TBD.

The pin assignments of this connector are as follows:

[TBD]

11.2.2.2 ADC Electronics Module Interconnection Panel Data Connector

The ADC electronics module interconnection panel data connector is a panel mounted female connector equivalent in performance to a connector conforming to military specification MIL-C-38999, part number TBD.

The pin assignments for this connector are as follows:

Pin #	Function
A	TxData +
B	TxData -
C	RxData+
D	not used
E	not used
F	RxData-
G	not used
H	not used

11.2.2.3 ADC Electronics Module Interconnection Panel AC Power Connector

The ADC electronics module interconnection panel AC power connector is a panel mounted PT00SE-22-96S type connector.

The pin assignments of this connector are as follows:

Pin #	Function
Pin A	Clean Hot
Pin B	Clean Neutral
Pin C	Clean Ground
Pin D	Commercial Hot
Pin E	Commercial Neutral
Pin F	Commercial Ground
Pin G	Telescope referenced ground

The ADC electronics module interconnection panel AC power connector provides 1440 watts of power on each of the Clean and Commercial lines. Nominally this is 12 amperes, 120 VAC ±10%, 57 - 63 Hz.

11.2.2.4 Glycol Connections

The ADC electronics module connection panel provides, if required, glycol supply and return line connections as described in section 10.1.7.2.4.

12 SOFTWARE INTERFACES

12.1 Instrument

12.1.1 Configuration

A target computer is provided to run the ADC target software. The ADC target software implements the ADC keyword service, implements the ADC motion control system and acts as a DCS client to communicate with the DCS and DCSGUI. The ADC target software will communicate via TCP/IP with the Keck I telescope K1server.

12.1.2 ADC Keyword Service

The ADC target software provides keywords compliant with the Keck keyword standards (KSD 8). The keywords are provided according to table 4.

[TBD]

Table 4: ADC Service Keywords for the Cassegrain ADC

12.1.3 Motion Control System

The ADC target software provides all functions required to control the prism separation adjustment mechanism in the ADC module. The motion control system communicates with the ADC target computer via TBD.

12.1.4 DCS Client

The ADC provides a DCS client using the Keck Task Library (KSD 8, KSD 28) providing the keyword interface and state machine defined in sections 3.5.1 and following of KSD 46a.

12.1.5 IP Addresses

The IP address assignments for the ADC target computer and motion controller are TBD.

12.2 Telescope

12.2.1 DCS

The Keck I telescope K1 server computer provides a DCS service conforming to KSD 46a.

12.2.1.1 DCS Keywords

New DCS keywords are provided according to table 5.

Keyword	Description	Full Name	Notes
ADCINIT	– Set to true to initialize the ADC – Read access indicates whether the initialize command is currently active	ADC INITialize	The GUI monitors this keyword
ADCINITC	– Read access accesses the last value written to ADCINIT – Write access sets the value read from ADCINIT	ADC INITialize Complementary	The ADC monitors this keyword
ADCSTBY	– Set to true to place the ADC in standby – Read access indicates whether the standby command is currently active	ADC StandBY	The GUI monitors this keyword
ADCSTBYC	– Read access accesses the last value written to ADCSTBY – Write access sets the value read from ADCSTBY	ADC StandBY Complementary	The ADC monitors this keyword
ADCHALT	– Set to true to halt the ADC – Read access indicates whether the halt command is currently active	ADC HALT	The GUI monitors this keyword
ADCHALTC	– Read access accesses the last value written to ADCHALT – Write access sets the value read from ADCHALT	ADC HALT Complementary	The ADC monitors this keyword
ADCSTAT	– An enumerated value which indicates the current ADC state – Acceptable values are listed in KSD-46	ADC STATe	
ADCSTST	– A string version of ADCSTAT for GUIs	ADC STate STring	See section 3.5.3 of KSD-46a for value recommendations
ADCERRS	– A string that explains an error or action in progress	ADC ERRor String	See section 3.5.3 of KSD-46a for value recommendations
ADCERVL	– A long that contains an error code value	ADC ERror VaLue	See section 3.5.3 of KSD-46a for value recommendations
ADCMODE	– An enumerated value which selects the rotator mode (tracking, null or fixed value) – Acceptable values are TBD	ADC MODE set	
ADCDEST	– A long that specifies the desired fixed prism spacing relative to null for the ADC in TBD units	ADC user DESTination	
ADCPOSN	– A long that reports the desired fixed prism spacing relative to null for the ADC in TBD units	ADC POSitioN	

Table 5: New DCS keywords for the Cassegrain ADC

12.2.2 Boot Host

The Keck I telescope K1 server computer acts as the boot host for the Linux operating system running on the ADC electronics module target computer if required. Account name, password support and account privileges are TBD.

12.2.3 Interlocks and Alarms

The defining point interlocks for the ADC module include the incorporation of changes to the interlock and alarm monitoring software on the Keck I telescope. These changes are made by CARA.

12.2.4 DCSGUI

The Cassegrain ADC is controlled by a DCSGUI control row implemented by CARA.