ICD: ALMA09003.08000.0001

(Formerly M&C ICD 2)

Holography Receiver / Monitor and Control Interface

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Date: 2000-OCT-02

DRAFT

Revision: Initial draft

		Date:
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Revision Control

1. Revision: Initial draft for CDR
   Date: October 02, 2000
   Revised by: Martin Pokorny
   Reason for / items changed: Initial draft for review

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1.0 Description

The purpose of this document is to define the Monitor and Control interface between the Holography receiver and the Monitor and Control system, for the Test Interferometer only. Monitor and control points for both the front and back ends of the Holography receiver are included. The holography data generated by the back end of the Holography receiver is also defined in this document.

2.0 Related Documents and Drawings

2.1 Documents incorporated into this ICD by reference

[1] ALMA-US Computing Memo #7 ALMA Monitor and Control Bus Draft Specifications, Version 1.3, 2000-April-18
[2] ALMA Software Glossary, Draft Version, 2000-June-13

2.2 Documents containing related information, not essential to this ICD

[3] "CAN System Engineering", Wolfhard Lawrenz, Springer-Verlag, 1997 (Sections 1 & 2)

2.3 Standards

[4] ISO 11898:1993 Road vehicles - Interchange of digital information - Controller area network (CAN) for high-speed communication

3.0 Monitor and Control interface

3.1 General

The holography M&C interface consists of a single CAN node operating as defined in [1]; both the monitor and control data, and the holography data points are transmitted on the antenna AMB.

The Monitor and Control CAN node shall normally operate at node address 0x20.

3.2 Summary of Monitor Points

Monitor data shall be polled by the ALMA bus master according to the protocol specified in [1].

Table 1: Summary of Monitor Points

Name	***Relative Address (hex)***	***Data Size (bytes)***	***Timing Event Associated***
Device specific:			
GET_GUNN_LOOP_STATUS		*1*	*No*
GET_SIG_IF_LEVEL		*2*	*No*
GET_REF_IF_LEVEL		*2*	*No*
GET_SIG_BB_LEVEL		*2*	*No*
GET_REF_BB_LEVEL		*2*	*No*
GET_LO_LEVEL		*2*	*No*
GET_RCV_FREQUENCY		*2*	*No*
GET_TEMPERATURE (many)		*2*	*No*
GET_HEATER_CURRENT		*2*	*No*
GET_TUNING_VOLTAGE		*2*	*No*
GET_LO_MIXER_CURRENT		*2*	*No*
Generic:			
GET_CAN_ERROR		*4*	*No*
GET_PROTOCOL_REV_LEVEL		*3*	*No*
GET_SW_REV_LEVEL		*3*	*No*
GET_TRANS_NUM		*4*	*No*

3.3 Holography Data Monitor Points

Holography data shall be polled by the ALMA bus master according to the timing-event associated protocol specified in the Addendum of [1].

A holography data point consists of six 32-bit words composed of integrated products of pairs of the three signals named S, Q, and R. The products are designated in this document by QQ, QR, QS, RR, RS, and SS. Two 32-bit words may comprise the data portion of a single CAN message, and thus three CAN messages are required to transmit a single holography data point.

The holography receiver will always obtain 4 data points per timing interval, and these can be read during the following timing interval. Any that are not read during that interval will be overwritten.

Table 2: Summary of Data Monitor Points

Name	***Relative Address (hex)***	***Data Size (bytes)***	***Timing Event Associated***
GET_DATA_QQ_QR_0		*8*	*Yes*
GET_DATA_QS_RR_0		*8*	*Yes*
GET_DATA_RS_SS_0		*8*	*Yes*
GET_DATA_QQ_QR_1		*8*	*Yes*
GET_DATA_QS_RR_1		*8*	*Yes*
GET_DATA_RS_SS_1		*8*	*Yes*
GET_DATA_QQ_QR_2		*8*	*Yes*
GET_DATA_QS_RR_2		*8*	*Yes*
GET_DATA_RS_SS_2		*8*	*Yes*
GET_DATA_QQ_QR_3		*8*	*Yes*
GET_DATA_QS_RR_3		*8*	*Yes*
GET_DATA_RS_SS_3		*8*	*Yes*

3.4 Summary of Control Points

Control data shall be transmitted by the ALMA bus master according to the protocol specified in [1].

Table 3: Summary of Control Points

Name	***Relative Address (hex)***	***Data Size (bytes)***	***Timing Event Associated***
SET_GUNN_LOOP		*1*	*No*
SET_SIG_ATTENUATION		*1*	*No*
SET_REF_ATTENUATION		*1*	*No*
SET_RCV_FREQUENCY		*2*	*No*
RESET_DSP		*1*	*No*

3.4 Monitor Points in Detail

Only device-specific monitor points are covered here; generic ones are described in detail elsewhere.

Name	*GET_GUNN_LOOP_STATUS*
Relative Address	
Description	*Status of Gunn diode loop.*
Suggested Interval	*60*
TE Associated	*No*
Data	*1 Byte: (ubyte)* *Bit 0: Gunn oscillator lock (0:off, 1:on)* *Bit 1: Synthesizer lock (0:off, 1:on)*

Name	*GET_SIG_IF_LEVEL*
Relative Address	
Description	*Get signal intermediate frequency (IF) level.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 byte: (uint16)* *16-bit value representing level of signal IF (units?, range?)*

Name	*GET_REF_IF_LEVEL*
Relative Address	
Description	*Get reference intermediate frequency (IF) level.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 byte: (uint16)* *16-bit value representing level of reference IF (units?, range?)*

Name	*GET_SIG_BB_LEVEL*
Relative Address	
Description	*Get signal baseband (BB) level.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 byte: (uint16)* *16-bit value representing level of signal BB (units?, range?)*

Name	*GET_REF_BB_LEVEL*
Relative Address	
Description	*Get reference baseband (BB) level.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 byte: (uint16)* *16-bit value representing level of reference BB (units?, range?)*

Name	*GET_LO_LEVEL*
Relative Address	
Description	*Get local oscillator (LO) level.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 byte: (uint16)* *16-bit value representing level of LO (units?, range?)*

Name	*GET_RCV_FREQUENCY*
Relative Address	
Description	*Get receiver frequency.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 bytes: (uint16)* *16-bit value representing receiver frequency (units?, range?)* *[Could also be a one-byte selector for a small set of enumerated frequencies.]*

Name	*GET_TEMPERATURE (many)*
Relative Address	
Description	*Get a temperature.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 bytes: (uint16)*

Name	*GET_HEATER_CURRENT*
Relative Address	
Description	*Get current in heater.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 bytes: (uint16)* *16-bit value representing the electrical current in the heater.*

Name	*GET_TUNING_VOLTAGE*
Relative Address	
Description	*Get tuning voltage.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 bytes: (uint16)* *16-bit value representing the tuning voltage.*

Name	*GET_LO_MIXER_CURRENT*
Relative Address	
Description	*Get current in LO mixer.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 bytes: (uint16)* *16-bit value representing the electrical current in the LO mixer.*

3.5 Holography Data Monitor Points in Detail

Name	*GET_DATA_QQ_QR_n (n in {0..3})*
Relative Address	
Description	*Get the QQ and QR components of a holography data point in the n^{th} 12ms interval after start of timing event.*
Suggested Interval	*48 ms*
TE Associated	*Yes*
Data	*8 bytes: (2x uint32)* *Bytes 0-4: (uint32)* *QQ component of (integrated) holography data* *Bytes 5-7: (uint32)* *QR component (integrated) holography data*

Name	*GET_DATA_QS_RR_n (n in {0..3})*
Relative Address	
Description	*Get the QS and RR components of a holography data point in the n^{th} 12ms interval after start of timing event.*
Suggested Interval	*48 ms*
TE Associated	*Yes*
Data	*8 bytes: (2x uint32)* *Bytes 0-4: (uint32)* *QS component of (integrated) holography data* *Bytes 5-7: (uint32)* *RR component (integrated) holography data*

Name	*GET_DATA_RS_SS_n (n in {0..3})*
Relative Address	
Description	*Get the RS and SS components of a holography data point in the n^{th} 12ms interval after start of timing event.*
Suggested Interval	*48 ms*
TE Associated	*Yes*
Data	*8 bytes: (2x uint32)* *Bytes 0-4: (uint32)* *RS component of (integrated) holography data* *Bytes 5-7: (uint32)* *SS component (integrated) holography data*

Name	*GET_CAN_ERROR*
Relative Address	
Description	*Number of CAN bus errors since power-up and error code of last error*
Suggested Interval	*(debug)*
TE Associated	*No*
Data	*4 Bytes* *bytes 0-1 (uint16)* *count of CAN errors since power up.* *byte 2 (ubyte)* *Internal slave error code:* *0x01: Duplicate slave address detected* *0x02: No DS1820 device found* *0x03: No serial number read* *0x04: CRC error on a 1-Wire bus transaction* *byte 3 (ubyte)* *Error code of last CAN error. Codes are those defined by Intel 82527 CAN Controller status register as follows:* *Bits 0-2:* *0x0: No error* *0x1: Stuff error* *0x2: Form error* *0x3: Ack error* *0x4: Bit1 error* *0x5: Bit 0 error* *0x6: CRC error* *0x7: Undefined* *Bit 3: Last transmission was OK* *Bit 4: Last reception OK* *Bit 5: Reserved* *Bit 6: Warning status; an error counter has reached the limit of 96* *Bit 7: Bus off status; an error counter has reached the limit of 256*

Name	*GET_PROTOCOL_REV_LEVEL*
Relative Address	
Description	*Revision level of the holography data node slave protocol code*
Suggested Interval	*(debug)*
TE Associated	*No*
Data	*3 Bytes* *byte 0 (ubyte): major revision level* *byte 1 (ubyte): minor revision level* *byte 2 (ubyte): patch level* *i.e. 0xXX 0xYY 0xZZ is interpreted as VXX.YY.ZZ*

Name	*GET_SW_REV_LEVEL*
Relative Address	
Description	*Revision level of the holography receiver embedded code*
Suggested Interval	*(debug)*
TE Associated	*No*
Data	*3 Bytes* *byte 0 (ubyte): major revision level* *byte 1 (ubyte): minor revision level* *byte 2 (ubyte): patch level* *i.e. 0xXX 0xYY 0xZZ is interpreted as VXX.YY.ZZ*

Name	*GET_TRANS_NUM*
Relative Address	
Description	*Number of transactions handled by the holography data node since power up*
Suggested Interval	*(debug)*
TE Associated	*No*
Data	*4 Bytes: (uint32)* *count of handled transactions*

3.6Control Points in Detail

Name	*SET_GUNN_LOOP*
Relative Address	
Description	*Set state of the Gunn diode loop.*
Suggested Interval	*60*
TE Associated	*No*
Data	*1 byte: (ubyte)* *Bit 0: Gunn oscillator on/off (off: 0, on: 1)* *Bit 1: PLL open/close (open: 0, close: 1)* *Bit 2: Oscillator selection*

Name	*SET_SIG_ATTENUATION*
Relative Address	
Description	*Set attenuation of signal channel.*
Suggested Interval	*60*
TE Associated	*No*
Data	*1 byte: (uint8)* *6-bit value representing attenuation of signal channel in dB.*

Name	*SET_REF_ATTENUATION*
Relative Address	
Description	*Set attenuation of reference channel.*
Suggested Interval	*60*
TE Associated	*No*
Data	*1 byte: (uint8)* *6-bit value representing attenuation of reference channel in dB.*

Name	*SET_RCV_FREQUENCY*
Relative Address	
Description	*Set receiver frequency.*
Suggested Interval	*60*
TE Associated	*No*
Data	*2 bytes: (uint16)* *16-bit value representing receiver frequency (units?, range?)* *[Could also be a one-byte selector for a small set of enumerated frequencies.]*

Name	*RESET_DSP*
Relative Address	
Description	*Send reset pulse to digital signal processor, true for 1-100 microsec and then false.*
Suggested Interval	*Rarely*
TE Associated	*No*
Data	*1 byte, dummy value*

4.0 Safety Issues

The holography receiver has no safety issues requiring frequent monitoring. No action of the monitor and control receiver can cause incorrect or dangerous conditions in the holography receiver.