SUBORBITAL AND SPECIAL ORBITAL PROJECTS DIRECTORATE

Line of Sight Receiver Interface Control Document for the ULDB/Tiger Mission

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Line of Sight Receiver ICD 0001

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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	05/2000	Initial release

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Line of Sight Receiver
Interface Control Document (ICD) 0001.0
for the ULDB/TIGER Mission

1.0 Operations Description

The Line of Sight (LOS) Receiver System for the Ultra Long Duration Balloon (ULDB)/Trans-Iron Galactic Element Recorder (TIGER) Mission is made of three components: the Johnson Data Telemetry Model 3412 Transceiver with the Model 3240 Loader Board installed; the Model 3282 Modem; and the Val-Com Type LSU Low Profile Antenna. The antenna is passive and contains no pre-amp. However, the antenna does have a tuning capacitor and has to be tuned to the frequency being used. For ULDB purposes, only the receiver section of the transceiver is being used, and for the remainder of this document it will be referred to as a RECEIVER.

2.0 Mechanical Specifications

2.1 Dimensions

Antenna: 6.3” dia x 1.0” high
Receiver: 4.75”L x 3.25”W x 2.238”H
Modem: 4.75”L x 2.90”W x 1.237”H

2.2 Mass

Antenna: 1.08 lb
Receiver: 0.40 lb
Modem: 0.40 lb

2.3 Mounting – Hole Pattern

Antenna: Reference UHF Low Profile Antenna Bottom View Drawing
Receiver: Reference Mechanical Layout Sheet
Modem: Mounted on Top of Receiver with Provided Mounting Hardware

2.4 Connectors – Power, Data, and RF

<u>Receiver</u>
Antenna Connector: BNC Female
Mate BNC Male
J102: 10-Pin Male Ribbon Connector 3M Type 3325
Mate: 10-Pin Female Ribbon AMP Type 746290-1
J104: 9-Pin Female Type DB-9S
Mate: 9-Pin Male Type DB-9P
<u>Modem</u>:
J101: 25-Pin Female Type DB-25S
Mate: 25-Pin Male Type DB-25P
J102: 10-Pin Male Ribbon Connector 3M Type 3325
Mate: 10-Pin Female Ribbon AMP Type 746290-1
J103: DE-15 Female (not used)

2.5 Drawings

Antenna: Reference UHF Low Profile Antenna Bottom View Drawing

Receiver: Reference Mechanical Layout Sheet
Reference LOS UHF Receiver Internal & External Interfaces, Document No. 2042594
Modem: Reference DL-3282 1200 Baud Modem Service Manual, pp. 2-6, Figure 2.3
Reference LOS UHF Receiver Internal & External Interfaces, Document No. 2042594
General: Reference LOS Receiver Block Diagram

3.0 Electrical Interface

3.1 Connectors and Pin Assignments

Antenna: The antenna has one connector, either a Female Type BNC or TNC.
Receiver: Reference DL-3400 Series Technical Specifications Sheet Form S781, dated 9/99
Reference DL-3282 1200 Baud Modem Service Manual, Second Printing, July 1997, pp. 2-6, Figure 2-3

Receiver - Connector J102

Connector J102 is a male 10 Pin 3M Type 3325. It is the data output connector to the DL-3282 Modem. Pinouts are listed in Table 3-1 below.

Table 3-1. Receiver Connector J102

PIN	FUNCTION
1	NOT USED
2	RECEIVE WIDEBAND DATA OUT
3	FREQUENCY SELECT IN
4	RECEIVE SIGNAL STRENGTH INDICATOR
5	SUPPLY VOLTAGE 13.3 VDC
6	NOT USED
7	CARRIER DETECT OUT
8	NOT USED
9	GROUND
10	RECEIVE NARROWBAND DATA OUT

Receiver – Connector J104

Connector is a 9 Pin Female, Type DB-9 RS-232. It is the data input from an external computer for programming purposes. Pinouts are listed in Table 3-2 below.

Table 3-2. Receiver Connector J104

PIN	FUNCTION
1	SLEEP / WAKE-UP
2	RS-232 RECEIVE DATA
3	NOT USED
4	NOT USED
5	GROUND

6	CHANNEL SELECT 0
7	NOT USED
8	CHANNEL SELECT 1
9	CHANNEL SELECT 2

Modem: Reference DL-3282 Technical Specifications Sheet
Form S299, dated 9/99
Reference DL-3282 1200 Baud Modem Service Manual,
Second Printing, July 1997, pp. 2-6, Figure 2-3.

Modem – Connector J101

Connector J101 is a 25 Pin Female Type DB-25 Standard RS-232C. Pinouts are listed below in Table 3-3. Pins that are not used are not listed.

Table 3-3. Modem Connector J101

PIN	FUNCTION
2	TX – TRANSMIT DATA
3	RX – RECEIVE DATA
4	RTS – REQUEST TO SEND
5	CTS – CLEAR TO SEND
6	DSR – DATA SET READY
7	GND – SIGNAL GROUND
8	DCD – DATA CARRIER DETECT
20	DTR – DATA TERMINAL READY
22	RI – RING INDICATOR

Note: The DL-3282 Modem is baud rate selectable between 300 and 1200 baud. For the purpose of ULDB projects the RS-232 interface will be set to 1200 baud, 8 data bits and 1 stop bit (1200N8I).

Modem – Connector J102

Connector J102 is a 10 Pin Male, 3M Type 3325. It is the Telemetry interface to the DL-3412 Receiver. Pinouts are listed below in Table 3-4.

Table 3-4. Modem Connector J102

PIN	FUNCTION
2	RECEIVER WIDEBAND DATA IN
5	SUPPLY VOLTAGE 13.3 VDC
7	CARRIER DETECT IN
9	GROUND
10	RECEIVER NARROWBAND DATA IN (FSK)

4.0 Power and Thermal Interface

4.1 Operating Voltage

Antenna None
Receiver: 10 to 16 VDC – 13.3 VDC Nominal
Modem: 8 to 15 VDC – 13.3 VDC Nominal

4.2 Power Consumption

Antenna: None
Receiver: 2 watts max.
Modem: Less than 1 watt

4.3 Thermal Considerations

Antenna: None
Receiver: Heat Sink with Thermal Grease
Modem: None

5.0 Data and Command Interface

5.1 Data Interface

Antenna: None
Receiver: Data Interface – Reference Housekeeping List (Table 5-1)
Modem: Data Interface – Reference Housekeeping List (Table 5-1)

Table 5-1. Data Interface Receiver Housekeeping List

Num	Description	Sample Rate in Seconds LOS	Sample Rate in Seconds OTH (desired)	Fit CPU to LOS via RS-232	Fit CPU-LOS (Bits per Minute)	Fit CPU-OTH (Bits per Minute)	Direct to PCM (Samples per Second)	Fit CPU to TDRSS	Fit CPU to INMARSAT	Fit CPU to ARGOS ST-13	ARGOS Fit Crit Nav	Res Bits	Description & Comments
#VALUE!	LOS CMD RCVR Toggle Enable Status	3	6	X	20	10	1	X	X	X	D5	1	
#VALUE!	LOS CMD RCVR Power Toggle Status	3	6	X	20	10	1	X	X	X	D6	1	
#VALUE!	LOS Rcvr #2-BUCD/ LOSRcvr #1-CPU #1/#2	3	6	X	20	10		X	X	X		1	
#VALUE!	LOS Rcvr #1-BUCD/ LOS Rcvr #2-CPU #1/#3	3	6	X	20	10		X	X	X		1	

5.2 Command Interface

Antenna: None
Receiver: Command Interface – Reference Command List, Rev. 1.0, 6/13/00 (Table 5-2)
Modem: Command Interface – Reference Command List, Rev. 1.0, 6/13/00 (Table 5-2)

Table 5-2. Command Interface Receiver Command List, Rev. 1.0, 6/13/00

Num	Description	Stack AART Address	Stack's Deck Cmd	BUCD AART Addr	CMDS	BUCD's Deck Cmd
#VALUE!	LOS CMD RCVR 1 or 2 ON	CD	27h	E3		17h
#VALUE!	LOS CMD RCVR Main Relay Toggle Enable 1 & 2 ON	CD	41h	E3		21h
#VALUE!	LOS CMD RCVR Toggle RCVR 1 ON & 2 OFF	CD	42h	E3		22h
#VALUE!	LOS CMD RCVR Toggle RCVR 1 OFF & 2 ON	CD	43h	E3		23h
#VALUE!	Switch LOS RCVR1 to CPU1 & RCVR2 to CPU2	8A	09h	E6		44h
#VALUE!	Switch LOS RCVR2 to CPU1 & RCVR1 to CPU2	8A	0Ah	E6		45h

6.0 Flight Software Interface

Flight Software: 1200N81

7.0 Ground Software Interface

Ground Software: 16 byte command formatted as follows:

BYTE #0 FRAME SYNC 1=FA
BYTE #1 FRAME SYNC 2=F3
BYTE #2 MSN BALLOON ID=5, LSN TDRSS ROUTING ADDRESS=4
BYTE #3 COMPLEMENT OF BYTE #2=AB
BYTE #4 COMMAND BYTE #1
BYTE #5 COMPLEMENT OF BYTE#4
BYTE #6 COMMAND BYTE #2
BYTE #7 COMLEMENT OF BYTE #6

8.0 Document References

8.1 Data Sheets/Specification Sheets

Antenna: UHF Low Profile Antenna Drawing
Web Site: http://www.vci.offc.com
Receiver: Unit Specifications Reference DL-3412 Synthesized UHF Telemetry Link Service Manual, pp. 1-5
Web Site: http://www.johnsondata.com
Modem: Unit Specifications Reference DL-3282 Technical Specifications Sheet (form) S299, dated 9/99

Web Site: http://www.johnsondata.com

8.2 User's Manuals , O&M Manuals, and Other Detailed Specifications

Antenna:	None
Receiver:	DL-3412 Synthesized UHF Telemetry Link Device Manual, Third Printing, dated October 1998 DL-3240 Universal Loader Board Service Manual, Fourth Printing, dated January 1999
Modem:	DL-3282 1200 Baud Modem Device Manual, Second Printing, dated July 1997

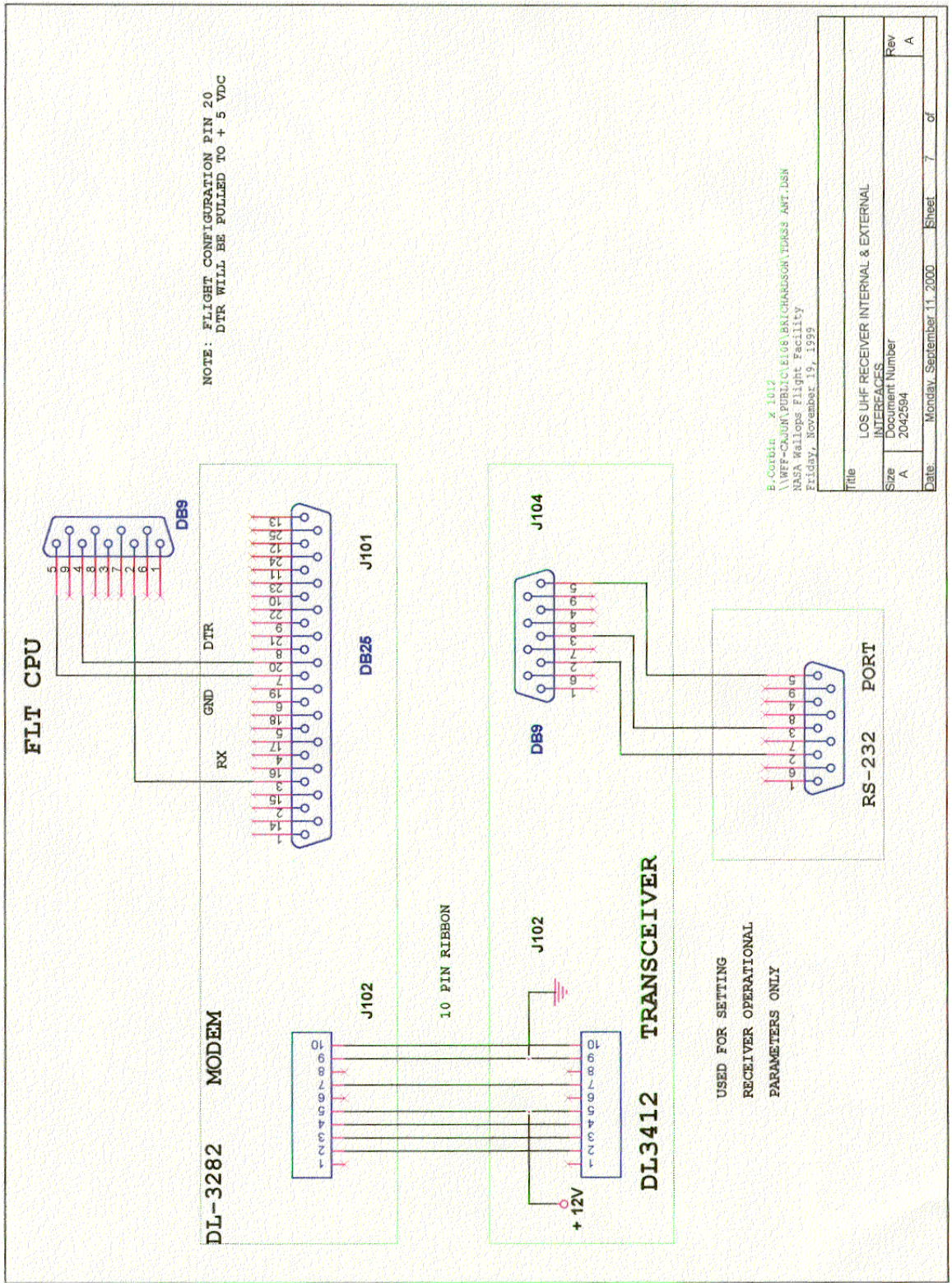

Figure 1. ULDB/TIGER LOS Receiver