Acceptance Test Plan

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Issue	Date Changed	Section Description of Change

CONTENTS

1. INTRODUCTION

The CDMS data interface Simulator forms a connection between the MIL-STD-1553B data bus (which is the data interface for instruments on Herschel/Planck) and a computer network.
The 1553 bus interface hardware used in the CDMS-Sim is a BU65549M2-300 PCI card, which is a standard off-the-shelf product from Data Device Corporation (DDC). The CDMS Simulator software has been developed at RAL using the DDC C code library.

This document describes the tests that shall be carried out before the unit is delivered to and accepted by the Herschel instruments. The purpose of the tests is to ensure compliance of the CDMS Simulator with all aspects of the design and users requirements. The procedure section, filled out with test results together with any associated test logs, will form the acceptance test report.

The test procedure incorporates the test requirements specifications SRON-U/HIFI-SP-5 draft 0.2, and also an Email dated 1 May 2001 from L.Dubbeldam to Wechsler, Bauer, King and Thuerey.

1.1 Purpose

The purpose of this document is to define the activities and responsibilities required for the acceptance testing of the CDMS for the three Herschel instruments.

1.2 Scope

The CDMS Simulator test specifications in the SRON document are derived from a suggested test plan in MIL-HDBK-1553A. However the MIL-HDBK test plan is written to test a 1553 RT device using a 1553 Tester. In our case the CDMS Simulator is a 1553 BC - the *instrument* is the RT, so the plan has to be adapted for our use.

DDC, the manufacturer of the CDMS Simulator bus interface card, has demonstrated that their equipment is compatible with that same 1553 test plan. These measurements have been made with the ACE device (bus interface component) acting as an RT. The DDC report may be found in Appendix A.

This CDMS Simulator test acceptance test comprises:

- Interface hardware measurements
  These are performed to confirm the build standard of the DDC card. Measurements of the Simulator output voltages, which my be important for the safety of flight equipment, are made in several different bus configurations. These were not in the requirements, but may be useful for future reference.

- Low-level 1553 bus protocol measurements
  These demonstrate the use of the DDC ACE windows menu to generate single messages and short sequences of messages.

- Satellite bus protocol measurements
  These demonstrate compliance with the PS-ICD and the Simulator requirements specification.

- Verification of user interface and Router interface
  Demonstrating the user interface requirements which were specified in the Simulator requirements specification.

The test procedure verifies the CDMS Simulator only. It does not include any instrument-specific or EGSE tesing.

2. DOCUMENT REFERENCES

2.1 Applicable documents

AD.1. FIRST-PLANCK CDMS interface test-requirements specifications, SRON-U-HIFI-SP-2000-5.
AD.2 Packet Structure ICD, SCI-PT-ICD-07527 issue 1
AD.3 Mil-Std-1553B
AD.4 FIRST/Planck CDMS Simulator Requirements, SRON-U/HIFI/SP/2000-004 issue 1.0

2.2 Reference Documents

RD.1 Hardware Manual MIL-STD 1553 BC/RT/MT PCI Interface Card, MN-65549-001.
RD.2. EGSE-ILT Users Requirements Document, FIRST-SPI-DOC-000127.
RD.3. CDMS Simulator Users Guide, SPIRE-RAL-PRJ-000807.

3. DELIVERABLES

3.1 Hardware

DDC 1553 BUS Card Part No BU-65549M2-300
Personal Computer Pentium III 900Mhz or better, 256Mb Memory.

3.2 Software

This software is provided on a CD which includes an installation procedure:

CDMS_SIM.EXE	(RAL CDMS Simulator LabView VI's in compiled form)
DDC.DLL	(RAL CDMS Simulator C Code)
Remote Terminal.EXE	(Simple instrument simulator)
Example telecommands	
Example buslists	

With hardware deliveries only:

DDC ACE Runtime library
DDC 'ACE Windows menu' program

3.3 Documentation

CDMS Simulator Users Guide

Certificates of Conformance

4. ENVIRONMENT

The CDMS-Sim acceptance tests will be performed at RAL.
Three PCs are used during the tests:

- CDMS-SIM
- Remote Terminal (simple instrument simulator)
- Router

The Router PC can optionally run the Systran 1553 bus monitor software to assist in understanding any problems encountered.

The computers will be isolated from any local computer Network during the testing.

4.1 Remote Terminal (simple instrument simulator)

The simple instrument simulator program used in simulator testing has two modes:

- Echo TC

The program receives a TC packet via the 1553 transfer protocol, changes the packet header into a valid TM header, and re-sends it back to the bus controller.

- Transmit TM

The program creates TM packet data of maximum packet length. It has a valid header containing a packet counter. The data area consists of a counting data pattern. The program generates TM requests and then transfers packet data over the bus at the maximum possible rate.

The instrument simulator can emulate any instrument; a control on the front panel sets the remote terminal (RT) number.

The RT is only intended to support the packet transfer protocol for simulator self-test and EGSE integration purposes. It has not been exhaustively tested in all 1553 configurations.

4.2 Router and Test Client

The Router with software version 0.92 is installed on a separate PC from the CDMS-Sim.
This PC also has a simple test client written in Java to send telecommands to and receive telemetry packets from the router.

5. CDMS-SIM TEST REQUIREMENTS MATRIX

5.1 Spacecraft Data Interface Requirements

Note: The CDMS Simulator is not required to perform all of the 'instrument' tests listed in the test matrix of the Test Requirements document, AD1. A bus tester may be required for those instrument-specific tests.

Test Requirement section		Test plan Section	Comments
4.2	Output Characteristics	6.1	
4.2.1	Amplitude	6.1.1	
4.2.2	Risetime / falltime	6.1.2	
4.2.3	Zero crossing stability	6.1.3	
4.2.4	Distortion, overshoot and ringing	6.1.4	
4.2.5	Output symmetry	6.1.5	
4.2.6	Output noise	6.1.6	
4.2.7	Output isolation	6.1.7	
4.2.8	Power on/off noise	6.1.8	
4.2.9	n/a		
4.2.10	n/a		
4.2.11	Frequency stability	6.1.9	
4.3.5	Input impedance	6.1.10	
4.5.9	Required mode commands	6.2.1	
	Transmit status		
	Transmitter shutdown and override		
	Reset remote terminal		
4.7	CDMS_Sim data link support	6.2	
4.7.1	Mode commands	6.2.1	
4.7.2	No response timeout	6.2.2	
4.7.3	Receive message	6.2.3	
4.7.4	Broadcast message	6.2.4	
4.7.5	Transmit message	6.2.5	
4.7.6	Receive low-level command	6.2.6	
4.8	Satellite data-bus protocol	6.3	
4.8.1	EGSE connection		
4.8.2	Basic protocol without TM or TC transfer	6.3.1	
4.8.3	Transfer of TC packet	6.3.2	
4.8.4	RT error conditions during data transfer	6.3.3	
4.8.5	TM packet transfer	6.3.4	
4.8.6	CDMS Sim error conditions during data transfer	6.3.5	
4.8.7	Nominal mode	6.3.6	
4.8.8	Burst mode	6.3.7	

5.2 Users Requirements

User Requirement section		Test plan Section	Comments
4.1.1	Implement bus controller functions according to MIL-STD-1553B	6	
4.1.1	Transfer TC packets received from the Router as messages on the 1553 bus.	6.5.2	
4.1.1	Transfer TM packets received as messages over the 1553 bus to the Router.	6.5.3	
4.1.1	Retrieve and send TM packets from file to the Router.	6.6	
4.1.1	Support creation, modification and storage of several bus profiles.	6.3.6 - 6.3.8	Buslists created with EXCEL.
4.1.1	Start up automatically in a reproducible configuration.		
4.1.1	Nominal bus profile: 25 TM packets/sec 2 Async. short TM packets/sec 2 TC packets/sec 2 Async. short TC packets/sec 1 Time / sec	6.3.6	Async messages/packets not yet fully defined, therefore not yet implemented. Time is a message not a packet.
4.1.1	Burst mode bus profile: 50 TM packets/sec 2 Async. short TM packets/sec 2* TC packets/sec 2 Async. short TC packets/sec 1 Time / sec	6.3.7	Async messages/packets not yet fully defined, therefore not yet implemented. TM packets cannot be redefined as TC packets at run-time. Time is a message not a packet.
4.1.1	Memory load mode bus profile: 0 TM packets/sec 2 Async. short TM packets/sec 20 TC packets/sec 2 Async. short TC packets/sec 1 Time / sec	6.3.8	Async messages/packets not yet fully defined, therefore not yet implemented. Time is a message not a packet.
4.1.2	The CDMS Simulator shall be able to operate stand-alone:	6.4	
4.1.2	Implement 1553 Bus Controller functions.	6	
4.1.2	Store TC packets as files.	6.4.1.2	
4.1.2	Edit TC files		Use any text editor eg Notepad
4.1.2	Generate TC packets from application data by adding header and checksum.	-	This requirement was deleted in a working group meeting; see CDMS requirements annex A, 18.
4.1.2	Display TM packets (hex)	6.4.1.3	
4.1.2	Transfer malformed TC packets (Length, APID, checksum)	6.4.1.2	The CDMS-Sim makes no checks on packet contents.
4.1.3	Perform bus monitor functions in addition to Stand-alone or connected functions:	6.4	

4.1.3	Archive TC and TM packets for 30 minutes at maximum rate.	6.3.7, 6.4.2	
4.1.3	Archive 1553 bus messages for 30 minutes at maximum rate.	6.4.2.3	
4.1.3	Display a list of transferred TM/TC packets.	6.4.1.2, 6.4.1.3	
4.1.3	Display individual TM/TC packets.	6.4.1.2, 6.4.1.3	
4.1.3	Display a list of transferred 1553 messages.	6.3.6 - 6.3.8	
4.1.3	Display individual 1553 messages	6.3.6 - 6.3.8	
4.1.3	Display traffic status information in real time.	6.4.1.2, 6.4.1.3	
4.1.3	Archived and displayed packets and messages shall be time-stamped.	6.4	
4.1.4	The CDMS-Sim shall synchronise its time and synchronise instruments according to the PS-ICD procedures:	6.3.1, 6.4.1.1	Full time synchronisation not yet implemented; but 1553 frame is synchronised to PC seconds.
4.1.4	The CDMS-Sim shall provide: 131.072 kHz		not implemented yet
4.1.4	The CDMS-Sim shall provide: 1 Hz synchronised to master time.		not implemented yet
4.1.5	Fault Detection, Isolation and Recovery:	6.4.1.4	
4.1.5	Display BC and RT error messages in real time.	6.4.1.4	
4.1.5	Display detected bus error conditions in real time.	6.4.1.4	
4.1.5	Display protocol errors in real time.	6.4.1.4	
4.1.5	Display CDMS-Sim error conditions.	6.4.1.4	
4.1.5	Switch between bus A and B as part of set-up.	6.4.1.1	
4.3.1	The CDMS-Sim shall interface with up to 4 RTs.	6.3.6	Buslist controls message destinations; can use all RTs.
4.3.3	The CDMS-Sim shall have controls/displays for:	6.4.1.1	
4.3.3	Simulator Configuration	6.4.1.1	
4.3.3	1553 traffic start/stop	6.4.1.1	
4.3.3	TM/TC packets in hex format	6.4.1.2, 6.4.1.3	
4.3.3	1553B messages	6.3	
4.3.3	Simulator status	6.4.1.1	
4.3.3	1553 bus traffic status	6.4.1.1	
4.3.4	The CDMS-Sim shall be capable of commanding, configuration and monitoring from an instrument EGSE.		Not yet implemented

6. TEST PROCEDURE

6.1 1553 Bus Electrical Interfaces

The BU-65549 card has a jumper selection for 'Direct Coupled' or 'Transformer Coupled' configuration. This refers to the external connection of the bus between units; signals are always isolated on the card by transformers. 'Transformer Coupled' is the default configuration for spacecraft connection using bus couplers, but measurements with 'Direct Coupled' connection are included here, since this method can be useful during bench tests.

6.1.1 Output Signal Amplitude

6.1.1.1 Open Circuit

Make peak-peak voltage measurements of the BC output signal at points A and B shown in the figure:

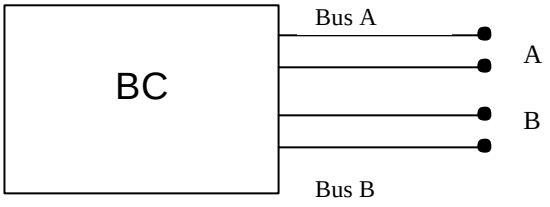


Figure 6.1.1.1 – Open Circuit measurement

Jumper setting	Bus A – open circuit pk-pk voltage	Bus B – open circuit pk-pk voltage
Direct Coupled		
Transformer Coupled		

6.1.1.2 Direct Coupled – with 39 ohm Load

This is the recommended load for direct coupled bench test connections (see RD.1 page 8). It should only be used with direct connections both ends. Connect the DDC BC and RT as shown below:

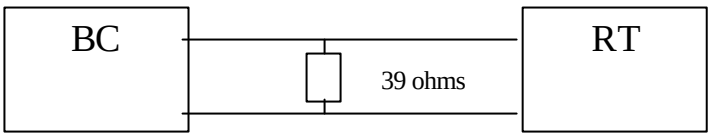


Figure 6.1.1.2

Make peak-peak voltage measurements of the BC output signal by connecting the oscilloscope across the 39 ohm resistor.

Jumper setting	Bus A pk-pk voltage	Bus B pk-pk voltage
Direct Coupled		

6.1.1.3 Transformer Coupled – Unterminated Bus

Change the DDC card jumpers to transformer-coupled for the remainder of the tests. Connect a North Hills bus coupler type DB40010 or equivalent as shown below. For this test the bus terminations are not fitted to the ends of the coupler (bus unterminated). Connect a link with breakout provision between BC and coupler and a test cable on the RT side, as shown:

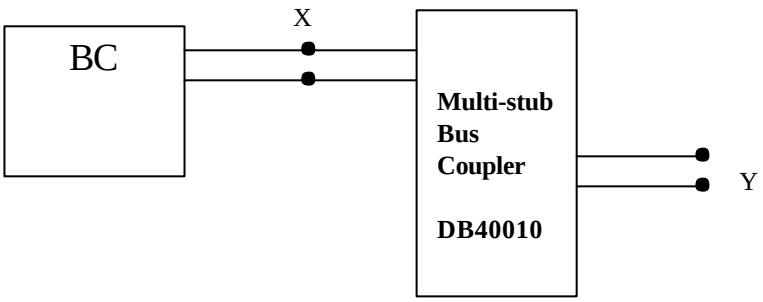


Figure 6.1.1.3

Jumper setting : Transformer coupled	Bus A voltage (peak-peak)	Bus B voltage (peak-peak)
BC Output at measurement point X		
Coupler Output at measurement point Y		

6.1.1.4 Transformer Coupled – Normal Bus Loads

This is a measurement of the Simulator (BC) connected to an Instrument (RT) via a bus coupler with 75 ohm bus terminations on each end of the bus. In this case the 'bus' is merely the short length inside the multi-stub coupler unit.

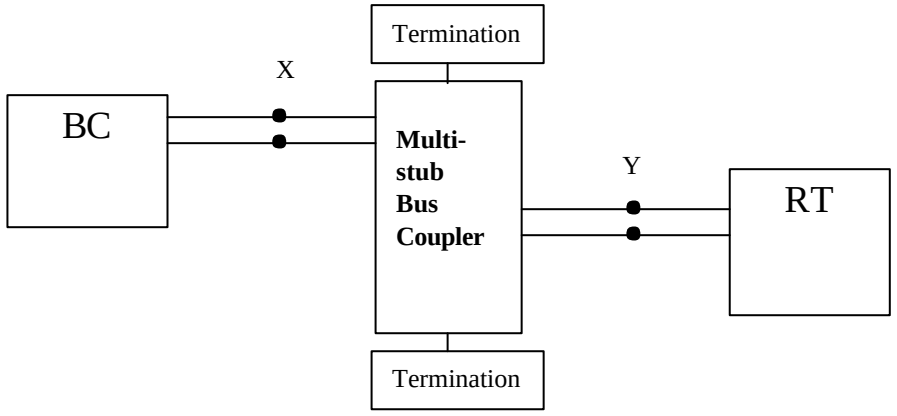


Figure 6.1.1.4

Jumper setting : Transformer coupled	Bus A voltage (peak-peak)	Bus B voltage (peak-peak)
BC Output at measurement point X		
Coupler Output at measurement point Y		

spec for voltages measured as above in transformer coupled configuration is 18-27v p-p.

6.1.2 Output Risetime

Continuing in the configuration of Figure 6.1.1.4 a valid sync command shall be sent from the CDMS Simulator. The risetime and falltime shall be measured between 10% and 90% points, see Figure 6.1.2. The pass criteria are

100nS < Tr < 300nS
100nS < Tf < 300nS

Rise time, Tr	
Fall time, Tf	

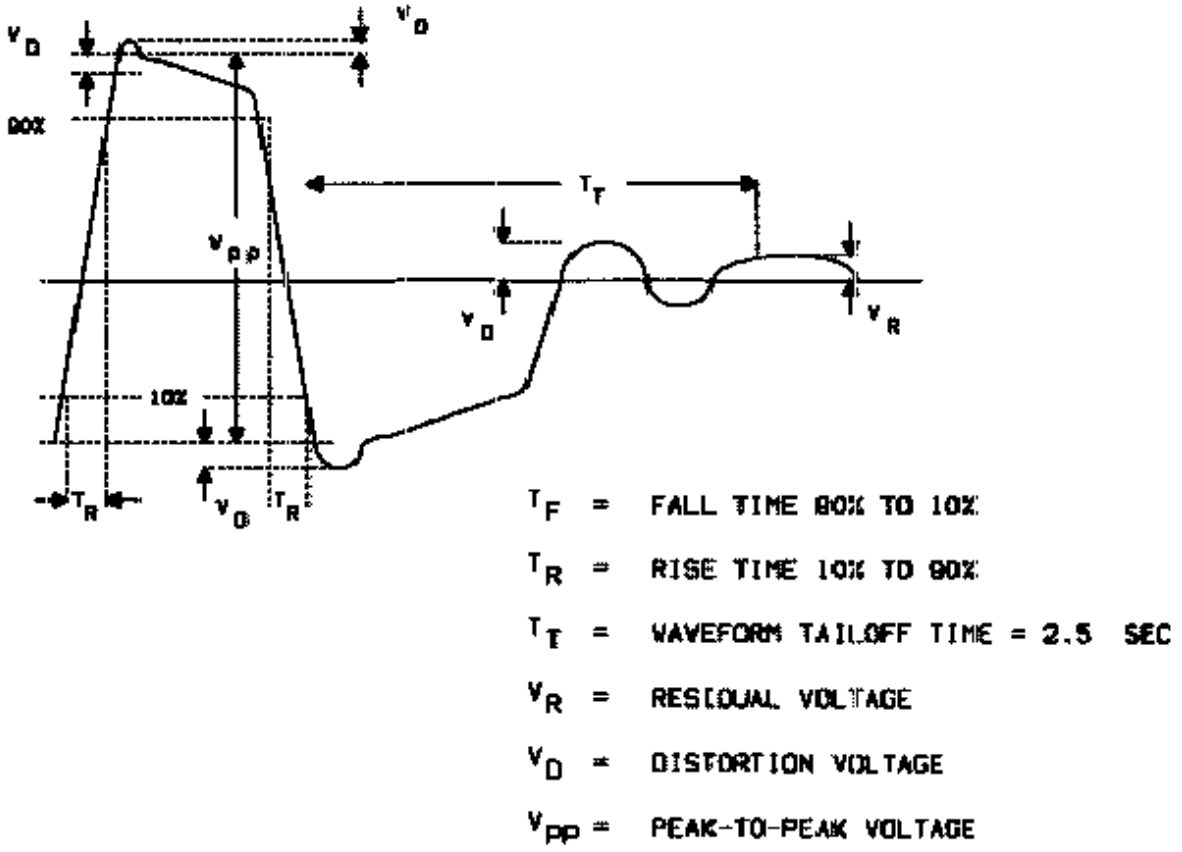


Figure 6.1.2 – Output Signal measurements

6.1.3 Output Zero Crossing

Messages shall be sent from the CDMS Simulator with data transitions at time intervals of 500nS, 1000nS, 1500nS and 2000nS (1,2,3,4 bit periods). The zero crossing time shall be measured for positive and negative transitions, see Figure 6.1.3. Specification is +/-25nS for each case.

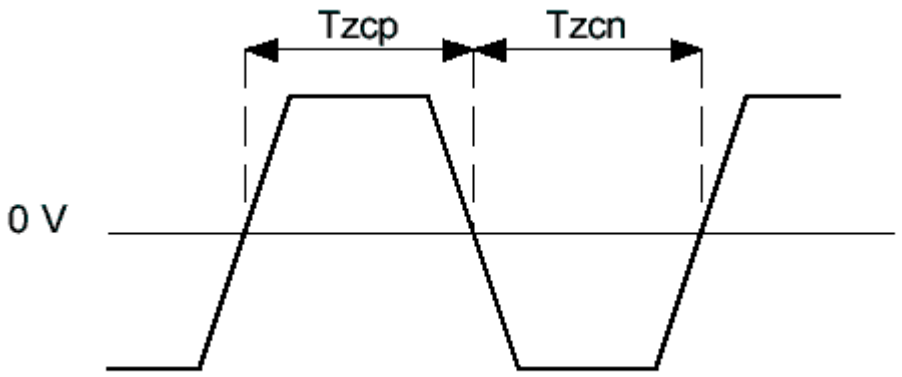


Figure 6.1.3– Zero Crossing Interval measurement

Zero Crossing Intervals, nominal	Measurement
500nS +/- 25	Tzcp =
500nS +/- 25	Tzcn =
1000nS +/- 25	Tzcp =
1000nS +/- 25	Tzcn =
1500nS +/- 25	Tzcp =
1500nS +/- 25	Tzcn =
2000nS +/- 25	Tzcp =
2000nS +/- 25	Tzcn =

6.1.4 Output Distortion

Measure the distortion voltage Vd on the CDMS Simulator signal as defined in Figure 6.1.2.
Specification is < 900mV peak, line-line for transformer-coupled configuration.

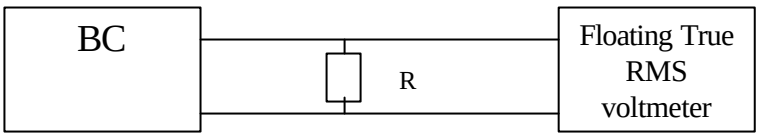
Distortion Voltage, Vd	

6.1.5 Output Symmetry

32 word messages shall be sent from the CDMS Simulator containing various repeating data values as listed in the table. The output symmetry is determined by measuring the waveform tail-off at the end of each message. The residual voltage (Vr) as shown in Figure 6.1.2 is measured at Tt (2.5uS after last transition). The pass criterion is Vr < 250mV.

Data Pattern	Residual Voltage, Vr
0x8000	
0x7FFF	
0x0000	
0xFFFF	
0x5555	
0xAAAA	

6.1.6 Output Noise



R = 70 ohms, transformer coupled

Figure 6.1.6 – Configuration for Noise measurement

The RMS voltmeter should have a bandwidth of DC to 10 MHz.
Measure the output noise voltage Vrms across the resistor R, with the power off and with the BC disabled.
Specification is Vrms < 14mV, for transformer-coupled.

Power	Noise voltage, RMS
Off	
On, BC disabled	

6.1.7 Output Isolation

Start the CDMS Simulator software running in Normal mode, generating a continuous sequence of messages, using the reference Astrium buslist. Measure the signal voltage on the active and inactive busses at the points shown in Figure 6.1.7. Change active bus and repeat the measurement. The specification for isolation is >45dB.

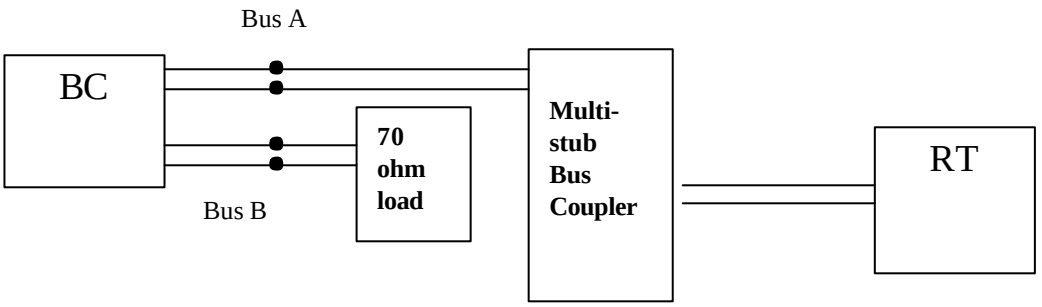


Figure 6.1.7 – Output Isolation measurement

Active Bus	Active Bus Voltage (peak-peak)	Inactive Bus Voltage (peak-peak)	dB (20Log10 Active/Inactive)
A			
B			

6.1.8 Output – Power On/Off noise

Using the configuration of Figure 6.1.7 monitor the voltage on both busses. Shut down the simulator software, then the PC power and record the maximum noise voltage. Repeat the measurement when switching on and starting the Simulator software. Do this test 10 times and record the worst case. Make a copy of oscilloscope traces and attach to the report.

The specification for noise spikes is < +/- 250 mV p-p.

Bus	Max noise transient at Switch Off (peak-peak)		Max noise transient at Switch On (peak-peak)	
	Voltage	Duration	Voltage	Duration
A				
B				

6.1.9 Output Frequency Stability

While running the reference Astrium buslist as in section 6.1.7, monitor the bus signal on an oscilloscope and measure the bit frequency (Fi). Record the minimum (Fsmin) and maximum (Fsmax) over >10,000 measurements. Also measure the average (Fav) over >1000 measurements.
Calculate:

SS1 = 100 * (Fsmax – Fav) / Fav [spec < 0.01]
SS2 = 100 * (Fav – Fsmin) / Fav [spec < 0.01]
S1 = 100 * (Fav – Fi) / Fi [spec < 0.1]

Bit Frequency, Fi	
Minimum, Fmin	
Maximum, Fmax	
Average, Fav	
SS1	
SS2	
S1	

6.1.10 Input Impedance

The input impedance of the BC is measured in the same way as that specified for a RT in section 4.3.5 of the test specifications, RD1. Disable the BC output. Connect a sinewave generator and resistance box to the bus output of the DDC card as shown in the figure. The generator amplitude shall be set to 1 to 2 volts RMS. At each test frequency increase the series resistance from zero until the peak-to-peak voltage measured at point X is halved. (Showing that the input impedance is equal to the resistance box reading).

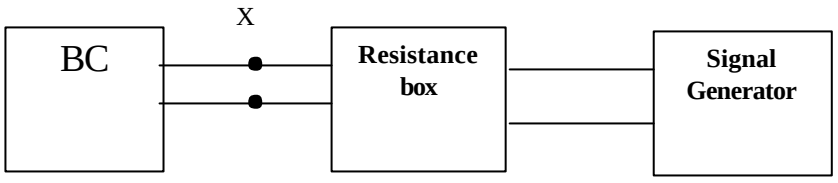


Figure 6.1.10

Frequency	Impedance, Bus A (ohms)	Impedance, Bus B (ohms)
75 kHz		
100 kHz		
250 kHz		
500 kHz		
1.0 MHz		

Specification: the impedance should be >1k ohms at all frequencies. (In transformer coupled configuration).

6.2 1553 Bus Data-link Layer Support

In this section we demonstrate that the Simulator can generate simple messages for later use in testing the instrument RTs. The DDC program “ACE Windows menu” is used. Figure 5.3 shows the setup. A jumper connection is made between channels A and C on the card, to connect BC and BM for bus A.

The RT provided with the simulator is not under test in this section; the aim is to test the Bus Controller which forms part of the CDMS Simulator. The RT is not guaranteed to support all data-link message responses.

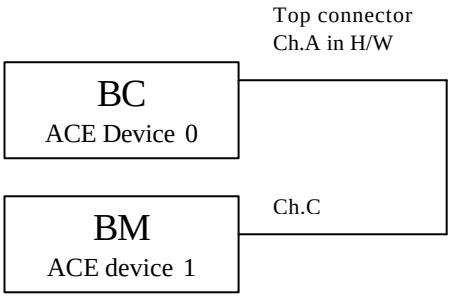


Figure 6.2 : Bus Loop-back for data-link tests on Simulator

The RAL CDMS Simulator software is not used in this section, since it is designed to run in a continuous manner controlled by a buslist file. Here only single messages are required.

6.2.1 Mode Commands

Using the DDC program ‘ACE Windows menu’ in Bus Controller mode create a command message for each of Mode Codes in Table 6-1. Store these commands in configuration file MODECMDS.ACE

Send each mode code command in turn and check that they appear correctly in the bus monitor log file.

Mode command	Pattern	SA	ref to AD-#3	BC	RT
Dynamic Bus Control	00000	00000	4.3.3.5.1.7.1	NO	NO
Synchronize (without data word) *)	00001	00000	4.3.3.5.1.7.2	YES	YES
Transmit Status Word	00010	00000	4.3.3.5.1.7.3	YES	YES
Initiate Self-test **)	00011	00000	4.3.3.5.1.7.4	YES	YES
Transmitter (TX) Shut-Down	00100	00000	4.3.3.5.1.7.5	YES	YES
Override TX Shut-Down	00101	00000	4.3.3.5.1.7.6	YES	YES
Inhibit Terminal Flag	00110	00000	4.3.3.5.1.7.7	YES	YES
Override Inhibit Terminal Flag Bit	00111	00000	4.3.3.5.1.7.8	YES	YES
Reset Remote Terminal **)	01000	00000	4.3.3.5.1.7.9	YES	YES
Transmit Vector Word	10000	00000	4.3.3.5.1.7.11	YES	YES
Synchronize (with data word) *)	10001	00000	4.3.3.5.1.7.12	YES	YES
Transmit Last Command	10010	00000	4.3.3.5.1.7.13	YES	YES
Transmit BIT (built-in Test data) Word **)	10011	00000	4.3.3.5.1.7.14	YES	YES
Selected TX Shut Down (SD)	10100	00000	4.3.3.5.1.7.15	NO	NO
Override Selected TX SD	10101	00000	4.3.3.5.1.7.16	NO	NO
Remaining Possible Command pattern (reserved for future use)	all other	00000	4.3.3.5.1.7.10	N/A	N/A

Table 6-1

Mode Code sent	Details	Log Entry
Dynamic bus control: MC0	31-T-00-00	
Sync without data word: MC1	31-T-00-01	
Transmit status word: MC2	02-T-00-02	
Initiate self-test: MC3	31-T-00-03	
Transmitter shut-down: MC4	31-T-00-04	
Override Tx shut-down: MC5	31-T-00-05	
Inhibit terminal flag: MC6	31-T-00-06	
Override terminal flag inhibit: MC7	31-T-00-07	
Reset Remote Terminal: MC8	31-T-00-08	
Transmit Vector word: MC16	02-T-00-16	
Sync with data: MC17	31-R-00-17, 5555	
Transmit last command: MC18	02-T-00-18	
Transmit built-in-test word: MC19	02-T-00-19	
Tx shutdown	31-R-00-20, 000A	
Override Tx shutdown	31-R-00-21,000A	

6.2.1.1 Required Mode Commands for RT Transmitter Control

This section shows that the simulator can be used to generate messages required by requirements (AD1) section 4.5.9.
Start the Bus Monitor (ACE device 1) logging to a file.
Start the Bus Controller (ACE device 0).

Run the test frame.
Examine the MON.ASF file and record the messages transmitted when each command was sent.

Command	Expected message(s) sent by BC	Bus monitor messages logged.
Valid message PACSCMD1	02-R-11-07 1C80,C000,0007,0102,0008, 0000,0A72	
Expected status	1000	
Mode code: Transmit status, SA0 MC2	02-T-00-02	
Expected status	1000	
Mode code: Transmitter shutdown MC4	31-T-00-04	
Expected block status word	8100	
Mode code: Override Transmitter shutdown MC5	31-T-00-05	
Expected block status word	8100	
Mode command: Reset remote terminal MC8	31-T-00-08	
Expected block status word	8100	

6.2.2 No Response Timeout

Not applicable to the CDMS Simulator BC.

6.2.3 Receive Message

Send the messages listed in Table 6-2 and note the bit pattern recorded in the monitor log file.

Test receive message	Log Entry
BC send TMConf message to RT2	
02-R-10-02, 1000, 0023	

Table 6-2

6.2.4 Broadcast Message

By design, the CDMS Simulator card will transmit any required bit pattern.

Note: The only apparent anomaly in the specification RD.4 is figure 4.2-1 showing mode code 1 where T/R =1. However the DDC monitor recognises this as a valid command (and T/R = 0 as invalid).

As a broadcast message test, send a typical spacecraft time broadcast message and note the bit pattern recorded in the monitor log file.

Test broadcast message	Log Entry
Timecode : 31-R-08-04, 002E, 0102, 0304, 0000	
Sync without data : 31-T-00-01	
sync with data : 31-R-00-17, 000C	

Table 6-3

6.2.5 Transmit Message

Send the messages listed in Table 5-2 and note the bit pattern recorded in the monitor log file.

Test transmit message	Log Entry
BC collects TMReq from RT2	
02-T-10-02	

Table 6-4

6.2.6 Receive Low-Level Command

Not applicable to CDMS Simulator.

6.2.7 Data-link Error Messages

Tests to verify the CDMS-Sim response to data-link errors are included in section 6.4.1.4 covering the following errors:

6.2.7.1 RT Status Errors

RT message error
RT busy error
RT subsystem flag
RT terminal flag

6.2.7.2 BC Status Errors

RT transmission error
RT no response timeout
BC loop back error

6.3 Satellite 1553 Bus Transfer-Layer Protocol

6.3.1 Basic Protocol without TM or TC transfer

For this test continue to use the test setup of Figure 6.2 (BC plus bus monitor).
Start the ACE menu in Bus monitor mode, ACE device 1.
Run the simulator with buslist file **RT2 buslist** for at least one major frame. (1 second)
Check the bus monitor log file against the list of messages in the table below. Record the start time of each subframe and the offset of each message within a subframe.

Note that this list includes only Broadcast messages (sync, timecode) and TMReq messages. When there is no RT and there are no TCs sent they are the only messages sent on the bus. For an explanation of the buslist format see RD3, CDMS-Sim Users Guide.

Subframe	Message slot (0 - 23)	Start time (uS)	Message type	RT (0 if TC)	SA	Data type		Log file time (uS)	Message MS	Message NMS
0	0	0	MCSync	31	0	None				
1	0	0	MCData	31	0	SyncFC				
2	0	0	MCData	31	0	SyncFC				
3	0	0	MCData	31	0	SyncFC				
3	21	14550	RTtoBC	2	10	TMReq				
4	0	0	MCData	31	0	SyncFC				
5	0	0	MCData	31	0	SyncFC				
6	0	0	MCData	31	0	SyncFC				
6	21	14550	RTtoBC	2	10	TMReq				
7	0	0	MCData	31	0	SyncFC				
8	0	0	MCData	31	0	SyncFC				
9	0	0	MCData	31	0	SyncFC				
9	21	14550	RTtoBC	2	10	TMReq				
10	0	0	MCData	31	0	SyncFC				
11	0	0	MCData	31	0	SyncFC				
12	0	0	MCData	31	0	SyncFC				
12	21	14550	RTtoBC	2	10	TMReq				
13	0	0	MCData	31	0	SyncFC				
14	0	0	MCData	31	0	SyncFC				

15	0	0	MCData	31	0	SyncFC				
16	0	0	MCSync	31	0	SyncFC				
17	0	0	MCData	31	0	SyncFC				
18	0	0	MCData	31	0	SyncFC				
19	0	0	MCData	31	0	SyncFC				
19	21	14550	RTtoBC	2	10	TMReq				
20	0	0	MCData	31	0	SyncFC				
21	0	0	MCData	31	0	SyncFC				
22	0	0	MCData	31	0	SyncFC				
23	0	0	MCData	31	0	SyncFC				
24	0	0	MCData	31	0	SyncFC				
25	0	0	MCData	31	0	SyncFC				
25	21	14550	RTtoBC	2	10	TMReq				
26	0	0	MCData	31	0	SyncFC				
27	0	0	MCData	31	0	SyncFC				
28	0	0	MCData	31	0	SyncFC				
28	21	14550	RTtoBC	2	10	TMReq				
29	0	0	MCData	31	0	SyncFC				
30	0	0	MCData	31	0	SyncFC				
31	0	0	MCData	31	0	SyncFC				
31	21	14550	RTtoBC	2	10	TMReq				
32	0	0	MCData	31	0	SyncFC				
32	2	900	MCData	31	8	Timecode				
33	0	0	MCData	31	0	SyncFC				
34	0	0	MCData	31	0	SyncFC				
35	0	0	MCData	31	0	SyncFC				
36	0	0	MCData	31	0	SyncFC				
37	0	0	MCData	31	0	SyncFC				
38	0	0	MCData	31	0	SyncFC				
38	21	14550	RTtoBC	2	10	TMReq				

39	0	0	MCData	31	0	SyncFC				
40	0	0	MCData	31	0	SyncFC				
41	0	0	MCData	31	0	SyncFC				
41	21	14550	RTtoBC	2	10	TMReq				
42	0	0	MCData	31	0	SyncFC				
43	0	0	MCData	31	0	SyncFC				
44	0	0	MCData	31	0	SyncFC				
44	21	14550	RTtoBC	2	10	TMReq				
45	0	0	MCData	31	0	SyncFC				
46	0	0	MCData	31	0	SyncFC				
47	0	0	MCData	31	0	SyncFC				
47	21	14550	RTtoBC	2	10	TMReq				
48	0	0	MCData	31	0	SyncFC				
49	0	0	MCData	31	0	SyncFC				
50	0	0	MCData	31	0	SyncFC				
51	0	0	MCData	31	0	SyncFC				
51	21	14550	RTtoBC	2	10	TMReq				
52	0	0	MCData	31	0	SyncFC				
53	0	0	MCData	31	0	SyncFC				
54	0	0	MCData	31	0	SyncFC				
54	21	14550	RTtoBC	2	10	TMReq				
55	0	0	MCData	31	0	SyncFC				
56	0	0	MCData	31	0	SyncFC				
57	0	0	MCData	31	0	SyncFC				
57	21	14550	RTtoBC	2	10	TMReq				
58	0	0	MCData	31	0	SyncFC				
59	0	0	MCData	31	0	SyncFC				
60	0	0	MCData	31	0	SyncFC				
60	21	14550	RTtoBC	2	10	TMReq				
61	0	0	MCData	31	0	SyncFC				

62	0	0	MCData	31	0	SyncFC				
63	0	0	MCData	31	0	SyncFC				
63	21	14550	RTtoBC	2	10	TMReq				

	Specification	
Major Frame duration	1.000 seconds	uS +/- uS
Subframe duration	15,625 mS	uS +/- uS
Broadcast time increments OK ?		
Subframe counter increments ?		

6.3.2 TC Packet transfer

Connect the Simulator (BC), monitor (BM), and the Remote Terminal (RT) together via a bus coupler unit as shown in Figure 6.3.2.

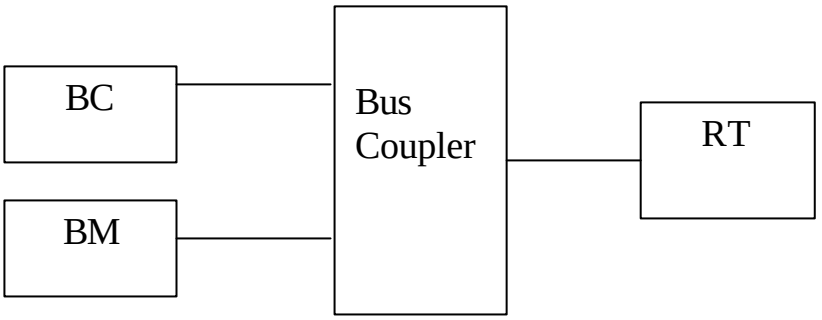


Figure 6.3.2 – Bus Configuration for TC Packet Trnsfer

Start the ACE menu as Bus monitor – logging on.
Select buslist file **RT2 buslist.**
Select bus A
Start the Bus Controller
Set the RT mode to Echo.
Start the RT running.
Set TC mode to local.
Select the TC to **MaxlenTC.txt**; this TC has length = 124 words with the data in a counting pattern.
Send the TC
Check the bus monitor log file and record the messages and RT responses in the table below.

	Messages	Expected values	Recorded values from Log file
1	RT2, SA11R, TC transfer	02-R-11-00	
2	RT status	1000	
3	RT2, SA12R, TC transfer	02-R-12-00	
4	RT status	1000	
5	RT2, SA13R, TC transfer	02-R-13-00	
6	RT status	1000	
7	RT2, SA14R, TC transfer	02-R-14-28	
8	RT status	1000	
9	RT2, SA27R, TC descriptor	02-R-27-02, 041C, 0101	
10	RT status	1000	
11	wait 2 subframes		
12	RT2, SA27T, TC confirmation	02-T-27-02, 041C, 0101	
13	RT status	1000	
14	Simulator TC list indicates confirmation received ?		

Are 1-10 in same subframe ? ☐

Message 1 contains data words 1C80 – 001C ? ☐

Message 2 contains data words 001D – 003C ? ☐

Message 3 contains data words 003D – 005C ? ☐

Message 4 contains data words 005D – 0078 ? ☐

6.3.3 RT Error Conditions

6.3.3.1 No TC Confirmation Message

Disable the TC confirmation in the RT software.
Re-send the maximum length TC.
Wait 2 major frames.

Confirm that the Simulator indicates no confirmation on the transmitted TCs list. ☐

6.3.3.2 No Increment of TC Sequence Counter

This condition cannot be simulated by the CDMS Sim software.
There would be no RT error, since an RT cannot detect a new TC without it?

6.3.4 TM Packet transfer

Continue with same hardware configuration as Figure 6.3.2
Start the Bus monitor software.
Run the simulator with buslist file **RT2 buslist** for at least two major frames.
Run RT with mode = burst (TM packet length is maximum at 512 words, with counting data.)
Check the bus monitor log file for the messages in the table below.

	Messages	**Expected message**	**Messages from Log file**
1	RT2, SA10T, TM Request	02-T-10-02,1000,0001	
2	RT status	1000	
3	wait 2 subframes		
4	RT2, SA11T, TM transfer	data = 0C80 – 0018	
5	RT status	1000	
5	RT2, SA12T, TM transfer	data = 0019 – 0038	
6	RT status	1000	
7	RT2, SA13T, TM transfer	data = 0039 – 0058	
8	RT status	1000	
9	RT2, SA14T, TM transfer	data = 0059 – 0078	
10	RT status	1000	
11	RT2, SA15T, TM transfer	data = 0079 – 0098	
12	RT status	1000	
13	RT2, SA16T, TM transfer	data = 0099 – 00B8	
14	RT status	1000	
15	RT2, SA17T, TM transfer	data = 00B9 – 00D8	
16	RT status	1000	
17	RT2, SA18T, TM transfer	data = 00D9 – 00F8	
18	RT status	1000	
19	RT2, SA19T, TM transfer	data = 00F9 – 0118	
20	RT status	1000	
21	RT2, SA20T, TM transfer	data = 0119 – 0138	
22	RT status	1000	
23	RT2, SA21T, TM transfer	data = 0139 – 0158	
24	RT status	1000	
25	RT2, SA22T, TM transfer	data = 0159 – 0178	
26	RT status	1000	
27	RT2, SA23T, TM transfer	data = 0179 – 0198	
28	RT status	1000	
29	RT2, SA24T, TM transfer	data = 0199 – 01B8	
30	RT status	1000	
31	RT2, SA25T, TM transfer	data = 01B9 – 01D8	
32	RT status	1000	
33	RT2, SA26T, TM transfer	data = 01D9 – 01F8	
34	RT status	1000	
35	RT2, SA10R, TM confirmation	02-R-10-02	
36	RT status	1000	

Record number of messages requested = 0x10 

Record number of words in last message
All TM transfer messages in same subframe ?
Time of transfers correct ?

Correct number of data words in each message (32) ?

Packet displayed correctly on Simulator display ?

6.3.5 CDMS-Sim (BC) Error Conditions

Cannot be tested; won't work without handshake.

6.3.6 Bus Polling Sequence: Nominal Mode

Continue the same hardware configuration as Figure 6.3.2

Start the Bus monitor software.
Run the simulator with the **Astrium buslist** . This is the suggested bus polling sequence for CDMS Nominal mode.
RT mode = burst TM
RT emulated = RT1
Start the RT.
The RT should be capable of generating 16 packets/major frame.
Let the BC run for at least two major frames.

Check the bus monitor log file and find the point where the RT started. Record the messages in the table below.
Note that only the bold messages are sent unless there is a TC, or a different RT is present.

Subframe	**Message slot** (0 - 23)	**Start time** (uS)	**Message type**	**RT** (0 if TC)	**SA**	**Data type**	**Logfile time** (uS)	**Message MS**	**Message NMS**
0	**0**	**0**	**MCSync**	**31**	**0**	**None**			
0	4	2400	BCtoRT	0	11	PacketTC			
0	20	14400	BCtoRT	0	27	TCDesc			
1	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
1	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
1	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
1	**21**	**14550**	**RTtoBC**	**3**	**10**	**TMReq**			
2	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
2	4	2400	RTtoBC	2	11	PacketTM			
2	20	14400	BCtoRT	2	10	TMConf			
2	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
2	22	14700	RTtoBC	0	27	TCConf			
3	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
3	4	2400	RTtoBC	3	11	PacketTM			
3	20	14400	BCtoRT	3	10	TMConf			
4	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
4	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			

4	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
5	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
5	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
6	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
7	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
7	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
7	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
8	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
8	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
9	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
10	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
10	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
10	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
11	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
11	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
12	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
12	**21**	**14550**	**RTtoBC**	**2**	**10**	**TMReq**			
13	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
13	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
13	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
13	**21**	**14550**	**RTtoBC**	**3**	**10**	**TMReq**			
14	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
14	4	2400	RTtoBC	2	11	PacketTM			
14	20	14400	BCtoRT	2	10	TMConf			
14	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
15	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
15	4	2400	RTtoBC	3	11	PacketTM			
15	20	14400	BCtoRT	3	10	TMConf			
16	**0**	**0**	**MCSync**	**31**	**0**	**SyncFC**			
16	4	2400	BCtoRT	0	11	PacketTC			
16	20	14400	BCtoRT	0	27	TCDesc			
16	**21**	**14550**	**RTtoBC**	**10**	**10**	**TMReq**			
17	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
17	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
17	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
18	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
18	4	2400	RTtoBC	10	11	PacketTM			
18	20	14400	BCtoRT	10	10	TMConf			
18	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
18	22	14700	RTtoBC	0	27	TCConf			
19	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
20	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
20	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
20	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			

20	**21**	**14550**	**RTtoBC**	**11**	**10**	**TMReq**			
21	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
21	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
22	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
22	4	2400	RTtoBC	11	11	PacketTM			
22	20	14400	BCtoRT	11	10	TMConf			
22	**21**	**14550**	**RTtoBC**	**12**	**10**	**TMReq**			
23	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
23	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
23	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
24	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
24	4	2400	RTtoBC	12	11	PacketTM			
24	20	14400	BCtoRT	12	10	TMConf			
24	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
25	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
26	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
26	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
26	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
27	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
27	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
28	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
29	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
29	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
29	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
30	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
30	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
31	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
32	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
32	**2**	**900**	**MCData**	**31**	**8**	**Timecode**			
32	4	2400	BCtoRT	0	11	PacketTC			
32	20	14400	BCtoRT	0	27	TCDesc			
32	**21**	**14550**	**RTtoBC**	**13**	**10**	**TMReq**			
33	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
33	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
33	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
34	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
34	4	2400	RTtoBC	13	11	PacketTM			
34	20	14400	BCtoRT	13	10	TMConf			
34	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
34	22	14700	RTtoBC	0	27	TCConf			
35	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
35	**21**	**14550**	**RTtoBC**	**14**	**10**	**TMReq**			
36	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
36	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			

36	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
37	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
37	4	2400	RTtoBC	14	11	PacketTM			
37	20	14400	BCtoRT	14	10	TMConf			
37	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
38	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
38	**21**	**14550**	**RTtoBC**	**2**	**10**	**TMReq**			
39	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
39	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
39	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
40	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
40	4	2400	RTtoBC	2	11	PacketTM			
40	20	14400	BCtoRT	2	10	TMConf			
40	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
41	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
42	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
42	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
42	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
43	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
44	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
45	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
46	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
47	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
48	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
48	4	2400	BCtoRT	0	11	PacketTC			
48	20	14400	BCtoRT	0	27	TCDesc			
49	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
50	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
50	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
50	22	14700	RTtoBC	0	27	TCConf			
51	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
52	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
52	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			
52	**20**	**14400**	**BCtoRT**	**1**	**10**	**TMConf**			
52	**21**	**14550**	**RTtoBC**	**3**	**10**	**TMReq**			
53	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
53	**21**	**14550**	**RTtoBC**	**1**	**10**	**TMReq**			
54	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
54	4	2400	RTtoBC	3	11	PacketTM			
54	20	14400	BCtoRT	3	10	TMConf			
55	**0**	**0**	**MCData**	**31**	**0**	**SyncFC**			
55	**4**	**2400**	**RTtoBC**	**1**	**11**	**PacketTM**			

55	20	14400	BCtoRT	1	10	TMConf				
56	0	0	MCData	31	0	SyncFC				
57	0	0	MCData	31	0	SyncFC				
58	0	0	MCData	31	0	SyncFC				
59	0	0	MCData	31	0	SyncFC				
60	0	0	MCData	31	0	SyncFC				
61	0	0	MCData	31	0	SyncFC				
62	0	0	MCData	31	0	SyncFC				
62	21	14550	RTtoBC	1	10	TMReq				
63	0	0	MCData	31	0	SyncFC				
63	21	14550	RTtoBC	2	10	TMReq				

Check the following:

All TM packet transfer subframes are filled?
(bitrate = 131k bits/sec)

Major Frame duration uS

Major Frame Sync message

Subframe Sync message

Subframe counter increments correctly ?

Make a printout of the TM packet logfile.
Check that the datalink layer TM packet counter increments from 1 to 255 then resets to 1 at rollover.

Make a printout of the 1553 message logfile.

6.3.7 Burst Mode

Use the same hardware configuration as Figure 6.4.2
Start the Bus monitor software.
RT mode = burst TM
RT emulated = RT2
The RT should be capable of generating 60 packets/major frame.
Start the RT.

Run the simulator with buslist file **RT2 BurstMode buslist**. for at least two major frames.
Check the bus monitor log file for the messages in the table below.

Subframe	Message slot	Start time	Message type	RT	SA	Data type		Log file	Message	Message
	(0 - 23)	(uS)		(0 if TC)				time (uS)	MS	NMS

0	0	0	MCSync	31	0	None				
0	4	2400	BCtoRT	0	11	PacketTC				
0	20	14400	BCtoRT	0	27	TCDesc				
1	0	0	MCData	31	0	SyncFC				
1	4	2400	RTtoBC	2	11	PacketTM				
1	20	14400	BCtoRT	2	10	TMConf				
1	21	14550	RTtoBC	2	10	TMReq				
2	0	0	MCData	31	0	SyncFC				
2	4	2400	RTtoBC	2	11	PacketTM				
2	20	14400	BCtoRT	2	10	TMConf				
2	21	14550	RTtoBC	2	10	TMReq				
2	22	14700	RTtoBC	0	27	TCConf				
3	0	0	MCData	31	0	SyncFC				
3	4	2400	RTtoBC	2	11	PacketTM				
3	20	14400	BCtoRT	2	10	TMConf				
3	21	14550	RTtoBC	2	10	TMReq				
4	0	0	MCData	31	0	SyncFC				
4	4	2400	RTtoBC	2	11	PacketTM				
4	20	14400	BCtoRT	2	10	TMConf				
4	21	14550	RTtoBC	2	10	TMReq				
5	0	0	MCData	31	0	SyncFC				
5	4	2400	RTtoBC	2	11	PacketTM				
5	20	14400	BCtoRT	2	10	TMConf				
5	21	14550	RTtoBC	2	10	TMReq				
6	0	0	MCData	31	0	SyncFC				
6	4	2400	RTtoBC	2	11	PacketTM				
6	20	14400	BCtoRT	2	10	TMConf				
6	21	14550	RTtoBC	2	10	TMReq				
7	0	0	MCData	31	0	SyncFC				
7	4	2400	RTtoBC	2	11	PacketTM				
7	20	14400	BCtoRT	2	10	TMConf				
7	21	14550	RTtoBC	2	10	TMReq				
8	0	0	MCData	31	0	SyncFC				
8	4	2400	RTtoBC	2	11	PacketTM				
8	20	14400	BCtoRT	2	10	TMConf				
8	21	14550	RTtoBC	2	10	TMReq				
9	0	0	MCData	31	0	SyncFC				
9	4	2400	RTtoBC	2	11	PacketTM				
9	20	14400	BCtoRT	2	10	TMConf				
9	21	14550	RTtoBC	2	10	TMReq				
10	0	0	MCData	31	0	SyncFC				
10	4	2400	RTtoBC	2	11	PacketTM				
10	20	14400	BCtoRT	2	10	TMConf				
10	21	14550	RTtoBC	2	10	TMReq				
11	0	0	MCData	31	0	SyncFC				

11	4	2400	RTtoBC	2	11	PacketTM				
11	20	14400	BCtoRT	2	10	TMConf				
11	21	14550	RTtoBC	2	10	TMReq				
12	0	0	MCData	31	0	SyncFC				
12	4	2400	RTtoBC	2	11	PacketTM				
12	20	14400	BCtoRT	2	10	TMConf				
12	21	14550	RTtoBC	2	10	TMReq				
13	0	0	MCData	31	0	SyncFC				
13	4	2400	RTtoBC	2	11	PacketTM				
13	20	14400	BCtoRT	2	10	TMConf				
13	21	14550	RTtoBC	2	10	TMReq				
14	0	0	MCData	31	0	SyncFC				
14	4	2400	RTtoBC	2	11	PacketTM				
14	20	14400	BCtoRT	2	10	TMConf				
14	21	14550	RTtoBC	2	10	TMReq				
15	0	0	MCData	31	0	SyncFC				
15	4	2400	RTtoBC	2	11	PacketTM				
15	20	14400	BCtoRT	2	10	TMConf				
15	21	14550	RTtoBC	2	10	TMReq				
16	0	0	MCSync	31	0	SyncFC				
16	4	2400	BCtoRT	0	11	PacketTC				
16	20	14400	BCtoRT	0	27	TCDesc				
17	0	0	MCData	31	0	SyncFC				
17	4	2400	RTtoBC	2	11	PacketTM				
17	20	14400	BCtoRT	2	10	TMConf				
17	21	14550	RTtoBC	2	10	TMReq				
18	0	0	MCData	31	0	SyncFC				
18	4	2400	RTtoBC	10	11	PacketTM				
18	20	14400	BCtoRT	10	10	TMConf				
18	21	14550	RTtoBC	2	10	TMReq				
18	22	14700	RTtoBC	0	27	TCConf				
19	0	0	MCData	31	0	SyncFC				
19	4	2400	RTtoBC	2	11	PacketTM				
19	20	14400	BCtoRT	2	10	TMConf				
19	21	14550	RTtoBC	2	10	TMReq				
20	0	0	MCData	31	0	SyncFC				
20	4	2400	RTtoBC	2	11	PacketTM				
20	20	14400	BCtoRT	2	10	TMConf				
20	21	14550	RTtoBC	2	10	TMReq				
21	0	0	MCData	31	0	SyncFC				
21	4	2400	RTtoBC	2	11	PacketTM				
21	20	14400	BCtoRT	2	10	TMConf				
21	21	14550	RTtoBC	2	10	TMReq				
22	0	0	MCData	31	0	SyncFC				
22	4	2400	RTtoBC	2	11	PacketTM				
22	20	14400	BCtoRT	2	10	TMConf				

22	21	14550	RTtoBC	2	10	TMReq				
23	0	0	MCData	31	0	SyncFC				
23	4	2400	RTtoBC	2	11	PacketTM				
23	20	14400	BCtoRT	2	10	TMConf				
23	21	14550	RTtoBC	2	10	TMReq				
24	0	0	MCData	31	0	SyncFC				
24	4	2400	RTtoBC	12	11	PacketTM				
24	20	14400	BCtoRT	12	10	TMConf				
24	21	14550	RTtoBC	2	10	TMReq				
25	0	0	MCData	31	0	SyncFC				
25	4	2400	RTtoBC	12	11	PacketTM				
25	20	14400	BCtoRT	12	10	TMConf				
25	21	14550	RTtoBC	2	10	TMReq				
26	0	0	MCData	31	0	SyncFC				
26	4	2400	RTtoBC	2	11	PacketTM				
26	20	14400	BCtoRT	2	10	TMConf				
26	21	14550	RTtoBC	2	10	TMReq				
27	0	0	MCData	31	0	SyncFC				
27	4	2400	RTtoBC	12	11	PacketTM				
27	20	14400	BCtoRT	12	10	TMConf				
27	21	14550	RTtoBC	2	10	TMReq				
28	0	0	MCData	31	0	SyncFC				
28	4	2400	RTtoBC	12	11	PacketTM				
28	20	14400	BCtoRT	12	10	TMConf				
28	21	14550	RTtoBC	2	10	TMReq				
29	0	0	MCData	31	0	SyncFC				
29	4	2400	RTtoBC	2	11	PacketTM				
29	20	14400	BCtoRT	2	10	TMConf				
29	21	14550	RTtoBC	2	10	TMReq				
30	0	0	MCData	31	0	SyncFC				
30	4	2400	RTtoBC	2	11	PacketTM				
30	20	14400	BCtoRT	2	10	TMConf				
30	21	14550	RTtoBC	2	10	TMReq				
31	0	0	MCData	31	0	SyncFC				
31	4	2400	RTtoBC	2	11	PacketTM				
31	20	14400	BCtoRT	2	10	TMConf				
31	21	14550	RTtoBC	2	10	TMReq				
32	0	0	MCData	31	0	SyncFC				
32	2	900	MCData	31	8	Timecode				
32	4	2400	BCtoRT	0	11	PacketTC				
32	20	14400	BCtoRT	0	27	TCDesc				
33	0	0	MCData	31	0	SyncFC				
33	4	2400	RTtoBC	2	11	PacketTM				
33	20	14400	BCtoRT	2	10	TMConf				
33	21	14550	RTtoBC	2	10	TMReq				

34	0	0	MCData	31	0	SyncFC				
34	4	2400	RTtoBC	13	11	PacketTM				
34	20	14400	BCtoRT	13	10	TMConf				
34	21	14550	RTtoBC	2	10	TMReq				
34	22	14700	RTtoBC	0	27	TCConf				
35	0	0	MCData	31	0	SyncFC				
35	4	2400	RTtoBC	2	11	PacketTM				
35	20	14400	BCtoRT	2	10	TMConf				
35	21	14550	RTtoBC	2	10	TMReq				
36	0	0	MCData	31	0	SyncFC				
36	4	2400	RTtoBC	2	11	PacketTM				
36	20	14400	BCtoRT	2	10	TMConf				
36	21	14550	RTtoBC	2	10	TMReq				
37	0	0	MCData	31	0	SyncFC				
37	4	2400	RTtoBC	14	11	PacketTM				
37	20	14400	BCtoRT	14	10	TMConf				
37	21	14550	RTtoBC	2	10	TMReq				
38	0	0	MCData	31	0	SyncFC				
38	4	2400	RTtoBC	2	11	PacketTM				
38	20	14400	BCtoRT	2	10	TMConf				
38	21	14550	RTtoBC	2	10	TMReq				
39	0	0	MCData	31	0	SyncFC				
39	4	2400	RTtoBC	2	11	PacketTM				
39	20	14400	BCtoRT	2	10	TMConf				
39	21	14550	RTtoBC	2	10	TMReq				
40	0	0	MCData	31	0	SyncFC				
40	4	2400	RTtoBC	2	11	PacketTM				
40	20	14400	BCtoRT	2	10	TMConf				
40	21	14550	RTtoBC	2	10	TMReq				
41	0	0	MCData	31	0	SyncFC				
41	4	2400	RTtoBC	2	11	PacketTM				
41	20	14400	BCtoRT	2	10	TMConf				
41	21	14550	RTtoBC	2	10	TMReq				
42	0	0	MCData	31	0	SyncFC				
42	4	2400	RTtoBC	2	11	PacketTM				
42	20	14400	BCtoRT	2	10	TMConf				
42	21	14550	RTtoBC	2	10	TMReq				
43	0	0	MCData	31	0	SyncFC				
43	4	2400	RTtoBC	2	11	PacketTM				
43	20	14400	BCtoRT	2	10	TMConf				
43	21	14550	RTtoBC	2	10	TMReq				
44	0	0	MCData	31	0	SyncFC				
44	4	2400	RTtoBC	2	11	PacketTM				
44	20	14400	BCtoRT	2	10	TMConf				
44	21	14550	RTtoBC	2	10	TMReq				
45	0	0	MCData	31	0	SyncFC				

45	4	2400	RTtoBC	2	11	PacketTM				
45	20	14400	BCtoRT	2	10	TMConf				
45	21	14550	RTtoBC	2	10	TMReq				
46	0	0	MCData	31	0	SyncFC				
46	4	2400	RTtoBC	2	11	PacketTM				
46	20	14400	BCtoRT	2	10	TMConf				
46	21	14550	RTtoBC	2	10	TMReq				
47	0	0	MCData	31	0	SyncFC				
47	4	2400	RTtoBC	2	11	PacketTM				
47	20	14400	BCtoRT	2	10	TMConf				
47	21	14550	RTtoBC	2	10	TMReq				
48	0	0	MCData	31	0	SyncFC				
48	4	2400	BCtoRT	0	11	PacketTC				
48	20	14400	BCtoRT	0	27	TCDesc				
49	0	0	MCData	31	0	SyncFC				
49	4	2400	RTtoBC	2	11	PacketTM				
49	20	14400	BCtoRT	2	10	TMConf				
49	21	14550	RTtoBC	2	10	TMReq				
50	0	0	MCData	31	0	SyncFC				
50	4	2400	RTtoBC	2	11	PacketTM				
50	20	14400	BCtoRT	2	10	TMConf				
50	21	14550	RTtoBC	2	10	TMReq				
50	22	14700	RTtoBC	0	27	TCConf				
51	0	0	MCData	31	0	SyncFC				
51	4	2400	RTtoBC	2	11	PacketTM				
51	20	14400	BCtoRT	2	10	TMConf				
51	21	14550	RTtoBC	2	10	TMReq				
52	0	0	MCData	31	0	SyncFC				
52	4	2400	RTtoBC	2	11	PacketTM				
52	20	14400	BCtoRT	2	10	TMConf				
52	21	14550	RTtoBC	2	10	TMReq				
53	0	0	MCData	31	0	SyncFC				
53	4	2400	RTtoBC	2	11	PacketTM				
53	20	14400	BCtoRT	2	10	TMConf				
53	21	14550	RTtoBC	2	10	TMReq				
54	0	0	MCData	31	0	SyncFC				
54	4	2400	RTtoBC	2	11	PacketTM				
54	20	14400	BCtoRT	2	10	TMConf				
54	21	14550	RTtoBC	2	10	TMReq				
55	0	0	MCData	31	0	SyncFC				
55	4	2400	RTtoBC	2	11	PacketTM				
55	20	14400	BCtoRT	2	10	TMConf				
55	21	14550	RTtoBC	2	10	TMReq				
56	0	0	MCData	31	0	SyncFC				
56	4	2400	RTtoBC	2	11	PacketTM				
56	20	14400	BCtoRT	2	10	TMConf				

56	21	14550	RTtoBC	2	10	TMReq				
57	0	0	MCData	31	0	SyncFC				
57	4	2400	RTtoBC	2	11	PacketTM				
57	20	14400	BCtoRT	2	10	TMConf				
57	21	14550	RTtoBC	2	10	TMReq				
58	0	0	MCData	31	0	SyncFC				
58	4	2400	RTtoBC	2	11	PacketTM				
58	20	14400	BCtoRT	2	10	TMConf				
58	21	14550	RTtoBC	2	10	TMReq				
59	0	0	MCData	31	0	SyncFC				
59	4	2400	RTtoBC	2	11	PacketTM				
59	20	14400	BCtoRT	2	10	TMConf				
59	21	14550	RTtoBC	2	10	TMReq				
60	0	0	MCData	31	0	SyncFC				
60	4	2400	RTtoBC	2	11	PacketTM				
60	20	14400	BCtoRT	2	10	TMConf				
60	21	14550	RTtoBC	2	10	TMReq				
61	0	0	MCData	31	0	SyncFC				
61	4	2400	RTtoBC	2	11	PacketTM				
61	20	14400	BCtoRT	2	10	TMConf				
61	21	14550	RTtoBC	2	10	TMReq				
62	0	0	MCData	31	0	SyncFC				
62	4	2400	RTtoBC	2	11	PacketTM				
62	20	14400	BCtoRT	2	10	TMConf				
62	21	14550	RTtoBC	2	10	TMReq				
63	0	0	MCData	31	0	SyncFC				
63	4	2400	RTtoBC	2	11	PacketTM				
63	20	14400	BCtoRT	2	10	TMConf				
63	21	14550	RTtoBC	2	10	TMReq				

Check the following:

All TM packet transfer subframes are filled?
(bitrate = 491k bits/sec)

Make a printout of the TM packet logfile.

Make a printout of the 1553 message logfile.

6.3.8 Memory load Mode

Use the same hardware configuration as Figure 6.3.2

Start the Router
Start Test client module, Commander.
Run RT software to echo received TC packets as TM packets.

Start the Bus monitor software.

Start the simulator.
Logon to Router, and specify APIDs of required packets.
Select buslist file **RT3 MemoryLoad buslist**.
Run the BC.
Pause the TC display.
In Commander load and run script to send commands.
Check the bus monitor log file for the messages in the table below.

Subframe	Message slot	Start time	Message type	RT	SA	Data type		Log file	Message	Message
	(0 - 23)	(uS)						time (uS)	MS	NMS
0	0	0	MCSync	31	0	None				
0	4	2400	BCtoRT	0	11	PacketTC				
0	20	14400	BCtoRT	0	27	TCDesc				
0	21	14550	RTtoBC	2	10	TMReq				
1	0	0	MCData	31	0	SyncFC				
1	4	2400	RTtoBC	1	11	PacketTM				
1	20	14400	BCtoRT	1	10	TMConf				
2	0	0	MCData	31	0	SyncFC				
2	4	2400	RTtoBC	2	11	PacketTM				
2	20	14400	BCtoRT	2	10	TMConf				
2	21	14550	RTtoBC	3	10	TMReq				
2	22	14700	RTtoBC	0	27	TCConf				
3	0	0	MCData	31	0	SyncFC				
3	4	2400	BCtoRT	0	11	PacketTC				
3	20	14400	BCtoRT	0	27	TCDesc				
3	21	14550	RTtoBC	1	10	TMReq				
4	0	0	MCData	31	0	SyncFC				
4	4	2400	RTtoBC	3	11	PacketTM				
4	20	14400	BCtoRT	3	10	TMConf				
5	0	0	MCData	31	0	SyncFC				
5	4	2400	RTtoBC	1	11	PacketTM				
5	20	14400	BCtoRT	1	10	TMConf				
5	21	14550	RTtoBC	2	10	TMReq				
5	22	14700	RTtoBC	0	27	TCConf				
6	0	0	MCData	31	0	SyncFC				
6	4	2400	BCtoRT	0	11	PacketTC				
6	20	14400	BCtoRT	0	27	TCDesc				
6	21	14550	RTtoBC	3	10	TMReq				
7	0	0	MCData	31	0	SyncFC				
7	4	2400	RTtoBC	2	11	PacketTM				
7	20	14400	BCtoRT	2	10	TMConf				
8	0	0	MCData	31	0	SyncFC				
8	4	2400	RTtoBC	3	11	PacketTM				
8	20	14400	BCtoRT	3	10	TMConf				
8	21	14550	RTtoBC	1	10	TMReq				

8	22	14700	RTtoBC	0	27	TCConf				
9	0	0	MCData	31	0	SyncFC				
9	4	2400	BCtoRT	0	11	PacketTC				
9	20	14400	BCtoRT	0	27	TCDesc				
9	21	14550	RTtoBC	2	10	TMReq				
10	0	0	MCData	31	0	SyncFC				
10	4	2400	RTtoBC	1	11	PacketTM				
10	20	14400	BCtoRT	1	10	TMConf				
11	0	0	MCData	31	0	SyncFC				
11	4	2400	RTtoBC	2	11	PacketTM				
11	20	14400	BCtoRT	2	10	TMConf				
11	21	14550	RTtoBC	3	10	TMReq				
11	22	14700	RTtoBC	0	27	TCConf				
12	0	0	MCData	31	0	SyncFC				
12	4	2400	BCtoRT	0	11	PacketTC				
12	20	14400	BCtoRT	0	27	TCDesc				
12	21	14550	RTtoBC	1	10	TMReq				
13	0	0	MCData	31	0	SyncFC				
13	4	2400	RTtoBC	3	11	PacketTM				
13	20	14400	BCtoRT	3	10	TMConf				
14	0	0	MCData	31	0	SyncFC				
14	4	2400	RTtoBC	1	11	PacketTM				
14	20	14400	BCtoRT	1	10	TMConf				
14	21	14550	RTtoBC	2	10	TMReq				
14	22	14700	RTtoBC	0	27	TCConf				
15	0	0	MCData	31	0	SyncFC				
15	4	2400	BCtoRT	0	11	PacketTC				
15	20	14400	BCtoRT	0	27	TCDesc				
15	21	14550	RTtoBC	3	10	TMReq				
16	0	0	MCData	31	0	SyncFC				
16	4	2400	RTtoBC	2	11	PacketTM				
16	20	14400	BCtoRT	2	10	TMConf				
17	0	0	MCData	31	0	SyncFC				
17	4	2400	RTtoBC	3	11	PacketTM				
17	20	14400	BCtoRT	3	10	TMConf				
17	21	14550	RTtoBC	1	10	TMReq				
17	22	14700	RTtoBC	0	27	TCConf				
18	0	0	MCData	31	0	SyncFC				
18	4	2400	BCtoRT	0	11	PacketTC				
18	20	14400	BCtoRT	0	27	TCDesc				
18	21	14550	RTtoBC	2	10	TMReq				
19	0	0	MCData	31	0	SyncFC				
19	4	2400	RTtoBC	1	11	PacketTM				
19	20	14400	BCtoRT	1	10	TMConf				
20	0	0	MCData	31	0	SyncFC				

20	4	2400	RTtoBC	2	11	PacketTM				
20	20	14400	BCtoRT	2	10	TMConf				
20	21	14550	RTtoBC	3	10	TMReq				
20	22	14700	RTtoBC	0	27	TCConf				
21	0	0	MCData	31	0	SyncFC				
21	4	2400	BCtoRT	0	11	PacketTC				
21	20	14400	BCtoRT	0	27	TCDesc				
21	21	14550	RTtoBC	1	10	TMReq				
22	0	0	MCData	31	0	SyncFC				
22	4	2400	RTtoBC	3	11	PacketTM				
22	20	14400	BCtoRT	3	10	TMConf				
23	0	0	MCData	31	0	SyncFC				
23	4	2400	RTtoBC	1	11	PacketTM				
23	20	14400	BCtoRT	1	10	TMConf				
23	21	14550	RTtoBC	2	10	TMReq				
23	22	14700	RTtoBC	0	27	TCConf				
24	0	0	MCData	31	0	SyncFC				
24	4	2400	BCtoRT	0	11	PacketTC				
24	20	14400	BCtoRT	0	27	TCDesc				
24	21	14550	RTtoBC	3	10	TMReq				
25	0	0	MCData	31	0	SyncFC				
25	4	2400	RTtoBC	2	11	PacketTM				
25	20	14400	BCtoRT	2	10	TMConf				
26	0	0	MCData	31	0	SyncFC				
26	4	2400	RTtoBC	3	11	PacketTM				
26	20	14400	BCtoRT	3	10	TMConf				
26	21	14550	RTtoBC	1	10	TMReq				
26	22	14700	RTtoBC	0	27	TCConf				
27	0	0	MCData	31	0	SyncFC				
27	4	2400	BCtoRT	0	11	PacketTC				
27	20	14400	BCtoRT	0	27	TCDesc				
27	21	14550	RTtoBC	2	10	TMReq				
28	0	0	MCData	31	0	SyncFC				
28	4	2400	RTtoBC	1	11	PacketTM				
28	20	14400	BCtoRT	1	10	TMConf				
29	0	0	MCData	31	0	SyncFC				
29	4	2400	RTtoBC	2	11	PacketTM				
29	20	14400	BCtoRT	2	10	TMConf				
29	21	14550	RTtoBC	3	10	TMReq				
29	22	14700	RTtoBC	0	27	TCConf				
30	0	0	MCData	31	0	SyncFC				
30	4	2400	BCtoRT	0	11	PacketTC				
30	20	14400	BCtoRT	0	27	TCDesc				
30	21	14550	RTtoBC	1	10	TMReq				
31	0	0	MCData	31	0	SyncFC				
31	4	2400	RTtoBC	3	11	PacketTM				

31	20	14400	BCtoRT	3	10	TMConf				
32	0	0	MCData	31	0	SyncFC				
32	2	900	MCData	31	8	Timecode				
32	4	2400	RTtoBC	1	11	PacketTM				
32	20	14400	BCtoRT	1	10	TMConf				
32	21	14550	RTtoBC	2	10	TMReq				
32	22	14700	RTtoBC	0	27	TCConf				
33	0	0	MCData	31	0	SyncFC				
33	4	2400	BCtoRT	0	11	PacketTC				
33	20	14400	BCtoRT	0	27	TCDesc				
33	21	14550	RTtoBC	3	10	TMReq				
34	0	0	MCData	31	0	SyncFC				
34	4	2400	RTtoBC	2	11	PacketTM				
34	20	14400	BCtoRT	2	10	TMConf				
35	0	0	MCData	31	0	SyncFC				
35	4	2400	RTtoBC	3	11	PacketTM				
35	20	14400	BCtoRT	3	10	TMConf				
35	21	14550	RTtoBC	1	10	TMReq				
35	22	14700	RTtoBC	0	27	TCConf				
36	0	0	MCData	31	0	SyncFC				
36	4	2400	BCtoRT	0	11	PacketTC				
36	20	14400	BCtoRT	0	27	TCDesc				
36	21	14550	RTtoBC	2	10	TMReq				
37	0	0	MCData	31	0	SyncFC				
37	4	2400	RTtoBC	1	11	PacketTM				
37	20	14400	BCtoRT	1	10	TMConf				
38	0	0	MCData	31	0	SyncFC				
38	4	2400	RTtoBC	2	11	PacketTM				
38	20	14400	BCtoRT	2	10	TMConf				
38	21	14550	RTtoBC	3	10	TMReq				
38	22	14700	RTtoBC	0	27	TCConf				
39	0	0	MCData	31	0	SyncFC				
39	4	2400	BCtoRT	0	11	PacketTC				
39	20	14400	BCtoRT	0	27	TCDesc				
39	21	14550	RTtoBC	1	10	TMReq				
40	0	0	MCData	31	0	SyncFC				
40	4	2400	RTtoBC	3	11	PacketTM				
40	20	14400	BCtoRT	3	10	TMConf				
41	0	0	MCData	31	0	SyncFC				
41	4	2400	RTtoBC	1	11	PacketTM				
41	20	14400	BCtoRT	1	10	TMConf				
41	21	14550	RTtoBC	2	10	TMReq				
41	22	14700	RTtoBC	0	27	TCConf				
42	0	0	MCData	31	0	SyncFC				
42	4	2400	BCtoRT	0	11	PacketTC				
42	20	14400	BCtoRT	0	27	TCDesc				

42	21	14550	RTtoBC	3	10	TMReq				
43	0	0	MCData	31	0	SyncFC				
43	4	2400	RTtoBC	2	11	PacketTM				
43	20	14400	BCtoRT	2	10	TMConf				
44	0	0	MCData	31	0	SyncFC				
44	4	2400	RTtoBC	3	11	PacketTM				
44	20	14400	BCtoRT	3	10	TMConf				
44	21	14550	RTtoBC	1	10	TMReq				
44	22	14700	RTtoBC	0	27	TCConf				
45	0	0	MCData	31	0	SyncFC				
45	4	2400	BCtoRT	0	11	PacketTC				
45	20	14400	BCtoRT	0	27	TCDesc				
45	21	14550	RTtoBC	2	10	TMReq				
46	0	0	MCData	31	0	SyncFC				
46	4	2400	RTtoBC	1	11	PacketTM				
46	20	14400	BCtoRT	1	10	TMConf				
47	0	0	MCData	31	0	SyncFC				
47	4	2400	RTtoBC	2	11	PacketTM				
47	20	14400	BCtoRT	2	10	TMConf				
47	21	14550	RTtoBC	3	10	TMReq				
47	22	14700	RTtoBC	0	27	TCConf				
48	0	0	MCData	31	0	SyncFC				
48	4	2400	BCtoRT	0	11	PacketTC				
48	20	14400	BCtoRT	0	27	TCDesc				
48	21	14550	RTtoBC	1	10	TMReq				
49	0	0	MCData	31	0	SyncFC				
49	4	2400	RTtoBC	3	11	PacketTM				
49	20	14400	BCtoRT	3	10	TMConf				
50	0	0	MCData	31	0	SyncFC				
50	4	2400	RTtoBC	1	11	PacketTM				
50	20	14400	BCtoRT	1	10	TMConf				
50	21	14550	RTtoBC	2	10	TMReq				
50	22	14700	RTtoBC	0	27	TCConf				
51	0	0	MCData	31	0	SyncFC				
51	4	2400	BCtoRT	0	11	PacketTC				
51	20	14400	BCtoRT	0	27	TCDesc				
51	21	14550	RTtoBC	3	10	TMReq				
52	0	0	MCData	31	0	SyncFC				
52	4	2400	RTtoBC	2	11	PacketTM				
52	20	14400	BCtoRT	2	10	TMConf				
53	0	0	MCData	31	0	SyncFC				
53	4	2400	RTtoBC	3	11	PacketTM				
53	20	14400	BCtoRT	3	10	TMConf				
53	21	14550	RTtoBC	1	10	TMReq				
53	22	14700	RTtoBC	0	27	TCConf				

54	0	0	MCData	31	0	SyncFC				
54	4	2400	BCtoRT	0	11	PacketTC				
54	20	14400	BCtoRT	0	27	TCDesc				
54	21	14550	RTtoBC	2	10	TMReq				
55	0	0	MCData	31	0	SyncFC				
55	4	2400	RTtoBC	1	11	PacketTM				
55	20	14400	BCtoRT	1	10	TMConf				
56	0	0	MCData	31	0	SyncFC				
56	4	2400	RTtoBC	2	11	PacketTM				
56	20	14400	BCtoRT	2	10	TMConf				
56	21	14550	RTtoBC	3	10	TMReq				
56	22	14700	RTtoBC	0	27	TCConf				
57	0	0	MCData	31	0	SyncFC				
57	4	2400	BCtoRT	0	11	PacketTC				
57	20	14400	BCtoRT	0	27	TCDesc				
57	21	14550	RTtoBC	1	10	TMReq				
58	0	0	MCData	31	0	SyncFC				
58	4	2400	RTtoBC	3	11	PacketTM				
58	20	14400	BCtoRT	3	10	TMConf				
59	0	0	MCData	31	0	SyncFC				
59	4	2400	RTtoBC	1	11	PacketTM				
59	20	14400	BCtoRT	1	10	TMConf				
59	21	14550	RTtoBC	2	10	TMReq				
59	22	14700	RTtoBC	0	27	TCConf				
60	0	0	MCData	31	0	SyncFC				
60	4	2400	BCtoRT	0	11	PacketTC				
60	20	14400	BCtoRT	0	27	TCDesc				
60	21	14550	RTtoBC	3	10	TMReq				
61	0	0	MCData	31	0	SyncFC				
61	4	2400	RTtoBC	2	11	PacketTM				
61	20	14400	BCtoRT	2	10	TMConf				
62	0	0	MCData	31	0	SyncFC				
62	4	2400	RTtoBC	3	11	PacketTM				
62	20	14400	BCtoRT	3	10	TMConf				
62	21	14550	RTtoBC	1	10	TMReq				
62	22	14700	RTtoBC	0	27	TCConf				
63	0	0	MCData	31	0	SyncFC				

All TC packet transfer subframes are filled? ☐

Make a printout of the TC packet logfile. ☐

Make a printout of the 1553 message logfile. ☐

6.4 Simulator Stand-Alone Operation

6.4.1 Front Panel

6.4.1.1 Simulator Control and Monitoring

6.4.1.1.1 Spacecraft Clock (master time)

Type an initial clock value in the control box, decimal value = ☐

Start the bus monitor
Start the Simulator bus polling

Check master time increments in display box ☐

Check in the bus log that master time starts at the selected offset and increments as displayed on screen. ☐

6.4.1.1.2 Buslist

Different buslists have been already used in section 6.3.
Confirm that buslists can be selected from the pull-down menu, and that the selection is displayed in the box. ☐

6.4.1.1.3 1553 Bus Status

Start and stop the bus polling by using the Run and Master Stop buttons
Confirm that the Bus Alive indicator is flashing when the polling is active. ☐

Select Bus B
Confirm that Bus B is indicated and the bus polling runs when started as above. ☐
Stop the polling.

Select Bus A
Confirm that Bus A is indicated and the bus polling runs when started as above. ☐

6.4.1.1.4 Router Status

Confirm that the Router Alive indicator flashes when a router connection is active, see section 6.5. ☐

6.4.1.2 TC displays

Ensure that the Simulator is running.
Select a TC stored on the Simulator from the pull-down menu.

Confirm that the command file name is displayed. ☐
Reselect a different TC if required.

Press the Send button
Confirm that the command header is displayed on the TC list, with the time of transmission. ☐

Click on the TC display line.
Confirm that the complete command packet is displayed in hex format in a pop-up window. ☐

Repeat as required.

6.4.1.3 TM displays

Start the Instrument Simulator RT.
Start the CDMS Simulator.

Confirm that TM packets are being received by monitoring the TM packet list. ☐

Pause the displayed packet list (logging to file does not stop).
Click on the list.
Confirm that the complete telemetry packet is displayed in hex format in a pop-up window. ☐

6.4.1.4 Error displays

For this section, use the DDC 'ACE Windows Menu' program in RT mode to generate simple RT messages containing errors.

Start the Simulator, running buslist file **RT2 Only bustlist.**
Monitor the Error display panel.
Confirm that No Response errors are being displayed from RT2, since the Simulator is polling for TMReq messages and there is no RT connected yet.

Record the Error string. ☐

Start the 'ACE Windows menu' as RT2
Confirm that the error messages stop. ☐

Configure the RT to respond to SA11R, generating RT status errors:
Send TCs to RT2 setting one error at a time, as shown in the table below.
Record the displayed error strings.

Status Bit set	Displayed error string
Sub System	
Terminal	
Service	
Busy	

6.4.2 Log Files

6.4.2.1 1553 Message File

The 1553 bus message file has been used extensively during section 6.3 of this document. No other tests are planned at this time.

6.4.2.2 TC Log File

A single TC log file in text format is created per Simulator session.
Open one of the previously generated TC log files with a text editor and check:

Time is written correctly? ☐

Full length (128 word) packets written correctly? ☐

6.4.2.3 TM Log File

Start the Simulator software again running a Burst Mode buslist and leave it running for >60 minutes.

TM packet files are changed after 30 minutes? ☐

Logging continues after one hour by overwriting first TM file? ☐

Check the file contents:

Time is written correctly? ☐

Full length (512 word) packets written correctly? ☐

6.5 Router Interface

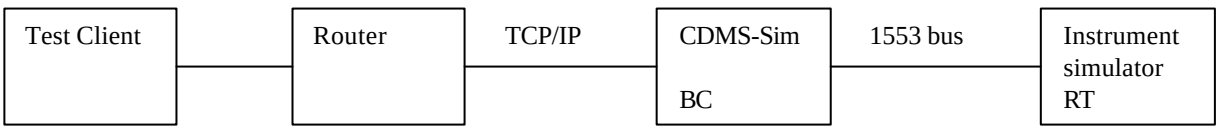


Figure 6.5 – Setup for Router Interface Testing

6.5.1 Log on

Use the Log On dialog box to make a connection to the Router.

Check that Router Alive indicator on front panel is flashing ☐

6.5.2 TC Packet flow

Send a TC from Test Client.

Check that the TC appears on the transmitted TCs list ☐

6.5.3 TM Packet flow

Start the Instrument Simulator RT with Command echo facility.
Send a short TC from the Test Client

Check that the TC appears on the CDMS-Sim transmitted TCs list ☐

Check that a TM packet appears on the CDMS-Sim received TM list ☐

6.6 TM Playback

Playback of TM files recorded during a Simulator session is an offline activity.
Copy the TM files which may be needed later or they will be over-written.

Start the Router
Connect a test client with TC and TM facilities

Open **Playback.vi**
Connect to the Router
Select the required file from the pulldown menu.
Select the required start time.
Press Play.
TM packets received OK by Router and Test Client ? ☐

Stop, fast forward and rewind buttons can be used to navigate through the TM file.

6.7 Remote Operation of Simulator

Define remote command functions
test them

7. ACCEPTANCE TEST REVIEW

Inspect documentation and data package.

8. APPENDIX A – DDC TEST REPORT