SμMMIT™ Reference Manual

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SμMMIT™ Reference Manual

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Overview Presentation

1553/1773 Products
Standard Product Overview

UTMC

Agenda

- 1553/1773 Protocol Handlers
- UT1553 Bus Transceiver

UT69151 SμMMIT

- S-Serial
- μ-Micro-coded
- M-Monolithic
- M-Multi-mode
- I-Intelligent
- T-Terminal

UT69151 SμMMIT

- Comprehensive MIL-STD-1553B dual redundant BC, RT, MT
- Autonomous operation in all modes
- Simultaneous RT and MT operation
- Interrupt Log List

UT69151 SμMMIT

- Built In Test (BIT)
  - Programmable into auto-initialization
- JTAG scan available for board testing
- Screened to selected MIL-STD-883C test methods
- Built on 1.2-micron CMOS process
- Available radiation hardened

UT69151 SμMMIT

- UT69151 SμMMIT
  - Monolithic protocol device
- UT69151 SμMMIT-LXE
  - Monolithic protocol device with multi-voltage transceivers
  - Transceivers operate with either -15V & 5V or -12V & 5V
  - MCM-C packaging (11 layer Alumina)
- UT69151 SμMMIT-DXE
  - Monolithic protocol device with 5-volt only transceivers
  - Single 5-volt supply device
  - MCM-C packaging

UT69151 SμMMIT FAMILY

- Package offerings
  - SμMMIT
    - 84-pin PGA (1.21 sq-inches)
    - 84-lead Flatpack (1.32 sq-inches)
  - SμMMIT LX/DX
    - 96-pin PGA (1.3 sq-inches)

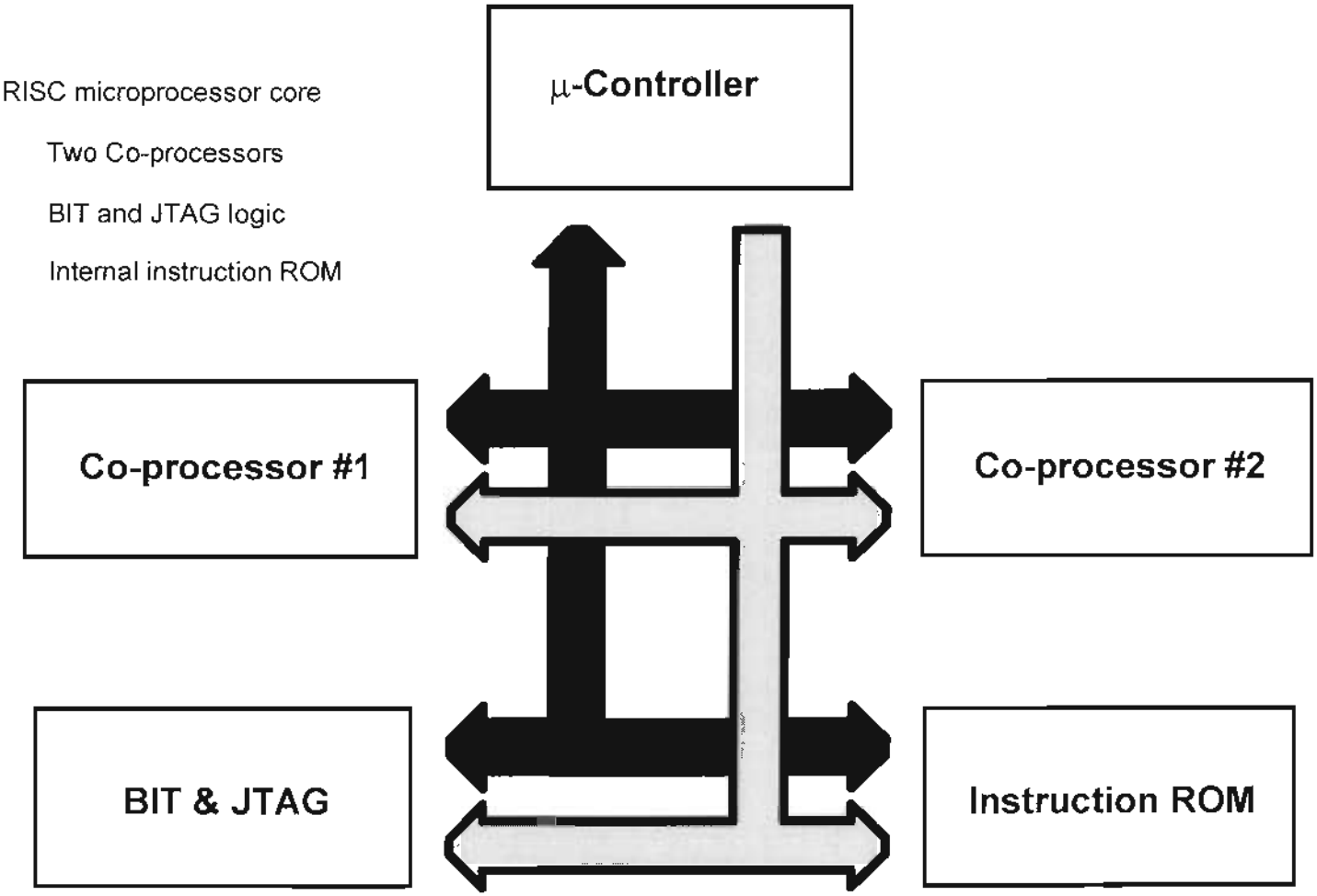
BLOCK DIAGRAM

RISC microprocessor core

Two Co-processors

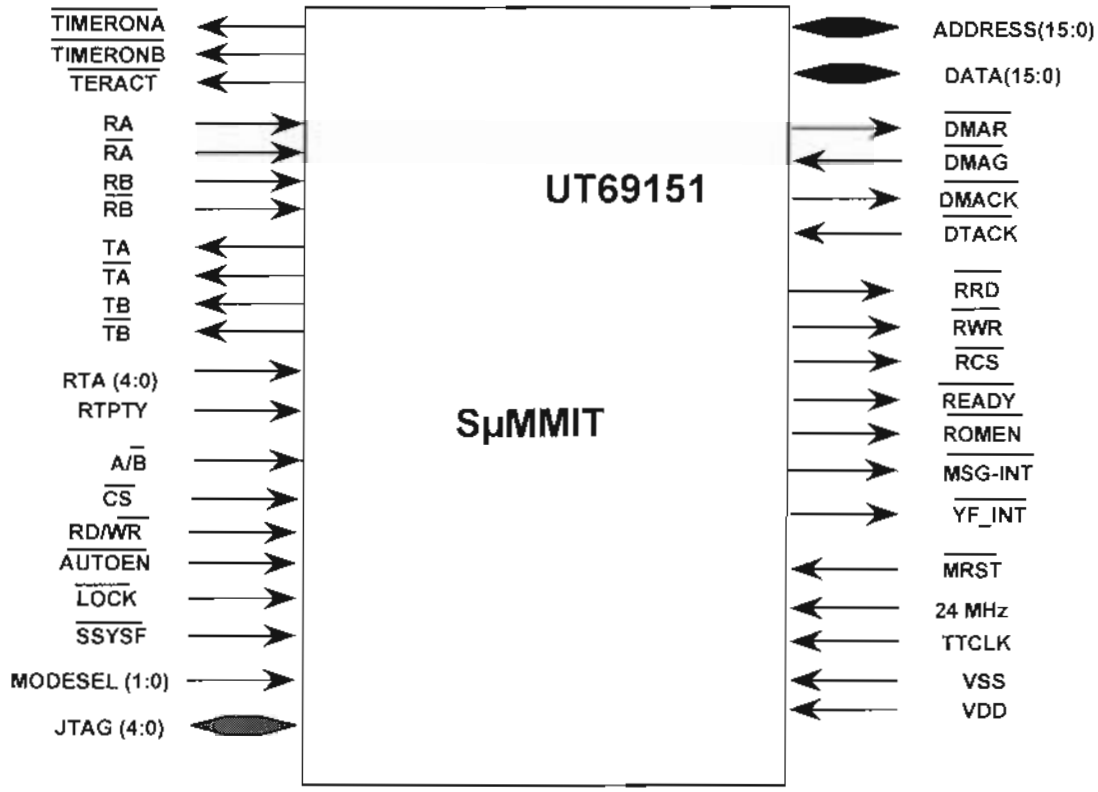
BIT and JTAG logic

Internal instruction ROM

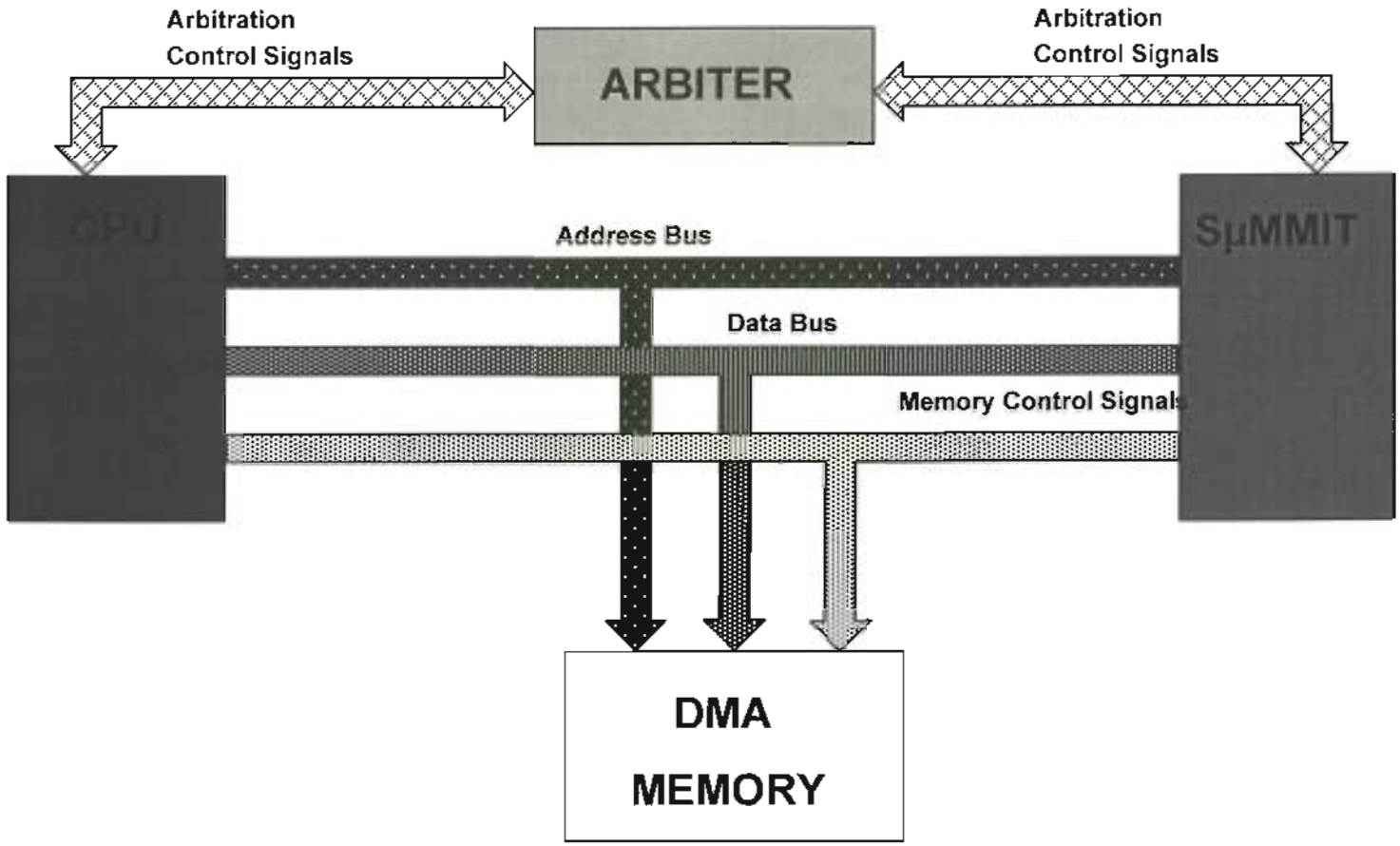


UTMC

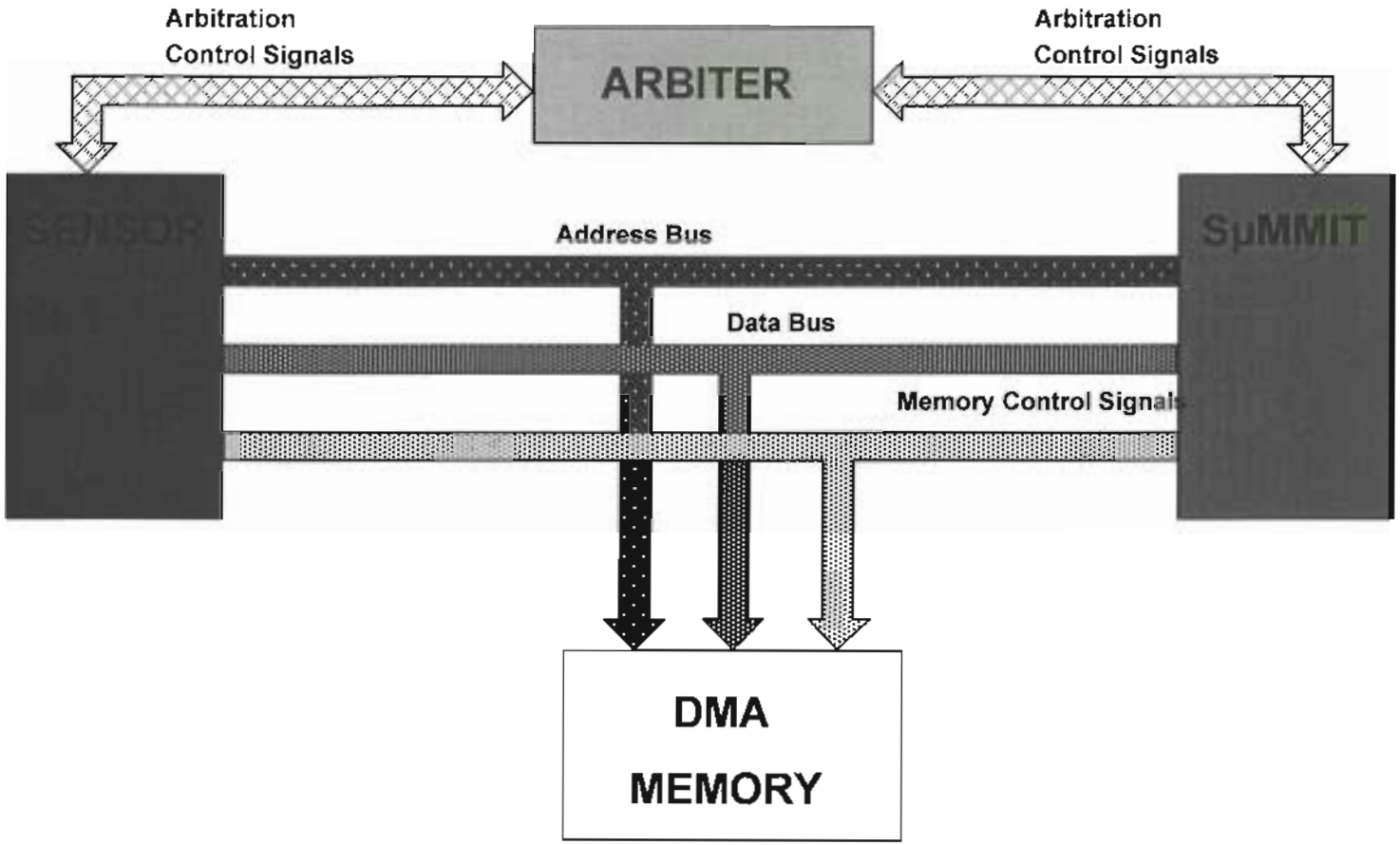
UT69151 SμMMIT
PIN DESCRIPTION



UT69151 SμMMIT
DMA CONFIGURATION



THE UT69151 SμMMIT
AUTONOMOUS DMA INTERFACE



UT69151 SμMMIT

REMOTE TERMINAL FEATURES

- MIL-STD-1553B Notice 2
- Supports all mode codes
- Internal illegalization
- Ping-pong buffering
  - Supports periodic or aperiodic message scheduling
- Message indexing
  - Receive subaddress and mode codes

UT69151 SμMMIT

REMOTE TERMINAL FEATURES

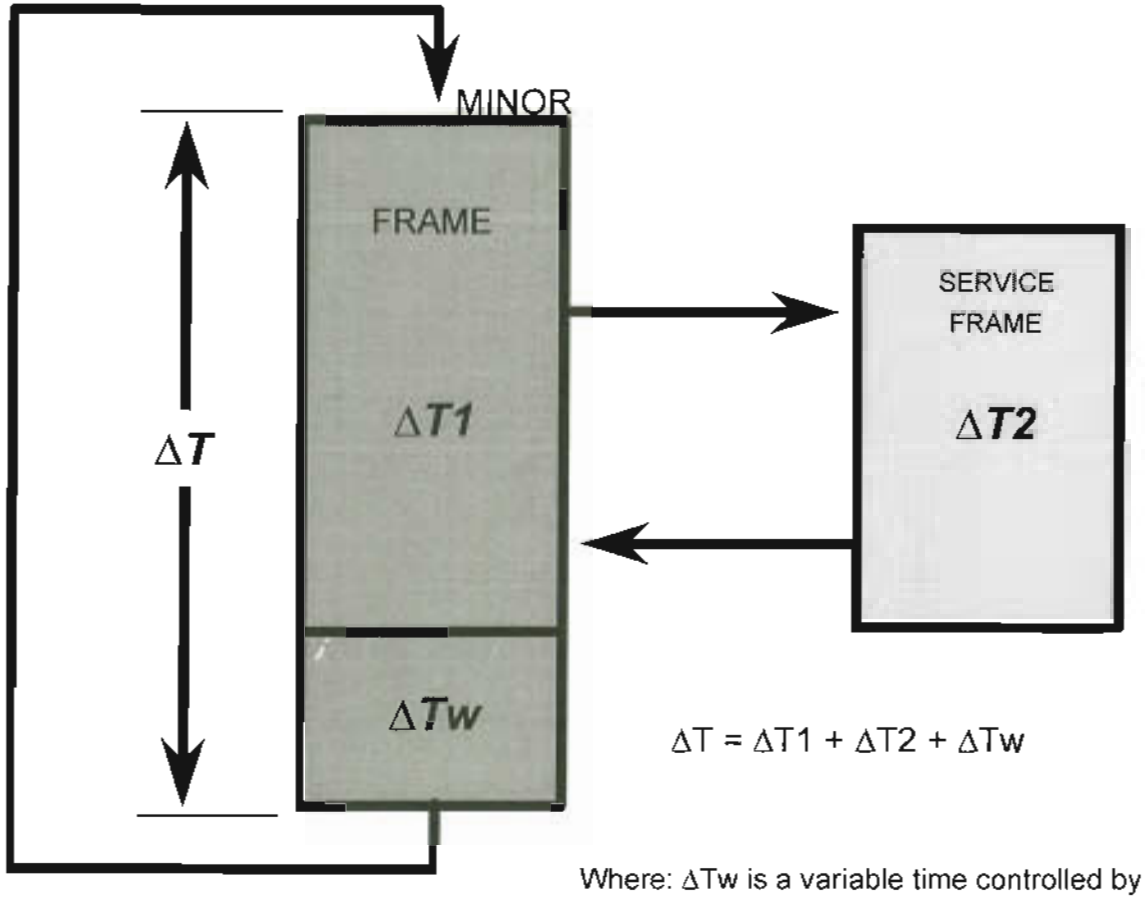
- User-defined data storage
  - Data Pointer A and B
  - Broadcast data pointer
- 16-bit (R/W) Time-tag
  - Mode code control
  - External clock (i.e.,resolution scaling)

UT69151 SμMMIT

REMOTE TERMINAL FEATURES

- Interrupt architecture
  - 9 types of interrupt
  - 16 entry interrupt buffer, ring-buffer architecture
  - Detailed interrupt event reporting (status word and location)
- Detailed message reporting
  - Parity, WC, RT-RT, Illegal, OVR

MINOR FRAME TIMER

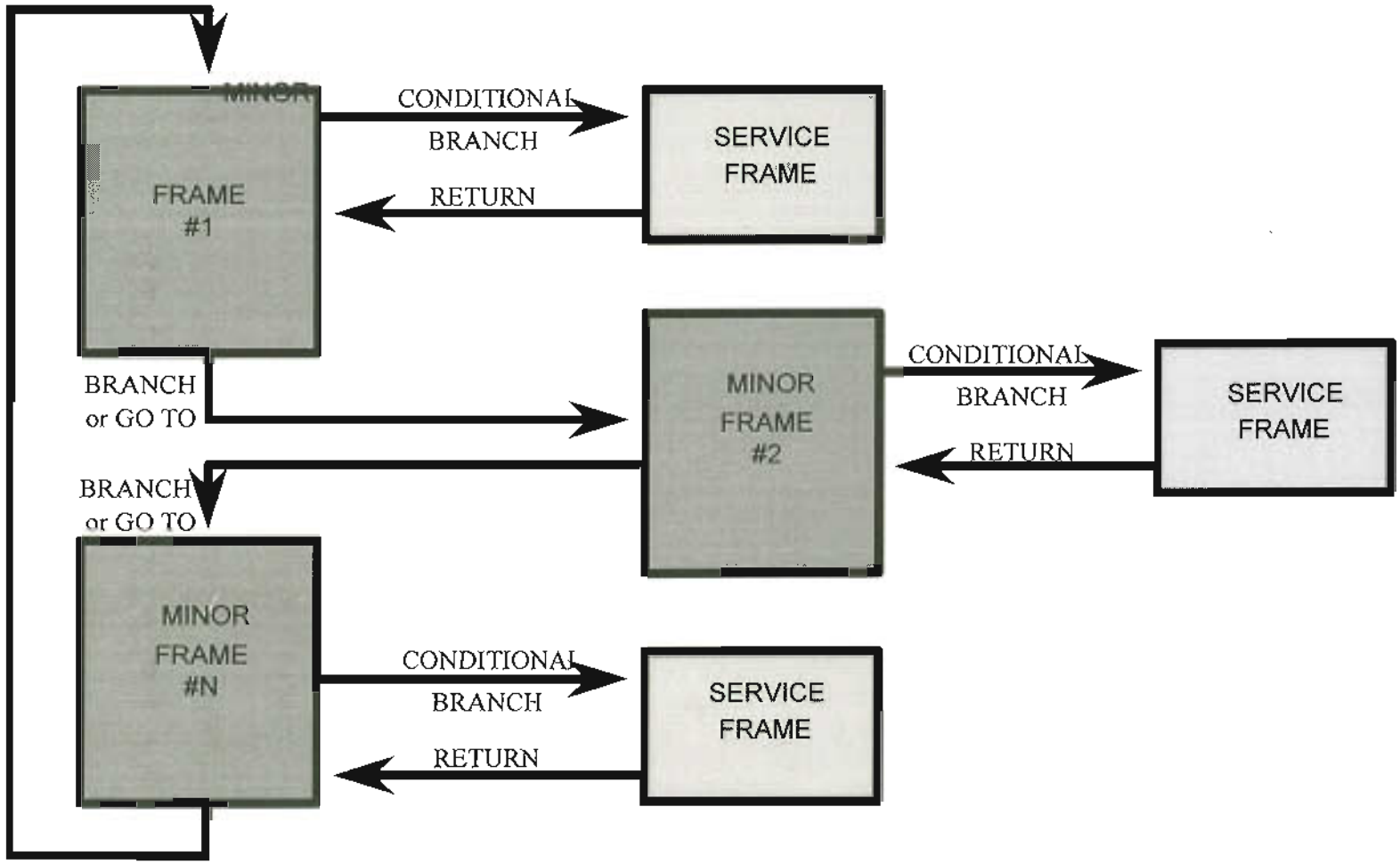


$\Delta T = \Delta T1 + \Delta T2 + \Delta Tw$

Where: ΔTw is a variable time controlled by the SμMMIT

UTMC

MINOR FRAME SEQUENCING



UTMC

UT69151 SμMMIT
BUS CONTROLLER FEATURES

- Instruction set
  - 14 opcodes, 7 condition codes
- Message scheduling
  - Resolution 64μs/bit (16-bit field)
- Status Word compare
  - Polling capability

UT69151 SμMMIT
BUS CONTROLLER FEATURES

- Detailed message and interrupt status reporting
  - 16-bit interrupt word
  - Control word for every command block
- Message retry
  - Automatic or condition generated
- Message information
  - Parity, WC, RT-RT, Illegal, OVR

UT69151 SμMMIT
MONITOR TERMINAL FEATURES

- Simultaneous RT/MT function
- Monitor all or selected RTs
- Context switching capability
  - Similar BC and MT blocks
- Message information word
- Interrupt Log List

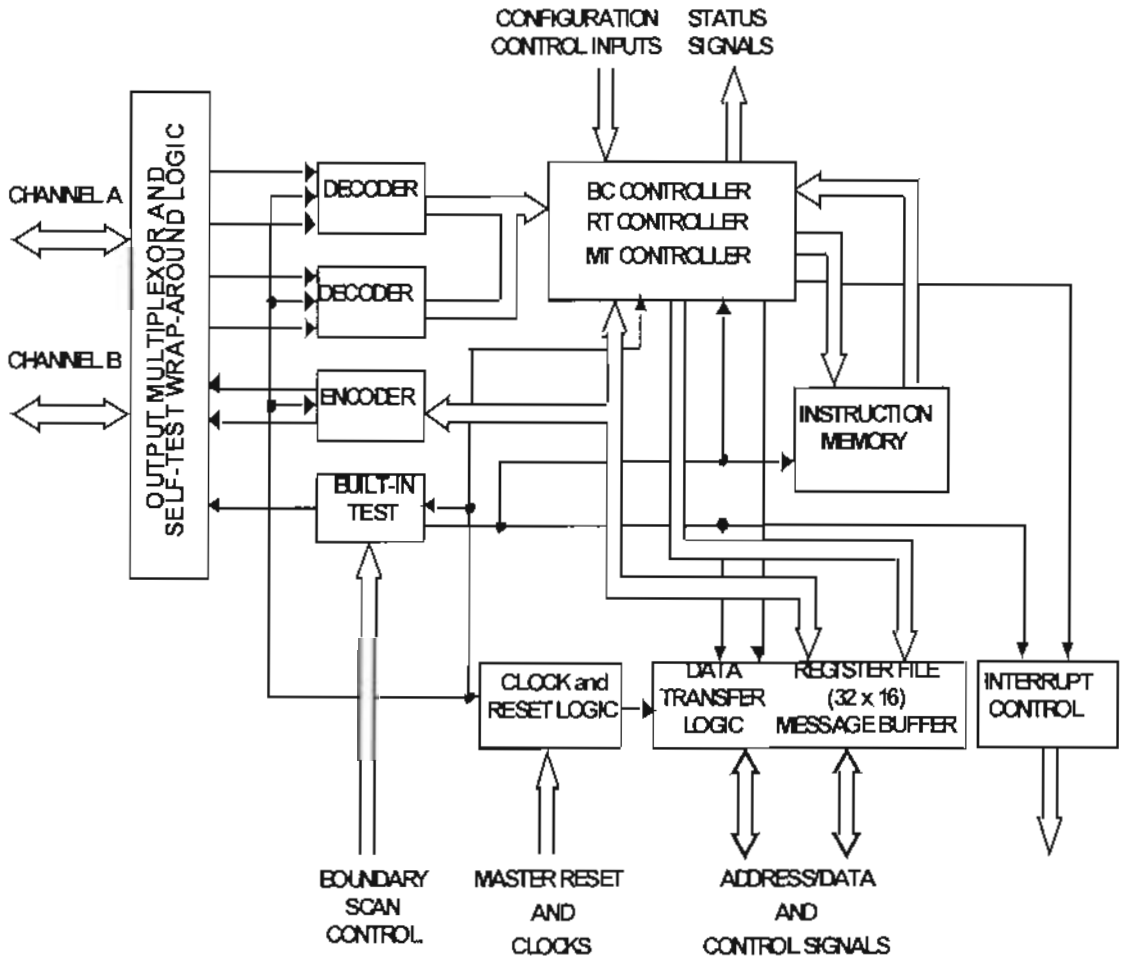
UT69151 SμMMIT RTE

- UT69151 SμMMIT RTE
  - Monolithic remote terminal protocol device with five volt only transceivers
  - Internal memory management and memory 4K x 16
  - Remote terminal only operation
  - MCM-C packaging
    - Three die solution
      - » 2 transceivers, 1 protocol handler with integrated memory

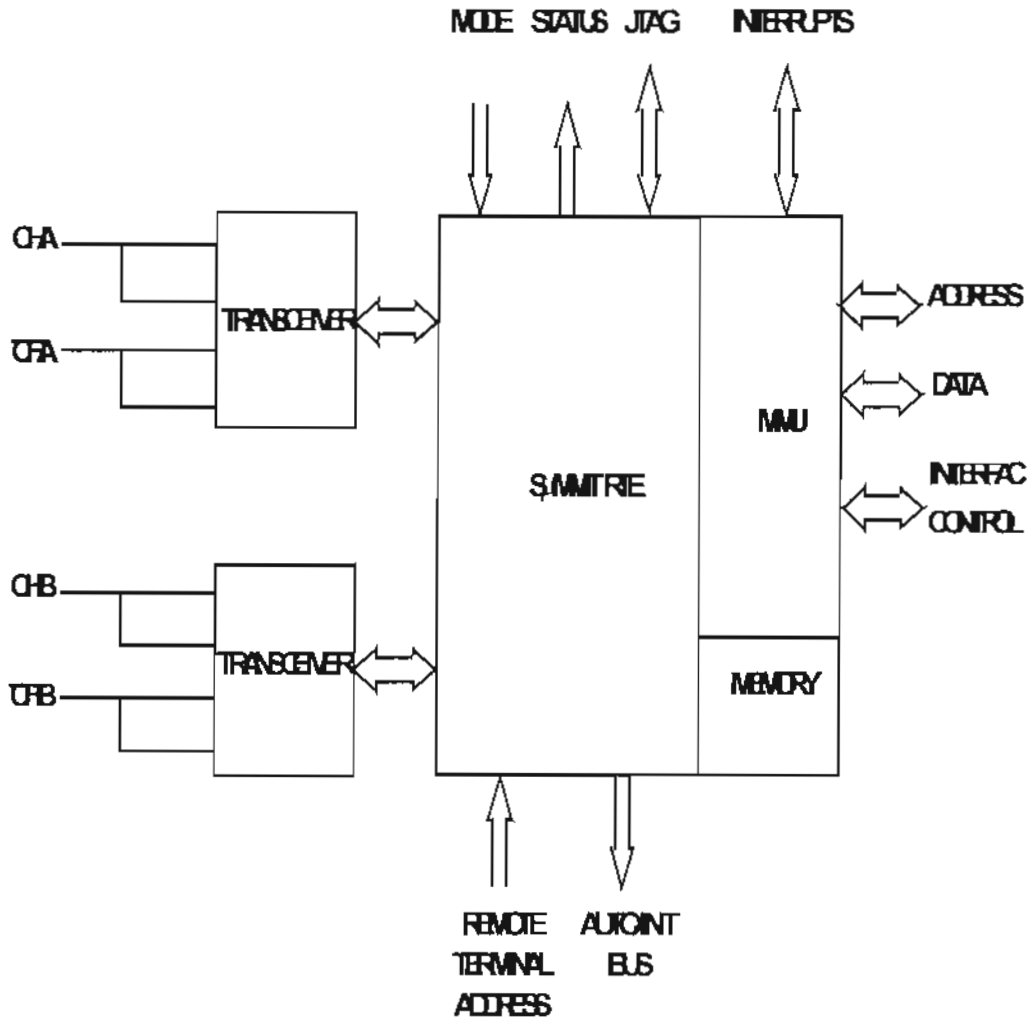
UT69151 SμMMIT RTE

- Target Applications
  - Low cost MIL-STD-1553 application
    - Avionics and vetronics
    - Precision guide munitions
  - Not rad-hardened
    - Built on 0.8μm epitaxial CMOS

SμMMIT Block Diagram

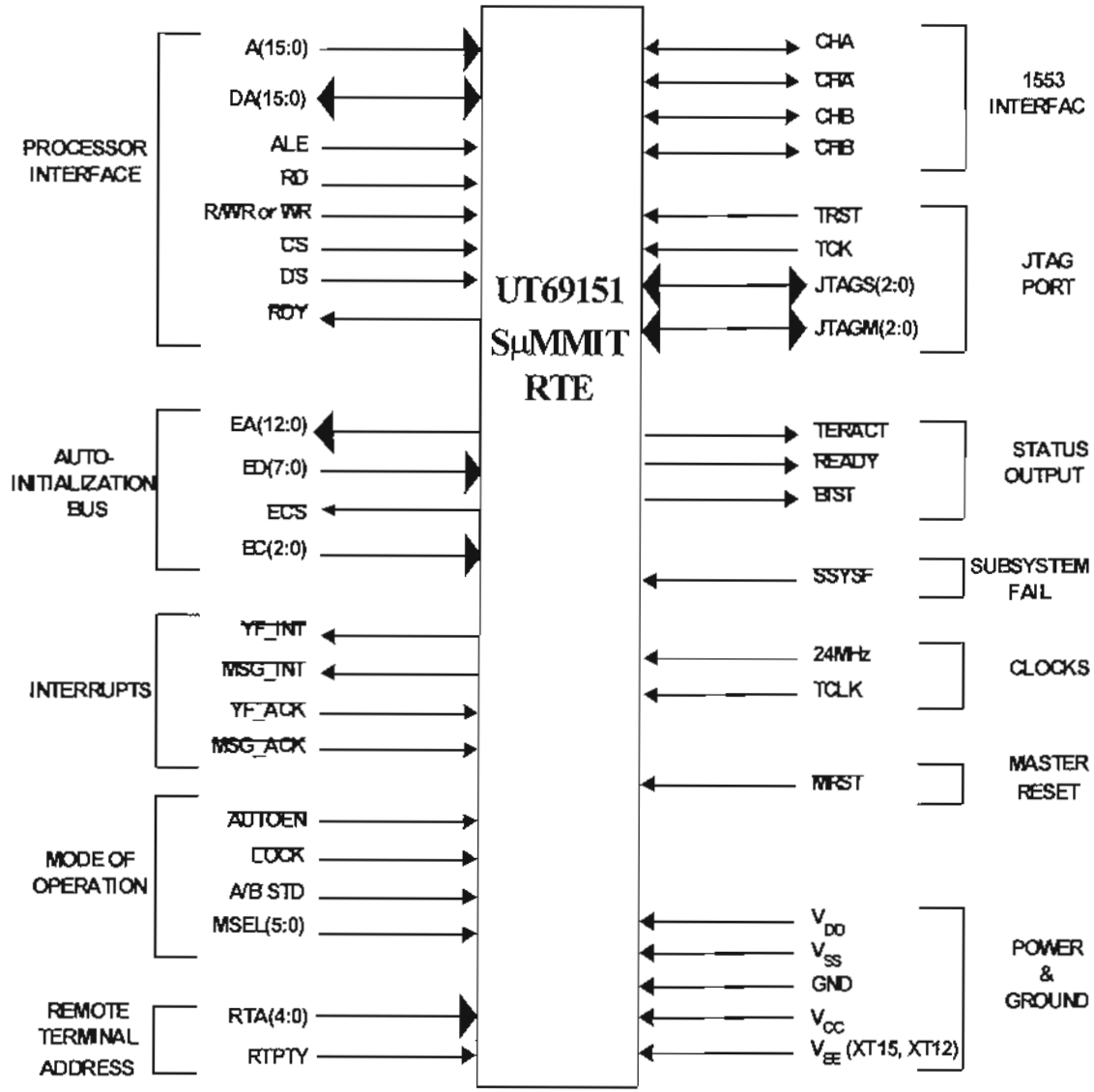


SμMMIT RTE Block Diagram



UTMC

SμMMIT RTE Pin Description



X

UT69151 SμMMIT RTE

Package Offerings

- Package offerings
  - SμMMIT RTE
    - 139-pin PGA (1.9 sq-inches)
    - 140-lead Flatpack (1.9 sq-inches)
    - 132-lead Flatpack (1.1 sq-inches)

UT69151 SμMMIT RTE

Host Interface

- Flexible interface to either 8 or 16 bit
  - 8K x 8 or 4K x 16 internal memory
  - Multiplexed or non-multiplexed data and address bus
  - Pulse or level interrupts

Mode	Memory Organization	Register Location	Memory Range
8-bit	8K x 8	0000(hex) 003F (hex)	0040(hex) to 1FFF (hex)
16-bit	4K x 8	0000(hex) to 001F (hex)	0020(hex) to 0FFF (hex)

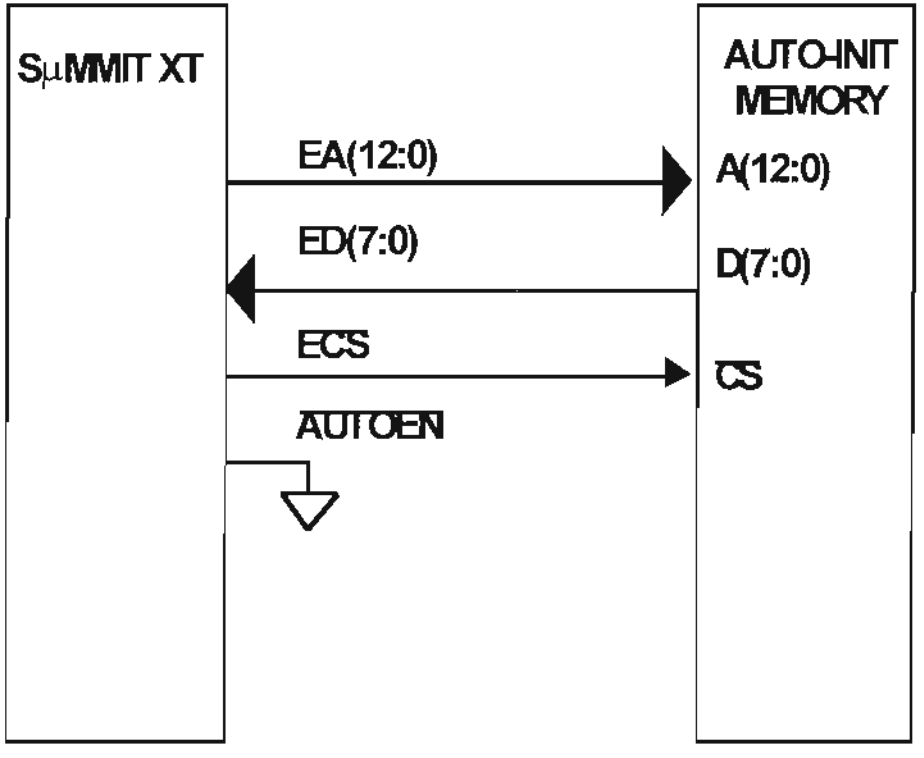
UT69151 SμMMIT RTE

Auto-Initialization System

- Decreases host overhead
- Ideal for autonomous operation (i.e., no host)
- Device configured via external ROM or non-volatile memory
- Status signals report start and end of initialization
- SμMMIT RTE automatically configures descriptor table

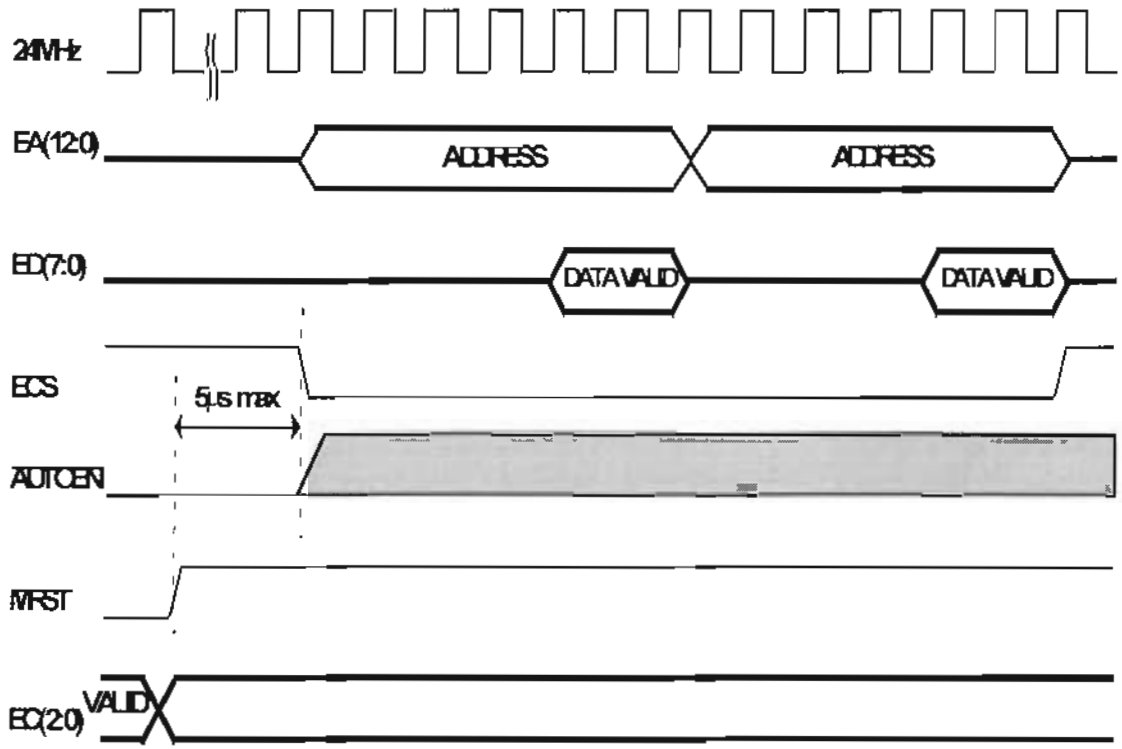
UT69151 SμMMIT RTE

Auto-Initialization System Configuration



UT69151 SμMMIT RTE

Auto-Initialization System Timing



UT69151 SμMMIT RTE

Remote Terminal Features

- MIL-STD-1553B Notice 2
- Supports all mode codes
- Internal illegalization
- Ping-pong buffering
  - Supports periodic or aperiodic message scheduling
  - Synchronous “buffer freeze”
- Message indexing
  - Receive subaddress and mode codes
  - Circular buffers

UT69151 SμMMIT RTE

Remote Terminal Features

- User-defined data storage
  - Data Pointer A and B
  - Broadcast data pointer
- 16-bit (R/W) Time-tag
  - Mode code control
  - External clock allows resolution scaling

UT69151 SμMMIT RTE

Remote Terminal Features

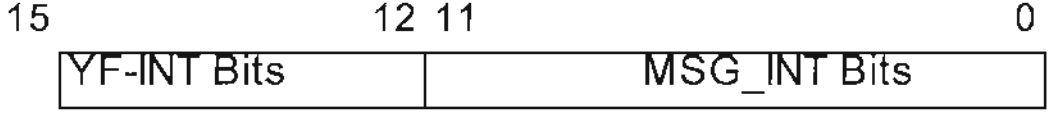
- 9 interrupt events
  - 16 entry interrupt buffer, ring-buffer architecture
  - Detailed interrupt event reporting (status word and location)
- Detailed message reporting
  - Parity, WC, RT-RT, Illegal, OVR

UT69151 SμMMIT RTE

Interrupt Architecture

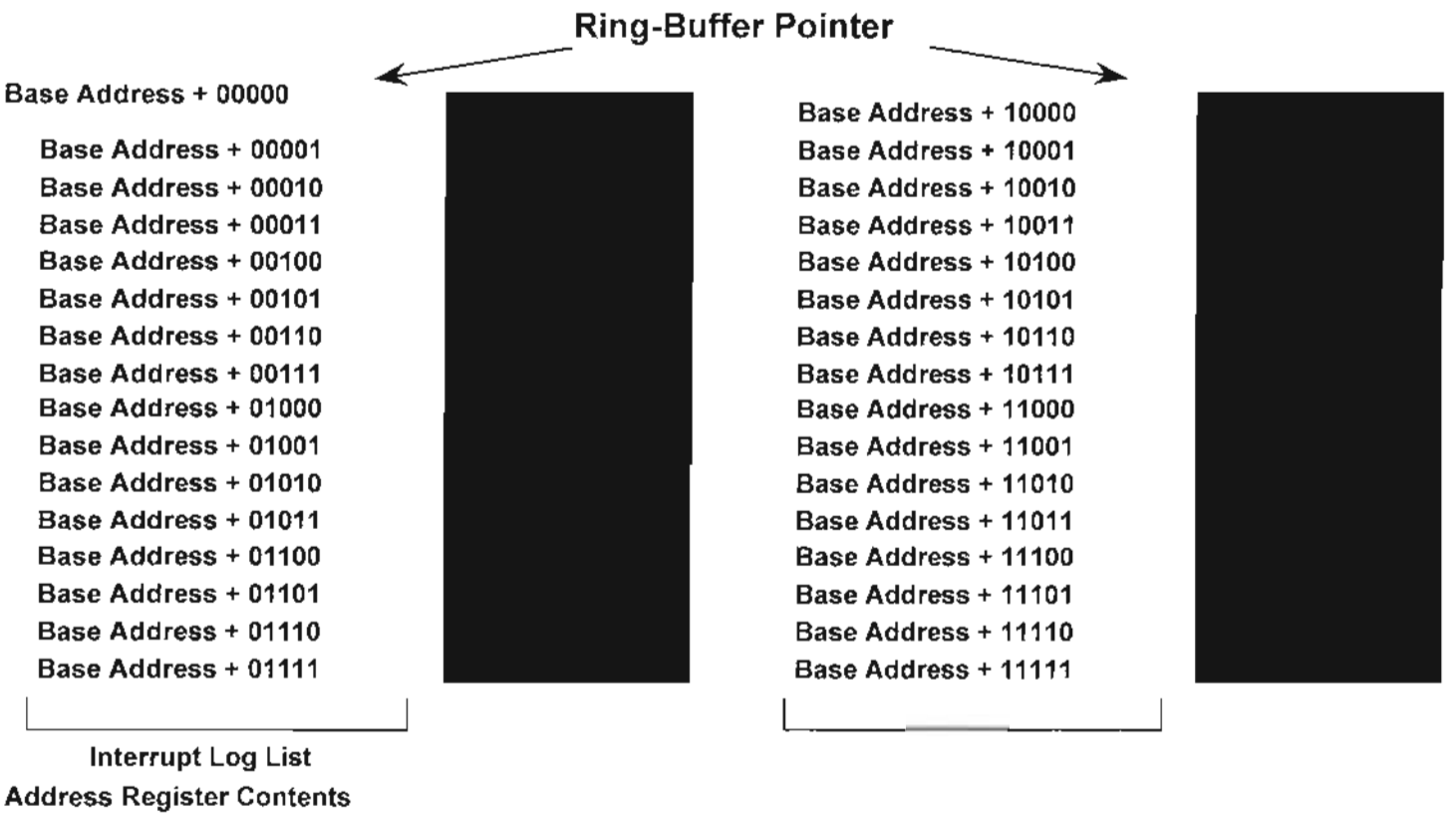
- Interrupt Architecture
  - 9 levels of interrupts
  - 16-bit Interrupt Status Word
  - 16-bit Interrupt Address

- Simplified housekeeping
  - User-defined interrupt buffer
  - 32-word ring-buffer architecture



Pending Interrupt and Mask Register

UT69151 SμMMIT RTE
Interrupt Architecture



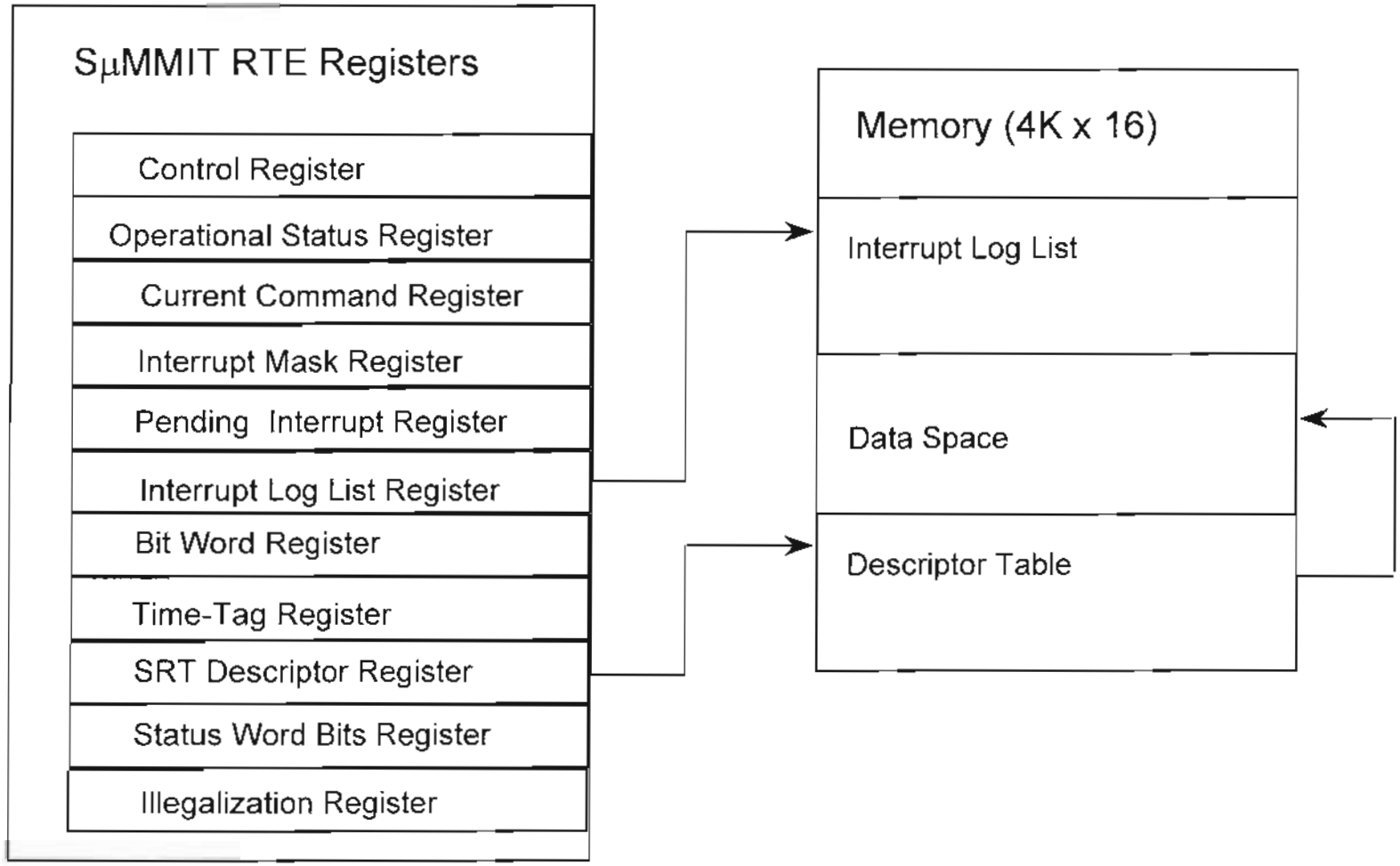
UT69151 SμMMIT RTE

Remote Terminal Registers

- Control
- Operational Status
- Current Command
- RT Descriptor Pointer
- Interrupt Mask
- Pending Interrupt
- Bit Word
- Interrupt Log List Pointer
- Time Tag
- RT Address and 1553 Status Word
- Illegalization Register

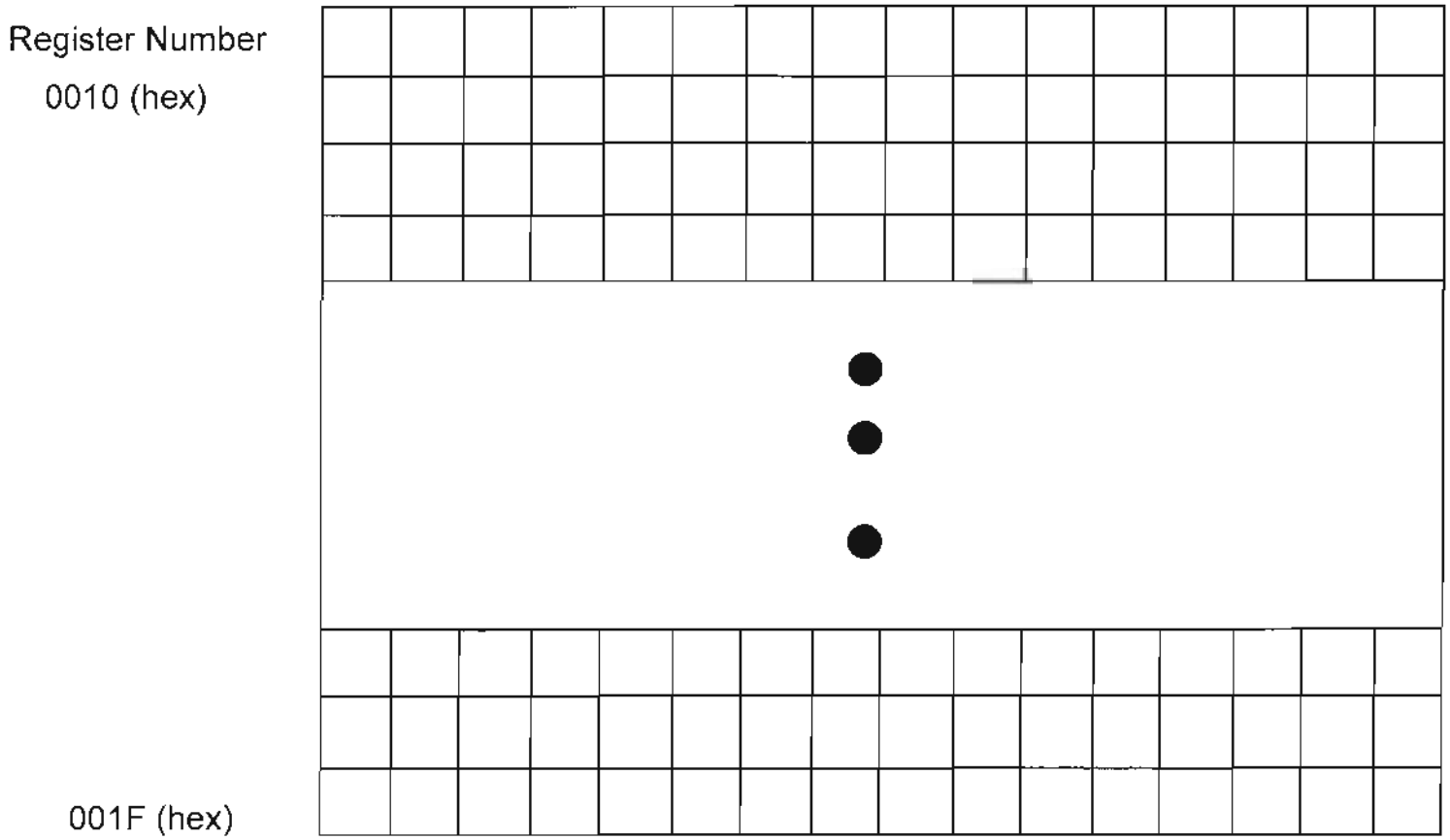
UT69151 SμMMIT RTE

Register Set



UTMC

UT69151 SμMMIT RTE
Illegalization Register Set



UT69151 SμMMIT RTE
Descriptor Table Definition

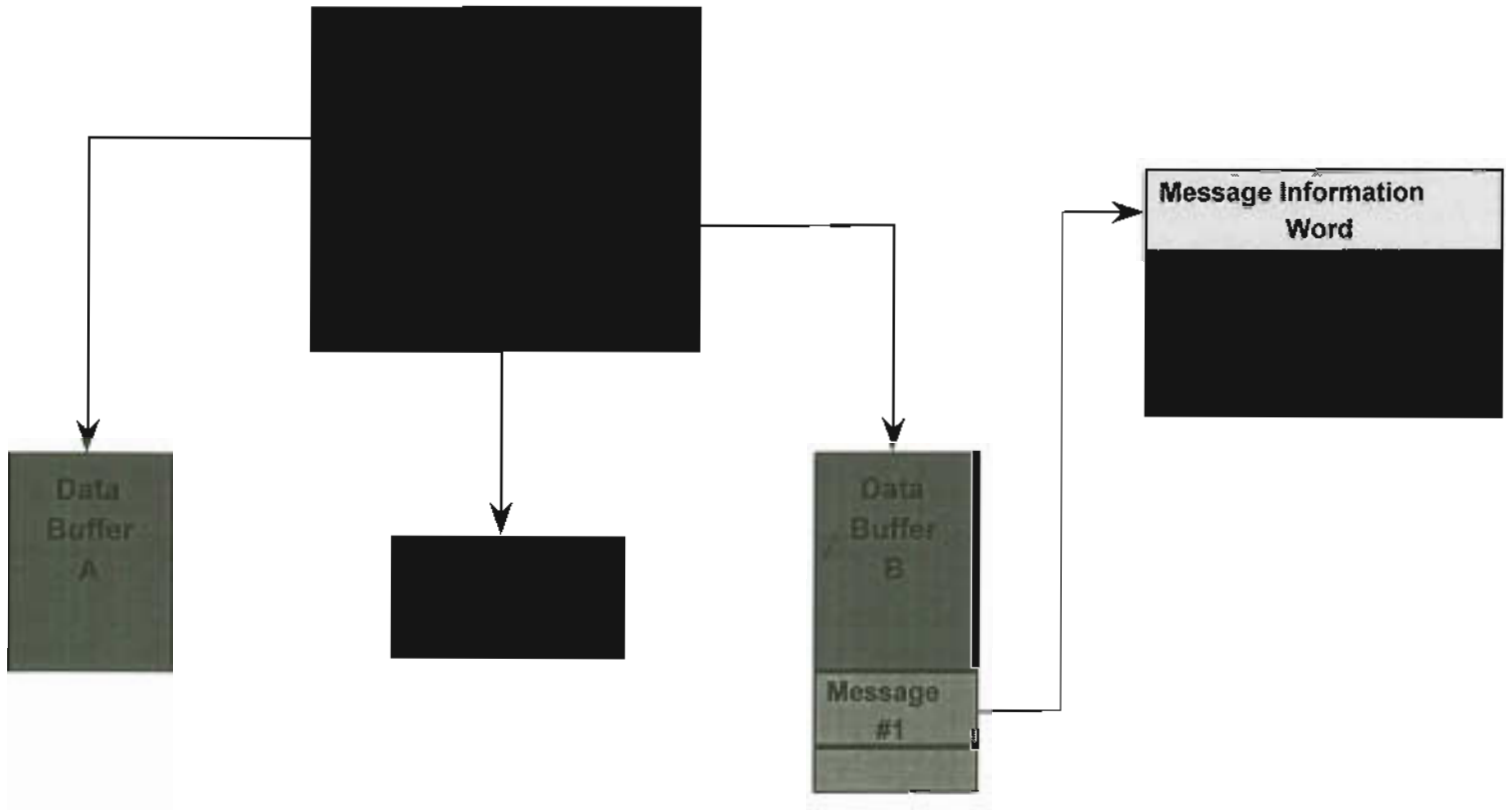
- 512 word look-up table
  - Reserves 4 words (i.e., descriptor block) for 64 subaddress
    - 32 transmit
    - 32 receive
  - Reserves 4 words (i.e., descriptor block) for 64 mode codes
    - 32 transmit
    - 32 receive
  - Linked to the SRT via the SRT Descriptor Space Register

Descriptor Block Definition

- Descriptor Block
  - Control Word
    - Index field
    - Interrupt enable bits (Index = 0, Access, Broadcast)
    - Buffer Control
  - Data Pointer A
    - Contains the starting address location of message buffer A
  - Data Pointer B
    - Contains the starting address location of message buffer B
  - Broadcast Pointer

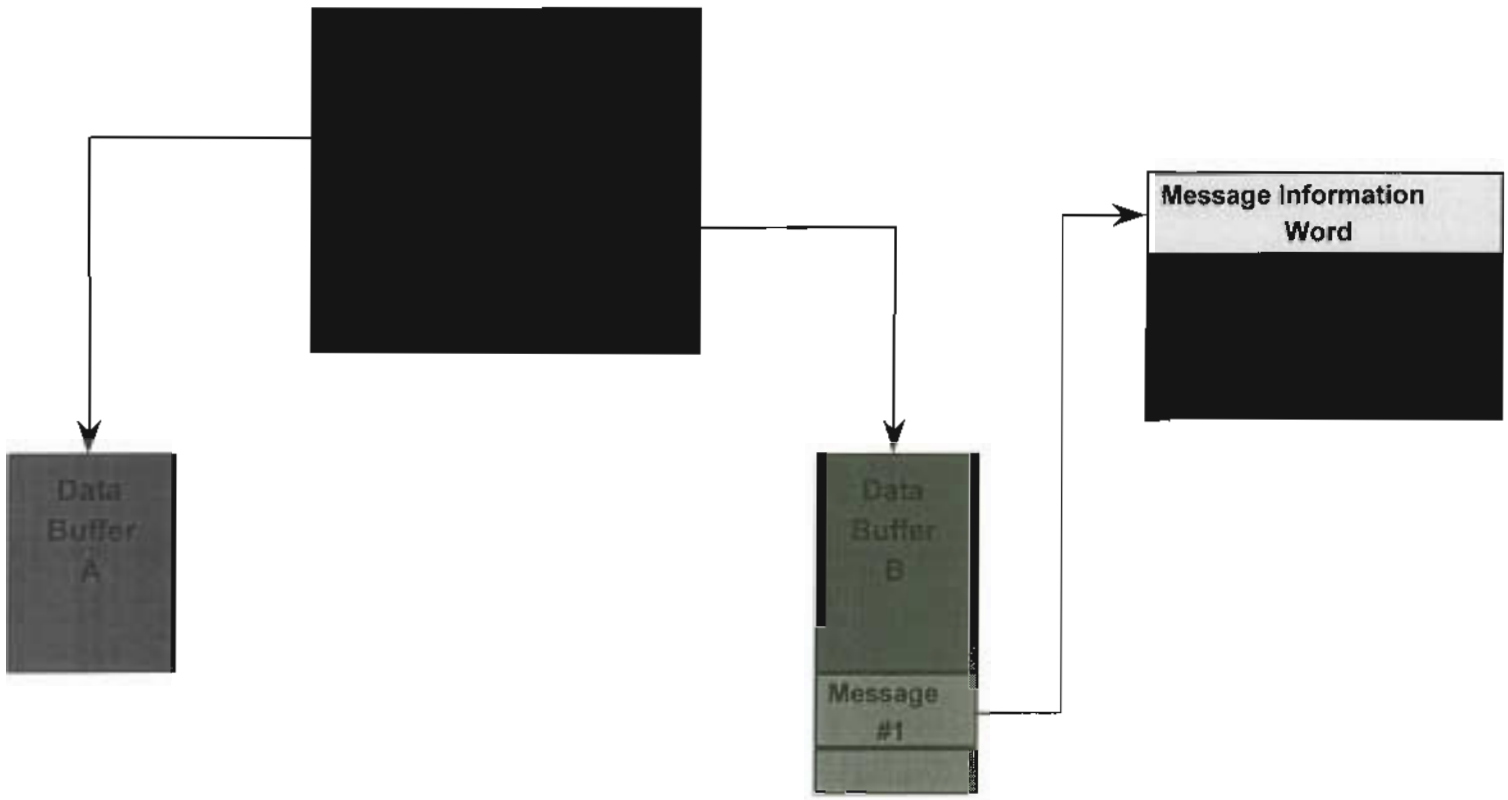
UT69151 SμMMIT RTE

Descriptor Block (Receive)



UT69151 SμMMIT RTE

Descriptor Block (Transmit)

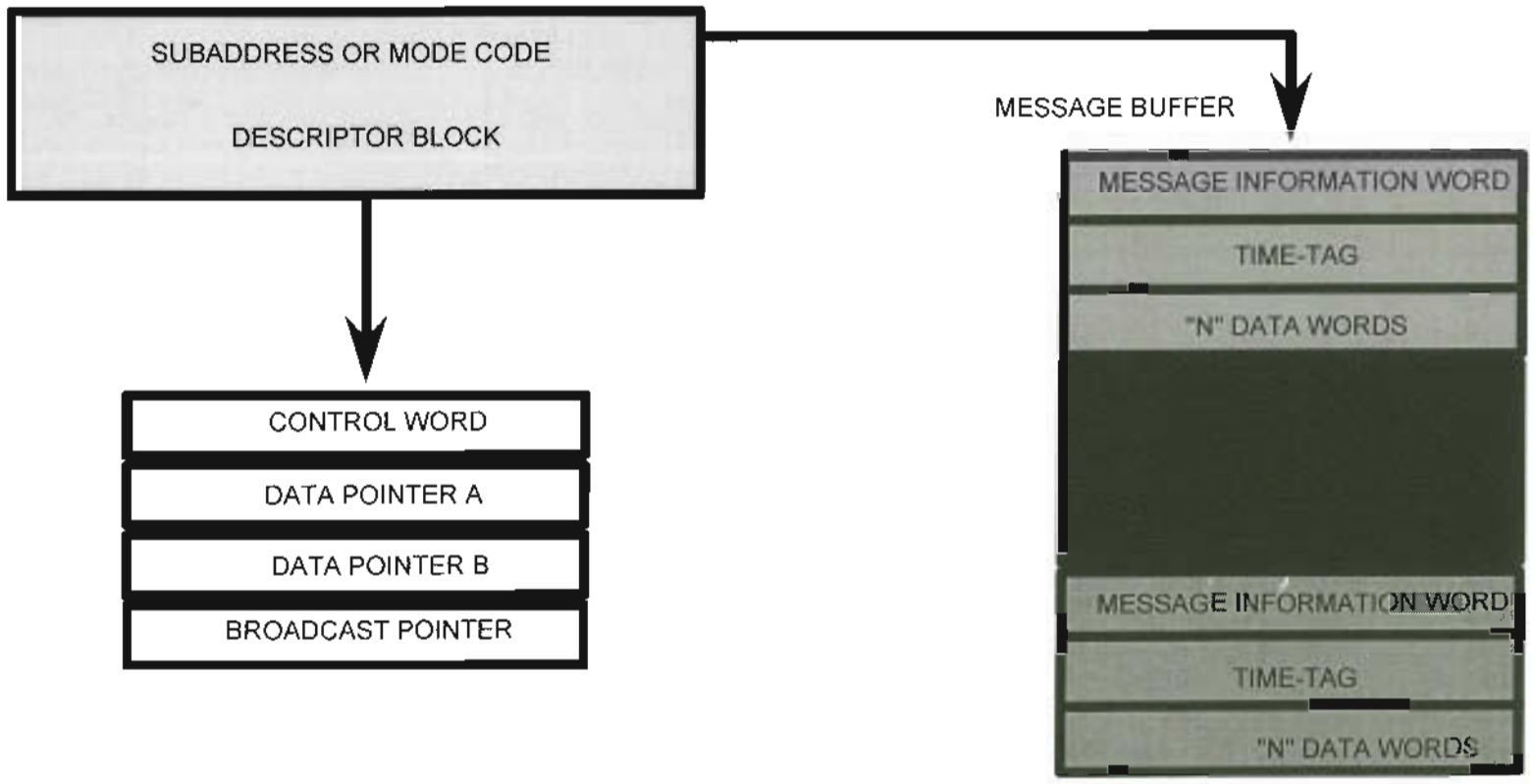


Message Indexing

- Receive message indexing
  - Allows the SRT to store 100 discrete messages to a defined subaddress
  - Ideal for bulk data transfer scenarios
    - Can generate an interrupt to the host/subsystem after the receipt of "N" messages to the subaddress
  - Data stored contiguously in memory
    - Data Pointer A defines the starting address of the message buffer
    - Data pointer automatically updated by the SμMMIT
    - Control Word index field automatically decrement

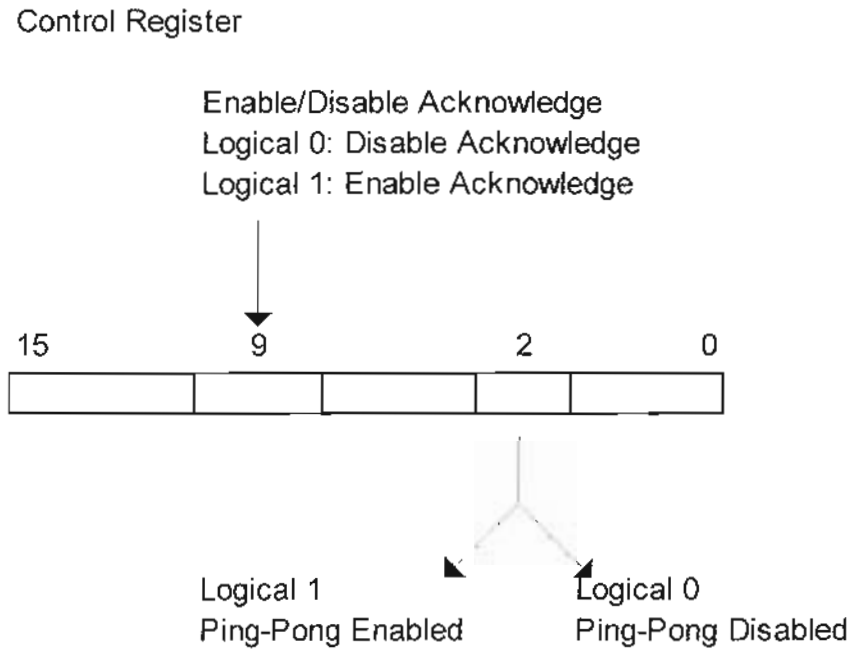
UT69151 SμMMIT RTE

Message Indexing



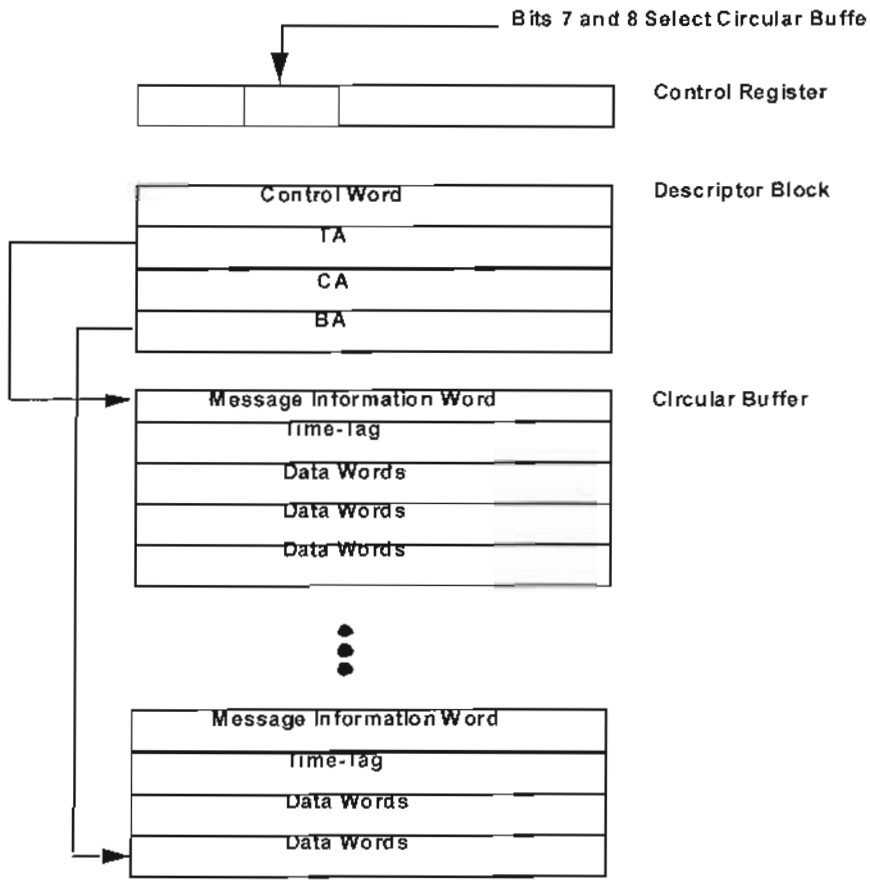
UT69151 SμMMIT RTE

- Ping-Pong Handshake
  - Allows software to freeze buffers for service



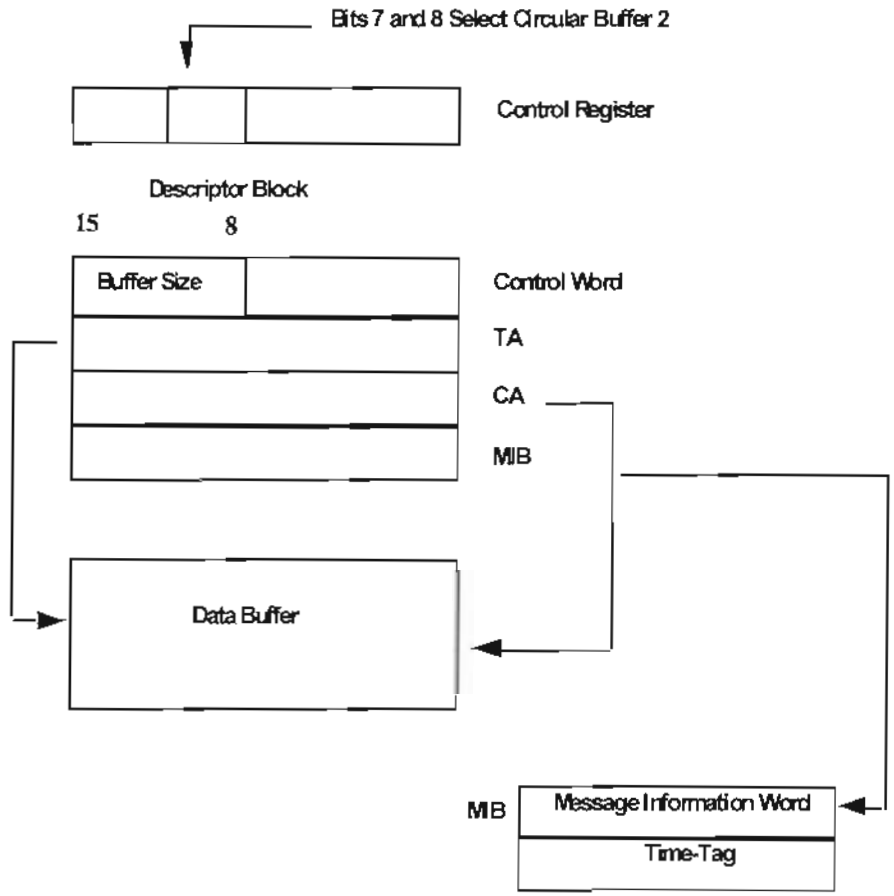
UT69151 SμMMIT RTE

- Circular Buffer Mode #1



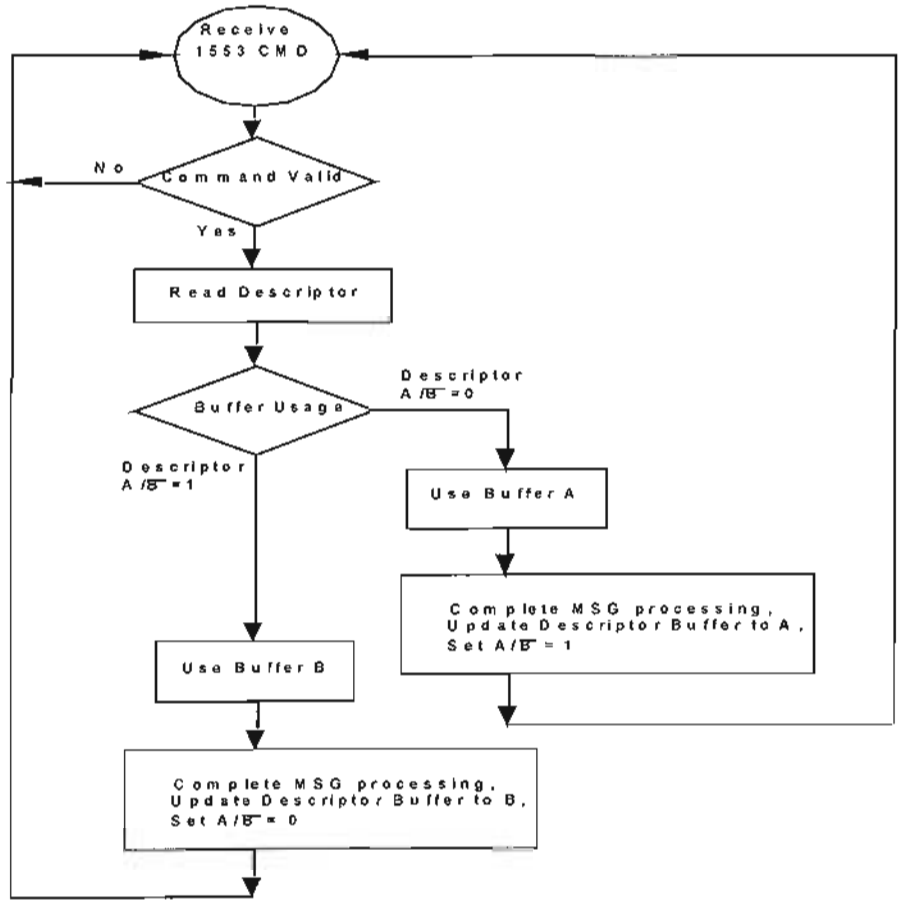
UT69151 SμMMIT RTE

- Circular Buffer Mode #2



UT69151 SμMMIT RTE

- Ping-Pong buffer flow chart



MIL-STD-1553 5-Volt-Only Bus Transceiver

Standard Products

UTMC

UT63M14X Bus Transceiver

- Bipolar bus transceiver for MIL-STD-1553A/B and MIL-STD-1760
  - Operates on a single 5 volt supply (+/-10%)
- Current status
  - Delivering production units
  - Available radiation-hardened to total dose
    - 1.0 Mrads(Si)
  - Standard Microcircuit Drawing (SMD) 5962-93226
    - QML Q or V

UT63M14X Bus Transceiver

- Compatible to industry standard
  - Current source output stage transmitters
  - Idle low transmitter inputs and receiver outputs
- Meets all electrical requirements of MIL-STD-1553B
- Physically and electrically isolated channels
- Monolithic process technology

UT63M14X Bus Transceiver

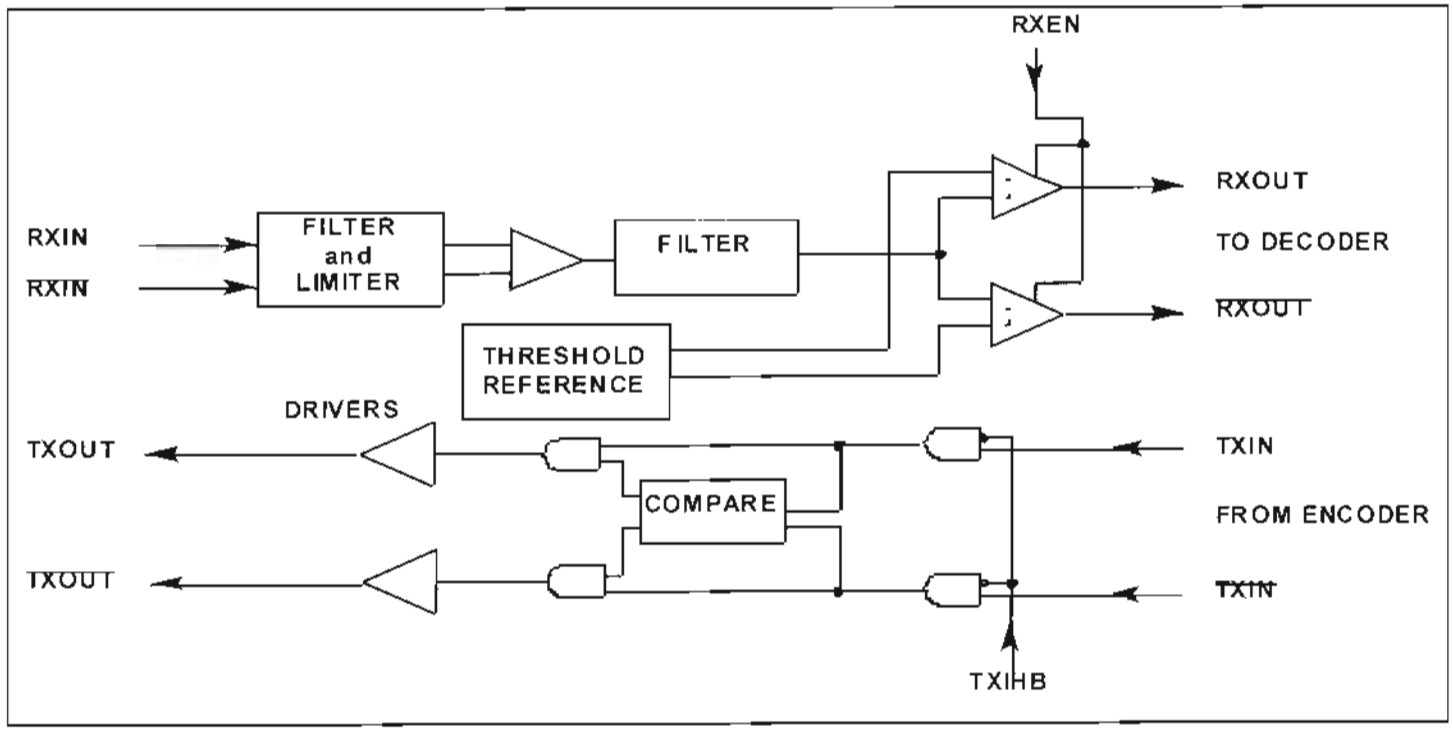
- Single 5 volt supply
  - 345mA @ 50% duty cycle
  - 22mA Stand-by
- Surface mount and through-hole packaging
  - 36-pin DIP (0.6 x 1.89 inches)
  - 24-lead flatpack (0.6 x .81 inches body size, 50-mil lead pitch)

UT63M14X Bus Transceiver

- Completed total dose
  - Device exhibited no latchup during radiation exposure
    - Total Dose (UTMC Cobalt 60 Source)
    - 1.0E6 rads(Si)
- Single Event Latchup immune

UT63M14X Bus Transceiver

- Block Diagram



UT63M1XX Bus Transceiver

- Bipolar bus transceiver for MIL-STD-1553A/B and MIL-STD-1760
  - Operates on either +5V/-15V or +5V/-12V
- Current status
  - Delivering production units
  - Available radiation-hardened to total dose
    - 100K rads(Si)
  - Standard Microcircuit Drawing (SMD) 5962-88644
    - QML Q or V

UT63M1XX Bus Transceiver

- Compatible to industry standard
  - Current source output stage transmitters
  - Idle low transmitter inputs and receiver outputs
- Single or dual channel
- Meets all electrical requirements of MIL-STD-1553B
- Physically and electrically isolated channels
- Monolithic process technology

UT63M1XX Bus Transceiver

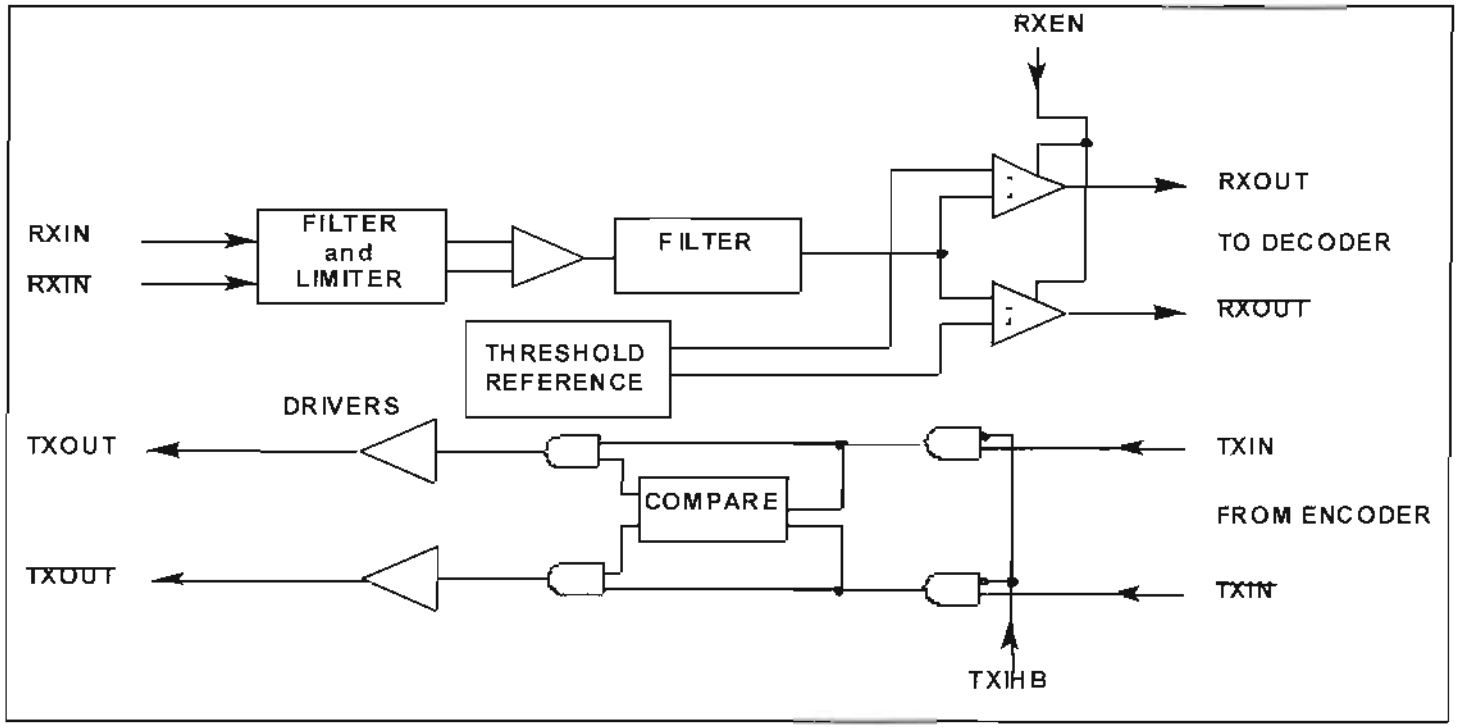
- Single 15/12 volt supply
  - 130mA @ 50% duty cycle
  - 40mA Stand-by
- Single 5 volt supply
  - 70mA @ 50% duty cycle
  - 70mA Stand-by
- Surface mount and through-hole packaging
  - 36-pin DIP (0.6 x 1.89 inches)
  - 24-pin DIP (0.6 x .1.2 inches)
  - 36-lead FP (.7 x 1.8 inches, 100 mil centers)
  - 36-lead FP (.7 x 1.0 inches, 50 mil centers)

UT63M1XX Bus Transceiver

- Completed total dose
  - Device exhibited no latchup during radiation exposure
    - Total Dose (UTMC Cobalt 60 Source)
    - 1.0E6 rads(Si)
- Single Event Latchup immune

UT63M1XX Bus Transceiver

- Block Diagram



UT69161 ASCENT

- Comprehensive AS-1773 (Aerospace Standard) dual redundant bus controller and remote terminal
  - Supports MIL-STD-1553B, MIL-STD-1773
- Supports both 1 Mbps and 20 Mbps bandwidths
  - Supports both uniphase and biphase operation at either bandwidth

UT69161 ASCENT

- Flexible host interface
  - 8 or 16 bit interface
  - Motorola or Intel
    - i.e., multiplexed or non-multiplexed
- Simple dual-port memory interface
  - No arbitration logic required
- Programmable Interrupts
  - Maskable
  - Pulse or level outputs (user selected)
- Custom 1.2μm CMOS design

UT69161 ASCENT

- Current status
  - Delivering prototype and reduced high-reliability product
    - Need re-design to lower power consumption and improve LET threshold

UT69161 ASCENT

- Single 5 volt supply
  - 40MHz input clock
  - 275mA @ 50% duty cycle
  - 40mA @ 0% duty cycle
- Flexible packaging
  - 172-lead quad-flatpack (1.15 x 1.15 inches body size, 25-mil lead centers)
  - 121-pin PGA (1.2 x 1.2 inches)

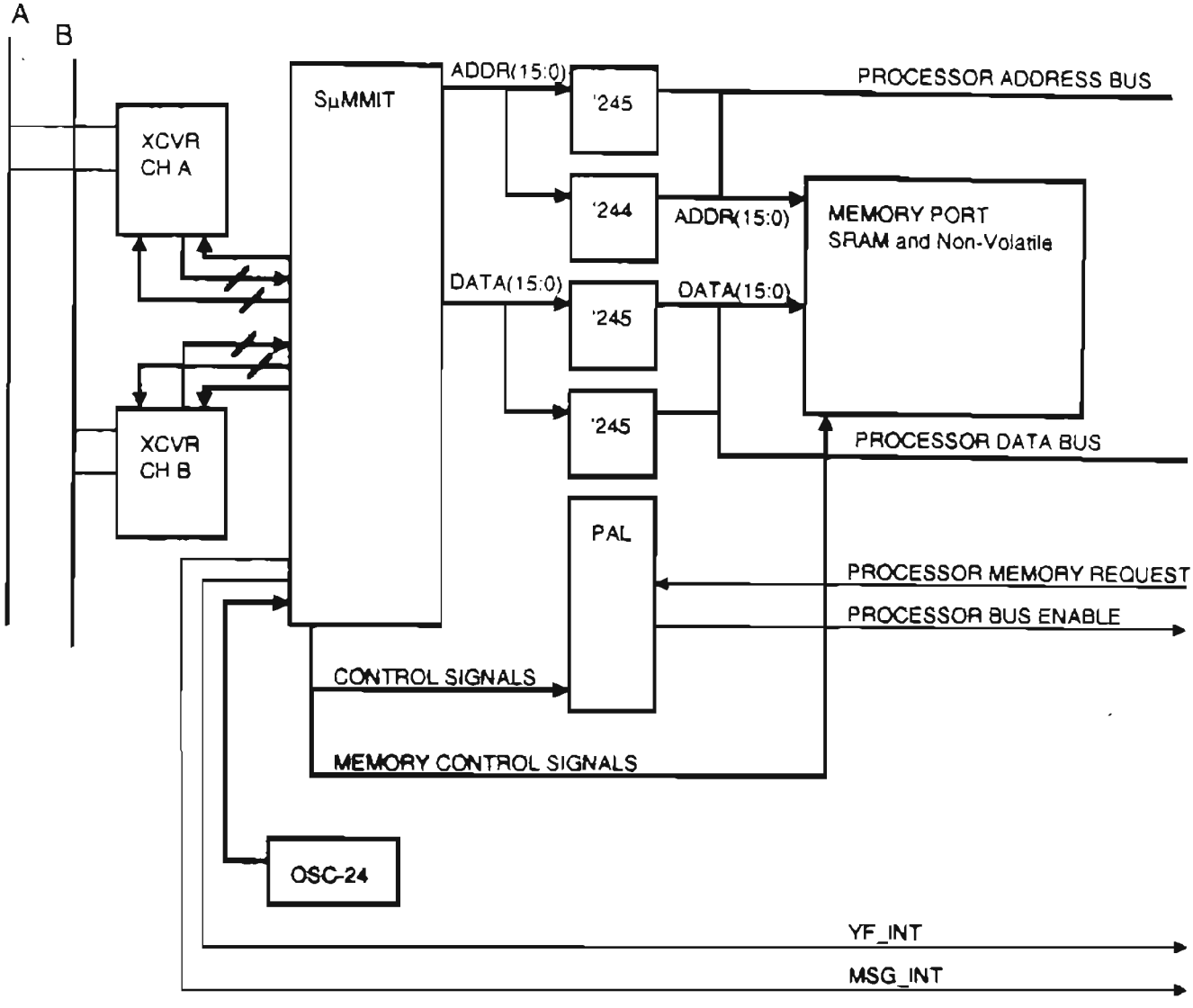
Section 2
Engineering Notebooks

Date: July 29, 1992

Number: SµMMIT-4

SµMMIT™ Shared Memory Interface (Wait-State)

The following is a block diagram showing a shared memory interface to a back-plane bus. The host microprocessor is interrupted when the SuMMIT requires service. The SµMMIT boots out of external non-volatile memory.

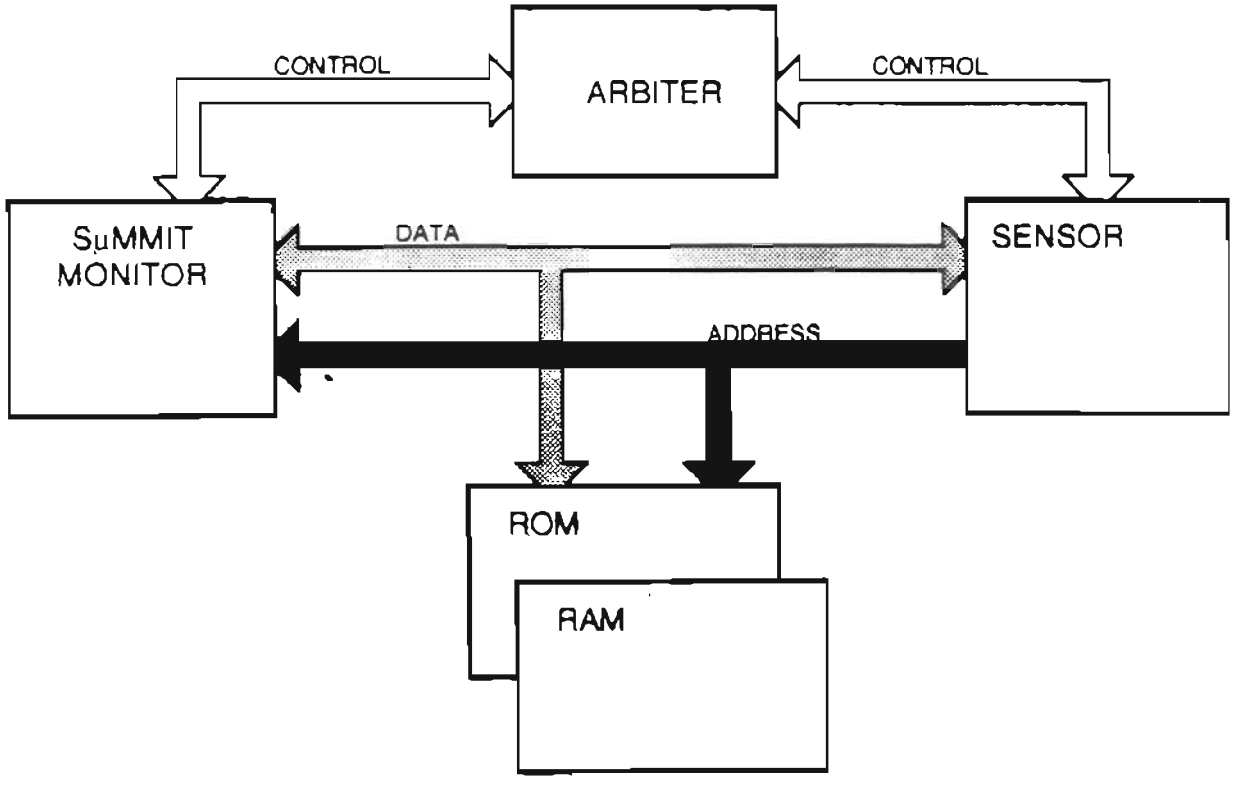


Date: September 29, 1992

Number: SμMMIT-5

Autonomous SμMMIT Interface

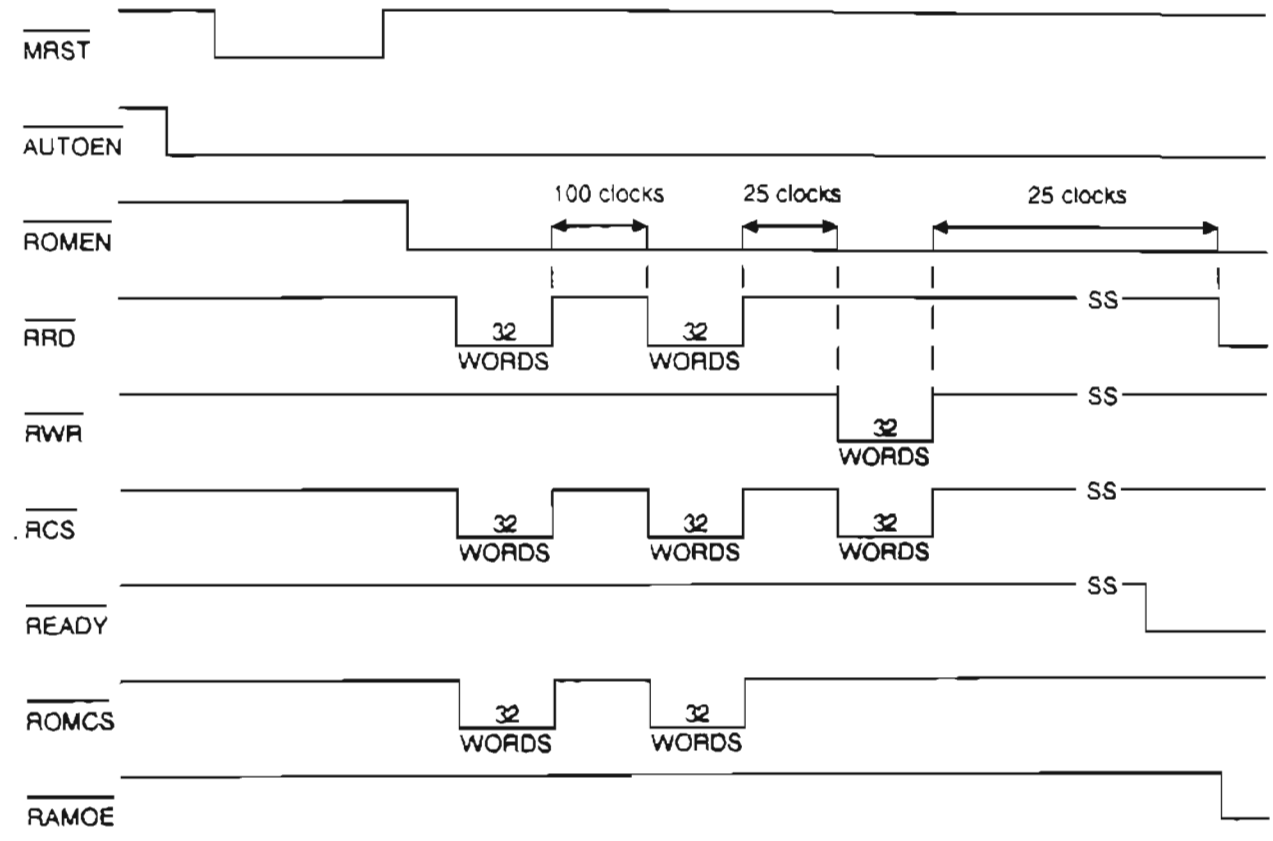
The following block diagram is used to interface the SμMMIT to non-volatile and volatile memory for an autonomous remote terminal.

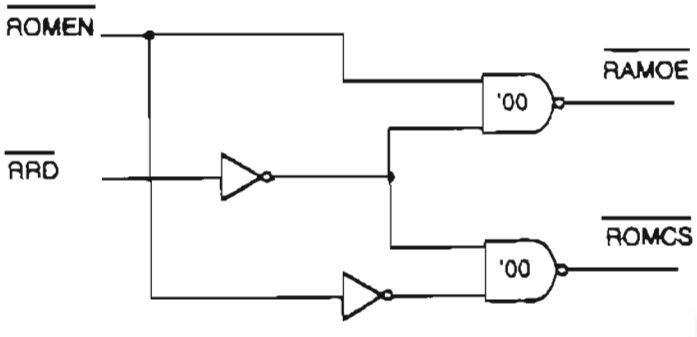


Number: SμMMIT-5

Autonomous SμMMIT™ Interface

The following timing diagram and circuit is used to control the interface of the SμMMIT to non-volatile and volatile memory for an autonomous remote terminal.



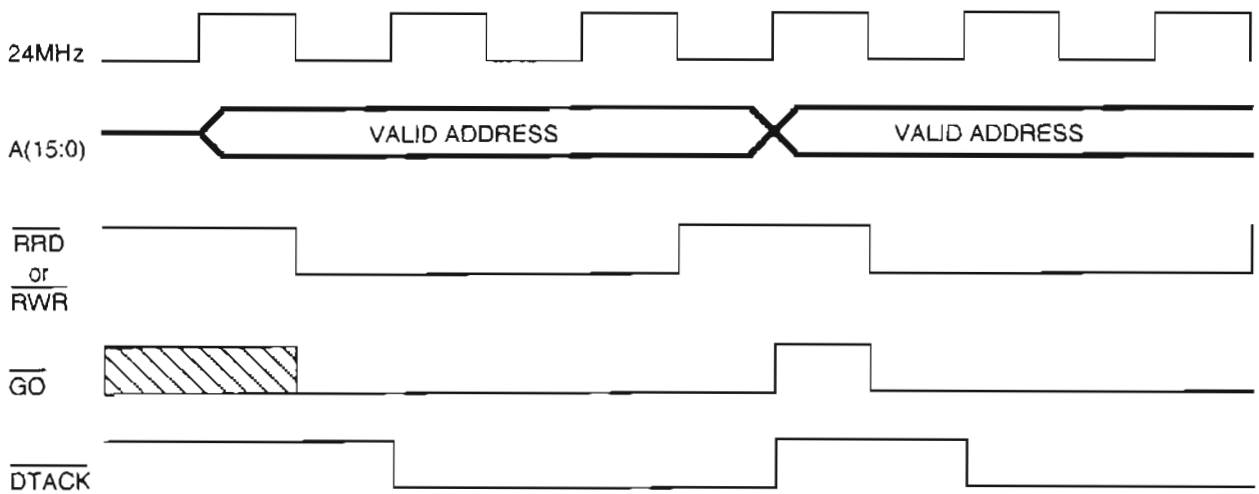


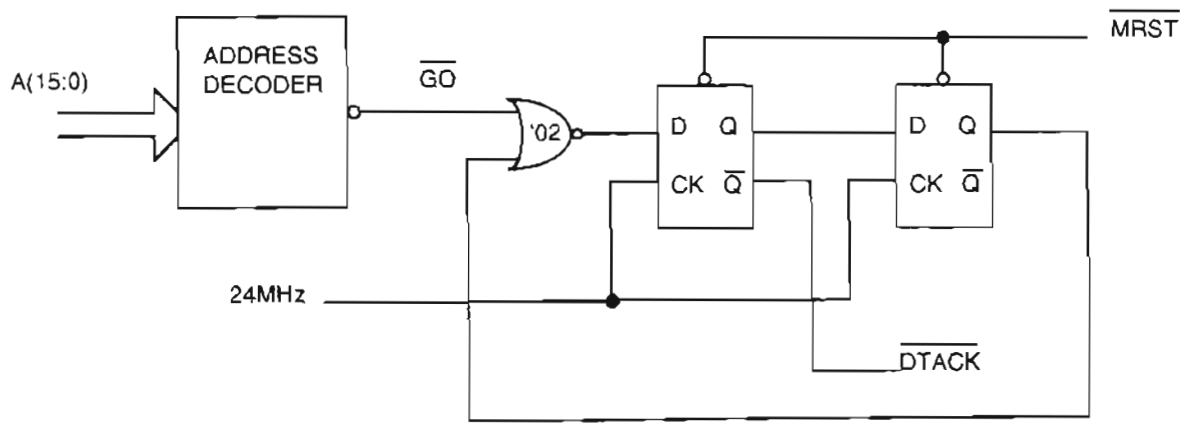
Date: September 22, 1992 pg 1 of 1

Number: SμMMIT-6

SμMMIT™ Wait State Interface

The following timing diagram and circuit is used to generate a wait-state for the SμMMIT accessing memory.

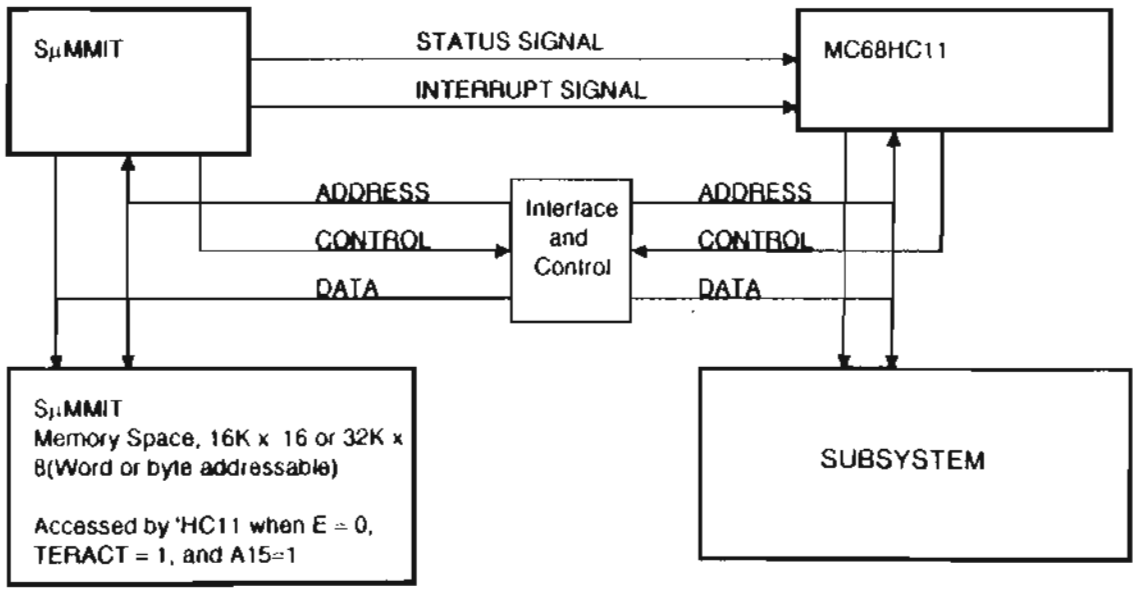




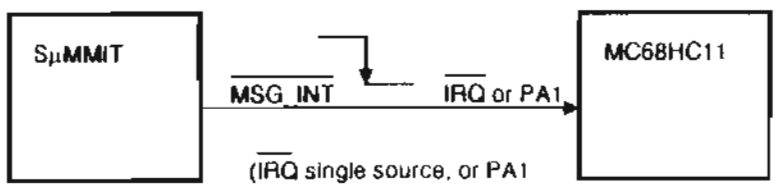
Number: SμMMIT-7

MC68HC11 Shared Memory Interface To UT69151 SμMMIT ™

BLOCK DIAGRAM

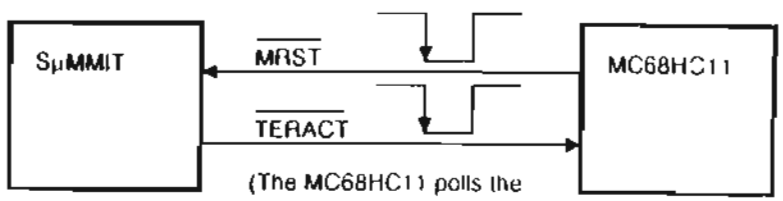


INTERRUPT SIGNAL



($\overline{IRQ}$ single source, or PA1 To service interrupt the MC68HC11 reads the SμMMIT's Interrupt Log which resides in the SμMMIT memory space)

STATUS SIGNAL

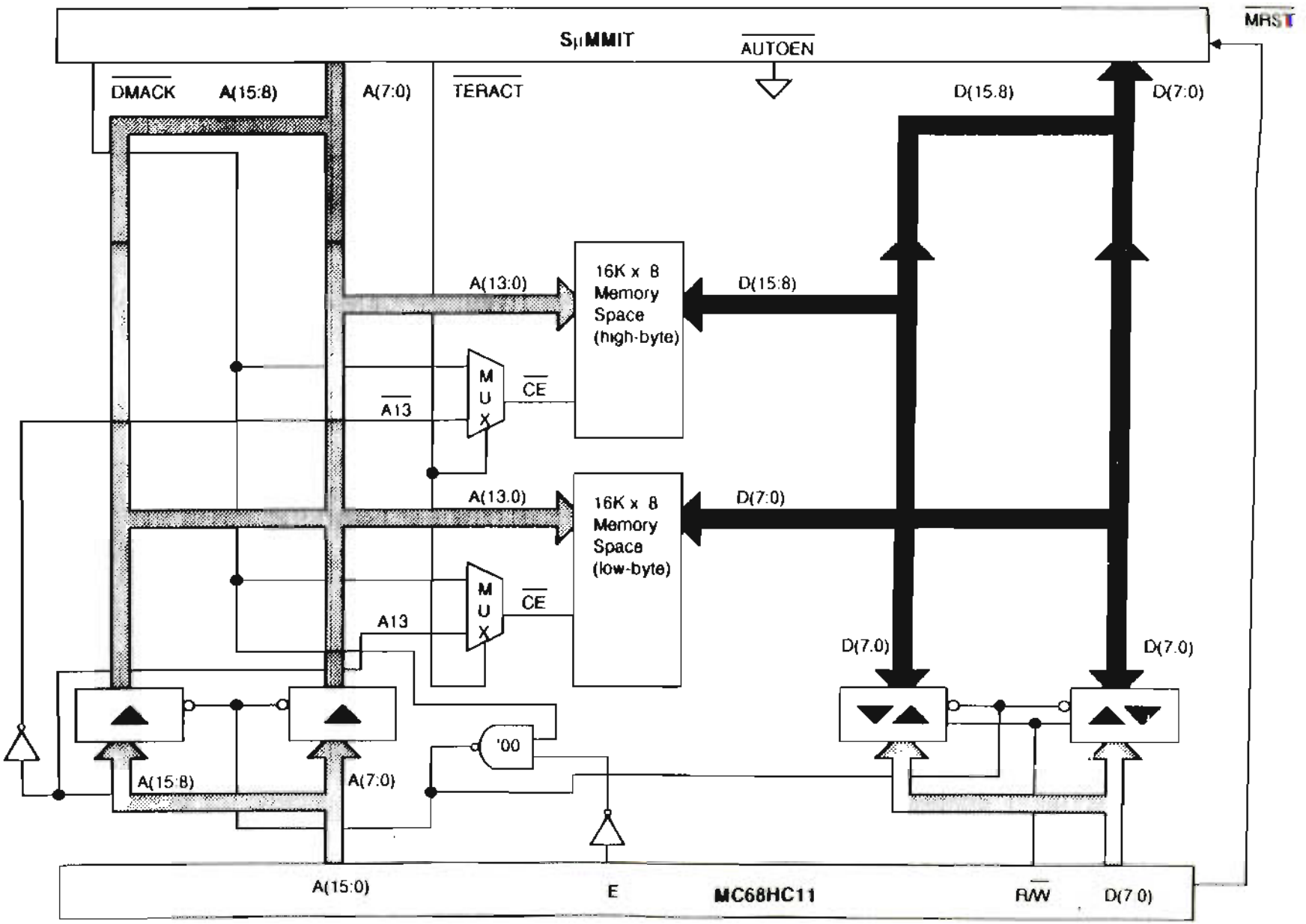


(The MC68HC11 polls the status of SμMMIT output "terminal active" to determine if the SμMMIT's memory space can be accessed

$\overline{TERACT}$ = 1 (No)
$\overline{TERACT}$ = 0 (Yes)

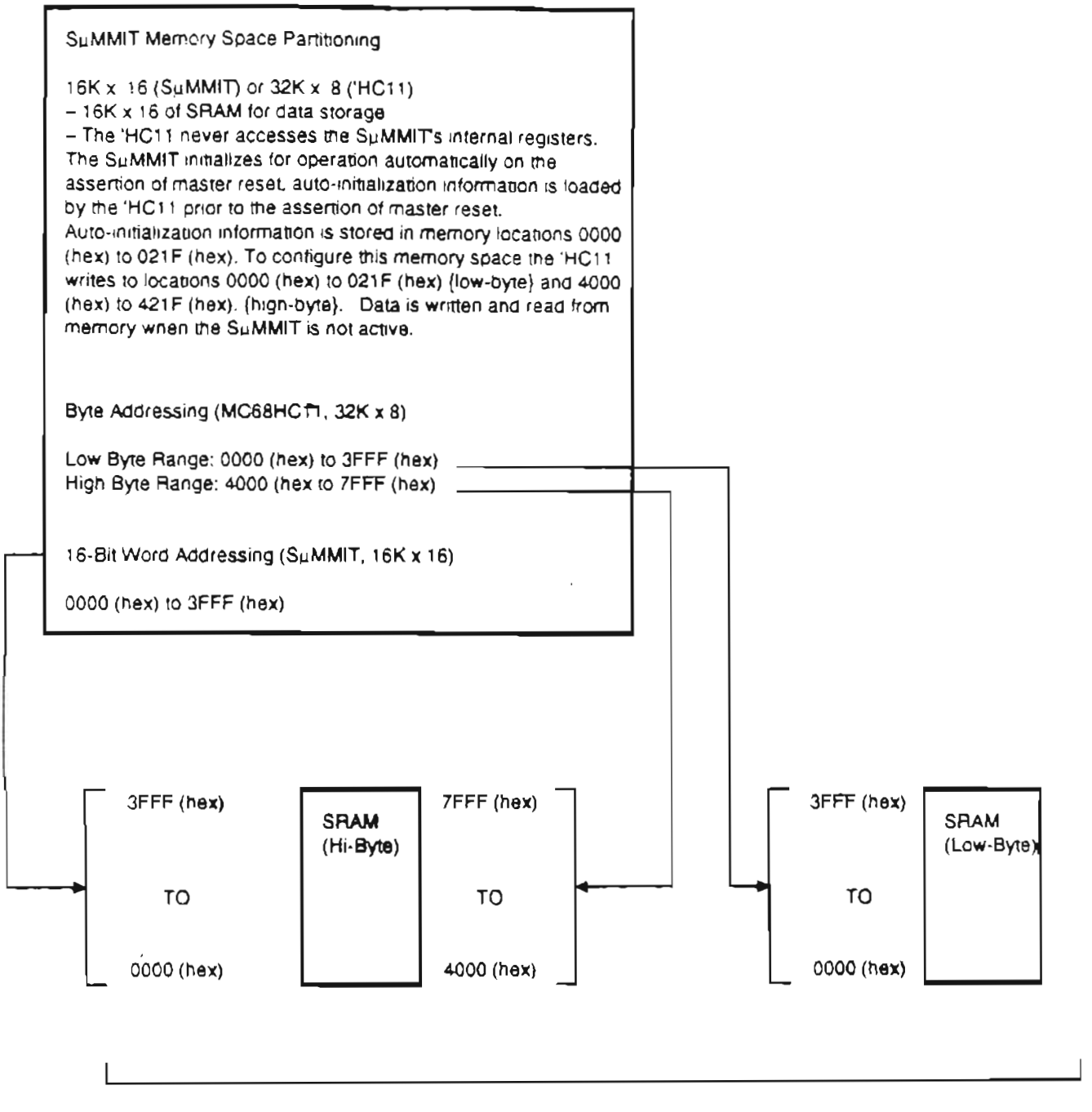
Number: SμMMIT-7

MC68HC11 Interface to SμMMIT™ Memory



MC68HC11 Shared Memory Interface To UT69151 SµMMIT ™

Example Memory Map:

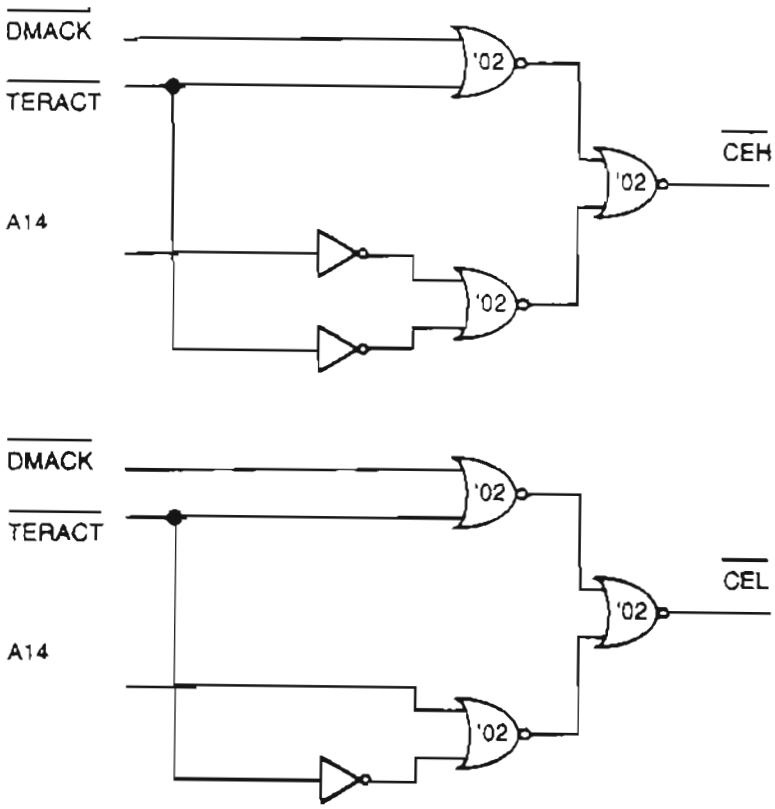


A 16-bit SµMMIT Word, requires two writes by the 'HC11 (low byte and high byte).

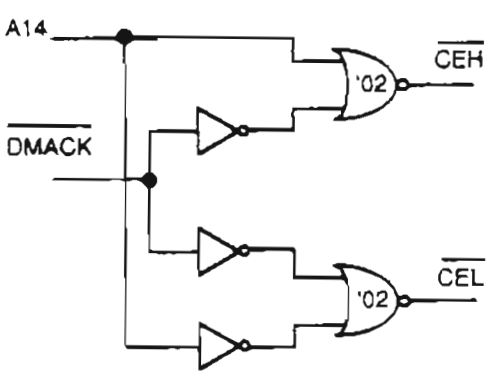
Number: SµMMIT-7

MC68HC11 Shared Memory Interface To UT69151 SµMMIT ™

Example #1 Mux (2 to 1):



Example #2 Mux (2 to 1):

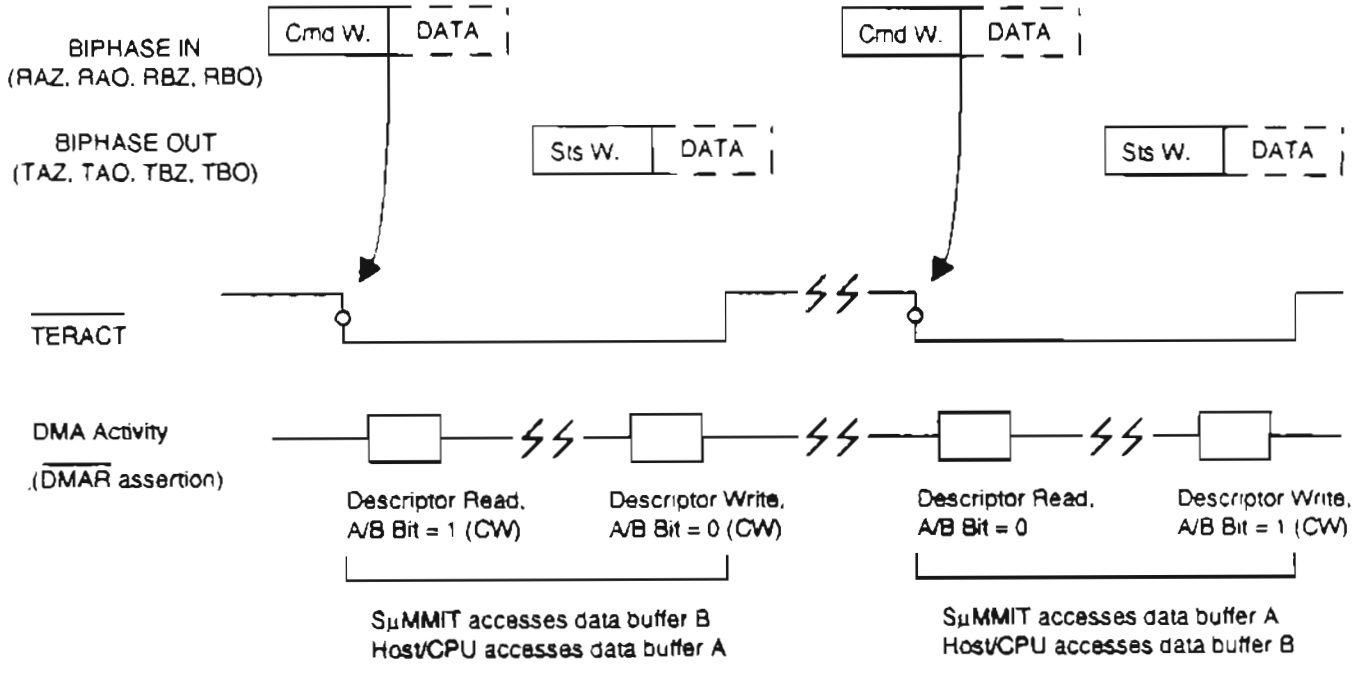


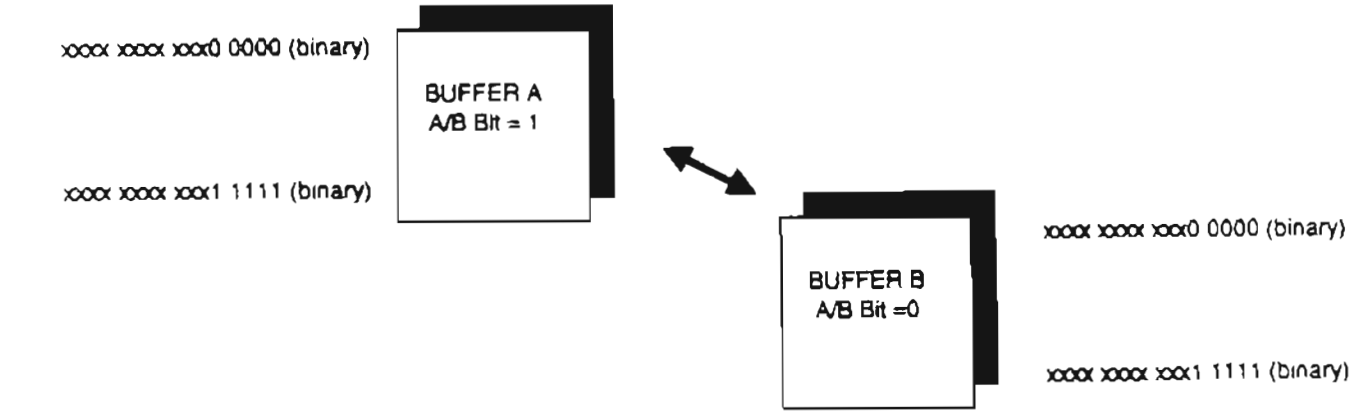
Date: October 19, 1992 pg 1 of 3

Number: SµMMIT-9

SµMMIT™ Remote Terminal Operation: Ping-Pong Data Handling

The following flow chart is used to extract data from, or enter data into the subaddress buffers of the UT69151 SµMMIT when the device is configured as a double buffered remote terminal (i.e., ping-pong). The initial conditions are as follows: Control Register PPEN = logic 1, Descriptor Control Word Bit 2 = logic 1 (A/B).

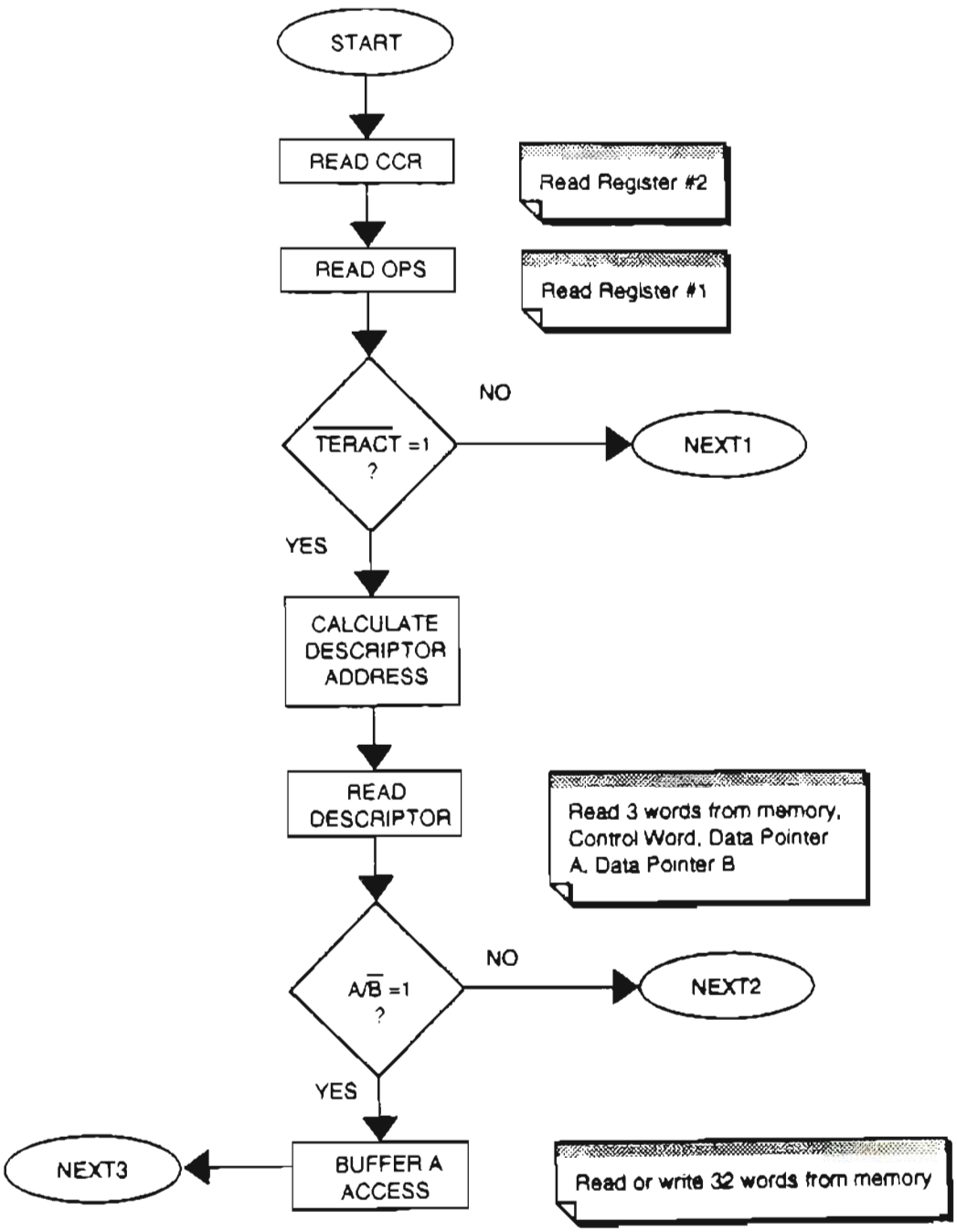




Number: SµMMIT-9

Remote Terminal Operation: Ping-Pong Data Handling

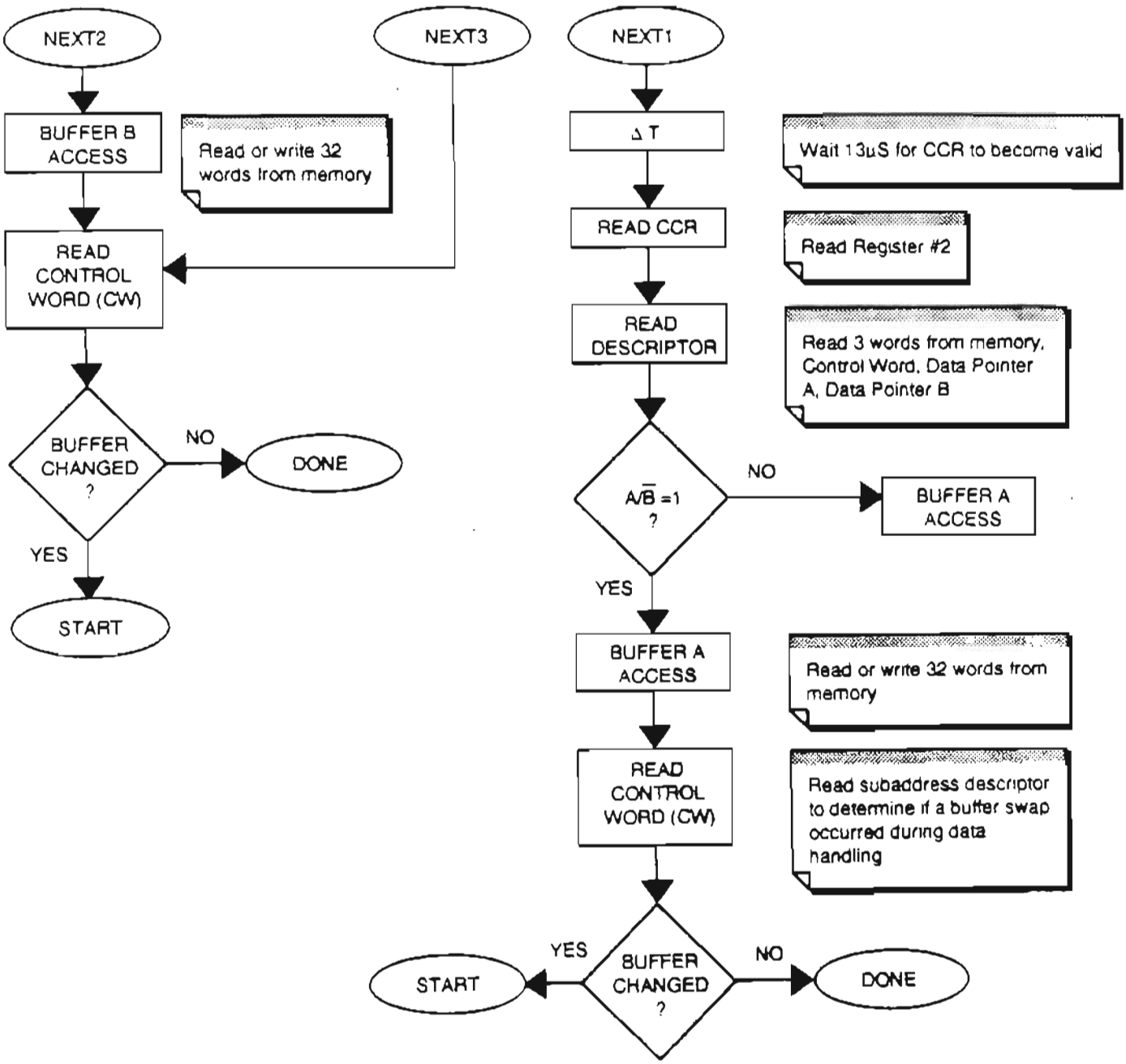
The following flow chart is used to extract data from, or enter data into the subaddress buffers of the UT69151 SµMMIT when the device is configured as a double buffered remote terminal (i.e., ping-pong). The initial conditions are as follows: Control Register PPEN = 1, Descriptor Control Word Bit 2 = 1 (A/B).



Number: SµMMIT-9

Remote Terminal Operation: Ping-Pong Data Handling

The following flow chart is used to extract data from, or enter data into the subaddress buffers of the UT69151 SµMMIT when the device is configured as a double buffered remote terminal (i.e., ping-pong). The initial conditions are as follows: Control Register PPEN = 1, Descriptor Control Word Bit 2 = 1 (A/B).



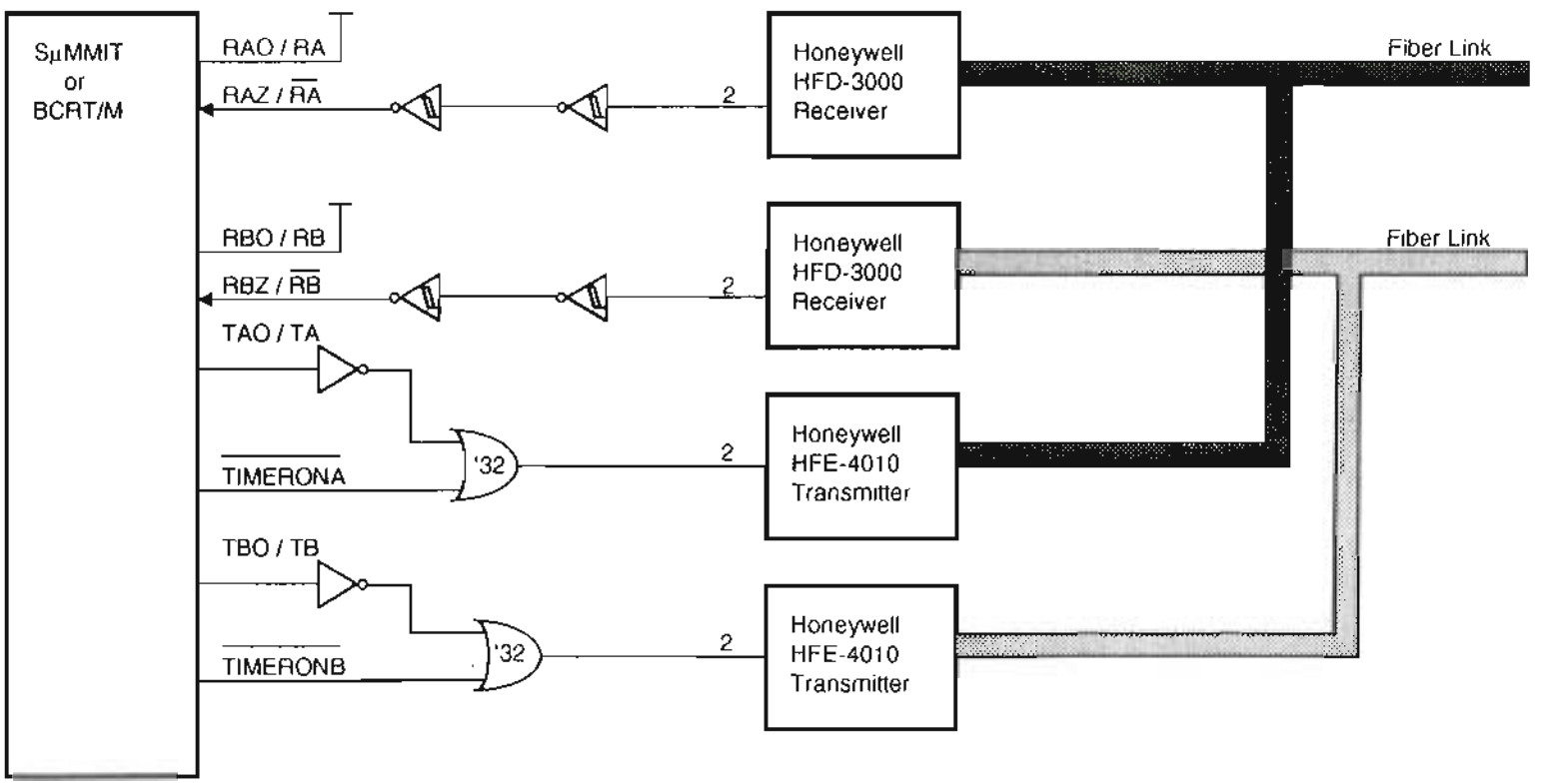
Date: December 22, 1993 pg 1 of 1

Number: SµMMIT-10

Uniphase Operation for Fiber Optic Systems

The following circuit is used to implement a MIL-STD-1773 interface to the UT69151 SµMMIT. This simple interface takes advantage of the SµMMIT's uniphase operating capabilities. Also shown in the circuit are the connections for the BCRT family of devices. The BCRT family of devices also have the capabillities to operate uniphase. Please note that for the BCRT family $\overline{\text{TIMERONB}}$ and $\overline{\text{TIMERONA}}$ signals are generated via a logical combination of CHA/$\overline{\text{B}}$ and $\overline{\text{TIMERON}}$.

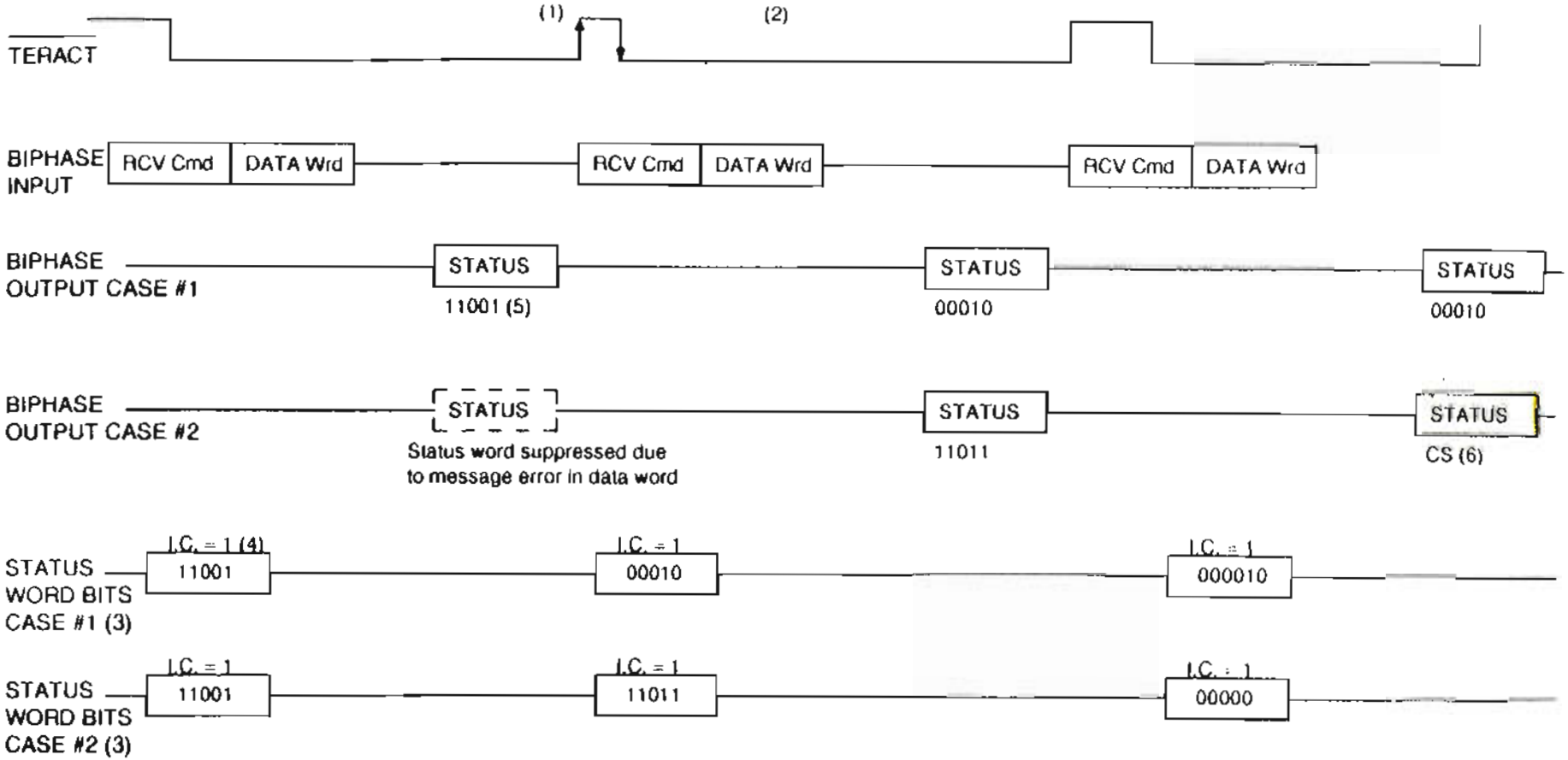
MIL-STD-1773 Interface:



Date: September 22, 1992

Number: SμMMIT-11

SμMMIT™ Immediate Clear Feature



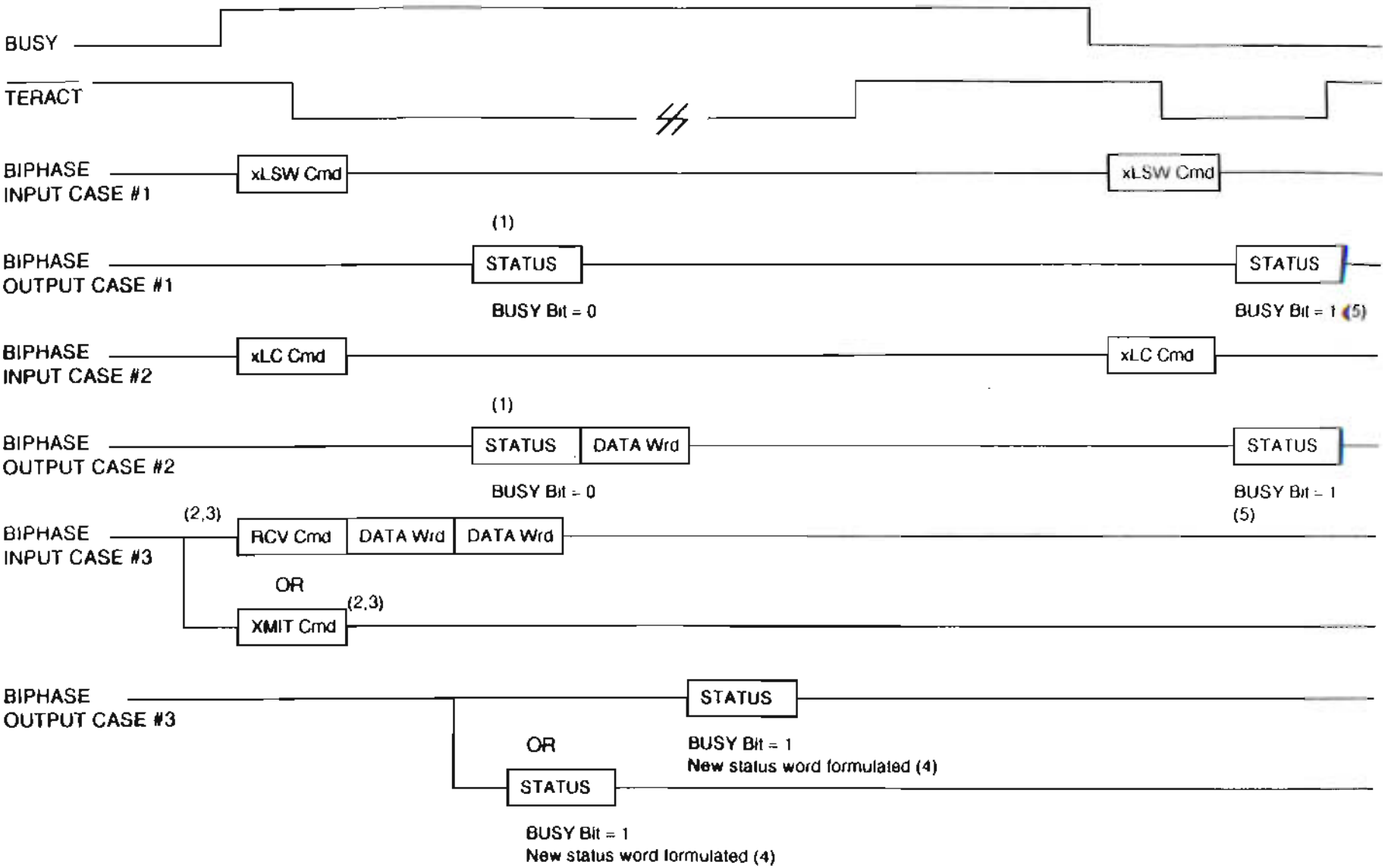
Notes:

1. An immediate clear is performed if status word transmission occurs. If status word transmission is suppressed, due to message error, immediate clear function not performed.
2. A new status word is formulated on the assertion of TERACT.
3. Status word bits are defined as Instrumentation (INS), Service Request (SRQ), Busy (BUSY), Subsystem Busy (SUBSYS), and Terminal Flag (TF). Control these bits by writing to the Remote Terminal Address/Status Word Register.
4. I.C. = 1, immediate clear function enabled. I.C.= 0, immediate clear function disabled. The user should either always use the immediate clear function or never enable this function. If I.C. = 0 then the programmable bits of the status word remain asserted until the host or subsystem clears the bit in the applicable register.
5. Information shown in this field contains the state of each programmable status word bit (i.e., INS, SRQ, BUSY, SUBSYS, and TF).
6. Status word transmited with clear status (CS) (i.e., all bits cleared).

Date: September 22, 1992

Number: SμMMIT-12

SμMMIT™ Busy Mode Operation



Notes:

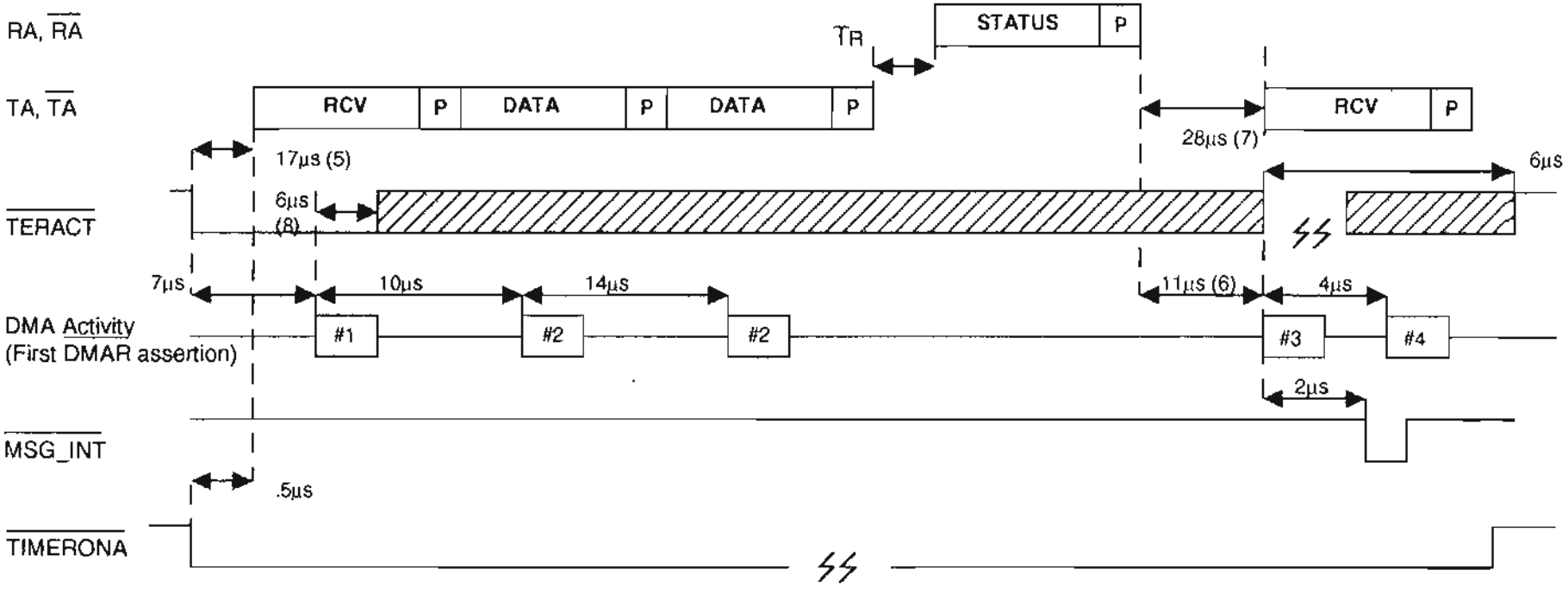
1. The status word is not affected by the receipt of either Transmit Last Status or Transmit Last Command mode codes. The remote terminal transmits the last status word with the BUSY bit negated. The bus controller cannot poll a remote terminal for a busy condition.
2. During a busy condition the remote terminal stores all applicable valid commands
3. On the reception of a mode code during busy, the remote terminal does not perform mode code related functions.
4. Any changes to the INS, SRQ, BRDCST, SUBSYS, or TF bits are reflected in the newly formulated status word
5. If a receive or transmit command is processed the status word is rebuilt and Busy is set to a logical one; otherwise BUSY = 0.
6. On the reception of illegal commands during busy the remote terminal responds with the assertion of the ME bit and Busy bit in the status word response

Date: September 22, 1992

Number: SμMMIT-8

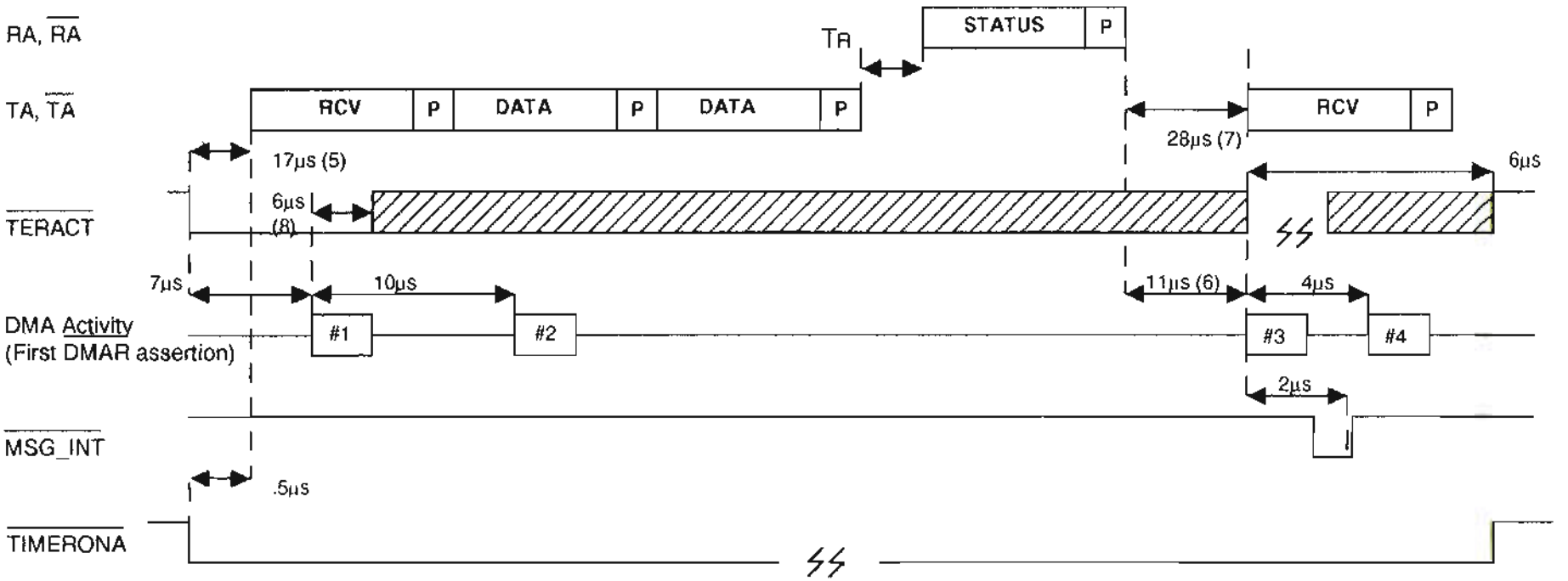
SμMMIT™ Message DMA Activity During Message Processing

UT69151 SμMMIT ™ BC-MODE OPERATION
Receive Command - Typical Timing



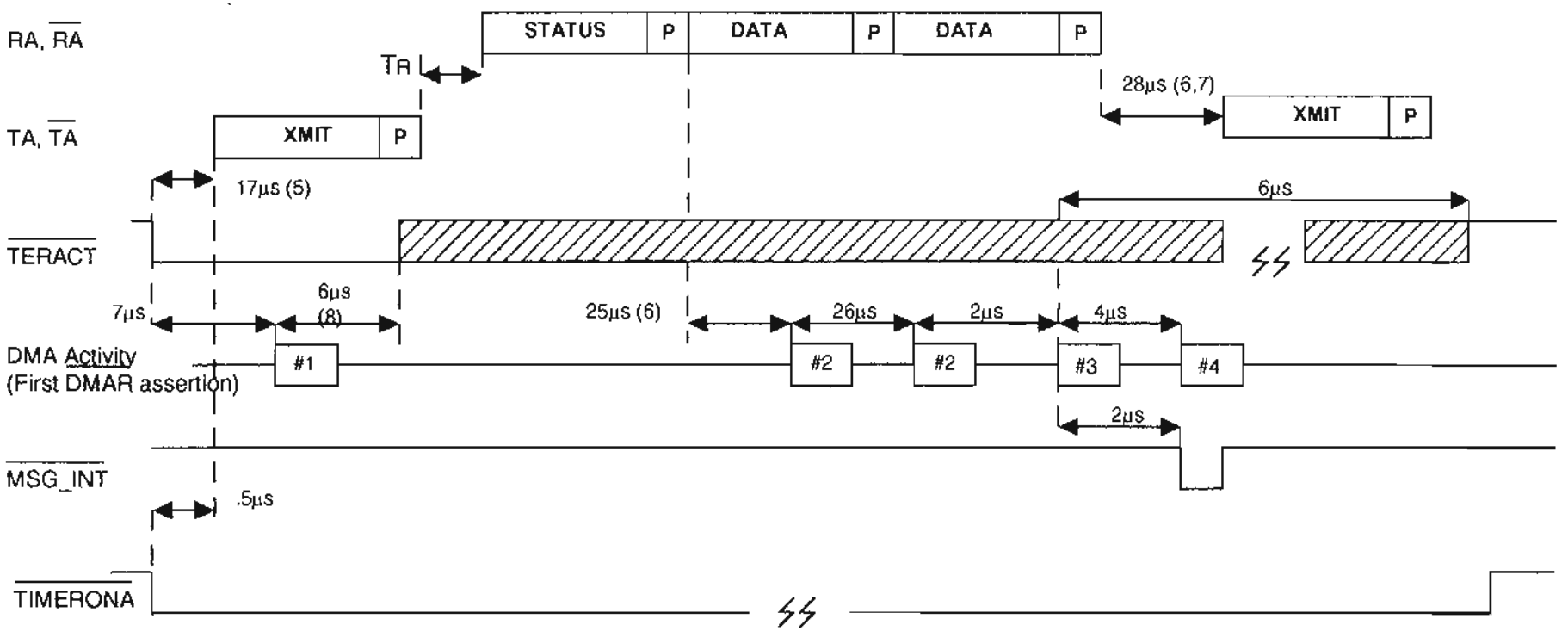
Notes:
1. Command Block Read
2. Data Word Read
3. Command Block Update
4. Next Command Block Read if applicable
5. With respect to command word mid-sync zero crossing
6. With respect to status word parity mid-bit zero crossing
7. BC-retry due to no-response is 40μs otherwise 12μs
8. End of List Command Block (no 1553 activity)

UT69151 SμMMIT ™BC-MODE OPERATION
Receive Command - Typical Timing Buffer Mode



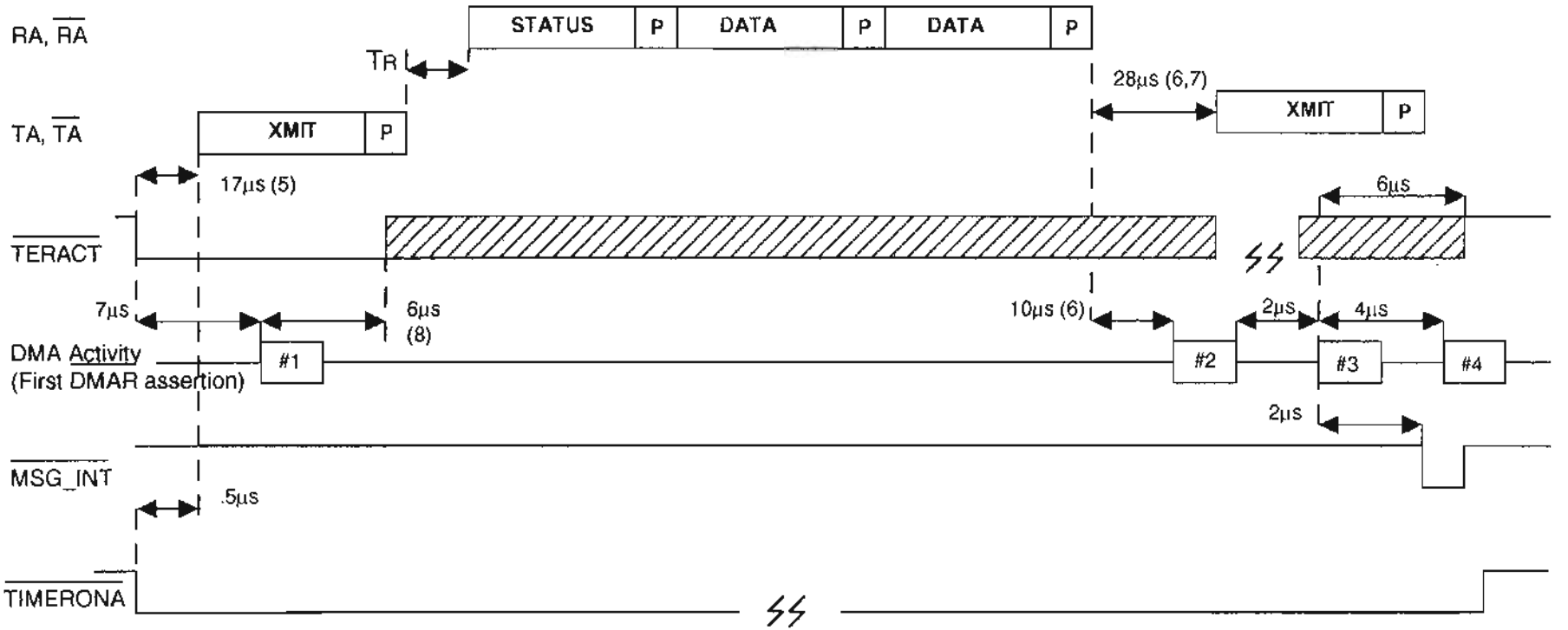
Notes:
1. Command Block Read
2. Data Word Reads
3. Command Block Update
4. Next Command Block Read if applicable
5. With respect to command word mid-sync zero crossing
6. With respect to status word parity mid-bit zero crossing
7. BC-retry due to no-response is 40μs otherwise 12μs
8. End of List Command Block (no 1553 activity)

UT69151 SμMMIT ™ BC-MODE OPERATION
Transmit Command - Typical Timing



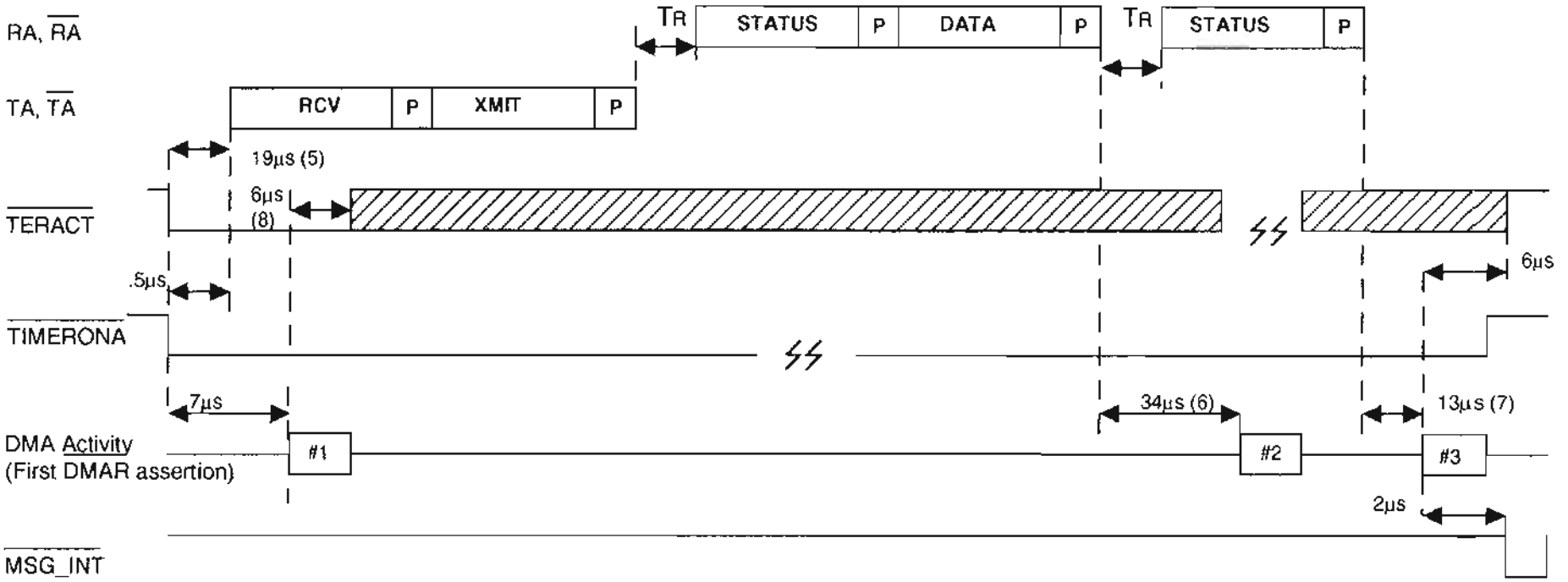
Notes:
1. Command Block Read
2. Data Word Write
3. Command Block Update
4. Next Command Block Read if applicable
5. With respect to command word mid-sync zero crossing
6. With respect to status word parity mid-bit zero crossing
7. BC-retry due to no-response is 20μs plus number of expected data words, otherwise 12μs
8. End of List Command Block (no 1553 activity)

UT69151 SμMMIT ™ BC-MODE OPERATION
Transmit Command - Typical Timing Buffer Mode



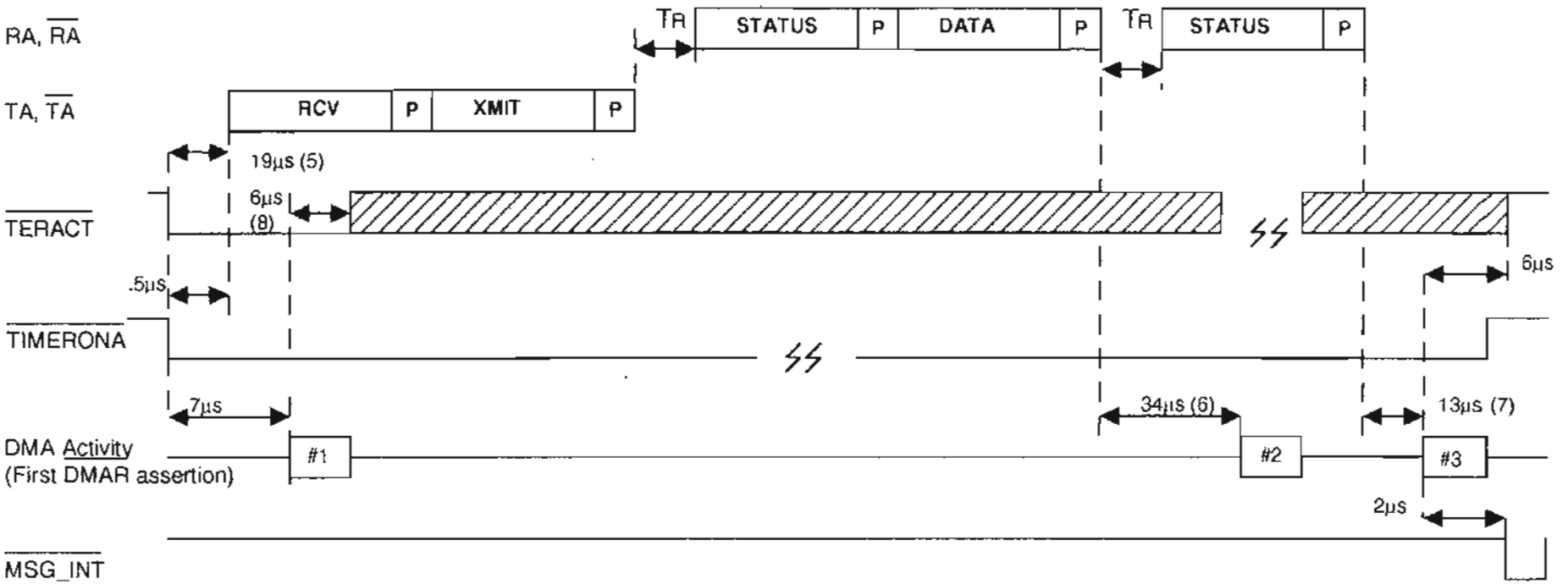
Notes:
1. Command Block Read
2. Data Word Writes
3. Command Block Update
4. Next Command Block Read if applicable
5. With respect to command word mid-sync zero crossing
6. Witth respect to status word parity mid-bit zero crossing
7. BC-retry due to no-response Is 20μs plus number of expected data words, otherwise 12μs
8. End of List Command Block (no 1553 activity)

UT69151 SμMMIT ™ BC-MODE OPERATION
RT-RT Command - Typical Timing



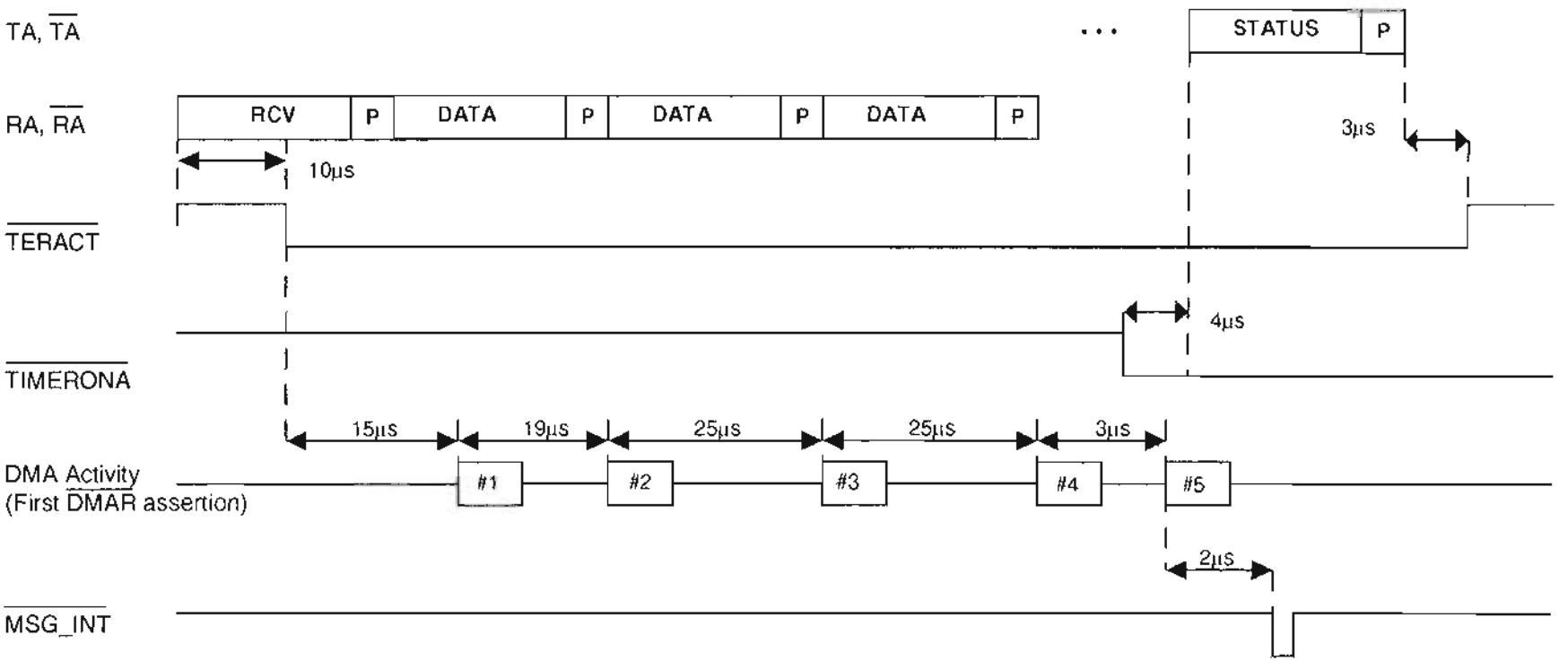
Notes:
1. Command Block Read
2. Data Word Write
3. Command Block Update
4. Next Command Block Read if applicable
5. With respect to command word mid-sync zero crossing
6. With respect to data word parity mid-bit zero crossing
7. With respect to status word parity mid-bit zero crossing
8. End of List Command Block (no 1553 activity)

UT69151 SμMMIT™ BC-MODE OPERATION
RT-RT Command - Typical Timing Buffer Mode



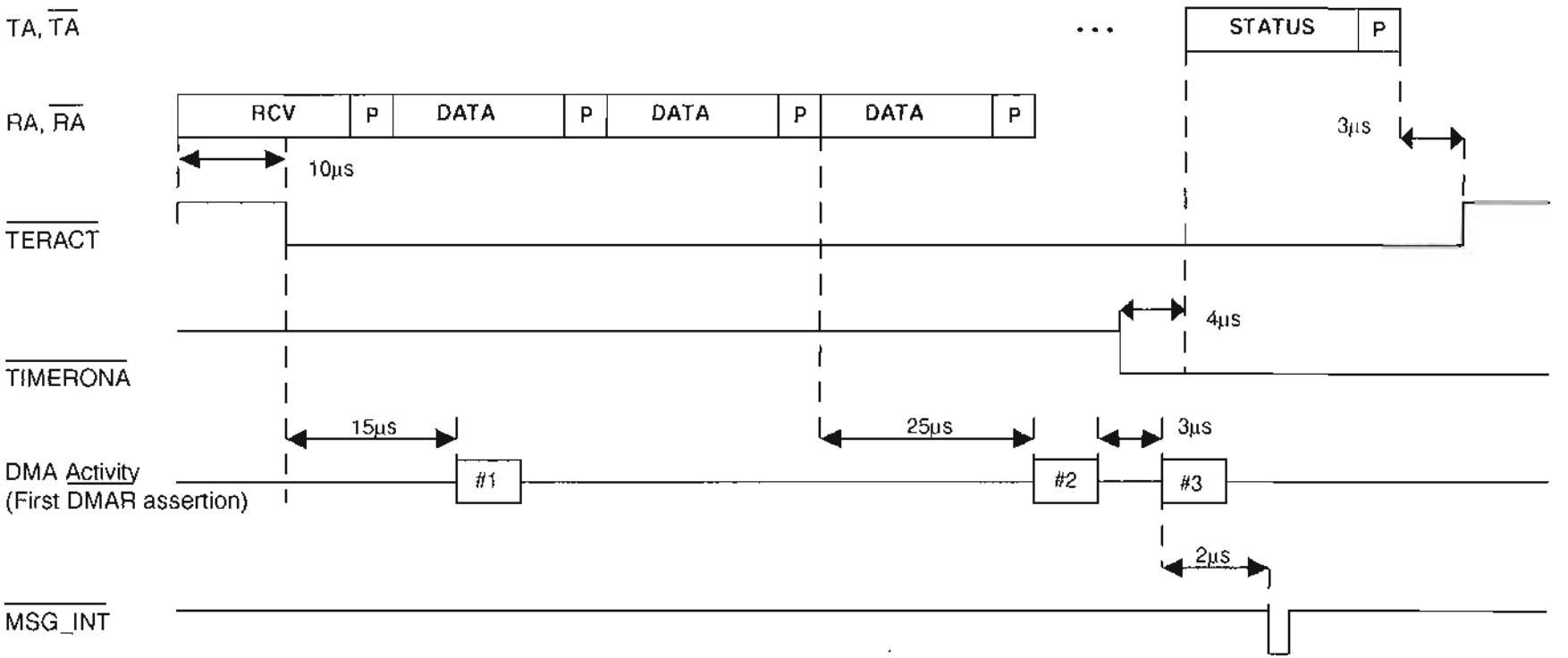
Notes:
1. Command Block Read
2. Data Word Write(s)
3. Command Block Update
4. Next Command Block Read if applicable
5. With respect to command word mid-sync zero crossing
6. With respect to data word parity mid-bit zero crossing
7. With respect to status word parity mid-bit zero crossing
8. End of List Command Block (no 1553 activity)

UT69151 SμMMIT™ RT-MODE OPERATION
Receive Command - Typical Timing



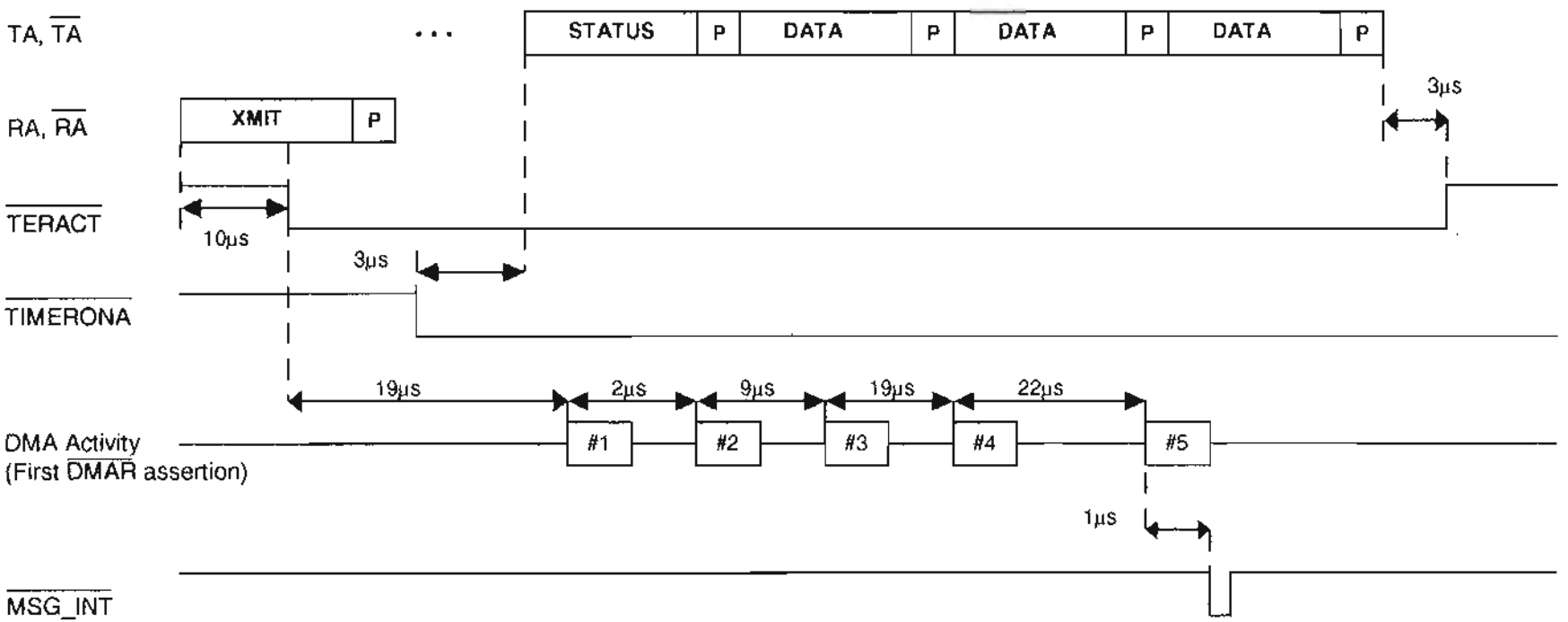
Notes:
1. Descriptor Read
2. Data Word Write
3. Data Word Write
4. Data Word Write
5. Descriptor Update and optional Interrupt Log

UT69151 SμMMIT ™ RT-MODE OPERATION
Receive Command - Typical Timing Buffer Mode



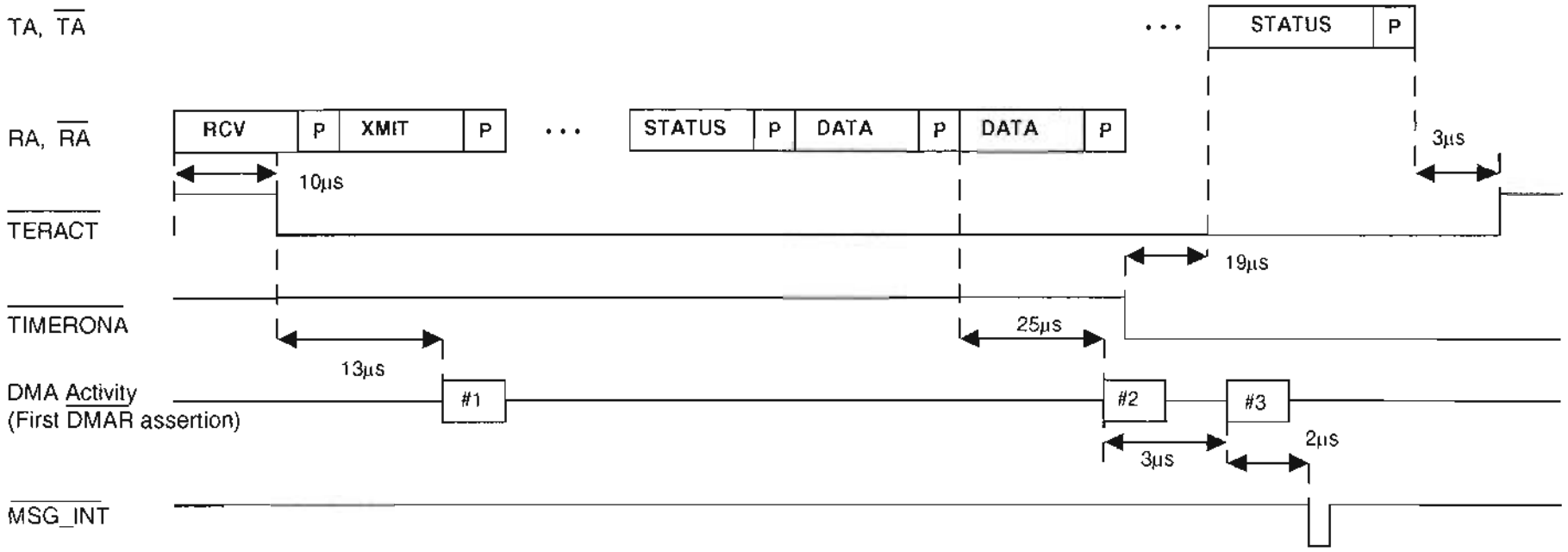
Notes:
1. Descriptor Read
2. Burst Data Word Write (SμMMIT stores all received data in local memory)
3. Descriptor Update and optional Interrupt Log

UT69151 SμMMIT™ RT-MODE OPERATION
Transmit Command - Typical Timing



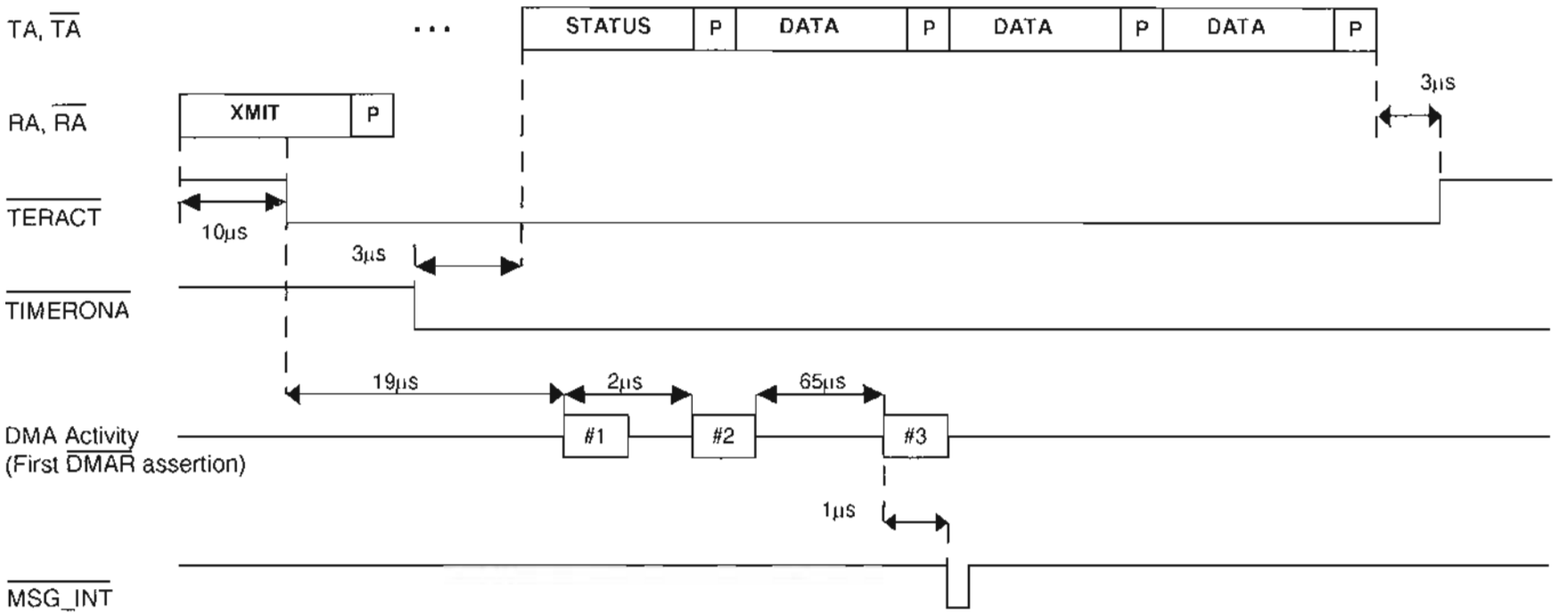
Notes:
1. Descriptor Read
2. Data Word Read
3. Data Word Read
4. Data Word Read
5. Descriptor Update and optional Interrupt Log

UT69151 SμMMIT ™ RT-MODE OPERATION
RT-RT Transfer (receive) - Typical Timing Buffer Mode



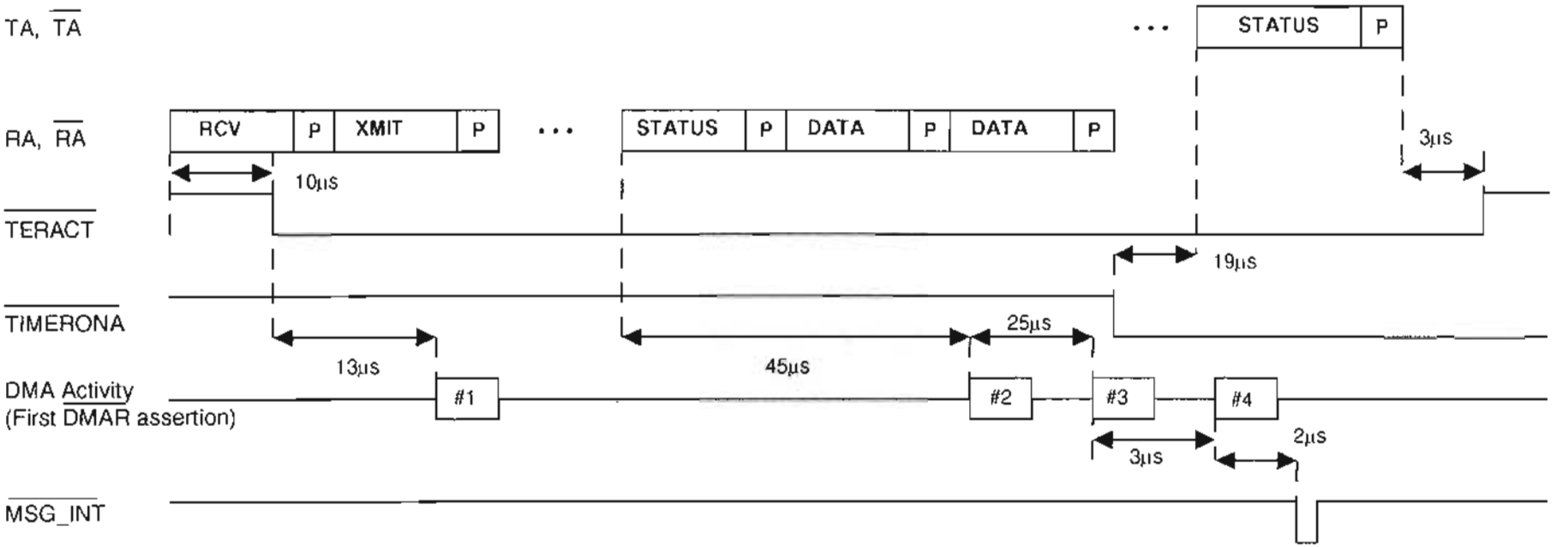
Notes:
1. Descriptor Read
2. Burst Data Word Write (SμMMIT stores all data in local memory)
3. Descriptor Update and optional Interrupt Log

UT69151 SμMMIT ™ RT-MODE OPERATION
Transmit Command - Typical Timing Buffer Mode



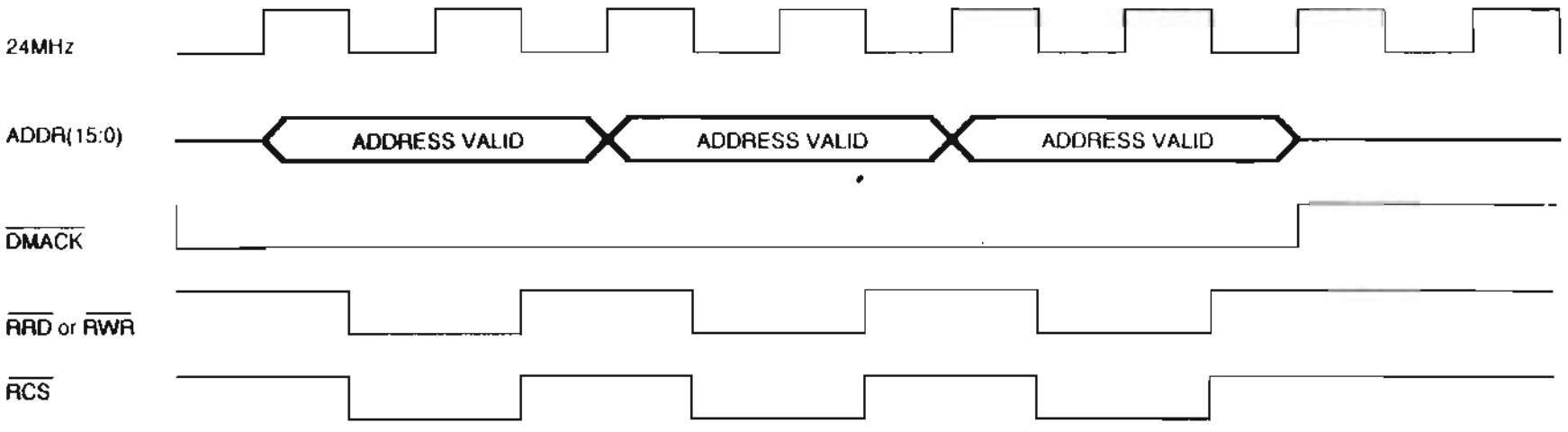
Notes:
1. Descriptor Read
2. Burst Data Word Read (SμMMIT retrieves all data from local memory)
3. Descriptor Update and optional Interrupt Log

UT69151 SμMMIT™ RT-MODE OPERATION
RT-RT Transfer (receive) - Typical Timing



Notes:
1. Descriptor Read
2. Data Word Write
3. Data Word Write
4. Descriptor Update and optional Interrupt Log

UT69151 SμMMIT™
Burst Mode Timing



Date: March 2, 1993

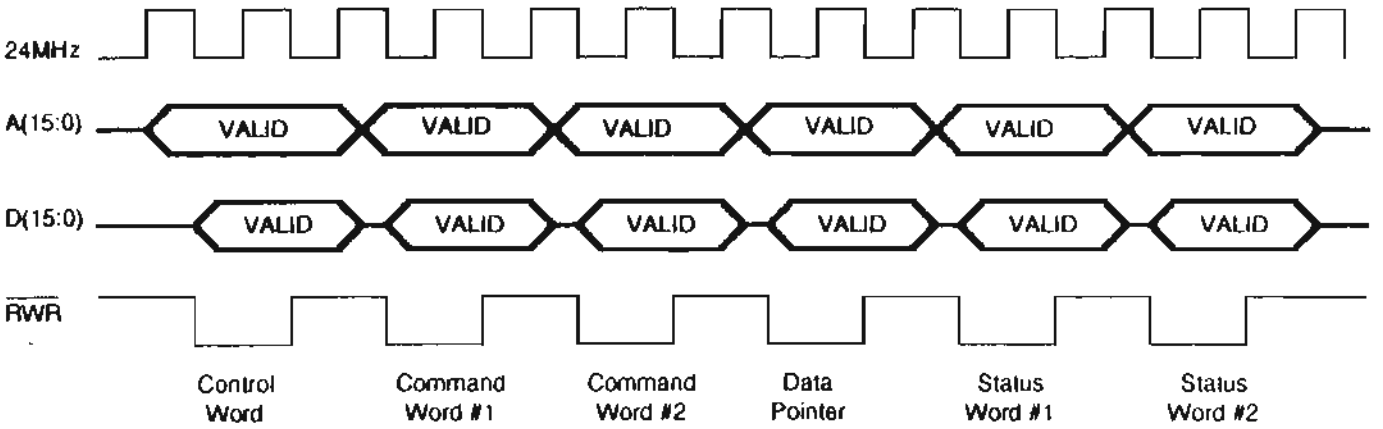
Number: SμMMIT-13

SμMMIT™ DMA Cycles

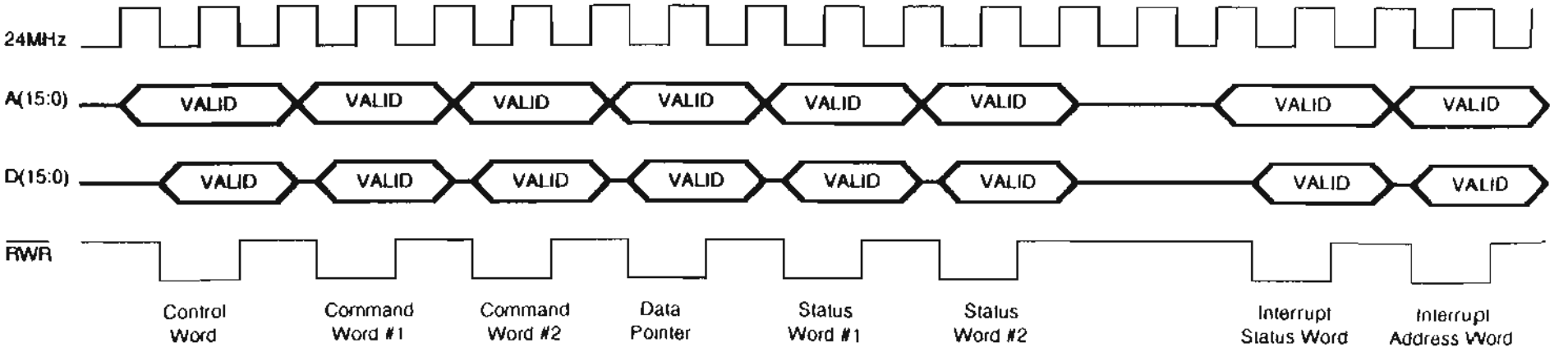
Number: SμMMIT-13

SμMMIT™ Bus Controller Memory Cycles:

Command Block Update: Burst of 6



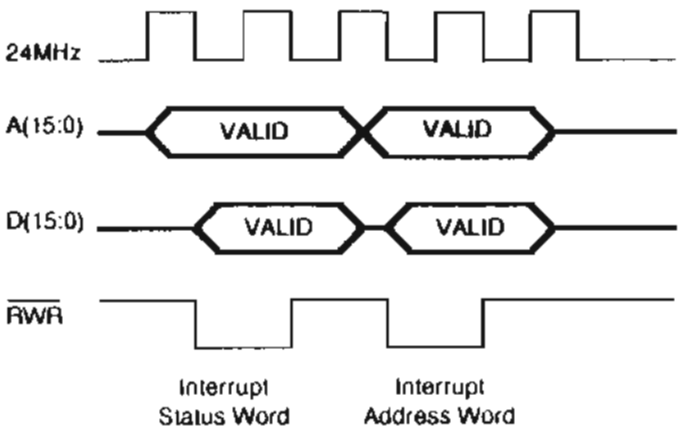
Command Block Update with Interrupt Logging: Burst of 8



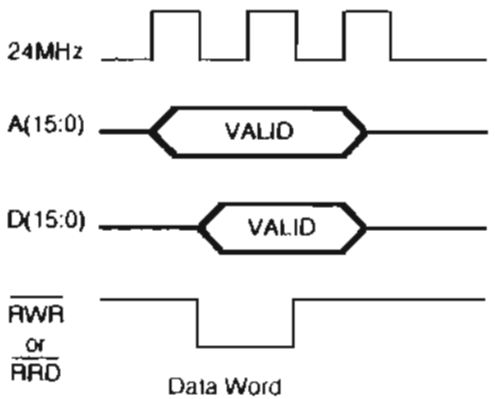
Number: SμMMIT-13

SμMMIT™ Bus Controller Memory Cycles:

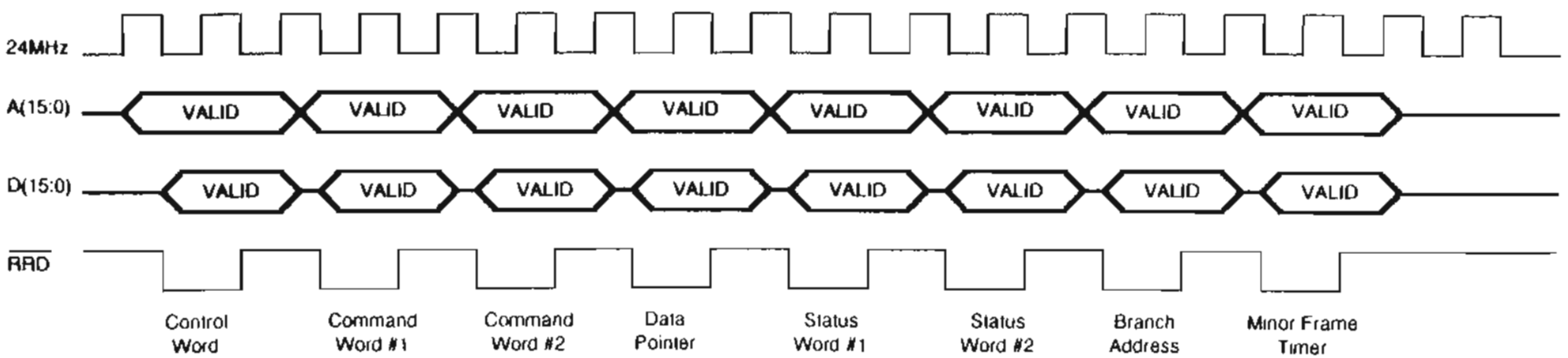
Interrupt Log (EOL Command Block): Burst of 2



Data Word: Non-Buffer Mode



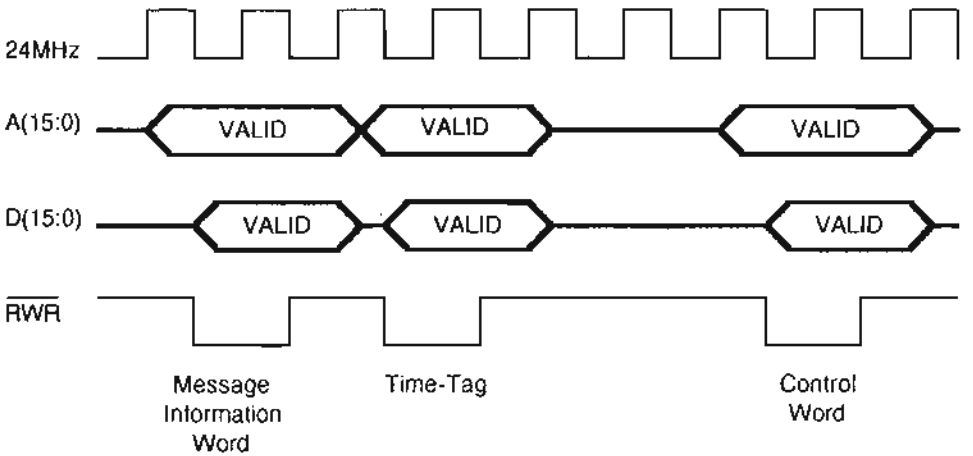
Command Block Read: Burst of 8



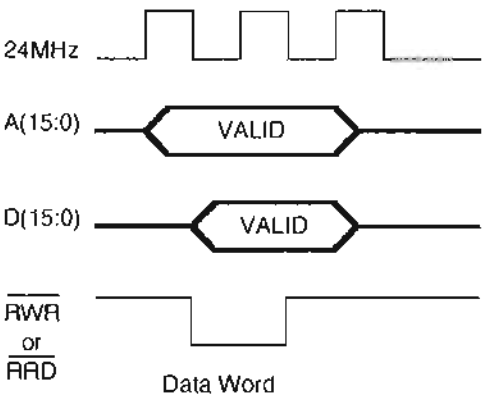
Number: SμMMIT-13

SμMMIT™ Remote Terminal Memory Cycles:

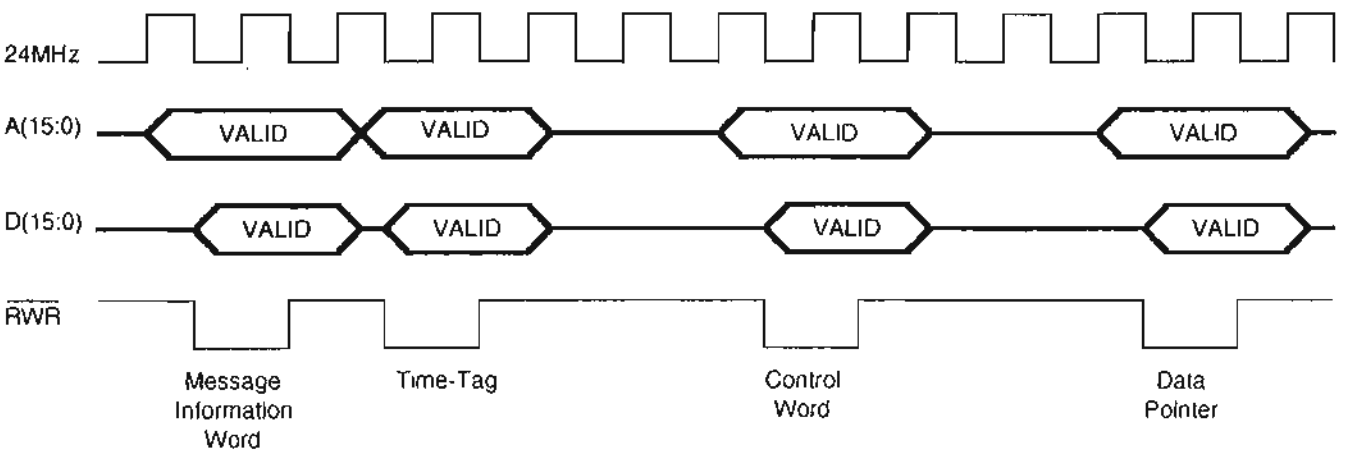
Message Logging and Descriptor Update: Burst of 3



Data Word: Non-Buffer Mode



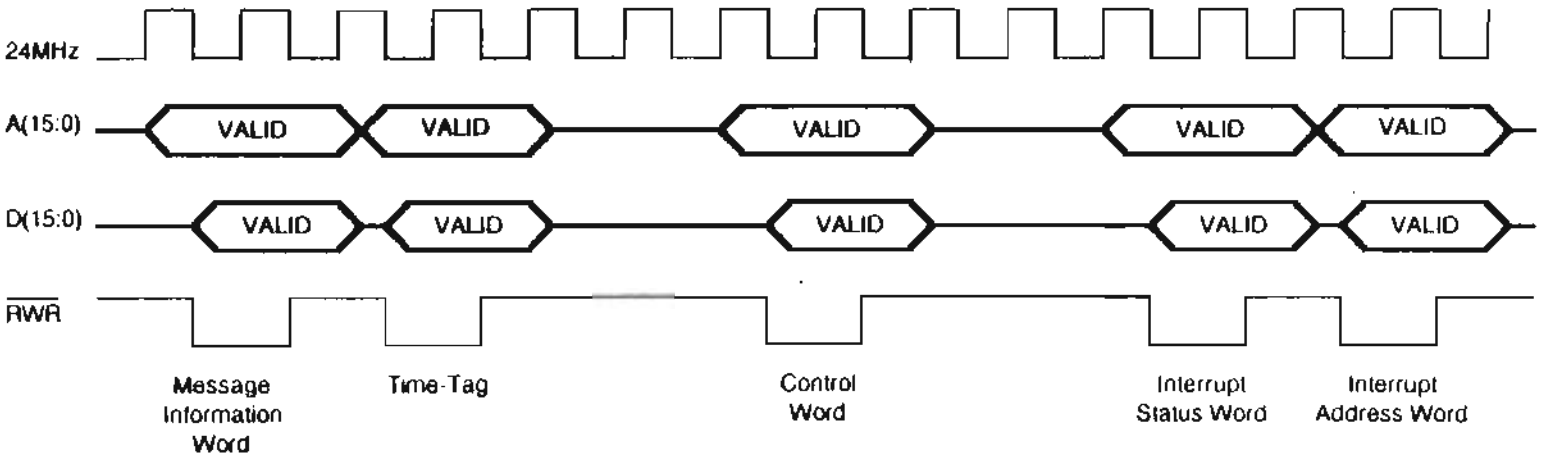
Message Logging and Descriptor Update: Burst of 4



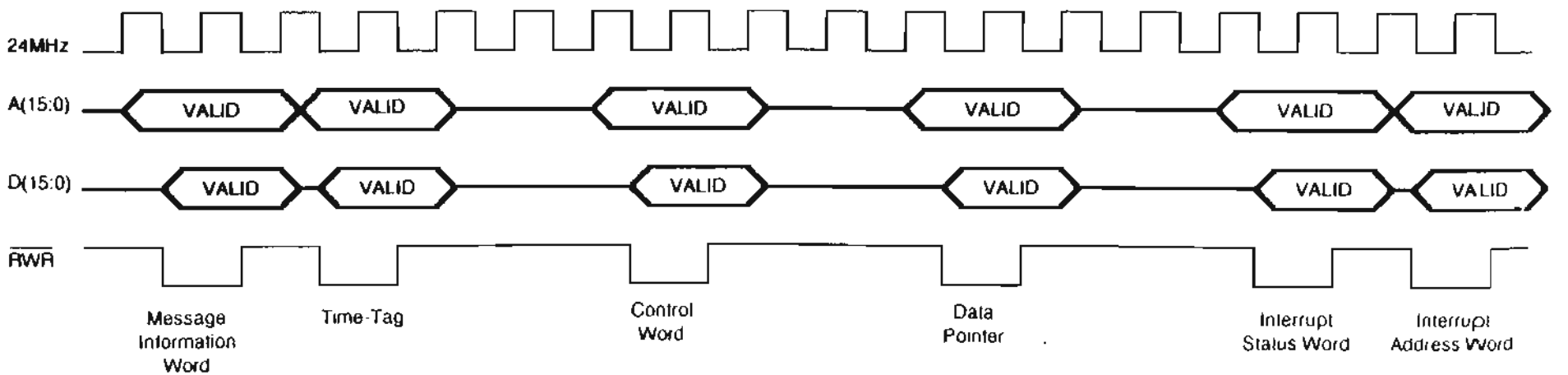
Number: SμMMIT-13

SμMMIT™ Remote Terminal Memory Cycles:

Message Logging, Descriptor Update, and Interrupt Logging: Burst of 5



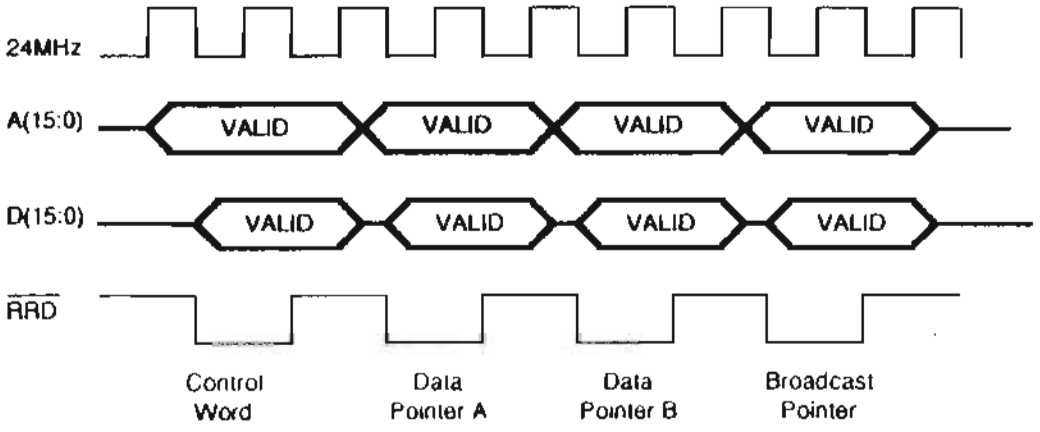
Message Logging, Descriptor Update, and Interrupt Logging: Burst of 6



Number: SμMMIT-13

SμMMIT™ Remote Terminal Memory Cycles:

Descriptor Read: Log Burst of 4

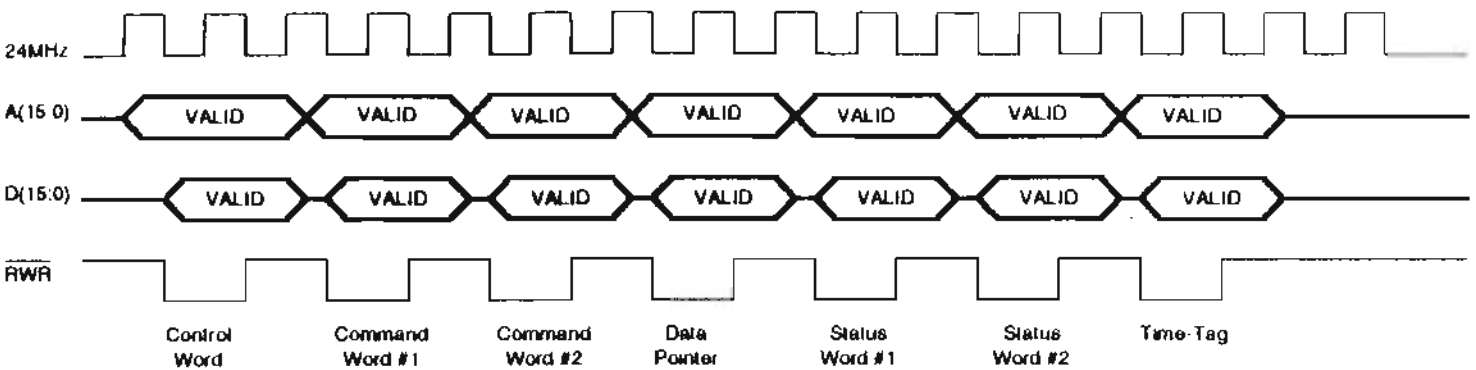


Date: March 2, 1993

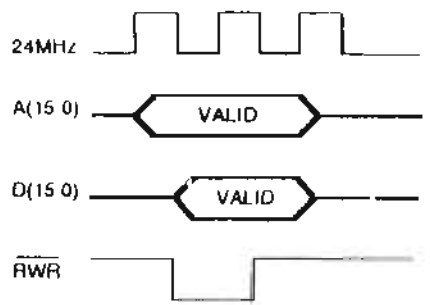
Number: SμMMIT-13

SμMMIT™ Monitor Memory Cycles:

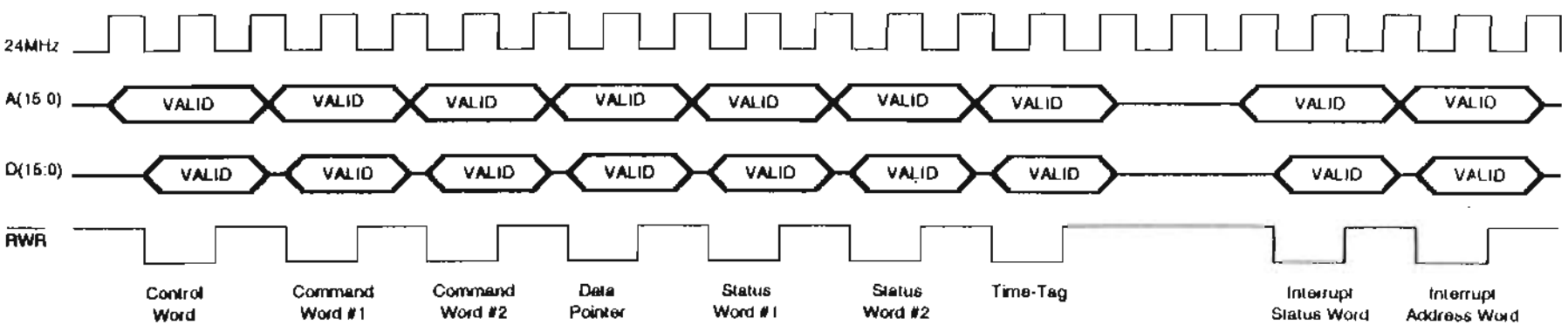
Command Block Write: Burst of 7



Data Word: Non-Buffer Mode



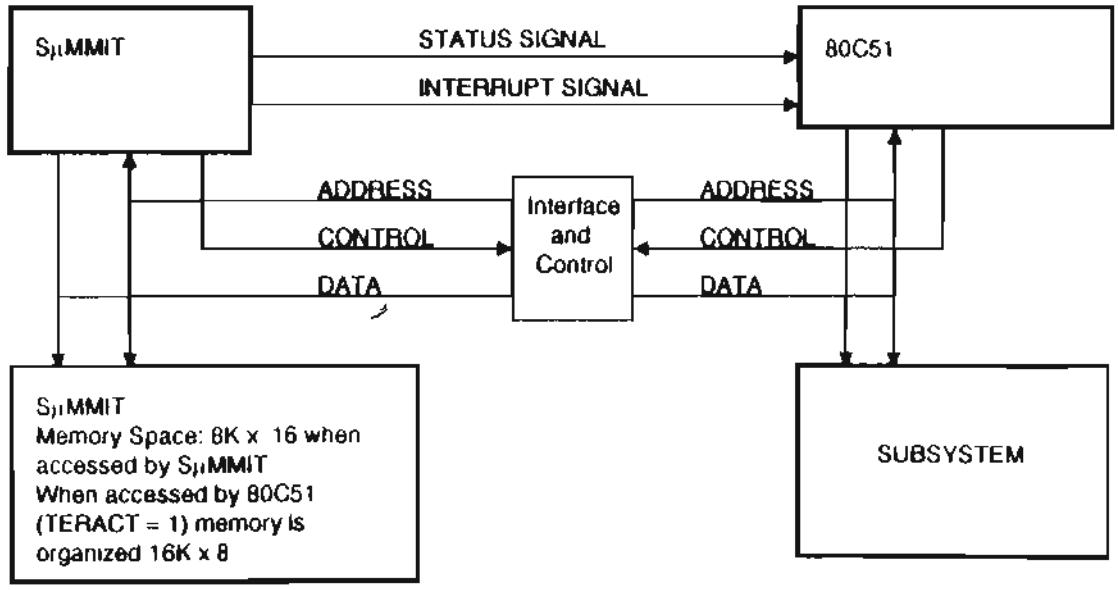
Command Block Write with Interrupt Log: Burst of 9



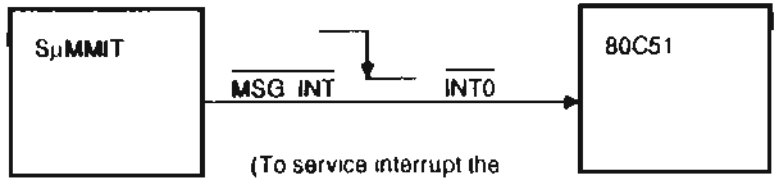
Number: SμMMIT-14

80C51 Shared Memory Interface To UT69151 SμMMIT ™

BLOCK DIAGRAM

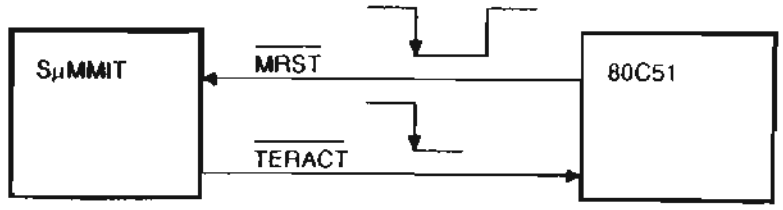


INTERRUPT SIGNAL



(To service interrupt the 80C511 reads the SμMMIT's Interrupt Log which resides in the SμMMIT memory space)

STATUS SIGNAL

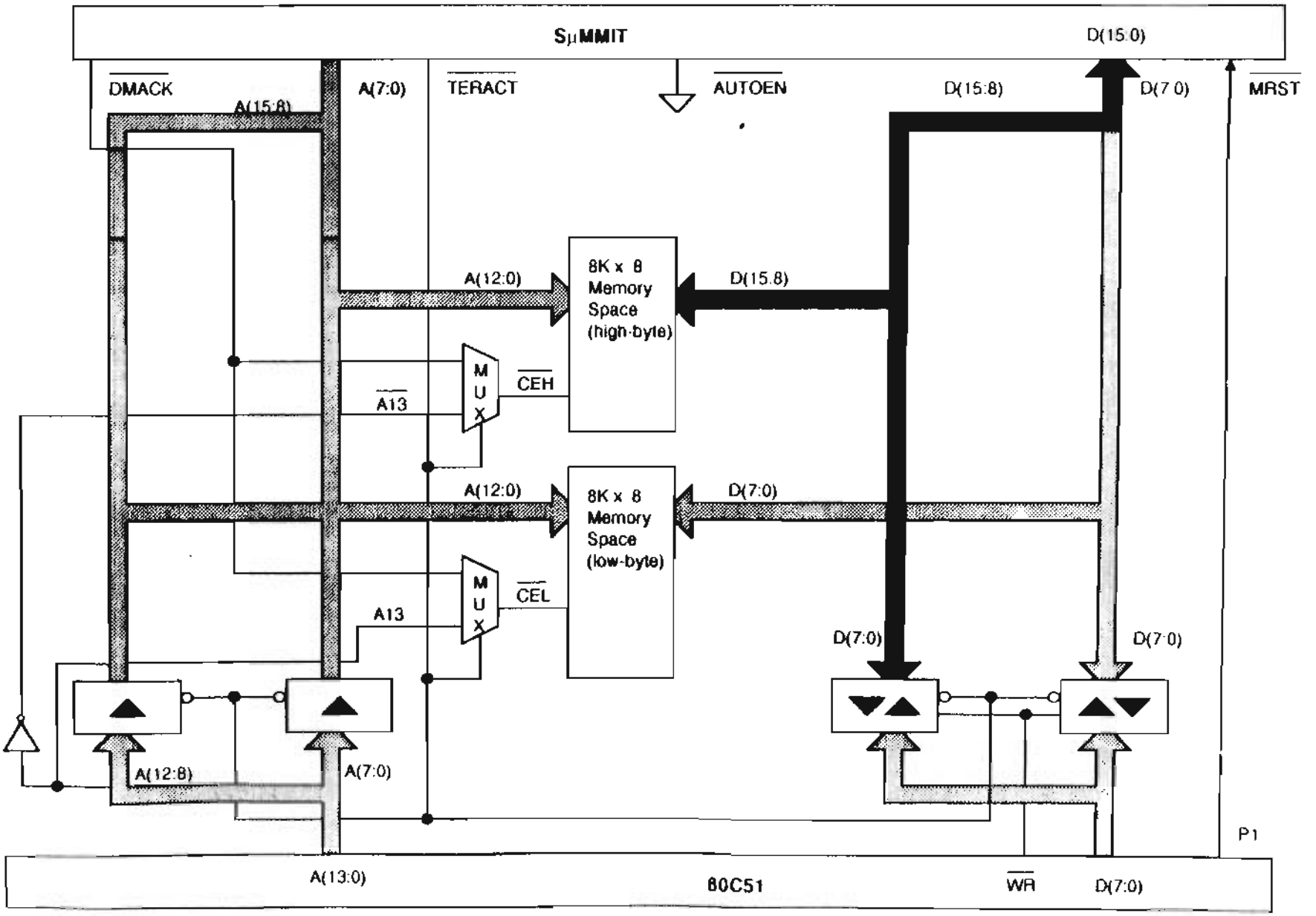


(The 80C51 polls the status of SμMMIT output "terminal active" to determine if the SμMMIT's memory space can be accessed (from Port 1)

$\overline{\text{TERACT}}$ = 1 (No)
$\overline{\text{TERACT}}$ = 0 (Yes)

Number: SμMMIT-14

80C51 Interface to SμMMIT Memory



Number: SμMMIT-14

80C51 Shared Memory Interface To UT69151 SμMMIT™

Example Memory Map:

SμMMIT Memory Space Partitioning

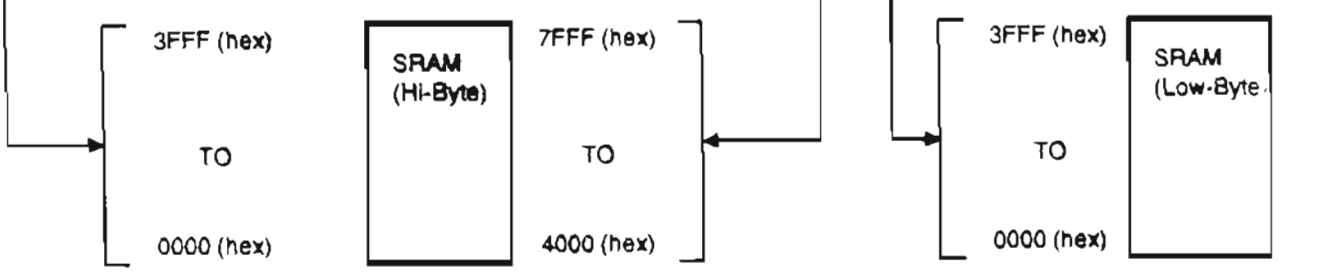
16K x 16 (SμMMIT) or 32K x 8 (80C51)
– 16K x 16 of SRAM for data storage
– The 80C51 never accesses the SμMMIT's internal registers.
The SμMMIT initializes for operation automatically on the assertion of master reset. auto-initialization information is loaded by the 80C51 prior to the assertion of master reset.
Auto-initialization information is stored in memory locations 0000 (hex) to 021F (hex). To configure this memory space the 80C51 writes to locations 0000 (hex) to 021F (hex) (low-byte) and 4000 (hex) to 421F (hex). (high-byte). Data is written and read from memory when the SμMMIT is not active.

Byte Addressing (MC68HC11, 32K x 8)

Low Byte Range: 0000 (hex) to 3FFF (hex)
High Byte Range: 4000 (hex to 7FFF (hex)

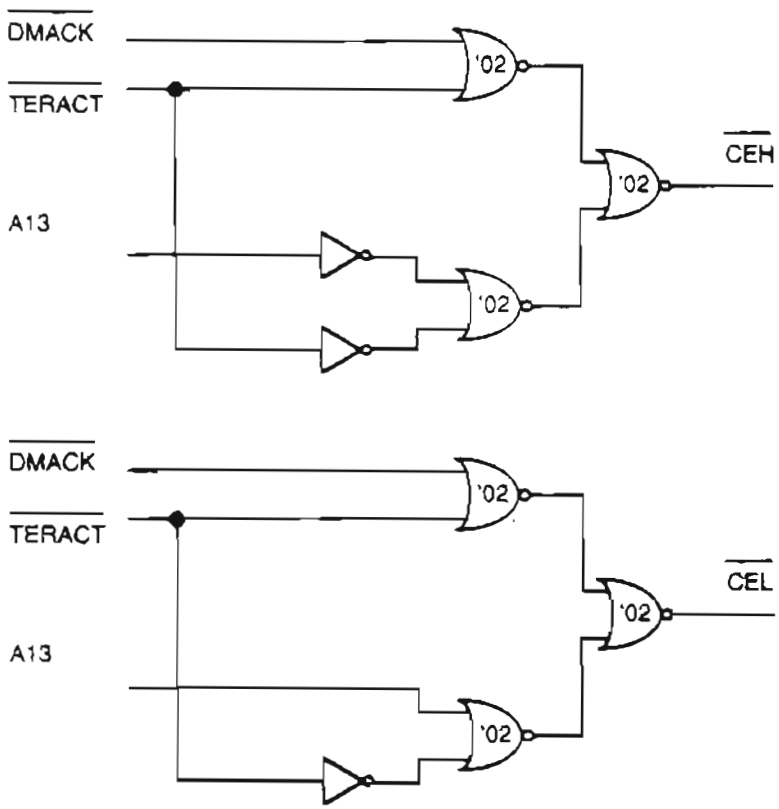
16-Bit Word Addressing (SμMMIT, 16K x 16)

0000 (hex) to 3FFF (hex)

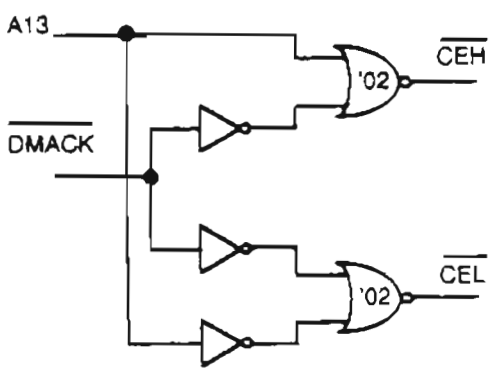


A 16-bit SμMMIT Word, requires two writes by the 80C51 (low byte and high byte).

Example #1 Mux (2 to 1):



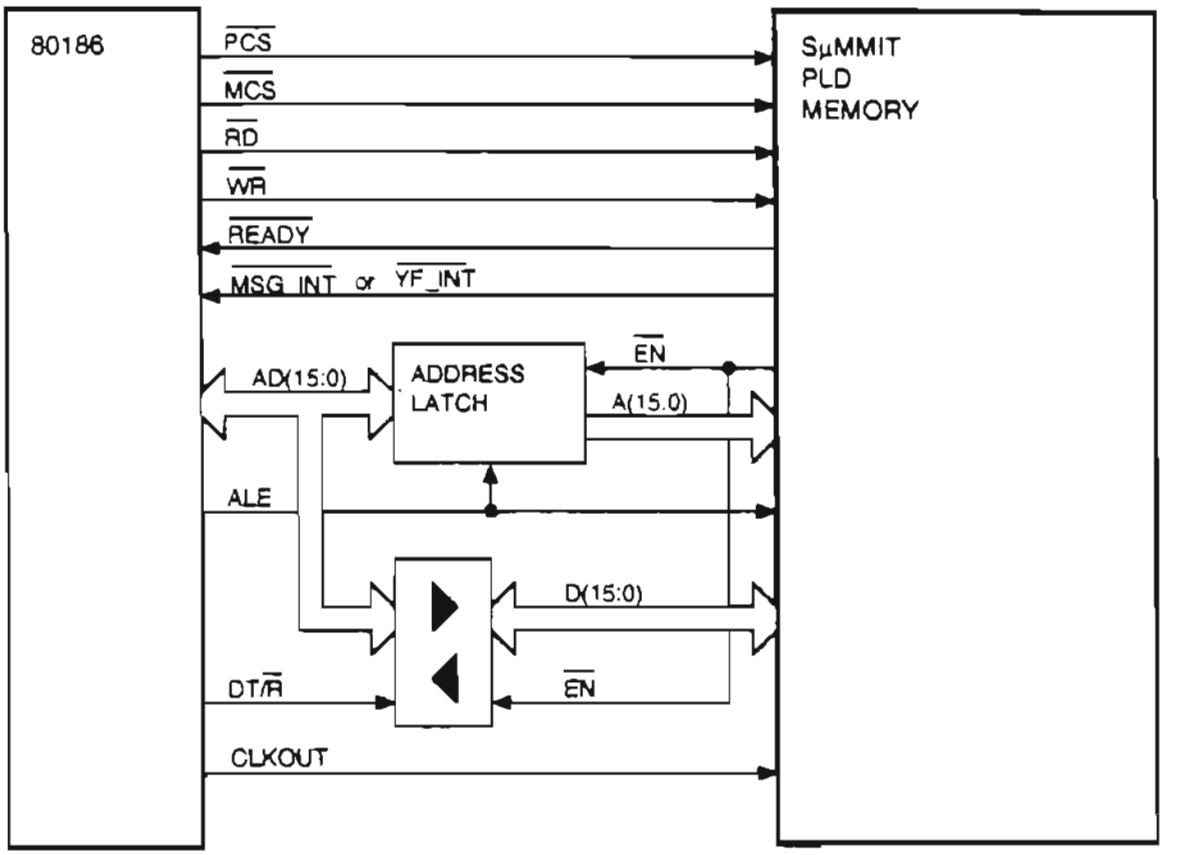
Example #2 Mux (2 to 1):



Date: June 8, 1993

Number: SµMMIT-15

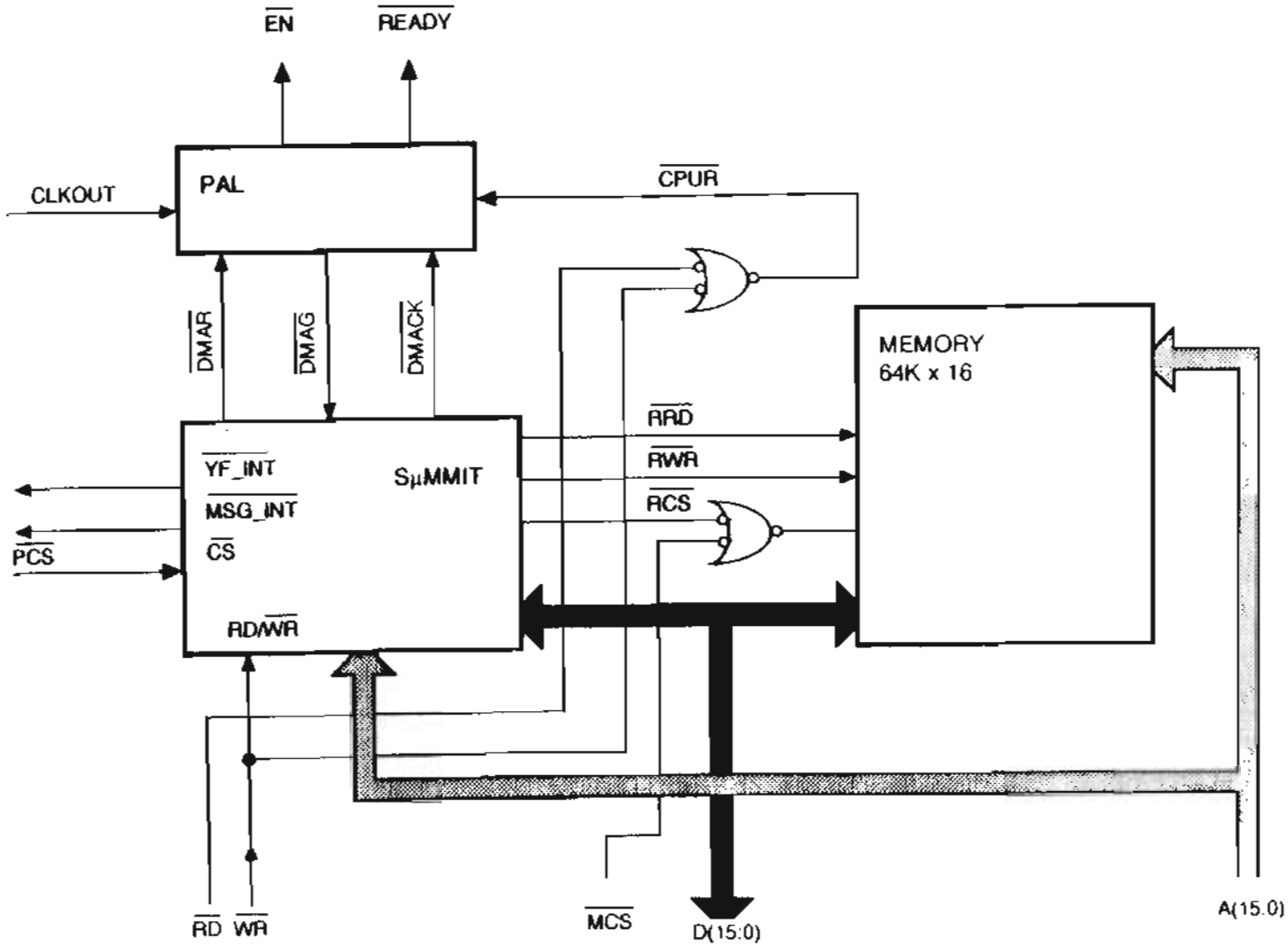
Shared Memory Interface To UT69151 SµMMIT™



Date: June 8, 1993

Number: SμMMIT-15

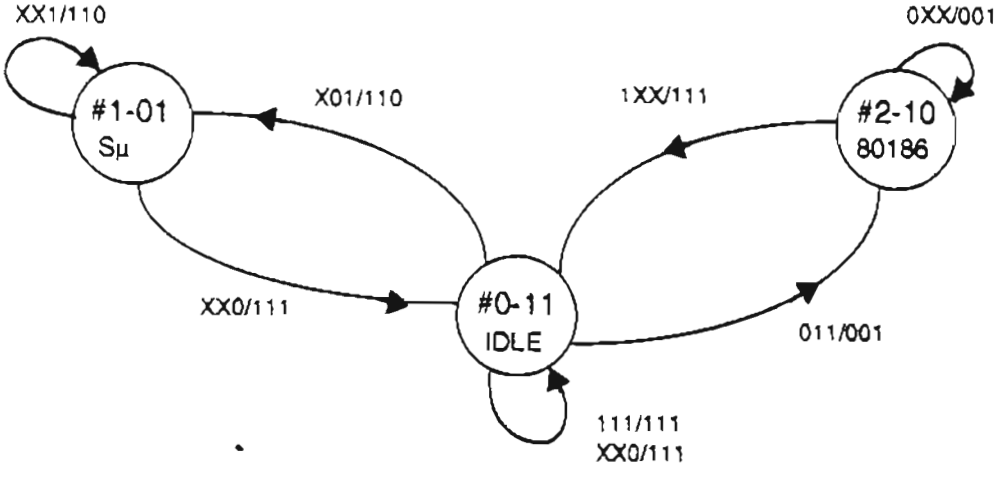
Shared Memory Interface To UT69151 SμMMIT™



Number: SμMMIT-15

Shared Memory Interface To UT69151 SμMMIT ™

Arbitration State Machine: Generates wait states via output signal READY



Inputs: $\overline{\text{CPUR}}$, $\overline{\text{DMAR}}$, $\overline{\text{DMACK}}$

Outputs: $\overline{\text{EN}}$, $\overline{\text{READY}}$, $\overline{\text{DMAG}}$

$\overline{\text{CPUR}}$	$\overline{\text{DMAR}}$	$\overline{\text{DMACK}}$	P.S.	N.S.	$\overline{\text{EN}}$	$\overline{\text{READY}}$	$\overline{\text{DMAG}}$	
X	X	0	11	11	1	1	1	; SμMMIT access
X	0	1	11	01	1	1	0	; SμMMIT request
0	1	1	11	10	0	0	1	; 80186 request
1	1	1	11	11	1	1	1	; No access or request
X	X	0	01	11	1	1	1	; SμMMIT acknowledge
X	X	1	01	01	1	1	0	; No SμMMIT acknowledge
0	X	X	10	10	0	0	1	; 80186 access
1	X	X	10	11	1	1	1	; 80186 access complete

Date: June 30, 1993

Number: SμMMIT-16

SμMMIT™ Example Command Block

0000 (hex)	Control Word	5600 (hex)
0001 (hex)	Commandl Word #1	3821 (hex)
0002 (hex)	Commandl Word #2	0000 (hex)
0003 (hex)	Data Pointer	0100 (hex)
0004 (hex)	Status Word #1	0000 (hex)
0005 (hex)	Status Word #2	0000 (hex)
0006 (hex)	Branch Address	0000 (hex)
0007 (hex)	Timer Value	0000 (hex)

```
;Control Word
    ; Execute block and branch
    ; Channel A
    ; Retries disabled in Control  Registerr
```

```
; Branch Address
    ; End -less loop
```

Number: SμMMIT-17

SμMMIT™ DMA Time-out Function

The SμMMIT architecture incorporates a DMA time-out feature that terminates DMA cycles upon the elapse of an internal watch-dog timer. A DMA time-out event is logged as an interrupt, if enabled, in the Pending Interrupt Register #4 (bit 15). In addition the SμMMIT records a DMA time-out event in the Bit Word Register #6 (bit 15).

At the start of a DMA cycle (i.e., assertion of DMAR) the watch-dog timer is loaded with a value that represents a 7μS time interval. The timer decrements until output signal DMACK negates, the negation of DMACK signals the completion of a DMA cycle. If the watch-dog timer reaches zero before the negation of DMACK, a DMA time-out scenario is declared and the cycle is terminated. The SμMMIT terminates the cycle by negating DMACK, RCS, and either RWR or RRD. Address and data bus pins return to a high impedance state.

Following a DMA time-out scenario the SμMMIT remote terminal and monitor will remain in the listening mode (i.e., prepared to respond to or monitor commands). When configured as a bus controller the device terminates message processing, and requires restart by the host or subsystem.

The following calculations determine the maximum number of wait states that can be added to a remote terminal DMA cycle without a DMA time-out scenario occurring.

Time alloted for a DMA transfer: 7μS

Maximun number of memory cycles in a remote terminal burst transfer: 6 accesses

Single wait-state period: 41nS

Single memory access period (zero-wait state): 82nS

Zero-wait state access time for a burst DMA transfer of 6: 6 x 82 = 492nS

DMAG assertion to DMACK assertion: 30nS

DMACK assertion to address bus active: 5nS

DMAR assertion to DMAG assertion: 1μS (System dependent, 1μS selected for this example)

Maximum zero-wait state DMA cycle time: 492nS + 30nS + 5nS + 1μS = 1.527μS

Maximum number of wait-states calucations per memory cycle:

7.0μS - 1.527μS = 5.473μS divided by 41nS/wait-states = 133 wait-states

133 wait-states divided by 6 accesses = 22 wait-states per access

Section 3
DDC Comparison

Rebuttal To DDC Comparison of the ACE To *UTMC's UT69151 SμMMIT™*

The following is a rebuttal to DDC's misleading claims in a document written 7/17/92. The intent of this document is to fairly present the UT69151 SμMMIT family of MIL-STD-1553 protocol devices.

RAM/PROCESSOR Interface

The ACE protocol device requires the host microprocessor to access memory through an onboard memory management unit. In this arrangement, the host microprocessor requests the bus and is given control of the bus when the IOEN signal asserts. The host microprocessor adds wait states to the memory cycle until the assertion of READY. If memory contention occurs, the microprocessor can wait up to 2.6μs for the ACE to release the bus (assert IOEN). For non-contented memory cycles, the IOEN asserts 85ns after a bus request (i.e., assertion of STRB and SELECT), the READY signal asserts 235ns (minimum) after IOEN resulting in a memory access time of 325ns for the ACE's internal RAM.

UTMC strongly believes that a simple external arbiter customized to support the system requirements is the most efficient approach to interfacing the MIL-STD-1553 protocol device to a subsystem microprocessor. An external arbiter is easily implemented in a state machine using a 22V10 PLA. A DMA interface allows the SμMMIT to access subsytem memory and thus removes the need for dedicated 16 bit of memory for the protocol device. The maximum the host would wait for access when contenting with the SμMMIT is 700ns.

A shared memory architecture with multiple users is also difficult to support when using the ACE. A subsystem (e.g., sensor) collecting data for transmission over the MIL-STD-1553 data bus needs access to the internal RAM of the ACE. Subsystem access may require arbitration with the microprocessor to gain control of DMA request signals STRB and SELECT. This would require an extra logic. The host microprocessor could transfer data from the sensor to the ACE's internal RAM. Having the host transfer data from the sensor to internal RAM increases the software overhead associated with the MIL-STD-1553 port.

The small memory space (4K x 16) of the ACE is also limiting in all modes of operation. In the remote terminal mode, approximately one quarter of the internal memory is allocated for look-up tables and stacks. The memory reserved for bus controller and monitor overhead is greater than 25%. The SμMMIT can access 64K x 16 of memory in all modes of operation.

The SμMMIT supports both 8-bit and 16-bit microprocessor systems. A system designer can implement a simple 8-bit interface with the SμMMIT's auto-initialization feature. UTMC's technical literature outlines the system architecture and ease of interface to the 80C51 and 68HC11.

P.C. Board Space

When using a DMA architecture, the SμMMIT LX/DX interfaces directly with the subsystem memory, therefore the area required for memory is not included in these

calculations. The following area calculations are made assuming through-hole package technology:

SμMMIT LX/DX	1.3in^2	ACE	1.9in^2
PLA	0.4in^2	PLA	0.4in^2
Component Spacing	0.5in^2	Component Spacing	0.5in^2
Total	2.2in^2	Total	2.8in^2

Depending on board layout and other printed circuit card components the layout can vary slightly.

Note: The above calculations do not include memory since the UTMC SμMMIT can interface to subsystem memory.

System Manufacturing Cost

Since the SμMMIT, subsystem, and host share memory, there are no additional devices in the UTMC solution than in the DDC solution. Cost savings due to reduced paperwork, material handling, incoming inspection, component testing, and printed circuit card testing are non-existent. UTMC has the ability to deliver MIL-STD-883 compliant devices via Defense Electronic Supply Center (DESC) Standard Military Drawings (SMDs) which reduce procurement paperwork, incoming inspection, and component testing.

Interrupt Architecture

The SμMMIT interrupt architecture has the flexibility to support varying interrupt service approaches including polling and service upon request. The SμMMIT interrupt architecture is simple, all interrupt events are captured in a 16-entry interrupt buffer, residing in memory, and/or in a 16-bit internal register. The host interrogates either the buffer or the register to determine the event that requires service.

The host can periodically read this buffer (poll) or access the buffer after the assertion of the YF_INT or MSG_INT outputs (service upon request). Interrupt logging is useful when the interrupt service latency is such that multiple interrupts can occur before the software vectors to the interrupt service routine. The SμMMIT's interrupt log buffer architecture has a superior advantage over the stack architecture found in the ACE. With the stack architecture, the host first reads the Interrupt Status Register to determine the type of interrupt and then proceeds to determine the source of the interrupt by paging through the message stacks. The SμMMIT stores all pertinent interrupt information in two localized 16-bit words. DDC also boasts that the ACE has several interrupt conditions that the SμMMIT does not, and that these additional interrupts conserve CPU bandwidth by eliminating the need to poll the ACE. UTMC is not clear on how additional interrupts increase CPU bandwidth. The autonomous architecture of the SμMMIT was designed to react to events, especially in the bus controller mode, and not generate interrupts that require host service.

Register Operation

The SμMMIT's internal registers can be written at anytime, however the user should understand that message processing can be affected by indiscriminately writing to internal registers, the same holds true for the ACE.

Fault Coverage

The claim of 99% fault coverage for a mixed mode (digital and analog transceiver) device like the ACE is inappropriate. The UT69151 SμMMIT, a completely digital device, has 95% percent fault coverage. Internal transceivers found in the SμMMIT LX/DX are functional tested via an internal wrap circuit.

Bus Controller Time-Out

The SμMMIT bus controller time-out circuit was designed to support MIL-STD-1553 revisions A and B.

Single Ended Operation

The decoder design of all UTMC MIL-STD-1553 products allows for uniphase operation (i.e., single-ended). The SμMMIT is designed into numerous MIL-STD-1773 applications and has a simpler interface than the ACE device or any other DDC product offerings. DDC products require a special end of transmission delimiter circuit, present MIL-STD-1773 applications using DDC products use an ASIC to generate the delimiter. Please reference the UTMC's technical literature for design specifics.

Transmit Inhibit

The SμMMIT automatically generates a transmitter inhibit signal to meet the remote terminal fail-safe timer provision in MIL-STD-1553. If the subsystem needs to inhibit the transmitter, Control Register bits 11 and 12 are cleared.

Bus Controller Operation

Comparing the ACE and SμMMIT architectures is very difficult and at times inappropriate. Many of DDC's statements regarding the SμMMIT's bus controller architecture are incorrect and/or misleading.

The SμMMIT's bus controller architecture was designed to be autonomous; that is, off-load the host by reacting to MIL-STD-1553 events as opposed to generating interrupts to the host requesting service. For example, the SμMMIT's ability to branch on conditions (e.g., assertion of SRQ bit) and message errors (e.g., no-response), allows the SμMMIT bus controller to respond to MIL-STD-1553 bus activity without host intervention. The SμMMIT can also periodically initiate self-test from within a minor frame, future off-loading the host from servicing the MIL-STD-1553 port. If required, the SμMMIT can synchronize the host by generating non-message error interrupts at anytime via the Interrupt and Continue opcode.

The SμMMIT's minor frame timer architecture off-loads the software designer from the task of calculating intermessage gap times. Instead of scheduling messages on a message-by-message basis the SμMMIT allows for the scheduling of messages on a minor frame basis. The minor frame timer is controlled by a 16-bit timer with a 41ns/bit resolution. For retry scenarios the SμMMIT automatically calculates message lengths to avoid bus collisions. The SμMMIT also automatically repeats minor frames when

programmed to do so. Easily implement Stop-on-Message , Status Set, Format Error, and Stop-on-Frame conditions with the SμMMIT's opcode set.

Another example of the SμMMIT's ability to off-load the host is the response to a Status Set condition. A Status Set condition is automatically handled by the SμMMIT, the ACE generates and interrupt requesting service from the host.

As stated earlier the ACE's 4K x 16 of memory is very restricting in the bus controller mode. The ACE can support stack sizes up to 2048 words which is 50% of the internal memory The remaining 2K x 16 of memory contains BC Message Blocks. For transferring large blocks of information the 2K x 16 memory restriction is very limiting.

External triggering of the SμMMIT's bus controller is accomplished via the auto-initialization feature of the SμMMIT. The host would strobe the SμMMIT's MRST signal to start a BC frame, the frame would end on an EOL opcode.

Remote Terminal Operation

In an effort to differentiate the ACE's remote terminal architecture from the SμMMIT, DDC presents compelling argument that, in truth, hold no real benefit to the user. Specifically, illegal and busy command scenarios, BIT word contents, transmit bulk data transfer, and remote terminal address latching functionality. The illegal and busy command functionality of the SμMMIT meets the requirements of MIL-STD-1553B Notice 2. The SμMMIT remote terminal has been validated by an independent test house, the results of that testing is available in a Test Report. The SμMMIT's BIT word contains 6 defined bits and 10 user-defined bits. UTMC believes the BIT word format adequately describes the health of the remote terminal hardware, especially the results of a built-in test and wrap-test. The DDC BIT word uses additional bits to report message error information to the bus controller. In a laboratory environment this may be of value, in a flight scenario the benefit is questionable. The option of a completely programmable BIT word is very CPU intensive and is of questionable benefit.

The SμMMIT supports bulk data transfer via the message indexing feature. The indexing architecture can store 256 messages per subaddress, at 32 words per message, indexing allows the transfer of 8K words. Upon reception of 256 commands the SμMMIT can generate an interrupt to the host requesting service. Message indexing is supported for receive subaddresses only.

For bulk data transfers the ACE architecture is advantages as the host does not have to swift through the data to remove Message Information Words and Time-Tag Words. A drawback to the ACE is the limited data memory (3K x 16), the small memory space severely restricts the bulk data transfer capability of the ACE. DDC's statement that the ACE is less susceptible to bit flips due to the separate storage of data pointers is also misleading, bit flips in any pointer structure will corrupt message handling. Also the statement that the loss of old data is preferable to the loss of recent data during bulk data transfers is puzzling. UTMC believes that any data loss during a bulk data transfer is critical and should not be allowed in the system.

In addition to message indexing, the SμMMIT supports single and double buffering. The ACE allows for the local enable/disable of ping-pong buffering, the SμMMIT uses a global enable/disable. When using the SμMMIT, the host can couple to the MIL-STD-1553 data bus by polling the TERACT signal, this signal is polled to determine if the

remote terminal is active or is preparing to process a message. If the remote terminal is inactive the host can service the MIL-STD-1553 without the possibility of corrupting data consistency. A semaphore with functionality is not supplied with the ACE device, as a result careful timing analysis must be performed to insure that the host does not access a buffer that will become active before service is complete. In this scenario the host determines the inactive block, the ACE updates the data pointer bit, and the next message is entered into the same buffer the host is accessing.

Monitor Operation

The SμMMIT's monitor architecture is designed to collect a user-specified number of messages and then generate an interrupt to the host requesting service. Specify the number of messages to store in register 13. Select remote terminals for monitoring via internal registers 14 and 15. The SμMMIT architecture does not allow for filtering of messages at the subaddress level. Data and message information is stored contiguously in two buffers residing in memory. Define the starting location for each buffer in registers 11 and 12. The centralized location of data and message information allows for low overhead service by the host.

The SμMMIT does require real-time service of the MBC interrupt to prevent data loss. Service consist of stopping the monitor (STEX = 0, Register #0), updating the Initial Monitor Data Pointer Register, and restarting the monitor (STEX=1, Register #0). An alternative to this sequence is the switching of memory banks on the occurrence of a MBC interrupt. A memory swapping technique increases the interrupt service latency of the host when reacting to a MBC interrupt.

DDC incorrectly stated the SμMMIT monitor time-out, the monitor times out at 12μs in the A mode and 17μs in the B mode. These limits are derived from MIL-STD-1553A and MIL-STD-1553B respectively.

The small amount of internal memory severely restricts the ACE's RT/MT operation. The ACE and SμMMIT have similar functionality when configured in this mode; however, a major difference is that the ACE has only 3K x 16 of memory to store monitor and remote terminal information. With such a limited storage area available, the ACE will frequently interrupt the host requesting service.

Accomplish external triggering of the SμMMIT's monitor via the auto-initialization feature. The host strobes the SμMMIT's MRST signal to start the monitor, monitoring stops when register 13 decrements to zero.

	SµMMIT	SµMMIT LXE/DXE	SµMMIT XTE	SµMMIT RTE	BUS-65170	BUS-61580	BUS-61590	BUS-65520
FUNCTIONALITY	Bus Controller Remote Terminal Bus Monitor	Bus Controller Remote Terminal Bus Monitor	Bus Controller Remote Terminal Bus Monitor	Remote Terminal	Remote Terminal	Bus Controller Remote Terminal Bus Monitor	Bus Controller Remote Terminal Bus Monitor	Bus Controller Remote Terminal Bus Monitor
PACKAGING	84-lead FP (1.15 x 1.15) 85-pin PGA (1.1 x 1.1)	100-lead FP (1 x 1.3) 96-pin PGA (1.0 x 1.3)	140-lead FP (1.3 x 1.4) 139-pin PGA (1.3 x 1.4)	132-lead FP (0.95 x 0.95) 140-lead FP (1.3 x 1.4) 139-pin PGA (1.3 x 1.4)	70-lead FP (1.0 x 1.9) 70-pin DIP (1.0 x 1.9) 1in^2 Mini-Ace	70-lead FP (1.0 x 1.9) 70-pin DIP (1.0 x 1.9)	78-lead FP (1.8 x 2.1) 78-pin DIP (1.8 x 2.1)	144-lead PGA (1.0 x 1.0) 144-pin PGA (1.5 x 1.5)
TRANSCEIVER	External Idle Low	1553 Internal	1553 Internal	1553 Internal	1553 Internal	1553 Internal	1553 or MacAir Internal	External
MEMORY	External 64K x 16	External 64K x 17	Internal 32K x 16	Internal 4K x 16	4K x 16	4K x 16 12K x 17 (BUS-65185)	4K x 16 12K x 17 (BUS-65192)	4K x 16
SYSTEM INTERFACE	Memory Mapped DMA	Memory Mapped DMA	8 or 16 bit Shared Memory	8 or 16 bit Shared Memory	8 or 16 bit Shared Memory	8 or 16 bit Shared Memory	8 or 16 bit Shared Memory	8 or 16 bit Shared Memory
INTERRUPT ARCHITECTURE	Yes Real Time or Logging	Yes Real Time or Logging	Yes Real Time or Logging	Yes Real Time or Logging	Yes	Yes	Yes	Yes
SELF-TEST	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
POWER	5 Volt Only	5 Volt only (DXE) 5 and -15 Volt (LXE) 5 and -12 Volt (LXE)	5 Volt only 5 and -15 Volt 5 and -12 Volt	5 Volt only (RTE)	5 Volt 5 and -15 Volt 5 and -12 Volt	5 Volt 5 and -15 Volt 5 and -12 Volt	5 Volt 5 and -15 Volt 6 and -12 Volt	5 Volt 5 and -15 Volt 5 and -12 Volt

Interface

	SµMMIT	SµMMIT LXE/DXE	SµMMIT XTE	SµMMIT RTE	BUS-65170	BUS-61580	BUS-61590	BUS-65620
8-BIT MULTIPLEXED	No	No	Yes	Yes	Yes	Yes	Yes	Yes
16-BIT MULTIPLEXED	No	No	Yes	Yes	Yes	Yes	Yes	Yes
8-BIT NON-MULTIPLEXED	No	No	Yes	Yes	Yes	Yes	Yes	Yes
16-BIT NON-MULTIPLEXED	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PROGRAMMABLE WAIT STATES	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A
DATA TRANSFER ACKNOWLEDGE	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes
INTERRUPT PULSE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INTERRUPT LEVEL	No	No	Yes	Yes	Yes	Yes	Yes	Yes
DMA	Yes (64K x 16)	Yes (64K x 16)	No	No	Yes	Yes	Yes	Yes
SHARED MEMORY	No	No	Yes (32K x 16)	Yes (4K x 16)	Yes	Yes	Yes	Yes

	SμMMIT	SμMMIT LXE/DXE	SμMMIT XTE	SμMMIT RTE	BUS-65170	BUS-61580	BUS-61590	BUS-65620
MEMORY MAPPED POINTER ARCHITECTURE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	2 Tier	2 Tier	2 Tier	2 Tier	3 Tier	3 Tier	3 Tier	3 Tier
MESSAGE INDEXING	Yes	Yes	Yes	Yes	No	No	No	No
CIRCULAR BUFFERING	Message Count Word Count	Message Count Word Count	Message Count Word Count	Message Count Word Count	Word Count	Word Count	Word Count	Word Count
DOUBLE BUFFERING	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INTERNAL COMMAND ILLEGALIZATION	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AUTO INITIALIZATION	Yes 16-bit Non Volatile	Yes 16-bit Non Volatile	Yes 8-bit Non Volatile	Yes 8-bit Non Volatile	No	No	No	No
TIME-TAG	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit
CONCURRENT REMOTE TERMINAL AND MONITOR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PROTOCOLS	1553A 1553B MacAir 3818 MacAir5690	1553A 1553B MacAir 3818 MacAir 5690	1553A 1553B MacAir 3818 MacAir 5690	1553A 1553B MacAir 3818 MacAir 5690	1553A 1553B	1553A 1553B	1553A 1553B MacAir 3818 MacAir 5690 MacAir 5232	1553A 1553B MacAir 3818 MacAir 5690 MacAir 5232
1553 NOTICE II COMPLIANCE VALIDATION	Subcontracted to TSI	Subcontracted to TSI	Subcontracted to TSI	Subcontracted to TSI	Internal	Internal	Internal	Internal

Bus Controller

	SμMMIT	SμMMIT LXE/DXE	SμMMIT XTE	SμMMIT RTE	BUS-65170	BUS-61580	BUS-61590	BUS-65620
MINOR FRAME SELF-TEST	Yes Wrap Around and BIT	Yes Wrap Around and BIT	Yes Wrap Around and BIT	N/A	N/A	Yes Loopback and BIT	Yes Loopback and BIT	Yes Loopback and BIT
MINOR FRAME TIMER	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
AUTO-RETRY	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
POLLING	Yes	Yes	Yes	N/A	N/A	No	No	No
MINOR FRAME BRANCH	Yes	Yes	Yes	N/A	N/A	No	No	No
GRACE-FULL HALT	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
COMMANDS PER MINOR FRAME	Limited by 64K x 16	Limited by 64K x 16	Limited by 64K x 16	N/A	N/A	512	512	512
MESSAGE SCHEDULING	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes

	SµMMIT	SµMMIT LXE/DXE	SµMMIT XTE	SµMMIT RTE	BUS-65170	BUS-61680	BUS-61590	BUS-65620
MEMORY MAPPED POINTER ARCHITECTURE	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
AUTO INITIALIZATION	Yes 16-bit Non Volatile	Yes 16-bit Non Volatile	Yes 8-bit Non Volatile	N/A	N/A	No	No	No
HALF-FULL INTERRUPT	Yes	Yes	Yes	N/A	N/A	No	No	No
BUFFER FULL INTERRUPT	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
REMOTE TERMINAL FILTERING	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
TRANSMIT RECEIVE & SUBADDRESS FILTERING	No	No	No	N/A	N/A	Yes	Yes	Yes
CONCURRENT REMOTE TERMINAL AND MONITOR	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes
EXTERNAL TRIGGER	No	No	No	N/A	N/A	Yes	Yes	Yes
MONITOR TRIGGER	Yes Via Auto-Initialization	Yes Via Auto-Initialization	Yes Via Auto-Initialization	N/A	N/A	Yes	Yes	Yes

Section 4
McDonnell Douglas Compliance

Reference: The UTMC SμMMIT™ Device Compliance to McDonnell Douglas A3818 1553 Specification

The purpose of this document is to briefly summarize the SμMMIT's compliance to the McDonnell Douglas (Mac-Air) A3818 mux bus specification. Some of the key requirements of the A3818 specification have been included in the SμMMIT to allow flexibility beyond the MIL-STD-1553B specification that the SμMMIT primarily serves.

The key requirements of the A3818 protocol are listed, in the relative order of importance, along with comments regarding the SμMMIT's ability to meet these requirements.

Requirement 1 - MIL-STD-1553A Remote Terminal Response Time:

A3818 protocol requires that the remote terminal response be less than 7.0 μs when measured from the zero-crossing of the parity bit to the zero crossing of the mid-point of the Status Word sync pattern.

The SμMMIT meets this response time requirement when placed in the "A" mode as described in the SμMMIT Product Handbook (bit 7 of the Operational Status Register).

Requirement 2 - Treat Remote Terminal Address (11111) as a unique Remote Terminal address

A3818 protocol specifies that remote terminal address 11111 (binary) is a unique remote terminal address (i.e., not reserved for broadcast).

The SμMMIT allows remote terminal address of 11111 to be treated as a non-broadcast address via the Control Register (Register 0, bit 4).

Requirement 3 - Treat Subaddress 11111 as a "normal" (non-Mode Code) Subaddress

A3818 protocol requires that subaddress 11111 be treated as a subaddress, rather than as an indicator that the word-count field of the Command Word contains a Mode Code. The MIL-STD-1553B protocol specifies that either 11111 or 00000 in the Subaddress field indicates that the Word Count field contains a Mode Code. A3818 reserves a Subaddress value of 00000 for this purpose only.

The SμMMIT allows the conformance to this requirement when it is placed in the MIL-STD-1553A mode of operation (Refer to Section 2.9 of the SμMMIT Product Handbook for additional details).

Requirement 4 - Status Word bits are "user definable"

A3818 protocol allows all bits of the Status Word, with the exception of the Remote Terminal Address field, Message Error bit, Terminal Flag Bit, and the Parity Bit, to be user defined.

The SμMMIT allows the conformance to this requirement when it is placed in the MIL-STD-1553A mode of operation.

Requirement 5 - "User definable Mode Codes"

A3818 protocol allows user definition of Mode Codes. The practical implication of this requirement is that the auto-execution of "MIL-STD-1553B" Mode Codes must be suppressed. The A3818 protocol does specify a single Mode Code, this being the Dynamic Bus Control Mode Code.

The SμMMIT allows the conformance to this requirement when it is placed in the MIL-STD-1553A mode of operation. Further, the SμMMIT allows, as a programmable option, the auto-execution of the Transmit Last Command Mode Code, provided the "user" has defined this Mode Code to be consistent with MIL-STD-1553B (i.e., 00010).

Requirement 6 - All Mode Codes are defined as Mode Codes are without data

A3818 protocol dictates that Mode Codes are without data.

The SμMMIT treats all Mode Codes as having no associated data word when placed in the MIL-STD-1553A mode of operation.

Requirement 7 - "A3818 Error Handling" Protocol

A3818 protocol states that certain error conditions are treated as prescribed in MIL-STD-1553B, while certain "lesser" errors are treated differently. Certain error conditions are to be handled by flagging the defective data words, and transmitting the Status Word with the Message Error Bit set.

The SμMMIT does not include provisions to handle this specific requirement. The MIL-STD-1553A and B protocols dictate that any message error condition is handled by suppressing of the Status Word and the setting of the message error bit. This particular requirement appears to be quite subjective within the A3818 protocol applications.

Reference: The UTMC SμMMIT™ Device Compliance to McDonnell Douglas A5690 1553 Specification

The purpose of this document is to briefly summarize the SμMMIT's compliance to the McDonnell Douglas (Mac-Air) A5690 mux bus specification. Some of the key requirements of the A5690 specification have been included in the SμMMIT to allow flexibility beyond the MIL-STD-1553B specification that the SμMMIT primarily serves.

The key requirements of the A5690 protocol are listed, in the relative order of importance, along with comments regarding the SμMMIT's ability to meet these requirements.

Requirement 1 - MIL-STD-1553A Remote Terminal Response Time:

A5690 protocol requires that the remote terminal response be less than 12.0 μs when measured from the zero-crossing of the parity bit to the zero crossing of the mid-point of the Status Word sync pattern as defined in MIL-STD-1553B.

The SμMMIT meets this response time requirement when placed in the "B" mode as described in the SμMMIT Product Handbook (bit 7 of the Operational Status Register).

Requirement 2 - Reserve Remote Terminal Address 11111 as a Broadcast Remote Terminal Address

A5690 protocol specifies that remote terminal address 11111 (binary) is reserved as a broadcast remote terminal address as defined in MIL-STD-1553B.

The SμMMIT allows remote terminal address of 11111 to be assigned as a broadcast address via Control Register (Register 0, bit 4).

Requirement 3 - Treat Subaddress 11111 and 00000 as Mode Code Indicators

A5690 protocol requires that subaddresses 11111 and 00000 be treated as indicators that the word-count field of the Command Word contains a Mode Code. MIL-STD-1553B protocol also specifies that either 11111 or 00000 in the Subaddress field indicates that the Word Count field contains a Mode Code.

The SμMMIT allows direct conformance to this requirement when it is placed in the MIL-STD-1553B mode of operation (Refer to Section 2.9 of the SμMMIT Product Handbook for additional details).

Requirement 4 - Status Word bits

A5690 protocol requires the Status Word comply with MIL-STD-1553B with the exception that the Dynamic Bus Control and Broadcast Command Receive bits are reserved and shall be set to logic zero. Although A5690 reserves remote terminal address 11111 for broadcast commands, the protocol does not specify a broadcast message format (A5690 Revision C), and is therefore not used. Dynamic Bus Control acceptance is a "not applicable" mode code, and is also not used in A5690 systems.

The SμMMIT conforms to this requirement when the system does not employ either Broadcast Commands or Dynamic Bus Control Mode Code commands. Control Register Bit 3 controls the assertion of the Dynamic Bus Control Acceptance Bit. If the SμMMIT has broadcast commands

enabled (i.e., reserving remote terminal address 11111 as a broadcast address) and receives a broadcast command the Broadcast Command Receive Bit is asserted.

Requirement 5 - A5690 Requires MIL-STD-1553B Message Error Processing

A5690 protocol requires the same message error processing as defined in MIL-STD-1553B

The SμMMIT device supports this requirement.

Requirement 6 - A5690 Mode Codes

A5690 protocol requires that mode codes 00000, 00110, 00111, 10100, and 10101 are not applicable.

The SμMMIT allows for the illegalization of all mode codes, and directly supports this requirement.

Section 5
Calculation of SμMMIT Current Utilization

Application Note
Calculation of SμMMIT Current Utilization

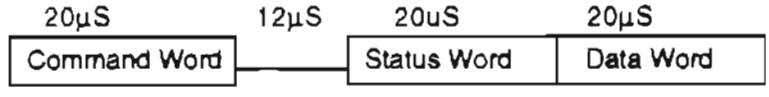
The following describes the average supply current drawn by the UT69151 protocol device during message processing. It is appropriate to calculate the supply current with respect to the message rate or duty cycle due to the SμMMIT's power saving architecture. Calculating the maximum current drawn per message then averaging over the message rate accurately determines the SμMMIT's supply current during message processing (for all modes of operation). This method takes into account the SμMMIT's ability to enter a low power standby mode during intervals of inactivity (inter and intra message). The following formula allows the system designer to calculate the supply current versus duty cycle for the SμMMIT.

$$I_{DUTY\_CYC} = I_{AVG\_MSG} * DUTY\_CYC + SI_{DD} * (1 - DUTY\_CYCLE)$$

Where DUTY_CYC equals the message length in seconds divided by one over the message rate

Example:

Message rate equals 5Hz (i.e., 5 messages per second)
Message length equals 72 μS per message

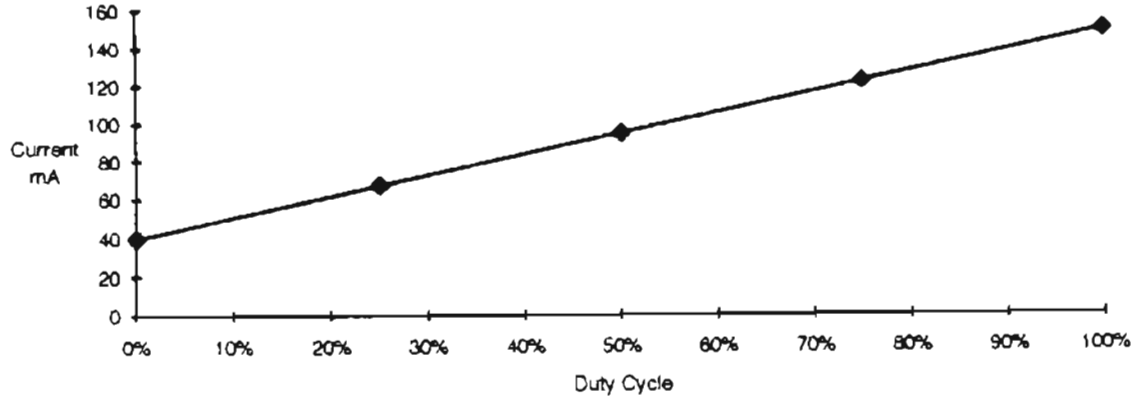


DUTC_CYC equals 360×10^{-6}
I_{AVG_MSG} equals 150mA
SI_{DD} equals 40mA

$$I_{DUTY\_CYC} = 150mA \times (360 \times 10^{-6}) + 40mA \times (1 - 360 \times 10^{-6})$$
$$I_{DUTY\_CYC} = 54\mu A + 39.98mA$$
$$I_{DUTY\_CYC} = 40.04mA$$

Table 1 is a graph of SμMMIT supply current versus duty cycle:

Table 1. Current versus Duty Cycle



Section 6
SμMMIT MIL-STD-1553B, Notice 2 Test Report

TEST SYSTEMS, Inc. MIL-STD-1553B RT VALIDATION TEST REPORT
By: TEST SYSTEMS, Inc.

SUM15.DAT
04/13/93 (11:17:28)

CUSTOMER:

UNITED TECHNOLOGIES MICROELECTRONICS CENTER
1575 Garden of the Gods Road
Colorado Springs, CO 80907

TEST STARTED:

April 13, 1993

TEST COMPLETED:

April 13, 1993

UNIT UNDER TEST IDENTIFICATION:

SuMMIT UT69151
Part Number TJ01/SJ01 Rev. C
Breadboard
UTMC UT63M125 15 Volt Transceiver
North Hills DX155302 Transformers

SUMMARY OF TEST RESULTS:	A-Bus	B-Bus
Electrical:	Passed	Passed
Required Protocol:	Passed	Passed
Optional Protocol:	Passed	Passed
Noise Rejection:	Passed	Passed

CERTIFICATE OF COMPLIANCE:

TEST SYSTEMS, Inc. certifies that this MIL-STD-1553B REMOTE TERMINAL VALIDATION TEST REPORT provides the results of the RT Validation Testing performed on April 13, 1993, in Phoenix for UNITED TECHNOLOGIES MICROELECTRONICS CENTER. TEST SYSTEMS, Inc. further certifies that this testing was in accordance with the RT VALIDATION TEST PROCEDURE dated 11-5-90 and complies with the RT Validation Test Plan (MIL-HDBK-1553 Appendix A) with the exceptions noted on page 2.

Leroy Earhart — 4/13/93

Leroy Earhart — Date

TEST SYSTEMS, Inc. 217 W. Palmaire Phoenix, AZ 85021 602/861-1010

EXCEPTIONS TO THE RT VALIDATION TEST PLAN:

1. Step 6 of Reset remote terminal (5.2.1.5.3) is changed to repeat step 4 rather than step 5. (Error in Test Plan.)

2. Frequency Stability (5.1.1.10) and Terminal Fail-Safe (5.2.1.3.7) tests were not run.

3. Not all commands which cause the BUSY bit to be set are recorded for every test. This can be impractical in tests where 10,000 iterations are performed because of the volume of information that would be generated. Rather than recording each scenario in which the BUSY bit is set, this report provides a count of the messages in the scenarios which have the BUSY bit set.

TEST COMMENTS:

Auto Enable was not active for all tests except two as noted below.

5.1.1.8.2 Power on response test was run with a manual reset in place of cycling power to simulate a power on reset in a normal application. The Auto Enable was active for this test.

5.2.1.9 Unique address test was run with Auto Enable active and the unit was manually reset each time the remote terminal address was changed.

Status bits were tested by setting and resetting the bits using support equipment.

NOTE:

Command words are expressed in four fields with 5 bits in the first, third and fourth fields and 1 bit in the second field. Status words are expressed in four fields with 5 bits in the first and fourth fields and 3 bits in the second and third fields. Each field is given in decimal.

TEST PERSONNEL:

Leroy Earhart	TSI
John Pressprich	UTMC

EQUIPMENT LIST:

EQUIPMENT TYPE	MANUFACTURER MODEL NO./SERIAL NO.	CALIBRATION Date Done	Date Due
1553 BUS TESTER	TSI 122 / 8804111	N/A	
1553 NOISE GENERATOR	TSI 101 / 880401	N/A	
Oscilloscope	TEK 2445B / B060730	01/05/93	01/05/94
True RMS Voltmeter	HP 3400A / 401-01050	07/09/92	07/09/93
Impedance Analyzer	HP 4192A /2830J06978	04/08/93	10/08/93
Function Generator	Tenma 72-380 / 8802028	N/A	
Host Processor	MIT SYS / TSC 11442	N/A	
Monochrome Monitor	GoldStar / MB-50300192	N/A	
Connection Panel	TSI 0100 / 900101	N/A	

Valid, Legal Non-Broadcast Commands (if not marked by '-')

SA	Receive (T/R=0) Word Count Field 1111111111222222222233 01234567890123456789012345678901	SA	Transmit (T/R=1) Word Count Field 1111111111222222222233 01234567890123456789012345678901
0	----------7--01----------	0	012345678-------6-89----------
1	01234567890123456789012345678901	1	01234567890123456789012345678901
2	01234567890123456789012345678901	2	01234567890123456789012345678901
3	01234567890123456789012345678901	3	01234567890123456789012345678901
4	01234567890123456789012345678901	4	01234567890123456789012345678901
5	01234567890123456789012345678901	5	01234567890123456789012345678901
6	01234567890123456789012345678901	6	01234567890123456789012345678901
7	01234567890123456789012345678901	7	01234567890123456789012345678901
8	01234567890123456789012345678901	8	01234567890123456789012345678901
9	01234567890123456789012345678901	9	01234567890123456789012345678901
10	01234567890123456789012345678901	10	01234567890123456789012345678901
11	01234567890123456789012345678901	11	01234567890123456789012345678901
12	01234567890123456789012345678901	12	01234567890123456789012345678901
13	01234567890123456789012345678901	13	01234567890123456789012345678901
14	01234567890123456789012345678901	14	01234567890123456789012345678901
15	01234567890123456789012345678901	15	01234567890123456789012345678901
16	01234567890123456789012345678901	16	01234567890123456789012345678901
17	01234567890123456789012345678901	17	01234567890123456789012345678901
18	01234567890123456789012345678901	18	01234567890123456789012345678901
19	01234567890123456789012345678901	19	01234567890123456789012345678901
20	01234567890123456789012345678901	20	01234567890123456789012345678901
21	01234567890123456789012345678901	21	01234567890123456789012345678901
22	01234567890123456789012345678901	22	01234567890123456789012345678901
23	01234567890123456789012345678901	23	01234567890123456789012345678901
24	01234567890123456789012345678901	24	01234567890123456789012345678901
25	01234567890123456789012345678901	25	01234567890123456789012345678901
26	01234567890123456789012345678901	26	01234567890123456789012345678901
27	01234567890123456789012345678901	27	01234567890123456789012345678901
28	01234567890123456789012345678901	28	01234567890123456789012345678901
29	01234567890123456789012345678901	29	01234567890123456789012345678901
30	01234567890123456789012345678901	30	01234567890123456789012345678901
31	----------7--01----------	31	012345678-------6-89----------

Illegal Command Detection Implemented:	Yes
Broadcast Implemented:	Yes
Data Wrap-Around	Receive SA: 30 Transmit SA: 30
Terminal Address Used:	1
Coupling Used:	Transformer
Implemented Status bits:	ME SRB BCR BUSY SF TF
Implemented Non-Broadcast Mode Codes:	1,2,3,4,5,6,7,8,16,17,18,19
Implemented Broadcast Mode Codes:	1,2,4,5,6,7,8,16,17,18,19

Valid, Legal Broadcast Commands (if not marked by '-')

SA	Receive (T/R=0) Word Count Field 1111111111222222222233 01234567890123456789012345678901	SA	Transmit (T/R=1) Word Count Field 1111111111222222222233 01234567890123456789012345678901
0	----------7--01----------	0	-1-345678----------
1	01234567890123456789012345678901	1	----------
2	01234567890123456789012345678901	2	----------
3	01234567890123456789012345678901	3	----------
4	01234567890123456789012345678901	4	----------
5	01234567890123456789012345678901	5	----------
6	01234567890123456789012345678901	6	----------
7	01234567890123456789012345678901	7	----------
8	01234567890123456789012345678901	8	----------
9	01234567890123456789012345678901	9	----------
10	01234567890123456789012345678901	10	----------
11	01234567890123456789012345678901	11	----------
12	01234567890123456789012345678901	12	----------
13	01234567890123456789012345678901	13	----------
14	01234567890123456789012345678901	14	----------
15	01234567890123456789012345678901	15	----------
16	01234567890123456789012345678901	16	----------
17	01234567890123456789012345678901	17	----------
18	01234567890123456789012345678901	18	----------
19	01234567890123456789012345678901	19	----------
20	01234567890123456789012345678901	20	----------
21	01234567890123456789012345678901	21	----------
22	01234567890123456789012345678901	22	----------
23	01234567890123456789012345678901	23	----------
24	01234567890123456789012345678901	24	----------
25	01234567890123456789012345678901	25	----------
26	01234567890123456789012345678901	26	----------
27	01234567890123456789012345678901	27	----------
28	01234567890123456789012345678901	28	----------
29	01234567890123456789012345678901	29	----------
30	01234567890123456789012345678901	30	----------
31	----------7--01----------	31	-1-345678----------

Test STAT abbreviation definitions:

ABRT: Test Aborted	**BCR:** Broadcast Received	**BRTF:** Brdcst Rcvd+TermFlag
BUSY: Busy Bit	**CS:** Clear Status	**DBA:** Dynamic Bus Accepted
DC: Don't Care	**EF:** Error Found	**Inhb:** Operator Inhibited
INVL: Invalid Test	**MBR:** Msg Err+Brdcst Rcvd	**MBRT:** ME+TF+BCR
ME: Message Error	**MTF:** MsgErr+TermFlag	**NR:** No Response
NRun: Not Run	**RIF:** Respond In Form	**SF:** Subsystem Flag
SR: Service Request	**TF:** Terminal Flag	**TO:** Timed Out
VR: Valid Response		

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	STAT	B U S B Meas.	STAT
5.1.1	OUTPUT CHARACTERISTICS						
5.1.1.1	OUTPUT AMPLITUDE Max	18.0-27.0	Vpp	22.50	Pass	22.40	Pass
	Min	18.0-27.0	Vpp	22.30	Pass	22.20	Pass
5.1.1.2	OUTPUT RISE TIME-Sync	100- 300	ns	125	Pass	125	Pass
5.1.1.2	OUTPUT RISE TIME-Data	100- 300	ns	122	Pass	122	Pass
5.1.1.2	OUTPUT FALL TIME-Sync	100- 300	ns	122	Pass	122	Pass
5.1.1.2	OUTPUT FALL TIME-Data	100- 300	ns	122	Pass	122	Pass
5.1.1.3	ZERO CROSSING STAB.						
	500ns Tzcp	475- 525	ns	503	Pass	504	Pass
	1000ns Tzcp	975-1025	ns	1004	Pass	1004	Pass
	1500ns Tzcp	1475-1525	ns	1500	Pass	1505	Pass
	2000ns Tzcp	1975-2025	ns	2000	Pass	2000	Pass
	500ns Tzcn	475- 525	ns	495	Pass	495	Pass
	1000ns Tzcn	975-1025	ns	996	Pass	994	Pass
	1500ns Tzcn	1475-1525	ns	1495	Pass	1495	Pass
	2000ns Tzcn	1975-2025	ns	1995	Pass	1996	Pass
5.1.1.4	DISTORTION, OVERSHOOT AND RINGING	≤ ± 900	mVp	10	Pass	10	Pass
5.1.1.5	OUTPUT SYMMETRY						
	(0000)	≤ ± 250	mVp	-185	Pass	-185	Pass
	(5555)	≤ ± 250	mVp	-145	Pass	-145	Pass
	(7FFF)	≤ ± 250	mVp	-130	Pass	-130	Pass
	(8000)	≤ ± 250	mVp	-180	Pass	-180	Pass
	(AAAA)	≤ ± 250	mVp	-145	Pass	-140	Pass
	(FFFF)	≤ ± 250	mVp	-130	Pass	-135	Pass
5.1.1.6	OUTPUT NOISE						
	with power on	≤ 14	mVrms	1	Pass	1	Pass
	with power off	≤ 14	mVrms	1	Pass	1	Pass
5.1.1.7	OUTPUT ISOLATION	≥ 45	db	73	Pass	73	Pass
	Active Bus	18.0-27.0	Vpp	22.50	Pass	22.40	Pass
	Inactive Bus		mVpp	5	Pass	5	Pass
5.1.1.8.1	POWER ON/OFF NOISE						
	Power Up Amplitude	≤ ± 250	mVp	20	Pass	30	Pass
	Pulse Width		us	.1		.1	
	Power Down Amplitude	≤ ± 250	mVp	10	Pass	10	Pass
	Pulse Width		us	.1		.1	
5.1.1.8.2	POWER ON RESPONSE	protocol	---		Pass		Pass

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	STAT	B U S B Meas.	STAT
5.1.1.9	TERMINAL RESPONSE TIME						
	Transmit	4.0-12.0	us	8.98	Pass	8.86	Pass
	Receive	4.0-12.0	us	8.80	Pass	8.80	Pass
	RT-UUT	4.0-12.0	us	8.80	Pass	8.80	Pass
	Mode Command	4.0-12.0	us	9.81	Pass	9.69	Pass
5.1.1.10	FREQUENCY STABILITY						
	Min. Frequency		kHz				
	Max. Frequency		kHz				
	Avg. Frequency		kHz				
5.1.2	INPUT CHARACTERISTICS						
5.1.2.1.1	ZERO CROSSING						
	DISTORTION						
	Min. Deviation	≤ -150	ns	-187	Pass	-185	Pass
	Max. Deviation	≥ 150	ns	180	Pass	180	Pass
	Plus 150 nsec	protocol	---		Pass		Pass
	Minus 150 nsec	protocol	---		Pass		Pass
5.1.2.1.2	AMPLITUDE VARIATIONS						
	1st CS threshold	200- 860	mVpp	640	Pass	660	Pass
	1st NR threshold	200- 860	mVpp	630	Pass	615	Pass
5.1.2.1.3	RISE AND FALL TIME						
5.1.2.1.3.1	TRAPEZOIDAL	protocol	---		Pass		Pass
5.1.2.1.3.2	SINUSOIDAL	protocol	---		Pass		Pass
5.1.2.2	COMMON MODE REJECTION						
	+10 volt	protocol	---		Pass		Pass
	-10 volt	protocol	---		Pass		Pass
	±10 volt	protocol	---		Pass		Pass

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	STAT	B U S B Meas.	STAT
5.1.2.3	INPUT IMPEDANCE						
	75 kHz Power ON	≥ 1000	ohms	2414	Pass	2446	Pass
	Phase Angle		degs	13		13	
	100 kHz Power ON	≥ 1000	ohms	2496	Pass	2527	Pass
	Phase Angle		degs	5		5	
	250 kHz Power ON	≥ 1000	ohms	2369	Pass	2390	Pass
	Phase Angle		degs	-23		-22	
	500 kHz Power ON	≥ 1000	ohms	1808	Pass	1828	Pass
	Phase Angle		degs	-46		-46	
	1.0 MHz Power ON	≥ 1000	ohms	1091	Pass	1104	Pass
	Phase Angle		degs	-66		-65	
	75 kHz Power OFF	≥ 1000	ohms	3066	Pass	2892	Pass
	Phase Angle		degs	12		11	
	100 kHz Power OFF	≥ 1000	ohms	3188	Pass	3017	Pass
	Phase Angle		degs	1		1	
	250 kHz Power OFF	≥ 1000	ohms	2702	Pass	2587	Pass
	Phase Angle		degs	-34		-33	
	500 kHz Power OFF	≥ 1000	ohms	1810	Pass	1796	Pass
	Phase Angle		degs	-56		-55	
	1.0 MHz Power OFF	≥ 1000	ohms	1034	Pass	1035	Pass
	Phase Angle		degs	-71		-70	

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.1	RT Response to Commands Non-Broadcast Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1920/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1920/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(61440/ 0/ 0)	0-0-00-00	- - -	NR	0-0-00-00	- - -	NR
	B:(61440/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(16/ 0/ 0)	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	B:(16/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(98/ 0/ 0)	1-0-00-00	1-4-0-00	ME	1-0-00-00	1-4-0-00	ME
	B:(98/ 0/ 0)	1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.1	RT Response to Commands Broadcast Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
	B:(960/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Valid, Illegal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	31-1-01-00	- - -	NR	31-1-01-00	- - -	NR
	B:(960/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Invalid Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(8/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(8/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(10/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
	B:(10/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(9B/ 0/ 0)	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	B:(9B/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.2	RT-RT Response to Command Words Non-Broadcast Receive Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	B:(960/ 0/ 0)	2-1-01-01	2-0-0-00	CS	2-1-01-01	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(30720/ 0/ 0)	0-0-00-00	- - -	NR	0-0-00-00	- - -	NR
	B:(30720/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	B:(2/ 0/ 0)	2-1-01-01	2-0-0-00	CS	2-1-01-01	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(58/ 0/ 0)	1-0-00-00	- - -	NR	1-0-00-00	- - -	NR
	B:(58/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Non-Broadcast Transmit Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	2-0-01-01	- - -	NR	2-0-01-01	- - -	NR
	B:(960/ 0/ 0)	1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(30720/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(30720/ 0/ 0)	0-1-00-00	- - -	NR	0-1-00-00	- - -	NR
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(14/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(14/ 0/ 0)	1-1-00-01	1-0-0-00	CS	1-1-00-01	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(40/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(40/ 0/ 0)	1-1-00-09	1-0-0-00	ME	1-1-00-09	1-0-0-00	ME
		1-1-00-18	1-0-0-00	ME	1-1-00-18	1-0-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Broadcast Receive Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
	B:(960/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(2/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(58/ 0/ 0)	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	B:(58/ 0/ 0)	0-1-01-00	0-0-0-00	CS	0-1-01-00	0-0-0-00	CS
		1-1-00-18	1-0-0-16	MBR	1-1-00-18	1-0-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	Response	STAT	B U S B Command	Response	STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Broadcast Transmit Commands						
	Valid, Legal Commands			N/A N/A N/A N/A			N/A N/A N/A N/A
	Valid, Illegal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	0-0-01-01	- - -	NR	0-0-01-01	- - -	NR
	B:(960/ 0/ 0)	31-1-01-01	- - -	NR	31-1-01-01	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Invalid Commands			N/A N/A N/A N/A			N/A N/A N/A N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(6/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(6/ 0/ 0)	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(10/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(10/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(40/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(40/ 0/ 0)	31-1-00-09	- - -	NR	31-1-00-09	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.2	Intermessage Gap						
5.2.1.2.1	Minimum Time						
	BC-UUT Transfer	1-0-05-00	1-0-0-00	CS	1-0-05-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	UUT-BC Transfer	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	UUT/RT Transfer	1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	RT/UUT Transfer	25-0-01-00	25-0-0-00	DC	2-0-01-00	2-0-0-00	DC
	A:(1000/ 0/ 0)	1-1-24-00	1-0-0-00	CS	1-1-24-00	1-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Mode Command w/o data	1-1-00-00	1-0-0-00	CS	1-1-00-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	Mode Command, Transmit w/Data	1-1-00-16	1-0-0-00	CS	1-1-00-16	1-0-0-00	CS
		1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Mode Command, Receive w/Data	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
		1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Broadcast BC-UUT	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	Broadcast RT/UUT	31-0-01-30	- - -	NR	31-0-01-30	- - -	NR
	A:(1000/ 0/ 0)	1-1-30-30	1-0-0-00	CS	1-1-30-30	1-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Broadcast UUT/RT	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	A:(1000/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Broadcast Mode Cmnd w/o data	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
		1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Broadcast Mode Cmnd w/data	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
		1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.2	Intermessage Gap						
5.2.1.2.2	Transmission Rate						
	Transmit-Transmit	1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	A:(19286/ 0/ 0)	1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	B:(19258/ 0/ 0)	1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	Busy (usec)		0			0	
	Receive-Receive	1-0-10-00	1-0-0-00	CS	1-0-10-00	1-0-0-00	CS
	A:(19276/ 0/ 0)	1-0-11-00	1-0-0-00	CS	1-0-11-00	1-0-0-00	CS
	B:(19266/ 0/ 0)	1-0-10-00	1-0-0-00	CS	1-0-10-00	1-0-0-00	CS
		1-0-11-00	1-0-0-00	CS	1-0-11-00	1-0-0-00	CS
	Busy (usec)		0			0	
	Transmit-Receive	1-1-20-00	1-0-0-00	CS	1-1-20-00	1-0-0-00	CS
	A:(19282/ 0/ 0)	1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	B:(19280/ 0/ 0)	1-1-20-00	1-0-0-00	CS	1-1-20-00	1-0-0-00	CS
		1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	Busy (usec)		0			0	
5.2.1.3	Error Injection						
5.2.1.3.1	Parity						
5.2.1.3.1.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.1.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.1.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(32/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(32/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	Response	STAT	B U S B Command	Response	STAT
5.2.1.3.2	Word Length						
5.2.1.3.2.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.2.2	Receive Command						
	Short Receive commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Long Receive commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.2.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(126/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(126/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.3	Bi-Phase Encoding						
5.2.1.3.3.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(34/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(34/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.3.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(34/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(34/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.3.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(1000/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.4	Sync Encoding						
5.2.1.3.4.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(5/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(5/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.4.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(5/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(5/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.4.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(160/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(160/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	BUS A Response	BUS A STAT	BUS B Command	BUS B Response	BUS B STAT
5.2.1.3.5	Message Length						
5.2.1.3.5.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(33/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(33/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.3	Receive Mode Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-00-17	- - -	NR	1-0-00-17	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	Transmit Mode Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1/ 0/ 0)	1-1-00-01	- - -	NR	1-1-00-01	- - -	NR
	B:(1/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.4	RT-RT Word Count Error	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
	B:(2/ 0/ 0)	1-0-08-00	- - -	NR	1-0-08-00	- - -	NR
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.6	Contiguous Data	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(32/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(32/ 0/ 0)	1-1-00-02	1-4-0-01	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.7	Terminal Fail-Safe						
5.2.1.4	Superseding Commands						
	part A	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	part B	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	part C	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	part D	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	BUS A Response	BUS A STAT	BUS B Command	BUS B Response	BUS B STAT
5.2.1.5	Required Mode Commands						
5.2.1.5.1	Transmit Status	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	B:(2/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.5.2	Xmtr Shutdown/Override	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-05	- - -	NR	1-1-00-05	- - -	NR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-05	1-0-0-00	CS	1-1-00-05	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.1.5.3	Reset Remote Terminal						
	Delay to Stable Response	1-1-00-08	1-0-0-00	CS	1-1-00-08	1-0-0-00	CS
	A:(1764/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1764/ 0/ 0)						
	(T ≤ 5000us)		5			5	
	Shutdown	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-08	1-0-0-00	CS	1-1-00-08	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.1.6	Data Wrap-around	1-0-30-00	1-0-0-00	CS	1-0-30-00	1-0-0-00	CS
	A:(10000/ 0/ 0)	1-1-30-00	1-0-0-00	CS	1-1-30-00	1-0-0-00	CS
	B:(10000/ 0/ 0)						
5.2.1.7	RT-RT Timeout Delay						
	Time to first NR	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	(54us ≤ T ≤ 60us)		55.5			55.5	
	Time to first CS	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	(54us ≤ T ≤ 60us)		55.0			55.0	

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.1.8	Bus Switching						
	RT Transmitting						
	Valid, Legal Command	1-1-02-00	- - -	NR	1-1-02-00	- - -	NR
	A:(10945/ 0/ 0)	1-1-05-00	1-0-0-00	CS	1-1-05-00	1-0-0-00	CS
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command w/Parity Error	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(10945/ 0/ 0)	1-1-05-00	- - -	NR	1-1-05-00	- - -	NR
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command to another RT	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(10945/ 0/ 0)	2-1-05-00	- - -	NR	2-1-05-00	- - -	NR
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	RT Receiving						
	Valid, Legal Command	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	1-1-05-00	1-0-0-00	CS	1-1-05-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command w/Parity Error	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	1-1-05-00	- - -	NR	1-1-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command to another RT	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	2-1-05-00	- - -	NR	2-1-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.9	Unique UUT Address						
	part A						
	UUT Adr 0	0-0-05-00	0-0-0-00	CS	0-0-05-00	0-0-0-00	CS
	UUT Adr 1	1-0-05-00	1-0-0-00	CS	1-0-05-00	1-0-0-00	CS
	UUT Adr 2	2-0-05-00	2-0-0-00	CS	2-0-05-00	2-0-0-00	CS
	UUT Adr 3	3-0-05-00	3-0-0-00	CS	3-0-05-00	3-0-0-00	CS
	UUT Adr 4	4-0-05-00	4-0-0-00	CS	4-0-05-00	4-0-0-00	CS
	UUT Adr 5	5-0-05-00	5-0-0-00	CS	5-0-05-00	5-0-0-00	CS
	UUT Adr 6	6-0-05-00	6-0-0-00	CS	6-0-05-00	6-0-0-00	CS
	UUT Adr 7	7-0-05-00	7-0-0-00	CS	7-0-05-00	7-0-0-00	CS
	UUT Adr 8	8-0-05-00	8-0-0-00	CS	8-0-05-00	8-0-0-00	CS
	UUT Adr 9	9-0-05-00	9-0-0-00	CS	9-0-05-00	9-0-0-00	CS
	UUT Adr 10 (0A)	10-0-05-00	10-0-0-00	CS	10-0-05-00	10-0-0-00	CS
	UUT Adr 11 (0B)	11-0-05-00	11-0-0-00	CS	11-0-05-00	11-0-0-00	CS
	UUT Adr 12 (0C)	12-0-05-00	12-0-0-00	CS	12-0-05-00	12-0-0-00	CS
	UUT Adr 13 (0D)	13-0-05-00	13-0-0-00	CS	13-0-05-00	13-0-0-00	CS
	UUT Adr 14 (0E)	14-0-05-00	14-0-0-00	CS	14-0-05-00	14-0-0-00	CS
	UUT Adr 15 (0F)	15-0-05-00	15-0-0-00	CS	15-0-05-00	15-0-0-00	CS
	UUT Adr 16 (10)	16-0-05-00	16-0-0-00	CS	16-0-05-00	16-0-0-00	CS
	UUT Adr 17 (11)	17-0-05-00	17-0-0-00	CS	17-0-05-00	17-0-0-00	CS
	UUT Adr 18 (12)	18-0-05-00	18-0-0-00	CS	18-0-05-00	18-0-0-00	CS
	UUT Adr 19 (13)	19-0-05-00	19-0-0-00	CS	19-0-05-00	19-0-0-00	CS
	UUT Adr 20 (14)	20-0-05-00	20-0-0-00	CS	20-0-05-00	20-0-0-00	CS
	UUT Adr 21 (15)	21-0-05-00	21-0-0-00	CS	21-0-05-00	21-0-0-00	CS
	UUT Adr 22 (16)	22-0-05-00	22-0-0-00	CS	22-0-05-00	22-0-0-00	CS
	UUT Adr 23 (17)	23-0-05-00	23-0-0-00	CS	23-0-05-00	23-0-0-00	CS
	UUT Adr 24 (18)	24-0-05-00	24-0-0-00	CS	24-0-05-00	24-0-0-00	CS
	UUT Adr 25 (19)	25-0-05-00	25-0-0-00	CS	25-0-05-00	25-0-0-00	CS
	UUT Adr 26 (1A)	26-0-05-00	26-0-0-00	CS	26-0-05-00	26-0-0-00	CS
	UUT Adr 27 (1B)	27-0-05-00	27-0-0-00	CS	27-0-05-00	27-0-0-00	CS
	UUT Adr 28 (1C)	28-0-05-00	28-0-0-00	CS	28-0-05-00	28-0-0-00	CS
	UUT Adr 29 (1D)	29-0-05-00	29-0-0-00	CS	29-0-05-00	29-0-0-00	CS
	UUT Adr 30 (1E)	30-0-05-00	30-0-0-00	CS	30-0-05-00	30-0-0-00	CS
	UUT Adr 31 (1F)	31-0-05-00	- - -	NR	31-0-05-00	- - -	NR
	part B	31-0-05-00	- - -	NR	31-0-05-00	- - -	NR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.1	Optional Protocol						
5.2.2.1.1	Dynamic Bus Control	1-1-00-00	1-0-0-00	CS	1-1-00-00	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
5.2.2.1.2	Synchronize						
5.2.2.1.2.1	Synchronize without data	1-1-00-01	1-0-0-00	CS	1-1-00-01	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
5.2.2.1.2.2	Synchronize with data	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	SYNC Word		0000			0000	
5.2.2.1.3	Initiate Self-Test	1-1-00-03	1-0-0-00	CS	1-1-00-03	1-0-0-00	CS
	A:(1964/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1964/ 0/ 0)						
	(T ≤ 100,000us)		692			692	
5.2.2.1.4	Transmit BIT word	1-1-00-19	1-0-0-00	CS	1-1-00-19	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	BIT Word		03ff			03ff	
5.2.2.1.5	Selective Xmtr Shutdown	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	1-0-00-20	1-0-0-00	CS	1-0-00-20	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-21	1-0-0-00	CS	1-0-00-21	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-21	1-0-0-00	CS	1-0-00-21	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-20	1-0-0-00	CS	1-0-00-20	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Alt Bus Selection Word		0000			0000	
	Pri Bus Selection Word		0000			0000	
5.2.2.1.6	Terminal Flag Bit Inhibit	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
	B:(4/ 0/ 0)	1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-00-06	1-0-0-00	CS	1-1-00-06	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-31-07	1-0-0-01	TF	1-1-31-07	1-0-0-01	TF
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	Response	STAT	B U S B Command	Response	STAT
5.2.2.1.7	Transmit Vector Word	1-1-00-16	1-0-0-00	CS	1-1-00-16	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	VECTOR Word		5100			5100	
5.2.2.1.8	Transmit Last Command	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-01-01	- - -	NR	1-0-01-01	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
5.2.2.2	Status Word						
5.2.2.2.1	Service Request	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
		1-1-01-01	1-1-0-00	DC	1-1-01-01	1-1-0-00	DC
		1-1-01-00	1-1-0-00	SR	1-1-01-00	1-1-0-00	SR
		1-1-01-00	1-1-0-00	SR	1-1-01-00	1-1-0-00	SR
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.2.2	Broadcast Command Received	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
5.2.2.2.3	Busy	1-1-01-01	1-0-0-08	DC	1-1-01-01	1-0-0-08	DC
		1-1-02-00	1-0-0-08	BUSY	1-1-02-00	1-0-0-08	BUSY
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
5.2.2.2.4	Subsystem Flag	1-1-01-01	1-0-0-04	DC	1-1-01-01	1-0-0-04	DC
		1-1-02-00	1-0-0-04	SF	1-1-02-00	1-0-0-04	SF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.2.2.5	Terminal Flag	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
		1-0-01-01	1-0-0-01	TF	1-0-01-01	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	BUS A Response	BUS A STAT	BUS B Command	BUS B Response	BUS B STAT
5.2.2.3	Illegal Command						
	part A			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	part B			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
5.2.2.4	Broadcast Mode Commands						
5.2.2.4.1	Synchronize without data	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
5.2.2.4.2	Synchronize with data	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	SYNC Word		0000			0000	
5.2.2.4.3	Initiate Self-Test	31-1-00-05	- - -	NR	31-1-00-05	- - -	NR
	A:(1968/ 0/ 0)	1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	B:(1968/ 0/ 0)						
	(T ≤ 100,000us)		4			4	
5.2.2.4.4	Xmtr Shutdown/Override	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	31-1-00-04	- - -	NR	31-1-00-04	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-1-00-05	- - -	NR	31-1-00-05	- - -	NR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		31-1-00-05	- - -	NR	31-1-00-05	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.4.5	Selective Xmtr Shutdown	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	31-0-00-20	- - -	NR	31-0-00-20	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-21	- - -	NR	31-0-00-21	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-21	- - -	NR	31-0-00-21	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-20	- - -	NR	31-0-00-20	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Alt Bus Selection Word		0000			0000	
	Pri Bus Selection Word		0000			0000	
5.2.2.4.6	Terminal Flag Bit Inhibit	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
	B:(4/ 0/ 0)	1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		31-1-00-06	- - -	NR	31-1-00-06	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-1-31-07	- - -	NR	31-1-31-07	- - -	NR
		1-1-00-18	1-0-0-17	BRTF	1-1-00-18	1-0-0-17	BRTF
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.4.7	Reset Remote Terminal						
	Delay to Stable Response	31-1-00-08	- - -	NR	31-1-00-08	- - -	NR
	A:(1768/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1768/ 0/ 0)						
	(T ≤ 5000us)		20			19	
	Clear Xmtr Shutdown	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(2/ 0/ 0)	31-1-00-08	- - -	NR	31-1-00-08	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.2.4.8	Dynamic Bus Control	1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-0-0-16	MBR	1-1-00-02	1-0-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.5	Error Injection						
	-Broadcast Messages						
5.2.2.5.1	Parity: BC-RT Broadcast						
5.2.2.5.1.1	Command w/Parity Error	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.5.1.2	Data Word Error	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
	A:(32/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	B:(32/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.5.2	Message Length: BC-RT Broadcast	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	A:(33/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(33/ 0/ 0)	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.3	Noise Rejection	1-0-30-00	1-0-0-00	CS	1-0-30-00	1-0-0-00	CS
	Words Received		44,000,022	PASS		44,000,022	PASS
	Noise Level used (mV)		140			140	
	A:(1333334/ 0/ 0)						
	B:(1333334/ 0/ 0)						

TEST SYSTEMS, Inc. MIL-STD-1553B RT VALIDATION TEST REPORT
By: TEST SYSTEMS, Inc.

UTMC-5V.DAT
06/12/96 (18:21:28)

CUSTOMER:

UNITED TECHNOLOGIES MICROELECTRONICS CENTER
1575 Garden of the Gods Road
Colorado Springs, CO 80907

TEST STARTED:

June 12, 1996

TEST COMPLETED:

June 12, 1996

UNIT UNDER TEST IDENTIFICATION:

5 Volt Transceiver UT63M147
SuMMIT UT69151E
Breadboard
Technitrol Transformers Q1553-45

SUMMARY OF TEST RESULTS:

	A-Bus	B-Bus
Electrical:	Passed	Passed
Required Protocol:	Passed	Passed
Optional Protocol:	Passed	Passed
Noise Rejection:	Passed	Passed

CERTIFICATE OF COMPLIANCE:

TEST SYSTEMS, Inc. certifies that this MIL-STD-1553B REMOTE TERMINAL VALIDATION TEST REPORT provides the results of the RT Validation Testing performed on June 12, 1996, in Phoenix for UNITED TECHNOLOGIES MICROELECTRONICS CENTER. TEST SYSTEMS, Inc. further certifies that this testing was in accordance with the RT VALIDATION TEST PROCEDURE dated 06-03-96 and complies with the RT Validation Test Plan (MIL-HDBK-1553 Appendix A) with the exceptions noted on page 2.

_____ _____
Leroy Earhart Date

TEST SYSTEMS, Inc. 217 W. Palmaire Phoenix, AZ 85021 602/861-1010

EXCEPTIONS TO THE RT VALIDATION TEST PLAN:

1. Step 6 of Reset remote terminal (5.2.1.5.3) is changed to repeat step 4 rather than step 5. (Error in Test Plan.)

2. Frequency Stability (5.1.1.10) and Terminal Fail-Safe (5.2.1.3.7) tests were not run.

3. Not all commands which cause the BUSY bit to be set are recorded for every test. This can be impractical in tests where 10,000 iterations are performed because of the volume of information that would be generated. Rather than recording each scenario in which the BUSY bit is set, this report provides a count of the messages in the scenarios which have the BUSY bit set.

TEST COMMENTS:

5.1.1.3 Zero Crossing Stability: An additional test was run off-line to measure the time of the first half sync from +3.0 volts to -3.0 volts. The nominal time is 1500 ns. Bus A 1541 ns; Bus B 1542 ns.

5.1.2.3 Input Impedance magnitude measurements recorded as 9999 ohms are actually 9999 ohms or greater.

Status bits were tested by setting and resetting the bits using support equipment.

NOTE:

Command words are expressed in four fields with 5 bits in the first, third and fourth fields and 1 bit in the second field. Status words are expressed in four fields with 5 bits in the first and fourth fields and 3 bits in the second and third fields. Each field is given in decimal.

TEST PERSONNEL:

Leroy Earhart	TSI
Bill Hoover	TSI
John Pressprich	UTMC

EQUIPMENT LIST:

EQUIPMENT TYPE	MANUFACTURER MODEL NO./SERIAL NO.	CALIBRATION Date Done	Date Due
1553 BUS TESTER	TSI 122 / 8804111	N/A	
Oscilloscope	TEK 2465B / B010436	09/05/95	09/05/96
True RMS Voltmeter	HP 3400A / 401-01050	10/13/94	10/13/96
Impedance Analyzer	HP 4192A /2830J06227	10/13/95	10/13/96
Function Generator	Tenma 72-380 / 8802028	N/A	
Host Processor *	MIT SYS / TSC 11442	N/A	
Monochrome Monitor	GoldStar / MB-50300192	N/A	
Connection Panel	TSI 0100 / 900101	N/A	

* The Host Processor has three TSI cards installed:
PC/AT PARALLEL I/O CARD
MANCHESTER CARD
1553 NOISE GENERATOR CARD

Valid, Legal Non-Broadcast Commands (if not marked by '-')

	Receive (T/R=0) Word Count Field		Transmit (T/R=1) Word Count Field
	11111111112222222233		11111111112222222233
SA	01234567890123456789012345678901	SA	01234567890123456789012345678901
0	----------------7--01----------	0	012345678-------6-89----------
1	01234567890123456789012345678901	1	01234567890123456789012345678901
2	01234567890123456789012345678901	2	01234567890123456789012345678901
3	01234567890123456789012345678901	3	01234567890123456789012345678901
4	01234567890123456789012345678901	4	01234567890123456789012345678901
5	01234567890123456789012345678901	5	01234567890123456789012345678901
6	01234567890123456789012345678901	6	01234567890123456789012345678901
7	01234567890123456789012345678901	7	01234567890123456789012345678901
8	01234567890123456789012345678901	8	01234567890123456789012345678901
9	01234567890123456789012345678901	9	01234567890123456789012345678901
10	01234567890123456789012345678901	10	01234567890123456789012345678901
11	01234567890123456789012345678901	11	01234567890123456789012345678901
12	01234567890123456789012345678901	12	01234567890123456789012345678901
13	01234567890123456789012345678901	13	01234567890123456789012345678901
14	01234567890123456789012345678901	14	01234567890123456789012345678901
15	01234567890123456789012345678901	15	01234567890123456789012345678901
16	01234567890123456789012345678901	16	01234567890123456789012345678901
17	01234567890123456789012345678901	17	01234567890123456789012345678901
18	01234567890123456789012345678901	18	01234567890123456789012345678901
19	01234567890123456789012345678901	19	01234567890123456789012345678901
20	01234567890123456789012345678901	20	01234567890123456789012345678901
21	01234567890123456789012345678901	21	01234567890123456789012345678901
22	01234567890123456789012345678901	22	01234567890123456789012345678901
23	01234567890123456789012345678901	23	01234567890123456789012345678901
24	01234567890123456789012345678901	24	01234567890123456789012345678901
25	01234567890123456789012345678901	25	01234567890123456789012345678901
26	01234567890123456789012345678901	26	01234567890123456789012345678901
27	01234567890123456789012345678901	27	01234567890123456789012345678901
28	01234567890123456789012345678901	28	01234567890123456789012345678901
29	01234567890123456789012345678901	29	01234567890123456789012345678901
30	01234567890123456789012345678901	30	01234567890123456789012345678901
31	----------------7--01----------	31	012345678-------6-89----------

Illegal Command Detection Implemented:	Yes
Broadcast Implemented:	Yes
Data Wrap-Around	Receive SA: 30 Transmit SA: 30
Terminal Address Used:	1
Coupling Used:	Transformer
Implemented Status bits:	ME SRB BCR BUSY SF TF
Implemented Non-Broadcast Mode Codes:	1,2,3,4,5,6,7,8,16,17,18,19
Implemented Broadcast Mode Codes:	1,3,4,5,6,7,8,17

Valid, Legal Broadcast Commands (if not marked by '-')

Receive (T/R=0) Word Count Field		Transmit (T/R=1) Word Count Field	
SA	1111111111222222222233 01234567890123456789012345678901	SA	1111111111222222222233 01234567890123456789012345678901
0	----------------7--01----------	0	-1-345678----------
1	01234567890123456789012345678901	1	----------
2	01234567890123456789012345678901	2	----------
3	01234567890123456789012345678901	3	----------
4	01234567890123456789012345678901	4	----------
5	01234567890123456789012345678901	5	----------
6	01234567890123456789012345678901	6	----------
7	01234567890123456789012345678901	7	----------
8	01234567890123456789012345678901	8	----------
9	01234567890123456789012345678901	9	----------
10	01234567890123456789012345678901	10	----------
11	01234567890123456789012345678901	11	----------
12	01234567890123456789012345678901	12	----------
13	01234567890123456789012345678901	13	----------
14	01234567890123456789012345678901	14	----------
15	01234567890123456789012345678901	15	----------
16	01234567890123456789012345678901	16	----------
17	01234567890123456789012345678901	17	----------
18	01234567890123456789012345678901	18	----------
19	01234567890123456789012345678901	19	----------
20	01234567890123456789012345678901	20	----------
21	01234567890123456789012345678901	21	----------
22	01234567890123456789012345678901	22	----------
23	01234567890123456789012345678901	23	----------
24	01234567890123456789012345678901	24	----------
25	01234567890123456789012345678901	25	----------
26	01234567890123456789012345678901	26	----------
27	01234567890123456789012345678901	27	----------
28	01234567890123456789012345678901	28	----------
29	01234567890123456789012345678901	29	----------
30	01234567890123456789012345678901	30	----------
31	----------------7--01----------	31	-1-345678----------

Test STAT abbreviation definitions:

ABRT: Test Aborted	BCR: Broadcast Received	BRTF: Brdcst Rcvd+TermFlag
BUSY: Busy Bit	CS: Clear Status	DBA: Dynamic Bus Accepted
DC: Don't Care	EF: Error Found	Inhb: Operator Inhibited
INVL: Invalid Test	MBR: Msg Err+Brdcst Rcvd	MBRT: ME+TF+BCR
ME: Message Error	MTF: MsgErr+TermFlag	NR: No Response
NRun: Not Run	RIF: Respond In Form	SF: Subsystem Flag
SR: Service Request	TF: Terminal Flag	TO: Timed Out
VR: Valid Response		

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	BUS A Meas.	BUS A STAT	BUS B Meas.	BUS B STAT
5.1.1	OUTPUT CHARACTERISTICS						
5.1.1.1	OUTPUT AMPLITUDE Max	18.0-27.0	Vpp	21.10	Pass	20.70	Pass
	Min	18.0-27.0	Vpp	20.80	Pass	20.40	Pass
5.1.1.2	OUTPUT RISE TIME-Sync	100- 300	ns	140	Pass	150	Pass
5.1.1.2	OUTPUT RISE TIME-Data	100- 300	ns	143	Pass	156	Pass
5.1.1.2	OUTPUT FALL TIME-Sync	100- 300	ns	143	Pass	156	Pass
5.1.1.2	OUTPUT FALL TIME-Data	100- 300	ns	143	Pass	156	Pass
5.1.1.3	ZERO CROSSING STAB.						
	500ns Tzcp	475- 525	ns	503	Pass	502	Pass
	1000ns Tzcp	975-1025	ns	1000	Pass	1002	Pass
	1500ns Tzcp	1475-1525	ns	1505	Pass	1505	Pass
	2000ns Tzcp	1975-2025	ns	2005	Pass	2005	Pass
	500ns Tzcn	475- 525	ns	498	Pass	498	Pass
	1000ns Tzcn	975-1025	ns	996	Pass	994	Pass
	1500ns Tzcn	1475-1525	ns	1500	Pass	1495	Pass
	2000ns Tzcn	1975-2025	ns	1998	Pass	2005	Pass
5.1.1.4	DISTORTION, OVERSHOOT						
	AND RINGING	≤ ± 900	mVp	400	Pass	300	Pass
5.1.1.5	OUTPUT SYMMETRY						
	(0000)	≤ ± 250	mVp	-140	Pass	-95	Pass
	(5555)	≤ ± 250	mVp	-130	Pass	-85	Pass
	(7FFF)	≤ ± 250	mVp	-95	Pass	-50	Pass
	(8000)	≤ ± 250	mVp	-120	Pass	-75	Pass
	(AAAA)	≤ ± 250	mVp	-133	Pass	-85	Pass
	(FFFF)	≤ ± 250	mVp	-120	Pass	-80	Pass
5.1.1.6	OUTPUT NOISE						
	with power on	≤ 14	mVrms	4	Pass	3	Pass
	with power off	≤ 14	mVrms	4	Pass	4	Pass
5.1.1.7	OUTPUT ISOLATION	≥ 45	db	68	Pass	74	Pass
	Active Bus	18.0-27.0	Vpp	21.10	Pass	20.70	Pass
	Inactive Bus		mVpp	8	Pass	4	Pass
5.1.1.8.1	POWER ON/OFF NOISE						
	Power Up Amplitude	≤ ± 250	mVp	25	Pass	50	Pass
	Pulse Width		us	.		.	
	Power Down Amplitude	≤ ± 250	mVp	25	Pass	50	Pass
	Pulse Width		us	.		.	
5.1.1.8.2	POWER ON RESPONSE	protocol	---		Pass		Pass

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	B U S A STAT	B U S B Meas.	B U S B STAT
5.1.1.9	TERMINAL RESPONSE TIME						
	Transmit	4.0-12.0	us	8.61	Pass	8.46	Pass
	Receive	4.0-12.0	us	8.80	Pass	8.80	Pass
	RT-UUT	4.0-12.0	us	8.80	Pass	8.80	Pass
	Mode Command	4.0-12.0	us	9.44	Pass	9.32	Pass
5.1.1.10	FREQUENCY STABILITY						
	Min. Frequency		kHz				
	Max. Frequency		kHz				
	Avg. Frequency		kHz				
5.1.2	INPUT CHARACTERISTICS						
5.1.2.1.1	ZERO CROSSING						
	DISTORTION						
	Min. Deviation	≤ -150	ns	-187	Pass	-185	Pass
	Max. Deviation	≥ 150	ns	180	Pass	180	Pass
	Plus 150 nsec	protocol	---		Pass		Pass
	Minus 150 nsec	protocol	---		Pass		Pass
5.1.2.1.2	AMPLITUDE VARIATIONS						
	1st CS threshold	200- 860	mVpp	650	Pass	660	Pass
	1st NR threshold	200- 860	mVpp	660	Pass	675	Pass
5.1.2.1.3	RISE AND FALL TIME						
5.1.2.1.3.1	TRAPEZOIDAL	protocol	---		Pass		Pass
5.1.2.1.3.2	SINUSOIDAL	protocol	---		Pass		Pass
5.1.2.2	COMMON MODE REJECTION						
	+10 volt	protocol	---		Pass		Pass
	-10 volt	protocol	---		Pass		Pass
	±10 volt	protocol	---		Pass		Pass

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	STAT	B U S B Meas.	STAT
5.1.2.3	INPUT IMPEDANCE						
	75 kHz Power ON	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	58		64	
	100 kHz Power ON	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	35		44	
	250 kHz Power ON	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	-65		-68	
	500 kHz Power ON	≥ 1000	ohms	6188	Pass	5935	Pass
	Phase Angle		degs	-80		-81	
	1.0 MHz Power ON	≥ 1000	ohms	2987	Pass	2855	Pass
	Phase Angle		degs	-86		-87	
	75 kHz Power OFF	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	62		68	
	100 kHz Power OFF	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	30		41	
	250 kHz Power OFF	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	-73		-76	
	500 kHz Power OFF	≥ 1000	ohms	5138	Pass	4942	Pass
	Phase Angle		degs	-83		-84	
	1.0 MHz Power OFF	≥ 1000	ohms	2502	Pass	2402	Pass
	Phase Angle		degs	-87		-87	

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.1	RT Response to Commands Non-Broadcast Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1920/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1920/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(61440/ 0/ 0)	0-0-00-00	- - -	NR	0-0-00-00	- - -	NR
	B:(61440/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(16/ 0/ 0)	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	B:(16/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(98/ 0/ 0)	1-0-00-00	1-4-0-00	ME	1-0-00-00	1-4-0-00	ME
	B:(98/ 0/ 0)	1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.1	RT Response to Commands Broadcast Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
	B:(960/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Valid, Illegal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	31-1-01-00	- - -	NR	31-1-01-00	- - -	NR
	B:(960/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Invalid Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(8/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(8/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(10/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
	B:(10/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(9/ 0/ 0)	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	B:(9/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Non-Broadcast Receive Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	B:(960/ 0/ 0)	2-1-01-01	2-0-0-00	CS	2-1-01-01	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(30720/ 0/ 0)	0-0-00-00	- - -	NR	0-0-00-00	- - -	NR
	B:(30720/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	B:(2/ 0/ 0)	2-1-01-01	2-0-0-00	CS	2-1-01-01	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(58/ 0/ 0)	1-0-00-00	- - -	NR	1-0-00-00	- - -	NR
	B:(58/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Non-Broadcast Transmit Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	2-0-01-01	- - -	NR	2-0-01-01	- - -	NR
	B:(960/ 0/ 0)	1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(30720/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(30720/ 0/ 0)	0-1-00-00	- - -	NR	0-1-00-00	- - -	NR
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(14/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(14/ 0/ 0)	1-1-00-01	1-0-0-00	CS	1-1-00-01	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(40/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(40/ 0/ 0)	1-1-00-09	1-4-0-00	ME	1-1-00-09	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Broadcast Receive Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
	B:(960/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(2/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(58/ 0/ 0)	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	B:(58/ 0/ 0)	0-1-01-00	0-0-0-00	CS	0-1-01-00	0-0-0-00	CS
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Broadcast Transmit Commands						
	Valid, Legal Commands			N/A N/A N/A N/A			N/A N/A N/A N/A
	Valid, Illegal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(960/ 0/ 0)	0-0-01-01	- - -	NR	0-0-01-01	- - -	NR
	B:(960/ 0/ 0)	31-1-01-01	- - -	NR	31-1-01-01	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Invalid Commands			N/A N/A N/A N/A			N/A N/A N/A N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(6/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(6/ 0/ 0)	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(10/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(10/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(40/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(40/ 0/ 0)	31-1-00-09	- - -	NR	31-1-00-09	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.2	Intermessage Gap						
5.2.1.2.1	Minimum Time						
	BC-UUT Transfer	1-0-05-00	1-0-0-00	CS	1-0-05-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	UUT-BC Transfer	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	UUT/RT Transfer	1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	RT/UUT Transfer	25-0-01-00	25-0-0-00	DC	2-0-01-00	2-0-0-00	DC
	A:(1000/ 0/ 0)	1-1-24-00	1-0-0-00	CS	1-1-24-00	1-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Mode Command w/o data	1-1-00-00	1-0-0-00	CS	1-1-00-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	Mode Command,	1-1-00-16	1-0-0-00	CS	1-1-00-16	1-0-0-00	CS
	Transmit w/Data	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Mode Command,	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	Receive w/Data	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Broadcast BC-UUT	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	Broadcast RT/UUT	31-0-01-30	- - -	NR	31-0-01-30	- - -	NR
	A:(1000/ 0/ 0)	1-1-30-30	1-0-0-00	CS	1-1-30-30	1-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Broadcast UUT/RT	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	A:(1000/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Broadcast Mode Cmnd	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
	w/o data	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Broadcast Mode Cmnd	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	w/data	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.2	Intermessage Gap						
5.2.1.2.2	Transmission Rate						
	Transmit-Transmit	1-1-05-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	A:(19256/ 0/ 0)	1-1-07-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	B:(19276/ 0/ 0)	1-1-06-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-07-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	Busy (usec)		0			0	
	Receive-Receive	1-0-10-00	1-0-0-00	CS	1-0-10-00	1-0-0-00	CS
	A:(19266/ 0/ 0)	1-0-11-00	1-0-0-00	CS	1-0-11-00	1-0-0-00	CS
	B:(19252/ 0/ 0)	1-0-10-00	1-0-0-00	CS	1-0-10-00	1-0-0-00	CS
		1-0-11-00	1-0-0-00	CS	1-0-11-00	1-0-0-00	CS
	Busy (usec)		0			0	
	Transmit-Receive	1-1-20-00	1-0-0-00	CS	1-1-20-00	1-0-0-00	CS
	A:(19264/ 0/ 0)	1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	B:(19262/ 0/ 0)	1-1-20-00	1-0-0-00	CS	1-1-20-00	1-0-0-00	CS
		1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	Busy (usec)		0			0	
5.2.1.3	Error Injection						
5.2.1.3.1	Parity						
5.2.1.3.1.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.1.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.1.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(32/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(32/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.3.2	Word Length						
5.2.1.3.2.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.2.2	Receive Command						
	Short Receive commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Long Receive commands	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.2.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(126/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(126/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.3	Bi-Phase Encoding						
5.2.1.3.3.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(34/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(34/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.3.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(34/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(34/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.3.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1088/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(1088/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.4	Sync Encoding						
5.2.1.3.4.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(5/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(5/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.4.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(5/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(5/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.4.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(160/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(160/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.3.5	Message Length						
5.2.1.3.5.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(33/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(33/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.3	Receive Mode Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-00-17	- - -	NR	1-0-00-17	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	Transmit Mode Command	1-0-01-01	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(1/ 0/ 0)	1-1-00-01	- - -	NR	1-1-00-01	- - -	NR
	B:(1/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.4	RT-RT Word Count Error	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
	B:(2/ 0/ 0)	1-0-08-00	- - -	NR	1-0-08-00	- - -	NR
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.6	Contiguous Data	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(32/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(32/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.7	Terminal Fail-Safe						
5.2.1.4	Superseding Commands						
	part A	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	part B	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	part C	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	part D	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.5	Required Mode Commands						
5.2.1.5.1	Transmit Status	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	B:(2/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.5.2	Xmtr Shutdown/Override	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-05	- - -	NR	1-1-00-05	- - -	NR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-05	1-0-0-00	CS	1-1-00-05	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.1.5.3	Reset Remote Terminal						
	Delay to Stable Response	1-1-00-08	1-0-0-00	CS	1-1-00-08	1-0-0-00	CS
	A:(1764/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1764/ 0/ 0)						
	(T ≤ 5000us)		5			5	
	Shutdown	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-08	1-0-0-00	CS	1-1-00-08	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.1.6	Data Wrap-around	1-0-30-00	1-0-0-00	CS	1-0-30-00	1-0-0-00	CS
	A:(10000/ 0/ 0)	1-1-30-00	1-0-0-00	CS	1-1-30-00	1-0-0-00	CS
	B:(10000/ 0/ 0)						
5.2.1.7	RT-RT Timeout Delay						
	Time to first NR	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	(54us ≤ T ≤ 60us)		55.5			55.5	
	Time to first CS	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	(54us ≤ T ≤ 60us)		55.0			55.0	

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.8	Bus Switching						
	RT Transmitting						
	Valid, Legal Command	1-1-02-00	- - -	NR	1-1-02-00	- - -	NR
	A:(10945/ 0/ 0)	1-1-05-00	1-0-0-00	CS	1-1-05-00	1-0-0-00	CS
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command w/Parity Error	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(10945/ 0/ 0)	1-1-05-00	- - -	NR	1-1-05-00	- - -	NR
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command to another RT	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(10945/ 0/ 0)	2-1-05-00	- - -	NR	2-1-05-00	- - -	NR
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	RT Receiving						
	Valid, Legal Command	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	1-1-05-00	1-0-0-00	CS	1-1-05-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command w/Parity Error	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	1-1-05-00	- - -	NR	1-1-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command to another RT	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	2-1-05-00	- - -	NR	2-1-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.9	Unique UUT Address						
	part A						
	UUT Adr 0	0-0-05-00	0-0-0-00	CS	0-0-05-00	0-0-0-00	CS
	UUT Adr 1	1-0-05-00	1-0-0-00	CS	1-0-05-00	1-0-0-00	CS
	UUT Adr 2	2-0-05-00	2-0-0-00	CS	2-0-05-00	2-0-0-00	CS
	UUT Adr 3	3-0-05-00	3-0-0-00	CS	3-0-05-00	3-0-0-00	CS
	UUT Adr 4	4-0-05-00	4-0-0-00	CS	4-0-05-00	4-0-0-00	CS
	UUT Adr 5	5-0-05-00	5-0-0-00	CS	5-0-05-00	5-0-0-00	CS
	UUT Adr 6	6-0-05-00	6-0-0-00	CS	6-0-05-00	6-0-0-00	CS
	UUT Adr 7	7-0-05-00	7-0-0-00	CS	7-0-05-00	7-0-0-00	CS
	UUT Adr 8	8-0-05-00	8-0-0-00	CS	8-0-05-00	8-0-0-00	CS
	UUT Adr 9	9-0-05-00	9-0-0-00	CS	9-0-05-00	9-0-0-00	CS
	UUT Adr 10 (0A)	10-0-05-00	10-0-0-00	CS	10-0-05-00	10-0-0-00	CS
	UUT Adr 11 (0B)	11-0-05-00	11-0-0-00	CS	11-0-05-00	11-0-0-00	CS
	UUT Adr 12 (0C)	12-0-05-00	12-0-0-00	CS	12-0-05-00	12-0-0-00	CS
	UUT Adr 13 (0D)	13-0-05-00	13-0-0-00	CS	13-0-05-00	13-0-0-00	CS
	UUT Adr 14 (0E)	14-0-05-00	14-0-0-00	CS	14-0-05-00	14-0-0-00	CS
	UUT Adr 15 (0F)	15-0-05-00	15-0-0-00	CS	15-0-05-00	15-0-0-00	CS
	UUT Adr 16 (10)	16-0-05-00	16-0-0-00	CS	16-0-05-00	16-0-0-00	CS
	UUT Adr 17 (11)	17-0-05-00	17-0-0-00	CS	17-0-05-00	17-0-0-00	CS
	UUT Adr 18 (12)	18-0-05-00	18-0-0-00	CS	18-0-05-00	18-0-0-00	CS
	UUT Adr 19 (13)	19-0-05-00	19-0-0-00	CS	19-0-05-00	19-0-0-00	CS
	UUT Adr 20 (14)	20-0-05-00	20-0-0-00	CS	20-0-05-00	20-0-0-00	CS
	UUT Adr 21 (15)	21-0-05-00	21-0-0-00	CS	21-0-05-00	21-0-0-00	CS
	UUT Adr 22 (16)	22-0-05-00	22-0-0-00	CS	22-0-05-00	22-0-0-00	CS
	UUT Adr 23 (17)	23-0-05-00	23-0-0-00	CS	23-0-05-00	23-0-0-00	CS
	UUT Adr 24 (18)	24-0-05-00	24-0-0-00	CS	24-0-05-00	24-0-0-00	CS
	UUT Adr 25 (19)	25-0-05-00	25-0-0-00	CS	25-0-05-00	25-0-0-00	CS
	UUT Adr 26 (1A)	26-0-05-00	26-0-0-00	CS	26-0-05-00	26-0-0-00	CS
	UUT Adr 27 (1B)	27-0-05-00	27-0-0-00	CS	27-0-05-00	27-0-0-00	CS
	UUT Adr 28 (1C)	28-0-05-00	28-0-0-00	CS	28-0-05-00	28-0-0-00	CS
	UUT Adr 29 (1D)	29-0-05-00	29-0-0-00	CS	29-0-05-00	29-0-0-00	CS
	UUT Adr 30 (1E)	30-0-05-00	30-0-0-00	CS	30-0-05-00	30-0-0-00	CS
	UUT Adr 31 (1F)	31-0-05-00	- - -	NR	31-0-05-00	- - -	NR
	part B	31-0-05-00	- - -	NR	31-0-05-00	- - -	NR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.1	Optional Protocol						
5.2.2.1.1	Dynamic Bus Control	1-1-00-00	1-0-0-00	CS	1-1-00-00	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
5.2.2.1.2	Synchronize						
5.2.2.1.2.1	Synchronize without data	1-1-00-01	1-0-0-00	CS	1-1-00-01	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
5.2.2.1.2.2	Synchronize with data	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	SYNC Word		0000			0000	
5.2.2.1.3	Initiate Self-Test	1-1-00-03	1-0-0-00	CS	1-1-00-03	1-0-0-00	CS
	A:(1964/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1964/ 0/ 0)						
	(T ≤ 100,000us)		692			692	
5.2.2.1.4	Transmit BIT word	1-1-00-19	1-0-0-00	CS	1-1-00-19	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	BIT Word		03ff			03ff	
5.2.2.1.5	Selective Xmtr Shutdown	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	1-0-00-20	1-0-0-00	CS	1-0-00-20	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-21	1-0-0-00	CS	1-0-00-21	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-21	1-0-0-00	CS	1-0-00-21	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-20	1-0-0-00	CS	1-0-00-20	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Alt Bus Selection Word		0000			0000	
	Pri Bus Selection Word		0000			0000	
5.2.2.1.6	Terminal Flag Bit Inhibit	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
	B:(4/ 0/ 0)	1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-00-06	1-0-0-00	CS	1-1-00-06	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-31-07	1-0-0-01	TF	1-1-31-07	1-0-0-01	TF
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	BUS A Response	BUS A STAT	BUS B Command	BUS B Response	BUS B STAT
5.2.2.1.7	Transmit Vector Word	1-1-00-16	1-0-0-00	CS	1-1-00-16	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	VECTOR Word		5100			5100	
5.2.2.1.8	Transmit Last Command	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-01-01	- - -	NR	1-0-01-01	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
5.2.2.2	Status Word						
5.2.2.2.1	Service Request	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-01-01	1-1-0-00	DC	1-1-01-01	1-1-0-00	DC
		1-1-01-00	1-1-0-00	SR	1-1-01-00	1-1-0-00	SR
		1-1-01-00	1-1-0-00	SR	1-1-01-00	1-1-0-00	SR
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.2.2	Broadcast Command Received	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
5.2.2.2.3	Busy	1-1-01-01	1-0-0-08	DC	1-1-01-01	1-0-0-08	DC
		1-1-02-00	1-0-0-08	BUSY	1-1-02-00	1-0-0-08	BUSY
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
5.2.2.2.4	Subsystem Flag	1-1-01-01	1-0-0-04	DC	1-1-01-01	1-0-0-04	DC
		1-1-02-00	1-0-0-04	SF	1-1-02-00	1-0-0-04	SF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.2.2.5	Terminal Flag	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.3	Illegal Command						
	part A			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	part B			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
5.2.2.4	Broadcast Mode Commands						
5.2.2.4.1	Synchronize without data	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
5.2.2.4.2	Synchronize with data	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	SYNC Word		0000			0000	
5.2.2.4.3	Initiate Self-Test	31-1-00-03	- - -	NR	31-1-00-03	- - -	NR
	A:(1968/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1968/ 0/ 0)						
	(T ≤ 100,000us)		704			704	
5.2.2.4.4	Xmtr Shutdown/Override	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	31-1-00-04	- - -	NR	31-1-00-04	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-1-00-05	- - -	NR	31-1-00-05	- - -	NR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		31-1-00-05	- - -	NR	31-1-00-05	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.4.5	Selective Xmtr Shutdown	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	31-0-00-20	- - -	NR	31-0-00-20	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-21	- - -	NR	31-0-00-21	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-21	- - -	NR	31-0-00-21	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-20	- - -	NR	31-0-00-20	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Alt Bus Selection Word		0000			0000	
	Pri Bus Selection Word		0000			0000	
5.2.2.4.6	Terminal Flag Bit Inhibit	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
	B:(4/ 0/ 0)	1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		31-1-00-06	- - -	NR	31-1-00-06	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-1-31-07	- - -	NR	31-1-31-07	- - -	NR
		1-1-00-18	1-0-0-17	BRTF	1-1-00-18	1-0-0-17	BRTF
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.4.7	Reset Remote Terminal						
	Delay to Stable Response	31-1-00-08	- - -	NR	31-1-00-08	- - -	NR
	A:(1768/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1768/ 0/ 0)						
	(T ≤ 5000us)		20			20	
	Clear Xmtr Shutdown	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(2/ 0/ 0)	31-1-00-08	- - -	NR	31-1-00-08	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.2.4.8	Dynamic Bus Control	1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-16	MBR	1-1-00-02	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.5	Error Injection -Broadcast Messages						
5.2.2.5.1	Parity: BC-RT Broadcast						
5.2.2.5.1.1	Command w/Parity Error	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.5.1.2	Data Word Error	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
	A:(32/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	B:(32/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.5.2	Message Length: BC-RT Broadcast	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	A:(33/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(33/ 0/ 0)	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.3	Noise Rejection	1-0-30-00	1-0-0-00	CS	1-0-30-00	1-0-0-00	CS
	Words Received	44,000,022		PASS	44,000,022		PASS
	Noise Level used (mV)	140			140		
	A:(1333334/ 0/ 0)						
	B:(1333334/ 0/ 0)						

TEST SYSTEMS, Inc. MIL-STD-1553B RT VALIDATION TEST REPORT
By: TEST SYSTEMS, Inc.

SUM-Y.DAT
11/14/97 (09:52:54)

CUSTOMER:

UNITED TECHNOLOGIES MICROELECTRONICS CENTER
1575 Garden of the Gods Road
Colorado Springs, CO 80907

TEST STARTED:

Nov. 13, 1997

TEST COMPLETED:

Nov. 14, 1997

UNIT UNDER TEST IDENTIFICATION:

SuMMIT
Part Number: UT69151E Y Die
Pic Number: JA01
Breadboard
UTMC UT63M147 5 Volt Transceiver
Technitrol Q1553-45 Transformers

SUMMARY OF TEST RESULTS:	A-Bus	B-Bus
Electrical:	Passed	Passed
Required Protocol:	Passed	Passed
Optional Protocol:	Passed	Passed
Noise Rejection:	Passed	Passed

CERTIFICATE OF COMPLIANCE:

TEST SYSTEMS, Inc. certifies that this MIL-STD-1553B REMOTE TERMINAL VALIDATION TEST REPORT provides the results of the RT Validation Testing performed on November 13 & 14, 1997, in Phoenix for UNITED TECHNOLOGIES MICROELECTRONICS CENTER. TEST SYSTEMS, Inc. further certifies that this testing was in accordance with the RT VALIDATION TEST PROCEDURE dated 06-03-96, using software dated 11-21-91 and complies with the RT Validation Test Plan (MIL-HDBK-1553 Appendix A) with the exceptions noted on page 2.

Leroy Earhart 11/14/97

Leroy Earhart — Date

TEST SYSTEMS, Inc. 217 W. Palmaire **Phoenix, AZ 85021 602/861-1010**

EXCEPTIONS TO THE RT VALIDATION TEST PLAN:

1. Step 6 of Reset remote terminal (5.2.1.5.3) is changed to repeat step 4 rather than step 5. (Error in Test Plan.)

2. Frequency Stability (5.1.1.10) and Terminal Fail-Safe (5.2.1.3.7) tests were not run.

3. Not all commands which cause the BUSY bit to be set are recorded for every test. This can be impractical in tests where 10,000 iterations are performed because of the volume of information that would be generated. Rather than recording each scenario in which the BUSY bit is set, this report provides a count of the messages in the scenarios which have the BUSY bit set.

TEST COMMENTS:

5.1.1.3 Zero Crossing Stability: An additional test was run off-line to measure the time of the first half sync from +3.0 volts to -3.0 volts. The nominal time is 1500 ns. Bus A 1540 ns; Bus B 1540 ns.

5.1.2.1.1 Zero Crossing Distortion: An additional test was run off-line with distortion greater than the +/-150 ns required by the standard and test plan. Bus A was tested with +/-165 ns distortion and Bus B was tested with +/-170 ns distortion.

5.1.2.3 Input Impedance magnitude measurements recorded as 9999 ohms are actually 9999 ohms or greater.

Status bits were tested by setting and resetting the bits using support equipment.

NOTE:

Command words are expressed in four fields with 5 bits in the first, third and fourth fields and 1 bit in the second field. Status words are expressed in four fields with 5 bits in the first and fourth fields and 3 bits in the second and third fields. Each field is given in decimal.

TEST PERSONNEL:

Leroy Earhart	TSI
Luke Lepley	UTMC

EQUIPMENT LIST:

EQUIPMENT TYPE	MANUFACTURER MODEL NO./SERIAL NO.	CALIBRATION Date Done	Date Due
1553 BUS TESTER	TSI 122 / 8804111	N/A	
Oscilloscope	TEK 2445B / B060730	09/12/97	09/12/98
True RMS Voltmeter	HP 3400A / 401-01050	08/29/97	08/29/99
Impedance Analyzer	HP 4192A /2830J06227	10/16/97	10/16/98
Function Generator	Tenma 72-380 / 8802028	N/A	
Host Processor *	MIT SYS / TSC 11442	N/A	
Monochrome Monitor	GoldStar / MB-50300634	N/A	
Connection Panel	TSI 0100 / 900101	N/A	

* The Host Processor has three TSI cards installed:
PC/AT PARALLEL I/O CARD, MANCHESTER CARD & 1553 NOISE GENERATOR CARD

Valid, Legal Non-Broadcast Commands (if not marked by '-')

Receive (T/R=0) Word Count Field		Transmit (T/R=1) Word Count Field	
	11111111112222222233		11111111112222222233
SA	01234567890123456789012345678901	SA	01234567890123456789012345678901
0	----------------7--01----------	0	012345678-------6-89----------
1	01234567890123456789012345678901	1	01234567890123456789012345678901
2	01234567890123456789012345678901	2	01234567890123456789012345678901
3	01234567890123456789012345678901	3	01234567890123456789012345678901
4	01234567890123456789012345678901	4	01234567890123456789012345678901
5	01234567890123456789012345678901	5	01234567890123456789012345678901
6	01234567890123456789012345678901	6	01234567890123456789012345678901
7	01234567890123456789012345678901	7	01234567890123456789012345678901
8	01234567890123456789012345678901	8	01234567890123456789012345678901
9	01234567890123456789012345678901	9	01234567890123456789012345678901
10	01234567890123456789012345678901	10	01234567890123456789012345678901
11	01234567890123456789012345678901	11	01234567890123456789012345678901
12	01234567890123456789012345678901	12	01234567890123456789012345678901
13	01234567890123456789012345678901	13	01234567890123456789012345678901
14	01234567890123456789012345678901	14	01234567890123456789012345678901
15	01234567890123456789012345678901	15	01234567890123456789012345678901
16	01234567890123456789012345678901	16	01234567890123456789012345678901
17	01234567890123456789012345678901	17	01234567890123456789012345678901
18	01234567890123456789012345678901	18	01234567890123456789012345678901
19	01234567890123456789012345678901	19	01234567890123456789012345678901
20	01234567890123456789012345678901	20	01234567890123456789012345678901
21	01234567890123456789012345678901	21	01234567890123456789012345678901
22	01234567890123456789012345678901	22	01234567890123456789012345678901
23	01234567890123456789012345678901	23	01234567890123456789012345678901
24	01234567890123456789012345678901	24	01234567890123456789012345678901
25	01234567890123456789012345678901	25	01234567890123456789012345678901
26	01234567890123456789012345678901	26	01234567890123456789012345678901
27	01234567890123456789012345678901	27	01234567890123456789012345678901
28	01234567890123456789012345678901	28	01234567890123456789012345678901
29	01234567890123456789012345678901	29	01234567890123456789012345678901
30	01234567890123456789012345678901	30	01234567890123456789012345678901
31	----------------7--01----------	31	012345678-------6-89----------

Illegal Command Detection Implemented:	Yes
Broadcast Implemented:	Yes
Data Wrap-Around	Receive SA: 30 Transmit SA: 30
Terminal Address Used:	1
Coupling Used:	Transformer
Implemented Status bits:	ME SRB BCR BUSY SF TF
Implemented Non-Broadcast Mode Codes:	1,2,3,4,5,6,7,8,16,17,18,19
Implemented Broadcast Mode Codes:	1,3,4,5,6,7,8,17

Valid, Legal Broadcast Commands (if not marked by '-')

	Receive (T/R=0) Word Count Field		Transmit (T/R=1) Word Count Field
	11111111112222222223		11111111112222222223
SA	01234567890123456789012345678901	SA	01234567890123456789012345678901
0	----------------7--01----------	0	-1-345678----------------------
1	01234567890123456789012345678901	1	--------------------------------
2	01234567890123456789012345678901	2	--------------------------------
3	01234567890123456789012345678901	3	--------------------------------
4	01234567890123456789012345678901	4	--------------------------------
5	01234567890123456789012345678901	5	--------------------------------
6	01234567890123456789012345678901	6	--------------------------------
7	01234567890123456789012345678901	7	--------------------------------
8	01234567890123456789012345678901	8	--------------------------------
9	01234567890123456789012345678901	9	--------------------------------
10	01234567890123456789012345678901	10	--------------------------------
11	01234567890123456789012345678901	11	--------------------------------
12	01234567890123456789012345678901	12	--------------------------------
13	01234567890123456789012345678901	13	--------------------------------
14	01234567890123456789012345678901	14	--------------------------------
15	01234567890123456789012345678901	15	--------------------------------
16	01234567890123456789012345678901	16	--------------------------------
17	01234567890123456789012345678901	17	--------------------------------
18	01234567890123456789012345678901	18	--------------------------------
19	01234567890123456789012345678901	19	--------------------------------
20	01234567890123456789012345678901	20	--------------------------------
21	01234567890123456789012345678901	21	--------------------------------
22	01234567890123456789012345678901	22	--------------------------------
23	01234567890123456789012345678901	23	--------------------------------
24	01234567890123456789012345678901	24	--------------------------------
25	01234567890123456789012345678901	25	--------------------------------
26	01234567890123456789012345678901	26	--------------------------------
27	01234567890123456789012345678901	27	--------------------------------
28	01234567890123456789012345678901	28	--------------------------------
29	01234567890123456789012345678901	29	--------------------------------
30	01234567890123456789012345678901	30	--------------------------------
31	----------------7--01----------	31	-1-345678----------------------

Test STAT abbreviation definitions:

ABRT: Test Aborted	BCR: Broadcast Received	BRTF: Brdcst Rcvd+TermFlag
BUSY: Busy Bit	CS: Clear Status	DBA: Dynamic Bus Accepted
DC: Don't Care	EF: Error Found	Inhb: Operator Inhibited
INVL: Invalid Test	MBR: Msg Err+Brdcst Rcvd	MBRT: ME+TF+BCR
ME: Message Error	MTF: MsgErr+TermFlag	NR: No Response
NRun: Not Run	RIF: Respond In Form	SF: Subsystem Flag
SR: Service Request	TF: Terminal Flag	TO: Timed Out
VR: Valid Response		

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	STAT	B U S B Meas.	STAT
5.1.1	OUTPUT CHARACTERISTICS						
5.1.1.1	OUTPUT AMPLITUDE Max	18.0-27.0	Vpp	22.80	Pass	22.60	Pass
	Min	18.0-27.0	Vpp	22.00	Pass	21.80	Pass
5.1.1.2	OUTPUT RISE TIME-Sync	100- 300	ns	145	Pass	140	Pass
5.1.1.2	OUTPUT RISE TIME-Data	100- 300	ns	140	Pass	139	Pass
5.1.1.2	OUTPUT FALL TIME-Sync	100- 300	ns	145	Pass	146	Pass
5.1.1.2	OUTPUT FALL TIME-Data	100- 300	ns	145	Pass	146	Pass
5.1.1.3	ZERO CROSSING STAB.						
	500ns Tzcp	475- 525	ns	502	Pass	502	Pass
	1000ns Tzcp	975-1025	ns	1002	Pass	1003	Pass
	1500ns Tzcp	1475-1525	ns	1500	Pass	1505	Pass
	2000ns Tzcp	1975-2025	ns	2000	Pass	2000	Pass
	500ns Tzcn	475- 525	ns	499	Pass	499	Pass
	1000ns Tzcn	975-1025	ns	997	Pass	999	Pass
	1500ns Tzcn	1475-1525	ns	1500	Pass	1500	Pass
	2000ns Tzcn	1975-2025	ns	1997	Pass	1997	Pass
5.1.1.4	DISTORTION, OVERSHOOT AND RINGING	≤ ± 900	mVp	500	Pass	600	Pass
5.1.1.5	OUTPUT SYMMETRY						
	(0000)	≤ ± 250	mVp	-105	Pass	-65	Pass
	(5555)	≤ ± 250	mVp	-95	Pass	-60	Pass
	(7FFF)	≤ ± 250	mVp	-75	Pass	-25	Pass
	(8000)	≤ ± 250	mVp	-95	Pass	-45	Pass
	(AAAA)	≤ ± 250	mVp	-95	Pass	-60	Pass
	(FFFF)	≤ ± 250	mVp	-90	Pass	-55	Pass
5.1.1.6	OUTPUT NOISE						
	with power on	≤ 14	mVrms	1	Pass	1	Pass
	with power off	≤ 14	mVrms	1	Pass	1	Pass
5.1.1.7	OUTPUT ISOLATION	≥ 45	db	81	Pass	81	Pass
	Active Bus	18.0-27.0	Vpp	22.00	Pass	21.80	Pass
	Inactive Bus		mVpp	2	Pass	2	Pass
5.1.1.8.1	POWER ON/OFF NOISE						
	Power Up Amplitude	≤ ± 250	mVp	50	Pass	50	Pass
	Pulse Width		us	.1		.1	
	Power Down Amplitude	≤ ± 250	mVp	50	Pass	50	Pass
	Pulse Width		us	.1		.1	
5.1.1.8.2	POWER ON RESPONSE	protocol	---		Pass		Pass

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	STAT	B U S B Meas.	STAT
5.1.1.9	TERMINAL RESPONSE TIME						
	Transmit	4.0-12.0	us	9.00	Pass	8.87	Pass
	Receive	4.0-12.0	us	8.80	Pass	8.80	Pass
	RT-UUT	4.0-12.0	us	8.80	Pass	8.80	Pass
	Mode Command	4.0-12.0	us	9.83	Pass	9.71	Pass
5.1.1.10	FREQUENCY STABILITY						
	Min. Frequency		kHz				
	Max. Frequency		kHz				
	Avg. Frequency		kHz				
5.1.2	INPUT CHARACTERISTICS						
5.1.2.1.1	ZERO CROSSING						
	DISTORTION						
	Min. Deviation	≤ -150	ns	-186	Pass	-185	Pass
	Max. Deviation	≥ 150	ns	179	Pass	178	Pass
	Plus 150 nsec	protocol	---		Pass		Pass
	Minus 150 nsec	protocol	---		Pass		Pass
5.1.2.1.2	AMPLITUDE VARIATIONS						
	1st CS threshold	200- 860	mVpp	645	Pass	685	Pass
	1st NR threshold	200- 860	mVpp	655	Pass	665	Pass
5.1.2.1.3	RISE AND FALL TIME						
5.1.2.1.3.1	TRAPEZOIDAL	protocol	---		Pass		Pass
5.1.2.1.3.2	SINUSOIDAL	protocol	---		Pass		Pass
5.1.2.2	COMMON MODE REJECTION						
	+10 volt	protocol	---		Pass		Pass
	-10 volt	protocol	---		Pass		Pass
	±10 volt	protocol	---		Pass		Pass

Ref. Section	Test Description (Xformr Coupled)	Limits	Units	B U S A Meas.	STAT	B U S B Meas.	STAT
5.1.2.3	INPUT IMPEDANCE						
	75 kHz Power ON	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	61		62	
	100 kHz Power ON	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	42		43	
	250 kHz Power ON	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	-62		-61	
	500 kHz Power ON	≥ 1000	ohms	7316	Pass	7031	Pass
	Phase Angle		degs	-78		-78	
	1.0 MHz Power ON	≥ 1000	ohms	3529	Pass	3381	Pass
	Phase Angle		degs	-84		-84	
	75 kHz Power OFF	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	64		64	
	100 kHz Power OFF	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	34		36	
	250 kHz Power OFF	≥ 1000	ohms	9999	Pass	9999	Pass
	Phase Angle		degs	-73		-72	
	500 kHz Power OFF	≥ 1000	ohms	5505	Pass	5392	Pass
	Phase Angle		degs	-81		-81	
	1.0 MHz Power OFF	≥ 1000	ohms	2712	Pass	2653	Pass
	Phase Angle		degs	-85		-85	

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.1	RT Response to Commands Non-Broadcast Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(1920/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(1920/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(61440/ 0/ 0)	0-0-00-00	- - -	NR	0-0-00-00	- - -	NR
	B:(61440/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(16/ 0/ 0)	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	B:(16/ 0/ 0)	1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(98/ 0/ 0)	1-0-00-00	1-4-0-00	ME	1-0-00-00	1-4-0-00	ME
	B:(98/ 0/ 0)	1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.1	RT Response to Commands						
	Broadcast Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(960/ 0/ 0)	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
	B:(960/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Valid, Illegal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(960/ 0/ 0)	31-1-01-00	- - -	NR	31-1-01-00	- - -	NR
	B:(960/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Invalid Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(8/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(8/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(10/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
	B:(10/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(98/ 0/ 0)	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	B:(98/ 0/ 0)	1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Non-Broadcast Receive Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(960/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	B:(960/ 0/ 0)	2-1-01-01	2-0-0-00	CS	2-1-01-01	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(30720/ 0/ 0)	0-0-00-00	- - -	NR	0-0-00-00	- - -	NR
	B:(30720/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	B:(2/ 0/ 0)	2-1-01-01	2-0-0-00	CS	2-1-01-01	2-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(58/ 0/ 0)	1-0-00-00	- - -	NR	1-0-00-00	- - -	NR
	B:(58/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Non-Broadcast Transmit Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(960/ 0/ 0)	2-0-01-01	- - -	NR	2-0-01-01	- - -	NR
	B:(960/ 0/ 0)	1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(30720/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(30720/ 0/ 0)	0-1-00-00	- - -	NR	0-1-00-00	- - -	NR
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(14/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(14/ 0/ 0)	1-1-00-01	1-0-0-00	CS	1-1-00-01	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(40/ 0/ 0)	2-0-01-00	- - -	NR	2-0-01-00	- - -	NR
	B:(40/ 0/ 0)	1-1-00-09	1-4-0-00	ME	1-1-00-09	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.1.1	Response to Command Words						
5.2.1.1.2	RT-RT Response to Command Words Broadcast Receive Commands						
	Valid, Legal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(960/ 0/ 0)	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
	B:(960/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Valid, Illegal Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Invalid Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(2/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(58/ 0/ 0)	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	B:(58/ 0/ 0)	0-1-01-00	0-0-0-00	CS	0-1-01-00	0-0-0-00	CS
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.1.1 5.2.1.1.2	Response to Command Words RT-RT Response to Command Words Broadcast Transmit Commands						
	Valid, Legal Commands			N/A N/A N/A N/A			N/A N/A N/A N/A
	Valid, Illegal Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(960/ 0/ 0)	0-0-01-01	- - -	NR	0-0-01-01	- - -	NR
	B:(960/ 0/ 0)	31-1-01-01	- - -	NR	31-1-01-01	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Invalid Commands			N/A N/A N/A N/A			N/A N/A N/A N/A
	Legal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(6/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(6/ 0/ 0)	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	Illegal Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(10/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(10/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
	Undefined Mode Commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(40/ 0/ 0)	0-0-01-00	- - -	NR	0-0-01-00	- - -	NR
	B:(40/ 0/ 0)	31-1-00-09	- - -	NR	31-1-00-09	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	Response	STAT	B U S B Command	Response	STAT
5.2.1.2	Intermessage Gap						
5.2.1.2.1	Minimum Time						
	BC-UUT Transfer	1-0-05-00	1-0-0-00	CS	1-0-05-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	UUT-BC Transfer	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	UUT/RT Transfer	1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	RT/UUT Transfer	25-0-01-00	25-0-0-00	DC	25-0-01-00	25-0-0-00	DC
	A:(1000/ 0/ 0)	1-1-24-00	1-0-0-00	CS	1-1-24-00	1-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	Mode Command w/o data	1-1-00-00	1-0-0-00	CS	1-1-00-00	1-0-0-00	CS
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	Mode Command,	1-1-00-16	1-0-0-00	CS	1-1-00-16	1-0-0-00	CS
	Transmit w/Data	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Mode Command,	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	Receive w/Data	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Broadcast BC-UUT	31-0-00-00	- - -	NR	31-0-00-00	- - -	NR
	A:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	B:(1000/ 0/ 0)						
	Broadcast RT/UUT	31-0-01-30	- - -	NR	31-0-01-30	- - -	NR
	A:(1000/ 0/ 0)	1-1-30-30	1-0-0-00	CS	1-1-30-30	1-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	Broadcast UUT/RT	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	A:(1000/ 0/ 0)	0-1-01-01	0-0-0-00	CS	0-1-01-01	0-0-0-00	CS
	B:(1000/ 0/ 0)	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	Broadcast Mode Cmnd	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
	w/o data	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						
	Broadcast Mode Cmnd	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	w/data	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(1000/ 0/ 0)						
	B:(1000/ 0/ 0)						

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.2	Intermessage Gap						
5.2.1.2.2	Transmission Rate						
	Transmit-Transmit	1-1-06-00	1-0-0-00	CS	1-1-06-00	1-0-0-00	CS
	A:(19286/ 0/ 0)	1-1-07-00	1-0-0-00	CS	1-1-07-00	1-0-0-00	CS
	B:(19276/ 0/ 0)	1-1-06-00	1-0-0-00	CS	1-1-06-00	1-0-0-00	CS
		1-1-07-00	1-0-0-00	CS	1-1-07-00	1-0-0-00	CS
	Busy (usec)		0			0	
	Receive-Receive	1-0-10-00	1-0-0-00	CS	1-0-10-00	1-0-0-00	CS
	A:(19280/ 0/ 0)	1-0-11-00	1-0-0-00	CS	1-0-11-00	1-0-0-00	CS
	B:(19276/ 0/ 0)	1-0-10-00	1-0-0-00	CS	1-0-10-00	1-0-0-00	CS
		1-0-11-00	1-0-0-00	CS	1-0-11-00	1-0-0-00	CS
	Busy (usec)		0			0	
	Transmit-Receive	1-1-20-00	1-0-0-00	CS	1-1-20-00	1-0-0-00	CS
	A:(19256/ 0/ 0)	1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	B:(19256/ 0/ 0)	1-1-20-00	1-0-0-00	CS	1-1-20-00	1-0-0-00	CS
		1-0-21-00	1-0-0-00	CS	1-0-21-00	1-0-0-00	CS
	Busy (usec)		0			0	
5.2.1.3	Error Injection						
5.2.1.3.1	Parity						
5.2.1.3.1.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
		1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.1.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
		1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.1.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(32/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(32/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.3.2	Word Length						
5.2.1.3.2.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.2.2	Receive Command						
	Short Receive commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Long Receive commands	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.2.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(126/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(126/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.3	Bi-Phase Encoding						
5.2.1.3.3.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(34/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(34/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.3.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(34/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(34/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.3.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(1088/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(1088/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.4	Sync Encoding						
5.2.1.3.4.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(5/ 0/ 0)	1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
	B:(5/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.4.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(5/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(5/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.3.4.3	Receive Data Words	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(160/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(160/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.1.3.5	Message Length						
5.2.1.3.5.1	Transmit Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
		1-1-06-00	- - -	NR	1-1-06-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.2	Receive Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(33/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(33/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.3	Receive Mode Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-00-17	- - -	NR	1-0-00-17	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	Transmit Mode Command	1-0-01-01	1-0-0-00	CS	1-0-01-01	1-0-0-00	CS
	A:(1/ 0/ 0)	1-1-00-01	- - -	NR	1-1-00-01	- - -	NR
	B:(1/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.5.4	RT-RT Word Count Error	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
	B:(2/ 0/ 0)	1-0-08-00	- - -	NR	1-0-08-00	- - -	NR
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.6	Contiguous Data	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(32/ 0/ 0)	1-0-05-00	- - -	NR	1-0-05-00	- - -	NR
	B:(32/ 0/ 0)	1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
5.2.1.3.7	Terminal Fail-Safe						
5.2.1.4	Superseding Commands						
	part A	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	part B	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	part C	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	part D	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.1.5	Required Mode Commands						
5.2.1.5.1	Transmit Status	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	B:(2/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
5.2.1.5.2	Xmtr Shutdown/Override	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-05	- - -	NR	1-1-00-05	- - -	NR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-1-00-05	1-0-0-00	CS	1-1-00-05	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.1.5.3	Reset Remote Terminal						
	Delay to Stable Response	1-1-00-08	1-0-0-00	CS	1-1-00-08	1-0-0-00	CS
	A:(1764/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1764/ 0/ 0)						
	(T ≤ 5000us)		5			5	
	Shutdown	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-08	1-0-0-00	CS	1-1-00-08	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.1.6	Data Wrap-around	1-0-30-00	1-0-0-00	CS	1-0-30-00	1-0-0-00	CS
	A:(10000/ 0/ 0)	1-1-30-00	1-0-0-00	CS	1-1-30-00	1-0-0-00	CS
	B:(10000/ 0/ 0)						
5.2.1.7	RT-RT Timeout Delay						
	Time to first NR	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
	(54us ≤ T ≤ 60us)		55.5			55.5	
	Time to first CS	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		2-1-01-00	2-0-0-00	CS	2-1-01-00	2-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	(54us ≤ T ≤ 60us)		55.0			55.0	

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	Response	STAT	B U S B Command	Response	STAT
5.2.1.8	Bus Switching						
	RT Transmitting						
	Valid, Legal Command	1-1-02-00	- - -	NR	1-1-02-00	- - -	NR
	A:(10945/ 0/ 0)	1-1-05-00	1-0-0-00	CS	1-1-05-00	1-0-0-00	CS
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command w/Parity Error	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(10945/ 0/ 0)	1-1-05-00	- - -	NR	1-1-05-00	- - -	NR
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command to another RT	1-1-02-00	1-0-0-00	CS	1-1-02-00	1-0-0-00	CS
	A:(10945/ 0/ 0)	2-1-05-00	- - -	NR	2-1-05-00	- - -	NR
	B:(10945/ 0/ 0)	1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	RT Receiving						
	Valid, Legal Command	1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	1-1-05-00	1-0-0-00	CS	1-1-05-00	1-0-0-00	CS
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command w/Parity Error	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	1-1-05-00	- - -	NR	1-1-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS
	Command to another RT	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(11649/ 0/ 0)	2-1-05-00	2-0-0-00	CS	2-1-05-00	2-0-0-00	CS
	B:(11649/ 0/ 0)	2-1-05-00	- - -	NR	2-1-05-00	- - -	NR
		1-1-00-02	1-0-0-00	CS	1-1-00-02	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.1.9	Unique UUT Address						
	part A						
	UUT Adr 0	0-0-05-00	0-0-0-00	CS	0-0-05-00	0-0-0-00	CS
	UUT Adr 1	1-0-05-00	1-0-0-00	CS	1-0-05-00	1-0-0-00	CS
	UUT Adr 2	2-0-05-00	2-0-0-00	CS	2-0-05-00	2-0-0-00	CS
	UUT Adr 3	3-0-05-00	3-0-0-00	CS	3-0-05-00	3-0-0-00	CS
	UUT Adr 4	4-0-05-00	4-0-0-00	CS	4-0-05-00	4-0-0-00	CS
	UUT Adr 5	5-0-05-00	5-0-0-00	CS	5-0-05-00	5-0-0-00	CS
	UUT Adr 6	6-0-05-00	6-0-0-00	CS	6-0-05-00	6-0-0-00	CS
	UUT Adr 7	7-0-05-00	7-0-0-00	CS	7-0-05-00	7-0-0-00	CS
	UUT Adr 8	8-0-05-00	8-0-0-00	CS	8-0-05-00	8-0-0-00	CS
	UUT Adr 9	9-0-05-00	9-0-0-00	CS	9-0-05-00	9-0-0-00	CS
	UUT Adr 10 (0A)	10-0-05-00	10-0-0-00	CS	10-0-05-00	10-0-0-00	CS
	UUT Adr 11 (0B)	11-0-05-00	11-0-0-00	CS	11-0-05-00	11-0-0-00	CS
	UUT Adr 12 (0C)	12-0-05-00	12-0-0-00	CS	12-0-05-00	12-0-0-00	CS
	UUT Adr 13 (0D)	13-0-05-00	13-0-0-00	CS	13-0-05-00	13-0-0-00	CS
	UUT Adr 14 (0E)	14-0-05-00	14-0-0-00	CS	14-0-05-00	14-0-0-00	CS
	UUT Adr 15 (0F)	15-0-05-00	15-0-0-00	CS	15-0-05-00	15-0-0-00	CS
	UUT Adr 16 (10)	16-0-05-00	16-0-0-00	CS	16-0-05-00	16-0-0-00	CS
	UUT Adr 17 (11)	17-0-05-00	17-0-0-00	CS	17-0-05-00	17-0-0-00	CS
	UUT Adr 18 (12)	18-0-05-00	18-0-0-00	CS	18-0-05-00	18-0-0-00	CS
	UUT Adr 19 (13)	19-0-05-00	19-0-0-00	CS	19-0-05-00	19-0-0-00	CS
	UUT Adr 20 (14)	20-0-05-00	20-0-0-00	CS	20-0-05-00	20-0-0-00	CS
	UUT Adr 21 (15)	21-0-05-00	21-0-0-00	CS	21-0-05-00	21-0-0-00	CS
	UUT Adr 22 (16)	22-0-05-00	22-0-0-00	CS	22-0-05-00	22-0-0-00	CS
	UUT Adr 23 (17)	23-0-05-00	23-0-0-00	CS	23-0-05-00	23-0-0-00	CS
	UUT Adr 24 (18)	24-0-05-00	24-0-0-00	CS	24-0-05-00	24-0-0-00	CS
	UUT Adr 25 (19)	25-0-05-00	25-0-0-00	CS	25-0-05-00	25-0-0-00	CS
	UUT Adr 26 (1A)	26-0-05-00	26-0-0-00	CS	26-0-05-00	26-0-0-00	CS
	UUT Adr 27 (1B)	27-0-05-00	27-0-0-00	CS	27-0-05-00	27-0-0-00	CS
	UUT Adr 28 (1C)	28-0-05-00	28-0-0-00	CS	28-0-05-00	28-0-0-00	CS
	UUT Adr 29 (1D)	29-0-05-00	29-0-0-00	CS	29-0-05-00	29-0-0-00	CS
	UUT Adr 30 (1E)	30-0-05-00	30-0-0-00	CS	30-0-05-00	30-0-0-00	CS
	UUT Adr 31 (1F)	31-0-05-00	- - -	NR	31-0-05-00	- - -	NR
	part B	31-0-05-00	- - -	NR	31-0-05-00	- - -	NR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.1	Optional Protocol						
5.2.2.1.1	Dynamic Bus Control	1-1-00-00	1-0-0-00	CS	1-1-00-00	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
5.2.2.1.2	Synchronize						
5.2.2.1.2.1	Synchronize without data	1-1-00-01	1-0-0-00	CS	1-1-00-01	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
5.2.2.1.2.2	Synchronize with data	1-0-00-17	1-0-0-00	CS	1-0-00-17	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	SYNC Word		0000			0000	
5.2.2.1.3	Initiate Self-Test	1-1-00-03	1-0-0-00	CS	1-1-00-03	1-0-0-00	CS
	A:(1964/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1964/ 0/ 0)						
	(T ≤ 100,000us)		732			732	
5.2.2.1.4	Transmit BIT word	1-1-00-19	1-0-0-00	CS	1-1-00-19	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	BIT Word		03ff			03ff	
5.2.2.1.5	Selective Xmtr Shutdown	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	1-0-00-20	1-0-0-00	CS	1-0-00-20	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-21	1-0-0-00	CS	1-0-00-21	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-21	1-0-0-00	CS	1-0-00-21	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-00-20	1-0-0-00	CS	1-0-00-20	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Alt Bus Selection Word		0000			0000	
	Pri Bus Selection Word		0000			0000	
5.2.2.1.6	Terminal Flag Bit Inhibit	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
	B:(4/ 0/ 0)	1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-00-06	1-0-0-00	CS	1-1-00-06	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-31-07	1-0-0-01	TF	1-1-31-07	1-0-0-01	TF
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	Response	STAT	B U S B Command	Response	STAT
5.2.2.1.7	Transmit Vector Word	1-1-00-16	1-0-0-00	CS	1-1-00-16	1-0-0-00	CS
	A:(2/ 0/ 0)						
	B:(2/ 0/ 0)						
	VECTOR Word		5100			5100	
5.2.2.1.8	Transmit Last Command	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	1-0-01-01	- - -	NR	1-0-01-01	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-1-00-02	1-4-0-00	ME	1-1-00-02	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-1-00-18	1-4-0-00	ME	1-1-00-18	1-4-0-00	ME
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
5.2.2.2	Status Word						
5.2.2.2.1	Service Request	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-1-01-01	1-1-0-00	DC	1-1-01-01	1-1-0-00	DC
		1-1-01-00	1-1-0-00	SR	1-1-01-00	1-1-0-00	SR
		1-1-01-00	1-1-0-00	SR	1-1-01-00	1-1-0-00	SR
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.2.2	Broadcast Command Received	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
5.2.2.2.3	Busy	1-1-01-01	1-0-0-08	DC	1-1-01-01	1-0-0-08	DC
		1-1-02-00	1-0-0-08	BUSY	1-1-02-00	1-0-0-08	BUSY
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-01	1-0-0-00	CS	1-1-01-01	1-0-0-00	CS
5.2.2.2.4	Subsystem Flag	1-1-01-01	1-0-0-04	DC	1-1-01-01	1-0-0-04	DC
		1-1-02-00	1-0-0-04	SF	1-1-02-00	1-0-0-04	SF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.2.2.5	Terminal Flag	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.2.3	Illegal Command						
	part A			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
	part B			N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
				N/A			N/A
5.2.2.4	Broadcast Mode Commands						
5.2.2.4.1	Synchronize without data	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-1-00-01	- - -	NR	31-1-00-01	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
5.2.2.4.2	Synchronize with data	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-0-00-17	- - -	NR	31-0-00-17	- - -	NR
	B:(2/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	SYNC Word		0000			0000	
5.2.2.4.3	Initiate Self-Test	31-1-00-03	- - -	NR	31-1-00-03	- - -	NR
	A:(1968/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1968/ 0/ 0)						
	(T ≤ 100,000us)		752			752	
5.2.2.4.4	Xmtr Shutdown/Override	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	31-1-00-04	- - -	NR	31-1-00-04	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-1-00-05	- - -	NR	31-1-00-05	- - -	NR
		1-0-01-00	- - -	NR	1-0-01-00	- - -	NR
		31-1-00-05	- - -	NR	31-1-00-05	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	BUS A Command	 Response	 STAT	BUS B Command	 Response	 STAT
5.2.2.4.5	Selective Xmtr Shutdown	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(4/ 0/ 0)	31-0-00-20	- - -	NR	31-0-00-20	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-21	- - -	NR	31-0-00-21	- - -	NR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-21	- - -	NR	31-0-00-21	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-00-20	- - -	NR	31-0-00-20	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	Alt Bus Selection Word		0000			0000	
	Pri Bus Selection Word		0000			0000	
5.2.2.4.6	Terminal Flag Bit Inhibit	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	A:(4/ 0/ 0)	1-1-01-01	1-0-0-01	DC	1-1-01-01	1-0-0-01	DC
	B:(4/ 0/ 0)	1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		31-1-00-06	- - -	NR	31-1-00-06	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-1-31-07	- - -	NR	31-1-31-07	- - -	NR
		1-1-00-18	1-0-0-17	BRTF	1-1-00-18	1-0-0-17	BRTF
		1-0-01-00	1-0-0-01	TF	1-0-01-00	1-0-0-01	TF
		1-1-01-01	1-0-0-00	DC	1-1-01-01	1-0-0-00	DC
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.4.7	Reset Remote Terminal						
	Delay to Stable Response	31-1-00-08	- - -	NR	31-1-00-08	- - -	NR
	A:(1768/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(1768/ 0/ 0)						
	(T ≤ 5000us)		21			20	
	Clear Xmtr Shutdown	1-1-00-04	1-0-0-00	CS	1-1-00-04	1-0-0-00	CS
	A:(2/ 0/ 0)	1-1-01-00	- - -	NR	1-1-01-00	- - -	NR
	B:(2/ 0/ 0)	31-1-00-08	- - -	NR	31-1-00-08	- - -	NR
		1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
5.2.2.4.8	Dynamic Bus Control	1-1-01-00	1-0-0-00	CS	1-1-01-00	1-0-0-00	CS
	A:(2/ 0/ 0)	31-1-00-00	- - -	NR	31-1-00-00	- - -	NR
	B:(2/ 0/ 0)	1-1-00-02	1-4-0-16	MBR	1-1-00-02	1-4-0-16	MBR

Reference Section	Test Description Bus: (run cnt/ errors/ busy cnt)	B U S A Command	 Response	 STAT	B U S B Command	 Response	 STAT
5.2.2.5	Error Injection -Broadcast Messages						
5.2.2.5.1	Parity: BC-RT Broadcast						
5.2.2.5.1.1	Command w/Parity Error	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-0-0-00	CS	1-1-00-18	1-0-0-00	CS
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.5.1.2	Data Word Error	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
	A:(32/ 0/ 0)	1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	B:(32/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
		31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.2.5.2	Message Length: BC-RT Broadcast	31-0-01-01	- - -	NR	31-0-01-01	- - -	NR
		1-1-00-18	1-0-0-16	BCR	1-1-00-18	1-0-0-16	BCR
	A:(33/ 0/ 0)	1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
	B:(33/ 0/ 0)	31-0-01-00	- - -	NR	31-0-01-00	- - -	NR
		1-1-00-18	1-4-0-16	MBR	1-1-00-18	1-4-0-16	MBR
		1-0-01-00	1-0-0-00	CS	1-0-01-00	1-0-0-00	CS
5.2.3	Noise Rejection	1-0-30-00	1-0-0-00	CS	1-0-30-00	1-0-0-00	CS
	Words Received	44,000,022		PASS	44,000,022		PASS
	Noise Level used (mV)	140			140		
	A:(1333334/ 0/ 0)						
	B:(1333334/ 0/ 0)						