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DDC
ILC DATA DEVICE CORPORATION®

BUS-65517II



IBM PC® COMPATIBLE MIL-STD-1553 SIMULATOR AND TESTER CARD

UPDATED! NOW HAS WINDOWS MENU!

DESCRIPTION

DDC's BUS-65517II is a versatile, full size IBM PC printed circuit card designed for the test and simulation of MIL-STD-1553 systems. It provides full, intelligent interfacing between the serial dual redundant MIL-STD-1553 data bus and the IBM PC. The user friendly software allows the BUS-65517II to simultaneously simulate a Bus Controller (BC), multiple Remote Terminal Units (RTUs), and/or a selectable, triggerable Bus Monitor (MT). The BUS-65517II may be either direct or transformer coupled to an external 1553 bus for use with user provided 1553 devices.

The BC and RTUs evaluate each 1553 message in real-time, determining if any format errors have occurred. Separate registers are maintained for the last command word and the last status word of each emulated RTU. In addition, the user may inject errors into any 1553 message issued by the emulated BC or RTUs. These errors include word count, bit count, zero crossing, parity, and, in the case of emulated RTUs, response errors (including the setting of any bit within the particular RTU's status word).

The intelligent MT captures the 1553 bus traffic. The user can define when MT operation is to begin and which messages (based on the RTU address, T/$\overline{R}$ bit, and subaddress) are to be, captured. Monitored information is displayed on a message by message basis.

Operation requires an IBM PC or compatible (with DOS 2.1 or higher), 640K RAM, BUS-65517II card, and DDC provided software. Optional software is available to allow the BUS-65117II RTUs to respond within the timing constraints of MIL-STD-1553A. An optional driver allows the user to control the operation of the BUS-65517II (see BUS-69008II data sheet for details). These features make the BUS-65517II an excellent choice for dynamic simulation of MIL-STD-1553B systems.

FEATURES

- *SIMULATION AND TEST OF MIL-STD-1553 SYSTEMS*
- *SIMULTANEOUS EMULATION OF BC, UP TO 31 RTUs, AND MT*
- *MT MODE RECONSTRUCTS 1553 BUS TRAFFIC*
- *ERROR INJECTION/DETECTION CAPABILITIES*
- *USER FRIENDLY SOFTWARE*
- *OPTIONAL RT PRODUCTION TEST PLAN SOFTWARE*
- *OPTIONAL 1553A RESPONSE AND REAL-TIME DRIVER SOFTWARE AVAILABLE*

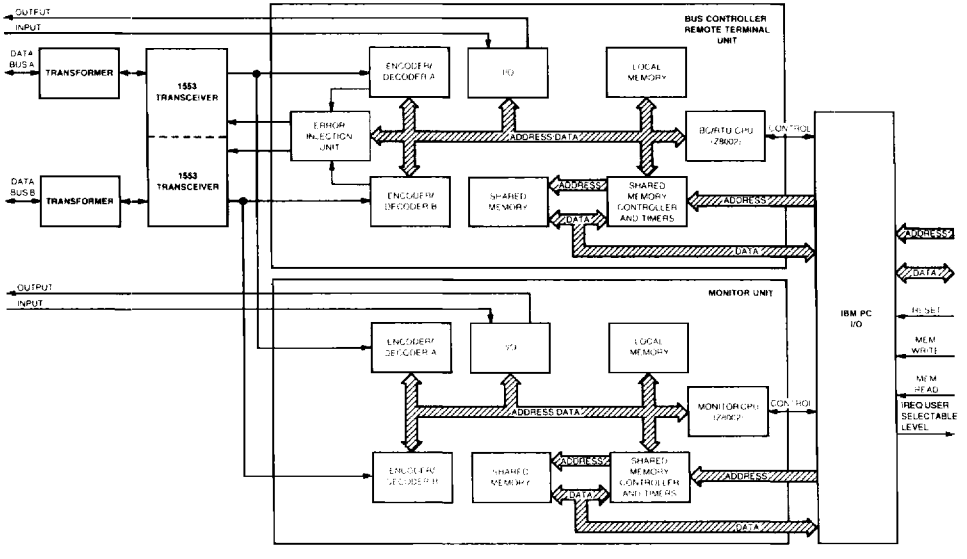


FIGURE 1. BUS-65517II BLOCK DIAGRAM

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TABLE 1. BUS-65517II REQUIREMENTS AND CAPABILITIES
HARDWARE REQUIREMENTS
IBM PC/XT/AT or Compatible with 640K RAM
DDC's BUS-65517II MIL-STD-1553 Simulator and Tester Card
SOFTWARE REQUIREMENTS
PC DOS 3.0 or higher
DDC's BUS-65517II Software diskette
AVAILABLE OPERATIONS
- Tests and simulates MIL-STD-1553 BC and up to 31 RTUs.
- Provides independent MT mode operation.
- Error injection and detection capabilities.

TABLE 2. BUS-65517II HARDWARE SPECIFICATIONS			
PARAMETER	**UNITS**	**VALUE**	
POWER SUPPLIES		**Idle**	**Max***
+5 V Supply Current Drain	A	1.7	1.8
+12V Supply Current Drain	mA	15	400
-12 V Supply Current Drain	mA	55	55
TEMPERATURE RANGE			
Operating (Case)	°C	0 to 50	
Storage	°C	-65 to 150	
PHYSICAL CHARACTERISTICS			
Size (Full size IBM PC card; requires one full size, 8 or 16 bit slot)	in (cm)	4.5 x 13.5 x 0.44 (11.4 x 34.3 x 1.1)	

*(100% Duty Cycle at MAX Transmit Amplitude ($28V_{pp}$)

GENERAL

The BUS-65517II allows an IBM PC to simultaneously simulate a MIL-STD-1553 BC, multiple (up to 31) RTUs, and an intelligent MT. The BUS-65517II may be either direct or transformer coupled to a dual redundant external 1553 bus, for operation with user provided 1553 devices. The BUS-65517II is memory mapped (uses a half segment in PC RAM) and interrupt selectable via jumpers on the board.

Full error detection features are provided in all modes of operation. In addition, user specified errors – including bit count, Manchester II errors – may be injected in both BC and any of the emulated RTU modes.

Operation of the BUS-65517II is controlled by user friendly software. The software flags the user if an attempt is made to enter an incorrect value and displays valid responses automatically. FIGURE 2 illustrates the BUS-65517II Menu Tree.

The three BUS-65517II operating modes are:
1. SETUP
2. RUN
3. DISPLAY COMMUNICATION STACK

Complete operating instructions are detailed in the BUS-65517II Manual.

SETUP MODE

The SETUP menus define the BUS-65517II as a BC, one or more RTUs, and a selectable triggerable MT. No real-time activity is performed in this mode. Through menu screens, the user specifies what errors (if any) are to be injected into the messages issued by the BC, or within the response(s) (data or status words) of the emulated RTUs.

BUS CONTROLLER MODE

The BC mode is programmed through a series of hierarchal menus. Up to 250 different messages may be defined at one time. The user defines these messages by overriding the default values in the SETUP/BC/MESSAGE menu (shown in FIGURE 3).
Error conditions may be injected into any of the messages by placing the cursor over the error field. Once an error has been selected, menus prompt for additional information regarding the error (number of bits, length of error, position of error, etc.).

The following errors may be injected:

LENGTH ERRORS:
Word Count – -32 to +1 words can be injected.
Bit Count – +3, +2, +1, -3, -2, or -1 bits can be injected in any word of the message.

ENCODING ERRORS:
Glitch – forces the output of the Manchester Encoder to equality for the user specified time period (in 50ns increments).
Inverse – exchanges the output of the Manchester Encoder for the user specified time period (in 50ns increments).

GAP ERRORS:
The user can insert a gap of 1 or 2µs (bus dead time) before any word of the message.

REMOTE TERMINAL MODE

The BUS-65517II can be programmed to emulate up to 31 unique RTU addresses. The SETUP/RT menu is shown in FIGURE 4. The BUS-65517II dynamically examines each message and determines the appropriate response for each emulated RTU (clear response, suppress status word and set message error bit, etc.). Additionally the user can force any bit of a paricular RTU's status word to be set to logic 1. All errors available in the BC mode can be injected along with the following response errors:

1) No response on Bus A, Bus B, or both busses
2) Late response (12 to 30µs)
3) Respond on the alternate bus

Each RTU can be programmed to accept bus control after a user defined delay.

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BUS MONITOR MODE

The BUS-65517II contains an independent MT which reconstructs monitored bus traffic and flags detected errors for user analysis. FIGURE 5, Communications Stack, illustrates how this information is displayed.

The BUS-65517II MT mode performs three stages of MT operation. The **first stage monitors** all messages received from the bus. The **second stage stores** the selected messages in an on-card circular buffer. The **third stage transfers** the contents of the circular buffer to the Communication Stack located in the PC'S system RAM. By default, the BUS-65517II software will use all available RAM (including expanded memory) for the Communication Stack; if desired, the stack size may be limited.

The first stage listens to both busses until a command is detected. It then receives, exclusively, from the active bus until the message is completed or invalidated. The second and third stages are programmed by the two MT menu options, SELECTION and CAPTURE.

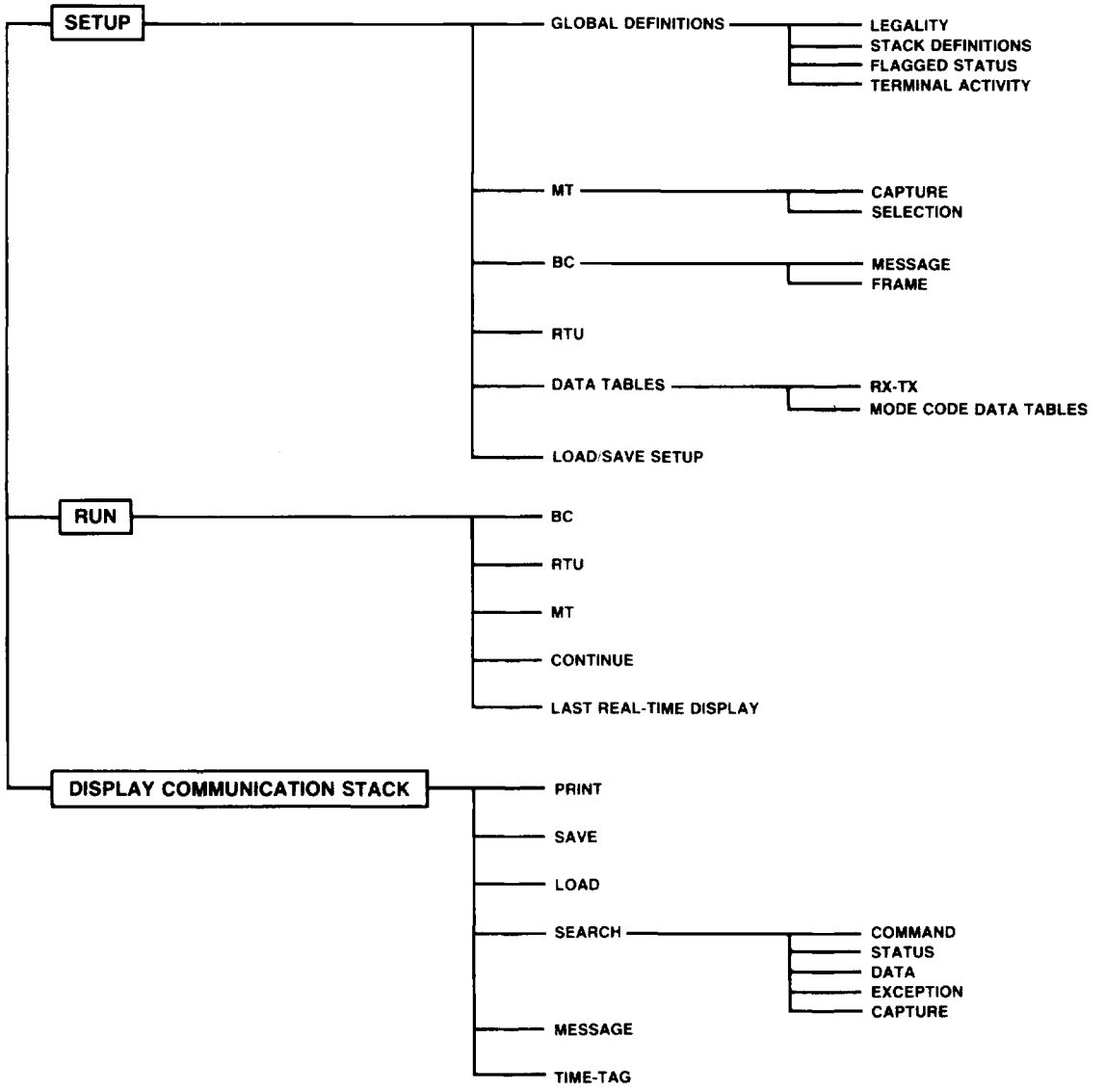


FIGURE 2. BUS-65517II MENU TREE

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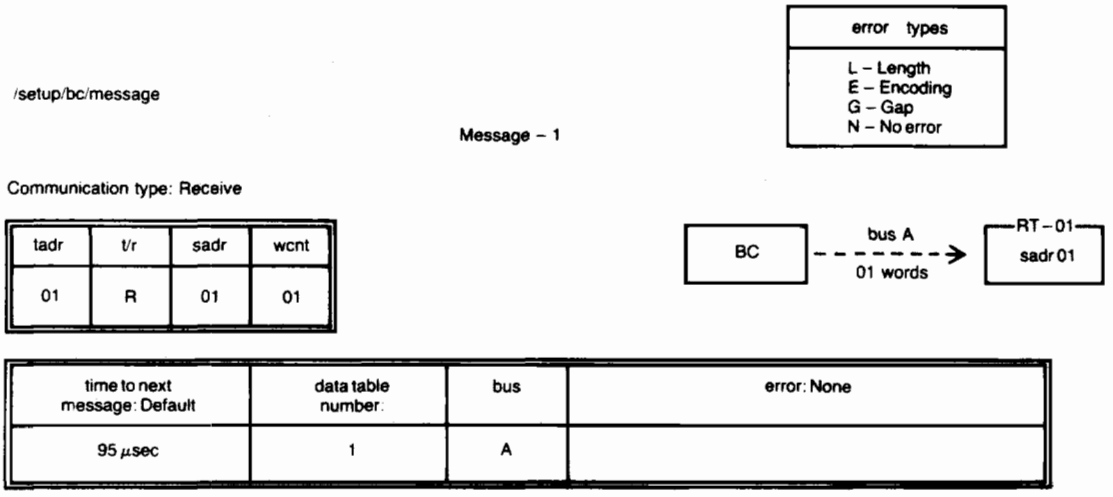


FIGURE 3. SETUP/BC/MESSAGE MENU

SELECTION

By default, the BUS-65517II monitors all 1553 bus traffic. If desired, the user can select which messages are to be stored in the Communication Stack. Messages may be selected on the basis of RT Address, T/$\overline{R}$ type, and subaddress.

CAPTURE

By default, the BUS-65517II begins storing the selected bus traffic as soon as the user issues the RUN command. If desired, the BUS-65517II can begin monitoring only after a specific command is seen on the bus, after any exception, (invalid word, invalid response, flagged bit in status word, etc.) is detected, after a specific exception, or upon receipt of an external trigger via the BUS-65517II's D type connector. The CAPTURE condition is defined by selecting the desired condition from the CAPTURE MENU.

After executing a RUN command, the 1553 traffic may be displayed by calling on the DISPLAY COMMUNICATION STACK screen (refer to FIGURE 5).

SETUP GLOBAL DEFINITIONS

Global definitions are conditions common to BC, RTU, and MT. They include:

*1. **Transmit Amplitude:*** The transmitter amplitude of the BC and RTUs can be varied in 0.1V (max) steps from 0.1V to at least 28Vpp as measured across a 77 ohm load attached to the BUS-65517II BNC connector. The amplitude is specified by entering a number between 0 and 255.

*2. **Response Time:*** This option defines the maximum time (14, 16, 18, or 20 μs) allowed for an RTU response. If a status word is not received within the allowed time, the BC and MT will detect a No Response error.

RUN MODE

The RUN mode causes the BUS-65517II to begin communication over the 1553 bus. The real-time display displays the 1553 bus traffic. This includes both internal emulated 1553 devices as well as traffic to and from external, user provided 1553 devices. A sample real-time display is shown in FIGURE 6.

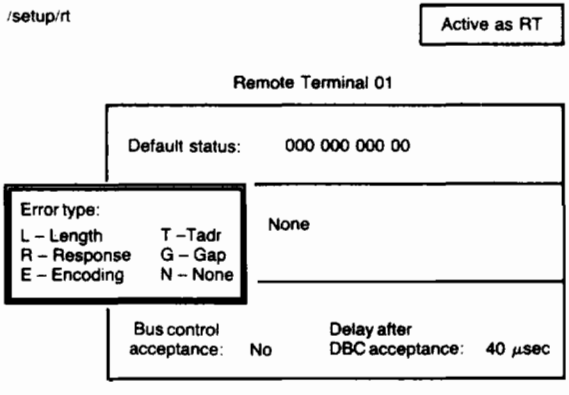


FIGURE 4. SETUP/RT MENU

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Print	saVe	Load	Search	Message_#	Time_tag
1. Capture	TIME =	0 μsec	BUS A	RT-01 ← bus A 00 words — RT-02 sadr 01	
	Cmd 0823	01-R-01-03			
	Cmd 1423	02-T-01-03			
	Exception No response				
2.	TIME =	2,044 μsec	BUS A	RT-01 ← bus A 00 words — RT-02 sadr 01	
	Cmd 0823	01-R-01-03			
	Cmd 1423	02-T-01-03			
	Exception No response				
3.	TIME =	214 μsec	BUS A	BC — bus A 03 words → RT-02 sadr 01	
	Cmd 1025	02-R-01-05			
	Data FB00 2301	2381			
	Exception Bad data	Manchester encoding			
4. Capture	TIME =	0 μsec	BUS A	BC — bus A 02 words → RT-01 sadr 19	
	Cmd 0A62	01-R-19-02			
	Data 043F AC4A				
	Stat 0C00 ME				
	Exception Bit in status				

End of tables

FIGURE 5. COMMUNICATION STACK

/run/bc

REAL TIME DISPLAY

BC RT MON running halted

invalid commands = 65504

total commands = 0,000,000,592

tadr	invalid data	invalid status	delayed data	resp. timing	wrong tadr	bit in status	illegal mode/cmd	total messages
00	00000	00000	00000	00001	00000	00001	00000	0,000,000,002
01	00000	00000	00000	00001	00000	00001	00005	0,000,000,032
02	00099	00000	00000	00012	00000	00000	00000	0,000,000,099
03	00000	00022	00000	00000	00000	00000	00000	0,000,000,022
04	00000	00000	00044	00000	00032	00000	00000	0,000,000,109
05	00000	00000	00000	00000	00000	00000	00000	0,000,000,333

FIGURE 6. REAL-TIME DISPLAY

TABLE 3. BUS-65517II INTERRUPT JUMPER SELECTION

INTERRUPT	PIN NUMBERS 2	3	4	5	7
2	LOW	N/C	N/C	N/C	N/C
3	N/C	LOW	N/C	N/C	N/C
4	N/C	N/C	LOW	N/C	N/C
5	N/C	N/C	N/C	LOW	N/C
7	N/C	N/C	N/C	N/C	LOW

TABLE 4. BUS-65517II ADDRESS JUMPER SELECTION

ADDRESS	PIN NUMBERS 19	18	17	16	15
9000	HI	LOW	LOW	HI	LOW
A000	HI	LOW	HI	LOW	LOW
B000	HI	LOW	HI	HI	LOW
C000	HI	HI	LOW	LOW	LOW
D000	HI	HI	LOW	HI	LOW

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Note: Dimensions are in inches (centimeters)

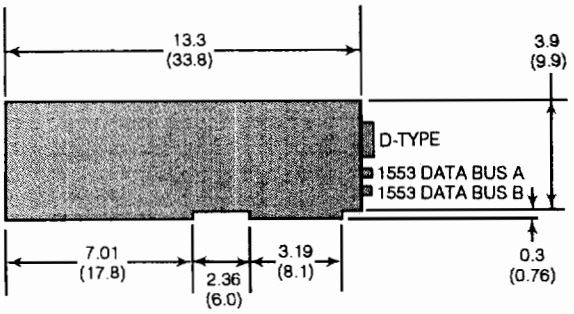


FIGURE 7. BUS-65517II MECHANICAL OUTLINE

ORDERING INFORMATION

BUS-65517II MIL-STD-1553 Simulator and Tester Card, includes menu software.

BUS-690XXII

Software Upgrades:

08 = MIL-STD-1553B "C" Library.
09 = MIL-STD-1553A&B "C" Library.
11 = Parameter MT & PIP (combination of BUS-69028 & BUS-69023 software).
18 = MIL-STD-1553B Pascal Library.
19 = MIL-STD-1553A&B Pascal Library.
23 = MIL-STD-1553A&B "C" Library, "Pascal" Library and Production Test Plan Software.
24 = MIL-STD-1553A&B "C" Library, "Pascal" Library, and Production & Validation Test Plan Software. (PTP & VTP)
25 = MIL-STD-1553B "C" Library and Windows 3.0 Support Library Software.
28 = MIL-STD-1553B Parameter Monitor Software
29 = MIL-STD-1553B Reconstructor Software for the BUS-65517II Card.

Note: "C" consists of Microsoft C, Turbo C++, and High C.

Call the technical support number listed below for additional literature.

E

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