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MM 368

1200 BAUD ASYNCHRONOUS

DATA MODEM

USER INSTRUCTIONS

1. INTRODUCTION

The MM368 data modem is used to connect asynchronous data terminals to a remote computer equipment over 4 wire leased lines. It converts digital information in accordance with CCITT Recommendations V24 and V28 into a form suitable for transmission over the normal telephone network, using frequency shift keyed modulation in accordance with CCITT Recommendation V23. The modem can operate over point to point or multidrop configurations, in half or full duplex, asynchronous mode.

The modem includes manual diagnostic facilities operated from the front panel, allowing easy diagnosis of data communications network problems, even when the remote control

option is not equipped. The diagnostic facilities may be upgraded to include secondary channel diagnostics controlled via a Manual Control Unit (SV451) or via the STC Automatic Diagnostic and Network Management (DINEMITE) system that allows remote controlled diagnosis of up to 16 modems per line in a point to point configuration.

Access to the diagnostic functions is made via an optional secondary channel board. The channel operates at 1.0 baud in half-duplex mode. This permits simultaneous control of the Master and equipped modems, without interference to transmission on the main data channel.

2. CONTROLS AND INDICATORS

There are two push-button switches and 14 coloured LED indicators on the front panel (see Figure 1)

The normal condition of the LED's should be:

POWER (Red): lit - indicates DC voltage presence.

NORMAL (Green): lit - when in NORMAL operation.

TEST (Red): not lit - alight only when in one of the TEST modes.

INTERFACE SIGNAL INDICATORS:

TD (Yellow): lit or flashing with data - TRANSMITTED DATA

RTS (Green): lit during transmission - REQUEST TO SEND

CTS (Green): lit during transmission - CLEAR TO SEND

RD (Yellow): lit or flashing with data - RECEIVED DATA

CD (Green): lit during reception of data - CARRIER DETECT

TEST MODE INDICATORS:

ALB (Red): not lit - ANALOGUE LOOP BACK

DLB (Red): not lit - DIGITAL LOOP BACK

LLB (Red): not lit - LINE LOOP BACK

SLF (Red): not lit - SELF TEST

PAT (Red): not lit - PATTERN GENERATOR

ERR (Red): not lit - ERROR DETECTOR

The two pushbuttons are only used for local diagnosis.

MODE

By pressing this button the modem can be switched to its different test modes. Continuous pressing will result in fast scanning through the five TEST modes and back to NORMAL mode.

ERROR IN

Used only with PATTERN (PAT) and SELF TEST (SLF) mode. When depressed an erroneous character is inserted into transmission and is detected as ERROR (ERR lamp lit) in the received data.

On the back panel is a POWER switch with a built in MAINS PRESENCE neon indicator, a mains socket, one mains fuse and a data terminal connection socket. The line cord is fed into the modem via an inlet hole (see figure 2).

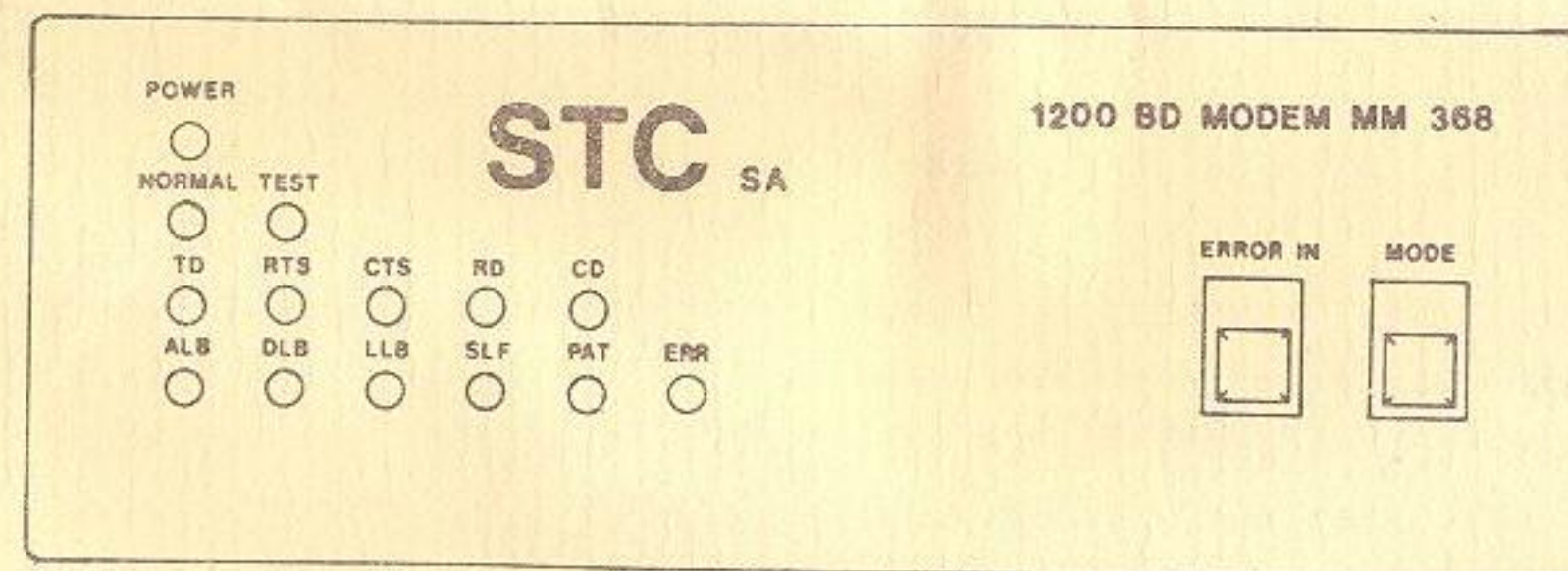


FIG. 1: FRONT PANEL

3. INSTALLATION

The MM368 can be supplied either as desk top or as a rack mounted model, the modem unit being identical whether rack mounted or enclosed in a standard plastic case. For those

applications not requiring remote diagnostic control, the subrack may be equipped with up to six modem units. When the diagnostic manual controller is fitted at a central site, up to

four modem units can be mounted in a 483mm subrack with the Manual Control Unit (SV451).

The modem will normally be fitted with a telephone line cord terminated in an 8 way plug. The cord is connected to screw terminals mounted on the board inside the modem. The 8

way plug is connected to the appropriate wall socket.

The data terminal is connected to the modem using a CANNON DB25P plug via a cable which should not exceed 15 metres in length. A list of pin connections is given in Table 1.

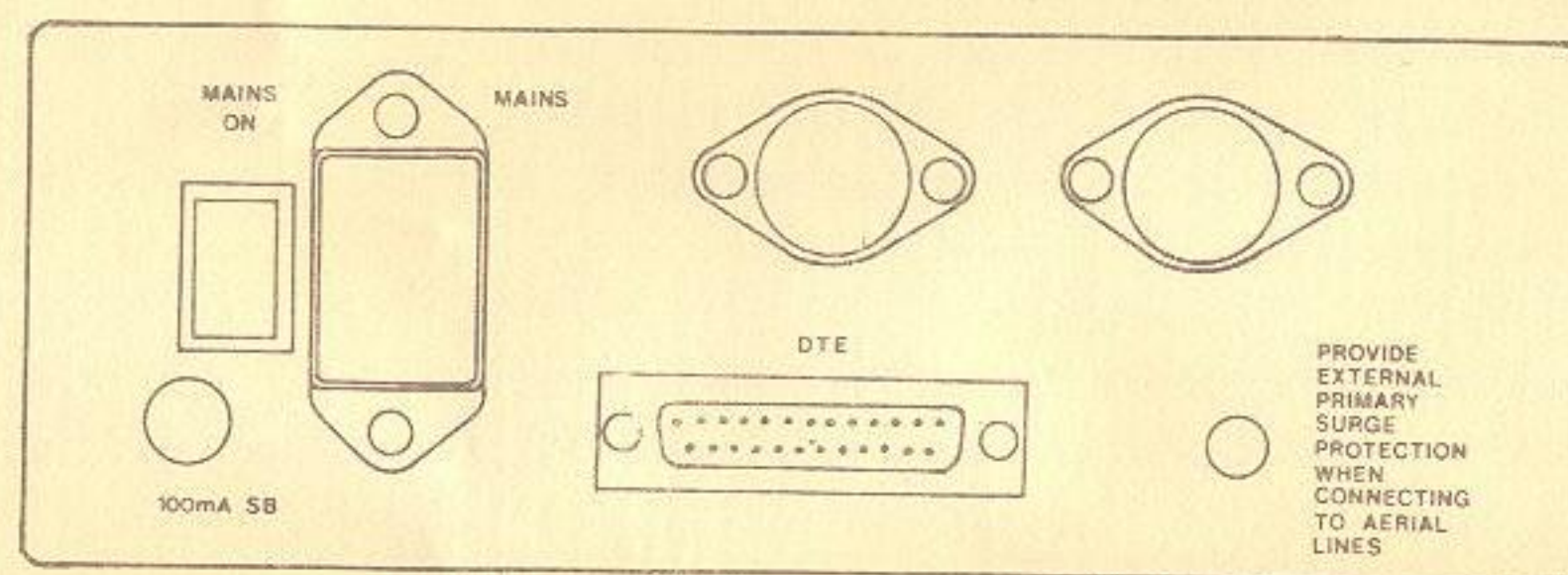


FIG. 2: REAR PANEL

4. TESTING AND FAULT DIAGNOSIS

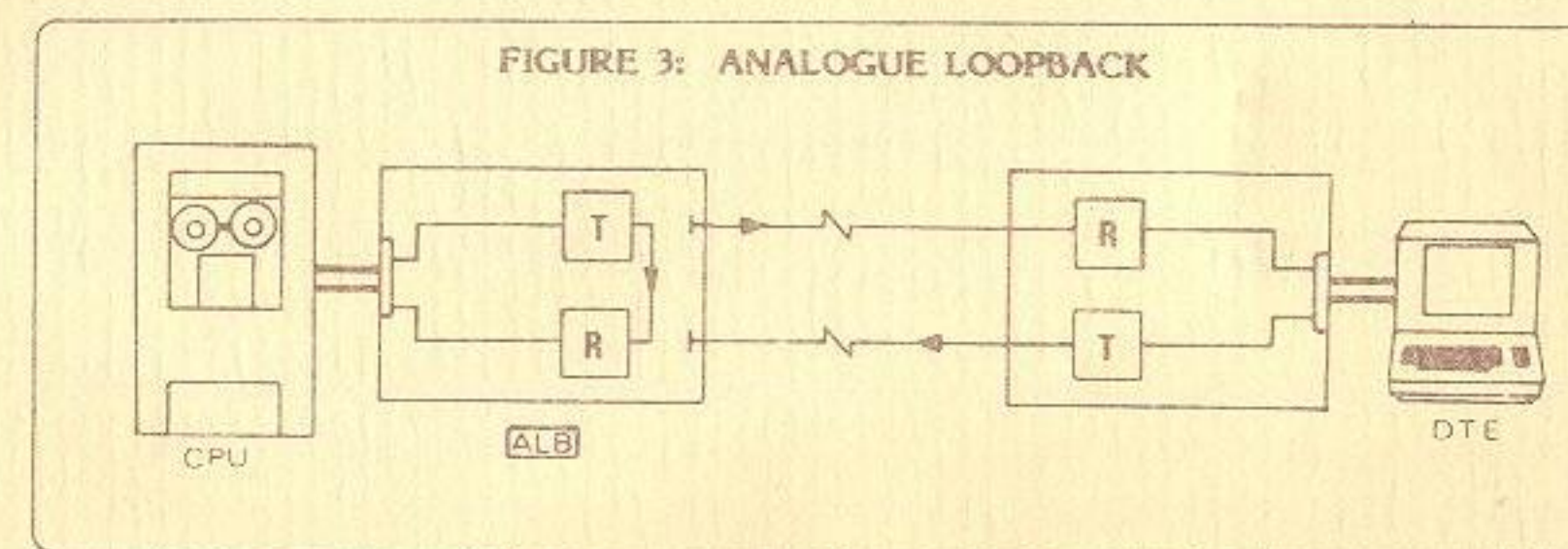
If a fault appears to have occurred in the data link the test facilities available on the modem enable an operator to find out which section of the link is at fault, (the data modem, terminal equipment, or line). In NORMAL mode of operation five LED's monitor the status of five interface signals. Whenever a fault occurs anywhere in the data link, these LED's will

indicate an abnormal condition.

All testing of the data link should be done with the co-operation of the distant end or data test centre, unless the modems on the link are equipped with remote diagnostic facilities so that the test can be accomplished from a central site without any intervention at the remote sites.

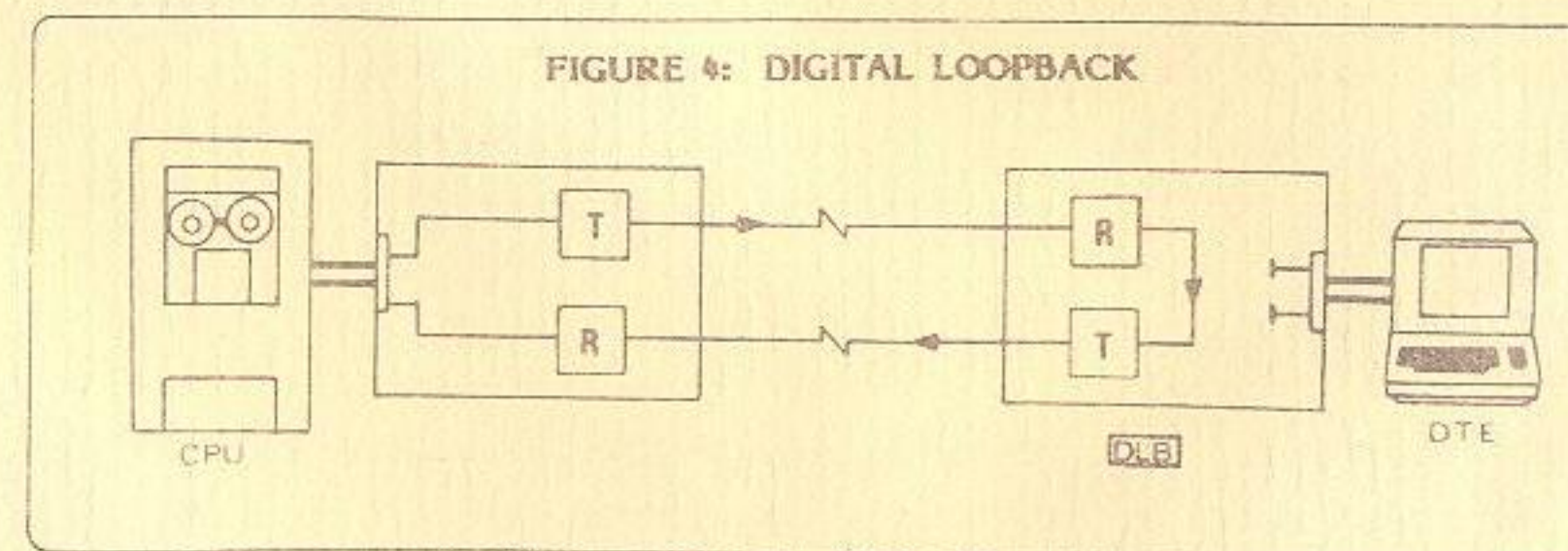
ALB - ANALOGUE LOOP BACK (Figure 3)

In this test mode the modem transmitter is connected to the receiver and the line is disconnected from the modem. The data terminal should receive the same data it is sending. The interface signal indicators should show as normal. This test mode can also be controlled by the data terminal equipment.



DLB - DIGITAL LOOP BACK (Figure 4)

In this test mode the terminal equipment is disconnected from the modem and the data input is connected to data output. This may be used to test the line and local modem from the distant end. The distant end of the link should be receiving the same data it is transmitting.

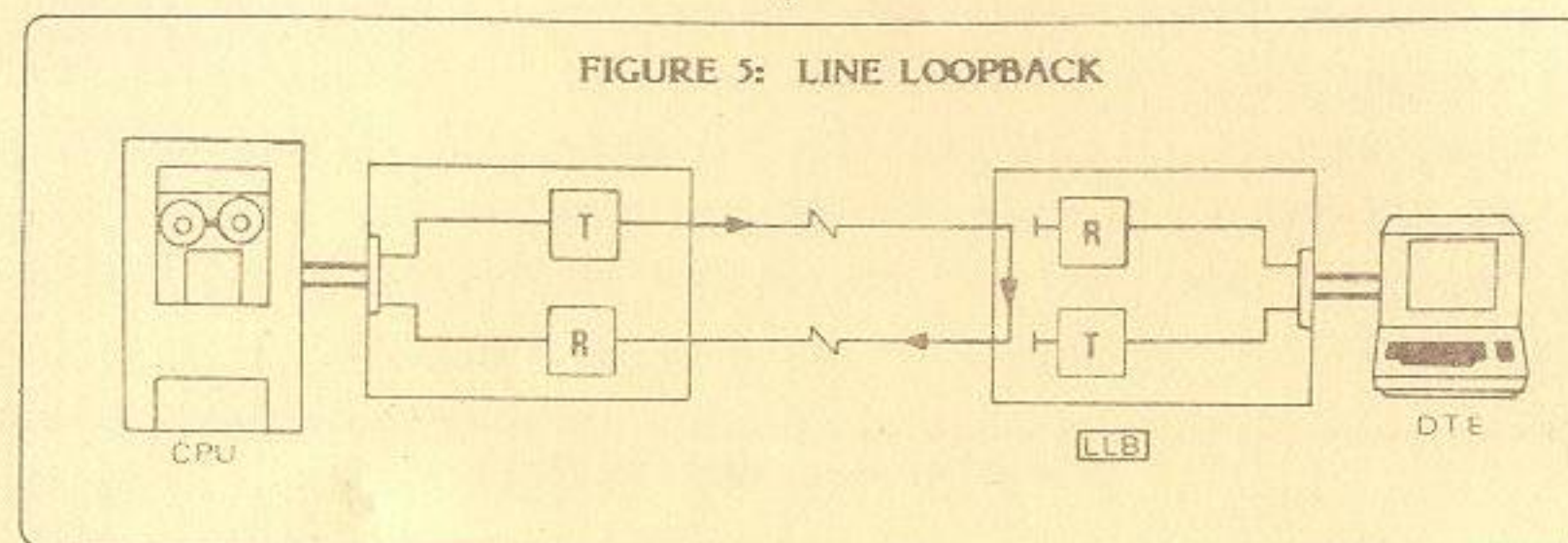


LLB - LINE LOOP BACK (Figure 5)

In this test mode the line is disconnected from the modem and the receive pair is connected to the transmit pair. The

distant end may use this mode to test the line, using PAT mode or any other test equipment.

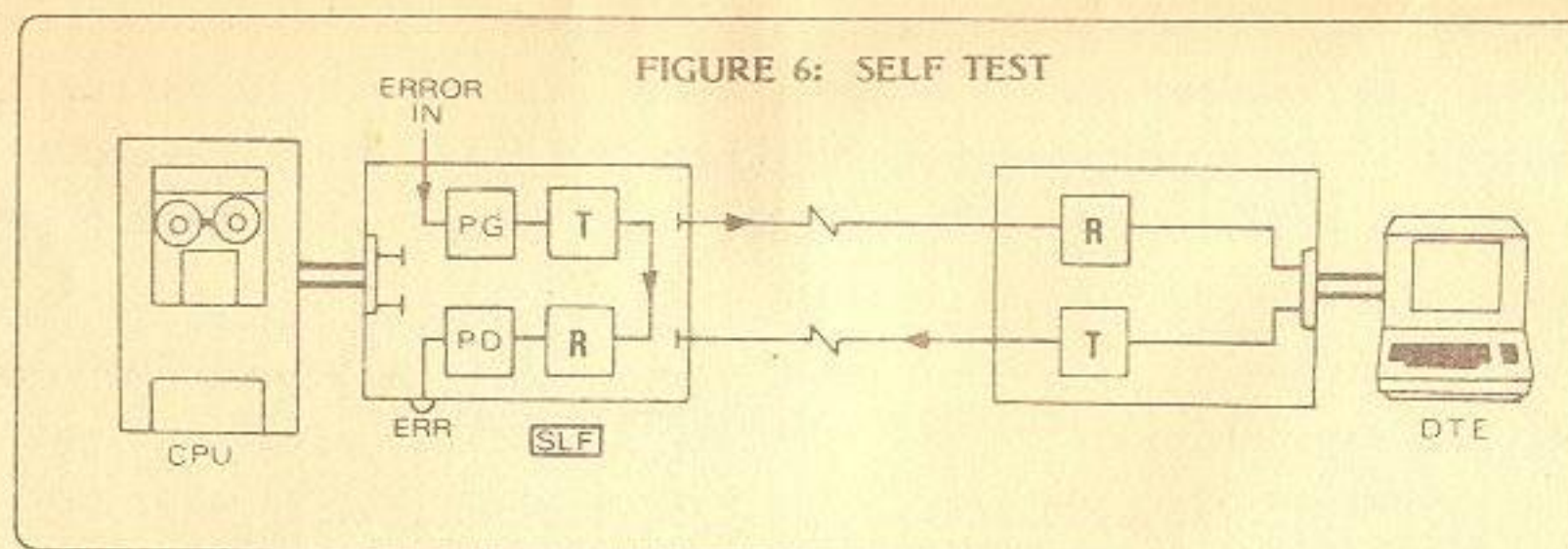
FIGURE 5: LINE LOOPBACK



SLF - SELF TEST

In this test the line is disconnected from the modem. The modem is disconnected from the terminal equipment and is internally connected to a pattern (random character) generator. The transmitter is internally connected to the receiver and this to a detector. If the ERROR (ERR) lamp is alight or flashes it indicates a faulty modem.

FIGURE 6: SELF TEST

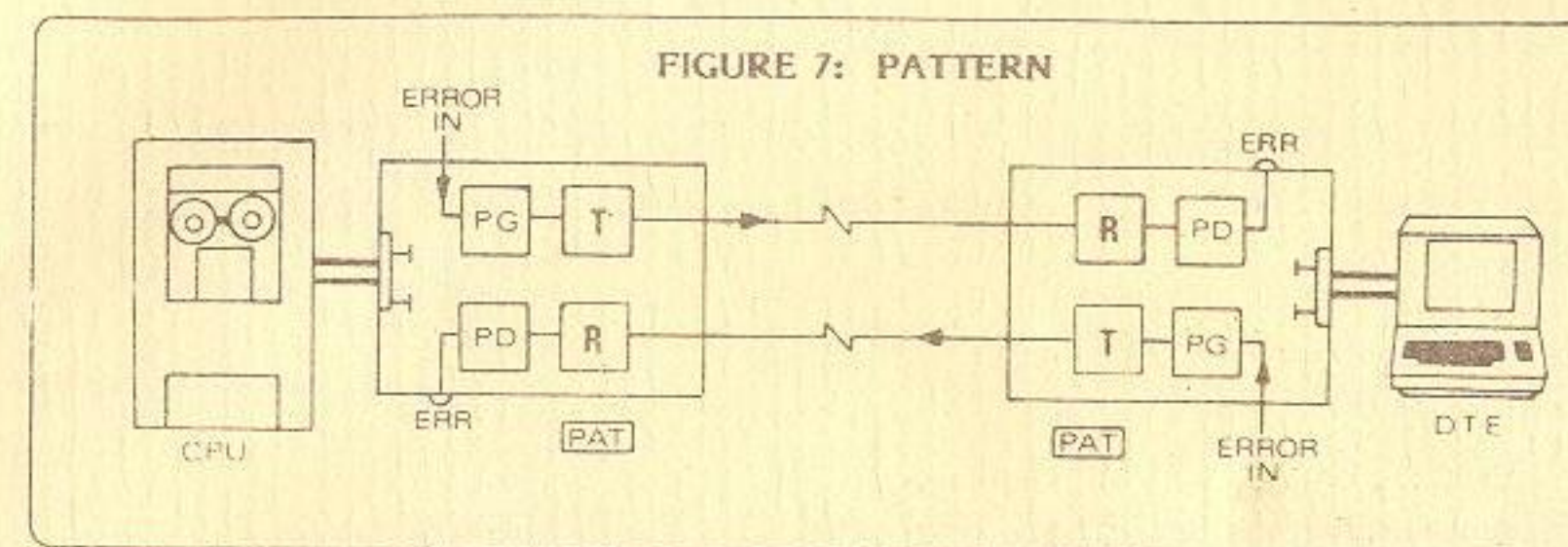


PAT (PATTERN)

In this mode the terminal equipment is disconnected from the modem and the internally generated pattern is sent over the send pair of wires. The receive pair is also connected to the line and the receiver to a pattern detector. If the received pattern is different to the locally generated one is considered to be erroneous and the ERR indicator is alight or flashes. The ERROR IN pushbutton can be used at

the other end of the link to inject such errors into the pattern.

FIGURE 7: PATTERN



5. REMOTE CONTROL DIAGNOSTICS

The MM368 modems equipped with the remote diagnostic daughter board may be controlled from a central site using a Manual Control Unit (SV451) or by an Automatic Diagnostic and Network Monitoring Controller (DINEMITE) as shown in figure 8.

The SV451 controls up to four (4) lines, each equipped with a Master modem and one or more Remote modems and can simultaneously monitor and control two modems per line. Each line may have a maximum of seventy-nine (79) modems.

5.1 SV451 INDICATORS (see figure 9)

STATUS LED's

There are 14 status LED's, 7 for each modem being interrogated.

*RTS, CTS, TD, CD, RD - five CCITT interface signals.

*MODEM OFF - confirms the modem shut-down.

*RESPONSE - is on as long as valid responses are being obtained from the modem being interrogated.

ALPHANUMERIC DISPLAY - three digits, used to display:

*Modem A or Modem B command.

*Line number (0-3) and modem A or modem B address (01-79)

DISPLAY FUNCTION LED's

Each LED incorporated in the SELECT DISPLAY FUNCTION key, indicates that the alphanumeric display is referring to that modem.

EXECUTE/HALT LED

When ON indicates that the unit is busy executing.

5.2 SV451 CONTROL KEYS

SELECT DISPLAY FUNCTION KEYS

One for modem A and one for modem B. When pressed for the first time, it causes the display to show the command mode of that modem. Thereafter, each depression of the key will alternate the display between command mode and address mode.

SELECT KEYS

Three keys, one for each display digit. When the display shows a command they all perform the stepping through the various command modes. When the display shows the line number and address each key serves to step the digit above it.

ERROR INSERT KEY

When in a pattern test (PAT) or a self test (S'F), depression of this key will cause the insertion of an error in the pattern of the modem that is selected. The key also provides the ability to backstep the alphanumeric display when the unit is not executing.

EXECUTE/HALT

Starts or stops execution of the selected commands over the

selected line/address. Both modems will execute their commands simultaneously.

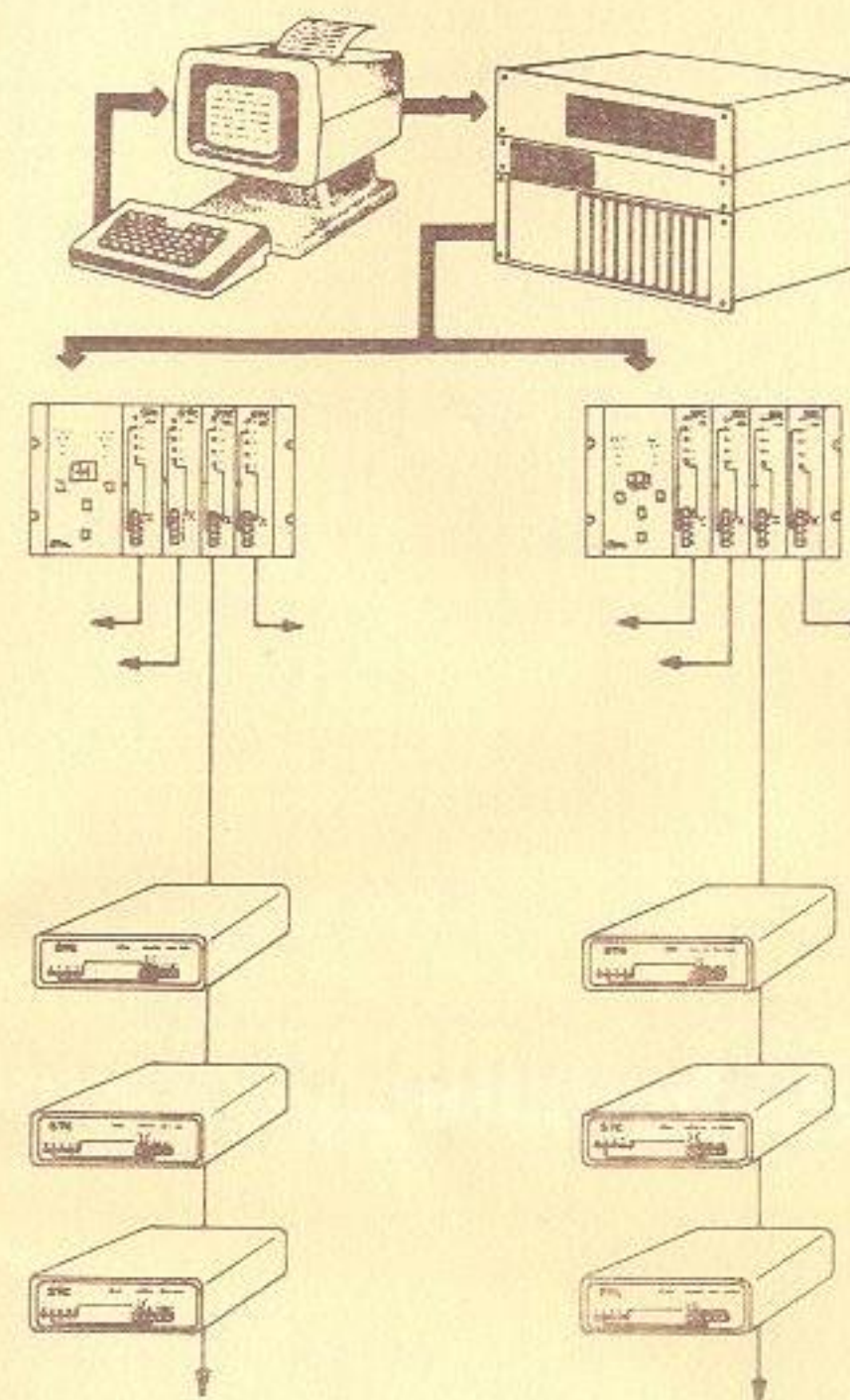


FIG. 8: REMOTE DIAGNOSTIC CONTROL

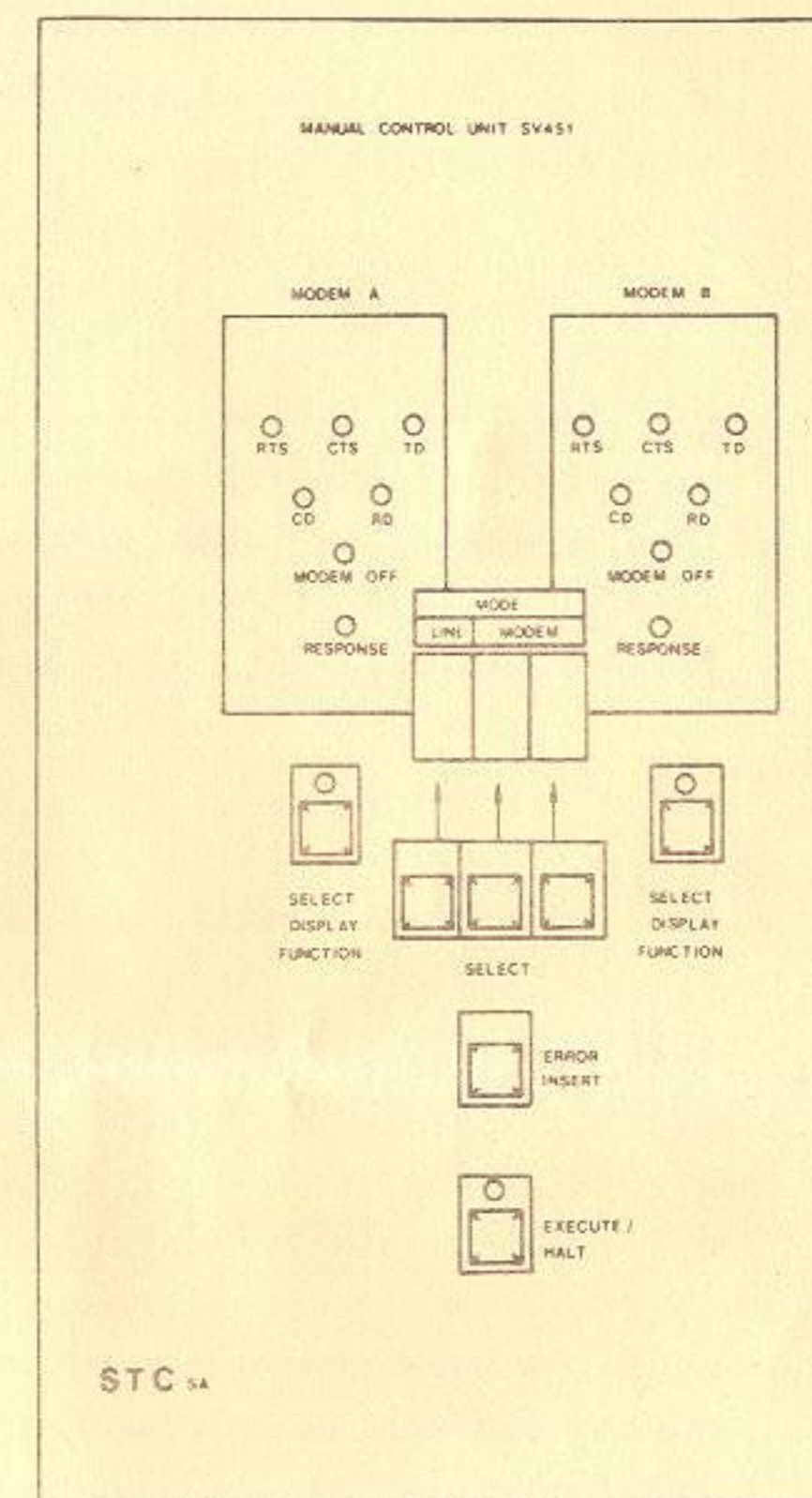


FIG. 9: SV451 FRONT PANEL

5.3 SV451 COMMANDS (MODES OF OPERATION)

OFF (NO COMMANDS)

No commands are executed or responses given. Whenever a test is performed on one modem only, the other one should be in the OFF mode. After completion of any test, both modem command displays should be set to OFF, to prevent inadvertent disruptive testing.

LLB (LINE LOOPBACK)

Verifies the operation of the telephone system and Master modem by using the pattern test (PAT) and the ERROR INSERT at a central site. Figure 5 shows a Remote modem in remote Line Loopback mode.

SLF (SELF TEST)

Any addressed modem can be set into a self test mode. The pattern test (PAT) and analogue loopback (ALB) of the modem are activated and the execution of the running test can be tested by the ERROR INSERT control. Figure 6 shows a Remote modem in SELF TEST mode.

PAT (PATTERN TEST)

The pattern generator and detector in the selected modems are activated. This enables separate and simultaneous tests to be performed for each direction between any two points in a network.

DLB (DIGITAL LOOPBACK)

Verifies the operation of the Remote mode, the telephone system and the Master modem, using the pattern test (PAT) and ERROR INSERT at the central site. Figure 4 shows a Remote modem in remote DIGITAL LOOPBACK mode.

ALB (ANALOGUE LOOPBACK)

Verifies local operation by providing the capability of testing the remote modem and its associated terminal. The modem's transmitter is looped back to the receiver. The receive line is disconnected from the modem.

MON (MONITOR)

Operation of modems is unaffected and the LED's display the status of the interface signals, pertaining to the modems

selected. This display is valid only when RESPONSE is ON and is operational under all test conditions.

RST (RESET)

Manually resets the modem to its normal mode after a disruptive test. If not manually executed, all disruptive tests are automatically reset after ten seconds.

MDN/MDF (MODEM ON/OFF)

Wake-up/shut-down command for the selected modem, that controls the RTS signal connection to the modem's interface. The shut-down command is used when a remote modem is streaming.

EXT (EXTERNAL)

When connected to the STC DINEMITE controller, the manual control unit is automatically disabled and set in the external mode. In this case the diagnostic facilities are upgraded so that commands are issued by the STC DINEMITE operator; the SV451 being completely transparent to the control and response signals transmitted.

TABLE 1: INTERFACE SIGNALS

PIN NO.	CIIT INTERCHANGE CIRCUIT		
	NO.	ABR.	NAME
1	101	GND	Protective Earth
2	103	TD	Transmitted Data
3	104	RD	Received Data
4	105	RTS	Request to Send
5	106	CTS	Ready for Sending
6	107	DSR	Data Set Ready
7	102	SG	Common Return
8	109	CD	Data Channel Received Line Signal Detector
9	-	+V	Test Voltage
10	-	-V	Test Voltage
11			
12	122	(S)CD	Secondary Channel Received Line Signal Detector
13	121	(S)CTS	Secondary Channel Ready for Sending
14	118	(S)TD	Secondary Channel Transmitted Data
15	-	-	-
16	119	(S)RD	Secondary Channel Received Data
17	-	-	-
18	142		Analogue Loopback
19	120	(S)RTS	Secondary Channel Request to Send
20	108.1	CDSTL	Connect Data Set to Line
21			
22	-	-	-
23	-	-	-
24	-	-	-
25	141		Test Indicator

6. MODEM STRAPPING FACILITIES

MODEM REF.

The following facilities may be provided by adjustable straps and dip-switches within the modems:

Request to Send - Clear to Send (CTS) delay	☐ 30msec	☐ 250msec
Request to Send (RTS) control	☐ perm. ON	☐ by DTE
Line Signal Detector (CD) threshold level (dBm)	☐ -23 ☐ -43	☐ -33
Transmit signal level (range 0 to -18dBm)	Level	
Data Set Ready (DSR) control	☐ perm. ON	☐ OFF in test mode
Connect Data Set to Line (CDSTL) control	☐ perm. ON	☐ by DTE
Line Loopback on power fail	☐ enabled	☐ disabled
Secondary Channel Card (option)	☐ IN	☐ OUT
Station Address (01-79)	No.	
Secondary Channel threshold (dBm)	☐ -33	☐ -43
Master/Slave	☐ master	☐ slave
Link configuration	☐ multipoint	☐ loop circuit