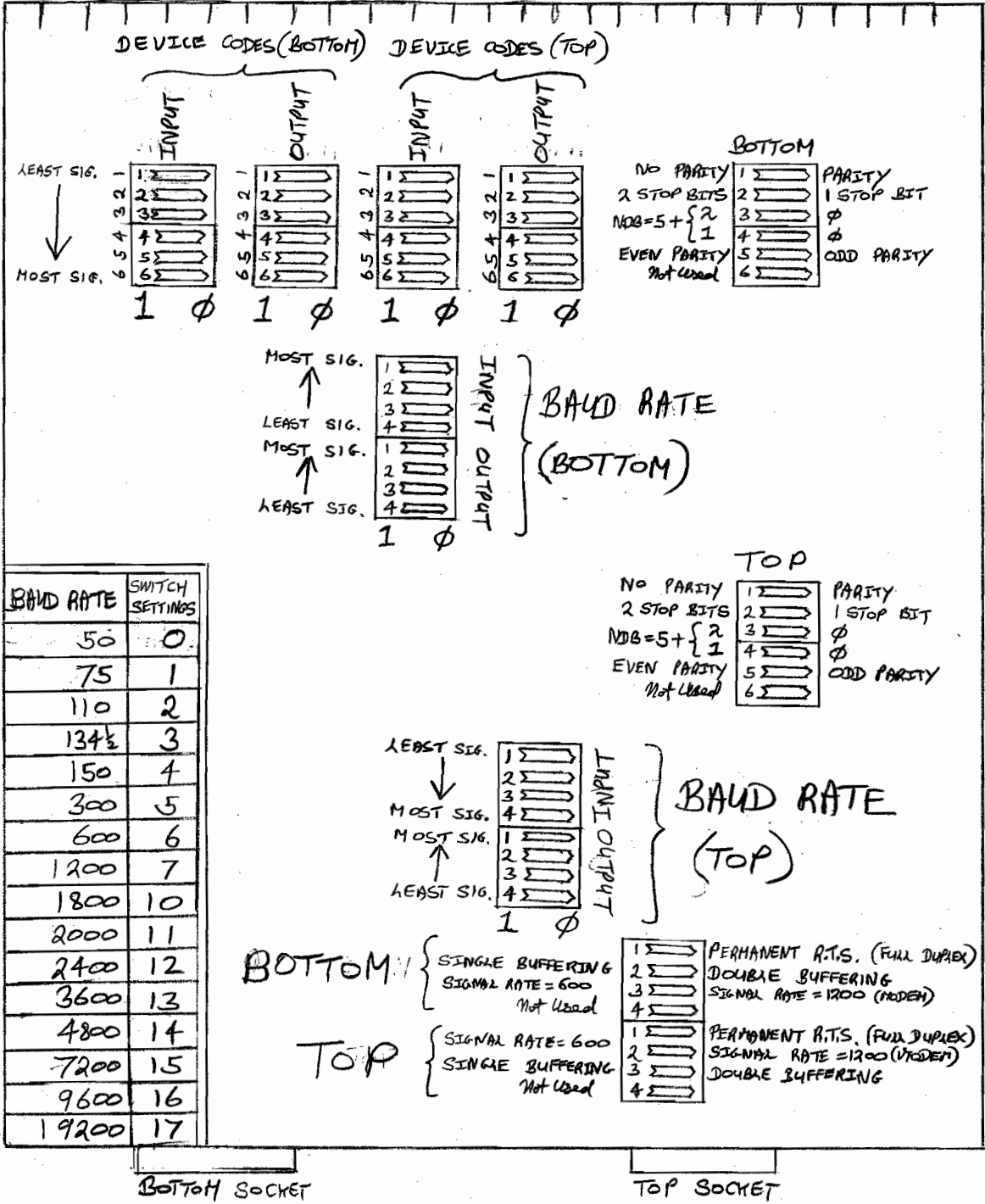


E D G E C O N N E C T O R S



BCL MOLECULAR 0314 INTERFACE BOARD



WARNING.

UNUSED SOCKETS MUST BE SWITCHED TO "DOUBLE BUFFERING"

General

The circuit will comprise two full-duplex interfaces on one board, designated as follows:-

Transmitter	A)	Transmitter	C)
Receiver	B)	Receiver	D)

1.1. Interrupt Priority

Will be

A	=	highest priority
B	=	next
C	=	next
D	=	lowest priority

1.2. Baud-rate selection

All four devices will have speed options independently selectable from the range 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600 and 19,200 baud.

3. Control bit selection

Each transmitter/receiver pair will have switch selectable options as follows:-

- a) Parity - Odd, even or no parity bit
- b) Stop bits - One or two
- c) Data bits - Five, six, seven or eight

If less than 8 data bits are selected, the invalid most significant bit or bits sent to the interface from program are ignored.

1.4. Double buffering

Double buffered operation may be selected for each transmitter by means of a switch.

In this mode, DONE is set and an INTERRUPT is requested as soon as the transmitter buffer is empty and ready to receive a further character. This will occur when the previous character has been transferred to the serial output register and transmission is commenced. By this means, the interrupt from character 'n' may be serviced and character 'n+1' sent to the interface during the transmission time of character 'n'. Interrupt servicing time is therefore concurrent with transmission and not consecutive as with single buffered operation. At 9,600 baud, where the transmission time is approximately one millisecond and interrupt servicing takes approximately half a millisecond, throughput can be increased by 50% and if other higher priority interrupts are pending the increase could be as much as 100%.

This facility may be used where it is not necessary to know that the transmission of a character has been completed before initiating the transmission of the next.

- e.g. with V.D.U
- Alphanumeric keyboard
 - Teletype
 - Full duplex modem link

1/2 MS into 1/3

1.5. Single-Buffering

This mode of operation sets DONE and initiates an INTERRUPT request as the last bit of a character transmission is terminated. The interrupt service time therefore starts after the end of transmission and adds to the transmission time.

Single buffered mode must be used with printers such as the
DRI 6330
and the TALLY 2000

where the state of the PRINTER BUSY line has to be examined by the hardware before another character is sent. It must also be used on half-duplex modem connections where it is necessary to know that transmission of the last character is completed before attempting to reverse the line. (See Software implications).

1.6. Device Addressing

Four device addresses, A, B, C, & D are provided. These will be selectable by dual-in-line switches instead of the customary wire links. Selection of mask bits will be by wire links.

2. Hardware Control Signals

Apart from the standard I/O highway signals, the interfaces use seven modem control signals as follows:-

1. Data Set Ready (D.S.R.)
2. Request to Send (R.T.S.)
3. Ready for Sending (R.F.S.)
4. Carrier Detector (C.D.)
5. Signalling Rate
6. Transmit Data
7. Receive Data

2.1. Data Set Ready

Indicates that the modem has been connected to the telephone line. With manual calling and answering as used in this company at the moment, this is achieved by pressing the DATA button on the telephone and apart from faults or loss of connection, this line should stay TRUE all the time the modem is in use. In local connections, this line should be tied to the pull up resistor.

This line is connected to status bit one on both receive and transmit sides of the interface. If D.S.R. is not true, status bit one will be a '1'.

2.2. Request to Send

Signals to a half-duplex modem that it is required to change to the transmit-mode. This signal is automatically sent by the interface when the transmitter is set BUSY and is cleared when the receiver is set BUSY.

When the R.T.S. signal is TRUE, the Carrier Detector signal is inhibited. The Post Office recommend that C.D. is also inhibited for 22 milliseconds after dropping R.T.S. This is achieved by a delay on the interface.

For local connections and for all full-duplex modem connections, the "PERMANENT R.T.S." option switch should be closed. This will set the R.T.S. signal true and at the same time enable the Carrier Detector signal even while transmission is taking place. The R.T.S. signal will not be used with local connections, or DATEL 600 modem models 3 or 4 but will be used when 2 "DATEL 600 Modem Model 5" (~~DATEL 600 Modem Model 5~~) are used in a four-wire duplex connection. (~~DATEL 600 Modem Model 5~~).

2.3. Ready for Sending

A signal from the modem indicating that it has recognised the R.T.S. signal and has reversed the line. It should be permanently present with a full-duplex modem. In local connections, it should be tied to the pull up resistor except in the case of printers where it is used as the PRINTER BUSY line. In this case, the interface should not be set BUSY whilst this line is FALSE. Where it is acting as a PRINTER BUSY line, it will go FALSE during transmission of a character indicating that the printer buffer is unable to accept further characters. In this case, the setting of DONE and INTERRUPT request will be delayed until it goes TRUE again.

An R.F.S. FALSE condition will cause a "1" to appear in bit 3 of the transmitter status word.

2.4. Carrier Detector

This is a signal from the modem indicating that a carrier is being received and incoming data should be valid. For local connections this input should be tied to the pull up resistor. For full-duplex modem connections, it should be permanently TRUE. When FALSE, reception of data is inhibited and status bit 2 will be set to '1' in the receiver status word.

2.5. Signalling Rate

Signal used only with DATEL 600 modems. When TRUE, it indicates to the modem that the transmitted or received data on the DATA channel (as distinct from the BACKWARD or SUPERVISORY channel) is at a baud rate exceeding 600 baud.

2.6. Transmit Data

This line carries the data to be transmitted to the modem or local printer, VDU, Keyboard/display etc.

Receive Data

This line carries the data received from the modem or keyboard etc. to the interface.

3.

Software Implication

The interface has been designed in such a way that the existing software written for the 2100 board will operate without modification when using the currently used peripherals. However, some of the status bits have been moved from receiver to transmitter and vice-versa to yield a more logical arrangement.

The interface has been designed to be compatible with Post Office DATEL 600 requirements. In order to be able to use the DATEL 600 half-duplex connection however, new software will be required. As much of the control as possible has been designed into the hardware to minimise the software design effort.

3.1.

Status BitsBit 1

"Data Set Not Ready". Appears on both transmit and receive sides of the interface. Indicates that no connection has been established (or the connection has been broken) between modem and telephone-line. This status bit should never appear on a modem link between the time the connection is established and the time it is broken. On local connections it is not used and should never appear.

Bit 2

"Receiver Carrier Not Detected". Appears only on receive side of the interface (i.e. keyboard address). This status bit should never appear on a full-duplex modem link from the time the connection is established until the time it is terminated. On a half-duplex modem link, it indicates that the processor end of the connection is not receiving valid data. It will be present whilst the processor end of the link is transmitting and for several milliseconds after the line has been reversed to receive. Whilst the status bit is a '1' the receiver is inhibited by the hardware. On local connections it is not used and should never appear.

Bit 3

"Not Ready for Sending". Appears only on transmit side of interface. Indicates that the modem is in the receive mode or has not yet complete the transition into the transmit mode. The interface will be inhibited from sending data until this status has cleared. On full duplex modem connections, this status bit should never appear from the time the connection is established until it is broken.

On local connections, the "Ready for Sending" control line will be used as a "Printer Busy" line with the DRI 6330 or the Tally 2000 printers or equivalent. In this case, status bit 3 will indicate "Printer Off-Line" or "Out of Paper". The interface should not be started whilst this status bit is present. During the output of a field, this line will become "busy" during the transmission of a character. In this case, the generation of an interrupt request will be delayed until the printer becomes "free" again.

Bit 4

"Parity or Framing Error Received". This status bit appears only on the receive side of the interface. It indicates that the last character received was not of the correct format with respect to parity, number of bits baud-rate etc. This bit may be cleared by CLEAR DEVICE or I.O. RESET.

Bit 5

"Overrun Error" This status bit appears only on the receive side of the interface. and indicates that a character has been received when the interface is "NOT BUSY" i.e. either it is "CLEAR" in which case the keyboard has been used before the program has "STARTED" the keyboard address, or it is "DONE" in which case the previous interrupt has not been serviced and a character has been lost. This bit may be cleared by CLEAR DEVICE or I.O. RESET.

3.2. Half Duplex

In half-duplex mode, two-way communication is possible between the processor and the terminal but only one way at a time. It is necessary for each end in turn to make a "Request to Send" to the modem, and to wait for a "Ready for Sending" signal from the modem before commencing transmission. In the hardware of this interface, provision has been made to generate the "Request to Send" signal when the transmit side of the interface is set "BUSY".

Transmission, however, will not commence until the "Ready for Sending" signal is received.

The "Request to Send" signal will be dropped by the hardware when the receive side of the interface is set "BUSY" and reception may then take place.

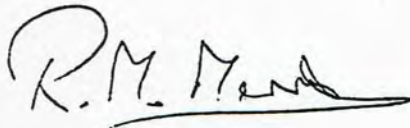
It should be noted that:-

1. When in the transmit mode, there is no way of knowing from the status bits that other end of the link is in the receive mode.
2. The time taken to reverse the line from receive to transmit is substantial (of the order of 20-40 milliseconds). It is therefore not practical to consider "flashing-back" data entered on the keyboard via the processor, the half-duplex facility on the VDU should therefore be used.
3. The new C.D.C. V.D.U. automatically generates a "Request to Send" signal on the first keystroke but will not commence transmission until the "Ready for Sending" signal is received from the modem. "Request to Send" is dropped by the V.D.U. after transmission of a C.R., L.F. or E.T.X. character. It will then be in the receive mode.

3.2. Continued

The above facts may be of some interest to applications programs as well as the operating system with regard to data format. It will thus be necessary for the operating system to keep track of the state of the transmitter and receiver in a half-duplex link and ensure that they are not operated simultaneously or corruption of data will result.

Interpretation of the status bits is as described in section 3.1. but I feel that some discussion is required to determine how to make the optimum use of what is available.

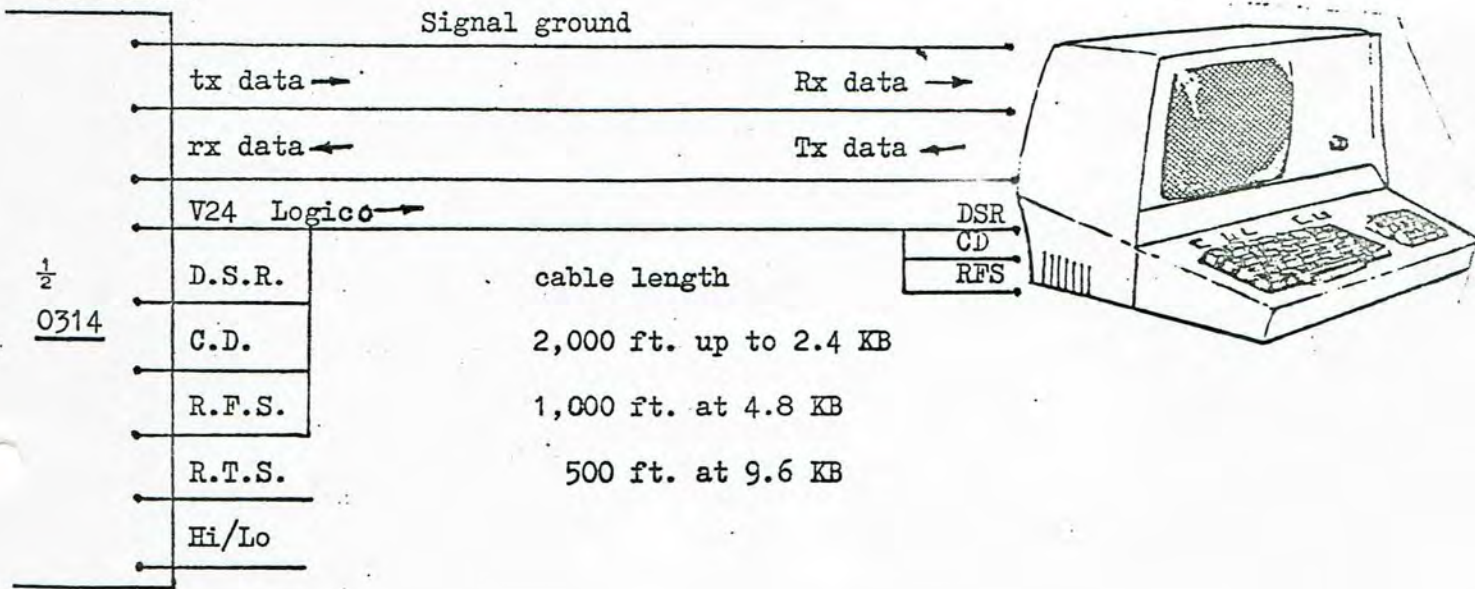
A handwritten signature in cursive script, appearing to read 'R.M. Morris', with a horizontal line underneath the name.

R.M.MORRIS

24.8.76 - Updated 29.9.76

POSSIBLE CONFIGURATION USING EXTENDED DUAL MODEM BOARD 0314

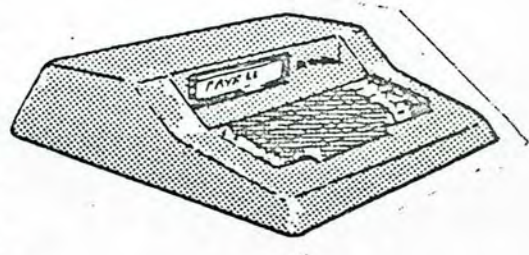
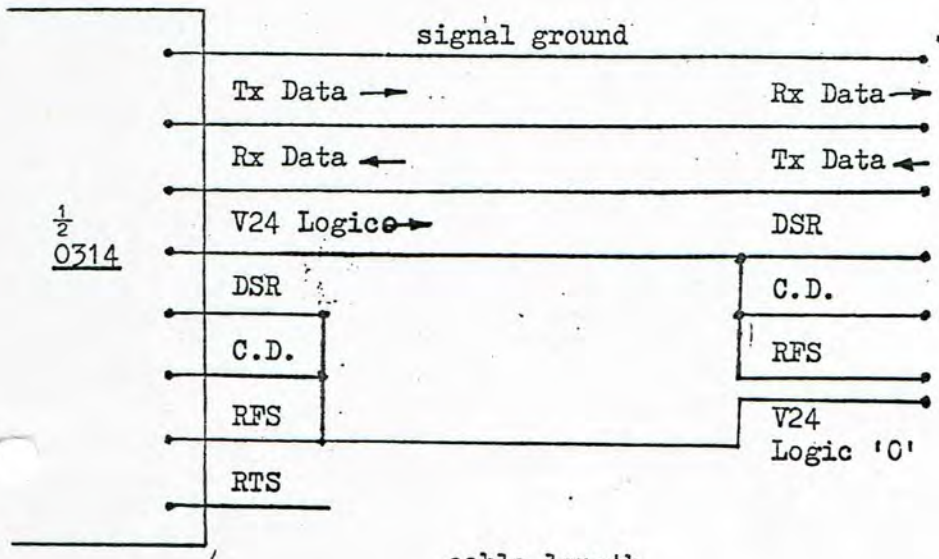
1. Local VDU



Switch Setting

Baud Rate	Optional. To conform with VDU setting (usually 4.8K baud)
No. of data bits	7
Parity	Even
No. of stop bits	11
Single/Double buffered	Double Buffered
Permanent request to send	Yes
High/Low signalling rate	Not applicable

2. Local BCL 16 character Alphanumeric Keyboard/Display



cable length

2,000 ft. up to 2.4 kb

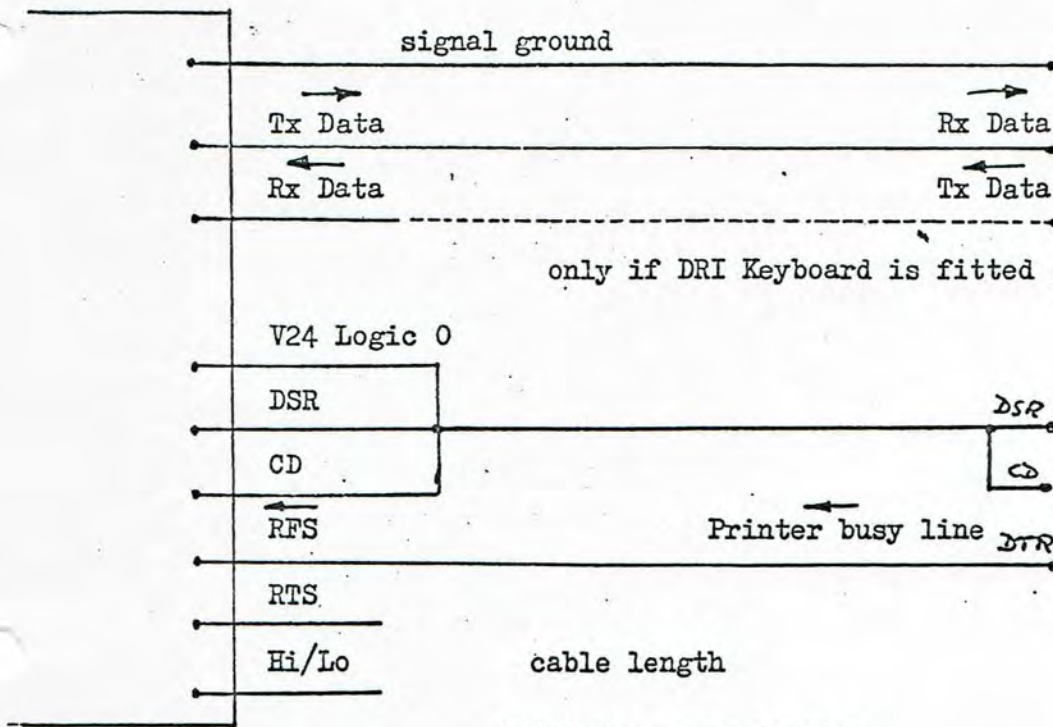
1,000 ft. at 4.8 kb

500 ft. at 9.6 kb

Switch Settings

Baud Rate	Optional. To conform with keyboard/Display setting (usually 4.8 KB)
No. of data bits	7
Parity	Even
No. of stop bits	1
Single/Double Buffered	Double Buffered
Permanent request to send	Yes
High/Low signally rate	Not applicable

9. Local D.R.I. 6220 Serial Printer

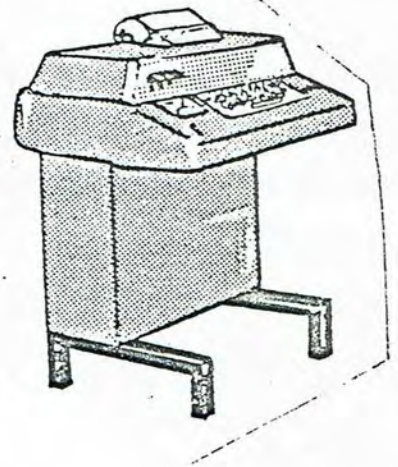
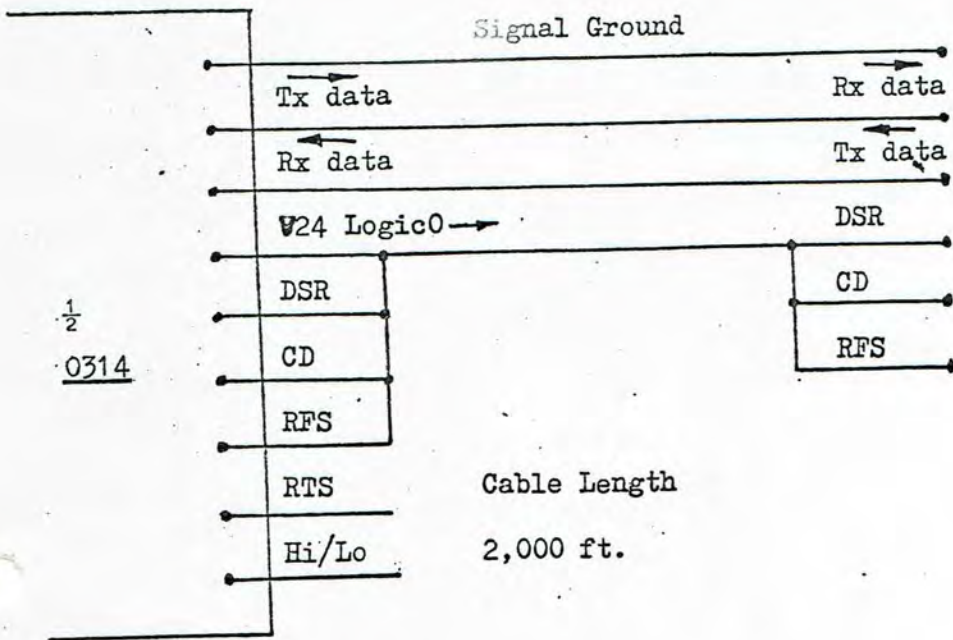


cable length
 2,000 ft. up to 2.4 kb.
 1,000 ft. at 4.8 kb.
 500 ft. at 9.6 kb.

Switch Settings

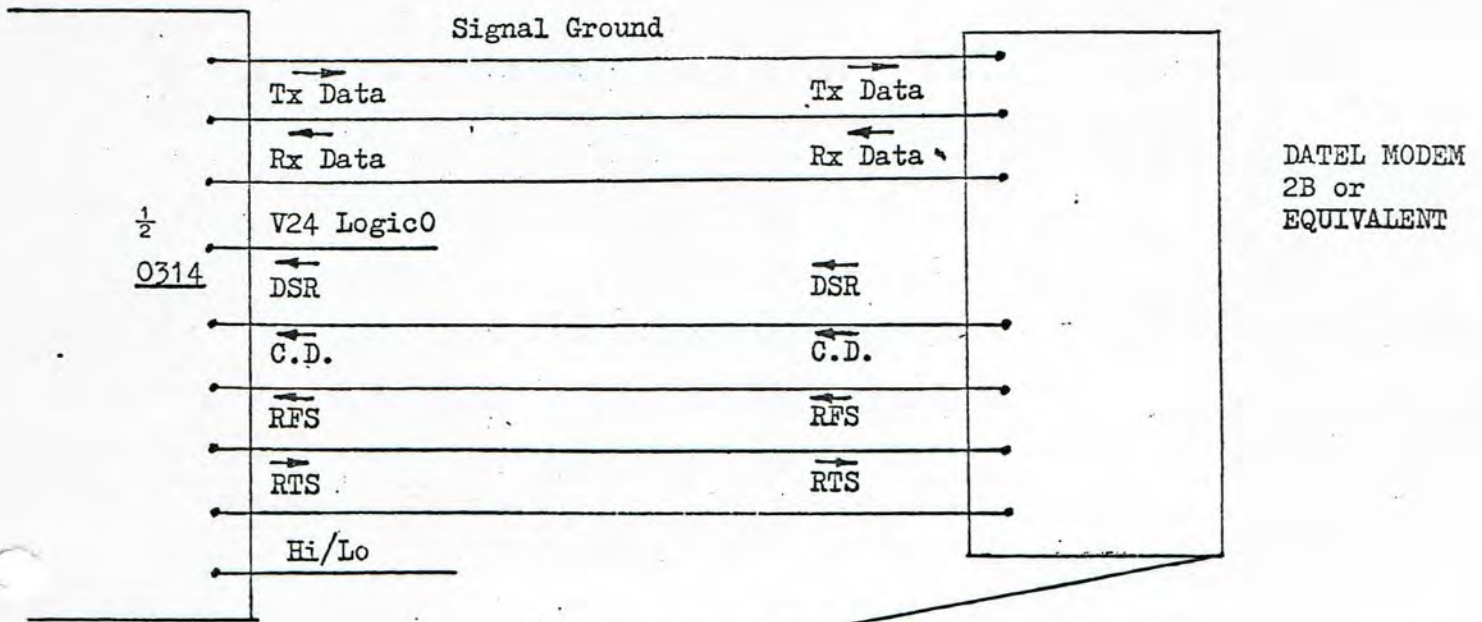
Baud Rate	Optional. To conform with printer setting (usually 4.8 K baud)
No. of data bits	7
Parity	Even
No. of stop bits	1
Single/double buffered	Single Buffered
Permanent Request to send	Yes
High/Low signalling rate	Not applicable

4. Local "Teletype"

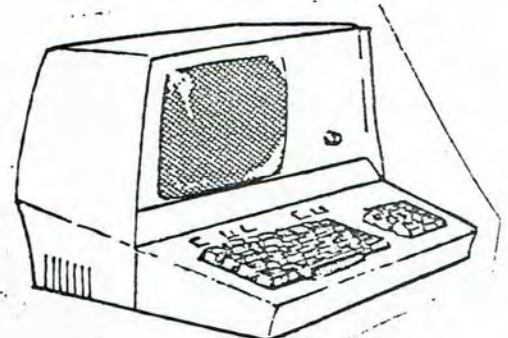
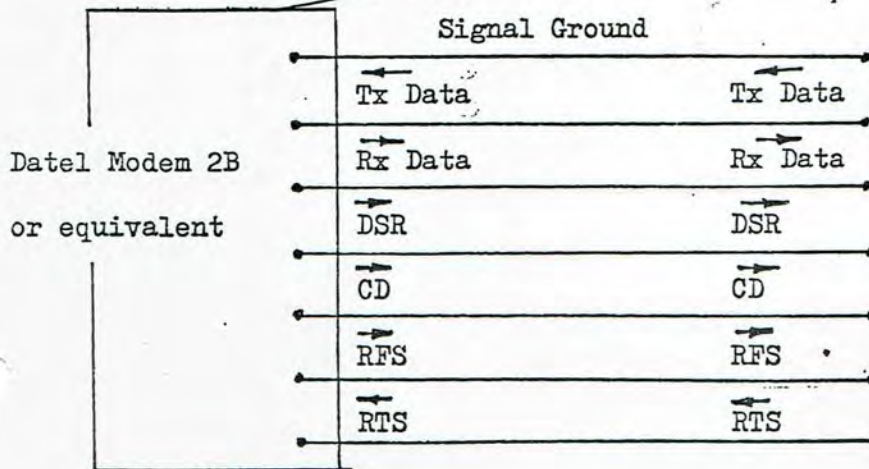


Baud Rate	110 Baud
No. of data bits	7
Parity	Even
No. of stop bits	2
Single/Double buffered	Single Buffered
Permanent request to send	Yes
High/Low signalling rate	Not applicable

5. Remote V.D.U. (Datel 200 Modems 2B 300 Baud maximum. Full duplex)



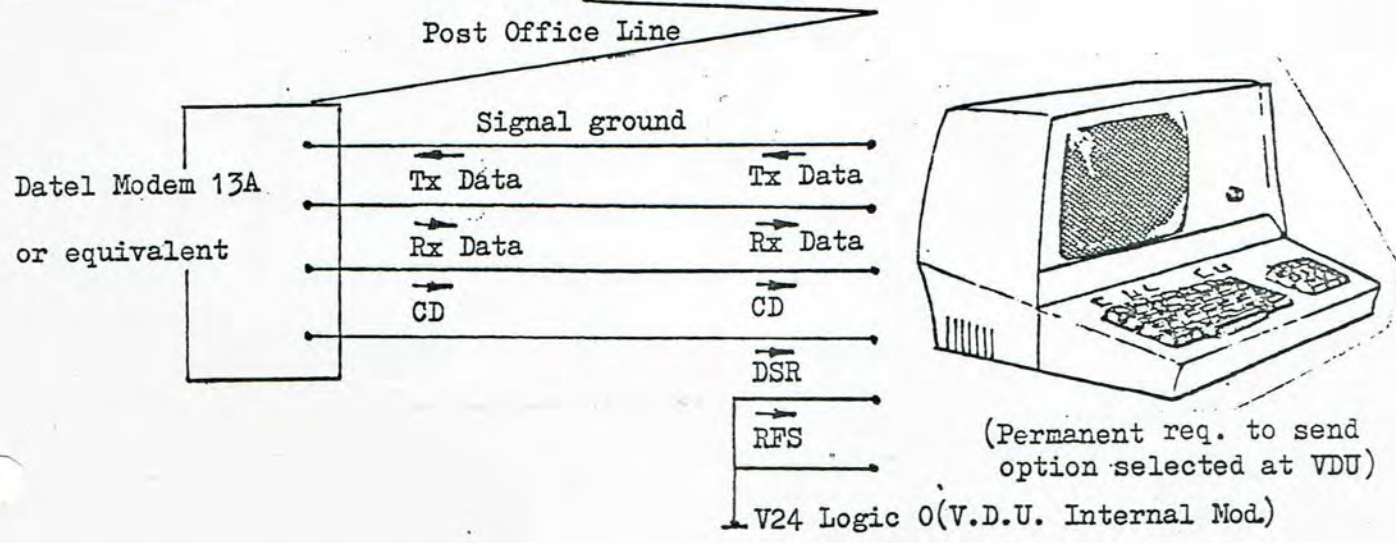
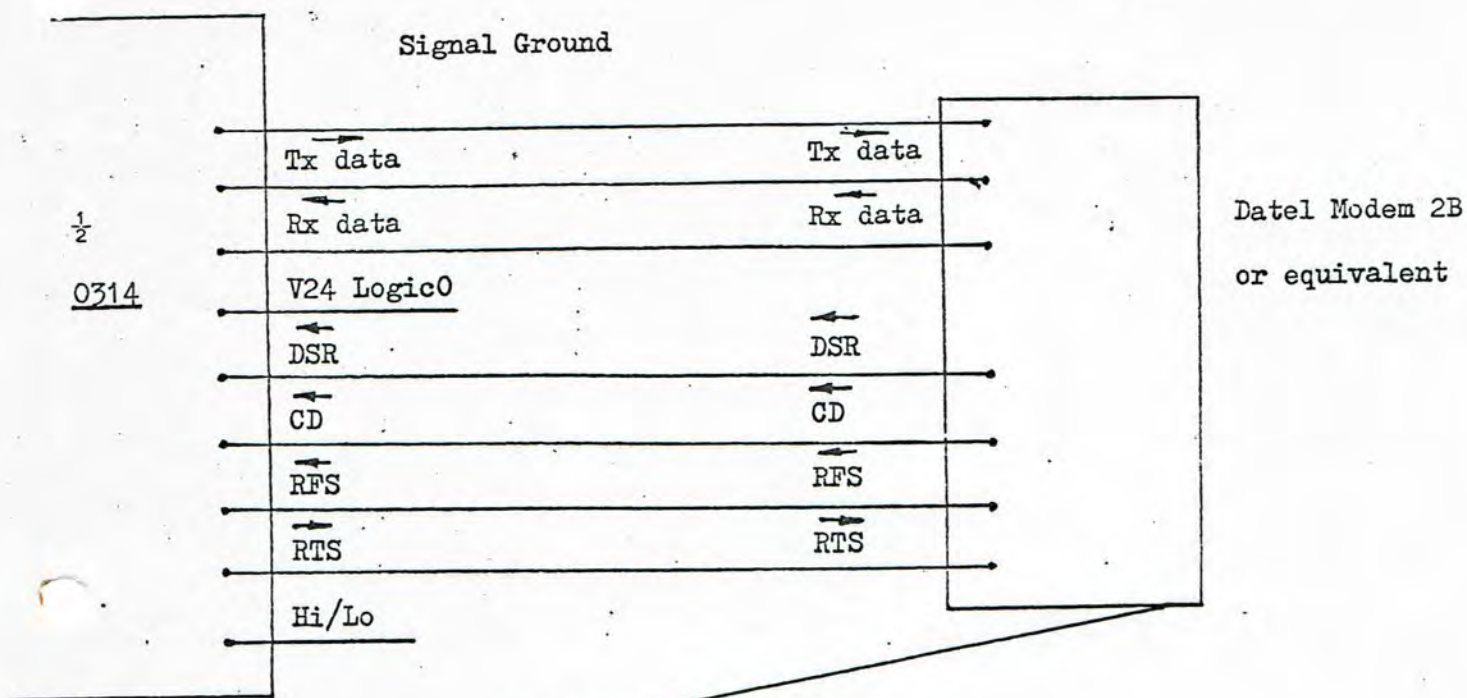
Post Office Line



(Permanent R.T.S. option selected at V.D.U.)

Switch Settings

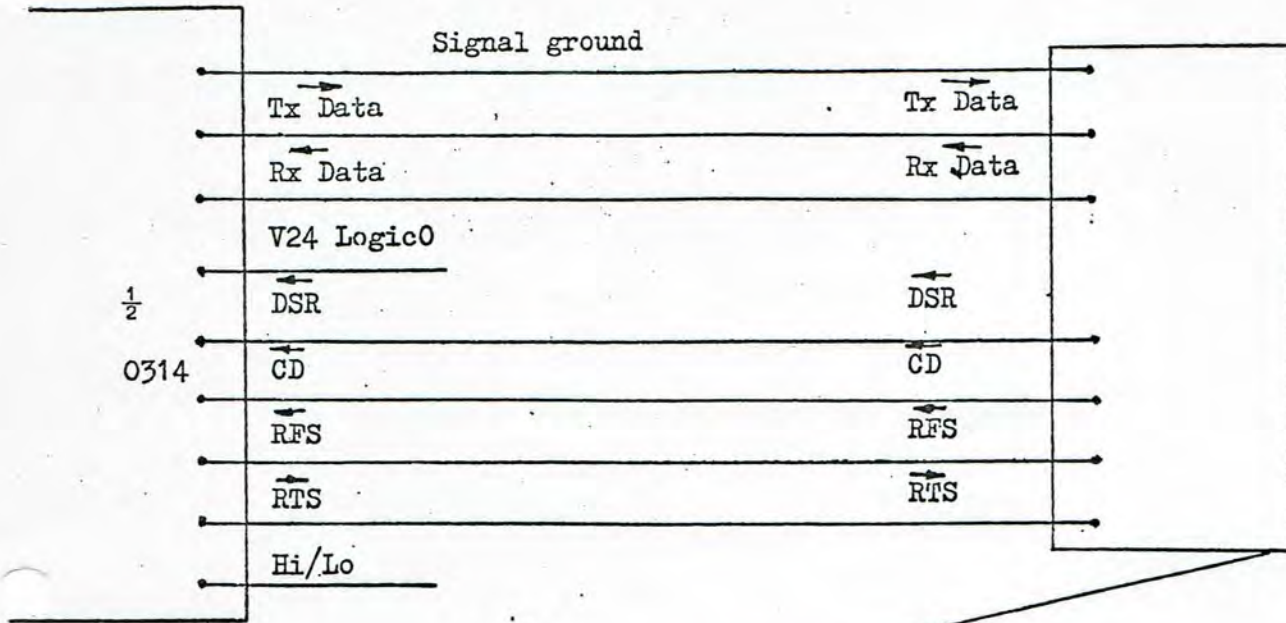
Baud Rate	Up to 300 Baud
No. of data bits	7
Parity	Even
No. of stop bits	1
Single/Double Buffered	Double Buffered
Permanent request to send	Yes
High/Low signalling rate	Not applicable



Switch settings

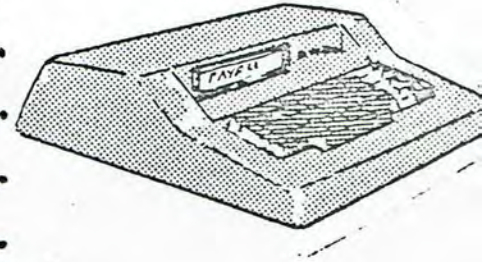
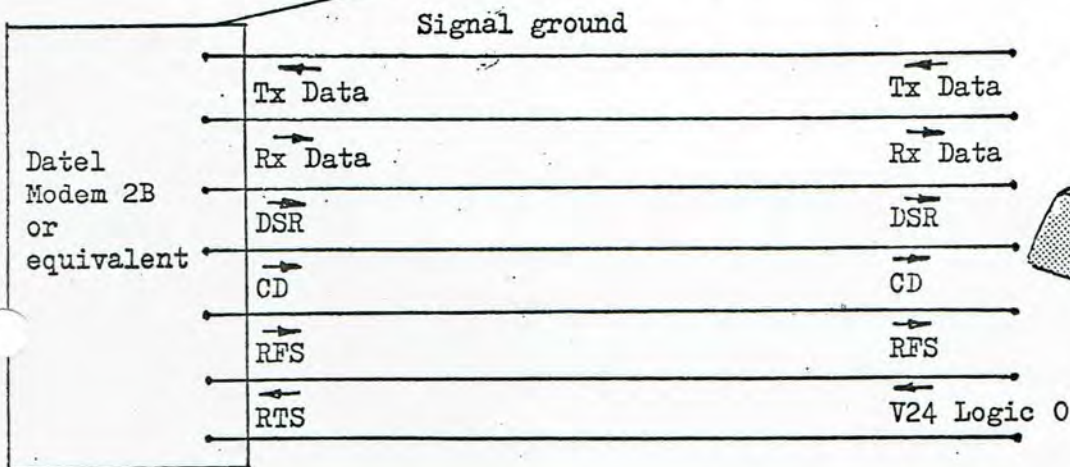
Baud Rate	Up to 300 baud
no. of data bits	7
parity	Even
No. of stop bits	1
Single/Double buffered	Double buffered
Permanent request to send	Yes
High/Low signalling rate	Not applicable

7. Remote BCL 16 character Alphanumeric Keyboard/Display
 (Datel 200 modems 2B 300 baud maximum. Full duplex)



Datel
 Modem 2B
 or
 equivalent

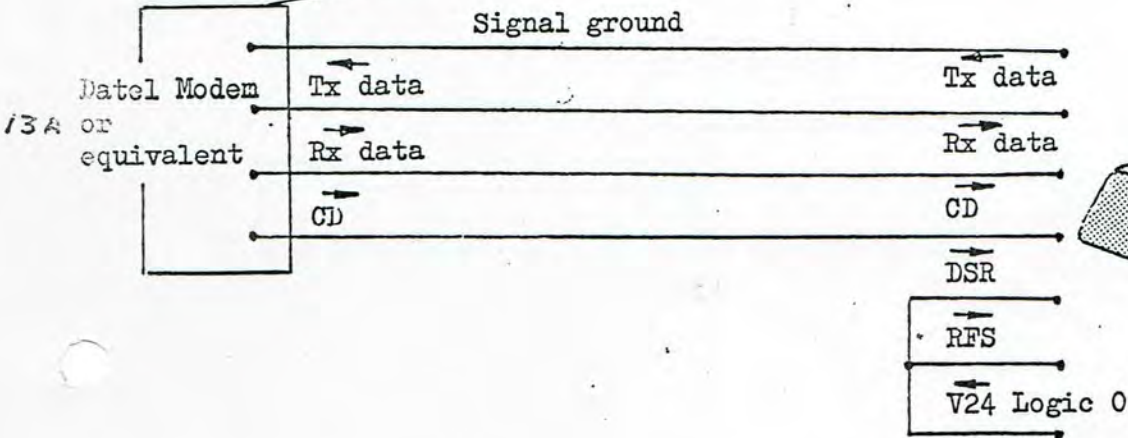
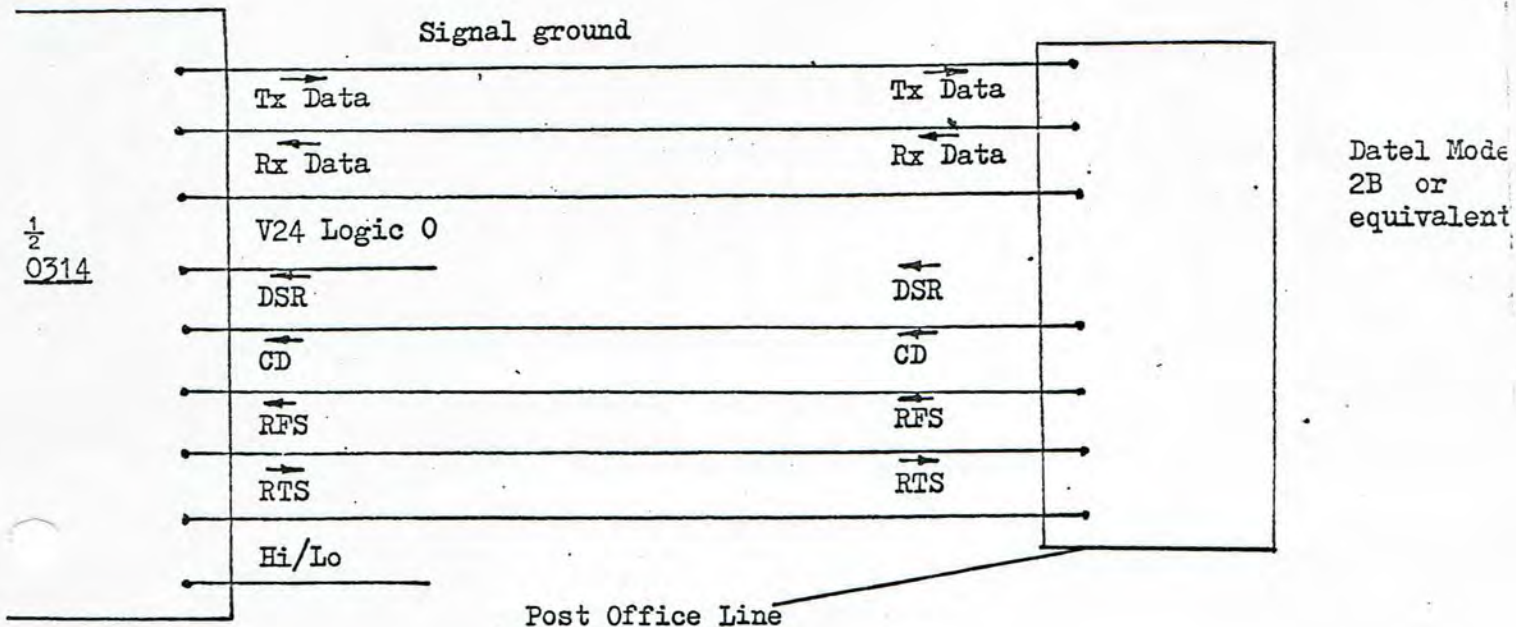
Post Office Line



Switch Setting

Baud rate	Up to 300 baud
No. of data bits	7
Parity	Even
No. of stop bits	1
Single/Double buffered	Double buffered
Permanent request to send	Yes
High/Low signalling rate	Not applicable

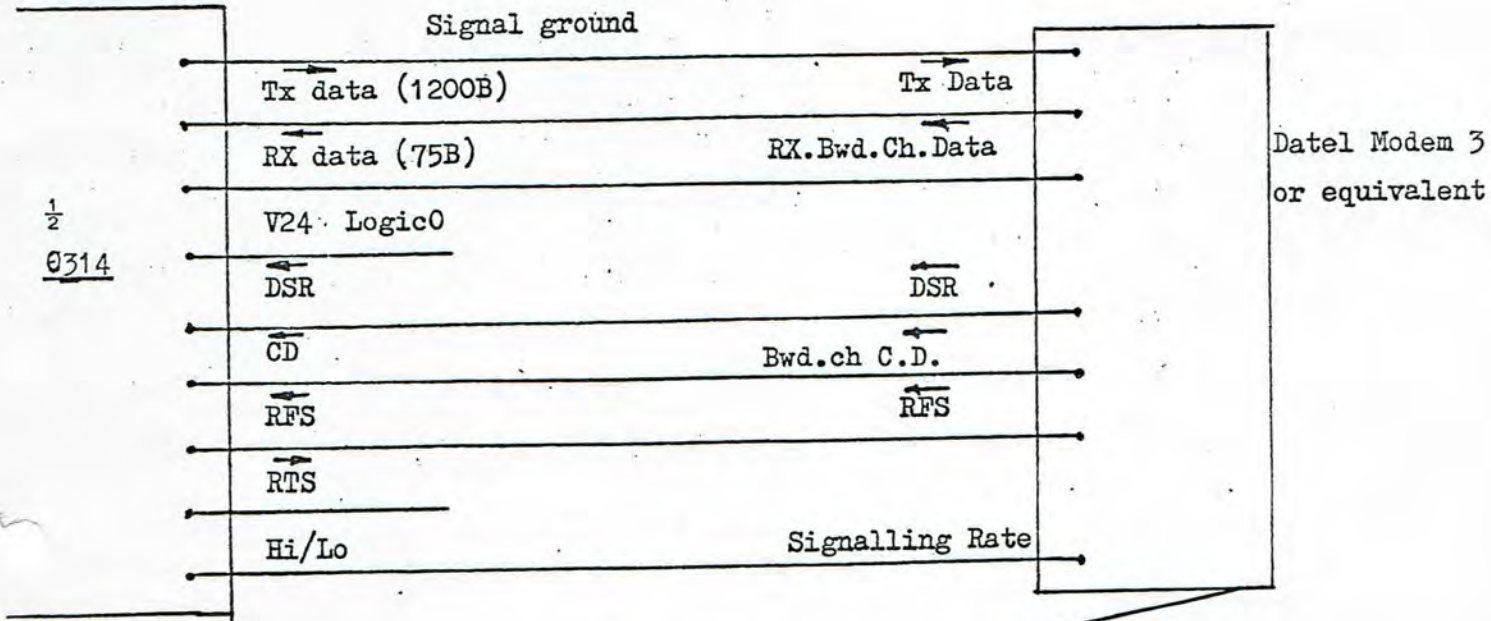
8. Remote BCL 16 character Alphanumeric Keyboard/display
 (Datel 200 modems 2B and 13A 300 baud maximum. Full duplex).



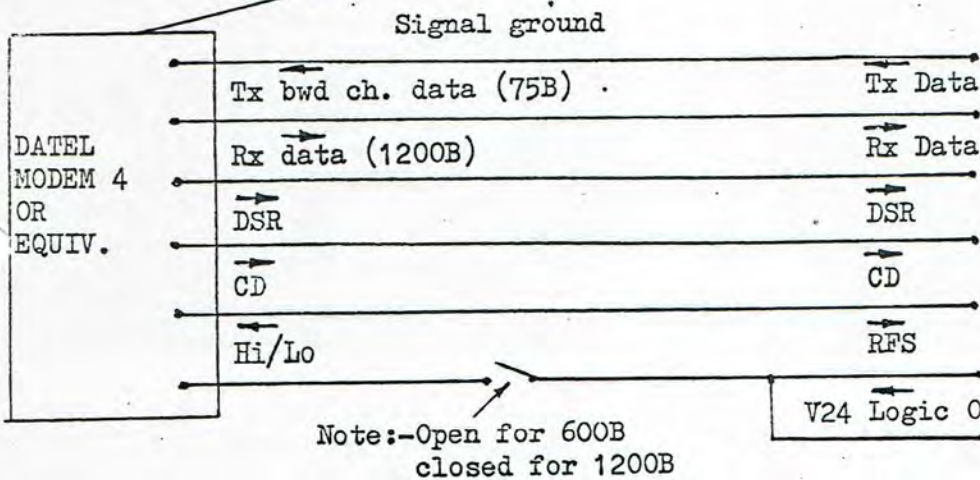
Switch setting

Baud Rate	Up to 300 baud
No. of data bits	7
Parity	Even
No. of stop bits	1
Single/double buffered	Double buffered
Permanent request to send	Yes
High/Low signalling rate	Not applicable

9. Remote DRI 6330 Printer (Datel 600 modems no: 3 and 4. 1200 Baud maximum with 75 baud backward channel. A symmetric full-duplex)
 N.B. Special service-routine required.



Post Office Line



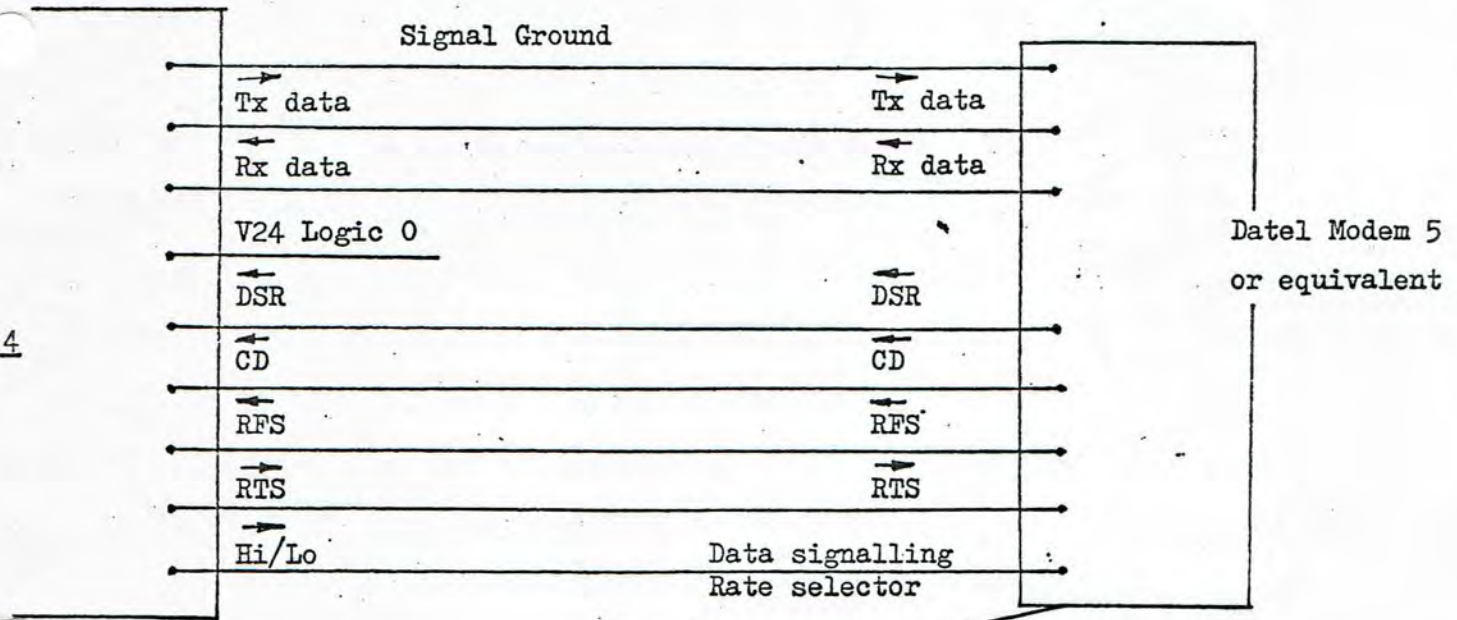
Printer must have extra 160 char. buffer, busy signal with 40 char. spaces left in buffer, backward channel busy signal options.

Switch Setting

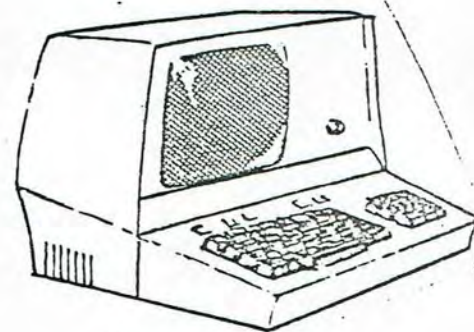
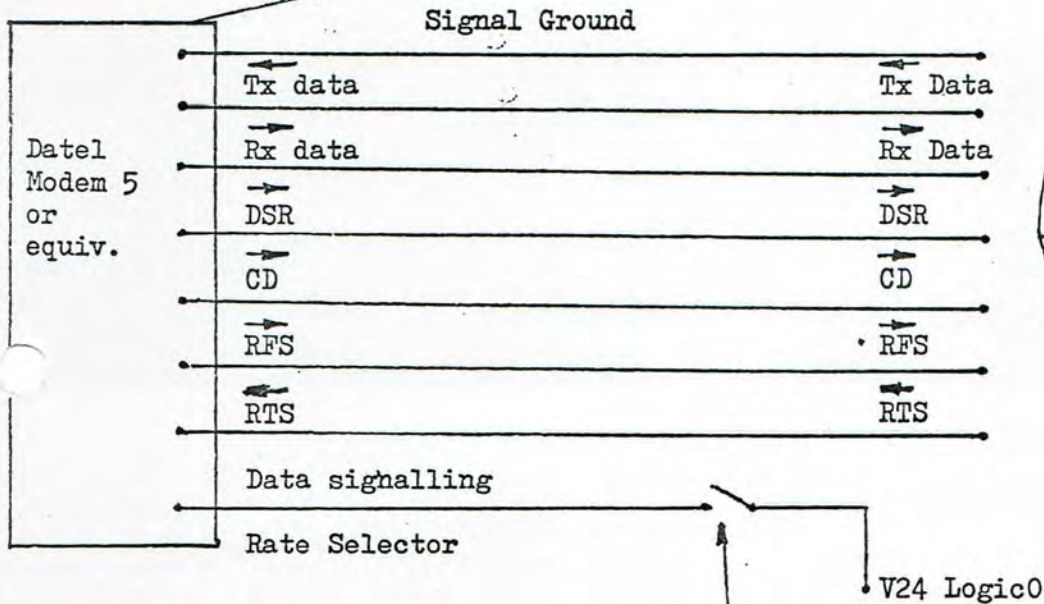
Baud Rate	1200 Baud tx. <input type="checkbox"/> 75 baud rx. (Optional 600 baud tx. over bad lines).
No. of data bits	7
Parity	Even
No. of Stopbits	1
Single/double buffered	<input checked="" type="checkbox"/> Single
Permanent request to send	<input checked="" type="checkbox"/> Yes
High/Low signalling rate	High rate for 1200 baud, low rate for 600 baud (must)

10. Remote V.D.U. (Datel 600 modems no. 5 1200 Baud maximum. half duplex).

$\frac{1}{2}$
0314



Post Office Line



(VDU must have switched request to send option)

Note: Closed for 1200 baud
open for 600 baud

u.e. Needs half duplex service routine.

TERMINAL	FUNCTION	DESTINATION		
1	PROT GND.	PIN 1 (PROT GND)		SCREEN
2	TX DATA	PIN 3 (RX DATA)	RED	7/0.20
3	RX DATA	PIN 2 (TX DATA)	BLUE	7/0.20
4				
5	R.F.S.	PIN 5 (R.F.S.)		
6	D.S.R.	PIN 6 (D.S.R.)		
7	SIG. GND.	PIN 7 (SIG. GND)	BLACK	7/0.20
8	C.D.	PIN 9 (C.D.)		
9				
10		PIN 10 (LOGIC '0')	YELL.	7/0.20
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H/W DEVELOPMENT 11/7/77 R.M. ~~Matta~~

REMARKS

DATE	DATE	DATE	DATE	BUSINESS COMPUTERS LTD. PORTSLADE SUSSEX ENGLAND BN4 1ER												USED ON
DRG	CKD.	APP.	MOD	A	B	C	D	E	F	G	H	I	J	K	TITLE	DRG No.
															VDU LOOM (0314)	SHT. of SHTS.

TERMINAL	FUNCTION	DESTINATION	WIRE
1	PROT. GND.	PIN 1 (PROT. GND.)	SCREEN
2	TX. DATA	PIN 3 (RX. DATA)	RED 7/0.20
3	RX. DATA	PIN 2 (TX. DATA)	BLUE 7/0.20
5	R.F.S.	PIN 10 (LOGIC '0')	YELLOW 7/0.20
6	D.S.R	PIN 6 (D.S.R)	
7	SIG. GND.	PIN 7 (SIG. GND)	BLACK 7/0.20
8	C.D.	PIN 9 (C.D.)	
10	LOGIC '0'	PIN 5 (R.F.S.)	WHITE 7/0.20
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26	PROT. GND.	FLYING LEAD TO OV	BLACK 16/0.20
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H/W DEVELOPMENT 11/7/77 R.M. MATA

REMARKS

DRN.	DATE	DATE	DATE	DATE	BUSINESS COMPUTERS LTD. PORTSLADE SUSSEX ENGLAND BN4 1ER													USED ON
CKD.					TITLE AND 16 LOOM (0314)													DRG No.
APP.	MOD	A	B	C	D	E	F	G	H	I	J	K		SHT.	of	SHTS.		

TERMINAL	FUNCTION	DESTINATION	WIRE
1	PROT. GND.	PIN 1 (PROT. GND.)	SCREEN
2	TX. DATA	PIN 3 (RX. DATA)	RED 7/0.20
3	RX. DATA	PIN 2 (TX. DATA)	BLUE 7/0.20
4			
5	R.F.S.	PIN 5 (R.F.S)	
6	D.S.R	PIN 6 (D.S.R.)	
7	SIG. GND.	PIN 7 (SIG. GND.)	BLACK 7/0.20
8	C.D.	PIN 8 (C.D.)	
9			
10		PIN 10 (LOGIC '0')	YELLOW 7/0.20
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26	PROT. GND.	FLYING LEAD TO ST	
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H/W DEVELOPMENT 11/7/77 R.M. MAID

REMARKS

DATE	DATE	DATE	DATE	BUSINESS COMPUTERS LTD. PORTSLADE SUSSEX ENGLAND BN4 1ER	USED ON
DRN	CKD.	APP.	MOD		TITLE
			1 2 3 4 5 6 7 8 9 10 11 12	TELETYPE LOOM (0314).	SHT. of SHTS.

'DATATECH' ISOLATION UNIT

15 WAY CANNON

TERMINAL	FUNCTION	DESTINATION	WIRE
1		PIN 1 (PROT. GND.)	SCREEN
	TX. DATA	PIN 2 (TX. DATA)	BLUE 7/0.20
3	RX. DATA	PIN 3 (RX. DATA)	RED 7/0.20
4	SEE BELOW R.T.S.	PIN 4 (R.T.S)	BROWN 7/0.20
5	R.F.S	PIN 5 (R.F.S.)	GREEN 7/0.20
6	D.S.R.	PIN 6 (D.S.R.)	YELLOW 7/0.20
7	SIG. GND.	PIN 7 (SIG. GND)	BLACK 7/0.20
8	C.D.	PIN 8 (C.D.)	WHITE 7/0.20
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~~PROT. GND. FLYING LEAD TO OY BLACK 16/0.20~~

*NOTE:- THIS LINE IS NORMALLY OMITTED. IT IS ONLY TO BE CONNECTED WHEN THE MODEM-LINK HAS NO TELEPHONE ASSOCIATED WITH IT.

{ -1 WITHOUT LINE 4 }
{ -2 WITH LINE 4 }

DATATECH ISOLATION UNIT TO BE FITTED WITH EARTH WIRE FOR CONNECTION TO MAINS EARTH.

H/W DEVELOPMENT 12/7/77 R.M. M...

REMARKS NOTE:- S OR SZ TYPE MODEM SWITCHING. (LOCKING PUSHBUTTON)

DRN.	CKD.	APP.	MOD DATE	BUSINESS COMPUTERS LTD. PORTSLADE SUSSEX ENGLAND BN4 1ER												USED ON
				TITLE DATEL 200. MODEM 2B LOOM (0314)												DRG No.
															SHT. of SHTS.	

'DATATECH' ISOLATION UNIT.

15 WAY CANNON SKT.

TERMINAL	FUNCTION	DESTINATION	WIRE
1		PIN 1 (PROT. GND.)	SCREEN
	TX DATA	PIN 2 (TX. DATA)	BLUE 7/0.20
3	RX DATA	PIN 3 (RX. DATA)	RED 7/0.20
4	R.T.S.	PIN 4 (R.T.S.)	BROWN 7/0.20
5	R.F.S.	PIN 5 (R.F.S.)	GREEN 7/0.20
6	D.S.R.	PIN 6 (D.S.R.)	YELLOW 7/0.20
7	SIG. GND.	PIN 7 (SIG. GND.)	BLACK 7/0.20
8	C.D.	PIN 8 (C.D.)	WHITE 7/0.20
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
22			
23	SIG. RATE	PIN 14 (SIG. RATE)	7/0.20
24			
25			
PROT GND FLYING LEAD TO GY			
DATATECH ISOLATION UNIT TO BE			
FITTED WITH EARTH WIRE FOR			
CONNECTION TO MAINS EARTH.			

H/W DEVELOPMENT 12/7/77 R.M. Mans

REMARKS NOTE:- S OR SZ TYPE MODEM SWITCHING (LOCKING PUSHBUTTON)

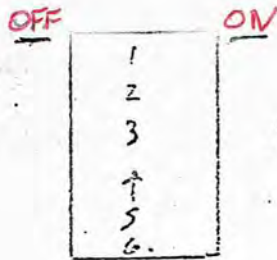
DATE	DATE	DATE	BUSINESS COMPUTERS LTD.												USED ON	
			PORTSLADE SUSSEX ENGLAND BN4 1ER													
DRN.	CKD.	APP.	MOD	A	B	C	D	E	F	G	H	I	J	K	TITLE	DRG No.
															DATEL 600.	
															MODEM NO. 5. (0314)	SHT. of SHTS.

BAUD RATE	SWITCHES			
	S	R	Q	P
50	0	0	0	0
75	0	0	0	1
110	0	0	1	0
134.5	0	0	1	1
150	0	1	0	0
300	0	1	0	1
600	0	1	1	0
1200	0	1	1	1
1800	1	0	0	0
2000	1	0	0	1
2400	1	0	1	0
3600	1	0	1	1
4800	1	1	0	0
7200	1	1	0	1
9600	1	1	1	0
19200	1	1	1	1

Function	Switch Position	Function	Switch Position
A/B	7C	C/D	5C
Parity	5 ON=ODD	Parity	5 ON=ODD
NDB1	4 ON=0	NDB1	4 ON=0
NDB2	3 ON=0	NDB2	3 ON=0
No. STOP BITS	2 ON=1 OFF=2	No. STOP BITS	2 ON=1 OFF=2
INHIBIT PARITY	1 ON=WITH P OFF= No. P 9E (RHS)	INHIBIT PARITY	1 ON= WITH P OFF=No P 9E (LHS)
SIG. RATE	2	SIG RATE	3
Perm. RTS	1	Perm. RTS	1
Double Buffering	3	Double Buffering	2

0314 BOARD SWITCH LOCATIONS

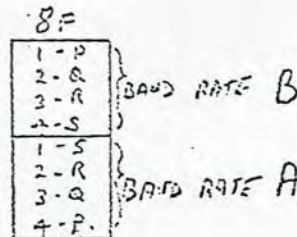
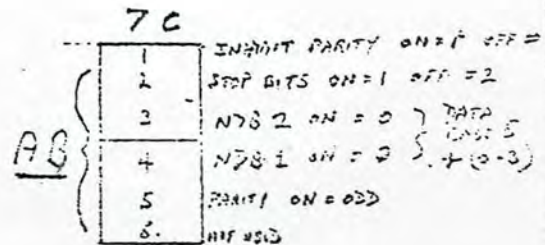
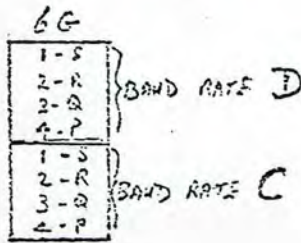
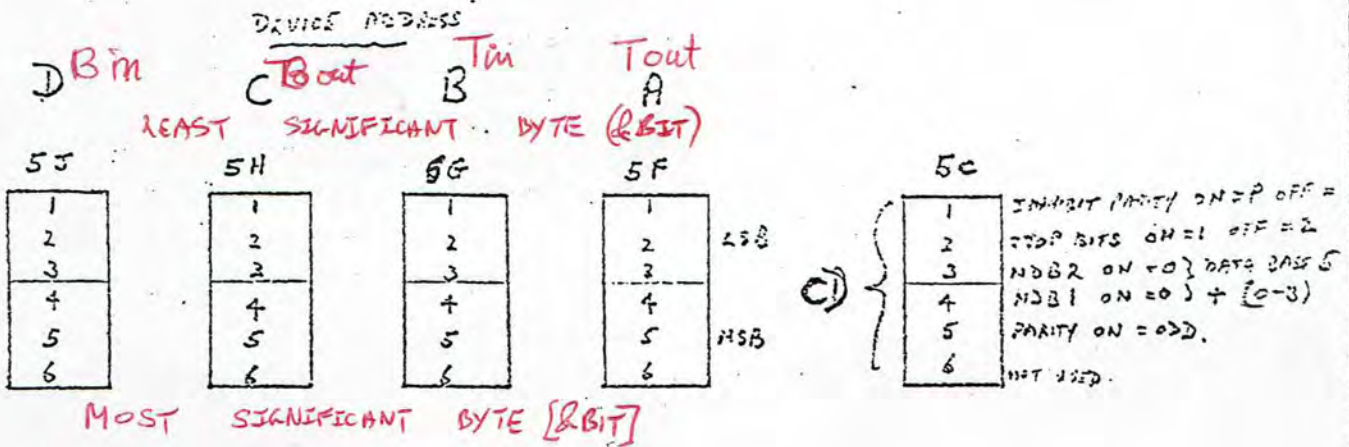
Function	Switch Position	Function	Switch Position
A Dev. Add	5F	A Baud Rate	8F (RHS)
Bit 1	1 ON=0		
2	2 ON=0	P	4 ON=0
3	3 ON=0	Q	3 ON=0
4	4 ON=0	R	2 ON=0
5	5 ON=0	S	1 ON=0
6	6 ON=0		
B Dev. Add	5G	B Baud Rate	8F (LHS)
1	1 ON=0		
2	2 ON=0	P	1 ON=0
3	3 ON=0	Q	2 ON=0
4	4 ON=0	R	3 ON=0
5	5 ON=0	S	4 ON=0
6	6 ON=0		
C Dec. Add	5H	C Baud Rate	6G (RHS)
1	1 ON=0		
2	2 ON=0	P	4 ON=0
3	3 ON=0	Q	3 ON=0
4	4 ON=0	R	2 ON=0
5	5 ON=0	S	1 ON=0
6	6 ON=0		
D Dev. Add	5J	D Baud Rate	6G (LHS)
1	1 ON=0		
2	2 ON=0	P	4 ON=0
3	3 ON=0	O	3 ON=0
4	4 ON=0	R	2 ON=0
5	5 ON=0	S	1 ON=0
6	6 ON=0		



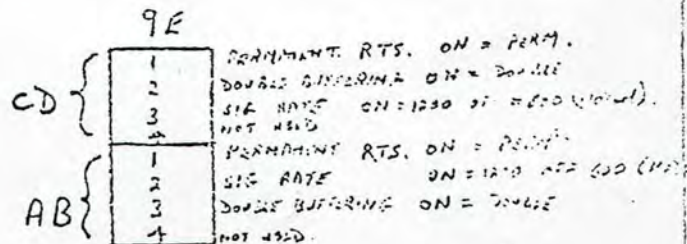
INTERFACE BOARD 341

EDGE CONNECTORS.

I H G F E D C B A



BAUD RATE	SWITCHES.			
	S	R	Q	P
50	0	0	0	0
75	0	0	0	1
110	0	0	1	0
134.5	0	0	1	1
150	0	↑	0	0
300	0	1	0	1
600	0	1	1	0
1200	0	1	1	1
1800	1	0	0	0
2000	1	0	0	1
2400	1	0	1	0
3600	1	0	1	1
4800	1	1	0	0
7200	1	1	0	1



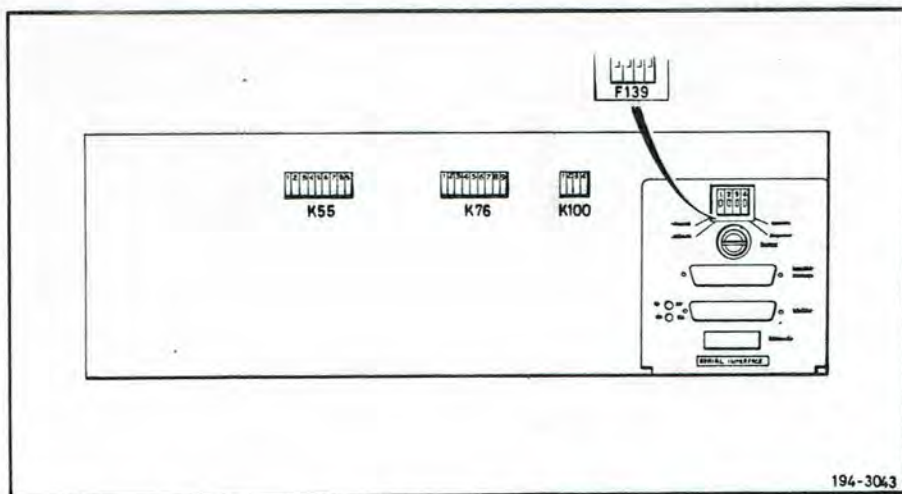


FIGURE 10.2 SWITCH LOCATIONS, MOD.02 PCB and later

In table 10.3 unless otherwise stated, the function refers to the ON setting. The SIM column gives the setting selected in manufacture.

switch	SIM	function (ON position)
--------	-----	------------------------

Switch A

✓ K76/1*	OFF	select 75 baud
K76/2*	OFF	select 100 baud
K76/3*	OFF	select 150 baud
K76/4*	OFF	select 200 baud
K76/5*	OFF	select 300 baud
K76/6*	ON	Receive and transmit at 600 or 1200 baud. Select baud rate with operator's switch F139/1.
K76/7*	OFF	select 2400 baud
K76/8*	OFF	select 4800 baud
K76/9*	OFF	select 9600 baud

Switch B

K55/1**	OFF	BUSY signal active from receipt of LF, CR, VT or FF until extension buffer is empty.
K55/2	OFF	BUSY signal active from receipt of ETX until microprocessor buffer empty.
K55/3	OFF	BUSY signal active from receipt of FF until microprocessor buffer empty.
K55/4	OFF	Prevent BUSY when off line.
K55/5	ON	Force BUSY when off line. Overridden when K55/4 is ON.
K55/6	OFF	Stop transmission when busy.
✓ - K55/7**	OFF	BUSY signal active when 40 bytes or less free space in extension buffer.
✓ - K55/8	ON	DATA OUT V24 when on line.
K55/9	OFF	BUSY when printer is deselected.

TABLE 10.3 SWITCH SETTINGS ON INSTALLATION
MOD.02 AND 03 PCB (CONTINUES)

pin	circuit number	function/signal name	active state
✓20	108	DATA TERMINAL READY	see switches (H88/8, H88/9) K100/1, K100/3
11	111	DATA SIGNALLING RATE	hi 1200, lo 600 see note 1

Note 1. Modem No 1 responds correctly to the state of this line which is controlled by operator's switch F139/1. Modem No 2 has a channel frequency control on pin 11 such that with the switch in the 1200 baud position the RX and TX channel frequencies are interchanged. For this reason, when operating with Modem No 2, the 600 baud position of switch F139/1 should always be used, or PLH-11 should be disconnected in the cable.

TABLE 10.4 CONNEXIONS TO 25 WAY PLG-H ON REAR PANEL (CONCLUDED)

pin	function/signal name	active state
1	BUSY (hi)	hi (open collector)
2	BUSY (lo)	lo (open collector)
3	DATA IN V24	-
4	EXTERNAL RESET	hi-going
5	DATA IN, OPEN COLLECTOR	see note 1
6	SELECT -VE OR +VE	see note 1
7	0 volts	
8	0 volts	
9	0 volts	
10	20mA ENABLE	see note 2
11	DATA IN, 20mA	see note 2
12	DATA IN, 20mA	see note 2
13	-12 volts (output)	
14	+5 volts (output)	
15	+12 volts (output)	
16	DATA OUT, V24	hi = mark
17	OPEN COLLECTOR -VE DATA OUT	lo = mark
18	OPEN COLLECTOR +VE DATA OUT	hi = mark
19	ENABLE OPEN COLLECTOR (lo)	see note 3
20	SHORT FOR NON ISOLATE	see note 4
21	20mA LOOP DATA OUT+	see note 4
22	20mA LOOP DATA OUT-	see note 4

TABLE 10.5 CONNEXIONS TO 25 WAY SOCKET SK-J ON REAR PANEL (CONTINUES)

pin	function/signal name	active state
23	4X SWITCHED CLOCK	(open collector) see note 5
24	8X SWITCHED CLOCK	(open collector) see note 5
25	16X SWITCHED CLOCK	(open collector) see note 5

Note 1. Pin 6 should be connected to 0 volts for open collector operation in which hi input corresponds to 1; or left open circuit if lo corresponds to 1.

Note 2. This line must be connected to 0 volts, either remotely or within the cable to enable the 20mA current loop input data lines.

Note 3. As for note 2, but for the open collector data input line.

Note 4. By connecting pin 20 to pin 21, and pin 22 to 0 volts, a non-isolated data output is provided giving 20mA on pin 21 during space periods.

Note 5. Switched square waves of frequency the stated multiple of the baud rate.

TABLE 10.5 CONNEXIONS TO 25 WAY SOCKET SK-J ON REAR PANEL (CONCLUDED)

The cables connecting the printer to the modem and to the computer should be made up with 7/0.2 mm wires. The maximum length in each case is 2 metres unscreened, or 10 metres with an overall screen fitted.

10.1.3 OPERATING INSTRUCTIONS

Although the operation of the serial interface is in general integral with that of the printer, some of the controls are operative only if this option is fitted. These are described in sections 10.1.3.1 and 10.1.3.2. Other controls are fitted on the option PCB and are available to the operator from the rear of the printer. These are described in sections 10.1.3.3 to 10.1.3.6.

10.1.3.1 The ON LINE/ OFF LINE switch

This is a two position non-locking switch in the printer front panel. In the OFF LINE position data may be keyed into the printer to the exclusion of the source. In the ON LINE position the source may receive and transmit data. The ON LINE indicator then lights up.

**10.1.3.2 The SELECT/
DESELECT switch**

This is a two position non-locking switch in the printer front panel, the operation of which is described in chapter 3. Selection causes the SELECTED indicator to light up.

On MOD.01 PCB, the signal DESELECT (lo), generated in the parallel interface section, causes the serial interface to generate the busy signal if required (see table 10.2, switch H88/4).

On MOD.02 PCB and later the signal WFY (lo) generated in the parallel interface section, causes the serial interface to generate the busy signal if required (see table 10.3, switch K55/9).

**10.1.3.3 The DATA
SIGNALLING
RATE switch
F139/1, rear
panel**

Select ON for 1200 baud or
OFF for 600 baud
See switch K51/3, table 10.2, MOD.01 or switch
K76/6 MOD.02 and later.

When used with Modem No 2, this switch should be set to the 600 baud position unless special provision has been made in the cabling to the Modem. See section 10.1.2.3, table 10.4, pin 11. F139/1 is set to ON for shipment.

**10.1.3.4 The SPLIT
FREQUENCY
switch F139/2
rear panel**

a) MOD 01 PCB

The switch is set to ON for shipment. Select OFF for SPLIT FREQUENCY. Data is then received at 1200 or 600 baud depending on F139 switch 1 and transmitted at 75, 150, 300, 2400, 4800 or 9600 baud, depending on which one of K33 switches 1 to 5 and K51 switch 1 is ON. If K51 switch 3 is selected ON, however, received and transmitted baud rates are again equal. When ON, the LOCAL COPY switch F139 switch 4 is enabled; also data is received and transmitted at the same selectable baud rate.

b) MOD.02 PCB and later

Split frequency operation is selected when the switch is ON, while the printer is ON LINE. The switch is set to OFF for shipment.

Data is received at 1200 or 600 baud depending on switch F139/1, and transmitted at 75, 150, 300, 2400, 4800 or 9600 baud, depending on which switch A, grid reference K76, is ON. If A/6 is ON the receiving and transmitting baud rates are again equal and subject to switch F139/1. If switch F139/2 is ON and the printer is OFF LINE receive and transmit are equal to the transmit frequency.

**10.1.3.2 The SELECT/
DESELECT switch**

This is a two position non-locking switch in the printer front panel, the operation of which is described in chapter 3. Selection causes the SELECTED indicator to light up.

On MOD.01 PCB, the signal DESELECT (lo), generated in the parallel interface section, causes the serial interface to generate the busy signal if required (see table 10.2, switch H88/4).

On MOD.02 PCB and later the signal WFY (lo) generated in the parallel interface section, causes the serial interface to generate the busy signal if required (see table 10.3, switch K55/9).

**10.1.3.3 The DATA
SIGNALLING
RATE switch
F139/1, rear
panel**

Select ON for 1200 baud or
OFF for 600 baud
See switch K51/3, table 10.2, MOD.01 or switch
K76/6 MOD.02 and later.

When used with Modem No 2, this switch should be set to the 600 baud position unless special provision has been made in the cabling to the Modem. See section 10.1.2.3, table 10.4, pin 11. F139/1 is set to ON for shipment.

**10.1.3.4 The SPLIT
FREQUENCY
switch F139/2
rear panel**

a) MOD 01 PCB

The switch is set to ON for shipment. Select OFF for SPLIT FREQUENCY. Data is then received at 1200 or 600 baud depending on F139 switch 1 and transmitted at 75, 150, 300, 2400, 4800 or 9600 baud, depending on which one of K33 switches 1 to 5 and K51 switch 1 is ON. If K51 switch 3 is selected ON, however, received and transmitted baud rates are again equal. When ON, the LOCAL COPY switch F139 switch 4 is enabled; also data is received and transmitted at the same selectable baud rate.

b) MOD.02 PCB and later

Split frequency operation is selected when the switch is ON, while the printer is ON LINE. The switch is set to OFF for shipment.

Data is received at 1200 or 600 baud depending on switch F139/1, and transmitted at 75, 150, 300, 2400, 4800 or 9600 baud, depending on which switch A, grid reference K76, is ON. If A/6 is ON the receiving and transmitting baud rates are again equal and subject to switch F139/1. If switch F139/2 is ON and the printer is OFF LINE receive and transmit are equal to the transmit frequency.

3.4.9.1.2 Functional Requirements -

- Protective Ground - This conductor is electrically connected to the terminal frame and to the power source protective ground through the terminal ac power system.
- Transmitted Data - The Transmitted Data circuit is used to transfer data from the terminal to the modem. Data is transmitted as a 10- or 11-bit serial word. In the order of transmission, the data word contains a start bit {spacing}, data bits 2^0 through 2^b , a parity bit and one or two stop bits {marking}. At 110 baud the transmitted word contains 11 bits. At all other baud rates the transmitted word contains 10 bits. Rate of transmission is determined by internal selector switches and the external rate selection switch.

With the field created by the start and stop bits, a marking condition is provided for a binary one indication and a spacing condition is provided as binary zero indication.

- Received Data - The Received Data circuit is used to transfer data from the modem to the terminal. The received data word must contain, in the order of reception, a start bit {spacing}, data bits 2^0 through 2^b , a parity bit, and a stop bit {marking}. Data must be presented to the terminal at a rate identical to the data rate selected for transmitted data.

Within the field created by the start and stop bits, a marking condition is interpreted as a binary one and a spacing condition is interpreted as a binary zero.

- Request to Send {RTS} - The Request to Send signal line is switched to the on condition by the terminal to initiate a transmit operation. Request to Send is disabled unless Data Set Ready and Data Terminal Ready are on. An internal switch is provided to maintain Request to Send in the on condition whenever DTR and DSR are on. Or, in the alternate position, allow RTS to be switched off during periods of no outgoing traffic. RTS will remain on for a minimum of one milli-second following the transmission of the last data bit.
- Clear to Send {CTS} - The Clear to Send signal line is expected to be switched to the on condition by the modem in response to the RTS signal being switched to the on condition by the terminal. The terminal will immediately begin transmitting data upon receipt of the CTS signal.
- Data Set Ready {DSR} - This signal line, when on, indicates the modem is in the data mode. Data will not be transmitted, nor will the Received Data line be monitored, if DSR is off.
- Signal Ground - The signal ground establishes the common ground reference potential for the control and data circuits.