

GEC**R48150/4.**

MR MORRIS. £ 81 upto 100. 9 WEEK DELIVERY.
D 140140

**VIEWDATA
LINE TERMINATING UNIT
LTU 11**

GEC Telecommunications Limited

Telephone Division
Whinbank Road
Aycliffe Industrial Estate
Darlington, DL5 6DA County Durham
England

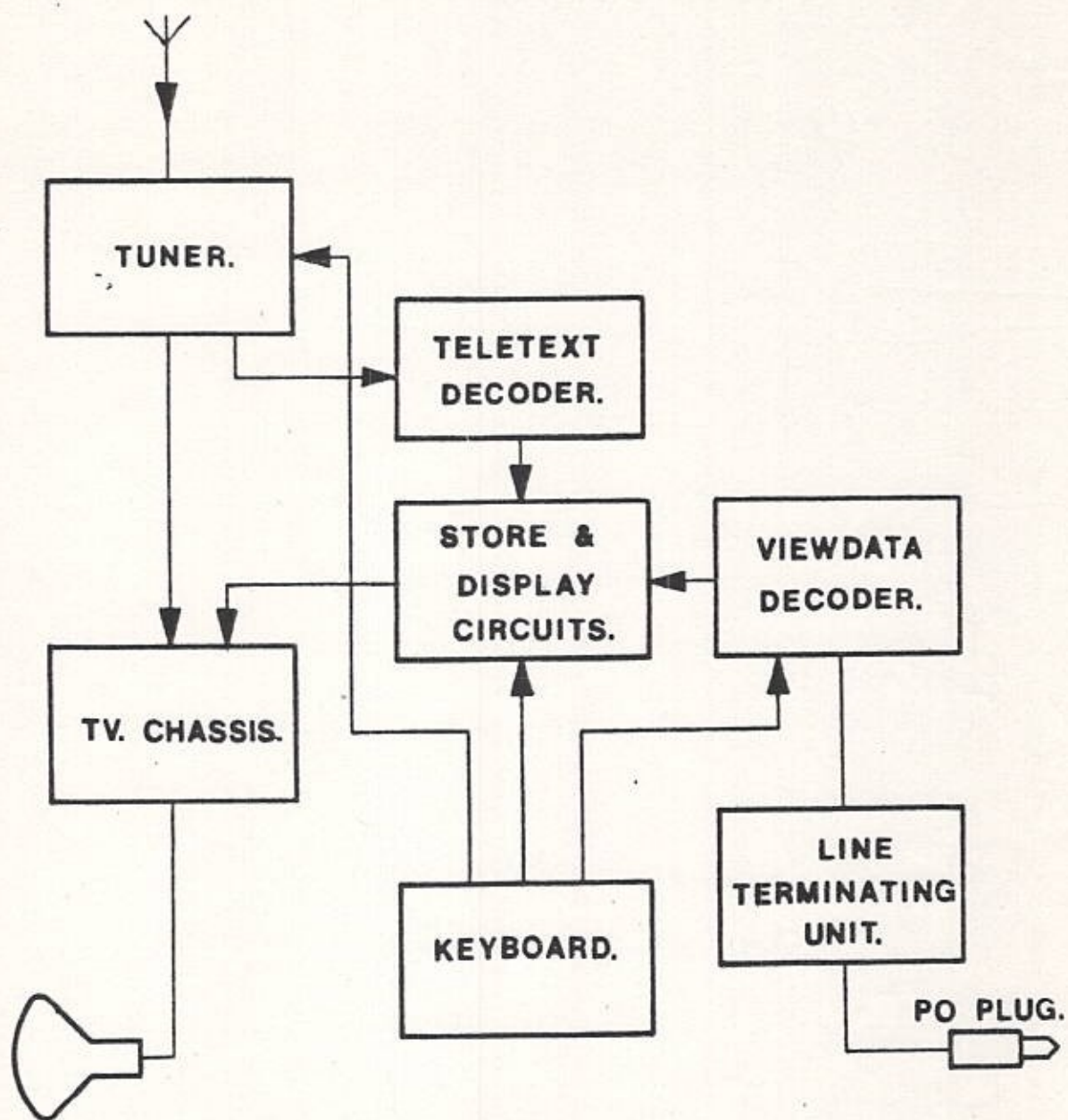


FIG.1.

TV WITH TELETEXT AND VIEWDATA.

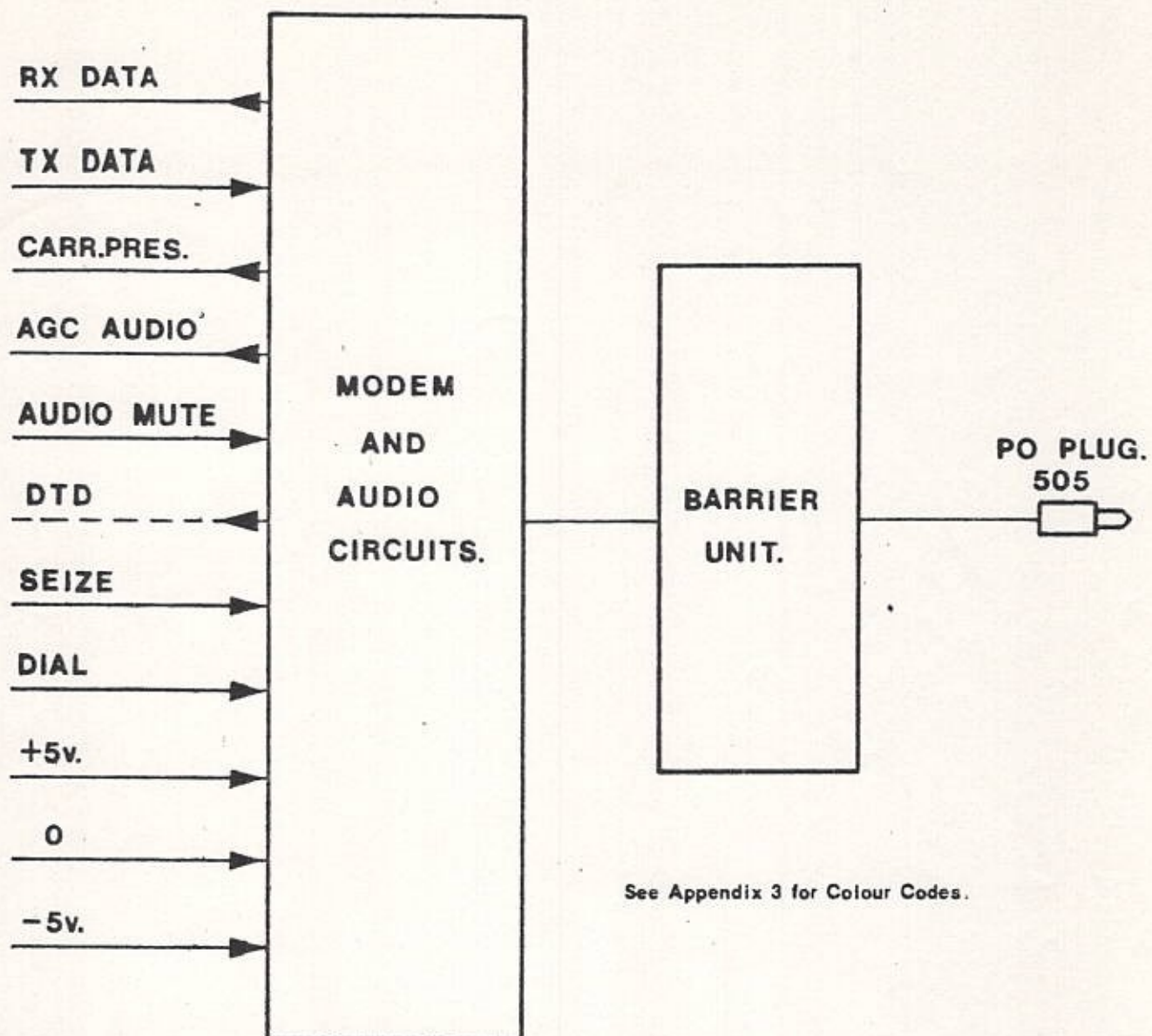


FIG.2.

LINE TERMINATING UNIT LTU 11.

INTRODUCTION

Television sets for the British Post Office Prestel service allow data to be accessed from the Post Office Prestel computer over the customer's telephone line, for display on the TV screen as alphanumeric or graphics information instead of the TV picture.

TV receivers for Viewdata (Fig. 1) incorporate a Viewdata decoder with data storage and display circuits, which can also include Tele-text decoding. Additionally, a Line Terminating Unit (LTU) is required to connect the decoder with the telephone line.

The GEC Line Terminating Unit LTU11 incorporates the following functions:

- a) Conversion of digital data signals used in the TV set to the analogue data signals on the telephone line - the Modem function.
- b) A through path for audio signals to allow monitoring of call set-up to the Viewdata computer.
- c) Carrier detection to check that the computer signal over the telephone line is present.
- d) Output circuits to seize the telephone line before dialling, and for dialling over the telephone line.
- e) Isolation between the TV set and the telephone line, to prevent dangerous voltages from the TV set appearing on the telephone line.

LTU11 complies with relevant British Post Office requirements incorporated in the P.O. document "Prestel Terminal Specification." The P.O. Prestel Market Trial is restricted to Direct Exchange Lines (DEL) and present versions of LTU11 are not suitable for Shared Service telephone lines.

2. MECHANICAL ARRANGEMENT

Line Terminating Unit LTU11 comprises two mechanical units, the modem and barrier unit. These are interconnected by a plug-ended cord permanently connected to the barrier unit. The barrier unit terminates the external line cord, which connects to the P.O. Viewdata Plug 505.

The modem unit is a single glass-fibre p.c. card measuring 264 x 143 mm. with a maximum height over components of 20 mm. The barrier unit provides isolation between the TV set and the telephone line, and is a totally enclosed unit measuring 190 x 110 x 60 mm.

NOTE: Each barrier unit is tested at 6 Kv d.c. for 60 secs across the safety components.

3. INTERFACE CIRCUITS

As shown in Fig. 2, the Line Terminating Unit LTU 11 has a number of interface circuits which connect to the Viewdata decode and display circuitry. The functions of these interface circuits are as follows, (see also Appendix 2):

3.1 Rx Data

Demodulated data received over the telephone line is presented as Logic 1 = "Idle", Logic 0 = "Mark". For minimum error rate, the modem is designed on the assumption that serial data timing within the Viewdata decode circuitry has a timing accuracy of better than 0.1%.

3.2 Tx Data

Data from the Viewdata control circuitry and keyboard is transmitted to the modem at 75 bits/s, Logic 1 = "Idle", Logic 0 = "Mark".

3.3 Carrier Present

The Carrier Present output is at Logic 0 when incoming modem carrier is present, Logic 1 when incoming carrier is absent. Timing is incorporated to ensure that interrupted signals do not give a Carrier Present output. Filtering is incorporated to minimise the possibility of dial tone causing the Carrier Present output to appear.

At present, dial tone in the U.K. has a very wide range of spectral content and power level. Although the LTU11 incorporates filtering to prevent dial tone being interpreted as "Carrier Present", rejection of dial tone cannot be guaranteed for all possible connections of Viewdata terminals. It is advisable to ensure that the Viewdata control circuits decode the ENQ character transmitted from the Viewdata computer as a double check that the computer is connected to line.

3.4 AGC Audio

The AGC audio output gives approximately 650 mV r.m.s. into 5k ohms irrespective of the level of signal on the telephone line. The audio output level is automatically muted when output modem carrier is transmitted. Alternatively, the audio output signal can be muted by the audio mute input (See Appendix 1).

3.5 Audio Mute

Logic 0 on the Audio Mute input mutes the audio output. This facility is provided to allow TV set loudspeaker output to be reduced during dialling to the Viewdata computer. (See Appendix 1).

3.6 DTD

The Dial Tone Detect output is inactive in the present version of LTU11. In the future, the P.O. will be introducing a new dial tone in the U.K. telephone network which could allow accurate dial tone detection in future versions of LTU11. The dial tone detect output allows outgoing dialling to the Viewdata computer to be started earlier than is otherwise possible, so reducing call set-up time to the viewdata computer. A transition from Logic 1 to Logic 0 will be available in future to initiate the dialling process.

3.7 Seize

The seize signal loops the telephone line and seizes the exchange. Removal of the seize signal releases the line and exchange. The seize signal is Logic 1 and Logic 0 releases the telephone line and exchange.

3.8 Dial

The dial input transmits the serial loop-disconnect dialling information to line. Loop "make" condition is Logic 1, Loop "break" is Logic 0. Timing of the impulse train should be within the following parameters for the U.K.:

Loop "make" period	-	33 mS \pm 2%
Loop "break" period	-	67 mS \pm 2%
Interdigit Pause	-	833 mS minimum

The dialling sequence should not start less than 5 seconds after applying the Seize signal. At the completion of dialling, the loop "make" condition (Logic 1) must be maintained throughout the call.

For all interface circuits using logic levels, Logic 1 is + 5V Logic 0 0V. All outputs from the LTU11 will drive one TTL input. (See Appendix 1).

3.9 Power

Power supplies for LTU11 are +5V and -5V with common return. Voltage variation must be held within 0.25V on both supplies (5%).

Maximum current consumption is 500mA at + 5V, 50mA at -5V.

LTU11 INTERFACE SPECIFICATIONVOLTAGE AND CURRENT LEVELS

All inputs and outputs work to TTL Voltage Levels.

+ve current is into the circuit, -ve current is out of the circuit.

Inputs	V (Low) in V (Max)	I (mA) (max)	V (High) in V (Min)	I (uA) (max)
--------	--------------------------	--------------	---------------------------	--------------

75 Baud Data	0.45	-1	4.25	+10
Audio Mute	0.45	-1	4.25	+10
Impulse	0.45	-0.3	4.25	+30
Seize	0.45	-0.01	2.4	+130

Outputs	V (Low) out V (Max)	I (mA) (max)	V (High) out V (Min)	I (uA) (max)
---------	---------------------------	--------------	----------------------------	--------------

1200 Baud Data	0.8	+1.6	2.4	-40
Carrier Indication	0.8	+1.6	2.4	-40
D.T.D.	0.8	+1.6	2.4	-40

<u>Auto Signal</u>	<u>mV into 5k</u>
--------------------	-------------------

600 Hz between 0 dBm and -10 dBm	600 to 700
-------------------------------------	------------

600 Hz between 0 dBm and -10 dBm with audio muted	Less than 10
---	--------------

LTU MODEM SPEC (PROVISIONAL)

Transmit Data Rate	75 bits/sec
Receive Data Rate	1200 bits/sec

Transmit Frequencies

Logic 1	390 Hz ± 1
Logic 0	450 Hz ± 2

Transmit Level

Minimum Transmit Level	-17 dBm (600 ohms)
Maximum Transmit Level	-11 dBm (600 ohms)

Receive Frequencies

1300 Hz	gives Logic 1
2100 Hz	gives Logic 0

Minimum Receive Level at 2100 Hz is -41 dBm (600 ohms)
Minimum Receive Level at 1300 Hz is -36 dBm (600 ohms)
Maximum Receive Level at 2100 Hz is -10 dBm (600 ohms)
Maximum Receive Level at 1300 Hz is -10 dBm (600 ohms)
Carrier Detector operates below minimum receive level
Carrier present = Logic 0, Carrier Failed = Logic 1
Isochronous Distortion $\pm 20\%$ Max

Audio Output

Input levels between 0 dBm and -15 dBm at 600 Hz gives an Audio out of 600 to 700 mV r.m.s. into 5k ohms.

Temperature

The LTU11 is designed to work over the temperature range 0°C to $+70^{\circ}\text{C}$.

LTU11 WIRING COLOUR CODEPart B.MODEM TO DECODER

RED	+5V
YELLOW	NOT USED
BLACK	-5V
GREEN	OV
ORANGE	Carrier Detector <i>user port 7</i>
GREY <i>41 100</i>	75 bits/Sec
BLUE/GREY <i>purple</i>	1200 bits/Sec
WHITE	Mute <i>- user port 2</i>
PINK	Audio Out <i>-</i>
BLUE	Impulsing <i>user port 0</i>
BROWN	Sieze <i>user port 1</i>
BLUE/WHITE	NOT USED <i>invert</i>

Orange	Bit 0	Carrier Detector	Out
Yellow	1	75 bits/sec	Out
Purple	2	1200 bits/sec	Out
White	3	Mute	Out
	4	Not used	
Blue	5	Impulsing	Out
Brown	6	Sieze	Out
	7	Flip-flopped by irrelevant timer	
		<i>invert</i>	
		<i>link also to cb1</i>	

MODEM TO LINE ISOLATOR

RED	+5V	Pin 1
GREEN	OV	Pin 2
BLUE	Impulsing	Pin 3
ORANGE	Sieze	Pin 4
BLACK	Rx	Pin 5
WHITE	Tx	Pin 6

LINE ISOLATOR TO PLUG 505

GREEN	Pin 1	Orange	b10
WHITE	Pin 2	Yellow	b9
BLUE	Pin 3	Purple	b12, b8
ORANGE	Pin 4	white	b5
RED	Pin 5	Blue	b4
		Brown	a32
		Green	

PRESTEL USER N.S. (CONTACT DICK SELMS,
 BILLING ADDRESS, CPU
 CUSTOMER NAME, ACCAN COMPUTERS LTD.
 EXCHANGE LINE, 62750
 CONTACT, L HARDWICK.

Andy Anderson
282

PHONE FROM CAMBRIDGE 01 618 1111
 01 918 1111

WEMBLAY

918
618

NUMBER 790937 1122.

583 9211 x347

PRESTEL EDITING.

Peter Cammell

NODE 65181 (5 FRAMES) NO CHARGE

DUKE PHONE 01 253 9951 MANUAL UPDATE

01 253 7883 BULK UPDATE.

PASSWORD 306227 9260

EDIT PASS kesa

91 51815

PERSONAL 3570 changes each month on 22nd.

SYSTEL NO 99999 0047.

Print Freephone 2296

KEEP OUT OF OFFICE HOURS. Cambridge (0223) FF 2043 311900

EDIT NODE 910

NOTICE BOARD 6516

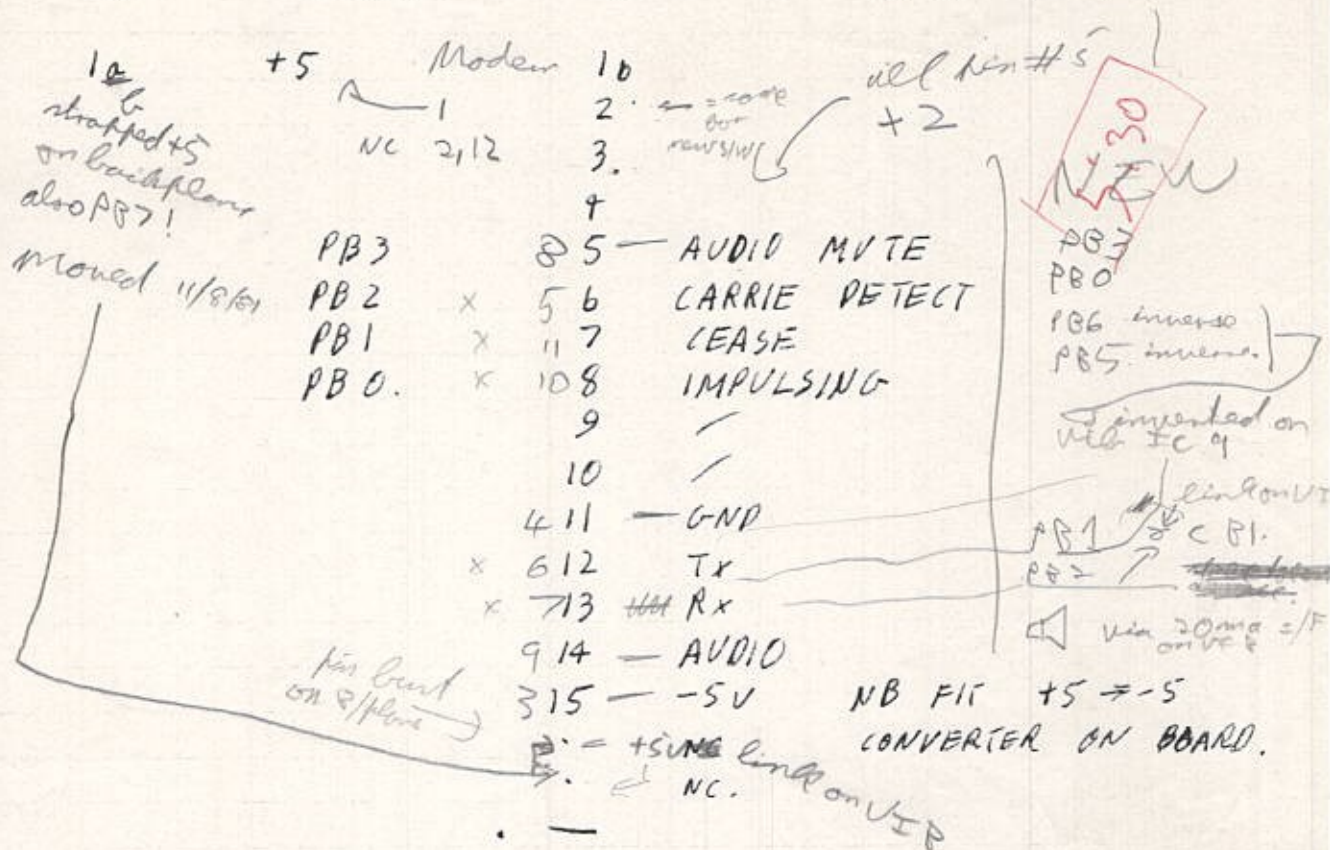
0206 Colchester 76000

Sdu

24441
ME Frijed
(44555)

600 6241

ACORN BACKPLANE TO VIB. (VIB 1552)

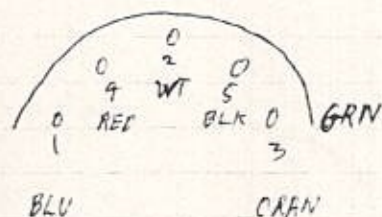


VIB MODIFY AS ABOVE

LINK IRQ - 6850, 6822

ISSUE 3 VIB CHECK MODIFICATIONS
GO TO CORRECT PB PINS.

ISOLATION UNIT PINS



BACK OF PLUG. (WIRE SIDE)

BACK OF PLUG (WIRE SIDE)

