BN

Telegraphs
North Sydney.

SAGEM TX35 COURSE HANDBOOK

2000 TYPE.

Telecom Australia
ENGINEERING TRAINING SECTION
SERVICES BRANCH N. S. W.

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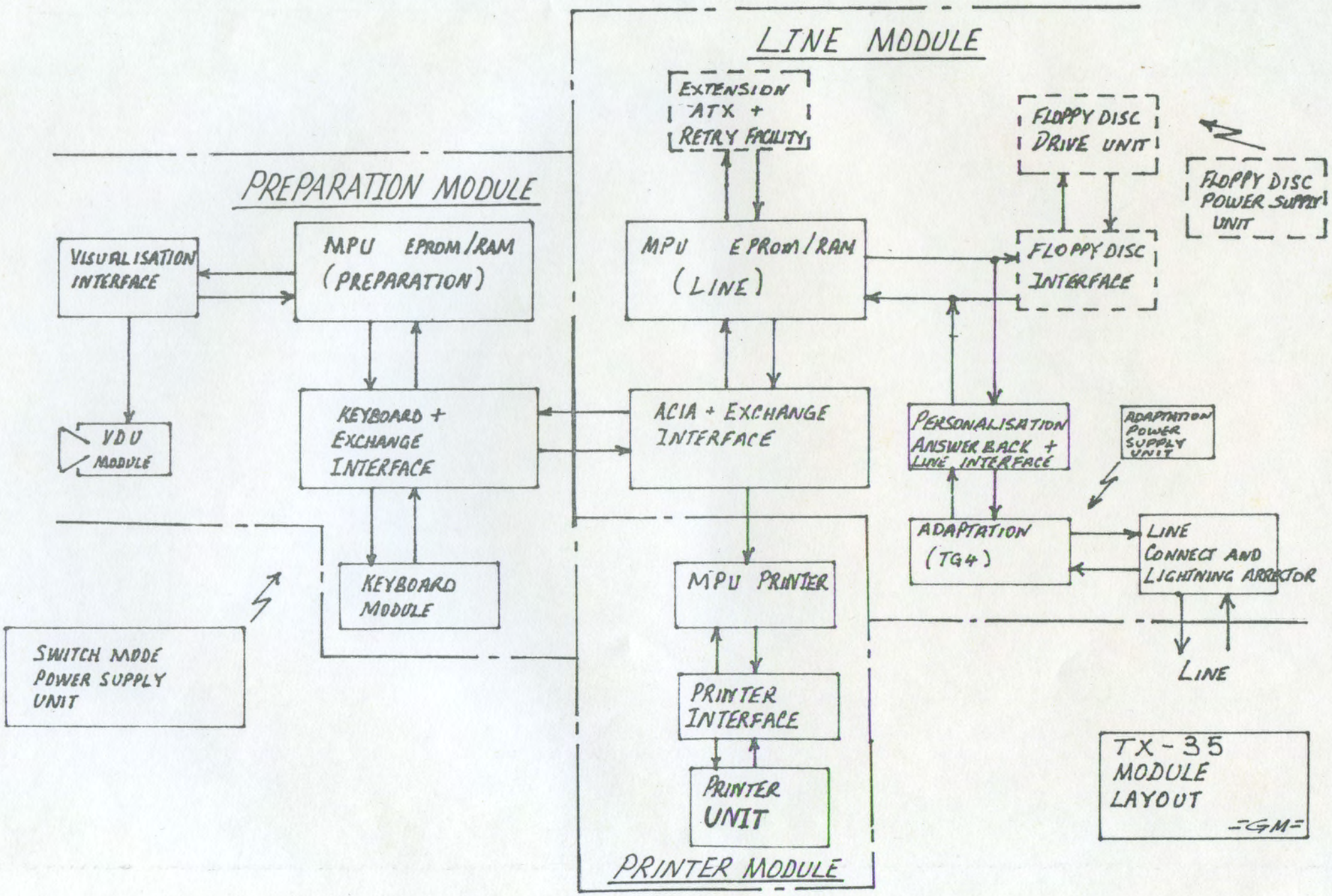
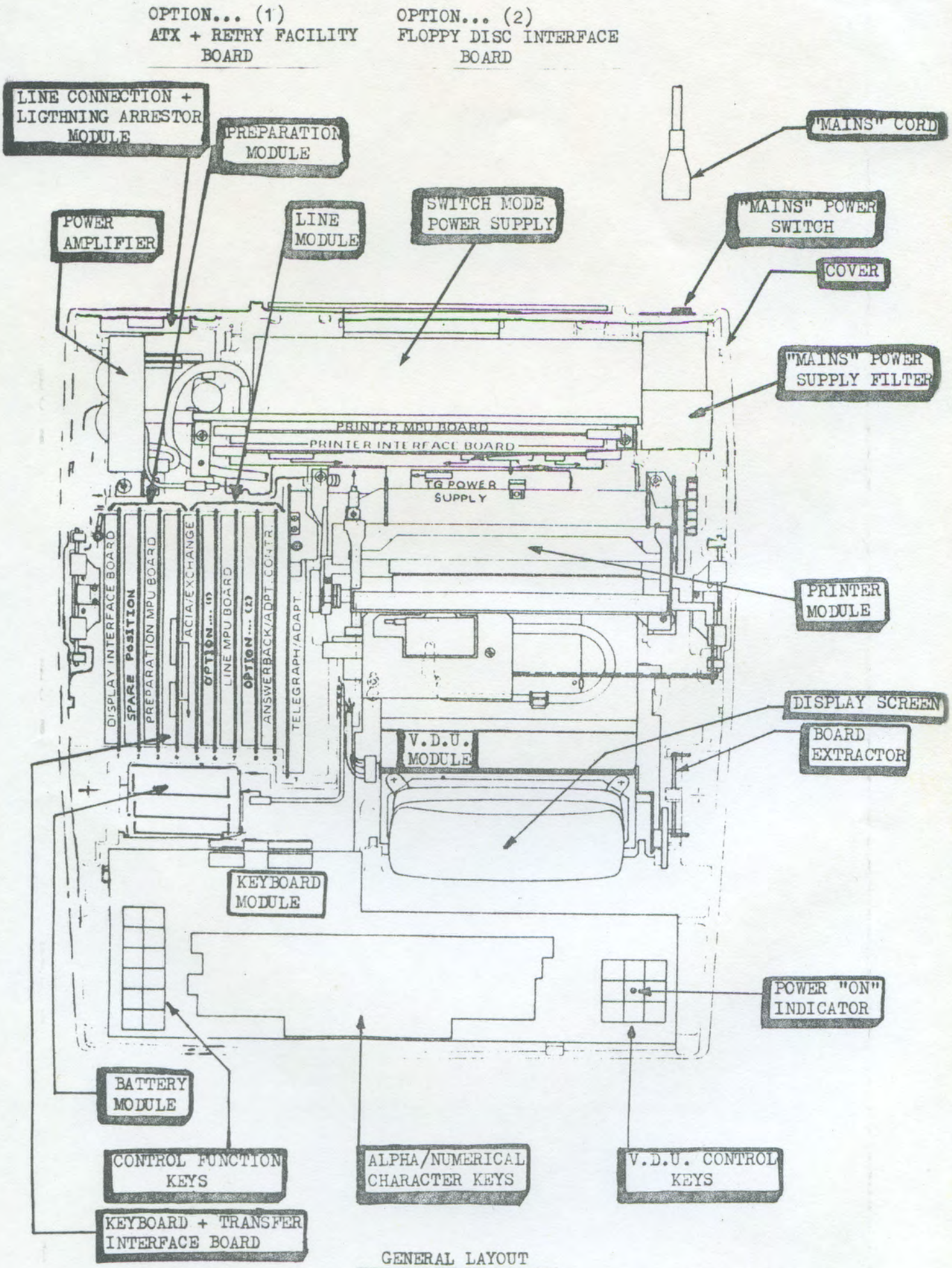
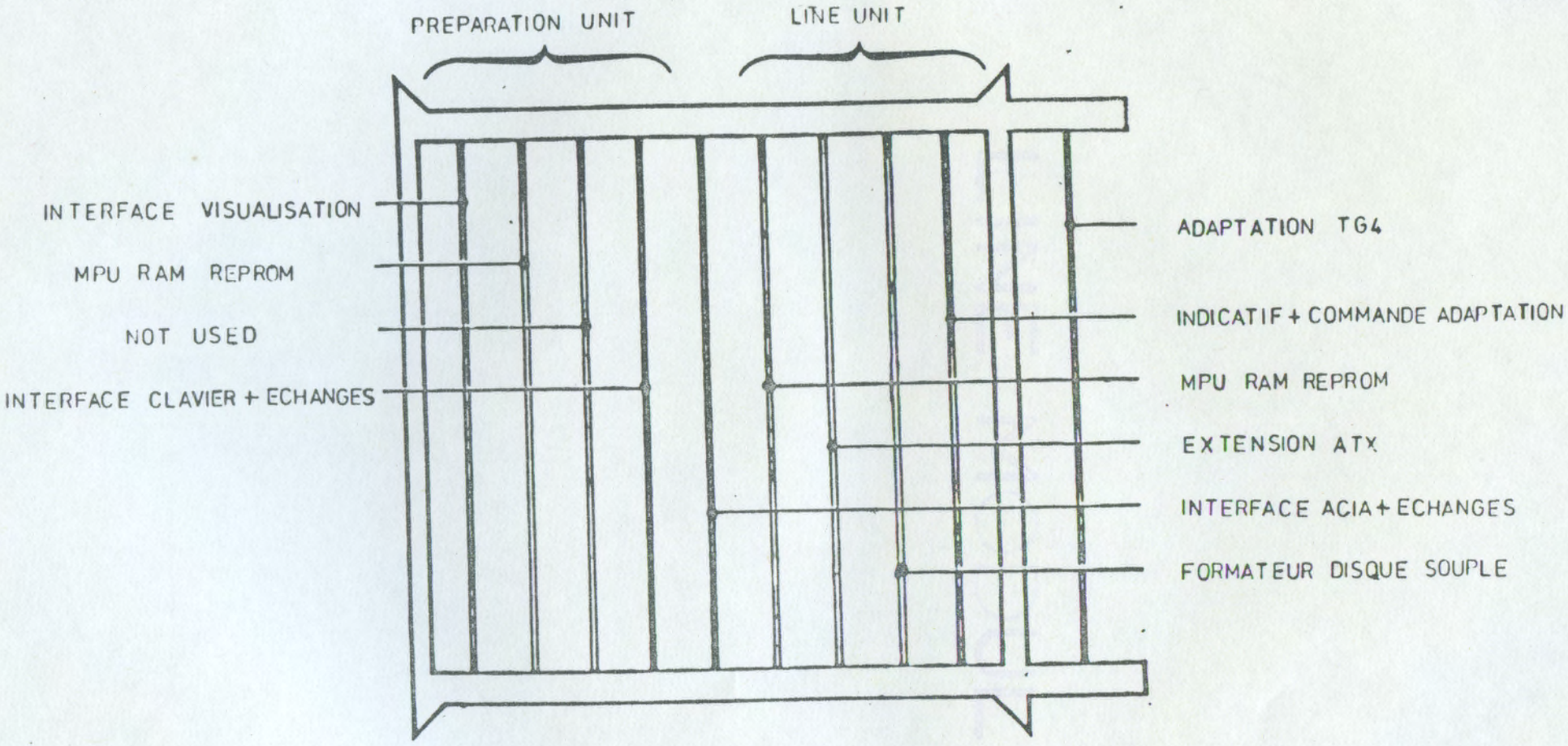
GENERAL LAYOUT


LINE MODULE
EXTENSION ATX + RETRY FACILITY
FLOPPY DISC DRIVE UNIT
FLOPPY DISC POWER SUPPLY UNIT
PREPARATION MODULE
VISUALISATION INTERFACE
MPU EPROM/RAM (PREPARATION)
MPU EPROM/RAM (LINE)
FLOPPY DISC INTERFACE
VDU MODULE
KEYBOARD + EXCHANGE INTERFACE
ACIA + EXCHANGE INTERFACE
PERSONALISATION ANSWER BACK + LINE INTERFACE
ADAPTATION POWER SUPPLY UNIT
ADAPTATION (TG4)
LINE CONNECT AND LIGHTNING ARRESTOR
KEYBOARD MODULE
MPU PRINTER
SWITCH MODE POWER SUPPLY UNIT
LINE
PRINTER INTERFACE
PRINTER UNIT
PRINTER MODULE
TX-35 MODULE LAYOUT
-GM-

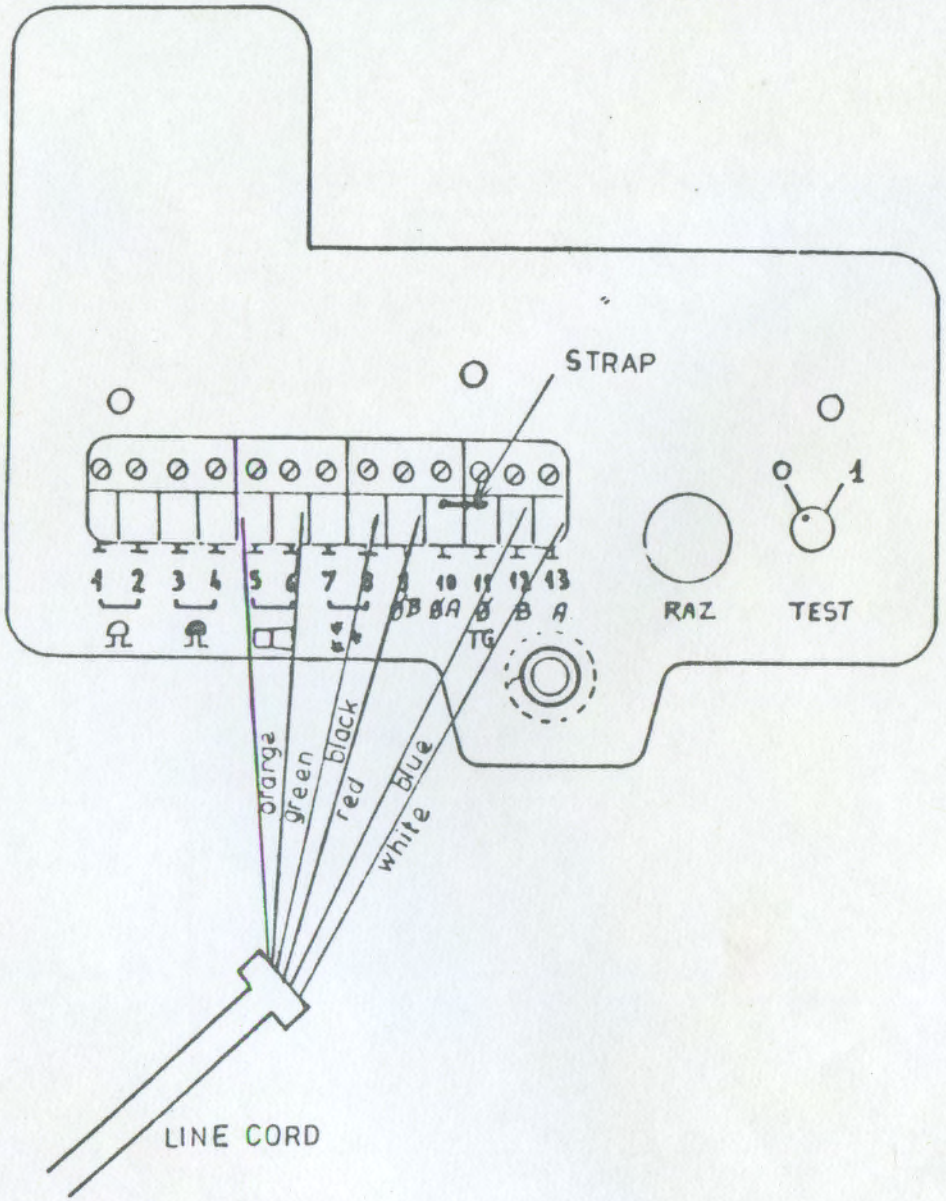


GENERAL LAYOUT



BOARD ASSEMBLY

LINE MODULE



RAZ PUSH BUTTON IS USED TO TRIGGER AUTOTEST

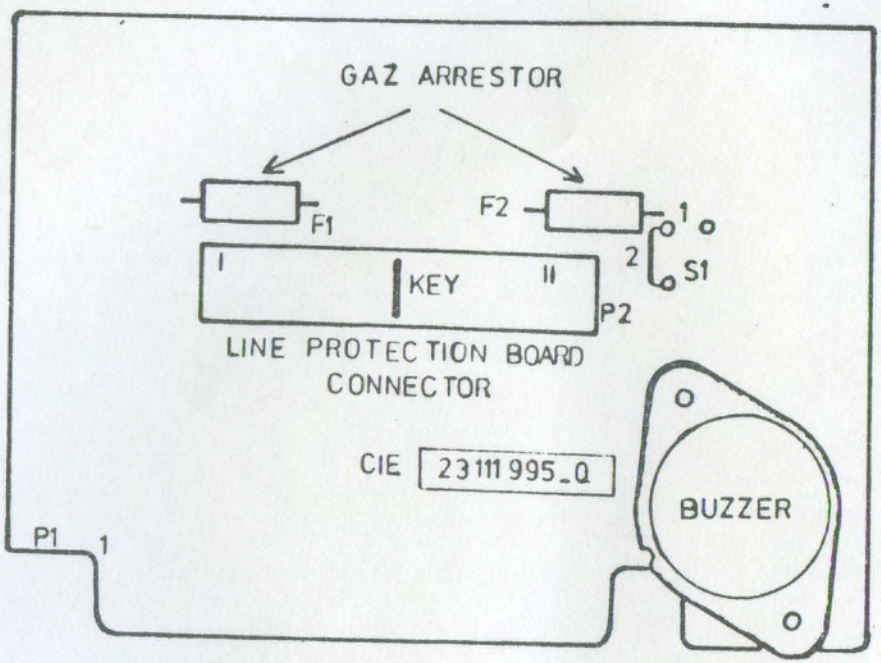
TEST 2 POSITION SWITCH IS USED TO:-

- POSITION 0 - NORMAL ON-LINE OPERATION
- POSITION 1 - RY TEST WHEN AUTOTEST IS PERFORMED

SWITCHING FROM 1 TO 0 STOPS RY TEST.

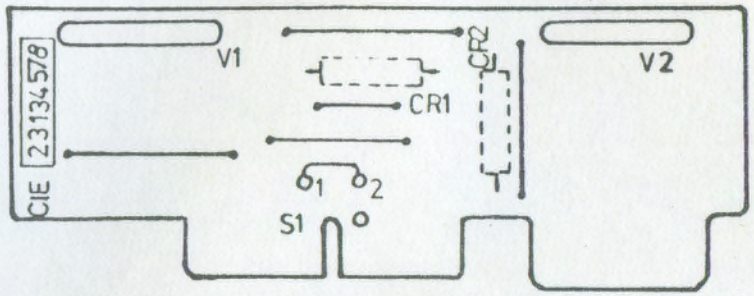
LINE CONNECTION MODULE

LINE CORD FITTING



LINE CONNECTION MODULE

MAIN BOARD



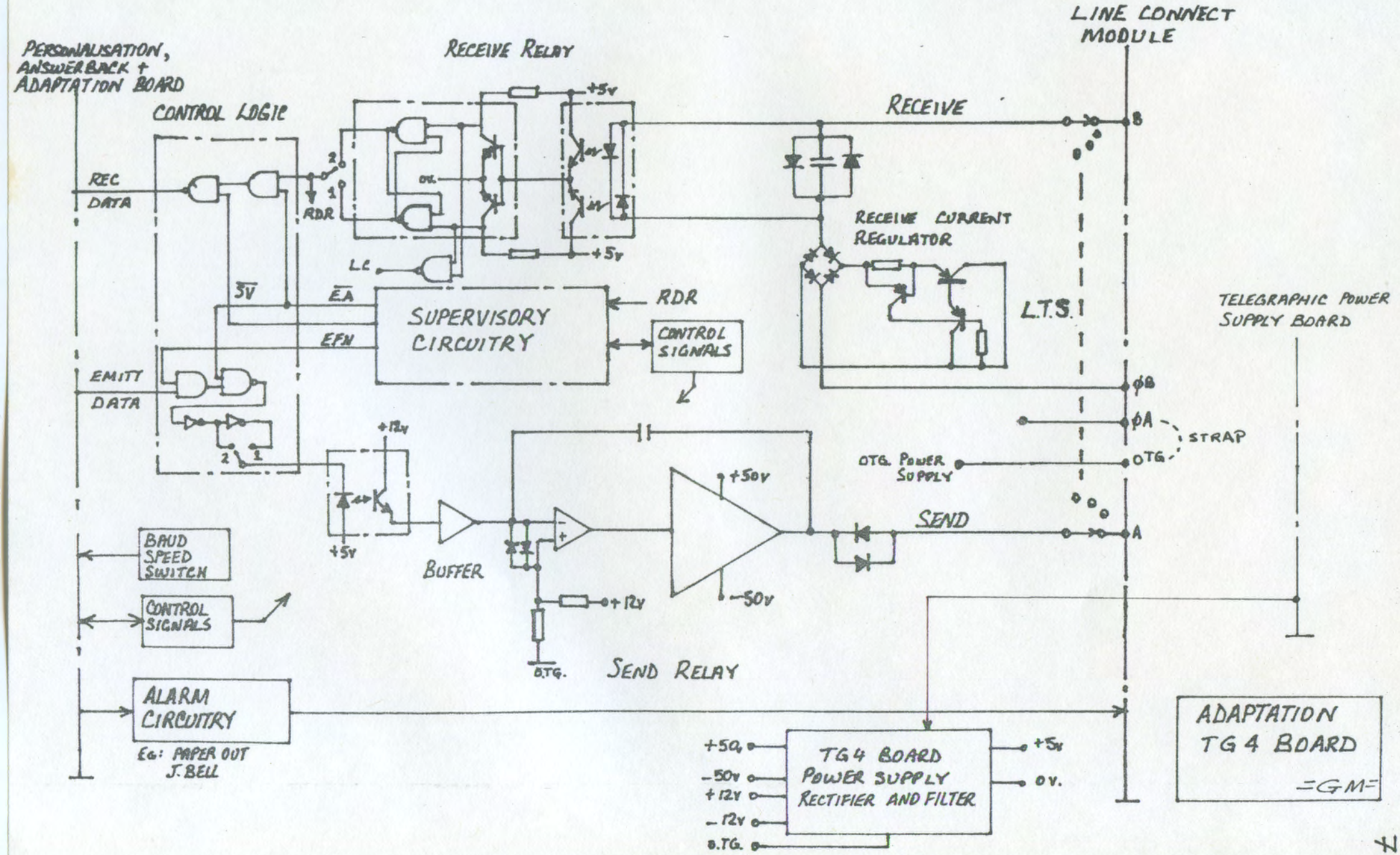
SWITCH S1 MUST BE IN POSITION 1

ZENER DIODE CR1 AND CR2 MUST NOT BE FITTED

VARISTOR V1 AND V2 MUST BE V 275_TYPE

LINE CONNECTION MODULE

LINE PROTECTION BOARD


PERSONALISATION, ANSWERBACK + ADAPTATION BOARD
RECEIVE RELAY
LINE CONNECT MODULE
CONTROL LOGIC
RECEIVE
REC DATA
RDR
+5V
OVL
LC
RECEIVE CURRENT REGULATOR
L.T.S.
3V
EA
EFN
SUPERVISORY CIRCUITRY
RDR
CONTROL SIGNALS
TELEGRAPHIC POWER SUPPLY BOARD
EMITT DATA
+12V
ϕB
ϕA
STRAP
OTG. POWER SUPPLY
OTG.
+50V
SEND
A
BAUD SPEED SWITCH
BUFFER
-50V
CONTROL SIGNALS
+12V
O.TG.
SEND RELAY
ALARM CIRCUITRY
Eg: PAPER OUT J. BELL
+50V
-50V
+12V
-12V
O.TG.
TG4 BOARD POWER SUPPLY RECTIFIER AND FILTER
+5V
0V.
ADAPTATION TG4 BOARD
=GM=

INDICATIF + COMMANDE ADAPTATION BOARD

This board is used to interface between the line MPU and the telegraphic board (TG4), to give to the MPU the configuration of the TX35, to control transmission of answerback, and to provide the clock for acia operation and telegraphic speed. Signals to set the machine in stand-by mode $\overline{CVEI}$ and to awake teleprinter $\overline{SVEI}$ when a call is received are also generated on this board. The $\overline{SVEI}$ signal, and the $\overline{SVEI}$ from the interface clavier and echanges board are coupled together and sent to the P.S. The $\overline{CVEI}$ signal follows the same procedure.

FUNCTIONS PERFORMED ON THIS BOARD

This board is composed of the following integrated circuits :-

- 3 PIA Z13, Z14, and Z16
- 1 UART Z15
- 1 PROM Z12 (answerback chip)
- 1 Clock generator
- 4 X 2 positions switches SW0 to SW3
- 1 DIL switch SW4-8

PIA Z13

This PIA which is under the line MPU control is used to transmit the answerback on receipt of WRU code or when "here is" key is depressed. Register A (PA0 to PA4) is used to address the PROM memory Z12 and register B (PB0 to PB7) to collect the characters from the output of the PROM. Output PA7 is used to operate the buzzer.

PIA Z14

This PIA is used to interface with the clock. Register B is used as output register and allows the line MPU to set the time. Register A is used as an input to give the line MPU access to the current time. The clock is composed of 2 chips, Z1 (MM 53107), which is a series 17 stage oscillator/divider, delivers a 60Hz frequency signal to Z8 MM 53105 which is a programmable TV timer. The clock gives only the time. The date is run by software.

PIA Z16

This PIA is used on two different functions. Register A is used to interface with the line during the connection and disconnection process. It also sends the alarm signals. Register B is mainly used to interface with the configuration switches (see table 1). The signal $\overline{CVEI}$ produced by the MPU to set the TX35 to stand-by mode is sent through this PIA to the power supply module.

CLOCK GENERATOR Z5

This circuit produces the different frequency signals for telegraphic purposes. It also produces a signal of 100Hz used as a real time clock used for telegraphic timing.

USART CIRCUIT 8251A Z15

This USART is used to serialize or deserialize the data coming from the MPU to the telegraphic board or coming from the TG4 board and going to the MPU.

SWITCHES

(A) Accessable by the operator

		To the front (A)	To the back (B)
SW0	erase transmitted messages	no	yes
SW1	memorize incoming messages	no	yes
SW2	printer line feeds	single	double
SW3	line feed after clearing	2	6

(B) Accessable by technician

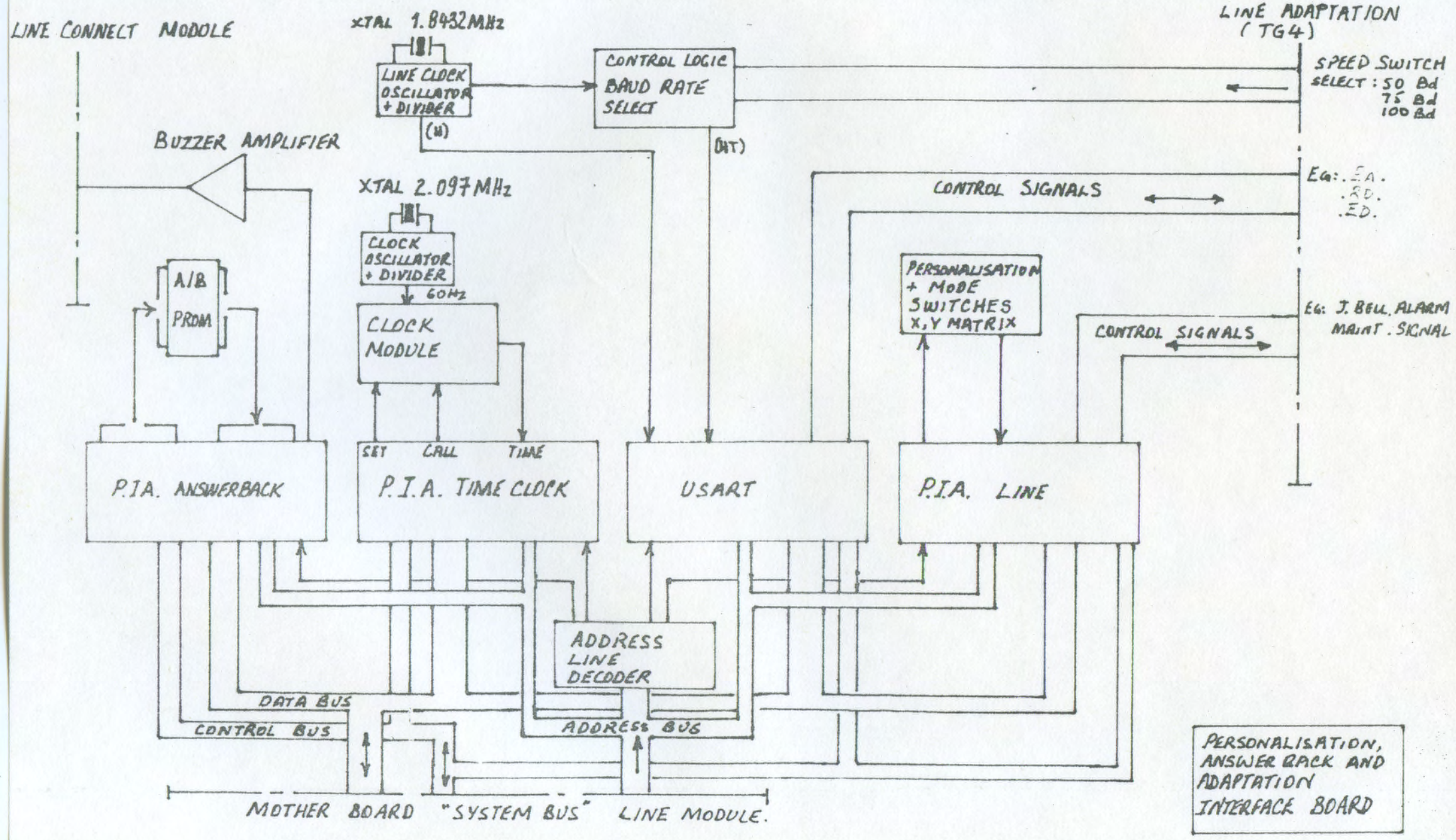
DIL SWITCH

POSITION	FUNCTION	0	1
1	disk operation	without	with
2	retry	without	with
3	audible alarm	permanent	momentary
4	answer back echange before transmission of message	with	without
5	type of numerotation	dialling code	telegraphic code
6	fig "D" memorisation	with	without
7	retry mode outgoing message priority	yes	no
8	telegraphic connection	2 wires	3 or 4 wires

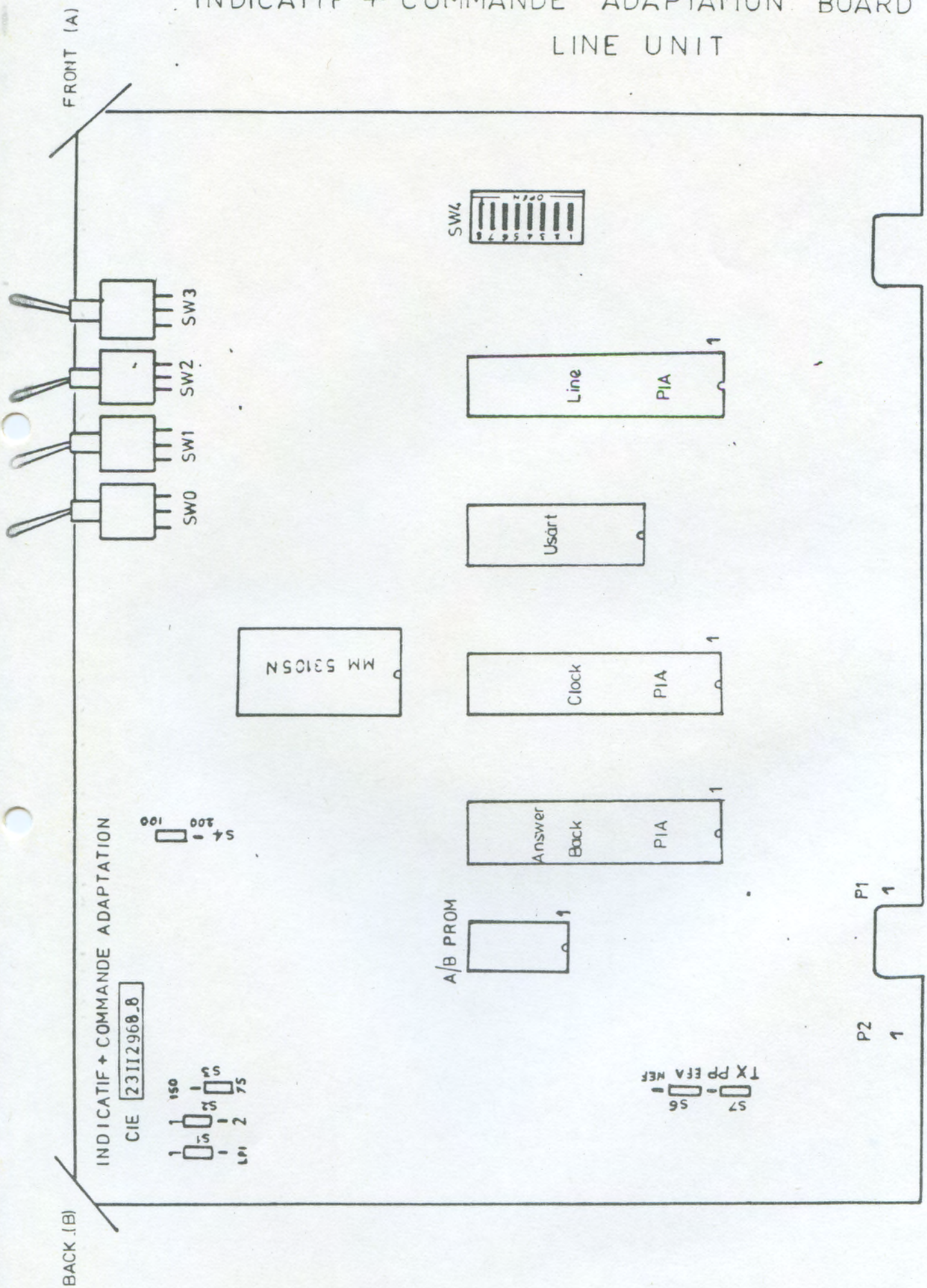
JUMPER	FUNCTION		
S1	punch/reader and printing unit	LPI	I *
S2	test of board at factory normal operation	2	1 *
S3	speed modulation	75 *	150
S4	speed modulation	200	100 *
S5	private telex	PP	T X *
S6	automatic transmission of a end signal with,without	EFA	NEF *
S7	private telex	PP	TX *

COMMENTS

S1	-	punch (not available)
S2	-	when jumper on position 2, clock is provided by test equipment
S3 & S4	-	speed 50 BD is directly connected.
	-	jumper S3 allows to have a speed of 75BD or 150 BD when TG4 is set for 75 BD.
	-	jumper switch S4 allows to have a speed of 100BD or 200 BD when TG4 switch is set for 100 BD.
S5	-	to allow operation on private network software must be changed.
S6	-	automatic transmission is for special application
S7	-	see S5


LINE CONNECT MODULE
XTAL 1.8432 MHz
LINE CLOCK OSCILLATOR + DIVIDER
(16)
CONTROL LOGIC
BAUD RATE SELECT
(16T)
LINE ADAPTATION (TG4)
SPEED SWITCH SELECT: 50 Bd 75 Bd 100 Bd
BUZZER AMPLIFIER
XTAL 2.097 MHz
CLOCK OSCILLATOR + DIVIDER
60Hz
CLOCK MODULE
CONTROL SIGNALS
EG: .EA. .RD. .ED.
A/B PROM
PERSONALISATION + MODE SWITCHES X,Y MATRIX
EG: J. BELL, ALARM MAINT. SIGNAL
CONTROL SIGNALS
SET
CALL
TIME
P.I.A. ANSWERBACK
P.I.A. TIME CLOCK
USART
P.I.A. LINE
ADDRESS LINE DECODER
DATA BUS
CONTROL BUS
ADDRESS BUS
MOTHER BOARD "SYSTEM BUS" LINE MODULE.
PERSONALISATION, ANSWER BACK AND ADAPTATION INTERFACE BOARD

INDICATIF + COMMANDE ADAPTATION BOARD
LINE UNIT



MPU - RAM/REPROM BOARD

This board is used in both the preparation unit and the line unit. The board by itself is the same for prep and line, the differences are at the level of the software and strap. This board is the heart of the unit in which it is fitted. Located on the board are the microprocessor (6800), the software contained in the 2764 Eprom memories, the 8 2K RAM memories (6526) and a circuit to insure a proper operation of the DMA cycle. This circuit is only used when the board is allocated to the preparation unit, the CRTC being the user.

. The microprocessor is a 6800. Its clock is obtained from a 15MHz crystal control oscillator. A circuit composed of 2 JK flipflops (74LS112) interrupts the MPU through its DBE input when a direct memory access is requested by the CRTC. When used as a line MPU RAM/REPROM board there is no interruption of cycle.

. Memory type 2764 is used to store the software. This memory is 8K BYTES. 5 memories are used for the line software MEF to M67 (40K BYTES) and 4 memories are used for the preparation software MEF to M89 (32K BYTES). Two straps are provided to indicate if the memories M67 and M45 are fitted on the board. Presently, only the line module is equipped with a M67 memory and so the S67 strap must be fitted.

. Part of the message memory is also on this board. There is 16K BYTES of RAM. The 4 first K BYTES are allocated to the MPU as working memory (Z3 and Z4) so 12K are available as message storage (Z5 to Z10). The other message memories are on the ATX board, plugged alongside the MPU board.

SWITCHES

S2

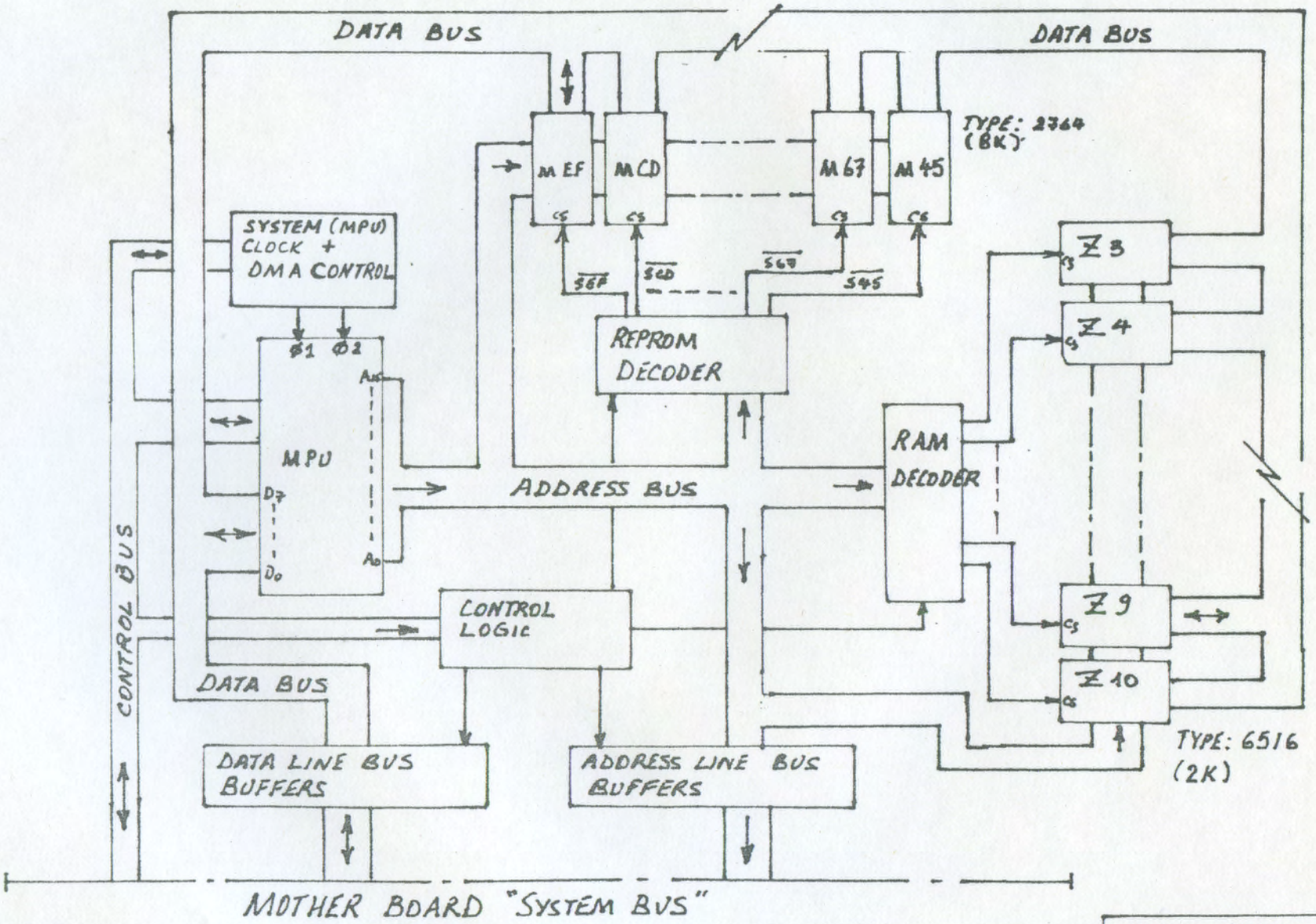
In position **2**, it allows the test equipment to clock the board when tested at the factory. In position **1** the board oscillator is connected. It is the normal position when fitted in the machine.

S1 and S3

In position 2 it allows the REPROM memories to be programmed on board with a special tool. In position **1** it allows the normal operation of the board.

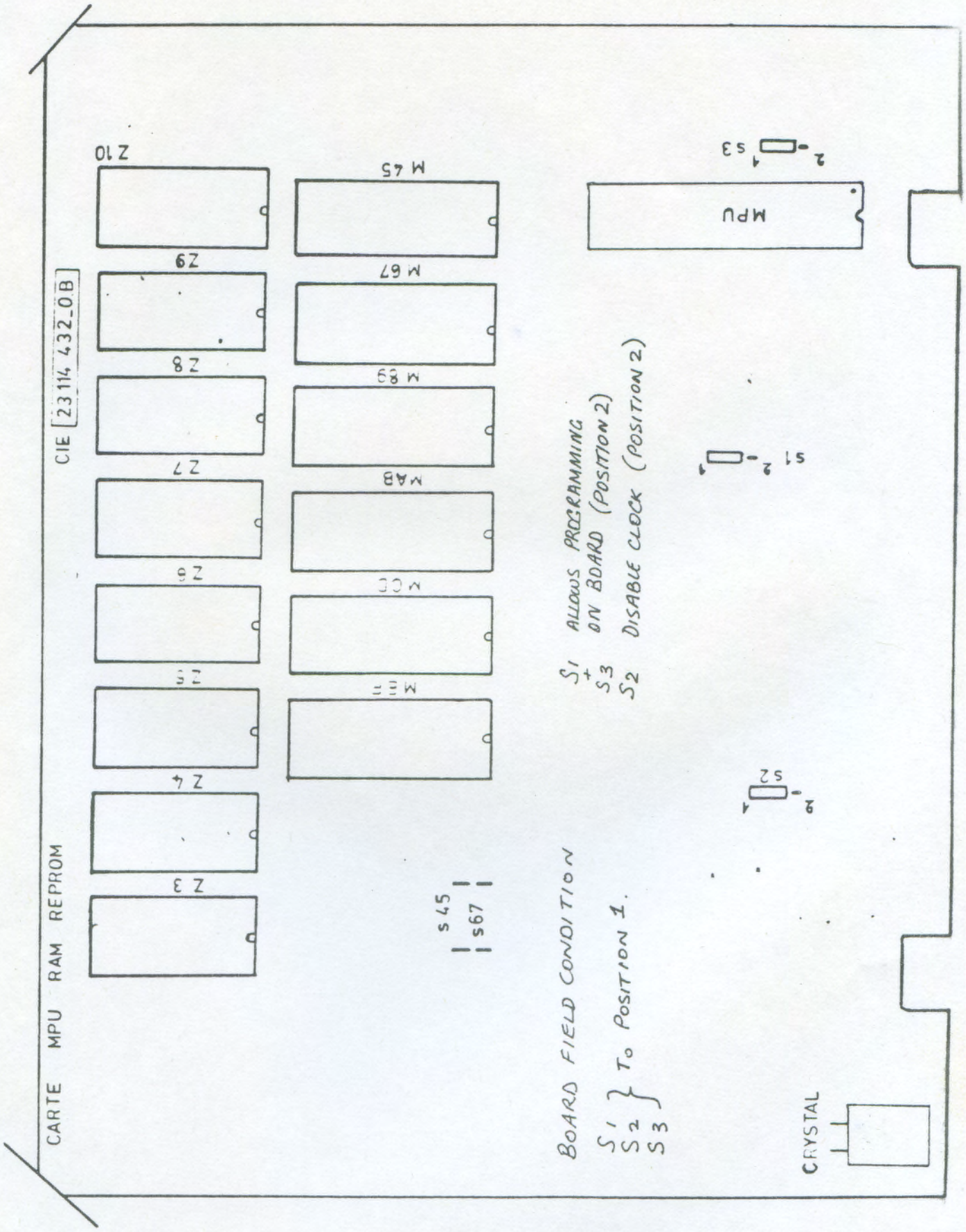
S67 and S45

Must be fitted when the memories M67 and M45 are used.



M.P.U. REPROM-
RAM MODULE
BOARD.

MPU RAM REPROM BOARD



EXTENSION ATX BOARD

This board is an extension to the 12K message memory already fitted on the MPU RAM/REPROM board. The total capacity when this board is fitted is 32 K BYTES (232 BLOCS)- a bloc being 128 characters.

The main circuits on this board are :-

- II RAM memories type 5517
- 1 line decoder 74159
- 1 PIA 6821
- 1 EPROM 2764
- 2 octal buffers/line driver with 3 state outputs 74LS S41
- 1 octal bus transceiver 74LS 245.

THE RAM MEMORY CHIP

The RAM memory chip is 5517 type which has a capacity of 2 K BYTES. There is provision to fit 16 memories on the board (Z1-Z16) but only II are presently used. (see board display)

PIA 6821 AND LINE DECODER 74 159

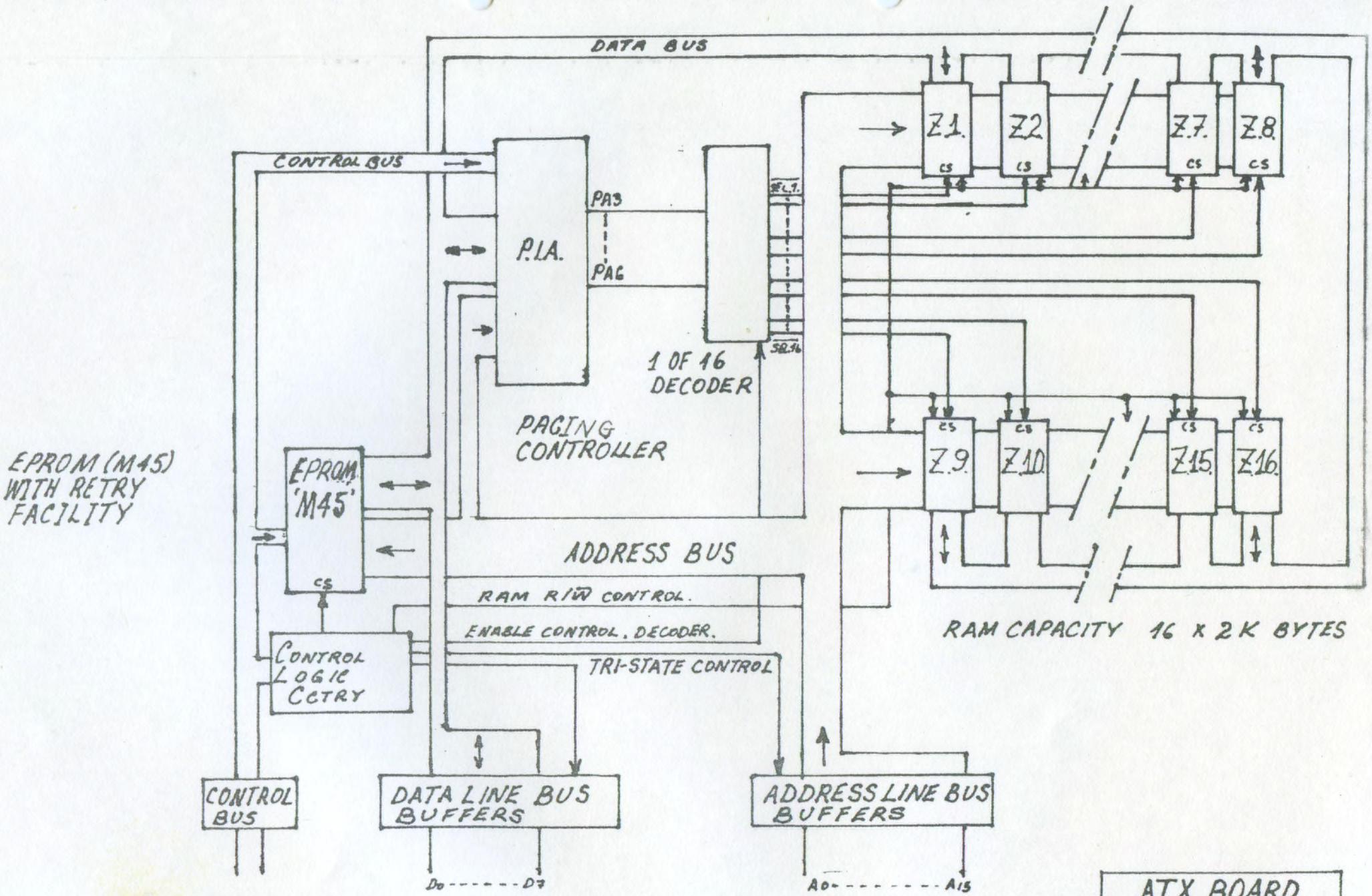
The paging method is used to extend the memory capacity which means that for one MPU address it is possible to work with more than one location. However the MPU must previously indicate through the PIA with which location it wants to work. The PIA (Z17) receives on its register A the page with which the MPU wants to read or write. This information is sent to the input of the line decoder (Z21 which by means of one of its 16 outputs selects the RAM (signals $\overline{SEL1}$ to $\overline{SEL16}$).

OCTAL BUFFER/LINE DRIVER WITH 3 STATE OUTPUTS 74LS 245 AND 74 LS 541

These three IC (Z12, Z20, Z23) are used to buffer the address bus and data bus of the MPU. The 3 state ability is only used on the data bus lines.

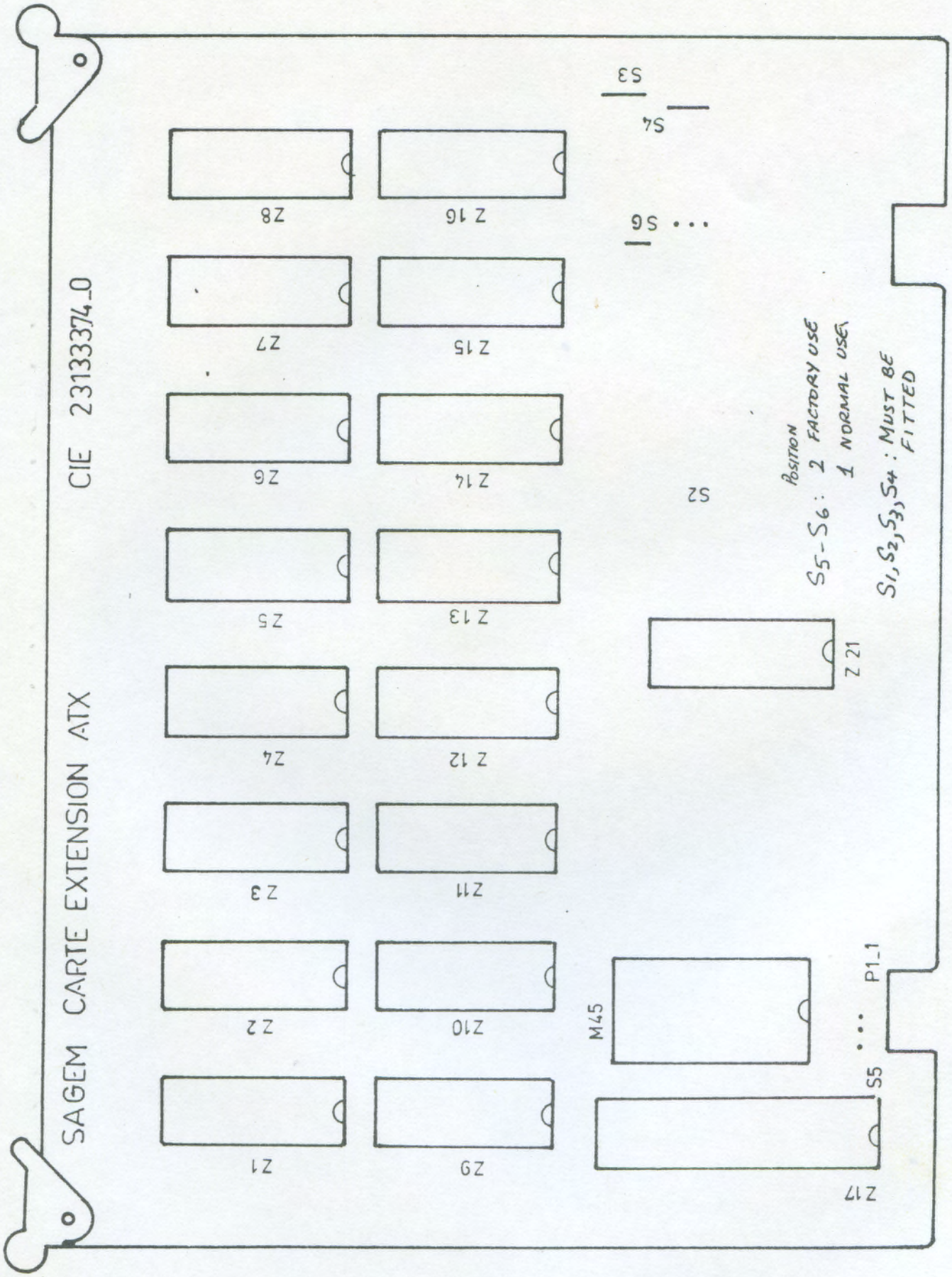
EPROM 2764 (M45

This eprom is part of the line software and contains the retry software.



ATX BOARD
MEMORYEXPANSION+
RETRY FACILITY.

EXTENSION ATX BOARD
LINE UNIT



INTERFACE ACIA + ECHANGE BOARD

This board is used by the line unit to interface with the preparation unit and printing unit.

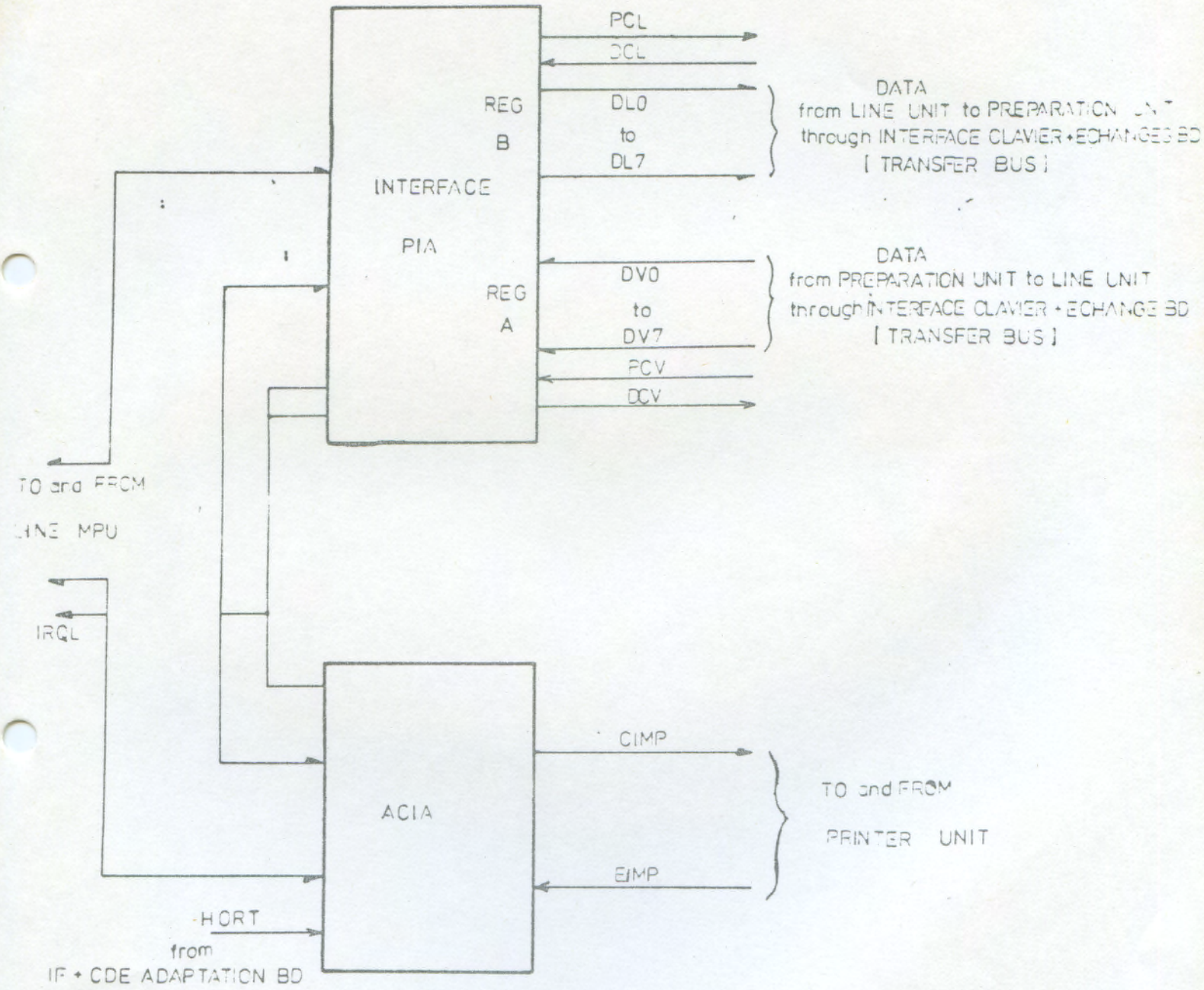
This board is composed of 2 integrated circuits, one PIA (Z1) and one ACIA (Z2)

PIA Z1

This is used by the line unit to interface with the preparation unit via the transfer bus, through the interface clavier + echange board. Its data is directly connected to the line MPU data bus. Its register A is connected to register B of PIA Z8 of interface clavier + echange board and its register B is connected to register A of PIA Z8 of the same board. Register A receives data from prep unit for line unit. Register B transmits data from line unit to prep unit. This PIA is addressed by the line MPU.

ACIA Z2

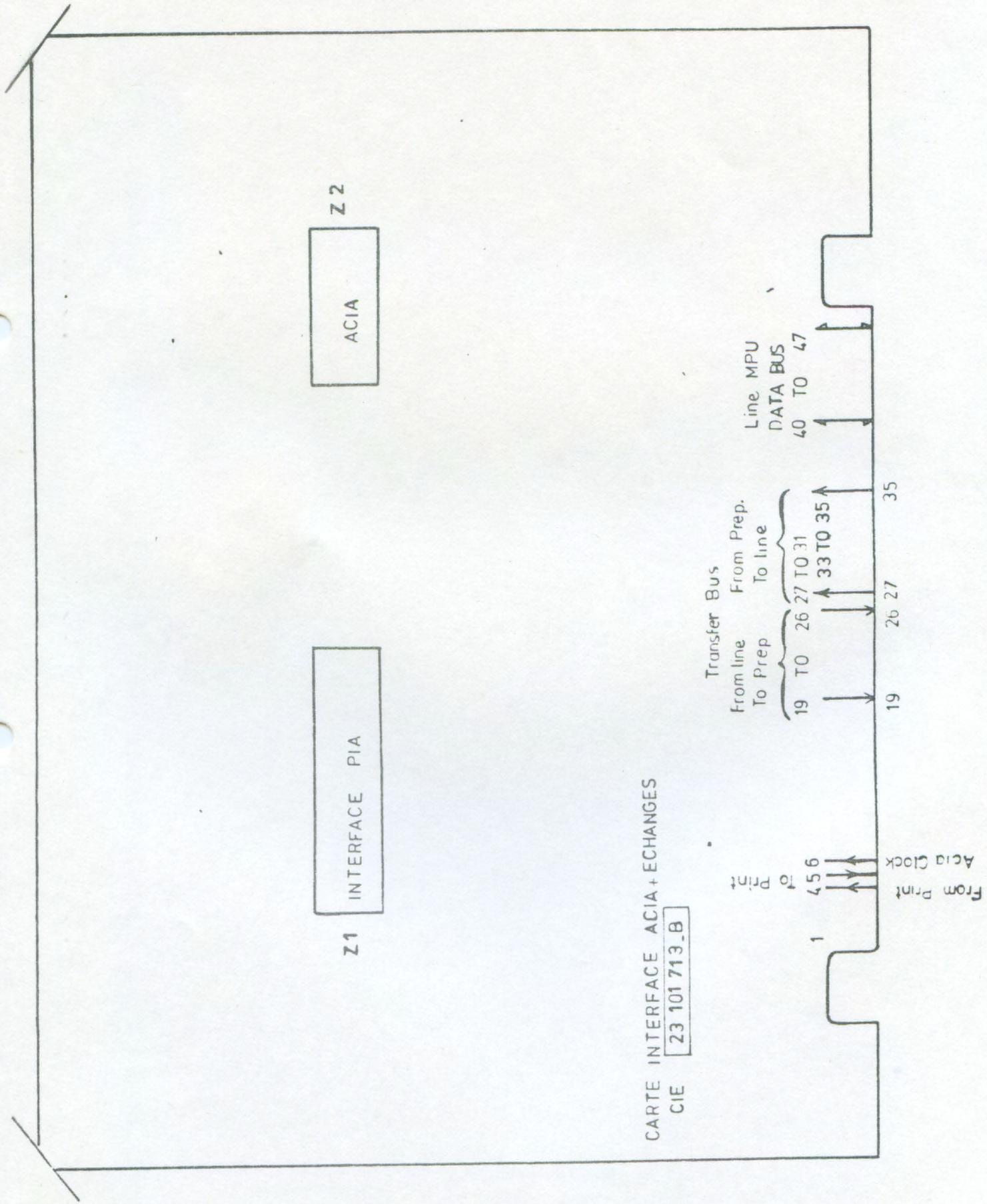
This is used by the line unit and printing unit to exchange data. Data between the 2 modules is in series configuration at a speed of 1200 BD. Clock pulses to run the ACIA are provided by a circuit located on the indicatif + commande adaptation board. Series data from the line unit leaves by pin 5 of the connector and series data from printing unit arrives by pin 4 of the connector. ACIA addressing is controlled by line MPU.

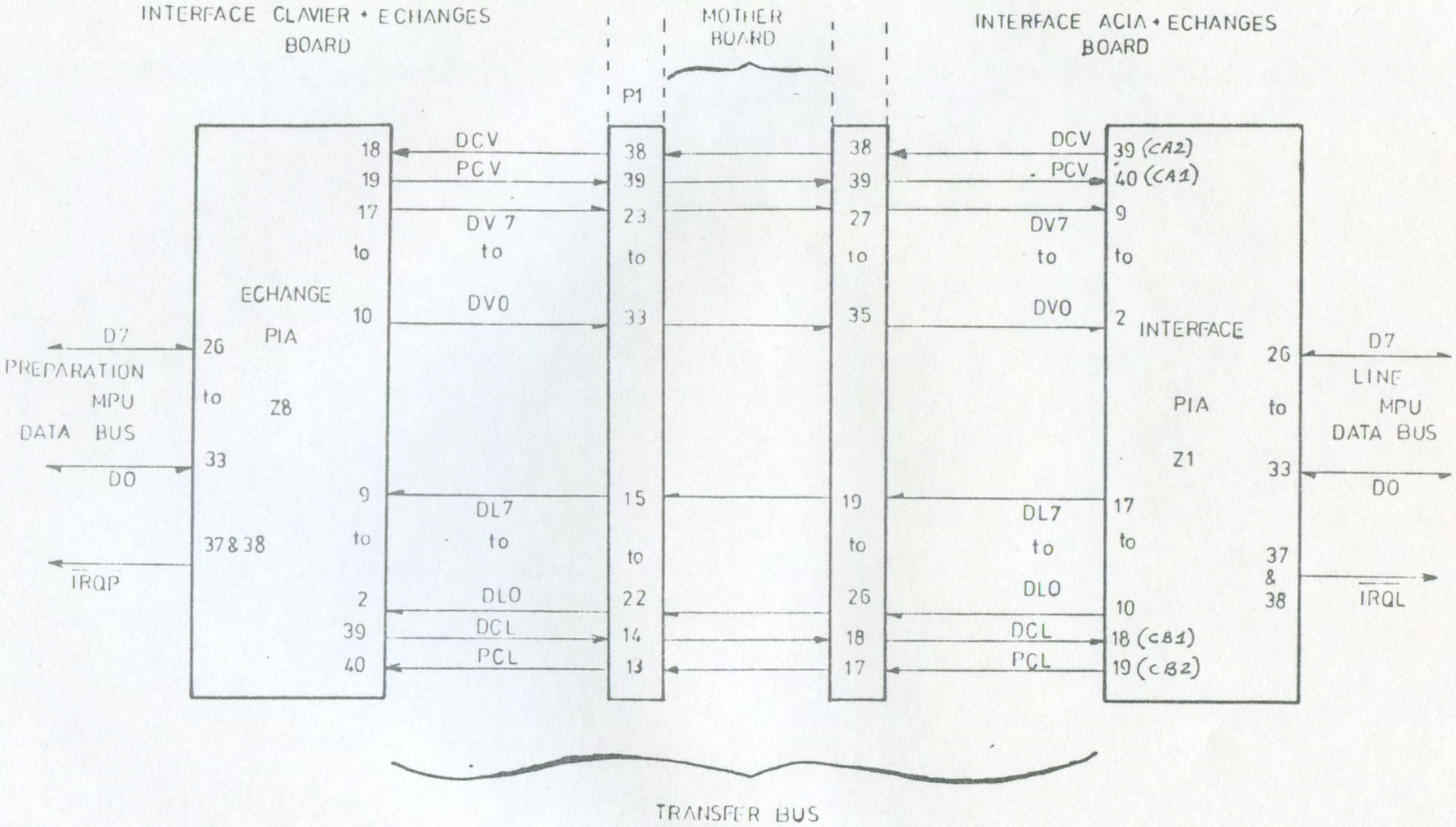


INTERFACE ACIA + ECHANGES

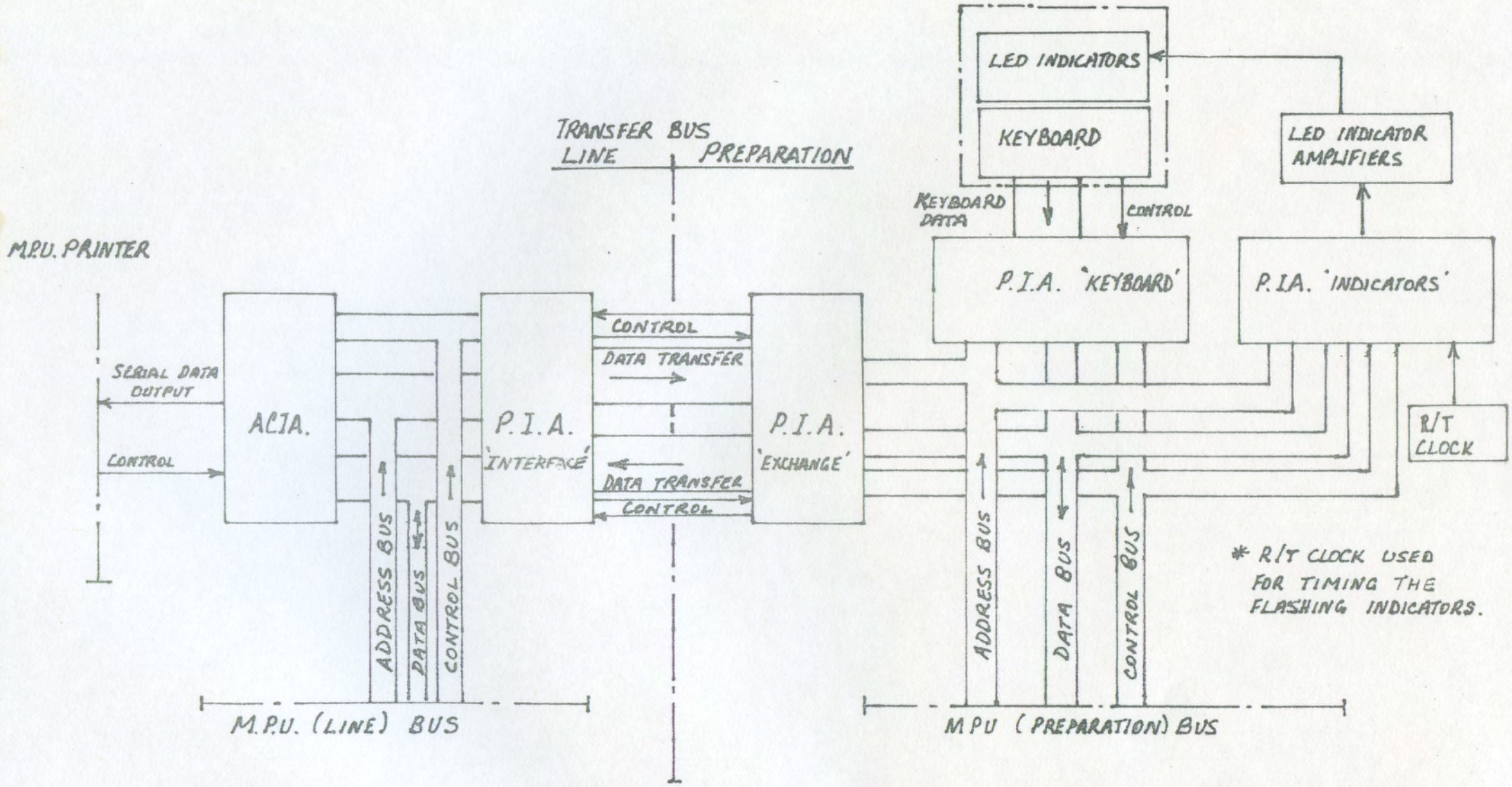
BOARD

INTERFACE ACIA + ECHANGES BOARD
LINE UNIT





TRANSFER BUS



ACIA + EXCHANGE INTERFACE
KEYBOARD + EXCHANGE INTERFACE

—GM—

PREPARATION MODULE

INTERFACE CLAVIER AND ECHANGES BOARD

This board is used by the preparation MPU to interface with the keyboard module and the line unit.

Functions performed on this board :-

This board is mainly composed of 3 PIA (Z5,Z6 and Z8) and 1 monostable 9602 (29).

PIA Z5

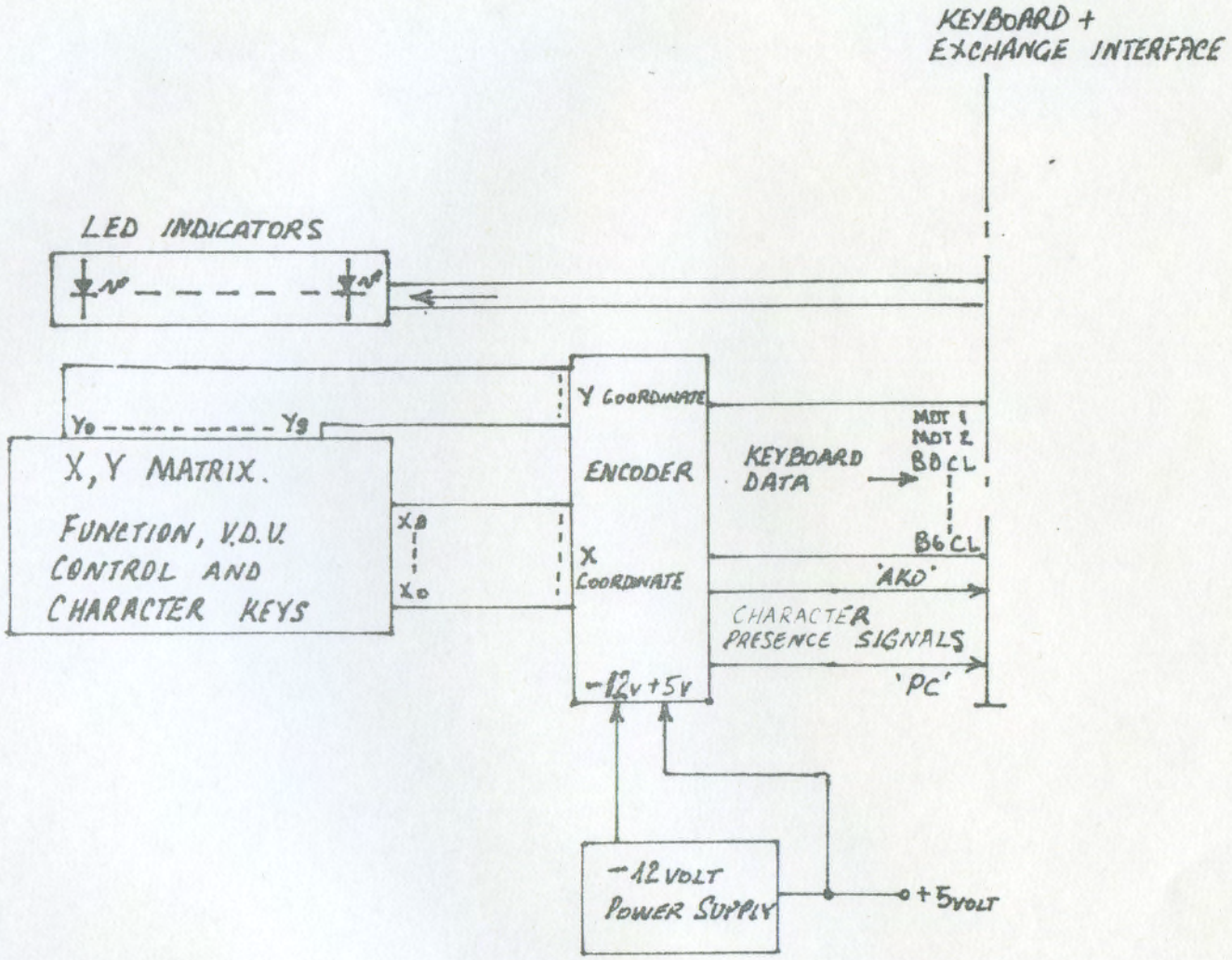
This is used to interface with the keyboard module. Signals to awake the TX35 when in stand-by mode pass through this PIA and inverter Z1. This signal enters the board by connector P3 pin 12 and leaves by connector P1 pin 1. Any key depressed activates this signal.

PIA Z6

This is used to command the led located on the keyboard. Led located on key [RO] excluded. This led being used as a "power-on" indicator. Timer circuit made with monostable Z9 is also connected to this circuit (CA1). This timer is used as a real time clock to flash the led.

PIA Z8

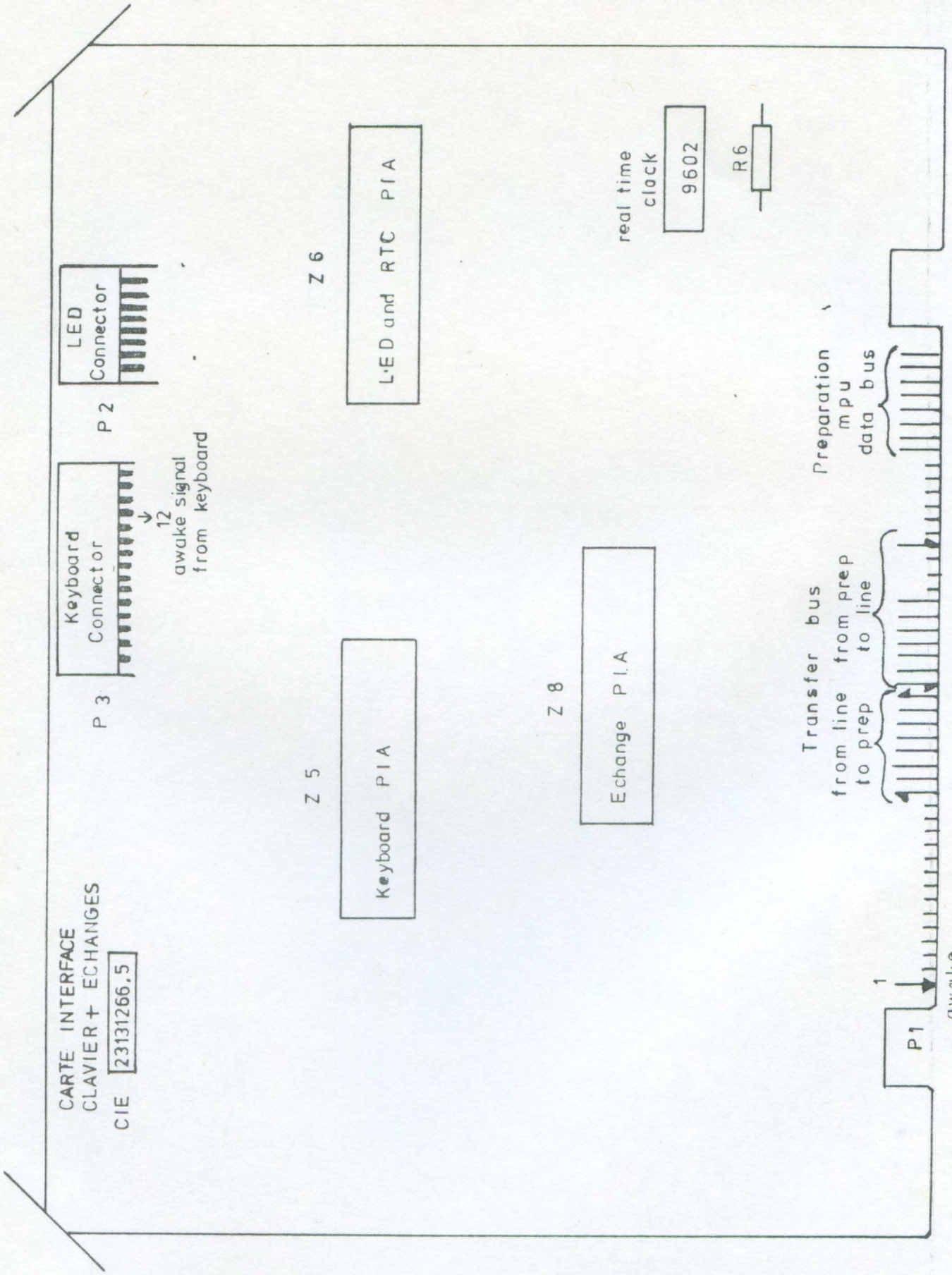
This is used by the preparation unit to interface with the line unit via the Acia + echange board. Its data bus is connected to the preparation unit MPU data bus. Register B is used to transfer data from preparation module to line module and register A is used to receive data from the line module, both via the PIA Z1 of acia + echange board. Connections between this PIA (Z8) and the PIA (Z1) located on board acia + echange can be regarded as a transfer bus.



KEYBOARD
MODULE

=GM=

INTERFACE CLAVIER + ECHANGES BOARD
PREP UNIT



INTERFACE VISUALISATION BOARD

This board is used to interface between the preparation microprocessor and the display unit and allows the MPU to display 20 lines of a message on the screen, the contents of this message being stored in the RAM located on the MPU board of the preparatuon module.

The mains circuits of this board are :-

- The display time base circuitry
- The CRTC (programmable CRT controller) 8275
- The character generator

THE TIME BASE CIRCUIT

This is composed of a 28.080 MHz crystal controlled oscillator and dividers, to produce the dot frequency, character frequency, the horizontal frequency (line) and vertical frequency (frame).

THE PROGRAMMABLE CRT CONTROLLER

This is a single chip device to interface CRT raster scan display with microprocessor systems. Its primary function is to refresh the display by buffering the information from the main memory and keeping track of the display position of the screen. (See following page for operational description)

THE CHARACTER GENERATOR (2311-350-5)

The character generator contains the pattern of each character to be displayed and according to the address sent to its inputs by the CRTC, delivers data which is dots or no dots for one row of one character . (See fig. 4) This data properly mixed with the synchronisation signal, gives a video signal which is sent to the display unit. This signal is in serial form.

SWITCHES

SW1 : Position 2 is used when the board is tested on equipment in the factory
Must be in position 1 when in machine

SW2 : Position 2 as above
Must be in position 1 when in machine

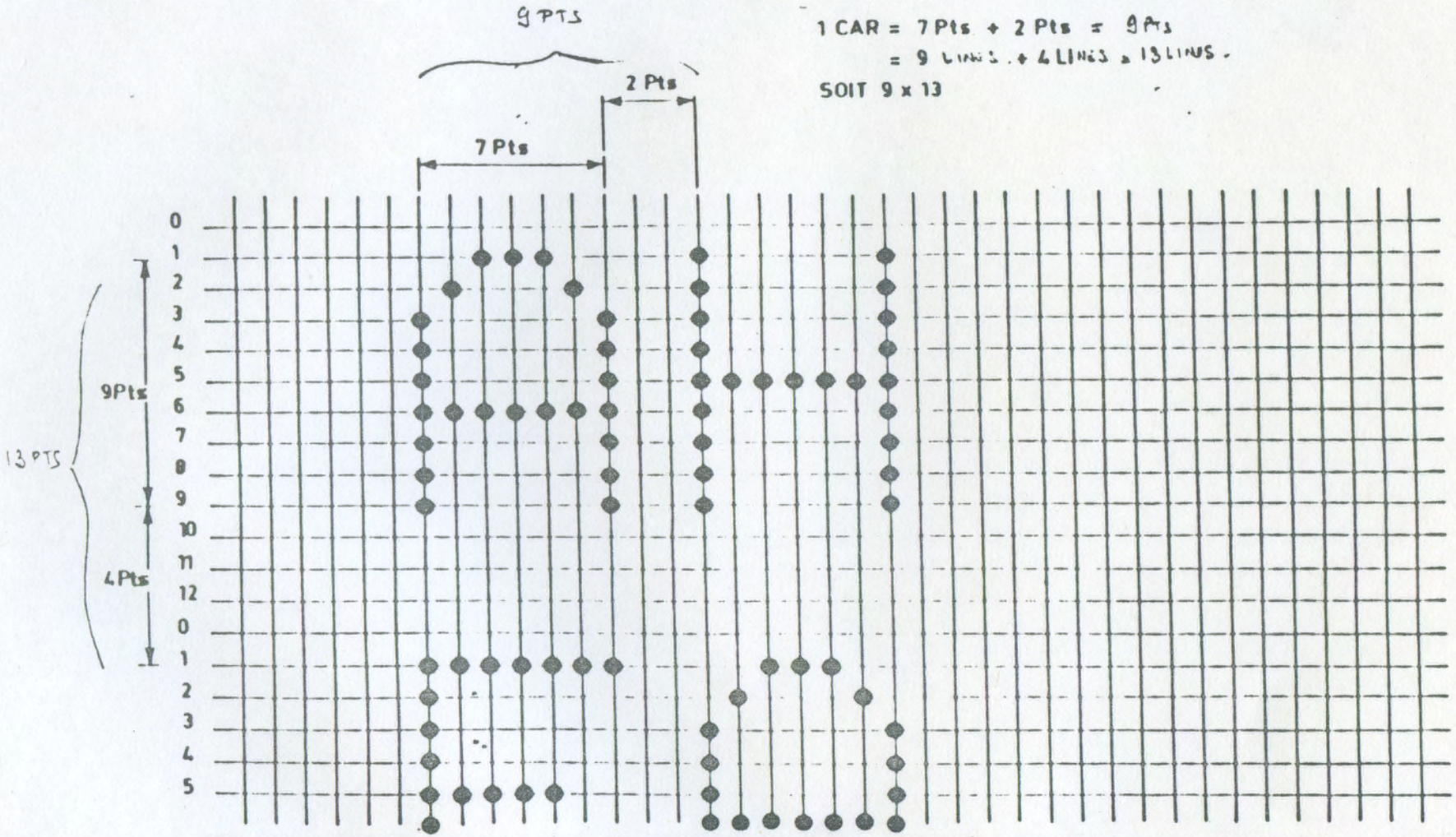
OSCILLATOR FREQUENCY CALCULATION

Number of frames per second	:	50
Number of rows per frame	:	x 24
Number of lines per row	:	x 13
Number of characters per row	:	x 100 *
Number of dots per character	:	x 9
From sinusoidal to square waves TRANSFORMATION	:	x 2
		$28.08 \; 10^6$

* 100 characters = 69 + hor retrace
72 + hor retrace
80 + hor retrace

1 frame = 1 service line
1 tabulation line
20 message lines
2 time of 1 line for verticla retrace

1 CAR = 7 Pts + 2 Pts = 9 Pts
= 9 LINES + 4 LINES = 13 LINES.
SOIT 9 x 13



NOTA: THESE PARAMETERS ARE LOADED INTO THE CRTC WHEN INITIALISATION OF TABS IS PERFORMED.

General Systems Operational Description

The 8275 provides a "window" into the microcomputer system memory.

Display characters are retrieved from memory and displayed on a row by row basis. The 8275 has two row buffers. While one row buffer is being used for display, the other is being filled with the next row of characters to be displayed. The number of display characters per row and the number of character rows per frame are software programmable, providing easy interface to most CRT displays. (See Programming Section.)

The 8275 requests DMA to fill the row buffer that is not being used for display. DMA burst length and spacing is programmable. (See Programming Section.)

The 8275 displays character rows one line at a time.

The number of lines per character row, the underline position, and blanking of top and bottom lines are programmable. (See Programming Section.)

The 8275 provides special Control Codes which can be used to minimize DMA or software overhead. It also provides Visual Attribute Codes to cause special action or symbols on the screen without the use of the character generator (see Visual Attributes Section).

The 8275 also controls raster timing. This is done by generating Horizontal Retrace (HRTC) and Vertical Retrace (VRTC) signals. The timing of these signals is programmable.

The 8275 can generate a cursor. Cursor location and format are programmable. (See Programming Section.)

The 8275 has a light pen input and registers. The light pen input is used to load the registers. Light pen registers can be read on command. (See Programming Section.)

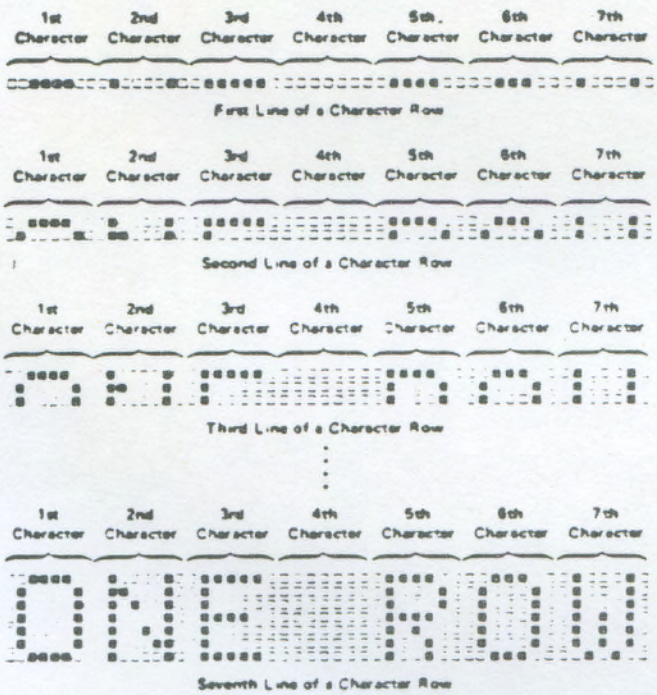
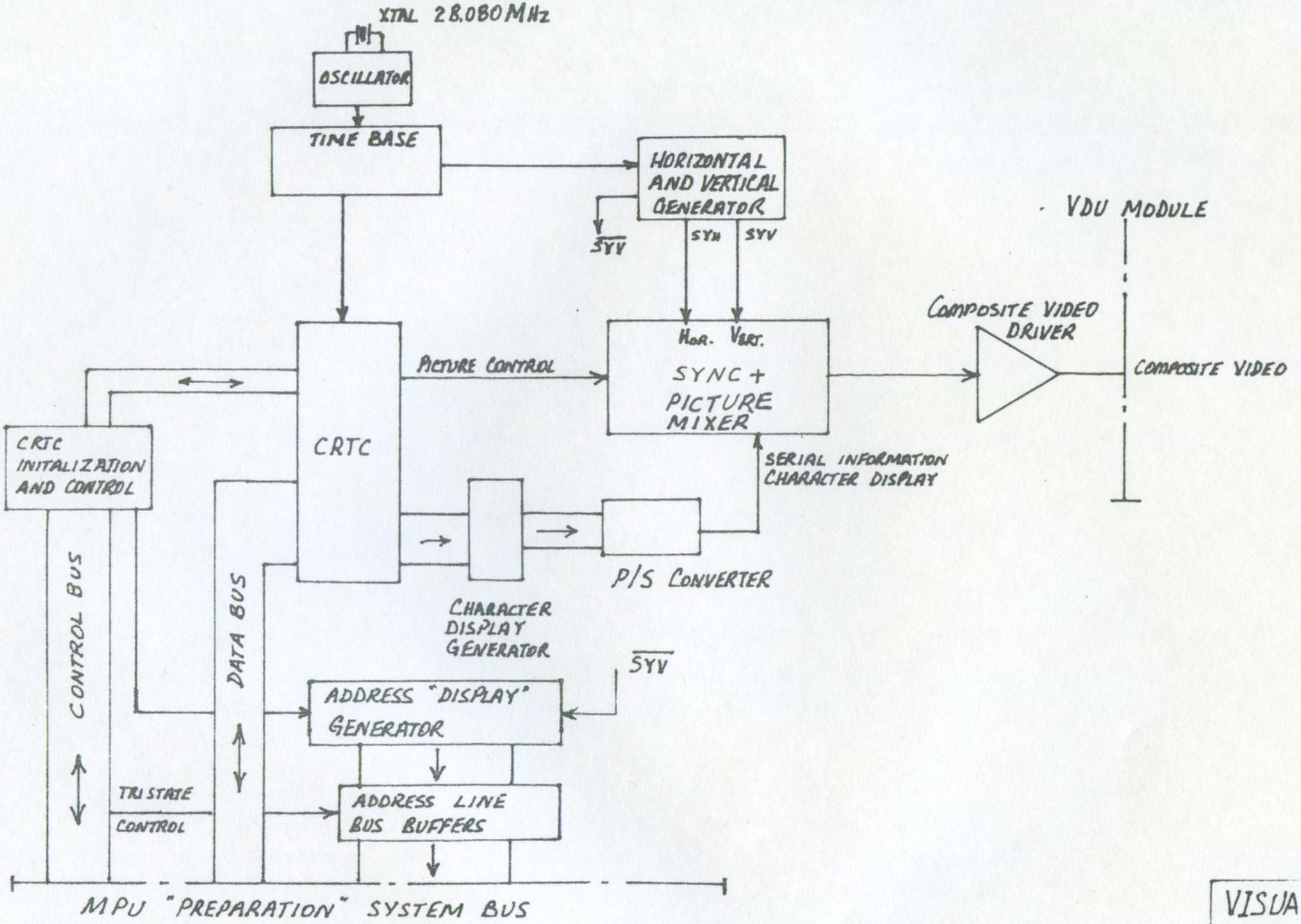


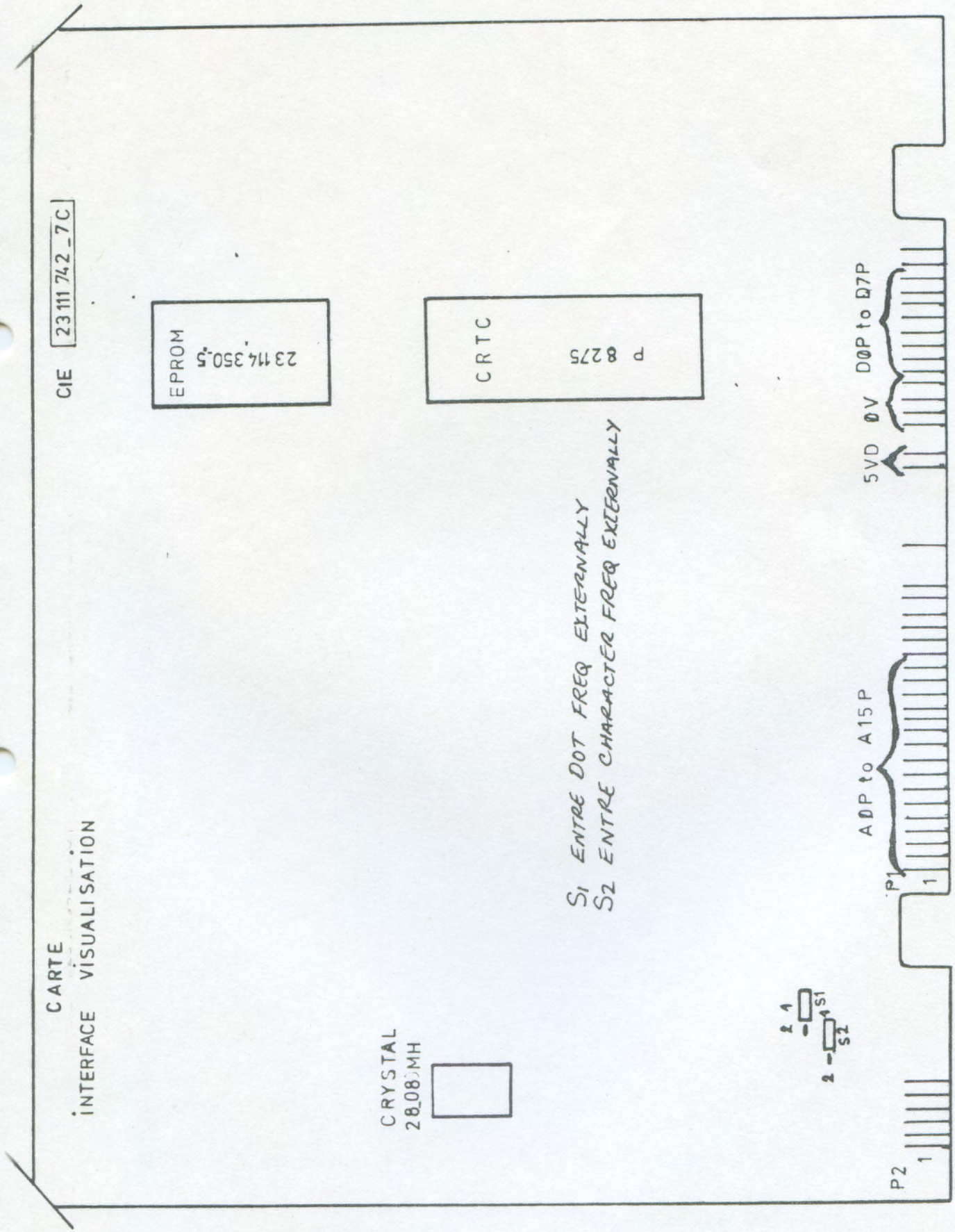
Figure 4. Display of a Character Row

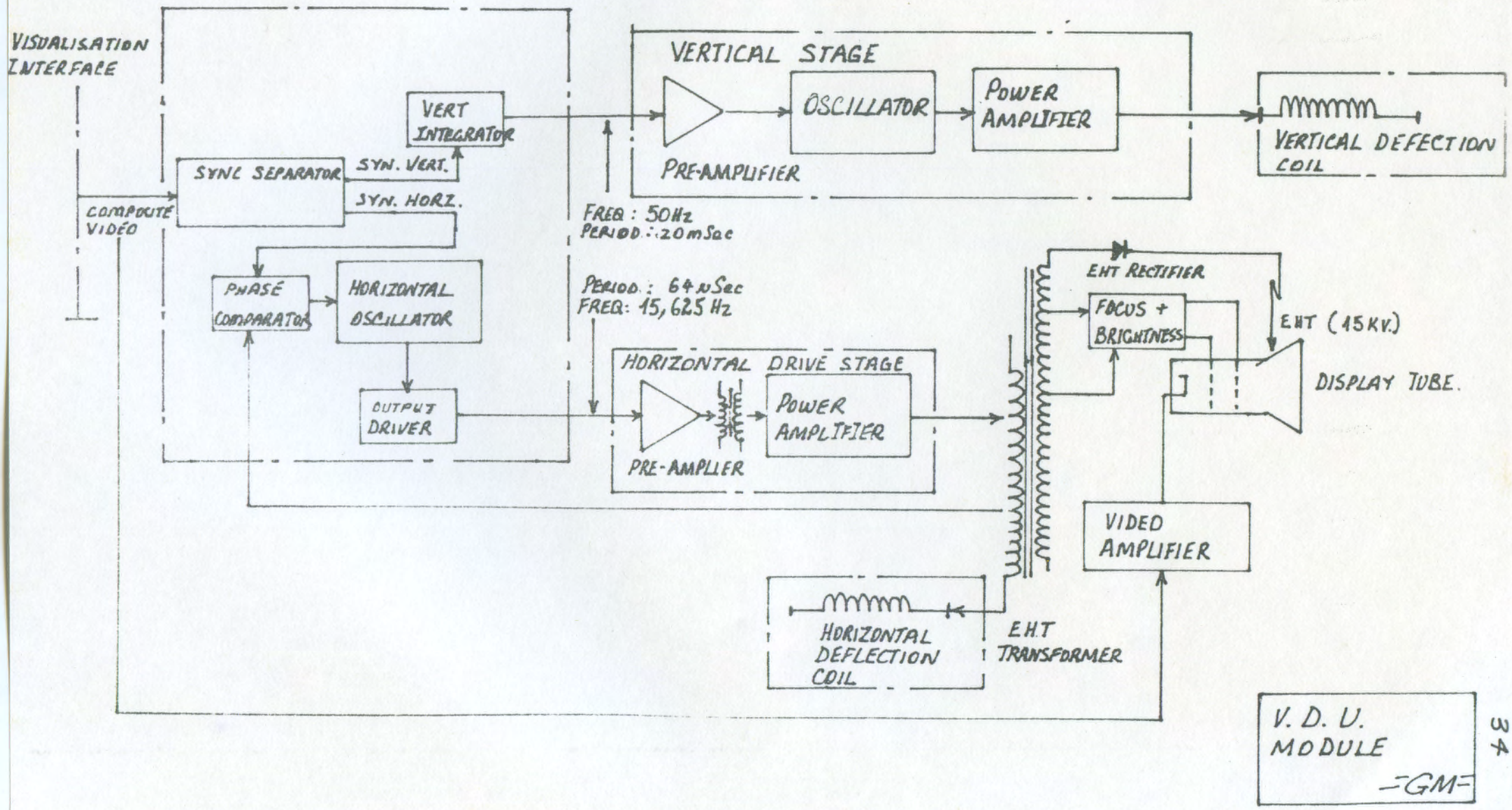


VISUALISATION INTERFACE BOARD

=GM=

INTERFACE VISUALISATION BOARD
PREP UNIT





V. D. U. MODULE

-GM-

PRINTER MODULE

MPU IMPRIMANTE BOARD

On this board is fitted the microprocessor which controls the printer unit. It is surrounded by its RAM and REPROM memories, and is connected to the line unit through the ACIA also located on this board.

MICROPROCESSOR

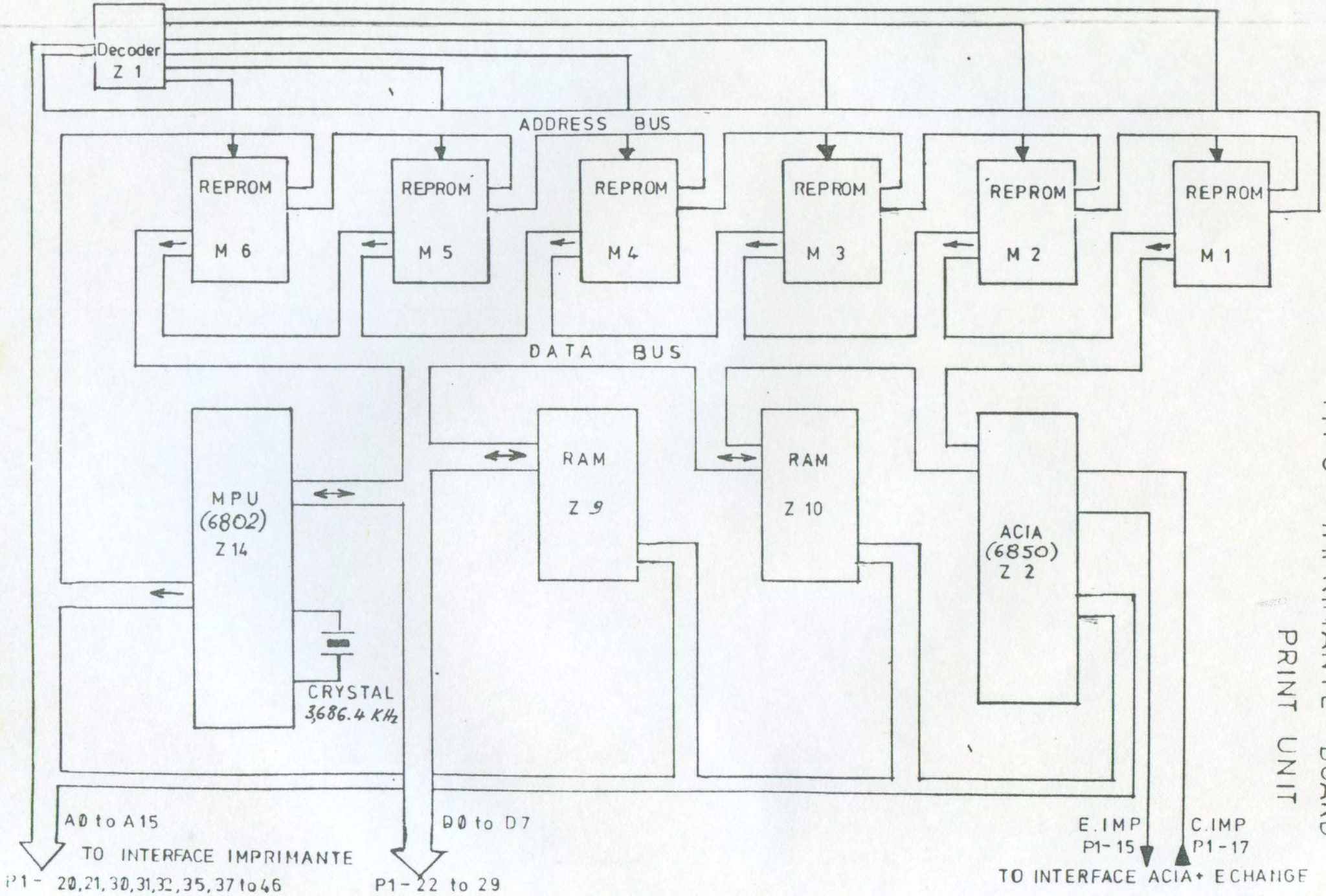
The microprocessor used on this board is a 6802. This type of MPU has its own internal clock. A 3686.4 KHz crystal is used to time it. An output (E) provides a signal which has a frequency of 1/4 crystal frequency, and is in phase with Ø2 of the 6800. This signal is divided by 12 BY A 7492 (Z11) and used as a received and transmit clock for the ACIA.

ACIA

The ACIA (6850) Z2 is used to receive and transmit serial data between the line unit and the printer unit. The transmission speed is 1200BD. Most of the information is from the line unit. The printer unit only sends its status regarding availability to proceed with printing (end of paper - printhead lock etc.)

MEMORIES

Six locations for EPROM 2716 memories are on the board but only three are used. The program is contained in memories M4, M5 and M6.
Two types of 2114 RAM are on this board, they are used as working memories.



MPU IMPRIMANTE BOARD

PRINT UNIT

CARTE INTERFACE IMPRIMANTE

This card is the interface between the printer MPU card and the print mechanics. It consists of three basic sections :-

- Carriage speed and position control
- Printhead pin drive
- Line feed drive

1. CARRIAGE SPEED AND POSITION CONTROL

Carriage speed and position are controlled by the MPU via PIA Z27. The signals CVØ - CV 4 are used to control speed of head travel and CV5 the direction. These signals are sent through a digital to analogue converter Z15. The output from PIN 4 which is amplified by Z16, goes to a gate 1/c type DG201 (Z8). These gates of Z8 are controlled by the $\overline{CAP}$ and $\overline{CAV}$ signals from the MPU via the PIA. The outputs of Z8 are again amplified (Z7), gated (Z26) and amplified (Z3) to give control via RLI of transistors Q12 + Q11. These give the output Vmot (P1-33) which is used to control the motor drive power transistors.

The signals COL.L and SENL (p2 6+3) from the sensor indicate speed and direction of printhead travel. These signals are sent to the MPU via Z6 and Z12. They are also used to generate the EIT signal which via Z13 and Z26 is used to input + or - 15V to Z8.

2. PRINTHEAD PIN DRIVE

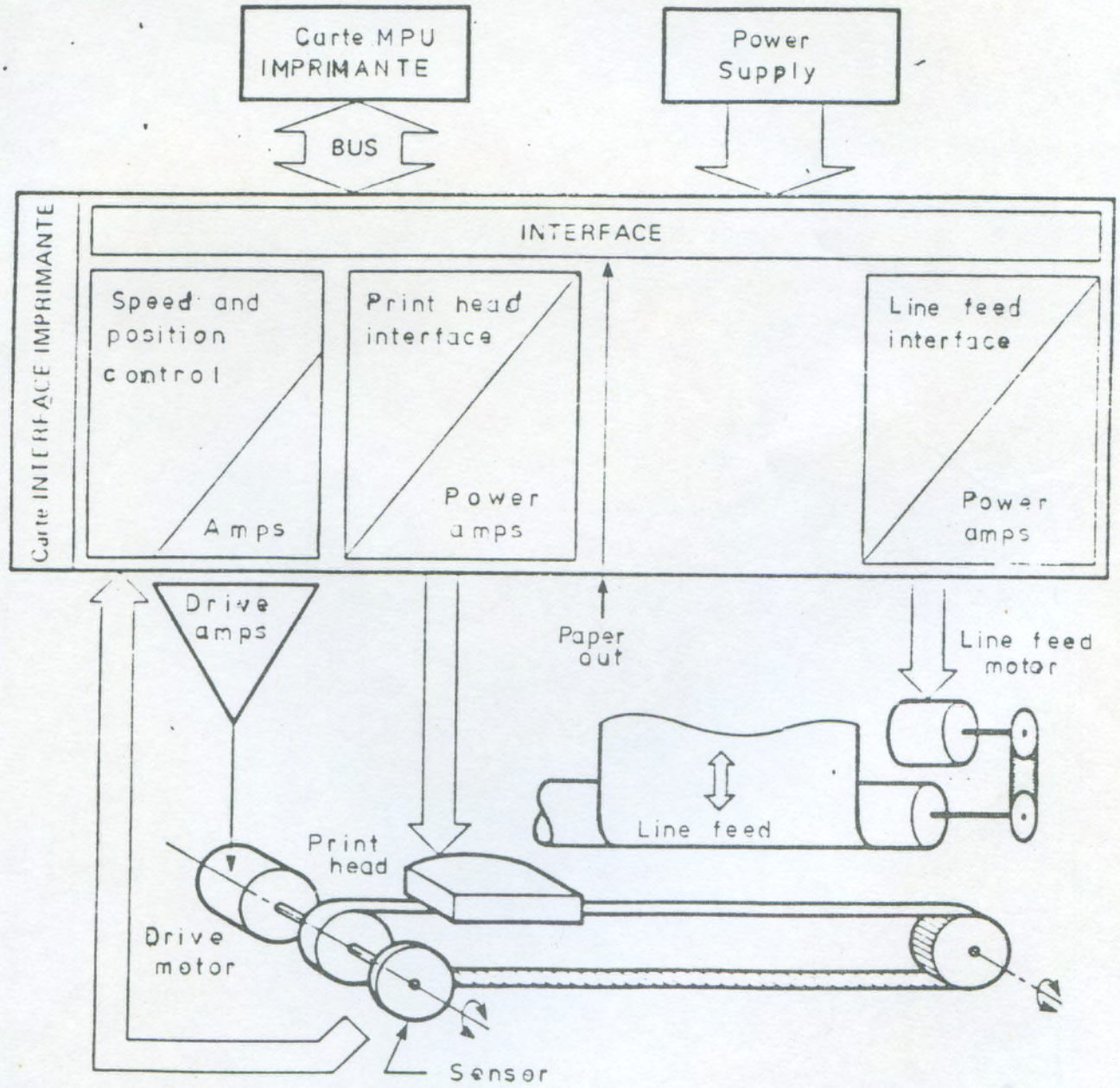
The printhead pins are controlled by the MPU via PIA Z17 PBO-6 and PA6-7. The crystal Y1 and timing chips Z1 give a clock output to Z10 and Z19. The outputs from Z10 + Z19 are gated by Z18 and used to enable the gates Z20, Z21 and one gate in Z28, for a set length period of time. Thus saturating Q1-Q9 for a set period as required to fire pins.

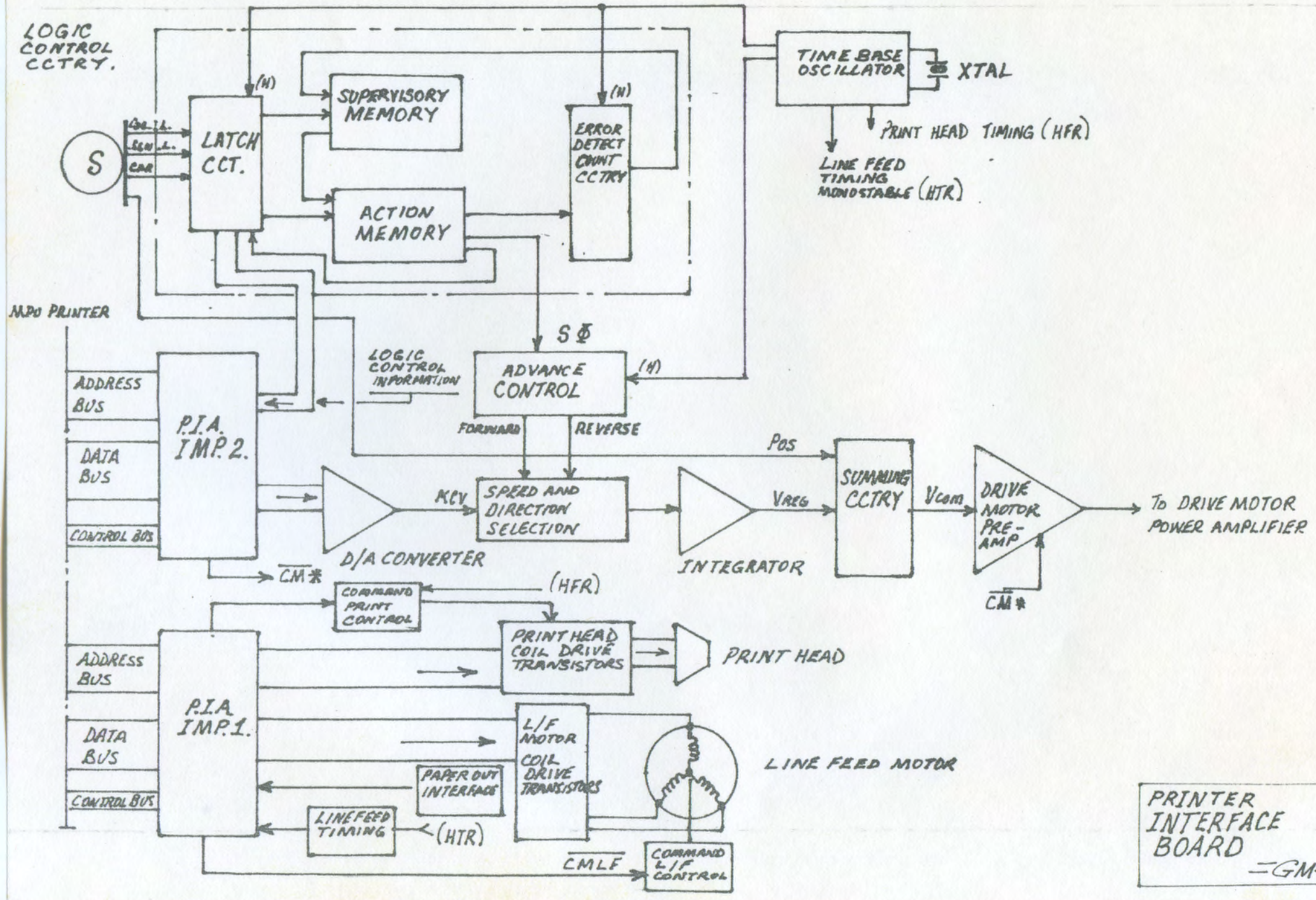
3. THE LINE FEED DRIVE

The line feed is controlled via PIA Z17 PAO-Z and PA4. Signals on PAO-Z via Z30 switch on and off Q13, Q14 + Q15 as required to earth the coils of the line feed motor. The signal on PA4 gives control of Q10, via Z30 and Q16, this is used to provide the stepping voltage for the three coils of the line feed motor.

NOTE: The PIA Z17 is also used to transmit the end of paper signal to the MPU. This signal comes from the switch on P3 pin 4 to the PAI CBI + PB7 inputs and then onto the MPU.

- PRINT UNIT -


Carte MPU IMPRIMANTE
Power Supply
BUS
Carte INTERFACE IMPRIMANTE
INTERFACE
Speed and position control
Amps
Print head interface
Power amps
Line feed interface
Power amps
Drive amps
Paper out
Line feed motor
Line feed
Print head
Drive motor
Sensor



PRINTER INTERFACE BOARD

—GM—

POWER SUPPLY

POWER SUPPLY

This power supply is a switching P.S. The principle is as follows :-

The mains is rectified and filtered. The DC voltage obtained is sampled at a frequency of around 20KHz. This sampled signal powers the primary of a transformer. The secondary delivers after rectifying and filtering, the voltages to be used in the teleprinter.

Regulation of the output is obtained by means of a loop, which according to the 5V voltage modifies the sampling in order to increase or decrease the voltage.

The power supply is divided into two parts, one is operation full-time (secondary), the other is operating when the teleprinter is not in stand-by mode (primary).

When in stand-by mode only the keyboard, the TG4 board and part of the indicatif + cde adaptation board are supplied with a 5 volts (5vv) P2-4.

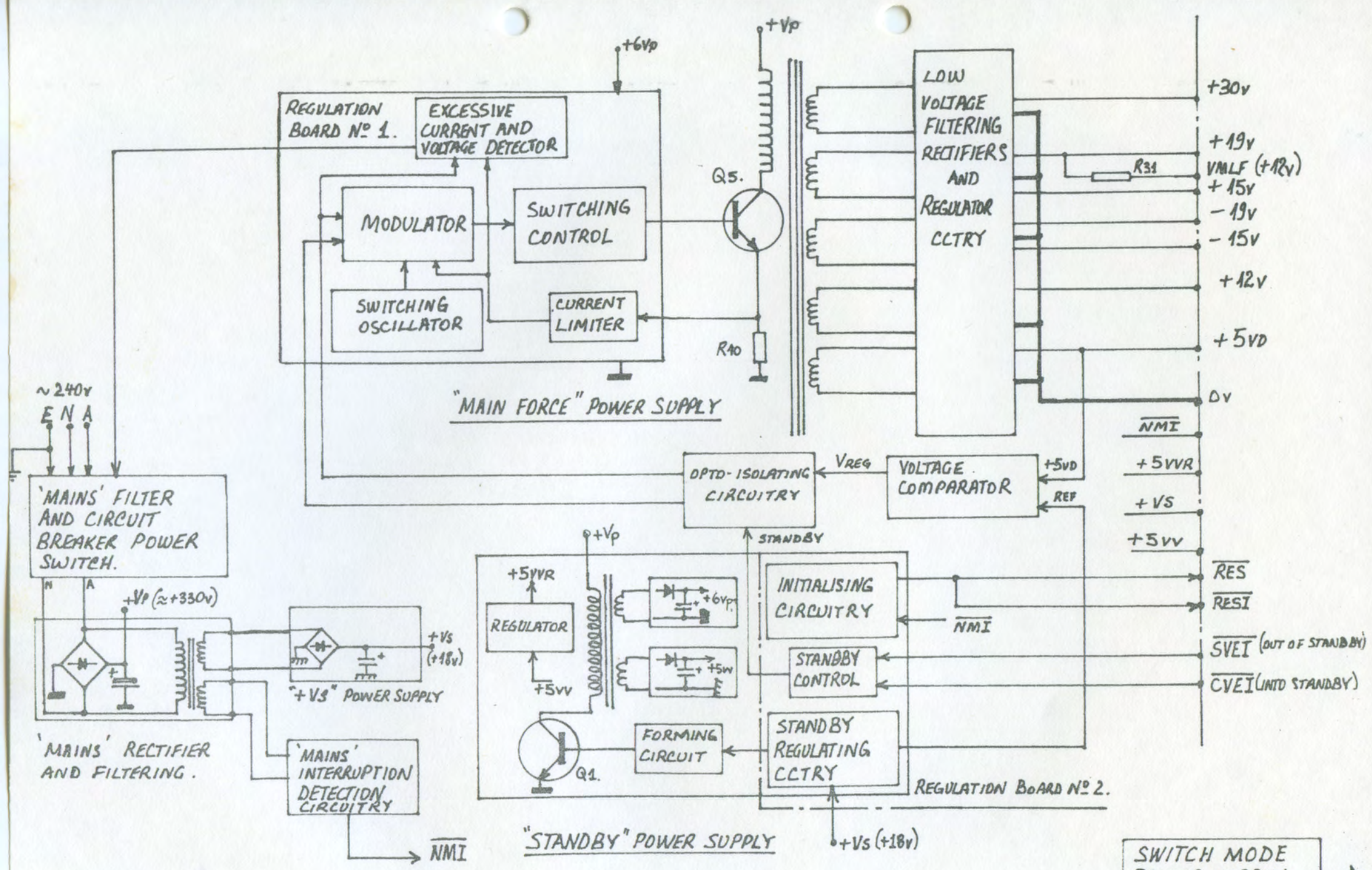
Two other voltages are also permanently present, (+VS) = 19 volts P2-13, which is used to provide the switching curcuit of the primary power supply, and battery charge voltage, +5VS = 5 volts P2 1 and 2, which is used in parallel with the battery and provides the RAM memories. In normal operation, the 5VS line is supplied from the mains. Under mains fail condition the battery provides this line for around 100 hours.

The primary P.S. is under the control of the $\overline{\text{SVEI}}$ and $\overline{\text{CVEI}}$.

The $\overline{\text{CVEI}}$ P2-10 sends the module to stand-by, by switching off the primary P.S. This signal is produced by the line MPU. $\overline{\text{SVEI}}$ P2-8 switches on the primary P.S. for full operation of the machine. This signal is produced by either the keyboard of the TG4 board.

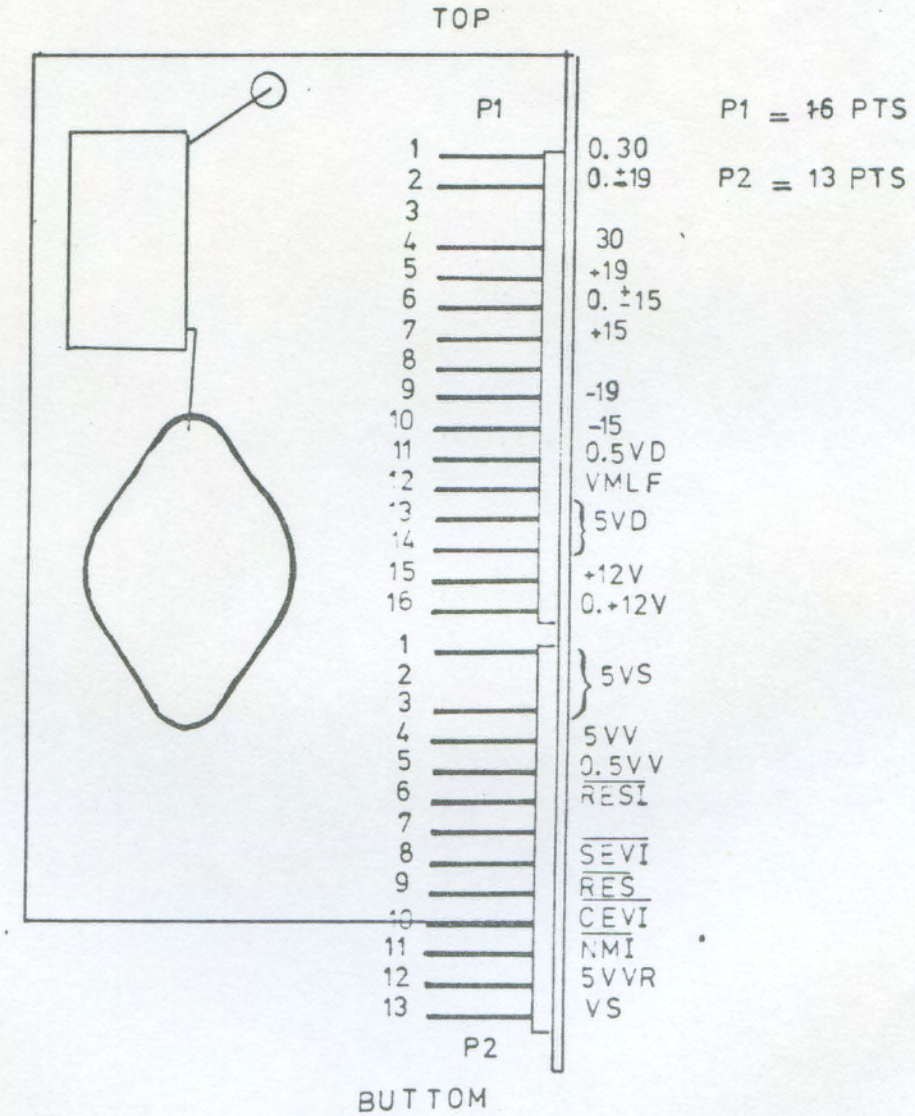
A circuit call"NMI" is also present on this board. Its purpose is to create a signal which it sends to the NMI input on the line MPU every time a failure on the mains is detected.

A restart unit is also fitted to produce two signals, RES p2-9 for line and preparation unit and RESI P2-6 for the printer unit.



SWITCH MODE POWER SUPPLY MODULE

=GM=



POWER SUPPLY

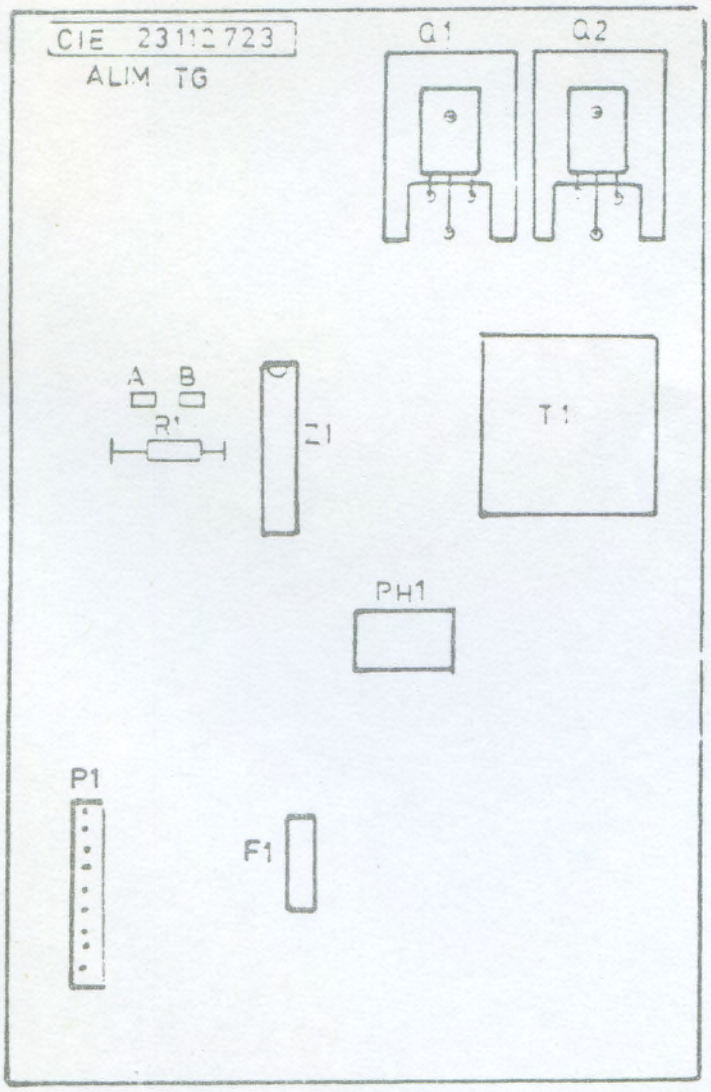
OUTPUTS

	CONNECTOR PT	DESIGNATION	VALUE MIN	VALUE MAX	
STANDBY SUPPLY P1	1	0 _ 30 V			
	2	0 ± 19 V			
	3				
	4	+ 30 V	29 V	36 V	
	5	+ 19 V	18,5 V	23,5 V	
	6	0 ± 15			
	7	+ 15 V	14,3 V	15,7 V	
	8				
	9	- 19 V	-18,5 V	-23,5 V	
	10	- 15 V	-14,3 V	-15,7 V	
	11	0 - 5 V			
	12	VMLF	10 V	13 V	
	13	+ 5 VD	4,75 V	5,25 V	
	14				
	15	+ 12 V	11,4 V	12,6 V	
	16	0 _ 12 V			
MAIN SUPPLY P2	1	+ 5 VS	4,5 V	5,5 V	
	2				
	3	+ 5 VS	4,5 V	5,5 V	
	4	+ 5 VV	4,75 V	5,25 V	
	5	0 - 5 VV			
	6	$\overline{RESI}$			
	7	NOT USED			
	8	$\overline{SVEI}$			
	9	$\overline{RES}$			
	10	$\overline{CVEI}$			
	11	$\overline{NMI}$			
	12	5 VVR			
	13	VS	16,5 V	21 V	

POWER SUPPLY VALUES

TELEGRAPHY POWER SUPPLY

This power supply is a switching P.S. based on the same principle as the mains P.S. The D.C. Voltage is provides by the VS voltage and the loop consists of a optical relay (CNY62) which switches on and off the sampling of VS to maintain proper value of the + and - TG voltages.



ALIMENTATION TELEGRAPHIQUE 60V.

APPENDIX

STANDBY MODE

This mode is used to decrease power consumption of the teleprinter when idle for a long period of time. It also increases life duration of the visualisation module.

When the TX35 is in stand-by mode only the following are powered :-

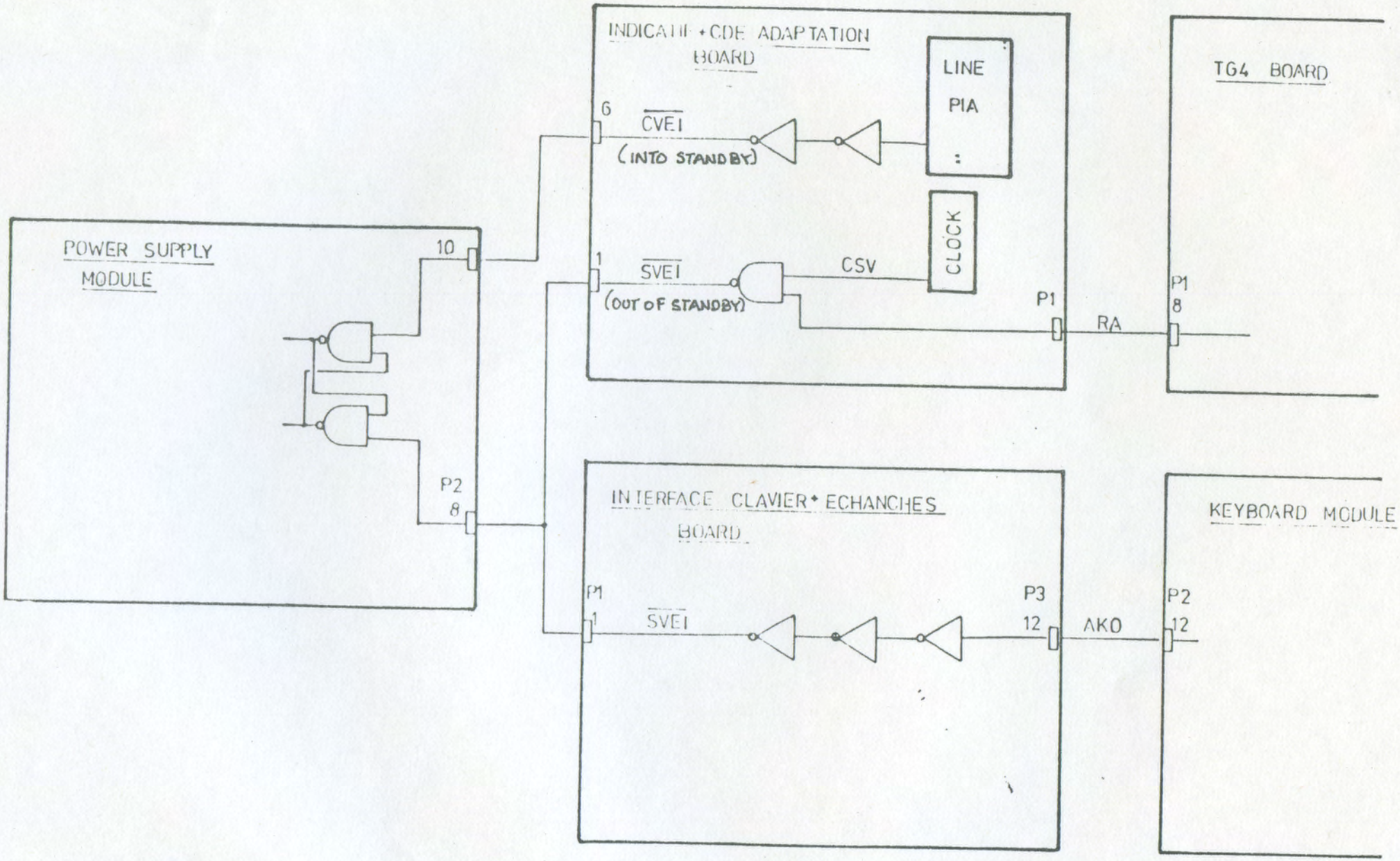
- RAM memories
- clock
- input and outputs from and to keyboard line.

To shift to the stand-by mode the TX35 must be on idle mode for 7 minutes and no message must have to be sent within the following 15 minutes.

There are three actions which awake the TX35 when in stand-by mode :-

- depressing any key of the keyboard module. It must be noted that this key has to be depressed a second time for its codification to be active.
- receiving a message
- being triggered by the clock

The Tx35 is not able to take into account any character received within 450 milliseconds following the change of status of the receive line.



STAND-BY CONTROL CIRCUIT

AUTO-TEST FACILITY

PRINCIPLE

The auto-test is triggered each time the push button located at the back of the TX35 is depressed. (RAZ button). The test is carried out in three phases.

- 1st phase - each unit tests itself according to the autotest contained in its software.
- 2nd phase - each unit attempts to converse with the two others
- 3rd phase - the test results are displayed and printed as well as the menu.
- 4th phase - diagnostic and various initialisations

PHASE 1

PRINTER UNIT . PRINTHEAD MOVES TO LEFT HAND SIDE .

Preparation unit

- All the leds switch on for one second
- Codification is displayed for one second
- REPROM contents is checked by steps of 2K
- RAM are checked without destroying the contents and size of memory is determined
- PIA'S are tested by writing and reading onto the registers

At the end of these tests :

- if the preparation unit is working
  - all the leds of the operation switches remain off
  - end of VDU testing is displayed

- if the preparation unit is not working
  - two leds of one row of the operation switches light up. and the screen displays a number

Interpretation of the result is as follows on the next page.

Interpretation of result

ROW SWITCH ON			FAULT	SCREEN DISPLAY
1	o	o	RAM	01 * *
2	o	o	REPROM	02 + +
3	o	o	INTERFACE VISUALISATION BD.	03.00
4	o	o	INTERFACE CLAVIER + ECHANGE BD	
			. PIA ECHANGE	04.00
			. PIA CLAVIER (KEYBOARD)	04.01
			. PIA VOYANTS (LED)	04.02
5		]	NOT USED	
6		]		

For * * and + + see RAM and REPROM allocation

Line unit

- Buzzer sounds once (.5 sec)
- Sending is set to idle
- Relays are closed for a short time
- REPROM contents is checked by steps of 2K
- RAM is checked by steps of 1K without destroying the contents, and size of the memory is determined
- PIA's are tested by writing and reading onto the registers.

At the end of these tests :

- if the line unit is working
  - nothing happens and phase 2 is started

Meaning of ** and ++

(**) RAM failure

Step = 1K/1K

Start = 0000

DISPLAYED	START AD	END AD
00	$0000	$03FF
01	$0400	$07FF
02	$0800	$0BFF
03	$0C00	$0FFF
04	$1000	$13FF
05	$1400	$17FF
06	$1800	$18FF
07	$1C00	$1FFF
08	$2000	$23FF
09	$2400	$27FF
10	$2800	$2BFF
11	$2C00	$2FFF
12	$3000	$33FF
13	$3400	$37FF
14	$3800	$3BFF
15	$3C00	$3FFF
16	$4000	$43FF
17	$4400	$47FF
18	$4800	$4BFF
19	$4C00	$4FFF
20	$5000	$53FF
21	$5400	$5700
22	$5800	$5B00
23	$5C00	$5FFF
24	$6000	$63FF
25	$6400	$67FF
26	$6800	$6BFF
27	$6C00	$6FFF
28	$7000	$73FF
29	$7400	$77FF
30	$7800	$7BFF
31	$7C00	$7FFF

(++) REPROM failure

Step = 2K/2K

Start = F800

DISPLAYED	START AD	END AD
00	$F800	$FFFF
01	$F000	$F7FF
02	$E800	$EFFF
03	$E000	$E7FF
04	$D800	$DFFF
05	$D000	$D7FF
06	$C800	$CFFF
07	$C000	$C7FF
08	$B800	$BFFF
09	$B000	$B7FF
10	$A800	$AFFF
11	$A000	$A7FF
12	$9800	$9FFF
13	$9000	$97FF
14	$8800	$8FFF
------ZONE CIRCUIT E/S----------		
16	$7800	$7FFF
17	$7000	$77FF
18	$6800	$6FFF
19	$6000	$67FF
20	$5800	$5FFF
21	$5000	$57FF
22	$4800	$4FFF
23	$4000	$47FF

- if the line unit is not working
  - sonor alarm sounds in trains of pulses
  - TG4 leds flashes in coordination with buzzer pulses.

The number of pulses at a time determined the faulty module as follows :-

FAULTY BOARD	NUMBER OF BUST (PULSES)
MPU RAM REPROM BD OR EXTENSION RAM FAULTY	1
REPROM FAULTY	2
INDICATIF + CDE ADAPTATION BD - USART - PIA IF - PIA LIGNE - PIA HEURE (OPTION)	3
ACIA + ECHANGES BOARD - PIA ECHANGE - PIA IMPRIMANTE	4
COUPLEUR DISQUE (OPTION)	5
TG4	6
EXTENSION BD PIA	7

PHASE II

Dialogue between line unit and preparation unit

Each unit transmits its status to the other. If dialogue is possible and the exchange of words correct then Phase III is started. If the dialogue is not possible or words not correct the external information is as follows :-

SCREEN FLASH	LINE UNIT FAULTY
AUDIBLE ALARM SOUNDS PERMANENTLY	PREPARATION UNIT FAULTY
SCREEN FLASH AND AUDIBLE ALARM SOUNDS PERMANENTLY	ELECTRICAL CONNECTION BETWEEN BOTH UNITS FAULTY

PHASE III

The line unit sends to preparation unit and printer unit

The following information to be displayed and printed :-

Displayed

```
    -                    -       -     -    -232-   -....-
:    :    :    :    :    :    :    :    :    :    :    :    :    :
 END OF V.D.U. TESTING

PRINTER ............: END OF TESTS..-SOFTWARE...: 23133847-7
PREPARATION........: END OF TESTS..-SOFTWARE...: 23134448-3N8AUM
LINE................: END OF TESTS..-SOFTWARE...: 23134450-8MCAUK

V.D.U. TESTING...........:
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890 %$Ø  * '()+,-./:=?
FIELD OPTIONS..: 11111111   (dependent on D.I.L switches)
ANSWERBACK.....: SAGEM TEST 01  (dependent on programmed A.B.)
STORAGE MEMORY..........: PROTECTED  (dependent on memory status)
```

Printed

```
PRINTER............: END OF TESTS..-SOFTWARE...: 23133847-7
PREPARATION........: END OF TESTS..-SOFTWARE...: 23134448-3N8AUM
LINE...............: END OF TESTS..-SOFTWARE...: 23134450-8MCAUK

PRINTER TESTING..........:
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890 %$ø &* '()+,-./:=?
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890 %$ø &* '()+,-./:=?
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890 %$ø &* '()+,-./:=?

FIELD OPTIONS...: 01111111

ANSWERBACK.....: MISSING

STORAGE MEMORY..........: PROTECTED
```

If during printing the printer unit fails or end of paper occurs the teleprinter shifts to "locked" mode.

PHASE 1V

Diagnostic

The following menu is displayed below previous display :-

```
INIT MEMORY.....: M?
INTEGRATED TEST.: T?
INIT TIME.......: H?
INIT DISK.......: F?        (disk machines only)
```

- If M key is depressed
  - message memory and abbreviated number tables are erased, number of blocks available are 232.

- If H key is depressed
  - time and date can be set.

.../...

If F key is depressed

- if no disk in machine service line will display "NO DISK" and menu will be displayed

- if disk is in format will be checked and formatted if necessary and original menu displayed.

If T key is depressed

- the following menu is displayed (test menu)

KEYBOARD TEST	:C?
LINE TEST	:L?
DRIVE TEST	:R?
DISK TEST	:D?

While in test mode

If C key is depressed

- "KEYBOARD TEST....." is displayed
- Each time a key is depressed its binary code is displayed
- No action for 20 secs returns teleprinter to original menu

If L key is depressed

- if 2 position switch (next to RAZ button) is in "O" position then "NON LOOPED LINE " is displayed on service line and original menu is displayed.

- if 2 position switch is in " 1 " position then "LINE TESTING..." is displayed and RY test starts. The RY test is displayed and printed.

- to stop RY test returns two position switch to " O " position. The original test menu will be displayed.

- If R key is depressed
  - if no disk present then "NO DISK" is displayed on service line
  - if disk is in then disk drive is checked and if operational original menu is displayed
  - if drive is faulty then "DISK ERROR" will be displayed on service line and original menu will be displayed (takes about 2 seconds)

- If D key is depressed
  - if no disk present then "NO DISK" is displayed on service line
  - if disk is in then disk read-write is checked and if operational original menu is displayed (takes about 56 seconds)

While in test mode (test menu displayed) if no key is depressed for 20 seconds the teleprinter will return to original menu.

While teleprinter is in diagnostic mode (original menu displayed) if no key is depressed for 20 seconds the teleprinter will revert to operational mode.

AUTOMATIC TRANSMISSION - RETRY FACILITY

This facility is used to automatically transmit messages previously prepared.

To be transmitted automatically the message must have on the address line, the subscriber number and time of transmission. The clock must have been initialised.

When the led located on the automatic retry key is on the facility is activated. Depressing this key changes the status from on to off and vice versa.

When the teleprinter is in the idle mode a cycle is done every minute to check if there is a message to send. During this cycle the MPU looks at all the messages to be sent in order to detect the one or ones which have reached their time. Priority if more than one are present will be explained later on

This cycle does not occur if :-

- a transmission is being made
- a message is being received
- a message is being printed locally
- the printing unit is faulty

A cycle is automatically triggered after :-

- the printing unit is released
- transmission or reception of a message stops
- a message is entered into the message memory
- stand-by mode is left
- mains is recovered

During the cycle every message with a current transmission time or a time up to 8 hours previous to the current time is considered to be for immediate transmission, it is then taken by the transmission sequence which establishes the connection and according to the result of the transmission, gives the new status by updating the transmission time number of tries still to go, or T or J status.

If the next message to transmit is within the next 15 minutes stand-by mode will not occur before transmission of this message.

If the next message is in more than 15 minutes and less than 12 hours, stand-by mode is authorised and the TX35 will be automatically re-awakened by the clock at the time transmission must occur.

If a message is to be transmitted in more than 12 hours and less than 16 hours the teleprinter will be automatically awake in 12 hours and then at the time the message must be sent.

In order not to monopolise the TX35 on transmission a non-authorised transmission period exists that allows time to :-

- receive message
- transmit manually
- make local copy

Switch position 7 on the DIL switch allows this time to be set to 1 minute (for receiving and transmitting teleprinters) or 10 seconds (for transmitting only teleprinters)

PRIORITY OF TRANSMISSION

Priority order is based on the message transmission time. However, if two or more messages have the same time priority is given to the one which has least number of retry's. If equal, the priority goes to the one with the lowest message number.

TRANSMISSION TIME

This time is entered by the operator. If no time is entered by the operator then the time the message preparation started is automatically inserted.

When transmission of a message has not been successful the transmission time is updated. The new time is the time the unsuccessful call had been cleared plus three minutes. The priority of transmission of this message is the one of the new time.

ANSWERBACK VERIFICATION

This verification is only done if the field on the address line has been filled and it is checked at the beginning and end of a call. The characters of the called party that are checked must be following characters of its answerback. The number checked could be between 1 and 7, letter shift, figure shift, line feed, carriage return and nul are not considered as characters.

When the WRU code (CR, LF, ↑ , ✠ ,) has been sent, the TX35 waits for ~~X~~ 10 secs to receive the first ~~six~~ Four characters. When the number of ~~8~~ 4 characters has been reached the timing drops to 1 second max between characters. After a silence of more than one second we assume that the answerback has been received. To be considered as valid an answerback must have at least 18 characters.

The number of characters received during an answerback must not exceed ~~34~~ 40 characters otherwise a deconnection procedure automatically takes place.

If the receives answerback is valid and the part to check is present it is declared accepted if not a second WRU demand will be sent.

RFD CODES (AUSTRALIAN CONDITIONS)

01 NO CALL CONFIRMATION RECEIVED

Possible reasons
* - exchange faulty
* - line faulty
* - transmission and reception of TX35 faulty

02 FIRST PROCEED TO SELECT PROTOCOLE FAULTY

Possible reasons
- not received
- typical sequence not received
- too many characters in the sequence
* - spurious pulses on network
* - procedure incorrect

~~03~~ TRANSMISSION OF FIRST SELECTION DISTURBED

Possible reasons
- break back received
- selection incorrect

04 SECOND PROCEDE TO SELECT PROTOCOLE FAULTY

Possible reasons
- not received
- typical sequence not received
- too many characters in sequence
* - spurious pulses on network
* - procedure not conforming
* - first selection incorrect

~~05~~ TRANSMISSION OF SECOND SELECTION DISTURBED

Possible reasons
- breakback received
* - spurious pulses on network
* - selection incorrect

~~06~~ CALL CONNECTED FAILURE

Possible reasons
* - procedure incorrect

07 "FAULT IN SELECTION"

POSSIBLE REASONS - WRONG NUMBER IN SELECTION SEQUENCE
- NO A/B. RECEIVED

~~08~~ ANSWERBACK NOT RECEIVED DURING CONNECTION SEQUENCE

Possible reasons - procedure error
- called party faulty

CAB or 09 ANSWERBACK INCORRECT

Possible reasons - wrong called party
- checking field not properly labelled

~~10~~ ANSWERBACK NOT RECEIVED DURING CONNECTION PROCEDURE

Possible reasons - called party faulty
- exchange disturbance

11 ANSWERBACK INCORRECT WHEN CHECKED DURING DISCONNECTION PROCEDURE

Possible reasons - line disturbance

12 BREAK-BACK DURING TRANSMISSION

Possible reasons - called party intervention
- spurious pulses on network

13 CALL CLEARED SIGNAL RECEIVED WHEN WAITING FOR FIRST PROCEED TO SELECT SIGNAL

Possible reasons * - exchange disturbance

~~14~~ CALL CLEARED SIGNAL RECEIVED WHEN TRANSMITTING FIRST SELECTION

Possible reasons * - contents of first selection incorrect

15 CALL CLEARED SIGNAL RECEIVED WHEN WAITING FOR SECOND PROCEED TO SELECT SIGNAL

Possible reasons * - first selection faulty
* - second exchange not available

~~16~~ CALL CLEARED SIGNAL RECEIVED WHEN TRANSMITTING SECOND SELECTION

Possible reasons * - fault in the second selection

~~17~~ CALL CLEARED SIGNAL RECEIVED WHEN WAITING FOR CONNECTION CONFIRMED STATUS

Possible reasons * - typical sequence not received

18 CALL CLEARED SIGNAL RECEIVED DURING CONNECTION PROCEDURE

Possible reasons * - call cleared on called subscriber

19 CALL CLEARED SIGNAL RECEIVED DURING TRANSMISSION OF TEXT

Possible reasons * - call cleared by called subscriber

20 CALL CLEARED SIGNAL RECEIVED DURING DISCONNECTION PROCEDURE

Possible reasons * - call cleared by called subscriber

OCC-21 CALL CLEARED SIGNAL RECEIVED AS WELL AS OCC CODES

Possible reasons * - called party busy

NC-22 CALL CLEARED SIGNAL RECEIVED AS WELL AS NC CODES

Possible reasons * - no line available at level of exchange

ABS-23 CALL CLEARED SIGNAL RECEIVED AS WELL AS ABS CODES

Possible reasons * - called party absent
* - line temporarily removed

NA-24 CALL CLEARED SIGNAL RECEIVED AS WELL AS NA CODES

Possible reasons * - number not authorised

NP-25 CALL CLEARED SIGNAL RECEIVED AS WELL AS NP CODES

Possible reasons * - no party - you may have selected wrong number.

NCH-26 CALL CLEARED SIGNAL RECEIVED AS WELL AS NCH CODES

Possible reasons * - subscriber number has changed

DER-27 CALL CLEARED SIGNAL RECEIVED AS WELL AS DER SIGNALS

Possible reasons * - temporarily unavailable (paper low etc)

MOM-28 MOMENT - MANUAL OPERATOR

use manual call mode

~~RDI-29~~ NOT USED IN AUSTRALIA

* - call diverted to another number

30 PRINTING UNIT FAULTY DURING CONNECTION PROCEDURE

Possible reasons * - paper out
- printhead lock
- other printing unit failure

31 PRINTING UNIT FAULTY DURING MESSAGE TRANSMISSION

32 PRINTING UNIT FAULTY DURING DISCONNECTION PROCEDURE

33 LINE FAILURE DURING CONNECTION PROCEDURE

Possible reasons * - received line open
* - maintenance switch rotated

34 LINE FAILURE DURING TRANSMISSION OF MESSAGE

Possible reasons * - received line open
* - maintenance switch rotated

35 LINE FAILURE DURING DISCONNECTION PROCEDURE

Possible reasons
* - received line open
* - maintenance switch rotated

36 DISK FAILURE DURING CONNECTION PROCEDURE - NOT USED

Possible reasons
* - door open
* - drive faulty
* - floppy disk faulty, etc.

37 DISK FAILURE DURING TRANSMISSION OF MESSAGE

Possible reasons
* - door open
* - drive faulty
* - floppy disk faulty, etc.

38 DISK FAILURE DURING DISCONNECTION PROCEDURE

Possible reasons
* - door open
* - drive faulty
* - floppy disk faulty, etc

42 CLEARING OF CALL SENT BY OPERATOR DURING CONNECTION PROCEDURE

43 CLEARING OF CALL BY OPERATOR DURING TRANSMISSION OF MESSAGE

44 CLEARING OF CALL BY OPERATOR DURING DISCONNECTION OF MESSAGE

BREAK BACK

The TX35 stops transmitting for one second every time a character is received while transmitting from the memory.

If during this second no other characters are received the sequence XXXXXX will be printed where the line had been interrupted, and the TX35 continues to transmit from the start of the interrupted line.

If the number of characters received is higher, depending on the type of transmission, the reaction is as follows :-

MANUAL TRANSMISSION (CALL/CLEAR)

The keyboard is locked and the operator makes a decision to either unlock the keyboard and continue to transmit or to give the other party the hand, or clear the call.

SEMI-AUTOMATIC TRANSMISSION (AUTOMATIC CALLING)

Transmission stops for 10 seconds and starts again (after inserting XXXXXX) at beginning of interrupted line. However, the call is automatically cleared if transmission is stopped more than twice or if the number of characters received is higher that 127.

AUTOMATIC TRANSMISSION (AUTOMATIC RE-TRY)

As above.