TELEPRINTER

TX 20

FIELD MAINTENANCE MANUAL

TECHNICAL DESCRIPTION

MAINTENANCE MANUAL

ILLUSTRATED CATALOGUE

SAGEM

FOREWORD

This Teleprinter model TX 20 FIELD MAINTENANCE MANUAL is divided into three parts :

1 - Technical description
2 - Maintenance manual
3 - Illustrated catalogue.

NOTE

This document cancels and replaces the FIELD MAINTENANCE MANUAL SA 11381

1

TECHNICAL DESCRIPTION

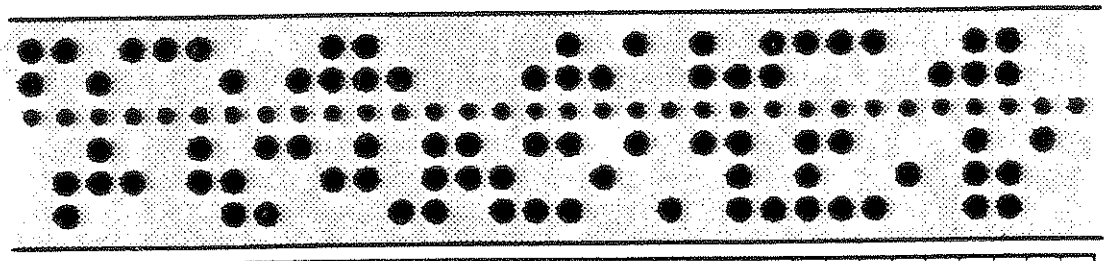
C O N T E N T S

GENERAL

The teleprinter is designed to interface with a communications network. It is an electronic device the control logic of which is organized around a microprocessor.

TECHNICAL SPECIFICATIONS

- Code No 2 CCITT



LETTERS A...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	<	↕	A...	1...	→	⊖
FIGURES 1...	-	?	:	*	3	X	X	X	8	☎	(	)	.	,	9	0	1	4	'	5	7	=	2	/	6	+						
Combinations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

In FIGURES position, combinations 6, 7 and 8 are reserved for national or private use.

<	Carriage return
↕	Line feed
A...	LETTERS shift
1...	FIGURES shift

→	Space
*	«Who are you ? »
☎	Sound signal
⊖	32nd (no punch)

NOTE : "LETTERS" symbol may be represented by "A..." or "⊕".

- ADAPTATION TO A TELEGRAPHIC WAY

  . Indicating : type A, type B, ...

  . Numbering : keyboard selection.

  . Telegraph speed : 50, 75 or 100 Bd
  Selector switch located on "ADAPTATION" board.

  . Telegraphic qualities:

  . overall "start-stop" distortion : < 2 %
  for any "ADAPTATION" board without psophometric filter,

  . effective net margin : ⩾ 42 %

  . rejects "start" polarity pulses with a duration of half an unit-element or less.

- Adaptation device (incorporated in the unit) : - signal output current injector,
  - signal input current regulator.

- KEYBOARD

  . operating principle : - electronic,
  - automatic "LETTERS-FIGURES" shift.

  . key layout : - QWERTY,
  - extended,
  - stepped.

  . use : two-key roll-over or N-key roll-over. The roll-over selector switch is located on the "CLAVIER" board.

- Programmed tabulation

- TAPE READER

  . reading speed : 6.66 - 10 - 13.33 - 15 cps depending on the unit operating mode.

  . tape : - 5 channels,
  - 17.5 mm wide.

- TAPE PUNCH

  . punching speed : 6.66 - 10 - 13.33 - 15 cps depending on the unit operating mode.

  . tape : - 5 channels,
  - 17.5 mm wide.

- PRINTER

  . character set : see PRINTER paragraph.

  . character definition : impact mosaïc printing on 7 lines and (5 + 4) columns.

. character size :
  . height : 2.7 mm.
  . width : 1.8 mm.

. number of printed characters/line : 69.

. character step : 2.54 mm (10 characters per inch).

. line spacing :
  . single line feed : 4.2 mm (1/6").
  . double line feed : 8.4 mm (1/3").
  Single and double line feed switch is located on the "PERSONNALISATION" board.

. printing speed :
  . off-line : 15 c/s.
  . on-line : according to unit operating mode

. minimum new line sequence : 1 character "carriage return" + 1 character "line feed".

. audible alarm for near-end of line : at 60 th character.

. paper drive : friction.

. paper : 210 mm or 216 mm wide roll with 130 mm maximum diameter

. maximum number of copies : 1 original + 3 copies (with carbon paper).

. alarm message text for paper out, tape out or unavailable unit

. ink ribbon : SAGEM.

. DUAL FUNCTION mode : preparation of a message on tape at the time of simultaneous transmission or reception of another message.

- Operation mode selection

(the control switches are located on the "PERSONNALISATION" board).

. for the operator :
  - with or without TAPE PUNCH operation at time of calling signal reception,
  - text with single or double line feed,
  - delay for text release after printing of a character : . 250 ms
    . 750 ms

. for maintenance technician : - half-duplex or full-duplex,

- with or without answer-back code exchange when communication is established,
- transient or permanent sound alarm signal,
- with or without answer-back code remote control by FIGURES D sequence,
- numbering by teleprinter signals or call dial pulses,
- with or without number 4 combination punching in "FIGURES" shift (FIGURES D),
- single or double current transmission

- Mains power supply : 115 V - 127 V - 220 V - 240 V ± 10 % 50 Hz or 60 Hz ± 2 Hz.

- Power consumption : 110 VA.

- Dimensions :

. width : 515 mm approx (without chad drawer),

. length : 620 mm approx,

. height : 220 mm approx (without page paper).

- Weight : 25 kg approx.

- Ambient conditions :

. operating temperature range : 0°C to + 45°C.

. storage temperature : - 30°C to + 70°C.

- Interference suppression : according to standard VDE 0875 level K (conduction).

TIONS.

COVER COLOR.

KEYBOARD.

. All types, different from AZERTY or QWERTY.

New line sequence.

. Automatic "carriage return + line feed + carriage return" sequence.

National use characters.

ABBREVIATED NUMBERING.

. The system enables the operator to store ten subscriber numerals of his choice. The transmission of one of the numbers is then obtained by pressing a single key on the KEYBOARD.

AUTOMATIC END OF MESSAGE.

. This tape reader facility automatically stops the tape after a message has been completed.

TAPE READER remote control :

. start is controlled by reception of the "LLLL" sequence,

. stop is controlled by the reception of four preselected characters.

Tight tape device (TAPE READER).

. This device stops the reading of the punched tape when it is pulled abnormally in its running direction.

Delayed starting of ANSWER-BACK UNIT.

TAPE PUNCH remote control :

. start TAPE PUNCH upon identification of a "CCCC" or ":::" sequence,

. stop TAPE PUNCH upon identification of a "FFFF" sequence.

- Sprocket paper drive with "CAROLL" type perforated margins.

  . Number of printable characters per line : 80.

- Alarm message text.

- Modulation speed remote control :

  . either by external wire,

  . or by character sequence.

- Primary and secondary TRANSFORMER voltages.

- Reception way cut-off detection device.

  . NOTE : This device is used in double current, or single current with "mark" current.

- "ADAPTATION" board.

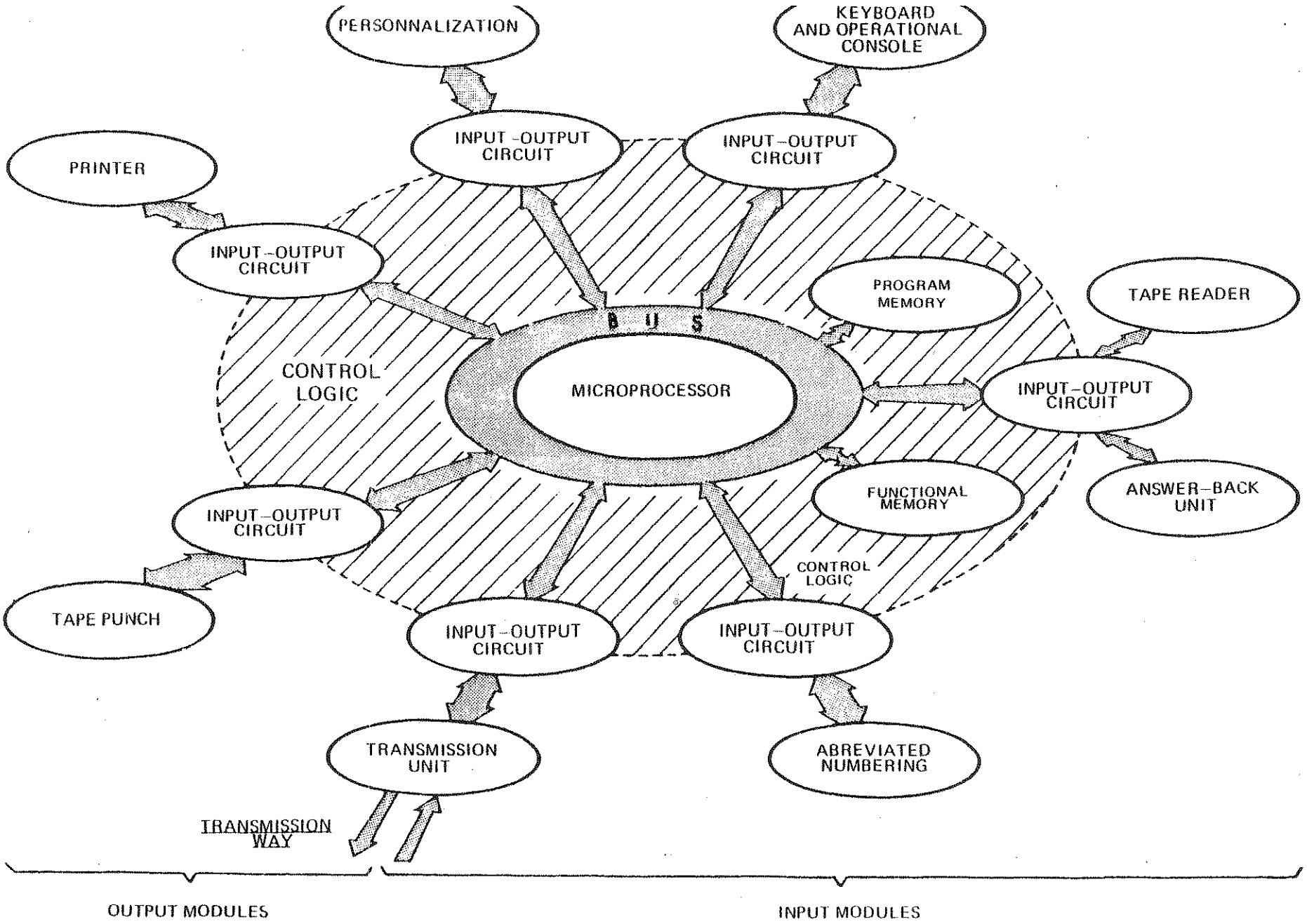
  . Depending on transmission way being used.

- LIGHTNING ARRESTOR. ("PARAFOUDRE" board)

  . Protects the unit against lightning and mains surges.

- LINE PROTECTION.

  . Protects the unit against overvoltage on the transmission line.


PERSONNALIZATION
KEYBOARD AND OPERATIONAL CONSOLE
INPUT-OUTPUT CIRCUIT
INPUT-OUTPUT CIRCUIT
PRINTER
INPUT-OUTPUT CIRCUIT
PROGRAM MEMORY
TAPE READER
BUS
CONTROL LOGIC
MICROPROCESSOR
INPUT-OUTPUT CIRCUIT
FUNCTIONAL MEMORY
ANSWER-BACK UNIT
INPUT-OUTPUT CIRCUIT
CONTROL LOGIC
TAPE PUNCH
INPUT-OUTPUT CIRCUIT
INPUT-OUTPUT CIRCUIT
TRANSMISSION UNIT
ABREVIATED NUMBERING
TRANSMISSION WAY
OUTPUT MODULES
INPUT MODULES

GENERAL ORGANIZATION

The teleprinter can be considered as a data micro-system consisting of a microprocessor with program and functional memories which interfaces with a certain number of peripherals through input-output circuits :

- signalling and control module :
  . OPERATIONAL CONSOLE.
- input modules :
  . KEYBOARD,
  . TAPE READER,
  . ANSWER-BACK UNIT,
  . TRANSMISSION DEVICE (transmission input-output circuit).
- output modules :
  . TAPE PUNCH,
  . PRINTER,
  . TRANSMISSION DEVICE (reception input-output circuit).

Each module interfaces with the "Bus" through an input-output circuit. The function of the microprocessor is to scan the "Bus" condition and to ensure, as a function of various conditions, data transfer and control sequences between the modules. Data exchanged between these peripheral modules and control logic are as follows :

- condition data from the modules to the control logic,
- control data from the control logic to the modules,
- data from the input modules to control logic and from control logic to the output modules.

Each "Hardware" module has an associated "Software" module contained in the program memory.

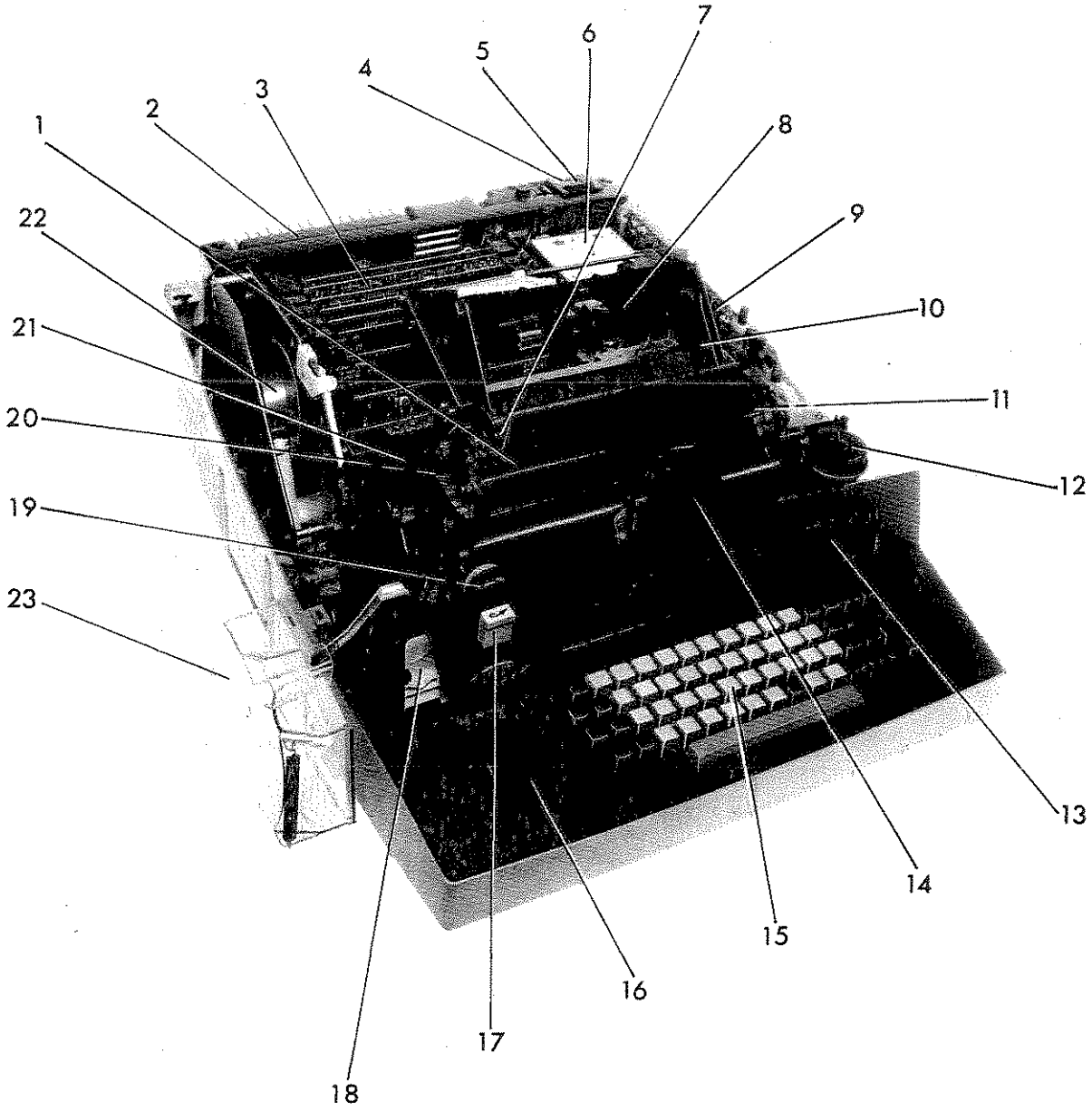
DESCRIPTION

The unit is designed so that a maximum of functions are carried out electronically. The unit flowchart is functional and modular. The unit consists of the following modules :

- OPERATIONAL CONSOLE (13),
- KEYBOARD (15),
- ANSWER-BACK UNIT (on "PIA LECTEUR + AMPLI" board),
- TAPE READER (16),
- TAPE PUNCH (18),
- PUNCH BACK SPACER (TAPE PUNCH) (17),
- TAPE STORE (22),
- CHAD BOX (23),
- PRINTER, basically comprising the following modules :
  . PRINTING DEVICE (14),
  . SENSOR (19),
  . DRIVE MOTOR (20),
  . PAPER ADVANCE (10),
  . PRESSURE ROLLERS (7),
  . PLATEN (1),
  . LINE FEED MOTOR (11),
  . LH RIBBON (21),
  . RH RIBBON (12),
- POWER AMPLIFIER (2),
- TRANSFORMER (6),
- $\pm$ 12 V POWER SUPPLY (8),
- LIGHTNING ARRESTOR (5) ("PARAFOUDRE"),
- MAINS CABLE (not shown),
- MAINS FILTER (4),
- "ADAPTATION" board (9),
- Electronic boards rack (3) containing the followings :
  . "ALIMENTATION" board,
  . "ASSERVISSEMENT" board,
  . "PIA IMP" board,
  . "PIA ERD + IT/ADA" board,
  . "PIA LECTEUR + AMPLI" board,
  . "PIA CLAVIER + MPU" board,

. "RAM + RPROM" board,
. "PIA PERFO + AMPLI" board,
. "NUMEROTATION ABREGEE" (abbreviated numbering) board,
. "PERSONNALISATION" board.

All these modules are readily replaceable.



OPERATIONAL CONSOLE

Function

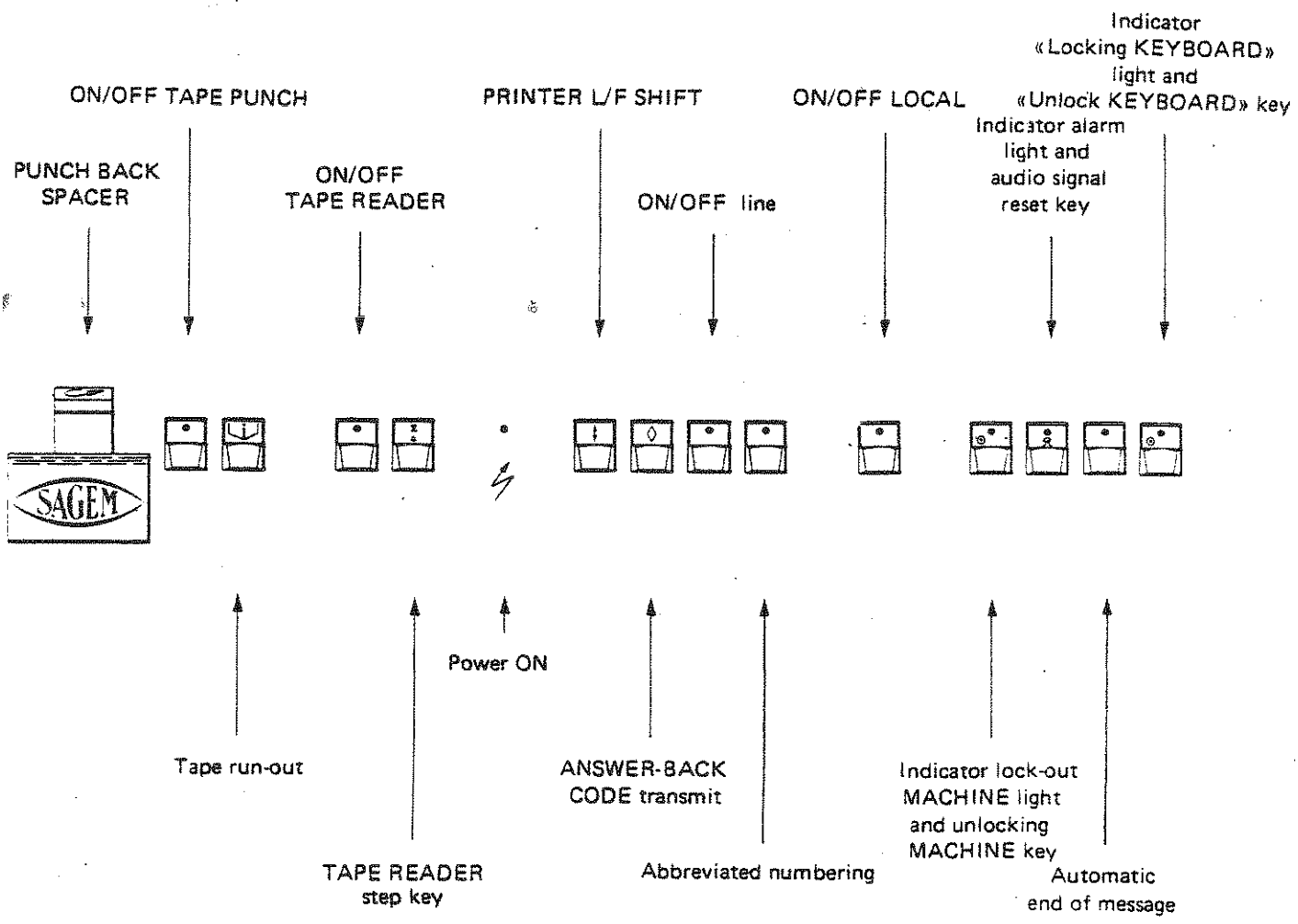
Control keys are provided for placing the unit in the desired configuration.

These are interfaced in the same way as the KEYBOARD keys. Indicator LEDS indicate the unit configuration signalling.

Description

The OPERATIONAL CONSOLE consists of :

- a set of 14 keys*,
- a set of 10 indicator light emitting diodes.*



* NOTE : The number of keys and indicator lights may vary, according to the type of unit.

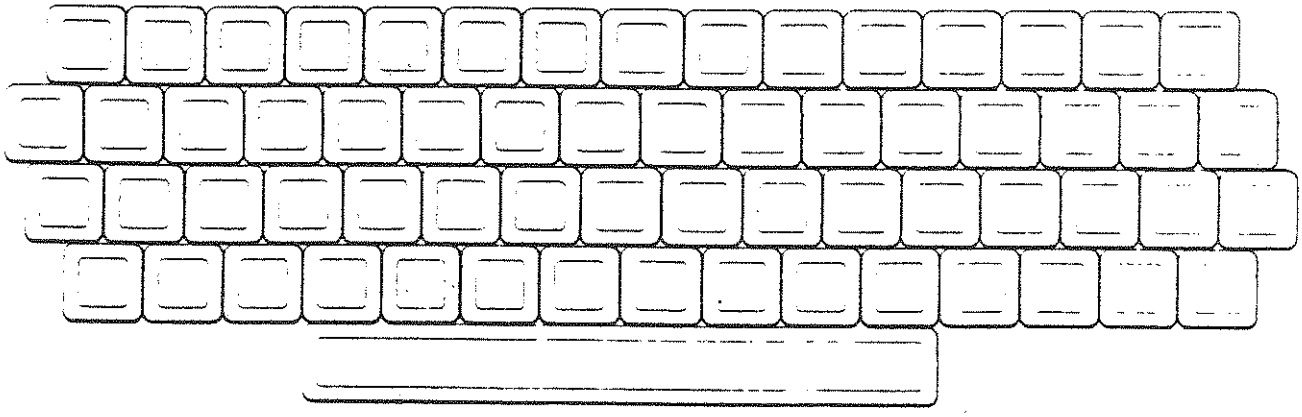
KEYBOARD

Function

When the operator depresses a key, the KEYBOARD supplies the corresponding five code elements of the No 2 CCITT alphabet.

Keyboard layout

Many different layouts and key engravings are available.

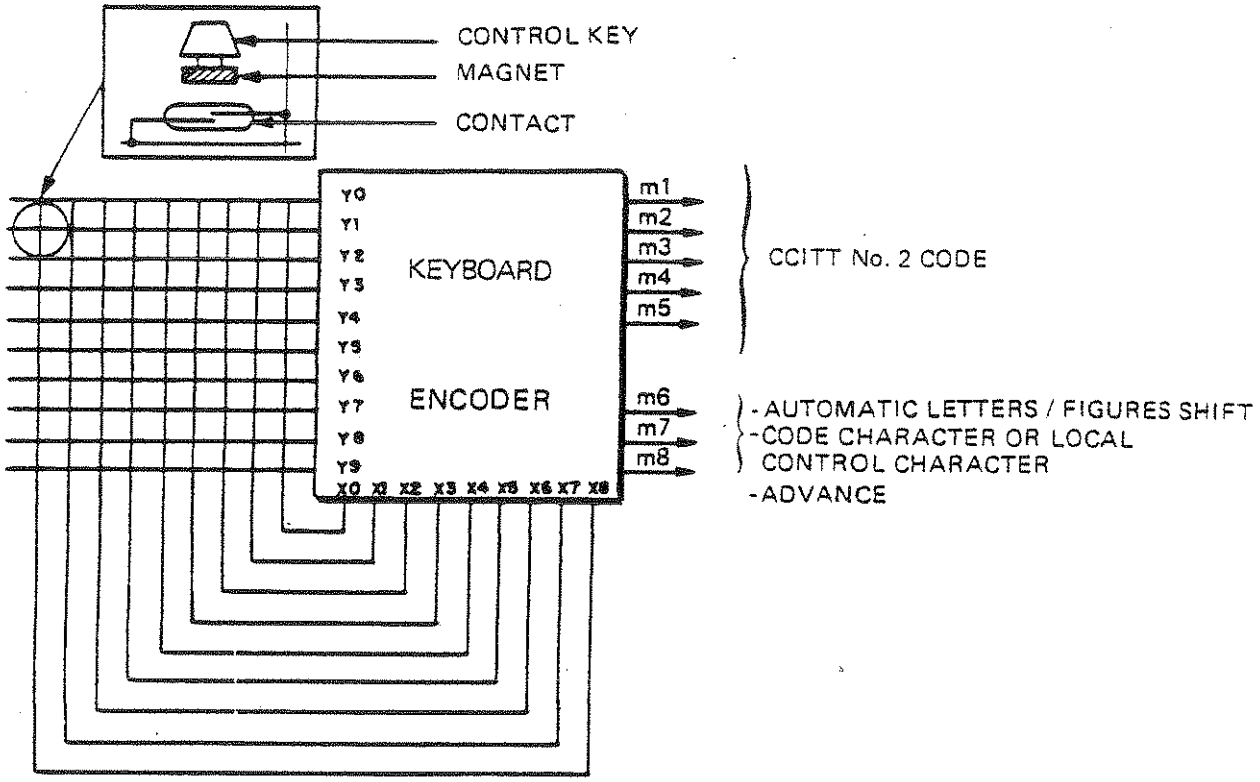


Usually, the KEYBOARD comprises the whole of No 2 CCITT code characters.

Description

The KEYBOARD is of the extended type mainly comprising :

- a set of dust-tight reed contact keys,
- a KEYBOARD encoder



ANSWER-BACK UNIT

The answer-back code is contained in a plug-in memory located on PIA LECTEUR + AMPLI" board.

The answer-back code change is accomplished simply by replacement of the plug-in memory.

NOTE : The ANSWER-BACK UNIT memory is programmed using the programmer EMP 5.

TAPE READER

Function

The TAPE READER allows automatic transmission of the characters recorded on punched tape.

Description

The TAPE READER consists of a tape drive device and a character reading device.

The tape drive device consists of a sprocket wheel driven by two gears, one which is attached to a stepping motor.

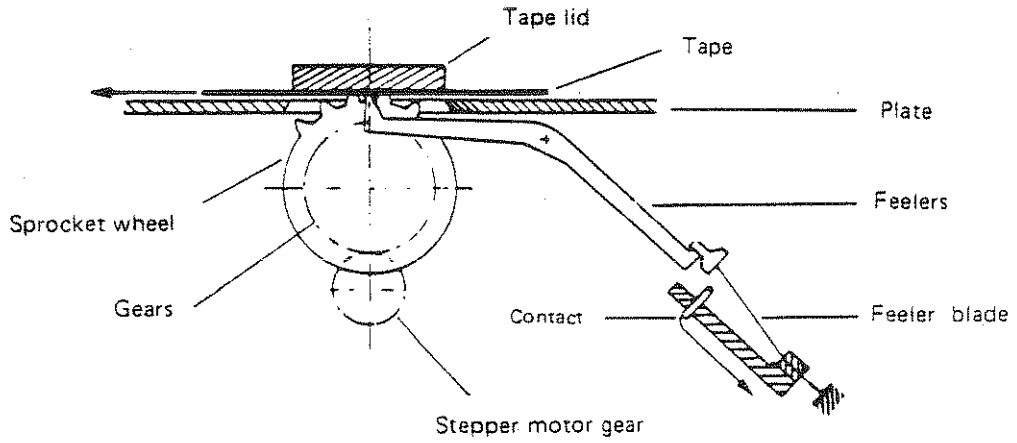
The character reading device consists of five feelers, each of which are associated with a contact operating as follows :

- hole ⟶ closed contact,
- no hole ⟶ open contact.

The punched tape is pressed against the plate by a tape lid.

Presence of the tape is signalled by the "tape out" feeler as follows :

- tape in ⟶ open contact,
- tape out ⟶ closed contact.



TAPE PUNCH

Function

The TAPE PUNCH is used to record characters on punched tape.

Description

The TAPE PUNCH consists of drive, guidance and electromechanical punching devices.

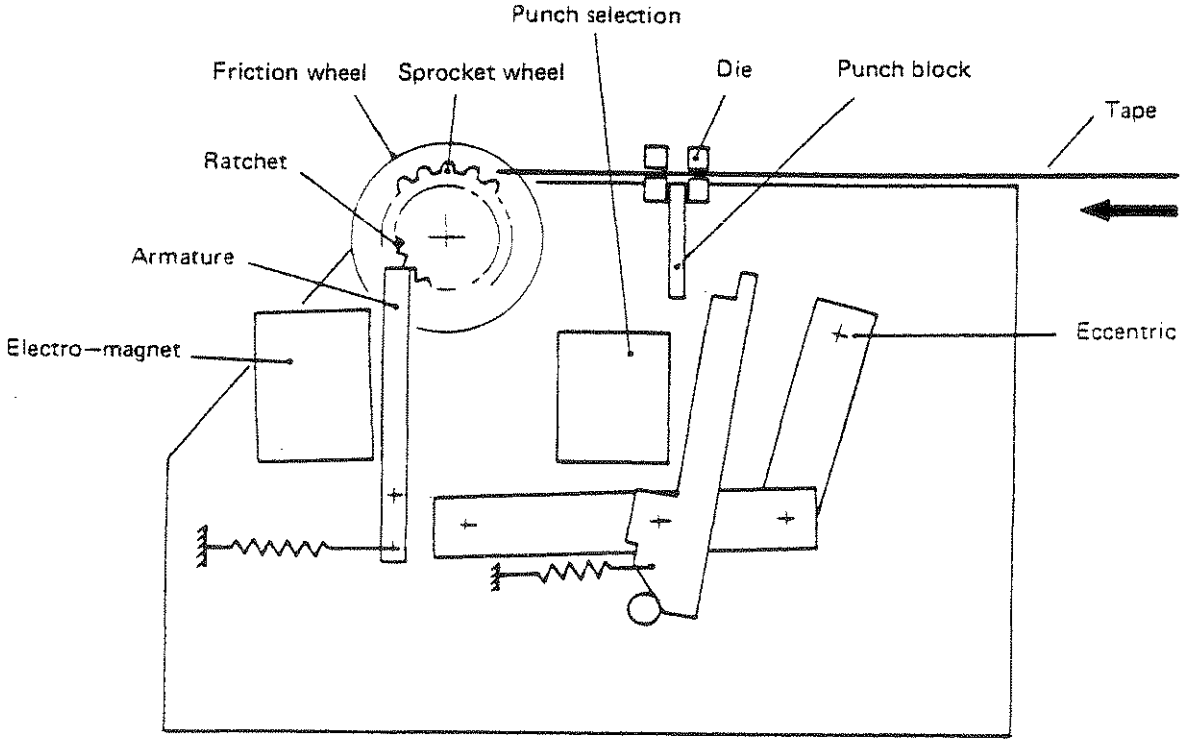
Tape drive is provided by a sprocket wheel integral with a ratchet wheel, forming one of the two friction plates. The other one is driven by a notch-belt, itself driven by a DC motor. The armature of an electromagnet holds back, or releases, the ratchet as a function of the current applied to it.

Tape guidance is provided by a guide equipped with a presser and a tension reducer device.

Electromechanical punching is carried out by means of the following equipment :

- punch and die block,
- eccentric,
- punch selection system,
- punch return system.

NOTE : A TAPE STORE and chad drawer are fitted to the TAPE PUNCH. The TAPE STORE is equipped with a tape out switch.



PRINTER

Function

The PRINTER is used to write messages on standard paper. The type of message, whether prepared locally, transmitted or received, can be distinguished by a different style of writing :

A LOCALLY PREPARED MESSAGE IS PRINTED IN CHARACTERS
SLANTING TO THE LEFT
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

A TRANSMITTED MESSAGE IS PRINTED IN CHARACTERS
SLANTING TO THE RIGHT
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

A RECEIVED MESSAGE IS PRINTED IN UPRIGHT CHARACTERS
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

This procedure indicates the type of message either on the original or the copies.

Description

The PRINTER consists of :

- a needle type PRINTING DEVICE assembled on a carriage,
- a carriage advance and return to line beginning system including :
  . the SENSOR,
  . the DRIVE MOTOR,
- PAPER ADVANCE,
- PRESSURE ROLLERS,
- a line feed control device including :
  . the LINE FEED MOTOR,
  . the PLATEN,
- a control device for ink ribbon advance and reverse feed comprising :
  . LEFT-HAND RIBBON module,
  . RIGHT-HAND RIBBON module.

PRINTING DEVICE

Function

The characters are printed according to a "mosaïc" type character definition of 7 lines and (5 + 4) columns. A set of points is used to form each character as shown in the table on next page. Printing is carried out by impact through the ink ribbon.

Description

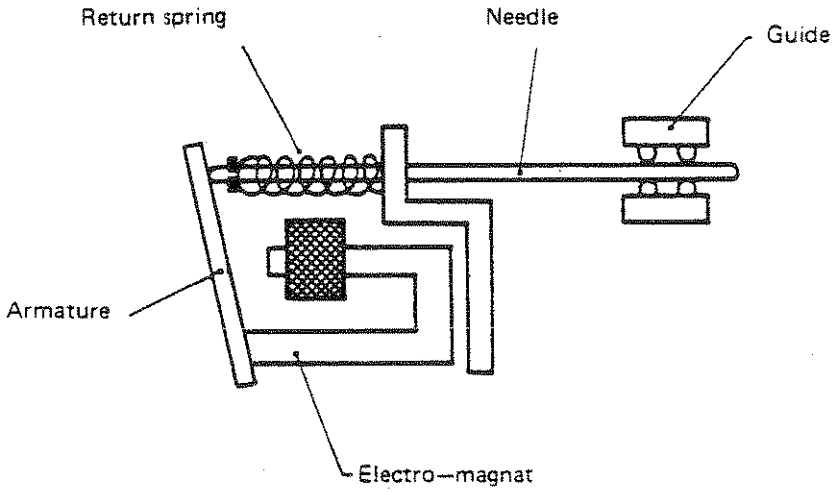
The PRINTING DEVICE comprises :

- 7 needles fitted in a guide,
- 7 electromagnets with armatures,
- 7 return springs.

Needle movement control is provided by an appropriate sequence delivered by the "PIA IMP" board. The 7 needles are returned by springs at control's end.

A knurl-knob adjusts the distance between the PRINTING DEVICE and the paper.

The adjustment depends on the number of copies and on the paper used.



CHARACTER SET

MOTIONS →					LETTERS				FIGURES			
					0	0	1	1	0	0	1	1
					0	1	0	1	0	1	0	1
5	4	3	2	1	columns / lines							
		0	0	0	0			T	Q			5	9
		0	0	1	1	E	D	Z	B	J	#	+	?
		0	1	0	2		R	L	G		4	'	⊠
		0	1	1	3	A	J	W		—	&	2	
		1	0	0	4		N	H	M		"	⊠	"
		1	0	1	5	S	F	Y	X	'	⊠	6	/
		1	1	0	6	I	C	P	V	8	:	0	=
		1	1	1	7	U	K	Q		7	(	1	

⊠ Reserved for characters intended for national use.

CARRIAGE ADVANCE AND RETURN-TO-BEGINNING OF LINE SYSTEM

. SENSOR

The SENSOR is mechanically coupled to the DRIVE MOTOR shaft and supplies the following signals :

- control of PRINTING DEVICE as a function of its position,
- control of DRIVE MOTOR as a function of instructions sent to the PRINTING DEVICE :
  - . movement direction,
  - . movement speed,
  - . position.

From these signals, the associated electronic unit corrects the orders issued so that the movements of the PRINTING DEVICE are in conformity with pre-established profiles.

The information transmitted by the drive unit to the PRINTER control logic is a follows :

"Character" (CAR)

This signal gives a transition each time the PRINTING DEVICE meets a stop position on the line.

"Column" (COL)

This signal gives a transition each time the PRINTING DEVICE meets a control position.

"Direction" (Sens)

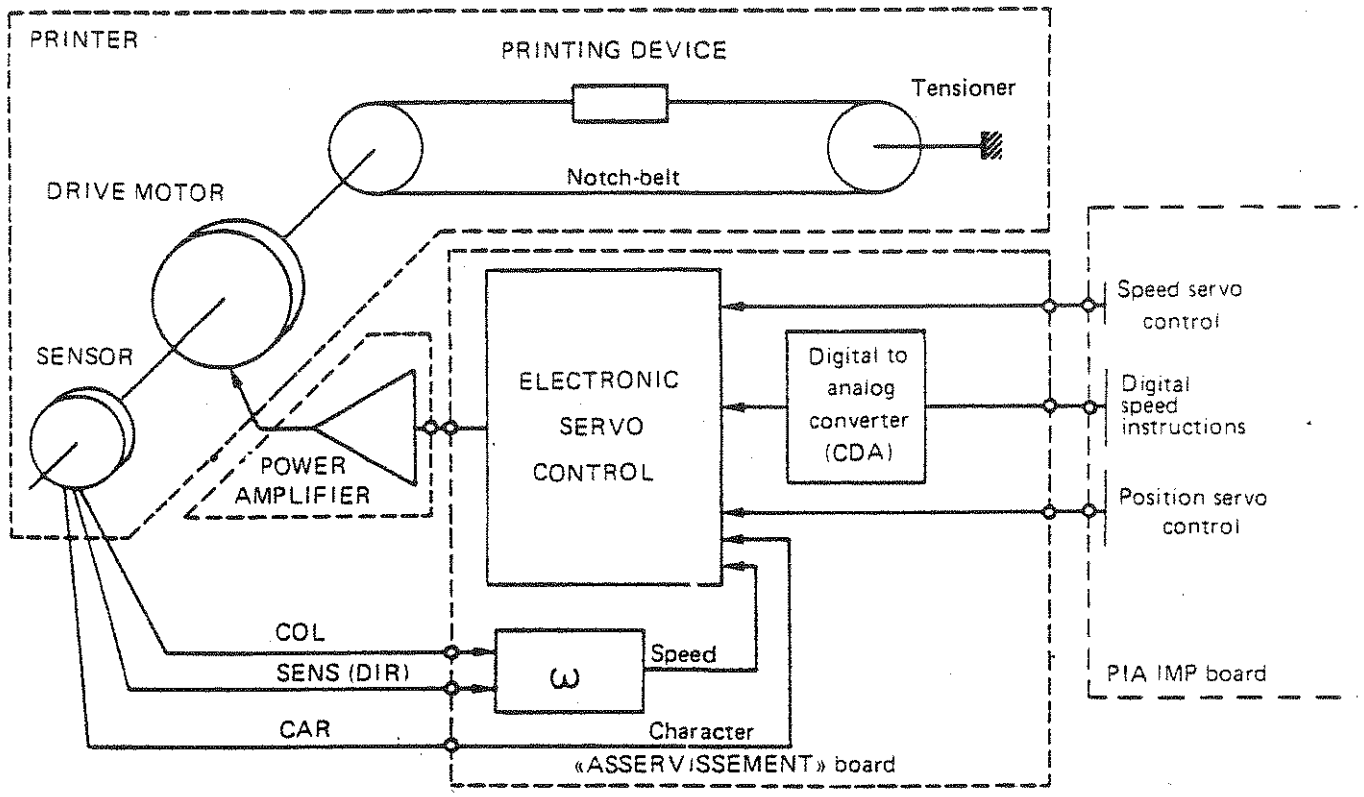
This signal is associated with the "column" signal so as to detect the direction of movement of the PRINTING DEVICE (right to left or left to right).

The speed and position servo loops are analog loops ; the digital speed instructions generated by the logic are converted into analog signals by a digital-to-analog converter (CDA).

. DRIVE MOTOR

The advance and return to beginning of line of the PRINTING DEVICE are carried out by means of a DC motor. It is slaved to data generated in the SENSOR and processed through the "ASSERVISSEMENT" and "PIA IMP" boards.

Motor movements are transmitted to the PRINTING DEVICE through two pulleys and a notch-belt.



PAPER ADVANCE

Basically, this consists of a paper store. A mechanical device receives 210 mm or 216 mm wide paper rolls. The paper store is equipped with a paper out switch. The closing of the switch contact results in :

- printing of the alarm message text,
- switching the unit in the inhibited mode.

LINE FEED CONTROL DEVICE

The paper drive is of the friction type. The paper is applied against the PLATEN by PRESSURE ROLLERS.

The PLATEN is rotated by a stepper motor (LINE FEED MOTOR). After printing, the message is cleared from the printing device to provide easy reading.

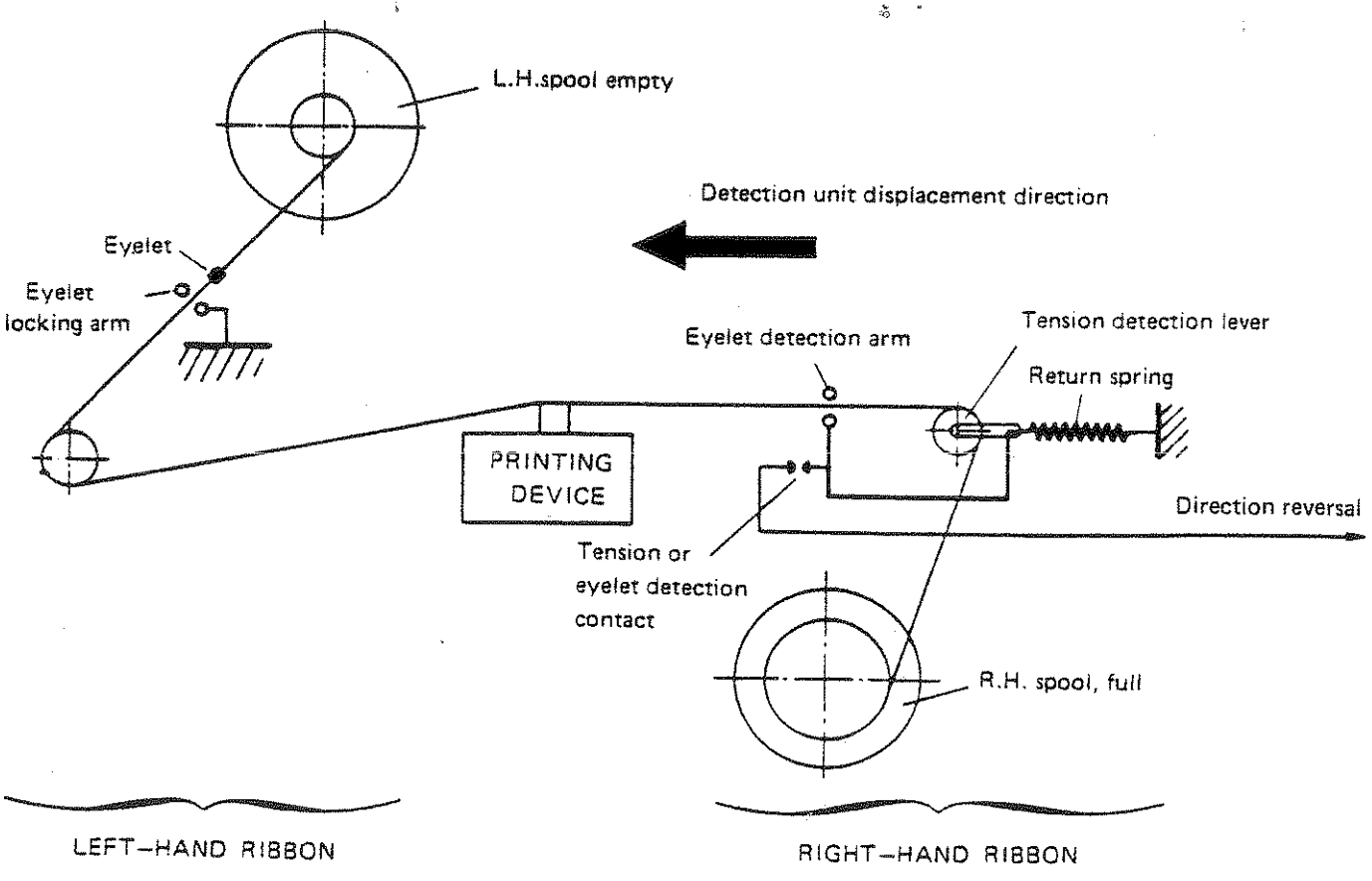
RIBBON ADVANCE AND REVERSE FEED

The drive device for the ink ribbon essentially comprises two autonomous modules :

- LEFT-HAND RIBBON,
- RIGHT-HAND RIBBON.

The LEFT-HAND RIBBON, basically comprising a DC motor, ensures that the ink ribbon tension is constant.

The RIGHT-HAND RIBBON, controls the movement of the ink ribbon and its reverse feed. Reversal is triggered when the ribbon eyelet locks in the eyelet detection arm or upon detection of a tension increase.



PRINTED CIRCUIT BOARDS

Function

The set of electronic boards controls the unit and the various modules.

Description

The electronic part consists of :

- an electronic boards rack containing the mother board in which are plugged the following boards :

. "ALIMENTATION" board	: groups ± 15 V, + 5 V, + 30 V power supplies, restart circuit and DRIVE MOTOR amplifier.
. "ASSERVISSEMENT" board	: generates DRIVE MOTOR amplifier signal.
. "PIA IMP" board	: contains PRINTER/bus input-output circuit (print, ribbon advance and reverse feed).
. "PIA ERD + IT/ADA" board	: contains TRANSMISSION/bus input-output circuit (way, interrupts, real time clock).
. "PIA LECTEUR + AMPLI" board	: contains TAPE READER/bus and ANSWER-BACK UNIT/bus input-output circuit.
. "PIA CLAVIER + MPU" board	: contains KEYBOARD/bus input-output circuit and microprocessor.
. "RAM + RPROM" board	: contains working memories (dynamic memories RAM) and program memories (read-only memory RPROM).
. "PIA PERFO + AMPLI" board	: contains TAPE PUNCH/bus input-output circuit and a fraction of PRINTER/bus input-output circuit (line feed).
. "NUMEROTATION ABREGEE" board	: contains subscriber numerals/bus input-output circuit.
. "PERSONNALISATION" board	: contains the options/bus input-output circuit (remote control and miscellaneous instructions).

- an "ADAPTATION" board ensures interface between the unit and the transmission way,

- a power supply, consisting of the following modules :

  . MAINS CABLE : allows the unit to be connected to the mains.

  . MAINS FILTER : provides mains filtration and contains the LIGHTNING ARRESTOR ("PARAFOUDRE" board).

  . TRANSFORMER : supplies AC voltages.

  . "ALIMENTATION" board : see "PRINTED CIRCUIT BOARDS" paragraph.

  . POWER AMPLIFIER : contains power transistors for + 5 V and + 30 V power supplies, and amplifier power stage for the DRIVE MOTOR. This module is mounted on the radiator at the rear of the unit.

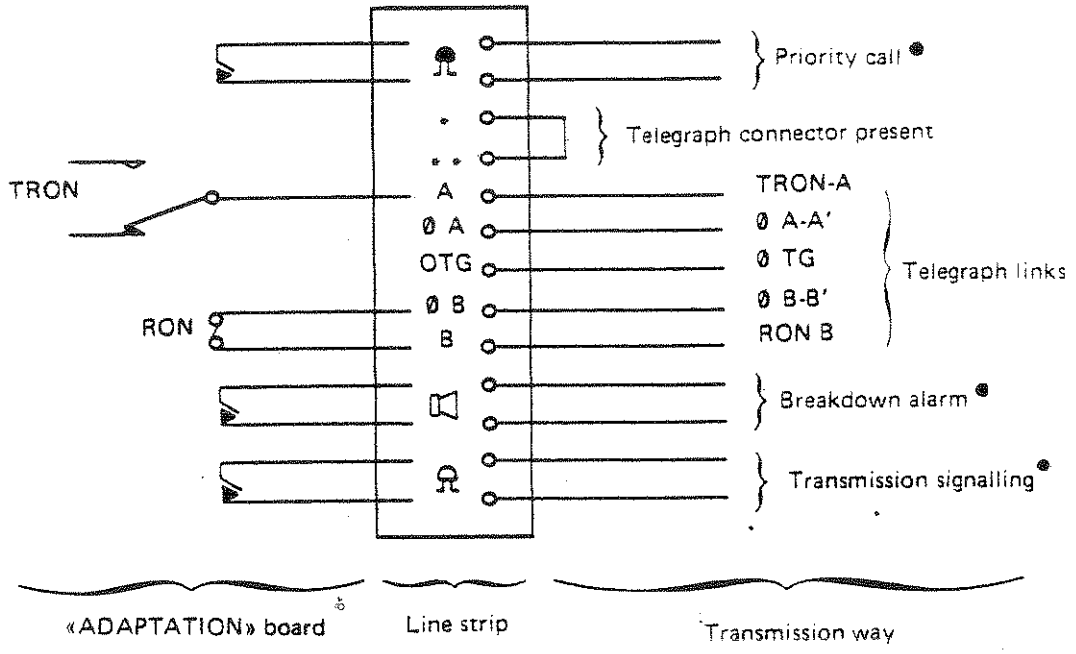
  . $\pm$ 12 V POWER SUPPLY : contains rectifier and filter for DRIVE MOTOR power supply.

  . POWER SUPPLY PROTECTION : ensures the protection at each transformer secondary outlets.

PLACING IN OPERATION

. Connection to a transmission way

The line terminal strip, located at the rear of the unit, is used for connection to a transmission way.



The following functions :

- Priority call,
- Breakdown alarm,
- Transmission signalling,

can be signalled by means of devices (luminous, acoustic, etc.) mounted on the exterior of the unit.

Relay contacts are accessible on the line strip.

The electrical characteristics of the relay contacts are as follows :

- maximum voltage : 100 V,
- maximum current : 250 mA,
- maximum cut-off capacity : 10 W,
- contact resistance : < 150 mΩ.

• This function may differ according to the type of unit.

To connect the telegraph links to the transmission way, refer to the technical sheet entitled : "DIFFERENT CASES OF TELEGRAPH CONNECTIONS".

2

MAINTENANCE MANUAL

C O N T E N T S

P L A T E S

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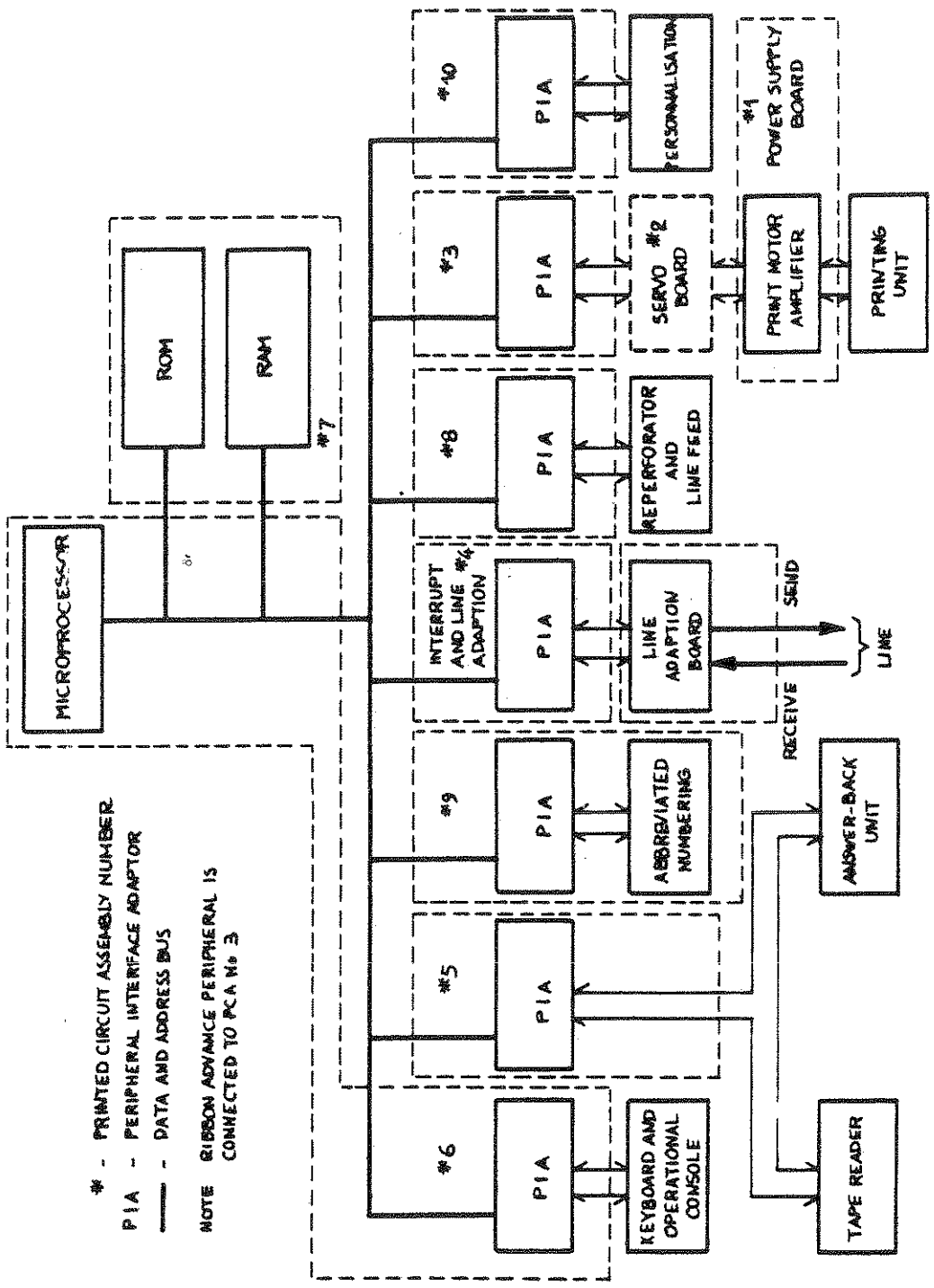
1 – OPERATIONAL DIAGRAM OF MODULES



TX20 BLOCK DIAGRAM

MODULE	LOCATION OF ASSOCIATED ELECTRONICS	
OPERATIONAL CONSOLE	"PIA CLAVIER + MPU" board	6
	"PERSONNALISATION" board	10
	"RAM + RPROM" board	7
KEYBOARD	"PIA CLAVIER + MPU" board	6
ANSWER-BACK UNIT	"PIA LECTEUR + AMPLI" board	5
	"PERSONNALISATION" board	10
	"RAM + RPROM" board	7
TAPE READER	"PIA LECTEUR + AMPLI" board	5
	"RAM + RPROM" board	7
TAPE PUNCH	"PIA PERFO + AMPLI" board	8
	"PERSONNALISATION" board	10
	"RAM + RPROM" board	7
TAPE STORE	"PIA PERFO + AMPLI" board	8
PRINTER, consisting of :		
. PRINTING DEVICE	"PIA IMP" board	3
. SENSOR	"ASSERVISSEMENT" board	2
. DRIVE MOTOR	POWER AMPLIFIER	
	"ALIMENTATION" board	1
	"ASSERVISSEMENT" board	2
. PAPER ADVANCE	"PIA ERD + IT/ADA" board	4
. LINE FEED MOTOR	"PIA PERFO + AMPLI" board	8
	"PERSONNALISATION" board	10
. RIBBON ASSEMBLY (LEFT)	"PIA IMP" board	3
. RIBBON ASSEMBLY (RIGHT)	"PIA IMP" board	3
	"PIA PERFO + AMPLI" board	8
	"PIA ERD + IT/ADA" board	4
"NUMEROTATION ABREGEE"	"PIA CLAVIER + MPU" board	6
TRANSMISSION UNIT	"PIA ERD + IT/ADA" board	4
	"ADAPTATION" board	TG4
Power supply	POWER AMPLIFIER	
	"ALIMENTATION" board	1
	± 12 V POWER SUPPLY	
	TRANSFORMER	
	MAINS FILTER	
	"PARAFOUDRE"	
	MAINS CABLE	
	"RAM + RPROM" board	

2 – GENERAL

This MAINTENANCE MANUAL is to assist the technician at the operating site.

Each function may concern several modules in the unit. In case of opération failure, proceed as follows :

- select the defective function,
- localize the defective module using the troubleshooting flow charts,
- replace the defective module, according to the chapter REMOVAL AND INSTALLATION OF MODULES.

When a function is defective, the failure may be located in an electronic board or in an electro-mechanical device. The troubleshooting flow charts include the principal possible failures and allow to localize the defective module.

When a defective module has been detected, it is important to replace it and to install the previously removed modules, in order to set the unit in its operating condition again.

CAUTION : Before any module disconnection or connection, it is mandatory to switch off the unit.

NOTE 1 : When replacing the PIA LECTEUR + AMPLI board, remove the ANSWER-BACK CODE memory package (Y3) and plug it on the new board.

NOTE 2 : When replacing the RAM + RPROM board, when necessary transfer each memory package from the previous to the same location on the new board.

3 – TROUBLESHOOTING FLOW CHARTS

TROUBLESHOOTING FLOW CHARTS ORGANIZATION

The general troubleshooting flow chart, allows the selection of the defective function (ex. : PRINTING 11). Each function is numbered from 1 to 11. At each function corresponds a list of failures, identified through two numbers according to the following scheme :

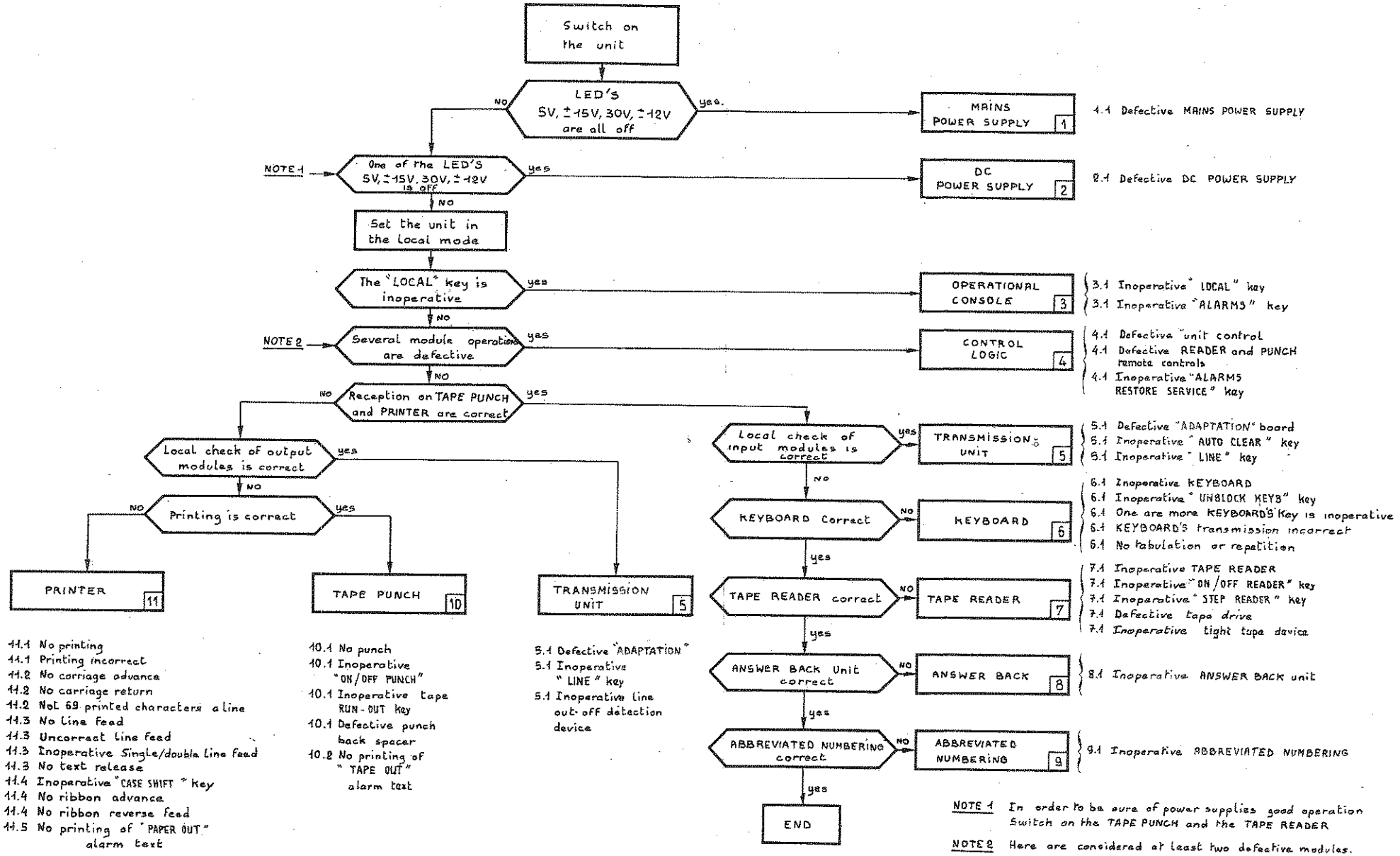
- the first one corresponds to the defective function,
- the second one corresponds to the relevant flow chart number.

EXAMPLE : No printing 11.1

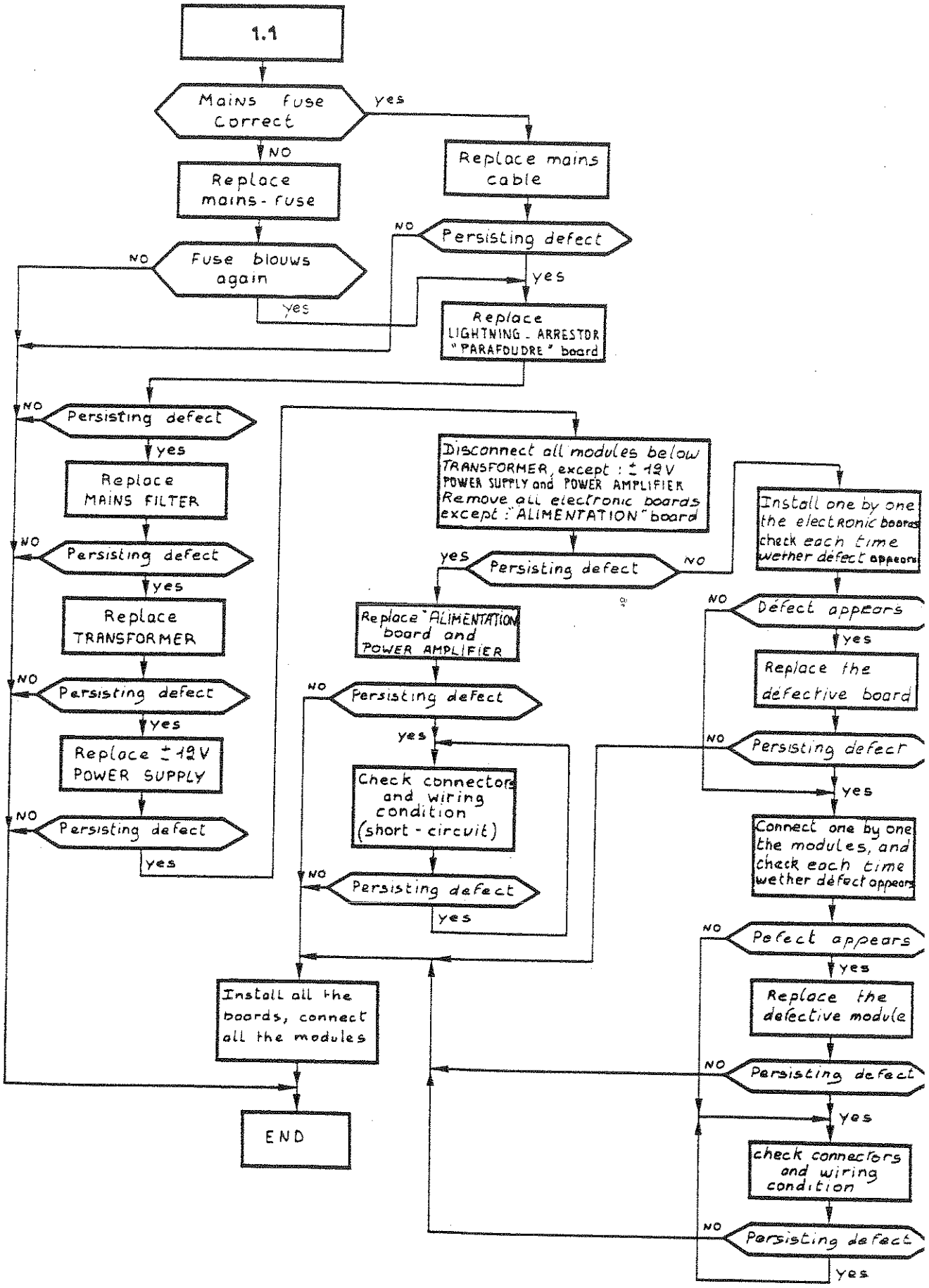
11 → PRINTING function.

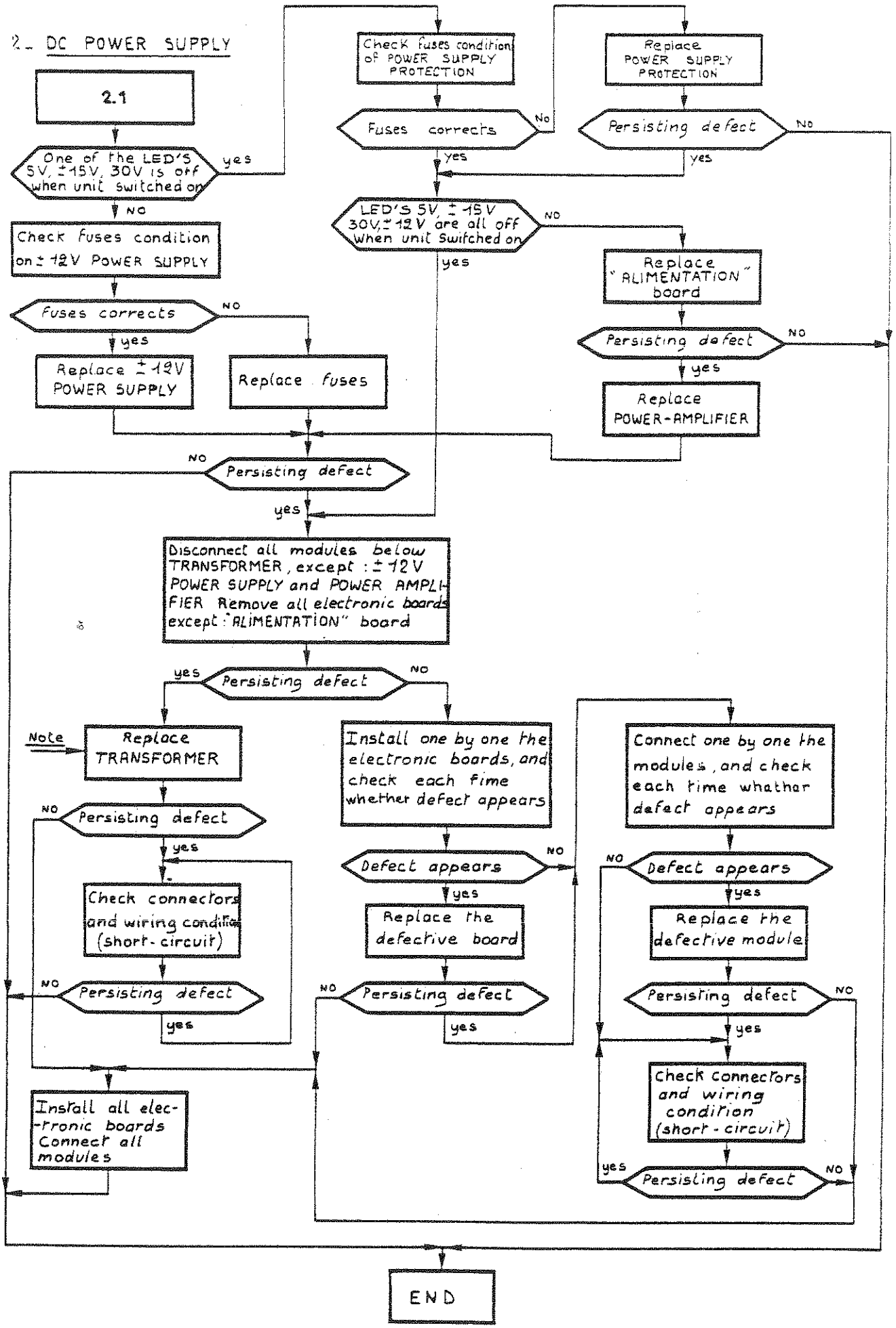
1 → PRINTING function first troubleshooting flow chart.

GENERAL TROUBLE SHOOTING FLOW CHART



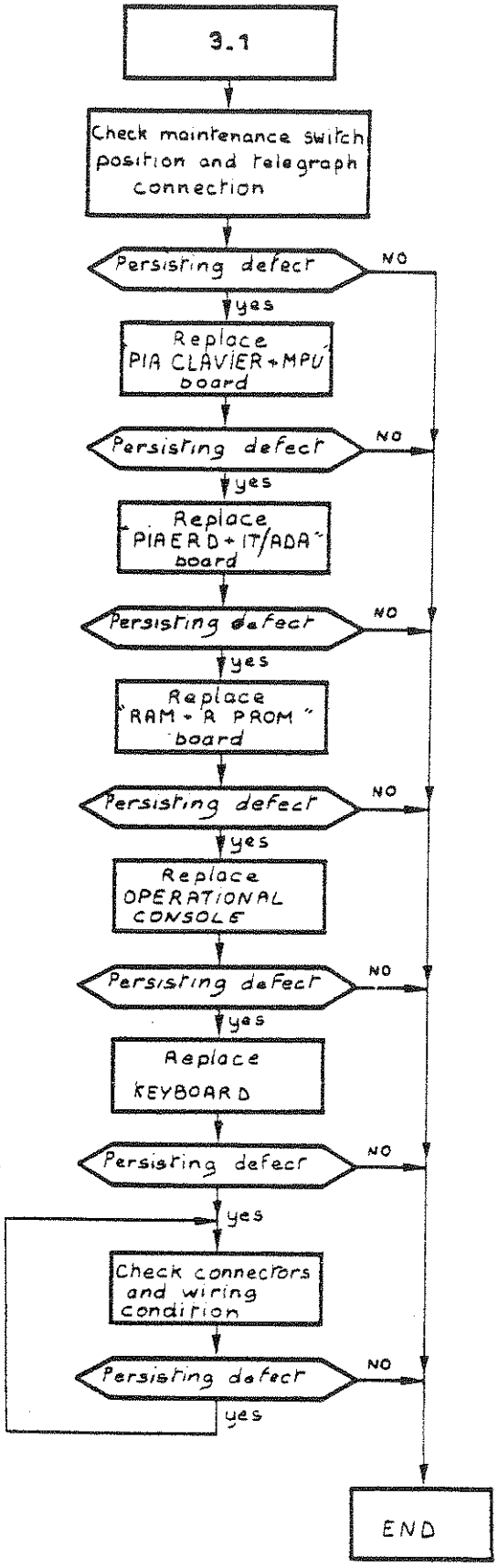
1 - MAINS POWER SUPPLY



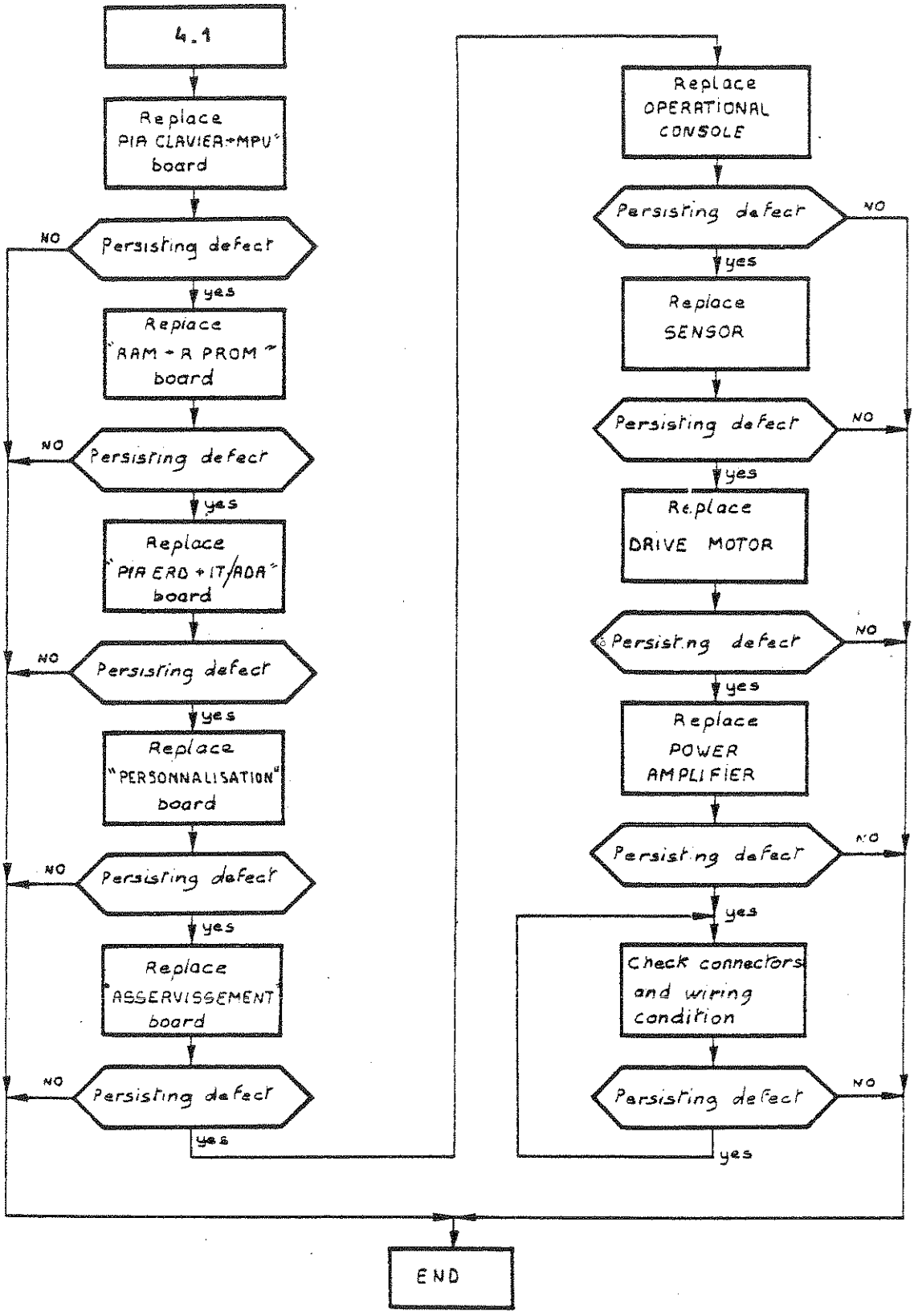


NOTE : Replace the latter whether is was not changed in 1_1

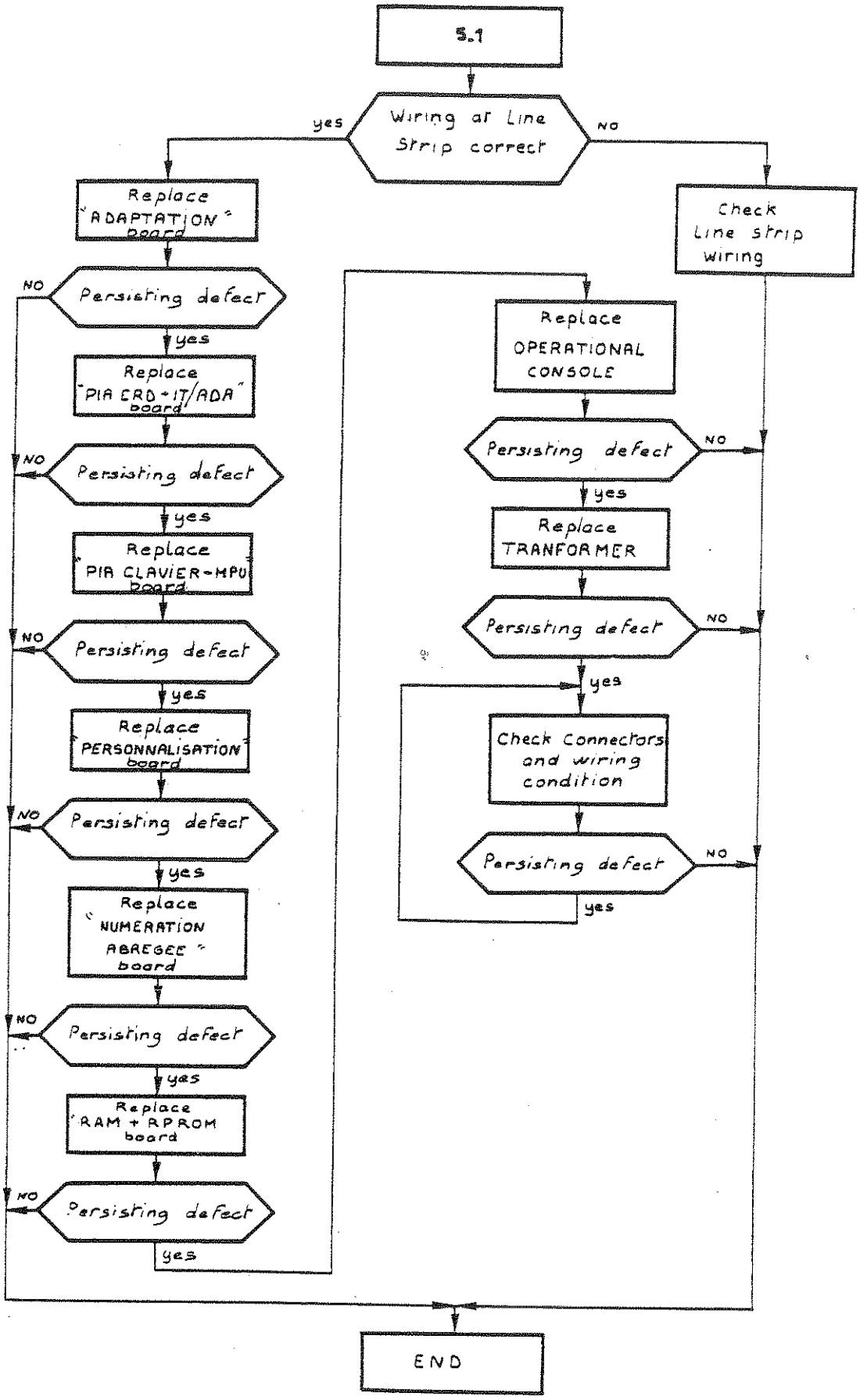
3_ OPERATIONAL CONSOLE



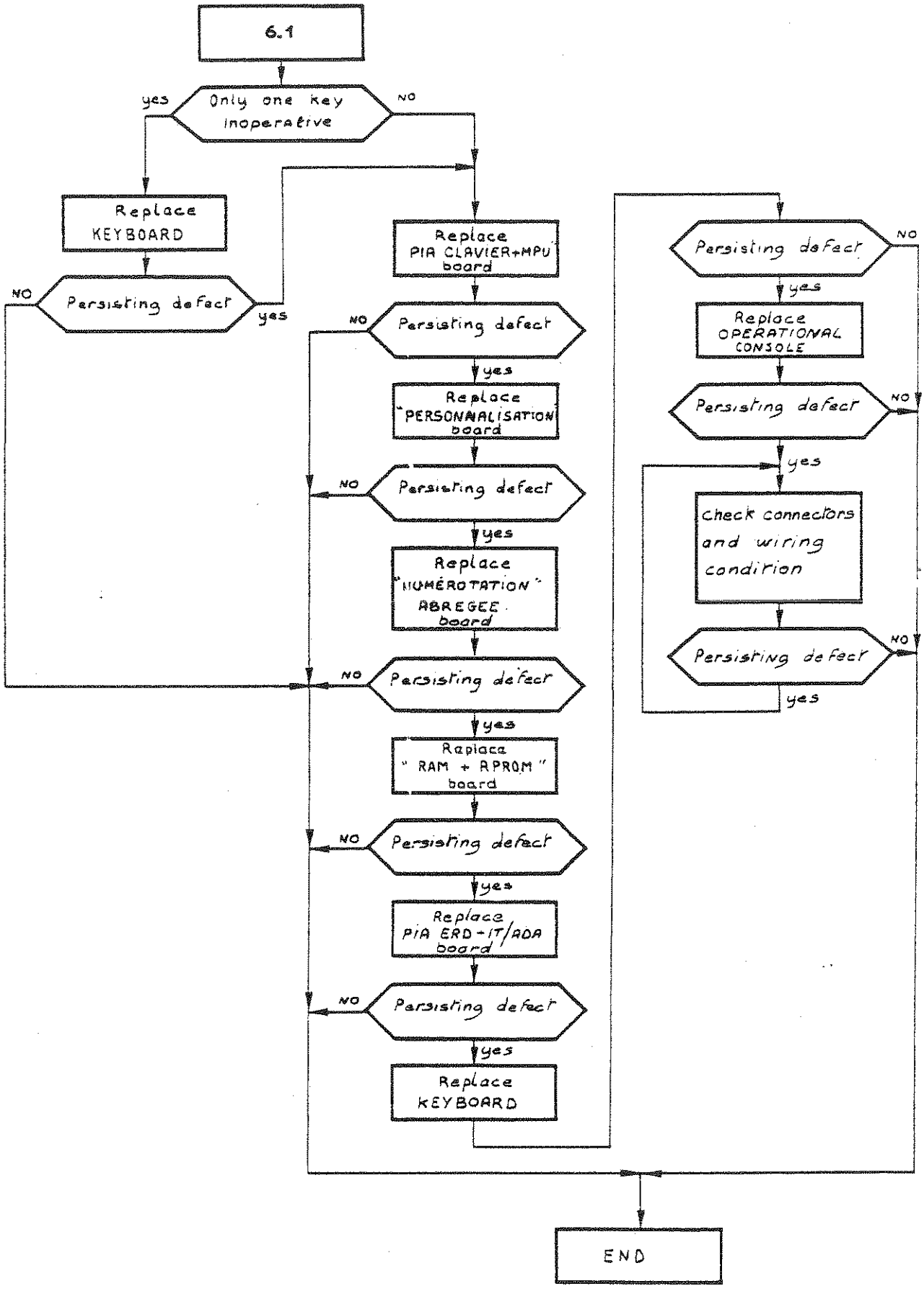
4 - CONTROL LOGIC



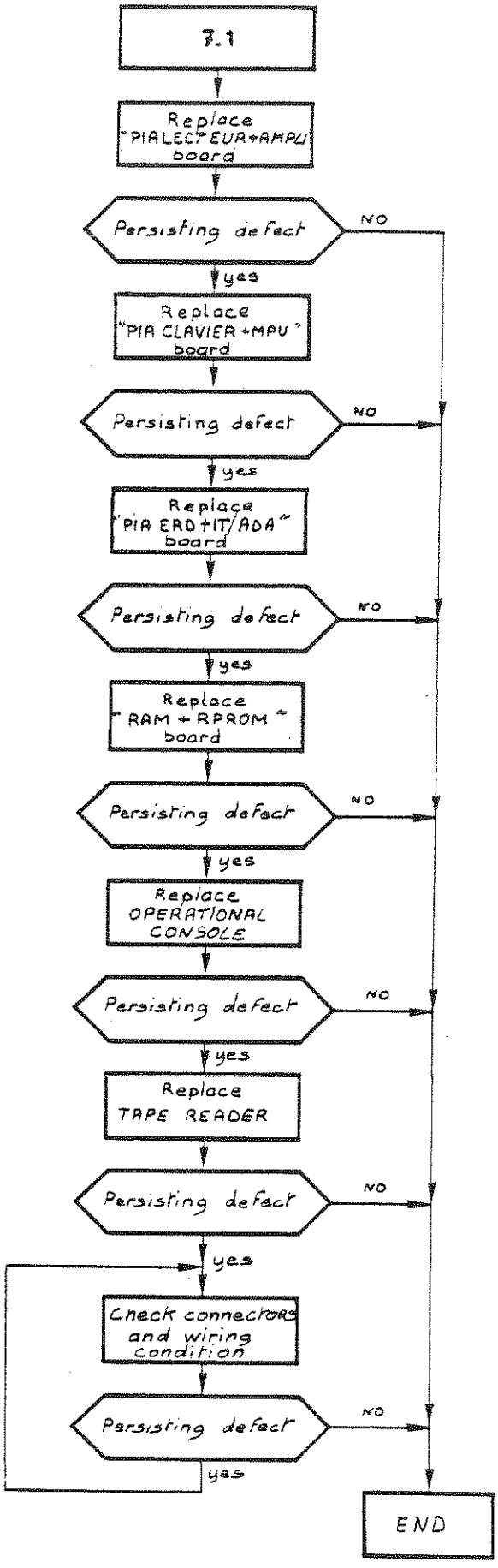
5_ TRANSMISSION UNIT



6 - KEYBOARD

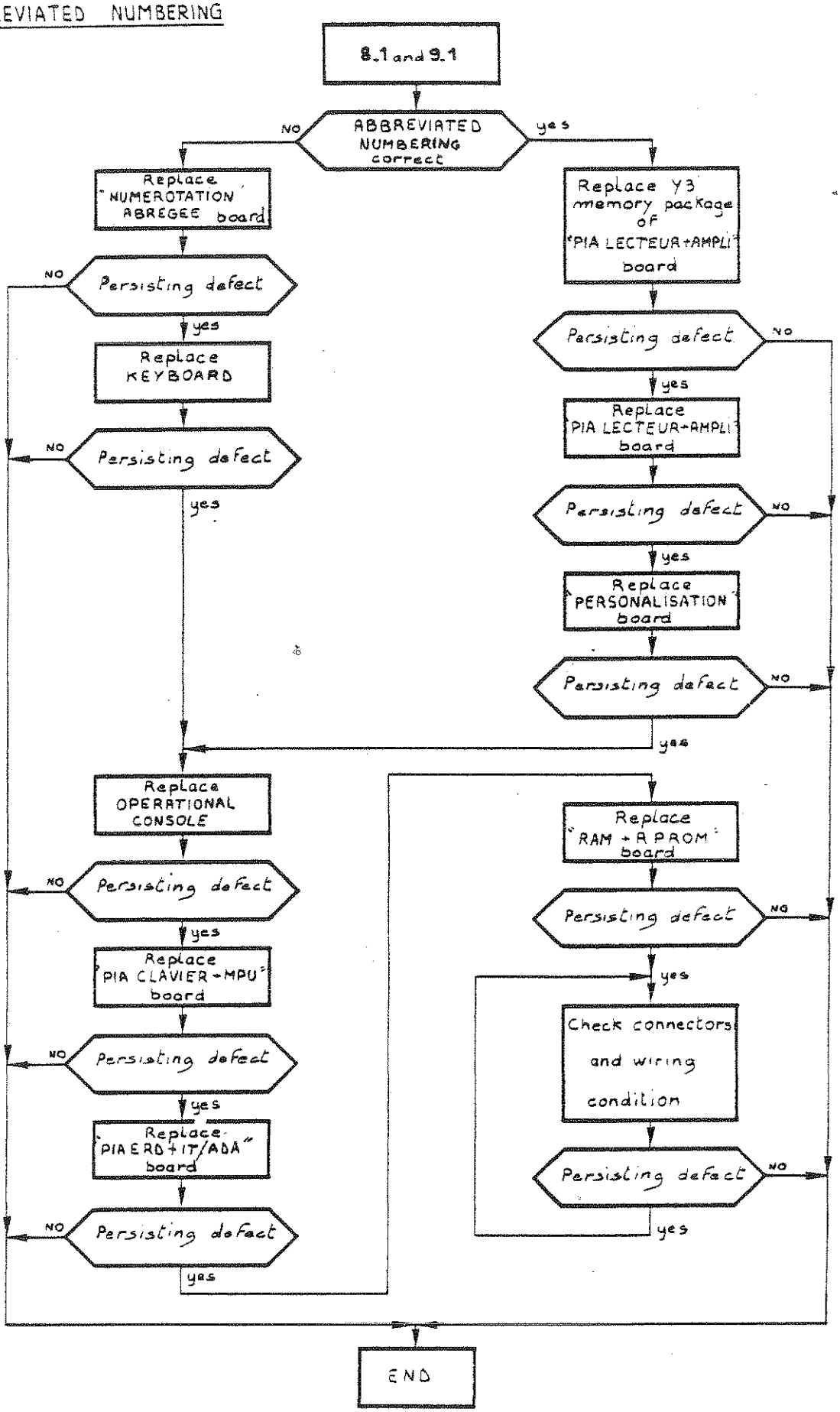

6.1
Only one key inoperative
yes
NO
Replace KEYBOARD
Persisting defect
NO
yes
Replace PIA CLAVIER+MPU board
Persisting defect
NO
yes
Replace "PERSONNALISATION" board
Persisting defect
NO
yes
Replace "NUMÉROTATION ABREGEE" board
Persisting defect
NO
yes
Replace " RAM + RPROM " board
Persisting defect
NO
yes
Replace PIA ERD-IT/ADA board
Persisting defect
NO
yes
Replace KEYBOARD
Persisting defect
NO
yes
Replace OPERATIONAL CONSOLE
Persisting defect
NO
yes
check connectors and wiring condition
Persisting defect
NO
yes
END

7- TAPE READER

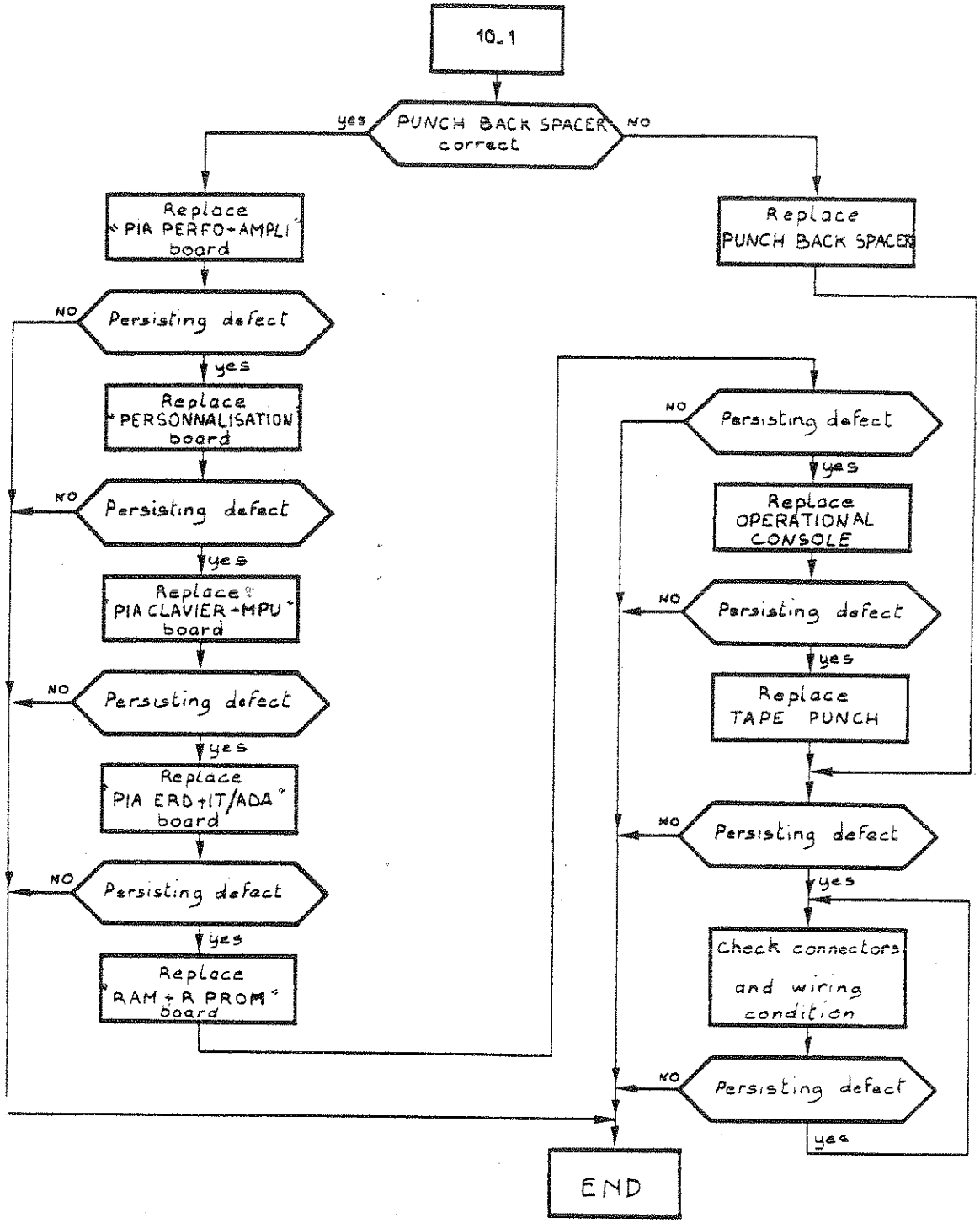


8_ ANSWER BACK CODE

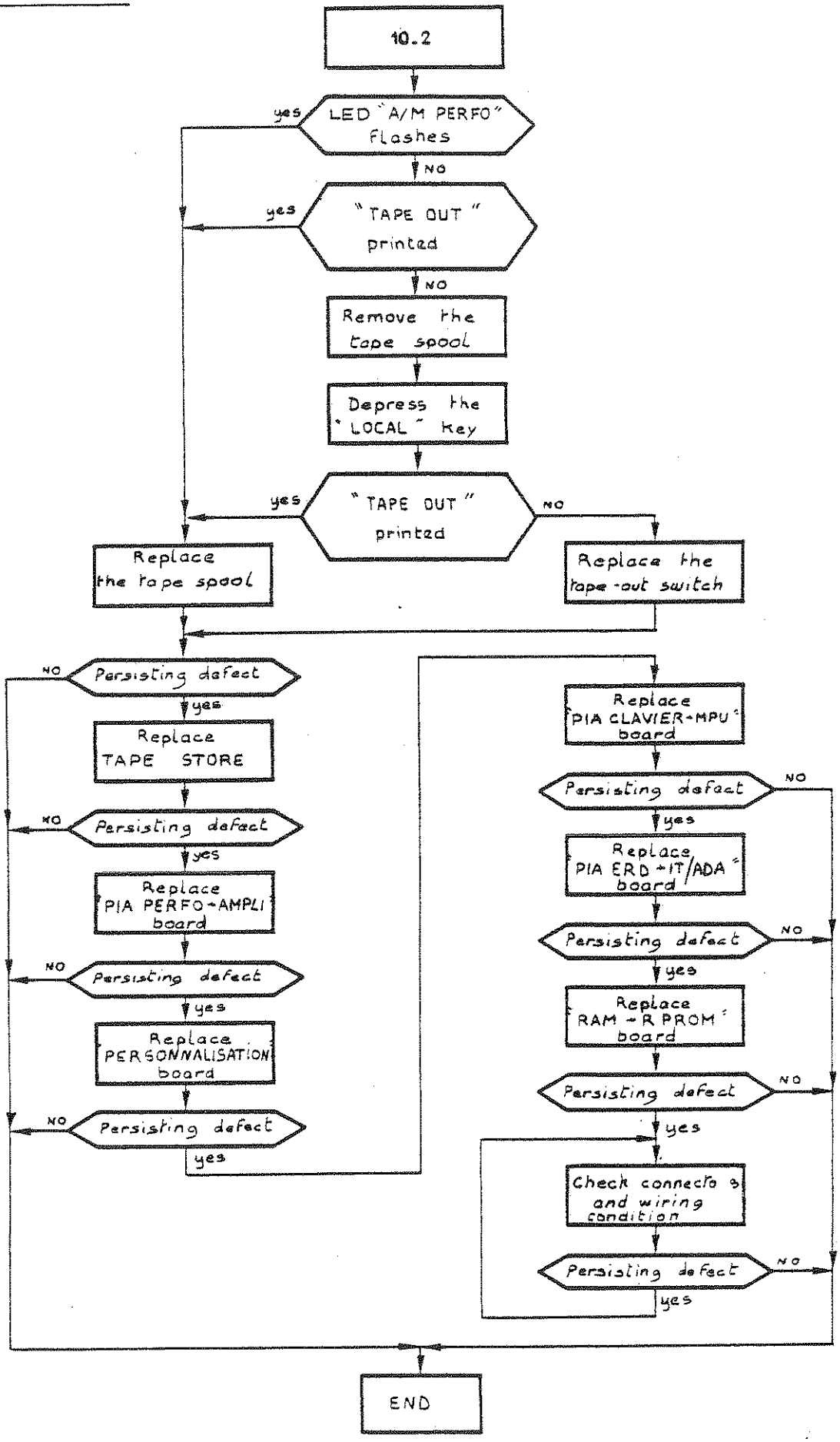
9_ ABBREVIATED NUMBERING



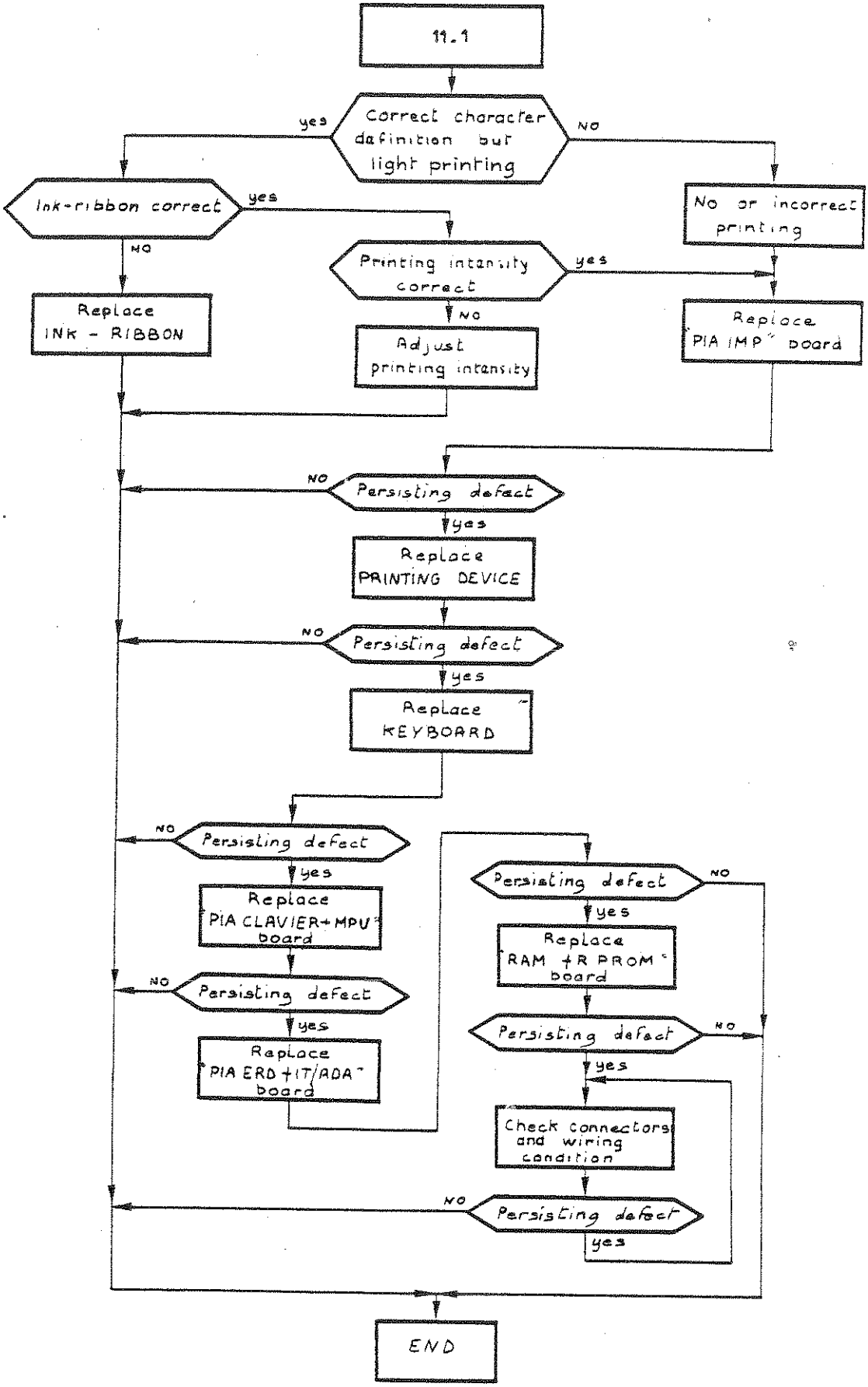
10 - TAPE PUNCH



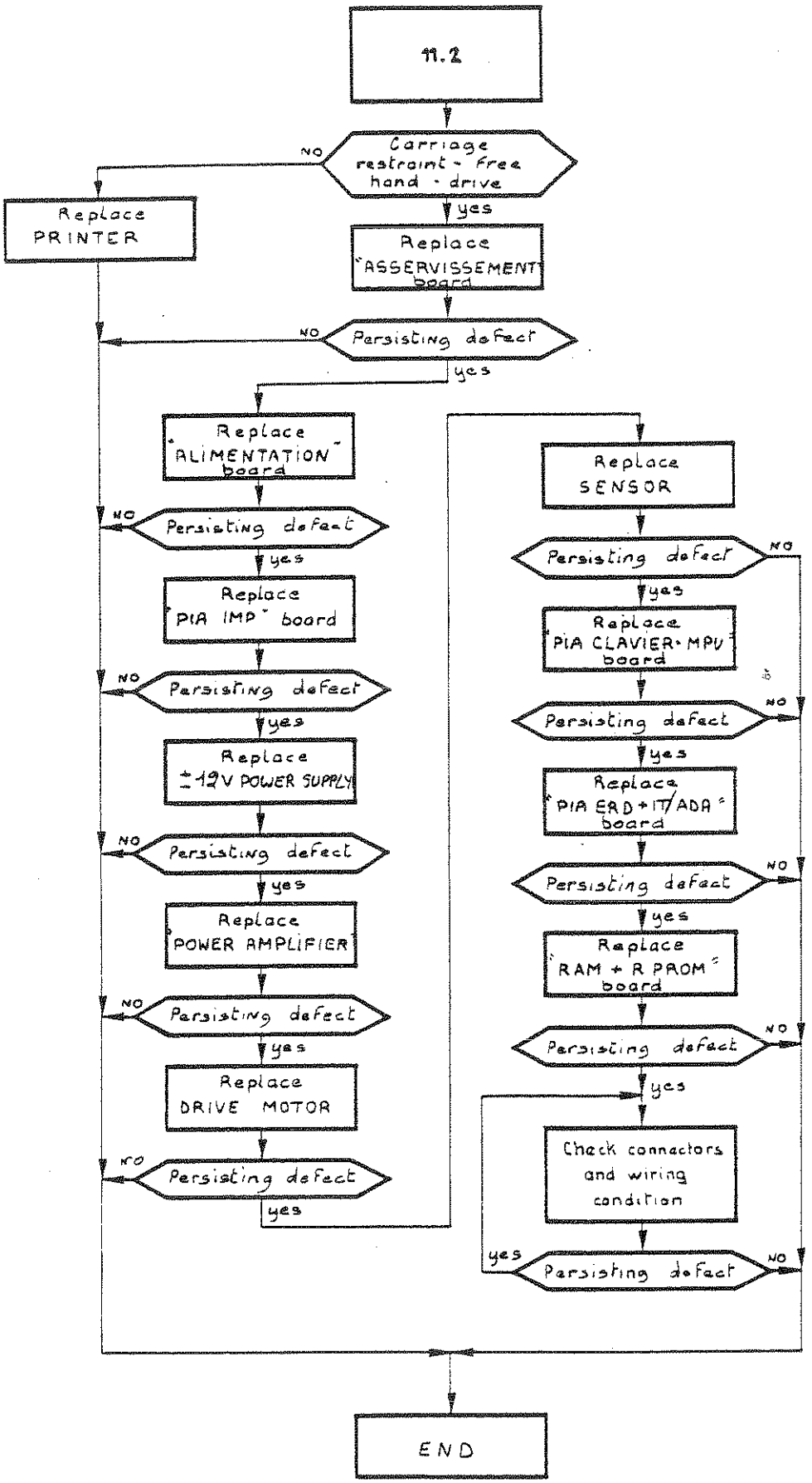
10 - TAPE PUNCH



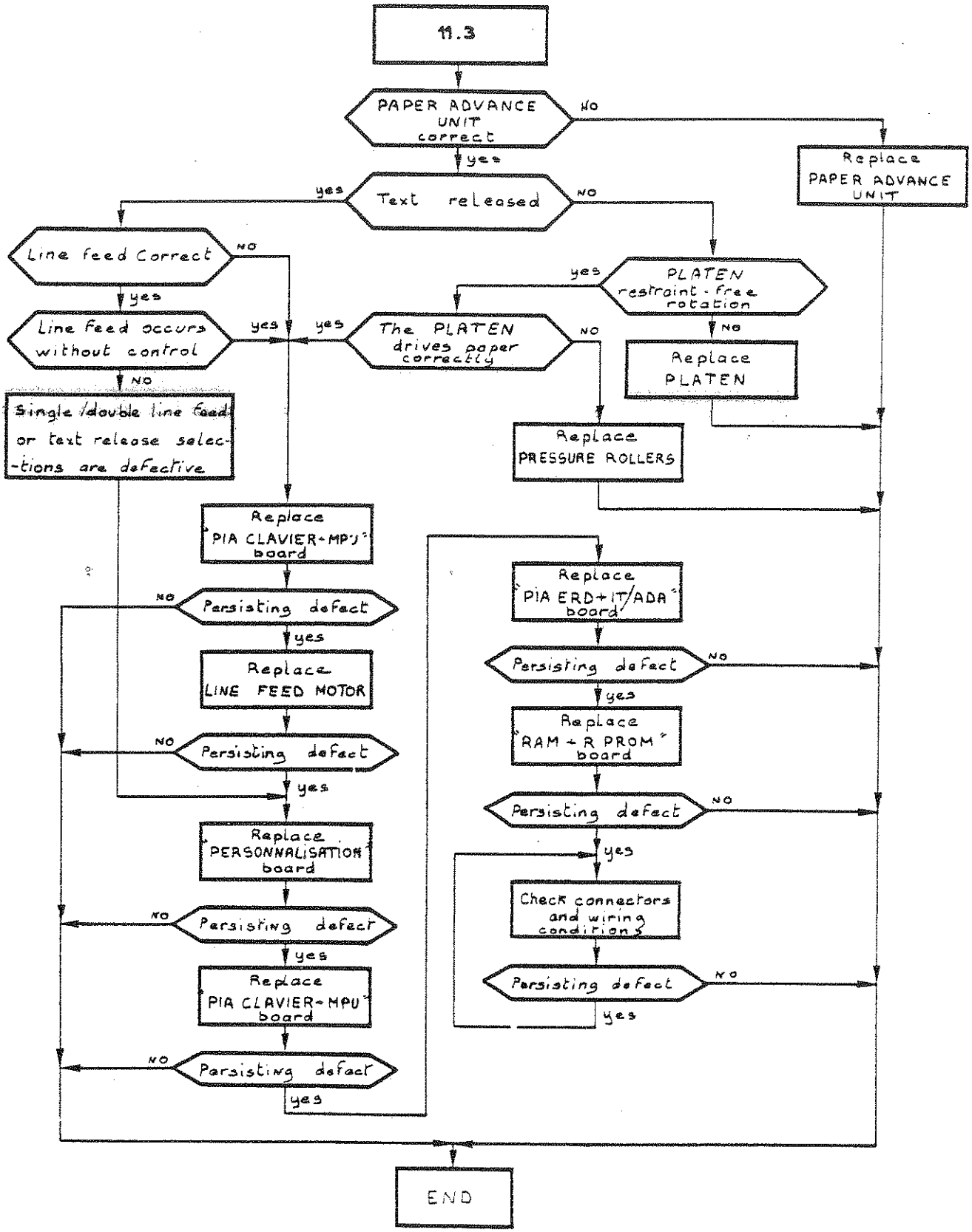
11 - PRINTER


11.1
Correct character definition but light printing
yes
NO
Ink-ribbon correct
yes
NO
No or incorrect printing
Printing intensity correct
yes
NO
Replace INK - RIBBON
Adjust printing intensity
Replace "PIA IMP" board
NO
Persisting defect
yes
Replace PRINTING DEVICE
NO
Persisting defect
yes
Replace KEYBOARD
NO
Persisting defect
yes
Replace "PIA CLAVIER+MPU" board
NO
Persisting defect
yes
Replace "PIA ERD+IT/ADA" board
Persisting defect
NO
yes
Replace "RAM +R PROM" board
Persisting defect
NO
yes
Check connectors and wiring condition
NO
Persisting defect
yes
END

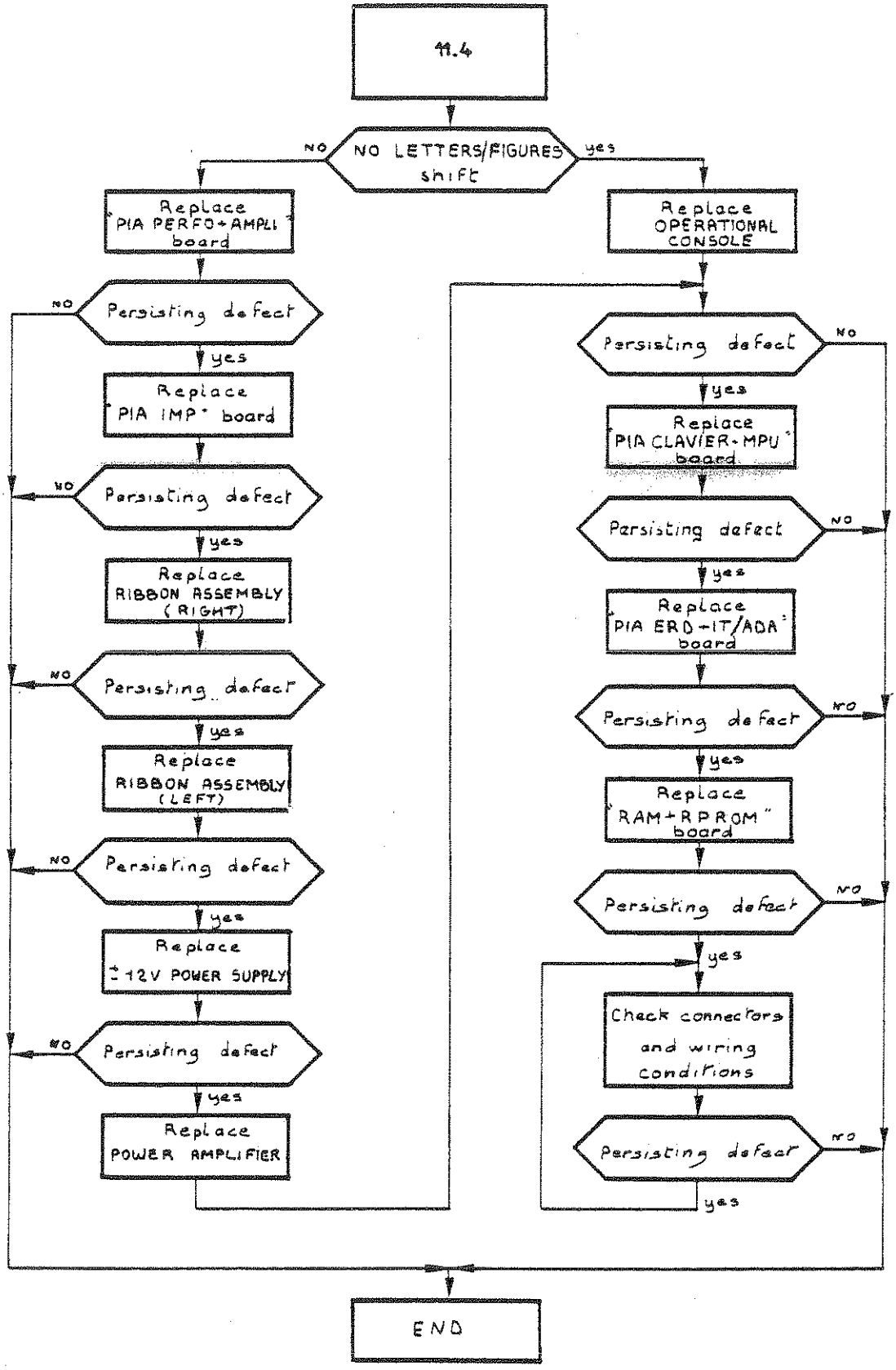
11_ PRINTER


11.2
Carriage restraint - free hand - drive
NO
yes
Replace PRINTER
Replace "ASSERVISSEMENT" board
Persisting defect
NO
yes
Replace "ALIMENTATION" board
Persisting defect
NO
yes
Replace "PIA IMP" board
Persisting defect
NO
yes
Replace ±12V POWER SUPPLY
Persisting defect
NO
yes
Replace POWER AMPLIFIER
Persisting defect
NO
yes
Replace DRIVE MOTOR
Persisting defect
NO
yes
Replace SENSOR
Persisting defect
NO
yes
Replace "PIA CLAVIER-MPU" board
Persisting defect
NO
yes
Replace "PIA ERD+IT/ADA" board
Persisting defect
NO
yes
Replace "RAM + R PROM" board
Persisting defect
NO
yes
Check connectors and wiring condition
yes
Persisting defect
NO
END

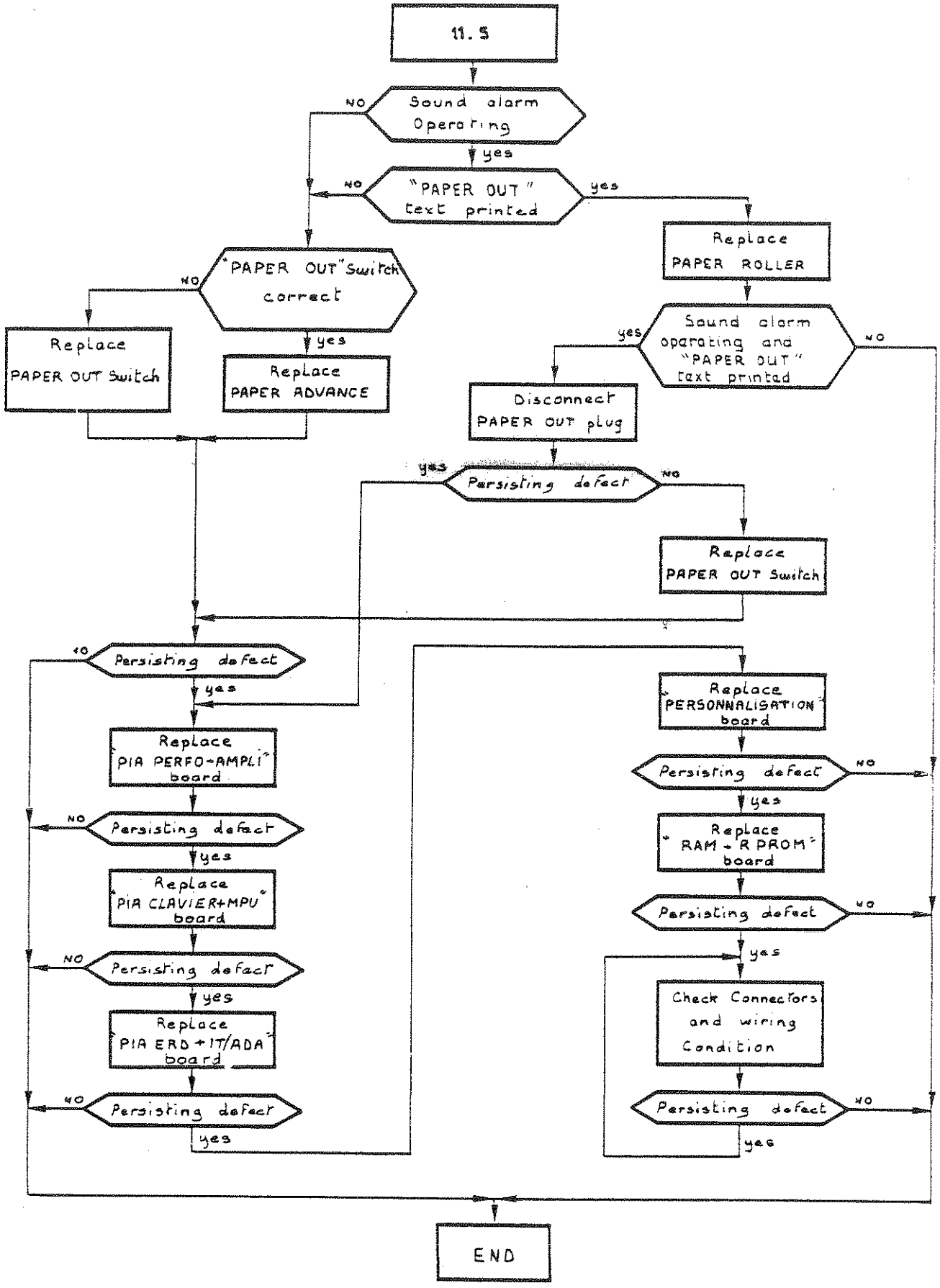
11 - PRINTER


11.3
PAPER ADVANCE UNIT correct
NO
Replace PAPER ADVANCE UNIT
yes
Text released
yes
NO
Line feed Correct
NO
yes
PLATEN restraint-free rotation
yes
Line feed occurs without control
yes
yes
The PLATEN drives paper correctly
NO
NO
Replace PLATEN
NO
Single/double line feed or text release selections are defective
Replace PRESSURE ROLLERS
Replace PIA CLAVIER-MPU board
Replace PIA ERD-IT/ADA board
NO
Persisting defect
yes
Persisting defect
NO
yes
Replace LINE FEED MOTOR
Replace RAM + R PROM board
NO
Persisting defect
yes
Persisting defect
NO
yes
Replace PERSONNALISATION board
Check connectors and wiring conditions
NO
Persisting defect
yes
Persisting defect
NO
yes
Replace PIA CLAVIER-MPU board
NO
Persisting defect
yes
END

11. PRINTER


11.4
NO LETTERS/FIGURES shift
NO
yes
Replace PIA PERFO-AMPLI board
Replace OPERATIONAL CONSOLE
Persisting defect
NO
yes
Replace PIA IMP* board
Replace RIBBON ASSEMBLY (RIGHT)
Replace RIBBON ASSEMBLY (LEFT)
Replace ± 12V POWER SUPPLY
Replace POWER AMPLIFIER
Replace PIA CLAVIER-MPU board
Replace PIA ERD-IT/ADA board
Replace "RAM+RPROM" board
Check connectors and wiring conditions
END

11 - PRINTER


11.5
Sound alarm Operating
NO
yes
"PAPER OUT" text printed
NO
yes
Replace PAPER ROLLER
"PAPER OUT" Switch correct
NO
yes
Replace PAPER OUT Switch
Replace PAPER ADVANCE
Sound alarm operating and "PAPER OUT" text printed
yes
NO
Disconnect PAPER OUT plug
yes
Persisting defect
NO
Replace PAPER OUT Switch
NO
Persisting defect
yes
Replace PIA PERFO-AMPLI board
NO
Persisting defect
yes
Replace PIA CLAVIER+MPU board
NO
Persisting defect
yes
Replace PIA ERD+IT/ADA board
NO
Persisting defect
yes
Replace PERSONNALISATION board
Persisting defect
NO
yes
Replace RAM-R PROM board
Persisting defect
NO
yes
Check Connectors and wiring Condition
Persisting defect
NO
yes
END

4 – REMOVAL AND INSTALLATION OF MODULES

Modules and their attachments are marked on plate 2-1 (MODULES LOCATION). The text refers to this plate.

CAUTION : - Never loosen painted screws.

- Before starting any work, disconnect the MAINS CABLE.

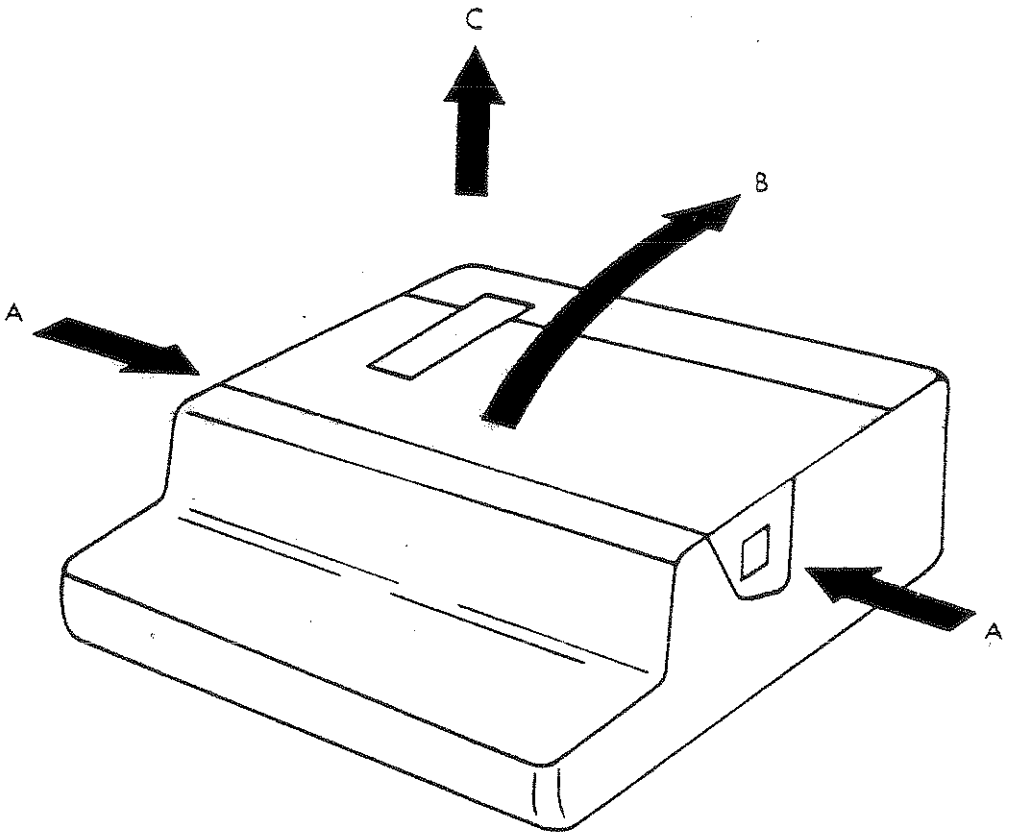
LIST OF TOOLS

Description
. Screwdriver, Allen, M3
. Screwdriver, round, 3 x 100 mm
. Screwdriver, round, 5 x 150 mm
. 0.5 mm shim, round-ended
. 5 unit code rule
. Tweezers
. Open-end wrench, 7 mm

COVER

Removal

- Depress the two buttons in the direction of arrows (A) and raise the COVER LID in the direction of arrow (B).
- Remove the ground connection from PAPER DEFLECTOR.



- Unscrew the two bolts (10) a quarter turn.
- Position the PAPER ADVANCE to the front of the unit.
- Remove the COVER in the direction of arrow (C).

Installation

- Proceed in reverse order of removal, taking care to ensure that the two quarter turn bolts are correctly inserted in their seats.
- Do not forget to reconnect ground to the PAPER DEFLECTOR.

PAPER DEFLECTOR

Removal

- Disconnect the ground wire.
- Remove the PAPER DEFLECTOR.

Installation

- Proceed in reverse order of removal.

FRONT PANEL ASSEMBLY

Removal

- Remove the COVER.
- Rock the FRONT PANEL ASSEMBLY and remove.
- Release the FRONT PANEL ASSEMBLY by pulling the top to the front of the unit.
- Disconnect the ground wire and the following modules :

  . "CLAVIER" board,
  . TAPE READER.

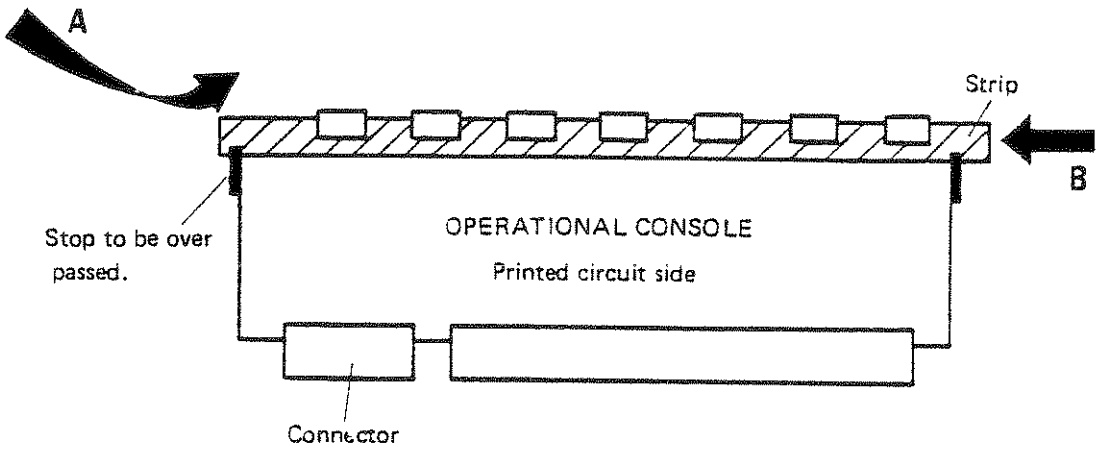
Installation

- Proceed in reverse order of removal.

OPERATIONAL CONSOLE

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Disconnect the OPERATIONAL CONSOLE from the "CLAVIER" board.
- Remove the strip in the direction of arrow (B), after having pulled its left end according to arrow (A).
- Remove the OPERATIONAL CONSOLE.



Installation

- Proceed in reverse order of removal.

PUNCH BACK SPACER

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Press the two attaching pins and release the PUNCH BACK SPACER.
- Remove the PUNCH BACK SPACER.

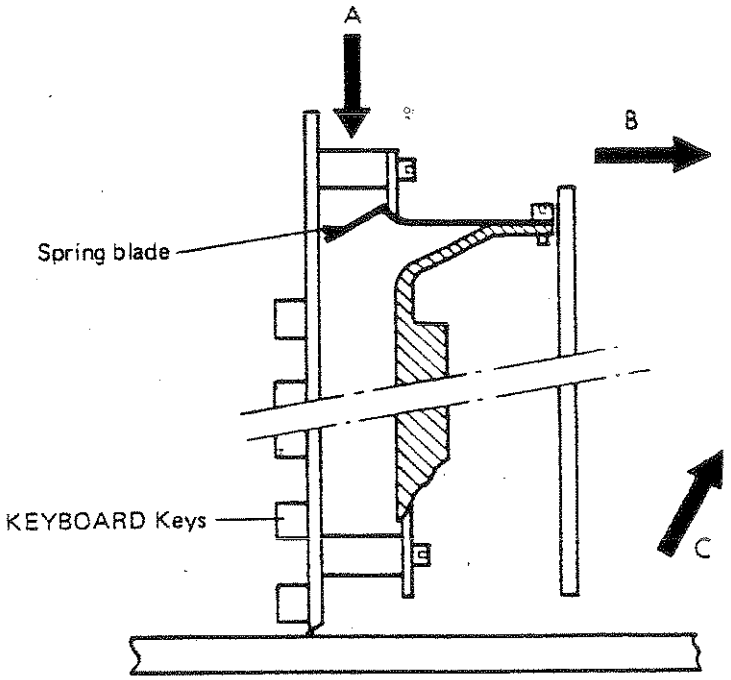
Installation

- Proceed in reverse order of removal.

KEYBOARD

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Disconnect the KEYBOARD from the OPERATIONAL CONSOLE.
- Hold the FRONT PANEL ASSEMBLY vertically (the TAPE READER down).
- Depress the spring blade in the direction of arrow (A) so as to release it from its stop.



- Remove the KEYBOARD in the direction of arrows (B), then (C).

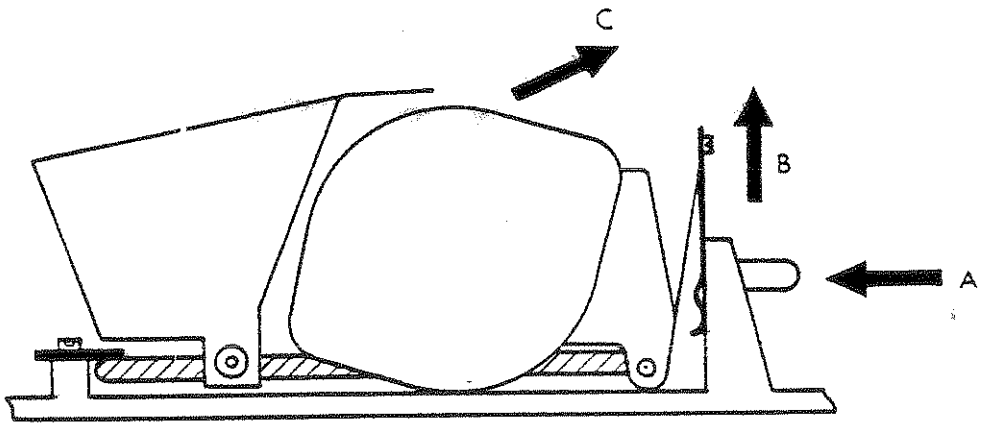
Installation

- Proceed in the reverse order of removal.

TAPE READER

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Disconnect the ground wire from the TAPE READER.
- Place the FRONT PANEL ASSEMBLY vertically.
- Depress the locking pin in the direction of arrow (A) so as to release the spring blade from its seat.
- Remove the TAPE READER in the direction of arrows (B), then (C).



Installation

- Proceed in reverse order of removal.

TAPE PUNCH

Removal

- Remove the FRONT PANEL ASSEMBLY, without disconnection.
- Disconnect the TAPE PUNCH.
- Loosen the two captive attachment screws (6) completely.
- Remove the TAPE PUNCH.

Installation

- Proceed in reverse order of removal.

TAPE STORE

Removal

- Remove the COVER.
- Remove the two attaching screws (3).
- Remove the PAPER DEFLECTOR ground wire.
- Take out the TAPE STORE.
- Disconnect and remove the TAPE STORE.

Installation

- Proceed in reverse order of removal.

NOTE : Take care :

- to correctly insert the bottom of its right-hand plate in its guide,
- to reconnect the PAPER DEFLECTOR ground wire (early version machines only).

TAPE OUT SWITCH

Removal

- Remove the TAPE STORE.
- Remove the connector by squeezing the locking lugs.
- Remove the two attaching screws (26) and the cable clip.
- Remove the TAPE OUT SWITCH, with its cable and connector.

Installation

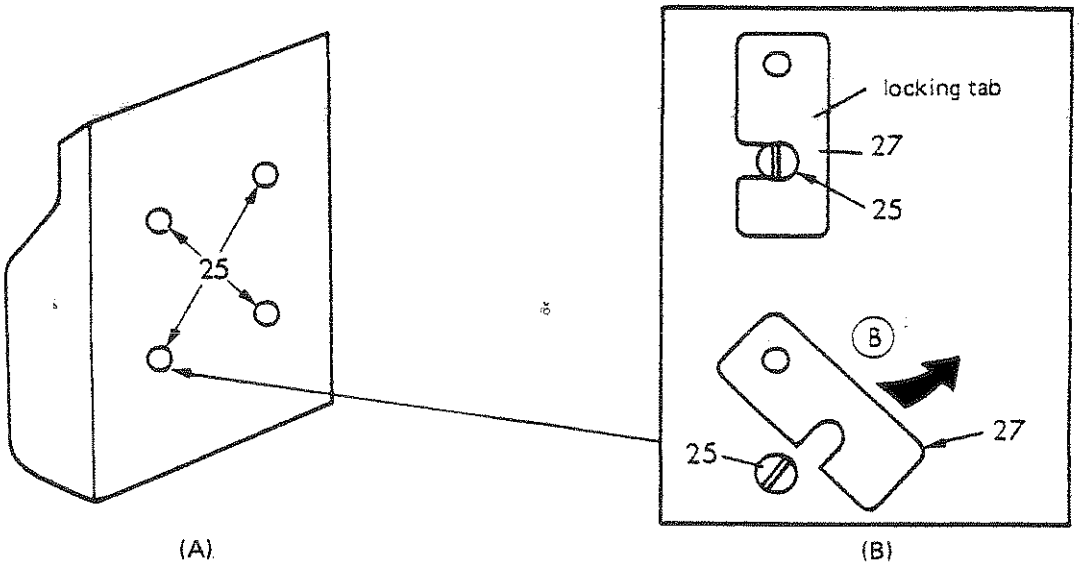
During TAPE OUT SWITCH installation, carry out its adjustment, as follows :

- Install the TAPE OUT SWITCH, with the cable clip, without locking the screws (26),
- Connect an ohmmeter between TAPE OUT SWITCH terminals.
- Set a 65 mm diameter-tape spool, the ohmmeter should indicate that TAPE OUT SWITCH is closed.
- Set a new tape spool, the ohmmeter should indicate that TAPE OUT SWITCH is opened.
- Tighten the two attaching screws (26).

PRINTER

Removal

- Remove the COVER.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the PRINTER (7 connectors).
- Loosen the four PRINTER attaching screws (25) and pivot the locking tabs (27) as shown on figure B , while retaining the PRINTER with one hand.



- Place the unit horizontally.
- Remove the PRINTER.

Installation

- Proceed in reverse order of removal.

PRINTING DEVICE

Removal

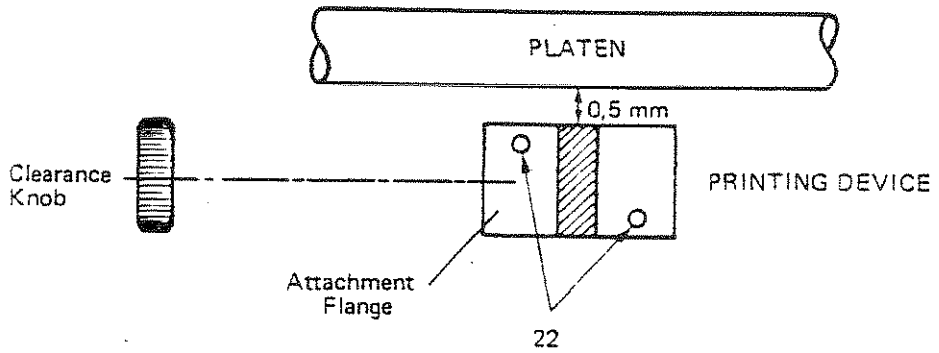
- Remove the COVER.
- Take the ink-ribbon out of the PRINTING DEVICE.
- Disconnect the PRINTING DEVICE (connector (24)).
- Remove the PRINTING DEVICE protective cover (23) by spreading one of its attaching tabs.

CAUTION : DO NOT LOOSEN PAINTED SCREWS.

- Remove the two attaching screws (22) and the attachment flange.
- Remove the PRINTING DEVICE.

Installation

- Proceed in reverse order of removal, but carry out the following adjustment before locking the two attaching screws (22) and installing the ink-ribbon :
  - . turn the PRINTING DEVICE clearance adjustment knob to the smallest clearance position,
  - . adjust the clearance between the PLATEN and the PRINTING DEVICE to 0.5 mm (without paper).



SENSOR

NOTE : New type sensor may be disconnected at the sensor without the removal of the bottom cover.

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect SENSOR.
- Remove SENSOR connector from its bracket, by squeezing the attachment lugs.
- Set the unit horizontally.

CAUTION : DO NOT LOOSEN PAINTED SCREWS.

- Loosen the SENSOR shaft clamp screw (8).
- Loosen SENSOR attaching screw (29).
- Remove the SENSOR.

Installation

- Proceed in reverse order of removal.

DRIVE MOTOR* (Type : PANCAKE)

Removal

- Remove the PRINTER.
- Remove DRIVE MOTOR connector from its bracket, by squeezing the attachment lugs.
- Loosen the clamp's screw (2).
- Remove DRIVE MOTOR attaching screw (1).
- Remove the DRIVE MOTOR.

Installation

- Proceed in reverse order of removal.

* NOTE : Removal and installation of DRIVE MOTOR depends on its type.

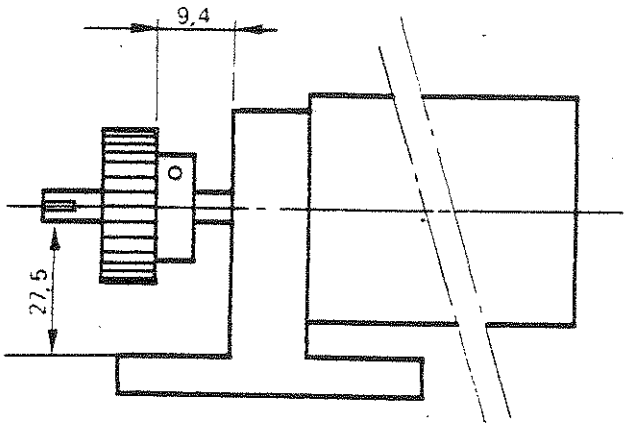
DRIVE MOTOR* (Type : CYLINDRICAL)

Removal

- Remove the PRINTER.
- Remove the SENSOR.
- Remove DRIVE MOTOR connector from its bracket, by squeezing the attachment lugs.
- Loosen the clamp screw (9).
- Remove the two DRIVE MOTOR plate screws (7).
- Remove DRIVE MOTOR and plate assembly.

Installation

- Install DRIVE MOTOR and plate assembly, without locking the three screws (5).
- Adjust the distance between the DRIVE MOTOR shaft and bright part of the casting to 27.5 mm ± 0.1 mm.
- Lock the three DRIVE MOTOR attaching screws (5).
- Install the notch-wheel and adjust the distance between its rear face and the DRIVE MOTOR bracket to 9.4 mm ± 0.5 mm.
- Install the SENSOR.
- Lock the two clamps screws (9 and 29).



*NOTE : Removal and installation of DRIVE MOTOR depends on its type.

RIGHT-HAND RIBBON ASSEMBLY

Removal

- Remove the PRINTER.
- Remove the ink-ribbon and the spools.
- Remove RIGHT HAND RIBBON ASSEMBLY connector from its bracket, by squeezing the two attachment lugs.

- Remove the two RIGHT HAND RIBBON ASSEMBLY attaching screws (12).
- Remove the RIGHT-HAND RIBBON ASSEMBLY.

Installation

- Proceed in reverse order of removal.

LEFT-HAND RIBBON ASSEMBLY

Removal

- Remove the COVER.
- Remove the ink-ribbon and the spools.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the LEFT-HAND RIBBON ASSEMBLY (one connector).
- Remove the LEFT-HAND RIBBON ASSEMBLY connector from its bracket, by squeezing the attachment lugs.
- Place the unit horizontally.
- Remove the attaching screw (4).
- Remove the LEFT-HAND RIBBON ASSEMBLY.

Installation

- Proceed in reverse order of removal.

PLATEN

Removal

- Remove the PRINTER.
- Remove the RIGHT-HAND RIBBON ASSEMBLY.
- Remove the PLATEN attachment device (31) and its two screws.
- Rock the PLATEN out of the belt and remove it.
  The PLATEN is equipped with a notch-wheel and its bearings.

Installation

- Proceed in reverse order of removal.

PAPER ADVANCE

Removal

- Remove the COVER.
- Remove the paper roller.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the PAPER ADVANCE.
- Remove the PAPER ADVANCE connector from its bracket, by squeezing the attachment lugs.
- Place the unit horizontally.
- Lift up, then rock the PAPER ADVANCE in the direction of the KEYBOARD.
- Separate the brackets from their axle by depressing the left-hand end to the inside.
- Remove the PAPER ADVANCE.

Installation

- Proceed in reverse order of removal.

PRESSURE ROLLERS

Removal

- Remove the PAPER ADVANCE.
- Remove the PLATEN, the paper press lever positioned in the direction of the KEYBOARD.
- Remove the two PRESSURE ROLLERS attaching screws (30).
- Remove the PRESSURE ROLLERS.

Installation

- Proceed in reverse order of removal.

PAPER OUT SWITCH

Removal

- Remove the COVER.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the PAPER OUT SWITCH.
- Remove the PAPER OUT SWITCH cable clip.
- Remove the two attaching screws (28).
- Remove the PAPER OUT SWITCH with its cable and its connector.

Installation

During PAPER OUT SWITCH installation, proceed to the following adjustment :

- Install the PAPER OUT SWITCH without locking the two attaching screws (28).
- Connect an ohmmeter between PAPER OUT SWITCH terminals.
- Set a 35 mm diameter-paper roll, the ohmmeter should indicate that PAPER OUT SWITCH is closed.
- Set a new paper roll, the ohmmeter should indicate that PAPER OUT SWITCH is opened.
- Tighten the two attaching screws (28) and proceed in reverse order of removal.

LINE FEED MOTOR

Removal

- Remove the PRINTER.
- Remove the LINE FEED MOTOR connector from its bracket by squeezing the attachment lugs.
- Remove the two LINE FEED MOTOR plate attaching screws (13).
- Rock the LINE FEED MOTOR and plate assembly out of the belt and remove it.
- Loosen the clamp screw (21) and remove the cog-wheel.
- Remove the three LINE FEED MOTOR attaching screws (14).
- Remove the LINE FEED MOTOR.

Installation

- Proceed in reverse order of removal.

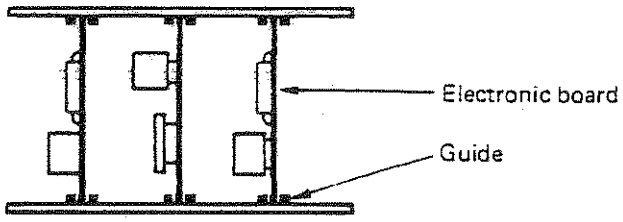
ELECTRONIC BOARDS

Removal

- Remove the COVER.
- Lift the PAPER ADVANCE and position it in the direction of the KEYBOARD.
- Remove the selected board by means of extractors located at upper ends.

Installation

- Proceed in reverse order of removal.
  NOTE : Take care to insert the board in its guides and press home by the extractors.



"ADAPTATION" BOARD

Removal

- Remove the COVER.
- Take out the "ADAPTATION" board.

Installation

- Proceed in reverse order of removal.

MAINS FILTER

Removal

- Remove the mains cable (15).
- Unscrew the three MAINS FILTER captive attaching screws (17).
- Disconnect the MAINS FILTER (one connector).
- Remove the MAINS FILTER.

Installation

- Proceed in reverse order of removal.

LIGHTNING ARRESTOR

Removal

- Pull the lid with the ring.
- Remove the LIGHTNING ARRESTOR ("PARAFOUDRE").

Installation

- Plug-in the "PARAFOUDRE" board by depressing it completely.

TRANSFORMER

Removal

- Remove the COVER.
- Remove the page paper roller.
- Disconnect the TRANSFORMER (two connectors, MAINS FILTER, and ± 12V POWER SUPPLY).
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the TRANSFORMER (two connectors, power supply protection).
- Remove the four TRANSFORMER attaching nuts (19) and their washers, while holding the TRANSFORMER from the unit's upper side.
- Place the unit horizontally.
- Position the PAPER ADVANCE to the front of the unit.
- Remove the TRANSFORMER.

Installation

- Proceed in reverse order of removal.

POWER AMPLIFIER

Removal

- Unscrew the three POWER AMPLIFIER attaching screws (18).
- Rock the POWER AMPLIFIER.
- Disconnect the POWER AMPLIFIER (4 connectors).
- Remove the POWER AMPLIFIER.

Installation

- Proceed in reverse order of removal.

± 12 V POWER SUPPLY

Removal

- Remove the COVER.
- Remove the page paper ROLLER.
- Remove the "ADAPTATION" board.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the ± 12 V POWER SUPPLY (2 connectors).
- Place the unit horizontally.
- Unscrew completely the two captive attaching screws (20).
- Remove the ± 12 V POWER SUPPLY.

Installation

- Proceed in reverse order of removal.

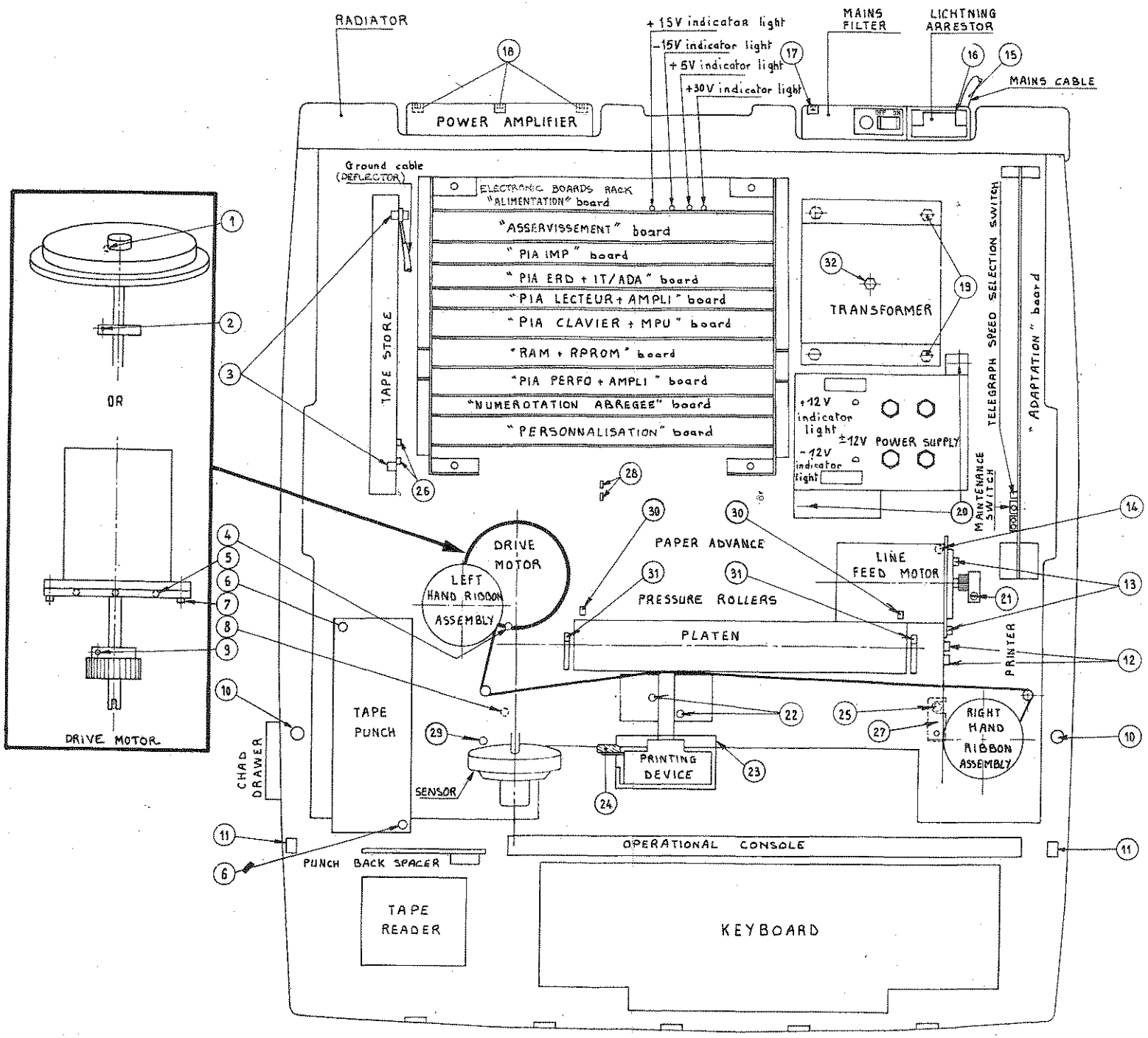
POWER SUPPLY PROTECTION

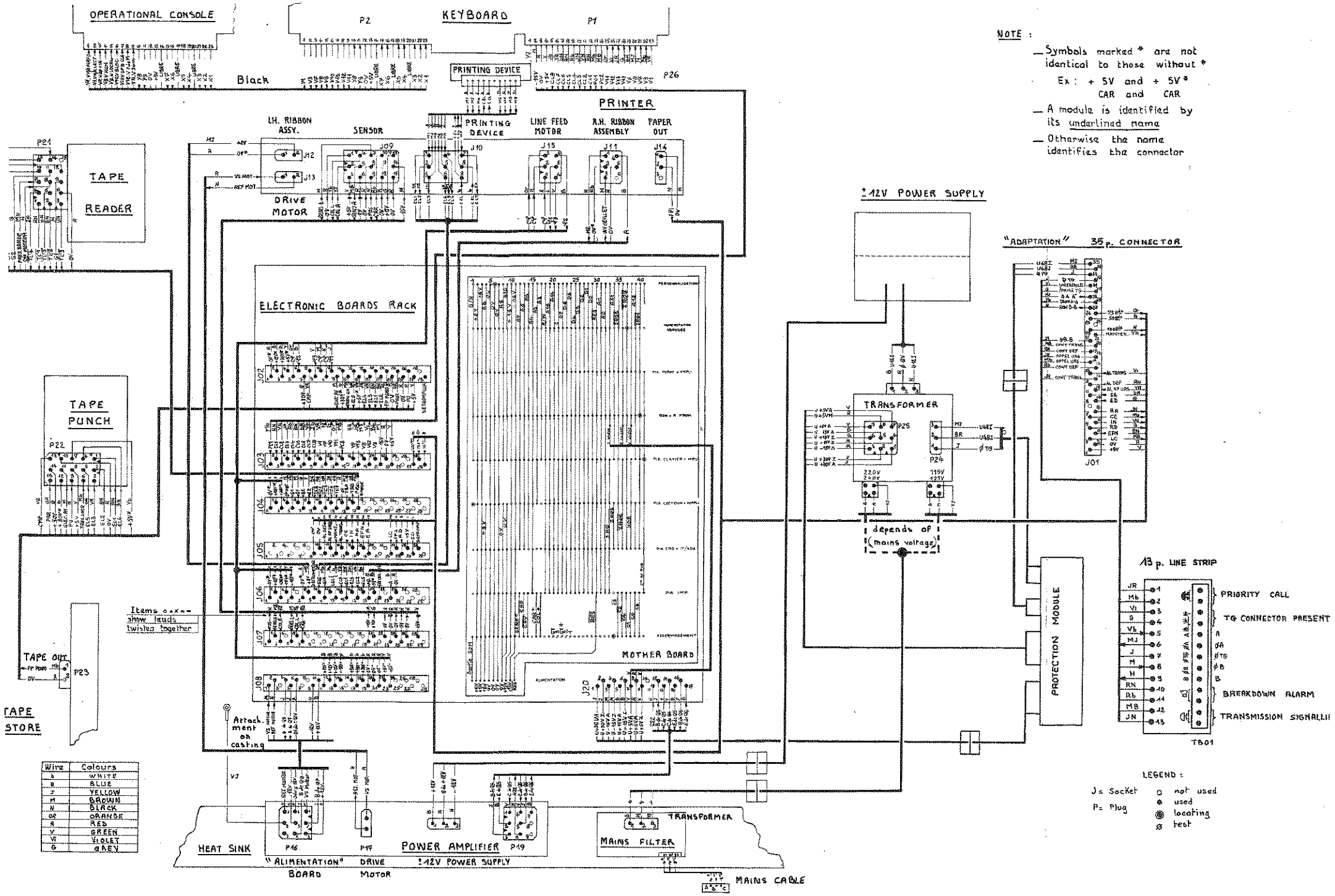
Removal

- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the POWER SUPPLY PROTECTION- 4 connectors, i.e. electronic rack, ADAPTATION board and TRANSFORMER (2).
- Remove the two attaching screws.
- Remove the POWER SUPPLY PROTECTION.

Installation

- Proceed in reverse order of removal.


RADIATOR
+15V indicator light
-15V indicator light
+5V indicator light
+30V indicator light
MAINS FILTER
LICHTNING ARRESTOR
MAINS CABLE
POWER AMPLIFIER
Ground cable (DEFLECTOR)
ELECTRONIC BOARDS RACK
"ALIMENTATION" board
"ASSERVISSEMENT" board
" PIA IMP " board
" PIA ERD + IT/ADA " board
"PIA LECTEUR+ AMPLI " board
" PIA CLAVIER + MPU " board
"RAM + RPROM" board
"PIA PERFO + AMPLI " board
"NUMEROTATION ABREGEE" board
" PERSONNALISATION" board
TAPE STORE
TRANSFORMER
±12V indicator light
±12V POWER SUPPLY
-12V indicator light
TELEGRAPH SPEED SELECTION SWITCH
" ADAPTATION " board
MAINTENANCE SWITCH
OR
DRIVE MOTOR
DRIVE MOTOR
LEFT HAND RIBBON ASSEMBLY
PAPER ADVANCE
PRESSURE ROLLERS
PLATEN
LINE FEED MOTOR
PRINTER
TAPE PUNCH
CHAD DRAWER
SENSOR
PRINTING DEVICE
RIGHT HAND RIBBON ASSEMBLY
PUNCH BACK SPACER
OPERATIONAL CONSOLE
TAPE READER
KEYBOARD


OPERATIONAL CONSOLE
P2
KEYBOARD
P1
Black
PRINTING DEVICE
P26
PRINTER
LH. RIBBON ASSY.
SENSOR
PRINTING DEVICE
LINE FEED MOTOR
R.H. RIBBON ASSEMBLY
PAPER OUT
J12
J13
J09
J10
J15
J11
J14
DRIVE MOTOR
VS MOT
REF MOT
P24
TAPE READER
TAPE PUNCH
P22
TAPE OUT
P23
TAPE STORE
ELECTRONIC BOARDS RACK
J02
J03
J04
J05
J06
J07
J08
MOTHER BOARD
J20
Items o x = = show leads twisted together
Attachment on casting
±12V POWER SUPPLY
TRANSFORMER
P25
P24
220V 240V
115V 127V
depends of mains voltage
"ADAPTATION" 35 p. CONNECTOR
J01
PROTECTION MODULE
13 p. LINE STRIP
PRIORITY CALL
TG CONNECTOR PRESENT
BREAKDOWN ALARM
TRANSMISSION SIGNALLII
TB01
NOTE :
— Symbols marked * are not identical to those without *
Ex : + 5V and + 5V*
CAR and CAR
— A module is identified by its underlined name
— Otherwise the name identifies the connector
LEGEND :
J = SocKet
P = Plug
o not used
• used
◉ locating
ø test
Wire Colours
b WHITE
B BLUE
J YELLOW
M BROWN
N BLACK
OR ORANGE
R RED
V GREEN
VI VIOLET
G GREY
HEAT SINK
"ALIMENTATION" BOARD
P16
P17
DRIVE MOTOR
POWER AMPLIFIER P19
±12V POWER SUPPLY
TRANSFORMER
MAINS FILTER
MAINS CABLE

3

ILLUSTRATED CATALOGUE

FOREWORD

1 - DOCUMENT COMPOSITION

The present document includes :

- a plate 00 (zéro) with its text ; this Plate shows the various assemblies likely to be removed in situ,
- an Index of Manufacturers.

2 - PLATE 00 IDENTIFICATION

On Plate 00, each main component is identified by an «item number».

When a main component has several variants, it is identified on Plate 00 with a same item number followed by an alphabetical index proper to each variant.

In the text, some items have their item number preceded by a dash ; in that case, the item is not located on the Plate.

Correspondence of columns on the text

- column 1 : item number on the Plate
- column 2 : SAGEM code
- column 3 : description of part (and eventually its circuit reference)
- column 4 : Manufacturer's reference and Manufacturer's code
- column 5 : quantity

3 - HOW TO USE THE PRESENT DOCUMENT

Knowing an item by its position on equipment, seek out the item No of the main corresponding component, by consulting the Plate 00.

Refer to the «INDEX OF MANUFACTURERS» which gives, according to the Manufacturer's code (column 1), the name and address of Manufacturer (column 2).

NOTE : Electric and electronic components having a circuit reference code, are identified by this code in Plate and text (2nd line of column 3).

4 - REPRESENTATION OF RELATIONSHIP BETWEEN ITEM AND ASSEMBLY

The notion of an item belonging to an assembly appears in the text according to the following principle :

- an item belongs to the assembly immediately above, whose description is shifted by one row to the left,
- an assembly includes all of the items or assemblies immediately «lower», whose description is shifted by one row to the right.

The attaching items are not illustrated and have no special item number. They appear in the text immediately belows the item they attach, and in the same row as this item.

5 - SIGNS AND ABBREVIATIONS

- SB («SUIVANT BESOIN»)

This indicates that the quantity required can only be determined when carrying out maintenance or adjustements.

- ******

This sign in column 2 of parts list means that no spare is provided for this component.

- (R1) A (R4)

Mention in french whose translation is : (R1) TO (R4).

6- ORDER FOR REPLACEMENT PARTS

When ordering a part, please indicate :

- machine name, its reference and serial number (on name plate),
- the part name,
  e.g. : «SPRING»
- the code number, followed of its key,
  e.g. : «23008560-6»

Orders and all related correspondance (enquiries, concerning bills, delivery dates, etc.) should be addressed to :

SAGEM
Département Télex et Bureautique
Service Pièces Détachées
6, avenue d'Iéna
75783 - PARIS-CEDEX 16
Téléphone : 729-10-10 - Télex : 614520F - SAGEM PARIS

Urgent orders may be telephoned or (preferably) telexed to the same address.

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23075300		Memory program 23080967-0	-				
23082130-3		New memory program 23082132-4					
23083000-0		New memory program 23082962-2					
	1	Metal operators panel latch replaced by a plastic one	00				
	3	To introduce SAGEM's motor	00			22000	
	8	Increase insulation of mains wiring					
	15	Change line cord terminating pin					
	18	Operator panel : Plastic designation strip and new glue					
	24	New key board with low keys	00				
	32	New clamp on sensor	00				

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23083000-0	38	Addition of line protection unit 23117527-1	-			45816	
	40	New sensor 23115293-4	00				
23106470-4		New memory program 23106465-0					
23108530-7		New memory program 23108527-9					
23115610-1	44	New memory program (7K) 23115601-5 and transcodeur 23105193-4	-			37969	
23116870-5	46	New "RAM + RPROM" Board 8K 23101491-5 logicial 23115601-5 Transcodeur 23105193-4	00			37969	
	48	"Alimentation" Board 23117707-2	00			49151	
	60	Protection module 23118038-9. Addition of a fuse on all transformer outputs	00				
	63	New "Printer" board 23117644-2	00				

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23116870-5	65	Line protection module add gas arrestors 23117527-1 to 23118719-8	00				
	66	New transformer 23118882-2	00				
	71	New "Alimentation" board 23118723-9					
23128390-3	77	New "RAM + RPROM" board 8K 23118714-3	00				
	82	New "PIA PERFO + AMPLI" board 23119272-7	00				
	83	Copy holder : Improvement of the rigidity					

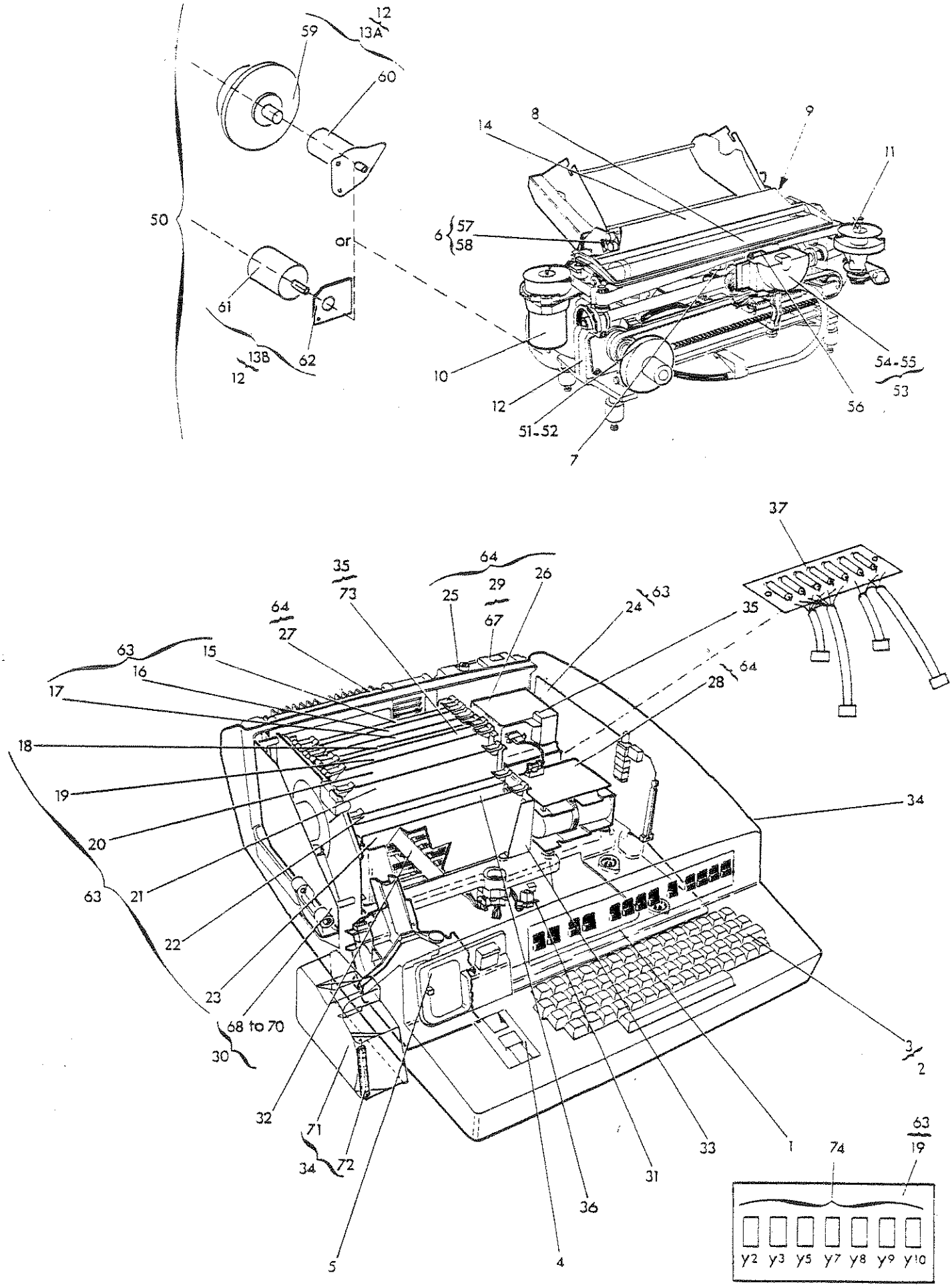


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
	**********	TELEPRINTER TX20 (WITHOUT LOGICIAL)	**********		01
1	23074375-7	. OPERATIONAL CONSOLE	23074375-7	53840	01
	23075139-5	. STRIP	23075139-5	53840	01
2A	23074795-8	. KEYBOARD	23074795-8	53840	01
3A	**********	. . CARD KEYBOARD	**********		01
2B	23126742-5	. KEYBOARD	23126742-5	53840	01
3B	**********	. . CARD KEYBOARD	**********	53840	01
4A	23074946-5	. TAPE READER	23074946-5	53840	01
4B	23075697-3	. TAPE READER (WITH TIGHT TAPE DETECTOR)	23075697-3	53840	01
5	23074900-1	. TAPE PUNCH	23074900-1	53840	01
50	23075076-5	. PRINTER	23075076-5	53840	01
	15621044-0	. SCREW C M5X12	E27115C50Q12QEUL	50035	04
51A	23075926-3	. . SENSOR	23075926-3	53840	01
	23074596-2	. . SENSOR FIXING SCREW	23074596-2	53840	01
52	23058757-6	. . CLAMP	23058757-6	53840	01
	15600058-4	. . SCREW CHC M3X16	E27161-30M16QVUL	50035	01
51B	23115293-4	. . SENSOR	23115293-4	53840	01
	23074596-2	. . SENSOR FIXING SCREW	23074596-2	53840	01
52	23058757-6	. . CLAMP	23058757-6	53840	01
	15600058-4	. . SCREW CHC M3X16	E27161-30M16QVUL	50035	01
	23108076-1	. . . SENSOR	23108076-1	53840	01
	23105811-0	. . . CABLE	23105811-0	53840	01
	23109228-7	. . . BRACKET	23109228-7	53840	01
53	23075077-3	. . PRINTING HEAD	23075077-3	53840	01
54	23075238-9	. . . COVER	23075238-9	53840	01
55	23075260-2	. . . INDEX	23075260-2	53840	01
	15690116-6	. . . SCREW CL N02-4.5	E27131-2P45EDTF	50035	01
56	23059763-4	. . CLAMP	23059763-4	53840	01
	15600048-0	. . SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
6	23074800-9	. . PAPER ADVANCE	23074800-9	53840	01
57	23075078-6	. . . PAPER LOW SWITCH AND CORD ASSEMBLY	23075078-6	53840	01
58	23073797-3	. . . SCREW-TAPPED PLATE	23073797-3	53840	01
	15620977-3	. . . SCREW C M2X10	E27115C20Q10CAUP	50035	02
7	23074400-1	. . PRESSURE ROLLERS	23074400-1	53840	01
	15600052-1	. . SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
8	23074750-2	. . PLATEN	23074750-2	53840	01
	23058916-1	. . CLAMP	23058916-1	53840	02
	15600274-9	. . SCREW CHC M3X20	E27161-30M20QVUL	50035	02
9	23059348-8	. . LINE FEED MOTOR	23059348-8	53840	01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
10	23079024-3	. . RIBBON ASSEMBLY (LEFT)	23079024-3	53840	01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	01
11	23079153-9	. . RIBBON ASSEMBLY (RIGHT)	23079153-9	53840	01
	15600143-7	. . SCREW CHC M3X12	E27161-30Q12QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
12	**********	. . PRINTING FRAME	**********		01
13A	23108436-8	. . . DRIVE MOTOR WITH BEARING ASSEMBLY	23108436-8	53840	01
59	23079764-3	. . . . DRIVE MOTOR	23079764-3	53840	01
	15600050-0	. . . . SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	. . . . WASHER M3U	E27611M30AAUL	50035	01

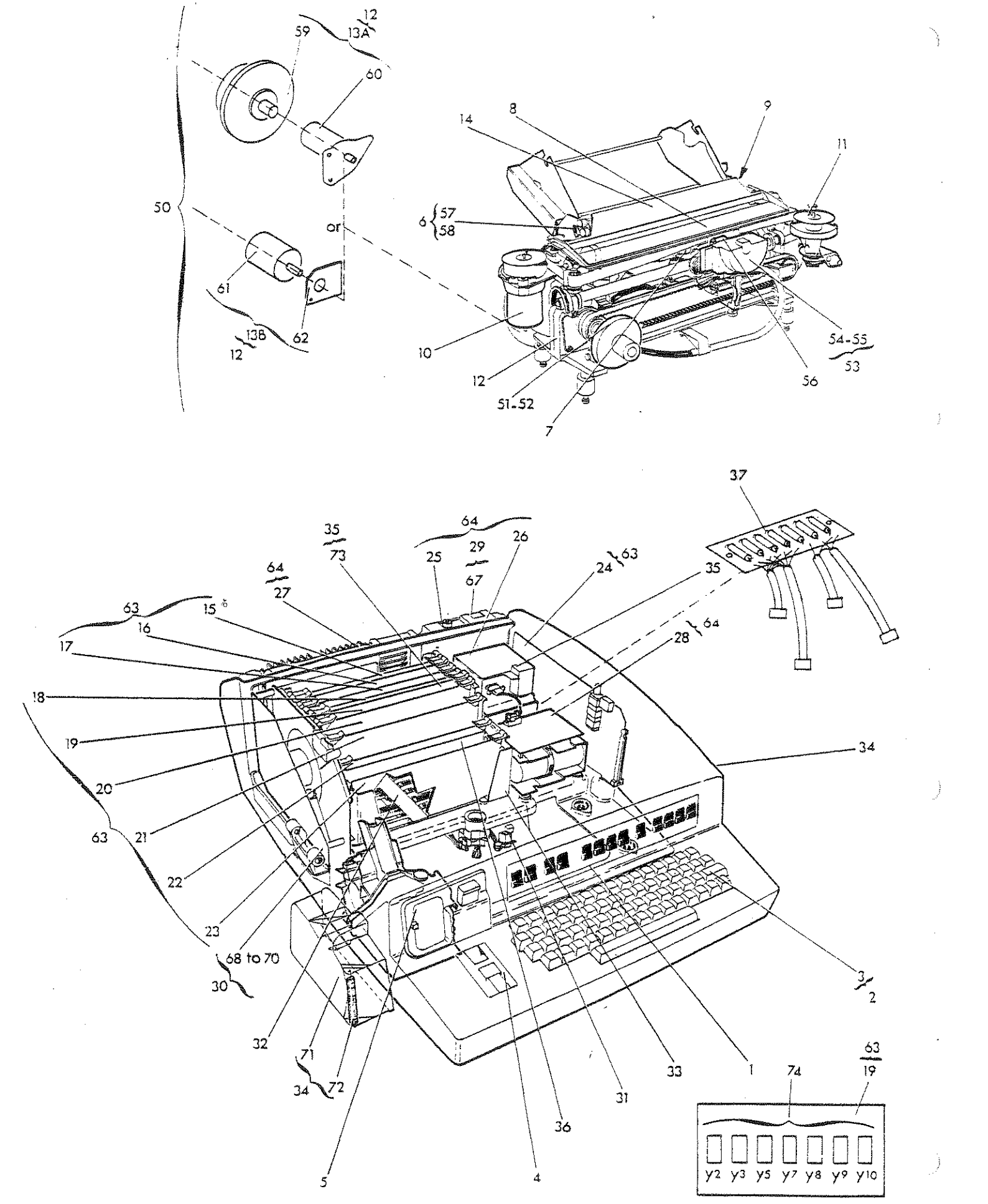


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
60	23079763-0	. . . . BEARING ASSEMBLY	23079763-0	53840	01
	15600052-1	. . . . SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	. . . . WASHER M3U	E27611M30AAUL	50035	02
13B	23108437-1	. . . DRIVE MOTOR WITH SUPPORT BRACKET	23108437-1	53840	01
	15600050-0	. . . SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
61	23077774-5	. . . . MOTOR CABLE	23077774-5	53840	01
62	23076643-7	. . . . BRACKET	23076643-7	53840	01
14	**********	. . MISCELLANEOUS EQUIPMENTS (TELEPRINTER) ...	**********		01
	**********	. MAIN BASE ASSEMBLY	**********		01
63	**********	. . ELECTRONIC BOARDS	**********		01
15A	23074407-2	. . . "ALIMENTATION" BOARD	23074407-2	53840	01
15B	23117707-2	. . . "ALIMENTATION" BOARD	23117707-2	53840	01
15C	23118723-9	. . . "ALIMENTATION" BOARD	23118723-9	53840	01
16	23074415-5	. . . "ASSERVISSEMENT" BOARD	23074415-5	53840	01
17A	23074352-5	. . . "PIA IMP" BOARD	23074352-5	53840	01
17B	23117644-2	. . . "PIA IMP" BOARD	23117644-2	53840	01
18	23074667-0	. . . "PIA ERD+IT/ADA" BOARD	23074667-0	53840	01
19	23073206-9	. . . "PIA LECTEUR+AMPLI" BOARD (WITHOUT .... INTEGRATED CIRCUIT)	23073206-9	53840	01
20A	23074345-0	. . . "PIA CLAVIER+MPU" BOARD	23074345-0	53840	01
20B	23077489-3	. . . "PIA CLAVIER+MPU" BOARD	23077489-3	53840	01
20C	23106892-6	. . . "PIA CLAVIER+MPU" BOARD	23106892-6	53840	01
21A	23074438-7	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23074438-7	53840	01
21B	23101491-5	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23101491-5	53840	01
21C	23118714-3	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23118714-3	53840	01
22A	23073040-3	. . . "PIA PERFO+AMPLI" BOARD	23073040-3	53840	01
22B	23119272-7	. . . "PIA PERFO+AMPLI" BOARD	23119272-7	53840	01
23	23074359-6	. . . "PERSONNALISATION" BOARD	23074359-6	53840	01
24	**********	. . . "ADAPTATION" BOARD (REFER TO SPECIFIC . TECHNICAL)	**********		01
64	**********	. . POWER SUPPLY DEVICES	**********		01
25A	23074393-4	. . . MAINS FILTER	23074393-4	53840	01
	23100155-9	. . . . SCREW M3X25	23100155-9	53840	03
	15700100-1	. . . . WASHER DE3	E27168E30AXTL	50035	03
25B	23100200-6	. . . MAINS FILTER	23100200-6	53840	01
	23100155-9	. . . . SCREW M3X25	23100155-9	53840	03
	15700100-1	. . . . WASHER DE3	E27168E30AXTL	50035	03
- 65	13270088-7	. . . . FUSE CARTRIDGE 1.25A	HA20-1U25	52745	01
	13270072-0	. . . . FUSE CARTRIDGE 0.8A	HA20U8	52745	01
	23100384-2	. . . . WASHER	23100384-2	53840	03
26A	23076906-6	. . . TRANSFORMER	23076906-6	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
26B	23118882-2	. . . TRANSFORMER	23118882-2	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
26C	23142688-9	. . . TRANSFORMER (04-001-96) C.I	23142688-9	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
37	23118038-9	. . . PROTECTION MODULE	23118038-9	53840	01
	15600048-0	. . . SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
27	23074188-6	. . . POWER AMPLIFIER	23074188-6	53840	01
	15600062-5	. . . SCREW CHC M3X25	E27161-30M25QVUL	50035	03
28	23079150-0	. . . +- 12V POWER SUPPLY	23079150-0	53840	01
- 66	13271069-3	. . . . FUSE CARTRIDGE 10A	HA20-10U	52745	02
- 29	**********	. . . "PARAFOUDRE" ASSEMBLY	**********		01
67	23074967-6	. . . . "PARAFOUDRE" BOARD	23074967-6	53840	01
30	23074501-1	. . TAPE STORE	23074501-1	53840	01
	15600143-7	. . SCREW CHC M3X12	E27161-30Q12QVUL	50035	02

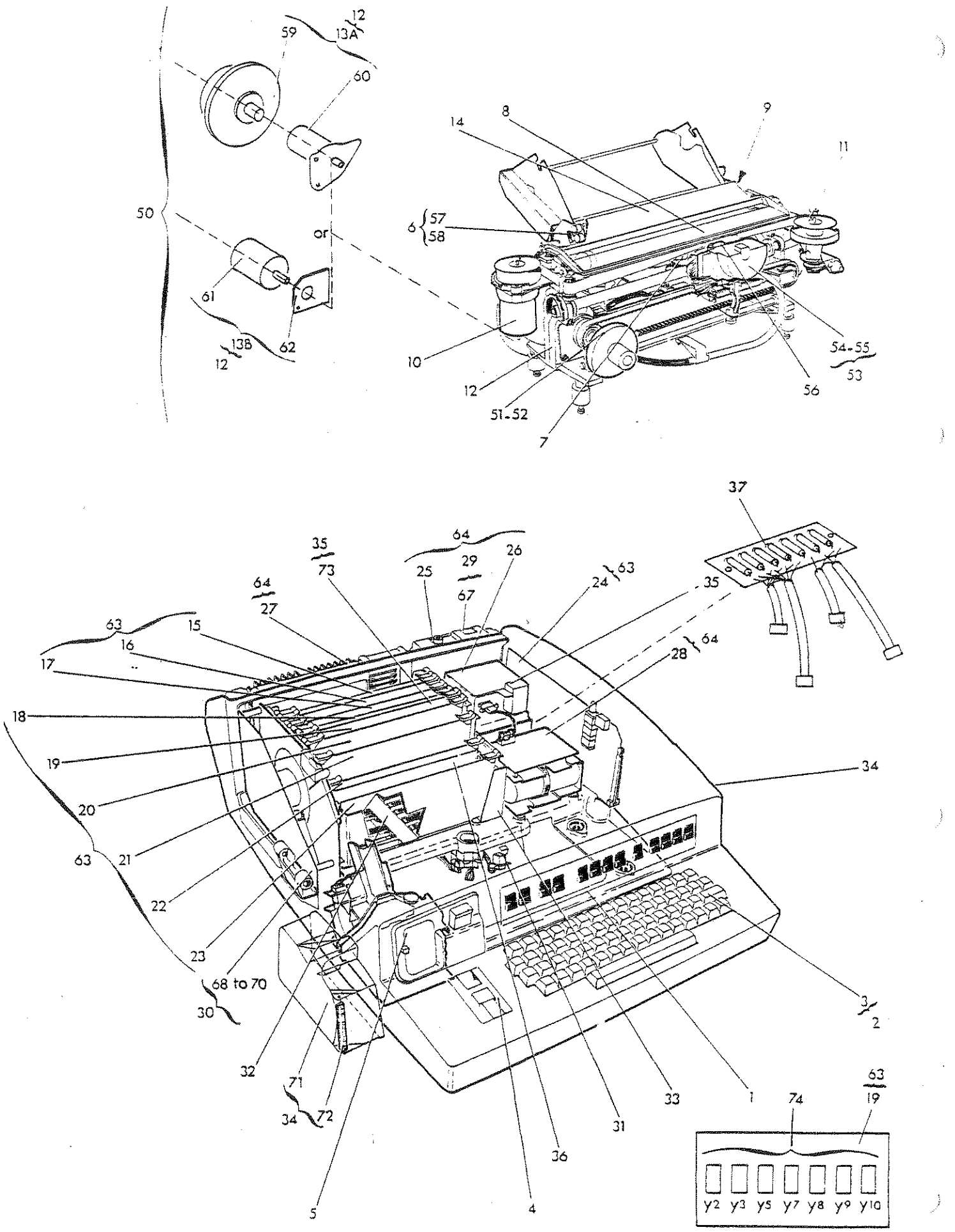


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
68	23074527-7	. . . TAPE LOW SNITCH AND CORD ASSEMBLY	23074527-7	53840	01
69	23074726-8	. . . CLAMP	23074726-8	53840	01
70	23073797-3	. . . SCREW-TAPPED PLATE	23073797-3	53840	01
	15621022-6	. . . SCREW C M2X10	E27115C20Q10QEUL	50035	02
31	**********	. . WIRING HARNESS	**********		01
	15600050-0	. . SCREW CHC M3X8	E27161-3008QVUL	50035	07
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	03
32	23100333-4	. . MAIN BASE	23100333-4	53840	01
33	**********	. . MISCELLANEOUS EQUIPMENTS (MAINS BASE)	**********		01
34	**********	. COVER	**********		01
71	23079306-2	. . CHAD BOX	23079306-2	53840	01
72	23079699-8	. . SPRING	23079699-8	53840	01
35	**********	. MISCELLANEOUS EQUIPMENTS (TELEPRINTER WITHOUT LOGICIAL)	**********		01
73	**********	. . INTEGRATED CIRCUIT (ANSWERBACK PROM) OF .. BOARD ITEM 19 (REFERENCE WRITTEN ON ITEM)	**********		01
74	**********	PROMS'SET (BOARD ITEM 21) (REFERENCES WRITTEN ON ITEM)	**********		01
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18767	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051 USA
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51148	HEWLETT-PACKARD CO CORPORATE HQ 1501 PAGE MILL RD PALO ALTO CA 94304 USA
51201	INA-ROULEMENTS SA ROUTE DE BITCHE 67501 HAGUENAU FRANCE
51241	JEANRENAUD (DEPARTEMENT ELECTRO COMMUTATION) B.P. 359 39105 DOLE FRANCE
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55242	COMEPA 34 RUE JACQUART 93500 PANTIN FRANCE
55326	GENERAL ELECTRIC SEMICONDUCTOR PRODUCT DEPARTEMENT ELECTRONICS PARK SYRACUSE NY 13221 USA
55626	INTEL FRANCE 74 RUE D'ARCUEIL 94528 RUNGIS CEDEX FRANCE
56184	METAFIX (STE) SA RUE EUGENE GAZEAU 60300 SENLIS FRANCE
56687	MOTOROLA INC SEMICONDUCTOR PRODUCTS DIV P O BOX 20923 5005 E MCDOWELL RD PHOENIX AZ 85036 USA
56876	TEKELEC-AIRTRONIC B.P.2 92310 SEVRES FRANCE
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59191	FRANCE CONNEXION SARL 14 RUE DE FONTENAY 94300 VINCENNES FRANCE
59582	AMI MICROSYSTEMS 124 AVENUE DE PARIS 94300 VINCENNES FRANCE
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99996	SCHURTER AG H WERKHOFSTER 8 CH 6002 LUZERN LU SUISSE
99997	SGS UNITED KINGDOM LTD PLANAR HOUSE WALTON STREET AYLESBURY BUCKS UNITED KINGDOM
99998	S S S SOLID STATE SCIENTIFIC, INC., MONTGOMERYVILLE INDUSTRIAL CENTER. MONTGOMERYVILLE PA 18936 USA
99999	SCHNORR, ADOLF, KG 7434 MAICHINGEN STUTTGARTER STRASSE RFA