

A P P E N D I X

'MONOTYPE' 31-CHANNEL TAPE PUNCH

Issued by The Monotype Corporation Limited, Salfords, Surrey

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# 'MONOTYPE' 31-CHANNEL TAPE PUNCH

## CONTENTS

	PAGE
INTRODUCTION .. .. .	1
SPECIFICATION	
Physical .. .. .	2
Electrical .. .. .	2
GENERAL TECHNICAL INFORMATION .. .. .	
INSTALLATION .. .. .	4
OPERATOR'S INSTRUCTIONS	
Loading procedure .. .. .	7
Checking drill .. .. .	9
Switch-on routine .. .. .	10
ROUTINE MAINTENANCE	
Daily .. .. .	11
Weekly .. .. .	11
Bi-Weekly .. .. .	12
Removal of jammed paper from Die Plate .. .. .	13
ILLUSTRATIONS	
Tape threading diagram .. .. .	8
FIG. 1 .. .. .	14
FIG. 2 .. .. .	15
FIG. 3 .. .. .	16
WIRING DIAGRAM .. .. .	17

'MONOTYPE' 3-CHANNEL TAPE PUNCH  
Serial Numbers 31P201 to 31P250

INTRODUCTION

A 'Monotype' 31-channel tape punch is a self-contained unit employed to perforate operating codes in 31-channel programme tape. It has been designed primarily as part of either a 'Monotype' Electronic Perforator or a 'Monotype' Tape Conversion System. Information from any suitable data processing system may be accepted however, where a 31-channel programme tape output is required.

The whole unit is mounted on a rigid base with all but the tape feed and punching mechanism enclosed within a metal casing. Function buttons are located on the front of the case together with mains 'on' and 'off' buttons; the mains input socket and data connection are located at the rear of the case. Tape feeds from a roll on the lowest spindle and is carried over guide rollers and a sensing arm to the feed wheel and the die plate; paper punchins are collected in a receptacle clipped over the gate immediately beneath a perforation reader. The perforated tape passes over another sensing arm and a writing platform, round a tensioning guide and to the take-up spool.

Both the tape feed and the code punching systems employed require only minimum maintenance, and the mechanical simplicity of the feed system makes readjustments unnecessary throughout the useful working life of the equipment. Electrical maintenance is minimised by the exclusive use of semiconductors in the electronic sections, and the extensive use of printed circuit board assemblies facilitates the quick replacement of electronic components if necessary.

Access is gained to the punch pins by removing the receptacle and lifting the gate release catch. Each punch pin may be removed separately for cleaning and inspection purposes without the use of tools. Ventilation louvres are provided at the top and the rear of the unit, and these must be kept free of obstruction at all times.

## SPECIFICATION

### Physical

#### Overall dimensions

Height	16" (40.6cm)
Width	16½" (42cm)
Depth	17" (43.2cm) including data connector and function buttons.

Weight (without paper roll) 84 lb (38 Kg)

The ambient working temperature should not exceed 35°C (95°F) and it should be noted that the temperature of any surface on which the punch is placed must not exceed 40°C (104°F). Attention should be given also, to the ventilation louvres in the punch case and to the cooling fan grill in the punch block assembly cover, which must be kept free from obstructions at all times.

### Electrical

#### Input requirements

Mains 220/240 volts single phase 50 Hz or  
110/120 volts single phase 50/60 Hz  
to special order.

Power consumption 200 VA peak.

#### Data

Active level + 2.8 volts minimum,  
+ 5 volts maximum.

Inactive level + 0.3 volts/- 0.3 volts  
maximum.

Duration 2.8ms minimum 3.4ms  
maximum.

Rise/fall time 20 microseconds  
maximum.

Current consumption 2mA/channel  
maximum.

Negative input level - 0.3 volts  
maximum.

## Paper feed

Two input lines

a) single forward step; duration to be coincident with data input.

b) single reverse step; asynchronous.

Note: unused inputs must be kept at ground level (inactive).

Active level + 2.8 volts minimum,  
+ 5 volts maximum.

Inactive level + 0.3 volts/- 0.3 volts maximum.

Maximum current out 0.04 mA (active).

Maximum current in 1.6 mA (inactive).

Feed motor trigger point on trailing edge of input pulse.

## Inhibit feed

Inactive level + 2.8 volts minimum,  
+ 5 volts maximum.

Active level + 0.3 volts/- 0.3 volts maximum.

Maximum current in 1.6 mA (inactive).

Maximum current out 0.04 mA (active).

## Output signals

Tight tape condition + 5 volts.

Normal condition ..... 0 volts.

(Monitor point on contact 'SS').

## Punching capacity

Maximum number of punches energised simultaneously ..... 8.

Maximum mean number of punches to be operated per character over a ten minute period at maximum punching speed ..... 4.

One punch may not be operated continuously for more than four seconds.

## Punching speed

20 characters per second maximum.

## GENERAL TECHNICAL INFORMATION

The schematic circuit diagram of a punch is shown in diagram Fig 4. Basically there are five component systems:

1. Function/Indication System.
2. Motor Drive System.
3. Punching System.
4. Tape Feeding System.
5. Power Supply.

Reference to illustrations will show the location of key components and the methods of gaining access to a punch.

All circuit boards are provided with locating slots in the connector edge to prevent incorrect insertions. Nevertheless, care should always be taken to ensure correct orientation of circuit boards when replacing them.

Punch solenoid protection fuses are provided. Reference to Fig 3. will show the positions of fuses relative to data channels.

## INSTALLATION

A punch unit is delivered securely packed in a wooden case bearing instructions to keep the contents in an upright position.

Open the case and remove the packing material from the top and sides to expose a cardboard container. Cut this container at the top and also down the side seams, so that access may be gained to webbing lifting straps already in place; do not lift the unit by any other method at this stage. Open and roll down the sealed polythene bag so that the internal protective packing can be removed. Move the punch to its permanent site by lifting it at the base plate only, since damage will be caused if pressure is applied elsewhere.

### Electrical connections

The mains supply should be connected via the three-core mains lead supplied with a punch. The connections are:

RED	Live
BLACK	Neutral
GREEN	Earth

A fuse carrying the mains supply to a punch should be rated at 10 amps. As an additional safeguard, each punch is equipped with a circuit breaker switch which will trip to disconnect the mains supply in the event of a dangerous overload condition occurring.

Data connections are made via the 38-way plug and socket which is adjacent to the mains plug and socket at the rear of the case. The free connector containing fixed contacts, to which data cable wires are soldered, must have these contacts sleeved to prevent the possibility of short circuits occurring. Connections to the data plug and socket are as detailed overleaf.

Remove the cover from the main case, which is secured by six posidrive screws, and check that all printed circuit boards are fully located in their edge connectors. Replace the cover and tighten the screws.

Connect the mains and data inputs as previously described, and check that when the unit is standing switched-on ready for operation all conditions are correct for the precise operation of a punch. When supplied as part of either an Electronic Perforator or a Tape Conversion

Unit, a punch is equipped with ready-made mains and data cables to suit the system.

Load a spool of programme tape according to both the diagram and the instructions written for the operator, and carry out the normal procedure to check operation of the feed system. With the punchings container clipped into position the punch is ready to accept data input.

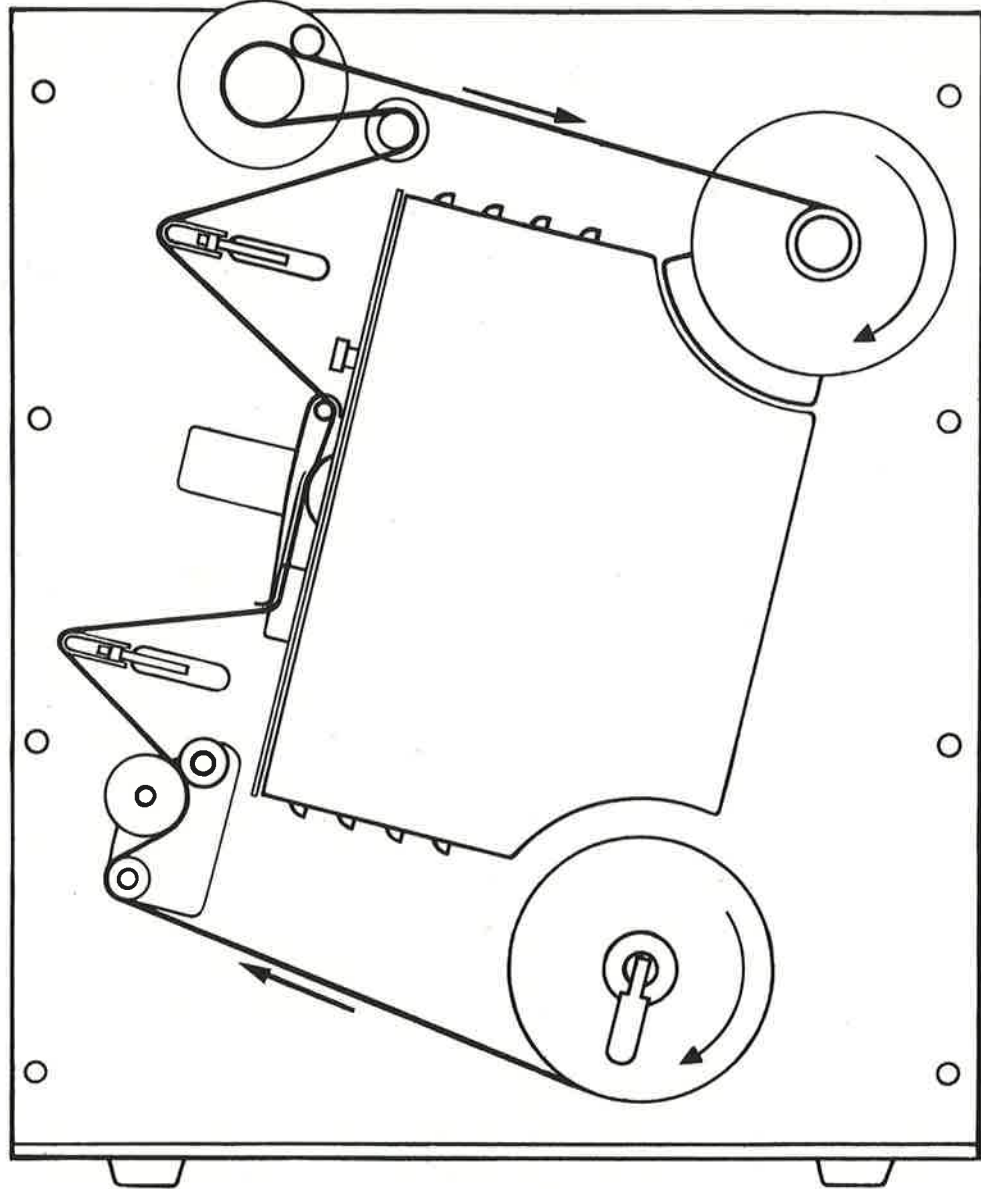
Arrangements should now be made to energise all punch inputs in accordance with the limits outlined in the electrical specification, coincident forward paper feed signals also being supplied.

#### DATA PLUG AND SOCKET CONNECTIONS

PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
A	Punch N	S	Punch B	HH	Punch 13
B	Punch M	T	Punch A	JJ	Punch 14
C	Punch L	U	Punch 1	KK	Punch 0005
D	Punch K	V	Punch 2	MM	Forward Paper Feed.
E	Punch J	W	Punch 3	PP	Stop Paper Feed.
F	Punch I	X	Punch 4	LL	Backward Paper Feed.
H	Punch H	Y	Punch 5	RR	+ 5v for test purposes only.
J	Punch G	Z	Punch 6	SS	External indication for tight
K	Punch F	AA	Punch 7		tape condition (giving + 5v
L	Punch S	BB	Punch 8		with respect to NN).
M	Punch E	CC	Punch 9	NN	Common Line.
N	Punch D	DD	Punch 10	TT	External inhibit of punch,
P	Punch 0075	EE	Punch 11		(this is normally connected
R	Punch C	FF	Punch 12		to NN).



Diagram showing method of threading  
programme tape on 'Monotype' 31-channel punch



### Checking drill

Having loaded a programme tape satisfactorily, switch on the mains supply again and check that the manual tape feed controls function correctly. Operation of the tape run-out button will give a feed of approximately sixteen steps per second. The tight tape indication can be checked by operating the tape arms to their fullest extent - towards the punch housing face plate - and noting that the tight tape indicator lamp flashes. Under tight tape conditions both the forward tape feed and all code punches are made inoperative.

Operate the tape run-out button for a few seconds to ensure that the tape is winding correctly on the take-up spool. Normally the paper guide systems should need no adjustment for first-time operation. However, it should be noted that the tension of the tape being wound onto the spool is governed by the attitude of the friction guide assembly; turning this assembly anti-clockwise will increase the wind-up tension. Excessive tension will create a tendency for the tape to wander or to tear and will also overload the wind-up motor and the gear box system.

### Switch-on routine

Due to an inherent characteristic of the tape feed motor system, there is a possibility that a tape feed will take place each time the punch is switched on. This could be either a forward or a backward feed; alternatively, when the first forward tape feed signal is supplied to the system after switch-on, it is possible that an initial reverse feed may result, or vice-versa.

Consequently, when a punch is used in conjunction with a 'Monotype' Electronic Perforator ensure that a 31-channel tape which is incomplete at the end of a period of operation is suitably marked for repositioning before switching off the equipment.

When operation is resumed and the equipment is switched on again, use the manual feed controls to move the tape either forwards or backwards, and then correctly reposition it, even if a tape feed has not occurred when switching on. The manual controls should be operated also immediately after loading programme tape into the wind-up system of a 31-channel punch, irrespective of the system with which it is associated.

Operation of the manual controls primes the tape feed system so that initial feed errors are eliminated before information is fed to the punch.

### Tight tape condition

Tight tape is indicated by a flashing red light contained in the continuous tape feed control button. While tight tape conditions prevail, both the data punch and paper feed systems are inoperative.

#### Lower tape arm

The lower tape arm can take up a tight tape position due to the following conditions:

- a) End of the blank 31-channel tape supply (end of tape glued to reel causes tight tape condition).
- b) Incorrect operation of paper drive capstan (see routine maintenance notes for cleaning instructions).
- c) Failure of reel out motor system.

#### Upper tape arm

The upper tape arm can take up a tight tape position due to the following conditions:

- a) Excessive use of the backspacing facility (when used with the Electronic Perforator) without first ensuring that sufficient loose paper is released from the take-up spool.
- b) Wind-up motor system continuously operating.
- c) Sticking punches preventing the output of paper from the die plates prior to a wind-up action.

Failure of either of the paper control motor systems to respond correctly to the tape arm actions must be immediately reported to the maintenance engineer responsible for the equipment.

When tight tape occurs as a result of backspacing, the condition can be corrected by winding the spool back by hand, after disengaging it by means of the take-up spool release mechanism. Perforating can then be continued after locking the take-up spool release mechanism again. Slack tape will automatically be taken up.

## ROUTINE MAINTENANCE

It is important to empty the punchings container at regular intervals, and at least as frequently as the programme tape spool is renewed. Failure to observe this precaution will result in tearing of the tape when the container becomes full.

### Daily

Remove all paper dust from the area of the die plates and the tape feed rollers. Use a .006" beryllium copper shim to clear small particles of paper from the die plates, particularly near the tape feed wheels, whilst the punch gate is open. At the same time clear the dust from the punch solenoid arms, and also from the rear end of the punch pins and die plates.

NOTE: The punch gate is opened by raising the die plate latch. Open and close the gate gently to avoid disturbing the seating of the punch pins, which could cause severe damage if closed onto the die plates.

Clean with a good quality brush, being careful to extract loose hairs. Check the operation of the tape feed rollers. Maintain the leading roller bearing slots in a clean condition at all times to ensure that the driven roller will fall freely onto the rubber driving roller.

Make sure that the cooling fan is operating satisfactorily.

Operate a suitable test routine to be sure that all 31 punches perforate tape correctly, and at the same time, check the linearity of punching; this can be performed conveniently by operating 'Line Fill' when a punch is used in conjunction with an Electronic Perforator.

### Weekly or after approximately 50 hours of operation

In addition to the routine daily maintenance, open the punch gate but do not remove the punch pins. Apply keyboard oil to the part of the punch pins protruding from the die and remove surplus oil with a lint-free cloth.

Using a paper tissue pad and methylated spirit, wipe clean the rubber driving roller.

### Monthly or after approximately 200 hours of operation

Open the punch gate, remove all the punch pins and lay in order of assembly on clean paper or lint-free cloth. Thoroughly clean the pins with a lint-free cloth or paper tissue (taking care to retain their assembly order).

Whilst the punch pins are removed and with the punch gate open, clean the die plates in the following manner: Apply a volatile solvent so that it runs through the die plate holes, yet avoids splashing. Collect the dust-laden solvent in a suitable receptacle. With the aid of an air line, blow out suspended dust from inside the die plate holes and clean the exteriors thoroughly.

Dip the small end of the punch pins in Molyslip G for a depth of  $1/16$ " approximately from the tip and replace the pins into their respective holes, spinning the part to distribute the lubricant in the guide holes before finally positioning.

Lubricate the punch pins with keyboard oil as described under the weekly procedure and apply a film of Molyslip G to the end of the punch pins contacting the solenoid levers.

NOTE: Never use abrasive substances to clean punch pins or die plates. Always use a mask or shield in front of the solenoid arms when removing pins or cleaning die plates.

Use only the approved .006" beryllium copper strip supplied for clearing jammed paper from the die plates, and avoid disturbing either the die plate fixing screws or the punch gate hinge blocks. If an improperly seated punch pin has caused damage to a die plate when attempting to close the gate, do not then try to force the pin into its correct position since this action will do further damage.

Removable wind-up spools must be maintained in good condition in order to function properly. Bent or loose side plates will affect the quality of tape wind-up.

Faults occurring which cannot be rectified by routine maintenance specified above, and which are outside the scope of these instructions for operation, should be referred to the appropriate offices as soon as possible.



### Removal of Jammed Paper from Die Plates

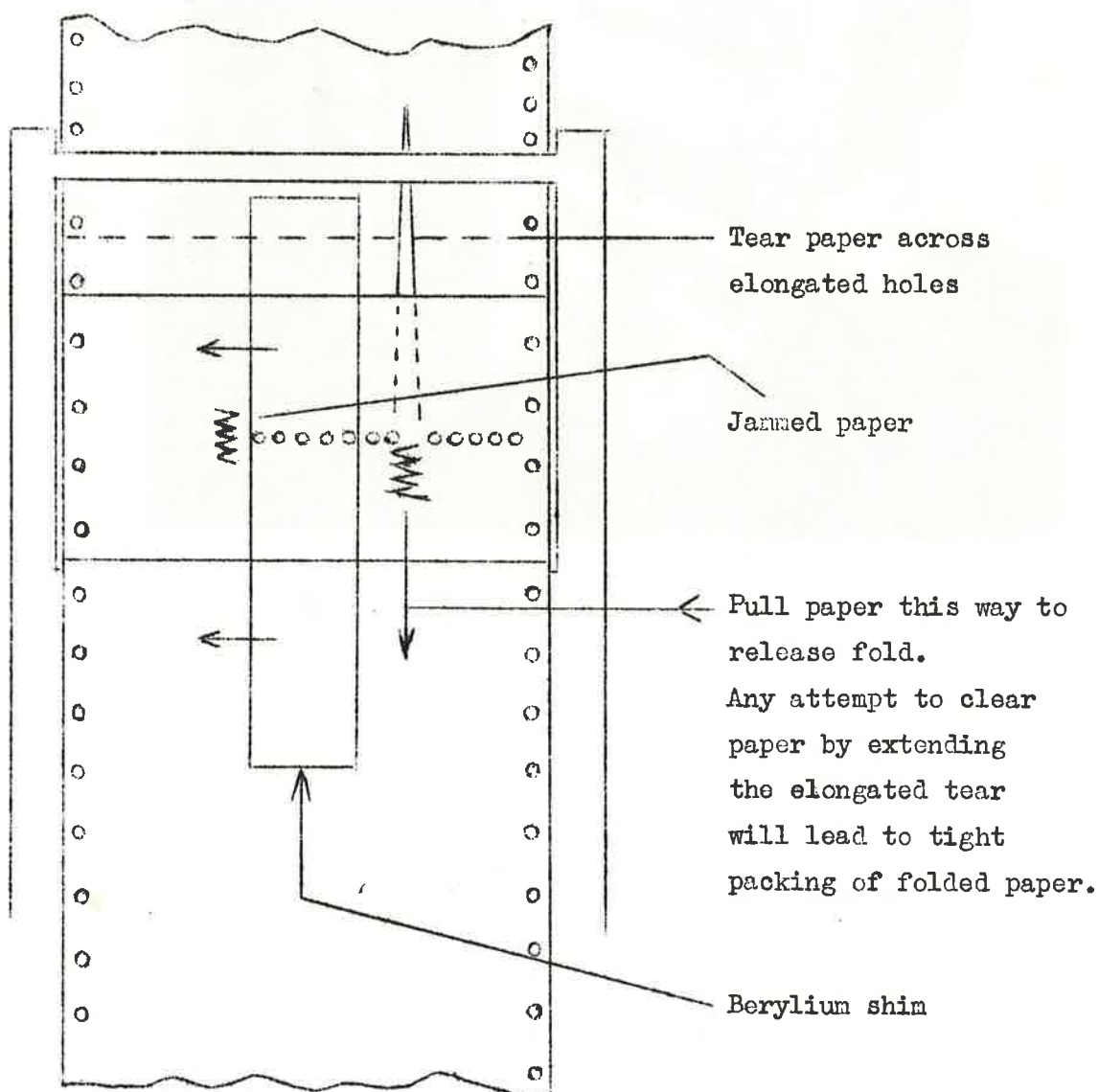
Paper may become jammed between the die plates as a result of a sticking punch or foreign matter in the paper.

A sticking punch usually causes an elongated tear in the paper with torn paper folding up behind the pin.

With care it is possible to free the paper without jamming the die plates.

First switch the punch off, release the punch gate so that the sprocket holes are free from the feed wheels and release the paper by tearing across the elongated hole, as shown in the illustration.

To clear jammed paper particles from between die plates use the .006" beryllium shim to pull paper towards sides of plates where it can be easily removed.



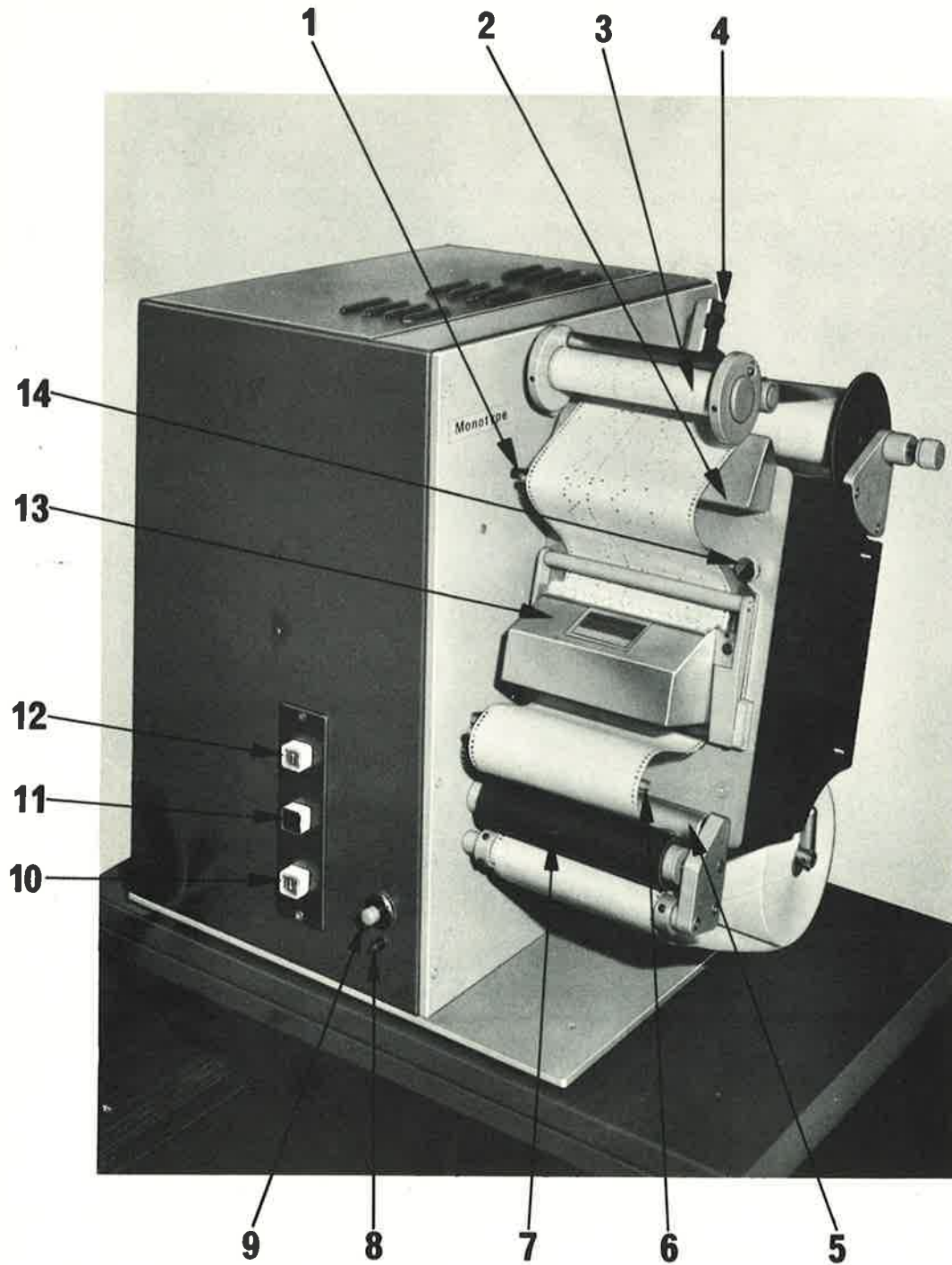


Fig 1

- 1 Tape take-up sensing arm
- 2 Tape writing platform
- 3 Tape take-up tension bail
- 4 Tape take-up spool release mechanism
- 5 Driven tape feed roller
- 6 Tape feed sensing arm
- 7 Driving tape feed roller

- 8 Circuit breaker 'OFF' button
- 9 Circuit breaker 'ON' button
- 10 Single feed reverse tape button
- 11 Tape run-out button incorporating tape warning lamp
- 12 Single feed forward tape button
- 13 Tape punchings container
- 14 Die plate latch

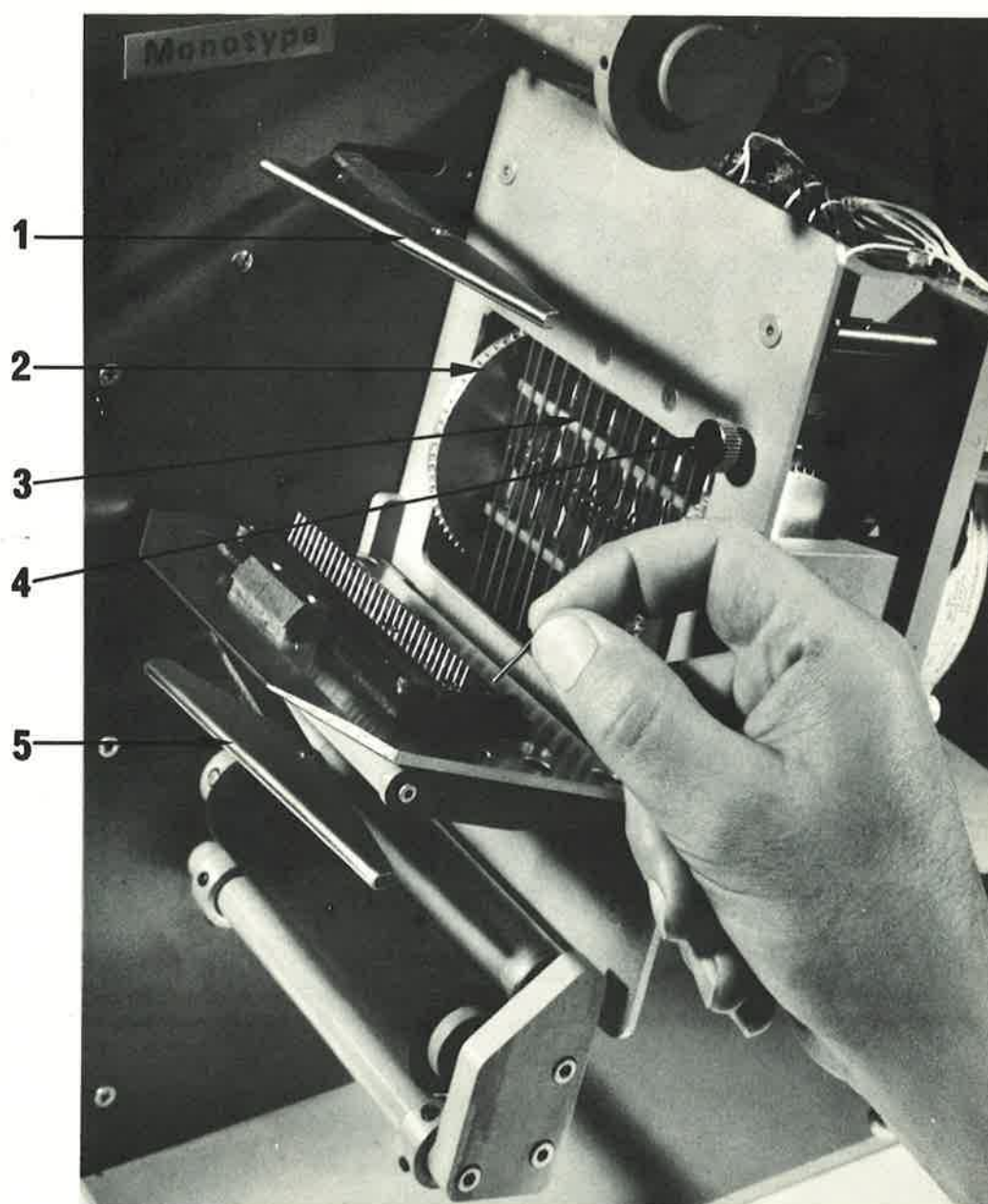


Fig 2

- 1 Tape take-up sensing arm
- 2 Tape feed wheel
- 3 Punch drive solenoid levers
- 4 Die plate latch
- 5 Tape feed sensing arm



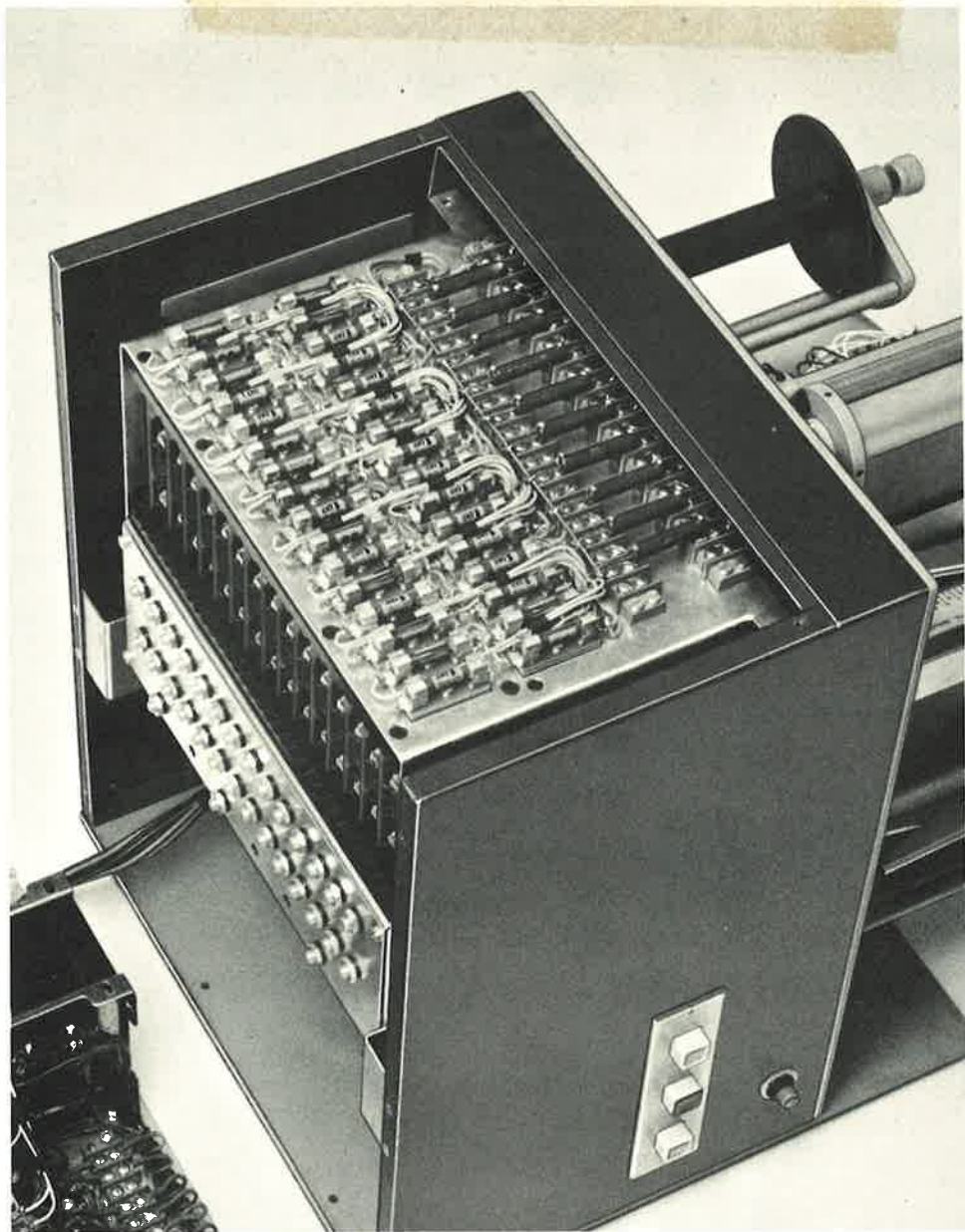


Fig 3  
The opened case showing positions of punch solenoid protection fuses.

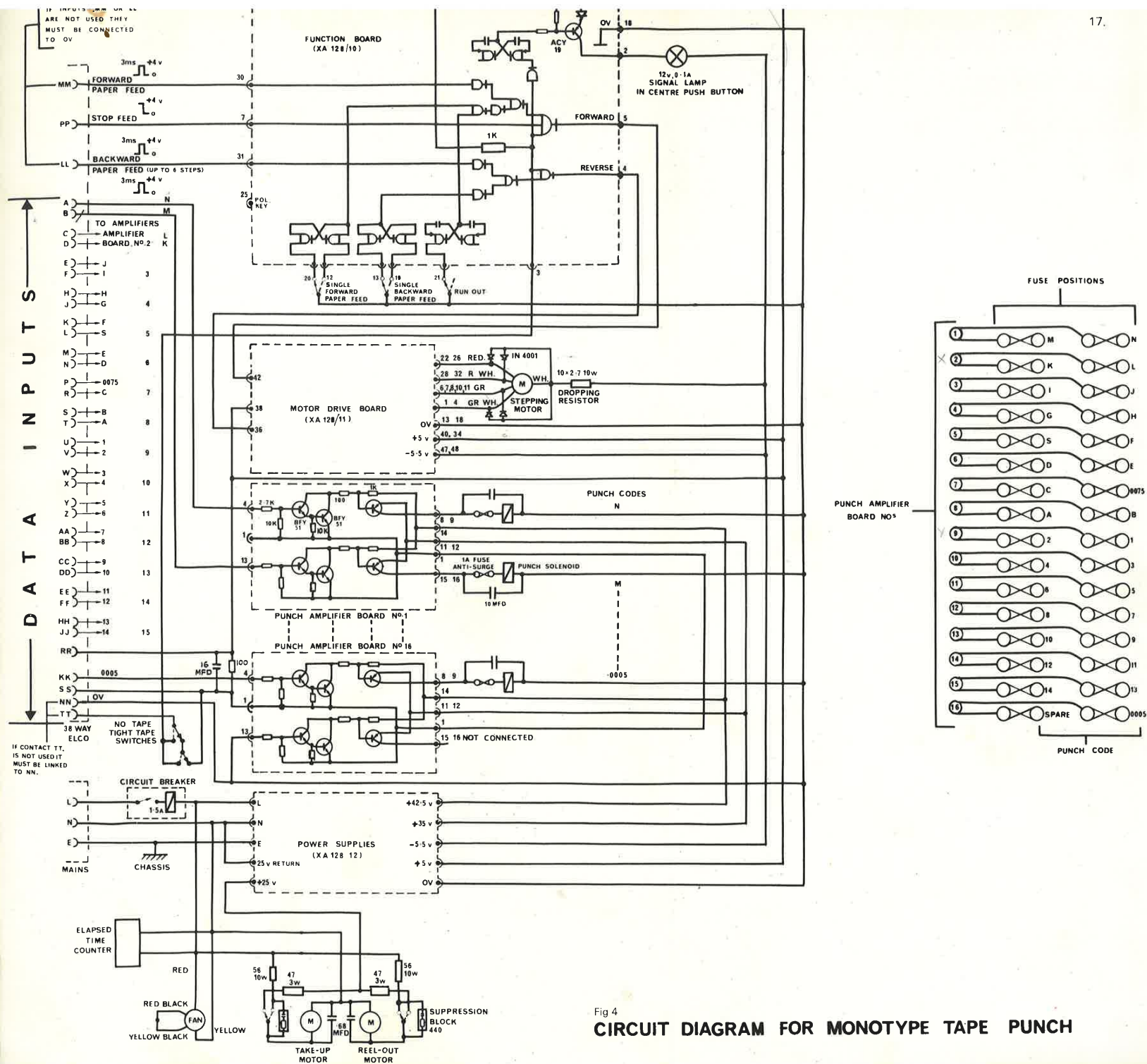


Fig 4  
CIRCUIT DIAGRAM FOR MONOTYPE TAPE PUNCH

OK  
IN USE

A

N	E-B	4	OHMS	-	X 1
	E-C	110		-	
	B-C	1K		-	X 10
P	E-B	00		-	X 1
	E-C	00		-	
	B-C	2.25		-	X 10

B

N	E-B	4		-	X 1
	E-C	0		-	
	B-C	100		-	X 10
P	E-B	1K		-	X 1
	E-C	0		-	
	B-C	2.25		-	X 10

OK  
IN USE

C

N	E-B	4		-	X 1
	E-C	120		-	
	B-C	1K		-	X 10
P	E-B	00		-	X 1
	E-C	00		-	
	B-C	2.25		-	X 10

D

N	E-B	4		-	X 1
	E-C	0		-	
	B-C	110		-	X 10
P	E-B	1K		-	X 1
	E-C	0		-	
	B-C	2.25		-	X 10

IF CON  
IS NOT  
MUST  
TO NA