TELETYPE
CORPORATION

HOW TO OPERATE

the 43 teleprinter

BASIC ASR

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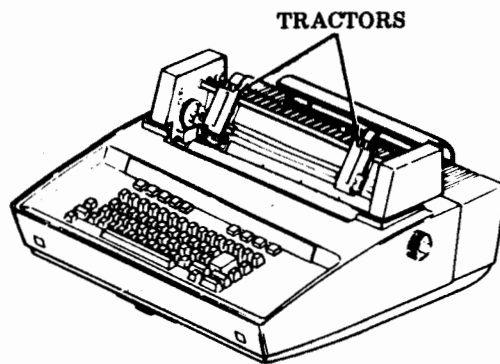
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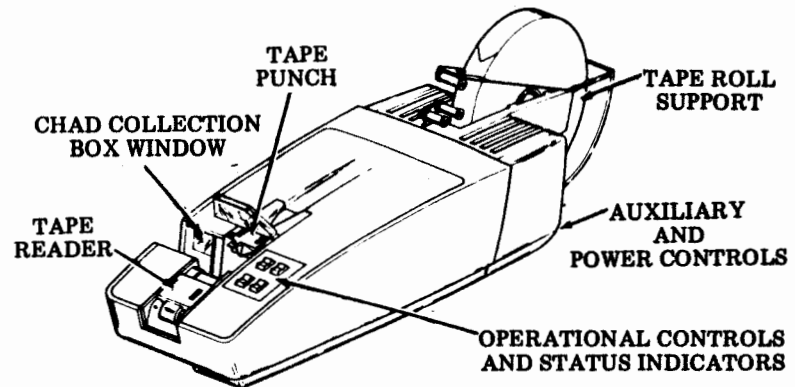
43 (8-level) Paper Tape Punch and Reader Unit
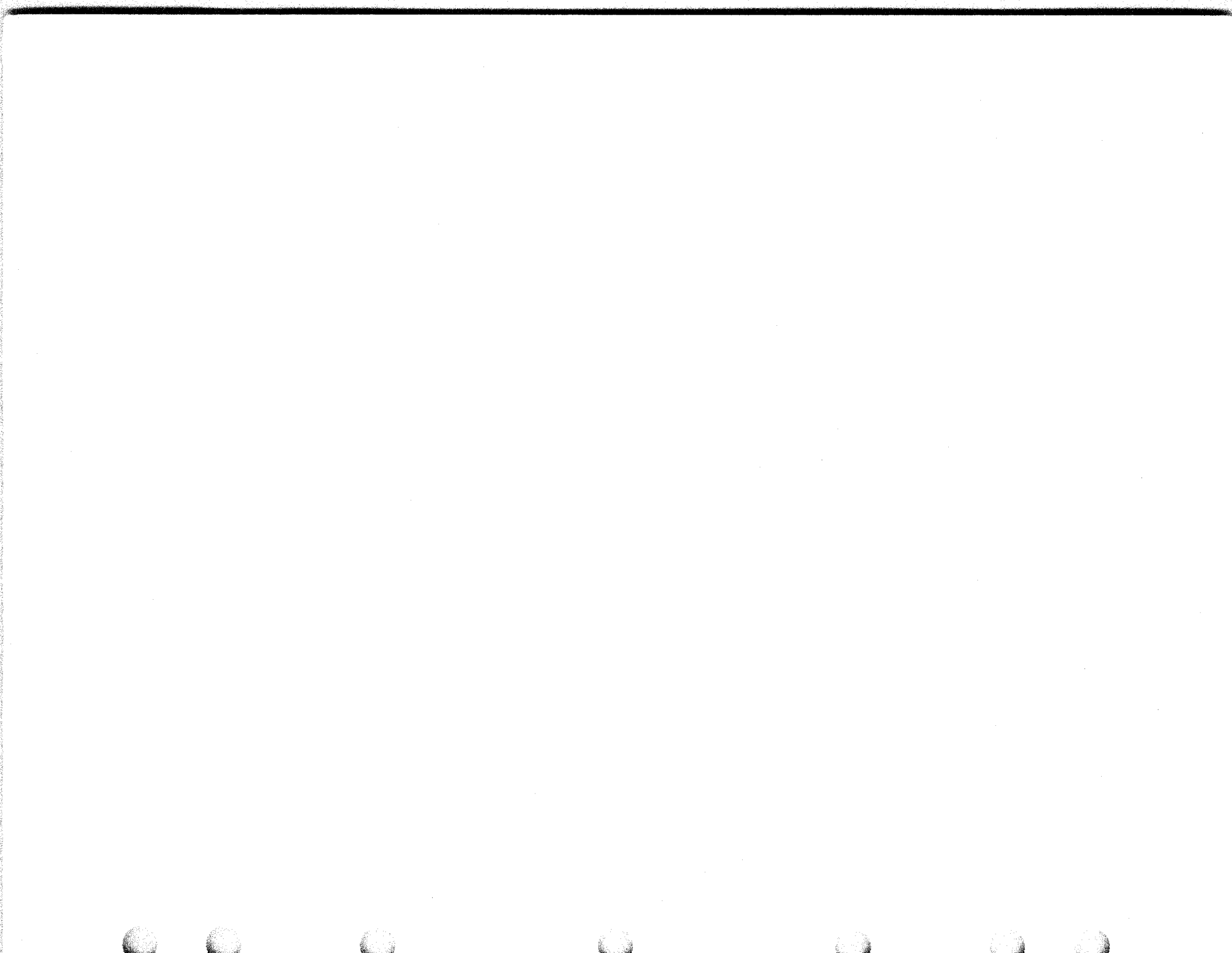
INTRODUCTION

The 43 Basic ASR Teleprinter provides character-at-a-time keyboard-printer send-receive operation and has the capability of preparing punched paper tape off-line, for later transmission on-line from the paper tape reader. In the on-line mode, the punch along with the printer can copy all received data. The punch and reader can also be controlled on-line by character sequences. (See SEND ON-LINE and RECEIVE ON-LINE.) Transmission speeds are 10 characters per second (cps) (100 wpm) or 30 cps (300 wpm) and can be selected by the attendant to match the remote station.

The 43 ASR Teleprinter may be connected to an external communications device (modem) which may be associated with a telephone for connections and for transmission of data. A permanent connection via private line may also be used in these arrangements.

The telephone can be used for normal voice communication or data messages can be exchanged over the telephone line using controls on the 43 Teleprinter and modem.

The Paper Tape (PT) unit may be located up to 50 cable feet from the teleprinter.

On sprocket feed printers, messages with up to 132 characters per line are printed on 12 inch wide sprocket feed paper. The paper may be fed from a supply box or limited amounts can be placed in a paper holder that clips on the rear of the teleprinter. (See Page 33 for paper suppliers.)

On friction feed printers, messages up to 80 characters per line are printed on 8-1/2 inch wide roll type paper. The roll is held in a support attached to the rear of the teleprinter.

The tractor feed printer accepts paper widths from 3-1/2 inches up to 12 inches. Messages up to 80 characters per line may be printed.

The chad resulting from punching approximately one-half roll of randomly punched tape will fill the small chad collection box associated with table top versions. The large box on pedestal versions will hold the chad from approximately one and one-half rolls of tape.

The ribbon is part of a cartridge that can be readily replaced with the cover open. Replacement ribbon cartridges can be obtained from Teletype Corporation (see Page 33).

A pullout directory card holder under the front of the keyboard may be used to write in frequently used telephone numbers (see Page 2). Exceptions to standard operating features should be recorded on the reverse side of the card.

1

CONNECTIONS AND POWER TURN ON

Teleprinter

● Make sure ac power cord, cord to any external communications device, and cord to PT Unit are connected as shown before turning on power.

ON/OFF
SWITCH

AC POWER CORD
RECEPTACLE

DETACHABLE
AC POWER CORD
(115 Vac OR 230 Vac)

ON
↑
OFF

FUSE

43 TELEPRINTER

ON/OFF
SWITCH

LINE PORT

To External
Communications
Device

To PT Unit

ON
↑
OFF

AUX PORT

AC POWER CORD TO
115 VAC OUTLET

(Rear View)
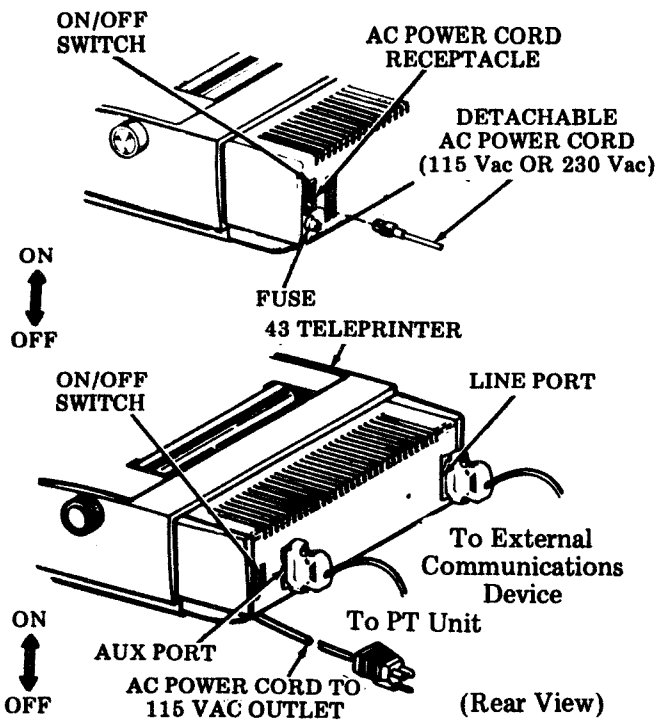
● Turn on power to teleprinter by depressing upper half of ON/OFF switch.

● When power is first turned on, the print head will move fully left and the TERM READY key on the operator console will light. During normal operation one of the three operational mode control keys should always be lit indicating power is on.

OPERATIONAL MODE
CONTROL KEYS

LOCAL

DATA

TERM
READY

KEYBOARD

DIRECTORY CARD
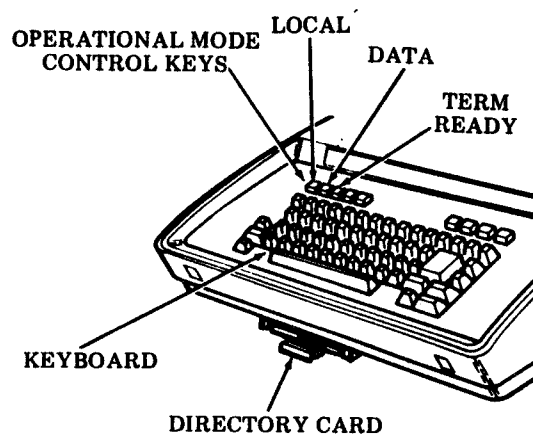
● Power should normally be left on to automatically answer incoming calls on arrangements so equipped or to receive data messages. However, when not in use, the power to the teleprinter may be turned off without affecting the normal use of the telephone.

● Telephone calls in the data mode will be disconnected if power to the teleprinter is turned off. In some applications, turning off power may affect operation of other terminals in the system.

2

PT Unit

●Make sure ac power cord and cable to KSR Teleprinter Auxiliary Port are connected as shown before turning on power.

To 43 Teleprinter
Auxiliary Port.

ON/OFF
SWITCH

ON
OFF

115 V
SET

AC POWER
CORD TO 115 V
AC OUTLET

115/230 V
SET
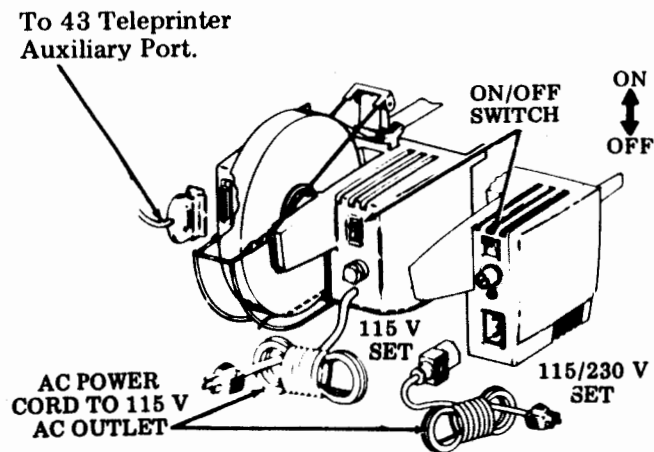
●Turn on power to PT unit by depressing upper half of ON/OFF switch.

●Power should normally be left on for automatic punch and reader operation on sets so equipped.

●The ASR arrangement will revert to normal KSR operation when the PT unit power is turned off or the cable is disconnected.

●Telephone calls in the data mode may be disconnected if power to the PT unit is turned on or off.

Note: Each time power is turned on, the motor starts. It continues to run for a minimum of 30 seconds if no data is sent or received during that interval.

3

TELEPRINTER OPERATIONAL CONTROLS AND STATUS INDICATORS

●Use and function of the operational control and status indicators should be reviewed before the 43 Teleprinter is operated locally or on-line.

One of these three keys always lit indicating communications mode and power on. (See Pages 5 through 7 and 37.)

Use in system dependent. Blinds keyboard when lit. (See Page 8.)

Lights on paper-out and other alarm conditions. (See Page 8.)

Independent local test of printer. (See Page 9.)

Use is system dependent. Controls printing of ■ on received parity error. (See Page 9.)

Sends and receives at 30 or 10 characters per second. (See Page 9.)

Controls local printing and punching of transmitted data. (See Page 9.)

Reset for partial roll of paper. (See Page 15.)

KEYBOARD
(See Pages 4 and 10.)

(Top View)

4
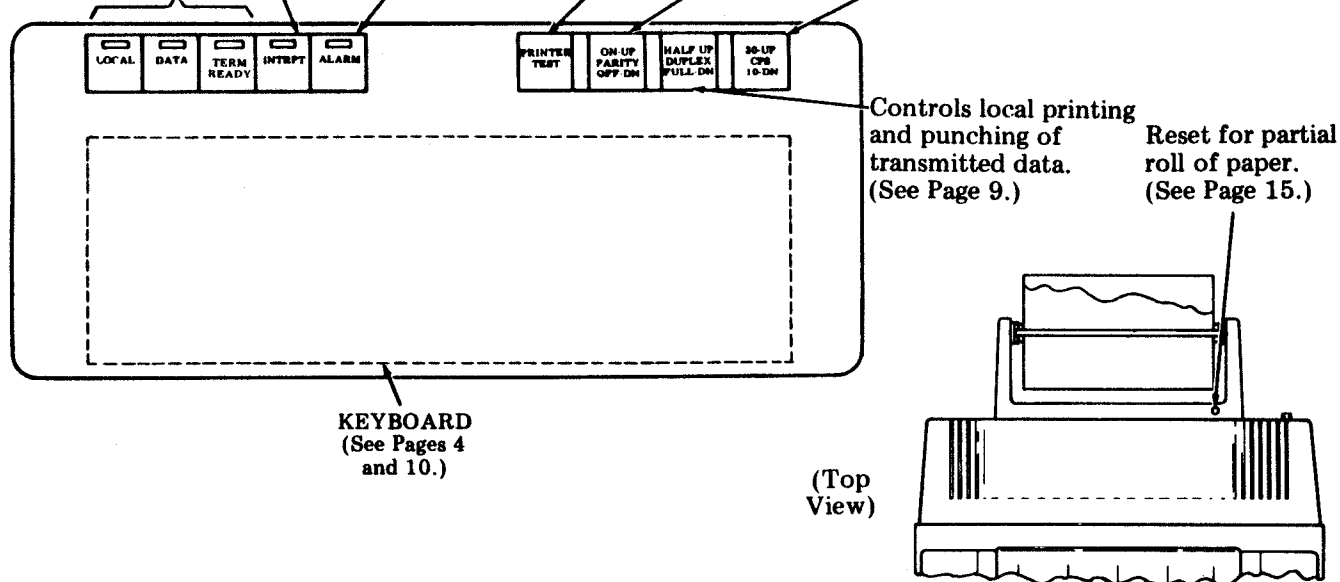
Local Mode Key

 Key lights in local mode.

●The keyboard and reader can send data locally off-line to the punch and printer in the local mode. (See PT UNIT AUXILIARY CONTROLS Page 20.) (Telephones associated with external communications devices may be able to operate regardless of the condition of the LOCAL lamp.)

●The local mode can be entered:

■At any time, by momentarily depressing the LOCAL key. This may cause a disconnect.
■When PRINTER TEST key is operated.
■Opening the cover or by removing paper in the automatic answer mode.
■Receiving eight line feeds in the data mode after paper-out alarm.

5

Data Mode Key

DATA Key lights in data mode.

● With key lit (LOCAL and ALARM lamps not lit) the keyboard and reader can send messages on-line and the printer and punch can receive messages on-line.

● The data mode is under control of the external communications device or directly connected distant terminal. (See TERM READY.)

Terminal Ready Mode Key

TERM READY Key lights indicating terminal ready mode.

●When power is turned on, the TERM READY lamp will light indicating a standby condition during which calls may be originated or answered.

●When calls are complete and data communication is established as indicated by the DATA lamp lighting, the TERM READY lamp turns off.

●The terminal ready mode can also be terminated by:

■Opening the cover.
■Operating local printer test.
■Removing paper.
■Manual transfer to local talk mode.
■Turning off power to teleprinter or PT unit.

●The terminal ready mode can be entered by depressing the TERM READY key momentarily. If depressed during the data mode, a telephone call may disconnect or DATA lamp may extinguish.

●On private line arrangements, the TERM READY lamp lights only when the terminal is ready but the remote terminal or external data set is not ready.

7

Interrupt and Alarm Keys

Key lights when transmission has been interrupted by the remote station.

Note: The use of this key is system dependent. It may not be operable with some remote stations. When operable, its use should be under direction of the system.

●The INTRPT key operates as follows:

■It lights under control of the remote station. When lit, keyboard sending is disabled.

■If depressed momentarily when lit, the interrupt is canceled.

■If depressed when not lit, the remote station sending may be interrupted ie, stop sending. Locally bell rings and key lights momentarily.

●Interrupt is also canceled by a disconnect or when power is turned off.

Key lights or flashes when alarm condition exists.

●Lights when:

■Paper-out condition is sensed (sprocket feed). This is an advance warning that eight received line feeds later (in the data mode), the call will disconnect. Also, after thirteen line feeds, paper

8

will be out at the print head.

■Low paper condition is sensed (friction feed). This is an advance warning that 25 to 50 feet of paper remain on the paper roll.

■When the cover is opened.

■When printer test is operated.

●Flashes when:

■Teleprinter is in a loopback test mode.

●Can be cleared by:

■Replacing paper or closing cover.

■On friction feed printers, if a partially full paper roll is installed, it may be necessary to depress the RESET key on the paper roll support. See Page 15.

■When flashing by:

ESC = sequence
Depressing LOCAL key.
Turning off power.

Note: In some systems, the ALARM key may be flashing during normal operation accompanied by printing. Unless otherwise instructed, the alarm should be cleared after extended periods of flashing. See Page 11.

Printer Test, Parity, Duplex, and Character Speed Keys

An independent test of the printer is provided for use by attendant or field service personnel. Test consists of continuous printing of the 94 character printed set as shown below. During test, bell rings and automatic return of carriage and line feed is performed within margin restraints.† Test should not be performed in data mode since data mode will be terminated and a telephone call may be disconnected. Depression of PRINTER TEST key initiates test. Test is terminated when this key is released. (See Pages 5 through 8 for keys that light or extinguish during test.)

Half-Duplex (key up) — printer and punch can copy data sent and received. The printer and punch can be blinded to on-line transmission from the local keyboard and reader while receiving messages simultaneously from the remote sender. This mode is known as Full Duplex (key down — DN).

Note: The local CR-LF function will not be performed in Full Duplex.

Sample of Test Message

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

Line Length 72 — Option 432b.*
Line Length 80 — Option 432c.*

↑← Option 431b.*	
↑← Option 431c.*	As Factory
^_ Option 431d.*	Furnished

The proper position of this key depends on system application. The remote sender may or may not be equipped to send correct (even) parity. The 43 Teleprinter sends even parity as factory furnished, Option 434a. When PARITY key is on, characters received with incorrect (odd) parity will print as substitute character symbol ■, when parity is off, the character that is received will be printed or performed if it is a printable character or a valid function. The PARITY key alternately locks down (DN) for parity off or releases up for parity ON to set parity checking mode.

In Half-Duplex, the printer and punch can copy all data sent and received but only one sender can operate at a time without interference, ie, characters from the keyboard will be inhibited if the unit is receiving on-line. The key locks down or releases up.

In order to communicate in the data mode, the transmission rates of the sending and receiving stations must be the same. This key alternately locks down or releases up and sets the on-line operating speed of the station to either 30 (key up) or 10 (key down — DN) characters per second (300 or 100 words per minute).

*See backside of Directory Card for record of any option exceptions that may have been enabled. Right margin must be set on tractor feed sets using narrow paper.

†If margins are set for less than 96 characters, a character will be skipped (not printed) each time a new line starts, except for the new line that starts a new cycle of printing.

9

KEYBOARD LAYOUT

● The keyboard is operational locally in the local mode and on-line in the data mode.

Locks down for capital alpha. Releases up for lower case (affects alpha characters only).

Shifts lower case alpha to upper case alpha and symbols on lower half of keytop to symbols on upper half. (Does not release CAPS LOCK.)

BEL — sounds bell.

BS — performs backspace in addition to BACKSPACE key.

See Page 11 for the remaining CTRL key generated characters.
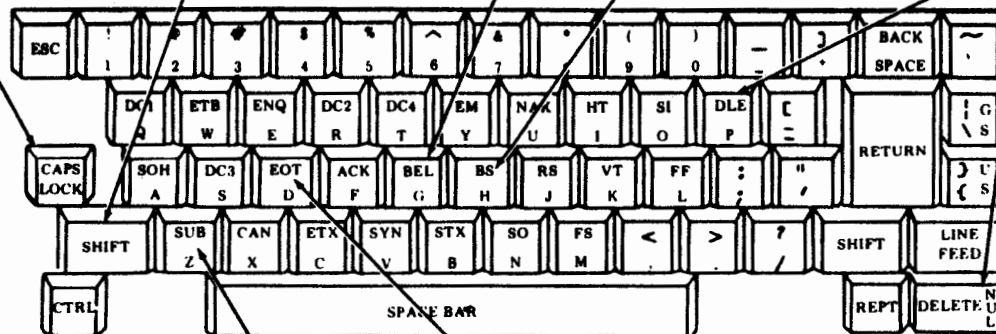
● Several keys perform special functions in addition to sending the code when depressed together with the CTRL key:

SUB — prints ■ .

EOT — may initiate telephone line disconnect.

● Several escape sequence functions also can be performed by depressing the ESC followed by the indicated lower case key. (See Page 11.)

ESC l — (ESC lower case L) set left margin.
ESC r — Set right margin.
ESC x — Clear left and right margin.
ESC m — Releases left and right margin.

10

SPECIAL KEYBOARD CHARACTERS

●Codes for the following characters are generated from the 43 Teleprinter keyboard by use of the CTRL key and the key with the symbol shown, operated together.

These characters are not functional in the Model 43 ASR Teleprinter but may be used in some systems.

ETB	DLE	VT	SYN
EM	GS	FF	STX
NAK	SOH	US	SO
HT	ACK	CAN	FS
SI	RS	ETX	NUL

These characters may be used to turn the reader on and off. (Local or HDX automatic send or receive modes.)

DC1	Reader on.
DC2	Punch on.
DC3, ENQ, EOT	Reader off.
DC4	Punch off.

●The special escape sequences listed below (in addition to those on Page 10) are functional in the 43 Teleprinter by sending (or receiving) the character immediately following the escape character (ESC key).

Use of other escape sequences are system dependent. (Some characters following ESC may print on tractor feed sets.)

ESC > Analog Loopback +
ESC < Digital Loopback ‡ +
ESC = Clears either Loopback.
ESC w Returns carriage and
          paper advances one line.

+Use of either loopback is dependent on associated communications device.
‡Used under control of remote station.

●Repeat speed varies depending on 10, 30 cps on line and approximately 50 cps locally.

KEYBOARD-PRINTER (KP) OPERATION

● The keyboard-printer can be operated locally with the LOCAL key lit or on-line with the DATA key lit.

●Signal Bell

The signal bell sounds when characters are entered seven characters before and at the right margin, ie, margin at 80, bell at 73 and 80. Also sounds at left margin when attempting to backspace, when an interrupt is sent and on paper-out.

●Local Return Line Feed

The carriage is returned and the paper advances one line when the CTRL RETURN keys are operated together. No character is sent on-line.

● Indicator Scale
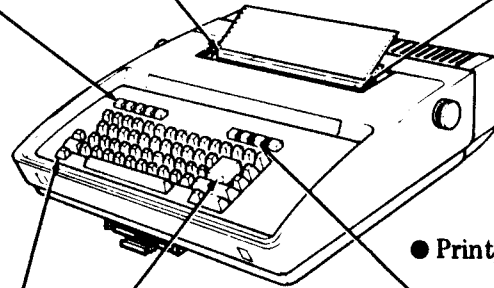
● Margin Setting

When power is turned on, the left- and right-hand printing margins are reset to 1 and 132 on sprocket feed or 1 and 80 on friction feed and tractor feed. They may be set or cleared locally or on-line by using the escape sequences. See Page 10. To change either margin outward, both must be reset.

● Printer

The printer copies all printable data messages except that in full duplex (data mode only) the printer copies received data only.

The next printing location of the print head and the position for setting left- and right-hand margins is indicated by the print head marker at the print indicator scale. The print head moves back when printing resumes after 1 second delay.

LAST PRINTED CHARACTER IN 5TH PRINTING POSITION

CENTER OF NEXT PRINTED CHARACTER

POSITION OF PRINT HEAD MARKER BEFORE 1 SECOND DELAY

PRINT HEAD MARKER AFTER 1 SECOND (Except at 131 and 132, provides last character visibility on sprocket and friction feed sets.)

PRINT INDICATOR SCALE

10

12
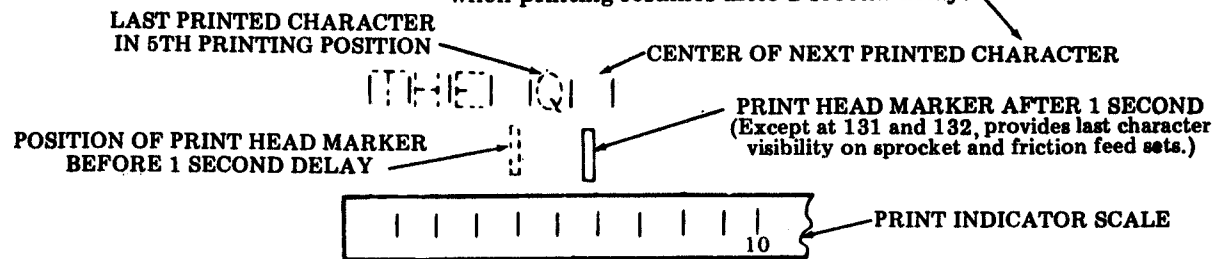
INSTALLING RIBBON

(1) Center print head and open cover. Alarm lamp lights.

(4) Place new ribbon around the outside of rollers.

(3) Pull print head locking lever back (towards keyboard) as far as it will go.

(8) Using thumb, push locking lever toward platen until it snaps into place.

(9) Close cover.

(7) Position print head against ribbon. With thumb on top of the print head, push the print head toward the platen, then move locking handle fully to the rear.

430035
CARTRIDGE
WITH RIBBON

(5) Pull on cartridge to the right and pass ribbon between print head and rollers (see Routing Diagram below).

(2) Remove and discard cartridge with used ribbon by grasping and lifting the cartridge. This applies only when changing a ribbon.

(6) Place ribbon cartridge on the right-hand bracket and allow magnet to pull cartridge down into place. Make sure it is down.

COVER RELEASE
(2 Places)

RIBBON ROUTING   ROLLERS   RIBBON CARTRIDGE
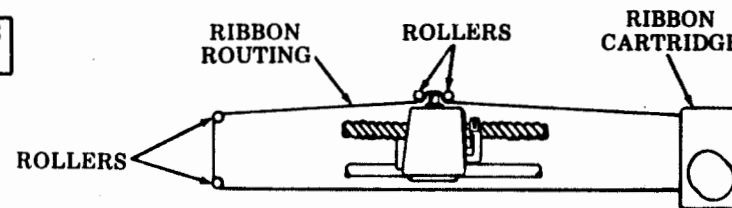
ROLLERS

Note: Make sure ribbon is fully seated on all four rollers before closing cover.

Routing Diagram

13

INSTALLING PAPER (Sprocket Feed)

●Install paper as shown after centering the print head and removing the unused paper. It is not necessary to disconnect an on-line call, open the cover or turn off power. However, to avoid loss of data, paper should not be replaced without requesting the remote terminal to stop sending.

Note: Paper may be fed directly from the supply box or if the paper holder is used, a limited stack of forms may be placed in the holder.

DEFLECTOR
(May not be present.)

① Pull the paper-out sensing lever towards you until it latches. Lift rear edge of paper separator and tilt forward.
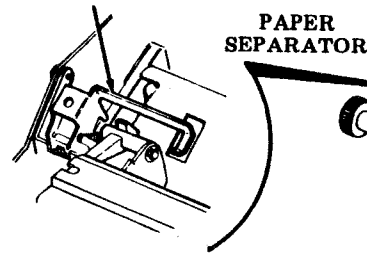
② Fold back first sheet, if desired, and route paper behind the paper separator. Line up sprocket holes on leading edge of both sides of paper with sprocket pins. Insert under rear side of platen. Release paper separator.

PAPER HOLDER
(This type snaps onto deflector.)

PAPER SEPARATOR
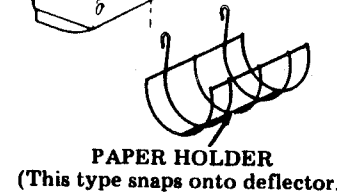
③ Advance paper to paper guide using platen knob.

SLIDES OVER BUSHINGS

PLATEN

④ Lift paper guide (plastic bar) thereby unlatching the paper-out sensing lever.

⑤ Advance paper under the paper guide then close guide. Paper may be fed to desired position using CTRL RETURN keys. (With power off the platen will be free rolling and CTRL RETURN is inoperative.)

REAR TEARING EDGE

PAPER GUIDE
(Plastic Bar)

(Rear View of KP)

BUSHINGS

14
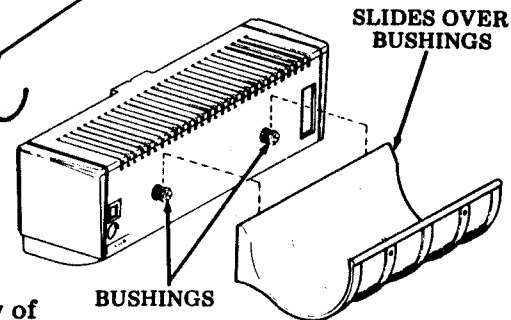
INSTALLING PAPER (Friction Feed)

●Install paper as shown after removing the unused paper from the printer. It is not necessary to turn off power or open the cover when replacing the paper but to avoid loss of data, paper should be replaced after the remote terminal stops sending.

(4) Adapters (if present) on new paper rolls, should be removed. The adapter can be used to cut and remove the outer layer of paper.

(5) Insert paper spindle into paper roll.

ADAPTER

PAPER SPINDLE

(3) Remove and retain paper spindle from tube of the used paper roll.

(2) Push back on the paper release to enable paper feeding.

(1) To remove unused paper or to straighten paper, pull forward on the paper release.

PAPER RELEASE

RESET

PAPER ROLLER

PAPER ROLL SUPPORT

PRESSURE ROLLER

PAPER TRAY

(7) Lift paper separator and insert paper between guide posts and down behind the platen. Release paper separator.

GUIDE POSTS

PAPER SEPARATOR

PLATEN KNOB

PAPER GUIDE (Plastic Bar)

(6) Place paper roll with spindle into the cradle of the paper roll support. Paper should unwind from the front of the paper roll and pass over the paper roller as shown.

(8) Lift paper guide and continue pushing paper down until paper engages the pressure roller. Advance paper using platen knob or line feed from keyboard. Feed paper under the paper guide then lower the paper guide.

(9) Depress to reset if ALARM lamp on the operator console does not turn off.

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INSTALLING PAPER (Tractor Feed)

● To install paper, it is not necessary to disconnect an on-line call, open the cover or turn off power. To avoid loss of data, however, paper should not be replaced without requesting the remote terminal to stop sending.

(3) Lift paper drag bail until locked in "up" position.

(1) Lift lids here to open and remove unused paper.

RIGHT TRACTOR

TRACTOR RELEASE

LEFT TRACTOR

VERNIER WHEEL

TRACTOR RELEASE

(2) Push paper release lever down (if not down) to release pressure roller.

(4) Depress paper-out switch lever and hold down.

SOFT ROLL BUTTON

(1) Squeeze the right tractor release with your thumb and forefinger and position the tractor to engage the paper feed holes, if necessary. (The left tractor should normally be fully left to assure paper-out sensing.)

(6) Push paper release lever to the rear or engage pressure roller and rotate platen knob to advance form until it extends approximately 4 inches beyond tractor, then push the paper release lever down to its released position. (This step may be omitted if paper may be installed without the aid of the pressure rollers.)

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PLATEN

PRESSURE ROLLER

Paper drag bail operating position.

PAPER PATH

(5) Fold back first sheet if desired, route paper under paper-out switch lever and under the platen just past the pressure roller. (Narrower than 12 inch forms should be centered to the platen to engage pressure rollers when inserting.) Release paper-out switch lever.

(8) Place the paper feed holes over the tractor pins keeping paper straight in tractor mechanism and close lids. This should cause the paper drag bail to fall into its operating position. Tractor may require side to side adjustment to hold form flat against the platen.

(11) Adjust tractor mechanism vernier wheel to provide up to 2 horizontal character positions. If greater adjust-ment is required, reposition both tractors.

(Partial Front View)

(9) Adjust the paper bail plastic roller to center of paper adjust metal roller to one inch (less for narrow paper) from right edge of paper.

(10) Set right margin (and left margin), if necessary.

(12) To reposition a line vertically, use soft roll feature. Depress soft roll button on platen knob and rotate platen to desired position. Release soft roll button.

17

PT UNIT CONTROL PANEL ARRANGEMENTS

One of the arrangements shown below will be present on your PT Unit. The purpose and operation of all controls and indicators is described on subsequent pages under PT UNIT INDICATORS — Page 19, PT UNIT AUXILIARY CONTROLS — Page 20, PT UNIT TAPE HANDLING CONTROLS — Page 21, PUNCH OPERATIONAL CONTROLS — Page 22, and READER OPERATIONAL CONTROLS — Page 25.
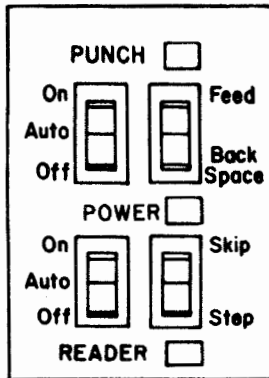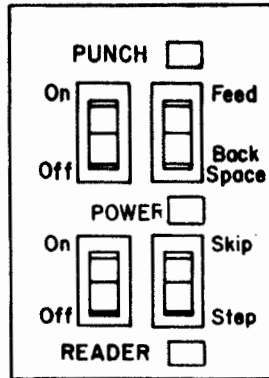
Manual & Automatic   Manual Only   Automatic Only
                                             (Momentary Start)
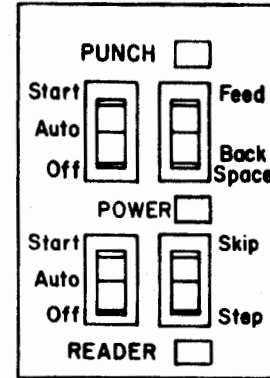
Each time a control switch position is changed to other than off, including feed, backspace, stop and skip, the motor starts. It continues to run for a minimum of 30 seconds if no data is sent or received during that interval.

PT UNIT INDICATORS

ASSOCIATED CONTROLS

PUNCH SWITCH

Indicator turns ON, OFF or Blinks	On
Indicator turns ON, OFF or Blinks	Auto
Indicator OFF	Off

Indicator turns ON, OFF or Blinks	On
Indicator OFF	Off

Indicator turns ON, OFF or Blinks	Start
Indicator turns ON, OFF or Blinks	Auto
Indicator OFF	Off

READER SWITCH

Indicator turns ON or Blinks	On
Indicator turns ON, OFF or Blinks	Auto
Indicator OFF or Blinks	Off

Indicator turns ON or Blinks	On
Indicator OFF or Blinks	Off

Indicator turns ON, OFF or Blinks	Start
Indicator turns ON, OFF or Blinks	Auto
Indicator OFF or Blinks	Off

Note: Operating reader switch to OFF and opening tape reader lid, allowing tape out contact to rise, will reset blinking indicator, except for tight or tangled tape condition.

PUNCH INDICATOR

PUNCH

POWER

READER
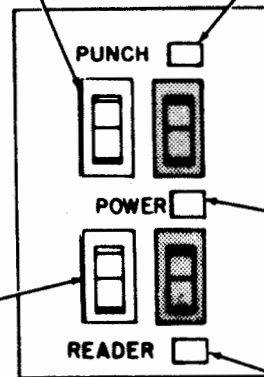
PUNCH INDICATOR

- Lights steadily indicating punch can perforate tape.

- Blinks indicating tape supply is low and punch may not be able to perforate tape.

- When not lit tape cannot be perforated.

POWER INDICATOR

- Lights steadily when power to the PT unit is turned on.

READER INDICATOR

- Lights steadily when the reader is conditioned to read tape.

- Blinks indicating tape gate is opened, tape becomes tight or tangled, or runs out or fails to advance. (See Note.)

- When not lit reader cannot read tape.

19

PT UNIT AUXILIARY CONTROLS (At Rear of Set)

10 ⊙━ 30

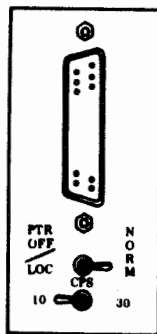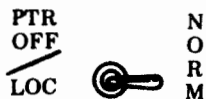Controls the signalling speed of the punch and reader in characters-per-second. When used with a 43 Tele-printer, the switch should be left in the 30 CPS position and the 30/10 CPS key on the 43 Tele-printer keyboard provides the feature.

PTR
OFF   N
⊙━ O
R
LOC   M

The "copy" switch located above the CPS switch can be operated to either the NORM position or to the PTR OFF/LOC position.

● When operated to the NORM position, data flow is always normal as shown:

Reader → | Printer
Keyboard → | Punch
| Line

Line → | Punch
| Printer
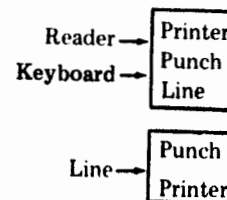
● When operated to the PTR OFF/LOC position, one of the three following modes, depending on the installer option, is provided:

✓Check One Provided	Option	Mode of Operation	Data Flow		
	453a	Printer Off	Reader →	Punch Line	
			Keyboard →	Punch Printer Line	
			Line →	Punch	
	453b or 453c	Local	Reader →	Punch	
			Keyboard →	Printer	
	453d	Normal	Same as for normal above.		

PT UNIT TAPE HANDLING CONTROLS

READER TAPE SENSING ARM
(Provides detection of the tight
tape or tangled tape condition.)

LOW TAPE ARM
(Provides detection of the low
tape conditon; within 25 feet
of being exhausted.)

READER TAPE SENSING PIN
(Provides detection of the tape
out or open tape lid condition.)

PUNCH OPERATIONAL CONTROLS

<u>Manual and Automatic</u>

PUNCH

On — if top down
Auto — if neither down
Off — if bottom down

PUNCH

Feed — if top held down

Back — if bottom pushed down
Space   and released

<u>On</u>

Operation to the ON position causes the punch to respond to all received signals by perforating the tape according to the data.
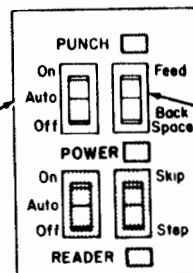
<u>Auto</u>

Operation to the AUTO position places the punch under control of received line signals, responding to a DC2 which causes punch turn-on, and a DC4 that turns it off. If punch on is manually selected first, the punch will immediately begin to operate, and will continue until DC4 is received or the switch is operated to off.

Note: If previously off, the punch will not perforate the DC2 character. It will perforate the DC4 character before going off.

<u>Off</u>

Operation to the OFF position stops the punch, if it is operating. Any data received while the switch is off will be lost.

<u>Feed</u>

With the punch control switch in the ON or OFF position, operation to the FEED position causes the punch mechanism to continuously perforate only the sprocket hole and to advance the blank tape as long as the switch is held operated. This operation may be used to prepare "leaders" for separating messages in the tape, or for initiating tape feed when a new supply of tape is entered into the punch.

Note: Data may be lost if the switch is operated to feed while data is being received and punched.

<u>Back Space</u>

With the punch control switch in the ON or OFF position, operation to the BACK SPACE position causes the tape to be reverse fed one space position for each operation. No code holes are punched. More than ten successive operations are not recommended.

Note: The tape may be damaged and/or data lost if the switch is operated to BACK SPACE while data is being received and punched.

22

PUNCH OPERATIONAL CONTROL (Contd)

Manual Only

PUNCH

On — if top down
Off — if bottom down

PUNCH

Feed — if top held down

Back — if bottom pushed down
Space   and released

On

Operation to the ON position causes the punch to respond to all received signals by perforating the tape according to the data.

Off

Operation to the OFF position stops the punch, if it is operating. Any data received while the switch is off will be lost.

Feed

With the punch control switch in the ON or OFF position, operation to the FEED position causes the punch mechanism to continuously perforate only the sprocket hole and to advance the blank tape as long as the switch is held operated. This operation may be used to prepare "leaders" for separating messages in the tape, or for initiating tape feed when a new supply of tape is entered into the punch.

Note: Data may be lost if the switch is operated to feed while data is being received and punched.
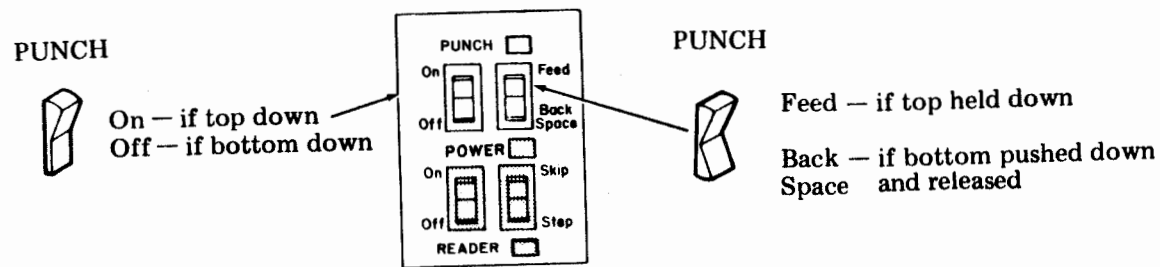
Back Space

With the punch control switch in the ON or OFF position, operation to the BACK SPACE position causes the tape to be reverse fed one space position for each operation. No code holes are punched. More than ten successive operations are not recommended.

Note: The tape may be damaged and/or data lost if the switch is operated to the BACK SPACE position while data is being received and punched.

23

PUNCH OPERATIONAL CONTROLS (Contd)

Automatic Only (Momentary Start)

PUNCH

Start — if top pushed down and released
Auto — if neither down
Off — if bottom down

```
PUNCH  ☐
Start        Feed
Auto
Off          Back
             Space
POWER  ☐
Start        Skip
Auto
Off          Stop
READER ☐
```

PUNCH

Feed — if top held down

Back Space — if bottom pushed down and released

Start

Operation to the START position causes the punch to respond to all received signals and perforate the tape according to the data, even though the switch has been released and gone back to the center AUTO position. This is the same as receiving a DC2 in AUTO.

Auto

Operation to the AUTO position places the punch under control of received line signals, responding to a DC2 which causes punch turn on, and a DC4 that turns it off. If punch ON is manually selected first, the punch will immediately begin to operate, and will continue until DC4 is received or the switch is operated to off.

Note: If previously off, the punch will not perforate the DC2 character. It will perforate the DC4 character before going off.

Off

Operation to the OFF position stops the punch, if it is operating. Any data received while the switch is off will be lost.

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Feed

With the punch control switch in the ON or OFF position, operation to the FEED position causes the punch mechanism to continuously perforate only the sprocket hole and to advance the blank tape as long as the switch is held operated. This operation may be used to prepare "leaders" for separating messages in the tape, or for initiating tape feed when a new supply of tape is entered into the punch.

Note: Data may be lost if the switch is operated to feed while data is being received and punched.

Back Space

With the punch control switch in the ON or OFF position, operation to the BACK SPACE position causes the tape to be reverse fed one space position for each operation. No code holes are punched. More than ten successive operations are not recommended.

Note: The tape may be damaged and/or data lost if the switch is operated to BACK SPACE while data is being received and punched.
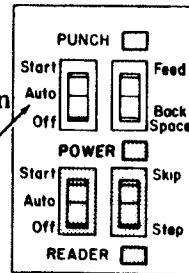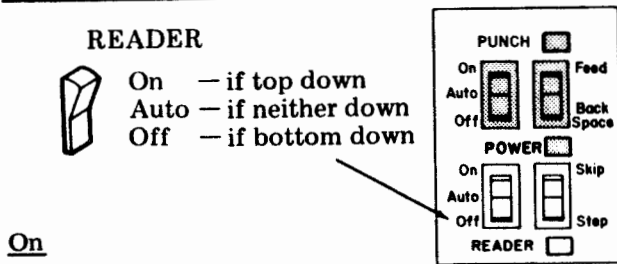
READER OPERATIONAL CONTROLS

Manual and Automatic

READER

On   — if top down
Auto — if neither down
Off   — if bottom down

```
PUNCH  ☐
  On        Feed
Auto
  Off       Back
           Space
POWER  ☐
  On        Skip
Auto
  Off       Stop
READER ☐
```

On

Operation to the ON position causes the reader to continuously step and sense tape (provided tape has been properly placed in reader). When running, the reader will stop wherever and as long as a tight or tangled tape condition occurs, and will restart upon correction of the condition. It will stop completely if the tape lid is opened or the tape runs out or fails to advance. To restart, see Note below.

Note: Operate switch to the OFF position before opening tape lid to correct condition. Opening of the reader tape lid while transmission is temporarily interrupted may cause loss of characters so the tape should be backed up and restarted at the beginning, the tape lid should be closed and switch operated to the ON position.

Auto

Operation to the AUTO position places the reader under control of received line signals, responding to a DC1 which causes reader turn on, and a DC3, ENQ or EOT that turns it off. The DC3, ENQ or EOT may be in the tape being sensed by the reader, if sent signals are being returned to the received data input. Two additional characters will be sent following the stopping character before the detection and stopping can occur. These should be preplanned "fill" or "trailer" characters.

If reader on is detected first, the reader will start immediately and then stop on DC3, ENQ, or EOT. When running, the reader will stop wherever and as long as a tight or tangled tape condition occurs, and will restart upon correction of the condition. It will stop completely if the tape lid is opened or the tape runs out or fails to advance. Opening the tape lid and correction of the condition and a restart are needed to cause reader turn on.

Off

Operation to the OFF position stops the reader if it is operating, and prevents further response to control signals. Restarting is possible in the middle of a message, without loss of data, if the reader gate is not opened.

READER OPERATIONAL CONTROLS (Contd)

Manual and Automatic

READER

Skip — if top pushed down
          and released

Step — if bottom pushed down
          and released

Skip

Operation to the SKIP position with the reader control switch off, causes the tape to advance one character space, but the character will not be transmitted.

Step

Operation to the STEP position with the reader control switch off, causes the reader feed mechanism to advance one character space. If tape is present and has moved, the character in the gate will be transmitted. No action will occur if the reader gate is open, no tape is present in the gate, or tight or tangled tape is present. If tape is in the gate but does not move, due to torn feed holes or improper insertion, the feed mechanism will operate once, but no character will be transmitted.

READER OPERATIONAL CONTROLS (Contd)

<u>Manual Only</u>

READER

On — if top down

Off — if bottom down

READER

Skip — if top pushed down
& released

Step — if bottom pushed down
& released

<u>On</u>

Operation to the ON position causes the reader to continuously step and sense tape (provided tape has been properly placed in reader). When running, the reader will stop wherever and as long as a tight or tangled tape condition occurs, and will restart upon correction of the condition. It will stop completely if the tape lid is opened or the tape runs out or fails to advance. To restart, see Note below.

Note: Operate switch to the OFF position before opening tape lid to correct condition. Opening of the reader tape lid while transmission is temporarily interrupted may cause loss of characters so the tape should be backed up and restarted at the beginning, the tape lid should be closed and switch operated to the ON position.

<u>Off</u>

Operation to the OFF position stops the reader if it is operating, and prevents further response to control signals. Restarting is possible, in the middle of a message, without loss of data, if the reader gate is not opened.
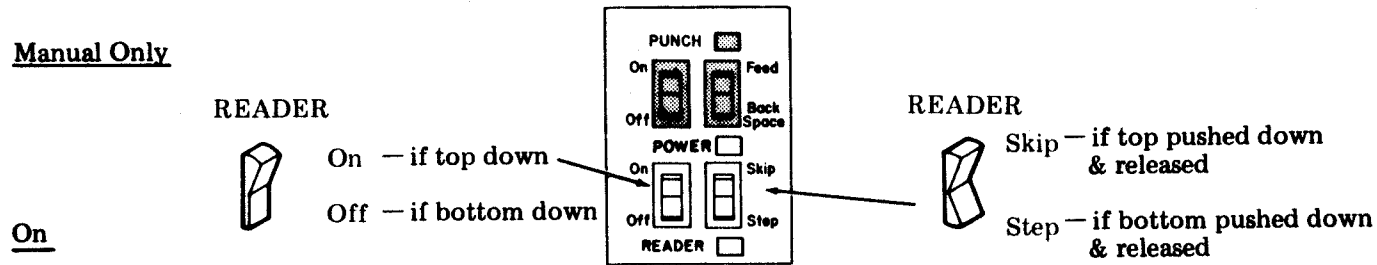
<u>Skip</u>

Operation to the SKIP position with the reader control switch off, causes the tape to advance one character space, but the character will not be transmitted.

<u>Step</u>

Operation to the STEP position with the reader control switch off, causes the reader feed mechanism to advance one character space. If tape is present and has moved, the character in the gate will be transmitted. No action will occur if the reader gate is open, no tape is present in the gate, or tight or tangled tape is present. If tape is in the gate but does not move, due to torn feed holes or improper insertion, the feed mechanism will operate once, but no character will be transmitted.
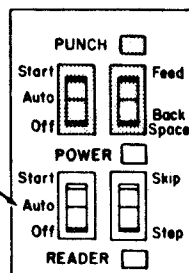
27

READER OPERATIONAL CONTROL (Contd)

Automatic Only (Momentary Start)

READER

Start — if top pushed down and released

Auto — if neither down

Off — bottom down

```
┌──────────────────────┐
│    PUNCH  ▢           │
│ Start ┌─┐  ┌─┐ Feed   │
│ Auto  │ │  │ │        │
│ Off   └─┘  └─┘ Back   │
│                Space  │
│    POWER  ▢           │
│ Start ┌─┐  ┌─┐ Skip   │
│ Auto  │ │  │ │        │
│ Off   └─┘  └─┘ Stop   │
│    READER ▢           │
└──────────────────────┘
```

Start

Momentary operation to the START position causes the reader to start immediately, stepping and sensing tape placed in the reader gate even though the switch has been released and gone back to the center AUTO position. This is the same as receiving a DC1 in Auto.

Auto

Operation to the AUTO position places the reader under control of received line signals, responding to a DC1 which causes reader turn on, and a DC3, ENQ or EOT that turns it off. The DC3, ENQ or EOT may be in the tape being sensed by the reader, if sent signals are being returned to the received data input. Two additional characters will be sent following the stopping character before the detection and stopping can occur. These should be preplanned "fill" or "trailer" characters.
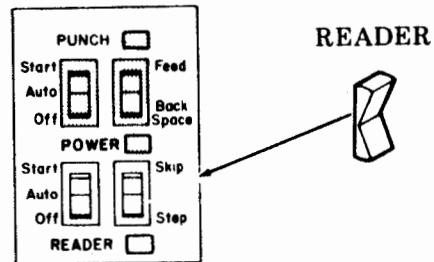
28

If reader on is detected first, the reader will start immediately and then stop on DC3, ENQ, or EOT. When running, the reader will stop wherever and as long as a tight or tangled tape condition occurs, and will restart upon correction of the condition. It will stop completely if the tape lid is opened or the tape runs out or fails to advance. Opening the tape lid and correction of the condition and a restart are needed to cause reader turn on.

Off

Operation to the OFF position stops the reader if it is operating, and prevents further response to control signals. Restarting is possible, in the middle of a message, without loss of data, if the reader gate is not opened.

READER OPERATIONAL CONTROLS(Contd)

Automatic Only (Momentary Start)

Skip — if top pushed down
      and released

Step — if bottom pushed down
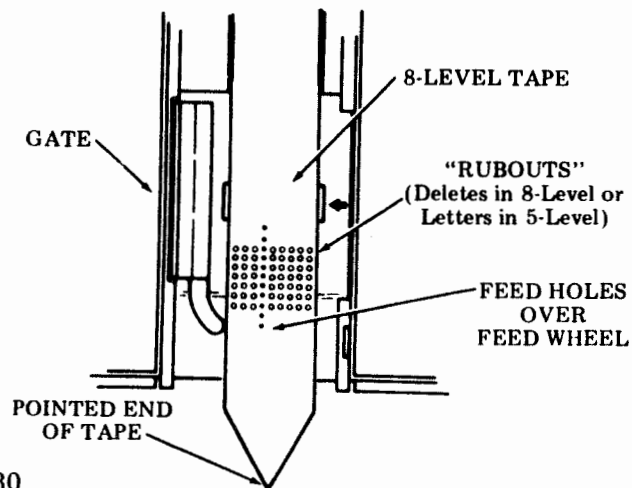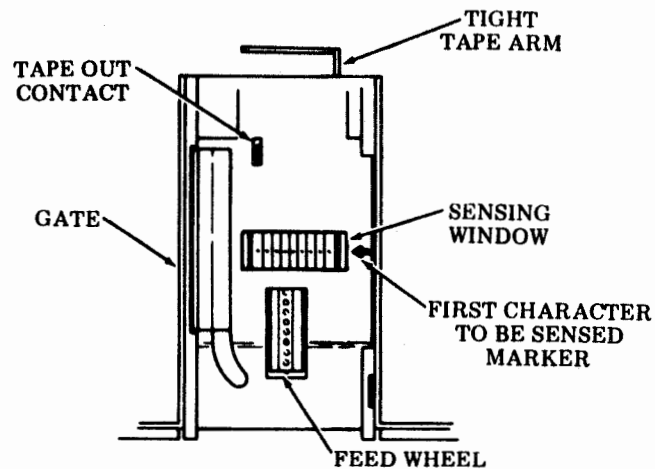   and released

Skip

Operation to the SKIP position with the reader control switch off, causes the tape to advance one character space, but the character will not be transmitted.

Step

Operation to the STEP position with the reader control switch off, causes the reader feed mechanism to advance one character space. If tape is present and has moved, the character in the gate will be transmitted. No action will occur if the reader gate is open, no tape is present in the gate, or tight or tangled tape is present. If tape is in the gate but does not move, due to torn feed holes or improper insertion, the feed mechanism will operate once, but no character will be transmitted.

PLACING TAPE IN TAPE READER

TIGHT TAPE ARM

TAPE OUT CONTACT

GATE

SENSING WINDOW

FIRST CHARACTER TO BE SENSED MARKER

FEED WHEEL

GATE

8-LEVEL TAPE

"RUBOUTS" (Deletes in 8-Level or Letters in 5-Level)

**FEED HOLES OVER FEED WHEEL**

POINTED END OF TAPE

30

To place prepared message tape in the tape reader for transmission, proceed as follows:

● Open tape gate by lifting up on right side.

● Hold tape so pointed end faces you and three large punches are to the left of small feed holes.

● Place tape so that feed holes are over teeth of feed wheel, and so the series of "deletes" before first character of message is over sensing window.

Note: It is possible to insert the tape upside down and wrong end out. This would cause a completely garbled message.

● Align tape and close gate. Make certain that tape is free to feed into gate without tangling. If tape is tight, transmission will not be possible.
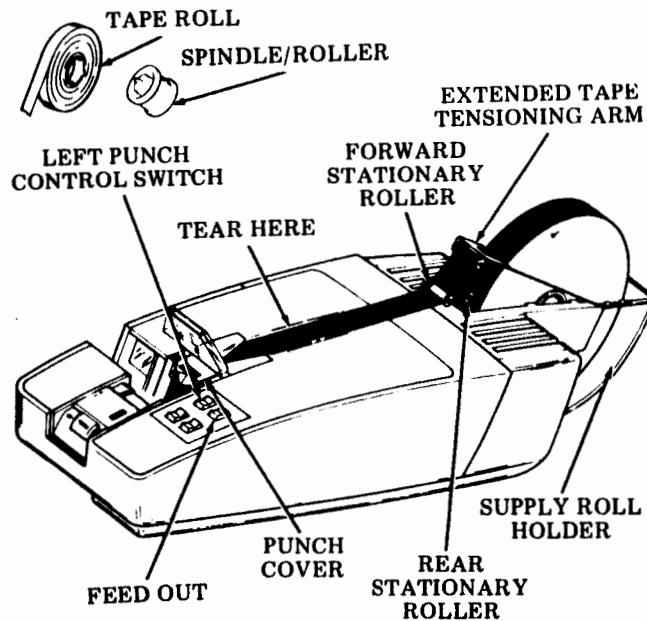
Note: When feeding tape directly from punch to reader, tape must be routed under tight tape arm and enough slack must be left in tape to prevent lever from closing tight tape contact.
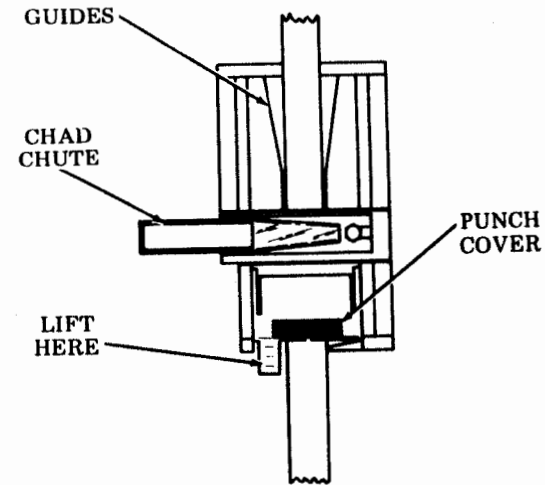

TAPE

PUNCH

READER

TIGHT TAPE ARM
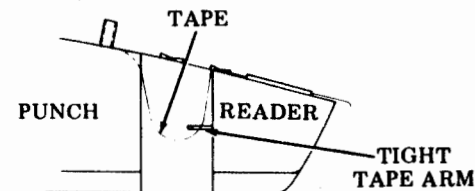
PUNCH TAPE REPLACEMENT

When the tape is low the PUNCH indicator will flash and some types of paper tape will change color.

● Operate left punch control switch to ON or START position.

● Tear off old tape (if present) at entrance to punch.

● Feed out tape (if present) in punch by operating and holding right punch control switch to FEED position.

TAPE ROLL

SPINDLE/ROLLER

EXTENDED TAPE
TENSIONING ARM

LEFT PUNCH
CONTROL SWITCH

FORWARD
STATIONARY
ROLLER

TEAR HERE

PUNCH
COVER

SUPPLY ROLL
HOLDER

REAR
STATIONARY
ROLLER

FEED OUT

● Lift used roll out of supply roll holder. Remove but do not discard spindle from core of old roll.

GUIDES

CHAD
CHUTE

PUNCH
COVER

LIFT
HERE

● Insert tape roller in new roll of tape and place roll in holder so that tape feeds from top of roll toward the front of set.

● Insert tape under the rear stationary roller over the extended tape tensioning arm, and under the forward stationary roller.

● Lift up the front of the punch cover and push the paper tape between the guides and through the punch. Close the cover.

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CHAD CONTAINER REMOVAL

●A plastic chad container is located under and to the left of the punch. It catches the chad (paper particles) punched out of the tape as the message tape is prepared.

●Periodically, remove the chad container by pulling the top of the container to the left and lifting up. Empty out the chad and replace the container. The tabs on the bottom of the container fit into the slots of the cabinet.
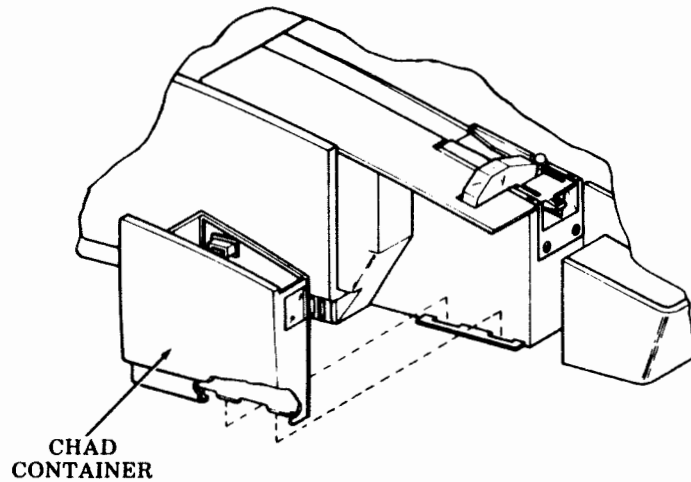
On pedestal versions slide the chad container forward until it clears the channels of the pedestal. To replace the chad container, insert the flanges into the pedestal channels and slide fully rearward.

CHANNELS

FLANGE

CHAD BOX

CHAD CONTAINER
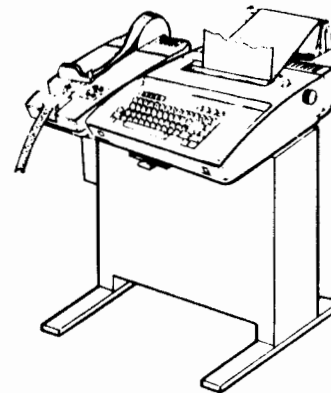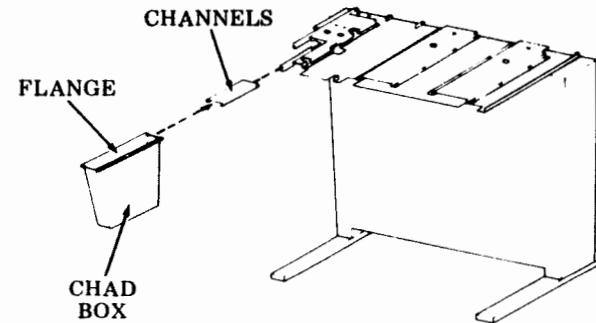
TELEPRINTER SUPPLIES AND MAINTENANCE

Ribbon

Only cartridges with ribbon designated for use with 43 Teleprinters should be used. The Teletype part number is 430035.

The cartridge with ribbon can be ordered from Teletype Corporation, 5555 Touhy Avenue, Skokie, IL 60077.

The ribbon should be replaced whenever it becomes frayed or print density becomes light. After the first few ribbons, replacement ribbons should produce 5 million or more legible characters of printing.

Sprocket Feed Paper

Paper for the 43 Sprocket Feed Teleprinter must be 12 inch sprocket feed, while tractor feed paper may be from 3 inch to 12 inch sprocket feed. Both teleprinters require paper with folds or horizontal perforations located midway between sprocket holes and standard sprocket hole size and spacing. This paper may be single-ply with 8-1/2 inch folds to provide 11 inch x 8-1/2 inch copy when the 1/2 inch wide sprocket hole strip is removed at the edge serrations. (Characters are printed to within 7/8 inch of the left and right paper edge before the strips are removed.)

Similar replacement paper may be obtained from the supplier listed on the original paper box or from other suppliers listed below or in the telephone book yellow pages.

Other types of sprocket feed paper with different form lengths, lighter weight, no edge serrations or additional copies, etc, may also be used. Multicopy forms consisting of the original and 2 copies of 12 pound basic paper (using 8 pound basic carbon paper) produce clear copy. Acceptable copy may also be obtained on variations of multicopy forms using different weight paper or carbonless paper, however all paper or forms should be tried before ordering large quantities. Crimped multiple part forms are not recommended and stapled forms are not allowed. Consult your paper supplier for specific needs to assure complete satisfaction.

Friction Feed Paper

Paper for the 43 Friction Feed Teleprinter should be standard 8-1/2 inches wide, single-ply, furnished in 5 inch maximum diameter rolls with a 1 inch diameter spindle hole.

Wallace Business Forms Inc.	Moore Business Forms, Inc.	Duplex Products Co.
444 W. Grand Ave.	1205 N. Milwaukee Ave.	228 W. Page
Chicago, IL 60610	Glenview, IL 60025	Sycamore, IL 60178
Cat. No. E-6879	Form No. 1280J	Cat. No. 1-1280-15P

Paper Tape

Paper tape for the PT unit must be 1 inch wide oiled paper tape furnished in 8 inch maximum diameter rolls with 2 inch diameter spindle hole. This 0.004 inch thick, 50 pound basic paper tape may be obtained from suppliers listed below or other suppliers:

> Eastern Specialities Co.
> 287 Northfield Road
> P. O. Box 181
> Northfield, Ill. 60093
> Phone 312-446-4780

Catalog No. 14071

> Moore Business Forms
> 36 S. Wabash Ave.
> Chicago, Ill. 60603
> Phone 312-346-4214

Catalog No. 60046

PAPER TAPE (PT) UNIT OPERATION

Paper tapes can be generated and edited locally. Data can be transmitted to the punch from the keyboard or reader.

● Depress [LOCAL] key.

● Operate [HALF UP / DUPLEX / FULL DN] key to UP position.

<u>To Prepare Punched Tape:</u>

PUNCH

On (Start)
(Auto)
Off

● Operate switch to ON or START position.

● Enter at least 10 DELETE characters.

● Enter desired message or data.

● Enter at least 10 DELETE characters.

PUNCH

On (Start)
(Auto)
Off

● Operate switch to OFF position.

● Tear the tape from the punch — pull straight up to create a " V " . This will prevent confusion as to which end of the tape goes into the tape reader first.

To Delete an Error in Message Tape:

PUNCH

Feed

Back Space

● Operate switch to BACKSPACE repetitively until the errored code is one character before the punch mechanism (3 character positions from visible character).

CHARACTER BEFORE
PUNCH MECHANISM

TAPE

CHAD CHUTE

VISIBLE
CHARACTER

Error made by
omitting F in this
sequence.

Tape corrected by
erasing G, H, I, J,
with DELETE,
re-entering F, etc.

● Enter DELETE characters to erase the errored code and any other code(s) following.

● Reenter the correct character and erased code(s).

● Proceed with tape preparation.

To Change Data Previously Prepared:

Note: Operation of the printer control switch (at rear of set) to the PTR OFF position permits the reading and/or punching of random data tapes without causing printout by the printer (see PT UNIT AUXILIARY CONTROLS).

PUNCH

On (Start)
(Auto)
Off

● Operate switch to ON or START position.

READER

On (Start)
(Auto)
Off

● Operate switch to OFF position.

● Insert beginning of previously prepared punched tape into tape reader.

READER

On (Start)
(Auto)
Off

● Operate switch to ON or START position.

READER

On (Start)
(Auto)
Off

● Operate switch to OFF position several characters before data to be changed is sensed by reader.

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READER

Skip

Step

● Operate switch to STEP repetitively until character ahead of data to be changed is sensed by reader.

☐ To remove an unwanted character or sequence of characters:

READER

Skip

Step

▲ Operate switch to SKIP once for each character to be removed.

☐ To add a missing character or sequence of characters:

Enter missing character or sequence.

☐ To replace one character or sequence of characters with another.

READER

Skip

Step

▲ Operate switch to SKIP once for each character to be replaced.

▲ Enter replacement character or sequence of characters.

COMMUNICATIONS WITH DISTANT TERMINALS

●Establishing connection and transferring to the data mode on these arrangements is basically under the control of the directly connected communications device (modem) and its associated telephone over the switched-network or, without a telephone over private lines. In some arrangements terminals are directly connected to the distant terminal or computer. Use of these external devices should be specified locally since many variations are possible, ie, pushbuttons on modem or on phone, exclusion keys, automatic answer, etc.

●The procedures as shown below, that normally apply to operation of the controls of the terminal, should be followed:
 ■ Before transferring a telephone call to the data mode (call originated or answered) or to place terminal in a ready condition
  ● When call is originated an answering tone is heard.
   1. Turn on ac power to teleprinter and PT unit (see Page 2 and 3).
   2. Clear any alarm condition (paper-out, cover open).
   3. Depress DATA key (if not lit). Key should flash.
   4. Call should be transferred to the external data set by means of controls on either the telephone or data set (DATA key, EXCLUSION key, etc.).
 ■ Transfer to data mode
  ● The DATA key lights under control of the external device or distant station with no loss of data:
   1. Data can be sent or received on-line only when the DATA key is lit and the LOCAL key is not lit.
   2. On some arrangements the DATA key may light immediately without the TERM READY key being lit.
 ■ To disconnect a telephone call in data mode
  ● Calls may be disconnected as follows:
   1. An EOT code is received. (TERM READY key may light.)
   2. The LOCAL key is depressed or printer test is initiated. (LOCAL key will light.)
   3. Paper out and eight received line feeds (LOCAL key will light.)
   4. Other log-off procedures, loss of data signals, etc.
   5. If power is turned ON or OFF to the teleprinter or PT unit.
 ■ Transfer to Talk
  ● Call transfer to talk from the data mode is under the control of external data communications device and any associated telephone. Transferring to the local mode may cause a disconnect. Normally, however, the external communication device will cause to DATA lamp to extinguish and the TERM READY to light when transfer to talk is initiated.

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SEND-ON LINE

Sending on-line is accomplished in either the half-duplex or full-duplex modes. To blind the punch and printer to on-line transmission from the keyboard and reader, while receiving messages simultaneously from the remote sender, place the DUPLEX key in the down position (Full-Duplex).

If sending from the reader, avoid depressing keys on the keyboard. Errored characters may be sent on-line.

Send From Keyboard

●Originate a call. (See ESTABLISHING COMMUNICATIONS WITH DISTANT TERMINALS.)

●Simply type message on the keyboard. Transmitted characters are printed and also punched (HDX mode) if punch is on.

●Terminate call in usual manner (see COMMUNICATIONS WITH DISTANT TERMINALS).

Send Manually From Reader

●Place reader switch in OFF position.

●Place prepared tape into reader (see PLACING TAPE IN TAPE READER).

●Originate a call (see COMMUNICATIONS WITH DISTANT TERMINALS).

●Place reader switch in ON position. Message is transmitted on-line. Transmitted characters are also punched (HDX mode) if punch is on and printed (HDX mode) if the printer is enabled (see AUXILIARY CONTROLS).

●Terminate call in usual manner (see COMMUNICATIONS WITH DISTANT TERMINALS).

Send Automatically From Reader

●Place reader switch in AUTO psoition.

●Prepare paper tape message. End message with reader stop code (DC3, ENQ or EOT) followed by 10 blank characters if operating in HDX mode (see PAPER TAPE (PT) UNIT OPERATION).

●Place prepared tape into reader (see PLACING TAPE IN TAPE READER).

●Establish a call (see COMMUNICATIONS WITH DISTANT TERMINALS).

●Request remote terminal to send reader start code (DC1). Depress reader start momentarily (if present) or send reader start code from keyboard, if in HDX mode.

Note: If keyboard is used to start reader, reader start code will be sent on-line and punched in local tape if punch is on.

●Message is transmitted on-line. Reader stops after sending reader stop code (DC3, ENQ or EOT) if in HDX mode.

●Terminate call in usual manner (see COMMUNICATIONS WITH DISTANT TERMINALS).

Note: EOT used as reader stop code may initiate line disconnect.

RECEIVE ON-LINE

Receiving on-line is accomplished in either the Half-Duplex or Full-Duplex modes. To blind the punch and printer to on-line transmission from the keyboard and reader, while receiving messages simultaneously from the remote sender, place the DUPLEX key in the down position (Full-Duplex).

To avoid errored characters from being punched in Half-Duplex, avoid sending from the reader when the punch is receiving messages.

Receive to Printer and Manual Punch Control

●Place printer control switch (at rear of PT unit) to normal position.

●Place punch switch in ON position.

●Establish connection with remote terminal (see COMMUNICATIONS WITH DISTANT TERMINALS).

●The message will be printed and punched simultaneously.

●Terminate call in usual manner (see COMMUNICATIONS WITH DISTANT TERMINALS).

Receive to Printer and Automatic Punch Control

● Place printer control switch (at rear of PT unit) to normal position.

● Place punch switch in AUTO position.

● Establish connection with remote terminal (see COMMUNICATIONS WITH DISTANT TERMINALS).

● If remote terminal sends a message printer copies message but punch does not.

● When remote terminal sends punch start code (DC2) followed by a message, printer and punch copy message.

● When punch start is operated momentarily (if present) printer and punch copy message sent by remote terminal.

● When remote terminal sends punch stop code (DC4) followed by a message, printer copies message, punch turns off after punching stop code and does not punch message.

● Terminate call in usual manner (see COMMUNICATIONS WITH DISTANT TERMINALS).

KEY TELEPHONES

● Key telephones may be associated with external data sets connected to the terminal. Use of these phones to originate and answer talk and data calls are under the control of the data set and should be specified locally.

WHEN TROUBLE OCCURS

Trouble that is encountered with the terminal should be reported as locally specified. A number to be called in case of trouble may be entered on the Directory Card by the installer.

If it can be determined that the trouble is in the remote equipment, the attendant at the location in trouble should follow local procedures for that area.

Before reporting a trouble, the attendant or local supervisor should:

☐ First
  Check the following:

•Make sure that all ac power cords are properly seated in power outlets.

•Is the KP power switch turned on?

•Is the PT unit power switch turned on?

•Are attendants experiencing the same trouble on other terminals?

☐ Second
  Answer each one of the following questions. Any "No" response to a question can indicate a source of trouble within the terminal.

•Are any control indicators on (power available, cords plugged in and cover closed)?

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•Is red lamp on at teleprinter power supply?
  The red lamp can be seen through air vent slot (6th slot from left) of the teleprinter bustle.
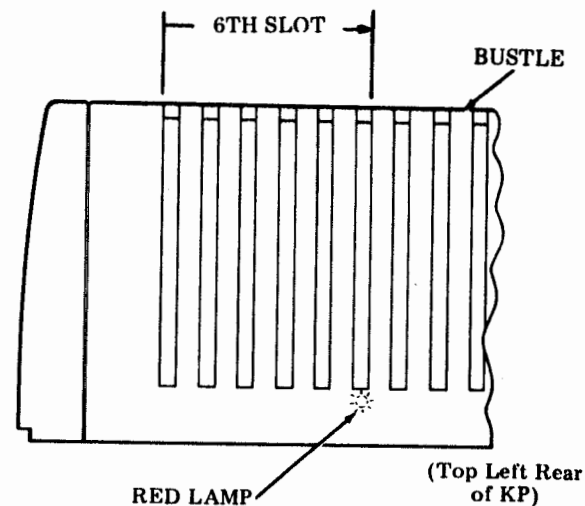
•Can any characters be locally generated from the keyboard to the printer?

•Can any control indicators be made to light?

•Can data be sent from keyboard and reader?

•Can data be received, printed, and punched?

☐Third
  Report any "No" responses to the questions when making a trouble call.

Tape Punch Troubles

If tape punch does not operate properly, check for the following conditions:

● Is the chad box completely filled so that chad cannot leave chad chute?

● Is tape piled up and jammed at tape punch exit?

● Is tape feeding properly into punch guides without getting jammed at entry point?

● Is tape routed properly through tape supply rollers?

● Has the roller been left out of the tape supply roll causing roll to drag or bind?

Tape Reader Troubles

If tape reader does not operate properly, check for the following conditions:

● Is tape properly threaded into reader according to instructions?

● Is tape tangled or snagged preventing free entry into reader?

● Is tape torn, wrinkled, or of incorrect width?

● Report as local trouble in tape reader.

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Teletype Corporation Product Service and Education Services

On the following page is a list of Teletype Corporation Product Service locations which provide maintenance service and repair on all Teletype Corporation products. For more information call toll free (US 800-323-4226) (IL 800-942-4192) 7:00 A.M. — 4:00 P.M. CST.

In addition, Teletype Corporation provides customer technical training at its headquarters at 5555 W. Touhy Avenue, Skokie, IL in the northwest suburban area of Chicago. The training covers the installation, maintenance and repair of all Teletype Corporation products. Arrangements can also be made for training to be conducted at customer-selected field sites.

For information about class schedules, enrollment, tuition, on-site training or any special training needs, please contact:

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Education Services
Teletype Corporation
5555 W. Touhy Avenue
Skokie, Illinois 60077
Telephone (312) 982-3940
TLX 25-4051
TWX 901-223-3611
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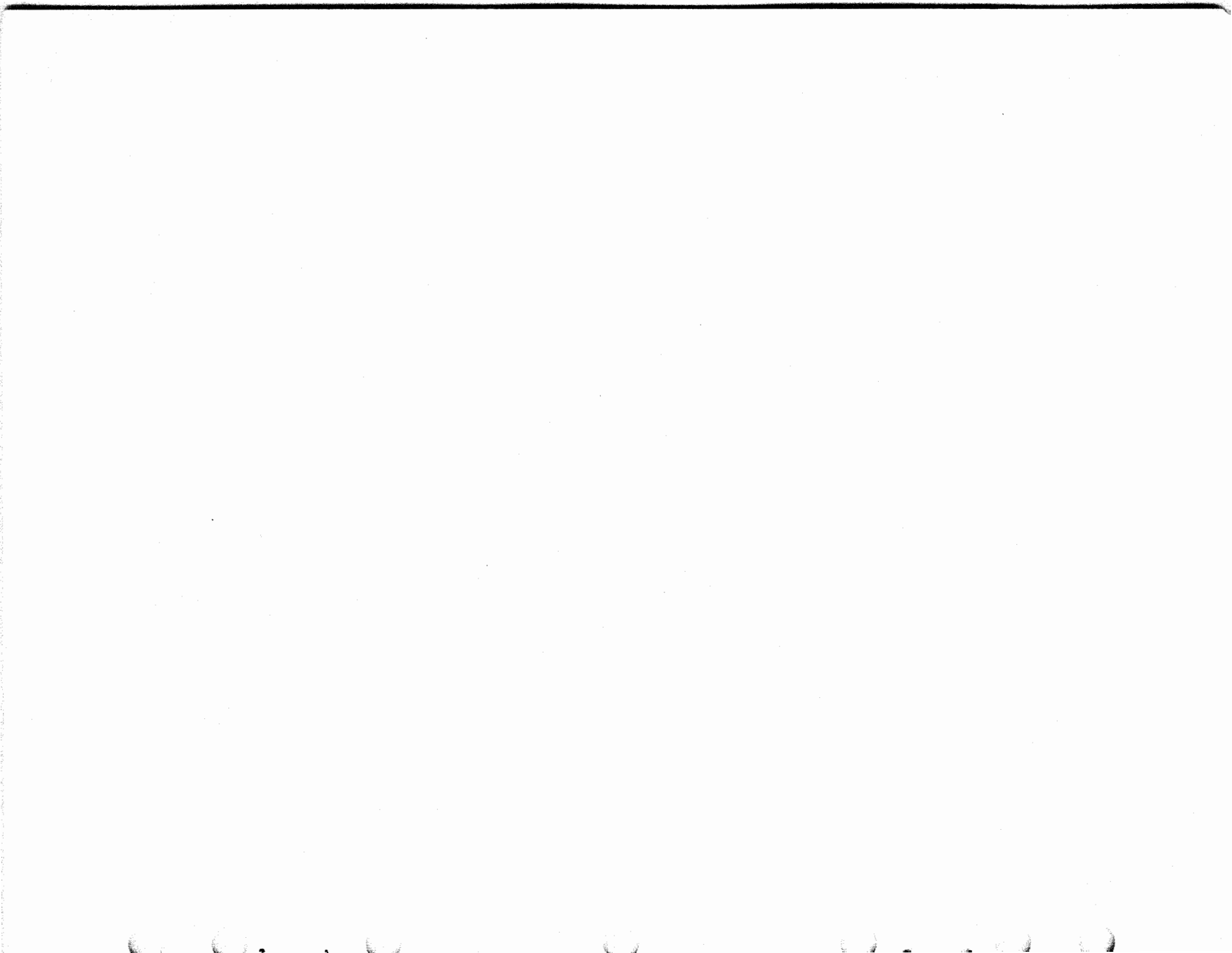|			
ALABAMA	BIRMINGHAM	230 OXMOOR CIRCLE SUITE 1113, HOMEWOOD, AL 35209	(205) 942-2574
	MOBILE	3207 INTERNATIONAL DR., SUITE B, MOBILE, AL 36606	(205) 473-8888
ARIZONA	PHOENIX	2113 S. 48TH ST., SUITE 104, TEMPE, AZ 85282	(602) 894-9891
	TUCSON	2015 N. FORBES BLVD., TUCSON, AZ 85705	(602) 623-6419
ARKANSAS	LITTLE ROCK	7501 INTERSTATE 30, SUITE 43, LITTLE ROCK, AR 72209	(501) 562-0266
CALIFORNIA	▲ LOS ANGELES	5445 SHEILA, CITY OF COMMERCE, CA 90040	(213) 728-2222
	OAKLAND	7305 EDGEWATER, SUITE C, OAKLAND, CA 94621	(415) 430-0202
	ORANGE COUNTY	11552 KNOTT, SUITE 9, GARDEN GROVE, CA 92641	(714) 891-2628
	SACRAMENTO	4221 NORTHGATE BLVD. NO. 4, SACRAMENTO, CA 95834	(916) 924-1933
	SAN DIEGO	7283 ENGINEER RD., SUITE B, SAN DIEGO, CA 92111	(714) 565-4375
	SANTA CLARA	3285 KIFER RD., SANTA CLARA, CA 95051	(408) 730-9083
	VENTURA COUNTY	2696 LAVERY COURT, SUITE 1, NEWBURY PARK, CA 91320	(805) 498-9655
COLORADO	COLORADO SPRINGS	905 GARDEN OF THE GODS RD., SUITE B, COLORADO SPRINGS, CO 80907	(303) 593-1222
	▲ DENVER	7100 BROADWAY, BUILDING 3-J, DENVER, CO 80221	(303) 429-9555
CONNECTICUT	HARTFORD	441 GOVERNORS HWY., SOUTH WINDSOR, CT 06074	(203) 568-9610
DIST. OF COLUMBIA	▲ LORTON, VA	9022 TELEGRAPH RD., LORTON, VA 22079	(703) 550-7507
FLORIDA	FT. LAUDERDALE	6858 N.W. 20TH AVE., FT. LAUDERDALE, FL 33309	(305) 974-4660
	JACKSONVILLE	9951 ATLANTIC BLVD., SUITE 424, JACKSONVILLE, FL 32211	(904) 721-1847
	MIAMI	12802 S.W. 122ND AVE., MIAMI, FL 33186	(305) 252-1370
	ORLANDO	102 LIVE OAKS BLVD., CASSELBERRY, FL 32707	(305) 834-3818
	TAMPA	5474 JETPORT INDUSTRIAL BLVD., TAMPA, FL 33614	(813) 885-7413
GEORGIA	▲ ATLANTA	2520 PARK CENTRAL BLVD., DECATUR, GA 30035	(404) 981-7267
IDAHO	BOISE	172 S. COLE RD., BOISE, ID 83709	(208) 343-3629
ILLINOIS	▲ CHICAGO NORTH	2330 EASTERN AVE., ELK GROVE VILLAGE, IL 60007	(312) 860-5602
	▲ CHICAGO SOUTH	2900 21ST AVE., BROADVIEW, IL 60153	(312) 345-7920
	DECATUR	3501 RUPP PKWY., DECATUR, IL 62526	(217) 875-1092
INDIANA	INDIANAPOLIS	6240 LAS PAS TRAIL, INDIANAPOLIS, IN 46268	(317) 255-4566
IOWA	DES MOINES	8345 UNIVERSITY BLVD., DES MOINES, IA 50311	(515) 223-8444
KANSAS	KANSAS CITY	6339 W. 110TH ST., OVERLAND PARK, KS 66211	(913) 383-3370
KENTUCKY	LOUISVILLE	3600 CHAMBERLAIN, SUITE 348, LOUISVILLE, KY 40222	(502) 426-4312
LOUISIANA	NEW ORLEANS	5626 JEFFERSON HWY., HARAHAN, LA 70123	(504) 733-4823
	SHREVEPORT	5150 INTERSTATE P.O. 9128, SHREVEPORT, LA 71109	(318) 636-7104
MARYLAND	BALTIMORE	8980 ROUTE 108, COLUMBIA, MD 21045	(301) 796-1166
MASSACHUSETTS	BOSTON	131 FLANDERS RD., P.O. BOX 566, WESTBORO, MA 01581	(617) 366-8881
MICHIGAN	DETROIT	12916 FARMINGTON RD., LIVONIA, MI 48150	(313) 525-5356
	KALAMAZOO	126 E. KILGORE RD., KALAMAZOO, MI 49001	(616) 344-1944
	LANSING	3202 S. PENNSYLVANIA AVE., LANSING, MI 48910	(517) 394-6250
MINNESOTA	DULUTH	HWY 61 & CANOSIA RD., ESKO, MN 55733	(218) 879-1225
	MINNEAPOLIS	8824 SEVENTH AVE., NO., GOLDEN VALLEY, MN 55427	(612) 546-0808
MISSISSIPPI	JACKSON	137 TURN-POWE PLAZA, PEARL, MS 39208	(601) 932-1273
MISSOURI	ST. LOUIS	11766 W. LINE INDUSTRIAL DR., ST. LOUIS, MO 63141	(314) 567-5910
NEBRASKA	OMAHA	13415 B STREET BAY 2, OMAHA, NE 68144	(402) 330-3606
NEVADA	RENO	23 GLEN-CARRAN CIRCLE, SPARKS, NV 89431	(702) 356-8022

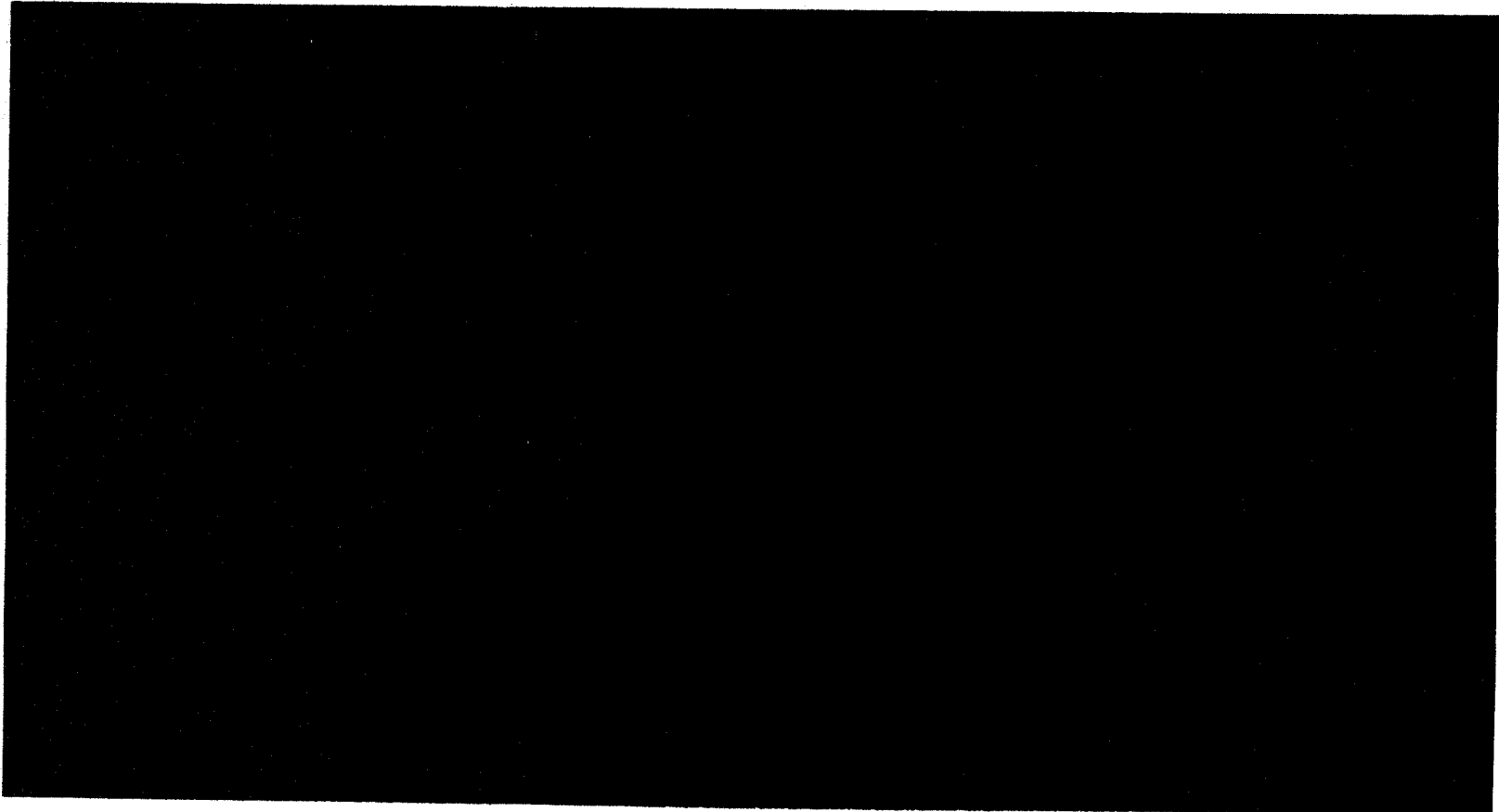|			
NEW JERSEY	▲ FAIRFIELD	90 CLINTON ROAD, FAIRFIELD, NJ 07006	(201) 575-8240
	EDISON	1245 ROUTE 1, EDISON, NJ 08817	(201) 494-8288
NEW MEXICO	ALBUQUERQUE	2820 BROADBENT PKWY., N.E., ALBUQUERQUE, NM 87107	(505) 345-1854
NEW YORK	ALBANY	4 NORMANSKILL BLVD., ELSMERE, NY 12054	(518) 462-9937
	BUFFALO	1505 CLEVELAND DR., CHEEKTOWAGA, NY 14225	(716) 634-7233
	LONG ISLAND	195 PARK AVENUE, BETHPAGE, NY 11714	(516) 822-3533
	MANHATTAN	42 BROADWAY, SUITE 1633, NEW YORK, NY 10004	(212) 785-2530
	ROCHESTER	115 METRO PARK, ROCHESTER, NY 14623	(716) 475-1740
	SYRACUSE	5 ADLER DR., EAST SYRACUSE, NY 13057	(315) 463-4666
NORTH CAROLINA	CHARLOTTE	11190 DOWNS RD., PINEVILLE, NC 28134	(704) 588-3297
	DURHAM	500 E. WILLIAMS ST., APEX, NC 27502	(919) 362-4469
	GREENSBORO	727 E. MOUNTAIN ST., KERNERSVILLE, NC 27284	(919) 996-4934
OHIO	CINCINNATI	4890 DUFF DR., SUITE E, CINCINNATI, OH 45246	(513) 874-2586
	CLEVELAND	5325 NAIMAN PKWY, SUITE F, SOLON, OH 44139	(216) 248-0288
	COLUMBUS	6969 WORTHINGTON, GALENA RD., WORTHINGTON, OH 43085	(614) 436-2065
	TOLEDO	1000 S. REYNOLDS RD., TOLEDO, OH 43615	(419) 381-9900
OKLAHOMA	OKLAHOMA CITY	1000 CORNELL PKWY., SUITE 700, OKLAHOMA CITY, OK 73108	(405) 947-0969
	TULSA	2002 S. 114TH EAST AVE., TULSA, OK 74128	(918) 437-2010
OREGON	PORTLAND	7950 S. W. CIRRUS DR., BEAVERTON, OR 97005	(503) 641-9575
PENNSYLVANIA	HARRISBURG	4407-D CARLISLE PIKE, CAMPHILL, PA 17011	(717) 737-0405
	PHILADELPHIA	103 ROCK ROAD, HORSHAM, PA 19044	(215) 674-2181
	PITTSBURGH	780 PINE VALLEY DR., PITTSBURGH, PA 15239	(412) 325-4403
SOUTH CAROLINA	COLUMBIA	6007 TWO NOTCH RD., COLUMBIA, SC 29204	(803) 786-2927
TENNESSEE	MEMPHIS	1835 NONCONNAH BLVD., SUITE 121, MEMPHIS, TN 38132	(901) 346-8840
	NASHVILLE	220 GREAT CIRCLE RD., SUITE 134, NASHVILLE, TN 37228	(615) 254-0546
TEXAS	▲ DALLAS	222 N. STORY RD., SUITE 126, IRVING, TX 75061	(214) 254-4189
	HOUSTON	8981 INTERCHANGE DRIVE, HOUSTON, TX 77054	(713) 666-1671
	SAN ANTONIO	4243 CENTER GATE, SAN ANTONIO, TX 78217	(512) 656-9370
UTAH	SALT LAKE CITY	3650 W. 2100 SOUTH, SALT LAKE CITY, UT 84120	(801) 972-6332
VIRGINIA	LORTON (DC AREA)	5701-G GENERAL WASHINGTON DR., ALEXANDRIA, VA 22312	(703) 941-6202
	NORFOLK	5308-D VIRGINIA BEACH BLVD., NORFOLK, VA 23502	(804) 461-1778
	RICHMOND	8427 GLAZEBROOK AVE., RICHMOND, VA 23228	(804) 262-4062
WASHINGTON	SEATTLE	635 STRANDER BLVD., SEATTLE, WA 98188	(206) 575-4515
WEST VIRGINIA	CHARLESTON	808 MAIN STREET, NITRO, WV 25143	(304) 755-3300
WISCONSIN	APPLETON	324 W. WISCONSIN AVE., SUITE 3, APPLETON, WI 54911	(414) 731-1494
	EAU CLAIRE	1806 WARDEN ST., EAU CLAIRE, WI 54701	(715) 832-4431
	MADISON	3680 KINSMAN BLVD., MADISON, WI 53704	(608) 249-5999
	MILWAUKEE	448 W. RAWSON AVE., OAK CREEK, WI 53154	(414) 764-6500
	WAUSAU	120 E. STEWART AVE., WAUSAU, WI 54401	(715) 845-8688
CANADA	▲ TORONTO	31 KLONDIKE DR., WESTON, ONTARIO, CANADA M9L 1S1	(416) 745-9474

▲ REGIONAL OFFICES

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