NCR

OPERATING INSTRUCTIONS

NCR 400
ELECTRONIC
ACCOUNTING MACHINE

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FOREWORD

This book describes the NCR 400 features and how they are used. The book supplements detailed make-ready instructions, sequential operating and correction procedures, and report preparation methods specifically designed by the NCR representative for the installation.

The NCR representative will also furnish programming information for carriage position controls and for encoding the punched program tape. Where applicable, supplemental information will also be furnished for programming peripheral punched tape or punched card units.
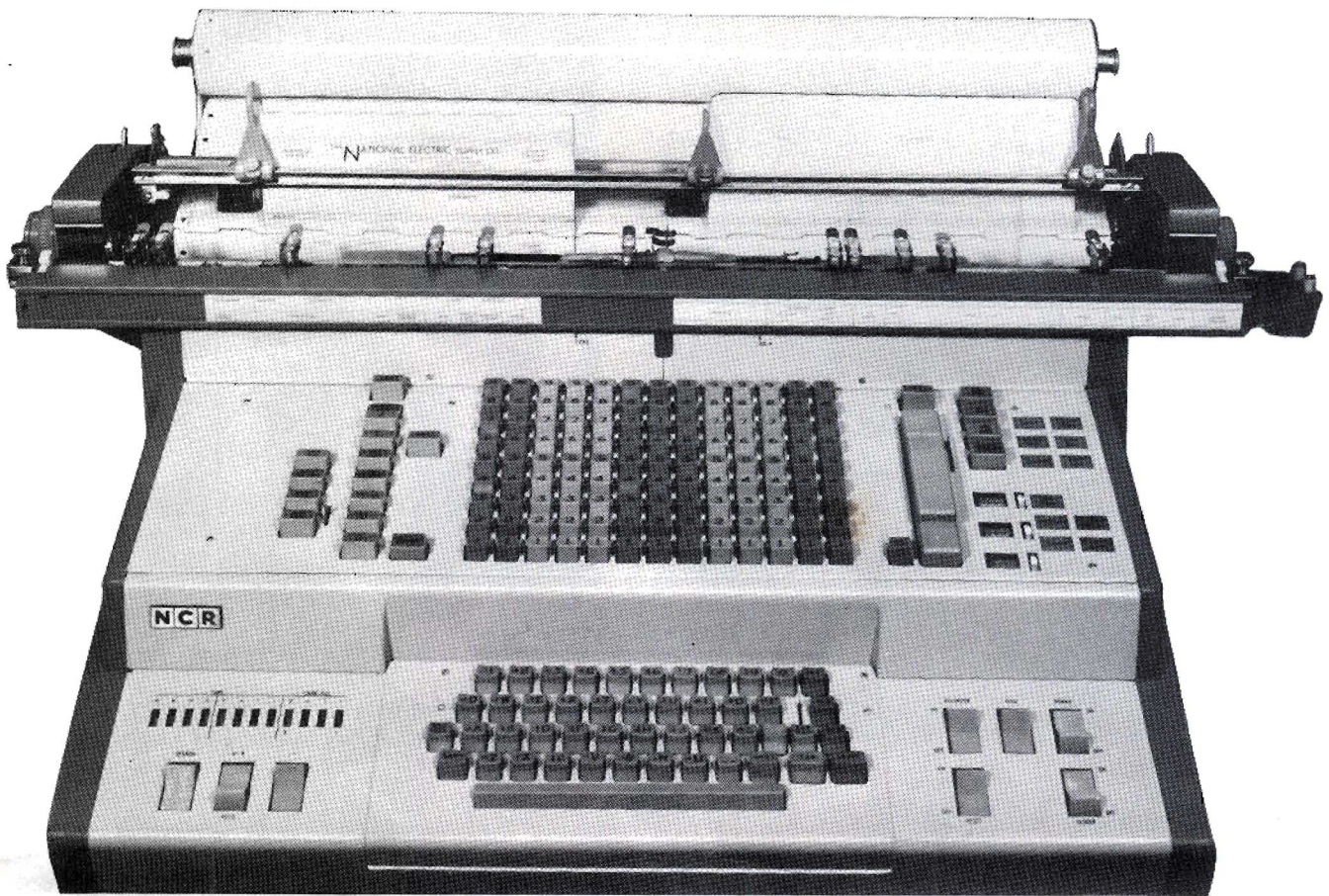
GENERAL DESCRIPTION

The NCR 400 Electronic Accounting Machine combines the operating simplicity of an accounting machine with the internal arithmetic speed and decision-making ability of an electronic computer.

The NCR 400 memory can store up to two hundred 13-digit words. A smaller capacity unit can be site expanded to maximum capacity as the need arises. Data are stored or recalled from memory in milliseconds.
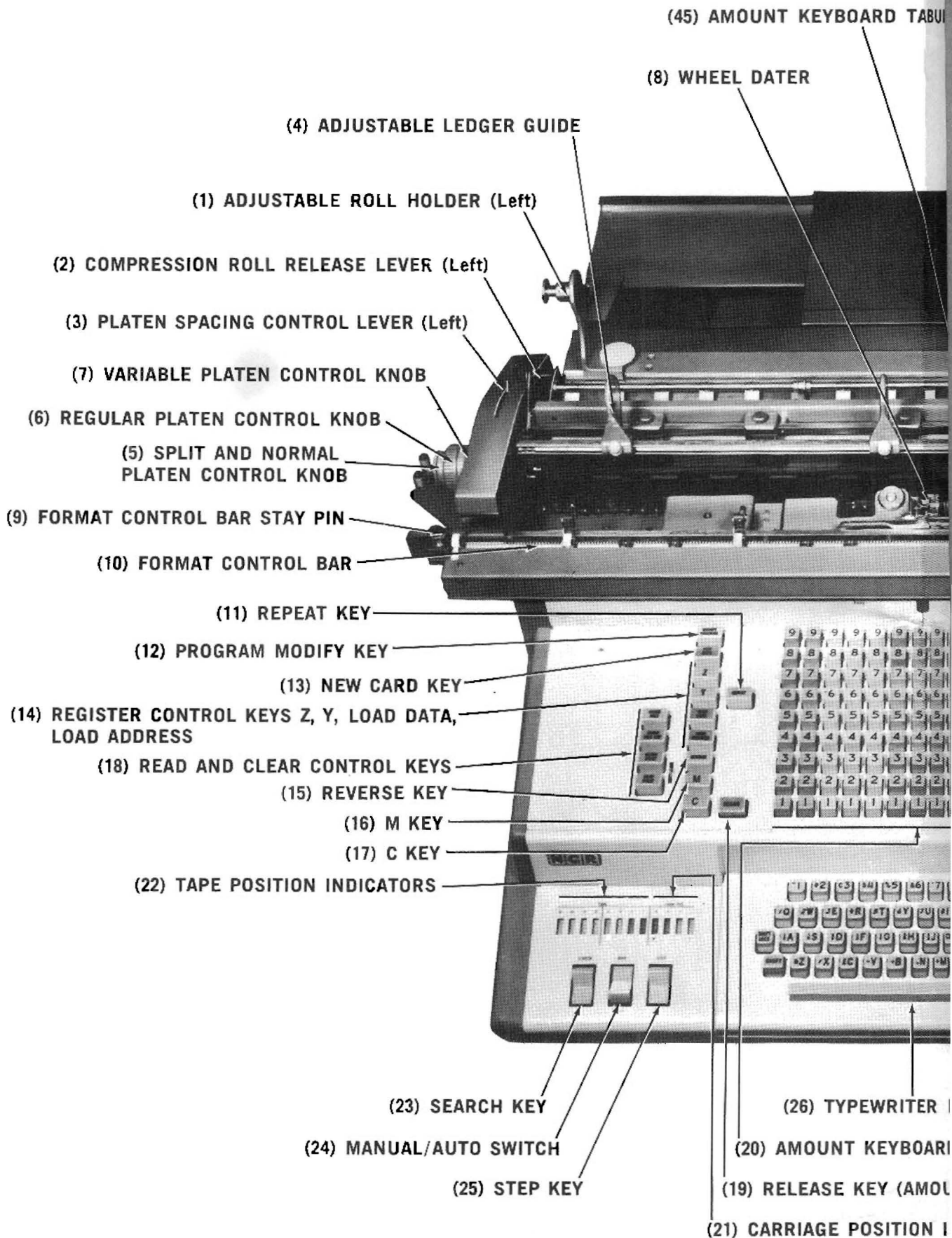
The full numeric keyboard provides 13 rows of keys for recording amounts, reference numbers, account codes, memory addresses, etc.

A standard electric typewriter keyboard provides for unlimited description.

NCR's exclusive 26" multiform carriage provides a wide latitude of form and system design. Carriage travel in either direction is smooth and quiet. The electronic read-write feature enables the NCR 400 to print data on one side of a ledger card and to magnetically encode related information on magnetic stripes on the back of the same record.

Removable front format control bars and binarily encoded program tapes combine to provide carriage and print control, and to direct the electronic arithmetic and decision making functions.

The NCR 400 may be programmed to accept punched card input and to provide punched card or punched paper tape output.

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Y (AMOUNT KEYBOARD)

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(53) TYPEWRITER TABULATION KEY

CONTROL SWITCHES
AND INDICATORS

SEARCH KEY (23)

One depression of the search key moves program tape in the direction the carriage last moved until it is synchronized with the control stop on which the carriage is located, then advances the tape one position.

MANUAL-AUTO SWITCH (24)

Has two settings. The Auto position is used for normal operation. The Manual position is used before turning system on or off, for program testing, for changing Format Control Bars and before using the following:

Clear Halt Key
Clear Non Print Key
Read Print Key
Clear Print Key
Y Key
Z Key
Load Data Key
Load Address Key
Reset Key
Step Key
Search Key

STEP KEY (25)

Used primarily for program checking. The Step Key feeds program tape one character at a time except on certain multiple-feed commands such as test and search, and commands involving put-away.

CARRIAGE POSITION INDICATORS (21)

Lights display the binary sequence control configuration built into the carriage control stop on which the carriage is positioned.

TAPE POSITION INDICATORS (22)

Lights indicate the program tape encoding for the next command to be executed or the next address to be selected. The lights are useful for program checking.
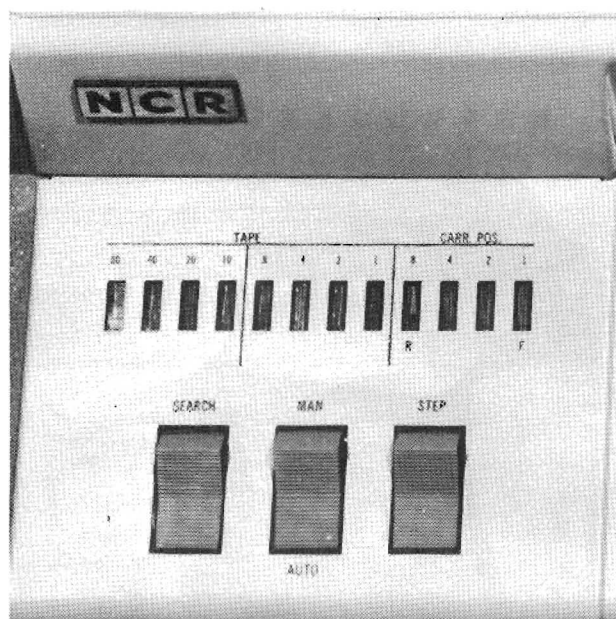
POWER SWITCH (48)

Turns entire system On or Off. Before using the Power Switch, the Manual/Auto Switch must be set at Manual. Power should be on before setting any other switches to On position.

LEDGER SWITCH (50)

Must be ON to activate magnetic ledger system. Switch is turned OFF if conventional ledgers are used.

FEED SWITCH (47)

When used with punched tape recorder, prepares leader used before and after posting run. When used with card punch, ejects card.

RECORDER SWITCH (46)

Controls power to peripheral equipment. A related light indicates when the switch is effective.

RESET SWITCH (49)

Releases electronic lockup after machine is placed in manual mode. A related light will indicate reason for the lockup.

PUNCHED TAPE READER

Reads binarily encoded program tape for electronics control of the NCR 400. The tape clamp is raised to insert strip or looped program tape. The tape is inserted, sprocket holes to the rear, over the drive wheel pins and the tape clamp is lowered.

A program tape and related format control bar are required for each application. During operation, the program tape is electronically synchronized with the carriage position.

The tape reader lens must be cleaned daily. Raise tape clamp and wipe with dry swab. If water is needed, use wet swab to clean, then wipe dry with another swab.
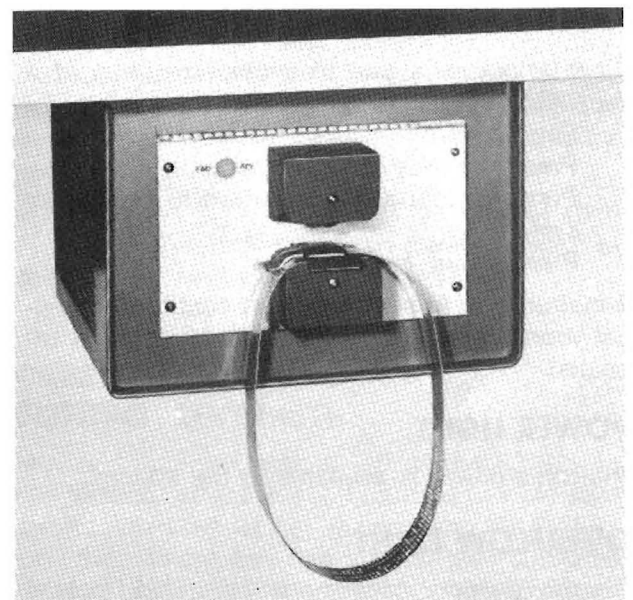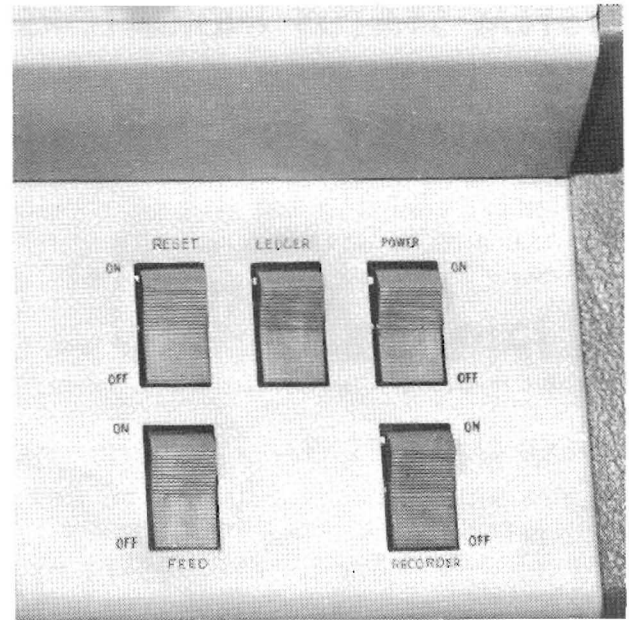
SYSTEM STATUS INDICATORS (40)

PARITY LIGHT

Signals lockup is due to parity malfunction of the paper tape punch. If card punch is used, the light indicates unregistered card, peripheral switches improperly set or drum card not properly installed.

RECORD LOCK LIGHT

Indicates malfunction of peripheral equipment.

LEDGER CHECK LIGHT

The magnetic ledger card ejects when the light indicates faulty execution of a Read Ledger command. The ledger should be re-inserted for another read attempt. If the form persists in ejecting an attempt should be made to read a different ledger card before assuming a system malfunction.

The system is locked if the light indicates wrong execution of a Write Ledger command. The program tape should include a recovery routine.

CARD FULL LIGHT

Lights when a posting is made on the last available posting line of a ledger card if a test for the last posting line is programmed.

INSERT CARD LIGHT

Indicates operator should insert a magnetic ledger card.

PRINT CHECK LIGHT

Signals lockup is due to wrong execution of a Print command. Recovery is as follows:
Reposition carriage where error occurred.
Press Vert Key to space paper.
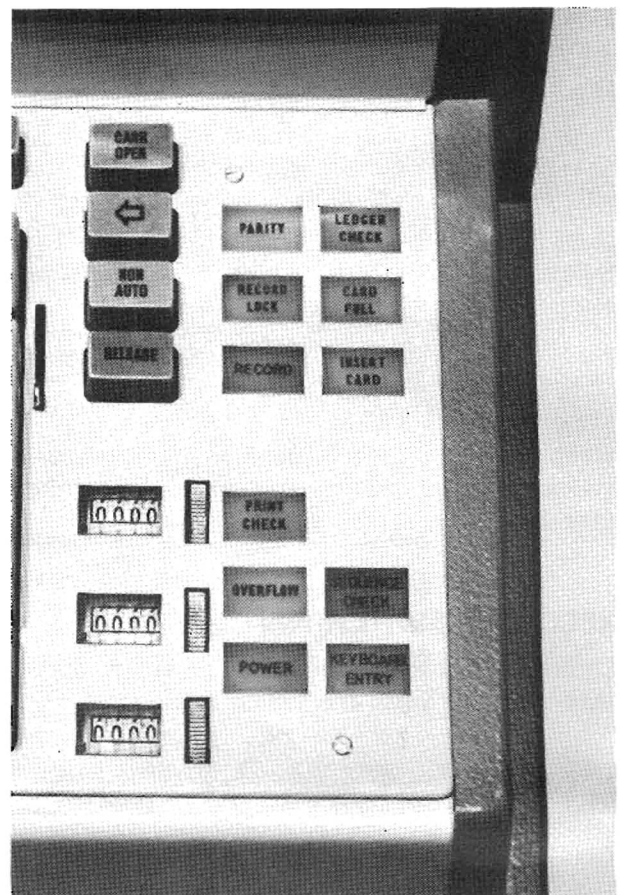Press Manual and Reset Keys to unlock the system.
Press motor bar.

A malfunction exists if the light continues to signal wrong print after the above procedure is repeated.

POWER LIGHT

Indicates power is available to the system.

OVERFLOW LIGHT

Signals memory capacity is exceeded, locking system. If use of zero divisor caused overflow, unlock by depressing manual and reset keys, then indexing any amount (1¢), Load Data key, Y key and motor bar. For any other cause, depress manual switch and reset key twice. Restore Auto key and proceed.

SEQUENCE CHECK LIGHT

Indicates program tape and carriage position are not synchronized. Normal relief is to depress Non Auto key and position carriage on proper stop. The Carriage Position Lights and the Binary Program Tape Lights will then agree.
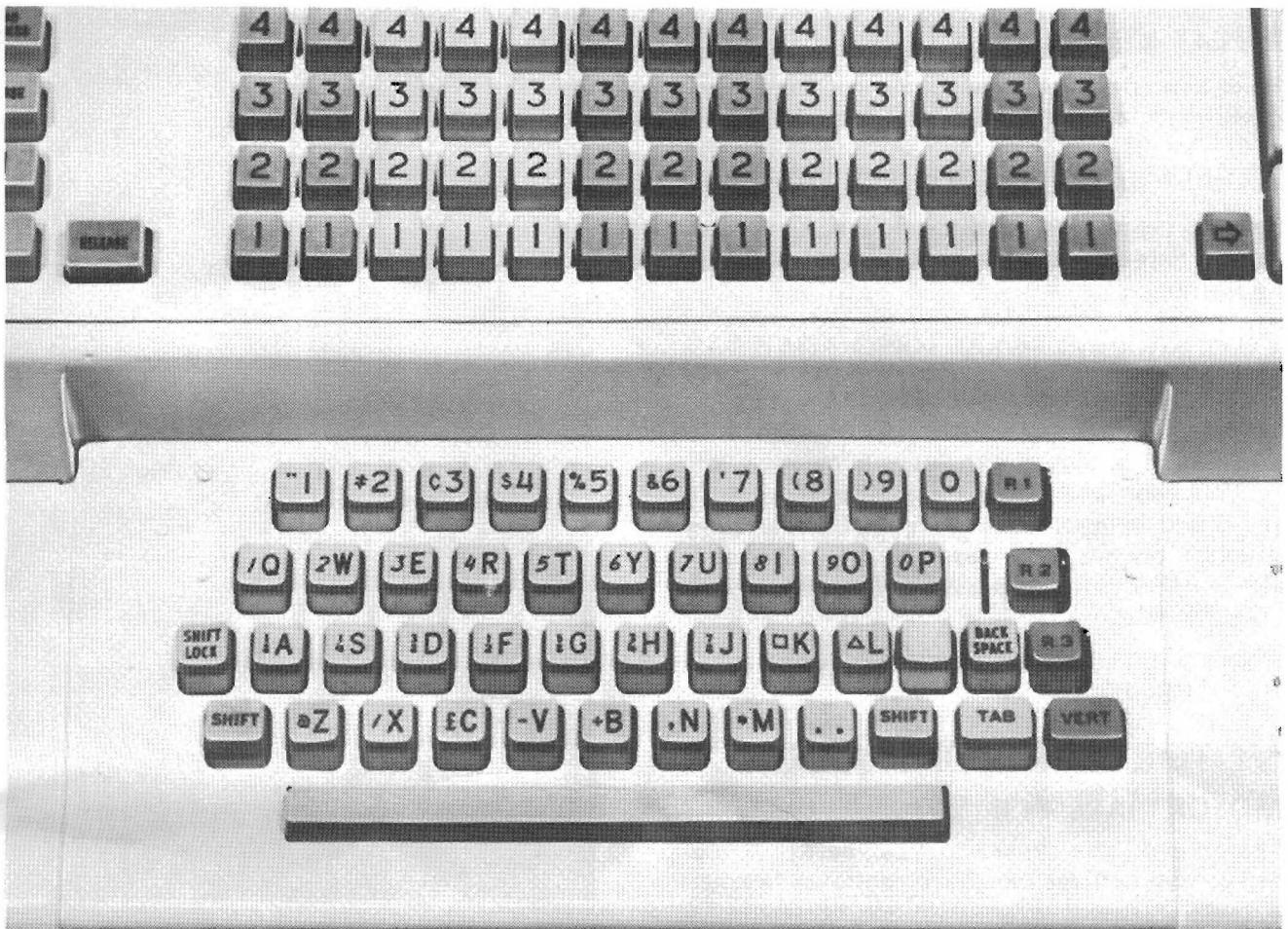
KEYBOARD ENTRY LIGHT

Signals operator that next command to be executed is a keyboard entry.

RECORD LIGHT

When lighted, indicates power is available to peripheral equipment.

THE ELECTRIC TYPEWRITER

TYPEWRITER KEYBOARD (26)

Contains 72 characters for typing alpha-numeric information. Upper case characters are accessed by using the shift keys. Gothic style type, which is 1/10 of an inch high, prints 10 characters per inch. Vertical spacing is in increments of 1/6 of an inch.

The Space Bar, and Back Space, Shift and Shift Lock Keys function like comparable controls of a standard typewriter.

TYPEWRITER TABULATION KEY (53)

Positions the typewriter at a predetermined typing, posting, or total clearing position.

VERTICAL SPACE KEY (54)

Spaces the platen one, two, or three lines depending upon the setting of the Platen Spacing Levers (features 3 and 30).

TYPEWRITER RETURN KEYS R1, R2, R3 (52)

Permit operator control of carriage return to three predetermined positions. Programming for the most efficient use varies with separate applications. Consult specific operating instructions for each application.

A Paper Feed Slide, located at the right of each Typewriter Return Key, may be moved forward to cause paper feed as the carriage returns.

CARRIAGE POSITION CONTROL LEVER (51)

Moving the small lever at left of the R2 Key to the forward, effective position modifies carriage return. When the R2 Key is used with the feature effective, the carriage first returns, then tabulates forward to the first typewriter tabulation control.

AMOUNT KEYBOARD AND CONTROL KEYS

REPEAT KEY (11)

Holds down depressed amount keys during subsequent machine cycles.

RELEASE KEY (19)

Restores depressed keyboard amounts, depressed control keys in adjacent control rows and the Repeat Key.

AMOUNT KEYS (20)

Contains 13 rows of keys numbered 1 through 9 in each row. Split and normal control is between rows 8 and 9. Two decimal positions used for multiplication and division are between rows 5 and 6 and between rows 2 and 3. Flexible construction permits the release of any depressed key by full or partial depression of another key in the same row.

Keyboard amounts may be indexed during automatic input or clearing.

MOTOR BAR CONTROLS

MOTOR BARS (43)

Three motor bars cause the machine to operate and provide carriage tabulation control as follows:

1. **UPPER MOTOR BAR**
   A TOUCH operation spaces paper vertically without carriage movement.
   A HOLD operation causes vertical spacing and returns carriage to a predetermined position.

2. **MIDDLE MOTOR BAR**
   A TOUCH or HOLD operation causes carriage tabulation to the next programmed position.

3. **LOWER MOTOR BAR**
   A TOUCH operation causes forward skip tabulation, usually through intervening positions, to a predetermined location. A HOLD operation causes forward carriage tabulation to a further predetermined position.

   A skip operation takes precedence over paper feed, carriage open, or carriage return controls.

MOTOR BAR CONTROL LEVER (42)

Located at right of Motor Bars. Provides two-position Middle Motor Bar control: the upper which permits normal operation; the lower which disables tabulation and spaces the platen vertically.
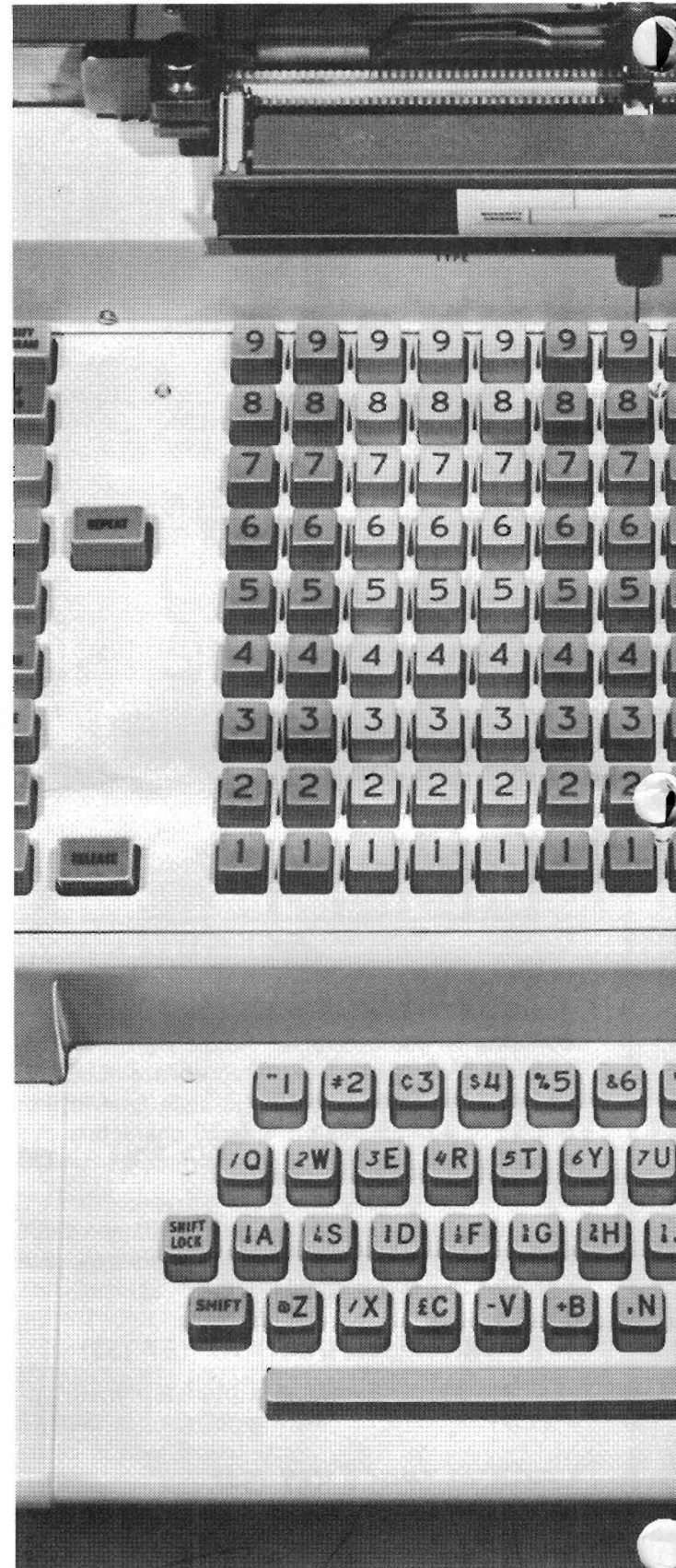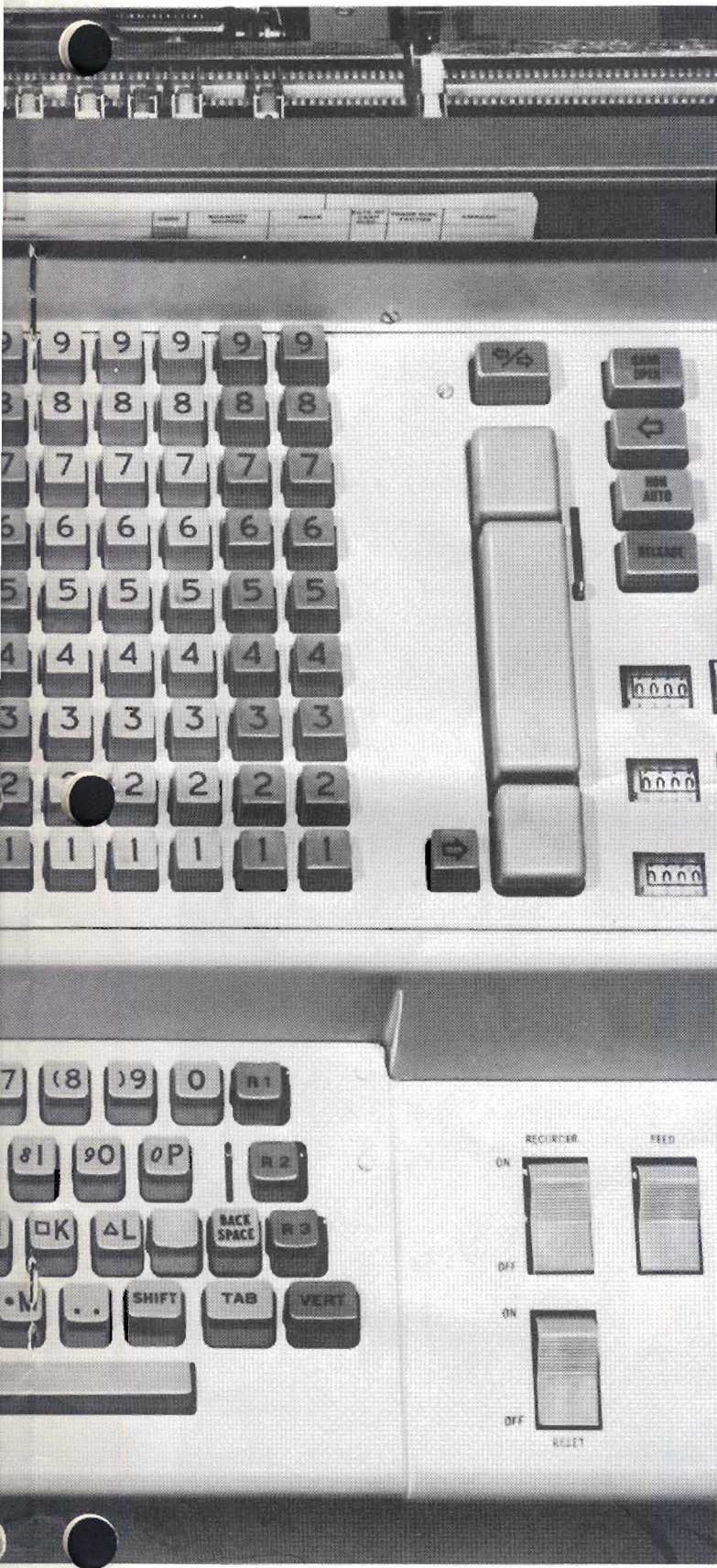
MANUAL CARRIAGE CONTROLS

CARRIAGE RELEASE KEY (36)

With power OFF, depression permits free manual movement of the carriage in either direction. With power ON, a partial depression moves the carriage forward (right to left); a full depression moves the carriage in reverse, (left to right). Carriage halts when the key is released.

CARRIAGE OPEN KEY (37)

With power ON, opens closed carriage or closes an opened carriage. Note: Typewriter keys are inoperative with carriage open.

CARRIAGE RETURN KEY (38)

Returns carriage to first stop with carriage return control. If the stop has automatic release, the machine operates.

NON AUTO KEY (39)

Disables automatic operation of the machine. The stay-down Non Auto key is restored by depressing the System Release Key immediately below it.

SYSTEM RELEASE KEY (41)

Has two functions:
1. Restores Non Auto Key.
2. Releases item counter reset wheels.

TABULATION KEY (45)

Tabulates carriage forward to next position without cycling machine.

If automatic release is programmed at next position, the machine will operate unless the NON AUTO Key is down.

ITEM COUNTERS (44)

Three item counters, each with four digit (9999) capacity, provide programmable activity count. Reset wheels at the side of each counter are locked until released by the System Release Key (feature 41).

ADDRESS READING, CLEARING, MODIFYING CONTROLS

CLEAR HALT KEY (18)

Stops machine cycling during automatic Clear Print or Read Print operations. The Clear Halt Key is used to stop the clearing or reading process at a desired address.

CLEAR NON PRINT KEY (18)

Writes zeros in memory addresses starting with the address in the Z register and continuing to include the highest address in memory.

To start clearing at a predetermined address, index the address on keyboard rows 1 and/or 2 and/or 3, then depress Load Address Key and the motor bar before depressing the Clear Non Print Key. To start clearing at address 00, depress Load Address Key and motor bar with no keys indexed on keyboard.

One machine cycle is made printing symbol CN, sign (blank for plus, "-" for negative), content and identity of the first amount cleared.

An adjacent latch prevents accidental depression of the Clear Non Print Key.

CLEAR PRINT KEY (18)

Similar to Clear Non Print except automatically repeated machine cycles successively print symbol CP, sign, content and identity for all addresses cleared.

READ PRINT KEY (18)

Similar to Clear Print except symbol RP is printed with each address read and memory content is not disturbed.
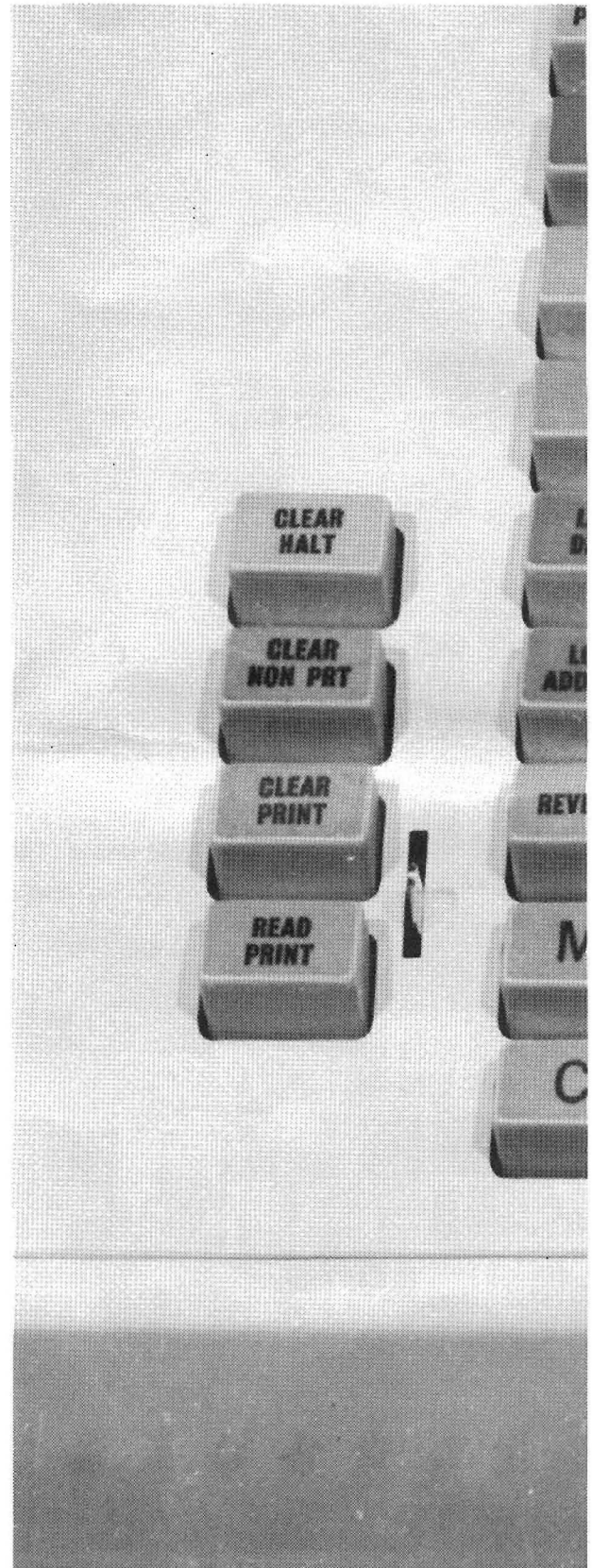
PROGRAM MODIFY KEY (12)

Changes a programmed print or print trip operation to permit keyboard entry and prints symbol MP.

NEW CARD KEY (13)

Overrides Read Ledger command, aligns ledger at first posting line. The key stays down and prints symbol NC on next machine cycle.

The New Card Key is used when transferring data from a full to a new card.

REGISTER CONTROL KEYS Z, Y, LOAD DATA, LOAD ADDRESS (14)

Print symbols X, Y, D, and A respectively. The keys are used primarily for system testing and debugging to manually read and change address contents.

Consult procedure instructions for use with any specific application.

REVERSE KEY (15)

Provides a simple means of correcting errors, making contra-entries in a posting column, or loading minus data amounts. A diamond symbol (◆) prints to identify a reverse entry.

M KEY, C KEY (16, 17)

Each key can change a programmed factor to a different predetermined factor. For billing applications the M and the C keys can be programmed to change a unit price to a price per 1000 or a price per 100. The symbol M or C is printed.

CARRIAGE FEATURES, WHEEL DATER
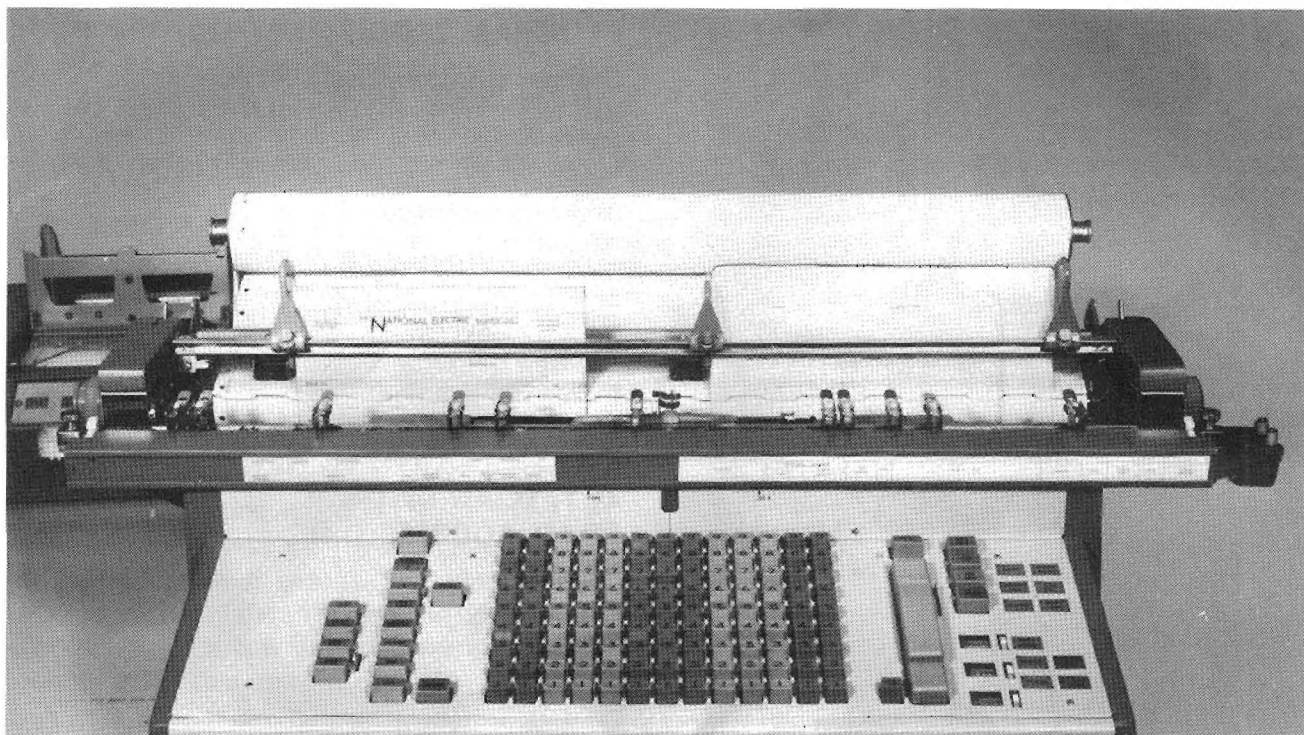
26" SPLIT AND NORMAL PLATEN (31)

Independent 10" and 16" sections can be coupled to provide a 26" solid platen. The full width is available for typing or posting. (To safeguard magnetic storage, no typing or posting should occur in the magnetic stripe area of the ledger card.)

## SPLIT AND NORMAL FEED LATCH

Permits three-way space control:

1. When pulled all the way out (extreme left), both sides space. This is the proper position when platen is coupled.
2. In middle position, both sides space when carriage is positioned to print on the right side. Only the left side spaces when carriage is positioned to print on the left side.
3. With latch at right, both sides are independent. Spacing occurs on the side in position to receive print.

PLATEN SPACING LEVERS (3, 30)

Provide 0, 1, 2, or 3-line spacing of the separate sides of the platen. When platen is coupled, the lever at right end of the carriage should be set at 0 and space control obtained from the left lever.

SPLIT AND NORMAL PLATEN CONTROL KNOBS (5, 6, 7, 34)

Two knobs are at the right end and three at the left end of the carriage. The inner knobs at each end provide variable spacing for the separate sides of the platen. The next knobs provide line-by-line spacing. The third knob at the left is pulled out (to the left) to split the platen and is pushed in (to the right) to couple.

Split & Normal Platen Feed Latch
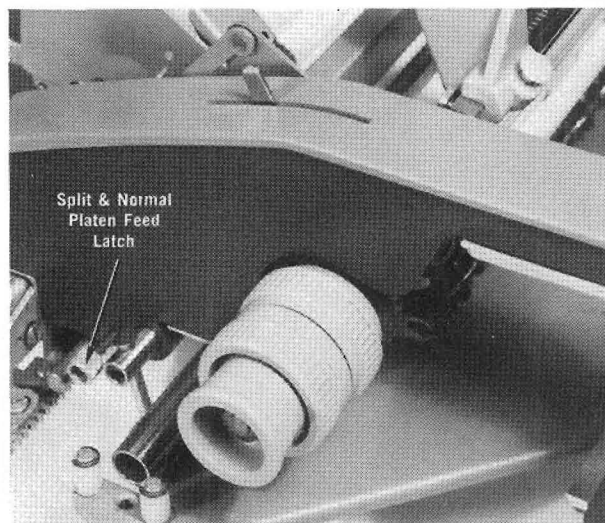
FORMAT CONTROL BAR (10)

Provides print and tabulation control for an accounting or reporting application. Stay pins at each end of the bar are raised and turned slightly to remove and replace control bars. The Carriage Release Key (feature 36) is used to shift the carriage if necessary to avoid obstruction.

The Format Control Bar should be handled carefully. (Never forcibly remove or insert.) Bars should be stored free of contact with other objects.

FORMAT CONTROL BAR INDEX

Obtained by inserting related form or report headings into a guide on the Format Control Bar Cover. Two printing positions are etched on the front of the cabinet to identify location of typed and amount keyboard entries.

PLASTIC LINE GUIDE (33)

Located directly in front of the platen. The guide contains two etched horizontal lines to identify location of the next posting line. Ledger guides attached to the plastic line guide and the horizontal lines permit rapid, accurate form alignment.

WHEEL DATER (8)

Five wheels, each with a blank position, can be set for automatic month, day and year printing or for printing any number from 0000 to 9999. A lever at the left of the month wheel releases the wheels for resetting.
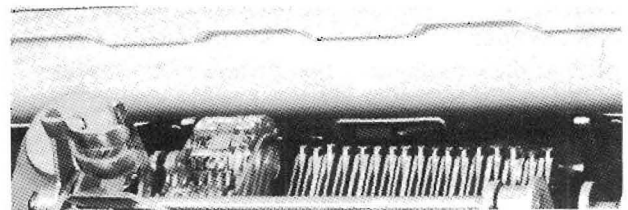
COLLATING ROLL LOCK LEVER

Located at the right end of the carriage adjacent to the right edge of the magnetic ledger table cover. The lever must be placed in the rear position (away from operator) for processing magnetic ledger cards and in the forward position when using non-magnetic ledgers.

MAGNETIC LEDGER SYSTEM — STARTING PROCEDURES

MAGNETIC LEDGER SYSTEM

Reads data into the system from magnetically encoded stripes on the back of ledger cards; writes updated data back onto the stripes after processing. Features included are the Ledger switch, and the Insert Card Light, Ledger Check Light, Full Card Light and the Collation Roll Lock Lever.

Magnetic ledgers are aligned between fixed right and left ledger guides. The removable left guide may be positioned against more than one fixed block on the line guide.

The first posting line of a magnetic ledger is programmable by lifting the cover from the narrow cabinet back of the machine and moving the rotary switch to one of five positions, A or B, C, D, E, and F. If ledger cards of varying size are used, consult the make-ready instruction of each application for proper switch setting.

STARTING AN OPERATION

Install Format Control Bar and place carriage at start position.

Install Program Tape

Depress Manual Switch

Turn Power Switch on

Turn on other switches needed (Ledger, Recorder)

Depress Search Key

Depress Auto Switch

Refer to application outline for such details as memory address loading, form insertion, paper guide settings, collation roll lock lever setting, data preparation and entry, correction procedures, reading and clearing memory for report or proving purposes, etc.

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