

PREVENTIVE }  
MAINTENANCE }

Reproducing Punch  
Type 513

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# PREVENTIVE MAINTENANCE

## Reproducing Punch Type 513

### PUNCH AND READ UNITS

#### I. Cleaning

A large amount of dust accumulates around the brush contact rolls, on the lower feed roll bracket and on the felt pad back of the punches. The brushes should be dropped, and the magnet unit removed to clean these points properly. It is well to check the (front to rear) location of the magnet unit between the side frames with reference to one of the side frames so it can be replaced in the same location to permit punching in registration without additional adjustment. *Check with thickness gauges.*

#### II. Inspection

1. Clutches for all adjustments
2. Feed (see *General Section—Horizontal Feeds*)
  - (a) FEED KNIFE ADJUSTMENTS
  - (b) FEED KNIFE GUIDE SLIDE
  - (c) EVEN FEEDING OF CARDS. The feed rolls on the punch side will be open at the time the knives are moving forward but will be closed as the knives are moving back. Therefore, the evenness of these should be checked against the edge of a card while they are moving away from the feed rolls. *Any play in the feed knives must be taken up by pulling them away from the feed rolls before checking against the edge of the card.*
  - (d) FEED ROLL OPENING DEVICE for wear and adjustment (punch side only).
  - (e) HOPPER SIDE PLATES. Punch unit for correct horizontal punching registration. Read unit for alignment with first upper feed roll.
  - (f) ROLLER THROAT
  - (g) FEED ROLL TENSION
  - (h) TIMING OF FEED KNIVES. Brush assembly should be correct before checking this.
  - (i) HOPPER POSTS
3. Brush Assembly (see *General Section*)
  - (a) BRUSH SEPARATORS
  - (b) BRUSHES
  - (c)  $\frac{1}{8}$ " PROJECTION
  - (d) BRUSH ALIGNMENT TO SCRIBED LINE
  - (e) BRUSHES EVENLY SPACED BETWEEN SEPARATORS
  - (f) BRUSH TRACKING. Hopper side plates to have been adjusted previously.
  - (g) BRUSH TIMING. This is to be checked in conjunction with feed knife timing. A good method of accurately checking brush timing is to wire all 80 brushes to one side of the comparing unit. Short the CB's and run a punched card in by hand with power on but with belt drive removed. As the brushes make contact, they will trip the comparing indicators, giving an exact timing for each brush.
4. Magnet Unit
  - (a) WORN PUNCHES shown by fuzzy punching.
  - (b) ECCENTRIC SHAFT for wear.
  - (c) PUNCH BAIL CONNECTING LINK PINS for free movement and wear.
  - (d) MAGNET ARMATURES for free movement and  $\frac{1}{8}$ " travel of interposers.
  - (e) PUNCH BAIL TONGUE for nicked or worn edge.
  - (f) STOP STUDS ON STRIPPER should be snug against die.
  - (g) VERTICAL PUNCHING REGISTRATION
  - (h) EASY INSERTION OF DIE
5. PX and RX Brushes
  - (a) BRUSHES for worn or bent strands.
  - (b) CLEARANCE BETWEEN BRUSH HOLDER AND COMMON CONTACT BAR
  - (c) BRUSHES for timing and registration.

## 6. Stacker Units

- (a) IDLER GEARS for worn bearings.
- (b) STACKER ROLL for wear and timing. Timing on this may be checked with the clutches latched. At this time the rubber roll should be vertical with the high side up. If the meshing of the gear teeth will not permit the roll to be exactly vertical, it should be tipped in a clockwise direction (facing the front of the machine), never counter-clockwise.
- (c) FREEDOM OF MOVEMENT OF STACKER TUBE

7. P & R Cams (see *General Section* for *Make and Break Type Cams*)8. Card Lever Contacts (see *General Section*)

## III. Lubrication

## IBM 6

- (1) All clutch pivot points.
- (2) Roller throat.
- (3) Feed roll opening device cam followers (followed by IBM 17).
- (4) Felt wick behind punches.
- (5) Interposers. These are better off with no oil than with too much. Oil only those that appear gummy or sticky by running between them a card soaked with IBM 6. Do not have too much oil on the surface of the card.
- (6) Punch magnet armature pivot points.
- (7) Card lever pivot points.

## IBM 9

- (1) Feed knife slides.
- (2) Center bearing of first upper feed roll.
- (3) Oil cups in all lower feed roll bearing brackets.
- (4) Oil holes in lower feed roll end bearings. The magnet unit must be removed to get at these.
- (5) Oil wells in casting side frames.
- (6) Contact roll driving spindle and keys (followed by IBM 17).

## IBM 17

- (7) Punch bail connecting links oil cups.
- (8) Punch bail pivot shaft bearings oil cups.
- (9) Stacker roll idler gear bearings.
- (10) P & R cam contact drive gear shafts and idlers.

## IBM 17

- (1) Feed roll drive gears.
- (2) Magnet armatures at points where pull rods fasten.
- (3) P & R contact cam surfaces very light film.
- (4) Card levers. Very light film between operating lever and phenolic pad on contact strap.

## IBM 21

- (1) Eccentric shaft zerck fittings.

## CONTINUOUS RUNNING UNITS

## I. Cleaning

The surfaces of the CR cams and the inside emitter surface of the summary punch emitter should be thoroughly cleaned.

## II. Inspection

## 1. Drive Gear Housing

- (a) PINS IN GENEVA GEAR ASSEMBLY. A loose or partly sheared pin will often be indicated by variation in the vertical registration on a card. As an example "one" and "nine" might be in registration vertically and a "five" hole might be off. Air bubbles will often form in the oil film over a loose pin. If the pins holding the Geneva dog one

tooth ratchet are bad, it is often possible to engage the dog and then, using a heavy screw driver for leverage, rock the Geneva gear back and forth without moving the shaft the one tooth ratched is pinned to.

- (b) OIL PUMP for operation and oil level.
- (c) OIL SEALS for leakage. It is recommended that the oil cup cover on the drive housing be crimped to prevent it properly seating on the oil cup. This will allow the passage of sufficient air to maintain normal pressure within the housing and will make the replacement of the oil seals unnecessary in many cases.

In cases where it is necessary to replace an oil seal, it is sometimes difficult to determine which seal is defective. Lubriplate is a very effective means of solving this problem and it may be used in the following manner:

Completely drain all oil from the drive housing and replace it with a pint of lubriplate. Lubriplate is a white fluid lubricant and the white color should quite readily point out the leaking oil seals. Lubriplate 100 may be used for this application and may be purchased locally.

A machine may be allowed to run for 8 to 10 hours with this lubricant in the drive housing, and it will seek out all openings around the housing or flaws in the oil seals. This lubricant is not recommended for regular use because of a separation that takes place after long periods of continuous operation. For this reason it should be removed from the drive housing after it has served its purpose and replaced with one pint of IBM lubricant 12.

One pint of lubriplate will be sufficient to test a machine and it can be used over many times. A test of this type is not a final indication of oil seal condition on machines that have been in the field for more than 2 years. If lubriplate is used on a machine in which several oil seals are badly worn, it is conceivable that the seal in the worst condition will keep the pressure down to the point where leakage would not be shown around some of the other worn seals. On new machines or just after the installation of new oil seals the above mentioned test will prove very effective.

2. CR Contacts (see *General Section*)

3. Summary Punch Emitter (see *General Section*)

### III. Lubrication

#### IBM 6

- (1) CR cam contacts on pivot points and cam followers.

#### IBM 9

- (1) Drive pulley pawl pivots.

#### IBM 12

- (1) In drive housing.

#### IBM 17

- (1) Drive pulley ratchet.
- (2) Very light film on contact cam surfaces.
- (3) Very light film on emitter surface.

## COMPARING UNIT

### I. Cleaning

Due to its location, very little card dust or grease accumulates in the comparing unit. However, any dirt on the indicator pivot points should be cleaned out.

### II. Inspection

Tripping off and relatching of each position. A good means of checking this is to use an 80-80 board, running a punched card in one feed and a blank card in the other. All positions should trip off. Run the test a second time reversing the feeds in which the cards are run.

### III. Lubrication

#### IBM 6

- (1) Magnet armature at pivot points.

#### IBM 17

- (1) Magnet armatures at points where pull rods fasten.

## MARK SENSING UNIT

### I. Cleaning

All dust and dirt should be cleaned from the brush assembly paying particular attention to dirt between brush separators. Any old oil or grease should be cleaned from the contact drum.

### II. Inspection

#### 1. Brush Assembly

- (a) **INDIVIDUAL BRUSHES** for wear, bent and crossed strands.
- (b) **TIMING.** Both make and break timing should be checked. The make time is governed by the lower limit of the marking space, and the break timing by the upper limit. Both may be checked as follows:
  - (1) Connect an ohmmeter with one wire on the **M.S.** common brushes and the other plugged into the control panel to the **M.S.** brush hub for the position being checked.
  - (2) With the power off, run in by hand a card that is marked as indicated below.
  - (3) **MAKE.** Place a pencil mark between the "0" and "1" marking positions. Thickness of the mark does not matter, but the top part of it should come all of the way up to the bottom edge of the "0" marking position. Brushes should make on this mark by one tooth past the line of index.
  - (4) **BREAK.** Place a pencil mark between the "X" and "0" marking positions, touching the top of the "0" position. Brushes should not break from this mark until about two teeth or more after C10 makes.
  - (5) Different cards should be used for testing the make and break timing, but time may be saved by testing ten positions on each card run through the machine if one position is tested on "0", the next on "1", etc.

#### 2. Mechanical Delay Unit Check for the following:

- (a) **CONTACT CAMS** for wear and clearance to drum.
- (b) **DRUM TIMING**
- (c) **MAGNET CAM MOUNTING PLATE** for correct positioning of magnet cores to contact pawls.

#### 3. Tube Unit

- (a) **CIRCUITS.** With the control grid shorted to the cathode to make a tube conductive there should be about a 70-volt drop across each delay magnet every time C10 makes. This can be checked by the following steps:
  - (1) Remove belt.
  - (2) Turn on main line switch and mark sensing switches and crank machine by hand. Engage the punch clutch so that R57 becomes energized by P1. Be sure the time delay relay is energized.
  - (3) Disconnect the wire from minus C (terminal #4 for unit 1, #14 for unit 2 and #24 for unit 3). These go to standard fuse 1.
  - (4) Short minus C (terminal #4 for unit 1, #14 for unit 2 and #24 for unit 3) to plus C (terminal #5 for unit 1, #15 for unit 2 and #25 for unit 3). This shorts grid control and cathode together to make all tubes for that unit conductive.
  - (5) Set meter to 250-volt D.C. scale and connect it in parallel with the delay magnet. The positive lead should be connected to the delay magnet common.

(6) Turn the machine until C10 makes at which time the meter should read approximately 70 volts.

(7) Check all 10 positions in turn by moving the negative lead of the voltmeter from one magnet to the next checking voltage drop on each.

- (b) 1.5 MEGOHM RESISTORS for value. This is the brown, green and green-colored resistor. The 100,000 ohm resistor is in the following circuit also but will not appreciably alter the meter reading. If the 1.5 MEGOHM resistor is open, the machine will lace a card in the position associated with the 1.5 MEGOHM resistor.

#### USING THE TRIPLETT METER

(1) Prevent the tubes from heating by disconnecting the wire from M.S. fuse #2 to the filament terminal (#1 for unit 1, #21 for units 2 and 3).

(2) Turn the main line and mark sensing switches ON.

(3) Set the meter on the 10-volt scale. Place the plus lead of the meter on the mark sensing brush common; place the minus lead in the M.S. IN hub for the position being tested. The meter should read 1 volt on the 10-volt scale.

(4) Repeat for each position by plugging to each M.S. IN hub for each position.

#### USING THE IBM METER

(1) MACHINE MUST BE TURNED OFF.

(2) Set meter dial to R  $\times$  1000 reading.

(3) Connect one lead of the meter to the C minus hub.

(4) Remove the tube from the socket of the position being tested and plug the other lead to the 5 position of that socket.

(5) Indicator should be deflected to between 1 and 2 megohms.

- (c) 100,000 OHM RESISTORS are colored brown, black and yellow. If this resistor is open, the machine will not punch in the position associated with it.

#### USING THE TRIPLETT METER

(1) With all tubes in the chassis, turn on the main line and mark sensing switches.

(2) Set the meter on the 50-volt scale and connect the meter leads, the plus lead to the common of the mark sensing brush and the minus to the M.S. IN hub.

(3) The meter should read 38 volts.

(4) Test each M.S. IN hub in the unit.

#### USING THE IBM METER

(1) MACHINE MUST BE TURNED OFF.

(2) Set meter dial to R  $\times$  1000 reading.

(3) Remove tube from position to be tested.

(4) Connect meter across socket terminals #5 and #6.

(5) Meter should read about 100 on the ohm scale.

- (d) 3,000 OHM RESISTORS are wire-wound and are about  $\frac{1}{2}$ " in diameter by 1" long.

#### USING THE TRIPLETT METER

(1) Remove chassis mounting screws.

(2) Set the meter on 100 or 250 volt DC scale.

(3) Clip the terminals of the meter on the resistors, one at each end.

(4) Turn the main line and mark sensing switches ON. Remove the belt and turn a marked card under the mark sensing brushes.

(5) The meter should read between 30 and 60 volts when the tube is conducting.

#### USING THE IBM METER

(1) THE MACHINE MUST BE TURNED OFF.

(2) Set meter dial to R  $\times$  100 reading.

- (3) Remove tube in position to be checked.
- (4) Connect one lead of meter to terminal #4 of that tube socket.
- (5) Connect the other lead to the plus terminal of the 150 MFD condenser, located behind the comparing unit. The plus terminal has a red mark.
- (6) The meter should read somewhere around 30 on the ohms scale.

#### 4. Double Punch Blank Column Detection

Blank column detection should be checked by running blank cards through the machine. Have switch for only one position at a time turned on. Test 10 or 15 cards for each position before turning switch off and going on to the next position.

Double punch should be checked with a special test deck made up to check one position at a time with 10 or 15 cards for each position. The cards used to check any one position should be double punched with some of them containing holes only one cycle point apart, and others five or six cycle points apart.

### III. Lubrication

Place a light film of IBM 17 on the tips of the pawls and contact cams in the mechanical delay unit.

## B A S E

1. Relays (see *General Section*)
2. Motor Generator (see *General Section*)
3. Control Panel (see *General Section*)

## T E S T

Cut the CB duration time down to two teeth on the index by advancing the break time. With this short CB duration, use an 80-80 board to check all functions of the machine including PX and RX pickups as well as class selectors, if any.