

PREVENTIVE }
MAINTENANCE }

Accounting Machine
Type 285

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PREVENTIVE MAINTENANCE

Accounting Machine, Type 285

CARD FEED UNIT

I. Cleaning

All dust and dirt should be brushed out of the hopper. Remove contact roll and brush assembly to clean feed unit properly. An easy way to clean dirt from the surface of the feed rolls is to hold the end of a card that has been dipped in IBM 6 lubricant and allow it to drag between two rolls while they are turning. This wiping action will take most of the dirt off the rolls. Be sure that all dirt and foreign material is removed from the gear teeth, as this will cause the gears to bounce and result in uneven feeding of the cards.

II. Inspection

1. Feed Unit

- (a) **FEED KNIFE** for an even projection of .0045"-.005". Use a leaf gauge and check by feeling for a projection over the edge of the gauge.
- (b) **CARD LEVELERS** for $\frac{1}{64}$ " clearance to top of cards.
- (c) **THROAT BLOCK** for having crown in line with top edge of throat knife.
- (d) **THROAT KNIFE** for wear and for .008"-.010" opening. If the throat block is properly adjusted, an .008" gauge should pass freely through in the three directions, but a .010" gauge should not pass.
- (e) **HOPPER SIDE PLATES**. These should be checked for proper card brush alignment and far enough apart to allow .005"-.008" clearance over the length of the card. This can be easily checked by inserting a card between the hopper side plate and the cards in the hopper. Adjusting the filler plates for a snug fit of this card will give approximately .006"-.007" clearance.

With brush assemblies in the machine, run in cards punched 5 in alternate columns, stopping the machine between 7 and 6. Remove contact roll assemblies and check alignment of the punched holes with the separator slots. Each punched hole must be exactly centralized over the space between separators. This should be checked with the cards against first one side and then the other side of the hopper bed. If the two sets of brushes are not in line with each other, adjust the entire brush holder and separator assembly of one set. The brush holder and separator assembly can be shifted slightly because of oversize holes for the mounting screws.

- (f) **FEED ROLL TENSION** for being even all the way across. Check this with power off by inserting four strips of a card between the rolls, and comparing the tension as each strip is pulled out of the rolls. Repeat at five or six different points throughout the cycle. If tension is not even, look for worn feed roll bearings, bent feed rolls, foreign matter in feed roll gears which causes the feed rolls to separate, or misalignment of the feed roll gears on the two ends which will cause the gears to climb up on the teeth. The last can best be remedied by loosening the two set screws in both gears, and turning the feed roll slightly so that the set screws will find new seats. Run the machine a few cycles to allow gears to fully mesh and tighten the set screws.

When tightening the drive gear, set it for no more than .004" end play. Remove the feed roll pressure bracket to check this.

As a final check to make sure that the feed rolls are not weaving in and out, run the machine and watch both end bearings of the feed rolls on the *inside* of the feed castings. Any perceptible movement may cause the cards to be fed unevenly, resulting in arcing of the brushes or other improper operations. The above test should be made with *no cards* being fed, because when cards are fed, the feed rolls do move back and forward the thickness of the cards.

2. Brush Assemblies (see *General Section*)

- (a) **CLEANING**
- (b) **BRUSH SEPARATORS**

- (c) BRUSHES
- (d) $\frac{1}{8}$ " PROJECTION
- (e) BRUSH ALIGNMENT TO SCRIBED LINE
- (f) BRUSHES EVEN SPACED BETWEEN SEPARATORS
- (g) BRUSH TRACKING
- (h) BRUSH TIMING

3. Card Levers (see *General Section*)

4. Stacker

- (a) BROKEN STACKER SPRINGS
- (b) TIMING to grip cards in middle of "9".
- (c) ESCAPE VALVE at top of dash pot so that the stacker table returns fully to normal when released, but so that it does not strike with force.

5. Feed Clutch

- (a) WEAR particularly on the driving pawl and the release pin for looseness. Either of these conditions may cause a "chattering" clutch. It is necessary to remove the drive pulley to check these. Do not forget that the screw holding the drive pulley is a left-hand thread.
- (b) LATCH for unlatching and re-latching clearances.
- (c) CLUTCH MAGNET CONTACT for dirt, burnt points and adjustment.

6. Card Feed CB's (see *General Section—Circuit Breaker Cams*)

7. Contact Roll Assembly for freedom of movement and no burnt or arced spots. Also check contact plungers for freedom of operation.

III. Lubrication

IBM 6

- (1) CF-CB cam follower rollers, followed by IBM 17.
- (2) CF-CB cam contact pivot points.

IBM 9

- (1) Cross beam bearing surfaces.
- (2) Cross beam links at pivot points.
- (3) All gear shaft and feed roll bearings on both sides of the feeds.
- (4) Idler gear bearings on both sides of the feed.
- (5) Two oil cups, one on each of the CF-CB shafts.
- (6) Feed roll pressure bracket oil wells.
- (7) Clutch and drive pulley pivot points.
- (8) Drive motor bearings.
- (9) Stacker drive gear pivots.
- (10) Stacker drum pivots.
- (11) Card weight roller pivots.
- (12) Contact roll bearings and gear chain driving the contact roll. These are located inside the side castings alongside of the brush assembly.

IBM 17

- (1) Light film on gear teeth.
- (2) Very light film on linen dilecto CF-CB cam surfaces.
- (3) Stacker opening cams.

COUNTER UNITS

UNLESS A COUNTER has been giving trouble, it need not be removed from the base when inspected. If ever a counter has to be removed from the base to replace a part, take advantage of the opportunity to lubricate all cams and followers accessible from the bottom of the counter.

I. Cleaning

Clean all old grease and dirt from the unit. If too much lubrication has been used in the past, oil and dirt sometimes accumulates between the add magnet cores and their armatures. This can be wiped off with a rag soaked in cleaning fluid at the time the add magnets are removed for inspection of their armature residuals.

II. Inspection

1. Lower Counter (see 601 Section for details)

- (a) ADD WHEEL CLUTCH GEAR
- (b) ADD MAGNET ARMATURES
- (c) CLUTCH TEETH OVERLAP
- (d) OVERTHROW LOCK ASSEMBLY
- (e) CARRY MAGNET

2. Upper Subtract Counter

- (a) SUBTRACT MAGNET ARMATURE for loose pins.
- (b) LATCH LEVER for overlapping the latch by $\frac{1}{32}$ ". This will also indicate that the unlatching clearance is right. If it is too great, the unlatching will be sluggish, resulting in "adding over."
- (c) SUBTRACTION PAWL for overlap on ratchet. This should be $\frac{1}{4}$ tooth at any line of index, and $\frac{1}{64}$ " to $\frac{1}{32}$ " at "F". See next item for test of this under power.
- (d) HEX NUT for adjustment by tripping off the adding clutches, unlatching the three-point latches and turning the three-lobe cams. As soon as the roller starts up the high dwell, the clutch should start disengaging.

This adjustment must be made carefully, because a too low setting of the hex nut will prevent the clutch teeth from bottoming.

To check under power the hex nut and subtract pawl overlap settings, plug the counter to subtract, and subtract all 9's in the counter. The adding wheels (except the ninth position) should not move when subtracting 9's. Remove carry magnet wire to prevent carrying of elusive 1 to units position.

If all the adding wheels "rock", it indicates that the clutches are not disengaging early enough to prevent "nipping". The overlap of the subtraction pawl on the ratchet will have to be increased by changing the relationship of the intermediate gears. If only one or two wheels "rock", the hex nut adjustment for these positions should be changed.

- (e) LOWER COUNTER ARMATURE KNOCKOFF for alignment with the add magnet armature and for adjustments. Place a light at the back of the counter and check to see that the armature knock-offs extending downward into the lower counter from the top counter line up laterally with the armature, when the rollers are on the high points of the three-lobe cams. At this point check also each lower armature knockoff by pushing the lower armature with a screwdriver back against its cores. There should be increased spring tension on the armature as soon as it is moved.

With the three-point latches latched and the rollers in the low dwells of the cams, the add magnet armatures should unlatch the clutch lever without touching this knockoff. This applies to the earlier as well as to the present type of lever.

The above checks on the lower counter armature knockoff adjustments are very important because improper knockoff action may result in "7 over" trouble when subtracting 9's. If any individual positions fail to meet these conditions, it will be necessary to bend the individual knockoffs.

3. Top Counter Moulding Assembly (see 601 section for detail)

- 4. Counter Reset Clutches for freedom operation and proper adjustment of the reset shaft collar which will position the reset shaft gear on its shaft so that when the clutch is manually engaged, the coupling pins will operate freely into the reset shaft gear (with the machine in a latched position). Also check for loose screws in the kick-over fingers.

III. Lubrication

IBM 6

- (1) Adding clutch lever pivots.
- (2) Adding clutch gear pivots.
- (3) Add wheels.
- (4) Top counter shaft pivots.
- (5) Three-lobe cam pivots.

IBM 9

- (1) Clutch disengaging lever bail pivots.
- (2) Overthrow lock pivots.
- (3) Carry lever bail pivots.
- (4) All bearing on both side plates.
- (5) Oil wells in counter drive shaft bearings under each counter.
- (6) Oil well in counter reset shaft bearings in front of each counter.

IBM 17

- (1) Clutch grooves on add wheel clutch gears.
- (2) Overthrow and carry lever bail cams.
- (3) All cam surfaces under counter; these should be lubricated every time counter is removed.
- (4) Light film on the inside surface of the top counter mouldings any time they are removed.

PRINT MECHANISM

I. Cleaning

This will be covered in each unit under the inspection heading.

II. Inspection

1. List Mechanism The carriage and magnet unit should be removed to inspect properly the mechanism under them.
 - (a) **CLEANING.** Wipe off all dirt and old grease from bearing surfaces.
 - (b) **ROCKER SHAFT** for wear and loose pins.
 - (c) **MAGNET UNIT STOP PAWL RESTORING MECHANISM** for wear and binds. These should work freely and not bind with one another.
 - (d) **LIST CAM** for freedom from bind on its shaft and for wear of internal cam. The cam rocking on its shaft when the machine is set to tab and cards are feeding is an indication that the cam is not properly lubricated.
 - (e) **LIST CAM FOLLOWER ROLLER** for wear and freedom of operation.
 - (f) **LIST CAM PAWL** for loose pivot, freedom of operation, and unlatching clearance.
 - (g) **HAMMER TRIP LEVER ARMS** for wear on the end that operates against the side operating links. A small amount of wear here can cause one side to trip off before the other.
2. Total Print Mechanism
 - (a) **CLEANING.** Wipe all dirt and old grease from bearing surfaces. Wash any grease from reset clutch contact and "P" cams with cleaning fluid.
 - (b) **RESET CLUTCH** for freedom of operation, worn pivots and adjustments.
 - (c) **WORM GEAR** for wear and proper lubrication.
 - (d) **"P" CAMS** (see *General Section—Make and Break Cam Contacts*)
 - (e) **TOTAL PRINT CB's** (see *General Section—Circuit Breaker Cams*). Timing on these should be set according to the total print list lap, but only after this total print list lap has been previously checked.

- (f) **TOTAL PRINT EMITTER.** The brushes for wear and damage. Replace any that show a noticeable bevel. Apply a thin coat of IBM 17 lubricant to emitter. Time brushes so that they make before and break after total print CB's.

3. Magnet Unit

- (a) **CLEANING.** Clean all dust and staples from unit. Check for paper clips among terminal posts.
- (b) **STOP PAWLS** for freedom of operation.
- (c) **STOP PAWL RESTORING BAIL** for relatching all stop pawls.
- (d) **KNOCKOFF BAR** for adjustments.

4. Print Unit

- (a) **CLEANING.** If the face of the type is dirty and filled with ink, crank the machine so that the type bars rise to their upper limit of travel and clean them with a plastic type cleaner. The type may be cleaned by rolling the cleaner over the face of the type. This operation will remove all ink and dirt in the type face. If both the type face and type tail are loaded with ink, the type unit should be taken off the machine and the type bars removed. Once the bars are removed, it is best to use a brush and completely clean the entire bar with cleaning fluid. At the same time, compress the type springs so that the ink may be thoroughly washed from the interior of the type case. It is essential that bars washed in cleaning fluid be re-lubricated with IBM 6.
- (b) **TYPE BARS BEFORE REPLACING** for broken or weak type springs, worn type case, loose rivets, bent type, etc.
- (c) **TYPE BARS AFTER REPLACING** for binds or sticky conditions. Return all type bars to their original position.
- (d) **SIDE OPERATING LINKS** for wear and tripping off evenly. Both ends must trip at exactly the same time. Check this by turning the machine over by hand, going very slowly at the point where hammers fire.
- (e) **HAMMERS** for broken springs and for free movement in their comb. They should all restore with the hammer bail with none of them lagging back. Any dirt in the comb will interfere with the hammer return.
- (f) **CROSS HEAD TRIP LEVER LATCH** for even tripping of the trip levers and for wear where the trip lever comes up against the latch. This should also be checked by turning the machine over by hand, making sure that both trip levers do latch and that they both unlatch at exactly the same time.
- (g) **RESTORING BAIL OPERATING LEVER** for loose shaft. This can be checked by removing both springs and holding one lever solidly in place; try to rock the other one. There should be little or no movement on one end that is not immediately transferred to the other end.
- (h) **LIST LAP.** This should be checked for both list and total lap. The lap on the right-hand side can be easily seen by looking through the hole in that end. The lap on the left end can also be seen through the hole in the right-hand side if a thin strip of white paper is inserted between the last bar on the left and the side casting. By shining a light on to the right side of this paper, enough light will reflect back to the stop pawls to enable them to be seen easily.
- (i) **RIBBON FEED.** Check the ribbon feed ratchet wheels for wear; see that when the ribbon reaches the end of the spool, the operating rivet in the ribbon will cause the ribbon to reverse.

5. Standard Carriage

- (a) **CLEANING.** Remove as an assembly to clean out all paper dust and form staples. Use IBM #9 lubricant on all rollers and operating bails, and also on feed pawl and detent roller under carriage cover at left end of the assembly.
- (b) **PLATEN** for proper clearance to type bars.

- (c) **PLATEN FEED RATCHET** for proper spacing on both list and total. The detent roller should fully seat in the detent ratchet after each space. Check with carriage in both extreme right and extreme left positions.

III. Lubrication

IBM 6

- (1) Hammer pivots.
- (2) Type bars and type tails.
- (3) Ribbon feed mechanism pivots.
- (4) Magnet unit stop pawl pivots.
- (5) Latch restoring pivots (both sides).
- (6) Stop pawl restoring bail pivots (both sides).
- (7) Print magnet armature pivots.
- (8) Total print CB cam roller and pivots.

IBM 9

- (1) Restoring bail pivots (both sides).
- (2) Side operating link pivots (both sides).
- (3) Two oil cups; one at each end of type bars.
- (4) Type bar lift arm pivots.
- (5) Cross head connecting link studs and pivots (both sides).
- (6) Rocker shaft pivots (both ends and center).
- (7) List and reset clutch pivots.
- (8) List tab handle shaft pivots.
- (9) List shaft bearing.
- (10) Total print shaft (bearings at both ends and bronze gear).
- (11) Worm gear bearings.
- (12) Cross head trip lever latches at pivot points.
- (13) Line spacing mechanism pivot points.

IBM 17

- (1) Restoring bail operating levers where trip lever adjusting screws strike.
- (2) Bottom tip of trip lever.
- (3) Cross head pawl.
- (4) Internal cut in list cam.
- (5) All cam follower rollers on list and total cams.
- (6) Total print CB cam rollers.
- (7) Very light film on linen dilecto.
 - (a) "P" cam surfaces.
 - (b) TPCB cam surfaces.
 - (c) Emitter surfaces.
 - (d) Type bar lever bumper stop.
- (8) Stop latch arm assembly.
- (9) Line spacing cam and rollers.

IBM 21

- (1) List cam grease fitting.

BASE

I. Cleaning

The entire machine should be wiped down with a rag soaked in cleaning fluid.

II. Inspection

- 1. "L" Cams (see *General Section—Make and Break Cams*)
- 2. Relays (see *General Section—Duo Relays*)
- 3. Control Panel (see *General Section*)
- 4. Motors (see *General Section*). Check both drive and reset motors.

III. Lubrication

IBM 6

- (1) Duo relay armature pivots.

IBM 9

- (1) Motor bearings (only a small amount).
- (2) Control panel pivot frame.

IBM 17

- (1) Light film on linen dilecto cam surfaces of "L" and total print CB cams.
- (2) Cam follower rollers on total print CB's.
- (3) MCR armature pivot points.

TEST

CUT THE CB duration down to $\frac{1}{8}$ " by advancing the break time. Then use a 200 card test deck to check list, add, subtract and control. If in proper condition, the machine should work correctly on this short duration time.