ALPHABETIC INTERPRETER

The Alphabetic Interpreter is used to print, on the face of a tabulating card, the interpretation of both the alphabetic and numerical information punched in the card.

GENERAL DESCRIPTION

The general appearance of the machine is somewhat similar to that of the Automatic Reproducing Punch, and it is approximately the same size.

The feed, which is of the horizontal type, is located at the right end of the machine. The stacker is located directly below the feed, and stacks the cards horizontally.

The main line switch and the start and stop keys are located on the front of the machine below the stacker.

The automatic plugboard is situated under the cover of the lower right end of the machine. Underneath the plugboard are located the motor terminals, and the variable resistance governing the output of the generator.

The front cabinet contains the fuses, the G. E. motor relays, the condensers, and the binding posts. The rear cabinet contains the MCR and the duo relays.

The drive motor is located at the left end of the lower base, and the motor generator is on the right end of the same base.

The machine is mounted on casters.

Current

The machine is equipped with its own motor-generator, and, therefore, may be specified to operate from either 110- or 220-volt alternating or direct current. The motor-generator supplies the necessary 40-volt direct current for the operation of all the electrical units of the machine with the exception of the drive motor.

The starting and running current for the drive motor and generator motor is as follows:

		Amperes				
		Start		Run	Running	
	Voltage	110	220	110	220	
D. C.	_	22.0	11.0	3.6	1.8	
A. C. 60 Cycle Single Phase		27.0	13.5	10.0	5.0	
A. C. 50 Cycle Single Phase		27.0	13.5	10.0	5.0	
A. C. 25 Cycle Single Phase		25.7	12.0	7.0	4.6	

Machines are equipped with a signal light, which glows when the generator is delivering the proper voltage. The start key should not be depressed until this light glows. This light is located on the front of the machine near the main line switch.

Speed

The machine operates at a speed of 60 cards per minute, regardless of the number of columns interpreted.

Card Column Capacity

The machine is furnished for 30-column cards only.

The feed is similar to that of the Horizontal Sorter. The cards are placed in the feed hopper face up, and with the top edge (12's) toward the throat.

The approximate capacity of the feed hopper is 700 cards, and that of the card stacker 900 cards.

The machine is designed to automatically stop if the supply of cards in the feed becomes exhausted, a card fails to feed, a jam occurs in the machine, or the stacker fills to capacity.

Bijur System

This machine is equipped with a standard Bijur lubricating system. The pump is located under the base at the left end of the machine, and is accessible through the left end cover. Directions for the proper care and servicing of this lubricating system are identical to that of the system on the ATFS machine, which is fully explained on Pages 69 and 70 of TM Section 405 of the Customer Service Manual of Instruction.

IBM Lubricant No. 9 (SAE 30 oil) should be used in this system. The lubricator should be operated once per week, preferably at the time the machine is started on Monday morning. In cases where the machine is operated more than average it may be necessary to operate the lubricator more than once a week. This should be left to the discretion of the individual serviceman.

This system reaches all oiling points with the exception of the ribbon operating arms, the feed knife assemblies, and the motor and generator.

Dimensions

Length, 34"; Height, 50"; Width, 20".

Weight

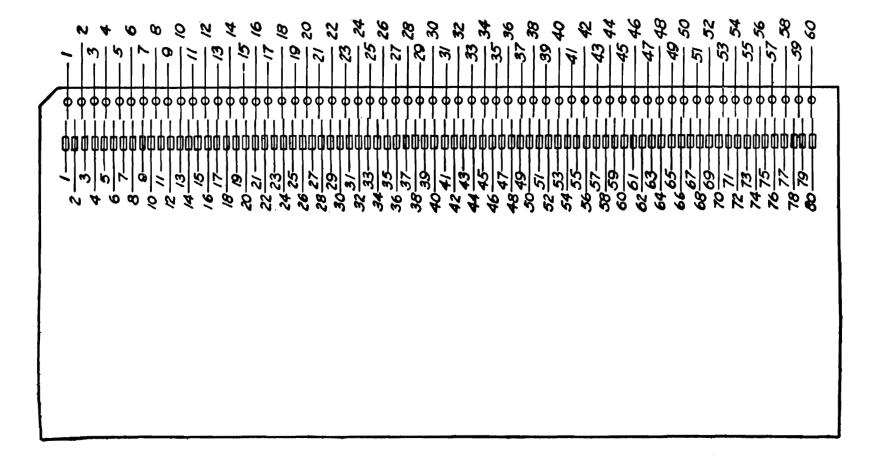
Packed, 1120 Lbs.; Unpacked, 776 Lbs.

FUNCTIONS

The machine is capable of printing on the face of a tabulating card the interpretation of both alphabetic and numerical information punched in the card.

The printing capacity is sixty characters in a row. Figure 1 shows the relative position of type to column. Each printing position is capable of printing either alphabetic (A to Z) or numerical (0 to 9) characters. These characters may be positioned along the top of the card above the 12's position or between the 12's and the 11's positions. The printing position is controlled by means of the printing-

C.S.D 683



SHOWING RELATIVE POSITION OF TYPE TO COLUMNS 80-COLUMN CARD

Fig. 1

position locating knob, which operates similar to the locating knob on the Numerical Interpreter

If sixty columns of interpreted information are sufficient, the printing can be accomplished in one run. If more than sixty columns of the card are to be interpreted, it is necessary to run the cards through the machine twice. It is obvious that when it is desired to interpret more than sixty columns, the balance will have to be interpreted in the second printing position and the plugboard rewired.

As the machine is not equipped with a mechanical zero printing device, all zeros punched to either the left or to the right of a significant figure will be printed providing those positions are plugged to the type bars. Unpunched card columns will not be interpreted.

If it is desired to interpret a "0" hole as a "10," or to interpret a "11" or a "12" hole, or any special character punching, the type bar assemblies must be equipped with special type

equipped with special type.

Switches, Keys and Printing-Position Locating Knob

The main-line switch is located on the front of the machine below the stacker. It is of the circuit-breaker type, and if for any reason this switch becomes overloaded, it will automatically open the line circuit. NOTE: There is a chart on the wiring diagram showing the proper thermal units to be used in this switch.

The stop key is located to the right of the main-line switch, and the start key on the right of the stop key. These keys perform the functions their names

imply.

The printing-position locating knob protrudes through the rear cover in line with the feed hopper. It is operated by first pulling it outward in order to unlock it and then turning it to the desired position. When the knob is turned to the right, it positions the card for printing between the "12" and "X" positions. By placing the knob to the left, it positions the cards for printing along the top position above the "12's." A positioning indicator is incorporated on the latest machines to indicate in what printing position the locating knob is in.

X-Eliminator

Each machine is equipped with a device to suppress the sensing of "X" and "12" impulses from fields that contain numerical information. This device is standard equipment, and consists of one twelve-position MCR, of which only ten positions are used.

Class Selectors

The machine can be equipped with one or two class selectors. Class selectors on this machine are not standard equipment.

Numerical information can be field or class selected by the use of class selectors.

Alphabetic information cannot be field selected, but the use of class selectors in conjunction with X-eliminators allows the selection or suppression of printing positions.

PLUGBOARD AND METHOD OF PLUGGING

The plugboard is a single-panel automatic plugboard. The plug-hubs are clearly marked, and by referring to Fig. 2, they can be readily understood.

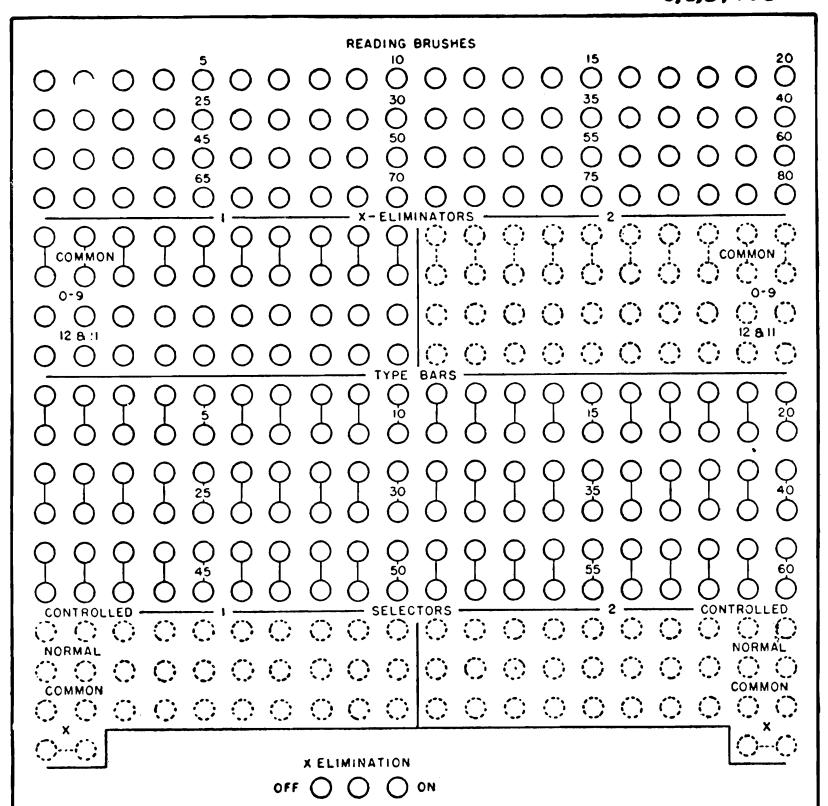
Interpreting Alphabetic or Numerical Data

Plug from the desired "Reading Brush" hubs to the desired "Type Bar" hubs. Interpreting Numerical Data and Eliminating on "X" Punching.

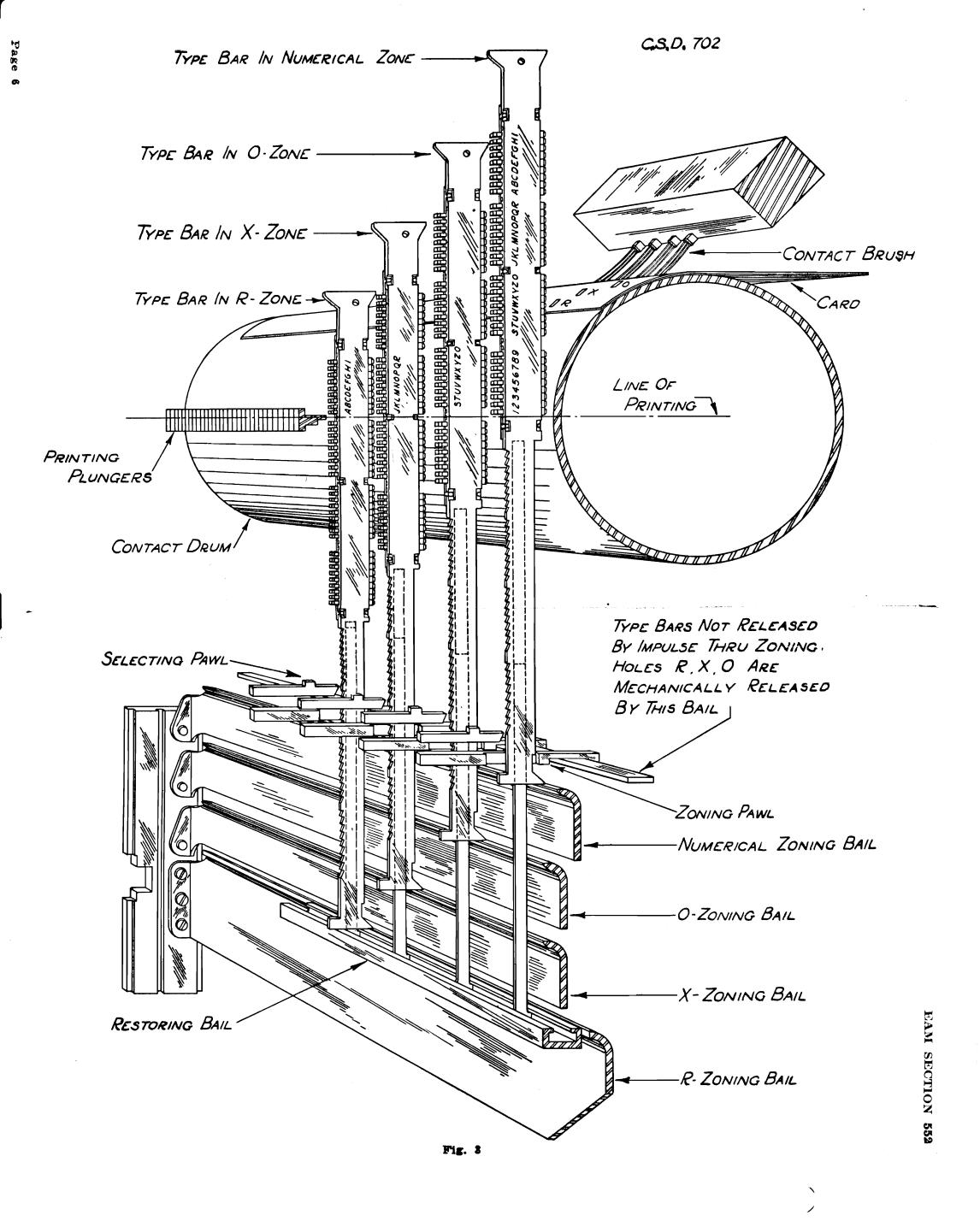
When it is desired to interpret numerical data, and the field contains "X" punchings, it is necessary to eliminate the "X" impulse in order to obtain the correct interpretation. The method of plugging is as follows: Plug from the desired "Reading Brush" hub to a "Common" hub of the "X-Eliminator." Plug from the corresponding "0-9" hub of the "X-Eliminator" to the desired "Type Bar" hub. Plug the "X-Elimination" switch "ON."

Class Selection of Alphabetic Data

Alphabetic fields in the card cannot be class selected, but type bars can be selected by means of the following plugging: Plug from the desired "Reading Brush" hubs to any desired "Common" hubs of the "X-Eliminator." Plug from corresponding hubs of the second row of "Common" hubs of the "X-Eliminator" to the desired "Common" hubs of the "Class Selector." Plug from the corresponding "12 and 11" hubs of the "X-Eliminator" to the desired "Type Bars" plug-hubs. Plug from the common corresponding "Type Bars" plug-hubs to the corresponding "Controlled" hubs of the "Class Selector." Plug from the corresponding "Normal" hubs of the "Class Selector" to the desired "Type Bars" plug-hubs. Plug from the "X" hub of the "Class Selector" to the desired "Reading Brushes" hub. Plug the "X-Elimination" switch "ON."



ALPHABETIC INTERPRETER (TYPE 552)



OPERATING PROCEDURE

Cards are placed in the feed face up with the "12" edge entering the throat first. After properly wiring the automatic plugboard and inserting it into its receptacle, and setting the printing-position locating knob to the desired position, the machine is ready to be operated. Place the main-line switch in its "ON" position and press the start key. The machine will continue to run unless stopped by one of the following methods: The automatic opening of the main-line circuit by means of the main-line switch, owing to an overload of aforementioned switch; depression of the stop key; feed magazine running out of cards; cards failing to feed; a jam in the machine; or the stacker filling to capacity. If the machine automatically stops, and a card jam exists, do not depress the start key as the jam might result in damage to the machine.

As the card pickers oscillate, they feed the bottom card from the feed through the throat to the first set of feed rolls. The card is carried forward by the first set of feed rolls to the second feed roll and the contact drum at a constant speed. When the card begins to receive its forward motion from the second upper feed roll and the contact drum, the speed of the forward movement decreases. As the card passes between the contact drum and the upper feed roll, it is also passing under the reading brushes. The reading brushes make contact through the zone holes—R, X, or O—and the zoning pawls are actuated by the print magnet unit. After the card reaches the O position, the card feed mechanism, with the exception of the picker knives and the first set of feed rolls, almost comes to a stop long enough for the magnet restoring bail to operate. The above is necessary in order to restore the print magnet armature on top of the drive rod lever after the zoning is completed. For exact movement of card, see the mechanical timing chart.

It should be mentioned at this time that when the card reaches the contact drum it passes under gripper fingers at each end of the drum. As the drum revolves, these gripper fingers hold the card securely to the drum until the card leaves the drum. This insures the card being held in the proper printing position.

After the print magnet unit is restored to normal, the speed of the card feeding increases, and the selecting pawls are set up by the print magnet unit which receives its impulses through the holes (1 to 9) in the cards.

The movement of the type bars and the card is synchronized, and all the type bars will be stopped in the printing position at the same time the card reaches its selected printing position. At this time the type bars and the card will remain in a stationary position until the printing operation is completed. After the printing is accomplished, the card resumes its forward movement and the type bars are restored to their normal position.

The printing is accomplished by means of individual plungers, which are cammed as a unit against the type tails.

At the completion of the printing, the card resumes its forward movement and is fed into the stacker.

Figure 3 is a schematic drawing showing the zoning of the type bars as a card passes through the zoning position.

OPERATION AND ADJUSTMENTS

Index

The index is located on the rear end of the printing cam shaft, and it is dowelled in place. It is divided into 30 points which are subdivided into twelfths. Each of the subdivisional points is equal to one degree, therefore one point is equal to twelve degrees. The index on the latest machines is divided into degrees.

Printing Cam Shaft

If the machine is disassembled for any reason, the first adjustment to be made is to time the printing cam shaft assembly. After this shaft is correctly timed, the remaining shafts may be timed in any desired sequence. The timing of this shaft establishes the correct index timing by which all other timing is set. The following method is employed to obtain the correct timing of the printing cam shaft (See Fig. 4):

Turn the machine over by hand until the printing cam follower on the print unit "A" just starts to ride on the high lobe of the printing cam "B." Insert a

C.S.D. 703

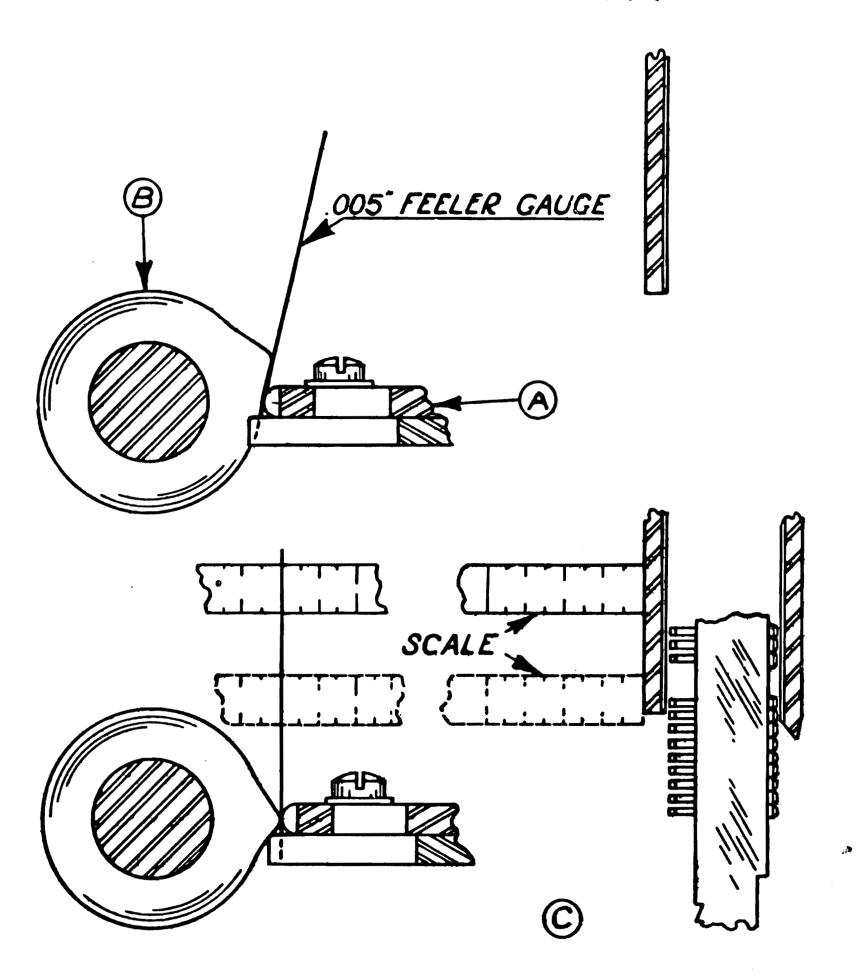


Fig. 4

.005" feeler gauge between te follower and the cam as shown in Fig. 4. Continue turning the machine over by hand until the feeler gauge assumes an absolute vertical position as shown at "C." Check this position by measuring from the feeler gauge to the print unit as illustrated. At this point the index should be at 210°.

Contact Drum Cam—Fig. 5.

With the index set at 60°, the contact drum cam "A" is pinned to the shaft

so the scribed line "B" will be against the contact drum cam roller "C" in line with the center line "D" of the operating rack assembly.

Note: Correct timing will cause the card to be advanced ¼ in. every 7½ degrees from 108 degrees to 168 degrees.

An incorrect adjustment of this cam will make it impossible to obtain the specified timing for the brush assembly in relation to the selection circuit breakers.

Cam Shaft Assembly

This shaft is located at the left end of the machine, and receives its motion from a vertical shaft driven by the horizontal drive shaft. The drive gear, on the rear end of the shaft, can be adjusted in relation to the shaft a portion of a tooth by means of the four screws on the gear. If it is necessary to move the shaft more than a portion of a tooth, it will then be necessary to remove the bearing caps and unmesh the drive gear and turn the shaft as required.

Reading from front to rear the cams are as follows:

1 and 10 Restoring Bail Cams. The purpose of these cams is to restore the type bars to their normal position.

2 and 9 Zone Carrier Cams. These cams control the type bar travel during selection time through control of the zoning bail carriage.

3 and 8 Magnet Unit Restoring Cams. These cams and the respective zone carrier cams are one piece. These cams restore the magnet unit to its normal setting after zoning and after selecting.

4 and 7 Restoring Bail Complementary Cams. These cams govern the travel of the print unit restoring bail on the down stroke.

5 Zone Bail Cam. This cam controls the zoning bails for their motion "in" (under the type bars) and "out" (clear of the type bars).

6 Pin Bail Operating Cam. This cam operates the pin bail, placing the drive rods in either the zoning or the selecting position.

The cam shaft is timed at the factory, but in case of removal, it will be necessary to re-time it to the machine as follows: Remove the head of the print unit. With the end type bar deposited on the numerical zone bail and the machine set at 100°, the type bar should have moved downward 3/32" when the machine is turned to 115 ½°. Fig. 6.

Note: The ball bearing housings of this shaft are similar in appearance, but they differ in construction. One contains a simple ball bearing with no thrust provision, while the other is designed to take care of the thrust of the cam shaft drive.

It is, therefore, important that these bearing housings be correctly replaced on the shaft after they have been removed. The thrust bearing housing is on the front end of the shaft, and the plain ball bearing housing is on the rear end of the shaft. In case these housings do not have identification marks, we advise you to mark them in order to be able to correctly identify them.

Magazine Front Plate

Printed in U.S.A.

Only the magazine front plate is adjustable, and it is adjusted for .008" to .010" clearance over the length of the card. This adjustment is obtained by means of adjustable bushings.

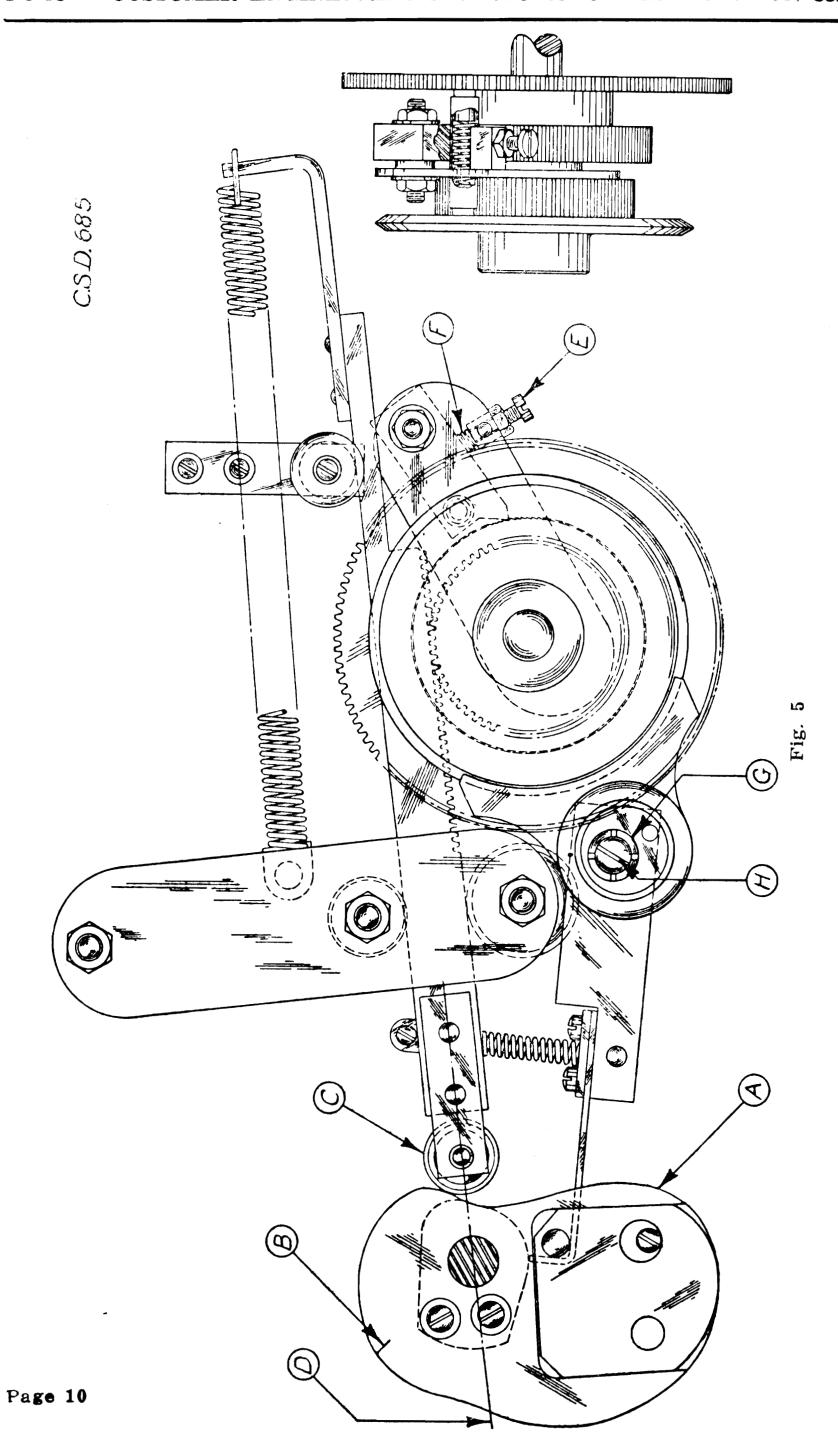
Card Feed Knife Assemblies Fig. 7

The card feed knives should be adjusted for a .004" to .0045" projection.

The card feed knife holders should be adjusted by means of the adjusting screws "A" so they feed the card in straight. Check to see that on the back stroke, the knives travel 1/32" beyond the edge of the card.

Card Feed Knife Crank Shaft Coupling-Fig. 7

The card feed knife crank shaft is a split shaft connected by means of a couplying "B" directly under the card feed bed. The purpose of this coupling is to properly time the feeding of the card. The timing is as follows: Set the printing locating knob to print in the upper position. Place a card in the feed and turn the machine over by hand until the top (leading) edge of the card is \%" below the center line of the contact drum "C." At this time, the machine index should be at 185°. To advance or retard the feeding of the card in order to obtain this correct timing, the coupling is adjusted by means of loosening the set screws "D" and turning the shaft accordingly.



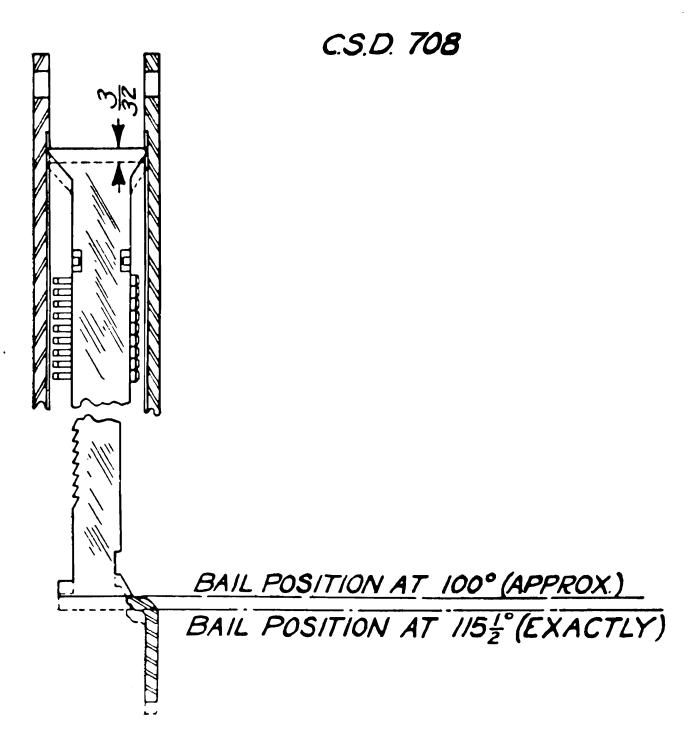


Fig 6

Throat Knife and Throat Block

The throat knife and the throat block adjustments are standard. They should be adjusted so an .008" and not a .010" thickness gauge will pass through the opening in the three standard ways.

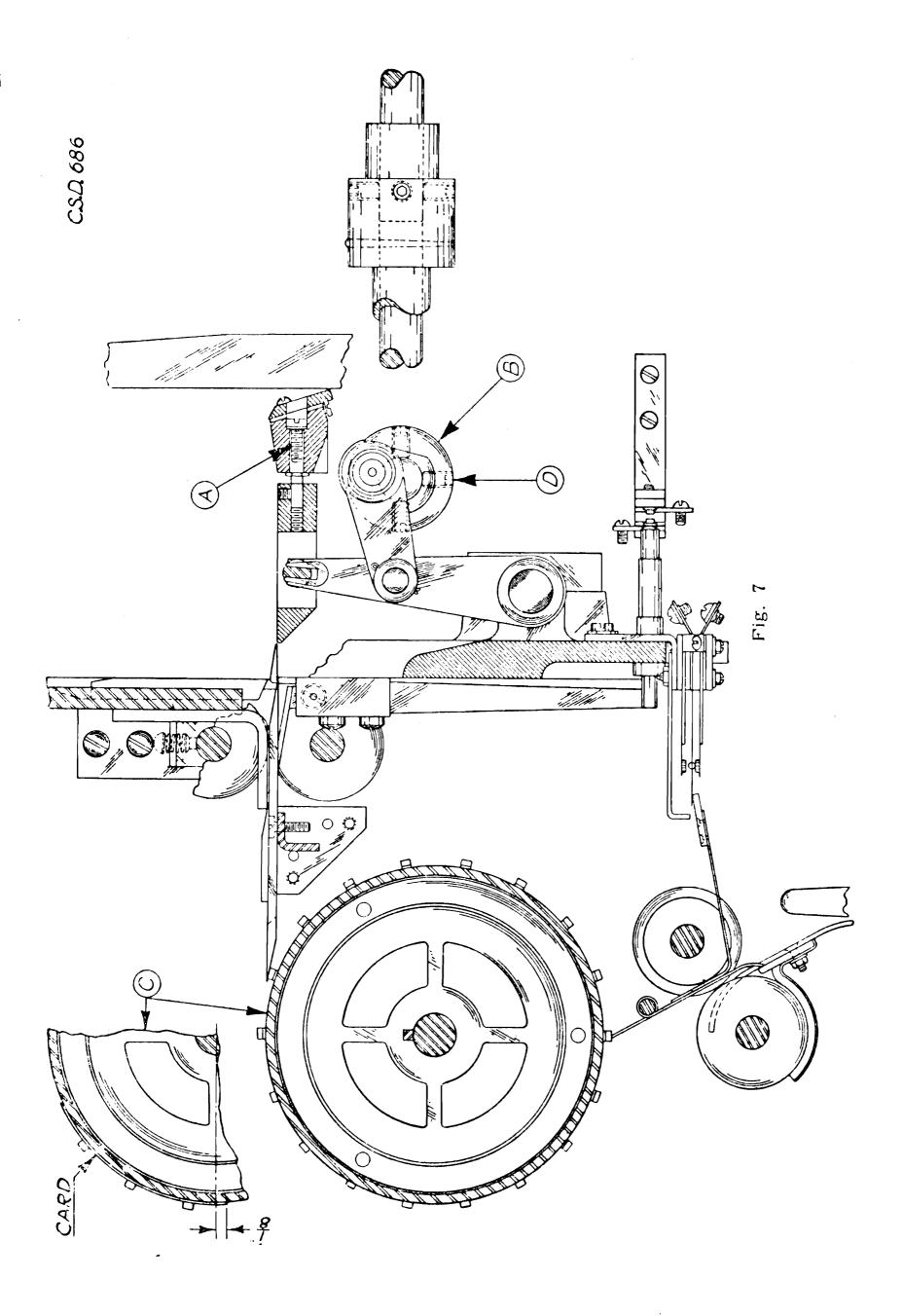
Card Guide

There are four card guides similar to the two upper card guides on a sorter. They are attached to the magazine back plate and are adjusted by bending. They are adjusted for a clearance of .012" to .020" between them and the lower guide plate.

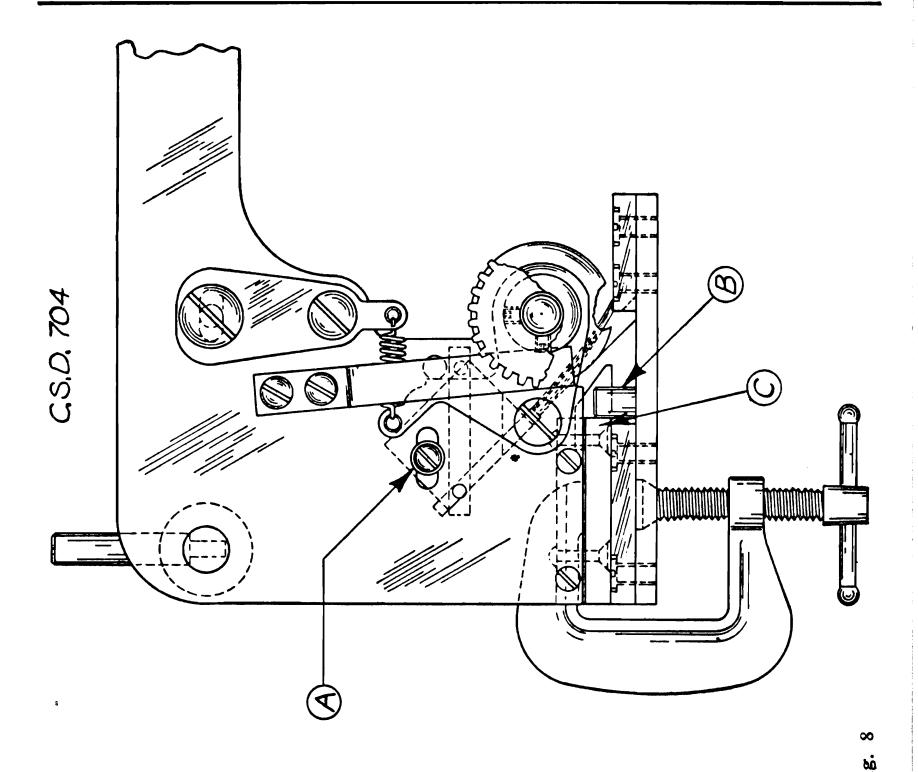
Brush Assembly—Fig. 8

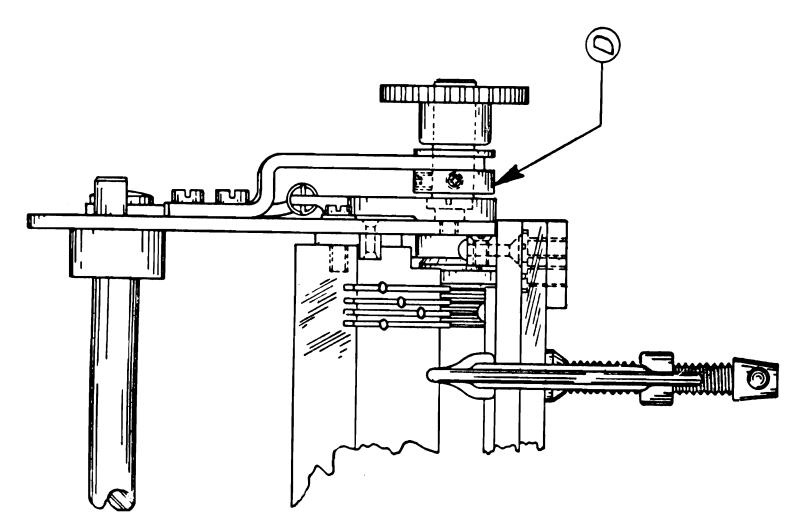
The brush assembly is composed of 80 three-group brushes, and it differs from other brush assemblies in that it is fitted with a grooved dilecto roll which acts as a brush guide and a feed roll.

The brushes are inserted in the holder until the end of the ferrule is flush with the edge of the holder. The holder is moved in the assembly until the clamping screws "A" are centrally located in the slots and then tighten the clamping screws. Install the card brush gauge (Part #178027) on the assembly as shown with the studs "B" firmly against the card plate "C." Pull the brushes back individually until one strand at the heel of each brush drops off the edge of the bar. Tighten the brush clamping screws. This procedure results in the correct brush projection of $\frac{1}{8}$ "









Printed in U. S. A.

Page 13

The brushes are aligned laterally to the holes in the cards by shimming the brush assembly holding brackets located on the side castings. The grooved dilecto roll is adjusted laterally by means of the brush roll locating collar "D" so the brushes are in the center of the grooves.

The brushes are timed to the holes in the card so they will make at least $1\frac{1}{2}$ ° before every selecting impulse, and break not earlier than $1\frac{1}{2}$ ° after each selecting impulse breaks. The make and break timing of the brushes should be checked for each selecting and zoning impulse. The correct timing is obtained by loosening the holder clamping screws "A," and moving the holder left or right in the assembly. Make sure that the clamping screws are tightened after the correct timing is obtained. See Electrical Timing Chart.

Contact Drum

The contact drum performs three functions; namely, the function of a feed roll, a contact roll and a platen. Owing to its size, it provides a large contact area for the brushes to make contact through the holes in the cards, and thereby decreasing the possibility of arcing.

It is essential to keep the contact roll absolutely free of all particles of dirt or other foreign matter, not only to insure good electrical contact, but also to insure clear printing impressions on the card.

There are eighteen card grippers on each end of the contact drum which hold the card in the proper printing position. These grippers are cammed out to receive the card, and spring tension holds them closed. Each gripper is fitted with an individual spring "A" Fig. 9, and the spring tension should be sufficient to hold the card securely against the drum. If only one gripper spring needs adjusting, it may be removed from the drum without removing the drum from the machine. If a number of springs are to be adjusted, it would expedite the operation to remove the drum from the machine.

Contact Drum Ratchet Pawl—Fig. 5.

The ratchet pawl back stop screw "E" should be adjusted so when it is released and moves in a counter clockwise direction, it will clear the ratchet gear by .008". This adjustment can be obtained by tightening the screw until the pawl just touches the ratchet, and then backing the screw out one-quarter turn. Check the entire circumference of the ratchet for clearance between it and the pawl. If for any reason the back stop screw is removed from the unit, be sure to replace spring "F" when replacing the screw.

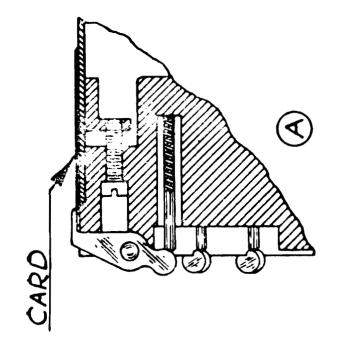
Contact Drum Brake—Fig. 5

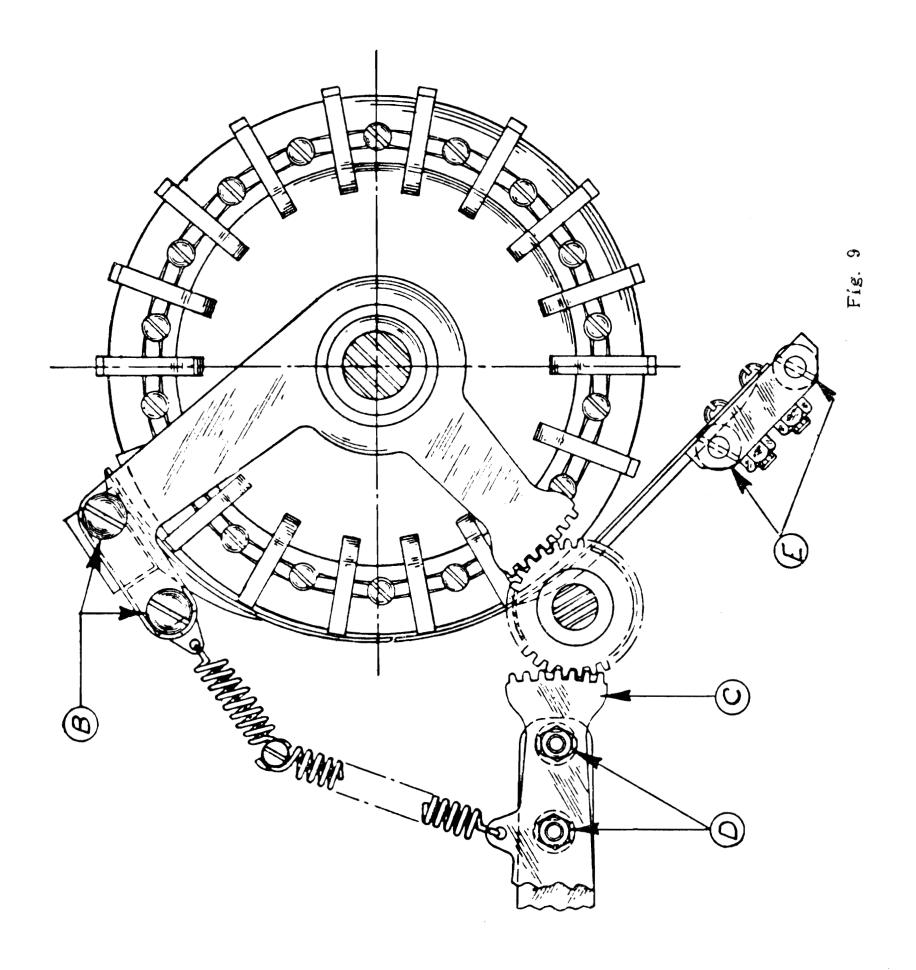
The purpose of the contact drum brake is to prevent overthrow of the contact drum so as to insure correct travel of the card into the printing position. The correct pressure is obtained by means of the eccentric bushing "G" which is locked by the retainer screw "H." The amount of brake tension will depend upon and vary with the speed of the machine. The brake should be adjusted for minimum tension so when it operates it will prevent overthrow of the drum, but still not too much tension to cause a twisting of the shaft.

Ribbon Shields—Fig. 9

The machine is equipped with two ribbon shields—an upper and a lower. These shields are located on the side of the contact drum towards the print unit. The purposes of these shields are to guide the card and to prevent the ribbon from smudging the card. The lower shield is stationary while the upper shield has an automatic movement which allows it to move out of the way of the type when printing, and to completely protect the card from the ribbon when not printing. The adjustments are as follows:

Upper Ribbon Shield—The clearance between the lower edge of the shield and the contact drum should be adjusted to a one-card thickness. The adjusting screws "B" are used to obtain this adjustment. Adjust the ribbon shield drive sector "C" by means of its screws "D" so when the shields are closed there will be a minimum clearance between the two shields. Check the opening of the shields at the printing position. This opening should not exceed 7/32" nor be under 3/16". When the shields are in a closed position, the edges should be even in order to prevent the cards from striking the edge of the lower shield.





Lower Ribbon Shield—The upper edge of the lower shield should be 3/32" below the center of the contact drum. The clearance between the upper edge of the shield and the contact drum should be a two-card thickness. The adjustment of the shield is controlled by the screws "E" which hold this assembly to the side frames.

Magnet Unit-Fig. 10

The magnet unit is a removable unit and is placed in the machine in a horizontal position. It is equipped with sixty magnet assemblies, which are arranged in four banks. It is also equipped with the necessary armatures, drive rods, levers and knockoff assemblies.

This same unit is used in setting up both the zoning pawls and the selecting pawls. After the magnets receive the zoning impulses; tripping their armatures and operating their drive rods, which in turn operate their respective zone pawls, the unit is then restored to normal in preparation to receiving the selecting impulses. The magnet unit drive rods are placed in the zoning position and then in the selecting position by the operation of the magnet unit rod guide or "pin bail." The adjustments are as follows:

The adjustments to be made with the unit off the machine are:

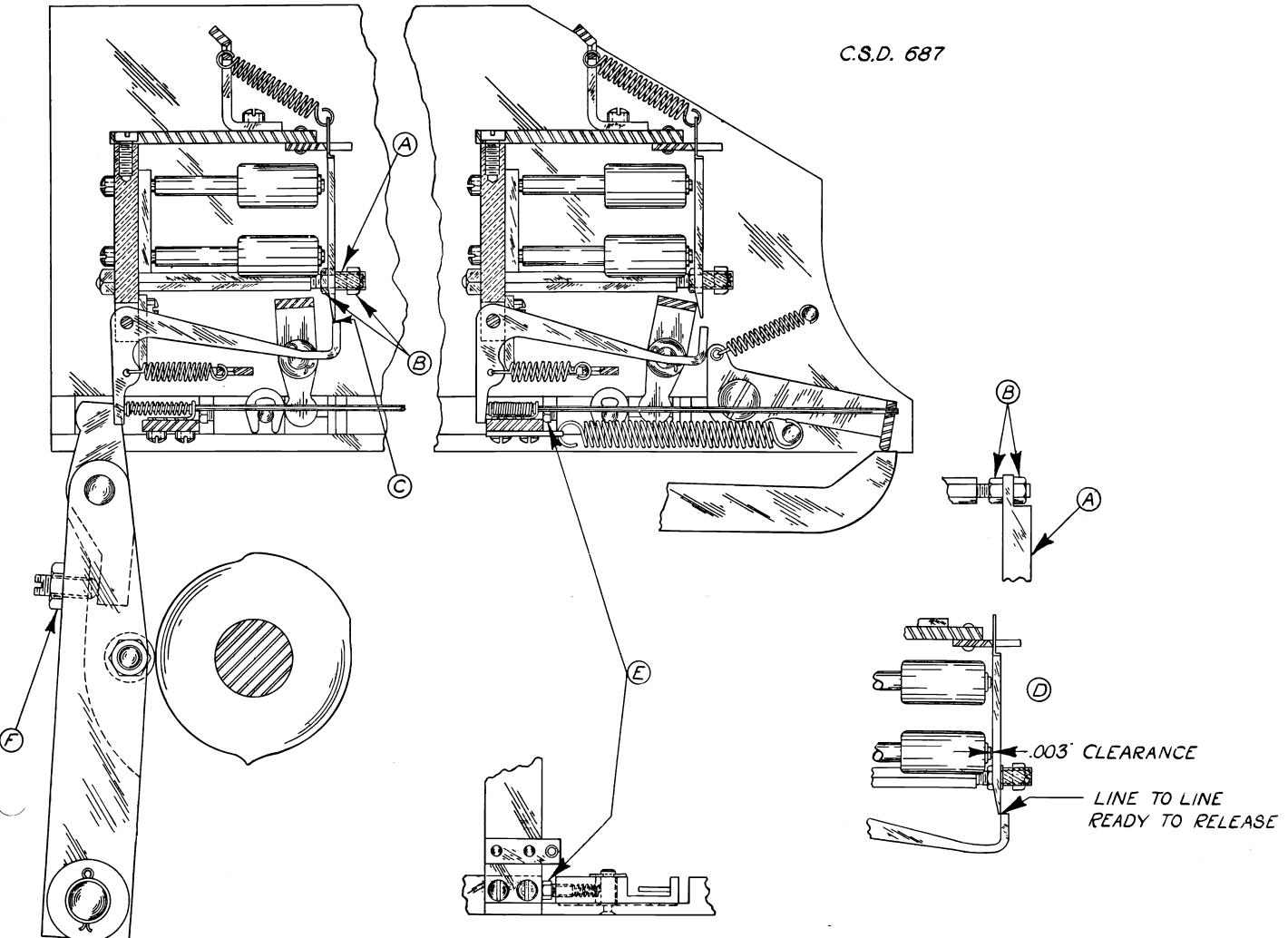
- 1. With the armature in its de-energized position, adjust the armature stop "A" by means of its adjusting nuts "B" so the inside face of the armature is in line with the edge of the drive rod lever as shown at "C." The armature stop should be adjusted to the two end armatures, and if the remaining armatures are not in correct adjustment, they will have to be adjusted by bending individually to the armature stop.
- 2. There should be a .015" clearance between the armature and the lower core when the armature is latched on its drive rod lever.
- 3. Check the armature to trip off the drive rod lever with a .003" and not a .005" gauge between the lower core and the armature "D."
- 4. Adjust the armature, by bending it, for a .002" clearance between the upper core and the armature when the armature is attracted and against the lower core.
- 5. Be sure to check the armature for freedom of movement after obtaining adjustments by bending.
- 6. Adjust the armature knockoff adjusting screw "E" until the armature knockoff bail returns the armatures fully against the armature stop when the restoring bar is in its extreme left position. Care should be exercised when making this adjustment to prevent the armature knockoff bail from bending the armatures.

After the above adjustments are made, the unit should be installed in the machine according to the following procedure:

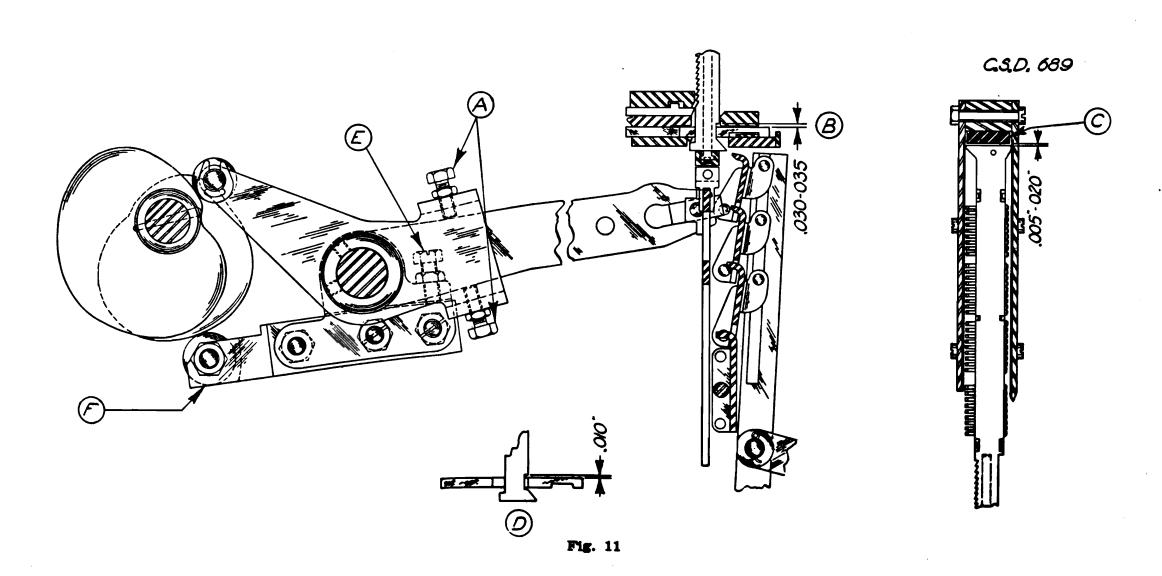
- 1. Remove the drive belt and drive pulley.
- 2. Set the machine to a point where the high lobe of the zone bail carrier cams are at the bottom and toward the right of the machine.
- 3. Insert the magnet unit, taking care not to spring the operating pin ball levers.
- 4. Raise the back end of the magnet unit and move the magnet unit restorer lever links into place.
- 5. Being careful not to spring the operating pin bail levers, slide the magnet unit into position and lock the unit in place with its locking pins.

After the unit is installed on the machine, the following adjustments are made:

- 1. Check for .015" .030" clearance between the magnet unit drive rods and the zoning and selecting pawls. If the clearance is not sufficient, remove the unit and lightly stone the ends of the rods.
- 2. Adjust the magnet unit restorer lever link screws "F" so when the levers are in the maximum restoring position, there will be a clearance of 3/64" between the armatures and the drive rod levers.



Printed in U. S. A.



Print Unit

The print unit consists of sixty type bar assemblies and their zoning and selecting pawls, and the hammer unit, which is termed the printing pressure bar assembly. The type bar is divided into four zones: namely, reading from top to bottom, "R" zone, "X" zone, "O" zone, and numerical zone. Special type may be inserted in the blank positions between the various zones in order to print special characters. This is an optional feature.

The printing pressure bar assembly is composed of a row of sixty individual plungers which operate against the type tails when the unit is cammed in against the type. These plungers are backed-up by a strip of rubber which absorbs the shock and holds the plungers in their extended position. This rubber strip should be held firmly in place, and if there is any clearance between it and the holding assembly, shims should be used to remove the clearance.

There is no provision on this unit to automatically print 0's if no hole appears in the card. Only card columns which contain punched information, and for which the machine is plugged to interpret, will be printed.

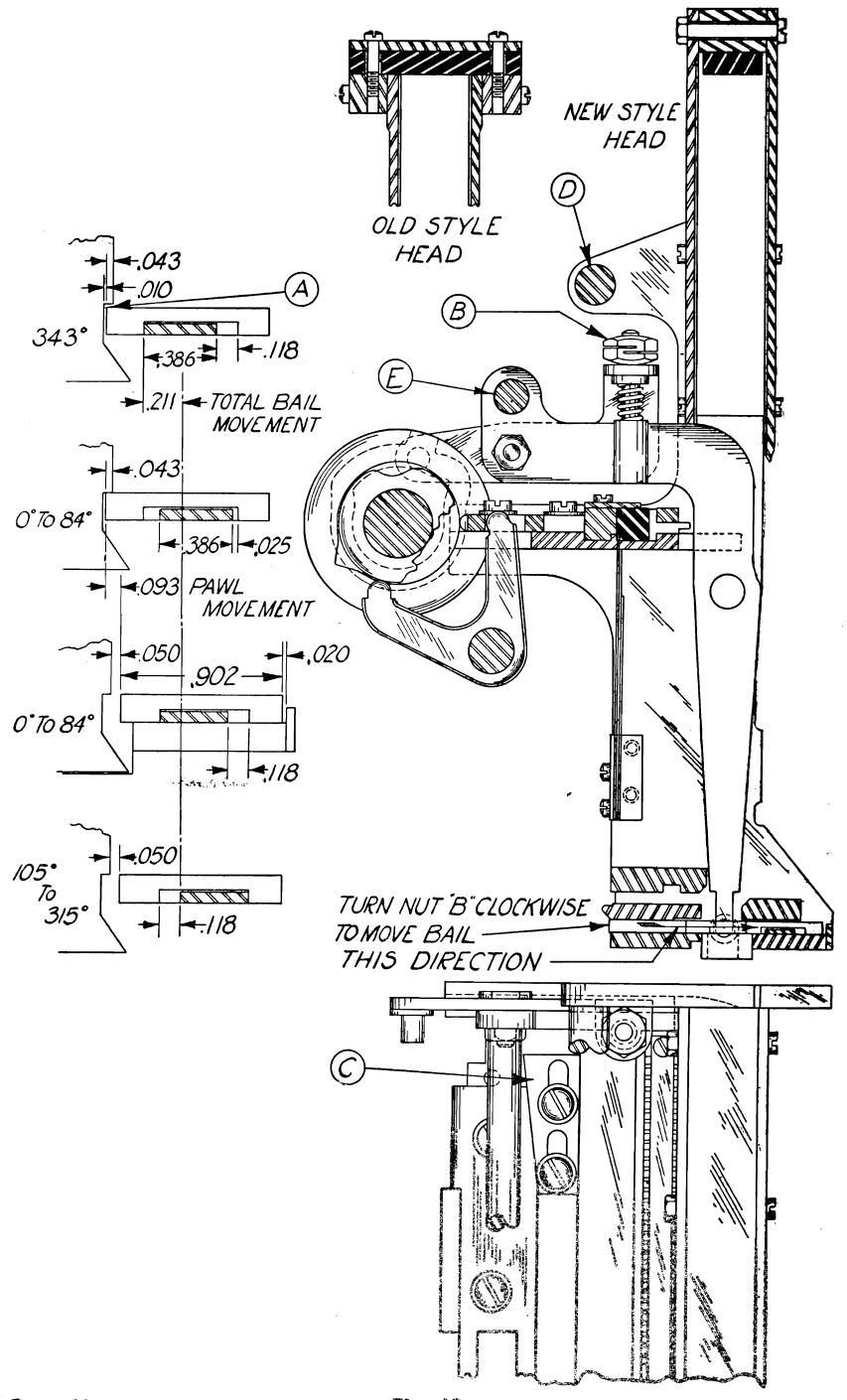
All of the adjustments of this unit are made with the unit on the machine. Before installing the unit check the type bars for freedom of movement, and check the friction springs for wear. The adjustments are as follows:

Fig. 11

- 1. Adjust screw "E" so the cam follower roller "F" will ride against the cam surface without binding.
- Set the machine at 336° and adjust the restoring bail cam levers by means of screws "A" for a .030" to .035" clearance between the zoning pawl and the top of the cut in the type bar as shown at "B." This clearance can be checked by removing the type bar guide cover plate and turning the machine over until the type bars are at their extreme upward limit of travel. At this time, the type bars must be pressed down against the restoring bail. Continue turning the machine over, and note the distance the type bars travel downward until they are stopped by means of their zoning pawls. A .030" to .035" downward movement will result in the correct clearance between the type bars and their zoning pawls. This adjustment will result in a .005" to .020" clearance between the type bar stop pad "C" and the top of the type bars when they are in their extreme upward travel. If this clearance is not correct, then the above adjustment will have to be re-checked. Check also for a clearance of at least .010" between the upper edge of the type bar latch recess and the upper edge of the zone pawl when they are at their intersecting position "D." This clearance can be observed through the hole in the front casting.
- 3. With the machine set at 343° there should be a .010" clearance between the type bar and the zone pawl as shown at "A" in Fig. 12. This clearance can be observed by looking through the hole in the side of the type unit. Adjusting nuts "B" are provided to obtain this adjustment. In order to obtain a .010" clearance back off these nuts until the zone pawl is against the type bar, and then turn the nut clockwise one complete revolution, as one revolution will result in a clearance of .010" Continue the cycle by hand, observing the movement of the bars until stopped by the zone bail. All the bars should move downward at the same time. This is an indication that both nuts are adjusted in proper relation to each other.

Fig. 13

- 4. Adjust the zoning bails so the type bars will overlap the zone bails 1/16", "A," when the type bars have been released and deposited on the zoning bails. This adjustment is obtained by means of zoning bail link "B."
- 5. With the type bar resting on the zero zone bail "C" and the machine is at 204°, adjust the zone unit locating bar screws "D" so the zero type bar tooth is in line with the selecting pawl. This adjustment results in the proper zero printing alignment. A card punched "0" and "8" in alternate columns should be run through the machine in order to check the proper alignment.
- 6. List lap adjustment. With the machine set at $115 \frac{1}{2}$ °, adjust the zoning carrier lever shaft eccentric "E" until the selecting pawl overlaps the second type bar tooth 1/64" as shown at "F."



Mg. 12

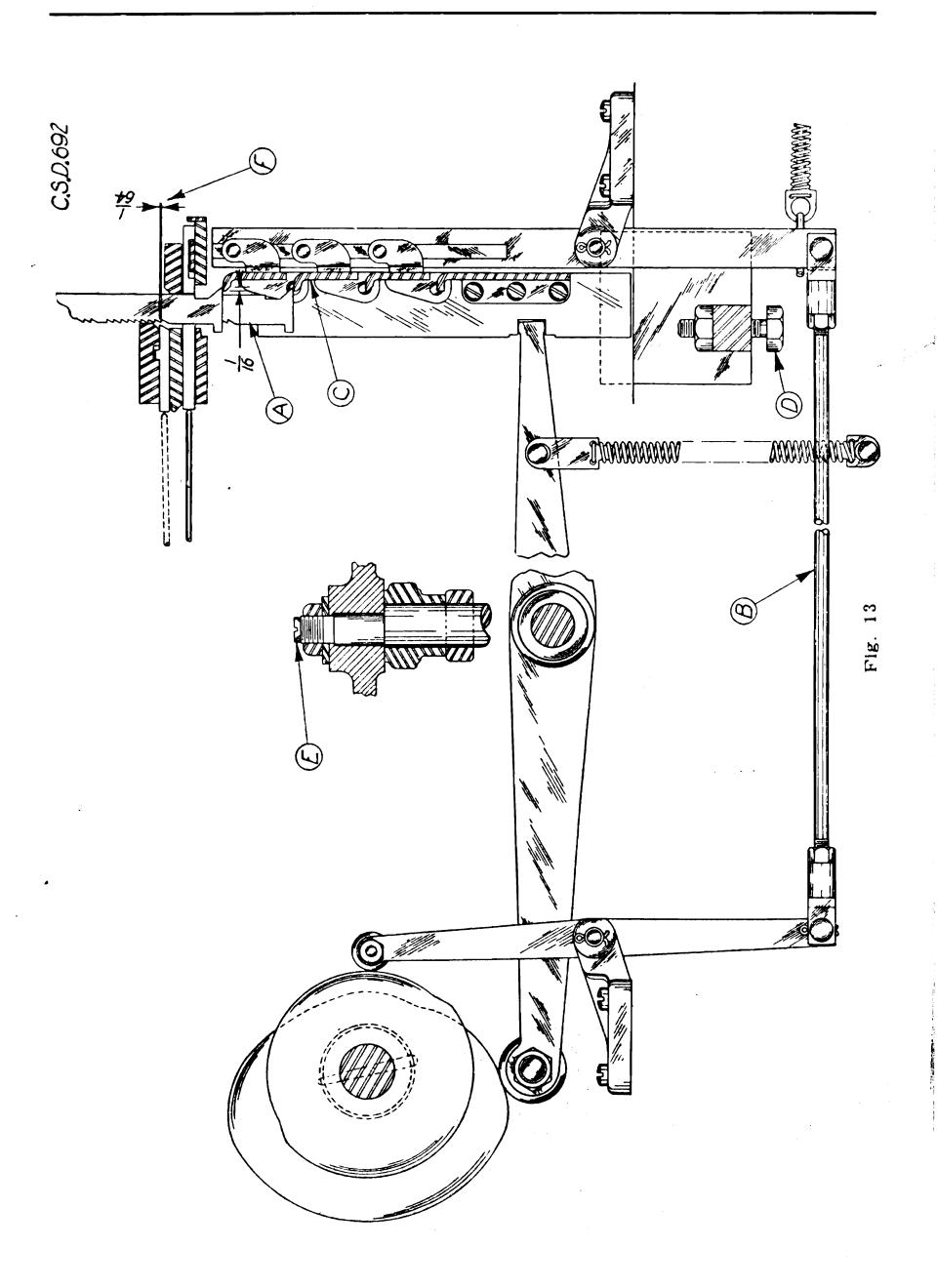


Fig. 12

7. The printing pressure bar assembly is adjusted by means of its two printing cam follower adjusting plates "C." Remove the ribbon and all cards from the machine. Turn the machine over by hand, tripping various magnet unit drive rods in order to stop the type bars in printing positions. Continue the machine cycle by hand until the high points of the printing cams are fully operating against the printing cam follower. At this time the type should be fully depressed, and there should be a clearance of 1/64" between the type face and the contact drum. This clearance can be observed by sighting through the side castings. After obtaining this adjustment, the ribbon should be replaced, and cards run through the machine, and the two cam follower adjusting plates advanced, in small amounts, to obtain clearness and even pressure without embossing the card.

Removal of the Printing Unit

To remove the printing unit proceed as follows.

- 1. Turn the machine by hand until the openings in the zoning pawl restoring lever cams are above the rollers of the cam followers.
 - 2. Remove the locating pins from the side frames.
- 3. Remove the restoring bail hinge rod from the bottom of the printing unit. This releases the friction slide carrier from the restoring bail.
- 4. Grasp the type bar frame spacer "D" and the zoning pawl locking rod "E," Fig. 12, in one hand when lifting the unit out of the machine so the type bars will be locked in their upper position. To replace the unit the reverse procedure should be followed. However, before the hinge rod can be installed, the machine must be turned until the restoring bail is in its highest position. This is approximately 336°. It is important that the hinge rod is centrally located in relation to the sides of the unit so it clears the side frames.

Ribbon Feed Mechanism

The ribbon feed mechanism is located on the front of the machine, left of the feed. It is a mechanical device which feeds the ribbon one space each machine cycle, and reverses the direction of travel when the ribbon reaches its limit in any one direction. The upper and lower ribbon feed ratches are equipped with hand knobs which permit winding the ribbons on the spools manually.

To install a ribbon it is necessary to remove the printing unit. The ends of the ribbon are equipped with locking bars which fit into the lock bar cut on the ribbon spools. The lock bars are held in place by means of the ribbon retainer rings. One end of the lock bar is inserted under the retainer ring and pushed in until the other end of the lock bar can be inserted under the ring at the other end of the spool. The lock bar is then centered between the ends of the spool.

Care should be exercised in manually winding the ribbons on their spools so as not to tear them. When one end of the ribbon is unfastened from the spool, the machine should not be turned over as it will jam the spacing mechanism and damage the ribbon feed operating arms.

There are no adjustments on this mechanism, but all parts should be checked for freedom of movement and proper functioning.

Stacker

The stacker assembly is located directly under the feed. The machine is equipped with a card lever contact which, when closed, completes a circuit keeping the machine running until the last card feeds into the stacker. The stacker is equipped with a contact which when opened by virtue of the stacker being filled to capacity, causes the machine to stop.

There are no adjustments on this assembly. The various working parts should be checked for freedom of operation and proper functioning.

CIRCUIT BREAKER AND COMMUTATOR UNIT

This unit is located on the left rear end of the machine, and is composed of four circuit breaker assemblies and seven commutator assemblies, all mounted on a vertical shaft. The shaft is driven from the horizontal drive shaft by means of worm gears.

The circuit breakers are located at the top end of the shaft and are numbered from top to bottom. The commutators are lower down on the shaft, and they

4-8-38

too are counted from top to bottom. The first and second commutator positions will not have any commutator contact straps unless the machine is equipped with class selectors.

The purposes of these circuit breakers and commutators are as follows:

- CB-1—Card Lever Holding Cam. This circuit breaker, in conjunction with the points of R-2 relay, provides a holding circuit for R-2 relay to complete reading of last card.
- CB-2—Zoning Make Cam. This circuit breaker, working in conjunction with CB-3 and various other contacts in the circuit, controls the completion of the zone selection circuit.
- CB-3—Zoning Break Cam. This circuit breaker controls the duration of the zone selection circuit by opening the circuit at a definite time.
- CB-4—Selection Circuit Control Cam. This circuit breaker controls the selection impulses, preventing CB-5 and CB-6 functioning electrically until the zoning operations are completed. It also allows the selection impulses 1 to 9 being received by the print magnets through CB-5 and CB-6.
- C-1—Class Selection Holding Commutator. This commutator provides a holding circuit for the class selector.
- C-2—Class Selection Pick-up Commutator. This commutator controls the completion of the class selection pick-up circuit.
- NOTE: Class Selection is an optional feature on this machine, and the above two commutator assemblies will not be complete unless the machine is equipped for class selecting.
- C-3—"X" Eliminator Commutator—This commutator controls the pick-up and holding circuit of the X-Eliminator.
- C-4—Card Jam Contact (L) Shunt Commutator, and C-5—Card Jam Auxiliary Gam Commutator—These commutators shunt the circuit for Relays 1, 5, and 6 around the lower points of the card jam contact. They are in parallel to provide easy adjustment of the duration of the circuit. (C5 is used as a "make", C4 as a "break" cam.)
- C-6—Card Lever Pick-up Commutator—This commutator establishes a definite timing for the completion of the R-2 relay pick-up circuit, to prevent tripping of magnets before the first card reaches the reading position.
- C-7—Card Jam Contact (U) Shunt Commutator—This commutator shunts the circuit for relays 1, 5 and 6 around the upper points of the card jam contact.

Adjustments

The circuit breakers are adjusted for an air gap of .015" to .025" when the operating arm is on the high dwell of the cam. The points should contact over their entire surface when made.

On the commutator assemblies, the contact straps are adjustable, and should be adjusted for the proper duration of contact. The commutator is shifted on the shaft in order to time it for the correct making point.

Consult the electrical timing chart for the proper timing.

SELECTION CIRCUIT BREAKERS

These two circuit breaker assemblies are of the automobile type circuit breaker. They are located on the rear of the machine near the commutator unit. Their operating cams are fastened to the horizontal shaft, and are adjustable on the shaft to permit timing the breakers.

These circuit breakers, which are numbered CB-5 and CB-6, provide a definite make and break timing for the selection impulses.

Adjustments

- 1. When on the high point of the cam, the air gap should be .015" to .025", preferably .020". The points should contact over their entire surface when made.
- 2. The cams are movable on the shaft and should be properly timed in accordance with the timing chart. In order to facilitate the timing of these circuit breakers, the section of the timing chart allotted to these breakers is divided into degrees.
- 3. The spring tension on the operating contact arm should be 15 to 16 ounces. It is imperative that this tension be correct, as it will prevent excessive wear of the fiber cam follower.
 - 4. Check the operating arm for free movement on its pivot.

Printed in U. S. A. Page 23

CARD LEVER, CARD JAM, AND STACKER CONTACTS

The location, purpose, and adjustment of these contacts are as follows:

Card Lever Contact—This contact is located under the feed magazine. It is actuated by a plunger which receives its motion from a card lever, which in turn is operated by the card as it emerges from between the first set of feed rolls.

The purpose of this contact is to control the energizing of Relay No. 2, preventing this relay from being energized when no cards are feeding.

This contact should be adjusted for a 1/16" air gap, when open, and when closed the operating strap should move the right strap 1/32" off its brass support. The card lever assembly should be adjusted by bending, so when it is fully operated by a card, its lower end will not strike the casting. When no cards are operating the lever, the plunger should be against the operating strap.

Card Jam Contact—This contact is located to the left of the card lever contact. It is operated by a card lever which is actuated by the cards as they pass through the lower ejector rolls into the stacker.

The purpose of this contact is to control, in conjunction with its shunt commutators, the circuit to the motor relays, opening this circuit in case of a card jam, and consequently causing the machine to stop.

It is very essential that the contact assembly be adjusted so the contacts make and break in accordance with the timing on the electrical timing chart. The air gap between the points, when the points are open, should be .020" to .025". When the lower contact points are open, the lower strap should have a .015" rise off its brass support. The card jam contact lever stop should be adjusted for a slight clearance between the stop and the insulator on the center strap when the card jam lever is fully operated by a card.

Stacker Contact—This contact is located below the stacker, and it is operated by the card stacker when the stacker fills to capacity.

The purpose of this contact is to open the motor relays circuit when the stacker fills to capacity, and thereby stopping the machine.

When the contact is made, there should be sufficient tension on the operating strap to raise the other strap 1/64" off its brass support. The contact should be adjusted to break when the stacker fills to its capacity, which is approximately 900 cards.

RELAYS

Mounted on relay panels in the front and rear cabinets are the necessary operating relays. The heavy duty G.E. motor relays are located in the front cabinet, and the duo and multi-contact relays are located in the rear cabinet. Class selection and additional X-elimination relays are also located in the rear cabinet. The positions of the relays in the rear cabinet are illustrated on the wiring diagram incorporated in the write-up.

The part numbers of the relays and the type of relays are as follows:

Type of Points

		Lookii	ng at Arn	nature End
				Relay No.
Part No.	\mathbf{A}	${f B}$	${f C}$	Duo Relays
111288			\mathbf{M}	1
117378			${f M}$	2
26477	${f M}$	\mathbf{M}		3 and 4 Class Selector (Optional)
				G. E. Relays
39720				Motor Relays 5 and 6
				Multi-Contact Relays
123791				X-Eliminator and Class Selector
				(Optional)

Adjustments

The following adjustments apply to all relays:

- 1. All relay armatures should be free.
- 2. Armature and armature retainer clearance should be .002" to .003".
- 3. All points should be clean and line up.
- 4. Upper contact spring stop should be adjusted to just touch the upper contact strap with slight tension when the armature is energized.

The following adjustments apply to relays as listed.

Reicy 26477

- 1. Armature and core gap when de-energized .015".
- 2. There should be a .015" air gap between the contact points.
- 3. The upper contact strap should have a .010" rise off its support when the armature is attracted.

Relay 111288

- 1. Armature and core air gap when de-energized .020".
- 2. Air gap between the contact points should be .020".
- 3. The upper contact strap should have a .015"—.020" rise off its support when the armature is attracted.

Relay 117378

Same as relay 111288.

MC Relay 123791

- 1. Armature and core air gap when de-energized .030".
- 2. Adjust make contact for .020" air gap when de-energized.
- 3. Break contact to have a .010" lift off its support when de-energized.
- 4. Make contact to have a .010" to .015" lift off its support when energized.
- 5. Break contact to have sufficient air gap when energized.

Purpose of Relay Contacts

R-1—These points when normally open prevent energizing the motor relays, with the consequent starting of the machine, by any means other than the depression of the start key.

R-2—These points when normally open prevent the completion of the zoning and selection circuits when no cards are feeding into the machine.

X-Elimination MCR—This relay is used in controlling the impulses to the print magnets when it is desired to eliminate either "12" or "X" impulses. The normally closed points permit the completion of the "12" and "X" circuits to the print magnets, and the normally open points when closed permit the completion of the 0 to 9 circuits to the print magnets.

CIRCUITS

1. Generator Motor Circuit. When the main line switch, which is of the sentinel circuit breaker type, is placed in its "ON" position it completes a circuit to the generator motor. The circuit is as follows: One side of the main line, thermal unit side of the circuit breaker switch, plug contact, generator motor, plug contact to the other side of the circuit breaker and out the other side of the line.

The generator motor is coupled to the generator, and when the generator is operating at its efficient output, the red signal light will glow. The circuit for this light is directly across the line from post 6 to post 1. The start key should not be depressed until the signal light glows.

2. Generator Circuits. The generator circuits will be as follows: 10 amp. fuse, plug contact, terminal line connection "L", series field, armature, armature connection "A," plug terminal to 10 amp. fuse. At the same time, a parallel circuit is completed through the shunt field of the generator: 10 amp. fuse, plug contact terminal line connection "L," shunt field, field connection "F," external variable resistor, contact terminal "A" to 10 amp. fuse.

NOTE: The external variable resistor is used to control the output of the generator.

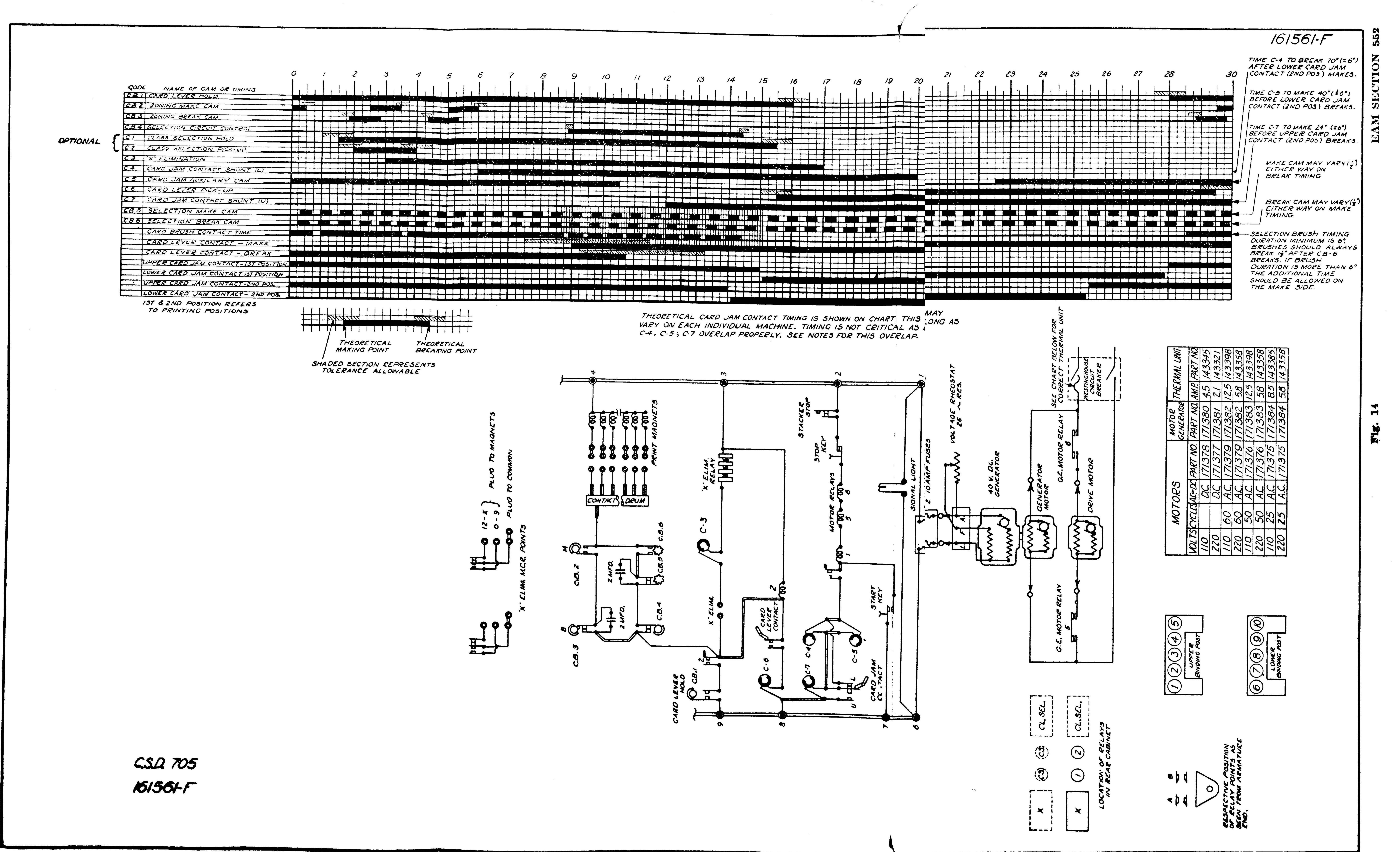
- 3. Start Key Circuit. After the generator motor has driven the generator for approximately half a minute, the output of the generator will be sufficient to operate the machine. This will be indicated by a red signal light on the latest machines. When the start key is depressed the following circuit will be completed: Post No. 7, start key, coils of R-1, coils of the motor relays 5 and 6, stop key, stacker stop contact to post No. 2.
- 4. Drive Motor Circuit. Energizing the motor relays 5 and 6 and the consequent closing of their contact points, will complete a circuit to the drive motor as follows: One side of the main line circuit breaker switch, points of motor relay No. 5, plug contact, drive motor, plug contact, points of motor relay No. 6 to the

thermal unit side of the circuit breaker switch. The drive motor will continue to run as long as relays 5 and 6 are energized.

- 5. R-1, R-5, and R-6 Holding Circuit. These relays will be held energized through circuits under control of C-4, C-5, C-7, and the card jam contact. These circuits, however, can be opened at any time through the operation of the stop key or the stacker stop. When first starting the machine after placing cards in the feed magazine, it will be necessary to hold the start key depressed until the third machine cycle in order to permit the first card to reach the card jam contact position. As this machine is not equipped with any means of stopping at a definite point on the index, we will assume for purposes of explanation that it is stopped at "0." The depression of the start key will then cause the machine to go into a machine cycle and the holding circuits for the above relays will be as follows:
- (A) After the machine cycle has advanced C-4 and C-7 to their making points, the circuit will be from post No. 8, C-7, C-4, contact points and coil of R-1, coils of R-5 and R-6, stop key, stacker stop to post No. 2.
- (B) When C-4 breaks and before the card jam lever operates, the circuit will then be as follows: Post No. 8, C-7, lower points of the card jam contact, contact points and coil of R-1, coils of R-5 and R-6, stop key, stacker stop to post No. 2. A parallel circuit thru C-5 will also be established shunting around the card jam contact lower when C-5 makes.

When cards reach the card jam contact lever station operating the lever and opening the lower contact points and closing the upper points, the holding circuits will be as follows:

- (C) When the upper points of the card jam contact makes before C-7 breaks, the following circuit will be established: Post No. 8, upper points of the card jam contact, C-5, contact points and coil of R-1, coils of R-5 and R-6, stop key, stacker stop to post No. 2. After C-5 breaks and before C-7 makes, the circuit will then be held through C-4 and the upper card jam contacts. When C-4 breaks then the circuit will be held through C-7 and the lower points of the card jam contact until C-5 makes. Before C-7 breaks, the upper points of the card jam contact makes and then the circuit is identical to the circuit described above
- 6. R-2 Pick-up Circuit. After the card lever contact is closed by means of the card passing through the first set of feed rolls, C-6 makes completing the pick-up circuit as follows: Post No. 8, C-6, card lever contact, coil of R-2 to post No. 3.
- 7. R-2 Holding Circuit. After C-6 breaks, R-2 will hold up through its own contact points and CB-1 as follows: Post No. 9, CB-1, points and coil of R-2 to Post No. 3. This relay will be continuously held up through circuits 6 and 7 as long as cards are feeding.
- 8. Zoning Circuits. These circuits are under control of CB-2 and CB-3, and are completed only while cards are feeding. The circuit is as follows: Post No. 9, CB-1, points of R-2, CB-3 and CB-2, common brush, contact drum, holes in the card, reading brushes, plughubs, plug wires to the desired print magnet plughubs, coils of print magnets to post No. 4.
- 9. Selection Circuits. These circuits are under control of CB-4, CB-5, and CB-6, and are completed only when cards are feeding. The circuit is as follows: Post No. 9, CB-1, contact points of R-2, CB-4, CB-5 and CB-6, common brush, contact drum, holes in the card, reading brushes, plughubs, plug wires to the desired print magnet plughubs, print magnets to post No. 4.
- 10. "X"-Eliminator MCR Circuit. When using this relay in connection with suppressing the sensing of "X" and "12" impulses, and also in connection with the use of class selectors. The circuit is as follows: Post No. 9, CB-1, points of R-2, "X Elimination" hubs plugged "ON," C-3, "X"-eliminator MCR to post No. 3. This relay remains energized as long as C-3 is made.
- 11. "X"-Elimination Circuit. When it is desirous to eliminate "X" and "12" impulses when only 0 to 9 interpretation of certain fields is wanted, the following circuit is completed: Post No. 9, CB-1, points of R-2, CB-4, CB-5, CB-6, common brush, contact drum, hole in card, reading brush, plughub, plug wire to common plughub of X-eliminator, normally open contact points, 0-9 plughub of X-eliminator, plug wire to desired print magnet plughub, print magnet to post No. 4.



DARA S

