BELL SYSTEM PRACTICES
Teletypewriter and Manual Telegraph Station and P.B.X. Installation and Maintenance

SECTION P35.633
Issue 2, August, 1950
AT&T Co Standard

REPERFORATOR-TRANSMITTER UNITS 14F AND 14G REQUIREMENTS AND PROCEDURES

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1. GENERAL

1.01 This section contains the apparatus requirements and adjusting procedures for the maintenance of the 14F and 14G reperforator transmitter units.

1.02 This section is reissued to incorporate new developments, revised arrangements of paragraphs and figures and improved adjustments and replaces the adjusting information in P98.036 and P98.038. The changes are too numerous and extensive to allow the use of margin indicating arrows.

1.03 All adjustments apply to both 14F and 14G units except where otherwise specified. The 14F reperforator transmitter differs from the 14G only in that it is equipped with control contacts operated by special pull bars.

1.04 **Selecting a Character or Function:** When the instructions for making an adjustment specify the setting up of a certain character or function, the following method should be followed: Rotate the motor fan counterclockwise, as viewed from the fan, until the selector armature locking lever is about to drop off the long high part of the locking cam. Hold or release the selector armature to move the selector-arm extension to the operated (MARKING) or unoperated (SPACING) side in accordance with the first selecting impulse of the code combination to be set up. With the selector arm in this position, rotate the motor fan until the top (No. 1) selector sword has been positioned and the locking lever is on the peak of the locking cam. Position the selector arm in accordance with the second impulse of the code combination to be set up and repeat the procedure followed in positioning the top (No. 1) selector sword. Position all of the selector swords following the foregoing procedure. When all swords have been positioned and the main shaft clutch has been engaged, further rotation of the motor fan will cause the unit to select the character to perform the functions which have been set up.

1.05 **To Move the Motor Unit:** To facilitate some adjustments, the motor unit should be moved in the following manner: Remove the gear guard. Remove the right-hand and the rear left-hand motor unit base plate mounting screws, loosen the left-hand front mounting screw, and swing the motor unit to the left.

Note: After all adjustments have been completed which are facilitated by moving the motor, the motor should be swung back into position and the gear guard replaced.

1.06 Special tools and gauges for the reperforator transmitter will be required as follows:

505A Contact Spring Adjusting Tool 507A Contact Spring Adjusting Tool 68B or 70D Gram Gauge	For bending and gauging the sensing contact springs.
TP121550 Bending Tool	For bending the distributor contact springs.
TP103534 Bending Tool	For twisting the vertical link bracket.
TP99391 Gauge	For gauging pull bar contacts on 14F Units.

2. REQUIREMENTS AND PROCEDURES

2.01 **Selector cams** should line up with their respective selector levers.

(a) Gauge by eye while selector cam is rotated through at least one revolution.

(b) To adjust, loosen the upper and lower main shaft bearing cap mounting screws and raise or lower the shaft. Tighten the upper bearing cap mounting screws and position the bearing retainer on the lower bearing cap so that the bridge of the retainer rests against the upper face of the ball bearing, and clears the lower bearing cap. Tighten the lower bearing cap mounting screws.

2.02 **Main-Shaft Clutch Throw-Out Lever:** There should be Min. .010", Max. .020" clearance between the clutch teeth when the clutch driven member is fully cammed out of engagement. **Fig. 1**

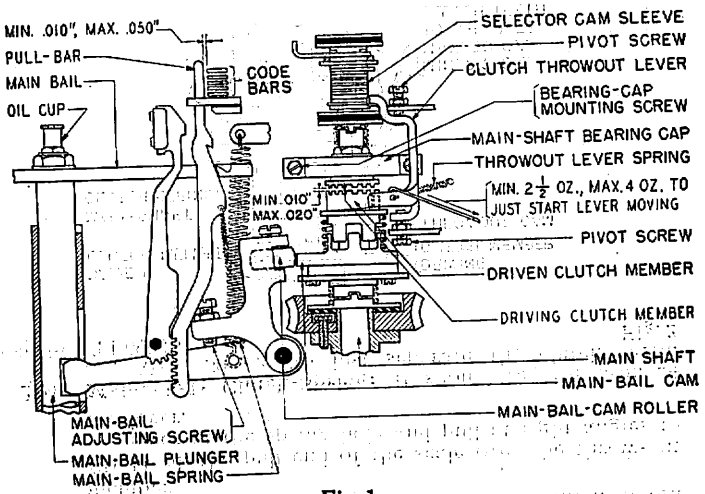

Fig. 1

(a) Adjust the clutch throw-out-lever pivot screws to meet the above requirement. The throw-out lever should be free on its bearings without perceptible end play when the pivot-screw lock-nuts are tightened.

2.03 **Main-Shaft Clutch Throw-Out-Lever Spring:** It should require Min. 2-½ oz., Max. 4 oz. to start the throw-out-lever moving. **Fig. 1**

(a) To gauge:

(1) Position the main shaft so that the throw-out lever is resting against the low part of the clutch driven member.

(2) Hook the pull end of the scale over the throw-out lever at the spring hole and pull at right angles to the lever.

2.04 **Main-Shaft Clutch-Spring:** It should require Min. 24 oz., Max. 30 oz., to just separate the clutch teeth. (Spring TP6993.) **Fig. 2**

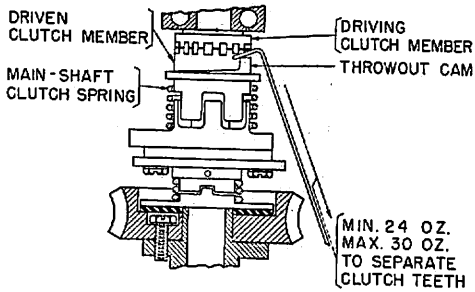

Fig. 2

(a) To gauge:

(1) Turn the main-shaft until the throw-out lever is resting against the low part of the clutch driven member.

(2) With the base plate removed, insert the pull end of the scale through the cable hole in the base and hook it over the throw-out cam on the driven clutch member and pull as shown in Fig. 2. Replace the base plate. **Fig. 2**

2.05 **Motor Position and Gear Mesh:**

(a) With the motor base plate eccentric stop approximately in the center of its adjustment and the base plate resting against the stop, a horizontal center line through the

main shaft gear should coincide approximately with a horizontal line through the center of the pinion.

(1) To adjust, add or remove shims between the motor feet and the base plate using the same number of shims under each motor foot. Shims not used should be retained beneath their respective mounting screw lock washers to prevent the screws from protruding beneath the base plate.

(b) There should be a barely perceptible amount of backlash between the motor pinion and the main shaft gear throughout one complete revolution of the gear.

(1) To adjust, loosen the motor mounting screws and align the motor on the base plate.

Note: The gear play may be refined by pivoting the motor base plate about the left-hand screw and adjusting the eccentric stop.

2.06 **Manual Tape-Out Mechanism:** The round tip of the clutch-release lever should be approximately midway between the trip latch plunger and the bracket. The clutch release lever should not limit the upper range movement of the indicator arm on the range finder scale. **Fig. 3**

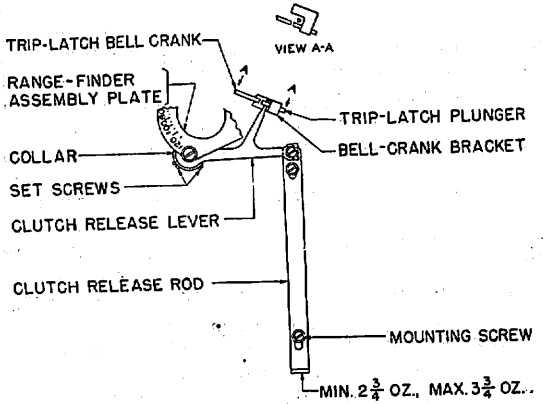

Fig. 3

(a) To adjust, loosen the screws in the collar under the clutch release lever and raise or lower the lever by means of the collar. Tighten the screws.

2.07 **Clutch release-rod** should slide freely on its mounting screws. **Fig. 3**

(a) Gauge by eye and feel.

(b) To adjust, loosen the lock-nut on the front mounting screw and raise the screw. Tighten the lock-nut.

2.08 **Clutch Release Rod Spring:** It should require Min. 2-3/4 oz., Max. 3-3/4 oz. to start the rod moving. **Fig. 3**

(a) Gauge by applying the push end of the scale to the end of the clutch release rod, parallel to it.

2.09 **Pull-Bars Supported by Function-Bar Spring Brackets.**

Note: In order to follow the procedure in this paragraph and 2.10 it will be necessary to remove the type basket as follows:

(1) Remove the pull-bar mounting plate assembly (Type "14F" only).

(2) Unhook the code bar locking lever spring. Set unit on its back supports and remove the base plate.

(3) Remove the three code-punch bracket mounting screws.

(4) Remove the sensing and distributor clutch detent lever bracket assembly by removing its two mounting screws.

(5) Remove the three type basket assembly mounting screws.

(6) Unhook the punch bail arm spring located behind the punch arm link.

(7) Remove the ribbon spools and the ribbon.

(8) Remove the code-punch block assembly rear mounting screw.

(9) Remove the front mounting screw of the right ribbon spool bracket. Loosen the rear mounting screw and swing the bracket so that the ribbon spool cup will not interfere with the removal of the type basket.

(10) Lift the code-punch bracket assembly and the punch block assembly out of the unit.

(11) With the pull-bars out of engagement with the pull-bar guide, loop a piece of string or wire around the top of the pull-bars and lift the assembly upward and out of the unit.

Pull-bars supported by function-bar spring brackets should be free, without bind and should have approximately equal clearance between the corresponding edges of the function-bar spring brackets. **Fig. 4**

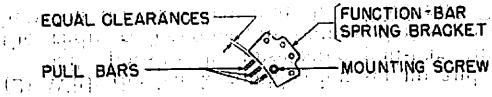

Fig. 4

(a) To adjust, loosen the function-bar spring bracket mounting screw and align the bracket. Tighten the screw.

2.10 **Pull-Bar Springs:** (Type basket removed per 2.09.) It should require Min. 3 oz., Max. 4 oz. to stretch springs of pull-bars, having associated type bars, to position length. It should require Min. 5-1/2 oz., Max. 6-3/4 oz. to stretch springs of pull-bars, not having associated type bars, to position length. If trouble is experienced due to "contact bounce," it may be necessary to select other springs of same code number, whose tensions are toward the high limit, not to exceed 6-3/4 oz. **Fig. 5**

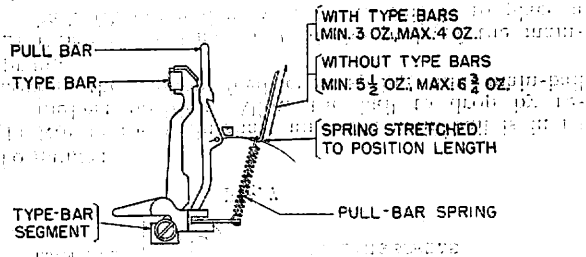

Fig. 5

(a) To gauge, unhook the pull-bar springs from the pull-bars and hook the pull end of the scale through the spring eye and pull vertically.

(b) To adjust, replace the spring. Function pull-bar springs located to the right and left side are adjusted as in Paragraphs 2.37 and 2.38.

Note: Remount the type basket by reversing the procedure in note in Paragraph 2.09.

2.11 **Main-Bail** (Motor moved out of the way). The main-bail should not bind throughout its entire travel. **Figs. 6, 7**

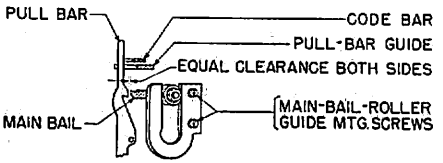

Fig. 6

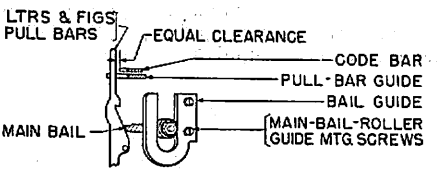

Fig. 7

(a) To gauge:

(1) Rotate the main-shaft until the main-bail is in its highest position. Allow the bail to drop by removing the ribbon feed-lever spring and main-bail spring.

(2) Block all pull-bars out of the path of the main-bail. (A convenient way to do this is to place a length of solder wire between the pull-bars and the code-bars.)

(3) Place a finger under the main-bail lever and slowly raise the main-bail to its highest position and release.

(4) There should be no evidence of bind on the upward travel and the bail should fall freely to its lowest position when released. The universal contacts may prevent the bail from falling to its lowest position in which case, the contacts should be removed.

(5) Rehook the main-bail and ribbon feed-lever springs.

(b) To adjust:

(1) Position the pull-bar guide so that its mounting screws are in the middle of the elongated slots and loosen the mounting screws of both main-bail roller-guides.

(2) With the blank combination set up and the main-bail opposite the unselected pull-bar humps, shift the right roller-guide to obtain the same clearance between the main-bail and the LTRS and FIGS pull-

bar humps. Tighten the right roller-guide top mounting screw friction-tight.

(3) With the main-bail cam roller on the high part of its cam, adjust the main-bail adjusting-screw to give some clearance between the pull-bars and the code-bars. Shift the right roller-guide around its friction-tight top mounting screw to obtain approximately the same clearance between the code-bars and the LTRS and FIGS pull-bars. Tighten the right roller-guide bottom mounting screw friction-tight and recheck adjusting step (2) above. Tighten both right roller-guide mounting screws after adjustments.

(4) Remove the main-bail spring and hold the ribbon feed-lever roller away from the main-bail plunger. Position the left roller-guide so that the main-bail is free throughout its travel and tighten the mounting screws. Check freeness of the main-bail by raising it to its uppermost position manually and releasing it. It should fall of its own weight to its lowest position. Replace the main-bail spring. Replace universal contacts.

(5) If it has been necessary to make the above adjustment, check requirements in Paragraphs 2.12 and 2.13.

2.12 **Pull-Bar Guide:** (Motor moved out of the way)

(a) There should be a Min. .008", Max. .020" clearance between main-bail and the projections on the unselected pull-bars. The oil cup on the main-bail plunger should clear the pull-bar guide. **Fig. 8**

(b) There should be Min. .004", Max. .080" clearance between the end of the No. 1 "T" lever and the bottom of the slot in the code-bar. All other levers should have some clearance. **Fig. 8**

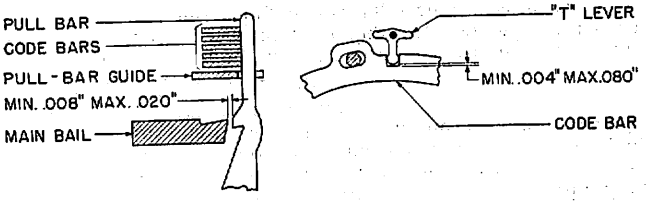

Fig. 8

(1) To gauge:

1. The "BLANK" and "LTRS" combinations should be set up in turn and the main-bail positioned opposite the pull-bar hump and the play of the main-bail taken up in the direction to make the clearance a minimum.

(2) To adjust (a) and (b):

1. Align the pull-bar guide by loosening its mounting screws and moving the bar within its enlarged mounting holes. Tighten the screws.

Note: When preceding requirements cannot be met, it may be necessary to readjust the main-bail roller guides. (See Paragraph 2.11.)

2.13 **Main-Bail Adjusting-Screw:** (Preliminary Adjustment) (Motor moved out of the way.) There should be Min. .010", Max. .050" between the unselected pull-bars and the outer projections on the code-bars. **Fig. 1**

(a) To gauge:

(1) Set up "BLANK" and "LTRS" combinations in turn, have the main-bail roller on the high part of its cam and the play in the main-bail and pull-bars taken up to make the clearance a minimum.

(b) To adjust:

(1) Loosen the main-bail adjusting-screw lock-nut and position the screw. Tighten the lock-nut.

2.14 **Main - Bail Adjusting - Screw:** (Final Adjustment) (Motor moved out of the way.) There should be at least .010" clearance between the front edges of the code-bars and the adjacent edges of the code-bar bell cranks. **Fig. 9**

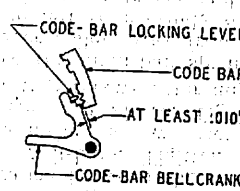

Fig. 9

(a) To gauge:

The code-bars should be positioned for "LTRS" selection with the main-bail roller on the high part of its cam (main-bail down).

(b) To adjust:

Keeping within the previously specified limits of .010" to to .050" between the pull-bars and the code-bars as specified in Paragraph 2.13, readjust the main-bail adjusting screw to obtain the .010" clearance specified herein. Move the motor back in place and check 2.05 (b). **Fig. 1**

2.15 **Code-Bar Bell Cranks**

(a) The code-bars should move freely between the code-bar bell-crank separator plates. **Fig. 10**

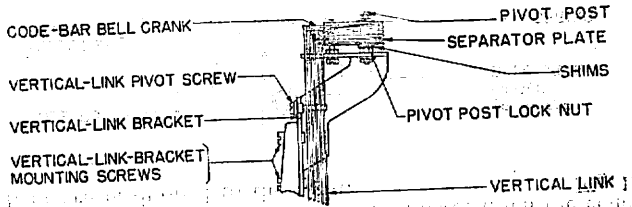

Fig. 10

(1) To adjust:

Make certain that the vertical-link bracket is mounted approximately in a vertical position and align the code-bar bell cranks with the code-bars by shifting the vertical-link bracket up or down. When necessary, add or remove shims between the lower separator plate and the shoulder on the pivot post.

(b) There should be .010" to .030" clearance between the right ends of the code-bars and the adjacent edges of the associated code-bar bell cranks when the code-bars are positioned for "Blank" selection and with the locking lever resting against the code-bars. **Fig. 11**

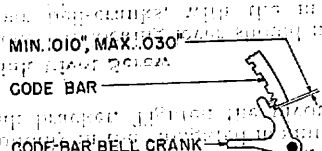

Fig. 11

(1) To adjust:

Loosen the pivot post lock-nut and move the pivot post horizontally in the elongated mounting holes in the vertical link bracket. Tighten the pivot post lock-nut. **Fig. 10**

2.16 **Vertical Link Pivot Screw**

Note: The code-bar locking lever should not bind against the code-bar bell-cranks, with the main-bail in the lowermost position.

If binding is encountered and cannot be removed by adjustment, it may be necessary to replace the selector-fingers with new style selector fingers (TP117257).

(a) The left-end surfaces of the punch selector-fingers should be in approximate alignment with the left vertical edge of the punches, when the code bars are positioned to the right (LTRS combination) and the code-bar bell-cranks are resting against the code-bars. Fingers and punches should meet squarely and at full surface when in operation. **Fig. 12**

(1) To adjust:

Position the vertical-link pivot screw in its elongated mounting hole. **Fig. 10**

(b) The left-end surface of all the punch selector-fingers should be approximately in line and at right angles to the front surface of the code-punch bracket when the code-bars are positioned to the right. **Fig. 12**

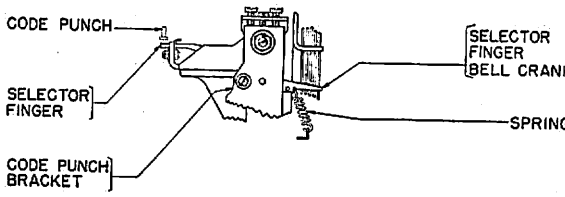

Fig. 12

(1) To adjust:

With the TP103534 bending tool, twist that portion of the vertical link bracket which mounts the vertical link pilot screw. Hold the adjusting tool parallel with the base while twisting. Recheck (a). **Fig. 10**

Caution: Care should be exercised when bending the vertical-link bracket to avoid disturbing other parts of the bracket.

Note: When the foregoing requirements have been met, the following checks should be made.

(c) With alternate combinations for "R" (2-4) and "Y" (1-3-5) set up on the code-bars and the punch-arm roller on the high part of its cam, there should be a clearance of at least .020" between the left end surface of the unselected punch selector-fingers and the right end of the punches.

(d) With the code-bars in the "Blank" combination selection and the code-bar locking lever against the code-bars, the left end of the punch-selector fingers should be drawn not more than half-way through their guide slots in the punch-bail. When these checks cannot be met, readjust (a) or (b) or both.

2.17 **Lower vertical-link bell-crank separator plates** should meet the following requirements with the main-bail in its lowermost position. **Fig. 13**

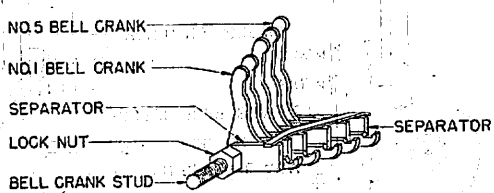

Fig. 13

(a) Separator plates without extension should be approximately in line with each other horizontally.

(b) Separator plate with extension should have Min. .005", Max. .020" clearance between the top edge of the No. 1 bell crank and the bottom side of the extension at the closest point and there should be some clearance between the bottom side of the extension and the top edge of the other four-bell cranks.

(c) Vertical parts of the bell cranks should be retained by at least 1/3 their width within their guide slots when the horizontal end is held against the separator-plate extension.

(1) To adjust, loosen the lock-nut on the bell-crank stud while holding the stud to prevent its loosening. Position the separator plates. If necessary, bend the plate extension to meet the requirements. Tighten the nut. Do not loosen the stud.

2.18 **Ribbon-Spool Cups:**

(a) The center of the left ribbon-spool cup-roller should be Min. 5-7/16", Max. 5-9/16" from the surface of the boss on which the pivoted sensing unit is mounted. **Fig. 14**

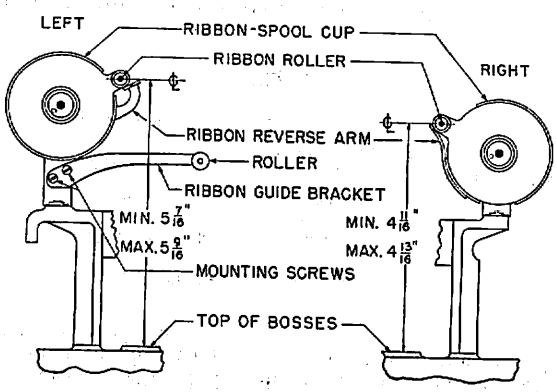

Fig. 14

(b) The center of the right ribbon-spool cup-roller should be Min. 4-11/16", Max. 4-13/16" from the surface of the boss on which the code-punch assembly is mounted. **Fig. 14**

(1) To adjust, loosen the ribbon-cup lock-nut and rotate the cup. Tighten the lock-nut.

2.19 **Ribbon-Spool Brackets:** Both left and right ribbon-spool cups should be in line and the right and left ribbon drive-shaft bevel gears should have a minimum amount of end play without binding when they are in mesh with their respective ribbon-feed-shaft bevel gears. **Figs. 15, 16**

(a) To adjust, loosen the right and left ribbon-spool bracket lock-nuts and mounting screws and align the brackets. Tighten the mounting screws and the lock-nuts.

2.20 **Left and right ribbon-spool shafts** should have some end play, not more than .010". **Figs. 15, 16**

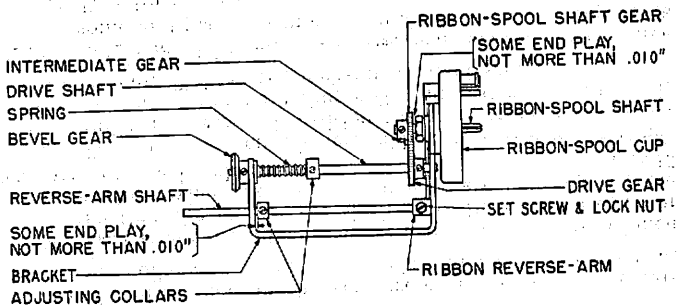

Fig. 15

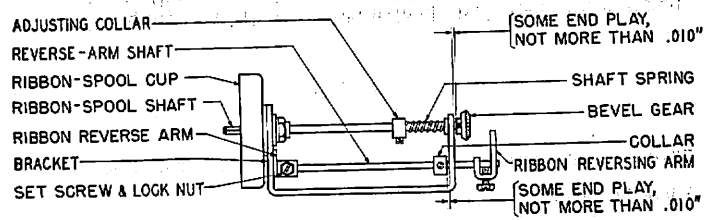

Fig. 16

(a) To adjust, loosen the ribbon-spool shaft-gear set screw and position the gears. Tighten the set screws making sure that they rest upon the flat surface of the shafts.

2.21 **Left ribbon-spool drive shaft** should protrude approximately the same distance through the bevel gear as it does through the front of the ribbon-spool bracket. **Fig. 15**

(a) To adjust, loosen the ribbon-spool drive-shaft bevel-gear set screw and position the gear. Tighten the set screw.

2.22 **Left ribbon-spool drive-shaft driving-gear** should mesh fully with the intermediate gear. **Fig. 15**

(a) To adjust, loosen the driving-gear set-screw and position the gear. Tighten the set screw.
Note: The intermediate-gear should run freely in mesh with the driving gear and the ribbon-spool shaft gear.

2.23 **Left and Right Ribbon-Spool-Shaft Compression Springs:** It should require Min. 2-1/2 oz., Max. 5 oz. to just start the ribbon-spool shafts moving. See Fig. 15 for location of parts and Fig. 17 for method of checking. **Figs. 15, 17**

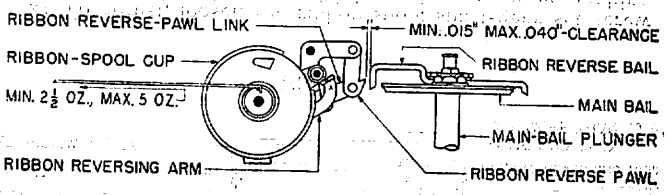

Fig. 17

(a) To gauge: With the ribbon-feed shaft gear disengaged from the left ribbon-spool drive-shaft gear, hook the pull end of the scale over the pin on the ribbon-spool shaft located inside the cup and pull at right angle to a line passing through the centers of the pin and the ribbon-spool shaft.

(b) To adjust, loosen the set screw on the spring adjusting collar and position the collar. Tighten the set screw.

2.24 **Left and right ribbon-reverse arms** should be positioned so that the end of the shafts are flush with the front of the brackets when the adjusting collars are held against the rear arm of the brackets. **Fig. 15**

(a) To adjust, loosen the left ribbon-reverse-arm lock-nut and set screw and position the arm. It may be necessary to move the adjusting collar in order to make this adjustment. Tighten the lock-nut and set screw.

2.25 **Left and right ribbon-reverse arm shafts** should have some end play, not more than .010". **Fig. 15, 16**

(a) To adjust, loosen the set screw in the adjusting collars and position the collars. Locate the set screws so that they are easily accessible. Tighten the set screws.

2.26 **Ribbon spools** should be sufficiently tight on their shafts to insure that they will not slide off in service. **Figs. 15, 16**

(a) To adjust, spread the prongs of the ribbon-spool shafts.

2.27 **Ribbon Reverse-Pawls:** There should be Min. .015", Max. .040" clearance between both right and left ribbon reverse-pawls and the ribbon reverse-bail when the ribbon reverse-arms are resting against the ribbon spool-cups (unoperated position) and the ribbon reverse-bail is opposite the ribbon reverse-pawls. **Fig. 17**

(a) To adjust, loosen the ribbon reverse-arm set screw and position the arm. Tighten the screws.

2.28 **Ribbon-reverse-pawl links** should not bind on their shoulder screws. **Figs. 18, 16**

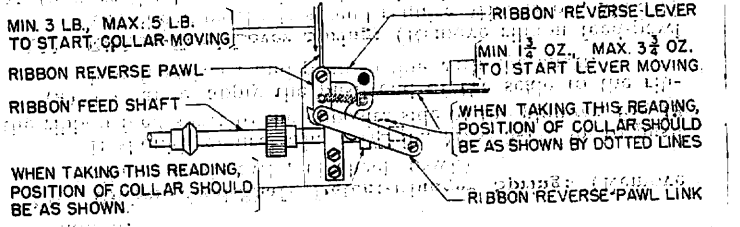

Fig. 18

(a) To adjust, loosen the lock-nuts and set screws on the ribbon-reversing arms located at the rear end of the ribbon-reverse-arm shaft and position the arms back and forth. Tighten the screws and lock-nuts and recheck 2.27.

2.29 **Left and Right Ribbon-Feed-Shaft Safety-Springs:** With the main-bail in its uppermost position and the ribbon-feed shaft held in its left-hand position, it should require Min. 3 lb., Max. 5 lb. to just start the spring collar moving when the push end of the scale is applied to the upper end of the right-hand ribbon-reverse pawl and pushed vertically downward. Check the left safety spring with the ribbon-feed shaft held in its right-hand position and the scale applied to the left-hand ribbon-reverse pawl. See Fig. 18 for position of gauge and Fig. 19 for location of spring. **Figs. 18, 19**

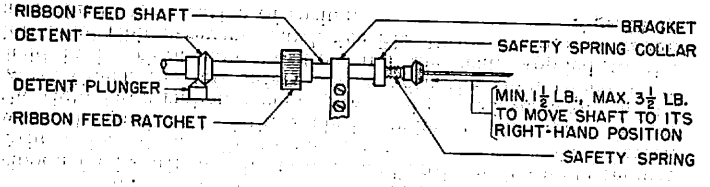

Fig. 19

2.30 **Right and Left Ribbon-Reverse-Pawl Spring:** It should require Min. 1-3/4 oz., Max. 3-3/4 oz. to start the right ribbon-reverse lever moving when the collar on the ribbon-feed shaft is moved away from the ribbon-reverse lever. **Fig. 18**

(a) To gauge, hook the pull end of the scale over the spring post of the ribbon-reverse lever and pull in line with the spring. Check the left ribbon-reverse pawl in the same manner.

2.31 **Ribbon-Feed-Shaft Detent-Plunger Spring:** (Remove ribbon feed-pawl and check pawl.)

It should require Min. 1-1/2 lb., Max. 3-1/2 lb. to push the ribbon feed-shaft to the opposite side of the plunger. **Fig. 19**

(a) To gauge, apply the push end of the scale to the ribbon feed-shaft and push in line with the shaft.

2.32 **Ribbon-Feed-Lever Spring:** (Remove ribbon feed-pawl and check pawl.) It should require Min. 12 oz., Max. 18 oz. to start the lever moving when the ribbon-feed-lever roller is in the plunger indent. **Fig. 20**

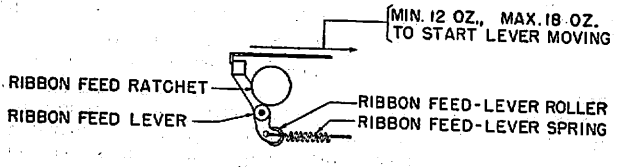

Fig. 20

(a) To gauge, hook the scale over the top of the ribbon feed lever and pull horizontally toward the front of the unit. **Replace ribbon feed-pawl and check-pawl.**

2.33 **Ribbon check-pawl** (top end) should clear the lower surface of the pull-bar guide by Min. 3/64", Max. 5/64" as gauged by eye. **Fig. 21**

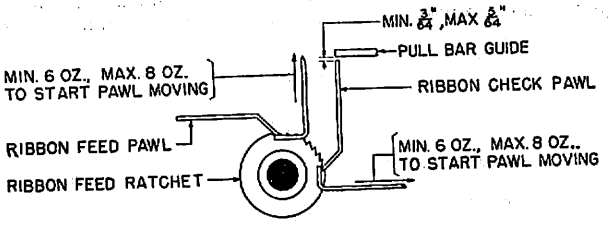

Fig. 21

(a) To adjust, loosen the check-pawl mounting screw and position the check-pawl.

2.34 **Ribbon Check-Pawl Pressure:** It should require Min. 6 oz., Max. 8 oz. to just pull the check pawl away from the ribbon-feed ratchet when the ratchet is positioned so that its tooth does not prevent free movement of the pawl. **Fig. 21**

(a) To gauge, hook the pull end of the scale under the engaging end of the check-pawl and pull horizontally toward the front of the unit.

(b) To adjust, change the curvature of the ribbon check-pawl. Do not crimp.

2.35 **Ribbon-feed pawl** should be positioned so that the ratchet will be moved one or two teeth for each revolution of the main shaft. **Fig. 21**

(a) To adjust, loosen the feed-pawl mounting screw and position the pawl. Tighten the screw.

2.36 **Ribbon Feed-Pawl Pressure:** It should require Min. 6 oz., Max. 8 oz. to just pull the feed pawl away from the ribbon-feed ratchet when the ratchet is positioned so that the tooth engaged by the pawl does not prevent free movement of the pawl. **Fig. 21**

(a) To gauge, hook the pull end of the scale under the engaging edge of the feed pawl adjacent to the feed ratchet. Pull vertically at right angle to the spring.

(b) To adjust, change the curvature of the ribbon feed-pawl. Do not crimp.

2.37 **Left Function Pull-Bar Spring:** It should require Min. 1 oz., Max. 1-1/2 oz. to just start the pull-bar moving when the main bail is in its lowest position. **Fig. 22**

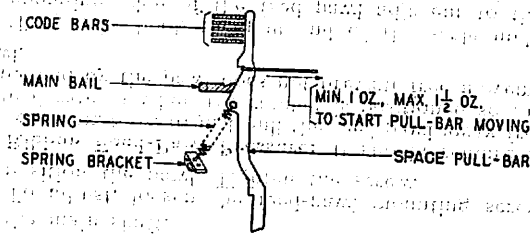

Fig. 22

(a) To gauge, hook the pull end of the scale over the "unshift on space" pull-bar just below the lobe and pull horizontally at right angle to the bar.

(b) To adjust, loosen the left function pull-bar spring-bracket lock-nut and position the bracket. Tighten the lock-nut.

2.38 **Code-Bar Locking-Lever Spring:** It should require Min. 3-1/2 oz., Max. 5 oz. to just start the lever moving when the main-bail is in its uppermost position and the code-bar bell cranks are held away from the locking lever. **Fig. 23**

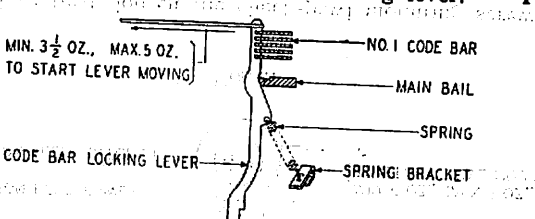

Fig. 23

(a) To gauge, hook the pull end of the scale over to locking lever just above the No. 1 code bar and pull horizontally at right angle to the locking lever.

(b) To adjust, loosen the code-bar locking-lever spring-bracket lock-nut and position the bracket. Tighten the nut.

2.39 **Pull-Bar-Contact Mounting-Plate:** The following requirements should be met with the pull-bars resting against the code-bars but not selected.

(a) The toes of the pull-bar hooks should be close as possible to .442" above the contact-mounting plate. **Fig. 24**

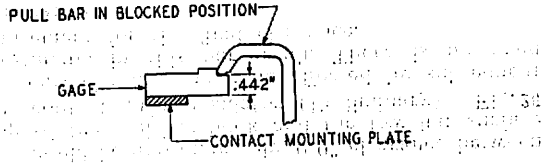

Fig. 24

(1) Gauge with the TP99391 gauge.

(2) To adjust, add or remove shims between the pull-bar-contact mounting plate and the mounting posts.

(b) The toes of the two end and one middle pull-bar hooks should be as close as possible to .620" in front of the contact mounting plate. **Fig. 25**

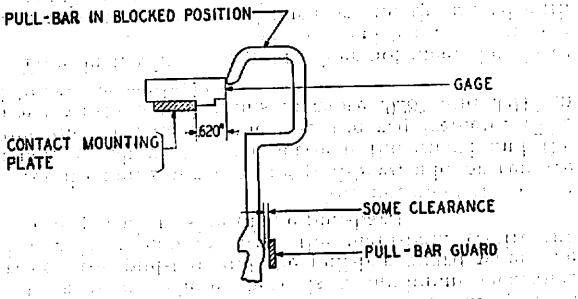

Fig. 25

(1) Gauge with the TP99391 gauge.

(2) To adjust, loosen the nuts securing the mounting plate and position the plate. Tighten the nuts.

2.40 **Pull-bar guard** should meet the following requirements with the main-bail in its lowest position; (Type "F" only). **Fig. 25**

(a) With the type bars resting against the back stop, it should not be possible to manually disengage the pull-bars from their guide slots.

(b) With the type bars held against the platen, there should be some clearance between the pull-bars and the pull-bar guard.

(c) The same clearance should be obtained for pull-bars not having associated type-bars.

(1) To check this adjustment, raise the pull-bar by hand to a point where there is a minimum clearance between the pull-bar and the pull-bar guard when the pull-bar is in contact with the main-bail. (Shift the platen to permit raising of the pull-bar.)

(2) To adjust. When the guard does not meet the above requirements for the **end pull-bars,** add or remove washers or shims located between the guard and the frame on the side not meeting the requirement. (The correct washers and shims measure .028" and .004" in thickness respectively.)

(3) To adjust. When the guard does not meet the above requirements for the **middle pull-bars,** loosen one guard mounting screw and push or pull the guard until the requirement is met. Tighten the mounting screw.

2.41 **Pull-Bar Contact-Assembly:**

Note: To insure uniformity in checking the adjustments the pull-bars should be blocked out of selection by the No. 1 code bar only. To do this, select the pull-bar and, by manually holding it out of selection, move the No. 1 code bar into the path of the pull-bar. The contact pressure should be measured with the scale held in a vertical position. The scale should engage the spring directly in front of the contact point.

(a) There should be approximately .020" clearance between the tip of the pull-bar hook and the low flat surface of the long contact spring insulator. (Preliminary) **Fig. 26**

Note: This clearance may be affected by subsequent adjustments in this paragraph. There is no fixed requirement for the final clearance.

(1) To gauge:

The pull-bar should be in the selected position with some clearance between it and the main bail.

(2) To adjust:

Bend the long contact spring for minimum clearance at this point and then obtain the .020" by bending the upper contact spring.

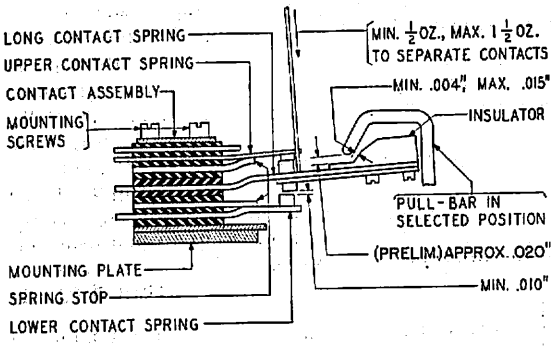

Fig. 26

(b) There should be Min. .004", Max. .015" clearance between the lower sloping surface of the long contact spring insulator and the adjacent surface of the pull-bar hook. The insulator should be aligned centrally with the pull-bar. **Fig. 26**

(1) To gauge:

The pull-bar should be in the selected position with play taken up by pressing lightly downward on the pull-bar.

(2) To adjust:

Loosen the contact assembly mounting screws and

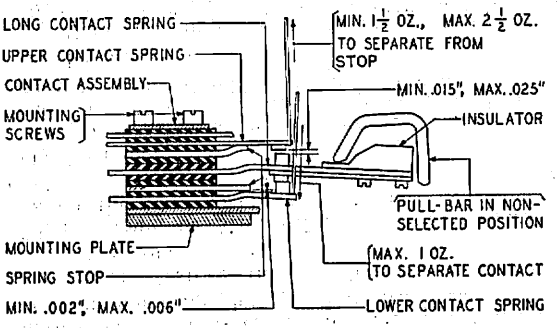

Fig. 27

reposition the assembly. Tighten screws. When the above requirements cannot be met, adjust the pull-bar contact mounting plate per Paragraph 2.39.

Note: Restore the pull-bar to its non-selected position.

(c) There should be Min. .015", Max. .025" clearance between the long spring contact and the upper spring contact. **Fig. 27**

(1) To gauge:

The pull-bar should be resting against the No. 1 code bar in the non-selected position and the upper contact spring should be against its stop.

(2) To adjust:

Bend the upper contact spring stop. To reduce "bounce" or "chatter," of the "H" pull-bar contact, adjust toward the maximum clearance.

(d) It should require Min. 1-1/2 oz., Max. 2-1/2 oz. to separate the upper contact spring from its stop. **Fig. 27**

(1) To gauge:

The pull-bar should be in its non-selected position and resting against the No. 1 code bar. Hook the scale under the upper spring at the contact and pull vertically.

(2) To adjust:

Bend the upper contact spring. To reduce "bounce" or "chatter," of the "H" pull-bar contact, adjust toward the maximum tension. Recheck requirement (b).

(e) It should require Min. 1/2 oz., Max. 1-1/2 oz. to separate the long spring contact from the upper spring contact. **Fig. 26**

(1) To gauge:

Pull-bar should be in the selected position. Apply the push end of the scale to the long contact spring at the contact and exert pressure downward.

(2) To adjust:

Bend the long contact spring and recheck requirement (c).

(f) There should be Min. .002", Max. .006" clearance between the lower contact spring and its stop. **Fig. 27**

(1) To gauge:

The pull-bar should be in its non-selected position and resting against the No. 1 code bar.

(2) To adjust:

Bend the lower contact spring stop.

(g) It should require Max. 1 oz. to separate the lower spring contact from the long spring contact. **Fig. 27**

(1) To gauge:

The pull-bar should be in the non-selected position.

Apply the push end of the scale to the lower contact spring at the contact and exert a downward pressure.

(2) To adjust:

Bend the lower contact spring and recheck requirement (f).

(h) With the pull-bar in its selected position, check that there is at least .010" clearance between the lower spring contact and the long spring contact. Gauge by eye. **Fig. 26**

Note: The bending of springs and stops sets up stresses which tend to cause changes in permanent adjustments. To stabilize the adjustments, each pileup of springs should be operated either manually or under power at least 20 times and then rechecked and readjusted as required.

2.42 **Main-Bail Spring:** (Preliminary Adjustment) (Final 2.140).

(a) It should require 14 to 15 lb. pull to start the adjustment lever moving. **Fig. 28**

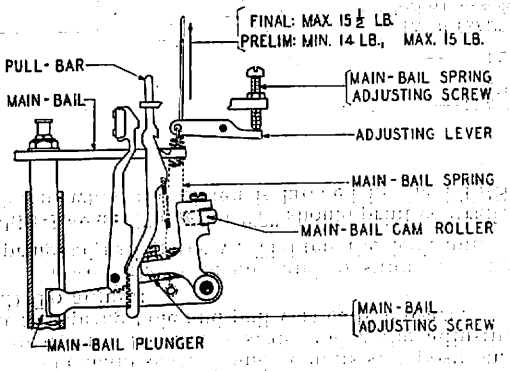

Fig. 28

(1) To gauge:

The main shaft should be in its stop position. (Main-bail down.) Hook the scale under the adjusting lever at the spring hole and pull vertically upward.

(2) To adjust:

Loosen the lock-nut and position the main-bail spring adjusting screw. Tighten the lock-nut.

2.43 **Shift-Lever:** The letter "T" should print centrally on the platen, when the platen is latched in the LTRS (rear) position. **Fig. 29**

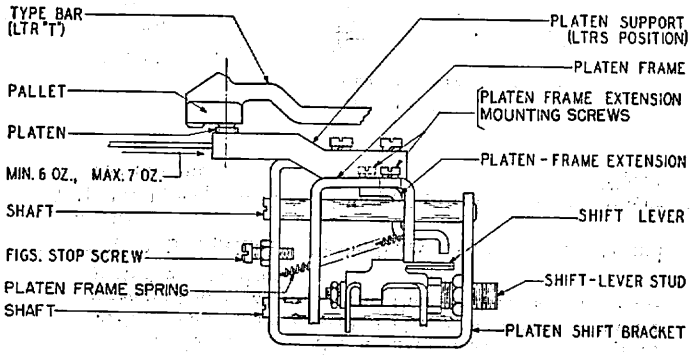

Fig. 29

(a) To adjust, loosen the shift lever stud lock-nut and position the stud. Tighten the lock-nut.

2.44 **Platen-Frame Spring:** It should require Min. 6 oz., Max. 7 oz. to just start the platen frame moving. The main-shaft should be in its stop position and the platen in its latched (LTRS-rear) position. **Fig. 29**

(a) To gauge, apply the push end of the scale to the front end of the platen support and push horizontally toward the rear of the unit.

2.45 **Figs. Stop Screw:** The figure 5 should print directly in front of and in line with the letter "T" (printed in 2.43) when the platen frame is unlatched and resting against the FIGS stop screw (forward position). **Fig. 30**

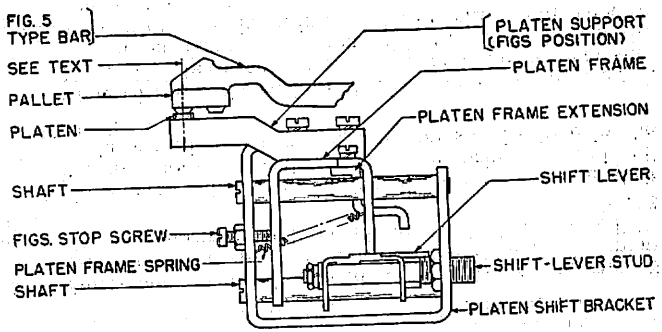

Fig. 30

(a) To adjust, loosen the FIGS stop screw lock-nut and position the screw. Tighten the lock-nut.

2.46 **Shift-Bail Bracket:** The front surface should be parallel to the front edge of the recessed portion of the base. **Fig. 31**

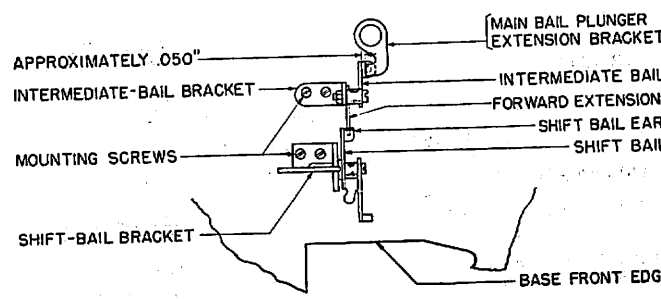

Fig. 31

(a) To adjust, loosen the shift-bail bracket mounting screws and position the bracket. Tighten the screws.

2.47 **Intermediate bail** forward extension should engage the center of the ear on the shift bail. **Fig. 31**

(a) To adjust, loosen the intermediate-bail bracket mounting screws and position the bail. Tighten the screws.

2.48 **Main-Bail-Plunger Extension Bracket:** The left edge of the operating surface on the main-bail-plunger extension should clear the side of the intermediate bail by approximately .050". **Fig. 31**

(a) To adjust, loosen the main-bail-plunger extension bracket lock nut and reposition the bracket. Tighten the nut. **Fig. 32**

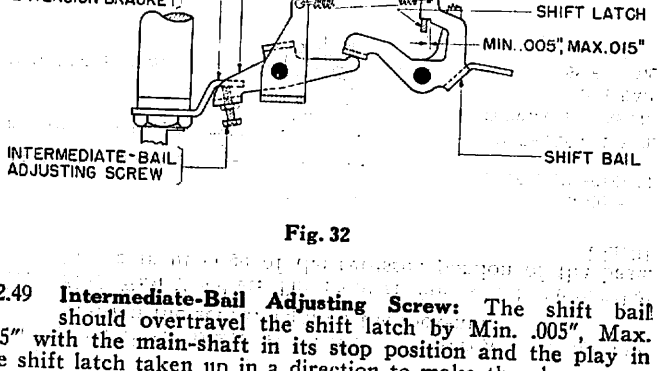

Fig. 32

2.49 **Intermediate-Bail Adjusting Screw:** The shift bail should overtravel the shift latch by Min. .005", Max. .015" with the main-shaft in its stop position and the play in the shift latch taken up in a direction to make the clearance a minimum. **Fig. 32**

(a) To adjust, loosen the intermediate-bail adjusting-screw lock-nut and position the screw. Tighten the nut.

2.50 **Shift-Bail Spring:** It should require Min. 6 oz., Max. 8 oz. to pull the spring to position length with the main shaft in its stop position and the platen latched in the LTRS position. **Fig. 32**

(a) To gauge, unhook the shift-bail spring from the shift bail and hook the scale through the spring eye and pull horizontally until the spring eye is opposite its hole in the shift bail.

2.51 **Platen-Frame Extension:** There should be Min. .010", Max. .020" between the shift bail and the vertical surface of the platen-frame extension with the main bail in its uppermost position, the platen in the FIGS position and the shift bail latched on the shift latch. **Fig. 33A**

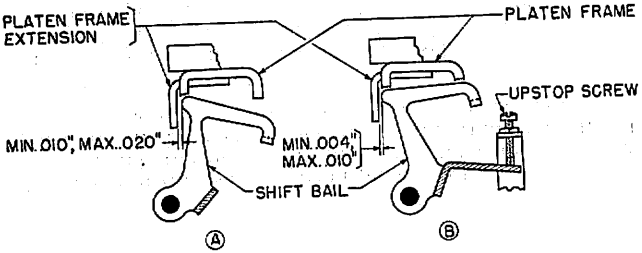

Fig. 33

(a) To adjust, loosen the platen-frame-extension mounting screws and reposition the extension by means of its elongated left mounting hole. Tighten the screws. **Fig. 29**

2.52 **Shift-Bail Upstop-Screw:** There should be Min. .004", Max. .010" clearance between the vertical surface of the platen-frame extension and the shift bail, with the main bail in its uppermost position, the platen in the LTRS position and the shift latch unlatched. **Fig. 33B**

(a) To adjust, loosen the shift-bail upstop-screw lock-nut and position the screw. Tighten the nut.

2.53 **Shift-Lever Spring:** It should require Min. 1 oz., Max. 1-1/2 oz. to just start the lever moving with the platen frame held clear of the lever. **Fig. 34**

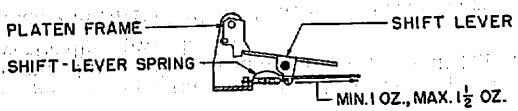

Fig. 34

(a) To gauge, hook the pull end of the scale around the shift lever at the spring hole and pull horizontally in line with the spring.

2.54 **Shift-Latch Spring:** It should require Min. 1/4 oz., Max. 1 oz. to start the shift latch moving with the main-shaft in the stop position. **Fig. 35**

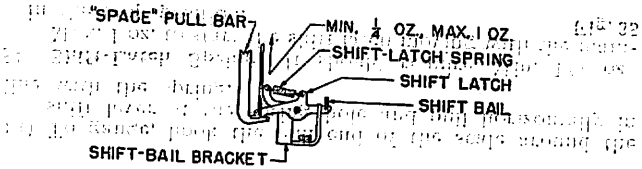

Fig. 35

(a) To gauge, hook the pull end of the scale under the end of the shift latch, just above the space pull-bar toe, and pull vertically upward.

2.55 **Code-Punch-Bail-Pivot Bracket:** (Preliminary Adjustment.) (Final 2.58.)

The lower surface of the punch-bail-pivot bracket should be Min. .080", Max. .090" above and parallel to the surface of the code-punch bracket on which it mounts. **Fig. 36**

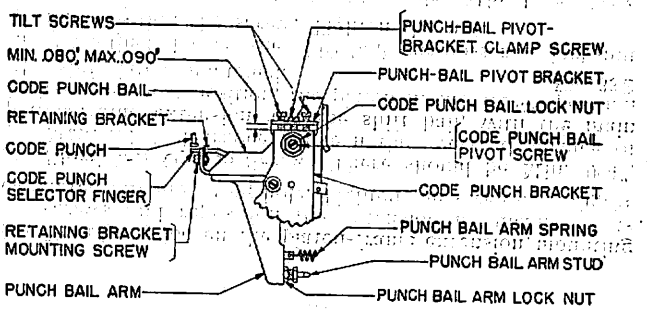

Fig. 36

(a) To adjust, loosen the front punch-bail-pivot-screw lock-nut and the punch-bail-pivot-bracket clamp screw and position the bracket by means of the right and left tilt adjusting screws. Tighten the lock-nut and the clamp screw.

2.56 **Code-Punch Bail:**

(a) The No. 1 and No. 5 code-punch selector fingers should be centered with respect to the No. 1 and No. 5 code punches and the code-punch bail should have some end play but not more than .004". **Fig. 37**

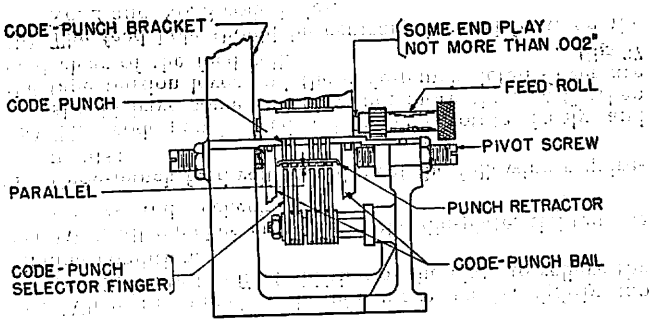

Fig. 37

(1) To adjust:

Position the code-punch-bail-pivot screws.

(b) The punch-retractor should float freely within the bail with the punch-retractor springs removed. **Fig. 37**

(1) To adjust:

Bend both legs of the punch-retractor near the cross brace and parallel to it. Replace the springs.

2.57 **Selector-Fingers Retaining Bracket:** The code-punch selector fingers should have Min. .006", Max. .015" up and down play in their slots in the retaining bracket. **Fig. 36**

(a) To adjust, loosen the selector-finger retaining-bracket mounting screws and position the bracket. Tighten the screws.

2.58 **Code-Punch-Bail-Pivot-Bracket:** (Final Adjustment.) (Preliminary 2.55.)

A line across the top of the code-punch-selector fingers should be parallel to a line across the bottom of the code punches. **Fig. 37**

(a) To gauge:

Insert a piece of tape into the punch block and back off the punch bail arm stud until the punch pins, when presented against the tape, barely emboss the tape. Punches 1 and 5 should emboss the tape equally.

(b) To adjust:

Loosen the punch-bail-pivot-bracket clamp screw and position the bracket by raising or lowering the right and

left tilting screws equally until the position is reached where the punch-bail-pivot bracket is parallel and the 1 and 5 punches emboss the tape equally. Tighten the clamping screw.

2.59 **Code-Punch Bail-Arm Stud:** (Preliminary Adjustment.) (Final 2.87.)

All code punches should just perforate the tape when the LTRS combination is set up and the motor is rotated manually.

(a) To adjust, loosen the punch-bail-arm-stud lock-nut and turn the stud in or out of the punch-bail arm. Tighten the lock-nut.

2.60 **Code-Punch Die-Plate Alignment**

Caution: The two top screws that hold the spring-arm bracket and die plate to the code-punch block assembly, should not be tampered with.

Note: The loosening of the screws that hold the spring-arm bracket and die plate to the code-punch block assembly, permits shifting of the die plate with respect to the punch-block casting and results in sticking code punches. If after thoroughly cleaning the code-punch block assembly, it is noted that the code punches stick, the die-plate position is probably out of alignment. The following procedure to realign the die plate should be followed:

(a) Operate all code-punches manually to engage the punches in the die-plate.

(b) Loosen and retighten (friction-tight) the two screws in the spring-arm and die-plate.

(c) Release the code-punches and observe that they are free and return to their lowermost position without hesitation.

(d) When the punches do not move freely, lightly tap the die-plate to effect shifting of the plate to relieve the binding condition.

(e) With all punches engaged in the die-plate, tighten the screws and recheck (c).

2.61 **Code-punch feed roll** should meet the following requirements:

(a) The code-punch feed roll should rotate freely and should have some end play, not more than .002" when the tape tension lever and the code-punch detent-lever are held clear of the feed roll. **Fig. 37**

(b) The feed hole should be centrally located between the No. 2 and No. 3 code holes.

(1) To gauge, place a length of tape, in which the feed holes have been perforated, into the die block and engage the feed holes on the pins on the feed wheel. Select the letter "I" and perforate the tape. Remove the tape from the die block and gauge by eye.

Note: The above is a factory adjustment and should not require readjustment unless the shim pileup has been disturbed or a new feed roll is to be installed. If it is necessary to readjust, the following procedure should be followed:

(a) Unhook the feed roll detent-lever spring.

(b) Remove the two code punch-block assembly-mounting screws.

(c) With the "Blank" combination selected and the punch-arm on the high part of its cam, hold the feed pawl clear and remove the code-punch-block assembly from the punch mechanism. Avoid damaging the punch pins when removing them from the punch retractor.

(d) Hold the punch-block assembly so that the support plate is upward and remove the two shoulder screws and the two support-plate mounting screws. Remove the support plate, being careful not to pull out the punch pins.

(e) Place the proper number of shims on each side of the feed roll to obtain an end play of not over .002". The shims should be slipped on the shaft by means of the slot. Avoid bending or kinking the shims.

(f) Place the feed roll with the shims in the die block with the wide ends toward the die pins and the straight side toward the bottom of the die block.

(g) Replace the support plate and the two mounting screws. Tighten the screws and recheck the location of the feed hole in relation to the code holes as specified, when the No. 2 and No. 3 code punches are operated manually. If the feed hole is not centered between the No. 2 and No. 3 code punch holes, shift one or more shims from one side to the other.

(h) The tape should be held in the die block so that the edges of the tape are parallel with the sides of the block. If the feed roll is rotated so that the left edge of the die plate is midway between two

feed-hole perforations, the No. 2 and No. 3 punch pins will perforate their holes in line with the feed holes. This will aid in gauging the position of the feed roll.

(i) With the "Blank" combination selected, manually rotate the motor until the punch-arm roller is on the high part of its cam. Place the punches of the code-punch assembly in their lowermost position, move the detent roller clear of the feed-roll ratchet and hold the feed pawl so that it passes through its slot in the block assembly.

(j) Engage the punches and the guide shoulder screws of the punch-block assembly in the retractor slots and replace the front punch-block mounting screw friction-tight.

(k) Hold the pivoted transmitter against the punch block and locate the block, within the limits of its mounting holes, parallel to the edge of the pivoted transmitter guide plate. (It may be necessary to move the ribbon guide out of the way.) Replace the rear screw and tighten both mounting screws.

(l) Rehook the feed-roll detent-lever spring. Check the following adjustments:

Paragraph Number	Paragraph Heading
2.63	Code-Punch Feed-Pawl
2.88	Code-Punch Feed-Roll Detent (Final Adj.)
2.93	Code-Punch Tape Guide
2.94	Ribbon Guide
2.96	Pivoted-Transmitter Bracket
2.97	Pivoted-Transmitter Pilot Screws
2.98	Tape-Feed-Pin Oscillator Backstop Screw
2.99	Pivoted-Transmitter Tape-Guide Plate
2.100	Tape-Depressing Bail

2.62 **Code-Punch Feed-Roll Detent:** (Preliminary Adjustment.) (Final 2.88.)

When a length of tape containing ten feed holes to the inch (check with the TP95960 Tape Gauge) is placed in the code-punch die-block and the code-punch feed-roll detent is resting in an indent between two teeth on the ratchet, the left edge of a feed hole should be visible at the left edge of the die block when the feed holes in the tape are engaged with the pins on the feed roll.

Fig. 38

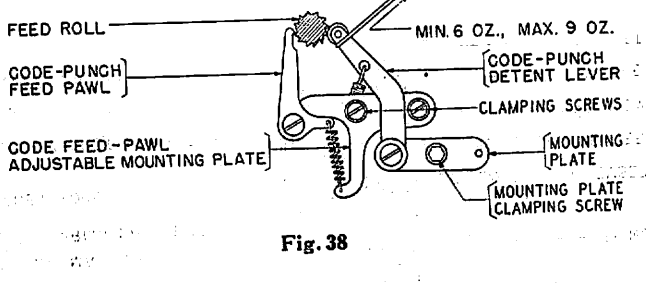

Fig. 38

(a) To adjust, loosen the detent-lever mounting-plate clamping screws and position the plate. Tighten the screws.

2.63 **Code-punch feed-pawl** (preliminary adjustment) should rest on the bottom of the first notch below the horizontal center line of the feed roll with the punch-arm roller on the lowest part of its cam. **Fig. 38**

(a) To adjust, loosen the code feed-pawl adjustable mounting plate clamping screws and position the plate by means of the elongated left-hand mounting hole. Tighten the screws.

2.64 **Sensing and Distributing Clutch Magnet Mechanism:**

Note: Adjustments (a) and (b) need not be made unless the shims or magnet have been disturbed.

(a) The clutch armature levers should have some end play, not to exceed .006". **Fig. 39B**

(1) To adjust, add or remove shims between the armature levers.

(b) The armature when operated should rest against the magnet cores evenly.

(1) To gauge, hold a light background behind the armature cores. **Fig. 39A**

(2) To adjust, add or remove shims between the magnet cores and the magnet yoke.

(c) With the driving clutch members positioned in the center of their elongated holes (preliminary) and the armatures held in the operated position, there should be Min. .010", Max. .040" clearance between the high part of the driven clutches and their respective clutch-throwout levers. The armatures should be parallel to the shafts and with the armatures in the unoperated positions, the clutch-

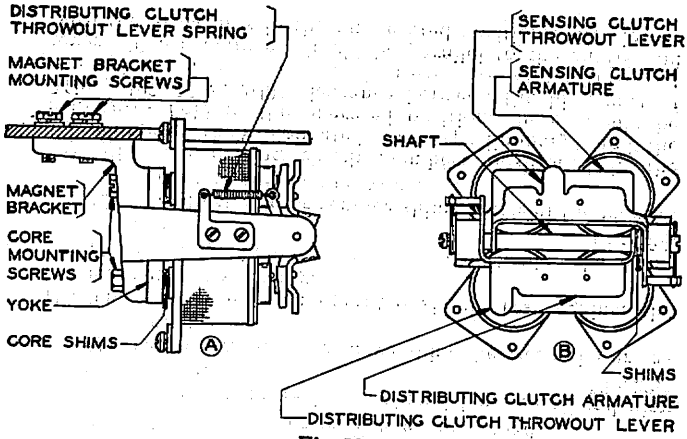

Fig. 39

throwout levers should disengage their clutches with approximately .005" clearance between the clutch teeth.

Figs. 40, 41

(1) To adjust, loosen the clutch-magnet bracket-mounting screws and position the bracket. Tighten the screws. (It may be necessary to loosen the clutch driving members mounting screws and position the members by means of their elongated mounting holes.)

Figs. 39A, 40

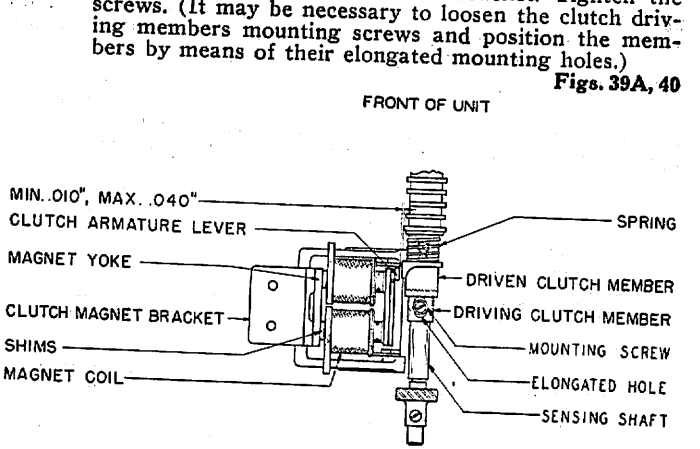

Fig. 40

2.65 **Sensing and Distributing Clutch-Magnet Release Springs:**

(a) When a clutch-magnet release-spring (TP120682) has been installed on each clutch-magnet, the spring should rest against the top insulators of each set of magnet coils.

(1) To adjust, bend the legs of the release spring.

(b) With the throwout lever springs removed, and the armature held lightly against the center leaf of the release spring but not compressing the release spring, there should be Min. .008", Max. .012" between the magnet core and the armature.

(1) To adjust, bend the center leaf spring.

Note: Check that the operating edges of the leaf extensions are parallel to their respective armatures.

(c) It should require at least 12 oz. to push the armature against the core.

(1) To gauge, apply the push end of the scale in a horizontal direction to the outer edge of the armature approximately in the middle. Replace the throwout lever springs.

2.66 **Sub-Shaft Bearing Brackets:** The sub-shaft should be free on its bearing with a minimum amount of end play. The gears at both ends should have a minimum amount of backlash throughout a complete revolution of the sub-shaft.

(a) To adjust, loosen the mounting screws of the sub-shaft mounting brackets and position the brackets. To adjust gear play between gears at left end of shaft, add or remove shims located between bearing brackets and base casting.

2.67 **Sensing and Distributing Driving Clutch.**

Caution: To avoid damage to the mechanism, check that there is clearance between the clutch members before applying power.

There should be Min. .005", Max. .015" clearance between the teeth of the driving and driven clutch members. **Fig. 41**

(a) Operate the unit under power, stop the cam assemblies by releasing the clutch throwout levers and then stop the motor.

(b) To adjust, loosen the driving clutch mounting screw and reposition the driving member by means of its elongated mounting hole. Tighten the screw.

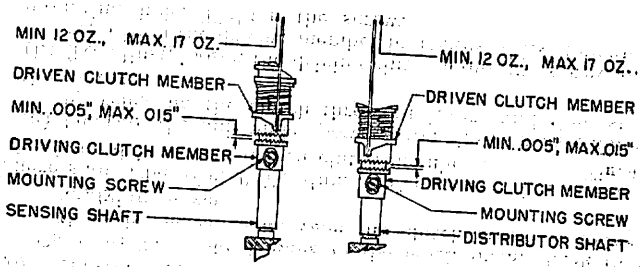

Fig. 41

2.68 **Punch-Arm Shaft Oiler:** The lid on the oil cup on the upper end of the punch-arm shaft should open to the left.

(a) To adjust, loosen the punch-arm shaft set screw and reposition the shaft. Tighten the set screw.

2.69 **Sensing-Shaft Rear-Bearing Oil Cup:** The lid on the oil cup on the rear bearing of the sensing shaft should open from the front of the unit and the clearance between the hexagonal portion of the oil cup and the lock-nut should not exceed 1/16".

(a) To adjust, loosen the hexagonal lock-nut on the oil cup and position the cup. Tighten the lock-nut.

2.70 **Sensing and Distributing-Clutch Spring:** It should require Min. 12 oz., Max. 17 oz. to just separate the teeth with the unit resting on its rear supports and the teeth on the driving clutch member resting on the teeth of the driven clutch member, but not engaged. **Fig. 41**

(a) To gauge, hook the pull end of the scale over the raised portion of the clutch driven members and pull in line with the shafts.

2.71 **Prepunch tape guide** should be positioned so that the TP99947 die-block cleaning tool when threaded through the tape guide, will not snag at the entrance to the die block. The rear of the guide should line up with the rear of the slot in the die block.

(a) To adjust, loosen the tape guide mounting screws and align the guide. Tighten the screws.

2.72 **Prepunch tape-guide spring** should be positioned so that its curved tip is centered on the tape at a point opposite the cut-out portion of the tape guide. The tension of the spring should hold the tape firmly toward the rear wall of the die-block slot without buckling.

(a) To adjust for center alignment, loosen the spring mounting screws and position the spring. To adjust the tension, bend the spring. Tighten the mounting screws.

2.73 **Prepunch Retaining-Bracket:**

(a) There should be some clearance, not more than .002", between the top of the feed-hole punch and the prepunch arm, when the feed-hole punch is at its highest point of travel. **Fig. 42**

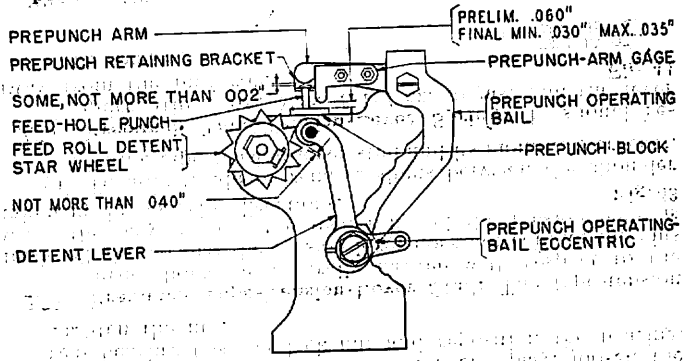

Fig. 42

(b) To adjust, loosen the prepunch retaining-bracket mounting screws and reposition the bracket. Tighten the screws.

(c) There should be no bind in the entire length of travel of the feed-hole punch.

(1) To check, remove the prepunch operating bail spring and feel for bind.

(2) To adjust, align the guide and die-plate assembly as required.

2.74 **Prepunch Feed-Roll Bearings:** The feed roll should be free in its bearings with some end play, not more than .004", with the feed-roll detent, the feed pawl, and the tape-tension lever held clear of the feed roll. **Fig. 43**

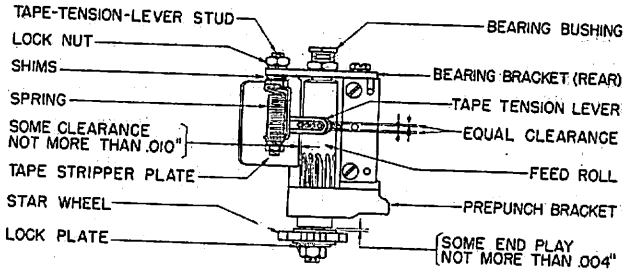

Fig. 43

(a) To adjust for freeness, loosen the rear bearing bracket mounting screws and reposition the bracket. Tighten the mounting screws. To adjust for end play, loosen the rear-bearing bushing lock-nut and reposition the bearing. Tighten the nut.

2.75 **Prepunch Tape-Tension-Lever Stud:** The tape-tension lever should be centrally located with respect to the feed-roll pins so that the tension lever does not contact the pins when the play in both the feed roll and the tension lever is taken up in opposite directions. **Fig. 43**

(a) To adjust, add or remove shims between the shoulder on the tape-tension-lever stud and its mounting bracket.

2.76 **Prepunch Tape-Tension-Lever Spring:** It should require Min. 5 oz., Max. 5-1/2 oz. to just pull the lever away from the feed roll. **Fig. 44**

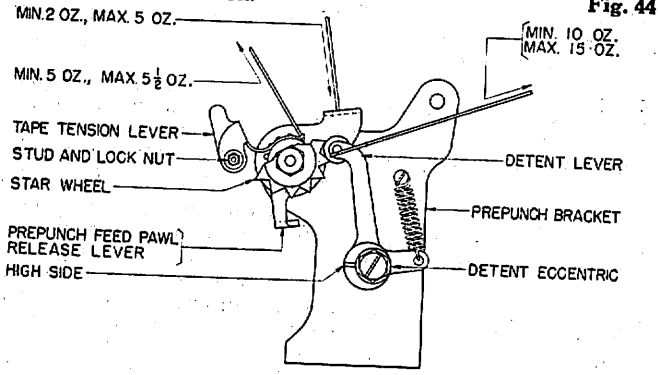

Fig. 44

(a) To gauge, hook the pull end of the scale under the tension lever at right-hand end of the slot and pull at a right-angle to the lever.

(b) To adjust, hold the tape-tension-lever stud with a wrench and loosen the lock-nut. Rotate the stud in either direction as required. Tighten the lock-nut while still holding the stud to avoid slipping.

2.77 **Prepunch Feed-Roll Detent:** (Preliminary Adjustment.) (Final 2.80.)

The high side of the detent eccentric should be positioned toward the left with the slot horizontal. **Fig. 44**

(a) To adjust, loosen the detent-eccentric mounting screw and rotate the eccentric. Tighten the screw.

2.78 **Prepunch Feed-Pawl Eccentric:** (Preliminary Adjustment.) (Final 2.81.) The feed pawl should rest in the bottom of the first notch below the horizontal center line of the feed roll with the punch-arm roller on the low part of its cam. **Fig. 45**

(a) To adjust, loosen the feed-pawl eccentric mounting screw and rotate the eccentric. Make certain the high side of the eccentric is to the left. Tighten the screw.

2.79 **Prepunch-Operating Bail:**

(a) A piece of unperforated tape should be held friction-tight in the prepunch block by means of the feed-hole punch when the punch-arm roller is on the high part of its cam.

(1) To adjust, loosen the prepunch operating-bail-eccentric mounting screw and rotate the eccentric. Tighten the screw.

(b) There should be approximately .060" preliminary clearance between the end of the prepunch arm gauge and the prepunch block. **Fig. 42**

(1) To adjust, loosen the prepunch-arm-gauge mounting nuts and position the gauge. Tighten the nuts.

(c) With the tape removed there should be Min. .030", Max. .035" clearance between the end of the prepunch-arm gauge and the prepunch block with the punch-arm roller on high part of cam. **Fig. 42**

(1) To adjust, loosen the prepunch operating-bail-eccentric mounting screw and reposition the eccentric. The high part of the eccentric should be positioned above the center of a horizontal line through the eccentric.

2.80 **Prepunch Feed-Roll Detent:** (Final Adjustment.) (Preliminary 2.77.)

There should be ten feed holes to the inch of tape ± .007" in a 4" length of tape when the tape has been perforated under power.

(a) Gauge with the TP95960 tape gauge. **Fig. 44**

(b) To adjust, loosen the feed-roll-detent eccentric mounting screw and rotate the eccentric, keeping the high side toward the left.

2.81 **Prepunch Feed-Pawl Eccentric:** (Final Adjustment.) (Preliminary 2.78.)

(a) With a length of unperforated tape inserted into the prepunch block and the motor rotated by hand until the tape has been punched and the punch has just withdrawn from the tape, the feed pawl should just engage a tooth of the feed-roll ratchet. Check each tooth for one complete revolution of the feed roll. **Fig. 45**

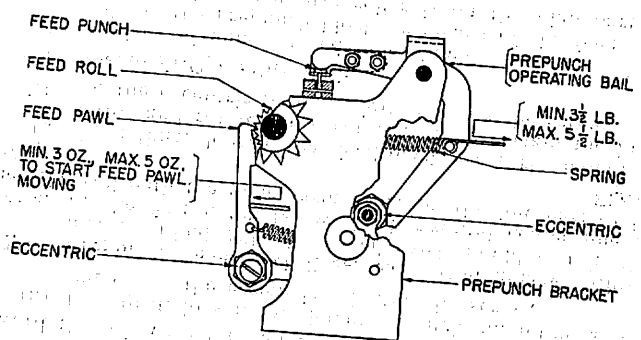

Fig. 45

(1) Gauge by manually rotating the feed roll counterclockwise with the detent roller riding on the star wheel.

(b) Hold the detent roller clear of the star wheel and rotate the feed roll clockwise just far enough to take up the play between the feed pawl and a tooth of the feed-roll ratchet without lifting the feed-pawl operating bail.

Hold the star wheel in this position and allow the detent roller to contact the star wheel and measure the clearance between the lower surface of the notch in the star wheel and the detent roller; this clearance should be Max. .040". **Fig. 42**

(c) Rotate the motor slowly by hand and note that the feed pawl rotates the feed roll and that the detent roller safely engages a notch in the feed-roll ratchet. When checked under power the feed holes in the tape should not be burred. **Fig. 45**

(1) To adjust, loosen the feed-pawl-eccentric clamping screw and reposition the eccentric, keeping the high side toward the left. Tighten the screw.

2.82 **Tape Stripper Plate:** There should be some clearance, not more than .010" between the upper edge of the tape stripper plate and the feed roll. Check throughout one complete revolution of the feed roll. **Fig. 43**

(a) To adjust, loosen the stripper-plate mounting screws and position the plate. Tighten the screws.

2.83 **Prepunch Operating-Bail Spring:** It should require Min. 3-1/2 lb., Max. 5-1/2 lb. to start the prepunch arm moving with the punch-arm roller on the low part of its cam and the prepunch operating-bail lower extension held against the operating-bail eccentric. **Fig. 45**

(a) To gauge, hook the pull end of the scale over the spring post on the bail and pull horizontally in line with the spring.

2.84 **Prepunch Feed-Roll Detent-Lever Spring:** It should require Min. 10 oz., Max. 15 oz. to just start the detent roller moving away from the star wheel. **Fig. 44**

(a) To gauge, hook the pull end of the scale over the detent lever at the roller and pull at right angles to the spring.

2.85 **Prepunch Feed-Pawl Spring:** It should require Min. 3 oz., Max. 5 oz. to start the feed pawl moving away from the feed-roll ratchet with the main shaft in the stop position. **Fig. 45**

(a) To gauge, apply the push end of the scale to the recessed portion of the feed pawl just above the spring and push in line with the spring.

2.86 **Prepunch Feed-Pawl Release-Lever Spring:** It should require Min. 2 oz., Max. 5 oz. to just start the lever moving. **Fig. 44**

(a) To gauge, apply the push end of the scale to the top of the release lever and push downward.

2.87 **Code-Punch Bail-Arm Stud:** (Final Adjustment.) (Preliminary 2.59.)

The code punches should punch a full lid with a minimum amount of tear. **Fig. 36**

(a) To gauge, energize the selector magnet and run out a length of tape under power by operating the clutch release lever.

(b) To adjust, loosen the lock-nut on the punch-bail arm stud located under the base and position the stud. Tighten the nut.

2.88 **Code-Punch Feed-Roll Detent:** (Final Adjustment.) (Preliminary 2.62.) The centers of the punch holes and the center of the feed hole should lie in a straight line when a length of tape has been run out as in 2.87. **Fig. 38**

(a) To adjust, loosen the feed-roll detent mounting-plate clamping screw and reposition the mounting plate by moving up or down. Recheck the code-punch feed pawl adjustment (2.63).

2.89 **Code-Punch Feed-Roll Detent Spring:** It should require Min. 6 oz., Max. 9 oz. to start the detent roller moving away from the feed-roll ratchet. **Fig. 38**

(a) To gauge, hook the pull end of the scale over the detent lever at the roller and pull at right angles to the upper portion of the lever.

2.90 **Code-Punch Feed-Pawl Spring:** It should require Min. 3-1/2 oz., Max. 6 oz. to start the pawl moving away from the feed-roll ratchet. **Fig. 46**

(a) To adjust, manually position the feed roll so that the tooth of the ratchet will not interfere with the free movement of the pawl, hook the pull end of the scale over the pawl at the spring hole and pull in line with the spring.

2.91 **Tape Depressing-Bail Spring:** It should require Min. 1/2 oz., Max. 2 oz. to extend the spring to position length with the tape depressing-bail resting against the transmitter plate. **Fig. 46**

(a) To gauge, unhook the spring from the bail, hook the pull end of the scale through the spring eye and pull vertically upward.

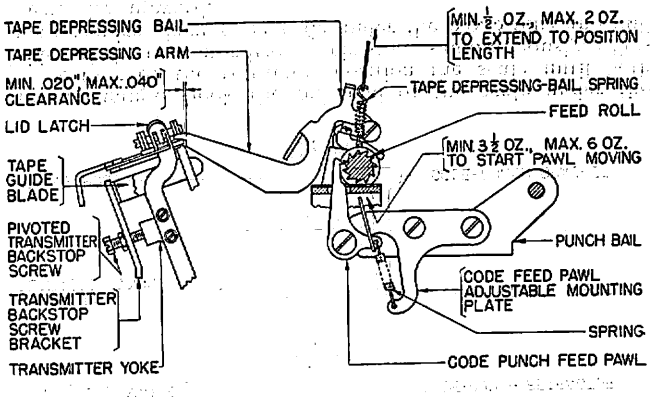

Fig. 46

2.92 **Selector-Finger Bell-Crank Spring:** It should require Min. 2-1/4 oz., Max. 3-1/4 oz. to start each bell crank moving, when the code-punch tape guide has been removed and the main shaft is in the stop position. **Fig. 12**

(a) To gauge, hook the pull end of the scale under the bell crank at the spring hole and pull vertically upward.

Replace the tape guide.

2.93 **Code-Punch Tape Guide:** The tape should enter the code-punch block without buckling and a centerline through the tape code holes of the LTRS combination should be at right angles to the edges of the tape. **Fig. 47**

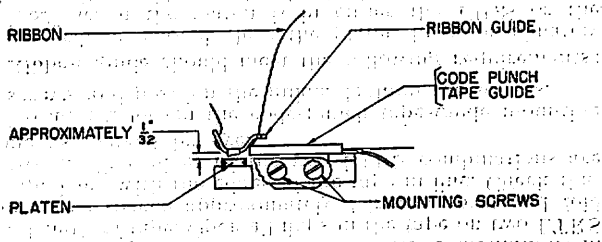

Fig. 47

(a) To gauge, perforate a series of LTRS combinations in a length of tape. Open all flaps in the tape on two LTRS perforations spaced approximately 2 inches apart and fold the tape back with the edges of the tape in line. Check that the two trailing edges of the two LTRS combinations are in line as gauged by eye.

(b) To adjust, loosen the code-punch tape-guide mounting screws and position the guide. Tighten the screws.

2.94 **Ribbon guide** should meet the following requirements:

(a) The ribbon should clear the platen by approximately 1/32" when the platen is in either the FIGS or the LTRS position. The guide should be centered over the platen. **Fig. 47**

(1) To adjust, loosen the ribbon-guide mounting screws and position the guide. Before tightening the screws, check (b).

(b) When fraction type pallets are used it may be necessary to reposition the ribbon guide to insure printing the entire character.

(1) To adjust, add or remove washers between the ribbon guide and the tape guide.

2.95 **Code-Punch Retractor-Springs:** It should require Min. 5-1/2 lb., Max. 8 lb. to start the retractor moving away from the down stops when the punch-arm roller is on the low part of its cam and the selector fingers are in the spacing (extreme right) position. **Fig. 48**

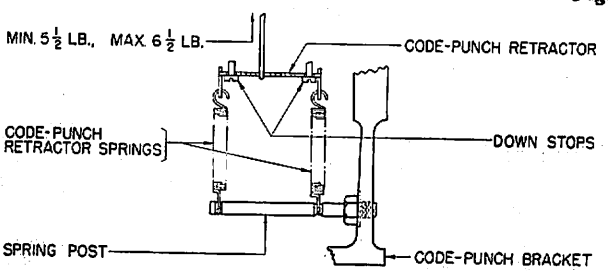

Fig. 48

(a) To gauge, hook the pull end of the scale under the center of the retractor, position the scale until both sides of the retractor leave their stops simultaneously. (This may require placing the scale under the No. 3 pin) and pull vertically upward.

2.96 **Pivoted-Transmitter Bracket:** When the pivoted transmitter is held against the code-punch block, the channel on the pivoted transmitter should be approximately in the same horizontal plane as the tape channel in the code-punch block. Gauge by eye.

(a) To adjust, increase or decrease the number of shims between the pivoted transmitter bracket and the base casting.

2.97 **Pivoted-Transmitter Pilot Screws:** With the sensing shaft in its stop position, the pins in the feed-pin oscillator should be in line with the feed holes in the tape at the point where the tape emerges from the code-punch block. The pivoted transmitter should have a minimum amount of end play without bind. **Fig. 49**

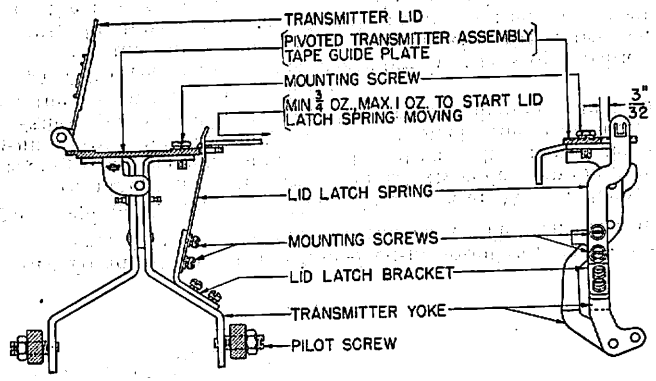

Fig. 49

(a) To adjust, loosen the lock-nuts on the pilot screws and position the screws.

Caution: Do not raise or lower the transmitter lid unless the sensing shaft is in its stop position.

2.98 **Tape-Feed-Pin-Oscillator Backstop Screw:** With the sensing-cam sleeve in the stop position, place a length of tape, which has ten holes to the inch, in the pivoted transmitter. Operate the sensing-cam sleeve slowly until the tape-feed pins leave and are just about to re-enter the tape-feed holes. Under this condition the feed pins should be centered directly beneath the feed holes in the tape. **Fig. 50**

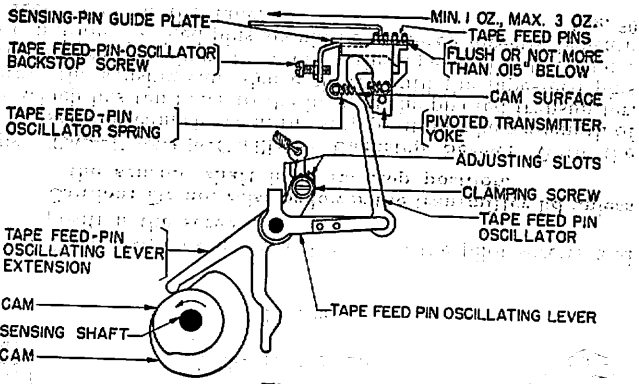

Fig. 50

(a) To adjust, loosen the tape-feed-pin-oscillator backstop-screw lock-nut and position the screw. Tighten the nut.

2.99 **Pivoted-Transmitter Tape-Guide Plate:** With a length of tape, perforated with the LTRS code combination, emerging from the code-punch block and with the pivoted sensing-unit tape-guide touching the punch block, the transmitter tape-guide plate should be adjusted on the pivoted frame to meet the following requirements:

(a) With the sensing-cam assembly in the stop position and the tape-feed holes engaged with the tape-feed pins, the tape should not buckle against either the front or the rear edges of the tape-guide channel. **Fig. 49**

(b) The five sensing pins should line up approximately in the center of the code holes in the LTRS perforated tape, between the hinged edge and the trailing edge and from front to rear.

(1) To gauge:

(a) Move the pivoted transmitter to its midway position, (between its extreme left and right-hand position) raise the tape retaining lid and raise the lids of the perforations over the pins.

(b) Block down the tape-out sensing-pin (rear) and tape holding-pin (front) by inserting a .065" or .070" gauge between the upper prong of their associated "Y" levers and the end of the slot in the guide comb.

(c) Release the sensing shaft clutch lever and turn the motor by hand until the "Y" levers of the five sensing pins are about ready to drop off their cams. In this position, the five sensing pins will have raised slightly above the surface of the tape guide plate and permit checking the requirement.

(2) To adjust:

Loosen the pivoted-transmitter assembly tape-guide plate mounting screws and move the plate from left to right or from front to rear as required while rechecking the foregoing requirements. Check to see that the sensing pins do not touch the edges of their code holes when the pivoted transmitter is (1) one space away from the die block, (2) in its midway position and (3) in the extreme left-hand position. Gauge by rotating the motor slowly by hand and observing the sensing pins when they are lifting up the flaps in the tape. Remove the .065" and .070" gauges. **Fig. 49**

2.100 **Tape Depressing Bail:** With the transmitter lid closed and latched, the tape depressing arm which rides on the pivoted transmitter when the transmitter is not in its left-hand (latched) position, should pass midway between the lid latch spring and the locating stud of the transmitter lid. **Fig. 46**

(a) To adjust, bend the blade of the tape depressing bail.

2.101 **Pivoted-Transmitter-Lid Latch Spring:** With the transmitter lid up, it should require Min. 3/4 oz., Max. 1 oz. to start the flat surface of the latch spring moving away from the tape guide plate. **Fig. 49**

(a) To gauge, hook the pull end of the scale through the latch spring adjacent to, and just above the tape-guide plate and pull at right angles to the spring.

(b) To adjust, bend the lid-latch spring bracket. Care should be exercised to prevent bending the pivoted-transmitter frame.

2.102 **Pivoted-transmitter lid-latch** should be latched by the latch spring with no appreciable play between the lid and the guide plate. There should be a clearance of approximately 3/32" between the left edge of the latch spring and the edge of the slot in the tape-guide plate. **Fig. 49**

(a) To adjust, loosen the lid-latch-spring mounting screws and reposition the spring by means of its enlarged mounting holes. Tighten the screws.

2.103 **Tape Holding-Lever Spring:** It should require Min. 2 oz., Max. 4 oz. to just start the tape-holding lever moving.

(a) To gauge, unlatch and raise the transmitter lid. Rotate the sensing-cam sleeve until the tape-holding lever is in the indent of its cam. Hold the pivoted transmitter in a vertical position and apply the push end of the scale to the pin in the tape-holding lever at the sending unit guide plate and push vertically downward.

2.104 **Y-Lever Pivot Shaft:** With the cam-follower tip on each Y lever resting firmly on the high part of its associated cam, the tip of the sensing finger which is withdrawn the least distance into the sensing-mechanism guide plate should be just flush with or not more than .005" below the surface of the tape channel in the guide plate. Gauge by eye with the pivoted transmitter against the die block, in the center and against left stop. **Fig. 51**

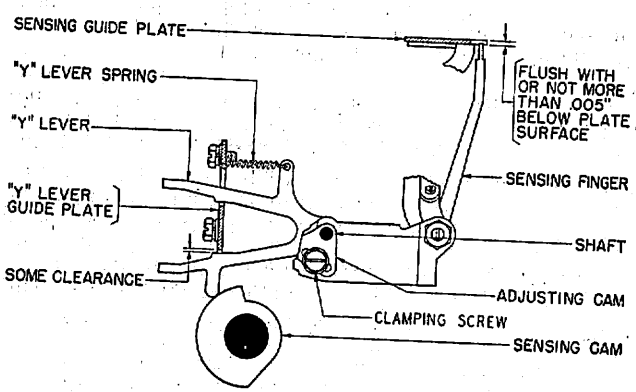

Fig. 51

(a) To adjust, loosen the Y-lever pivot-shaft adjusting cams clamping screws located at each end of the shaft and reposition the adjustable cams. Tighten the clamping screws.

2.105 **Y-Lever-Guide Plate:**

(a) With the cam follower tips of the Y-levers resting on the high part of their associated cams, there should be some clearance between the top edge of the lower arm of the Y-lever and the top of the associated slot. **Fig. 51**

(b) To adjust, position the Y-lever guide plate on its mounting screws in the transfer assembly casting.

(c) The following requirements should be met after the above adjustment has been made:

(1) With the cam-follower tips on the Y-levers opposite the low part of the associated cam and the Y-lever springs unhooked, the Y-levers and sensing pins should move freely in their guides. Rehook the Y-lever springs.

(2) With the cam-follower tips on the Y-levers opposite the low part of their associated cams, the lower edge of the upper arm of the Y-lever should rest firmly in the bottom of the associated guide slot in the guide plate. **Fig. 52**

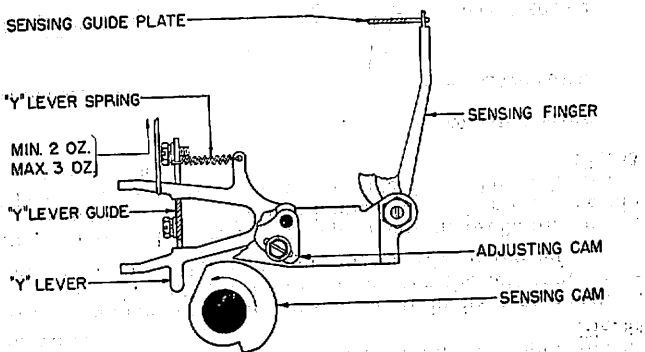

Fig. 52

(3) When the clearance between the top edge of the lower arm of the Y-levers and the top edge of the associated slot is reduced to zero by hand, the sensing pins should not become disengaged from the sensing-pin guide plate.

Note: If any of the foregoing requirements cannot be met, the Y-lever guide plate should be readjusted.

2.106 **Y-Lever Spring:** With the upper arm of the Y-lever resting firmly in the bottom of its slot, it should require Min. 2 oz., Max. 3 oz. to start the "Y" lever moving upward. **Fig. 52**

(a) To gauge, hook the pull end of the scale under the "Y" lever adjacent to the left side of the lever guide and pull upward.

2.107 **Tape Feed-Pin Oscillator:**

(a) The top surface of the tape feed-pin oscillator in which the tape feed-pins mount should rise to a point flush with or not more than .015" below the lower surface of the tape guide channel in the sensing-pin guide plate at any point during the feeding motion from right to left, when the cam-follower tip of the tape feed-pin oscillating-lever extension is riding firmly on the low part of its cam. **Fig. 50**

(b) The tips of the tape feed-pins should clear the tape as the oscillator moves from left to right on the return portion of the tape-feeding cycle when the cam-follower tip on the tape feed-pin oscillating-lever extension is on the high part of its cam.

(1) To adjust, loosen the tape feed-pin oscillating-lever extension clamping screw and position the lever by means of the adjusting slots.

2.108 **Tape Feed-Pin Oscillator Spring:** It should require Min. 1 oz., Max. 3 oz. to start the tape feed-pin oscillator moving. **Fig. 50**

(a) To gauge, with the sensing shaft in its stop position, hook the pull end of the scale over the left tape feed-pin in the oscillator and pull horizontally to the left.

2.109 **Tape-Feed Lever:** The tape feed-pin oscillator should start moving to the left immediately after the tape-pin feed-lever-extension roller starts to ride from the high to the low part of its cam. **Fig. 53**

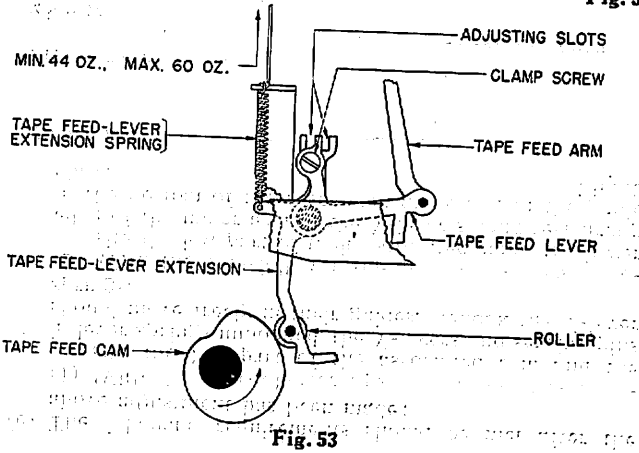

Fig. 53

(a) To adjust, engage the sensing-shaft clutch and rotate the motor by hand until the tape feed-lever extension just starts to move. Change the angular relation between the tape-feed lever and the tape feed-lever extension by loosening the clamping screw and moving the lever in its adjusting slot until the tape-feed lever just starts to move to the left. Tighten the screw. Recheck requirements and readjust if necessary.

2.110 **Tape-Feed-Lever Extension Spring:** It should require Min. 44 oz., Max. 60 oz. to extend the spring to position length with the sensing-cam sleeve in its stop position and the tape-feed-lever extension cam-roller resting on its cam. **Fig. 53**

(a) To gauge, unhook the upper end of the tape-feed-lever extension spring, hook the pull end of the scale through the spring eye and pull upward to position length. Rehook spring.

2.111 **Tape Feed-Pin Oscillating-Lever Extension Spring:** It should require Min. 40 oz., Max. 48 oz. to just start the oscillating lever extension moving when the cam-follower tip of the extension is resting firmly on the high part of its cam. **Fig. 54**

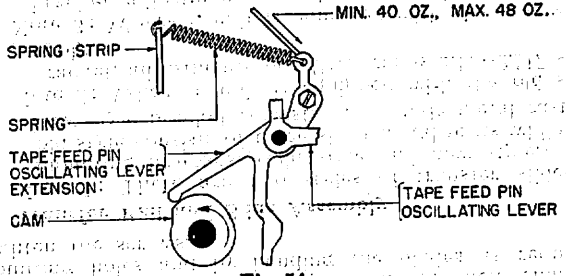

Fig. 54

(a) To gauge, apply the push end of the scale to the extension at the spring hole and push to the right as nearly in line with the spring as possible.

2.112 **Pivoted Transmitter Backstop Screw:** There should be Min. .020", Max. .040" clearance between the latch on the tape-depressing arm and the adjacent latching edge on the transmitter plate with the pivoted transmitter positioned against its backstop screw and the latch on the tape-depressing bail engaged with the transmitter. **Fig. 46**

(a) To adjust, loosen the backstop-screw lock-nut and position the screw. It may be necessary to bend the backstop-screw bracket to obtain this clearance. Tighten the lock-nut.

2.113 **Tape-guide blades** should pass between the tape-out and the No. 1 and between the No. 4 and No. 5 sensing fingers without touching the sensing fingers or the underside of the transmitter frame, as the transmitter pivots from right to left. **Fig. 46**

(a) To adjust, loosen the tape-guide-blade mounting screws and position the blades by means of their enlarged mounting holes and by bending the blades as required. Tighten the screws.

Transfer Bail and Slide Assembly

Note 1: There are two styles of transfer slide-bar mounting brackets. (Old style and new style.) The old style consists of three sheet metal parts while the new style bracket consists of a single metal casting.

Note 2: Where a unit is equipped with the old style bracket, adjustments per Paragraphs 2.114-2.117 shall apply.

Note 3: Where a unit is equipped with the new style bracket, adjustments per Paragraphs 2.118-2.122 shall apply.

Note 4: To check or adjust any of the transfer assembly features per Paragraphs 2.114-2.122 the transfer bail and slide assembly should be removed from the base casting.

2.114 **Lower Transfer-Slide-Bar Eccentric Shaft:** (Old style bracket) (transfer bail and slide assembly removed). The high part of the eccentric shaft should extend forward. **Fig. 55**

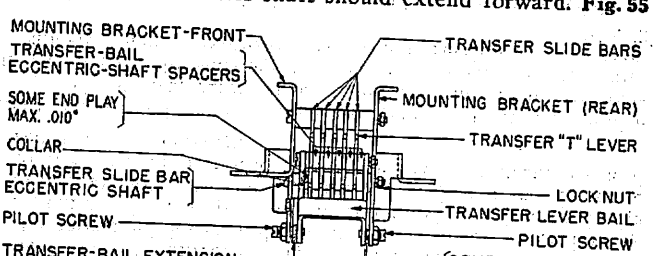

Fig. 55

(a) To adjust, loosen the eccentric-shaft lock-nut located on the rear of the shaft and reposition the shaft. Tighten the nut.

2.115 **Lower Transfer-Slide-Bar Eccentric Shaft Collar:** (Old style bracket) (transfer bail and slide assembly removed). The transfer slides should be perpendicular to their shafts, and move freely in their guides. There should be some end play, not more than .010", between the collar on the lower eccentric shaft and the adjacent slide bar when the play is taken up in a direction away from the collar. **Fig. 55**

(a) To adjust, loosen the collar set screws and position the collar. Tighten the screws.

2.116 **Transfer-Lever Bail:** (Old style bracket) (transfer bail and slide assembly removed). With the bail spring unhooked, the transfer levers should line up centrally with their associated transfer slide bars and the bail should rotate freely on its bearing screws with some end play, not more than .005". **Fig. 55**

(a) To adjust, loosen the lock-nuts on the pilot screws and position the screws. Tighten the nuts.

2.117 **Sensing-Contact Operating-Bails:** (Old style bracket) (transfer bail and slide assembly removed). The sensing-contact operating bails should line up centrally with the associated camming projections on the transfer slide bars. The bails should rotate freely on their shaft with some end play, not more than .005". **Fig. 56**

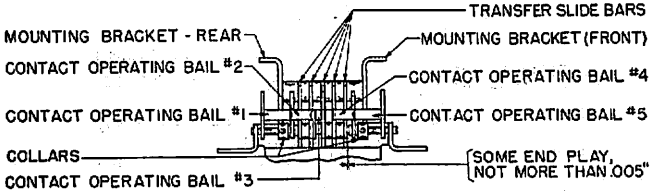

Fig. 56

(a) To adjust, loosen the set screw in one of the set-collars and position the collar against the aligned sensing-contact operating bail. Tighten the set screw. Loosen the set screw and position the other collar for specified clearance, when the play of the levers is taken up against the first collar. Tighten the screw and rehook the spring.

2.118 **Sensing-Contact Operating-Bails:** (New style bracket) (transfer bail and slide assembly removed). The sensing contact operating bails should be centrally located between the casting supports and the bails should rotate freely on their shaft with some end play, not more than .005". **Fig. 57**

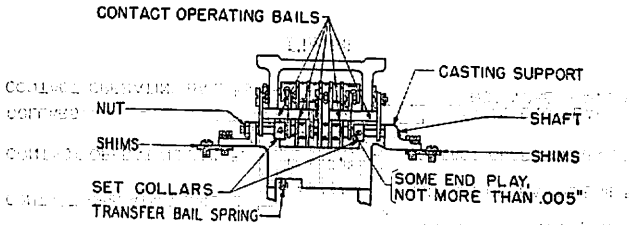

Fig. 57

(a) To adjust, loosen the set screws of one of the collars and centrally locate the entire assembly along its shaft. Tighten the screws on the collar. Loosen the set screws and position the other collar for the specified clearance when the play in the bails is taken up in a direction toward the previously adjusted collar. Tighten the set screws.

2.119 **Lower Transfer Slide-Bar Eccentric-Shaft:** (New style bracket) (transfer bail and slide assembly removed). With the transfer-bail spring unhooked and the lower slide-bar eccentric-shaft collars loose on the shaft, the high part of the lower transfer slide-bar eccentric-shaft should extend down. **Fig. 58**

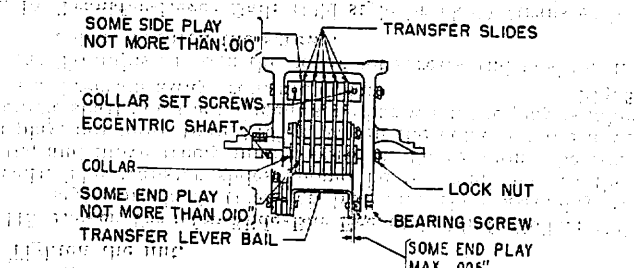

Fig. 58

(a) To adjust, loosen the eccentric-shaft lock-nut located on the rear of the shaft and position the shaft. Tighten the nut.

2.120 **Upper Transfer Slide-Bar-Shaft Collars:** (New style bracket) (transfer bail and slide assembly removed). The transfer slides should line up with their associated sensing-contact operating bails and there should be some end play, not more than .010". **Fig. 58**

(a) To adjust, loosen the set screws of both collars and reposition one collar so that the transfer slides each line up with their associated contact-operating bail when all the slides are held against this collar. Tighten its set screws. Reposition the other collar so that the slide bars move freely and have the specified end play. Tighten its set screws.

2.121 **Lower Transfer Slide-Bar Eccentric-Shaft Collars:** (New style bracket) (transfer bail and slide assembly removed). The transfer slide bars should be perpendicular to their shaft, move freely in their guides and there should be some end play, not more than .010" between the collar on the lower eccentric shaft and the adjacent slide bar when the play is taken up in a direction away from the collar. **Fig. 58**

(a) To adjust, loosen the collar set screws and position the collar. Tighten the screws.

2.122 **Transfer-Lever Bail:** (New style bracket) (transfer bail and slide assembly removed). With the bail spring unhooked, the transfer levers should line up centrally with their associated slide bars and the bail should rotate freely on its bearing screws with some end play. Max. .005". **Fig. 58**

(a) To adjust, loosen the bearing-screws lock-nuts and position the screws. Tighten the nuts and rehook the spring.

2.123 **Transfer Bail and Slide Assembly:** (Preliminary Adjustment.) (Final 2.125.) Rotate the sensing-shaft to its stop position and mount the transfer bail and slide assembly (previously removed) on the base casting. Position the assembly so that the "T" levers line up centrally with the "Y" levers and that there is approximately equal distance between the "T" and "Y" levers on the No. 1 and No. 5 sets of levers. **Fig. 59**

2.124 **Transfer T-Lever Eccentric Shaft:** Loosen the transfer-bail extension adjusting clamp screw. With a piece of tape perforated with the "Y" code combination inserted in the transmitter so that the "Y" character will be selected, trip the sensing-shaft clutch and rotate the motor by hand until the transfer-bail extension roller is on the high part of its cam.

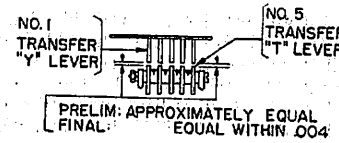

Fig. 59

Hold the roller against the cam and press the transfer bail to the right, manually, until the transfer slides move against their stops. **Do not jam.** Under this condition, at least one slide lever should be moved upward against its stop and at least one which is moved downward should also be against its stop. Tighten the transfer-bail extension clamp screw. **Fig. 60**

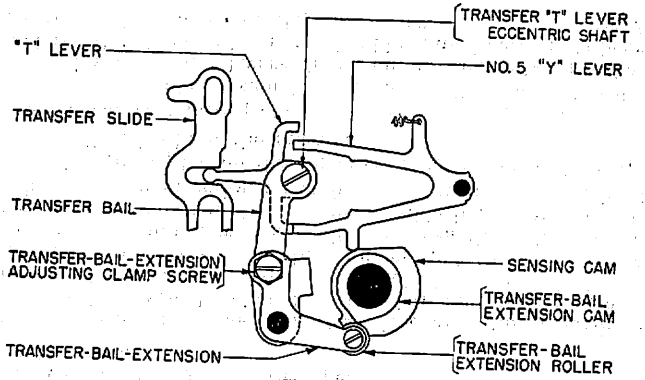

Fig. 60

(a) To adjust, loosen the transfer "T" lever eccentric-shaft lock-nut and position the shaft, keeping the high part of the eccentric shaft to the right. Tighten the nut.

2.125 **Transfer Bail and Slide Assembly:** (Final Adjustment.) (Preliminary 2.123.)

(a) With the "R" code combination set up on the "Y" transfer levers and the transfer-bail extension roller on the high part of its cam, there should be equal clearance, within .010", between the "T" lever and the "Y" levers when measured between the top prongs of the No. 4 set of levers and the bottom prongs of the No. 5 set of levers. **Fig. 61**

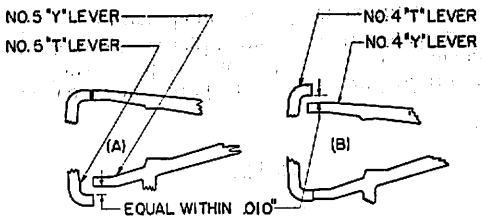

Fig. 61

(1) To adjust, add or remove shims equally under the three legs of the transfer-bail assembly bracket.

(b) With the sensing shaft in its stop position, there should be equal clearance, within .004" between the ends of the "T" and "Y" levers when measured between the top prongs of the No. 1 and No. 5 sets of levers. **Fig. 59**

(1) To adjust, loosen the transfer-bail bracket mounting screws and position the bracket. Tighten the screws.

2.126 **Transfer-Bail-Extension and Lower Transfer-Slide-Bar Eccentric Shaft:** (Final Adjustment.)

(a) Insert a length of tape perforated with the "R" code combination in the pivoted transmitter, trip the sensing clutch and rotate the motor by hand until the transfer-bail extension roller is on the high part of its cam and the "R" combination is set up on the "Y" levers. There should be some clearance, not more than .006" between the ends of the upper prongs of the No. 1 and the No. 5 "T" and "Y" levers when the play in the transfer slides is taken up in a direction to make this clearance a maximum. **Fig. 61A**

(1) To adjust, loosen the transfer-bail extension clamp screw and position the extension by means of its elongated hole. Tighten the screw. **Fig. 60**

(b) Insert a length of tape perforated with the "BLANK" code combination in the pivoted transmitter, trip the sensing clutch and rotate the motor by hand until the transfer-bail extension-roller is on the high part of its cam. With the play in the transfer slides taken up in a direction to make the clearance a maximum, there should be some clearance, not more than .010", between the closest set of "T" and "Y" levers. If necessary, loosen the lock-nut and refine the "T" lever eccentric shaft adjustment (2.125) keeping the

high part of the shaft to the right. Tighten the nut and recheck (a). **Fig. 61A**

2.127 **Transfer-Bail Spring:** It should require Min. 9 oz., Max. 11 oz. to just start the bail moving when the sensing shaft is in the stop position.

(a) To gauge, rotate the sensing contact levers out of the way and apply the push end of the scale to one of the spacers on the transfer "T" lever eccentric shaft and push horizontally to the right. **Fig. 60**

2.128 **Distributor contacts** should meet the following requirements with the distributor contact levers on the high part of their cams.

Note 1: The TP121550 bending tool should be used for adjusting the contact springs.

Note 2: Bakelite tips should be centrally aligned with their respective operating levers and opposing contacts should be centrally aligned with each other.

(a) It should require Min. 1/2 oz., Max. 1-1/2 oz. to just start the short contact springs moving away from the contact levers. **Fig. 62**

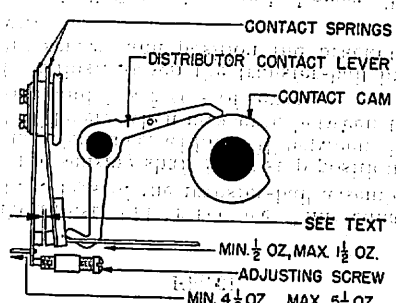

Fig. 62

(1) To gauge, apply the push end of the scale to the lower end of each short contact spring and push horizontally at right angles to the spring.

(2) To adjust, bend the short contact springs.

(b) There should be Min. .015", Max. .020" gap between the contact points. **Fig. 62**

(1) To adjust, position the adjusting screws.

Note: When a 1A TTY Test Set is available the contact gap in (b) of Paragraph 2.128 may be checked in the following manner:

(a) With the light image of the STOP impulse lined up with the zero mark on the stop segment of the stroboscope test scale, adjust the stop contact gap of the unit by means of its adjusting screw so that the end of the light image lines up with the 142 mark (plus or minus one division) on the stop segment scale. Adjust the line transmitting contacts gap by means of the adjusting screws until their light images are equal within plus or minus one division of the length of their respective segments on the stroboscope scale.

(b) With the START pulse zero indication on the stroboscope scale in line with the end of the STOP impulse light image, see that the beginning and ends of the light images of all five transmitting contact images are within five divisions of their segment length on their respective stroboscope scale lengths. If the signals do not meet these requirements, refine the contact gap adjustment.

Note: In order to meet the above requirements the contact gap may be reduced to a minimum of .010", if necessary, or increased to exceed the .020" maximum limit of adjustment.

(c) With the pull end of the scale hooked over the end of the long contact springs and pulled horizontally to the left, it should require Min. 4-1/2 oz., Max. 5-1/2 oz. to start the contact springs moving away from the adjusting screws. **Fig. 62**

(1) To adjust, bend the long contact springs and recheck requirement (b).

(d) It should require Min. 8 oz., Max. 10 oz. to start a lever moving with the short contact spring held clear of the lever. **Fig. 63**

(1) To gauge, hook the pull end of the scale over the contact lever just above its lower hooked portion and pull away from the contact spring.

(2) To adjust, loosen the nut holding the spring bracket to the casting and position the bracket. Tighten the nut.

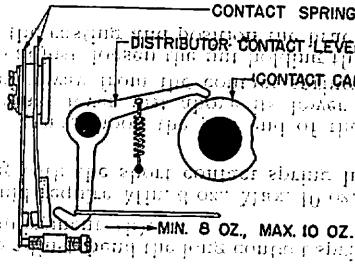

Fig. 63

2.129 **Transmitter auxiliary contact** should meet the following requirements:

Note: Bakelite tips should be centrally aligned with their respective operating levers and opposing contact should be centrally aligned with each other.

(a) It should require Min. 1/2 oz., Max. 1-1/2 oz. to just separate the short spring contact from the long spring contact when the bakelite tip of the long contact spring is resting against the transmitter auxiliary contact lever and the lever is resting against the high part of its cam. **Fig. 64**

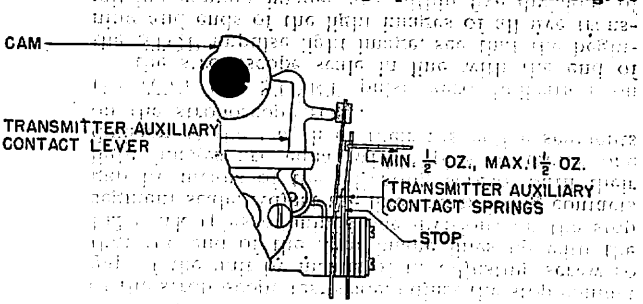

Fig. 64

(1) To gauge, trip the sensing clutch and rotate the motor by hand until the contact lever operates the long contact spring. Hook the pull end of the scale behind the short contact spring at the contact and pull horizontally to the right.

(2) To adjust, bend either or both sides of the short contact spring making sure to maintain a slight clearance between the springs and their stops. Fig. 65

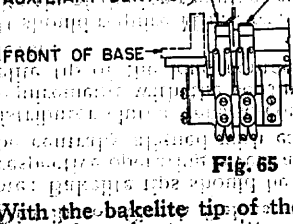

Fig. 65

(b) With the bakelite tip of the long contact spring resting against the transmitter auxiliary contact lever and the lever resting on the low part of its cam, it should require Min. 1-1/2 oz., Max. 2-1/2 oz. to move the bakelite tip away from the auxiliary lever. Fig. 66

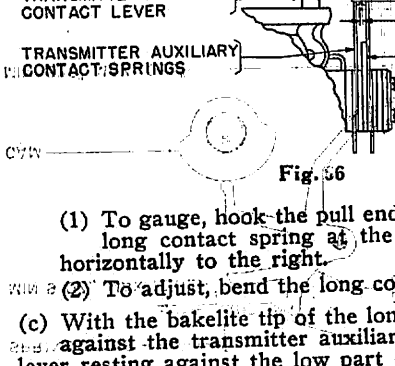

Fig. 66

(1) To gauge, hook the pull end of the scale behind the long contact spring at the contact point and pull horizontally to the right.

(2) To adjust, bend the long contact spring.

(c) With the bakelite tip of the long contact spring resting against the transmitter auxiliary contact lever and the lever resting against the low part of its cam, there should be a gap of Min. .015", Max. .020" between the two sets of contacts. Fig. 66

(1) To adjust, bend the short contact spring stop. Recheck (a).

2.130 **Distributor - Clutch Release - Contact - Lever Spring:** It should require Min. 9 oz., Max. 12 oz. to pull the spring to position length with the distributor-clutch-release contact lever resting on the high part of its cam. **Fig. 67**

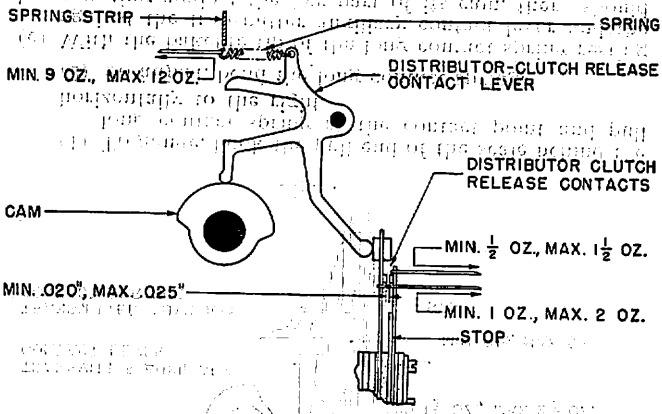

Fig. 67

(a) To gauge, unhook the spring from the spring strip and hook the pull end of the scale through the spring eye and pull toward the spring-mounting hole. Rehook the spring.

2.131 **Distributor-Clutch Release-Contact:**

Note: Bakelite tips should be centrally aligned with their respective operating levers and opposing contacts should be centrally aligned with each other.

The distributor-clutch release-contact should meet the following requirements with the sensing shaft in the stop position and bakelite tip of the long contact spring resting against its contact lever:

(a) It should require Min. 1 oz., Max. 2 oz. to start the bakelite tip of the long contact spring moving away from the contact lever. **Fig. 67**

(1) To gauge, hook the pull end of the scale behind the long contact spring at the contact and pull to the right.

(2) To adjust, bend the long contact spring.

(b) There should be Min. .020", Max. .025" gap between the contact points. **Fig. 67**

(1) To adjust, bend the stop adjacent to the short contact springs.

(c) It should require Min. 1/2 oz., Max. 1-1/2 oz. to just start each short contact spring moving away from its stop. **Fig. 67**

(1) To gauge, hook the pull end of the scale behind the short contact springs at the contact and pull to the right.

(2) To adjust, bend the short contact springs. Recheck (b).

(d) There should be some clearance between the short contact springs and their stops when the contact levers are opposite the low part of the cam and the contacts are closed. **Fig. 67**

(1) If there is no clearance, refine (b).

2.132 **Tape-Out Sensing-Lever Spring:** It should require Min. 7 oz., Max. 8 oz. to pull the spring to position length with the tape-out sensing lever on the high part of its cam. **Fig. 68**

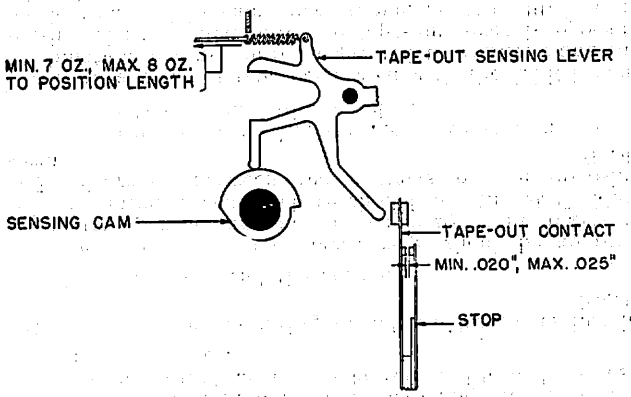

Fig. 68

(a) To gauge, unhook the tape-out sensing-lever spring from the spring bracket, hook the pull end of the scale through the spring eye and pull to position length.

2.133 **Tape-Out Contacts**

(a) Remove the tape chute.

Note 1: Bakelite tips should be centrally aligned with their operating levers and opposing contacts should be centrally aligned with each other.

Note 2: The tape-out contact assembly, together with its mounting bracket may be removed to make adjustment (b & c).

(b) The short contact spring should rest lightly against its stop. **Fig. 68**

(1) To adjust, bend the spring.

(c) The long and short contact springs should be approximately parallel and at approximately right angles to their mounting bracket. There should be Min. .020", Max. .025" clearance between the contacts of the opposing springs. **Fig. 68**

(1) To adjust, bend the springs or short spring stop. Replace the mounting bracket.

(d) With a piece of tape perforated with the LTRS combination, inserted into the pivoted transmitter, and the sensing shaft rotated until the tape-out lever is opposite the low part of its cam, there should be Min. .010", Max. .030" clearance between the insulator on the long contact spring and the tip of the tape-out lever. **Fig. 69**

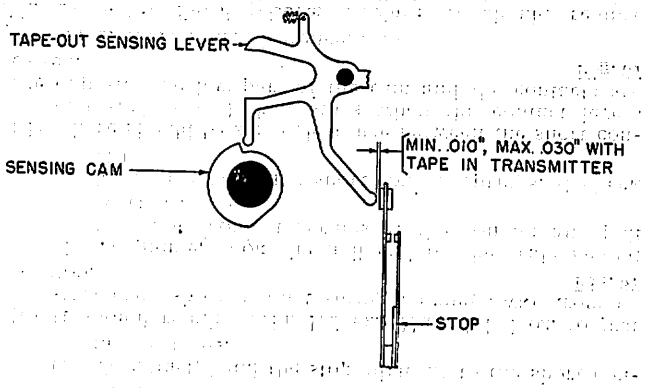

Fig. 69

(1) To adjust, loosen contact mounting bracket screws and position the bracket as required. Tighten screws and replace the tape chute. Check that with the tape removed from the transmitter, the contacts are closed and that the short springs are not resting against their stop.

2.134 **Transmitter-Stop Contact** (Tape Chute Off)

Note: Bakelite tips should be centrally aligned with their operating levers and opposing contacts should be centrally aligned with each other.

(a) With the short contact spring tensioned against its backstop and aligned so that it is parallel to its mounting bracket, it should require Min. 1/4 oz., Max. 1/2 oz. to just open the contacts. **Fig. 70**

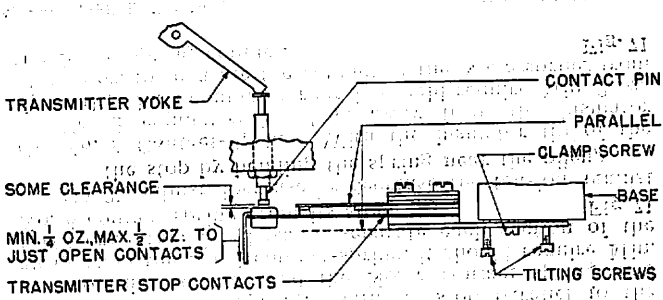

Fig. 70

(1) To gauge, hook the pull end of the scale over the end of the long contact spring and pull at right angles to the spring mounting.

(2) To adjust, bend the long contact spring.

(b) With a length of perforated tape emerging from the code-punch mechanism and engaged in the pivoted transmitter, the contact should be closed with some clearance between the insulated tip on the long contact spring and the lower end of the contact pin when the next to the last character on the tape is being sensed by the selector pins. With the last character in the tape being sensed, the contacts should be open and there should be Min. .010" clearance between the contacts. **Fig. 70**

(1) To adjust, loosen the contact-assembly bracket clamp screw and position the bracket by means of of the two tilting screws. Tighten the clamp screw and remount the tape chute.

2.135 **Universal Contacts**

Note 1: Bakelite tips should be centrally aligned with their operating levers and opposing contacts should be centrally aligned with each other.

Note 2: When measuring the tension values in the following requirements, the scale should be applied beside the spring contact and at a right angle to the spring. These springs are bifurcated and requirements apply to each side of the spring.

Note 3: To facilitate adjustment, the universal contact assembly and its bracket may be removed from the base casting.

(a) **No. 4 Contact-Spring:** With its stop parallel to the mounting surface and the No. 5 contact spring held away from the No. 4 contact-spring, it should require Min. 1-1/2 oz., Max. 2-1/2 oz. to separate each section of the No. 4 contact-spring from its stop. **Fig. 71**

(1) To adjust, increase or decrease the tension against the stop by bending the spring near the pileup.

(b) **No. 5 Contact-Spring:** With the insulator tip of the No. 2 contact-spring held away from the insulator tip of the No. 5 contact-spring, it should require Min. 2 oz., Max. 3 oz. to separate the contact of the No. 5 spring from the No. 4 spring contact. **Fig. 71**

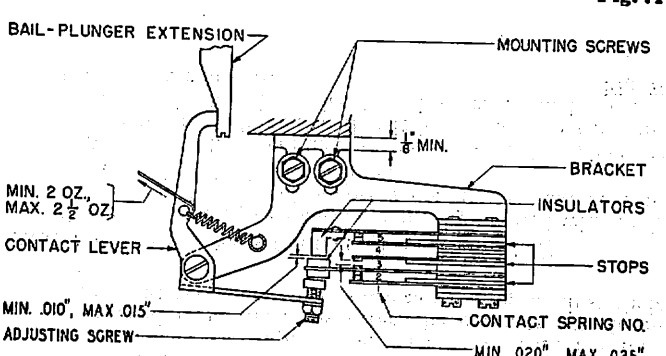

Fig. 71

(1) To adjust, bend the No. 5 contact-spring near the pileup.

(c) **No. 1 Contact-Spring:** With its stop parallel to the mounting surface and the No. 2 contact held away from the No. 1 contact, it should require Min. 1-1/2 oz., Max. 2-1/2 oz. to separate the No. 1 contact spring from its stop. **Fig. 71**

(1) To adjust, increase or decrease the tension against the stop by bending the spring near the pileup.

(d) **No. 2 Contact-Spring:**

(1) With the No. 5 contact-spring tip insulator blocked away from the No. 2 contact-spring tip insulator and, if necessary, the No. 3 spring-contact held away, it should require Min. 2 oz., Max. 3 oz. to separate the No. 2 and No. 1 contacts. **Fig. 71**

(a) To adjust, bend the No. 2 spring.

(2) With the No. 5 spring returned to its unoperated position, there should be a clearance of Min. .010", Max. .015" between the No. 5 and No. 2 contact-spring tip insulators.

(a) To adjust, bend the No. 2 contact-spring between the contact and the tip insulator.

(e) **No. 3 Contact-Spring:**

(1) It should require Min. 1 oz., Max. 2 oz. to separate the No. 3 contact-spring from its stop. **Fig. 71**

(a) To adjust, increase or decrease the tension against the stop by bending the spring near the pileup.

(2) When the No. 2 and No. 1 spring-contacts are making, there should be a clearance of Min. .020", Max. .025" between the No. 3 and No. 2 spring-contacts.

(a) To adjust, increase or decrease the clearance by simultaneously bending the No. 3 contact-spring and its stop. Recheck (e1).

Note: Remount the universal contact assembly on the base bracket. There should be at least 1/8" clearance between the top edge of the universal contact bracket and the milled section on the base casting. **Fig. 71**

(f) **No. 5 Spring-Contact Clearance (Operated Position)**

(1) With the contact-lever of the universal contact assembly on the high camming surface of the bail-plunger extension, there should be a clearance of Min.

.020", Max. .025" between the No. 5 and No. 4 spring-contacts. **Fig. 71**

(a) To adjust, reposition the universal-contact adjusting screw.

(g) **Contact Bracket:**

(1) Rotate the motor by hand until the bail rises to within .020" to .080" of the notch in the pull-bars. The No. 4 and No. 5 spring-contacts should just make at this point.

(a) To adjust, raise or lower the universal contact-bracket in its slotted mounting holes. (Determine with a test lamp and recheck (f).)

2.136 **Universal Contact-Lever Spring:** It should require Min. 2 oz., Max. 2-1/2 oz. to pull the spring to position length when the universal contact lever is resting on the high camming surface of the bail-plunger extension. **Fig. 71**

(a) To gauge, unhook the universal contact-lever spring from the contact-lever and hook the pull end of the scale through the spring eye and pull in line with the spring hole to position length. Rehook spring.

2.137 **Punch-Bail-Arm Spring:** It should require Min. 6 lb., Max. 7 lb. to start the punch bail-arm roller moving away from its cam when the roller is resting on the low part of the cam. **Fig. 72**

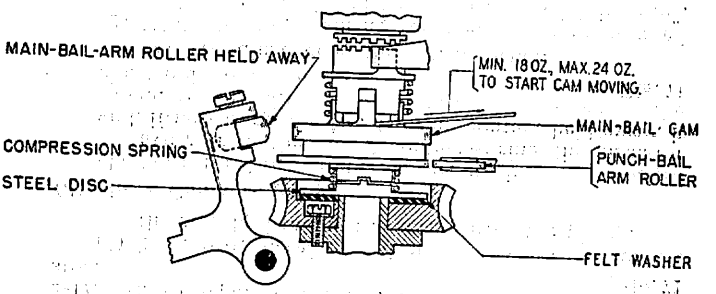

Fig. 72

(a) To gauge, hook the pull end of the scale over the punch-bail arm at the roller and pull at right angles to the arm.

2.138 **Distributor and sensing-clutch throwout-lever springs** should meet the following requirements with the throwout levers on the low part of the clutch cam and the clutch teeth engaged. **Fig. 39**

(a) It should require Min. 3 oz., Max. 5 oz. to just start the lower throwout lever moving.

(1) To gauge, apply the push end of the scale to the bottom edge of the lower armature and push as nearly horizontal as possible.

(b) It should require Min. 5 oz., Max. 7 oz. to just start the upper throwout lever moving.

(1) To gauge, hook the pull end of the scale over the upper throwout-lever spring arm at the spring and pull as nearly horizontal as possible.

2.139 **Distributor and Sensing-Clutch Detent-Levers Spring:** It should require Min. 1-3/4 oz., Max. 3 oz. to just start each detent lever moving.

(a) To gauge, hook the pull end of the scale over the detent levers at the rollers and pull at right angles to the levers.

2.140 **Mail-Bail Spring:** (Final Adjustment) (Preliminary 2.42)

Note: The force with which the type bars strike the platen, is regulated by the main-bail spring adjusting screw.

(a) With the motor running, send alternate LTRS and FIGS signals to the reperforator transmitter unit. Loosen the main-bail spring adjusting screw lock-nut and back off the main-bail spring adjusting screw until the platen fails to return to the LTRS position. Then, turn the adjusting screw in a clockwise direction until the platen just changes from the LETTERS and FIGURES positions without failure. Turn the adjusting screw an additional 1-1/2 turns clockwise and tighten the lock-nut. **Fig. 28**

(b) With the main shaft clutch disengaged, hook the scale under the main-bail spring tension adjusting lever at the spring hole and pull in line with the spring.

(1) It should require Max. 15-1/2 lb. to start the lever moving.

2.141 **Main-Bail Cam Clutch-Torque:**

Note: The clutch-torque should be measured after the motor has been running at least 10 minutes with the main-bail cam remaining stationary.

(a) Press downward on the main bail so as to move the main-bail roller away from its cam. At the same time, hold the cam lever roller and the punch-bail arm roller away from their cams.

(1) Hook the scale in the screw hole on top of the main-bail cam and pull at a right angle to the radius. It should require Min. 18 oz., Max. 24 oz. to start the cam moving opposite to its normal direction of rotation. **Fig. 72**

2.142 **Selector Clutch Torque:**

Note 1: For field maintenance purposes, the torque may drop to 12 oz. Min. before readjustments or replacements of parts are required.

Note 2: The clutch torque should be measured after the motor has been running at least 10 minutes with the selector cam sleeve remaining stationary.

(a) Hook and pull end of the scale over the selector cam sleeve stop arm. It should require Min. 14 oz., Max. 18 oz. to hold the cam sleeve stationary. **Fig. 73**

(1) The clutch torque depends upon the condition of the felt friction washers and the friction clutch spring. When the torque requirement cannot be met, shims may be added at the lower end of the friction clutch spring to increase the spring pressure. However, it may be necessary to replace the friction washers if they are worn or have become hardened.

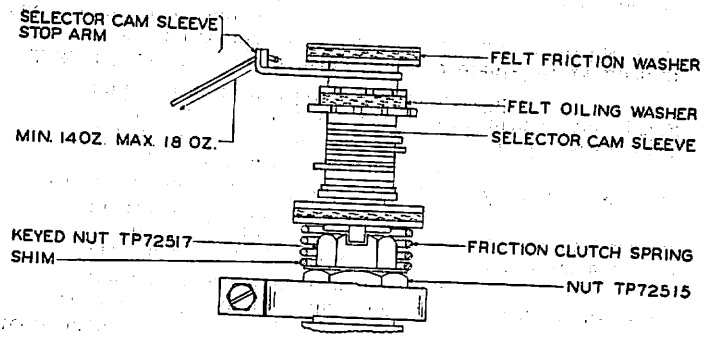

Fig. 73

Shim Parts

TP96763 shim (.012" thick)
TP96764 shim (.016" thick)
TP96765 shim (.020" thick)

(2) When the unit is equipped with a keyed nut and capstan nut, the pressure of the clutch may be increased or decreased by turning the capstan nut with a screwdriver. **Fig. 74**

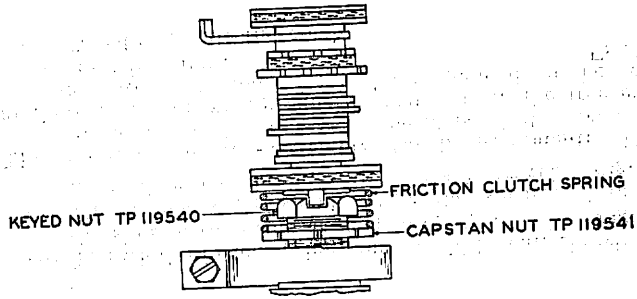

Fig. 74

Note 3: When the unit is not equipped with a keyed nut (TP119540) and a capstan nut (TP-119541) and new felt friction washers and shims do not allow the requirement to be met, a keyed nut (TP119540) and capstan nut (TP119541) should be installed to replace the keyed nut (TP72517) and nut (TP72515).

Sensing Contacts (2.143-2.147)

Note 1: To facilitate checking the sending control-contacts, the entire assembly may be removed from the base to the extent of the slack in the cable connected to the contact terminals.

Caution: The sensing contact assembly is pre-heated and the clamping screws tightened under pressure at the factory. When for any reason the screws become loosened, they should be tightened with a torque of 20 inch pounds. This may be accomplished by applying a 5 pound pull at the end of a 4" offset screwdriver.

Note 2: The 505A and 507A adjusting tools should be used for bending the sensing contact springs. The 68B or 70D gram gauge should be used for checking the spring tensions of sensing contact springs.

2.143 **Sensing-Contact and Spring-Tang Alignment:**

(a) The alignment of all contacts should be within the limits indicated in Fig. 75 as gauged by eye. **Fig. 75**

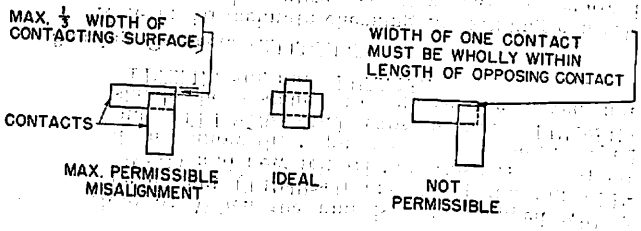

Fig. 75

(b) The width of each spring tang should lie entirely within the slots in the comb as gauged by eye. **Fig. 76**

(c) The spring studs should clear the springs through which they pass in all positions of stud travel. **Fig. 76**

2.144 **Sensing - Contact - Assembly Comb Alignment:** The spring tangs should rest in the slots of the comb so that there is approximately equal clearance from the free end of the tang to the bottom of the slot as gauged on the two end springs with tangs. **Fig. 76**

(a) To adjust, shift the comb.

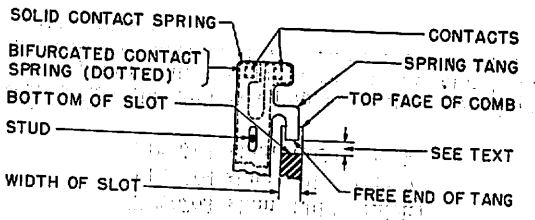

Fig. 76

2.145 **Sensing-Contact Springs:**

(a) All contact springs should be tensioned toward the narrow end of the comb so that they exert some tension against the adjacent contact spring, comb, etc.

(b) Unless otherwise specified, the tension should be measured with the springs in the normal unoperated position.

(c) Both sections of the bifurcated springs should be in alignment with each other so that the contacts on the bifurcated springs make or break with their opposing contacts at approximately the same time.

(d) A spring which is tensioned against the comb, or an opposing spring or a stud, should register the required tension just as the tang leaves the comb, just as the contacts break or just as it leaves the stud.

(e) When gauging tensions on solid springs, the gauge should be applied near the end of the springs just in front of the contacts.

(f) When checking tension on swingers, the gauge should be applied at the end of both parts of the bifurcated springs just above the contacts.

(g) There should be a clearance between adjacent springs, whether in operated or unoperated position, of at least .008" as gauged by eye.

(h) Refer to Fig. 77 for position and number of contacts which apply in the following adjustments:

(1) The tangs of the heavy contact springs (Nos. 1, 3, 5, 6, 8, 9, 11 and 12) should be in alignment with the main body of the springs before starting adjustments.

(a) To adjust, bend the tangs.

(2) It should require Min. 30 grams, Max. 50 grams to just move the tang away from the comb. On springs 5, 8 and 11, the opposing springs should be held clear by pressing the right-hand stud to the left.

(a) To adjust, bend the contact springs.

(3) Contact spring No. 2 should be tensioned toward the right so that its stud is in contact with the No. 4 spring and it should require Min. 6 grams, Max. 12 grams to move the spring to a point where its stud just leaves the No. 4 spring.

(a) To adjust, bend the No. 2 spring.

(4) It should require Min. 18 grams, Max. 25 grams to just move the No. 4 spring contact clear of its opposing contact with the stud of the No. 2 spring resting against the No. 4 spring.

(a) To adjust, bend the No. 4 spring.

(5) It should require Min. 18 grams, Max. 25 grams to just move the No. 7 spring contact clear of its opposing contact (No. 8) and there should be some clearance, not more than .003" between the stud of the No. 7 spring and the No. 4 spring.

(a) To adjust, bend and bow the No. 7 spring. If further refinements are necessary, the tang on the No. 8 spring may be bent slightly and the tension rechecked.

Note: When making the foregoing adjustment, some clearance should be maintained between the No. 10 spring and the stud on the No. 7 spring. Hold the No. 10 spring away by hand.

(6) It should require Min. 18 grams, Max. 25 grams to just move the No. 10 spring contact clear of its opposing contact (No. 11) and there should be some clearance, not more than .003", between the stud of the No. 7 spring and the No. 10 spring.

(a) To adjust, bend and bow the No. 10 spring. If further refinements are necessary, the tang on the No. 11 spring may be bent slightly.

2.146 **Sensing-Contact Spring-Pileup Alignment:**

(a) (Preliminary) There should be Min. .010", Max. .015" gap between the stud on the No. 13 spring and the No. 10 spring on the No. 1 and No. 5 contact-pileup assemblies, with the transfer-slides in the spacing (lower) position and the slots in all the contact operating-bail-eccentrics in a vertical position (high side up or down whichever gives the fullest engagement between the end of the plunger and the curvature of the eccentric).

(1) To adjust, loosen the two eccentric-stop mounting screws and rotate the eccentrics away from the brackets. Loosen the contact-bracket mounting screws and shift the bracket. Tighten the mounting screws. Rotate the eccentrics so that they touch the bracket and tighten the eccentric mounting screws. This is a preliminary adjustment.

(b) The right-hand stud on each pileup should be centrally aligned with its associated contact-bail eccentric.

(1) To adjust, align each contact pileup by means of its mounting screws and enlarged holes in the mounting plate.

(c) There should be Min. .005", Max. .015" clearance between the stud of the No. 13 contact spring and the No. 10 contact spring on each of pileups 2, 3 and 4.

(1) To adjust, reposition the contact-bail eccentrics.

(d) With the transfer slides in their SPACING (lower) position, spring No. 13, in each pileup should require Min. 18 grams, Max. 25 grams to move, just as the stud leaves the slide lever eccentric.

(1) To adjust, bend and bow the No. 13 spring.

(e) With the slide levers in their SPACING (lower) position, adjacent spring contacts Nos. 1 and 2, 3 and 4, 6 and 7, 9 and 10, 12 and 13, should make contact when a .035" gauge is inserted between the transfer slide eccentrics and their respective studs. The same spring contacts should not make contact when a .025" gauge is inserted between the transfer slide eccentrics and their respective studs.

Fig. 77

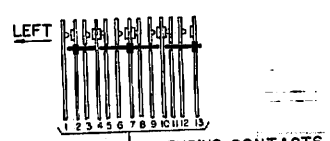

Fig. 77

(1) To adjust, bend the tangs on springs Nos. 1, 3, 6, 9 and 12 and recheck the requirements per Paragraphs 2.145 (h) (2), (h) (3), (h) (4), (h) (5) and (h) (6).

(f) With the slide levers in their spacing (lower) position, there should be at least .008" clearance between the contacts of the light contact springs and the contacts of their associated left-hand heavy springs. With the slide levers in the marking (upper) positions, there should be at least .008" clearance between the contacts of the light springs and the contacts of their associated right-hand heavy springs.

(g) With the slide levers in the marking position, move the heavy left-hand contact springs away from their stops or from the light springs and note that there is some follow of the light contact springs.

2.147 **Tape-Feed Indicator-Contact Assembly:**

(a) The formed portion of the tape-contact lever which follows the tape loop, between the prepunch and the code-punch mechanisms, should be slightly to the front of the tape feed holes or approximately in the center of the tape. **Fig. 78A**

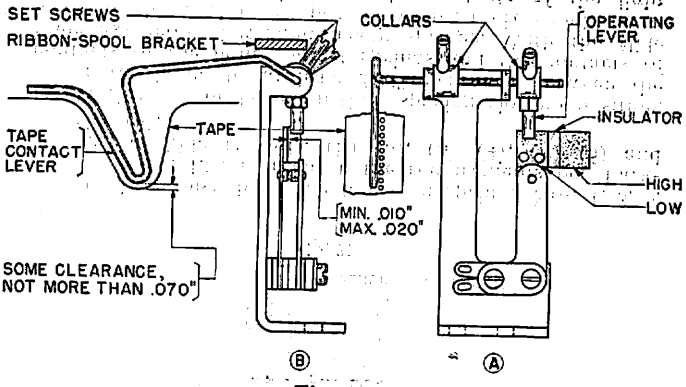

Fig. 78

(b) With the tape held against the tape guides, there should be some clearance, not more than .070" between the tape and the formed part of the tape-contact lever at the bottom of the loop. **Fig. 78B**

(1) To adjust for requirements (a) and (b), position the collar on the tape contact lever between the ears of the contact bracket. The set-screw post in the collar acts as a backstop against the ribbon-spool bracket for controlling the clearance between the lever and the tape, and also to clamp the tape contact-lever in the collar. The collar also acts as a front stop against the inside of the bracket front ear to control the central position of the tape contact-lever on the tape. (When necessary, bend the tape contact-lever for proper clearance between the tape and the lever.)

(c) With the tape-lever arm in its central position on the tape and the contact spring operating lever on the low part of the insulator on the long contact spring, there should be Min. .010", Max. .020" clearance between the contact spring operating lever and the insulator. **Fig. 78B**

(1) To adjust, loosen the rear collar set-screw post so that the collar will be friction-tight on the tape contact lever. The collar holding the contact spring operating lever can then be positioned to give proper clearance between the operating lever and the insulator. Tighten the set screw.

(d) When the tape-contact lever is pushed to its rearmost position and the contact-spring operating lever is on the high part of the insulator on the long contact spring, there should be at least .015" gap between the contacts of the long and short springs.

(1) To adjust, bend the short heavy contact spring. Recheck (c).

(e) It should require Min. 2 oz., Max. 3 oz. to just separate the contacts with the tape-contact lever in the center of the tape.

(1) To gauge, apply the push end of the scale to the insulator on the long contact spring at a point between the rivets and push horizontally at right angles to the spring.

(2) To adjust, bend the long contact spring.