

TRAFFIC AND PLANT REGISTERS 5- AND 12-TYPES REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers 5 and 12 type traffic and plant registers.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 Reference shall be made to Section 020-010-711 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

*1.04 **Asterisk** — Requirements are marked with an asterisk (*) when to check for them would necessitate the dismantling or dismantling of apparatus, or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons or its performance indicates that such a check is advisable.

1.05 **Operate** — A register is said to operate if, when current is connected to its winding.

(1) **Registers having no contacts**, the armature adjusting screw touches the front stop

(2) **Registers having contacts**, the operating spring touches the front stop (for break contact registers) or the front contact (for make contact registers).

1.06 **Non-Operate** — A register is said to non-operate, if when current is connected to its winding, the armature does not move away from the armature backstop rod.

1.07 **Release** — A register is said to release when the armature moves from its operated position to its normal position against the armature backstop rod.

1.08 **Hold** — A register is said to hold if, after it has operated and the current through its winding is reduced abruptly the armature does not move from its operated position.

2. REQUIREMENTS

2.01 **Cleaning** — Contacts shall be cleaned, when necessary, in accordance with the section covering cleaning of relay contacts and parts.

2.02 **Operating Pawl Position**

(a) Figs. 1(A) and 2(A) — With the register electrically operated there shall be a slight clearance between the operating pawl and the overthrow stop. This will permit a slight backward and forward movement of the units wheel. This backward and forward movement shall not be sufficient to permit the top of any figure to lie above the top edge of the cap window or the bottom of any figure to lie below the bottom edge of the cap window. This requirement shall be met on every tooth of the ratchet wheel. Gauge by eye.

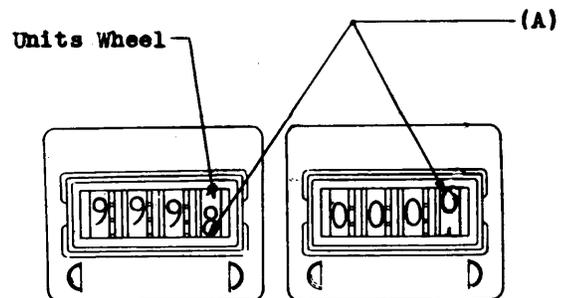


Fig. 1 — Alignment of Number Wheels

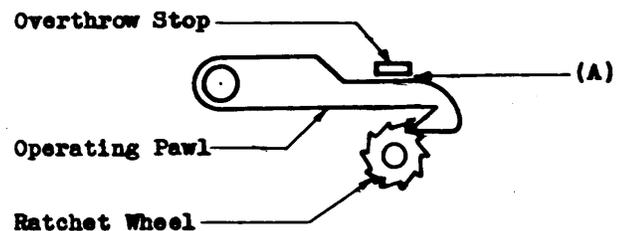


Fig. 2 — Operating Pawl Position

(b) Fig. 3(A): With the register electrically operated and with the play in the operating pawl bearings taken up to the right, not more than 1/4 the width of the operating pawl shall extend beyond the right hand face of the ratchet wheel. This requirement shall be met on all teeth of the ratchet wheel. Gauge by eye.

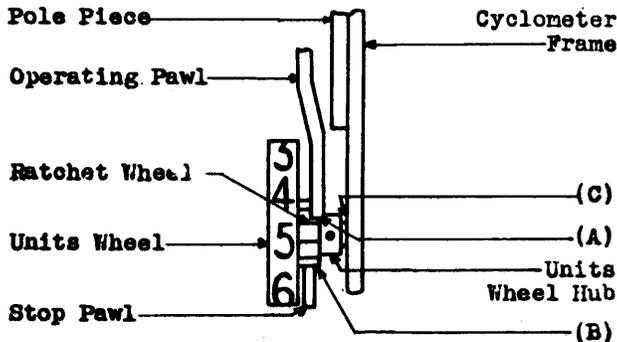


Fig. 3 - Position of Operating and Stop Pawls

(c) Fig. 3(A) and (B) — With the armature released slowly by hand and with the clearance between a tooth on the ratchet wheel and the stop pawl taken up, the tip of the operating pawl shall drop into its normal position in front of a tooth on the ratchet wheel. This requirement shall be met on every tooth of the ratchet wheel.

2.03 Stop Pawl Position: Fig. 3(B)

(a) With the register electrically operated, the stop pawl shall drop into its normal position behind the teeth of the ratchet wheel.

(b) 12-type registers — With the armature in the operated position and the units wheel turned in a backward direction to take up the play, it shall be possible while releasing the armature to turn the units wheel further backward 1/64 inch on its circumference.

(c) These requirements shall be met on every tooth of the ratchet wheel. Gauge by eye.

2.04 Stop Pawl Stop Spring Position: On message registers equipped with a stop pawl stop spring there shall be sufficient clearance between the stop pawl and the stop spring,

with the armature and the stop pawl in their normal positions, to permit a slight rotary movement of the units wheel from its normal position for each digit, but this movement in the "0" position shall not exceed

Max. 1/16" (one third the height of the figure "0")

gauged by eye on the periphery of the units wheel. Hold the armature in the non-operated position and rock the units wheel back and forth by means of an orange stick pressed against the teeth of the ratchet wheel.

2.05 Freedom of Operation — Figs. 4(A) and (B) and 5(A) and (B): With the register electrically operated, the operating pawl shall not bind on its bearing or against the pole-piece or the side of the units wheel. If the pawl touches the units wheel due to side play in the pawl, but can be made to stand away from the wheel it shall not be considered as binding against the wheel. This requirement shall be met on every tooth of the ratchet wheel. Gauge by eye and by feel.

2.06 End Play — Fig. 3(C): There shall be a perceptible amount of end play between the units wheel hub and the frame. Gauge by feel.

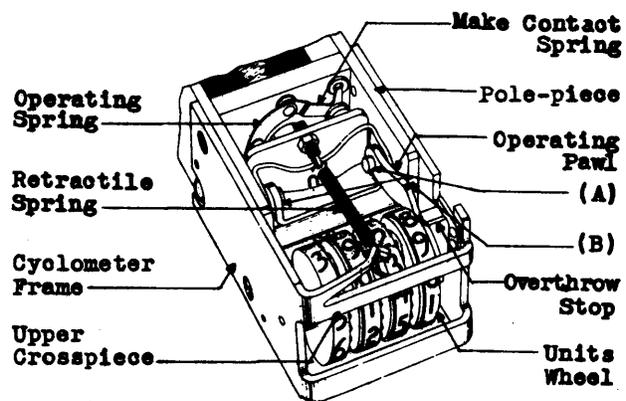


Fig. 4 - 12 Type Register

2.07 Register Mounting and Alignment — Fig. 6(A)

(a) Registers shall be mounted approximately level and shall be fastened securely to the mounting plate. This shall be checked for by attempting to move the register horizontally

and vertically and not by attempting to turn it. Gauge by eye and by feel.

(b) Registers shall be mounted so that the No. 90 cap remover can be inserted between the register caps. The vertical spacing between rows of registers shall be approximately equal. Gauge by eye.

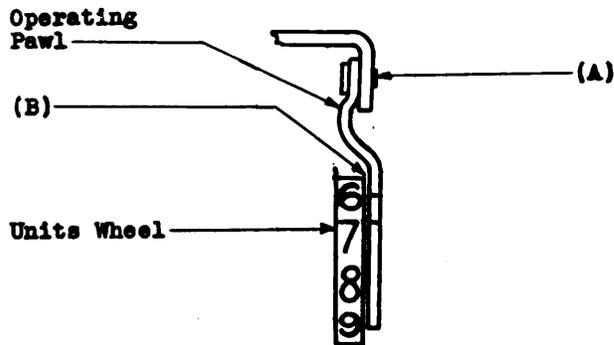


Fig. 5 - Earlier Type Operating Pawl and Units Wheel

2.08 Register Cap Fit — Fig. 6(B) — The register cap shall be tight with not more than perceptible side play but shall be readily removable with the No. 90 cap remover.

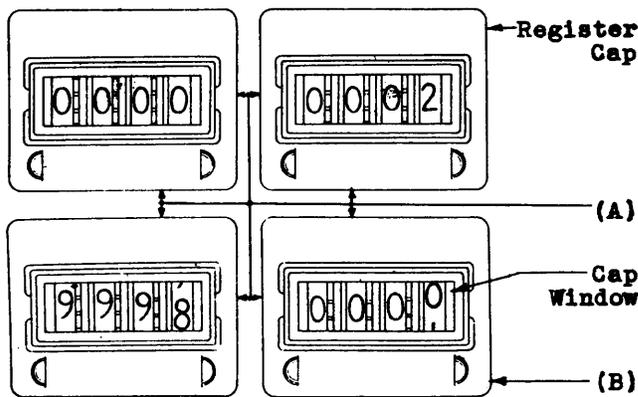


Fig. 6 - Register Mounting and Alignment

***2.09 Contact Separation and Spring Clearance**

(a) Fig. 7(A): The separation between normally open contacts shall be:

Min. .010"
Max. .020"

Gauge by eye.

(b) The separation between contacts that are open when the register is fully operated shall be:

Min. .010"
Max. .020"

Gauge by eye.

(c) Fig. 7(B): On registers equipped with make contacts there shall be a slight clearance between the feather contact spring and the spring stop with the register unoperated. Gauge by eye.

***2.10 Tightness of Lock Nut** — Fig. 7 (C):

The lock nut shall be sufficiently tight to hold the armature adjusting screw in the adjusted position. Gauge by feel.

2.11 Retractable Spring Clearance — Fig. 7(D):

The retractile spring shall not touch the register cap or the number wheels. Use a short straight edge (No. 132-Y gauge) across the top of the cyclometer frame to simulate the inside surface of the cover cap and gauge by eye.

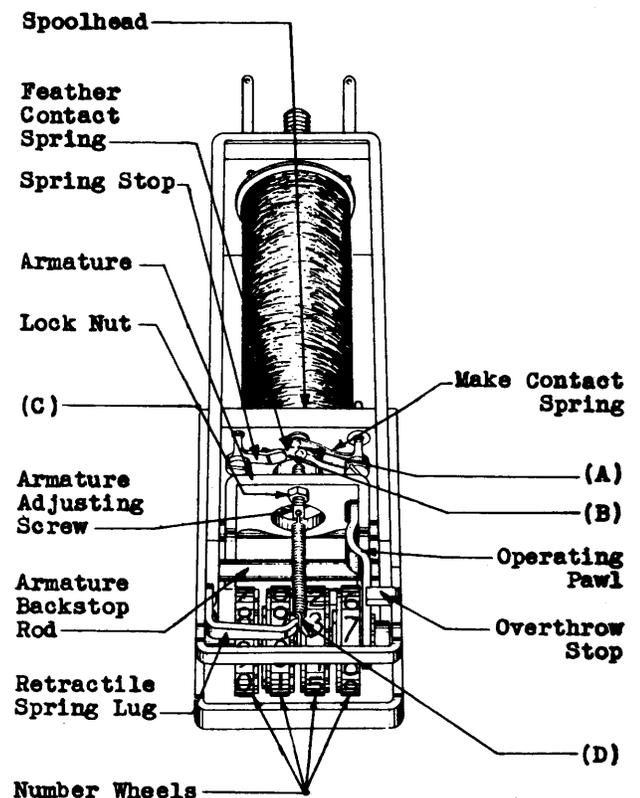


Fig. 7 - 5 Type Register

2.12 Retractable Spring Lug Position — Fig. 8(A)

- (a) The front tip of the retractile spring lug shall not extend forward further than the rear face of the cyclometer frame cross piece nor backward further than 5/32" from the same face. Gauge by eye.
- (b) The lug shall be approximately straight except for the bend made at the tip for holding the retractile spring. Gauge by eye.

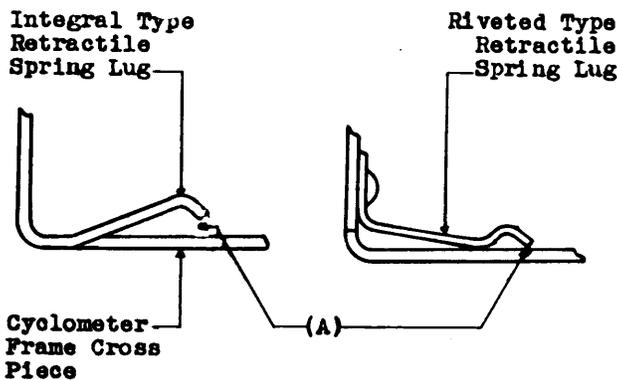


Fig. 8 - Retractable Spring Lug Position

2.13 Electrical Requirements: The register shall meet the electrical requirements specified on the circuit requirement table. The specified operate current shall be applied ten consecutive times to insure turning of two number wheels. The register shall meet the nonoperate requirement on three successive tests applied at intervals of one second or less.

Note: The electrical requirements shall be applied in the following order: operate, hold, release, nonoperate. It is satisfactory to allow a time interval or to stop the vibration of the armature spring between the release of the register and the nonoperate test.

2.14 100 Operation Test (Applies after turn-over only): The register shall operate 100 consecutive times on the electrical operate value specified on the circuit requirement table applied with the interruptions furnished by the test set provided for the office or an equivalent test set. This requirement shall be met with the register cap in place.

Note: Where no test equipment is available for making the 100 operation test it will be satisfactory to substitute for this test the application of the electrical operate value a sufficient number of times to cause 3 number wheels to turn. The number of applications shall not be less than 10.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Test Apparatus and Materials

CODE OR SPEC. NO.	DESCRIPTION
TOOLS	
46	3/8" Hex. Single End Socket Wrench
90	Cap Remover
138	Adjuster
363	Spring Adjuster
403A	5/32" and 3/16" Hex. Double End Socket Wrench
KS-6015	Duck-Bill Pliers
—	6-1/2" P-Long Nose Pliers
—	3" Cabinet Screwdriver
—	4" Regular Screwdriver
KS-6320	Orange Stick
GAUGES	
132-Y	Thickness Gauge
TEST APPARATUS	
31C (or equivalent)	Test Set
35 Type	Test Set
MATERIALS	
—	No. 22 Bare Tinned Copper Wire

3.002 Obtaining Access to Various Parts of Mounted Registers: In order to gain access to the various parts of the register in making the adjustments specified herein, it may be necessary to move the strip of registers forward or remove the register from its mounting. To move the strip of registers, remove the register mounting plate screws with the 4" regular

screwdriver and draw the strip of registers forward until the spoolhead is in the same plane as the front of the strip of registers above and below. Do not pull the register mounting plate further forward as this may damage the skinners. If the register is mounted on a mounting plate which is fastened inside of the framework channel, or if the length of the leads is not sufficient to permit the strip of registers to be moved forward, unsolder the leads, remove the register mounting nut with the No. 46 wrench or the mounting screws with the 3-inch cabinet screwdriver and remove the register from the mounting plate. In remounting the register, make certain that requirement 2.07 (Register Mounting and Alignment) is met.

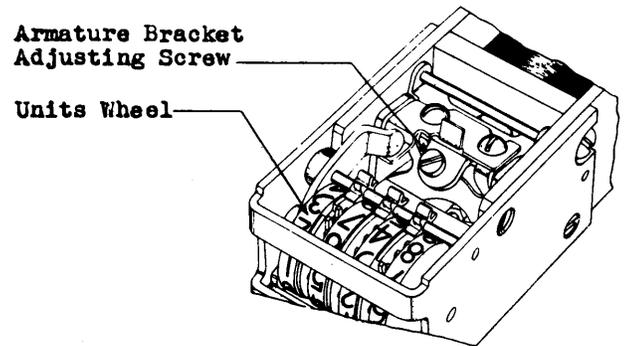


Fig. 9 – Register Equipped with Balanced Pawl Armature

3.01 *Cleaning* (Rq. 2.01)

- (1) Clean the contacts in accordance with the section covering cleaning of relay contacts and parts.

3.02 *Operating Pawl Position* (Rq. 2.02)

3.03 *Stop Pawl Position* (Rq. 2.03)

- (1) If the units wheel is advanced too far, if the operating pawl binds on the overthrow stop, or if the operating pawl does not drop into its normal position in front of a tooth on a register equipped with a balanced pawl armature (see Fig. 9), turn the armature bracket adjusting screw out (counterclockwise) with the 3-inch cabinet screwdriver until the required adjustment is obtained. If sufficient clearance cannot be obtained in this manner, proceed as outlined (3). Check the register as covered in (4) and (5).

- (2) If the units wheel is advanced too far, if the operating pawl binds on the overthrow stop, or if the operating pawl does not drop into its normal position in front of a tooth on a register equipped with a pawl screw (see Fig. 16), turn the pawl screw out (counterclockwise) with the 3-inch cabinet screwdriver, until the condition is corrected. Exercise care not to back out the pawl screw so that it is not held securely by the threads in the armature. If sufficient clearance cannot be obtained in this manner, proceed as outlined in (3). Check the adjustment of the register as covered in (4) and (5).

- (3) If the units wheel is advanced too far, if the operating pawl binds on the overthrow stop, or if the operating pawl does not drop into its normal position in front of a tooth on a register not equipped with an armature bracket adjusting screw or a pawl screw (see Fig. 14), or if the required adjustment cannot be obtained by adjusting the armature bracket adjusting screw or pawl screw on registers equipped with such adjusting screws, proceed as follows. Obtain access to the parts of the register as covered in 3.002 and unhook the retractile spring from the retractile spring lug. Loosen the locknut on the armature adjusting screw with the No. 403A socket wrench and turn the screw in (clockwise) with the long-nose pliers until the operating pawl assumes a satisfactory position. Tighten the locknut securely. Check the adjustment of the register as covered in (4) and (5), and then reconnect the retractile spring to the retractile spring lug, exercising care not to damage the retractile spring.

- (4) Ascertain that the operating pawl is capable of advancing the units wheel to the next position and also that the stop pawl drops into position behind the ratchet wheel tooth as the units wheel advances. If the units wheel does not advance enough to meet requirement 2.02, or if the stop pawl does not drop into position as specified in requirement 2.03, adjust the armature bracket adjusting screw, or the pawl screw, or the armature adjusting screw in a direction opposite that specified in (1), (2) or (3) until the condition is corrected and then adjust the overthrow stop

as covered in (6). If a satisfactory adjustment cannot be obtained in this manner, replace the register with a new one.

(5) Check the clearance between the operating pawl and the overthrow stop to determine whether it is enough to allow the register to overcount. To do this, hold the armature operated and attempt to turn the units wheel. If the clearance is too great the wheel will turn, and it will be necessary to adjust the overthrow stop as covered in (6).

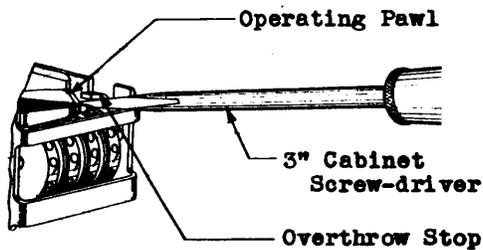


Fig. 10 - Method of Adjusting Overthrow Stop Upward

(6) To provide a clearance between the overthrow stop and the pawl, pry the overthrow stop upward using the 3-1/2-inch cabinet screwdriver as shown in Fig. 10. To decrease the clearance between the overthrow stop and the pawl, force the overthrow stop downward with the long nose pliers. Apply the pressure at the free end of the stop as shown in Fig. 11.

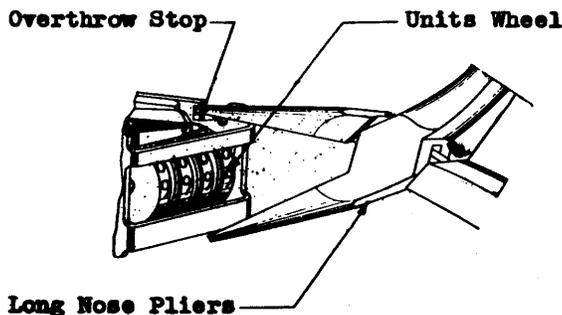


Fig. 11 - Method of Adjusting Overthrow Stop Downward

Caution: In adjusting the overthrow stop as covered in (6) exercise extreme care not to break the overthrow stop, as it will not stand much adjusting. On 12 type registers, make sure that a clearance exists between the overthrow stop and the units wheel and if necessary, adjust the stop to the right to provide this clearance.

(7) Make all other adjustments that appear necessary before remounting the register on the rack. Remount the register, making sure that requirement 2.07 (Register Mounting and Alignment) is met.

(8) If the operating pawl does not engage the ratchet wheel correctly, replace the register with a new one.

3.04 Stop Pawl Stop Spring Position (Rq. 2.04)

(1) If there is insufficient clearance between the stop pawl and the stop spring, the units wheel cannot be turned manually without forcing when the armature is held in the nonoperated position. To obtain the required clearance, move the strip of registers forward as described in 3.002. Hold the armature in the operated position and carefully press upward and back against the tip of the stop spring with the blade of the 3-inch cabinet screwdriver as shown in Fig. 12. Extreme care should be used not to exert too much pressure since a very slight amount of clearance permits a relatively large movement of the units wheel. In case there is too much clearance, hold the armature in the operated position, insert the tip of the screwdriver blade between the rear of the stop spring and the armature bracket as shown in Fig. 13 and adjust the stop spring forward by carefully pressing the screwdriver blade against the operating pawl cross piece.

3.05 Freedom of Operation (Rq. 2.05)

3.06 End Play (Rq. 2.06)

(1) If the register fails to meet the requirements covering freedom of movement and end play, replace it.

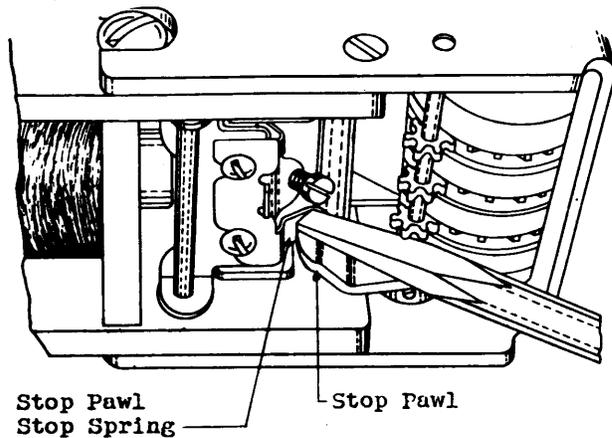


Fig. 12 – Method of Adjusting Stop Pawl Stop Spring for More Clearance

3.07 Register Mounting and Alignment (Rq. 2.07)

- (1) To tighten loose mounting nuts use the No. 46 wrench and to tighten loose mounting screws on registers so equipped use with 3-inch cabinet screwdriver. At the same time the mounting nut or screws are tightened, align the register so it is approximately level and the vertical spacing between rows of registers is approximately equal. Check that the clearance between the rows of registers is sufficient to permit the insertion of the No. 90 cap remover.

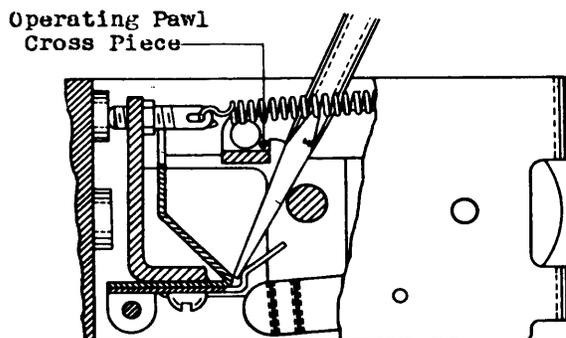


Fig. 13 – Method of Adjusting Stop Pawl Stop Spring for Less Clearance

3.08 Register Cap Fit (Rq. 2.08)

- (1) Adjust the sides of the cap as required with the KS-6015 duckbill pliers until it fits properly.

3.09 Contact Separation and Spring Clearance (Rq. 2.09)

- (1) In adjusting to meet the contact separation requirements obtain access to the parts of the register as covered in 3.002.
- (2) If the register is equipped with make contacts and the contact separation is too small, insert a piece of No. 22 bare tinned copper wire between the feather contact spring and the spring stop close to the point where the spring is fastened to the spoolhead. Place the duckbill pliers over the spring and spring stop as shown in Fig. 14 and compress the pliers.

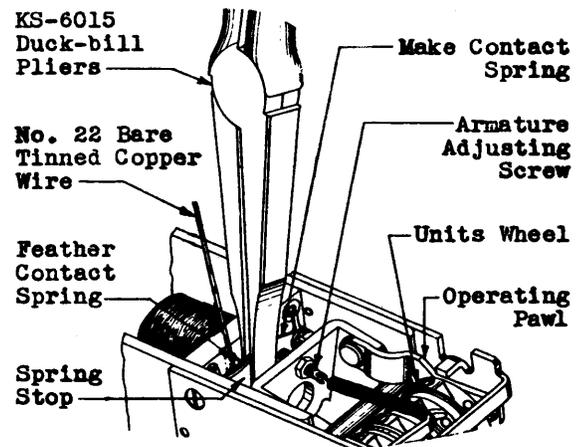


Fig. 14 – Method of Increasing Contact Separation

- (3) If the register is equipped with make contacts and the contact separation is too large, grasp the feather contact spring and spring stop with the duckbill pliers as close as possible to the point where the spring is fastened to the spoolhead as shown in Fig. 15. Compress the pliers.

- (4) If the feather contact spring does not clear the spring stop and the contact separation is satisfactory, pry the stop slightly

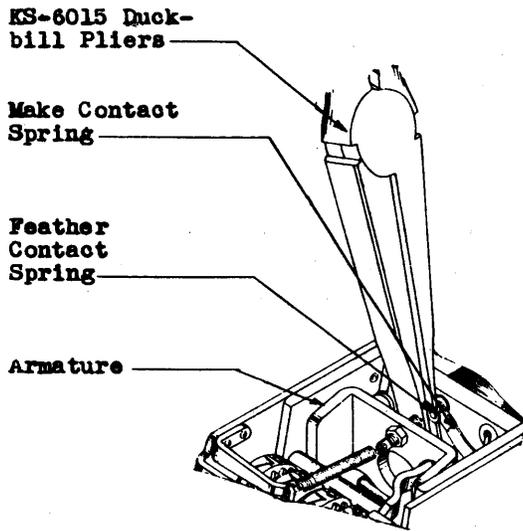


Fig. 15 – Method of Reducing Contact Separation

towards the number wheels, using the 3-inch cabinet screwdriver. Exercise care not to damage the feather contact spring or destroy the contact separation adjustment.

(5) If the register is equipped with break contacts and the contact separation is too small or too large with the armature electrically operated, adjust the stationary spring slightly towards or away from the number wheels using the No. 363 spring adjuster as shown in Fig. 16. After making this adjustment, allow the armature to release and make sure that the contacts close reliably. If they do not, adjust the break contact spring towards the number wheels using the No. 363 spring adjuster and applying it close to the point where the spring leaves the spoolhead in the same position as shown in Fig. 16 for the stationary spring.

3.10 Tightness of Lock Nut (Rq. 2.10)

(1) In order to tighten a loose lock nut, obtain access to the parts of the register as covered in 3.002, and use the long nose pliers or the No. 403A socket wrench.

3.11 Retractable Spring Clearance (Rq. 2.11)

(1) If the retractile spring touches the register cap or number wheels and it appears to be due to a defective spring, replace the

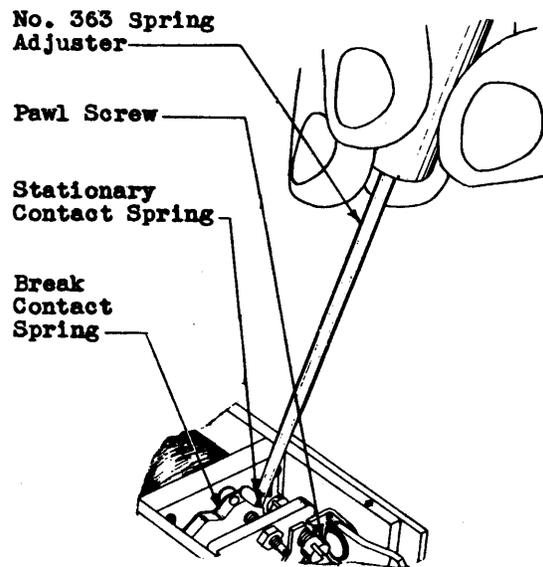


Fig. 16 – Method of Adjusting for Contact Separation on Break Contact Registers

spring with a new one. If the spring seems satisfactory, force the retractile spring lug slightly upward or downward as required.

(2) To move the lug upward, insert the 3-inch cabinet screwdriver between the lug and the cross piece of the cyclometer frame and pry it upward as shown in Fig. 17.

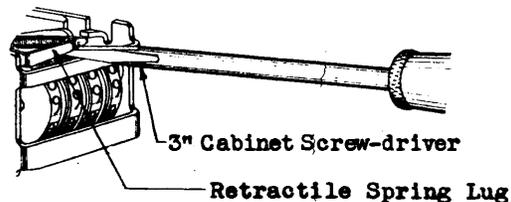


Fig. 17 – Method of Adjusting Retractable Spring Lug Upward

(3) To force the lug downward, place the long nose pliers over the lug and the lower side of the cyclometer frame cross piece as shown in Fig. 18 and compress the pliers.

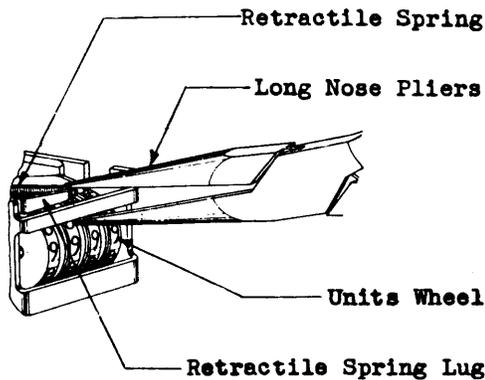


Fig. 18 – Method of Adjusting Retractable Spring Lug Downward

- 3.12 Retractable Spring Lug Position** (Rq. 2.12)
- 3.13 Electrical Requirements** (Rq. 2.13)
- 3.14 100 Operation Test** (Rq. 2.14)

- (1) If the register fails to meet the 100 operation test repeat the test with the cap removed. If with the cap removed, the register meets the test this is an indication that the cap binds on one end of the pinion shaft or in the case of registers equipped with early type caps on one end of the cyclometer shaft. Check the register cap to see that the side flaps are not bent inward at their rear corners. If they are, straighten them with the KS-6015 duckbill pliers and repeat the 100 operation test with the cap in place.
- (2) If the 100 operation test is not being applied, check the register for proper operation on all teeth of the ratchet wheel.
- (3) If the register fails to meet the operate or hold requirements, decrease the tension of the retractile spring by adjusting the re-

tractile spring lug away from the cyclometer frame cross piece with the No. 138 adjuster, applying it approximately in the middle of the lug as shown in Fig. 19. If the tension of the spring cannot be reduced sufficiently within the limits of the adjusting of the lug, replace the spring with a new one.

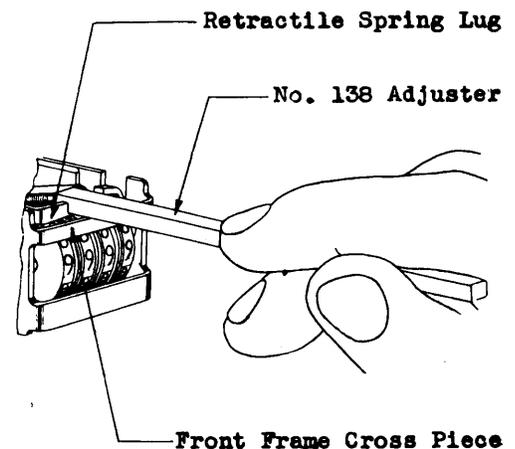


Fig. 19 – Method of Adjusting Retractable Spring Tension

- (4) If the register fails to meet the nonoperate or release requirements increase the tension of the retractile spring by adjusting the lug towards the cyclometer frame cross piece with the No. 138 adjuster applying it approximately in the middle of the lug as shown in Fig. 19. If the tension of the spring cannot be increased sufficiently within the limits of the adjusting of the lug, replace the spring with a new one.