# SECONDARY CLOCKS
# REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers secondary clocks per KS-1987, KS-6620, KS-6621, KS-6622 and KS-6862.

1.02 This section is reissued to incorporate material from the addendum in its proper location.

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 Part 1, "General" and Part 2, "Requirements" form part of the Western Electric Co. Inc. Installation Department handbook.

1.05 The normal (unoperated) position of the stepping mechanism is that position in which the magnet armature rests against the armature back stop.

1.06 The operated position is that position in which the magnet armature rests flat against the magnet core and the driving pawl is advanced to the next tooth on the ratchet wheel.

1.07 Secondary clocks are equipped with different types of stepping movements, namely the No. 1 and the No. 1-A. These codes are stamped on the stepping movement case. Since these mechanisms are entirely different and require different adjustments, the stepping movement case should be examined to determine the type of stepping movement with which the clock is equipped before an attempt is made to correct any faults in the clock.

2. REQUIREMENTS

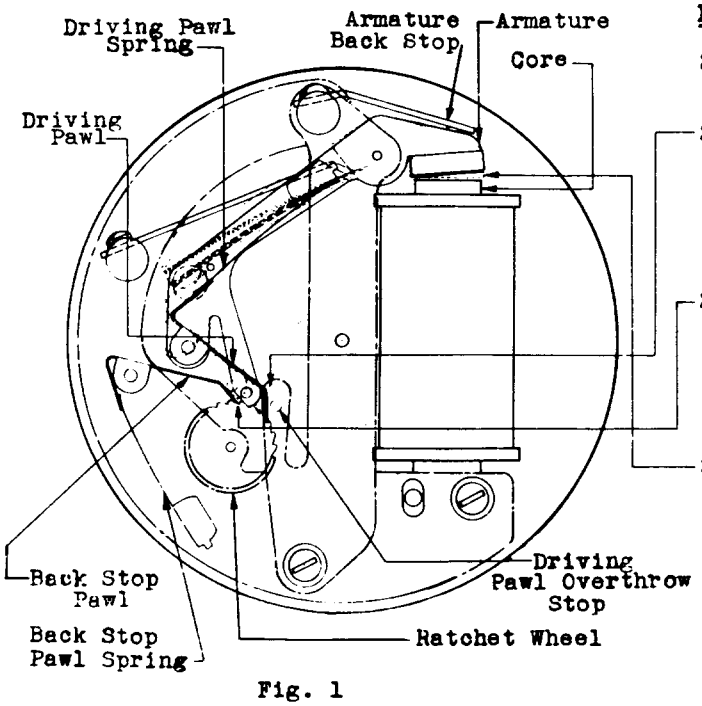


Fig. 1

NO. 1-A STEPPING MOVEMENT

2.01 Cleaning The movements shall be cleaned approximately every five years.

2.02 Clearance Between the Driving Pawl and the Driving Pawl Overthrow Stop With the stepping mechanism in the normal position, the tip of the driving pawl shall clear the driving pawl overthrow stop by approximately 1/64". Gauge by eye.

2.03 Clearance Between the Back Stop Pawl and the Edge of the Ratchet Wheel Tooth With the stepping mechanism in the normal position the tip of the back stop pawl shall clear the edge of the ratchet wheel tooth by approximately 1/64". Gauge by eye.

2.04 Relation of Armature to Cores With stepping mechanism electrically operated the armature shall strike approximately flat on the cores. Gauge by eye.

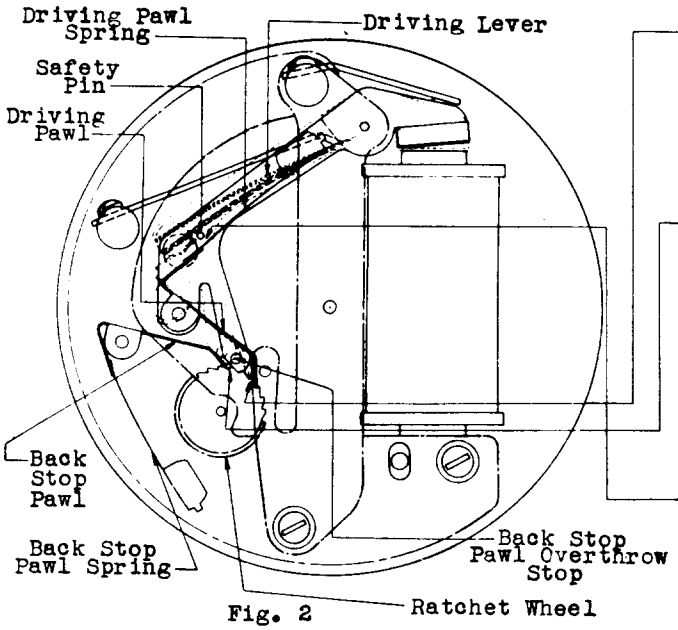


Fig. 2

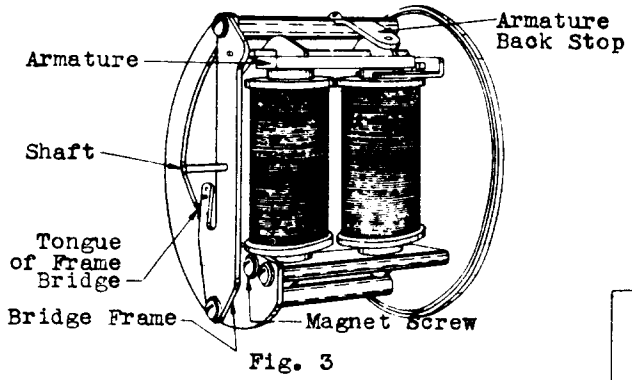


Fig. 3

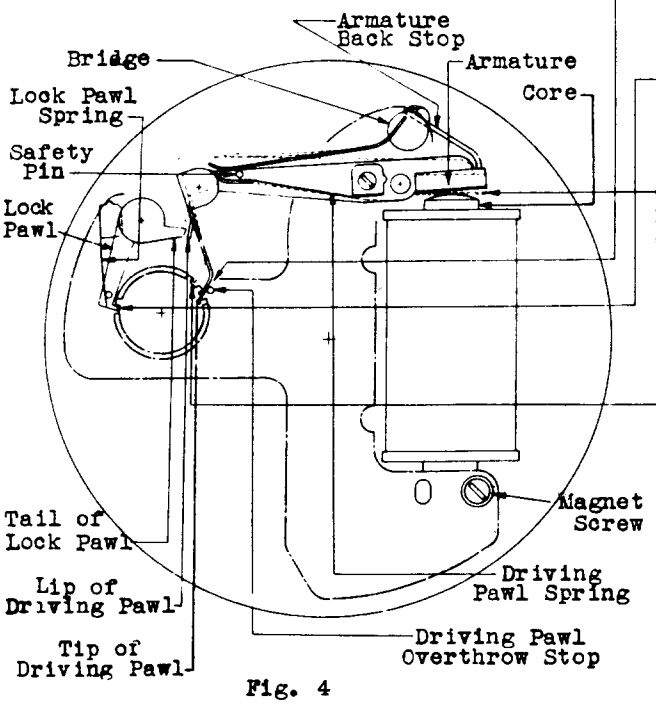


Fig. 4

2.05 Clearance Between the Driving Pawl and the Edge of the Following Ratchet Wheel Tooth With the stepping mechanism in the operated position the tip of the driving pawl shall clear the edge of the following tooth of the ratchet wheel by approximately 1/64". Gauge by eye.

2.06 Clearance Between the Back Stop Pawl and the Back Stop Pawl Overthrow Stop

(a) With the stepping mechanism in the operated position the tip of the back stop pawl shall clear the back stop pawl overthrow stop. Gauge by eye.

(b) The back stop pawl shall clear the back stop pawl overthrow stop while the pawl is passing over the ratchet wheel tooth. Gauge by eye.

2.07 Clearance Between the Driving Pawl Spring and the Safety Pin The driving pawl spring shall clear the safety pin in the driving lever by approximately 1/64" at the greatest rise. Gauge by eye.

2.08 Electrical Requirements The stepping mechanism shall operate without gain or loss in time, when a potential between min. 18 volts and max. 30 volts D.C. is applied to the winding terminals of the stepping magnet.

NO. 1 STEPPING MOVEMENT

2.09 Cleaning The movements shall be cleaned approximately every five years.

2.10 Clearance Between the Driving Pawl and the Driving Pawl Overthrow Stop With the stepping mechanism in the normal position the tip of the driving pawl shall just clear the driving pawl overthrow stop. Gauge by eye.

2.11 Clearance Between the Lock Pawl and the Edge of the Ratchet Wheel Tooth With the stepping mechanism in the normal position there shall be a slight clearance between the tip of the lock pawl and the edge of the ratchet wheel tooth. Gauge by eye.

2.12 Relation of the Armature to the Cores With the stepping mechanism electrically operated the armature shall strike approximately flat on the cores. Gauge by eye.

2.13 Relation of the Driving Pawl to the Ratchet Wheel

(a) With the stepping mechanism in the operated position the tip of the driving pawl shall clear the edge of the following tooth of the ratchet wheel by approximately 1/64". Gauge by eye.

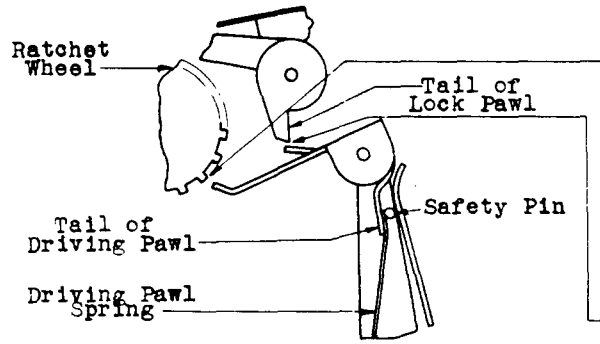


Fig. 5

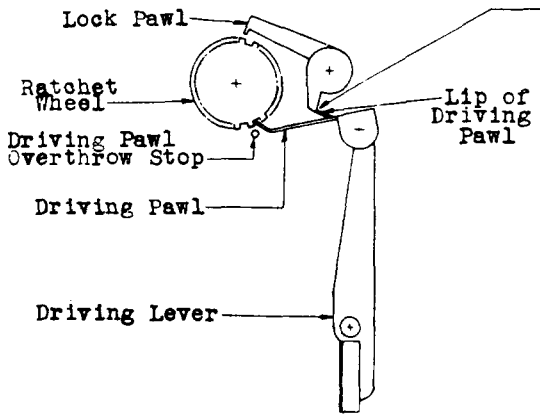


Fig. 6

2.13 (Continued)

(b) With the stepping mechanism in the operated position and with the tail of the driving pawl and the driving pawl spring pressed against the safety pin, the tip of the driving pawl shall clear the ratchet wheel by approximately 1/64". Gauge by eye.

2.14 Relation of the Lip of the Driving Pawl to the Tail of the Lock Pawl

(a) With the stepping mechanism in the operated position the lip of the driving pawl shall clear the back of the tail of the lock pawl by approximately 1/64".

(b) As the stepping mechanism returns to normal, the lip of the driving pawl should engage the tail of the lock pawl and lift the lock pawl out of the notch in the ratchet wheel and at the same time allow the wheel to be advanced. As the lip drops off the tail, the lock pawl should land on top of the tooth and slide into the following notch at the finish of the drive. Gauge by eye.

2.15 Electrical Requirements The stepping mechanism shall operate without gain or loss in time, when a potential between min. 18 volts and max. 30 volts D.C. is applied to the winding terminals of the stepping magnet.

3. ADJUSTING PROCEDURES

TOOLS

| Code No. | Description |
|---|---|
| 363 | Spring Adjuster |
| 371 | Spring Adjuster |
| KS-6015 | Duck-bill Pliers |
| - | Bell System Cabinet Screw-driver 6-1/2" per A.T. & T. Co. Drawing 46-X-40 |
| - | Bell System P-Long Nose Pliers 6-1/2" per A.T. & T. Co. Drawing 46-X-56 |
| KS-14164 | No. 4 Artist's Show Card Brush |

GAUGES

| | |
|---|---|
| 70-F | 10-0-10 Gram Gauge |

MATERIALS

| | |
|---|---|
| KS-2423 | Cloth |
| - | Toothpicks Hardwood, Flat at One End and Pointed at the Other |

3.001 In making any adjustments, it will be necessary to gain access to the stepping mechanism. To do this proceed as follows:

3.002 In the case of clocks per KS-1987 open the door, loosen and remove the screws holding the stepping mechanism case to the stepping mechanism with the 6-1/2" cabinet screw-driver. Then pull off the winged setting knob and remove the stepping mechanism case.

3.003 In the case of clocks per KS-6620 remove the clock from the wall and disconnect the leads. Then remove the winged setting knob and stepping mechanism case.

3.004 In the case of clocks per KS-6621 disconnect the leads, drive out the hinge pin, and remove the clock from the wall. Then remove the winged setting knob and stepping mechanism case.

3.005 In the case of clocks per KS-6622, loosen and remove the stepping mechanism mounting plate screws using the 6-1/2" cabinet screw-driver and pull the stepping mechanism out from the wall disconnecting the leads. Then remove the winged setting knob and stepping mechanism case.

3.01 CLEANING (Rq.2.01)

M-1 When a clock requires cleaning do not remove the magnets or change any adjustments.

M-2 If upon inspection of the stepping movement there is found to be an accumulation of dust or foreign matter on the teeth of the gears or other parts of the movement, brush the foreign matter off with the No. 4 Artist's Show Card Brush, and wipe the parts with a clean dry KS-2423 cloth. Clean the pivot holes by carefully moving the particular shaft concerned back and forth a number of times and brushing out the dust with the brush. Under no circumstances should any oil be applied to any part of the stepping movement.

3.02 CLEARANCE BETWEEN THE DRIVING PAWL AND THE DRIVING PAWL OVERTHROW STOP (Rq.2.02)

M-1 If the driving pawl fails to clear the driving pawl overthrow stop satisfactorily when the stepping mechanism is in the normal position, or if the clearance is excessive, examine the driving pawl to see whether or not it is distorted in any way. Also see whether or not the tip of the driving pawl is bent at an angle of approximately 45° with respect to the straight portion of the driving pawl. If the driving pawl is distorted or if the angle is not approximately 45°, correct this condition using the No. 363 spring adjuster.

M-2 Check whether or not the driving pawl spring is tensioned slightly against the driving pawl. The tension of this flexible spring against the driving pawl should not exceed 5 grams and when adjusting it exercise extreme care not to distort it. Use the No. 70-F gauge applying it near where it touches the pawl and noting the tension as the spring breaks from the pawl. Use the No. 363 spring adjuster for adjusting this spring, applying it near the base of this spring.

M-3 If the tip of the driving pawl still fails to clear the driving pawl overthrow stop satisfactorily, the trouble may be due to the armature back stop being set so as to allow the magnet armature to move back too far, thereby forcing the driving lever forward and consequently causing the tip of the driving pawl to touch or not sufficiently clear the driving pawl overthrow stop. In this case adjust the armature back stop very slightly toward the magnet

3.02 (Continued)

cores applying the No. 371 spring adjuster as shown in Fig. 7. In adjusting the armature back stop, however, do not make the gap between the armature and core so small as to interfere with the proper operation of the magnet when the circuit is closed.

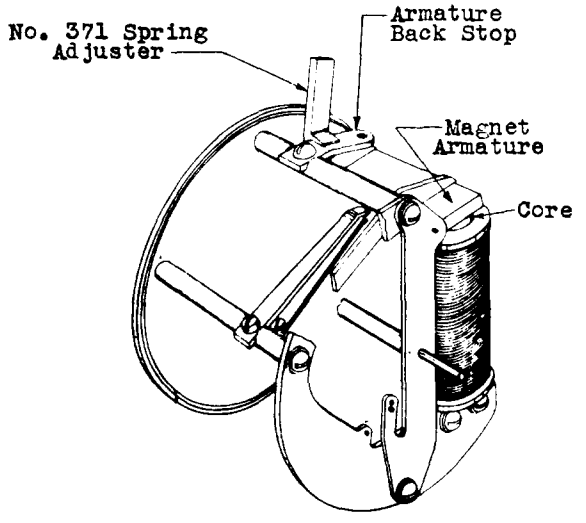


Fig. 7 - Method of Adjusting for Clearance Between the Driving Pawl and the Driving Pawl Overthrow Stop

M-4 If the clearance between the tip of the driving pawl and the driving pawl overthrow stop is greater than the specified amount adjust the armature back stop away from the magnet cores so as to allow greater backward movement of the armature. The gap should not be made so great as to prevent the armature from operating properly when the operating circuit is closed. An armature air-gap of approximately .030" will in general prove to be satisfactory.

M-5 If a satisfactory clearance can not be obtained when the above adjustments have been made, the tongue of the bridge frame on which the driving pawl overthrow stop is mounted, may be adjusted slightly toward or away from the bridge frame as required with a pair of P-long nose pliers applied as shown in Fig. 8. The adjustment should be made at the base of the tongue. However, this method of adjustment should only be resorted to when all other methods to obtain a satisfactory adjustment fail.

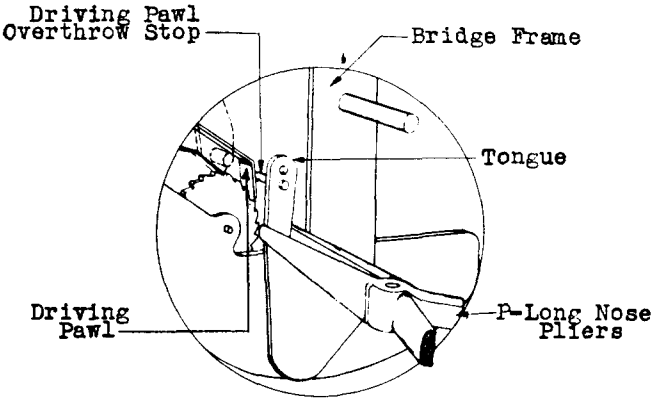


Fig. 8 - Method of Adjusting for Clearance Between the Driving Pawl and the Driving Pawl Overthrow Stop

3.03 CLEARANCE BETWEEN THE BACK STOP PAWL AND THE EDGE OF THE RATCHET WHEEL TOOTH (Rq.2.03)

M-1 If the back stop pawl fails to clear the edge of the ratchet wheel tooth satisfactorily when the stepping mechanism is in the normal position, or if the clearance is too great first examine the back stop pawl to determine whether or not it is distorted in any way. Also see whether the tip of the back stop pawl is bent at an angle of approximately 45° with respect to the straight portion of the back stop pawl. If the back stop pawl is distorted or if the angle is not approximately 45°, correct the condition using the No. 363 spring adjuster.

M-2 See whether or not the back stop pawl spring is tensioned slightly against the back stop pawl. The tension of this flexible spring against the back stop pawl should not exceed 5 grams and when adjusting it, extreme care should be exercised not to distort it. Use gauge 70-F applying it near where the spring touches the pawl and noting the tension as the spring breaks from the pawl. Use the No. 363 spring adjuster to adjust this spring applying it near the base of the spring.

3.03 (Continued)

M-3 If the tip of the back stop pawl still fails to clear the ratchet wheel tooth satisfactorily the trouble may be due to the armature back stop being set so as not to allow the armature to move back far enough and thereby prevent the driving pawl from driving the ratchet wheel far enough forward. In this case adjust the armature back stop, very slightly away from the magnet cores using the No. 371 spring adjuster, applied as shown in Fig. 7. This will increase the forward motion of the ratchet wheel and consequently increase the clearance between the tip of the back stop pawl and the ratchet wheel tooth. Increasing the clearance between the tip of the back stop pawl and the ratchet wheel tooth will also result in an increase of the back lash in the gears so that care should be exercised not to make the clearance too great. In adjusting the armature back stop do not increase the gap between the armature and cores sufficiently to cause interference with any of the previous adjustments.

M-4 If is is found necessary to adjust the armature back stop toward the magnet cores due either to excessive back lash or excessive clearance between the back stop pawl and the tooth, do not make the gap so small as to interfere with the proper operation of the magnet when the circuit is closed.

3.04 RELATION OF THE ARMATURE TO THE CORES (Rq.2.04)

3.05 CLEARANCE BETWEEN THE DRIVING PAWL AND EDGE OF THE FOLLOWING TOOTH (Rq.2.05)

3.06 CLEARANCE BETWEEN THE BACK STOP PAWL AND THE BACK STOP PAWL OVERTHROW STOP (Rq.2.06)

M-1 Relation of the Armature to the Cores Operate the magnet armature by hand. Should the armature strike against the inner edge of the cores first, it will be necessary to remove the stepping mechanism in order to adjust the magnet.

M-2 In the case of clocks per KS-1987, KS-6620 and KS-6621 remove the screws holding the stepping mechanism board to the clock case and remove the stepping mechanism board on which the stepping mechanism is mounted using the 6-1/2" cabinet screw-driver. Turn the dial clamps off the dial and lift out the clock movement and dial. Then remove the nut holding the hands. It is now possible to remove the clock hands but in doing this exercise care to grasp the clock hands at the hub and exert a slight twisting motion to the left and right. With the clock hands removed, it is now possible to remove the face. To do this, remove the screws holding the dial of the clock to the stepping mechanism board, remove the dial, the screws holding the stepping mechanism to the stepping mechanism board and remove the stepping mechanism. Use the 6-1/2" cabinet screw-driver to remove the screws.

M-3 In the case of clocks per KS-6622 remove the nut holding the hands, and remove the hands. Exercise care to grasp the clock hands at the hub and exert a slight twisting motion to the left or right. With the hands removed, remove the screws holding the mounting plate to the stepping mechanism using the 6 1/2" cabinet screw-driver. Then remove the stepping mechanism.

M-4 The magnet can now be adjusted. Loosen the four screws that hold the magnet assembly and then shift the magnet assembly slightly up or down as required. When the magnet is set so that the armature strikes approximately flat against the cores, tighten the screws securely.

M-5 Clearance Between the Driving Pawl and the Edge of the Following Ratchet Wheel Tooth The setting of the magnets also determines whether or not the tip of the driving pawl will satisfactorily clear the following tooth when the stepping mechanism is in the operated position. Therefore at the time the magnet is being shifted, note that with the armature in the operated position, the tip of the driving pawl satisfactorily clears the edge of the following tooth of the ratchet wheel. Should the clearance be more than the specified amount, and if the driving pawl is not distorted, and if the angle of the tip of the driving pawl is approximately 45° it is an indication that the magnets have been shifted down too far whereas if the clearance is insufficient, under the same conditions, it is an indication that the magnets have not been shifted down far enough. In either case, it will be necessary to loosen the magnet screws again in accordance with M-1 and shift the magnet as required. In this case check requirements 2.02, 2.03 and 2.04. Also at this time, check that the gap between the armature and core, with the magnet in the normal position, is approximately .030". If the trouble is due to a distorted spring or incorrectly bent pawl tip, the condition should be corrected, using the No. 363 spring adjuster.

3.04-3.06 (Continued)

M-6 Clearance Between the Back Stop Pawl and the Back Stop Pawl Overthrow Stop Operate the armature by hand and then slowly release it to see whether the back stop pawl satisfactorily clears the back stop pawl overthrow stop when the back stop pawl is passing over the tooth. If there is no clearance and the pawl is not distorted and if the angle of bend of the tip of the back stop pawl is approximately 45°, the trouble may be corrected by adjusting the tongue of the driving lever at the base of the tongue. Adjusting should be either toward or away from the magnets as the case may be and should be made with a pair of P-long nose pliers as shown in Fig. 9. However, this method of adjustment should be resorted to only when all other methods fail to obtain the desired results.

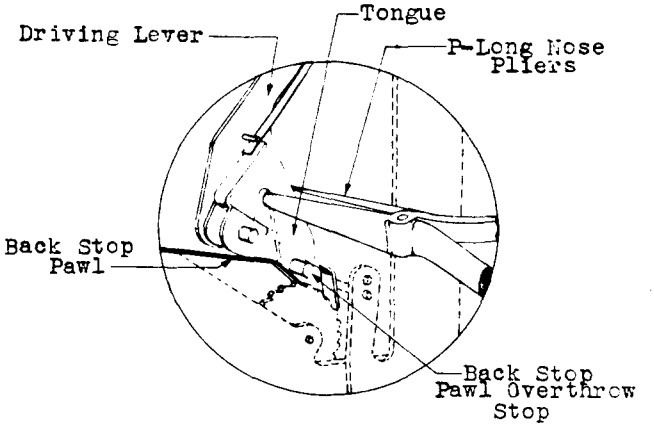


Fig. 9 - Method of Adjusting for Clearance Between Back Stop Pawl and Back Stop Pawl Overthrow Stop

3.07 CLEARANCE BETWEEN DRIVING PAWL SPRING AND SAFETY PIN (Rq.2.07

M-1 If the driving pawl spring fails to clear the safety pin satisfactorily, examine this spring to determine whether it is distorted in any way. Straighten out any kinks that may be in the spring with the No. 363 spring adjuster and tension the spring slightly against the tail of the driving pawl. Tension the spring by applying the adjuster near its base. This tension, however, should not in any case exceed 5 grams.

M-2 If the driving pawl spring still fails to clear the safety pin satisfactorily adjust the tail of the driving pawl at its base, slightly away from the pin, using the No. 363 spring adjuster.

3.08 ELECTRICAL REQUIREMENTS (Rq.2.08)

M-1 A clock meeting all of the above adjustments should operate satisfactorily when the operating circuit is closed. Should the clock meet all of the previous adjustments and still fail to operate, the trouble may be due to the tension of the laminated driving spring being excessive. Excessive tension of the laminated driving spring will greatly decrease the power of the magnets for moving the hands. In this case reduce the tension by adjusting the stop spring resting on the laminated driving spring, slightly upward, with the No. 371 spring adjuster as shown in Fig. 10. However, note that with the armature in the operated position, the driving spring is under tension. At this time it is also advisable to recheck the tension of the driving pawl spring and back stop pawl spring.

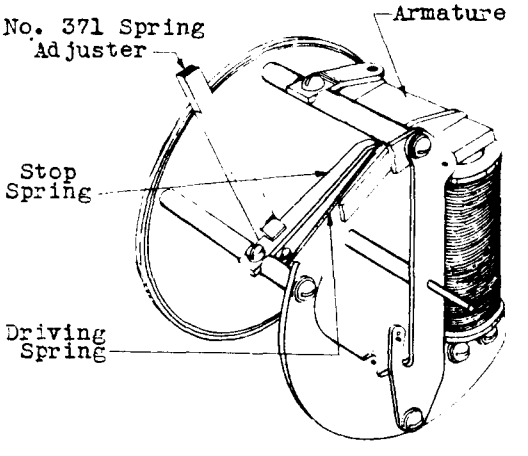


Fig. 10 - Method of Adjusting to Meet Electrical Requirements

These tensions should not exceed 5 grams. Assemble all the parts in the clock case after all the adjustments have been completed.

M-2 If the clock still fails to operate satisfactorily after all of the above adjustments have been made, and meets all the requirements it should be sent back to the Western Electric Company for repairs.

3.09 CLEANING (Rq.2.09)

M-1 When a clock requires cleaning do not remove the magnets or change any adjustments.

M-2 Open the door of the clock, loos en and remove the screws holding the stepping movement case to the stepping movement with a 6-1/2" cabinet screw-driver. Pull off the winged setting knob. Then remove the stepping movement case.

M-3 If upon inspection on the stepping movement there is found to be an accumulation of dust or foreign matter on the teeth of the gears or other parts of the movement, brush the foreign matter off with the No. 4 Artist's Show Card Brush and wipe the parts with clean dry KS-2423 cloth. The pivot holes should be cleaned by carefully moving the particular shaft concerned back and forth a number of times and brushing out the dust with the rigger brush. Under no circumstances should any oil be applied to any part of the stepping movement.

3.10 CLEARANCE BETWEEN THE DRIVING PAWL AND THE DRIVING PAWL OVERTHROW STOP (Rq.2.10)

M-1 If the tip of the driving pawl presses against the driving pawl overthrow stop or if the clearance between the tip of the driving pawl and the driving pawl overthrow stop is excessive when the stepping mechanism is in the normal position, examine the driving pawl to see whether or not it is distorted in any way. Also see whether the tip of the driving pawl is bent at an angle of approximately 45° with respect to the straight portion of the driving pawl. If the driving pawl is distorted or if the angle is not approximately 45°, correct this condition using the No. 363 spring adjuster.

M-2 Check whether or not the driving pawl spring is tensioned slightly against the driving pawl. The tension of this flexible spring against the driving pawl should not exceed 5 grams and when adjusting it exercise extreme care not to distort it. Use the No. 70-F gauge applying it where the spring touches the pawl and noting the tension as the spring breaks from the pawl. Use the No. 363 spring adjuster for adjusting this spring applying it near the base of the spring.

M-3 Trouble may be due either to the driving spring being tensioned excessively against the driving lever or else due to their being no or very little tension of the driving spring against the lever. In either case the above correct by adjusting the spring close to the point where it leaves the bridge using the duck-bill pliers.

M-4 If the requirement still is not met the trouble may be due to the armature back stop being set so as to allow the magnet armature to move back too far, thereby forcing the driving lever forward and consequently causing the tip of the driving pawl to press against the overthrow stop. In this case adjust the armature back stop very slightly toward the magnet cores, using the No. 371 spring adjuster, applied as shown in Fig. 11. However, in adjusting the armature back stop do not make the gap between the armature and core so small as to interfere with the proper operation of the magnet when the circuit is closed.

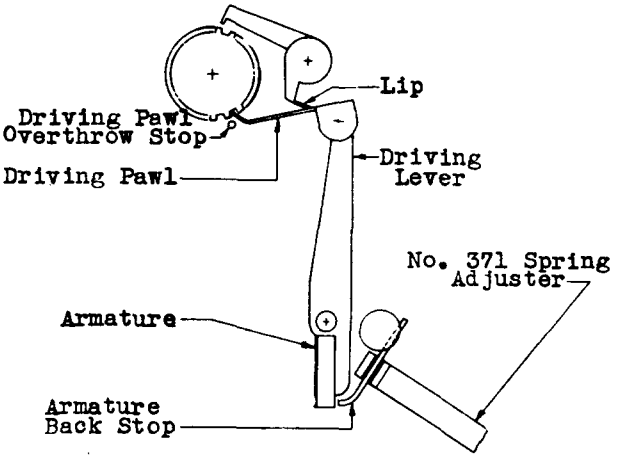


Fig. 11 - Method of Adjusting for Clearance Between Driving Pawl and Driving Pawl Overthrow Stop

M-5 If the clearance between the tip of the driving pawl and the driving pawl overthrow stop is greater than the specified amount adjust the armature back stop away from the magnet

3.10 (Continued)

cores. The gap should not be made so great as to prevent the armature from operating properly when the circuit is closed. An armature gap of approximately .030" will in general be satisfactory.

3.11 CLEARANCE BETWEEN THE LOCK PAWL AND THE EDGE OF THE RATCHET WHEEL TOOTH (Rq.2.11)

M-1 If the tip of the lock pawl fails to clear the edge of the ratchet wheel tooth as specified, or if the clearance is too great, first examine the lock pawl to determine whether or not it is distorted in any way. Also see whether the tip of the lock pawl is bent at an angle of approximately 90° with respect to the straight portion of the lock pawl. If the spring is distorted correct the condition by using the No. 363 spring adjuster. If the angle of the tip of the lock pawl is incorrect, the movement should be sent to the Western Electric Company for repairs.

M-2 See whether or not the lock pawl spring is tensioned slightly against the lock pawl. The tension of this flexible spring against the lock pawl should not exceed 5 grams and when adjusting it exercise extreme care not to distort it. Use the No. 363 spring adjuster in adjusting the spring, applying it near the base of the spring.

M-3 If the tip of the lock pawl still fails to clear the ratchet wheel tooth satisfactorily, trouble may be due to the armature back stop being set so as not to allow the armature to move back far enough and thereby prevent driving pawl from driving the ratchet wheel far enough forward. In this case adjust the armature back stop very slightly away from the magnet cores using the No. 371 spring adjuster, applied as shown in Fig. 11. This will increase the forward motion of the ratchet wheel and consequently increase the clearance between the tip of the lock pawl and the ratchet wheel tooth. Increasing the clearance between the tip of the lock pawl and the ratchet wheel tooth will also result in an increase in the back lash in the gears and care should be exercised not to make the clearance too great. In adjusting the armature back stop do not increase the gap between the armature and core sufficiently to cause interference with any of the previous adjustments.

M-4 If it is found necessary to adjust the armature back stop toward the magnet cores due either to excessive back lash or excessive clearance between the back stop pawl and the tooth, do not make the gap so small as to interfere with the proper operation of the magnet when the circuit is closed.

3.12 RELATION OF THE ARMATURE TO THE CORES (Rq.2.12)
3.13 RELATION OF THE DRIVING PAWL TO THE RATCHET WHEEL (Rq.2.13)
3.14 RELATION OF THE LIP OF THE DRIVING PAWL TO THE TAIL OF THE LOCK PAWL (Rq.2.14)

M-1 Relation of the Armature to the Cores Operate the magnet armature by hand. Should the armature strike against the inner edge of the cores first, it will be necessary to remove the stepping mechanism from the clock case in order to adjust the magnet. Remove the screws holding the stepping mechanism board to the clock case and remove it using the 6-1/2" cabinet screw-driver. Turn the dial clamps off the dial and lift out the clock mechanism and dial. Then remove the nut holding the clock hands and remove the hands. In doing this, exercise care to grasp the clock hands at the hub and exert a slight twisting motion to the left and right. With the clock hands removed, it is possible to remove the dial. To do this remove the screws holding the dial of the clock to the stepping mechanism board, then remove the screws holding the stepping mechanism to the stepping mechanism board and remove the stepping mechanism. Use the 6-1/2" cabinet screw-driver to remove the screws. The magnet can now be adjusted. Loosen the four screws that hold the magnet assembly and then shift the magnet assembly slightly up or down as required. When the magnet is set so that the armature strikes approximately flat against the cores, tighten the screws securely.

M-2 Relation of the Driving Pawl to the Ratchet Wheel The setting of the magnets also determines whether or not the tip of the driving pawl will satisfactorily clear the following tooth when the stepping mechanism is in the operated position. Therefore at the time the magnet is being shifted, note that with the armature in the operated position, the tip of the driving pawl satisfactorily clears the edge of the following tooth of the ratchet wheel. Should the clearance be more than the

3.12-3.14 (Continued)

specified amount, and if the driving pawl is not distorted and if the angle of the tip of the driving pawl is approximately 45°, it is an indication that the magnets have been shifted down too far whereas if the clearance is insufficient, under the same conditions, it is an indication that the magnets have not been shifted down far enough. In either case, it will be necessary to loosen the magnet screws again in accordance with M-1 and shift the magnet as required. In this case check requirements 2.10 and 2.11. Also at this time, check that the gap between the armature and core, with the magnet in the normal position, is approximately .030". If the trouble is due to a distorted spring or incorrect angle at which the tip of the driving pawl is bent, the condition should be corrected using the No. 363 spring adjuster.

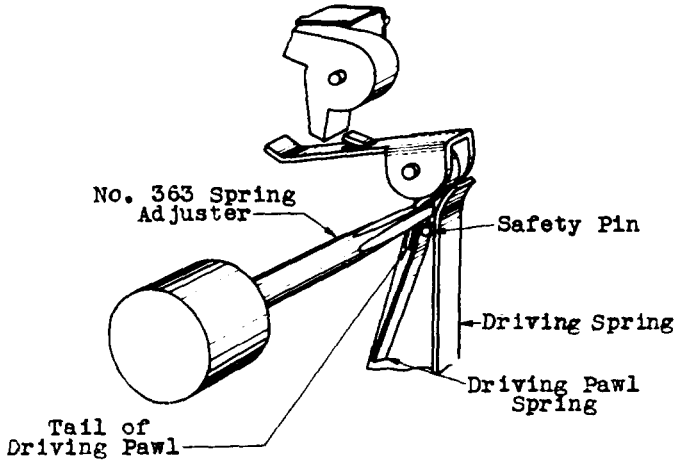


Fig. 12 - Method of Adjusting Tail of Driving Pawl

M-3 Operate the armature by hand and if the tail of the driving pawl and the driving pawl spring do not touch the safety pin on the driving lever, press them against the safety pin by hand. With the movement in this position, if the tip of the driving pawl does not satisfactorily clear the ratchet wheel it is an indication that the tail of the driving pawl is bent at an incorrect angle. Correct this condition by bending the tail of the driving pawl close to the point where it leaves the rounded portion of the driving pawl using the No. 363 spring adjuster as shown in Fig. 12. When in the correct position the tail of the driving pawl should be approximately paralleled to the outer edge of the driving lever when the stepping movement is in the normal position.

M-4 Relation Between the Lip of the Driving Pawl to the Tail on the Lock Pawl Operate the armature by hand and see whether or not the lip of the driving pawl satisfactorily clears the tail of the lock pawl. If there is no clearance, and if the driving pawl is not distorted, the trouble may be due to the angle of bend of the lip of the driving pawl being incorrect. The lip should be bent at an angle of approximately 45° with respect to the straight portion of the driving pawl. If necessary adjust the lip with the No. 363 spring adjuster. However, when making this adjustment note that when the armature is allowed to release, the lip of the driving pawl will engage the tail of the lock pawl and lift the lock pawl out of the notch in the ratchet wheel and at the same time allow the wheel to be advanced.

M-5 Should the lip of the driving pawl satisfactorily clear the tail of the lock pawl when in the operated position and also engage the tail of the lock pawl while the armature is being released, but either fail to lift the locking pawl or else fail to cause the ratchet wheel to be driven forward, the trouble may be due to the driving spring not being tensioned against the driving lever. This tension should not be so great as to prevent the magnets from operating satisfactorily when the circuit is closed, yet it should have sufficient tension so that when the armature restores to the normal position, the tension of this spring will be sufficient to cause the driving pawl to drive the ratchet wheel forward the proper distance.

M-6 At this time it is also advisable to check the tension of the lock pawl spring against the lock pawl. Should the tension be excessive, it may prevent the lip of the driving pawl from satisfactorily lifting the lock pawl when the armature is returning to the normal position. Likewise, if the tension is insufficient it may prevent the proper release of the lock pawl

3.12-3.14 (Continued)

when the ratchet wheel has been advanced. It is, therefore, very important to see that this spring is properly tensioned. The tension of this flexible spring against the locking pawl should not exceed 5 grams and when adjusting it, exercise extreme care not to distort it. Use the No. 70-F gauge applying it near where the spring touches the pawl and note the tension as the spring breaks from the pawl. Use the No. 363 spring adjuster for adjusting this spring, applying it near the base of the spring.

3.15 ELECTRICAL REQUIREMENTS (Rq.2.15)

M-1 A clock meeting all of the above adjustments should operate satisfactorily when the circuit is closed. Should the clock meet all of the previous adjustments and still fail to operate, the trouble may be due to the tension of the driving spring being excessive. Excessive tension of the driving spring will greatly decrease the power of the magnet for moving the hands. In this case reduce the tension by bending the spring close to the point where it leaves the bridge using the No. 371 spring adjuster. At this time it is also advisable to check the tension of the driving pawl spring and back stop pawl spring. These tensions should not exceed 5 grams. Assemble all the parts in the clock case after all the adjustments have been made.

M-2 If the clock fails to operate satisfactorily after all of the above adjustments have been made and meets all the requirements, it should be sent back to the Western Electric Company for repairs.