

KEYS
518-TYPE
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the 518A (D-76858), B, C, and D keys and the D-34393 interrupter key of 31A, B, and C test sets.

1.02 This section is reissued primarily to cover the 518D key. Detailed reasons for reissue will be found at the end of the section.

1.03 Reference shall be made to Section 020-010-711 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 Normal or unoperated position is that position where the lower contact spring rests in approximately the center of the large groove in the impulse wheel.

1.06 The operated position is that position where the lower contact spring rests on a tooth of the impulse wheel and is in contact with the upper contact spring.

1.07 One drop of oil for the purpose of this section is the amount of oil released from a piece of No. 22 bare-tinned copper wire after it has been dipped 1/4 inch into the oil and slowly removed.

2. REQUIREMENTS

2.01 Cleaning

- (a) Contacts shall be cleaned in accordance with approved procedures.
- (b) Other parts shall be cleaned in accordance with approved procedures.

2.02 Lubrication: Fig. 1(A)

(a) The following parts shall be adequately lubricated with KS-6232 oil. When lubrication is necessary, one drop of the oil shall be applied to the edge of cam and to the side of ratchet wheel adjacent to the main gear.

(b) No lubricant shall be applied to the pinion or gear teeth.

(c) After turnover, it is recommended that the parts listed in requirement (a) above be lubricated at intervals of one year. This interval may be extended if periodic inspections have indicated that local conditions are such as to insure that requirement (a) shall be met during the extended interval.

2.03 Record of Lubrication: During the period of installation, a record shall be kept by date of the lubrication of the key and this record shall be turned over to the telephone company with the equipment. If no lubrication has been done, it shall be so stated.

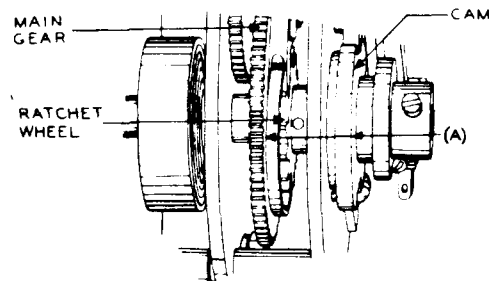


Fig. 1 - Lubrication Points

*2.04 Contact Alignment: Fig. 2(A) - The contact centers shall not be out of alignment more than 25 per cent of the diameter of the contact points.

Gauge by eye.

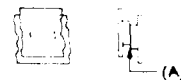


Fig. 2 - Contact Alignment

*2.05 Contact Separation: Fig. 3(A) - The separation between open contacts shall be

(a) 518A (D-76858), B, C, and D-34393 Keys

Test - Min 0.010 in.
Readjust - Min 0.012 in.

Use the KS-6909 gauge.

SECTION 032-720-701

Γ (b) 518D Key

Min 0.012 in.
Max 0.016 in.

└ Use the KS-6909 gauge.

*2.06 Contact Pressure: Fig. 3(A) - The pressure between closed contacts shall be

(a) D-34393 Key

Test - Min 12 grams
Readjust - Min 15 grams

Use the 70D gauge.

(b) 518-type and D-76858 Keys

Test - Min 14 grams
Max 20 grams
Readjust - Min 17 grams
Max 20 grams

Use the 70D gauge.

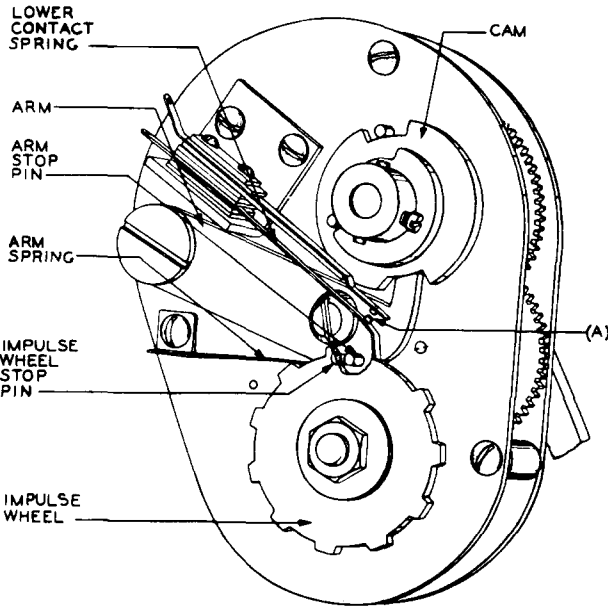


Fig. 3 - Rear View

*2.07 Spring Tension

(a) Keys Not Equipped With Auxiliary Operating Spring: Fig. 4(A) - The tension of the operating spring against the impulse wheel in the unoperated position shall be

- Max 5 grams measured at the contacts.
- Use the No. 70F gauge.

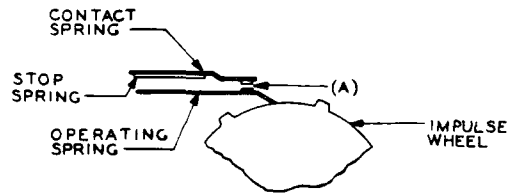


Fig. 4 - Spring Tension - Keys Not Equipped With Auxiliary Operating Spring

(b) Keys Equipped With Auxiliary Operating Spring: Fig. 5(A) - The auxiliary operating spring shall be tensioned slightly against the operating spring and the combined tension of the two springs against the impulse wheel in the unoperated position shall be

- Max 5 grams measured at the stud.
- Use the No. 70F gauge.

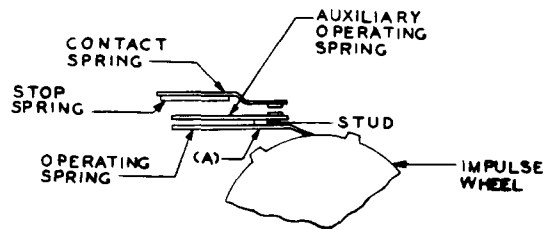


Fig. 5 - Spring Tension - Keys Equipped With Auxiliary Operating Spring

*2.08 Contact Follow: Fig. 6(A) - There shall be a follow of

Test Min 0.010 in.
Readjust - Min 0.010 in.

Gauge by eye.

*2.09 Flexible Spring Position: Fig. 6(B) - In the unoperated position the flexible top contact spring shall rest at least on the end of the stop spring that is nearest the contact on the flexible spring.

*2.10 Force Required to Rise the Arm and Release Impulse Wheel: Fig. 7(A) - The force required to raise the arm and release impulse wheel shall be

Test - Min 130 grams
Readjust - Min 140 grams

Use the No. 79C gauge applied at the point indicated in the figure.

2.11 Setting of Adjustable Stop: Fig. 7(B) - The adjustable stop shall be set so

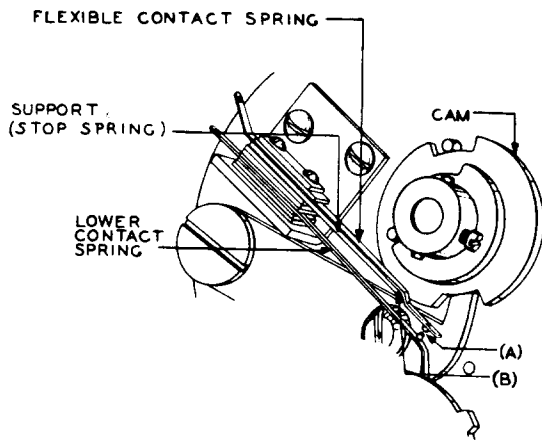


Fig. 6 - Position of Flexible Spring and Contact Follow

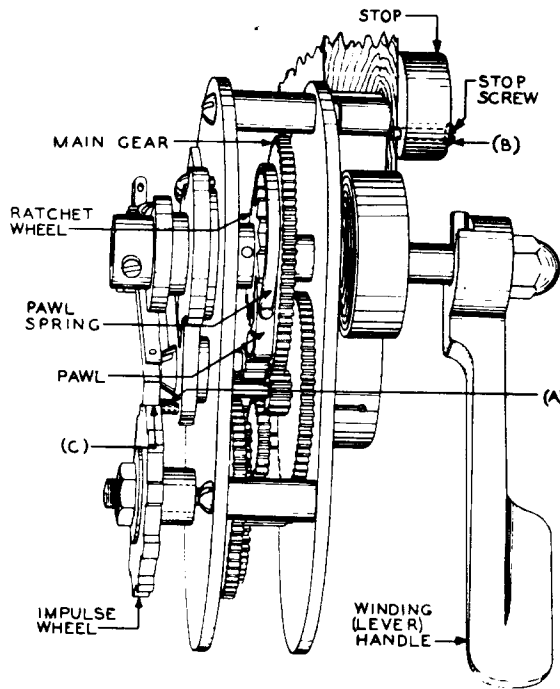


Fig. 7 - General View

that when the winding lever is pulled against it, the ratchet on the main shaft will be advanced 5 teeth where the ratchet wheel has 15 teeth and 10 teeth where the ratchet wheel has 30 teeth. Where a key is equipped with a ratchet wheel having 15 teeth, the key shall not start until after the pawl has engaged the fifth tooth of the ratchet wheel, but it shall start before the pawl has engaged the sixth tooth of the ratchet wheel. Where the key is equipped with a ratchet wheel having 30 teeth, the key shall not start until after the pawl has engaged the tenth tooth of the

ratchet wheel, but it shall start before the pawl has engaged the eleventh tooth of the ratchet wheel.

2.12 Relation of Impulse Wheel to the Arm: Fig. 7(A) - The stop pins on the impulse wheel and arm shall be securely engaged when the pawl has advanced 5 teeth on a 15-tooth ratchet wheel and 10 teeth on a 30-tooth ratchet wheel.

2.13 Speed: Fig. 7(C)

(a) D-34393 and 518C Keys: The impulse wheel shall make ten complete revolutions in

Min 100 seconds
Max 110 seconds

Use the KS-3008 stop watch.

(b) 518A (D-76858) and B Keys: The impulse wheel shall make ten complete revolutions in

Test - Min 53-1/2 seconds,
Max 60-1/2 seconds
Readjust - Min 55 seconds,
Max 59 seconds

Use the KS-3008 stop watch.

(c) 518D Key: The time in interval between the make of the initial impulse and the break of the one-hundredth impulse shall be

Min 51 seconds
Max 53 seconds

Use the KS-3008 stop watch.

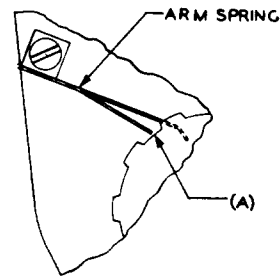


Fig. 8 - Bifurcated Arm Spring

Keys Equipped With Bifurcated Arm Spring

*2.14 Backlash: Fig. 8 - As the key is wound, the backlash of the impulse wheel shall not be sufficient to allow any tooth of the impulse wheel to strike the operating spring.

Gauge by eye.

*2.15 Position of Arm Spring: Fig. 8(A) - The portion of the arm spring that engages the impulse wheel teeth shall not touch the impulse wheel between teeth.

Gauge by eye.

SECTION 032-720-701

*2.16 Tension of Arm Spring: Fig. 8 - The tension of the arm spring against the tooth of the impulse wheel shall be

Min 35 grams
Max 40 grams

Use the 70D gauge. Apply the gauge at the end of the arm spring where it touches the tooth.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, and Materials

Code or
Spec No.

Description

Tools

KS-3008	Stop Watch
KS-6854	3-1/2-in. Screwdriver
KS-7782	Parallel Jaw Pliers
KS-8097	Offset Box Wrench
KS-14164	Brush
-	3-in. Cabinet Screwdriver
-	4-in. Regular Screwdriver
-	6-in. Cabinet Screwdriver

Gauges

70D (or the replaced 70)	50-0-50 Gram Gauge
70F (or the replaced 70C)	10-0-10 Gram Gauge
79C	0-200 Gram Gauge
KS-6909	Thickness Gauge Nest

Materials

KS-2423	Cloth
KS-6232	Oil
KS-8372	Trichloroethylene
-	No. 22 Bare-tinned Copper Wire

3.002 When these keys are mounted in a box, it will be necessary to remove the key in order to make any of the adjustments specified herein.

3.01 Cleaning (Rq 2.01)

(1) Clean the contacts in accordance with approved procedures.

(2) Clean the other parts of the key thoroughly once a year with KS-8372 trichloroethylene using the KS-14164 brush. Lubricate the key as outlined in 3.02.

3.02 Lubrication (Rq 2.02)

(1) When lubricating the key, apply one drop of KS-6232 oil to the edge of cam and the side of ratchet wheel adjacent to the main gear. Excessive lubricant shall not be allowed to remain on either point. Remove any excess oil with the KS-2423 cloth. Take care in applying the oil that none is applied or spattered onto the teeth of the gear or pinions.

3.03 Record of Lubrication (Rq 2.03)
(No procedure)

- 3.04 Contact Alignment (Rq 2.04)
- 3.05 Contact Separation (Rq 2.05)
- 3.06 Contact Pressure (Rq 2.06)
- 3.07 Spring Tension (Rq 2.07)
- 3.08 Contact Follow (Rq 2.08)
- 3.09 Flexible Spring Position (Rq 2.09)

(1) If a key fails to meet the contact separation or pressure requirements, it is advisable to remove the key from the test set. To do this proceed as follows. Remove the nut holding the handle from the shaft with the KS-8097 offset box wrench, the shaft screw when furnished with the KS-6854 screwdriver, the handle from the shaft, and finally the key mounting screws with the 4-inch regular screwdriver. Remove the bottom of the box with the 6-inch cabinet screwdriver and then remove the screw holding the cable with the 3-1/2-inch screwdriver. The key is now loose in its mounting and can be removed. See whether the springs are out of alignment. If they are, loosen the spring assembly screw very slightly with the 3-1/2-inch screwdriver, set the springs in alignment, and then retighten the assembly screw. When mounted, the lower contact spring should rest centrally on the impulse wheel and should be parallel to the key frame. The centers of the contact points should line up within 25 per cent of their diameter.

(2) Adjusting for contact separation, contact pressure, and contact follow should, unless otherwise specified, be done close to the point where the spring leaves the assembly clamping plates and insulators with the KS-7782 pliers.

(3) When adjusting contact springs, take care to adjust them in line with their movement and not to twist the contacts off center.

(4) Start the key, hold it, and note whether the flexible contact spring rests against its stop spring within the half of the free length of the flexible contact spring nearer the contact point, when its contact is open. In cases where it does not, due to a previous distortion of the spring, adjust the spring as follows. Insert a piece of wire between the two springs where they leave the spring assembly clamping plate and insulators. Then place the pliers over the stop spring and flexible contact spring close to the insulators and press them together as shown in Fig. 9 so that the flexible contact spring rests on the stop spring on at least one point as close as practicable to the contact point but not further than one-half the free length of the flexible contact spring away from the contact point. Remove the wire and then the pliers. When the contacts are fully made, the upper contact spring should be held slightly away from its support. This indicates that the contacts have a follow which insures reliable contact pressure.

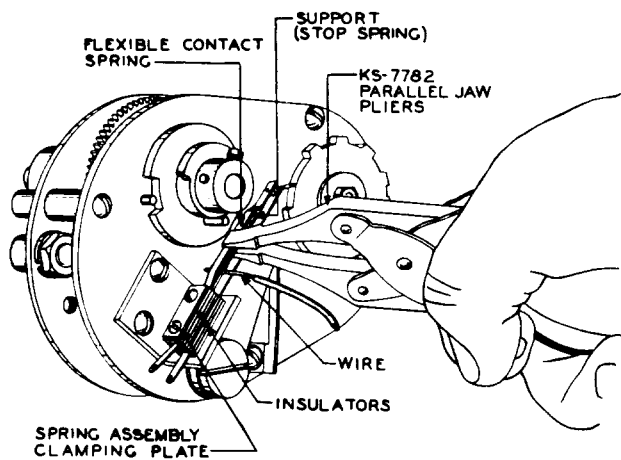


Fig. 9 - Method of Adjusting the Flexible Contact Spring

3.10 Force Required to Raise Arm and Release Impulse Wheel (Rq 2.10)

(1) To check for this requirement, apply the force at the arm stop pin with the 79C gauge held so as not to snag on the impulse wheel stop pin. Push the gauge against the pin in the same direction as the movement of the pin. (See Fig. 10.) If the key fails to meet the minimum requirement, tension the arm spring at its base with the pliers so that the arm will lie solidly in the notch of the cam when in its normal position.

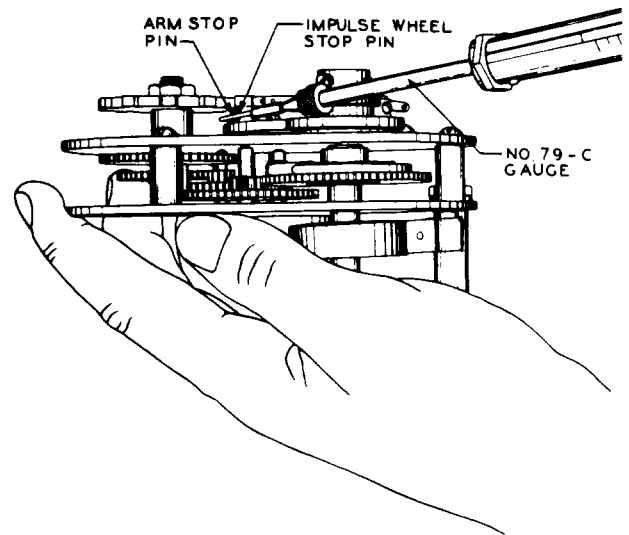


Fig. 10 - Method of Checking the Force Required to Raise the Arm and Release the Impulse Wheel

- 3.11 Setting of Adjustable Stop (Rq 2.11)
- 3.12 Relation of Impulse Wheel to the Arm (Rq 2.12)
- 3.13 Speed (Rq 2.13)

- (1) Failure of a key to operate properly is often due to dirt. If this condition exists, clean the key as outlined in procedure 3.01 and then relubricate it as outlined in procedure 3.02.
- (2) If the winding lever strikes the stop before the pawl has advanced 5 teeth on the 15-tooth ratchet wheel or 10 teeth on the 30-tooth ratchet wheel, loosen the stop screw with the 4-inch regular screwdriver and rotate the stop to a point where the lever will strike it after the pawl has engaged the fifth tooth or tenth tooth, respectively, but not so far as to allow the pawl to reach the sixth tooth or eleventh tooth, respectively. Then tighten the stop screw securely to prevent the stop from moving out of position. With this adjustment the key will be in a position to start when the handle strikes the stop. Likewise, if it is possible to move the winding lever far enough to allow the sixth tooth of the ratchet wheel which has 15 teeth or the eleventh tooth of the ratchet wheel which has 30 teeth to be engaged by the pawl, reset the stop. Such a condition, unless corrected, will result in forcing and cause the key to send 110 interruptions instead of 100.
- (3) If all stop adjustments fail to cause the key to start before the pawl has engaged the sixth or eleventh tooth of

ratchet wheels having 15 and 30 teeth, respectively, or if the impulse wheel starts before the pawl has engaged the fifth or tenth tooth of ratchet wheels having 15 and 30 teeth, respectively, or if at any time the key fails to make the complete ten revolutions in the specified time, the matter should be referred to the supervisor for further consideration. Do not adjust the timing element except when the key is equipped with a governor of the type shown in Fig. 11. In this case if it is desired to change the speed of the key, loosen the screws holding the governor tension spring arms in place with the 3-inch cabinet screwdriver and shift the arms toward or away from each other as required. Shifting the arms toward each other will decrease the governor spring tension and thereby reduce the speed of the key, whereas shifting the arms away from each other will increase the governor spring tension and thereby increase the speed of the key.

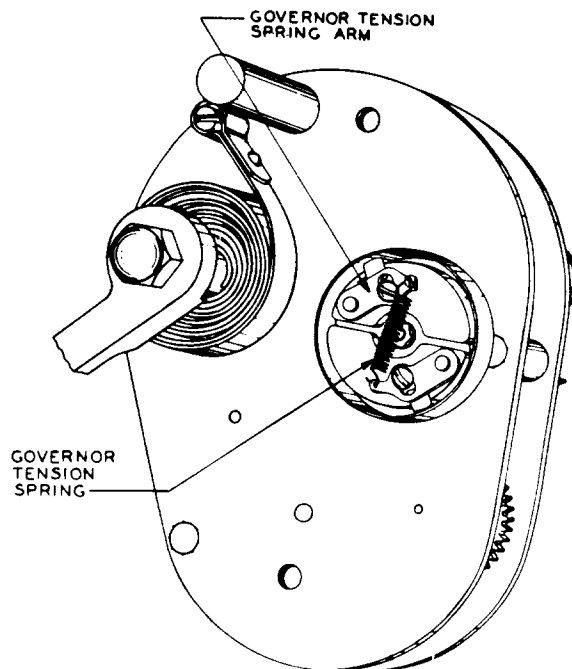


Fig. 11 - Governor Assembly

- 3.14 Backlash (Rq 2.14)
 3.15 Position of Arm Spring (Rq 2.15)

(1) If the backlash of the impulse wheel is sufficient to allow the operating spring to snag on any tooth of the impulse wheel, loosen the arm spring mounting screw with the 4-inch regular screwdriver and shift the arm spring as far as possible toward the impulse wheel. Then tighten the mounting screw securely.

(2) If the portion of the arm spring that engages the impulse wheel touches the impulse wheel between teeth, adjust the spring with the pliers at a point where both legs of the spring meet. After making this adjustment, check the tension of those portions of the spring that rest against the arm and the tooth of the impulse wheel. If the tension is not satisfactory, readjust as outlined in 3.10 and 3.16.

- 3.16 Tension of Arm Spring (Rq 2.16)

(1) If the spring fails to meet the requirements, adjust the spring with the pliers as close as practicable to the point where this leg joins the other leg. Adjust only that leg of the spring

- which touches the tooth rather than the
 — leg which touches the arm.

REASONS FOR REISSUE

1. To cover the 518D key.
2. To amplify spring tension requirements (2.07).
3. To add backlash and position of arm spring requirements and procedures (2.14, 2.15, 3.14, and 3.15).
4. To add requirement and procedure for tension of arm spring (2.16 and 3.16).
5. To revise list of tools, gauges, and materials (3.001).
6. To revise figure numbers.