X-70291-01, ISSUE 1
May 27, 1926

INSTALLATION AND MAINTENANCE REQUIREMENTS
FOR
THE FOOTE-PIERSON & CO. INK WRITING REGISTER
(SINGLE PEN REGISTER)
PER KS-3106

SECTION 1 - GENERAL

1.1 This specification covers the installation and maintenance requirements for the Foote-Pierson & Co. Ink Writing Register per KS-3106. Unless otherwise specified herein or in the "Circuit Requirement Tables" on circuit drawings the requirements covered by this specification apply to all registers of the above type.

1.2 Section 2 of this specification covers the requirements for both operating tests and the inspection of mechanical adjustments which shall be used to determine whether the register is in proper condition for delivery to the customer and for service. These are called "Test Requirements" and are listed on Sheets 1 and 2 attached hereto.

1.3 Section 3 of this specification covers the operating and mechanical requirements which must be met in readjusting a register which fails to meet the test requirements. These are called "Readjust Requirements" and are listed on Sheets 1 and 2 attached hereto. In addition to the readjust requirements, Section 3 also gives the approved maintenance methods of meeting these requirements.

1.4 The tensional and dimensional requirements set up in this specification, unless otherwise specified, should be met, regardless of the method of test or adjustment employed. The facilities for meeting these requirements are provided in the form of standard tools and gauges. However, if it is found by experience that certain requirements can be obtained satisfactorily by "FEEL" or by "EYE", these methods may be employed. It is suggested that checking with tools and gauges be made often enough to insure that proper test and adjustment requirements are being met. Furthermore, where the requirements are close, it would be advisable to use tools and gauges to obtain adjustment.

1.5 The following is a list of the tools, gauges and materials specified in Section 2 and Section 3 for use in inspecting and readjusting the register.

Tools

Code No.	Description
35	Screw-driver - 3 1/2"
-	Cabinet screw-driver - 3 1/2"
-	Oil-dropper (piece of No.22 (B&S) bare tinned copper wire)
-	Ink dropper (glass medicine dropper) or a small camels hair brush

Gauges

73-D	.013" - .017" Thickness Gauge
74-C (or the replaced 74-A and 74-B	Nest of Thickness Gauges
79-B	0-1000 Gram Push-Pull Tension Gauge
79-C (or the replaced 79-A)	0-200 Gram Push-Pull Tension Gauge 0-200 Gram Push-Pull Tension Gauge

Materials

-	Cotton cloth per KS-2423
Eagle No. 3	Spindle Oil
-	Foote-Pierson & Co. Register Ink
-	Flat ended toothpicks
-	Blotting paper

SECTION 2 - TEST REQUIREMENTS

2.01 Unless otherwise specified, any register, of the type covered by this specification shall meet the test requirements given on sheets 1 and 2, attached hereto.

SECTION 3 - READJUST REQUIREMENTS

3.0 General

3.01 A register should be readjusted in accordance with the following methods to meet the readjust requirements specified on sheets 1 and 2 attached hereto.

3.1 Cleaning (See Requirement 2.1, Sheet 1)

M-1 Clean all external parts of the register with a cotton cloth per KS-2423, taking care to remove all dust, lint particles, etc. that have accumulated outside of the motor housing. Do not remove the glass covers or attempt to clean any parts inside of the housing.

3.2 Lubrication (See Requirement 2.2, Sheet 1)

M-1 The register should be turned on its side when lubricating bearings to insure that the oil enters the bearings and to prevent it from running down the side of the register housing.

M-2 Apply one drop of oil to each of the bearings having no dust caps.

M-3 To lubricate the bearings, having small dust caps, loosen the screws holding the small dust caps sufficiently to permit them to be turned aside thereby exposing the ends of the shafts. Use tool No. 35 for this purpose. Apply one drop of oil to each bearing, replace the dust caps, and tighten the screws. Any oil appearing outside of the dust caps should be wiped off with a dry cloth per KS-2423.

M-4 To oil the rear main bearing, remove one of the screws which holds the large dust cap in place and loosen the other sufficiently to permit the cap to be turned aside. Apply one drop of oil between the shaft and the housing and replace the dust cap.

3.3 Inking (See Requirement 2.3, Sheet 2)

M-1 To check the marking on the tape, observe the operation of the register under service conditions and note that the printing wheel makes distinct marks on the tape, which do not smudge easily or require an excessive length of time for drying. If the register fails to meet the requirement and there is a question of the registers being in the proper adjustment, press upward against the printing lever with a sufficient force to simulate the operating conditions.

M-2 If the ink roller should require more ink, raise the ink roller and dust shield and, with an ink dropper or a small camels hair brush, apply several drops of Foote-Pierson & Company's register ink to the felt ink roller. Replace the ink roller and dust shield and repeat the check as indicated under M-1. If necessary apply more ink in the manner specified above.

M-3 If too much ink should be applied, remove the paper tape, operate the armature manually and, while the roller is rotating, wipe the excess ink from the printing wheel with a piece of blotting paper.

3.4 Control Arm Adjustment (See Requirement 2.4, Sheet 2)

M-1 To check for the setting of the control arm, operate the armature manually by tapping it quickly. Observe the operation of the control arm and note that it intercepts the stop pin on the worm shaft on the second revolution of the shaft after the armature is released.

M-2 To adjust the control arm, place a flat-ended toothpick between the star-wheel and the shelf, loosen the lock nut on the control arm adjusting screw with the fingers and turn the screw in (to the right) until the control arm begins to move. Then, with one hand, hold the armature operated and with the other turn the control arm adjusting screw out (to the left) until the arm has passed over two turns and is resting between the second and the third turns of the worm spring. Allow the armature to restore to normal and turn the control arm adjusting screw in (to the right) until the guide just touches the worm spring. Tighten the lock nut as tightly as possible with the fingers and remove the toothpick from the star-wheel when the adjustment is completed.

3.5 Armature Air-Gap (See Requirement 2.5, Sheet 2)

M-1 When checking the armature air-gap requirement, block the mechanism by inserting a toothpick between the star-wheel and the shelf and then, with the feeler gauges check the clearance between the armature and the stop pins on both cores.

M-2 To adjust the armature air-gap turn the armature back stop screw in (to the right) or out (to the left) as required to meet the specified requirement. If it is found that the cores are not in the proper position to permit the requirement to be met by this method, it will be necessary to reposition them.

M-3 To reposition the cores, back off the armature back stop screw and place the .017" side of the No. 73-D gauge between the armature and the stop pin nearer the armature. Turn the armature back stop screw to the right until the gauge is held snugly. Then remove the gauge and with the 3 1/2" cabinet screw-driver, loosen magnet bracket screws. Locate both magnets so that the gauge fits snugly between the armature and the stop pin on either magnet core and tighten the magnet bracket screws.

3.6 Printing Lever Adjustment (See Requirement 2.6, Sheet 2) In order to secure the best operation of the register, the adjustment of the printing lever should be held within the specified limits. The register should be operated electrically in the actual operating circuit. These adjustments should be made as follows:

M-1 Non-Mark Requirement Place the .007" blade of the No.74-C gauge between the armature and the stop pin nearer the armature and operate the armature electrically. The mechanism should operate, moving the tape, but the printing wheel should not mark the tape.

M-2 If the tape does not move it is an indication that there is too much clearance between the adjusting screw on the lower armature extension and the push rod which actuates the control arm. When this is the case, this clearance should be reduced by turning the knurled adjusting screw out (counter clockwise) with a screw-driver until the control arm will release the mechanism when the armature is operated against the gauge. If it is necessary to change the position of the adjusting screw as specified above, care should be taken to insure that there is still a clearance between the adjusting screw and the push rod when the armature is in its unoperated position.

M-3 In order to meet this requirement on registers not equipped with the adjusting screw on the lower armature extension, it may be necessary to lower the position of the coils so that, when the armature is operated, the push rod will be moved a greater distance. If this is necessary, loosen magnet bracket screws and allow the magnet coils to drop toward the base of the register. Locate both magnets so that the cores are approximately parallel and, with the armature operated, there is an appreciable clearance between the control arm and the worm shaft and tighten the screws. After changing the position of the magnets it will be necessary to readjust for the armature air-gap requirement.

M-4 If the printing wheel marks the tape on the above test, remove the tape from under the paper feed wheel and the paper guide and with a small screw-driver (No.35 tool) turn the printing lever adjusting screw in (to the right). The adjusting screw

should be given only a very slight turn, after which the tape should be replaced and the test repeated. If the printing wheel still marks the tape, the adjustment should be repeated, but care should be taken to prevent moving the printing lever adjusting screw any farther than is absolutely necessary in order to meet the non-mark requirement.

M-5 Mark Requirement Place the .004" blade of the No. 74-C gauge between the armature and the stop pin nearer the armature and again operate the armature as specified in M-1. The mechanism should operate and the printing wheel should produce a distinct mark on the tape. If the printing wheel fails to mark the tape, remove the tape from under the paper feed wheel and turn the printing lever adjusting screw out (to the left) as described in M-4 above. As in the first case, the screw should be given only a very slight turn before replacing the tape and again repeating the test. If it is necessary to adjust the printing lever in order to meet the "mark" requirement the "non-mark" requirement should be rechecked to insure that the adjustment previously made has not been destroyed.

M-6 After meeting the adjustment specified in M-5 above, remove the gauge and with the armature electrically operated, check that there is clearance between the head of the adjusting screw on the lower armature extension and the motor housing.

3.7 Armature Retractile Spring Tension (See Requirement 2.7, Sheet 2)

M-1 To check the tension of the armature retractile spring, attach the No. 79-B gram gauge to the printing lever at the hook to which the retractile spring is attached, and pull in a direction directly opposing the pull of the spring. The gauge should register at least the specified minimum tension but not more than the specified maximum tension at the instant the printing lever starts to move from its position of rest. Before making any measurements with a No.79 type gram gauge, hold it in the vertical position to obtain the zero reading. This is equal to the weight of the plunger of the gauge. For measuring spring tensions where the gauge is held in the vertical position, the true reading is equal to the indicated reading less the zero reading.

M-2 The tension of the retractile spring may be adjusted by turning the knurled adjusting knob. The spring cord should be wound on this knob in such a manner that turning the knob to the right will increase the tension of the spring and turning the knob to the left will reduce it.

Attached:

X-70291-01, Sheet 1, Issue 1
X-70291-01, Sheet 2, Issue 1

RMB)
HWF)AH
FAC)

DEPT. 332-B-4

3.8 Paper Feed-Wheel Pressure (See Requirement 2.8, Sheet 2)

M-1 To check the pressure of the paper feed-wheel against the star wheel, attach the 79-C gram gauge to the paper feed-wheel arm at the hook to which the retractile spring is attached and pull in a direction directly opposing the pull of the spring. The gauge should register at least the specified minimum tension but not more than the specified maximum tension at the instant the feed-wheel breaks contact with the driving wheel. Before making any measurements with the gauge obtain the zero reading in the manner covered under 3.7 M-1.

M-2 The tension of the retractile spring may be adjusted by turning the knurled adjusting knob. The spring cord should be wound on the knob in such a manner that turning the knob to the right will increase the tension of the spring and turning the knob to the left will reduce it.

3.9 Operation (See Requirement 2.9, Sheet 2) The register should be checked for operation without removing it from the circuit. When checking this requirement use a dial known to give pulses within the specified limits and where possible use one which approaches the maximum limit rather than the minimum limit. The dial to be used should be checked with a dial tester to determine that it pulses within the specified limits. The test should then be made in the following manner:

M-1 Dial the digit zero. The register should follow the dial pulses, making 10 distinct marks on the tape. Failure to respond properly to the dial pulses will be indicated if the marks are run together in one or more places or if one or more of the marks is faint, noticeably shortened or entirely missing.

M-2 If the marks are run together in one or more places it indicates that the armature is sluggish in restoring, in which case increase the armature retractile spring tension slightly. If, on the other hand, one or more of the marks is faint, shortened or missing it indicates either that the printing lever is improperly adjusted or that the armature retractile spring tension or the armature air-gap are above their maximum limits. To determine whether the printing lever is at fault, recheck its adjustment as specified in paragraph 3.6 of this specification. If the adjustment of the printing lever is correct, reduce the armature retractile spring tension and the armature air-gap slightly toward their minimum values.

M-3 Whenever it is necessary to change the armature retractile spring tension or the armature air-gap in making the above adjustment for operation a recheck of these requirements must be made in order to insure that they are within their specified limits.

M-4 If the register cannot be made to function properly by adjusting according to the specified methods, it shall be returned to the Western Electric Company for repairs.

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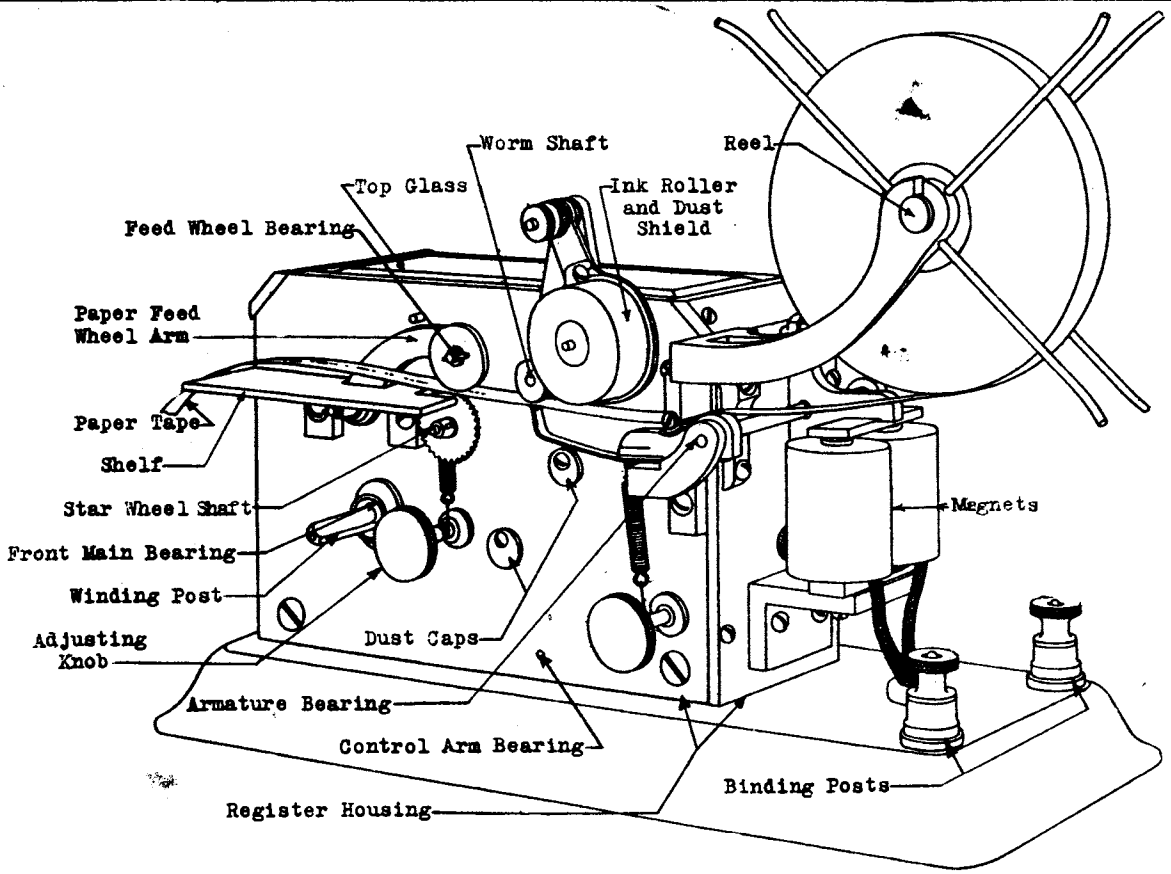


DEFINITIONS AND GENERAL INFORMATION

2.001 One Drop of Oil The amount of oil obtained from a piece of No. 22 gauge bare tinned, copper wire, when it is dipped 1/2 inch into Eagle No. 3 spindle oil and quickly removed, shall constitute one drop.

2.002 Operate-Operated Position Operate means that when the specified Test or Readjust operate current is applied, the armature shall move so that it touches the stop pins or the stop pin nearer the armature. This is also the operated position of the armature.

2.003 Unoperated or Normal Position is the position of the armature, when the armature air-gap is within the specified limits, no current is applied to the windings of the magnets and the armature back stop screw is resting against the register housing.

2.004 Unless otherwise specified, the requirements given on sheets 1 and 2 are both test and readjust requirements.

2.005 Requirements are given in the order in which adjustments should be made by the Telephone Company.

2.006 All tests, readjustments and inspections shall be made without removing the glass covers from the registers.

2.007 Gauges and methods are listed for the use of the Telephone Company.

REQUIREMENTS

2.1 Cleaning (Readjust Only) all parts of the register outside of the motor housing shall be clean and free from dust.

2.2 Lubrication The following points shall be lubricated with one drop of Eagle No.3 spindle oil. Use a piece of No.22 B and S bare, tinned copper wire.

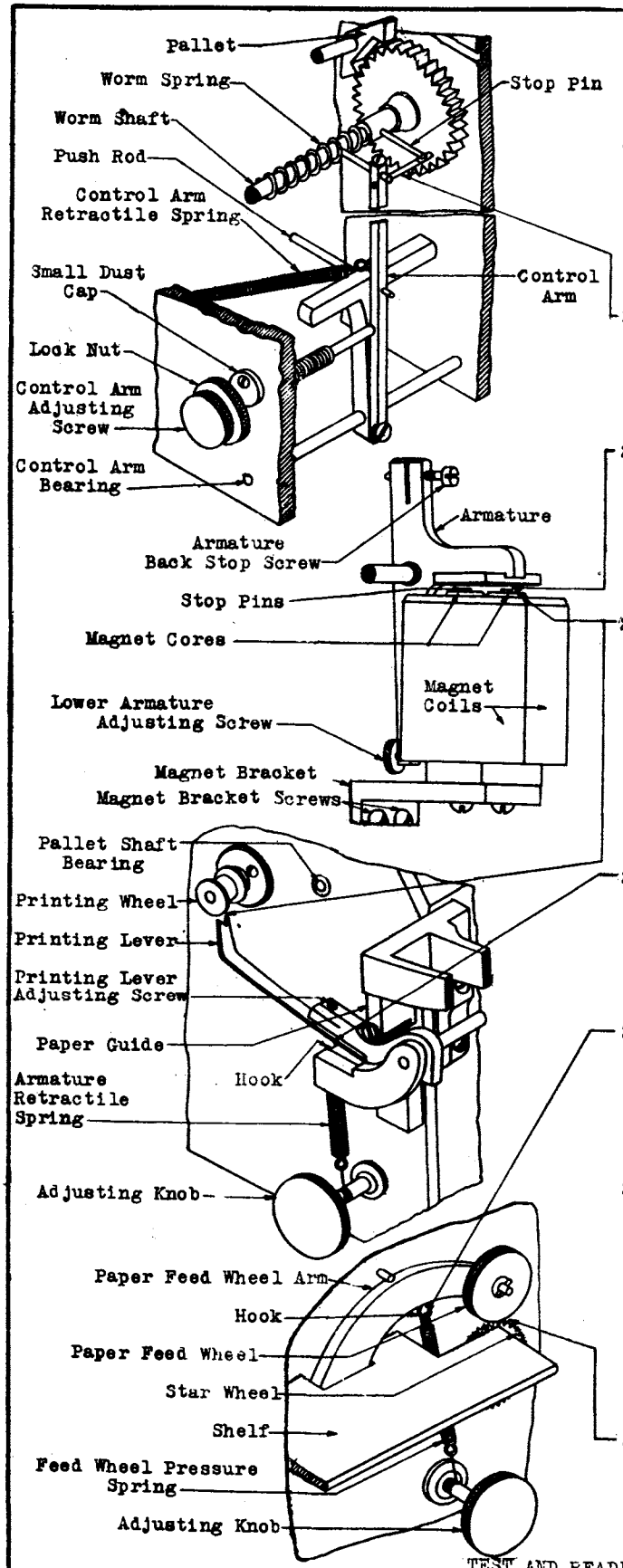
(a) Armature bearings (2).
(b) External bearings accessible by raising dust caps. (7 small and 1 large.)
(c) Front main bearing (1).
(d) The control arm bearings (2).
(e) Star wheel shaft bearings (2).
(f) Paper feed wheel bearing (1).
(g) Worm shaft bearings (2). (One under the dust shield.)
(h) Pallet shaft bearings (2).

No oil shall be allowed to accumulate on any external part of the register. The designations of the parts as indicated above correspond to those shown on the accompanying figures.

(Test Applied Before Turnover) Registers shall be lubricated as specified above before they are put into operation and no register which has been in operation for more than 3 months since it was last inspected for lubrication, shall be turned over to the Telephone Company. A record shall be kept of inspections for lubrication and shall be turned over to the Telephone Company with the apparatus.

(Readjust Applies After Turnover) Registers shall be inspected periodically (about once a year) to determine whether they require lubrication and, if necessary, be lubricated as specified above.

TEST AND READJUST REQUIREMENTS
FOR FOOTE-PIERSON & CO. INK WRITING REGISTER
SINGLE PEN PER KS-3106



REQUIREMENTS (CONT.)

2.3 Inking Frequent inspections of the marks on the tape should be made and, when necessary, sufficient ink should be applied to permit the printing wheel to make distinct marks on the tape. Use a medicine dropper or a small camels hair brush.

2.4 Control Arm Adjustment The control arm shall be set so that it engages the stop pin on the worm shaft, on the second revolution of the shaft after the armature is released.

2.5 Armature Air-Gap When the armature is in the unoperated position, the air-gap measured between the armature and the stop pins on both cores of the magnets, shall be: (Test) min. .012", max. .018"; (Readj.) min. .013". max. .017". Use the 73-D and 74-C gauges.

2.6 Printing Lever Adjustment (Readjust Only) The printing wheel shall not mark the tape when a .007" gauge is placed in the smaller air-gap between the armature and the stop pin and the armature is operated electrically as specified in paragraph 2.002. The printing wheel shall mark the tape when a .004" gauge is placed in the smaller air-gap between the armature and the stop pin and the armature is operated electrically as specified above. Use the 74-C gauge.

2.7 Armature Retractile Spring Tension The tension of the armature retractile spring, measured at the hook on the printing lever, shall be: (Test) min. 200 gs., max. 300 gs.; (Readj.) min. 225 gs., max. 275 gs. Use the 79-B gauge.

2.8 Paper Feed-Wheel Pressure The pressure of the paper feed-wheel against the star wheel, measured at the hook on the paper feed-wheel arm shall be: (Test) min. 65 gs., max. 85 gs.; (Readj.) min. 70 gs., max. 85 gs. Use the 79-C gauge.

2.9 Operation With a potential of at least 45 volts, but not more than 50 volts D.C. applied across a series circuit consisting of the magnets and 200 ohms non-inductive resistance or a potential of at least 21 volts but not more than 25 volts D.C. applied across the windings of the magnets, the register shall be capable of recording dial pulses of the following speeds: (Test) min. 16 pulses per second, max. 20 pulses per second (Readj.) min. 17 pulses per second, max. 20 pulses per second.

2.10 Speed The mechanism shall be capable of driving the paper tape at a speed of at least 2-1/2" per second, measured as the tape passes between the star wheel and the paper feed-wheel.

TEST AND READJUST REQUIREMENTS
FOR FOOTE-PIERSON & CO. INK WRITING REGISTER
SINGLE PEN PER KS-3106