I. & M. REQUIREMENTS SPECIFICATION
BELL TELEPHONE LABORATORIES, INC.
SYSTEMS DEVELOPMENT DEPT., NEW YORK

X-70218-01 - ISSUE 1
MAY 5, 1926

INSTALLATION AND MAINTENANCE REQUIREMENTS

FOR

NO. 5 TYPE TRAFFIC REGISTERS

SECTION 1 - GENERAL

1.1 This specification covers the installation and maintenance requirements for No. 5 type traffic registers. 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 when not used as line registers.

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 following is a list of the tools and test apparatus specified in Section 2 and Section 3 for use in inspecting and readjusting the register.

Code No.	Tools	Description
35		Screw-driver 3-1/2".
46 or (the replaced 102)		Wrench 3/8" Hex. Socket.
90		Cap Remover.
138		Retractile Spring Lug Adjuster.
363		Spring Adjuster.
-		Screw-driver 4-1/2" per KS-2631.
-		Orange Stick.
-		Long Nose Pliers.

Test Apparatus

35-C	Current flow test box.
-	100 operation test set.

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, when not used as a line register.

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.

3.02 In case it is necessary to remove the register from the mounting plate to make any one adjustment, make all other adjustments that appear necessary before remounting the register. The 100 operation test, if being applied, should be made also after the register is remounted.

3.1 Back Lash (See requirement 2.1 on Sheet 1).

3.2 Bind (See requirement 2.2 on Sheet 1).

3.3 Stop Pawl (See requirement 2.3 on Sheet 1).

3.4 End Play (See requirement 2.4 on Sheet 1).

M-1 If the register fails to meet requirements 2.1 to 2.4 inclusive, it shall be replaced with one that meets all requirements.

3.5 Mounting (See requirement 2.5 on Sheet 1).

3.6 Alignment (See requirement 2.6 on Sheet 1).

M-1 The readjustments necessary for meeting the mounting and alignment requirements are interdependent and in making readjustment to meet either requirement consideration should be given to the other.

M-2 To tighten loose mounting nuts use the No. 46 tool and to tighten loose mounting screws, on registers so equipped, use tool KS-2631. At the same time the mounting nut and screws are tightened, align the register so that it is approximately level, the cap removing tool can be inserted

and the vertical spacing between rows of registers is approximately equal.

3.7 Register Cap (See requirement 2.7 on Sheet 1).

M-1 Adjust the cap as required with pliers or fingers until it fits properly.

3.8 Pawl Clearance (See requirement 2.8 on Sheet 1).

M-1 If the pawl binds on the overthrow stop, the fault should be corrected as follows: In those cases where the register is provided with a pawl screw, back out the screw with tool No. 35 until the pawl does not bind on the overthrow stop. Where the register is not provided with a pawl screw, remove the retractile spring. Loosen the lock nut on the armature adjusting screw with pliers and then turn in the screw until the pawl does not bind on the overthrow stop. Tighten the lock nut securely. In turning in the screw note that the pawl is still capable of advancing the units wheel to the nextposition when the register is operated. Backing out the pawl screw, on registers so equipped, will also help to eliminate a bind.

M-2 Check the clearance between the pawl and the overthrow stop to determine whether it is enough to cause the register to over count. To do this hold the armature operated and attempt to turn the units number wheel. If the clearance is too great the wheel will turn. To correct, remove the retractile spring, loosen the lock nut on the armature adjusting screw and back out the screw until the fault is corrected noting that the register in operating closes the front contacts, when provided. Tighten the lock nut securely. Turning in the pawl screw will also help to eliminate this fault.

M-3 In replacing the retractile spring, exercise care not to damage it.

M-4 If the pawl clearance requirement cannot be met by the above adjustments proceed as follows: To provide a clearance between the overthrow stop and the pawl, pry the stop upward using a No. 35 tool. To decrease the clearance between the overthrow stop and the pawl, first remove the register from the mounting plate and then force the stop downward. Apply the pressure at the free end of the stop. In making these adjustments extreme care should be exercised not to break the stop as

it is very brittle and will not stand much bending. Remount the register noting that requirements 2.5 and 2.6 are met.

3.9 Contact Separation (See requirement 2.9 on Sheet 2)

M-1 In adjusting to meet the contact separation requirement it will be necessary to remove the register from the mounting plate unless it is so mounted that access to the various parts may be obtained.

M-2 If the contact separation is less than .010", it may be corrected by bending the feather contact spring towards the number wheels using the No. 363 tool and applying it near the place where the spring is fastened.

M-3 If the contact separation is more than .020", it may be corrected by bending the feather contact spring towards the fixed spring using the No. 363 tool and applying it near the place where the spring is fastened.

M-4 If the feather contact spring does not clear the spring stop and the contact separation is satisfactory, pry the stop slightly towards the number wheels using the No. 35 tool. Exercise care not to damage the contact spring or destroy the contact separation adjustment.

3.10 Lock Nut (See requirement 2.10 on Sheet 2)

M-1 To tighten loose lock nuts use pliers. It may be necessary to remove the register from the mounting plate to make this adjustment. If so, note that requirements 2.5 and 2.6 are met when the register is remounted.

3.11 Retractile Spring (See requirement 2.11 on Sheet 2)

M-1 If the retractile spring touches the register cap and it appears to be due to a defective spring replace the spring. If the spring seems satisfactory force the retractile spring lug slightly upward or downward as required. To move the lug upward insert the No. 35 tool between the lug and the front frame cross piece and pry it up. To force the lug downward place the pliers over the lug and the lower part of the register frame and press the pliers together.

3.12 100 Operation Test (See requirement 2.12 on Sheet 2)

3.13 to 3.17 Operation Tests (See requirement 2.13 to 2.17 on Sheet 2)

3.18 Retractile Spring Lug (See requirement 2.18 on Sheet 2)

M-1 If the 100 operation test is not being applied, it is advisable to check the register for proper operation on all teeth of the ratchet wheel.

M-2 If the register fails to meet the operate or hold requirement decrease the tension of the retractile spring by bending the retractile spring lug away from the front frame cross piece with tool No. 138 applying it approximately in the middle of the lug. If the tension of the spring can not be reduced sufficiently, within the limits of the bending of the lug, the spring should be replaced.

M-3 If the register fails to meet the non-operate or release requirement increase the tension of the retractile spring by bending the lug towards the front frame cross piece with tool No. 138 applying it approximately in the middle of the lug. If the tension of the spring cannot be increased sufficiently, within the limits of the bending of the lug, the spring should be replaced.

Attached:
X-70218-01 Sheet 1, Issue 1
X-70218-01 Sheet 2, Issue 1

BELL TELEPHONE LABORATORIES, INC.

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DEFINITIONS AND GENERAL INFORMATION

2.001 Operate means that when the specified test operating electrical requirement is applied, the armature shall move towards the core until the armature adjusting screw closes the front contacts, or, in case the register has no front contacts, until the adjusting screw touches the front stop. The pawl shall also advance the units wheel to the next position.

2.002 Non-Operate means that when the specified non-operate test electrical requirement is applied, the armature shall not move from the unoperated position against the distance rod.

2.003 Release means that when the operating or hold test electrical requirement is reduced to the release test value, the armature shall return to the unoperated position against the distance rod.

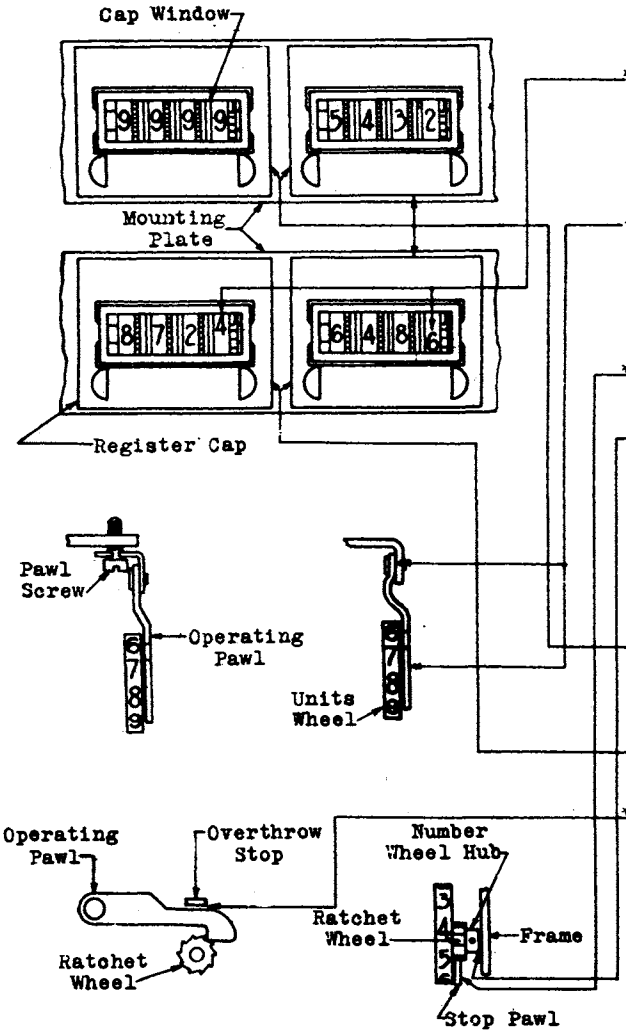
2.004 Hold means that when the test operating electrical requirement is abruptly reduced to the hold test value, the armature shall not move from its operated position.

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

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

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

*2.008 Requirements 2.1, 2.2, 2.3 and 2.8 shall be noted as the register is electrically operated and shall be met on any tooth of the ratchet wheel.



REQUIREMENTS

*2.1 Back Lash The units wheel shall have a noticeable forward and backward movement or "back lash". The back lash shall not be sufficient to allow 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.

*2.2 Bind The operating pawl shall not bind on its bearing or against 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.

*2.3 Stop Pawl The stop pawl shall drop into its normal position behind each tooth of the ratchet wheel.

2.4 End Play There shall be a perceptible amount of end play between the number wheel hub and the frame.

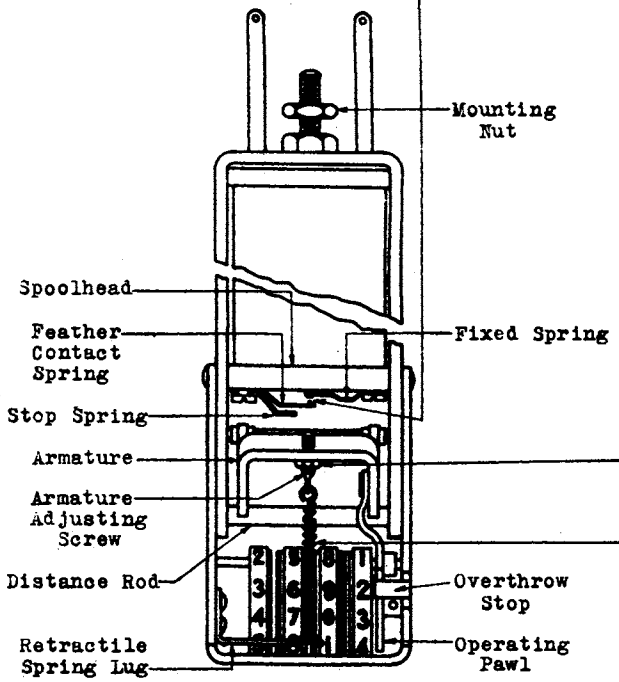
2.5 Mounting Registers shall be mounted approximately level and shall be fastened securely to the mounting plate. This shall be checked for by attempting to move the register horizontally and vertically and not by attempting to turn it.

2.6 Alignment Registers shall not be mounted so close together that the No. 90 tool can not be inserted between the caps. The vertical spacing between rows of registers shall be approximately equal.

2.7 Register Cap shall be tight but readily removable with the No. 90 tool.

*2.8 Pawl Clearance There shall be a slight clearance between the operating pawl and the overthrow stop. This shall be considered as having been satisfactorily met if, with the register electrically operated, the operating pawl may be moved slightly from side to side without binding on the overthrow stop. The clearance shall not be sufficient to permit over-count.

TEST AND READJUST REQUIREMENTS FOR NO. 5 TYPE TRAFFIC REGISTERS



2.9 Contact Separation shall be reliable (at least .010" but not more than .020") as judged by eye. One method of checking this is to push the feather contact spring forward with an orange stick and note the distance it travels before it engages the fixed spring.
(Readjust Only) There should be a slight clearance between the feather contact spring and the spring stop.

2.10 Lock Nut on the armature adjusting screw shall be sufficiently tight to hold the screw in any adjusted position.

2.11 Retractile Spring shall not touch the register cap or the number wheels.

2.12 100 Operation Test The registers in panel and step-by-step machine switching offices shall meet the 100 operation test as applied by the standard message register test set supplied for the office. This requirement shall not be applied by the installer as a part of this specification.

NOTE When the 100 operation test is to be made by the installer it will be specified in and made in accordance with the performance requirements specification.

2.13 Operation Tests The register shall meet the electrical requirements specified on the circuit requirement tables, on any tooth of the ratchet wheel. The requirements need only be applied once in panel and step-by-step machine switching offices and 10 times in manual offices and shall be applied in the following order.

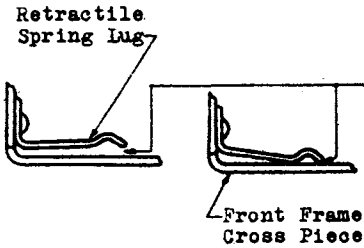
2.14 Operate On the operating current or voltage when specified on the "Circuit Requirement Table".

2.15 Hold On the holding current or voltage when specified on the "Circuit Requirement Table".

2.16 Release On the releasing current or voltage when specified on the "Circuit Requirement Table".

2.17 Non-Operate On the non-operating current or voltage when specified on the "Circuit Requirement Table" immediately after the release.

NOTE The time interval between the tests for release and non-operate shall be as short as practical in order to test the register for non-operation before the magnetic residual effect disappears.



2.18 Retractile Spring Lug When turned over to the Telephone Company the front tip of the retractile spring lug shall not extend forward further than the rear face of the front frame cross piece, nor backward further than 5/32" from the same face as judged by eye. The lug shall be approximately straight except for the bend made at the tip for holding the spring.

NOTE It will be satisfactory for the Telephone Company in readjusting to bend the retractile spring lug forward to the front face of the front frame cross piece.

TEST AND READJUST REQUIREMENTS
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