BELL SYSTEM PRACTICES
Teletypewriter Stations

SECTION P33.006
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SOTUS

SEQUENTIAL SELECTOR AND PANEL MAINTENANCE INSPECTIONS, TESTS AND LUBRICATION

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REFERENCES

1. GENERAL

1.01 This section describes routine procedures for the maintenance of the BS2D, BS3C and BS6L SOTUS sequential selectors. Lubrication is included.

1.02 This section is reissued to:

(a) Add the BS2D and BS6L sequential selectors.

(b) Include the material of the Addendum, Issue 1.

(c) Bring the lubrication instructions up to date in accordance with the latest information from the Teletype Corporation.

(d) Simplify the lubrication schedule by rearrangement of material.

Due to the extensive nature of this revision, marginal arrows to indicate changes are not used.

1.03 Trouble analyses show that failures often occur immediately after maintenance visits. Therefore, while the equipment should receive adequate attention, it is important that the working parts be disturbed as little as possible.

1.04 Intervals between inspections should be as long as possible. The sequential selector should require less attention than the teletypewriter equipment with which it is associated. The frequency of routine inspections should be determined locally and in general should be determined by the need for lubrication, although the following factors should be taken into consideration:

(1) Hours of service per day
(2) Speed of operation
(3) Customer requirements
(4) Location
(5) Temperature
(6) Exposure to dirt

1.05 Except as hereafter stated, first clean the equipment as necessary, then lubricate it and finally test it. Each of these operations should itself be performed in the order given. However, the operation of cleaning the contacts, magnet armature, and pole faces should be performed **after** lubricating the equipment. Do not readjust parts unless their adjustments have been disturbed or are obviously wrong.

1.06 The symbols used to indicate the lubrication required are as follows:

O	Oil (one or two drops, as required)
OF	Oil freely (Note 1)
OS	Oil sparingly (Note 2)
SAT	Saturate with oil
G	Grease
GS	Grease sparingly (Note 2)
OGO	Oil, grease, oil

Note 1: Freely means that a moderate surplus of lubricant is desirable on the surface being lubricated and that some overflow of lubricant to adjacent parts is not harmful.

Note 2: Sparingly means that a surplus of lubricant might be harmful. A thin film of oil or grease is applied to the surface requiring lubrication, any surplus which might spread to adjacent surfaces being removed.

2. PREPARATIONS FOR ROUTINE

2.01 Before going to the station, check with the test room to make sure that the circuit or equipment can be released at the time needed.

(1) Obtain permission from the customer and arrange for the release of the apparatus in accordance with established procedures.

(2) Meanwhile prepare the work space, taking care to protect the customer's furniture.

(3) Observe and listen to the operation of the sequential selector and relay equipment. Note any points that may require special attention.

(4) **After obtaining the release,** switch off the power.

(5) Pull out the power and multiple-contact plugs. Move the sequential selector unit to the work space.

3. CLEANING

3.01 Cleaning should be done only if there is loose dirt, chips, flaky rust, corrosion (formations of salts), accumulations of dirty oil and dirty grease, or similar material which would be likely to cause trouble by working onto bearing surfaces or contacts. If cleaning is done, proceed as follows, being careful to avoid working dirt into bearing surfaces:

(1) With the sequential selector unit removed, wipe off the selector panel, including the motor unit, with a dry cloth.

(2) Place the selector on its back (code levers face up).

(3) Wipe off or brush away any dirt on or around:

(a) selector mechanism

(b) transfer levers

(c) selector-vane operating links

(d) function and code levers

(4) Wipe off the end plates.

(5) Wipe off the blocking- and latching-lever assembly.

(6) Clean the front contact assemblies using the 265B tool and a KS-2423 cloth.

Note: The top contacts may be reached by placing all contact-operating levers in their latched position, and moving the contact-operating plungers away from the center contact tongues.

(7) Clean the Blank-Pause contacts in the Timer Mechanism.

4. LUBRICATION

Note: Place the unit in its normal position and remove the blocking- and latching-lever assembly.

4.01 Do not allow lubricant to get on the magnet armature, pole faces or contacts. Because of the relatively light loads and the difficulty in reaching many of the springs, no lubricant need be used on them, except where specified.

4.02 SELECTOR MECHANISM

(a) Remove the range-scale front mounting-screw, loosen the rear screw (friction tight) and swing the scale out of the way.

(b) Lubricate as follows:

Part	Where lubricated	Lubricant
(1) Armature lever	Two bearings	OS
(2) Trip-plunger Trip-latch Bellcrank Stop pawl	Bearing and sliding points	OS
(3) Swords and selector levers	Between separator plates	O
(4) Transfer-levers	All points of contact	O
(5) Armature-locking lever	At post	
(6) Cam-sleeve assembly	Each cam peak	O
(7) Locking wedge	Point of contact with the locking lever	O
(8) Selector-arm	Pivots and extensions	
(9) Detent-post	Pivots and slot under the selector-arm	O
(10) Locking-lever-cam felt oil ring	On the cam-sleeve assembly	SAT
(11) Selector-cam felt washers	Separate the two friction discs with a blunt screwdriver	SAT
(12) Loops of selector lever, locking lever, and magnet-armature springs	On the loops	O

4.03 MAIN SHAFT

(a) Remove the friction disc from the selector end of the shaft, and remove the oil-plug (thumb screw) from the gear end. Elevate the selector end of the unit and fill the shaft with oil until oil appears at the gear end.

(b) Replace the friction disc and oil plug.

(c) Replace the range scale.

(d) Lubricate the following points:

	Part	Where lubricated	Lubricant
(1)	Ball bearings	Bearing balls	OGO
(2)	Selector cam-sleeve compression spring	On the loops	O
(3)	Fiber gear	Teeth	GS
(4)	Clutch	—	OF
(5)	Main-bail eccentric	Eccentric	O
(6)	Stripper-bail eccentric	Eccentric	O
(7)	Drive-arm pivot post	Post	O
(8)	Detent-lever eccentric	Post	O
(9)	Detent sleeve	Between the main- and stripper-bail eccentrics	G
(10)	H-Answer-back mechanism cam (BS6L only)	Cam	GS
(11)	Ratchet clutch-teeth	Teeth	OGO
(12)	Clutch-pawl guide	Slot in drive arm	O

4.04 BLOCKING-AND-LATCHING-LEVER ASSEMBLY

(1)	Blocking-and-latching-levers	Bearing points on their shafts	O
(2)	Blocking-and-latching-lever combs	Between the slots in upper and lower combs	O
(3)	Cam surfaces on the bottom ends of blocking levers	Where engaged by contact-operating levers	GS
(4)	R-Y test latching lever	Bearing	O
(5)	R-Y test operating lever	Bearing and the latching surfaces	O

4.05 MAIN BAIL

Part	Where lubricated	Lubricant
(1) Drive link	Between drive link and its bracket	O
(2) Operating bar	Two felt washers	SAT
(3) Connecting links	Four felt washers	SAT
(4) Main bail	Two bearings on shaft	O
(5) Main bail	Points of contact with the function levers	GS

4.06 CLUTCH TRIP-SHAFT WITH TRIP LEVER AND BLOCKING LEVER

(1) Pivot bearings	Two felt washers	SAT
(2) Clutch trip lever	Point of contact with cam	GS
(3) Clutch blocking lever	Point of contact with clutch lever	GS

4.07 STRIPPER BAIL

(1) Drive link	Between drive link and its bracket	O
(2) Operating-bar bearings	Two felt washers	SAT
(3) Connecting links	Four felt washers	SAT
(4) Stripper-arm plates	Two felt washers	SAT
(5) Stripper-bail bearings	Two pivots	O
(6) Latch-bail bearings	At ends of the shaft	O
(7) H, R, Y function levers with toes	At the toes	OGO
(8) Two reset screws	At the stop posts	G
(9) Latch-bail backstop	Engagement with latch bail	O
(10) Stripper bail	Front and rear edge	GS
(11) Latch-bail latches	Point of contact with the stripper-bail extensions	O

4.08 FUNCTION LEVERS

Part	Where lubricated	Lubricant
(1) Bearing points	On shaft at rear	O
(2) Front and rear combs	Between the slots	O
(3) Function levers	Points of contact with locking levers	O

4.09 CONTACT OPERATING LEVERS

(1) Pivot points ; reach from the top, with the unit tilted forward		
(2) Front and rear combs	Between the slots	O
(3) Pullbars	Bearings and latches	O
(4) Contact operating levers	Point of contact with latching lever surfaces	O
(5) 6th-Vane shift levers	Bearing surfaces	O

Note: BS2D and BS3C have three shift levers at the H, CR and LF positions.

BS6L has two shift levers at the H and LF positions.

4.10 VANE ASSEMBLY

(1) Vanes	Points of contact in the notches of the vane guides and contact with pushbars	O
(2) Vane-operating-link assembly	Between slots of the front and rear combs	O
(3) Vane-stops	Points of contact with the vanes	O
(4) 6th-Vane detent-lever	Points of contact with 6th-vane	O
(5) 6th-Vane detent-lever	Two bearings	O
(6) 6th-Vane operating bellcranks	At point of contact with the 6th vane	O
(7) 6th-Vane operating bellcranks	At the point of contact with the vane shift levers	O

	Part	Where lubricated	Lubricant
(8)	6th-Vane operating bellcranks	At the pivots	O

Note: BS2D and BS3C have three bellcranks at the H, CR and LF positions.

BS6L has two bellcranks at the H and LF positions.

4.11 H-ANSWER-BACK MECHANISM (BS6L Only)

(1)	H-answer-back cam	Bearing surface	G
(2)	Cam follower	Bearing	O
(3)	Cam follower	At latching point	GS
(4)	Auxiliary latch	Bearing	O
(5)	Cam-engaging surface	Point of engagement with contact cam follower	GS
(6)	Answer-back trip latch	At latching point	GS
(7)	Long-contact-spring insulator	Point of contact with cam follower	GS
(8)	Trip-latch shaft	Two bearings	O
(9)	Trip-latch operating bail blade	Working edge of bail blade	GS
(10)	Cut-on-levers blocking bail	Two bearings	O
(11)	Cut-on-levers blocking bail blade	Working edge of bail blade	GS
(12)	Cut-on-levers operating bail	Two bearings	O
(13)	Cut-on-levers operating bail	Points of engagement with the space operating lever	GS
(14)	Transmitter-start-levers blocking bail	Two bearings	O
(15)	Transmitter-start-levers blocking bail blade	Working edge of blade	GS
(16)	Clutch trip-shaft-bail	Point of contact with operating lever yokes	GS

Part	Where lubricated	Lubricant
(17) Multiple blocking bail	Two bearings	O
	Engaging surface with function levers	GS
	Combs and pin engaging contact operating lever	GS

4.12 MECHANICAL TIMER (BS3C and BS6L Only)

(1) Two clutch friction washers	Separate with blunt screwdriver	SAT
(2) Compression spring	On the loops	O
(3) Timer shaft	Two bearings	O
(4) Timer shaft gear	Teeth	GS
(5) Timer pinion	Teeth	GS
(6) Cam-sleeve assembly	Cams	GS
(7) Levers	Bearing surfaces	O
(8) Timer-blocking-bar guide	Slot of guide	O
(9) Blocking bar	Point of engagement with function lever	O
(10) Blocking-bar-pivot eccentric screw	At the screw	O
(11) Trip-bar guide	Slot of guide	O
(12) Trip bar	Point of contact with contact operating lever extension	O
(13) Sensing-bail arm	Point of contact with adjusting screw	O
(14) Contact-bail	Point of contact with spring insulator screw	GS
(15) Contact-bail holding-lever	Upper and lower guiding surfaces (BS6L Only)	O

Part	Where lubricated	Lubricant
(16) Contact-bail holding-lever adjusting screw	Point of contact with space operating lever	GS

Note: Place the unit in its normal position and reinstall the blocking-and-latching-lever assembly; make sure that it is properly seated on its eccentrics and against its left-hand position screw.

4.13 MOTOR

(1) Motor pinion	Teeth	GS
(2) Motor bearings	One stroke of the grease gun for each bearing	G

Note: Most motor troubles result from overlubrication. Accordingly, motors should be greased only **once a year.** A tag or similar record should be attached to the motor to indicate when it was last lubricated.

4.14 SELECTOR PANEL

(1) Slides and latches	—	G
(2) Rollers	—	O
(3) Counter-shaft ball bearings	—	OGO

Note: After the lubrication has been completed, clean the selector-magnet pole faces and armature with a strip of KS-bond or other hard surface paper. Check all contacts to remove any lubricant that may have dropped on them, using the 265-B tool and KS-2423 cloth.

5. COMPLETION OF ROUTINE

(1) Reinstall the sequential selector on its panel, reconnect the power and the multiple-contact plug, and turn on the power switches.

(2) Using R-Y test signals from the test room, and the R-Y test mechanism, check the orientation setting in accordance with P30.002.

Note: Should the indicator on the R-Y test mechanism show errors, watch the operation of the vane-operating links. If these links are alternating (2-4) (1-3-5) the test failure is probably due to improper functioning of the latch and stripper bails.

(3) After measuring the orientation, **check to see that the range-finder arm is secured in the optimum position.**

(4) Place the R-Y latch lever (right-hand) in the down (Green) position.

(5) Observe and listen to the operation of the motor and gear train to check for noisy bearings and gear backlash. If the motor is governed, check its speed.

(6) Check all station-control functions by means of signals from the test room, watching the operation of the selector and other station equipment.

(7) Release the equipment for restoration to the circuit.

(8) If the service was interrupted watch the operation of the station when the switching center resumes transmission.