ADJUSTMENT GUIDE

1. 3,000 TYPE RELAYS.

2. 600 TYPE RELAYS.

3. A.P.O. UNISELECTORS.

4. 2,000 TYPE SWITCHES.

1. 3,000 Type Relays

1. Residual Screws.	As per code label. Up to 5 mils, tolerance = ± 1. Over 5 mils, tolerance = ± 1. If shown in brackets, tolerance = ± 1.
2. Residual Studs.	Labels marked "A" = 4 mils. Tolerance = - 2. Labels marked "B" = 12 mils. Tolerance = - 5. Labels marked "C" = 20 mils. Tolerance = - 9. On Red Label relays, use value on label.
3. Armature Travel.	Standard value = 31 ± 2 with X or Y contacts = 43 ± 2. If residual is shown in brackets tolerance is ± 1 in both cases. Red labels under 31 mils = as per adjustment sheet ± 1.
4. Contact Springs.	Straight and parallel in half operated position. Double contacts operate together. Contact overlap, 1/3rd, maximum.
5. Block Pressure.	K contacts, 14 mil. springs (white labels) = 30 gms. min. K contacts, 12 mil. springs (green labels) = 21 gms. min. All except K contacts 14 mil. springs (white) = 16 to 20 gms. All except K contacts 12 mil. springs (green) = 11 to 15 gms.
6. Contact Pressure.	MAKE spring of standard K unit only, 14 mil. springs 16 to 20 gms. MAKE spring of standard K unit only, 12 mil. springs 11 to 15 gms.
7. Lever Pressures.	5 to 8 gms, except on BREAK type of Y unit, which are tensioned to give normal spring lift.
8. Spring Lift.	About 5 mils, minimum 2 mils.
9. Contact Clearance.	10 mils minimum in all cases.
10. Contact Sequence.	All BREAK contacts break before any MAKE contacts make, except in cases of K, X or Y units.

2. 600 Type Relays

Adjust as for 3,000 Type with the following exceptions -

1. Residual Studs.	Labels marked "A" = 4, tolerance - 2. Labels marked "B" = 8, tolerance - 3. Labels marked "C" = 12, tolerance - 4.
2. Armature Travel.	Standard = 25 mils ± 2.
3. Block Pressures.	As for 3,000 Type, 14 mil. springs in all cases.
4. Lever Spring Pressures.	May be taken at gross value providing - (a) The outside lever springs within 5-8 gms. limit. (b) Each lever spring tensioned toward armature.

3. A.P.O. Uniselectors

1. Armature.	Parallel with coil box in operated position.
2. Pawl.	Central with ratchet wheel, no bind.
3. Interrupter Springs.	Clear inside frame, minimum 1/32".
4. Armature Back Stop.	Adjust to centre wiper tips on No. 1 contact.
5. Detent.	Centred on ratchet, leaving one free tooth from pawl. Tension 125-150 grams. Must drop in on all teeth when armature operated by hand and released slowly - no back lash.
6. Wipers.	Check on 25 contact, minimum clearance 10 mils between contacts. Tension 30-40 grams at tip on 25th contact. 4 mils inside tips when off bank and clear of brush of feed by at least 10 mils when pushed sideways. Adjust alignment (2 fixing screws).
7. Brushes.	Tension on 11th contact 35-45 grams (to increase, line with 24th contact).
8. Operate armature.	65 mils between armature and back stop obtained by adjusting knife edge.
9. Pawl Spring.	Tension 175-200 grams in operated position. Loosen pawl stop screws $\frac{1}{4}$ turn and lightly wedge pawl, tighten screws. No back lash, no clearance between armature and back stop.
10. Interrupter Springs.	Tension 200-225 grams. Break of not more than 4 mils when 36 mils inserted between armature and back stop.
11. Armature Restore Springs.	Tensioned to restore slowly to normal against pressure of 150-200 grams at end of armature (wipers about to enter 1st contact).
12. Wipers.	Must rotate smoothly in series with 60 ohms.

4. 2,000 Type Switches

Tolerances. When readjustments are being made, mean values shall be aimed at and the tolerances reduced to a minimum.

1. Clean switch thoroughly, remove all dirt and oil dag.	
2. Test switch for framing to Negative and Positive battery.	
3. Carriage Assembly.	Free on bearing, minimum side play.
4. Carriage Restore Spring.	Tension, 3 or 4 banks 4-5 turns.
5. Shaft.	Located in conical seat, no side play.
6. Clamp Adjustment.	Comb plate extended lug to rotary disc, Min. 5, Max. 10 mils. Clearance in comb slot on return normal level.
7. Vertical and Rotary Detents.	Free on bearing, with minimum play.
8. Vertical Detent.	Flush with left of ratchet. Cut in level for chamfered type, 5 mils drop for square cut. To just touch root of ratchet, (Screw Adj.). Spring tension 110 grams ± 30.
9. Rotary Detent.	Square with teeth of rotary hub. Upper projection flush with rotary disc, just clear underside of cam. To clear rotary hub when returning on normal level. Carriage to latch securely with minimum play. Clearance to short face of 1st notch with carriage stepped vertically less than 5 mils. Just clears long face rotary hub. (Screw Adj.). Vertical detent to clear ratchet on levels 1 and 0. Spring tension 130 ± 30 grams.
10. Vertical Armature.	Free on bearings. Strikes squarely on both faces of magnet core.
11. Vertical Pawl.	Free on bearing. Flush with left of ratchet. To strike teeth squarely. Clears ratchet on 1st step on levels 1 and 0.
12. Vertical Pawl Guide.	Carriage up 1, pawl to strike root of 4th tooth. To clear 3rd tooth of ratchet when restoring.
13. Vertical Armature Stroke.	When operated clearance on detent, is 5 mils Min., 10 mils Max.
14. Vertical Armature Back Stop.	Pawl just drops in without causing carriage to rise. Pawl clears 3rd tooth of vertical ratchet on normal level. Vertical detent withdrawn, carriage held by pawl and to cut in off pawl on levels 2 and 9.
15. Vertical Pawl Front Stop.	Vertical detent just drops in when armature operated by hand. No vertical play when armature operated electrically and when armature restores.
16. Vertical Pawl Spring.	Tension in operated position. 100 ± 30 grams.
17. Vertical Armature Restore Spring.	Tension 340 ± 40 grams.
18. Subsidiary Vertical Pawl Guide.	Centred to Vertical pawl and rotary hub.
19. Rotary Armature.	Free on bearings. Strikes squarely on both faces of magnet core.

20. Rotary Pawl.	Free on bearings. Locking projection level with comb plate extended lug. Strike squarely into teeth. Clear top of rotary hub on restoring on normal level.
21. Rotary Pawl Guide.	Carriage raised and rotated one step, pawl has about 1/3rd slide on long face of 4th tooth. On 12th step, pawl projection locks behind comb extension, tip of pawl must clear hub on all levels. Pawl projection clears comb plate extension during rotary stepping.
22. Rotary Armature Stroke.	When operated, clearance between short face and detent is 5 mils Min., 10 mils Max.
23. Rotary Armature Back Stop.	Rotary pawl to clear hub with 5 mils and foul with 10 mils.
24. Rotary Pawl Front Stop.	Rotary detent just drops in when armature operated by hand. No rotary play when armature operated electrically and no back lash when armature restores.
25. Pawl Spring Tension.	150 ± 30 grams.
26. Rotary Armature Restore Spring.	340 ± 40 grams. With carriage on 12th step, check armature will fully restore when released by hand.
27. Rotary Interrupter.	Lever free on bearings. Tension 40 ± 10 grams. Contacts clearance 12 - 18 mils. Loop spring 150 to 220, even toggle operation. 5 mils max. clearance to strikers, studs 10 mils. With armature operated electrically on 12th step, clearance between striker and lever buffer.
28. Wipers.	Secure on carriage. About $\frac{3}{8}$" gap without collar. Min. 12, Max. 18 mils gap at tips. Vertical wipers, Min. 25, Max. 40 grams tension.
29. Mechanically Operated Springsets.	
(i) Levers.	Free, with minimum play. Correct stroke for contact operation. In line with buffers.
(ii) Rollers.	Free, with minimum play. Equal operation, levels "1" and "0".
(iii) Springs.	Straight and parallel.
(iv) Contacts.	Max. overlap 1/3rd. Twin contacts "make" and."break" together. All "B" contacts break in sequence from lever. All "M" contacts make in sequence from lever. Openings, as set by buffers, or 20 ± 10 mils. Openings, "C" contacts during change-over, 5 mils min. Pressures, 30 ± 10 gms.
(v) Back Stop.	Clearance, lever tip to buffer when first contact "B" or "C", 10 mils Max. Clearance, lever tip to buffer when first contact "M", nil.

END.