

P.O. TYPE 12 RELAY

Maintenance

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GENERAL.

Par.

2. Introduction.—This Instruction describes the maintenance of the P.O. Type 12 Relay which is a reverse action comb-operated relay and has its coil mounted between the two spring-sets. A maximum of five relays can be mounted on a common multi-limbed frame which serves as the yokes and cores. Fig. 1 shows the assembly strip of four relays and one spare position. Fig. 2 shows the individual parts of the relay. The armature, coil and spring-set assembly are held onto the yoke part of the frame by a clip, fixing screw and nut. The methods of dismantling and assembling are given in pars. 11 and 12.

3. Coding.—The relay is coded Relay No. 12/..., the number following the 12/ being used to differentiate between individual designs. Each relay on the frame

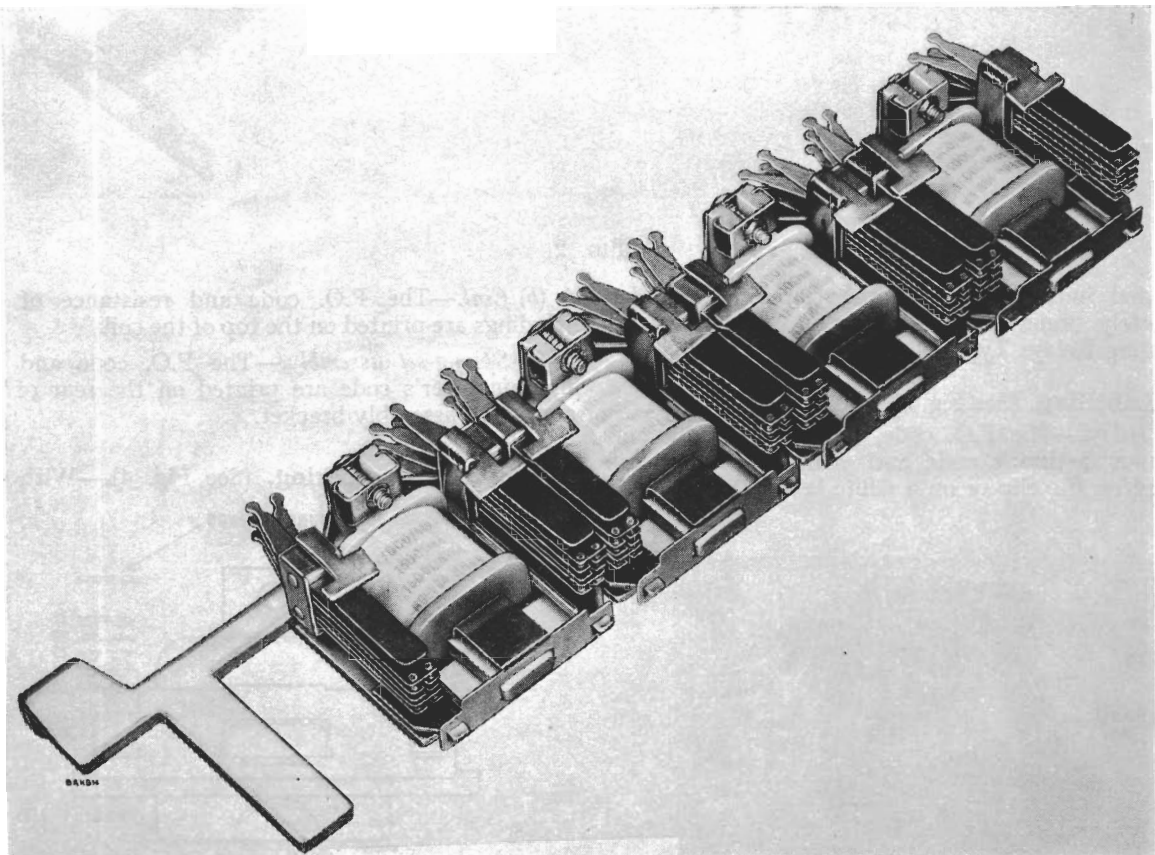


Fig. 1

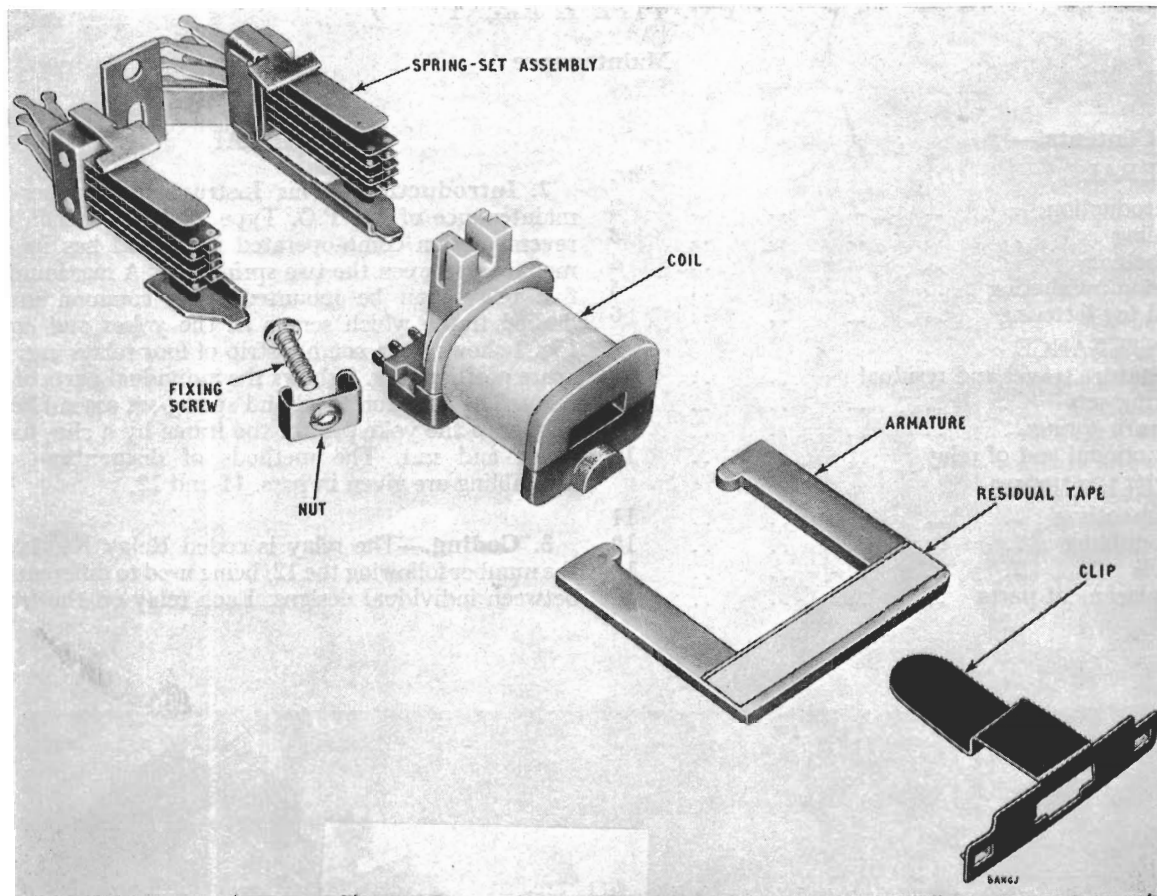


FIG. 2

is coded individually and the frame is provided separately under the title Frame, Relay, used for mounting Relays Type 12.

4. Labelling. (See Fig. 3).—

(a) *Relay.*—The P.O. code, the residual code and the manufacturer's code and year of contract are printed on the clip or on a white label affixed to the clip.

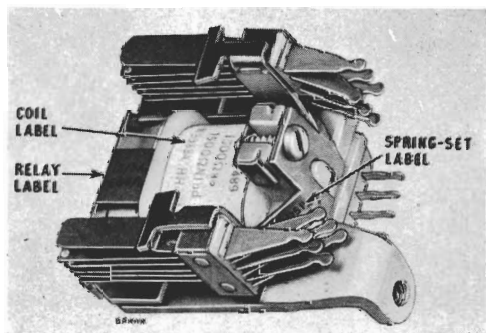


FIG. 3.—LABELLING

(b) *Coil.*—The P.O. code and resistance of the windings are printed on the top of the coil.

(c) *Spring-set assembly.*—The P.O. code and the manufacturer's code are printed on the rear of the spring-set assembly bracket.

5. Spring numbering. (See Fig. 4).—With the

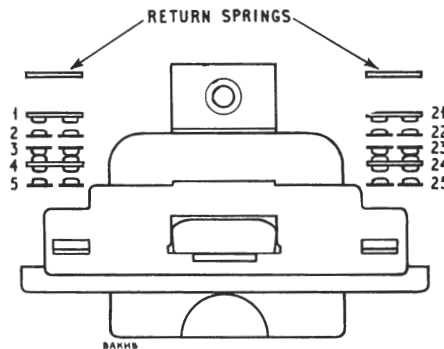


FIG. 4.—SPRING NUMBERING VIEWED FROM FRONT OF RELAY

springs above the armature and viewed from the front, the springs are numbered downwards towards the armature starting from spring 1 at the top left and spring 21 at the top right. *NOTE*:—This is the reverse direction to that for 3000 and 600 type relay springs.

6. Coil tag lettering. (See Fig. 5).—There are five tags designated a-e from right to left when the relay is viewed from the rear. *NOTE*:—This is the opposite way to that for 3000 type relay coil tags.

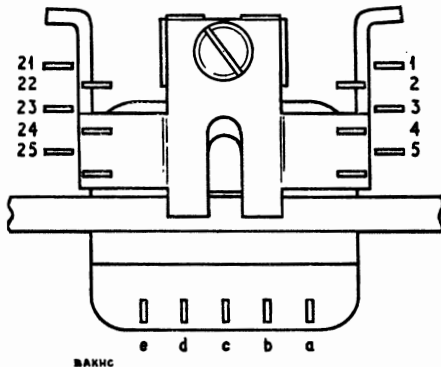


FIG. 5.—COIL TAG LETTERING VIEWED FROM REAR OF RELAY

MAINTENANCE

7. Armature travel and residual.—These are not adjustable. Change the armature if the polyester tape which forms the residual becomes worn or damaged. The thickness of the tape layers for varying residual codes is given in Table I.

Early relays had tape fixed to both sides of the armature, the tape on the other side to the residual limiting the armature travel. Take care to replace

these armatures the correct side up as described in par. 12(b).

TABLE I

Armature residual code letter	Thickness of tape on residual side of armature	
	Residual side	
	(layers)	(mils)
A	1	2.5
B	2	5
C	3	7.5

8. Spring-sets.—The only parts of the spring-set assembly which may be adjusted are the return spring and lug. Before checking the adjustments, however, ensure that the spring-set assembly is correctly seated [see par. 12(f)]. Change the complete spring-set assembly if any part is worn and cannot be brought into adjustment (see par. 9).

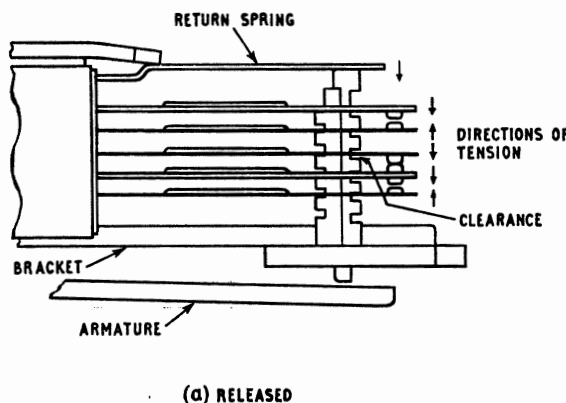
(a) *Alignment checks.*—

(i) *Springs.*—Make sure they are straight and free from kinks.

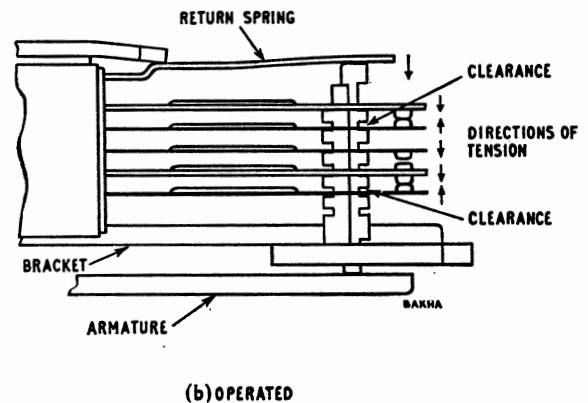
(ii) *Contacts.*—Check that the contact domes are not out of alignment by more than $\frac{1}{8}$ of their diameter and that the twin contacts of moving springs both make on their respective stationary spring contacts by the end of travel.

(iii) *Lifting combs.*—Ensure that each comb is free to move in its hole in the bracket arm and that it does not bind against the stationary comb.

(b) *Spring tension.*—The direction of spring tensions is shown in Fig. 6.



(a) RELEASED



(b) OPERATED

FIG. 6.—DIRECTION OF SPRING TENSIONS

When measuring tensions apply the gauge detail to the tip of the spring between the contacts, with the gauge in line with the spring.

(i) *Moving springs*.—Check that a force of 20 gm minimum is exerted on the associated stationary spring with the armature normal for break springs and operated for make springs. *NOTE*:—Moving springs of make contacts are tensioned away from the armature against the lifting comb and return spring, whereas moving springs of break contacts are tensioned towards the armature against their associated break springs.

(ii) *Stationary springs*.—Check that the tension is sufficient to ensure that the stationary springs which are tensioned against the stationary combs do not lift from these combs when the armature is operated.

(c) *Lifting comb clearance*.—Check that the lifting comb continues to move after the contacts have made when the relay is operating or releasing and that for make springs when operated and break springs when released there is a clearance between the associated lifting comb step and each moving spring (see Fig. 6).

(d) *Sequence of operation*.—On the operation of the relay, check that all break contacts open before any make contacts close and that for a change-over unit, the break spring leaves the stationary spring before the make spring makes contact with the stationary spring. Also check that on release of the armature, the reverse applies. If these requirements are not met it may be due to incorrect seating of the spring-set assembly.

9. Return spring.—

(a) *Tension*.—With the relay released, check that the lifting comb bears squarely on the bracket arm, and that the return spring exerts a force of 10 gm minimum on the lifting comb. Apply the gauge detail to the underside of the return spring adjacent to the lifting comb. *NOTE*:—The return spring is provided to ensure the full restoration of the lifting comb and spring-sets.

(b) *Adjustment*.—There are three types of return spring (see Fig. 7).

(i) *Cranked and cranked-waisted types*.—Adjust these types by bending the lug against the return spring using an Adjuster, Lug, No. 1. If necessary, make a set in the tip of the return spring using Pliers,

Adjusting, No. 1 to ensure that the spring bears squarely on the comb.

(ii) *Straight type*.—Adjust this type by bowing and setting the return spring using Pliers, Adjusting, No. 1. The lug is normally bent away from the spring but if adjustment cannot be obtained by bowing and setting, adjust the lug as in (i).

10. Functional test of relay.—With a 5-mil feeler gauge inserted between the armature and the part of the frame which forms the pole face and with the relay operated electrically, check that all make contacts are made.

With a 5-mil feeler gauge inserted between the bottom step of the lifting comb and the bracket arm and with the relay released, check that all break contacts are broken.

MISCELLANEOUS

11. Dismantling.—

(a) Remove the fixing screw from the rear of the relay

(b) Lift the complete spring-set assembly from the rear of the relay.

NOTE:—Do not dismantle the spring-set assembly any further

(c) Pull out the clip from the front of the relay

(d) Slide the coil and the armature off the core frame

(e) Lift the armature from the coil

(f) Slide the nut off the coil former.

12. Assembling.—

(a) Slide the nut onto the coil former

(b) Locate the lugs on the rear of the armature into the slots at the rear of the coil former, ensuring that the rounded corner of the armature is on the right-hand side of the coil when viewed horizontally with the armature back stop under the armature.

(c) With the coil tags to the rear, slide the coil and armature onto the core frame.

(d) From the front of the relay, slide the tongue of the clip between the coil and the top of the core frame and locate the slot in the clip over the end of the core frame.

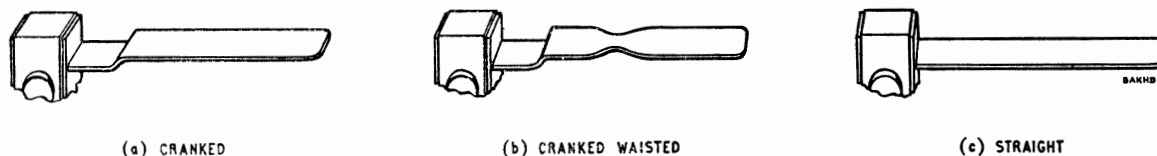


FIG. 7.—TYPES OF RETURN SPRING.

(e) Locate the front lugs of the spring-set assembly bracket into the slots in the clip and lower the rear of the assembly so that the lug on the rear of the coil former locates into the slot at the rear of the spring-set assembly bracket.

(f) Replace the fixing screw from the rear of the relay ensuring that when this screw is tightened both

sides of the spring-set assembly bracket are seated on the frame.

13. Tools.—The tools required for the adjustment of the relay are given in Table 2.

14. Replacement parts.—The available parts are listed in B 5530.

TABLE 2

Rate Book description	Use
Screwdriver, Instrument, No. 2	Relay fixing screw
Gauges, Tension, No. 1	Measuring spring tensions
„ „ Feeler, No. 2	General use including functional test
„ „ „ „ No. 10	
Pliers, Adjusting, No. 1	Adjustment of return spring
Adjuster, Lug, No. 1	„ „ lug

Reference:—B 5530
(TPM2/3)

END