

## PO TYPE 19 RELAY

## Maintenance

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2 INTRODUCTION This Instruction describes the maintenance of the PO Type 19 relay which is a reverse action comb operated pulsing relay. A typical relay is shown in Fig 1.

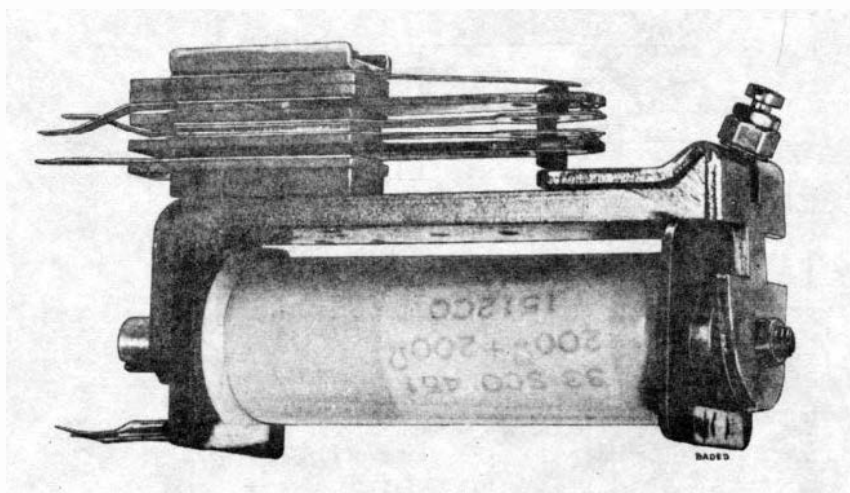


FIG 1

3 CODING The relays are coded 'Relay No. 19/...', the number immediately following the 19/ being used to differentiate between individual designs.

4 LABELLING The manner of labelling of the relay is the same as for 3000-type relays which is described in H5144.

**5 TOLERANCES AND ADJUSTMENT** The relay is a 'red label' relay, ie a current adjusted relay. Details of adjustment values for each individual relay should be obtained from the relevant relay-adjustment card.

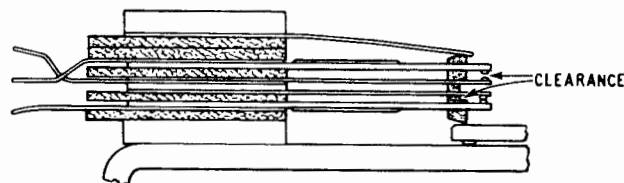
## 6 SPRING-SET ACTION

(a) The relay is comb operated reverse action using stiff stationary springs as shown in Fig 2.

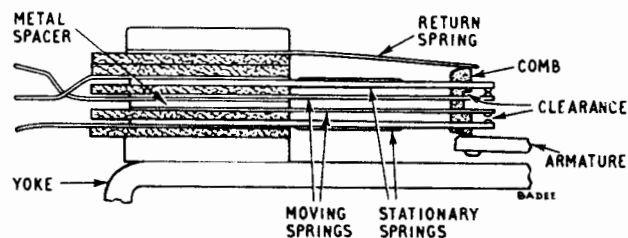
(b) Moving springs which 'make' when the armature operates are tensioned away from the armature against the comb. When the armature operates moving the comb, these springs move under their own tension and make on their associated stationary springs.

(c) Moving springs which 'break' when the armature operates are tensioned towards the armature. When the armature operates, these springs are moved directly by the comb.

(d) Spring-sets consist of only make and break units which can be combined by a metal spacer to provide a change-over or a make-before-break contact unit as shown in Fig 2. The connexion to the two moving springs is by a single tag.



(a) ARMATURE RELEASED



(b) ARMATURE OPERATED

FIG 2

For a change-over contact unit the stationary springs are set during manufacture so that the break spring 'breaks' before the make spring 'makes'. For a make-before-break contact unit the stationary springs are set during manufacture so that the make spring 'makes' before the break spring 'breaks'.

For a make-before-break contact unit to maintain the numbering arrangements of the tags to conform with a 3000-type contact unit so direct replacement can take place without altering the wiring, a crank is put in the lead-out tag of the moving springs and the make spring, as shown in Fig 3(b).

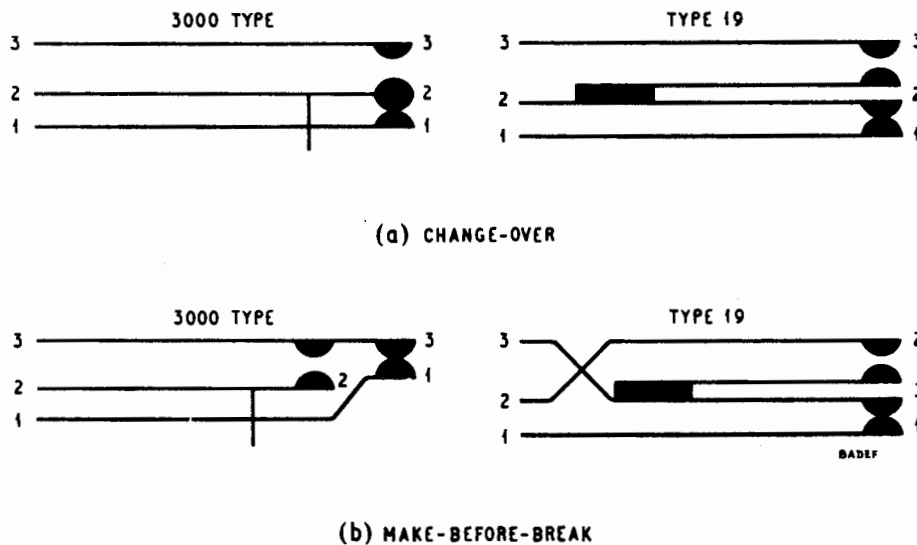


FIG 3

## 7 SPRING NUMBERING

(a) *Make and Break contact units* Since the left and right-hand spring-sets are of identical construction and therefore interchangeable, the spring numbering will be the same in each case, but the tags will follow 3000-type relay practice.

For example, spring number 1 left-hand and spring number 1 right-hand are nearest the armature when viewed from the front of the relay and are associated with tags number 1 and 21 respectively as shown in Fig 4(a).

(b) *Change-over contact unit* For a change-over contact unit, the unit is made up of a break contact unit and a make contact unit with the two moving springs joined electrically. The two moving springs are therefore given only one tag number as electrically they act as one spring. Other than this, a change-over contact unit is numbered as in paragraph (a), see Fig 3(a) and Fig 4(b).

(c) *Make-before-break contact unit* For make-before-break contact units, a crank is made in the lead out tag associated with the moving springs and the make-spring because of this the tags number 1, 3 and 2 and 21, 23 and 22, see Fig 3(b) and Fig 4(c).

Fig 4 follows

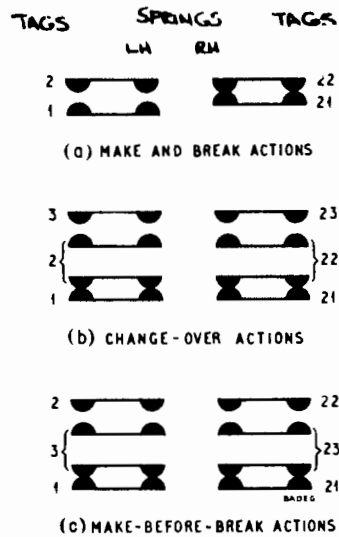


FIG 4

8 COIL TAG NUMBERING The coil tags are designated 'a' to 'e' from left to right when viewed from the rear of the relay.

#### ADJUSTMENT

9 ARMATURE AND RESIDUAL ADJUSTMENTS The method of adjustment of the armature-fixing screw, armature travel and residual air gap for the type 19 relay are the same as those specified for the 3000-type relay (see H5144). When the armature is refitted to the relay it should be operated by hand 3 or 4 times to allow the operating combs to take up their normal working position. Only then should the buffered springs be checked for buffer block clearance.

#### 10 SPRING-SET ADJUSTMENT

(a) The methods of adjusting moving springs are the same as for the 3000-type relay (see H5144).

(b) Twin contacts should make or break simultaneously as judged by eye.

(c) The moving springs should be straight or slightly bowed throughout their length.

#### (d) Moving spring tensions

(i) With the armature released, a break spring should have a contact pressure against its associated stationary spring of 10-16 gm test, 11-15 gm readjust.

(ii) With the armature operated, a make spring should have a contact pressure against its stationary spring of 10-16 gm test, 11-15 gm readjust.

(e) *Comb clearance and contact clearance and sequence* This is shown in Fig 2.

(i) For make springs on operate, and break springs on release, the comb should continue to move after the contacts have made so that there is a clearance between the moving spring and the comb step.

(ii) For change-over contact units the break spring should lift from the lower stationary spring before the make spring 'makes' on the upper stationary spring.

(iii) For make-before-break contact units, when the make spring 'makes' on the upper stationary spring there should still be a clearance between the step of the comb and the break spring.

(iv) The contact clearance should be 10 mil minimum unless stated otherwise on the relay-adjustment card.

(v) If the conditions above are not met, adjust the stationary springs as detailed in (f).

(f) *Stationary springs* Set the stationary springs from their roots with Pliers, Adjusting No. 1 or No. 2 to give the correct comb and contact clearance and correct contact sequence.

**11 RETURN SPRING AND CURRENT TESTS** As some of the moving springs are tensioned away from the armature a return spring is provided in order to restore the armature and spring-sets on release of the relay.

Adjust the return spring tension so that the relay will pass the current tests stated on the relay adjustment card.

(a) The return spring tension, as indicated on the adjustment card, is checked with the opposing tension of the make spring removed.

(b) The make spring is then adjusted to measure 11-15 gms against the return spring.

(c) Relay Adjustment Cards to be suitably annotated.

Obtain the required return spring tension by bowing and setting from the root with Adjuster, Spring No. 1 or Pliers, Adjusting No. 1 or No. 2.

General information on carrying out current tests is contained in H5144.

#### MISCELLANEOUS

**12 TOOLS** The tools listed in B5144 for the 3000-type relay are adequate for the adjustment of the type 19 relay.

**\*13 REPLACEMENT PARTS** Replacement Parts available for Type 19 are limited to the armature fixing screw (Part No. 1/DSC/398) and the two most commonly used spring-set assemblies (Part Nos. 2/DSP/3113 and 4/DSP/3113). If any other part requires replacement change the complete relay.

Sv6.5.6

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