# Chapter 2

# CUT-OUTS, DIFFERENTIAL (ROTAX F3900 SERIES)

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## LIST OF ILLUSTRATIONS



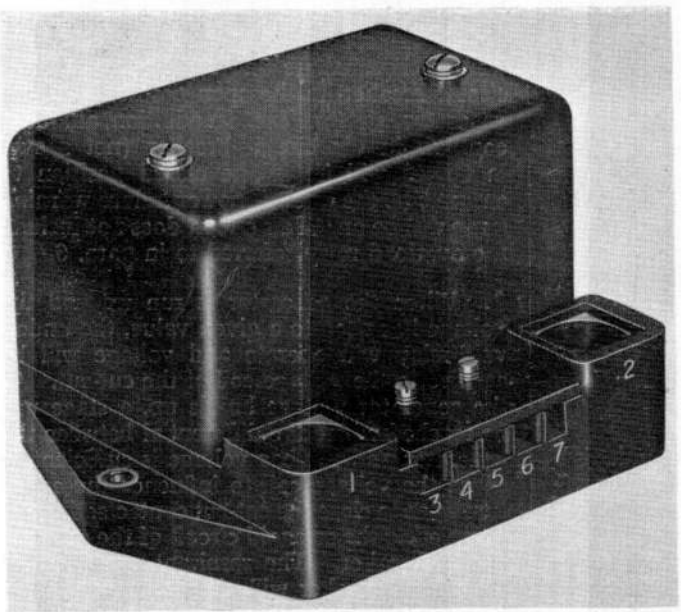


**Fig. 1. A typical cut-out in the F3900 series**

### Introduction

**1.** Cut-outs in the F3900 series are intended for use, in conjunction with an external relay or circuit breaker, in an aircraft generator supply system. As the name implies, the cut-out operates on a voltage differential between the generator output and the battery supply to the bus-bar.

### DESCRIPTION

**2.** Although basically similar in design, the types in the F3900 series differ in rating and voltage setting. For details of specific types, reference should be made to A.P.4343B, Vol. 1, Sect. 11.

**3.** A general view of a typical cut-out in the F3900 series is given in fig. 1 and shows

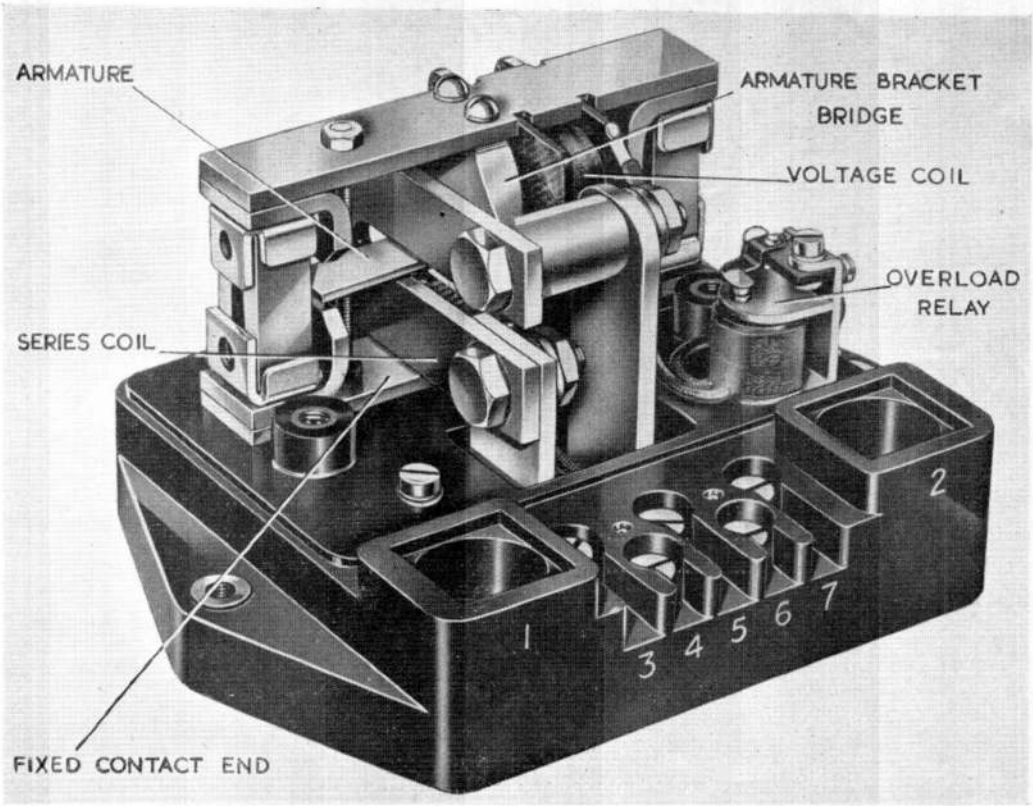


**Fig. 2. View of cut-out, with cover removed**

the terminal arrangement. The main terminals 1 and 2 are connected to the series (current) coil, and are located at the extremities of the terminal block in the moulded base.

**4.** Terminal 3 is internally linked to terminal 1 and connects externally to an undervolt relay, thereby causing a differential voltage to be applied to the cut-out voltage coil (terminals 4 and 5).

**5.** The cut-out contacts between terminals 6 and 7, when bridged by the action of the pivoted armature, complete the circuit to the external circuit breaker, thereby operating the latter to put the generator on line.

**6.** A more detailed view of the unit is given in fig. 2, where the general arrangement of components is shown. The armature is pivoted above the voltage coil, within the magnet system, and is enclosed by the horseshoe shaped series coil. In this illustration an overload relay is shown. In certain units within the series, this small relay is omitted.

## FUNCTIONING

**7.** A typical installation circuit is shown in fig. 3. This shows the cut-out contacts, as well as those of the undervolt relay and the circuit breaker, in the open position, i.e., the generator is not on line. In addition, auxiliary contacts in the circuit breaker (not shown in fig. 3) will be in the closed position to ensure that the aircraft power failure warning lamp will be on. This circuit does not include the overload relay referred to in para. 6.

**8.** When the generator is run up and the voltage has risen to a given value, the undervolt relay will operate and voltage will be applied to the voltage coil of the cut-out. As the generator voltage builds up, a stage will be reached where the differential between the generator and bus-bar voltage is sufficient to cause the voltage coil to influence the armature so as to close the cut-out contacts, thereby completing the solenoid circuit of the external circuit breaker. The resultant operation of the circuit breaker will allow current to flow between the generator and battery via the series coil of the cut-out and thus assist the

magnetic system to hold the armature in the closed position. In addition, the operation of the circuit breaker will open the auxiliary contacts (*para.* 7) and so switch off the power failure warning lamp.

**9.** When the generator voltage falls below that of the battery, reverse current will flow though the series coil of the cut-out. This will cause the cut-out contacts to open, thereby removing voltage from the circuit breaker solenoid. The circuit breaker contacts will consequently open to isolate the battery from the generator.

## INSTALLATION

**10.** The cut-out may be mounted in any position providing facilities for inspection, the unit being unaffected by vibration or attitude. For complete installation details reference should be made to the relevant Aircraft Handbook.

## SERVICING

**11.** Except for periodic visual inspection, no servicing will normally be required between major servicing periods. If the unit is functioning satisfactorily, it should be assumed to be serviceable for continued use.

### Inspection

**12.** Without removing the cover, inspect the moulding for signs of cracks or distortion. Ensure that all electrical connections make good contact and that the covers are secure.

**Note . . .**

*The cut-out must not be operated manually. If a detailed inspection is to be made, it is necessary to shunt the magnets so that the armature is freed from their influence. Failure to comply with this instruction may result in damage to the unit.*

### Operational test

**13.** After installing the unit in the aircraft, a test should be carried out to ensure that it has been properly installed and connected.

**14.** Connect a Type "D" testmeter between terminals 4 and 5, run up the engine and check that the warning light goes out when the cut-out operates at a differential voltage of between 3·5 and 4·0 volts.

**15.** With the testmeter suitably adjusted, reduce engine speed; the cut-out should break the supply to the circuit breaker, and the warning lamp should come on when the reverse current reaches a value between 15 and 30 amp.

**16.** In the event of unsatisfactory results from the tests detailed in the foregoing paragraphs, disconnect the leads from the unit. Refer to fig. 3, and, with a suitable testmeter, check that continuity exists between terminals 1 and 2, and 1 and 3. A resistance of between 427 and 522·5 ohms should be indicated between terminals 4 and 5.

**17.** A faulty cut-out must be removed from its installation and a serviceable unit fitted.

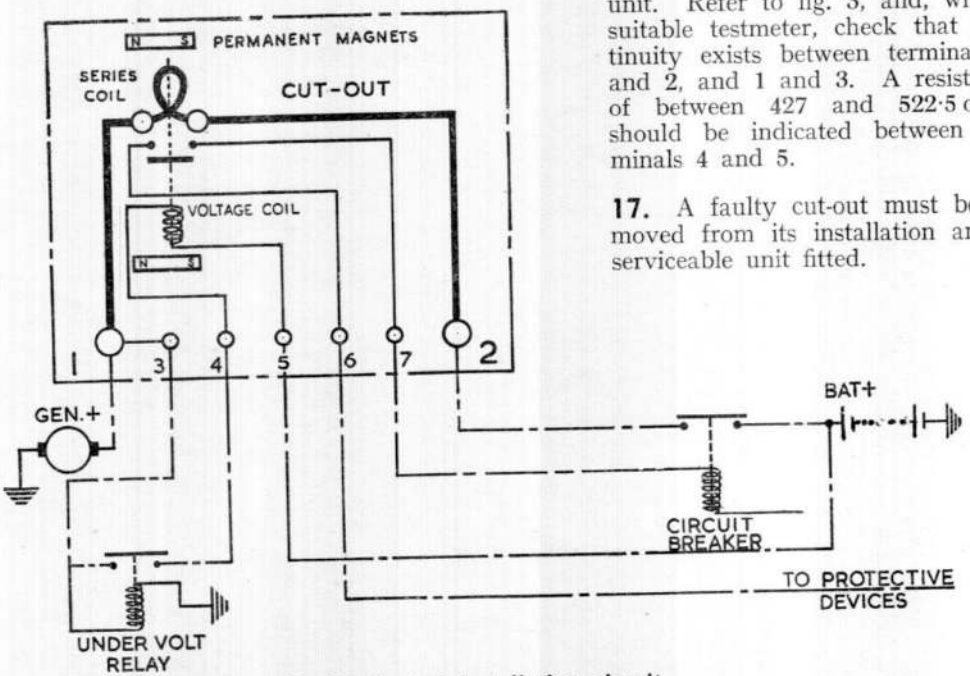


**Fig. 3. Typical installation circuit**



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