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Chapter 6

MULTIPLE PROTECTION UNIT, ROTAX TYPE F5103/1

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LEADING PARTICULARS

Multiple protection unit, Type F5103/1	Ref. No. 5CW/6837
<i>Field supply contacts:</i>	
<i>Voltage rating</i>	112V d.c.
<i>Current rating</i>	40 amp.
<i>D.C. operating voltages</i>	28V and 112V
<i>Operating field current</i>	14 to 42 amp.
<i>Operating temperature range</i>	-40 deg. C. to + 50 deg. C.
<i>Maximum altitude</i>	60,000 ft.
<i>Dimensions of base plate</i>	8.75 in. × 10.75 in.
<i>Overall height</i>	5.687 in.
<i>Weight (approx.)</i>	12 lb.

Introduction

1. The Type F5103/1 protection unit is used in conjunction with a transformer-rectifier unit, Type U2701/1 or U2704 in the N0701/3 generating system installed in certain aircraft (e.g. Britannia), to deliver a combined output of 208V, 3-phase a.c. and 112V and 28V d.c. A description of the generating system will be found in A.P.4343, Vol. 1, Sect. 2.

DESCRIPTION

2. The function of the unit (*fig. 1*) is to break the alternator excitation supply, thus removing the alternator from the system in the event of a fault condition. For example:

- (1) L.V. or M.V. rectifier failures and a.c. line to earth faults.
- (2) Excessive rotor current.
- (3) Overvoltage on the L.V. or M.V. outputs.
- (4) Overvoltage on the a.c. output lines.
- (5) Reverse current.

3. Overvoltage circuits incorporate a temperature compensating device and a hermetically sealed air dashpot time delay.

4. The unit comprises the following components, mounted on an aluminium base plate as illustrated in *fig. 2*, and interconnected as shown in the diagram of internal connections (*fig. 3*):

No.	Type	Description	Ref. No.
1	F5903	Overvoltage unit with double relay	—
1	D9218/3	Circuit breaker, Type 1A, No. 14	5CY / 4770
3	RSG24/10/44/2SP	Pullin relay (relays 1, 2 and 3)	—

These components are enclosed by a cover incorporating gauze ventilation panels on the top and sides. A description of the D9218/3 unit, with operational details, will be found in A.P.4343B, Vol. 1, Book 2, Sect. 11, Chap. 4.

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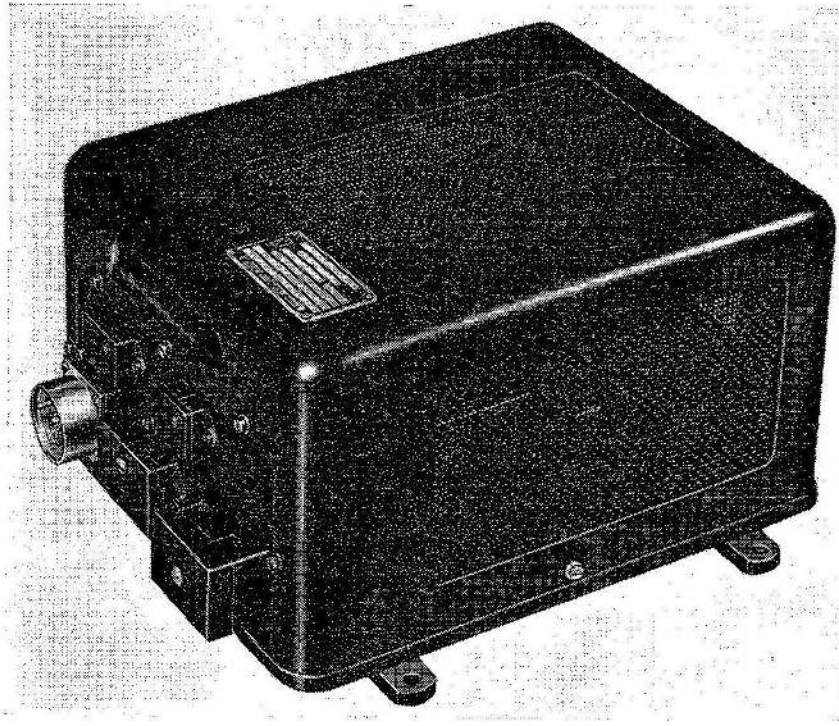


Fig. 1. Multiple protection unit, Type F5103/1

5. A 14-pole plug and four terminal blocks are mounted on their own panel which is fitted to brackets secured to the base. Four clinch nuts mounted on the base, and five anchor nuts mounted on the front panel, are provided to secure the base to the cover which houses the assembly.

Overvoltage unit, Type F5903 (L.V. and M.V. sections)

6. The unit comprises two independently operated relays, each connected to a separate network of resistors. A thermistor is included in each network to provide temperature compensation. The relays and thermistors are mounted on one side of the base and are covered by a metal case. The resistors and terminal blocks are mounted on the opposite side of the base.

7. In the unit, one relay (Relay A) is designed to operate in a 28V system, and the other (Relay B) to operate in a 112V system.

Note . . .

In the following paragraphs, the information applies equally to Relay A and Relay B.

8. The relay has a shunt and series coil, and is, in effect, a solenoid and plunger type relay with an instantaneous "clapper" type relay coupled magnetically. The solenoid plungers are a close controlled fit in a tube and act as a dashpot and piston time delay. Under the

influence of the magnetic flux, the two plungers move towards each other, and in doing so the flux around the "clapper" relay circuit increases, but remains insufficient to cause the "clapper" to operate until the two plungers are almost in contact with each other.

9. The plungers and their associated springs form a balanced assembly rendering the operational voltage independent of any accelerating forces to which the relay may be subjected. The "clapper" and contact assembly is also dynamically balanced for this purpose.

10. If the overvoltage in either the 28V or 112V systems becomes excessive, Relay A of the F5903 will be tripped to complete a 28V circuit (L.V.) to the D9218/3 circuit breaker. The effect of this is considered in para. 15. Associated units within the system will cause L.V. or M.V. overvoltage if either of the faults (1) or (4) mentioned in para. 2 occur. The operational characteristic of the relay is such that a time delay occurs between the application of an overvoltage signal and the closure of the relay contacts. This prevents the relay operating during transient overvoltage conditions which obtain during normal load switching between T.R.U's., or when a T.R.U. is being switched on to a busbar. This inverse characteristic causes the delay to vary between a comparatively long time for small overvoltages and a short time

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