

## Chapter 13

## PROTECTION UNIT, ROTAX, TYPE F 7504

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## LEADING PARTICULARS

<b>Protection unit, Type F7504</b> ... ..	Ref. No. 5UC/7381
<b>Voltage—</b>	
Supply voltage ... ..	200 volts, 3 phase a.c., 334–485 c/s
Relay voltage ... ..	28 volts d.c.
<b>Load conditions—</b>	
Steady load—	
Nominal line current ... ..	18 amp.
Current protection level	6 amp. out of balance or 24 amp. in excess in one or more lines
Cyclic load—	
Nominal line current ... ..	28 amp.
Current protection level ... ..	10 amp. out of balance or loads in excess of 107 amp. in one or more lines
OR	
Nominal line current ... ..	80 amp.
Current protection level ... ..	26.5 amp. out of balance or loads in excess of 107 amp. in one or more lines
<b>Overall dimensions—</b>	
Length ... ..	6.687 in.
Height ... ..	5.093 in.
Width ... ..	6.781 in.
Weight ... ..	3.25 lb.

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## Introduction

1. The F7504 protection unit is designed for use in 3-phase a.c. aircraft de-icing systems to provide protection against current unbalance, or overload current faults in two separate load circuits. One load is 18 amperes continuous, the second load is 28 amperes, or 80 amperes cyclic. Selection of these loads is by external switching.

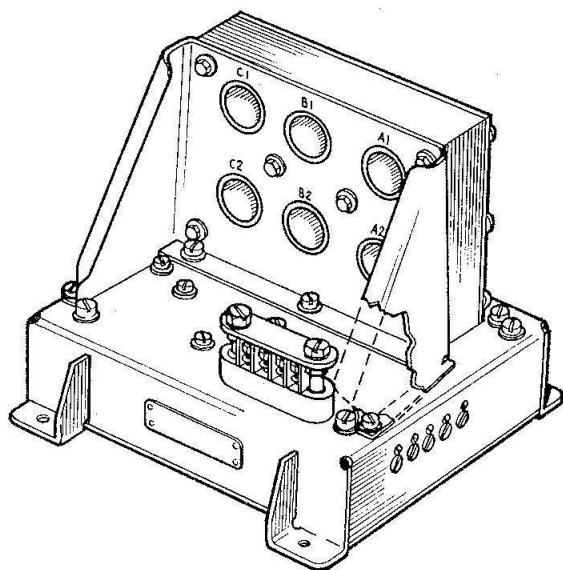


Fig. 1. Protection unit, Type F7504

## DESCRIPTION

2. The unit consists basically of an aluminium fabricated chassis containing an insulated group board assembly. Resistors and electronic components are mounted on the group board assembly, mounted on the top surface of the chassis and at 90 degrees to it is a second aluminium fabricated chassis, containing three 3-phase current transformer secondaries in a block moulding. Two of these secondaries are double wound over one set of toroidal cores and the third over a further set of cores.

3. A single relay and five miniature potentiometers are mounted on the lower and side surfaces of the chassis assembly, with the d.c. terminal block mounted on the top surfaces. Interconnection between all components is by means of a single cable form, connecting the group board assembly of electronic components and the associated relay and toroidal transformer positioned on the chassis assembly.

## Operation

4. Under conditions of 18 amperes continuous de-icing load the unit affords protection at 6 amperes line current unbalance or, alternatively, at line currents in excess of 24 amperes.

5. A signal, directly proportional to the individual line currents, is effected by passing the supply lines as straight through primaries through three wound toroidal core secondaries, the secondary current being full wave rectified, smoothed and fed to a resistor. These three signals provide the input to a 3-phase bridge rectifier, the output of which is proportional to the difference between the minimum and maximum line currents (i.e. to the degree of current unbalance).

6. With healthy load conditions, the currents are balanced. The voltages derived are proportional to the average value of line currents and are therefore equal, the resultant output from the 3-phase bridge rectifier being zero.

7. To provide for conditions of current overload, a Shockley diode is connected across part of the secondary of one line, so that when the voltage across the diode reaches a pre-determined level, the diode breaks down to cause an apparent out of balance condition.

8. The output of the 3-phase bridge rectifier is fed to a transistorized switching amplifier which drives a relay. The error signal is arranged so that, at the desired trip level, enough potential is available between the base and emitter of T1 to overcome the base emitter volt drop and provide base current drive and hence collector current. Almost all of the collector current of T1 is drawn through the base of T2, hence a heavy collector current will flow in T2. As the collector current of T2 starts to flow, the voltage at the relay coil starts to rise and the relay is energized. A positive supply is then available from terminal 2 to electrically latch the relay.

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