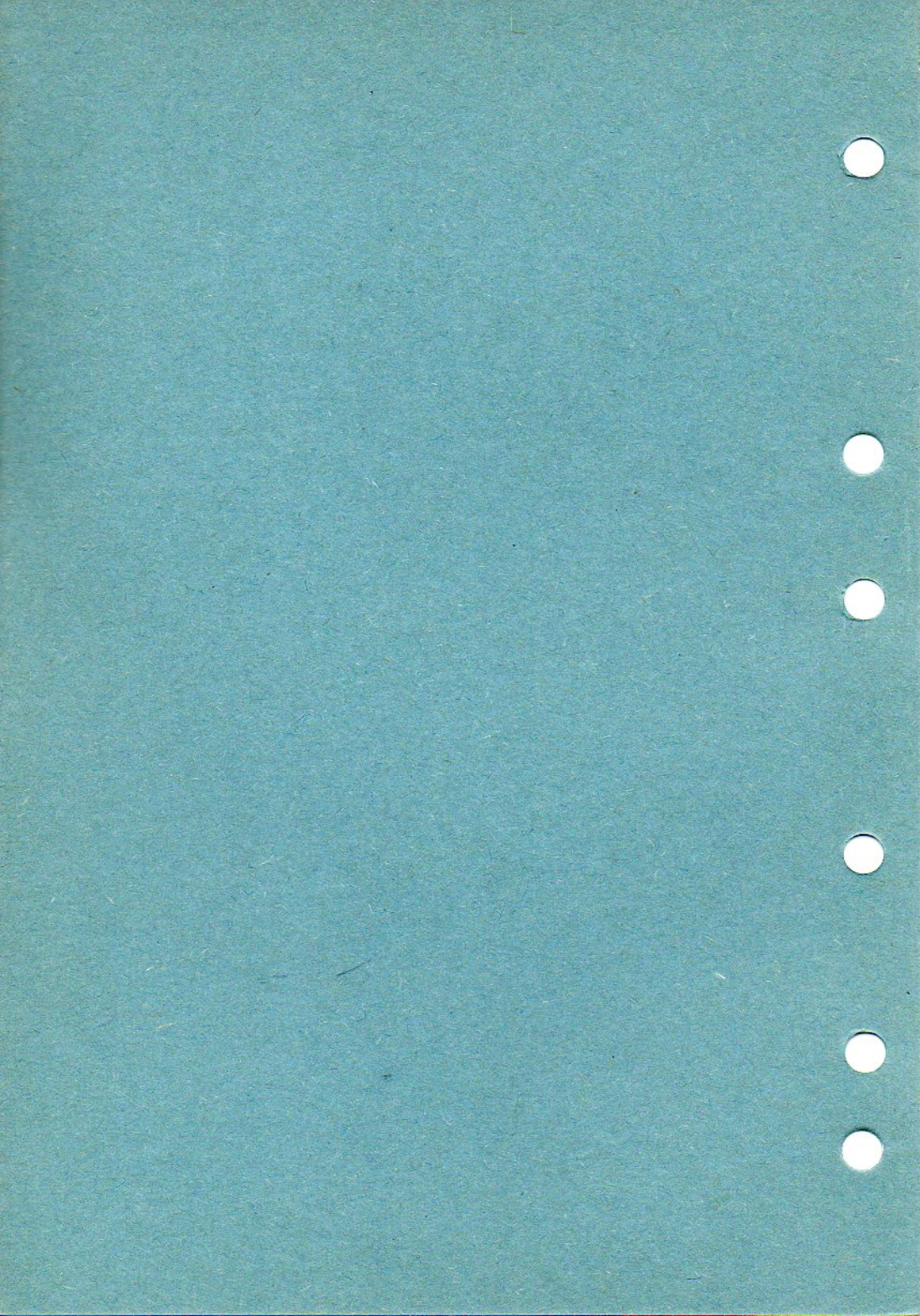


**PART II**  
**LIMITATIONS**

**LIST OF CHAPTERS**

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**PART 2**

The limitations given in this Part are taken from the Release to Service Issue 2 to AL 8. The Release to Service must be consulted to ascertain the latest release standard.

**CHAPTER 1 - ENGINE LIMITATIONS****Contents**

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**1 Engine - Avon Mk 102**

<i>Rating</i>	<i>Time Limit per Flight</i>	<i>RPM</i>	<i>JPT°C</i>
Take-off and operational necessity	30 minutes (combined total)	7800 ±50	600
Max continuous	Unrestricted	7600	565
Idling on ground	Unrestricted	2750 ±100	500

Note 1: At low air temperatures the engines may underspeed to as low as 7650 RPM at full throttle, but they still maintain maximum thrust.

Note 2: The governed RPM at take-off thrust vary with a change in fuel density from those at which the engine settings are made. A higher density causes a drop in RPM and a lower density a rise. Every 0.01 change in density causes a corresponding difference of 50 in the governed RPM.

## 2 Oil Pressure

Minimum at idling RPM	...	...	...	...	...	3 PSI
Minimum at 7400 RPM and above	...	...	...	...	...	15 PSI
Normal at 7400 RPM	...	...	...	...	...	20 PSI

## 3 Fuel and Oil

### (a) Fuel

NATO Code No	UK Joint-Service Designation	UK Specification	US Designation/ Specification
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*Standard Fuel.* The following fuel may be used without flight or maintenance restrictions:

F-34	Avtur/FSII	DERD 2453 ◆◆	JP-8/MIL-T-83133
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*Alternative Fuels.* The following fuels may be used only if standard fuel is not available; subject to the relevant notes:

F-35 (Note 1)	Avtur	DERD 2494	Jet A-1 or Jet A (Notes 1 and 2) /ASTM-D-1655
F-44	Avcat/FSII	DERD 2452	JP-5/MIL-T-5624
F-43 (Note 1)	Avcat	DERD 2498	- Jet B (Notes 1 and 3) /ASTM-D-1655

Note 1: Unless either AL-31 or AL-38 is blended during refuelling, these fuels do not contain Fuel System Icing Inhibiter (FSII). Therefore:

- a. Operation on these fuels is limited to 14 elapsed days to limit fungus growth and an equal number of days on a fuel containing FSII is to follow; This limit applies whether or not flying takes place. All uplifts of non-FSII fuel are to be recorded in the MoD Form 700.
- b. Operational commanders should note the possibility of LP filter blockage

with ice if the fuel temperature falls below 0°C.

- c. Water drain checks are particularly important when operating on these fuels, especially if refuelling at high ambient temperatures when the maximum possible time should be allowed between refuelling and drain checks.

Note 2: This fuel is an aviation kerosene with a freezing point of minus 40°C. When using this fuel, the flight profile is to be planned to avoid low outside air temperatures; the subsequent flight must also be operated as if Jet A were being used.

Note 3: This is an aviation wide-cut fuel with a freezing point of minus 50°C. When using this fuel, the flight profile is to be planned to avoid low outside air temperatures; the subsequent flight must also be operated as if Jet B were being used.

(b) *Oil.* Oil to DERD specification 2490, UK Inter-Service designation OM-11, NATO Code O-135 is cleared for use.

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**PART 2****CHAPTER 2 - AIRFRAME LIMITATIONS****Contents**

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◆◆	
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Jettisoning of Wing-Tip Tanks or Pods ... ..	7

**1 General**

The aircraft is released for RN and RAF use by day and by night in temperate and tropical climates.

**2 Maximum Weights**

For take-off and all permitted forms of flying	42,500 lb
For landing	40,000 lb

In emergency the aircraft may be landed at up to maximum take-off weight but extreme care is required, particularly when braking.

**3 Maximum Altitude**

The aircraft is limited to a maximum altitude of 45,000 feet.

## 4 Speed

<i>Condition</i>	<i>Maximum IAS (knots)</i>	<i>Maximum IMN</i>
Clean aircraft	450	0.75 below 15,000 feet 0.79 15,000 to 25,000 feet 0.80 above 25,000 feet
With wing-tip tanks or pods	355	0.75 below 25,000 feet 0.77 above 25,000 feet

Note: Avoid the onset of moderate buffet, which may occur at lower mach numbers, because of the possibility of vibration damage to pack bay equipment.

For the operation of:

Airbrakes MID	As for clean aircraft	
Airbrakes OUT	400	0.75 12,500 to 25,000 feet 0.79 above 25,000 feet
Undercarriage	190	-
Flaps	160	-

The maximum speed for the operation of a service also applies for flight with the service in the extended position.

## 5 Centre of Gravity

(a) *Forward Limit (With or Without Wing-Tip Tanks or Pods)*. The forward centre of gravity (CG) limit is 1.235 feet aft of datum (AOD) at weights up to 29,000 lb; it then moves linearly aft to 1.9 feet AOD at 42,500 lb.

(b) *Aft Limit*

(i) *Without Wing-Tip Tanks or Pods*. The aft CG limit without wing-tip tanks or pods is 3.058 feet AOD up to an altitude of 25,000 feet; it then moves linearly forward to 2.66 feet AOD at 45,000 feet.

(ii) *With Wing-Tip Tanks or Pods.* The aft CG limit with wing-tip tanks or pods is 2-808 feet AOD up to an altitude of 37,000 feet; it then moves linearly forward to 2-66 feet AOD at 45,000 feet.

(c) *Uneven Surfaces.* When taxiing over uneven surfaces the aft CG limit should not exceed 2-885 feet AOD.

(d) *Ferry Role.* In the Ferry Role the CG is very close to the aft limit. If the full survival pack and personal equipment is to be carried, together with wing-tip tanks, a thorough check on CG position is to be made before flight.

## 6 Manoeuvre

(a) Intentional spinning and aerobatics are prohibited.

(b) Practice stalling is permitted above 10,000 feet but it is not recommended above 25,000 feet.

(c) Combined application of coarse aileron and g loading is to be avoided.

(d) The application of negative-g loading is to be avoided. This is an engine fuel supply consideration (see Part 1, Chap 2).

(e) The normal acceleration limitations are as follows:

(i) *At Weights Up to 37,600 lb Without Wing-Tip Tanks or Pods*

With negligible aileron applied	...	...	...	3	g
With aileron applied...	...	...	...	2	g

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CAN/15*

(ii) *At Weights Above 37,600 lb or at All Weights With Wing-Tip Tanks or Pods*

With negligible aileron applied	...	...	...	3	g
With aileron applied...	...	...	...	1.5	g

## 7 Jettisoning of Wing-Tip Tanks or Pods

The wing-tip tanks or pods may be jettisoned at any speed, full or empty, within the limitations imposed when carrying wing-tip tanks or pods.

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## PART 2

CHAPTER 3 - MISCELLANEOUS  
LIMITATIONS

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**1 Aircraft Category**

The Aircraft Category for approaches is Category C.

**2 Engine Out Allowance**

The engine out allowance (EOA) is 450 feet.

**3 Visual Committal Height**

The visual committal height (VCH) is 600 feet.

**3A Pilot's Eye to Mainwheel Height**

The pilot's eye to mainwheel height in the landing configuration, and on a 3° glidepath is 8.6 feet. Under these conditions, the effect of a 1° change in attitude is 0.4 feet.

**4 Maximum Crosswind Component**

The maximum recommended crosswind component for take-off is 25 knots. The maximum permitted crosswind component for landing is 25 knots.

## **5 Aircraft Arresting Barrier Engagement**

The aircraft is cleared for engagement with Mk 5, Mk 6, Mk12A, Type A and Type B arresting barriers; in the case of Mk 12A and Type B barriers at the 'Light Aircraft' setting only. A table giving the recommended maximum entry groundspeed for aircraft weight is in the FRC. An aircraft engaging a barrier at speed/weight combinations higher than those shown runs the net out to its maximum length; the cables then come off the brake units and the aircraft continues forward at some residual velocity. An aircraft entering a barrier at a groundspeed in excess of 120 knots may exceed the impact strength of the net and burst through.

## **6 Aircraft Arresting Gear Trampling**

The aircraft is cleared to trample the supported and tensioned cable of the following types of arresting gear at speeds up to unstick speed: RHAG; PUAG; CHAG; BAK 9; BAK 12; 500S.

## **7 Pilot Size**

A pilot having a thigh length in flying clothing of more than 25.5 inches must not fly the aircraft. This restriction is imposed because a pilot with a greater thigh length is liable to injury due to the knees fouling the coaming if the ejection seat is used.

## **8 Ejection Seats**

The best speed for ejection is 200 knots, in straight and level flight. Ejection may be initiated, in straight and level flight, at any height from ground level upwards. However, runway ejections should only be made when the speed of the aircraft is above 90 knots or the circumstances of the emergency dictate that ejection is the only reasonable solution. If at any time the aircraft is nose-down or descending, the minimum safe height is increased and depends on the angle of dive and aircraft speed.

## **9 Tyre Limiting Speed**

The tyre limiting speed on the ground is 161 knots groundspeed.

**10 Radio, Radar and Navigation Equipment**

(a) The following Installations are cleared for operation subject to the limitations and conditions for use specified in the general statement and notes below:

- ◆ ARI 5877 AD 722 Radio Compass (Notes 1 and 2)
- ARI 5951 Green Satin (Note 3)
- ARI 18107/4 Tacan (Notes 4, 5 and 6)
- ARI 18107/18 Tacan (Note 7)
- ARI 23090/2 618 T-3 HF (Notes 1 and 8)
- ARI 23099 Intercom UA60
- ARI 23099/24 Intercom UA60 (Notes 7 and 9)
- ARI 23118 AD 260 VOR/ILS (Notes 1, 9 and 10)
- ARI 23134/3 IFF/SSR (Note 11)
- ARI 23172 Radio Altimeter Mk 7B (Note 12)
- ARI 23208 Davall Voice Recorder (Note 7)
- ARI 23288/3 AD 120 VHF (Notes 13 to 16)
- ARI 23301/3 PTR 1751UHF (Notes 13 to 19)
- ARI 23314 Omega (Notes 7 and 20)

(b) *General Statement*

All the installations are permitted to be operated from ground level to 45,000 feet in temperate climates. In tropical climates, all the installations except the PTR 1751 UHF, AD 120 VHF, Radio Altimeter and Green Satin are permitted to be operated from 2000 feet AGL to 45,000 feet, provided that a TAS for 350 knots and recommended duty cycles are not exceeded. Below 2000 feet, refer to Notes 1, 6 and 12 as applicable.

Note 1: Below 2000 feet in tropical climates the equipments are liable to operate in ambient temperatures exceeding their limiting temperatures at OAT exceeding 36°C.

Note 2: With transmissions in the UHF band 226.0 to 260.0 MHz on upper and lower aeriels, heavy break-through and increase in background noise may be heard in the Radio Compass receiver when it is tuned to 300 kHz: the ADF pointer may also be deflected.

Note 3: Operation of JS 603 (ARI 23165) on the same ◆

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◆ frequency as Green Satin causes interference and loss of tracking.

Note 4: UHF transmissions on 296.2 MHz on the lower aerial are liable to cause the Tacan range and bearing to unlock on Channel 98.

Note 5: ALT 21A (ARI 23166) D-band radiations common to Tacan receiver frequencies are likely to unlock the Tacan range and bearing indications.

Note 6: At OAT exceeding 43°C, equipment should not be operated for longer than 1 hour continuously.

Note 7: No guarantee of performance can be given.

Note 8: The system does not tune above 25 MHz.

Note 9: Interference on receiver from ALT 15H (ARI 23167) is to be expected, depending on receiver frequency and aerial selection. Interference is maximum on low UHF frequencies and lower aerial.

Note 10: UHF transmissions on the ILS glidepath frequency in use cause the glidepath pointer to deviate and operate the warning flag.

Note 11: UHF transmissions on 257.5 and 343.3 MHz using either aerial affect the aircraft IFF/SSR equipment such that the transponder signal transmitted may be unreadable.

Note 12: Pending a modification to introduce extra ventilation, equipment is not to be operated in OAT exceeding 30°C.

Note 13: No communication is possible on UHF or on VHF above 127 MHz during ALT 15H transmissions and UHF transmissions are impaired during ALT 15H transmissions from another aircraft with separations of up to 3000 feet.

Note 14: There is a possibility of interference from VHF to VOR and ILS localiser and from either UHF radio to ILS glidepath, Tacan and IFF, all of which are more noticeable when using the lower UHF aerial. ◆

◆ Note 15: Interference occurs to both UHF radios from VHF on harmonically related frequencies and to VHF and UHF radios from HF transmission on some test frequencies.

Note 16: Monitoring any frequency using normal aircraft V/UHF installations may prove unreliable during ARI 23362 transmissions. The maximum use of the latter's Guard Abort and Guard Alert functions, with programming of protected bands, provides full protection for monitoring guard frequency.

Note 17: The PTR 1751 UHF has a restricted duty cycle of 5 minutes transmit, 10 minutes receive and 15 minutes transmit maximum in any hour. Exceeding these limits does not damage the radio but may cause it to reduce its radiated power output and this may not be accompanied by any noticeable reduction in sidetone level.

Note 18: For simultaneous operation of both UHF radios, frequency separations of up to 2 MHz may be necessary.

Note 19: Mutual receiver interference may affect reception by either UHF radio whilst they are set to receive on frequencies separated by 50 MHz.

Note 20: If both DC generators fail Omega and its associated inverter are to be switched off.

## 11 Electronic Countermeasures Equipment

(a) The following installations are cleared for operations subject to the limitations and conditions of use specified in the general statement and associated notes below:

- ARI 18207 Repeater (Notes 1, 2, 3, 4 and 5)
- ARI 23165 JS 603 (Notes 1, 2 and 6)
- ARI 23166 ALT 21A (Notes 6 and 7)
- ARI 23167 ALT 15H (Notes 8 and 9)
- ARI 23287 AN APR 9 (Note 10)
- ARI 23361 Tektronix Spectrum Analyser and  
Computer Controller (Note 11)
- ARI 23362 Sylvania Communications Jammer  
(Notes 12, 13, 14 and 15)
- ARI 23363 REL I/J Jammer System (Notes 16 to 20) ◆

◆(b) *General Statement*

(i) Except where otherwise stated in the following notes, each electronic countermeasures (ECM) equipment is permitted to be operated in temperate climates with any combination of other ECM equipments with the air scoop shutters open in maximum OAT conditions up to a height of 45,000 feet. Because of equipment problems caused by the ingress of moisture through the air scoops the shutters should normally be kept closed. However, if any of the transmitters trip out during use, the shutters may be opened for five minutes and an attempt made to reset the transmitter(s).

(ii) Use of the ECM equipments, except the ARI 18207 Repeater, is unrestricted in tropical climates from 200 to 45,000 feet provided the air scoops are open and a TAS of 350 knots is not exceeded.

Note 1: No guarantee of performance is given for the forward AI aeriels.

Note 2: Permitted to be operated into AI and Weapon aeriels but the changeover is not to be made when the equipment is operating.

Note 3: Below 10,000 feet the equipment is permitted to be operated in maximum OAT, with air scoops open, provided TAS does not exceed 350 knots.

Note 4: The ON/OFF switches and warning lamps on the control unit do not afford protection against inadvertent operation.

Note 5: Operation in OAT exceeding plus 34°C is not recommended.

Note 6: To be operated normally with air scoops open. Operation with air scoops closed is permissible at altitudes below 5000 feet provided no more than one ARI 23167 transmitter or two ARI 23165/23166 transmitters are operated for not more than 15 minutes continuously.

Note 7: Because of known drift problems, monitoring of the transmitter is essential and care must be exercised in selection of operating frequencies, band widths, time and zones. ◆

◆ Note 8: The function switch on the control unit does not afford protection against inadvertent operation ie, in transmit condition and left unnoticed.

Note 9: Continuous operation is permissible below 1000 feet up to a maximum OAT of plus 47°C with air scoops open. At OAT exceeding plus 47°C operation is limited to 30 minutes ON and 30 minutes OFF. From 1000 to 45,000 feet continuous operation is permissible in all OAT conditions.

Note 10: For use in temperate climates only.

Note 11: No guarantee of performance can be given.

Note 12: The maximum power output is to be restricted to 200 watts for both AM and FM operation (load card programmable at power level 3).

Note 13: The facility to use continuous transmission on a single channel is to be disabled (load card programmable).

Note 14:

a. The operating envelope is limited to:

(i) 1000 feet, 325 knots.

(ii) 20,000 feet, 325 knots.

(iii) 40,000 feet, 0.72M.

b. The equipment may be operated in climbs, descents, straight and level flight and gentle manoeuvres with a maximum power setting of level 3.

c. The cooling scoops are to be in the open position when the equipment is operated.

Note 15: Electromagnetic interference is present between the system and the following ARI (for details see the Release to Service): 18107, 23090, 23118, 23134, 23167, 23288, 23301 and 23314. ◆

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◆ Note 16: Cleared for ground running for periods up to 30 minutes duration followed by a cooling period of 60 minutes. All pack bay scoops are to be open prior to switch on. ARI 23362 ground/flight switch is to be set to ground. The system is to be electrically powered from an external source.

Note 17: No definition of performance or guarantee of reliability can be given.

Note 18: The maximum height of operation during ARI 23363 transmission should be restricted to 20,000 feet AMSL/FL200.

Note 19: ARI 23362 transmissions should be limited to a maximum of power level 2 and ARI 23362 should not be switched between off and standby while the ARI 23363 is switched on. Should frequent equipment failure still occur during use of these two ARI then their use must be restricted to operation in isolation. Except when operating from a single alternator this Note may be withdrawn when ARI 23362 is supplied from No 2 alternator busbar.

Note 20: Electromagnetic interference is present between the system and ARI 23134 and 23172 (for details see the Release to Service).

*(c) Chaff Dischargers and Dispensers*

(i) The discharger, cartridge 2.25" No 4 Mk 1 installations are cleared for use throughout the aircraft's cleared flight envelope. Firing of the discharger cartridge is prohibited after the prior dispensing of gravity chaff.

(ii) The chaff dispensing units are cleared for unrestricted use throughout the aircraft flight envelope. ◆

## 12 Electrical Equipment

The turbo alternators are subject to the following limitations during ground running:

*(a) Ground Running at 1/3 Load (10 kVA) with No External Cooling*

*(i) With Lower Access Panel Removed:*

At 15°C ambient - 60 minutes (maximum)\*

At 50°C ambient - 20 minutes (maximum)

\*This period must be followed by a cooling period of not less than 90 minutes before re-starting.

*(ii) With Lower Access Panel Fitted:*

At 15°C ambient - 30 minutes (maximum)

At 50°C ambient - 14 minutes (maximum)

*(b) Ground Running at Full Load (30 kVA)*

The period of running a turbo alternator at full load is not to exceed 5 seconds.

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