

Chapter 2

SIMSTART TROLLEYS

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LEADING PARTICULARS

| | |
|--|-------------------------|
| Trolley Simstart (Valiant) Mark 1, Type 1A | Ref. No. 4F/4203 |
| Trolley Simstart (Victor) Mark 1, Type 1B | Ref. No. 4F/4204 |
| Trolley Simstart (Vulcan) Mark 1, Type 1C | Ref. No. 4F/4205 |
| <i>Overall dimensions</i> | |
| <i>Length</i> | 18 ft. 6½ in. |
| <i>Width</i> | 5 ft. 3½ in. |
| <i>Height</i> | 3 ft. 6 in. |
| <i>Chassis Mark 2 Type C</i> | <i>Ref. No. 4F/2019</i> |
| <i>Frame length</i> | 12 ft. |
| <i>Wheel base</i> | 9 ft. |
| <i>Turning circle</i> | 35 ft. |
| <i>Tyre pressures</i> | 65 lb/in ² |
| <i>Batteries Type H, 24V, 40A.H.</i> | <i>Ref. No. 5J/3303</i> |

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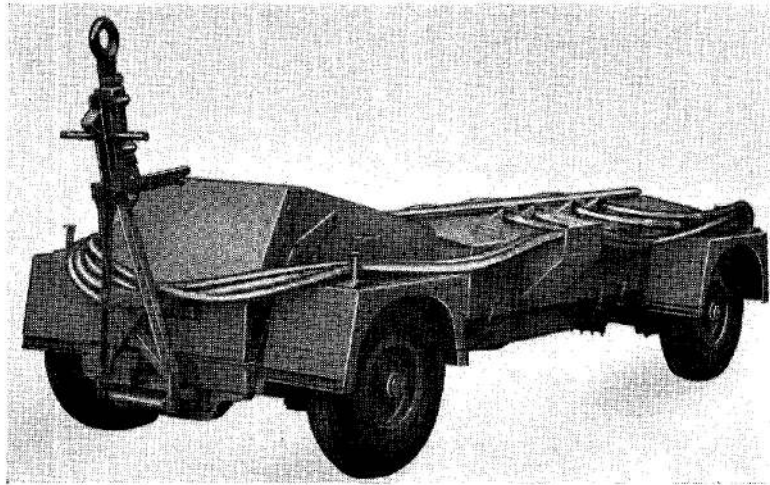


Fig. 1. General view of Simstart trolley

Introduction

1. Simstart trolleys are designed to provide the necessary starter control circuits and the electrical power for the simultaneous starting of all four engines fitted to the Victor Mark I and IA, Vulcan Mark I and IA or Valiant aircraft. Fig. 1 illustrates a Victor Simstart trolley. A separate trolley is provisioned for each type of aircraft but the basic details, dimensions and weight of the three trolleys are virtually identical, the differences being primarily confined to the start panels and associated wiring. This chapter refers to the chassis, battery connections, and sections of the electrical installation which are common to the three types of trolleys. The Simstart trolley is intended for use only on aircraft which are modified to accommodate it. During simultaneous engine starting the aircraft control and start panels are inoperative, a control panel and four similar start panels fitted to the trolleys are in complete control of the starting procedure. A separate chapter providing comprehensive information on the individual circuits and start panels will be found in Sections 2, 3 and 4 of this publication.

DESCRIPTION

Chassis

2. The components are mounted on a Type C Mark 2 standard chassis, full information on which will be found in A.P.1464G, Vol. 1, Part 2, Sect. 5, Chap. 37. The frame is constructed of channel section members welded together to form a base for the flat

platform on which the components are mounted. The axles are of the under-slung type and are fitted with rubber suspension.

3. Girling brakes are fitted to the rear wheels and are operated from the towing eye by an overrun device through a cable and rods. A separate hand operated lever permits operation of the brakes for parking purposes.

4. A ventilated battery cover is secured to the main chassis by six bonnet fasteners. Four brackets are provided on the top of the cover to permit safe stowage of the N.A.T.O. sockets which are attached to the starting cables.

5. The console, on which is mounted the control and start panels, is provided with a cover which is secured by screws. Attached to this, by means of hinges, is a spring loaded cover which protects the control panel and also the switch and charging panel.

Battery connections

6. The 24V, 40A.H. Type H lead acid batteries, which provide power for engine starting may be seen in fig. 2. Connections to the distribution panel and charging points are shown in figs. 3 and 4.

7. Twenty-one batteries are mounted on the chassis their locations are as shown in fig. 3, the one marked 24V being the normal 24V supply for the starter and control panels.

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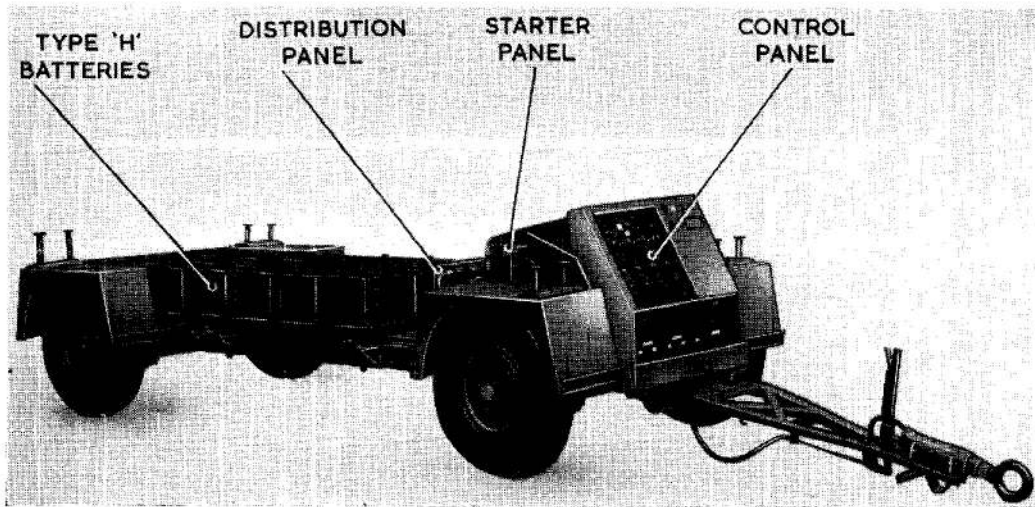


Fig. 2. Trolley with covers removed

For engine starting the remaining twenty batteries are arranged in four 120V banks, numbered one to four, each of five batteries lettered A to E. The 120V supplies are fed to the individual engine starting circuits via separate 250A. H.R.C. fuses. To enable the trolley to be still capable of four-engine starting in the event of a defect occurring in any one bank of batteries, and also to reduce the peak loading on any one bank, the four banks are interconnected via a ring of four 150A. H.R.C. fuses (see *fig. 3*).

Charging circuit (*fig. 4*)

8. To permit battery charging from a standard servicing trolley having a 112V and 28V supply, each 120V battery is divided into two sections. One section comprising four batteries which are charged from the 112V supply; the remaining battery, lettered A in each bank, is charged from the 28V supply. The START/CHARGE and OFF switches, also shown in *fig. 5*, effect the necessary alteration to the battery connections. The covered N.A.T.O. plug charging points may be seen to the right of the switches in this figure. Charge limiting resistors are included in the charging circuits to afford some protection to the batteries in the event of an unnoticed upward drift in the charging supply voltage.

9. As previously mentioned, the unlettered

battery marked 24V (*fig. 3*) provides the normal supply to the control and start panels. An emergency supply for this service is provided by tapping a 24V supply from the batteries at the lower end of the 120V banks, i.e., those lettered "A". Changeover is brought about by placing the MASTER SWITCH (*fig. 5*) to EMERGENCY.

Distribution panel (*fig. 2 and 3*)

10. The distribution panel, which is located between the batteries and the console, carries the main distribution terminals and fuses. It forms the intermediate connection point between the batteries and the remainder of the system.

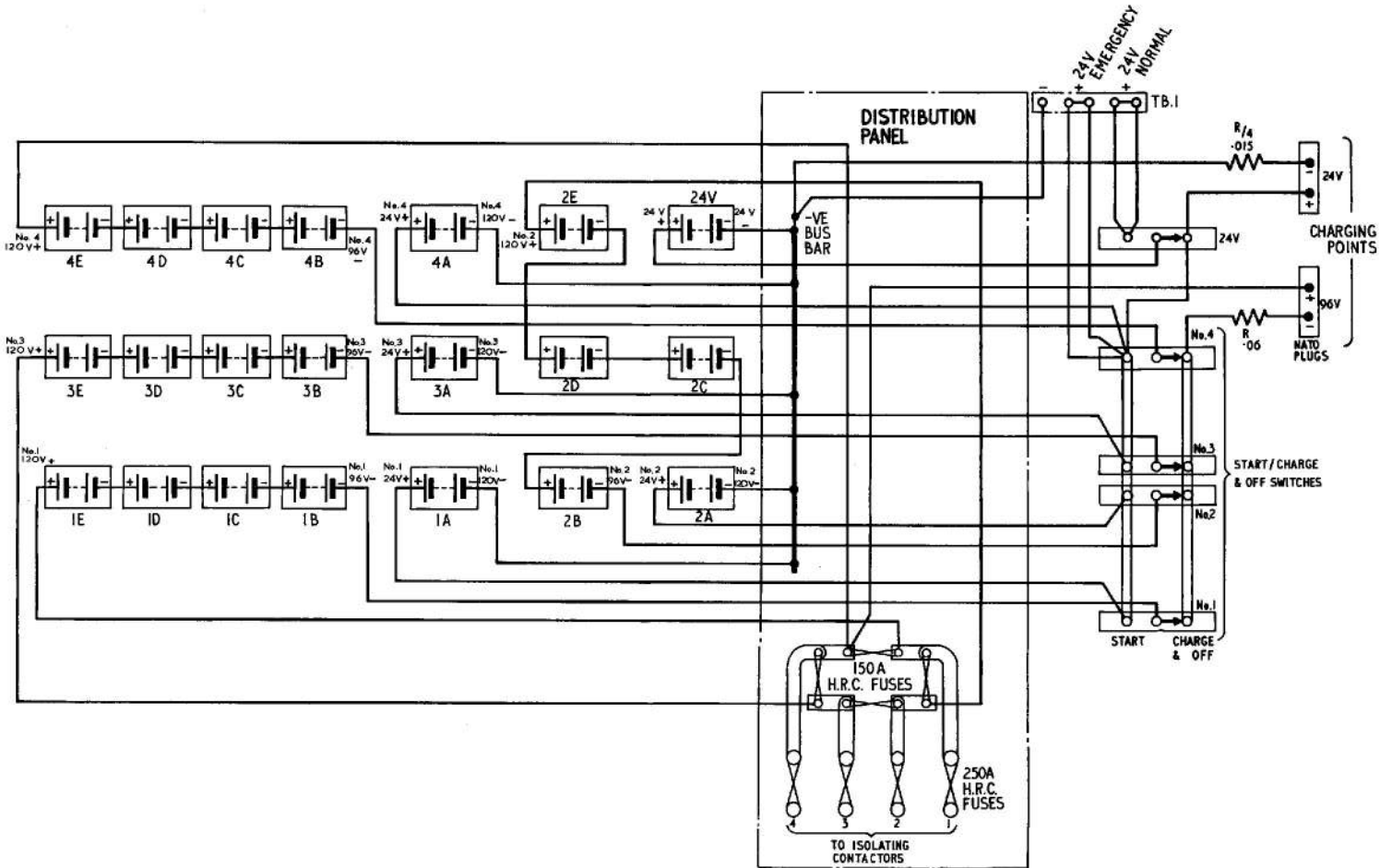
Control panel

11. The control panel, which is standard for all types of trolley and is shown in *fig. 5*, carries the individual control switches and starter buttons together with three indicating lights for each of the four engine starting circuits. These components are identified by the engraved illuminated panel mounted on the left. General illumination is provided by lights fitted at the top of the panel which are controlled by the switch mounted on the right, and protected by the 2.5A fuse immediately above it. Mounted centrally at the top of the panel are a MASTER SWITCH and its green indicator light.

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Fig. 3. Battery locations and connections



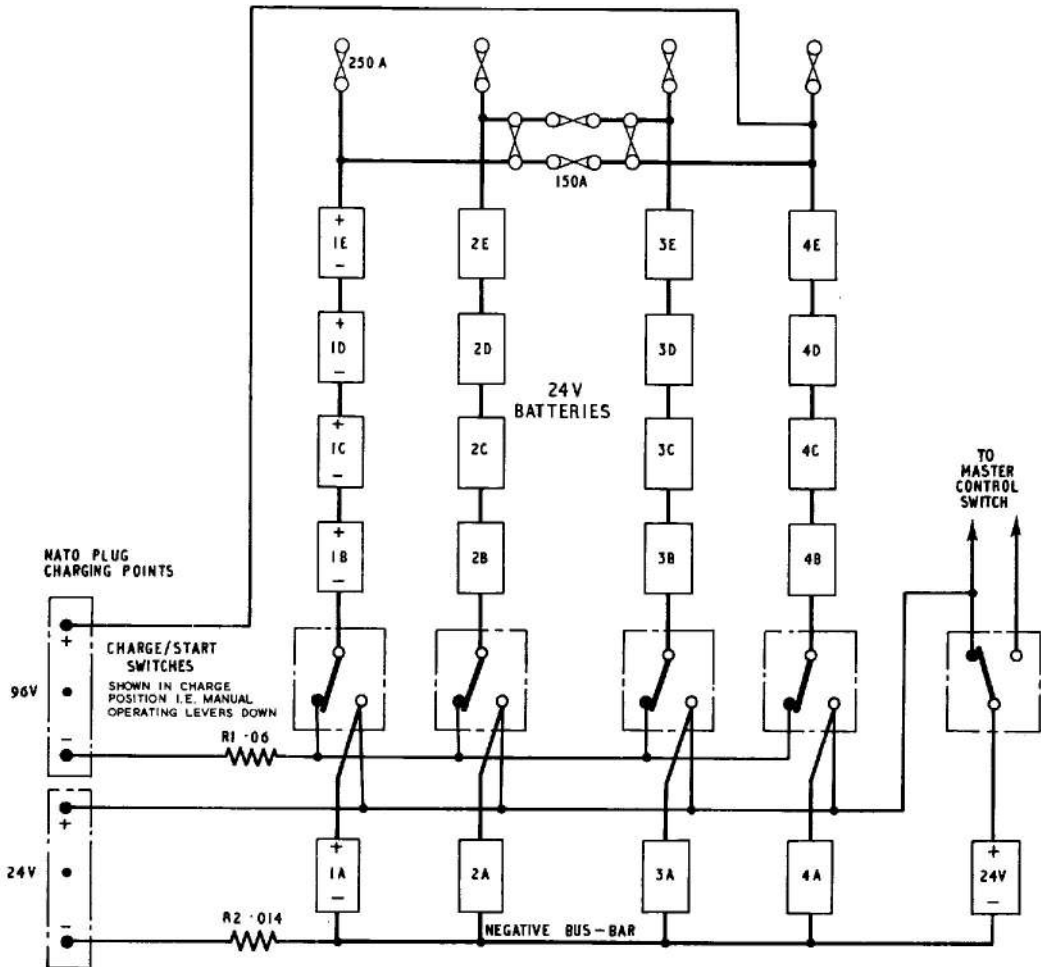


Fig. 4. Charging circuit

Switch and charging panel (fig. 5)

12. Immediately below the control panel is the switch and charging panel. This carries the N.A.T.O. charging plugs and the START/CHARGE and OFF switches. A switch bar is provided to enable all four switches to be simultaneously switched off in an emergency during an engine start. Because of the interconnection of the battery banks through the 150A fuses (see para. 7) individual starting circuits cannot be opened separately by means of these switches.

13. The switch marked 24V controls the 24V battery mentioned in para. 7. To charge the battery from a 28V source via the 24V N.A.T.O. plugs the switch should

be placed down (FLIGHT). By placing the switch up (GROUND) the normal 24V supply will be connected to the control and start panels.

OPERATION**Charging**

14. A description of the circuit is given in para. 8. A standard servicing trolley 112V supply should be connected to the 96V CHARGING POINT (fig. 5), and the 28V supply connected to the 24V CHARGING POINT immediately below it. To charge the battery banks numbered 1 to 4 (fig. 4) the four START/CHARGE and OFF switches should be placed to CHARGE and OFF, (down). The 24V battery may also be charged by placing

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the switch marked 24V to the charge position (down).

Aircraft engine starting (fig. 5 and 6)

15. The trolley is to be used only in conjunction with the type of aircraft to which it is appropriate and which has been modified to provide the Simstart facility. The N.A.T.O. sockets must be connected only to the four special N.A.T.O. plugs on such aircraft and not on any account to the aircraft normal N.A.T.O. servicing plugs.

16. Before connecting the plugs to an aircraft, check the trolley as follows:—Ensure that the four circuit breakers at the top of the control panel (fig. 5) are closed and place all switches listed below in the UP position.

- Five START/CHARGE switches to START
- Four IGNITION switches to ON
- One PANEL LIGHT switch to ON
- Four 24v CONTROL switches to ON
- One MASTER SWITCH to ON (Normal).

17. The MASTER SWITCH (top centre of panel) should be operated last and whilst it remains in the OFF position all circuits should remain dead. On moving the master switch to ON the green indicator light, the switch indicator, strip lights and the panel lights will come on. No neon indicator lights should glow at this stage. Now move the master switch to OFF.

18. Connect the four N.A.T.O. sockets to the appropriate aircraft plugs ensuring good engagement. Place the master switch to ON when the lower row of neon lights (CONNECTED TO AIRCRAFT) should glow. The failure of one or more of these lights to glow should be investigated as it indicates a bad connection to the aircraft or a fault in the trolley. Move the master switch to OFF leaving all other switches UP. In this condition the trolley is on standby and no current is being consumed.

19. Instructions to start will be given from the cockpit, upon which the master switch is placed ON and the start push buttons are pressed individually at approximately *one second* intervals. During the actual starting cycle the start in progress lights will illuminate and the POWER TO AIRCRAFT neon lights will glow. As each starting cycle finishes the appropriate lights should extinguish.

20. If a power to aircraft light remains on at the end of a start cycle it indicates that there is a fault and that some current is still flowing to the aircraft starter motor. The circuit can then be opened by the individual 24v SUPPLY SWITCH or the MASTER SWITCH or, as a last resort, by depressing the switch bar over the four START/CHARGE and OFF switches below the control panel. Ensure that the POWER TO AIRCRAFT lights are

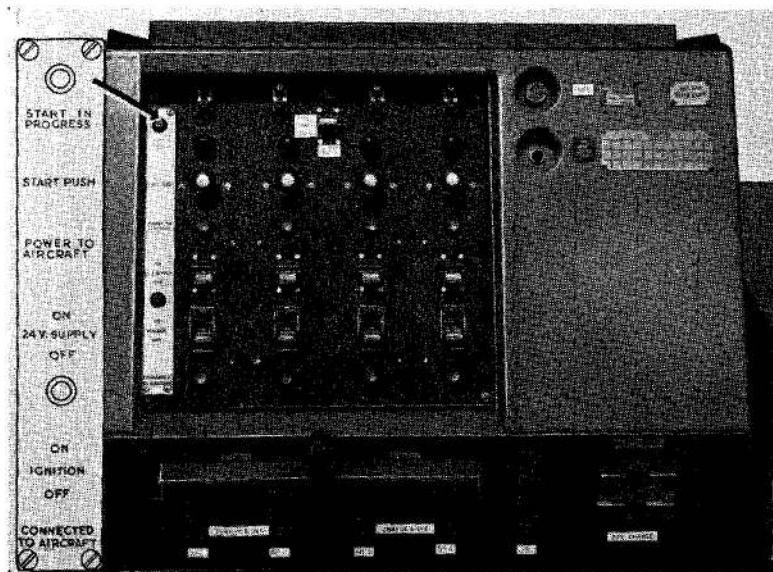


Fig. 5. Control panel

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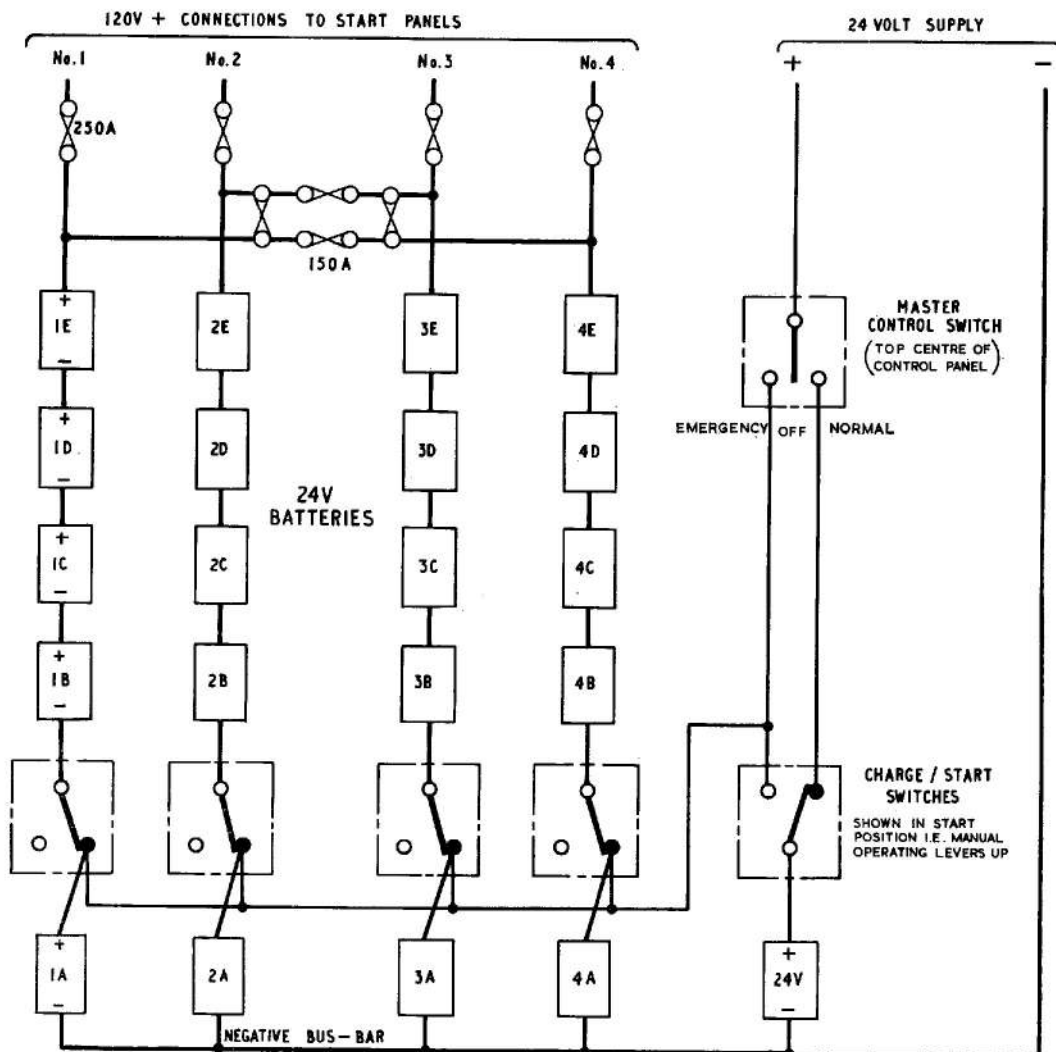


Fig. 6. Power supplies circuit

extinguished before detaching the plugs from the aircraft.

Note . . .

(1) The one second interval spacing between the operation of the start buttons materially reduces the peak loading on individual banks of batteries and must be complied with.

(2) If when the master switch is placed to ON, following the instruction to start, there is no evidence of a supply, that is no panel lights, no strip lights and no green light, the master switch should immediately be placed to EMERGENCY when an alternative 24V supply will be obtained from the main battery banks.

SERVICING

Batteries

21. The acid level of this type of battery when used in aircraft is limited to the level of the perforated grid over the plates, but to reduce the amount of servicing required in the case of the batteries fitted to the Simstart trolley, it is permitted to increase the acid level until it is $\frac{1}{4}$ in. above the perforated grid. This level must be increased initially only by the addition of acid of the correct specific gravity, and subsequently maintained with distilled water.

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22. The batteries are normally to be recharged after each Simstart operation if the trolley is in use, or given a topping up charge at periods not exceeding fourteen days if the trolley is on standby. The circuits are basically designed for constant potential charging at 112V and 28V respectively, but these input voltages are to be reduced if the batteries are discharged to the extent that the charging current exceeds 40A.

General

23. All connections should be examined for security and cleanliness. Cable insulation should be free from damage and deterioration, the trolley to aircraft connecting cables should receive particular attention in this respect.

24. The major items of equipment fitted to the Simstart trolley are of standard aircraft type and reference should be made to the relevant Air Publication for servicing instructions relating to these components.

Insulation test (250V)

25. Two pole wiring has been used throughout and there are no electrical connections to the chassis or framework. After dis-

connecting the batteries and closing all switches, the minimum insulation resistance tests between all poles and frame should be 10 megohms.

Chassis

26. Complete servicing instructions are included in A.P.1464G, Vol. 1, Part 2, Sect. 5, Chap. 37.

Lubrication

27. The following components should be lubricated with grease lubricating Ref. No. 34D/169, during routine servicing.

- (1) Brake cable (one nipple at front cross member).
- (2) Draw bar swivel bracket pin (one nipple on the underside).
- (3) Steering drag link (two nipples).
- (4) Steering pivot on front axle (one nipple).
- (5) Steering track rod (four nipples).
- (6) Front axle king pins (one nipple for each).
- (7) Brake compensator on rear axle (two nipples).

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