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## INTRODUCTION

The Douglas DC-3 electrical system is a single bus 24-volt DC system. This electrical bus is called the "Main DC Bus" or "Ship's Bus". The structure of the aircraft serves as the electrical ground. Power is supplied to the bus from two engine generators and two 12 Volt batteries connected in series. The AC system is supplied by one 115 volt, 400 Hz inverter and is used for radio equipment only. The inverter has been deactivated on some DC-3 aircraft. This chapter provides a general overview of the electrical system as well as normal operations and limitations.

## GENERAL

### DC CIRCUITS

#### Aircraft Batteries

Two 14 volt, 88 ampere hour batteries are connected in series to provide 28 volts to the main DC bus. Each battery is mounted on a tray located in a box below the companionway fuselage floor. An external power plug receptacle is installed in the bottom of the fuselage forward of the wing leading edges.



**Battery Switch**

The main bus is powered through a three position switch installed on the left overhead switch panel in the cockpit. This switch is called the "Battery Switch". The three positions of the Battery Switch are: aircraft batteries (BATT), external power (BATT CART), or OFF. Power is supplied to the main DC bus whenever power is available either from the ship's batteries or from an external source, and the switch is in the correct respective position.

#### Generators

A P-1 generator, rated at 75 continuous amps is installed on each engine accessory section. One generator with the batteries will provide ample power for operation of all required equipment.

## Generator Controls and Indicators



**Generator Control Switch**

Each generator circuit is equipped with a switch relay that is operated by bus voltage through the respective generator switch. When the Generator Switch is OFF, the equalizer and field circuits are interrupted and the generator's voltage output will drop to residual voltage (0.5 to 2 volts).

A voltage regulator automatically controls generator output within desired limits regardless of changes in engine RPM or electrical load. Each generator begins to operate and supply proper voltage to the Main DC Bus when its respective engine RPM is at or above approximately 950 RPM and the associated Generator Switch is in the ON position.

A reverse current relay automatically connects the generator to the bus when the generator output is normal and will disconnect the generator from the bus when there is a reverse current flow from the bus to the generator. The reverse current relay is operative only when the respective Generator Switch is ON.

#### Generator Fuse

Each generator is protected by a 200-amp fuse located on the circuit breaker panel in the companionway.

#### Generator Field Flashing Switches

Generator field flashing switches are located on the circuit breaker panel and provide a means for flashing the respective generator field in the event voltage output is not indicated. When required, these switches should only be depressed momentarily.

#### Caution:

**DO NOT ACTUATE A GENERATOR FLASHING SWITCH IF VOLTAGE IS INDICATED.**

**Voltmeter**

The voltmeter is located on the Captain's overhead panel and is used for checking voltage on the main DC bus.

**Ammeters**

There is one ammeter for each generator on the right overhead switch panel that indicates the electrical load being supplied by its respective generator.

### ELECTRICAL CONTROL & PROTECTION

The electrical system control panels are located above the windshields in front of each pilot. The circuit breaker panel is located in the companion-way below the radio rack. All systems have circuit breaker type protection with the exception of the generators and the feather pump motors. The feather pump motors are not protected in any way by fuse or circuit breaker.

## OPERATION

### BEFORE STARTING ENGINES

Use an external battery cart when available. If an external power source is not available for starting the engines, ensure that at least 25 volts DC is indicated on the voltmeter prior to attempting an engine start from the ship's batteries. During start, the minimum voltage should be 22 volts.

### AFTER STARTING ENGINES

Verify that the external power source has been disconnected by noting no voltage indication on the overhead voltmeter as shown. Select ship's batteries after engine start. Check the amperage and the operation of each generator in accordance with the AFTER START checklist for each engine prior to connecting the generator to the main bus.

### IN FLIGHT

During flight, periodically check the ammeters to confirm proper generator paralleling and operation.

### LIMITATIONS

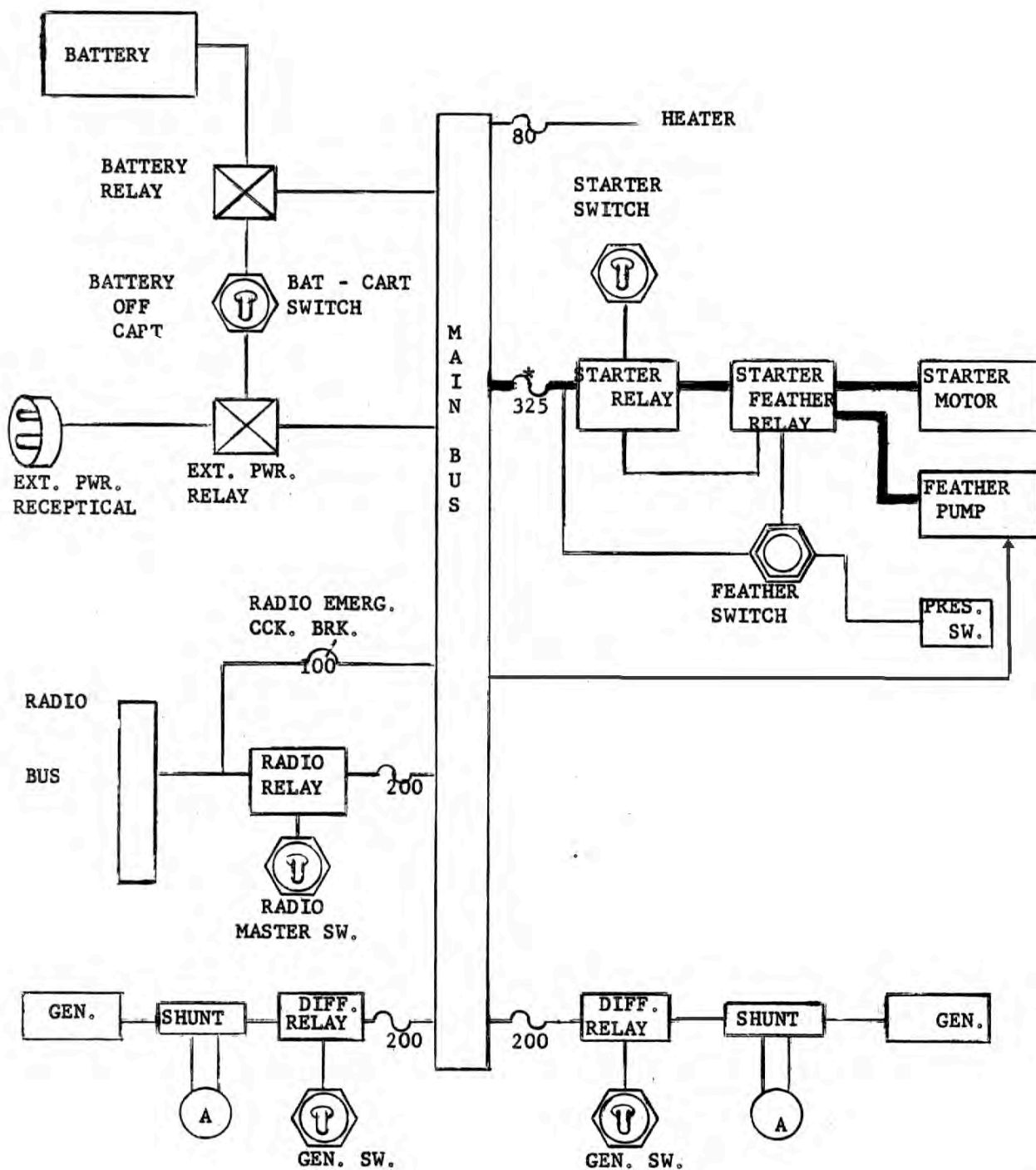
Normal Generator Voltage ....  $27.7 \pm 0.1$  Volts

Max. Parallel Gen. Differential ..... 20 Amps

Max. Cont. Gen. Amps ..... 75 Amps

Min. Voltage Before Start ..... 25 Volts

Min. Voltage During Start ..... 22 Volts



DC-3 Electrical System

— End of Chapter —