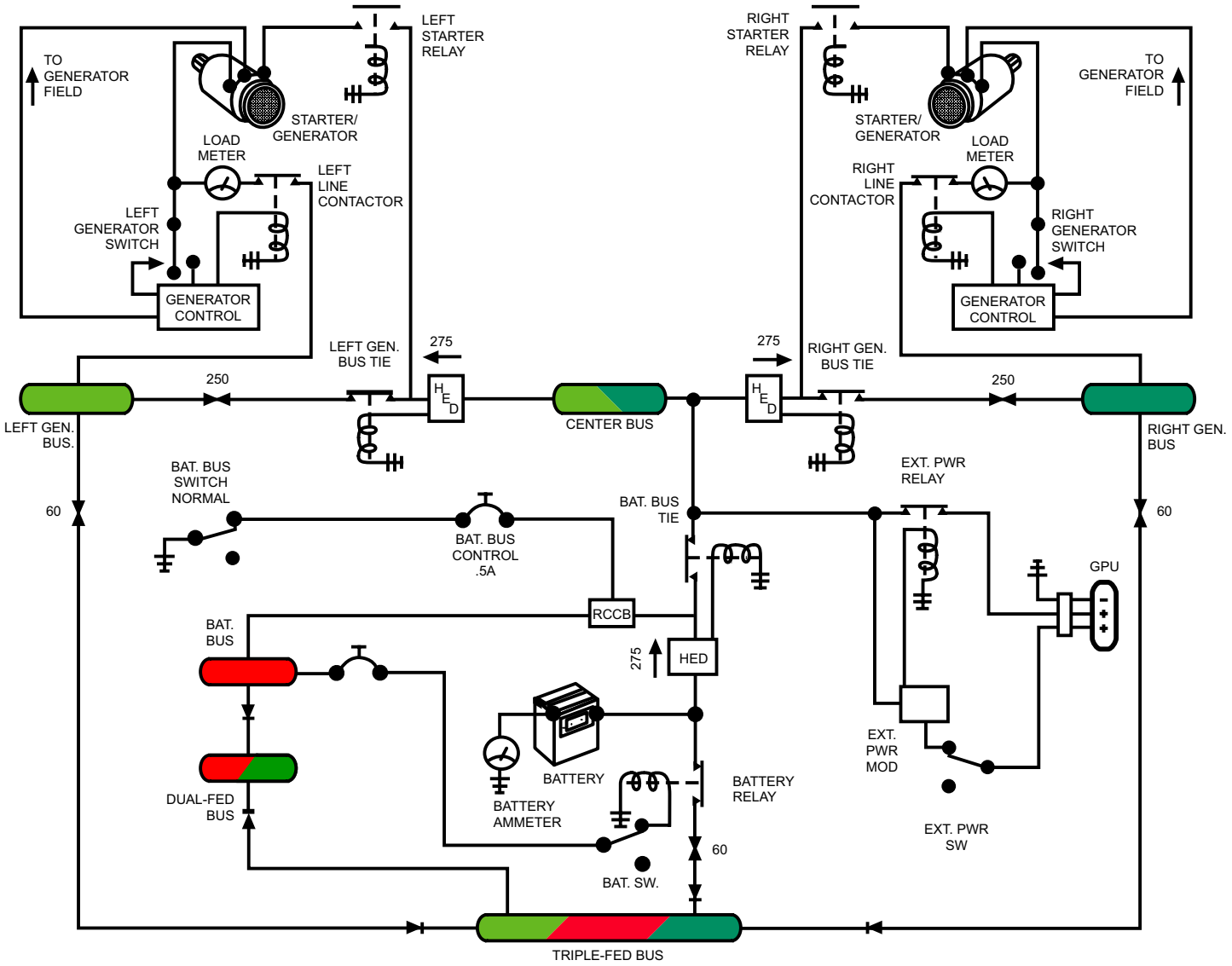
DC Electrical System



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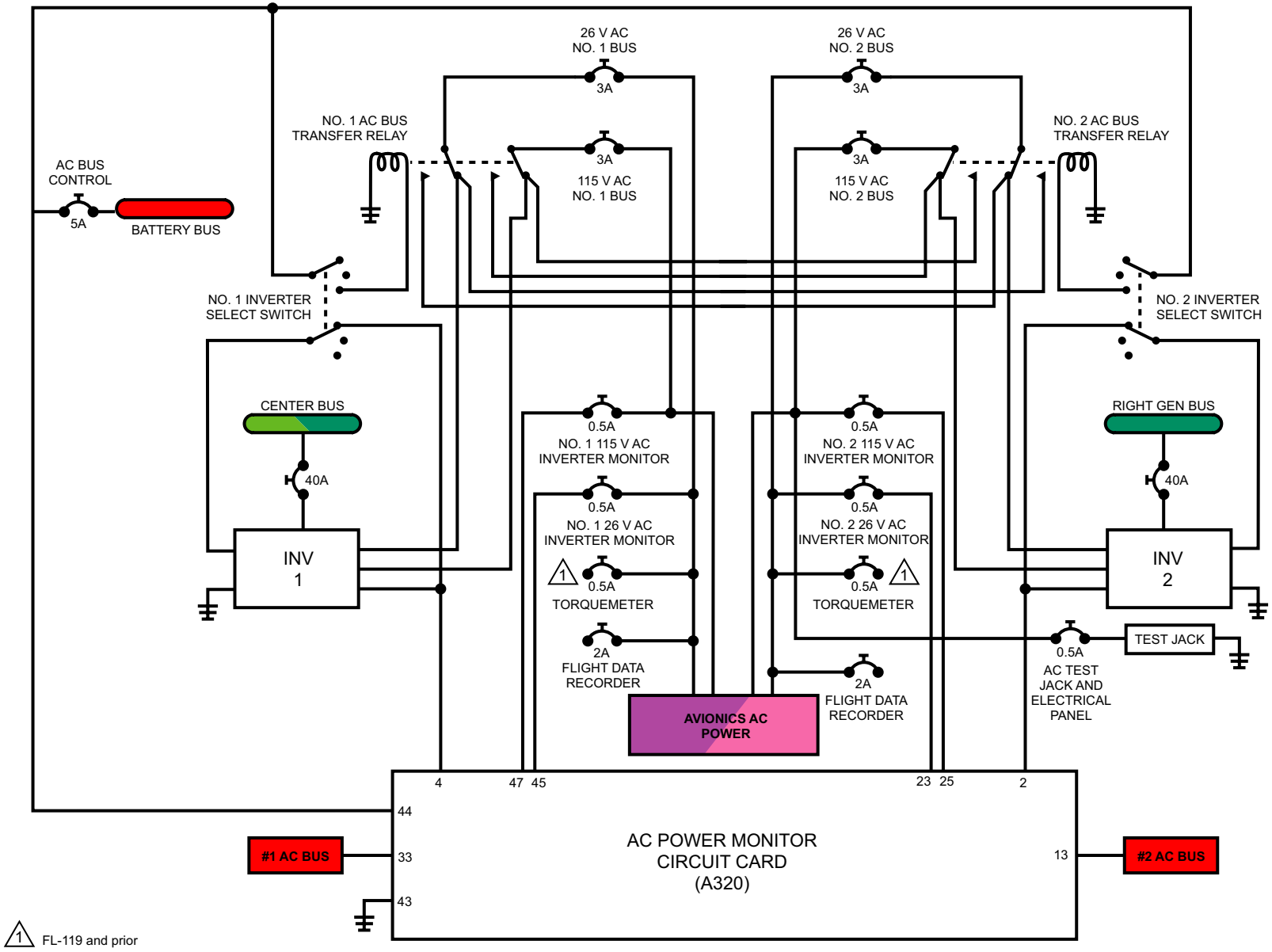
AC Electrical System



DC System

DC electrical sources include:

- two 300 amp, 28 volt starter/generators
- an external power DC system

On aircraft prior to FL-215 and FM-10

- a 24 volt, 36 ampere-hour air cooled nickel-cadmium (nicad) battery

On aircraft after FL-215, FM-10, and FN-2

- a 24 volt, 42 ampere-hour, sealed lead-acid battery

These power sources supply the triple-fed bus that distributes power to the aircraft through circuit breakers.

Battery

The battery is used to start the engines and as a redundant power source. Battery power is connected to the battery bus, the center bus and the triple-fed bus through a battery switch and relay. A hot battery bus allows selected equipment to be powered without selecting the battery switch. The main battery feeds the battery, the center and the triple-fed buses. Selected equipment is connected to the hot battery bus.

Battery current and voltage can be monitored with the battery ammeter and voltmeter. On aircraft with a nicad battery, a battery charge current detector continuously monitors the battery-charging rate. If the charging rate exceeds 7.5 amps for six seconds or more, the monitoring system illuminates the BATTERY CHARGE annunciator and triggers the flashing MASTER CAUTION annunciators. After a battery engine start, the BATTERY CHARGE annunciator normally illuminates after the operating engine generator is turned on.

Generators

The generators function as starters during engine starts. Once an engine is running, the generators provide DC power to the aircraft. L GEN and R GEN switches control the generators. The MASTER SWITCH gang bar turns off the battery and generator switches simultaneously.

Reverse-current protection prevents the generators from absorbing power from the generator buses if the generators are not operating, or if generator voltage is less than bus voltage.

Voltage Regulation

Each generator is equipped with a generator control panel. The generator control panels are self-contained units, which provide the following:

- line-contactor relay control
- overvoltage protection
- overexcitation protection
- cross-start current limiting
- reverse current protection
- starter/generator priority
- generator load paralleling.

The generator control panel monitors the output voltage and controls the shunt field excitation to maintain a constant voltage of 28.25V DC under varying operating conditions. The line-contactor relays connect each generator to its corresponding bus and, if any fault is detected, the relay will disconnect the generator from the bus. A paralleling circuit provides generator load equalization. If an overvoltage occurs, the line contactor will open and the GEN RESET will have to be selected.

External Power

An appropriately rated ground power unit (GPU) can supply the aircraft electrical system through an external power receptacle on the right wing. The GPU should be capable of both delivering 1,000 amps starting and providing a continuous load of 300A at 28 to 28.4V DC. Connecting a GPU illuminates the EXT PWR annunciator. The annunciator will remain in steady illumination while the voltage remains between 24 and 32 volts. Otherwise it will flash approximately 4 times per second.

DC Power Distribution

Five primary buses distribute power to all of the sub-buses from the three main power sources. The primary buses consist of a "hot" battery bus, center bus, triple-fed bus, and the left and right generator buses. This system is termed a triple-fed bus system, with each bus receiving power from the three DC power sources. This design minimizes the risk of a complete power loss should a power source become isolated.

The battery directly powers the hot battery bus. Selecting the BAT BUS switch to NORM will energize the battery bus. With the BAT BUS switch in EMER OFF, the battery is completely isolated from the electrical system.

Current sensors, limiters, diodes and relays also individually protect the five primary buses. The triple-fed bus is protected by a diode and a 60-ampere current limiter wired between it and each feeder bus. This configuration provides overcurrent protection and prevents current flow away from the triple-fed bus. Load-shedding is accomplished by isolating a faulty bus from those that are still functional, thereby preventing a failure of the entire electrical system.

AC Power

The AC electrical system is a 115V AC and 26V AC, single phase, 400 Hz system. It operates on 28V DC and provides AC power to certain avionics and electrical equipment. The AC system is designated as No. 1 and No. 2. The No. 1 inverter is powered from the center bus and the No. 2 inverter is powered from the right generator bus. Selecting the inverter switch to ON will supply power to the corresponding AC bus; selecting BUS TRANSFER will transfer the load to the other inverter, providing the inverter is selected ON.

Electrical Systems

DC Electrical System

Power Source	Battery Starter/Generators (2) 300A (STD) External power unit
Distribution	Hot Battery bus Battery relay Main Battery bus Generator buses (left and right) Dual-fed bus Center bus Triple-fed bus Triple-fed Avionics bus L and R GEN Avionics bus
Control	Switches BATT IGNITION AND ENGINE START (L/R) Three-position GEN Bus Tie
Monitor	Generator loadmeter DC volt and BATTERY ammeter Switches L and R GEN BAT VOLTMETER BUS SELECT BAT BUS GEN TIES MAN CLOSE EXT PWR BUS SENSE RESET Annunciators EXT POWER BATTERY CHARGE L and R GEN TIE OPEN L and R DC GEN BAT TIE OPEN
Protection	Generator Control Panel Bus Tie Current sensor Line Contactor relay Current limiters and diodes Fuses or circuit breakers

AC Electrical System

Power Source	Inverters
Distribution	Generator and center buses L and R GEN AC buses Avionics bus 26V AC bus 115V AC avionics
Control	INVERTER switches
Monitor	#1 and #2 AC BUS annunciator
Protection	AC Power Monitor Circuit Card DC Circuit Breaker Inverter output: fuses and circuit breakers