

Figure 2-4 shows a typical schematic for the circuits described in the following Starting, Start-Disconnect, and Stopping sequences. Relay contact references normally open (NO) and normally closed (NC) refer to position of contacts with the unit at rest (not energized).

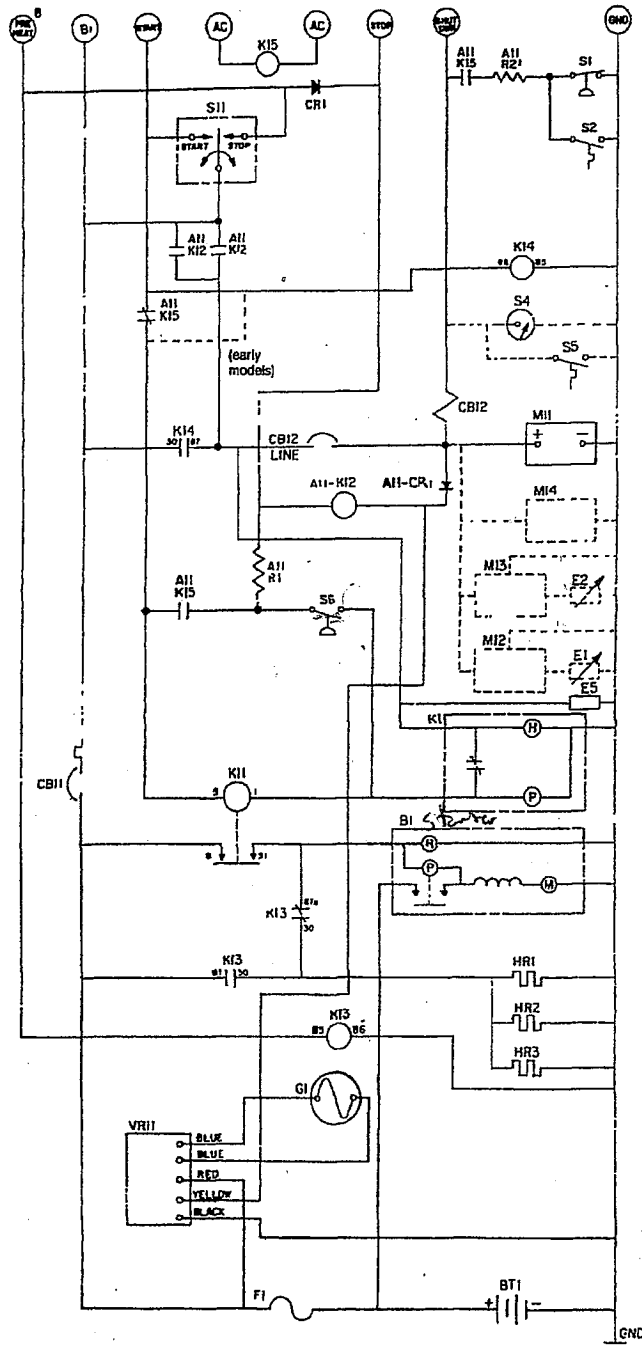


FIGURE 2-4. MDKC/MDKD CONTROL SCHEMATIC

Starting Sequence: The engine Preheat switch is held for 10 to 30 seconds (depending upon temperature). This energizes the Heater Solenoid K13 and closes a set of NO contacts to connect B+ to the glow plugs. After the preheat time, the start sequence is initiated by pressing the Start button S11.

Switch S11 connects B+ to the coil of K14 and (through the A11-K15 contacts and K16 [early production only] NC contacts) to the Start Solenoid K11. The coil of K11 is grounded through the pull coil of K1 after K1 is completely pulled in and the pull coil is disconnected from B+. K1 must pull in completely before the engine will crank.

The closing of the K11 contacts connects B+ to the glow plugs and to the starter solenoid B1. K14 connects B+ to the fuel solenoid K1, fuel pump E5, CB21 fault breaker and engine monitor circuits only during starting.

Start-Disconnect Sequence: As the engine starts, latch switch S6 closes and completes the ground circuit through resistor A11-R1 for the K12 power relay. The closing of K12 dual contacts completes the B+ running circuit to CB12 fault circuit breaker. This was accomplished by K14 during cranking.

The start-disconnect circuit provides starter protection. As the generator gains speed and output voltage, the K15 starter protection relay energizes at about 90 volts AC. The A11-K15 NC contacts open and de-energize the K11 start solenoid; the A11-K15 NO contacts close and provide another ground path for K12 through K11 coil similar to S6.

A backup start-disconnect circuit is initiated by the battery charging alternator G1. When DC output at CR11 reaches approximately 6 volts, K16 energizes and opens B+ to the K11 start solenoid. De-energizing K11 disconnects B+ from the starter solenoid to stop cranking and eliminate glow plug heating. The K16 relay and CR11 diode are not used in later production generator sets.

Stopping Sequence: Placing S11 in the Stop position puts B+ on the ground side of K12 power relay. This causes K12 to de-energize and disconnect B+ from CB12, fuel pump E5, and the K1 fuel solenoid. De-energizing K1 shuts off the fuel flow and stops the engine.

Emergency Shutdown: Fault breaker CB12 opens to stop the engine any time a fault sensor closes the circuit to ground. The fault sensors, shown in Figure 2-4, are:

- S1 low oil pressure
- S2 high coolant temperature
- S4 overspeed (option)
- S5 high exhaust temperature

CB21 should not be reset for starting until fault is located and corrected.

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