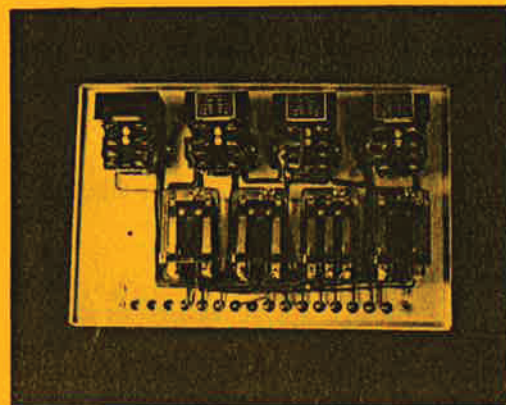
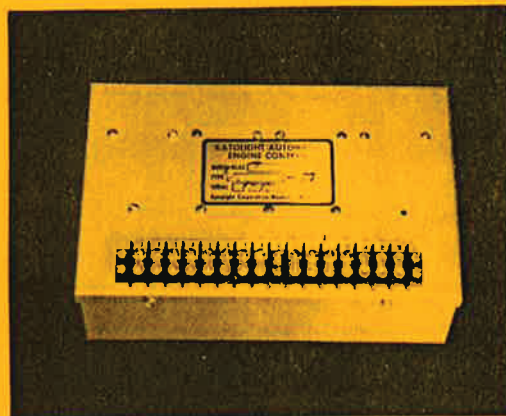




AUTOMATIC START CONTROLS

**MODEL
KLAS 50-D50**

Components are carefully selected to provide maximum reliability and service life. The critical engine-crank circuits are equipped with highly dependable solid state time delay relays for consistent timing of crank and rest intervals.

Mode of operation is selected by a three or four position switch as specified. In "MANUAL" position the control is energized immediately; in "AUTOMATIC", operation commences only when a remote set of contacts close, such as those of an automatic transfer switch; center position is "OFF". The four position rotary switch gives an additional "TEST" position in which the automatic control is out of the circuit and the engine may be started manually.

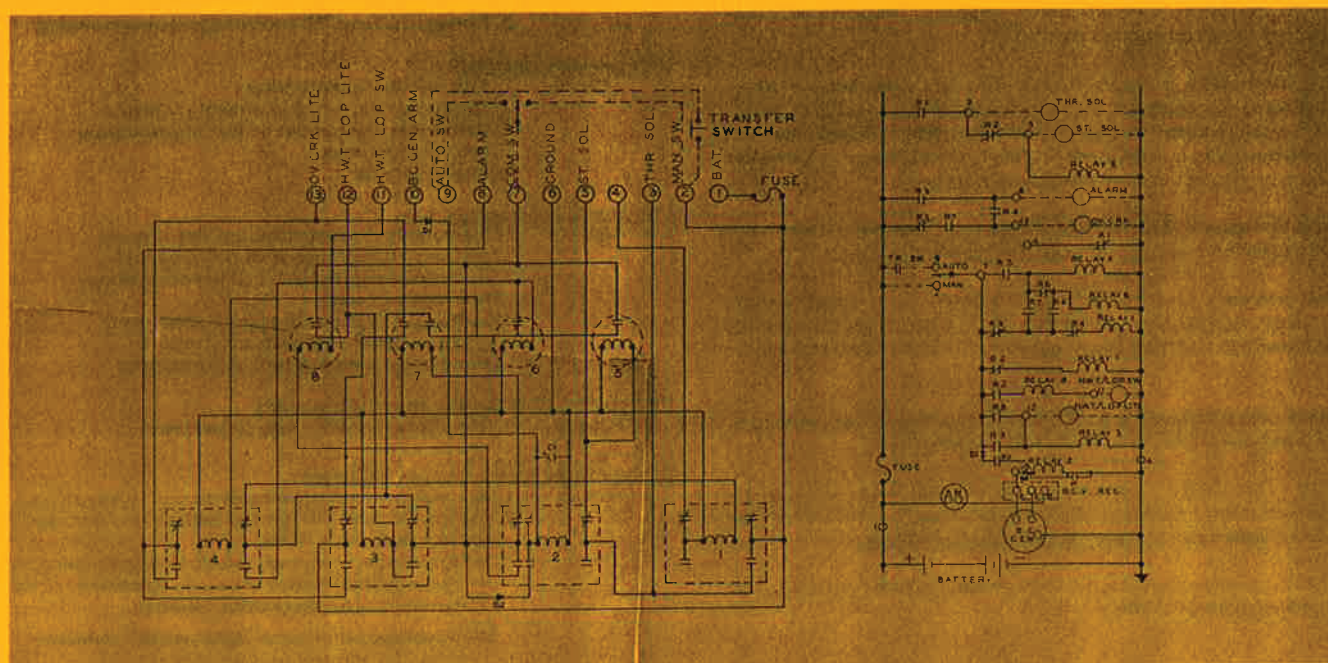
Current during cranking cycle flows thru closed contacts of relays 3 and 4 to coil of crank relay 1. It closes and completes starting circuit (terminal 3 & 5) and coil circuit of time relay 5. After an interval of about 7 seconds, No. 5 pulls in momentarily, its contacts energizing relay 4 which drops out relay 1 crank circuit. Relay 4 remains closed to supply current to time relay 6 for a 7 second "rest" period until 6 opens to break lockout of 4. Current then flows again as in initial cranking cycle.

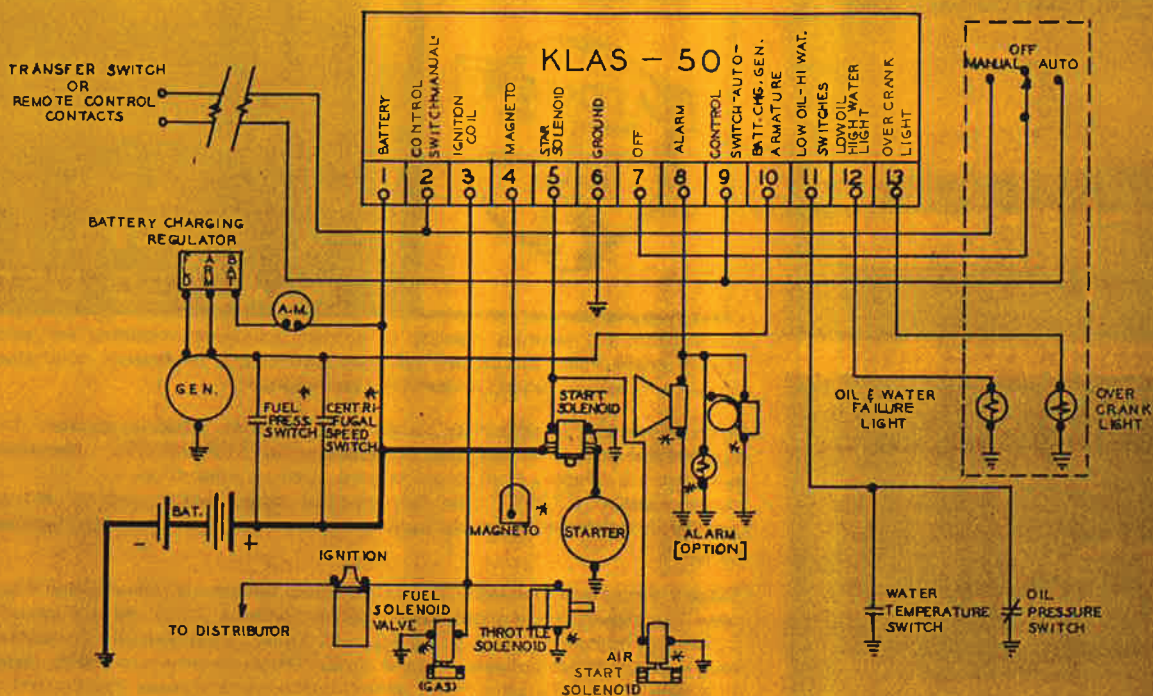
Unless engine starts, this sequence continues until relay 7 closes in about 90 seconds, locking in relay 4. Overcrank light and alarm is then indicated and cranking stops.

If the engine starts, voltage appears at relay 2 from battery charging generator or centrifugal switch, breaking starting solenoid current and continuity of relay 7, discontinuing cranking limiter. Relay 8 is energized in about 15 seconds to complete oil pressure/high temperature failure circuit.



THREE POSITION SWITCH • FOUR POSITION ROTARY SWITCH • FAILURE INDICATING LIGHTS





This instruction bulletin covers normal installation, operating and test procedures. The Klas 50 and Klas D50 controls provide basic engine control features. This control has 5 crank cycles of approximately 7 to 10 seconds cranking and 7 to 10 seconds rest for an approximate cranking time of 90 seconds. This is predetermined by the settings of rheostats on solid state relays 7, 8 and 9. These solid state relays give precise timing and are not effected by the fluctuations of ambient temperature and battery voltage. After the crank interval and the engine has attempted to start and has not started, the control will remain off and the alarm and overcrank light will be activated until reset. With normal engine start and operation safety shutdowns for high water temperature and low oil pressure are connected, providing switches on the engine for these functions. Oil pressure failure occurs instantly except immediately following cranking period. During this period, there is a 10 to 15 second delay provided.

The Klas 50 and Klas D50 are designed for automatic operation in conjunction with an automatic transfer switch or load start switch. (It may be used on either standard battery ignition, megneto or diesel systems, dependent on accessories specified.)

INSTALLATION: With the Klas 50 and Klas D50 controls, horizontal chassis mounting is preferred. If severe vibration is present, shock insulators may be required to prevent the relays from cycling when not energized. Mounting in an enclosure or panel free of dust and fumes will afford maximum contact life and reduce spark hazard.

Wire terminations should be made with solderless connectors. Use No. 14 flexible wire for short runs, heavier wire for remote locations.

CAUTION: Circuitry of this control is limited to 9 amps. Starter solenoids, audio alarms, etc., requiring more than 9 amps must be controlled by additional heavy duty relays or contactors operated by the control.

A 3 position switch, failure lights and decal are provided for control of the unit. Functions are "OFF, AUTOMATIC & MANUAL".

OPERATION: The "OFF" position should be used while servicing the engine, since cranking cannot occur. It is also used to shut down the engine for any reason and to reset the control after a failure.

In "MANUAL" position, the engine will start and operate normally with safety shutdown features in effect.

"AUTO" position places the control directly across a remote automatic transfer contactor or other device which then controls the engine. There are two failure lights. The overcrank light indicates control has completed its crank cycle and unit hasn't started. The low oil/high water failure light indicates unit shut down from low oil pressure or high water temperature failure. The failure light will remain on until unit is manually reset. An alarm horn (Same Voltage as control) may also be used in conjunction with failure lights

RESET CONTROL AFTER FAILURE BY TURNING
FUNCTION SWITCH TO "OFF".

Should unit fail to crank:

- Check:
1. Battery
 2. Fuse
 3. Dirt in engine control contacts
 4. Voltage at starter solenoid
 5. Starter and solenoid for malfunction
 6. Voltage on term. 10 (no voltage during cranking)

Unit will start, then fail:

- Check:
1. Fuel and fuel supply filters
 2. Ignition system - fuel or throttle solenoid
 3. Carburetor adjustment or fuel injector pump - fuel solenoid valve
 4. Engine control

Unit cranks but does not start:

- Check:
1. Fuel and fuel supply lines for dirt or leaks
 2. Ignition system, fuel or throttle solenoid
 3. Carburetor adjustment, fuel injection pump, fuel solenoid valve
 4. Voltage at ignition, throttle, fuel solenoid
 5. Engine control - contacts may be dirty. Use contact cleaning tool, not abrasives.

Unit cranks continuously: (over 100 seconds)

- Check
1. Time delay relay 7 - may be defective.

Unit starts but starter does not disengage:

- Check:
1. All leads in crank disconnect circuit for continuity.
 2. Voltage on term. 10 (battery voltage present after engine reaches 600 RPM)
 - a) No voltage after engine starts indicates defective speed switch, if used for crank disconnect or no battery charging generator buildup.
 - b) If voltage on terminal 10, check for defective relay 2 in control or open diode.