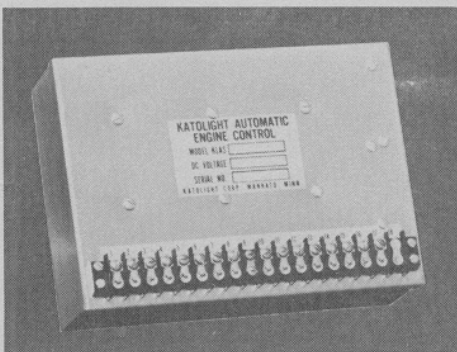
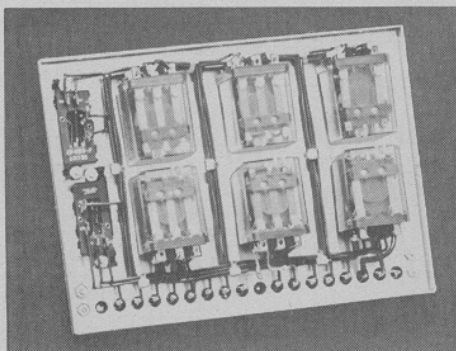




AUTOMATIC START CONTROLS

**MODEL
KLAS 33 - D33**



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

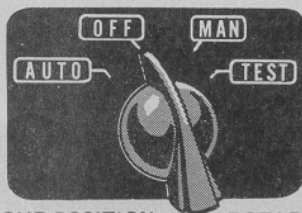
Mode of operation is selected by a three or four position switch as specified. In "MANUAL" position the control is energized immediately; in "AUTOMATIC", operation commences only when a remote set of contacts close, such as those of an automatic transfer switch; "OFF" position disables engine operation.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

Current during cranking cycle flows thru normally closed contacts of relays 5, 6, 3 & 4 to energize relay 1 which closes completing the current path to ignition coil (term. 3) & thru (N.C.) contact relay 2 to start solenoid (term. 5) & to the coil of cranking timing relay (7).

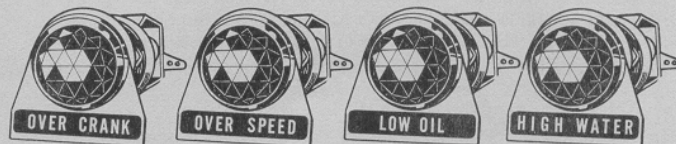
If engine fails to start within 45 seconds, relay 7 closes to energize relay 4 to activate the overcrank light & failure alarm. With relay 4 energized, relay 1 is deenergized to terminate cranking. Should engine start normally; relay 2 is energized from Terminal 10, which receives a positive voltage from the crank disconnect switch closing or battery charging generator. The oil pressure circuit has a built-in 15 second delay (relay 8) after engine starts.



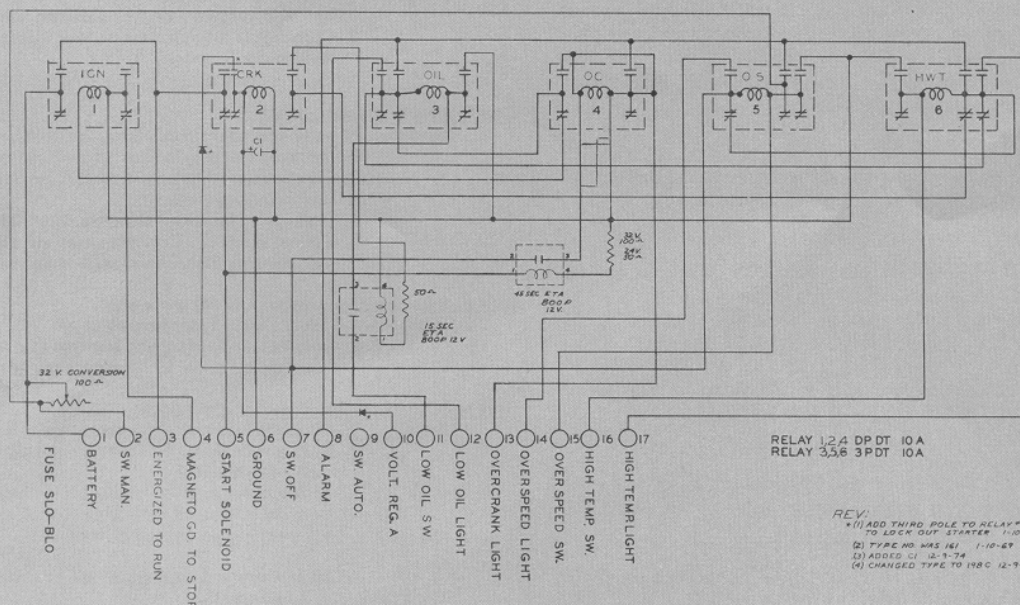
THREE POSITION SWITCH • FOUR POSITION



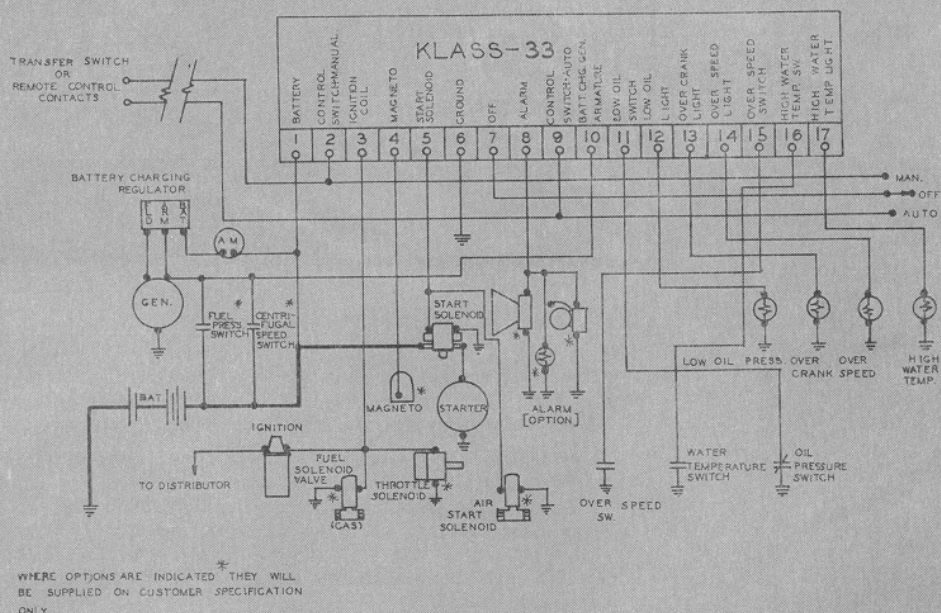
ROTARY SWITCH •



FAILURE INDICATING LIGHTS



KATOLIGHT CORPORATION
MANKATO, MINNESOTA 56001



This instruction bulletin covers normal installation, operating and test procedures. The Klas 33 & D33 controls provide basic engine control features. Cranking interval of approximately 45 seconds is predetermined and may vary somewhat due to 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 alarm will be activated until reset. With a normal engine start the unit will shutdown immediately when any of the safety switches close. The safety switches are mounted on the engine using the normally open contacts for high water temperature and overspeed alarms and the normally closed contacts for low oil pressure alarm. Oil pressure failure occurs immediately except following cranking period. During this period, there is a 10 to 15 second delay provided.

The Klas 33 or Klas D33 is designed for automatic operation in conjunction with an automatic transfer switch or load start switch. (It may be used on either standard battery ignition, magneto or diesel systems, dependent on accessories specified).

INSTALLATION: The Klas 33 or Klas D33 control 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 "AUTOMATIC, OFF & 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. The failure lights will indicate either an overcrank (unit failed to start during cranking cycle) or a shutdown from overspeed (when used with mechanical overspeed switch), high water temperature or oil pressure failure. It 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 60 seconds)

- Check:
1. Delay relay - may be defective
 2. Low battery voltage at control (Low voltage will cause delay relay to be very slow acting.)

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.

