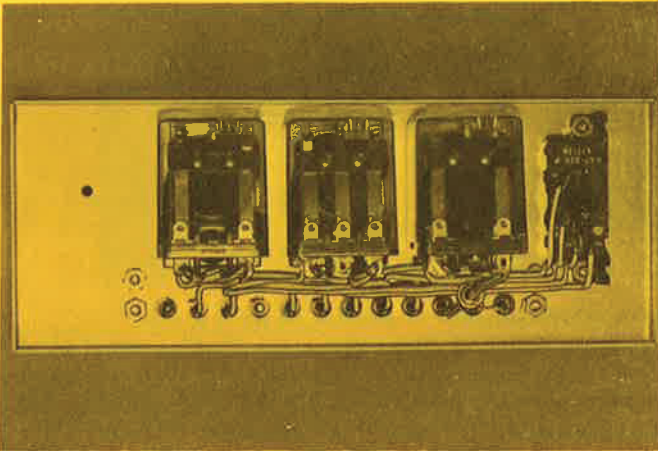
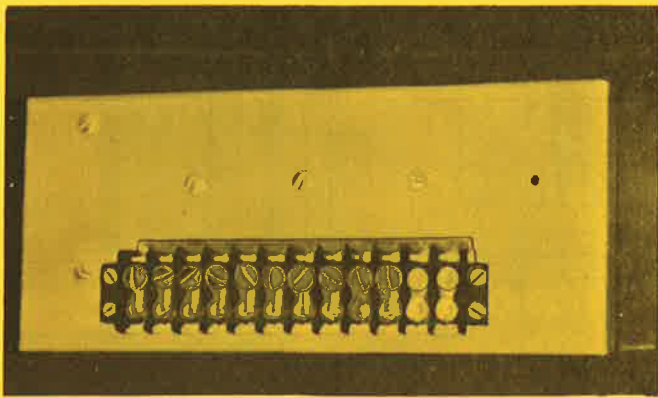




AUTOMATIC START CONTROLS

MODEL
KLAS 3-D3

Component selection is engineered to provide reliability and accuracy of operation consistent with the application. Time delay relay is of the thermal type to give consistent service. All models feature enclosed contacts for longer life and greater reliability.

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 engine may be started manually.

Current during cranking period flows thru relay 1, normally closed contact, to energize relay 3. Relay 3 breaks magneto ground, if used, energizes ignition coil or throttle solenoid of diesel units and allows current to start solenoid and time relay 4 thru relay 2.

When engine starts, relay 2 pulls in, being activated from 115 volts AC generator. This breaks cranking circuit.

Should unit fail to start, relay 4 closes in about 45 seconds, locks in relay 3 to sound alarm and stops cranking period.

Reset control by turning to "OFF" position.



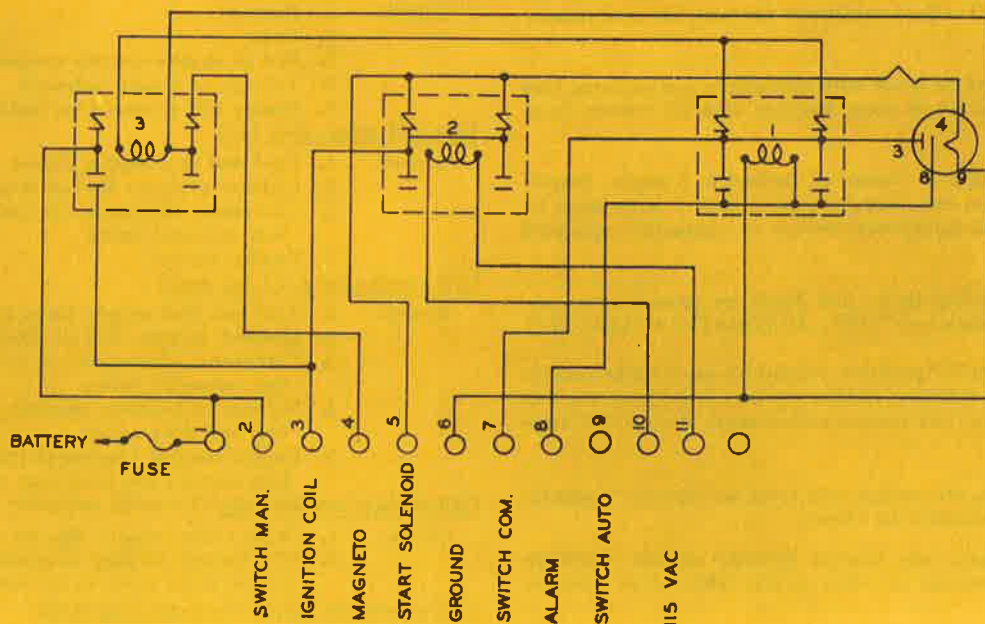
THREE POSITION SWITCH • FOUR POSITION



ROTARY SWITCH •

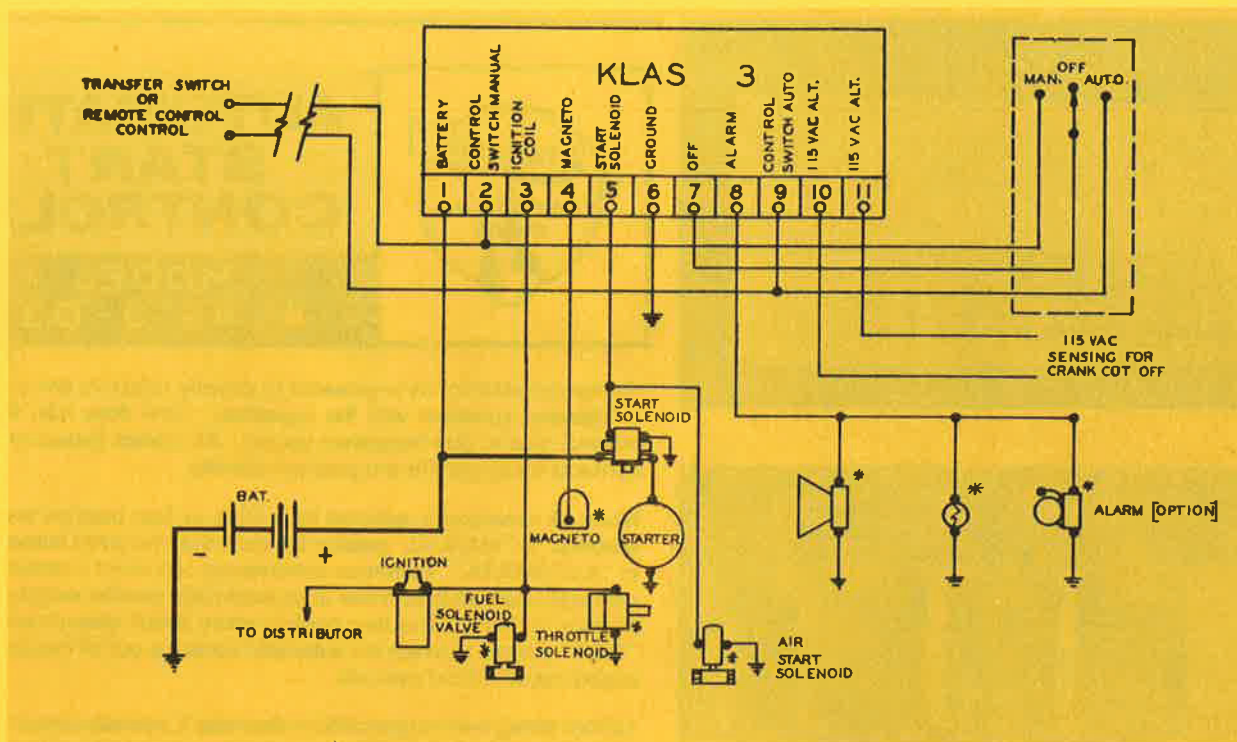


FAILURE INDICATING LIGHT



KATOLIGHT CORPORATION

3201 THIRD AVENUE - MANKATO, MINNESOTA 56001



KATOLIGHT AUTOMATIC ENGINE CONTROL OPERATING INSTRUCTIONS - MODEL KLAS 3 & D3

This instruction bulletin covers normal installation, operating and test procedures. The Klas 3 & Klas D3 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 normal engine start, the control senses generator voltage buildup and disconnects the cranking control and unit will continue running.

The Klas 3 or Klas D3 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 3 or Klas D3 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 5 amps. Starter solenoids, audio alarms, etc., requiring more than 5 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.

If the optional four-position switch is used, the three-positions "manual", "off" and "automatic" are the same as the standard

three-position switch functions with a test position added which will by-pass the engine control completely and allow the engine to run when started by means other than the engine control. Shut down by turning the four-position switch to the "off" position.

The failure light will indicate an overcrank (engine failed to start in the 45 second crank cycle.) It will remain on until unit is manually reset. An alarm horn (same voltage as control) may also be used in conjunction with failure light.

(Cranking time is approximately 45 seconds with normal ambient temperature and fully charged battery. A 5 watt resistor or potentiometer may be installed per diagram to increase or decrease cranking time. A 15 ohm resistor is supplied with the control. Less resistance will shorten the cycle. Should engine fail to start, the alarm light, if used, will go on and no further cranking will occur until manually reset. If engine starts normally, check starter solenoid to see that it disengages at about 1/4 engine speed.

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

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 or fuel solenoid valve
 5. Engine control - contacts may be dirty. Use contact cleaning tool, not abrasives.

Unit cranks continuously: (over 60 seconds)

- Check:
1. Delay relay (tube) - 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. Generator for voltage buildup. If voltage builds up normally, fault may be in relay 2. It must energize as generator voltage builds up.