GENERATOR MOUNTED CONTROL PANEL
(TYPE 2 — CHANGE LEVEL 0 THRU 1)

INTRODUCTION

The uses of the generator mounted control panel are:

To help control the electric power made by the generator set

To monitor (check) the operation of the generator set.

To help protect the generator set from damage caused by low oil pressure, high coolant temperature, overspeed and overcrank.

To help with the transfer of electrical load to and from the generator set.

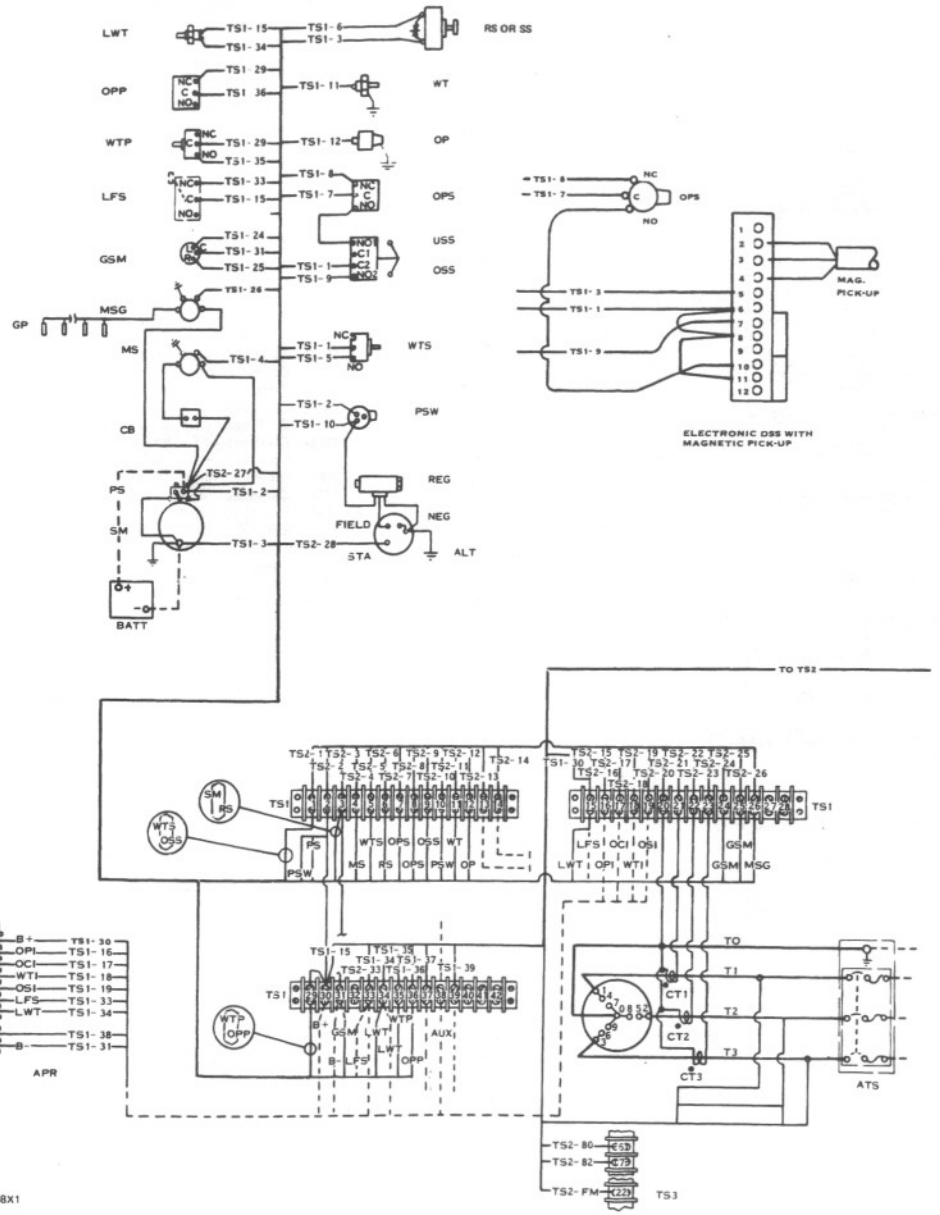
To help parallel two or more units onto the same bus.

IDENTIFICATION

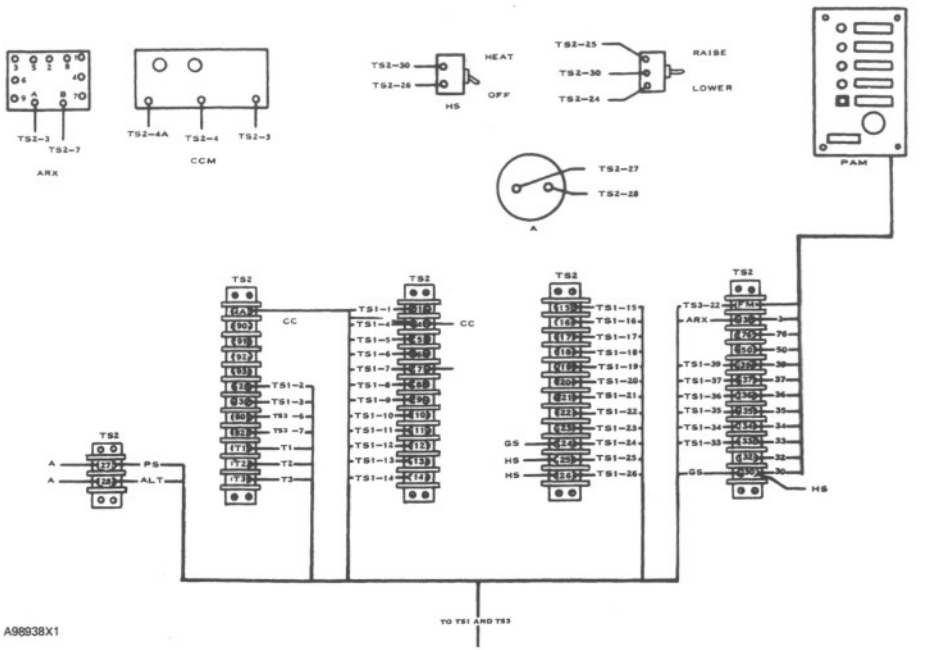
The location of the control panel is on the top of the regulator housing. This panel has a place for a heat switch and prealarm module. The control panel has a 12 place model number on the panel nameplate. The model number gives an indication of the control panel component part numbers. Make reference to the Parts Book, GENERATOR MOUNTED CONTROL PANEL, Form No. SEBP1068. The last digit of the model number is the change level to which the panel was built.

WIRING

The earlier type control panels are equipped with either a mechanical or an electrical type speed switch. See wiring diagrams that follow and photo illustration for identification.



*Some rack solenoids (RS) and shutoff solenoids (SS) do not have a zener diode across the terminals.



WIRING DIAGRAM

A	AMMETER
ALT	ALTERNATOR
APR	ANNUNCIATOR PANEL—REMOTE
ARX	AUXILIARY RELAY MODULE
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY CONTACT
B+	BATTERY POSITIVE
B−	BATTERY NEGATIVE
BATT	BATTERY
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CT	CURRENT TRANSFORMER
GS	GOVERNOR SWITCH
GSM	GOVERNOR SYNCHRONIZING MOTOR
HS	HEAT SWITCH
I	INITIATING CONTACT (FOR CUSTOMER USE)
LFS	LOW FUEL LEVEL SWITCH
LWT	LOW WATER TEMPERATURE SWITCH
MS	MAGNETIC SWITCH
MSG	MAGNETIC SWITCH (GLOW PLUGS)
OCI	OVERCRANK INDICATOR
OP	OIL PRESSURE GAUGE SENDING UNIT
OPI	LOW OIL PRESSURE INDICATOR
OPP	OIL PRESSURE SWITCH (PRE-ALARM)
OPS	OIL PRESSURE SWITCH (SHUTDOWN)
OSI	OVERSPEED INDICATOR
OSS	OVERSPEED SWITCH (SHUTDOWN
PAM	PRE-ALARM MODULE
PS	PINION SOLENOID
PSW	PRESSURE SWITCH
RS	SHUTOFF SOLENOID
SM	STARTING MOTOR
TS	TERMINAL STRIP
USS	UNDERSPEED SWITCH
WT	WATER TEMPERATURE GAUGE SENDING UNIT
WTI	HIGH WATER TEMPERATURE INIDCATOR
WTP	WATER TEMPERATURE SWITCH (PRE-ALARM)
WTS	WATER TEMPERATURE SWITCH (SHUTDOWN)

Wire and Cable shown as dash lines (—) are to be put on by the customer.

TS2 Terminal numbers are shown on control panel schematics.

The wiring diagram shows the connections for all available attachments. The unit will have wiring only for the attachments which are installed.

TS3-6. Before connecting TS2-80 to TS3-6, remove yellow wire from TS3-7. Put insulation on the end of the yellow wire so it can not make electrical contact with TS3-7.

Jumper wires from B+ to TS1-2 to TS1-30 to TS1-29 to TS1-15 are for use with annunciator panel (remote) or pre-alarm module only.

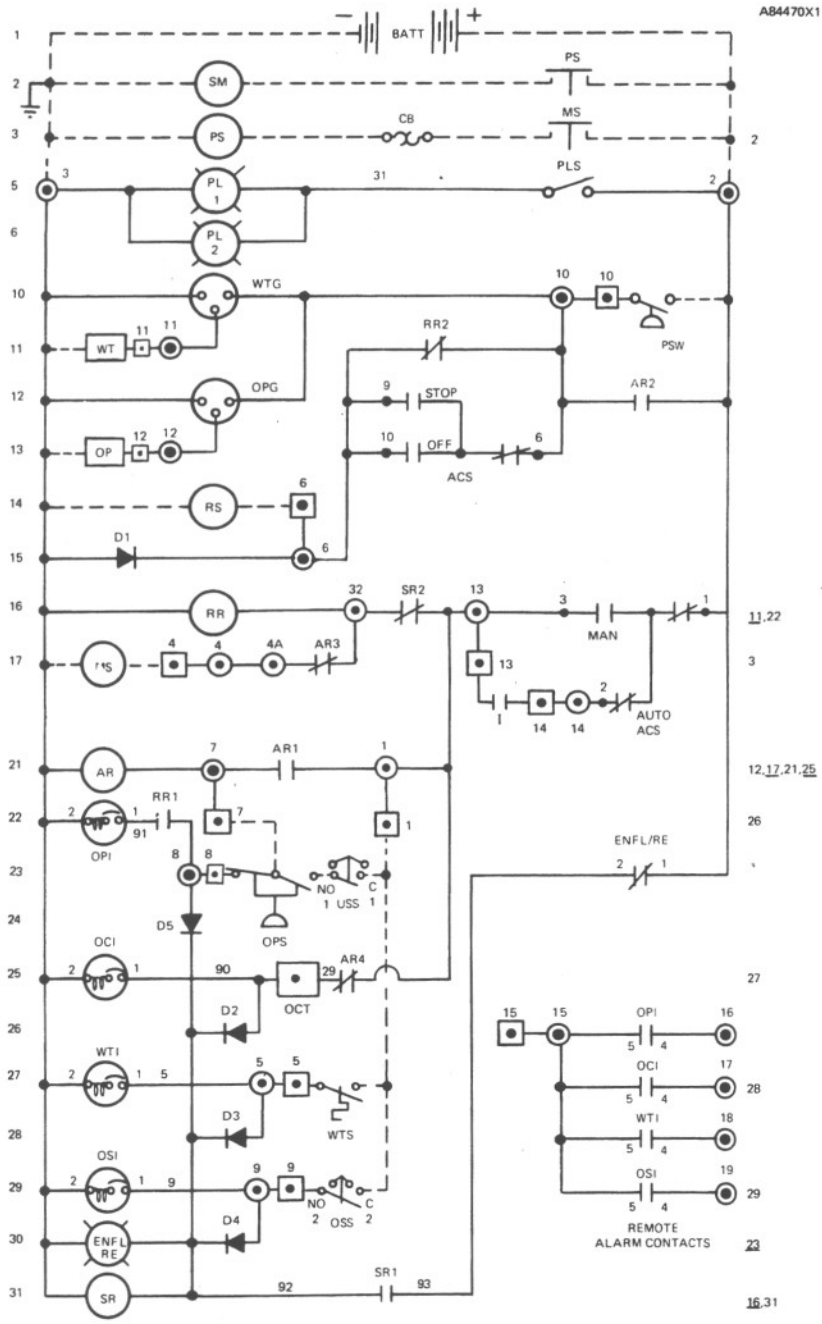
TS1-38 is the terminal for connection of the indicator light on the annunciator panel (remote) which shows that the generator is working.

When cycle cranking module (CCM) is installed remove the jumper wire from TS2-4A to TS2-4.

Do not operate alternator (ALT) without a battery (BATT) connected in the circuit. Do not polarize the alternator. Do not try to charge a common battery (BATT) with the alternator (ALT) and a DC generator at the same time.

TS1-37 is the terminal for the connection of the low oil pressure indicator (OPP) in the pre-alarm module.

TS1-39 is the terminal for the connection of remote shutdown and pre-alarm indicators when the pre-alarm module is used.



CONTROL PANEL WITH MECHANICAL SPEED SWITCH
AUTOMATIC POSITION

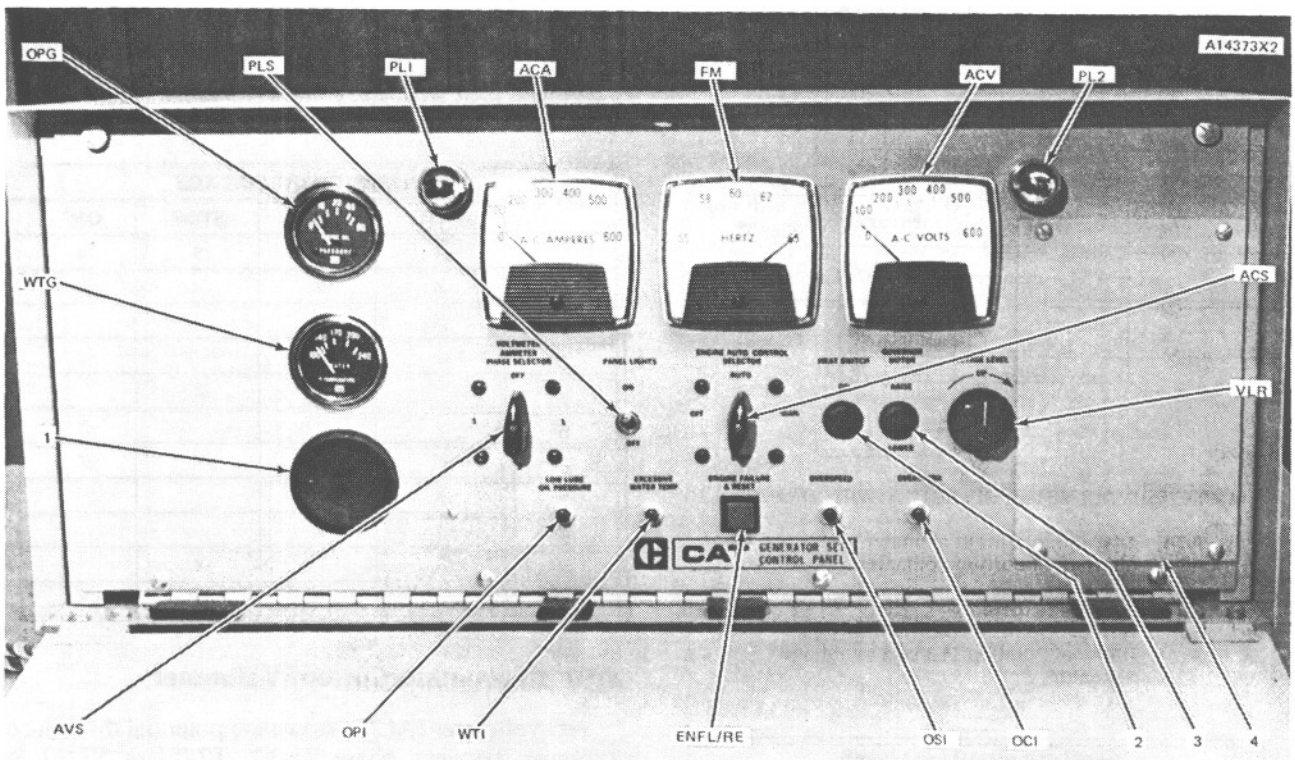
A	DC Ammeter
ACS	Engine Control Switch
ALT	Charging Alternator
AR	Arming Relay
ARX	Auxiliary Relay Module
BATT	Battery
CB	Circuit Breaker
CCM	Cycle Cranking Module
CCT	Cycle Crank Relay
CRC	Cycle Crank Logic Timer
D	Diode
DSS	Dual Speed Switch (Includes USS and OSS)
ENFL	Engine Fault Light With Fault Reset Function
GP	Glow Plugs
GS	Governor Switch
GSM	Governor Synchronizing Motor
HS	Glow Plug Heat Switch
I	Remote Start Initiating Contact
MS	Magnetic Switch (Crank Circuit)
MSG	Magnetic Switch (Glow Plug Circuit)
OCI	Overcrank Indicator
OCT	Overcrank Timer
OP	Oil Pressure Gauge Sender
OPG	Oil Pressure Gauge
OPI	Low Oil Pressure Indicator
OPS	Oil Pressure Switch
OSI	Overspeed Indication
OSS	Overspeed Switch
PIL	Panel Illumination Lamp
PLS	Panel Lamp Switch
PS	Pinion Solenoid
PSW	Pressure Switch
RE	Fault Reset Switch, Part of ENFL
RR	Run Relay
RS	Rack Solenoid
SM	Starting Motor
SR	Shutdown Relay
USS	Underspeed Switch
WT	Water Temperature Gauge Sender
WTG	Water Temperature Gauge
WTI	High Water Temperature Indicator
WTS	Water Temperature Switch

⊙ Terminal Strip Point (Control Panel)

⊡ Terminal Strip Point (Generator Terminal Box)

COMPONENTS

NOTE: For specifications on components located on the engine, make reference to the ENGINE SERVICE MANUAL.



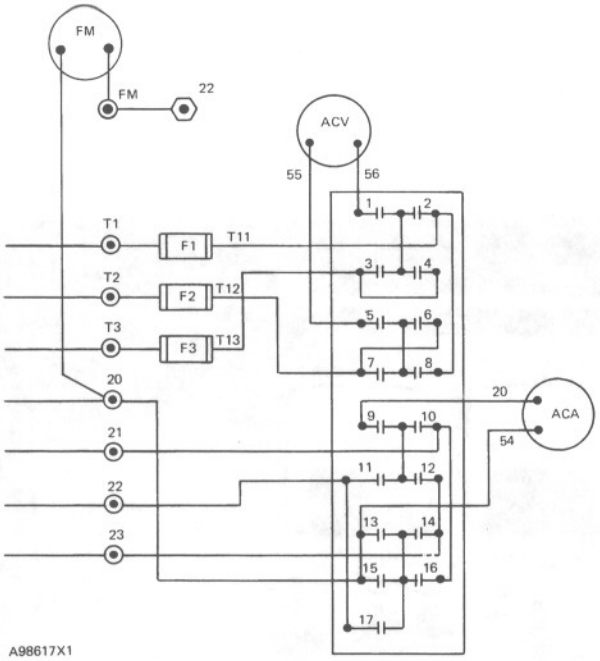
CONTROL PANEL (TYPE 2 — CHANGE LEVEL 0 THRU 1)

ACA	Alternating current ammeter
ACS	Engine control switch
ACV	Alternating current voltmeter
AVS	Ammeter/voltmeter selector switch
ENFL/RE	Engine failure light/reset switch
FM	Frequency meter
PL1,2	Panel lamps
PLS	Panel lamp switch
OCI	Overcrank indicator
OPG	Oil pressure gauge
OPI	Oil pressure indicator
OSI	Overspeed indicator
WTG	Water temperature gauge
WTI	Water temperature indicator
VLR	Voltage level rheostat

1. Button (direct current ammeter DCA, if so equipped)
2. Button (heat switch HS, if so equipped)
3. Button (governor switch GS, if so equipped)
4. Panel (prealarm module PAM, if so equipped)

ACA Alternating Current Ammeter

AC ammeter (ACA) gives an indication, in amperes, of the current from each phase of the generator to the load. Ammeter/voltmeter selector switch (AVS) is used to connect the ammeter to the current transformer on phase T1, T2 or T3; see Contact Chart. Ammeters normally have an input range from 0 to 5 amperes. Current transformer (CT1, CT2 or CT3) causes a reduction of the actual line current, in its respective phase lead, to a level within the input range of the ammeter. The ammeter is calibrated (has marks) to give an indication of the actual current flow in one phase load of the generator.



AMMETER/VOLTMETER SELECTOR SWITCH (AVS)

ACA Alternating current ammeter
ACV Alternating current voltmeter
F1,2,3 Fuses
FM Frequency meter
◉ Terminal point on TS2 in control panel
◉' Terminal Point on TS3 part of voltage regulator

CONTACT CHART FOR AVS				
	OFF	1	2	3
1		X	X	X
2		X		
3			X	
4				X
5		X	X	X
6		X		
7			X	
8				X
9		X X	X X	X X
10		X X	X	
11			X X	X
12				X X
13	X X	X		
14	X X	X X	X X	X
15		X X	X X	X X
16	X X	X	X X	X X
17	X X	X X	X	X X

NOTE: X gives an indication of a closed contact, X on the line gives an indication of "make before break"

ACS Engine Control Switch

Engine control switch (ACS) controls the engine start and stop systems. To start the engine move the switch to the manual position. To stop the engine, move the switch to the STOP or OFF position. For standby application (engine starts when remote initiating contact I closes) move the switch to the AUTO position. For more information on the operation of this switch, make reference to the AUTOMATIC START/STOP SYSTEM.

CONTACT CHART FOR ACS				
	AUTO	MAN	STOP	OFF
	1	2	3	4
1	X	X	X	X
2	X			
3		X		
4			X	
5				X
6	X	X	X	X
7	X			
8		X		
9			X	
10				X

ACV Alternating Current Voltmeter

AC voltmeter (ACV) shows the potential difference (voltage) between phase T1-T2, T2-T3 or T3-T1 at position 1, 2 or 3 respectively. Make reference to the ALTERNATING CURRENT AMMETER.

DCA Direct Current Ammeter

Direct current ammeter (DCA) goes in place of plug (1). This ammeter shows the amount of DC current in amperes, that flows in the alternator circuit (if so equipped).

ENFL/RE Engine Failure Light/Reset Switch

Engine failure light/reset switch (ENFL/RE) will activate when the engine has a failure. One or more of the shutdown indicators will also activate to give an indication of the problem. Shutdown relay (SR) will activate to start the shutdown sequence. Make reference to SHUTDOWN CAUSED BY ENGINE FAILURE and ENGINE DOES NOT START.

NOTICE

Turn engine control switch (ACS) to the STOP or OFF position immediately after engine shutdown caused by high water temperature, low oil pressure or overspeed. This will cause an open in the circuit to the arming relay (AR). Normally open contact of arming relay (AR2) will open and current fow to rack solenoid (RS) will stop. This will help prevent damage to the rack solenoid from too much current.

FM Frequency Meter

Frequency meter (FM) shows the hertz (cycles per second) of the electricity made when the generator set is in operation. There is a direct relation between the frequency of the electricity and the rpm of the generator set; see formula.

$$\text{frequency (hertz)} = \frac{\text{number of poles x rpm}}{120}$$

GS Governor Switch

Governor switch (GS) is in place of button (3) when the engine is equipped with a remote control synchronizing motor for the governor. Engine speed is controlled with this switch.

HS Heat Switch

Heat switch (HS) is in place of button (2) when the engine is equipped with glow plugs. This switch is used to operate the glow plugs for cold weather starting.

OPG Oil Pressure Gauge

Oil pressure gauge (OPG) shows the pressure, in psi, of engine lubrication oil. When pressure switch (PSW) or normally open contact of the arming relay (AR2) is closed, oil pressure gauge (OPG) is connected across battery voltage. There is a relation between the current flow in this circuit and the engine oil pressure read on oil pressure gauge (OPG). Oil pressure sender (OP) controls the current flow by a change in resistance according to the change in engine oil pressure.

PAM Prealarm Module

Make reference to ATTACHMENTS.

PL1,2 Panel Lamps

Light for the control panel is given by panel lamps (PL1 and PL2). These lamps are controlled by panel light switch (PLS).

VLR Voltage Level Rheostat

Voltage level rheostat (VLR) takes the place of voltage level rheostat (R2) on the generator regulator assembly. It is used to adjust the voltage output of the generator.

NOTE: Make reference to OPERATION OF GENERATOR; REGULATOR ADJUSTMENT. On generators equipped with a generator mounted control panel, the yellow wire from voltage level rheostat (R2) to terminal (7) on the regulator terminal strip is disconnected at terminal (7).

WTG Water Temperature Gauge

Water temperature gauge (WTG) shows the temperature, in degrees fahrenheit, of engine coolant. When pressure switch (PSW) or normally open contact of the arming relay (AR2) is closed, water temperature gauge (WTG) is connected across battery voltage. There is a relation between the current flow in this circuit and the coolant temperature read on water temperature gauge (WTG). Water temperature sender (WT) controls the current flow by a change in resistance according to the change in coolant temperature.

AUTOMATIC START/STOP SYSTEM

Introduction

The automatic start/stop system is normally used for standby operation. That is, without an operator. The generator set must start, pick up the load, operate the load, and stop after the load is removed. An automatic transfer switch controls the transfer of load to and from the generator set. When normal (commercial) power has a failure, initiating contactor (I), part of the automatic transfer switch, closes. This will begin the automatic start sequence. When the engine starts, the control panel instruments will show voltage and frequency. The automatic transfer switch will transfer the load to the generator set when voltage and frequency reach approximately rated value. When normal power returns, the automatic transfer switch will transfer the load back to normal power. Initiating contactor (I) will open. This will begin the automatic stop sequence. The generator set will also stop automatically if the engine has a failure.

NOTE: There are two types of automatic start/stop systems used with the earlier type generator mounted control panel. One uses a mechanically driven speed switch (USS and OSS) and an oil pressure switch (OPS) that is the shape of a cylinder. The other uses an electrical speed switch (DSS) and an oil pressure switch that is the shape of a box.

Automatic Start

With engine control switch (ACS) in the AUTO position, contacts 1, 2 and 6 are closed. When commercial (normal) power has a failure, initiating contactor (I) closes. This makes a complete circuit from battery (BATT) to energize run relay (RR), magnetic switch (MS), dual speed switch (DSS) (if so equipped) and overcrank timer (OCT).

When run relay (RR) is energized, contacts (RR2) open and contacts (RR1) close. (RR2) open prevents current flow to rack solenoid (RS) through pressure switch (PSW). (RR1) closed makes it possible to energize oil pressure indicator (OPI).

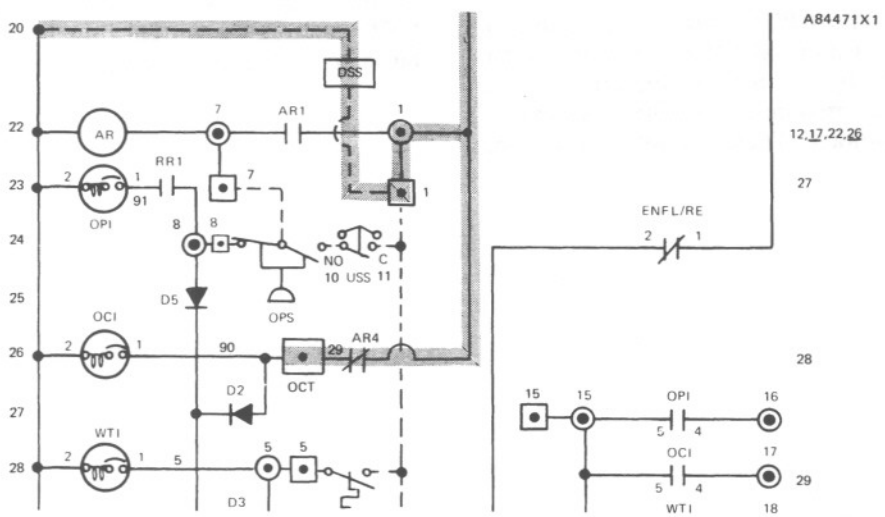
When magnetic switch (MS) is energized, (MS) contacts close and pinion solenoid (PS) is energized. This causes (PS) contacts to close, starting motor (SM) will crank the engine. (FPS) or (PSW) will close. This energizes water temperature gauge (WTG) and oil pressure gauge (OPG).

When overcrank timer (OCT) is energized, a timer will start. After the engine cranks for approximately 30 seconds, the timer will top. (OCT) contacts will close. Make reference to ENGINE DOES NOT START.

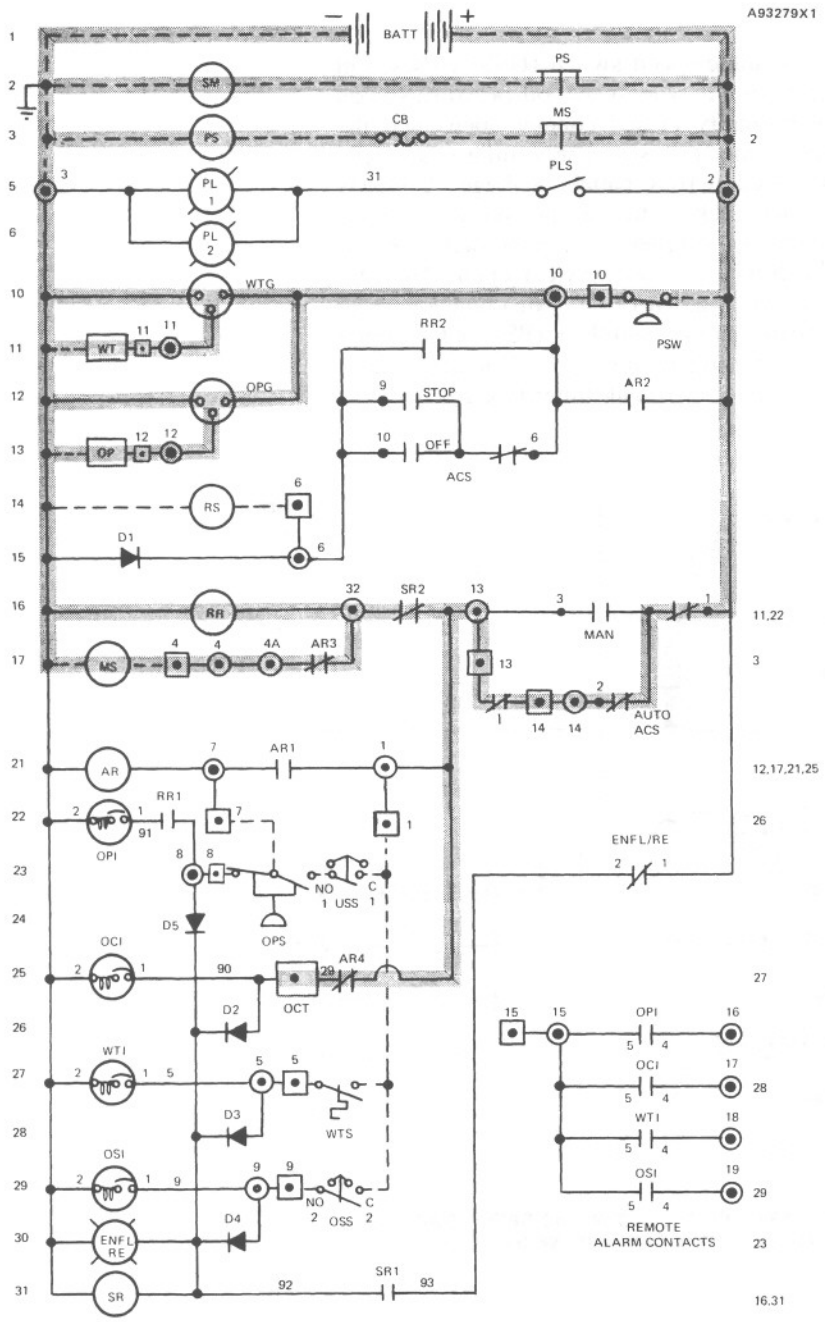
When dual speed switch (DSS) (if so equipped) is energized, the magnetic pickup relays the engine rpm to the switch. The dual speed switch has an underspeed (USS) circuit and an overspeed (OSS) circuit.

Manual Start

The current flow for manual start is similar to automatic start except engine control switch (ACS) is turned to the MAN position. Contact (2) is open and contact (3) is closed. It is not necessary for initiating contactor (I) to close. Run relay (RR), magnetic switch (MS) and overcrank timer (OCT) will energize as soon as contact (3) is closed.



CONTROL PANEL WITH ELECTRONIC SPEED SWITCH AUTOMATIC POSITION—ENGINE CRANKS



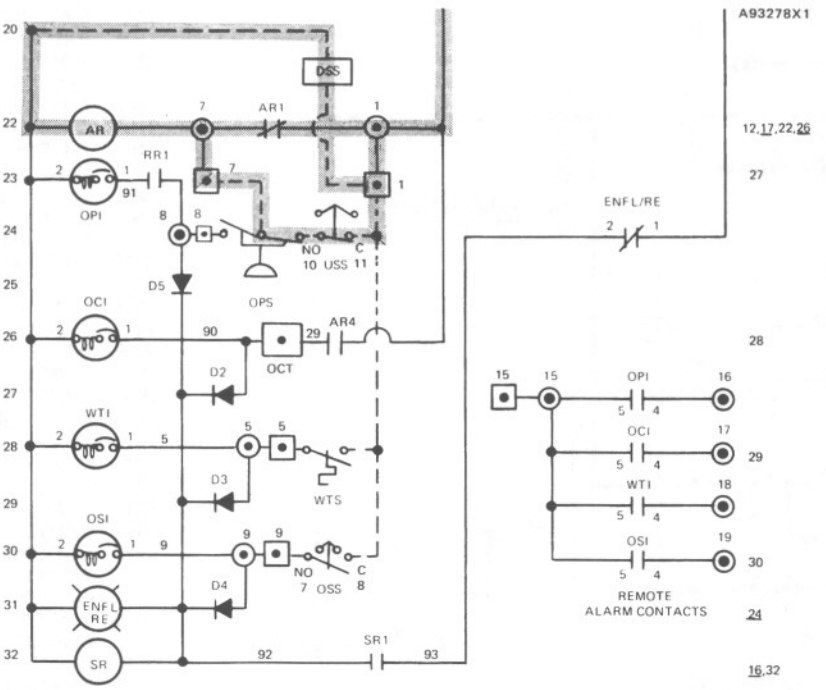
CONTROL PANEL WITH MECHANICAL SPEED SWITCH
AUTOMATIC POSITION—ENGINE CRANKS

ADC AMMETER
ACS ENGINE CONTROL SWITCH
ALT CHARGING ALTERNATOR
AR ARMING RELAY
ARX AUXILIARY RELAY MODULE
BATT BATTERY
CB CIRCUIT BREAKER
CCM CYCLE CRANKING MODULE
CCT CYCLE CRANK RELAY
CRC CYCLE CRANK LOGIC TIMER
D DIODE
DSS DUAL SPEED SWITCH (INCLUDES USS AND OSS)
ENFL ENGINE FAULT LIGHT WITH FAULT RESET FUNCTION
GP GLOW PLUGS
GS GOVERNOR SWITCH
GSM GOVERNOR SYNCHRONIZING MOTOR
HS GLOW PLUG HEAT SWITCH
I REMOTE START INITIATING CONTACT
MS MAGNETIC SWITCH (CRANK CIRCUIT)
MSG MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCI OVERCRANK INDICATOR
OCT OVERCRANK TIMER
OP OIL PRESSURE GAUGE SENDER
OPG OIL PRESSURE GAUGE
OPI LOW OIL PRESSURE INDICATOR
OPS OIL PRESSURE SWITCH
OSI OVERSPEED INDICATION
OSS OVERSPEED SWITCH
PIL PANEL ILLUMINATION LAMP
PLS PANEL LAMP SWITCH
PS PINION SOLENOID
PSW PRESSURE SWITCH
RE FAULT RESET SWITCH, PART OF ENFL
RR RUN RELAY
RS RACK SOLENOID
SM STARTING MOTOR
SR SHUTDOWN RELAY
USS UNDERSPEED SWITCH
WT WATER TEMPERATURE GAUGE SENDER
WTG WATER TEMPERATURE GAUGE
WTI HIGH WATER TEMPERATURE INDICATOR
WTS WATER TEMPERATURE SWITCH

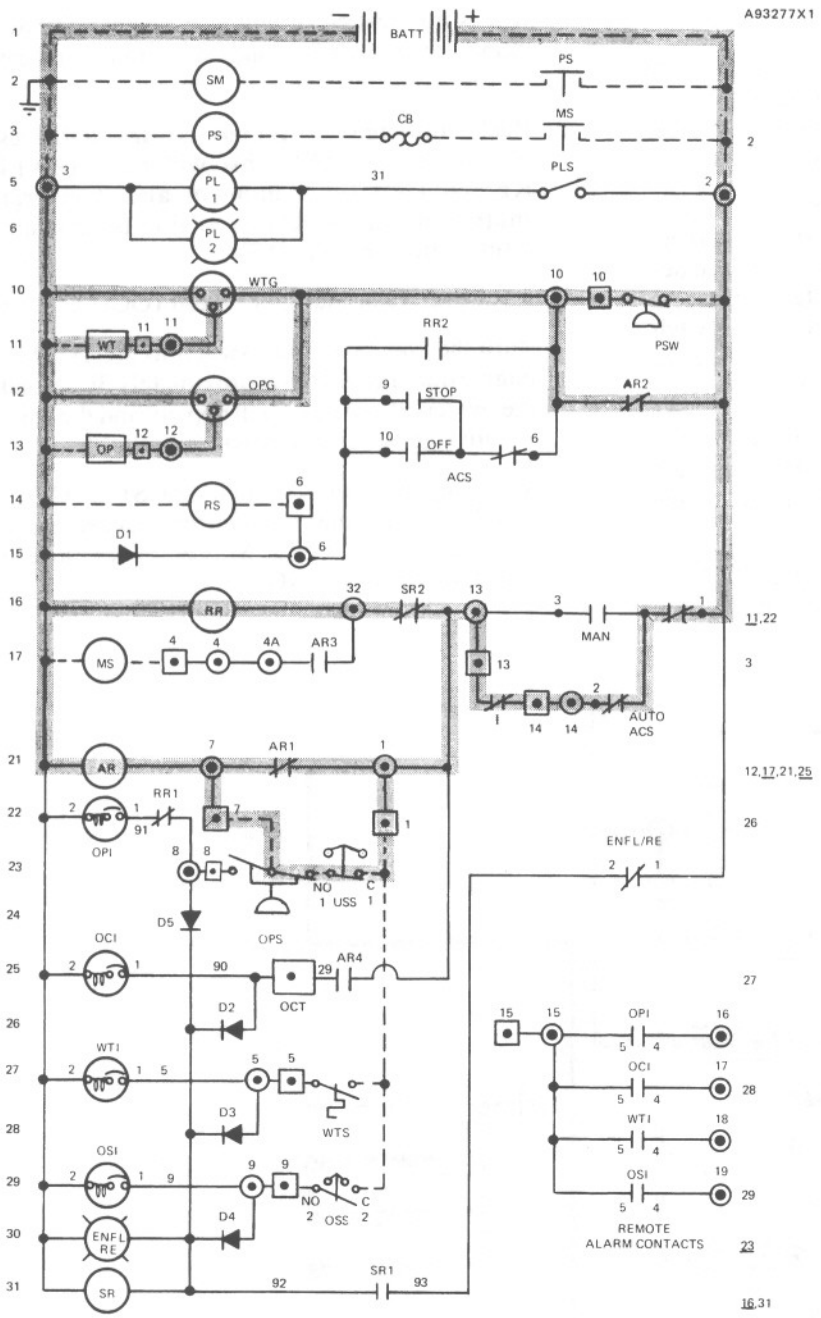
⊙ TERMINAL STRIP POINT (CONTROL PANEL)
⊡ TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

Engine Starts

At 600 rpm, underspeed switch (USS) closes. Oil pressure increases. This activates oil pressure switch (OPS). The normally closed contact opens and the normally open contact closes. The arming relay (AR) is now connected across battery voltage. Contacts (AR1) close and lock in the arming relay. Contacts (AR2) close to help complete a circuit to rack solenoid (RS) for shutdown. Contacts (AR3) open. This de-energizes magnetic switch (MS). (MS) contacts open to de-energize pinion solenoid (PS). (PS) contacts open to de-energize starting motor (SM). Contacts (AR4) open to de-energize overcrank timer (OCT).



CONTROL PANEL WITH ELECTRONIC SPEED SWITCH AUTOMATIC POSITION-ENGINE STARTS



CONTROL PANEL WITH MECHANICAL SPEED SWITCH
AUTOMATIC POSITION–ENGINE STARTS

ADC	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES USS AND OSS)
ENFL	ENGINE FAULT LIGHT WITH FAULT RESET FUNCTION
GP	GLOW PLUGS
GS	GOVERNOR SWITCH
GSM	GOVERNOR SYNCHRONIZING MOTOR
HS	GLOW PLUG HEAT SWITCH
I	REMOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCI	OVERCRANK INDICATOR
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPI	LOW OIL PRESSURE INDICATOR
OPS	OIL PRESSURE SWITCH
OSI	OVERSPEED INDICATION
OSS	OVERSPEED SWITCH
PIL	PANEL ILLUMINATION LAMP
PLS	PANEL LAMP SWITCH
PS	PINION SOLENOID
PSW	PRESSURE SWITCH
RE	FAULT RESET SWITCH, PART OF ENFL
RR	RUN RELAY
RS	RACK SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
USS	UNDERSPEED SWITCH
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTI	HIGH WATER TEMPERATURE INDICATOR
WTS	WATER TEMPERATURE SWITCH

⊙ TERMINAL STRIP POINT (CONTROL PANEL)

⊡ TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

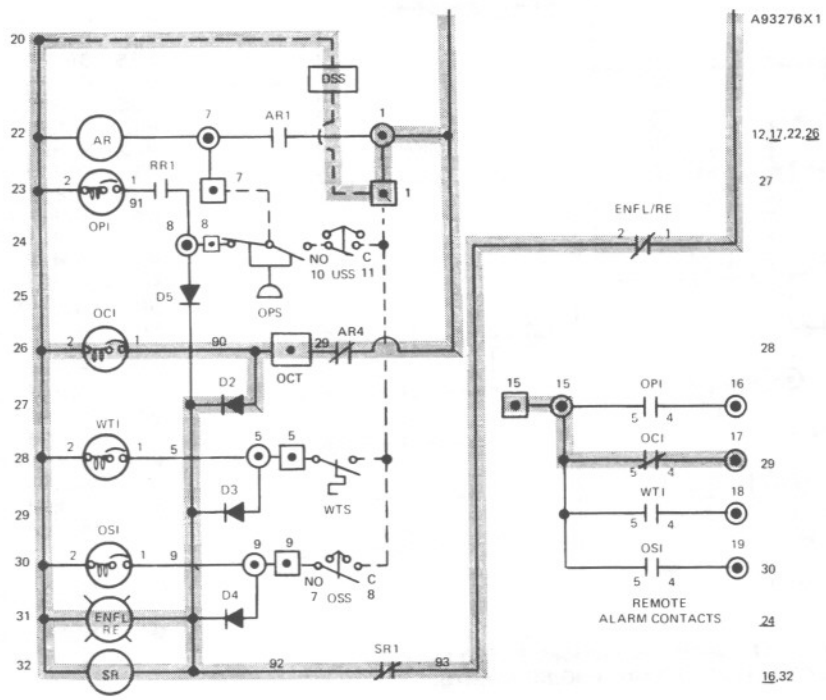
Engine Does Not Start

If the engine does not start in approximately 30 seconds, overcrank timer (OCT) will let current flow to overcrank indicator (OCI), engine failure light/reset switch (ENFL/RE) and shutdown relay (SR).

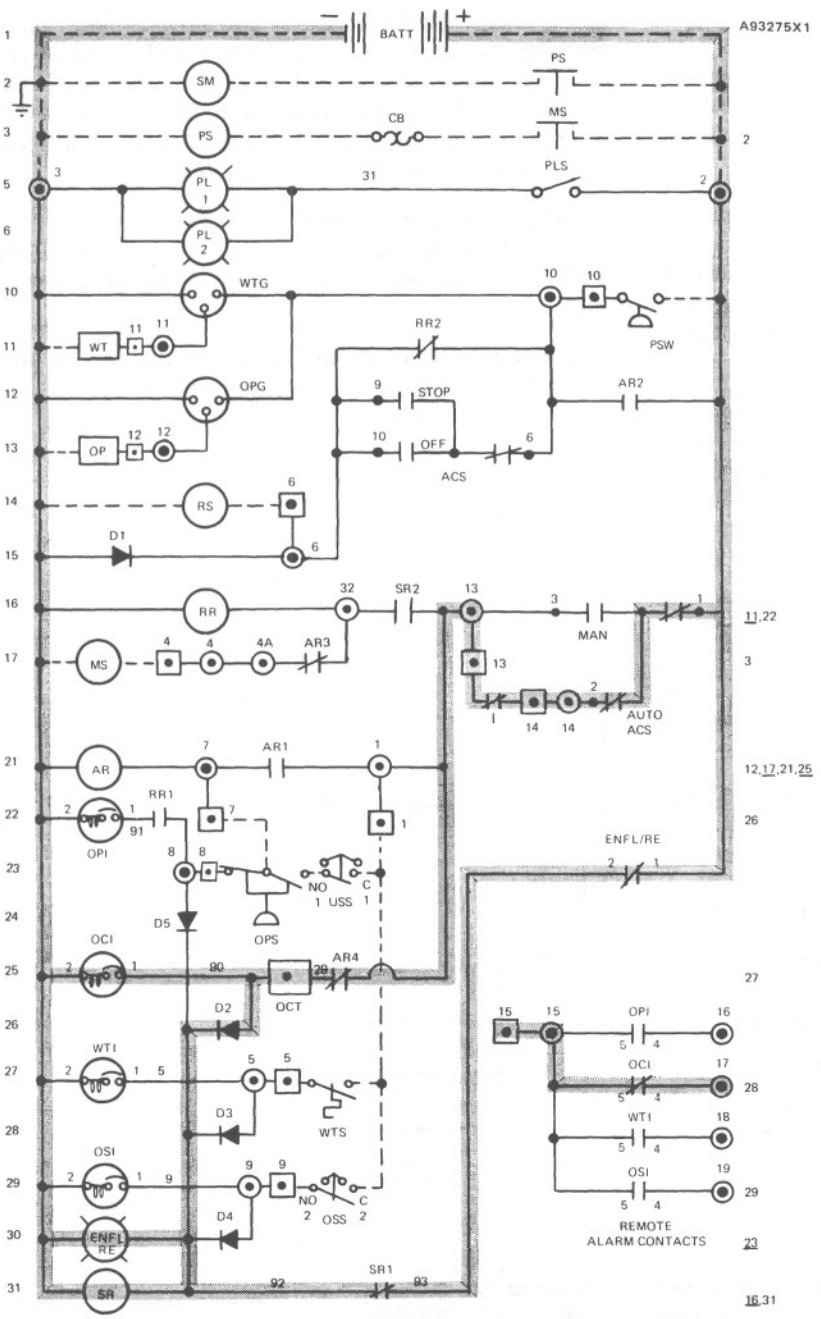
(SR1) contacts close to lock in the shutdown relay. (SR2) contacts open. This de-energizes run relay (RR) and magnetic switch (MS). (MS) contacts open and de-energize pinion solenoid (PS). (PS) contacts open and de-energize starting motor (SM). Pressure switch (PSW) will open. This de-energizes water temperature gauge (WTG) and oil pressure gauge (OPG).

Overcrank indicator (OCI) will pop out (move out suddenly) and engine failure light/reset switch (ENFL/RE) will give light. To start the engine, do the steps that follow:

1. Turn engine control switch (ACS) to OFF or STOP. This will prevent the engine from starting if it is not desired. It will also de-energize overcrank timer (OCT) and overcrank indicator (OCI).
2. Push and release engine failure light/reset switch (ENFL/RE). This will open (ENFL/RE) contacts for a moment and de-energize shutdown relay (SR) and engine failure light/reset switch (ENFL/RE).
3. Push overcrank indicator button (OCI) back in.
4. Turn the engine controls switch to AUTO. If the engine does not start in approximately 30 seconds, the overcrank indicator will pop out and the engine failure light/reset switch will give light.
5. Turn engine control switch (ACS) to OFF or STOP. Correct the problem that caused the engine not to start. Make reference to TROUBLESHOOTING.



CONTROL PANEL WITH ELECTRONIC SPEED SWITCH AUTOMATIC POSITION—ENGINE DOES NOT START



CONTROL PANEL WITH MECHANICAL SPEED SWITCH
AUTOMATIC POSITION-ENGINE DOES NOT START

ADC	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES USS AND OSS)
ENFL	ENGINE FAULT LIGHT WITH FAULT RESET FUNCTION
GP	GLOW PLUGS
GS	GOVERNOR SWITCH
GSM	GOVERNOR SYNCHRONIZING MOTOR
HS	GLOW PLUG HEAT SWITCH
I	REMOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCI	OVERCRANK INDICATOR
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPI	LOW OIL PRESSURE INDICATOR
OPS	OIL PRESSURE SWITCH
OSI	OVERSPEED INDICATION
OSS	OVERSPEED SWITCH
PIL	PANEL ILLUMINATION LAMP
PLS	PANEL LAMP SWITCH
PS	PINION SOLENOID
PSW	PRESSURE SWITCH
RE	FAULT RESET SWITCH, PART OF ENFL
RR	RUN RELAY
RS	RACK SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
USS	UNDERSPEED SWITCH
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTI	HIGH WATER TEMPERATURE INDICATOR
WTS	WATER TEMPERATURE SWITCH

⊙ TERMINAL STRIP POINT (CONTROL PANEL)

⊡ TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

Return of Commercial (Normal) Power

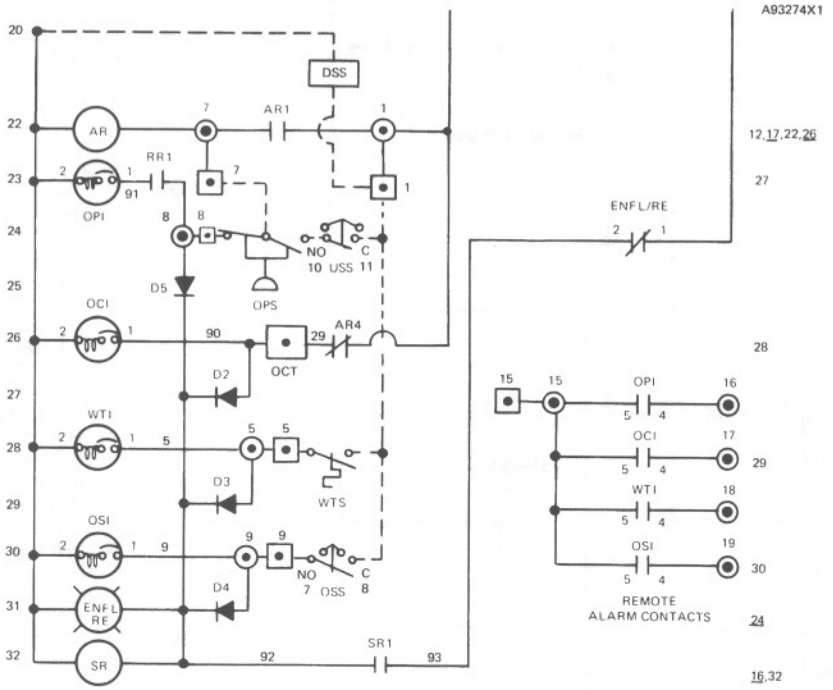
When commercial power returns, the automatic transfer switch transfers the load to commercial power. Initiating contacts (I) open. This de-energizes run relay (RR) and arming relay (AR).

When run relay (RR) is de-energized, contacts (RR2) close and contacts (RR1) open. (RR2) closed energizes rack solenoid (RS). The rack solenoid moves the rack to the FUEL OFF position. (RR1) open prevents an indication of low oil pressure with normal shutdown.

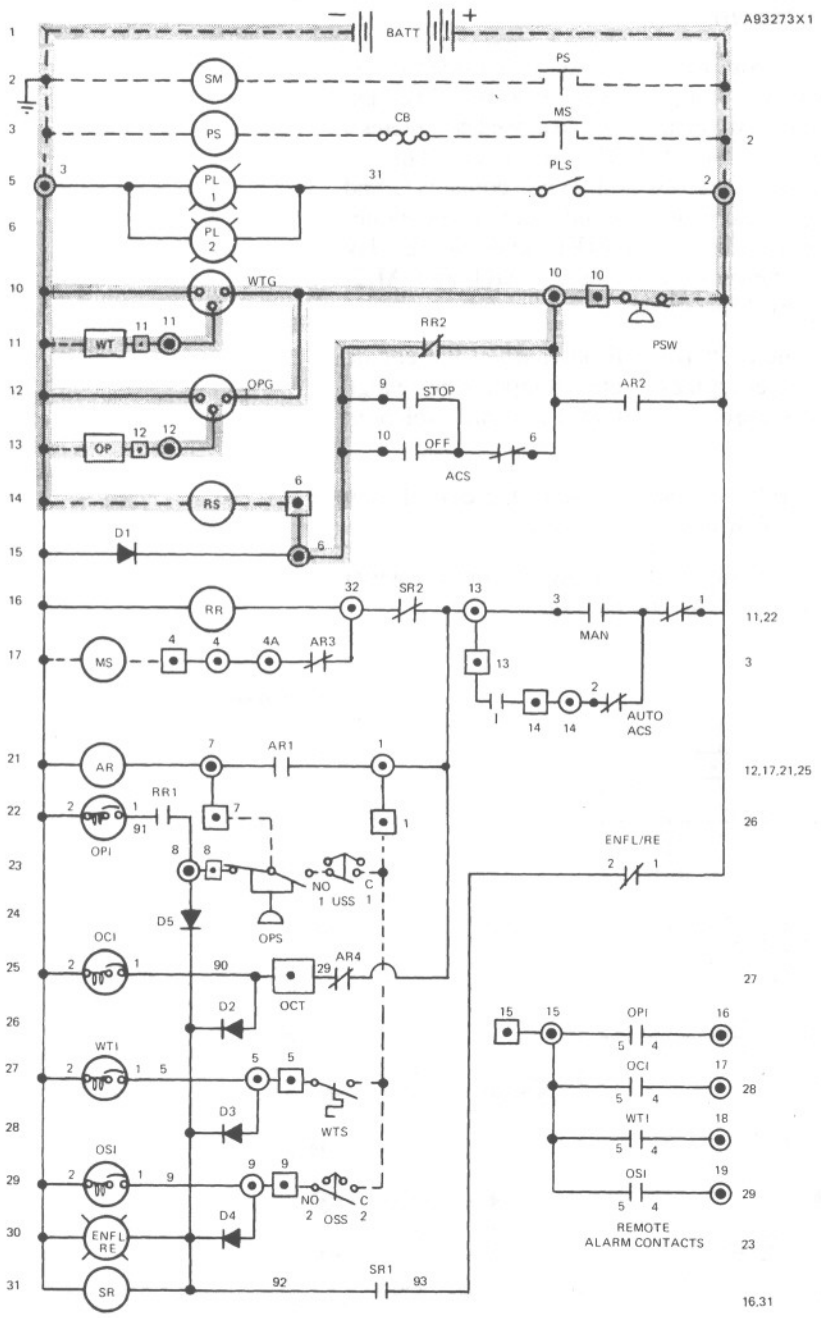
When arming relay (AR) is de-energized, contacts (AR1 and AR2) open and contacts (AR3 and AR4) close. (AR1) open prevents the arming relay from being energized before the engine starts. (AR2) open prevents current flow to rack solenoid (RS) when engine control switch (ACS) is in the OFF or STOP position. (AR3) closed helps complete the circuit to magnetic switch (MS). (AR4) closed helps complete the circuit to and overcrank timer (OCT).

When the engine stops, pressure switch (PSW) opens. This de-energizes water temperature gauge (WTG), oil pressure gauge (OPG) and rack solenoid (RS).

Diode (D1) releases any voltage in the coil of rack solenoid (RS) when it is de-energized.



CONTROL PANEL WITH ELECTRONIC SPEED SWITCH AUTOMATIC POSITION-COMMERCIAL POWER RETURNS



CONTROL PANEL WITH MECHANICAL SPEED SWITCH
AUTOMATIC POSITION-COMMERCIAL POWER RETURNS

ADC	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES USS AND OSS)
ENFL	ENGINE FAULT LIGHT WITH FAULT RESET FUNCTION
GP	GLOW PLUGS
GS	GOVERNOR SWITCH
GSM	GOVERNOR SYNCHRONIZING MOTOR
HS	GLOW PLUG HEAT SWITCH
I	REMOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCI	OVERCRANK INDICATOR
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPI	LOW OIL PRESSURE INDICATOR
OPS	OIL PRESSURE SWITCH
OSI	OVERSPEED INDICATION
OSS	OVERSPEED SWITCH
PIL	PANEL ILLUMINATION LAMP
PLS	PANEL LAMP SWITCH
PS	PINION SOLENOID
PSW	PRESSURE SWITCH
RE	FAULT RESET SWITCH, PART OF ENFL
RR	RUN RELAY
RS	RACK SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
USS	UNDERSPEED SWITCH
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTI	HIGH WATER TEMPERATURE INDICATOR
WTS	WATER TEMPERATURE SWITCH
⊙	TERMINAL STRIP POINT (CONTROL PANEL)
⊡	TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

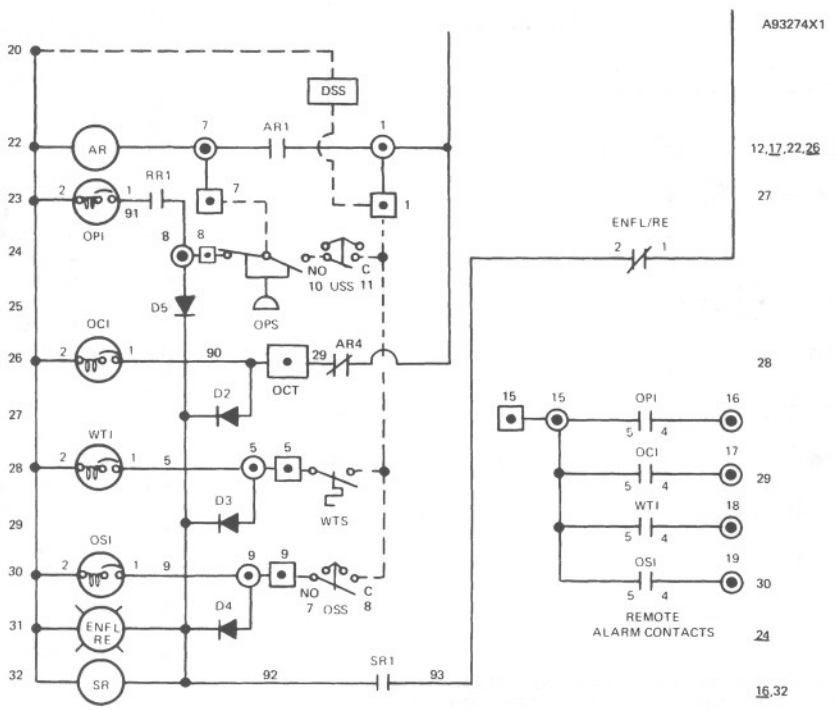
Manual Shutdown

When engine control switch (ACS) is turned to the STOP or OFF position, contacts (9 or 10) close and contacts (2 and 3) are open. (9 or 10) closed completes a circuit to rack solenoid (RS). The rack solenoid moves the rack to the fuel OFF position. When contacts (2 and 3) are both open, no shutdown indicators can operate. This also de-energizes run relay (RR) and arming relay (AR). (RR2) opens, (RR1) closes. (AR1 and AR2) open, (AR3 and AR4) close.

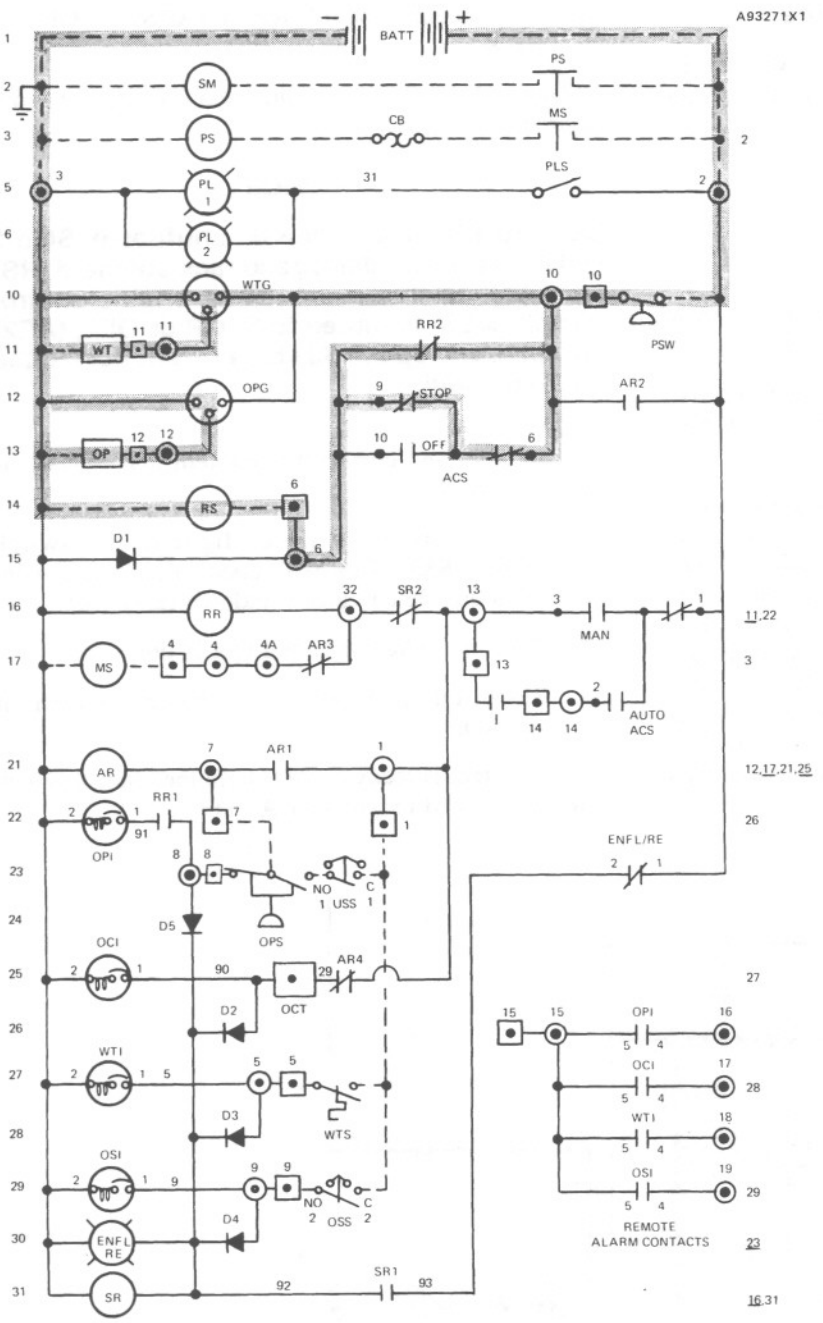
Pressure switch (PSW) will open when the engine stops. This de-energizes water temperature gauge (WTG), oil pressure gauge (OPG) and rack solenoid (RS).

Diode (D1) releases any voltage in the coil of rack solenoid (RS) when it is de-energized.

The system is ready to start if engine control switch (ACS) is turned to MAN or AUTO.



CONTROL PANEL WITH ELECTRONIC SPEED SWITCH STOP POSITION—MANUAL SHUTDOWN



CONTROL PANEL WITH MECHANICAL SPEED SWITCH STOP POSITION—MANUAL SHUTDOWN

ADC	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES USS AND OSS)
ENFL	ENGINE FAULT LIGHT WITH FAULT RESET FUNCTION
GP	GLOW PLUGS
GS	GOVERNOR SWITCH
GSM	GOVERNOR SYNCHRONIZING MOTOR
HS	GLOW PLUG HEAT SWITCH
I	REMOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCI	OVERCRANK INDICATOR
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPI	LOW OIL PRESSURE INDICATOR
OPS	OIL PRESSURE SWITCH
OSI	OVERSPEED INDICATION
OSS	OVERSPEED SWITCH
PIL	PANEL ILLUMINATION LAMP
PLS	PANEL LAMP SWITCH
PS	PINION SOLENOID
PSW	PRESSURE SWITCH
RE	FAULT RESET SWITCH, PART OF ENFL
RR	RUN RELAY
RS	RACK SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
USS	UNDERSPEED SWITCH
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTI	HIGH WATER TEMPERATURE INDICATOR
WTS	WATER TEMPERATURE SWITCH

⊙ TERMINAL STRIP POINT (CONTROL PANEL)

⊡ TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

Shutdown Caused by Engine Failure

The packaged generator set has shutdown sensors, shutdown indicators and a shutdown circuit for the conditions that follow:

1. Low oil pressure
2. High water temperature
3. Overspeed
4. Overcrank

For information about overcrank shutdown, make reference to ENGINE DOES NOT START.

Conditions (1, 2 or 3) will energize its respective indicator, engine failure light/reset switch (ENFL/RE) and shutdown relay (SR).

(SR1) contacts close to lock in the shutdown relay. (SR2) contacts open. This de-energizes run relay (RR). (RR2) closes and (RR1) opens. (RR2) closed energizes rack solenoid (RS). The rack solenoid moves the rack to the fuel OFF position. Pressure switch (PSW) will open when the engine stops. This de-energizes water temperature gauge (WTG), oil pressure gauge (OPG) and rack solenoid (RS). The correct indicator will pop out (move out suddenly) to show the cause of the shutdown. To start the engine, do the steps that follow:

1. Turn engine control switch (ACS) to OFF or STOP.

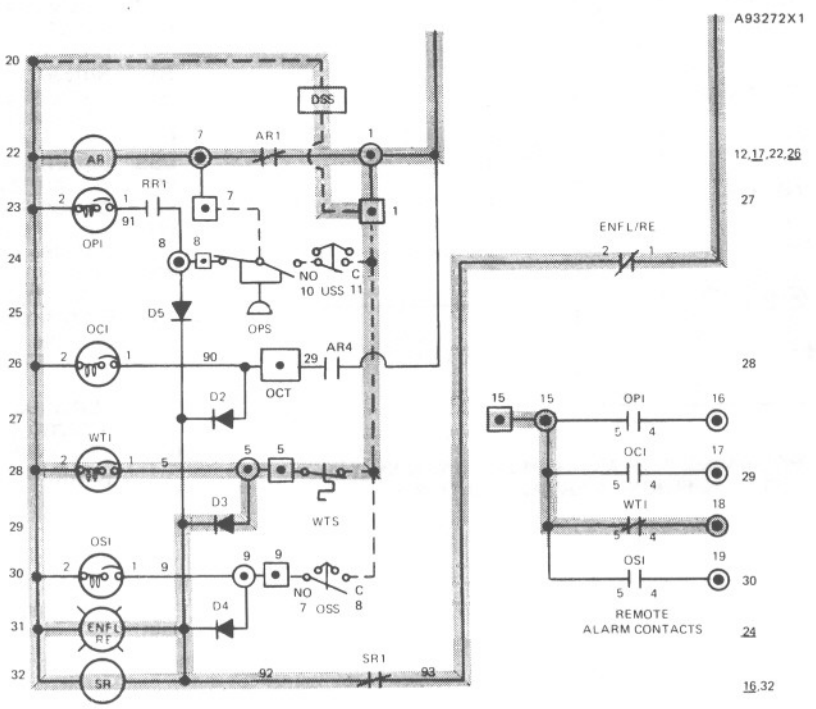
This will prevent the engine from starting if it is not desired.

NOTICE

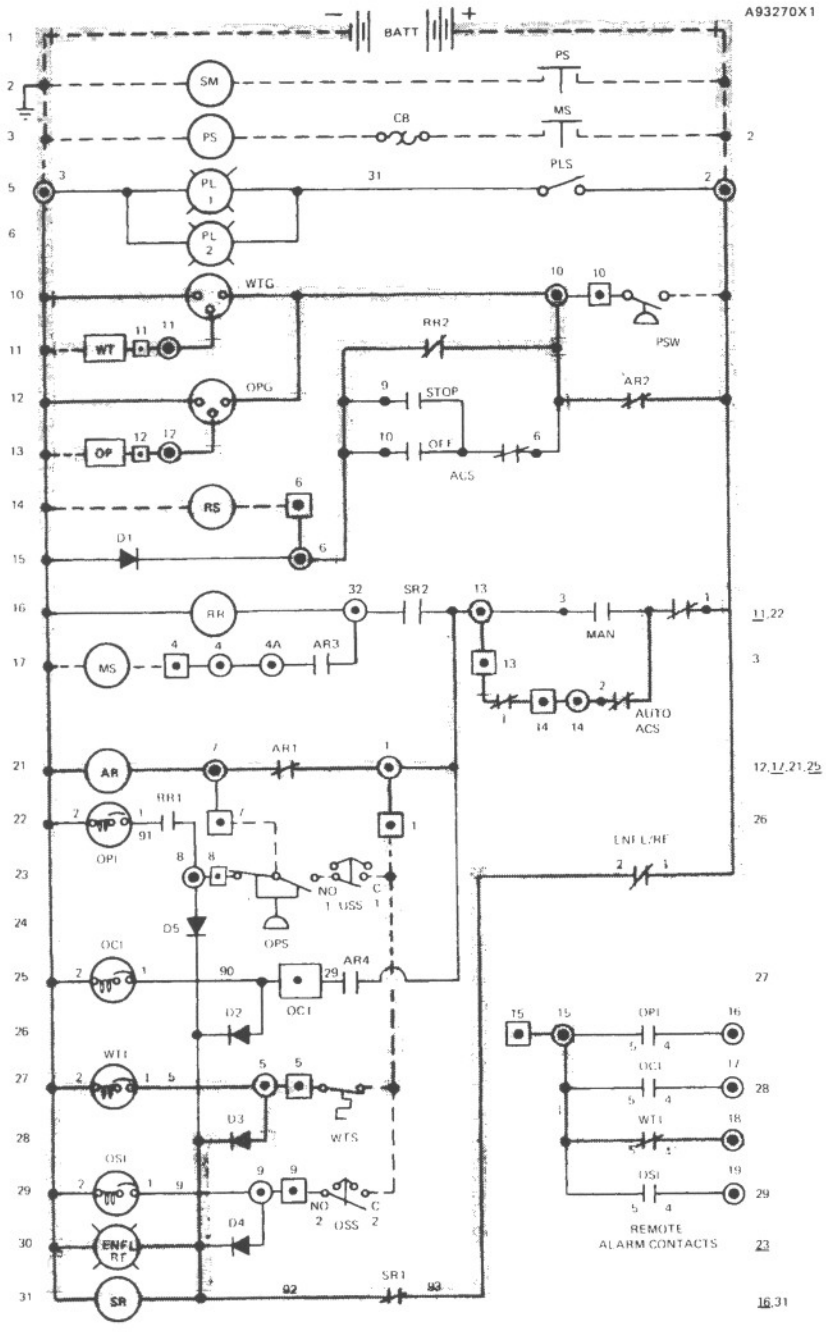
Do Step 1 immediately after shutdown. Step 1 will help prevent damage to rack solenoid (RS) from too much current. When engine control switch (ACS) is turned to STOP or OFF, (AR2) contacts will open and stop current flow to the rack solenoid.

2. Identify and correct the problem that caused the shutdown.
3. Push engine failure light/reset switch (ENFL/RE). This will open (ENFL/RE) contacts and de-energize shutdown relay (SR).
4. Push the indicator button that is out.
5. Reset oil pressure or overspeed switch if necessary.

The system is ready to start if engine control switch (ACS) is turned to MAN or AUTO.



CONTROL PANEL WITH ELECTRONIC SPEED SWITCH AUTOMATIC POSITION—HIGH WATER TEMPERATURE SHUTDOWN



CONTROL PANEL WITH MECHANICAL SPEED SWITCH
AUTOMATIC POSITION—HIGH WATER TEMPERATURE SHUTDOWN

ADC	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES USS AND OSS)
ENFL	ENGINE FAULT LIGHT WITH FAULT RESET FUNCTION
GP	GLOW PLUGS
GS	GOVERNOR SWITCH
GSM	GOVERNOR SYNCHRONIZING MOTOR
HS	GLOW PLUG HEAT SWITCH
I	REMOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCI	OVERCRANK INDICATOR
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPI	LOW OIL PRESSURE INDICATOR
OPS	OIL PRESSURE SWITCH
OSI	OVERSPEED INDICATION
OSS	OVERSPEED SWITCH
PIL	PANEL ILLUMINATION LAMP
PLS	PANEL LAMP SWITCH
PS	PINION SOLENOID
PSW	PRESSURE SWITCH
RE	FAULT RESET SWITCH, PART OF ENFL
RR	RUN RELAY
RS	RACK SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
USS	UNDERSPEED SWITCH
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTI	HIGH WATER TEMPERATURE INDICATOR
WTS	WATER TEMPERATURE SWITCH

⊙	TERMINAL STRIP POINT (CONTROL PANEL)
⧈	TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)