GENERATOR MOUNTED CONTROL PANEL
(TYPE 3 — CHANGE LEVEL 2 THRU 8)

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.

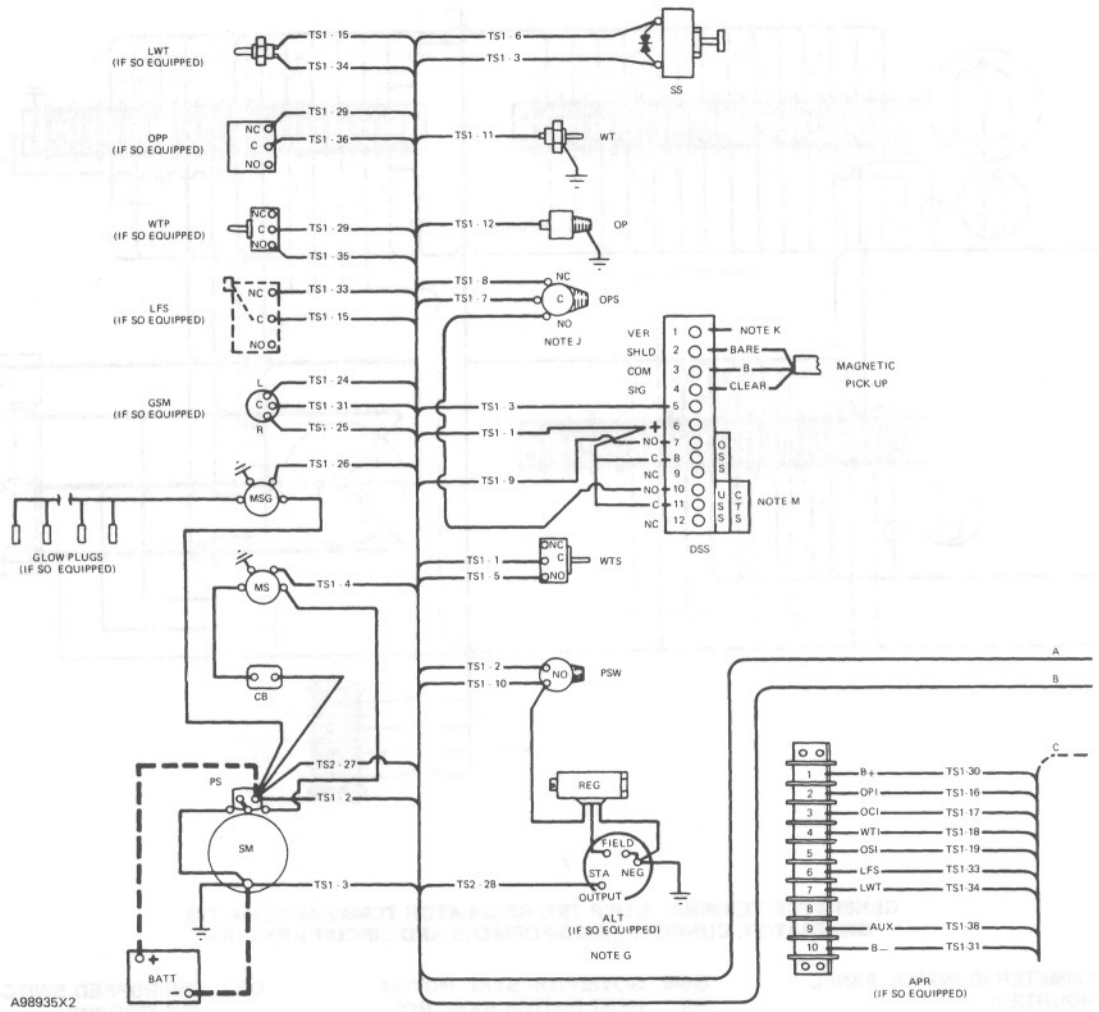
To help parallel two or more units onto the same bus.

IDENTIFICATION

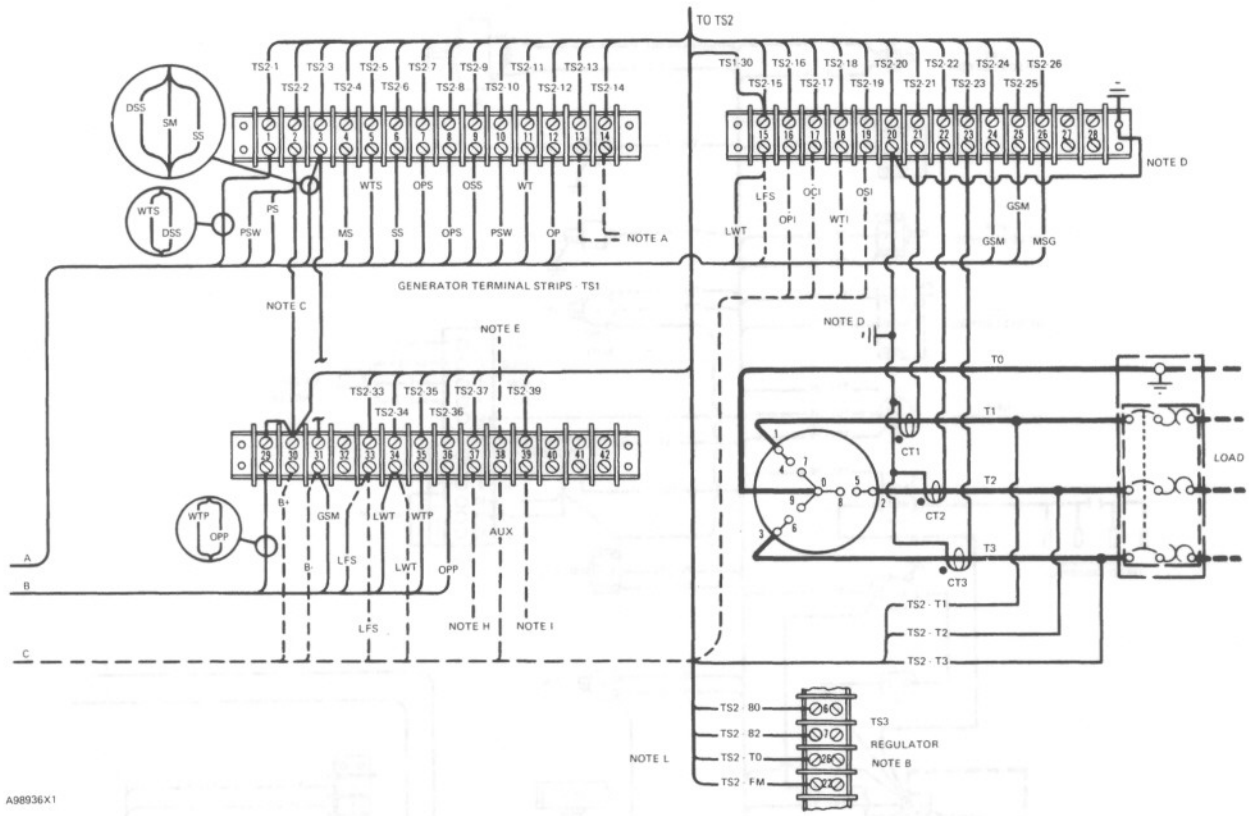
The location of the control panel is on the top of the regulator housing. This panel has a place for a heat switch and prealarm module. The shutdown indicators are relay lamp type. The control panel has a 12 place model number on the panel nameplate. The model number gives an indication of the control 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

See the pages that follow for wiring diagrams, schematics and photo illustrations for identification.

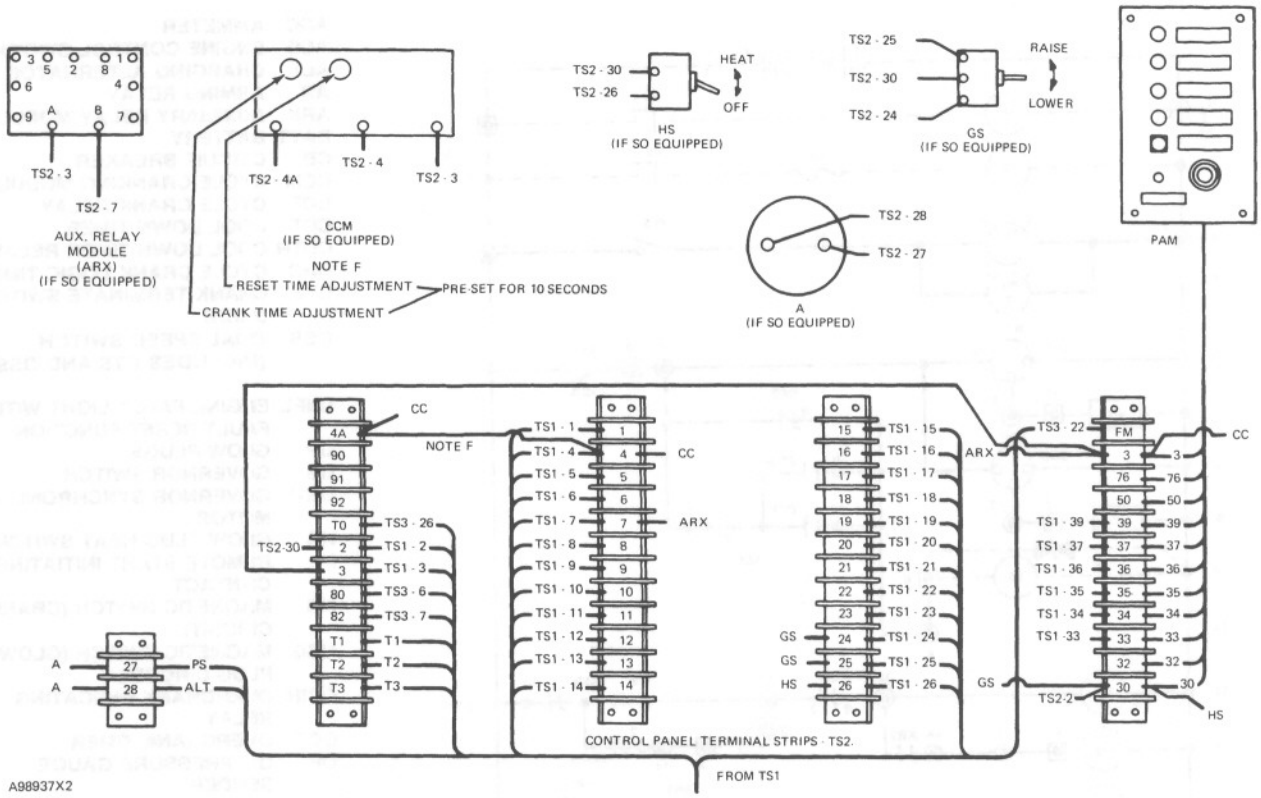


GENERATOR MOUNTED COMPONENTS AND ANNUNCIATOR PANEL (REMOTE)



GENERATOR TERMINAL STRIP TS1, REGULATOR TERMINAL STRIP TS3. GENERATOR, CURRENT TRANSFORMERS AND CIRCUIT BREAKER

A	AMMETER (CONTROL PANEL MOUNTED)
ALT	CHARGING ALTERNATOR (NOTE H)
APR	ANNUNCIATOR PANEL—REMOTE
ARX	AUXILIARY RELAY MODULE (CONTROL PANEL MOUNTED)
AUX	AUXILIARY CONTACT (NOTE E)
B+	BATTERY POSITIVE
B−	BATTERY NEGATIVE
BATT	BATTERY
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE (CONTROL PANEL MOUNTED)
CT	CURRENT TRANSFORMER
CTS	CRANK TERMINATE SWITCH
DSS	DUAL SPEED SWITCH
GS	GOVERNOR SWITCH (CONTROL PANEL MOUNTED)
GSM	GOVERNOR SYNC MOTOR
HS	HEAT SWITCH (CONTROL PANE MOUNTED)
LFS	LOW FUEL LEVEL SWITCH
LWT	LOW WATER TEMP SWITCH
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCI	OVERCRANK INDICATOR
OP	OIL PRESSURE GAUGE SENDER
OPI	LOW OIL PRESSURE INDICATOR
OPP	OIL PRESSURE SWITCH (PRE-ALARM)
OPS	OIL PRESSURE SWITCH (SHUTDOWN)
OSI	OVERSPEED INDICATOR
OSS	OVERSPEED SWITCH (SHUTDOWN)
PAM	PREALARM MODULE (CONTROL PANEL MOUNTED)
PS	PINION SOLENOID
PSW	PRESSURE SWITCH
SS	SHUTOFF SOLENOID
SM	STARTING MOTOR
TS	TERMINAL STRIP
USS	UNDERSPEED SWITCH (CRANK TERMINATION)
WT	WATER TEMPERATURE GAGE SENDER
WTI	HIGH WATER TEMPERATURE INDICATOR
WTP	WATER TEMPERATURE SWITCH (PRE-ALARM)
WTS	WATER TEMPERATURE SWITCH (SHUTDOWN)



CONTROL PANEL COMPONENTS (PARTIAL) AND CONTROL PANEL TERMINAL STRIP TS2

NOTE: DOTTED WIRES BY CUSTOMER

NOTE A: To normally open initiating contacts I of automatic transfer switch.

NOTE B: The yellow wire from voltage level rheostat (R2) to terminal 7 on the regulator terminal strip is disconnected at terminal 7.

NOTE C: Some generator sets without an annunciator panel (remote) or a prealarm module are not equippEd with B+ connection from TS1-2 to TS1-30 to TS1-29 and TS1-15.

NOTE D: Some generator sets are grounded at the line from the current transformer's neutral. Some are grounded through a jumper between TS1-20 and a terminal strip support screw.

NOTE E: To normally open auxiliary contact on emergency side of transfer switch, if the generator set is equipped with an annunciator panel (remote). Used to give generating indication.

NOTE F: Red jumper between TS2-4A and TS2-4 is not used with cycle cranking module.

NOTE G: Do not operate the alternator without a battery connected in the circuit. Do not polarize alternator. Do not charge a common battery with the alternator and a DC generator at the same time.

NOTE H: To optional remote low lubrication oil pressure indicator installed by the customer.

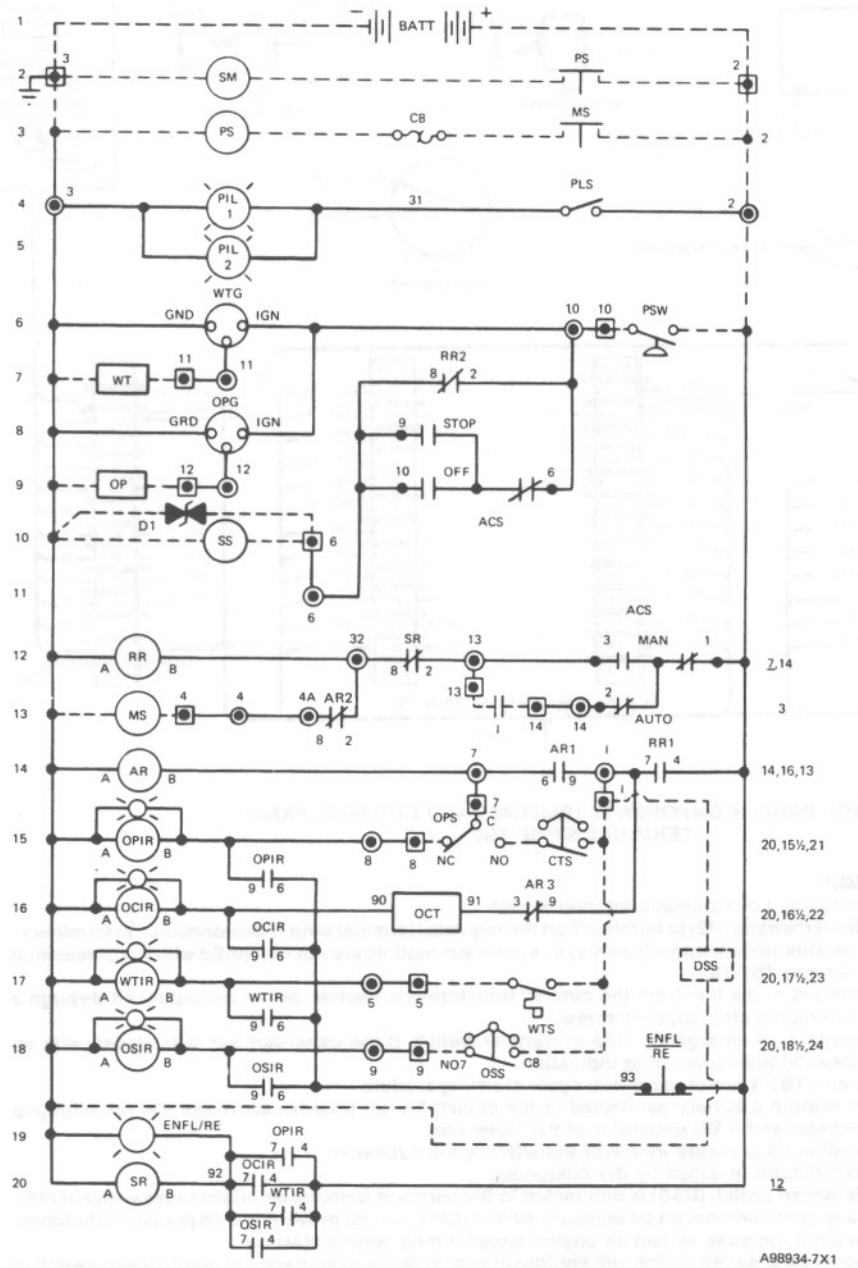
NOTE I: To optional remote shutdown indicator installed by the customer.

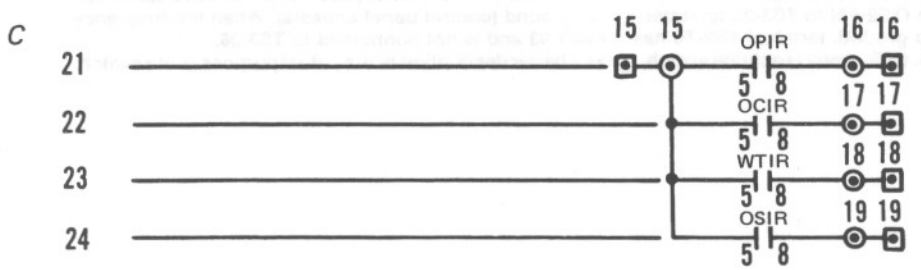
NOTE J: On some generator sets, underspeed switch (USS) is connected to the common terminal on oil pressure switch (OPS). Connect the wire to the normally open terminal on oil pressure switch (OPS) to help prevent low oil pressure shutdown when engine oil pressure does not increase as fast as engine speed during engine starting.

NOTE K: If terminal 1 is connected to terminal 2, speed switch will shutdown engine at 3/4 overspeed set point. Speed switches with a verify button do not have terminal 1. Push the verify button to shutdown the engine at 3/4 overspeed set point.

NOTE L: Some frequency meters are connected phase (TS2-FM to TS3-22 to stator T7) to neutral (TS2-T0 to TS3-26 to stator T0). Others are connected phase (TS2-FM to TS3-22 to stator T7) to ground (control panel chassis). When the frequency meter is connected phase to ground, terminal TS2-T0 has a mark 93 and is not connected to TS3-26.

NOTE M: CTS is a replacement for USS. CTS, crank terminate switch, gives a better description of the actual purpose of the switch.



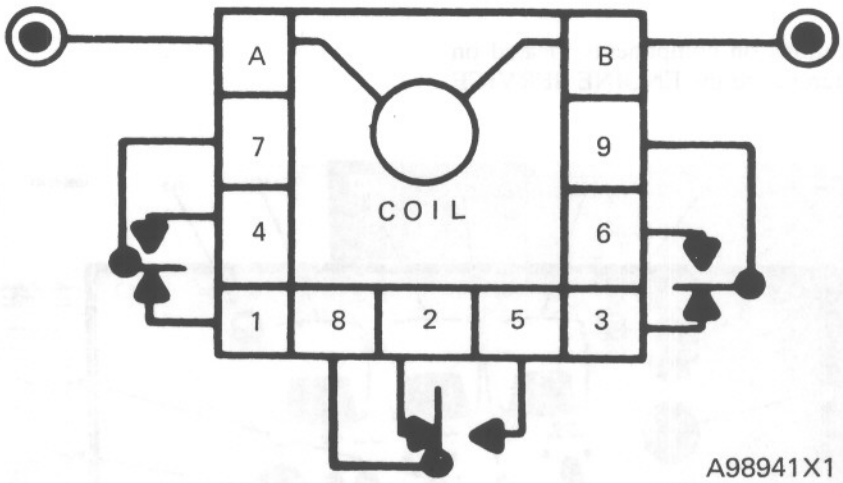


CONTROL PANEL
AUTOMATIC POSITION

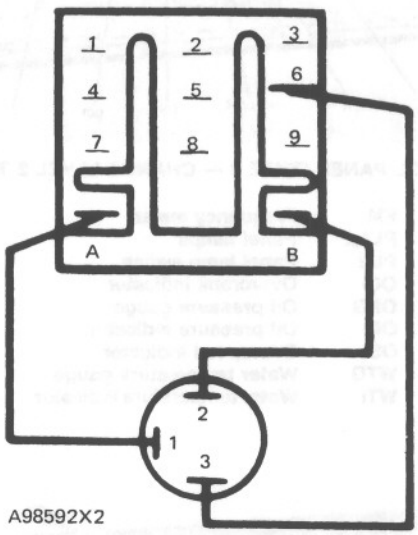
ADC AMMETER
ACS ENGINE CONTROL SWITCH
ALT CHARGING ALTERNATOR
AR ARMING RELAY
ARX AUXILIARY RELAY MODULE
BATT BATTERY
CB CIRCUIT BREAKER
CCM CYCLE CRANKING MODULE
CCT CYCLE CRANK RELAY
CDT COOL DOWN TIMER
CDTR COOL DOWN TIMER RELAY
CRC CYCLE CRANK LOGIC TIMER
CTS CRANK TERMINATE SWITCH
D DIODE
DSS DUAL SPEED SWITCH (INCLUDES CTS AND DSS)

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)
OCIR OVERCRANK INDICATING RELAY
OCT OVERCRANK TIMER
OP OIL PRESSURE GAUGE SENDER
OPG OIL PRESSURE GAUGE
OPIR LOW OIL PRESSURE INDICATOR RELAY
OPS OIL PRESSURE SWITCH
OSIR OVERSPEED INDICATING RELAY
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
SS SHUT-OFF SOLENOID
SM STARTING MOTOR
SR SHUTDOWN RELAY
WT WATER TEMPERATURE GAUGE SENDER
WTG WATER TEMPERATURE GAUGE
WTIR HIGH WATER TEMPERATURE INDICATING RELAY
WTS WATER TEMPERATURE SWITCH

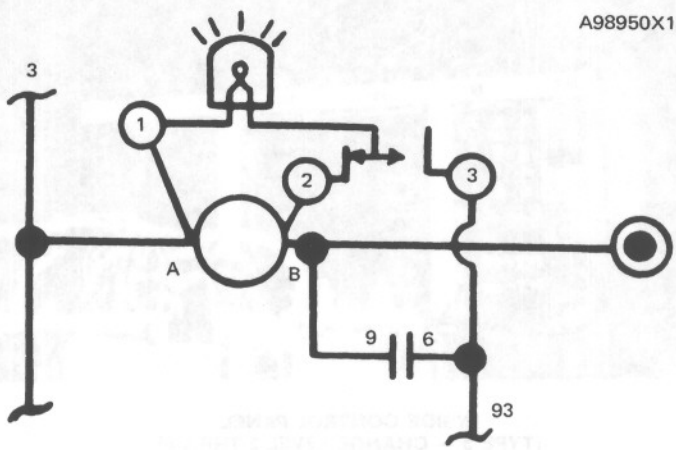
⊙ TERMINAL STRIP POINT (CONTROL PANEL)
⊡ TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)



RELAY CONTACT SCHEMATIC



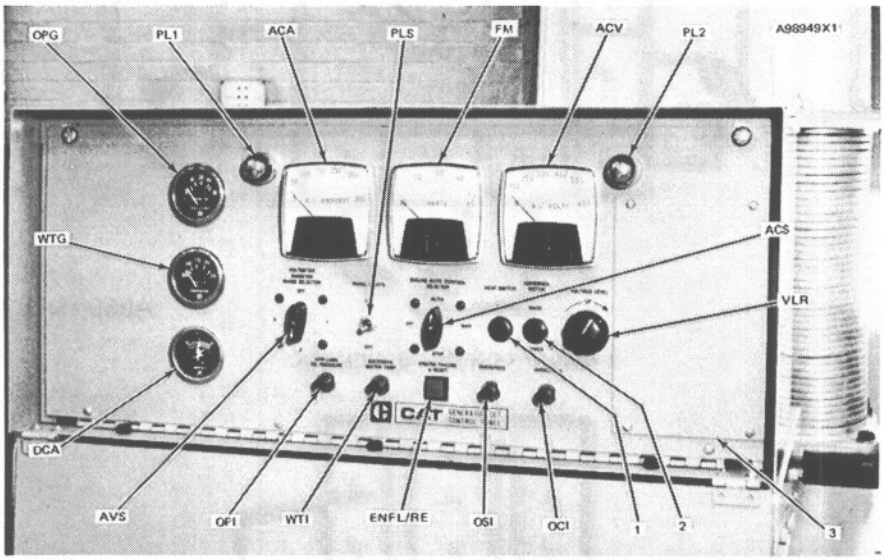
RELAY LAMP COMPONENT WIRING



RELAY LAMP SCHEMATIC

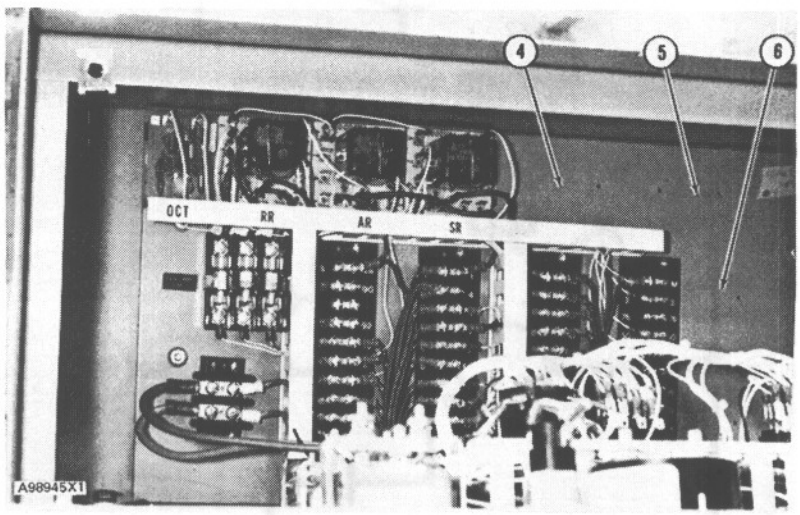
COMPONENTS

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



CONTROL PANEL (TYPE 3 — CHANGE LEVEL 2 THRU 8)

ACA	Alternating current ammeter	FM	Frequency meter	VLR	Voltage level rheostat
ACS	Engine control switch	PL1,2	Panel lamps	1.	Button (heat switch HS, if so equipped)
ACV	Alternating current voltmeter	PLS	Panel lamp switch	2.	Button (governor switch GS, if so equipped)
AVS	Ammeter/voltage selector switch	OCI	Overcrank indicator	3.	Panel (prealarm module PAM, if so equipped)
DCA	Direct current ammeter	OPG	Oil pressure gauge		
ENFL/RE	Engine failure light/reset switch	OPI	Oil pressure indicator		
		OSI	Overspeed indicator		
		WTG	Water temperature gauge		
		WTI	Water temperature indicator		



INSIDE CONTROL PANEL (TYPE 3 — CHANGE LEVEL 2 THRU 8)

4. Location for CDT (cool down timer if so equipped). 5. Location for AUX (auxiliary relay, if so equipped). 6. Location for CCM (cycle crank module, if so equipped).

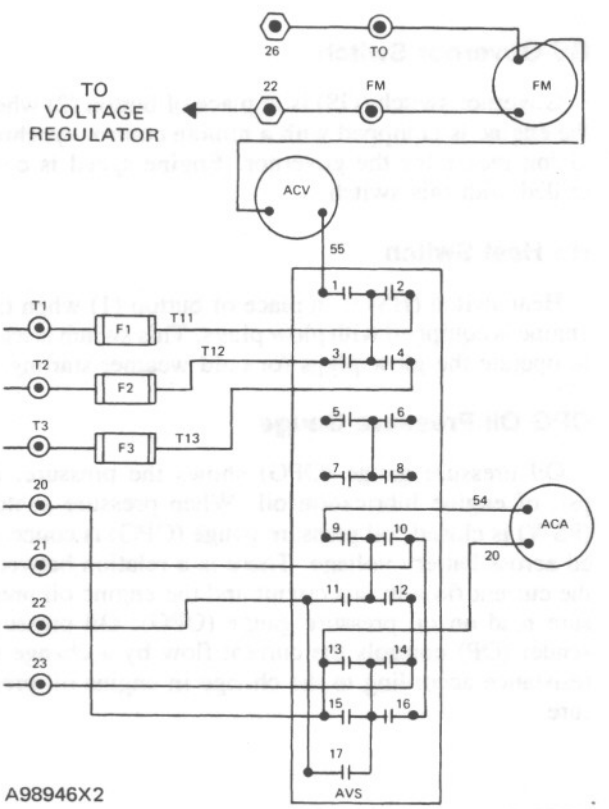
ACA Alternating Current Ammeter

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.

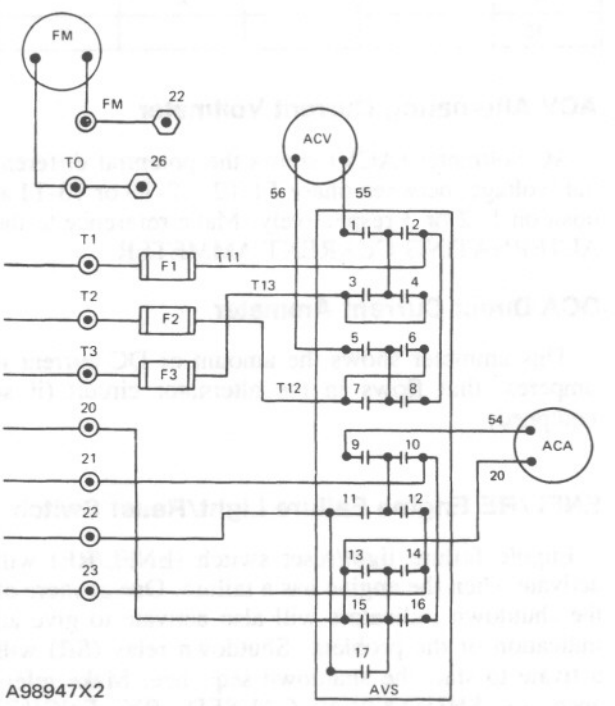
NOTE: Several methods have been used to connect control panel instruments. The recommended method is shown in the diagrams.

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
10		X	X		
11			X	X	
12				X	X
13	X	X			
14	X	X	X	X	
15		X	X	X	X
16	X	X	X	X	X
17	X	X	X		X

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



(600V Control Panel Only)



AMMETER/VOLTMETER SELECTOR SWITCH (AVS) WIRING DIAGRAMS

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

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 differential (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

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 flow 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 (2) 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 (1) 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) 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).

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

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, remote start initiating contact (I) closes. This makes a complete circuit from battery (BATT) to energize run relay (RR) and magnetic switch (MS).

When run relay (RR) is energized, contacts (RR2) open and contacts (RR1) close. (RR2) open prevents current flow to shutoff solenoid (SS) through pressure switch (PSW). (RR1) closed energizes dual speed switch (DSS) and overcrank timer (OCT).

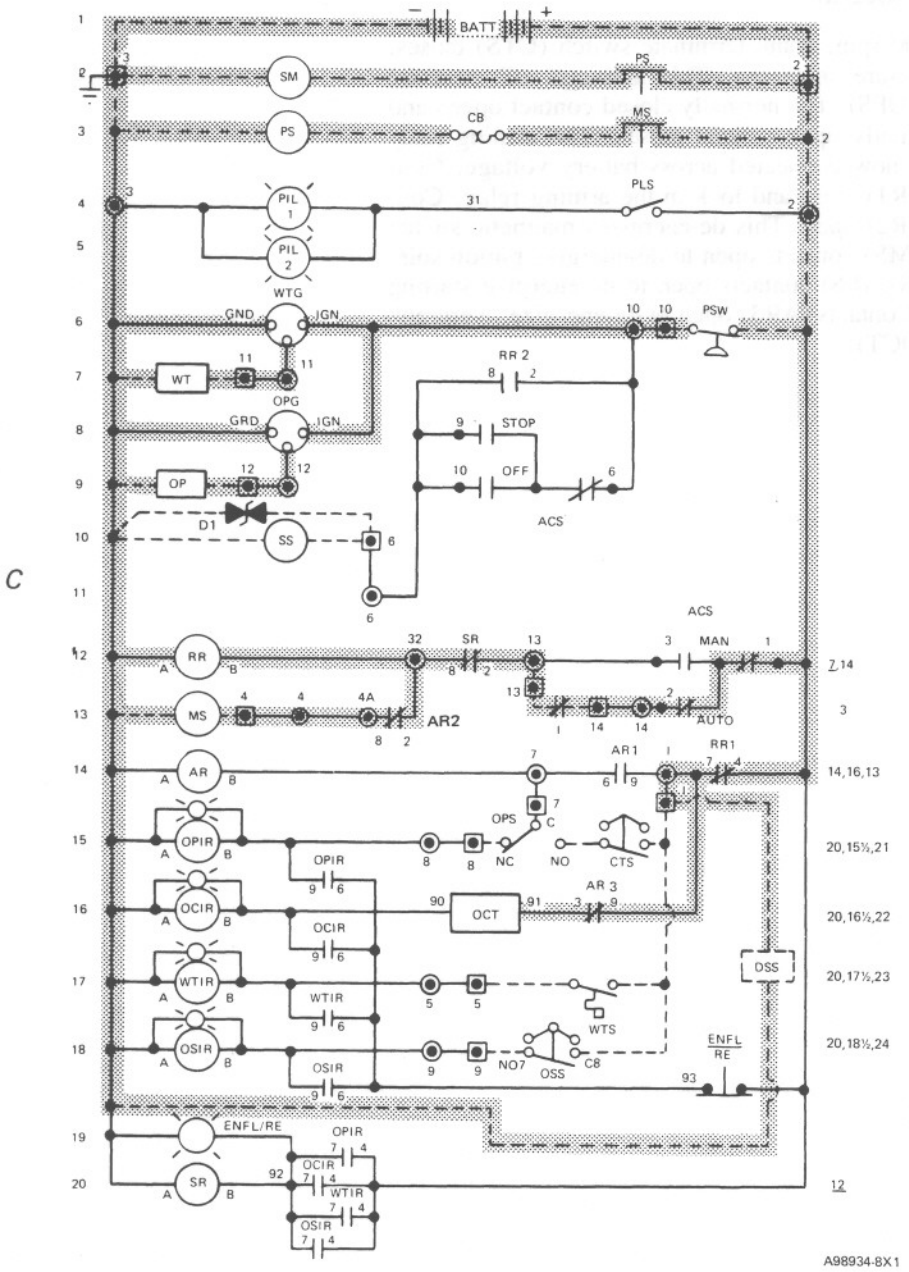
When dual speed switch (DSS) is energized, a magnetic pickup relays engine rpm to the switch. The dual speed switch has a crank terminate (CTS) circuit and an overspeed (OSS) circuit.

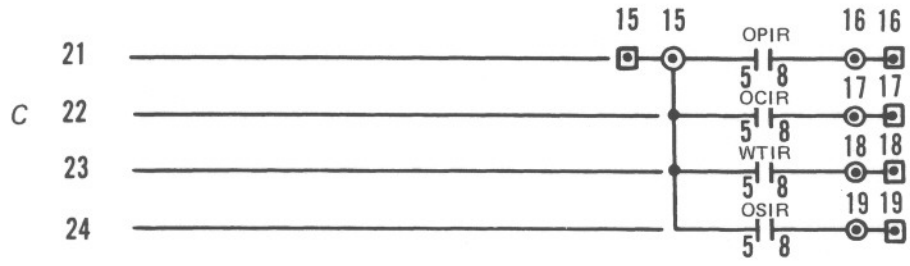
When overcrank timer (OCT) is energized, a timer will start. After the engine cranks for approximately 30 seconds the timer will stop. (OCT) contacts will close. Make reference to ENGINE DOES NOT START.

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. (PSW) will close. This energizes water temperature gauge (WTG) and oil pressure gauge (OPG).

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 remote start indicating contact (I) to close. Run relay (RR) and magnetic switch (MS) will energize as soon as contact (3) is closed.





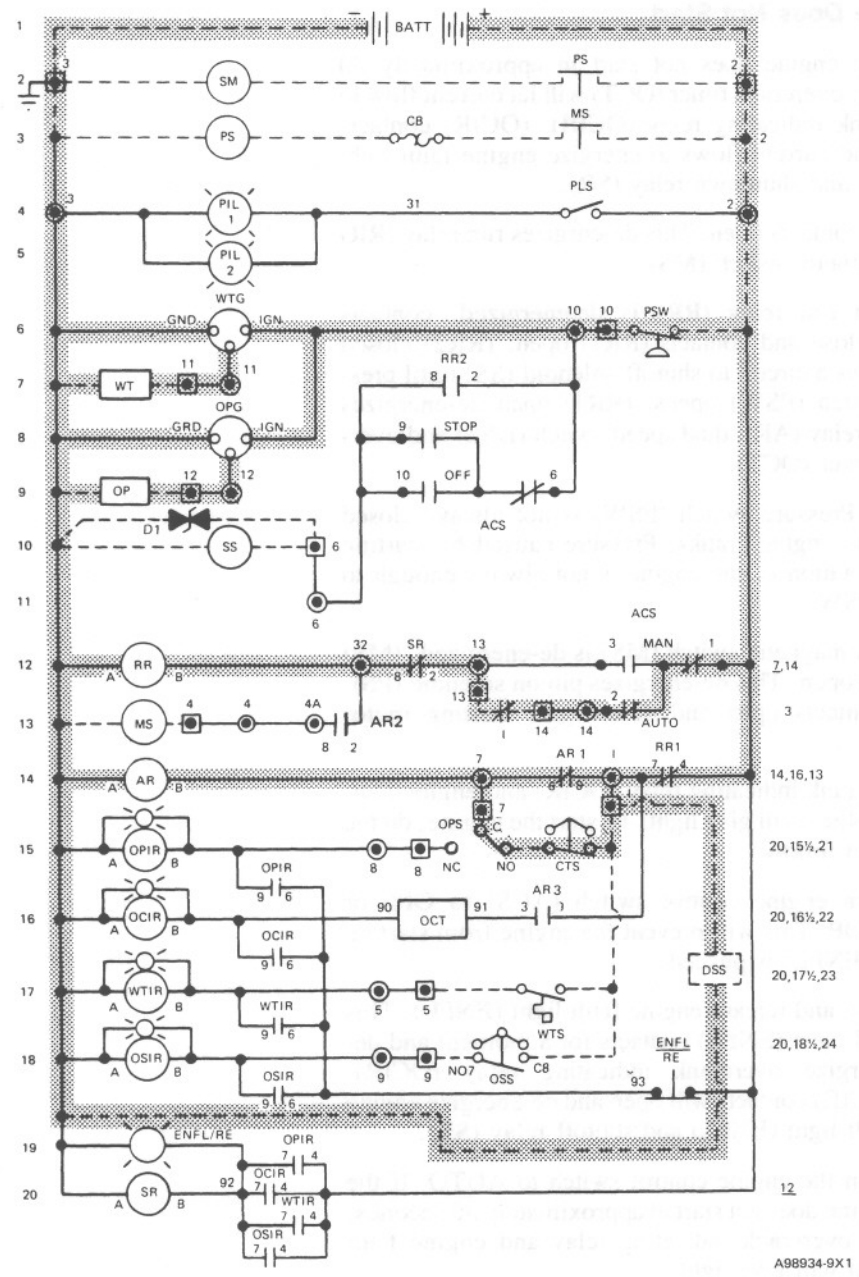
CONTROL PANEL
AUTOMATIC POSITION—ENGINE CRANKS

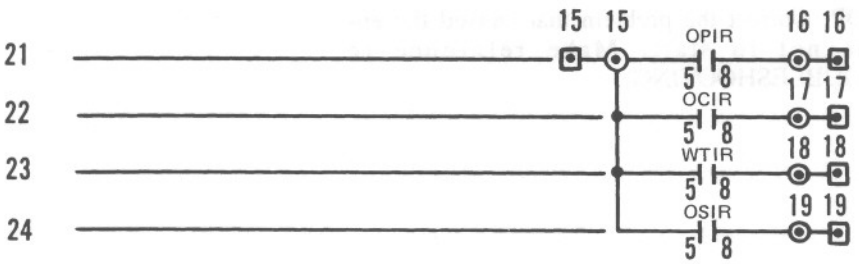
A	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
B+	BATTERY POSITIVE
B−	BATTERY NEGATIVE
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
CT	CURRENT TRANSFORMER
CTS	CRANK TERMINATE SWITCH
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES CTS 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	RMEOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCIR	OVERCRANK INDICATING RELAY
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPIR	LOW OIL PRESSURE INDICATING RELAY
OPS	OIL PRESSURE SWITCH
OSIR	OVERSPEED INDICATING RELAY
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
SS	SHUT-OFF SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTIR	HIGH WATER TEMPERATURE INDICATING RELAY
WTS	WATER TEMPERATURE SWITCH

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

Engine Starts

At 600 rpm, crank terminate switch (CTS) 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) open. This de-energizes magnetic switch (MS). (MS) contacts open to de-energize pinion solenoid (PS). (PS) contacts open to de-energize starting motor. Contacts (AR3) open to de-energize overcrank timer (OCT).





B41392X1

CONTROL PANEL
AUTOMATIC POSITION—ENGINE STARTS

A	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
B+	BATTERY POSITIVE
B–	BATTERY NEGATIVE
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
CT	CURRENT TRANSFORMER
CTS	CRANK TERMINATE SWITCH
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES CTS 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)
OCIR	OVERCRANK INDICATING RELAY
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPIR	LOW OIL PRESSURE INDICATING RELAY
OPS	OIL PRESSURE SWITCH
OSIR	OVERSPEED INDICATING RELAY
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
SS	SHUT-OFF SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTIR	HIGH WATER TEMPERATURE INDICATING RELAY
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 indicating relay (OCIR). (OCIR) contacts close and current flows to energize engine fault light (ENFL) and shutdown relay (SR).

(SR) contacts open. This de-enrgizes run relay (RR) and magnetic switch (MS).

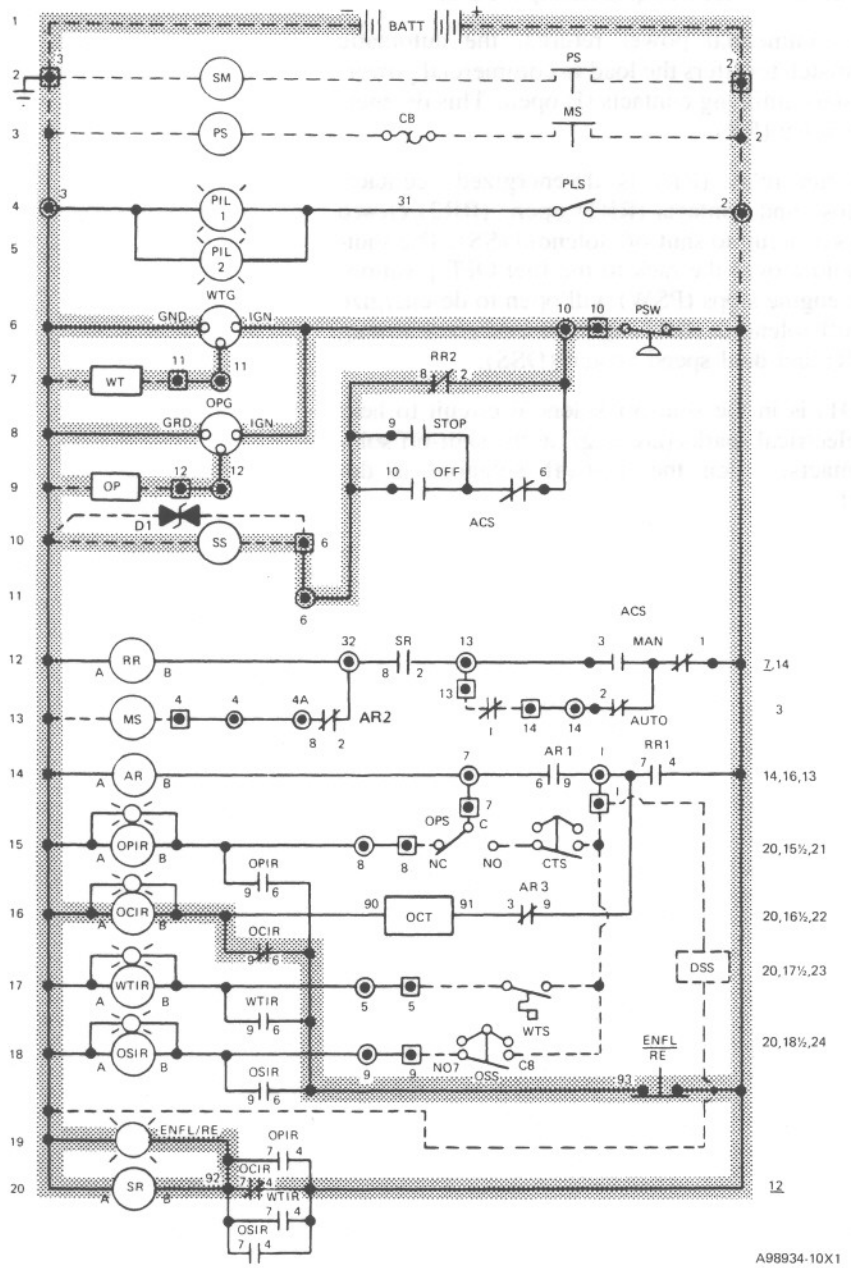
When run relay (RR) is de-energized, contacts (RR2) close and contacts (RR1) open. (RR2) closed completes a circuit to shutoff solenoid (SS) until pressure switch (PSW) opens. (RR1) open de-energizes arming relay (AR), dual speed switch (DSS) and overcrank timer (OCT).

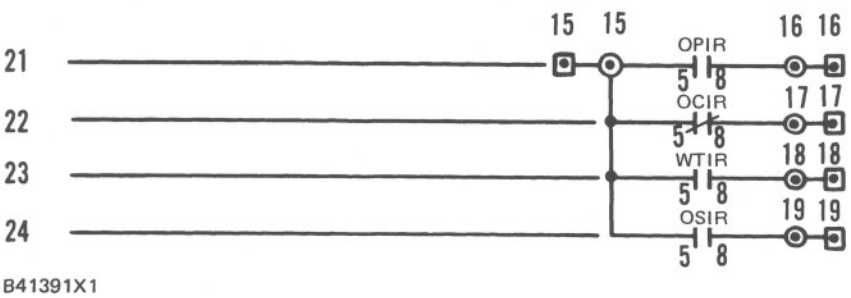
NOTE: Pressure switch (PSW) is not always closed when the engine cranks. Pressure caused by starting motor rotation of the engine is not always enough to close (PSW).

When magnetic switch (MS) is de-energized, (MS) contacts open. This de-energizes pinion solenoid (PS). (PS) contacts open and de-energize starting motor (SM).

Overcrank indicating relay (OCIR) and engine fault light (ENFL) 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 (ENFL) is pushed.
2. Push and release engine fault light (ENFL). This will open (ENFL) contacts for a moment and de-energize overcrank indicating relay (OCIR). (OCIR) contacts will open and de-energize engine fault light (ENFL) and shutoff relay (SR).
3. Turn the engine control switch to AUTO. If the engine does not start in approximately 30 seconds, the overcrank indicating relay and engine fault light will give light.
4. Turn engine control switch (ACS) to OFF or STOP. Correct the problem that caused the engine not to start. Make reference to TROUBLESHOOTING.





B41391X1

CONTROL PANEL
AUTOMATIC POSITION—ENGINE DOES NOT START

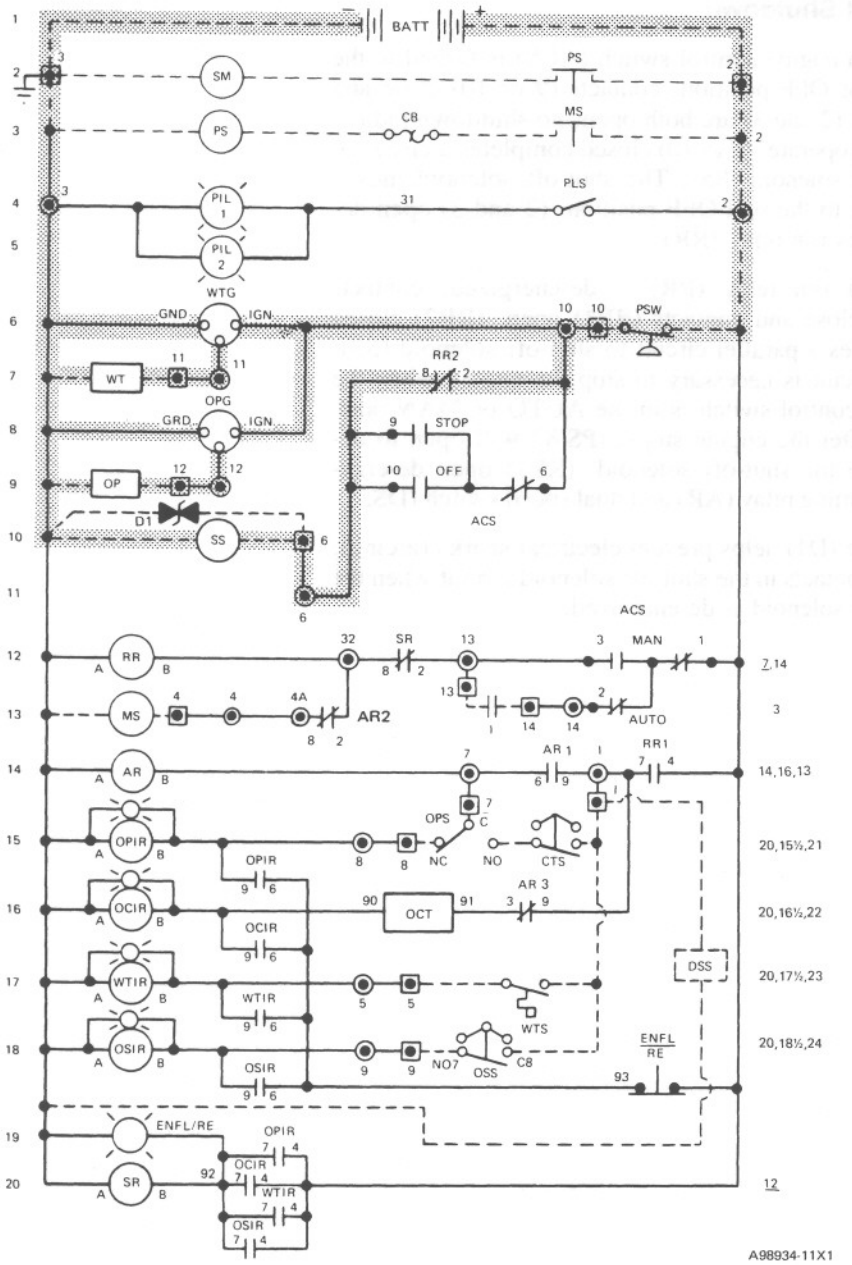
A	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
B+	BATTERY POSITIVE
B–	BATTERY NEGATIVE
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
CT	CURRENT TRANSFORMER
CTS	CRANK TERMINATE SWITCH
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES CTS 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	RMEOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCIR	OVERCRANK INDICATING RELAY
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPIR	LOW OIL PRESSURE INDICATING RELAY
OPS	OIL PRESSURE SWITCH
OSIR	OVERSPEED INDICATING RELAY
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
SS	SHUT-OFF SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTIR	HIGH WATER TEMPERATURE INDICATING RELAY
WTS	WATER TEMPERATURE SWITCH
⊙	TERMINAL STRIP POINT (CONTROL PANEL)
⊡	TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

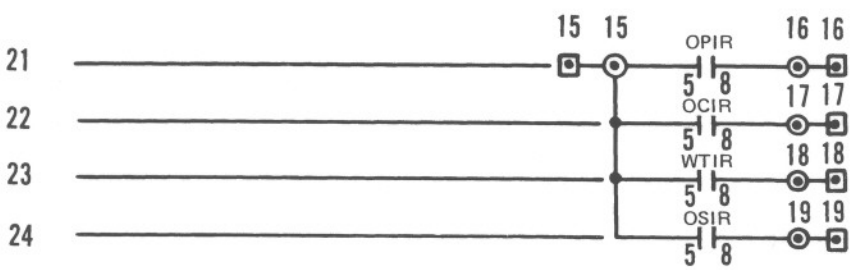
Return of Commercial (Normal) Power

When commercial power returns, the automatic transfer switch transfers the load to commercial power. Remote start initiating contacts (I) open. This de-energizes run relay (RR).

When run relay (RR) is de-energized, contacts (RR2) close and contacts (RR1) open. (RR2) closed completes a circuit to shut-off solenoid (SS). The shut-off solenoid moves the rack to the fuel OFF position. After the engine stops (PSW) will open to de-energize the shut-off solenoid. (RR1) open de-energizes arming relay (AR) and dual speed switch (DSS).

Diode (D1) is in the shut-off solenoid circuit to help prevent electrical sparks (arching), at the shut-off solenoid contacts, when the shut-off solenoid is de-energized.





B41392X1

CONTROL PANEL
AUTOMATIC POSITION—AUTOMATIC SHUTDOWN

A	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
B+	BATTERY POSITIVE
B–	BATTERY NEGATIVE
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
CT	CURRENT TRANSFORMER
CTS	CRANK TERMINATE SWITCH
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES CTS 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	RMEOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCIR	OVERCRANK INDICATING RELAY
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPIR	LOW OIL PRESSURE INDICATING RELAY
OPS	OIL PRESSURE SWITCH
OSIR	OVERSPEED INDICATING RELAY
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
SS	SHUT-OFF SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTIR	HIGH WATER TEMPERATURE INDICATING RELAY
WTS	WATER TEMPERATURE SWITCH

⊙ TERMINAL STRIP POINT (CONTROL PANEL)

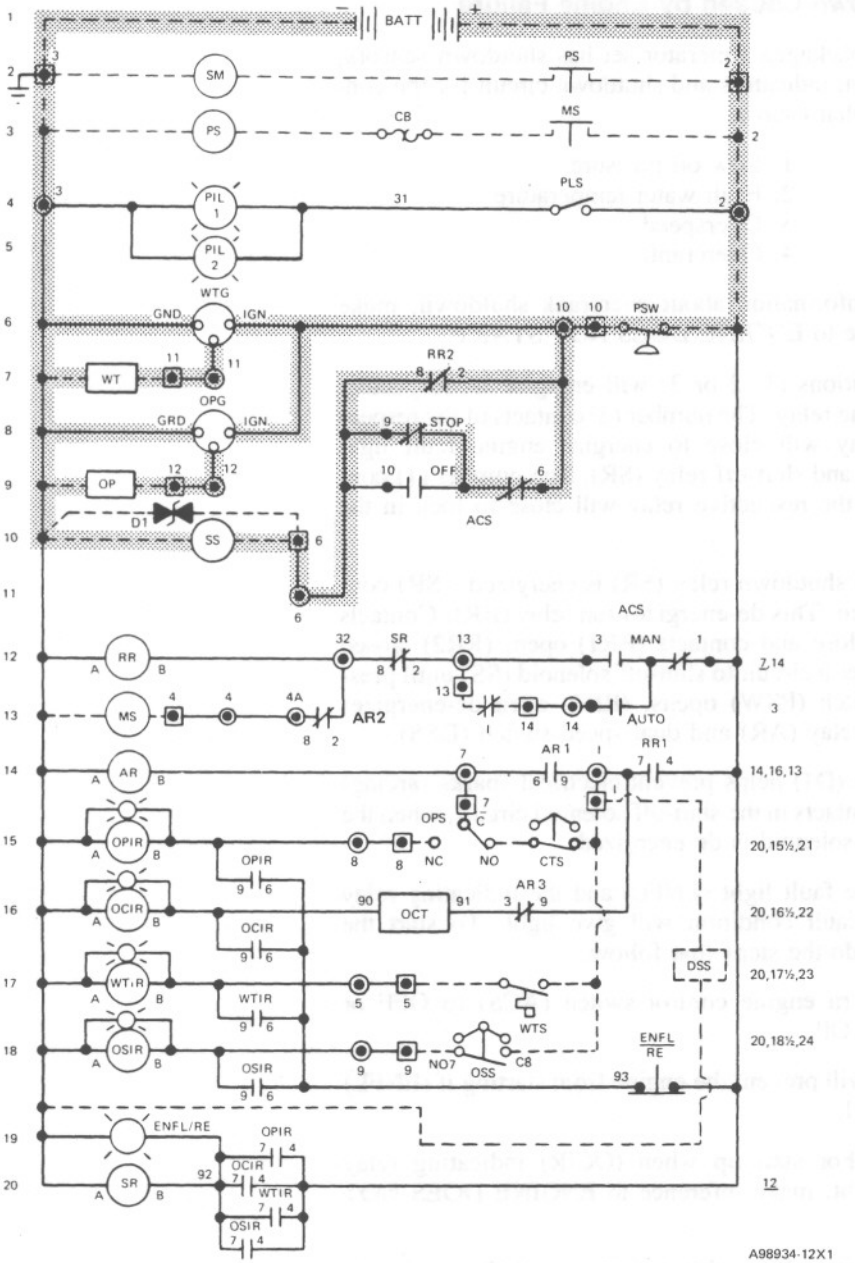
⊡ TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

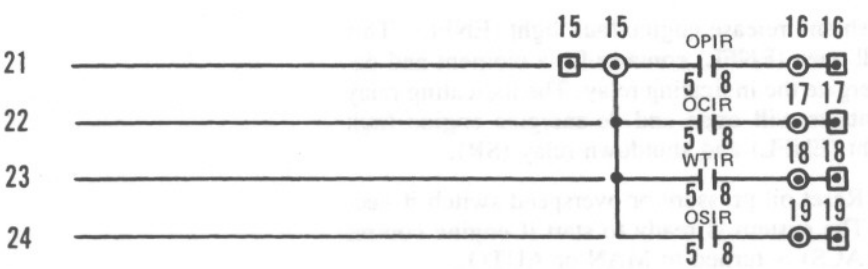
Manual Shutdown

When engine control switch (ACS) is turned to the STOP or OFF position, contacts (9 or 10) close and contacts (2 and 3) are both open, no shutdown indicators can operate. (9 to 10) closed completes a circuit to shut-off solenoid (SS). The shut-off solenoid moves the rack to the fuel OFF position. (2 and 3) open de-energizes run relay (RR).

When run relay (RR) is de-energized, contacts (RR2) close and contacts (RR1) open. (RR2) closed completes a parallel circuit to shut-off solenoid (SS). This circuit is necessary to stop the engine when the engine control switch is in the AUTO or MAN position. After the engine stops, (PSW) will open to de-energize the shut-off solenoid. (RR1) open de-energizes arming relay (AR) and dual speed switch (DSS).

Diode (D1) helps prevent electrical sparks (arcing), at the contacts in the shut-off solenoid circuit when the shut-off solenoid is de-energized.





CONTROL PANEL
STOP POSITION—MANUAL SHUTDOWN

A	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
B+	BATTERY POSITIVE
B–	BATTERY NEGATIVE
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
CT	CURRENT TRANSFORMER
CTS	CRANK TERMINATE SWITCH
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES CTS 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	RMEOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCIR	OVERCRANK INDICATING RELAY
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPIR	LOW OIL PRESSURE INDICATING RELAY
OPS	OIL PRESSURE SWITCH
OSIR	OVERSPEED INDICATING RELAY
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
SS	SHUT-OFF SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTIR	HIGH WATEH TEMPERATURE INDICATING RELAY
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 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 indicating relay. The number (2) contacts of the respective relay will close to energize engine fault light (ENFL) and shut-off relay (SR). The number (1) contacts of the respective relay will close to lock in the relay.

When shutdown relay (SR) is energized, (SR) contacts open. This de-energizes run relay (RR). Contacts (RR2) close and contacts (RR1) open. (RR2) closed completes a circuit to shut-off solenoid (SS) until pressure switch (PSW) opens. (RR1) open de-energizes arming relay (AR) and dual speed switch (DSS).

Diode (D1) helps prevent electrical sparks (arcing) at the contacts in the shut-off solenoid circuit, when the shut-off solenoid is de-energized.

Engine fault light (ENFL) and the indicating relay for the fault condition will give light. To start the engine, do the steps that follow.

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

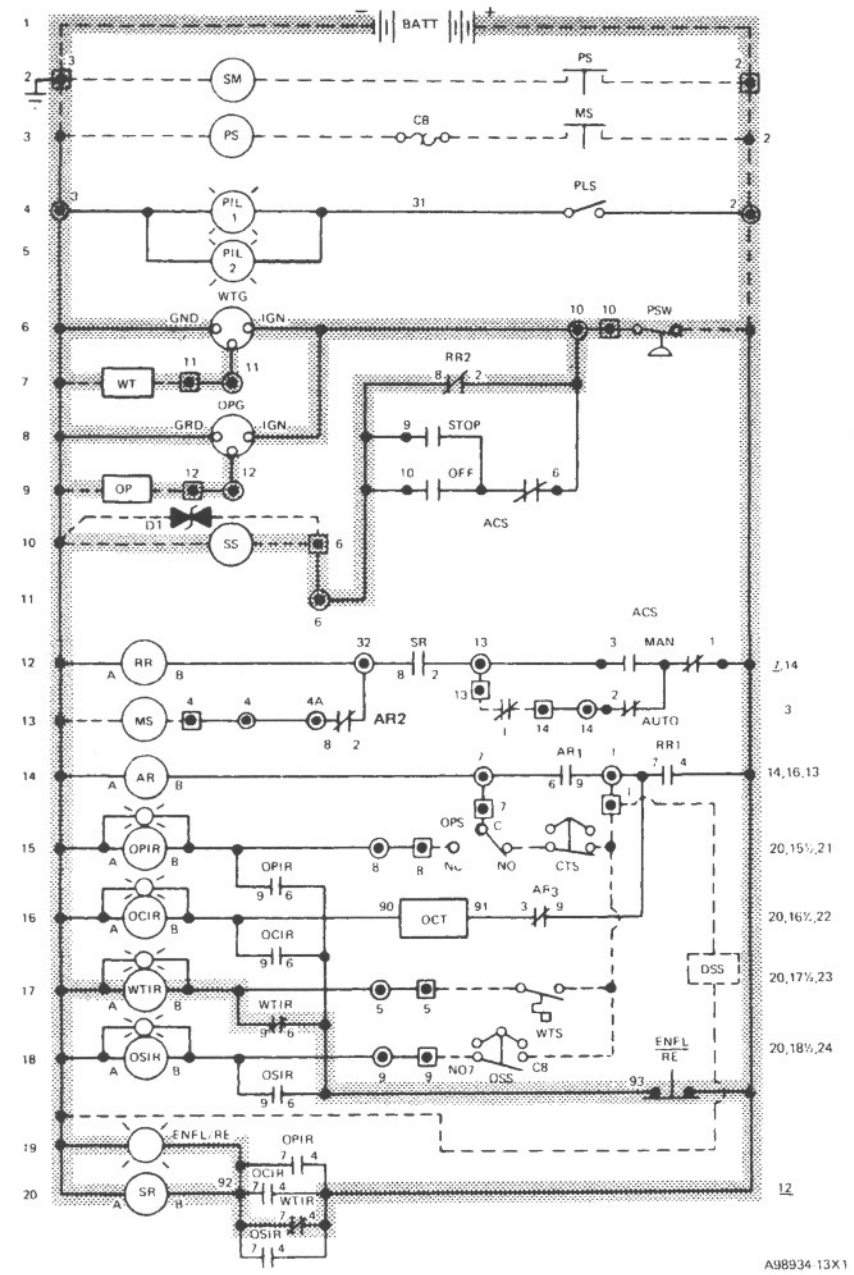
This will prevent the engine from starting if (ENFL) is pushed.

NOTE: For start up when (OCIR) indicating relay gives light, make reference to ENGINE DOES NOT START.

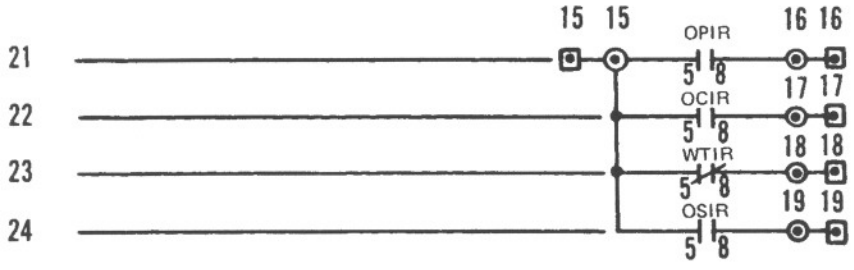
2. Correct the problem that caused the engine to shutdown.

3. Push and release engine fault light (ENFL). This will open (ENFL) contacts for a moment and de-energize the indicating relay. The indicating relay contacts will open and de-energize engine fault light (ENFL) and shutdown relay (SR).

NOTE: 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.



A98934-13X1



B41393X1

CONTROL PANEL
AUTOMATIC POSITION—SHUTDOWN (HIGH WATER TEMPERATURE)

A	AMMETER
ACS	ENGINE CONTROL SWITCH
ALT	CHARGING ALTERNATOR
AR	ARMING RELAY
ARX	AUXILIARY RELAY MODULE
BATT	BATTERY
B+	BATTERY POSITIVE
B−	BATTERY NEGATIVE
CB	CIRCUIT BREAKER
CCM	CYCLE CRANKING MODULE
CCT	CYCLE CRANK RELAY
CRC	CYCLE CRANK LOGIC TIMER
CT	CURRENT TRANSFORMER
CTS	CRANK TERMINATE SWITCH
D	DIODE
DSS	DUAL SPEED SWITCH (INCLUDES CTS 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	RMEOTE START INITIATING CONTACT
MS	MAGNETIC SWITCH (CRANK CIRCUIT)
MSG	MAGNETIC SWITCH (GLOW PLUG CIRCUIT)
OCIR	OVERCRANK INDICATING RELAY
OCT	OVERCRANK TIMER
OP	OIL PRESSURE GAUGE SENDER
OPG	OIL PRESSURE GAUGE
OPIR	LOW OIL PRESSURE INDICATING RELAY
OPS	OIL PRESSURE SWITCH
OSIR	OVERSPEED INDICATING RELAY
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
SS	SHUT-OFF SOLENOID
SM	STARTING MOTOR
SR	SHUTDOWN RELAY
WT	WATER TEMPERATURE GAUGE SENDER
WTG	WATER TEMPERATURE GAUGE
WTIR	HIGH WATER TEMPERATURE INDICATING RELAY
WTS	WATER TEMPERATURE SWITCH

⊙ TERMINAL STRIP POINT (CONTROL PANEL)

⊡ TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)