GENERATOR MOUNTED CONTROL PANEL
(TYPE 1 — PRIOR TO CATERPILLAR PARTS SERVICE)

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. Identification of some of the control panel components is given on black plastic plates. The position of control panel switches is also given on these plates. The control panel has an eleven place model number on the panel nameplate.

NOTE: Parts for this control panel are not serviced by Caterpillar Tractor Company.

WIRING

Wiring diagram No. 1 shows wiring connections for control panels made before the remote annunciator panel and prealarm module were availble through Caterpillar.

Wiring diagram No. 2 shows wiring connections for control panels made after remote annunciator panel 3N7325 and prealarm module 3N5569 were available through Caterpillar.

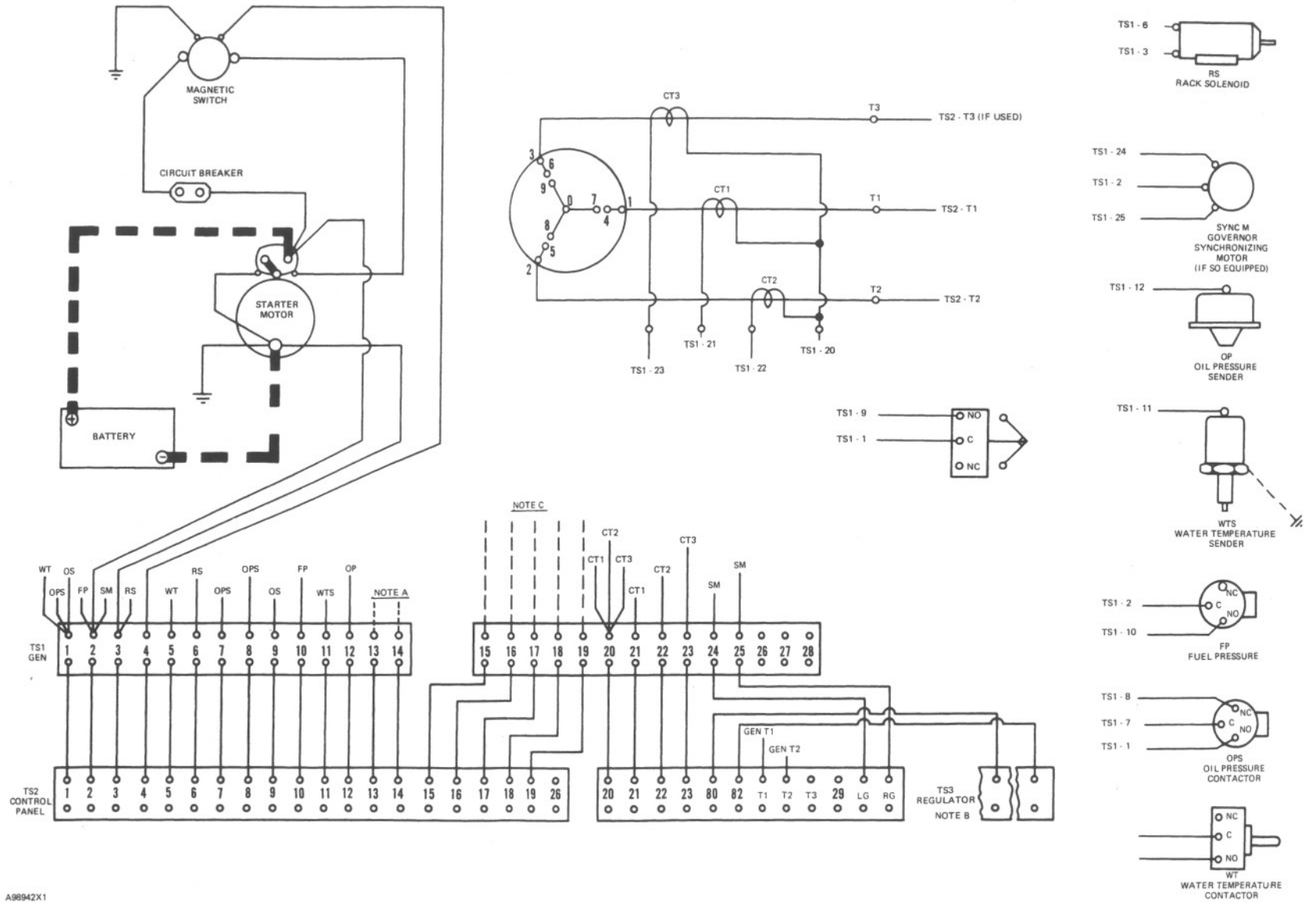
Wiring diagram No. 3 is for packaged generator sets with a two element speed switch (OSS and USS) in place of overspeed switch (OS).

NOTE: A photograph of the panel is shown after wiring diagram No. 2.

MAXIMUM RECOMMENDED TOTAL BATTERY CABLE LENGTH		
CABLE SIZE	DIRECT ELECTRIC STARTING	
	12 Volt	24-32 Volt
0	4 ft. (1.2 m)	15 ft. (4.6 m)
00	5 ft. (1.5 m)	18 ft. (5.5 m)
000	6 ft. (1.8 m)	21 ft. (6.4 m)
0000	7.5 ft. (2.3 m)	27 ft. (8.2 m)

COLOR CODE		
B	—	black
W	—	white
R	—	red
PU	—	purple
W/B	—	white with black stripe
O	—	orange
BR	—	brown
BL	—	blue
LT GR	—	light green

The number after the color is the recommended wire size



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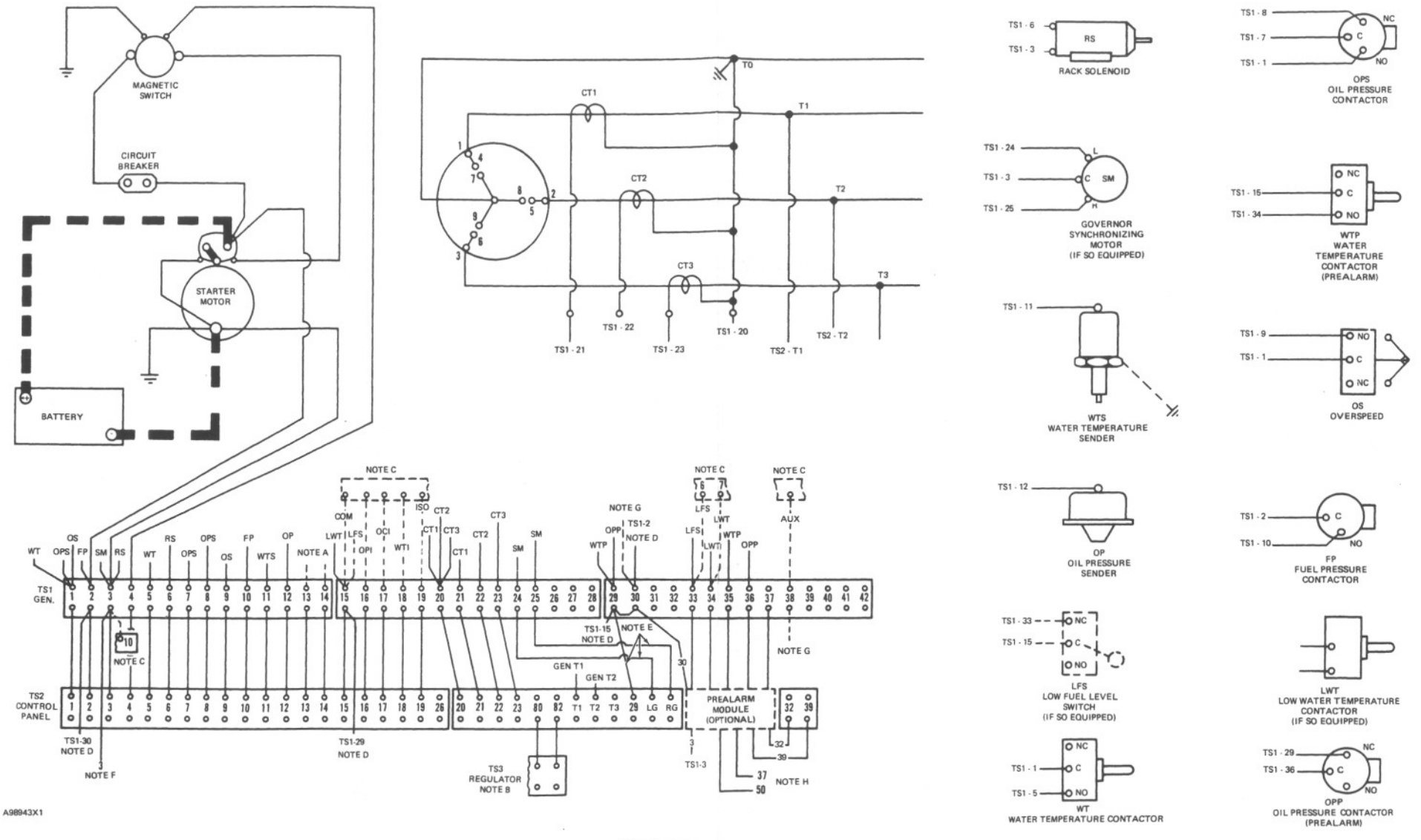
WIRING DIAGRAM No. 1

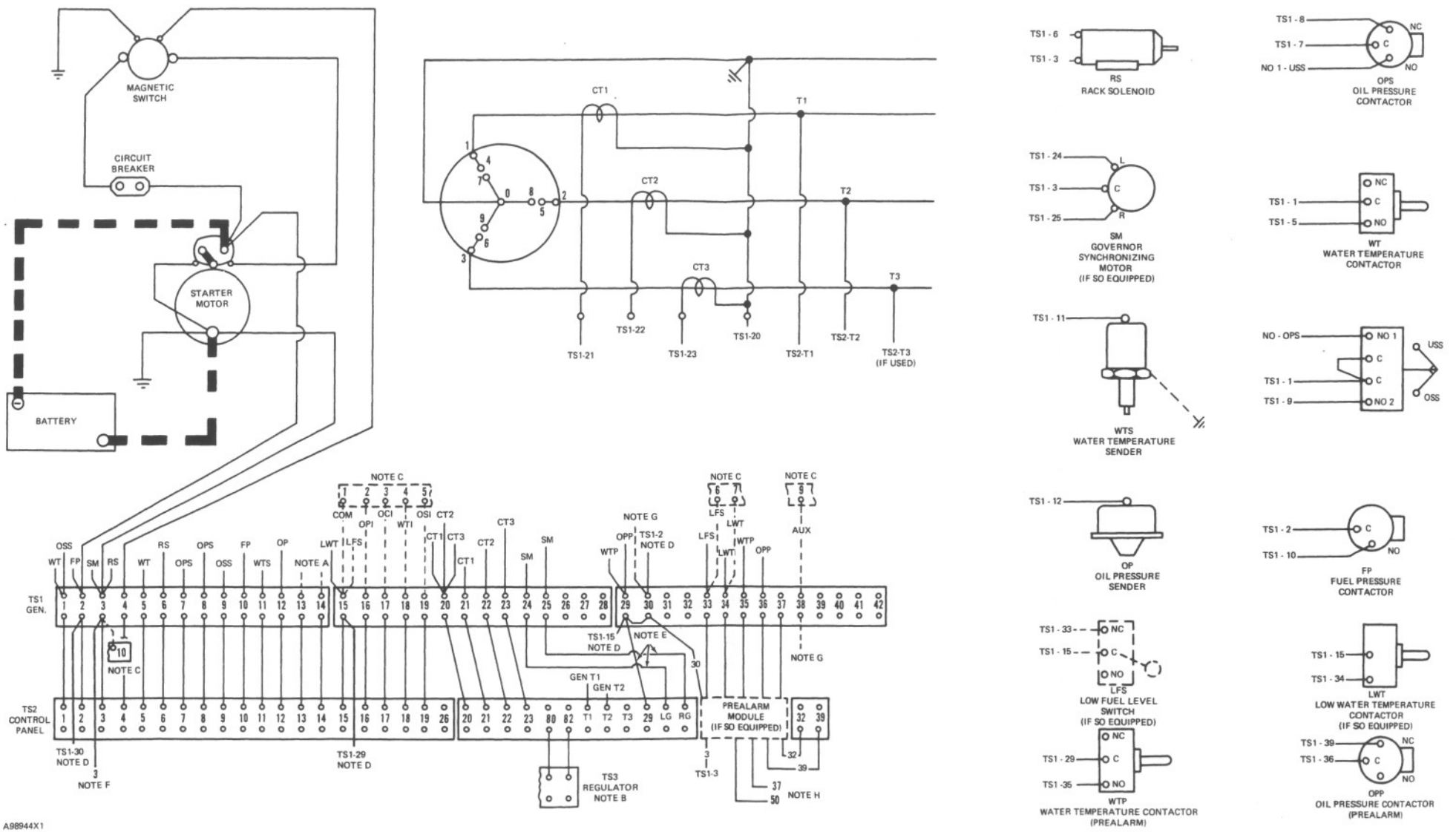
NOTE: Customer must supply wires shown dotted.
NOTE A: To initiating contactor at automatic transfer switch.
NOTE B: The yellow wire from voltage level rheostat (R2) to terminal (7) on the regulator terminal strip must be disconnected at terminal (7).
NOTE C: Terminals 15, 16, 17, 18 and 19 of TS2 available for remote annunciator panel.



WIRING DIAGRAM No. 2

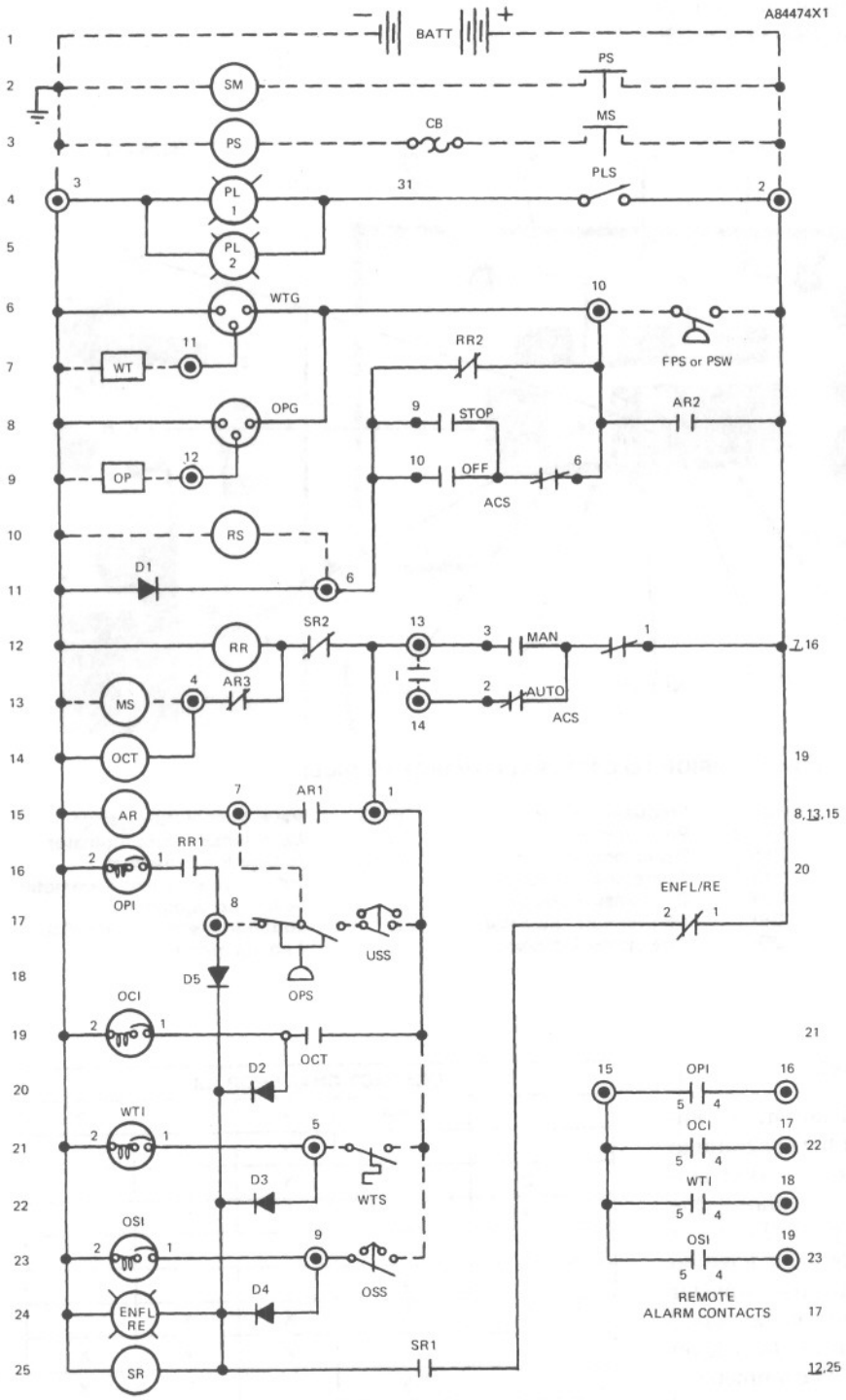
NOTE: Customer must supply wires shown dotted.
NOTE A: To initiating contactor at automatic transfer switch.
NOTE B: The yellow wire from voltage level rheostat (R2) to terminal (7) on the regulator terminal strip must be disconnected at terminal (7).
NOTE C. Terminals in optional remote annunciator panel.
NOTE D: Used only with optional remote annunciator panel, prealarm module, or PSG governor. Jumper B+ from TS1-2 to TS1-30 to TS1-29 to TS1-15 with R#14

NOTE E: Used only with governor switch and PSG governor.
NOTE F: Connected to optional prealarm module.
NOTE G: Connected to auxiliary contact (N.O.) on emergency side of transfer switch. Used only with optional remote annunciator panel for generator indication.
NOTE H: To optional prealarm module. Connect wire 37 to terminal 1 on the low oil pressure indicator. Connect wire 50 to the normally open contact on the oil pressure timer.



WIRING DIAGRAM NO. 3

NOTE: Customer must supply wires shown dotted.
NOTE A: To initiating contactor at automatic transfer switch.
NOTE B: The yellow wire from voltage level rheostat (R2) to terminal (7) on the regulator terminal strip must be disconnected at terminal (7).
NOTE C. Terminals in optional remote annunciator panel.
NOTE D: Used only with optional remote annunciator panel, prealarm module, or PSG governor. Jumper B+ from TS1-2 to TS1-30 to TS1-29 to TS1-15 with R#14
NOTE E: Used only with governor switch and PSG governor.
NOTE F: Connected to optional prealarm module.
NOTE G: Connected to auxiliary contact (N.O.) on emergency side of transfer switch. Used only with optional remote annunciator panel for generator indication.
NOTE H: To optional prealarm module. Connect wire 37 to terminal 1 on the low oil pressure indicator. Connect wire 50 to the normally open contact on the oil pressure timer.

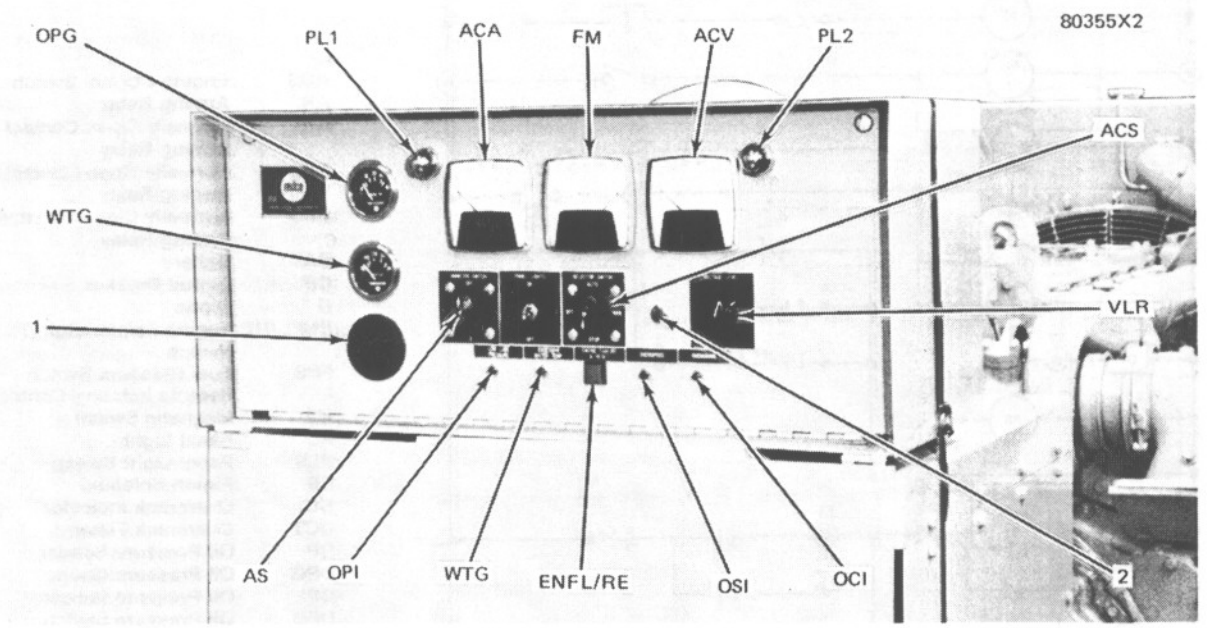


CONTROL PANEL—AUTOMATIC POSITION

ACS	Engine Control Switch
AR	Arming Relay
AR1	Normally Open Contact Of Arming Relay
AR2	Normally Open Contact Of Arming Relay
AR3	Normally Closed Contact of Arming Relay
BATT	Battery
CB	Circuit Breaker
D	Diode
ENFL/RE	Engine Failure Light/Reset Switch
FPS	Fuel Pressure Switch
I	Remote Initating Contact
MS	Magnetic Switch
PL	Panel Light
PLS	Panel Light Switch
PS	Pinion Solenoid
OCI	Overcrank Indicator
OCT	Overcrank Timer
OP	Oil Pressure Sender
OPG	Oil Pressure Gauge
OPI	Oil Pressure Indicator
OPS	Oil Pressure Switch
OSI	Overspeed Indicator
OSS	Overspeed Switch
PSW	Pressure Switch
RR	Run Relay
RR1	Normally Open Contact of Run Relay
RR2	Normally Closed Contact of Run Relay
RS	Rack Solenoid
SM	Starting Motor
SR	Shutdown Relay
SR1	Normally Open Contact of Shutdown Relay
SR2	Normally Closed Contact of Shutdown Relay
USS	Underspeed Switch (if equipped)
WT	Water Temperature Sender
WTG	Water Temperature Gauge
WTI	Water Temperature Indicator
WTS	Water Temperature Switch

COMPONENTS

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



CONTROL PANEL (TYPE 1 — PRIOR TO CATERPILLAR PARTS SERVICE)

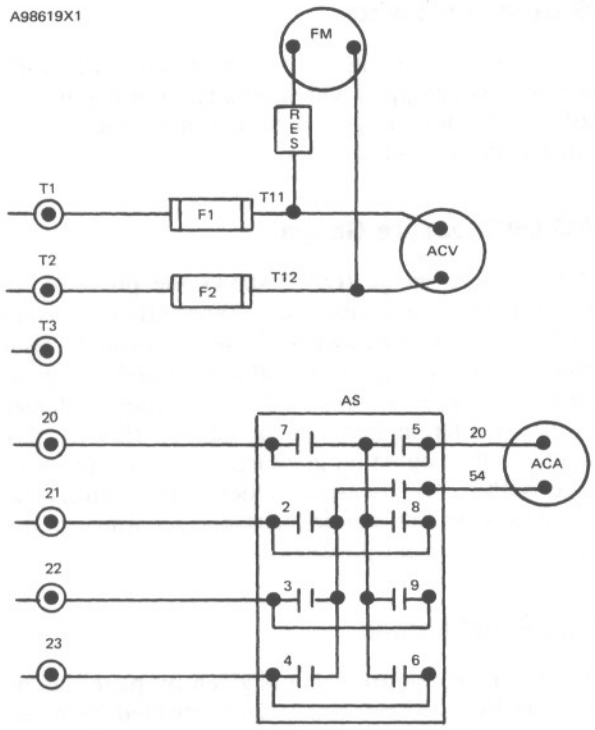
ACA	Alternating current ammeter	FM	Frequency meter	WTG	Water temperature gauge
ACS	Engine control switch	PL1,2	Panel lamps	WTI	Water temperature indicator
ACV	Alternating current voltmeter	PLS	Panel lamp switch	VLR	Voltage level rheostat
AS	Ammeter selector switch (Ammeter/voltmeter selector switch AVS,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

ACA Alternating Current Ammeter

AC ammeter (ACA) gives an indication, in amperes, of the current from each phase of the generator to the load. Either ammeter selector switch (AS) or ammeter/voltmeter selector switch (AVS) connect the ammeter to the current transformer on phase T1, T2 or T3; see Contact Charts. Ammeters normally have an input range from 0 to 5 amperes. Current transfer (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 lead of the generator.

CONTACT CHART FOR AS				
	OFF	1	2	3
1		X	X	X
2		X		
3			X	
4				X
5	X			
6	X	X	X	
7		X	X	X
8	X		X	X
9	X	X		X

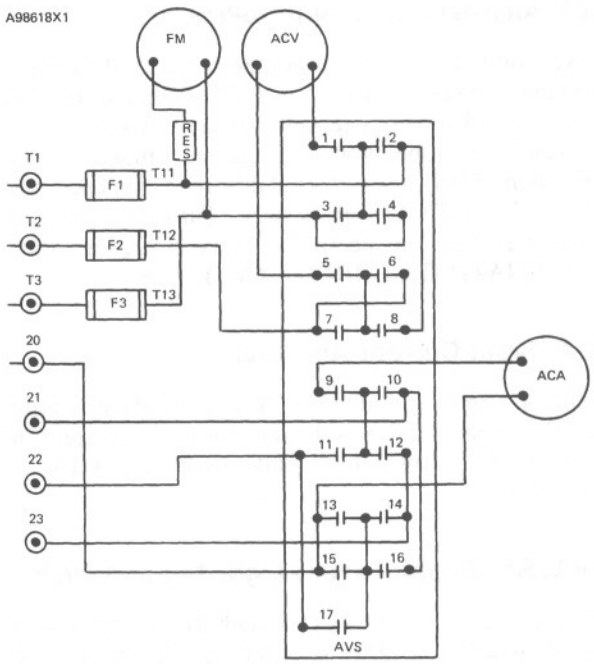
NOTE: X gives an indication of a closed contact



AMMETER SELECTOR SWITCH (AS)

ACA Alternating current ammeter
ACV Alternating current voltmeter
F1,2 Fuses
FM Frequency meter
RES Resistor
⊙ Terminal points on TS2 in control panel

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



AMMETER/VOLTMETER SELECTOR SWITCH (AVS)

ACA Alternating current ammeter
ACV Alternating current voltmeter
F1,2 Fuses
FM Frequency meter
RES Resistor
⊙ Terminal points on TS2 in control panel

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	X	X	X
8		X		
9			X	
10				X

ACV Alternating Current Voltmeter

AC voltmeter (ACV) shows the potential difference (voltage) between phase T1 and T2, when the panel is equipped with an ammeter selector switch (AS) only. If the panel is equipped with an ammeter/voltmeter selector switch (AVS), the potential difference between T1-T2, T2-T3 or T3-T1 can be seen. Turn the switch to 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 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.

OPG Oil Pressure Gauge

Oil pressure gauge (OPG) shows the pressure, in psi, of engine lubrication oil. When fuel pressure switch (FPS), 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.

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 fuel pressure switch (FPS), 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

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, initiating contactor (I) closes. This makes a complete circuit from battery (BATT) to energize run relay (RR), magnetic switch (MS) and overcrank timer (OCT).

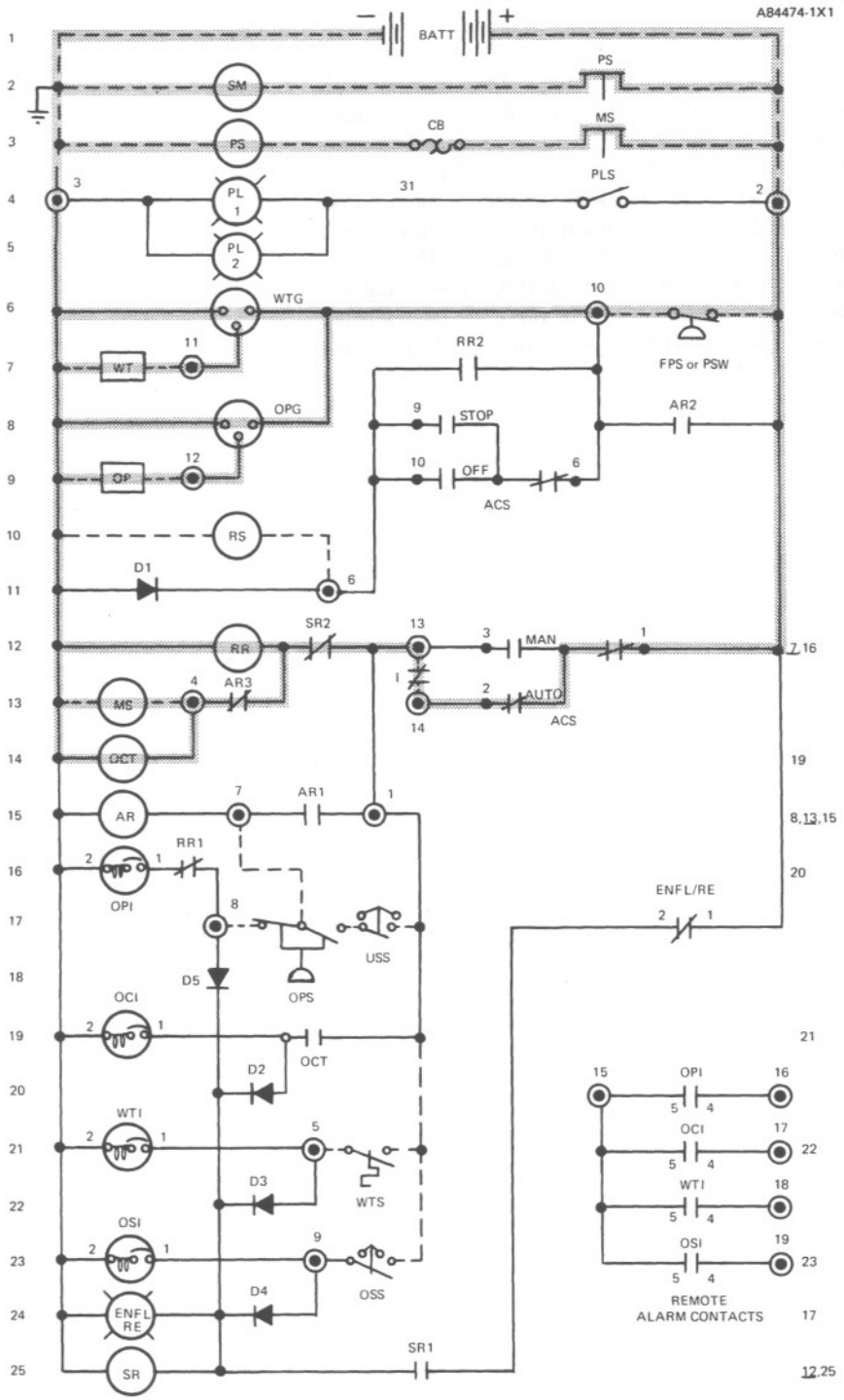
When run relay (RR) is energized, contacts (RR2) open and contacts (RR1) close. (RR2) open prevents current flow to rack solenoid (RS) through fuel pressure switch (FPS) or pressure switch (PSW). (RR1) closed makes it possible to energize oil pressure indicator (OPI).

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 stop. (OCT) contacts will close. Make reference to ENGINE DOES NOT START.

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
AUTOMATIC POSITION-ENGINE CRANKS

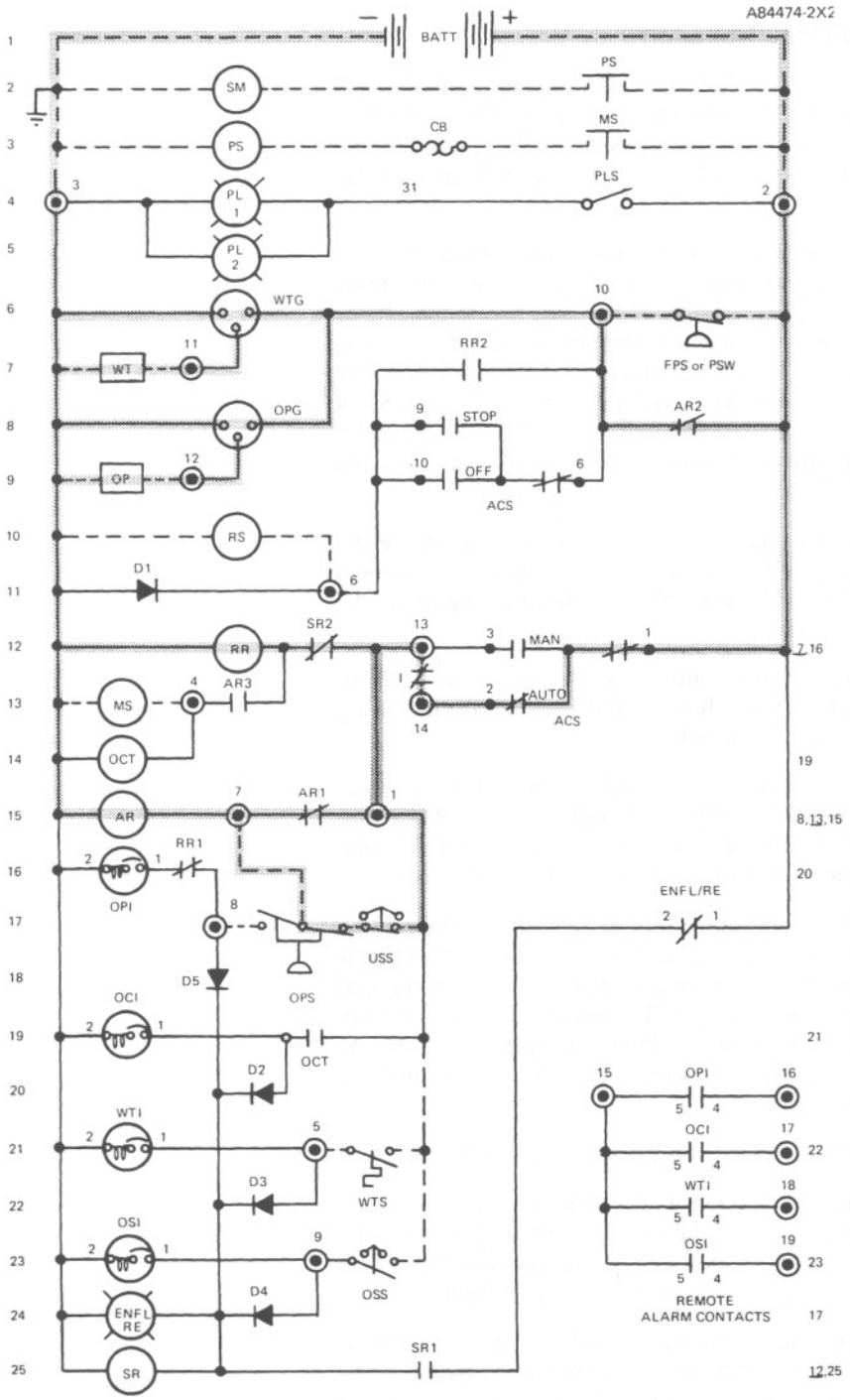
ACS	Engine Control Switch
AR	Arming Relay
AR1	Normally Open Contact of Arming Relay
AR2	Normally Open Contact of Arming Relay
AR3	Normally Closed Contact of Arming Relay
BATT	Battery
CB	Circuit Breaker
D	Diode
ENFL/RE	Engine Failure Light/Reset Switch
FPS	Fuel Pressure Switch
I	Remote Initating Contact
MS	Magnetic Switch
PL	Panel Light
PLS	Panel Light Switch
PS	Pinion Solenoid
OCI	Overcrank Indicator
OCT	Overcrank Timer
OP	Oil Pressure Sender
OPG	Oil Pressure Gauge
OPI	Oil Pressure Indicator
OPS	Oil Pressure Switch
OSI	Overspeed Indicator
OSS	Overspeed Switch
PSW	Pressure Switch
RR	Run Relay
RR1	Normally Open Contact of Run Relay
RR2	Normally Closed Contact of Run Relay
RS	Rack Solenoid
SM	Starting Motor
SR	Shutdown Relay
SR1	Normally Open Contact of Shutdown Relay
SR2	Normally Closed Contact of Shutdown Relay
USS	Underspeed Switch (if equipped)
WT	Water Temperature Sender
WTG	Water Temperature Gauge
WTI	Water Temperature Indicator
WTS	Water Temperature Switch
⊙	Terminal points on terminal strip TS2 in control panel housing.

Dotted lines show switches and components on the engine and a remote initiating contact (I).

The numbered contacts are part of the engine control switch (ACS).

Engine Starts

At 600 rpm, underspeed switch (USS), closes (if so equipped). 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 overcrank timer (OCT) and magnetic switch (MS). (MS) contacts open to de-energize pinion solenoid (PS). (PS) contacts open to de-energize starting motor (SM).



CONTROL PANEL
AUTOMATIC POSITION—ENGINE STARTS

ACS	Engine Control Switch
AR	Arming Relay
AR1	Normally Open Contact of Arming Relay
AR2	Normally Open Contact of Arming Relay
AR3	Normally Closed Contact of Arming Relay
BATT	Battery
CB	Circuit Breaker
D	Diode
ENFL/RE	Engine Failure Light/Reset Switch
FPS	Fuel Pressure Switch
I	Remote Initating Contact
MS	Magnetic Switch
PL	Panel Light
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OPS	Oil Pressure Switch
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OSS	Overspeed Switch
PSW	Pressure Switch
RR	Run Relay
RR1	Normally Open Contact of Run Relay
RR2	Normally Closed Contact of Run Relay
RS	Rack Solenoid
SM	Starting Motor
SR	Shutdown Relay
SR1	Normally Open Contact of Shutdown Relay
SR2	Normally Closed Contact of Shutdown Relay
USS	Underspeed Switch (if equipped)
WT	Water Temperature Sender
WTG	Water Temperature Gauge
WTI	Water Temperature Indicator
WTS	Water Temperature Switch
⊙	Terminal points on terminal strip TS2 in control panel housing.

Dotted lines show switches and components on the engine and a remote initiating contact (I).

The numbered contacts are part of the engine control switch (ACS).

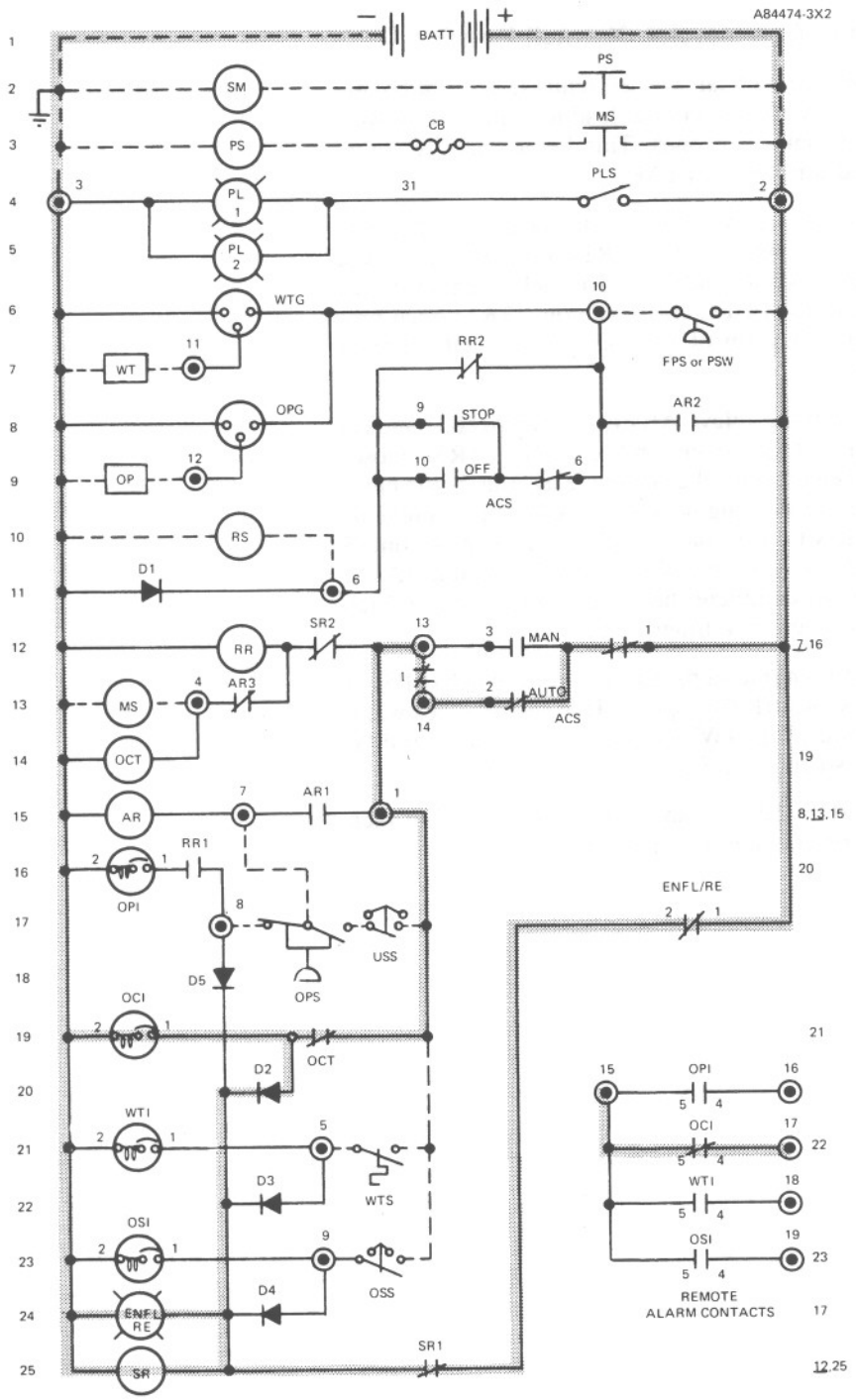
Engine Does Not Start

If the engine does not start in approximately 30 seconds, (OCT) contacts will close. This completes the circuit 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), magnetic switch (MS) and overcrank timer (OCT). (MS) contacts open and de-energize pinion solenoid (PS). (PS) contacts open and de-energize starting motor (SM). Fuel pressure switch (FPS) or 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.
2. Push engine failure light/reset switch (ENFL/RE). This will open (ENFL/RE) contacts and de-energize shutdown relay (SR) and engine failure light/reset switch (ENFL/RE).
3. Release the engine failure light/reset switch. If the light goes out, go to the next step. If the light is still on (OCT) contacts are still closed. A thermal protector keeps (OCT) contacts closed to protect the starting motor. Push and release the engine failure light/reset switch at short intervals until the light goes out.
4. Push overcrank indicator button (OCI) back in.
5. Turn the engine control 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.
6. Turn engine control switch (ACS) to OFF or STOP. Correct the problem that caused the engine not to start. Make reference to TROUBLESHOOTING.



ACS	Engine Control Switch
AR	Arming Relay
AR1	Normally Open Contact of Arming Relay
AR2	Normally Open Contact of Arming Relay
AR3	Normally Closed Contact of Arming Relay
BATT	Battery
CB	Circuit Breaker
D	Diode
ENFL/RE	Engine Failure Light/Reset Switch
FPS	Fuel Pressure Switch
I	Remote Initating Contact
MS	Magnetic Switch
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RR1	Normally Open Contact of Run Relay
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SM	Starting Motor
SR	Shutdown Relay
SR1	Normally Open Contact of Shutdown Relay
SR2	Normally Closed Contact of Shutdown Relay
USS	Underspeed Switch (if equipped)
WT	Water Temperature Sender
WTG	Water Temperature Gauge
WTI	Water Temperature Indicator
WTS	Water Temperature Switch
⊙	Terminal points on terminal strip TS2 in control panel housing.

Dotted lines show switches and components on the engine and a remote initiating contact (I).

The numbered contacts are part of the engine control switch (ACS).

CONTROL PANEL
AUTOMATIC POSITION—ENGINE DOES NOT START

Return of Commercial (Normal) Power

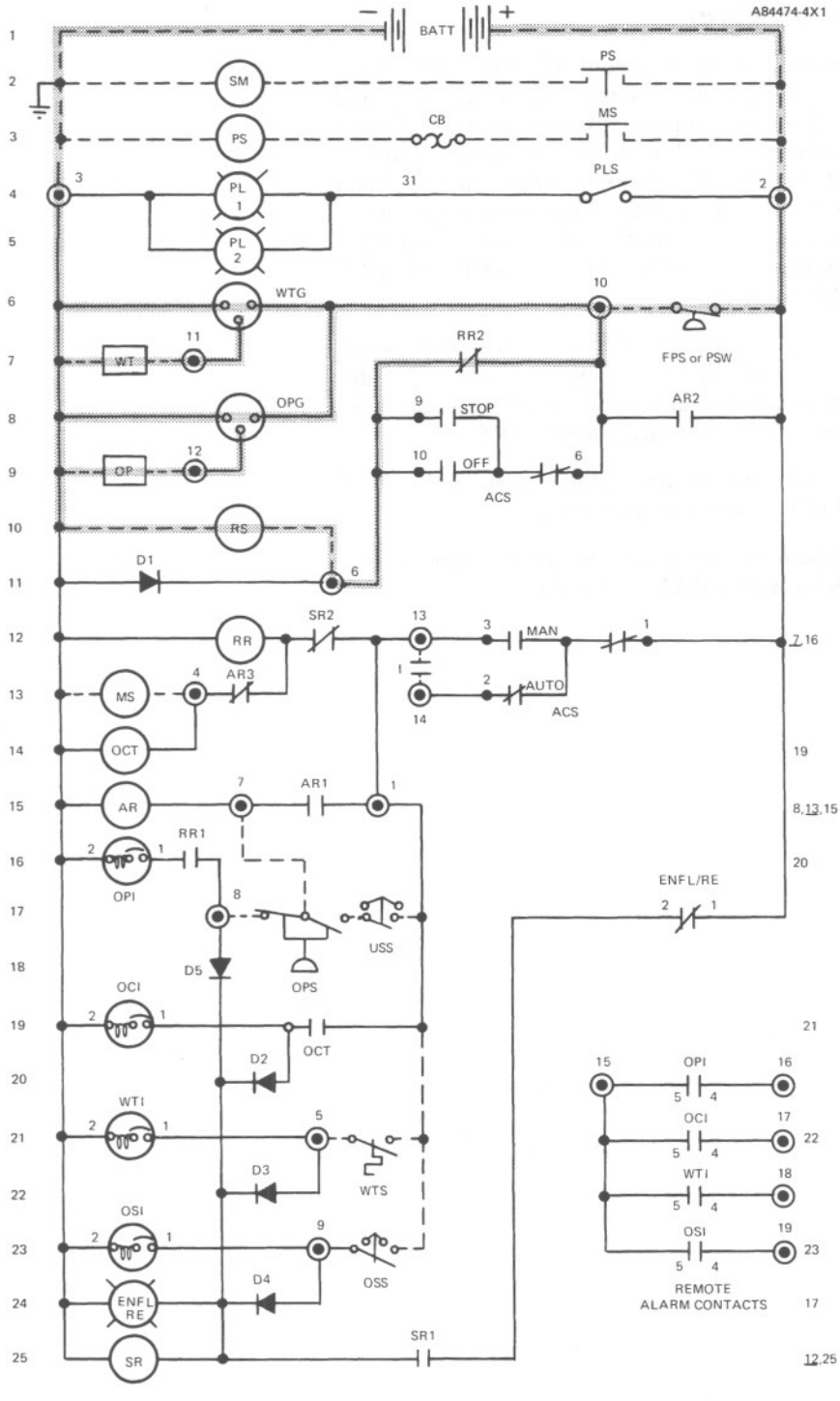
When commercial power returns, the automatic transfer switch transfers the load to comercial power. Initiating contacts (I) open. This de-energizes run relay (RR) and arming relay (AR).

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) 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) and overcrank timer (OCT).

When the engine stops, fuel pressure switch (FPS) or 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
AUTOMATIC POSITION—COMMERCIAL POWER RETURNS

ACS	**Engine Control Switch**
AR	**Arming Relay**
AR1	**Normally Open Contact of Arming Relay**
AR2	**Normally Open Contact of Arming Relay**
AR3	**Normally Closed Contact of Arming Relay**
BATT	**Battery**
CB	**Circuit Breaker**
D	**Diode**
ENFL/RE	**Engine Failure Light/Reset Switch**
FPS	**Fuel Pressure Switch**
I	**Remote Initating Contact**
MS	**Magnetic Switch**
PL	**Panel Light**
PLS	**Panel Light Switch**
PS	**Pinion Solenoid**
OCI	**Overcrank Indicator**
OCT	**Overcrank Timer**
OP	**Oil Pressure Sender**
OPG	**Oil Pressure Gauge**
OPI	**Oil Pressure Indicator**
OPS	**Oil Pressure Switch**
OSI	**Overspeed Indicator**
OSS	**Overspeed Switch**
PSW	**Pressure Switch**
RR	**Run Relay**
RR1	**Normally Open Contact of Run Relay**
RR2	**Normally Closed Contact of Run Relay**
RS	**Rack Solenoid**
SM	**Starting Motor**
SR	**Shutdown Relay**
SR1	**Normally Open Contact of Shutdown Relay**
SR2	**Normally Closed Contact of Shutdown Relay**
USS	**Underspeed Switch (if equipped)**
WT	**Water Temperature Sender**
WTG	**Water Temperature Gauge**
WTI	**Water Temperature Indicator**
WTS	**Water Temperature Switch**
⊙	**Terminal points on terminal strip TS2 in control panel housing.**

Dotted lines show switches and components on the engine and a remote initiating contact (I).

The numbered contacts are part of the engine control switch (ACS).

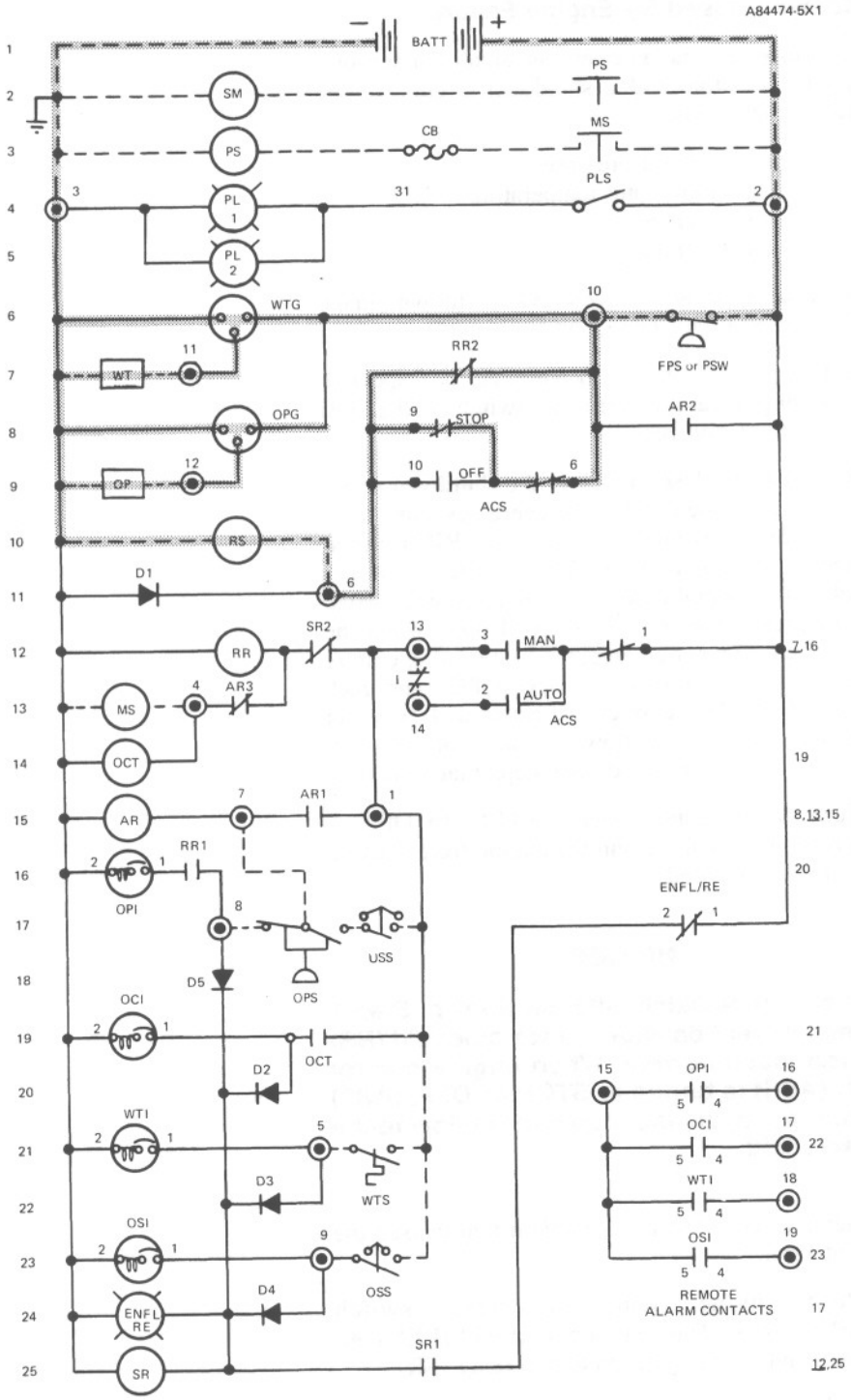
Manual Shutdown

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) closes.

Fuel pressure switch (FPS) or 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
STOP POSITION—MANUAL SHUTDOWN

ACS	Engine Control Switch
AR	Arming Relay
AR1	Normally Open Contact of Arming Relay
AR2	Normally Open Contact of Arming Relay
AR3	Normally Closed Contact of Arming Relay
BATT	Battery
CB	Circuit Breaker
D	Diode
ENFL/RE	Engine Failure Light/Reset Switch
FPS	Fuel Pressure Switch
I	Remote Initiating Contact
MS	Magnetic Switch
PL	Panel Light
PLS	Panel Light Switch
PS	Pinion Solenoid
OCI	Overcrank Indicator
OCT	Overcrank Timer
OP	Oil Pressure Sender
OPG	Oil Pressure Gauge
OPI	Oil Pressure Indicator
OPS	Oil Pressure Switch
OSI	Overspeed Indicator
OSS	Overspeed Switch
PSW	Pressure Switch
RR	Run Relay
RR1	Normally Open Contact of Run Relay
RR2	Normally Closed Contact of Run Relay
RS	Rack Solenoid
SM	Starting Motor
SR	Shutdown Relay
SR1	Normally Open Contact of Shutdown Relay
SR2	Normally Closed Contact of Shutdown Relay
USS	Underspeed Switch (if equipped)
WT	Water Temperature Sender
WTG	Water Temperature Gauge
WTI	Water Temperature Indicator
WTS	Water Temperature Switch
⊙	Terminal points on terminal strip TS2 in control panel housing.

Dotted lines show switches and components on the engine and a remote initiating contact (I).

The numbered contacts are part of the engine control switch (ACS).

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. Fuel pressure switch (FPS) or 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:

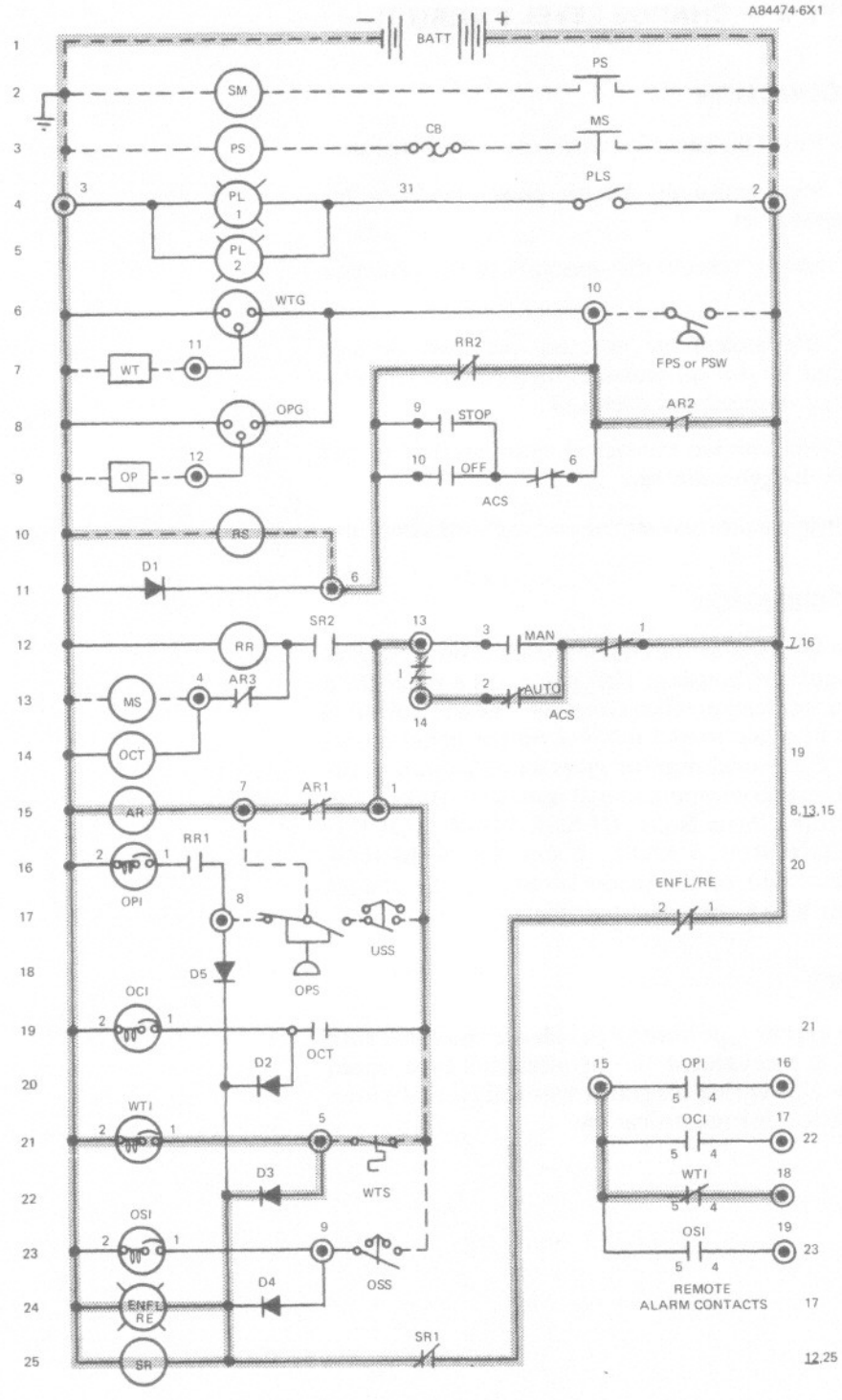
1. Turn engine control switch (ACS) to OFF or STOP. This will prevent the engine from starting if it is not desired.

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
AUTOMATIC POSITION—HIGH WATER TEMPERATURE SHUTDOWN

ACS	Engine Control Switch
AR	Arming Relay
AR1	Normally Open Contact of Arming Relay
AR2	Normally Open Contact of Arming Relay
AR3	Normally Closed Contact of Arming Relay
BATT	Battery
CB	Circuit Breaker
D	Diode
ENFL/RE	Engine Failure Light/Reset Switch
FPS	Fuel Pressure Switch
I	Remote Initating Contact
MS	Magnetic Switch
PL	Panel Light
PLS	Panel Light Switch
PS	Pinion Solenoid
OCI	Overcrank Indicator
OCT	Overcrank Timer
OP	Oil Pressure Sender
OPG	Oil Pressure Gauge
OPI	Oil Pressure Indicator
OPS	Oil Pressure Switch
OSI	Overspeed Indicator
OSS	Overspeed Switch
PSW	Pressure Switch
RR	Run Relay
RR1	Normally Open Contact of Run Relay
RR2	Normally Closed Contact of Run Relay
RS	Rack Solenoid
SM	Starting Motor
SR	Shutdown Relay
SR1	Normally Open Contact of Shutdown Relay
SR2	Normally Closed Contact of Shutdown Relay
USS	Underspeed Switch (if equipped)
WT	Water Temperature Sender
WTG	Water Temperature Gauge
WTI	Water Temperature Indicator
WTS	Water Temperature Switch
⊙	Terminal points on terminal strip TS2 in control panel housing.

Dotted lines show switches and components on the engine and a remote initiating contact (I).

The numbered contacts are part of the engine control switch (ACS).