

B66878X1

CONTROL PANEL
AUTOMATIC POSITION (AUTO SHUTDOWN)

Manual Shutdown

When engine control switch (ACS) is turned to the STOP position or OFF/RESET position, contacts (10 and 11) are open. With contacts (10 and 11) open, the run relay (RR) de-energizes.

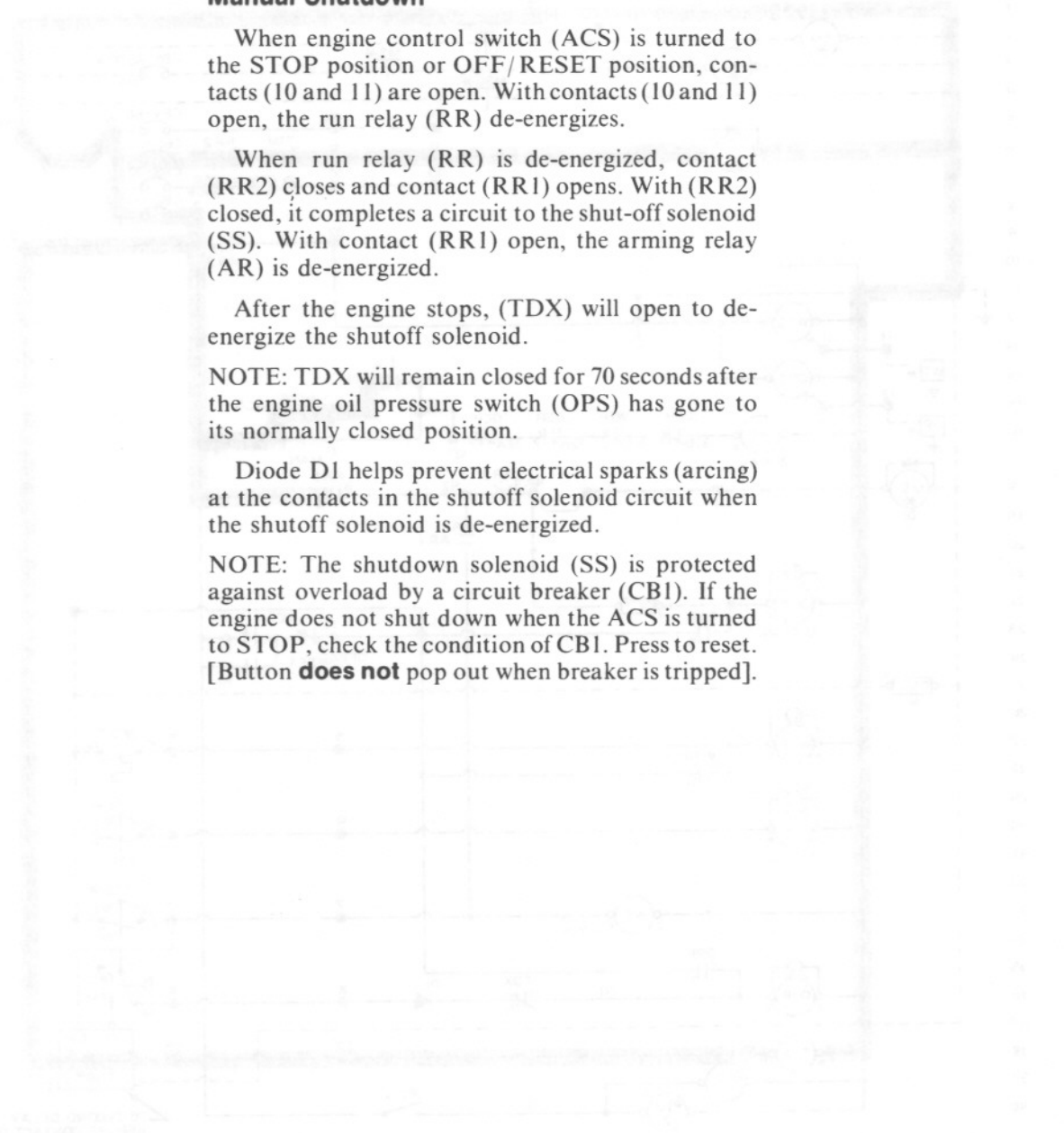
When run relay (RR) is de-energized, contact (RR2) closes and contact (RR1) opens. With (RR2) closed, it completes a circuit to the shut-off solenoid (SS). With contact (RR1) open, the arming relay (AR) is de-energized.

After the engine stops, (TDX) will open to de-energize the shutoff solenoid.

NOTE: TDX will remain closed for 70 seconds after the engine oil pressure switch (OPS) has gone to its normally closed position.

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

NOTE: The shutdown solenoid (SS) is protected against overload by a circuit breaker (CB1). If the engine does not shut down when the ACS is turned to STOP, check the condition of CB1. Press to reset. [Button **does not** pop out when breaker is tripped].



CONTROL PANEL
STOP/RESET POSITION (TYPE 5) SHUTDOWN

Engine Shutdown Caused by Water Temperature Failure

When engine coolant temperature becomes too high, the normally open water temperature switch (WTS) closes. This, in turn, energizes the water temperature relay (WTR). Contact (WTR1) closes to lock in the relay (WTR).

The normally closed contact (WTR2) opens. This de-energizes run relay (RR). Contact (RR2) closes and contact (RR1) opens. (RR2) closed completes a circuit to shut-off solenoid (SS) until (TDX) opens (70 seconds after OPS opens). (RR1) open de-energizes the arming relay (AR).

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

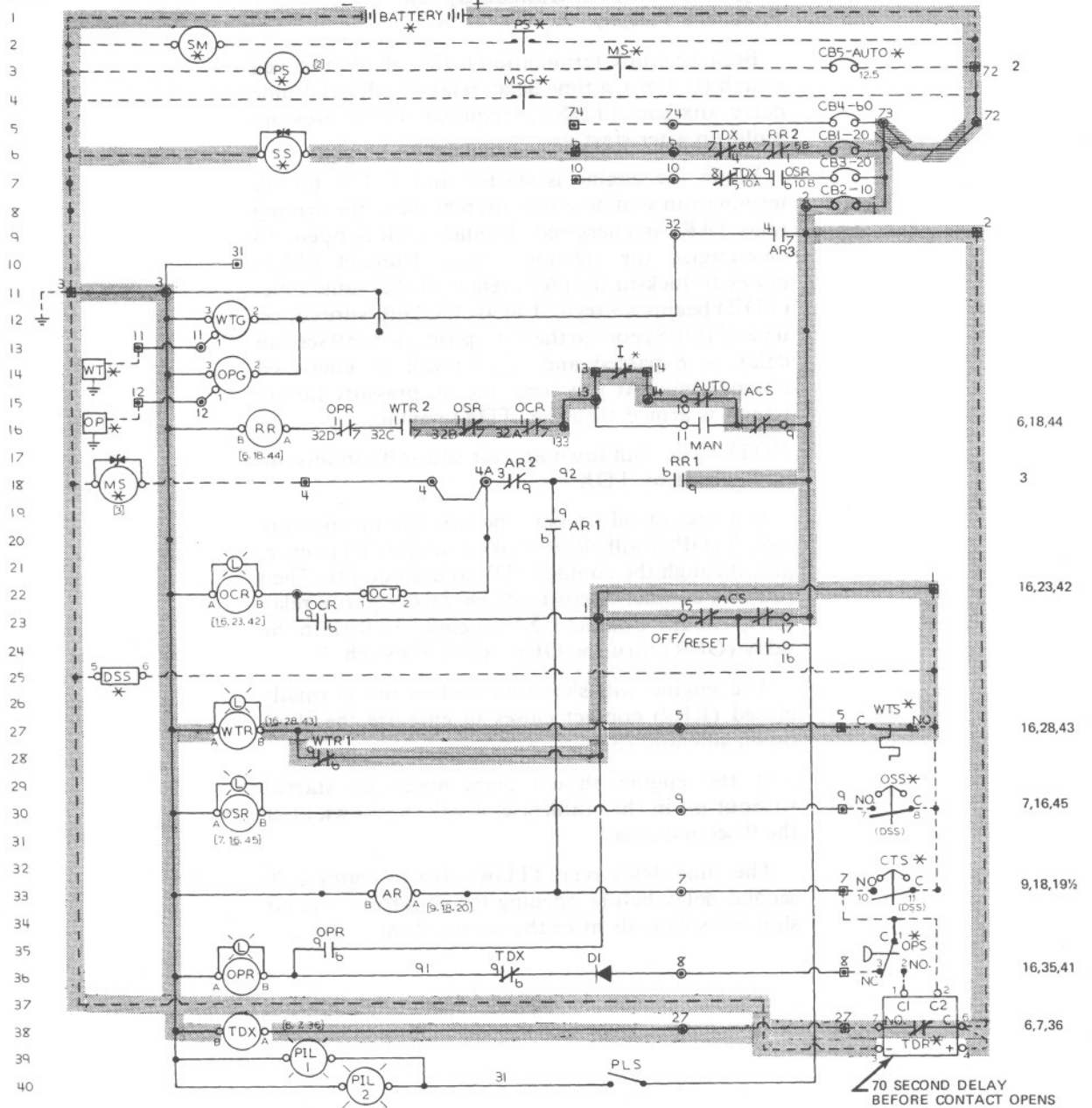
The water temperature indicating relay (WTR) will light. To start the engine, do the steps that follow:

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

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

2. Correct the high water temperature problem.
3. Rotate ACS to OFF/RESET position. This de-energizes the (WTR). Contact (WTR1) will close to energize the run relay coil. Contact (WTR2) will open to de-energize the shutdown solenoid.
4. The system is ready to start if engine control switch (ACS) is turned to MAN or AUTO.

LINE NO.



41	15	OPR	1b	1b	AR	ARMING RELAY	OCT	OVERCRANK TIMER	TDR	TIME DELAY RELAY
42	15	OCR	17	17	ACS	ENGINE CONTROL SWITCH	OP	OIL PRESSURE GAUGE	TDX	TIME DELAY AUXILIARY
43	15	WTR	18	18	BATT	BATTERY	OPG	OIL PRESSURE GAUGE	WT	WATER TEMPERATURE
44	15	OSR	19	19	CB	CIRCUIT BREAKER	OPIR	LOW OIL PRESSURE	WTG	WATER TEMPERATURE
45	15	OPR	19	19	CCM	CYCLE CRANKING MODULE	OPS	OIL PRESSURE SWITCH	WTIR	HIGH WATER TEMPERATURE
		PLS	31	31	CTS	CRANK TERMINATE SWITCH	OSIR	OVERSPEED INDICATING	WTS	WATER TEMPERATURE
		PIL 1	31	31	D	DIODE		RELAY		SWITCH
		PIL 2	31	31	DSS	DUAL SPEED SWITCH	OSS	OVERSPEED SWITCH		
					I	REMOTE START INITIATING	PIL	PANEL ILLUMINATION LAMP		
					MSG	MAGNETIC SWITCH (CRANK	PLS	PANEL LAMP SWITCH		
					CIRCUIT)	CIRCUIT)	PS	PINION SOLENOID		
					MS	MAGNETIC SWITCH (CRANK	RR	RUN RELAY		
					CIRCUIT)	CIRCUIT)	SS	SHUT-OFF SOLENOID		
					MSG	MAGNETIC SWITCH (GLOW	SM	STARTING MOTOR		
					PLUG	PLUG CIRCUIT)	SR	SHUTDOWN RELAY		
					OCIR	OVERCRANK INDICATING				
					RELAY	RELAY				

B66880X1

CONTROL PANEL SHUTDOWN (HIGH WATER TEMPERATURE)

Engine Shutdown Caused by Oil Pressure Failure

Because crank termination is the job of the speed switch (C.T.S.), a time delay relay (TDR) and time delay auxiliary (TDX) is required for oil pressure build-up after start-up.

When the engine is started and C.T.S. (crank termination switch) closes (at 600 rpm), the arming relay (AR) is energized. Contact (AR2) opens to de-energize the starting motor. Contact (AR1) closes to lock-in the (AR) relay. At this same time, (TDR) begins a 9 second delay. If oil pressure comes up and (OPS) goes to the N.O. position, the 9 second delay is bypassed and (TDX) will be energized immediately. At this time, the oil pressure failure circuit is armed thru the (TDX) contact.

NOTE: The shutdown and air shut-off circuits are also armed by TDX.

If a loss of oil pressure occurs, the oil pressure switch (OPS) will close. This causes (OPR) to energize through the contact TDX and diode D1. Then (OPR1) contact opens to de-energize the run relay (RR) circuit. Contact (OPR2) closes to lock-in the relay (OPR) thru the OFF/RESET switch.

The engine will shut down when the normally closed (RR2) contact closes to energize the shutdown solenoid (SS).

If the engine should accidentally be started without oil in the crankcase, it will shutdown after the 9 second delay.

The time delay relay (TDR) also provides a 70 second delay before opening the shutdown and air shut-off solenoids after the engine stops.

Shutdown Caused By Overspeed

When the engine is shutdown due to an overspeed condition, the overspeed relay (OSR) is energized and locked in by the overspeed switch (OSS) contact of the dual speed switch (DSS).

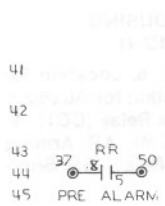
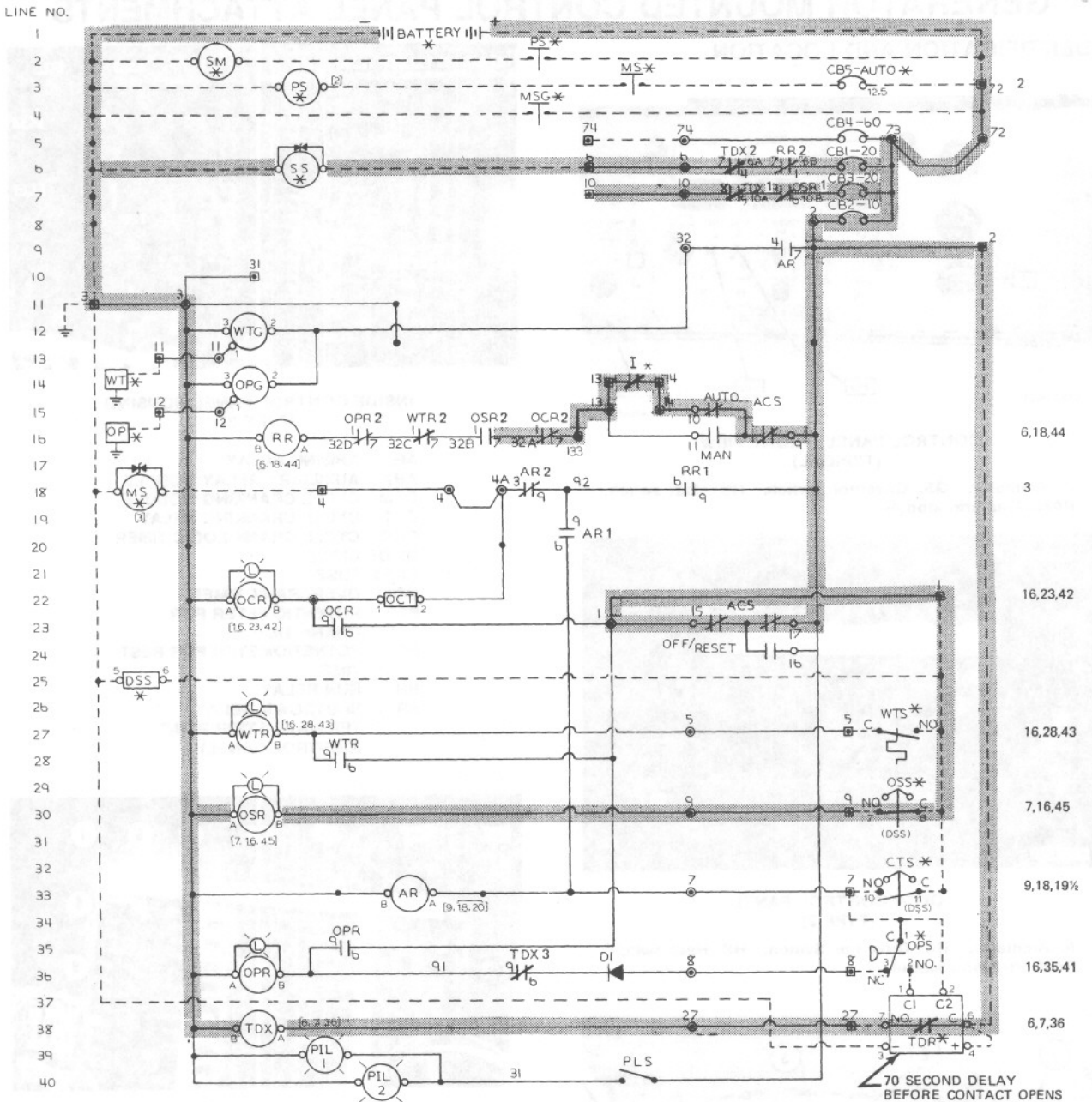
The normally closed contact (OSR2) opens to de-energize the run relay (RR). The normally open contact (OSR1) closes to complete a circuit through the closed (TDX1) contact. This energizes the optional air shutoff solenoid (ASO).

Closed contacts (RR2) and (TDX2) will energize the shutdown solenoid (SS). As soon as the oil pressure switch (OPS) starts to close, (TDR) starts a time delay for 70 seconds. After 70 seconds, the (TDR) contact opens and de-energizes relay (TDX). Then all (TDX) contacts open.

To reset the overspeed fault relay, rotate the (ACS) to OFF/RESET. This will de-energize the dual speed switch and permit the OSS contact to open.

Before restarting, check for possible causes of the overspeed.

NOTE: The shutdown solenoid and air shut-off solenoid are each protected with thermal type circuit breakers. If either solenoid does not energize to shutdown, check breaker condition by pressing button to reset.



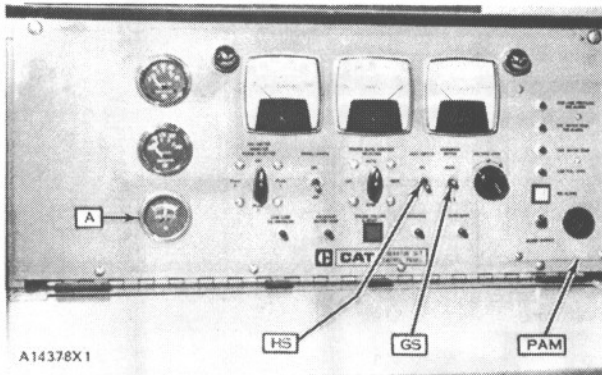
41	OPR	1b	1b	AR	ARMING RELAY	OCT	OVERCRANK TIMER	TDR	TIME DELAY RELAY
42	OCIR	17	17	ACS	ENGINE CONTROL SWITCH	OP	OIL PRESSURE GAUGE	TDX	TIME DELAY AUXILIARY
43	WTR	18	18	BATT	BATTERY	OPIR	SENDER	WT	WATER TEMPERATURE
44	RR	15	15	CB	CIRCUIT BREAKER	OPG	OIL PRESSURE GAUGE	WTG	GAUGE SENDER
45	PRE ALARM	15	15	CCM	CYCLE CRANKING MODULE	OPIR	INDICATOR RELAY	WTG	WATER TEMPERATURE
		19	19	CTS	CRANK TERMINATE SWITCH	OPS	OIL PRESSURE SWITCH	WTIR	GAUGE
		19	19	D	DIODE	OSIR	OVERSPEED INDICATING	WTIR	HIGH WATER TEMPERATURE
		15	15	DSS	DUAL SPEED SWITCH	RELAY	RELAY	WTIR	INDICATING RELAY
					(INCLUDES CTS AND OSS)	OSS	OVERSPEED SWITCH	WTS	WATER TEMPERATURE
					REMOTE START INITIATING	PLS	PANEL ILLUMINATION LAMP	WTS	SWITCH
					CONTACT	PLS	PANEL ILLUMINATION LAMP	*	INDICATES EQUIPMENT EXTERNAL
					MAGNETIC SWITCH (CRANK	PS	PINION SOLENOID		TO CONTROL PANEL
					CIRCUIT)	RR	RUN RELAY		TERMINAL STRIP POINT
					MAGNETIC SWITCH (GLOW	SS	SHUT-OFF SOLENOID		(CONTROL PANEL)
					PLUG CIRCUIT)	SM	STARTING MOTOR		TERMINAL STRIP POINT
					OVERCRANK INDICATING	SR	SHUTDOWN RELAY		(GENERATOR TERMINAL BOX)
					RELAY				

B66882X1

CONTROL PANEL SHUTDOWN (OVERSPEED)

GENERATOR MOUNTED CONTROL PANEL ATTACHMENTS

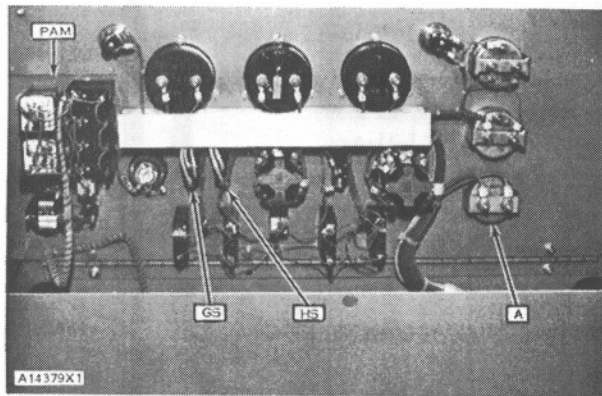
IDENTIFICATION AND LOCATION



A14378X1

**CONTROL PANEL (FRONT VIEW)
(TYPICAL)**

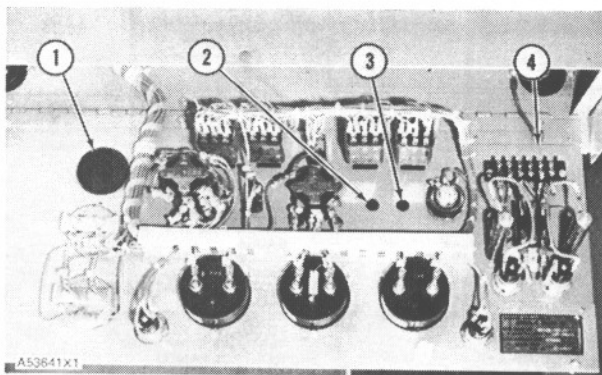
A. Ammeter. GS. Governor Switch. HS. Heat switch. PAM. Prealarm Module.



A14379X1

**OPEN CONTROL PANEL
(TYPE 2)**

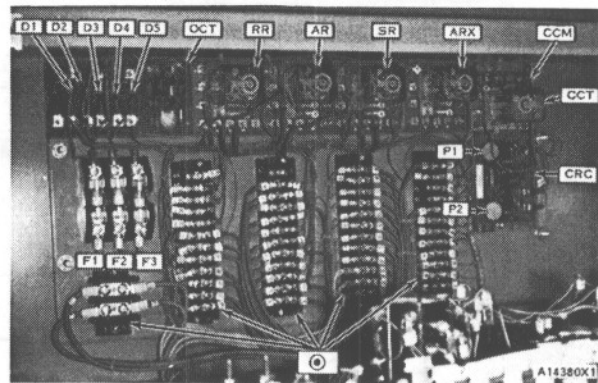
A. Ammeter. GS. Governor Switch. HS. Heat switch. PAM. Prealarm Module.



A53641X1

**OPEN CONTROL PANEL
(TYPICAL FOR TYPE 3 AND 4)**

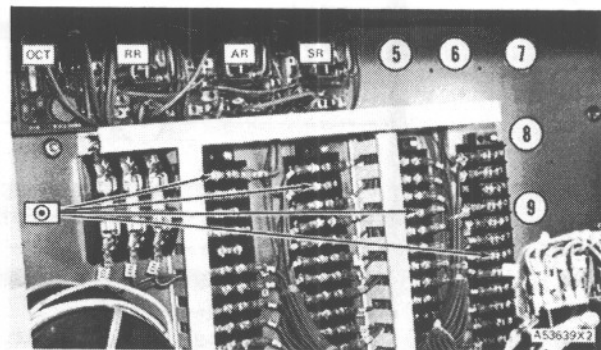
1. Location for D.C. ammeter. 2. Location for glow plug heat switch. 3. Location for governor switch. 4. Synchronizing Lights Module.



A14380X1

**INSIDE CONTROL PANEL HOUSING
(TYPE 2)**

- AR ARMING RELAY
- ARX AUXILIARY RELAY MODULE
- CCM CYCLE CRANKING MODULE
- CCT CYCLE CRANKING RELAY
- CRC CYCLE CRANK LOGIC TIMER
- D1-D5 DIODE
- F1-F3 FUSE
- OCT OVERCRANK TIMER
- P1 POTENTIOMETER FOR CRANK TIME
- P2 POTNETIOMETER FOR REST TIME
- RR RUN RELAY
- SR SHUTDOWN RELAY TERMINAL STRIP POINT (CONTROL PANEL)

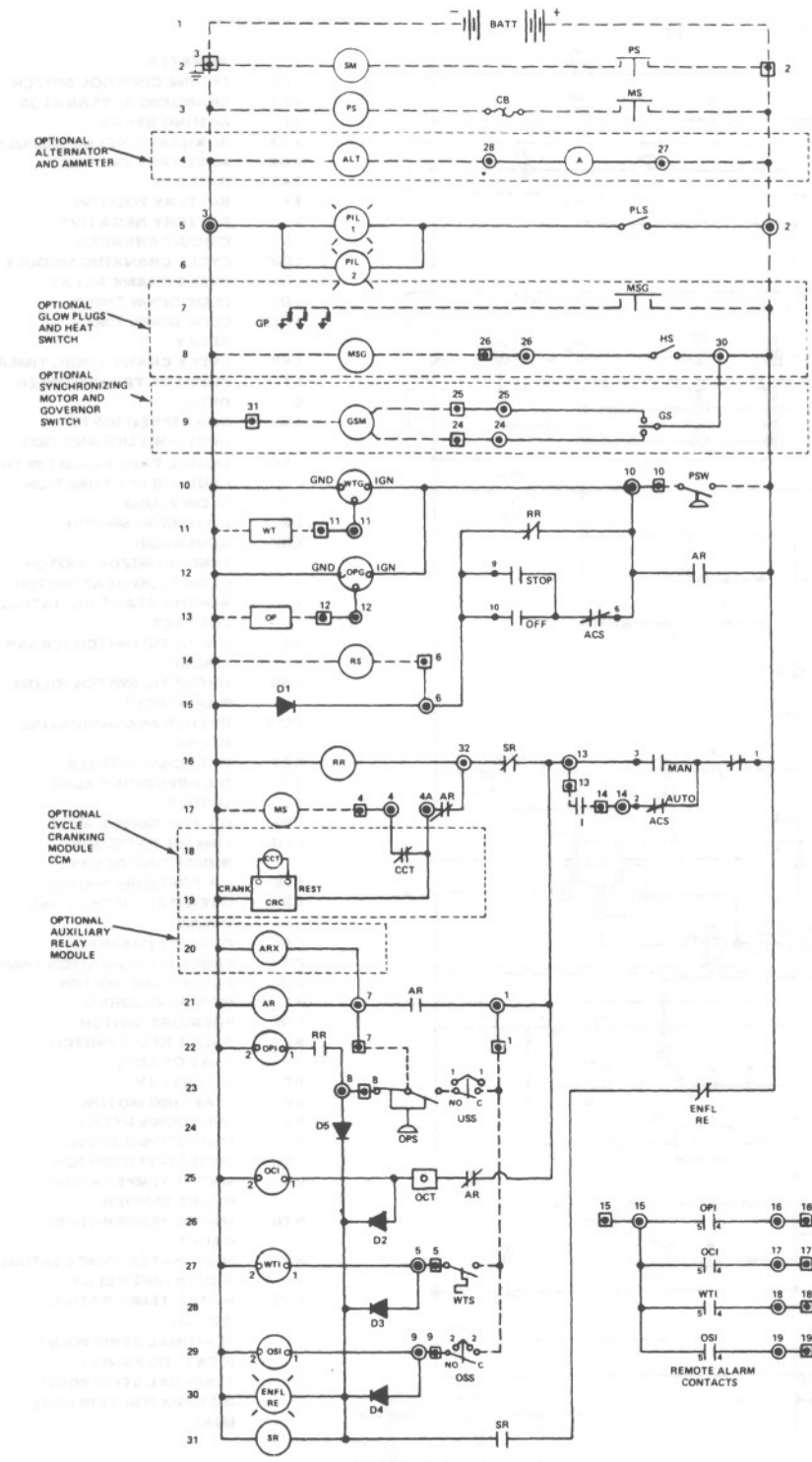


A53639X2

**INSIDE CONTROL PANEL HOUSING
(TYPICAL FOR TYPE 3 AND 4)**

5. Location for Cool Down Timer (CDT). 6. Location for Cool Down Timer-Relay (CDTR). 7. Location for Auxiliary Relay (AUX). 8. Location for Cycle Crank Relay (CCT). 9. Location for Cycle Cranking Module (CCM). AR. Arming Relay. OCT. Overcrank Timer. RR. Run Relay. SR. Shutdown Relay.

A98933-1X1



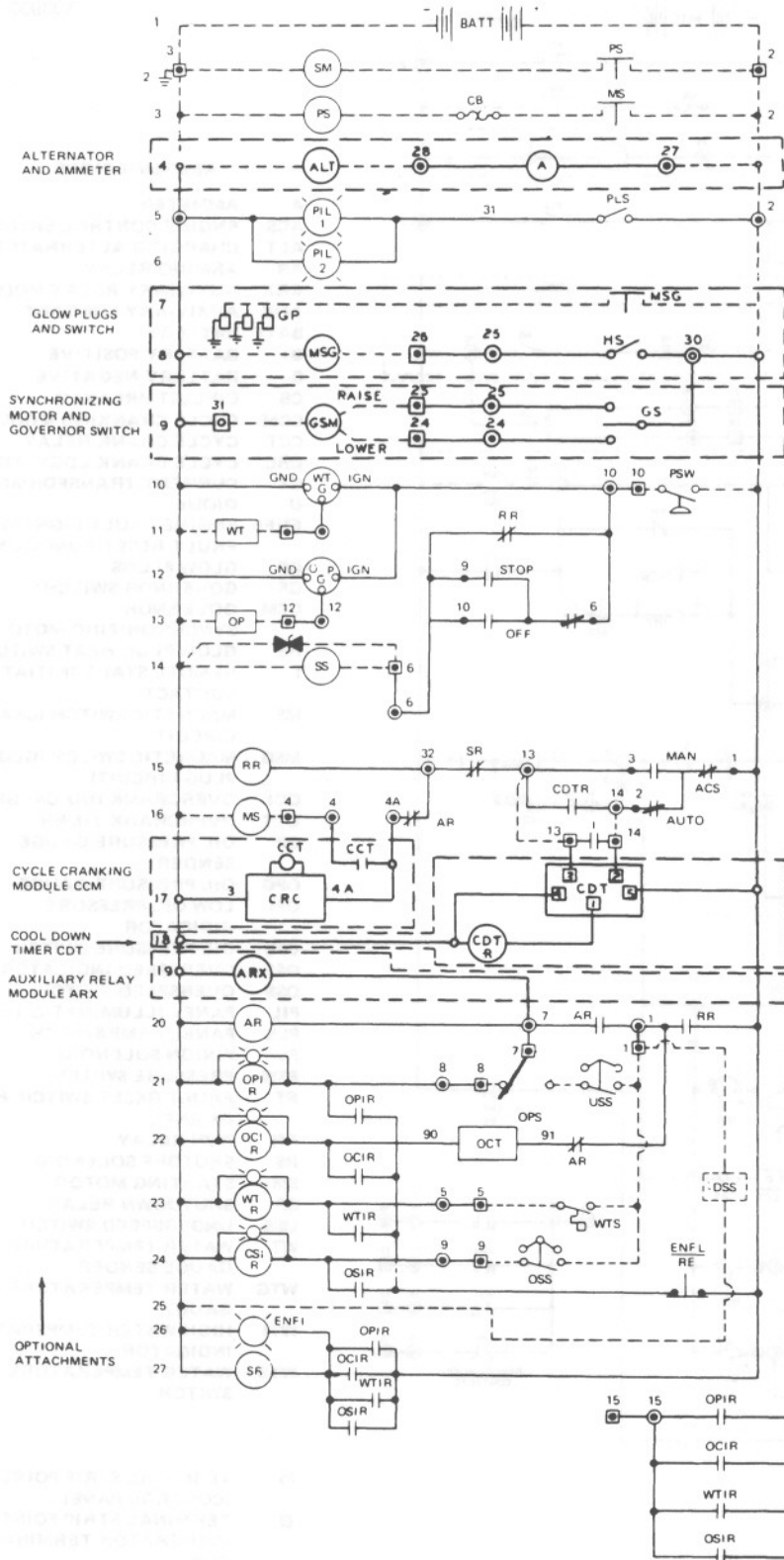
ABBREVIATIONS

- A AMMETER
- ACS ENGINE CONTROL SWITCH
- ALT CHARGING ALTERNATOR
- AR ARMING RELAY
- ARX AUXILIARY RELAY MODULE
- AUX AUXILIARY CONTACT
- 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
- D DIODE
- 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 SENDER
- OPI LOW OIL PRESSURE INDICATOR
- OPS OIL PRESSURE SWITCH
- OSI OVERSPEED INDICATOR
- 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 SHUTOFF 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)

SCHMATIC OF CONTROL PANEL WITH ALL ATTACHMENTS SHOWN (TYPE 2)

The schematic shows the normal condition of all relays.



ABBREVIATIONS

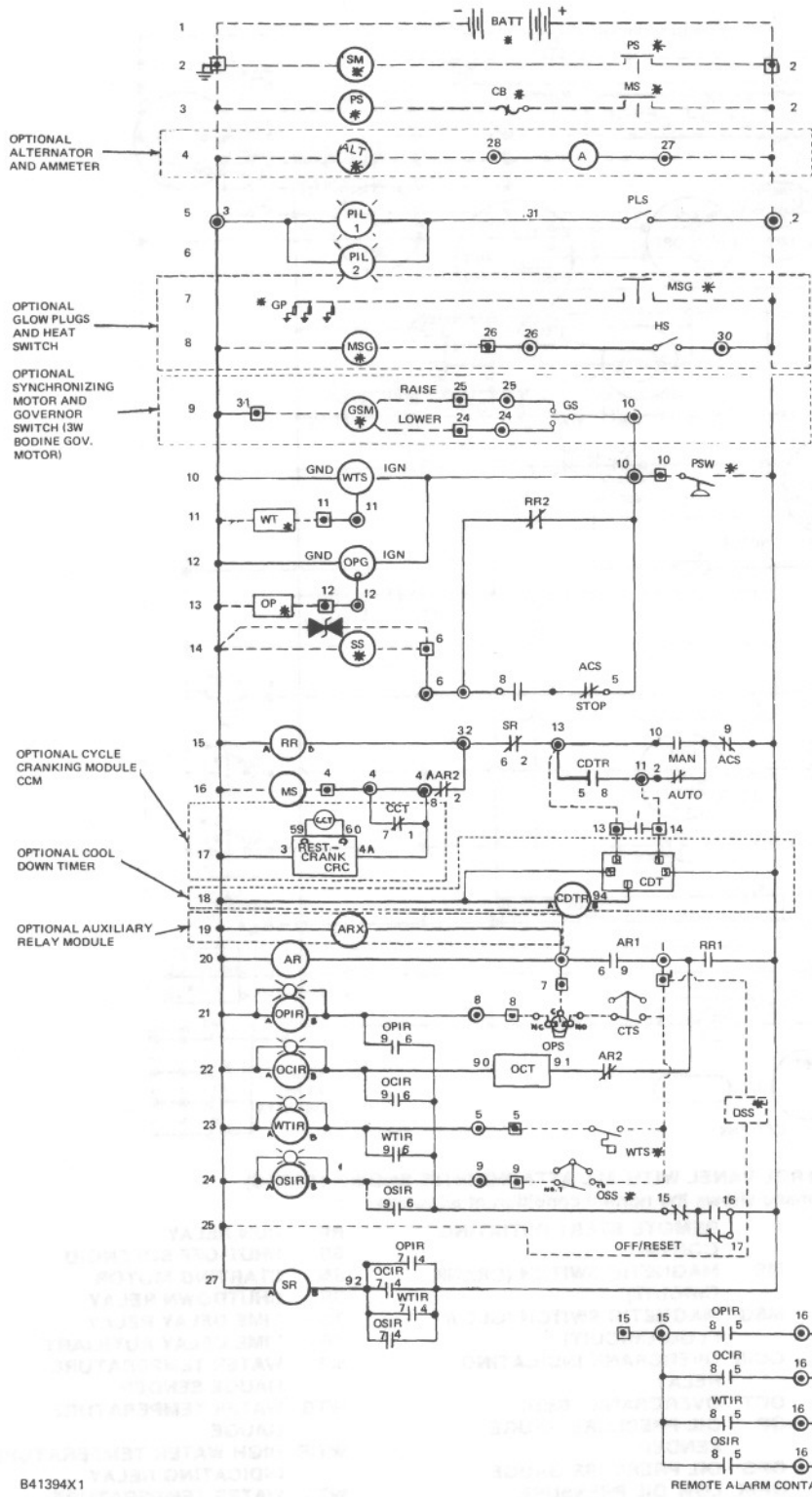
- A AMMETER
- ACS ENGINE CONTROL SWITCH
- ALT CHARGING ALTERNATOR
- AR ARMING RELAY
- ARX AUXILIARY RELAY MODULE
- AUX AUXILIARY CONTACT
- BATT BATTERY
- B+ BATTERY POSITIVE
- B- BATTERY NEGATIVE
- CB CIRCUIT BREAKER
- CCM CYCLE CRANKING MODULE
- CCT CYCLE CRANK RELAY
- CDT COOL DOWN TIMER
- CDTR COOL DOWN TIMER RELAY
- CRC CYCLE CRANK LOGIC TIMER
- CT CURRENT TRANSFORMER
- 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)
- OCIR OVERCRANK INDICATING RELAY
- OCT OVERCRANK TIMER
- OP OIL PRESSURE GAUGE SENDER
- OPG OIL PRESSURE GAUGE
- OPIR LOW OIL PRESSURE INDICATING RELAY
- OPS OIL PPESSURE 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
- SM STARTING MOTOR
- SR SHUTDOWN RELAY
- SS SHUTOFF SOLENOID
- USS UNDERSPEED SWITCH
- 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)

REMOTE ALARM CONTACTS

SCHMATIC OF CONTROL PANEL WITH ALL ATTACHMENTS SHOWN (TYPE 3)

The schematic shows the normal condition of all relays.

A98932-1X



- 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 OSS)
- 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
- 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

- * INDICATES EQUIPMENT EXTERNAL TO CONTROL PANEL
- TERMINAL STRIP POINT (CONTROL PANEL)
- TERMINAL STRIP POINT (GENERATOR TERMINAL BOX)

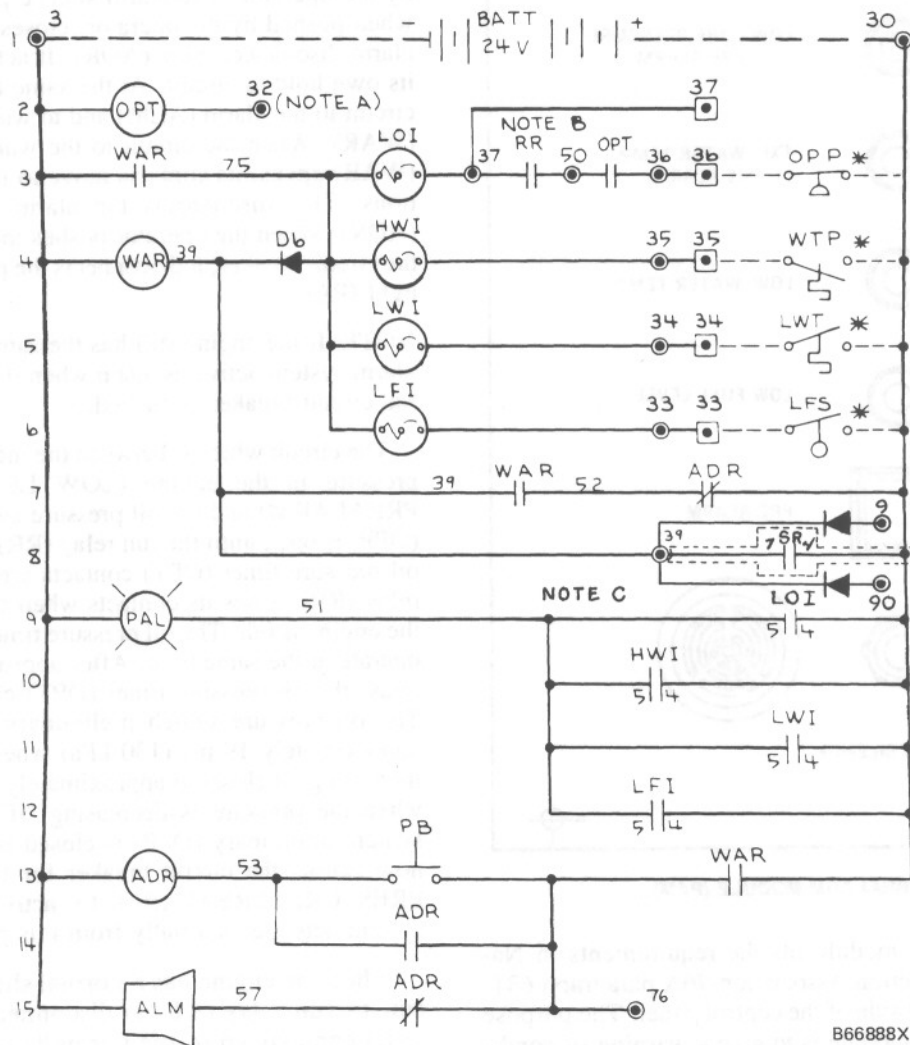
B41394X1

REMOTE ALARM CONTACTS

SCHEMATIC OF CONTROL PANEL WITH ALL ATTACHMENTS SHOWN (TYPE 4)

The schematic shows the normal condition of all relays.

PREALARM MODULE



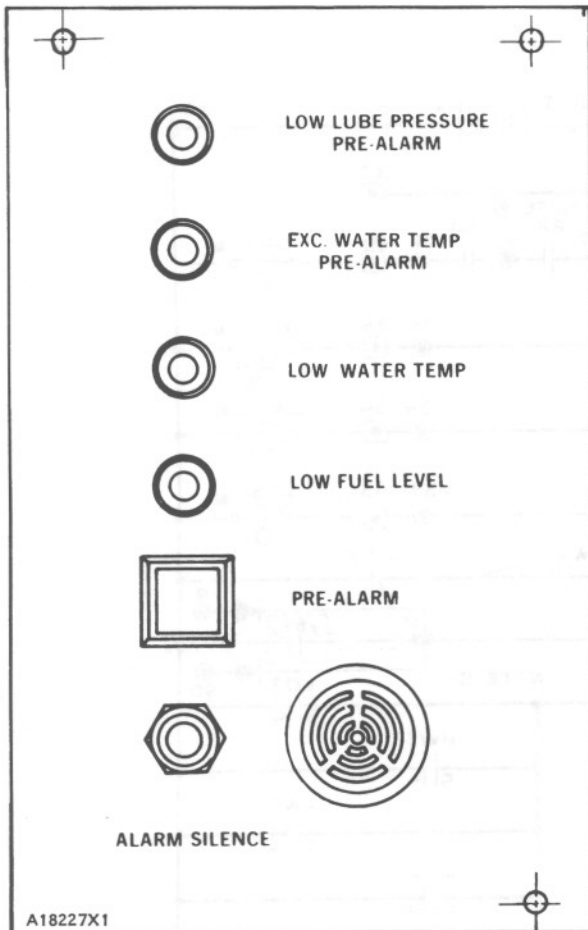
PREALARM MODULE (PAM)

- ADR ALARM DISCONNECT RELAY
- ALM ALARM (SONALERT)
- D DIODE
- HWI HIGH WATER TEMP. INDICATOR
- LFI LOW FUEL LEVEL SWITCH
- LFS LOW FUEL LEVEL SWITCH
- LOI LOW OIL PRESSURE INDICATOR
- LWI LOW WATER TEMPERATURE INDICATOR
- LWT LOW WATER TEMPERATURE SWITCH
- OPP OIL PRSSURE SWITCH-PRELIMINARY
- OPT OIL PRESSURE TIMER
- PAL PRELIMINARY ALARM LIGHT
- PB ALARM SILENCE PUSH BUTTON
- RR RUN RELAY
- SR SHUTDOWN RELAY (TYPE 1 THROUGH 4 CONTROL PANELS)

- WAR WARNING ALARM RELAY
- WTP WATER TEMPERATURE SWITCH—PRELIMINARY
- TERMINAL BOARD POINT IN PANEL
- TERMINAL BOARD POINT ON ENGINE
- ENGINE MOUNTED EQUIPMENT

- NOTE A: Terminal (32) is energized by battery positive when the engine cranks. Battery positive is removed when the engine stops.
- NOTE B: Terminal (37) can be connected to a remote low lubrication oil pressure indicator installed by the customer.
- NOTE C: Type 5 Control Panel requires diodes to sound an alarm on overspeed and overcrank conditions.

B66888X1



PREALARM MODULE (PAM)

The prealarm module fits the requirements in National Fire Protection Association-76A paragraph 631. It fits in the right side of the control panel. The purpose of the prealarm module is to give a warning of conditions that can become a problem before they are serious enough to keep the engine from starting or running. The prealarm module activates its warning system for the following conditions:

When the engine has one of these conditions, the switch which measures it closes. This closes the circuit to the indicator in the control panel for that condition. The indicators are circuit breakers of the push button type. When the circuit breaker first gets the current from the switch, it is in its normally closed position. The circuit is closed to the warning auxiliary relay (WAR) which activates and closes its own hold in circuit and the circuit to the alarm (ALM) which is a warning horn. The circuit breaker activates and opens the circuit to the warning alarm relay (WAR) and closes the circuit to the preliminary alarm light (PAL). This makes the preliminary alarm light (PAL) operate.

The preliminary alarm light (PAL) and the alarm (ALM) operate until they are manually disconnected by the operator. The alarm silence push button (PB), when pushed by the operator, closes the circuit to the alarm disconnect relay (ADR). It activates and closes its own hold in circuit. At the same time, it opens the circuit to the alarm (ALM) and to warning alarm relay (WAR). When the circuit to the warning alarm relay (WAR) opens, its contacts move to their normal positions. This disconnects the alarm disconnect relay (ADR). When the operator pushes the push button for the circuit breaker, it disconnects the preliminary alarm light (PAL).

NOTE: If the engine still has the same conditions, the alarm system activates again when the push button for the circuit breaker is pushed.

The circuit which is between the indicator for low oil pressure in the engine (LOW LUBE PRESSURE PREALARM) and the oil pressure switch-preliminary (OPP) is open until the run relay (RR) contacts and the oil pressure timer (OPT) contacts are closed. The run relay (RR) closes its contacts when the signal to start the engine is felt. The oil pressure timer (OPT) starts to operate at the same time. After approximately 90 seconds, the oil pressure timer (OPT) closes its contacts. The oil pressure switch preliminary (OPP) opens at approximately 19 psi (130 kPa) when the pressure is increasing. It closes at approximately 15 psi (105 kPa) when the pressure is decreasing. If the oil pressure switch-preliminary (OPP) is closed for any reason, it now causes the circuit breaker for the LOW LUBE PRESSURE PREALARM to activate. The alarm system activates normally from this point.

When the engine has a normal shutdown, the circuit to run relay (RR) is disconnected. Run relay (RR) contacts go to the normally open position in the oil pressure circuit. This keeps the oil pressure switch-preliminary (OPP) from activating the low oil pressure indicator (LOI) when the oil pressure decreases because of normal engine shutdown.

The alarm (ALM) in the prealarm module operates when the automatic start-stop system causes shutdown of the engine because of an engine problem. When the shutdown relay (SR) is activated by one of the switches in the automatic start-stop system, some of the contacts close a circuit through terminal 39 which activates the warning alarm relay (WAR). This causes alarm (ALM) to operate. (See Note C.)

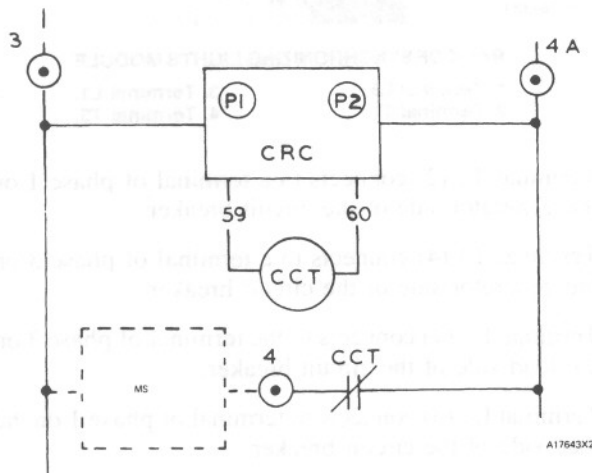
NOTE: This does not cause the preliminary alarm light (PAL) to operate.

The alarm silence push button (PB) must be manually operated to stop the operation of the alarm (ALM).

INDICATOR	CONDITION
LOW LUBE PRESSURE PREALARM	Engine oil pressure less than approximately 15 psi (105 kPa).
EXC. WATER TEMP PREALARM	Engine coolant temperature more than 197°F (92°C).
LOW WATER TEMP	Engine coolant temperature less than 70°F (21°C).
LOW FUEL LEVEL	Fuel supply of approximately 3 hrs.

CYCLE CRANKING MODULE

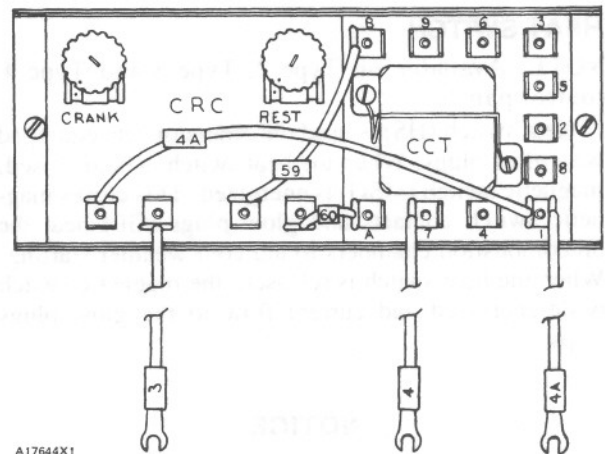
NOTE: Jumper between TB2-4 and 4a must be removed when the cycle cranking module is used.



WIRING DIAGRAM

The cycle cranking module (CCM) has a cycle cranking relay (CCT) and a cycle crank logic timer (CRC). The cycle crank relay (CCT) controls the circuit to the magnetic switch (MS) which controls the circuit to the starting motor (SM). The cycle crank logic timer (CRC) controls the cycle crank relay (CCT). The overcrank timer (OCT) controls the time that the cycle crank module (CCM) is activated.

The cycle crank logic timer (CRC) has a CRANK POT (P1) and a REST POT (P2). When the cycle cranking module (CCM) is activated, the cycle crank relay (CCT) is in its normally closed condition. The starting motor activates. At the same time the cycle crank logic timer (CRC) starts to measure the time electronically. The time for operation of the starting



A17644X1

CYCLE CRANKING MODULE

**CCT CYCLE CRANK RELAY
CRC CYCLE CRANK LOGIC TIMER**

motor is controlled by the adjustment of CRANK POT (P1). When the time is done, the cycle crank logic timer (CRC) activates the cycle crank relay (CCT). The cycle crank relay (CCT) opens the circuit that controls the starting motor (SM). At the same time the cycle crank logic timer (CRC) starts to measure the time, according to the adjustment of REST POT (P2). When the time is done, the cycle crank logic timer (CRC) opens the circuit to the cycle crank relay (CCT) and starts to measure time according to CRANK POT (P1) again. The CRANK POT (P1) and REST POT (P2) are each adjusted to 10 seconds at the factory. This series of cycles does not stop until the circuit, which activates the cycle cranking module (CCM), is opened by the shutoff relay (SR) or arming relay (AR).

The overcrank timer (OCT) is adjusted to activate the shutdown relay after a total of 90 seconds when the cycle cranking module (CCM) is installed. When the engine starts the overcrank timer (OCT) and cycle cranking module (CCM) are disconnected by the arming relay (AR).

HEAT SWITCH

NOTE: Available on Type 2, Type 3 and Type 4 control panels.

Heat switch (HS) is used on generator sets equipped with glow plugs. When the heat switch is held closed, magnetic switch (MSG) is energized. This closes magnetic switch contacts and glow plugs (GP) heat the precombustion chambers to aid cold weather starting. When the heat switch is released, the magnetic switch is de-energized and current flow to the glow plugs stops.

NOTICE

Do not energize the glow plugs when the engine is warm.

AMMETER

NOTE: Available on all control panels.

Ammeter (A) is a DC ammeter used to show the rate of charge or discharge in the alternator circuit. The purpose of the optional alternator circuit is to charge batteries (BATT).

GOVERNOR SWITCH

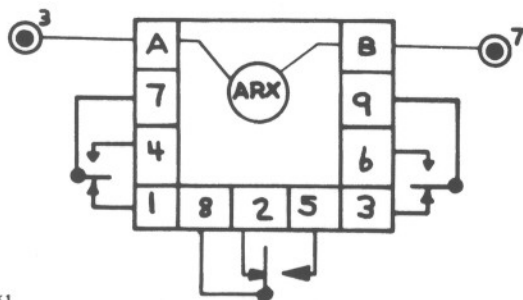
NOTE: Available on all control panels.

When the engine governor is equipped with a synchronizing motor, governor switch (GS) is used to change engine rpm. Move the switch up to increase rpm, down to decrease rpm.

AUXILIARY RELAY MODULE

NOTE: Available on all control panels.

Auxiliary relay module (ARX) is in a parallel circuit with arming relay (AR). The (ARX) coil is energized during engine operation. The auxiliary relay module has both normally open and normally closed contacts. They are available for use as desired by the customer.

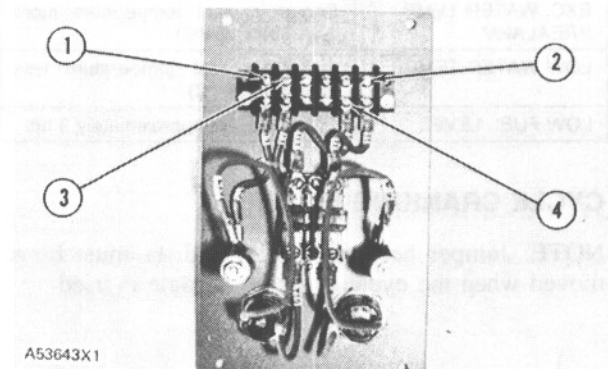


A18226X1

AUXILIARY RELAY MODULE (ARX)

SYNCHRONIZING LIGHTS MODULE

NOTE: Available for Type 3 and 4 control panels. This module is located in the same place as prealarm module (PAM).



A53643X1

BACK OF SYNCHRONIZING LIGHTS MODULE

- | | |
|-----------------|-----------------|
| 1. Terminal L3. | 3. Terminal L1. |
| 2. Terminal T1. | 4. Terminal T3. |

Terminal T1 (2) connects to a terminal of phase 1 on the generator side of the circuit breaker.

Terminal T3 (4) connects to a terminal of phase 3 on the generator side of the circuit breaker.

Terminal L3 (1) connects to the terminal of phase 3 on the load side of the circuit breaker.

Terminal L1 (3) connects to terminal of phase 1 on the load side of the circuit breaker.

NOTE: IF the synchronizing lights rapidly go ON and OFF, when the engine is running, do not close the circuit breaker. Check for one of the conditions that follow.

Engine speed (frequency) not the same as the load.

Voltage level not the same as the load.

Wires from the synchronizing lights module not correctly connected to the phase terminals on the circuit breaker.

If each light goes ON and OFF, but not at the same time, the phase rotation of the generator is opposite to the phase rotation of the load.

NOTICE

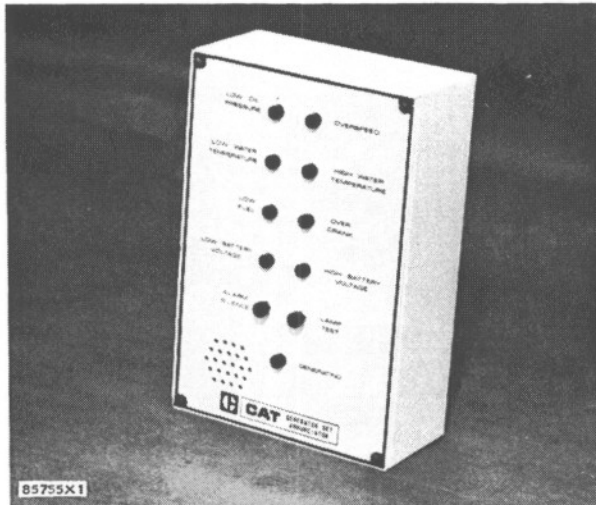
Never close the circuit breaker with either synchronizing light ON or with switch OFF.

REMOTE ANNUNCIATOR PANEL

NOTE: Available for all control panels.

If ordered, an annunciator panel is available for installation in an area where the safety indicators on the generator set can be constantly checked. Horn (H) and

To stop the horn from operating, push alarm silence switch (S1). This "turns off" the silicon control rectifier (SCR1). To test the condition of the panel lights, push lamp test switch (S2).

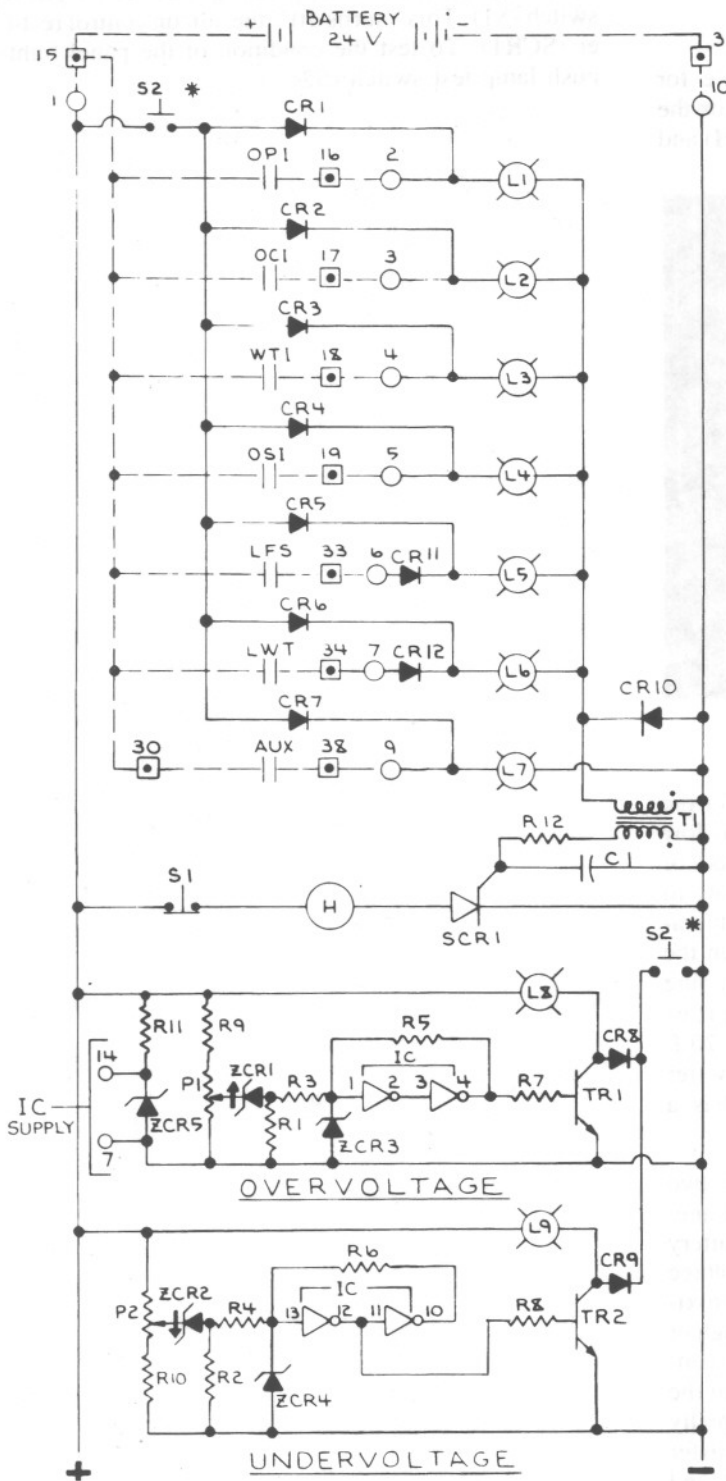


ANNUNCIATOR PANEL

one of the panel lights (L1 through L4) operate for the following conditions: a safety shutdown caused by low oil pressure, high water temperature, overspeed or overcrank. The horn and a light will also operate to show conditions of low fuel level or low water temperature. The low fuel level light (L5) operates when the fuel supply is only enough to keep the engine running for three hours. The low water temperature light (L6) operates when the water temperature is below 70°F (21°C). This condition shows that the jacket water heater (attachment) is either disconnected or has a failure.

The annunciator panel is also equipped with two lights (L8 and L9) to show high or low battery voltage. The high voltage light (L8) operates when the battery voltage is approximately 29 volts. The low voltage light (L9) operates when the battery voltage is approximately 25 volts. The horn does not operate for a high or low voltage condition. A generating light (L7) is connected to terminal point 38 on the terminal strip in the generator housing. An auxiliary contact (normally open) on the emergency side of the remote transfer switch is connected between terminal point 38 and terminal point 30 on the same terminal strip. When the transfer switch has connected the load to the generator set and the generator is operating, light (L7) will also operate.

SCHEMATIC OF ANNUNCIATOR PANEL



ABBREVIATIONS

- AUX AUXILIARY CONTACT
- C1 DISC CAPACITOR
- CR1-12 RECTIFIER DIODES
- H HORN
- IC INTEGRATED CIRCUITS
- L1-9 PANEL LIGHTS
- LFS LOW FUEL LEVEL SWITCH
- LWT LOW WATER TEMPERATURE CONTACTOR
- OCI OVERCRANK INDICATOR
- OPI OIL PRESSURE INDICATOR
- OS1 OVERSPEED INDICATOR
- P1 HIGH VOLTAGE POTENTIOMETER
- P2 LOW VOLTAGE POTENTIOMETER
- R1-12 RESISTORS
- S1 ALARM SILENCE SWITCH
- S2 LAMP TEST SWITCH*
- SCR1 SILICON CONTROL RECTIFIER
- T1 PULSE TRANSFORMER
- TR1-TR2 TRANSISTOR
- WT1 HIGH WATER TEMPERATURE INDICATOR
- ZCR1-5 ZENER DIODE

*Push to test.

○ Terminal points on terminal strip in annunciator panel.

⊙ Terminal points on terminal strip in control panel.

⊠ Terminal points on terminal strip in generator housing.

Dash (---) lines show the circuits of components on the engine and in the generator housing and control panel.

A54561X1