

DESCRIPTION OF REMOTE AUTOMATIC START/STOPCIRCUIT OPERATION (Figs. 8.1 to 8.9)8.1A START CIRCUIT

Note: When the speed amplifier is energised the Speed Contacts will open.

Local or remote can be selected by operating the Selector Switch.

Operation of the Selected Start push-button will energise relay SPB (via Contacts MSS1, SSR1 and SDR1). Timer FTS will be energised (via Contacts MSS1 and SPB1).

Contact SPB1 will close to maintain relay SPB
Contact SPB2 will close to energise Timer PST
Contact SPB3 will close in Timer SDT Circuit
Contact SPB4 will close to energise relay PAE

See Pump Motor Start sequence for relays PAE, PAA, LOP and Timer PST.

When lub. oil flow is established, the lub. oil flow switch will close, Timer SDT will be energised (via Contacts LSS1, SPB3 and FTS2).

Contact SDT1 will time closed to energise the starting air solenoid
Contact SDT2 not used

The engine will rotate to firing speed, when a speed switch will close to energise relay LSS.

Contact LSS1 will change over to energise Timer PAC and de-energise Timer SDT
Contact LSS2 will close to maintain relay PAE
Contacts LSS3 and LSS4 not used

Contact SDT1 will open to remove starting air
Contact SDT2 not used

Contact PAC1 will close in relay PAA Circuit (no action)
Contact PAC2 not used

The engine will accelerate to full speed. As the engine approaches full speed, a speed switch will close to energise relay MSS.

Contact MSS1 will open to reset the start circuit
Contact MSS2 will change over to energise Timer LHF and illuminate the "Engine running On Light Fuel" lamp (via Contact HFR2)
Contact MSS3 will close to energise Timers ACT and FCT
Contact MSS4 not used

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Contact ACT1 will time closed to commission Engine Alarms
Contact ACT2 will time closed to commission Shutdown Alarms

Contact PCT1 will time closed to commission Pump Stopped
Alarms

Contact PCT2 not used

8.1B FAILED TO START

If the engine does not fire and run up to speed, then Timer FTS will remain energised (via Contacts MSS1 and SPB1).

Contact FTS1 will time closed to illuminate
'Failed to Start' lamp

Contact FTS2 will time open to de-energise Timer SDT
which will remove starting air from
the engine

The Start Circuit is reset by operating the stop pushbutton which will de-energise relay SPB via Contact SSR1.

8.1C PUMP MOTOR START SEQUENCE

When the engine start pushbutton is operated, relay PAE and Timer PST are energised (See "1" - Start Circuit).

Contact PAE1 will close to energise relay PAA

Contact PAE1 will close (no action)

Contact PAE3 will close (no action)

Contact PAE4 will close (no action)

Contact PST1 will close to maintain Timer PST

Contact PST2 will close (no action)

Contact PAA1 will close to energise Cam Timer CS
(via Contact PST2)

Contact PAA2 will close to energise relay LOP

Contact PAA3 and PAA4 not used

Contact LOP1 will close to start the 'Lub.oil priming pump'

Contact LOP2, LOP3 and LOP4 not used

Contact CS1 will close after 2 sec. to start the
'Crankcase extraction fan' via Contact PAE2

Contact CS2 will close after 4 sec. to start the
'Light fuel pressurising pump' via Contact PAE3

Contact CS3 will close after 6 sec. to start the
'Heavy fuel Busrail pump' via Contact PAE4

Contact CS4 will close after 8 sec. to start the
'Jacket water pump'

Contact CS5 will close after 10 sec. to start the
'Valve cage water pump'

Contact CS6 will close after 12 sec. to start
'Radiator fan No.1'

Contact CS7 will close after 14 sec. to start
'Radiator fan No.2'

Contact CS8 will close after 16 sec. to start
'Radiator fan No.3'

Contact CS9 will close after 18 sec. to start
'Radiator fan No.4'

Contact CS10 will close after 20 sec. to start
'Radiator fan No.5'

Contact CS11 will close after 22 sec. to start
'Radiator fan No.6'

Contact CS12 will close after 24 sec. to start
'Radiator fan No.7'

Contact CS13 will close after 26 sec. to start
'Radiator fan No.8'

Contacts CS14 to CS16 inclusive are spare

Contact CS17 will close to illuminate
'Motor start sequence complete' indication

Contact CS18 will open to de-energise the
Cam clutch and maintain contacts

Relay PAE is maintained energised when the engine is running by
Contact LSS2.

Relay LOPl is de-energised by Contact MSS1 when the engine is running.

Contact LOPl will open to stop the 'Lub. oil priming pump'.

When the engine has stopped, Contact LSS2 will open to de-energise
relay PAE and Contact MSS1 will close to energise relay LOP via Contact PAA2.

Contact LOPl will close to start the
'Lub. oil priming pump'

Contact PAE1 will open (no action)

Contact PAE2 will open to stop the
'Crankcase extraction fan'

Contact PAE3 will open to stop the
'Light fuel pressurising pump'

Contact PAE4 will open to stop the
'Heavy fuel busrail pump'

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Time delay relay PAC will be de-energised via Contact LSS1

Contact PAC1 will time open to de-energise relay PAA
Contact PAC2 not used

Contact PAA1 will open to de-energise cam timer CS
Contact PAA2 will open to de-energise relay LOP
Contact PAA3 and PAA4 not used

Contact LOP1 will open to stop the 'Lub.oil priming pump'

Contacts CS1 to CS17 will open to stop remaining pump
and fan motors

If the supply to Cam timer CS and Timer PST is broken:

Contact PST1 will time open
Contact PST2 will time open

When the supply returns, the start pushbutton would have to be operated to reset Cam Timer Circuit, or the Pumps started manually.

NOTE: The following information is given in anticipation that heavy fuel will be used in the future.

8.1D HEAVY FUEL CHANGEOVER

When the engine is started Timer LHF is energised via Contact MSS2.

LHF1 will time closed in relay HFR and HFA circuit
Contact LHF2 not used

If the selector switch is selected to Heavy Fuel relay, HFA will be energised.

Contact HFA1 will close to commission Heavy Fuel Alarms
Contact HFA2, HFA3 and HFA4 not used

When the Heavy Fuel temperature and pressure are correct, the temperature and pressure switches will close. When the alarms are all healthy Contact CFA2 will be closed and relay HFR will be energised (via HF/LF switch, Contacts LHF1, SSR2 and SDR3).

Contact HFR1 will close to energise Timer HFS
Contact HFR2 will change over to illuminate the
'Engine running on heavy fuel' lamp
Contact HFR3 will close to energise the heavy
fuel solenoid
Contact HFR4 not used

Contact HFS1 will close in the 'Stopped on heavy fuel'
indicator circuit (no action)
Contact HFS2 will open in Timer SPT circuit

8.1E STOPPING SEQUENCE - SET ON HEAVY FUEL

Operation of the stop pushbutton will energise relay SSR.

Contact SSR will open to isolate the start circuit
Contact SSR2 will open to de-energise relay HFR
Contact SSR3 will close to maintain relay SSR
Contact SSR4 will close in Timer SPT Circuit (no action)

Contact HFR1 will open to de-energise Timer HFS
Contact HFR2 will change over to illuminate the
'Engine running light fuel' lamp

Contact HFR3 will open to de-energise the heavy fuel
solenoid
Contact HFR4 not used

Contact HFS1 will time open in stopped on heavy fuel
indicator circuit (no action)
Contact HFS2 will time closed to energise Timer SPT

Contact SPT1 will open to de-energise Timer SSR
Contact SPT2 will close to energise relay SDR

Contact SDR1 will open to isolate the start circuit
Contact SDR2 will close to energise the shutdown
solenoid

Contact SDR3 will open in relay HFR circuit (no action)
Contact SDR4 not used

Contact SSR1 will close (no action)
Contact SSR2 will close (no action)
Contact SSR3 will open (no action)
Contact SSR4 will open to de-energise Timer SPT

Contact SPT1 will time closed (no action)
Contact SPT2 will time open to de-energise the shutdown
solenoid

NOTE: Time setting for Timer SPT to be longer than the run-down time
of the engine.

As the engine runs down a speed switch will open to de-energise relay
MSS, and at a lower speed a second switch will open to de-energise relay LSS.

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Contact MSS1 will close in the start circuit (no action)
Contact MSS2 will change over to de-energise Timer LHF
and extinguish the 'Engine running on Light Fuel Lamp'
Contact MSS3 will open to de-energise Timers ACT and PCT
Contact MSS4 not used

Contact LHF1 will open to isolate relay HFR and relay HFA
circuits

Contact LHF2 not used

Contact LSS1 will change over to de-energise Timer PAC
and close in Timer SDT Circuit (no action)

Contact LSS2 will open to de-energise relay PAE

Contact LSS3 and LSS4 not used

8.1F STOPPING SEQUENCE - SET ON LIGHT FUEL

Operation of either stop pushbutton will energise relay SSR.

Contact SSR1 will open to isolate Start Circuit

Contact SSR2 will open (no action)

Contact SSR3 will close to maintain relay SSR

Contact SSR4 will close to energise Timer SPT (via Contact HFS2)

Contact SPT1 will open to de-energise relay SSR

Contact SPT2 will close to energise relay SDR

Contact SDR1 will open to isolate Start circuit

Contact SDR2 will close to energise the shutdown solenoid

Contact SDR3 will open in relay HFR circuit (no action)

Contact SDR4 not used

Contact SSR1 will close (no action)

Contact SSR2 will close (no action)

Contact SSR3 will open (no action)

Contact SSR4 will open to de-energise Timer SPT

Contact SPT1 will time closed (no action)

Contact SPT2 will time open to de-energise the
shutdown solenoid

When the engine runs down, relays MSS and LSS will be de-energised,
the sequence being as under 'Stopping Sequence on Heavy Fuel.'

8.1G FAULT SHUTDOWN

Each shutdown fault operates a VAA relay with a self-resetting armature and a hand reset flag.

- Contact 1 will close to operate the Standard Alarm Unit
- Contact 2 will close to energise relay SDR in the
Auto Start Unit
- Contact 3 will close to energise the governor shutdown
solenoid
- Contact 4 will close to trip the master trip relay

If the engine is running on heavy fuel when the trip occurs, the 'Engine Stopped on Heavy Fuel' indicator will be illuminated via Contacts MSS2 and HFS1.

8.1H FAULT ALARM

If any fault is indicated on the alarm modules, Contact CFA2, from the engine alarm module, and Contact CFB2 from the pump failure alarm module will open to ensure the engine is running on light fuel.