Oakland Center
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Mechanical Sales, Inc.

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# FIRE PUMP DISTRIBUTOR
## Diesel Installation & Start-Up Checklist

**I. Project Data** PROJECT: _____

A. Pump S/N _____ Model _____
B. Engine S/N _____ Model _____
C. Controller S/N _____ Model _____

| II. Contractor or Pump Distributor Checklist* | Completion Initial | Completion Date |
|---|---|---|
| A. Unit properly mounted and secured. | _____ | _____ |
| B. Cooling Water connections on Heat Exchanger properly installed. | _____ | _____ |
| C. Muffler properly connected to engine and to outside. | _____ | _____ |
| D. Engine Coolant (50% Water/ 50% Anti-Freeze) filled to proper level. | _____ | _____ |
| E. Engine lubricating oil filled to proper level. | _____ | _____ |
| F. Fuel lines from tank connected to engine. | _____ | _____ |
| G. Engine Jacket Water Heater to be supplies with 120 volt AC Electric, and a dedicated 20 Amp Breaker | _____ | _____ |
| H. Main Fuel Tank filled with No. 2 Diesel Fuel. | _____ | _____ |
| I. Engine Controller connected to Engine Junction Box. | _____ | _____ |
| ▪ Make sure 10 Control Wires are supplied by the Electrician, consisting of 7 #14, stranded wires, and 3 #10 stranded wires. | | |
| ▪ Provide 120 volt power to controller (not to be energized until start-up) on its own 20 Amp Breaker | | |
| J. Batteries: serviced, charged, and connected to engine, to be done by Mechanical Sales, Inc. on the day of the Start-Up. | _____ | _____ |

** To be completed before calling Mechanical Sales, Inc. for installation review of engine. Contractor or Pump Distributor will be billed by engine Distributor for the time and material involved in completing any items necessary for running the engine.

**III. Engine Distributor/ Dealer Activity**

A. Review contractor installation
B. Start engine and check Engine Systems for proper operation/ Adjust operating speed as required.
C. Review maintenance procedure with Owner/ operator Representative.
D. Review Warranty information booklet with Owner/ Operator.

** Only one no-charge visit is authorized for this activity!
Requirements for a non-warranty return by Mechanical Sales, Inc. is chargeable.

# DIESEL FIRE PUMP CONTROL STARTUP CHECKLIST

Customer:_____ Job Name:_____ Date:_____

Location:_____ Pump Rep:_____ Control Rep:_____

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Manufacturer_____ Catalog#_____ Serial#_____
DC Voltage_____ AC Voltage_____

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___Verify conduit entrances are such that the controller's enclosure rating has not been compromised
___Verify wires 1 through 11 (excluding #7) are wired from the engine to the controller
___Verify wires 1 through 11 are stranded
___Verify proper wire sizing-especially 6, 8, and 11 per manufacturer recommendation
___Verify incoming AC/DC voltages are consistent with supplied equipment
___Verify charger settings are consistent with battery type (if applicable) and voltage
___Verify tightness of all terminations
___Verify proper sensing line input location

**Consult colleagues before operation!**

___Apply DC voltage to the panel and verify proper initialization
___Apply AC charging voltage to the panel and verify charger function
___Set internal clock
___Verify that transducer outputs are consistent with that of the pump guy's calibrated gauge (Results may vary based on previous jockey pump usage/sensing line location)
___Verify water flow from the cooling loop when the selector switch is placed in the manual position
___Verify Manual 1, Manual 2, and automatic starting functions
___Remote alarms connected?
___Verify local alarm conditions: ___low oil pressure ___high coolant temperature
___engine over speed ___battery #1/2
___charger loss/failure ___engine fail to start

___Pressure settings Fire pump on: ___ reset: ___ MRT ___ Minutes or Manual Stop
Jockey pump on: ___ off: ___

___sequential start time?

**Additional Notes**

_____
_____
_____
_____
_____

CLARKE
Fire Protection Products, Inc.

CLARKE UK, LTD.
Fire Protection Products

# START-UP INSPECTION (S.U.I) CHECKLIST

| | | | |
|---|---|---|---|
| Facility Identification (Name): | | | |
| Address: | | City : | |
| State/Province: | Postal Code: | Country: | |
| S.U.I. Test Date: | Clarke Engine Model: | Engine Serial Number: | |
| Pump Mfr.: | Pump Model: | Pump Speed: | Right Angle Gear Ratio: |
| Pump Rating (GPM): | Pump Pressure PSI: | Controller Mfr.: | Controller Model: |

## Inspection Requirements

| | | |
|---|---|---|
| Engine Full Load RPM: | Engine Oil Pressure at Full Load (PSI): | Stabilized Engine Temp. at Full Load(°F): |

## Check and Correct as Necessary

(Make necessary comments at bottom of form)

STATIC CHECKS (Pre–Start - up):

- ☐ Pump set is secured to foundation
- ☐ Pump set base is grouted
- ☐ Coupling or driveshaft aligned and serviced
- ☐ Coolant plugs and coolant installed
- ☐ Heat Exchanger discharge piping installed and secured
- ☐ Engine pre-heater connected to a dedicated AC power source
- ☐ Crankcase oil level full
- ☐ Fuel supply and return lines connected, - no galvanized or copper piping, tank at proper elevation, tank filled
- ☐ Pump room air supply and ventilation equipment complete, adequate, and functional
  Size of inlet air louver _____ x _____
- ☐ Air cleaner mounted, protective covering removed
- ☐ Pump set is properly protected and temperature controlled if necessary
- ☐ Exhaust system complete and supported by the building structure, rain protected
- ☐ Controller wired according to supplier's instructions
- ☐ Batteries filled, secured, connected, and charged

RUNNING CHECKS:

- ☐ Manual start at engine panel with fire pump controller in OFF position
- ☐ Manual start at fire pump controller with Engine Panel in AUTOMATIC
- ☐ Water solenoid operation, verify raw water discharge
- ☐ Cooling loop pressure gauge reading _____psi
- ☐ Engine gauges functioning correctly
- ☐ No leaks at fuel, water, exhaust
- ☐ High coolant temperature alarm verification
- ☐ Low coolant temperature alarm verification
- ☐ Low oil pressure alarm verification
- ☐ High raw water temperature alarm verification
- ☐ Low raw water flow alarm verification
- ☐ Use infrared temp-gun to measure & record engine damper temperature at full load HP: _____°F or _____°C.*
- ☐ Overspeed shutdown using verification procedure
- ☐ Clean Y-strainers in cooling loop after all testing is completed
- ☐ Final hour meter reading: _____
- ☐ Work performed by: _____
- ☐ Warranty Registration for engine submitted on-line at www.clarkefire.com

**For Electronic Engines Only**:

- ☐ With engine off, switch ECM Selector to Alternate ECM to verify alarm
- ☐ Start engine in Alternate ECM, verify speed setting and no additional alarms
- ☐ With engine off, switch ECM Selector to Primary ECM and start engine to verify normal operation
- ☐ ECM Warning and Failure Alarm Verification

Comments: _____

*NOTE: If engine damper temperature exceeds 200°F (93°C) there could be a torsional issue. Consult pump manufacturer.

| | |
|---|---|
| Pump Dealer: _____ | Serviced by: _____ |
| Address: _____ | Address: _____ |
| City: _____ | City: _____ |
| Postal Code: _____ Country: _____ | Postal Code: _____ Country: _____ |

wire must be wired from the grounding lug in the controller to earth ground. In most cases, the engine manufacturer furnishes the engines with all accessories installed and wired to the connection box. Therefore, it is only necessary to wire from the engine connection box to like numbered terminals in the Controller. Note proper wire sizes. All wires must be stranded.

A drain valve is provided to relieve water pressure to the pressure switch, thus closing the pressure switch contacts and starting the engine. This test simulates an actual start demand. Since the Controller operates the drain valve only momentarily, a small amount of water is drained off. The water pressure sensing line to the Controller from the pump must be thoroughly flushed before connection to the Controller in order to remove chips, particles, or other matter, that could enter the plumbing components in the Controller.

Controllers configured with **"Automatic Stop"** enabled may be changed to **"Manual"** stop by disabling this feature in System Config Screen 104. If deluge valve switches are to be used for starting, enable the Deluge Valve Option in Config Screen 121 and connect the remote normally closed switch to terminals 31 and 111.

## B. TEST PROCEDURE

All of the following tests should be made on each unit after installation. If each test is satisfactory, the operator may place the control switch in **"Auto"** mode and depend upon the panel operating properly when required. Also, any one or all of these tests may be carried out at any time after installation, if so desired. **NOTE: If 115 Volts A.C. is not connected to Controller, the "Charger Failure" lights and "AC Power Loss" light and alarm will be activated and if the Power Failure Start feature (System Config Screen 111) is enabled, the controller will start automatically. The 115VAC must be turned ON to prevent the engine from starting.**

### ENGINE TERMINAL (terminals 1-12) STATUS INDICATOR LIGHTS

Light Emitting Diodes (L.E.D.) lights have been installed on the microprocessor module to indicate the status of each engine terminal. Status indication is given below:

| Terminal Number (Microprocessor Func #) | L.E.D. (light) "ON" Indication |
|---|---|
| 1 (Out 06) | Power available to fuel and water solenoids |
| 2 (In 06) | Speed switch has operated into engine running mode |
| 3 (In 07) | Speed switch has operated into overspeed mode |
| 4 (In 08) | Oil Pressure switch contacts closed (Low Oil Pressure) |
| 5 (In 09) | Water temperature switch contacts closed (High Engine Temp.) |
| 6 (In 01) | Battery #1 voltage present |
| 8 (In 02) | Battery #2 voltage present |
| 9 (Out 02) | Crank #1 voltage present (while cranking on Battery #1) |
| 10 (Out 03) | Crank #2 voltage present (while cranking on Battery #2) |
| 12 (Out 07) | Energize to stop voltage present |

### a. BATTERY LOCKOUT TEST:

1. Turn on Battery #1 switch and Battery #2 switch.
2. Press the **"Reset"** button. Battery #1 and Battery #2 Healthy lights should be on.
3. Turn Battery #1 switch off for a couple of seconds and back on. Battery #1 light should go off and remain off.
4. Press **"Reset"** button. Battery #1 light should come on.
5. Repeat for Battery #2.

### b. CRANKING CYCLE TEST: This test simulates a condition where the engine refuses to start.

1. Disconnect Terminal No.1 on Controller panel. **NOTE: Disconnecting Terminal No.1 is for the purpose of removing power from the fuel solenoid so engine will not start. On engines where the fuel solenoid is not used (Caterpillar), or is connected other than through Terminal #1 (Clarke-G.M.), other means must be used to stop fuel flow to the engine to prevent starting.**
2. Press the **"Test"** mode button to start cranking the engine. Time the crank and rest periods, and count the number of cranks. There should be six (6) crank periods separated by five (5) rest periods each of approximately 15-seconds

duration. The **"Failed to Start"** light should come on and the alarm horn should sound. Status indicator light for Terminal #1 should come on as soon as the **"Test"** push button is pressed and the pressure drops below the low set point. Indicator lights for terminals 9 and 10 should come on alternately to indicate cranking cycle. (See above)

3. Press the **"Stop"** push button to stop the engine and properly reconnect all leads.

NOTE: **In order to prevent discharging the starting batteries, this same test can be made without actually cranking the engine by disconnecting the starter cable and observing the action of the starter contactors and/or status indicator lights for terminals 9 and 10.**

c. **CHECKING STARTING MOTOR RELEASE**

1. Press the "**Test**" mode button. Engine should start promptly and starting motor should release at approximately 1/3 of engine speed. Status indicator light for terminal #2 should come on to indicate speed switch has operated to disconnect cranking and the Engine Running LED should illuminate.

NOTE: A convenient method of determining the exact instant the starter releases is to connect a battery test light or voltmeter across the starter terminals and observe when power is disconnected.

2. Press the "**Stop**" push button to stop the engine.

d. **OIL PRESSURE FAILURE TEST:**

1. Press the **"Test"** mode button to start engine. When the engine is starting and oil pressure is not yet up to full pressure, the **"Engine Low Oil Pressure"** light will illuminate, but the horn will not sound. When pressure builds up, and the switch opens, the light will go out. This feature provides indication that the oil pressure switch contacts are operating in a normal manner.

Note: On Electronic Engines with electronic oil pressure sensors, the oil pressure light may not illuminate while the engine is cranking. The low oil pressure test should be performed on these engines with the engine running as described below.

2. After the engine is running, connect a temporary jumper between terminal #4 and terminal #11.
3. Both the **"Engine Low Oil Pressure"** light and status indicator light for terminal #4 should come on immediately. Wait approximately seven (7) seconds. Alarm horn should sound.
4. Press the **"Stop"** push button to stop the engine and remove jumper between terminal #4 and terminal #11.
5. Wait at least 30 seconds for elements to reset before making any further tests.

e. **WATER TEMPERATURE FAILURE TEST:**

1. Press the **"Test"** push button to start engine.
2. Jumper contacts on water temperature switch on engine.
3. Alarm horn sounds and the **"High Water Temperature"** light on controller will illuminate after approximately 7 seconds. Status indicator light for terminal #5 should come on with **"High Water Temperature"** light.
4. Press the **"Stop"** push button to stop the engine and remove jumper on water switch.

f. **OVERSPEED FAILURE TEST:**

1. Press the **"Test" mode** button to start engine.
2. Momentarily short the contacts on the engine speed switch, or connect a temporary jumper between terminal #3 and #6 on the controller.
3. The alarm horn sounds and the **"Engine Overspeed"** light will illuminate immediately. Engine comes to a stop. Status indicator lights for terminals #3 and #12 should come on with the **"Engine Overspeed"** light.
4. Remove the jumper from terminals #3 and #6 then turn the selector switch to the **Off** position. Press the **"Reset"** button to reset the **"Overspeed"** alarm. Turn the selector switch back to the **Auto** position.

g. **CONTACTOR COIL FAILURE ALARM TEST:**

1. While the controller is in the **"Auto"** mode disconnect the field wire from terminal 9. Within a few seconds the **"Contactor Coil Failure"** lamp should illuminate and the alarm horn should sound. Reconnect the field wire to terminal 9. The **"Contactor Coil Failure"** lamp should go out and the alarm horn should silence. Repeat for terminal 10.

h. **AUTOMATIC STARTING TESTS:**

1. Place control in **"Auto"** position.
2. Bleed off pressure in system until pressure drops below the low set point. The **"Pump on Demand"** light should come on.
3. Engine should start automatically and continue to run after pressure rises above the high set point, if arranged for **"Manual"** stop. If arranged for **"Automatic"** stop, engine will continue to run for time set on Engine Run Timer and then stop.
4. Press the **"Stop"** push button to stop the engine.
5. Repeat tests for each demand switch such as deluge valve, remote start, etc.

i. **PERIODIC WEEKLY START TEST:**

1. Pressure must be up and all other demand switches de-activated.
2. 115 V.A.C. power must be turned on to the panel.
3. When the current day and time of day matches the settings in System Config screens 107 and 108, the solenoid drain valve will energize and the engine will begin cranking. It will continue to run for the amount of time set.
4. Should a remote manual start occur or a low pressure condition occur while the pump is running on Weekly Test, the pump will not stop until the Stop pushbutton is pressed or if set for Automatic Stop, the Minimum run timer times out.
5. The periodic Weekly Test function is factory set to No in Screen 106 due to Factory Mutual standard requirements. Contact the Metron Factory Service department for instructions to turn this function on if this is not a Factory Mutual insured facility.

j. **SETTING PROGRAM WEEKLY TEST TIME:** System Config screen 106 through 109.

k. **REMOTE START SWITCH CIRCUITS:** Field wiring terminals are provided on the controller so that optional remote start switches such as Remote Pushbutton Stations, Deluge Valve Switch, Fire Alarm Switches, etc., may be used to start the engine. Two (2) sets of terminals are provided. Terminals #112 and #31 are used for remote manual start push buttons (close to start). Terminals #111 and #31 are used for remote Deluge Valve Switch or other remote automatic start switches (open to start). Upon automatic start from this type of switch, the engine will be stopped either automatically (if set for automatic stop) after the demand switch de-activates and Engine Auto Stop Timer times out, or manually at the Controller. Terminals #111 and #31 must have a jumper installed if a remote Deluge switch is "Enabled" but not to be used. When the controller is shipped from the factory Deluge Valve start is Disabled (System Config screen 121).

l. **AC POWER FAILURE STARTING:** If this feature has been enabled it can be tested by disconnecting the normal 115 V.A.C. to the Controller. After the preset time delay (which is specified in System Config screen 112), the Controller will commence cranking the engine. The **"Charger #1 Failure", "Charger #2 Failure", and "AC Power Loss"** lamps will illuminate and the alarm will sound without delay.

m. **NORMAL OPERATION – AUTOMATIC:** Turn the selector switch to the **"Auto"** position. A green **"Automatic Mode"** light will illuminate and the engine will automatically start upon drop in pressure or operation of other start switches. If the Auto Stop Timer is disabled (Manual Stop) the engine must be turned off at the Controller. When the Auto Stop Timer is enabled, upon termination of the demand signal, the engine will run for the length of time left on the Auto Stop Timer and then will stop automatically.

n. **AN ADJUSTABLE SEQUENTIAL START TIMER IS SUPPLIED FOR MULTIPLE PUMP INSTALLATION:** Normally, the leading pump Controller will not have a delay timer and will commence cranking the engine immediately upon operation of a demand signal (other than Power Failure which is time delayed). The subsequent Controllers will have a time delay which is adjustable from 0 to 999 seconds. Each time delay should be set with progressively longer times on each subsequent pump. The recommended time interval is ten (10) to fifteen (15) seconds. This may be extended or shortened as required by the local authorities having jurisdiction.

o. **PUMP ROOM ALARMS:** Field terminals may be provided for various inputs from pump room alarms. These alarms include: Low Fuel, Low Pump Room Temperature, Reservoir Low, Reservoir Empty, Low Suction Pressure, Relief Valve Discharge and/or Flow Meter On etc. A maximum of ten (8) pump room alarms are available. The Controller is arranged so that the alarm horn will sound and the light will come on when the alarm sensor contacts close. These pump room alarms can be silenced with the "Silence" push button on the OID if they have been configured as silenceable.

# MECHANICAL SALES, INC.

## FIRE PUMP TEST WORKSHEET

**CONTRACTOR:** _____ **AHJ:** _____

**PROJECT:** _____ **TEST DATE:** _____

**LOCATION:** _____ **TECH:** _____

**PUMP MFR:** _____ **START UP DATE:** _____

**S/N:** _____ **TECH:** _____

**MODEL:** _____ **GPM:** _____ **PSI:** _____

**JOCKEY PUMP MFR.:** _____

**MOTOR MFR:** _____ **S/N :** _____

**MODEL - S/N:** _____ **MODEL :** _____

**HP:** _____ **RPM:** _____ **FLA:** _____ **CONTROLLER:** _____

**S/N :** _____

**CONTRL MFR:** _____

**S/N:** _____ **NET CHURN:** _____

**MODEL:** _____ **STATIC SUCTION:** _____

**VOLTAGE:** _____ **AIC:** 100K **STATIC DISCHARGE:** _____

**(+) OR (-) ADJUST:** _____

| ELECTRIC MOTOR | | | PUMP PRESSURE | | | NOZZLE SIZE - PRESSURE - GPM | | | | | | | | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLTS | AMPS | RPM | SUCT | DISC | NET | FLOW# | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | GPM | % |
| | | | | | | 1 | | CHURN | | | | | | | | 0 |
| | | | | | | 2 | | | | | | | | | | 50 |
| | | | | | | 3 | | | | | | | | | | 100 |
| | | | | | | 4 | | | | | | | | | | 150 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

| MERCOID SETTINGS | CUT IN PRESSURE | CUT OUT PRESSURE | AUTO | MANUAL |
|---|---|---|---|---|
| FIRE PUMP | | | | |
| JOCKEY PUMP | | | | |

| COMMENTS |
|---|
| |
| |
| |
| |
| |
| |

| ATTENDING PERSONNEL |
|---|
| |
| |
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# MECHANICAL SALES, INC.

**8970-E Route 108**
**Columbia, MD 21085**

**(410) 964-0841**
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# SERVICE REPORT TICKET

| | |
|---|---|
| **Date:** | **Equipment Mfg:** |
| **Customer:** | **Serial #** |
| **Project:** | **Model:** |
| | |
| **Jobsite Contact** | **Service Rep:** |

**DETAILS OF WORK PERFORMED**

**Parts Supplied:**

**Total Number of Hours:** **Number of OT Hours:** **Miles:**