MURPHY®

467 ENGINE CONTROLLER
OPERATION MANUAL 40-27-2894

FOR USE WITH: IASXXXXX Firmware Late 2011 and 2012. 8/3/12

PRELIMINNARY

DESCRIPTION
The 467 controller is a dedicated microprocessor based engine controller. The installed program is specifically designed for this application.

SENSOR INPUTS
The 467 controller accepts several different types of inputs. They are configurable to match what the software will support. See the wiring hookup drawing for terminal details.
(7) Analog inputs. Configurable for; 4-20 ma, 0-5 vdc, and sender/ground only digital.
(8) Digital inputs. These are high/low inputs accepting either B (+) or B (-).
(1) Frequency input. This is an optically isolated speed sensing input from a magnetic pickup.

OUTPUTS
(7) Digital outputs. These are open collector sinking transistor outputs rated for 200ma.
(1) Analog output. This is .4 to 4.2 vdc for throttling tiered diesels.

COMMUNICATIONS
(2) J1939 CAN ports.
(1) RS-485 port.
(1) RS-232 port.

LOADING PROGRAM
Always perform a factory setup after loading a program into the 467.

CONTROL SEQUENCE OUTLINE

AUTO START STOP CONDITIONS

This 467 controller has the ability to start and stop the engine or electric motor automatically in three different ways. These include Modbus SCADA, Temperature Set-points, and by the built in Clock.

Modbus: By writing a "1" in the start/stop register, the engine or electric can be called to run.

Crop Temperature: The engine or electric is called to start and stop based on the crop temperature start/stop set points. **If wireless is selected, the lowest reading is used for start and stop. If the temperature is above the "temp. line" (S61) and wireless probes are selected, the controller will use the highest reading for start and stop.**

Clock: The engine or electric is called to run by the selected day and time set points.

Local Contact: The engine or electric is called to run when this contact closes.

Chemagate Contact: The engine is called to run when this contact closes. See CHEMAGATE STOP SEQUENCE.

Soil Moisture: If the controller is not in a soil moisture lockout period, the engine or electric is called to run when the soil moisture drops to the auto start %. Auto stop occurs when the soil moisture rises to the auto stop %. **If wireless is selected, the lowest reading is used for start and stop.**

NOTE: Whatever start / stop condition causes the auto start, that same condition must cause the auto stop. If another start / stop condition is calling for an auto start (except clock start) while the engine is running, and the original condition is calling for a stop, the engine will continue to run until the latter condition calls for an auto stop.

NOTE: If system flow is selected for analog 5 in the M#'s, the crop temperature start/stop feature is not available.

ENGINE START SEQUENCE

With the TEST - OFF- AUTO selector in the "AUTO" position, and there are no failures, [STATUS: SELECTOR -AUTO; STATE: PANEL READY].

I. If a start condition occurs, as determined by the user, the controller will initiate an auto start sequence [STATUS: AUTO START; STATE: DLY ON STRT]:

A. The controller has a DELAY ON START function. The controller will ignore the automatic start signal for the DELAY ON START time delay. If this function is not used set the delay to zero (0). The delay is field adjustable from 1 to 500 seconds. When this delay expires, the prime output turns on and the prime delay begins timing.

B. When the PRIME DELAY expires; the following shutdown circuits are "ARMED" immediately (Names in parenthesis are actual names displayed),
1. **LOW COOLANT LEVEL** (LO COOLANT LVL) (If used).
2. **HIGH DISCHARGE PRESSURE** (HI DISCH PSI).
3. **OVERSPEED** (OVERSPEED).
4. **OVERCRANK** (OVERCRANK).

C. The fuel circuit is energized. (This output doubles as the electric call to run when electric has been chosen)

D. The starter pilot relay is energized [STATUS: AUTO START; STATE: CRANK ON/OFF].

E. Cycle cranking begins: Crank 10 seconds; Rest 10 seconds until engine starts or OVERCRANK program operates.

NOTE: CYCLE CRANKING. If the engine does not start on the first crank, the controller will de-energize the starter output for the entire rest cycle.

*NOTE: **OVERCRANK**. If the engine fails to start after the field-programmable number (preset to 6) of cranking attempts, **OVERCRANK** will be indicated on the alphanumeric display. The Micro-controller Start Sequence will be halted and automatic control circuits will be locked out. The lockout must be manually reset before normal operation may be resumed.*

The Micro-controller will energize the ENGINE FAILURE status output. The "Fail" Status is reset by moving the panel selector switch to the "OFF" position.

F. When the engine speed rises above the field-programmable Crank Disconnect speed setting, an automatic Run Sequence begins [STATUS: AUTO START; STATE: WARMUP TIMING]:
   1. Cycle cranking is discontinued immediately.
   2. Internal "hourmeter" program begins to record engine running hours.
   3. The engine mounted throttle actuator is signaled to slowly increase the engine speed to the field programmable “WARMUP RPM.”
   4. Two (2) timing periods begin:
      a) Shutdown Lockout time delay -- field-programmable period. Preset to thirty (30) seconds.

      NOTE: The second line of the display will show "SHUTDOWN DELAY TIMING" until the lockout delay expires.

      b) Warmup time delay -- field-programmable to 500 seconds

G. When the preset, Shutdown Lockout delay expires the following shutdown/alarm circuits are "armed:" (Names in parenthesis are actual names displayed):
   1. **LOW OIL PRESSURE** (LO OIL PRESS)
   2. **HIGH COOLANT TEMPERATURE** (HIGH H20 TEMP)
   3. **LOSS OF SPEED** (LOSS OF SIGNAL)
   4. **LOW BATTERY** (LOW BATTERY) SELF-CLEARING ALARM ONLY

   NOTE: If the engine speed drops below the crank stop rpm set point before the lockout delay expires, the re-crank delay begins timing. When this delay expires, cycle cranking will resume.

SHUTDOWNS

When a shutdown occurs, the appropriate Shutdown Name is shown on the second line of the display and the engine is signaled to shutdown immediately. The display will indicate cause of shutdown and the panel must be manually reset --selector moved to OFF position -- before normal operation may be resumed. The Micro-controller stores the Shutdown Name in the program set point memory for future reference. On any shutdown, the Engine Failure output is turned on.

H. When the Warmup timing period expires [STATUS: AUTO START; STATE: AT LOAD]:
   1. The Controller will throttle the engine between the minimum and maximum rpm set points to maintain the system pressure. (OPL or Transducer)
   2. At-load time delay begins timing.

   NOTE: The engine is throttled quickly through the range of RPM between the Bypass Minimum and Bypass Maximum RPM set points.

   NOTE: If the Flood Switch closes while throttling to pressure, the engine is throttled to the Flood Preset RPM set point. When the Flood Switch re-opens, pressure throttling is resumed.

   NOTE: If the system flow rises above the Maximum Flow Throttle setpoint and deadband, while throttling to pressure, the engine is throttled to the minimum RPM set point. The engine will remain at minimum until the flow drops below the Maximum Flow Throttle setpoint and deadband. Pressure throttling will then resume.

I. When the At-Load time delay expires the **LOW DISCHARGE PRESSURE** (LO DISCH PSI) shutdown is armed.

STOP SEQUENCE

II. If a stop condition occurs, the controller will initiate an auto stop sequence [STATUS: AUTO STOP; STATE: DLY ON STOP]:

A. The controller has a DELAY ON STOP function. The controller will ignore the automatic stop signal for the DELAY ON STOP time delay. If this function is not used set the delay to zero (0). The delay is field adjustable from 1 to 500 seconds.

B. When the DELAY ON STOP delay expires the engine mounted throttle actuator is signal to slowly decrease the engine speed to the engine idle RPM.

C. The Cooldown time delay period begins timing (1 to 500 seconds) [STATUS: AUTO STOP; STATE: COOLDOWN TIMING]. When this delay expires:
1. Internal "hourmeter" program stops recording and stores current engine running hours.
2. All shutdown circuits are locked out.
3. The solenoid fuel valve is de-energized.
4. Control circuits automatically reset for next START sequence [STATUS: SELECTOR - AUTO; STATE: PANEL READY].

CHEMAGATE STOP SEQUENCE

If running from the Chemagate start / stop contact, and the contact re-opens, the stop and cool down delays are bypassed and the engine is signaled to return to full idle (no throttling routines are used). The Chemagate run delay begins timing, when this delay expires the engine is signaled to stop.

SELECTOR SWITCH (Applies to either engine or electric motor operation)

III. The Control panel is equipped with a 3 position selector switch ... TEST -- OFF -- AUTO:

TEST Automatic **START** and **RUN** sequences are initiated when selector is moved to the TEST position. The control panel will perform its operations as though an automatic start signal were accepted. The engine or electric motor will be kept in operation until the switch is moved to the OFF position. If the switch is moved rapidly from the TEST position through the OFF position to the AUTO position the controller will initiate an auto stop sequence, if there is no auto start active.

OFF Disconnects control power to prevent the engine or the electric motor from starting or continuing to run through the control panel.

AUTO As described in above sequence outline.

ELECTRIC START SEQUENCE

With the TEST - OFF- AUTO selector in the “AUTO" position (this switch is mounted on the S449 relay board). [STATUS: SELECTOR – AUTO; STATE: PANEL READY].

IV. If a start condition occurs, the controller will initiate an auto start sequence [STATUS: AUTO START; STATE: DLY ON STRT]:

A. The controller has a DELAY ON START function. The controller will ignore the automatic start signal for the DELAY ON START time delay. If this function is not used set the delay to zero (0). The delay is field adjustable from 1 to 500 seconds. When this delay expires, the prime output turns on and the prime delay begins timing.

B. When the prime delay expires, the following is "ARMED" immediately (Names in parenthesis are actual names displayed),
1. **HIGH DISCHARGE PRESSURE** (HI DISCH PSI). (Transducer only)

C. The electric call to run output is turned on. (This output doubles as the engine fuel circuit when engine has been chosen) The prelube output turns off.

D. The At-Load time delay begins timing. When this delay expires, the **LOW DISCHARGE PRESSURE** (LO DISCH PSI) shutdown is armed.

ELECTRIC STOP SEQUENCE

V. If a stop condition occurs, the controller will initiate an auto stop sequence [STATUS: AUTO STOP; STATE: DLY ON STOP]:

A. The controller has a DELAY ON STOP function. The controller will ignore the automatic stop signal for the DELAY ON STOP time delay. If this function is not used set the delay to zero (0). The delay is field adjustable from 1 to 500 seconds.

B. When the stop delay expires:
1. All shutdown circuits are locked out.
2. The electric call output is turned off.
3. Control circuits automatically reset for next START sequence [STATUS: SELECTOR - AUTO; STATE: PANEL READY].

SPECIAL FEATURES

LOSS OF SENDER

Temperature: When the engine starts, the temperature sender failure delay (fixed for 180 seconds) begins timing. When this delay expires, the controller must sense a loss of temperature sender *connection* to the 467 controller throughout an additional bubble timer (fixed for 60 seconds). When the controller is no longer reading the sender, due to the loss of connection, the display will read 3 dashes (---) instead of temperature. If this condition remains when the bubble timer expires, the display will read “LOST TEMP SENDER”, and the controller will signal the engine to shutdown. The controller must be reset manually as in any failure shutdown before normal operation can continue. The “LOST TEMP SENDER” shutdown will occur only if one of the wires between the temperature sender and the controller is disconnected. If the temperature sender or wiring shorts to ground, the 467 display will increase to the maximum reading of 300 degrees causing a high temperature shutdown. The temperature during the last shutdown is recorded in P-3. If this recorded reading is zero, this would indicate that the controller shutdown on “LOST TEMP SENDER”.

Pressure: A loss of oil pressure sender connection, “LOST PR SENDER” will only occur if the controller senses a loss of pressure sender *connection* to the 467 controller prior to receiving a start signal (test or auto). When the controller is not reading the sender, due to the loss of connection, the display will read 3 dashes (---) instead of pressure. If this condition remains throughout the shutdown lock out delay, the display will read “LOST PR SENDER”, and the controller will signal the engine to shutdown. The controller must be reset manually as in any failure shutdown before normal operation can continue. The “LOST PR SENDER” shutdown will occur only if one of the wires between the pressure sender and the controller is disconnected. If the pressure sender becomes disconnected after the lock out delay expires, the controller will signal the engine to shutdown on “LOW OIL PRESSURE”. If the pressure sender or wiring shorts to ground, the 467 display will increase to the maximum reading of 100 PSI. The pressure during the last shutdown is recorded. If this recorded reading is -999, this would indicate that the controller shutdown on “LOST PR SENDER”.

NOTE: The 467 controller will **not** signal the engine to shutdown if the oil pressure sender fails high, meaning sender or wires are shorted to ground. As with all failure shutdowns, it is recommended by the factory and is the responsibility of the user of this product to periodically test all shutdowns for proper operation.

WIRED (LOCAL) CROP TEMPERATURE PROBE FAILURE

The controller will detect if the Model 12 temperature probe has been disconnected or has stopped operating. If the temperature reading is below 5F degrees when the controller is powered up, the start delay begins timing. If the temperature reading remains below 5F degrees throughout the start delay, the 467 is locked out from any future temperature auto starts. This lockout is disabled when the “prime” delay expires. This lockout is reset when another type of start signal is introduced or the temperature rises above 5F degrees.

WIRELESS CROP TEMPERATURE PROBE FAILURE

The controller will monitor up to 8 (selectable) remote wireless temperature probes. If the temperature reading is below 5F degrees on **all** selected probes when the controller is powered up, the start delay begins timing. If the temperature reading remains below 5F degrees on **all** of the selected probes throughout the start delay, the 467 is locked out from any future temperature auto starts. This lockout is disabled when the “prime” delay expires. This lockout is reset when another type of start signal is introduced or the temperature rises above 5F degrees on **one** of the selected probes.

WIRED (LOCAL) & WIRELESS SOIL MOISTURE START LOCKOUT

The controller will not allow a soil moisture auto start if the time of day falls within one of the two lockout periods. If the soil moisture falls to the emergency % set point during a lockout period, the engine will start and run for the selected time, or the run is cancelled if the soil moisture reaches the high set point.

NOTE: The wireless probes and the irrigation valves control are broadcasted from the wireless radio controller which is a Modbus slave on the RS485. Port 1.

CONDITIONS WHERE EMAILS AND TEXT MESSAGES ARE SENT

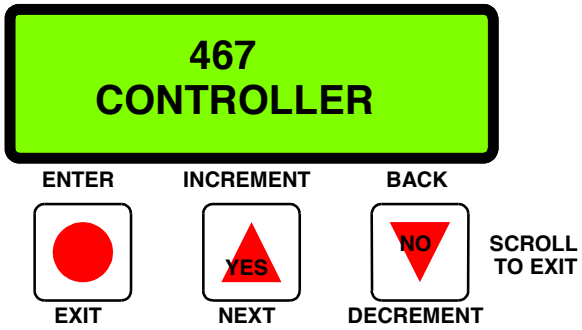
CONDITION	EMAIL OR TEXT
LOW COOLANT LEVEL	YES
HIGH DISCHARGE PRESSURE	YES
OVERSPEED	YES
OVERCRANK	YES
LOW OIL PRESSURE	YES
HIGH COOLANT TEMPERATURE	YES
LOSS OF SPEED	YES
LOW DISCHARGE PRESSURE	YES
AUTO STOP	YES
LOW BATTERY ALARM	YES
CLOCK START (IF SELECTED)	YES
TEMP. START (IF SELECTED)	YES
ON SITE START (IF SELECTED)	YES
MAXIMUM FLOW THROTTLE	YES
OVERRIDE START/STOP (IF SELECTED)	YES
SOIL START LOCKED OUT	YES
EMERG. SOIL START	YES
TEMP PROBE FAILURE	YES
TEMP PROBE FAILURE RESET	YES

SEQUENCE OF OPERATION

Operation Directions

OPERATING THE INTERFACE

By using the three push-buttons and the liquid crystal display, you can make set-point changes, acknowledge alarms, and scroll through the display. The graphic below shows the display and push-buttons. The ● ⮝ ⮟ keys are membrane type push-buttons. The ● button is best described as an Enter key. You can confirm a set-point and acknowledge alarms with this button. The ⮝ button is used for increasing a set-point or scrolling up the display. The ⮟ button is used for decreasing a set-point or scrolling down the display. The 2 line dot-matrix liquid crystal display shows information pertinent to its current running mode.



For example, if the unit receives a remote start signal, it will auto start the engine and display the current operation on the screen. These states include Crank On, Crank Off, Warm-up, Cooldown, etc. When the unit has brought the engine on stream, the display will scroll vertically through the engine vital signs. These include, Oil Pressure, Engine Temperature, Engine Speed, Running Hours, etc.

FIRST TIME SETUP

Before using the unit for the first time, it is necessary to configure all the set-points. To access the S-numbers (Setup numbers), use the following procedure:

1. Press the ⮟ button until the title page appears.

IAS071512 (508)-759-8038

2. Now, press the ● button once. This will bring up the entry code screen.
3. Next, press the ⮝⮟ buttons until the appropriate entry code is displayed. See the Secret Code Supplement for your number.
4. Finally, press the ● button once. You are now able to edit the S-numbers.

   To change an S-number, the following procedure should be used. We will change the day of the week for this example.

5. Once you have accessed the S-numbers through the above procedure, the screen will show the following:

I1-4 0000 S-1 LINE 1 SELECT

   Note: The top line may be different. Refer to S1 in S-Number Description and Listing section.

6. Now, press the ⮝ button until the following screen appears:

I1-4 0000 S7 SET DAY OF WK

7. Next, press the ● button once. This will bring up the following screen: (Note: The value in the DAY OF WEEK may **vary).**

I1-4 0000 FRIDAY

8. Next, press the ⋏⋎ buttons until the appropriate value is displayed. For demonstration purposes, set the unit to WEDNESDAY.

I1-4 0000 WEDNESDAY

9. Finally, press the ● button once. You have now changed the day of the week to WEDNESDAY.

All set-points are adjusted in the same manner as described above. The only difference is which S-number you select before scrolling the set-point change. Once you have adjusted each S-number, with the appropriate values, you must exit the S-number setup mode. To do this, hold the ⋎ button until the following screen is displayed and then press the ● button once. This will put the unit back into normal operation mode. If you forget to exit the S-numbers, the unit will exit for you after a pre-programmed amount of time.

I1-4 0000 S-0 CIRCLE = EXIT

MAIN DISPLAYS (*) Displayed when "electric" is selected in S8.

During normal operation, the unit allows you to scroll through a number of informative front displays by using the ⋏⋎ buttons. A listing and explanation of each follows:

1. **KC ENTERPRISE (*)**
   This is the first line of the title page.
2. **PROGRAM 40-33-2894 (*)**
   This is the second line of the title page. It shows which program is installed in your unit. This information is helpful when calling for technical assistance.
3. **DD MMM YYYY (*)**
   This line displays the present date.
4. **HH:MM:SS (*)**
   This line shows the present time.
5. **RUN HOURS: XXXX.X (*)**
   This is your on board hour meter. It digitally displays the number of hours your electric / engine has run. All the service reminders are based on the elapse time on the hour meter.
6. **BATTERY XX.X VDC (*)**
   This displays the engine battery voltage or 12 vdc power supply when controlling an electric pump.
7. **ENG SPD XXXX RPM**
   This displays the current engine RPM.
8. **DISCH PSI XXX (*)**
   This displays the current discharge pressure as sensed from a pressure transducer.
9. **CROP TMP XXX °F (*) or SYSTEM FLOW XXXX GPM (*)**
   This displays the current ambient crop temperature from the wired local Model 12 probe, up to 8 wireless probes **(the lowest reading is displayed),** or the system flow (display only no control) from a transducer.
10. **SOIL MOISTURE XXX % (*)**
    This displays the current soil moisture from a wired local probe, or up to 8 wireless probes which **the lowest reading is displayed**.

11. OIL PR XXX PSI

This displays the current engine oil pressure as sensed from an electric gauge sender. Shutdowns based on oil pressure reference this number.

12. H2O TEMP XXX °F

This displays the current engine jacket water temperature as sensed from an electric gauge sender. The unit will signal the engine to shutdown if this temperature reading exceeds the shutdown point selected in S10.

13. XXXXXXXXXXXXXXX (*)

There are two positions on the selector switch that are displayed on this line: SELECTOR IN AUTO, and SELECTOR IN OFF. When this window shows AUTO, your TEST - OFF - AUTO switch is in the AUTO position. When in AUTO, the unit is ready to start the engine. When this window shows AUTO START the engine has started running. When this window shows OFF, your TEST - OFF - AUTO switch is in the OFF position. The unit will not initiate an auto start with the switch in the OFF position. If the switch is moved to the OFF position while the engine is running, the unit will signal the engine to stop. When this window shows TEST START, your TEST - OFF - AUTO switch is in the TEST position. When the switch is flipped to TEST, the unit will start the engine as if a start signal had been received; regardless of the start / stop contacts. Also if the selector is in AUTO and the commercial power fails the controller will enter a power fail mode of operation.

14. ST: XXXXXXXXX

ST stands for STATE. This window shows what state your controller is in. These states include the following: NOT READY, PANEL READY, START DLY, PRIME, CRANK ON, CRANK OFF, RECRANK DLY, WARMUP, AT LOAD, STOP DLY, COOLDOWN, and SHUTDOWN.

NOT READY (*): This state occurs when the selector is in the OFF position. It means that the panel is not ready to run in Automatic mode.

PANEL READY (*): This state occurs when the selector is in the AUTO position and no shutdowns have occurred. It means that the panel is ready to run in Automatic mode.

START DLY (*): This state occurs when a start signal is sensed and the start delay is timing. The start signal must be present throughout this delay before the unit goes to the next state.

PRIME (*): This state occurs after the Start Delay expires. During the Prime state, the unit energizes the prime output throughout the delay.

CRANK ON: This state occurs after the Prelube Delay expires. During the Crank On state, the unit energizes the starter circuit and attempts to start the engine.

CRANK OFF: This state occurs after the Crank On state if the unit senses that the engine has not started. During the Crank Off state, the unit removes power from the starter circuit to cool off the starter before another cranking attempt is made.

RECRANK DLY: This state occurs if a false start occurs. A false start occurs when the engine speed rises above crank disconnect RPM and then drops back below. This delay will not allow the controller to re-engage the starter. The purpose is to allow the engine to stop moving before allowing the controller to re-engage the starter. This state can only occur during the lockout delay.

WARMUP: This state occurs after the unit senses that the engine has started. During this state, the unit throttles the engine to the warm-up RPM and stays at this engine speed until the Warmup Delay expires. The Lockout Delay also begins timing when the Warmup State begins.

AT LOAD (*): This state occurs after the Warmup state concludes. The At Load delay begins timing. The Low Discharge Pressure shutdown is armed when this delay expires.

STOP DLY (*): This state occurs when a stop signal is sensed and the stop delay is timing. The stop signal must be present throughout this delay before the unit goes to the next state.

COOLDOWN: This state occurs after the Stop Delay has expired. During the Cooldown state, the unit throttles the engine to an idle. As the engine RPM passes through the Clutch Release RPM, the unit will deactivate the clutch circuit. If a start signal is received during the Cooldown state, the unit will switch to the At Load state and ignore the Warmup state.

SHUTDOWN (*): This state occurs if a shutdown condition is detected. Reasons for shutdown include low oil pressure, high engine temperature, overspeed, etc. During this state, the engine is signaled to shutdown and all start signals are ignored until the state is reset by moving the selector to the OFF position and then back into AUTO or TEST.

S-NUMBER DESCRIPTION AND LISTING

The S-numbers are used for customizing the controller to your specific application. Included in the S-numbers are the adjustable variables for the system. These S-Numbers must be set before trying to use the unit. Following is a list of available S-Numbers and a short description of the function of each. See Secret Code Supplement for the entry code number.

S-0 Manual 'EXIT' from the S-number setup mode. Press " 'CIRCLE' TO EXIT"

S-1 **Line One Selection**. Sets the variable to be displayed on the **top line** of the display while in the Setup Select mode. Available:
RUN HOURS
ENGINE SPEED
LEAD SPEED
SYSTEM VOLTAGE
OIL PRESSURE
ENGINE TEMPERATURE
INPUT / OUTPUT STATUS
Note: The input / output status information will show an X on an I/O if that particular input is or output is active. If there is no input or the output is OFF, the unit will display an O. This can be used for testing wiring before starting the engine. For more information, see the section titled "Double Checking Your Wiring".

S-2 Set Time **Minutes**. To adjust the minutes portion of the Real Time Clock.

S-3 Set Time **Hours**. To adjust the hours portion of the Real Time Clock.

S-4 Set Date **Day**. To adjust the day portion of the date display.

S-5 Set Date **Month**. To adjust the month.

S-6 Set Date **Year**. To adjust the year.

S-7 Set **Day of Week**. Adjusts day of week Sunday through Saturday. Day advances with date.

-------- S-8 **ENG OR ELEC:** Enter in the type driver being used, either engine or electric motor. **Factory set to Engine. Note: When "Electric" is selected, S44 will become S9.**

-------- S-9 **SPEED CALIB:** This setting is used to calibrate the speed signal so that the unit will display engine RPM. Simply enter the number of Pulses per revolution the magnetic pickup or alternator supplies to the unit. Another way to set this variable is to get the engine running at a known RPM and then change the number until the top line matches your known RPM. The resulting number is the pulses per revolution. **Factory set to 170.**

-------- S-10 **OVERSPEED:** This setting allows you to enter the highest speed the engine can run before damage is caused. If the unit senses that the engine has exceeded this speed, it will signal the engine to shutdown. **Factory set to 2000.**

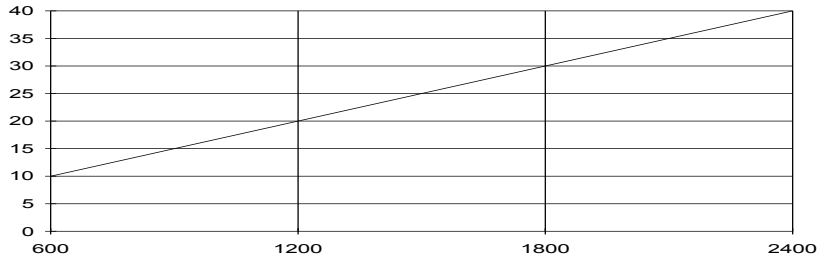
-------- S-11 **LOCKOUT DELAY:** This delay is used to ignore conditions such as low oil pressure when the engine first starts to allow the pressure time to reach its normal operating range (adjustable from 1 to 60 seconds). **Factory set to 45.**

-------- S-12 **LOP @ LOW SPD:** The 467 Controller gives you two oil pressure shutdown points. For engines that develop very little oil pressure at an idle, you put a lower shutdown setting in this set-point. The unit automatically changes the shutdown point between the Low Speed Shutdown point and the High Speed Shutdown point. **Factory set to 15. (103kpa)**

-------- S-13 **LOP @ HI SPD**: This set-point is the higher oil pressure shutdown point that is referred to in number 12 above. This is the point that you want the engine to shutdown during normal high speed engine operation. By shutting down the engine at a higher oil pressure, you can avert damage that could be caused by waiting to shut down the engine at the lower set-point needed to accommodate an idle. **Factory set to 30. (206kpa)**

-------- S-14 **LOP LO SPEED:** Set this to your engine idle speed. If the engine is running at this speed, an idle for example, and the oil pressure reaches the set-point selected in S7, the unit will initiate an automatic shutdown. **Factory set to 600.**

-------- S-15 **LOP HI SPEED:** Set this to your engine maximum speed. If the engine is running at this speed, and the oil pressure reaches the set-point selected in S8, the unit will initiate an automatic shutdown. **Factory set to 1600.**



The Graph above shows how the set-point changes between your high speed set-point and low speed set-point. As the engine speed increases, the unit automatically raises the oil pressure shutdown set-point along a straight line between the two set-points you entered.

-------- S-16 **HI WATER TMP:** Adjust this setting to the engine jacket water temperature you do not want to exceed. If the unit senses a temperature higher than this set-point, it will initiate an automatic shutdown. **Factory set to 235. (102c)**

-------- S-17 **WARMUP DLY:** You can adjust this variable to the number of seconds you want your engine to warm-up before it engages the clutch and throttles up to an at load condition (adjustable from 1 to 500 seconds). **Factory set to 180.**

------- S-18 **COOLDOWN DLY:** You can adjust this variable to the number of seconds you wish to cool down your engine before it shuts off after a stop signal is received (adjustable from 1 to 500 seconds). **Factory set to 180.**

-------- S-19 **CRANK TIME:** Set this delay to the desired amount of time you want each engine cranking attempt to last. Consult your engine manual for recommended cranking and resting times (adjustable from 1 to 30 seconds). **Factory set to 17.**

-------- S-20 **REST TIME:** Set this delay to the desired amount of time you want each rest period between cranking attempts to last. Consult your engine manual for recommended resting and cranking times (adjustable from 1 to 30 seconds). **Factory set to 17.**

-------- S-21 **RECRANK DLY:** This delay is used to adjust the amount of time the unit will wait for the engine to stop moving before attempting another crank if a false start occurs. A false start is when the engine starts but then dies before the LOCKOUT DELAY has expired (adjustable from 1 to 30 seconds). **Factory set to 10.**

-------- S-22 **CRK STOP RPM:** This RPM set point is used to adjust where the unit releases the starter during cranking. Set this to the RPM the engine attains just as it starts. This way, the starter is not engaged unnecessarily after the engine starts. You must also set this set point to the speed you release the starter while cranking. This is how the unit senses whether the engine is running or not. You will get a LOSS OF SPEED SIGNAL shutdown if this is adjusted too high. **Factory set to 300.**

-------- S-23 **CRK ATTEMPTS:** Set the number of attempts you would like the controller to try an engine start. If the engine fails to start after the number of attempts you have selected, it will fail the engine and display OVERCRANK on the front display. This shutdown requires a manual reset. **Factory set to 6.**

-------- S-24 **WARMUP RPM:** This is the engine RPM the controller will throttle the engine to during warm-up. Consult the engine manual for the optimum warm-up speed. **Factory set to 900.**

-------- S-25 **MIN RPM:** When throttling to a pressure, the engine will not throttle below this set point. **Factory set to 750.**

-------- S-26 **MAX RPM:** When throttling to a pressure, the engine will not throttle above this set point. **Factory set to 1600.**

-------- S-27 **BYPASS MIN RPM.** The engine is not throttled between the bypass minimum and bypass maximum RPM set points. **Factory set to 1200.**

-------- S-28 **BYPASS MAX RPM.** The engine is not throttled between the bypass minimum and bypass maximum RPM set points. **Factory set to 1300.**

-------- S-29 **MAX. FLOW THROTTLE:** While throttling to pressure, if the flow rises above this set point and the flow deadband, the engine is throttled to the minimum rpm set point. The engine will remain at the minimum rpm setpoint until the flow drops below the flow deadband, pressure throttling will then resume. **Factory set to 2500 GPM.**

-------- S-30 **FLOW DBAND:** This set point extends above and below the MAX. FLOW THROTTLE setpoint **Factory set to 100 GPM.**

-------- S-31 **FLOOD PRESET RPM.** The engine is throttled to this set point when the Flood Switch is closed. **Factory set to 1000.**

-------- S-32 **CLUTCH ENGAGE RPM:** When the engine speed reaches this set point after the warmup delay has expired, the clutch output is turned on. **Factory set to 600.**

-------- S-33 **CLUTCH OPEN RPM:** When the engine speed reaches this set point during the cooldown delay, the clutch output is turned off. **Factory set to 600.**

-------- S-34 **RATE INC RPM:** This set point is used to customize how fast or slow the controller will increase the engine RPM while throttling. Experiment with this number until the proper throttling is achieved. (All engines) **Factory set to 17.**

-------- S-35 **RATE DEC RPM:** This set point is used to customize how fast or slow the controller will decrease the engine RPM while throttling. Experiment with this number until the proper throttling is achieved. (All engines) **Factory set to 17.**

-------- S-36 **THR MIN PULSE:** This set point is used to further customize the way controller will throttle the engine. Higher numbers will cause the throttling outputs to stay active for longer periods of time when the system is throttling either up or down. If the engine is hunting then lower the value. If the engine never reaches the set point then increase the value. (Mechanical engines only) **Factory set to 4300.**

-------- S-37 **THR FDBK DLY:** This set point is used to adjust the amount of time the controller waits to sample the change made by the previous throttle pulse. If the system pressure, for example takes a long time to change based on engine speed changes, this set point should be increased. However, if the system pressure responds quickly then set the variable to a smaller value. (Mechanical engines only) **Factory set to 2.**

-------- S-38 **THR SENSITVY:** This set point adjusts the throttler sensitivity when it closes in on the desired set point. Higher numbers cause it to make coarser signal adjustments when approaching a set point than lower numbers. This set point is used to keep the controller from overshooting and undershooting the set point. Lower the number if the controller is hunting. Raise the value if the unit doesn't achieve the desired set point. (Mechanical engines only) **Factory set to 685.**

-------- S-39 **SET ADJ DLY:** This delay allows the controller to stop making adjustments to the engine RPM for this delay. It allows for a settling time after making a speed adjustment (adjustable from 1 to 300 seconds). (All engines) **Factory set to 2.**

-------- S-40 **ENG TYPE:** Enter "ECM" for diesels with ECM / J1939. Enter "mechanical" for engines that do not have an ECM. When "ECM" is selected, parameters such as oil pressure, water temperature, and RPM are read from the ECM. **Factory set to Mechanical.**

-------- S-41 **ENG THR TYPE:** If "ECM" is selected above enter in the type of throttling to be used for the ECM. Enter "J1939" or "analog". **Factory set to Analog.**

-------- S-42 **SNDR TYPES:** This set point allows you select between Murphy sending units or VDO sending units for the Pressure and Temperature inputs. **Factory set to MURPHY SENDER.**

-------- S-43 **LOW BATTERY ALARM.** An alarm will occur if the engine batteries drop to this set point. **Factory set to 10.0.**

-------- S-44 **XDUCR OPL:** Select between using a pressure transducer or a Murphy OPL Swichgage. **Factory set to XDUCER. Note: When "OPL" is selected, S55 will become S45)**

-------- S-45 **PSI MAX:** Set this to the maximum value of the pressure transducer. For example, if the transducer is rated for 0 to 100 psi, enter 100. **Factory set to 100. (689kpa) (This set point is available only if xducer is selected in S44)**

-------- S-46 **PSI MIN:** Set this to the minimum value of the pressure transducer. For example, if the transducer is rated for 0 to 100 psi, enter 0. **Factory set to 0. (0kpa) (This set point is available only if xducer is selected in S44)**

-------- S-47 **PSI MAX CNT:** With 20 ma. on the analog channel, make the top line read the same value as the bottom line. **Factory set to 904. (This set point is available only if xducer is selected in S44)**

-------- S-48 **PSI MIN CNT:** With 4 ma. On the analog channel, make the top line read the same value as the bottom line. **Factory set to 181. (This set point is available only if xducer is selected in S44)**

-------- S-49 **HIGH DISCH PSI:** This set point allows you to set an engine shutdown point on high discharge pressure. **Factory set to 90. (620kpa) (This set point is available only if xducer is selected in S44)**

-------- S-50 **LOW DISCH PSI:** This set point allows you to set an engine shutdown point on low discharge pressure. **Factory set to 25. (172kpa) (This set point is available only if xducer is selected in S44)**

-------- S-51 **MAIN PSI:** The engine will attempt to maintain this psi when throttling from a pressure transducer. **Factory set to 50. (344kpa) (This set point is available only if xducer is selected in S44)**

-------- S-52 **DBAND PR:** This set point extends above and below the maintain set point. No throttling will occur while the pressure is in the deadband. This setpoint is common to both S82 & S84. **Factory set to 2. (13kpa) (This set point is available only if xducer is selected in S44)**

-------- S-53 **CHEM MAIN PSI:** Chemagate operation only. The engine will attempt to maintain this psi when throttling from a pressure transducer. **Factory set to 50. (344kpa) (This set point is available only if xducer is selected in S44)**

-------- S-54 **CHEM DLY:** Set this variable to the amount of time you would like the engine to run after the Chemagate start / stop contact re-opens. (adjustable from 1 to 300 seconds). **Factory set to 30.**

-------- S-55 **STRT DLY:** Set this delay on engine start to the number of seconds that the start signal must be present before the unit accepts it and initiates an auto start sequence (adjustable from 1 to 500 seconds). **Factory set to 1.**

-------- S-56 **PRIME DLY:** Set in the number of seconds you wish the unit to turn on the prime output before the controller initiates an auto start (adjustable from 1 to 500 seconds). **Factory set to 30.**

-------- S-57 **STOP DLY:** Set this delay on engine stop to the number of seconds that the stop signal must be present before the unit accepts it and initiates a stop sequence (adjustable from 1 to 500 seconds). **Factory set to 1.**

-------- S-58 **AT LOAD DLY:** Set this variable to the amount of time you would like the Low Discharge Pressure shutdown ignored after warm-up, or after the electric call output is turned on. This allows the system to build discharge pressure with the engine AT LOAD before arming the shutdown (adjustable from 1 to 500 seconds). **Factory set to 90.**

-------- S-59 **STRT TMP:** Enter in the auto start crop temperature. **Factory set to 34F. (1c)**

-------- S-60 **STOP TMP:** Enter in the auto stop crop temperature. **Factory set to 38F. (3c)**

-------- S-61 **TMP LINE:** If the crop temperature is below this set point, S59 & S60 are used for auto start/stop. If the crop temperature is above this set point, S62 and S63 are used for auto start/stop. **Factory set to 195F. (90c)**

-------- S-62 **STRT TMP:** Enter in the high auto start crop temperature. **Factory set to 100F. (37c)**

-------- S-63 **STOP TMP:** Enter in the low auto start crop temperature. **Factory set to 90F. (32c)**

-------- S-64 **RADIO TYPE:** Options are :

- MOIST – TR1000 Banner Radio with Acclima Moisture Probe
- TENSION – TR1000 Banner Radio with Irrometer Soil Tension Probe
- MULTI-HOP – New Style Banner Radio in use from 2012
- MOIST_C – To be set by IAS Personnel if needed
- TENSION_C – To be set by IAS Personnel if needed

-------- S-65 **SOIL START %:** Enter in the % of soil moisture for an auto start to occur. (0-50%) **Factory set to 10%.**

-------- S-66 **SOIL STOP %:** Enter in the % of soil moisture for an auto stop to occur. (0-50%) **Factory set to 40%.**

-------- S-67 **SOIL MOIST. EMERG:** Enter in the % of soil moisture for an emergency auto start to occur. **Factory set to 3%.**

-------- S-68 **SOIL MOIST. EMERG. TIME:** Enter in the minimum run time for the emergency soil moisture start. **Factory set to 30 MIN.**

-------- S-69 **SOIL MOIST. HIGH:** The emergency soil moisture run time is cancelled if the soil moisture rises above this set point. **Factory set to 70%.**

-------- S-70 **ENABLE SS OVERIDE:** When YES is selected, digital input 7 can be used for a momentary auto start and momentary auto stop, in the event of a SCADA comm. failure. **Factory set to NO.**

-------- S-71 **FLOW MAX:** Set this to the maximum value of the flow transducer. For example, if the transducer range is 0-3000 GPM enter 3000. **Factory set to 3000 GPM**

-------- S-72 **FLOW MIN:** Set this to the minimum value of the flow transducer. For example, if the transducer range is 0-3000 GPM, enter 0. **Factory set to 0.**

-------- S-73 **FLOW MAX CNT:** With 5 vdc on the analog channel, make the top line read the same value as the bottom line. **Factory set to 904.**

-------- S-74 **FLOW MIN CNT:** With 1 vdc or 4 ma. On the analog channel, make the top line read the same value as the bottom line. **Factory set to 181. If transducer is 0-5 vdc, enter zero in this set point.**

-------- S-75 **CROP T MAX:** Set this to the maximum value of the crop temperature transducer. For example, if the transducer range is for 0 to 115 F, enter 115. **Factory set to 115. (46c)**

-------- S-76 **CORP T MIN:** Set this to the minimum value of the crop temperature transducer. For example, if the transducer range is for 0 to 115 F, enter 0. **Factory set to 0. (0c)**

-------- S-77 **CROP MAX CNT:** With 5 vdc on the analog channel, make the top line read the same value as the bottom line. **Factory set to 1023.**

-------- S-78 **CROP MIN CNT:** With 1 vdc or 4 ma. On the analog channel, make the top line read the same value as the bottom line. **Factory set to 0. If transducer is 0-5 vdc, enter zero in this set point.**

-------- S-79 **TEMP CALIBRATION:** [+/-] It is possible that the ambient crop temperature displayed on the controller is slightly higher or lower than the *actual* ambient air temperature. If the actual ambient air temperature is known from a reliable source, change this set point to add to or subtract from the reading displayed on the controller. **Factory set to 0F. (0C) NOTE : This is only to be used with hard-wired probes, not wireless probes.**

-------- S-80 **CROP TEMP CONFIG:** Select either “Wired/Local” or “Wireless”. **Factory set to Wireless.**

-------- S-81 **# TEMP PROBES:** Select 1 through 8 probes being used. **Factory set to 1.**

-------- S-82 **# SOIL MOIST PROBES:** Select 1 through 8 probes being used. **Factory set to 1.**

-------- S-83 **# EOL PROBES :** Select number of End-Of-Line Pressure Sensors.

-------- S-84 **LOW EOL PSI :** Set PSI for cut-out for low End-Of-Line Pressure.

-------- S-85 **SHORT CODE: Factory set to 6245.**

-------- S-86 **RESEND EMAIL:** This is how often the controller will send an email after a failure has occurred. Emails continue at this rate until the controller is reset. (adjustable from 1 to 300 minutes). **Factory set to 45.**

-------- S-87 **STATION NAME:** Enter in the name of station, which will appear in the subject line of the email.

-------- S-88 **EMAIL1 PART1:** Enter in the email address to receive failure notification. Use the Enter button to move the cursor to the correct space. Use the UP and DOWN arrows for the correct character. There are 16 characters available including spaces. If address is less than 16 characters, move the cursor one space past the last needed character and hold the up arrow until the space is blank. Push the enter button once and the blinking cursor should disappear. Push the enter button again to go to the next S#. This is done to remove any blank spaces after the valid characters.

-------- S-89 **EMAIL1 PART2:** If the email address exceeds 16 characters, enter in the remaining portion of email address to receive failure notification.

-------- S-90 **EMAIL1 PART3:** If the email address exceeds 32 characters, enter in the remaining portion of email address to receive failure notification.

-------- S-91 **MODEM CHOICE.** Select either "Bluetree" / Airlink1" / "Airlink2". **Factory set to Bluetree.**

------- S-92 **SMS NUMBER :** Not Currently Used

------- S-93 **DISPLAY CNFG:** Set this to either "English" or "Metric". This will effect; Oil Pressure, Water Temperature, Crop Temperature, Wind Speed and Weather Station readings. **DO NOT CHANGE THIS SET POINT WHILE ENGINE IS RUNNING, FALSE SHUTDOWNS WILL OCCUR. Factory set to English.**

------- S-94 **SOIL CLK EN :** Default Off, Reserved.

M-NUMBER DESCRIPTION AND LISTING

The following numbers are in the M#'s. This is not the complete list, the normal M#'s are in addition to the following:

--------	M1	Display Analog Inputs
--------	M2	RS485 ADDRESS – The first slave address to poll. Default 1.
--------	M3	RS232 ADDRESS – the Modbus Slave address of the unit. Factor default set to 1.
--------	M4	HEX VIEW. Used to control output during debugging.
--------	M5	FORCE OUT 1-7. Used to set outputs for debugging.
--------	M6	AN OUT 1 DUTY – Set duty-cycle of analog 1 output.
--------	M7	F SETUPS. Return to Factory Defaults. Select "Y" and wait until display changes to 'N'.

-------- M23 **T PROBE FAIL SEND:** Enter YES if an email or test message will be sent when a temperature probe failure occurs. **Factory set to No.**

-------- M24 **LO COOLNT SEND:** Enter YES if an email or test message will be sent when a low coolant shutdown occurs. **Factory set to No.**

-------- M25 **HI DISH PRS SEND:** Enter YES if an email or test message will be sent when a high discharge pressure shutdown occurs. **Factory set to No.**

-------- M## **OVERSPEED SEND:** Enter YES if an email or test message will be sent when an overspeed shutdown occurs. **Factory set to No.**

-------- M## **OVERCRANK SEND:** Enter YES if an email or test message will be sent when an overcrank shutdown occurs. **Factory set to No.**

-------- M## **LO OIL PRS SEND:** Enter YES if an email or test message will be sent when a low oil pressure shutdown occurs. **Factory set to No.**

-------- M## **HI TEMP SEND:** Enter YES if an email or test message will be sent when a high coolant temperature shutdown occurs. **Factory set to No.**

-------- M## **LOSS OF SPD SEND:** Enter YES if an email or test message will be sent when a loss of speed shutdown occurs. **Factory set to No.**

-------- M## **LO DISH PRS SEND:** Enter YES if an email or test message will be sent when a low discharge pressure shutdown occurs. **Factory set to No.**

-------- M## **LO DISH PRS SEND:** Enter YES if an email or test message will be sent when a low discharge pressure shutdown occurs. **Factory set to No.**

-------- M## **AUTO STOP SEND:** Enter YES if an email or test message will be sent when any auto stop occurs. **Factory set to No.**

-------- M## **LO BATTERY SEND:** Enter YES if an email or test message will be sent when a low battery alarm occurs. **Factory set to No.**

-------- M## **CLOCK STRT SEND:** Enter YES if an email or test message will be sent when a clock start occurs. **Factory set to No.**

-------- M## **TEMP STRT SEND:** Enter YES if an email or test message will be sent when a temperature start occurs. **Factory set to No.**

-------- M## **ONSITE STRT SEND:** Enter YES if an email or test message will be sent when an onsite start occurs. **Factory set to No.**

-------- M## **MAX FLOW THR SEND:** Enter YES if an email or test message will be sent when a maximum flow throttle condition occurs. **Factory set to No.**

-------- M## **OVRIDE S/S SEND:** Enter YES if an email or test message will be sent when an override start or stop occurs. **Factory set to No.**

-------- M## **SOIL LOCKOUT SEND:** Enter YES if an email or test message will be sent when a soil moisture start lockout occurs. **Factory set to No.**

-------- M## **EMRG SOIL START SEND:** Enter YES if an email or test message will be sent when an emergency soil moisture start occurs. **Factory set to No.**

-------- M## **T PROBE FAIL SEND:** Enter YES if an email or test message will be sent when a temperature probe failure occurs. **Factory set to No.**

-------- M## **T PROBE RESET SEND:** Enter YES if an email or test message will be sent when a temperature probe failure reset occurs. **Factory set to No.**

NOTE: All the emails or text messages need to be date and time stamped.

STATION NAME
DATE TIME (24hr)
IP ADDRESS
MESSAGE

```
MURPHY BOG
2/9/2009 15:38
166.159.104.241
SITE START
```

P-NUMBER DESCRIPTION AND LISTING

The 467 Controller has P-numbers in addition to the S-numbers you configured in the previous step. These are accessed in the same manner but using a different access code. See the Secret Code Supplement for this code number.

P-0: Manual 'EXIT' from the S-number setup mode. Press " 'CIRCLE' TO EXIT"

P-1: **Line One Selection**. Sets the variable to be displayed on the **top line** of the display while in the Setup Select mode. Available:
ENGINE SPEED
RUN HOURS
SYSTEM VOLTAGE
OIL PRESSURE
ENGINE TEMPERATURE

P-2: **SUN SEL:** Set this to YES if you want to start your engine on SUNDAY. Set it to NO if you want to lock out the start time on this day. **Factory set to NO**.

P-3: **MON SEL:** Set this to YES if you want to start your engine on MONDAY. Set it to NO if you want to lock out the start time on this day. **Factory set to NO**.

P-4: **TUE SEL:** Set this to YES if you want to start your engine on TUESDAY. Set it to NO if you want to lock out the start time on this day. **Factory set to NO**.

P-5: **WED SEL:** Set this to YES if you want to start your engine on WEDNESDAY. Set it to NO if you want to lock out the start time on this day. **Factory set to NO**.

P-6: **THR SEL:** Set this to YES if you want to start your engine on THURSDAY. Set it to NO if you want to lock out the start time on this day. **Factory set to NO**.

P-7: **FRI SEL:** Set this to YES if you want to start your engine on FRIDAY. Set it to NO if you want to lock out the start time on this day. **Factory set to NO**.

P-8: **SAT SEL:** Set this to YES if you want to start your engine on SATURDAY. Set it to NO if you want to lock out the start time on this day. **Factory set to NO**.

P-9: **CLK A RUN TM:** This set-point lets you set in the amount of time you would like your engine to run on your first start time. You have three available start times per day (A, B, and C). **Factory set to 0.0.**

P-10: **CLK A HR:** This set-point lets you set the clock hour you would like to start. For example, if you want to start in the 3 o'clock in the afternoon hour, set it to 15. **Factory set to 00.**

P-11: **CLK A MIN:** This set-point lets you set the clock minute you would like to start. For example, if you want to start at 8:30 in the morning, you would adjust this until it read 30 in the minute portion **Factory set to 00.**

P-12: **CLK B RUN TM:** This set-point lets you set in the amount of time you would like your engine to run on your first start time. You have three available start times per day (A, B, and C). **Factory set to 0.0.**

P-13: **CLK B HR:** This set-point lets you set the clock hour you would like to start. For example, if you want to start in the 3 o'clock in the afternoon hour, set it to 15. **Factory set to 00.**

P-14: **CLK B MIN:** This set-point lets you set the clock minute you would like to start. For example, if you want to start at 8:30 in the morning, you would adjust this until it read 30 in the minute portion **Factory set to 00.**

P-15: **CLK C RUN TM:** This set-point lets you set in the amount of time you would like your engine to run on your first start time. You have three available start times per day (A, B, and C). **Factory set to 0.0.**

P-16: **CLK C HR:** This set-point lets you set the clock hour you would like to start. For example, if you want to start in the 3 o'clock in the afternoon hour, set it to 15. **Factory set to 00.**

P-17: **CLK C MIN:** This set-point lets you set the clock minute you would like to start. For example, if you want to start at 8:30 in the morning, you would adjust this until it read 30 in the minute portion **Factory set to 00.**

P-18: **MOIST LOCK 1 HR:** This set-point lets you set the clock hour you would like to begin the soil moisture auto start / stop lockout period 1. **Factory set to 00.**

P-19: **MOIST LOCK 1 MIN:** This set-point lets you set the clock minute you would like to begin the soil moisture auto start / stop lockout period 1. **Factory set to 00.**

P-20: **MOIST LOCK 1 TIME:** This set-point lets you set the duration of the soil moisture auto start / stop lockout period 1. **Factory set to 00.**

P-21: **MOIST LOCK 2 HR:** This set-point lets you set the clock hour you would like to begin the soil moisture auto start / stop lockout period 2. **Factory set to 00.**

P-22: **MOIST LOCK 2 MIN:** This set-point lets you set the clock minute you would like to begin the soil moisture auto start / stop lockout period 2. **Factory set to 00.**

P-23: **MOIST LOCK 2 TIME:** This set-point lets you set the duration of the soil moisture auto start / stop lockout period 2. **Factory set to 00.**

P-24: **DSH PR @ SHDW:** Shows what the discharge pressure was when the unit initiated the last failure shutdown. To view the information, press the ● button. **(applies if transducer is selected in S44)**

P-25: **CROP TMP @ SHDW:** Shows what the ambient air temperature was when the unit initiated the last failure shutdown. To view the information, press the ● button.

P-26: **OIL PR @ SHDW: (not available if "electric" is selected in S8)** Shows what the engine oil pressure was when the unit initiated the last failure shutdown. To view the information, press the ● button.

P-27: **TEMP @ SHDWN: (not available if "electric" is selected in S8)** Shows what the engine jacket water temperature was when the unit initiated the last failure shutdown. To view the information, press the ● button.

P-28: **SOIL MOISTURE @ SHDWN:** Shows what the soil moisture % was when the unit initiated the last failure shutdown. To view the information, press the ● button.

P-29: **TACH @ SHDWN: (not available if "electric" is selected in S8)** Shows what the engine speed was when the unit initiated the last failure shutdown. To view the information, press the ● button.

P-30: **LAST SHUTDOWN:** Shows what caused the last failure shutdown and the time in running hours that it occurred. To view the information, press the ● button.

P-31: **PROGRAM #**: The value in this window is the program and version number. This is helpful information to have before calling the factory for technical help.

GENERAL WIRING PRECAUTIONS

There are several precautions you can take on initial installation to reduce chances of failure over time. Many of these steps may take a few extra minutes to do at the time of installation; however, they can also save many headaches in the future. We strongly recommend that you follow these precautionary steps.

1. **Diodes**

Place suppression diodes across all inductive loads. These loads typically include pilot relays, solenoid valves, starter solenoids, etc. This helps increase contact life and eliminate a source of electrical interference.

2. **Wire power leads directly to battery Post.**

When hooking your power supply to your Test- Off - Auto switch (AUTOMATIC MODE) or OFF-ON switch (MANUAL MODE), run you're wiring directly to the battery post. This helps minimize noise generated from battery chargers and alternators.

3. **Pilot excessive loads.**

Many of the outputs on the 467 Controller are rated for low current, control type loads. Do not run high current loads directly to the unit.

4. **Use stranded wire for hookup.**

Solid wire transmits vibration and is more likely to crystallize and break when it is subjected to movement.

5. **Separate AC and DC wiring.**

Never run AC and DC handling wiring together. AC signals may get coupled into the control circuits leading to erratic operation.

6. **Wire standby battery charger directly to battery.**

Standby chargers must be wired directly to the battery. Failing to do this may result in erratic operation due to electronic "noise" coupled into the microprocessor.

7. **Special precautions for spark ignition engines.**

Magnetos and ignition coils produce high voltage and cause high frequency interference. The 467 Controller is designed to filter out much of this interference; however, precautions must be taken to protect the unit. Sender and shutdown wiring must be routed away from the magneto and spark coil wiring. Resistor spark plugs and spark plug wires reduce electrical interference and may also be required in especially "noisy" environments.

8. **Use shielded cable on magnetic pickup.**

Shielded cable is recommended for connecting the magnetic pickup to the 467 Controller. This helps prevent signal loss and the possible coupling of electrical interference into the relatively sensitive speed sensing circuit. The shield should only be grounded on one end.

Remember, proper care during installation will help your 467 Controller live a long and trouble-free operating life. If for any reason you have questions during installation, feel free to give us a call.

DOUBLE CHECKING YOUR WIRING

The 467 controller has built in diagnostic information for confirming your wiring before you attempt to auto start your engine. The diagnostic information is found in the S-numbers under S1 LINE 1 SELECT. The factory default line 1 display shows the engine RPM.

By scrolling through the displays, you will see the following:

I1-4 00X0
ENTER SELECTION

This represents the 4 standard digital only inputs. An O means that the input is not active. An X means that the input is active.

1. AUTO POSITION ON TOGGLE SWITCH
2. TEST POSITION ON TOGGLE SWITCH
3. LOW DISCHARGE PRESSURE
4. OPL INCREASE

The next screen shows the rest of your inputs:

I5-12 00X0 0000
ENTER SELECTION

1. BATTERY VOLTAGE INPUT (IGNORE)
2. TEMPERATURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
3. OIL PRESSURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
4. LOW COOLANT LEVEL / SOIL MOISTURE TRANSDUCER INPUT
5. OPL DECREASE
6. CROP TEMPERATURE or SYSTEM FLOW TRANSDUCER
7. PRESSURE TRANSDUCER
8. LOCAL CONTACT START/STOP

The next screen shows the state of your outputs:

01- 07 00X0 000
ENTER SELECTION

1. FUEL VALVE / ELECTRIC CALL OUTPUT
2. STARTER CIRCUIT OUTPUT
3. CLUTCH OUTPUT
4. THROTTLE DECREASE OUTPUT
5. THROTTLE INCREASE OUTPUT
6. PRIME PUMP OUTPUT
7. SPARE

CUSTOMER WIRING INTERFACE LIST PORT 1 DB 25 CONNECTOR

467 Pin Assignment	449 Terminal Assignment	RELAY	HARDWARE ASSIGNMENT	PROGRAM PIN ASSIGNMENT
1	31		Analog 4	OPL Decrease
2	33		Analog 0	Battery Monitor (No customer hookup)
3	35		Analog 7	Local Contact Start/Stop
4	37		Analog 1	Electric Gauge Sender for Engine Water Temperature (from ES2T-250)
5	39		Input 1	Auto Position of Test Off Auto Toggle Switch
6	11		Input 2	Test Position of Test Off Auto Toggle Switch
7	COM 1=B+ NO=8 NC=7 COM 2=18 NO=16 NC=17	K6	Output 1	Fuel Solenoid /ECM Enable / Electric Call Output
8	20		Battery +	Battery Plus
9	20		Battery +	Battery Plus
10	COM 1=6 NO=4 NC=5 COM 2=15 NO=13 NC=14	K2	Output 2	Starter Output
11	9 & 10		Battery -	Ground
12	NO = 21 & 22	K1	Output 3	Clutch Output
13	1		Frequency Input	Frequency Input
14	32		Analog 6	Discharge Pressure Transducer input
15	34		Analog 5	Crop Temperature or Flow Transducer
16	36		Analog 3	Low Coolant Level (from L150) or Soil Moisture Transducer.
17	38		Analog 2	Electric Gauge Sender for Engine Oil Pressure (from ES2P-100)
18	40		Input 3	Low Discharge Pressure
19	12		Input 4	OPL Increase
20	NO = 23 & 24	K3	Output 4	Throttle Decrease Output
21	NO = 25 & 26	K4	Output 5	Throttle Increase Output
22	NO = 27 & 28	K5	Output 6	Prime Pump Output
23	NO = 29 & 30	K7	Output 7	Spare
24	3		RS485 -	RS485 (-) Master to C267 & Temp. Controller
25	2		RS485 +	RS485 (+) Master to C267 & Wireless Radio

Port 2 RS-232 DB9 Male

Transmit	Modem	Pin 3
Receive	Modem	Pin 2
DTS	Not Used	Pin 8
RTS	Not Used	Pin 7
Ground	Not Used	Pin 5

Port 3 CAN DB9 Female

Can 1 HI	ECM (If Selected)	Pin 1
Can 1 LO	ECM (If Selected)	Pin 2
Can 2 HI	Peer to Peer (Not Used)	Pin 3
Can 2 LO	Peer to Peer (Not Used)	Pin 4
Analog Out	Not Used	Pin 5
Digital Input 5	Chemagate Start / Stop	Pin 6
Digital Input 6	Flood Switch	Pin 7
Digital Input 7	Override Start / Stop (toggle between)	Pin 8
Digital Input 8	Spare	Pin 9

Comm. Modules Address in ()

C267_1 (#1)		
267_1_DI__1	Spare	JP2.17
267_1_DI__2	Spare	JP2.7
267_1_DI__3	Spare	JP2.16
267_1_DI__4	Spare	JP2.6
267_1_DI__5	Spare	JP2.15
267_1_DI__6	Spare	JP2.5
267_1_DI__7	Spare	JP2.14
267_1_DI__8	Spare	JP2.4

Comm. Modules Address in ()

C267_1 (#1)	**Function**	**Pin #**
267_1_DO_1	Spare	JP1.4
267_1_DO_2	Spare	JP1.9
267_1_DO_3	Spare	JP1.3
267_1_DO_4	Spare	JP1.8
267_1_DO_5	Spare	JP1.2
267_1_DO_6	Spare	JP1.7
267_1_DO_7	Spare	JP1.1
267_1_DO_8	Spare	JP1.6

Comm. Modules Address in ()

C267_1 (#1)	**Function**	**Pin #**
267_1_AI_1	Spare	JP2.13
267_1_AI_2	Spare	JP2.3
267_1_AI_3	Spare	JP2.12
267_1_AI_4	Spare	JP2.2
267_1_AI_5	Spare	JP2.11
267_1_AI_6	Spare	JP2.1
267_1_AI_7	Spare	JP2.10

Comm. Modules Address in ()

C267_2 (#2)		
267_1_DI__1	Spare	JP2.17
267_1_DI__2	Spare	JP2.7
267_1_DI__3	Spare	JP2.16
267_1_DI__4	Spare	JP2.6
267_1_DI__5	Spare	JP2.15
267_1_DI__6	Spare	JP2.5
267_1_DI__7	Spare	JP2.14
267_1_DI__8	Spare	JP2.4

Comm. Modules Address in ()

C267_2 (#2)	Function	Pin #
267_1_DO_1	Spare	JP1.4
267_1_DO_2	Spare	JP1.9
267_1_DO_3	Spare	JP1.3
267_1_DO_4	Spare	JP1.8
267_1_DO_5	Spare	JP1.2
267_1_DO_6	Spare	JP1.7
267_1_DO_7	Spare	JP1.1
267_1_DO_8	Spare	JP1.6

Comm. Modules Address in ()

C267_2 (#2)	Function	Pin #
267_1_AI_1	Spare	JP2.13
267_1_AI_2	Spare	JP2.3
267_1_AI_3	Spare	JP2.12
267_1_AI_4	Spare	JP2.2
267_1_AI_5	Spare	JP2.11
267_1_AI_6	Spare	JP2.1
267_1_AI_7	Spare	JP2.10