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Marine Engine Monitoring & Instrumentation System

SELECTRONIC® EMS Control System Installation and Operation Manual

FOR USE WITH : PROGRAM #'s MA94100 V4 & MA94099 V4 REVISED: 07-Feb 1996

GENERAL INFORMATION

DESCRIPTION

The Murphy Marine Alarm and Enunciator system uses a Murphy EMS 447 Control panel in the engine room and an EMS 447 Controller on the bridge. The two units communicate through a twisted pair of wires. Electric gauge senders are wired to the engine room unit and alarm points are programmed into the controller. If an alarm condition is sensed, audible and visual alarm outputs are turned on in the engine room and on the bridge. A message on the screen of each unit also spells out the alarm condition. Monitored conditions include the following: Engine Temperature, Oil Pressure, Fresh Water Pressure, Raw Water Pressure, Fuel Pressure, Gear Oil Pressure, Gear Oil Temperature, Coolant Level, Oil Level, and Engine Speed.

OPERATING THE EMS CONTROLLER

See document numberEMS-94072N for detailed instructions on the general operation of the EMS controller.

OPERATION SEQUENCE

The MEMIS system reads information from electric gauge senders and Murphy SWICHGAGE® type devices. You program limits into the controller and if a limit is reached, the unit will alarm. These limits include low oil pressures, high temperatures, and high / low levels. The MEMIS system alarms by displaying the alarm on the screen and turning on audible and visual alarm outputs in the engine room and at each repeater location. An alarm can then be acknowledged by pressing the ENTER key of any unit in the system. Pressing the ENTER key will silence the audible but leave the visual alarm on. If the alarm condition persists throughout a programmable alarm back delay, the unit will again turn on the audible alarm output. If, however, the alarm clears after being acknowledged, the visual alarm will automatically turn off.

When an alarm occurs, the unit logs the current operating parameters of the engine and keeps a running history of the last ten alarm conditions. It also logs the engine running hours that have elapsed at the time of the alarm.

SCROLLING MAIN DISPLAYS

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. MURPHY ALARM
   This is the first line of the title page.
2. ENGINE ROOM UNIT
   This is the second line of the title page.
3. ST: SYSTEM ON
   This shows the state of the system.
3. RUN HOURS XXXX.X
   This is your on board hour meter. It digitally displays the number of hours your engine has been running. All the service reminders are based on the elapsed time on the hourmeter.
4. BATTERY XX.X VDC
   This displays your system voltage.

5. ENG SPD XXXX RPM
   This displays the current engine RPM. Decisions to alarm on overspeed / underspeed are based on this number. Remember to calibrate this in the S-numbers.
6. OIL PR XXX PSI
   This displays the current engine oil pressure as sensed from an electric gauge sender. Alarms based on oil pressure reference this number.
7. ENG TEMP XXX °F
   This displays the current engine temperature as sensed from an electric gauge sender. The unit will signal the engine to shutdown if this temperature reading exceeds the shutdown set-point .
8. FRESH H20 XXX PSI
   This displays the current fresh water pressure as sensed from an electric gauge sender. Alarms based on fresh water pressure reference this number. (If DIGITAL is selected for this type alarm, this line will not display).
9. RAW H20 XXX PSI
   This displays the current raw water pressure as sensed from an electric gauge sender. Alarms based on raw water pressure reference this number. (If DIGITAL is selected for this type alarm, this line will not display).
10. FUEL XXX PSI
    This displays the current fuel pressure as sensed from an electric gauge sender. Alarms based on fuel pressure reference this number.
11. GEAR OIL PR XXX PSI
    This displays the current gear oil pressure as sensed from a pressure transmitter. Alarms based on gear oil pressure reference this number.
12. GEAR OIL TEMP XXX ºF
    This displays the current gear oil temperature as sensed from an electric gauge sender. Alarms based on gear oil temperature reference this number.
13. CHG OIL XXX HRS
    This display shows the number of running hours remaining before the oil must be changed in the engine.
14. OIL FLT XXX HRS
    This display shows the number of running hours remaining before the oil filter on the engine must be changed.
15. FUEL FLT XXX HRS
    This display shows the number of running hours remaining before the fuel filter on the engine must be changed.
16. AIR CLNR XXX HRS
    This display shows the number of running hours remaining before the air cleaner on the engine must be serviced or changed.

MA94100

S-NUMBER DESCRIPTION AND LISTING

The S-numbers are used for customizing the controller to your specific engine. **These S-Numbers must be set before operating the engine**. 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. Note: The factory default values are in parentheses.

--------- S-0: CIRCLE = EXIT. Used to exit the S-number setup mode.

--------- S-1: LINE 1 SELECT Used to change what is displayed on the top line throughout your S-number editing session. Your choices include: Run Hours, Engine Speed, Battery Voltage, Oil Pressure, Engine Temperature, Fresh Water Pressure, Raw Water Pressure, Fuel Pressure, Gear Oil Pressure, Gear Oil Temperature, and input / output status. The input / output status information will show an X on an I/O if that particular input is active or output is ON. 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: SPEED CALIB (265.00) 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 supplies to the unit

. The number of flywheel teeth should be entered. 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.

--------- S-3: OVERSPEED (2500) 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 an alarm.

--------- S-4: LOCKOUT DELAY (30) This delay is used to ignore conditions such as low oil pressure, low fresh water pressure, low sea water pressure and low gear oil pressure during start up procedures. This allows pressures to reach the normal operating ranges without sounding an alarm.

--------- S-5: # REMOTES (1) Enter the number of remote enunciator heads hooked to the engine room unit. Remember, each remote unit must be configured with a unique controller #. For example, if you have 1 selected in this S-number, the remote should have a 1 in the controller #. If you have 2 selected in this S-number, one remote should have a 1 in the controller # and the other should have a 2.

--------- S-6: LOP @ LOW SPD (10) The EMS Controller gives you two oil pressure alarm 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 alarm point between the Low Speed Alarm point and the High Speed Alarm point.

--------- S-7: LOP @ HI SPD (27) This set-point is the higher oil pressure alarm point that is referred to in number 6 above. This is the point that you want an alarm during normal high speed engine operation. By alarming at a higher oil pressure, you can avert damage that could be caused by waiting to alarm at the lower set-point needed to accommodate an idle.

--------- S-8: PSI LO SPEED (600) 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 S5, the unit will alarm.

--------- S-9: PSI HI SPEED (1000) Set this to your maximum operating speed. If the engine is running at this speed, and the oil pressure reaches the set-point selected in S6, the unit will alarm.

--------- S-10: HI ENG TEMP (208 ºF) Adjust this setting to the engine temperature you do not want to exceed. If the unit senses a temperature higher than this set-point, it will alarm.

--------- S-11: FRSH H20 D/A (ANALOG) This lets you determine whether your Fresh Water Alarm device is a digital SWICHGAGE® type or an analog electric gauge sender type. Note, if DIGITAL is selected, the following two set-points will read NOT USED.

--------- S-12: LFW @ LO SPD (7) Adjust this setting to the fresh water pressure at low speed. If the unit senses a pressure lower than this set-point, it will alarm.

--------- S-13: LFW @ HI SPD (25) Adjust this setting to the fresh water pressure at high speed. If the unit senses a pressure lower than this set-point, it will alarm.

--------- S-14: RAW H20 D/A (ANALOG) This lets you determine whether your Raw Water Alarm device is a digital SWICHGAGE® type or an analog electric gauge sender type. Note, if DIGITAL is selected, the following two set-points will read NOT USED.

--------- S-15: LRW @ LO SPD (4) Adjust this setting to the raw water pressure at low speed. If the unit senses a pressure lower than this set-point, it will alarm.

--------- S-16: LRW @ HI SPD (10) Adjust this setting to the fresh water pressure at high speed. If the unit senses a pressure lower than this set-point, it will alarm.

--------- S-17: LOW FUEL PSI (20) Adjust this setting to the fuel pressure . If the unit senses a pressure lower than this set-point, it will alarm.

--------- S-18: GOP D/A (ANALOG) This lets you determine whether your Gear Pressure Alarm device is a digital SWICHGAGE® type, an analog electric gauge sender type or a 4-20 ma pressure transmitter type. Note, if DIGITAL is selected, the following four set-points will read NOT USED.

--------- S-19: GOP @ LOW SP (50) Adjust this setting to the gear oil pressure at low speed. If the unit senses a pressure lower than this set-point, it will alarm.

--------- S-20: GOP @ HI SPD (170) Adjust this setting to the gear oil pressure at high speed. If the unit senses a

pressure lower than this set-point, it will alarm.

--------- S-21: MAX GEAR PRS (400) Adjust this to the maximum pressure range of your pressure transmitter. This is not used if DIGITAL or ANALOG is selected as the Gear Oil Pressure type. For example, if you have a Murphy PXM300 pressure transmitter, set this to 300. This is the pressure represented by a output of 20ma from the transmitter.

--------- S-22: GEAR PRS SLP (230) With your transmitter powered up and no pressure applied, make the set-point match the value on the top line. This is usually 51. If the number is much different than this, consult the factory.

--------- S-23: GEAR OIL TMP (230) Adjust this setting to the gear oil temperature you do not want to exceed. If the unit senses a temperature higher than this set-point, it will alarm.

--------- S-24: LOW BATT ALM (9.0) Adjust this setting to the low battery alarm point. If the unit senses a battery voltage lower than this set-point, it will alarm.

--------- S-25: CHANGE OIL (4000) Set the interval in engine running hours you wish to be prompted to change your engine oil.

--------- S-26: CHG OIL FLTR (1400) Set the interval in engine running hours you wish to be prompted to change your engine oil filter.

--------- S-27: CHG FUEL FLT (2000) Set the interval in engine running hours you wish to be prompted to change your engine fuel filter.

--------- S-28: SERV AIR CLN (2000) Set the interval in engine running hours you wish to be prompted to service your engine air cleaner / filter.

--------- S-29: ALMBACK 1 (YES) This is the Low Oil Pressure Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-30: ALMBCK 1 DLY (30) This is the Low Oil Pressure Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-31: DELAY SEL 1 (YES) This is the Low Oil Pressure Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-32: ALARM 1 DLY (5) This is the Low Oil Pressure Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-33: ALMBACK 2 (YES) This is the High Engine Temperature Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-34: ALMBCK 2 DLY (60) This is the High Engine Temperature Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-35: DELAY SEL 2 (NO) This is the High Engine Temperature Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-36: ALARM 2 DLY (5) This is the High Engine Temperature Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-37: ALMBACK 3 (YES) This is the Low Water Level Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-38: ALMBCK 3 DLY (60) This is the Low Water Level Alarm Back delay set-point. If the associated alarm

back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-39: DELAY SEL 3 (YES) This is the Low Water Level Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-40: ALARM 3 DLY (5) This is the Low Water Level Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-41: ALMBACK 4 (YES) This is the Low Fresh Water Pressure Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-42: ALMBCK 4 DLY (60) This is the Low Fresh Water Pressure Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-43: DELAY SEL 4 (YES) This is the Low Fresh Water Pressure Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-44: ALARM 4 DLY (5) This is the Low Fresh Water Pressure Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-45: ALMBACK 5 (YES) This is the Low Raw Water Pressure Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-46: ALMBCK 5 DLY (60) This is the Low Raw Water Pressure Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-47: DELAY SEL 5 (YES) This is the Low Raw Water Pressure Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-48: ALARM 5 DLY (5) This is the Low Raw Water Pressure Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-49: ALMBACK 6 (YES) This is the Low Fuel Pressure Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-50: ALMBCK 6 DLY (60) This is the Low Fuel Pressure Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-51: DELAY SEL 6 (YES) This is the Low Fuel Pressure Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-52: ALARM 6 DLY (5) This is the Low Fuel Pressure Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-53: ALMBACK 7 (YES) This is the Low Oil Level Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-54: ALMBCK 7 DLY (60) This is the Low Oil Level Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been

pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-55: DELAY SEL 7 (YES) This is the Low Oil Level Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-56: ALARM 7 DLY (5) This is the Low Oil Level Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-57: ALMBACK 8 (YES) This is the Low Gear Oil Pressure Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-58: ALMBCK 8 DLY (60) This is the Low Gear Oil Pressure Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-59: DELAY SEL 8 (YES) This is the Low Gear Oil Pressure Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-60: ALARM 8 DLY (5) This is the Low Gear Oil Pressure Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-61: ALMBACK 9 (YES) This is the High Gear Oil Temperature Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-62: ALMBCK 9 DLY (60) This is the High Gear Oil Temperature Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-63: DELAY SEL 9 (NO) This is the High Gear Oil Temperature Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-64: ALARM 9 DLY (5) This is the High Gear Oil Temperature Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-65: ALMBACK 101 (YES) This is the Loss Of Speed Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-66: ALMBCK 101 DLY (15) This is the Loss Of Speed Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-67: DELAY SEL 101 (YES) This is the Loss Of Speed Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-68: ALARM 101 DLY (5) This is the Loss Of Speed Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-69: ALMBACK 102 (YES) This is the Overspeed Alarm Back armed set-point. If you would like the unit to remind you of an alarm even after you have acknowledged it, set this to YES. If you want no further warnings, set this to NO.

--------- S-70: ALMBCK 102 DLY (15) This is the Overspeed Alarm Back delay set-point. If the associated alarm back armed set-point is set to YES, the unit will wait through this delay, after the Enter Key has been pushed, and alarm again. This will continue until the alarm has cleared.

--------- S-71: DELAY SEL 102 (NO) This is the Overspeed Delay On Alarm Select set-point. Set this to YES if you want the alarm condition to be present throughout a delay before you get an alarm. Set this to NO if you want the alarm to occur immediately.

--------- S-72: ALARM 102 DLY (5) This is the Loss Of Speed Delay On Alarm set-point. If the associated Delay On Alarm Select set-point is set to YES, the alarm condition must be present throughout this delay for the unit to alarm. If the Delay On Alarm Select set-point is set to NO, this set-point will be ignored.

--------- S-73: SCROLL DLY (30) When you hit a button on the controller, it will stop scrolling through the engine parameters. It will begin scrolling again once the amount of seconds in this set-point has elapsed.

ACCESSING THE P-NUMBERS

The EMS 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-NUMBER DESCRIPTION AND LISTING

The P-numbers are used for acknowledging service reminders and for accessing the alarm history list. Following is a list of available P-number information and acknowledgments.

--------- P-0: CIRCLE = EXIT Used to exit the P-number setup mode.

--------- P-1: LINE 1 SELECT Used to change what is displayed on the top line throughout your P-number editing session. Your choices include: Run Hours, Engine Speed, Battery Voltage, Oil Pressure, and Engine Temperature.

--------- P-2: OIL PR @ ALRM Shows what the engine oil pressure was when the last alarm occurred. To view the information, press the ● button.

--------- P-3: TEMP @ ALRM Shows what the engine temperature was when the last alarm occurred. To view the information, press the ● button.

--------- P-4: FR H20 @ ALRM Shows what the fresh water pressure was when the last alarm occurred. To view the information, press the ● button.

--------- P-5: RAW H20 @ ALRM Shows what the raw water pressure was when the last alarm occurred. To view the information, press the ● button.

--------- P-6: FUEL PR @ ALRM Shows what the fuel pressure was when the last alarm occurred. To view the information, press the ● button.

--------- P-7: GR OIL PR @ ALRM Shows what the gear oil pressure was when the last alarm occurred. To view the information, press the ● button.

--------- P-8: GR OIL TEMP @ ALRM Shows what the gear oil temperature was when the last alarm occurred. To view the information, press the ● button.

--------- P-9: TACH @ ALARM Shows what the engine speed was when the last alarm occurred. To view the information, press the ● button.

--------- P-10: LAST ALARM Shows what caused the last alarm and the time in running hours that it occurred. To view the information, press the ● button.

--------- P-11: ##th ALARM These P-numbers store the 2nd through the 10th causes of alarm and the running hours each occurred. To view the information, press the ● button.

--------- P-20: ACK CHG OIL This setting allows the user to acknowledge that he/she has changed the oil in the engine as prompted by the unit. When this setting is toggled from NO to YES, the unit resets the counter and will not prompt the user again until the selected number of running hours has elapsed.

--------- P-21: ACK OIL FLTR This setting allows the user to acknowledge that he/she has changed the oil filter as prompted by the unit. When this setting is toggled from NO to YES, the unit resets the counter and will not prompt the user again until the selected number of running hours has elapsed.

--------- P-22: ACK FUEL FLT This setting allows the user to acknowledge that he/she has changed the fuel filter as prompted by the unit. When this setting is toggled from NO to YES, the unit resets the counter and will not prompt the user again until the selected number of running hours has elapsed.

--------- P-23: ACK AIR CLNR This setting allows the user to acknowledge that he/she has changed or serviced the air cleaner as prompted by the unit. When this setting is toggled from NO to YES, the unit resets the counter and will not prompt the user again until the selected number of running hours has elapsed.

--------- P-24: PROGRAM # This set-point cannot be changed. It shows you what program and version number is

running in your unit. This is useful for technical help.

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S-NUMBER DESCRIPTION AND LISTING

The S-numbers are used for setting the Repeater Unit #. **These S-Numbers must be set before operating the system**. 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: CIRCLE = EXIT Used to exit the S-number setup mode.

--------- S-1: LINE 1 SELECT Used to change what is displayed on the top line throughout your S-number editing session. Your choices include: input / output status. The input / output status information will show an X on an I/O if that particular input is active or output is ON. If there is no input or the output is OFF, the unit will display an O. This can be used for testing wiring. For more information, see the section titled “Double Checking Your Wiring”.

--------- S-2: CONTROLLER # (1) If you have a single repeater unit, set this to 1. If you have more than one, set each repeater to a unique controller number. For example, if you have 2 repeater units, set the first unit to 1 and the second unit to 2.

--------- S-3: SCROLL DLY (30) When you hit a button on the controller, it will stop scrolling through the engine parameters. It will begin scrolling again once the amount of seconds in this set-point has elapsed.

ACCESSING THE P-NUMBERS

The EMS 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-NUMBER DESCRIPTION AND LISTING

Following is a list of available P-number information .

--------- P-0: CIRCLE = EXIT Used to exit the P-number setup mode.

--------- P-1: LINE 1 SELECT Used to change what is displayed on the top line throughout your P-number editing session. Your choices include: Run Hours, Engine Speed, Battery Voltage, Oil Pressure, and Engine Temperature.

--------- P-2: PROGRAM # This set-point cannot be changed. It shows you what program and version number is running in your unit. This is useful 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. Suppression 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 key switch, run your 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 EMS 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. Special precautions for spark ignition engines.
   Magnetos and ignition coils produce high voltage and cause high frequency interference. The EMS Controller is designed to filter out much of this interference; however, precautions must be taken to protect the unit. Sender and alarm 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.
7. Use shielded cable on magnetic pickup.
   Shielded cable is recommended for connecting the magnetic pickup to the EMS 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 EMS 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 EMS 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. By scrolling through the displays, you will see the following:

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. Following is what each input represents.

ENGINE ROOM UNIT I/O

I1-4 00X0
ENTER SELECTION

1. NOT USED
2. NOT USED
3. HIGH / LOW OIL LEVEL INPUT
4. LOW COOLANT LEVEL INPUT

The next screen shows the rest of your inputs:

I5-12 00X0 0000
ENTER SELECTION

5. BATTERY VOLTAGE INPUT (IGNORE)
6. ENGINE TEMPERATURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
7. OIL PRESSURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
8. FRESH WATER PRESSURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
9. RAW WATER PRESSURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
10. FUEL PRESSURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
11. GEAR OIL PRESSURE SENDER (For test purposes, you can ground this input to make sure you have run your wire properly.)
12. GEAR OIL TEMPERATURE SENDER

The next screen shows your outputs:

01- 07 00X0 000
ENTER SELECTION

1. AUDIBLE ALARM
2. VISUAL ALARM
3. NOT USED
4. NOT USED
5. NOT USED
6. NOT USED
7. NOT USED

REPEATER UNIT I/O

I1-4 00X0
ENTER SELECTION

1. NOT USED
2. NOT USED
3. NOT USED
4. NOT USED

The next screen shows the rest of your inputs:

I5-12 00X0 0000
ENTER SELECTION

5. BATTERY VOLTAGE INPUT (IGNORE)
6. NOT USED
7. NOT USED
8. NOT USED
9. NOT USED
10. NOT USED
11. NOT USED
12. NOT USED

The next screen shows your outputs:

01- 07 00X0 000
ENTER SELECTION

1. AUDIBLE ALARM
2. VISUAL ALARM
3. NOT USED
4. NOT USED
5. NOT USED
6. NOT USED
7. NOT USED