CAUTION: The DSM-43820DUS temperature scanner is suitable for use in Class I, Groups C & D, Division 1 and 2 hazardous locations when installed in accordance with these instructions.

The thermocouple leads connected to this device operate at a very low voltage and power levels and MUST NOT CONTACT any external voltage source. Damage to the system will result from connection between the thermocouple and the ignition system or any AC or DC power source.

WARNING: DEVIATION FROM THESE INSTALLATION INSTRUCTIONS MAY LEAD TO IMPROPER OPERATION OF THE MONITORED MACHINE WHICH COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

1.0 DESCRIPTION

1.1 The Altronic DSM-43820DUS temperature scanner is an electronic instrument designed to monitor temperatures using industry standard type J or K thermocouples. Automatic cold junction compensation is built-in. The DSM-43820DUS can monitor up to twenty temperature inputs. The temperature scanner uses a microcontroller to process the input signal and a nonvolatile memory to store the setup and setpoint values. A 2x16 character LCD displays the channel number and the numeric temperature value in EF or EC. A front mounted keypad serves as the user interface. The instrument can read type J thermocouples between !76EF and 1382EF (!60EC and 750EC) and type K thermocouples between !76EF and +1472EF (!60EC and 800EC).

1.2 There are nine user established temperature setpoints and two configurable output switches that can be adjusted using the keypad. The output switches can be mapped to the setpoints in three different modes. There are two common high setpoints and a deviation setpoint for up to 16 cylinder exhaust channels. The remaining four channels have individual high setpoints and additionally can be arranged in two pairs with each pair having its own differential setpoint (these are typically used for turbochargers and catalytic converters). When the temperature has exceeded its setpoint value, a solid state output switch turns on/off to the switch common, and the "AL" (alarm) LCD indicator turns on. Additionally, fault indicators such as "H1", “H2", “DEV” and “DIFF” will display whenever a faulted point is indicated. All setpoint changes are performed through the keypad or through RS-485 communications.

1.3 The DSM-43820DUS temperature scanner is designed to be versatile and simple to use. Type J or K thermocouples and EF or EC units can be selected via the keypad. Either automatic or manual scan functions can be selected. An alarm log is available for the first eight faults. RS-485 serial communications allows data and alarm status to be communicated to other devices. An escape key is provided to permit the user to exit any setup function and return to the normal display. A programmable software filter is also provided which can be used to stabilize readings where the thermocouple signal is fluctuating. Calibration can be performed using the keypad. Factory default configurations, including factory calibration settings, can be recalled for easy setup.

1.4 The power requirement for the temperature scanner is 12 to 30 Vdc, 0.1 A max.

1.5 For proper operation, these installation instructions must be adhered to strictly.

2.0 THERMOCOUPLES

2.1 The DSM-43820DUS temperature scanner is designed to operate with industry standard, grounded or ungrounded, type J or K thermocouples. Ungrounded thermocouples are recommended where possible.

3.0 MOUNTING

3.1 Mount the temperature scanner inside a control panel or to a suitable flat surface so that the display is at a convenient viewing height. A drilling template is provided. NOTE: Avoid mounting the DSM temperature scanner with the LCD display facing direct sunlight. The display temperature range is !22EF to +175EF (!30EC to +80EC).

4.0 WIRING (SEE WIRING DIAGRAMS)

4.1 POWER WIRING - Connect the power input wires, plus to terminal DC+ and minus to DC!; power requirement is 12 to 30 Vdc (0.1 amps max.). Connect the DC! terminal to panel ground which should be the same as engine ground. DO NOT ground this device directly to the ignition system common coil ground.

4.2 THERMOCOUPLES AND THERMOCOUPLE EXTENSION WIRE - Grounded or ungrounded type J or K thermocouples may be used. Use thermocouple extension wire of the same type as the thermocouple probe to connect the thermocouple to the temperature scanner. Use stranded thermocouple wire having a good moisture-resistant insulation such as PVC; for higher ambient temperatures, Teflon or B-fibre insulated thermocouple wire is recommended. To insure an accurate signal is transmitted to the instrument, avoid any added junctions, splices and contact with other metals. Take care not to damage the insulation when installing and take precautions against later damage from vibration, abrasion, or liquids in conduits. In addition, it is essential that the following practices be adhered to:

A. Never run thermocouple wires in the same conduit with ignition wiring or other high energy wiring such as AC line power.
A. Keep secondary wires to spark plugs and other high voltage wiring at least eight inches (200mm) away from thermocouples and extension wiring.

4.3 OUTPUT SWITCH WIRING - An alarm or fault condition occurs when the temperature of a point reaches or violates one of the setpoint values. This will cause the solid state output switch to turn ON or OFF (software configurable) to the switch common terminal. Output switch 1 defaults to closed (N/C) and switch 2 to open (N/O) with the absence of power. The output switch is isolated from the DC! terminal and is rated 200V, 0.2 amp. The N/O switch has a unique internal overload current protection circuit. If an overload occurs, the internal circuitry limits current to safe levels. When the overload is removed, the output switch resumes its normal ON characteristics. These switches can be wired to an Altronic annunciator system or to pilot duty relays as shown in the wiring diagrams.

4.4 RS-485 COMMUNICATIONS WIRING - The DSM-43820 temperature scanner can communicate to other instruments, PC's or PLC's via the two serial RS-485 communication wires. Use a two conductor shielded cable of fine gauge stranded wire and connect the wires to the terminals marked RS-485 "A" and RS-485 "B". Connect to the other communication device "A" to "A"(!) and "B" to "B"(+). Connect the shield wire to the master device only.

4.5 HAZARDOUS AREA OPERATION - The DSM-43820DUS temperature scanner is CSA certified for CLASS I, DIVISION 2, GROUPS C & D areas when mounted in a suitable enclosure. The device may be operated as CLASS I, DIVISION 1, GROUPS C & D intrinsically safe, if the following conditions are met:

Note: Refer to figures 5, 9 and 10 for intrinsically safe hook-up.

A. The temperature scanner must be powered through a CSA-certified positive polarity zener barrier rated 21 volts / 0.1 amp max. A suitable barrier is a Stahl part no. 9004/51-206-100-00; follow the installation instructions supplied with the barrier.
B. The switch outputs, if used, must be connected to the sensor inputs of an Altronic DA, or DD annunciator system with the 690 series power supply.
C. The RS-485 communications must not be used for Class I, Division 1, Group D intrinsically safe applications.

   In addition, the following requirements must be met (see NFPA standard no. 493):

   1. The intrinsically safe instrument wires within the panel enclosure must be kept at least two (2) inches away from other wiring. Run the thermocouple extension wires leaving the panel in a separate conduit from all other wiring and keep them separate throughout the installation.
   2. Wiring to the sensors must have a grade of insulation capable of withstanding an AC voltage of 500 volts RMS.
   3. Sensor wires must be run in separate conduits and junction boxes from high voltage wires such as ignition, fuel valve, and other high voltage wiring.

WARNING:	**SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY AND/OR SUITABILITY FOR CLASS I, DIV. 2, GROUPS C & D.**
	DO NOT DISCONNECT EQUIPMENT IN DIV. 2 ENVIRONMENT UNLESS POWER IS SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

4.6 TESTING THERMOCOUPLE LEADS - If it becomes necessary to check thermocouple to terminal strip wiring with an ohmmeter or other checker, first unplug the thermocouple connectors from the temperature scanner. This will prevent possible damage to the device's sensitive low voltage detection circuitry.

5.0 INITIAL OPERATION

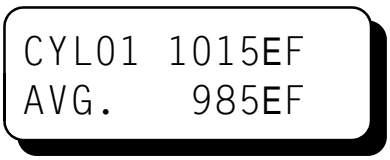
5.1 This section allows for quick setup and installation of the DSM-43820DUS temperature scanner. Mount and wire the device as described in sections 3.0 and 4.0. Upon initial power up, press the SETUP key; the unit will be in the configuration mode. Press the SETUP key until the display reads "THERMOCOUPLE / J or K". Press the • or – (up or down arrow key) to view the thermocouple options. Press ENTER/ACK when the appropriate thermocouple type is displayed to load the default data for that type. This procedure loads the factory default calibration parameters and no additional calibration should be required. Next, enter the configuration mode again and when the display reads either "UNITS EF" or "UNITS EC", press the • or – (up or down arrow key) to scroll and press ENTER/ACK to accept the desired units choice. The device is now ready to accurately read temperatures.

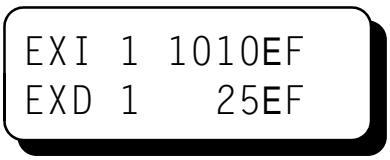
6.0 NORMAL OPERATION

6.1 The channels are assigned as follows:

1 thru 16	Engine cylinder exhaust	“CYLXX”
17	Exhaust inlet 1	“EXI 1"
18	Exhaust outlet 1	“EXO 1"
19	Exhaust inlet 2	“EXI 2"
20	Exhaust outlet 2	“EXO 2"

When the DSM-43820DUS temperature scanner is in the "normal" mode, it displays the exhaust cylinder number (“CYLXX”) with the absolute temperature value in EF or EC (1st line) and (2nd line) the average cylinder temperature (“AVG”) of all configured cylinders for inputs 1 through 16. The common exhaust temperatures are displayed as “EXI 1” (EXHAUST IN 1 or 2) and “EXO 1” (EXHAUST OUT 1 or 2) and each differential temperature is displayed as “EXD 1” (EXHAUST DIFFERENTIAL 1 or 2) in EF or EC. These are from inputs 17 through 20. The common exhaust absolute temperatures are from turbochargers in and out and or catalytic converter in and out. The common exhaust differentials are the difference between EXI 1 and EXO 1 for common exhaust 1 and EXI 2 and EXO 2 for common exhaust 2.





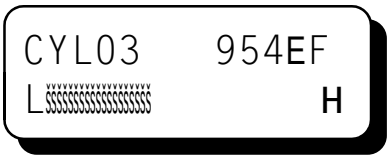
6.2 When the setpoints are armed and if a fault occurs, the display will show the cause of the alarm. When displaying the channel that faulted, the bottom line will read “ALARM” and the top line will show “AL”. In addition, one or all of the corresponding setpoint violations for that channel (DEV, HI 1, HI 2, DIFF, or HI) are displayed. An “AL” will show in the top line if <u>any channel</u> has a setpoint violation indicating at least one channel has a fault. In addition, the corresponding configured output(s) will activate.

6.3 If a monitored thermocouple temperature falls below the minimum range of the instrument (!76EF or !60EC), the display will read "X LO OOR" (Low Out Of Range) to identify this condition. If the thermocouple temperature exceeds the maximum range of the instrument (1382EF or 750EC for type J, 1472EF or 800EC for type K) the display will read "X HI OOR" (High Out Of Range). "X" represents the associated cylinder or common exhaust number.

NOTE: If a thermocouple or its wiring becomes open or disconnected from the temperature scanner, the display will read "X TCOPEN" (ThermoCouple Open) and if configured for a high or if differential is great enough, its configured output switch will turn on. This value will <u>not</u> be included in the average temperature value. All configured unused thermocouple inputs <u>must be shunted</u> to prevent this condition in normal operation.

7.0 BARGRAPH OPERATION

7.1 An analog bargraph is available for each cylinder channel and each common exhaust channel. The bargraph's low end point is the engine arm temperature and the high end point for channels 1-16 is cylinder high 2 and for channels 17-20 is the respective individual high setpoint value. To view the bargraph, press the ESC key, and the bottom line will show the bargraph. Press the ESC key again to toggle back to the average or differential display values. There is no time-out for displaying the bargraph, it will be displayed until the ESC key is pressed or a fault occurs on the displayed channel. If a fault occurs on the displayed channel, the fault will be displayed on the second line for that channel instead of the bargraph. The bargraph display is shown below.



8.0 KEYPAD DESCRIPTION

8.1 The DSM-43820DUS temperature scanner contains an eight-key front keypad which is used to view or change the setpoint values and to configure and calibrate the temperature scanner. The eight front panel keys are VIEW ALARMS, RESET, SETUP, ENTER/ACK, SETPTS, ESC, and • , – (up and down arrow keys).

8.2 VIEW ALARMS - The VIEW ALARMS key allows the user to view the status of the engine sense line and display channels which in the past have exceeded their setpoints (up to the first 8 faults) in the order they occurred after a reset has been performed. This is helpful in determining which thermocouple is responsible for causing an alarm. Pressing VIEW ALARMS first displays whether the engine sense line is active or not, then scrolls through the channels in the order in which the measured temperature has violated the setpoint values. The first channel that was violated will be displayed first along with the "H1", "H2", "DEV", "HI" or "DIFF" indicators. H1, H2 and DEV are cylinder faults; HI and DIFF are common exhaust faults. Any other channels that have had an alarm condition after the first one will be displayed in the order that they occurred. Any channel that has not violated its setpoint value will not be displayed. After displaying all channels (up to 8 maximum) that have violated their setpoints, the display will revert back to the normal display. Pressing RESET while in the "normal" display mode will clear all faults. If no faults are logged, the display will show the engine sense line status and then revert back to the "normal" mode.

8.3 RESET - The RESET key is used to clear the alarm logs, the display fault indicators and the output switch if set to latching mode. See section 10.7 for more information on reset.

8.4 SETUP - The SETUP key is used to scroll through the scanner setup menu.

8.5 ENTER/ACK - The ENTER/ACK key is used to save new data or a new configuration in nonvolatile memory. The setup will remain even through power-down.

8.6 SETPTS - The SETPTS (setpoints) key is used to view or change each of the eight setpoint values. When pressed, each setpoint description as well as the setpoint temperature value is displayed. Refer to section 10.0 for more information. NOTE: The setpoints cannot be changed if the protection is set to "On".

8.7 ESC - The ESC (escape) key can be used at any time during the setup, setpoint or view alarm modes to return to the normal mode. When the ESC key is pressed in any configuration mode, any changed values are ignored (not stored in memory), the configuration returns to the previous values, and the display returns to the normal reading.

8.8 • – - The up and down arrow keys are used to increment or decrement the displayed channel and corresponding temperature value. Each press of the up arrow key increments the channel one at a time while the down arrow key decrements it. These keys also scroll through the selections in the setup mode and are used to increase or decrease values for setpoints, calibration and the filter screen.

9.0 DEFAULT FACTORY SETTINGS

9.1 The DSM-43820DUS temperature scanner contains two default settings that are available to the user anytime during the life of the instrument. Upon receipt, the temperature scanner is set to one of these settings. These default settings will provide factory calibration for both type J and K thermocouples.

9.2 SELECTING A DEFAULT SETTING - From the normal mode, press the SETUP key until the display reads either "THERMOCOUPLE / J or K". Use the • or – key to select either a type J or K thermocouple and press ENTER/ACK. All of the configuration parameters as well as the calibration values will automatically be reset to the factory settings for that thermocouple type.

9.3 DEFAULT SETTINGS - Listed below are the factory default settings stored in permanent memory.

UNITS:	Degrees F (EF) or Degrees C (EC)
DISPLAY SCAN:	Manual
NUMBER OF POINTS:	16 cylinders, 2 common exhaust
PROTECTION STATUS:	Protection is OFF (Allows setpoints to be changed.)
NODE NUMBER:	1
DISPLAY FILTER:	230 out of 255
ENGINE SENSE LINE:	Dry contact
ARM TEMPERATURE:	500EF
STARTUP TIMER:	1 minute
OUTPUT SWITCHES:	Shelf state, non-latching, mode 1
SETPOINT VALUES:	CYL DEV and EXH DIFF = 100 EF CYL HI 1, EXH OUT 1 and EXH OUT 2 = 900 EF CYL HI 2, EXH IN 1 and EXH IN 2 = 1000 EF
CHECKSUM:	Checksum disabled

WARNING: UNIT MUST BE PROPERLY CONFIGURED FOR EACH APPLICATION PRIOR TO USE.

10.0 SETPOINTS

10.1 There are nine individually adjustable setpoints which can be set anywhere within the range of the scanner or OFF. The setpoints are as follows:

SET CYL DEV	-	Deviation from average cylinder temperature
SET CYL HI 1	-	First high cylinder setpoint
SET CYL HI 2	-	Second high cylinder setpoint
SET EXH.DIFF 1	-	Common exhaust 1, differential of common exhaust 1
SET EXH.INLET 1	-	Common exhaust 1, high inlet temperature
SET EXH.OUTLET 1	-	Common exhaust 1, high outlet temperature
SET EXH.DIFF 2	-	Common exhaust 2, differential of common exhaust 2
SET EXH.INLET 2	-	Common exhaust 2, high inlet temperature
SET EXH.OUTLET 2	-	Common exhaust 2, high outlet temperature

The channels are mapped to the setpoints and outputs as follows:

		---------OUTPUT SWITCH---------		
CHANNELS	SETPOINT	MODE 1	MODE 2	MODE 3
1 thru 16	CYL DEV	SW2	SW1	SW1
1 thru 16	CYL HI 1	SW1	SW1	SW1
1 thru 16	CYL HI 2	SW2	SW2	SW2
17	EXH INLET 1	SW2	SW2	SW2
18	EXH OUTLET 1	SW2	SW2	SW2
diff of 17 & 18	EXH DIFF 1	SW2	SW2	SW1
19	EXH INLET 2	SW2	SW2	SW2
20	EXH OUTLET 2	SW2	SW2	SW2
diff of 19 & 20	EXH DIFF 2	SW2	SW2	SW1

To view or change the setpoint values, press the SETPTS key one time to view the first setpoint; press it again to view the second setpoint and so on. The setpoint description will be on the first line and the value will be on the second line.

To adjust the displayed value, press the • or – (up/down arrow keys) to increase or decrease the value until the desired trip-point is reached. Press ENTER/ACK to accept and save the new value. The new setpoint value will change only if the ENTER/ACK key is pressed. Press the ESC key to return to the normal display mode with no setpoint value change. To set the selected setpoint off (no fault display or output switch action) press the RESET and then the ENTER/ACK key when adjusting the setpoint; the display will show "OFF". To turn it back on, again press the RESET and then ENTER/ACK keys.

NOTE: When in the setpoints mode, the previous setpoint values are monitored, and the new value is monitored only after the ENTER/ACK key is pressed. If no key is pressed for 15 seconds, the display will return to the normal mode and the configuration will revert back to the previous parameters.

10.2 OUTPUT SWITCHES - Output switch 1 (SW1) is closed (N/C) with the absence of power and switch 2 (SW2) is open (N/O) with the absence of power. Each switch can be actively configured with the keypad to be either open or closed and latching or nonlatching. Both switches are rated 200V, 0.2 amp max. Switch 1 is activated when the temperature of any cylinder temperature exceeds the high 1 setpoint value. Switch 2 is activated when any of the cylinder or common exhaust temperatures have been exceeded (see chart above). The output switch will make an electrical connection to switch common within one second (see note below) with a setpoint violation. A hysteresis of 10EF or 5EC is used on all setpoints to prevent the output from rapidly turning on and off near a setpoint. The output switch, if set to non-latching, will clear when the temperature values of all configured channels are 10EF / 5EC less than any setpoint. For example, if a high 2 setpoint value is set to 900EF, the output switch will trip when the monitored temperature on say cylinder 3 reaches 900EF or greater and will not clear until the input temperature is less than or equal to 890EF. If the output switch is set to LATCHING, the output switch will remain tripped until reset is initiated.

NOTE: The output switch reaction time is tied to the filter value with two seconds being the minimum. For other reaction times see section 11.10 below.

10.3 ENGINE SENSE LINE - All setpoints and output switches can be controlled during start-up by using the engine sense line. An external contact closure or sensing pulses from a pickup monitoring gear teeth can be used. Use the SETUP key to choose either “DRY CONTACT” or “PULSED PICKUP”. For a dry contact, an external contact must be provided that will connect the engine sense line to either the 5V OUT terminal on the back of the scanner or the supply voltage when the engine is not running. Open the contact from the positive voltage when the engine is running. For the pulsed pickup input, a magnetic pickup or a hall- effect pickup can be used to sense engine rotation. With the engine sense line “NOT ACTIVE” all the setpoints and outputs will be inactive, and the display will read one of the normal screens. When the scanner is in operation, the state of the engine sense line can be determined by pressing the VIEW ALARMS key. The display will show either “ENG. SENSE LINE / ACTIVE” or “NOT ACTIVE”.

NOTE: If the ENGINE SENSE LINE is not used, setpoints and outputs are always active.

10.4 ENGINE ARM TEMPERATURE - The cylinder deviation and common exhaust differentials are activated by the engine arm temperature and the start-up timer. The cylinder deviation and common exhaust differentials are not active below the engine arm temperature. Once the arm temperature is met, the start-up timer initiates. The start-up timer allows the temperatures to stabilize before becoming active. When the start-up timer times out, all configured setpoints and outputs are active. The engine arm temperature is configured from the configuration menu.

10.5 START-UP TIMER - As stated above, the start-up timer initiates when the engine arm temperature is met. The normal display shows the start-up timer counting down by displaying “TIMER’ and “xxm” (minutes); for the last 60 seconds, the display is “xxs” (seconds). If at any time when the timer is active the average cylinder temperature goes below the configured engine arm temperature, the timer will start over. It is not until the average cylinder temperature stays above the configured engine arm temperature for the entire established time that the setpoints will become active. If at any time during normal operation the average cylinder temperature goes below the configured arm temperature, the cylinder deviation and common exhaust differential setpoints will become inactive. The start-up timer can be canceled by pressing the ENTER/ACK key, or reset to maximum programmed time by pressing the RESET key. When the start-up timer expires, all setpoints are active as well as the output switches. Pressing the ESC key or the up/down arrow keys while the timer is active will display the normal screen. Pressing the ESC key again will return to the start-up timer screen.

10.6 MODE, OUTPUT SWITCHES - There are three different output switch modes that determine which switch (SW1 or SW2) will trip with a given fault condition; mode 1, 2, or 3. The table of these three modes and how they are mapped is shown in section 10.1. Use the setup key to reach the “OUTPUT SWITCHES” menu and use the up or down arrow keys to select the desired mode.

10.7 STATUS INDICATORS - A status of whether the setpoints are armed or not is available by pressing the SETPTS key. An “A” for armed will appear on the second line far right on each setpoint screen if the setpoint is armed. If not armed “NA” will appear. Also, a status of the engine sense line is available by pressing the VIEW ALARMS key. The display will show “ENGINE SENSE LINE - NOT ACTIVE” with the engine sense line pulled high and “ENGINE SENSE LINE - ACTIVE” with the engine sense line open. If the setpoint is set to “OFF” the “A” indicator will not display.

10.8 RESET OPERATION - Reset can be initiated in one of three ways: by pressing the RESET key, by grounding the reset terminal on the back of the unit, or by sending a reset command via the RS-485 communications. A reset operation clears the view alarms and places the output switch in the non-tripped condition. Reset can be held active by either grounding the reset terminal on the back of the unit or by depressing and holding the reset button in on the front keypad. When reset is kept active, the output switch will stay in the non-faulted condition and the display will show "RESET" to inform the operator.

11.0 CONFIGURATION

11.1 The following are the configuration headings of the temperature scanner. From the normal display mode, press the SETUP key to enter the configuration mode. Once in the setup mode press the SETUP key to reach any of these configuration headings. After a selection has been made, press the ENTER/ACK key; the display will read "SAVED". The new data is saved at this time. The ESC (escape) key can be used at any time to abort the configuration mode and return to the normal reading. During configuration, the unit allows 15 seconds for first level and 60 seconds for other levels between keystrokes to change or save a new configuration. If the time lapses without a keystroke, the device will automatically return to the normal mode without making any changes. The new information is saved only if the ENTER/ACK key is pressed and the display reads "SAVED". A flowchart is provided that shows step-by-step progression through the configuration procedure.

11.2 “UNITS / EF or EC" - The available temperature units are EF and EC. When changing temperature units, the displayed temperature is automatically converted to the new unit value. To change the unit indicator, enter the configuration mode and press the SETUP key until the display reads either " EF " or " EC ". The previously programmed unit indicator will appear. Use the • or – arrow keys to select one of the available units, and press ENTER/ACK to accept and save the change. The display will read "SAVED" and return to the normal mode displaying the new units selected and the numeric value converted to the selected units.

11.3 "AUTO SCAN” - Allows the user to display automatically or manually the selected number of points. The scan starts with cylinder 1 and progresses in numerical order to the last cylinder channel selected in configuration. It then reads the common exhaust points selected in configuration and then repeats the entire sequence. In manual scan the device continually displays the temperature value of one channel at a time. The next channel or previous channel and corresponding temperature value is displayed with each press of the • or – arrow key. In auto scan the device will display each channel number and temperature value for approximately two seconds before automatically switching to the next channel. The • or – arrow keys can be used in autoscan to quickly advance or descend to other channels.

11.4 "THERMOCOUPLE / J or K” TYPE - The instrument can read either type J or K thermocouples. Use the • or – arrow key to select a thermocouple type and press ENTER/ACK to accept and save the new thermocouple type.

NOTE: Pressing ENTER/ACK will return all of the adjustable parameters, including the setpoint switch values, to factory default values. When verifying the type, press ESC to exit without reloading default values. All thermocouple inputs must be either type J or K; the inputs cannot be mixed.

11.5 "CALIBRATE" - For calibration procedures, see Section 12.0.

11.6 "CYLINDERS / 1-16" - This allows the user to select the number of cylinders to be monitored, from 1 to 16 cylinders or channels. Cylinders not selected will not display and will have no effect on the output switch. NOTE: Cylinder 1 is always used and the rest of the channels used follow in numeric order from cylinder 1.

11.7 "COMMON EXHAUST / 0-2" - This allows the user to select the number of common exhaust pairs to be monitored. An entry of 1 will activate exhaust inlet 1 and outlet 1 (channels 17 and 18). An entry of 2 will activate all four common exhaust points (channels 17-20). An entry of 0 should be used if none of these points are to be used. The common exhaust points not selected will not be displayed and will have no effect on the output switch.

11.8 "SETPOINT PROTECTION / OFF or ON" - This feature allows the user an added layer of protection by preventing the setpoints from inadvertently being changed. When protection is ON, the user is able to view the setpoint values but is not able to change any of them. If an attempt is made to change the setpoint values and the ENTER key is pressed when protection is on, the display will read "LOCKED" and return to the normal display mode.

11.9 "NODE NUMBER / 1-99" RS-485 COMMUNICATIONS NODE NUMBER - For RS-485 serial communications, each unit must be assigned a node or identification number so that a DSM device can be identified by the device communicating with it. Any unique number from 1 to 99 may be used.

11.10 "FILTER VALUE / 1-255" DISPLAY FILTER - The display filter can be used to stabilize the display reading of a changing input. Filtering is done in both hardware and software. The software filter is an adjustable filter; the rate of change is less for large values. The filter value is read-out in a number from 1 to 255, 1 being minimum filter value and 255 being maximum filter value. Below are some typical filter values and their effect on the display reading. Settling values are approximate times in seconds to reach 90% of new reading. Use the • or – arrow keys to increase or decrease the filter value and press ENTER/ACK to save the new filter value.

FILTER VALUE	1	128	200	210	220	230	240	250	253	255
SETTLING, SEC.	2.0	2.5	3.0	4.0	5.0	9.0	14	34	70	200

11.11 “ENG.SENSE LINE” - All setpoints and output switches can be inhibited during start-up by using the engine sense line. Lock-out can occur with either an external contact closure or by sensing pulses from a pickup monitoring gear teeth. Use the • or – arrow key to pick either “DRY CONTACT” or “PULSED PICKUP”.

11.12 “SET ARM TEMP” - The cylinder deviation and common exhaust differentials are activated by the engine arm temperature and the start-up timer. The cylinder deviation and common exhaust differentials become active above the engine arm temperature and after the timer expires. It can be set to any temperature within the range of the scanner. Use the • or – arrow key to set the arm temperature.

11.13 “SET TIMER” START-UP TIMER - The start-up timer starts when the engine arm temperature is met. It can be set from 1 minute to 30 minutes. Use the • or – arrow keys to increase or decrease the timer.

11.14 "OUTPUT 1 / OUTPUT 2" OUTPUT SWITCH STATE - The options for each of the output switches are fail safe or shelf state, and latching or non-latching. Shelf state is when the outputs are in the same condition with no faults as when unpowered; fail-safe is when they are opposite. In non-latching mode, the output switch changes state when the setpoints come out of violation; in latching mode, a reset event is required to clear from the tripped state. Unpowered states for the switches are closed for SW1 and open for SW2.

12.0 CALIBRATION

12.1 The instrument is calibrated at the factory and should not require additional calibration. However, calibration can be performed in the field many times over the life of the device. The calibration mode is used to calibrate the zero and span values. Calibration can be performed from the front keypad without disassembling the unit. A thermocouple calibrator or simulator is required to provide a calibration reference.

NOTE: During calibration, the unit allows 60 seconds between keystrokes to change or save a new calibration. If 60 seconds lapse without a keystroke, the device will automatically return to the normal mode with the previous values. The new calibration information is saved only if the ENTER/ACK key is pressed and the display reads "SAVED".

12.2 CALIBRATION PROCEDURE - Connect the appropriate thermocouple simulator, either type J or K using proper thermocouple extension wire to temperature scanner thermocouple input channel 01. The DSM-43820DUS temperature scanner MUST be calibrated on channel 01 (CYL01) only. The calibration performed on channel 1 applies to all channels. To calibrate the temperature scanner, press the SETUP key until the display reads "CALIBRATE" and press ENTER/ACK. The display will read "SET LO POINT". Adjust the simulator for a very low reading (0EF) and press ENTER/ACK. Use the • or – arrow keys to increase or decrease the display reading to match the setting of the simulator and press ENTER/ACK. The display will now read "SET HI POINT". Adjust the simulator for a very high reading (1000EF) and press ENTER/ACK. Again use the • or – arrow keys to increase or decrease the display reading to match the simulator and press ENTER/ACK. The display will read "SAVED" and will return to the normal reading with the new calibration values stored in permanent memory. NOTE: Be sure that the thermocouple type and the units (EF or EC) of the calibrator match the units of the instrument before performing a calibration.

12.3 The DSM-43820DUS temperature scanner has a feature that allows a slight adjustment of either the zero or span values individually. This type of calibration can be used to "tweak" the readout to match that of a known value without actually performing a formal calibration procedure. This adjustment must be performed only on channel 1. NOTE: This type of adjustment will invalidate calibration settings from the procedures in section 12.2.

A. ZERO ADJUSTMENT ONLY - To make a small adjustment on the zero calibration value of the temperature scanner, enter the calibration mode by pressing the SETUP key until the display reads "CALIBRATE" and press ENTER/ACK; the display will read "SET LO POINT". With the standard at or near zero, press ENTER/ACK and use the • or – arrow keys to increase or decrease the display reading to match the standard and press ENTER/ACK. The display will read "SET HI POINT"; press the SETUP key and the display will read "SAVED" and will return to the normal reading with the new zero calibration value stored in permanent memory.

B. SPAN ADJUSTMENT ONLY - To make a small adjustment on the span point of the temperature scanner, enter the calibration mode by pressing the SETUP key until the display reads "CALIBRATE" and press ENTER/ACK; the display will read "SET LO POINT". Press the SETUP key and the display will read "SET HI POINT". With the standard at or near the desired span value, press ENTER/ACK and use the • or – arrow keys to increase or decrease the display reading to match the standard and press ENTER/ACK. The display will read "SAVED" and will return to the normal reading with the new span calibration value stored in permanent memory.

13.0 INSTRUMENT LOCKOUT

13.1 The DSM-43820DUS contains a lockout feature that prohibits access to the configuration menu; it does allow the operator to change from EF to EC or vice versa. To lock, press and hold the ENTER and ESC keys together and then also press the SETUP key. The display will read “LOCKED” and return to the normal mode with the configuration menu locked out. To unlock, press and hold the ENTER and ESC keys together and then press the – arrow key. The display will read “UNLOCKED” and return to the normal mode allowing configuration changes to be made.

14.0 RS-485 COMMUNICATIONS

14.1 The DSM-43820DUS temperature scanner is part of a system that has been carefully designed to easily interface to popular computers, terminals, programmable controllers and future Altronic instruments. The data and status on any channel as well as the setpoint values can be read remotely. The setpoints can also be adjusted remotely. The first alarm fault can be displayed and then cleared. A remote reset can also be performed.

14.2 MASTER / SLAVE OPERATION - The DSM device RS-485 communication system is designed as a master/slave system; that is, each unit responds to its own unique address (node number) only after it is interrogated by the master (computer). One master and up to 32 slaves can communicate in the system. The units communicate with the master via a polling system. The master sends a command and only the polled slave responds. The slave modules can never initiate a communications sequence. A simple command/response protocol must be strictly observed.

14.3 NODE NUMBER - The node number is used in the system to identify the desired slave unit being polled. The node number can be any numeric value from 1 to 99 although only 32 devices can be served on a single communications port. This number range (1 to 99) is allowed so that if device grouping by function or application is desired it can be implemented using the first digit as the group or engine number and the second as the unit number. For example, 53 could be used to identify the number 3 slave unit mounted on engine number 5.

14.4 ASCII COMMUNICATION - All communication to and from the temperature scanner is performed using ASCII characters. This allows the information to be processed with the "string" functions common to high level computer languages such as BASIC and C. For computers that support standard serial port interfaces, no special machine language software drivers are required. The use of the ASCII format also allows for the connection of these devices to an auto answer modem for long distance operation without the need for a local supervisory computer. The ASCII characters also make system debugging easy using standard terminal emulation software.

14.5 HALF DUPLEX OPERATION - The RS-485 system employed uses two wires for communication and cannot send and receive data at the same time over the same two wires making it a half duplex system. When the master is in the transmit mode, the slave is in the receive mode and visa-versa.

14.6 ELECTRICAL OPERATING RANGE - RS-485 is a communications standard to satisfy the need for multi-dropped systems that can operate at high speeds over long distances. RS-485 uses a balanced differential pair of wires switching from 0 to 5 volts to communicate data. RS-485 drivers can handle common mode voltages from !7 to +12 volts without loss of data, making them an excellent choice for industrial environments.

14.7 COMMUNICATIONS PARAMETERS - The following must be set by the master to communicate with the slaves:

Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None

14.8 COMMUNICATIONS WIRING - The RS-485 wiring diagram illustrates the wiring required for multiple slave unit hookup. Note that every slave unit has a direct connection to the master. This allows any one slave unit to be removed from service without affecting the operation of the other units. Every unit must be programmed with a unique address or node number, but the addition of new units or nodes can be in any order. To minimize unwanted reflections on the transmission line, the bus should be arranged as a trunk line going from one module to the next. Random structures of the transmission line should be avoided. Special care must be taken with long busses (500 feet or more) to ensure error free operation. Long busses must be terminated with a 120 ohm resistor between the terminals marked RS-485 "A" and RS-485 "B" at the master only. The use of twisted pair shielded cable will enhance signal fidelity and is recommended. To prevent ground loops the shield should be connected to the shield terminal at the master only.

14.9 RX, TX INDICATORS - An RX and TX (receive and transmit) LED is visible on the back of the DSM-43820DUS unit to indicate when the unit is either receiving or transmitting data.

14.10 CONNECTING TO A PC - When connecting the DSM-43820DUS temperature scanner to the RS-232 port on a PC, an RS-232 to RS-485 converter must be used for the communication interface. See wiring diagram for details.

14.11 LOADING - RS-485 uses a balanced differential pair of wires switching from 0 to 5 volts to communicate data. In situations where many units (32 max.) are connected together on a long run, voltage drop on the communications leads becomes a major problem. Voltage drops on the RS-485 minus lead appear as a common mode voltage to the receivers. While the receivers are rated to a maximum voltage difference of +/!7 volts, !7V to +12V, a practical system should not have a voltage difference exceeding +/!3 volts under normal conditions. The wire gauge used for the connections therefore limits the maximum number of units or the maximum length of wire between units in each application. The following formula can be used as a guideline to select the appropriate wire gauge.

For 18 AWG wire	No. of DSM units = (4000) / (ft of wire used)
For 20 AWG wire	No. of DSM units = (2500) / (ft of wire used)
For 22 AWG wire	No. of DSM units = (1600) / (ft of wire used)

NOTE: The maximum number of units connected together in a system is 32.

14.12 COMMAND STRUCTURE - The DSM units operate with a simple command/response protocol to control all functions. A command must be transmitted to the unit by the master (computer or PLC) before the slave can respond with useful data. A slave unit can never initiate a communications sequence. A variety of commands exist to fully exploit the functionality of the individual units.

Communication of functions to the DSM is performed with two character ASCII command codes. The general format used for the commands is illustrated below using the READ DATA command from channel 3 of a DSM as an example. The hexadecimal values for the characters are shown only as a reference for those using low level (assembly language) decoding and will not appear on the communications terminal screen. All of the characters used in the communications protocol are standard ASCII characters and appear on the computer keyboard as shown with the exception of the "not acknowledge" (NAK) which is the industry standard "control U".

	header	**start**	**node**	**space**	**command**	**space**	**data**	**end**
ASCII	>	(	0 1		R D		0 3	)
HEX	3Eh	28h	30h 31h	20h	52h 44h	20h	30h 33h	29h

COMMAND HEADER ">" (3Eh) - Each command must begin with the command header sometimes referred to as a prompt character. The ASCII character used is the ">" which means that a command message will be sent from the master to the slave.

START OF TEXT "(" (28h) - The command header must be followed by the start of text indicator.

NODE NUMBER 01 - 99 - The node number or address of the device being contacted is next. A two digit number from 01 to 99 can be used.

SPACE (20h) - Following the node number is an ASCII space character (not printable, value 20h) to act as a delimiter between the node number and the two character command word. For the balance of this document the space character will be shown normally without a specific description of each occurrence.

COMMAND WORD "RD" (52h, 44h) - The command words are standard two letter (upper case) commands sent by the master for gathering specific information about the status of a slave. The commands are listed under STANDARD COMMANDS below.

SPACE (20h) - Following the command word is another ASCII space character to act as a delimiter between the command word and the channel number.

CHANNEL NUMBER "03" - This is the channel number in the slave unit that the information is requested from.

END OF TEXT ")" (29h) - The end of text indicator says this is the end of the command.

STANDARD COMMANDS - The standard commands available are:
NOTE: The first number in each command is the node number.

RD	**R**ead **D**ata	>(01 RD 03)	Read value of ch3.
RL	**R**ead **L**ow value	>(02 RL 01)	Read arm temp (for constructing bargraphs).
RH	**R**ead **H**igh value	>(15 RH 02)	Read high setpoint of ch2.
RS	**R**ead **S**etpoint	>(02 RS 01)	Reads setpoint 01. (See chart below for descriptions).
CS	**C**hange **S**etpoint	>(15 CS 02 sxxxx.)	Change setpoint value for setpoint 02 (see below).
CA	**C**lear **A**larms	>(11 CA)	Clear current alarms and alarm logs.
RR	**R**emote **R**eset	>(01 RR)	Reset the unit.
FA	**F**irst **A**larm value	>(01 FA)	Read the first alarm to fault output 2.
F1	**F**irst **A**larm value, output 1	>(01 F1)	Read the first alarm to fault output 1.
F2	**F**irst **A**larm value, output 2	>(01 F2)	Read the first alarm to fault output 2.

NOTES: In the CS setpoint adjustment command, the variable data is of the form: sign (+/!) followed by the four most significant digits and a decimal point. Digits to the left of the most significant non-zero number must be filled with zero's for place holders (Ex: +0325.). A plus sign must be used for a setpoint value of zero (Ex: +0000.). To read the average cylinder temperature, use channel 23, to read the common exhaust differentials, use channels 21 and 22.

Listed are the 2 digit number codes and channel numbers corresponding to the nine setpoints:

01 = DEV	Cylinder Deviation	Channels 1-16 Y 23
02 = H1	Cylinder high #1	Channels 1-16
03 = H2	Cylinder high #2	Channels 1-16
04 = EXH DIFF 1	Common Exhaust differential #1	Channel 21
05 = EXH INLET 1	Common Exhaust inlet high #1	Channel 17
06 = EXH OUTLET 1	Common Exhaust outlet high #1	Channel 18
07 = EXH DIFF 2	Common Exhaust differential #2	Channel 22
08 = EXH INLET 2	Common Exhaust inlet high #2	Channel 19
09 = EXH OUTLET 2	Common Exhaust outlet high #2	Channel 20

STANDARD RESPONSES - The standard responses to the commands above are:

COMMAND	RESPONSE
>(01 RD 03)	<(01 4382 CH03 sxxxx. DegF OK OK)

Node 01, unit type 43820, channel 3, x value, DegF units, first setpoint status indicator, second setpoint status indicator.

>(02 RL 01)	<(02 CH01 sxxxx. DegF)

Channels 1-20 & 23 (21 & 22 are excluded), the arm temperature value, x value, DegF units. Note: This response is used primarily for the bargraph display in external instruments.

>(15 RH 02)	<(15 CH02 sxxxx. DegF)

Channel 2's high 2 alarm is x value DegF units.
Note: This response is used primarily for the bargraph display in external instruments.

>(02 RS 00)	<(02 00 sxxxx. DegF)

Reads the cylinder deviation setpoint value.

>(15 CS 02 +1195.)	<(15 CS 02)

Set cylinder high #2 setpoint to 1195 degrees .

>(11 CA)	<(11 CA)

Cleared alarms at node 11.

>(01 RR)	<(01 RR)

Performed a remote reset at node 01.

>(01 FA)	<(01 CH07 HI)

Ch7's high setpoint was first to fault at node 01. FA reads the first fault on output 2 only.

>(01 F1)	<(01 CH01 H1)

Ch1's high 1 setpoint was first to fault at node 01. F1 reads the first fault on output 1 only.

>(01 F2)	<(01 CH23 DF)

Ch23's diff setpoint was first to fault at node 01. F2 reads the first fault on output 2 only.

SETPOINT STATUS INDICATORS FOR THE **READ DATA** RESPONSE - Setpoint status indicators consist of two ASCII characters. The first is the low setpoint indicator, the second is the high setpoint indicator. The valid status indicators are:

OK No faults detected on the requested channel
DV Cylinder deviation on configured channels 1-16 is outside of the setpoint value
H1 A configured cylinder channel 1-16 is above its setpoint for output 1
H2 A configured cylinder channel 1-16 is above its setpoint for output 2
DF A configured common exhaust channels differential is greater than the setpoint value
HI A configured common exhaust channel 17-20 is above its setpoint value
NA The channel is not being used and has been disabled in the configuration menu
TD The channel is not yet armed

VALID RESPONSE - A command/response sequence is not complete until a valid response is received. When a slave unit receives a valid command, it interprets the command, performs the desired function and then communicates the response to the master within the specified time. The master may not initiate a new command until the response from a previous command is completed.

A valid response can occur in three ways:
1) a normal response indicated by a "< " header and "( )" beginning and end of text
2) an error response indicated by a "§" NAK (not acknowledged)
3) a communications time-out error

Each command has an associated delay time before a response can be made from the slave unit. If the response does not occur within the time specified for the commands as given, a communications time-out error occurs. This error is usually caused by an improper command header or possibly an improper or non-existent node sent by the master. The commands and their associated maximum response delay times are listed below.

RD, RL, RH, FA, F1, F2, CD, CE commands	20 msec. max.
RS, CS, CA, RR commands	100 msec. max.

An NAK error response will be sent by the DSM-43820DUS unit when it has received a command with an error in the message. All commands must be of the format above; all letters must be uppercase. The header, start-and-end of text characters, a valid node number and spaces must be sent and correct to receive an NAK; if not, no response will be sent.

NO ALARMS RESPONSE - If view alarms memory in the unit polled is clear, the response will be: <(01 CH~~ CL)

14.13 CHECKSUMS - Two additional commands are provided so that the user may enable or disable the communication checksum routines. When enabled, the messages include an error-checking checksum that is based upon an Exclusive-Or, Modulo 100 conversion sum of the characters in the message string between and including the start of text "(" character and the end of text ")" character. The checksum number is a decimal number that is appended to the message. The slave unit calculates the checksum of the message and compares the calculated value to the actual value it received from the master in the checksum field. If the two values are not equal, an error results and no response is sent.

CE	for	**C**hecksum **E**nabled	>(01 CE)	checksum enabled for node 01
CD	for	**C**hecksum **D**isabled	>(01 CD)	checksum disabled for node 01

To calculate the Exclusive-Or, Modulo 100 checksum, take the binary value of the 8 bit ASCII character "(" and XOR it with the next binary value of the ASCII character in the string. Take the result and XOR it with the next. Continue these calculations until the end of text ")" character and that is the checksum value. If the decimal number of any of the calculations are greater than 99, use Modulo 100 math. For example, for decimal 154, use 54.

The Exclusive-Or is a binary Boolean operator. The XOR truth table is as follows:

A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

XOR EXAMPLE FOR "(" XORed WITH "0":

```
    00101000
    00110000
    00011000 =   24 (DECIMAL)
```

An example of the calculation of the checksum is below:
Command: >(01 RD 01)

ASCII CHAR	BINARY EQUIV	CHECKSUM (DECIMAL)
>	Not used	---
(	00101000	---
0	00110000	24
1	00110001	41
SPACE	00100000	9
R	01010010	91
D	01000100	31
SPACE	00100000	63
0	00110000	15
1	00110001	62
)	00101001	23

The checksum value will be sent at the end of the command, so the command will look like:
>(01 RD 01)23

FIGURES SECTION:

FIG. 1 - MOUNTING DIMENSIONS AND SPECIFICATIONS

FIG. 2 - DSM-43820DUS CONFIGURATION WORKSHEET

FIG. 3 - DSM-43820DUS FLOWCHART

FIG. 4 - GENERAL ELECTRICAL CONNECTIONS

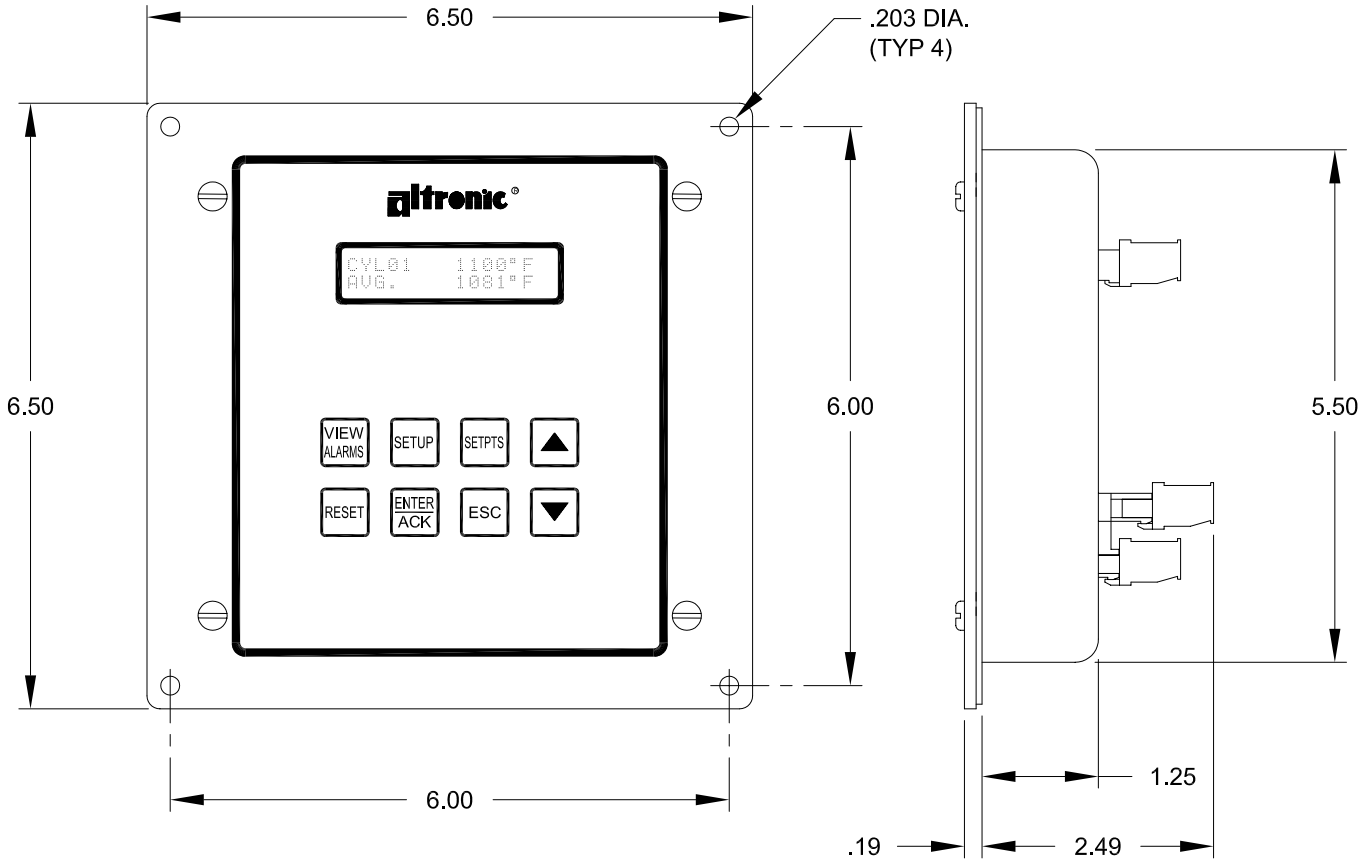
FIG. 5 - WIRING DIAGRAM, ALTRONIC ANNUNCIATOR SYSTEMS

FIG. 6 - WIRING DIAGRAM, DC RELAYS

FIGS. 7,8 - WIRING DIAGRAM, RS-485 COMMUNICATIONS

FIGS. 9, 10, 11 - WIRING DIAGRAM, ENGINE SENSE LINE

FIG.1 MOUNTING DIMENSIONS AND SPECIFICATIONS, DSM-43820DUS



SPECIFICATIONS:

POWER REQUIRED: DC POWERED 12-30 VDC, 0.10 AMP. MAX.

THERMOCOUPLE TYPE: "J" (IRON-CONSTANTAN) OR "K" (CHROMEL-ALUMEL).

TEMPERATURE SCALE: PROGRAMMABLE °C OR °F.

DISPLAY: BACKLIT 2 X 16 LCD CHARACTER.

DISPLAY UPDATE RATE: 2 SECOND NOMINAL.

DISPLAY SCAN RATE: 2.0 SECONDS PER CHANNEL (44 SECONDS FOR 20 CHANNELS PLUS 2 DIFF. NOMINAL).

RANGE: TYPE "J" THERMOCOUPLE -60° TO 750°C OR -76° TO 1382°F.
TYPE "K" THERMOCOUPLE -60° TO 800°C OR -76° TO 1472°F.

OUTPUT SWITCH: TWO PROGRAMMABLE FORM A/B (N/O, N/C) SOLID STATE SWITCHES RATED 200 VDC, 0.2 AMP CONTINUOUS, OPTICALLY ISOLATED FROM POWER SUPPLY. HYSTERESIS FIXED AT 10°F.

SWITCH RESPONSE TIME: TIED TO FILTER VALUE AND DISPLAY READING (WITH FILTER AT 1 MAX RESPONSE TIME IS APPROXIMATELY TWO SECONDS).

AMBIENT TEMPERATURE RANGE: -40° TO 80°C (-40° TO 175°F).

INSTRUMENT ACCURACY: ±1%, ±1 DEGREE EXCLUSIVE OF THERMOCOUPLE ERROR.

HAZARDOUS AREA CLASSIFICATION: CLASS I, GROUPS C & D, DIV. 2
CLASS I, GROUPS C & D, DIV. 1 WHEN POWERED FROM A CSA CERTIFIED ZENER BARRIER RATED 21 VOLTS/0.1 AMP MAX.

FIG.2 DSM-43820DUS - CONFIGURATION WORKSHEET

SERIAL#_____ **SITE:**_____

UNIT __ °F __ °C

AUTO SCAN __ YES __ NO

TYPE __ "J" THERMOCOUPLE (iron-constantan)
__ "K" THERMOCOUPLE (chromel-alumel)

CYLINDERS _____ # OF CYLINDERS MONITORED

COMMON EXHAUST _____ # OF COMMON EXHAUST PTS MONITORED

SETPOINT PROTECTION __ ON __ OFF

RS-485 COMMUNICATIONS NODE NUMBER _____

FILTER _____ (1=min filtering, 255=max filtering, default = 230)

ENGINE SENSE LINE __ DRY CONTACT __ PULSED PICKUP

SET ARM TEMP _____ (in °F or °C) **SET TIMER** _____ (in min)

OUTPUT SWITCH 1 STATE __SHELF __FAIL SAFE
__LATCHING __NON-LATCHING

OUTPUT SWITCH 2 STATE __SHELF __FAIL SAFE
__LATCHING __NON-LATCHING

SETPOINTS

CYL DEV _____ (in °F or °C) EXH DIFF 2 _____ (in °F or °C)

CYL HI 1 _____ (in °F or °C) EXH INLET 2 _____ (in °F or °C)

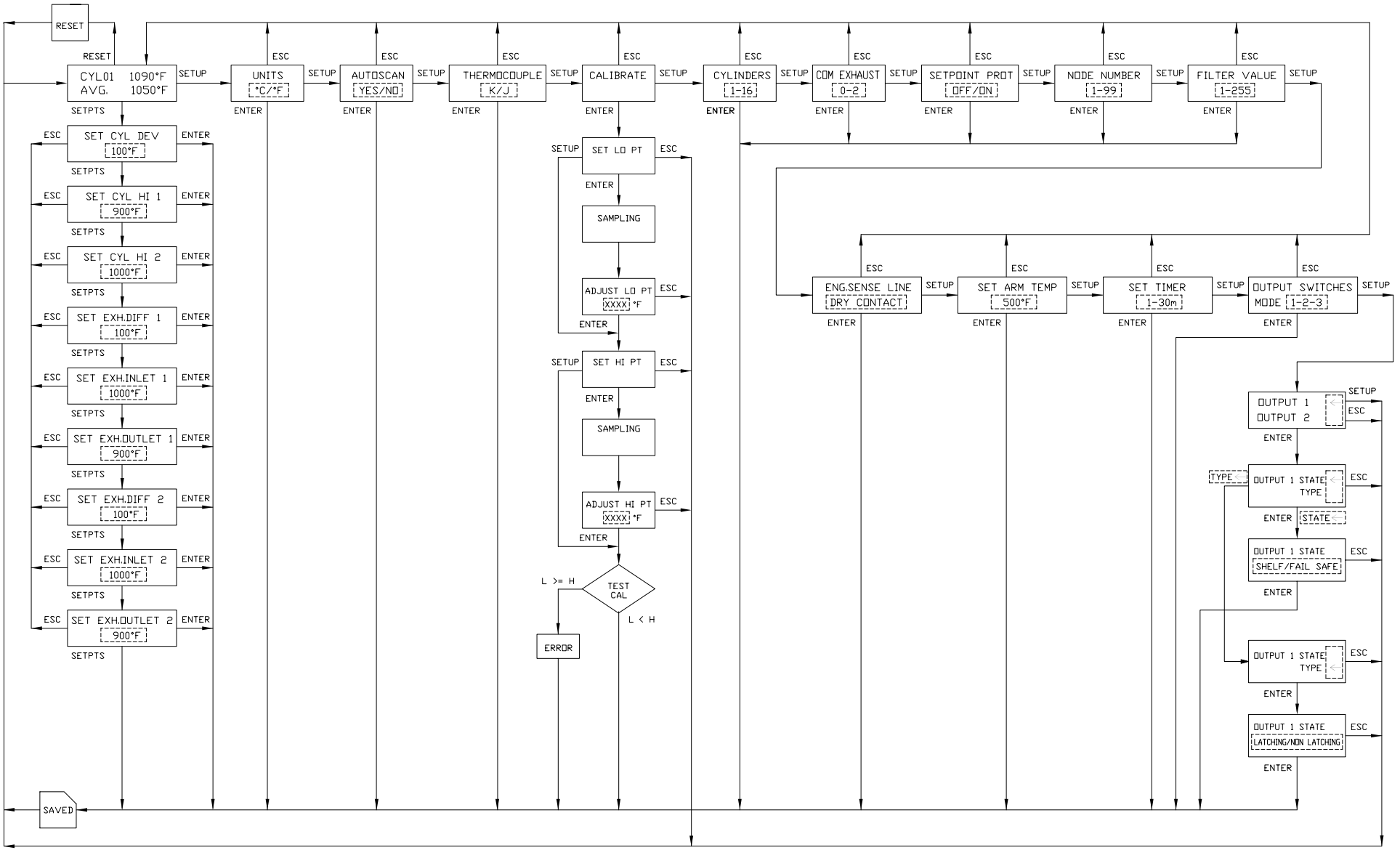
CYL HI 2 _____ (in °F or °C) EXH OUTLET 2 _____ (in °F or °C)

EXH DIFF 1 _____ (in °F or °C)

EXH INLET 1 _____ (in °F or °C)

EXH OUTLET 1 _____ (in °F or °C)

FIG.3 DSM-43820DUS - FLOWCHART



VIEW ALARMS: DISPLAYS HISTORY OF CHANNELS, UP TO 8 TOTAL, IN THE ORDER THAT THEY HAVE EXCEEDED THEIR SETPOINT VALUES.
NOTE: TO CLEAR THE ALARM HISTORY, PRESS THE 'RESET' KEY, ALL CURRENT NON-FAULTED ALARMS WILL CLEAR.

RESET: RESETS ALL CURRENT NON-FAULTED ALARMS AND RETURNS THE OUTPUT SWITCH TO THE NON-FAULTED CONDITION WHEN IT IS SET TO LATCHING.

△ ▽: THE UP AND DOWN ARROW KEYS ADVANCE THE DISPLAY TO THE NEXT CHANNEL AND TEMPERATURE VALUE.

SETPTS: WHEN THE SETPTS KEY IS PRESSED THE SETPOINT WILL BE DISPLAYED FOR 16 SECONDS AND WILL AUTOMATICALLY REVERT BACK TO THE NORMAL DISPLAY MODE IF NO KEY IS PRESSED. IF THE UP OR DOWN ARROW KEY IS PRESSED THE SETPOINT VALUE WILL INCREMENT OR DECREMENT AND REFRESH THE TIMER. PRESSING THE ENTER KEY SAVES THE NEW VALUE. PRESSING THE SETPOINTS KEY DOES NOT SAVE AND ADVANCES TO THE NEXT SETPOINT. IF THE ESC KEY IS PRESSED, THE DISPLAY WILL REVERT BACK TO THE NORMAL DISPLAY MODE AND RETAIN THE PREVIOUS SETPOINT VALUE. PRESS THE RESET KEY TO TURN THE SETPOINT OFF.

DEFAULT SETTINGS

FOR FACTORY DEFAULT SETTINGS SELECT 'J' OR 'K' THERMOCOUPLE TYPE

J OR K THERMOCOUPLE
°F OR °C UNITS

SETPOINTS:
CYL DEV: 100°F
CYL HI 1: 900°F
CYL HI 2: 1000°F
EXH DIFF 1: 100°F
EXH INLET 1: 1000°F
EXH OUTLET 1: 900°F
EXH DIFF 2: 100°F
EXH INLET 2: 1000°F
EXH OUTLET 2: 900°F

MANUAL SCAN
CYLINDERS: 16
COM EXHAUST: 2
SETPOINT PROT: OFF

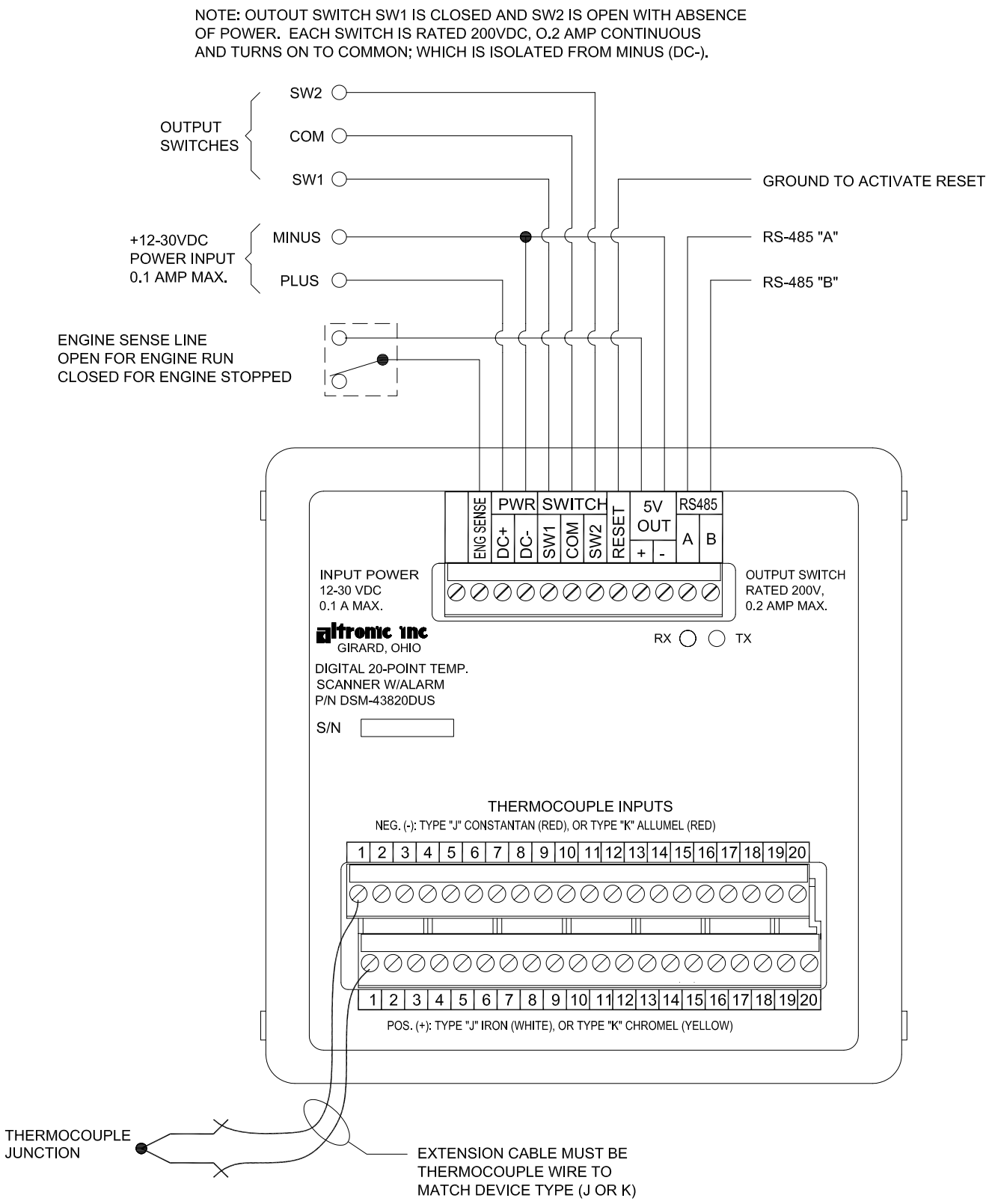
NODE NUMBER: 1
FILTER: 230
ENG.SENSE: CONT CLOSE
SET ARM TEMP: 500°F

SET TIMER: 1m
OUTPUT SWITCHES: SHELF STATE
NON-LATCHING
CHECKSUM DISABLED

FLOWCHART KEY

1-16 — △ ▽ DASHED LINES- USE UP AND DOWN ARROW KEYS TO SCROLL

FIG.4 GENERAL ELECTRICAL CONNECTIONS, DSM-43820DUS



NOTES:

1. ALWAYS USE POINT 1 AND PROCEED IN SUCCESSION TO THE HIGHEST POINT REQUIRED.
2. ALL THERMOCOUPLES AND EXTENSION WIRE MUST BE OF THE SAME TYPE. ALL CONNECTIONS TO BE CLEANED, TIGHTLY TWISTED AND INSULATED WITH CERAMIC WIRE NUTS.
3. ALL UNUSED THERMOCOUPLE INPUTS MUST BE SHUNTED FOR PROPER OPERATION.
4. THERMOCOUPLES SHOULD BE EITHER ALL UNGROUNDED OR ALL GROUNDED.

FIG.5 WIRING DIAGRAM
ALTRONIC ANNUNCIATOR SYSTEMS, DSM-43820DUS

NOTE: FOR INTRINSICALLY SAFE OPERATION THE FOLLOWING CONDITIONS MUST BE MET: (ALSO SEE SECTION 4.5)

1. DC POWER MUST BE FROM A CSA CERTIFIED POSITIVE POLARITY ZENER BARRIER RATED 21 VOLTS/0.1 AMP MAX. A SUITABLE BARRIER IS A STAHL PART NO. 9004/51-206-100-00; FOLLOW THE INSTALLATION INSTRUCTIONS SUPPLIED WITH THE BARRIER.
2. THE SWITCH OUTPUTS, IF USED, MUST BE CONNECTED TO THE SENSOR INPUTS OF AN ALTRONIC DA OR DD ANNUNCIATOR SYSTEM WITH 690 SERIES POWER SUPPLY.
3. THE RS-485 COMMUNICATIONS MUST NOT BE USED FOR CLASS I, DIVISION 1, GROUP D INTRINSICALLY SAFE APPLICATIONS.

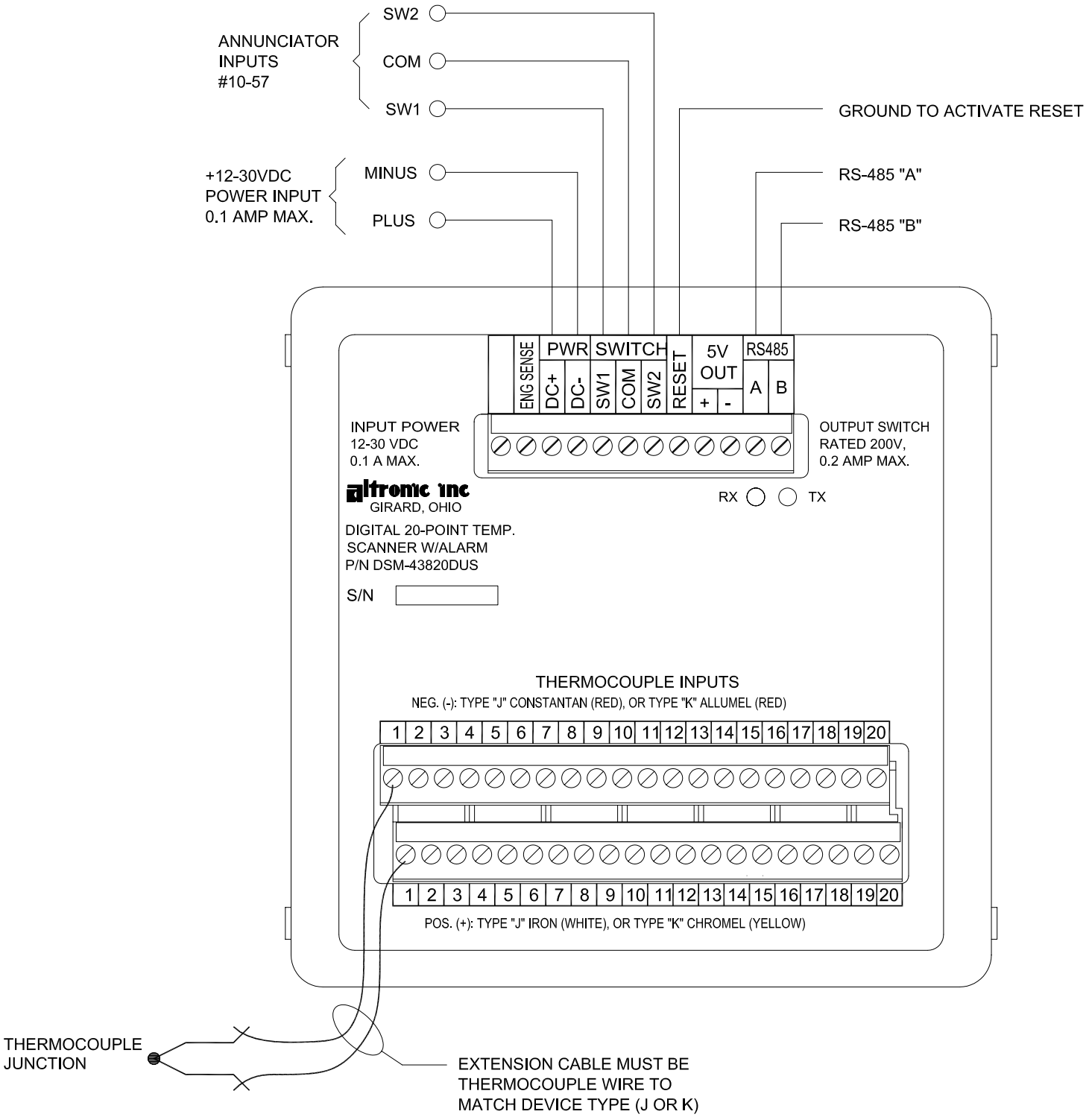


FIG.6 WIRING DIAGRAM - DC RELAY, DSM-43820DUS

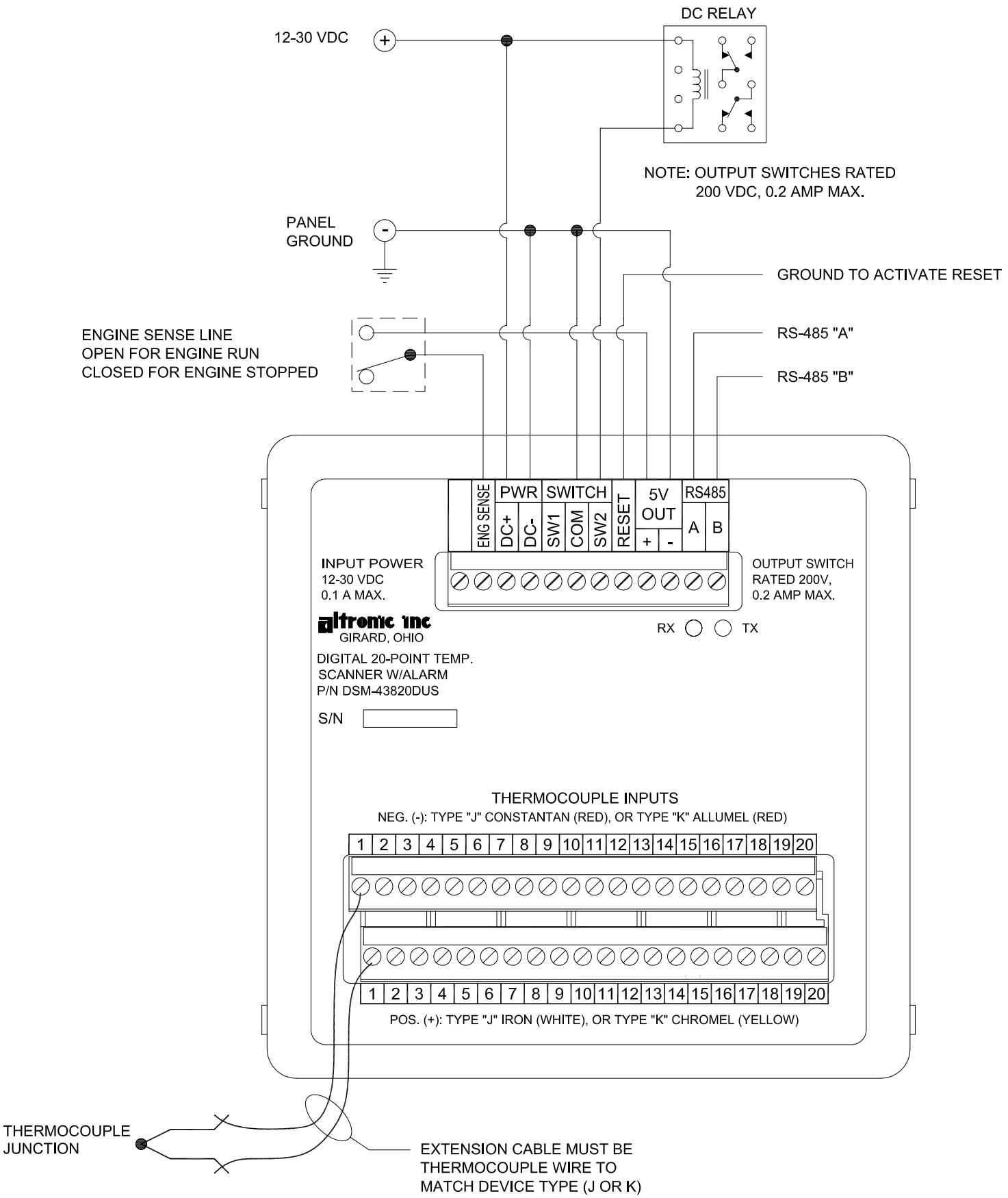


FIG.7 RS-485 COMMUNICATIONS (PC HOOK-UP)

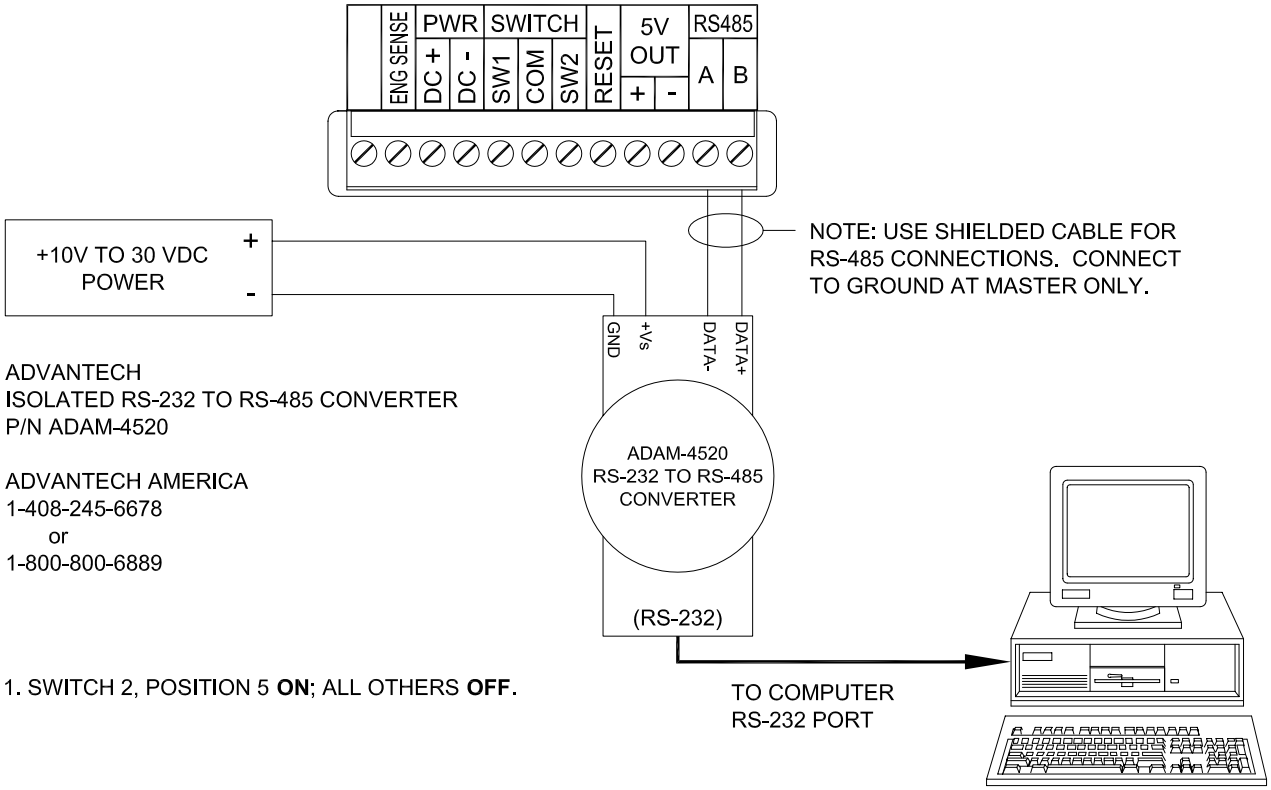
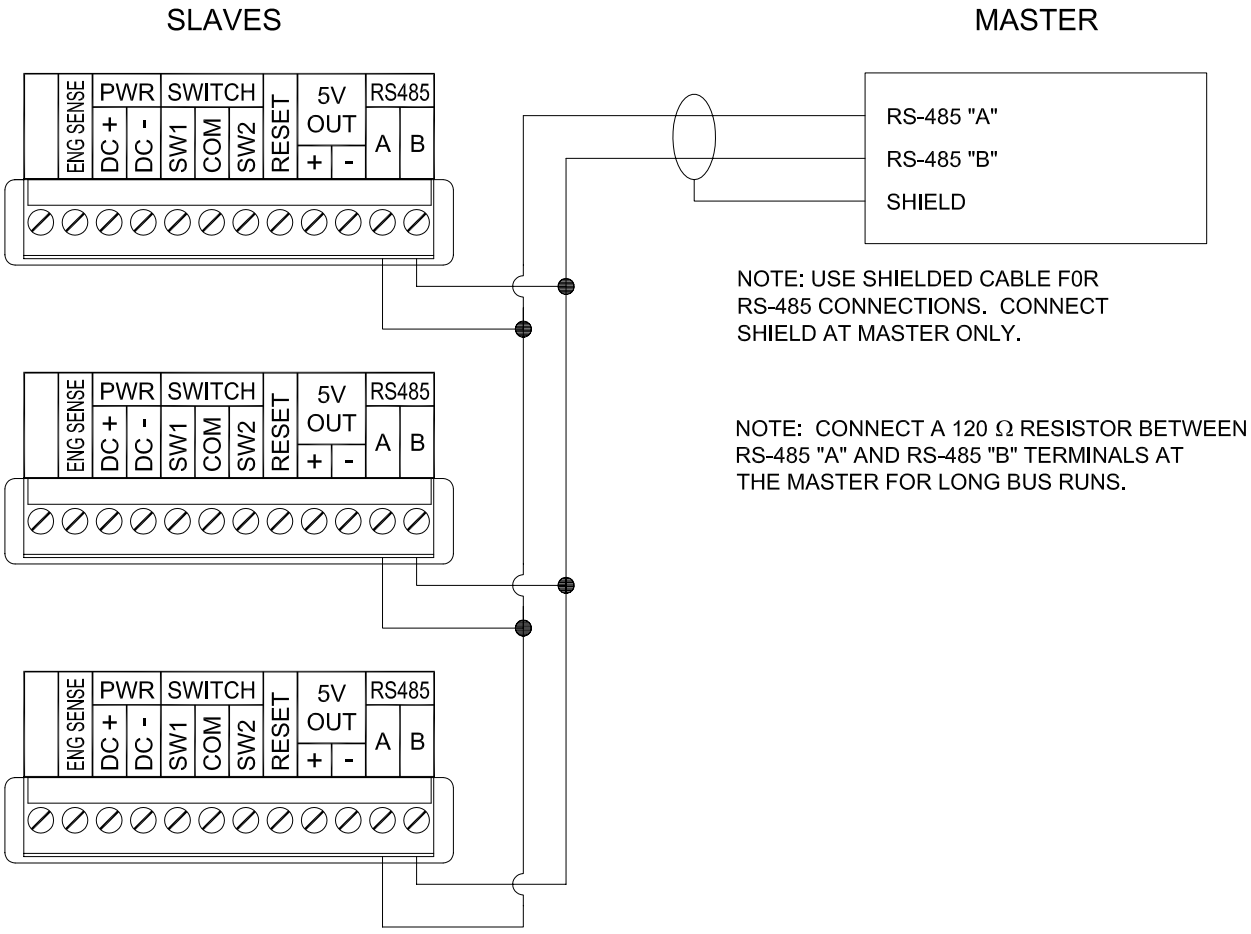


FIG.8 RS-485 COMMUNICATIONS (MULTIPLE SLAVE UNITS)



WIRING DIAGRAM - ENGINE SENSE LINE, DSM-43820DUS

FIG.9 EXTERNAL CONTACT CLOSURE - "DRY CONTACT"

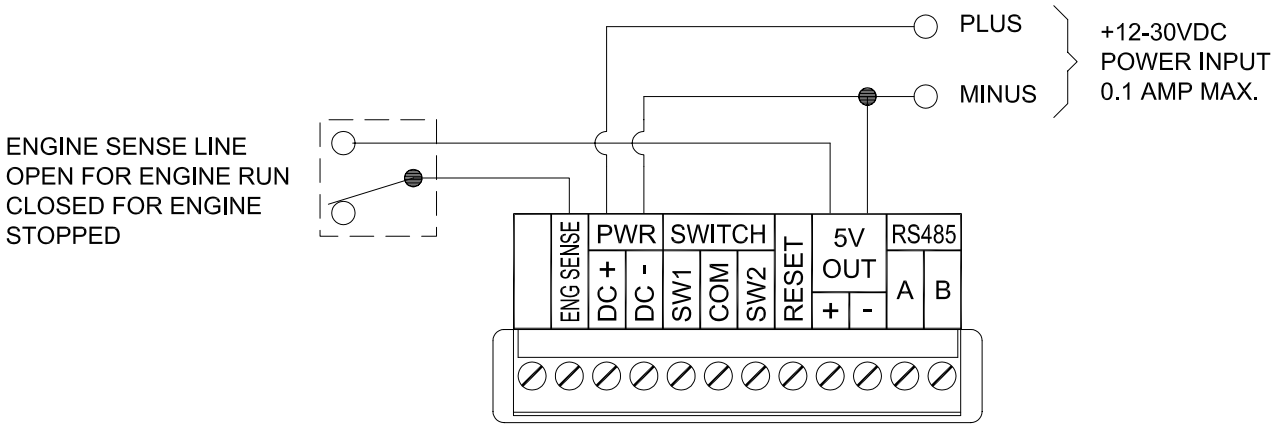


FIG.10 MAGNETIC PICKUP - "PULSED PICKUP"

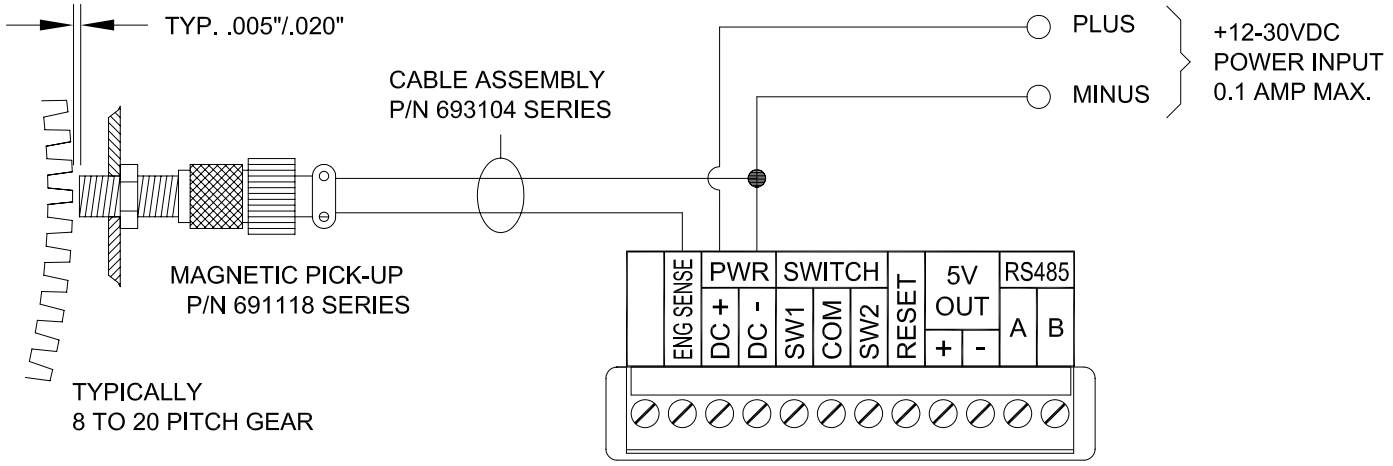
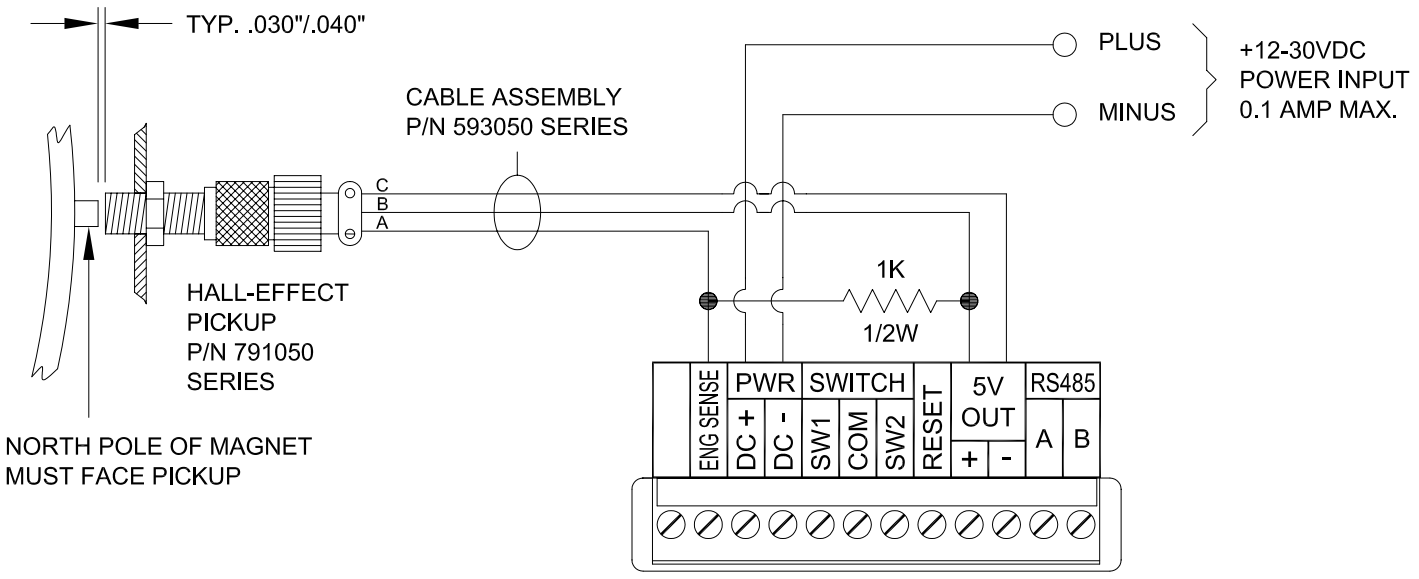


FIG.11 HALL-EFFECT PICKUP - "PULSED PICKUP"

WARNING: NOT TO BE USED FOR INTRINSICALLY SAFE INSTALLATIONS.