ALTRONIC DIGITAL SETPOINT GAUGE
DSG-1401DU/DUP TIMING INDICATOR

INSTALLATION INSTRUCTIONS
FORM DSG1401 II 1-96

CAUTION: The DSG-1401DU and DSG-1401DUP digital setpoint gauges are suitable for use in Class I, Group D, Division 1 and 2 hazardous locations when installed in accordance with these instructions.

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 DSG-1401DU/DUP digital setpoint gauge is a microprocessor-based electronic instrument designed to provide an accurate indication of timing on engines with C.D. ignition systems. Timing range is 180 °BTDC to 180 °ATDC. Two signals are required, one from a magnetic pickup sensing a reference pin on the engine flywheel and the other from the number 1 cylinder ignition coil of a C.D. industrial ignition system. The gauge uses a microcontroller to process the input signals and a nonvolatile memory to store the gauge setup and the setpoint values. A LCD display is used to indicate the numeric timing value, °BTDC or °ATDC indication, state of the output switches, and a bargraph.

1.2 The monitored timing is continuously compared against two adjustable setpoints. Each setpoint can be individually configured as high or low and as normally open or normally closed. In addition, each setpoint can be individually adjusted for a hysteresis value, a trip delay time and a reset delay time. Two other setpoints can be used to sense engine rotation and ignition pulses to the number 1 cylinder ignition coil.

1.3 The Altronic DSG-1401DU/DUP digital setpoint gauge is designed to be simple to use with features such as front panel keypad configuration, a pre-set factory setting, and an escape key for programming mistakes. Although simple to use, the gauge is also very versatile with features such as programmable top-dead-center pin location, a calibration mode that allows timing display adjustment while the engine is running and selectable display resolution. In addition, the LCD display contains a bargraph that can be programmed for bar mode or single bar between two selected points. A programmable software display filter is also incorporated to stabilize readings where the input signal is fluctuating.

1.4 A 4-20 mA current loop output is present on the DSG-1401DUP model. The current loop output can be configured anywhere within the range of the gauge, as well as reverse acting. The current loop is also easily configured through the keypad.

1.5 The power requirement for the DSG-1401DU/DUP gauge is 12 to 36 Vdc, 50 mA max.

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

2.0 SIGNAL INPUT

2.1 The DSG-1401 series gauge requires two signals to process timing, one from a magnetic pickup sensing a reference pin installed in the engine flywheel and the other from the primary of the number 1 cylinder ignition coil of a C.D. industrial ignition system. The operating speed range of the gauge, if suitable input signals are received, is 25 to 2500 RPM.

2.2 NUMBER 1 CYLINDER IGNITION COIL INPUT - The number 1 cylinder ignition coil input is electrically isolated from all other terminals of the instrument including ground. This input is designed to accept a signal from the ignition coil primary of a negative or positive ground C.D. ignition system in the range of 100 to 400 volts. The connection is made to the back of the DSG-1401 gauge at terminals 1 and 2. See wiring diagrams for correct hookup.

2.3 MAGNETIC PICKUP INPUT - The magnetic pickup input is designed to accept one pulse per engine revolution from a magnetic pickup such as the Altronic P/N 691 118-x magnetic pickup series. Minimum signal voltage required from the magnetic pickup at low speeds is 2.2V peak. Connect the 691 118 series magnetic pickup to pins 3(−) and 4(+) of the gauge as shown in the installation drawing.

3.0 MOUNTING

3.1 DSG-1401DU/DUP GAUGE - Mount the gauge 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 gauge with the LCD display facing direct sunlight. The display temperature range is −40 °F to +175 °F (−40 °C to +80 °C).

3.2 MAGNETIC PICKUP 691 118 SERIES - Mount the magnetic pickup securely to a rigid bracket or surface. Set the air gap from the flywheel reference pin to the magnetic pickup to .005"/.020". A smaller gap will allow a timing indication at lowest engine speeds. Be sure the reference pin will not hit the pickup in the complete 360° of rotation. It is important for maximum signal efficiency that the centerline of the rotating pin pass through the centerline of the pickup. See drawing 691 118 for magnetic pickup dimensions.

3.3 REFERENCE PIN - The reference pin is sensed by the magnetic pickup for a top-dead-center reference. Although the gauge uses the reference pin as a top-dead-center point, the reference pin and pickup do not have to line-up with the engine set for top-dead-center of number one cylinder; the gauge can be set up to adjust for any offset. (See section 11.2 for set up instructions). The reference pin can be located on the face or the periphery of the flywheel as long as it passes by the pole piece of the magnetic pickup once per engine revolution. A larger diameter wheel will give better results over a wide speed range. The reference pin should project 1/4" or more from the face of the flywheel. Use a steel (ferrous) #8 or #10 threaded screw, cut off the head and file the end smooth. A steel 1/4"-20 bolt or stud (similar to the reset pin used for the CPU ignition systems) can also be used.

4.0 WIRING (SEE WIRING DIAGRAMS)

4.1 GENERAL - Take care not to damage the insulation and take precautions against damage from vibration, abrasion or liquids in conduits. Also never run low voltage power, current loop, or output switch wires in the same conduit as the ignition wiring or other high energy wiring such as AC line power, etc. Keep wires at least 12 inches away from all high voltage wiring.

4.2 POWER WIRING - Connect the power input wires to terminals 5(−) and 6(+); power requirement is 12 to 36 Vdc. The minus terminal (−) is connected to panel ground which should be the same as engine ground. DO NOT ground this device directly to the ignition system common coil ground.

4.3 SIGNAL INPUT WIRING:

-- NUMBER 1 CYLINDER IGNITION COIL PRIMARY OF A C.D. IGNITION SYSTEM - Connect a wire from the number 1 cylinder ignition coil primary of a C.D. ignition system to the back of the DSG-1401 gauge at terminal 1 for negative ground or 2 for positive ground ignition systems. The ground connection should be made to the other terminal, 2 for negative ground and 1 for positive ground ignition systems, by placing a short ground wire from the ground polarity terminal on the back of the gauge to panel ground which should be the same as engine ground. The back of the gauge is labeled for proper hookup. Use a fine gauge stranded wire such as Altronic 603 102 (black) or 603 103 (white) 24 AWG for connections. DO NOT connect the ground polarity terminal directly to the ignition system common coil ground on the engine.

-- MAGNETIC PICKUP - Connect the two wires from the 691 118 series or similar magnetic pickup to the back of the gauge at terminals 3 (−) and 4 (+) using cable assembly 693 104 series. DO NOT run the magnetic pickup wires in the same conduit as the number 1 cylinder coil primary wire or other high voltage wires.

4.4 OUTPUT SWITCH WIRING - A fault condition will cause the output switches configured for normally-open to turn ON, and the normally-closed switches to turn OFF, with their common. The shelf state (unpowered) is an open condition. Switches 1 and 2 turn on/off with common A; switches 3 and 4 turn on/off with common B. These outputs are solid state, Form A, switches that are isolated from the power supply. The switches are rated at 200 V, 140 mA and employ 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 relay resumes its normal ON characteristics. These outputs may be connected to an Altronic annunciator system or to pilot duty relays as shown in the wiring diagrams.

4.5 OUTPUT CURRENT LOOP WIRING - Model DSG-1401DUP has a 4-20 mA current loop available for the control of Altronic ignition systems, valves, actuators, and other devices commonly used in process control. The current loop output is accessible through terminals 7 (−) and 8 (+) and is internally limited to 20 mA. The output is protected against open and short circuits. A 250 ohm loop resistor can be used over the entire supply voltage range from 12 to 36 Vdc. The maximum load resistance that can be tolerated in the loop is determined by the supply voltage. When using the maximum rated loop resistor of 500 ohms with a desired full scale loop output of 20 mA, the supply voltage must be between 15 and 36 VDC. At 12 VDC supply voltage, the maximum load resistor for 20 mA loop output current is 350 ohms. Refer to the wiring diagrams for typical hookup.

4.6 HAZARDOUS AREA OPERATION - The DSG-1401DU/DUP device is CSA certified for CLASS I, DIVISION 2, GROUP D areas when mounted in a suitable enclosure. The device may be operated as CLASS I, DIVISION 1, GROUP D intrinsically safe, if the following conditions are met:

A. The gauge is powered from a CSA-certified zener barrier rated 30 volts max., 120 ohms min. A suitable barrier is a Stahl part no. 9001/01-280-165-10; follow the installation instructions supplied with the barrier.
B. The number 1 cylinder ignition coil primary input must be connected through an Altronic barrier 690 107 or 690 108; follow the hookup instructions supplied with the barrier.
C. The magnetic pickup input must be from an Altronic p/n 691 118 magnetic pickup.
D. The switch outputs, if used, are connected to the sensor inputs of an Altronic DA or DD annunciator system with a 690 series power supply.
E. The current loop output, if used, is connected to an intrinsically-safe transmitter mounted in a Division 1 area or through a CSA-certified zener barrier rated 30 volts max, 120 ohms min.

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

   1. The intrinsically-safe gauge wires within the panel enclosure must be kept at least two (2) inches away from other wiring.
   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, GROUP D.** **DO NOT DISCONNECT EQUIPMENT IN DIV. 2 ENVIRONMENT UNLESS POWER IS SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.**

5.0 NORMAL OPERATION

5.1 When the DSG-1401 gauge is in the "normal" mode, it displays a numeric timing value, a °BTDC or °ATDC indicator, and a bargraph of the timing position. If a setpoint value is exceeded, its associated output switch turns ON and a display annunciator of 1, 2, 3, or 4 (switch 1, 2, 3, or 4) turns on indicating that switch has tripped. NOTE: The bargraph can be turned off.

6.0 KEYPAD DESCRIPTION

6.1 The DSG-1401 gauge contains a six-key front keypad which is used to view or change the setpoint values, and to configure the gauge. The six front panel keys are MODE, ENTER, SETPTS, ESC, and ▲, ▼ (up and down arrow keys). Only one key should be pressed at a time.

6.2 MODE - The MODE key is used to enter configuration (or setup) mode and to scroll through the gauge setup menu.

6.3 ENTER - The ENTER key is used in the setup mode to proceed through the configuration and to accept the data. It is used in the setpoint mode to accept and save the new setpoint value. At the end of a configuration when a new setup has been entered, press ENTER and the display will read "SAVE", then "donE", and the new data or configuration will be stored in the nonvolatile memory.

6.4 SETPTS - The SETPTS (setpoints) key is used to view or change each setpoints' value. When in the normal mode, press the SETPTS key; the value and annunciator for setpoint no. 1 are displayed. Press the SETPTS key again; the value and annunciator for setpoint no. 2 are displayed. Repeat for setpoints nos. 3 and 4. Press SETPTS key one more time to return to the normal mode.

6.5 ESC - The ESC (escape) key can be used at any time during configuration or setpoint mode 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.

6.6 ▲ ▼ - The up and down arrow keys are used to scroll through the selections in the setup mode and to increase or decrease setup values and setpoints. These keys when held will rapidly increase or decrease display values. Use the ▲ up arrow key to change values towards 180 °BTDC and the ▼ down arrow key to change values towards 180 °ATDC.

7.0 DEFAULT FACTORY SETTINGS

7.1 The DSG-1401 series gauge contains default settings that are available to the user anytime during the life of the gauge. Upon receipt, the gauge is configured to these settings. These settings can be used as a starting point when custom-configuring the gauge as all of the parameters are set to known values.

7.2 SELECTING THE DEFAULT SETTING - From the normal mode, press the MODE key until the display reads "St.UP" and press ENTER and then the MODE key; the display will read "dFLt", press ENTER. All of the configuration parameters will automatically be set to the factory default settings. NOTE: If you do not want to change the gauge configuration at this time, press the ESC key instead of the ENTER key and the gauge configuration will not change.

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

SETPOINT VALUES:	SETPOINT 1 - 20 °BTDC SETPOINT 2 - 30 °ATDC SETPOINT 3 - SPIN SETPOINT 4 - FIRE			
SETUP (OFFSET):	Zero degrees offset (reference pin and pickup line up at number 1 firing cylinder TDC).			
RESOLUTION:	0.1 degrees			
BARGRAPH:	Single bar mode between 45 °BTDC and 45 °ATDC.			
SETPOINT CONFIGURATION:	SETPOINT 1	SETPOINT 2	SETPOINT 3	SETPOINT 4
	LOW	HIGH	OFF	OFF
	N/O	N/O	N/O	N/O
	1.0° hyst	2.0° hyst	NA	NA
	1.0 sec trip	3.0 sec trip	5.0 sec trip	4.0 sec trip
	1.5 sec reset	2.0 sec reset	0.5 sec reset	0.5 sec reset
OUTPUT CURRENT LOOP:	The 4 mA point is set at 45 °BTDC. The 20 mA point is set at 45 °ATDC.			
DISPLAY FILTER:	The display filter is set for 240 out of 255, which provides a moderate amount of dampening.			

8.0 INITIAL OPERATION

8.1 Mount and wire the gauge as described above. Upon power-up all segments on the display will turn on for a display check. The display will then proceed to read "StOP" if there are no signal inputs. The gauge will be set for the reference pin and pickup to line-up at top-dead-center from the factory. With the engine operating, use a known correct timing source (timing light or engine analyzer) to confirm the DSG-1401 reading is correct. If the DSG-1401 does not match the known correct timing source, perform a simple calibration. To change the timing value on the DSG-1401 gauge press the MODE key until the display reads "CAL", then press ENTER. The display will read the current timing value; press the ▲ or ▼ (up or down arrow keys) to increase or decrease the value until the correct timing value is displayed. Press ENTER to accept and save the new correct timing value. NOTE: In performing the calibration procedure just described, the gauge electronically changed the reference pin location to align with the magnetic pickup when number 1 firing cylinder is at top-dead-center. Also the gauge automatically senses for 2 or 4 cycle engines and adjusts the reading accordingly.

9.0 ADJUSTING SETPOINTS

9.1 There are two individually adjustable setpoints which can be set anywhere within the range of the gauge. To view or change the setpoint values, press the SETPTS key, the timing setpoint value and the annunciator "1" (indicating switch 1) will be shown on the display. To change the value, press ▲ or ▼ (the up or down arrow key) to increase or decrease the value until the desired trip point for that switch is reached; press ENTER to accept and save the new value. Follow the same procedure to change the setpoint value of switch 2. Each press of the SETPTS key allows the user to view the next setpoint value. Switches 3 and 4 are factory set to trip when engine rotation is sensed, "SPIn" setpoint 3, and when ignition to the number 1 cylinder is sensed, "FirE" setpoint 4. NOTE: When in the setpoints mode, the previous setpoint values continue to be monitored; the new value is monitored only when the ENTER key is pressed. If no key is pressed for 20 seconds, the display will return to the normal mode and the configuration will revert back to the previous parameters.

10.0 OUTPUT SWITCH EXPLANATION

10.1 OUTPUT SWITCHES 1 AND 2 - Output switches 1 and 2 are active only with the engine rotating with proper input signals and the display reading a valid timing value. When the engine shuts down with either output 1 or 2 tripped, the outputs will remain active only until the reset delay timer times out. To avoid an unused setpoint annunciator 1 or 2 from displaying during normal operation, configure the unused setpoints to HIGH with a setpoint value ATDC well above the maximum operating timing value. Follow the procedure in section 11.6, Setpoint Configuration.

10.2 OUTPUT SWITCHES 3 AND 4 - Output switches 3 and 4 are active with no magnetic pickup signal and no number 1 cylinder signal to the DSG-1401 gauge (when the engine is stopped). When the engine begins to rotate and the DSG-1401 gauge receives a valid magnetic pickup input signal, the display will read "SPIn" and output switch 3 (spin) will turn off after its reset delay timer expires. With the engine continuing to rotate and the DSG-1401 gauge receiving a valid ignition signal from the number 1 ignition coil, the display will indicate the timing value and output switch 4 (fire) will turn off after its reset delay timer expires. When the engine stops and the DSG-1401 gauge ceases to receive both a magnetic pickup signal and a number 1 cylinder input signal the display will read "StOP" and upon expiration of their trip delay timers switches 3 and 4 will turn on. Output switches 3 and 4 wired in series (see wiring diagram) can be used to signal that the engine has stopped. NOTE: With output switches 3 and 4 turned off the display will still indicate spin and stop but annunciators 3 and 4 will not be displayed. To configure switches 3 and 4, see section 11.6, Setpoint Configuration.

NOTE: For troubleshooting purposes, the display will show "no.PU" (no pickup) with the absence of the magnetic pickup signal but with the presence of the number 1 cylinder input signal.

11.0 GAUGE CONFIGURATION

11.1 The following are the headings for each configuration menu of the gauge. Press the MODE key to reach any of these configuration headings from the normal display mode. After a selection has been made and configuration performed, press the ENTER key; the display will read "SAVE/donE". It is at this time that the new data is saved. The ESC (escape) key can be used at any time to abort the configuration mode and return to the normal reading. During configuration, the gauge allows 20 seconds for first level and setpoints and 1 minute for other levels between keystrokes to change or save a new configuration. If the time lapses without a keystroke, the gauge will automatically return to the normal mode without making any changes. The new information is saved only if the ENTER key is pressed and the gauge reads "SAVE/donE". The range of the gauge is 180 °BTDC to 180 °ATDC; use the ▲ up arrow key to increment the timing value towards 180 °BTDC or the ▼ arrow key to adjust the timing value towards 180 °ATDC until the desired timing value is reached. A flowchart is provided that shows step-by-step progression through the gauge configuration procedure.

11.2 SETUP - Setup is used for an initial setup of the gauge when the engine is stopped to tell the gauge where the reference pin is with respect to engine number 1 firing cylinder at top-dead-center. If the reference pin and magnetic pickup line up with the engine number 1 firing cylinder at top-dead-center, the setup value should be zero. If the reference pin and magnetic pickup do not line up with the engine number 1 firing cylinder at top-dead-center, change the setup value to one that corresponds with the number of degrees that the pickup and reference pin differ. This value can also be adjusted once the engine is running by accessing the CAL mode where the actual timing is read and can be adjusted. See section 11.3 below. To change the setup value press the MODE key until the display reads "St.UP", then press ENTER. The display will read the current offset value. Press the ▲ or ▼ arrow keys to increase or decrease the value until the desired offset value is reached. Press ENTER to accept and save the new value. The display will read "SAVE/donE" and the gauge will be set for the new offset value. NOTE: The factory default settings can be accessed from the setup screen by pressing the MODE key, see section 7.2 SELECTING THE DEFAULT SETTING for further description.

11.3 CAL - In CAL (calibration) mode with the engine running, the actual timing is shown on the display and can be adjusted. The reference pin and pickup may not line up when the engine number 1 firing cylinder is at top-dead-center and the setup value may not be accurate. To calibrate the gauge to read the correct timing value, the correct timing value must be known. With the engine operating preferably at full rated speed, use a timing light or other accurate timing source to obtain the correct timing value and compare that value to the gauge. If the timing value needs adjusted, perform the following calibration procedure. To change the timing value in the CAL mode press the MODE key until the display reads "CAL", then press ENTER. The display will read the current dynamic timing value. Press the ▲ or ▼ arrow keys to increase or decrease the value until the desired timing value is reached. Press ENTER to accept and save the new value. The display will read "SAVE/donE" and the gauge will be displaying the new timing value. NOTE: The setpoints and current loop are active in CAL mode.

11.4 RESOLUTION - The display can be set to indicate the timing value in three different resolutions 0.1, 0.5 and 1.0. The DSG-1401 gauge calculates the timing value, setpoints, bargraph and current loop values in tenths of a degree, the resolution function effects the displayed timing value only. When the DSG-1401 gauge is used on ignition systems that are connected to the camshaft where timing may vary because of gear backlash, 1.0 resolution should be selected so that the display will read more consistently. When the DSG-1401 gauge is used with crankshaft referenced CPU ignition type systems, 0.1 resolution may be the best choice. To change the display resolution, press the MODE key until the display reads "rESO" and press ENTER. Use the ▲ or ▼ arrow keys to scroll through the three resolution selections, select the desired resolution and press ENTER to accept and save the change. The display will read "SAVE/donE" and return to the normal mode displaying the timing value in the selected resolution. NOTE: If the actual timing is varying causing the displayed timing value to vary, a larger filter value can be used to help average the readings and steady the display. See section 11.8 to change the filter value.

11.5 BARGRAPH - The bargraph appears across the bottom of the display and can be configured in three different modes. The selections are:

"On IIIIII" Bar mode between two points
"On I I I" Single bar between two points
"OFF" No bargraph displayed

To change the bargraph mode, press the MODE key until the display reads "bAr" and press ENTER. Use the ▲ or ▼ arrow keys to select a bargraph mode. A description of each mode follows:

"On IIIIII" - Bar mode between two points: press ENTER and the display will read "br.LO", indicating the low bar value, press ENTER and the current numeric timing low bar value will be displayed. Use the ▲ or ▼ arrow keys to adjust the low bar value. Press ENTER and the display will read "br.HI", indicating the high bar value, press ENTER and the current numeric timing high value will be displayed; follow the same procedure to adjust this value. Press ENTER to return to the normal display mode with the new bargraph configuration.

"On I I I" - Single bar mode between two points: press ENTER and the display will read "br.LO", indicating the low bar value, press ENTER and the current numeric timing low bar value will be displayed. Use the ▲ or ▼ arrow keys to adjust the low bar value. Press ENTER and the display will read "br.HI", indicating the high bar value, press ENTER and the current numeric timing high value will be displayed; follow the same procedure to adjust this value. Press ENTER to return to the normal display mode with the new bargraph configuration.

"OFF" - No bargraph: press ENTER and the display will return to the normal mode and the bargraph will be off.

11.6 SETPOINT CONFIGURATION - The setpoint configuration allows the user to select output switches 1 and 2 as either a low or high setpoint, normally-open or normally-closed and to set a switch hysteresis value. Setpoint switches 3 and 4 (spin and fire) can be turned on or off and set to normally open or normally closed. In addition a trip delay and reset delay can be set for all four of the setpoints. To change the setpoint configuration, press the MODE key until the display reads "SP.CF", press ENTER and the display will read "SP.1", press the ENTER key to configure output switch 1. Press the MODE key to access the setpoint configuration for switches 2, 3, or 4.

A. LOW OR HIGH, OUTPUT SWITCHES 1 AND 2 ONLY - Switches 1 and 2 can be set to change state on either a low or high value; low values being towards 179.9 °BTDC and high values being towards 179.9 °ATDC. After pressing the enter key the display will read "1-LO" or "1-HI". Use the ▲ or ▼ arrow keys to select and press ENTER.

B. ON OR OFF, OUTPUT SWITCHES 3 AND 4 ONLY - Switches 3 and 4 can be set to either on (active) or off (not active). When switches 3 and 4 are turned off, the output switches and indicators 3 and 4 will not be active although the display will still read "spin" on startup and "stop" with no input signals to the gauge. Under spin and fire press the enter key, the display will read "On" or "OFF". Use the ▲ or ▼ arrow keys to select and press ENTER.

C. NORMALLY-OPEN OR NORMALLY-CLOSED OUTPUT SWITCH - Each individual switch can be set to be either a normally-open or normally-closed output switch. After pressing ENTER the display will read "1-NO" or "1-NC". Use the ▲ or ▼ arrow keys to select and press ENTER.

D. HYSTERESIS, OUTPUT SWITCHES 1 AND 2 ONLY- Hysteresis sometimes is referred to as a deadband value. It is a numeric value that is added to a low setpoint value and subtracted from a high setpoint value before the switch reverts to the normal condition (clears). The hysteresis value range is 0 to 89.9 and is displayed in tenths of a degree. After pressing ENTER, the display will read "HySt". Use the ▲ or ▼ arrow keys to select a hysteresis value and press ENTER.

E. TRIP DELAY TIME - The trip and reset time delays can be used to delay the output switch from immediately tripping upon exceeding a setpoint. These times can be set from 0.25 to 63.50 seconds in 0.25 second increments. The output switch will trip or reset only if the reading exceeds the setpoint value for the entire time period without interruption. After pressing ENTER the display will read "t.dLy" (trip delay time). Press ENTER and the previously set trip delay time will be shown. Use the ▲ or ▼ arrow keys to select a trip delay time and press ENTER.

F. RESET DELAY TIME - The output switch will not reset until the reset time delay is continuously satisfied. After pressing ENTER the display will read "r.dLy" (reset delay time). Press ENTER and the previously set reset delay time will be shown. Use the ▲ or ▼ arrow keys to select a reset delay time. Press ENTER to accept the selected configuration for switch 1, the display will then read "SAVE/donE", and the new configuration will be saved. Repeat the same procedure to configure setpoints 2, 3, and 4.

SETPOINT EXAMPLE: If the setpoint is configured as HIGH, 10.0 °ATDC with a 2.5 second trip delay time, the reading must be above 10.0 °ATDC for the full 2.5 seconds without interruption before the switch will trip. The reset time delay works in a similar manner but with the addition of the hysteresis value. If the same setpoint had a reset time delay of 5 seconds and a hysteresis value of 1.0 degree, the reading would have to be below 9.0 °ATDC for at least 5 seconds before the switch would reset.

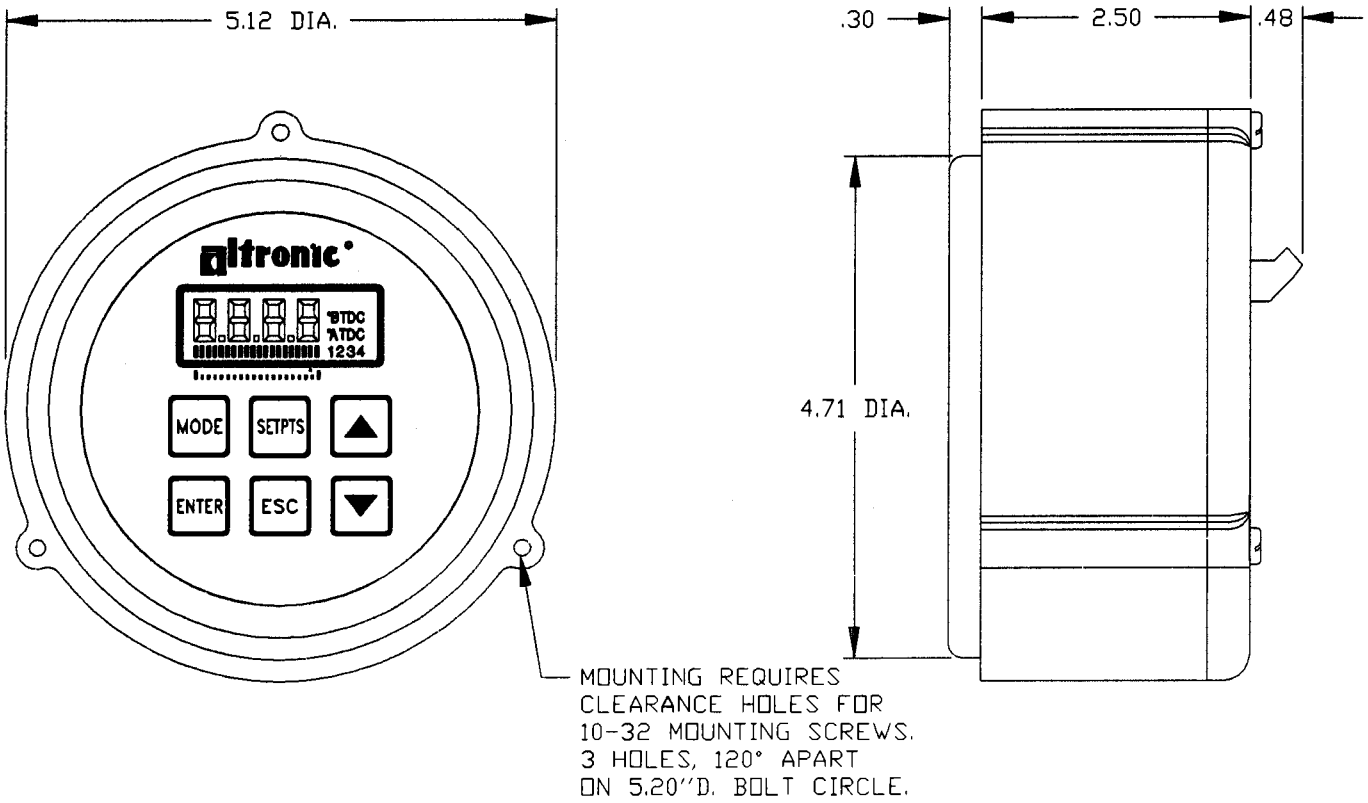
11.7 OUTPUT CURRENT LOOP (DSG-1401DUP ONLY) - The 4-20 mA current loop output allows the user to output a signal proportional to the timing angle being measured and displayed. To configure the current loop, press the MODE key until the display reads "LOOP" and press ENTER. The display will read "LP.LO" (loop low); press ENTER and the timing value for the previously set 4 mA point will be displayed. Use the ▲ or ▼ arrow keys to adjust the numeric value for the 4 mA point. Press ENTER and the display will read "LP.HI" (loop high); press ENTER and the previous timing value for the 20 mA point will be displayed. Again use the ▲ or ▼ arrow keys to adjust the desired 20 mA numeric value. Press ENTER to save the new 4-20 mA configuration and return to the normal reading. NOTE: The 4-20 mA current loop can be configured for reverse action; simply configure the "LP.LO" or low point with the 20 mA value and the "LP.HI" or high point with the 4 mA value.

11.8 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 averaging filter. The filter value is read-out in a number from 1 to 255; 1 being no 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 make a step change of 10 degrees where the display reaches 90% of the new reading. To set the filter value, press the MODE key until the display reads "FILt" and press ENTER. The display will read the previously set filter value. Use the ▲ or ▼ arrow keys to increase or decrease the filter value and press ENTER to save the new value.

FILTER VALUE	1	128	200	210	220	230	240	250	252	253	254	255
SETTLING, SEC.	.33	.50	1.0	2.0	3.0	4.0	5.0	12.0	18.0	20.0	30.0	60.0

FIGURES SECTION:

MOUNTING DIMENSIONS AND SPECIFICATIONS



SPECIFICATIONS:

POWER REQUIRED: 12-36 Vdc 50mA MAX.

SIGNAL INPUTS: NO. 1 CYLINDER IGNITION COIL OF A C.D. IGNITION SYSTEM (100 - 400V) AND A MAGNETIC PICKUP SENSING A FLYWHEEL MOUNTED REFERENCE PIN.

DISPLAY: 0.4" 4 DIGIT LCD WITH DISPLAY INDICATORS AND 20 SEGMENT BARGRAPH.

RANGE: 180 °BTDC TO 180 °ATDC.

DISPLAY RESOLUTION: PROGRAMMABLE TO 0.1, 0.5 OR 1.0.

DISPLAY UPDATE RATE: 3 TIMES PER SECOND WITH PROGRAMMABLE DISPLAY FILTER.

UNITS: °BTDC AND °ATDC.

INSTRUMENT ACCURACY: ±.3%, ±1 UNIT.

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

SETPOINTS: 4 USER PROGRAMMABLE SETPOINTS, 2 SETPOINTS SELECTABLE HIGH OR LOW, NORMALLY OPEN OR NORMALLY CLOSED WITH INDEPENDANT ADJUSTABLE HYSTERESIS VALUE AND PROGRAMMABLE TRIP DELAY AND RESET DELAY TIMES. THE OTHER 2 SETPOINTS INDICATE ENGINE ROTATION AND IGNITION. THESE SETPOINTS CAN BE TURNED ON OR OFF, NORMALLY OPEN OR NORMALLY CLOSED WITH SETTABLE TRIP AND RESET DELAY TIMES.

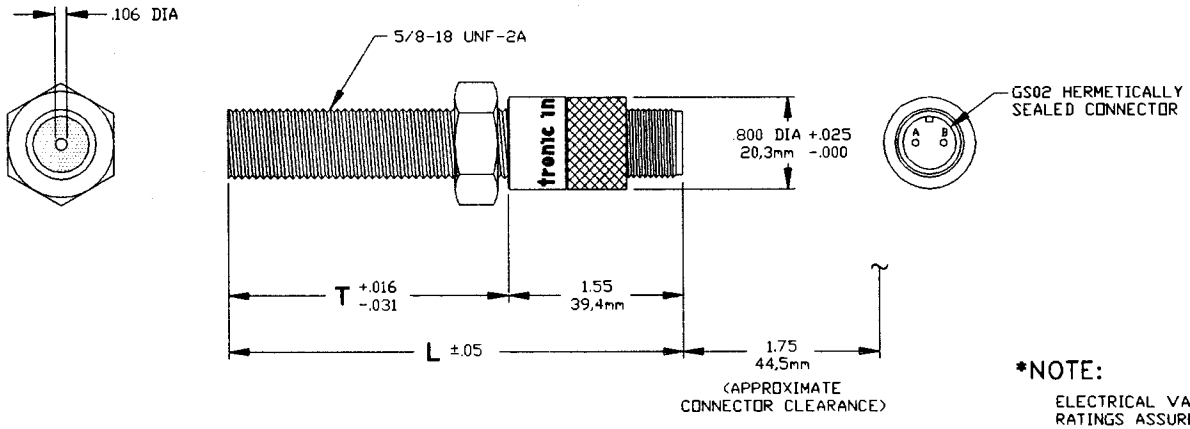
OUTPUT SWITCH RATING: 200 Vdc, 140mA CONTINUOUS.

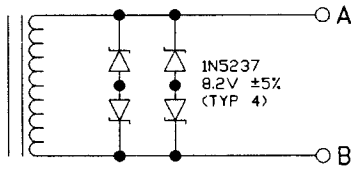
CURRENT LOOP OUTPUT SPAN: 4-20mA USER PROGRAMMABLE, DIRECT OR REVERSE ACTING.

MAXIMUM LOOP RESISTANCE: 500Ω.

LOOP ACCURACY: ±.5% OF SPAN.

HAZARDOUS AREA CLASSIFICATION: CLASS I, GROUP D, DIV. 2 AND CLASS I, GROUP D, DIV. I WHEN INSTALLED IN ACCORDANCE WITH THESE INSTRUCTIONS





*NOTE:

ELECTRICAL VALUES GIVEN ARE ABSOLUTE RATINGS ASSURED 100% BY TEST.

ELECTRICAL DATA *	
MAX. COIL INDUCTANCE	420 mH
MIN. COIL RESISTANCE	900Ω

ALTRONIC P/N	T	L
691 118-1	1.75"/44,5mm	3.30"/83.3mm
691 118-2	2.50"/63,5mm	4.05"/102.8mm
691 118-3	3.0"/76.2mm	4.55"/115.6mm
691 118-4	4.5"/114.3mm	6.05"/153.7mm
691 118-6	6.0"/152.4mm	7.55"/191.8mm

REVISIONS			
NO.	DATE	BY	DESCRIPTION
6	8-7-92	WTP	UPDATED
7			
8			
9			
10			

TOLERANCES (EXCEPT AS NOTED)
DECIMAL .XXX - ±.005 .XX - ±.010
FRACTIONAL
MATERIAL

ALTRONIC INC.

TITLE: MAGNETIC PICKUP SALES DRAWING

DRAWN BY: DWA
CHECKED BY:
APPROVED BY:
SCALE: FULL
DATE: 3-16-81
PART NUMBER: 691 118

691 118

DSG 1401 - CONFIGURATION WORKSHEET

SITE: _____

MODEL# DSG-1401DU___ **SERIAL#** _____ **DATE** _____

SETPOINTS #1 _____ °___ TDC #2 _____ °___ TDC

SETUP _____ °___ TDC (LOCATION OF RESET PIN)

RESO ___ 0.1° ___ 0.5° ___ 1.0°

BAR ___ OFF ___ ON ___ ON

_____ °___ TDC br.LO _____ °___ TDC br.HI

(between bar-LOW, bar-HIGH)

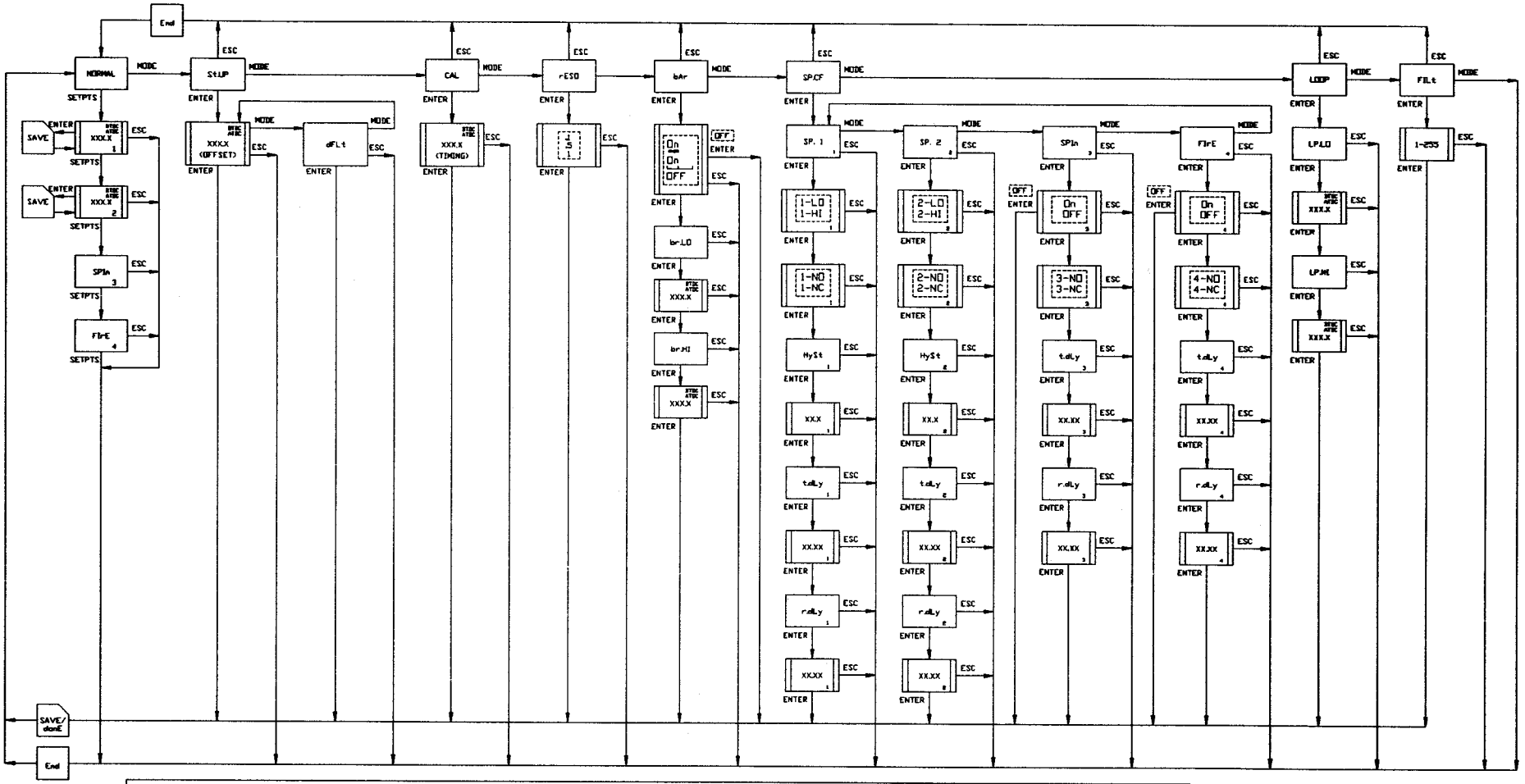
SP.CF

SETPOINT 1	SETPOINT 2	SETPOINT 3	SETPOINT 4
___ LO ___ HI	___ LO ___ HI	___ ON ___ OFF	___ ON ___ OFF
___ NO___ NC	___ NO___ NC	___ NO ___ NC	___ NO ___ NC
_____ HYST	_____ HYST		
_____ t.dLy	_____ t.dLy	_____ t.dLy	_____ t.dLy
_____ r.dLy	_____ r.dLy	_____ r.dLy	_____ r.dLy

LOOP _____ °___ TDC LP.LO (4 mA) _____ °___ TDC LP.HI (20 mA)

FILT _____ (1=min filtering, 255=max filtering, default = 240)

DSG-1401 - FLOWCHART



DEFAULT SETTINGS

FOR DEFAULT SETTINGS, SELECT dFLt UNDER StUP	SETUP	RESOLUTION	BARGRAPH
	0° OFFSET	0.1°	SINGLE BAR BETWEEN 45°BTDC AND 45°ATDC

OUTPUT SWITCH CONFIGURATION

SETPOINT 1 -	20°BTDC.	LOW,	NORMALLY OPEN.	1°HYSTERESIS.	TRIP DELAY 1 SEC.	RESET DELAY 1.5 SEC.
SETPOINT 2 -	30°ATDC.	HIGH.	NORMALLY OPEN.	2°HYSTERESIS.	TRIP DELAY 3 SEC.	RESET DELAY 2.0 SEC.
SETPOINT 3 -	SPIN.	OFF.	NORMALLY OPEN.	N.A.	TRIP DELAY 5 SEC.	RESET DELAY 0.5 SEC.
SETPOINT 4 -	FIRE.	OFF.	NORMALLY OPEN.	N.A.	TRIP DELAY 4 SEC.	RESET DELAY 0.5 SEC.

CURRENT LOOP: 4 mA - 45°BTDC; 20 mA - 45°ATDC

FILTER: 240

FLOWCHART KEY

XXX.X — △ DOUBLE BARS- USE UP AND ▽ DOWN ARROW KEYS TO SCROLL

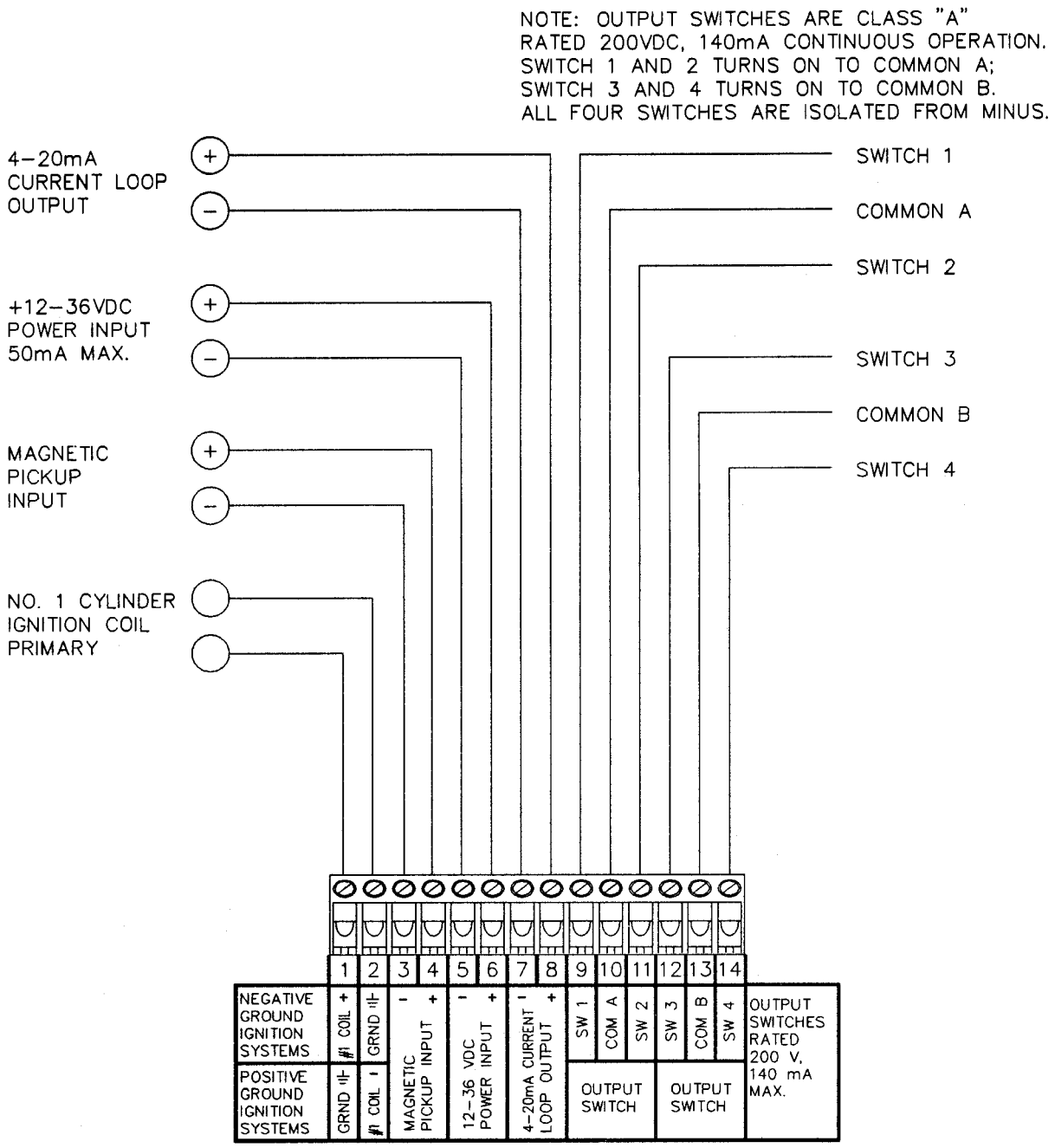
1-NO / 1-NC — DASHED LINES- MAKE A SELECTION

OUTPUT SWITCH DELAY TIME IS IN INCREMENTS OF .25 SECONDS FROM .25 TO 63.50 SECONDS

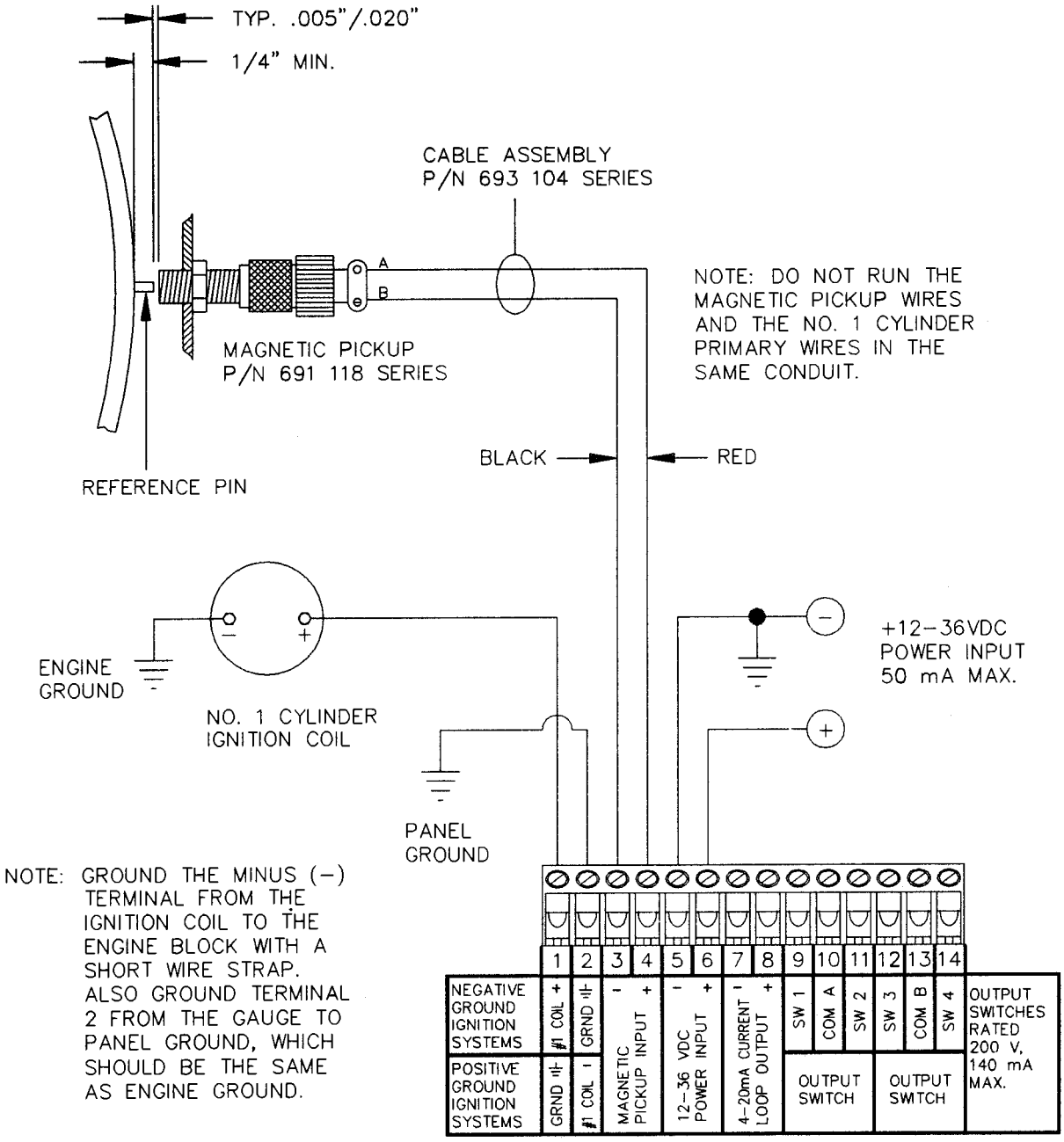
180°BTDC ◄—— △

▽ ——► 180°ATDC

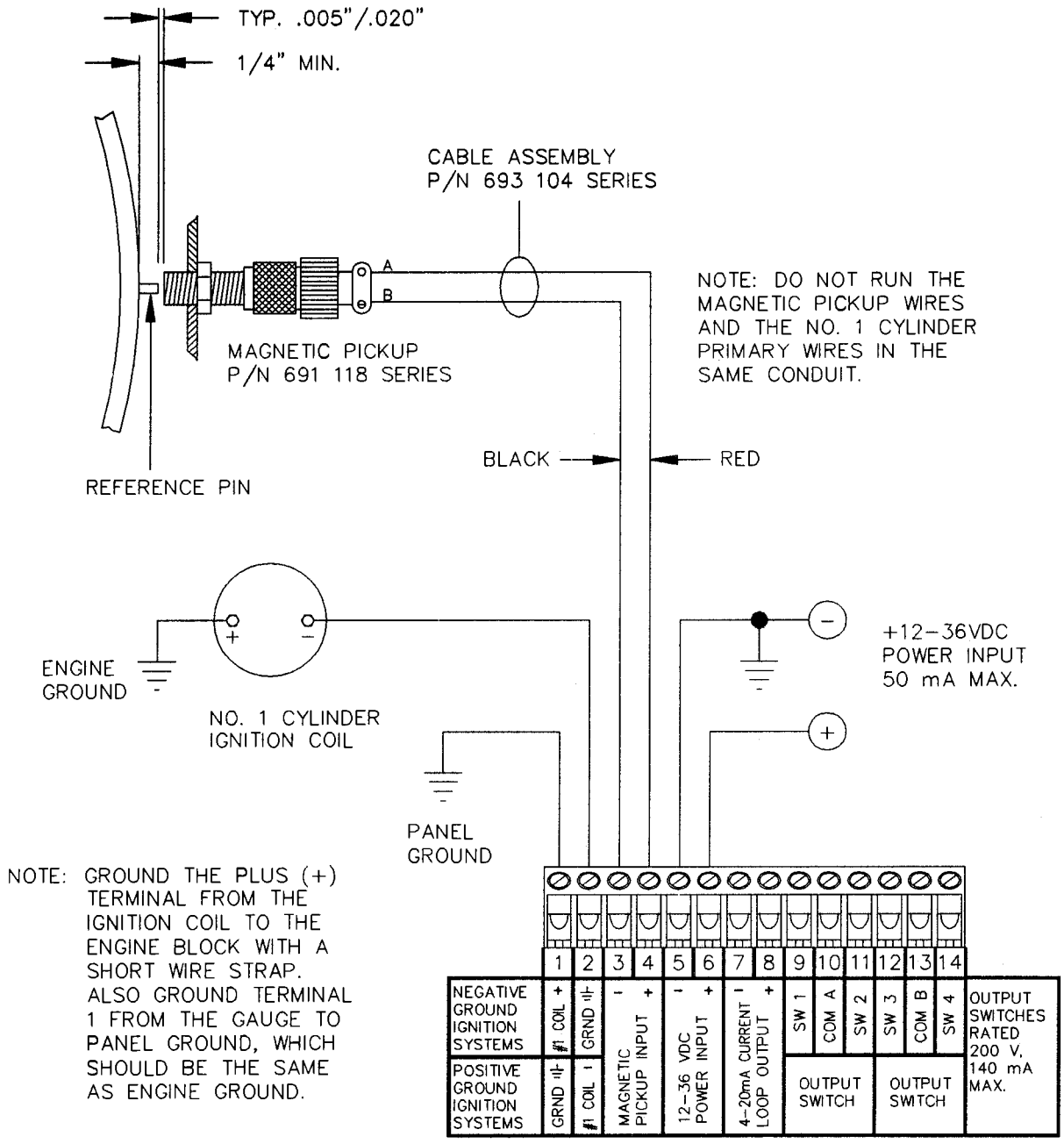
GENERAL ELECTRICAL CONNECTIONS



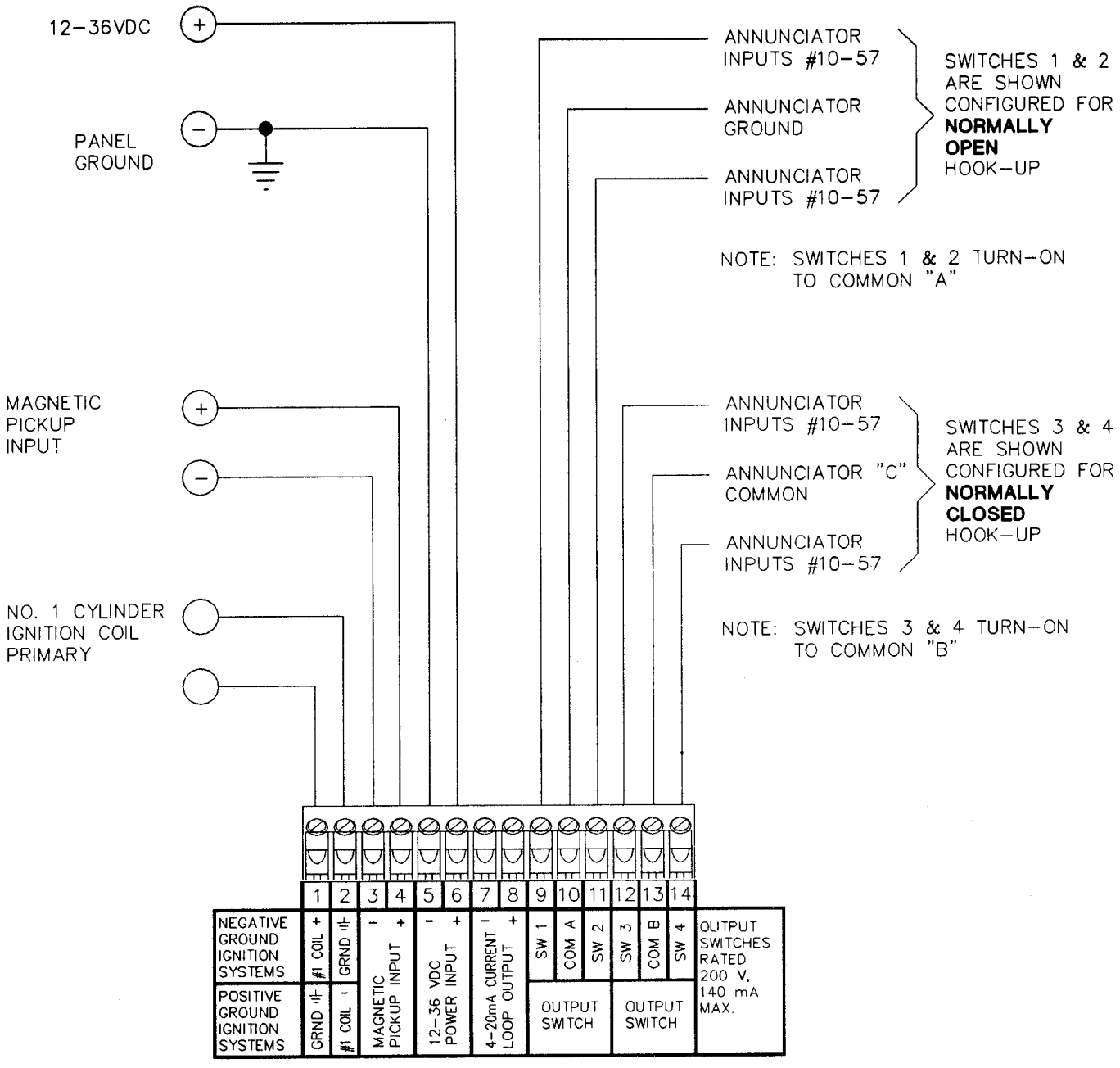
WIRING DIAGRAM – NEGATIVE GROUND IGNITION SYSTEMS



WIRING DIAGRAM – POSITIVE GROUND IGNITION SYSTEMS

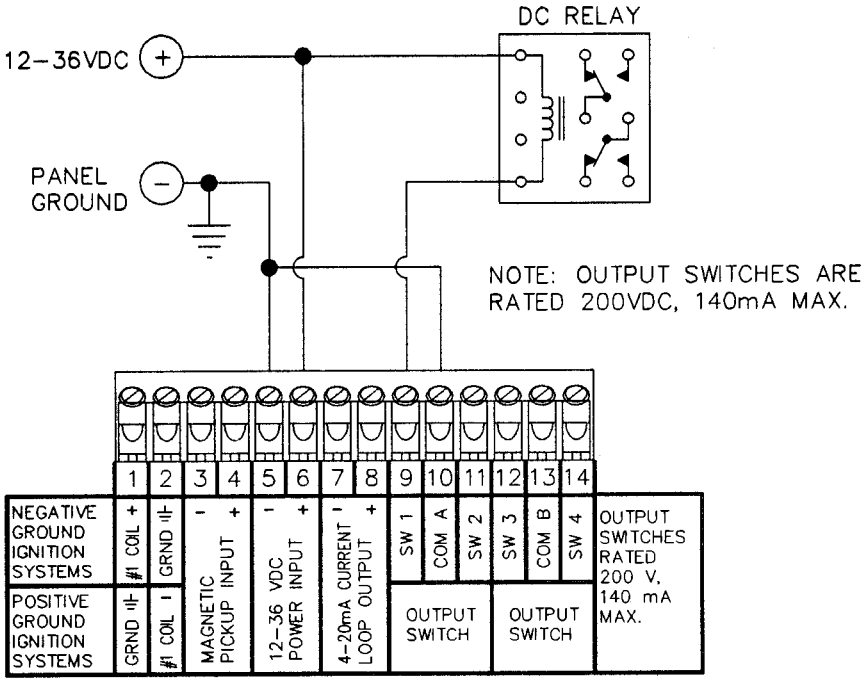


WIRING DIAGRAM
ALTRONIC ANNUNCIATOR SYSTEMS

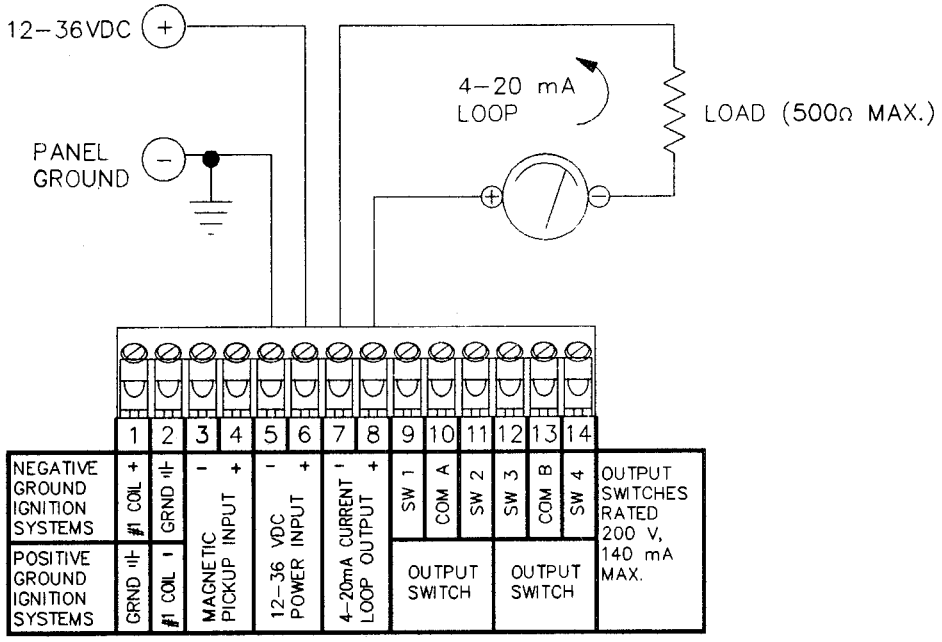


NOTE: FOR INTRINSICALLY SAFE OPERATION, POWER THROUGH A CSA CERTIFIED ZENER BARRIER RATED 30 VOLTS MAX., 120Ω MIN.
THE NO. 1 CYLINDER IGNITION COIL PRIMARY INPUT MUST BE CONNECTED THROUGH AN ALTRONIC BARRIER 690 107 OR 690 108.
FOLLOW THE INSTALLATION INSTRUCTIONS SUPPLIED WITH THE BARRIERS.
THE MAGNETIC PICKUP INPUT MUST BE FROM AN ALTRONIC 691 118 PICKUP.

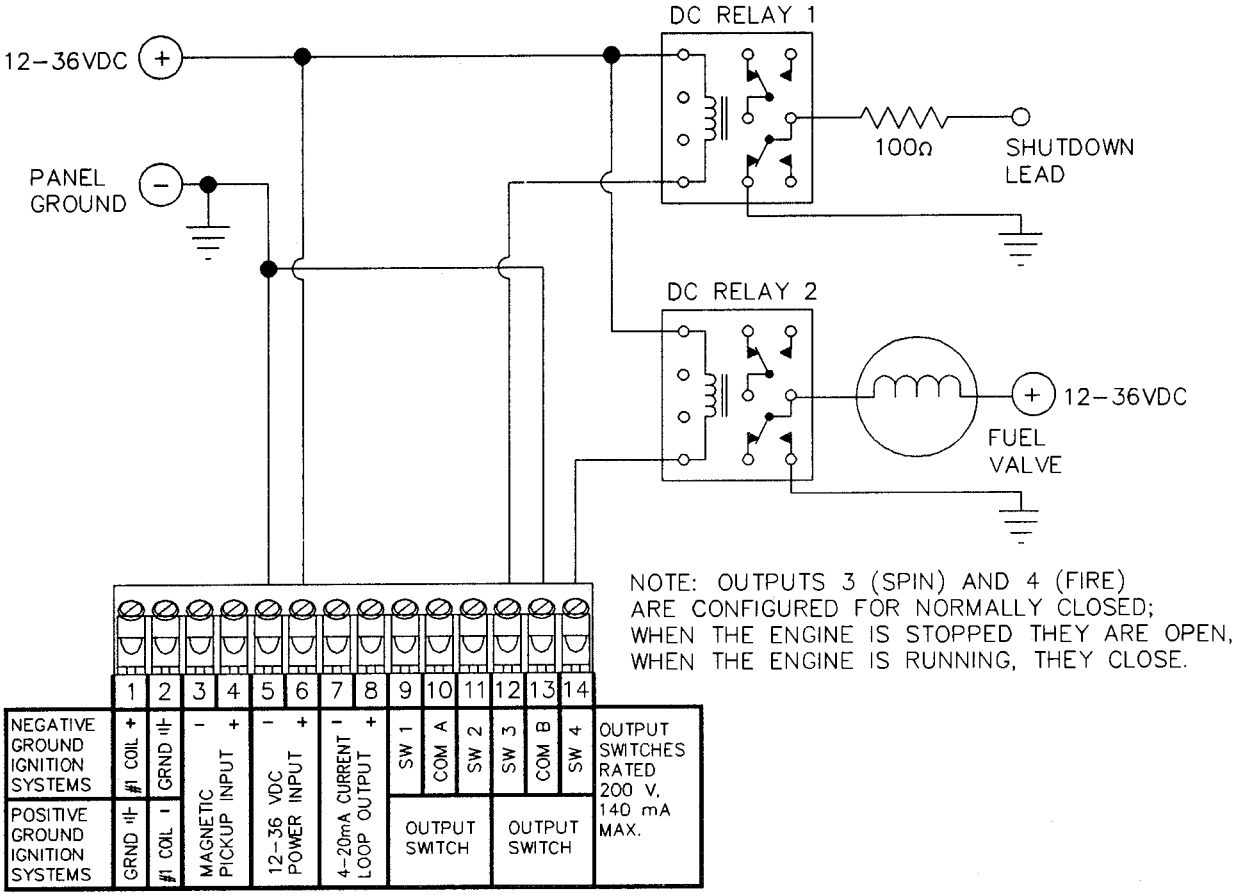
WIRING DIAGRAM – DC RELAY



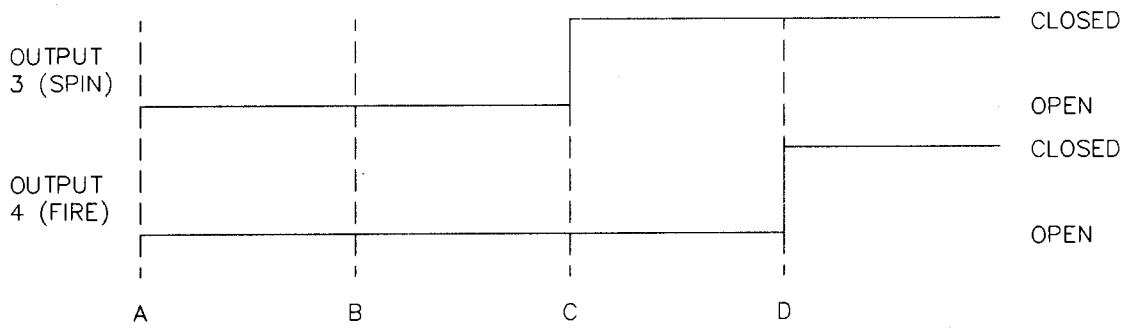
WIRING DIAGRAM – CURRENT LOOP OUTPUT



WIRING DIAGRAM – START–UP SEQUENCE



TIMING DIAGRAM



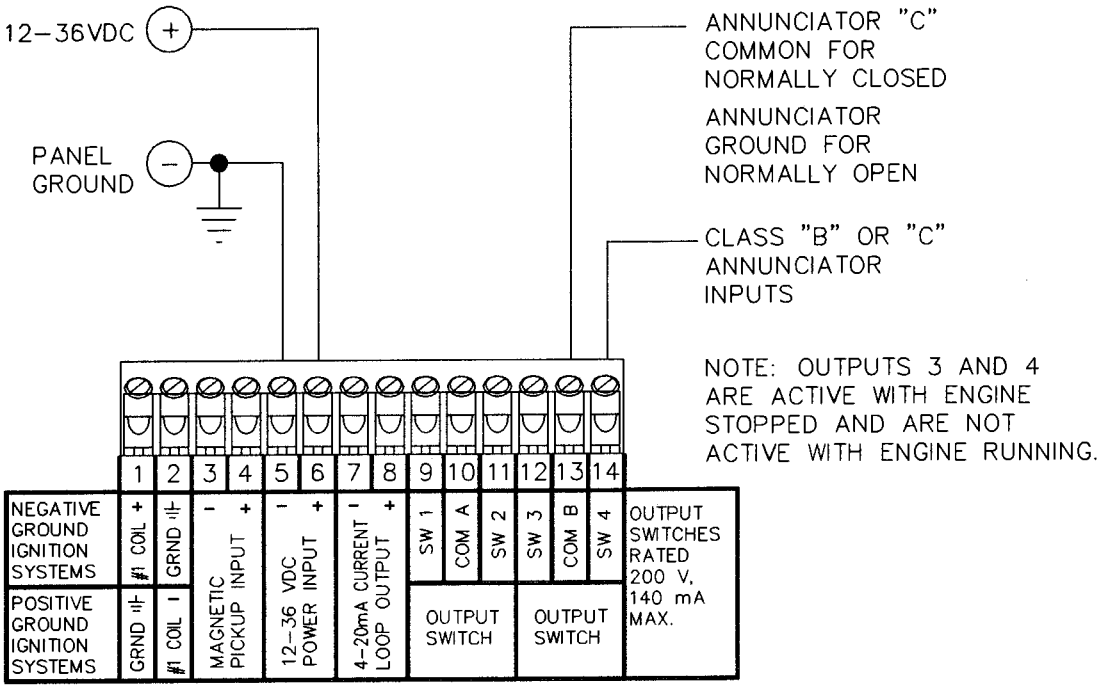
A. ENGINE IS STOPPED.

B. ENGINE BEGINS TO ROTATE. DSG–1401 RECEIVES MAGNETIC PICKUP PULSES. OUTPUT 3'S RESET TIMER STARTS.

C. ENGINE CONTINUES TO ROTATE. OUTPUT 3'S TIMER ENDS AND OUTPUT 3 CLOSES. IGNITION IS UNGROUNDED AND THE DSG–1401 RECEIVES NO. 1 CYLINDER IGNITION PULSES. OUTPUT 4 TIMER STARTS.

D. ENGINE CONTINUES TO ROTATE WITH IGNITION FIRING. OUTPUT 4 TIMER ENDS AND OUTPUT 4 CLOSES, THE FUEL VALVE IS ENERGIZED AND FUEL IS TURNED ON. ENGINE IS RUNNING WITH IGNITION AND FUEL.

WIRING DIAGRAM – LOSS OF IGNITION



WIRING DIAGRAM – LOSS OF ENGINE ROTATION