WARNING: READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLING OR OPERATING THE DD ANNUNCIATOR SYSTEM. AN IMPROPERLY INSTALLED OR OPERATING DEVICE MAY RESULT IN AN UNSAFE OPERATING CONDITION OF THE MONITORED MACHINE WHICH CONSEQUENTLY COULD POSE THE THREAT OF PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

1.0 DESCRIPTION

1.1 The Altronic DD-40NTS digital annunciator is an electronic, 40-point monitor and shutdown device. The annunciator has a built-in hourmeter / tachometer with over speed protection. A front mounted keypad serves as a user interface along with a LCD display.

1.2 The DD-40NTS annunciator system is suitable for use in Class I, Group C or D, Division 2 hazardous locations and consists of the following items:

DD-40NTS-O	Annunciator, 40 normally open points
DD-40NTS-U	Annunciator, 40 normally closed or open points (can be mixed) (requires terminal module part no. 672169-1)
691200-1	Power Supply - 10 to 30 Vdc, 50 mA max. or 100 to 400 volt negative ground CD ignition systems.
693115-1	Cable, DB-25 (2 required for DD-40NTS-U unit only)
693116-1	Cable, DB-9 (for RS-232 serial communications)

1.3 RS-232 / RS-485 serial communications are provided for remote engine monitoring via modem or satellite. Serial communications require the use of the DC power option.

1.4 For reliable operation, the following instructions must be adhered to strictly.

2.0 MOUNTING

2.1 ANNUNCIATOR UNIT - Using four #10 screws, mount the Annunciator Unit 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. The annunciator unit box must be grounded.

NOTE: Avoid mounting with the LCD display facing direct sunlight. The display temperature range is -40°F. to +175°F.

2.2 691200-1 POWER SUPPLY - The Power Supply mounts directly to the back of the Annunciator Unit using two 8-32 x 5/16" length screws provided.

2.3 The terminal strip board (only applicable on the -U version) can be snapped on 32 or 35 mm DIN mounting rails.

3.0 WIRING (SEE WIRING DIAGRAMS)

3.1 The annunciator unit plugs into the power supply through a DB-9 connector.

3.2 The sensor leads connect to the removable terminal strips on the back of the annunciator. These terminal strips match those used with the earlier DD-40NT / DD-20NT systems.

3.3 At the terminal strip of the Annunciator unit, strip the insulation back 3/8"; twist the exposed wires tightly together. Insert the exposed wire end completely into the terminal strip and securely tighten the clamping screw. It is suggested that wire 18 AWG (max.) to 24 AWG (min.) be used for the connections directly to the annunciator terminal strip connector.

3.4 Wires running to the various sensors should be in good condition or replaced with new wiring. Terminations to the main panel terminal strip (if used) should be made with a suitable terminal and crimping tool or by soldering. There is no requirement for explosion-proof conduit or Class I enclosures; however, suitable physical protection should be provided.

CAUTION:

a.) SENSOR WIRING: Sensor wires within the panel enclosure must be kept at least two (2) inches from other wiring. Use a separate junction box for ignition and fuel valve wires. Run sensor leads leaving the panel in a conduit separate from all other wiring and keep separate throughout the installation. Wiring to the sensors must have a grade of insulation capable of withstanding an AC voltage of 500 V. RMS. Sensor leads may be connected to any passive device using contacts such as standard switch gauges or level switches. DO NOT connect sensor leads to relay contacts or to any voltage producing element.

b.) Sensors will be exposed to much lower voltages and current than with the standard Murphy tattletale or similar type system. In the case of a field conversion where sensors have previously been used with Murphy tattletales, it is recommended that the sensors be checked frequently when the DD system is first put into use. Sensor contacts may be burned or pitted from past exposure to ignition system primary voltage. It is advisable to replace such sensors.

c.) If it becomes necessary to check sensor to panel wiring with an ohmmeter or other checker, first DISCONNECT the plug-in terminal strips from the back of the Annunciator Unit. Applying voltage to the annunciator through the sensor leads may damage the device. In addition, the area should be tested as non-hazardous before such testing commences.

3.5 For the -U version, connect the annunciator unit to the 672169-1 terminal modules using 693115-x cables with standard DB-25 connectors. Make sure the cables are securely connected.

WARNING REGARDING OLDER ALTRONIC OVERSPEED DEVICES:

If retrofitting into an older panel, the DD-40NTS annunciator will not recognize the output signal from older Altronic overspeed devices:

DTO-1000, DTO-1010, DTO-2200, DTO-3200

DTHO-2100, DO-3300, PTO-2100, PTHO-2100

These devices will NOT work for overspeed protection in conjunction with a DD-40NTS annunciator. For such protection, use the overspeed feature built into the DD-40NTS annunciator (refer to section 6.3).

4.0 ANNUNCIATOR CONFIGURATION

4.1 The DD-40NTS series unit MUST be configured prior to use. If replacing an older series DD series annunciator, modes 1 and 4 can be used to directly emulate the older system's performance. Mode 1 duplicates the operation of the DD-40 series and mode 4 duplicates the DD-20 series units. To configure the unit, press the MENU key to reach the configuration headings from the normal display mode. After a selection has been made, press the ENTER key to save the selection. Press MENU to move to the next step. A flowchart is provided that shows step-by-step progression through the annunciator configuration procedure.

4.2 CONFIGURE MODE - The mode selection allows the unit to be programmed in one of four modes as shown. The RESET button must be pressed after a change in mode number.

NOTE: A keypad sequence (password) is required to edit values. From the status screen (RPM, HOURS, or STATUS) , press and hold down the ENTER key then press the MENU key at the same time to allow values to be modified. Otherwise, selected items may only be viewed. There is no similar protection for the TIMER button (Class B1 and B2 timers) or hourmeter.

MODE	TYPE OF POINTS	CHANNELS	NOTES
1	24 Class A 16 Class B1	30-37, 40-47, 50-57 10-17, 20-27	Duplicates operation of DD-40NT series.
2	24 Class A 12 Class B1 4 Class B2	30-37, 40-47, 50-57 10-17, 20-23 24-27	
3	24 Class A 10 Class B1 2 Class B2 4 Class C	30-37, 40-47, 50-57 10-17, 20-21 22-23 24-27	
4	12 Class A 8 Class B1	20-27, 30-32, 40 10-17	Duplicates operation of DD-20NT series.

Class Definitions:

Class A Point is always armed.
Class B1 Point is armed B1 time after power-up or pressing the RESET key.
Class B2 Point is armed B2 time after power-up or pressing the RESET key.
Class C Point is armed after it clears.

Use the UP and DOWN keys to select the mode and press the ENTER key to save the mode.

4.3 PROGRAM RPM 1 - This selects the RPM pre-divide number equal to the pulses per revolution (PPR). The RPM signal can be from either a CD ignition shutdown lead or a magnetic pickup. The range is selectable from 0.5 to 360 PPR. Use the UP and DOWN keys to select the proper pre-divide number and press the ENTER key to save.

4.4 PROGRAM RPM 2 - This selects the RPM overspeed value. The range is selectable from 1 to 2499 RPM. Use the UP and DOWN keys to select the overspeed value and press the ENTER key to save the selection. To disable the overspeed function, enter 2500.

4.5 PROGRAM TIMER 2 - This selects the time delay in seconds for tripping SDI and OUTPUT 2 after a fault occurs. The range of the delay is from 1 to 60 seconds. Use the UP and DOWN keys to select the time and press the ENTER key to save the selection. In typical applications, SW 1 is used to turn off the fuel and either SDI or SW2 is used to turn off the ignition.

4.6 PROGRAM SW1 - This selects the RUN state of output SW1, normally open (N.O.) or normally closed (N.C.). Use the UP and DOWN keys to select the state and press ENTER to save.

4.7 PROGRAM SW2 - This selects the RUN state of output SW2, normally open (N.O.) or normally closed (N.C.). Use the UP and DOWN keys to select the state and press ENTER to save.

4.8 PROGRAM SERIAL MODE - This selects the type of communications used by the annunciator. Selections are provided for NONE (must be used for ignition powered applications), RS-232 ASCII (A 232), RS-232 Modbus RTU (232), RS-485 ASCII (A 485), or RS-485 Modbus RTU (485). Use the UP and DOWN keys to select and ENTER to save.

4.9 PROGRAM NODE NUMBER - This selects the node number for the annunciator. The range of the node number is from 01 to 99. Use the UP and DOWN keys to select the node number and press the ENTER key to save the selection. This applies only for serial communications and need not be programmed for non-serial applications.

4.10 PROGRAM HOURS - This selects the pre-programmed number of hours. The range is from 00000 to 65535 hours. Press the UP and DOWN arrow keys to modify the hours, then press the ENTER key to save.

4.11 TIMER KEY - This selects the B1 and B2 timer delays. The range is from 1 to 999 seconds. Pressing the TIMER key once displays the B1 timer, and pressing the TIMER key again displays the B2 timer. Use the UP and DOWN keys to change the respective B timer and press the ENTER key to save the selection.

4.12 DEFAULT SETTINGS - As shipped from the factory, the device default settings are as follows:

MODE	1
RPM1 (PPR)	1
RPM2	200 RPM
TIMER2	5 seconds
SW1	N.O.
SW2	N.O.
SERIAL MODE	None
NODE NUMBER	01
HOURS	00000
B1 TIMER	5 seconds
B2 TIMER	10 seconds

NOTE: Unit must be properly configured for each application prior to use.

5.0 KEYPAD DESCRIPTION / FUNCTION

5.1 MENU - This key allows the user to view / change the following:
1. Mode selection
2. Pulses per revolution
3. Over speed value
4. Output timer 2
5. Node number
6. Programmed hours

5.2 UP ARROW - This key is used to increment / modify selections and allows the user to view either the current RPM, the hourmeter or the annunciator status.

5.3 DOWN ARROW - This key is used to decrement / modify selections and allows the user to view either the current RPM , the hourmeter or the annunciator status.

5.4 ENTER - This key allows for selected items to be saved.

5.5 STOP - This key initiates a shutdown condition and the unit will display a status of [60]. This has precedence over all other functions.

5.6 RESET - This key clears any faults and resets the Class B1 and B2 timers. The annunciator displays [00] if one or more points is not armed. Once all the channels are armed, the display reads [01]. The annunciator will power up in the RESET mode. The unit will not reset the outputs if any of the Class A points are faulted.

5.7 TEST - This key provides for battery and operating voltage tests and also allows inputs to be tested (faulted) without causing a shutdown. The battery in the Power Supply may be checked when the machine is down and the display reads [00]; push and hold the TEST key - a reading of [80] indicates satisfactory battery voltage. The operating voltage may be checked when the machine is operating and the display reads [01]; push and hold the TEST key - a reading of [89] indicates the operating voltage is acceptable. To test the sensor input points, the annunciator must first be displaying [01] meaning all points are armed. Push and release the TEST key, and the display will read [09] indicating the Test Mode. Faulted points will be displayed but will not cause the outputs to trip. Testing an additional point requires the TEST button to be pressed again. The annunciator will remain in test mode for two minutes before reverting back to the running mode [01]. Any point not cleared in two minutes (either by pressing the TEST or RESET key) will cause the outputs to trip.

NOTE: Two fault occurrences will override the TEST mode: manual STOP function [60] and OVERSPEED [70].

5.8 TIMER - This key allows the B1 and B2 delay timers to be viewed or modified.

5.9 KEYPAD SEQUENCE (PASSWORD) PROTECTION - From the status screen (RPM, HOURS, or STATUS) , press and hold the ENTER key, then press the MENU key to allow values to be modified. Otherwise, the selected items may only be viewed. There is no keypad sequence protection for the TIMER button (Class B1 and B2 timers).

5.10 CANCEL TIMERS - From the status screen (RPM, HOURS, or STATUS), depress the ENTER key. While holding the ENTER key, also press the DOWN ARROW key.

6.0 OPERATION

6.1 OPERATING SEQUENCE

MACHINE	DISPLAY	FUNCTION	DESCRIPTION
Down	[10-57]	Shutdown	Shutdown caused by the fault number indicated. Number will remain until fault is corrected and RESET button depressed.
	[60]	Shutdown	Shutdown caused by depressing STOP button.
	[70]	Shutdown	Shutdown caused by overspeed.
	[71]	Shutdown	Shutdown caused by loss of RPM signal.
	[80]	Shutdown	Push TEST button when down, indicates battery is OK.
	[00]	Reset	Before starting machine, momentarily push the RESET button. A display of [00] indicates all Class A sensors are ready for start-up. Any number 10-57 indicates a faulted sensor that must be cleared before start-up.
	[60]	Engine Purge	To purge engine prior to start, depress the STOP button, roll the engine to purge, then push the RESET button. Engine can then be started provided display reads [00].
Running	[00]	Start-up	Start-up timers have Class B1 and B2 points disarmed. All Class A points are being monitored. Pushing the RESET button re-cycles the start-up timers. To cancel the start-up timers, press the ENTER key, followed by the DOWN key while still depressing the ENTER key.
	[01]	Normal	All points are being monitored. The transition from [00] to [01] indicates the end of the last start-up timer interval.
	[89]	Test	From [01] display, press and hold TEST button; indicates adequate operating voltage.
	[09]	Test	Press and release TEST button - a timed test period is initiated for approximately two minutes. As a sensor is faulted, its number is latched on the display (but the output is not activated). To move to the next point, first clear the sensor, then push the TEST button again. The display reverts to [09] until the next sensor is faulted. After the last test, push the TEST button to get [09] on the display; wait two minutes until [01] displays.
	[01]	Normal	Test period has ended; all points are being monitored. **DO NOT LEAVE MACHINE UNLESS DISPLAY READS [01].**

NOTE:

a.) TEST cannot be used until the start-up timer interval ends - [01] on the display.

b.) A display reading of [09] means the system output will not activate unless the STOP button is pushed.

c.) Do not leave a sensor number on the display after the last test; push the TEST button to get [09] on the display; then wait two minutes until [01] displays or select the CANCEL TIMERS feature.

d.) For a complete system test, allow the test timer interval to expire - display changes from [09] to [01]. Then cause one sensor to fault and allow the system output to activate. This will test the entire system for correct operation upon a fault with minimal downtime.

6.2 RPM / HOURMETER - Press the UP and DOWN keys to view the RPM and the hourmeter. The RPM screen remains until the operator chooses another option. The Hours display will revert to the status screen after two minutes. In either case, the annunciator will display the fault number when a shutdown occurs.

6.3 RPM OVERSPEED PROTECTION - The DD-40NTS annunciator has a built in tachometer to monitor engine overspeed. When the detected RPM is greater than the RPM overspeed setpoint, the annunciator will trip the fuel and ignition outputs. When this occurs, the unit will display [70] and activate the "FAULT" indicator. Refer to the Wiring Diagram - Tachometer Input drawings for the proper hookup.

WARNING: The DD-40NTS annunciator will not recognize the output signal from an Altronic DTO-3200 or other older overspeed devices (see listing on page 2). These devices will NOT work for overspeed protection in conjunction with a DD-40NTS annunciator. For such protection, use the overspeed feature built into the DD-40NTS annunciator.

6.4 BATTERY - The 691200-1 Power Supply contains a special long-life lithium battery. When the monitored equipment is not operating, current draw form the battery is only microamps (millionths of amps). When the annunciator is powered, there is no drain from the battery. This allows for a battery life of up to 5 years in normal operation. The battery in the power supply is replaceable; use ONLY Altronic part no. 601952. Be sure to observe the proper polarity as marked in the Power Supply when replacing the battery.

7.0 OUTPUTS

7.1 Two (2) digital outputs SW1 and SW2 are located in the Power Supply. These are rated 400 volts DC, 0.5 amp maximum.

7.2 Output SW1 will trip immediately upon a fault condition or if the STOP key is depressed.

7.3 Outputs SDI and SW2 will trip after a pre-programmed time delay (TIMER PROGM2) from either a fault condition or if the STOP key is depressed.

7.4 For Power Supply 691200-1, the maximum voltage is 400 volts from a negative ground C.D. ignition with a current drain of microamps. The maximum current rating is 50 mA when powered from a DC voltage source of 10 to 30 volts.

8.0 SERIAL COMMUNICATIONS

8.1 Serial communications may be selected as RS-232 or RS-485 using ASCII or Modbus RTU protocol.

8.2 MASTER/SLAVE OPERATION - The RS-485 communication system in the annunciator 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). A simple command / response protocol must be strictly observed.

8.3 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.

8.4 ASCII COMMUNICATION - All communication to and from the annunciator 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.

8.5 COMMUNICATIONS PARAMETERS

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

8.6 COMMAND STRUCTURE - The annunciator operates with a simple command/response protocol to monitor 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.

Communication to the annunciator is performed with two character ASCII command codes. The general format used for the commands is illustrated below using the READ DATA command 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**	**end**
ASCII	>	(	01	R	D	)
HEX	3Eh	28h	30h 31h	20h	52h 44h	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" (30h 31h) - The node number or address of the device being contacted.

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.

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.

End of Text ")" (29h) - The end of text indicator says this is the end of the command.

STANDARD COMMANDS

Information coming serial command(s)	Command	Response	Notes
Annunciator status	>(01 RD)	<(01 XX)	(XX - Refer to section 6.0)
Read hourmeter	>(01 RH)	<(01 XXXXX)	(XXXXX = Hours)
Read current RPM	>(01 RP)	<(01 XXXX)	(XXXX = RPM)
Reset the annunciator	>(01 RR)	<(01 RR)	
Stop the annunciator	>(01 RS)	<(01 RS)	

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 20mS. 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.

An NAK error response will be sent by the annunciator when it has received a command with an error in the message. All commands must be of the format above. 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.

8.7 RS-485 COMMUNICATIONS

A. 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.

B. 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.

C. 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.

D. LOADING - RS-485 uses a balanced differential pair of wires switching from 0 to 5 volts to communicate data. In situations where many units (99 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 annunciator units = (4000) / (ft of wire used)
For 20 AWG wire No. of annunciator units = (3600) / (ft of wire used)
For 22 AWG wire No. of annunciator units = (2400) / (ft of wire used)

NOTE: The maximum number of units connected together in a system is 99.

8.8 RS-232 COMMUNICATIONS

A. For proper operation, the wire length should not exceed 50 feet.
B. Use standard DB-9 connector and computer cable, Altronic no. 693 116-x or equivalent.

8.9 MODBUS STRUCTURE - The annunciator can operate as a Modbus RTU slave. 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.

Select the Modbus communications option. See section 4.8. Communication to the annunciator can then be performed using standard Modbus RTU protocol. Multiple register reads are supported, specify number of registers.

Register	**(16 bit binary register value)**
40001	RPM (0-2500)
40002	Hourmeter hours (0-65535)
40003	Class B1 timer (seconds)
40004	Shutdown Status (0 = OK, 1 = Fault)
40005	Output Status (bit 0 = SW1, bit 1 = SW2, 1 = tripped, 0 = running)
40006	Input (chan. 10-27; bit 0 = 10, bit 8 = 20, bit 15 = 27)
40007	Input (chan. 30-47; bit 0 = 30, bit 8 = 40, bit 15 = 47)
40008	Input (chan. 50-57; bit 0 = 50, bit 7 = 57, bit 8 = ovrspd, bit 9 = loss of spd)
	Input OK = 1, Input Fault = 0; 40006, 40007, 40008 all FF for running OK.

DRAWINGS SECTION:

SALES DRAWING - DD-40NTS-O ANNUNCIATOR SYSTEM

SALES DRAWING - DD-40NTS-U ANNUNCIATOR SYSTEM

INSTALLATION DIAGRAM - DD-40NTS TO 691200-1 POWER SUPPLY

WIRING DIAGRAM - GENERAL HOOK-UP, DD-40NTS-O

WIRING DIAGRAM - GENERAL HOOK-UP, DD-40NTS-U

FLOWCHART - DD-40NTS

WIRING DIAGRAM - CD IGNITION AND CD FUEL VALVE (M50-CD)

WIRING DIAGRAM - DC POWERED FUEL VALVE (M50-B)

WIRING DIAGRAM - DC POWERED FUEL VALVE (M50-FS)

WIRING DIAGRAM - DC POWERED RELAY

WIRING DIAGRAM - TACHOMETER INPUT, IGNITION SHUTDOWN LEAD

WIRING DIAGRAM - TACHOMETER INPUT, PICKUP

WIRING DIAGRAM - REMOTE RESET

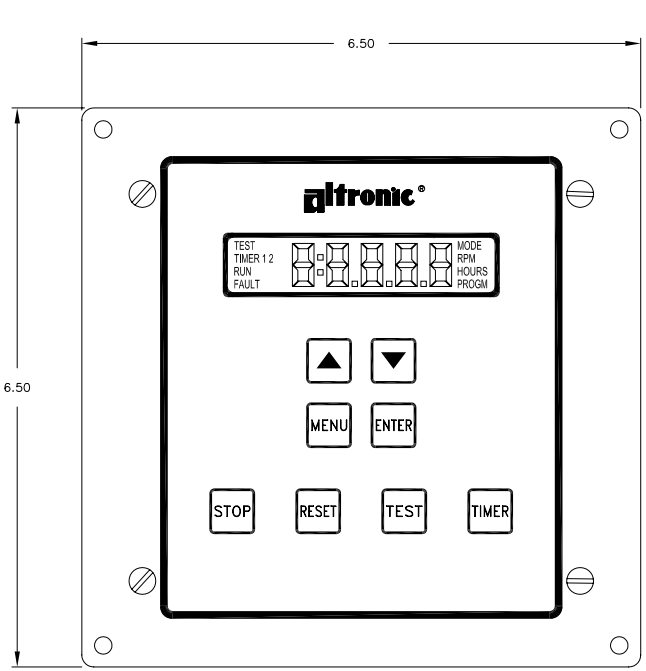
WIRING DIAGRAM - RS-485 COMMUNICATIONS

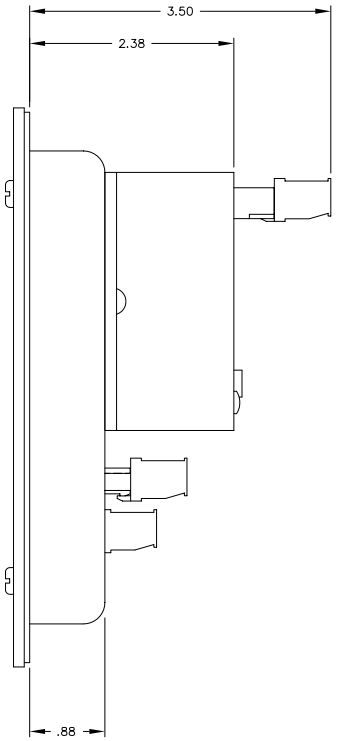
WIRING DIAGRAM - RS-232 COMMUNICATIONS

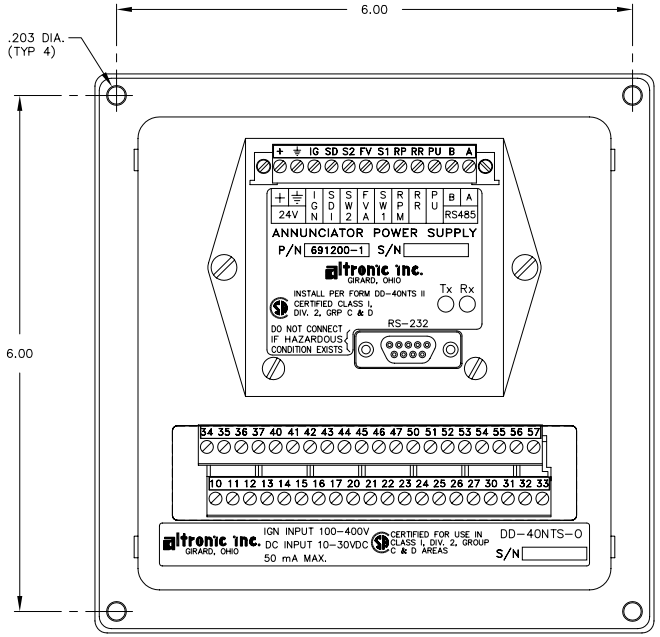
WIRING DIAGRAM - NULL MODEM CABLE

WIRING DIAGRAM - RS-485 COMMUNICATIONS TO EXTERNAL MODEM

WIRING DIAGRAM - RS-232 COMMUNICATIONS TO EXTERNAL MODEM







SPECIFICATIONS:

POWER REQUIRED: DC POWERED 12–24 VDC, 5 WATTS TYPICAL OR CD IGNITION SYSTEM 100 VOLTS MINIMUM.

INPUTS: RPM SIGNAL FROM CD IGNITION OR PICKUP.
40 DISCRETE SWITCH INPUTS NORMALLY OPEN.
4 SELECTABLE OPERATING MODES FOR NUMBER OF CLASS A, B (TWO TIMERS B1, B2) AND C SENSORS.

MODE	A	B1	B2	C
1	24	16	0	0
2	24	12	4	0
3	24	10	2	4
4	12	8	0	0

OUTPUTS: 2 DIGITAL OUTPUTS PROGRAMMABLE N.O. OR N.C.
AUXILIARY TERMINALS FOR CD IGNITION SHUTDOWN AND FUEL VALVE TRIP, PROGRAMMABLE DELAY TIME ON OUTPUT SW2.

FEATURES: INTEGRATED OVERSPEED TACHOMETER AND RUNTIME HOURMETER.

DISPLAY: CUSTOM 5 DIGIT LCD DISPLAY.

SCAN RATE: SCANS ALL 40 DISCRETE SWITCHES 5 TIMES/SECOND.

OPERATING TEMPERATURE RANGE: –40°C TO +80°C (–40°F TO 176°F)

COMMUNICATIONS: RS–232 OR RS–485, CONNECTION ON POWER SUPPLY (DC POWER REQUIRED)

HAZARDOUS AREA CLASSIFICATION: CLASS 1, GROUP C & D, DIV. 2, T4.

REVISIONS			
NO.	DATE	BY	DESCRIPTION
1	4–11–02	WTP	ECN 020015
2			
3			
4			
5			

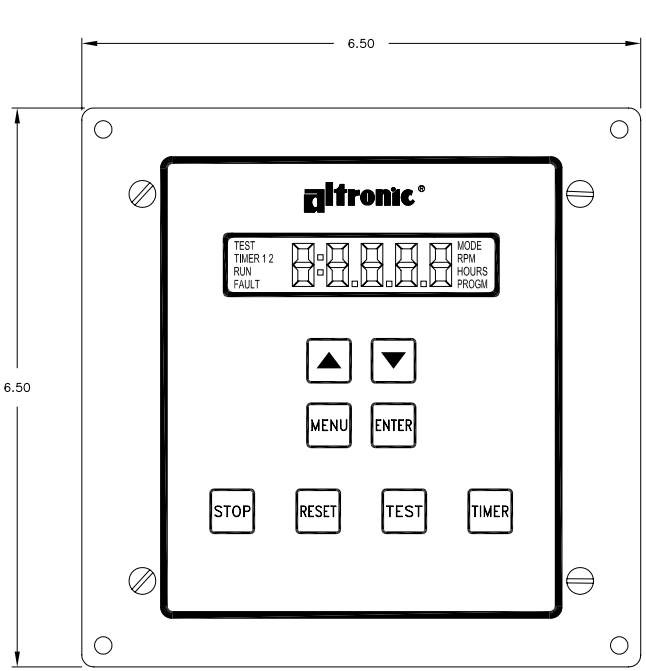
TOLERANCES (EXCEPT AS NOTED)
DECIMAL .XXX – ±.005 .XX – ±.010
FRACTIONAL
MATERIAL

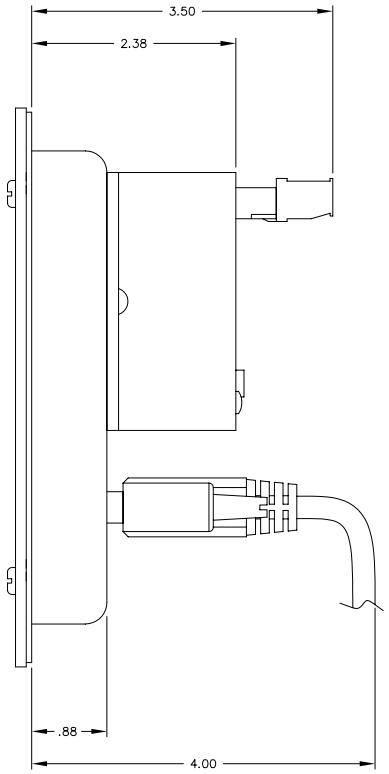
ALTRONIC INC.

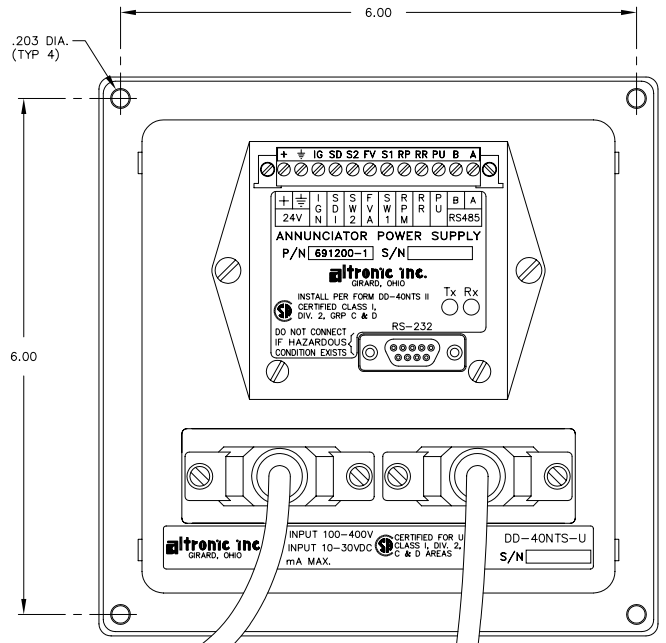
TITLE SALES DRAWING DD–40NTS–O ANNUNCIATOR W/ POWER SUPPLY

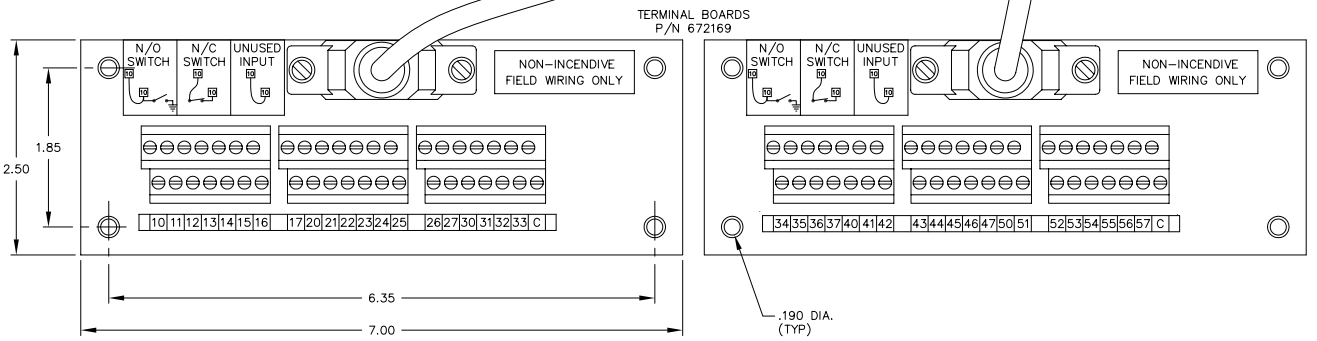
DRAWN BY WTP | SCALE FULL | DRAWING NUMBER
CHECKED BY | DATE 2–12–01 | 699 113
APPROVED BY

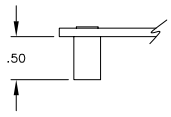
699 113











SPECIFICATIONS:

POWER REQUIRED: DC POWERED 12–24 VDC, 5 WATTS TYPICAL OR CD IGNITION SYSTEM 100 VOLTS MINIMUM.

INPUTS: RPM SIGNAL FROM CD IGNITION OR PICKUP. 40 DISCRETE SWITCH INPUTS EITHER NORMALLY OPEN OR NORMALLY CLOSED. 4 SELECTABLE OPERATING MODES FOR NUMBER OF CLASS A, B (TWO TIMERS B1, B2) AND C SENSORS.

MODE	A	B1	B2	C
1	24	16	0	0
2	24	12	4	0
3	24	10	2	4
4	12	8	0	0

OUTPUTS: 2 DIGITAL OUTPUTS PROGRAMMABLE N.O. OR N.C. AUXILIARY TERMINALS FOR CD IGNITION SHUTDOWN AND FUEL VALVE TRIP, PROGRAMMABLE DELAY TIME ON OUTPUT SW2.

FEATURES: INTEGRATED OVERSPEED TACHOMETER AND RUNTIME HOURMETER.

DISPLAY: CUSTOM 5 DIGIT LCD DISPLAY.

SCAN RATE: SCANS ALL 40 DISCRETE SWITCHES 5 TIMES/SECOND.

OPERATING TEMPERATURE RANGE: –40°C TO +80°C (–40°F TO 176°F)

COMMUNICATIONS: RS–232 OR RS–485, CONNECTION ON POWER SUPPLY (DC POWER REQUIRED)

HAZARDOUS AREA CLASSIFICATION: CLASS 1, GROUP C & D, DIV. 2, T4.

REVISIONS			
NO.	DATE	BY	DESCRIPTION
1	5–25–01	WTP	ECN 010038
2	6–22–01	WTP	ECN 010052
3	4–11–02	WTP	ECN 020015
4			
5			

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

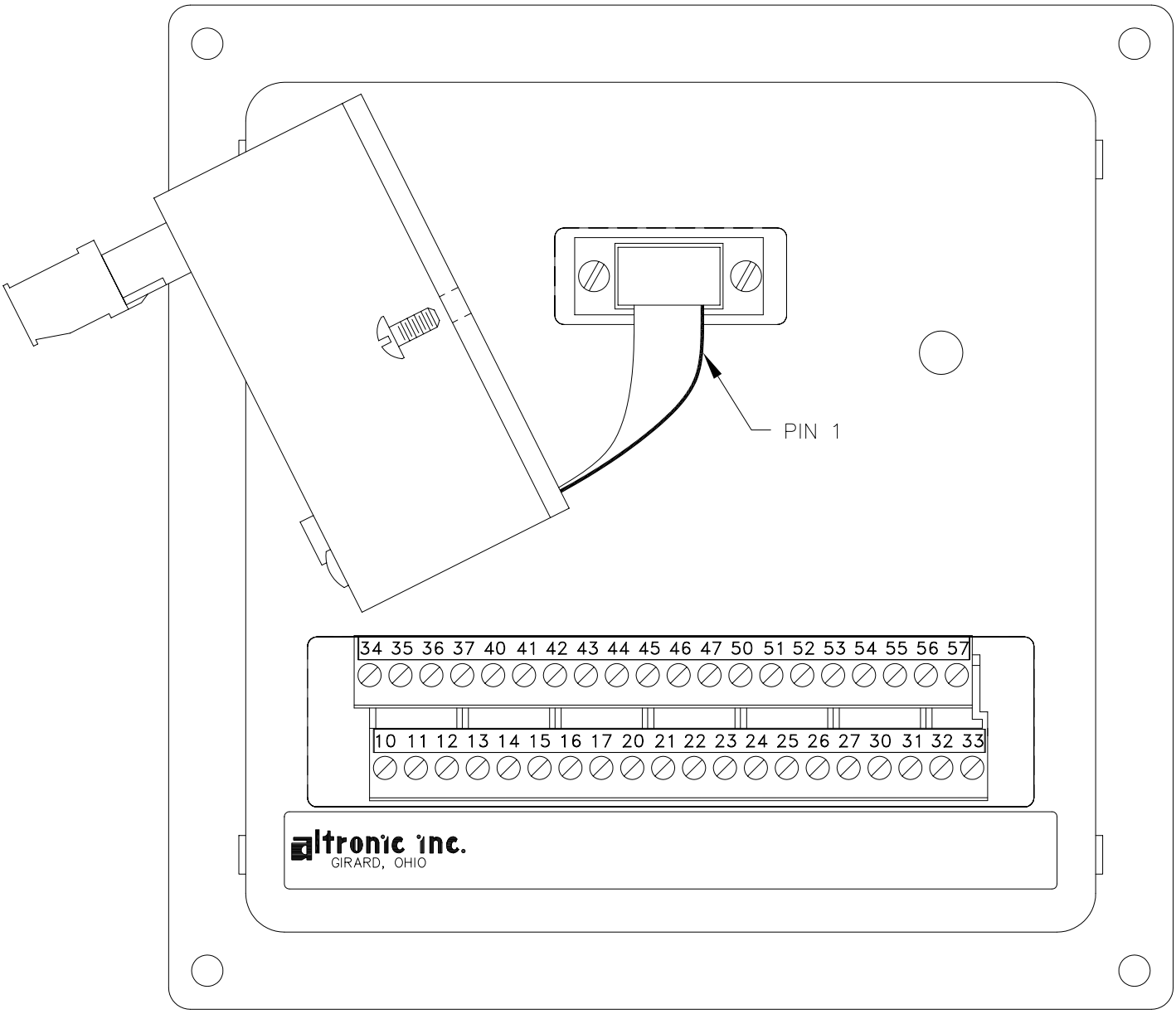
ALTRONIC INC.

TITLE: SALES DRAWING DD–40NTS–U ANNUNCIATOR W/ POWER SUPPLY

DRAWN BY WTP | SCALE FULL | DRAWING NUMBER
CHECKED BY | DATE 2–12–01 | 699 114
APPROVED BY

699 114

INSTALLATION DIAGRAM
DD-40NTS TO 691200-1 POWER SUPPLY

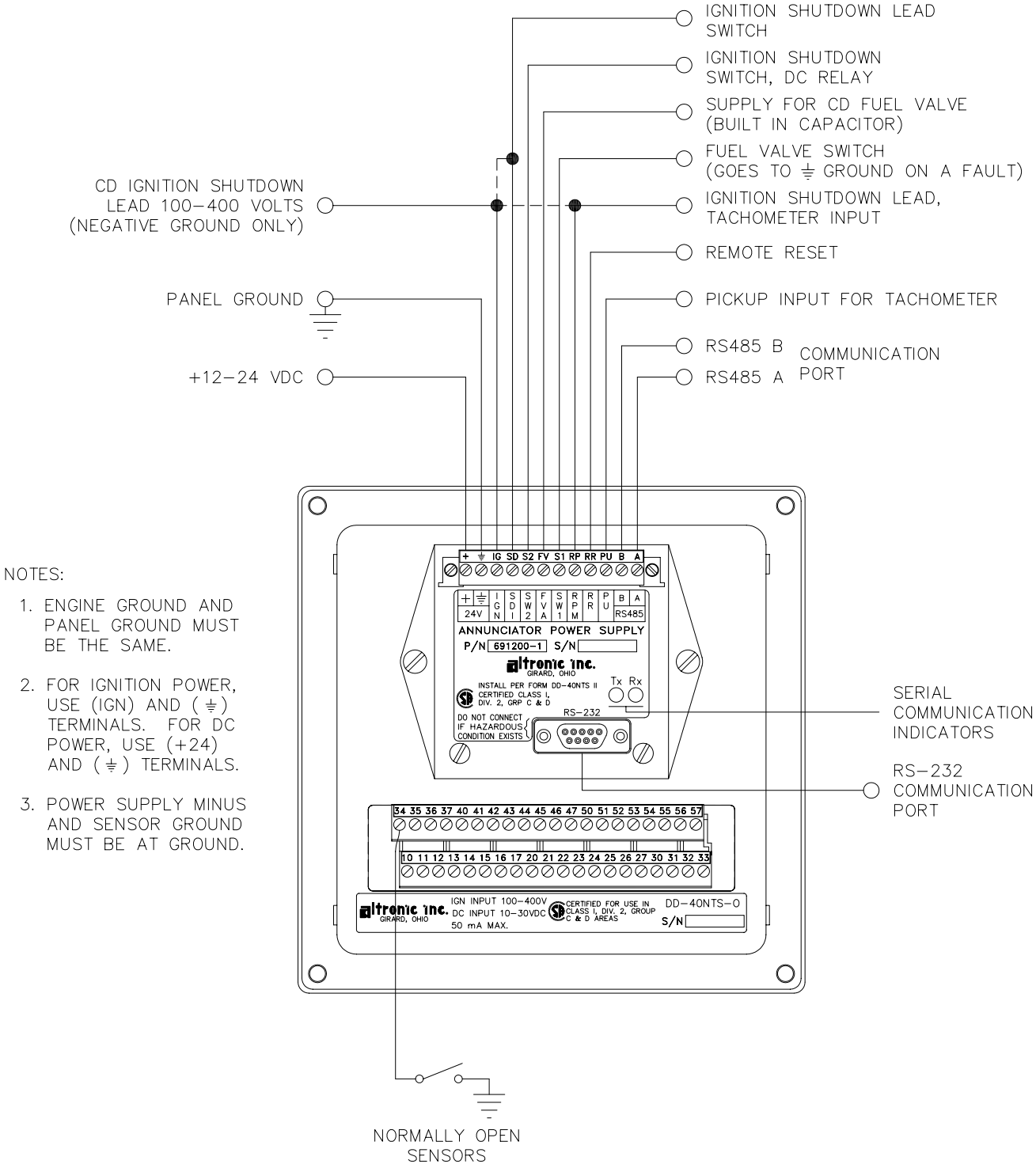


NOTES:

1. PLUG DB-9 CABLE FROM POWER SUPPLY INTO ANNUNCIATOR UNIT. SECURE WITH SCREWS.

2. SECURE POWER SUPPLY TO ANNUNCIATOR UNIT WITH 2 EA. 8-32 X 5/16" SCREWS PROVIDED.

GENERAL HOOK–UP – DD–40NTS–O

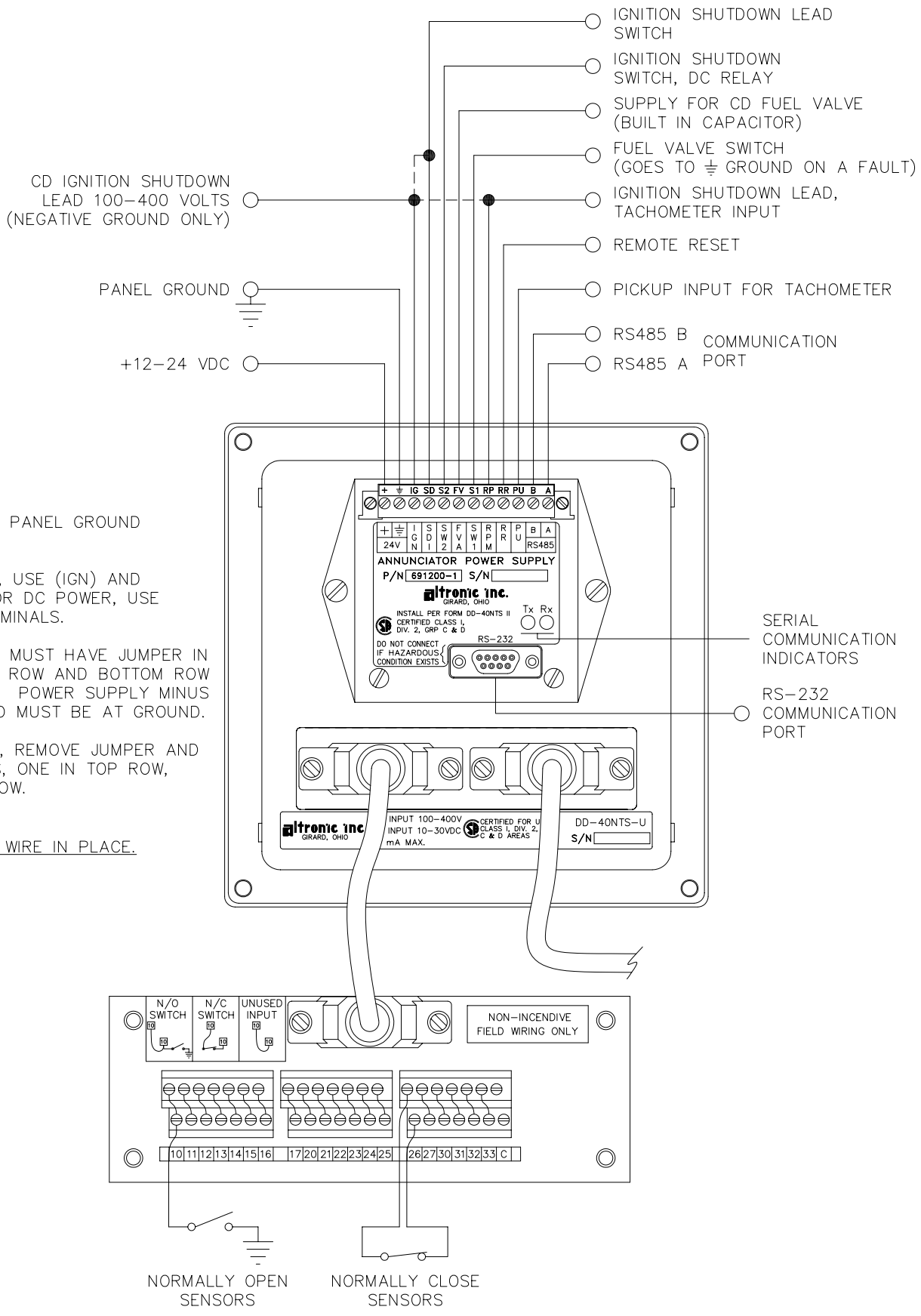


NOTES:

1. ENGINE GROUND AND PANEL GROUND MUST BE THE SAME.
2. FOR IGNITION POWER, USE (IGN) AND (⏚) TERMINALS. FOR DC POWER, USE (+24) AND (⏚) TERMINALS.
3. POWER SUPPLY MINUS AND SENSOR GROUND MUST BE AT GROUND.

WARNING: SENSOR LEADS FROM THE ANNUNCIATOR MUST NOT CONTACT ANY EXTERNAL VOLTAGE SOURCE. DAMAGE TO THE SYSTEM WILL RESULT FROM CONNECTION BETWEEN THE SENSOR LEADS AND THE IGNITION SYSTEM OR ANY AC OR DC POWER SOURCE.

GENERAL HOOK–UP – DD–40NTS–U

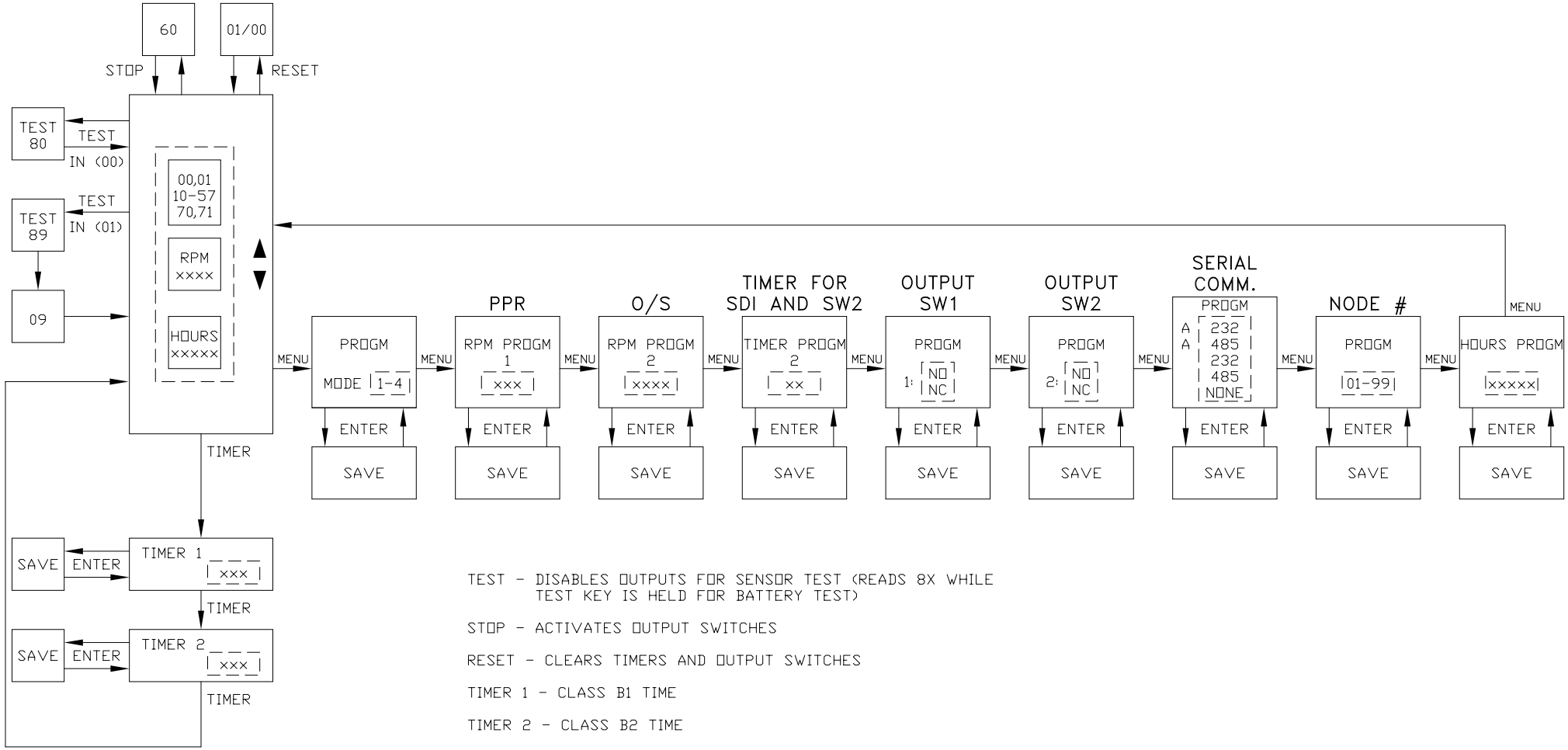


NOTE:

1. ENGINE GROUND AND PANEL GROUND MUST BE THE SAME.
2. FOR IGNITION POWER, USE (IGN) AND (⏚) TERMINALS. FOR DC POWER, USE (+24) AND (⏚) TERMINALS.
3. N.O. SENSOR SWITCH MUST HAVE JUMPER IN PLACE BETWEEN TOP ROW AND BOTTOM ROW OF TERMINAL BLOCK. POWER SUPPLY MINUS AND SENSOR GROUND MUST BE AT GROUND.
4. N.C. SENSOR SWITCH, REMOVE JUMPER AND PLACE SWITCH WIRES, ONE IN TOP ROW, OTHER IN BOTTOM ROW.
5. ALL UNUSED INPUTS MUST HAVE JUMPER WIRE IN PLACE.

WARNING: SENSOR LEADS FROM THE ANNUNCIATOR MUST NOT CONTACT ANY EXTERNAL VOLTAGE SOURCE. DAMAGE TO THE SYSTEM WILL RESULT FROM CONNECTION BETWEEN THE SENSOR LEADS AND THE IGNITION SYSTEM OR ANY AC OR DC POWER SOURCE.

DD-40NTS-O/U FLOWCHART



TEST - DISABLES OUTPUTS FOR SENSOR TEST (READS 8X WHILE TEST KEY IS HELD FOR BATTERY TEST)

STOP - ACTIVATES OUTPUT SWITCHES

RESET - CLEARS TIMERS AND OUTPUT SWITCHES

TIMER 1 - CLASS B1 TIME

TIMER 2 - CLASS B2 TIME

PROGM MODE - SELECTION FOR INPUTS (SEE SECTION 4.0)

RPM PROGM 1 - PPR (PULSES PER REVOLUTION)

RPM PROGM 2 - RPM OVERSPEED

TIMER PROGM 2 - TIME DELAY FOR SDI AND OUTPUT SWITCH 2

OUTPUT SW1 - CONFIGURES OUTPUT SWITCH 1 FOR NORMALLY OPEN OR NORMALLY CLOSED CONTACTS

OUTPUT SW2 - CONFIGURES OUTPUT SWITCH 2 FOR NORMALLY OPEN OR NORMALLY CLOSED CONTACTS

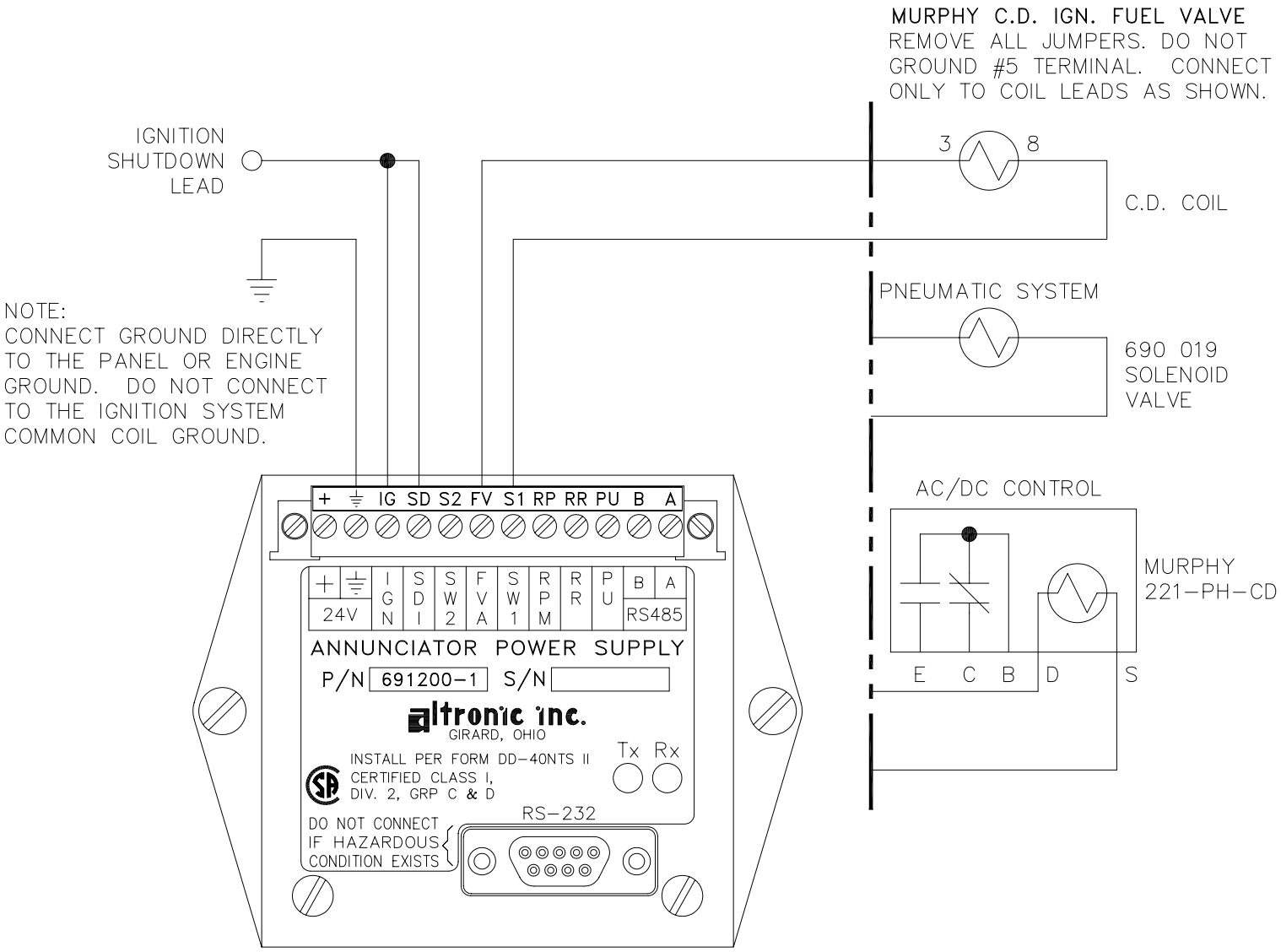
PROGM: A 232 OR A 485 ⇒ ASCII SERIAL COMMUNICATIONS
232 OR 485 ⇒ MOD BUS RTU SERIAL COMMUNICATIONS
NONE ⇒ PICK FOR IGNITION POWERED, NO SERIAL COMMUNICATIONS

PROGM - NODE NUMBER (NOT REQUIRED FOR NON-SERIAL APPLICATIONS)

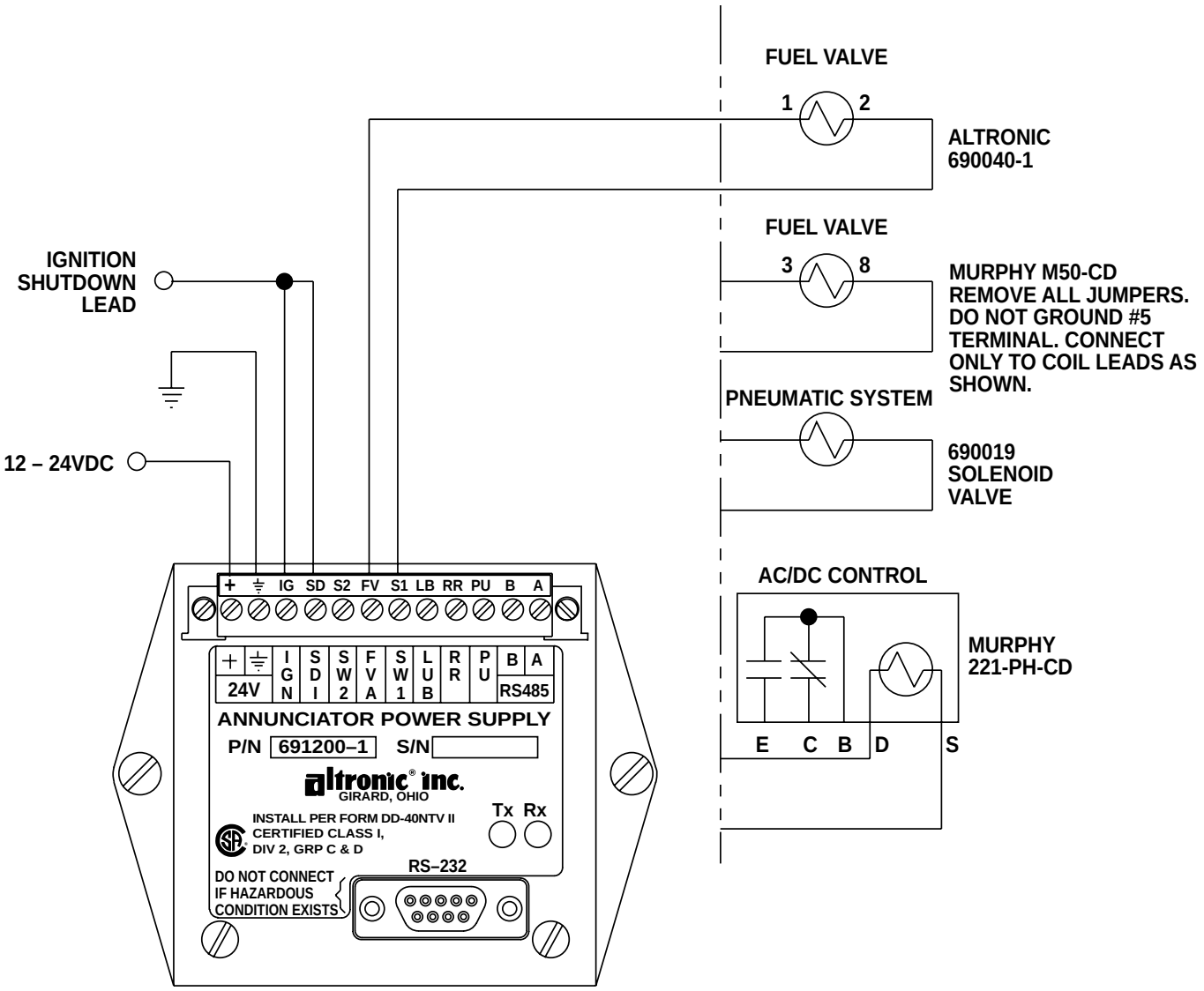
HOURS - RESET OR PRESET HOURS

NOTE: DASHED LINES, USE ▲ OR ▼ ARROW KEYS TO CHANGE.

WIRING DIAGRAM – CD IGNITION AND CD FUEL VALVE (M50–CD)



WIRING DIAGRAM: DC-POWERED AND CD FUEL VALVE



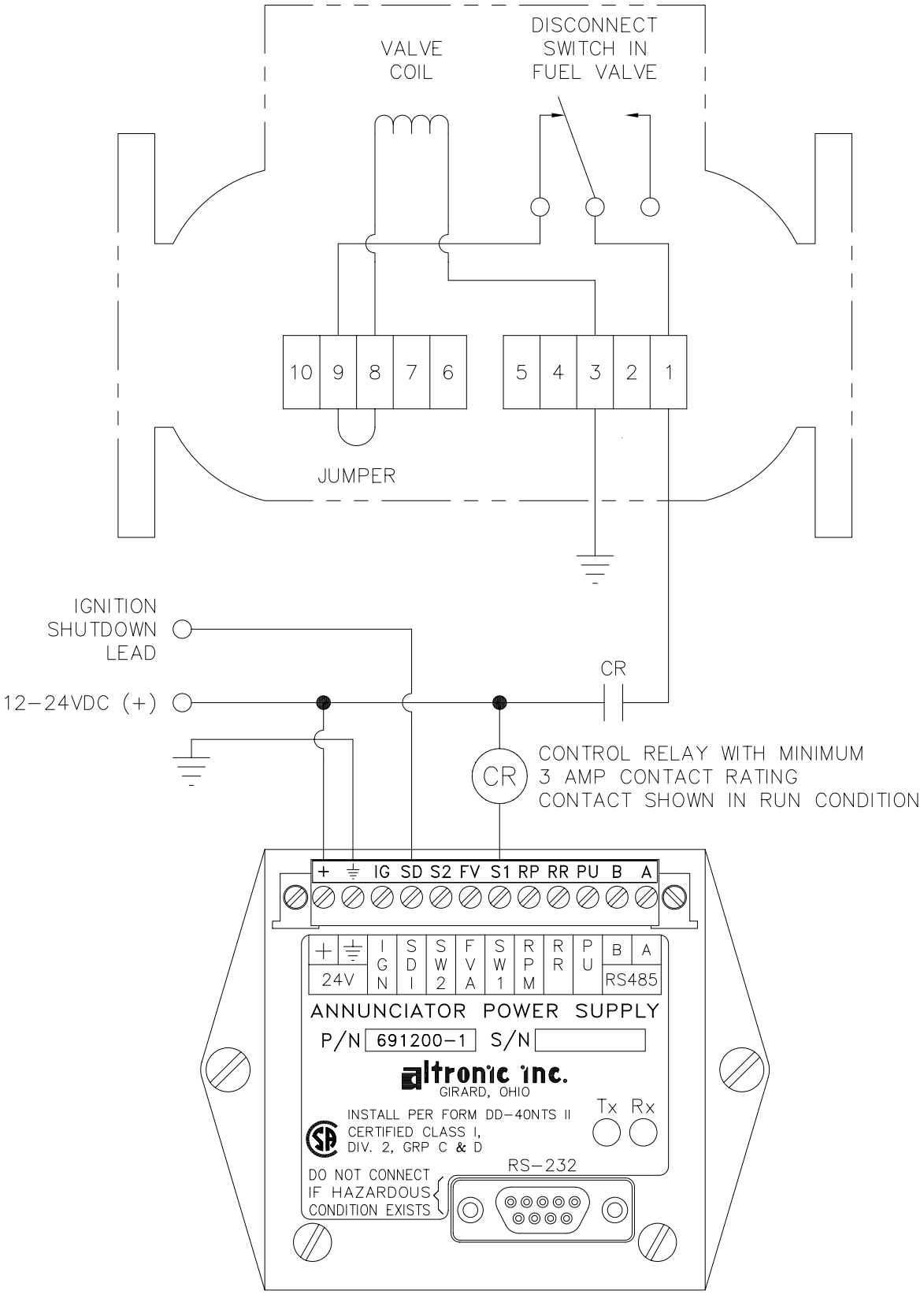
NOTE: WHEN 24V IS USED TO POWER ANNUNCIATOR SUPPLY, THE SHUTDOWN LEAD MUST BE TIED TO THE "IGN" TERMINAL TO CHARGE THE TRIP CAPACITOR

NOTE: CONNECT GROUND DIRECTLY TO THE PANEL OR ENGINE. DO NOT CONNECT TO THE IGNITION SYSTEM COMMON COIL GROUND

CAUTION: LUB TERMINAL (8TH FROM LEFT) REPLACES RPM TERMINAL ON THE 691200-1 POWER SUPPLY. IF REPLACING A 691200-1 POWER SUPPLY WITH 691200-3, REMOVE THE JUMPER BETWEEN THE 3RD AND 8TH (FROM LEFT) TERMINALS AND DISCARD. REFER TO INSTRUCTIONS DD-NTS II 5-02 FOR WIRING DETAILS USING A 691200-1 POWER SUPPLY.

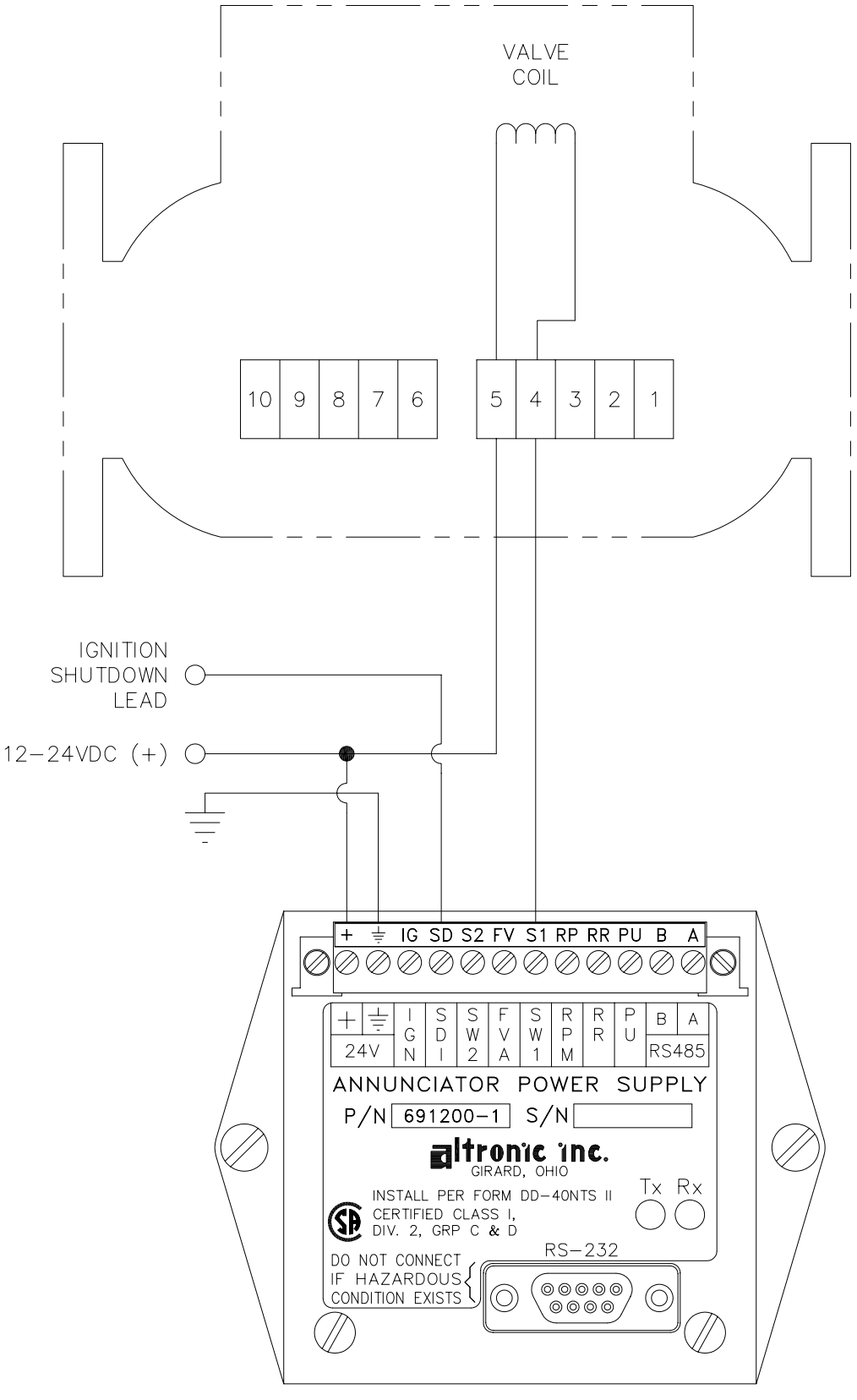
WIRING DIAGRAM – DC POWERED FUEL VALVE (M50–B)

HOOK–UP DRAWING TO TRIP A DC POWERED (ENERGIZED TO CLOSE) FUEL VALVE MURPHY P/N M50–B AND DISCONNECT THE 12–24VDC TO THE FUEL VALVE DURING SHUTDOWN.

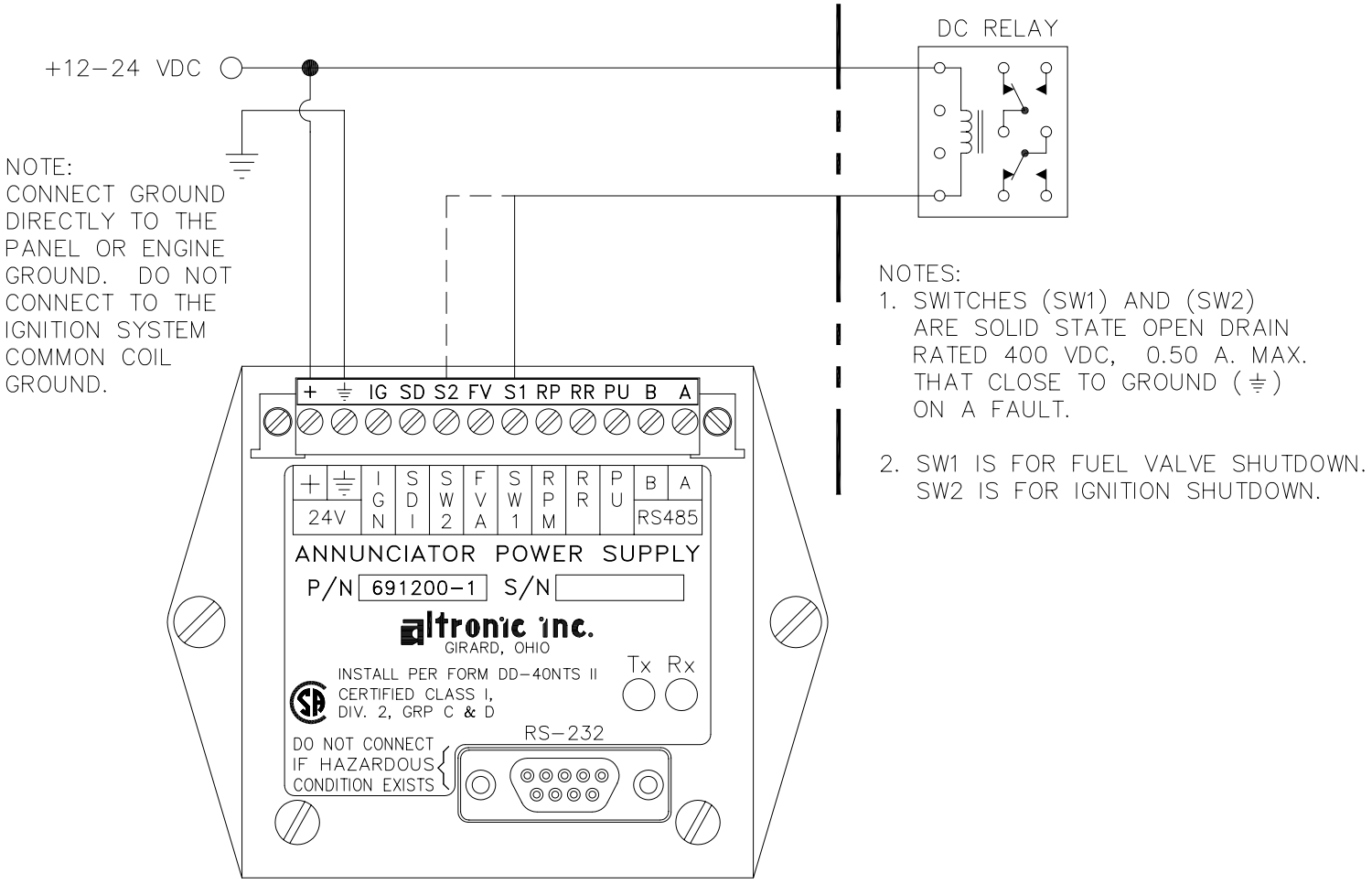


WIRING DIAGRAM – DC POWERED FUEL VALVE (M50–FS)

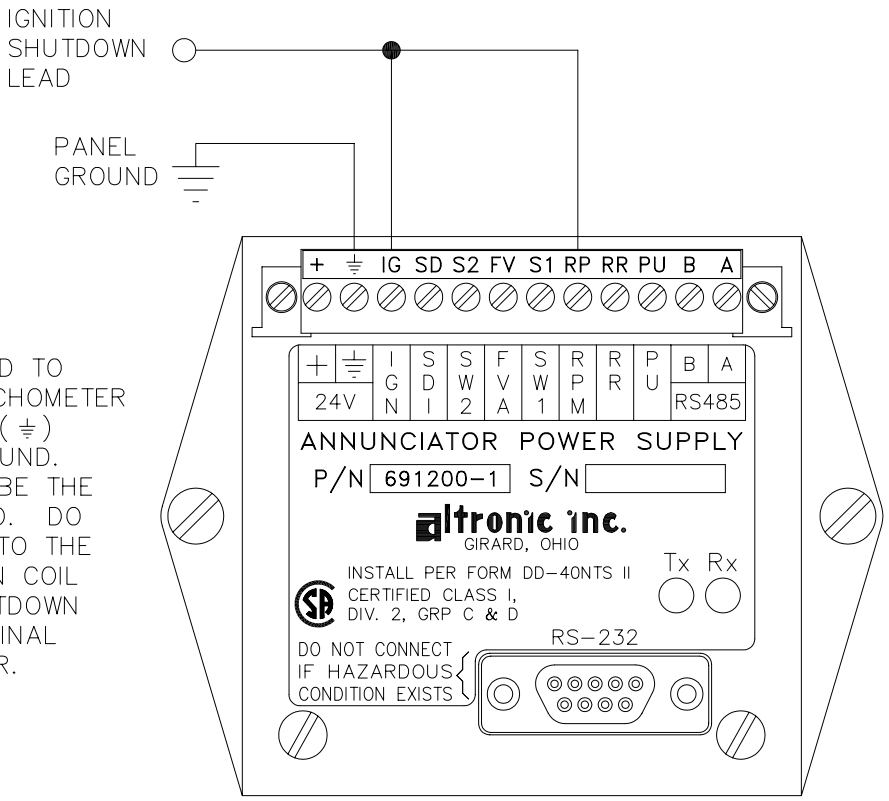
HOOK–UP DRAWING TO TRIP A DC POWERED (ENERGIZED TO RUN) FUEL VALVE MURPHY P/N M50–FS BY OPENING SW1 (THE FUEL VALVE SWITCH) DURING SHUTDOWN.



WIRING DIAGRAM – DC RELAY



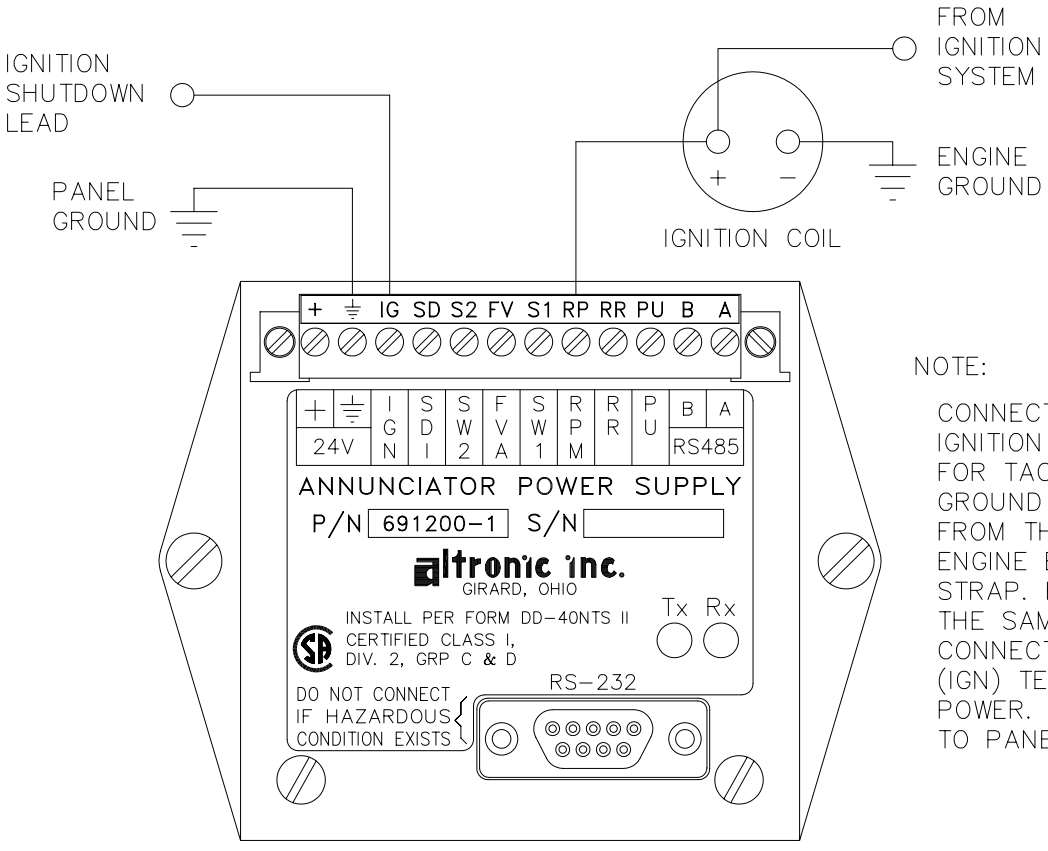
WIRING DIAGRAM – TACHOMETER INPUT
NEGATIVE GROUND C.D. IGNITION SHUTDOWN LEAD INPUT



NOTE:

CONNECT SHUTDOWN LEAD TO (RPM) TERMINAL FOR TACHOMETER INPUT SIGNAL. CONNECT (⏚) TERMINAL TO PANEL GROUND. PANEL GROUND SHOULD BE THE SAME AS ENGINE GROUND. DO NOT CONNECT DIRECTLY TO THE IGNITION SYSTEM COMMON COIL GROUND. CONNECT SHUTDOWN LEAD TO THE (IGN) TERMINAL FOR ANNUNCIATOR POWER.

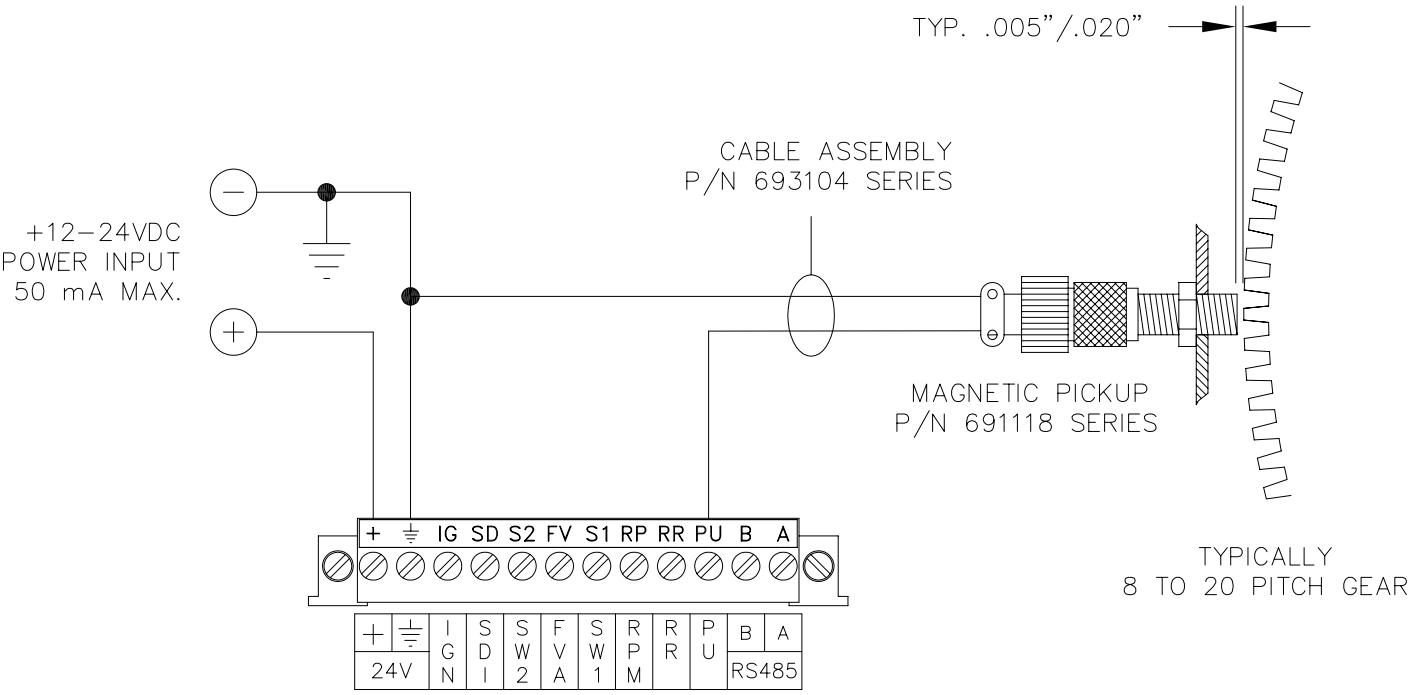
WIRING DIAGRAM – TACHOMETER INPUT
IGNITION COIL INPUT, NEGATIVE GROUND



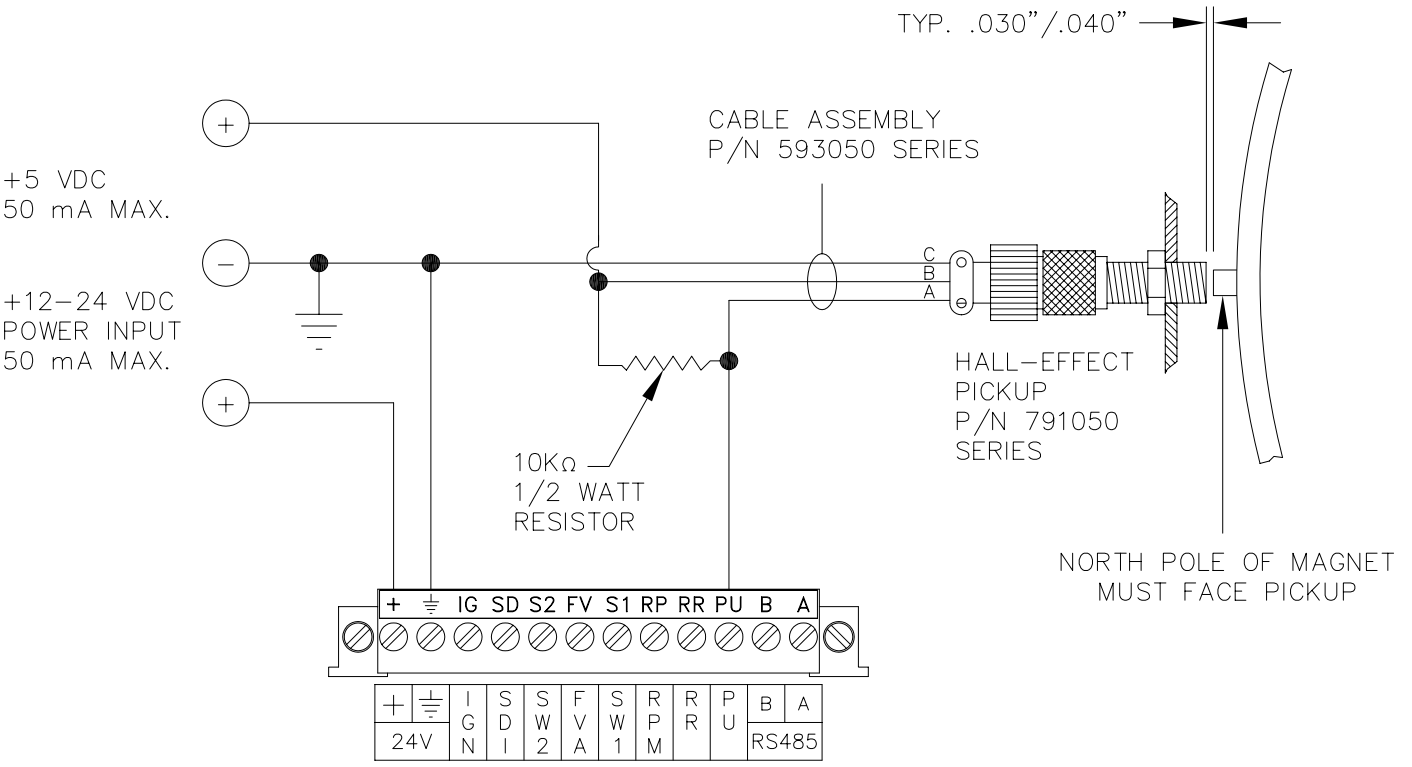
NOTE:

CONNECT (+) TERMINAL FROM IGNITION COIL TO (RPM) TERMINAL FOR TACHOMETER INPUT SIGNAL. GROUND THE MINUS (–) TERMINAL FROM THE IGNITION COIL TO THE ENGINE BLOCK WITH A SHORT WIRE STRAP. PANEL GROUND SHOULD BE THE SAME AS ENGINE GROUND. CONNECT SHUTDOWN LEAD TO THE (IGN) TERMINAL FOR ANNUNCIATOR POWER. CONNECT (⏚) TERMINAL TO PANEL GROUND.

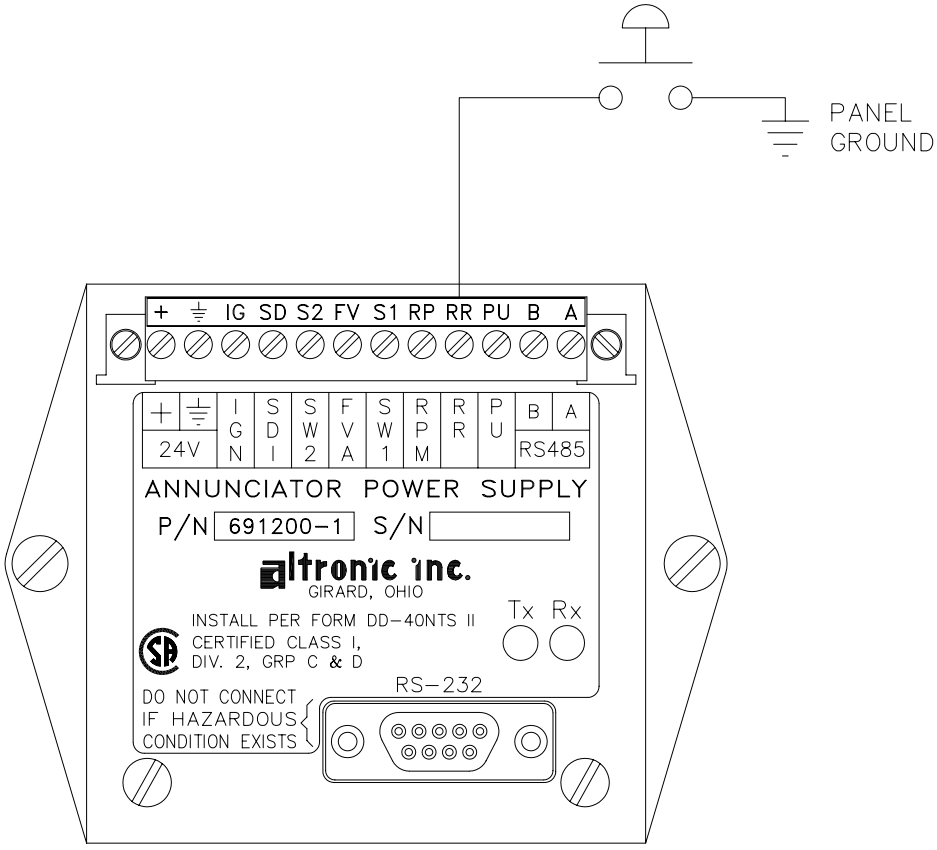
WIRING DIAGRAM
MAGNETIC PICKUP TACHOMETER INPUT



WIRING DIAGRAM
HALL–EFFECT PICKUP TACHOMETER INPUT



WIRING DIAGRAM – REMOTE RESET

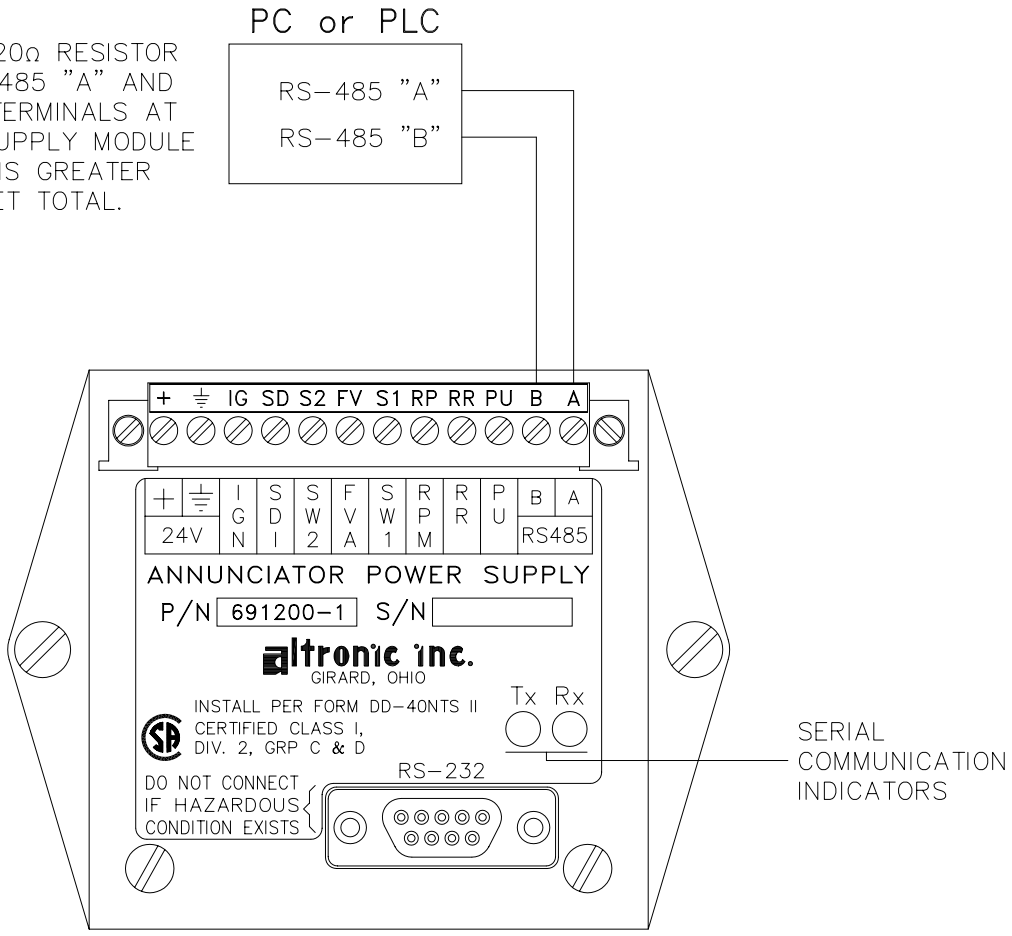


NOTE:

USE A MOMENTARY PUSH-BUTTON OR RELAY FOR REMOTE RESET. MAKE SURE REMOTE RESET IS OPEN DURING ENGINE OPERATION.

WIRING DIAGRAM – RS–485 COMMUNICATIONS

NOTE: CONNECT A 120Ω RESISTOR BETWEEN RS–485 "A" AND RS–485 "B" TERMINALS AT THE POWER SUPPLY MODULE FOR WIRE RUNS GREATER THAN 500 FEET TOTAL.



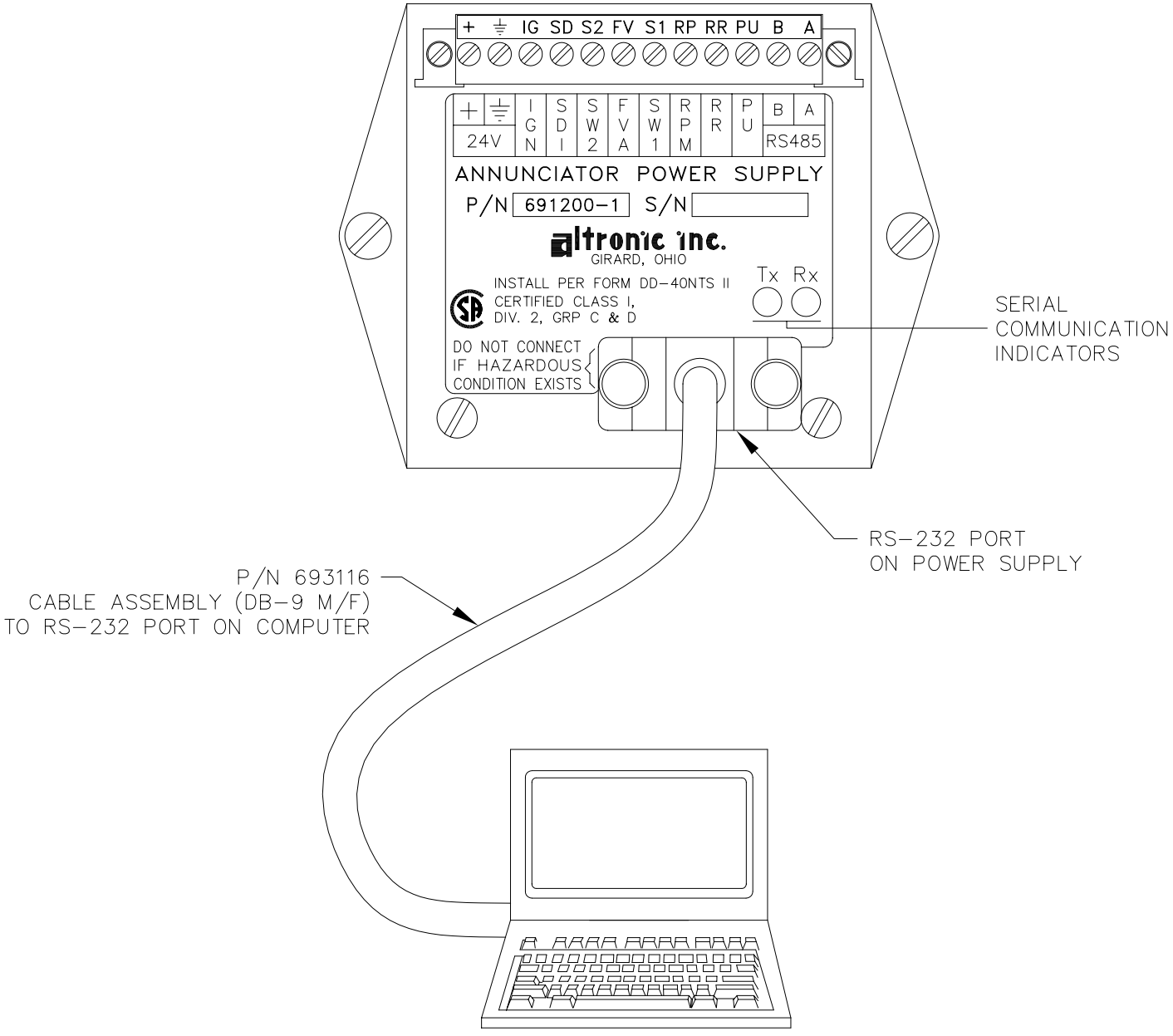
NOTES:

1. USE SHIELDED CABLE FOR RS–485 CONNECTIONS. CONNECT SHIELD AT PC OR PLC ONLY.

2. EACH UNIT MUST HAVE A UNIQUE NODE NUMBER. MAXIMUM 32 NODES.

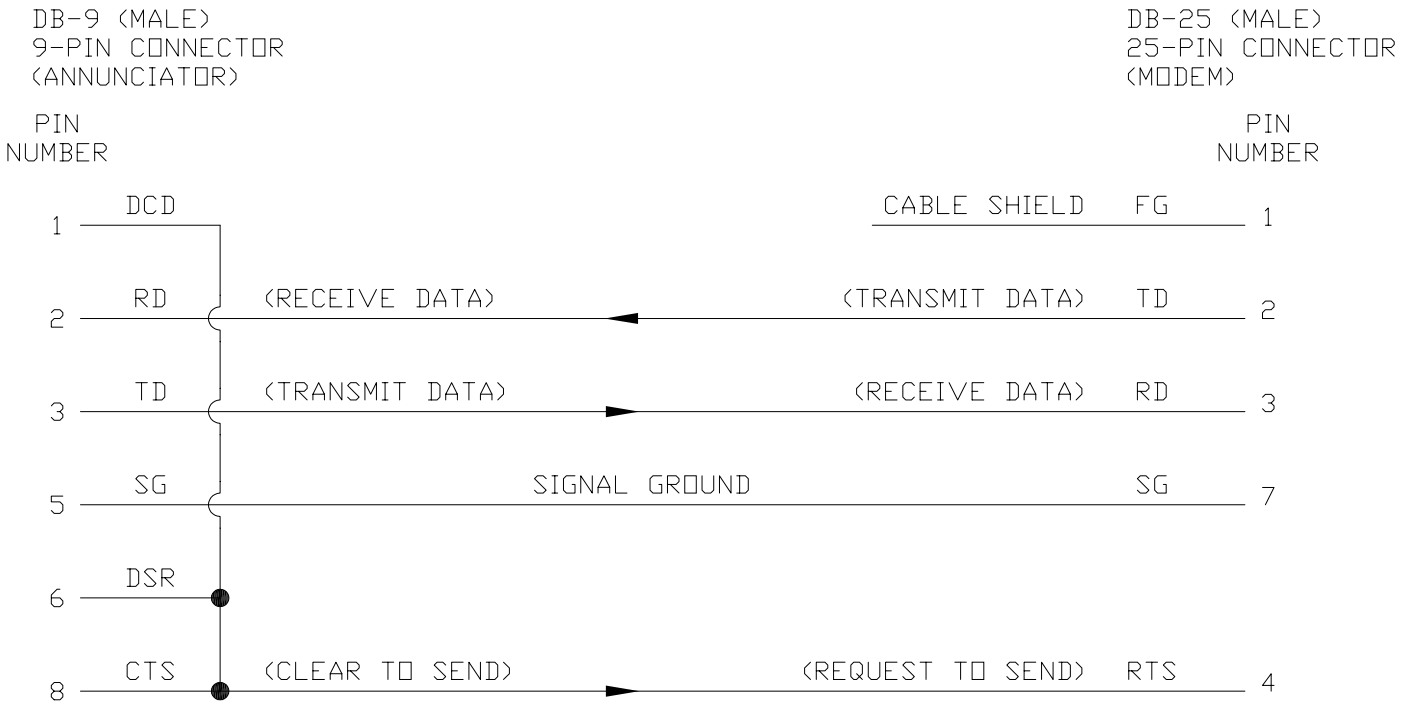
3. TO MINIMIZE UNWANTED REFLECTIONS ON THE RS–485 LINE, THE WIRES SHOULD BE HOOKED–UP FROM ONE INSTRUMENT TO THE NEXT IN A DAISYCHAIN FORMAT.

WIRING DIAGRAM – RS–232 COMMUNICATIONS



WIRING DIAGRAM – NULL MODEM CABLE
DD–40NTS ANNUNCIATOR SYSTEM

RS-232 NULL MODEM CABLE. USE TO CONNECT THE DD-40NTS ANNUNCIATOR SYSTEM TO AN EXTERNAL MODEM. CONNECTION IN THIS MANNER ELIMINATES THE NEED FOR A NULL MODEM ADAPTER.



PINS NOT LISTED ARE NOT USED FOR THIS APPLICATION AND ARE LEFT OPEN.

ACCEPTABLE CABLES FOR RS–232 APPLICATIONS:

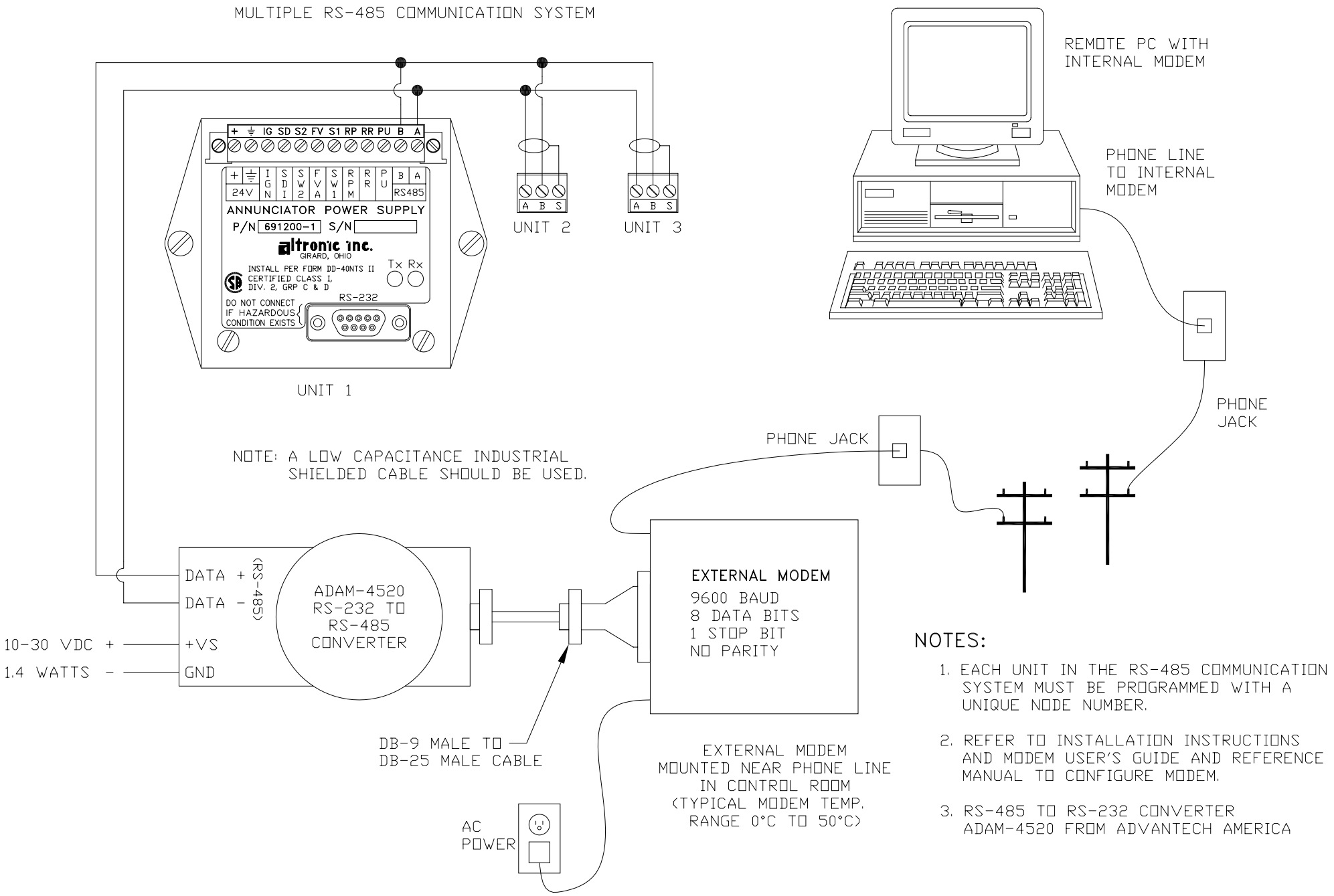
9534, 9536 BELDEN 4 OR 6 CONDUCTOR

9609, 9611 BELDEN 4 OR 6 CONDUCTOR (LOW CAPACITANCE)

9927, 9931 BELDEN 4 OR 6 CONDUCTOR (LOW CAPACITANCE)

FOR OTHER ACCEPTABLE CABLES SEE BELDEN OR OTHER MANUFACTURERS CATALOGS.

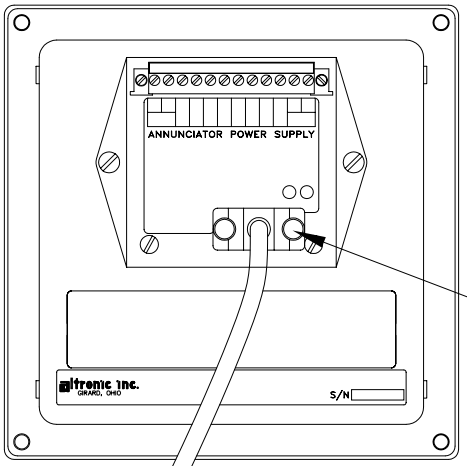
WIRING DIAGRAM
RS-485 COMMUNICATIONS TO EXTERNAL MODEM



NOTES:

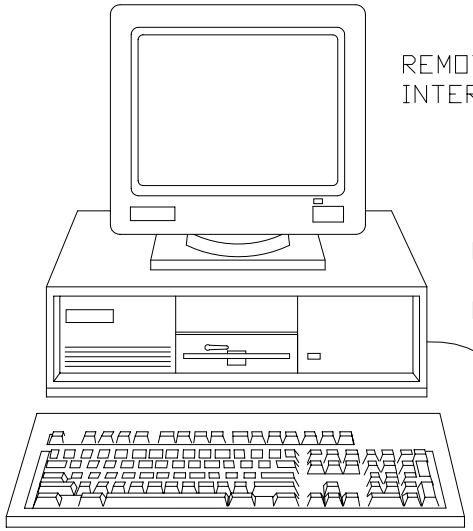
1. EACH UNIT IN THE RS-485 COMMUNICATION SYSTEM MUST BE PROGRAMMED WITH A UNIQUE NODE NUMBER.
2. REFER TO INSTALLATION INSTRUCTIONS AND MODEM USER'S GUIDE AND REFERENCE MANUAL TO CONFIGURE MODEM.
3. RS-485 TO RS-232 CONVERTER ADAM-4520 FROM ADVANTECH AMERICA

WIRING DIAGRAM
RS-232 COMMUNICATIONS TO EXTERNAL MODEM



DD-40NTS ANNUNCIATOR SYSTEM
MOUNTED IN PANEL

RS-232 PORT
MALE DB-9 CONNECTOR
REQUIRED ON CABLE



REMOTE PC WITH
INTERNAL MODEM

PHONE LINE
TO INTERNAL
MODEM

RS-232 STANDARD MAX.
CABLE LENGTH 50 FT.
FOR BEST RESULTS AN INDUSTRIAL
SHIELDED CABLE SHOULD BE USED.

NOTE: FOR EXTENDED DISTANCES
A LOW CAPACITANCE INDUSTRIAL
SHIELDED CABLE SHOULD BE USED.

PHONE JACK

PHONE
JACK

NULL MODEM ADAPTER
TYPICAL: RADIO SHACK
CAT. NO. 26-1496B

EXTERNAL MODEM
9600 BAUD
8 DATA BITS
1 STOP BIT
NO PARITY

DB-9 TO DB-25
ADAPTER

AC
POWER

EXTERNAL MODEM
MOUNTED NEAR PHONE LINE
IN CONTROL ROOM
(TYPICAL MODEM TEMP. RANGE 0°C TO 50°C)

NOTES:

1. REFER TO INSTALLATION INSTRUCTIONS AND MODEM USER'S GUIDE AND REFERENCE MANUAL TO CONFIGURE MODEM.

2. A NULL MODEM CABLE CAN BE USED INSTEAD OF THE NULL MODEM ADAPTOR IF DESIRED.