

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

1.0 SYSTEM DESCRIPTION

- 1.1 The Altronic CPU-2000, DC-powered ignition system is a microprocessor-based capacitor discharge system applicable to slow and medium speed, stationary engines. The system features crankshaft-triggered timing accuracy and the capability to vary timing electronically by several means, including an external 4-20 mA control signal. The system is field-programmable and offers a variety of advanced control, emissions reduction, monitoring, diagnostic, and engine protection features. The CPU-2000 system consists of two main parts; a user interface Logic Module and an engine mounted Output Module.
- 1.2 Two models of the Output Module are available; part no. 291116-1 for applications requiring up to 16 individual outputs and part no. 291132-1 for applications requiring up to 32 individual outputs.
- 1.3 The Logic Module 291100-1 has an alphanumeric LCD display showing the operating status, engine RPM, energy level, single or multi-striking mode, current loop input value and ignition timing. Additional display screens show set-up and diagnostic information.
- 1.4 An optional Diagnostic Module 291105-1 provides enhanced primary and secondary circuit diagnostics on an individual cylinder basis. Included are displays allowing the user to monitor relative voltage demand at the spark plugs and the capability for the system to automatically set its energy level based upon the monitored voltage demand.
- 1.5 To allow for a simple and economical upgrade of existing Altronic II-CPU installations, the CPU-2000 utilizes existing Altronic II-CPU coils, magnetic pickups, Hall-effect pickup and trigger magnet, pickup cables, primary wiring harness(es) and junction box(es).
- 1.6 Power requirement is 24 Vdc, 5 ampere for single-strike applications. For applications using the multi-strike feature, a 10 ampere power supply should be installed. For details, refer to section 10.4 and drawing 209 120.

WARNING: THE IGNITION SYSTEM MUST BE CONFIGURED PRIOR TO USE ON AN ENGINE. REFER TO SECTION 9.7 OF FORM CPU-2000 OI TO VIEW THE CURRENT CONFIGURATION. REFERENCE FORM CPU-2000 PI FOR INSTRUCTIONS DESCRIBING HOW TO CONFIGURE THE IGNITION SYSTEM. VERIFY EEPROM PROGRAMMING PRIOR TO STARTING ENGINE.

2.0 SYSTEM COMPONENTS

- 2.1 The system consists of a Logic Module (section 3.0), an Output Module (section 4.0), an optional Diagnostic Module (section 5.0), two (2) magnetic pickups and cables, a Hall-effect pickup and trigger magnet (4-cycle engines only), appropriate cables and harnesses, and an ignition coil for each spark plug. For a total system overview, refer to drawing 209 077 (without Diagnostic Module) or 209 077A (with Diagnostic Module).
- 2.2 For non-hazardous area operation there is an unshielded epoxy coil 291001. For hazardous area operation, shielded primary cable assemblies are available for connection to the optional shielded coil series 291001-S or 591008. See the system Application List, form CPU-2000 AL, for details.

3.0 MOUNTING THE CPU-2000 LOGIC MODULE

- 3.1 The CPU-2000 Logic Module is preferably panel-mounted off the engine in such a manner as to minimize exposure to vibration. Refer to drawing 299 103 for physical dimension details.
- 3.2 The Logic Module should be mounted within 50 feet (15 m) of the Output Module which is to be mounted on the engine.
- 3.3 Operating temperature range is -40°F. to 158°F. (-40°C. to 70°C.). Humidity specification is 0-95%, non-condensing. Housed in a NEMA 4 enclosure, the CPU-2000 Logic Module is splash resistant; however, the mounting site should provide as much protection from inclement weather as is practical. Avoid mounting the LCD display and keypad in direct sunlight.

4.0 MOUNTING THE CPU-2000 OUTPUT MODULE

- 4.1 Refer to drawing 209 102A for physical dimension details. Select a mounting location meeting the following requirements:
 - On the engine.
 - Within 50 ft. of the Logic Module.
 - Within 5 ft. of the Diagnostic Module (if used).
 - Within 7 ft. of the primary junction box.
 - The front panel door of the Output Module should be easily accessible and free to swing open.
 - The maximum ambient temperature must not exceed 150°F. (65°C.).
- 4.2 The Output Module enclosure should be fastened securely to a rigid engine bracket using the shock mounts provided.
- 4.3 When replacing an existing Altronic II-CPU system, the CPU-2000 Output Module would typically be mounted in place of the II-CPU control module; the mounting footprint is identical to facilitate the changeover.

5.0 MOUNTING THE OPTIONAL CPU-2000 DIAGNOSTIC MODULE

- 5.1 Refer to drawing 299 106 for physical dimension details. The mounting bolt pattern is the same as for the Output Module. Select a mounting location meeting the following requirements:
- On the engine.
 - Within 5 ft. of the Output Module.
 - The front panel door of the Diagnostic Module should be easily accessible and free to swing open.
 - The maximum ambient temperature must not exceed 150°F. (65°C.).
- 5.2 The Diagnostic Module enclosure should be fastened securely to a rigid engine bracket using the shock mounts provided.

6.0 MOUNTING FLYWHEEL GEAR/DRILLING FLYWHEEL HOLES

- 6.1 The Altronic CPU-2000 system requires a source of angular position pulses from the engine crankshaft. This can be a flywheel ring gear, a separately provided gear or specially drilled holes in the flywheel. The source of position pulses must meet the following requirements:
- Must be ferrous material
 - Diameter of 18" or greater
 - No. of teeth or holes of 180 or greater
 - Maximum run-out referenced to the pickup of .007"
- Refer to drawings 209 102A and 209 103 for further details.

7.0 MOUNTING THE MAGNETIC PICKUPS

- 7.1 The system requires two magnetic pickup signals: the angular position pulses from the gear or drilled holes and a reset pulse near the most advanced firing position desired for no. 1 cylinder. The pickups must be mounted to rigid brackets to maintain an air gap of $.015" \pm .005"$ with respect to the rotating gear or flywheel. It is also important for maximum signal efficiency that the centerline of the rotating part pass through the center of the pickup
- see drawing 209 102A.

8.0 MOUNTING THE FLYWHEEL RESET PIN

- 8.1 Set the engine with no. 1 cylinder six (6) degrees ahead of the most advanced firing point. Mark a point on the flywheel directly opposite the pole piece of the reset magnetic pickup; then rotate the engine to a position convenient for drilling and tapping the flywheel at the point marked above. The reset pin should be made from a steel (magnetic) 1/4"-20 bolt or stud. See drawing 209 102A for details.
- 8.2 Rotate the engine to the original set point and adjust the air gap between the end of the reset pin and the magnetic pickup at .010" using a feeler gauge.

9.0 MOUNTING THE CYCLE TRIGGER (4-CYCLE ENGINE ONLY)

- 9.1 The trigger magnet (260604, 260605 or 720002) must be mounted on the engine camshaft or other accessory drive operating at camshaft speed. An M8 (8 mm) tapped hole, 0.5 inches (13 mm) deep is required - see drawings 260 604, 260 605 or 720 002 for details. The magnet MUST rotate on a diameter NOT EXCEEDING:
- 6 inches (150 mm) for magnet 720002, or
 - 15 inches (375 mm) for magnet 260604 or 260605.
- 9.2 Set the engine on the COMPRESSION stroke of no. 1 cylinder with the reset pin DIRECTLY OPPOSITE the reset pickup. The Hall-effect pickup (591014-x) must be mounted DIRECTLY OPPOSITE the trigger magnet (section 8.1) coincident with the reset pickup and pin being lined-up - refer to drawing 209 060A.

NOTE: The Hall-effect signal and the reset pickup signal must occur at the same time for the system to function.

The Hall-effect pickup dimensions are shown on drawing 591 014. The air gap between the Hall-effect pickup and trigger magnet must not exceed .040" (1.0mm).

10.0 LOGIC MODULE ELECTRICAL HOOK-UP

- 10.1 The power connections to the CPU-2000 must be in accordance with the National Electrical Code or other applicable country code. The CPU-2000 is suitable for installation in Class I, Division 2, Group D locations.
- 10.2 The Logic Module must have its own 24 Vdc power connection. Although the device has internal protective fuses (3 amp), an external fuse near the power source is recommended. See section 13.0 for other details regarding powering the CPU-2000 system.
- 10.3 Power wiring and signal (transducers) wiring must be in separate conduits and conduit entries into the Logic Module to avoid undesired electrical interaction. All conduit entries are sized for a 1/2"-14 NPT male conduit fitting. Separate as follows (refer to drawing no. 209 078):
- | | |
|----------------------|---|
| RIGHT CONDUIT ENTRY | Power wiring and cable 293030-xx to Diagnostic or Output Module |
| CENTER CONDUIT ENTRY | Magnetic pickups and Hall-effect pickup |
| LEFT CONDUIT ENTRY | Control inputs, serial communications, and alarm outputs |
- 10.4 RIGHT ENTRY: Input power supply wires (16 AWG minimum) should enter the right conduit entry and connect to the 24 Vdc supply terminals of terminal block. The interface cable 293030-xx connecting the Logic Module with either the Diagnostic or Output Module also enters through the right conduit entry. Refer to drawings 209 078 and 299 104 for connection details.

CAUTION: Do not mistake the brown (pin "D") and light brown (pin "S") wires.

- 10.5 CENTER ENTRY: Run a separate conduit for the two (2) magnetic pickup cable assemblies. These should enter through the center entry in the CPU box and terminate as shown on drawing 209 078.
4-CYCLE ENGINE ONLY: The cable from the Hall-effect pickup also enters through the center entry and connects as shown.
- 10.6 LEFT ENTRY: A separate conduit must be used to the left-hand entry for all connections to the user interface terminal strips in the Logic Module. Use 24 AWG, UL style 1015 wire or shielded cable for these connections; the 24 AWG wire is available from Altronic under part no. 603102 (black) or 603103 (white).
- A. SHUTDOWN INPUT (terminal 4): Use to stop the ignition for engine shutdown. This input is open for normal operation of the system and is connected to engine ground to inhibit ignition firings. NOTE: This is a 5 volt low level signal.
 - B. ALARM OUT (terminal 5), SHUTDOWN OUT (terminal 6), FIRE CONFIRM OUT (terminal 7): Three output switches are available for monitoring ignition system status. Each output consists of a solid state switch normally closed to a single common rail COMMON OUT (terminal 8). The switches are rated 75 mA @ 100 Vdc. These output switches are electrically isolated from all other terminals. The recommended hook-up is shown on drawing 209 078. For operational details, refer to the CPU-2000 Operating Instructions, form CPU-2000 OI.
 - C. 4-20 MA TIMING CONTROL INPUT: The 4-20 mA timing control loop connects to terminals 9(+) and 10(-). This input is electrically isolated from all other terminals; refer to drawings 209 078 and 209 079.
 - D. MISC INPUT (terminal 11): Provides for control of various user selected features. This input is normally open; connect to engine ground to activate the selected feature (see drawing 209 078). NOTE: This is a 5 volt low level signal. For programming and operational details, refer to CPU-2000 Operating Instructions, form CPU-2000 OI.

11.0 OUTPUT MODULE ELECTRICAL HOOK-UP

- 11.1 All required connections to the CPU-2000 Output Module are made through harnesses using multi-pin, threaded connectors.
- 11.2 17-PIN CONNECTOR: The 293030-xx series cable (system without Diagnostic Module) or 293031-xx series cable (system with Diagnostic Module) plugs into the 17-pin connector on the bottom panel of the Output Module. Insert the connector into the Output Module receptacle and tighten hand-tight; then carefully tighten an additional one-sixth turn with a wrench.
NOTE: See section 13.0 for details of the DC power connection to the Output Module.
- 11.3 19-PIN CONNECTOR(S): Refer to section 14.1 for hookup details for the output connector(s) of the Output Module.

12.0 DIAGNOSTIC MODULE ELECTRICAL HOOK-UP

- 12.1 All required connections to the optional CPU-2000 Diagnostic Module are made through harnesses using multi-pin, threaded connectors. Refer to drawing 299 106 for details.
- 12.2 17-PIN CONNECTORS: The 293030-xx cable from the Logic Module and 293031-xx series cable from the Output Module plug into the two 17-pin connectors on the bottom panel of the Diagnostic Module. These two connectors in the Diagnostic Module are interchangeable; select the connectors to arrange for the best routing of the two cables. Insert the connector into the receptacle and tighten hand-tight; then carefully tighten an additional one-sixth turn with a wrench.
- 12.3 3-PIN CONNECTOR: A 3-conductor cable (593050, 593052-xx or 593057-xx) is required to connect to the engine junction box and the output "N" and "V" leads. Cable lead "A" connects to the output harness "N" lead; cable lead "B" connects to the output harness "V" lead. This cable plugs into the 3-pin connector on the bottom panel of the Diagnostic Module. Refer to drawing 209 121.
- 12.4 10-PIN CONNECTOR: The 10-pin connector in the Diagnostic Module is reserved for future development.
- 12.5 RETROFITTING THE DIAGNOSTIC MODULE: When retrofitting the Diagnostic Module to an existing CPU-2000 installation, in addition to the above steps, the following additional steps are required where the Logic Module S/N is 1725 or lower:
- A. Two firmware chips in the Logic Module must be upgraded to operate with the Diagnostic Module:
 - The 28-pin display board EPROM located in the blue socket with the label "DSP2000" must have part no. 601707 ver. 2.0 or higher. To replace this chip, first remove the cover board on the Logic Module door.
 - The 40-pin logic board MICROPROCESSOR located in the blue socket with the label "CPU2000" must have part no. 601747 ver. 2.0 or higher. To replace this chip, first remove the large cover board containing the wiring label information.
 - B. Cable 293030-xx MUST have the light brown (pin "S") and pink (pin "T") wires connected to the EXTERNAL CONTROL (DSM) connector in the Logic Module. Replace the 293030 cable if leads "S" and/or "T" are missing.
 - Lead "S" connects to the DSM SERIAL RS485 + terminal.
 - Lead "T" connects to the DSM SERIAL RS485 – terminal.See drawing 209078 for this hookup.

13.0 DC POWER HOOKUP - 293030-XX CABLE

13.1 The power connections to the CPU-2000 must be in accordance with the National Electrical Code or other applicable country code. The CPU-2000 is suitable for installation in Class I, Division 2, Group D locations.

13.2 It is necessary to split the control cable and power leads of the 293030 cable in an engine mounted junction box or conduit tee. This box should be separate from the main junction box used to terminate the output harness(es) to the ignition coils.

The junction box should have three (3) 1/2" conduit entries (refer to drawing 209 077 or 209 077A):

1ST ENTRY - Conduit fitting of 293030 series connecting cable from the Output Module.

2ND ENTRY - Two leads from a source of nominal 24 Vdc (20-32 Vdc). The negative of the 24 Vdc supply MUST be common with engine ground. Refer to drawing 209 120 for details of the power hookup.

3RD ENTRY - The gray jacketed control cable from the 293030 series cable connecting to either the Diagnostic or Logic Module.

13.3 The CPU-2000 system can be powered in one of the following ways:

A. 24 volt battery with charger.

B. DC power supply capable of furnishing 24-28 Vdc.

NOTE: The negative (-) of the 24 Vdc supply MUST BE COMMON WITH ENGINE GROUND. Engines using positive ground DC accessories or starter motors will require a separate dedicated power supply for the CPU-2000.

WARNING: ALTHOUGH THE DEVICE HAS INTERNAL PROTECTIVE FUSES (6.3 AMP), TWO EXTERNAL 10 AMP FUSES NEAR THE POWER SOURCE ARE RECOMMENDED FOR THE PROTECTION OF ENGINE AND BUILDING WIRING. THIS WILL REDUCE THE POSSIBILITY OF A FIRE OCCURRING IN THE EVENT OF A SHORT CIRCUIT IN THE WIRING. SEE DRAWING 209 120.

IMPORTANT: For proper operation of the CPU-2000 system, voltage and current supplied must be sufficient during all selected modes of operation. Drawing 209 120 provides these details regarding the DC power hook-up:

1. CURRENT DRAW PER SYSTEM - formula varies depending on number of outputs used, engine cycle and RPM, and the use of the multi-strike feature.
2. MINIMUM WIRE GAUGE REQUIREMENTS - Chart 1 of drawing 209 120 gives the requirement vs. the length of run between the power source and the CPU-2000 Output Module.
3. MULTIPLE ENGINE INSTALLATIONS - Multiply current required per system by the number of engines. Where more than one engine is powered from a common power source, see Chart 2 of drawing 209 120 for the minimum wire size required.

14.0 PRIMARY WIRING

- 14.1 The main wiring harness (293023-x, 293026-x, or 293027-x) connects the Output Module to the engine junction box. Refer to drawing 509 025 if it is desired to shorten the conduit length of the harness. Insert the connector into the Altronic CPU-2000 Output Module receptacle and tighten hand-tight; then carefully tighten an additional one-sixth turn with a wrench. NOTE: Two harnesses are used with Output Module type 291 132-1.

Referring to applicable drawing 209 118 or 209 119, write in the engine firing order below:

FOR OUTPUT MODULE 291116-1 (16 OUTPUT) - SEE DRAWING 209 118:

Connector: A - B - C - D - E - F - G - H - J - K - L - M - R - S - T - U

Engine: _____

FOR OUTPUT MODULE 291132-1 (32 OUTPUT) - SEE DRAWING 209 119:

(x1 = upper connector; x2 = lower connector)

Connector: A1- A2- B1- B2- C1- C2- D1- D2- E1- E2- F1- F2- G1- G2- H1- H2

Engine: _____

J1- J2- K1- K2- L1- L2- M1- M2- R1- R2- S1- S2- T1- T2- U1- U2

- 14.2 Connect the harness leads in the junction box in accordance with the engine's firing order. The leads from the junction box corresponding to the above system outputs connect to the ignition coil negative (-) terminals. The "P" lead and the common coil ground lead(s) connecting the positive (+) terminals of the ignition coils must be grounded to the engine in the junction box. On V-engines, run a separate common ground lead for each bank. Separate ground connections in the junction box are recommended. Refer to wiring diagrams 209 105A (unshielded) or 209 106A (shielded) for general details.
- 14.3 Primary wire should be no. 16 gauge stranded, tinned copper wire. The insulation should have a minimum thickness of .016" and be rated 105°C. or higher. Irradiated PVC or polyolefin insulations are recommended. Altronic primary wire no. 503188 meets these specifications. All primary wiring should be protected from physical damage and vibration.
- 14.4 If two ignition coils per cylinder connected to a common output are used, use PARALLEL WIRING as shown on the wiring diagrams 209 105A and 209 106A.
- 14.5 All unused primary wires should be individually taped so that they are insulated from ground and each other. The unused primary wires can then be tie-wrapped together for a clean installation.

15.0 SHUTDOWN WIRING

- 15.1 To shut-off the DC-powered CPU-2000 system, a special input (SHUTDOWN INPUT - terminal 4) in the Logic Module is provided. This input is open for normal operation and is connected to engine ground to initiate an ignition shutdown. Use a switch rated 24 Vdc, 0.5 amps. Refer to section 9.6A. and drawing 209 078 for details.
- 15.2 DO NOT ground leads "N" or "V" to stop the ignition with the CPU-2000 system. This can cause component failure in the Output Module. These leads are provided to power existing ignition powered instruments and for scope analysis only.

WARNING: Please note the following application limitations between the CPU-2000 ignition system and these Altronic instruments:

DTO-1010, DT/DTH/DTO/DTHO-1200, DT/DTH/DTO-3200, DO-3300, DTUO-4200

- **The above Altronic ignition-powered tachometers and overspeed devices will NOT function correctly with CPU-2000 systems using memory codes beginning with N6, N8, P6, P8, Z2 or Z4.**
- **The above Altronic ignition-powered tachometers and overspeed devices will NOT function correctly with any CPU-2000 system operating in the multi-strike mode.**

NOTE: Tachometer and overspeed functions are provided by the CPU-2000 Logic Module; see sections 4.0 and 9.4 of form CPU-2000 OI. If a separate device is needed, Altronic models DTO-1201P or DSG-1201DU/DUP will function with all CPU-2000 systems.

16.0 SECONDARY WIRING

- 16.1 Mount the ignition coils as close as possible to the engine spark plugs consistent with a secure mounting and avoidance of temperatures in excess of 185°F (85°C.).
- 16.2 The spark plug leads should be fabricated from silicone insulated 7 mm cable with suitable terminals and silicone spark plug boots. The use of leads with resistor spark plug boots (Altronic series 59320x-xx) is recommended to minimize interference from emitted RFI on the operation of other nearby electronic equipment. Another option is the use of suppression ignition cable (Altronic part no. 503185). It is also essential to keep spark plug leads as short as possible and in all cases not longer than 24 inches (600 mm). Spark plug leads should be kept at least 2 inches (50 mm) away from any grounded engine part. In deep spark plug wells, use rigid insulated extenders projecting out of the well.
- 16.3 The use of a clear, silicone grease (such as Dow Corning DC-4, G.E. G-623 or GC Electronics Z5) is recommended for all high-tension connections and boots. This material helps seal out moisture and prevent corrosion from atmospheric sources.

DRAWINGS SECTION:

INSTALLATION DRAWINGS:

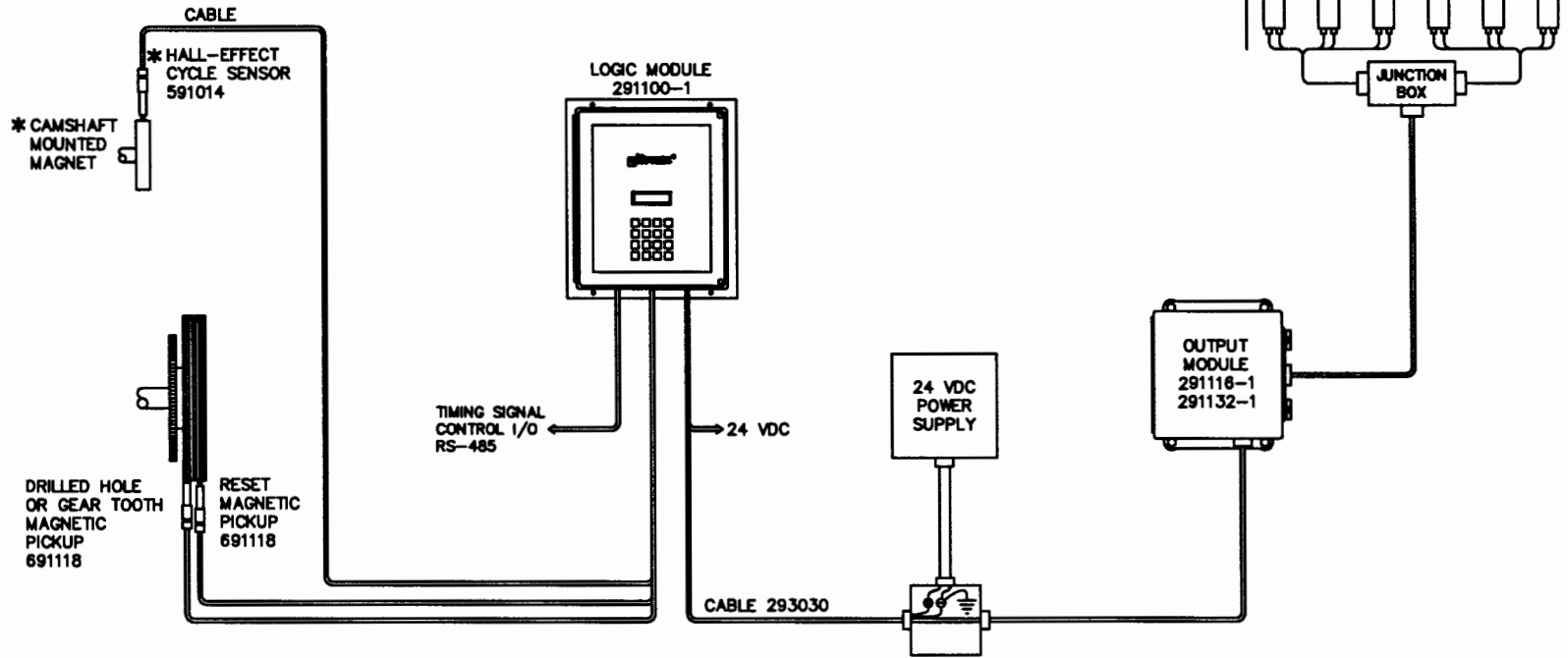
209 077	IGNITION SYSTEM BASIC LAYOUT
209 077A	IGNITION SYSTEM BASIC LAYOUT W/DIAGNOSTIC MODULE
209 078	LOGIC MODULE WIRING DIAGRAM
209 079	TIMING CURVE, 4-20 MA
209 102A	PICKUP MOUNTING DETAIL
209 103	FLYWHEEL HOLE DRILLING
209 105A	COIL WIRING DIAGRAM - UNSHIELDED
209 106A	COIL WIRING DIAGRAM - SHIELDED
209 118	OUTPUT MODULE 291116-1 HOOK-UP DIAGRAM
209 119	OUTPUT MODULE 291132-1 HOOK-UP DIAGRAM
209 120	DC POWER HOOK-UP
209 121	"N" AND "V" LEAD HOOK-UP

COMPONENT DRAWINGS:

299 102	OUTPUT MODULE MOUNTING DIMENSIONS
299 103	LOGIC MODULE MOUNTING DIMENSIONS
299 106	DIAGNOSTIC MODULE MOUNTING DIMENSIONS
299 104	CABLE ASSEMBLY 293030-XX
299 105	CABLE ASSEMBLY 293031-XX
509 025	SHIELDED HARNESS CONDUIT LENGTH ADJUSTMENT
260 604	MAGNET ASSEMBLY SALES DRAWING
260 605	MAGNET ASSEMBLY SALES DRAWING
720 002	MAGNET ASSEMBLY SALES DRAWING
591 014	HALL-EFFECT PICKUP SALES DRAWING
691 118	MAGNETIC PICKUP SALES DRAWING

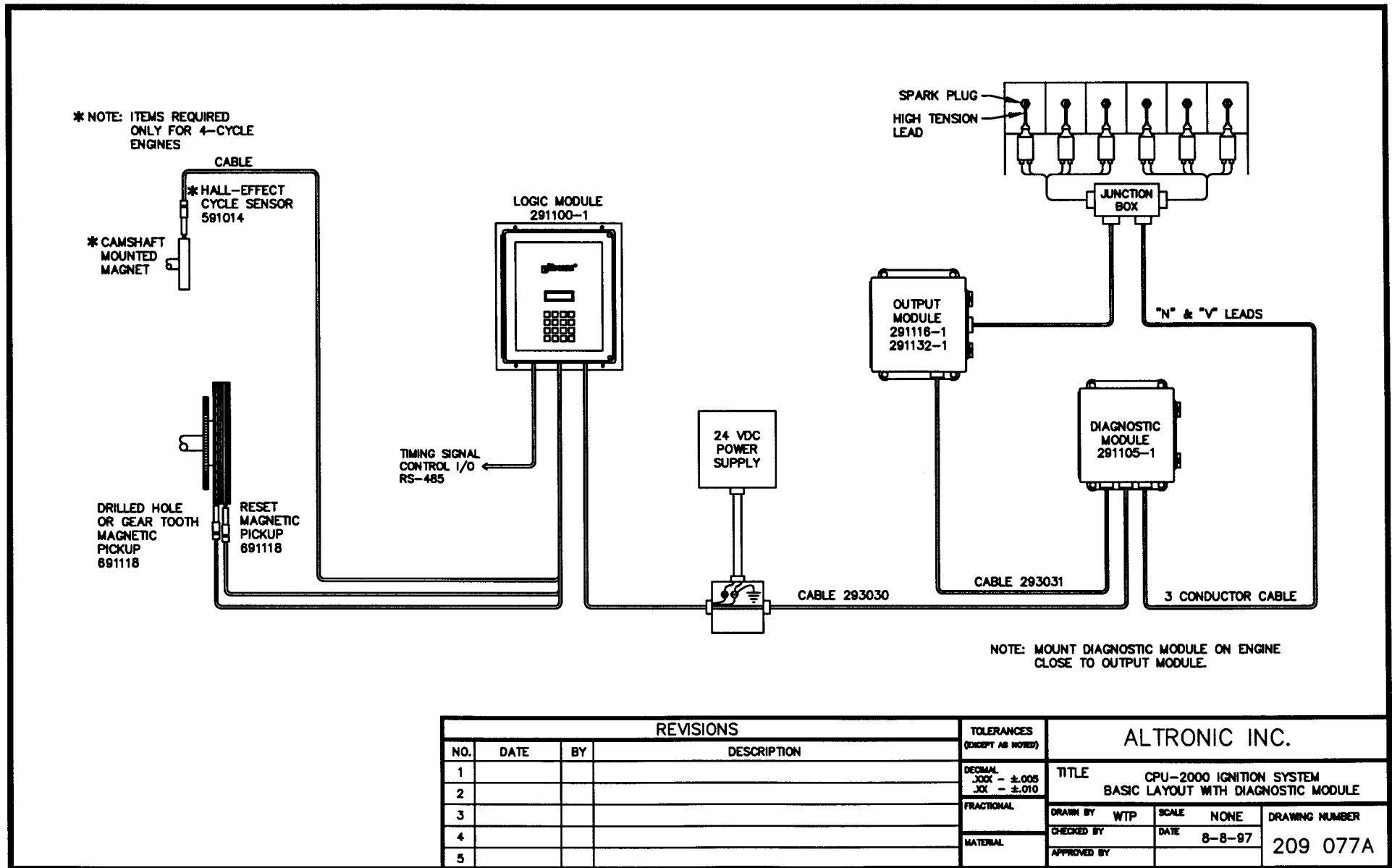
INSTALLATION DRAWINGS

* NOTE: ITEMS REQUIRED ONLY FOR 4-CYCLE ENGINES



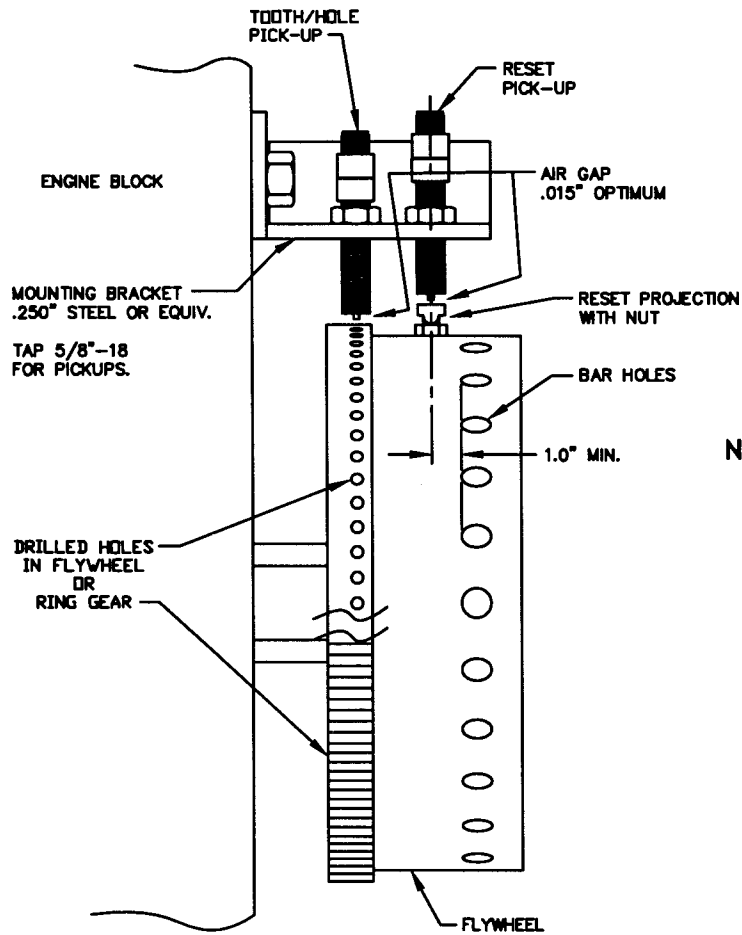
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3					CHECKED BY	DATE 12-13-94	
4					APPROVED BY		
5							

209 077

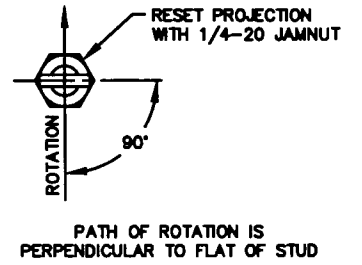


209 077A

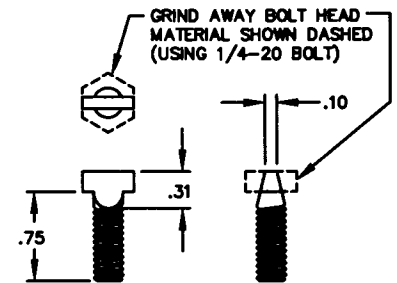
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1				.XXX - ±.005		CPU-2000 IGNITION SYSTEM BASIC LAYOUT WITH DIAGNOSTIC MODULE	WTP	NONE	8-8-97	209 077A
2				.XX - ±.010			CHECKED BY			
3							APPROVED BY			
4										
5										



NOTE:
1. FLYWHEEL GUARD NOT SHOWN FOR CLARITY.



EDGE VIEW



RESET PROJECTION

NOTE:
VISUAL PROPORTION OF THIS ILLUSTRATION WILL CHANGE WITH VARIATIONS IN GEAR AND FLYWHEEL SIZE AND RELATIONSHIP.

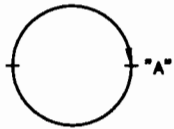
REVISIONS			
NO.	DATE	BY	DESCRIPTION
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2			
3			
4			
5			

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

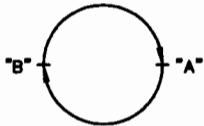
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APPROVED BY			

209 102A

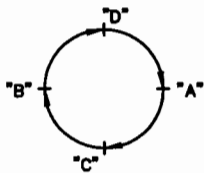
FLYWHEEL LAYOUT



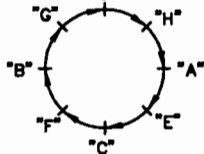
MARK "A" AND MEASURE CIRCUMFERENCE A→A



MEASURE 1/2A→A AND MARK "B"
NOTE: A→B = B→A

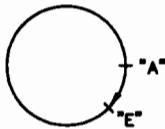


MEASURE 1/2A→B AND MARK "C"
MEASURE AND MARK "D" IN THE SAME MANNER



MEASURE 1/2A→C AND MARK "E"
MEASURE AND MARK "F", "G", AND "H" IN THE SAME MANNER

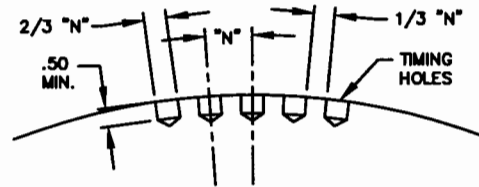
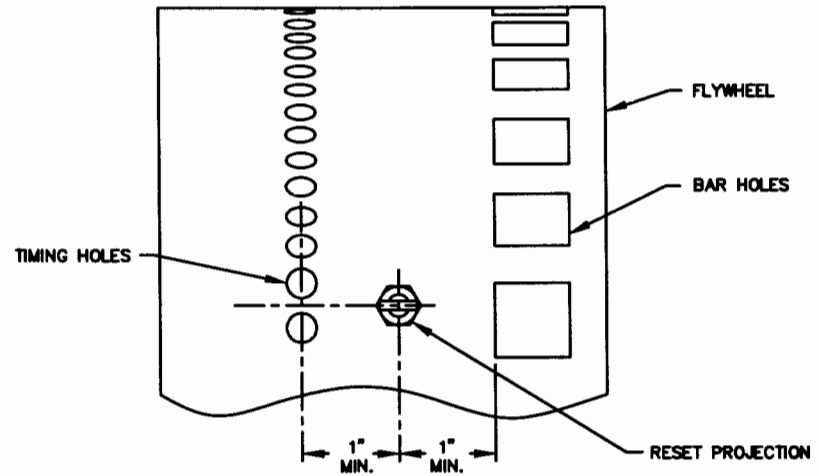
NOTE: CONFIRM INTERVALS BETWEEN MARKS ARE NOW EQUAL.



MEASURE THE LENGTH A→E, DIVIDE BY 45, AND BEGINNING WITH "A" MARK OFF INTERVALS OF THIS LENGTH TO "E". COUNTING "A" AND "E" THERE SHOULD BE 46 MARKS.
DO THE REMAINING 7 SECTIONS IN THE SAME MANNER.

PROCEDURE FOR DRILLING 360 HOLES IN ENGINE FLYWHEEL

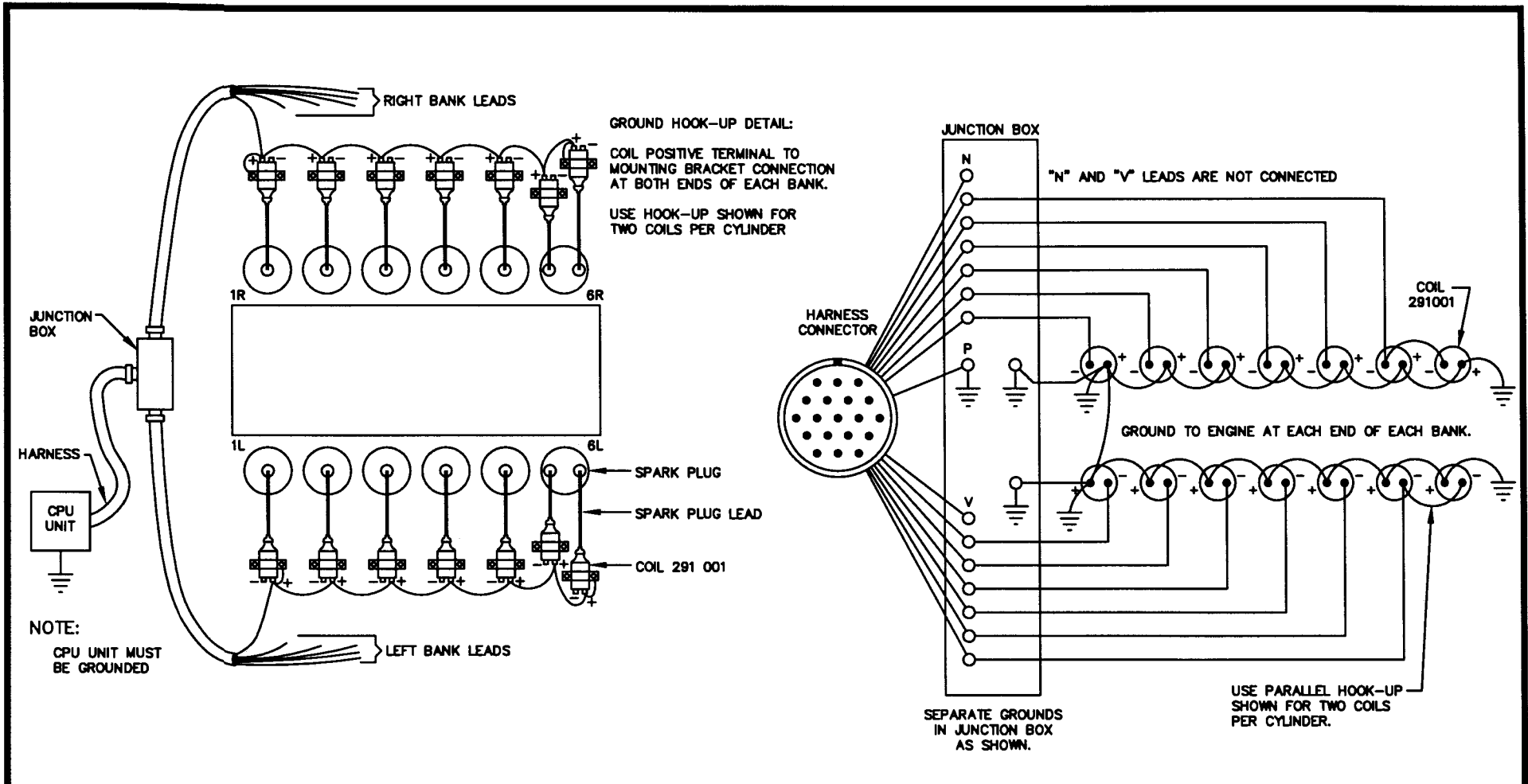
DRILLING DETAIL



DISTANCE
$$"N" = \frac{A \text{ TO } E}{45}$$

NOTE: IF 2/3 "N" WORKS OUT TO BE BETWEEN STANDARD DRILL SIZES - USE NEXT SIZE LARGER.

REVISIONS				TOLERANCES EXCEPT AS NOTED	ALTRONIC INC.			
NO.	DATE	BY	DESCRIPTION	DECIMAL XXX - ±.005 XX - ±.010	TITLE FLYWHEEL HOLE DRILLING		PART NUMBER	
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3					APPROVED BY			
4								
5								

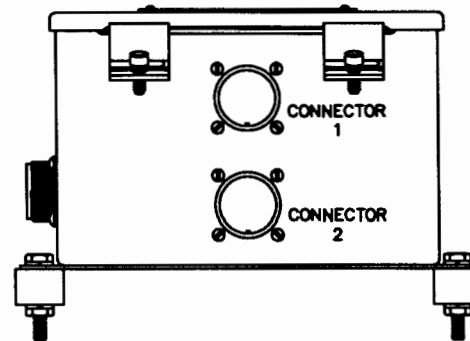


REVISIONS				TOLERANCES (EXCEPT AS NOTED)		ALTRONIC INC.				
NO.	DATE	BY	DESCRIPTION	DECIMAL		TITLE				
1	2-2-89	WTP	REMOVED "N" LEAD FROM JUNCTION BOX; ADDED CPU NOTE	.XXX	±.005	WIRING DIAGRAM - UNSHIELDED				
2				.XX	±.010					
3				FRACTIONAL		DRAWN BY	WTP	SCALE	NONE	PART NUMBER
4				MATERIAL		CHECKED BY		DATE	6-6-88	209 105A
5						APPROVED BY				

NO. OUTPUTS	MEMORY CODE	IGNITION SYSTEM FIRING ORDER
10	J2x, J4x E6A*, E8A*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2
12	L2x, L4x F6x*, F8x*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2-F1-F2
14	N2x, N4x G6A*, G8A*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2-F1-F2-G1-G2
16	P2x, P4x H6x*, H8x*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2-F1-F2-G1-G2-H1-H2
18	R2x, R4x I6A*, I8A*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2-F1-F2-G1-G2-H1-H2-J1-J2
20	T2x, T4x J6x*, J8x*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2-F1-F2-G1-G2-H1-H2-J1-J2-K1-K2
24	X2x, X4x L6x*, L8x*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2-F1-F2-G1-G2-H1-H2-J1-J2-K1-K2-L1-L2-M1-M2
32	Z2x, Z4x P6x*, P8x*	A1-A2-B1-B2-C1-C2-D1-D2-E1-E2-F1-F2-G1-G2-H1-H2-J1-J2-K1-K2-L1-L2-M1-M2-R1-R2-S1-S2-T1-T2-U1-U2

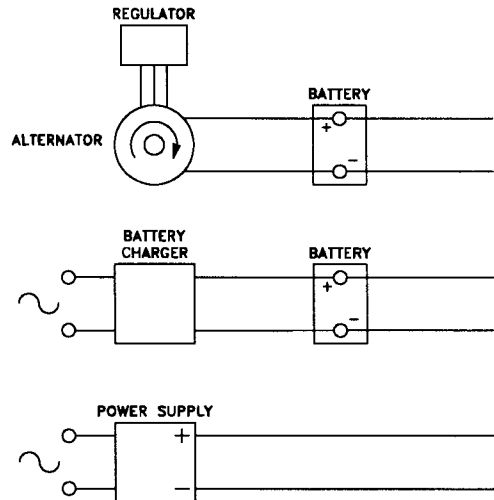
* MEMORY CODES WITH 6 OR 8 CYCLE DESIGNATION ARE USUALLY USED FOR WIRING TWO LEADS TO EACH ENGINE CYLINDER. LEADS A1,A2 CONNECT TO THE TWO COILS OF THE SAME CYLINDER. FOLLOW THE SAME HOOK-UP WITH B1,B2 THEN C1,C2, ETC. ALL EVEN-NUMBERED OUTPUTS (A2,B2,C2, ETC.) CAN BE CUTOFF USING THE MISC INPUT TERMINAL OR AT 200 RPM - SEE SECTION 9.6D. AND OPERATING INSTRUCTIONS FORM CPU-2000 OI.

291 132-1 OUTPUT MODULE

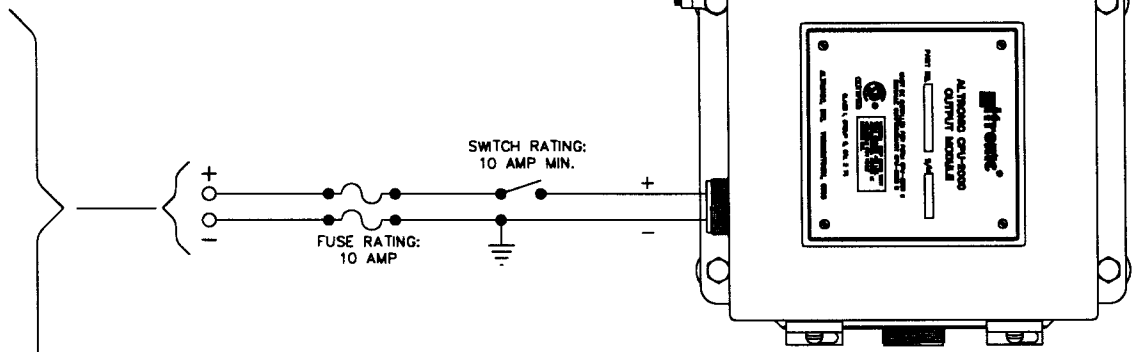


REVISIONS				TOLERANCES EXCEPT AS NOTED		ALTRONIC INC.			
NO.	DATE	BY	DESCRIPTION	DECIMAL	FRACTIONAL	TITLE		PART NUMBER	
1				.XXX - ±.005		CPU-2000 OUTPUT MODULE 291 132-1 HOOK-UP DIAGRAM		209 119	
2				.XX - ±.010					
3						DRAWN BY	WTP	SCALE	NONE
4						CHECKED BY		DATE	1-3-95
5						APPROVED BY			

D.C. POWER SOURCE



POWER SUPPLY SPEC: SEE CHART BELOW.



1. IT IS RECOMMENDED THAT EACH SYSTEM BE CONNECTED SEPARATELY BACK TO THE POWER SOURCE. USE CHART 1 TO DETERMINE THE WIRE SIZE (GAUGE) REQUIRED.

2. IF MULTIPLE UNITS ARE POWERED FROM A SOURCE LOCATED IN A SEPARATE BUILDING, USE CHART 2 TO DETERMINE THE WIRE SIZE (GAUGE) REQUIRED BETWEEN THE POWER SOURCE AND THE ENGINE ROOM. CREATE A COMMON POWER HOOKUP POINT IN THE ENGINE ROOM; THEN USE CHART 1 TO DETERMINE THE WIRE SIZE REQUIRED FROM THIS COMMON POINT TO EACH IGNITION MODULE.

AVERAGE CURRENT DRAW	4-CYCLE	2-CYCLE
SINGLE-STRIKE MODE	$\frac{N \times \text{RPM}}{8,000}$	$\frac{N \times \text{RPM}}{4,000}$
MULTI-STRIKE MODE	$\frac{N \times \text{RPM}}{2,500}$	$\frac{N \times \text{RPM}}{1,250}$

N = NUMBER OF OUTPUTS USED.
MULTIPLY BY NUMBER OF ENGINES FOR TOTAL REQUIREMENT.

OPERATING VOLTAGE REQUIREMENT:

STARTING:	20 VDC MIN.
RUNNING:	24-28 VDC

DISTANCE IN FEET	MINIMUM WIRE GAUGE
UP TO 25	16 AWG
26-40	14 AWG
41-65	12 AWG
66-100	10 AWG
101-160	8 AWG

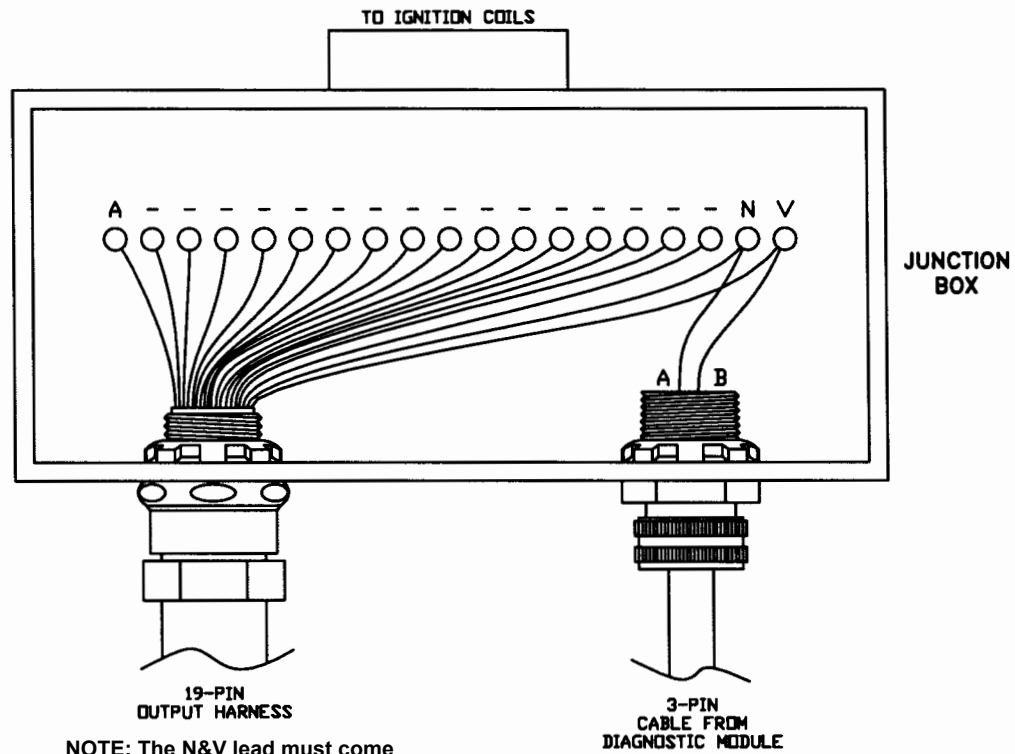
CHART 1

NO. OF SYSTEMS X DISTANCE IN FEET	MINIMUM WIRE GAUGE
26-40	14 AWG
41-65	12 AWG
66-100	10 AWG
101-160	8 AWG
161-250	6 AWG
251-400	4 AWG

CHART 2

NOTE: ABOVE 400, USE MULTIPLE PAIRS OF WIRES FROM THE POWER SOURCE TO THE ENGINE ROOM.

REVISIONS				TOLERANCES (EXCEPT AS NOTED)		ALTRONIC INC.			
NO.	DATE	BY	DESCRIPTION	DECIMAL		TITLE			
1	4-1-96	WTP	ECN 960044	.XXX	±.005	DC POWER HOOKUP CPU-2000 IGNITION SYSTEM		DRAWN BY WTP SCALE .888 PART NUMBER	
2	9-4-97	WTP	ECN 970090	.XX	±.010				
3				FRACTIONAL		CHECKED BY		DATE 2-16-96	
4				MATERIAL		APPROVED BY		209 120	
5									



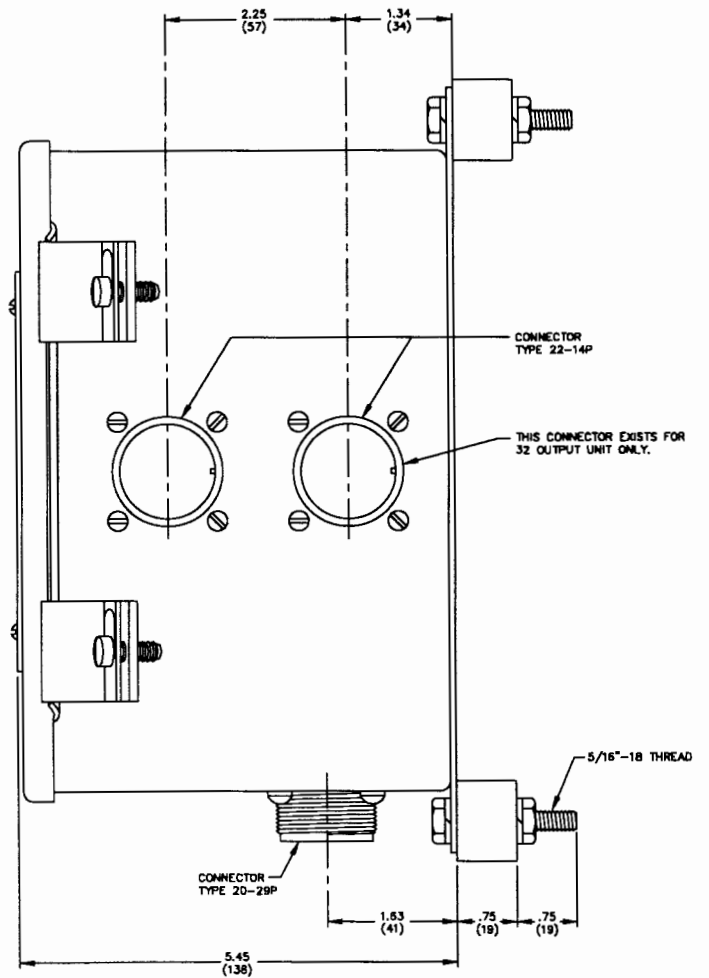
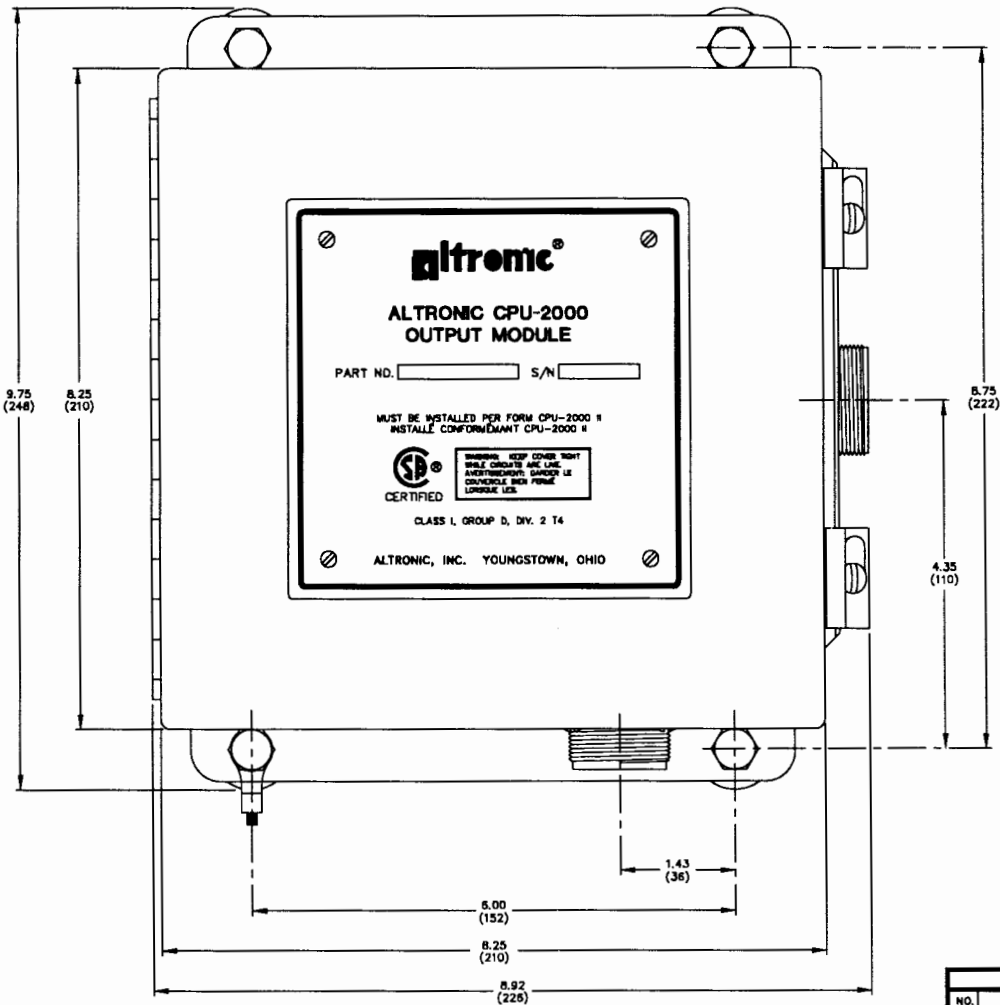
NOTE: The N&V lead must come from connector 1 on the output module. Connector 1 is closest to the output module door.

REVISIONS				TOLERANCES EXCEPT AS NOTED		ALTRONIC INC.			
NO.	DATE	BY	DESCRIPTION	DECIMAL		TITLE			
1				.XXX	±.005	WIRING HOOKUP			
2				.XX	±.010	"N" AND "V" LEADS			
3				FRACTIONAL		DRAWN BY	WTP	SCALE	
4				MATERIAL		CHECKED BY		DATE	
5						APPROVED BY		8-11-97	
							DRAWING NUMBER		209 121

209 121

COMPONENT DRAWINGS

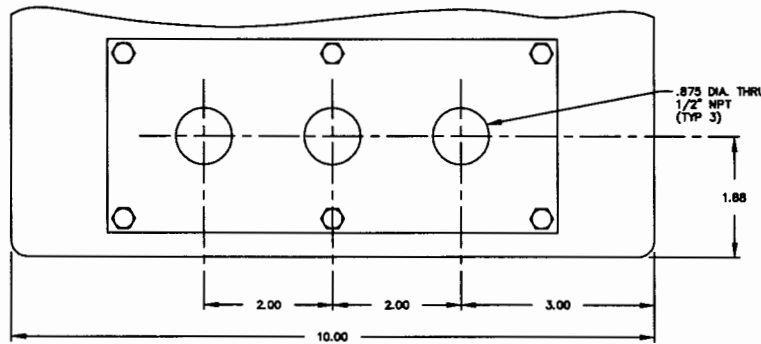
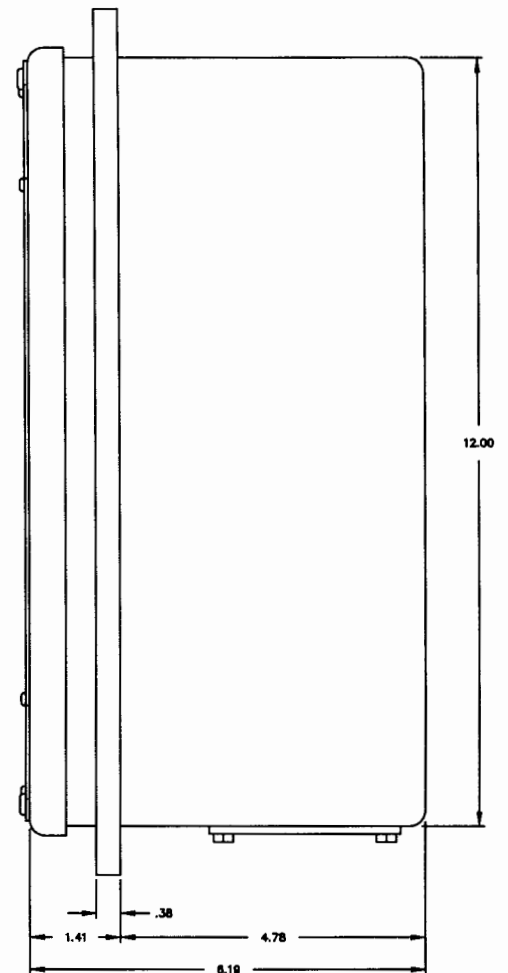
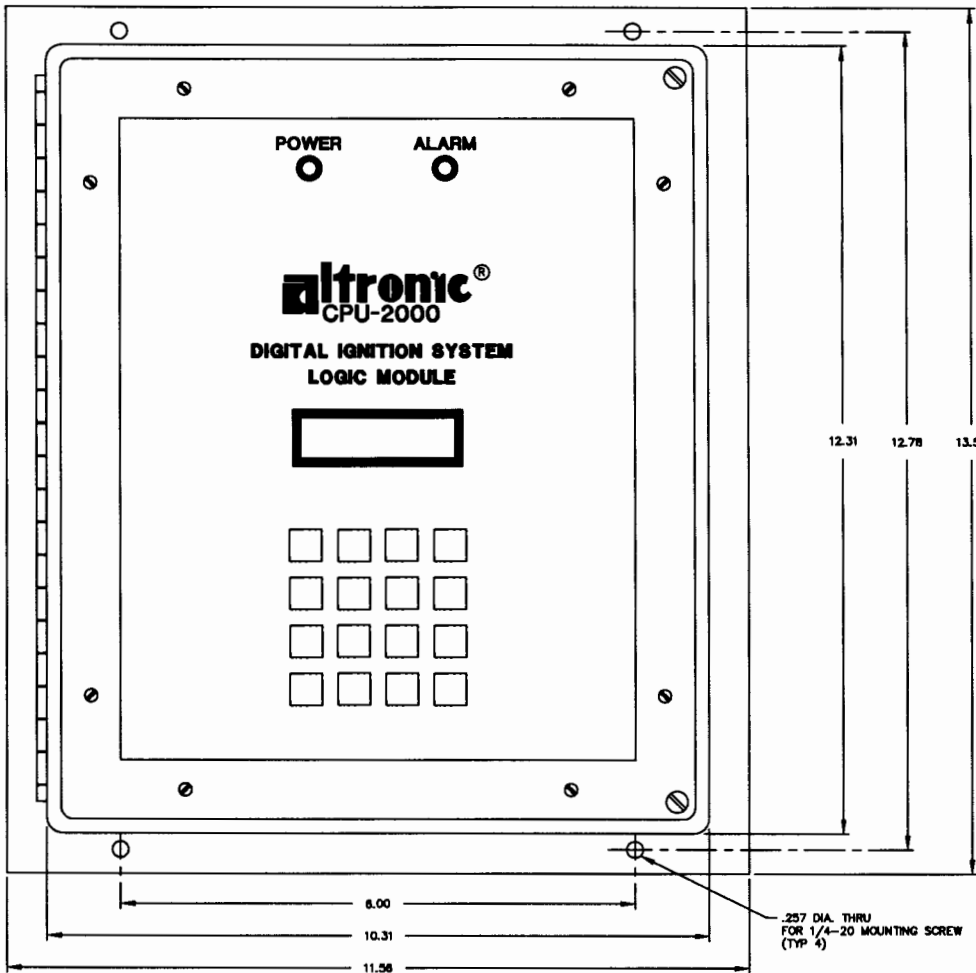
SPECIFICATION	
INPUT VOLTAGE	= 24 VDC 20-32 VDC
INPUT CURRENT	= 5 ADC MAX.
OPERATING TEMP.	= -40°C TO 70° C



DIMENSIONS ARE IN INCHES (mm)

REVISIONS				TOLERANCES (UNLESS AS NOTED)		ALTRONIC INC.	
NO.	DATE	BY	DESCRIPTION	DECIMAL	FRACTIONAL	DRWN BY	DRAWING NUMBER
1	9-4-97	WTP	ECN 970090	.001 - ±.015		WTP	299 102
2				.002 - ±.030			
3							
4							
5							

299 102



SPECIFICATIONS

- OUTPUTS:** 3 SOLID STATE RELAY OUTPUTS (FIRE, ALARM, SHUTDOWN)
 RATED AT 100 VDC/AC @ 75 mA (SINKING)
 1 14 LINE DIGITAL BUS (TO OUTPUT MODULE)
 1 5 LINE DIGITAL BUS (FUTURE EXPANSION MODULE)
- INPUTS:** 1 HALL EFFECT PICK-UP INPUT
 2 MAGNETIC PICK-UP INPUTS (GEAR TOOTH, RESET)
 1 4-20 mA LOOP INPUT (ISOLATED)
 2 DIGITAL INPUTS (GROUND TO ACTIVATE) (SHUTDOWN, MULTI-FUNCTION CONFIGURABLE)
 2 RS485 SERIAL COMMUNICATIONS PORTS (LOGIC MODULE, FUTURE EXPANSION MODULE)

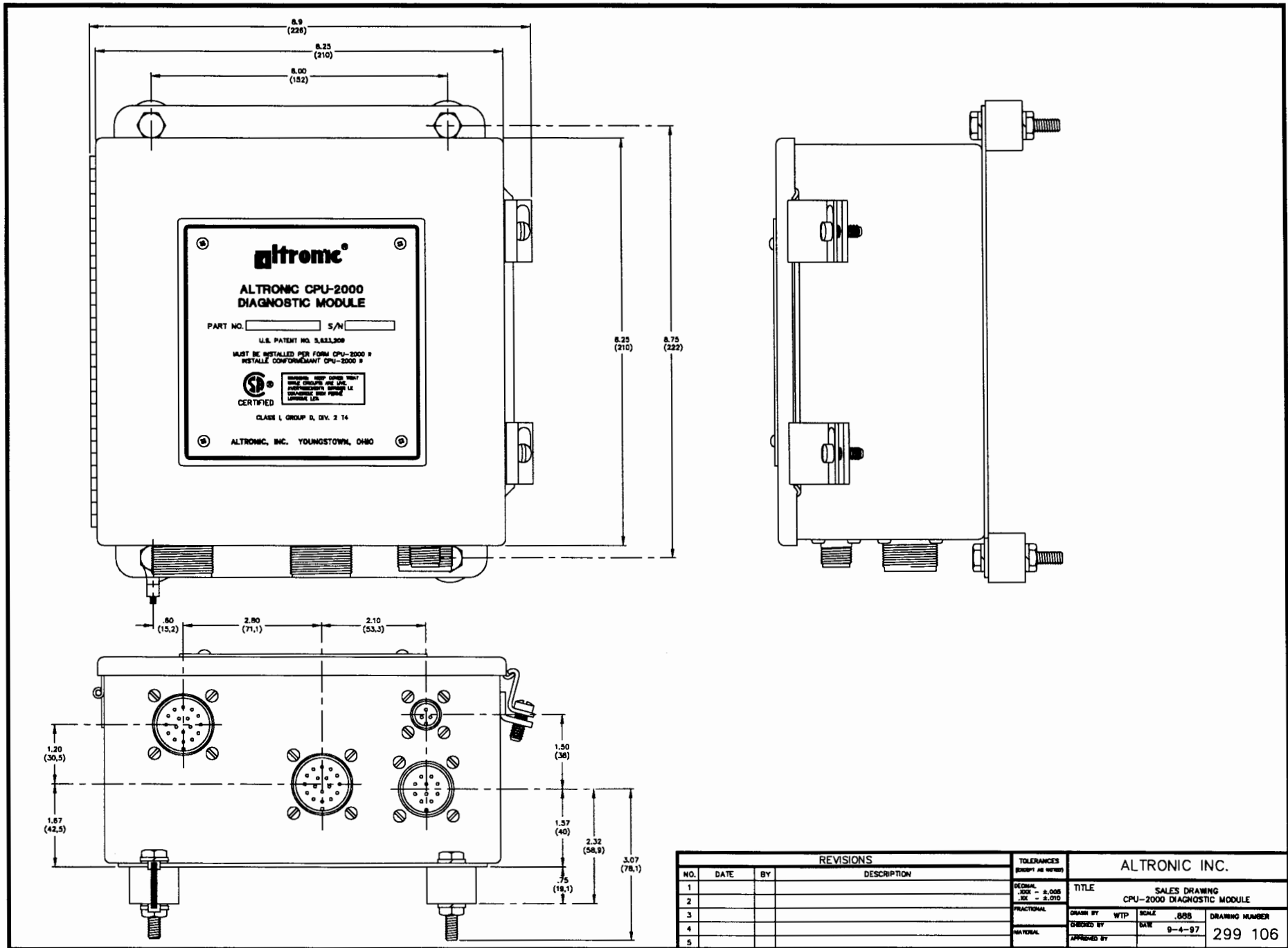
SPECIFICATIONS (CONT.)

- DISPLAY:** 2 X 16 BACKLIT LCD MODULE
POWER: 20-32 VDC, 10 WATTS
PACKAGE: NEMA 4, WEATHERPROOF ENCLOSURE
FIELD CONNECTIONS: PLUG-IN TERMINAL STRIPS IN BOX
 ACCESSED VIA PLATE IN BOTTOM

REVISIONS				TOLERANCES (UNLESS AS NOTED)		ALTRONIC INC.	
NO.	DATE	BY	DESCRIPTION	DECIMAL	FRACTIONAL	DRRAWN BY	TITLE
1	1-30-95	GET	ECN 950000	.001 - .005		GET	SALES DRAWING, CPU-2000 LOGIC MODULE
2				.001 - .010			
3							
4							
5							

SCALE	PART NUMBER
.001	299 103

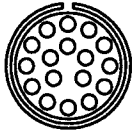
299 103



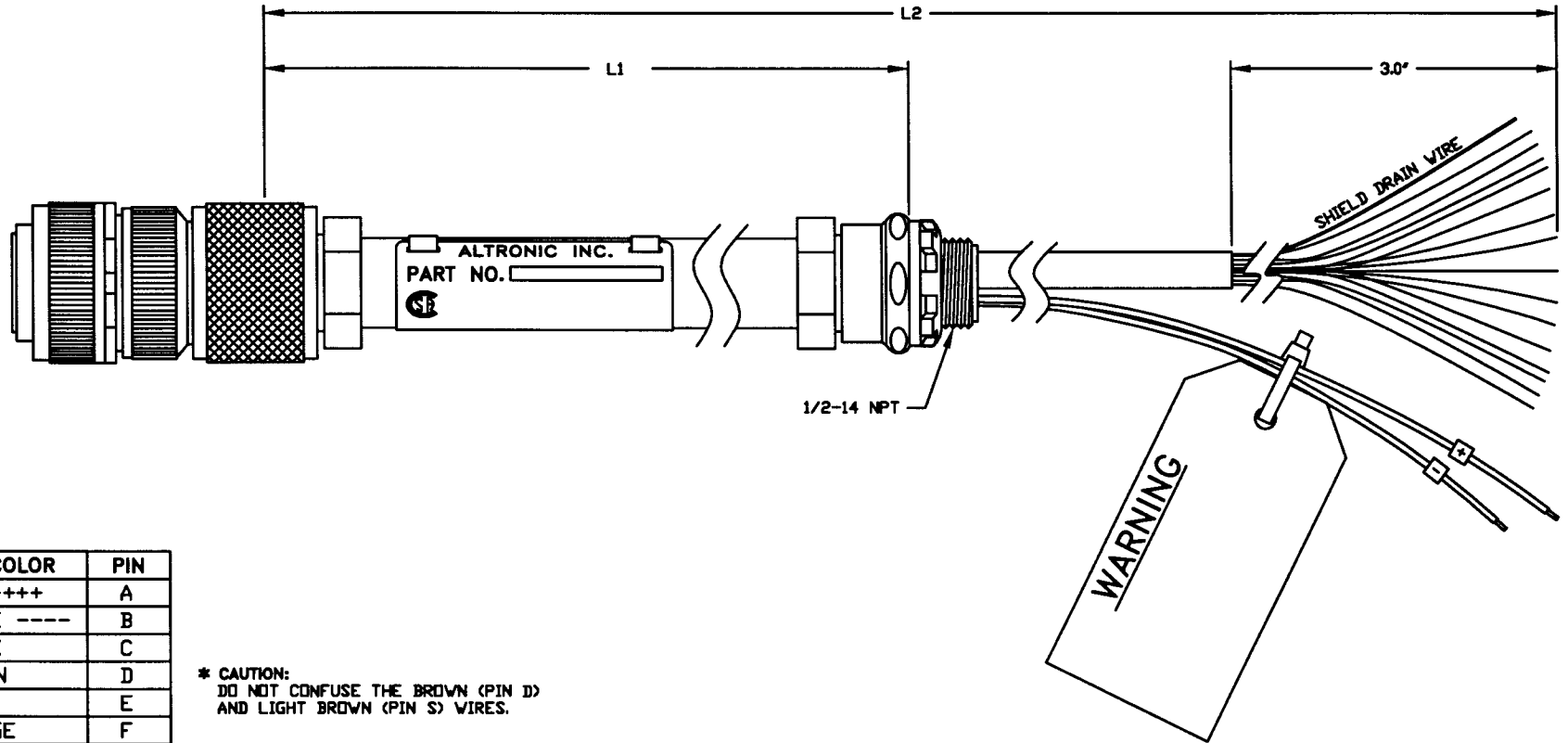
REVISIONS				TOLERANCES (EXCEPT AS NOTED)		ALTRONIC INC.	
NO.	DATE	BY	DESCRIPTION	DECIMAL	FRACTIONAL	TITLE	
1				.005	.010	SALES DRAWING	
2						CPU-2000 DIAGNOSTIC MODULE	
3						DRAWN BY	SCALE .658
4						CHECKED BY	DATE 9-4-97
5						APPROVED BY	DRAWING NUMBER 299 106

1.88708041 4384638E+007
289106.dwg

HARNESS
CONNECTOR PIN
ARRANGEMENT



20-29S



WIRE COLOR	PIN
RED +----	A
WHITE - - - -	B
BLACK	C
* BROWN	D
RED	E
ORANGE	F
YELLOW	G
GREEN	H
BLUE	J
VIOLET	K
GRAY	L
WHITE	M
RED/BLK	N
RED/GRN	P
RED/YEL	R
* LT BRN	S
PINK	T

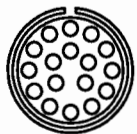
* CAUTION:
DO NOT CONFUSE THE BROWN (PIN D)
AND LIGHT BROWN (PIN S) WIRES.

PART NO.	L1 LENGTH	L2 LENGTH
293030-25	72'	25'
293030-50	72'	50'
293030-75	72'	75'

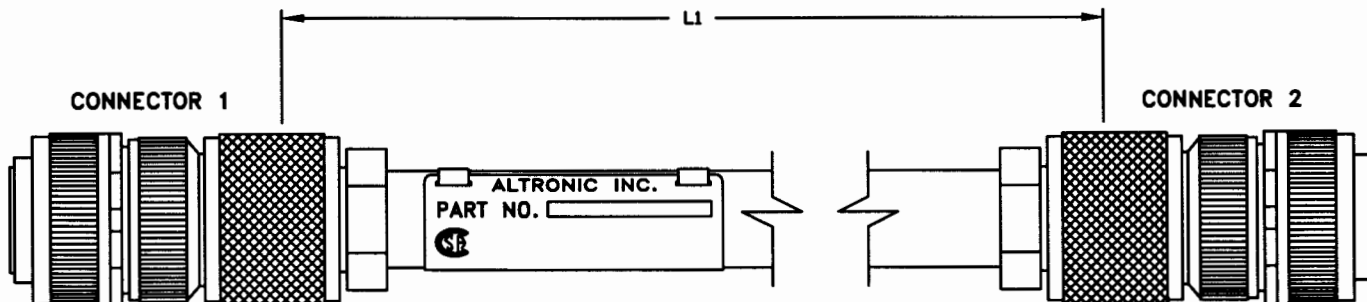
REVISIONS				TOLERANCES (EXCEPT AS NOTED)		ALTRONIC INC.				
NO.	DATE	BY	DESCRIPTION	DECIMAL	FRACTIONAL	TITLE				
1	8-6-97	WTP	ECN 970000	.005		SALES DRAWING SHIELDED HARNESS 293030				
2				.010		DRAWN BY	WTP	SCALE	FULL	PART NUMBER
3						CHECKED BY		DATE	2-19-96	299 104
4						APPROVED BY				
5										

299 104

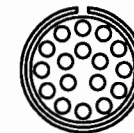
HARNESS
CONNECTOR PIN
ARRANGEMENT



20-29S



HARNESS
CONNECTOR PIN
ARRANGEMENT



20-29S

CONNECTOR 1 PIN	CONNECTOR 2 PIN
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
J	J
K	K
L	L
M	M
N	N
P	P
R	R
S	S
T	T

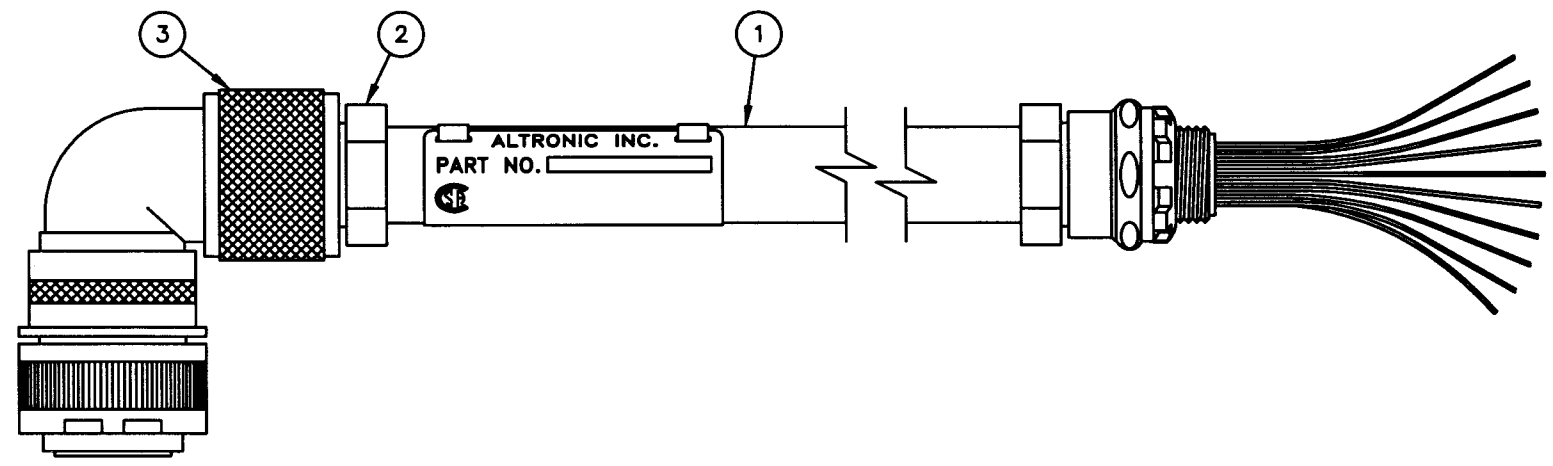
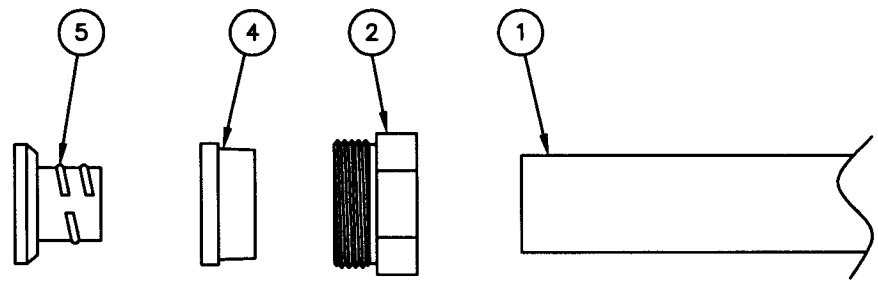
PART NO.	L1 LENGTH
293031-24	24'
293031-48	48'
293031-72	72'

REVISIONS				TOLERANCES EXCEPT AS NOTED		ALTRONIC INC.				
NO.	DATE	BY	DESCRIPTION	DECIMAL .XXX - ±.005 .XX - ±.010	FRACTIONAL	TITLE		DRAWING NUMBER		
1						SALES DRAWING SHIELDED HARNESS 293031			299 105	
2						DRAWN BY	WTP	SCALE		FULL
3						CHECKED BY		DATE		8-6-97
4						APPROVED BY				
5										

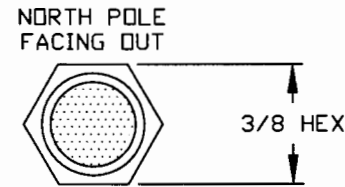
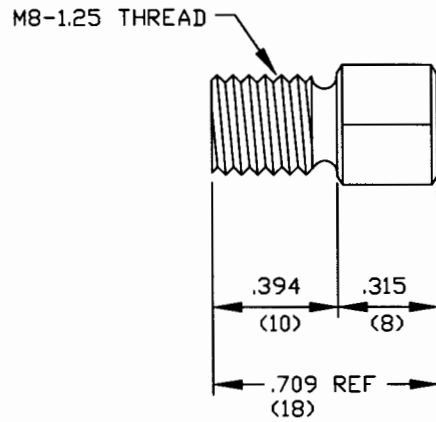
299 105

TO SHORTEN HARNESS

1. LOOSEN AND DISENGAGE NUT (2) AND REMOVE CONDUIT (1) COMPLETELY FROM CONNECTOR AND HARNESS ASSEMBLY (3).
2. REMOVE ITEMS (5), (4), AND (2) IN THAT ORDER FROM CONDUIT (1). NOTE THREADS ON (5).
3. CUT CONDUIT TO LENGTH WITH HACKSAW AND DRESS WITH FILE TO INSURE A CLEAN, SQUARE END. REMOVE FILINGS FROM INSIDE CONDUIT.
4. REINSTALL ITEMS (2), (4), AND (5) IN THAT ORDER.
5. INSTALL REASSEMBLED CONDUIT INTO (3) AND TIGHTEN (2).



REVISIONS				TOLERANCES (EXCEPT AS NOTED)		ALTRONIC INC.			
NO.	DATE	BY	DESCRIPTION	DECIMAL		TITLE			
1	3-14-92	WTP	REDRAWN ON CAD	.XXX	±.005	SHIELDED HARNESS CONDUIT LENGTH ADJUSTMENT			
2				.XX	±.010	DRAWN BY	DWA	SCALE	NONE
3						CHECKED BY		DATE	5-28-85
4						APPROVED BY		PART NUMBER	
5								509 025	



REVISIONS

NO.	DATE	BY	DESCRIPTION
1			
2			
3			
4			
5			

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

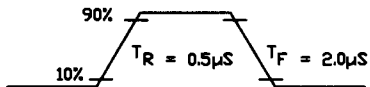
ALTRONIC INC.

TITLE		MAGNET ASSEMBLY SALES DRAWING	
DRAWN BY	WTP	SCALE	2X
CHECKED BY		DATE	1-27-88
APPROVED BY		PART NUMBER	
		720 002	

SPECIFICATIONS:

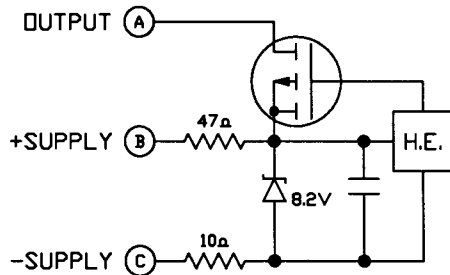
SUPPLY VOLTAGE: 5 TO 8 VOLTS D.C.
 SUPPLY CURRENT: 50 mA. MAX.
 OUTPUT VOLTAGE @ 5 mA.: SUPPLY VOLTAGE MINUS 1.0 VOLT MAX.
 OUTPUT CURRENT SOURCING: 10 mA. MAX.
 STORAGE AND OPERATING TEMP.: -40°C TO +125°C
 -40°F TO +257°F
 ENCAPSULATED IN GLASS-FILLED EPOXY SUITABLE FOR ENGINE OIL OR OTHER NON-CONDUCTIVE MEDIA ONLY.
 MAXIMUM OPERATING PRESSURE: 50 psi DIFFERENTIAL

TYPICAL OUTPUT WAVEFORM

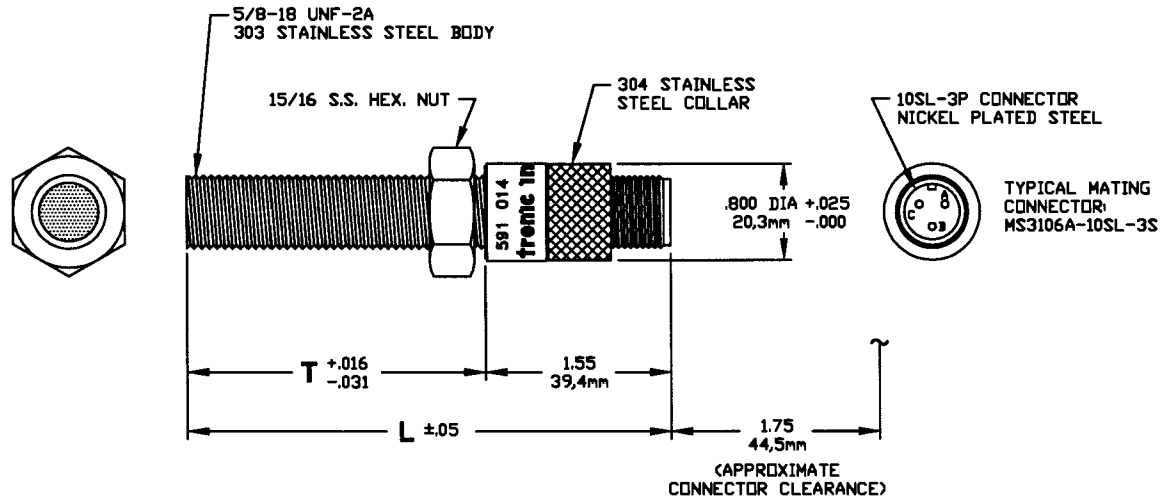


TRIGGERED BY THE NORTH POLE OF MAGNET 5 VOLT SUPPLY 1KΩ LOAD

SCHEMATIC



ALTRONIC P/N	T	L
591014-2	2.50"/63,5mm	4.05"/102,8mm
591014-4	4.50"/114,3mm	6.05"/153,7mm



NOTE:

1. NORTH POLE OF MAGNET MUST FACE SENSING END WITH AIR GAP OF .030/.040 (.76/1.0).
2. CENTERLINE OF MAGNET'S ROTATION MUST RUN THROUGH CENTERLINE OF PICKUP.

REVISIONS

NO.	DATE	BY	DESCRIPTION
1	10-8-90	WTP	REDRAWN ON CAD
2	8-6-92	WTP	UPDATED TITLE
3	11-5-96	WTP	ECN 960134
4	9-2-97	WTP	ECN 970105
5			

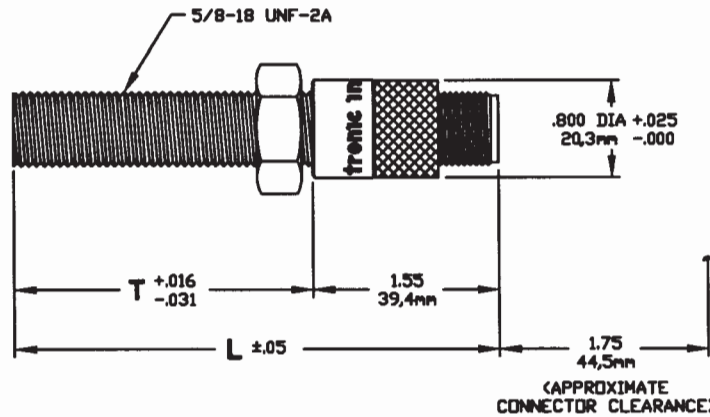
TOLERANCES (EXCEPT AS NOTED)
DECIMAL
FRACTIONAL
MATERIAL

ALTRONIC INC.

TITLE SALES DRAWING, HALL EFFECT PICKUP

DRAWN BY	SCALE	FULL	DRAWING NUMBER
DWA	1-26-88		591 014

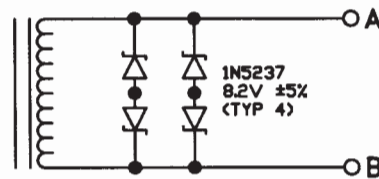
591 014



***NOTE:**

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

ELECTRICAL DATA *	
MAX. COIL INDUCTANCE	420 mH
MIN. COIL RESISTANCE	800-1200 Ω



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				TOLERANCES (EXCEPT AS NOTED)		ALTRONIC INC.			
NCL	DATE	BY	DESCRIPTION	DECIMAL	FRACTIONAL	TITLE		PART NUMBER	
6	8-7-92	WTP	UPDATED	.005		MAGNETIC PICKUP SALES DRAWING		691 118	
7				.010					
8						BROWN BY	DWA	SCALE	FULL
9						CHECKED BY		DATE	3-16-81
10						APPROVED BY			