

ALTRONIC, INC.
712 TRUMBULLAVE.
GIRARD, OHIO 44420

**DIS. IGNITION SYSTEM
500 SERIES**

IMPORTANT SAFETY NOTICE

PROPER INSTALLATION, MAINTENANCE, REPAIR AND OPERATION OF THIS EQUIPMENT IS ESSENTIAL. THE RECOMMENDED PRACTICES CONTAINED HEREIN SHOULD BE FOLLOWED WITHOUT DEVIATION. AN IMPROPERLY INSTALLED OR OPERATING IGNITION SYSTEM COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

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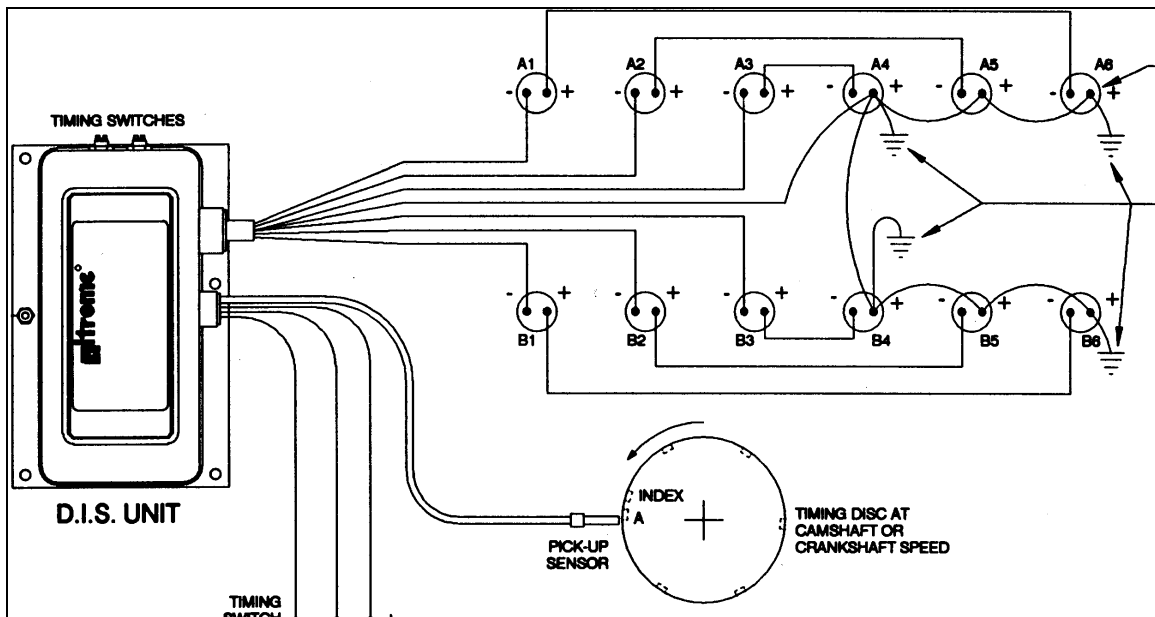
1.0 DESCRIPTION

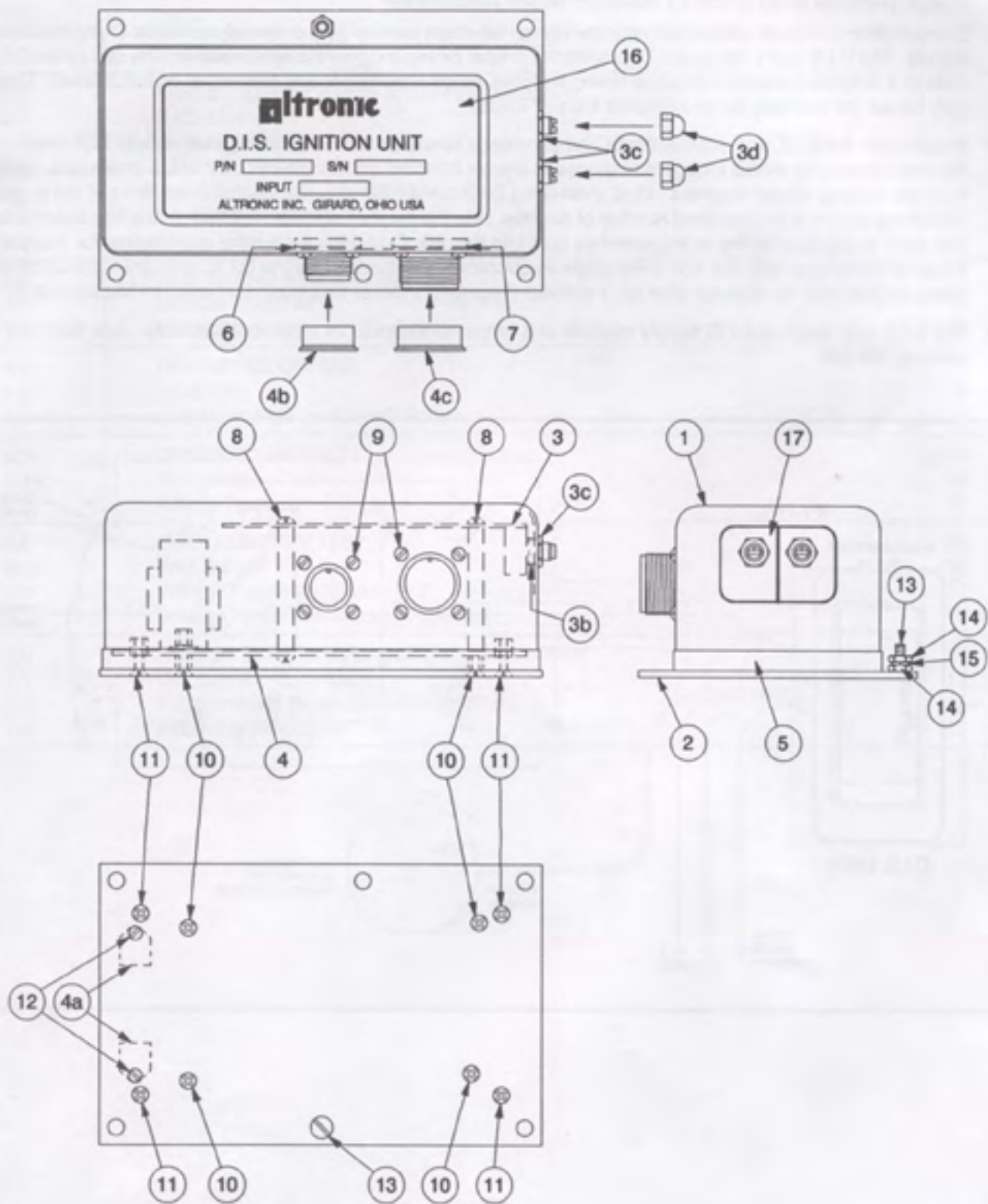
1.1 The Altronic D.I.S. is a microcircuit based, digital ignition system for spark ignited engines fueled by natural gas, LPG or gasoline. The system has no wearing parts and uses the capacitor discharge principle providing high energy, precision times sparks for maximum engine performance.

Crankshaft or camshaft referenced magnets with a Hall-effect pick-up give extremely accurate timing reference signals. The D.I.S. unit's microcircuits provide the proper timing and distribution functions. The 500 series D.I.S. units (3-8 outputs) have two 8-position timing switches which allow two timing settings to be established. These may be set, for example, for two different fuels or loads.

1.2 In operation, the D.I.S. unit steps up the DC supply voltage to charge an energy storage capacitor. SCR switching devices release this stored energy in response to signals from the unit's logic circuitry which processes signals from the rotating trigger magnets. Most even-firing D.I.S. units have one magnet for every firing of the engine; each firing occurs a programmed number of degrees after the magnet signal is received. In the 500 series units, this delay is adjusted by the timing switches built into the unit. Odd-firing units have one magnet for every two firings of the engine with the odd firing angle electronically synthesized by the D.I.S. circuitry. One additional index magnet trails 15 degrees after no. 1 cylinder magnet to indicate that another revolution has started.

1.3 The D.I.S. unit requires a DC supply capable of 5 amps continuous, 25 amp peak currents – see form DIS II, drawing 709 050.





2.0 PARTS IDENTIFICATION AND SPECIFICATION

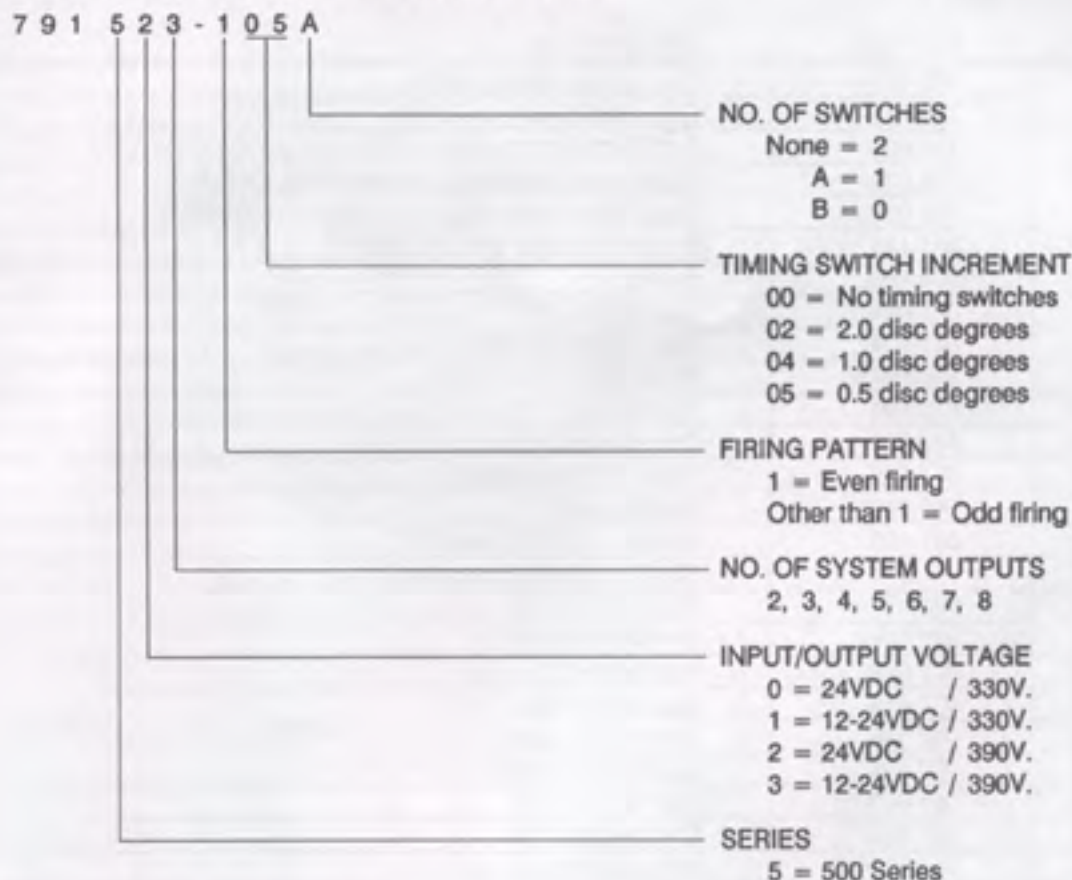
2.1 PARTS LIST - D.I.S. UNIT

REF. NO.	QTY.	PART NO.	DESCRIPTION
1	1	710 031-1	Can - single timing switch
		710 031-2	Can - dual timing switches
2	1	710 030	Bottom plate
3	1	772 026-1	Logic board assembly - single timing switch
		772 026-2	Logic board assembly - dual timing switches
3a	AR	604 125	Program jumper (not illustrated)
3b	1,2	610 199	O-ring
3c	1,2	902 621	Nut 3/8-32
3d	1,2	601 431	Cap - timing switch
4	1	See below	Power board assembly
4a	2	610 193	Insulator
4b	1	510 540	Cap - 6-pin connector
4c	1	604 122	Cap - 10-pin connector
5	1	610 049	Gasket - can
6	1	501 335	Gasket - 6-pin connector
7	1	501 372	Gasket - 10-pin connector
8	4	902 561	Screw 8-32 x 1/2
9	8	902 064	Screw 6-32 x 3/8
10	4	902 615	Seal screw 8-32 x 1/4
11	4	902 616	Seal screw 8-32 x 7/8
12	2	902 595	Screw 6-32 plastic
13	1	902 596	Screw 10-32 x 5/8
14	2	901 682	Nut 10-32
15	1	901 004	Lockwasher #10
16	1	702 001	Label - D.I.S. part no.
17	1	702 003	Label - single timing switch
		702 004	Label - dual timing switches

POWER BOARD ASSEMBLY (4)

D.I.S. UNIT	
791 503-102	781 011-11
791 513-102	781 011-11
791 523-102	781 011-11H
791 523-104A	781 011-11H
791 523-105A	781 011-51H
791 504-102	781 011-21
791 514-102	781 011-21
791 524-102	781 011-21H
791 505-102	781 011-34
791 506-102	781 011-31
791 506-104	781 011-31
791 506-202	781 011-33
791 506-402	781 011-32
791 506-502	781 011-32
791 508-102	781 011-42
791 508-104	781 011-41
791 508-202	781 011-42

2.2 D.I.S. UNIT PART NO. - The D.I.S. units are available with various numbers of outputs, even or odd firing patterns. The part no. identifies the various factors as follows:



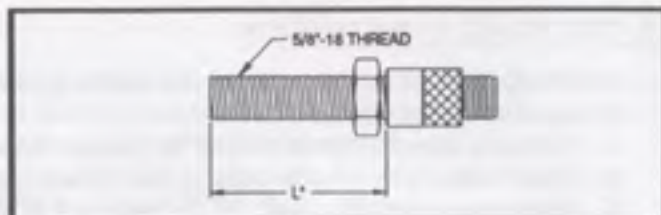
2.3 D.I.S. UNIT SPECIFICATION CHART

D.I.S. PART NO.	MAGNET DISC	SWITCH INCREMENT	FIRING PATTERN - DISC DEGREES							SCOPE PATTERN		
			A	B	C	D	E	F	H		I	
791 503-102	3 + 1	2°	0	-120	-240						a	
791 513-102	3 + 1	2°	0	-120	-240						a	
791 523-102	3 + 1	2°	0	-120	-240						b	
791 523-104A	3 + 1	1°	0	-120	-240						b	
791 523-105A	6 + 1	0.5°	0	-120	-240						b	
791 504-102	4 + 1	2°	0	-90	-180	-270					c	
791 514-102	4 + 1	2°	0	-90	-180	-270					c	
791 524-102	4 + 1	2°	0	-90	-180	-270					c*	
791 505-102	5 + 1	2°	0	-72	-144	-216	-288					d
791 506-102	6 + 1	2°	0	-60	-120	-180	-240	-300				e
791 506-104	6 + 1	1°	0	-60	-120	-180	-240	-300				f
791 506-202	3 + 1	2°	0	-90	-120	-210	-240	-330				g
791 506-402	3 + 1	2°	0	-45	-120	-165	-240	-285				h
791 506-502	3 + 1	2°	0	-30	-120	-150	-240	-270				i
791 508-102	4 + 1	2°	0	-45	-90	-135	-180	-225	-270	-315		k
791 508-104	8 + 1	1°	0	-45	-90	-135	-180	-225	-270	-315		m
791 508-202	4 + 1	2°	0	-30	-90	-120	-180	-210	-270	-300		n

* Pattern should have the higher amplitude of pattern b.

2.4 HALL-EFFECT PICK-UP 791 050 SERIES

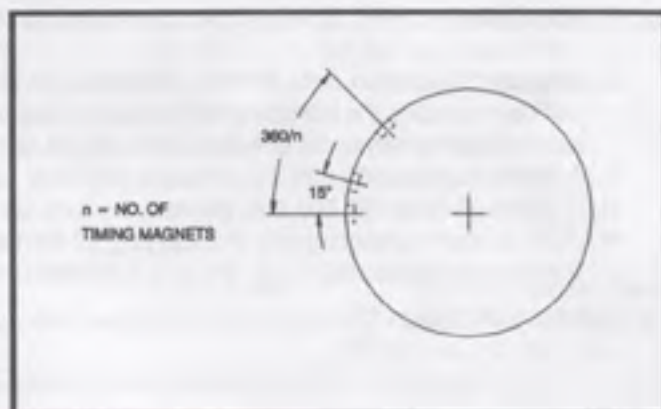
PART NO.	LENGTH "L"
791 050-1	1.75"
791 050-2	2.5"
791 050-4	4.5"



2.5 TRIGGERING MAGNETS

A. 790 10x MAGNET DISC

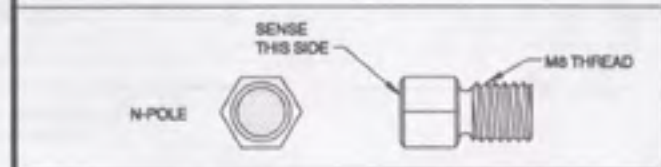
MAGNETS	7.45" DIA.	5.00" DIA.
2 + 1	790 102-1	790 112-1
3 + 1	790 103-1	790 113-1
4 + 1	790 104-1	790 114-1
5 + 1	790 105-1	790 115-1
6 + 1	790 106-1	790 116-1
8 + 1	790 108-1	790 118-1



B. 720 001 MAGNET BUTTON - .437 DIA.



C. 720 002 MAGNET - 8MM THREAD



2.6 WIRING HARNESSSES

PART NO.	CONNECTOR / PINS	CYLS. / L1*	APPLICATION	NOTES
793 004-3	180° / 10	3,6 / 72"	harness	b
793 004-4	180° / 10	4,8 / 72"	harness	b
793 004-6	180° / 10	6,12 / 72"	harness	b
793 004-8	180° / 10	8,16 / 72"	harness	b
793 006-3	180° / 10	3,6 / 180"	harness	b
793 006-4	180° / 10	4,8 / 180"	harness	b
793 006-6	180° / 10	6,12 / 180"	harness	b
793 006-8	180° / 10	8,16 / 180"	harness	b
793 007-2	180° / 3 + 180° / 6	- / 60"	pick-up cable	b
793 007-3	180° / 3 + 180° / 6	- / 100"	pick-up cable	b
793 007-4	180° / 3 + 180° / 6	- / 80"	pick-up cable	b
793 007-5	180° / 3 + 180° / 6	- / 120"	pick-up cable	b

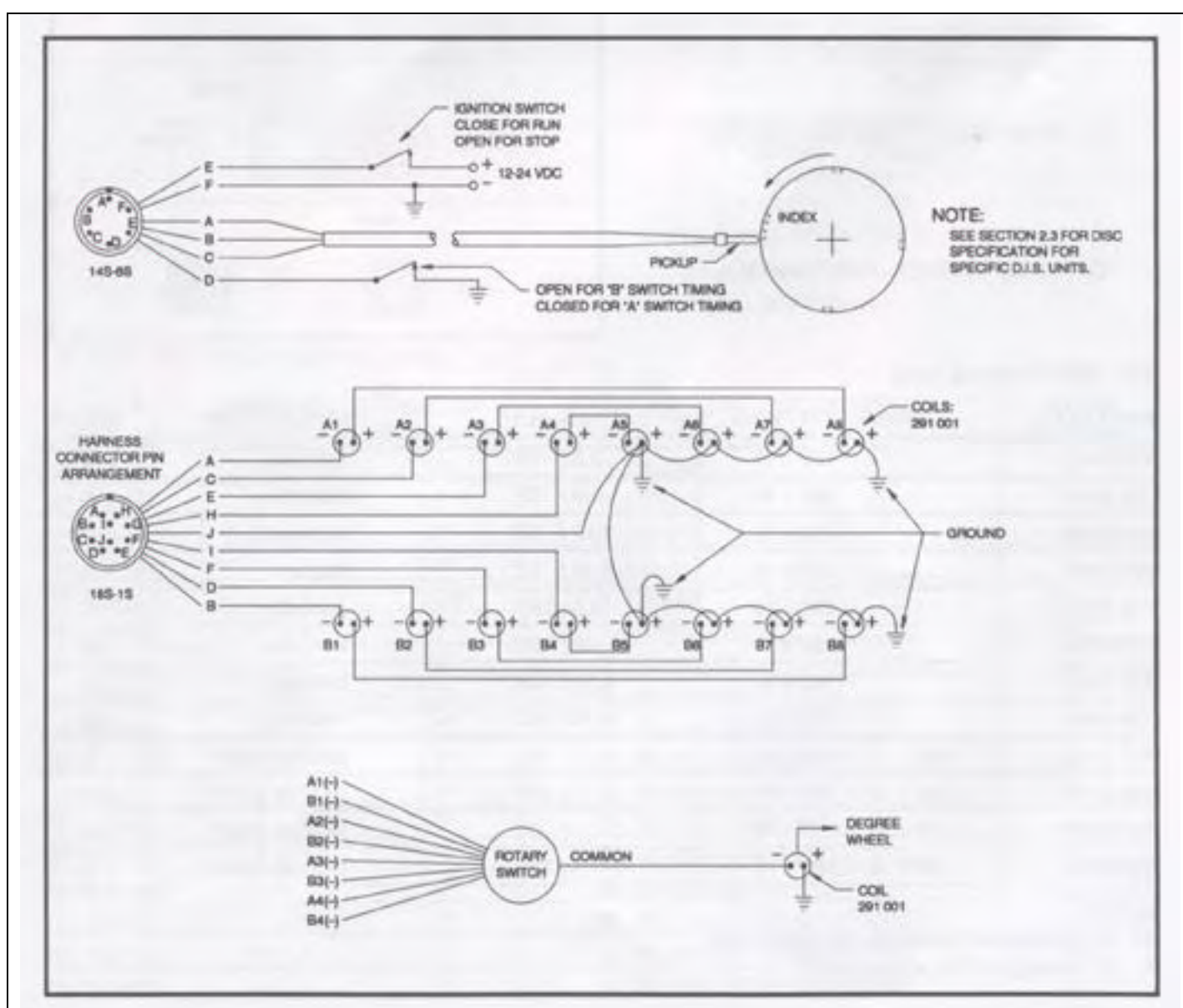
NOTES:

b) All 180 degree connectors are potted type.

* L1 = length of 16 ga. conductor

3.0 TEST STAND REQUIREMENTS

- 3.1 MATERIAL REQUIRED - In order to test a D.I.S. ignition system, a specialized test stand is required comprised of the following items:
- A. A variable speed motor of 0.25 HP or greater, capable of rotating 1,800 RPM.
 - B. A spark degree wheel graduated in 360 increments with the indicator attached to the driving shaft.
 - C. An attachment for either the 5.00" diameter or 7.45" diameter magnet discs for the D.I.S. system to be mounted to the motor driving shaft.
 - D. A Hall-effect pick-up 791 050-2 mounted to sense the rotating magnet disc - see installation instructions form DISH, drawing 709102.
 - E. Sixteen (16) ignition coils 291 001 connected to suitable, adjustable spark gaps. Additionally, one 291 001 coil connected to the indicating degree wheel and an arrangement to connect its negative terminal individually to the negative terminals of coils A1 -A4 and B1 -B4.
 - P. A wiring harness 793 008-8 connecting the D.I.S. unit to the ignition coils.
 - G. A wiring harness 793 007-2 to connect the pick-up 791 050-2 to the D.I.S. unit.
 - H. A DC power source capable of supplying 12-24VDC, 5 amps.
 1. A means to elevate the D.I.S. unit to a controlled temperature of 150" P. (65" C.).
- 3.2 WIRING DIAGRAM - The test stand should be constructed and wired as shown below.



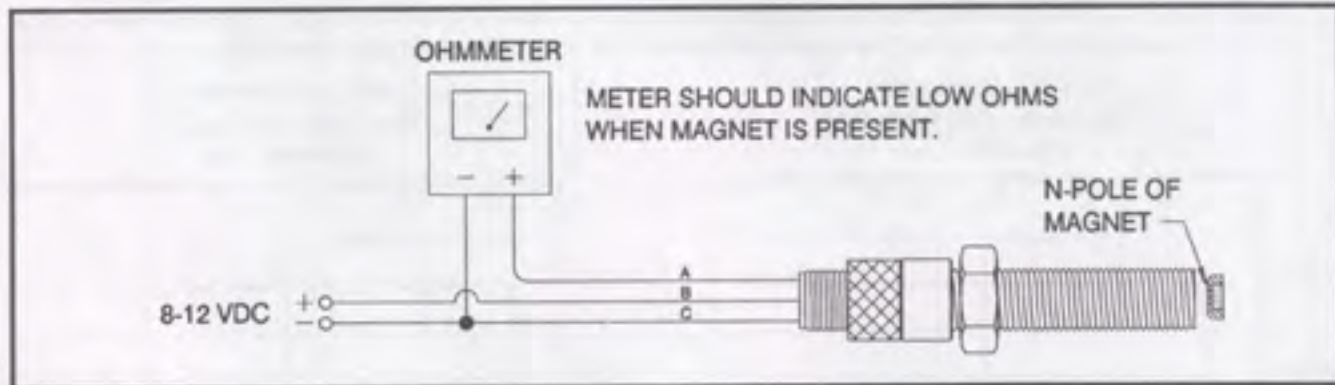
4.0 OHMMETER CHECKS

- 4.1 D.I.S. UNIT - Use Simpson Model 260 or equivalent analog volt-ohmmeter. The checks below, if outside the range indicated, establish a bad unit. A unit with a normal reading may still be defective; only the full performance check using an oscilloscope (see sections 5.0 and 6.0) can confirm correct operation.

TEST	OHMMETER SCALE	NEGATIVE LEAD	POSITIVE LEAD	READING
D.I.S.-500 10-pin connector	R x 10,000	Pin "G" Pin "G" Pin "G" Pin "G" Pin "G" Pin "G" Pin "G" Pin "G"	Pin "A" Pin "B" Pin "C" Pin "D" Pin "E" Pin "F" Pin "H" Pin "I"	*Infinite - replace power board (4) if reading is below 250,000 ohms.
D.I.S.-500 10-pin connector	R x 10,000	Pin "G"	Ground stud	*Infinite - replace power board (4) if reading is below 250,000 ohms.
D.I.S.-500 6-pin connector	R x 100	Pin "F"	Pin "E"	Infinite - replace power board (4) if reading is below 1,000 ohms.

*NOTE: The ohmmeter needle will deflect and then move to a final infinite reading within 2 seconds.

- 4.2 HALL-EFFECT PICK-UP 791 050-x - A source of 8 to 12 volt DC is required in addition to an ohmmeter. The DC source may be a small battery or a commercial power supply. Use one of the D.I.S. system magnets - see section 2.5.



5.0 OPERATIONAL TEST

5.1 PERFORMANCE TEST - Apply the appropriate voltage (see section 2.2) and operate the magnet disc at the speed indicated for each test.

DISC RPM	INPUT VOLTAGE	TEST
25 RPM	10 VDC	All outputs fire a 15mm gap
900 RPM	24 VDC	All outputs fire a 15mm gap
1,800 RPM	24 VDC	All outputs fire a 15mm gap

5.2 TIMING TEST - Refer to section 2.3 for the information for the particular D.I.S. unit being tested. If performance does not meet the indicated specification, change the logic board assembly (3).

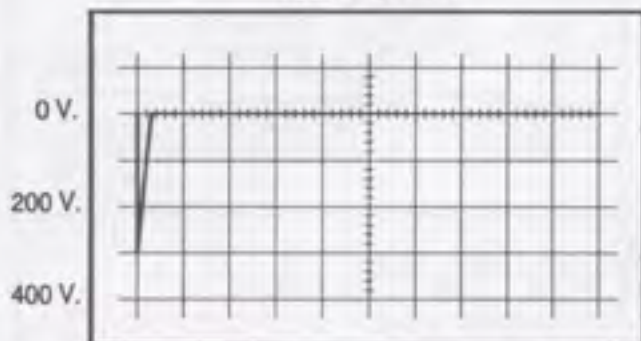
- Setting the degree wheel at "0" degrees for output "A", the timing pattern for the remaining outputs should match that shown in the chart of section 2.3.
- With the "D" lead (6-pin connector) grounded, check that the timing changes by the proper Switch Increment according to the chart of section 2.3 when Switch A is adjusted from position 7 to 6, 6 to 5, etc. Switch position 7 should be the most advanced timing, position 0 most retarded.
- With the "D" lead (6-pin connector) open, check that the timing changes by the proper Switch Increment according to the chart of section 2.3 when Switch B is adjusted from position 7 to 6, 6 to 5, etc. Switch position 7 should be the most advanced timing, position 0 most retarded.

6.0 OSCILLOSCOPE TEST

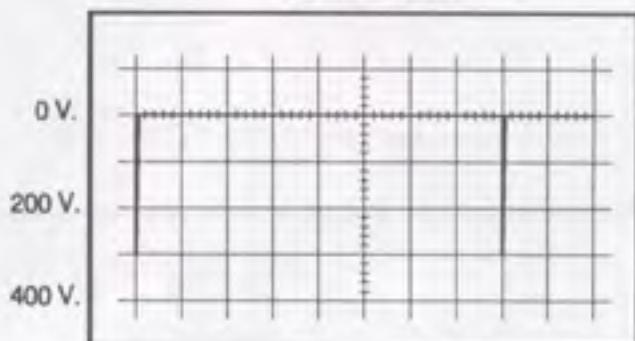
6.1 TEST SET-UP - Two 100:1 oscilloscope probes are required. NOTE: The signals being monitored are 300-400 volts, negative polarity. It is recommended that these tests be performed with the D.I.S. unit heated to a temperature of 150° F. (65° C.).

6.2 VOLTAGE PATTERN AT THE IGNITION COIL - Connect the oscilloscope trigger input and reading probe to the negative (-) coil terminal and ground. The patterns shown are common to all 330 volt D.I.S. units (see section 2.2); units with 390 volt output will have a similar pattern but about 60 volts higher amplitude.

Coil (-) Connection
Time Base - 500 μ sec/div.
750 RPM - Disc



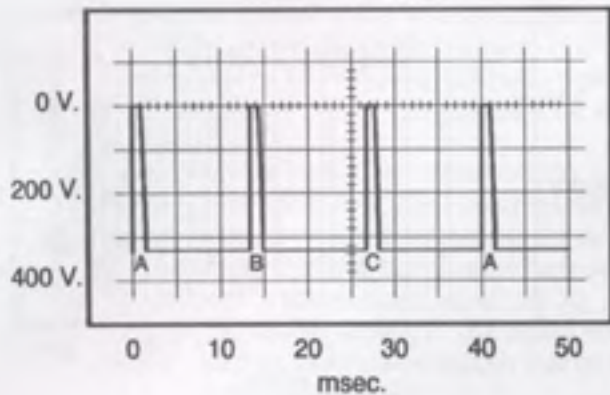
Coil (-) Connection
Time Base - 5 msec/div.
750 RPM - Disc



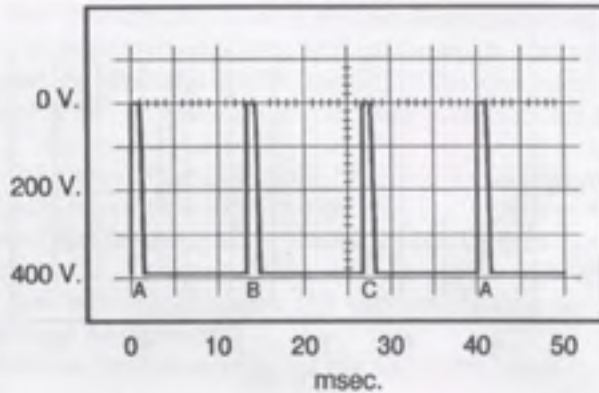
6.3 VOLTAGE PATTERN ON THE STORAGE CAPACITOR

- The trigger input of the oscilloscope should be connected to the "A" primary coil lead. NOTE: This is a 300V. negative polarity signal.
- Connect the oscilloscope reading probe to the "G" lead of the 10-pin connector test harness 793 008-8. The "G" lead pattern displays all firings of the unit. Refer to section 2.3 for reference to the proper pattern for the specific D.I.S. unit being tested; the normal capacitor patterns are shown on the following two pages.
- To test on an actual Installation, use the Altronic D.I.S. Test Box (part no. 791 500-1) or an adaptor harness made for the purpose of making the "G" pin accessible.

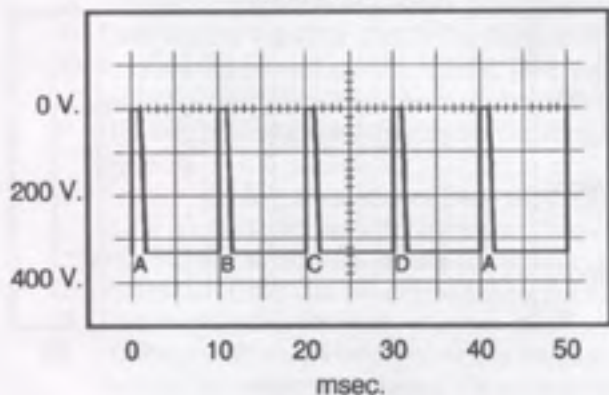
Scope Pattern " a "
791 503-102, 791 513-102
1,500 RPM - Disc



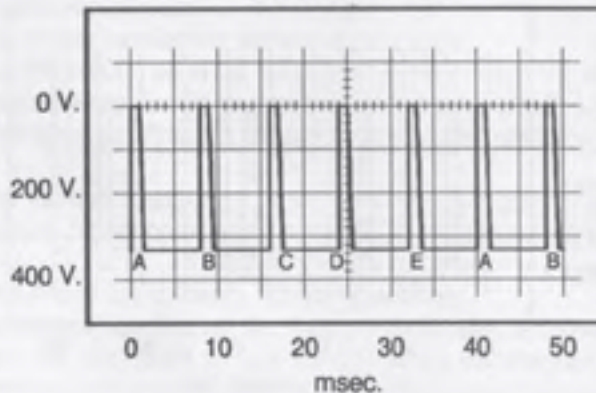
Scope Pattern " b "
791 523-102, 791 523-104A, 791 523-105A
1,500 RPM - Disc



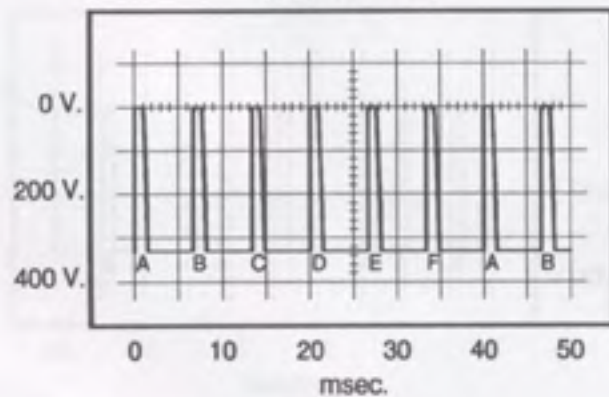
Scope Pattern " c "
791 504-102
1,500 RPM - Disc



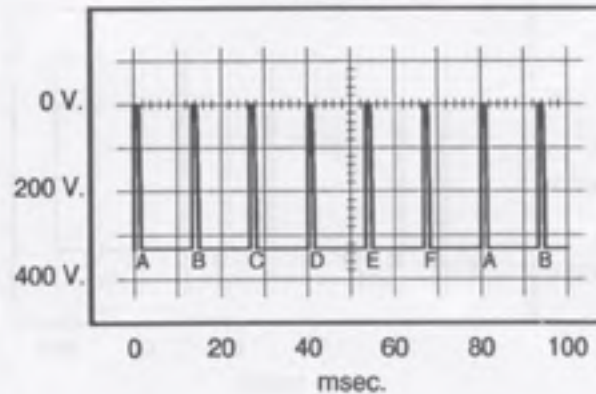
Scope Pattern " d "
791 505-102
1,500 RPM - Disc



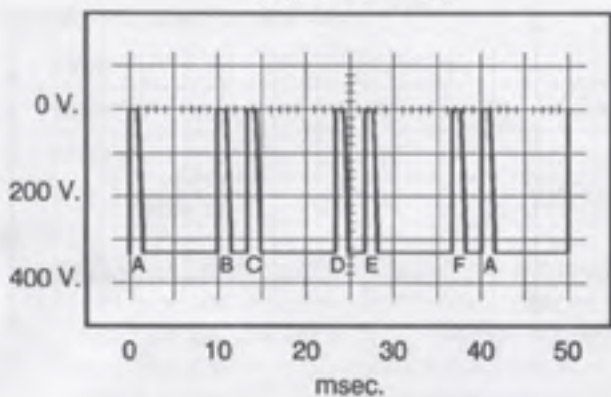
Scope Pattern " e "
791 506-102
1,500 RPM - Disc



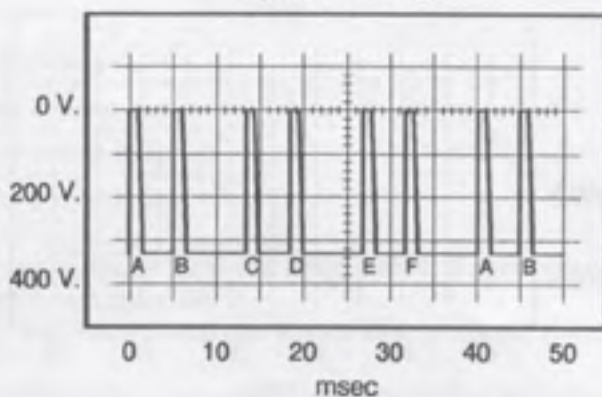
Scope Pattern " f "
791 506-104
750 RPM - Disc



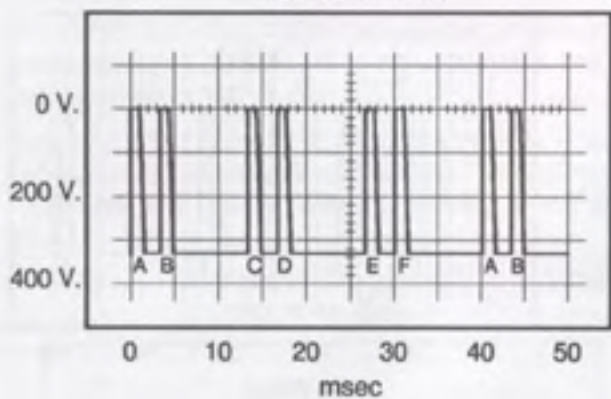
Scope Pattern "g"
791 506-202
1,500 RPM - Disc



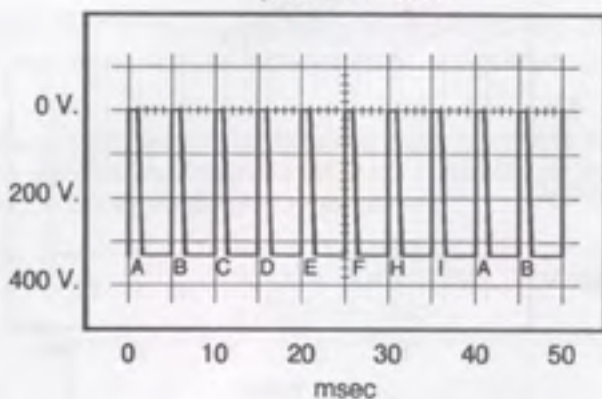
Scope Pattern "h"
791 506-402
1,500 RPM - Disc



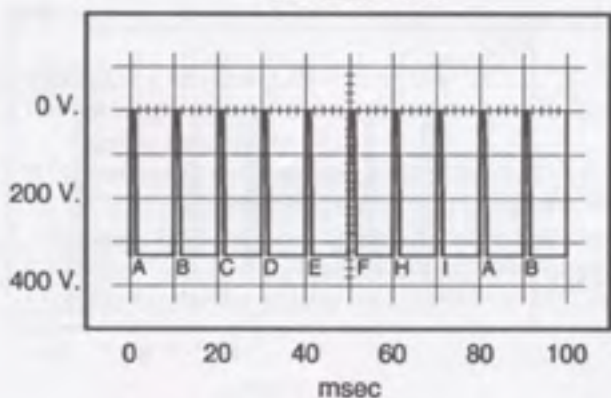
Scope Pattern "i"
791 506-502
1,500 RPM - Disc



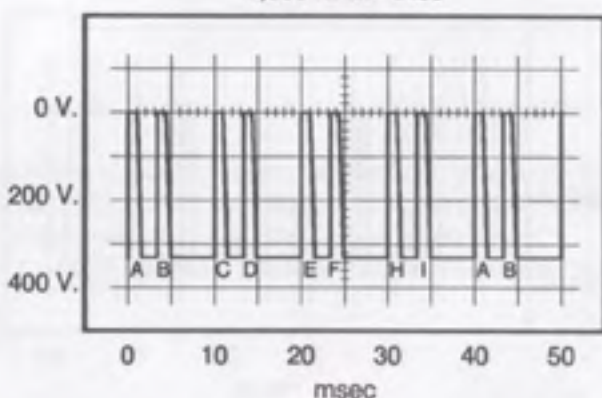
Scope Pattern "k"
791 508-102
1,500 RPM - Disc



Scope Pattern "m"
791 508-104
750 RPM - Disc



Scope Pattern "n"
791 508-202
1,500 RPM - Disc



7.0 CIRCUIT BOARD REPLACEMENT PROCEDURE

7.1 DISASSEMBLY PROCEDURE

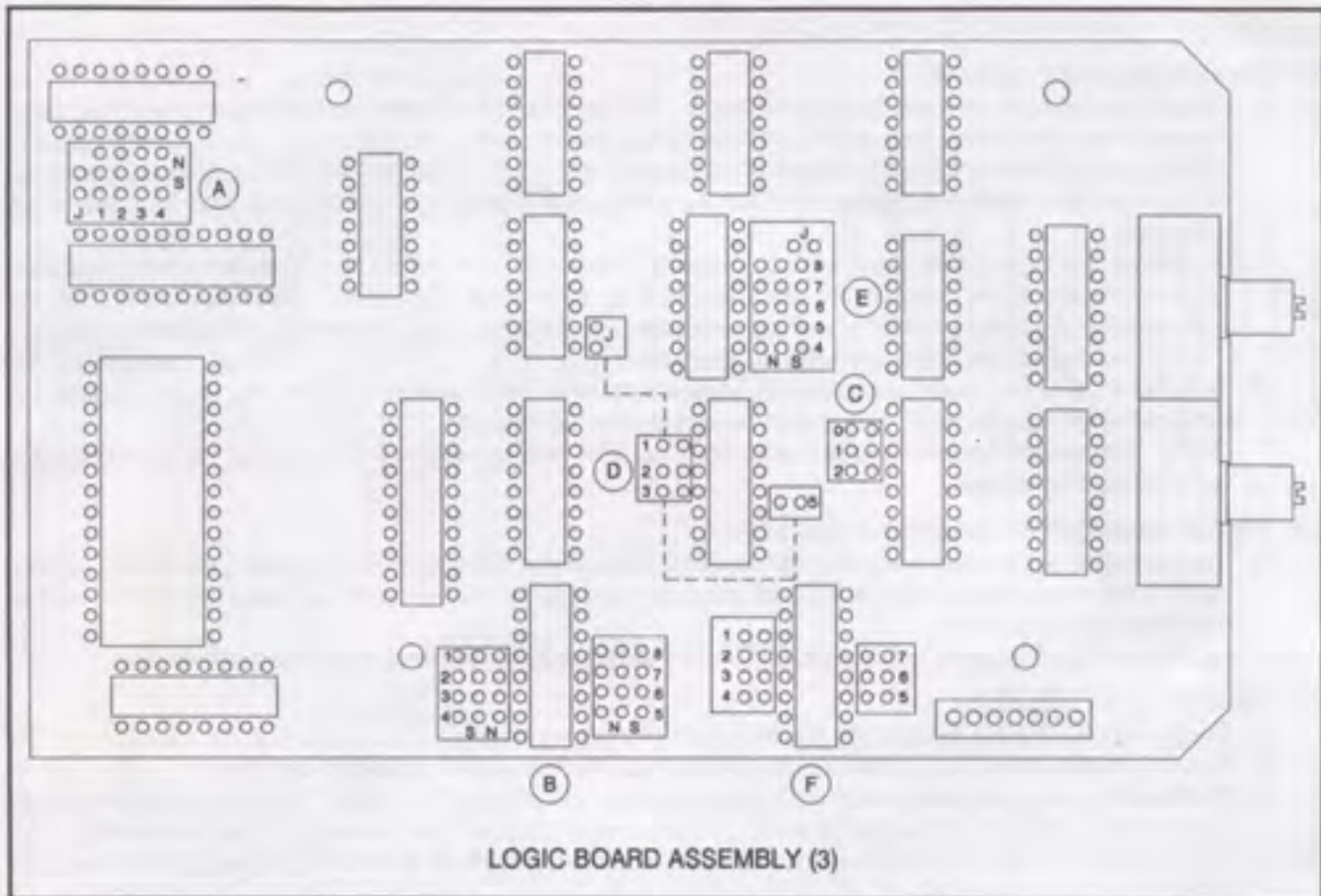
- A. Loosen and remove all the following hardware: The hex nuts (3c) holding the two timing switches, eight connector screws (9) and four screws (11) through the bottom plate. Carefully push the two connectors into the enclosure. While holding the bottom plate, loosen the enclosure and tilt upwards at the end opposite the timing switches. Slide the enclosure off of the timing switch bushings and lift away from the rest of the assembly.
- B. To remove the logic board assembly (3), loosen and remove four screws (8). Carefully unplug the ribbon cable connector at the power board assembly (4) and remove the logic board. NOTE: On older units, the ribbon cable connector is soldered to the power board. In this case, if either board (3) or (4) must be replaced, it is recommended that both boards be exchanged.
- C. To remove the power board assembly (4), loosen and remove four screws (10) and two plastic screws (12) through the bottom plate (2). The power board can now be removed.
NOTE: Exchange all power boards that do NOT have an orange capacitor at the end of the board near the large transformer.

7.2 PROGRAMMING REPLACEMENT LOGIC BOARD

- A. If replacing the logic board assembly, the new logic board must be programmed correctly for the application. Refer to the drawing and chart on the next page for the location of the program jumpers (3a) and be sure all are in the correct position.
NOTE: The D.I.S. unit will operate properly only if all the program Jumpers are correctly installed.

7.3 ASSEMBLY PROCEDURE

- A. Check the condition of gaskets (5), (6), and (7); replace if necessary.
- B. Examine the insulator (4a) on the bottom of the two power transistors; replace if damaged.
- C. Position the power board assembly (4) in place over the bottom plate (2). NOTE: The two connectors should be on the opposite side of the plate from the ground screw (13). Install four screws (10) and two plastic screws (12) into place loosely; then tighten starting first with screws (10) which should be torqued to 18 in.-lbs (0.21 kgm).
- D. Position the logic board assembly (3) in place over the four standoffs. Be sure the two O-rings (3b) are in place on the timing switch bushings. Plug in the ribbon cable connector into the socket on the power board (4). Install four screws (8) and tighten securely.
- E. At this point, the unit should be tested per sections 5.0 and 6.0 to insure correct operation.
- P. To complete the assembly process, position the enclosure can (1) over the finished assembly. Start the two connectors through their respective holes and move the enclosure so that the two timing switches emerge through the holes in the end of the enclosure. Work the enclosure into final position; then install four screws (11) and torque to 12 in.-lbs. (0.14 kgm). Install and tighten all connector screws (9) and the two timing switch nuts (3c).
- G. Retest the completely assembled unit per sections 5.0 and 6.0 to insure correct operation.
- H. Reinstall timing switch caps (3d) and connector caps (4b) and (4c).



LOGIC BOARD PROGRAMMING CHART

D.I.S. PART NO.	POSITION A	POSITION B	POSITION C	POSITION D	POSITION E	POSITION F
	J-1-2-3-4	1-2-3-4-5-6-7-8	0-1-2	1-2-3-5-J	4-5-6-7-8-J	1-2-3-4-5-6-7
791 503-102	- N S - -	N N N S N N N S	- - X	X - - X -	- - - N - X	- - - - - -
791 513-102	- N S - -	N N N S N N N S	- - X	X - - X -	- - - N - X	- - - - - -
791 523-102	- N S - -	N N N S N N N S	- - X	X - - X -	- - - N - X	- - - - - -
791 523-104A	- N S - -	N N N S N N N S	- X -	X - - X -	- - - N - X	- - - - - -
791 523-105A	- - N S -	N N S N N N S S	X - -	- - X X -	- - - N - X	- - - - - -
791 504-102	X - - N -	N S S N N S N S	- - X	X - - X -	- - - N - X	- - - - - -
791 514-102	X - - N -	N S S N N S N S	- - X	X - - X -	- - - N - X	- - - - - -
791 524-102	X - - N -	N S S N N S N S	- - X	X - - X -	- - - N - X	- - - - - -
791 505-102	- N - S -	N N N S S S N S	- - X	X - - X -	- - - N - X	- - - - - -
791 506-102	- - N S -	N N S N N N S S	- - X	X - - X -	- - - N - X	- - - - - -
791 506-104	- - N S -	N N S N N N S S	- X -	X - - X -	- - - N - X	- - - - - -
791 506-202	- N S - -	N N N S N N N S	- - X	X - - X -	- - - N X	- - X X X X -
791 506-402	- N S - -	N N N S N N N S	- - X	X - - X -	- - - N X	- X - X X - X
791 506-502	- N S - -	N N N S N N N S	- - X	X - - X -	- - - N X	- - X X X X -
791 508-102	X - - N -	N S S N N S N S	- - X	X - - X -	- - - N X	- - X X X - X
791 508-104	X - - - N	S S N N S N S S	- X -	X - - X -	N - S - -	- - - - - -
791 508-202	X - - N -	N S S N N S N S	- - X	X - - X -	- - - N X	- - X X X X -