

**ALTRONIC, INC.
712 TRUMBULL AVE.
GIRARD, OHIO 44420**

**DISN IGNITION SYSTEM
400 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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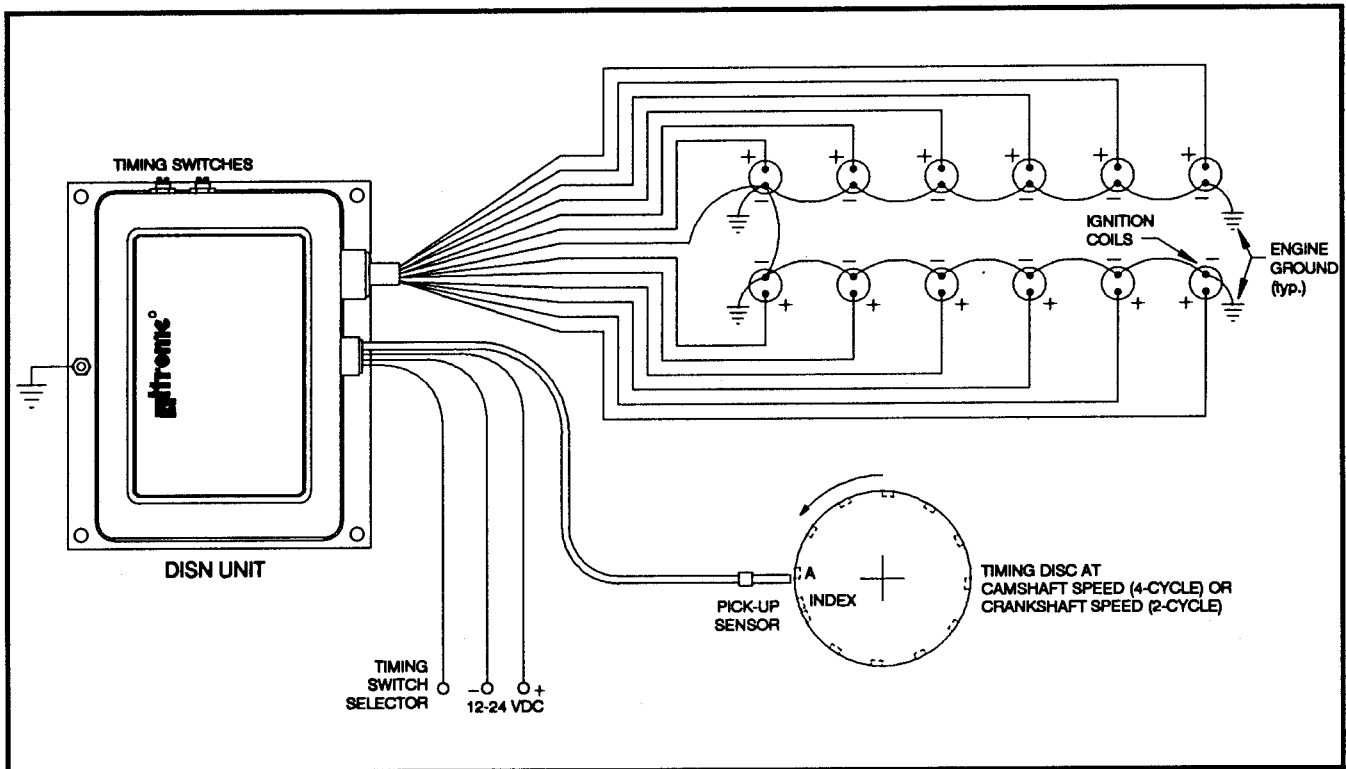
1.0 DESCRIPTION

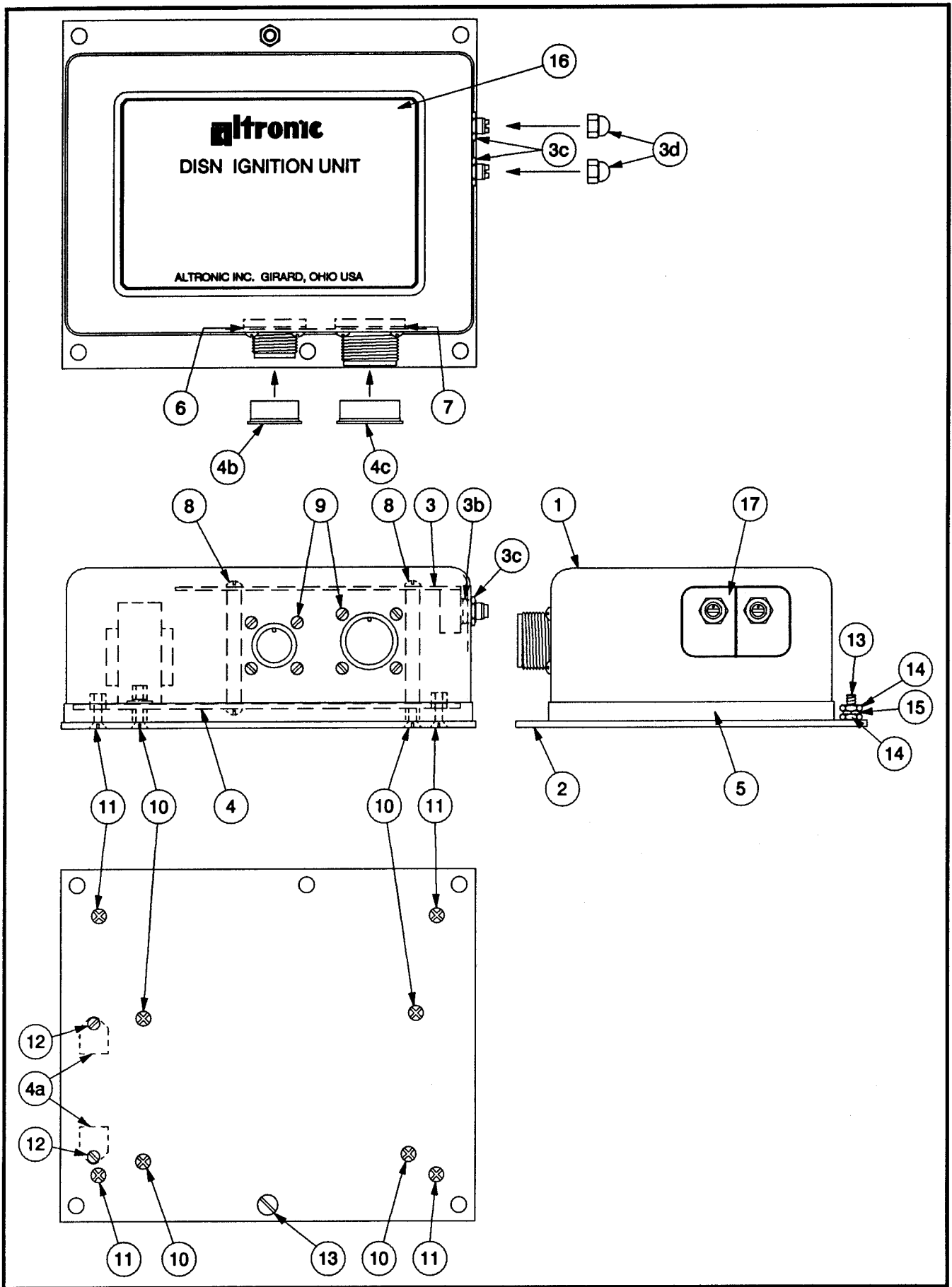
1.1 The Altronic DISN is a microcircuit based, digital ignition system for spark ignited engines fueled by natural gas, LPG or gasoline. The system has no wearing parts and uses the capacitor discharge principle providing high energy, precision timed sparks for maximum engine performance.

Crankshaft or camshaft referenced magnets with a Hall-effect pick-up give extremely accurate timing reference signals. The DISN unit's microcircuits provide the proper timing and distribution functions. The 400 series DISN units (4-16 outputs) have two 16-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 DISN 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 DISN 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 400 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 DISN circuitry. One additional index magnet trails 10-15 degrees after the last magnet; the DISN unit recognizes this as the index signal that another revolution is to begin.

1.3 The DISN unit requires a DC supply capable of 12-24 VDC, 5 amps continuous - see form DISN400 II, drawing 709 400.





2.0 PARTS IDENTIFICATION AND SPECIFICATION

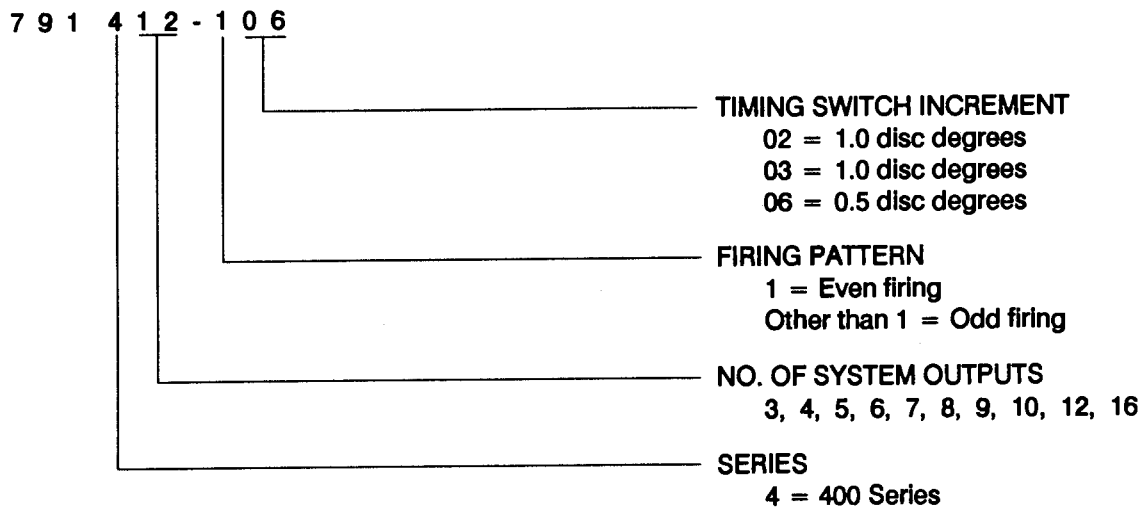
2.1 PARTS LIST - DISN UNIT

REF. NO.	QTY.	PART NO.	DESCRIPTION
1	1	710 050	Can - 4-8 output unit
		710 051	Can - 10-16 output unit
2	1	710 049	Bottom plate
3	1	772 026-3	Logic board assembly
3a	AR	604 125	Program jumper (not illustrated)
3b	2	610 199	O-ring
3c	2	902 621	Nut 3/8-32
3d	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
		510 517	Cap - 19-pin connector
5	1	610 049	Gasket - can
6	1	501 335	Gasket - 6-pin connector
7	1	501 372	Gasket - 10-pin connector
		501 222	Gasket - 19-pin connector
8	4	902656	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 017A	Label - DISN part no.
17	1	702 014	Label - timing switches

DISN UNIT	POWER BOARD ASSEMBLY (4)
791 403-103	781 015-1D
791 404-103	781 015-1C
791 404-106	781 015-1C
791 405-106	781 015-1B
791 406-106	781 015-1A
791 408-106	781 015-2A
791 410-106	781 015-3B
791 410-206	781 015-3B
791 412-106	781 015-3A
791 412-202	781 015-3A
791 412-206	781 015-3A

DISN UNIT	POWER BOARD ASSEMBLY (4)
791 412-406	781 015-3A
791 412-606	781 015-3A
791 412-706	781 015-3A
791 412-806	781 015-3A
791 412-906	781 015-3A
791 416-102	781 015-41
791 416-106	781 015-41
791 416-206	781 015-42
791 416-406	781 015-41
791 416-706	781 015-41

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



2.3 DISN UNIT SPECIFICATION CHART

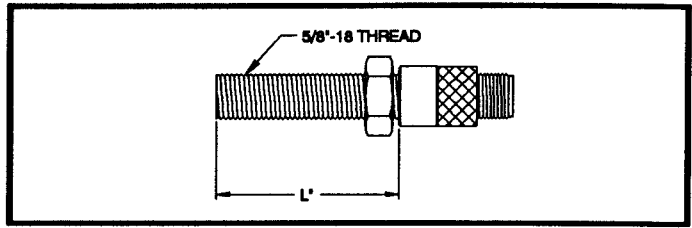
DISN PART NO.	MAGNET DISC	SWITCH INCREMENT	FIRING PATTERN - DISC DEGREES A - B - C - D - E - F - H - I	SCOPE PATTERN
791 403-103	3 + 1	1.0	0-120-240	a
791 404-103	4 + 1	1.0	0- 90-180-270	b
791 404-106	4 + 1	0.5	0- 90-180-270	c
791 405-106	5 + 1	0.5	0- 72-144-216-288	d
791 406-106	6 + 1	0.5	0- 60-120-180-240-300	e
791 408-106	8 + 1	0.5	0- 45- 90-135-180-225-270-315	f

DISN PART NO.	MAGNET DISC	SWITCH INCREMENT	FIRING PATTERN - DISC DEGREES A - B - C - D - E - F - K - L - M - N - P - R - S - T - U - V	SCOPE PATTERN
791 410-106	10 + 1	0.5	0- 36 - 72- 108 -144- 180 -216- 252 -288- 324	g
791 410-206	5 + 1	0.5	0- 27 - 72- 99 -144- 171 -216- 243 -288- 315	h
791 412-106	12 + 1	0.5	0- 30 - 60- 90 -120- 150 -180- 210 -240- 270 -300- 330	i
791 412-202	6 + 1	0.5	0- 15 - 60- 75 -120- 135 -180- 195 -240- 255 -300- 315	k
791 412-206	6 + 1	0.5	0- 15 - 60- 75 -120- 135 -180- 195 -240- 255 -300- 315	k
791 412-406	6 + 1	0.5	0- 22.5- 60- 82.5-120-142.5-180-202.5-240-262.5-300-322.5	m
791 412-606	6 + 1	0.5	0- 24 - 60- 84 -120- 144 -180- 204 -240- 264 -300- 324	n
791 412-706	6 + 1	0.5	0- 27.5- 60- 87.5-120-147.5-180-207.5-240-267.5-300-327.5	p
791 412-806	6 + 1	0.5	0- 20 - 60- 80 -120- 140 -180- 200 -240- 260 -300- 320	q
791 412-906	6 + 1	0.5	0- 28 - 60- 88 -120- 148 -180- 208 -240- 268 -300- 328	p
791 416-102*	8 + 1	0.5	0- 22.5- 45- 67.5- 90-112.5-135-157.5-180-202.5-225-247.5-270-292.5-315- 337.5	r
791 416-106	8 + 1	0.5	0- 22.5- 45- 67.5- 90-112.5-135-157.5-180-202.5-225-247.5-270-292.5-315- 337.5	r
791 416-206	8 + 1	0.5	0- 30 - 45- 75 - 90- 120 -135- 165 -180- 210 -225- 255 -270- 300 -315- 345	s
791 416-406	8 + 1	0.5	0- 15 - 45- 60 - 90- 105 -135- 150 -180- 195 -225- 240 -270- 285 -315- 330	t
791 416-706	8 + 1	0.5	0- 21 - 45- 66 - 90- 111 -135- 156 -180- 201 -225- 246 -270- 291 -315- 336	u

* Requires special test disc 790 143 or use Test Unit 791 022-1.

2.4 HALL-EFFECT PICK-UP 791 050 SERIES

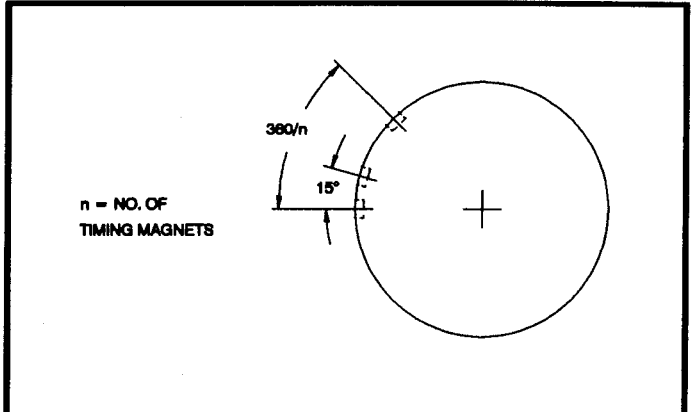
PART NO.	LENGTH "L"
791 050-1	1.75"
791 050-2	2.5"
791 050-4	4.5"



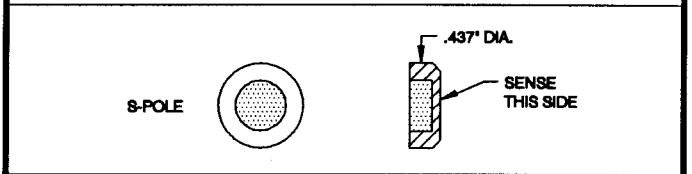
2.5 TRIGGERING MAGNETS

A. 790 10x MAGNET DISC

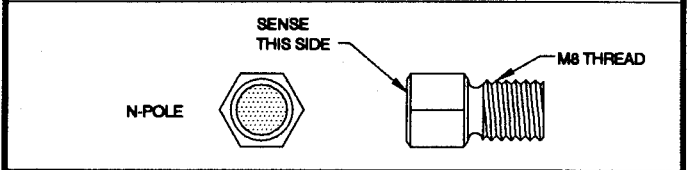
MAGNETS	7.45" DIA.	5.00" DIA.
3 + 1	790 103-1	790 113-1
4 + 1	790 104-1	790 114-1
5 + 1	790 105-1	790 115-1
6 + 1	790 106-1	790 116-1
8 + 1	790 108-1	790 118-1
10 + 1	790 120-1	790 130-1
12 + 1	790 122-1	790 132-1



B. 720 001 MAGNET BUTTON - .437 DIA.



C. 720 002 MAGNET - 8MM THREAD



2.6 WIRING HARNESSSES

A. See form DISN AL for listing of wiring harnesses.

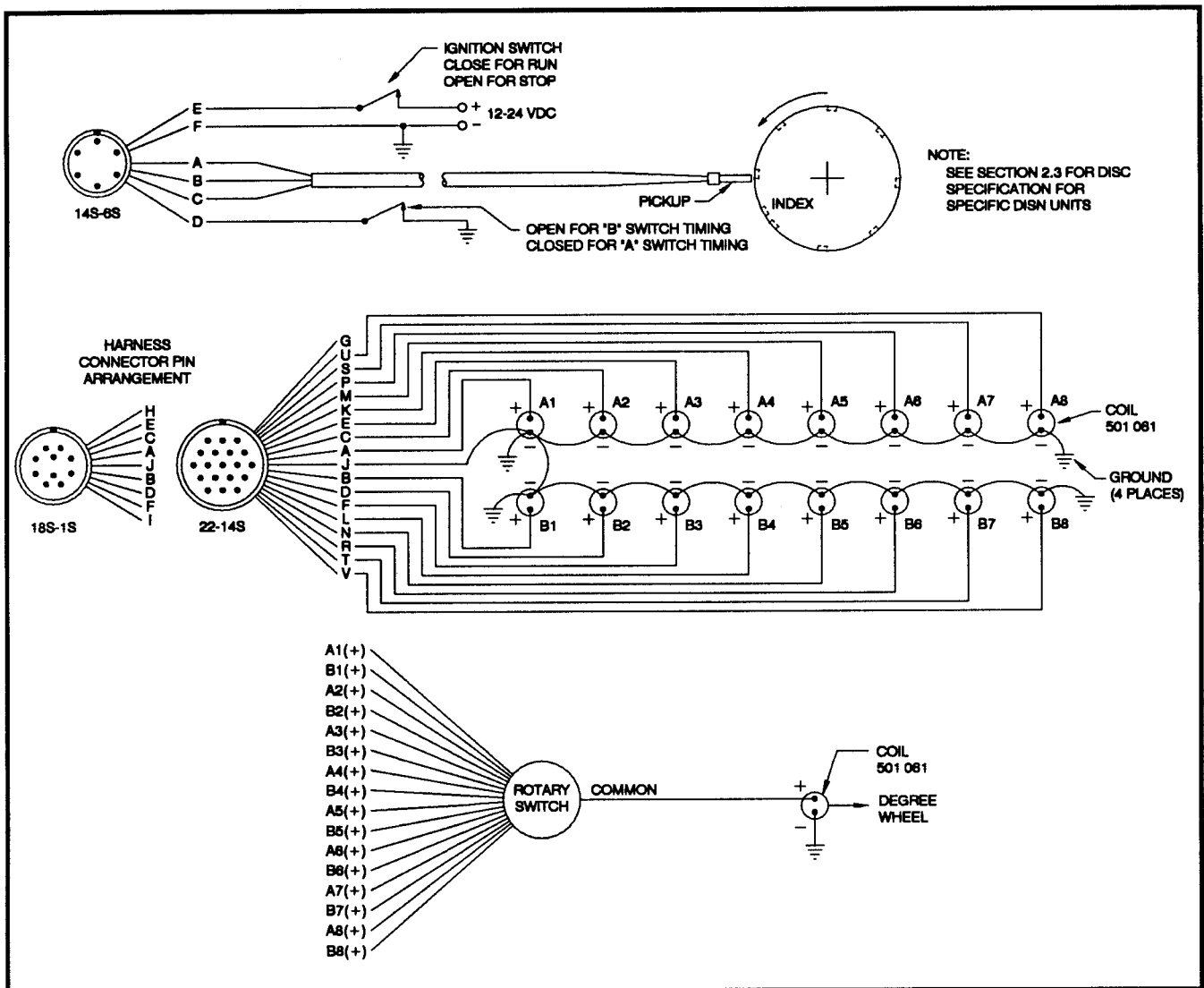
3.0 TEST STAND REQUIREMENTS

3.1 MATERIAL REQUIRED - In order to test a DISN 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 DISN 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 DISN II, drawing 709 402.
- E. Sixteen (16) ignition coils 501 061 connected to suitable, adjustable spark gaps. Additionally, one 501 061 coil connected to the indicating degree wheel and an arrangement to connect its positive terminal individually to the positive terminals of all other coils.
- F. Wiring harnesses 793 008-8 and 793 012-16 connecting the DISN unit to the ignition coils.
- G. A wiring harness 793 007-2 to connect the pick-up 791 050-2 to the DISN unit.
- H. A DC power source capable of supplying 12-24VDC, 5 amps - see installation instructions form DISN II, drawing 709 400. NOTE: If a battery is used to provide the DC power, be sure to install two fuses as shown on drawing 709 400.
- I. A means to elevate the DISN unit to a controlled temperature of 150° F. (65° C.).

NOTE: Altronic Test Unit 791 022-1 can provide simulated magnet disc signals to exercise the DISN unit outputs at a fixed firing rate.

3.2 WIRING DIAGRAM - The test stand should be constructed and wired as shown below.



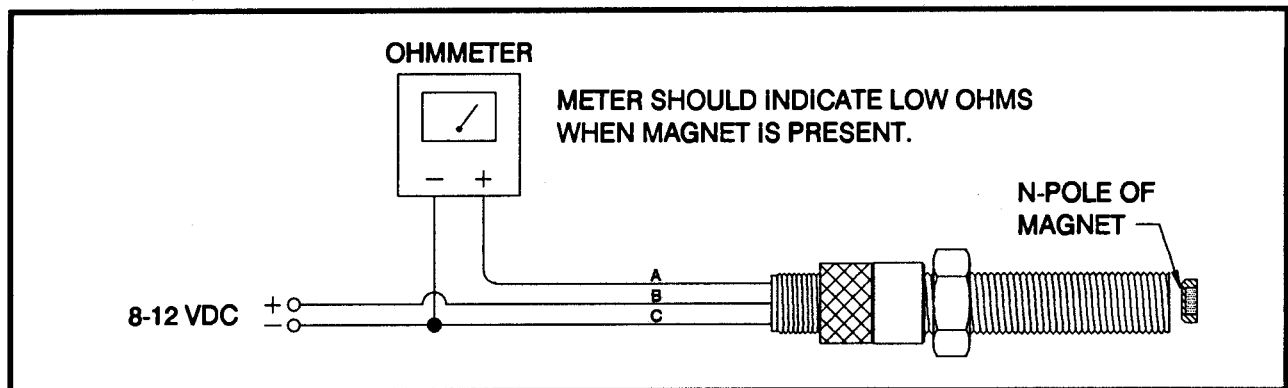
4.0 OHMMETER CHECKS

4.1 DISN 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	POSITIVE LEAD	NEGATIVE LEAD	READING
DISN unit 10-pin (1) or 19-pin (2) connector	R x 10,000	Pin "G"	Pin "A"	*Infinite - replace power board (4) if reading is below 250,000 ohms.
		Pin "G"	Pin "B"	
		Pin "G"	Pin "C"	
		Pin "G"	Pin "D"	
		Pin "G"	Pin "E"	
		Pin "G"	Pin "F"	
		Pin "G"	Pin "H" (1)	
		Pin "G"	Pin "I" (1)	
		Pin "G"	Pin "K" (2)	
		Pin "G"	Pin "L" (2)	
		Pin "G"	Pin "M" (2)	
		Pin "G"	Pin "N" (2)	
		Pin "G"	Pin "P" (2)	
		Pin "G"	Pin "R" (2)	
		Pin "G"	Pin "S" (2)	
Pin "G"	Pin "T" (2)			
Pin "G"	Pin "U" (2)			
Pin "G"	Pin "V" (2)			
DISN unit 10-pin or 19-pin connector	R x 10,000	Pin "G"	Ground stud	*Infinite - replace power board (4) if reading is below 250,000 ohms.
DISN unit 6-pin connector	R x 100	Pin "E"	Pin "F"	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 5 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 DISN system magnets - see section 2.5. NOTE: The Hall-effect pick-up may also be tested using Altronic Test Unit 791 022-1.



5.0 OPERATIONAL TEST

5.1 PERFORMANCE TEST - Apply 12-24 VDC 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
400 RPM	24 VDC	All outputs fire a 15mm gap
900 RPM	24 VDC	All outputs fire a 15mm gap

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

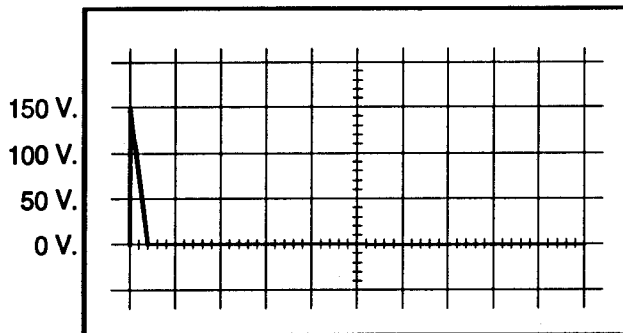
- Setting the degree wheel at "0" degrees for output "A", the timing pattern for the remaining outputs should match that shown in the chart of section 2.3.
- With the "D" lead (6-pin connector) grounded, check that the timing changes by the proper Switch Increment according to the chart of section 2.3 when Switch A is adjusted from position 15 to 14, 14 to 13, etc. Switch position 15 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 15 to 14, 14 to 13, etc. Switch position 15 should be the most advanced timing, position 0 most retarded.

6.0 OSCILLOSCOPE TEST

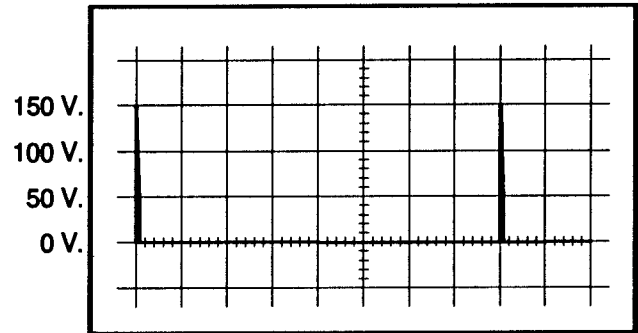
6.1 TEST SET-UP - Two 100:1 oscilloscope probes are required. NOTE: The signals being monitored are 150-200 volts, positive polarity. It is recommended that these tests be performed with the DISN unit heated to a temperature of 150° F. (65° C.).

6.2 VOLTAGE PATTERN AT THE IGNITION COIL - Connect the oscilloscope trigger input and reading probe to the positive (+) coil terminal and ground. The patterns shown are common to all 160 volt DISN units.

Coil (-) Connection
Time Base - 100 μ sec/div.
750 RPM - Disc



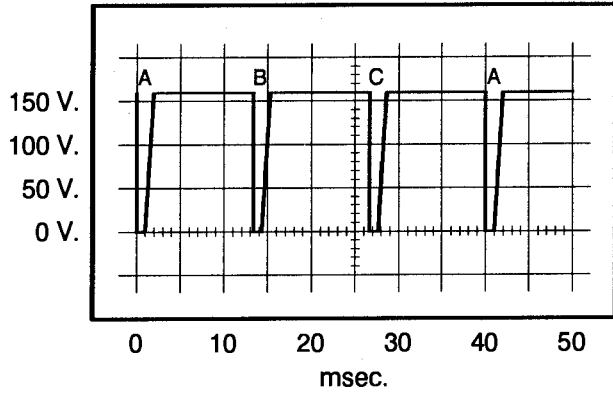
Coil (-) Connection
Time Base - 10 msec/div.
750 RPM - Disc



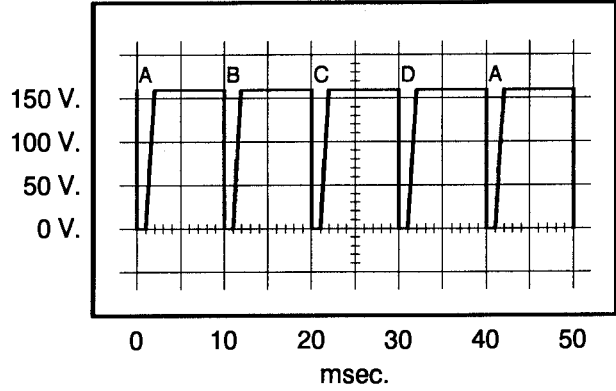
6.3 VOLTAGE PATTERN ON THE STORAGE CAPACITOR

- The trigger input of the oscilloscope should be connected to the "A" primary coil lead. NOTE: This is a 150V. positive polarity signal.
- Connect the oscilloscope reading probe to the "G" lead of the 10-pin or 19-pin connector harness. The "G" lead pattern displays all firings of the unit. Refer to section 2.3 for reference to the proper pattern for the specific DISN unit being tested; the normal capacitor patterns are shown on the following three pages.
- If the pattern is missing one discharge, replace the power board assembly.

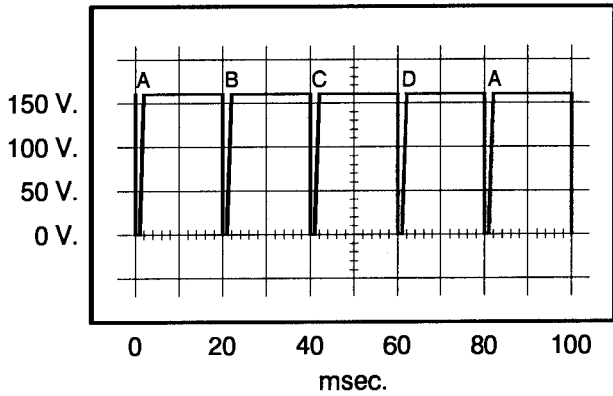
Scope Pattern " a "
791 403-103
1,500 RPM - Disc



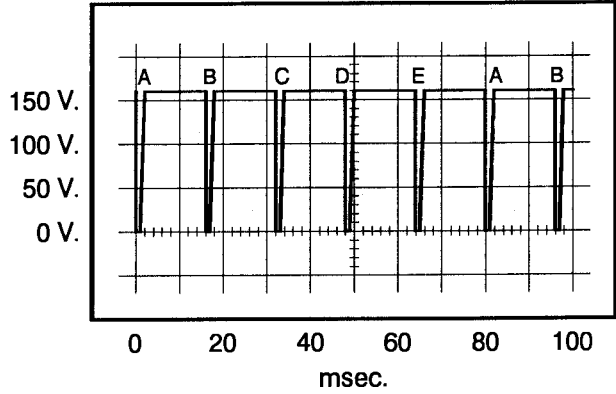
Scope Pattern " b "
791 404-103
1,500 RPM - Disc



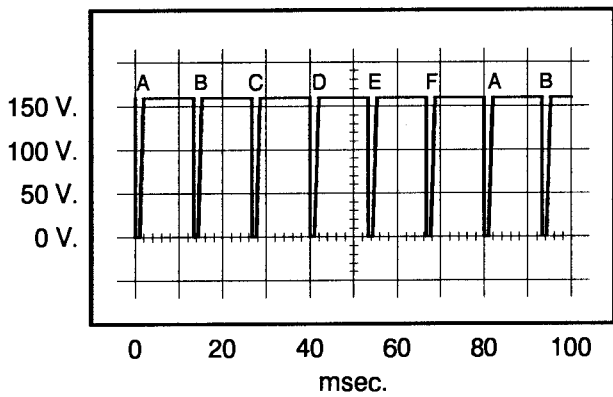
Scope Pattern " c "
791 404-106
750 RPM - Disc



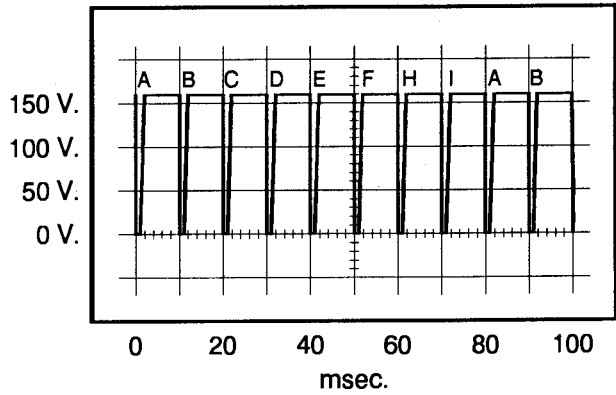
Scope Pattern " d "
791 405-106
750 RPM - Disc



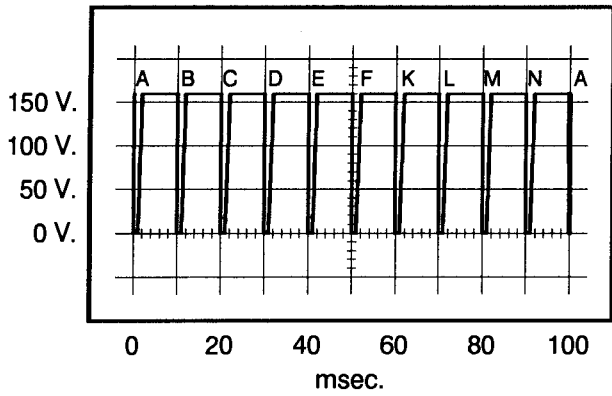
Scope Pattern " e "
791 406-106
750 RPM - Disc



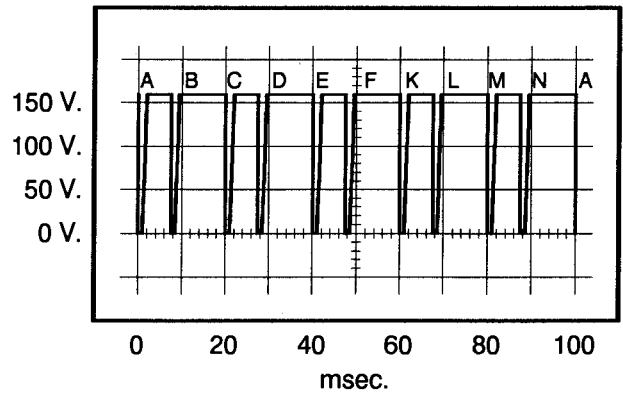
Scope Pattern " f "
791 408-106
750 RPM - Disc



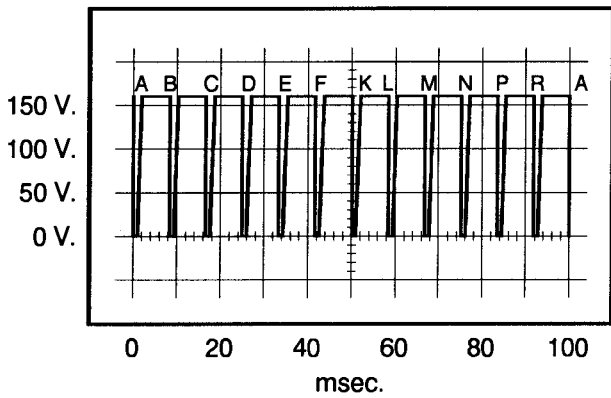
Scope Pattern "g"
791 410-106
600 RPM - Disc



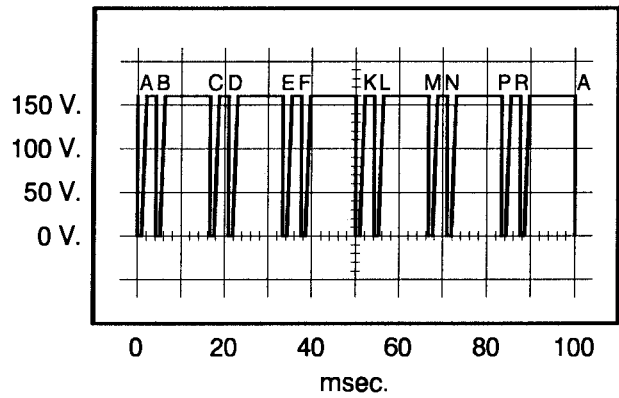
Scope Pattern "h"
791 410-206
600 RPM - Disc



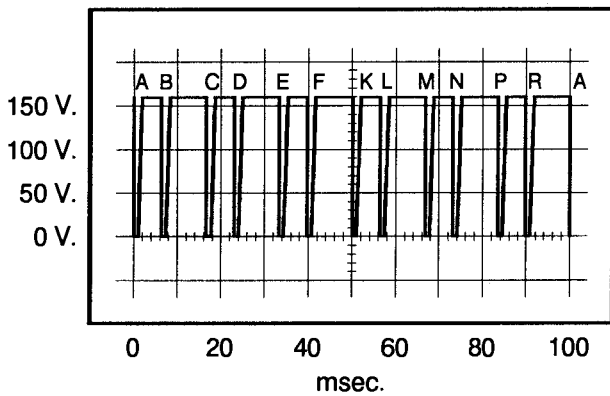
Scope Pattern "i"
791 412-106
600 RPM - Disc



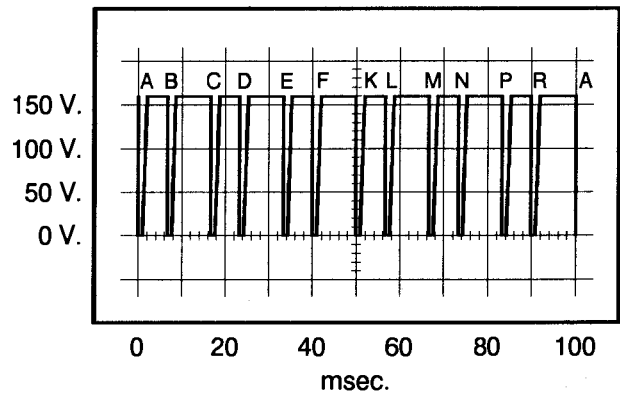
Scope Pattern "k"
791 412-202, 791 412-206
600 RPM - Disc



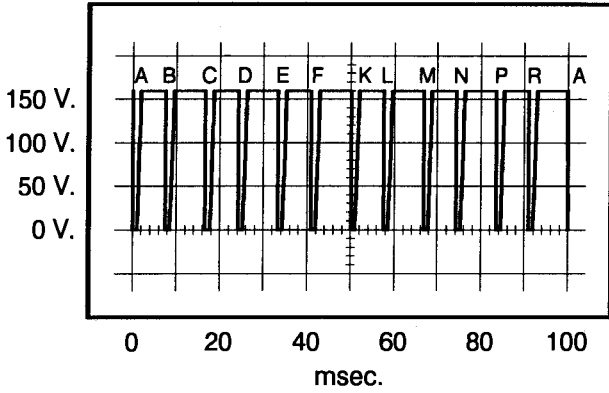
Scope Pattern "m"
791 412-406
600 RPM - Disc



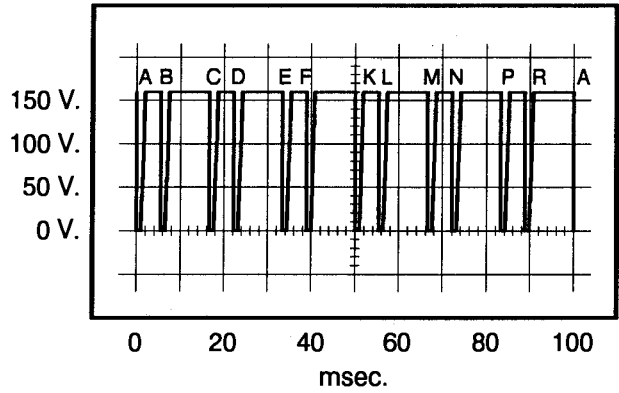
Scope Pattern "n"
791 412-606
600 rpm - Disc



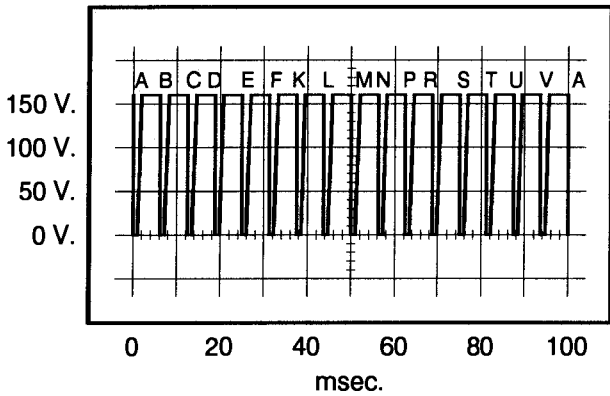
Scope Pattern " p "
791 412-706, 791 412-906
600 RPM - Disc



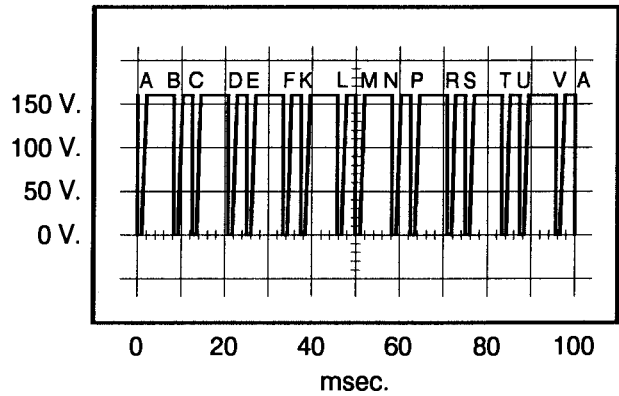
Scope Pattern " q "
791 412-806
600 RPM - Disc



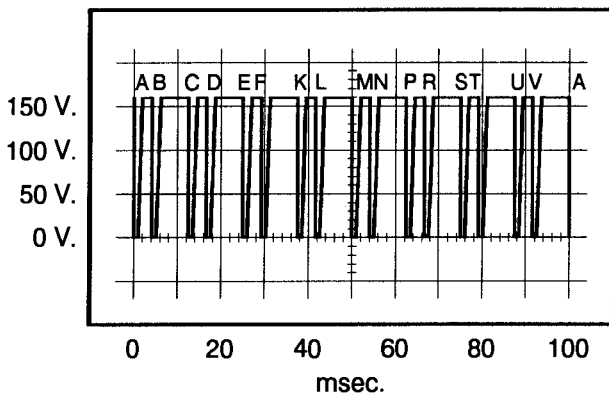
Scope Pattern " r "
791 416-102, 791 416-106
600 RPM - Disc



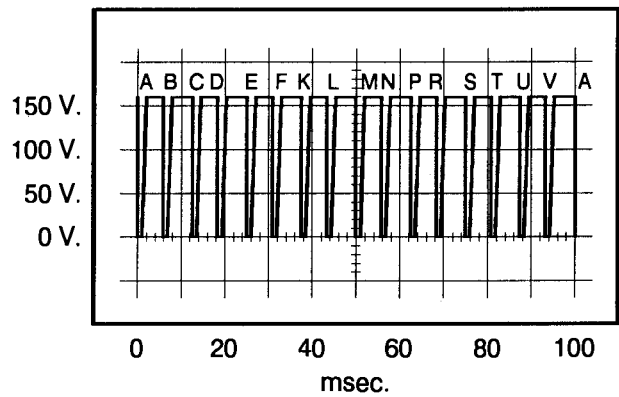
Scope Pattern " s "
791 416-206
600 RPM - Disc



Scope Pattern " t "
791 416-406
600 RPM - Disc



Scope Pattern " u "
791 416-706
600 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.
- 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.

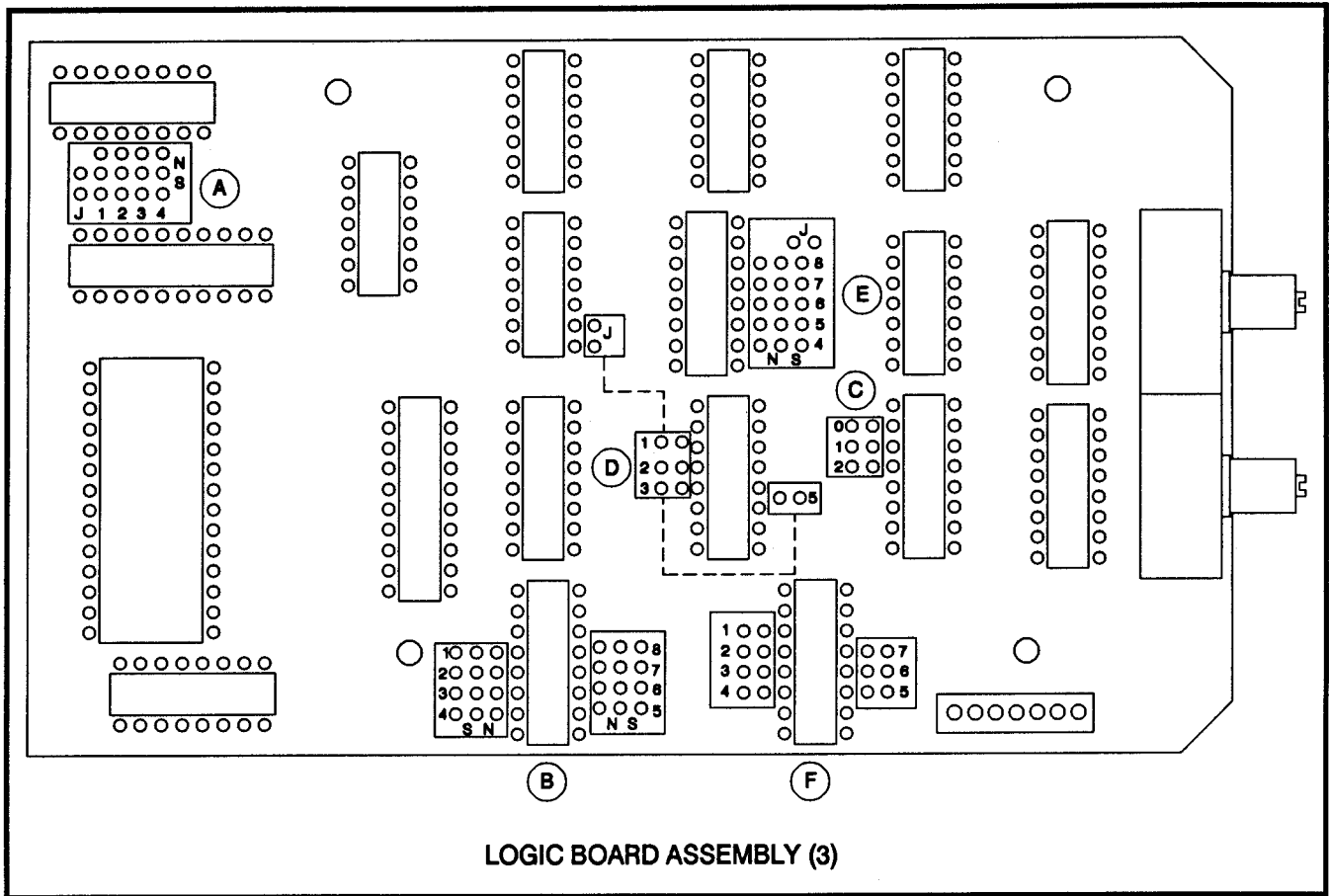
7.2 PROGRAMMING REPLACEMENT LOGIC BOARD

- 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 DISN 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 NEW screws (10) and two NEW 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.
- F. 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 NEW 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 ASSEMBLY (3)

LOGIC BOARD PROGRAMMING CHART

DISN UNIT PART NO.	POSITION A J-1-2-3-4	POSITION B 1-2-3-4-5-6-7-8	POSITION C 0-1-2	POSITION D 1-2-3-5-J	POSITION E 4-5-6-7-8-J	POSITION F 1-2-3-4-5-6-7
791 403-103	- N S - -	N N N S N N N S	- X -	- X - - X	- - - N - X	- - - - - -
791 404-103	X - - N -	N S S N N S N S	- X -	- X - - X	- - - N - X	- - - - - -
791 404-106	X - - N -	N S S N N S N S	X - -	- X - - X	- - - N - X	- - - - - -
791 405-106	- N - S -	N N N S S S N S	X - -	- X - - X	- - - N - X	- - - - - -
791 406-106	- - N S -	N N S N N N S S	X - -	- X - - X	- - - N - X	- - - - - -
791 408-106	X - - - N	S S N N S N S S	X - -	- X - - X	N - S - - -	- - - - - -
791 410-106	- - S - N	N N S S S N S S	X - -	- X - - X	- - N - - X	- - - - - -
791 410-206	- N - S -	N N N S S S N S	X - -	- X - - X	- - - N - X	- X X - X X -
791 412-106	- - - S N	N S N N N S S S	X - -	- X - - X	- - N - - X	- - - - - -
791 412-202	- - N S -	N N N S N N N S	- X -	- - - X X	- - - - N X	- - X X X X -
791 412-206	- - N S -	N N S N N N S S	X - -	- X - - X	- - - N - X	- X X X X - -
791 412-406	- - N S -	N N S N N N S S	X - -	- X - - X	- - - N - X	X - X X - X -
791 412-606	- - N S -	N N S N N N S S	X - -	- X - - X	- - - N - X	- - - - X X -
791 412-706	- - N S -	N N S N N N S S	X - -	- X - - X	- - - N - X	X X X - X X -
791 412-806	- - N S -	N N S N N N S S	X - -	- X - - X	- - - N - X	- - - X - X -
791 416-102	X - - - N	N S S N N S N S	- X -	- - - X X	- - - - N X	- X - X X - X
791 416-106	X - - - N	S S N N S N S S	X - -	- X - - X	N - S - - -	X - X X - X -
791 416-206	X - - - N	S S N N S N S S	X - -	- X - - X	N - S - - -	- X X X X - -
791 416-406	X - - - N	S S N N S N S S	X - -	- X - - X	N - S - - -	- X X X X - -
791 416-706	X - - - N	S S N N S N S S	X - -	- X - - X	N - S - - -	- X - X - X -