

SECTION 5 — ENGINE ELECTRICAL SYSTEMS

TABLE OF CONTENTS

2000 Electrical Specifications Chart	5-2
Resistance Tests Chart	5-2
Electrical Specifications (Individual)	5-3
Testing Electrical Components	5-13
Troubleshooting/Testing Ignition System	
EFI Models	5-13
Fan Cooled Models	5-14
Twin & Triple L/C Models	5-18
Digital 3-D Ignition (700/800/1000 cc)	5-21
Testing Electrical Resistances	
EFI Models	5-23
Fan Cooled Models	5-24
440 cc L/C Model	5-26
500/600 cc Twin Carburetor Models	5-28
550 cc Models	5-29
600 cc Triple Models	5-31
700 cc Models	5-33
800/1000 cc Models	5-34
Arctic Cat Ignition Analyzer	
Fan Cooled Models	5-36
Liquid Cooled Models	5-39
Testing Voltage Regulator	5-42
Testing Low-Oil Light Sensor	5-42
Testing High Temperature Sensor	5-42
Testing High Temperature Warning Light	5-43
Electric Start Components	
Solenoid	5-43
Charging Diode	5-43
Fuse	5-43
Ignition Switch - Electric Start Function	5-44
Starter Motor	5-44
Troubleshooting Electric Start	5-50
Wire Color Code and Function Description	5-51
Ignition Timing	5-52
2000 Ignition Timing Specifications	5-53
2000 Wiring Diagram Index (Ignition)	5-61
2000 Wiring Diagrams	5-62

2000 ELECTRICAL SPECIFICATIONS CHART

MODEL	ENGINE MODEL	IGNITION MANUFACTURER	IGNITION TIMING			SPARK PLUG (NKG)	SPARK PLUG GAP		IGNITION TYPE	LIGHTING COIL OUTPUT @3000 RPM
			Degrees	mm	in.		mm	in.		
Kitty Cat (1999)	AP06A2	Kokusan Denki	20 [Ⓣ]	1.728	0.068	BR6HS	0.7-0.8	0.028-0.031	OPEN	12V/32W
Bearcat 340 — Panther 340	AG34A8	Kokusan Denki	16 [Ⓣ]	1.440	0.056	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/185W
Z 370	AA37A2	Kokusan Denki	13 [Ⓣ]	1.056	0.042	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/185W
Bearcat 440 I, 440 II — Panther 440 — Z 440	AS44A3	Kokusan Denki	18 [Ⓣ]	2.012	0.079	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/185W
ZL 440	AL44L9	Mitsubishi Denki	18 [Ⓣ]	1.860	0.073	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/215W
ZL 500 Carb — ZR 500 Carb	AS50L4	Kokusan Denki	24 [Ⓣ]	3.390	0.133	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/210W
Powder Special 500 EFI — ZL 500 EFI — ZR 500 EFI	AT50L4	Kokusan Denki	24 [Ⓣ]	3.390	0.133	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/175W
Bearcat Wide Track — Panther 550 — ZL 550	CB55L1	Kokusan Denki	24 [Ⓣ]	3.540	0.139	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/180W
Pantera 580 EFI — ZL 580 EFI	AB58L4	Kokusan Denki	30 [Ⓣ]	5.459	0.215	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/175W
Powder Special 600 EFI — ZL 600 EFI — ZR 600 EFI	AD60L4	Kokusan Denki	20 [Ⓣ]	2.371	0.093	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/175W
Powder Special 600 Carb — ZL 600 Carb — ZR 600 Carb	AE60L4	Kokusan Denki	24 [Ⓣ]	3.390	0.133	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/210W
Triple Touring 600 — ZRT 600	AA60L6	Kokusan Denki	27 [Ⓣ]	3.884	0.153	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/210W
Powder Special 700 — ZL 700 — ZR 700	AB70L8	Kokusan Denki	27 [Ⓣ]	4.625	0.182	BR10ES	0.7-0.8	0.028-0.031	OPEN	12V/200W
ZRT 800	AA80L6	Kokusan Denki	12 [Ⓣ]	0.886	0.035	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/185W
Pantera 1000 — Thundercat — Thundercat Mountain Cat	AA10L3	Kokusan Denki	16 [Ⓣ]	1.556	0.061	BR9EYA	0.7-0.8	0.028-0.031	OPEN	12V/185W

- Ⓣ 6000 RPM - Engine warm

Ⓣ 4000 RPM

Ⓣ 3250 RPM
- Ⓣ 3500 RPM

Ⓣ 5000 RPM

Ⓣ 1800 RPM

RESISTANCE TESTS CHART

ITEM	KOKUSAN									MITSUBISHI
	600 cc - Twin (carbureted)	600 cc EFI	550 cc	800 cc, 1000 cc	500 cc, 580 cc EFI	700 cc	500 cc (carbureted)	600 cc - Triple	340 cc, 370 cc, 440 cc F/C	
Ignition Coil — Primary	0.092 ± 15% OR ↔ B/W	0.30 ± 15% OR ↔ B	0.30 ± 15% OR ↔ B	0.34 ± 15% POS ↔ NEG	0.30 ± 15% OR ↔ B	0.30 ± 15% OR ↔ B	0.30 ± 15% OR ↔ B	0.34 ± 15% POS ↔ NEG	0.30 ± 15% OR ↔ B	0.092 ± 15% OR ↔ B/W
Ignition Coil — Secondary	4400 ± 20% HT ↔ HT	8500 ± 20% HT ↔ HT	8500 ± 20% HT ↔ HT	7900 ± 20% HT ↔ HT HT ↔ POS	8500 ± 20% HT ↔ HT	8500 ± 20% HT ↔ HT	8500 ± 20% HT ↔ HT	7900 ± 20% HT ↔ HT HT ↔ POS	8500 ± 20% HT ↔ HT	4100 ± 15% HT ↔ HT
Lighting Coil	0.20 ± 20% Y ↔ Y	0.10 ± 20% Y ↔ Y	0.22 ± 20% Y ↔ Y	0.15 ± 20% Y ↔ Y	0.09 ± 20% Y ↔ Y	0.16 ± 20% Y ↔ Y	0.15 ± 20% Y ↔ Y	0.15 ± 20% Y ↔ Y	0.22 ± 20% Y ↔ Y	0.11 ± 10% Y ↔ Y
Magnetο Coil	(Charge)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	160 ± 20% R/W ↔ B/R N/A	N/A
	(Trigger)	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A
	(Charge 1) (Charge 2)	46 ± 20% G ↔ G N/A	17 ± 20% (low) B/R ↔ G/R 17 ± 20% (high) G/R ↔ BR/W	160 ± 20% R/W ↔ B/W 17 ± 20% B/R ↔ R/W	15 ± 20% B/R ↔ G/R 15 ± 20% BR/W ↔ G/R	46 ± 20% (high) B ↔ G 450 ± 20% (low) BR ↔ G	17 ± 20% B/R ↔ G/R 17 ± 20% G/R ↔ BR/W	46 ± 20% (high) G ↔ B/R 450 ± 20% (low) G ↔ W	20 ± 20% G ↔ B/R 450 ± 20% G ↔ W	1260 ± 10% G ↔ B/W 16 ± 10% W/R ↔ B/W
Ignition Timing Sensor	101 ± 20% G/W ↔ BR	190 ± 20% G/W ↔ BR	N/A	101 ± 20% G/W ↔ BR	190 ± 20% (580 cc) G/W ↔ BR	101 ± 20% G/W ↔ BR	101 ± 20% G/W ↔ BR	101 ± 20% G/W ↔ BR	N/A	N/A
Injection Coil	N/A	19 ± 20% BL/W ↔ BL/W	N/A	N/A	21 ± 20% BL ↔ BL	N/A	N/A	N/A	N/A	N/A
Pump Coil	N/A	1.9 ± 20% OR ↔ OR	N/A	N/A	1.8 ± 20% OR ↔ OR	N/A	N/A	N/A	N/A	N/A
Spark Plug Cap	5000 ± 20%	5000 ± 20%	5000 ± 20%	5000 ± 20%	5000 ± 20%	5000 ± 20%	5000 ± 20%	5000 ± 20%	5000 ± 20%	5000 ± 20%

■ NOTE: EFI Models must use both resistor type spark plugs and spark plug caps.

Abbreviation:

B

BL

W

Y

R

G

BR

GRND

N/A

OR

POS

HT

NEG

— Black

— Blue

— White

— Yellow

— Red

— Green

— Brown

— Ground

— Not Applicable

— Orange

— Positive

— High Tension

— Negative

Electrical Specifications (340/370/440 cc - Fan Cooled)

■ NOTE: The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections	-
Ignition Coil Primary Secondary	0.25-0.34 ohm 6800-10,200 ohms	orange high tension wire	black high tension wire
Charge Coil	128-192 ohms	red/white	black/red
Lighting Coil	0.17-0.26 ohm	yellow	yellow
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Peak Voltage Output Test (Arctic Cat Ignition Analyzer)		
RPM	2000	3000	4000
Charge Coil**	205V	192V	185V
CDI	190V	180V	175V
Lighting Coil***	15V	16V	16V
Description	Test Value	+ Test Connections	-
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing* (340 cc)	16° BTDC @ 6000 RPM 1.440 mm (0.056 in.)		
Ignition Timing* (370 cc)	13° BTDC @ 6000 RPM 1.056 mm (0.042 in.)		
Ignition Timing* (440 cc)	18° BTDC @ 6000 RPM 2.012 mm (0.079 in.)		
Lighting Coil Output	12V/185W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

* Timing to be checked only with the engine at normal operating temperature.

** The voltage reading on the charge coil may be much higher as a large negative spike is sometimes present and may be picked up by the analyzer.

*** Unregulated voltage output.

Electrical Specifications (440 cc - Liquid Cooled)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections -	
Ignition Coil Primary Secondary	0.078-0.106 ohm 3485-4715 ohms	orange high tension wire	black/white high tension wire
Charge Coil (1)	1134-1386 ohms	green	black/white
Charge Coil (2)	14.31-17.49 ohms	white/red	black/white
Lighting Coil	0.099-0.121 ohm	yellow	yellow
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Peak Voltage Output Test (Arctic Cat Ignition Analyzer)		
RPM	2000	3000	4000
Charge Coil (1)**	188V	184V	123V
Charge Coil (2)	33V	54V	75V
CDI	176V	173V	163V
Lighting Coil***	15V	19V	21V
Description	Test Value	+ Test Connections -	
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing*	18° BTDC @ 6000 RPM 1.860 mm (0.073 in.)		
Lighting Coil Output	12V/215W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

* Timing to be checked only with the engine at normal operating temperature.

** The voltage reading on the charge coil may be much higher as a large negative spike is sometimes present and may be picked up by the analyzer.

*** Unregulated voltage output.

Electrical Specifications (500 cc - Carbureted)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections	-
Ignition Coil Primary Secondary	0.25-0.34 ohm 6800-10,200 ohms	orange high tension wire	black high tension wire
Charge Coil (1)	36.8-55.2 ohms	green	black/red
Charge Coil (2)	360-540 ohms	green	white
Ignition Timing Sensor	80.8-121.2 ohms	green/white	brown
Lighting Coil	0.12-0.18 ohm	yellow	yellow
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Peak Voltage Output Test (Arctic Cat Ignition Analyzer)		
RPM	2000	3000	4000
Charge Coil (1)*	164V	180V	219V
Charge Coil (2)	160V	172V	211V
CDI	163V	172V	170V
Lighting Coil**	18V	20V	21V
Description	Test Value	+ Test Connections	-
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing	24° BTDC @ 3500 RPM 3.390 mm (0.133 in.)		
Lighting Coil Output	12V/210W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

* The voltage reading on the charge coil may be much higher as a large negative spike is sometimes present and may be picked up by the analyzer.

** Unregulated voltage output.

Electrical Specifications (550 cc)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections	-
Ignition Coil Primary Secondary	0.25-0.34 ohm 6800-10,200 ohms	orange high tension wire	black high tension wire
Charge Coil (1)	128-192 ohms	red/white	black/white
Charge Coil (2)	13.6-20.4 ohms	black/red	red/white
Lighting Coil	0.17-0.26 ohm	yellow	yellow
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Peak Voltage Output Test (Arctic Cat Ignition Analyzer)		
RPM	2000	3000	4000
Charge Coil (1)	149V	140V	136V
Charge Coil (2)	148V	137V	133V
CDI	138V	132V	129V
Lighting Coil**	18V	19V	19V
Description	Test Value	+ Test Connections	-
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing*	24° BTDC @ 6000 RPM 3.540 mm (0.139 in.)		
Lighting Coil Output	12V/180W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

* Timing to be checked only with the engine at normal operating temperature.

** Unregulated voltage output.

Electrical Specifications (500/580 cc EFI)

■ NOTE: The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections -	
Ignition Coil Primary Secondary	0.25-0.34 ohm 6800-10,200 ohms	orange high tension wire	black high tension wire
Charge Coil (high speed)	36.8-55.2 ohms	black	green
Charge Coil (low speed)	360-540 ohms	brown	green
Lighting Coil	0.07-0.10 ohm	yellow	yellow
Ignition Timing Sensor	152-228 ohms	green/white	brown
Injection Coil	16.8-25.2 ohms	blue	blue
Fuel Pump Coil	1.4-2.1 ohms	orange	orange
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Test Value	+ Test Connections -	
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing (500 cc)	24° BTDC @ 3500 RPM 3.390 mm (0.133 in.)		
Ignition Timing (580 cc)	30° BTDC @ 4000 RPM 5.459 mm (0.215 in.)		
Lighting Coil Output	12V/175W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

Electrical Specifications (600 cc - Twin Carbureted)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections	-
Ignition Coil Primary Secondary	0.079-0.105 ohm 3520-5280 ohms	orange high tension wire	black/white high tension wire
Charge Coil (1)	36.8-55.2 ohms	green	green
Ignition Timing Sensor	80.8-121.2 ohms	green/white	brown
Lighting Coil	0.16-0.24 ohm	yellow	yellow
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Peak Voltage Output Test (Arctic Cat Ignition Analyzer)		
RPM	2000	3000	4000
Charge Coil	164V	180V	219V
CDI	163V	172V	170V
Lighting Coil**	18V	20V	21V
Description	Test Value	+ Test Connections	-
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing	24° BTDC @ 3250 RPM 3.390 mm (0.133 in.)		
Lighting Coil Output	12V/210W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

* The voltage reading on the charge coil may be much higher as a large negative spike is sometimes present and may be picked up by the analyzer.

** Unregulated voltage output.

Electrical Specifications (600 cc EFI)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections -	
Ignition Coil Primary Secondary	0.25-0.34 ohm 6800-10,200 ohms	orange high tension wire	black high tension wire
Charge Coil (high speed)	13.6-20.4 ohms	green/red	brown/white
Charge Coil (low speed)	13.6-20.4 ohms	black/red	green/red
Lighting Coil	0.08-0.12 ohm	yellow	yellow
Ignition Timing Sensor	152-228 ohms	green/white	brown
Injection Coil	15.2-22.8 ohms	blue	blue
Fuel Pump Coil	1.52-2.28 ohms	orange	orange
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Test Value	+ Test Connections -	
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing	20° BTDC @ 5000 RPM 2.371 mm (0.093 in.)		
Lighting Coil Output	12V/175W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

Electrical Specifications (600 cc Triple)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections -	
Ignition Coil Primary	0.29-0.39 ohm	positive spade terminal	negative spade terminal
Secondary (Dual Lead)	6320-9480 ohms	high tension wire	high tension wire
(Single Lead)	6320-9480 ohms	high tension wire	positive spade terminal
Charge Coil (1)	16-24 ohms	green	black/red
Charge Coil (2)	360-540 ohms	green	white
Lighting Coil	0.12-0.18 ohm	yellow	yellow
Ignition Timing Sensor	80.8-121.2 ohms	green/white	brown
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Peak Voltage Output Test (Arctic Cat Ignition Analyzer)		
RPM	2000	3000	4000
Charge Coil (1)	190V	206V	175V
Charge Coil (2)	104V	142V	152V
CDI	137V	151V	148V
Lighting Coil	17V	20V	21V
Description	Test Value	+ Test Connections -	
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing	27° BTDC @4000 RPM 3.884 mm (0.153 in.)		
Lighting Coil Output	12V/210W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

Electrical Specifications (700 cc)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections -	
Ignition Coil Primary Secondary	0.25-0.34 ohm 6800-10,200 ohms	orange high tension wire	black high tension wire
Charge Coil (1)	13.6-20.4 ohms	black/red	green/red
Charge Coil (2)	13.6-20.4 ohms	green/red	brown/white
Lighting Coil	0.12-0.19 ohm	yellow	yellow
Ignition Timing Sensor	80.8-121.2 ohms	green/white	brown
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Test Value	+ Test Connections -	
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing	27° BTDC @ 4000 RPM 4.625 mm (0.182 in.)		
Lighting Coil Output	12V/200W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR10ES		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

Electrical Specifications (800/1000 cc)

■ **NOTE:** The ignition system is a Normally Open Ignition (NOI).

Description	Resistance Test Test Value	+ Test Connections	-
Ignition Coil Primary Secondary (Dual Lead) (Single Lead)	0.29-0.39 ohm 6320-9480 ohms 6320-9480 ohms	positive spade terminal high tension wire high tension wire	negative spade terminal high tension wire positive spade terminal
Charge Coil (1)	12-18 ohms	black/red	green/red
Charge Coil (2)	12-18 ohms	brown/white	green/red
Lighting Coil	0.12-0.18 ohm	yellow	yellow
Ignition Timing Sensor	80.8-121.2 ohms	green/white	brown
Spark-Plug Cap	4000-6000 ohms	cap end	cap end
Description	Peak Voltage Output Test (Arctic Cat Ignition Analyzer)		
RPM	2000	3000	4000
Charge Coil (1)	142V	164V	167V
Charge Coil (2)	210V	246V	253V
CDI	145V	154V	153V
Lighting Coil	17V	20V	21V
Description	Test Value	+ Test Connections	-
Voltage Regulator	11-13 AC volts @ 2500-2700 RPM	yellow	brown
Low Oil-Light Sending Unit	Less than 1 ohm (float end down)	terminal	terminal
High Temperature Sensor	Open (water temperature lower than 190°F)	terminal	ground
	Up to 20 ohms (water temperature higher than 230°F)	terminal	ground
High Temperature Warning Light	Less than 10 ohms	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
Description	Standard		
Ignition Timing (800 cc)	12° BTDC @ 1800 RPM 0.886 mm (0.035 in.)		
Ignition Timing (1000 cc)	16° BTDC @ 4000 RPM 1.556 mm (0.061 in.)		
Lighting Coil Output	12V/185W		
Ignition Type	CDI/NOI (Normally Open Ignition)		
Spark Plug	NGKBR9EYA		
Spark-Plug Gap	0.7-0.8 mm (0.028-0.031 in.)		

Testing Electrical Components

All tests of the engine electrical components should be made using either the digital Fluke Model 73 Multimeter (p/n 0644-191) or the analog Multitester (p/n 0644-033). Replace any component that does not have a test value within specifications.

■ **NOTE:** Whenever using a digital-style tester, “open (infinite resistance)” denotes an overload and the meter reading will be OL since the meter is not calibrated to register resistance values of that magnitude.

■ **NOTE:** Whenever using an analog-style tester, “open (infinite resistance)” denotes ohm count too high to register, and the meter reading indicator will remain stationary at the ∞ (infinity) position.

■ **NOTE:** Whenever testing switches, less than 1 ohm is desirable with the switch in the activated position.

Troubleshooting Ignition System (EFI Models)

When troubleshooting the standard “normally open” ignition system, use the following procedure.

1. Remove the spark plugs and visually check their condition. Replace any fouled plug. Attach the spark plugs to the high tension leads and ground them on the cylinder heads.

CAUTION

Before checking for spark, place all the engine switches in the deactivated position. In the event the engine could be flooded, pull the starter rope (slowly at first) several times to clear the engine of excess fuel.

CAUTION

Never crank the engine over without grounding the spark plugs. Damage to coils and/or CDI unit may result.

■ **NOTE:** Make sure the ignition switch and the emergency stop switch are in the ON position.

2. Crank the engine over and check for spark. If no spark is present, check to make sure the throttle cable is properly tensioned. Compress the throttle control and while holding the throttle control in this position, crank the engine over and check for spark. If spark is now present, adjust the throttle cable tension.
3. If no spark is present, disconnect the main wiring harness from the engine. Crank the engine over. If spark is present, the problem is either one or more of the following:
 - a. Defective emergency stop switch
 - b. Defective safety switch in throttle-control housing
 - c. Corroded or loose wire connection at the throttle-control housing or main wiring harness
 - d. Defective ignition switch
 - e. Fouled spark plugs
 - f. Defective charge coil (high speed and low speed)
 - g. Defective ignition timing sensor
 - h. Defective ECU or loose or corroded connection in wiring harness

■ **NOTE:** To check these possible causes, proceed to Testing Ignition System.

Testing Ignition System (EFI Models)

■ **NOTE:** There must be free-play between the throttle lever and the control housing.

MAIN WIRING AND SAFETY SWITCHES

1. Check the wiring connections coming from the ignition key and emergency stop switches. The throttle control switch connector is located on the front side of the steering post. If any of the connections appear dirty or corroded, clean them with fine sandpaper and compressed air; then connect all wires and squeeze the connections with a pliers for additional tightness.
2. Disconnect the main wiring harness connector coming from the engine stator assembly. Disconnecting this connector will bypass the main wiring harness and all switches which will not allow the engine to be shut off without first installing an additional auxiliary ground wire.

3. Insert an auxiliary ground wire into the black wire of the four-wire main harness connector on the engine side. To stop the engine once it has been started, touch the auxiliary ground wire to the engine.
4. Support the rear of the snowmobile up on a shielded safety stand; then set the brake lever lock. Inspect the complete throttle mechanism to assure that it's working properly.
5. Attempt to start the engine. To stop the engine (if the engine starts), touch the auxiliary ground wire installed into the four-wire connector to a ground on the engine. If the engine fails to start, the problem is with the coils mounted on the engine, high tension coil assembly, or the ECU. If the engine starts, the problem is with the switches, main wiring harness, or throttle cable free-play.

IGNITION KEY SWITCH

1. Disconnect the ignition key switch connectors; then connect the ohmmeter leads to each of the ignition key switch terminals.
2. With the switch in the OFF position, the meter must read less than 1 ohm of resistance.
3. With the switch in the ON position, the meter must read OL (infinite resistance).

THROTTLE CONTROL SWITCH

1. Verify that the throttle cable has free-play between the throttle lever and control housing.
2. Disconnect the throttle control switch connector; then connect one ohmmeter lead to the brown wire and the other lead to the black/white wire of the emergency stop switch.
3. With the throttle lever in the idle position and the emergency stop knob in the up (RUN) position, the meter must read no resistance (open). If the meter reads resistance (closed), replace the switch.
4. With the throttle lever in the idle position and the emergency stop knob in the down (STOP) position, the meter must read resistance (closed). If the meter reads no resistance (open), replace the switch. With the emergency stop knob still in the down (STOP) position, move the throttle lever to the wide open position. The meter must read no resistance (open). If the meter reads resistance (closed), replace the switch.

5. Connect one ohmmeter lead to the brown wire and the other lead to the violet wire. With the emergency stop knob in the down (STOP) position, the meter must read resistance (closed). If the meter reads no resistance (open), replace the switch. With the emergency stop knob in the up (RUN) position, the meter must read no resistance (open). If the meter reads resistance (closed), replace the switch.

Troubleshooting Ignition System (Fan Cooled Models)

When troubleshooting the standard “normally open” ignition system, use the following procedure.

1. Remove the spark plugs and visually check their condition. Replace any fouled plug. Attach the spark plugs to the high tension leads and ground them on the cylinder heads.

CAUTION

Before checking for spark, place all the engine switches in the deactivated position. In the event the engine could be flooded, pull the starter rope (slowly at first) several times to clear the engine of excess fuel.

CAUTION

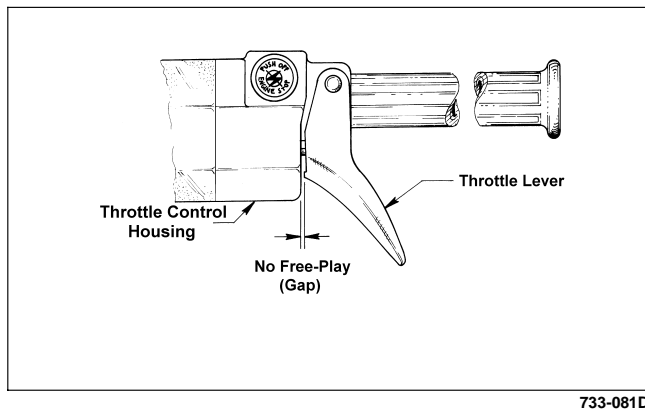
Never crank the engine over without grounding the spark plugs. Damage to coils and/or CDI unit may result.

■ **NOTE:** Make sure the ignition switch and the emergency stop switch are in the ON position.

2. Crank the engine over and check for spark. If no spark is present, check to make sure the throttle cable is properly tensioned. Compress the throttle control and while holding the throttle control in this position, crank the engine over and check for spark. If spark is now present, adjust the throttle cable tension.

■ **NOTE:** On the models equipped with a 2-wire throttle control switch connector, there must be no free-play between the lever and the control housing.

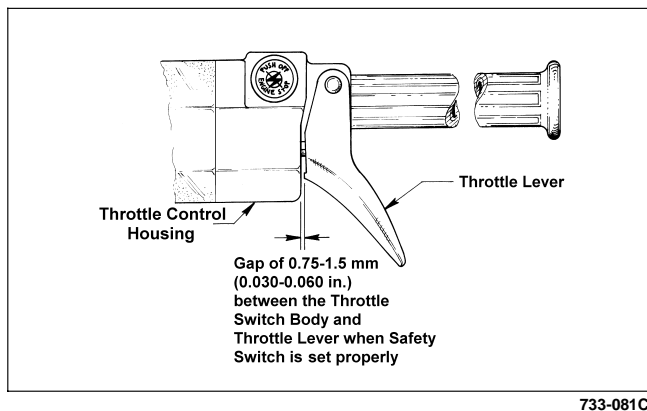
Fig. 5-1



■ **NOTE:** If cable free-play gap is apparent, rotate the swivel adapter until no free-play is achieved. The piston valve must be resting against the tip of its idle speed screw.

■ **NOTE:** On the models equipped with a 3-wire throttle control switch connector, there must be 0.75-1.5 mm (0.030-0.060 in.) free-play between the lever and the control housing.

Fig. 5-2



3. If no spark is present, disconnect the main wiring harness from the engine. Crank the engine over. If spark is present, the problem is either one or more of the following.
 - a. Defective emergency stop switch
 - b. Defective safety switch in throttle-control housing
 - c. Grounded or shorted wire connection at the throttle-control housing or main wiring harness
 - d. Defective ignition switch

■ **NOTE:** To check these possible causes, proceed to Testing Ignition System. If no spark is present, proceed to Arctic Cat Ignition Analyzer in this section.

Testing Ignition System (Single Carburetor F/C Models)

■ **NOTE:** The throttle control is equipped with a two-wire throttle control switch connector. There must be no throttle cable free-play between the throttle lever and the control housing.

MAIN WIRING AND SAFETY SWITCHES

1. Check the wiring connections coming from the ignition key and throttle control switches. The two-wire throttle control switch connector is located on the front side of the steering post. If any of the connections appear dirty or corroded, clean them with fine sandpaper and compressed air; then connect all wires and squeeze the connections with a pliers for additional tightness.
2. Disconnect the main wiring harness four-wire connector coming from the engine stator assembly. Disconnecting the connector will bypass the main wiring harness and all switches which will not allow the engine to be shut off without first installing an additional auxiliary ground wire.
3. Insert an auxiliary ground wire into the black wire of the four-wire main harness connector on the engine side. To stop the engine once it has been started, touch the auxiliary ground wire to the engine.
4. Support the rear of the snowmobile up on a shielded safety stand; then set the brake lever lock. Inspect the complete throttle mechanism to assure that it's working properly.
5. Attempt to start the engine. To stop the engine (if the engine starts), touch the auxiliary ground wire installed into the four-wire connector to a ground on the engine. If the engine fails to start, the problem is with the coils mounted on the engine, high tension coil assembly, or the CDI unit. If the engine starts, the problem is with the switches, main wiring harness, or throttle cable free-play.

■ **NOTE:** Whenever working with a two-wire throttle control switch connector, the throttle cable must have no free-play when measured between the throttle lever and control housing.

MAIN HARNESS

1. Disconnect the main wiring harness four-wire connector coming from the engine stator assembly. Connect one ohmmeter lead to the violet wire and the other lead to the brown wire on the chassis side of the main wiring harness four-wire connector. With all switches in the RUN position, the meter must read no resistance (open).
2. If the meter reads resistance (closed), test the Ignition Key Switch and Throttle Control Switch independently of each other.

IGNITION KEY SWITCH

1. Disconnect the ignition key switch connectors; then connect the ohmmeter leads to each of the ignition key switch terminals.
2. With the key switch in the OFF position, the meter must read resistance (closed). If the meter reads no resistance (open), the switch must be replaced.

THROTTLE CONTROL SWITCH

■ **NOTE:** The throttle control has a two-wire wiring harness connector located on the front side of the steering post. Whenever working with a two-wire throttle control switch, the throttle cable must be adjusted so there is no free-play between the throttle lever and control housing.

1. Verify that the throttle cable has no free-play between the throttle lever and control housing.
2. Disconnect the two-wire throttle control switch connector; then connect the ohmmeter leads to each of the switch wires.
3. With the throttle lever in the idle position and the emergency stop knob in the down (STOP) position, the meter must read resistance (closed). If the meter reads no resistance (open), replace the switch.
4. Depress the throttle lever with the emergency stop knob in the up (RUN) position. The meter must read no resistance (open). If the meter reads resistance (closed), replace the switch.
5. With the throttle lever depressed and the emergency stop knob in the down (STOP) position, the meter must read resistance (closed). If the meter reads no resistance (open), replace the switch.

Testing Ignition System (Twin Carburetor F/C Models)

■ **NOTE:** The throttle control is equipped with a 3-prong emergency stop switch connector. There must be 0.75-1.5 mm (0.030-0.060 in.) free-play between the lever and the control housing (see Section 4-Adjusting Carburetors).

MAIN WIRING AND SAFETY SWITCHES

1. Check the wire connections at the ignition key switch and at the emergency stop switch. This connector is located on the front side of the steering post. If any of the connections appear dirty or corroded, clean with fine sandpaper and compressed air; then connect all wires and squeeze connections with a pliers for added tightness.
2. Disconnect the main wiring harness connector coming from the engine. Using an ohmmeter, connect one lead to the black wire in the connector of the main harness. Connect the remaining ohmmeter lead to the brown wire in the connector of the main harness.
3. With all switches in the RUN position, the meter must read resistance (closed). If the meter reads no resistance (open), proceed to testing Emergency Stop/Throttle Switch, Carburetor Safety Switches, and Ignition Key Switch.

EMERGENCY STOP/THROTTLE SWITCH

1. If the meter read no resistance (open) in the previous test, locate the wiring harness coming from the emergency stop/throttle switch assembly.
2. Disconnect the 3-wire connector. Using an ohmmeter, connect one meter lead to the black wire and the other meter lead to the black/red wire in the connector.
3. With the emergency stop knob, located on top of the throttle control, in the ON (pulled up) position and the throttle lever compressed, the meter must read resistance (closed).
4. If the meter reads no resistance (open) and the lever/control housing free-play is correct, replace the throttle switch.
5. If the meter reads resistance (closed) but the engine will not start, with the ohmmeter leads still connected, alternately release and compress the throttle lever; then move the emergency stop knob down and up.

6. The meter must read no resistance (open) when the throttle lever is released and the emergency stop knob is in either the UP or the DOWN position.
7. If the meter reads resistance (closed), replace the throttle switch.
8. Connect one meter lead to the black/red wire and the other meter lead to the black/white wire.
9. With the throttle lever released (idle position) and the emergency stop knob in the DOWN position, the meter must read no resistance (open).
10. If above tests were good, proceed to testing Carburetor Safety Switches and Ignition Key Switch.

CARBURETOR SAFETY SWITCHES (Twin)

1. If the meter read no resistance (open) in the previous test, disconnect the carburetor safety switches one at a time and test for a closed circuit.
2. Attach the two ohmmeter leads to the two leads coming from each carburetor switch. The meter must read resistance (closed).
3. If the meter reads no resistance (open), the switch must either be adjusted or replaced (see Synchronizing Carburetor Safety Switches in this sub-section). If the meter reads resistance (closed), proceed to testing Ignition Key Switch.

IGNITION KEY SWITCH

1. If the meter read resistance (closed) in the previous test, disconnect the ignition key switch connectors and connect the ohmmeter leads to each of the leads from the switch.
2. With the key switch in the OFF position, the meter must read resistance (closed). If the meter reads no resistance (open), replace the switch.

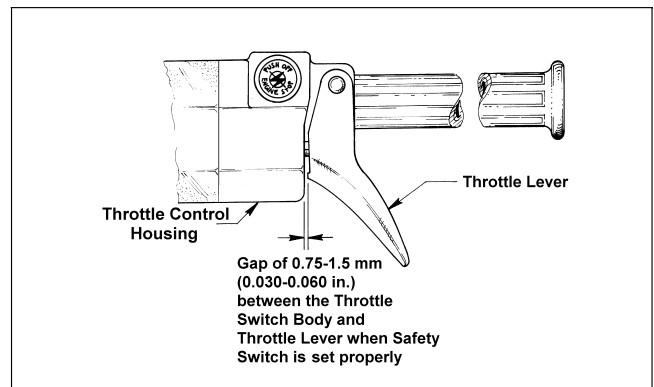
SYNCHRONIZING CARBURETOR SAFETY SWITCHES (Twin)

Before synchronizing the carburetor safety switches, check to make certain the carburetor idle speed screws are adjusted equally and the piston valves are synchronized. The carburetor safety switches affect ignition spark at idle only. If ignition spark problems are observed at partial or full-throttle positions, the problem is not with the carburetor safety switches.

■ **NOTE:** The throttle control is equipped with a 3-wire throttle control switch connector. There must be 0.75-1.5 mm (0.030-0.060 in.) free-play between the lever and the control housing.

1. Inspect the cable free-play gap between the throttle lever and the control housing at idle. Adjust the throttle cable swivel adapter at the top of each carburetor for 0.75-1.5 mm (0.030-0.060 in.) cable free-play gap between the throttle lever “nibs” and the control housing. While observing if there is any cable free-play gap, apply slight pressure to the throttle lever to take up any cable slack that may be present. However, do not apply enough pressure to actually raise the carburetor slides during this adjustment. After cable free-play is properly adjusted, tighten the jam nut on each carburetor securely.

Fig. 5-3

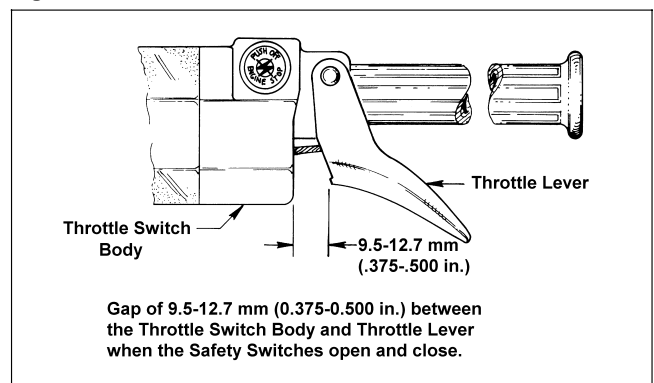


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2. To determine which switch needs adjusting, disconnect both carburetor safety switches from the main wiring harness connector.
3. Connect a digital ohmmeter to one carburetor safety switch connector; then compress the throttle lever while observing the meter reading and measure the gap between the throttle lever and control housing at the moment the meter reading changes from open to closed. Repeat this step for the other carburetor safety switch.

■ **NOTE:** The correct throttle lever/housing gap should be in a range of 9.5 - 12.7 mm (0.375-0.500 in.) the moment the meter reading changes from open to closed. A switch that changes from open to closed before the other one is the switch that must be raised to attain safety switch synchronization.

Fig. 5-4



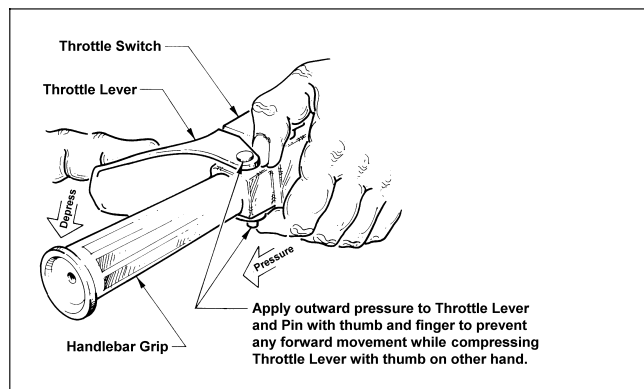
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4. If an adjustment is necessary, loosen the switch bracket screws, move the switch up, tighten the screws, and then reset using step 3.

■ **NOTE:** After completion of any adjustments, throttle lever “side pressure” should not cause an ignition miss at idle. Carburetor switches set too low or an excessively tight throttle cable makes the shutdown system very sensitive to throttle lever “side pressure” near idle. To test carburetor safety switch synchronization, follow steps 5-9.

5. Reconnect the carburetor safety switch connectors. Place the rear of the snowmobile on a shielded safety stand; then start the engine and allow it to warm up for 3-4 minutes.
6. Hold both the top and bottom of the throttle lever pin so that depression of the throttle lever does not move the lever pin in its control slot.

Fig. 5-5



0728-916

7. Slowly depress the throttle lever to increase engine RPM.

■ **NOTE:** It is very important that engine RPM be allowed to increase slowly, since most engines have a “rich area” at approximately 2500 RPM.

8. Observe the tachometer and the drive clutch to determine the moment the carburetor safety switches shut down the ignition. Since retaining the throttle lever pin prevents the switch in the throttle control housing from closing, the carburetor safety switches should shut down the ignition at or slightly after clutch engagement.
9. Repeat steps 6-8 several times. If ignition shutdown always occurs at or slightly after clutch engagement, the carburetor safety switches are synchronized.

10. Again, inspect the gap between the throttle lever and the control housing at idle. Adjust the throttle cable swivel adapter at the top of each carburetor for 0.75-1.5 mm (0.030-0.060 in.) cable free-play gap between the throttle lever “nibs” and the control housing. While observing if there is any cable free-play gap, apply slight pressure to the throttle lever to take up any cable slack that may be present. However, do not apply enough pressure to actually raise the carburetor slides during this adjustment. After cable free-play is properly adjusted, tighten the jam nut on each carburetor securely.

■ **NOTE:** After completion of any adjustments, throttle lever “side pressure” should not cause an ignition miss at idle. Carburetor safety switches set too low or an excessively tight throttle cable makes the shutdown system very sensitive to throttle lever “side pressure” near idle.

Troubleshooting Ignition System (Twin & Triple L/C Models)

When troubleshooting the standard “normally open” ignition system, use the following procedure.

1. Remove the spark plugs and visually check their condition. Replace any fouled plug. Attach the spark plugs to the high tension leads and ground them on the cylinder heads.

⚠ CAUTION

Before checking for spark, place all the engine switches in the deactivated position. In the event the engine could be flooded, pull the starter rope (slowly at first) several times to clear the engine of excess fuel.

⚠ CAUTION

Never crank the engine over without grounding the spark plugs. Damage to coils and/or CDI unit may result.

■ **NOTE:** Make sure the ignition switch and the emergency stop switch are in the ON position.

2. Crank the engine over and check for spark. If no spark is present, check to make sure the carburetor throttle cables are properly tensioned. Compress the throttle control and while holding the throttle control in this position, crank the engine over and check for spark. If spark is now present, adjust the carburetor throttle cable tension.

3. If no spark is present, disconnect the main wiring harness from the engine. Crank the engine over. If spark is present, the problem is either one or more of the following:
 - a. Defective emergency stop switch
 - b. Defective safety switch in throttle-control handle
 - c. Corroded or loose wire connection at the throttle-control housing or main wiring harness
 - d. Defective ignition switch

■ **NOTE:** To check these possible causes, proceed to **Testing Ignition System**. If no spark is present, proceed to **Arctic Cat Ignition Analyzer** in this section.

Testing Ignition System (Twin & Triple L/C Models)

■ **NOTE:** There must be 0.75-1.5 mm (0.030-0.060 in.) throttle cable free-play (on the VM-style carburetor models) or no free-play (on the TM-style carburetor models) between the throttle lever and the control housing.

MAIN WIRING AND SAFETY SWITCHES

1. Check the wiring connections coming from the ignition key, emergency stop, and carburetor switches (on VM-style). The throttle control switch connector is located on the front side of the steering post. If any of the connections appear dirty or corroded, clean them with fine sandpaper and compressed air; then connect all wires and squeeze the connections with a pliers for additional tightness.
2. Disconnect the main wiring harness connector coming from the engine stator assembly. Disconnecting this connector will bypass the main wiring harness and all switches which will not allow the engine to be shut off without first installing an additional auxiliary ground wire.
3. Insert an auxiliary ground wire into the black wire of the main harness connector on the engine side. To stop the engine once it has been started, touch the auxiliary ground wire to the engine.
4. Support the rear of the snowmobile up on a shielded safety stand; then set the brake lever lock. Inspect the complete throttle mechanism to assure that it's working properly.

5. Attempt to start the engine. To stop the engine (if the engine starts), touch the auxiliary ground wire installed into the connector to a ground on the engine. If the engine fails to start, the problem is with the coils mounted on the engine, high tension coil assembly, or the CDI unit. If the engine starts, the problem is with the switches, main wiring harness, or throttle cable free-play.

MAIN HARNESS

1. Disconnect the main wiring harness connector coming from the engine stator assembly. Connect one ohmmeter lead to the violet wire and the other lead to the brown wire on the chassis side of the main wiring harness four-wire connector. With all switches in the RUN position, the meter must read no resistance (open).
2. If the meter reads resistance (closed), test the Ignition Key Switch, Throttle Control Switch, and Carburetor Safety Switches independently of each other.

IGNITION KEY SWITCH

1. Disconnect the ignition key switch connectors; then connect the ohmmeter leads to each of the ignition key switch terminals.
2. With the switch in the OFF position, the meter must read less than 1 ohm resistance.
3. With the switch in the ON position, the meter must read OL (infinite resistance).

THROTTLE CONTROL SWITCH

1. Verify that the throttle cable has 0.75-1.5 mm (0.030-0.060 in.) free-play (VM-style carburetor models) or no free-play (TM-style carburetor models) between the throttle lever and control housing.
2. Disconnect the throttle control switch connector; then connect one ohmmeter lead to the brown wire and the other lead to the black/white wire of the emergency stop switch.
3. With the throttle lever in the idle position and the emergency stop knob in the up (RUN) position, the meter must read no resistance (open). If the meter reads resistance (closed), replace the switch.
4. With the throttle lever in the idle position and the emergency stop knob in the down (STOP) position, the meter must read resistance (closed). If the meter reads no resistance (open), replace the switch. With the emergency stop knob still in the down (STOP) position, move the throttle lever to the wide open position. The meter must read no resistance (open). If the meter reads resistance (closed), replace the switch.

5. Connect one ohmmeter lead to the brown wire and the other lead to the violet wire. With the emergency stop knob in the down (STOP) position, the meter must read resistance (closed). If the meter reads no resistance (open), replace the switch. With the emergency stop knob in the up (RUN) position, the meter must read no resistance (open). If the meter reads resistance (closed), replace the switch.

CARBURETOR SAFETY SWITCHES (VM-Style)

1. Disconnect both carburetor safety switches at the carburetors from the main wiring harness.
2. Connect the ohmmeter leads to one of the carburetor safety switches. With the throttle lever in the idle position, the ohmmeter must read no resistance (open). If the meter reads resistance (closed), adjust the switch (see Synchronizing Carburetor Safety Switches in this sub-section). Test the remaining switch.

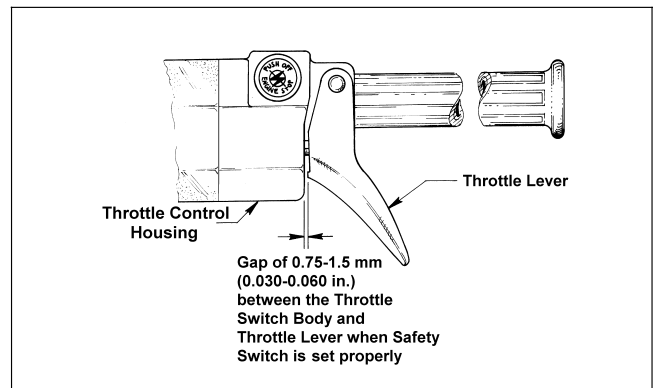
SYNCHRONIZING CARBURETOR SAFETY SWITCHES (VM-Style)

Before synchronizing the carburetor safety switches, check to make certain the carburetor idle speed screws are adjusted equally and the throttle valves are synchronized. The carburetor safety switches affect ignition spark at idle only. If ignition spark problems are observed at partial or full-throttle positions, the problem is not with the carburetor safety switches.

■ **NOTE:** The throttle control is equipped with a 3-wire throttle control switch connector. There must be 0.75-1.5 mm (0.030-0.060 in.) free-play between the lever and the control housing.

1. Inspect the cable free-play gap between the throttle lever and the control housing at idle. Adjust the throttle cable swivel adapter at the top of each carburetor for 0.75-1.5 mm (0.030-0.060 in.) cable free-play gap between the throttle lever “nibs” and the control housing. While observing if there is any cable free-play gap, apply slight pressure to the throttle lever to take up any cable slack that may be present. However, do not apply enough pressure to actually raise the carburetor slides during this adjustment. After cable free-play is properly adjusted, tighten the jam nut on each carburetor securely.

Fig. 5-6

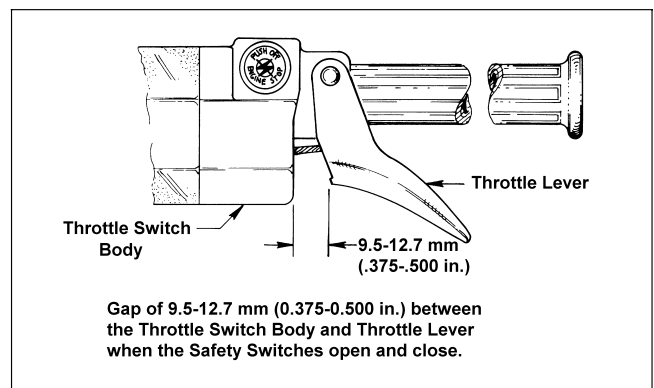


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2. To determine which switch needs adjusting, disconnect both carburetor safety switches from the main wiring harness connector.
3. Connect a digital ohmmeter to one carburetor safety switch connector; then compress the throttle lever while observing the meter reading and measure the gap between the throttle lever and control housing at the moment the meter reading changes from open to closed. Repeat this step for the other carburetor safety switch.

■ **NOTE:** The correct throttle lever/housing gap should be in a range of 9.5 - 12.7 mm (0.375-0.500 in.) the moment the meter reading changes from open to closed. A switch that changes from open to closed before the other one is the switch that must be raised to attain safety switch synchronization.

Fig. 5-7



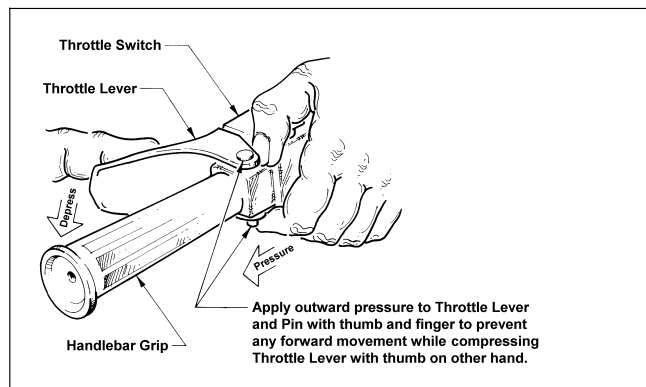
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4. If an adjustment is necessary, loosen the switch bracket screws, move the switch up, tighten the screws, and then reset using step 3.

■ **NOTE:** After completion of any adjustments, throttle lever “side pressure” should not cause an ignition miss at idle. Carburetor switches set too low or an excessively tight throttle cable makes the shutdown system very sensitive to throttle lever “side pressure” near idle. To test carburetor safety switch synchronization, follow steps 5-9.

5. Reconnect the carburetor safety switch connectors. Place the rear of the snowmobile on a shielded safety stand; then start the engine and allow it to warm up for 3-4 minutes.
6. Hold both the top and bottom of the throttle lever pin so that depression of the throttle lever does not move the lever pin in its control slot.

Fig. 5-8



0728-916

7. Slowly depress the throttle lever to increase engine RPM.

■ **NOTE:** It is very important that engine RPM be allowed to increase slowly, since most engines have a “rich area” at approximately 2500 RPM.

8. Observe the tachometer and the drive clutch to determine the moment the carburetor safety switches shut down the ignition. Since retaining the throttle lever pin prevents the switch in the throttle control housing from closing, the carburetor safety switches should shut down the ignition at or slightly after clutch engagement.
9. Repeat steps 6-8 several times. If ignition shutdown always occurs at or slightly after clutch engagement, the carburetor safety switches are synchronized.
10. Again, inspect the gap between the throttle lever and the control housing at idle. Adjust the throttle cable swivel adapter at the top of each carburetor for 0.75-1.5 mm (0.030-0.060 in.) cable free-play gap between the throttle lever “nibs” and the control housing. While observing if there is any cable free-play gap, apply slight pressure to the throttle lever to take up any cable slack that may be present. However, do not apply enough pressure to actually raise the carburetor slides during this adjustment. After cable free-play is properly adjusted, tighten the jam nut on each carburetor securely.

■ **NOTE:** After completion of any adjustments, throttle lever “side pressure” should not cause an ignition miss at idle. Carburetor safety switches set too low or an excessively tight throttle cable makes the shutdown system very sensitive to throttle lever “side pressure” near idle.

Digital 3-D Ignition (700/800/1000 cc)

The advantage of a 3-D ignition system is it actually has up to twelve slightly different timing curves which are controlled by both throttle position and engine RPM. This system allows the technician to match a more safe timing curve to each engine operating condition.

A condition in which the 3-D ignition will have a distinct advantage is when the operator completes high-speed operation and backs the throttle position off slightly to cruise. Since the engine now may still be at fairly high RPM, it is running at less throttle opening. This condition can create a higher engine operating temperature because of the slightly leaner jet needle position. With the 3-D ignition as soon as the throttle position is backed off, the ignition timing will be reduced and engine temperature also will be reduced.

When checking the ignition timing, a couple points must be remembered. First, since the ignition timing is affected by the throttle position, the throttle position sensor (TPS) must be in good operating condition and adjusted correctly. Second, the ignition timing must be checked according to the following chart. Never remove the drive belt to make the timing check. Always place the rear of the snowmobile on a shielded safety stand and allow the track to rotate freely.

Engine	RPM	Ignition Timing $\pm 2^\circ$	Fail-Safe Timing $\pm 2^\circ$
700 cc	4000	27°	15°
800 cc	1800	12°	N/A
1000 cc	4000	16°	14°

When checking ignition timing, it is important that the timing light be connected to the number 1 spark plug wire, which is the MAG-side cylinder. If the number 2 cylinder spark plug wire is used, the timing light may show a 2° error in ignition timing when ignition timing is actually correct.

For example, the correct ignition timing on the 700 cc is 27° $\pm 2^\circ$ BTDC at 4000 RPM.

If ignition timing is at 15° BTDC at 4000 RPM, the throttle position sensor (TPS) has failed and must be replaced. This is known as “Fail-Safe Ignition Timing” and is built into the system to protect the engine should the TPS fail.

If the ignition timing isn't 27° $\pm 2^\circ$ at 4000 RPM, the TPS should be checked for proper adjustment using the TPS Adjustment Tool (p/n 0644-299). To adjust the TPS, use the following procedure.

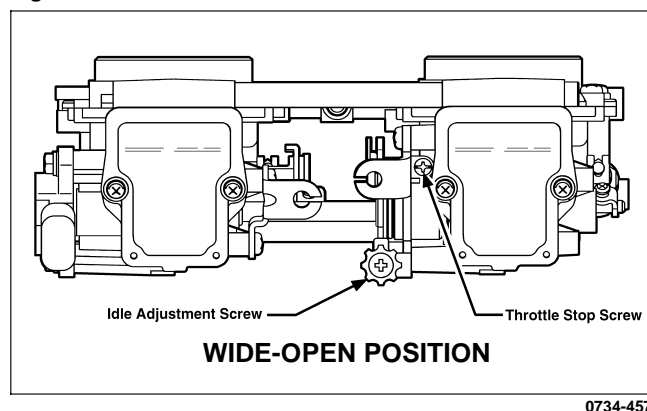
ADJUSTING TPS

■ **NOTE:** Before using the TPS adjustment tool, verify its battery condition. The battery used in the tool is a 9-volt battery.

To check battery condition, use a digital volt/ohmmeter set on DC volt scale. Test between the adjustment tool black and red jacks. Insert the red lead of the digital voltmeter into the green jack of the adjustment tool and the black lead of the digital voltmeter into the black jack of the adjustment tool. If voltage is found below 4.9 volts, replace the battery.

1. Loosen the two screws securing the TPS.
2. Using TPS Adjustment Tool (p/n 0644-299), connect its wiring harness to the TPS. Connect the two meter leads (red and black) using the two pin jack adapters provided with the adjustment tool to the red and black jacks of the TPS adjustment tool.
3. Set the selector to the DC scale. Adjust the TPS to the specifications in the following chart with the throttle fully closed; then tighten the two screws securing the TPS.
4. Squeeze the throttle to the wide-open position. If the reading is not as specified in the following chart, adjust the throttle stop screw until the correct voltage is indicated on the voltmeter.

Fig. 5-9



5. Connect the throttle cable to the throttle shaft. Adjust the throttle cable, if required, so that both the idle and wide-open positions are obtainable while working the throttle lever. Keep in mind that there must be no free-play in the throttle lever in the idle position.
6. Check the idle voltage using the TPS Adjustment Tool (p/n 0644-299). Adjust the idle voltage to the specifications in the following chart using the idle adjustment screw.
7. Disconnect the adjustment tool harness from the TPS. Connect the snowmobile TPS harness to the newly installed or adjusted TPS.

■ **NOTE:** Before installing the TPS harness connector, apply dielectric grease to the connector pins.

Engine	Closed Position	Idle Position	Wide-Open Position
700 cc	0.025 V	0.325 V	3.920 V
800 cc	0.300 V	0.600 V	4.012 V
1000 cc	0.300 V	0.600 V	4.012 V

REPLACING TPS

1. Disconnect the throttle cable from the throttle shaft.
2. Turn the idle speed screw counterclockwise until its end no longer contacts the throttle stop. The throttle valves should now be completely closed.
3. Disconnect the TPS wiring harness connector. Remove the two screws securing the TPS to the right-side carburetor.
4. Install the new TPS and secure with two screws, flat washers, and lock washers.

FAIL-SAFE IGNITION TIMING

Engines equipped with the 3-D ignition system have a protective feature called “fail-safe” ignition timing which prevents engine damage should the TPS fail. If the TPS does fail, the engine will run normally at low RPM but will run poorly at high RPM. This will allow the operator to get the snowmobile to safety with little or no engine damage.

■ **NOTE:** The engine will continue to operate this way until the TPS is replaced.

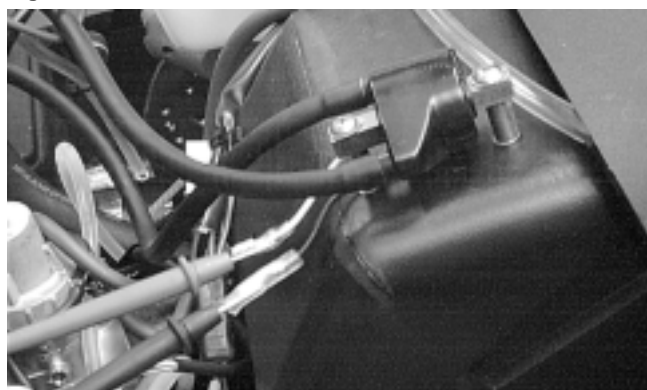
Testing Electrical Resistances (EFI Models)

■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

1. Disconnect the double wire plug from the ECU to the ignition coil.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the orange lead; then connect the black meter lead to the black lead.

Fig. 5-10



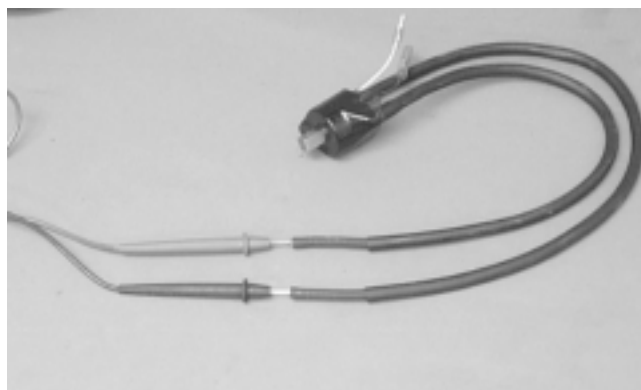
AK051D

4. Ignition coil primary resistance must be between 0.25-0.34 ohm.

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.

Fig. 5-11



AK050D

4. Ignition coil secondary resistance must be between 6800-10,200 ohms.

CHARGE COIL (High Speed)

1. Disconnect the triple-wire plug from the ECU to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the black wire (500/580 cc) or to the green/red wire (600 cc) in the plug; then connect the black meter lead to the green wire (500/580 cc) or to the brown/white wire (600 cc) in the plug.

Fig. 5-12



AK014

4. Charge coil (high speed) resistance must be between 36.8-55.2 ohms (500/580 cc) or 13.6-20.4 ohms (600 cc).

CHARGE COIL (Low Speed)

1. Disconnect the triple-wire plug from the ECU to the magneto.
2. Set the selector in the X100 position (500/580 cc) or X10 (600 cc).

3. Connect the red meter lead to the brown wire (500/580 cc) or to the black/red wire (600 cc) in the plug; then connect the black meter lead to the green wire (500/580 cc) or to the green/red wire (600 cc) in the plug.

Fig. 5-13



AK013

4. Charge coil (low speed) resistance must be between 360-540 ohms (500/580 cc) or 13.6-20.4 ohms (600 cc).

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-14



AK015

4. Lighting coil resistance must be between 0.07-0.10 ohm (500/580 cc) or 0.08-0.12 ohm (600 cc).

IGNITION TIMING SENSOR

1. Disconnect the two timing sensor leads (green/white and brown) from the ECU.
2. Connect the meter leads to the sensor leads.
3. Ignition timing sensor resistance must be between 152-228 ohms.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-15



B170

4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must read OL (infinite resistance).

Testing Electrical Resistances (Fan Cooled Models)

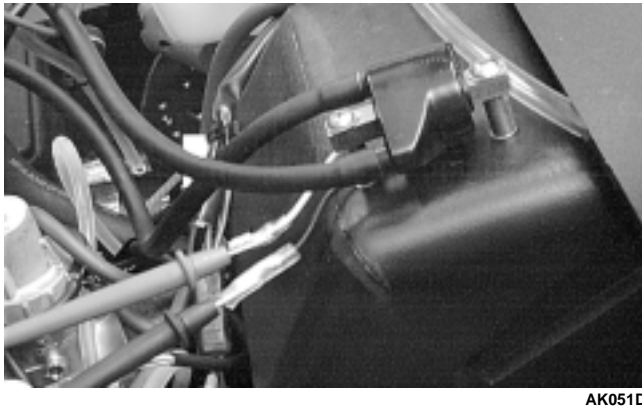
■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

1. Disconnect the two connectors from the CDI unit to the ignition coil.
2. Set the selector in the X1 position.

3. Connect the red meter lead to the orange lead; then connect the black meter lead to the black lead.

Fig. 5-16



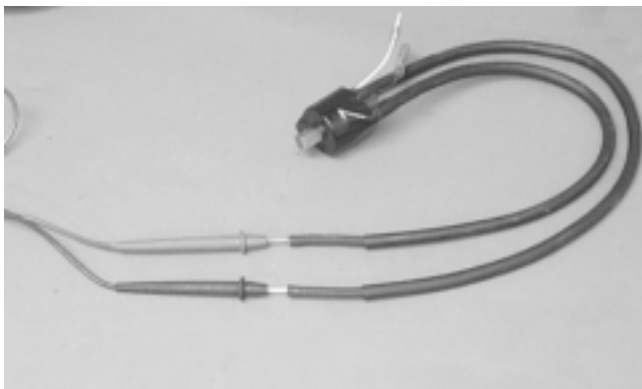
AK051D

4. Ignition coil primary resistance must be between 0.25-0.34 ohm.

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.

Fig. 5-17



AK050D

4. Ignition coil secondary resistance must be between 6800-10,200 ohms.

CHARGE COIL

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector in the X100 position.
3. Connect the red meter lead to the red/white wire in the plug; then connect the black meter lead to the black/red wire in the plug.

Fig. 5-18



AK013

4. Charge coil resistance must be between 128-192 ohms.

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-19



AK015

4. Lighting coil resistance must be between 0.17-0.26 ohm.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-20



B170

4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must read OL (infinite resistance).

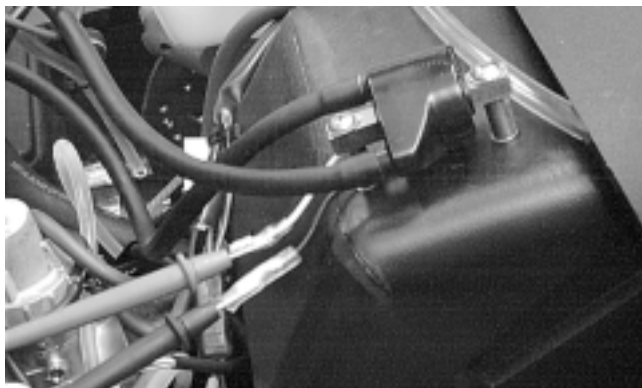
Testing Electrical Resistances (440 cc L/C Model)

■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

1. Disconnect the double wire plug from the CDI unit to the ignition coil.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the orange lead; then connect the black meter lead to the black/white lead.

Fig. 5-21



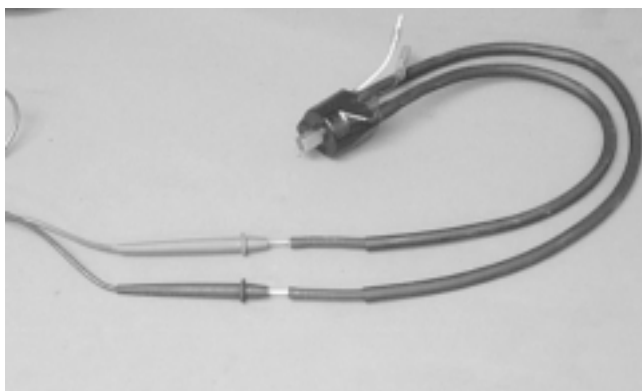
AK051D

4. Ignition coil primary resistance must be between 0.078-0.106 ohm.

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.

Fig. 5-22



AK050D

4. Ignition coil secondary resistance must be between 3485-4715 ohms.

CHARGE COIL (1)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1K position.
3. Connect the red meter lead to the green wire in the plug; then connect the black meter lead to the black/white wire in the plug.

Fig. 5-23



AK014

4. Charge coil (1) resistance must be between 1134-1386 ohms.

CHARGE COIL (2)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector in the X10 position.
3. Connect the red meter lead to the white/red wire in the plug; then connect the black meter lead to the black/white wire in the plug.

Fig. 5-24



AK013

4. Charge coil (2) resistance must be between 14.31-17.49 ohms.

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-25



AK015

4. Lighting coil resistance must be between 0.099-0.121 ohm.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-26



B170

4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm of resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must read OL (infinite resistance).

Testing Electrical Resistances

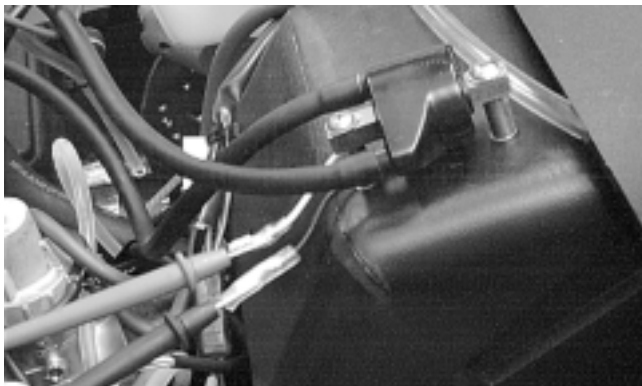
(500/600 cc Twin Carburetor Models)

■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

1. Disconnect the double wire plug from the CDI unit to the ignition coil.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the orange wire in the plug; then connect the black meter lead to the black wire (500 cc) or the black/white wire (600 cc) in the plug.

Fig. 5-27



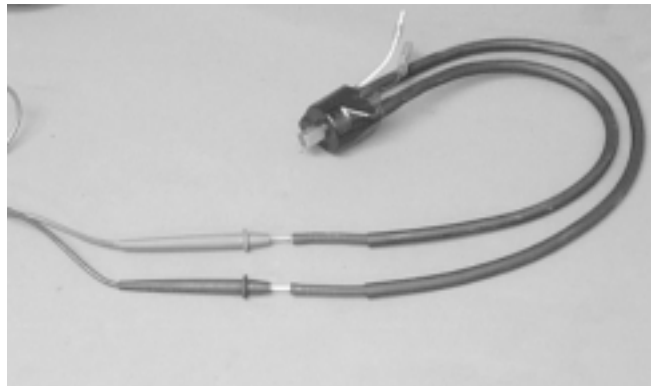
AK051D

4. Ignition coil primary resistance must be between 0.25-0.34 ohm (500 cc) or 0.079-0.105 ohm (600 cc).

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.

Fig. 5-28



AK050D

4. Ignition coil secondary resistance must be between 6800-10,200 ohms (500 cc) or 3520-5280 ohms (600 cc).

CHARGE COIL (1)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the green wire in the plug; then connect the black meter lead to the black/red wire (500 cc) or the green wire (600 cc) in the plug.

Fig. 5-29



AK014

4. Charge coil (1) resistance must be between 36.8-55.2 ohms.

CHARGE COIL (2) - (500 cc)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector in the X100 position.
3. Connect the red meter lead to the green wire in the plug; then connect the black meter lead to the white wire in the plug.

Fig. 5-30



AK013

4. Charge coil (2) resistance must be between 360-540 ohms.

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-31



AK015

4. Lighting coil resistance must be between 0.12-0.18 ohm (500 cc) or 0.16-0.24 ohm (600 cc).

IGNITION TIMING SENSOR

1. Disconnect the two timing sensor leads (green/white and brown) from the CDI unit.
2. Connect the meter leads to the sensor leads.
3. Ignition timing sensor resistance must be between 80.8-121.2 ohms.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.

3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-32



B170

4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must read OL (infinite resistance).

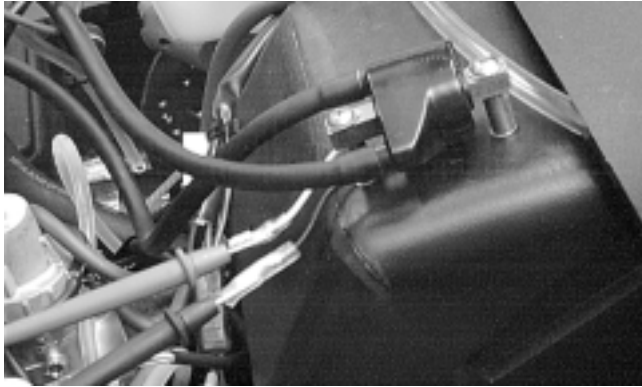
Testing Electrical Resistances (550 cc Models)

■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

1. Disconnect the double wire plug from the CDI unit to the ignition coil.
2. Set the selector in the X1 position.
3. Connect the red meter lead the orange wire in the plug; then connect the black meter lead to the black wire in the plug.

Fig. 5-33



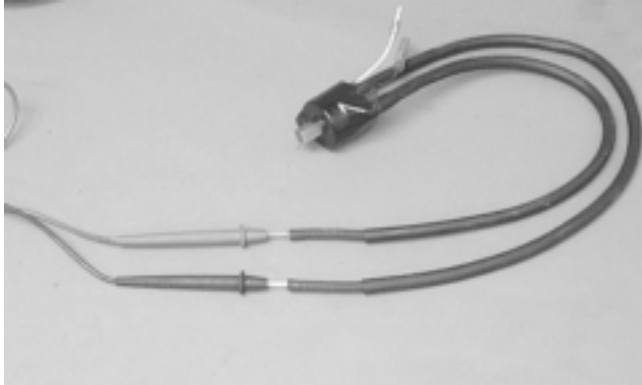
AK051D

4. Ignition coil primary resistance must be between 0.25-0.34 ohm.

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.

Fig. 5-34



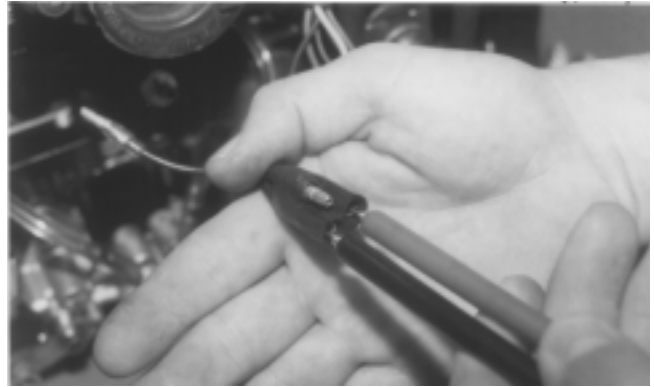
AK050D

4. Ignition coil secondary resistance must be between 6800-10,200 ohms.

CHARGE COIL (1)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector in the X100 position.
3. Connect the red meter lead to the red/white wire in the plug; then connect the black meter lead to the black/white wire in the plug.

Fig. 5-35



AK014

4. Charge coil (1) resistance must be between 128-192 ohms.

CHARGE COIL (2)

1. Disconnect the triple-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the black/red wire in the plug; then connect the black meter lead to the red/white wire in the plug.

Fig. 5-36



AK013

4. Charge coil (2) resistance must be between 13.6-20.4 ohms.

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-37



AK015

4. Lighting coil resistance must be between 0.17-0.26 ohm.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-38



B170

4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm of resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must indicate OL (infinite resistance).

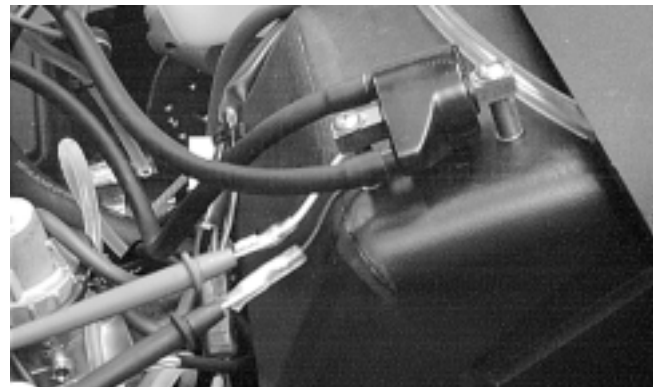
Testing Electrical Resistances (600 cc Triple Models)

■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

1. Disconnect the spade connectors from the ignition coil body.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the positive spade terminal; then connect the black meter lead to the negative spade terminal.

Fig. 5-39



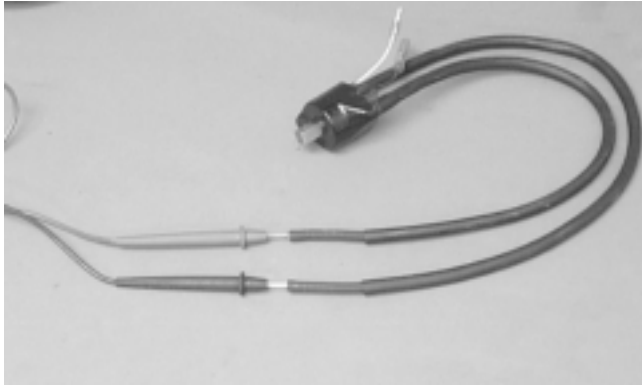
AK051D

4. Ignition coil primary resistance must be between 0.29-0.39 ohm.

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. On the dual lead coil, connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.
4. On the single lead coil, connect the red meter lead to one high tension wire; then connect the black meter lead to the positive spade terminal.

Fig. 5-40



AK050D

5. Ignition coil secondary resistance must be between 6320-9480 ohms on both coils.

CHARGE COIL (1)

1. Disconnect the four-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the green wire in the plug; then connect the black meter lead to the black/red wire in the plug.

Fig. 5-41



AK014

4. Charge coil (1) resistance must be between 16-24 ohms.

CHARGE COIL (2)

1. Disconnect the four-wire plug from the CDI unit to the magneto.
2. Set the selector in the X100 position.
3. Connect the red meter lead to the green wire in the plug; then connect the black meter lead to the white wire in the plug.

Fig. 5-42



AK013

4. Charge coil (2) resistance must be between 360-540 ohms.

IGNITION TIMING SENSOR

1. Disconnect the two timing sensor leads (green/white and brown) from the CDI unit.
2. Connect the meter leads to the sensor leads.
3. Ignition timing sensor resistance must be between 80.8-121.2 ohms.

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-43



AK015

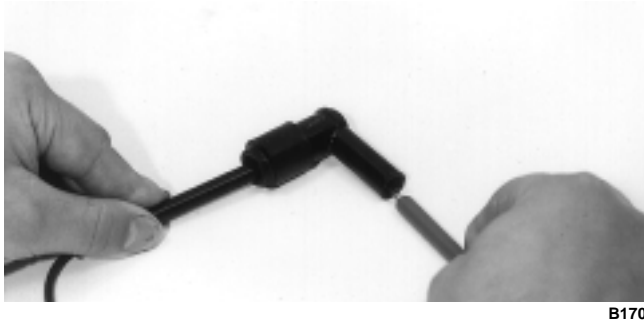
4. Lighting coil resistance must be between 0.12-0.18 ohm.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.

3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-44



4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm of resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must read OL (infinite resistance).

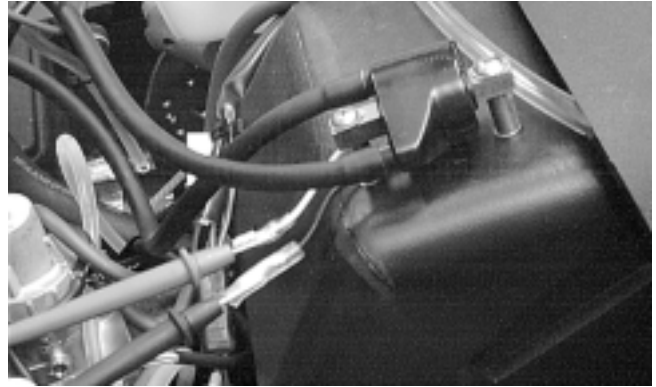
Testing Electrical Resistances (700 cc Models)

■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

1. Disconnect the double wire plug from the CDI unit to the ignition coil.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the orange lead; then connect the black meter lead to the black lead.

Fig. 5-45

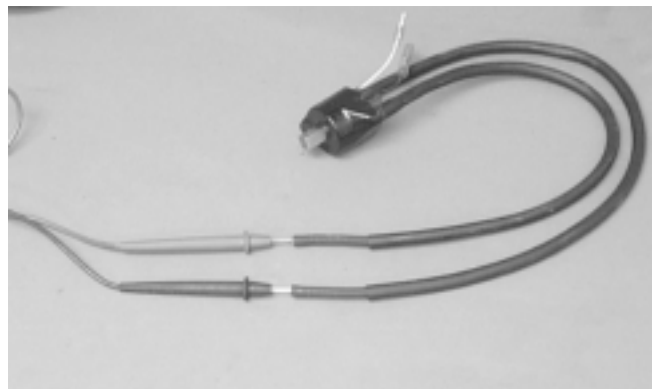


4. Ignition coil primary resistance must be between 0.25-0.34 ohm.

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.

Fig. 5-46



4. Ignition coil secondary resistance must be between 6800-10,200 ohms.

CHARGE COIL (1)

1. Disconnect the four-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the black/red wire in the plug; then connect the black meter lead to the green/red wire in the plug.
4. Charge coil (1) resistance must be between 13.6 - 20.4 ohms.

CHARGE COIL (2)

1. Disconnect the four-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the green/red wire in the plug; then connect the black meter lead to the brown/white wire in the plug.
4. Charge coil (2) resistance must be between 13.6 - 20.4 ohms.

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-47



AK015

4. Lighting coil resistance must be between 0.12 -0.19 ohm.

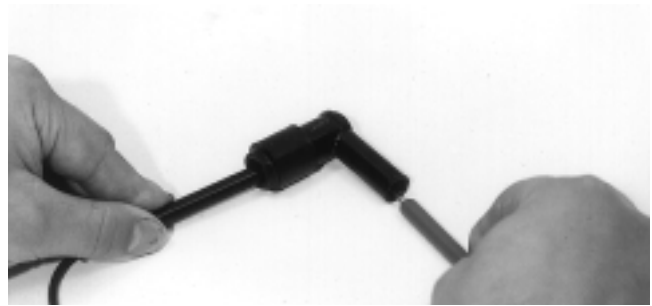
IGNITION TIMING SENSOR

1. Disconnect the two timing sensor leads (green/white and brown) from the CDI unit.
2. Connect the meter leads to the sensor leads.
3. Ignition timing sensor resistance must be between 80.8-121.2 ohms.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-48



B170

4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must read OL (infinite resistance).

Testing Electrical Resistances (800/1000 cc Models)

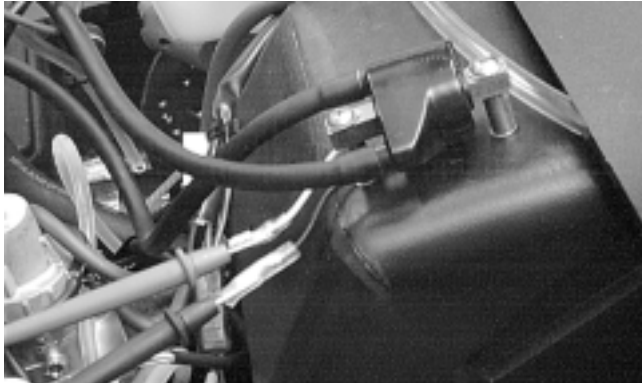
■ **NOTE:** Resistance tests of the engine electrical components should be made using the Fluke Multimeter only. Analog-style multimeters may not be accurate enough to use in these critical tests. Replace any component that does not have a test value within specifications.

IGNITION COIL (PRIMARY)

■ **NOTE:** Both ignition coils can be tested using the following procedure.

1. Disconnect the spade connectors from the external coil body.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the positive spade terminal; then connect the black meter lead to the negative spade terminal.

Fig. 5-49



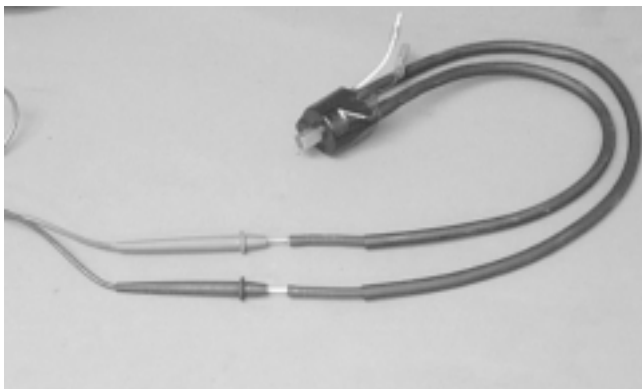
AK051D

4. Ignition coil primary resistance must be between 0.29-0.39 ohm.

IGNITION COIL (SECONDARY)

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. On the dual lead coil, connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.

Fig. 5-50



AK050D

4. On the single lead coil, connect the red meter lead to one high tension wire; then connect the black meter lead to the positive spade terminal.
5. Ignition coil secondary resistance on both coils must be between 6320-9480 ohms.

CHARGE COIL (1)

1. Disconnect the four-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the black/red wire in the plug; then connect the black meter lead to the green/red wire in the plug.

Fig. 5-51



AK014

4. Charge coil (1) resistance must be between 12-18 ohms.

CHARGE COIL (2)

1. Disconnect the four-wire plug from the CDI unit to the magneto.
2. Set the selector in the X1 position.
3. Connect the red meter lead to the brown/white wire in the plug; then connect the black meter lead to the green/red wire in the plug.

Fig. 5-52



AK013

4. Charge coil (2) resistance must be between 12-18 ohms.

IGNITION TIMING SENSOR

1. Disconnect the green/white and brown wires from the timing sensor to the main harness.

Fig. 5-53



AO102D

2. Set the selector in the X10 position.
3. Connect the red tester lead to the green/white wire; then connect the black tester lead to the brown wire.
4. Ignition timing sensor resistance must be between 80.8 and 121.2 ohms.

LIGHTING COIL

1. Disconnect the main wiring harness from the engine.
2. Set the selector in the X1 position.
3. Connect the two meter leads to each of the yellow leads in the connector from the engine.

Fig. 5-54



AK015

4. Lighting coil resistance must be between 0.12-0.18 ohm.

SPARK-PLUG CAP

1. Remove the spark-plug caps from the high tension wires.
2. Set the selector in the X1K position.
3. In turn on each cap, touch a tester lead to each end of the spark-plug cap.

Fig. 5-55



B170

4. Spark-plug cap resistance must be between 4000-6000 ohms.

IGNITION SWITCH

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. The meter must read less than 1 ohm resistance between the ignition switch terminals.
4. Rotate the key to the RUN position.
5. The meter must read OL (infinite resistance).

Arctic Cat Ignition Analyzer (Fan Cooled Models)

■ **NOTE:** Ignition analyzer test specifications are on the Electrical Specifications (Individual) pages in this section.

The Ignition Analyzer can perform the following tests.

- A. Stator Plate Charge Coil Output
- B. Stator Plate Lighting Coil Output
- C. CDI Unit Output
- D. System Regulated Voltage
- E. Battery Voltage
- F. Spark-Plug Voltage (with optional High Voltage Sensor)

⚠ CAUTION

Do not connect any analyzer harness lead wires directly to the spark plug high tension wires or analyzer failure will result. The optional high voltage sensor must be used to measure any voltage exceeding 1000 volts.

⚠ WARNING

Most voltages generated by the ignition system are sufficient to interrupt pacemakers! All technicians, especially those using pacemakers, must avoid contact with all electrical connections after the engine has been started.

A. ANALYZER SETUP PROCEDURE

1. Connect the Analyzer Wiring Harness (p/n 0686-069) into the analyzer back-panel jack. Rotate the harness connector to position the alignment slots. Complete insertion of the connector and secure the connector nut.

Fig. 5-56



AK059D

2. Disconnect the rubber straps from the analyzer lower strap posts. Position the analyzer on the handlebar pad and wrap the straps around the pad. Stretch the straps and install them on the lower strap posts.

Fig. 5-57



AK060D

3. Disconnect the four-prong stator plate/main harness connector. Insert both four-prong analyzer wiring harness connectors making certain that both connectors are completely seated.
4. Disconnect the three-prong stator plate/CDI connector. Insert both three-prong analyzer wiring harness connectors making certain that both connectors are completely seated.
5. Disconnect the two-prong CDI/ignition coil connector. Insert both two-prong analyzer wiring harness connectors making certain that both connectors are completely seated.

■ NOTE: The color code of the two-prong connectors must be observed. The two black/white wires must be connected together and the two white/blue wires must be connected.

⚠ WARNING

Elevate the snowmobile track with a good quality safety stand when performing tests in the shop area. Do not allow anyone near the front or back of the machine while conducting these tests.

⚠ CAUTION

Check the analyzer wiring harness routing before starting the engine. Do not allow the analyzer harness to contact the exhaust system, driven shaft, clutches, or the drive belt.

6. Start the engine and allow it to idle for about five minutes. Select the analyzer TACH switch position, rotate the selector to the LIGHT/TACH position, and then increase the engine speed to 2000, 3000, and 4000 RPM. If the snowmobile tachometer is within 120 RPM of the analyzer reading, the snowmobile tachometer can be used when conducting the following tests. If the reading is not within 120 RPM or if the snowmobile is not equipped with a tachometer, the analyzer tachometer must be used to set the following RPM.
7. In many cases, if the tester readings are erratically flashing high and low numbers, this indicates one of the following conditions.
 - A. Defective spark-plug cap - check cap and replace.
 - B. Defective high tension lead wire end - cut 6 mm (1/4 in.) off the end of the wire and install cap.
 - C. Defective resistor spark plug - install new spark plug.

Before any further testing can be done, locate the component causing the erratic readings and replace.

■ **NOTE:** For troubleshooting a model that will not start, attach the analyzer as outlined under section A. Conduct all of the following tests using the recoil starter and cranking the engine over hard three times. Use the specifications called out for 2000 RPM.

■ **NOTE:** The individual components must be checked in the following sequence using the appropriate specifications chart for recommended values.

B. CHARGE COIL OUTPUT TEST

1. Perform sub-section A before conducting this charge coil test.
2. Start the engine and allow it to idle for 4-5 minutes if not previously done in step A-6. Select the analyzer VOLT switch position and rotate the analyzer selector to the CHRG position.
3. Operate the engine at 2000 RPM and observe the analyzer charge coil reading. The observed reading must not be less than the recommended value. Next, observe the analyzer reading at 3000 and 4000 RPM.
4. If any readings are less than the listed values, disconnect the CDI unit from the system; then using the recoil starter, crank the engine over hard three to four times. If the reading is within tolerance for 2000 RPM, the CDI unit may be defective. Repeat the test once again after connecting the CDI unit and see if the reading is once again below specifications at cranking speed. If readings remain low, replace the CDI unit. If the test results remain low with the CDI unit disconnected, replace the charge coil.

■ **NOTE:** A defective CDI unit can cause a low reading for the charge coil output test. To verify reading, step 4 under Charge Coil Output Test is very important.

■ **NOTE:** The observed readings are permitted to be greater than (but never less than) the recommended values.

C. CDI OUTPUT TEST

1. Perform sub-sections A and B before conducting this CDI test.
2. Rotate the analyzer selector to the CDI position.
3. Operate the engine at 2000, 3000, and 4000 RPM. If any of the observed CDI readings are less than the recommended values, replace the CDI unit.

D. LIGHTING COIL OUTPUT TEST

WARNING

Elevate the snowmobile track with a good quality safety stand when performing the lighting coil output test. Do not allow anyone near the front or back of the machine while conducting this test. All safety switches will be bypassed while conducting the lighting coil output test.

1. Perform sub-section A before conducting this lighting coil test.
2. Stop the snowmobile engine and disconnect the snowmobile main wiring harness from the four-prong analyzer wiring harness connector (the four-prong analyzer wiring harness connector must remain connected to the four-prong stator plate connector).
3. Insert an auxiliary ground wire into the black wire of the four-wire main harness connector on the engine side. To stop the engine once it has been started, touch the auxiliary ground wire to the engine.
4. Rotate the selector to the LIGHT/TACH position.
5. Operate the engine at 2000, 3000, and 4000 PM. If any of the observed lighting coil readings are less than the recommended values, replace the stator plate lighting coil.

WARNING

Stop the engine and remove the auxiliary ground wire before proceeding.

E. VOLTAGE REGULATOR OUTPUT TEST

WARNING

Elevate the snowmobile track with a good quality safety stand when performing the voltage regulator test. Do not allow anyone near the front or back of the machine while conducting this test. All safety switches will be bypassed while conducting the voltage regulator test.

1. Perform sub-section D before conducting this voltage regulator test.
2. Disconnect the analyzer wiring harness. Reconnect all snowmobile electrical connectors to their original positions.
3. Remove the analyzer from the handlebar and disconnect the analyzer wiring harness from the analyzer back-panel connector.

4. Remove the red and black lead wires from their carrying case. Insert the red lead wire connector into the analyzer front-panel red jack and the black lead wire into the black jack.
5. Rotate the selector to the EXT position. Select the snowmobile HIGH BEAM headlamp position.
6. Insert the analyzer black lead wire into the headlamp connector on the brown wire position using the appropriate lead wire end. Insert the analyzer red lead wire into the yellow wire position.
7. Operate the engine at 3000 to 4000 RPM. The observed reading must indicate between 30 to 36 volts. If the observed reading is less than 30 volts or more than 36 volts, replace the voltage regulator.

■ **NOTE:** The analyzer is a “peak reading” voltmeter. Even though the regulator is limiting the system voltage to about 13 volts RMS (root mean squared), the analyzer is measuring and displaying voltage spikes of 30 to 36 volts. These spikes are normal and do not damage the snowmobile lights. Please remember that the analyzer will always display the maximum voltage spike present, not the “average” voltage that most meters display.

⚠ CAUTION

Never use the analyzer front panel lead wires with the analyzer wiring harness connector inserted into the analyzer back-panel jack.

■ **NOTE:** The Ignition Analyzer can conduct most of the electrical system performance tests while the snowmobile is operated in the normal “field” environment. If the electrical system “breaks down” after an extended warm-up or only at high speeds, simply operate the snowmobile until those conditions are achieved. The rotating selector switch on the analyzer front-panel (together with the analyzer’s “multipoint wiring harness”) makes the analyzer an extremely versatile test instrument. With the analyzer safely positioned on the handlebar pad within the operator’s view, the analyzer is usable under normal operating conditions.

Arctic Cat Ignition Analyzer (Liquid Cooled Models)

■ **NOTE:** Ignition analyzer test specifications are on the Electrical Specifications (Individual) pages in this section.

The Ignition Analyzer can perform the following tests.

- A. Stator Plate Charge Coil (1) Output
- B. Stator Plate Charge Coil (2) Output
- C. Stator Plate Lighting Coil Output
- D. CDI Unit Output
- E. System Regulated Voltage
- F. Battery Voltage
- G. Spark-Plug Voltage (with optional High Voltage Sensor)

⚠ CAUTION

Do not connect any analyzer harness lead wires directly to the spark plug high tension wires or analyzer failure will result. The optional high voltage sensor must be used to measure any voltage exceeding 1000 volts.

⚠ WARNING

Most voltages generated by the ignition system are sufficient to interrupt pacemakers! All technicians, especially those using pacemakers, must avoid contact with all electrical connections after the engine has been started.

A. ANALYZER SETUP PROCEDURE

1. Connect the Analyzer Wiring Harness (p/n 0686-069) into the analyzer back-panel jack. Rotate the harness connector to position the alignment slots. Complete insertion of the connector and secure the connector nut.

Fig. 5-58



AK059D

2. Disconnect the rubber straps from the analyzer lower strap posts. Position the analyzer on the handlebar pad and wrap the straps around the pad. Stretch the straps and install them on the lower strap posts.

Fig. 5-59



AK060D

3. Disconnect the four-prong stator plate/main harness connector. Insert both four-prong analyzer wiring harness connectors making certain that both connectors are completely seated.
4. Disconnect the three-prong stator plate/CDI connector. Insert both three-prong analyzer wiring harness connectors making certain that both connectors are completely seated.
5. Disconnect the two-prong CDI/ignition coil connector. Insert both two-prong analyzer wiring harness connectors making certain that both connectors are completely seated.

■ **NOTE:** The color code of the two-prong connectors must be observed. The two black/white wires must be connected together and the two white/blue wires must be connected.

WARNING

Elevate the snowmobile track with a good quality safety stand when performing tests in the shop area. Do not allow anyone near the front or back of the machine while conducting these tests.

CAUTION

Check the analyzer wiring harness routing before starting the engine. Do not allow the analyzer harness to contact the exhaust system, driven shaft, clutches, or the drive belt.

6. Start the engine and allow it to idle for about five minutes. Select the analyzer TACH switch position, rotate the selector to the LIGHT/TACH position, and then increase the engine speed to 2000, 3000, and 4000 RPM. If the snowmobile tachometer is within 120 RPM of the analyzer reading, the snowmobile tachometer can be used when conducting the following tests. If the reading is not within 120 RPM or if the snowmobile is not equipped with a tachometer, the analyzer tachometer must be used to set the following RPM.

7. In many cases, if the tester readings are erratically flashing high and low numbers, this indicates one of the following conditions.

- A. Defective spark-plug cap - check cap and replace.
- B. Defective high tension lead wire end - cut 6 mm (1/4 in.) off the end of the wire and install cap.
- C. Defective resistor spark plug - install new spark plug.

Before any further testing can be done, locate the component causing the erratic readings and replace.

■ **NOTE:** For troubleshooting a model that will not start, attach the analyzer as outlined under section A. Conduct all of the following tests using the recoil starter and cranking the engine over hard three times. Use the specifications called out for 2000 RPM.

■ **NOTE:** The individual components must be checked in the following sequence using the appropriate specifications chart for recommended values.

B. CHARGE COIL (1) OUTPUT TEST

1. Perform sub-section A before conducting this charge coil (1) test.
2. Start the engine and allow it to idle for 4-5 minutes if not previously done in step A-6. Select the analyzer VOLT switch position and rotate the analyzer selector to the CHRG position.
3. Operate the engine at 2000 RPM and observe the analyzer charge coil (1) reading. The observed reading must not be less than the recommended value. Next, observe the analyzer reading at 3000 and 4000 RPM.
4. If any readings are less than the listed values, disconnect the CDI unit from the system; then using the recoil starter, crank the engine over hard three to four times. If the reading is within tolerance for 2000 RPM, the CDI unit may be defective. Repeat the test once again after connecting the CDI unit and see if the reading is once again below specifications at cranking speed. If readings remain low, replace the CDI unit. If the test results remain low with the CDI unit disconnected, replace the coil.

■ **NOTE:** A defective CDI unit can cause a low reading for both charge coil output tests. To verify readings, step 4 under Charge Coil (1) Output Test is very important.

■ **NOTE:** The observed readings are permitted to be greater than (but never less than) the recommended values.

C. CHARGE COIL (2) OUTPUT TEST

1. Perform sub-sections A and B before conducting this charge coil (2) test.
2. Rotate the analyzer selector to the CHRG position.
3. Operate the engine at 2000, 3000, and 4000 RPM. If any of the observed coil readings are less than the recommended values, disconnect the CDI unit from the system and repeat test at cranking speed. Using the recoil, crank the engine over hard three times and observe readings. If the voltage is now within specifications, the CDI unit may be defective. Repeat test after connecting the CDI unit and see if the reading is once again below specifications at cranking speed. If readings remain low, replace the CDI unit. If the test results remain low with the CDI unit disconnected, replace the coil.

D. CDI OUTPUT TEST

1. Perform sub-sections A, B, and C before conducting this CDI test.
2. Rotate the analyzer selector to the CDI position.
3. Operate the engine at 2000, 3000, and 4000 RPM. If any of the observed CDI readings are less than the recommended values, replace the CDI unit.

E. LIGHTING COIL OUTPUT TEST

WARNING

Elevate the snowmobile track with a good quality safety stand when performing the lighting coil output test. Do not allow anyone near the front or back of the machine while conducting this test. All safety switches will be bypassed while conducting the lighting coil output test.

1. Perform sub-section A before conducting this lighting coil test.
2. Stop the snowmobile engine and disconnect the snowmobile main wiring harness from the four-prong analyzer wiring harness connector (the four-prong analyzer wiring harness connector must remain connected to the four-prong stator plate connector).
3. Insert the supplied bypass plug into the four-prong analyzer wiring harness connector.
4. Rotate the selector to the LIGHT/TACH position.
5. Operate the engine at 2000, 3000, and 4000 RPM. If any of the observed lighting coil readings are less than the recommended values, replace the stator plate lighting coil.

WARNING

Stop the engine and remove the bypass plug before proceeding.

F. VOLTAGE REGULATOR OUTPUT TEST

WARNING

Elevate the snowmobile track with a good quality safety stand when performing the voltage regulator test. Do not allow anyone near the front or back of the machine while conducting this test. All safety switches will be bypassed while conducting the voltage regulator test.

1. Perform sub-section E before conducting this voltage regulator test.
2. Disconnect the analyzer wiring harness. Reconnect all snowmobile electrical connectors to their original positions.
3. Remove the analyzer from the handlebar and disconnect the analyzer wiring harness from the analyzer back-panel connector.
4. Remove the red and black lead wires from their carrying case. Insert the red lead wire connector into the analyzer front-panel red jack and the black lead wire into the black jack.
5. Rotate the selector to the EXT position. Select the snowmobile HIGH BEAM headlamp position.
6. Insert the analyzer black lead wire into the headlamp connector on the brown wire position using the appropriate lead wire end. Insert the analyzer red lead wire into the yellow wire position.
7. Operate the engine at 3000 to 4000 RPM. The observed reading must indicate between 30 to 36 volts. If the observed reading is less than 30 volts or more than 36 volts, replace the voltage regulator.

NOTE: The analyzer is a “peak reading” voltmeter. Even though the regulator is limiting the system voltage to about 13 volts RMS (root mean squared), the analyzer is measuring and displaying voltage spikes of 30 to 36 volts. These spikes are normal and do not damage the snowmobile lights. Please remember that the analyzer will always display the maximum voltage spike present, not the “average” voltage that most meters display.

CAUTION

Never use the analyzer front panel lead wires with the analyzer wiring harness connector inserted into the analyzer back-panel jack.

■ **NOTE:** The Ignition Analyzer can conduct most of the electrical system performance tests while the snowmobile is operated in the normal “field” environment. If the electrical system “breaks down” after an extended warm-up or only at high speeds, simply operate the snowmobile until those conditions are achieved. The rotating selector switch on the analyzer front-panel (together with the analyzer’s “multipoint wiring harness”) makes the analyzer an extremely versatile test instrument. With the analyzer safely positioned on the handlebar pad within the operator’s view, the analyzer is usable under normal operating conditions.

Testing Voltage Regulator

1. Using a shielded safety stand, raise the rear of the snowmobile off the floor.
2. Using a multitester, connect the red tester lead to a yellow wire and the black tester lead to a brown wire in the accessory harness connector.
3. Set the selector on the 25 ACV position; then start the engine and allow to idle. The meter must read 11-13 volts.
4. Increase the engine speed to 2500-2700 RPM. The meter must read 11-13 volts. If the meter reads more than 13 volts, replace the voltage regulator.

Testing Low-Oil Light Sensor

The low-oil light sensor is a magnetic switch. Its operation is based on a magnet located around the inside diameter of a 1/2 in. hole in a plastic float. The switch located in the stem of the sending unit is positioned through the hole in the float. When the float drops to the lower part of the stem, the magnet closes the electrical contacts (located in the stem) allowing the current to pass on to the warning light.

If the sensor should fail, it must be replaced. To test the sensor, use the following procedure.

1. Remove the sensor from the oil reservoir by twisting and pulling upwards. Wipe excess oil from the sensor.
2. Unplug the sensor from the wiring harness.
3. Using an ohmmeter, set the selector on the X1K position.

4. Touch each of the meter leads to one of the two wires coming from the sensor. With the sensor in its normal position (float end down), the meter should read resistance.
5. If the meter reads no resistance, check to make sure good contact has been made with each of the wires coming from the sensor. If the meter still reads no resistance, replace the sensor.
6. While maintaining contact between the meter leads and the sensor, raise the float. The meter must read no resistance. If the meter reads resistance, replace the sensor.
7. If the sensor tested out satisfactory but the light doesn’t illuminate with only a small amount of oil in the reservoir, check the bulb.
8. If the bulb is in good condition, check for voltage at the connection where the sensor plugs into the accessory wiring harness. Using a multimeter set on the 50 ACV scale, start the engine and allow it to idle. Touch the red lead of the voltmeter to the red wire in the two-prong connector. Touch the black lead to the black wire in the wiring harness. At idle, the meter should read 5 to 6 volts (AC). If no voltage is present but the lights on the snowmobile operate normally, either check the wiring harness for a broken wire or replace the harness.

Testing High Temperature Sensor

1. Disconnect the main wiring harness connector from the temperature sensor.
2. Connect an ohmmeter between the sensor terminal and any convenient chassis ground (or any brown wire). The ohmmeter must read less than 20 ohms of resistance with the water temperature more than +230°F. The ohmmeter must read no resistance with the water temperature less than +190°F.

■ **NOTE:** It may be easier to remove the sensor from the water manifold for testing purposes. Immerse the sensor body (only up to the threads) in automatic transmission fluid and slowly heat the fluid. The ohmmeter must indicate the above resistances when connected between the sensor terminal and the sensor body/chassis.

Testing High Temperature Warning Light

1. Disconnect the main wiring harness connector from the temperature sensor.
2. Temporarily place a jumper wire from the main wiring harness sensor connector to any convenient chassis ground (or any brown wire).
3. If the high temperature warning light is not illuminated with the engine running (and the harness terminal grounded), test the light bulb. An ohmmeter must read less than 10 ohms across the bulb filament.
4. If the bulb does not illuminate even when tested good, use the ohmmeter to test the bulb harness. Also test the red/white wire continuity from the temperature sensor connector to the bulb connector.

Solenoid (Electric Start Models)

TESTING

■ **NOTE:** The electric start solenoid may be tested using either one of the following methods.

Method #1

1. Disconnect the electric start harness from the main wiring harness.
2. Place the ohmmeter leads across the solenoid coil terminals (brown wire and red/white wire).
3. The ohmmeter must read between 3 and 5 ohms.

Method #2

1. Connect the battery to the solenoid coil terminals (brown wire and red/white wire).
2. A loud, audible “click” should be heard as the solenoid internal contacts make connection.
3. Disconnect the battery from the solenoid.
4. A loud, audible “click” should be heard as the solenoid internal contacts release.

■ **NOTE:** An in-line ammeter would measure between 2 and 4 amps of solenoid coil current flow with the battery connected.

⚠ CAUTION

NEVER connect an in-line ammeter with the large starter cables because the 200 amps of current flow will instantly damage most ammeters.

Charging Diode (Electric Start Models)

TESTING

1. Disconnect the electric start harness from the main wiring harness.

⚠ CAUTION

To prevent ohmmeter damage when testing circuits on snowmobiles equipped with an electric start, be sure to disconnect the battery before testing.

2. Connect the ohmmeter positive lead (red) to the diode yellow wire and the ohmmeter negative lead (black) to the diode red wire. The ohmmeter must read between 300 and 700 ohms.
3. Connect the ohmmeter positive lead (red) to the diode red wire and the ohmmeter negative lead (black) to the diode yellow wire. The ohmmeter must read OPEN (infinite resistance).

Fuse (Electric Start Models)

TESTING

1. Remove the fuse from the fuse holder.
2. Connect the ohmmeter across the fuse end-caps.
3. The ohmmeter must read less than 1 ohm of resistance.

Ignition Switch - Electric Start Function (Electric Start Models)

TESTING

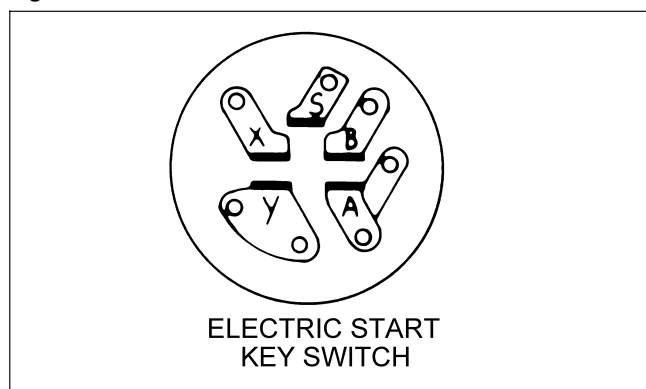
⚠ CAUTION

To prevent ohmmeter damage when testing circuits on snowmobiles equipped with an electric start, be sure to disconnect the battery before testing.

1. Disconnect the wiring harness from the ignition switch; then remove the switch from the console.
2. Using the ohmmeter, test the connections indicated in the following chart. If the meter does not read as specified or has more than one ohm of resistance, the switch must be replaced.

Position	Lead to Terminal	Lead to Terminal	Meter Reading
OFF	ANY	ANY	OPEN
ON	X	Y	CLOSED
ON	B	A	CLOSED
START	X	Y	CLOSED
START	B	S	CLOSED

Fig. 5-60



686-087A

■ **NOTE:** Some ignition-switch terminals may not be labeled (X, Y, A, B, or S). Also, some ignition-switch terminals may be improperly labeled. Refer to the wiring harness diagrams of the ignition switch when connecting the ohmmeter. Using the designations stamped on the ignition-switch terminals when connecting the ohmmeter may result in erroneous resistance readings.

Starter Motor

REMOVING

1. Disconnect the battery.
2. Remove the PTO-side and center expansion chambers.
3. Remove the nut and lock washer securing the positive cable; then remove cable from the starter motor.
4. Remove the drive clutch (see Section 8).
5. Remove the two lock nuts and one machine screw securing the starter motor and end cap assembly to the bracket; then remove the starter motor and end cap assembly.

DISASSEMBLING

■ **NOTE:** For assembly purposes, scribe a reference line on the front cap, rear cap, and the case.

1. Remove the snap ring securing the drive gear to the starter motor; then remove the drive gear and account for the spring washer.
2. Remove the two long starter motor bolts. As the bolts are being removed, hold pressure against the rear brush cover.

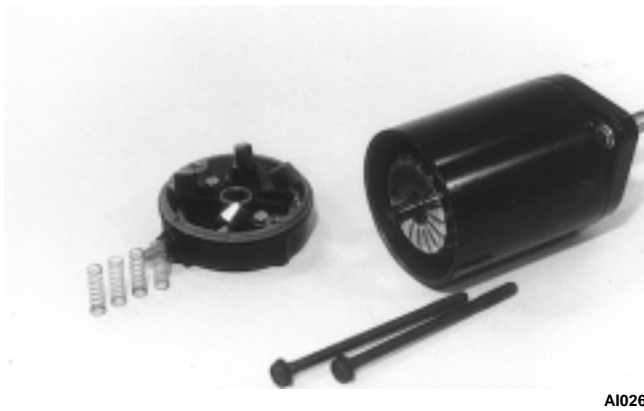
Fig. 5-61



AI050

3. Slowly remove the rear brush cover and account for the four brush holder springs.

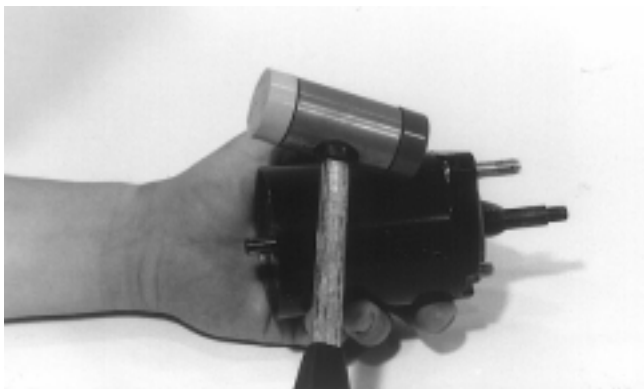
Fig. 5-62



AI026

4. Using a plastic hammer, tap the front starter cap free of the starter case and slide the cap free from the armature shaft. Account for any shim washers.

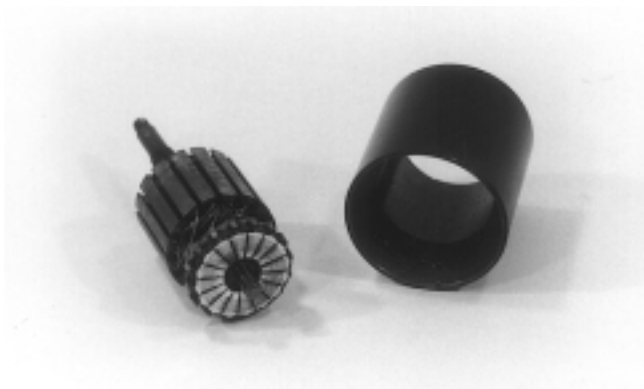
Fig. 5-63



AI027

5. Slide the armature free of the starter case.

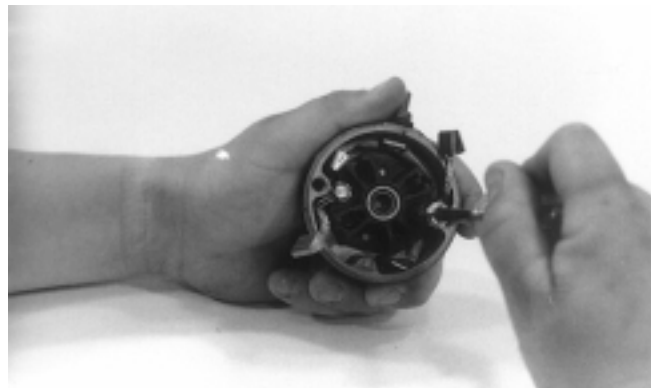
Fig. 5-64



AI028

6. Lift all brushes from the brush holder and account for the four brush springs.
7. Using a 5/16-in. socket, remove the two cap screws securing the ground brushes to the end cap. Remove the brushes and brush holder from the end cap.

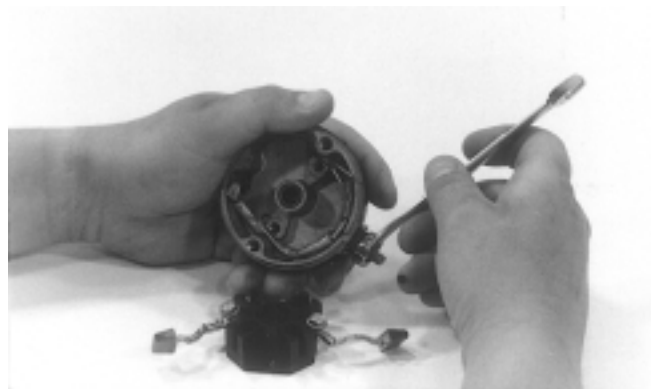
Fig. 5-65



AI036

8. Using a 7/16-in. wrench, remove the nut securing the cable stud to the end cap. Account for the lock washer, flat washer, and fiber washer.

Fig. 5-66



AI037

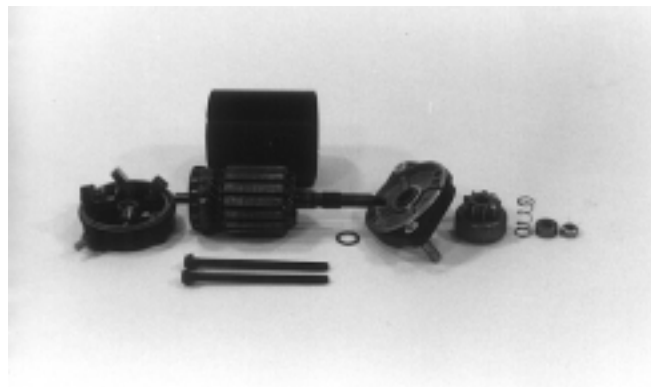
9. While holding the brush wires, pull the stud from the end cap. Account for the plastic insulator.

CLEANING AND INSPECTING

NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Thoroughly clean all components except the armature and brushes in parts-cleaning solvent; then dry with compressed air.

Fig. 5-67



AI029

⚠ CAUTION

Do not wash the armature and brushes in any kind of solvent. Use only compressed air and clean dry cloth in cleaning these components.

2. Inspect all threaded areas for damaged or stripped threads.
3. Inspect the brush holder assembly and brushes for damage or wear. Using a calipers, measure the length of the brushes. If brush measurement is less than 7.5 mm (0.30 in.), replace brushes as a set along with new brush springs.

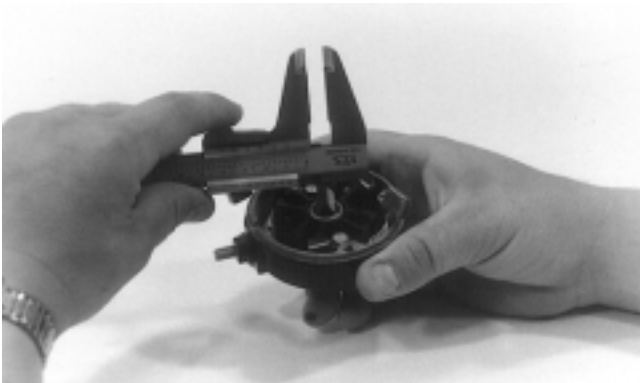
Fig. 5-68



AI030

4. Inspect brush leads for cracks, wear, or fraying. If any of these conditions exist, replace the brushes as a set along with new brush springs.
5. Inspect the end-cap bushing for wear. Using a calipers, measure inner diameter at the end-cap bushing. If found to be 8.6 mm (0.338 in.) or larger, replace the end cap.

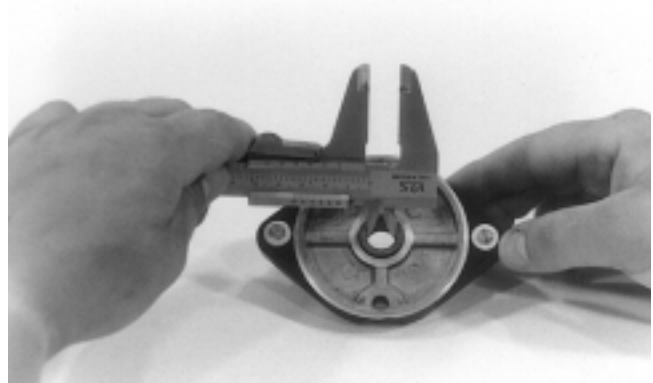
Fig. 5-69



AI031

6. Inspect the front-cap bushing for wear. Using a calipers, measure the inner diameter of the front-cap bushing. If found to be 13.2 mm (0.523 in.) or larger, replace the front cap.

Fig. 5-70



AI032

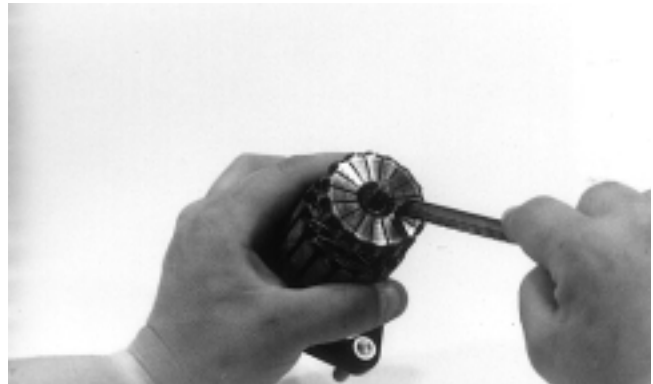
7. Inspect the brass commutator end of the armature for any burned spots or damage. If the commutator is slightly burned or damaged, the armature must be replaced. This is a molded commutator and no attempt to turn it down in a lathe should be tried.

⚠ CAUTION

Do not use emery cloth to clean the commutator as emery particles will become imbedded in the brass commutator resulting in a short circuit. Use only #00 grit sandpaper.

8. Inspect the commutator end for buildup in the grooves. Buildup in the grooves must be removed to prevent any chance of arcing between individual sections of the commutator. Carefully remove any buildup using a thinly ground hacksaw blade. Do not cut any deeper than the original groove which can be seen by looking at the commutator from the side.

Fig. 5-71



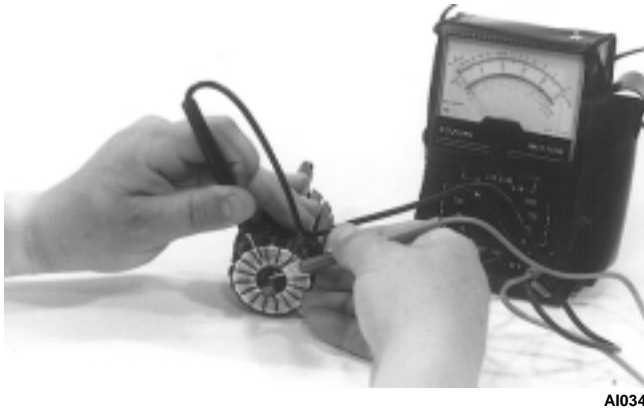
AI033

NOTE: After cleaning any buildup from the commutator, use compressed air to clean.

9. Inspect the armature for shorting. Use the multimeter and the following procedure:
 - A. Set the selector on the X1K position; then touch the leads and zero the meter.

- B. Touch the black tester lead to the armature shaft.
- C. Using the red tester lead, probe the commutator end of the armature. The meter indicator should not move. If the indicator needle moves, the armature must be replaced.

Fig. 5-72

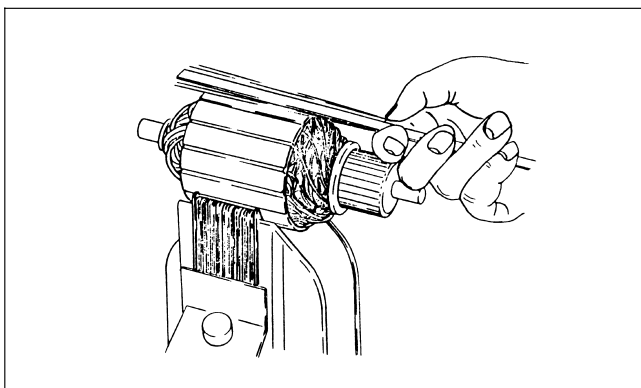


AI034

10. Inspect the armature for shorting. Use a “growler” and the following procedure:

- A. Place the armature in the “growler.”
- B. While holding a metal strip over the armature, rotate the armature an entire revolution. If the metal strip vibrates at any point on the armature, the armature is shorted and must be replaced.

Fig. 5-73



0725-653

11. Inspect the ground brushes to make sure they are properly grounded. Use the multimeter and the following procedure:

- A. Set the selector on the X1K position; then touch the leads and zero the meter.
- B. Touch the black tester lead to a ground brush.
- C. Touch the red tester lead to the end cap. The meter needle should move to the right. If the needle does not move to the right, check that the ground connection is tight and clean. Recheck for proper ground. If there still isn't any meter needle movement, replace the brushes as a set along with new brush springs.

Fig. 5-74



AI035

ASSEMBLING

1. Install the stud with the positive brush set attached in the end cap. Make sure the insulator is in position over the stud and the longest brush lead is positioned to the right of the stud hole.

Fig. 5-75



AI038

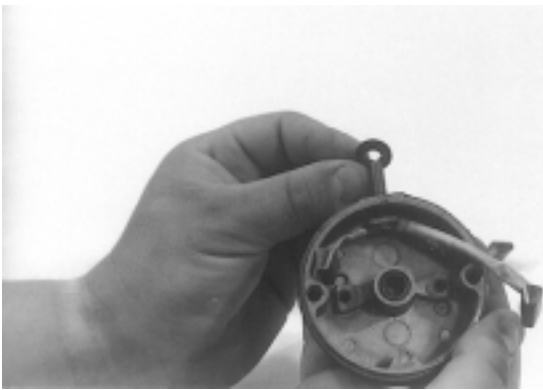


CAUTION

Check the stud to make sure insulator is between stud and cap on backside.

2. In order, place the fiber washer, flat washer, and lock washer on the stud. Apply a small amount of red Loctite #271 to the stud threads and secure with the nut. Tighten to 0.7 kg-m (5 ft-lb).

Fig. 5-76



AI039

3. Place the brush holder into position in the end cap.

■ **NOTE:** Position the longest positive brush lead beneath the ground wire on right side.

4. Place a cap screw through the left ground brush lead eyelet and position the eyelet flat against the brush holder. Secure with a cap screw.
5. Place the right ground brush eyelet flat against the brush holder and secure with a cap screw. The eyelet stem must be positioned to the top of the threaded hole boss in the end cap.

Fig. 5-77



AI040

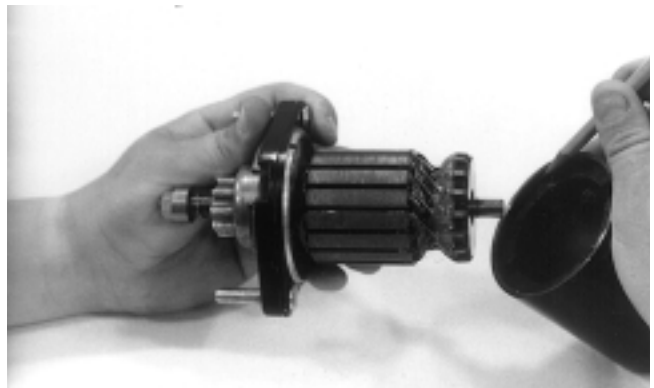
6. Place the four brush springs into the brush holder and place each brush (flat side down) on top of the springs.

■ **NOTE:** Apply a small amount of low-temperature grease to the end cap bushing and the front cap bushing.

7. Place a wave washer and a thrust washer on the armature shaft; then slide the front cap into position.
8. Apply a thin coat of grease to the armature shaft and slide the drive gear and spring washer onto the shaft. Secure with a snap ring.

9. Start the commutator end of the armature assembly into the starter case at the end with the fields nearest the end of the housing. Align the marks on the front cap and case.

Fig. 5-78



AI042

10. Compress the four brushes (flat side down) into the brush holder. Hold the brushes in position using the Starter Assembly Tool (p/n 0644-052).

Fig. 5-79



AI043

11. Carefully place the starter case and armature assembly into the end cap. Again, check to make sure the scribed marks of these two components are aligned. With the case flat on the assembly tool, slowly pull the tool from the starter motor. The case should then drop into place.

Fig. 5-80



AI044

12. Apply red Loctite #271 to the threads of the two long bolts; then start the bolts down through the front cap and thread them into the end cap. Tighten to 1-1.4 kg-m (7-10 ft-lb).

■ **NOTE:** The starter shouldn't be picked up until the two long bolts have been tightened. Spring pressure from the brush springs will push the end cap off the case.

DISASSEMBLING PINION

1. Remove the pinion assembly from the end cap. Account for a wave washer, thrust washer, and spacer.
2. Press in on the pinion stop and remove the snap ring.
3. Remove the stopper, spring, and pinion gear from the shaft.

CLEANING AND INSPECTING PINION

■ **NOTE:** Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Using parts-cleaning solvent, wash grease from the pinion gear. Dry with compressed air.
2. Inspect the pinion gear for wear. If the gear is worn or chipped, replace the pinion assembly.
3. Inspect the inner spiral gear and housing. If the spiral gear shows any signs of wear, replace the pinion assembly.
4. Inspect the inner housing for tightness and cracks. If the housing shows any signs of being loose or cracked, replace the pinion assembly.
5. Inspect the pinion return spring for wear. If the spring shows any worn areas, replace the spring.

ASSEMBLING/INSTALLING PINION

1. Apply a thin coat of grease to the spiral gear; then slide the pinion onto the driveshaft along with the return spring and stopper.
2. Slide the spacer, thrust washer, wave washer, and thrust washer onto the driveshaft and slide the assembled pinion gear assembly into the end cap. Slide the remaining thrust washer onto the bracket side of the driveshaft.
3. Secure the assembled end cap to the mounting bracket with the machine screw.

TESTING STARTER MOTOR

■ **NOTE:** Before installing the starter motor, perform test to ensure proper operation using the following procedure.

1. Attach a black jumper cable to a good ground on the starter.
2. Attach the opposite end of the black jumper cable to the negative post of a good 12V battery.
3. Attach the red jumper cable to the positive post of the battery.
4. Holding the starter firmly down on a work bench, touch the red jumper cable to the positive cable stud of the starter.

WARNING

Be sure to keep clear of the pinion gear area as it will spin at a high RPM when the red cable is touched to the positive stud. Personal injury may result if contact is made with a spinning pinion.

■ **NOTE:** Starter motor must instantly spin at a high RPM. The pinion must snap out against the stopper. If the motor does not spin, remove the red cable immediately. Check the battery condition and all connections. If everything checks out satisfactorily and the starter does not spin, disassemble the motor and check for pinched or broken wires.

INSTALLING

1. Place the starter motor into the bracket; then secure with two washers and lock nuts. Tighten to 1.7-2.1 kg-m (12-15 ft-lb).
2. Attach the red positive cable to the positive stud terminal and secure with a nut and lock washer. While tightening the nut, hold the cable in position so it is parallel with the starter.

CAUTION

Check the cable installation to make sure it isn't near any moving parts or against any sharp edges.

3. Secure the positive cable to the starter motor with a long cable tie.
4. Connect the cable to the positive post of the battery; then connect the negative cable to the negative post.
5. Install the drive clutch (see Section 8).
6. Install the PTO-side and center expansion chambers.

Troubleshooting Electric Start

Problem: Hot or Smoking Wires	
Condition	Remedy
1. System wired incorrectly	1. Check wiring against wiring diagram
Problem: Starter Does Not Turn Over	
Condition	Remedy
1. Battery discharged	1. Check/charge the battery
2. Connection loose	2. Check tightness of all connections
3. Grounding improper	3. Check ground connections
4. Fuse blown—not installed	4. Check—replace fuse

Wire Color Code and Function Description

■ **NOTE:** The following wire color code and function description will assist in using the Main Harness and Hood Harness wiring diagrams (see Section 6). Note that some colors are numbered. When a numbered color appears on either of the wiring diagrams, refer to this color code description page, and it will provide you with additional information.

COLOR	FUNCTION — DESCRIPTION
Brown	Electrical Common; Chassis Ground
	The brown wire is connected to the chassis at the engine stator plate and also through the voltage regulator chassis bolt (prior to 1989, the taillight harness also had a chassis connection). The headlight bracket is grounded on some models to reduce the bracket RFI emissions. All brown wires are common ground.
Yellow	AC Power; 13 Volts AC (Alternating Current)
	The yellow wire is connected to the engine stator plate lighting coil and the voltage regulator. The voltage produced by the lighting coil is very engine RPM dependent. The voltage regulator is necessary to maintain 13.5 VAC on the yellow wire whenever the engine exceeds about 3000 RPM. All yellow wires are 13 VAC. The signal on the yellow wire is AC. Not only is the voltage level of this signal RPM dependent, but the signal frequency (cycles per second) is RPM dependent as well. The electric tachometer uses this changing frequency phenomenon to indicate the engine RPM. An electric tachometer will operate properly when connected to any yellow (13 VAC) and brown (common ground) wire pair.
White	Headlight Low Beam
	The white wire connects the dimmer switch to the headlight bulb. The low beam filament will illuminate when the dimmer switch connects the white wire to 13 VAC power.
Blue	Headlight High Beam and Indicator Light
	The blue wire connects the dimmer switch to the headlight bulb. The high beam will illuminate when the dimmer switch connects the blue wire to 13 VAC power. Some models use a tachometer with a high beam indicator light. The high beam indicator light will also illuminate when the dimmer switch connects the blue wire to 13 VAC power.
Green	Handlebar Warmer Indicator Light
	Some models use a tachometer with a handlebar warmer indicator light. The green wire connects the handlebar warmer switch to the "warmer" indicator light. The "warmer" light will illuminate when the handlebar warmer switch connects the green wire to common ground.

COLOR	FUNCTION — DESCRIPTION
Violet or Black (NOI)	Ignition System "Shut-Off"
	The violet or black wire connects the ignition system CDI module to the throttle control switches. Ignition spark is interrupted when any of the switches close, connecting the violet or black wire to a common ground.
Black/Red	Ignition System "Shut-Off"
	The black/red wire connects the throttle control switches to the ignition switch. "Spark" occurs when the black/red is at a common ground level and "spark" stops when the black/red wire is open (not connected to common ground).
Red/White #1	High Temperature Warning Light
	Some models use a speedometer with a high temperature warning light. The red/white #1 wire connects the high temperature sensor to the temperature warning light. The "temp" light will illuminate when the sensor connects the red/white #1 wire to common ground.
Red/White #2	Solenoid Coil Power
	The red/white #2 wire connects the ignition switch (12 volt DC) power to the solenoid. The solenoid will activate when the ignition switch connects the red/white #2 wire to the + 12 VDC battery power.
Red #1	Brakelight
	The red #1 wire connects the brake control assembly switch to the brakelight filament. The brakelight will illuminate when the brake switch connects the red #1 wire to 13 VAC power.
Red #2	Electric Start Battery Power; 12 Volts DC (Direct Current)
	The red #2 wire connects the battery positive post (+12 VDC) to the ignition switch through the fuse holder. All electric start red #2 wires are +12 VDC. If the fuse "blows," all red #2 wires are disconnected from the battery and battery charging (via the charging diode) discontinues until the fuse is replaced.
Red #3	Low Oil Warning Light
	The red #3 wire connects the low oil sensor to the "oil" warning light. The "oil" light will illuminate when the sensor connects the red #3 wire to 13 VAC power.
Gray	Electric Fuel Level Gauge
	Some models are equipped with an electric fuel level gauge. The gray wire connects the in-tank resistive sensor to the gauge. As the fuel level rises, the sensor resistance decreases, and the gauge needle rises; conversely, as the fuel level goes down, the sensor resistance increases, and the gauge needle drops.
Orange	Reverse Alarm
	Some models are equipped with a reverse gear and reverse alarm. The orange wire connects the reverse switch to the reverse alarm. The reverse alarm will "beep" when the switch connects the orange wire to 13 VAC power.

Ignition Timing

CHECKING

1. Connect a timing light to the MAG-side spark plug lead.
2. Using a shielded safety stand, raise the rear of the snowmobile off the floor and start the engine. Gradually increase the engine speed to the specified RPM; the pointer should align with the proper timing mark on the flywheel.
3. If timing is not correct, adjust the ignition timing.

ADJUSTING

1. Remove the recoil starter, starter pulley, and flywheel.
2. Loosen the two screws securing the stator plate and rotate the stator plate in the proper direction to attain correct timing.

■ **NOTE:** Rotate the stator plate clockwise to retard the timing or counterclockwise to advance the timing. The stamped marks on the stator plate at the upper socket-head cap screw mounting hole can be used for timing.

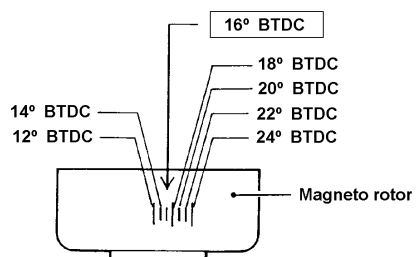
3. Tighten the screws securing the stator plate.
4. Install the flywheel, starter pulley, and recoil starter.
5. Affirm timing for accuracy and adjust if necessary.

2000 Ignition Timing Specifications

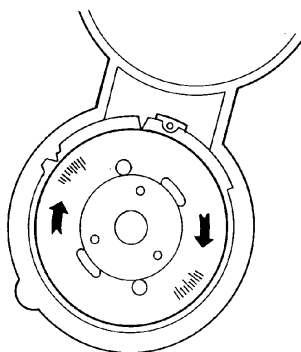
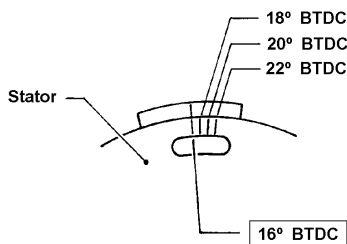
Table of Contents

340 cc	5-53
370 cc	5-54
440 cc F/C	5-54
440 cc L/C	5-55
550 cc	5-55
580 cc EFI	5-56
500 cc (Carbureted)	5-56
500 cc EFI	5-57
600 cc (Triple)	5-57
800 cc	5-58
600 cc EFI	5-58
600 cc (Twin-Carbureted)	5-59
700 cc	5-59
1000 cc	5-60

340 cc

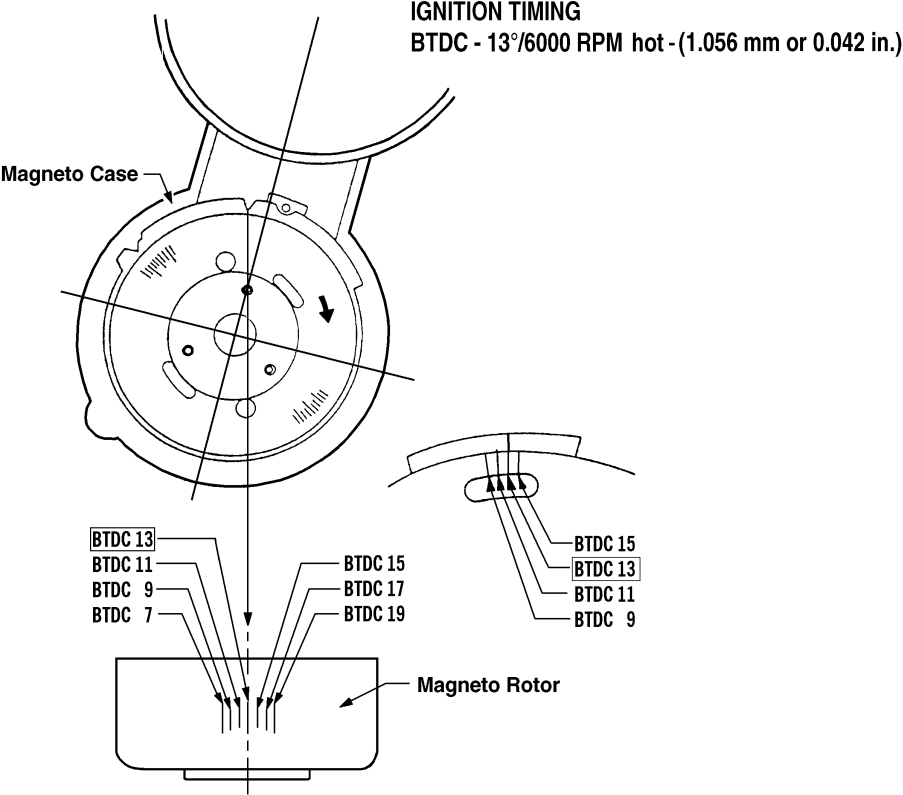


Ignition Timing
BTDC-16°/6000 RPM hot - 1.440 mm (0.056 in.)



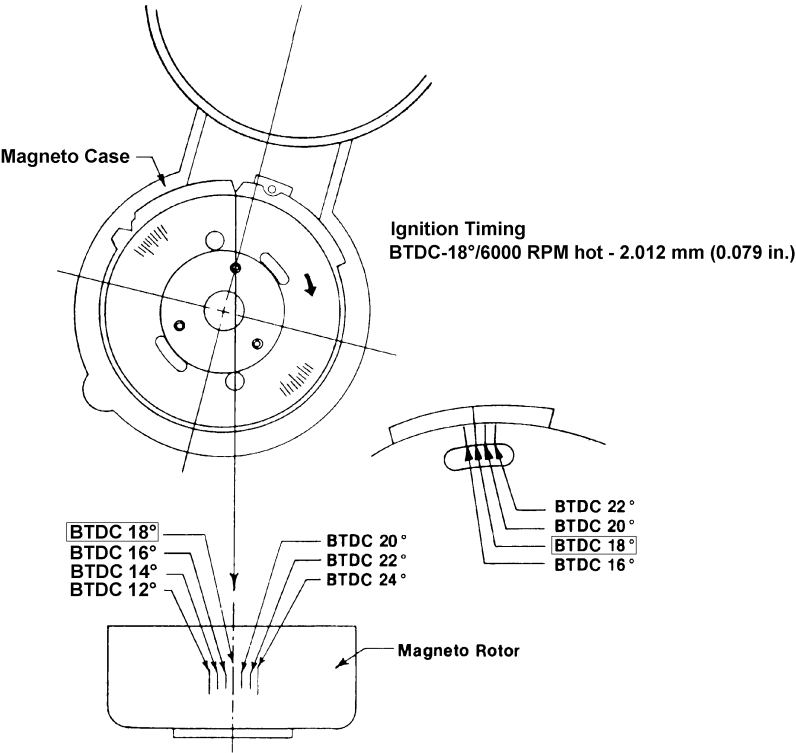
Mag. Rotor/Housing Assembly

370 cc



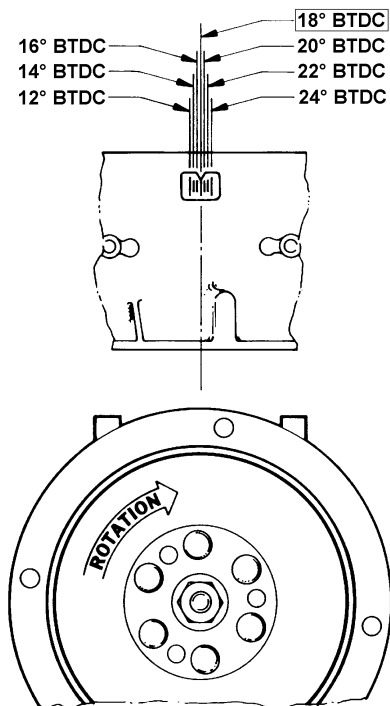
0734-489

440 cc F/C

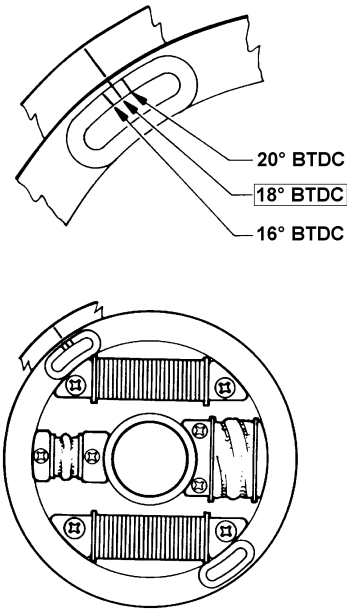


0726-863

440 cc L/C

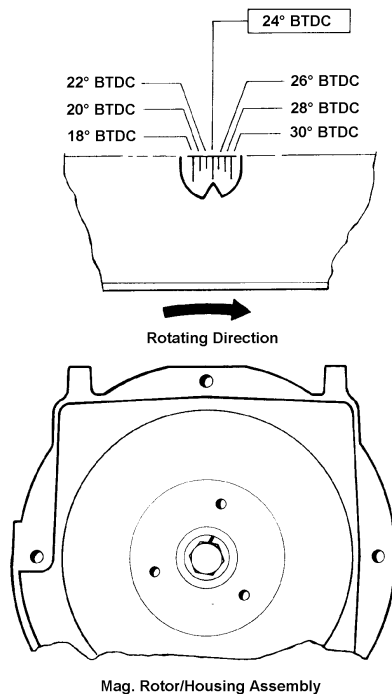


IGNITION TIMING
BTDC - 18°/6000 RPM hot - (1.860 mm or 0.073 in.)

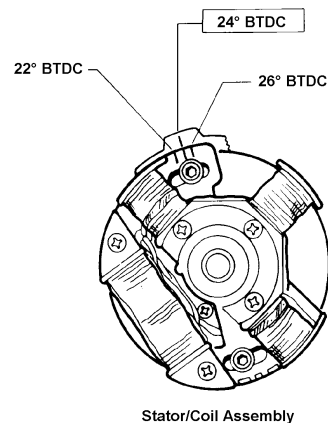


0728-165

550 cc

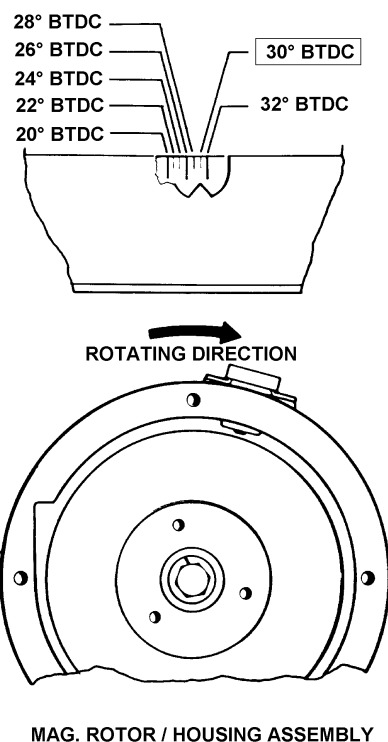


IGNITION TIMING
BTDC - 24°/6000 RPM hot - (3.540 mm or 0.139 in.)



0730-215

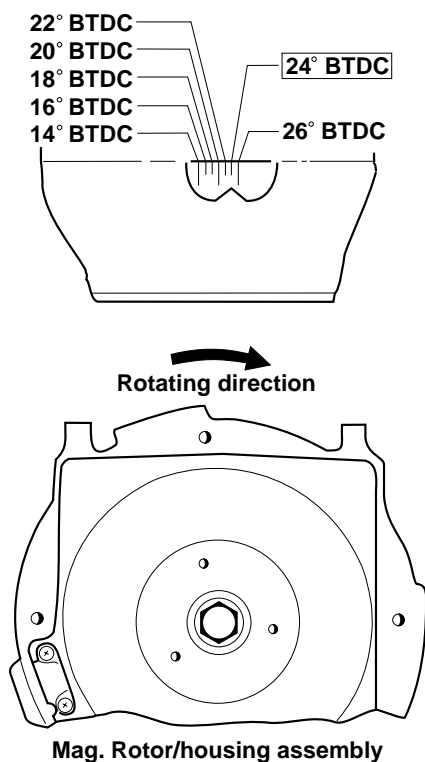
580 cc EFI



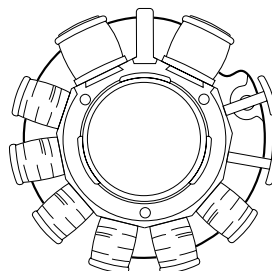
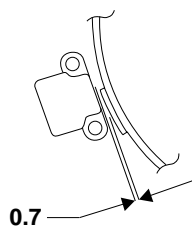
IGNITION TIMING
 BTDC - 30°/4000 RPM - (5.459 mm or 0.215 in.)

732-629A

500 cc (Carbureted)



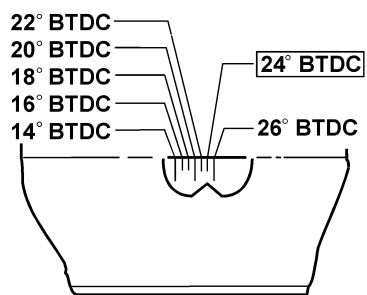
IGNITION TIMING
 BTDC - 24°/3500 RPM - (3.390 mm or 0.133 in.)



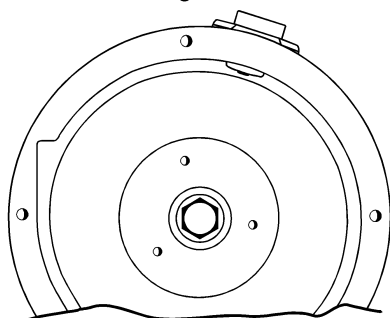
Stator/coil assembly
 (no timing adjustment required)

733-584C

500 cc EFI



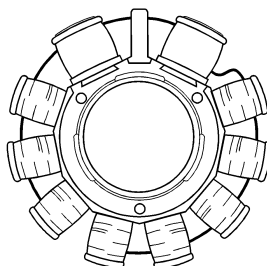
Rotating Direction



Mag. Rotor/Housing Assembly

IGNITION TIMING

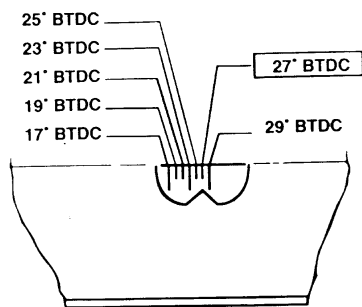
BTDC - 24°/3500 RPM - (3.390 mm or 0.133 in.)



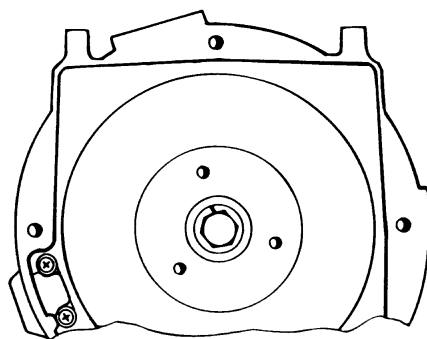
Stator/Coil Assembly
(no timing adjustment required)

0734-459

600 cc (Triple)



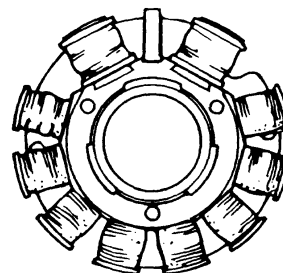
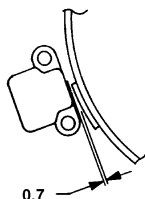
Rotating direction



Mag. Rotor/Housing Assembly

IGNITION TIMING

BTDC - 27°/4000 RPM - (3.884 mm or 0.153 in.)



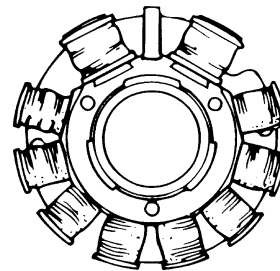
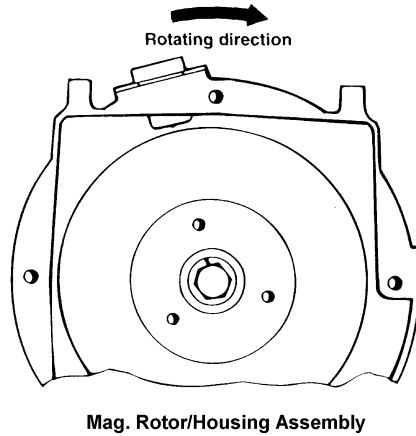
Stator/coil assembly
(no timing adjustment required)

0732-631

800 cc

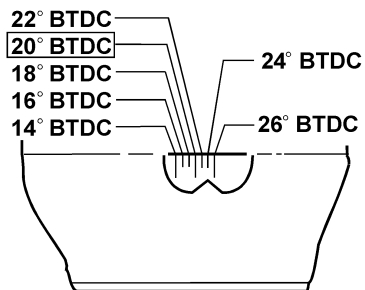
■ NOTE: For timing purposes on the 800 cc, use a dial indicator and scribe a mark on the flywheel for 12° BTDC.

IGNITION TIMING
BTDC-12°/1800 RPM - (0.086 mm or 0.035 in.)

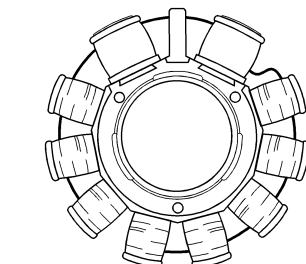
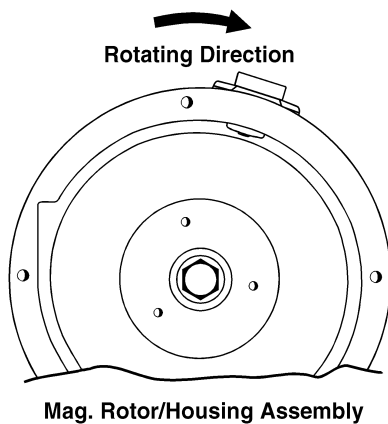


731-248F

600 cc EFI

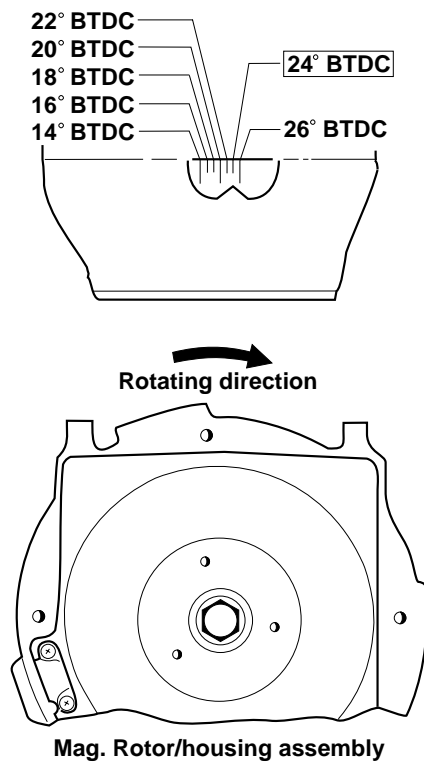


IGNITION TIMING
BTDC - 20°/5000 RPM - (2.371 mm or 0.093 in.)



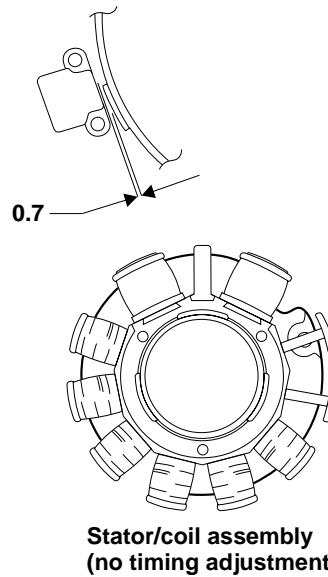
0734-460

600 cc (Twin - Carbureted)



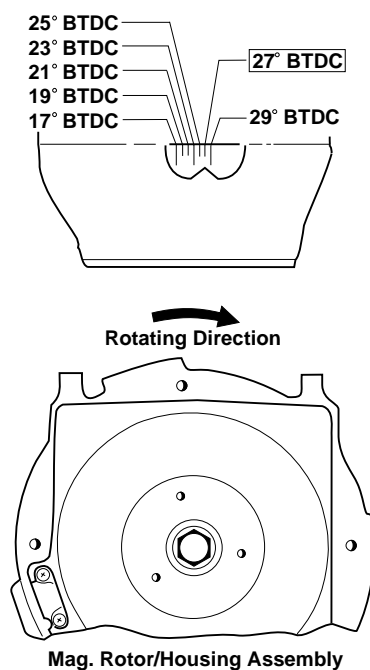
IGNITION TIMING

BTDC - 24°/3250 RPM - (3.390 mm or 0.133 in.)



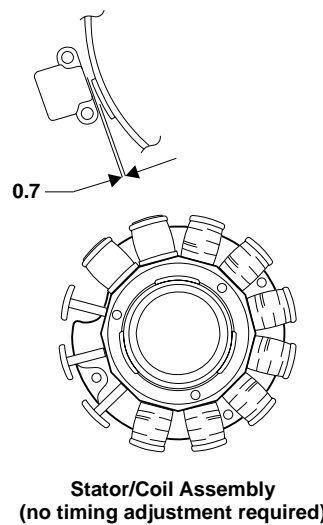
733-584B

700 cc



IGNITION TIMING

BTDC - 27°/4000 RPM - (4.625 mm or 0.182 in.)

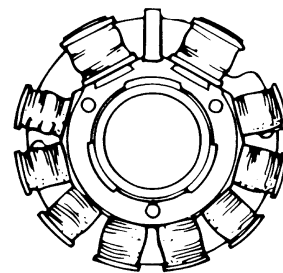
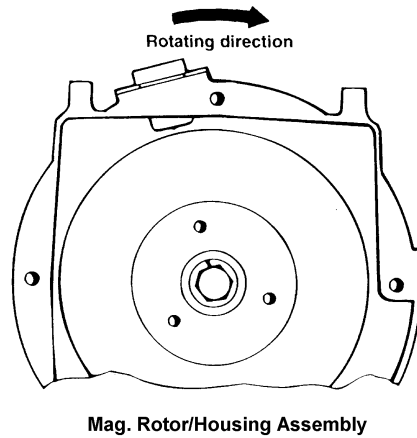


0734-491

1000 cc

- NOTE: For timing purposes on the 1000 cc, use a dial indicator and scribe a mark on the flywheel for 16° BTDC.

IGNITION TIMING
BTDC-16°/4000 RPM - (1.556 mm or 0.061 in.)



731-248G

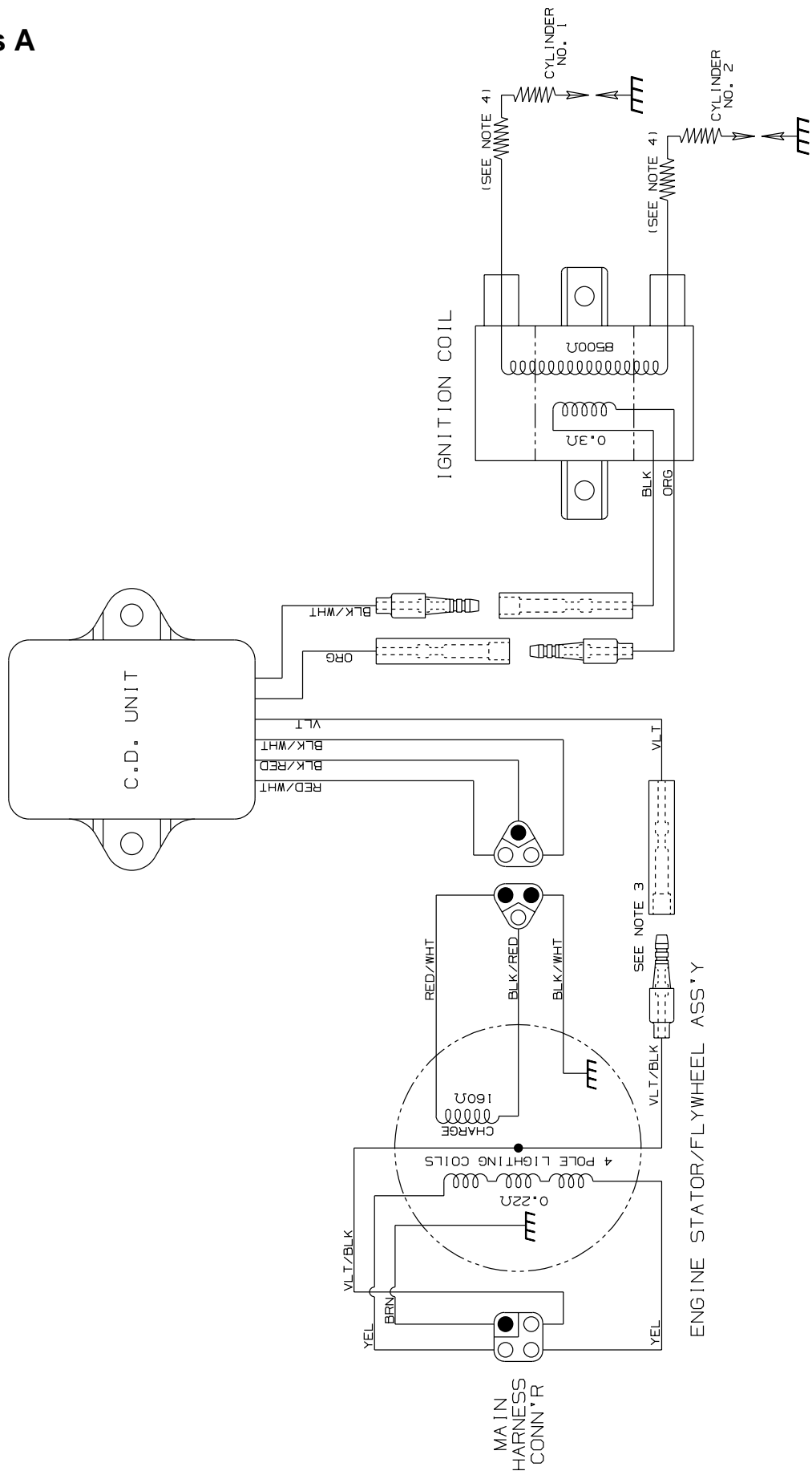
2000 Wiring Diagram Index (Ignition)

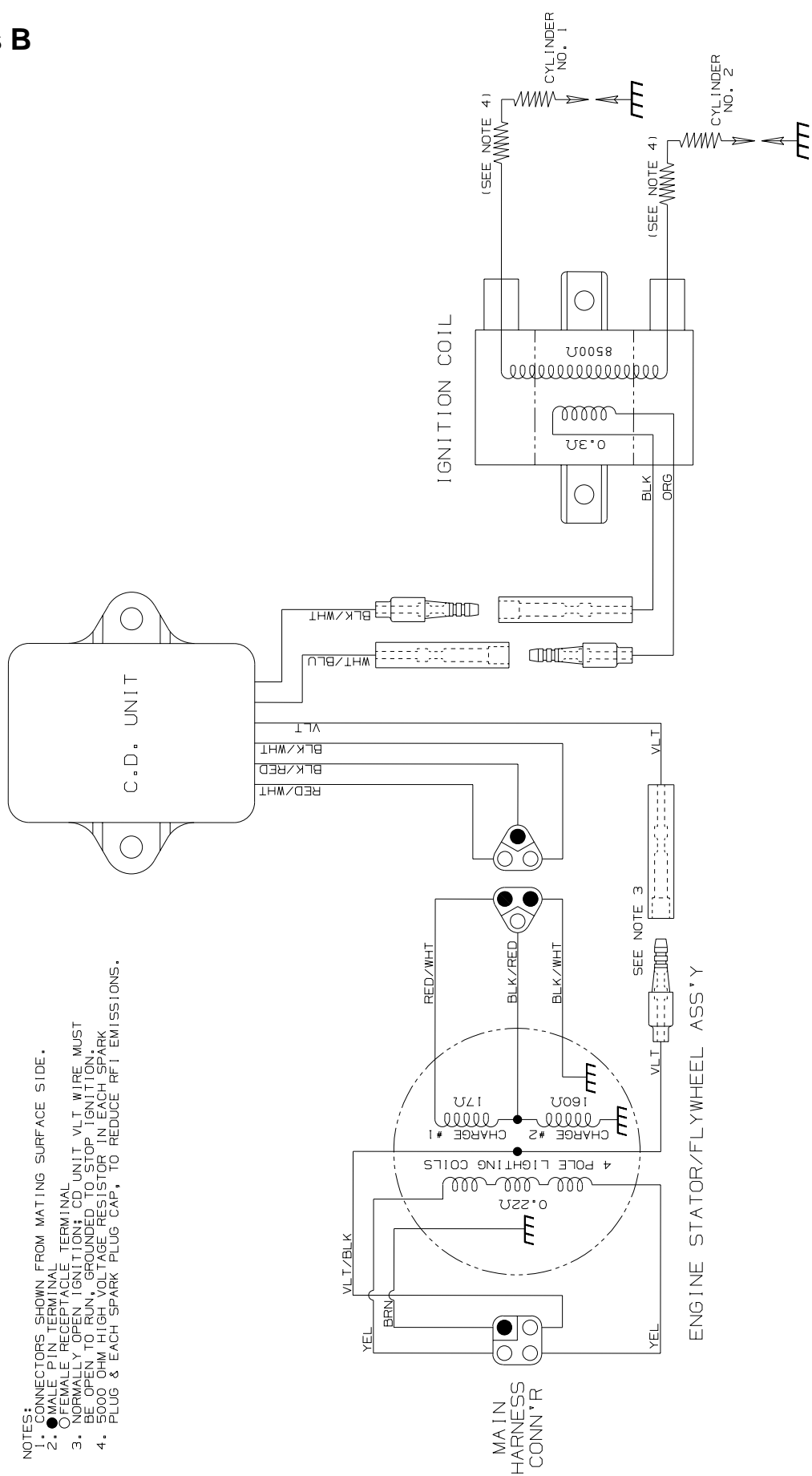
This chart is designed to direct the technician to the appropriate Ignition Harness Wiring Diagram. Select the snowmobile model from the chart to determine the correct diagram.

Snowmobile Models	Ignition Harness
Bearcat 340	A
Bearcat 440 I	A
Bearcat 440 II	A
Bearcat W/T	B
Pantera 580 EFI	C
Pantera 1000	G
Panther 340	A
Panther 440	A
Panther 550	B
Powder Special 500 EFI	C
Powder Special 500 EFI LE	C
Powder Special 600	I
Powder Special 600 LE	I
Powder Special 600 EFI	J
Powder Special 600 EFI LE	J
Powder Special 700	H
Powder Special 700 LE	H
Thundercat	G
Thundercat M/C	G
Triple Touring 600	D

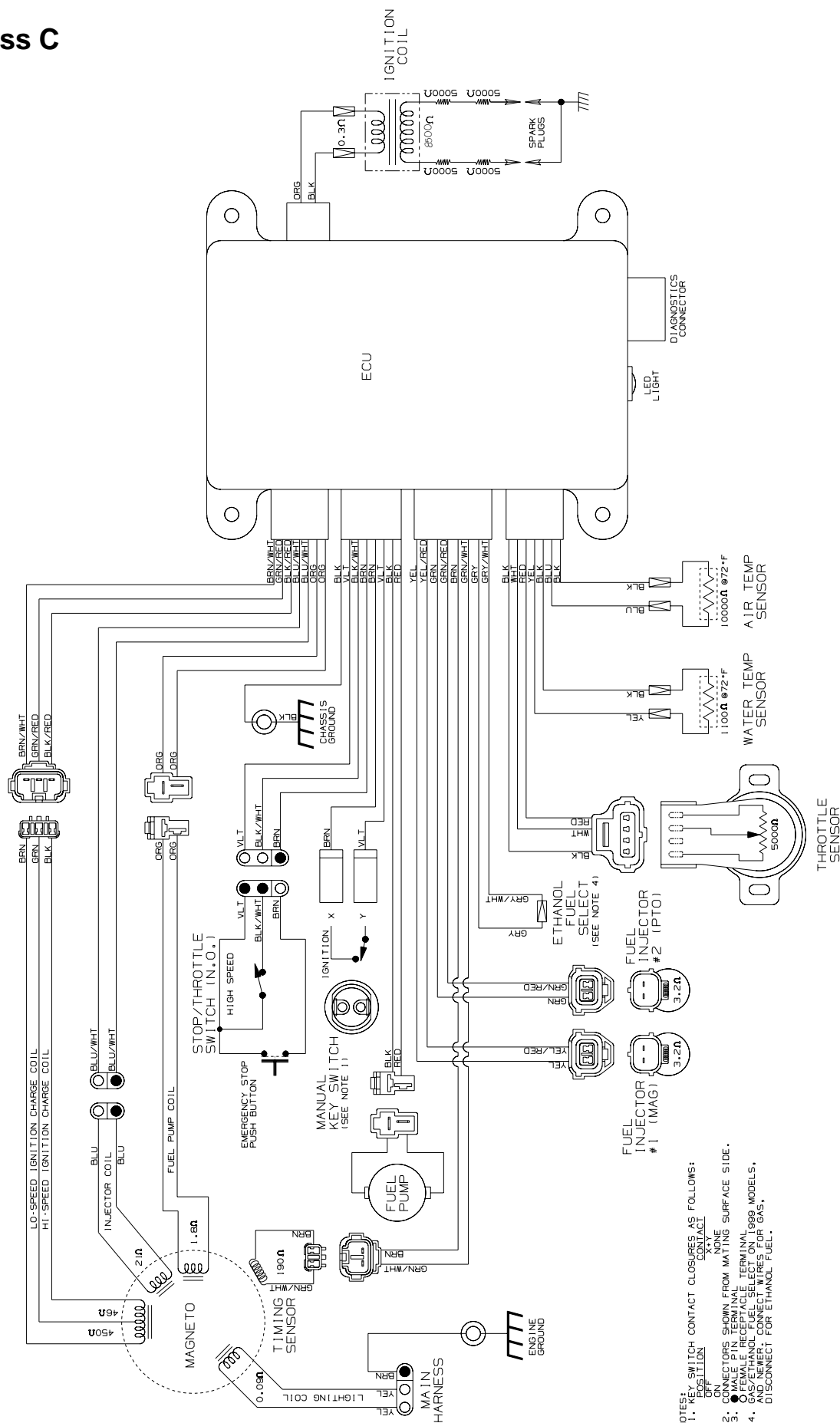
Snowmobile Models	Ignition Harness
Z 370	B
Z 440	B
ZL 440	E
ZL 500	F
ZL 500 EFI	C
ZL 550	B
ZL 580 EFI	C
ZL 600	I
ZL 600 EFI	J
ZL 700	H
ZR 500	F
ZR 500 EFI	C
ZR 600	I
ZR 600 EFI	J
ZR 600 EFI LE (Clicker)	J
ZR 600 EFI LE (Reverse)	J
ZR 700	H
ZR 700 LE (Clicker)	H
ZR 700 LE (Reverse)	H
ZRT 600	D
ZRT 800	G

Harness A



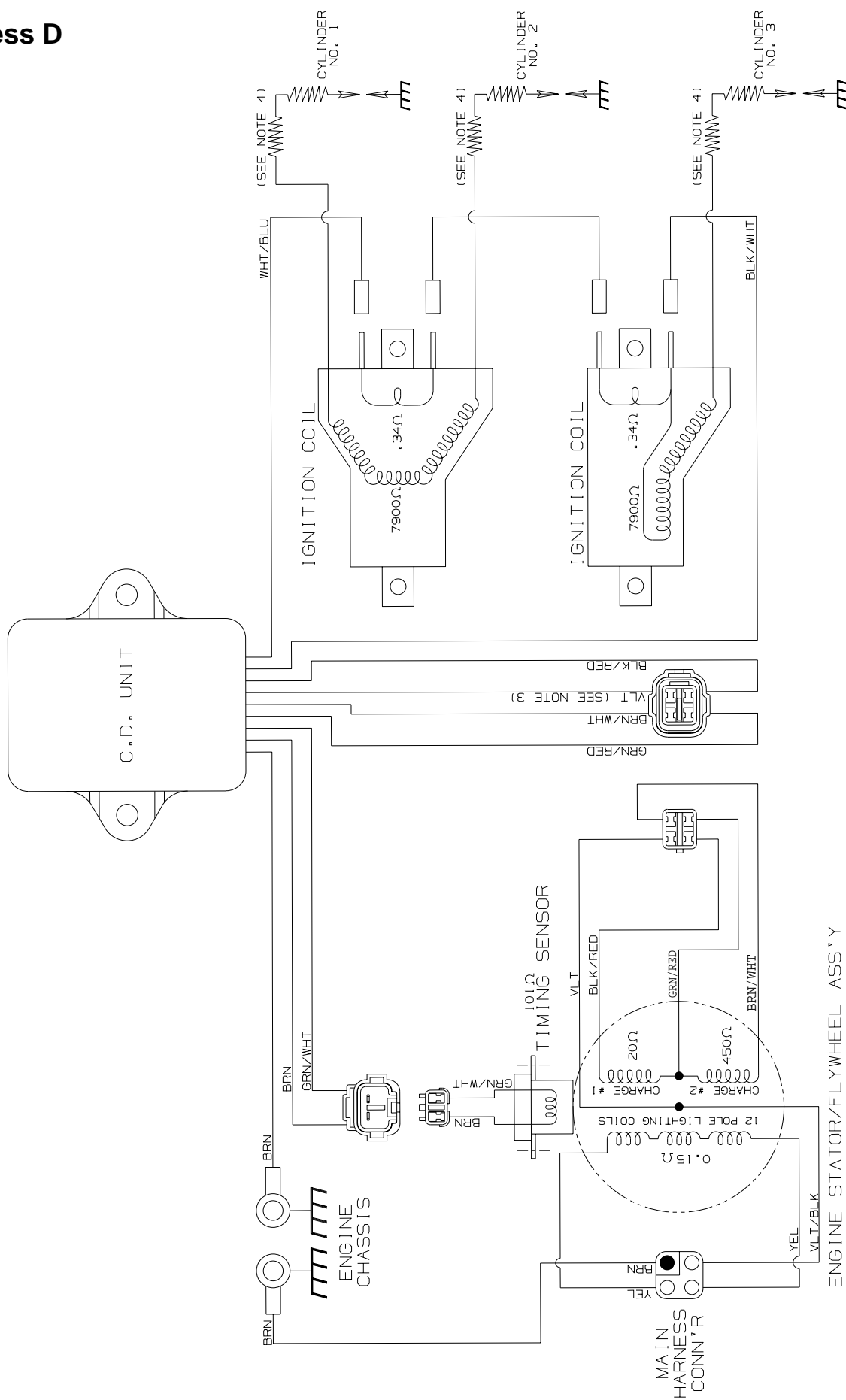


Harness C

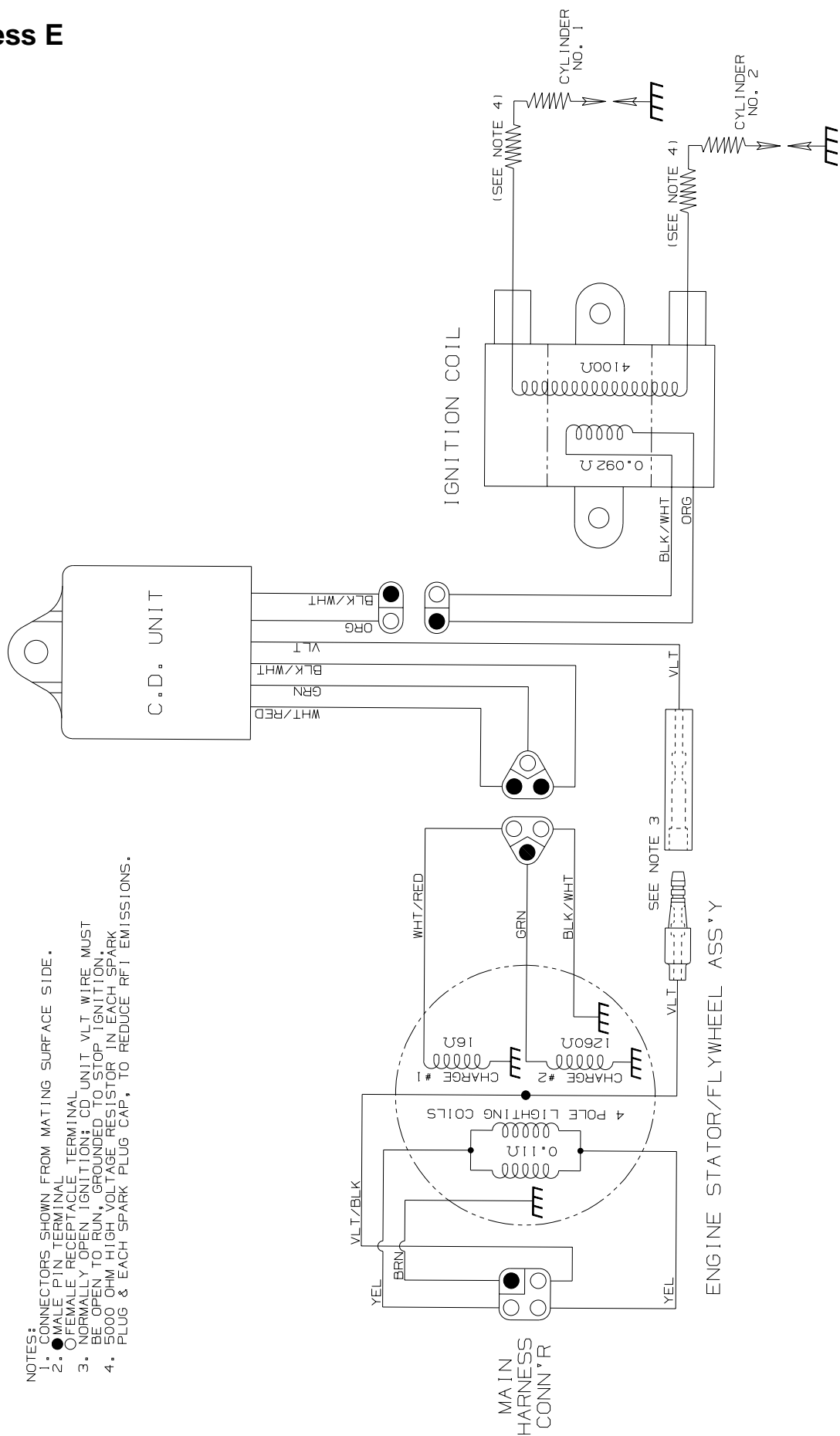


- NOTES: X, SWITCH CONTACT CLOSURES AS FOLLOWS:
1. X, SWITCH CONTACT CLOSURES AS FOLLOWS:
2. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
3. MALE PIN TERMINAL RECEPTACLE TERMINAL AND NEWER, CONNECT Wires FOR GAS.
4. DISCONNECT FOR ETHANOL FUEL.

Harness D



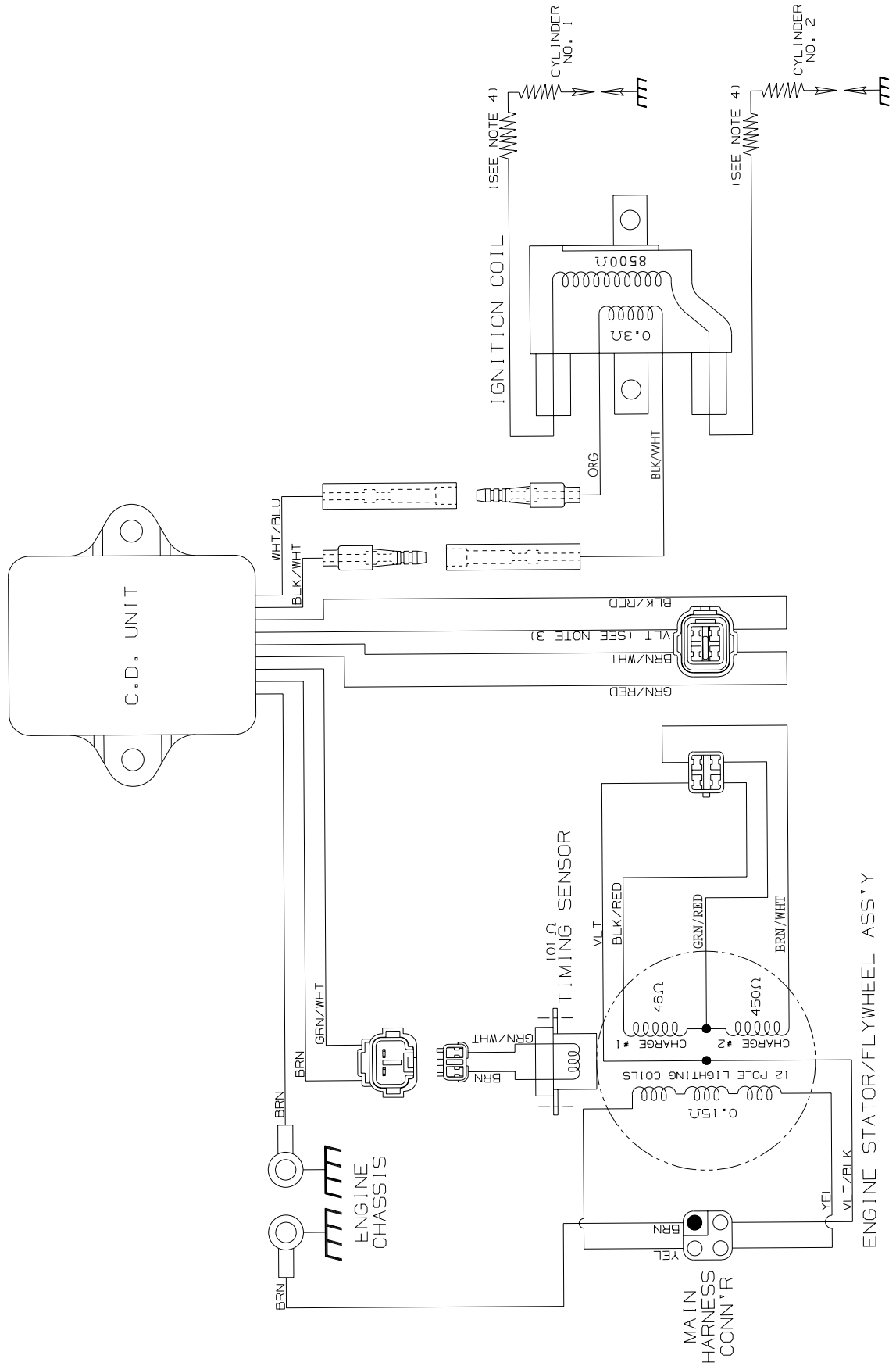
Harness E



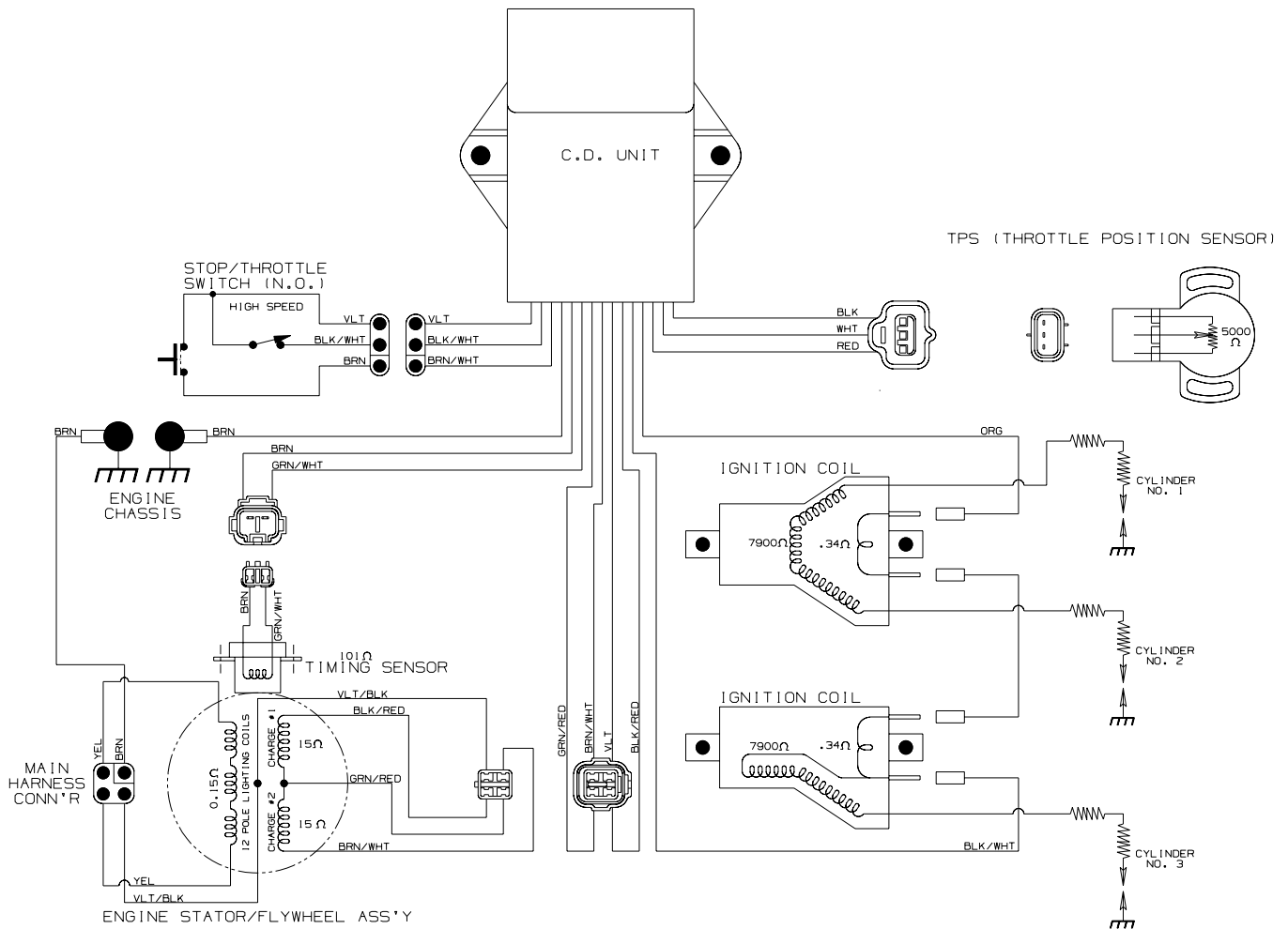
- NOTES:
- 1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
 - 2. ● MALE PIN TERMINAL
 - 3. ○ FEMALE RECEPTACLE TERMINAL
 - 4. NORMALLY OPEN IGNITION; CD UNIT VLT WIRE MUST BE OPEN TO RUN, GROUNDED TO STOP IGNITION.
 - 5. 5000 OHM HIGH VOLTAGE RESISTOR IN EACH SPARK PLUG & EACH SPARK PLUG CAP, TO REDUCE RFI EMISSIONS.

Harness F

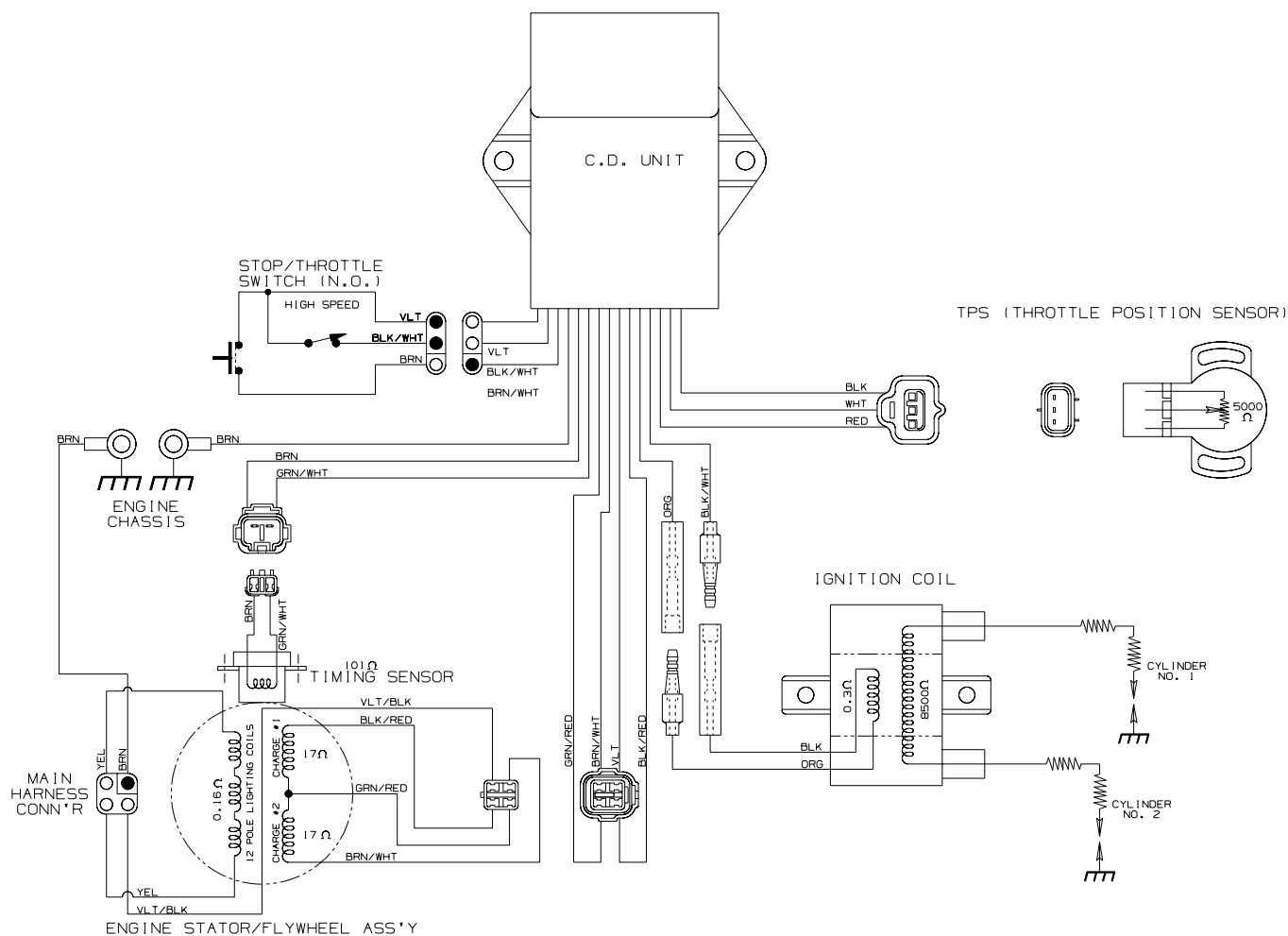
- NOTES:
1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
 2. ● MALE PIN TERMINAL OF FEMALE RECEPTACLE. TERMINAL NORMALLY OPEN TO RUN, GROUNDED TO STOP IGNITION.
 3. NORMALLY OPEN TO RUN, GROUNDED TO STOP IGNITION.
 4. 5000 OHM HIGH VOLTAGE RESISTOR IN EACH SPARK PLUG & EACH SPARK PLUG CAP, TO REDUCE RFI EMISSIONS.



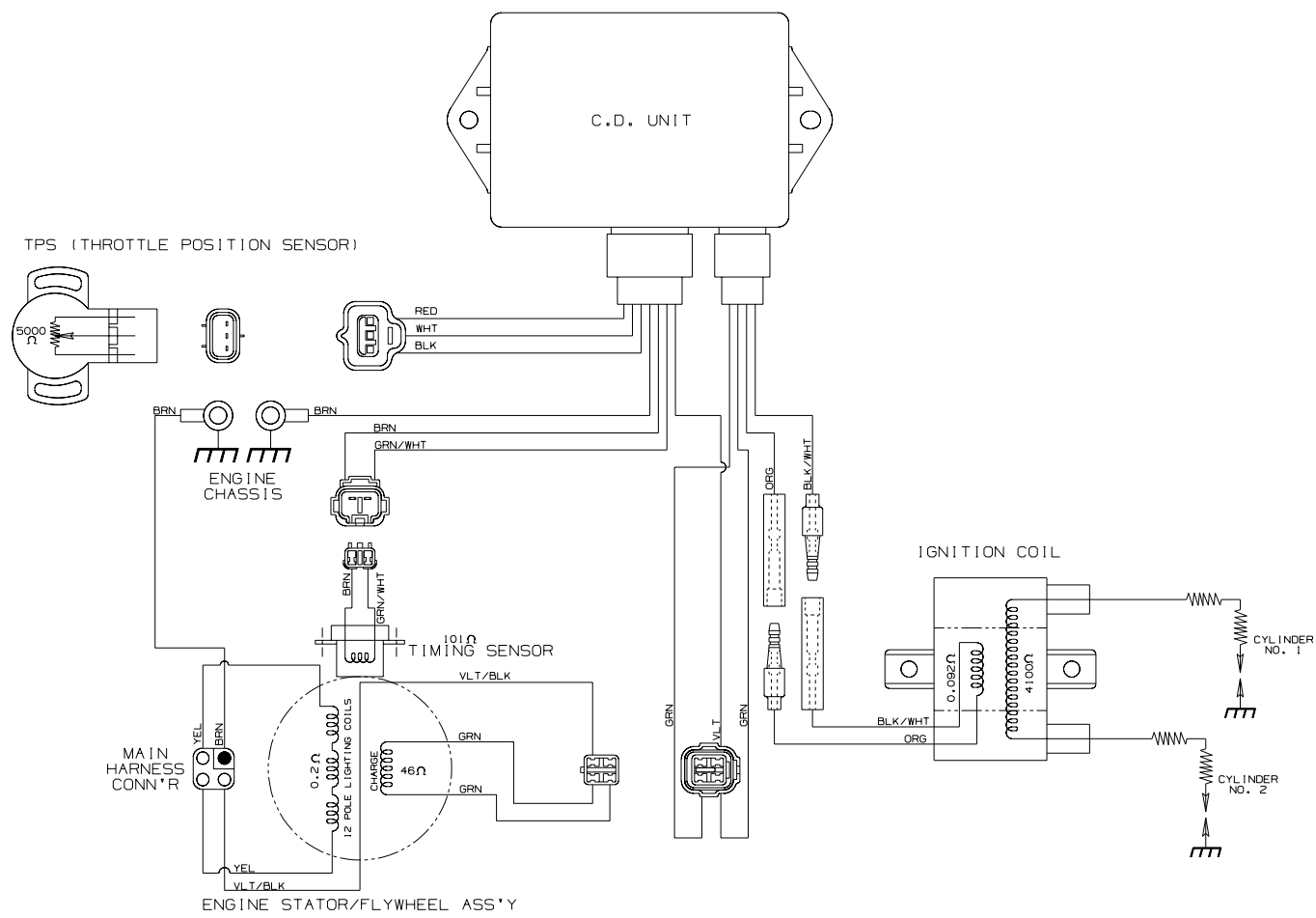
Harness G



Harness H



Harness I



Harness J

