YAMAHA

SNOWMOBILE

EX440D

SUPPLEMENTARY SERVICE MANUAL

[Frame serial number: 8J7-036101 ~ 8J7-049999
Engine serial number: SS433-036101 ~ SS433-049999]

LIT-12618-00-26

8J7-28197-10

CONTENTS

1. NEW SERVICE PROCEDURE

(New service procedure applied to the 1980 EX440D)

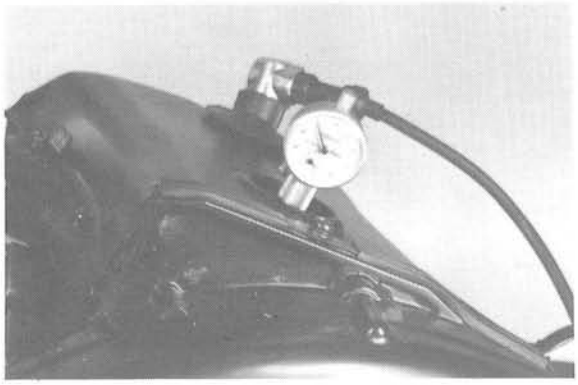
A. Ignition timing

1. Remove the recoil starter assembly.
2. Remove the right side spark plug and screw dial gauge stand into spark plug hole.

Tool name	Tool No.
Dial gauge stand	90890-01195

2. Insert dial gage with needle into stand.

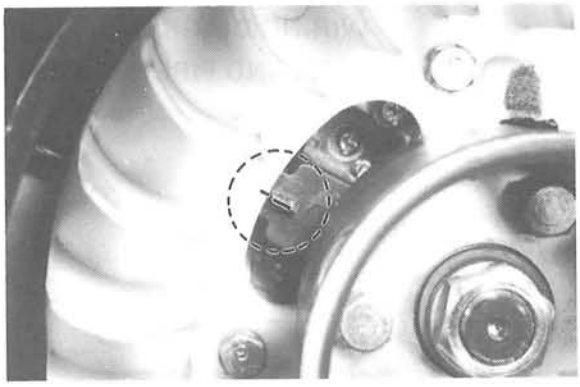
Tool name	Tool No.
Dial gauge	90890-01252
Dial gauge needle	90890-03098



4. Rotate magneto flywheel until piston is at top-dead-center (T.D.C.)
   Set the zero on dial gauge face to line up exactly with a dial gauge needle. Tighten set screw on dial gauge stand to secure dial gauge assembly. Rotate flywheel back and forth to be sure that indicator needle does not go past zero.
5. Starting at T.D.C., rotate flywheel counterclockwise until dial gauge reads approximately 3-1/2 needle revolutions before-top-dead-center (B.T.D.C.).
6. Slowly turn flywheel clockwise until dial gauge reads specified ignition timing.

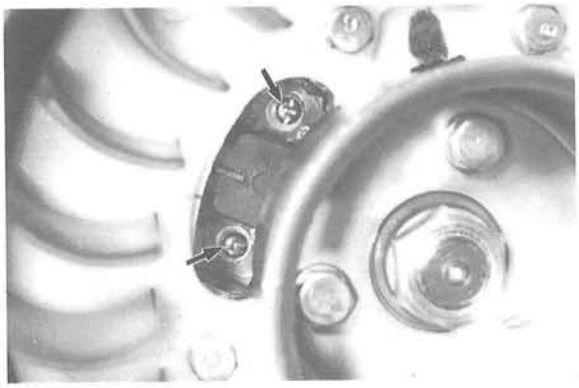
Ignition timing (B.T.D.C.)
1.6 ± 0.1 mm (0.060 ± 0.004 in)

7. Check the marks on flywheel and pulser for alignment.



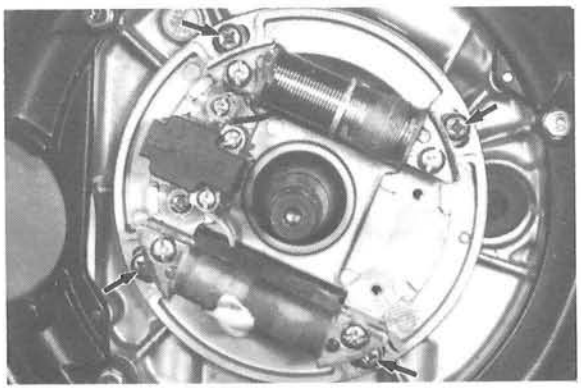
If not aligned, adjust ignition timing as follows:

a. Loosen the pulser set screws and turn the pulser until mark alignment is achieved.



NOTE:

If the marks can not be aligned by this adjustment, remove the flywheel rotor and turn the base (stator) assembly.



b. Tighten the pulser set screws.

8. Remove the dial gauge and stand. Replace the spark plug and recoil starter.

Tightening torque
Spark plug: 2.8 m-kg (20 ft-lb)
Starter assembly: 0.7 m-kg (5 ft-lb)

NOTE:
The timing light should be used to check if the marks on the rotor and base are aligned when both are replaced with new ones. The marks should align at any specified timing.

2. MAINTENANCE INTERVAL

[PERIODIC MAINTENANCE]

Check point	Every			When necessary	Seasonally
	20 hrs. or 400 km (250 mi)	40 hrs. or 800 km (500 mi)	80 hrs. or 1,600 km (1,000 mi)		
ENGINE:					
Tightness of bolts and nuts	○				○
Bends, cracks and wear	○				○
Abnormal noise	○				○
Loose connection and breaks of fuel and pulse pipes	○				○
Loose connection and breaks of oil pipes	○				○
Loose connection and breaks of oil delivery pipe	○				○
Manual rope starter system		○			○
Carburetor					
● Operation of starter jet		○			○
● Mixing adjuster (pilot screw)				○	○
● Idling speed adjustment				○	○
Operation and adjustment of oil pump		○			○
Ignition timing					○
Cylinder compressions			○		○
Muffler joints	○				○
Cylinder head/exhaust pipe decarbonize					○
Spark plug condition, gap and cleaning	○				○
Tightening of the cylinder head**					○
DRIVE:					
Tightness of bolts and nuts	○				○
Wear on slide runners	○				○
Primary drive system		○			○
V-belt	○				○
Secondary drive system		○			○
Sheave distance		○			○
Sheave offset		○			○
Brake pad wear		○			○
Brake operation and adjustment		○			○
Guide wheel rubber		○			○
Wear of drive track wheel sprocket		○			○
Drive track adjustment		○			○
Breaks in drive track		○			○
Bends in front and rear axles		○			○
Checking of lock washers		○			○
Drive chain adjustment		○			○
Drive chain oil level		○			○

Check point	Every			When necessary	Seasonally
	20 hrs. or 400 km (250 mi)	40 hrs. or 800 km (500 mi)	80 hrs. or 1,600 km (1,000 mi)		
BODY:					
Tightness of bolts and nuts	○				○
Bends and cracks	○				○
Welded riveted, joints	○				○
Ski adjustment		○			○
Ski runner wear	○				○
Breaks in fuel tank		○			○
Cleaning of fuel tank					○
Fuel filter					○
Loose connection and breaks in fuel pipe		○			○
Breaks in oil tank		○			○
Oil filter					○
ELECTRICAL:					
Wear, breakage of wire covering		○			○
Breaks in high-tension cord	○				○
Voltage regulator working voltage					○
Operation of engine stop switch		○			○
Operation of tether switch		○			○
Headlight		○			○
Taillight		○			○
Brake light		○			○

** Retighten every 10 hours from the first use.

[LUBRICATION INTERVALS]

Lubrication point	Every			When necessary	Seasonally	Oil/Grease Brand name
	20 hrs. or 400 km (250 mi)	40 hrs. or 800 km (500 mi)	80 hrs. or 1,600 km (1,000 mi)			
ENGINE:						
Starter case					○	Aeroshell grease #7A or Esso Beacon 325 grease
Oil pump control box			○		○	
Pump drive cover			○		○	
Oil in the oil tank				○		YAMALUBE 2-cycle oil
DRIVE:						
Primary sheave weight and roller pins		○			○	Molybdenum disulfide snowmobile grease
Secondary shaft and sliding sheave		○			○	
Front axle housing		○			○	Light all-purpose grease
Shaft 1 and shaft 2 (Slide rail)			○		○	
Drive chain oil replacement		○			○	Gear oil API "GL-3" SAE #75 or #80
BODY:						
Steering column lower bearing		○			○	Light all-purpose grease
Steering column upper bearing		○			○	Motor oil
Steering links		○			○	Light all-purpose grease
Ski column		○			○	
Ski wear plate		○			○	
Ski retaining pin		○			○	
Brake wire and stopper and brake lever		○			○	Esso Beacon 325 grease

3. SPECIFICATIONS

NOTE: * ..... New specification
(Compared with 1979 EX440C)

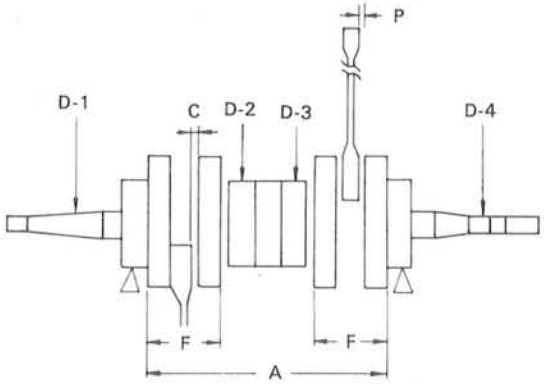
General

Model:	
Model (I.B.M. No.)	* EX440D (8J7)
Frame I.D. & starting number	* 8J7-036101
Engine I.D. & starting number	* SS433-036101
Dimension:	
Overall length	2,520 'mm (99.2 in)
Overall width (std)	980 mm (38.6 in)
Overall height (w/windshield)	995 mm (39.2 in)

Engine

Description:	
Engine type	Fan cooled two-stroke 7-port torque induction, twin cylinders
Engine model	SS433
Displacement	433 cc (26.42 cu.in)
Bore × Stroke	68 × 59.6 mm (2.68 × 2.35 in)
Effective compression ratio	7.0 : 1
Starting system	Recoil hand starter
Ignition system	C.D.I.
Lubrication system	"Autolube" oil injection
Cylinder head:	
Combustion chamber volume (with spark plug)	24.6 cc (1.50 cu.in)
Compression chamber type	Dome + Squish
Head gasket thickness	0.5 mm (0.02 in)
Cylinder:	
Material	Cast iron sleeves aluminum
Bore size	68 mm (2.677 in)
Taper limit	0.05 mm (0.0020 in)
Out of round limit	0.01 mm (0.0004 in)
Piston:	
Piston skirt clearance (Measuring point)	0.045 ~ 0.050 mm (0.0018 ~ 0.0020 in) (20 mm from piston skirt end)
Piston oversize	1st 68.25 mm (2.687 in) 2nd 68.50 mm (2.697 in) 3rd 68.75 mm (2.707 in) 4th 69.00 mm (2.717 in)
Piston pin outside diameter × length	ϕ18 × 55 mm (ϕ0.709 × 2.17 in)
Piston ring:	
Piston ring design (Top)	Keystone
(2nd)	Keystone
Ring end gap (installed) (Top)	0.35 ~ 0.55 mm (0.014 ~ 0.022 in)
(installed) (2nd)	0.35 ~ 0.55 mm (0.014 ~ 0.022 in)
Small end bearing:	
Type	Needle bearing
Big end bearing:	
Type	Needle bearing
Crankshaft:	
Crankshaft assembly width (A)	174 ± 0.1 mm (6.85 ± 0.004 in)
(F)	$56\ ^{+0}_{-0.05}$ mm ($2.205\ ^{+0}_{-0.002}$ in)
Crankshaft deflection (D)	0.03 mm (D-1) 0.04 mm (D-2) 0.04 mm (D-3) 0.05 mm (D-4)

Connecting rod large end side clearance (C)	0.25 ~ 0.75 mm (0.010 ~ 0.030 in)
Connecting rod small end deflection (P)	2.0 mm (0.079 in)



Crank pin outside diameter × length	24 × 55 mm (0.945 × 2.165 in)
Crank pin type	Solid shaft assembly type with serration
Crank bearing type (Left) × q'ty	#6306 special × 2 pcs.
(Center) × q'ty	#6206 special × 2 pcs.
(Right) × q'ty	#6206 special × 1 pc.
Crank oil seal type (Left) × q'ty	FWJ-32 78 9.5 × 1 pc.
(Center) × q'ty	Labyrinth seal × 1 pc.
(Right) × q'ty	FWJ-32 48 10 × 1 pc.

Carburetor:		
Type & manufacturer/quantity		BD44 × 38 KEIHIN × 1 pc.
I.D. Mark		8H600
Main jet	(M.J.)	#145
Main air jet	(M.A.J.)	#180
Power jet	(Pw.J.)	#150
Power air jet	(Pw.A.J.)	#200
Slow jet	(S.J.)	#90
Slow air jet	(S.A.J.)	#100
Pilot screw	(P.S.)	1-5/8
Starter jet	(St.J.)	#160
Float height		15 $^{+2}_{-3}$ mm (0.59 $^{+0.08}_{-0.12}$ in)
Idling engine speed		1,500 r/min

Main jet setting chart:

Altitude \ Temperature	−30°C (−22°F)	−20°C (−4°F)	−10°C (14°F)	0°C (32°F)	10°C (50°F)	20°C (68°F)
Sea level	#145	#145	#145	#145	#140	#140
~ 600m (2000 ft)	#145	#145	#145	#145	#140	#140
~ 1200m (4000 ft)	#140	#140	#140	#140	#135	#135
~ 1800m (6000 ft)	#135	#135	#135	#135	#130	#130
~ 2400m (8000 ft)	#130	#130	#130	#130	#125*	#125*
~ 3000m (10000 ft) or more	#125*	#125*	#125*	#125*	#120*	#120*

* Change the starter jet to #95 or #100.

Intake reed valve:	
Type	V type
Bending limit	0.3 mm (0.012 in)
Valve lift	10.4 mm (0.409 in)
Tightening torque	8.0 cm-kg (6.9 in-lb)
Lubrication:	
Autolube pump — Color code	Dark blue
— Minimum stroke	0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in)
— Maximum stroke	1.65 ~ 1.87 mm (0.0650 ~ 0.0736 in)
— Reduction ratio	1/44
— Output Min./200 strokes	0.95 ~ 1.19 cc (0.0321 ~ 0.0402 oz)
— Output Max./200 strokes	7.84 ~ 8.89 cc (0.2651 ~ 0.3006 oz)
Autolube pump wire free play	25 ± 1 mm (0.98 ± 0.04 in) at idle
Oil tank capacity	2.8 Liter (3 US.qt)
Oil grade	YAMALUBE 2-cycle

Drive and track suspension

Transmission:	
Type	V-belt automatic centrifugal engagement
Drive ratio	3.5 : 1 ~ 1 : 1
Engagement rpm	2,900 ~ 3,300 r/min
Primary spring:	
Part No.	90501-45534
Color code	Blue/Green
Secondary spring:	
Part No.	90508-45286
Color code	Yellow
Secondary spring pre-load (twist)	150° (Hole No. 1)
Sheave distance	270 $^{+0}_{-3}$ mm (10.6 $^{+0}_{-0.12}$ in)
Sheave off-set	5.5 ± 0.5 mm (0.22 ± 0.02 in)
V-belt width and outer line length	31.6 x 1,099 mm (1.24 x 43.3 in)
V-belt wear limit	26 mm (1.02 in)
Track suspension:	
Type	Slide rail suspension
Damper type	Oil and gas damper
Spring color code	No. painted
Slide runner wear limit	10 mm (0.4 in)
Track width	380 mm (15 in)
Track deflection	25 ~ 30 mm/10 kg (0.984 ~ 1.18 in/22 lb)
Lnegth on ground	850 mm (33.5 in)
Wheel sprocket material and number of teeth	Polyethylene 8T
Stopper band length	214 mm (8.4 in) (3rd hole from the bottom)
Secondary drive:	
Type	Chain (#35-3)
Reduction ratio	29/17 (1.706)
Chain pitch × Number of links	9.525 mm (0.375 in) × 68L
Free play	10 $^{+5}_{-2}$ mm (0.4 $^{+0.2}_{-0.08}$ in)
Chain housing oil quantity	320 cc (10.82 oz)
Chain housing oil grade	Gear oil API "GL3" (SAE #75 or 80)
Brake:	
Type	Floating pad type disc brake
Brake pad thickness	13.5 mm (0.53 in)
Brake pad wear limit	9.5 mm (0.37 in)
Gap between pad and disc	0.15 mm (0.006 in)

Chassis

Frame:	
Frame design & material	Aluminum + Steel
Steering system:	
Caster (ski column)	25°
Camber	0°
Ski length × width × thickness	980 × 140 × 2.6 mm (38.6 × 5.5 × 0.10 in)
Ski stance	800 mm (31.5 in)
Ski Toe-out	0 ~ 6 mm (0 ~ 0.23 in)
Steering linkage type	Tie-rod
Lock to lock angle (ski)	Right ski, L: 20.2° R: 27.6° Left ski, L: 27.6° R: 20.2°
Lock to lock angle (steering column)	Right: 46.5° Left: 46.5°
Front suspension:	
Type	Leaf spring
damper type	Oil damper
Fuel tank:	
Capacity	30 Liter (9.0 US.gal)
Fuel grade	Regular gasoline

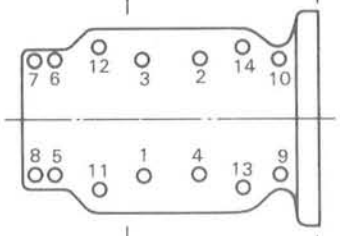
Electrical

Ignition system:	
Type — flywheel magneto (C.D.I. Type)	
Model/manufacturer	* F280-78/HITACHI
Voltage	12V
Pulser coil resistance	* 78Ω at 20°C (68°F) (White/Red — Black)
Charging coil resistance	* 113Ω at 20°C (68°F) (Brown — Black) * 29Ω at 20°C (68°F) (Blue — Black)
Ignition timing:	
B.T.D.C.	1.6 ± 0.1 mm (0.060 ± 0.004 in)
Ignition:	
Model/Manufacturer	CM62-20/HITACHI
Spark gap	9 mm (0.35 in)/300 r/min 11 mm (0.43 in)/3,000 r/min
Primary winding resistance	0.15Ω at 20°C (68°F)
Secondary winding resistance	3.6kΩ at 20°C (68°F)
Diode (Yes or No)	No
Spark plug:	
Type & Quantity	* NGK B-9ES × 2 pcs.
Spark plug gap	* 0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Spark plug cap:	
Type	Rubber type with noise suppressor
Noise suppressor resistance	5kΩ at 20°C (68°F)
C.D.I. unit:	
Model/Manufacturer	* TIA01-30/HITACHI
Lighting system:	
Lighting output	12V/100W
Lighting coil resistance	* 0.22Ω at 20°C (68°F) (Yellow — Black)
Headlight type	Semi shield
Bulb wattage/q'ty	12V 60/60W × 1 pc.
Tail/brake light wattage	12V 8W/23W
Meter light wattage	12V 3.4W

A.C. regulator:	
Model/Manufacturer	TRIZ-24B/HITACHI or S8516B/TOSHIBA
Voltage	13.8 ± 0.5V

Tightening Torque

Part to be tightened	Thread size	Tightening torque	Remarks
Engine:			
Spark plug	M14 P1.25	2.8 m-kg (20 ft-lb)	
Cylinder head	M8 P1.25	2.5 m-kg (18 ft-lb)	Special nut—Stud bolt
Cylinder head	M8 P1.25	2.5 m-kg (18 ft-lb)	Nut—Stud bolt
Flywheel magneto	M16 P1.0	7.3 m-kg (53 ft-lb)	
Crankcase upper and lower	M8 P1.25	First: 1.0 m-kg (7.5 ft-lb) Final: 2.0 m-kg (15 ft-lb)	
Tightening sequence			
Starter pulley	M8 P1.25	1.1 m-kg (8 ft-lb)	
Crankcase and engine bracket	M10 P1.25	4.0 m-kg (29 ft-lb)	Special nut—Stud bolt
Cylinder and exhaust pipe	M8 P1.25	2.0 m-kg (15 ft-lb)	
Drive and track suspension:			
Primary sliding sheave and cap	M6 P1.0	1.1 m-kg (8 ft-lb)	
Installation of primary sheave	UNF 1/2"	Initial: 12 m-kg (87 ft-lb) Loosen once and retighten: 6.0 m-kg (43.5 ft-lb)	Use motor oil
Installation of secondary sheave	M10 P1.25	5.0 m-kg (36 ft-lb)	
Bearing housing	M10 P1.25	6.5 m-kg (47 ft-lb)	
Secondary shaft and Bearing collar	Socket screw	0.6 m-kg (4 ft-lb)	
Brake caliper and Housing chain	M10 P1.25	5.0 m-kg (36 ft-lb)	
Installation of drive chain sprocket	M14 P1.5	6.0 m-kg (43.5 ft-lb)	Nut
Installation of driven chain sprocket	M10 P1.25	5.0 m-kg (36 ft-lb)	Bolt
Chain housing and Frame	M8 P1.25	2.5 m-kg (18 ft-lb)	
Installation of front axle L.H.	M22 P1.0	8.5 m-kg (61.5 ft-lb)	
Front axle housing and Frame	M8 P1.25	2.5 m-kg (18 ft-lb)	
Shaft 1 and Frame	M10 P1.25	6.5 m-kg (47 ft-lb)	Use LOCK-TITE
Shaft 2 and Rear bracket	M10 P1.25	6.5 m-kg (47 ft-lb)	Use LOCK-TITE
Rear bracket and Frame	M8 P1.25	3.0 m-kg (21.5 ft-lb)	Use LOCK-TITE
Installation of suspension wheel	M6 P1.0	1.0 m-kg (7 ft-lb)	
Installation of rear guide wheel	M8 P1.25	2.5 m-kg (18 ft-lb)	Use LOCK-TITE
Installation of runner sliding 1	M6 P1.0	0.3 m-kg (2 ft-lb)	Use LOCK-TITE
Installation of runner sliding 2	M6 P1.0	1.0 m-kg (7 ft-lb)	Use LOCK-TITE
Pivot arm and Frame sliding 1	M6 P1.0	1.3 m-kg (10 ft-lb)	Use LOCK-TITE
Bracket 5 & 6 and Frame sliding 1	M6 P1.0	1.3 m-kg (10 ft-lb)	Use LOCK-TITE
Frame sliding 1 and 2 & 3	M8 P1.25	2.5 m-kg (18 ft-lb)	
Installation of stopper 1	M6 P1.0	0.4 m-kg (3 ft-lb)	



Part to be tightened	Thread size	Tightening torque	Remarks
Chassis:			
Engine mounting bolt	M10 P1.25	3.8 m-kg (27.5 ft-lb)	Nylon nut
Ski runner	M8 P1.25	1.45 m-kg(10 ft-lb)	Use plain washer and LOCK-TITE
Steering column and Gate	M6 P1.0	0.9 m-kg (6.5 ft-lb)	
Steering relay rod adjusting nut	M10 P1.25	2.5 m-kg (18 ft-lb)	
Outside arm and Ski column	M10 P1.25	4.0 m-kg (29 ft-lb)	Use lock washer and wave washer
Steering lower bracket	M8 P1.25	1.5 m-kg (11 ft-lb)	Use lock washer and LOCK-TITE
Installation of steering column 1, 2	M6 P1.0	0.9 m-kg (6.5 ft-lb)	Use lock washer
Steering relay ass'y	M10 P1.25	3.0 m-kg (22 ft-lb)	Use cotter pin
Level gauge securing bolt	M6 P1.0	0.25 m-kg(1.8 ft-lb)	
Screw to install the front of seat	M6 P1.0	0.5 m-kg (3.5 ft-lb)	
Nut to install the rear of seat	M8 P1.25	0.9 m-kg (6.5 ft-lb)	
Brake level holder	M5 P0.8	0.4 m-kg (3.0 ft-lb)	
Throttle lever	M6 P1.0	0.35 m-kg(2.5 ft-lb)	

4. SPECIAL TOOLS

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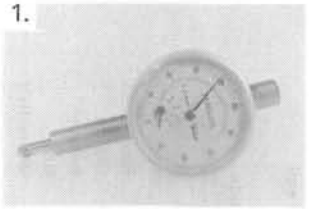

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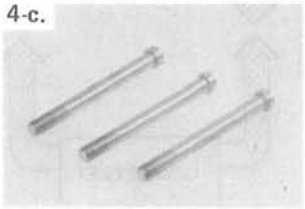

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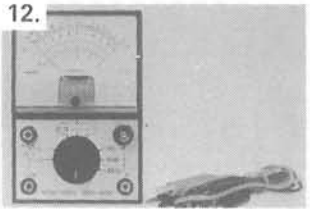

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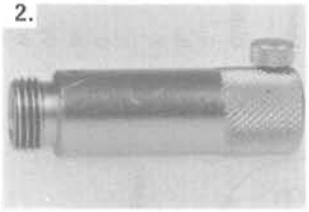

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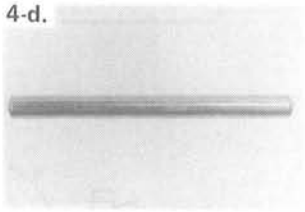

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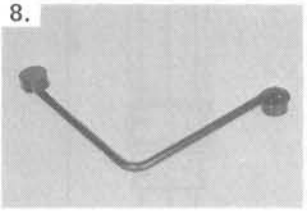
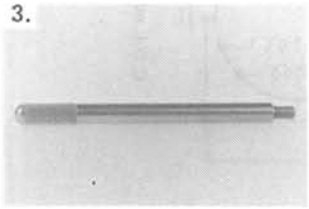
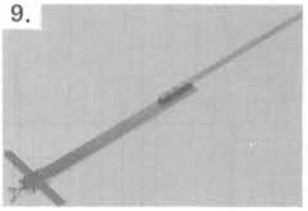


13.


3.


4-e.


9.


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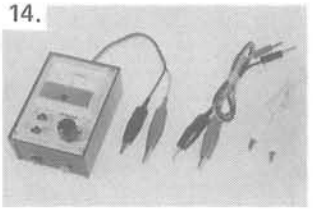
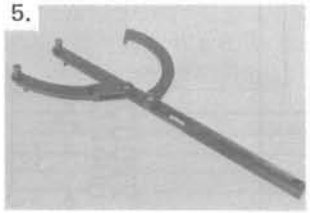


4-a.


5.


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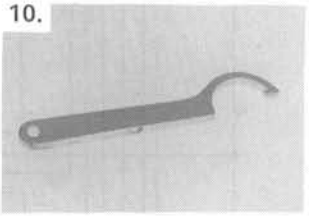
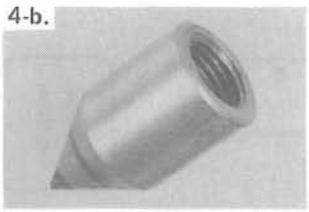


4-b.


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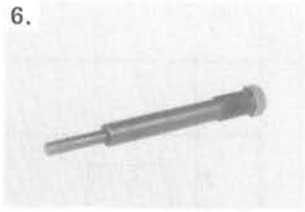
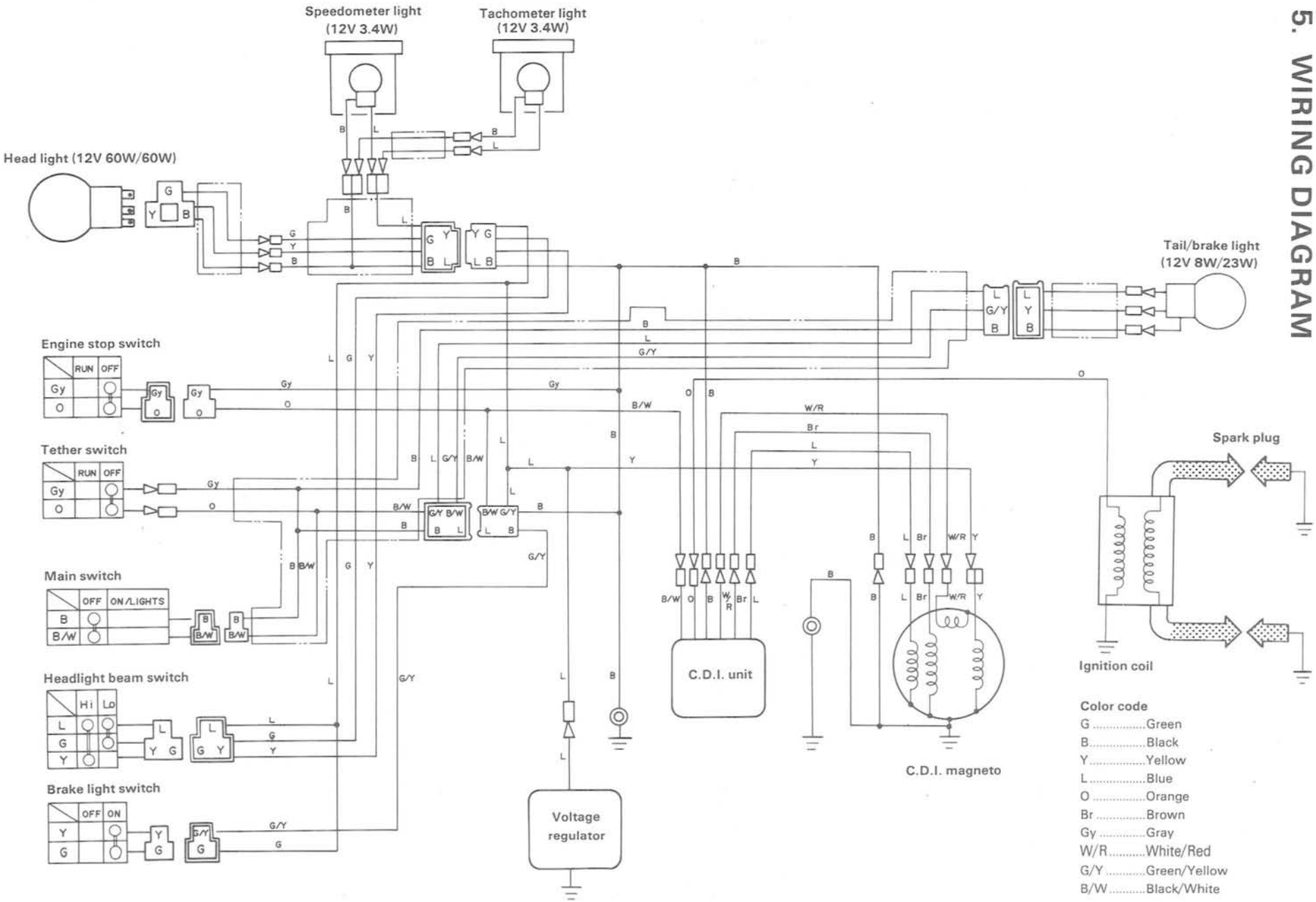


11.


No.	Description	Tool No.
1	Dial gauge	90890-03097
2	Dial gauge stand No. 2	90890-01195
3	Dial gauge needle (56 mm)	90890-03098
4-a	Flywheel puller bolt	90890-01803
4-b	Flywheel puller attachment	90890-01804
4-c	Flywheel puller screw	90890-01806
4-d	Drive handle	90890-01817
4-e	Flywheel puller body	90890-01848
5	Rotor holding tool	90890-01235
6	Primary fixed sheave puller	90890-01859
7	Sheave sub-assembly tool	90890-01858
8	Bushing tool	90890-01877
9	Sheave gauge	90890-01875
10	Eccentric bearing installer	90890-01851
11	Main switch ring nut tool	90890-01857
12	Pocket tester	90890-03104
13	Electro tester	90890-03021
14	A.C. Regulator checker	90890-03090

5. WIRING DIAGRAM



6. WIRE AND PIPE ROUTING DIAGRAM

1. Main switch
2. Tether switch
3. Wire harness 2
4. Fuel tank breather pipe
5. Fuel pipe
6. Clip
7. Hose
8. C.D.I. unit
9. Wire harness 1
10. To tail light
11. Starter wire
12. Fuel level pipe
13. Oil level pipe
14. Oil tank breather pipe
15. Voltage regulator
16. Speedometer cable
17. Tachometer cable
18. Oil pipe
19. To carburetor
20. To engine crankcase
21. To oil pump
22. To tachometer gear unit
23. To carburetor
24. Clamp
25. Clamp
26. Head light lead wire
27. Speedometer cable (Gray)
28. Tachometer cable (Black)
29. Spring
30. Shroud stopper
31. Starter wire
32. Brake wire
33. Throttle wire
34. Pump wire
35. Clamp
36. To tachometer gear unit
37. To speedometer
38. To tachometer