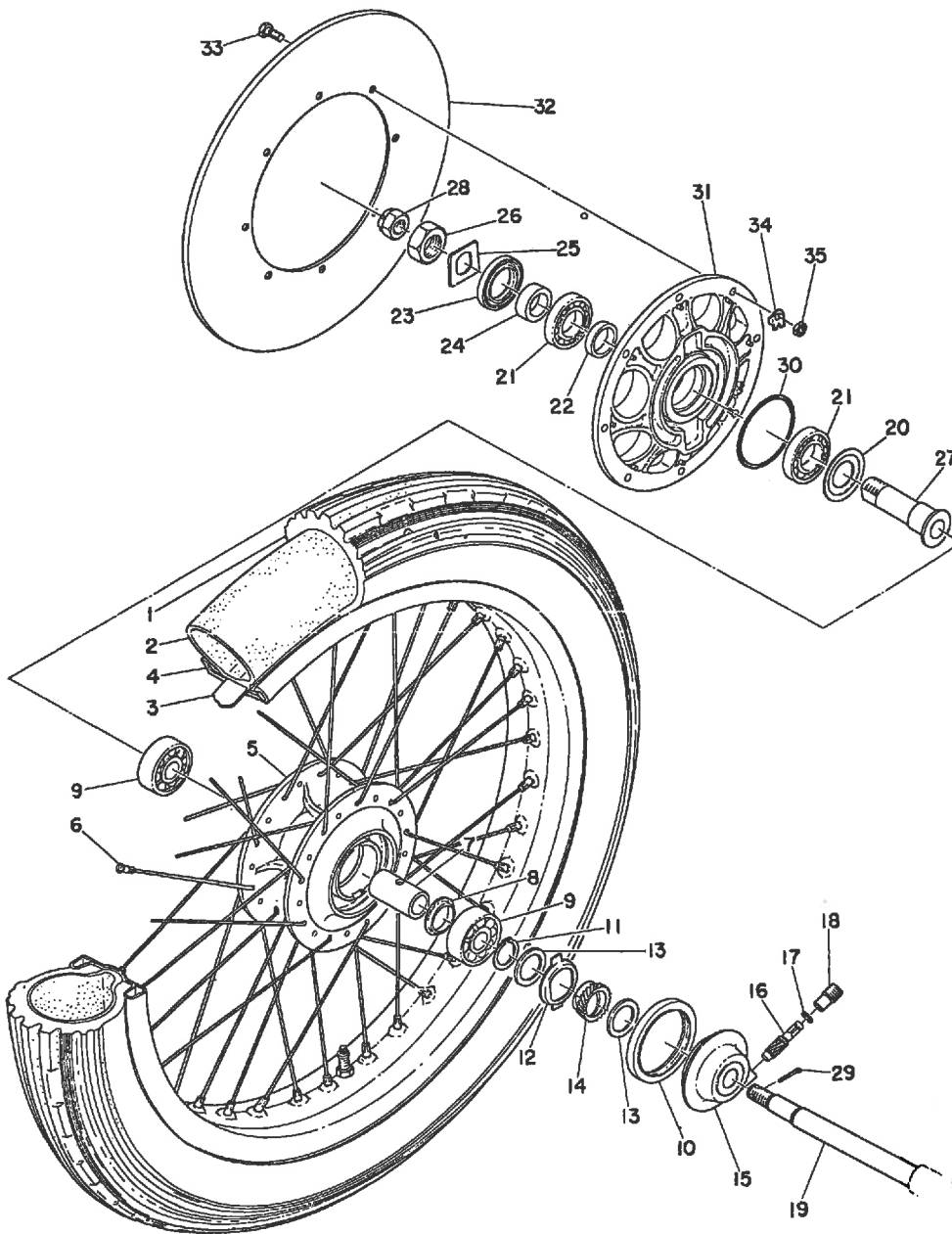


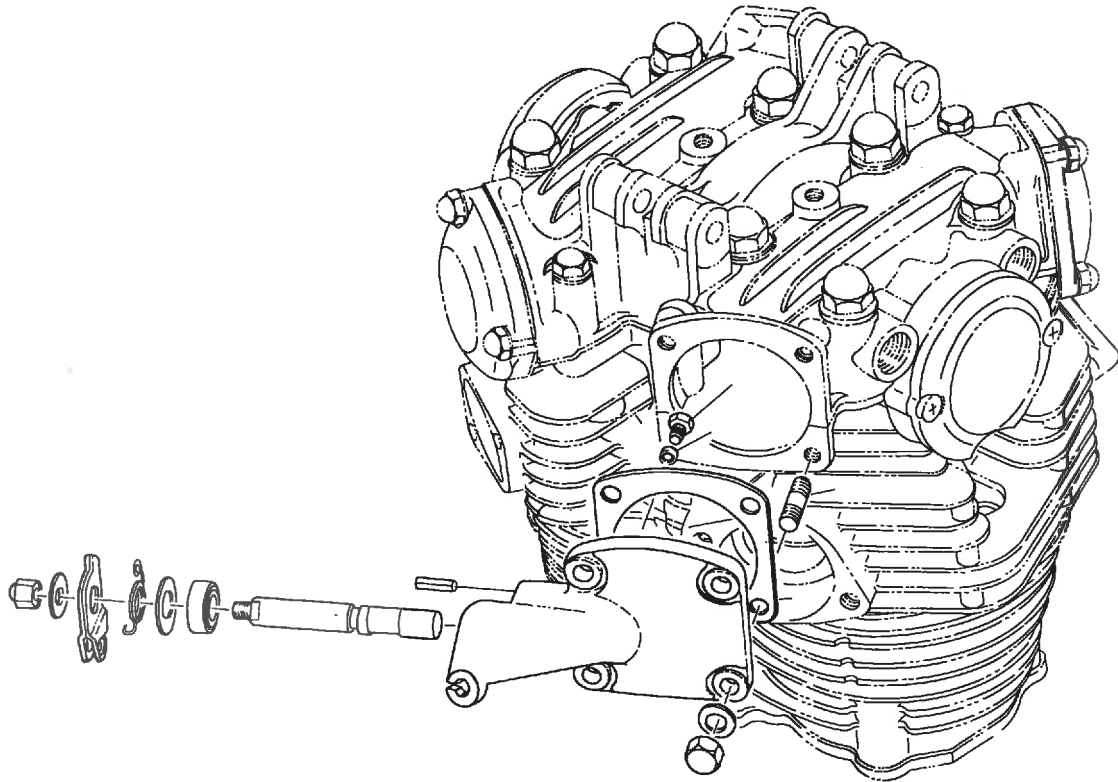
FRONT WHEEL (XS2)



- 1 TIRE, front (3.50-19-4PR)
- 2 TUBE (3.50-19)
- 3 BAND, rim (3.50-19)
- 4 RIM (1.85B-19)
- 5 HUB, front
- 6 SPOKE SET
- 7 SPACER, bearing
- 8 FLANGE, spacer
- 9 BEARING (6303Z)
- 10 OIL SEAL (SD-60-72-7) ...
- 11 CIRCLIP (S-25)
- 12 CLUTCH, meter
- 13 WASHER, thrust (25-32-1.6)
- 14 GEAR, drive
- 15 HOUSING, gear unit
- 16 GEAR, meter
- 17 WASHER (6.2-9.5-0.8) ...
- 18 BUSHING
- 19 SHAFT, wheel
- 20 COVER, dust
- 21 BEARING (16005)
- 22 SPACER, bearing (25-32-6) .
- 23 OIL SEAL (DD-30-47-5)
- 24 COLLAR, shaft (22-30-10) ..
- 25 WASHER, special
- 26 NUT, shaft
- 27 SHAFT, disc ...
- 28 NUT, shaft
- 29 PIN, cotter
- 30 O-RING (3.0-56.2)
- 31 BRACKET, disc
- 32 DISC, brake
- 33 BOLT, fitting ..
- 34 WASHER, lock
- 35 NUT



CYLINDER HEAD



MODEL TX650

This supplement is for the exclusive parts for the TX650.

Please refer to XS2 and previous Parts Lists for parts not listed in this supplement.

Fig. 1 CYLINDER HEAD · CRANK · CRANKCASE

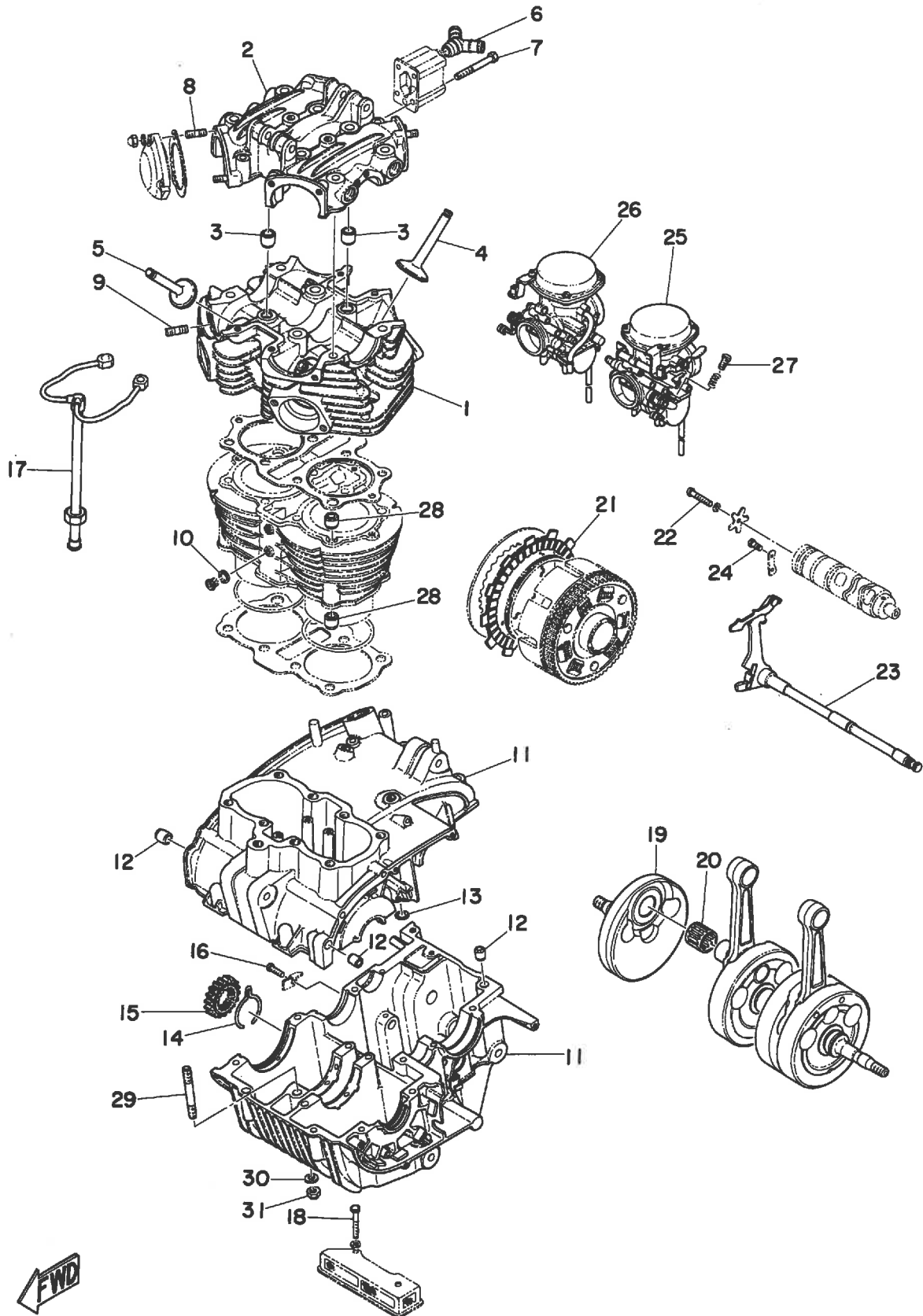


Fig. 3 FRONT FENDER · CALIPER · MASTER CYLINDER

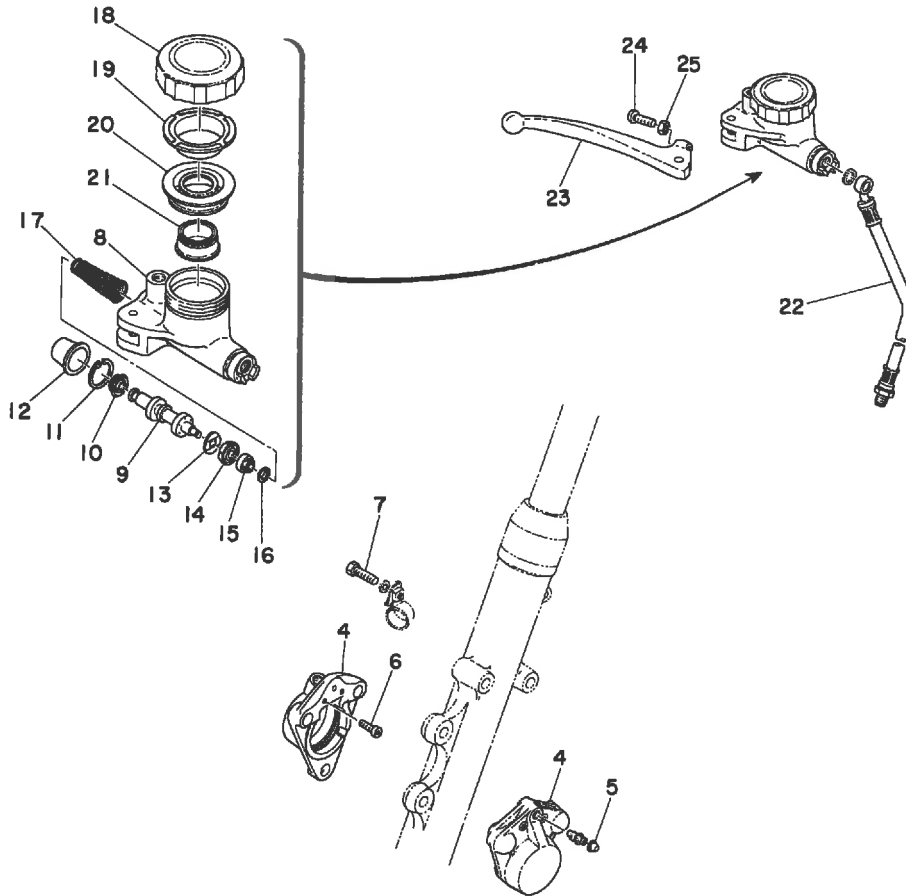


Fig. 4 FRONT FORK

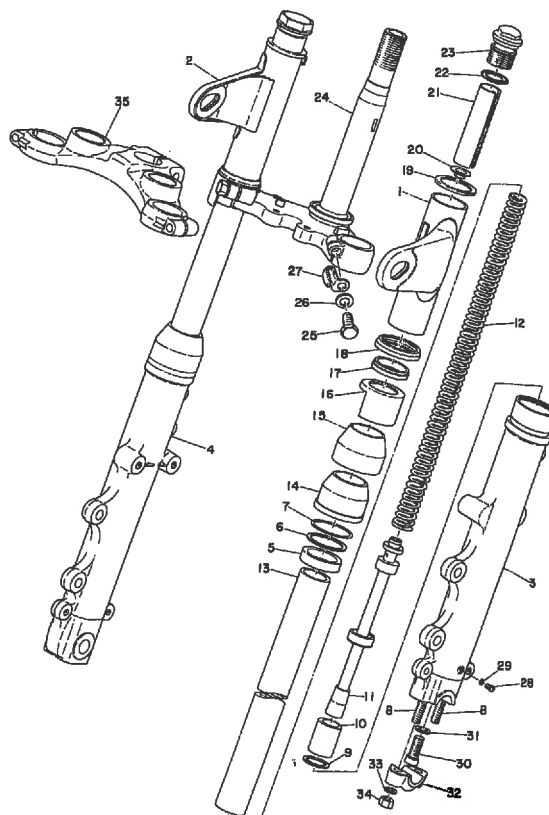
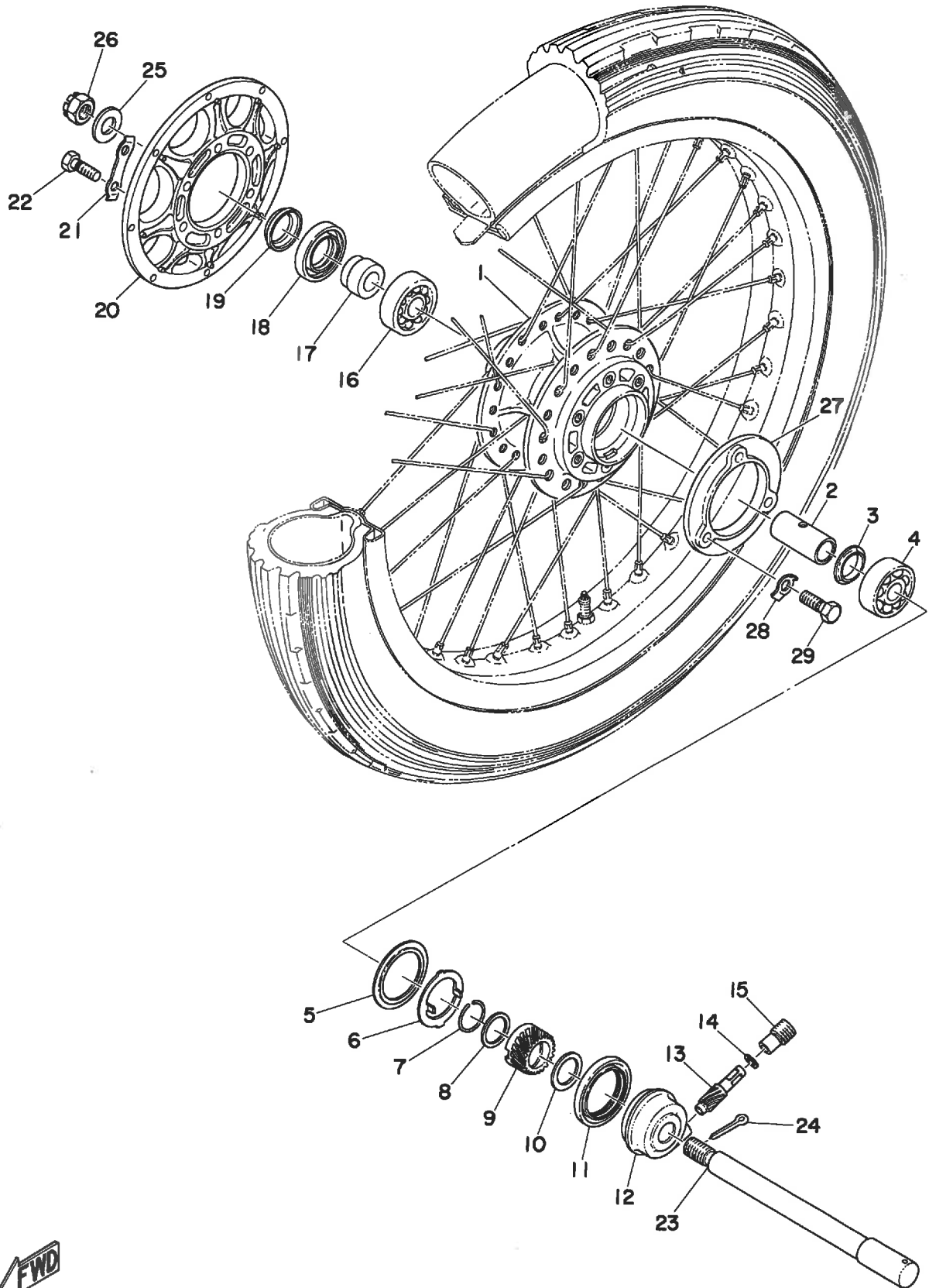


Fig. 5 FRONT WHEEL · DISC BRACKET

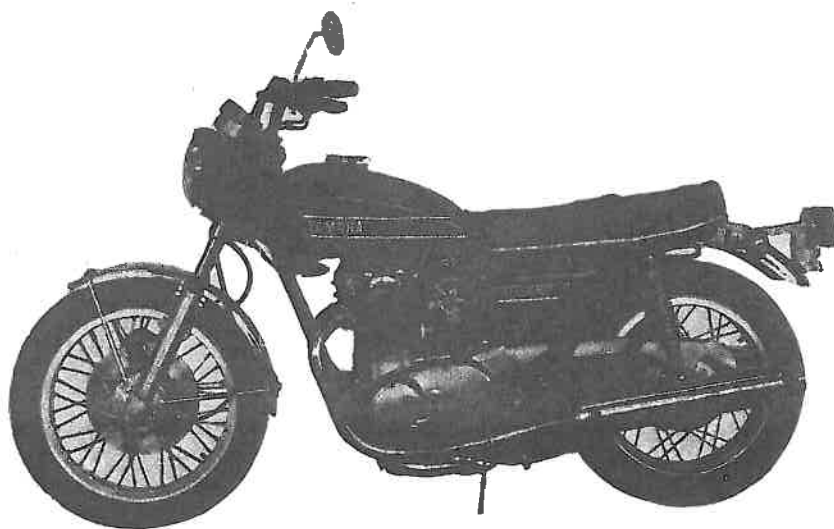


YAMAHA

SUPPLEMENTARY

SERVICE MANUAL

TX650A



FOREWORD

Yamaha's TX650A is an improved version of the TX650, thus certain specifications and data have been changed. For complete information on service procedure, it is necessary to use this Supplementary Service Manual together with the XS1B, XS2 and TX650 Service Manual. To help facilitate the use of this system, corresponding page numbers have been provided to refer the reader to the correct place in the XS1B, XS2 and TX650 Manual.

(Page 1) GENERAL SPECIFICATIONS

General Specifications have been changed as follows:

Item		TX650A
Engine	Valve Clearance	Cold IN: 0.10 mm. (0.004 in.) EX: 0.15 mm. (0.006 in.) Warm IN: 0.15 mm. (0.006 in.) EX: 0.20 mm. (0.008 in.)
Carburetor	Main Jet Needle Jet Pilot Fuel Jet	#127.5 4N8-4th stage #45
Battery	Model Manufacturer Capacity Dimension	YB14L YUASA 12V. 14 AH. 5.27 x 3.50 x 6.53 ins. (134 mm. x 89 mm. x 166 mm.)
Chassis	Fuel Tank Capacity	3.96 U.S. gals. (15.0 lits.)
Dimension	Wheelbase	56.5 ins. (1,435 mm.)

Recommended engine oil capacity	
Routine oil change:	2000cc (2.1 qt.)
Oil strainer cleaning:	2200cc (2.3 qt.)
Dry, overhauled engine:	2500cc (2.6 qt.)

(Page 22)

4) —c) Specifications have been changed as follows:

	Cam Lift (A)		Base Circle Diameter (B)	
	Standard Valve	Wear Limit	Standard Valve	Wear Limit
Intake	39.99 ± 0.05	39.75	32.19 ± 0.05	32.12
Exhaust	40.03 ± 0.05	39.79	32.24 ± 0.05	32.17

(All dimensions given in millimeters.)

(Page 27)

17) -a) Revision of Specifications

Valve spring specification chart has been changed as follows:

	OUTER	INNER
Diameter of wire	4.2 mm.	2.9 mm.
Direction of winding	Right Hand	Left Hand
Total winding	6.25	8.0
Free Length	42.55 mm.	42.0 mm.
Installed Length (Valve Closed)	37 mm	35.0 mm.
Installed Pressure	17.7±1.25 kgs. (39.02±2.75 lbs.)	10±0.7 kgs. (22.05±1.54 lbs.)
*Compressed Length (Valve Open)	27.5 mm.	25.5 mm
Compressed Pressure	57.5±4.0 kgs. (126.78±8.82 lbs.)	27.2±1.9 kgs. (59.97±4.19 lbs.)
* Measured without collar. Tolerance: ± 3%		

(Page 32)

25) Chain Tensioner has been changed as follows:

25) Chain Tensioner

a) Remove the cap, lock nut and adjuster bolt.

The vibration damper attached to the crankcase can be removed after the cylinder is pulled out.

b) It is not necessary to remove the bolts from the chain tensioner holder. Should the holder be removed, use a new gasket with both faces coated with Yamaha Bond No. 4 when the holder is re-installed.

c) To adjust the chain, remove the cap and loosen the tensioner lock nut. Turn the adjuster in until the push rod is flush with the end of the adjuster. Tighten the lock nut and install the cover.

d) Check the chain tension every 2000 miles. (In case of a new chain, check after the initial 250 miles and after 500 miles.)

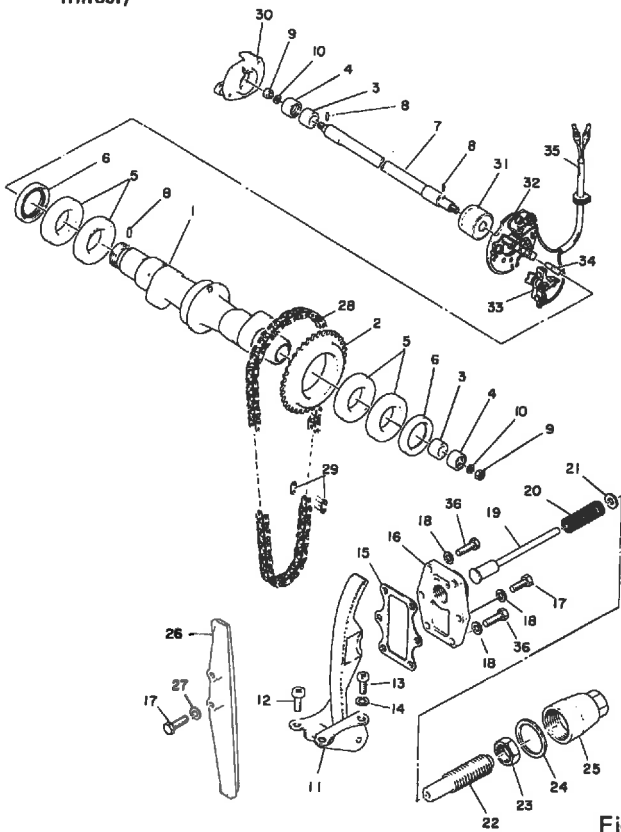


Fig. 1

- | | |
|----------------------------|----------------------------|
| 1. Cam shaft | 19. Rod |
| 2. Sprocket | 20. Spring |
| 3. Breaker shaft bushing | 21. Damper |
| 4. Labyrinth seal | 22. Bolt |
| 5. Bearing (16005 special) | 23. Lock nut |
| 6. Oil seal (S-25-40-6) | 24. O-ring (2.4-31.5) |
| 7. Breaker shaft | 25. Cap |
| 8. Dowel pin (3-7) | 26. Stopper 1 guide |
| 9. Nut | 27. Holder gasket |
| 10. Spring washer | 28. Chain (DK219FT 106L) |
| 11. Stopper 2 guide | 29. Chain joint |
| 12. Reamer bolt | 30. Governor assembly |
| 13. Pan head screw | 31. Cam |
| 14. Spring washer | 32. Breaker plate assembly |
| 15. Tensioner case gasket | 33. Contact breaker |
| 16. Tensioner holder | 34. Lubricator |
| 17. Bolt | 35. Lead wire 1 |
| 18. Plain washer | 36. Bolt 2 |

(Page 48)

13) Clutch Installation

Item a) has been changed as follows:

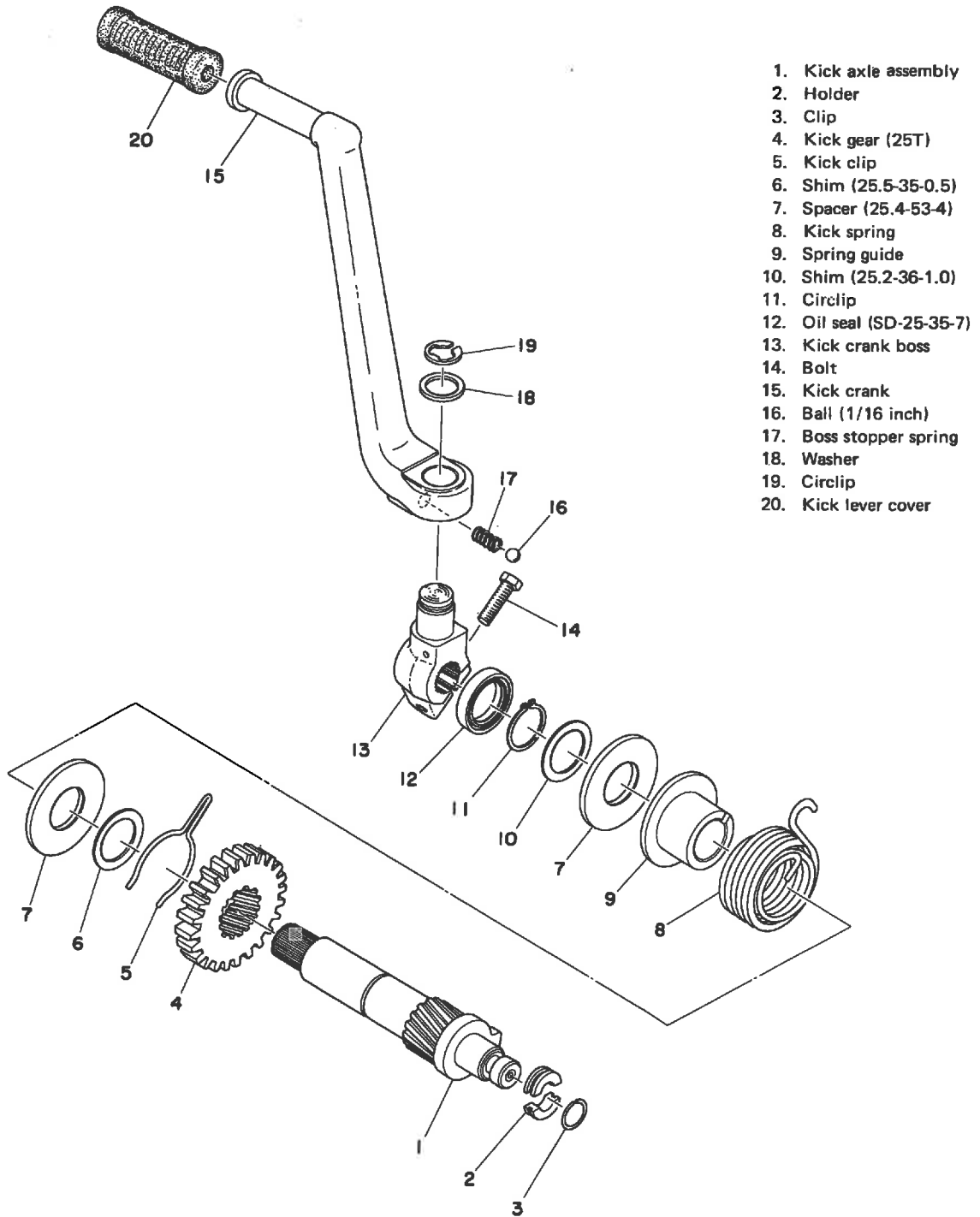
a) Reverse the clutch removal sequence.

Tighten the clutch boss lock nut to 5 – 8 m-kgs. (36.17 – 57.82 ft-lbs.)

(Page 50)

17) Kick Starter Assembly

The illustration and construction of Kick Starter Assembly has been changed as follows:



1. Kick axle assembly
2. Holder
3. Clip
4. Kick gear (25T)
5. Kick clip
6. Shim (25.5-35-0.5)
7. Spacer (25.4-53-4)
8. Kick spring
9. Spring guide
10. Shim (25.2-36-1.0)
11. Circlip
12. Oil seal (SD-25-35-7)
13. Kick crank boss
14. Bolt
15. Kick crank
16. Ball (1/16 inch)
17. Boss stopper spring
18. Washer
19. Circlip
20. Kick lever cover

Fig. 2

(Page 78)

c) Air Filter

The description and illustration of Air Filter has been changed as follows:

- 1) Two air filters (foam rubber) are housed in separate metal cases located under the seat. Remove both mounting bolts and take both case caps off.

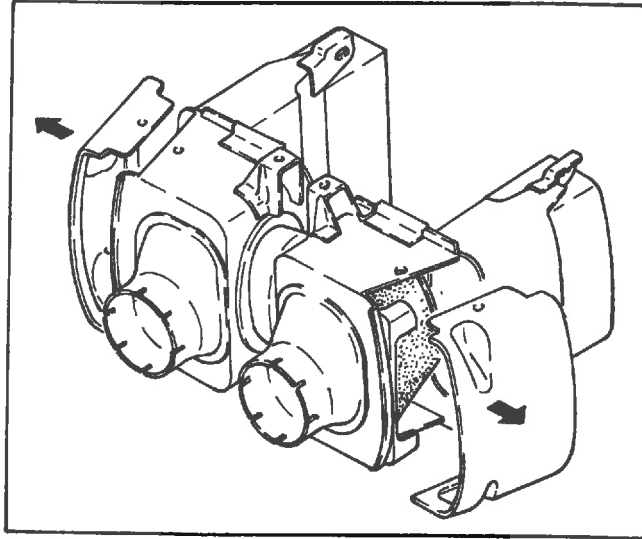


Fig. 3

- 2) This model is equipped with a washable oil impregnated foam rubber air filter. It must be removed and cleaned at least once a month, more often if the motorcycle is ridden frequently in the dirt. Wash the foam rubber filter thoroughly in solvent so that all dirt is removed. Squeeze all the solvent out. Pour oil onto the filter (Motor oil 10W/30), work it completely in, and then squeeze out excess oil.

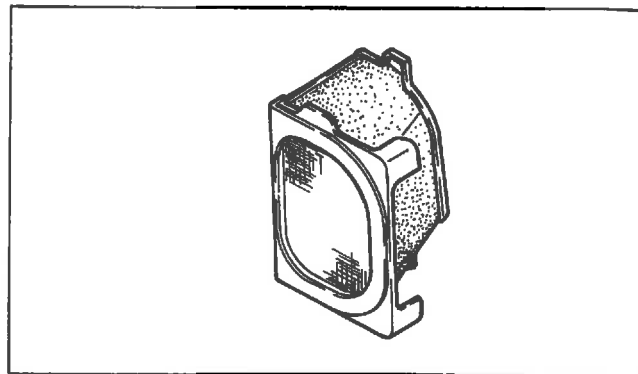
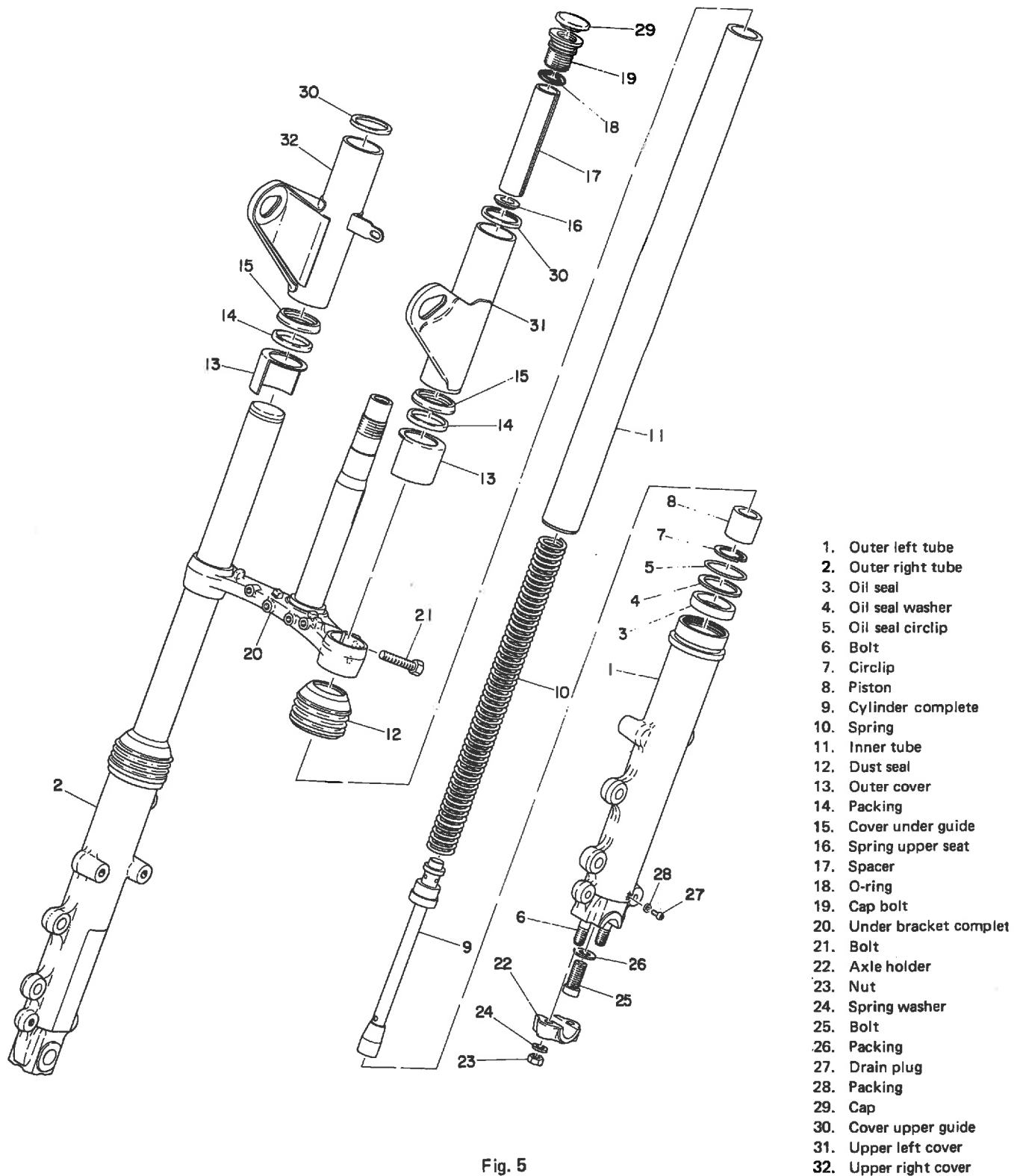


Fig. 4

(Page 80)

Front Forks (XS2, TX650)

Illustration and construction of Front Forks has been changed as follows:



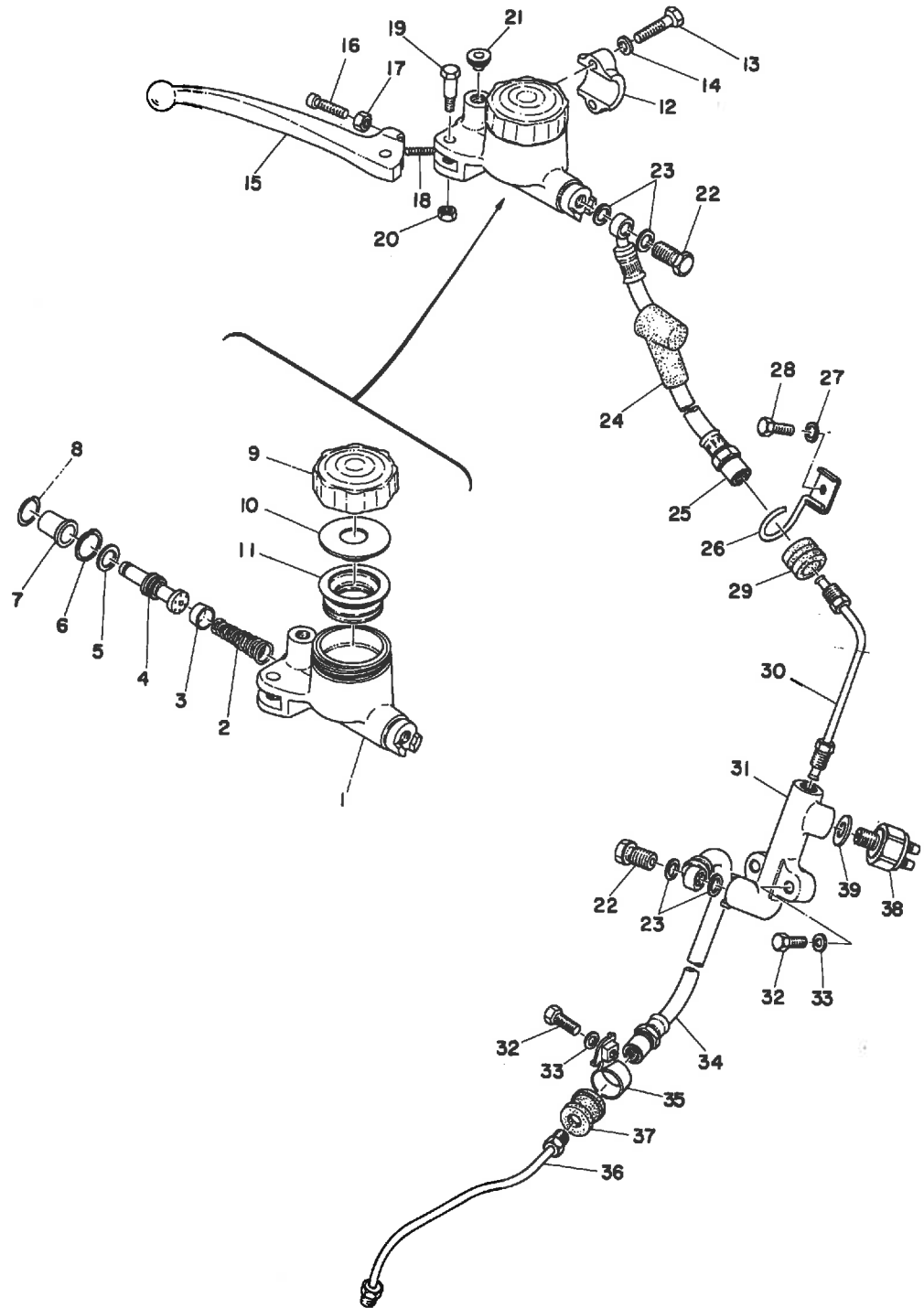
1. Outer left tube
2. Outer right tube
3. Oil seal
4. Oil seal washer
5. Oil seal circlip
6. Bolt
7. Circlip
8. Piston
9. Cylinder complete
10. Spring
11. Inner tube
12. Dust seal
13. Outer cover
14. Packing
15. Cover under guide
16. Spring upper seat
17. Spacer
18. O-ring
19. Cap bolt
20. Under bracket complet
21. Bolt
22. Axle holder
23. Nut
24. Spring washer
25. Bolt
26. Packing
27. Drain plug
28. Packing
29. Cap
30. Cover upper guide
31. Upper left cover
32. Upper right cover

Fig. 5

(Page 123)

1) Construction

Illustration and Construction of Disk Brake has been changed as follows:



1. Master cylinder body
2. Conical spring
3. Cylinder cup 1
4. Piston assembly
5. Spacer
6. Circlip
7. Master cylinder boot
8. Boot stopper
9. Reservoir cap
10. Diaphragm plate
11. Reservoir diaphragm
12. Master bracket
13. Bolt
14. Spring washer
15. Right lever
16. Adjusting screw
17. Adjusting nut
18. Lever return spring
19. Lever fitting screw
20. Nut
21. Blind plug
22. Oil bolt
23. Oil bolt washer
24. Master cylinder boot
25. Brake hose 1
26. Brake hose 3 holder
27. Spring washer
28. Bolt
29. Brake hose rubber
30. Brake pipe 3
31. Joint
32. Bolt
33. Spring washer
34. Brake hose 2
35. Brake hose 2 holder
36. Brake pipe 1
37. Brake hose rubber
38. Front stop switch assembly
39. Special washer

Fig. 6

(Page 131)**2) Master Cylinder**

Item a) has been changed as follows:

a) Remove the brake lever.

(Take care not to misplace the brake lever return spring.)

(Page 117)**2) Specifications**

"NOMINAL ENGINE R.P.M." has been changed as follows:

300 r.p.m. at 75A. or less

NEW ELECTRICAL EQUIPMENT

Stoplight Outage Indicator System

Should the stoplight burn out, an instrument cluster light flashes to warn the driver.

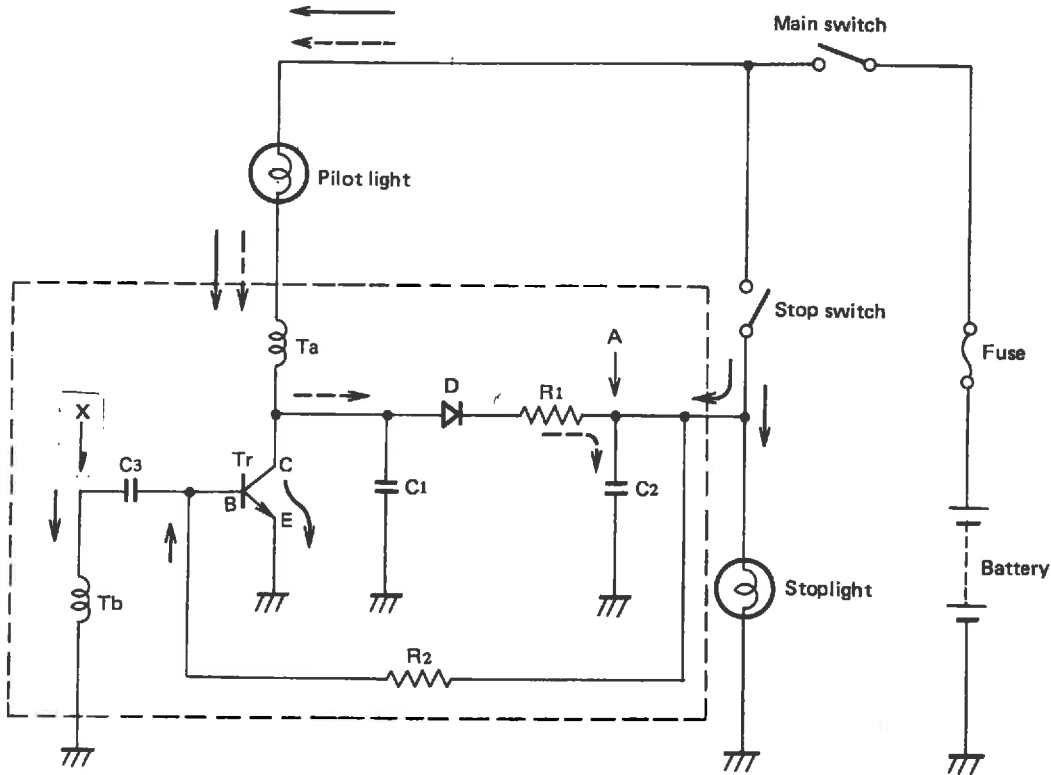


Fig. 7

1) Operation

a) When the stop switch closes (the stoplight is good), current flows through the following route:

Battery → Fuse → Main Switch → Stop Switch → R₂ → B (Transistor) → E (Transistor) → Ground

When the base current flows as described above, current flows from Pilot Light → Ta → C (Transistor) → E (Transistor) → Ground. Thus the pilot light lights up.

b) When the stop switch opens (the stoplight burns out), current flows through the following route:

Battery → Fuse → Main Switch → Pilot Light → Ta → D → R₁ → C₂ → Ground

As the condenser (C₂) begins to store current, the voltage at "A" increases. The moment that it reaches a specific level, C₂ begins to discharge, and the base current flows from the transistor. In other words, current flows from Pilot Light → Ta → C (Transistor) → E (Transistor) → Ground, and thus the pilot light turn off.

When C₂ has discharged, the voltage at A drops, and thus the base current stops flowing. Therefore, the current from the pilot light also decreases, and as a result, current is induced between "Ta" and "Tb", flowing in the direction opposing the magnetic flux. The voltage at "X" drops, and no current flows through the transistors. By repeating this operation, the pilot light goes on and off.

c) When the Stoplight burns out, but the pilot light is in good condition:

- | | | | |
|---------------------|---|--------------------------------------|-------------------------------|
| Stoplight burns out | — | Brake pedal is applied | Pilot light is on. |
| | | Brake pedal is not applied | Pilot light turns on and off. |
| Stoplight is good | — | Brake pedal is applied | Pilot light is on. |
| | | Brake pedal is not applied | Pilot light is off. |

Alarm System
Rear Brake Lining

* If the rear brake lining wears more than 2 mm., the pilot light lights up.

1) Operation

a) If the brake lining wears more than 2 mm.: When the brake pedal is depressed, the cam shaft rotates and causes the cam shaft shim, having a cutaway (shaded area), to rotate, thus pushing the alarm switch button. This makes the pilot light turn on, warning the rider that the brake lining has worn beyond limits.

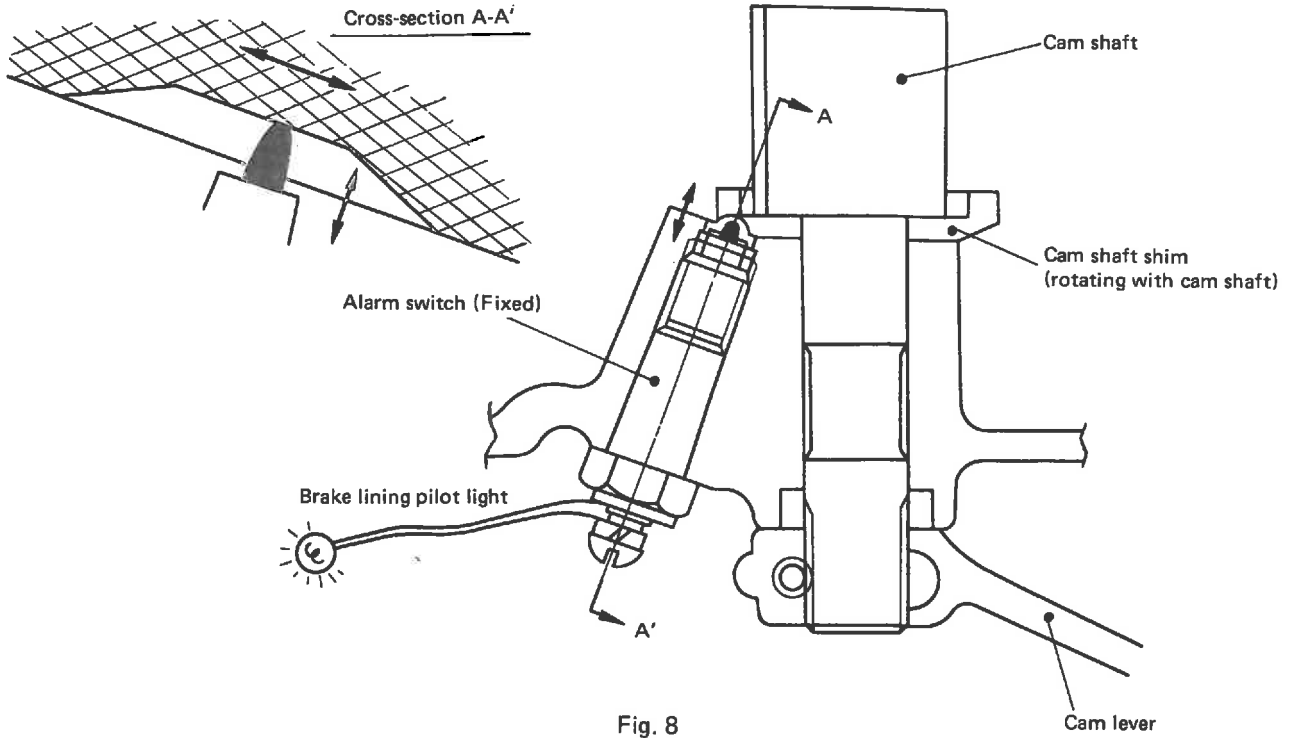


Fig. 8

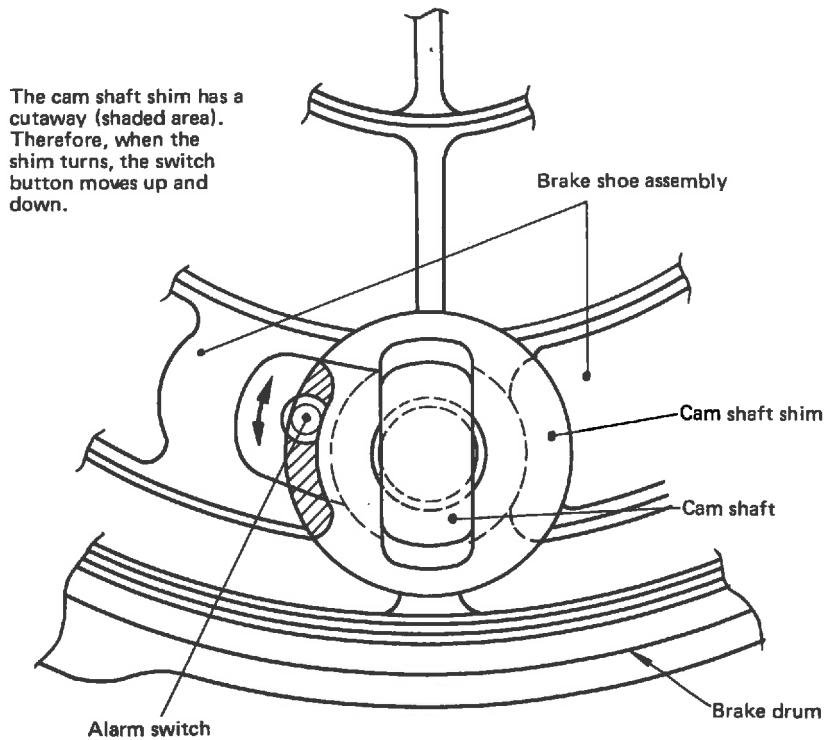


Fig. 9

- b) When the main switch is turned on and the starter button is depressed, the brake lining wear warning light should go on. If not, the light is assumed to be burnt out.

Brake lining alarm system

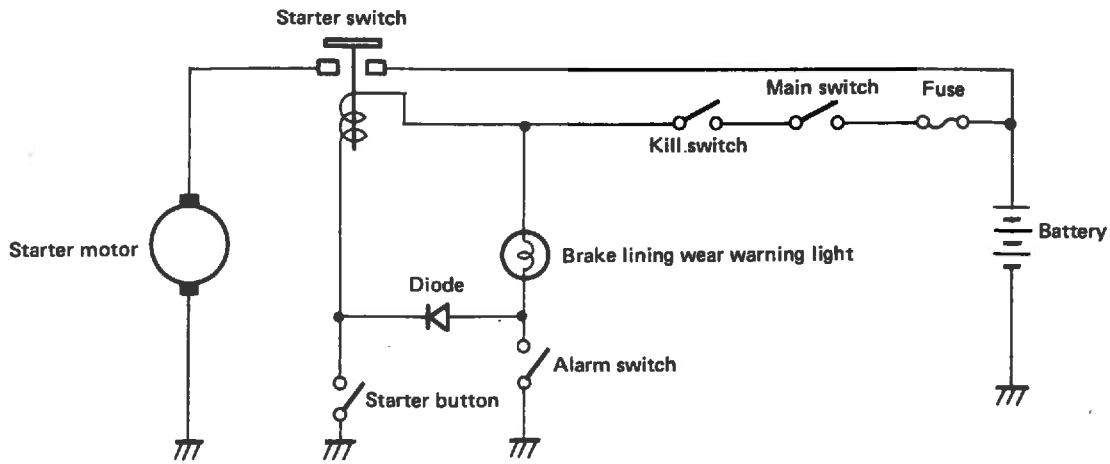
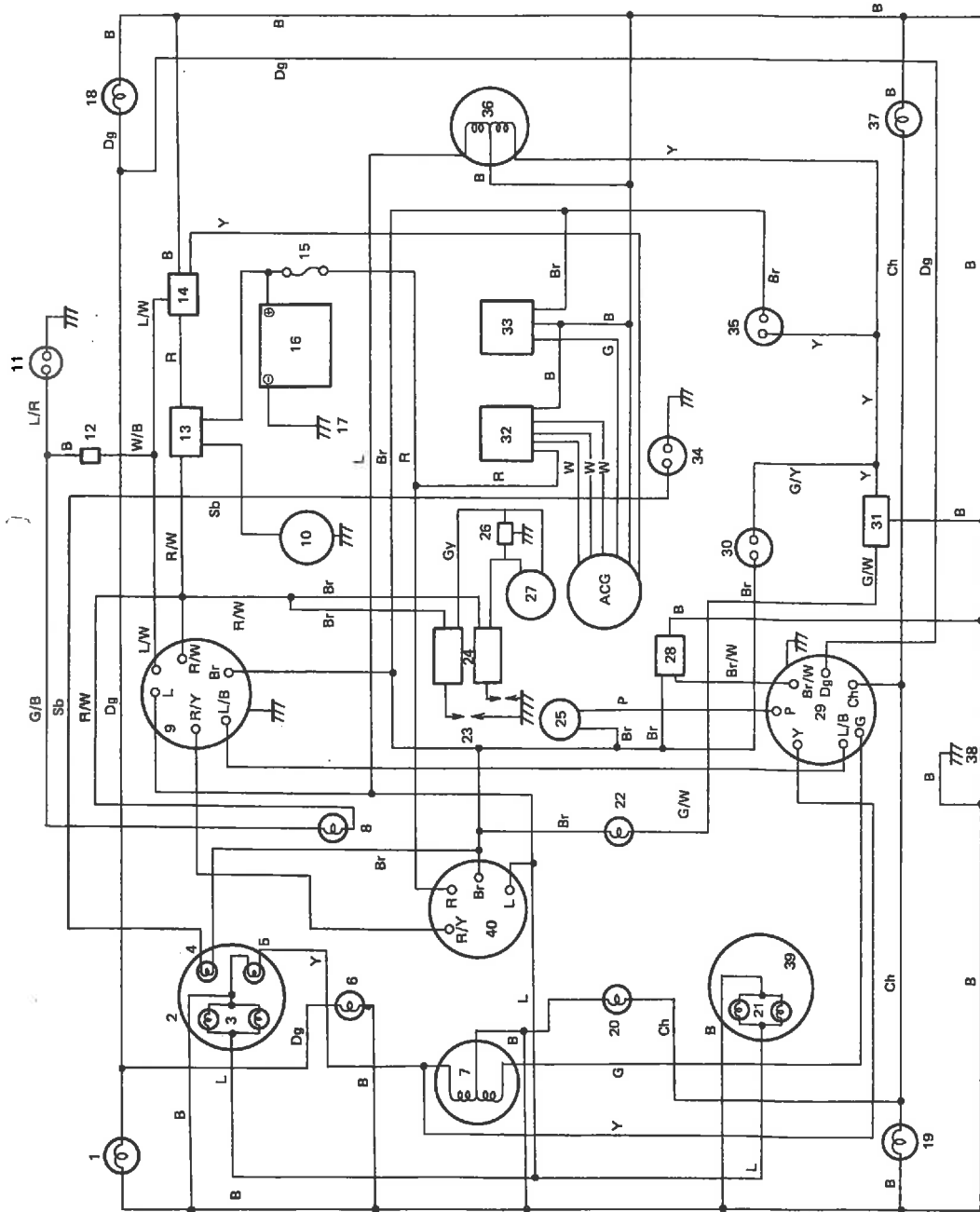


Fig. 10

TX650A Wiring Diagram



- | | | | |
|-----|-------------|------|--------------|
| G/B | Green Black | R/Y | Red/Yellow |
| B | Black | W | White |
| L | Blue | G/Y | Green/Yellow |
| Y | Yellow | L/W | Blue/White |
| G | Green | R/W | Red/White |
| Br | Brown | P | Pink |
| R | Red | Br/W | Brown/White |
| G/W | Green/White | Dg | Dark green |
| W/B | White/Black | L/R | Chocolate |
| L/R | Blue/Red | Ch | Sky blue |
| L/B | Blue/Black | | |

1. Front flasher light (R) 12V./27W.
2. Tachometer
3. Lamp 12V./3W.
4. Neutral pilot light 12V./3W. x 2
5. High beam pilot light 12V./3W.
6. Flasher pilot light 12V./3W.
7. Headlight 12V. 50/40W.
8. Brake lining pilot light 12V./3W.
9. Starter motor
10. Brake lining alarm switch
11. Starter switch
12. Diode
13. Starter switch
14. Safety relay
15. Fuse
16. Battery YB14L
17. Ground to chassis
18. Rear flasher light (R) 12V./27W.
19. Front flasher light (L)
20. Flasher pilot light 12V./3W. x 2
21. Light 12V./3W. x 2
22. Stoplight warning light 12V./3W.
23. Spark plug
24. Ignition coil
25. Horn
26. Condenser
27. Contact breaker
28. Flasher relay
29. Handle switch (L)
30. Front stop switch
31. Lamp checker
32. Rectifier
33. Regulator
34. Neutral switch
35. Rear stop switch
36. Tail/stoplight 12V., 32/3W.
37. Rear flasher light 12V./27W.
38. Ground to chassis
39. Speedometer
40. Main switch

Kill switch

Br	R/W	L/W
OFF	○	○
RUN	○	○
OFF	○	○

Light switch (R)

L/B	R/Y	L
OFF	○	○
ON	○	○

Starter switch

L/W	Ground
OFF	○
ON	○

Horn switch

P	Ground
OFF	○
ON	○

Flasher switch

Ch	Br/W	Dg
L	○	○
N	○	○
R	○	○

Dimmer switch

Y	L/B	L
HI	○	○
Lo	○	○

Main switch

R	Br	R/Y	L	Key
OFF	○	○	○	Removable
I	○	○	○	Unremovable
II	○	○	○	Removable

APPENDIX A

CLEANING AND STORAGE

A. CLEANING

Frequent thorough cleaning of your motorcycle will not only enhance it's appearance but will improve general performance and extend the useful life of many components.

1. Before cleaning the machine:
 - a. Block off end of exhaust pipe to prevent water entry; a plastic bag and strong rubber band may be used.
 - b. Remove air cleaner or protect it from water with plastic covering.
 - c. Make sure spark plug(s), gas cap, oil tank cap, transmission oil filler cap and battery caps are properly installed.
2. If engine case is excessively greasy, apply degreaser with a paint brush. Do not apply degreaser to chain, sprockets, or wheel axles.
3. Rinse dirt and degreaser off with garden hose, using only enough hose pressure to do the job. Excessive hose pressure may cause water seepage and contamination of wheel bearings, front forks, brake drums, and transmission seals. Many expensive repair bills have resulted from improper high-pressure detergent applications such as those available in coin-operated car washes.
4. Once the majority of dirt has been hosed off, wash all surfaces with warm water and mild, detergent-type soap. An old tooth brush or bottle brush is handy to reach those hard-to-get-to places.
5. Rinse machine off immediately with clean water and dry all surfaces with a chamois skin, clean towel, or soft absorbent cloth.
6. Immediately after washing, remove excess moisture from chain and lubricate to prevent rust.
7. Chrome-plated parts such as handlebars, rims, spokes, forks, etc., may be further cleaned with automotive chrome cleaner.
8. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.
9. Automotive-type wax may be applied to all painted and chrome-plated surfaces. Avoid combination cleaner-waxes. Many contain abrasives which may mar paint or protective finish on fuel and oil tanks.
10. After finishing, start the engine immediately and allow to idle for several minutes.

B. STORAGE

Long term storage (30 days or more) of your motorcycle will require some preventive procedures to insure against deterioration. After cleaning machine thoroughly, prepare for storage as follows:

1. Drain fuel tank, fuel lines, and carburetor float bowl(s).
2. Remove empty fuel tank, pour a cup of 10W to 30W oil in tank, shake tank to coat inner surfaces thoroughly and drain off excess oil. Reinstall tank.
3. Remove spark plug(s), pour about one tablespoon of 10W to 30W oil in spark plug hole(s) and reinstall spark plugs. Kick engine over several times (with ignition off) to coat cylinder walls with oil.
4. Remove drive chain. Clean thoroughly with solvent and lubricate with graphite-base chain lubricant. Reinstall chain or store in a plastic bag (tie to frame for safekeeping).
5. Lubricate all control cables.
6. Remove battery and charge. Store in a dry place and re-charge once a month. Do not store battery in an excessively warm or cold place (less than 32°F or more than 90°F).
7. Block up frame to raise both wheels off ground. (Main stands can be used on machines so equipped.)
8. Deflate tires to 15psi.
9. Tie a plastic bag over exhaust pipe outlet(s) to prevent moisture entering.
10. If storing in humid or salt-air atmosphere, coat all exposed metal surfaces with a light film of oil. Do not apply oil to rubber parts or seat cover.
11. Periodically (every 15-30 days) kick the engine over several times (ignition off). Operate all controls at this time also.

APPENDIX B TROUBLESHOOTING

A) No Start or Difficult to Start

1) Ignition System

Possible Cause	Inspection and Repair
1. Carbon-fouled or worn out spark plug.	Clean plug (if possible) and gap to .6-.7mm
2. Gap incorrect or bridged.	" " " " " " "
3. Contact breaker point burned up or worn out	Clean or change points. Correct capacitor, etc.
4. Point gap incorrect.	Set point gap (.3-.4mm).
5. Ignition timing out of adjustment.	Set ignition timing. Pages 115 - 116
6. Ignition coil no good.	Use electro-tester to measure primary and secondary winding resistance. Also make a standard coil test.
7. Condenser shorted out.	Use electro-tester to check capacity and insulation.
8. Brown or red ignition wires broken or shorted.	Turn on main switch. Hit horn and stoplight. No operation means possible broken wire.
9. Main switch no good.	Check main switch.
10. Blown fuse.	Replace.
11. Battery discharged or defective.	Check specific gravity of each cell with hydrometer. Check voltage

2) Fuel System

Possible Cause	Inspection and Repair
1. No gas.	Disconnect fuel line at carburetor; turn fuel petcocks on; check for fuel to flow.
2. Tank cap vent hole plugged.	
3. Petcock defective.	
4. Fuel line plugged.	
5. Carburetor not level.	
6. Carb equalizer tube has hole or loose connection.	

3) Compression-Cylinder Compression Shows Low Pressure

Possible Cause	Inspection and Repair
1. Lack of tappet clearance; valve held open.	Adjust tappet.
2. Valve timing incorrect.	Camshaft improperly installed or cam chain loose.
3. Cylinder head gasket seal broken.	Check for combustion gases blowing out past gasket.
4. Valve seat defective.	See Valve Seat Repair Section.
5. Piston ring(s) defective.	Too much smoke under load. Especially blue smoke indicating oil burning. See individual wear sections for inspection methods.
6. Cylinder tapered or out of round.	
7. Valve guide(s) worn out.	
8. Guide seals bad.	

2) Fuel System

Possible Cause	Inspection and Repair
1. Butterfly valve not opening completely or in synchronization.	Make corrective adjustment.
2. Dirty air filter element.	Clean with high pressure air.
3. Carburetor float level incorrect.	Measure and change if required.
4. Incorrect main jet size.	Remove jet and check stamped size.
5. Incorrect jet needle notch.	Check position of clip in needle.
6. Cracked and leaking vacuum diaphragm.	Remove air cleaner and observe vacuum piston operation while running engine.
7. Carburetor not level.	Level carburetors.
8. Choke half on.	Check chokes.

3) Compression System

Possible Cause	Inspection and Repair
1. Weak or broken valve spring.	Make valve spring tests, replace if weak.
2. Valve timing (camshaft) incorrect.	Check cam chain tension.
3. Broken piston rings.	Compression below 9.0 kg/cm ² (128 psi)

D) Engine Overheating

1) Ignition

Possible Cause	Inspection and Repair
1. Ignition timing too advanced or retarded.	Check timing.
2. Malfunctioning governor.	Check action of governor rod and pivot weights.
3. Too hot spark plug heat range.	Check heat range.

2) Fuel System

Possible Cause	Inspection and Repair
1. Too lean air-fuel mixture.	Any jet plugged or too small. Air leak in carburetion intake system.
2. Bad gasoline.	Listen for detonation; check for unusual deposits on spark plug.

3) Oil System

Possible Cause	Inspection and Repair
1. Oil level too low.	Check and refill.
2. Oil too thin.	Improper weight or too contaminated-change oil. 20w/40 "SE"
3. Oil pump defective.	Loosen oil delivery line to head and check for oil flow.
4. Oil passage(s) plugged.	Disassemble engine-squint solvent or oil through passages.

4) Too Much Blue Exhaust Smoke

Possible Cause	Inspection and Repair
1. Too much engine oil.	Check oil level and drain some if necessary.
2. Breather plugged up.	Check and clean if necessary.
3. Cylinder and/or piston rings worn.	Make necessary measurements and replace as necessary.
4. Worn or cracked valve guide.	Make necessary measurements and replace as necessary.
5. Cracked valve guide seals.	Make necessary inspection and replace as necessary.

APPENDIX C

(650cc)

PERTINENT PARTS and SERVICE BULLETINS

Note

THE FOLLOWING INFORMATION MUST BE USED AS A GUIDE ONLY TO INDICATE THE DIRECTION TAKEN BY VARIOUS MODIFICATIONS. IT IS INCLUDED ONLY AS AN AID TO SERVICING THE 650 SERIES AND, SHOULD A QUESTION ARISE REGARDING A CERTAIN PART, THE MECHANIC SHOULD REFER TO AN UP-TO-DATE MODEL PARTS BOOK, SERVICE OR PARTS NEWS BULLETIN, OR THE MANUFACTURER.

MOTORCYCLE PARTS NEWS

YAMAHA INTERNATIONAL CORPORATION
MONTEBELLO, CALIFORNIA

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NUMBER 298

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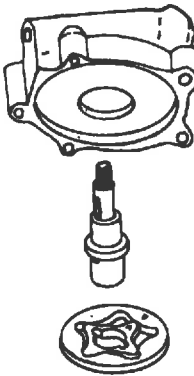
XSL OIL PUMP MODIFICATIONS

To achieve more efficient pump operation for a greater length of time, the inner and outer rotor thicknesses have been increased. The pump shaft and pump cover have been modified as well to match the modified disks. Exact changes in dimensions are listed below.

These modified parts are installed as standard equipment on all XSL's from Engine Number 004130 and above.

Due to design differences, the standard pump parts and the modified pump parts are not interchangeable except as a set. Do not attempt to mix these two sets of parts as the oil pump's efficiency will be drastically reduced.

REF. NO.	DESCRIPTION	OLD PART NO.	NEW PART NO.	PRICE & DISC.
8-0-1	Ass'y, Oil Pump	256-00001-00	256-00001-00	10.40 50%
8-1	Cover, Pump	256-13316-00	256-13316-01	4.00 50%
8-2	Ass'y, Rotor	256-13310-00	256-13310-01	3.38 50%
8-4	Shaft	256-13314-00	256-13314-01	3.59 50%



XSL MODIFIED O-RING FOR ROCKER SHAFT PLUG (XSL PTS BK, PP. 17 & 18)

In order to ensure positive oil sealing at the rocker shaft plug, the thickness of the O-ring that fits over the plug has been increased. The larger O-ring will still fit onto the standard rocker shaft plug.

These larger O-rings are standard items on all XSL's after Engine Number 4322.

FIG. NO.	DESCRIPTION	OLD PART NO.	NEW PART NO.	PRICE & DISC.	REMARKS
7-13	O-ring	93210-16022	93210-17143	Same	Was 2x16 Now 2.4x15.4

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XSL MODIFIED WASHER FOR CYLINDER STUD NUT (XSL PTS BK, PP. 1 & 2)

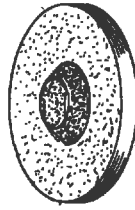
The washer placed beneath the cylinder stud nut used to be a plain flat washer. Now, there are improved washers, that are coated with a specially shaped layer of rubber, that appreciably reduce oil leaks up past the studs. Installation and torquing procedures remain the same.

These rubber covered washers are standard items on XSLs after Engine Number 4322.

FIG. NO.	DESCRIPTION	OLD PART NO.	NEW PART NO.	PRICE	DISC.	REMARKS
1-17	Washer	92901-10200	256-11173-00	.42	50%	4 machline

PLEASE SHOW YOUR SERVICE MANAGER THIS FOLLOWING PARAGRAPH:

One side of the rubber coated washer is built-up in a conical shape (see the drawing below for details). During installation, this conical rubber side must fit down against the head cover. When stud nut is tightened, the coned rubber oil seal will effectively fill any space between the stud, the stud hole, and the washer.



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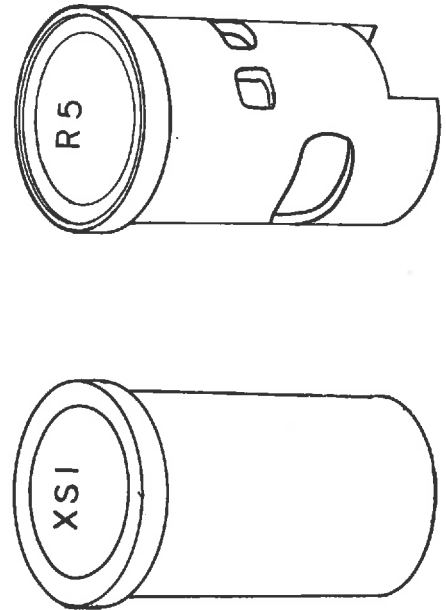
XSL & R5 SERIES REPLACEMENT CYLINDER SLEEVES (Accessory)

SUBJECT: Factory-made replacement cylinder sleeves for the XSL series and the R5 series are now available from Yamaha Parts Department. These sleeves can help salvage cylinder assemblies having damaged original sleeves.

INSTALLATION: The old sleeve can be quickly removed (after heating cylinder) and new sleeve dropped in. The bore is slightly undersize, so it must be bored and honed to proper piston clearance (complete installation instructions given in Service News Bulletin #273 and #275).

ORDERING INFORMATION:

Fig. No.	Description	Part Ordering No.
1-47 (Add to XSLA Parts Bk.)	SLEEVE, Cylinder	AC0011000800
1-30 (Add to R5A Parts Bk.)	SLEEVE, Cylinder	AC0011000900



PLEASE BRING YOUR PARTS BOOKS AND ACCESSORY CATALOG UP TO DATE

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X51B PISTON IMPROVEMENT

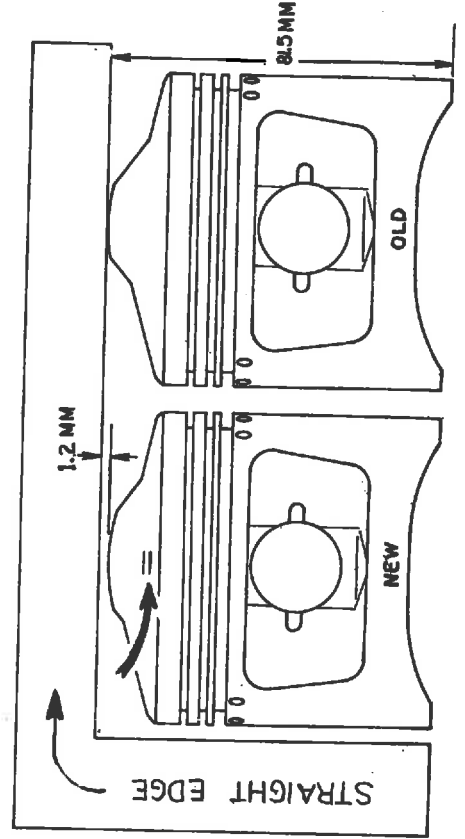
The X51B piston crown has been changed in shape for a more stable idle. The new piston crown is 1.2mm lower. This, in effect, changes chamber volume from 42.2cc to 47.2cc, giving a compression ratio of 8.1:1 as opposed to 8.7:1 with the '-01' pistons.

The new pistons will be found in all models starting with Engine No. 23130. The crown of the new piston is marked '1/1' as shown in the drawing. Although some of the pistons after frame No. 23130 may not be correctly marked, they will still be the new ('-02') version.

We have been advised that there will be no adverse effect on performance by mixing old and new pistons on the same machine.

REF. NO.	DESCRIPTION	PART NUMBER	PRICE	DISC.	REMARKS
5-13	Piston	256-11631-01-96	same	A	↪23129
5-13-1	Piston	256-11631-02-96	same	A	23130↪
5-13-2	Piston	256-11635-02-00	same	A	(1st O/S)
5-13-3	Piston	256-11636-02-00	same	A	(2nd O/S)

Both types currently in stock. Type '-01' will not be restocked.



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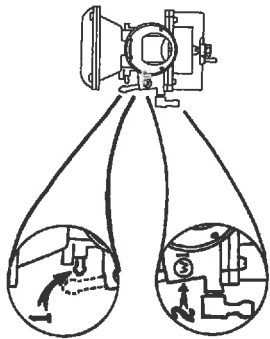
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X51 ADDITIONAL SERVICE INFORMATION (Carburetion, oil, engine leaks, crankcases)

Carburetor specifications on the X51 have been changed twice since production. The final change improves idling, shortens the warm-up time, and changes the low-load, low-rpm operating characteristics.

The rough sketches at the right show the I.D. marks that indicate which carb is which. Series 1 and 2 can be used on the same machine. Series 3 carbs must be used as a set. They cannot intermix with earlier types.

As an additional aid to identification, besides the series number (#2 in drawing), you can measure the inner diameter of the float bowl vent fitting (#1 in drawing). The chart below shows each of the changes and the engine numbers involved.



SPECIFICATIONS:

ABBREV.	W1	E2	E3
Main Jet	130	Same	Same
Pilot Jet	45	#42.6	#42.6
Pilot Outlet	0.8	Same	0.7 φ
Pilot Bypass #1	1.0	Same	0.8 φ
Pilot Bypass #2	0.6	Same	1.0 φ
Air Jet	1.0	Same	1.2 φ
Needle Jet	2-5	Same	Same
Cut Needle	4JN19-4	Same	Same
Cut Nway	---	---	---
Air Screw (turns out)	5	1	1
Starter Jet	0.6	Same	Same
Floater Level	25mm	Same	4mm
Air Vent	2.5	3.0 φ	3.0 φ
I.D. Mark	W1	E2	E3

Engine numbers in series 00101-02514 02515-03628 03629~

REMEMBER: Carburetors with an W1 or E2 marking will not intermix with an E3 on the same machine.

ENGINE OIL:

For best all-around performance we now recommend that a 20W-40 detergent oil conforming to SAE "MS" specifications or better be used in the crankcase. This multi-grade oil is available at most larger stations. Use a name brand, quality oil.

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X51 ADDITIONAL SERVICE INFORMATION--continued

ENGINE OIL--continued

Each machine should have at least two or three complete oil changes within the first 2,000 miles in order to reduce the possibility of oil contamination during break-in. Thereafter the oil should be changed every 2,000 miles or six months. Should the engine be used in an abusive manner these intervals must be reduced accordingly.

ENGINE LEAKS

The X51, compared to many other designs on the market, is remarkably leak-free. However, it is our constant desire to correct possible leakage areas whenever they are reported to us.

Your Specifications Sheet and Service News Bulletin #230 give the torque specifications for all nuts and bolts on the model. In addition, Service News Bulletin #236 covers the treatment of certain areas of the engine to protect against oil leaks and seized threads.

There are additional points that you can cover during engine re-assembly which will provide further protection against leaks. These are, in particular, the cylinder head gasket, contacting surfaces between the cylinder head and cylinder head cover, breaker cover (1), cylinder head side cover, contacting surfaces between tensioner arm assembly and cylinder, and contacting surfaces between strainer cover and crankcase.

For all of the above we recommend Yamaha Bond #4 or #5 as the occasion demands and where heat is a critical factor, a metallic gasket compound such as X & W Copper Coat.

Yamaha Bond #5 is a light, non-drying, rubber base sealant. Yamaha Bond #4 is heavier, more pressure resistant and more inclined to be tacky.

Other manufacturer's sealants, anti-seize compounds, etc., are acceptable for use in areas where the Yamaha Bonds are inapplicable. They must be used strictly in accordance with the manufacturer's recommendations.

The cylinder head cover holding nuts have been modified and an oil seal added. New part number: 256-11173-00-00.

The chain tensioner cap (-01 type) should be installed with two gaskets.

CRANKCASES

Parts News Bulletin #288 (7/27/70) advised, among other things, that the main axle bearing and seat (F47, 10-9 Parts Book) had been changed from 51 to 50mm OD. Information now in our possession indicates that the engine number of the change may be in error. In light of this fact, and the many other changes on the X51 crankcases, we suggest that you very carefully measure all changed points on the crankcases prior to ordering a replacement part.

At some later date we will provide you with a bulletin which will delineate each change on this model in order to aid you during the ordering of replacement parts. For now, we suggest that you Part and Service Personnel thoroughly study the following bulletins: Motorcycle Parts News Bulletins #275, #280, #284, #288, #293, and Motorcycle Service News Bulletins #231, #232, #236, #237, and #242. ##

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X51. OIL PUMP AND/OR PRESSURE CHECK

The trochoidal oil pump in the X51, due to its method of design, should never fail. However, there is the remote possibility of foreign matter jamming between the drive gears or into a delivery passage.

Should the drive gears fail, the tachometer will quit working. In order to locate the problem first remove the tachometer cable from the housing on the right front side of the crankcase. Start the engine and see if the gear shaft end (square) in the housing still rotates. If it does, the problem is in the tachometer cable or unit.

If doubt still exists, loosen the cylinder head oil delivery pipe jam nut at the fitting on the crankcase in front and between the cylinders. Start the engine and watch for excessive oil leaks. With the jam nut removed oil should spurt out from the fitting. If necessary, slightly raise the pipe from its housing. Do not rev the engine.

If either of the above tests indicates a problem in oil pressure or delivery the side cover will have to be removed and the pump inspected. In addition, the oil filter and sump oil strainer should be removed and cleaned.

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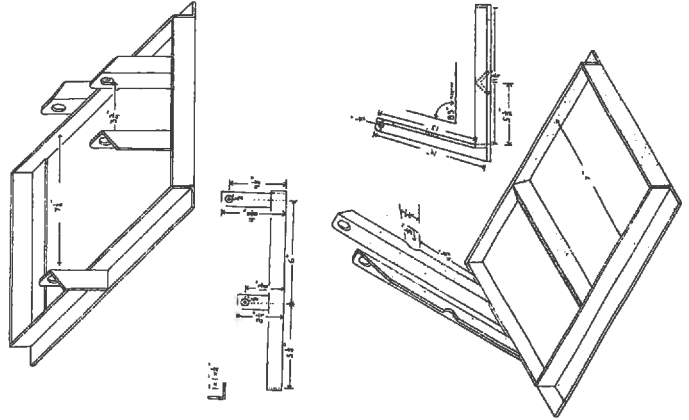
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X51. ENGINE WORK STAND

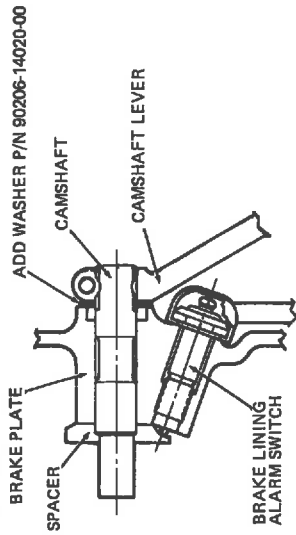
Due to the greater weight and size of the X51 650 engine, special engine mounting stands, for use on the work bench, have been designed. These stands will not be available from Yamaha International; however, diagrams illustrating their construction from 1 x 1 x 1/4 inch angle iron are provided below. We recommend you build these stands to facilitate servicing of the X51.



REAR BRAKE CAMSHAFT, Addition of washer

Excessive lateral movement of rear brake camshaft may cause premature operation of the brake lining alarm switch and indicator lamp.

To prevent this a wave washer should be added between the brake shoe plate and the camshaft lever. See drawing below.



PARTS ORDERING

Please make the following addition to your TX500/TX500A, TX650A, and TX750 Parts Lists.

TX500/500A

PAGE	REF. NO.	NEW PART NO.	DESCRIPTION	QTY.	REMARKS
120	37-50	90206-14020-00	WASHER, wave	1	Addition (TX500A only)

TX650A

106	35-46	90206-14020-00	WASHER, wave	1	Addition
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TX750

124	38-44	90206-14020-00	WASHER, wave	1	Addition
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AFFECTED MACHINES

TX500A: F/N ~ 371-117805 — machines need washer.

F/N 371-116706 — washer installed by factory.

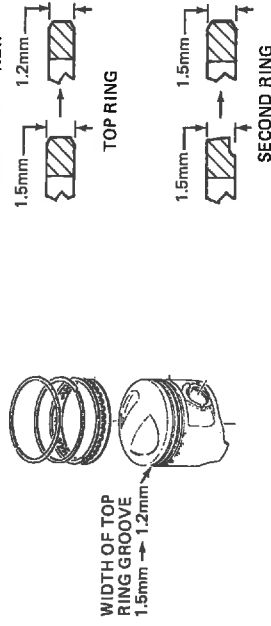
TX650A: All machines have washer installed by factory.

TX750: All machines need washer.

† † † †

TX650A, XS650B
PISTON AND PISTON RING DESIGN CHANGE

The piston and piston rings on TX650A and XS650B have been redesigned for better piston ring sealing. The new pistons and rings are interchangeable as a SET ONLY.



PARTS LIST

PAGE	REF. NO.	OLD PART NO.	NEW PART NO.	DESCRIPTION	QTY.
10	4-15	447-11631-00-96	447-11631-01-96	Piston (Std.)	2
		447-11635-00-00	447-11635-01-00	Piston (1st O/S)	2
		447-11636-00-00	447-11636-01-00	Piston (2nd O/S)	2
		447-11637-00-00	447-11637-01-00	Piston (3rd O/S)	2
10	4-16	447-11638-00-00	447-11638-01-00	Piston (4th O/S)	2
		256-11610-00-00	447-11610-00-00	Piston Ring Set (Std.)	2s
		256-11610-10-00	447-11610-10-00	Piston Ring Set (1st O/S)	2s
		256-11610-20-00	447-11610-20-00	Piston Ring Set (2nd O/S)	2s
		256-11610-30-00	447-11610-30-00	Piston Ring Set (3rd O/S)	2s
		256-11610-40-00	447-11610-40-00	Piston Ring Set (4th O/S)	2s

AFFECTED MACHINES

TX650A 010152 ~ have new style pistons and rings.

XS650B All machines have new style pistons and rings.

PLEASE BRING YOUR PARTS BOOK UP-TO-DATE!

† † † †

TECHNICAL BULLETIN



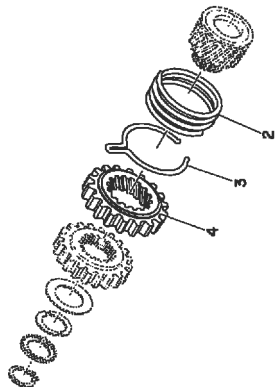
TECHNICAL BULLETIN



MOTORCYCLE
M5-071

ALL ELECTRIC START 650'S ERRATIC STARTER ENGAGEMENT

Erratic electric starter engagement and disengagement on Yamaha 650 twins is often the result of the improper functioning of the three parts described below. Replacement of these parts with the indicated improved parts (only as a set), will generally cure erratic engagement problems.

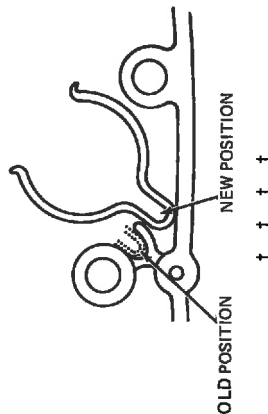


PARTS LIST (REFERENCE NUMBERS REFER TO TX650A PARTS LIST)

REF. NO.	NEW PART NUMBER	DESCRIPTION	QTY.	PRICE-DISC.
7-2	90501-15409-00	SPRING, compression	1	\$.54 - A
7-3	90468-29062-00	CLIP	1	.40 - A
7-4	447-15516-00-00	GEAR 4	1	4.80 - A

NOTE: These parts are standard XS650C parts. They may be used as a set only on all earlier 650 Yamaha twins with electric starters.

The clip (wishbone-shaped spring) position is changed as shown below.

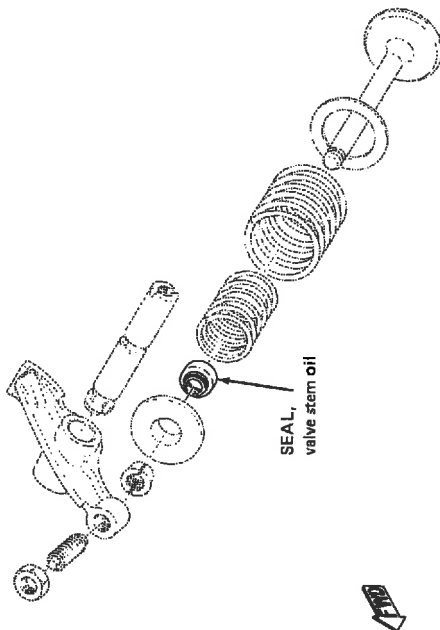


TECHNICAL BULLETIN

MOTORCYCLE
M5-023

All 650cc Twins VALVE GUIDE OIL SEALS

Valve stem oil seals are available for all 650cc twins.



ALL MODELS:

PART NUMBER	DESCRIPTION	QTY.	PRICE
341-12119-02-00	SEAL, valve stem oil	4	\$1.18 - A

NOTES:

- (1) XS1, XS1B, XS2 Parts List indicate P/N 256-12119-01-00. That number is superseded to the number above.
- (2) TX650 Parts List supplement, TX650A and XS650B Parts List omitted these seals.

PLEASE BRING YOUR PARTS LIST UP-TO-DATE!

↑ ↑ ↑ ↑



TECHNICAL BULLETIN

9-1-A Metric to Inch System

	KNOWN	MULTIPLIER (Rounded off)	RESULT
TORQUE	kg-m	7.235	ft-lbs
	kg-m	86.82	in-lbs
	kg-cm	.0724	ft-lbs
	kg-cm	.8682	in-lbs
WT.	kg	2.205	lb
	g	.03527	oz
FLOW/DISTANCE	Km/l	2.352	mpg
	Km/hr	0.6214	mph
	Km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in
	mm	0.03937	in
VOL./CAPACITY	cc (cm ³)	0.03381	oz (U.S. liq.)
	cc (cm ³)	0.06102	cu in
	l (liter)	2.1134	pt (U.S. liq.)
	l (liter)	1.057	qt (U.S. liq.)
	l (liter)	0.2642	gal (U.S. liq.)
MISC.	kg/mm	56.007	lb/in
	kg/cm ²	14.2234	psi (lb/in ²)
	Centigrade	(°C × $\frac{9}{5}$) + 32	Fahrenheit (°F)

9-1-B Inch to Metric System

	KNOWN	MULTIPLIER (Rounded off)	RESULT
TORQUE	ft-lbs	0.13826	kg-m
	in-lbs	0.01152	kg-m
	ft-lbs	13.825	kg-cm
	in-lbs	1.1518	kg-cm
WT.	lb	0.4536	kg
	oz	28.35	g
FLOW/DISTANCE	mpg	0.4252	Km/l
	mph	1.609	Km/hr
	mi	1.609	Km
	ft	0.3048	m
	yd	0.9144	m
	in	2.54	cm
	in	25.4	mm
VOL./CAPACITY	oz (U.S. liq.)	29.57	cc (cm ³)
	cu in	16.387	cc (cm ³)
	pt (U.S. liq.)	0.4732	l (liter)
	qt (U.S. liq.)	0.9463	l (liter)
	gal (U.S. liq.)	3.7853	l (liter)
MISC.	lb/in	0.017855	kg/mm
	psi (lb/in ²)	0.07031	kg/cm ²
	Fahrenheit	(°F - 32) × $\frac{5}{9}$	Centigrade (°C)

DEFINITION OF TERMS

kg-m	=	Kilogram meters: usually torque.
g	=	Gram(s).
kg	=	Kilogram(s): 1,000 grams.
km	=	Kilometer(s).
l	=	Liter(s).
km/l	=	Kilometer(s) per liter: Mileage.
cc	=	Cubic centimeter(s) (cm ³): Volume or capacity.
kg/mm	=	Kilogram(s) per millimeter: usually spring compression rate.
kg/cm ²	=	Kilogram(s) per square centimeter: pressure.

Millimeters to Inches

	0	.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0		.0039	.0079	.0118	.0157	.0197	.0236	.0276	.0315	.0354
1	.0394	.0433	.0472	.0512	.0551	.0591	.0630	.0669	.0709	.0748
2	.0787	.0827	.0866	.0906	.0945	.0984	.1024	.1063	.1102	.1142
3	.1181	.1200	.1260	.1299	.1339	.1378	.1417	.1457	.1496	.1535
4	.1575	.1614	.1654	.1693	.1732	.1772	.1811	.1850	.1890	.1929
5	.1969	.2000	.2047	.2087	.2126	.2165	.2205	.2244	.2283	.2323
6	.2362	.2402	.2441	.2480	.2520	.2559	.2598	.2638	.2677	.2717
7	.2756	.2795	.2835	.2874	.2913	.2953	.2992	.3031	.3071	.3110
8	.3150	.3189	.3228	.3268	.3307	.3346	.3386	.3425	.3465	.3504
9	.3543	.3583	.3622	.3661	.3701	.3740	.3780	.3819	.3858	.3898
10	.3937	.3976	.4016	.4055	.4094	.4134	.4173	.4213	.4252	.4291

.01mm = .0004 .03mm = .0012 .05mm = .0020 .07mm = .0028 .09mm = .0035
 .02mm = .0008 .04mm = .0016 .06mm = .0024 .08mm = .0031 .10mm = .0039

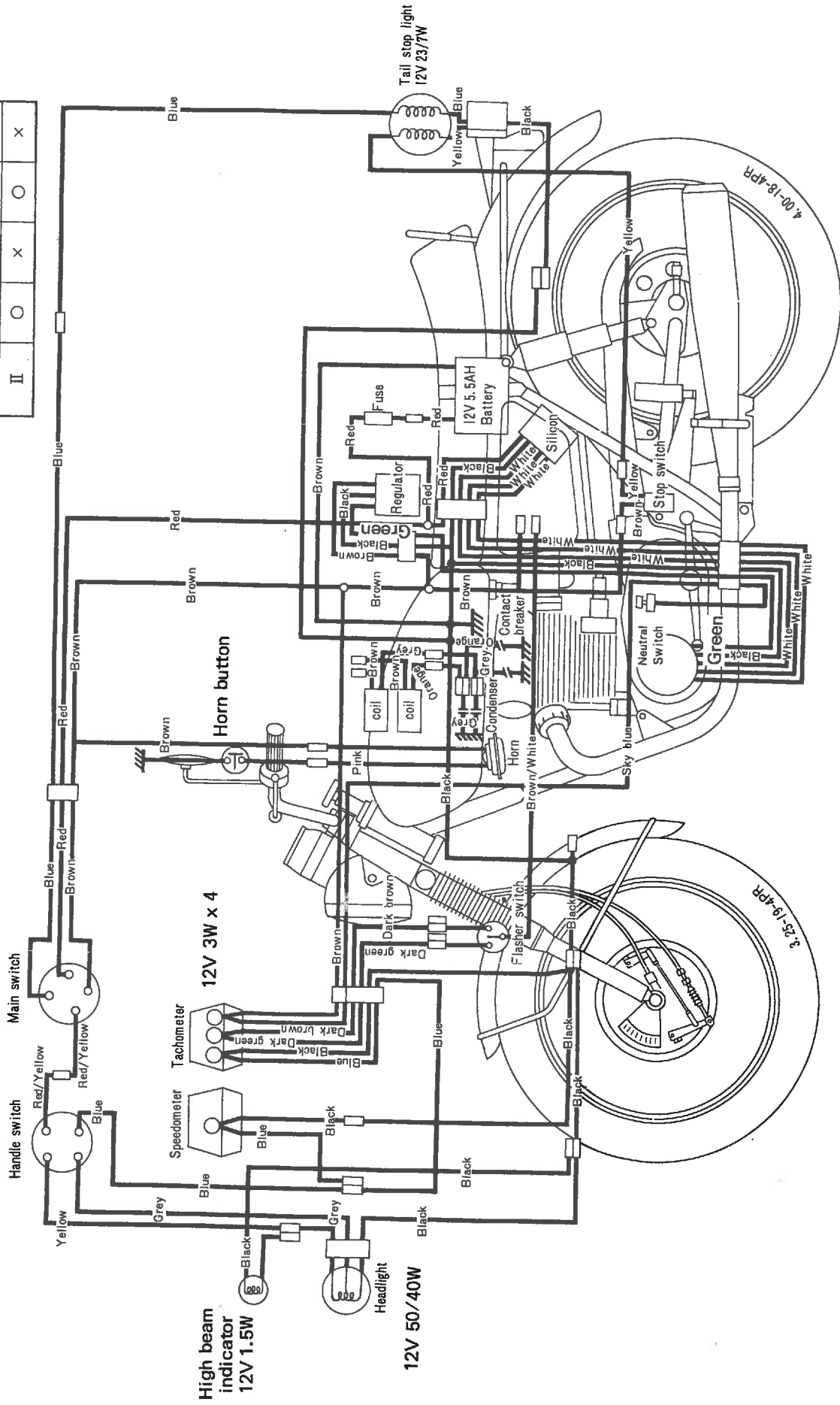
Inches to Millimeters

	0	.01	.02	.03	.04	.05	.06	.07	.08	.09
0		.254	.508	.762	1.016	1.270	1.524	1.778	2.032	2.286
.1	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
.2	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
.3	7.620	7.874	8.128	8.382	8.636	8.890	9.144	9.398	9.652	9.906
.4	10.160	10.414	10.668	10.922	11.176	11.430	11.684	11.938	12.192	12.446
.5	12.700	12.954	13.208	13.462	13.716	13.970	14.224	14.478	14.732	14.986
.6	15.240	15.494	15.748	16.002	16.256	16.510	16.764	17.018	17.272	17.526
.7	17.780	18.034	18.288	18.542	18.796	19.050	19.304	19.558	19.812	20.066
.8	20.320	20.574	20.828	21.082	21.336	21.590	21.844	22.098	22.352	22.606
.9	22.860	23.114	23.368	23.622	23.876	24.130	24.384	24.638	24.892	25.146
1.0	25.400	25.654	25.908	26.162	26.416	26.670	26.924	27.178	27.432	27.686

.001" = .0254mm .003" = .0762mm .005" = .1270mm .007" = .1778mm .009" = .2286mm
 .002" = .0508mm .004" = .1016mm .006" = .1524mm .008" = .2032mm .010" = .254mm

XS-1 650 Circuit Diagram

Key position	Color				
	Red	Brown	Sky blue	Red & Yellow	Red & Yellow
OFF	X	X	X	X	X
I	O	O	X	O	O
II	O	X	O	X	X



High beam indicator
12V 1.5W

Headlight
12V 50/40W

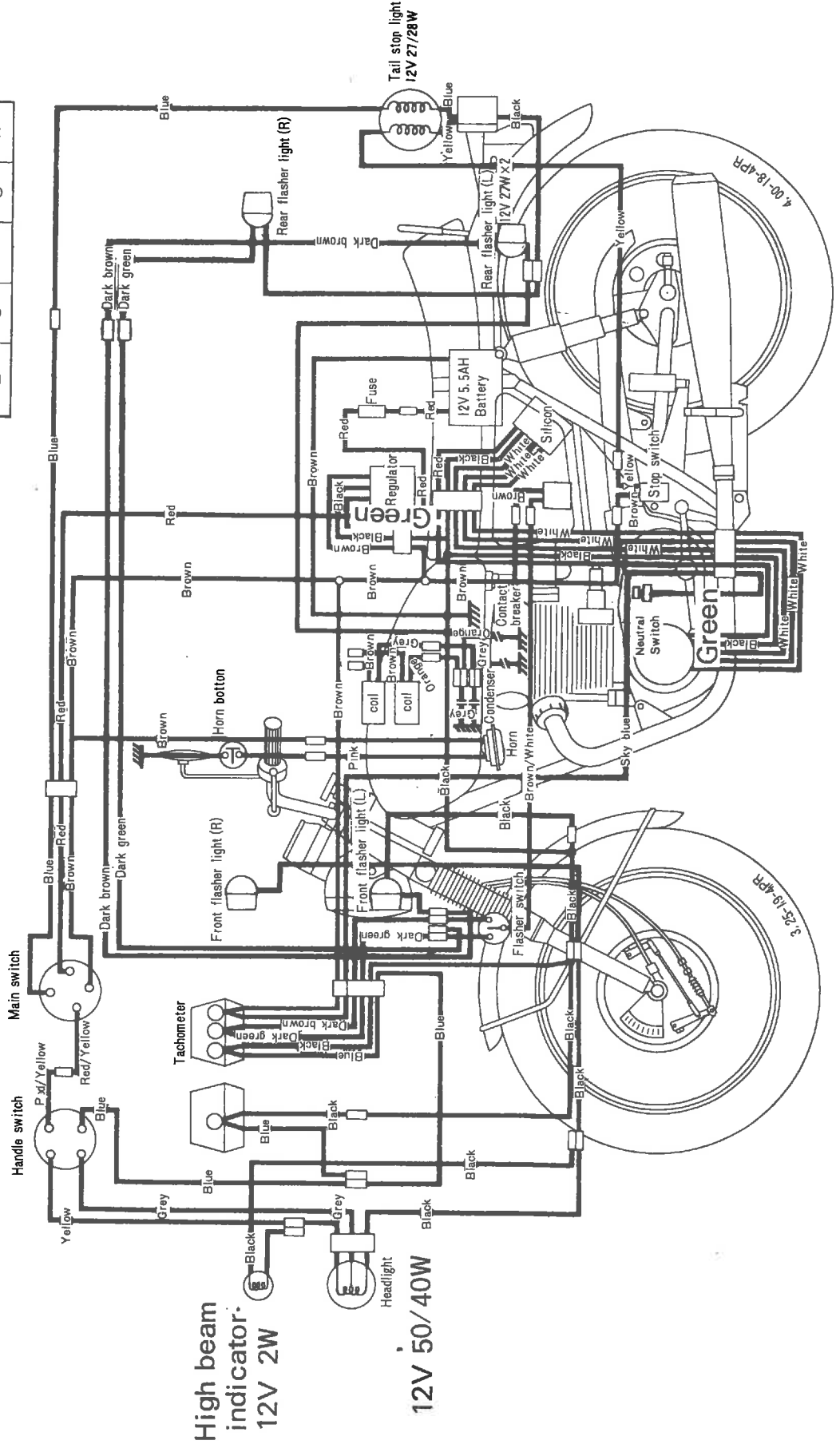
Tachometer
12V 3W x 4

Horn button

Tail stop light
12V 23/7W

XS1-B 650 Circuit Diagram

Key position	Color				
	Red	Brown	Sky blue	Red & Yellow	Red & Yellow
OFF	X	X	X	X	X
I	O	O	X	O	O
II	O	X	O	X	X



XS2-TX650 CIRCUIT DIAGRAM

Circuit connected by main switch

Color Position	R	Br	Bl	R/Y
OFF	X	X	X	X
I	O	O	X	O
II	O	O	X	X

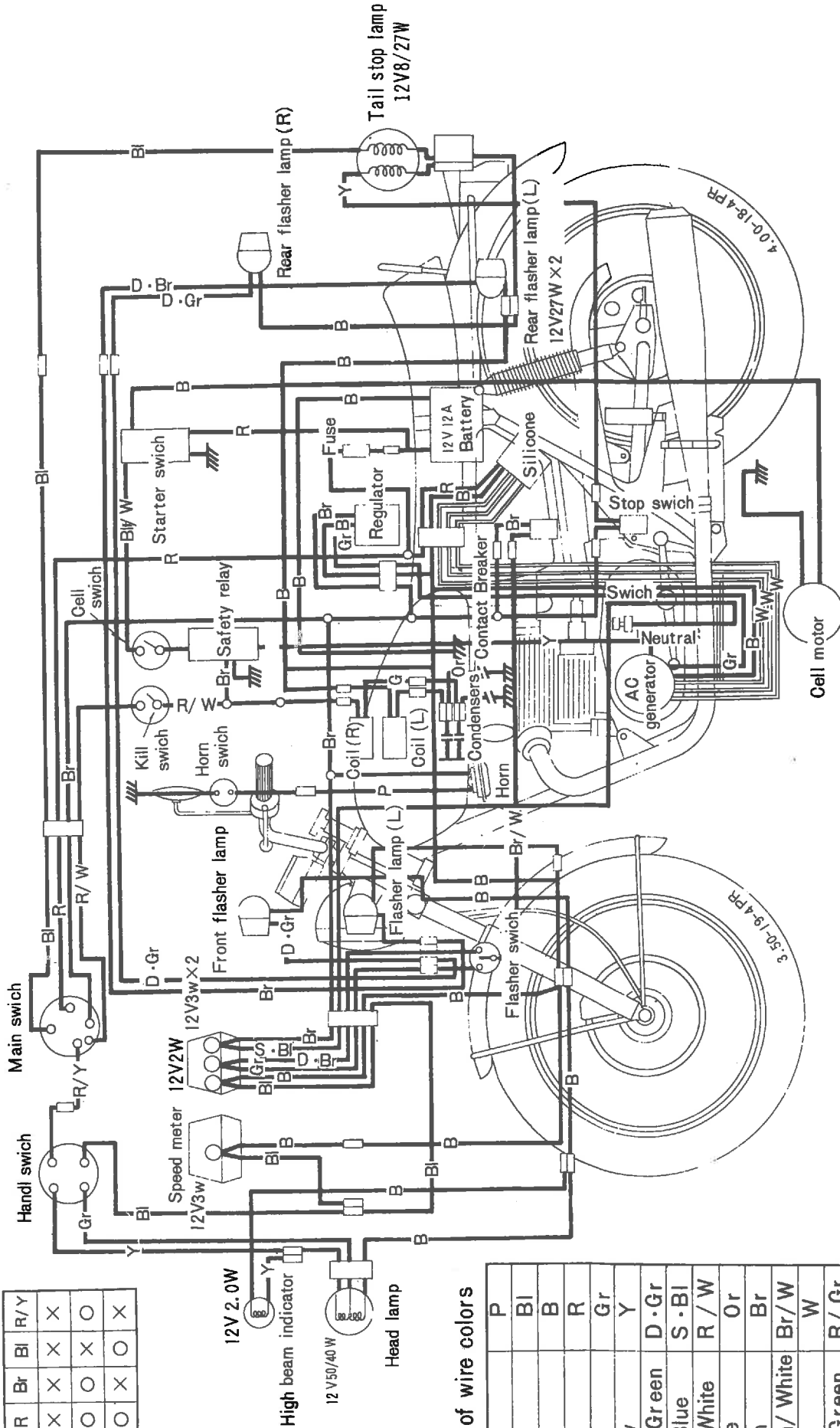


Chart of wire colors

Pink	P
Blue	Bl
Black	B
Red	R
Green	Gr
Yellow	Y
Dark Green	D-Gr
Sky Blue	S-Bl
Red/White	R/W
Orange	Or
Brown	Br
Brown/White	Br/W
White	W
Red/Green	R/Gr
Grey	G

TIGHTENING TORQUE VALUES FOR ENGINE PARTS

PART NAME	SIZE (mm)	TORQUE (Kg-M)
Spark Plug	14	2.8 ± 0.1
Kick Crank Bolt	8	2.0 ± 0.1
Drain Plugs	30	3.0 ~ 3.5
Oil Delivery Pipe Bolt	10	2.3 ± 0.1
Air Cleaner Element Screw	6	1.0 ± 0.1
Drive Sprocket Nut	23	13.0 ± 0.1
Primary Drive Gear Nut	16	5.5 ± 0.1
Rotor Nut	12	12.0 ± 0.1
Yoke Screw	6	1.0 ± 0.1
Clutch Nut	18	13.0 ± 0.1
Clutch Springs Bolts	6	1.0 ± 0.1
Cylinder Head Cover Bolts	8	2.3 ± 0.1
Cylinder Head Cover Nuts	10	3.8 ± 0.1
Cylinder Head Side Cover Nuts	6	0.9 ± 0.1
Valve Adjusting Nuts	8	2.5 ± 0.1
Crankcase Cover Screws	6	1.0 ± 0.1
Crankcase Screws	8	2.0 ± 0.1
Cylinder Retaining Bolts	8	1.7 ± 0.1

TORQUE SPECIFICATIONS

Stud size	kg.-m	In-lbs *
6 mm	1.0	90
7	1.5	135
8	2.0	180
10	3.2-4.0	300-350
12	4.0-4.6	350-400
14	4.6-5.2	400-450
17	5.87-7.0	500-600
Spark Plug	2.7-2.9	230-250

* Ft-lbs = In-lbs divided by 12