YAMAHA

GPX338G/433G

G.Y.T. KIT

Installation Manual

YAMAHA MOTOR CO., LTD.

WARNING

This book is designed to provide information to the racer who is interested in obtaining higher performance from his production Yamaha Snowmobile.

Some of the modifications in this booklet may shorten the life of the machine. YAMAHA INTERNATIONAL CORPORATION and YAMAHA MOTOR CANADA LTD. can not be held responsible for damage to the engine parts or chassis as a result of modifications presented in this book.

Machines that are raced or run extremely hard should be inspected frequently for evidence of wear or damage. Inspection at regular intervals and replacement of any worn parts will extend the life of a racing machine.

A machine that fails may cause extensive damage and may be expensive to rebuild. Some machine failures may cause temporary loss of control, resulting in injury to the rider.

When considering a machine modification, remember that the performance will be affected. The whole power curve will be changed if the engine is modified.

Where permitted by law, YAMAHA shall not be liable for incidental or consequential damages, including injury to person or property.

YAMAHA makes no warranty of any kind, expressed or implied, and all implied warranties of merchantability and fitness for a particular purpose are hereby disclaimed by company.

GPX338G/433G
G.Y.T. Kit Installation Manual

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I. PARTS LIST

IN GPX338G/433G G.Y.T. there are two kinds of kits: full kit and improvement kit. The full kit consists of the parts that can be used without modification, while the parts in the improvement kit need modifying.
The improvement kit can give the engine the same performance as the full kit with some modification to improvement kit parts.

A. FULL KIT

Ref. No.	Parts No.	Description	GPX338G	GPX433G
Fig. 1 (1)	888-11311-70 889-11311-70	Body cylinder left	1	1
Fig. 1 (2)	888-11321-70 889-11321-70	Body cylinder right	1	1
Fig. 1 (8)	888-11111-70 889-11111-70	Head cylinder left	1	1
Fig. 1 (9)	888-11121-70 889-11121-70	Head cylinder right	1	1
Fig. 1 (3)	878-11631-70 889-11631-70	Piston	2	2
Fig. 1 (4)	878-11611-70 829-11611-00	Ring piston	2	2
Fig. 16-2	888-14610-70 889-14610-70	Exhaust pipe Assembly 1	1	1
Fig. 16-2	888-14620-70 889-14620-70	Exhaust pipe Assembly 2	1	1
Fig. 1 (5)	604-11634-00	Clip piston pin	4	4
Fig. 1 (6)	878-11181-00 879-11181-00	Gasket cylinder head	2	2
Fig. 1 (7)	878-11351-00 857-11351-00	Gasket cylinder	2	2
Fig. 5	—	Fuel pump set	1	1
Fig. 17 (2)	90501-55356	Spring compression	1	1
Fig. 17 (5)	878-17623-70 879-17623-70	Cam	1	1
Fig. 10	878-13326-70	Shaft housing	1	1
Fig. 10	126-13116-00	Gasket pump case	1	1

B. IMPROVEMENT KIT

Ref. No.	Parts No.	Description	GPX338G	GPX433G
Fig. 1 (1)	878-11311-70 879-11311-70	Body cylinder left	1	1
Fig. 1 (2)	878-11321-70 879-11321-70	Body cylinder right	1	1
Fig. 1 (8)	878-11111-00 889-11111-70	Head cylinder left	1	1

Ref. No.	Parts No.	Description	GPX338G	GPX433G
Fig. 1 (9)	878-11121-00 889-11121-70	Head cylinder right	1	1
Fig. 5	90446-08107	Hose (pulse pipe)	2	–
Fig. 12	90116-08039	Stud	4	4
Fig. 1 (3)	878-11631-70 879-11631-70	Piston	2	2
Fig. 1 (4)	878-11611-70 829-11611-00	Ring piston	2	2
Fig. 16-2	878-14610-70 879-14610-70	Exhaust pipe Assembly 1	1	1
Fig. 16-2	878-14620-70 879-14620-70	Exhaust pipe Assembly 2	1	1
Fig. 16-2	828-14612-70	Ring nut	2	2
Fig. 16-2	878-14752-70	Pipe	2	–
Fig. 1 (5)	604-11634-00	Clip piston pin	4	4
Fig. 1 (6)	878-11181-70 879-11181-00	Gasket cylinder head	2	2
Fig. 1 (7)	878-11351-00 857-11351-00	Gasket cylinder	2	2
Fig. 5	–	Fuel pump set	1	1
Fig. 10	878-13326-70	Shaft housing	1	1
Fig. 10	126-13116-00	Gasket pump case	1	1
Fig. 17 (2)	90501-55356	Spring compression	1	1
Fig. 17 (5)	878-17623-70 879-17623-70	Cam	1	1

C. OPTIONAL KIT PARTS

Ref. No.	Parts No.	Description	GPX338G	GPX433G
Fig. 30	888-17632-10	Weight	O	O
Fig. 17 (2)	90501-55354	Spring compression	O	O
Fig. 17 (2)	90501-55355	Spring compression	O	O
Fig. 17 (2)	90501-55242	Spring compression	O	O

II. SERVICE DATA

Model	GPX338G (G.Y.T.)	GPX433G (G.Y.T.)
ENGINE		
Cylinder head tightening torque	Nuts: 16.6 ~ 19.5 ft-lbs. (2.3 ~ 2.7 m-kgs.)	Nuts: 16.6 ~ 19.5 ft-lbs. (2.3 ~ 2.7 m-kgs.)
Piston clearance	0.0018 ~ 0.0020 in. (0.045 ~ 0.050 mm.)	0.0018 ~ 0.0020 in. (0.045 ~ 0.050 mm.)
Lubrication oil (Recommended way)	1st YAMALUBE 2-stroke oil	1st YAMALUBE 2-stroke oil
	2nd Another brand 2-stroke oil labeled "BIA certified for service TC-W"	2nd Another brand 2-stroke oil labeled "BIA certified for service TC-W"
Ignition timing (Recommended way)	1st with Timing light (including Electro tester 90890-03021)	1st with Timing light (including Electro tester 90890-03021)
	B.T.D.C. 0.055 in. (1.4 mm.) (at 5,000 ± 200 r.p.m.)	B.T.D.C. 0.071 in. (1.8 mm.) (at 5,000 ± 200 r.p.m.)
	2nd with Dial gauge	2nd with Dial gauge
	B.T.D.C. 0.055 ± 0.004 in. (1.4 ± 0.1 mm.)	B.T.D.C. 0.071 ± 0.004 in. (1.8 ± 0.1 mm.)
Compression ratio	6.75 : 1	6.64 : 1
Idling speed	Over 4,500 r.p.m.	Over 4,500 r.p.m.
Spark plug	Champion N-59G	Champion N-59G
Fuel pump		
Outlet adjusting screw	3 ~ 4	3-4/1 ~ 4-1/8
Main calibration screw	L/H 1-1/4 ~ 2-1/8 R/H 1 ~ 1-7/8	1-1/4 ~ 2-1/8
Hose (pulse pipe) dia.	0.295$^{\phi}$ – 0.098$^{\phi}$ in. (7.5$^{\phi}$ – 2.5$^{\phi}$ mm.)	0.295$^{\phi}$ – 0.098$^{\phi}$ in. (7.5$^{\phi}$ – 2.5$^{\phi}$ mm.)
Hose (pulse pipe) length	13.78 ins. ~~(250 mm.)~~ 300mm	13.78 ins. ~~(850 mm.)~~ 300
Mixing		
Bore	1.65$^{\phi}$ ins. (42$^{\phi}$ mm.)	1.77$^{\phi}$ ins. (45$^{\phi}$ mm.)
Needle taper	55′	55′
Shim	0.078 in. (2 mm.)	0.078 in. (2 mm.)
Needle seat	0.06535$^{\phi}$ in. (1.66$^{\phi}$ mm.)	0.06614$^{\phi}$ in. (1.68$^{\phi}$ mm.)
Oil/Fuel ratio	1/15	1/15
DRIVE		
Clutch		
Primary spring for 5,400 r.p.m. clutch engagement	Part No. 90501-55356 Color Code: BLUE-SILVER	Part No. 90501-55356 Color Code: BLUE-SILVER
Primary cam	Part No. 878-17623-70 (10R-5t)	Part No. 879-17623-70 (9R-6t)
Secondary spring (S.T.D.)	Part No. 90508-45081 Color Code: Not painted	Part No. 90508-45081 Color Code: Not painted
V-Belt	Part No. 888-17641-00 Outer line length: 1,099 ± 4 mm.	Part No. 888-17641-00 Outer line length 1,099 ± 4 mm.
Sheave distance	$10.6\ ^{+0}_{-0.11}$ ins. ($270\ ^{+0}_{-3}$ mm.)	$10.6\ ^{+0}_{-0.11}$ ins. ($270\ ^{+0}_{-3}$ mm.)
Sheave offset	0.48 ± 0.019 in. (11 ± 0.5 mm.)	0.48 ± 0.019 in. (11 ± 0.5 mm.)

Model	GPX338G (G,Y.T.)	GPX433G (G.Y.T.)
Chain housing		
Oil capacity	10.8 fl.oz (320 c.c.)	10.8 fl.oz (320 c.c.)
Oil	SAE 10W/30 Motor oil, "SE" detergent	SAE 10W/30 Motor oil, "SE" detergent
Chain	Triple roller chain enclosed in oil bath	Triple roller chain enclosed in oil bath
Reduction ratio (Drive chain sprocket/Driven chain sprocket)	21/33	22/33
Suspension		
Track width	15 ins. (381 mm.)	15 ins. (381 mm.)
Length on ground	29.9 ins. (760 mm.)	29.9 ins. (760 mm.)
Track deflection	0.6 $^{+0.2}_{-0}$ in./22 lbs. (15 $^{+5}_{-0}$ mm./10 kgs.)	0.6 $^{+0.2}_{-0}$ in./22 lbs. (15 $^{+5}_{-0}$ mm./10 kgs.)
Drive sprocket	Double polyurethane, 9 teeth	Double polyurethane, 9 teeth
Slide runner wear limit	0.4 in. (10 mm.)	0.4 in. (10 mm.)
BRAKE		
Brake pad wear limit	0.37 in. (9.5 mm.)	0.37 in. (9.5 mm.)
Gap between pad and disk	0.0059 in. (0.15 mm.)	0.0059 in. (0.15 mm.)
BODY		
Ski width (S.T.D.)	35.0 ins. (890 mm.)	35.0 ins. (890 mm.)
Ski width (Using optional ski saddle)	29.5 ins. (750 mm.)	29.5 ins. (750 mm.)
Optional ski runner	Parts No. 888-23731-10	Parts No. 888-23731-10
Optional aluminum ski	Parts No. 888-23710-10	Parts No. 888-23710-10

III. INSTALLATION

A. HEAD CYLINDER, BODY CYLINDER AND GASKET

(1) Cylinder body (Left)
(2) Cylinder body (Right)
(3) Piston
(4) Piston ring
(5) Piston pin clip
(6) Cylinder head gasket
(7) Cylinder gasket
(8) Cylinder head (Left)
(9) Cylinder head (Right)

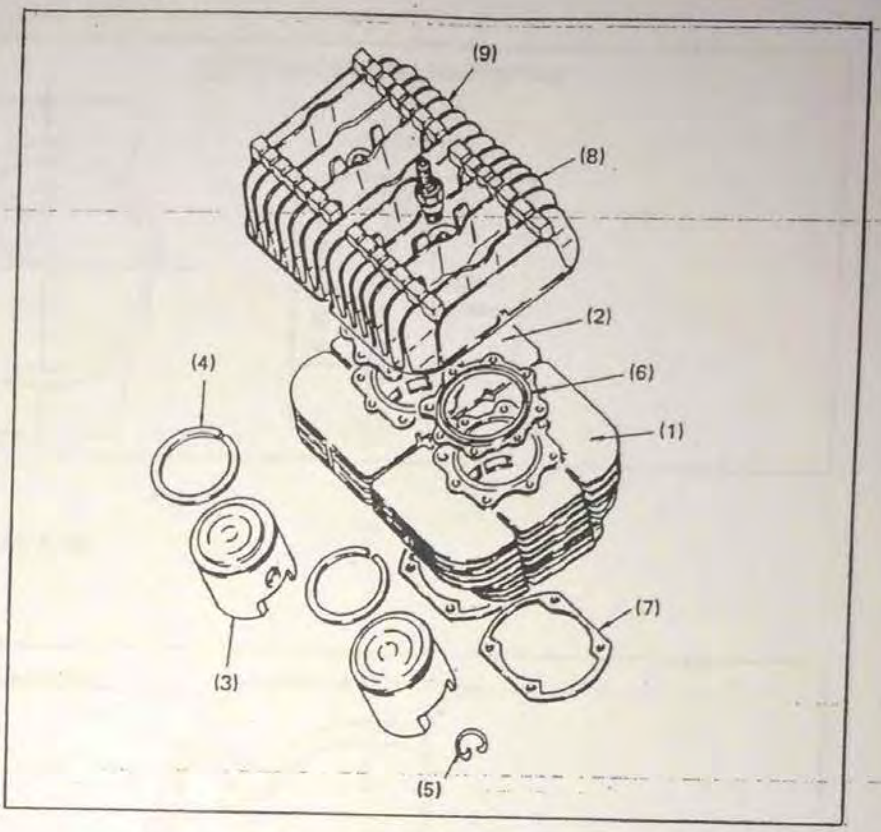

Fig. 1

1. Full kit installation

1) Remove standard cylinder heads, cylinders, pistons and piston rings.
2) Install G.Y.T. Kit pistons, cylinders, piston rings and cylinder head.

Note: The cylinder head gasket and cylinder gasket contained in the G.Y.T. Kit are of the same type as standard, and therefore, no replacement is needed, except when the engine must be reassembled.

	GPX338G	GPX433G
Gasket cylinder head	0.0197 in. (0.5 mm.) thick 878-11181-00	0.0197 in. (0.5 mm.) thick 879-11181-00
Gasket cylinder	878-11351-00	857-11351-00

2. Improvement kit installation

1) Remove standard cylinder heads, cylinders, pistons and piston rings.
2) Install one of the following pistons.
   GPX338G:
   Piston (878-11631-70) contained in the kit
   GPX433G:
   Piston (879-11631-70) contained in the kit
3) Install piston rings (kit parts).

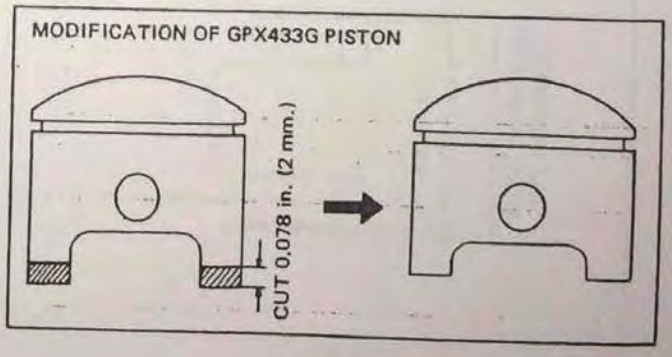

Fig. 2

4) To improve engine performance extensively, the cylinder body should be modified.

a) Modification of GPX338G Cylinder Body
R/H (878-11311-70)
L/H (878-11321-70)

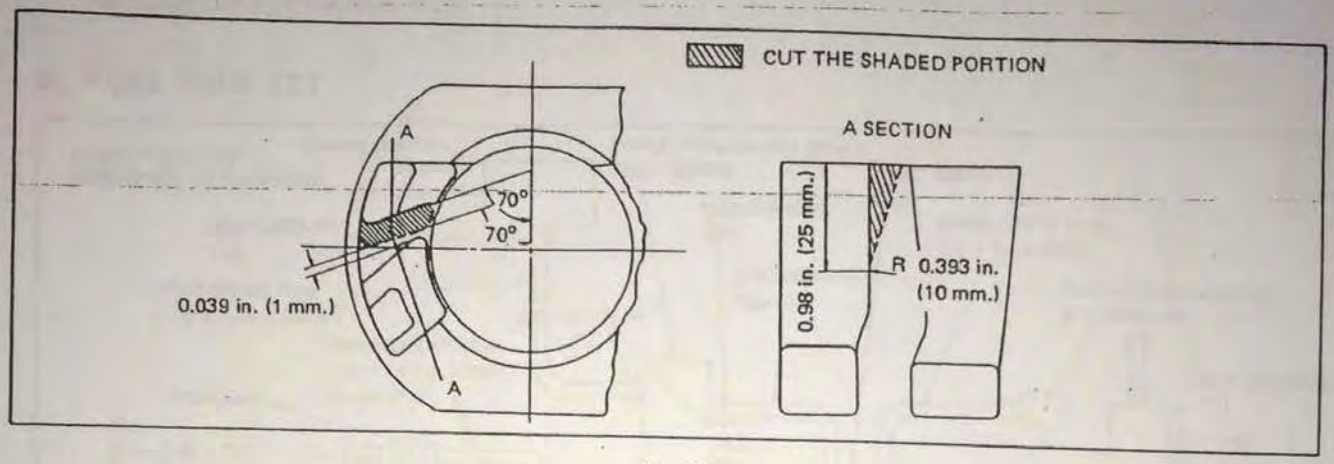

Fig. 3

b) Modification of GPX433G Cylinder Body
R/H (879-11311-70)
L/H (879-11321-70)

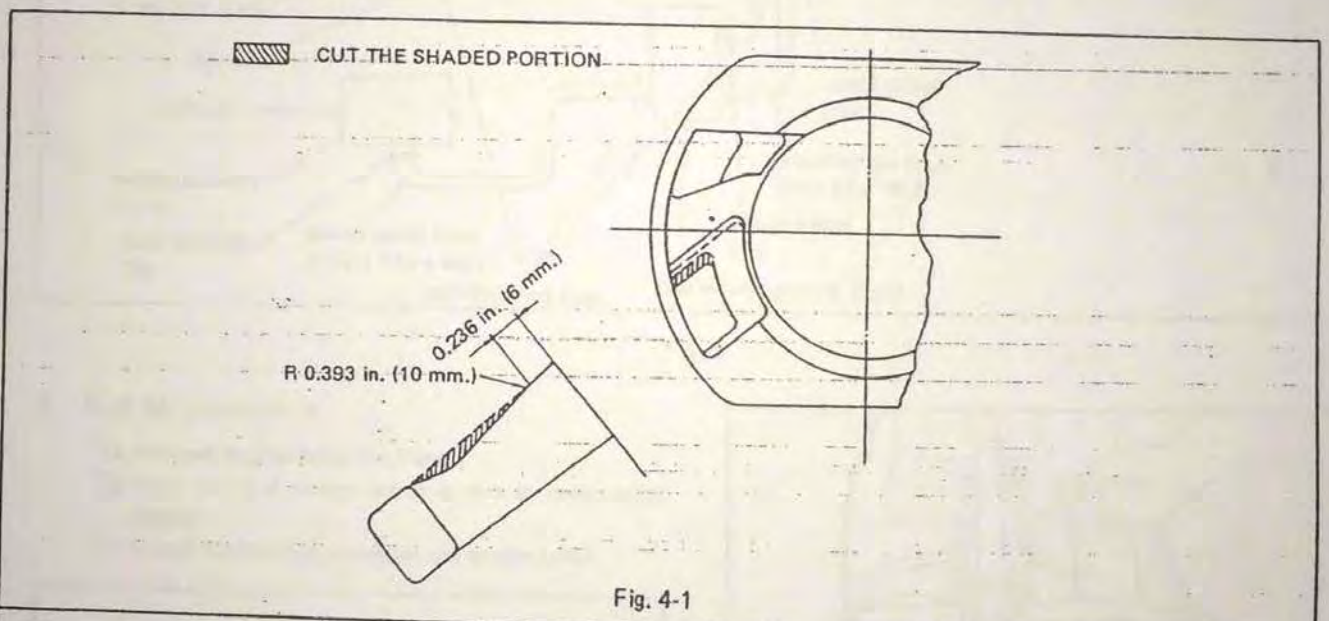

Fig. 4-1

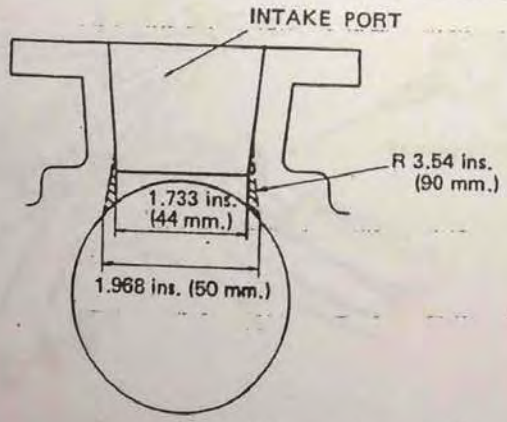

Fig. 4-2

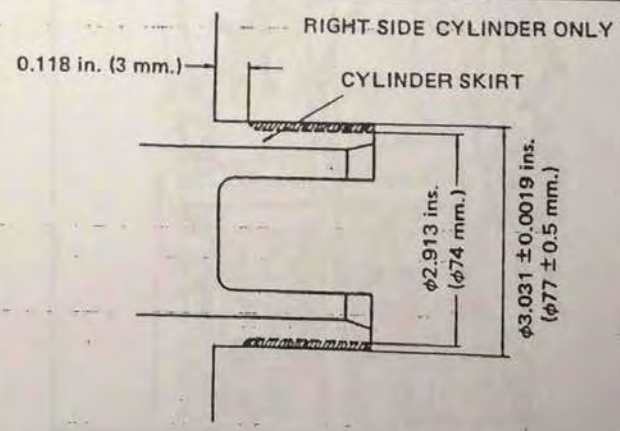

Fig. 4-3

5) Install cylinder head gasket as follows:
GPX338G: Install the cylinder head gasket [0.039 in. (1.0 mm.) thick, Part No. 878-11181-70] contained in the Kit.
GPX433G: S.T.D.
6) Install G.Y.T. Kit cylinder head.

B. FUEL PUMP SET

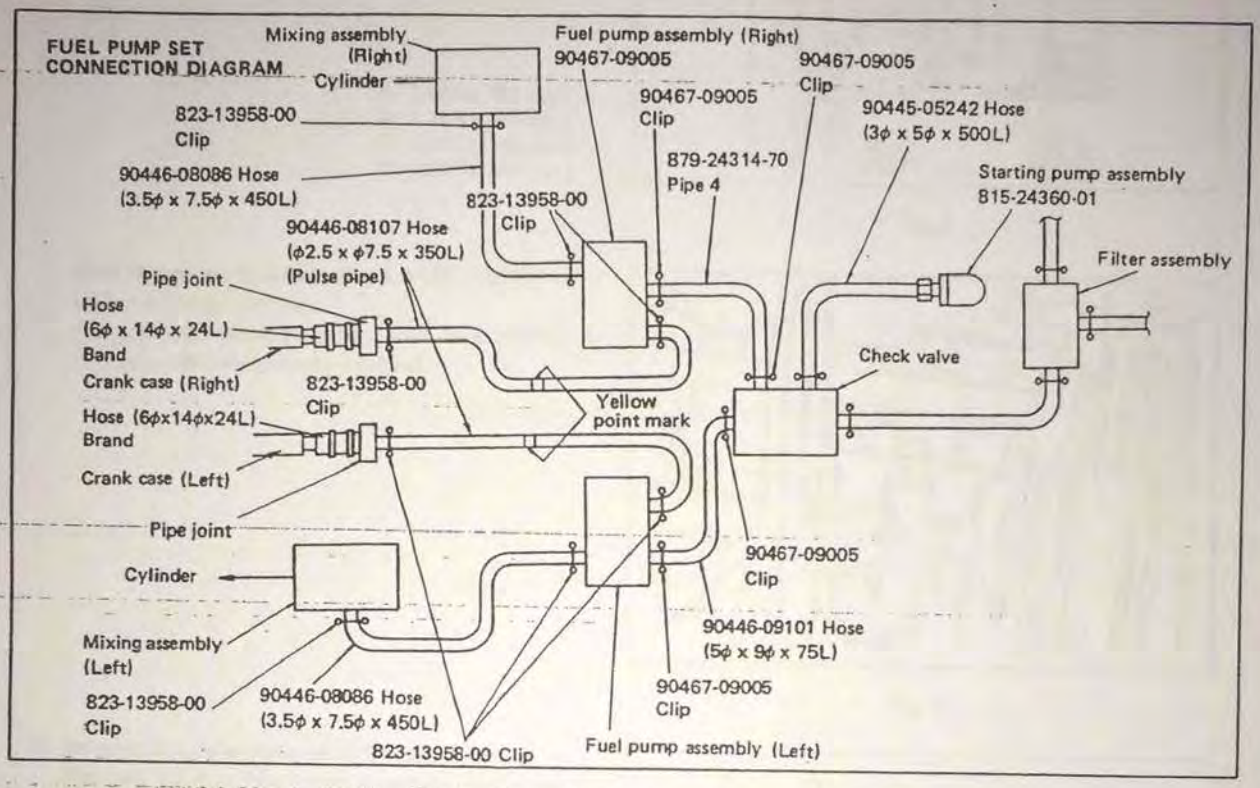

Fig. 5

1. Full kit installation

1) Remove engine from the frame.
2) Wire the fuel pump set as shown in connection diagram.
3) Install the starting pump on the engine cowl.

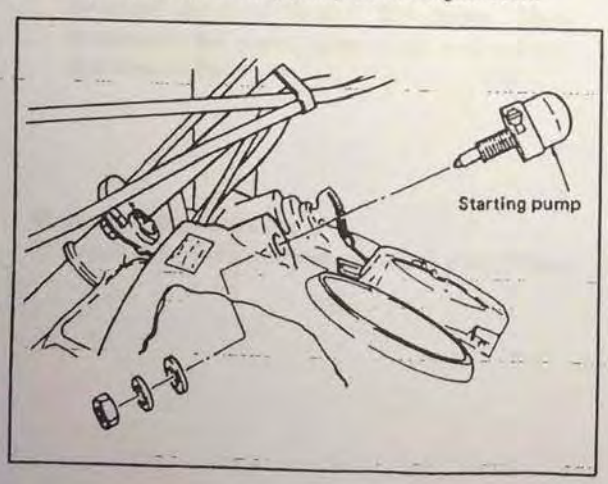

Fig. 6

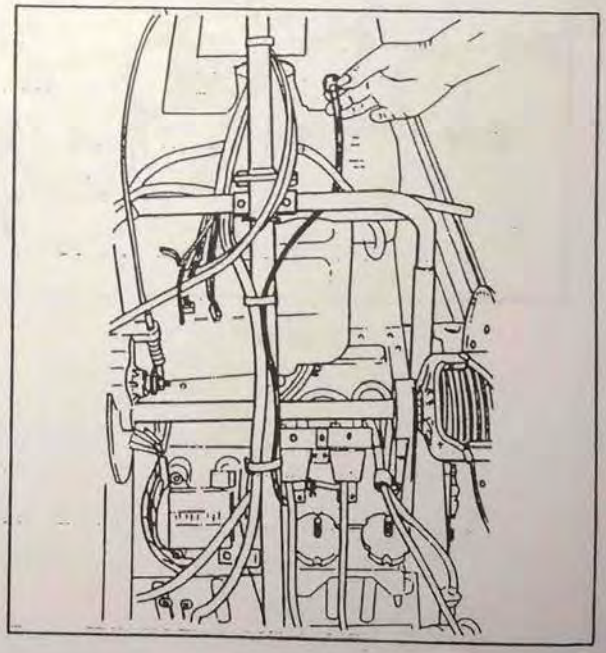

Fig. 7

4) Install fuel pump as follows:
Place the pump, check valve assembly on the frame in the location shown.
Mark the locations of the pump stay mounting holes.

A: 2.56 ins. (65 mm.)
B: 3.74 ins. (95 mm.)
C: 0.472 in. (12 mm.)
D: 0.591 in. (15 mm.)

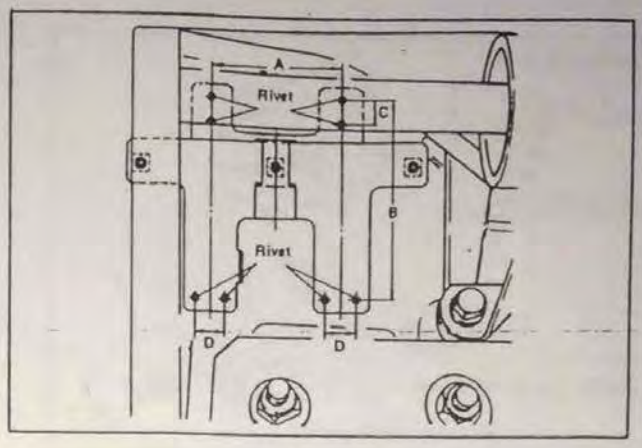

Fig. 8

Drill the mounting holes using a 0.158 ~ 0.165 in. (4.0 ~ 4.2 mm.) drill size.
Install pump assemblies using 0.157$^{\phi}$ in. x 0.370 in. (4$^{\phi}$ mm. x 9.4 mm.) rivets provided.

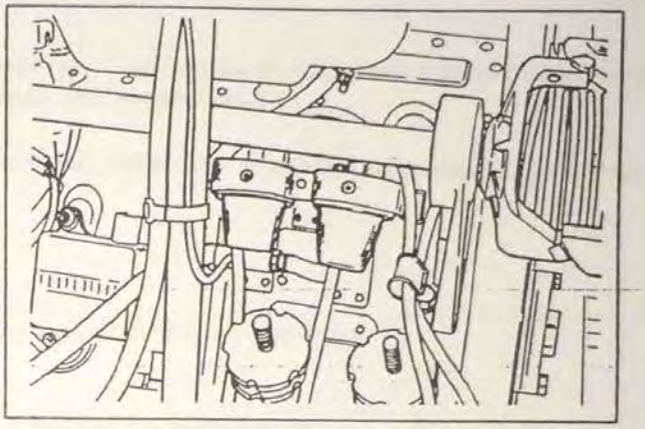

Fig. 9

5) Remove Autolube pump assembly as follows:
Remove the Autolube pump assembly, and loosen the pump drive cover mounting bolts. Loosen the two screws securing the Autolube pump, and remove the pump drive cover.
Remove the Autolube pump assembly, and clean the pump drive cover mounting surface. Then install the shaft housing.
Before installing the shaft housing, fill with Aeroshell grease or Beacon 325 grease. Next, re-assemble the pump drive cover and primary sheave assembly.

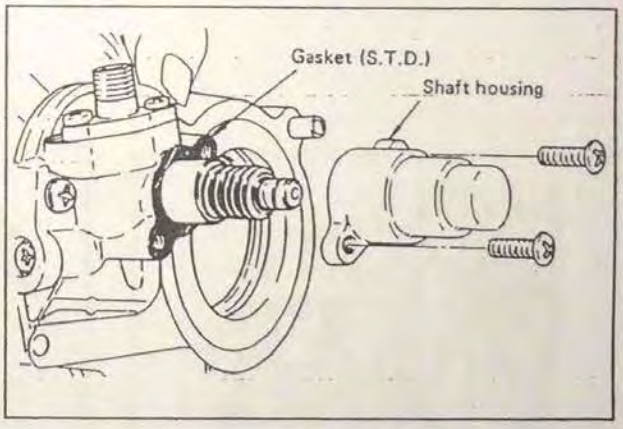

Fig. 10

6) Install engine in the frame.
7) Install pulse line joints onto crankcase pulse fittings.

8) Connect left side pump to crankcase left joint by hose, and connect right side pump to crankcase right joint by hose.

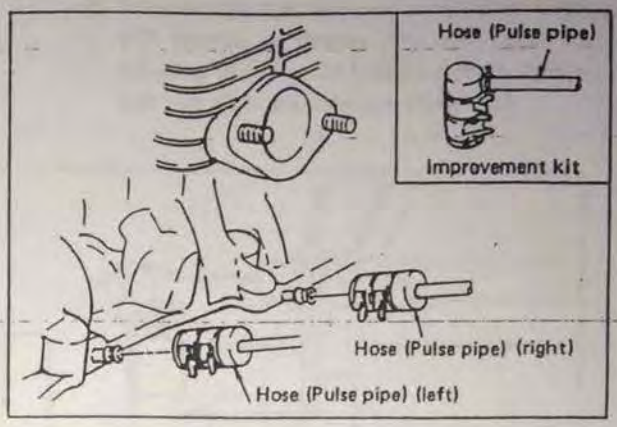

Fig. 11

CAUTION:

Hose (Pulse pipes): The length and inside diameter of the pulse pipe closely relates to pump performance. Therefore, it is important to use genuine YAMAHA pulse pipes. Pulse pipe length: 14.7 ins. (350 mm.)

Take care not to cut pulse pipes too short.

As for other fuel pipes, they can be cut in proper length as required. Pump must be installed in the position indicated. If not, pump performance may be impaired.

Note:

a) See connection diagram.
b) Make sure fuel pipe joints are not leaky.
c) Check to see that the pulse pipe joint bore (crankcase is exactly 0.21 in. (5 mm.) in diameter. If not, correct to 0.21 in. (5 mm.)
d) There is a yellow paint mark in the middle of pulse pipe.
e) Note that a white painted mark is shown in the middle of pulse pipe of improvement kit.

9) Mixing chamber installation
   a) Install mounting studs into cylinders.
   b) Install gaskets.
   c) Install chambers using spring washers and nuts.

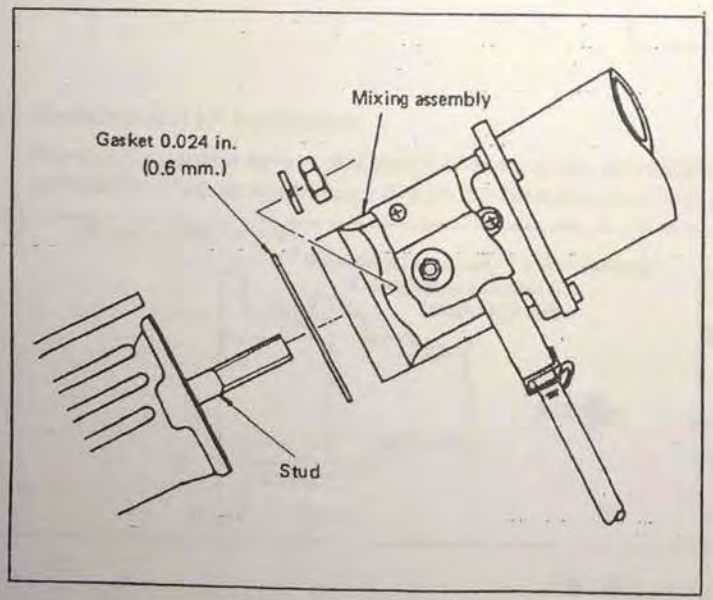

Fig. 12

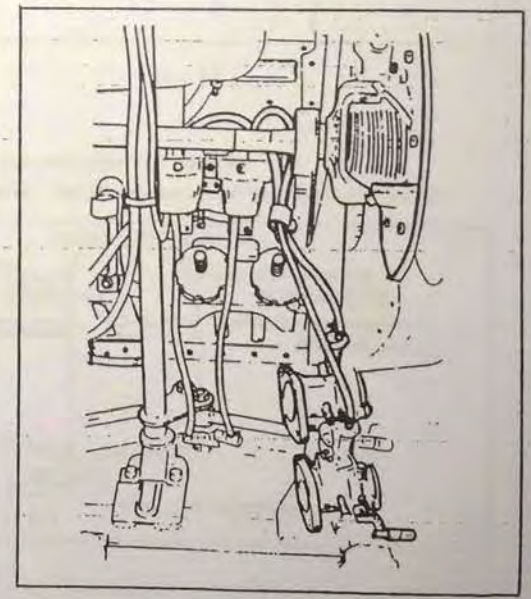

Fig. 13

10) Connect throttle wires and synchronize throttles.
   a) Squeeze throttle to full open position and check to see that both butterfly valves are fully open. Loosen lock nut and adjust throttle wire holder if necessary.
   b) Make certain that both butterfly valves reach full throttle at exactly the same time by adjusting throttle wire holder. Always tighten lock nut when adjustment is completed.

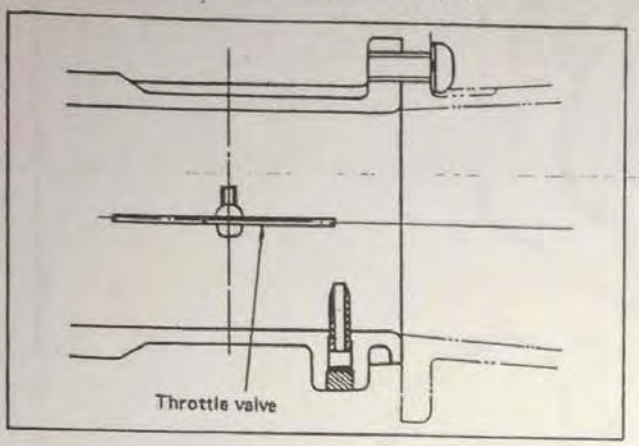

Fig. 14

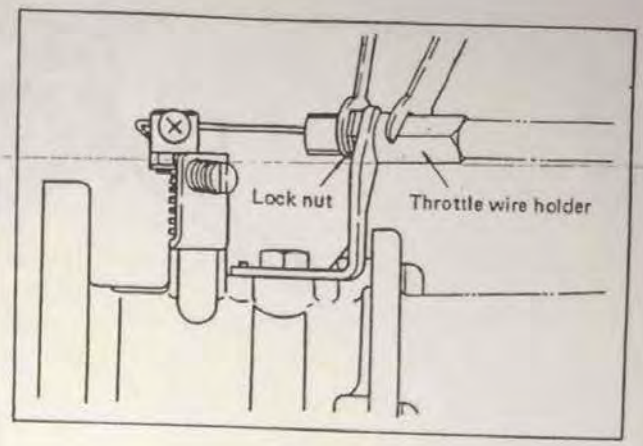

Fig. 15

2. Improvement kit installation

Improvement kit parts can be installed in the same manner as full kit parts. Note that hose (pulse pipe) for GPX433G is colored white, not yellow.

C. EXPANSION CHAMBER

Before installing expansion chamber, cut the end (○ mark) of frame as shown in Fig. 16-1.

1. Full kit installation

Remove the standard exhaust pipe assembly, and install the kit part.

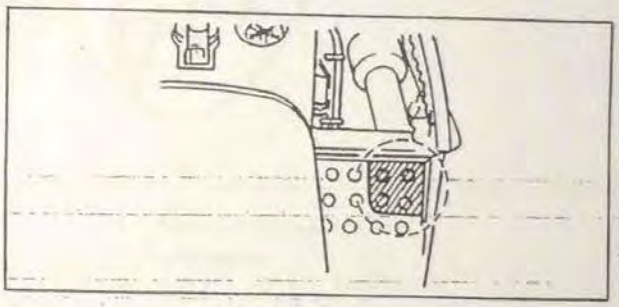

Fig. 16-1

2. Improvement kit installation

Remove the standard exhaust pipe assembly and ring nut, and install those contained in the Kit.

GPX338G: Press-fit pipe (kit part 878-14752-70) into ring nut (kit part). Install exhaust pipe assembly (kit parts).

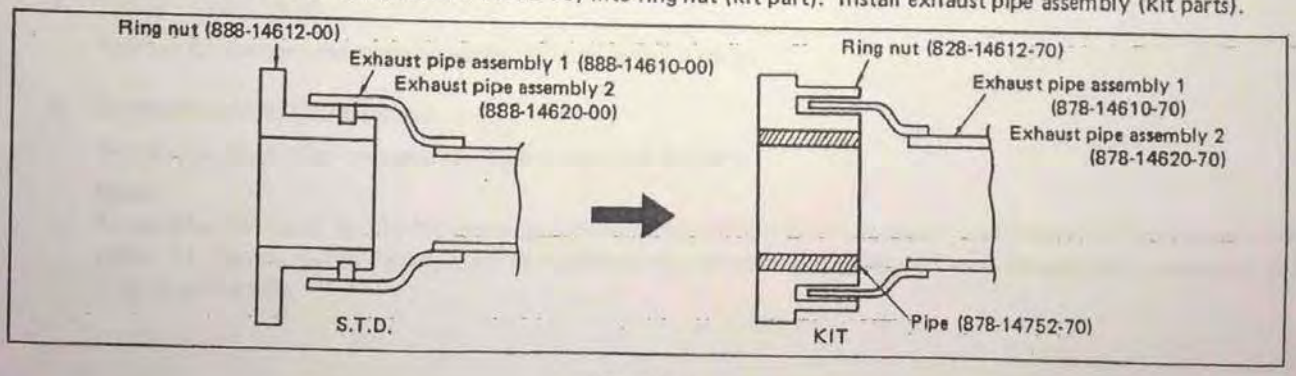

Fig. 16-2

GPX433G: Install ring nut (kit part, 827-14612-70) and exhaust pipe assemblies 1 and 2 (879-14610-70, 879-14620-70)