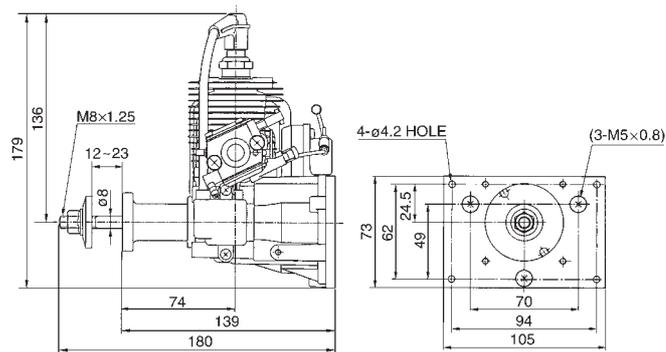


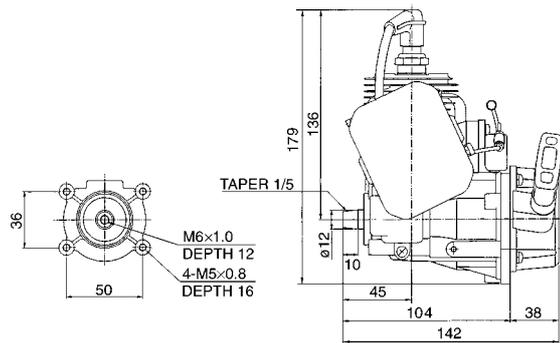
OWNER'S MANUAL

MODEL : G230PU - for Airplane
G230PUH - for Helicopter
G230PUM - for Boat

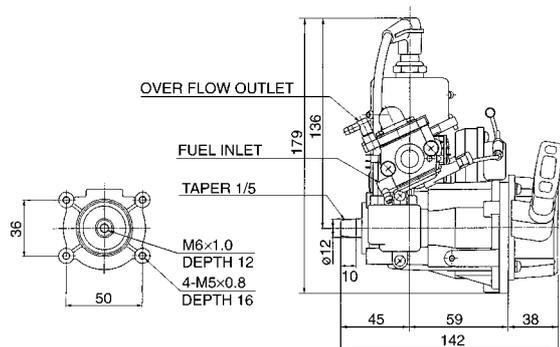
G230PU



G230PUH



G230PUM



! WARNING !

- Do not modify any parts of the engine.
- This engine is designed to be used to Radio controlled products.
- In case any modification by customer, KOMATSU ZENOAH shall not bear any responsibility from the damage caused by such modification.
- Keep ignition system well maintained.

! 警告 !

- この製品はラジオコントロール飛行機、ボート用に設計されています。
- 改造、組み替えされて使用された場合当社は一切の責任を負いません。
- 特に電装品は常に点検、整備してご使用ください。

1. SAFETY PRECAUTIONS

- This manual describes the engine. For its mounting and control, see the instruction manual for the model airplane, helicopter and boat.
- Each engine is designed for use on each model airplane, helicopter and boat. If it is used for any other purpose, we cannot be responsible for its reliability or safety.
- Use genuine parts for replacement.
- Check the propeller, rotor and screw propeller every time. If it is damaged, replace it with a new one.
- If the propeller (or the rotor or the screw propeller) hit something while the engine is in operation, immediately stop the engine and check it.
- Start the engine on a flat surface without pebble stones.
- Never modify the flywheel.
- Check the flywheel. If it is damaged, replace it with a new one.
- When mixing the fuel, or operating the engine, carry it out in a well-ventilated place.

2. MOUNTING G230PU

Make sure that the G230PU is mounted on the aircraft grade plywood with more than 6mm of thickness or a mount of equivalent strength and is firmly fixed with 4 bolts.

[NOTE]

1. Be sure to set flat washers or metal plate on the reverse side of the mount to prevent bolts from sinking into the mount. Before be sure to check for loose bolts.
2. Since the engine is equipped with a float-less carburetor with a diaphragm pump, the direction of cylinder and position of fuel tank can be freely selected .

3. If the rubber joint is placed between the engine and the body for anti-vibration, check if the rubber is too week and select the proper hardness of the rubber, in order to avoid the unexpected vibration under operating engine RPM zone.

Note carefully that if the engine is vibrated at idling, then the idling RPM is likely to get unstable due to overflow at carburetor by the vibration.

4. Coat the bolts for muffler with anti-looser (e.g., Locktite or equivalent).when assembling.

3. PROPELLER, ROTOR & SCREW PROPELLER

1. Propeller for airplane

The recommended prop sizes are as shown in the table bellow.

Diameter × Pitch (in.)
18 × 6, 16 × 8 ~ 10

This engine with a standard muffler produces the maximum output when the engine is running at about 10,000rpm. Be sure to use a propeller which makes the engine speed approximately 7,000~9,500rpm while the airplane is flying.

[NOTE]

When mounting the spinner, set a pin on the hub with more than 3mm of diameter, thus preventing slipping.

2. Rotor for helicopter

Adjust the rotor-pitch to obtain 9,000~10,000 rpm of the engine at full throttle operation.

3. Screw Propeller for boat

The exhaust system (e.g., muffler) is not equipped with as standard. When you select the exhaust system for the engine, check how many the engine speed (rpm) is required when the maximum output is generated by using the muffler you select.

And then decide the appropriate the screw propeller that would meet such engine speed (rpm) that the muffler required.

In general, standard size of the screw propeller (Surface prop type) are as follows:

Diameter (mm)
65 ~ 75

Pich ratio (mm)
1.9 ~ 1.4

4. FUEL

Mix gasoline and 2-stroke oil at a mixing ratio of 25 ~ 40 :1.

[NOTE]

1. Be sure to use a gasoline-resistant fuel piping. (Do not use any silicon rubber tube).
2. Never use any alcohol fuel or alcohol added fuel, or the rubber part in the carburetor will be damaged.

5. OPERATION

Hand flip start

Since the G230PU is equipped with the ultra compact C.D.I. type flywheel magneto ignition system, it should be started according to the following procedure;

* The magneto system of G230PU is designed in such a way that when the exhaust port is closed by the piston, that is, when the compression stroke starts (Refer to Fig. 1-A), sparks are never produced on spark plug no matter how fast the propeller may be flipped. Be sure to quickly flip the propeller when the edge of magnet on the rotor is approaching the coil (Fig. 1-B). It means that the propeller should be quickly flipped about 90 degrees in crank angle before the compression is about to start.

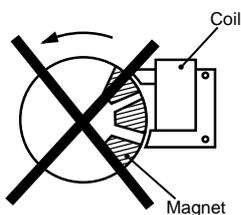


Fig.1-A

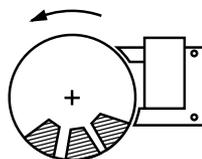


Fig.1-B

How to Start the Engine

1. For Airplane

- a. Fill the fuel tank with the fuel.
- b. Choke the engine and turn the propeller a few times until the fuel appears at the carburetor.
- c. Set the throttle valve at the idle position or at the position slightly open from the idle position. Quickly flip the propeller in the counterclockwise direction according to the procedure described above. Flip the propeller a few times. Then the engine starts.

2. For Helicopter & Boat

- a. Fill the fuel tank with the fuel.
- b. Push the priming bulb upper the carburetor until fuel appears in the priming bulb.(for Helicopter)
- c. Choke the engine and open the throttle valve approximately 1/3~1/2 of the full open position.
- d. Quickly pull the starter cord when the initial explosion is heard.
- e. When the initial explosion is heard, open the choke, set the throttle valve at the idle position or at the position slightly open from the idle position and quickly pull the starter cord a few more times. Then the engine starts.

[NOTE]

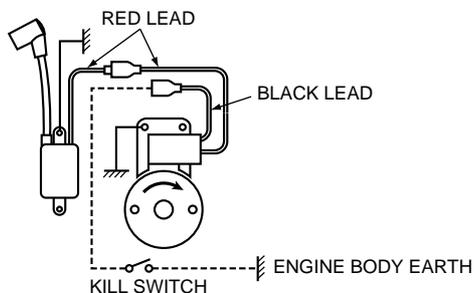
- Be sure to open the choke when the initial explosion is heard.
- When the choke is opened, be sure to close the throttle valve

to a position near the idle position before starting the next flipping (If the engine is started while the throttle is wide open, a great thrusting force is produced, which is very dangerous).

- Be sure to wear a thick glove when flipping the propeller. Use all fingers, except thumb, for the flipping operation.

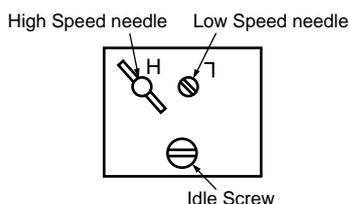
How to Stop the Engine

For stopping the engine, the black lead wire from the coil should be grounded to the engine body, or the throttle valve should be closed completely.



6. CARBURETOR ADJUSTMENT

The carburetor is provided with 3 adjust screws which are set to the best (approximately) positions by our company, but they may need a little adjustment depending on the temperature, atmospheric pressure (altitude), etc. of the area where the engine is used. Start the engine without making any adjustments. Make readjustments only when the engine shows any mal-functioning.



- Standard opening of each needle as follows:
 Low speed needle: $1\frac{1}{8} \pm \frac{1}{4}$
 High speed needle: $1\frac{3}{8} \pm \frac{1}{4}$

Idle Screw: Turning this screw clockwise increases the idling R.P.M. Turning it counterclockwise decreases the idling R.P.M.

Low speed needle: This is the fuel adjust screw (not the air screw). Turning this needle clockwise makes the mixture gas leaner and turning it counterclockwise makes it richer.

High speed needle: Turning this needle clockwise makes the mixture gas leaner and turning it counterclockwise richer. Set this needle at a position which is 1/4 open from the maximum R.P.M. position while the airplane is on ground.

[NOTE]

- Do not tighten the High and Low Speed needles too firmly.
- When the unit has just started and the engine is not warm enough, there may be insufficient acceleration and the engine may be stopped. Be sure to perform idling before operation.

7. ENGINE BREAK-IN

No specific break-in is required. The engine is gradually broken-in as it is used and the output is also increased gradually.

8. SERVICING

The engine can be disassembled or reassembled without any specific difficulties, but be careful of the following matters:

a. For disassembling, the special tools shown in the parts list are required in addition to the general tools. Be sure to use a new gasket when the crankcase and cylinder have been disassembled.

b. Removing rotor

- Screw in the stopper (P/N 3350-96220) in place of the spark plug. Then turn the rotor counterclockwise until the piston touches the stopper. Take care it can cause damage to the piston or connecting rod if the stopper is not screwed in to the bottom.
- Loosen and remove the rotor securing nut.
- Remove the rotor by using the puller (P/N 1490-96101). Do not hit on the crankshaft by a hammer, that can increase the runout of the shaft.

c. Assembling crankcase

- Apply grease on the oil seal lips and oil on the bearing.
- Assemble the crankshaft with a new gasket.

3. When both front and rear crankcases are tightened, the portion of gasket protruding on the cylinder mounted surface should be cut off with a knife until the gasket becomes flush with the cylinder mounted surface.

d. Assembling piston

Before assembling the piston, apply the oil on the small end bearing and piston, and set the piston ensuring that the arrow mark on the top of piston is directed toward the direction of exhaust port.

e. Assembling cylinder

- Coat the oil on the inner surface of cylinder.
- The piston is provided with a knock pin which stops the piston ring from turning. Set the splitted section of piston ring at the knock pin and assemble the cylinder ensuring not to break the piston ring.

f. Adjusting air gap of coil.

The air gap of coil should be adjusted to 0.3 mm (0.01").

g. Adjusting ignition time.

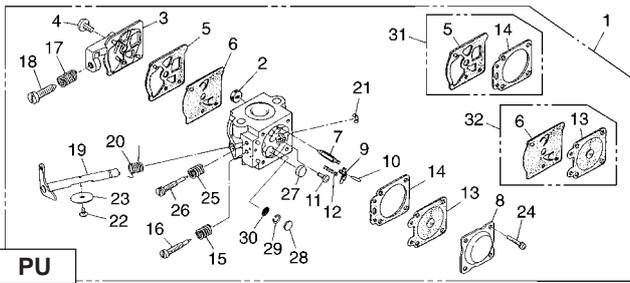
This engine with the point-less C.D.I. type requires no adjustments of ignition time.

9. SPECIFICATIONS

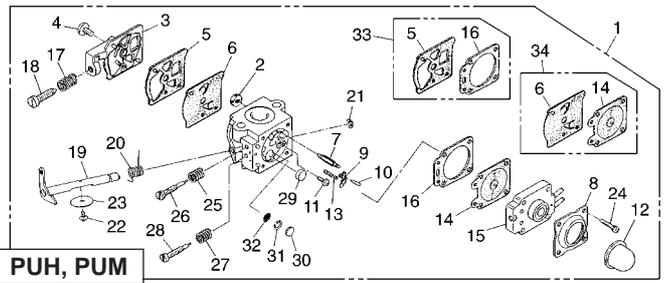
MODEL	ZENOAH G230PU	ZENOAH G230PUH	ZENOAH G230PUM
PURPOSE	Airplane	Helicopter	Boat
TYPE	Air cooled		Water cooled
DISPLACEMENT	22.5cc		
BORE × STROKE	32mm × 28mm		
COMPRESSION RATIO	8.6 : 1		
MAXIMUM OUTPUT	1.95PS/10500rpm [1.80PS/10500rpm]		2.25PS/11000rpm
OPERATING ENGINE SPEED	2000~10000rpm	3000~11000rpm	3500~15000rpm
IGNITION SYSTEM	CDI type Flywheel magneto		
CARBURETOR	WALBRO WA197A	WALBRO WA167A	WALBRO WA167A
AIR CLEANER	—	Dry type	—
STARTING	Hand flip	Recoil starter	
FUEL	2-cycle oil pre-mixed gasoline (Mix ratio 25~40:1)		
SPARK PLUG	NGK BMR7A or CHAMPION RCJ4		
DRY WEIGHT [* with standard muffler]	1.42Kg [*1.58Kg]	1.49Kg [*1.65Kg]	1.45Kg

Specifications are subject to change without notice.

10. PARTS LIST



PU



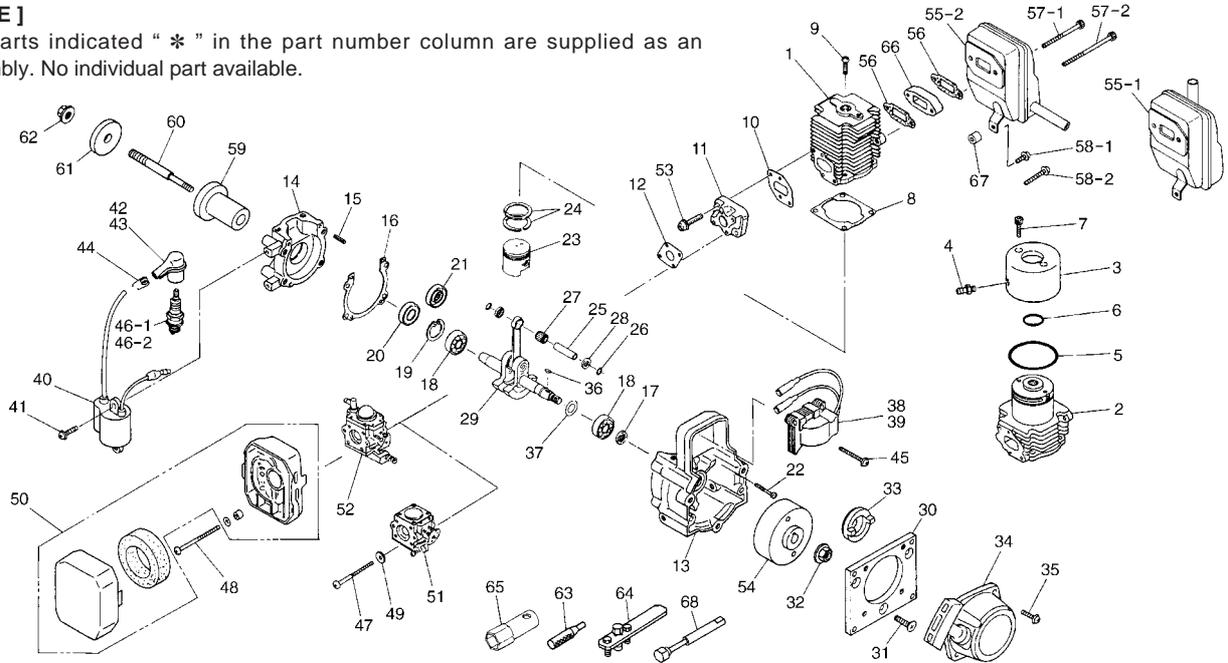
PUH, PUM

Index No.	Parts No.	Description	Q'ty /Unit	Index No.	Parts No.	Description	Q'ty /Unit
1	1145-81002	CARBURETOR ASSY	1	18	2630-81330	• SCREW	1
2	3306-81380	• SCREEN	1	19	1148-81371	• SHAFT ASSY	1
3	2630-81120	• PUMP COVER	1	20	2670-81410	• SPRING	1
4	3330-81130	• SCREW	1	21	1148-81390	• RING	1
5	3304-81140	• GASKET, pump	1	22	3310-81360	• SCREW	1
6	1172-81150	• DIAPHRAGM, pump	1	23	1282-81340	• THROTTLE VALVE	1
7	3310-81311	• VALVE, inlet	1	24	3310-81351	• SCREW	4
8	3310-81280	• METERING COVER	1	25	3080-81320	• SPRING	1
9	3310-81230	• METERING LEVER	1	26	1148-81331	• H NEEDLE	1
10	3310-81250	• PIN	1	27	1480-81420	• PLUG, welch	1
11	3310-81240	• SCREW	1	28	1790-81430	• PLUG	1
12	2670-81270	• SPRING	1	29	3304-81440	• RING	1
13	3310-81260	• DIAPHRAGM ASSY	1	30	3304-81450	• SCREEN	1
14	3310-81290	• GASKET, metering	1	31	3304-81910	• GASKET KIT	1
15	1491-81160	• SPRING	1	32	3304-81920	• DIAPHRAM KIT	1
16	1148-81171	• NEEDLE	1				
17	3350-81380	• SPRING	1				

Index No.	Parts No.	Description	Q'ty /Unit	Index No.	Parts No.	Description	Q'ty /Unit
1	1148-81002	CARBURETOR ASSY	1	18	2630-81330	• SCREW	1
2	3306-81380	• SCREEN	1	19	1148-81371	• SHAFT ASSY	1
3	2630-81120	• PUMP COVER	1	20	2670-81410	• SPRING	1
4	3310-81130	• SCREW	1	21	1148-81390	• RING	1
5	3304-81140	• GASKET, pump	1	22	3310-81360	• SCREW	1
6	1172-81150	• DIAPHRAGM, pump	1	23	1282-81340	• THROTTLE VALVE	1
7	3310-81311	• VALVE, inlet	1	24	1148-81530	• SCREW	4
8	1751-81520	• METERING COVER	1	25	3080-81320	• SPRING	1
9	3310-81230	• METERING LEVER	1	26	1148-81331	• H NEEDLE	1
10	3310-81250	• PIN	1	27	1491-81160	• SPRING	1
11	3310-81240	• SCREW	1	28	1148-81171	• NEEDLE	1
12	1751-81510	• PRIMER PUMP	1	29	1480-81420	• PLUG, welch	1
13	2670-81270	• SPRING	1	30	1790-81430	• PLUG	1
14	3310-81260	• DIAPHRAGM ASSY	1	31	3304-81440	• RING	1
15	1790-81210	• BODY ASSY	1	32	3304-81450	• SCREEN	1
16	1751-81470	• GASKET, metering	1	33	2630-06010	• GASKET KIT	1
17	3350-81380	• SPRING	1	34	3304-81920	• DIAPHRAM KIT	1

[NOTE]

The parts indicated " * " in the part number column are supplied as an assembly. No individual part available.



Index No.	Parts No.	Description	Q' ty per unit			Index No.	Parts No.	Description	Q' ty per unit			Index No.	Parts No.	Description	Q' ty per unit		
			PU	PUH	PUM				PU	PUH	PUM				PU	PUH	PUM
1	1148-12112	CYLINDER	1	1	0	25	1101-41310	PIN PISTON	1	1	1	49	1142-83110	SPACER 5x10x1.6	2	0	2
2	1160-12111	CYLINDER	0	0	1	26	1260-41320	RING SNAP	2	2	2	50	1751-82002	AIRCLEANER	0	1	0
3	1160-12210	JACKET	0	0	1	27	5500-41410	BEARING	1	1	1	51	1145-81002	CARBURETOR 197A	1	0	0
4	07851-00515	JOINT	0	0	2	28	1101-41340	WASHER THRUST	2	2	2	52	1148-81002	CARBURETOR 167A	0	1	1
5	07000-03038	O RING 3x38	0	0	1	29	1155-42000	CRANKSHAFT C	1	1	1	53	0263-90520	SCREW M5X20	2	2	2
6	1160-12320	O RING 1.5x19.5	0	0	1	30	1155-74110	PLATE MOUNT	1	1	1	54	1155-71110	ROTOR	1	1	1
7	1160-12330	BOLT M3x8	0	0	2	31	0262-10516	SCREW CM5x16	3	3	3	55-1	1155-15110	MUFFLER	1	0	0
8	1140-13121	GASKET CYL	1	1	1	32	1650-43230	NUT	1	0	0	55-2	1148-08010	MUFFLER	0	1	0
9	3310-12281	BOLT M5x20	4	4	4	33	1160-75210	PULLEY	0	1	1	56	1140-13141	GASKET MUFF	1	2	0
10	1140-13151	GASKET INSU	1	1	1	34	1861-75101	RECOIL ASSY	0	1	1	57-1	01252-30550	BOLT M5x50	2	0	0
11	1148-13161	INSULATOR	1	1	1	35	0263-30414	SCREW M4x14	0	4	4	57-2	01252-30560	BOLT M5x60	0	2	0
12	3330-14121	GASKET CARB	1	2	1	36	1000-43240	KEY	1	1	1	58-1	0263-30408	SCREW M4x8	1	0	0
13	1155-21101	CRANKCASE COMP	1	1	1	37	1140-43250	SHIM	0-2	0-2	0-2	58-2	0263-90416	SCREW M4x16	0	1	0
14	*	CRANKCASE (R)	1	1	1	38	2629-71210	COIL SO (GRAY)	1	0	0	59	1152-43260	HUB	1	0	0
14	*	CRANKCASE (F)	1	1	1	39	1160-71211	COIL SO (RED)	1	0	1	60	1152-43281	STUD	1	0	0
15	2629-21130	PIN	3	3	3	40	2629-71311	COIL IG	1	1	1	61	1152-43290	WASHER HUB	1	0	0
16	1140-21141	GASKET CASE	1	1	1	41	0263-30414	SCREW M4x14	2	2	2	62	3350-53410	NUT	1	0	0
17	2169-21210	SEAL 12x22x7	1	1	1	42	2629-72210	CAP PLUG (BLACK)	1	0	0	63	3350-96220	STOPPER (OPT)	1	1	1
18	1155-21240	BEARING	2	2	2	43	2850-72110	CAP PLUG (RED)	0	1	1	64	1490-96101	PULLER ASSY (OPT)	1	1	1
19	04065-02812	RING SNAP	1	1	1	44	1400-72121	SPRING	1	1	1	65	1110-91320	SOCKET	1	1	1
20	06034-06001	BEARING	1	1	0	45	0260-30422	SCREW M4x22	2	2	2	66	1145-15412	SPACER	0	1	0
21	1850-21220	SEAL OIL	0	0	1	46-1	1148-73120	SPARKPLUG BMR7A	1	0	0	67	1158-15420	SPACER	0	1	0
22	01252-30530	BOLT M5x30	4	4	4	46-2	1155-73120	SPARKPLUG RCJ4	0	1	1	68	1101-96220	ROD-A (OPT)	1	1	1
23	5600-41111	PISTON	1	1	1	47	0263-90550	SCREW M5x50	2	0	2						
24	1100-41210	RING PISTON	2	2	2	48	0263-30555	SCREW M5x55	0	2	0						

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