PUCH MAXI-S PRE-DELIVERY INSTRUCTIONS

1. Remove Maxi from crate.

2. Remove front wheel, seat, left and right pedal, tool kit, crank, and crank spindle (if necessary) from crate.

3. Remove all protective packing from bicycle.

4. Set bike on center stand.

5. Install front fender using four-5mm hex bolts and 4 split lock washers.

6. Install front wheel with speedometer drive on right hand side (operators view). Speedo drive should be horizontal and cable exit must face rear. Assure that brake stops on fork leg and brake backing plate interlock. Install fender brace on each side of axle and secure with flat washer and nut.

7. Install handlebar in steering stem and tighten. Handlebar should be perpendicular to front wheel and must not protrude more than 110mm (4.33") above top of steering stem nut. Control cables and electrical wiring should not cross from side to side.

8. Secure electrical wiring to handle bar at lower bends of bar using the two (2) tie-raps provided.

9. Install speedometer cable in speedometer drive on front wheel. Rotate the wheel to insure that the square end of the cable indexes properly into the drive.

10. Install the front brake cable at the wheel and adjust at the brake lever on the handlebar.

11. Install (if necessary) the crank spindle.

12. Install on the left hand side of crank spindle, one flat washer, one wave washer and the crank. Secure the crank using a wedge pin, one flat washer and one hex nut.

13. Install the right and left pedals and tighten securely.

14. Invert the seat on a flat surface and install the tool bag by the following procedure:

    a. Install one of the rectangular plastic retainers on each tool bag strap.

    b. Pass the tool bag straps through the loops under the seat.

    c. Pass the straps back through the retainers and then through the loops on the tool bag to hold the flap closed.

    d. Pull the straps tight and slide the retainers up against the loop under the seat.

 16T (Countershaft Drive Sprocket) 14T-NJ = 2 =

15. Install the seat, on seat post, in the frame. Adjust as required and secure.

16. Adjust rear brake cable (if necessary) using adjuster on brake lever on the handlebar.

17. Check adjustment of starter cable. There should be approximately 3/4" free-play measured at end of starter lever. If adjustment is required, loosen cable adjuster on right lower side of frame and lengthen or shorten cable as required.

18. Check the adjustment of the drive chain (1/2" slack midway between sprockets) and change if necessary by loosening the axle nuts and loosening or tightening the chain adjusters as required. Ensure that the rear wheel is centered between the two sides of the swingarm and retighten the axle nuts.

19. Check the chain guide on the pedal chain tensioner to ensure that it is pointing straight down. Adjust if necessary.

20. Check all other nuts and bolts and tighten if necessary.

21. Remove the gearbox oil filler plug on the right engine case. The oil should be up to the bottom of the hole. Refill if necessary using Automatic Transmission Fluid. Gearbox capacity is 170cc's.

22. Check tire pressure and inflate if necessary. Front tire 26 P.S.I.; Rear tire 32 P.S.I.

23. Put properly mixed fuel into fuel tank and test run engine. When engine is warm adjust idle speed so that bicycle does not creep when idling.

24. With engine running, adjust headlite using the following method:

    a. On a wall mark a vertical ine and a horizontal line crossing it at a height of 20".

    b. Place the bicycle on the level ground 20 ft. from the wall in line with the horizontal line.

    c. The high beam should center on the cross of the two lines. If not, loosen the headlamp bracket screws and adjust as necessary.

    d. The top of the low beam should be 2" below the horizontal line.

25. Thoroughly clean the bicycle.

* * * * * *

12. MAINTENANCE SCHEDULE:

The general and periodical maintenance required by the Puch motorized bicycle is clearly described in the Operator Manual, and should be performed at the mileage intervals shown in the following chart:

LUBRICATION & MAINTENANCE CHART

○ to be performed by owner

● to be performed by dealer at owner's expense

FREQUENCY

After miles	Every miles							OPERATIONS TO PERFORM
300	600	900	600	900	1800	3600	7200	
○			●					Tire wear and condition
	●					●	●	Throttle cable adjustment
	●	○		○		○	○	Check tire pressure
		○		○		○	○	Check gearbox oil level
	●			○		○	○	~~Clean~~ and lubricate chain
	●				○	○	○	Clean air filter
	●					○		Change gearbox oil
	●	○		○		○	○	Check spark plug
					●		●	Decarbonize engine
					○	○	○	Clean exhaust baffle
	●				○		○	Retighten screws and nuts
	●					○		Clean fuel valve and lines
	●				●		●	Clean carburetor
	●				●		●	Idle speed adjustment
	●					●		Check ignition timing
	●					●		Adjust clutch
	●			○	○	○	○	Check brakes / lining
	●					●		Check / lubricate hub bearings
	●						●	Steering bearing adjust / ~~lubrication~~
	●			○		○	○	Lubricate control cables

All

○ NOTE: Above time schedule applies to moped use on dry paved surfaces. If moped is used in wet, muddly or sandy areas, maintenance should be more frequent. Always check controls and lighting before any trip.

MAXI-S DELUXE:

Engine

Maximum output	2 hp. at 4500 r.p.m.
Maximum torque	3.15 ft. lb (0,38 mkp) at 3600 r.p.m.
Compression ratio	10.5
Bore	1.49 in. (38 mm)
Stroke	1.69 in. (43 mm)
Displacement	48.8 cc
Cooling	air cooled
Lubrication	regular gasoline / Ski-Doo oil 50 / 1
Carburetor	Bing 1 / 14
Main jet	64
Needle jet	2.20
Needle position	2nd notch from top
Ignition	magneto
Breaker point gap	0.0137 - 0.0177 in. (0.35 - 0.45 mm)
Ignition timing	0.00315 - 0.0472 in. (0.8 - 1.2 mm) full advance of BTDC
Spark plug	Champion L86 or Bosch W175 T1
Spark plug gap	0.016 - 0.020 in. (0.4 - 0.5 mm)
Dynamo	flywheel magneto Bosch RCP1 6V 22 / 5 / 18 W

Power Transmission

Gearbox	single speed automatic
Clutch	centrifugal
Primary transmission	helical gears
Secondary transmission	chain ½" x 3/8"
Pedalling chain	chain ½" x 1/8"

Gear Ratios

Engine rear	106: 21;i	5.05
Gear-rear wheel	45: 16;i	2.81
Pedalling transmission	28: 23;i	1.22

Chassis

Frame	shell type frame, pressed steel
Front wheel suspension	telescopic fork; 1.96 in. (50 mm) spring travel
Rear wheel suspension	shock absorbers: 1.96 in. (50 mm) spring travel
Brakes	internal expanding shoe brakes
Dia. of brake drum	3.14 in. (80 mm)
Width of brake lining	0.678 in. (20 mm)
Total effective braking surface	8.06 sq in. (52 cm^2)
Tire size front rear	2.00 x 17
Tire pressure front / rear	26 / 32 psi (1.8 / 2.25 Kg / cm^2)
Fuel tank	0.845 U.S. gal. (3.2 litres)

Weights and Dimensions

Wheelbase	42.75 in. (1086 mm)
Overall length	66.9 in. (1700 mm)
Overall width	27.1 in. (690 mm)
Overall height (without mirror)	39.3 in. (1000 mm)
Ground clearance	3.9 in. (100 mm)
Dry weight	86 lbs. (39 kg)

Electrical Equipment

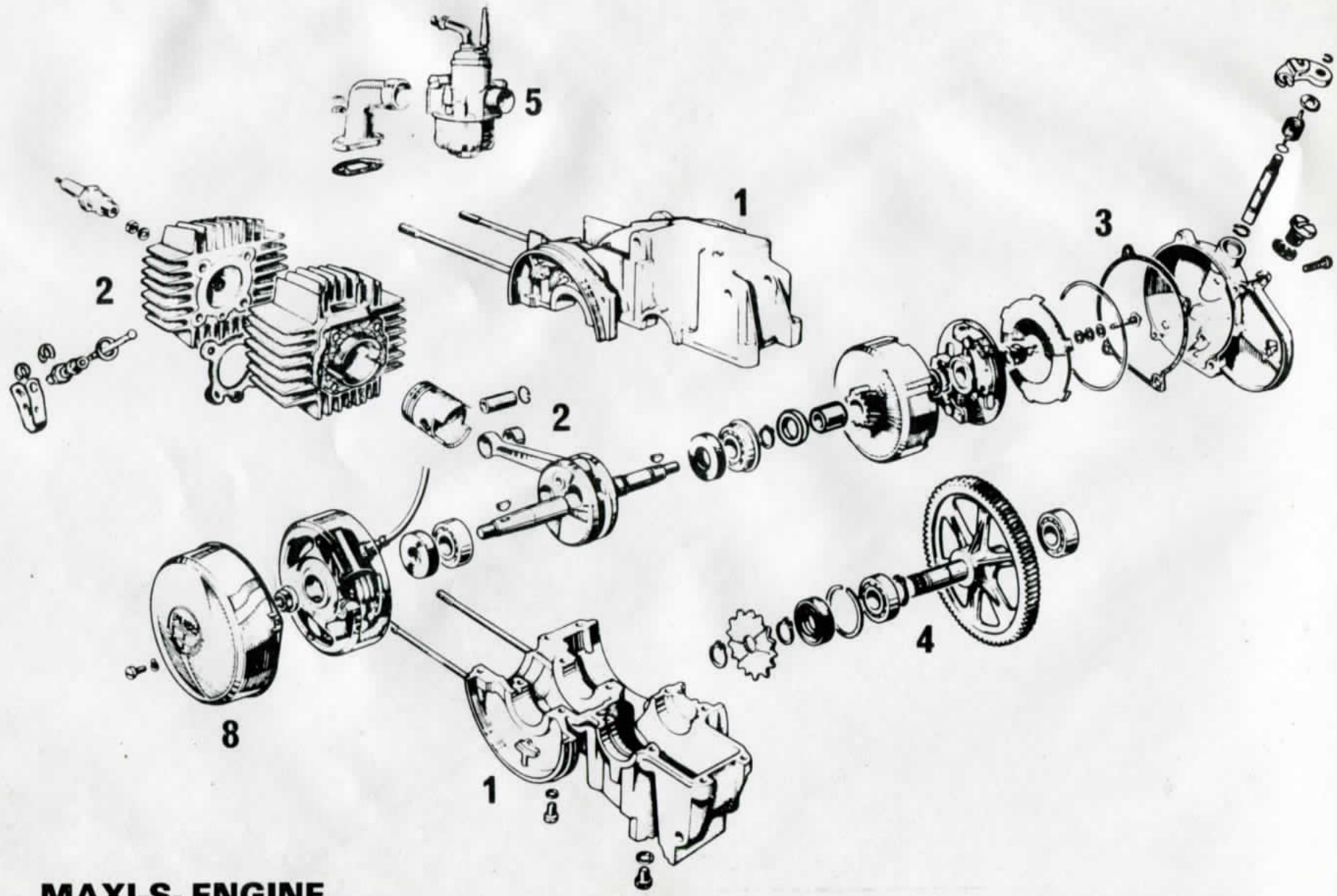
Electrical system	6 V
Magneto generator	Bosch RCP 1 6 V 25-5 / 18 W as from machine no. 1001 (10 W)
Ignition coil	outside the generator
Spark plug	Champion L 86, Bosch W 175 T 1, NGK B-6H or B-6HS
Headlamp bulb	6 V 15 W (10 W)
Rear light bulb	6 V 5-18 W
Speedometer bulb	6 V 1.2 W
Warning device	buzzer

Performance and Consumption

Top speed	28 mph (45 km / h)
Hill climbing ability	15%
Standard fuel consumption (DIN)	147 m / U.S. gal.

Lubricants

Engine	Ski-Doo oil 50 / 1 or good quality two stroke motor oil
Gearbox	7 oz. (170 cc) automatic transmission fluid
Control cables	Light machine oil
Wheel bearing	Lithium base grease
Chains	chain lubricant



MAXI-S- ENGINE
Group-Plan

TROUBLE SHOOTING CHECK CHART

HARD TO START OR WON'T START

Check fuel system for operation, air leaks or loose connections. Condition of fuel.

Check ignition for spark-if unit is getting fuel and has spark, but will not start-check condition of spark plug. If in doubt, replace spark plug.

Check engine compression by pulling starter lever and crank engine slowly.

(Compression varies with each engine model)

EXAMPLE

FUEL	IGNITION
Carb. Adj. too lean. Inoperative choke-contaminated fuel, empty gas tank.	Inoperative spark plugs-dirty or improperly gapped. Weak coil or condenser-open or high resistance in primary circuit. Open or high resistance in secondary circuit. Engine not timed properly.

ENGINE WON'T TURN OVER

1. corrosion
2. broken rod or crankshaft
3. improper assembly after repair
4. inoperative starter clutch
5. magneto jammed.

CRANKS OVER EXTREMELY EASILY

1. cylinder or piston scored
2. blown head gasket
3. broken, worn or seized piston rings
4. loose spark plug
5. loose head nuts
6. hole in piston
7. faulty crankcase gaskets or seals
8. warped or cracked cylinder head

WON'T START, BUT KICKS BACK AND BACKFIRES

1. fly wheel key sheared, or missing
2. improper timing
3. faulty breaker points or condenser

NO SPARK

1. faulty external ignition coil
2. faulty breaker or condenser
3. faulty leads
4. spark plug - faulty

WEAK SPARK

1. ignition switch
2. leaking leads or connections
3. weak internal coil (generating)
4. weak ignition coils
5. burnt or dirty breaker points.

ENGINE CAN BE STARTED BY CHOKING, BUT DIES WHEN CHOKE NOT USED

1. clogged fuel line or filter
2. dirty carburator
3. contaminated fuel
4. leaking manifold gasket
5. leaking fuel line
6. crankshaft seals leaking
7. pinched fuel line

RUNNING - LOW SPEED
-LOW SPEED MISS-DOESN'T IDLE SMOOTHLY

1. improper fuel mixture
2. leaking head gasket
3. defective spark plug
4. leaking crankshaft seal
5. improper ignition timing
6. weak coil or condenser
7. burnt or worn breaker points
8. loose ignition wires
9. ignition wires leaking

HIGH SPEED MISS

1. spark plug dirty or improperly gapped
2. wrong heat range
3. broken or shorted ignition wires or switch
4. improper ignition timing
5. weak coil or condenser
6. leaking head gasket
7. combustion chamber carboned
8. loose wires
9. improper breaker point gap
10. water in fuel
11. inlet needle sticking

POOR ACCELERATION - LOW R.P.M.

1. incorrect gas oil ratio
2. old fuel
3. obstructed fuel lines
4. restricted fuel filter
5. partially plugged pulse hole
6. incorrect carb adjustment
7. inlet needle and seat leaking or sticking
8. timing out of adjustment
9. improperly gapped spark plugs
10. loose-broken or badly insulated high tension leads.
11. weak ignition coil
12. piston rings stuck or piston scored

13. excessive carbon in combustion chamber
14. carboned exhaust system
16. loose muffler baffle

IDLES WELL-POOR ACCELERATION-DIES AT FUEL THROTTLE

1. obstructed H.S. jet
2. Float lever set too low
3. choke partly closed
4. fuel line or filter partly obstructed
5. fuel tank vent plugged
6. bad breakers-weak coil or seak condenser-leaking leads

ENGINE OVERHEATS

1. incorrect gas-lubrication ratio or improperly mixed fuel.
2. spark plug range too hot
3. engine not assembled correctly during repair (binding)
4. carburator mixture too lean
5. broken or dirty engine fins
6. incorrect timing
7. too much carbon formation

ENGINE SEIZES(STOPS SUDDENLY)

1. no lubrication in gas
2. rod on main bearing seized
3. cylinder or piston scored or seized
4. bent or broken rod or crankshaft
5. overheat

ENGINE KNOCKS EXCESSIVELY

1. incorrect gas-lubrication ratio
2. advanced timing
3. excessive carbon
4. worn or loose bearings
5. loose flywheel nut
6. flywheel hitting coil heels of coils
7. loose assemblies, bolts or screws

EXCESSIVE FUEL CONSUMPTION

1. carburator casting porous
2. carburator improperly adjusted

VIBRATES EXCESSIVELY OR RUNS ROUGH AND SMOKES

1. idle or high speed mixture too rich
2. float lever too high
3. engine mounts loose
4. improper lubrication fuel ratio
5. contaminated fuel
6. worn bearings
7. bent crankshaft

NO POWER UNDER HEAVY LOAD

1. faulty carburator
2. advanced ignition timing
3. faulty ignition coils
4. carbon build-up in combustion chamber
5. cylinder scored
6. seized rings
7. high speed adjustment lean
8. spark plugs fouled or faulty
9. leaks in fuel system
10. leaking manifold gaskets
11. leaking crankcase
12. contaminated fuel

HIGH SPEED BACKFIRING

1. lean carburator adjustment
2. carbon formation on spark plug
3. crankshaft oil seal leaking
4. leaking crankcase
5. defective condenser
6. breaker points improperly gapped.

PUCH-MAXI CARBURETOR OPERATION TROUBLESHOOTING TIPS

The carburetor on the Puch-Maxi is a Bing variable venturi (slide type) carburetor. The term variable venturi comes from the fact that the slide varies the amount of the restriction of air through the throat of the carburetor and the term venturi denotes a restriction in an air passage.

The components in the carburetor are simple. Please refer to the accompanying drawing for identification of each part number. The slide (item 11) is attached to a cable which is operated by the twist grip on the handlebar. Turning the twist grip either raises or lowers the slide and this in turn either increases or decreases the amount of air allowed to flow through the throat of the carburetor.

Protruding from the bottom of the slide is a tapered rod or "needle" (item 10). Its position in relation to the slide is determined by a small clip (item 9) which is inserted in one of four grooves at the top of the needle. This clip then rests on the inside of the bottom of the slide.

Underneath the slide in the body of the carburetor is a brass tube with a carefully selected inside diameter. This tube is called a "needle jet" (item 12). The needle hanging out of the slide hangs down into this needle jet.

Threaded into the bottom of the needle jet is a small brass plug called the "main jet" (item 13). The main jet has a precisely drill passage through it and is available in various sizes.

At the bottom of the carburetor is a removable aluminum fuel reservoir called the "float bowl" (item 20). The float bowl threads onto the base of the carburetor body. Inside the float bowl is a styrofoam ring which is called the "float" (item 17). There is a small brass arm attached to the float on one end and pinned to the carburetor on the other by the float pin (item 16). Underneath this arm is a steel "inlet needle" (item 14) which is inserted into a "needle seat" in the carburetor body.

The method of operation of the carburetor is as follows:

1. When the float bowl is empty and the fuel petcock on the fuel tank is opened, fuel flows through the fuel line and into the carburetor through the inlet banjo (item 21 and 24) and the filter screen (item 22) to the top of the inlet needle. Because the float bowl is empty, the float is hanging down and the needle is off its' seat allowing fuel to enter the bowl. As the bowl fills, the float rises to a predetermined level at which point the needle presses against its seat and the flow of fuel is stopped. As fuel is consumed by the engine the float goes up and down to maintain a constant level of fuel in the float bowl.

2. In order to start a cold engine a very rich fuel air mixture is required. (A rich mixture whould be 1 part of fuel to 5 parts of air or 5:1). This can be accomplished by either increasing the amount of fuel or decreasing the amount of air. In the Bing carburetor there is a choke plate (item 28) which when pushed down cuts off most of the airflow through the throat

of the carburetor and thus creates a very rich mixture. When the engine starts and the throttle is opened, the slide pushes the choke plate up out of the carburetor throat removing the restriction.

3. Since the airflow at each throttle opening position is always constant, a means must be provided to obtain the proper amount of fuel for the right mixture. (The average running mixture is 1 part of fuel to 20 parts of air or 20:1). From idle to approximately 3/4 throttle the fuel supply is determined by the needle and the needle jet.

   If the fuel mixture is too lean (not enough fuel) the clip on the needle should be lowered one notch in order to raise the needle farther out of the needle jet. This will result in more fuel being discharged at each throttle open position from idle to 3/4 throttle.

   If the fuel mixture is too rich (too much fuel) the clip on the needle should be raised one notch in order to lower the needle into the neddle jet. This will result in less fuel being discharged at each throttle open position from idle to 3/4 throttle.

   From 3/4 to full throttle the fuel supply is determined by the size of the main jet. A larger main jet will richen the mixture from 3/4 to full throttle and a smaller main jet will lean the mixture in the same range.

4. The setting of the float can also have an effect on the mixture. If the float is too far from the bottom of the carburetor when the needle closes the fuel reserve will be limited and the engine could run lean. If the float is too close to the carburetor body when the needle closes, the engine could run too rich and/or the carburetor could flood.

   To properly set the float level remove the float bowl and invert the carburetor. The float is properly adjusted when the top edge of the float is parallel with the gasket surface of the float bowl on the carburetor body. This setting is very important and should always be checked when mixture problems are encountered.

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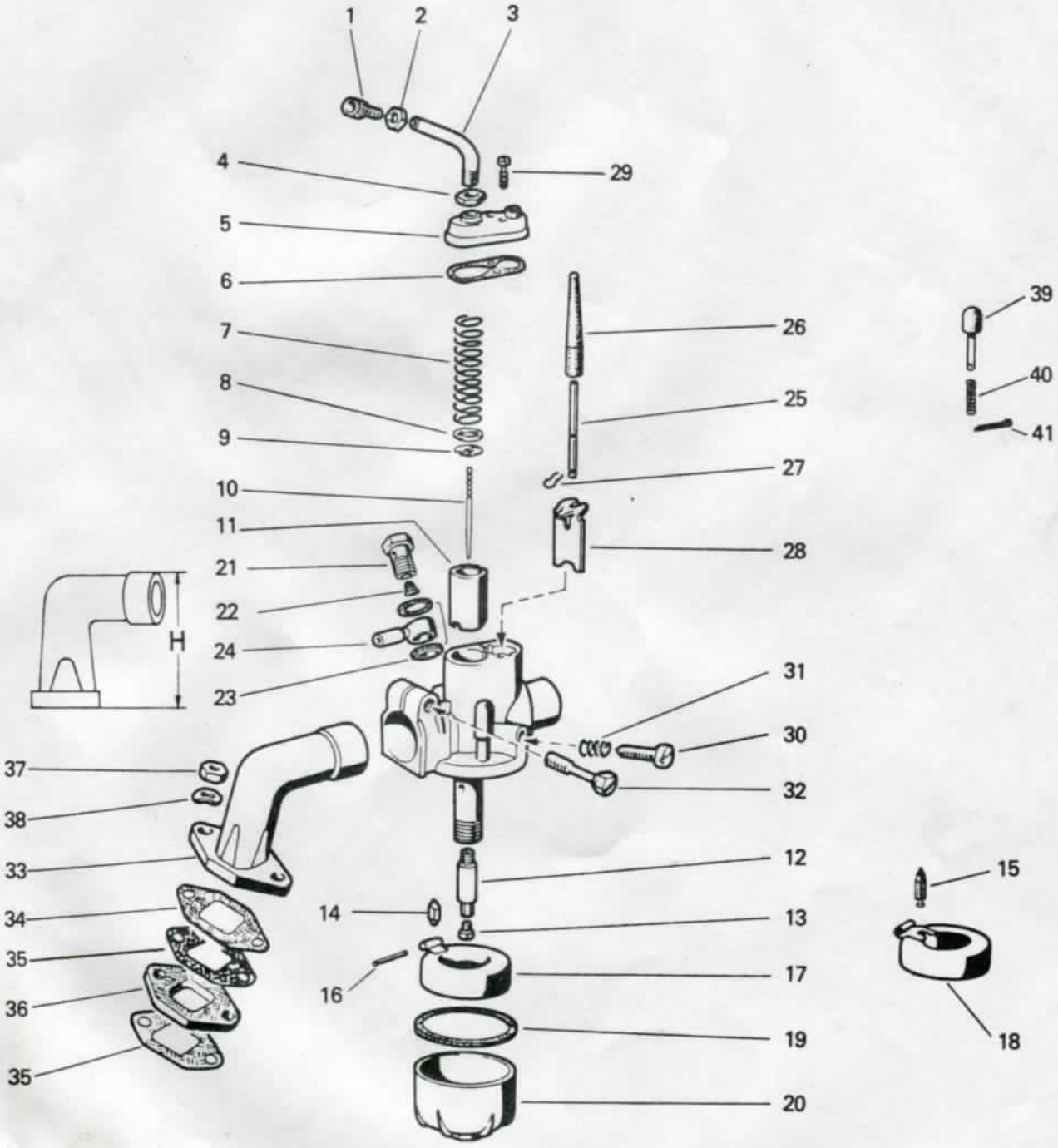
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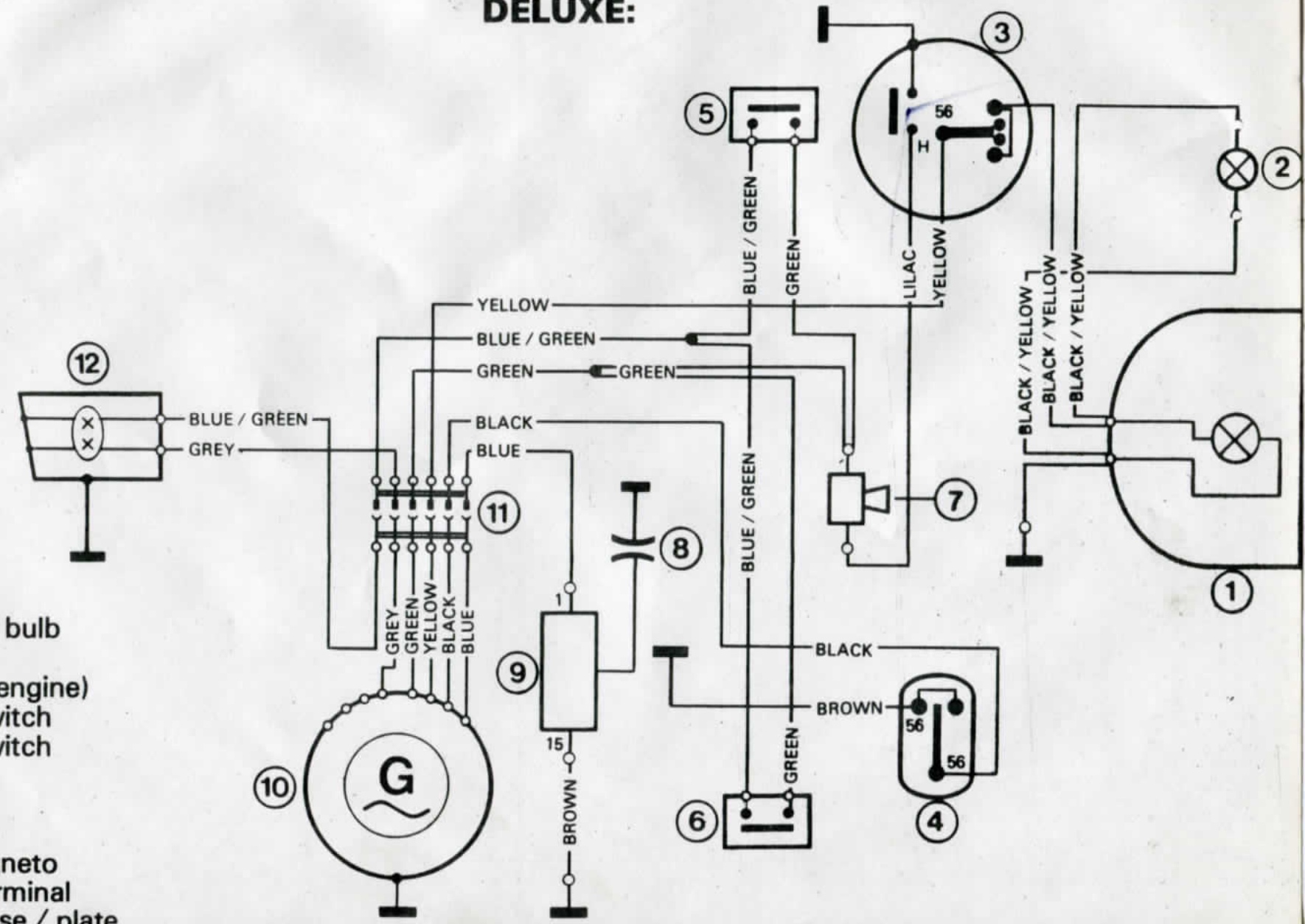

1 Headlamp
2 Speedometer bulb
3 Light switch
4 Stop switch (engine)
5 Brake light switch
6 Brake light switch
7 Horn
8 Spark plug
9 Ignition coil
10 Flywheel magneto
11 Conductor terminal
12 Tail stop license / plate

PUCH MAXI

Ignition System Troubleshooting Suggestions

When looking for problems in the ignition system, it is quickest and easiest to check and eliminate each item in the system completely before passing on to the next item. The following sequence of checks should be helpful in finding the source of ignition problems.

1. Replace the sparkplug. A sparkplug that fires when laid against the cylinder head may not fire when subjected to engine compression. Check for spark.

2. Remove the R.H. chainguard and locate the black wire running from the engine stop switch to the junction block. Remove this wire and you eliminate the possiblity of a faulty engine stop switch. Check for spark.

3. Verify the connections of the blue wire in terminal #1 and both ends of the ground wire in terminal #3. If faulty, repair and check for spark.

4. Remove the sparkplug wire from the high tension post and inspect the wire end visually to see if the screw in the terminal has been in contact with the copper wire in the core. If not, repair and check for spark.

5. Attach a continuity tester to the coil end of the sparkplug wire and to the connector inside the sparkplug cap. Check for continuity.

6. Obtain from stock a new ignition coil. Install the sparkplug wire and the blue and brown wires from the old coil into the new coil. Attach to sparkplug and check for spark. NOTE: It is not necessary to remove old coil to perform test.

7. Remove the magneto cover and extract the flywheel. Inspect the condition of the breaker points. If there are signs of arcing (eg. blued points, carbon colored spots, etc.) the condensor is probably faulty and both the breaker points and condensor should be replaced. (When replacing the breaker points and condensor follow steps 8 and 9 as well). Retime the engine and check for spark.

8. Remove the ignition backing plate and check the wiring behind the plate for pinched, broken or bare wires. Repair, retime the engine and check for spark.

9. Insert a piece of cardboard (eg. a matchbook cover) between the breaker point faces to insulate them. Attach one lead of an ohmmeter to the wire terminal on the generating coil. Attach the other lead to a suitable ground on the ignition backing plate. The generating coil internal resistance should be 1 OHM $\pm$10%. If the coil is defective there will be a high resistance reading or an open circuit. Replace coil, retime engine and check for spark. NOTE: All electrical connections should be made using a resin core, electrical type solder. Acid core solder will cause a repeat failure.

TIMING PROCEDURE FOR PUCH MAXI

1. Remove 2 screws securing magneto cover and remove cover.

2. Remove R.H. chain guard.

3. Remove spark plug.

4. Visually inspect condition of breaker points for signs of burning or deposits on contact surfaces. Replace if necessary. NOTE: Breaker point contact surfaces should never be filed.

5. Make sure that contact surfaces are properly aligned, then pass a piece of cardboard (eg. a matchbook cover) between contact surfaces or spray with contact cleaner to remove any oily residue.

6. With breaker points in fully open position use a feeler gauge to determine gap between contact surfaces. If necessary, loosen attachment screw and reset gap to proper specifications. Retighten attachment screw and recheck gap. PROPER BREAKER POINT GAP SHOULD BE .014" to .018".

7. Install dial indicator in spark plug hole. Bring piston to TOP DEAD CENTER (T.D.C.), then back off to determine if indicator plunger movement is at least 1.5mm (.060"). If not, insert dial indicator deeper into adapter and recheck.

8. Set engine kill switch on handlebar to "RUN" position. Remove BLUE wire from terminal #1 of black Ignition Coil.

9. Attach one lead of tester (buzzer, continuity light, etc.) to BLUE wire which was removed from ignition coil. Connect the other lead of tester to a suitable ground on the engine (cylinder fin, engine case screw, etc.)

10. Turn the flywheel until the piston is at T.D.C.. Rotate the flywheel opposite of the direction of rotation (counter clockwise) about 1.5mm.

11. Turn the flywheel slowly in the direction of rotation (clockwise) until the points start to break (indicated by a decrease in buzzer volume or the light dimming.) Check the reading on the dial indicator to determine if the points are breaking when the piston is the proper distance before T.D.C. (B.T.D.C.). BREAKER POINTS SHOULD OPEN WHEN THE PISTON IS BETWEEN 0.8mm and 1.2mm (.032" and .048") B.T.D.C.

12. If the points break too far B.T.D.C. (eg. 1.3mm, .052") the timing is Advanced. To change the timing (Retard it), loosen the three (3) screws attaching the ignition backing plate to the crankcase and turn the backing plate in a clockwise direction. Retighten the backing plate screws and repeat steps #10 and #11.

    If the points break too close to T.D.C. (eg. 0.7mm, .028") the timing is Retarded. To change the timing (advance it), loosen the three (3) screws attaching the ignition backing plate to the crankcase and turn the backing plate in a counter-clockwise direction. Retighten the backing plate screws and repeat steps #10 and #11.

    Repeat steps #10-12 until the points break when the piston is between 0.8mm and 1.2mm (.032" to .048") B.T.D.C.

13. Remove the dial indicator from the spark plug hole and replace the spark plug, reconnect the blue wire to the ignition coil, replace the R.H. chain guard and the magneto cover.

    NOTE: In some cases it may not be possible to time the engine within the specifications because the breaker points are set towards their upper or lower limits (.104" or .018").

    If the backing plate is turned clockwise to its' limit and the timing is still too advanced (too far B.T.D.C.), decrease the breaker point gap and try again.

    If the backing plate is turned counterclockwise to its' limit and the timing is still too retarded (too close to T.D.C.), increase the point gap and try again.

    If it is found necessary to open the point gap over .018" or close the gap below .014" the breaker points should be replaced.

CORRECT PROCEDURES

FOR SPARK PLUG REMOVAL

The hotter the engine, the more care is required in removing the spark plug. This is especially critical with aluminum cylinder heads, such as those frequently found in recreational vehicle engines. According to engineers when the engine is operating, both the spark plug and the engine head near the plug are at about the same temperature - the spark plug perhaps a little hotter. When the engine is shut off the aluminum head cools rapidly, closing in tightly on the slower cooling steel spark plug shell. The resulting tightness between the spark plug and the head, plus aluminum's softness and tendency to adhere to steel, could definitely result in stripping of the aluminum heads if the spark plugs are carelessly removed.

To illustrate the problems which can occur, a test was conducted with various installation and removal procedures using a popular make snowmobile engine with aluminum heads. The engineers deliberately overtightened the plugs to 25 lb-ft upon installation to increase the severity of the tests.

After the engine was run at operating temperatures for thirty minutes, the following data was obtained:

1) Installed hot, removed cold - 19 lb-ft removal torque
2) Installed hot, removed hot - 27 lb-ft removal torque
3) Installed cold, removed cold - 31 lb-ft removal torque
4) Installed cold, removed hot - 45 lb-ft removal torque

At the higher removal torques of 40 lb-ft and above there is a very real danger of thread damage in aluminum cylinder heads. For this reason it is recommended that the engine be allowed to cool before removing spark plugs. The engineers suggest that care be taken to install plugs properly in compliance with the torque values in specification charts.

TORQUE INDICATING WRENCHES
AND
RECOMMENDATIONS FOR PROPER USAGE

Why you should use a torque wrench

Manufacturers of mechanical equipment have determined by experience that better performance and longer life can be obtained by tightening certain bolts or groups of bolts to a uniform degree of tightness. Even an experienced mechanic cannot tighten a group of bolts, such as cylinder head bolts, evenly; but with a Torque Indicating Wrench, an unskilled apprentice can quickly and accurately tighten bolts uniformly to manufacturers recommendation. Modern high compression engines and today's exacting manufacturing and repair standards demand accurate torque indicating tools.

What is torque?

Torque is twist and is usually measured in foot pounds. For example: Imagine yourself pulling with a force of ten pounds at right angle to the handle of a wrench and at a distance of 1 1/2 feet from a bolt being tightened. The torque or twist exerted would be ten pounds multiplied by 1 1/2 feet or 15 foot pounds. Changing the distance of grip on the wrench, or changing the strength of pull, or changing the angle of pull, will change the torque applied.

Easy to use

The Torque Indicating Wrenches instantly make all of the calculations for you. Its' simplified rugged construction uses a centerless ground alloy steel beam which accurately indicates on a clearly marked scale without any fragile or complicated mechanisms. The slide marker over the scale can be set to the proper point and after that it is only necessary to watch the pointer and the marker which can easily be done from practically any position.

Torquing hints

1. Always work on clean threads - rust and dirt will influence your reading.

2. If threads are oiled, reduce torque applied by 10%. For example- if you wish to pull 100 foot pounds, apply 90 foot pounds.

3. Never tighten a fastener completely with a wrench and then check the torque. Use the torque wrench in the final tightening stages.

The torque reading in foot pounds is the torque required to bring any given bolt to its maximum safe stress point.

Tension is the pressure in pounds per square inch (P.S.I.) that the bolt material can stand before stretching occurs.

For example - brass parts would determine the tension applied rather than the bolts being used.

Torque Values for Engine (± 10%)

Cylinder head	1.0 KG / m (7.24 ft / lb)
Nut for flywheel	3.5 Kg / m (25.31 ft / lb)
Nut for clutch fixing	2.7 Kg / m (19.53 ft / lb)
Housing screws	.79 Kg / m (5.78 ft / lb)
Housing cover screws	.79 Kg / m (5.78 ft / lb)
Screws for engine fixing	3.2 Kg / m (23.14 ft / lb)

Torque values for frame (± 10%)

Front / rear spindle fixing	2.7 Kg / m (19.53 ft / lb)
Rear suspension unit holder, top	2.3 Kg / m (16.66 ft / lb)
Rear suspension unit holder, bottom	1.2 Kg / m (8.69 ft / lb)
Rear fork bearing	4.0 Kg / m (28.98 ft / lb)
Handlebar fixing	2.7 Kg / m (19.53 ft / lb)
Crank fixing	.70 Kg / m (5.07 ft / lb)
Mudguard fixing brackets	.60 Kg / m (4.34 ft / lb)

Millimeters to inches

mm.	Inches	mm.	Inches	mm.	Inches	mm.	Inches	mm.	Inches
.01	.00039	.41	,01614	.81	.03189	21	.82677	61	2.40157
.02	.00079	.42	.01654	.82	.03228	22	.86614	62	2.44094
.03	.00118	.43	.01693	.83	.03268	23	.90551	63	2.48031
.04	.00157	.44	.01732	.84	.03307	24	.94488	64	2.51968
.05	.00197	.45	.01772	.85	.03346	25	.98425	65	2.55905
.06	.00236	.46	.01811	.86	.03386	26	1.02362	66	2.59842
.07	.00276	.47	.01850	.87	.03425	27	1.06299	67	2.63779
.08	.00315	.48	.01890	.88	.03465	28	1.10236	68	2.67716
.09	.00354	.49	.01929	.89	.03504	29	1.14173	69	2.71653
.10	.00394	.50	.01969	.90	.03533	30	1.18110	70	2.75590
.11	.00433	.51	.02008	.91	.03583	31	1.22047	71	2.79527
.12	.00472	.52	.02047	.92	.03622	32	1.25984	72	2.83464
.13	.00512	.53	.02087	.93	.03661	33	1.29921	73	2.87401
.14	.00551	.54	.02126	.94	.03701	34	1.33858	74	2.91338
.15	.00591	.55	.02165	.95	.03740	35	1.37795	75	2.95275
.16	.00630	.56	.02205	.96	.03780	36	1.41732	76	2.99212
.17	.00669	.57	.02244	.97	.03819	37	1.45669	77	3.03149
.18	.00709	.58	.02283	.98	.03858	38	1.49606	78	3.07086
.19	.00748	.59	.02323	.99	.03898	39	1.53543	79	3.11023
.20	.00787	.60	.02362	1.00	.03937	40	1.57480	80	3.14960
.21	.00827	.61	.02402	1	.03937	41	1.61417	81	3.18897
.22	.00866	.62	.02441	2	.07874	42	1.65354	82	3.22834
.23	.00906	.63	.02480	3	.11811	43	1.69291	83	3.26771
.24	.00945	.64	.02520	4	.15748	44	1.73228	84	3.30708
.25	.00984	.65	.02559	5	.19685	45	1.77165	85	3.34645
.26	.01024	.66	.02598	6	.23622	46	1.81102	86	3.38582
.27	.01063	.67	.02638	7	.27559	47	1.85039	87	3.42519
.28	.01102	.68	.02677	8	.31496	48	1.88976	88	3.46456
.29	.01142	.69	.02717	9	.35433	49	1.92913	89	3.50393
.30	.01181	.70	.02756	10	.39370	50	1.96850	90	3.54330
.31	.01220	.71	.02795	11	.43307	51	2.00787	91	3.58267
.32	.01260	.72	.02835	12	.47244	52	2.04724	92	3.62204
.33	.01299	.73	.02874	13	.51181	53	2.08661	93	3.66141
.34	.01339	.74	.02913	14	.55118	54	2.12598	94	3.70078
.35	.01378	.75	.02953	15	.59055	55	2.16535	95	3.74015
.36	.01417	.76	.02992	16	.62992	56	2.20472	96	3.77952
.37	.01457	.77	.03032	17	.66929	57	2.24409	97	3.81889
.38	.01496	.78	.03071	18	.70866	58	2.28346	98	3.85826
.39	.01535	.79	.03110	19	.74803	59	2.32283	99	3.89763
.40	.01575	.80	.03150	20	.78740	60	2.36220	100	3.93700

METRIC TO AMERICAN CONVERSION TABLE

MULTIPLY	BY	TO OBTAIN
(LINEAR)		
Millimeters (mm)	.03937	Inches
Millimeters (mm)	.00328	Feet
Centimeters (cm)	.3937	Inches
Centimeters (cm)	.0328	Feet
(DISTANCE)		
Meters (m)	39.37	Inches
Meters (m)	3.28	Feet
Kilometers (km)	3281	Feet
Kilometers (km)	.6214	Miles
(AREA)		
Square Centimeters (cm^2)	.155	Square Inches
Square Centimeters (cm^2)	.001076	Square Feet
Square Meters (m^2)	10.76	Square Feet
(VOLUME)		
Cubic Centimeters (cc)	.06102	Cubic Inches
Liters (1)	61.02	Cubic Inches
(LIQUID CAPACITY)		
Liters (1)	2.113	Pints
Liters (1)	1.057	Quarts
Liters (1)	.2642	Gallons
Cubic Centimeters (cc)	.0338	Fluid Ounces
U.S. Gallons	1.2	Imperial gals.
Imperial gallons	4.537	Liters
Imperial gallons	277.274	cu. in.
(WEIGHT)		
Grams (gm)	.03527	Ounces
Kilograms (kg)	2.205	Pounds
(OTHER)		
Kilogram-Meters (kg-m)	7.233	Foot-Pounds (Ft-Lbs.)
Kilometers/Liters (km/l)	2.352	Miles/Gallon (mpg)
Metric Horsepower (ps)	1.014	Brake Horsepower (bhp)

AMERICAN TO METRIC CONVERSION TABLE

MULTIPLY	BY	TO OBTAIN
(LINEAR)		
Inches (in.)	25.4	Millimeters
Inches (in.)	2.54	Centimeters
Feet (ft.)	304.8	Millimeters
Feet (ft.)	30.48	Centimeters
(DISTANCE)		
Inches (in.)	.0254	Meters
Feet (ft)	.3048	Meters
Miles (mi.)	1.609	Kilometers
(AREA)		
Square Inches (in^2)	6.452	Square Centimeters
Square Feet (sq. ft)	929	Square Centimeters
(VOLUME)		
Cubic Inches (cu. in.)	16.39	Cubic Centimeters
Cubic Inches (cu. in.)	.01639	Liters
(LIQUID CAPACITY)		
Pints (pt.)	.4732	Liters
Quarts (qt.)	.9463	Liters
Gallons (gal.)	3.785	Liters
Fluid Ounces (fl. oz.)	29.58	Cubic Centimeters
U.S. Gallons	1.2	Imperial gals.
Imperial gallons	4.537	Liters
Imperial gallons	277.274	cu.in.
(WEIGHT)		
Ounces (oz.)	28.35	Grams
Pounds (lb.)	.4536	Kilograms
(OTHER)		
Foot-Pounds (Ft.-lbs.)	.1383	Kilogram-Meters (kg-m)
Miles/Gallon (mpg)	.4252	Kilometers/Liter (km/l)
Brake horsepower (bhp)	.9862	Metric Horsepower (ps)