

# Appendix

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## Additional Considerations for Racing

This motorcycle has been manufactured for use in a reasonable and prudent manner and as a vehicle only. However, some may wish to subject this motorcycle to abnormal operation, such as would be experienced under racing conditions. **KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR MOTORCYCLE AND ITS OPERATION.**

Racing should be done under supervised conditions, and recognized sanctioning bodies should be contacted for further details. For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important notes.

- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are used in competition or related uses. Please read the warranty carefully.
- Motorcycle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.
- When the motorcycle is operated on public roads, it **must** be in its original state in order to ensure safety and compliance with applicable regulations.

### Carburetor:

Sometimes an alteration may be desirable for improved performance under special conditions when proper mixture is not obtained after the carburetor has been properly adjusted, and all parts cleaned and found to be functioning properly.

If the engine still exhibits symptoms of overly rich or lean carburetion after all maintenance and adjustments are correctly performed, the main jet can be replaced with a smaller or larger one. smaller numbered jet gives a leaner mixture and larger numbered jet a richer mixture.

### Spark Plug:

The spark plug ignites the fuel and air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plug must be used, and the spark plug must be kept clean and the gap adjusted.

Tests have shown the plug listed in the "General Information" chapter to be the best plug for general use.

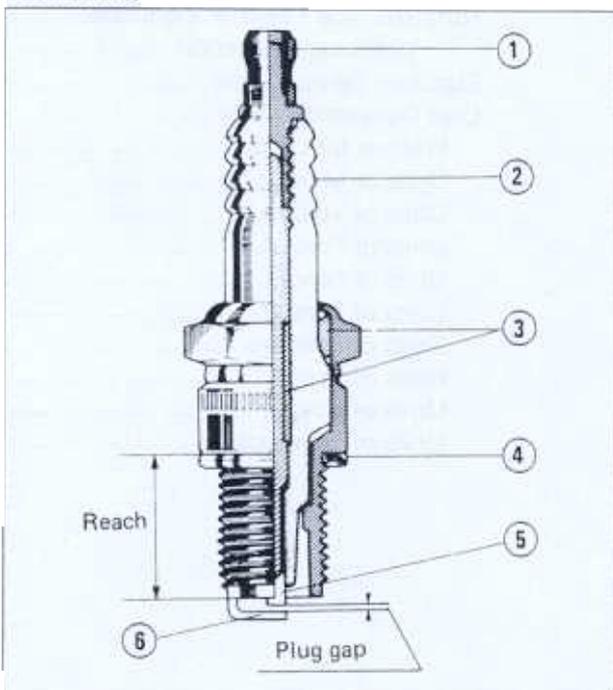
Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of the correct heat range is used should be determined by removing and inspecting the plug.

When a plug of the correct heat range is being used, the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400 ~ 800°C (750 ~ 1,450°F) and can be judged by noting the condition and color of the ceramic insulator around the center electrode. If the ceramic is clean and of a light brown color, the plug is operating at the right temperature.

A spark plug for higher operating temperatures is used for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too cool a heat range is used – that is, a "cold" plug that cools itself too well – the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramic insulator.

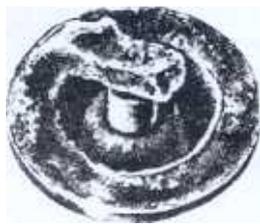
The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will prevent an effective spark. Carbon build-up on the plug can also cause other troubles. It can heat up red-hot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

### Spark Plug



- |              |                     |
|--------------|---------------------|
| 1. Terminal  | 4. Gasket           |
| 2. Insulator | 5. Center Electrode |
| 3. Cement    | 6. Side Electrode   |

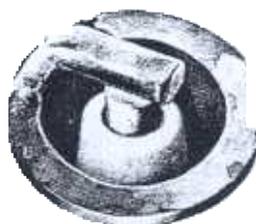
**Spark Plug Condition**



Carbon Fouling



Oil Fouling



Normal Operation



Overheating

**Spark Plug Inspection**

- Remove the spark plug and inspect the ceramic insulator.
- ★ Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is black, it indicates that the plug is firing at too low a temperature, so the next hotter type should be used instead. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

**Standard Spark Plug Threads**

Diameter:	10 mm
Pitch:	1.0 mm
Reach:	19 mm

**NOTE**

- The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).

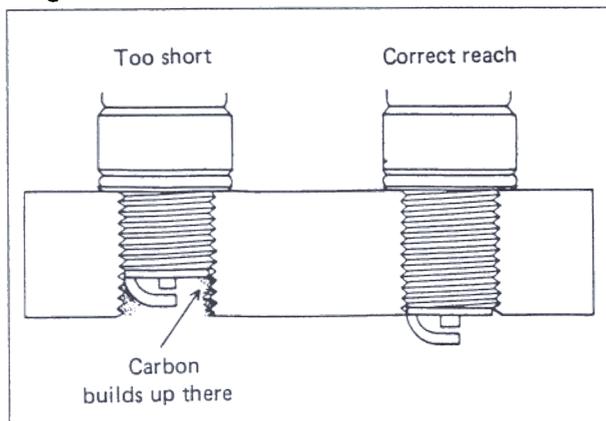
**CAUTION**

If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same type electrode (regular type or projected type) as the standard plug.

If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.

If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.

**Plug Reach**



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**Troubleshooting Guide**


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**NOTE**

○ *This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

**Engine Doesn't Start, Starting Difficulty:****Starter motor not rotating:**

- Starter lockout or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

**Starter motor rotating but engine doesn't turn over:**

- Starter motor clutch trouble

**Engine won't turn over:**

- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure

**No fuel flow:**

- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

**Engine flooded:**

- Fuel level in carburetor float bowl too high
- Float valve worn or stuck open
- Starting technique faulty  
(When flooded, crank the engine with the throttle fully open to allow more air to reach the engine.)

**No spark; spark weak:**

- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- IC igniter trouble
- Neutral, starter lockout, or side stand switch trouble
- Pickup coil trouble
- Ignition coil trouble
- Ignition or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

**Compression Low:**

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance

- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

**Poor Running at Low Speed:****Spark weak:**

- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Pickup coil trouble
- Ignition coil trouble

**Fuel/air mixture incorrect:**

- Pilot screw maladjusted
- Pilot jet, or air passage clogged
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter plunger stuck open
- Fuel level in carburetor float bowl too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner duct loose

**Compression low:**

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head warped
- Cylinder head gasket damaged
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

**Other:**

- IC igniter trouble
- Carburetors not synchronizing
- Vacuum piston doesn't slide smoothly
- Engine oil viscosity too high
- Drive train trouble
- Brake dragging

**Poor Running or No Power at High Speed:****Firing incorrect:**

- Spark plug dirty, broken, or maladjusted
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Pickup coil trouble
- Ignition coil trouble

**Fuel/air mixture incorrect:**

Starter plunger stuck open  
 Main jet clogged or wrong size  
 Jet needle or needle jet worn  
 Air jet clogged  
 Fuel level in carburetor float bowl too high or too low  
 Bleed holes of needle jet holder or needle jet clogged  
 Air cleaner clogged, poorly sealed, or missing  
 Air cleaner duct poorly sealed  
 Water or foreign matter in fuel  
 Carburetor holder loose  
 Fuel tank air vent obstructed  
 Fuel tap clogged  
 Fuel line clogged  
 Fuel filter clogged

**Compression low:**

Spark plug loose  
 Cylinder head not sufficiently tightened down  
 No valve clearance  
 Cylinder, piston worn  
 Piston ring bad (worn, weak, broken, or sticking)  
 Piston ring/groove clearance excessive  
 Cylinder head gasket damaged  
 Cylinder head warped  
 Valve spring broken or weak  
 Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

**Knocking:**

Carbon built up in combustion chamber  
 Fuel poor quality or incorrect  
 Spark plug incorrect  
 IC igniter trouble

**Miscellaneous:**

Throttle valve won't fully open  
 Vacuum piston doesn't slide smoothly  
 Brake dragging  
 Clutch slipping  
 Overheating  
 Engine oil level too high  
 Engine oil viscosity too high  
 Drive train trouble

**Overheating:****Firing incorrect:**

Spark plug dirty, broken, or maladjusted  
 Spark plug incorrect  
 IC igniter trouble

**Fuel/air mixture incorrect:**

Main jet clogged or wrong size  
 Fuel level in carburetor float bowl too low  
 Carburetor holder loose  
 Air cleaner poorly sealed, or missing  
 Air cleaner duct poorly sealed  
 Air cleaner clogged

**Compression high:**

Carbon built up in combustion chamber

**Engine load faulty:**

Clutch slipping  
 Engine oil level too high

Engine oil viscosity too high

Drive train trouble

Brake dragging

**Lubrication inadequate:**

Engine oil level too low  
 Engine oil poor quality or incorrect

**Gauge incorrect:**

Water temperature gauge broken  
 Water temperature sensor broken

**Coolant incorrect:**

Coolant level too low  
 Coolant deteriorated

**Cooling system component incorrect:**

Radiator clogged  
 Thermostat trouble  
 Radiator cap trouble  
 Thermostatic fan switch trouble  
 Fan relay trouble  
 Fan motor broken  
 Fan blade damaged  
 Water pump not turning  
 Water pump impeller damaged

**Over Cooling:****Gauge incorrect:**

Water temperature gauge broken  
 Water temperature sensor broken

**Cooling system component incorrect:**

Thermostatic fan switch trouble  
 Thermostat trouble

**Clutch Operation Faulty:****Clutch slipping:**

Friction plate worn or warped  
 Steel plate worn or warped  
 Clutch spring broken or weak  
 Clutch slave cylinder trouble  
 Clutch hub or housing unevenly worn

**Clutch not disengaging properly:**

Clutch plate warped or too rough  
 Clutch spring compression uneven  
 Engine oil deteriorated  
 Engine oil viscosity too high  
 Engine oil level too high  
 Clutch housing frozen on drive shaft  
 Clutch release mechanism trouble  
 Clutch hub locknut loose

**Gear Shifting Faulty:****Doesn't go into gear; shift pedal doesn't return:**

Clutch not disengaging  
 Shift fork bent or seized  
 Gear stuck on the shaft  
 Shift return spring weak or broken  
 Shift return spring pin loose

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- Pawl spring broken
- Shift mechanism arm broken

### **Jumps out of gear:**

- Shift fork worn
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Neutral positioning pin spring weak or broken
- Shift fork pin worn
- Drive shaft, output shaft, and/or gear splines worn

### **Overshifts:**

- Neutral positioning lever spring weak or broken
- Pawl spring broken

## **Abnormal Engine Noise:**

### **Knocking:**

- IC igniter trouble
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- Overheating

### **Piston slap:**

- Cylinder/piston clearance excessive
- Cylinder, piston worn
- Connecting rod bent
- Piston pin, piston pin hole worn

### **Valve noise:**

- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing worn

### **Other noise:**

- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring worn, broken, or stuck
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mounts loose
- Crankshaft bearing worn
- Primary gear worn or chipped
- Camshaft chain tensioner trouble
- Camshaft chain, sprocket, guide worn

## **Abnormal Drive Train Noise:**

### **Clutch noise:**

- Weak or damaged rubber damper
- Clutch housing/friction plate clearance excessive
- Clutch housing gear worn

### **Transmission noise:**

- Bearings worn
- Transmission gears worn or chipped
- Metal chips jammed in gear teeth
- Engine oil insufficient

### **Drive chain noise:**

- Drive chain adjusted improperly
- Chain worn
- Rear and/or engine sprocket worn
- Chain lubrication insufficient

- Rear wheel misaligned

## **Abnormal Frame Noise:**

### **Front fork noise:**

- Oil insufficient or too thin
- Spring weak or broken

### **Rear shock absorber noise:**

- Shock absorber damaged

### **Disc brake noise:**

- Pad installed incorrectly
- Pad surface glazed
- Disc warped
- Caliper trouble

### **Other noise:**

- Bracket, nut, bolt, etc. not properly mounted or tightened

## **Oil Pressure Warning Light Goes On:**

- Engine oil pump damaged
- Engine oil screen clogged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearings worn
- Crankshaft bearings worn
- Oil pressure switch damaged
- Wiring damaged
- Relief valve stuck open
- O-ring at the oil passage in the crankcase damaged

## **Exhaust Smokes Excessively:**

### **White smoke:**

- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

### **Black smoke:**

- Air cleaner clogged
- Main jet too large or fallen off
- Starter plunger stuck open
- Fuel level in carburetor float bowl too high

### **Brown smoke:**

- Main jet too small
- Fuel level in carburetor float bowl too low
- Air cleaner O-ring damaged
- Air cleaner poorly sealed or missing

## **Handling and/or Stability Unsatisfactory:**

### **Handlebar hard to turn:**

- Steering stem locknut too tight
- Bearing damaged
- Steering bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

### **Handlebar shakes or excessively vibrates:**

Tire worn  
 Swing arm pivot bearings worn  
 Rim warped, or not balanced  
 Wheel bearing worn  
 Handlebar mounting bolt loose  
 Steering stem head nut loose

**Handlebar pulls to one side:**

Frame bent  
 Wheel misalignment  
 Swing arm bent or twisted  
 Steering maladjusted  
 Front fork bent  
 Right/left fork legs unbalanced (oil level, air pressure, anti-dive setting)

**Shock absorption unsatisfactory :**

(Too hard)  
 Front fork oil excessive  
 Front fork oil viscosity too high  
 Front fork adjustment too hard  
 Rear shock adjustment too soft  
 Tire air pressure too high  
 Front fork anti-dive mechanism trouble  
 Front fork bent  
 (Too soft)  
 Front fork oil insufficient and/or leaking  
 Front fork oil viscosity too low  
 Front fork air pressure too low  
 Front fork, rear shock absorber spring weaken  
 Rear shock absorber oil leaking  
 Front fork anti-dive mechanism trouble

**Brake Doesn't Hold:**

Air in the brake line  
 Pad or disc worn  
 Brake fluid leakage  
 Disc warped  
 Contaminated pad  
 Brake fluid deteriorated  
 Primary or secondary cup damaged  
 Master cylinder scratched inside

**Battery Discharged:**

Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)  
 Battery leads making poor contact  
 Load excessive (e.g., bulb of excessive wattage)  
 Ignition switch trouble  
 Alternator trouble  
 Wiring faulty  
 Regulator/Rectifier trouble

**Battery Overcharged:**

Regulator/Rectifier trouble

**General Lubrication****Lubrication**

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

**NOTE**

- *Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

**Pivots: Lubricate with Motor Oil**

Side Stand  
 Clutch Lever  
 Brake Lever  
 Brake Pedal

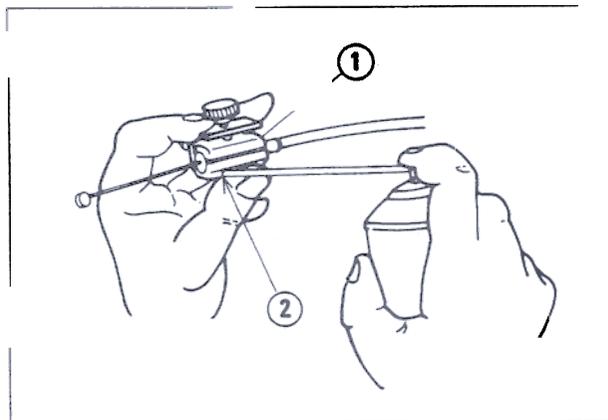
**Points: Lubricate with Grease.**

Throttle Inner Cable Lower End  
 Speedometer Inner Cable\*

\*Grease the lower part of the inner cable sparingly.

**Cables: Lubricate with Cable Lubricant**

Choke Cable  
 Throttle Cables  
 Clutch Cable

**Cable Lubrication**

1. Cable
2. Pressure Cable Luber: K56019-021

## 16-8 APPENDIX

### Nut, Bolt, and Fastener Tightness

#### Tightness Inspection

- Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

#### NOTE

- For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).

- ★ If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.
- ★ If cotter pins are damaged, replace them with new ones.

#### Nut, bolt and fastener to be checked

##### Wheels:

- Front Axle Nut
- Front Axle Clamp Bolts
- Rear Axle Nut
- Chain Adjusting Bolt Locknut

##### Brakes:

- Front Master Cylinder Clamp Bolts
- Caliper Mounting Bolts
- Rear Master Cylinder Mounting Bolts
- Rear Caliper Mounting Bolts
- Torque Link Nuts
- Brake Lever Pivot Nut
- Brake Pedal Bolt
- Brake Rod Joint Cotter Pin

##### Suspension:

- Front Fork Clamp Bolts
- Front Fender Mounting Bolts
- Rear Shock Absorber Mounting Nuts
- Swing Arm Pivot Shaft Nut
- Uni-Trak Link Nuts

##### Steering:

- Stem Head Nut
- Handlebar Mounting Bolts

##### Engine:

- Engine Mounting Bolts
- Cylinder Head Bolts
- Muffler Connecting Pipe Clamp Bolts
- Muffler Mounting Bolt and Nut
- Muffler Connecting Clamp Bolts
- Clutch Lever Pivot Nut

##### Others:

- Side Stand Bolt
- Front Footpeg Mounting Bolts
- Footpeg Bracket Mounting Bolts
- Down Tube Mounting Bolts

### Standard Torque Table

This table relating tightening torque to thread diameter, lists the basic torque for bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. Refer to each chapter for reference to these features. All of the values are for use with dry solvent-cleaned threads.

#### General Fasteners

Threads dis. (mm)	Torque		
	N-m	kg-m	ft-lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in-lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in-lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

**Unit Conversion Table**

**Prefixes for Units:**

Prefix	Symbol	Power
mega	M	x 1 000 000
kilo	k	x 1 000
centi	c	x 0.01
milli	m	x 0.001
micro	μ	x 0.00001

**Units of Mass:**

kg	x	2.205	=	lb
g	x	0.03527	=	oz

**Units of Volume:**

L	x	0.2642	=	gal (US)
L	x	0.2200	=	gal (imp)
L	x	1.057	=	qt (US)
L	x	0.8799	=	qt (imp)
L	x	2.113	=	pint (US)
L	x	1.816	=	pint (imp)
mL	x	0.03381	=	oz (US)
mL	x	0.02816	=	oz (imp)
mL	x	0.06102	=	cu in

**Units of Force:**

N	x	0.1020	=	kg
N	x	0.2248	=	lb

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kg	x	9.807	=	N
kg	x	2.205	=	lb

**Units of Length**

km	x	0.6214	=	mile
m	x	3.281	=	ft
mm	x	0.03937	=	in

**Units of Torque:**

N-m	x	0.1020	=	kg-m
N-m	x	0.7376	=	ft-lb
N-m	x	8.851	=	in-lb

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kg-m	x	9.807	=	N-m
kg-m	x	7.233	=	ft-lb
kg-m	x	86.80	=	in-lb

**Units of Pressure:**

kPa	x	0.01020	=	kg/cm <sup>2</sup>
kPa	x	0.1450	=	psi
kPa	x	0.7501	=	cm Hg

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kg/cm <sup>2</sup>	x	98.07	=	kPa
kg/cm <sup>2</sup>	x	14.22	=	psi
cm Hg	x	1.333	=	kPa

**Units of Speed:**

km/h	x	0.6214	=	mph
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**Units of Power:**

kW	x	1.360	=	PS
kW	x	1.341	=	HP

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PS	x	0.7355	=	kW
PS	x	0.9863	=	HP

**Units of Temperature:**

