BILLY GOAT HIGH WHEEL MOWER
Owner's Manual
HW651SP & HW651HSP
Accessories

CONTENTS

SPECIFICATIONS AND SOUND/VIBRATION 3

INSTRUCTION LABELS 4

PACKING CHECKLIST & ASSEMBLY 5

OPERATION 6-7

MAINTENANCE 8-9

TROUBLESHOOTING AND WARRANTY PROCEDURE 10

ILLUSTRATED PARTS & PARTS LIST 11-12

Specifications

	HW651SP	HW651HSP
Engine: HP	6.0 (4.5 kW)	6.5 (4.85 kW)
Engine: Model	FJ180V	GSV190
Engine: Type	Kawasaki OHV	HONDA OHV
Engine: Fuel Capacity	2.1 qt (2.0 L)	1.6 qt (1.5 L)
Engine: Oil Capacity	0.63 qt. (0.6 L)	0.69 qt (0.65L)
Total Unit Weight:	156# (70.8 kg)	156# (70.8 kg)
Max. operating slope	15°	15°
Overall length	62"(1.57m)	62"(1.57m)
Overall width	32"(0.81m)	32"(0.81m)
Overall height	43"(1.09m)	43"(1.09m)
Lwa at operator position	100.48dBa	100.48dBa
Lpa at operator position	80.48dBa	80.48dBa
Vibration at operator position	1.04 g	1.04 g

SOUND

SOUND LEVEL 80 dB(a) at Operator Position

Sound tests were conducted in accordance with 2000/14/EEC, and were performed on 2-21-2002 under the conditions listed below.

⚠Sound power level listed is the highest value for any model covered in this manual. Please refer to serial plate on the unit for the sound power level for your model.

General Conditions:	Sunny
Temperature:	49°F (9.4°C)
Wind Speed:	8 mph (12.8 kmh)
Wind Direction:	South East
Humidity:	53%
Barometric Pressure:	30.15Hg (102.1kpa)

VIBRATION DATA

VIBRATION LEVEL 1.04g (10.2m/s^2)

Vibration levels at the operator's handles were measured in the vertical, lateral and longitudinal directions using calibrated vibration test equipment. Tests were performed on 6-21-12 under the conditions listed below.

General Conditions:	Sunny
Temperature:	81°F (27.2°C)
Wind Speed:	9 mph (14.5kph)
Wind Direction:	North North West
Humidity:	47%
Barometric Pressure:	30.06Hg (101.8kpa)

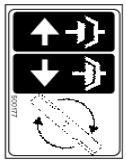
INSTRUCTION LABELS

The labels shown below were installed on your BILLY GOAT ® HW Mower. If any labels are damaged or missing, replace them before operating this equipment. Item numbers from the Illustrated Parts List and part numbers are provided for convenience in ordering replacement labels. The correct position for each label may be determined by referring to the Figure and Item numbers shown.

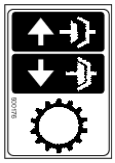
LABEL DANGER KEEP HANDS AND FEET AWAY ITEM #61 P/N 400424

LABEL OILCHAIN #49 ITEM#62 P/N 830502

DANGER FLYING DEBRIS ITEM #111 P/N 810736

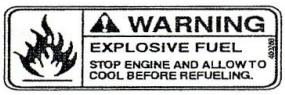


LABEL CLUTCH BLADE ITEM #84 P/N 500177

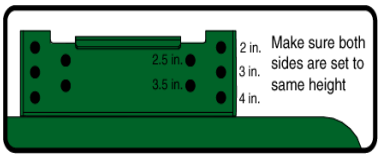


LABEL CLUTCH DRIVE ITEM #101 P/N 500176

LABEL WARNING GUARDS ITEM #63 P/N 900327

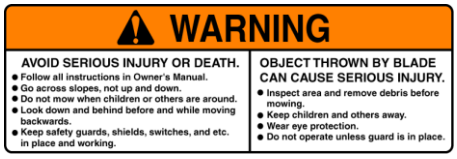


LABEL EXPLOSIVE FUEL ITEM # 48 P/N 400268

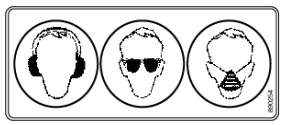


LABEL CUTTING HEIGHT ITEM #58 P/N 510147

LABEL WARNING MOWER ITEM #60 P/N 510206



LABEL MOWER INSTRUCT. ITEM #59 P/N 510207

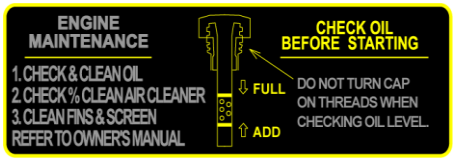


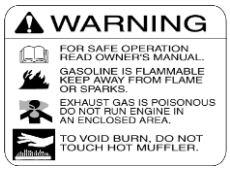
LABEL EAR EYE BREATHING ITEM #110 P/N 890254

LABEL READ MANUAL ITEM #109 P/N 890301

ENGINE LABELS

KAWASAKI



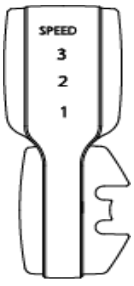


HONDA

THROTTLE CONTROLS

FIXED THROTTLE
Engine speed is factory set.

SPEED CONTROL
Push forward for faster speed, pull back for slower speed



PACKING CHECKLIST

Your Billy Goat HW Mower is shipped from the factory in one carton, completely assembled except for the upper handle.

READ all safety instructions before assembling unit.
TAKE CAUTION when removing the unit from the box the Handle Assembly is attached and folded over

PUT OIL IN ENGINE BEFORE STARTING

PARTS BAG & LITERATURE ASSY

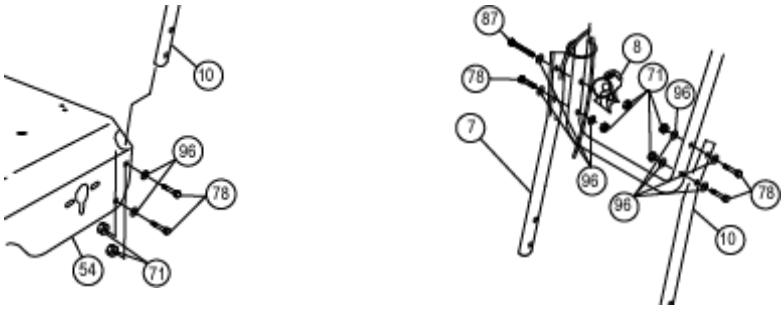
Warranty card P/N- 400972, Owner's Manual P/N-510282, General Safety and Warnings Manual P/N-100296

Boxing Parts Checklist

☐ **Kawasaki**
☐ **Honda**

☐ **Literature Assy P/N-510256**

ASSEMBLY



1. REMOVE unit from carton and allow upper handle (item 7) to lay on ground behind unit.
2. REMOVE hardware items 8, 71, 78, 87, 96, & 97 from temporary storage positions on lower handles (items 10).
3. ATTACH lower handle (item 10) to the main frame using hardware (items 71, 78, & 96) removed from the previous step (see figure above).
4. ATTACH upper handle to lower as shown in page 14, and securely tighten all fasteners.
Note: Be sure the engine starter rope is properly installed in the starter rope guide (item 8) before tightening the corresponding fasteners (see figure above).
5. CONNECT spark plug wire to spark plug.

OPERATION

⚠Like all mechanical tools, reasonable care must be used when operating machine.
Inspect machine work area and machine before operating. Make sure that all operators of this equipment are trained in general machine use and safety.
PUT OIL IN ENGINE BEFORE STARTING
Do not operate if excessive vibration occurs. If excessive vibration occurs, shut engine off immediately and check for damaged or worn blade, loose blade jam nut, loose engine or lodged foreign objects.
Note: See maintenance section for proper blade jam nut torque specifications.

STARTING

ENGINE: See engine manufacturer's instructions for type and amount of oil and gasoline used. Engine must be level when checking and filling oil and gasoline.

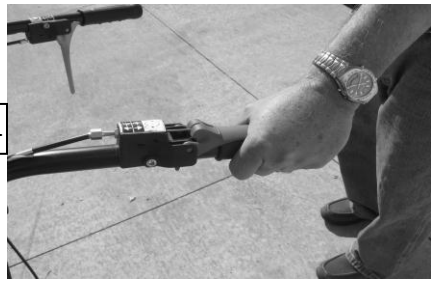
ENGINE SPEED: Set at factory. The engine runs at a constant speed.
1. Select desired cutting height before starting engine.
2. Place mower on a sidewalk or driveway where the mower blade is in an unloaded condition. If it must be started on the lawn, move mower over previously cut grass.
3. Be sure drive lever (Yellow lever on the right hand side) is not engaged (fig. 1).
4. Prime to choke. Prime is located in front of the engine.
5. Pull down on operator presence control lever (Red lever on the left hand side - fig. 1.1), then pull back on starter rope slowly until resistance is felt. Then pull cord rapidly to start. Repeat if necessary.

STOP POSITION

Fig. 1

OPERATING POSITION

Fig. 1.1



HANDLING & TRANSPORTING:

Using two people to lift machine is recommended. Lift holding the handle and front of deck. Secure in place during transport.

⚠ Never lift the machine while the engine is running.

CUTTING OPERATION

⚠ **CAUTION: The mower blade will be rotating whenever engine is running.**

⚠ **CAUTION**: Shut down the engine when crossing gravel drives, walks or roads and under all conditions where thrown objects might be a hazard.

⚠ **CLEARING A CLOGGED CUTTING DECK**: Turn engine off and wait for blade to stop completely. Disconnect spark plug wire.

Wearing durable gloves, remove clog. **Danger**, the clog may contain sharp materials. Reconnect spark plug wire.

⚠ **CAUTION**: Use extreme care when operating the blade. Inspect the work area for foreign objects that could cause damage to the unit or injure the operator if struck by the blade. Never operate the blade with bystanders in the work area

CUTTING HEIGHT ADJUSTMENT

Fig. 2

⚠ CAUTION: DO NOT make cutting height adjustment when engine is running. Cutting height can be adjusted from 2" to 4" by 1/2" increments by lowering or raising the deck. For easiest adjustment change the height from one side at a time. To change cutting height, remove lock pins, raise or lower deck to desired height, and then reinsert lock pins. Repeat this step on other side NOTE: Be sure that the deck is level. Running the deck out of level will result in poor cut quality and increased belt wear.

Fig. 3

PROPULSION

This unit is self-propelled, and is controlled by a lever control. To engage the wheel drive, pull up and squeeze it against operator's handle. The drive is disengaged by releasing this lever.(See Fig. 3 & 3.1)

GROUND SPEED can be varied by selecting a higher or lower gear using the gearshift lever on top of the handle (See Fig. 4). Under most conditions cutting should be done in first or second gear. Third gear should be reserved for conditions where weeds and brush are thinned out or not as tall. The quality of the cut produced is directly related to the unit's ground speed during cutting. If the quality of the cut is not satisfactory (i.e. material left standing) you should shift into a lower gear during cutting. For improved control in confined areas, this machine can be pushed forward or backward by releasing the drive lever located at the right side of the handle.

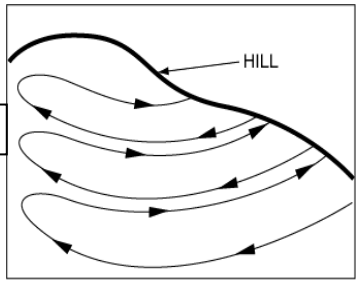
Fig. 3.1

Fig. 4

HILLSIDE MOWING

⚠ **WARNING!** Never mow on any slope greater than 15 degrees. Always mow across the face of slopes; never up and down or diagonally see fig 5). DO NOT attempt sudden starts or stop when mowing on a slope. Avoid sudden turns and use extreme caution when changing direction on a slope.

Fig. 5



CAUTION: Wheels must be chocked or blocked when unit is parked on a slope.

MAINTENANCE

PERIODIC MAINTENANCE

Periodic maintenance should be performed at the following intervals:

Maintenance Operation	Every Use (daily)	Every 5 hrs or (daily)	Every 25 Hours	Every 100 Hours
Inspect for loose, worn or damaged parts.	●			
Check for excessive vibration		●		
Inspect belt for wear			●	
Engine (See Engine Manual)				
Lubricate front wheels and height adjustment pins			●	
Sharpen Blade			●	
Replace blade and traction belts				●

BLADE Removal / Sharpening

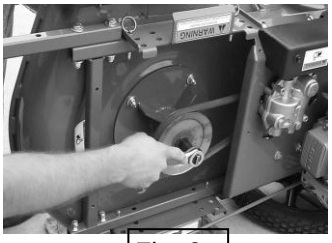


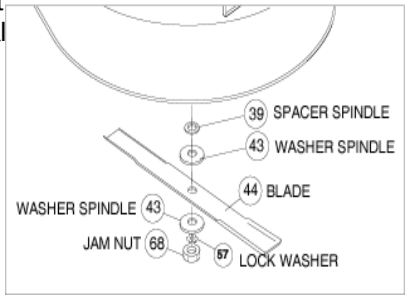
Fig. 6

⚠ NOTE: When sharpening the blade it is a good idea to check the balance of the blade. A properly balanced blade will increase life of the bearings and other components.
Tools required: 3/8 inch socket, 5/8 inch socket, torque wrench, blade block.
1. Disconnect spark plug wire.
2. Remove 5 screws (item 76) then remove belt guard (19).
3. Set the unit on its side to allow access to both pulley and the blade.
Note: When tipping the unit on its side, keep the air cleaner side of engine up. Be sure the gas is drained out to prevent from spilling before tipping the unit on its side. Never tip the mower more than 90 degrees and do not leave the mower tipped for any length of time.
4. While protecting your hands with pair of gloves or heavy rag to hold the blade, loosen but do not remove the bolt (88) on the pulley side (fig. 6).
5. Remove jam nut (68), blade washer (43), blade (44), blade washer (43), and blade spacer (39).
6. Replace or sharpen the blade then install in the exact order they were removed (fig. 7).
7. **Tighten the jam nut until it is flush with the end of the shaft** (fig 7). Then tighten the bolt on the pulley side - Torque it to 55-60 ft-lbs.
Note: When replacing the blade use B.G.I. Part no. 510107.
8. Reinstall belt guard then connect spark plug.
Note: Before installing the fasteners inspect them for wear and replace as necessary.

Fig. 7

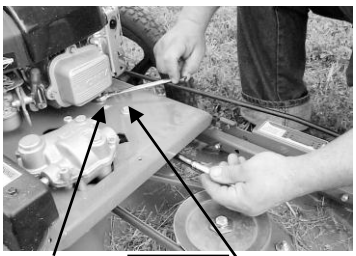
BELT REPLACEMENT

When replacing one belt the other should be inspected for wear and replaced if worn. It is good practice to change both belts when either is worn beyond use. Use only original equipment belts for replacement. Billy Goat uses only premium quality, Kevlar corded and coated belts in your unit. Substitute belts do not meet the design and performance requirements for your unit, and will greatly reduce machine performance and belt life.



Blade Drive Belt

Tools required: 3/8 inch socket, 1/2 inch socket, 3/8" torque wrench.
1. Disconnect spark plug wire.
2. Set the deck height to middle position (3 inches cutting height).
3. Remove 5 screws (item 76) then remove belt guard (19).
4. Loosen but do not remove the nut (71) at the top of the engine base located just front of the engine. This will release the tension on the blade drive belt (37). NOTE: It may be necessary to loosen bolt (85) in order to allow idler pulley bracket to pivot.
5. Replace the old belt with the new belt.
Note: Use only O.E.M. approved belt for this machine - B.G.I. Part no. 510139.
6. To adjust tension on the new belt, insert 3/8" torque wrench in the idler bracket, apply 10 lbs. of torque then tighten the nut (71) on top of the engine base (fig. 8).
Note: Belt requires very little tension to drive the blade. Over tensioning the belt will greatly reduce the life of the belt.
7. Install belt guard using 5 screws (76)
8. Reconnect spark plug wire.
Note: Start the unit up and cut grass to make sure the blade belt is not slipping.



Nut (71) Fig. 8 Nut (85)

BELT REPLACEMENT continued
Drive Belt

Tools required: 3/8 inch socket, 1/2 inch socket, 3/8" torque wrench.
1. Follow steps 1 through 5 above to remove the blade drive belt.
2. Set the unit on its side to allow access to both pulley and the blade.
Note: When tipping the unit on its side, keep the air cleaner side of engine up. Be sure the gas is drained out to prevent from spilling before tipping the unit on its side. Never tip the mower more than 90 degrees and do not leave the mower tipped for any length of time.
3. Swing over the drive belt idler to release tension on drive belt then remove it (fig. 9).
4. Install the new belt (fig. 10).
Note: Use only O.E.M. approved belt for this machine - B.G.I. Part no. 510138.
5. Set the unit back down.
6. Follow steps 6 through 8 on previous section to reinstall the blade belt.

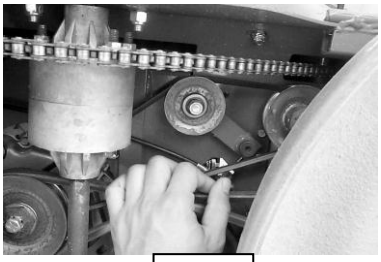


Fig. 9

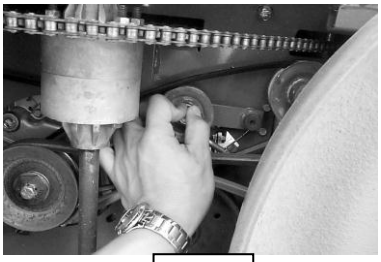


Fig. 10

SELF PROPELLED DRIVE ADJUSTMENT
Tools required: two 1/2 wrenches.

As the clutch wears, adjustments may be required to maintain proper control cable tension, and clutch engagement (fig. 11). If the clutch begins slipping or squealing during normal operation it may require an adjustment to increase the clutch cable tension. A properly adjusted drive clutch should require a minimum of 3/8" of spring stretch when drive lever is engaged (fig. 12). Adjust by tightening or by loosening clutch cable adjusting nut as required, located at the clutch lever (fig. 12). If further adjustment is required, primary adjuster is located at the underneath the engine base (fig. 13). Replacement of cable may be necessary if adjustment will not allow for proper drive clutch engagement.

⚠**WARNING**: If the drive clutch begins to squeal or slip, do not continue to operate your unit until adequate adjustment or repair has been performed. Improper adjustment can cause drive clutch to slip and overheat, greatly reducing machine performance and transmission life.

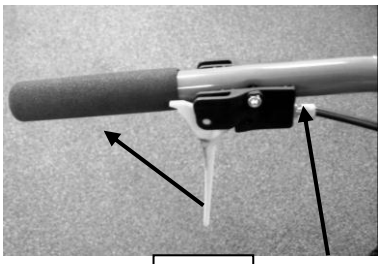


Fig. 11 Adjuster

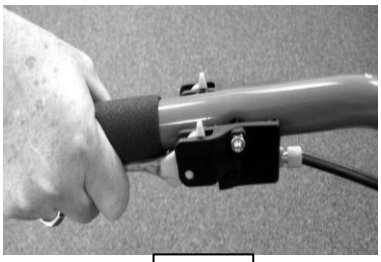


Fig. 12

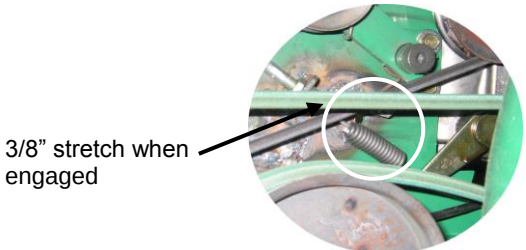
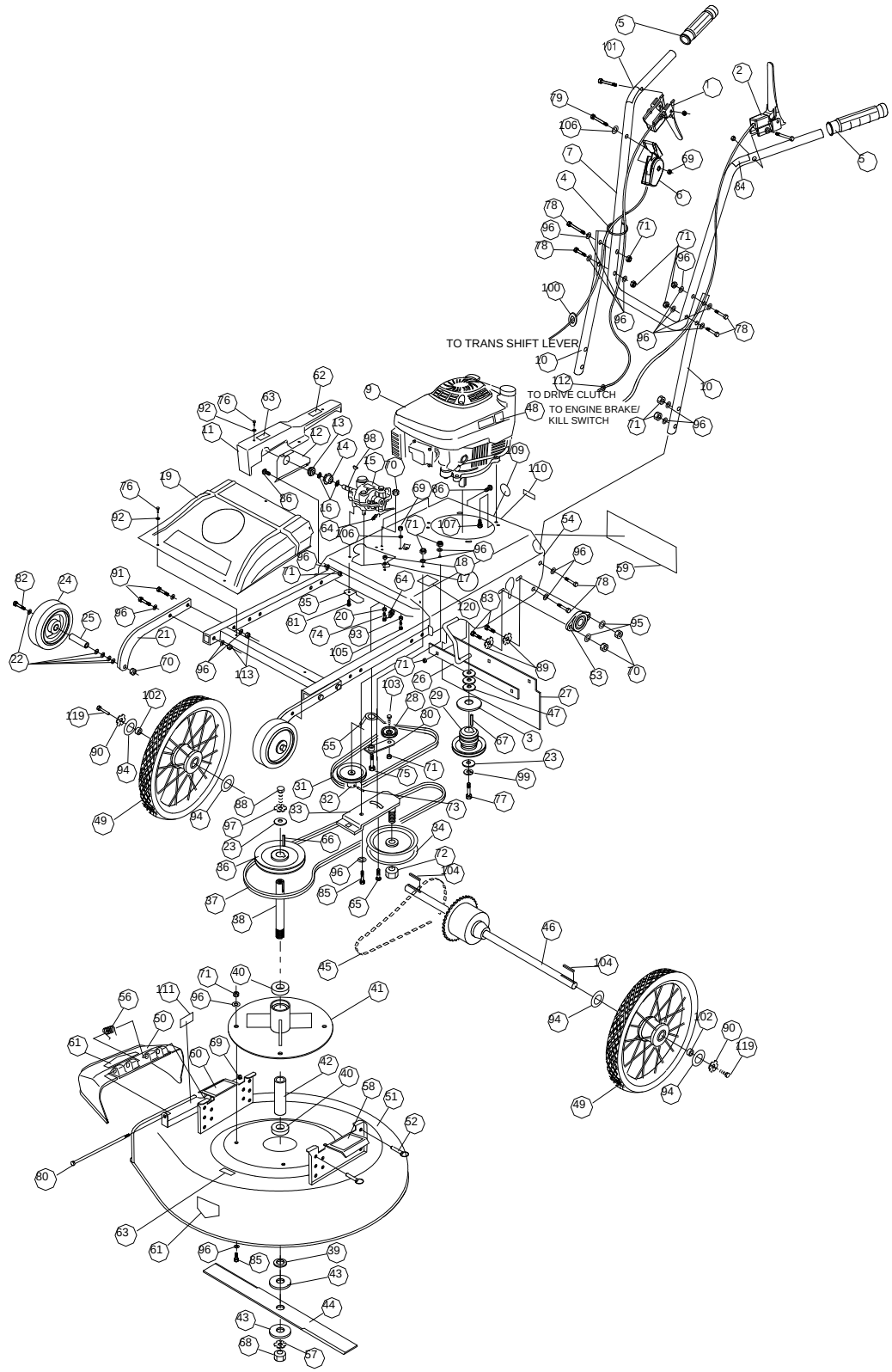


Fig. 13

Troubleshooting

Problem	Possible Cause	Solution
Engine will not start.	Operator presence control lever is not engaged. Engine not properly primed. Out of gasoline, bad or old gas. Spark plug wire disconnected. Dirty air cleaner. Blade is trying to cut grass while starting.	Engage operator presence control lever. Prime to choke. Check Gasoline. Check for spark with an approved tester. Clean or replace air cleaner. Start the mower on pavement or previously cut area.
Engine will not stop	Damaged operator presence control lever. Damaged control cable.	Replace operator presence control lever. Replace control cable
Engine runs poorly	Spark plug loose. Engine RPM set too low. Water or dirt in fuel system. Spark plug fouled, faulty or wrong gap	Sharpen or replace blade (pg 11). Check engine RPM (refer to engine manual). Drain or siphon then replace with fresh gasoline. Reset gap or replace spark plug (refer to engine manual).
Abnormal vibration.	· Loose or out of balance blade. Bent blade. Loose engine bolts	Stop work immediately. Check blade mount and balance. Replace damaged or bent blade if required (pg 11). Check engine mount.
Uneven cut	Height adjust is not set correctly. Dull or bent blade	Be sure height adjust is set the same on both sides(pg 9). Sharpen or replace blade (pg 11).
Will not cut or has poor cutting performance	Dull or bent Blade. Clogged deck. Wet Grass. Excessively high grass.	Sharpen or replace blade (pg 11). Unclog deck(pg 9). Check engine RPM (refer to engine manual). Do not mow when grass is wet. Mow once at a high cuting setting then mow again at desired setting or make a narrower cutting path.
Belt slips or smokes	Belt tension too low. Belt worn or stretched. Pulleys worn or damaged.	Increase tension at idler (pg 11). Replace belt. Replace Pulleys.
No self propelling	Not set to gear. Out of adjustment clutch cable. Broken clutch cable. Worn or broken belt.	Shift lever to desired gear. Adjust clutch cable(pg 12). Replace with new cable. Replace belt (pg 12).
Self propelled drive will not release.	Clutch cable out of adjustment. Damaged operator presence control lever.	Adjust clutch cable (pg 12). Replace operator presence control bail.
Engine is locked, will not pull over.	Debris locked against blade. Operator presence control lever not engaged. Broken control cable.	Remove debris (pg 9). Engaged operator presence control lever (pg 9). Replace control cable.

PARTS DRAWING HW



PARTS LIST

ITEM NO.	DESCRIPTION	HW651SP PART NO.	QTY	HW651HSP PART NO.	QTY
1	LEVER DRIVE CLUTCH W/CABLE	510263	1	510263	1
2	LEVER ENGINE BRAKE W/CABLE	510262	1	510262	1
3	SPACER 1" ID X 2" OD	-	-	830113	1
4	TY WRAP	900407	3	900407	3
5	GRIP HANDLE 1" ID X 5" BLACK	510274	2	510274	2
6	CONTROL SHIFT 3 SPEED	510127	1	510127	1
7	HANDLE UPPER HW	510261	1	510261	1
8					
9	ENGINE 6.0 HP KAWASAKI	510264	1	-	-
	ENGINE 6.5 HONDA OHV	-	-	510279	1
10	HANDLE LOWER HW	510265	2	510265	2
11	CHAIN GUARD HW	510111	1	510111	1
12	PLATE BEARING RIGHT	510120	1	510120	1
13	BEARING 1/2 CLIP	510125	1	510125	1
14	8 TOOTH SPROCKET	510126	1	510126	1
15	TRANSMISSION 3 SP	510108	1	510108	1
16	C-CLIP 1/2	350146	2	350146	2
17	WASHER #10 SAE	8172005	1	8172005	1
18	LOCK NUT #10	8155007	1	8155007	1
19	BELT GUARD HW	510110	1	510110	1
20	NUT #10 HEX	8154007	1	8154007	1
21	FRONT WHEEL BRACKET	510269	2	510269	2
22	WASHER 1/2" ZP	8172011	10	8172011	10
23	WASHER 1/2" - .453 ID	440153	2	440153	2
24	WHEEL FRONT 6"'	510268	2	510268	2
25	SPACER WHEEL FRONT	900819	2	900819	2
26	PLATE DEFLECTOR MOUNT	510144	1	510144	1
27	RUBBER DEFLECTOR	510141	1	510141	1
28	PULLEY IDLER	510137	1	510137	1
29	PULLEY DOUBLE 2"/4" W/INERTIA	510237	1	-	-
	PULLEY DOUBLE 2"/4" W/INERTIA-25MM	-	-	510280	1
30	ARM IDLER TRANS WA HW	510199	1	510199	1
31	BELT 3L320	510138	1	510138	1
32	PULLEY 3" OD 10MM BORE	510122	1	510122	1
33	PLATE ENGINE IDLER WA HW	510191	1	510191	1
34	PULLEY IDLER	510136	1	510136	1
35	BRACKET TRANS LEVER	510123	1	510123	1
36	PULLEY 5.5" OD X 7/8" BORE	510118	1	510118	1
37	BELT BLADE 5L560	510139	1	510139	1
38	SHAFT DRIVE BLADE	510114	1	510114	1
39	SPACER SPINDLE BC2401	500232	1	500232	1
40	BEARING 7/8" SEALED	500101	2	500101	2
41	SPINDLE BLADE WA HW	510105	1	510105	1
42	TUBE SPACER SPINDLE	510116	1	510116	1
43	WASHER SPINDLE 2.5 OD	510117	2	510117	2
44	BLADE 23 1/2 W 7/8 HOLE	510107	1	510107	1
45	CHAIN #41 75 PITCH	510132	1	510132	1
46	REAR AXLE ASSY	510104	1	510104	1
47	SPACER HW HONDA	-	-	510281	3
48	LABEL WARNING FUEL EN/SP	100261	1	100261	1
49	WHEEL SPOKE 16"	510266	2	510266	2
50	GUARD EXHAUST CHUTE	510197	1	510197	1
51	DECK ASSY W/LABELS	510160	1	510160	1
52	PIN 3/8X 1 1/2	510130	4	510130	4
53	BEARING 3/4 CAST FLANGE	350209	2	350209	2
54	BASE ASY W/LABELS	510247	1	510247	1
55	SPRING TRANS IDLER	510142	1	510142	1
56	SPRING EXHAUST CHUTE	510205	1	510205	1
57	WASHER LOCK 7/8 INT TOOTH	350154	1	350154	1

ITEM NO.	DESCRIPTION	HW651SP PART NO.	QTY	HW651HSP PART NO.	QTY
58	LABEL CUTTING HEIGHT	510147	1	510147	1
59	LABEL INSTRUCTION	510207	1	510207	1
60	LABEL WARNING MOWER	510206	1	510206	1
61	LABEL OPEI	400424	2	400424	2
62	LABEL OIL CHAIN	830502	1	830502	1
63	LABEL DANGER GUARDS	900327	2	900327	2
64	SPRING TENSION	400217	1	400217	1
65	CARRIAGE BOLT 5/16"-18X1	8024040	1	8024040	1
66	KEY SQ 3/16 X 5/8"	9201072	1	9201072	1
67	KEY SQ 3/16" X 1 1/4"	9201071	1	-	-
	KEY SQ 1/4" X 1"	-	-	9201113	1
68	NUT JAM 7/8" -14	350155	1	350155	1
69	NUT LOCK 1/4-20 HEX ZP	8160001	3	8160001	3
70	NUT LOCK 3/8-16	8160003	7	8160003	7
71	NUT LOCK 5/16	8160002	19	8160002	19
72	NUT LOCK 5/8-11	8160007	1	8160007	1
73	ROLL PIN 3/16 X 1.25	8195166	1	8195166	1
74	SCREW MACHINE #10-24X 3/4	8059136	1	8059136	1
75	BOLT SHOULDER 1/2" X 1"	500114	1	500114	1
76	SCREW SELF TAP 1/4 X 3/4"	510208	8	510208	8
77	SCREW CAP 3/8-24 X 1 1/4"	400946	1	400946	1
78	SCREW CAP 5/16"-18X1 3/4	8041031	8	8041031	8
79	SCREW CAP 1/4-20 X 2 1/4"	8041011	1	8041011	1
80	SCREW CAP 1/4-20 X 7" ZP	8041023	1	8041023	1
81	SCREW SELF TAP 6 X 16	510188	3	510188	3
82	SCREWCAP 3/8-16 X 3"	8041058	2	8041058	2
83	SCREWCAP 3/8-16 X 1 1/2"	8041052	4	8041052	4
84	LABEL CLUTCH BLADE	500177	1	500177	1
85	SCREWCAP 5/16-18 X 1"	8041028	5	8041028	5
86	CARRIAGE BOLT 5/16-18X3/4	8024039	5	8024039	5
87					
88	SCREWCAP 7/16-20 X 1 1/4 GR8	510213	1	510213	1
89	TWISTED WASHER 3/8"	400502	4	400502	4
90	TWISTED WASHER 5/16"	430298	2	430298	2
91	SCREW CAP 3/8-16 X2	8041054	4	8041054	4
92	WASHER 1/4 SAE BLACK	510193	8	510193	8
93	NUT JAM 1/4 - 20	8143001	1	8143001	1
94	WASHER 3/4 SAE	8172015	4	8172015	4
95	WASHER 3/8 FC	8171004	4	8171004	4
96	WASHER 5/16 FC	8171003	35	8171003	35
97	WASHER LOCK 7/16" S/T MED	8177013	1	8177013	1
98	KEY WOODWRUFF 1/8 X 1/2	510180	1	510180	1
99	WASHER LOCK 3/8 S/T MED	8177012	1	8177012	1
100	RUBBER GROMMET	520087	1	520087	1
101	LABEL CLUTCH DRIVE	500176	1	500176	1
102	SPACER NYLON BUSHING	520045	2	520045	2
103	SCREWCAP 5/16-18 X 1 1/2	8041030	1	8041030	1
104	KEY SQ. 3/16 X 2 1/8"	9201087	2	9201087	2
105	SCREW CAP 1/4-20 X 1 1/4	8041007	1	8041007	1
106	WASHER 1/4 SAE	8172007	2	8172007	2
107	SCREW 3/8 X 1 TAPTITE	510255	4	510255	4
108					
109	LABEL READ MANUAL	890301	1	890301	1
110	LABEL EAR EYE BREATHING	890254	1	890254	1
111	LABEL FLYING DEBRIS	810736	1	810736	1
112	GROMMET 1" HOLE	510169	1	510169	1
113	NUT LOCK 3/8-16 THIN	8161042	4	8161042	4
118					
119	SCREWCAP 5/16" - 18 X 3/4" HCS ZP	8041026	2	8041026	2
120	LABEL MADE IN U.S.A.	520116	1	520116	1