Ghost Wheels™

Installation Manual

For Harley Davidson FL series

Includes

Electra Glide, Ultra Classic, Road King, Road Glide

These instructions will guide you through the installation of your new Ghost Wheels™ kit onto your Harley Davidson as it was manufactured, and does not consider any modification that may have been made that could interfere with these instructions. Some models are slightly different from one to another so the installer must be somewhat flexible in understanding some variations.

GHOST WHEELS™

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If you have any questions or problems feel free to call Safety Features at 1-888-452-2552.

Installation Instructions

Motorcycle Preparation

Refer to your Harley Manual when necessary

Position Motorcycle on a hoist or jack stands to hold it in an upright and straight position as close to 90°as possible.

Remove the following parts:

- Seat
- Saddle Bags
- Side Panels
- Passenger Foot Rests
- Exhaust Heat Shields
- Battery (see note below)

The following parts will have to be loosened and may have to be removed:

- Mufflers (loosen right side only)
- Loosen exhaust header and crossover pipe (do not remove). This is required to get the right bottom bolt off. (assembly 10002351 pg 22).
- Battery & battery box (depending on year & battery size, the mounting frame will need to be moved to the rear to clear the right hand axle assy.)

Left and Right Mounting Plate Installation

Left Side

1. Remove existing control arm end cap and grind the outside flush. See picture below for reference. The swing arm will drop if both sides are removed at the same time. To ease installation, complete one side before starting on the other. Note: there is a left and right. Left and right end caps shown.

2. Install mounting plate assembly 10002351 on top of the end cap using 7/16” hex head bolt and lock washer in the bottom hole. Use the 7/16” counter sink bolt in the top hole. Make sure the end cap is seated properly. The end cap notch should fit into the recess on the frame. The pivot arm assembly is shipped on mounting plate assembly; you may remove the pivot arm to make installation easier.
3. Snug up the bolts evenly, make sure the end caps are not crooked in relation to the frame. Tighten both bolts to 25 ft lbs. (Further tightening will be required after the toe in is set).
4. If you removed the left hand pivot arm assembly, remount it now, 10002575-A (pg 20) with seal, bearings (2), washer, nut, cotter pin and dust cover.
5. Repeat for right hand side.

Toe In Adjustment

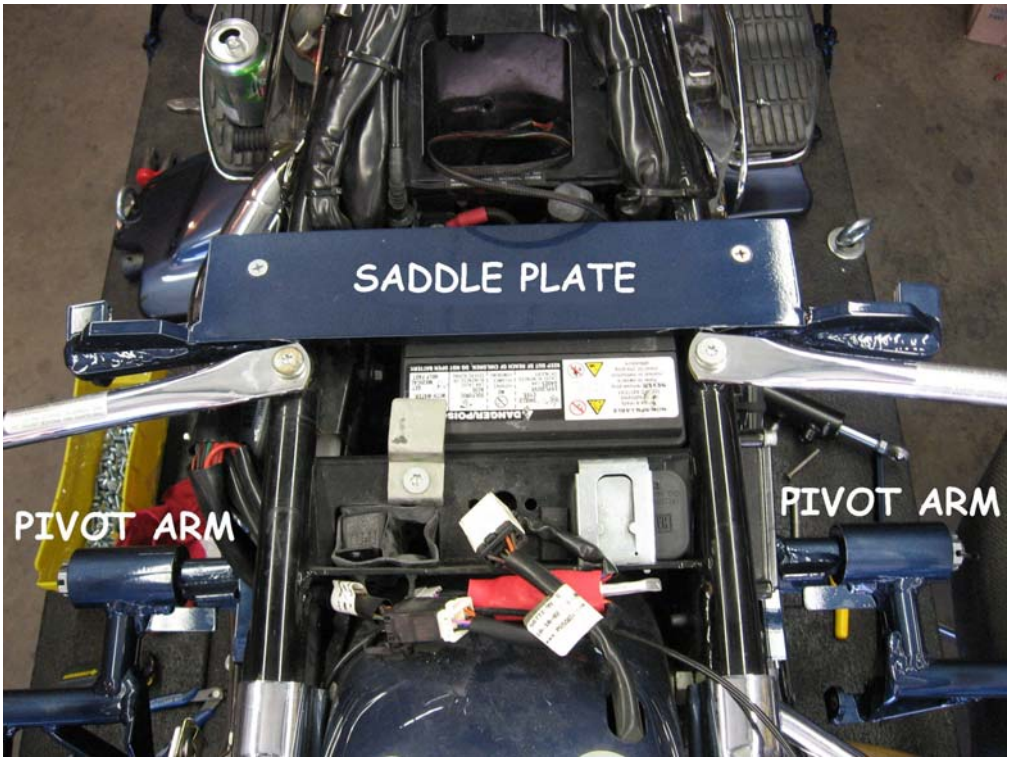
Adjustment made with the mounting plates, bolts, pivot arms, and hubs (without wheels and tires) in place.

1. The adjusting point is where the mounting plate bolts to the crash bar.
2. Place a straightedge against the rear tire and up to but not touching the front tire. A minimum of 3’ is recommended.
3. Clamp a straight edge against the edge of the hub close to the center of the hub.
4. Measure the distance next to the hub and as far out as your straightedges go. Subtract the measurement close to the hub from the measurement away from the hub. A positive number is toe-in, a negative number is toe-out. At about 3’ a toe-in measurement of 1/8” to a 1/4” is desirable.
5. Adjust the toe in by adding or removing washers between the frame and the plate.
6. When the toe in is set, go back and torque the 7/16” bolts to 38 foot pounds.
7. Repeat for the other side.
8. Check all of the bolts on both sides for tightness**.**

Mount Saddle Plate

Mount saddle plate with “L” clamps to the top of the frame as shown. Note: This plate is the top mounting position for the hydraulic cylinders. Some year bikes require the “L” clamps on the inside of the bike frame while other bikes require the “L” clamps on the outside of the bike frame. See

DWG. 10002577-A.(pg 23). The battery on some 2007 models sits too high, put a straight edge on the frame rails to check the battery height. If the battery sits higher than the frame rails, it can be lowered on some bikes by loosening the bolts on the right side holding the battery cage. Other bikes you may have to file the holes to get enough clearance for the battery. The left side of the battery cage is welded and may have to be bent down.

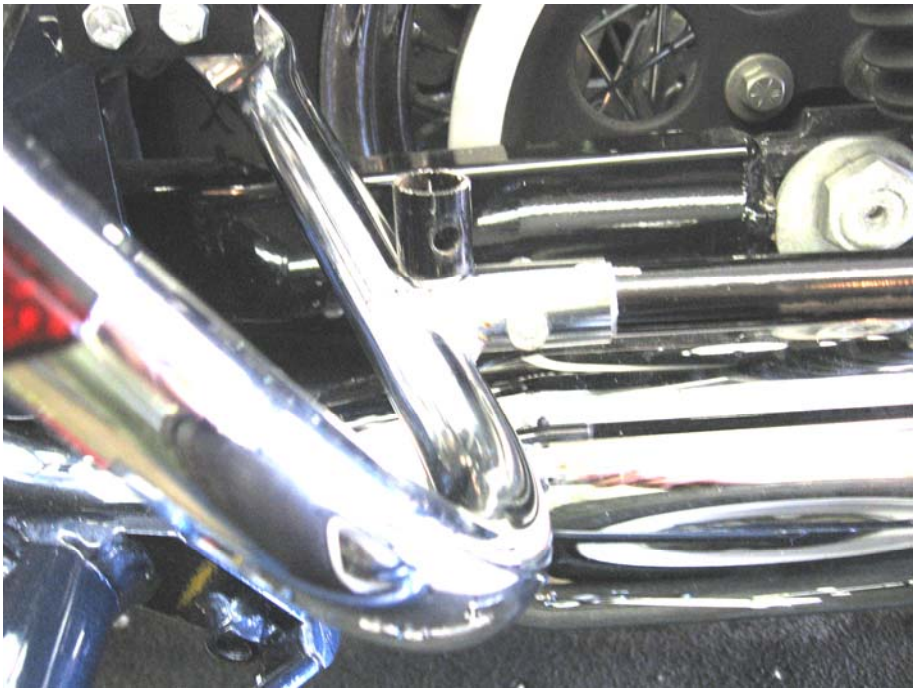


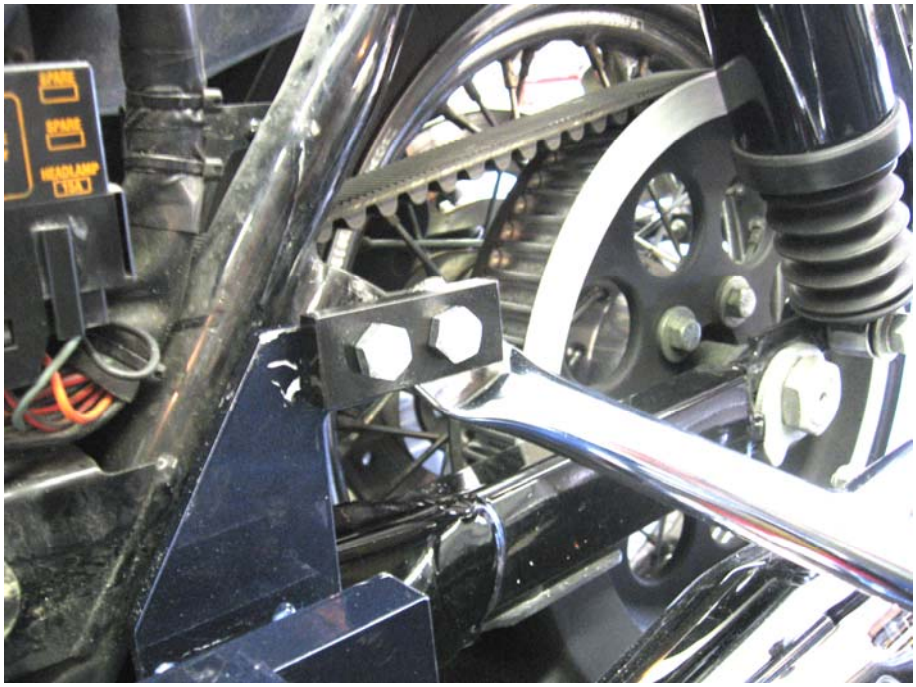
Cylinder Installation Right and Left sides

1. Start at the top mounting position at outer edge of saddle plate (See DWG 10002577-A, pg 23). Mount top of hydraulic cylinder using 3/8”-24-NF x 2 LG SS bolt to saddle plate. Use 3/8” washers to center the saddle plate tab in the cylinder tabs.
2. Add 2 washers to the inside of the bolt then add the ¼”x 1” bar stock, then finger tighten the SS nylock hex nut.
3. The ¼” x 1” flat bar connects the saddle plate and the mounting plate. This bar provides needed support for the saddle plate. There is a threaded hole on the mounting plate that the flat bar gets bolted to, the flat bar runs almost parallel to the cylinder (bottom slightly to the rear of the cylinder). You can’t see it on the pictures because it is behind the cylinder. Some bending to get the bar to line up with each individual bike is necessary. With the flat bar connected to the cylinder bolt on the saddle plate, mark the location to drill the flat bar. Drill a 3/8” hole and bolt the flat bar using the 3/8 -16NC x 1-1/2 LG SS bolt.
4. Extend the cylinder ram downward where the lower ball joint connects to the pivot arm.
5. Insert the 3/8” -24NF x 2 LG SS bolt into the weld nut, use the 3/8” washers to evenly space the

ball joint.

6. Raise and lower the pivot arm as you tighten the ball joint bolts. Make sure that the pivot arm moves smoothly up and down.





7. On some bikes the pivot arm may hit the crash bar. A possible fix is to shorten the horizontal bar that runs underneath the saddlebag. The upper picture shows the piece we cut from the left side of a Road King in order to clear the pivot arm. The lower picture shows the piece we made to move the crash bar back. The top mounting was not modified. In this situation we didn't have to modify the saddlebag guard on the right side. On some models we have gained enough clearance by loosening all the crash bar mounting bolts and pulling back while tightening. There might be enough play to clear

the pivot arm. Because the models differ you will have to make the determination on the best solution. On rare occasions, on some models the saddlebag has to be modified to clear the pivot arm.

8. Repeat these steps for the left side.

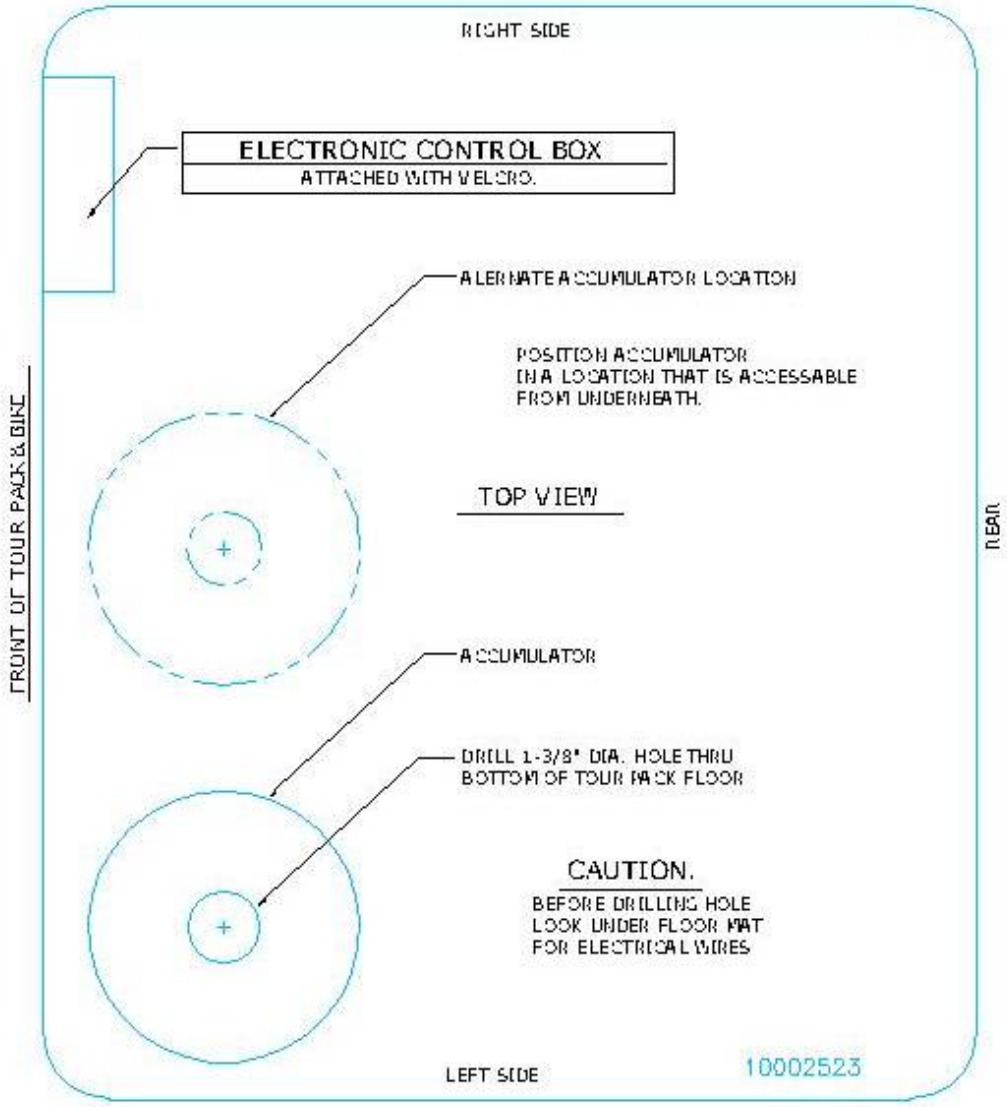
Accumulator tank Installation

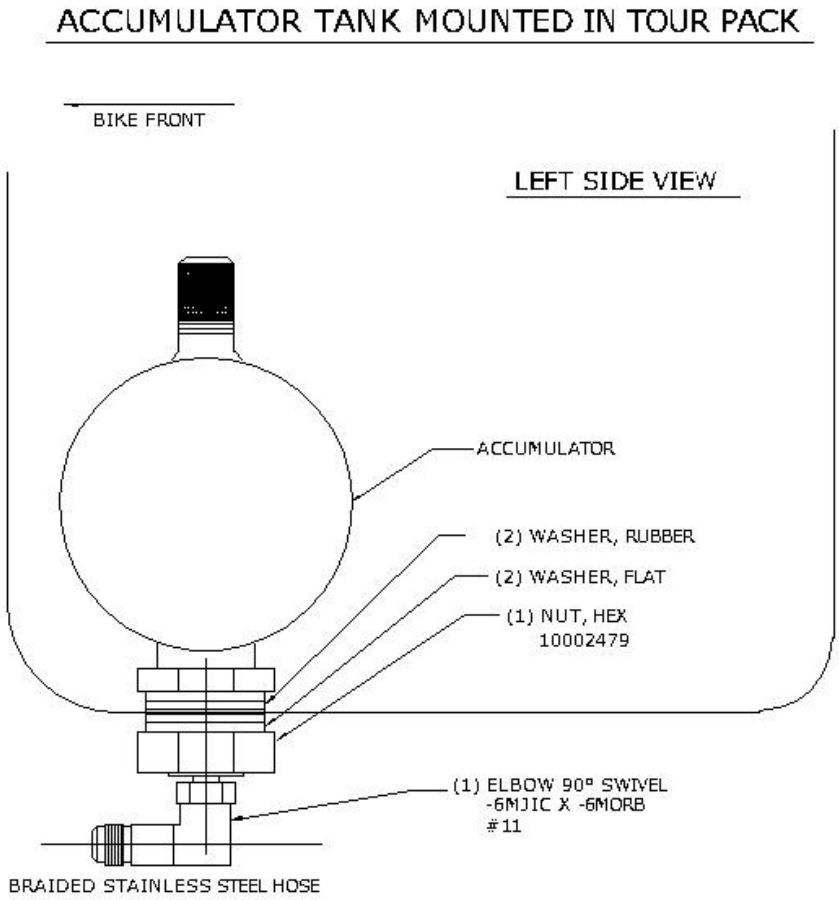
Drill a 1-3/8” hole in the right saddlebag or the front corner of the tour pack depending on your situation. In newer models we put the hole in the center front of the trunk. This makes the hydraulic hose connection more difficult but two helmets should fit. Check to make sure you don’t drill through any wires.

Fittings

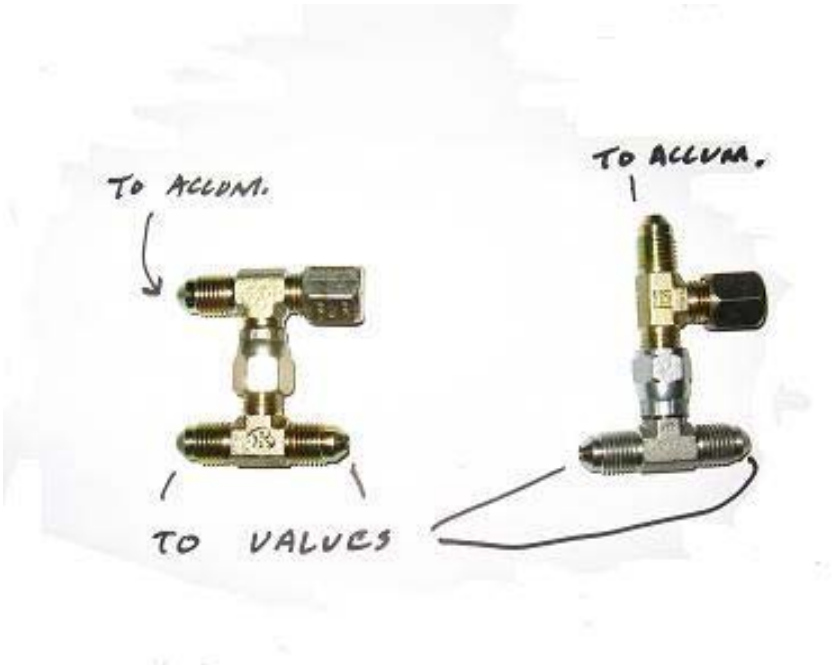
1-Nut, Hex 10002479
1- Elbow, 90 degree Swivel-6 JIC x 6 MORB
Flat Washer

Accumulator Tank mounted in trunk.
See appendix for a picture of a saddle bag installation.

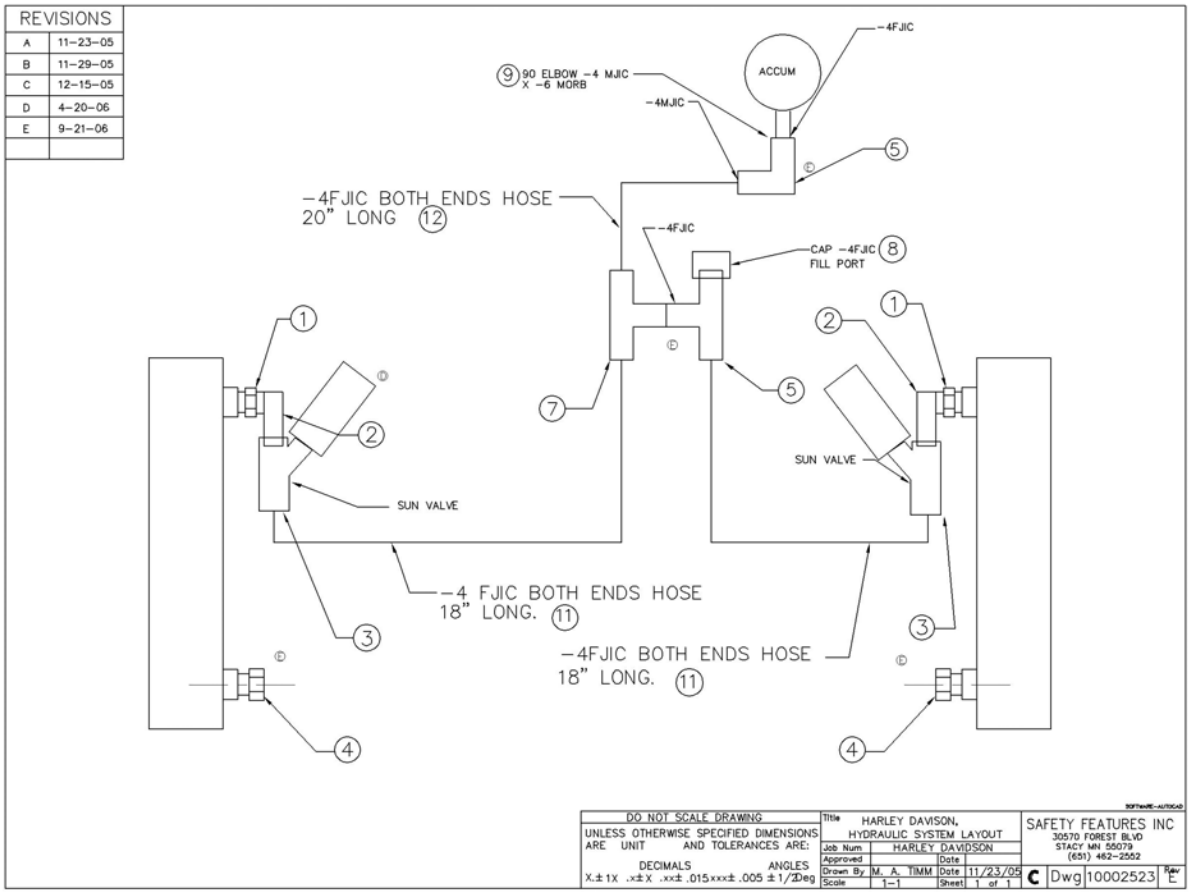

RIGHT SIDE
ELECTRONIC CONTROL BOX
ATTACHED WITH VELCRO.
ALTERNATE ACCUMULATOR LOCATION
POSITION ACCUMULATOR
IN A LOCATION THAT IS ACCESSABLE
FROM UNDERNEATH.
TOP VIEW
FRONT OF TOUR PACK & BIKE
REAR
ACCUMULATOR
DRILL 1-3/8" DIA. HOLE THRU
BOTTOM OF TOUR PACK FLOOR
CAUTION.
BEFORE DRILLING HOLE
LOOK UNDER FLOOR MAT
FOR ELECTRICAL WIRES
LEFT SIDE
10002523



Most installations only need one flat washer. Two flat washers and the rubber washers are used when mounting to fiberglass alone. Newer tour packs have a metal plate that gives enough stability.



Two tee configurations. Pick the one that fits your application the best. The left hand one we use for saddlebag installations, the one on the right for trunk installations.



FITTINGS – HARLEY

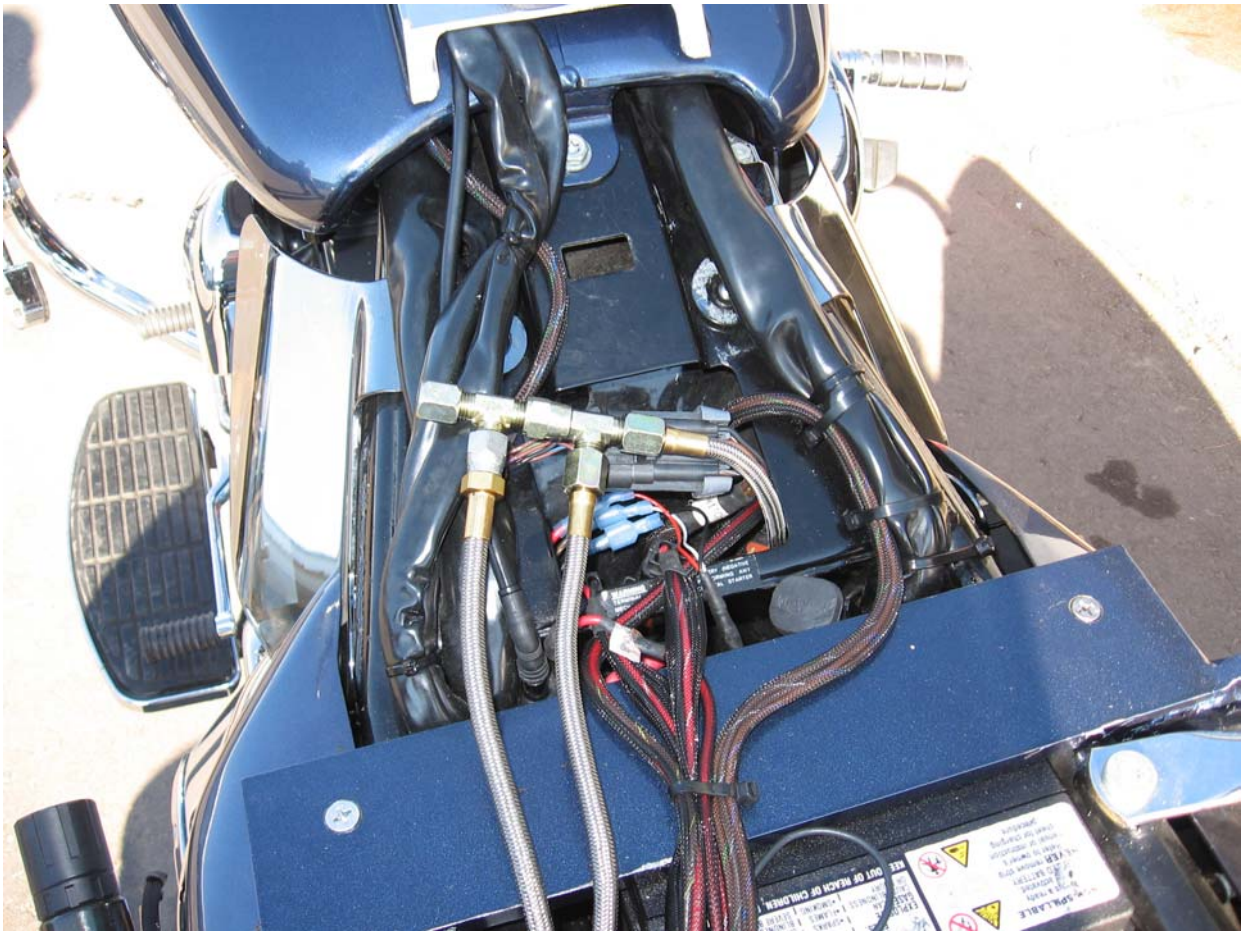
1 – (2) REQ'D=HEX PIPE NIPPLE–1/4 MNPT X1/4 MNPT
2 – (2) REQ'D–90 ELBOW–1/4 FNPT SWIVEL X –6MORB SWIVEL
3 – (2) REQ'D–90 ELBOW– –4MJIC X –6MORB
© 4 – (2) REQ'D–BREATHER
5 – (1) INCLUDED–TEE–4MJIC X –4FJIC X –4MJIC
6 – (1) REQ'D–TEE–4MJIC X –4MJIC X –4FJIC
7 – (1) REQ'D–TEE–4MJIC X –4MJIC X –4MJIC
8 – (1) REQ'D–CAP–4FJIC
9 – (1) REQ'D–90 ELBOW––4MJIC X –6MORB
© 10 – (1) REQ'D–NUT – 1 1/8–12NC HEX (10002479)

HOSE SET – HARLEY

© 11 – (2) REQ'D–4 FJIC BOTH ENDS 18" LONG. 3,000 PSI–BRAIDED STAINLESS
© 12 – (1) REQ'D–4 FJIC BOTH ENDS 20" LONG. 3,000 PSI–BRAIDED STAINLESS

10002523 Rev E

Hydraulic Hose Installation

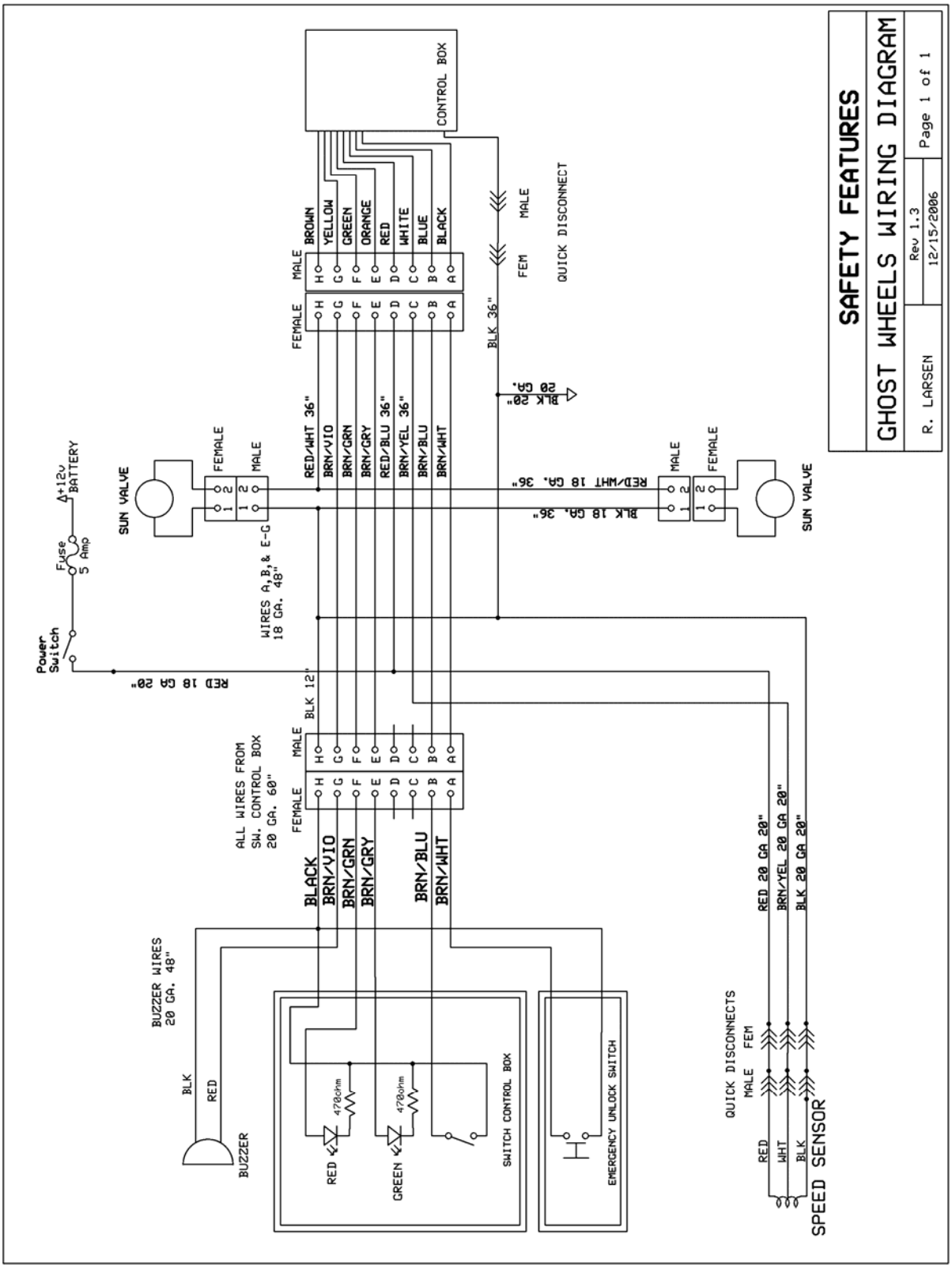


Hose & Wire Routing

The above picture shows the wires and hydraulic hoses, if there is room along the side of the battery the wires should be run under the saddle plate. The picture is from a Road King installation with only saddlebags. Check the clearance between the top rails and the battery.

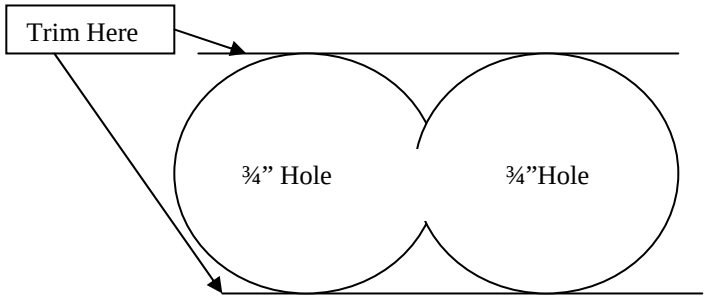
Wire Harness Installation

1. Pass the 9 pin connector through the hole drilled in the tour pack or saddlebag.
2. Connect all the connectors.
3. Connect ground wire to a solid ground, usually a factory ground is located under the seat just on top of the rear fender.
4. Locate and install switch box between the grip and the left hand accessory assembly on the handle bar.
5. Install the on/off switch to right hand valve. The in-line fuse end of the switch connects to the battery, the other wire connects to the red wire of the harness. The fuse is a 5 amp fuse.



Main Wire Diagram

Electrical Control Box



1) If you have a tour pack.

   a) Drill the (2) 3/4” holes slightly over lapping 1” from the front of the tour pack and 5” in from the front right corner of the tour pack. Trim the widows peaks between the holes.
   b) Run the plug and cable through the holes and seal with silicon or hot-glue.
   c) Mount the box, using the Velcro strips provided and connect the plugs.

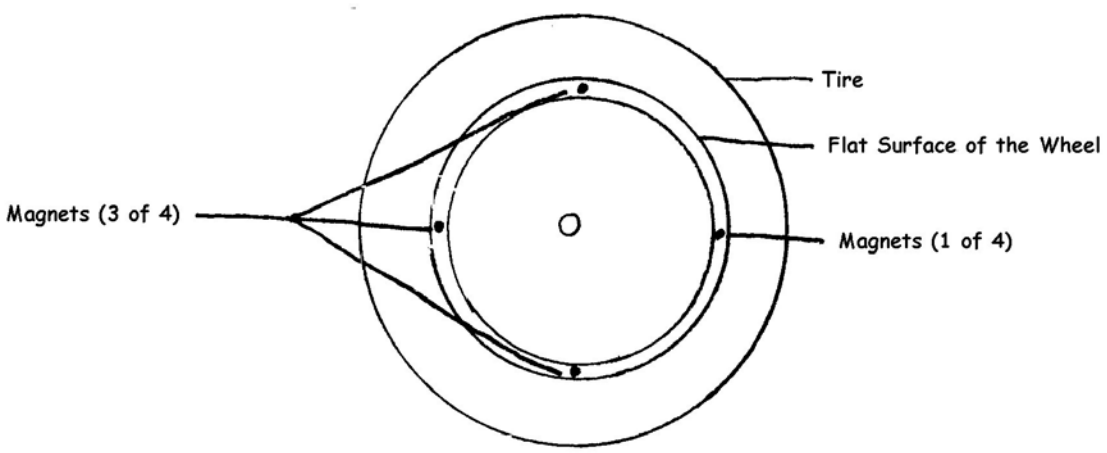
2. If you don’t have a tour pack you will have to mount the control box in the saddle bag. See appendix A (pg 25) for a picture of a saddlebag installation.

Sensor and Magnet Installation

1. Remove the rearmost rear brake caliper bolt.
2. Mount the sensor bracket & insert bolt and tighten. (This bracket can bend to adjust the distance from the magnets) Paint it after making sure the sensor lines up with the magnets.
3. Run the wires along with the brake line and under the seat with the other wires.
4. Plug the red wire to the red wire in the harness.
5. Plug the black wire to the black wire in the harness.
6. Plug the white wire to the brown/yellow wire in the harness.
7. Check the wire routing to ensure they do not touch the muffler or any moving parts.

Magnets

1. Be careful as these magnets are very fragile unattached.
2. Measure 4 equal distances around the right side of the rear wheel on the flat surface for mounting the magnets.
3. Use JB weld or a good grade of epoxy to attach the magnets to the wheel. A clean surface will minimize the chance of them detaching.
4. For steel rims put a dab of adhesive on the spot you want the magnet and hold the magnet above the spot, move it closer until the magnet jumps. For aluminum rims cut 4 strips of duct tape (approx ½" x 3") put the magnet in the center of the duct tape. Put a small amount of adhesive on the magnet. Tape the magnet on the correct spot on the rim. Do not put the magnet on the rim and slide it over, the adhesive must be underneath the magnet.
5. We have better results if the magnets are installed the same, ie. all positive out, or all negative out.

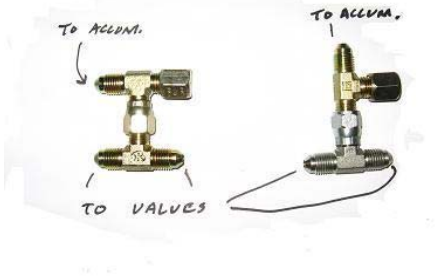


Fender Installation

Mount the fender to the fender plate then mount the assembly to the pivot arm. Check the clearance on both sides of the tire. If the fender or any of the bolts rub, bend the angle iron on the pivot arm to provide clearance. Before using lift the pivot arm and spin the wheel to ensure there is no interference.

Adding Hydraulic Fluid

1. The valves and cylinders are prefilled at the factory. Any air in the lines will be detrimental to the proper functioning of the wheels locking. Take care when removing the plugs and reconnecting to the remaining lines. DO NOT remove the caps until the lines are routed from the cylinder and the hydraulic line is routed from the accumulator. The accumulator hose can be installed but should not be tightened to the accumulator at this time.
2. Remove the valve core from the accumulator tank.
3. Connect the hoses from the cylinders and the accumulator hose to the tee. Use any configuration that will ensure a clean installation. Here are the two we use.



4. There is an unused fitting on the tee, this is for filling and bleeding. Place a clear filler hose (not supplied) onto the unused tee connector. This hose can be from 24” to 72” long. Longer works better. Hang it vertically. Partially (12”) fill the clear hose with fluid.
5. The system will require Dextron®III . Use only Dextron®.III.
6. If the hydraulic hose has been connected to the bottom of the accumulator, loosen it now. Watch the clear hose, as air bleeds out of the hydraulic hose the fluid will drop in the clear hose. When fluid comes out by the accumulator fitting, tighten it.
7. Open the parking valves by turning the handle all the way clockwise. The filler hose should have a little fluid in it at this time. We will force some fluid up the filler hose so we don’t want too much fluid.
8. Raise one side up slowly, watching the filler hose. Hold up for 5 to 10 seconds or until the bubbles stop coming out of the filler hose. Make sure when you slowly drop the arm that there is fluid in the filler hose. DO NOT let any air back into the hoses. Since there is fluid in the cylinder and the valve it shouldn’t take more than one or two times to remove any air.
9. Repeat this for the other side.
10. When all the air is evacuated from the system, close the parking valves leaving the arms all the way down.
11. Only about 1” of play is desired when lifting the pivot arms. In the event that there is more than 1-1/2” of play, you must repeat the bleeding process.
12. Replace the valve stem in the accumulator tank and add 30 pounds of air pressure. The pressure in the accumulator valve is variable. The higher the accumulator pressure the more turning resistance you might feel. At the shop we use around 15, the range is 30 max, 10 min.

NOTE: If you have to bleed the system after the initial installation, remember to release the air pressure from the accumulator or you will have fluid everywhere.

Before Riding Your Harley with Ghost Wheels™

You must read the following before you attempt to ride your Harley with Ghost Wheels installed as the system has two methods to lock the hydraulic line. One is the **Manual Parking Valves** (MPV's) and the **main system** which is electric. Locking the valves changes your bike from two wheeled handling (lean into corners, counter-steering, etc.) to a trike (no lean, more handlebar input, etc.). You must get used to the transition. The problems we have seen are due to people trying to steer a trike like a bike. We **strongly recommend** practicing in an empty parking lot until you are very familiar with the transition, and with riding in both modes. The

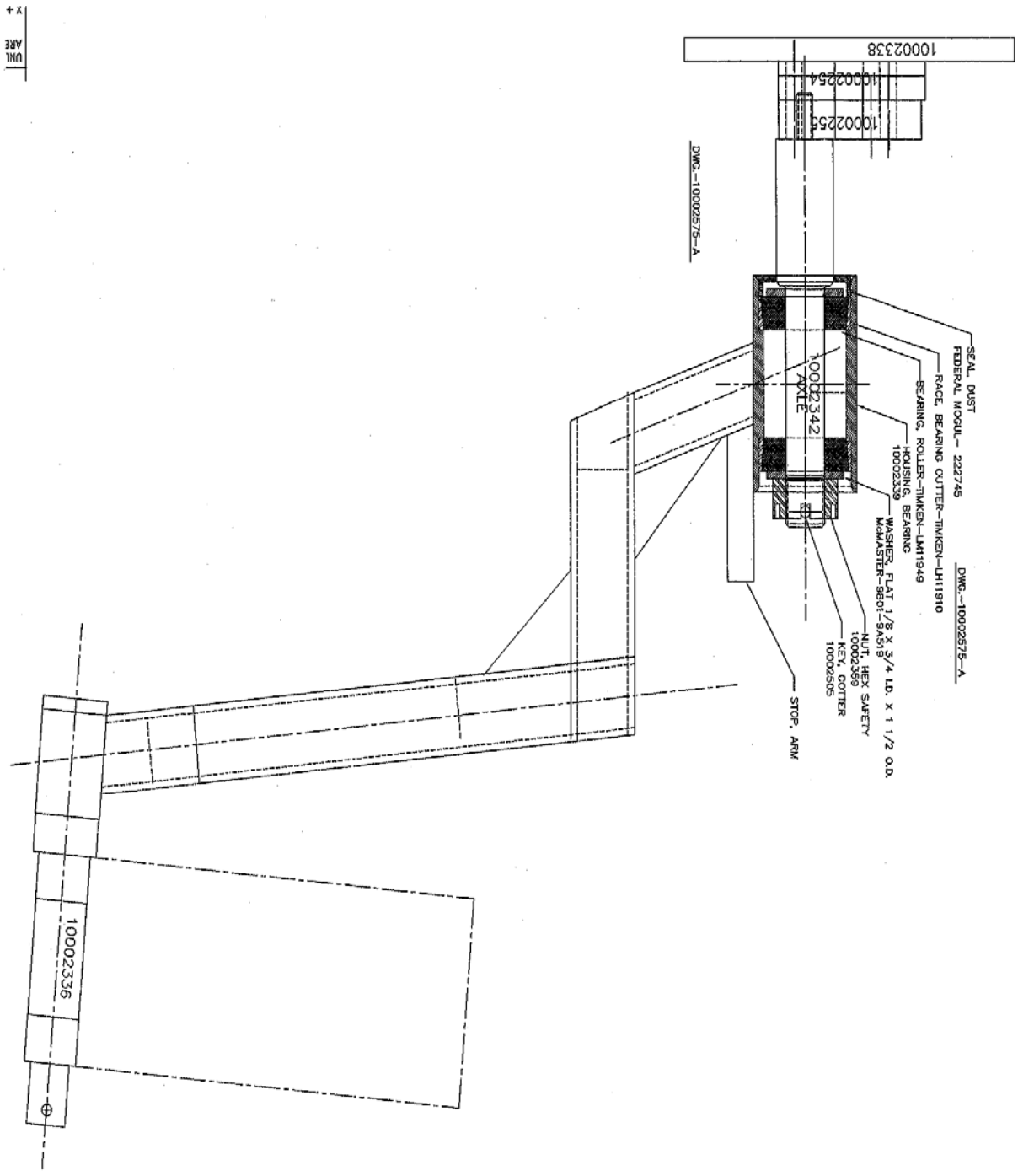
Getting Started

1. Check the control switch on the left handlebar to make sure it is switched to the DOWN position. In this position the system is locked.
2. Before you unlock the MPV's you must start the engine and turn on the power switch located by the right hand valve.
3. It is important that you are sure that you have full power and a strong battery before you move on.
4. **Should you open the MPV's with a dead battery the motorcycle will fall over**.
5. With the engine running, open the MPV's, and the electric valves will activate. The red light will come on. The system will remain locked until you are moving and the control switch is moved to the UP position. You must be moving for the switch to unlock the valves. The black button or momentary switch will unlock the valves at any time, moving or stationary.
6. Remember, you are in control of locking the valves. The computer will prevent the wheels from locking when your speed is too high. If the wheels are locked the computer will NOT unlock them regardless of your speed. The buzzer will come on to remind you to unlock the wheels. You are in control of when to lock and when to unlock the wheels.

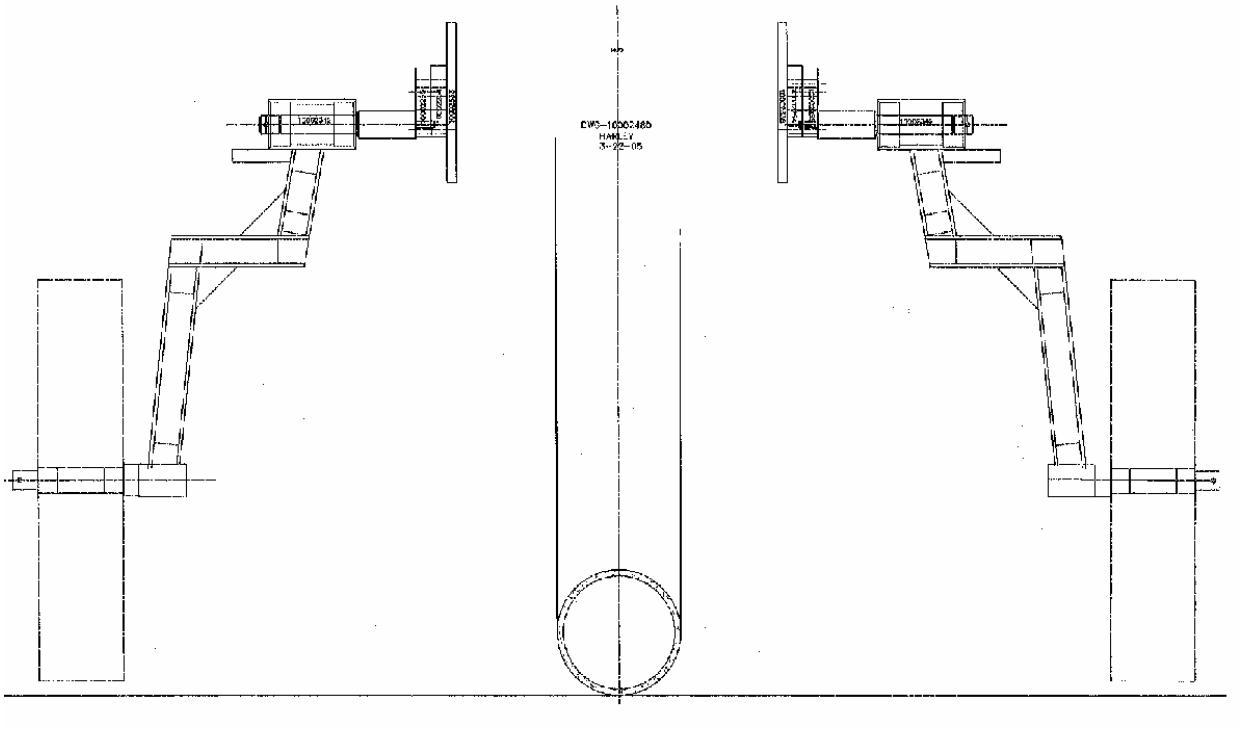
You are now ready to ride!!!!

1. As you begin to ride and achieve a balanced speed of 5-10 MPH you should now move the control switch to the UP and unlocked position. The green light will come on and the red light will go out.
2. You must now maintain your balance and accelerate to a safe riding speed.
3. Do not unlock the control switch if you are negotiating a curve or if you are on an unlevel surface. The transition from trike to bike **will cause you to swerve** if you are not plumb and the road is not level. Either wait until the road straightens or stop and go through the following instructions.
4. Be prepared to hold up your motorcycle while you make the necessary corrections to bring your bike to an upright position.
5. Place both feet on solid ground and grasp the handlebars with both hands.
6. Push and hold the black emergency unlock (ie. momentary) switch on the left handlebar. The red light will go off and the green light will come on. The electric valves will now open and **you** will be holding up the motorcycle.
7. Bring the bike to an upright position and release the black button. The green light will go off and the red light will come on and the valves will be in a locked position.
8. You can ride with locked valves at 5-10 MPH around shopping malls, parks, and on parade. Safety Features, Inc. does not recommend riding at higher speeds with locked valves.
9. Stopping for more that 10 minutes without manually locking the MPV's will result **in loss of hydraulic backpressure** as the fluid bleeds back into the system.
10. **Be sure to get used to manually locking the MPV's prior to turning the power switch off. Failure to do so could result in the bike tipping over and damage occurring.**

Appendix A



DWG. 10002575-A



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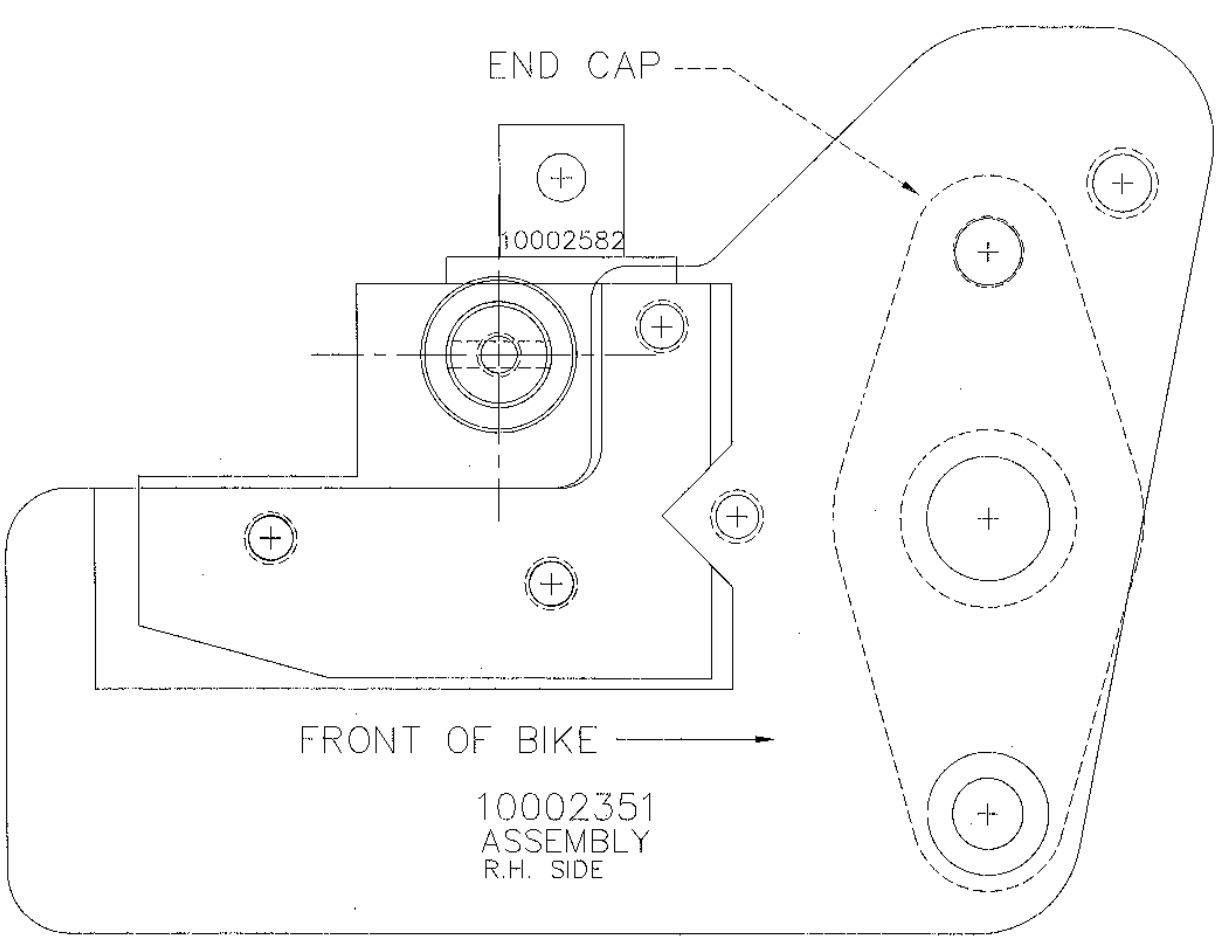

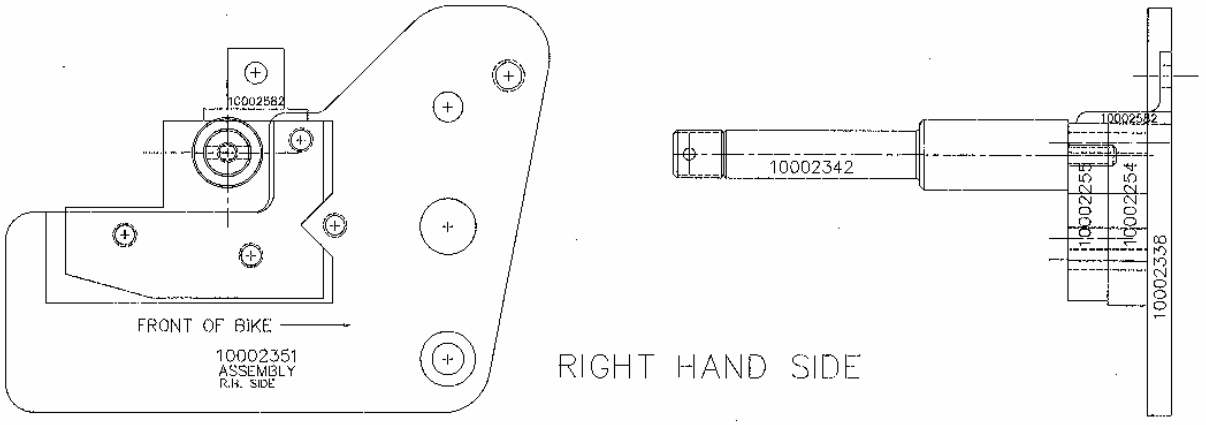

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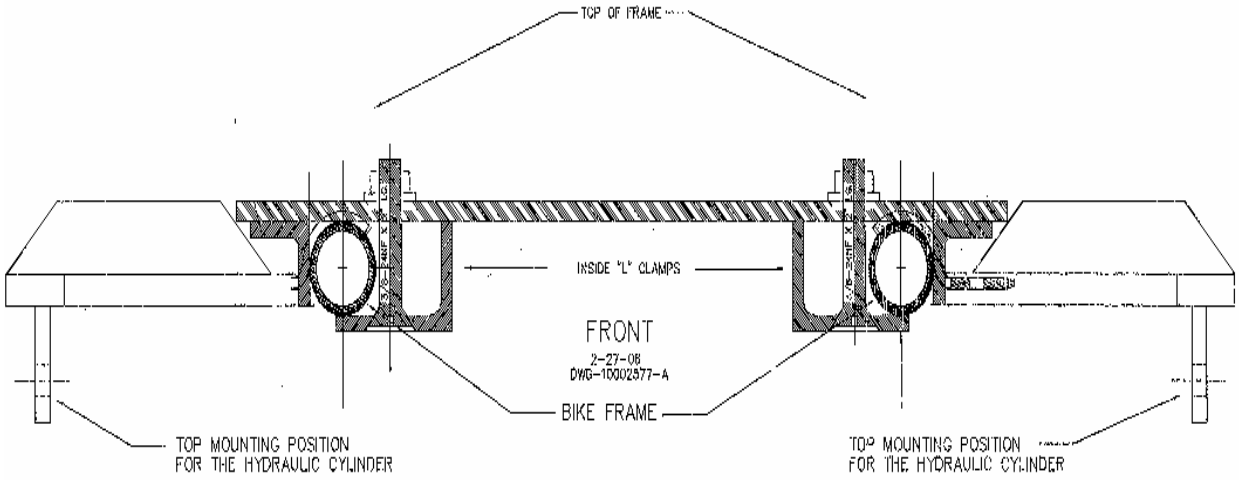

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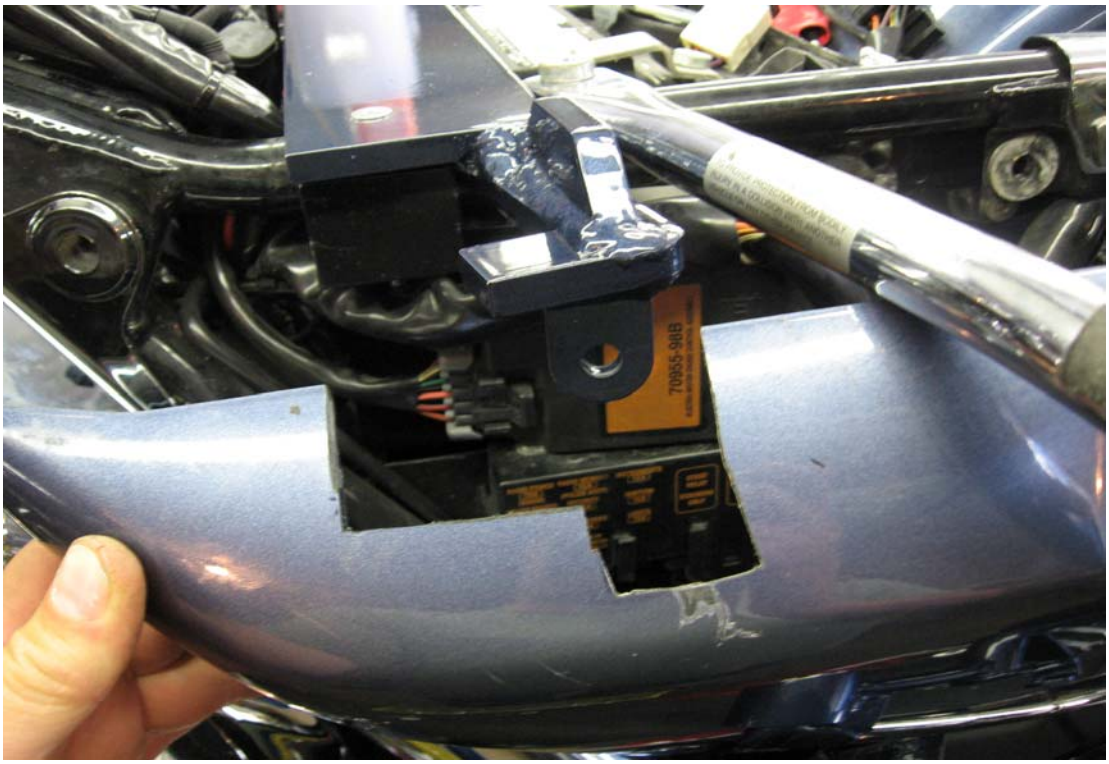
Upper Cylinder Mount

Right Side Cylinder Arrangement

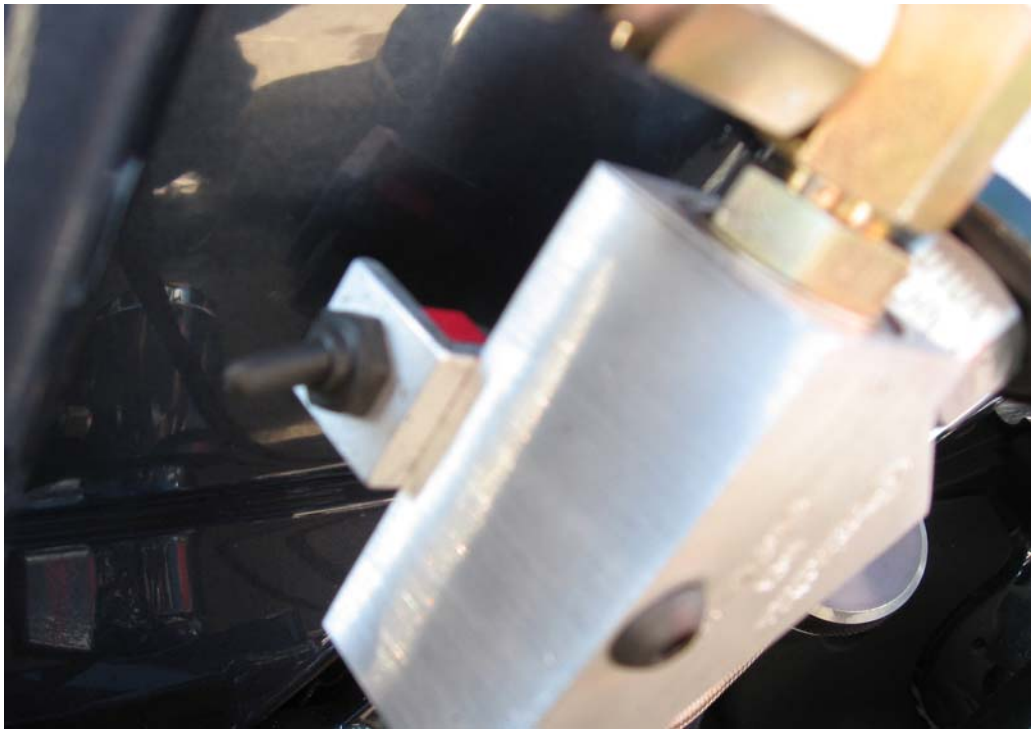


Side Cover Cut

Accumulator in Saddlebag

Computer in Saddlebag

Heat Shield Cut



On/Off Switch

Handle Bar Switch

Left Side Cylinder

Sample Torque Values

Thread	Tensile Stress Area	SAE Grade 2	SAE Grade 5	SAE Grade 8	SAE Grade 2	SAE Grade 5	SAE Grade 8	SAE Grade 2	SAE Grade 5	SAE Grade 8
Size	TSA	75% Yield Strength (PSI) - 43000			75% Yield Strength (PSI) - 69000			75% Yield Strength (PSI) = 98000		
		Plain	Zinc Plated	Waxed	Plain	Zinc Plated	Waxed	Plain	Zinc Plated	Waxed
	Square Inches	A. lb.	Ft.Lb.	Ft.Lb.	Ft.Lb.	Ft.Lb.	Ft.Lb.	Ft.Lb.	Ft.Lb.	Ft.Lb.
1/4-20.	0.0318	6	6	3	9	10	5	13	14	6
1/4-28.	0.0364	7	7	3	10	12	5	15	16	7
5/16-18.	0.0524	12	13	6	19	21	9	27	29	13
5/16-24.	0.058	13	14	6	21	23	10	30	33	15
3/8-16.	0.0775	21	23	10	33	37	17	47	52	24
3/8-24.	0.0878	24	26	12	38	42	19	54	59	27
7/16-14.	0.1063	33	37	17	53	59	27	76	83	38
7/16-24.	0.1187	37	41	19	60	66	30	85	93	42
1/2-13.	0.1419	51	56	25	82	90	41	116	127	58
1/2-20.	0,1599	57	63	29	92	101	46	131	144	65
9/16-12.	0.182	73	81	37	118	129	59	167	184	84
9/16-18.	0.203	82	90	41	131	144	66	186	205	93

These values are for reference only. Our research shows these values should work for stainless.

Stainless Steel Torque Guide

	Nm		Ft-Lbs	
BOLT SIZE	**GRADE 304 (A2)**	**GRADE 316 (A4)**	**GRADE 304 (A2)**	**GRADE 316 (A4)**
1/4" - 20	8.5	9	6.27	6.64
1/4" - 28	11	11	8.11	8.11
5/16" - 18	15	16	11.06	11.80
5/16" - 24	16	17	11.80	12.54
3/8" - 16	27	28	19.91	20.65
3/8" - 24	29	31	21.39	22.86
7/16" - 14	42	44	30.98	32.45
7/16" - 20	45	47	33.19	34.67
1/2" - 13	58	61	42.78	44.99
1/2" - 20	61	64	44.99	47.20
9/16" - 12	77	81	56.79	59.74
9/16" - 18	85	89	62.69	65.64
5/8" - 11	125	131	92.20	96.62
5/8" - 18	141	147	104.00	108.42
3/4" - 10	173	179	127.60	132.02
3/4" - 16	168	176	123.91	129.81

Suggested Max Torquing Values - a guide based upon industry tests on dry products wiped clean. The 3/8"diameter and under metal products were roll-threaded and, where size range permitted, were made on Bolt Maker equipment. Source: ITT Harper.

4/9/2007		**Harley Packing List**			
	Shipped				
		Item	**Qty**	**Description**	
		Box #1			
		1	1	RIGHT HAND ARM & BASE ASSEMBLY	
		2	1	LEFT HAND ARM & BASE ASSEMBLY	
		3	2	FENDER SUPPORT PLATES	
		4	2	WHEELS 16"	
		5	2	WHEEL HUB ASSEMBLIES	
		6	2	RIGHT & LEFT HAND SUPPORT BARS	
		7	1	MOUNTING HARDWARE PACKAGE	
		8	2	HUB DUST COVERS	
		Box #2			
		1	1	COMPUTER	
		2	1	WIRE HARNESS ASSEMBLY	
		3	2	HYDRAULIC VALVE ASSEMBLY	
		4	2	HYDRAULIC CYLINDERS	
		5	1	SADDLE ASSEMBLY WITH CLAMP BRACKETS	
		6	1	ACCUMULATOR	
		7	5	HOSE ASSEMBLIES	
		8	1	MANUAL	
		9	1	TEMPLATE PACKAGE	
		10	2	TEE-4MJIC X -4MJIC X -4MJIC	
		11	1	TEE--4MJIC X -4FJIC X -4MJIC	
		12	1	90 DEGREE SWIVEL -6MORB X -4MJIC	
		13	1	BOTTLE OF TOUCHUP PAINT	
		14	1	PACKAGE 10 PIECE TY WRAPS	
		15	1	SENSOR ASSEMBLY	
		16	4	SENSOR MAGNETS	
		17	2	FENDERS	
		18	2	BABY MOON HUB CAPS	
		19	1	SWITCH BRACKET	
		20	1	SENSOR BRACKET	