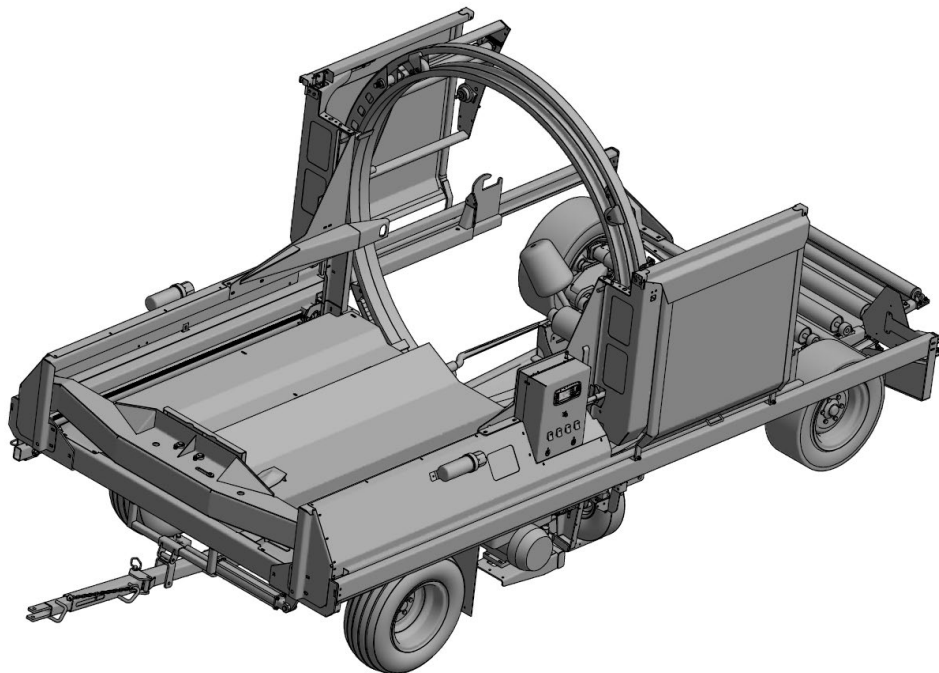


# Tube-Line Bale Wrapper

# TLR 5000ECV



# Operator's Manual

Thank you for choosing the Tubeline TLR5000ECV Bale Wrapper. Our hope is that it will give you many years of productive service. This machine is designed to wrap a continuous line of round bales in a film of plastic.

Please read and understand this manual and the machine before operation.

## Warranty and Limitation of Liability

All equipment is sold subject to mutual agreement that it is warranted by the company to be free from defects of materials and workmanship. But the company shall not be liable for special, indirect or consequential, damages of any kind under this contract or otherwise. The company's liability shall be limited exclusively to replacing or repairing without charge, at its factory or elsewhere, at its discretion.

Any material, or workmanship defects which become apparent within one year from the date on which the equipment was purchased, and the company shall have no liability for damages of any kind. The buyer by the acceptance of the equipment will assume all liability for any damages, which may result from the use or misuse by his employees or others.

Warranty coverage is null and void unless Warranty  
Registration form has been completely filled in and is on file at  
Tube-Line Manufacturing Ltd.

# Serial # Decal

## Serial Number

The implement serial number is located on the front of the frame. This number helps us to track changes and improvements and must be mentioned when ordering parts or requesting service. For your convenience, a space has been provided inside the front cover of this manual to record the serial number, model number, purchase date, and dealer name.

Model # : \_\_\_\_\_

Serial # : \_\_\_\_\_

Date Purchased : \_\_\_\_\_

Dealer Name : \_\_\_\_\_



# Safety

**Take note!** This safety alert symbol is found throughout this manual to call your attention to instructions involving yourself and others working around the machine.

Failure to follow these instructions can result in injury or death!



This symbol means

**- Attention!  
Become Alert!  
Your Safety is involved!**

## **Signal Words are used in this book.**

**Caution:** Indicates a potentially hazardous situation that may result in injury.

**Warning:** Indicates a potentially hazardous situation that could result in serious injury or death.

**Danger:** Indicates a hazardous situation that needs to be avoided. It is you the operator that needs to be aware of these dangers.

If you have any questions not answered in this manual, please contact your dealer or Tubeline Manufacturing Ltd.

6455 Reid Woods Drive,  
R. R. #4 Elmira  
Ontario, Canada  
N3B 2Z3

Email : [sales@tubeline.ca](mailto:sales@tubeline.ca)  
Fax : (519)-669-5808  
Tel : (519)-669-9488

## **Safety Guidelines**

Safety of the operator is one of our main concerns, however we do hear of some accidents that could have been avoided if some precautions had been taken.

To avoid personal injury study the following precautions and insist those working with you or for you, follow them.

In most cases the pictures will have the shielding in place, in some they may be removed, only to show a view behind the shield.

Keep all the shields, safety doors in place. If they become faulty and fail to work replace them. They are for your safety, do not operate the equipment with them removed.

Replace any decals that may be missing or that are not readable. Location of the decals is indicated in this manual.

Do not operate this machine while under the influence of drugs or alcohol.

Review the safety instructions with all users annually.

This equipment should not be operated by children, or with those unfamiliar with the operation of the machine. Do not allow persons to operate this machine until they have read this manual and/or were instructed by a qualified person.

Do not paint over, remove or deface any safety signs or warning decals on your equipment. Observe all safety signs and practice the instructions on them.

If the bale seems to be larger than the hoop do not try to force the material through as the film spools may touch the bale and break the plastic. If it stalls halfway through you can't back up, you will have to pull the bale apart by hand.

## **Lighting and Marking**

This machine is equipped with lights and reflectors as required by the most stringent government and ASAE specifications. They should work with the tractor 7-pin connector.

# Safety Decal Location



# Safety Decal Location





# Safety Decal

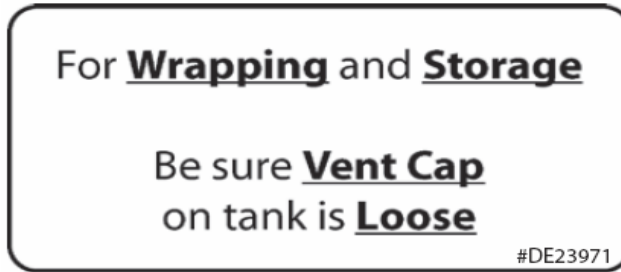
ITEM – A  
PART # - DE23846



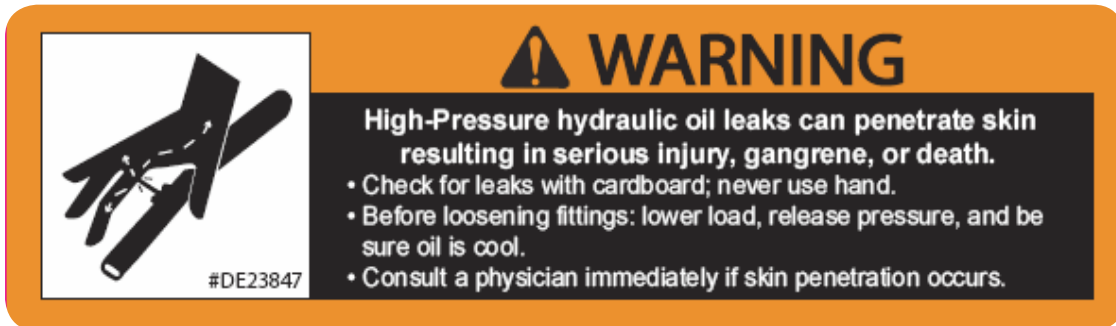
ITEM – F  
PART # - DE23845



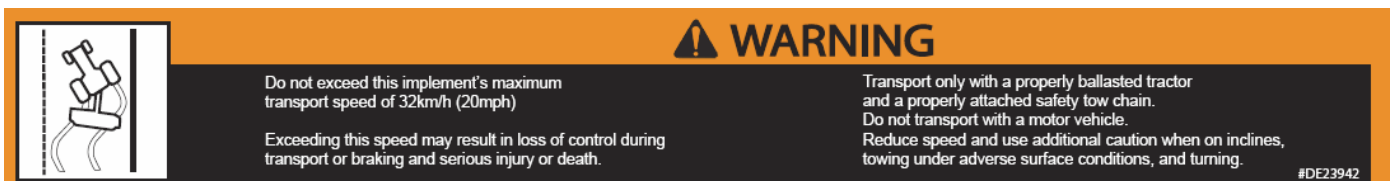
ITEM – G  
PART # - DE23971



ITEM – H  
PART # - DE23847



ITEM – E  
PART # - DE23942

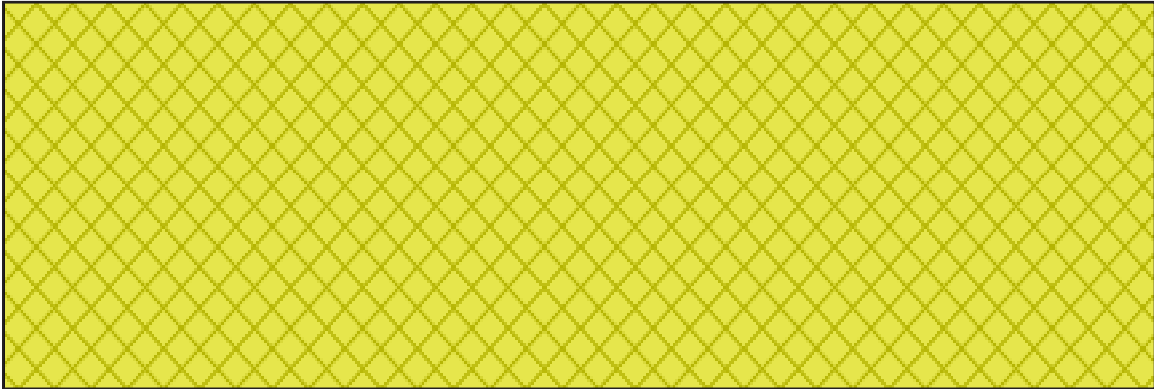


# Safety Decal

**ITEM - I (Both Sides of the Machine)**  
**PART # - DERED**



**ITEM - J (Both Sides of the Machine)**  
**PART # - DEAMBER**



**ITEM - K**  
**PART # - DECANADA**



**ITEM - L**  
**PART # - DE23941**



- Keep safety signs clean and legible at all times
- Replace safety signs that are missing or illegible
- Decals are available through your dealer

# Safety Decal



ITEM - N  
PART # - DE30880



ITEM - O  
PART # - DE30879



ITEM - P  
PART # - DE30881





## Remember

Your best assurance against accidents or damage to the machine is to know how it operates. If you do not understand a portion of the manual or a function of the wrapper, please contact your dealer or an experienced operator.



## Before Operation

- Carefully study and understand the manual or be trained by an experienced operator.
- Do not wear loose clothing that may get caught in moving parts.
- Visually inspect the machine to make sure no parts are loose or missing.
- Be sure that no tools are left on the machine.
- Make sure no hay is lying on the engine and that the cooling fins are not clogged with dust and hay (this could cause a fire)
- Do not hurry the learning process. Be familiar with one part before trying the next part.
- Practice by running the machine through its paces, first in Manual Mode with no bales in the machine until you are comfortable and familiar with the operation. After you become familiar with the operation, switch the machine to Auto Mode. Use a pole to push the table switch down to start the cycle.
- Do not reach in and push the switch paddle down by hand.

### Bale Size

**Round Bales** - The TLR5000ECV will wrap bales up to 5' x 5 ½'. It will wrap all sizes smaller than this dimensions as well.

Remember when making big bale silage the bales will be heavier than dry hay. This puts extra strain on loading and transporting equipment. Also, bales will be heavier when feeding out and may have to be moved on wet ground or snow. As a result most operators reduce silage bale diameter to 4-4 ½', even though the wrapper will handle larger size.

**Square Bales** - Model TLR5000X2-ECV is **NOT** a square bale machine.



## Recommended Operating Procedure

We suggest the following method of operating the TLR5000ECV Tubeline Wrapper

Park the wrapper where you want the end of the row to be, facing in the appropriate direction with wrapper in up position.

Apply parking brake and fold in the first section of the tongue and fasten the bracket into the hydraulic steering slider with the pin that held the tongue.

### To Wrap Bales with Model TLR5000ECV

Before the first bale that will stay on the line is placed on the wrapper, place an end cap on the bale. (Check with your plastic supplier for suggestions.)

- Pull about 4 ft of plastic through each stretcher and tie it under the twine on the bale, or tie it in the slots on the hoop brace (both sides)
- Start the machine by starting the engine under the table on the left hand side. You may need to choke it on the first use.
- You will see a control panel mounted above the engine, turn the ON/OFF switch to ON, you should see the control panel and the ON/OFF switch light up.
- With the control panel set to Manual Mode press the Ram REV button to advance the bale without the plastic stretcher applying plastic.
- As the bale is pushed through the hoop, start the hoop rotating to apply plastic by pushing the “Rotate” button (with the Ram REV button)
- When the ram hits the switch at the end of the stroke the forward motion on the cylinder will stop. More about this later.
- With the wrapper set to Manual Mode the panel buttons will have to be pushed and held, if you let them go the function will stop.
- Pressing the Ram FWD will retract the ram and open the bale pusher to accommodate the next bale.
- Wrap the 1st few bales in Manual Mode until the first bale overhangs the rear of the machine by 6 inches. Lower machine to the ground and **disengage parking brake, if equipped with a power drive, disengage the hydraulic lever.**
- **Note!** You may want to leave some weight on the wheels until the wrapper starts moving to avoid bales from sliding on the ground.
- After you have wrapped a few bales in this way, press the Auto/Manual button to set Auto Mode and place bale on the bale table. As the bale depresses the table trigger ram will start automatically.

**Danger** - The use of automatic setting when pushing off bales can cause severe injury or death.



## Warning

To stop the cycle: after the cycle has started in Automatic Mode, press the Auto/Manual button for Manual Mode (or if you have the optional remote kit, push the Stop button on the hand unit to stop the cycle).

For safety reasons, safety switches are installed in the doors. In Auto Mode the safety doors must be closed for the machine to work. In Manual Mode these switches reduce hoop and ram switches.

## Steering

This wrapper is equipped with hydraulic steering. The purpose of this is to keep the wrapper operating in a straight line or to direct the wrapper around obstacles. If the ground is uneven or the wrapper is operated on the side of a hill, then it can drift out of line. The loader operator is usually able to detect if the wrapper is not moving in the desired direction. When steering around obstacles in the wrapping path do not make sharp turn as this prevents the bales from being tightly packed together.

When starting a row, align the wrapper in the desired direction for the row and ensure the steering is in the center position.

## Optional- Remote Control

With the remote control the machine can be controlled with a hand held unit. The machine will now go through the complete wrap cycle and stop at the end of the cycle. Two of the remote buttons are used to control right and left steering. The fourth button is the remote cycle stop. Notice- the “on/off” switch on the control panel will turn off all the electric current to the Control Panel and also Engine Stop. When stopping the machine, switching the engine to OFF is advised. This will avoid draining the battery.

## Pushing the Last Bale Off the Wrapper

The wrapper must be in Manual Mode to push the last bale off.

To push off the last bale :

- Open the bale pusher by pivoting the handle under the ram to the opposite side of that machine.
- Start pushing the bale through the wrapper by using the reverse button and wrap button on the control panel. Continue pushing the bale through the wrap chamber until you have reached the end of the stroke.
- Retract the bale pusher
- Open the safety doors, remove 2 x 3 tube from the Hydraulic tank side of the wrapper and lay it across the top of the pushoff brackets (lower pushoff to other side if machine is equipped with optional folding pushoff).
- Open the bale pusher, store the 2 x 3 tube in bracket, secure with lock pin
- Undo steering, unfold tongue and insert lock pin.
- Make sure the brakes are released before driving away.

## **Post Operation**

Remember to turn off the control panel when turning off the machine, if the green ON/OFF switch is lit on your control panel, it indicates the control panel is still powered. Leaving the control panel on for long periods of time will drain your battery. Also if you have the engine start turned to electric only remember to turn the engine off and remove the key.

After wrapping, inspect the rows of silage regularly to ensure there is no damage occurring from birds, rodents or livestock.

## **Feeding Livestock**

When its time to take a bale off a row all that is needed is a loader tractor. You can pick up bales without cutting the plastic, as the plastic will break away between bales and can be removed from the side of the bales before dropping the bales in the feeder.

Wrapped bales do not spoil as the line is fed. Unlike long bags of bales, the stretch wrap prevents air from moving past the bales and causing the bales at the far end to heat and spoil. As the next bale is undisturbed it will not spoil for one to two days in warm weather and for at least a week in cooler weather.

## **Disposal of Plastic**

Users of bale wrappers are encouraged to collect all plastic to prevent it from becoming an environmental problem. Plastic, although bulky, is inserted in a landfill and will not pollute the ground water. Manufactures are making serious efforts to economically recycle silage plastic. Use recycling services when available. Please do not burn the plastic! Collect and dispose all plastic in an Environmentally Friendly manner.

Remember the air and the ground that you contaminate is your visible footprint for many generations!

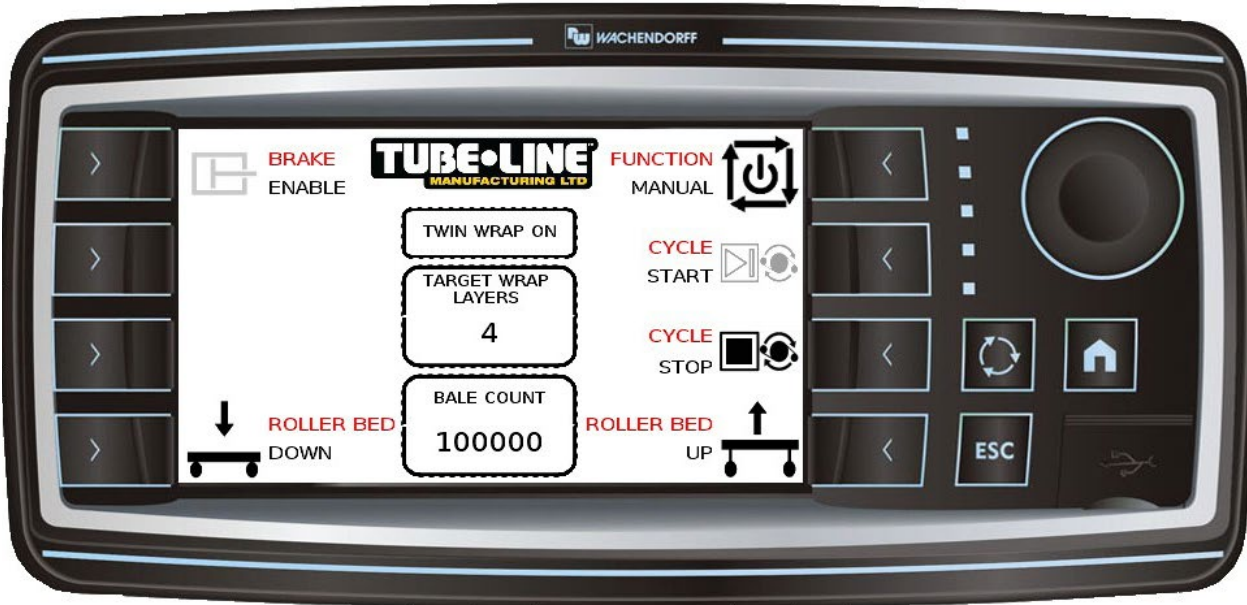
Unsightly used silage film will encourage complaints.

# Control Screen Operation

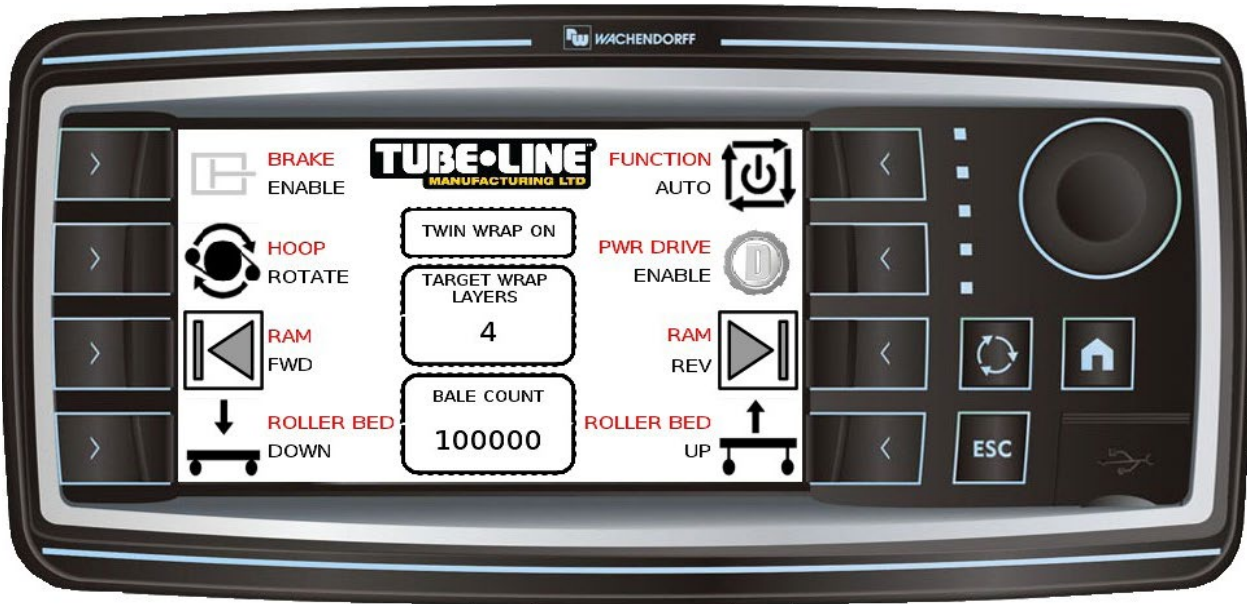
After the machine is started and the control panel screen is on you should see either a manual or automatic screen. The following screens show the different functions of the TLR5000ECV.

*Please note that functionality will vary with different installed features.*

## Auto Home Screen



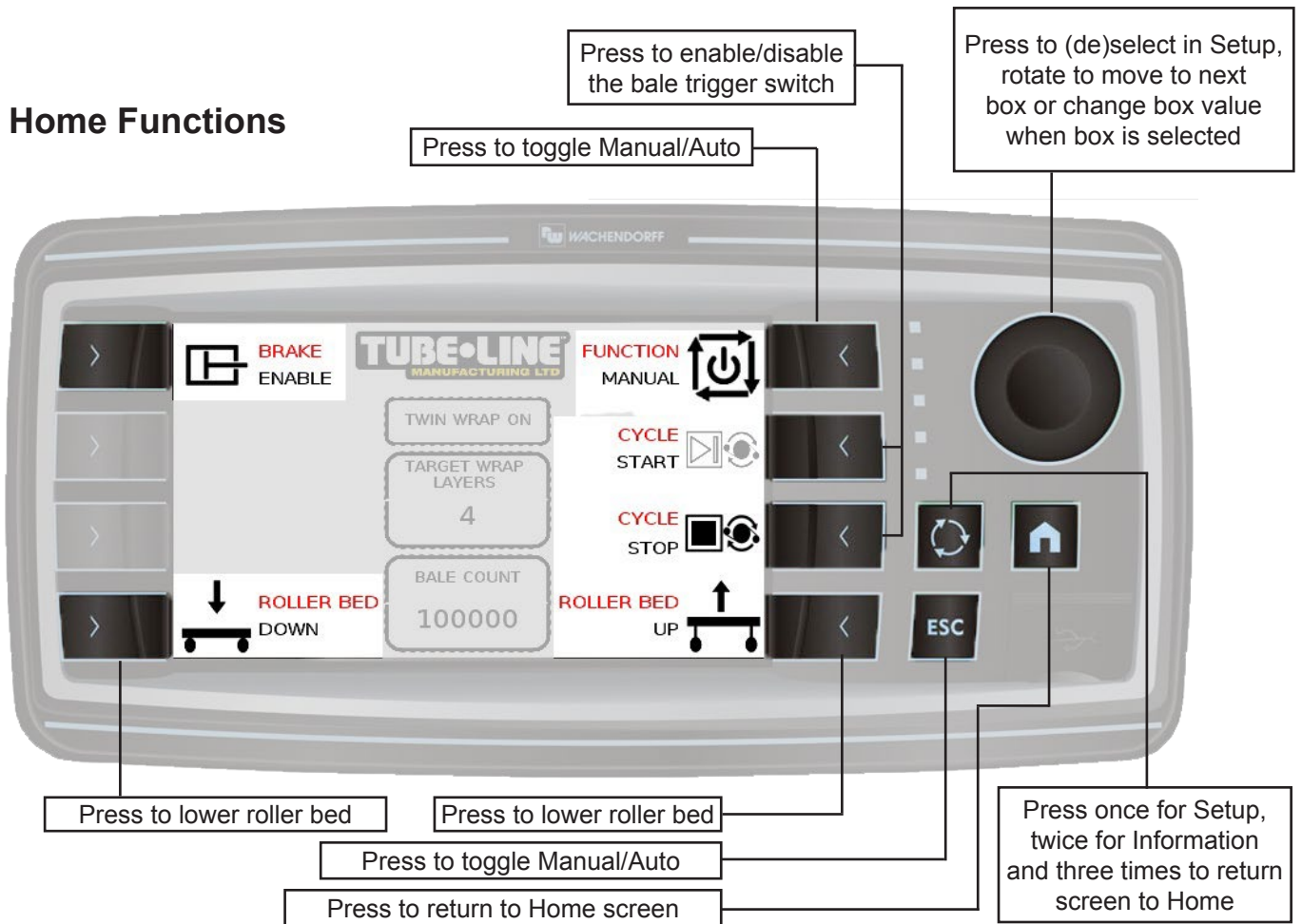
## Manual Home Screen



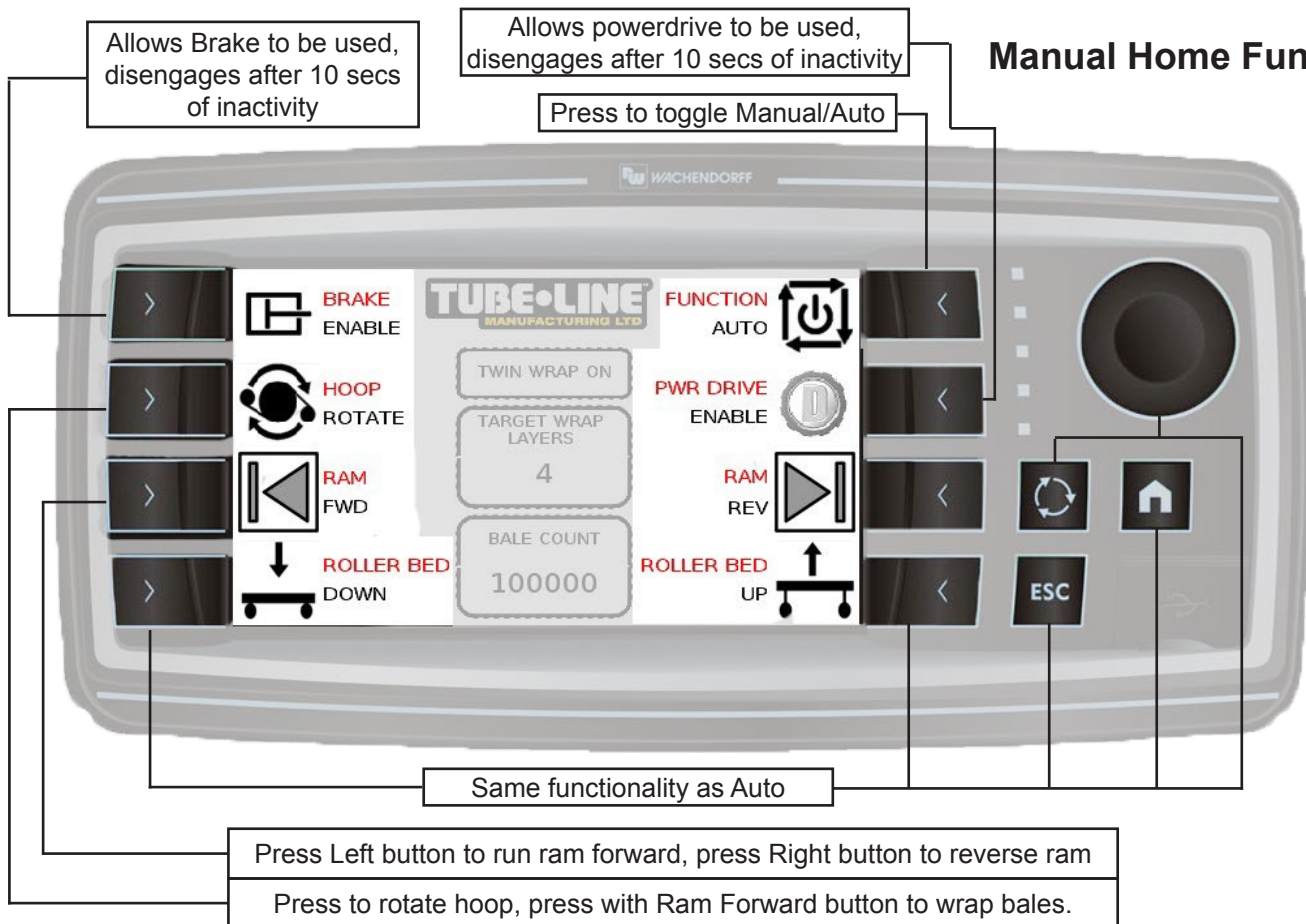
Error Message : If, while operating, you see one of these errors where the Tubeline decal is, stop the machine and check that the doors are fully closed and that the film has not ripped or is empty.



## Auto Home Functions



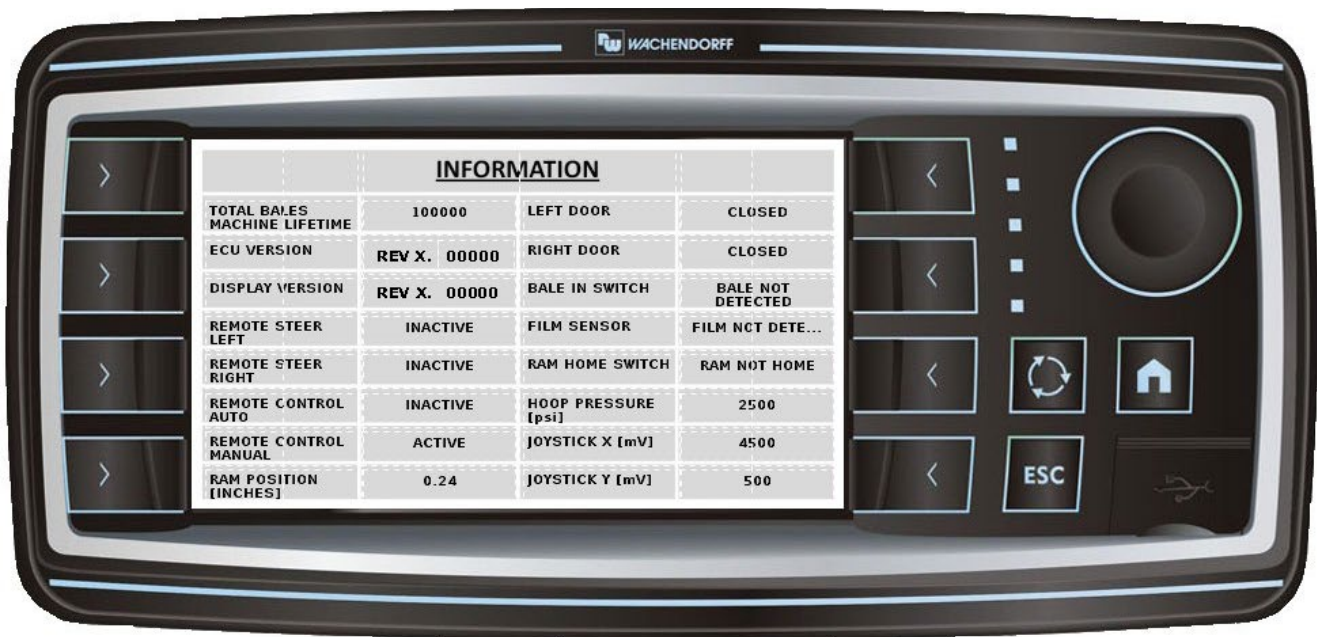
## Manual Home Functions



## Setup Screen



## Information Screen



In the setup screen you may change settings to customize the wrapping operation.

- Switch Twin Wrap box to “YES” if you have installed this option (4 rolls instead of normal 2)
- Target Wrap Layers : Change amount from 2-20 layers per bale
- Disable the film sensor as needed
- Add more time before power drive auto disengages
- Change to different preset bale widths (36”,48”,60”)
- Change to different complete ram travel length (default is 42”)
- Change to different length the ram will travel before the hoop starts rotating (default is 6”)
- Set Bale Count Adjust to zero at start of new job

# Trouble Shooting / Maintenance



## Caution

Be Safe, never ride on the machine while being used or transported. Never climb on the table or inside the wrap chamber with the Engine running.

Use Manual Mode or stop the engine when changing plastic rolls. Never leave it in Auto Mode as your helper may set a new bale on the table or press the start button on the remote.

Installation of Plastic

Procedures for maintenance, repairs or plastic rolls replacement :

1. Push the Emergency Button
2. Remove the key from the motor (has to be kept by the end user to avoid accident)
3. Do the required maintenance / repairs

*Turn control panel off to avoid wasting battery if repairs are lengthy*

## Plastic Installation

1. Wrinkles in the plastic with seams between layers easily visible. Check to determine if the plastic is properly routed through the Tensioner rollers.
2. Plastic tears between the Tensioner and the bale. Film spool holders: not turning freely. Lubricate and turn by hand until free. Slave roller not turning freely. Lubricate and turn by hand until free.
3. Tensioner rolls not turning freely : Loosen the bolts holding the bearing and check if this makes a difference. It may be that the bearings have too much end pressure, in this case re-tighten the bearings and loosen the locking collar on the roller shaft this will allow the shaft to slide in the bearing; re-tighten the bearing collar. The gears can also be meshed too tight; this can be fixed by slightly loosening one set of bearing bolts. Using a hammer and punch, lightly tap the bearing away from the other roller.

**Caution** - Do not use a hammer on the aluminum stretcher rolls.

4. Poor quality plastic: Use a brand with good tear resistance.
5. Tack build up on the rollers, particularly in hot weather : Clean the Tensioner with warm soapy water.
6. Plastic roll is too hot : In very hot weather the plastic can become soft if left in the sun for long periods of time. In these conditions, the spare rolls should be kept in the shade. After the rolls have been installed on the machine one can be parked on the bottom and a cover can be placed on the top one. Rolls of plastic may catch on the bottom of the bale. If bales are misshaped the roll of plastic may drag on the bottom of the bale, causing the plastic to break.



**Danger! Stop engine before attempting to install plastic.**

# Transportation / Storage

## Brake

The TLR5000ECV is equipped with a manual parking brake in rear left wheel. If the wrapper is equipped with optional POWER DRIVE, the power drive is engaged and used as a parking brake.

Notice - Make sure **BRAKE IS DISENGAGED** before transporting the wrapper.

## Caution

Before moving the wrapper any distance close the fuel valve at the engine! As the machine is towed it will bounce and shake, as it does this the carburetor float will let too much fuel into the system. Raw fuel can get into the engine cylinder and wash the cylinder walls down and end up in the engine oil.

## **OBSERVE MAXIMUM TRANSPORT SPEED**

The maximum transport speed for this implement is 32 km/h (20 mph).

Some tractors are capable of operating at speeds that exceed the maximum transport speed of this implement. Regardless of the maximum speed capability of the tractor being used to tow this implement, do not exceed the implement's maximum transport speed. Exceeding the implements maximum transport speed can result in: - Loss of control of the tractor/implement combination - Reduced or no ability to stop during braking - Implement tire failure - Damage to the implement structure or its components Use additional caution and reduce speed when towing under adverse surface conditions, when turning, and when on inclines. Do not attempt transport if the fully loaded implement weighs more than 1.5 times the weight of the tractor.

## Tires

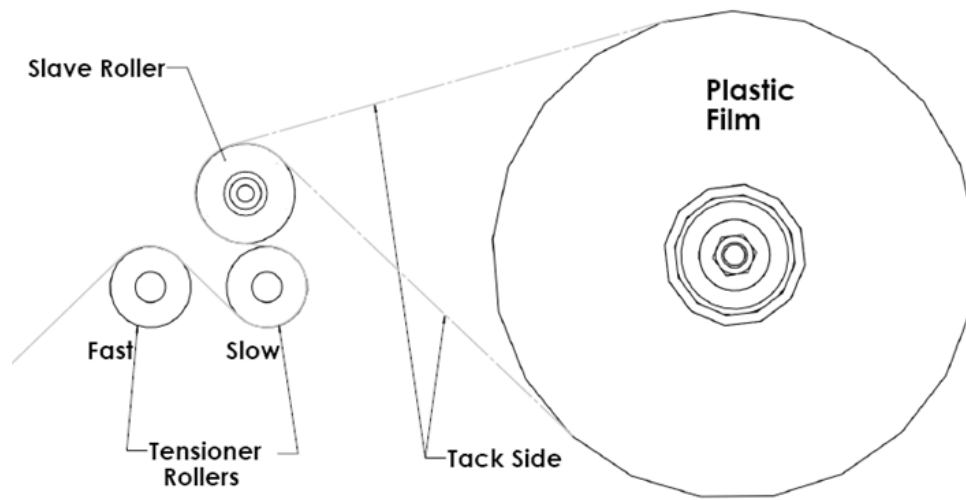
Proper tire pressure is 36 psi and should be maintained at all times. On the rear axle replace tire with the same type and brand if possible. If this is not practical then replace with a tire that has the same outside diameter.

Plastic from the factory has a natural tack on the inside. In the event of the plastic being stored for an extended period of time the tack may migrate to the opposite side. To test for tacky side fold plastic inside to inside and pull apart. Fold opposite way (top to top) to determine tackier side.

The roll of plastic should be installed with the tack on the inside of the plastic film next to the bale silage. The plastic then passes over the slave roller and is threaded through the two metal rollers on the Tensioner as shown in the diagram.

The two metal stretcher rolls rotate at different speeds. This causes the plastic to be stretched. It is very important that the plastic goes over the slow roller first and the faster roll second. If there is any question, which is the faster roller:

- Turn one roller by hand and watch the speed of the other roller, this should help you determine which is the fast and slow roller. When the plastic is installed correctly, it should stretch tight on the bale to form a smooth tube.



### Danger



When the machine is in Manual Mode the safety switches and the film sensor reduce the ram and hoop speed.

- Test the hydraulics by rotating the hoop and moving the ram back and forth.
- Install the roll of plastic according to the Plastic Installation diagram.

### Caution

Close safety doors after installing plastic to avoid injury.

### Caution

Round hay bales are heavy and silage bales are even heavier. Use only bale-handling equipment. Keep bales low when turning loader.

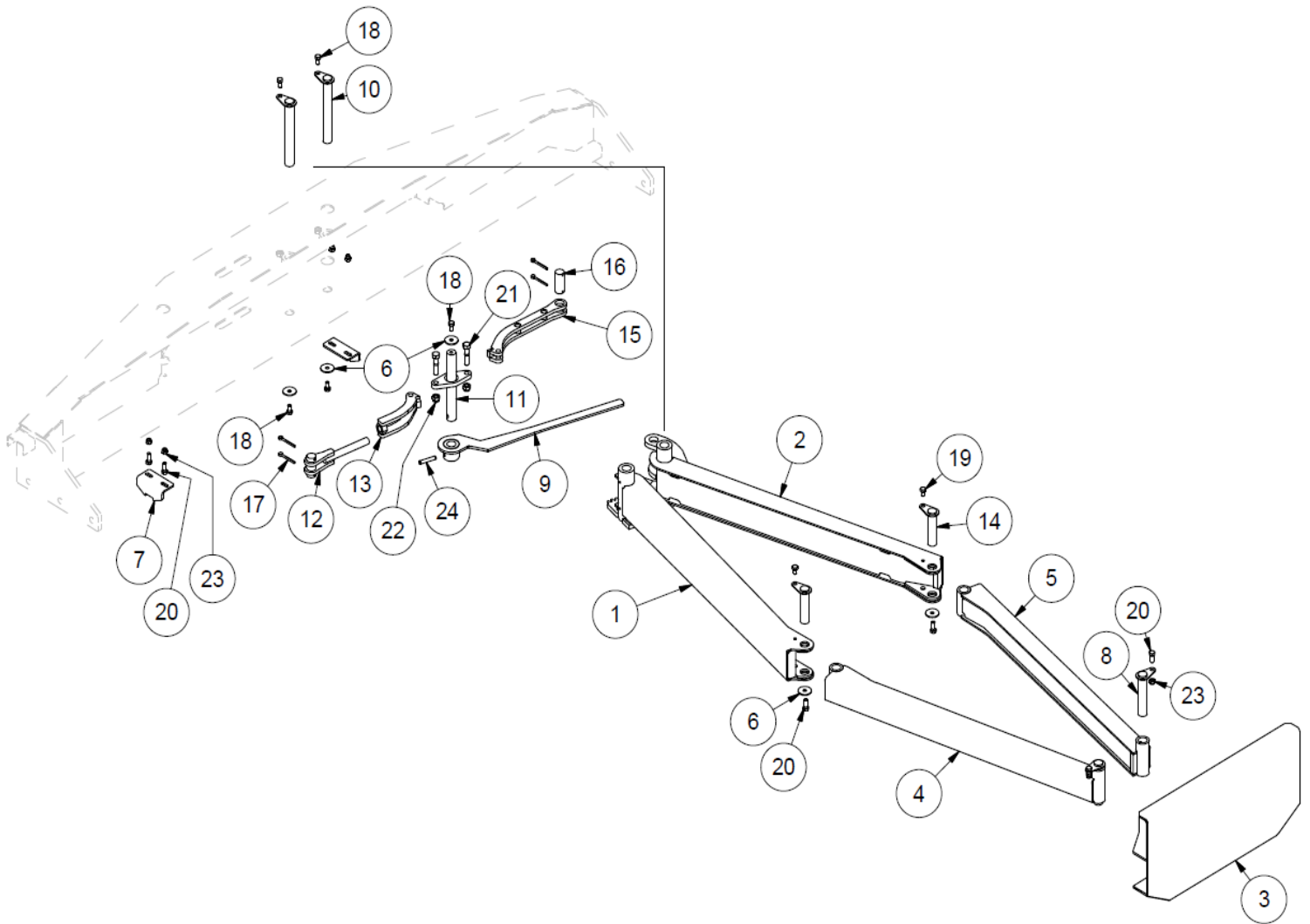
### Caution

It is important that the bale sit firmly on the deck, as the bale spears should deflect the hay somewhat. Failure to do this may cause the plastic to stick to the spears and tear the plastic inside the bale.

*Intentionally Blank*

**TLR5000ECV**  
**Parts Lists & Breakdowns**

# TLR5000ECV Front Pushoff



To order complete ram assembly (includes 30927, see next page), use part # : 31935

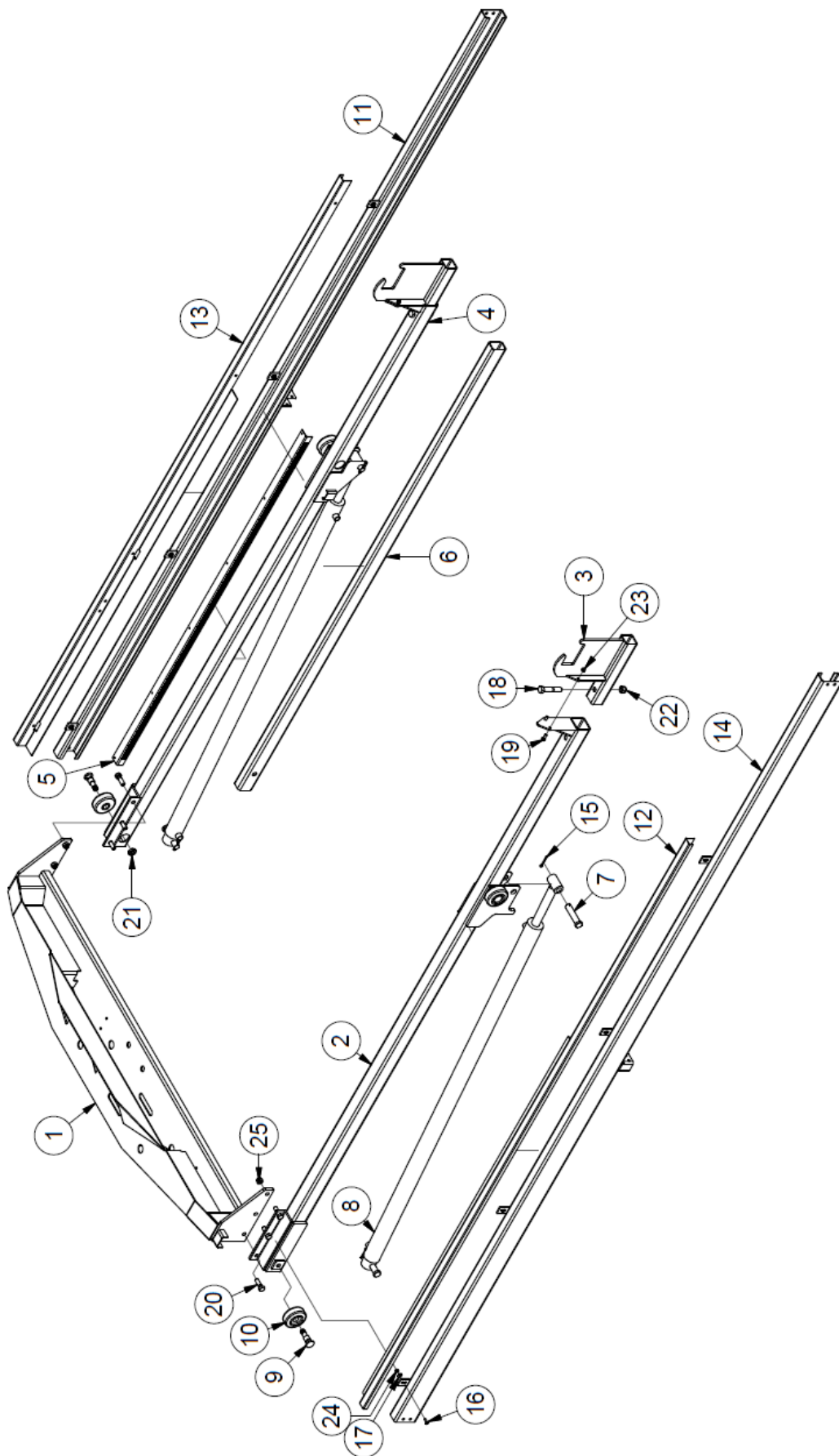


# TLR5000ECV

## Front Pushoff

<b>Item</b>	<b>Qty</b>	<b>Part #</b>	<b>Description</b>
1	1	30455	Left Large Arm
2	1	30456	Right Large Arm
3	1	30459	Push Plate
4	1	30457	Left Small Arm
5	1	30462	Right Small Arm
6	5	30924	Pin Washer
7	2	30958	Handle Holder
8	2	30980	Last Pushoff Plate Pin
9	1	30981	Last Pushoff Handle
10	2	30982	Pushoff Middle Pin
11	1	30983	Linkage Pivot
12	1	30985	Linkage Adjuster
13	1	30986	Pivot Adjuster
14	2	30988	Arm Joint Pin
15	1	30989	Solid Pivot Arm
16	2	30993	Ram Linkage Mount Pin
17	4	Obtain Locally	CP .188 X 2 Cotter Pin
18	5	Obtain Locally	HB .375 X .75 Hex Bolt
19	2	Obtain Locally	HB .375 X .5 Hex Bolt
20	8	Obtain Locally	HB .375 X 1 Hex Bolt
21	2	Obtain Locally	HB .5 X 2.25 Hex Bolt
22	2	Obtain Locally	LN .5 Lock Nut
23	6	Obtain Locally	LN .375 Lock Nut
24	1	Obtain Locally	RP .375 X 2 Roll Pin

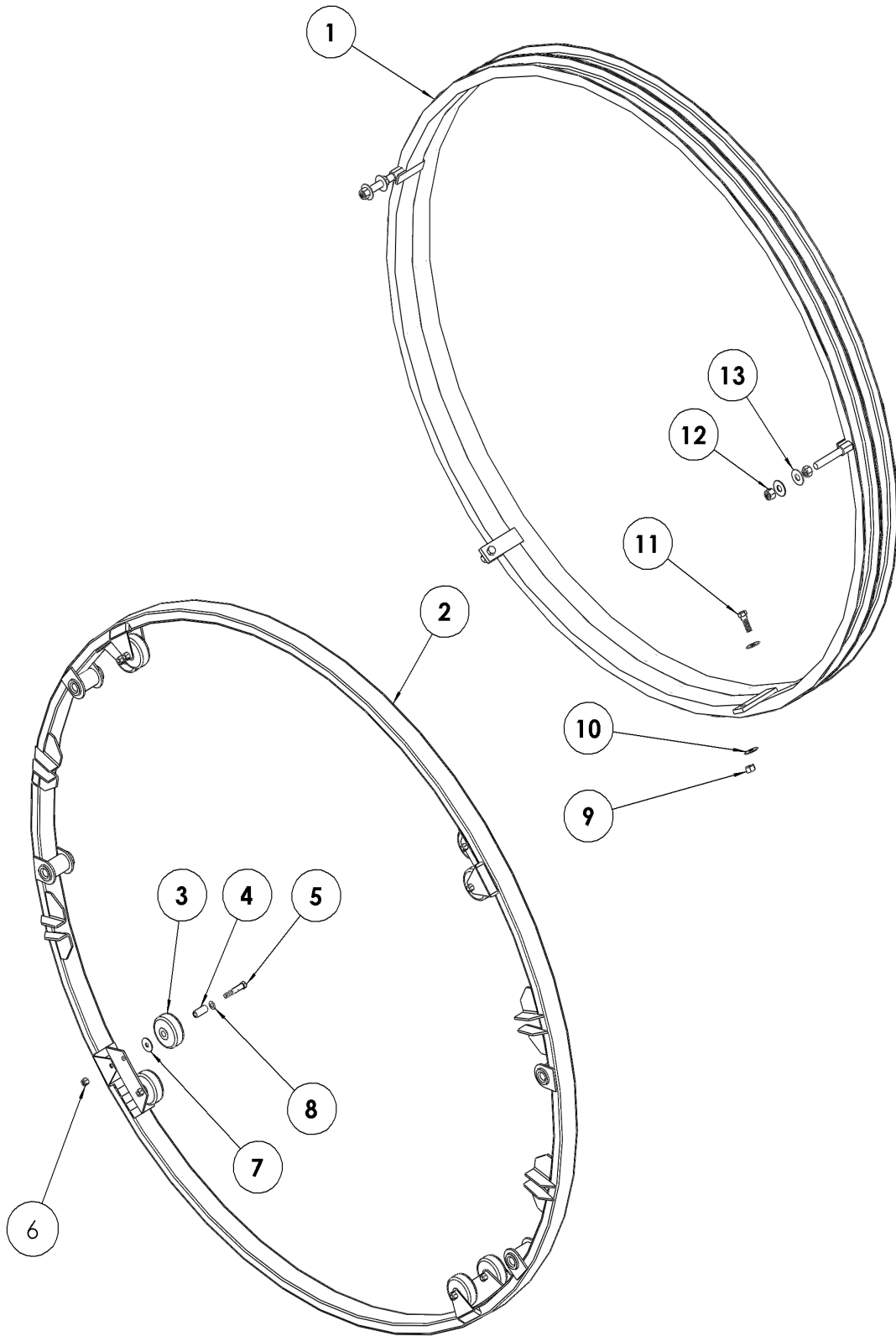
# TLR5000ECV Ram



# TLR5000ECV Ram

Item	Qty	Part #	Description
1	1	30927	Ram
2	1	30961	Left Side Ram Tube
3	2	30967	Last Pushoff Tube Holder
4	1	30991	Right Side Ram Tube
5	4	31710	Speed Sensor Guide
6	1	TL500-301-048	Pushoff Tube
7	2	TL550-100-042	Ram Cylinder Pin
8	4	TL550-100-043	Ram Cylinder
9	1	TL5X2-301-156	Ram Wheel Axle
10	1	TL5X2-301-157	Ram Wheel
11	4	TL5X2-301-170	Right Side Rail
12	1	TL5X2-301-171	Left Side Rail
13	1	TL5X2-301-172	Right Door Track
14	4	TL5X2-301-176	Left Door Track
15	8	Obtain Locally	CP .188 X 2 Cotter Pin
16	8	Obtain Locally	FHSCS .313 X 1 Flat Head Socket Cap Screw
17	6	Obtain Locally	FW .313 Flat Washer
18	4	Obtain Locally	HB .75 X 4 Hex Bolt
19	2	Obtain Locally	HB .375 X 1 Hex Bolt
20	4	Obtain Locally	HB .625 X 2 Hex Bolt
21	8	Obtain Locally	HJN .75 UNF Hex Jam Nut
22	4	Obtain Locally	LN .75 Lock Nut
23	6	Obtain Locally	LN .375 Lock Nut
24	2	Obtain Locally	LN .313 Lock Nut
25	6	Obtain Locally	LN .625 Lock Nut

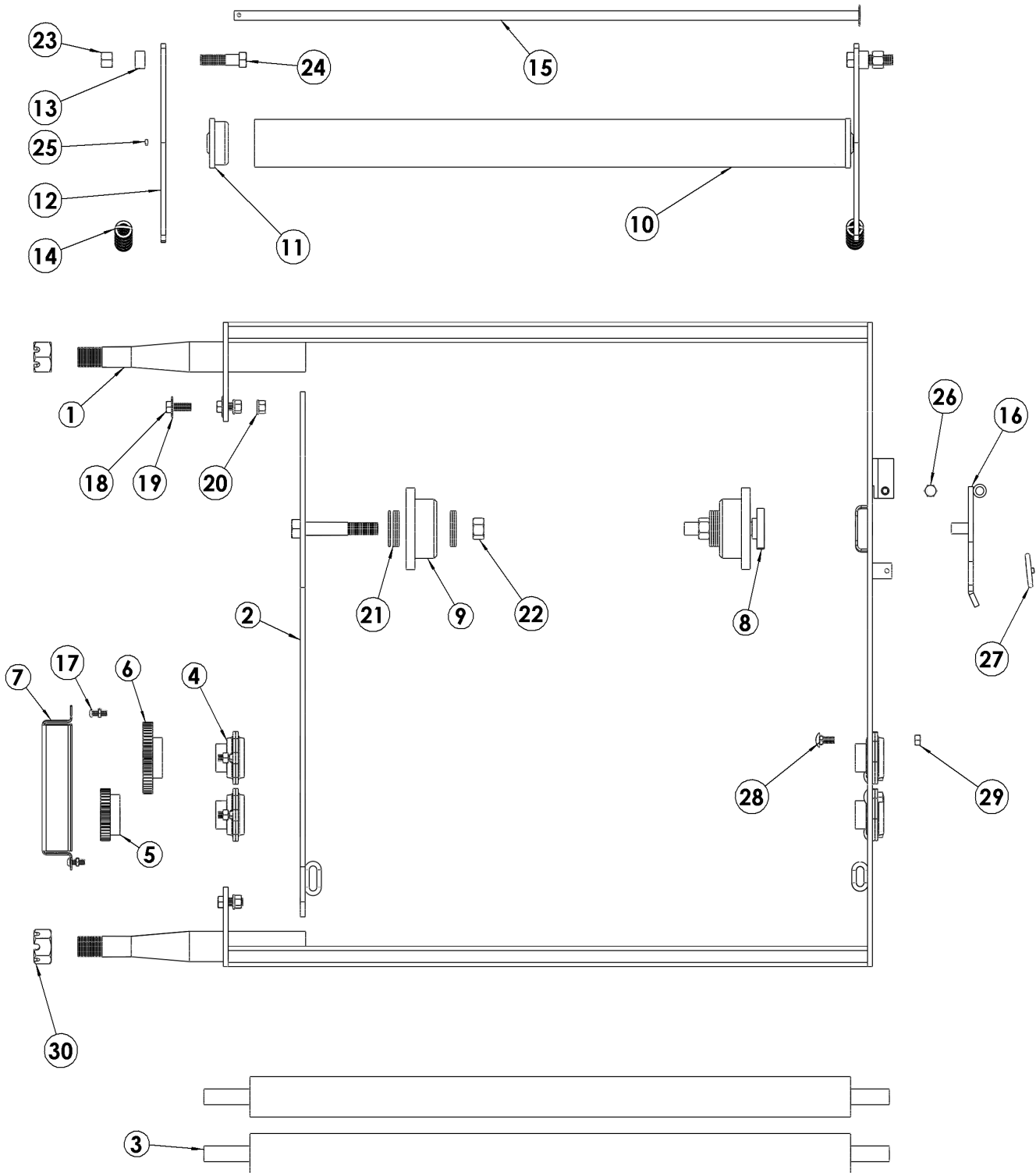
# TLR5000ECV Hoop Assembly



# TLR5000ECV Hoop Assembly

<b>Item</b>	<b>Qty</b>	<b>Part #</b>	<b>Description</b>
1	1	TL550-100-002	Inner Hoop
2	1	TL550-301-001	Outer Hoop
2A		TL5X2-500-101	Complete Outer Hoop (Items 2-8)
3	8	TL500-200-014	4" Hoop Wheel
3A		TL5X2-500-102	Complete 4" Hoop Wheel
4	8	TL550-200-016	Spanner
5	8	TL500-100-015	Axle Bolt
6	8	Obtain Locally	LN 1/2-20 Steel Locknut
7	8	Obtain Locally	FW 1/2 Fender Washer
8	8	Obtain Locally	SAE 1/2 Washer
9	2	Obtain Locally	LN 5/8-11 Locknut
10	4	Obtain Locally	FW 5/8 Flat Washer
11	2	Obtain Locally	HB 5/8-11 X 2 Gr.5 Hex Bolt
12	4	Obtain Locally	LN 3/4-10 Locknut
13	4	Obtain Locally	FW 3/4 Flat Washer

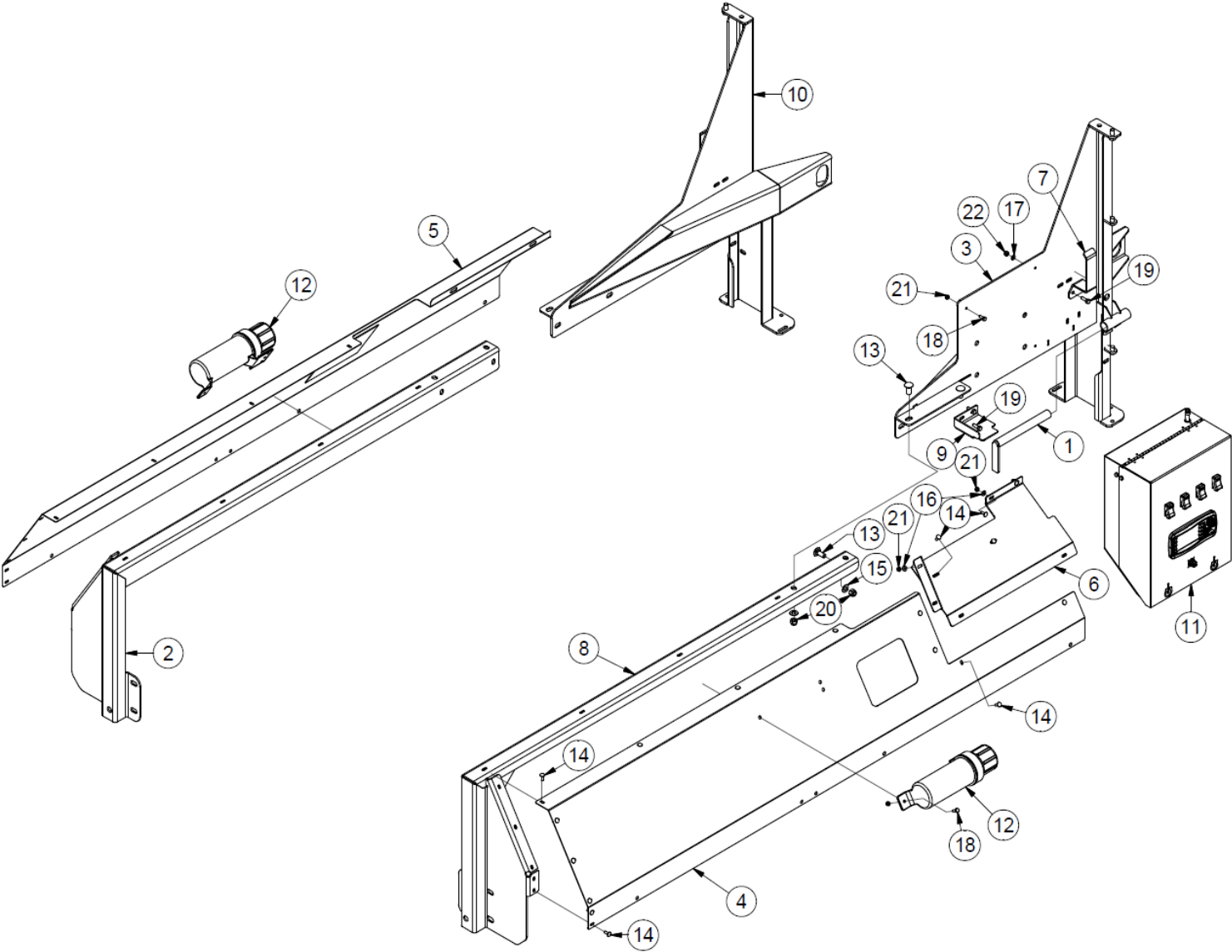
# TLR5000ECV Wrap Carrier



# TLR5000ECV Wrap Carrier

Item	Qty	Part #	Description
1A	2	TL550-100-072	Complete Wrap Carrier
1	2	TL550-100-089	Main Wrap Bracket
2	2	TL550-200-090	Main Wrap Side Insert
3	4	TL550-100-006	Tensioner Rollers
4	4	TL550-100-007	¾ Bearing c/w Flange
5	2	TL550-100-008	Small Gear
6	2	TL550-100-009	Large Gear
7	2	TL550-100-010	Gear Cover
8A		TL5X2-500-103	Spool Holder c/w Parts (Ref # 8,9,21,22)
8	2	TL550-200-115	Spool Holder
9	4	TL550-200-012	Plastic Wrap Spool
10A	2	TL5X2-500-104	Slave Roller c/w End cap (Ref # 10,11)
10	2	TL550-100-022	ABS Pipe
11	4	TL500-100-021	HMWPVC Plastic End Cap
12	4	TL550-100-016	Slave Roller Mount Bracket
13	4	TL550-100-017	Spacer
14	4	TL500-100-135	Tensioner Spring
15	2	TL550-100-018	Slave Roller Axle Shaft
16	2	TL550-200-103	Spool Latch
17	8	Obtain Locally	10-24 x 3/4 Bolt c/w nut & Lockwasher
18	8	Obtain Locally	3/8-16 x 1 Bolt Gr.5
19	8	Obtain Locally	3/8 Flatwasher
20	10	Obtain Locally	3/8-16 Locknut
21	20	Obtain Locally	5/8 Flatwasher
22	4	Obtain Locally	5/8-11 Locknut
23	4	Obtain Locally	1/2-13 Locknut
24	4	Obtain Locally	1/2-13 x 2 Bolt Gr.5
25	2	Obtain Locally	1/8 Cotter Pin
26	2	Obtain Locally	3/8-16 x 2 1/2 Bolt Gr.5
27	2	Obtain Locally	3/16 Linch Pin
28	16	Obtain Locally	5/16-18 x 3/4 Carr Bolt
29	16	Obtain Locally	5/16-18 Locknut
30	4	Obtain Locally	1"-14 UNF Slotted Nut

# TLR5000ECV Hoop Brace

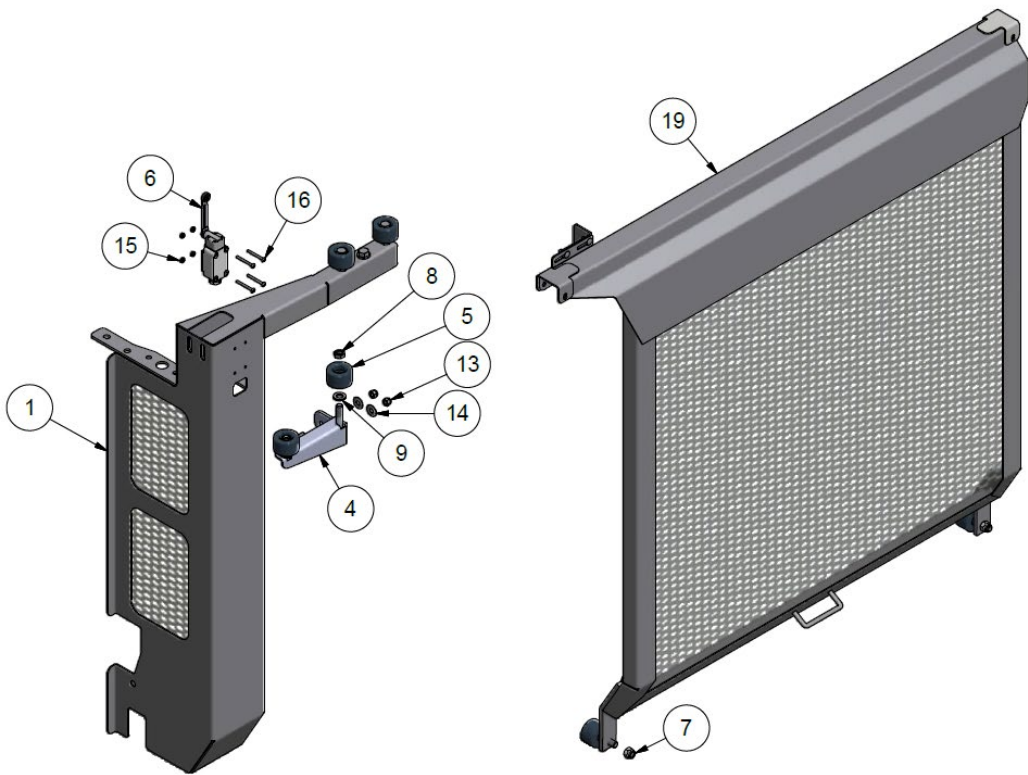
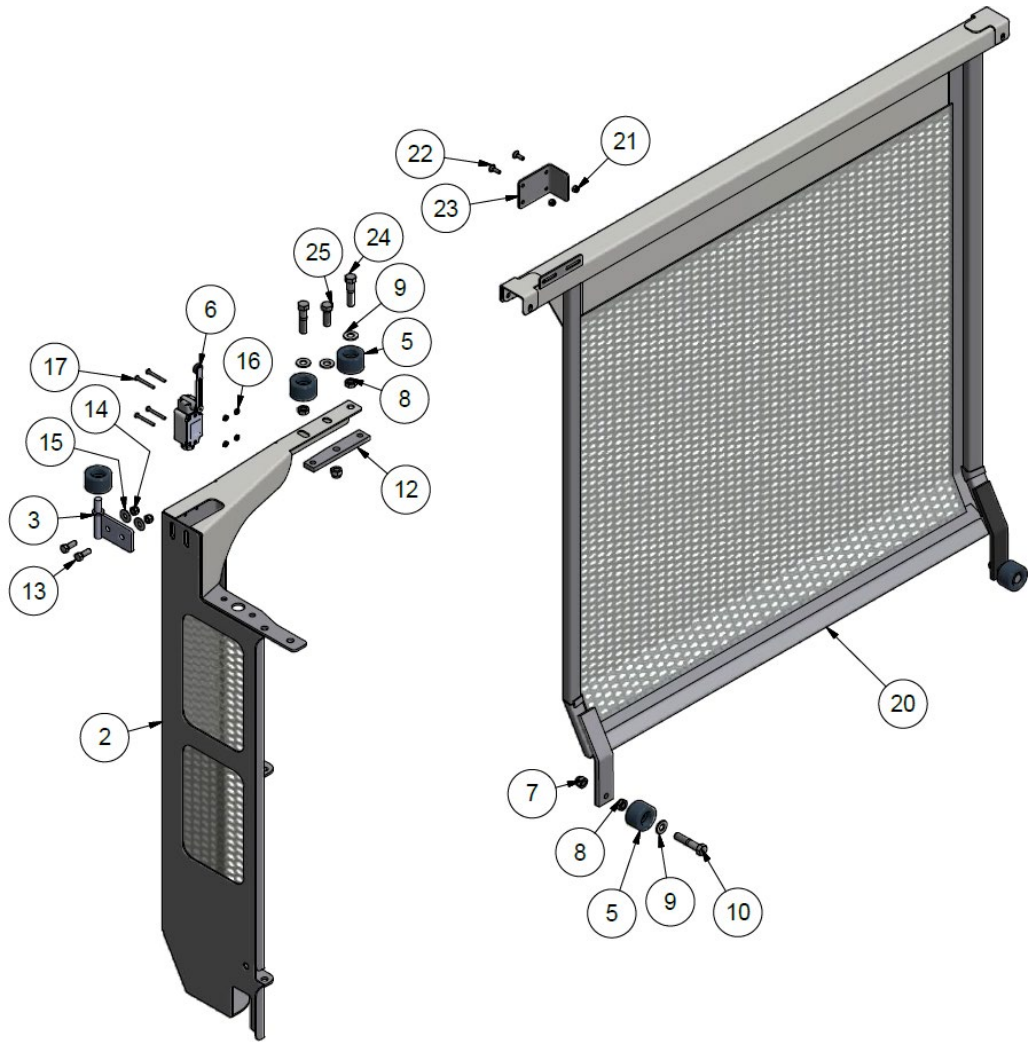




# TLR5000ECV Hoop Brace

<b>Item</b>	<b>Qty</b>	<b>Part #</b>	<b>Description</b>
1	1	25667	Hoop Lock Pin
2	1	32788	Right Front Hoop Brace
3	1	33361	Control Panel Mount
4	1	35387	Left Side Shield
5	1	35388	Right Side Shield
6	1	35606	Control Panel Shield
7	2	35621	Tape Holder
8	1	35634	Left Rear Hoop Brace
9	1	35638	Hoop Lock
10	1	35640	Right Rear Hoop Brace
11	1	36043	Control Panel
12	2	TL5X2-201-111	Manual Holder
13		Obtain Locally	CB .5 X 1.25 Carriage Bolt
14		Obtain Locally	CB .25 X .75 Carriage Bolt
15		Obtain Locally	FW .5 Flatwasher
16		Obtain Locally	FW .25 Flatwasher
17		Obtain Locally	FW .313 Flatwasher
18		Obtain Locally	HB .313 x 1 Hex Bolt
19		Obtain Locally	HB .24 x .75 Hex Bolt
20		Obtain Locally	LN .25 Locknut
21		Obtain Locally	LN .5 Locknut
22		Obtain Locally	LN .313 Lock Nut

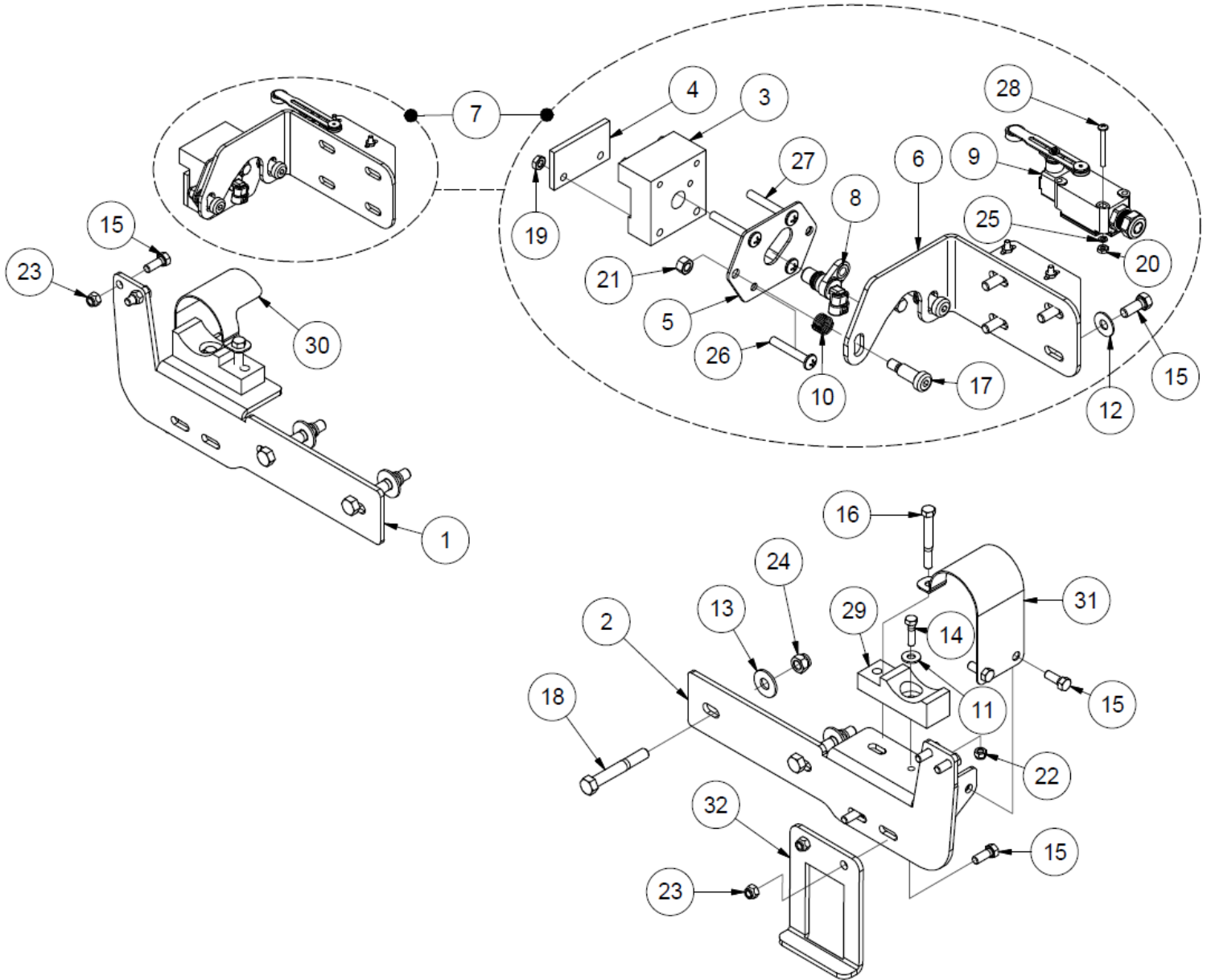
# TLR5000ECV



# TLR5000ECV Safety Guarding

Item	Qty	Part #	Description
1	1	TL5X2-100-025	Left Safety Guard
2	1	TL5X2-100-024	Right Safety Guard
3	1	TL5X2-301-103	Right Top Door Roller Bracket
4	1	TL5X2-301-120	Left Top Door Roller Bracket
5	6	TL5X2-301-121	Door Roller
6	2	TL550-100-060	Limit Switch
7	6	Obtain Locally	1/2-13 Locknut
8	8	Obtain Locally	1/2-13 Jam Nut
9	4	Obtain Locally	1/2 SAE Flatwasher
10	4	Obtain Locally	1/2-13 x 2 1/2 Bolt Gr.5
11	1	TL550-200-050	Hoop Lock Pin
12	1	Obtain Locally	5/16-18 Locknut
13	1	Obtain Locally	5/16-18 x 1 Bolt Gr.5
14	4	Obtain Locally	3/8-16 x 1 1/4 Bolt Gr.5
15	4	Obtain Locally	3/8-16 Locknut
16	4	Obtain Locally	3/8 Flatwasher
17	8	Obtain Locally	10-24 Nut
18	8	Obtain Locally	10-24 x 1 3/4 Bolt Gr.5
19	1	31562	Left Door Weldment
20	1	33222	Right Door Weldment
21	4	Obtain Locally	1/4 Lock Nut
22	4	Obtain Locally	1/4 x 3/4 Carriage Bolt
23	2	25062	Door Switch Tab
24	4	Obtain Locally	HB 1/2-13 x 4 Bolt
25	2	Obtain Locally	HB 1/2-13 x 1.5 Hex Bolt

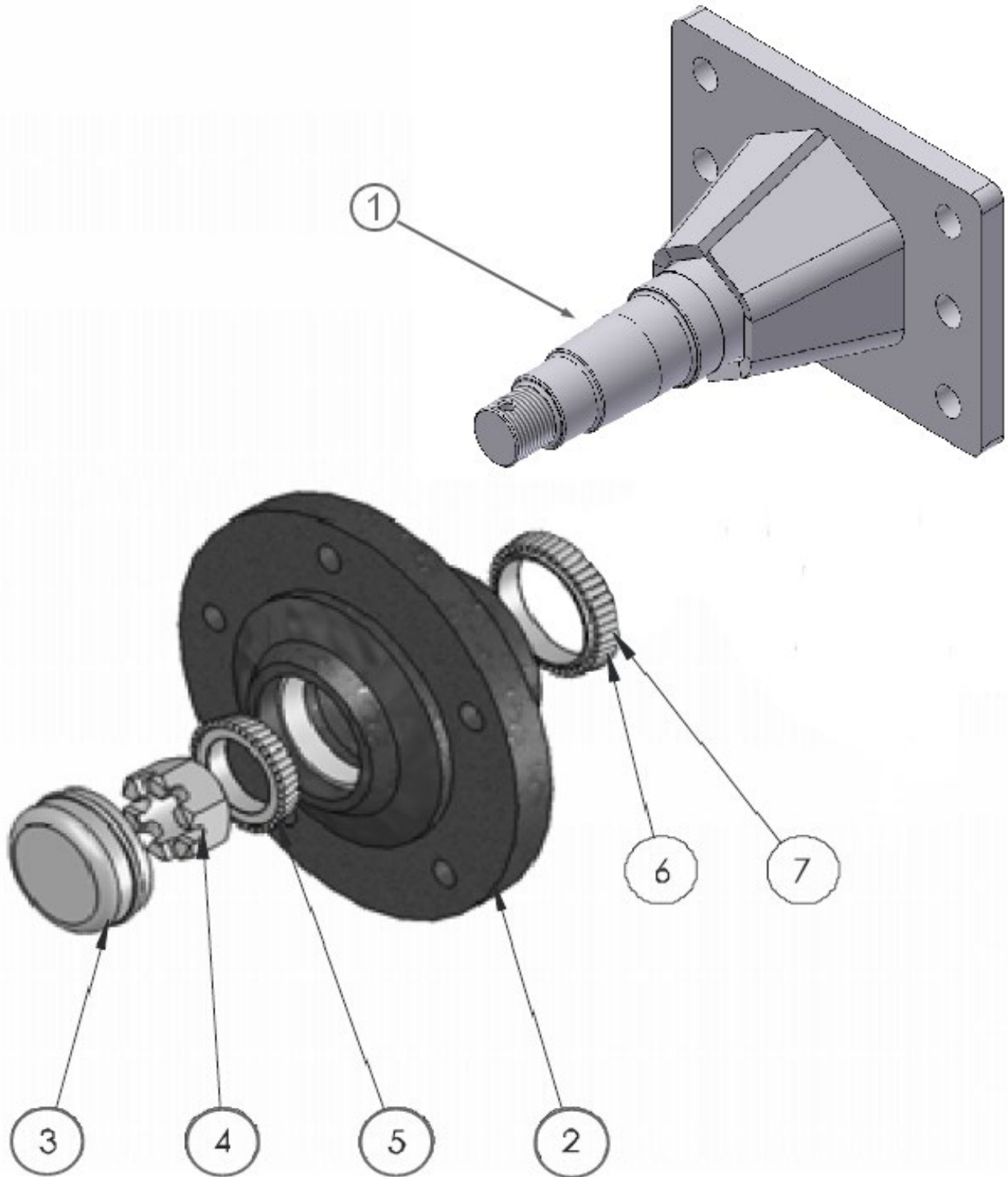
# TLR5000ECV Cylinder Support



## TLR5000ECV Cylinder Support

Item	Qty	Part #	Description
1	1	25671	Left Cylinder Support
2	1	25672	Right Cylinder Support
3	1	31712	Sensor Guide Block
4	1	31713	Sensor Guide Strip
5	1	31714	Speed Sensor Spacer
6	1	31977	Speed Sensor Mount
7	1	32506	Speed Sensor Kit
8	1	32632	Speed Sensor
9	1	32633	Switch
10	2	36034	Spring
11	2	Obtain Locally	FW .313 x 1 Flatwasher
12	4	Obtain Locally	FW .375 Flatwasher
13	4	Obtain Locally	FW .5 Flatwasher
14	2	Obtain Locally	HB .313 x 1 Hex Bolt
15	14	Obtain Locally	HB .375 x 1 Hex Bolt
16	2	Obtain Locally	HB .375 x 3 Hex Bolt
17	2	Obtain Locally	HB .5 x 1 SS Shoulder Screw
18	4	Obtain Locally	HB .5 x 3.5 Hex Bolt
19	4	Obtain Locally	HJN .313 Hex Jam Nut
20	4	Obtain Locally	HJN 10-24 Hex Jam Nut
21	2	Obtain Locally	HN .375 Hex Nut
22	2	Obtain Locally	LN .313 Lock Nut
23	12	Obtain Locally	LN .375 Lock Nut
24	4	Obtain Locally	LN .5 Lock Nut
25	4	Obtain Locally	LW 10-24 Lock Washer
26	2	Obtain Locally	MS .313 x 2 Machine Screw
27	2	Obtain Locally	MS .313 x 2.25 Machine Screw
28	4	Obtain Locally	MS 10-24 x 1.75 Machine Screw
29	2	TL550-200-109	Rubber Cylinder Mount
30	1	TL5X2-100-132	Left Cylinder Clamp
31	1	TL5X2-100-133	Right Cylinder Clamp
32	1	TL5X2-500-142	Last Pushoff Holder

# TLR5000ECV Axle-Spindle-Hub

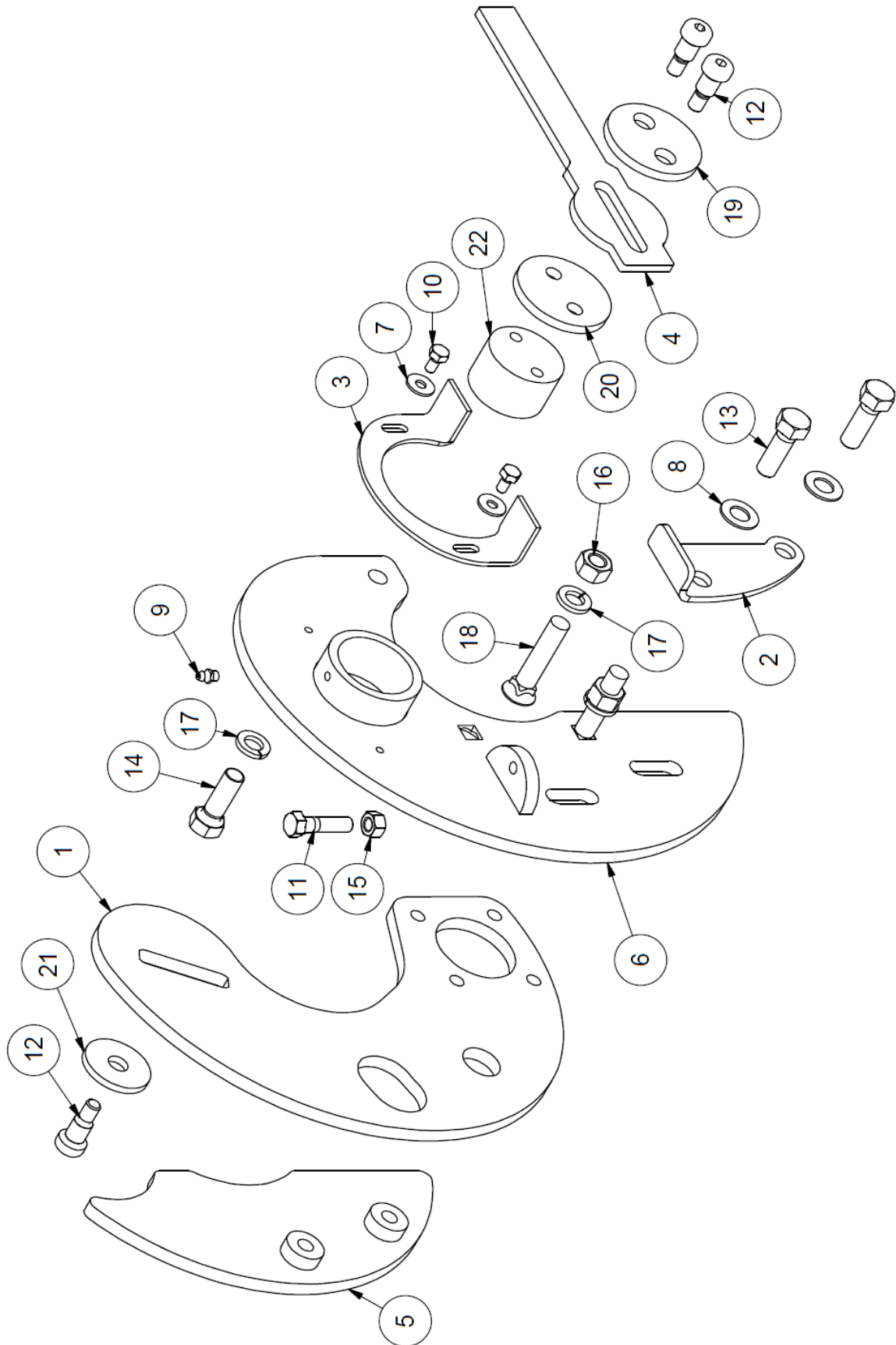


# TLR5000ECV

## Axle-Spindle-Hub

<b>Item</b>	<b>Qty</b>	<b>Part #</b>	<b>Description</b>
1	1	TL550-200-001	Spindle (serial # up to 11R012)
1	1	TL109-100-356	Spindle (serial # after 11R012)
2	1	TL500-100-066	Hub
3	1	TL500-100-073	Dust Cap
4	1	TL500-100-070	Castellated Nut
5	1	TL500-100-068	Outer Bearing
6	1	TL500-100-064	Inner Bearing
7	1	TL500-100-063	Inner Seal

# TLR5000ECV Power Drive Bracket



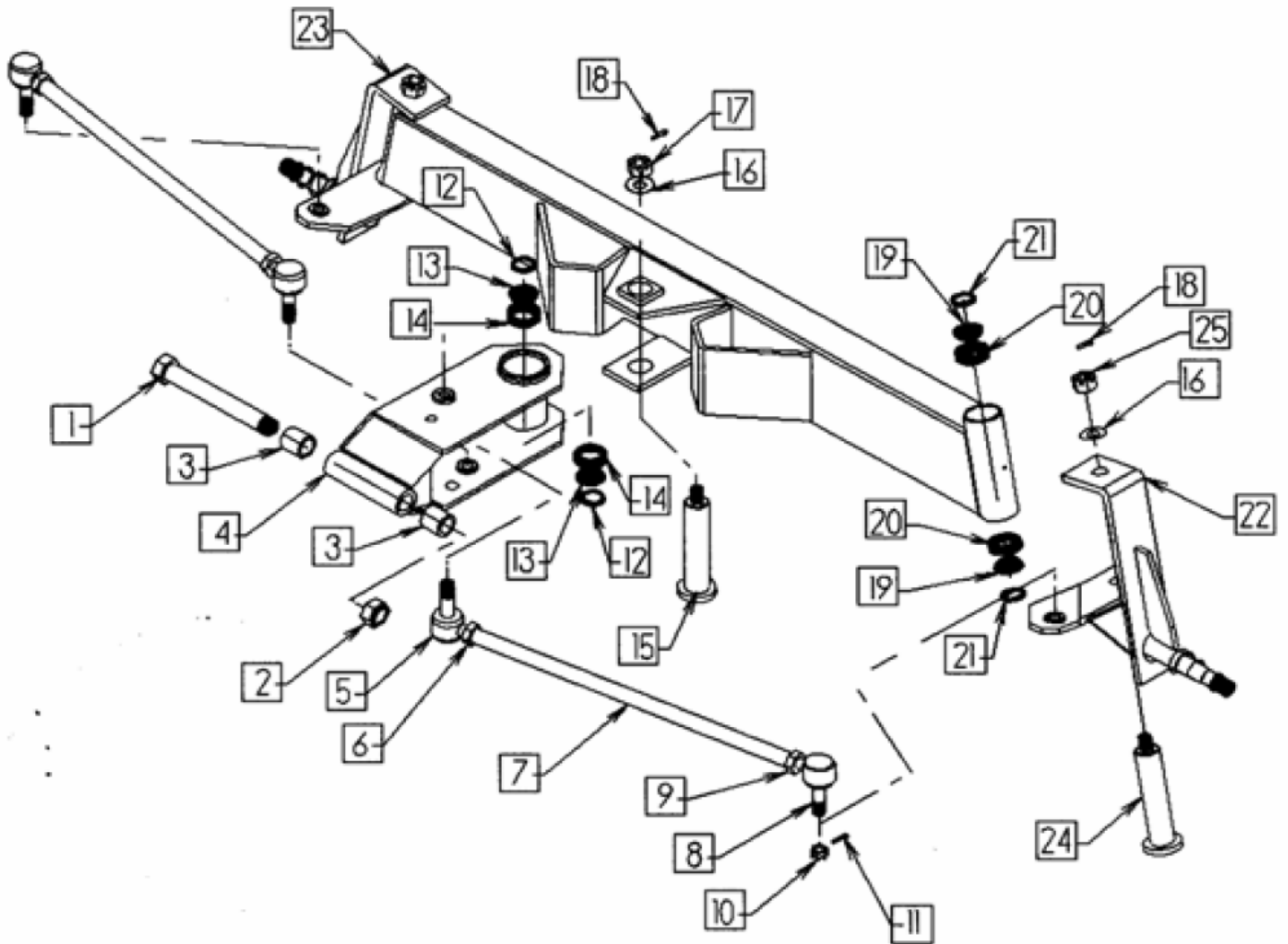


# TLR5000ECV

## Power Drive Bracket

Item	Qty	Part #	Description
1	1	25116	Drive Engaging Plate
2	1	25119	Outside Plate Guide
3	1	25121	Handle Lock
4	1	25122	Handle
5	1	25123	Bolt-On Plate
6	1	25124	Main Bracket
7	2	Obtain Locally	FW .25 Flat Washer
8	2	Obtain Locally	FW .5 Flat Washer
9	1	Obtain Locally	.25 Grease Zerk
10	2	Obtain Locally	HB .25 X .5 Hex Bolt
11	1	Obtain Locally	HB .375 X 1.5 Hex Bolt
12	3	Obtain Locally	HB .375 X .625 SS Socket Head Shoulder Screw
13	2	Obtain Locally	HB .5 X 1.5 Hex Bolt
14	1	Obtain Locally	HB .5 X 1.5 UNF Hex Bolt
15	1	Obtain Locally	HN .375 Hex Nut
16	2	Obtain Locally	HN .5 Hex Nut
17	3	Obtain Locally	LW .5 Lock Washer
18	2	Obtain Locally	PB .5 X 2.5 Plow Bolt
19	1	WHEEL2012	Outside Handle Washer
20	1	WHEEL20121	Inside Handle Washer
21	1	WHEEL2013	Inside Cam Washer
22	1	WHEEL9	Eccentric

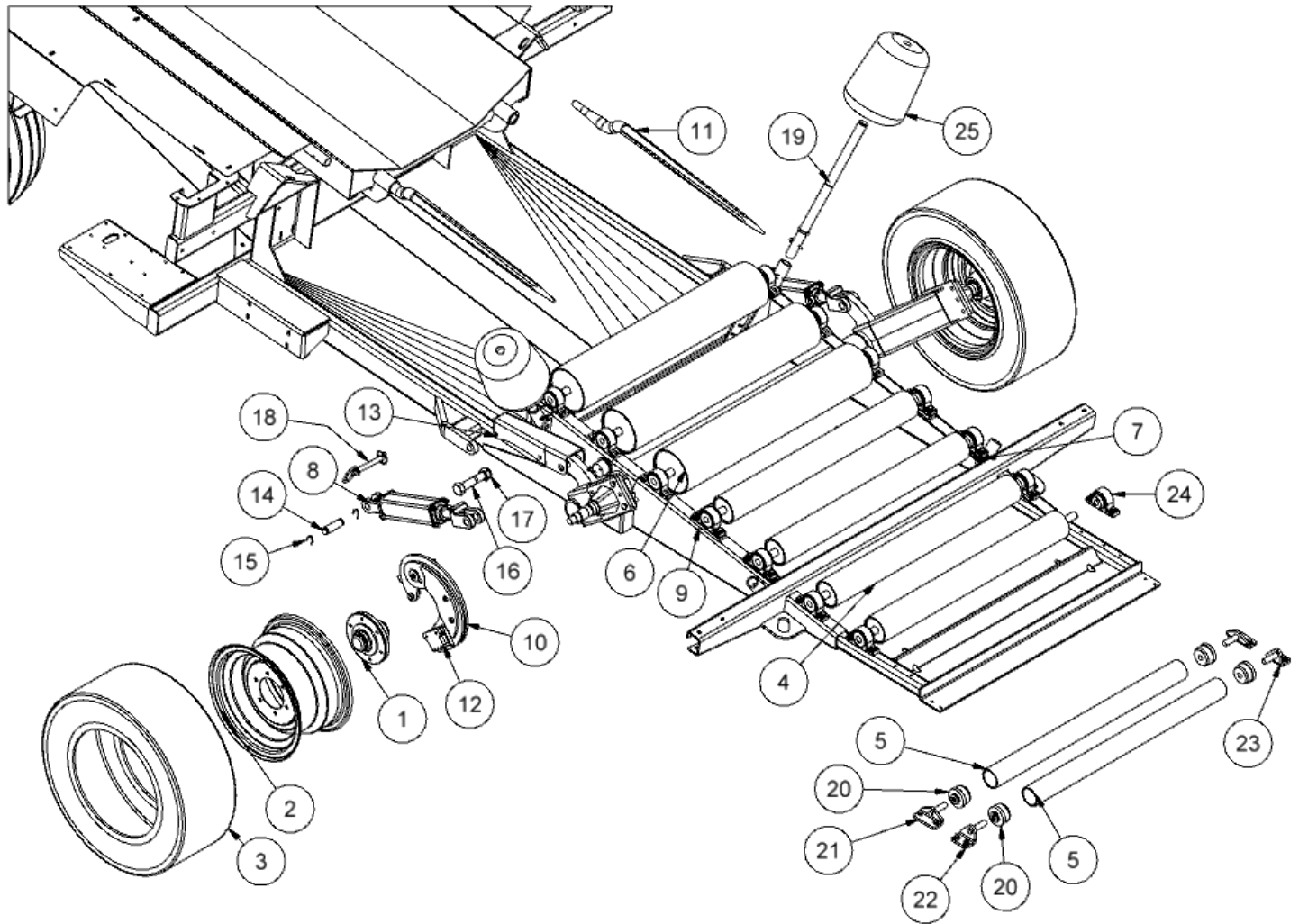
# TLR5000ECV Front Axle



## TLR5000ECV Front Axle

Item	Qty	Part #	Description
1	1	TL500-100-152	7/8 x 8 Bolt
2	1	TL500-100-153	7/8 Locknut
3	2	TL550-111-012	Tongue Bracket Bushing
4	1	TL550-221-008	Tongue Bracket Asm
5	2	TL550-111-006	Tie Rod End Right Thread
6	2	TL550-111-003	¾ Jam Nut (NF RH)
7	2	TL550-220-001	Tie Rod
8	2	TL550-111-007	Tie Rod End Left Thread
9	2	TL550-111-002	¾ Jam nut (NF LH)
10	4	TL550-111-004	9/16 NF Slotted Hex Nut
11	4	TL550-111-005	1/8 Cotter Pin
12	2	TL550-111-011	Tongue Bracket Seal
13	2	TL550-111-010	Tongue Bracket Timkin Bearing
14	2	TL550-111-009	Tongue Bracket Timkin Cup
15	1	TL550-221-013	Tongue Bracket Pin
16	3	TL550-111-014	13/16 Flatwasher
17	1	TL550-111-015	Tongue Bracket Nut
18	3	TL550-111-016	3/16 x 2 Cotter Pin
19	4	TL550-200-080	Spindle Bearing Timkin Cone
20	4	TL550-200-081	Spindle Bearing Timkin Cup
21	4	TL550-200-082	Spindle Bearing Seal
22	1	TL550-100-083	Left Side Spindle Assy
23	1	TL550-100-084	Right Side Spindle Assy
24	2	TL550-100-085	Spindle Pin
25	2	TL500-100-070	1" Fine Thread Castle Nut

# TLR5000ECV Rear Axle & Roller Bed

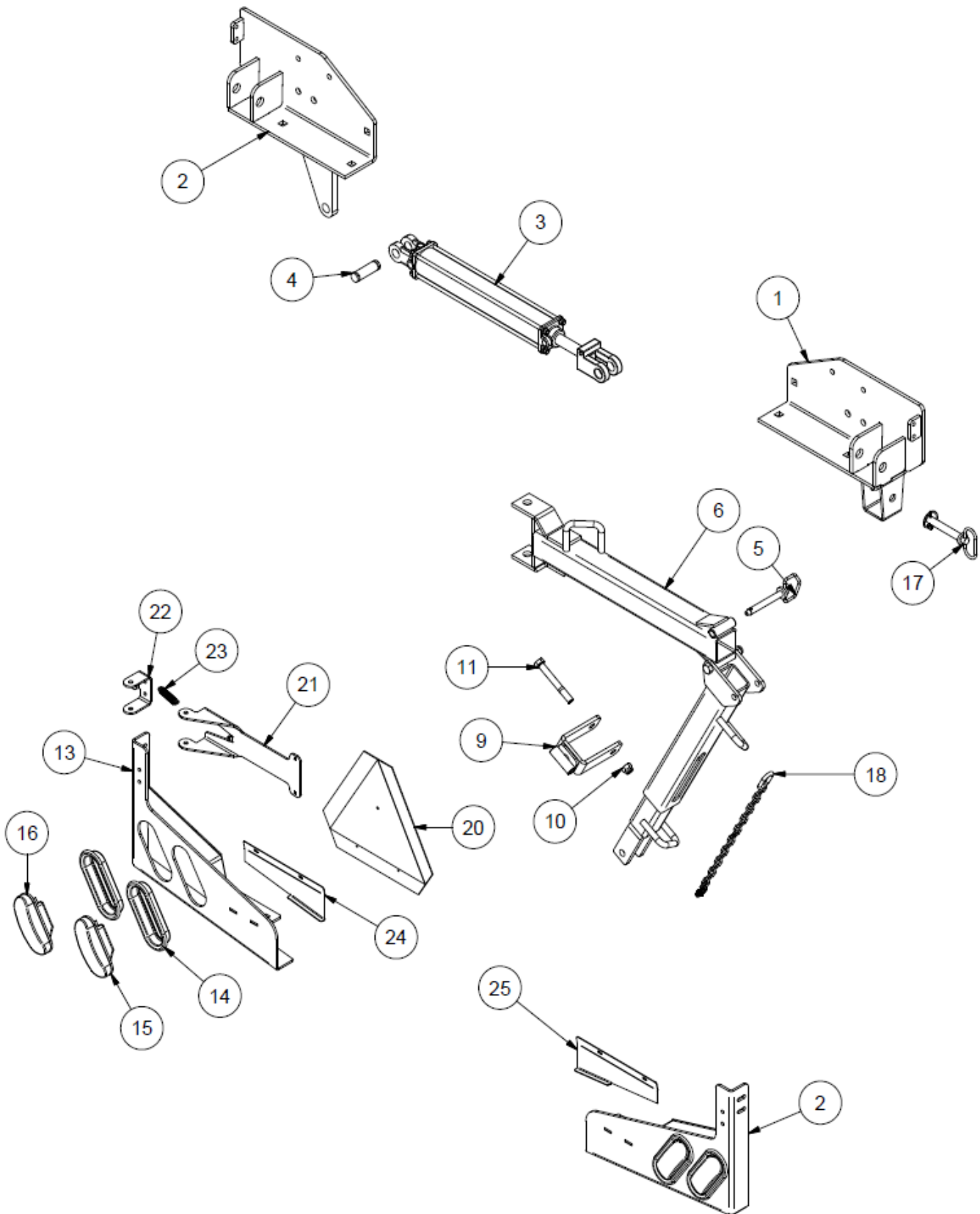


# TLR5000ECV

## Rear Axle & Roller Bed

Item	Qty	Part #	Description
1	1	TL500-100-152	7/8 x 8 Bolt
2	1	TL500-100-153	7/8 Locknut
3	2	TL550-111-012	Tongue Bracket Bushing
4	1	TL550-221-008	Tongue Bracket Asm
5	2	TL550-111-006	Tie Rod End Right Thread
6	2	TL550-111-003	¾ Jam Nut (NF RH)
7	2	TL550-220-001	Tie Rod
8	2	TL550-111-007	Tie Rod End Left Thread
9	2	TL550-111-002	¾ Jam nut (NF LH)
10	4	TL550-111-004	9/16 NF Slotted Hex Nut
11	4	TL550-111-005	1/8 Cotter Pin
12	2	TL550-111-011	Tongue Bracket Seal
13	2	TL550-111-010	Tongue Bracket Timkin Bearing
14	2	TL550-111-009	Tongue Bracket Timkin Cup
15	1	TL550-221-013	Tongue Bracket Pin
16	3	TL550-111-014	13/16 Flatwasher
17	1	TL550-111-015	Tongue Bracket Nut
18	3	TL550-111-016	3/16 x 2 Cotter Pin
19	4	TL550-200-080	Spindle Bearing Timkin Cone
20	4	TL550-200-081	Spindle Bearing Timkin Cup
21	4	TL550-200-082	Spindle Bearing Seal
22	1	TL550-100-083	Left Side Spindle Assy
23	1	TL550-100-084	Right Side Spindle Assy
24	2	TL550-100-085	Spindle Pin
25	2	TL500-100-070	1" Fine Thread Castle Nut

# TLR5000ECV Front Corner - Steering



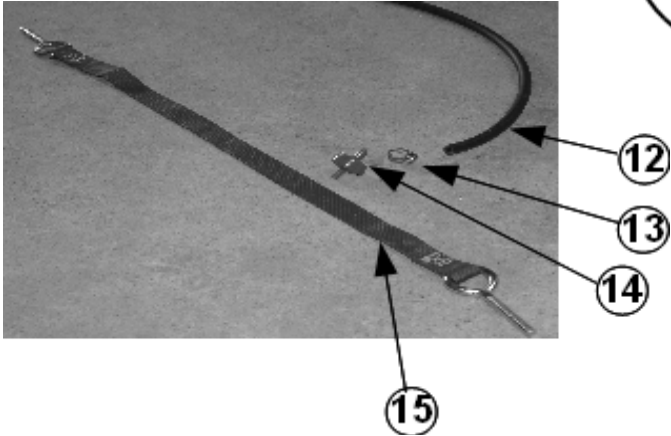
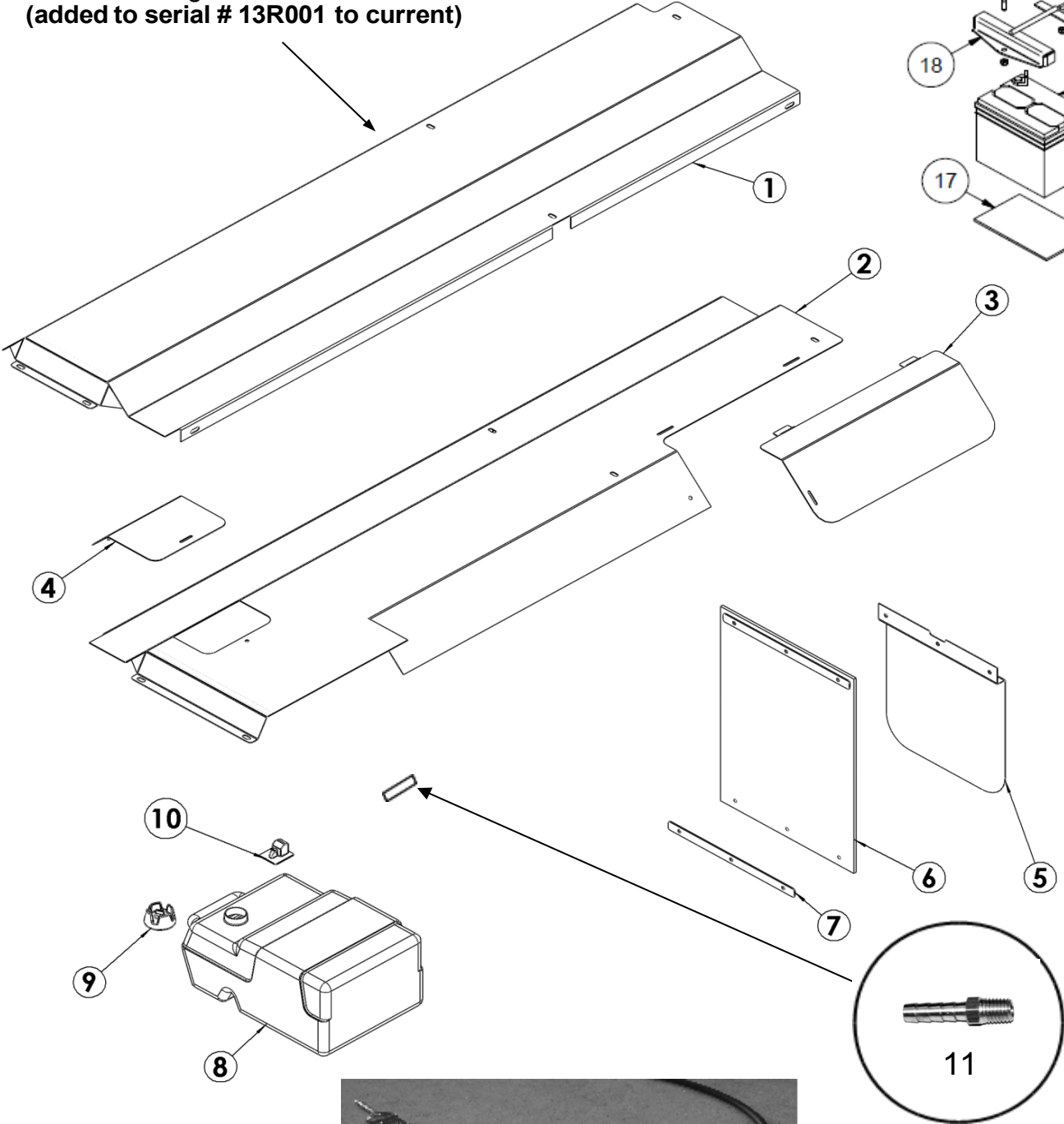
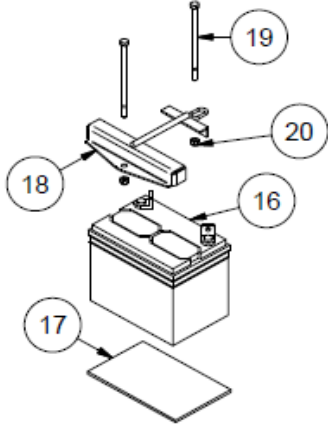
# TLR5000ECV

## Front Corner - Steering

Item	Qty	Part #	Description
1	1	TL5X2-500-131	Front Right Corner
2	1	TL5X2-500-132	Front Left Corner
3	1	TL500-100-103	Steering Cylinder
4	2	TL5X2-500-116	Cylinder Pin
5	1	TL500-100-154	Tongue Pin
6A		TL5X2-500-133	Complete Tongue (Ref # 5-8 )
6	1	TL550-100-051	Main Tongue
7	1	TL550-100-052	Swing Tongue
8	1	TL550-100-053	Sliding Tongue
9	1	TL500-301-160	Tongue Holder
10	1	Obtain Locally	5/8-11 Locknut
11	1	Obtain Locally	5/8-11 x 5 Bolt Gr.5
12	1	TL5X2-500-134	Right Rear Light Bracket
13	1	TL5X2-500-135	Left Rear Light Bracket
14	4	TL5X2-500-136	Light Mount Grommet
15	2	TL5X2-500-137	Red Light ( Brake )
16	2	TL5X2-500-138	Amber Light ( Clearance )
16A		TL5X2-500-140	Red Light Kit ( Ref # 14,15)
16B		TL5X2-500-141	Amber Light Kit ( Ref # 14, 16)
17	1	TL550-100-050	Pushoff Holder Pin
18	1	TL25261	10,000 lbs Safety Chain
19		TL109-100-354	Steering Cylinder Seal Kit
20	1	DESMV	Slow Moving Vehicle Sign
21	1	25075	SMV Bracket
22	1	25074	SMV Bracket
23	1	28771	Spring
24	1	TL5X2-500-171	Left Light Bracket Cap
25	1	TL5X2-500-170	Right Light Bracket Cap

# TLR5000ECV Fenders - Gas Tank

Outside flange has holes for oil fill  
(added to serial # 13R001 to current)



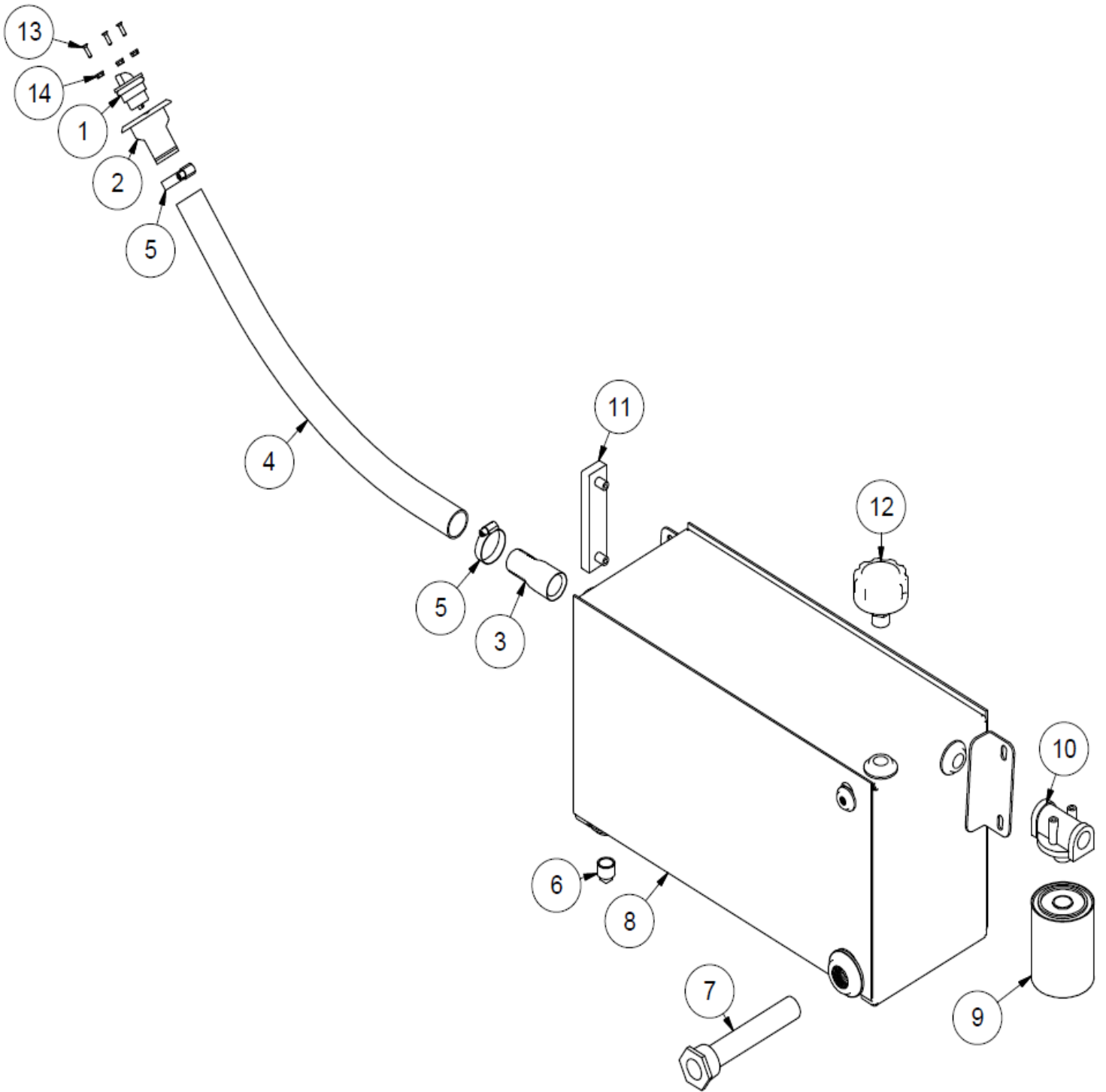


# TLR5000ECV

## Fenders - Gas Tank

Item	Qty	Part #	Description
1	1	TL5X2-500-131	Front Right Corner
2	1	TL5X2-500-132	Front Left Corner
3	1	TL500-100-103	Steering Cylinder
4	2	TL5X2-500-116	Cylinder Pin
5	1	TL500-100-154	Tongue Pin
6A		TL5X2-500-133	Complete Tongue (Ref # 5-8 )
6	1	TL550-100-051	Main Tongue
7	1	TL550-100-052	Swing Tongue
8	1	TL550-100-053	Sliding Tongue
9	1	TL500-301-160	Tongue Holder
10	1	Obtain Locally	5/8-11 Locknut
11	1	Obtain Locally	5/8-11 x 5 Bolt Gr.5
12	1	TL5X2-500-134	Right Rear Light Bracket
13	1	TL5X2-500-135	Left Rear Light Bracket
14	4	TL5X2-500-136	Light Mount Grommet
15	2	TL5X2-500-137	Red Light ( Brake )
16	2	TL5X2-500-138	Amber Light ( Clearance )
16A		TL5X2-500-140	Red Light Kit ( Ref # 14,15)
16B		TL5X2-500-141	Amber Light Kit ( Ref # 14, 16)
17	1	TL550-100-050	Pushoff Holder Pin
18	1	TL25261	10,000 lbs Safety Chain
19		TL109-100-354	Steering Cylinder Seal Kit
20	1	DESMV	Slow Moving Vehicle Sign
21	1	25075	SMV Bracket
22	1	25074	SMV Bracket
23	1	28771	Spring
24	1	TL5X2-500-171	Left Light Bracket Cap
25	1	TL5X2-500-170	Right Light Bracket Cap

# TLR5000ECV Oil Tank

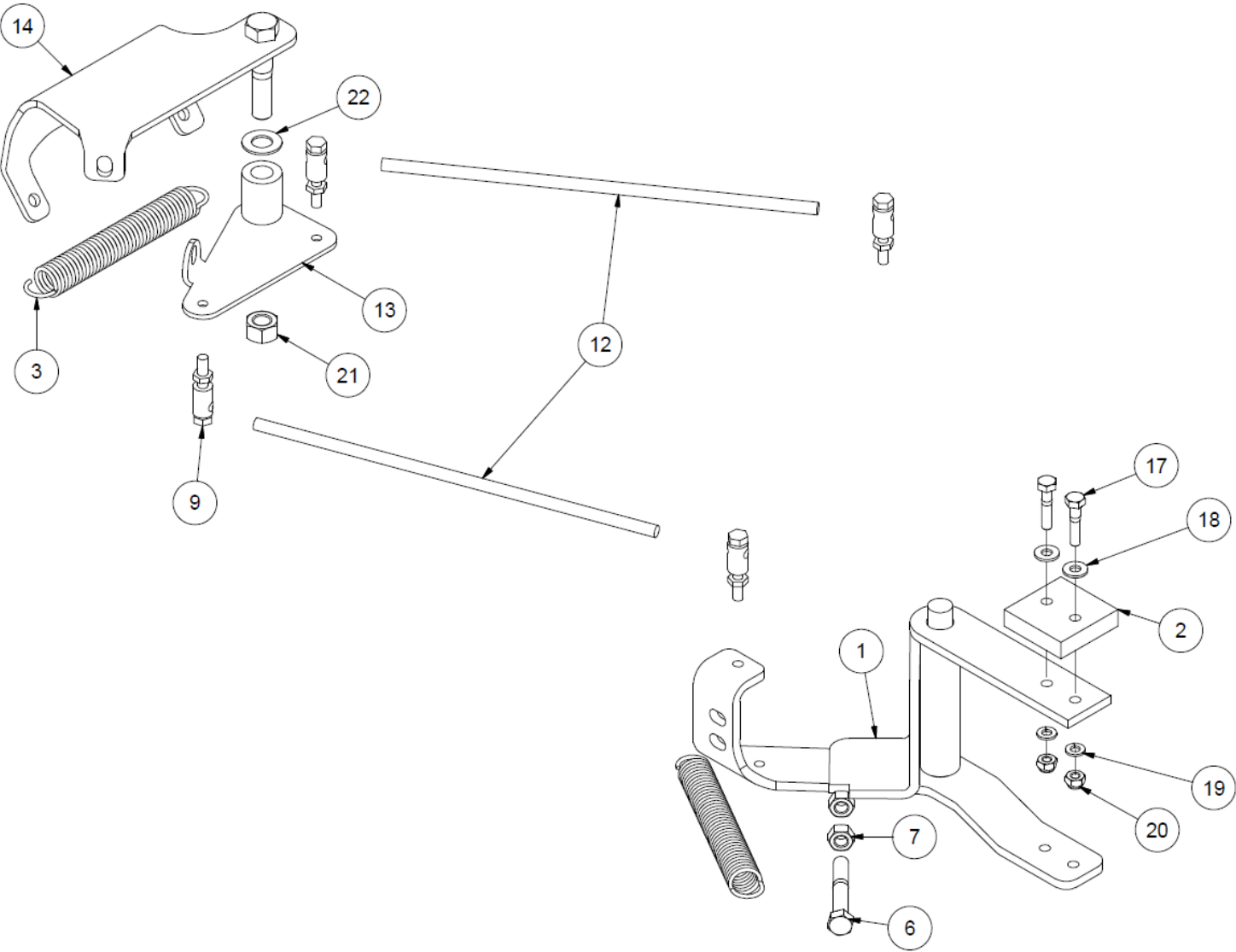


# TLR5000ECV Oil Tank

Item	Qty	Part #	Description
1	1	30868	Oil Fill Cap
2	1	30869	Oil Fill Body
3	1	30894	Oil Fill Barbed Fitting
4	1	30883	Oil Fill Tube
5	2	30884	2" Gear Clamp
6	1	TL500-100-174	Magnetic Plug
7	1	TL500-100-175	Suction Strainer
8	1	TL5X2-500-151	Hydraulic Oil Tank
9	1	TL500-100-173	10 Micron Filter
10	1	TL500-100-172	Filter Base
11	1	TL500-100-171	Sight Gauge
12	1	TL500-100-169	Breather Cap
13	3	Obtain Locally	FHSCS 10-24 X .75 Flat Head Socket Cap Screw
14	3	Obtain Locally	HFN 10-24 Hex Flange Nut

Filter Cross Reference	
Filter	Reference
Stauf	SF6520
Gresen	F22001
Fram	P1653-A
Fleetguard	HF6510
Cross	1A9021

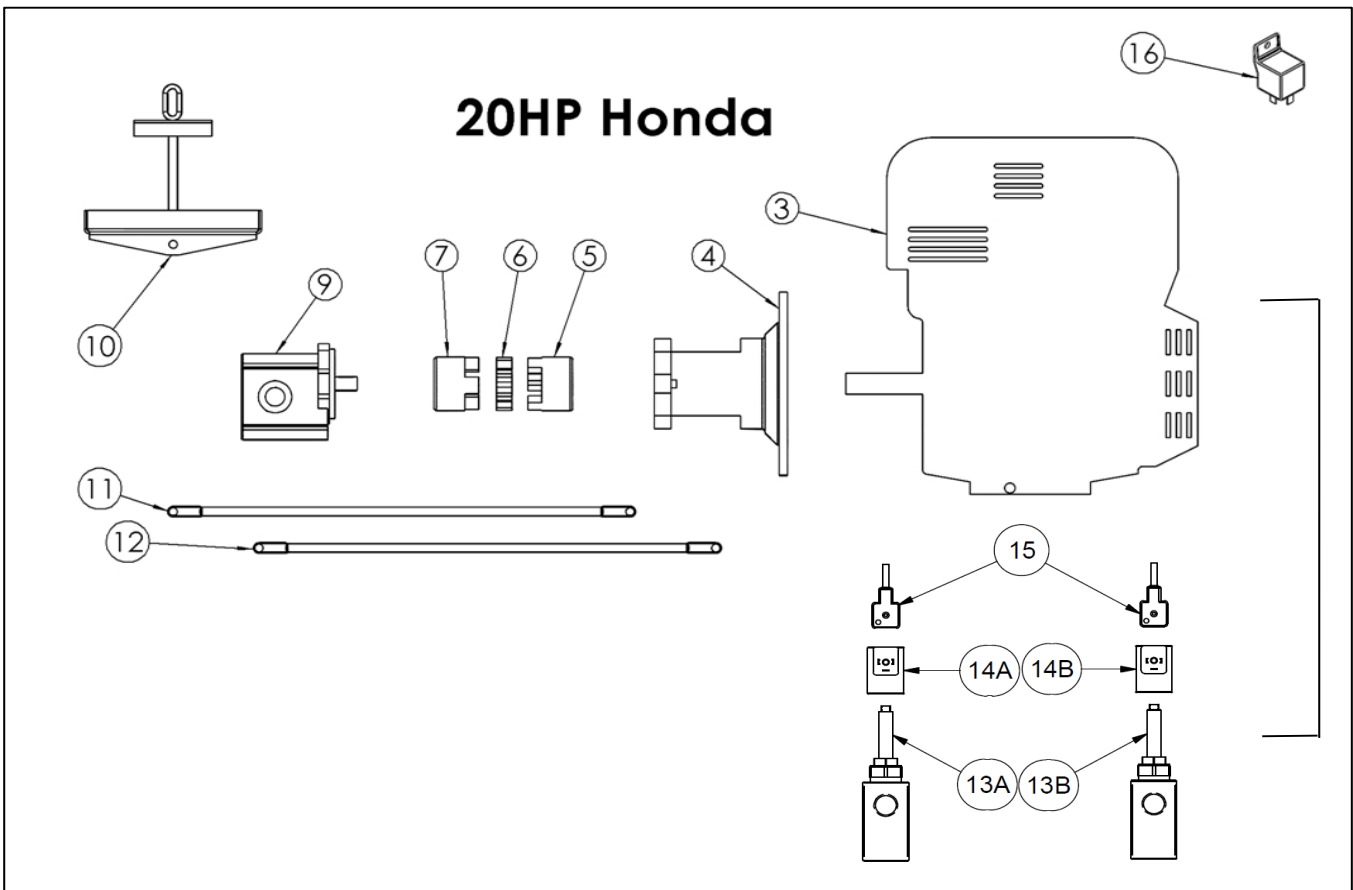
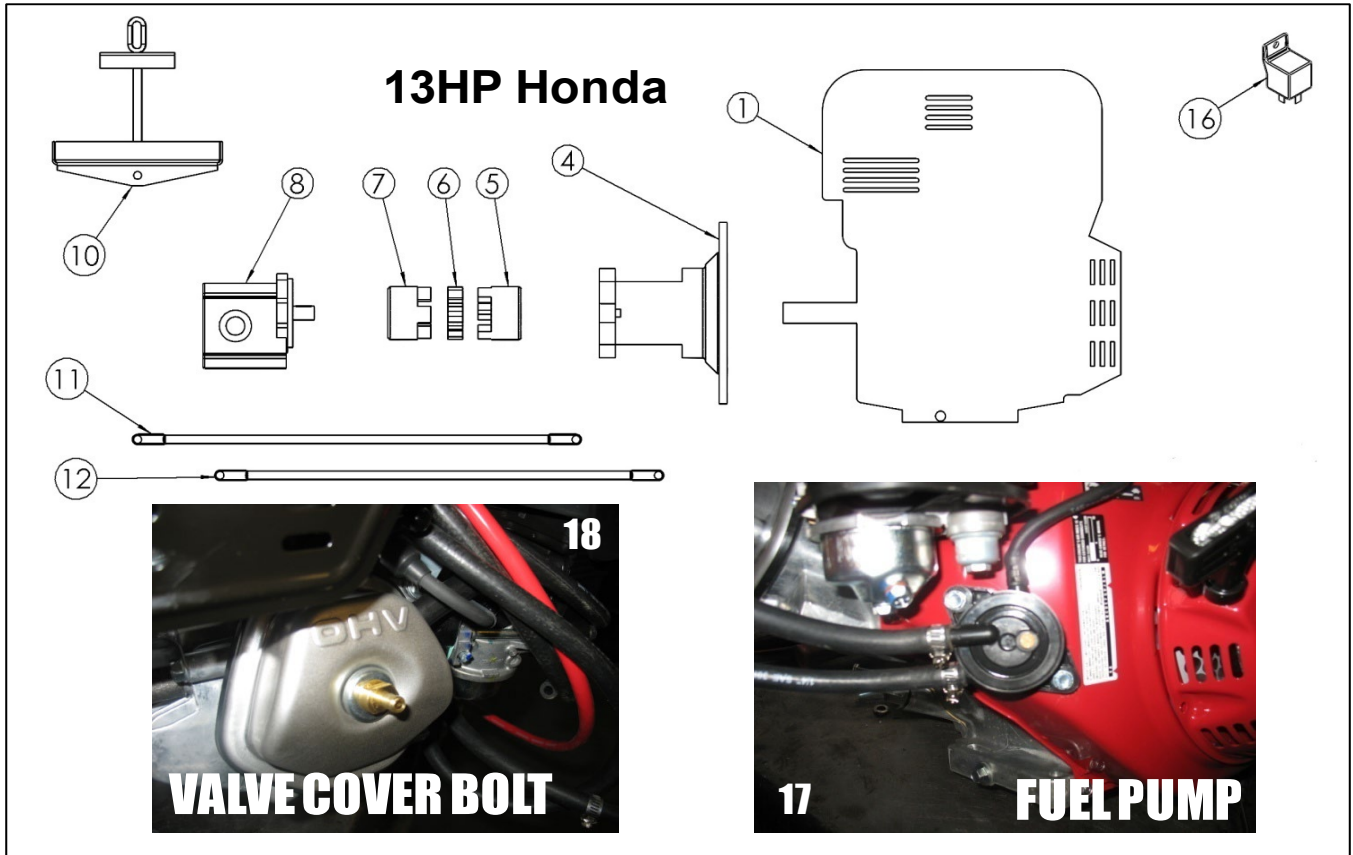
# TLR5000ECV Throttle Linkage



# TLR5000ECV Throttle Linkage

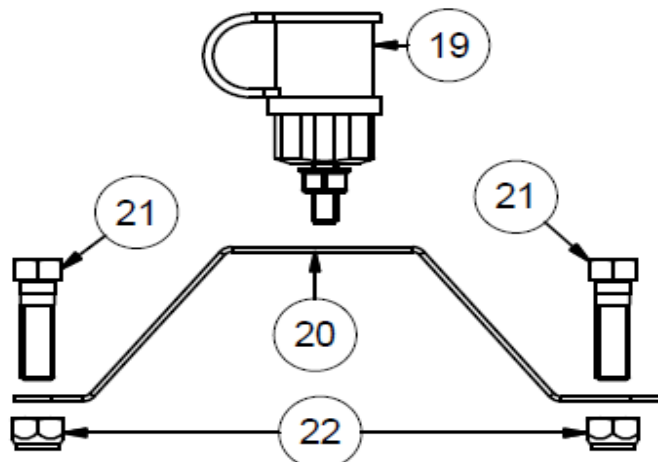
Item	Qty	Part #	Description
1	1	TL5X2-500-154	Main Link (Use for 20HP from Serial # 11R001- current)
2	1	TL5X2-100-232	Striker Block
3	1	TL550-100-069	Throttle Spring
4		TL550-100-065	Ball Joint
5	1	TL5X2-100-231	Control Rod
6	2	Obtain Locally	3/8-16 x 2 1/2 Bolt Gr.5
7	2	Obtain Locally	3/8-16 Jam Nut
8	1	TL599-100-067	13 HP Engine Throttle Base
9		TL550-100-067	Linkage Pivot
10	1	TL599-100-069	1/4-28 UNF Rod x 4
11	1	TL5X2-100-230	13 HP Swing Link
12	2	TL5X2-500-155	1/4-28 UNF Rod x 9 1/2
13	1	TL5X2-500-156	20 HP Swing Link
14	1	TL6X2-120-001	20 HP Engine Throttle Base
15	1	TL6X2-120-004	20 HP Control Rod
16	1	TL5X2-500-157	20 HP Main Link
17	2	Obtain Locally	1/4-20 x 1 1/4 Bolt Gr.5
18	2	Obtain Locally	1/4 Flatwasher
19	2	Obtain Locally	1/4 Lockwasher
20	2	Obtain Locally	1/4-20 Nuts
21	1	Obtain Locally	1/2 Steel Type Lock Nut
22	1	Obtain Locally	1/2 SAE Washer

# TLR5000ECV Engines

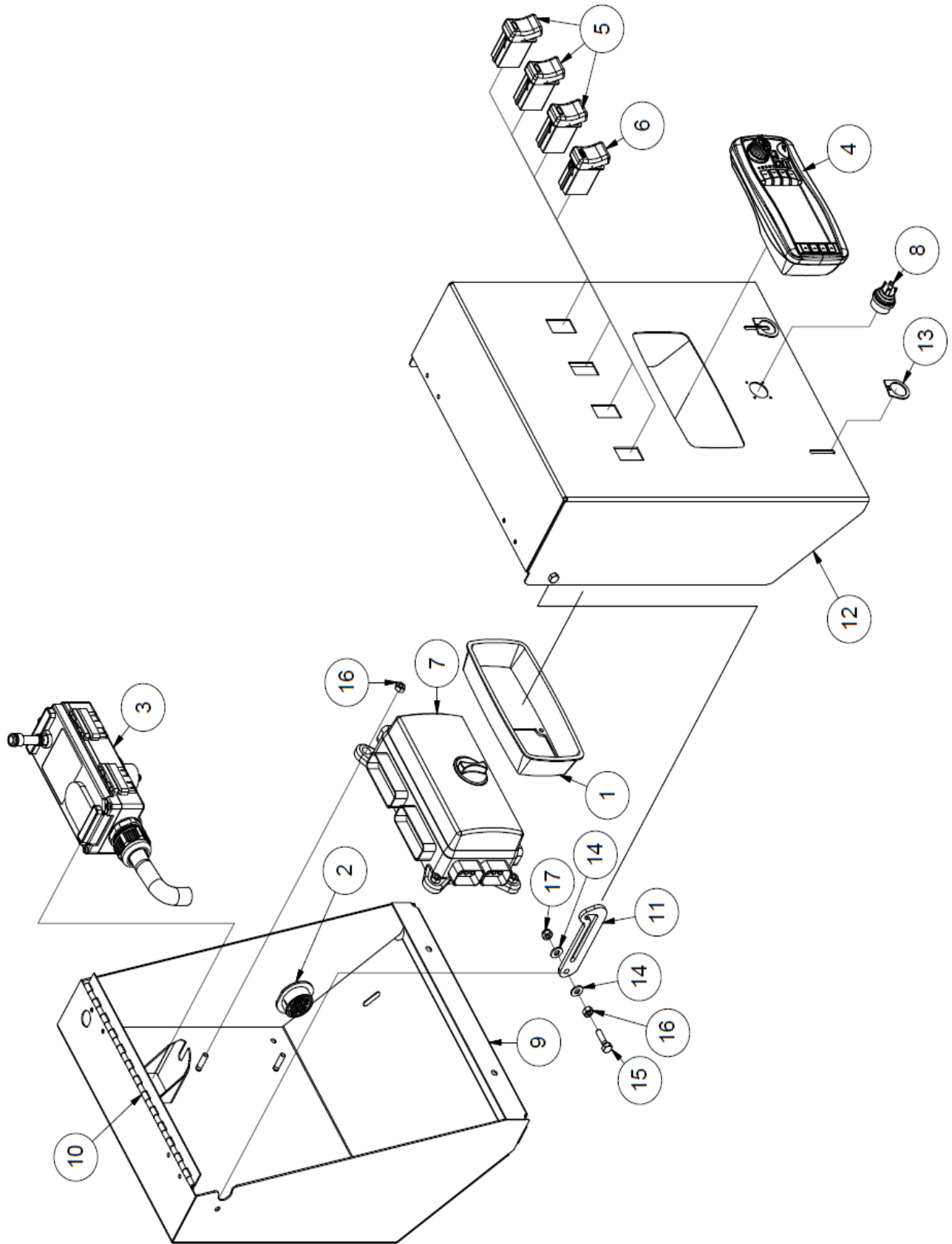


# TLR5000ECV Engines

Item	Qty	Part #	Description
1		TL5X2100200	13 HP HONDA ELECTRIC START
3		TL6X2100200	20 HP Honda Engine Electric Start
4	1	TL500100182	Engine – Pump Adapter
5	1	TL500100183	Love Joy Coupling Engine Side
6	1	TL500100184	Coupling Spacer
7	1	TL500100185	Love Joy Coupling Pump Side
8	1	TL500100181	Hydraulic Pump Casappa # PLP20-112
9	1	TL5X2101181	Hydraulic Pump Casappa # PLP20-14
10	1	TL500301221	Battery Hold Down
11	1	TL5X2500159	Red Battery Cable
12	1	TL5X2500160	Black Battery Cable
13A	1	TL6X2102202	Dump Valve Base (up to serial # 13R004)
13B	1	31545	Dump Valve Base (Serial # 13R005-current)
14A	1	TL6X2102204	Dump Valve Solenoid (up to serial # 13R004)
14B	1	31546	Dump Valve Solenoid (Serial # 13R005-current)
15	1	31505	Dump Valve Wiring Harness
16	1	TL500100220	35 amp Relay (mounted on 13hp & 20hp Honda)
17	1	TL25649	Fuel Pump (13hp only)
18	1	TL25591	Valve Cover Bolt (13hp only)
	1	30872	Battery Boost Cable
19	1	30873	Battery Boost Post
20	1	31379	Battery Boost Mount
21	2	Obtain Locally	HB 7/16 x 2 Hex Bolt
22	2	Obtain Locally	LN 7/16 Lock Nut



# TLR5000ECV Control Panel

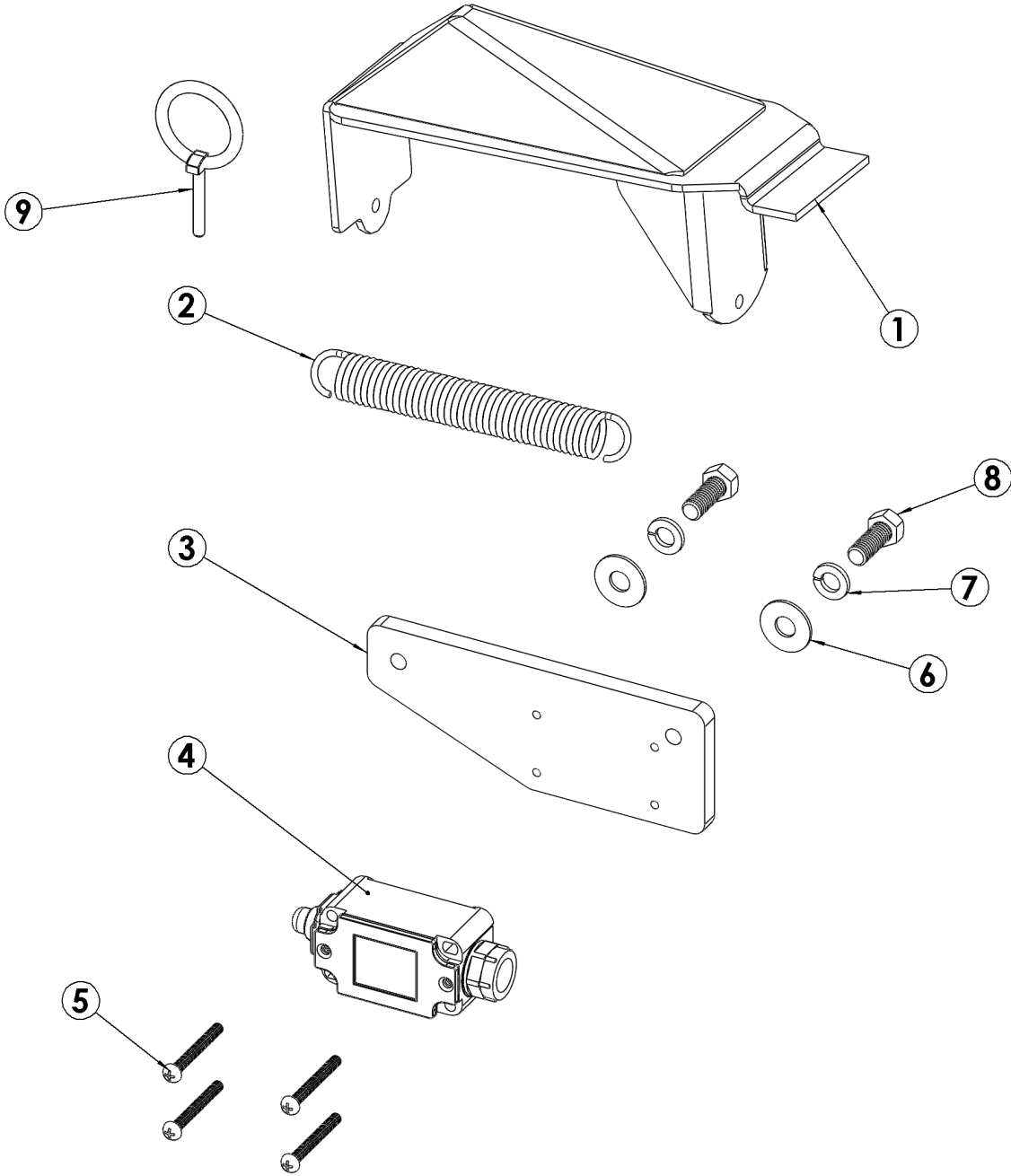




# TLR5000ECV Control Panel

<b>Item</b>	<b>Qty</b>	<b>Part</b>	<b>Description</b>
1	1	32630	Display Mount
2	1	32642	Control Panel Harness
3	1	32648	Remote Antenna
4	1	32652	Display Screen
5	3	33322	Function Switch
6	1	33323	E-Stop Switch
7	1	33324	Fuse Box
8	1	33325	Steering Joystick
9	1	35610	Control Panel Box
10	2	35633	Hinge
11	1	35637	Control Panel Link
12	1	36044	Control Panel
13	2	36268	Camlock
14	4	Obtain Locally	FW .25 Flat Washer
15	2	Obtain Locally	HB .25 x 1 Hex Bolt
16	6	Obtain Locally	HN .25 Hex Nut
17	2	Obtain Locally	LN .25 Lock Nut

# TLR5000ECV Table Trigger

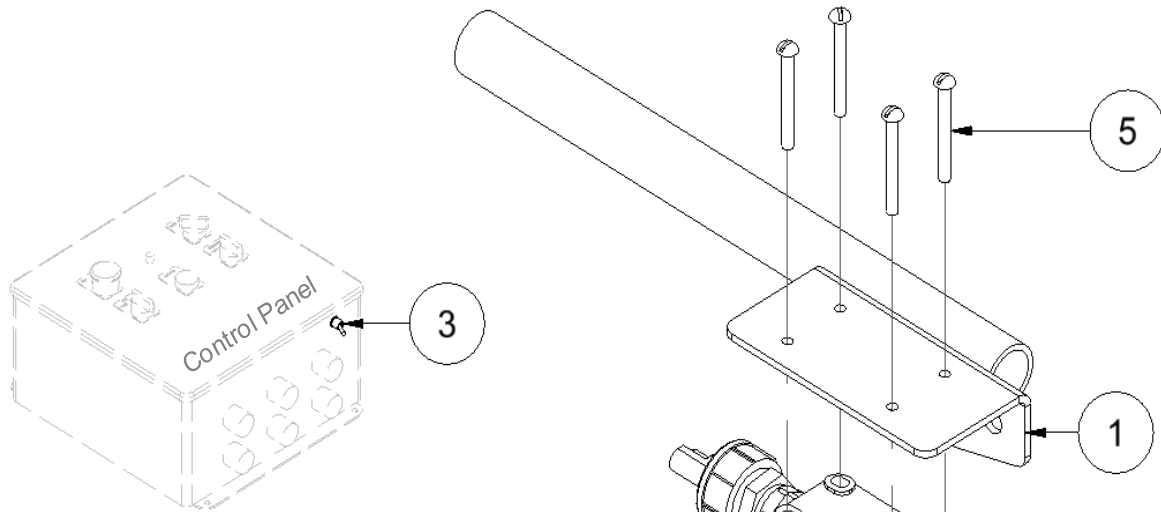


# TLR5000ECV

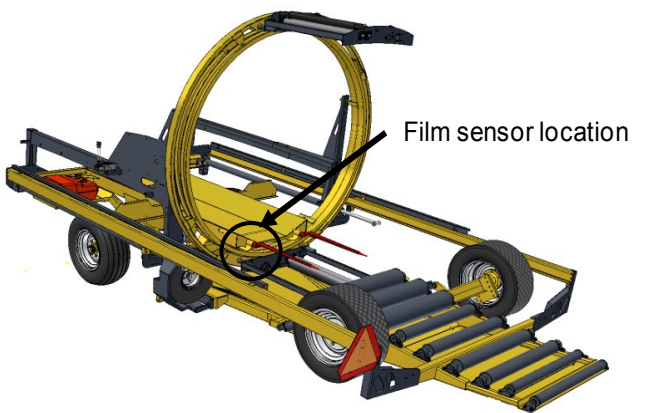
## Table Trigger

<b>Item</b>	<b>Qty</b>	<b>Part #</b>	<b>Description</b>
1	1	TL5X2-500-152	Trigger
2	1	TL550-100-069	Spring
3	1	TL5X2-500-153	Table Switch Mount Plate
4	1	TL5X2-100-221	Push Button Limit Switch
5	4	Obtain Locally	10-24 x 1 ½ Bolt
6	2	Obtain Locally	3/8 Flat Washer
7	2	Obtain Locally	3/8 Lock Washer
8	2	Obtain Locally	3/8-16 x 1 Bolt Gr.5
9	1	Obtain Locally	3/16 Linch Pin

# TLR5000ECV Film Sensor



Sensor wire must be adjusted so that only one layer of plastic is covering the end of the wire while wrapping. Adjustment can be made on the bracket and on the sensor wire. The end of the sensor wire behind the switch can be bent to allow the wire in front of the switch to drop down far enough to trip the switch when no plastic is present.



# TLR5000ECV Film Sensor

Item	Qty	Part #	Description
	1	TLPSSK-ECV	Complete Kit
1	1	TLFSB2007	Film Sensor Bracket
2	1	32635	Film Sensor Limit Switch (Complete)
3	1	TL550-200-235	Toggle Switch
4	4	Obtain Locally	10-24 Hex Nut
5	4	Obtain Locally	10-24 x 1.75 Machine Screw
6	4	Obtain Locally	#10 Lock Washer
	2	Obtain Locally	12" Wire (Terminal 18 & 19)
7	1	TL550-100-049	Wire Arm
8	1	TL550-100-082	Wire Clamp

## Installation












- Install film sensor bracket
- Locate the wire labeled film sensor (pre-wired machine)
  - Remove the plug and connect to film sensor switch
    - Install toggle switch in the control panel
  - Remove the jumper wire between terminal 18 & 19
  - Connect wires from toggle switch to terminal 18 & 19

### Wire Adjustment (Use measurements as initial guide only)

- Measure length of wire from the hoop face (see previous page)
  - 9.5" wire = approx. 3" between wraps = 8-9 layers per bale
- 9.5" wire should stop hoop rotation just after an empty tensioner passes the wire
  - Lengthen wire 3" for 4 layers of wrap or 1.5" for 6 layers
    - Shorten wire by 1.5" for 10 layers per bale

As a guide, if the hoop stops before an empty tensioner passes the film sensor wire, the wire is **too short** and if the hoop **does not** stop with one empty tensioner the film sensor is **too long**.

# UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES

SAE Grade and Head Markings	1 or 2 <sup>b</sup>	5	5.1	5.2	8	8.2
	NO MARK 					
SAE Grade and Nut Markings	2	5		8		
	NO MARK 					

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Size	Grade 1				Grade 2 <sup>b</sup>				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>	
	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

<sup>a</sup> "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

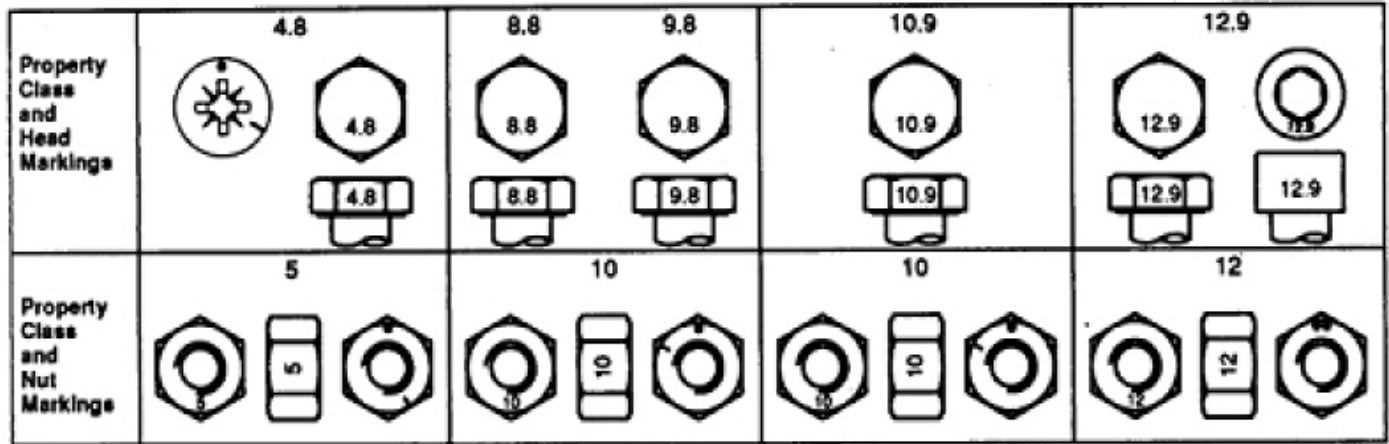
<sup>b</sup> Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

# METRIC BOLT AND CAP SCREW TORQUE VALUES



Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>	
	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

<sup>a</sup> "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

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