

# MPS 350<sup>®</sup> X

## TRUCK MOUNTED ATTENUATOR

### PRODUCT DESCRIPTION ASSEMBLY MANUAL



# MPS 350<sup>®</sup> X

## Truck Mounted Attenuator (“TMA”)

The MPS 350<sup>®</sup> X system has been tested pursuant to National Cooperative Highway Research Program (“NCHRP”) Report 350 specifications. Based on a review of these crash test results, the Federal Highway Administration (“FHWA”) determined that the MPS 350<sup>®</sup> X system is eligible for reimbursement under the Federal-aid Highway Program.

### Product Description Assembly Manual



15601 Dallas Parkway  
Suite 525  
Addison, Texas 75001



**Important:** These instructions are to be used only in conjunction with the assembly, maintenance, and repair of MPS 350<sup>®</sup> X systems. These instructions are for standard assemblies specified by the appropriate highway authority. In the event the specified system assembly, maintenance, or repair would require a deviation from standard assembly parameters, contact the appropriate highway authority engineer. This system has been deemed eligible for reimbursement by the FHWA for use on the national highway system under criteria utilized by that agency. **Valtir** representatives are available for consultation if required.

**This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Valtir at (888) 323-6374.**

The instructions contained in this manual supersede all previous information and manuals. All information, illustrations, and specifications in this manual are based on the latest MPS 350<sup>®</sup> X system information available to Valtir at the time of printing. We reserve the right to make changes at any time. Please contact Valtir to confirm that you are referring to the most current instructions.

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## Customer Service Contacts

Valtir is committed to the highest level of customer service. Feedback regarding the MPS 350® X system, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

### Valtir

Telephone:	(888) 323-6374 (USA) +1 (214) 589-8140 (International)
E-mail:	www.Valtir.com>Contact
Website:	www.Valtir.com

### Regional Telephone Contacts:

Centerville, Utah	(800) 772-7976
Dallas, Texas	(800) 527-6050
Elizabethtown, Kentucky	(800) 282-7668
Girard, Ohio	(800) 321-2755
Orangeburg, South Carolina	(800) 835-9307

## Important Introductory Notes

Proper assembly of the MPS 350® X system is critical to achieve performance that has been evaluated and accepted by the FHWA per NCHRP Report 350. These instructions should be read in their entirety and understood before assembling the MPS 350® X system. These instructions are to be used only in conjunction with the assembly of the MPS 350® X system and are for standard assemblies only as specified by the applicable highway authority. If you need additional information, or have questions about the MPS 350® X system, please contact the highway authority that has planned and specified this assembly and, if needed, contact Valtir's Customer Service Department. This product must be deployed in the location specified by the appropriate highway authority. If there are deviations, alterations, or departures from the assembly protocol specified in this manual, the device may not perform as it was tested.



**Important:** **DO NOT** use any component part that has not been specifically crash tested and/or approved for this system during the assembly or repair of this system.



**Warning:** Do not assemble, maintain, or repair the MPS 350® X system until you have read this manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution, and Important statements within the manual are completely followed. Please call Valtir at (888) 323-6374 if you do not understand these instructions.

This product has been specified for use by the appropriate highway authority and has been provided to that user who has unique knowledge of how this system is to be assembled. No person should be permitted to assist in the assembly, maintenance, or repair of this system that does not possess the unique knowledge described above. These instructions are intended for an individual qualified to both read and accurately interpret them as written. These instructions are intended only for an individual experienced and skilled in the assembly of highway products that are specified and selected by the highway authority.



**Important:** Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the MPS 350® X system. It is the responsibility of the installer to follow the instructions contained in this manual. Failure to follow this warning can result in serious injury or death to workers and/or bystanders. This failure may further compromise the eligibility of this system by the FHWA. Please keep up-to-date instructions for later use and reference by anyone involved in the assembly of the product.



**Warning:** Ensure that all of the MPS 350® X system Danger, Warning, Caution, and Important statements within the MPS 350® X manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.

## **Safety Symbols**

This section describes the safety symbols that appear in this MPS 350® X manual. Read the manual for complete safety, assembly, operating, maintenance, repair, and service information.

### **Symbol**

### **Meaning**



**Safety Alert Symbol:** Indicates Important, Caution, Warning, or Danger. Failure to read and follow the Danger, Warning, Caution, or Important statements could result in serious injury or death to workers and/or bystanders.



**Warning:** It is the responsibility of the installer to follow these warnings. Failure to comply with these warnings could result in increased risk of serious injury or death in the event of a vehicle impact with a system that has not been accepted by the FHWA.

## **Safety Rules for Assembly**

### **\* Important Safety Instructions \***

This manual must be kept in a location where it is readily available to persons who are skilled and experienced in the assembly, maintenance, or repair of the MPS 350® X system. Additional copies of this manual are available from Valtir by calling (888) 323-6374 or by email at [product.info@trin.net](mailto:product.info@trin.net). Please contact Valtir if you have any questions concerning the information in this manual or about the MPS 350® X system.

It is the responsibility of the installer to use appropriate safety precautions when operating power equipment, moving heavy equipment or MPS 350® X components. Work gloves, safety goggles, safety-toe shoes, and back protection shall be used.

Safety measures incorporating traffic control devices specified by the highway authority must be used to provide safety for personnel while TMA is in use. TMA personnel must follow the traffic control plan that has been established by the highway authority for TMA use.

## **Limitations and Warnings**

Valtir, in compliance with the NCHRP Report 350 “Recommended Procedures for the Safety Performance of Highway Safety Features”, contracts with FHWA approved testing facilities to perform crash tests, evaluation of tests, and submittal of results to the FHWA for review.

The MPS 350<sup>®</sup> X system was tested to meet the impact criteria, requirements, and guidelines of NCHRP Report 350. These tests, specifically set forth by FHWA, evaluate product performance by utilizing established impacts outlined by NCHRP Report 350 involving a range of vehicles on the roadways, from lightweight cars (approx. 820kg [1800 lb.]) to full size pickup trucks (approx. 2000 kg [4400 lb.]) as specified by the appropriate highway agency. A product can be certified for multiple Test Levels. The MPS 350<sup>®</sup> X system is certified to the Test Level(s) as shown below:

### **Test Level 3: 100 km/h [62 mph]**

**These FHWA directed tests are not intended to represent the performance of systems when impacted by every vehicle type or every impact condition existing on the roadway. This system is tested only to the test matrix criteria of NCHRP Report 350 as approved by FHWA.**

Additionally, the MPS 350<sup>®</sup> X system was tested to meet the impact criteria, requirements, and guidelines of TD 49. These tests, specifically set forth by The Highways Agency, evaluate product performance by simulating those impacts outlined by TD 49 involving a typical range of vehicles on our roadways, from lightweight cars (approx. 900 kg [2000 lbs.]) to heavier cars (approx. 1500 kg [3300 lbs.]) as specified by The Highways Agency. A product can be certified for various speed levels as shown below:

### **TL3.UK: 110 km/h [68 mph]**

**Highways Agency directed tests are not intended to represent the performance of systems when impacted by every vehicle type or every impact condition existing on the roadway. This system is tested only to the test matrix criteria of TD 49 as approved by the Highways Agency.**

Valtir expressly disclaims any warranty or liability for injury or damage to persons or property resulting from any impact, collision or harmful contact with products, other vehicles, or nearby hazards or objects by any vehicle, object or person, whether or not the products were assembled in consultation with Valtir or by third parties.

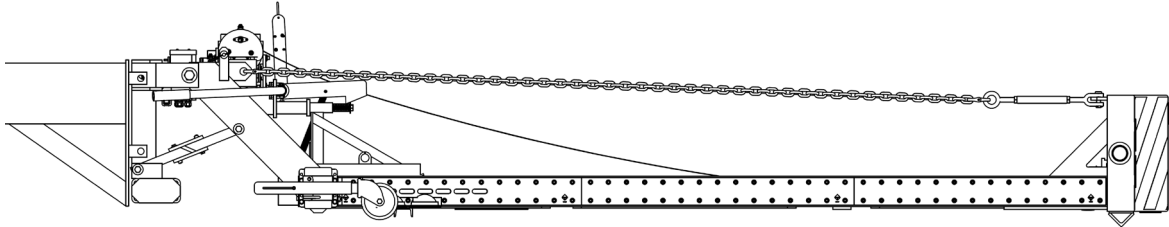
The MPS 350<sup>®</sup> X system is intended to be assembled, delineated, and maintained within specific state and federal guidelines. It is important for the highway authority specifying the use of a highway product to select the most appropriate product configuration for its site specifications. The customer should be careful to properly select, assemble, and maintain the product. Careful evaluation of the site lay out, vehicle population type; speed, traffic direction, and visibility are some of the elements that require evaluation in the selection of a highway product.

After an impact occurs, the debris from the impact should be removed from the area immediately and the product should be evaluated and restored to its original specified condition or replaced as soon as possible. All components and assemblies should be inspected and any parts that are damaged should be replaced with original Valtir replacement parts. Contact the Customer Service Department prior to repair if you have any questions (p. 3).

## Safety Instructions

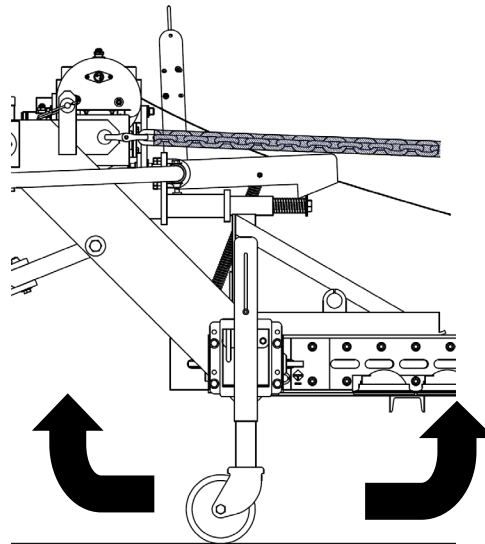
For the safety of the operator, the operator shall stand at the rear of the truck on the non-traffic side. When tilting the TMA, stay clear of all moving parts.

1. The TMA shall be fastened to the truck. In the DOWN (horizontal) position, the bottom of the TMA shall be 280 to 330 mm [11" to 13"] from the ground and level (Figure 12). The TMA must be left in the DOWN (horizontal) position whenever possible. The TMA can only absorb the energy of an impacting vehicle, within NCHRP Report 350 criteria, when in the DOWN (horizontal) position.



**Figure 1**

2. Jacks are used to support the MPS 350<sup>®</sup> X when it is detached from the truck (Figure 2). Rotate or swivel Jacks into the storage (horizontal) position when the TMA is attached to the truck.



**Figure 2**



**Warning:** Do not use hands or feet to lift or support the MPS 350<sup>®</sup> X. Always use the provided Jacks. Always keep feet clear of frame when in operation and during maintenance activities.



**Danger:** Ensure that no one is near, under or behind the MPS 350<sup>®</sup> X when in operation.



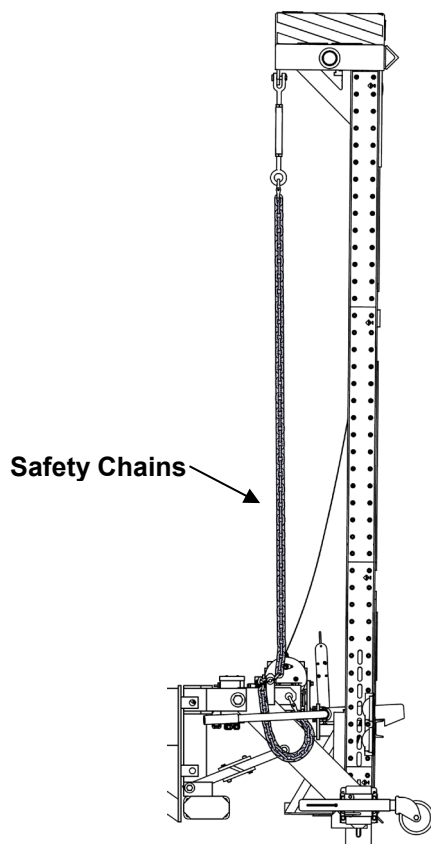
**Caution:** The MPS 350<sup>®</sup> X system is intended to only support its own weight. Do not drag the TMA or place anything on top of the system as damage will result. Do not sit, stand, or lean on any part of the TMA.

3. Before raising or lowering the TMA, the operator shall be fully trained as to its proper operation. All operators shall fully understand the contents of this manual prior to operating the system.



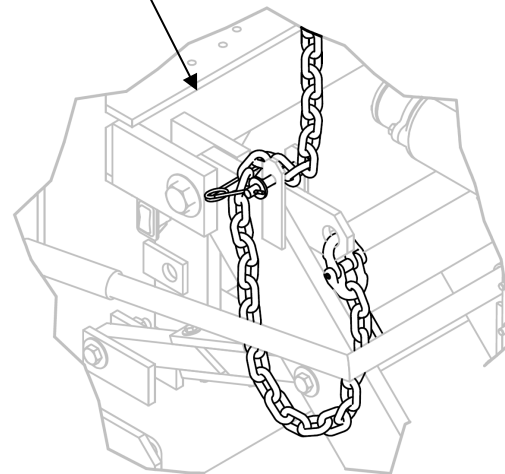
**Caution:** Never stand under the TMA when attempting to lower it.

4. When traveling long distances or storing the TMA in the UP (vertical) position, properly secure the frame with the Safety Chains using the Linchpins provided with the system (Figures 3 & 4).



**Figure 3**

**Linchpin Securing Safety Chain (Chain Cover Not Shown For Clarity)**



**Figure 4**

5. Confirm all persons are standing clear before raising or lowering the TMA. Verify the system is stopped in full UP (vertical) position and retaining chain is in use before allowing anyone directly behind the elevated system. Never allow anyone to stand under the TMA when it is in the raised position or while it is being lowered.

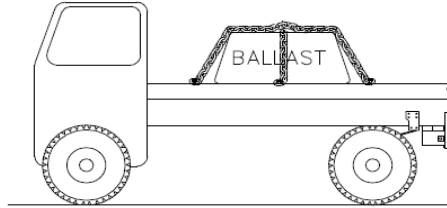


**Caution:** When traveling to and from a work zone, travel with the MPS 350<sup>®</sup> X in the UP (vertical) traveling position.



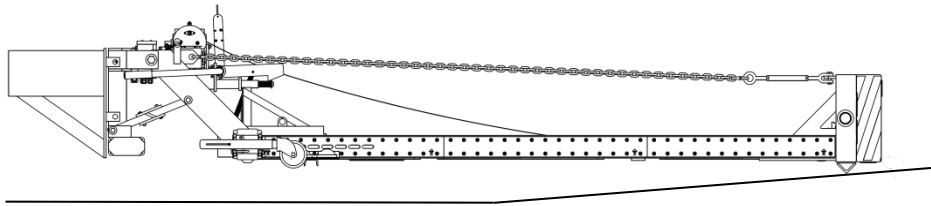
6. Ballast and other heavy objects **MUST BE ADEQUATELY ANCHORED** to the truck to prevent shifting during an impact (Figure 5).

**Note:** The force on the tie-down straps could be 20 times the weight of the ballast during an impact.



**Figure 5**

7. The agency or authority responsible for the truck shall inspect it for adequate operator safety equipment (e.g., seat belts, head rests, etc.).
8. It is required that the MPS 350<sup>®</sup> X system be mounted to trucks weighing a minimum of 6804 kg [15,000 lbs.] to achieve intended impact performance of the system under appropriate state and federal guidelines (p. 9).
9. The driver shall be cautious while operating the truck with the TMA in the UP (vertical) or DOWN (horizontal) position so that injury and/or damage will not result (Figure 6).



**Figure 6**

10. The driver shall be cautious while making turns with the TMA in the DOWN (horizontal) position. The TMA extends beyond the end of the truck and will swing wide while turning.



**Caution:** Do not leave the Winch Strap tight in the DOWN (horizontal) position while the MPS 350<sup>®</sup> X is being used as the Winch and/or the attachment point to the Frame Assembly could be damaged.

11. This system is an impact attenuator and is often used in high traffic risk areas. Stay clear of traffic lane whenever possible. If the system is impacted, there may be fragments from the truck and/or impacting vehicle that could cause injury or death.
12. The Winch Assembly system was solely designed to lift and lower the TMA system. Improper usage will cause the lift mechanism to malfunction and cause permanent damage to the system.
13. The system must be in the DOWN (horizontal) position to perform as tested during an impact. Do not leave the system raised, even slightly, during worksite operations.



**Caution:** While traveling in a moving work zone, NEVER drive faster than 35 mph (55 km/hr) with MPS 350<sup>®</sup> X in a DOWN (horizontal) operating position. Speeds slower than 35 mph (55 km/hr) are required when the MPS 350<sup>®</sup> X starts bouncing or uneven road conditions exist.

## Controlling Skid Distance (Roll Ahead)

The use of a TMA on the back of a truck will not affect the skid (roll ahead) distance of an impacted truck. **KEEP WORK CREWS CLEAR!**

### Controlling skid distance (roll ahead):

- Skid distance is significantly increased and is less predictable for lightweight shadow vehicles.
- Skid distance is reduced and is more consistent when heavier shadow vehicles are used.
- **Required minimum truck weight: 6,804 kg. [15,000 lbs.] or greater.**

**Roll-Ahead Distance for Shadow Vehicles**

Weight of Shadow Vehicle (Moving)	Prevailing Speed km/h [mph]	Weight of Impacting Vehicle to be Contained*			
		2,040 kg [4,500 lbs]	4,536 kg [10,000 lbs]	6,804 kg [15,000 lbs]	10,886 kg [24,000 lbs]
6,804 kg [15,000 lb]	96-105 [60-65]	23 m [75 ft]	46 m [150 ft]	53 m [175 ft]	69 m [225 ft]
	80-88 [50-55]	23 m [75 ft]	38 m [125 ft]	46 m [150 ft]	53 m [175 ft]
	72 [45]	15 m [50 ft]	30 m [100 ft]	30 m [100 ft]	30 m [100 ft]
10,886 kg [24,000 lb]	96-105 [60-65]	23 m [75 ft]	30 m [100 ft]	46 m [150 ft]	53 m [175 ft]
	80-88 [50-55]	15 m [50 ft]	23 m [75 ft]	30 m [100 ft]	46 m [150 ft]
	72 [45]	15 m [50 ft]	23 m [75 ft]	23 m [75 ft]	30 m [100 ft]

**Note:** Distances are applicable for shadow vehicle speeds up to 25 km/h [15 mph].

**Roll-Ahead Distance for Barrier Vehicles**

Weight of Barrier Vehicle (Stationary)	Prevailing Speed km/h [mph]	Weight of Impacting Vehicle to be Contained*			
		2,040 kg [4,500 lbs]	4,536 kg [10,000 lbs]	6,804 kg [15,000 lbs]	10,886 kg [24,000 lbs]
6,804 kg [15,000 lb]	96-105 [60-65]	8 m [25 ft]	23 m [75 ft]	30 m [100 ft]	46 m [150 ft]
	80-88 [50-55]	8 m [25 ft]	15 m [50 ft]	23 m [75 ft]	30 m [100 ft]
	72 [45]	8 m [25 ft]	8 m [25 ft]	15 m [50 ft]	23 m [75 ft]
10,886 kg [24,000 lb]	96-105 [60-65]	8 m [25 ft]	15 m [50 ft]	23 m [75 ft]	30 m [100 ft]
	80-88 [50-55]	8 m [25 ft]	8 m [25 ft]	15 m [50 ft]	23 m [75 ft]
	72 [45]	8 m [25 ft]	8 m [25 ft]	8 m [25 ft]	15 m [50 ft]

### \*Weights of Typical Vehicles:

Midsized automobile - 1,020 kg [2,250 lb]

Full-size automobile - 1,500 kg [3,500 lb]

Loaded 3/4-ton pickup truck - 2,750 kg [6,000 lb]

Loaded 1-ton cargo truck - 4,500 kg [10,000 lb]

Loaded 4-yard dump truck - 11,000 kg [24,000 lb]

Source: "Use of Truck Mounted Attenuators in Work Zones" by Jack B. Humphreys, P.E. and T. Darcy Sullivan, P.E., University of Tennessee.

## **Assembly**

Read and understand all instructions before beginning assembly.



**Important:** The truck weight, excluding TMA, must be a minimum of 6804 kg [15,000 lbs.] to achieve intended impact performance of the system under appropriate state and federal guidelines.

If system must be attached to the truck by welding parts to the frame, do not weld forward of the rear leaf spring hangers to ensure structural integrity of frame. Use American Welding Society (AWS) qualified welders to ensure durable attachment of the TMA system. Disconnect the truck battery before any welding on the truck or TMA.

The truck frame must be suitable and accessible for mounting a TMA system. If there are any questions regarding the suitability, please contact the appropriate highway authority or end user that specified this system for guidance. Valtir is available for consultation with that agency.

Only use reflective striping patterns that have been specifically approved by the highway authority specifying the use of this TMA.

### **Inspect Shipment**

Carefully uncrate all components. Before assembling the MPS 350® X system, check the received parts against the shipping list supplied with the system. Verify that all parts were received.

### **Recommended Tools**

- Welding equipment GMAW or SMAW
- Cutting torch
- Hammer
- Tape measure
- 1/2" drive socket wrench w/ 6" extension
- 1/2" drive sockets (9/16", 1-1/8", 1-1/2")
- Open end wrenches (9/16", 1-1/8", 1-1/2")
- 12" crescent wrenches (2)
- Marking implement (pencil, soap stone)
- Floor jack or Forklift
- Center punch
- Work gloves and other personal protection equipment as required
- Bubble level

**Note:** The above list of tools is a general recommendation and should not be considered an extensive list. Depending on specific site conditions and the complexity of the assembly specified by the appropriate highway authority the required tools may vary. Decisions as to what tools are needed to perform the job are entirely the responsibility of the specifying highway authority and the authority's selected contractor performing the assembly of the system at the authority's specified assembly site.

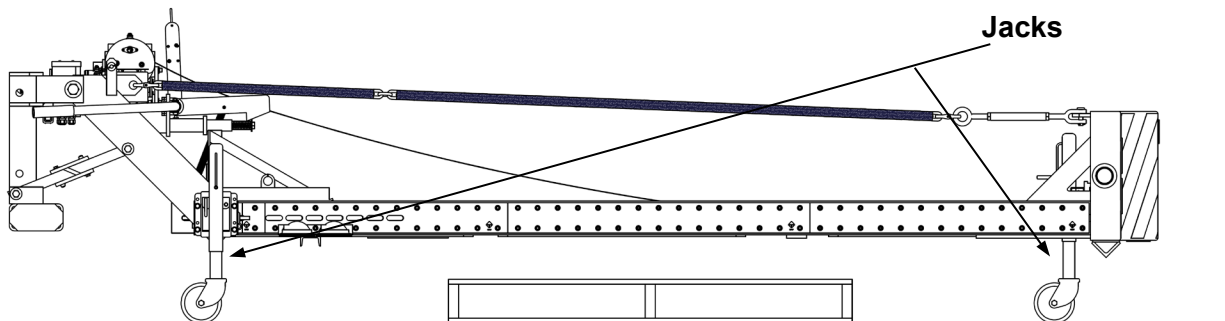
## Unpacking and Attaching the MPS 350<sup>®</sup> X



**Caution:** Prior to mounting the MPS 350<sup>®</sup> X, verify that the fuel tank(s) on the truck is more than 10'-6" (3.2 m) from the rear of the truck. If the distance is less than 10'-6" (3.2 m), contact Valtir about various extensions (p. 3).

1. Read safety instructions thoroughly before operating the MPS 350<sup>®</sup> X.
2. Remove the shipping bands and protective material. Properly dispose of all shipping materials.
3. Remove plastic Striping Assembly components (drawing 620344 on p. 35) and cardboard box with the Miscellaneous Hardware.
4. Open the Miscellaneous Hardware box and inventory items from the Miscellaneous Hardware Assembly (drawing 620358 on p. 31). Contact Valtir if parts are missing (p. 3).
5. Remove the shipping stands and attach the three (3) Jacks (PN 005678B) with four (4) 3/8" x 1" Hex Bolts (PN 113598G) and four (4) 3/8" Whiz Nuts (PN 003257G) per Jack found in the Misc. Hardware Assembly.

Raise the MPS 350<sup>®</sup> X off the shipping pallet using the storage Jacks.



**Figure 8**

6. Confirm the truck is on flat level ground.
7. Inform the truck driver that the MPS 350<sup>®</sup> X is going to be assembled, repaired, or adjusted. Chock the wheels to prevent truck movement. **Do not start truck engine.**



**Caution:** Always inform the truck driver when the MPS 350<sup>®</sup> X is going to be attached, repaired, operated, or adjusted. Chock the wheels. Remove the keys from the ignition of the truck and place signs on the truck that it is being serviced – **DO NOT START ENGINE.**

8. Add load to the truck; if applicable, the truck must be loaded to the correct weight before the MPS 350<sup>®</sup> X is attached. The minimum loaded weight is 6,804 kg (15,000 lbs.). This could be different for local regulations. Consult your local governing specifications.

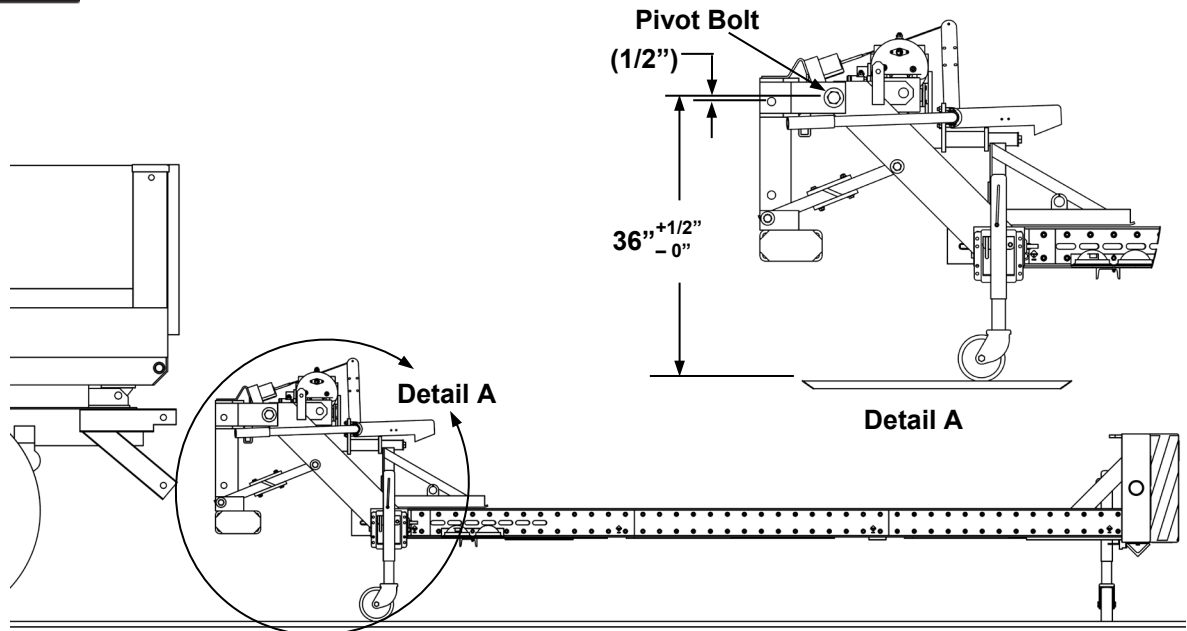


**Warning:** Do not operate the MPS 350<sup>®</sup> X while wearing loose fitting clothing or other loose accessories, which may become tangled in the MPS 350<sup>®</sup> X during operation.

- Move the MPS 350<sup>®</sup> X into position at the back of the truck. Use the Jacks to set the correct assembled height at 915 mm [+ 12 mm /- 0 mm] (36" [+ 1/2" /- 0"]), (**minimum** height of 36" (915 mm) and maximum height of 36-1/2" (927 mm) to the center of the Pivot Bolt.



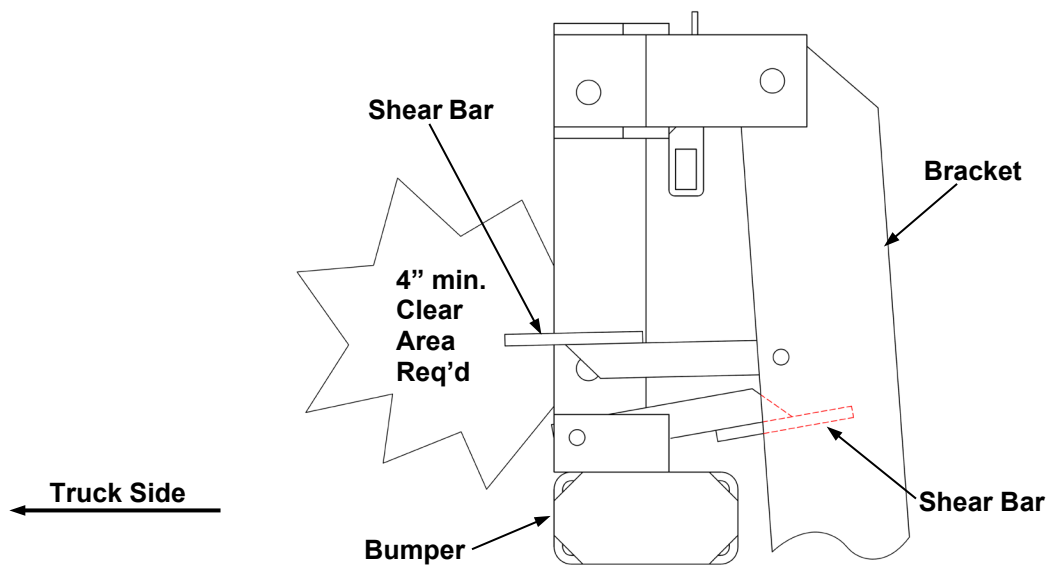
**Important:** Proper mounting height must be maintained to achieve intended impact performance of the system.



**Figure 9**



**Caution:** Leave adequate (4" minimum) clear area directly behind the Bumper Assembly and directly in front of the Shear Bars to ensure that the Shear Bars are not obstructed during an impact. Failure to follow this warning will result in damage to the truck and the MPS 350<sup>®</sup> X (Figure 10).



**Figure 10**

10. Select the best mounting option for your application.

- A. This option uses a minimum 1/2" (13 mm) thick plate welded across the back of the truck frame rails as shown in Figure 11a below. Mount Tabs (1/2" thick min.) welded to the plate provide attachment points for the Bumper. The length of the Mount Tabs should allow for a maximum of 1/2" (13 mm) clearance between the Lower Bumper Cross Member and the Mounting Plate. The Mounting Plate should be braced to the truck frame using the "C" Channels provided with the TMA. Weld the Channels to the truck frame as far forward as possible, but behind the rear-most leaf spring hanger, following the truck manufacturer's warnings and recommendations regarding attachment methods.

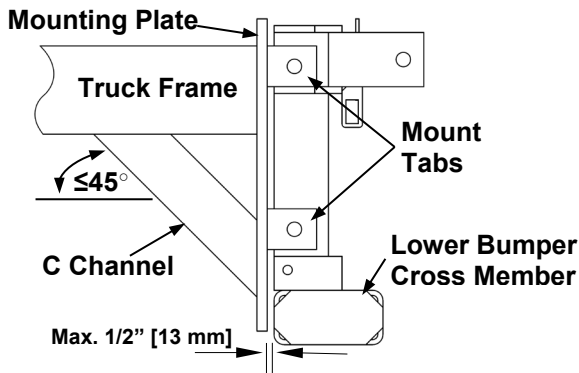


Figure 11a (Steel Plate)

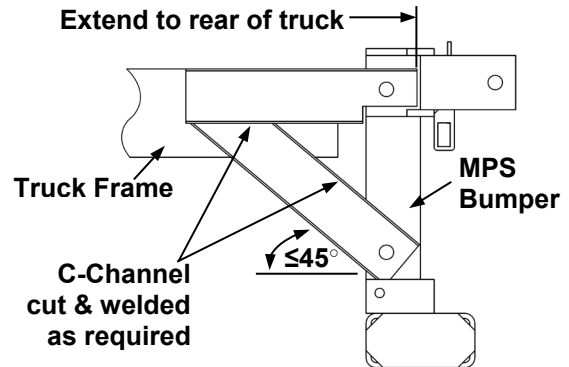


Figure 11b (C-Channels)

- B. Mount the TMA to the truck frame rails as required using the four (4) C-Channels (Figure 11b). The C-Channel support(s) will provide the required structural support. Weld the Channels to the truck frame as far forward as possible, but behind the rear-most leaf spring hanger, following the truck manufacturer's warnings and recommendations regarding attachment methods.
- C. Socket Hitch Option (p. 37 and 38). Contact Valtir to discuss any special mounting requirements for your particular application (p. 3).



**Important:** All welding must be performed by a professional or certified welder. Disconnect truck battery prior to welding.

11. After the MPS 350<sup>®</sup> X is mounted to the truck, adjust the Impact Face height using the Turnbuckles. The bottom edge of the Impact Face should measure between 11 to 13" (280 to 330 mm) from the ground (Figure 12). Rotate or swivel Jacks into storage (horizontal) position on the TMA for later use (p. 6).

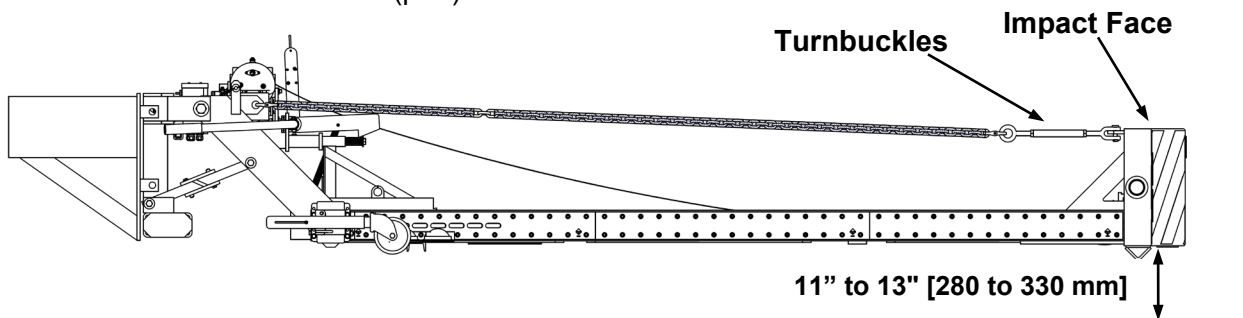


Figure 12

12. Connect the Winch by routing two (2) 2 AWG (max 15' in length) battery cables (positive and ground conductors) from the charged truck battery to the back of the truck. The use of a welding cable quick-disconnect allows easy attachment and removal of the MPS 350® X from the truck and enables easy routing of the cables. Confirm operation of the Winch and Controls. Valtir can provide optional Cable Kits in 15', 20' (1 AWG), or 25' (1/0 AWG) lengths.



**Caution:** For over-current protection, the positive cable lead coming off the truck battery should be protected with a 200 amp fuse or circuit breaker within 18" of the truck battery.

13. Push and hold the DOWN button on the unit's rocker switch while holding the end of the Winch Strap. Un-spool the Winch Strap until it is long enough to attach to the Cross Frame. Remove the 1" (25 mm) diameter Pin from the Winch Strap. Position the Winch Strap between the two Cross Bar Tabs. Insert 1" (25 mm) diameter Pin through the Cross Bar Tabs and the loop on the end of the Winch Strap. Secure by inserting the Cotter Pin into the hole in the 1" (25 mm) diameter Pin and flaring out the ends of the cotter pin.

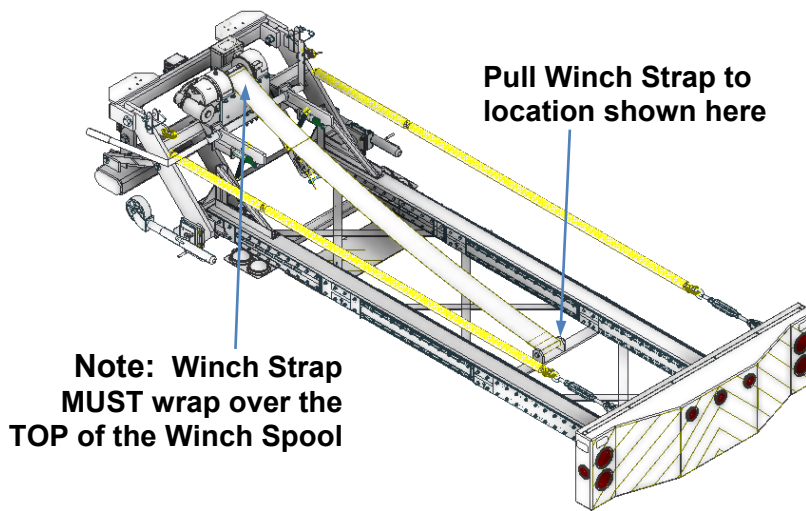


Figure 13



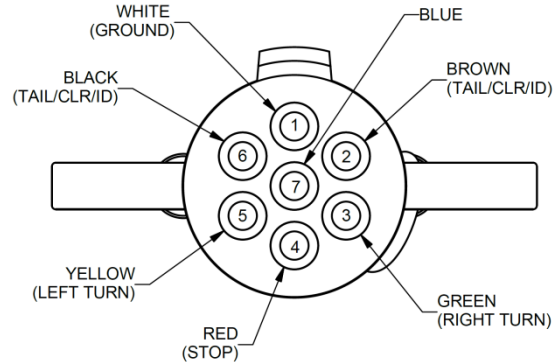
Figure 14



**Caution:** The Winch Strap on the MPS 350® X should **ALWAYS** wrap over the top of the Winch Drum to ensure proper function of Winch (Figure 13).

- Attach the Durashell® Nose and Striping Assembly on the Impact Fence first using the fasteners provided as shown in drawing 620344 on page 35.
- Mount the Lighting Junction Box on the Lower Bumper Cross Member of the Bumper Assembly, and on the lower channel of the Impact Fence (p. 32). The following chart references the wiring color code and function for the connector wiring.

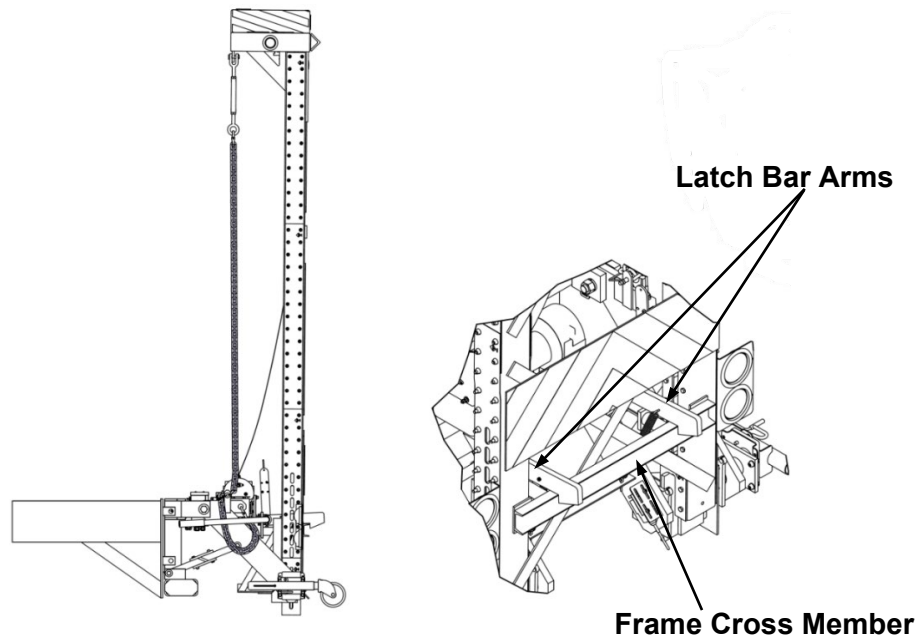
Wire Color	Function
White	Ground
Brown	Tail / Clearance, and ID Lamps
Green	Right Hand Turn and Hazard
Red	Stop Lamp
Yellow	Left Hand Turn and Hazard
Black	Tail / Clearance, and ID Lamps
Blue	Not Used



**Figure 15**  
**(VIEW IS LOOKING AT PLUG)**

- Mount the Lighting System on the MPS 350® X. Use drawing 620139 for mounting and routing instructions (p. 32, 33, and 34).
- Raise the MPS 350® X to the UP (vertical) position until the Latch Bar Arms drop into place over the Frame Cross-member on the Frame Assembly. The Latch Bar Arms must engage and secure the Frame Cross-member (Figure 16). When the unit is secured, the Upper Limit Switch will activate and the Winch will automatically power down.

**Note:** Depending on vehicle wiring a jumper wire may be required from the Brown to Black pins to get all MPS 350® lights to illuminate. Check all lights in the lowered and raised position.



**Figure 16**



18. With the MPS 350® X in an UP (vertical) position, remove the Linchpin and open the Clip on the end (Figure 17). Insert the Chain between the Chain Retainer Tabs. Next, insert the Linchpin through the Chain Retainer Tabs and Chain. Lock the Clip on the end to secure in place. Repeat this step for the Chain on the other side of the system.

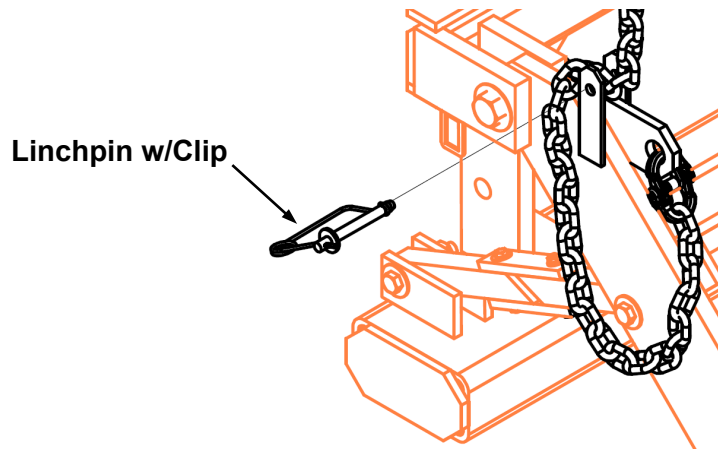


Figure 17



**Danger:** Ensure that no one is near, under or behind the MPS 350® X when in operation.



**Warning:** The MPS 350® X must be lowered completely until the Frame Assembly's weight rests on the Support Chains. Failure to follow this warning could result in serious injury or death to the operator and/or bystanders.



**Warning:** Do NOT modify the MPS 350® X system in any way.



**Warning:** Ensure that the MPS 350® X system and delineation used meet all federal, state, specifying agency, and local specifications.



**Warning:** Ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices ("MUTCD") and local standards.

## Operation Guidelines

Before operating the MPS 350<sup>®</sup> X, thoroughly read and understand these instructions and the safety section of this manual. Verify that the system is properly assembled and in working order.

The MPS 350<sup>®</sup> X system has been equipped with an Electric Hoist Assembly that can be used to raise the TMA up from its DOWN (horizontal) position. The TMA may be raised remotely to prevent possible scraping of the rear end of the system as the truck travels in and out of sloped driveways. The driver simply activates the UP button from inside the cab to momentarily raise the TMA higher. When the operator removes his finger from the button, the TMA will remain in place until the unit is lowered back to the horizontal position by pressing the DOWN button. The weight of the TMA shall not be solely supported by the Winch Strap for extended periods.



**Important:** An alarm will sound if the TMA is not in the full UP or DOWN position.



**Important:** In a work zone, the truck should be driven with the TMA in the DOWN (horizontal) position whenever possible. The system can only perform as an attenuator when the system is in the DOWN (horizontal) position.

While raising or lowering the TMA from outside the cab, the operator is to stand on the non-traffic side of the truck and remain aware of traffic conditions. Always stay clear of moving parts. Never allow anyone to stand under the TMA when it is in the raised position or while it is being lowered.

**The controls can be located on either side of the TMA Frame.** A set of controls may also be located in the truck cab. The controls on the TMA Frame are to be mounted to the **non-traffic side** of the system. To change the mounting position, the switch can be easily repositioned on the either side of the TMA Frame.

**Note: Move control switch and release lever on MPS 350<sup>®</sup> X before work site arrival.**

### Raising and Lowering the System



**Caution:** Make sure the top of the system is clear of all objects before proceeding. Under no circumstances should anyone be allowed behind the system when it is being raised or lowered.

When operating from the cab, always be aware of objects behind the TMA.

### Raising the System

There is one UP (vertical) position switch on each set of controls (p. 21). To tilt the system up, press and hold the UP switch until the system reaches the vertical position.



**Danger:** Know the overhead clearance of overhead obstructions. **NEVER** drive the MPS 350<sup>®</sup> X under any overhead obstruction without knowing the clearance height. Failure to follow this warning could cause damage to the MPS 350<sup>®</sup> X and may result in serious personal injury or death.



**Caution:** If someone will be doing maintenance behind the raised system, or if the system is to be stored in the UP (vertical) position, be sure to secure the system with the Retaining Chain as shown in Figure 17 (p. 16).

## Lowering the System

There is one DOWN (horizontal) position switch on each set of controls (p. 20). To tilt the system down, press and hold the switch DOWN until the system reaches the horizontal position. To lower the system, be sure that the Retaining Chain is released and that no one is behind the system. Press down on the release lever to disengage the Latch Bar manually and press and hold the DOWN button. If the unit is equipped with the optional Cab Controller, an Actuator with Cable will automatically disengage the Latch Bar when the DOWN button is held down. Continue pressing the DOWN button until the system reaches the full horizontal position. The Winch will stop automatically when the TMA contacts and activates the Lower Limit Switch.

## **Assembly Checklist (Complete and File)**

**Performed by:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Location:** \_\_\_\_\_

- MPS350X is securely fastened to truck (p. 12)
- There is adequate clearance at the mounting plate to allow the shear bars to drop in the event of an impact and extend up to 4" towards the front of the truck (p. 12)
- Rear impact face is adjusted to 12" (+/- 1") above grade (p. 13)
- Power wire from battery to TMA is of proper size and fused (p. 32)
- Winch strap wraps over TOP of winch and is properly pinned (p. 14)
- Durashell® Nose and striping assemblies are properly attached (p. 14)
- All lights/turn signals are installed and work properly per pin functions (p. 14)
  - Jumper from BRN to BLK may be required depending on vehicle wiring
- While truck is running the MPS350X raises and lowers without losing power (p. 14 & 26)
- If equipped, in-cab controller operates the system properly (p. 20 & 39)
- All jacks are rotated up to the travel position (p. 13)

## Maintenance

Before performing any Maintenance on the MPS 350® X, thoroughly read and understand the Maintenance Section of this manual. If maintenance is to be performed with the system in the UP (vertical) position, be sure to secure the system with the Retaining Chains (p. 15).

### Recommended Routine Maintenance

Description	Interval
<ol style="list-style-type: none"> <li>1. Check operation of Limit Switches and Latch Bar Assembly.</li> <li>2. Visually inspect MPS 350® X for loose bolts, damaged parts, etc.</li> <li>3. Check for 11" – 13" (280 mm – 330 mm) of ground clearance under Impact Face. Adjust if necessary.</li> <li>4. Inspect Turnbuckles to ensure that Lock Nuts are tight.</li> <li>5. Inspect Winch Strap and hardware for damage.</li> </ol>	DAILY
<ol style="list-style-type: none"> <li>1. Visually inspect 3/8"Ø Shear Bolts at Support Strut for wear.</li> <li>2. Inspect the Support Strut Mounting Bolts.</li> <li>3. Inspect operation of the Latch Bar Assembly and Springs.</li> <li>4. Inspect Chain Assembly for damage.</li> </ol>	WEEKLY
<ol style="list-style-type: none"> <li>1. Inspect demarcation markings on Impact Face of MPS 350® X.</li> <li>2. Inspect Caution and Warning decals for legibility. Call Valtir for replacements.</li> <li>3. Inspect Frame mounting hardware to ensure that Bolts are tight and Winch Strap is undamaged.</li> <li>4. Inspect Electrical Wiring and Plugs.</li> <li>5. Inspect Rip Plates and attachment hardware.</li> <li>6. Inspect Winch Strap Attachment Plate and Bolts by unwinding the Winch until the Bolts are visible. Check for stretching of holes in Winch Strap past Retainer Plate.</li> </ol>	MONTHLY
<p><b>Replace</b> 3/8"Ø Shear Bolts in Support Struts with approved Bolts. <b>See drawing 620131 for Shear Bolt replacement details (p. 27).</b></p> <p>Ensure that all Fasteners are secure.</p> <p>Depending on frequency and severity of use, Shear Bolt replacement intervals may vary. Valtir recommends inspecting and/or replacing hardware every three (3) months or as determined by end user periodic inspections.</p>	*THREE MONTHS
<p><b>Replace</b> 5/8"Ø Shear Bar Mounting Bolts on the Bracket and Bumper with approved Bolts. See drawing 620131 for Shear Bolt orientation and placement details (p. 27).</p> <p>Depending on frequency and severity of use, Shear Bar Mounting Bolt replacement intervals may vary. Valtir recommends inspecting and/or replacing hardware annually or as determined by end user periodic inspections.</p>	YEARLY

\* **Extra Shear Bolts provided at the center of the Lock Bar Assembly (p. 28).**



**Warning:** Ensure that all fasteners are secure. Failure to follow this warning could result in serious injury or death to the operator and/or bystanders.



**Caution:** When traveling to and from the work zone, travel with the MPS 350® X in the UP (vertical) position.



**Caution:** The above routine maintenance recommendations should be in addition to daily inspection of the MPS 350<sup>®</sup> X system during its use.



**Caution:** While traveling in a moving work zone, NEVER drive faster than 35 mph (55 km/hr) with MPS 350<sup>®</sup> X in a Down (horizontal) Position. Speeds slower than 35 mph (55 km/hr) are required when the MPS 350<sup>®</sup> X starts bouncing or uneven road conditions exist.

## Winch System Operation

The MPS 350<sup>®</sup> X is raised and lowered using the Winch.



**Danger:** Do not operate the MPS 350<sup>®</sup> X near overhead power lines. If the MPS 350<sup>®</sup> X comes into contact or close proximity with a power line or there is arcing (**visible or audible electrical activity**), **STAY** in the truck cab, and **immediately contact appropriate local responders / emergency personnel**. Keep away from any metal parts on the MPS 350<sup>®</sup> X. Do not let anyone get close to the truck. Do not attempt to jump from the truck. The Power Company must disconnect the power before you can leave the cab.



**Danger:** It is the responsibility of the operator to know the overhead clearance of overhead obstructions. **NEVER** drive the MPS 350<sup>®</sup> X under any overhead obstruction without knowing the clearance height. Failure to follow this warning could cause damage to the MPS 350<sup>®</sup> X and may result in serious personal injury or death.



**Danger: NEVER ATTEMPT TO MANUALLY RAISE THE FRAME ASSEMBLY OF THE MPS 350<sup>®</sup> X.** Failure to follow this warning could result in serious injury or death to the operator and/or bystanders.

A Control Box located on the Bumper of the MPS 350<sup>®</sup> X houses all the logic circuitry and connects to all peripheral control devices. A Power Disconnect Switch is mounted separately on the Bumper and a Remote Cab Controller (if equipped) can be connected directly to the Winch housing.

The Remote Cab Controller (optional) allows the operator to raise and lower the system from within the cab of the truck (see below).



**Figure 18**  
**Remote Cab Controller**

When the TMA is securely locked in the UP (vertical) position with the Latch Bar Arms engaged, the Top Limit Switch activates and cuts power to the Winch motor. In order to lower the TMA and restore power to the Winch, the Latch Bar Handle must be pulled back to raise the Latch Bar Arms and disengage the Top Limit Switch. If the MPS 350<sup>®</sup> X is equipped with the optional Cab Controller, the Latch Bar Assembly will be raised automatically via the Actuator device.



**Caution:** Failure to ensure proper function of the Limit Switches may result in failure of the Winch or damage to the TMA.

## Lowering the MPS 350® X

To lower the MPS 350® X from the UP (vertical) position to the DOWN (horizontal) position, complete the following steps:



**Warning:** Ensure that no one is near, under, or behind the MPS 350® X when in operation. Failure to follow this warning could result in serious injury or death to the operator and/or bystanders.



**Warning:** Ensure that the Winch Strap is tight and without slack before releasing the Latch Bar Assembly. **NEVER RELEASE THE LATCH BAR ASSEMBLY IF THE WINCH STRAP IS SLACK.** Failure to follow the warning could result in serious injury or death to operator and/or bystanders.



**Warning:** Do not operate the MPS 350® X while wearing loose fitting clothing or other loose accessories, which may become tangled in the MPS 350® X during operation.

1. Remove Linchpin and release Chains from Chain Retainer Tabs by unlocking the end of the Clip. Place the Linchpin back in the Chain Retainer Tab.
2. Manually disengage the Latch Bar Assembly by pressing down on the Latch Bar Handle until the Latch Bar Arms clear the Frame Cross-member completely. Continue pressing down on the Latch Bar Handle while operating the Control Switch (Step 3 and Figure 19).
3. While pressing down on the Latch Bar Handle, operate the Winch by pressing DOWN on the control switch. Once the Frame Assembly has started lowering and has cleared the Latch Bar Arms, you can release the Latch Bar Handle. Continue pressing the DOWN button on the Controller Switch until the Bottom Limit Switch disengages power to the Winch. The Frame Assembly's weight shall rest fully on the Support Chains and the Winch Strap shall not be in tension.

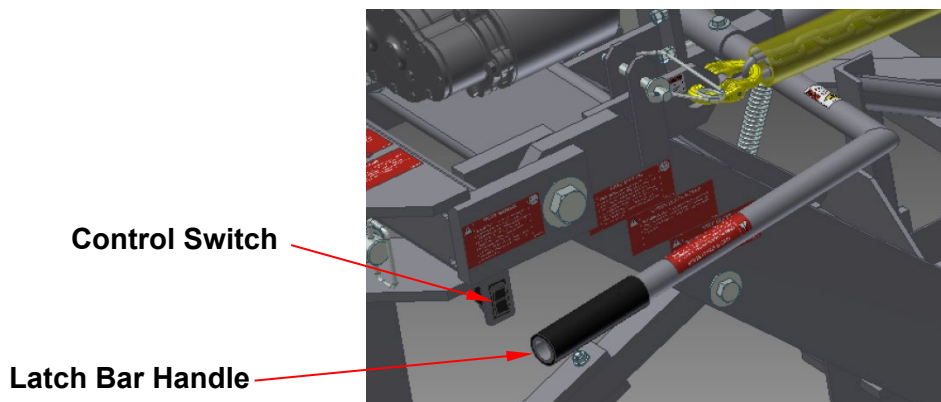


Figure 19



**Warning:** The MPS 350® X must be lowered completely until the Frame Assembly's weight rests on the Support Chains or the Bottom Limit Switch must be adjusted. Failure to follow this warning could result in damage to the Winch motor.

**Note:** The Cab Control Assembly is available for the MPS 350® X (p. 20). Contact your Valtir representative for more information (p. 3).

## Raising the MPS 350<sup>®</sup> X

The MPS 350<sup>®</sup> X must be raised to an UP (vertical) position using the Winch.



**Warning:** Attempting to raise the MPS 350<sup>®</sup> X to an UP (vertical) position using a device other than the Winch may result in damage to the system and/or injury to the operator.

Push and hold UP on the Control Switch to operate the Winch. As the Frame Assembly approaches the UP (vertical) position, a pair of Coil Springs located on the Bracket Assembly will contact a Frame Cross-member on the Frame Assembly. The Frame Assembly will compress the springs until the Latch Bar Arms drop into place. Once the Frame Assembly is secured in the full UP (vertical) position, the Upper Limit Switch should disengage power to the Winch motor.

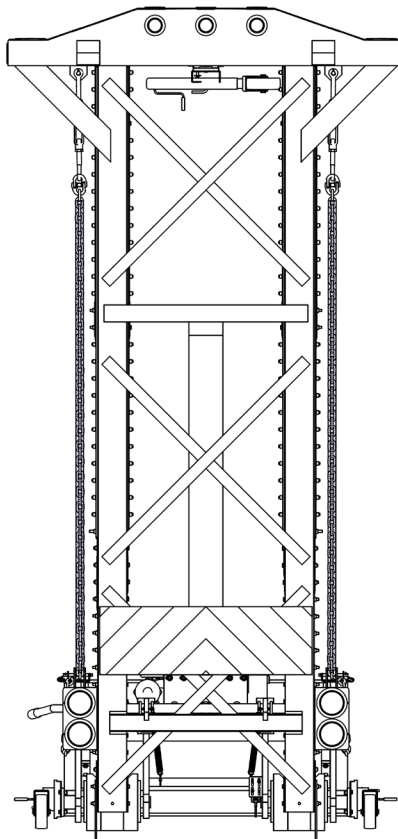


Figure 20

## Chain Retainer

The MPS 350® X is supplied with a Linchpin and a pair of Chain Retainer Tabs located at the top of the Bracket Assembly (Figure 20). When the MPS 350® X is raised to the full UP (vertical) position, the operator should lock the Chains between the Chain Retainer Tabs with the Linchpin. This procedure will provide an additional level of safety and will keep the chains from swinging excessively.

### Complete the following steps to lock the Chains with the Linchpin:

1. Insert the Chain between the Chain Retainer Tabs. Next, insert the Linchpin through the Chain Retainer Tabs and Chain.
2. Lock the Clip on the end to secure in place (Figure 21).
3. Repeat the above steps for the second Chain.

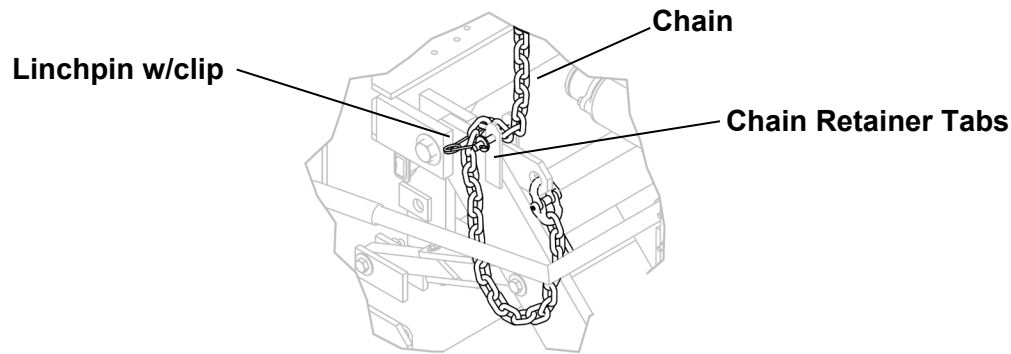


Figure 21

## Removing the MPS 350® X From the Truck

The MPS 350® X is supplied with three (3) side wind Jacks that are used to maneuver the MPS 350® X when it is unattached from the truck.

### Steps to remove the MPS 350® X from the truck:

1. Confirm the truck is on flat level ground.
2. Inform the truck driver that the MPS 350® X is going to be dismantled. Chock the wheels to prevent truck movement.
3. Remove the keys from the ignition of the truck. Place signs on the truck that it is being serviced **-DO NOT START ENGINE.**
4. Ensure all electrical plugs are disconnected between the truck and the MPS 350® X.
5. Ensure the MPS 350® X is in the DOWN (horizontal) position. Pull the release pin and rotate each Jack into the vertical position.
6. Repeat this step until all three (3) Jacks are vertical.
7. Use the hand crank to lower the Jacks until the wheels touch the ground.
8. Using the appropriate tools, remove the four (4) Bolts or Pins that attach the MPS 350® X to the truck.

**Note:** It may be necessary to use the jacks to adjust the height so that the MPS 350® X can be easily removed.

9. Roll the MPS 350® X away from the truck.



## When the MPS 350® X is Impacted

During a vehicle impact within NCHRP Report 350 criteria, the MPS 350® X will function in a series of events:

1. The 3/8" diameter Shear Bolts located in the Shear Bars will shear.
2. The Bracket Assembly will rotate downward to a vertical orientation until it hits the Lower Bumper Cross-member on the Bumper Assembly.
3. The Frame Assembly will begin to move forward under the truck.
4. As the Frame Assembly moves forward, the galvanized Rip Plates are passed through and ripped by the Cutters.
5. The impacting vehicle and the MPS 350® X frame will come to rest together after some distance that depends on the speed and weight of the impacting vehicle.

### **Rapid Field Replacement of Shear Bolts**

Field replacement of the Shear Bolts may become necessary due to nuisance hits, excessive bouncing, or poor preventative maintenance. The operation can be performed quickly, safely, and accurately using the steps shown below:

1. Confirm the truck is on flat level ground.
2. Inform the truck driver that the MPS 350® X is going to be serviced. Chock the wheels to ensure that the truck does not move.
3. Remove the keys from the ignition of the truck. Place signs on the truck that it is being serviced **-DO NOT START ENGINE.**
4. Rotate all three (3) Jacks downward and lower each Jack just enough to take the load off the Shear Bolts to be replaced.
5. Working on one Shear Bolt/Nut Connection at a time, remove one (1) Whiz Nut. Use a hammer to tap out and remove the bolt.

**Note:** It may be necessary to slightly rotate the Jacks until sufficient load is taken off the bolt to be removed. This task is easier with two people so one person can feel the looseness of the bolt as the other rotates the jack.

6. Reference the orientation of the bolts on DWG 620131 on page 27 and then replace the Shear Bolt that's been removed. Tighten Whiz Nut.
7. Repeat procedure for the remaining three (3) bolts being sure to only remove one bolt at a time and replace each bolt in the correct orientation.
8. Raise Jacks fully and rotate to the stowed position. Remove wheel chocks.
9. Continue operations



**Important:** Valtir makes no recommendation whether use or reuse of any part of the system is appropriate or acceptable following an impact. It is the sole responsibility of the owner to make that determination. It is critical that you inspect this product after assembly is complete to make certain that the instructions provided in this manual have been strictly followed.

## Low-Speed Impact

A LOW-SPEED-IMPACT is one that strokes less than 45" (1145 mm) of the Galvanized Rip Plates. This length includes the precut 6" slot on the front of the Frame Assembly.

**Note:** There is a decal placed on top of the Beam Assembly which indicates the maximum allowable stroke.

Should such an impact occur, complete the following steps to repair the MPS 350® X.

1. Order the Rip Plate Repair Kit (PN 007412B) from Valtir or your local distributor.
2. Disconnect the electrical plugs and then remove the Bracket Assembly from the Bumper Assembly by removing the two (2) 1" diameter hex bolts.
3. Transport the Bracket Assembly and Frame Assembly to the repair facility by a wrecker.

**Note:** In some cases, the Winch can be used to lift the Nose of the MPS 350® X slightly off the ground and then transported by the truck in a low ground clearance condition. The first 45" (1145 mm) of Rip Plate can be replaced and the entire MPS 350® X reused.

## Medium-Speed Impact

A MEDIUM-SPEED IMPACT is one that strokes between 45" (1145 mm) and 87" (2210 mm) of the Galvanized Rip Plates. The MPS 350® X must be removed from the truck and transported by wrecker as described above.

**Note:** The Beam Assembly must be replaced. If the Bracket Assembly and Bumper Assembly are damaged, they must also be replaced.

## High-Speed Impact

A HIGH-SPEED IMPACT is one that strokes beyond 87" (2210 mm) of the Galvanized Rip Plates. The MPS 350® X must be removed from the truck and transported by wrecker as described above.

**Note:** The Beam Assembly and Bracket Assembly must be replaced. The Bumper Assembly must also be replaced if it was damaged.



**Important:** Please contact Valtir if there are any damage assessment questions (p. 3).



**Warning:** Use only Valtir parts that are specified herein for the MPS 350® X for assembling, maintaining, or repairing the MPS 350® system. **Do not utilize or otherwise comingle parts from other systems even if those systems are other Valtir systems.** Such configurations have not been tested, nor have they been deemed eligible for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with an UNACCEPTED system.

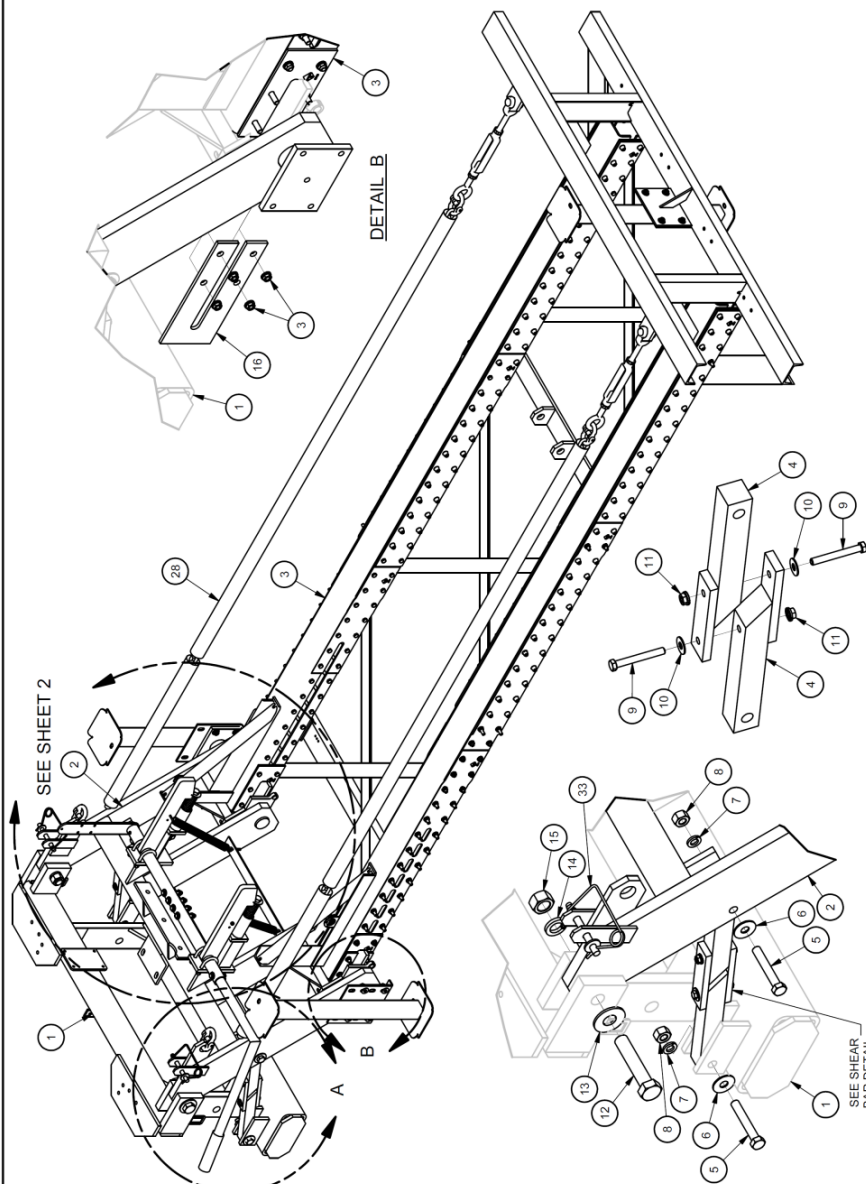
## Troubleshooting Table

Problem	Probable Cause	Remedy
<b>Winch will not operate</b>	<ol style="list-style-type: none"> <li>1. Power cable not connected</li> <li>2. Low Voltage</li> <li>3. Truck is positioned on a steep downhill slope</li> <li>4. Limit Switches not disengaging</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure power cables (+12vdc and ground) are securely connected between the truck's charged batteries and the Control Box.</li> <li>2. To prevent premature damage to the motor, the Winch will not operate if the initial voltage is not at least 12.0v (±3%) or 24.0v (±3%) for 24 v systems. Check voltage to ground at winch if low voltage is suspected. Vehicle should be running while operating the TMA.</li> <li>3. The unit will not lower when the truck is positioned on a steep slope. Park the truck on a level surface and try again. If this does not work, ensure the tilt sensor/switch (the cylindrical device located in the control box on the right side wall) is parallel to grade.</li> <li>4. Ensure the Limit Switches are positioned correctly. Adjust as required.</li> </ol>
<b>Winch operates intermittently</b>	<ol style="list-style-type: none"> <li>1. Low voltage</li> </ol>	<ol style="list-style-type: none"> <li>1. The Winch will not operate if the voltage drops below 10.3VDC (±3%) for 12VDC systems or 20.6VDC (±3%) for 24VDC systems at any time during operation. If voltage drops below the minimum threshold, the Winch will not operate for 5 seconds. After 5 seconds the system will reset itself. While the truck is running, use a DC voltmeter to ensure the voltage does not drop under the minimum value during operation under load. Charge/replace batteries as required and ensure the truck's alternator is charging all batteries. Be sure all electrical connections are clean and free of corrosion. If proper voltage cannot be reached, increase power cable gauge or shorten the cable length between the battery and TMA.</li> </ol>
<b>Winch solenoids chattering</b>	<ol style="list-style-type: none"> <li>1. Poor ground connection</li> <li>2. Low voltage</li> </ol>	<ol style="list-style-type: none"> <li>1. The winch solenoids are grounded through their mounting brackets. If the bracket is poorly grounded (rare), contact Customer Service.</li> <li>2. See "Low Voltage" remedies above.</li> </ol>
<b>Winch motor running hot</b>	<ol style="list-style-type: none"> <li>1. Excessive Winch use</li> </ol>	<ol style="list-style-type: none"> <li>1. The winch is designed for intermittent use. Allow sufficient time for the motor to cool down in between operations. Cool down times vary depending on environmental conditions.</li> </ol>

620131 - 1 of 2

ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	BUMPER FRM.MPS	1
2	SEE TABLE	CUTTER FRM.MPS	1
3	SEE TABLE	RIP RAILS FRM.MPS	1
4	SEE TABLE	SHEAR BAR	4
5	008629	BOLT.HX.5/8X1.65.P	4
6	003300	WASHER.FLAT.5/8 X 1.3/4. G	6
7	118101	WASHER.LOCK.5/8.P	6
8	118101	NUT.HX.5/8.P	8
9	119622	BOLT.HX.3/8X3.G5.P	8
10	003255	WASHER.FLAT.3/8.P	10
11	003257	NUT.HX.SRRRT.FLG.3/8-16.P	21
12	003120	BOLT.HX.1X5.G5.P	2
13	003900	1" ROUND WASHER F84	2
14	118061	WASHER.LOCK.1.P	2
15	119635	NUT.HX.1.P	2
16	SEE TABLE	RETAINER FRM.MPS	2
17	SEE TABLE	LATCH BAR.VERT LOCK	2
18	SEE TABLE	HANDLE LATCH BAR	1
19	006635	GRIP.BAR.1.7/32X6.CUSHIONED	1
20	006636	TMA.LBOLT.3/8"X1.25".PLTD	4
21	006718	BOLT.HX.3/8X2.14.G5.P	1
22	119663	NUT.HX.3/8.P	16
23	004014	SPRING.DIE.5/8X1.14X8	2
24	004559	BOLT.HX.5/8X9.G5.P	2
25	004523	BOLT.EYE.3/16X2.WO NUT.P	4
26	119610	NUT.HX.#10.P	8
27	006638	SPRING.EXT.1X7.9/64	2
28	007480	CHAIN ASSEMBLY.MPS.350	2
29	620356	STAND.MPS350.PT	2
30	119585	BOLT.HX.3/8X1.1/2.G2.P	12
31	118037	WASHER.FLAT.3/8X1.P	24
32	619160	DECAL ASSY.MPS-350X	1
33	003085	PIN.LINCH.1/2X3.1/2.P	2

ITEM	620131B (GALV)	619190B (BLACK)	619200B (YELLOW)
1	620126G	620431W	620431Y
2	620124G	620414W	620414Y
3	620130G	620465W	620465Y
4	620110G	620469W	620469Y
15	620066G	620411W	620411Y
17	620066G	620411W	620411Y
18	620070G	620554W	620554Y



DETAIL A  
SEE SHEAR BAR DETAIL

DETAIL B

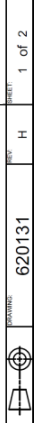
DETAIL C

NOTES:  
1. ORIENTATION OF ITEMS 4, 9, 10, & 11 IS CRITICAL FOR PROPER SYSTEM PERFORMANCE. ALL PARTS TO BE POSITIONED AS SHOWN IN 'DETAIL A' & 'SHEAR BAR DETAIL'. TORQUE FASTENERS TO 35 FT.-LBS.  
2. DECALS NOT SHOWN FOR CLARITY.

DESIGNED BY: D. Hayes Jr.	DATE: 2/6/2013	TOLERANCES PER CEMCTHPS-SF-001, UNLESS OTHERWISE SPECIFIED.
DRAWN BY: P. Krueger	DATE: 2/13/2013	DO NOT SCALE DRAWING
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M AND CEMCTHPS-SF-001		
EST UNFINISHED WT.: 1496 lbs		

ASSEMBLY NO. 619200B - YLW  
ASSEMBLY NO. 619190B - BLK  
ASSEMBLY NO. 620131B - GALV

FRAME ASSY.MPS.GALV



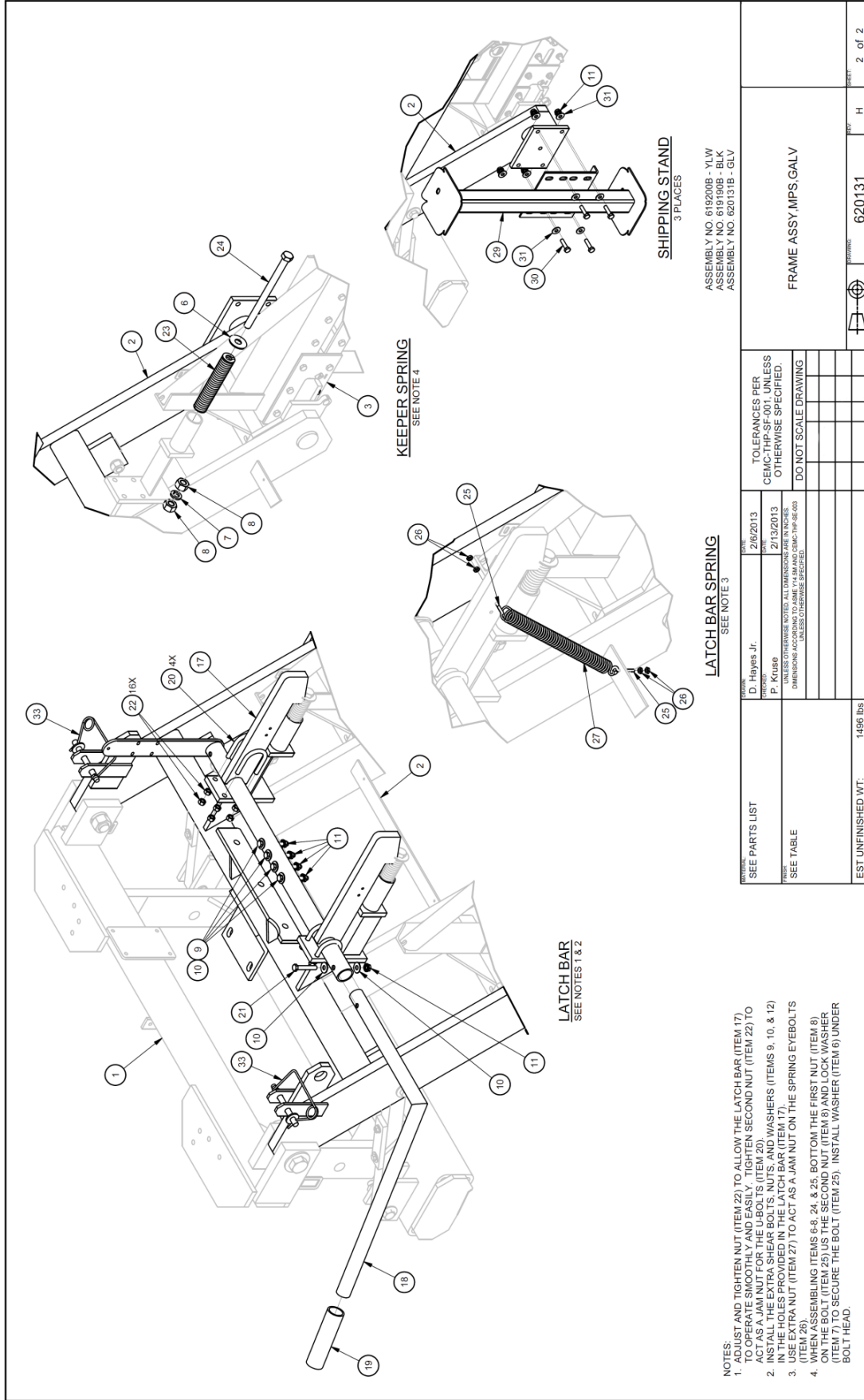
620131

H

1 of 2

FRAME ASSEMBLY, MPS 350® X

620131 - 2 of 2



ASSEMBLY NO. 619200B - YLW  
 ASSEMBLY NO. 619190B - BLK  
 ASSEMBLY NO. 620131B - GLV

FRAME ASSY, MPS, GALV

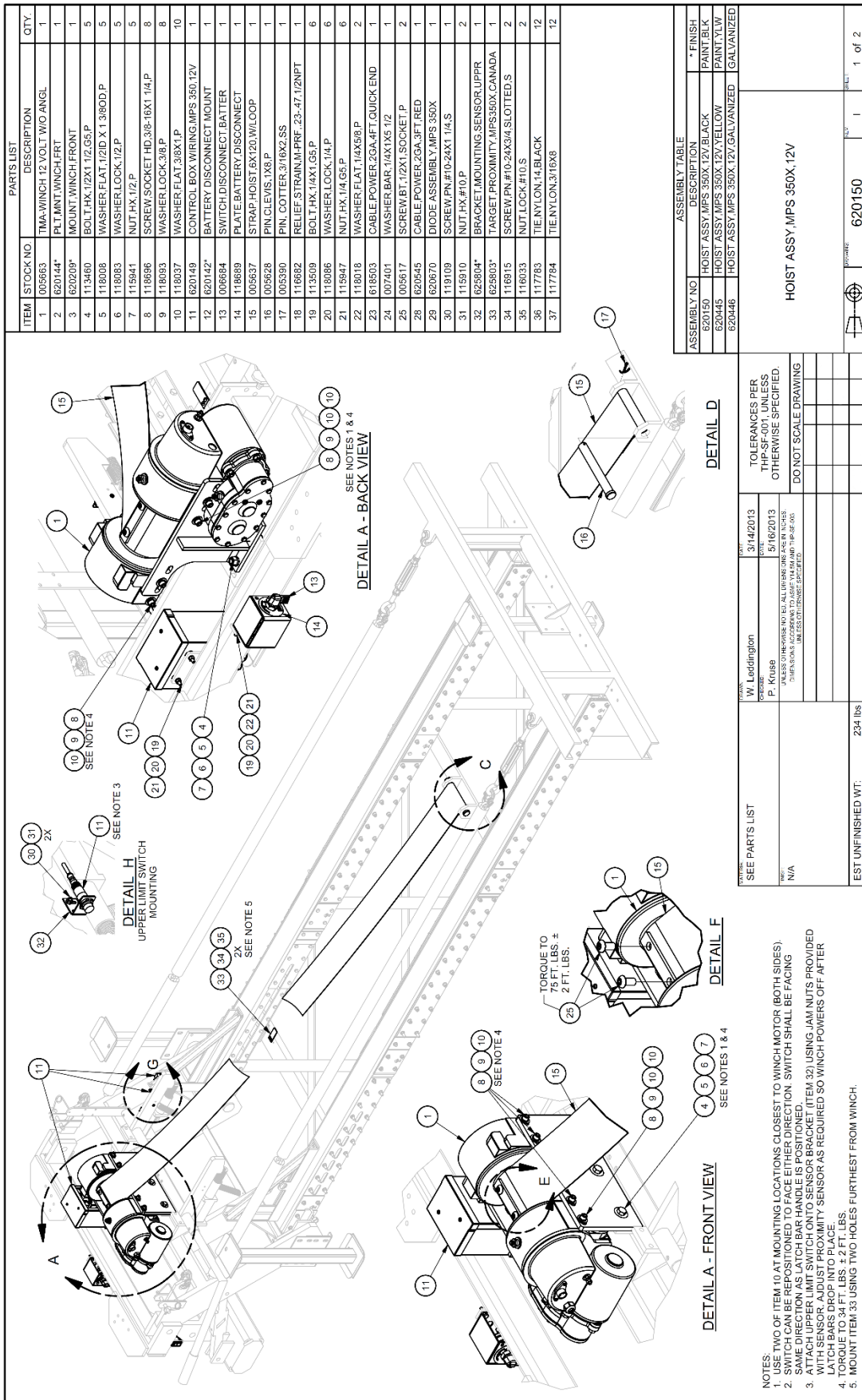
DATE 2/6/2013	TOLERANCES PER CEMCTHPP-SF-001, UNLESS OTHERWISE SPECIFIED.
DESIGNED BY P. Kluwe	DO NOT SCALE DRAWING
DATE 2/13/2013	
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M AND CEMCTHPP-SF-001 UNLESS OTHERWISE SPECIFIED.	

EST UNFINISHED WT.: 1496 lbs

REV	DESCRIPTION	DATE	BY	APP'D

620131 H 2 of 2

620150 - 1 of 2



**NOTES:**

- TWO OF ITEM 10 AT MOUNTING LOCATIONS CLOSEST TO WINCH MOTOR (BOTH SIDES).
- SWITCH CAN BE POSITIONED TO FACE EITHER DIRECTION. SWITCH SHALL BE FACING SAME DIRECTION AS LATCH BAR HANDLE IS POSITIONED.
- ATTACH UPPER LIMIT SWITCH ONTO SENSOR BRACKET (ITEM 32) USING JAM NUTS PROVIDED WITH SENSOR. ADJUST PROXIMITY SENSOR AS REQUIRED SO WINCH POWERS OFF AFTER LATCH BARS DROP INTO PLACE.
- TORQUE TO 34 FT. LBS. ± 2 FT. LBS.
- MOUNT ITEM 35 USING TWO HOLES FURTHEST FROM WINCH.

**SEE PARTS LIST**

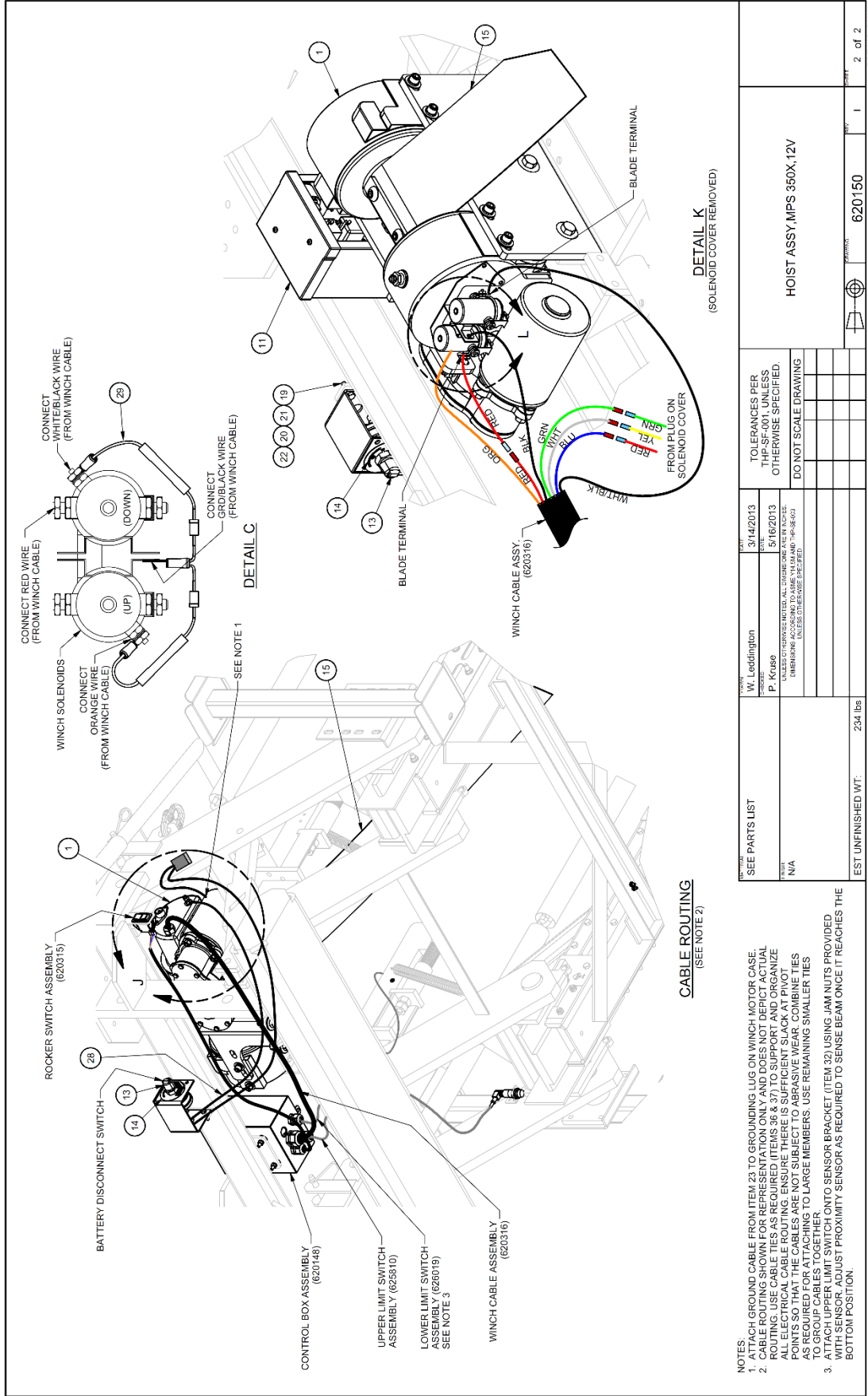
W. Leddington  
P. Krueger

DATE: 3/14/2013  
DATE: 5/16/2013

JAMES O'HEWES: NO. 80 ALL DIMENSIONS ARE IN INCHES.  
DIMENSIONS IN PARENTHESES INDICATE FACTORY TOLERANCES.

**TOLERANCES PER UNLESS OTHERWISE SPECIFIED. DO NOT SCALE DRAWING**

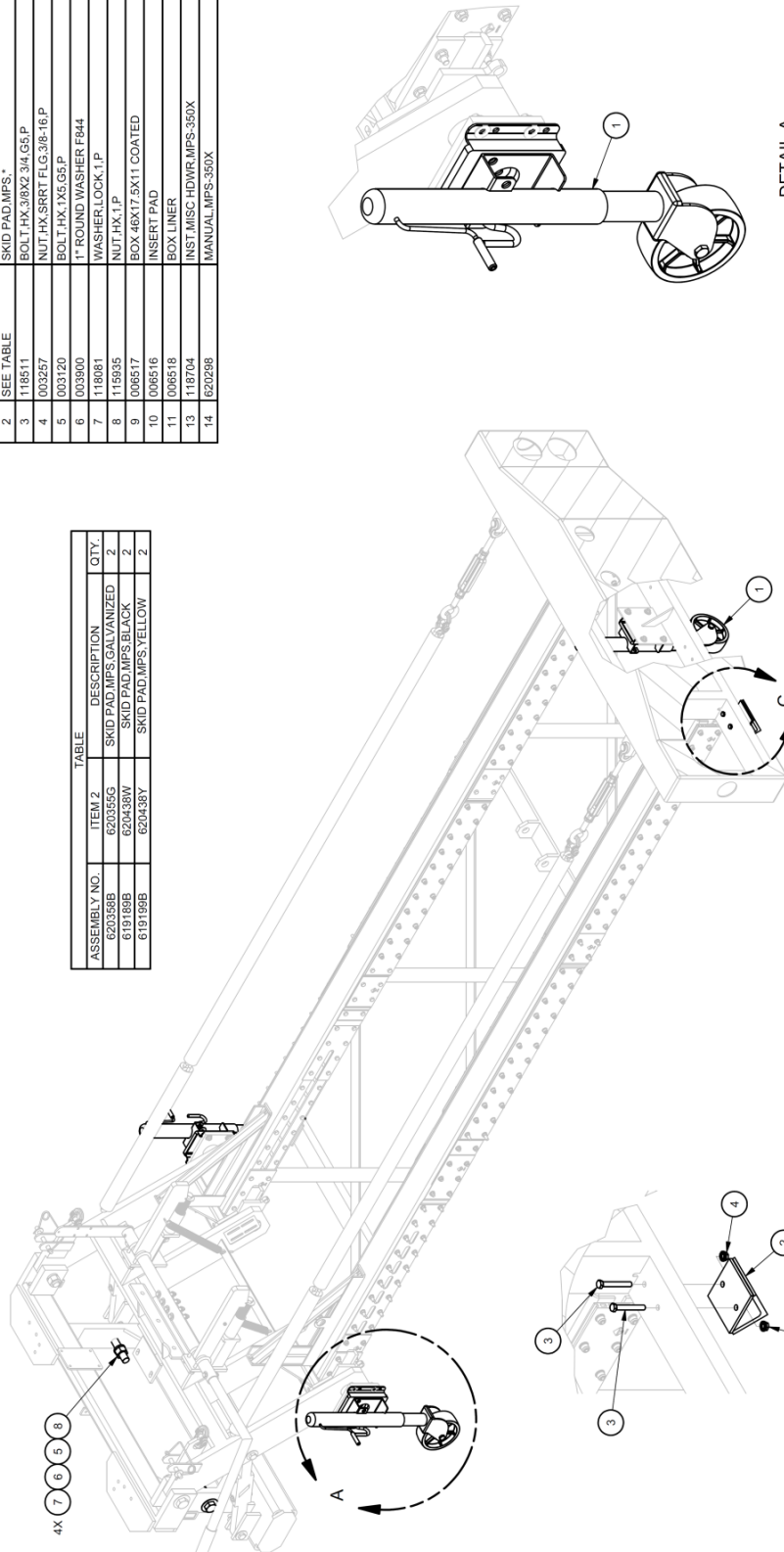
EST UNFINISHED WT.: 234 lbs



SEE PARTS LIST	DATE: 3/14/2013 BY: P. KRUSE	TOLERANCES PER THE DRAFTER UNLESS OTHERWISE SPECIFIED.
MATERIAL: N/A	DRAWING AREA: 234 LBS	DO NOT SCALE DRAWING
		EST UNFINISHED WT.: 234 lbs
PART: 620150		REV: 1
DRAWING NO: 620150		OF: 2 of 2

### HOIST ASSEMBLY, MPS 350® X, 12V

620358



ASSEMBLY NO.	ITEM 2	DESCRIPTION	QTY.
620358B	620355G	SKID PAD,MPS,GALVANIZED	2
619169B	620438W	SKID PAD,MPS,BLACK	2
619169B	620438Y	SKID PAD,MPS,YELLOW	2

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	006578	TMA-JACK (1200# XP10)	3
2	SEE TABLE	SKID PAD,MPS,*	2
3	118511	BOLT,HX,3/8X2 3/4,G5,P	4
4	003257	NUT,HX,SRRT,FLG,3/8-16,P	4
5	003120	BOLT,HX,1X5,G5,P	4
6	003900	1" ROUND WASHER F844	4
7	118081	WASHER,LOCK,1,P	4
8	115935	NUT,HX,1,P	4
9	006517	BOX,46X17,5X11 COATED	1
10	006516	INSERT PAD	1
11	006518	BOX LINER	1
13	118704	INST,MISC HDWR,MPS-350X	1
14	620298	MANUAL,MPS-350X	1

DETAIL A  
SEE NOTE 2  
3 PLACES

DETAIL B  
2 PLACES

NOTES:  
1. FINISH AND GENERAL WORKMANSHIP PER CEMC-THP-SF-004. UNLESS OTHERWISE SPECIFIED.  
2. REPLACE SHIPPING STANDS WITH JACKS (ITEM 1). USE EXISTING HARDWARE.

DESIGNER D. Hayes Jr	DATE 4/12/2013	TOLERANCES PER CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.
ISSUED BY P. Kruse	DATE 4/22/2013	DO NOT SCALE DRAWING
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ANSI Y14.5M UNLESS OTHERWISE SPECIFIED.		
ESTIMATED WEIGHT: 81.44 lbsmass		
MISC HWDR ASSY,MPS-350X		
INSTALL INSTRUCTION: 118704B		
REV	620358	1 of 1

MISC HARDWARE, MPS 350® X



620139 - 1 of 3

ITEM		STOCK NO.		PARTS LIST		DESCRIPTION		QTY.
1	SEE TABLE			BRKT_LIGHT_4INX2_*				2
2	SEE TABLE			BRACKET_HARNSS.**				2
3	SEE TABLE			LIGHTING & WIRH KIT **				1
4	116886G			SCREW_HWH1_1X1 1/4_SELF_DRILL_TAP.P				6
5	117783B			TIE_NYLON_1/4_BLACK				10

ASSY. NO.	LIGHT TYPE	ITEM 1	ITEM 2	ITEM 3
620139B	GALV 12V	620136G	618290G	118668B
620146B	GALV 12V LED	620136G	618290G	118669B
620147B	GALV 24V	620136G	618290G	118670B
620373B	GALV 24V LED	620136G	618290G	118712B
619193B	BLACK 12V	620136W	618290W	118668B
619194B	BLACK 24V	620136W	618290W	118669B
619195B	BLACK 24V	620136W	618290W	118710B
620374B	BLACK 24V LED	620136W	618290W	118712B
619196B	YELLOW 12V	620136Y	618290Y	118668B
619197B	YELLOW 24V	620136Y	618290Y	118669B
619198B	YELLOW 24V LED	620136Y	618290Y	118710B
620375B	YELLOW 24V LED	620136Y	618290Y	118712B
620667B	GALV 24V LED AUS	620136G	618290G	118804B

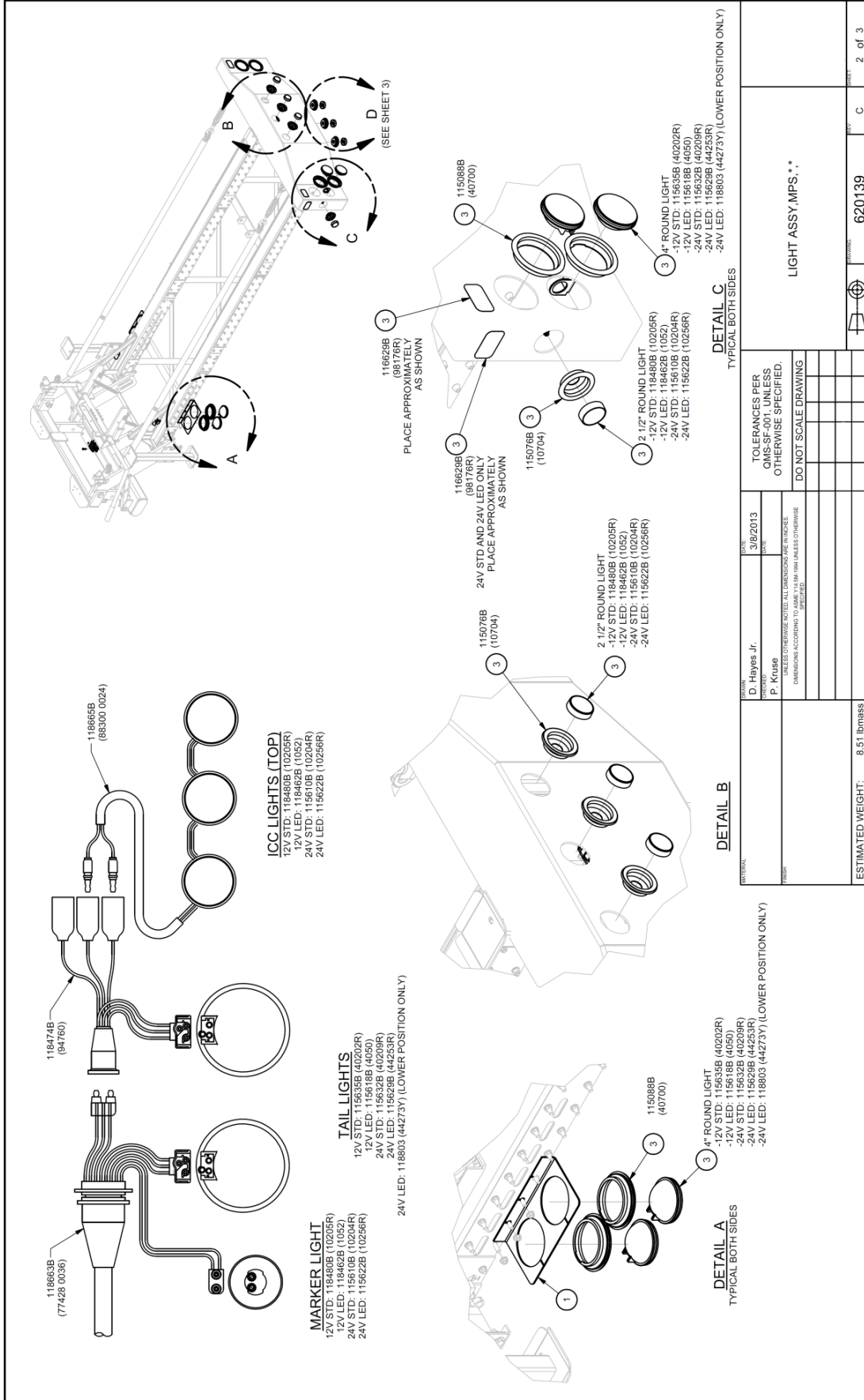
DATE:	3/9/2013
DESIGNER:	D. Hayes Jr.
DATE:	
DESIGNER:	P. Kruse
TOLERANCES PER QMS-SF-001, UNLESS OTHERWISE SPECIFIED.	
DIMENSIONS UNLESS NOTED, ALL DIMENSIONS ARE IN INCHES.	
DIMENSIONS ACCORDING TO TABLE 1A 3M 1MM UNLESS OTHERWISE SPECIFIED.	
DO NOT SCALE DRAWING	

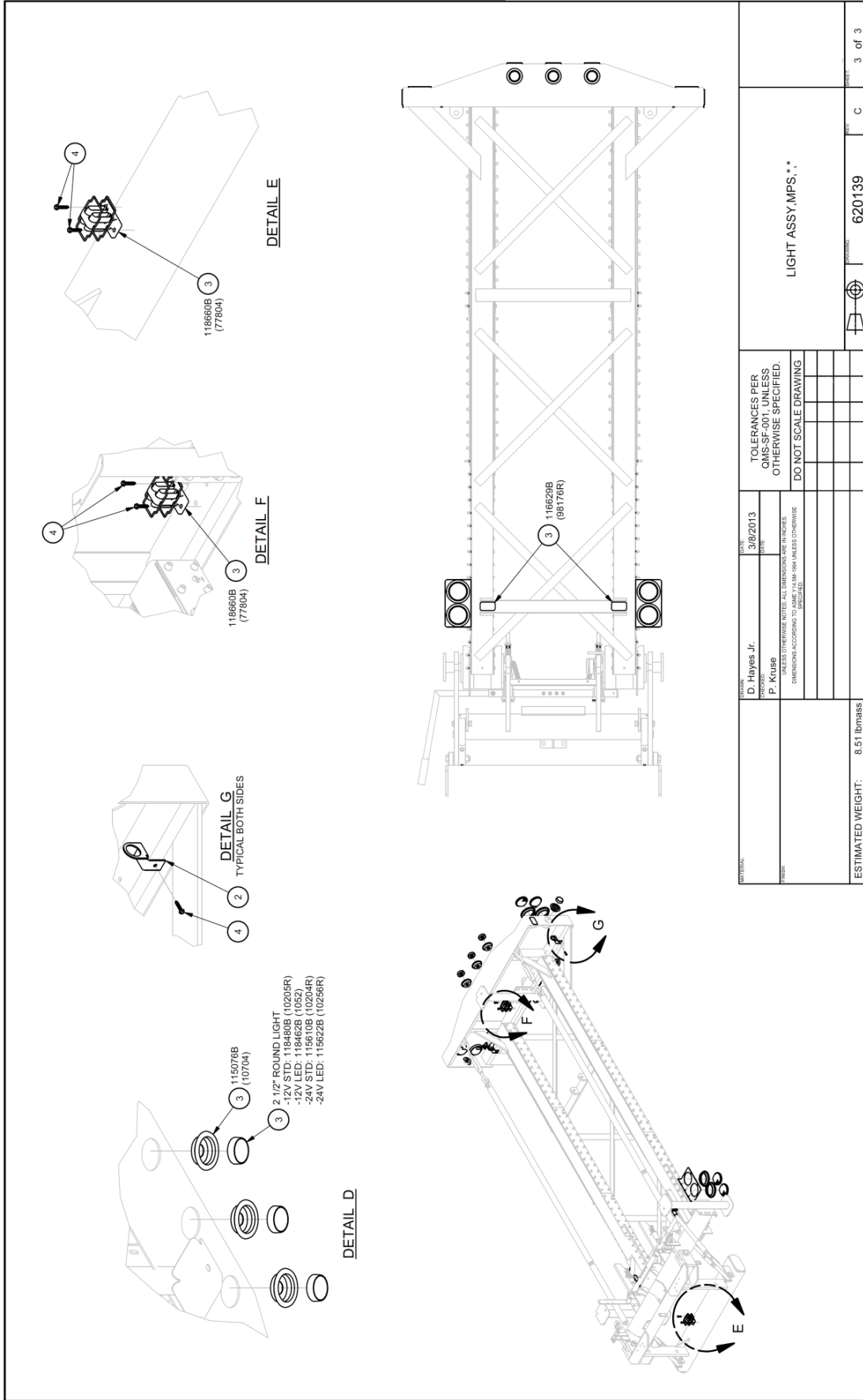
SEE PARTS LIST	ESTIMATED WEIGHT: 8.51 lbmass
NOTES: 1. USE ITEM 5 TO SECURE ALL CABLES.	

LIGHT ASSY. MPS. **	
620139	C
1 of 3	1 of 3



620139 - 3 of 3



Please use the chevron or striping as set forth by each highway authority.

620344 - 1 of 2

STRIPING ASSEMBLY TABLE			PARTS LIST			
ASSY. NO.	ITEM 1	ITEM 2	ITEM	STOCK NO.	DESCRIPTION	QTY.
620344	CONCRETE	620333	1	SEE TABLE	STRIPING ASSY. END MPS	1
620345	4" YLWBK (CHEVRON)	620322	1	SEE TABLE	STRIPING ASSY. BTM MPS	1
620346	4" ORGBLK (CHEVRON)	620323	2	620440	FLT. ST. 1/4X4X4 WH.G.	2
620347	8" REDDHT (CHEVRON)	620324	12	116880	SCREW HWHL 1/4X1 SELF DRILLUTAP.P	12
620348	6" WHTRSG (CHEVRON)	620325	1	620880	WSHRBAR/IMPT FACE.MPS.PT	1
620349	4" YLWBK (45 DEG SLANT)	620326	1	116511	BOLT.HX.3/8X2.3/4.GS.P	4
620350	4" YLWBK (CHEVRON)	620327	4	003257	NUT.HX.3/8X2.3/4.GS.P	4
620351	8" YLWBK (CHEVRON)	620328	1	620428	INSTRUCTIONS,STRIPING ASSY. MPS	1
620352	6" ORGBLK (CHEVRON)	620329				
620353	6" FLR ORGBLK (CHEVRON)	620341				
620354	12" WHTRD (SQUARES)	620342				
620427	BLANK, NO HOLES	620343				
626521	6" FL YLW GRN/REDAL (CHEVRON)	626320				
626599	8" FL YLW GRN/PL ORG (CHEVRON)	626398				

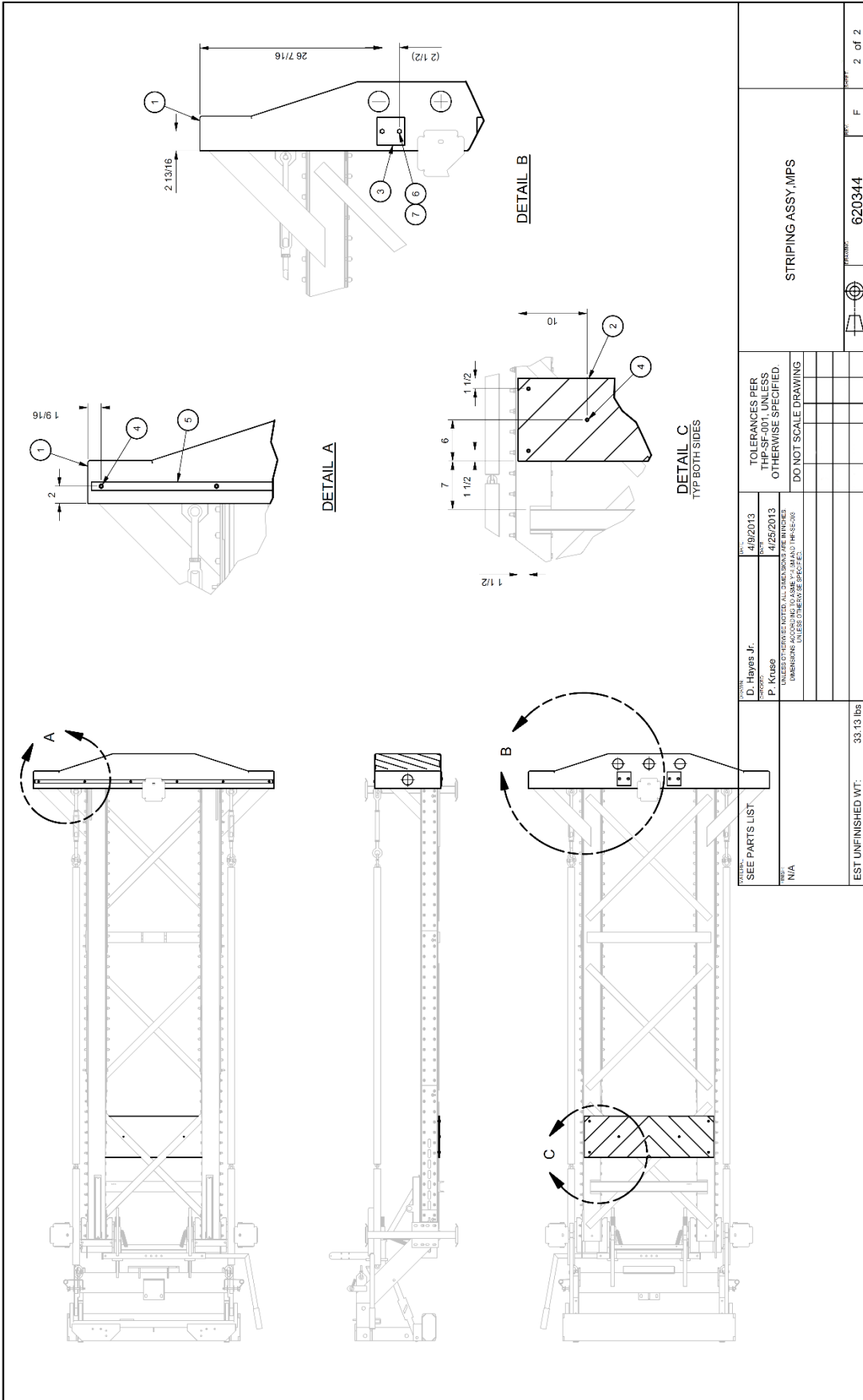
  
  

DATE:	REV:	BY:	CHKD:	APP'D:	DESCRIPTION:
SEE PARTS LIST	4/9/2013	P. K. URB			STRIPING ASSY. MPS
EST UNFINISHED WT: 33.13 lbs	4/25/2013				INSTRUCTIONS P/N 620428
					620344
					F
					1 of 2

**STRIPING ASSEMBLY, MPS 350® X**

NOTES:  
 1. FINISH AND GENERAL WORKMANSHIP PER THP-SF-004, UNLESS OTHERWISE SPECIFIED.  
 2. STRIPING PATTERN SHOWN IS GENERIC. SEE STRIPING ASSEMBLY TABLE ITEM DRAWINGS FOR SPECIFIC STRIPING PATTERN.

620344 - 2 of 2



PARTS LIST SEE PARTS LIST	DATE	4/09/2013	DESIGNED BY D. Hayes Jr.	TOLERANCES PER UNLESS OTHERWISE SPECIFIED.	PART	2 of 2
	DATE	4/25/2013				
REVISION	N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES DIMENSIONS IN PARENTHESIS ARE DIMENSIONS IN MILLIMETERS (PLEASE DO NOT SCALE)		DO NOT SCALE DRAWING		
EST UNFINISHED WT:	33.13 lbs					



620367

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	BRKT SUPPORT TOP,MPS,L.*	1
2	SEE TABLE	BRKT SUPPORT TOP,MPS,R.*	1
3	SEE TABLE	BRKT SUPPORT BTM,MPS,L.*	1
4	SEE TABLE	BRKT SUPPORT BTM,MPS,R.*	1
5	119332	BOLT,HX 1X3 1/2 GR P	8
6	003900	1" ROUND WASHER F944	8
7	119080	WASHER LOCK,1,G	8
8	119932	NUT,HX,1,G8 P	8
9	116295	PIN,HITCH 1X6 3/4 W/SNAP	4
10	620465	INSTRUCTIONS,ATTACHMENT ASSY,MPS	1

TABLE					
ASSEMBLY NO.	FINISH	ITEM 1	ITEM 2	ITEM 3	ITEM 4
620367B	GALVANIZED	620363G	620364G	620365G	620366G
620466B	BLACK	620363W	620364W	620365W	620366W
620467B	YELLOW	620363Y	620364Y	620365Y	620366Y

**ATTACHMENT ASSEMBLY, MPS 350® X**

620479

ITEM	STOCK NO.	DESCRIPTION	QTY.
1	620534	BRACKET, MOUNT, ACTUATOR, MPS	1
2	113587	BOLT, HX, 3/8X1 1/2, G5, P	2
3	118030	WASHER, FLAT, 3/8 ID X 1 3/16 OD, P, HRD	2
4	003257	NUT, HX, SRRT, FLG, 3/8-16, P	2
5	118747	ACTUATOR, 12V, INCRAM	1
6	113514	BOLT, HX, 1/4X2 1/2, G5, G	3
7	115947	NUT, HX, 1/4, P	3
8	118086	WASHER, LOCK, 1/4, P	3
9	118693	WASHER, FLAT, #8, P	2
10	117988	WASHER, FLAT, #8, P	2
11	118690	SCREW, PN#8X1 1/4, P	2
12	115915	NUT, HX, #8, P	2
13	SEE TABLE	REMOTE, WINCH, RAMSEY	1
14	116682	RELIEF STRAIN, M, PRF, 23-47, 1/2NPT	1
15	118749	LANYARD, 12IN, EYE, G	1
16	620535	CABLE ASSY, 18 IN, W/ CRIMP & SPADE	1
17	620548	INSTRUCTIONS, ASSY, CAB CONTROL, MPS, 12V	1

ASSY NO	DESCRIPTION	ITEM 13	CABLE LENGTH
620479	CAB CONTROL ASSY, MPS, 12V, 25FT	118706	25FT
620480	CAB CONTROL ASSY, MPS, 12V, 50FT	118795	50FT

**NOTES:**

- FINISH AND GENERAL WORKMANSHIP PER QMS-SF-004, UNLESS OTHERWISE SPECIFIED.
- REMOVE KNOCKOUT FROM CONTROL BOX ENCLOSURE PRIOR TO MOUNTING ITEM 14.

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DATE: 12/26/2013  
 DRAWN: D. Hayes Jr.  
 CHECKED: P. Kruse  
 DIMENSIONS ACCORDING TO ASME Y14.5M UNLESS OTHERWISE SPECIFIED.  
 UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES.  
 TOLERANCES PER QMS-SF-001, UNLESS OTHERWISE SPECIFIED.  
 DO NOT SCALE DRAWING

ESTIMATED WEIGHT: 6.03 lbmass

CAB CONTROL ASSY, MPS, 12V

INSTRUCTIONS: 620548

SEE PARTS LIST

REV: N/A

620479 1 of 1 A

# CAB CONTROL ASSEMBLY, MPS 12V



**Notes:**

**Notes:**

**Notes:**



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