



Maintenance Management Order

SUBJECT: Preventive Maintenance Servicing Guidelines for
Lockheed Martin (LM) Tray Management System (TMS)
Vertical Transfer Unit (VTU) Vertical Systems Vertical Lift
Unit (VLU)
TO: LM TMS VLU Sites

DATE: August 16, 2010
NO: MMO-080-10
FILE CODE: TM2
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Acronym has been updated to VLU.

This Maintenance Management Order (MMO) provides Preventive Maintenance (PM) guidelines for Lockheed Martin (LM) Tray Management System (TMS) Vertical Transfer Unit (VTU) Vertical Systems Vertical Lift Unit (VLU). The acronym is VLU. The class code is AA.

The minimum maintenance skill level to perform each task on the various checklists is included in the Minimum Skill Level column. This does not preclude higher level employees from performing any of this work.

The workhours represented in this MMO reflect the maximum workhours required to maintain the equipment. Given local conditions, management may modify task frequencies.

WARNING

Various products requiring Material Safety Data Sheets (MSDS) may be utilized during the performance of the procedures in this bulletin. Ensure the current MSDS for each product used is on file and available to all employees. When reordering such a product, it is suggested that current MSDS be requested. Refer to MSDS for appropriate personal protective equipment.

WARNING

The use of compressed or blown air is prohibited. When cleaning is required, an alternative cleaning method such as a HEPA filtered vacuum cleaner or a damp rag must be used in place of compressed or blown air. A lint-free cloth or brush may be used only on optical equipment when other cleaning methods can not be used.

Maintenance Managers are to use these preventive maintenance guidelines when preparing the route sheets for local maintenance personnel. It is the responsibility of each Maintenance Manager to ensure all WARNINGS, CAUTIONS, and NOTES are included with each applicable task as part of the preparation of any local route sheets.

For questions or comments concerning this bulletin contact the MTSC HelpDesk, either online at **MTSC>HELPDESK>Create/Update Tickets** or call (800) 366-4123.



Robert E. Albert
Manager
Maintenance Technical Support Center
Maintenance Policies and Programs

Attachments:

1. Summary Workload Estimate
2. LM TMS VTU VLU: Master Checklist: 03-VLU-AA-301-M: Monthly
3. LM TMS VTU VLU: Master Checklist: 03-VLU-AA-302-M: Quarterly
4. LM TMS VTU VLU: Master Checklist: 03-VLU-AA-303-M: Semi-Annual

ATTACHMENT 1

**SUMMARY
WORKLOAD ESTIMATE
FOR
LM TMS VTU VLU**

**SUMMARY
WORKLOAD ESTIMATE**

Days	Routine Servicing (hrs/yr)	Repair* (hrs/yr)	Total Servicing & Repair Time (hrs/yr)	Nonproductive Time ** (hrs/yr)	Total Servicing Per Machine (hrs/yr)
5 Day	11.23	3.37	14.60	1.46	16.06
6 Day	11.23	3.37	14.60	1.46	16.06
7 Day	11.23	3.37	14.60	1.46	16.06

NOTES

*Repair estimates based on 30% of servicing.

**Based on 10% of total servicing and repair.

ATTACHMENT 2

LM TMS VTU VLU

MASTER CHECKLIST

03-VLU-AA-301-M

MONTHLY

Time Total: 33 Minutes

U.S. Postal Service		IDENTIFICATION												
Maintenance Checklist		WORK CODE		EQUIPMENT ACRONYM						CLASS CODE		NUMBER		TYPE
		0	3	V	L	U				A	A	3	0	1
Equipment Nomenclature LM TMS VLU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD			Occurrence Monthly			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

SAFETY
STATEMENT

1. **COMPLY WITH ALL SAFETY PRECAUTIONS.** Disconnect power and apply lockouts when required by this instruction. Refer to current local lockout procedures to properly shut down and lock out this machine. Open equipment and inspect dust conditions. Check for suspicious dust or unusual debris. If any unusual substance is found notify supervisor prior to proceeding with any further action on the equipment.

THE USE OF COMPRESSED OR BLOWN AIR IS PROHIBITED.
When cleaning is required, an alternative cleaning method such as a HEPA filtered vacuum cleaner, a damp cloth, lint-free cloth or brush, must be used in place of compressed or blown air. Report safety deficiencies to your supervisor immediately upon detection.

WARNING

Be cautious when working around or on equipment when power has been applied.

WARNING

Do not remove covers if torque limiter adjustment or brake adjustment is needed. Unexpected platform movements may occur due to slippage.

CAUTION

If any misalignment is observed, do not run the Vertical Lift Unit (VLU) until item(s) have been corrected.

CHAIN TIMING

2. **Check chain timing.** Jog the VLU, as required, to align the platform flight bars on one of the platforms going up/down the back of the VLU with one of the VLU horizontal frame members. The flight bars and horizontal frame member should be parallel. If they are not parallel, notify supervisor.

U.S. Postal Service Maintenance Checklist	IDENTIFICATION														
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	0	3	V	L	U					A	A	3	0	1	M
Equipment Nomenclature LM TMS VTU			Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD			Occurrence Monthly			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
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VLU JOG CHECK 3. **Operate the VLU in the jog/manual mode.** 2 9

1. Listen for any unusual ticks, rattles, or bangs while running the VLU in the jog mode.
2. Verify the VLU starts and stops abruptly, indicating proper operation of the torque limiter and brake mechanism while running the VLU. If the VLU does not start abruptly (noticeable chain slippage) during starts, it may be necessary to adjust the torque limiter. If the VLU does not stop abruptly when the JOG button is released (noticeable chain coasting), it may be necessary to adjust the brake.
3. Position one of the VLU platforms halfway around the bottom axle between the front and back of the VLU and stop the VLU.
4. Notify supervisor of any deficiencies found.

POWER DOWN 4. **Power down and lock out power.** Power down the machine and lock out its electrical power as prescribed by the current local lockout/restore procedures. 1 9

CONDITION CHECK 5. **Check lubrication.** 1 9

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

1. Remove the VLU side guards, verify that automatic oiler applicators are intact and in contact with the lift chain.
2. Check chains, platform, and flight bar links for proper lubrication. Verify that chains and links are wet at joints. If chains, platform, and flight bar links are not properly lubricated, it may be necessary to oil these points using 20W non-detergent oil applied with an oil can or brush. If platform links need oiling, oil each link, including roller links, then jog the next platform into position and oil each link.

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Repeat until all platforms are lubricated.

OILER CHECK

6. **Check oiler.**

1 9

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

1. Check oil level in oiler reservoir to ensure it contains a sufficient quantity of 20W non-detergent oil. If less than 1 inch of oil is in reservoir, replenish oil.
2. Check sight glasses. If sight glasses become full, the tubes leading from the reservoir to the applicator(s) may be clogged. Clean if required.
3. Check the chain and other mechanisms to ensure oil is not dripping from them.
4. Check for any oil leaks on the oiler and the floor. Clean any oil drips from the oiler assembly and floor.
5. Notify supervisor of any deficiencies found.

WARNING

Be cautious when working around or on equipment when power has been applied.

SAFETY CHECK

7. **Check all emergency/safety stop/switches and safety sensors.**

2 9

1. Restore power as prescribed by the current local lockout/restore procedures.
2. Press the LIFT MOTOR PRESET button so PWR ON illuminates. Press each emergency stop switch individually and verify the PWR ON lamp goes off each time.
3. Press the LIFT MOTOR PRESET button again. Open and close each access panel and guard and verify the PWR ON lamp goes OFF when each panel or guard is opened.

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Equipment Nomenclature LM TMS VTU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD				Occurrence Monthly			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

CAUTION

If any misalignment is observed, do not run VLU until item(s) have been corrected.

SPROCKET,
CHAIN
ALIGNMENT AND
TIMING
CHECK

- | | | | |
|----|--|----|---|
| 8. | <p>Check chain and sprocket alignment and chain timing. Check the chain and sprocket alignment and chain timing of the items listed below. Each chain and its associated sprockets should all run in the same visual plane and parallel to the vertical chain guides. If any sprockets appear to be running out of this plane, or otherwise indicate misalignment, notify supervisor.</p> <ol style="list-style-type: none"> 1. Each lift chain. 2. Each tail shaft sprocket. 3. Each idler (stub) shaft sprocket. Pay particular attention to the idler (stub) shafts to determine if any have "walked" out of alignment due to a loose locking collar set screw. The lower idler (stub) shaft sprockets can be checked by aligning them with the sprockets on the tail or take-up shafts, and using a straight edge to ensure they are in line. Check top idler (stub) shaft sprocket alignment by visually checking to see if the sprocket is in the middle of the chain on both sides, and the shaft has not "walked" out of its bearing. 4. Each take-up shaft sprocket. 5. While standing at the back of the VLU, check the locking links connecting the platform to the flight bar on the platform. The platform should be hanging vertically, and the lower locking links should form about a 30-degree angle. | 18 | 9 |
|----|--|----|---|

LIFT CHAIN
TENSION CHECK

- | | | | |
|----|--|---|---|
| 9. | <p>Check lift chain tension.</p> <ol style="list-style-type: none"> 1. Power down the machine and lock out its electrical power as prescribed by the current local lockout/restore procedures. | 2 | 9 |
|----|--|---|---|

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Equipment Nomenclature LM TMS VLU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD			Occurrence Monthly			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

2. Check the tension of the four lift chains (two on each side of the VLU) at the midpoint of their lower horizontal run at the bottom of the VLU. There should be 2-4 inches of slack at this point. The two center chains will seem slightly tighter due to the weight of the platform. The two outer and the two inner chains should have approximately the same tension. If tension is not correct, notify supervisor.
3. Replace guards previously opened or removed.

WARNING

Be cautious when working around or on equipment when power has been applied.

RETURN TO SERVICE

10. **Restore equipment to service.** Restore equipment to service as prescribed by the current local lockout instructions providing lockout/restore procedures. 1 9

CLEAN UP

11. **Clean up.** Ensure all tools, lubricants, rags, etc., are removed from the work area. Notify supervisor of any deficiencies. 1 All

ATTACHMENT 3

LM TMS VTU VLU

MASTER CHECKLIST

03-VLU-AA-302-M

QUARTERLY

Time Total: 43 Minutes

U.S. Postal Service Maintenance Checklist	IDENTIFICATION														
	WORK CODE		EQUIPMENT ACRONYM						CLASS CODE		NUMBER			TYPE	
	0	3	V	L	U					A	A	3	0	2	M
Equipment Nomenclature LM TMS VLU			Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD			Occurrence Quarterly			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

SAFETY STATEMENT

1. **COMPLY WITH ALL SAFETY PRECAUTIONS.** Disconnect power and apply lockouts when required by this instruction. Refer to current local lockout procedures to properly shut down and lock out this machine. Open equipment and inspect dust conditions. Check for suspicious dust or unusual debris. If any unusual substance is found notify supervisor prior to proceeding with any further action on the equipment.

THE USE OF COMPRESSED OR BLOWN AIR IS PROHIBITED. When cleaning is required, an alternative cleaning method such as a HEPA filtered vacuum cleaner, a damp cloth, lint-free cloth or brush, must be used in place of compressed or blown air. Report safety deficiencies to your supervisor immediately upon detection.

3 All

POWER DOWN

2. **Power down and lock out power.** Power down the machine and lock out its electrical power as prescribed by the current local lockout/restore procedures.

1 9

GEAR REDUCER INSPECTION, REFLECTOR CLEANING

3. **Check gear reducers and clean top reflectors.**

1 9

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

1. Check seals for any signs of leakage.
2. Clean up any leaks.
3. Using a clean wiping paper or cloth, clean reflectors for top photo eyes.

IDLER, TAKE-UP SPROCKET LUBRICATION

4. **Lubricate idler shaft and take-up shaft sprockets.** Lubricate the sprockets on the idler and take-up shafts at the points where they meet these shafts by applying a few drops of 20W non-detergent oil to each side of these sprockets.

1 9

SENSOR CLEANING

5. **Clean sensors.** Remove side panel(s) for access as required. Wipe off the eyes of the five

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		WORK CODE		EQUIPMENT ACRONYM						CLASS CODE		NUMBER			TYPE
		0	3	V	L	U					A	A	3	0	2
Equipment Nomenclature LM TMS VTU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD				Occurrence Quarterly			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

sensors (photo eyes) and the reflectors for the lower photo eyes with a clean cloth. For UP VLU, there are 4 photo eyes on the bottom and 1 photo eye on top. For DOWN VLU, there are 2 photo eyes on the bottom and 3 photo eyes on top. Reinstall side panel(s) removed.

ROLLER CHAIN
LUBRICATION

6. **Lubricate roller chains at the induction port of the VLU.** 30 9

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

1. Remove the personnel safety guard that leads into the VLU (expanded metal/Lexan cover) 4 bolts.
2. Disconnect photo eyes/reflectors as needed.
3. Remove chain guard covering rollers and chains (6 bolts).
4. Apply 20W non-detergent oil or equivalent as evenly as possible to chains.
5. Clean up excess oil (over spray).
6. Re-install chain guard and personnel safety guard.
7. Re-attach all photo eyes and reflectors and align.

WARNING

Be cautious when working around or on equipment when power has been applied.

RETURN TO
SERVICE

7. **Restore equipment to service.** Restore equipment to service as prescribed by the current local lockout/restore procedures. 1 9

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Equipment Nomenclature LM TMS VLU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD			Occurrence Quarterly				

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

DISPOSE OF MATERIAL

- | | | | |
|----|--|---|---|
| 8. | Dispose of lubricant contaminated materials. | 2 | 9 |
| | Dispose of any materials contaminated by lubricants in accordance with your facility hazardous waste storage and disposal regulations. | | |

CLEAN UP

- | | | | |
|----|---|---|-----|
| 9. | Clean up. Ensure all tools, lubricants, rags, etc., are removed from the work area. Notify supervisor of any deficiencies. | 1 | All |
|----|---|---|-----|

ATTACHMENT 4

LM TMS VTU VLU

MASTER CHECKLIST

03-VLU-AA-303-M

SEMI-ANNUAL

Time Total: 53 Minutes

U.S. Postal Service		IDENTIFICATION													
Maintenance Checklist		WORK CODE		EQUIPMENT ACRONYM						CLASS CODE		NUMBER			TYPE
		0	3	V	L	U				A	A	3	0	3	M
Equipment Nomenclature LM TMS VLU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD			Occurrence Semi-Annual				

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

SAFETY
STATEMENT

1. **COMPLY WITH ALL SAFETY PRECAUTIONS.** Disconnect power and apply lockouts when required by this instruction. Refer to current local lockout procedures to properly shut down and lock out this machine. Open equipment and inspect dust conditions. Check for suspicious dust or unusual debris. If any unusual substance is found notify supervisor prior to proceeding with any further action on the equipment.

THE USE OF COMPRESSED OR BLOWN AIR IS PROHIBITED. When cleaning is required, an alternative cleaning method such as a HEPA filtered vacuum cleaner, a damp cloth, lint-free cloth or brush, must be used in place of compressed or blown air. Report safety deficiencies to your supervisor immediately upon detection.

WARNING

Be cautious when working around or on equipment when power has been applied.

LIMITER CHECK,
SENSE TEST,
UPPER GUIDE
INSPECTION

2. **Check brake and torque limiter; perform sense test and check upper guide wear-surface.**
 1. Power down the machine and lock out its electrical power as prescribed by the current local lockout/restore procedures.
 2. Obtain a quantity of 50 pound trays equal to one more than the number of horizontal platforms on the VLU, and position them sequentially on the VLU in-feed conveyor and the ECA conveyor.
 3. Visually check the condition of the plastic covering (wear surface) on the upper guide angles (angle mounted horizontally on each side at the top of the VLU).
 4. Remove the drive chain guard. Mark the torque limiter with a marker so any slippage

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Equipment Nomenclature LM TMS VLU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD				Occurrence Semi-Annual			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

can be measured.

5. Check sprocket to determine if it is aligned with the chain. If not, it may be necessary to align the sprocket and tighten the setscrews. Notify supervisor of any deficiencies found.

WARNING

Be cautious when working around or on equipment when power has been applied.

6. Restore equipment to service as prescribed by the current local lockout/restore procedures.

NOTE

Do not allow test trays to feed into TMS conveyor system.

7. Begin feeding the trays onto the VLU. When the VLU is full of trays, stop it by pressing the E-Stop switch, and add an additional tray to one of the platforms. Make the following checks repeating as necessary:
 - a) Verify each platform receives a tray. If a platform does not receive a tray, notify supervisor. It may be necessary to check/adjust the flight bar proximity switch.
 - b) When each platform is loaded with a 50-pound tray, the VLU should stop quickly with no coasting (less than 1/2 second) when an E-Stop is pressed. If it takes more than 1/2 second to stop, it may be necessary to adjust the brake. Refer to the Duty Master manufacturer's bulletin. Notify supervisor.
 - c) Start and stop the fully loaded VLU again.
 - d) Power down the machine and lock out its electrical power as prescribed by the current local lockout/restore procedures.
 - e) Check torque limiter for slippage. If the

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Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
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limiter has moved more than 1/8 turn when the fully loaded VLU was started, it may be necessary to adjust the torque limiter (one notch at a time) until slippage is less than 1/8 turn. Refer to the Dalton manufacturer's bulletin. Notify supervisor of any deficiencies found.

- f) Check all 3 set screws in the torque limiter for tightness, and replace drive chain guard previously removed.

WARNING

Be cautious when working around or on equipment when power has been applied.

- g) Restore equipment to service as prescribed by the current local lockout/restore procedures.
- h) Jog VLU in reverse and remove all trays from the VLU. Stop the VLU so a platform is halfway around the bottom axle between the front and back of the VLU.

DRIVE CHAIN
TENSION/ALIGNMENT CHECK,
DRIVE CHAIN/
SPROCKET
LUBRICATION

3. **Check tension and alignment of motor drive chain and sprockets and lubricate motor drive chain and sprockets.** 14 9
1. Power down the machine and lock out its electrical power as prescribed by the current local lockout/restore procedures.
 2. Remove both lower chain guards from the clutch/brake unit.

NOTE

If necessary, rotate the conveyor roller by hand to disengage the brake.

3. Visually check clutch/brake sprocket with drive and conveyor sprockets for wear and alignment. Rotate conveyor roller by hand if required.

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Equipment Nomenclature LM TMS VLU		Equipment Model Vertical Lift Unit						Bulletin Filename MM09072AD				Occurrence Semi-Annual			

Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
					Run Hours	Pieces Fed (000)	Freq.

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

4. Rotate conveyor roller by hand, and lubricate the lower drive chains with 20W non-detergent oil. Reinstall all lower guards previously removed.
5. Remove the top chain guard covering the drive chain.
6. Check the top motor drive chain and sprockets for wear and alignment.
7. Check the top motor drive chain tension at the mid-point of the lower section of chain. Slack should be between 1/2 inch and 3/4 inch.
8. Lubricate the top motor drive chain with 20W non-detergent oil. Reinstall upper chain guard(s).

GEAR REDUCER
INSPECTION,
CLEAN
PHOTOEYES

4. **Check gear reducer and clean top photo eyes and reflectors.** 5 9

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

1. Check seals for any signs of leakage.
2. Clean up any leaks.
3. Using a clean wiping cloth, clean the photo eyes and reflectors on the upper section of the VTU.
5. **Check control panel electrical connections.** 12 9
Check electrical connections in control panel for tightness and signs of corrosion. Tighten and clean or replace the electrical connections as required.

CONTROL PANEL
INSPECTION

U.S. Postal Service Maintenance Checklist		IDENTIFICATION													
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		0	3	V	L	U					A	A	3	0	3
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Part or Component	Item No	Task Statement and Instruction (Comply with all current safety precautions)	Est. Time Req (min)	Min. Skill Lev	Thresholds		
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WARNING

Be cautious when working around or on equipment when power has been applied.

RETURN TO
SERVICE

6. **Restore equipment to service.** Restore equipment to service as prescribed by the current local lockout/restore procedures. 1 9

WARNING

Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.

DISPOSE OF
MATERIAL

7. **Dispose of lubricant contaminated materials.** Dispose of any materials contaminated by lubricants in accordance with your facility hazardous waste storage and disposal regulations. 2 9

CLEAN UP

8. **Clean up.** Ensure all tools, lubricants, rags, etc., are removed from the work area. Notify supervisor of any deficiencies. 1 All