

MAINTENANCE TECHNICAL SUPPORT CENTER  
HEADQUARTERS MAINTENANCE OPERATIONS  
UNITED STATES POSTAL SERVICE



# Maintenance Management Order

**SUBJECT:** Network Distribution Center (NDC)  
Operational and Preventive Maintenance  
Guidelines for Parcel Sorter (Carousel)

**DATE:** December 14, 2012

**NO:** MMO-147-12

**TO:** Manager Maintenance, All NDCs

**FILE CODE:** Y8

mcol:mm12048ad

Online Change Record		
Change #	Date	Description of Change
2	2/17/2021	Attachment 2, Item 11, Added new step 9 to replace latch pins or hardware. Attachment 2, Item 25 Added new step 5 to replace cover on encoder module.
1	9/29/2014	Convert frequency numerical values to alphabetical values as per MMO-019-14

This Maintenance Management Order (MMO) provides Network Distribution Center (NDC) Operational and Preventive Maintenance Guidelines for the Parcel Sorter (Carousel). This MMO supersedes MMO-031-98. The acronym is PSM. The class code is CA.

The workhours indicated in the workload estimate (Attachment 1) are based on a 20-hour operations window and reflect the maximum annual workhours required to maintain each system. Actual workhour requirements and the frequency of tasks are dependent on run time and pieces processed. Therefore, PM workhour requirements will vary day-to-day based on site specific machine utilization. Management may modify task frequencies to address local conditions.

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

Preventive Maintenance (PM) guidelines provide maintenance employees with the recommended task based maintenance activities. The Electronic Conditioned Based Maintenance (eCBM) is an abbreviated task list that represents a portion of the PM checklist. The complete master PM checklist must be accessible to all maintenance employees when performing PM and eCBM task based maintenance activities.

**WARNING**

Steps contained in this bulletin may require the use of Personal Protective Equipment (PPE). Refer to the current Electrical Work Plan (EWP) MMO for appropriate PPE requirements.

**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. An alternative cleaning method such as a HEPA filtered vacuum cleaner, a damp rag, lint-free cloth, or brush must be used in place of compressed or blown air.

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  
HQ Maintenance Operations

- Attachments
1. Summary Workload Estimate for PSM
  2. Master Checklist: 03-PSM-CA-001-M: PM
  3. Master Checklist: 09-PSM-CA-001-M: Operational Maintenance

**ATTACHMENT 1**

**SUMMARY**

**WORKLOAD ESTIMATE**

**FOR PSM**

**SUMMARY  
WORKLOAD ESTIMATE  
FOR PSM**

**NOTE**

Since this equipment contains multiple units of unknown quantity, the workload estimate can not be provided in a traditional roll-up table. For this guideline, the annual work hours are derived from local site specific entries made in an electronic Work Hour Estimator Program (eWHEP) worksheet. Refer to eWHEP for further guidance.

**ATTACHMENT 2**

**PSM MASTER CHECKLIST**

03-PSM-CA-001-M

Time Total: 384.66 minutes

U.S. Postal Service <b>Maintenance Checklist</b>	IDENTIFICATION													
	WORK CODE		EQUIPMENT ACRONYM						CLASS CODE		NUMBER			TYPE
	0	3	P	S	M				C	A	0	0	1	M
Equipment Nomenclature Parcel Sorter (Carousel)		Equipment Model					Bulletin Filename mm12048ad			Occurrence				

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.	<p><b>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.</b></p> <p><b>THE USE OF COMPRESSED OR BLOWN AIR IS PROHIBITED.</b></p> <p><b>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 on optical equipment only when other cleaning methods cannot be used. Report safety deficiencies to your supervisor immediately upon detection.</b></p> <p><b>WARNING FOR EWP/PPE:</b> Steps contained in this bulletin may require the use of Personal Protective Equipment (PPE). Refer to the current Electrical Work Plan (EWP) MMO for appropriate PPE requirements.</p> <p><b>WARNING:</b> Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.</p> <p><b>NOTE:</b> Predictive maintenance (PdM) techniques are included within this PM guideline. The recommended procedure is to utilize the Ultrasonic Detector to supplement determining the condition of rotating components (i.e. bearings, rollers and shafts and other slow speed rotating equipment) in addition to audible "listen to" and "check for noise" tasks Refer to manufacturer's user's manual and video for Ultrasonic Detector Operational Instructions.</p>	3	All			W
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<b>Maintenance Checklist</b>		WORK CODE		EQUIPMENT ACRONYM					CLASS CODE		NUMBER			TYPE
		0	3	P	S	M				C	A	0	0	1
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MAIL SEARCH:	2.	<b>WARNING:</b> <b>Be cautious when working around or on equipment when power has been applied.</b>  <b>CHECK FOR MAIL.</b> Look for loose mail while performing these activities.	3	07			W
SYSTEM:	3.	<b>WARNING:</b> <b>Be cautious when working around or on equipment when power has been applied.</b>  <b>START EQUIPMENT.</b> Start equipment and check warning indicators for proper operation.	3	07			W
DRIVE: REDUCER	4.	<b>SORTER REDUCER STRAINER.</b> Turn sorter reducer strainer handle one full turn in either direction to scrape strainer plates.	3*	07			W
DRIVE: REDUCER	5.	<b>CHECK REDUCER OIL PRESSURE.</b> Record the reducer oil pressure. If below 12 psi, report to supervisor immediately.	3*	07			W
DRIVE:	6.	<b>CHECK MOTOR AND GEAR HOUSING.</b> Check motor and gear housing as follows:  1. Use the ultrasonic detector with stethoscope probe to check motor and gear housings to detect for excessive vibration and noise.  2. Use the noncontact infrared thermometer to check for excessive heat on the motor and reducer.	6*	09			Q
DRIVE: BRAKE	7.	<b>CHECK BRAKE.</b> Check brake as follows:  1. Observe effectiveness of brake. 2. Check braking action on motor. 3. Listen for noisy brake operation.  If applicable (pneumatic brake only). 4. Check all airlines and brake parts for leaks. 5. Check for proper air pressure (75-95 PSIG).	8*	09			Q
DRIVE: COUPLING	8.	<b>CHECK OUTPUT COUPLING.</b> Check output coupling for any misalignment of shafts.	2*	09			Q
TRAY STRAIGHTENER:	9.	<b>CHECK TRAY STRAIGHTENER.</b> Check tray straightener as follows:	4	07			Q

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		<ol style="list-style-type: none"> <li>Observe carriages at the tray straightener for smooth operation and proper latching.</li> <li>Check that clearance between tray and straightener is 1/2".</li> </ol>					
CARRIAGE: CHAIN	10.	<p><b>CHECK CHAIN / CARRIAGE ASSEMBLIES.</b> Check Chain/Carriage assemblies as follows:</p> <ol style="list-style-type: none"> <li>Look for proper chain lubrication (if applicable).</li> <li>Cracked trays, missing bumpers, and damaged carriage wheels or centering wheel.</li> <li>Look for mail or debris caught in chain or between carriages.</li> </ol>	0.12*	07			W
CARRIAGE:	11.	<p><b>CHECK CARRIAGE ASSEMBLY.</b> Check carriage assembly as follows:</p> <ol style="list-style-type: none"> <li>Remove latch pins or hardware and lower removable track (maintenance access panel).</li> <li>Examine trays for cracks and rough edges.</li> <li>Clean all dirt and build-up from carriage assembly and wheels. Jog as necessary.</li> <li>Examine all carriage wheels and centering wheel for wear and damage. Verify retaining rings are installed and not damaged.</li> <li>Tilt tray and examine index lever and index lever pin for wear or damage.</li> <li>Examine front and rear carriage pins for wear, damage, and verify pins are fully engaged.</li> <li>Examine carriage for cracks, warpage, scarring, gouges, and missing mail catchers.</li> <li>Check for damaged or missing bumpers and verify compression spring is in place.</li> <li>Replace latch pins or hardware and lower removable track (maintenance access panel).</li> </ol>	3*	07			Q
CARRIAGE: CHAIN	12.	<p><b>CHECK CHAIN.</b> Observe chain (one complete revolution at slow speed) around one sprocket for indications of frozen or worn rollers, missing chain fasteners, and cracked or broken links.</p>	0.04*	07			Q
DRIVE: UNICO:	13.	<p><b>CHECK UNICO DRIVE CABINET.</b> Check cabinet</p>	4*	09			Q



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		as follows: 1. Clean or replace filter as needed. 2. Review fault history. 3. Review fault mask.					
SYSTEM:	14.	<b>WARNING FOR EWP/PPE:</b> Steps contained in this bulletin may require the use of Personal Protective Equipment (PPE). Refer to the current Electrical Work Plan (EWP) MMO for appropriate PPE requirements. <b>POWER DOWN AND LOCK OUT POWER.</b> Power down the machine and lock out its electrical power as prescribed by the current local lockout instructions providing lockout/restore procedures.	3	07			W
OILER:	15.	<b>CHECK OILER OIL LEVEL.</b> Check automatic oiler level. Add if required (OL-3) (if applicable).	5	07			W
WIPER: DRAIN PAN	16.	<b>CHECK WIPER AND DRIP PAN.</b> Check chain oil wipers and oil drip pan as follows (if applicable): <b>WARNING:</b> Discard solvent soaked materials according to local procedures to prevent spontaneous combustion. 1. Check chain oil wipers. 2. Drain and clean oil drip pan.	15	07			M
CARRIAGE: CHAIN	17.	<b>CHECK CHAIN TENSION.</b> Check the sorter chain tension. Tension chain as necessary.	60	09			Q
DRIVE: REDUCER	18.	<b>CLEAN REDUCER OIL STRAINER.</b> Disassemble reducer oil strainer, clean and reassemble.	15*	09			M
DRIVE: REDUCER	19.	<b>CHECK AND CLEAN MOTOR AND REDUCER HOUSINGS.</b> Clean the motor and reducer housings to ensure that they are free from dirt accumulation.	30*	07			S
DRIVE: REDUCER	20.	<b>LUBRICATE REDUCER.</b> Take oil sample for test. Check oil level and fill as needed. (Lubricant GL-5-EP.)	15*	07			A
DRIVE: COUPLING	21.	<b>LUBRICATE OUTPUT COUPLING.</b> Lubricate output coupling with GR-2-EP lubricant.	5*	07			A
DRIVE: COUPLING	22.	<b>WRENCH TEST OUTPUT COUPLING BOLTS.</b>	5*	07			A

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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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		Wrench test mounting bolts on output coupling.					
DRIVE: REDUCER	23.	<b>CLEAN AND LUBRICATE DRIVE SHAFT BEARING.</b> Clean and lubricate drive shaft bearing as follows:  <b>WARNING:</b> <b>Discard solvent soaked materials according to local procedures to prevent spontaneous combustion.</b>  1. Wipe clean and lubricate the drive shaft bearing with (GR-2-EP) lubricant. 2. Lube until fresh lubricant appears at relief vent. 3. Clean off excess lubricant from bearing.	6*	07			A
DRIVE: SPROCKET	24.	<b>CHECK AND CLEAN SPROCKET TEETH.</b> Check and clean sprocket teeth as follows:  1. Check sprocket teeth for wear. 2. Remove build-up of foreign material. 3. Check sprocket teeth mounting bolts. 4. Tighten, if required, SAE-8 bolts and lock nuts to 15 ft/lb. torque.	30*	07			S
ENCODER:	25.	<b>CHECK ENCODER MODULE.</b> Check sorter encoder module as follows:  1. Remove cover on encoder module; check for damage to belt. 2. Examine top and bottom covers for wear, scuffs, gouging, strapping, cracking swells, or ply separation. 3. Check for build-up of foreign material on top and bottom belt surfaces. 4. Check motor encoder. 5. Replace cover on encoder module	10	07			A
ENCODER:	26.	<b>CLEAN AND LUBRICATE BEARING.</b> Clean and lubricate bearing as follows:  <b>WARNING:</b> <b>Discard solvent soaked materials according to</b>	4	07			Q

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		<b>local procedures to prevent spontaneous combustion.</b>  1. Wipe clean and lubricate bearing on the encoder module drive shaft, located on top of the main drive sprocket.  2. Clean excess lubricant from bearing.					
DISCHARGE: TRIPPER ASSEMBLY:	27.	<b>CLEAN AND CHECK TRIPPER ASSEMBLY.</b> Clean and check tripper assembly as follows:  1. Remove foreign material from tripper assembly, power cables, solenoids, and air hoses.  2. Examine air hose connectors and look for damaged air hoses.  3. Listen for air leaks.  4. Look for damage to electrical cable, solenoid valves, and connector.  5. Examine trippers for proper tipping position.  6. Wrench test all mounting bolts. Check for excess wear.  7. Examine bumpers for wear or damage. Rotate tripper roller for ease of rotation and wear or damage.  8. Look for damaged or worn linkage.  9. Check pivot points for ease of operation and cylinder mounting hardware.	4*	09			Q
TRACK	28.	<b>CHECK TRACK SECTIONS.</b> Check track sections as follows:  1. Look for cracks or damage.  2. Look for missing rub strips.  3. Look for uneven carriage travel through sections.  4. Inspect expansion joint for damage and uneven travel.  5. Inspect entrance and exit slip joints for damage.	20	09			Q
STRUCTURE:	29.	<b>CHECK CONDUIT AND WIRING.</b> Check conduit	10	07			S

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		and wiring as follows: 1. Check for damage to conduit and wiring between control panel and motor panels, limit switches, photocells, and other control devices associated with this group panel. 2. Look for conduit being used for handhold or steps.					
ACCESS DOOR: MAINTENANCE	30.	<b>CLEAN AND CHECK LIMIT SWITCH.</b> Clean and check limit switch as follows: 1. Remove dust from housing and tripper arm of maintenance access door track switch. 2. Look for damaged or worn linkage. 3. Check pivot points for ease of operation. 4. Wrench test switch mounting bolts for tightness. 5. Look for damage to conduit and wiring.	3	07			Q
STRUCTURE:	31.	<b>CHECK STRUCTURE.</b> Check structure as follows: 1. Look for damage to supporting and structural members of equipment, misalignment at joints between equipment sections, and loose connecting bolts. 2. Look and feel for loose anchor bolts, hanger rods, and tie rods. 3. Look for cracked or broken welds. 4. If composite track, check for broken or missing wear strip.	40	07			S
CENTERING DEVICE:	32.	<b>CENTERING DEVICE.</b> Check parcel centering device for mounting and loose hardware. Check arm locations for proper clearance over trays and centering of parcels.	10	07			Q
STATIC DEVICE:	33.	<b>CHECK STATIC DISCHARGE DEVICE.</b> Check condition and contact of static discharge device.	5	07			Q
TRAY STABILIZER:	34.	<b>CHECK TRAY STABILIZER.</b> Check tray stabilization bar through induction areas for mounting, damage and wear strip. - 1/2" clearance.	15	07			Q
TRAY	35.	<b>CHECK TRAY STRAIGHTENER.</b> Check tray	15	07			Q

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STRAIGHTENER:		straightener bar for mounting, damage and wear strip - 1/2" clearance.					
SYSTEM:	36.	<p><b>WARNING FOR EWP/PPE:</b> Steps contained in this bulletin may require the use of Personal Protective Equipment (PPE). Refer to the current Electrical Work Plan (EWP) MMO for appropriate PPE requirements.</p> <p><b>WARNING:</b> Be cautious when working around or on equipment when power has been applied.</p> <p><b>RESTORE EQUIPMENT TO SERVICE.</b> Restore equipment to service as prescribed by the current local procedure providing lockout/restore procedures.</p>	3	All			W
START UP:	37.	<p><b>START UP.</b> Perform normal start-up procedures as follows:</p> <ol style="list-style-type: none"> <li>Start or preset equipment.</li> <li>Check for proper operation.</li> </ol>	5	All			W
SENSOR: TRACKING (DVS, IVS, LVS)	38.	<p><b>RUN FMPCS MAINTENANCE SENSOR TESTS.</b> Check tracking sensor alignment, run test for each sorter tracking sensor (observe test results on message log). Verify condition of tray stabilizer and wear strip for tray load sensors.</p>	5*	10			Q
DISCHARGE:	39.	<p><b>RUN FMPCS MAINTENANCE DISCHARGE TESTS.</b> Run discharge unit test for each discharge (observe each discharge unit tipping tray).</p>	0.5*	10			Q
DISCHARGE: CHUTE	40.	<p><b>TEST CHUTE SENSORS.</b> Verify operation of chute sensor and reporting circuits:</p> <ol style="list-style-type: none"> <li>For chutes that only have one sensor (these sensors are located near the top of each chute). <ul style="list-style-type: none"> <li>Block the sensor and check to see if the chute full light illuminates.</li> <li>While the sensor is blocked check the FMPCS condition report or message log to see that it indicates the chute is full.</li> <li>Check the FMPCS Cimplicity screen to see if</li> </ul> </li> </ol>	1*	10			Q

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		blocked sensor is shown on the screen.  2. For chutes that have two sensors (the second sensor is located near the middle of the chute). <ul style="list-style-type: none"> <li>• Block the upper sensor and check the FMPCS condition report or message log to see that it indicates the chute is full.</li> <li>• Check the FMPCS Cimplicity screen to see if blocked sensor is shown on the screen.</li> <li>• Block lower sensor to see if the chute full light illuminates (if this is a container loader the parcel gate should move).</li> </ul> 3. For chutes or container loaders that have a button to inhibit the discharge unit (location varies): <ul style="list-style-type: none"> <li>• Press the inhibit button, check to see if the chute full light illuminates and that the FMPCS condition report or message log to see that it indicates the discharge inhibit is active.</li> <li>• Check the FMPCS Cimplicity screen to see that the correct condition is shown on the screen.</li> </ul>					
CLEAN UP:	41.	<b>CLEAN UP.</b> Ensure all tools, lubricants, rags, etc., are removed from the work area. Report all deficiencies to your supervisor.	3	All			W

\* --- the tasks marked with an asterisk are per unit tasks.

\*\* --- the tasks marked with two asterisks are critical tasks.

**ATTACHMENT 3**

**PSM MASTER CHECKLIST**

09-PSM-CA-001-M

Operational Maintenance

Time Total: 57 minutes

U.S. Postal Service		IDENTIFICATION										
<b>Maintenance Checklist</b>		WORK CODE		EQUIPMENT ACRONYM				CLASS CODE		NUMBER		TYPE
		0	9	P	S	M				C	A	0 0 1
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SAFETY STATEMENT:	1.	<p><b>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.</b></p> <p><b>THE USE OF COMPRESSED OR BLOWN AIR IS PROHIBITED.</b></p> <p><b>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 on optical equipment only when other cleaning methods cannot be used. Report safety deficiencies to your supervisor immediately upon detection.</b></p> <p><b>WARNING FOR EWP/PPE:</b> Steps contained in this bulletin may require the use of Personal Protective Equipment (PPE). Refer to the current Electrical Work Plan (EWP) MMO for appropriate PPE requirements.</p> <p><b>WARNING: Be cautious when working around or on equipment when power has been applied.</b></p>		All			T
FMPCS REPORTS:	2.	<p><b>GENERATE AND REVIEW REPORTS.</b> Analyze data provided on the following reports to determine if any areas of the machine are degrading or need attention. Reports can be selected through the FMPCS menu system or requested at the command line. Reports are to be generated for current tour.</p> <p>1. Review volume report (Look for high number occurrences of Induction failure, Mis-sent (Induction Unit problem, Discharge problem or failure, ...))</p> <p>2. Review condition report (Look for not operational, out of service, failing or down equipment)</p>	15	10			T



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		3. Review maintenance report (Look for any high number occurrences of problems or failures)  4. Review current message log					
SENSOR: TRACKING (DVS, IVS, LVS)	3.	<b>RUN FMPCS MAINTENANCE SENSOR TESTS.</b> Run sensor test for each sorter tracking sensor (observe test results on message log). The location of mail on the trays or tray state must be known to determine correct test results.	5*	10			T
DISCHARGE:	4.	<b>RUN FMPCS MAINTENANCE DISCHARGE TESTS.</b> Run discharge unit test for any discharge showing a high failure rate in the maintenance report (observe discharge unit tipping tray).	10	10			T
PSOC: (PARCEL SORTER OVERHEAD CAMERA)	5.	<b>OBSERVE CAMERA.</b> Look at the PSOC computer monitor and verify that it is: Ready, Connected to FMPCS and displaying read rate and bar code results.	2	10			T
INDUCTION:	6.	<b>CHECK INDUCTION UNIT.</b> Observe condition of the induction unit (belting, edge guards, controls, lighting ...).	2*	09			T
INDUCTION: SHAKER TABLE	7.	<b>CHECK SHAKER TABLE.</b> Observe shaker table operation (if applicable) (noisy stroke, banging ...)	1*	09			T
INDUCTION:	8.	<b>CHECK INDUCTION.</b> Observe induction of mail piece onto the sorter, ensure mail piece is hitting the correct tray (ALPA enabled and working correctly for mail piece not centered on belt).	1*	09			T
INDUCTION: SCANNER	9.	<b>CHECK SCANNER.</b> Verify scanners ability to read bar code.	1*	09			T
INDUCTION: PRINTER	10.	<b>CHECK PRINTER.</b> Observe application of label and printed label quality.	1*	09			T
DRIVE: CHAIN	11.	<b>CHECK CHAIN.</b> Check chain tension by observing chain slack coming off the driving sprocket (bull wheel). Check chain lubrication (if applicable).	1*	09			T

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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		
					Run Hours	Pieces Fed (000)	Freq.

DRIVE: REDUCER	12.	<b>CHECK DRIVE.</b> Reducer, drive gear and coupling (look for oil leaks, grease seals, listen for bearing or gear noise ...).	1*	07			T
CARRIAGE: CHAIN	13.	<b>CHECK CARRIAGES.</b> Observe sorter carriages for broken trays, latching plates or missing/damaged mail catchers (beaver tails) between carriages or missing wheels.	10	07			T
TRAY STRAIGHTENER:	14.	<b>CHECK TRAY STRAIGHTENERS.</b> Verify tray straighteners are functional and wear strip is in good condition.	2	07			T
TRAY STABILIZER:	15.	<b>CHECK TRAY STABILIZERS.</b> Verify tray stabilizers are functional and wear strip is in good condition.	2	07			T
REPORT:	16.	<b>REPORT DEFICIENCIES.</b> Report all deficiencies to your supervisor.	3	All			T