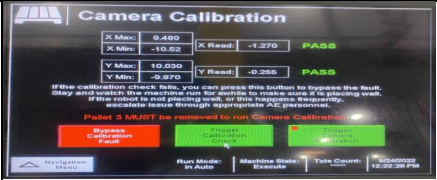

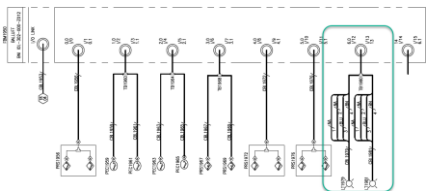
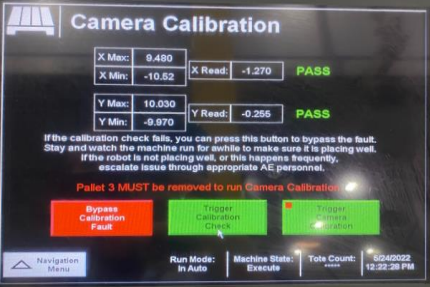

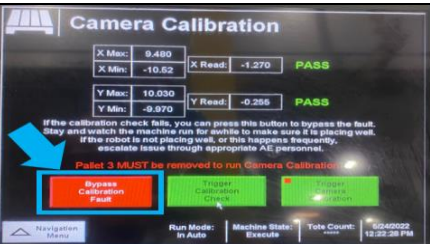


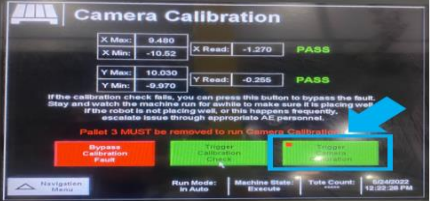

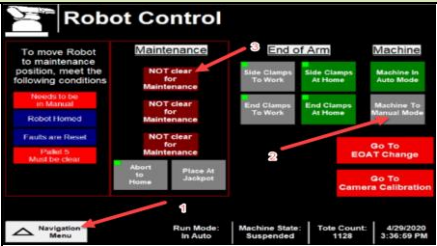







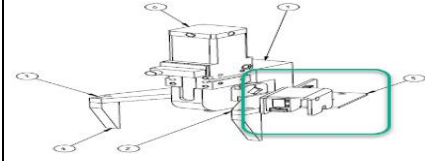




Maintenance Job Planning/Estimating Worksheet					
Planner:		WO#:		Date:	
Job Contact:		Location:		Asset ID#:	
Job Description:		RWC4 Vision Issue Guidance			
Technicians Required:		2			
Elapsed Time:		1.5 hours			
Job Scope					
<p>General Information on RWC4 Vision processes:</p> <p>HMI Calibration Check is a verification that the values returned by the vision system based on the robot's position, the position of the target, the camera's focus, and the camera's aperture are within the acceptable limits from the programmed baseline settings. These baseline settings are entered into the program during Automatic or Manual Camera Calibration. Calibration check does not calibrate the system or change any values in the program. If calibration check passes, you should never run Automatic or Manual calibration.</p> <p>Manual Camera Calibration is performed by the user by stepping through individual programs in the teach pendant. The user will adjust the regions of interest, check focus and aperture, manually enter values into the programs, verify the calibration, and if necessary, re-teach the grid frame. Manual Camera Calibration will overwrite any previous calibrations. Pallet 3 must be removed for this process. This should only be performed by CSE/CSL personnel.</p> <p>HMI Automatic Camera Calibration is a fully automated version of Manual Camera Calibration. Automatic Camera Calibration will overwrite any previous manual or automatic calibrations. The program teaches the grid frame, adjusts the regions of interest, and verifies calibration in an 5-8 minute process. If Automatic Camera Calibration passes, it means that the verification program passed. If Automatic Camera Calibration passes, it should not be re-attempted. If the calibration check fails, Manual Camera Calibration should be attempted. Pallet 3 must be removed for this process.</p>					
Job Plan Seq.	Task Description	Task Duration	Technicians Required	Estimated Labor Hours	Reference Pictures
10	Ensure there is a vision-related error. Make sure that uneven pallets are not being used. Vision-related errors include multiple mis-stacked totes, vision error kickouts, multiple "Robot Faulted" faults displayed on the HMI with a corresponding CVIS-XXX error in the alarm history of the teach pendant, Calibration Check failure, Camera Calibration failure, or the camera does not turn on at all.	0.03	1	0.03	<p>Vision-related "Robot Faulted" faults: CVIS-774: Camera Command ID Does Not Match CVIS-454: Camera Communication Error CVIS-085: Camera Timeout CVIS-020: Big Circles Cannot Be Distinguished Any other error with CVIS-XXX To access the alarm history on the teach pendant, select MENU, arrow down to 4 ALARM and press ENTER. This will show active alarms. Select History on the top line menu to view alarm history.</p>
20	Ensure that the first layer of totes is placing correctly in all six locations. The first layer of totes is NOT placed by input from the vision system and is hard-coded in the software. However, poor first-layer placement can cause vision errors on the remaining layers. First layer placement is directed by position registers (PR's) and offsets.	0.04	1	0.04	
30	Always follow OSHA, LOTO, PTP, NFPA, Alternative Protection Procedures (APP), and Amazon Safety Policies before placing hands on equipment.	0.01	1	0.01	
40	"Take 2 for Safety". Review the area you will be working in, inspect for potential barriers or unsafe conditions.	0.03	1	0.03	
50	Use required PPE as needed to complete the job. Gloves, safety glasses, etc.	0.01	1	0.01	
Calibration Check and Bypass Calibration Fault					
60	Evaluate the ambient light in the area. Make sure all light fixtures are working as they may have been during installation. Determine if automatic lighting may be off at the first calibration check of the day. Check if any building skylights could be affecting the calibration grid.	0.03	1	0.03	
70	Select the Navigation Menu on the HMI and select Login. Enter the username MAINT, the password 1234, and select Login. Select Setup and access the Camera Calibration screen. Select Trigger Calibration Check.	0.02	1	0.02	
80	Observe the calibration check. Make sure that both ring lights turn on and are red when they are above the calibration grid.	0.03	1	0.03	

90	If one light comes on, evaluate the ring light splitter (APN 95299) on the EoAT. If no lights come on, evaluate both the ring light splitter and the fuse powering I/O block 1950 in the figure.	0.04	1	0.04	
100	Passing and failing tolerances are approximately plus or minus ten for both x and y. The values shown are the variance from the values established during full camera calibration. If the values displayed are 0 and 0 and the check passes, repeat the calibration check three times to verify they are still 0 and 0. If the values are still 0 or FAIL is displayed, the calibration check has failed.	0.03	1	0.03	
110	IF the check has failed AND there is immediate time to troubleshoot, THEN create a project work order titled "RWC4 Vision Troubleshooting," assign the equipment to the Fanuc controller, complete the PTP, and proceed to Line 160.	0.04	1	0.04	
120	If the check passes and no other vision issues present, skip to Line 350. If the check passes and other vision issues are present such as "Robot Faulted" faults with specific CVIS-XXX, skip to line 220	0.01	1	0.01	
130	IF the check fails AND immediate operation is needed, THEN the Calibration fault can be bypassed. DO NOT bypass and ignore. Create a work order titled "RWC4 Vision Troubleshooting" and determine a time with Operations management to troubleshoot the underlying cause. Go back to the Camera Calibration screen and select Bypass Calibration Fault. Return the machine to operation and logout of the HMI.	0.05	1	0.05	
140	Watch the pallet height sensor inspect the three points on new pallets before placing the first tote. Ensure that the red dot hits the flat areas of the pallets at all three points. Ensure all six pallets are stacking correctly on the second to fifth levels. Watch for mis-stacked totes, vision error kickouts, and "Robot Faulted" faults as described in Line 10.	0.10	1	0.10	
150	If vision issues are occurring during stacking, create a project work order titled "RWC4 Vision Troubleshooting," assign the equipment to the Fanuc Controller, and escalate to operations for immediate downtime to troubleshoot. Do Not Bypass and Ignore. Skip to Line 350.	0.05	1	0.05	
Trigger Camera Calibration					
160	Request access to the cell and remove pallet 3. Return the robot to operation. Select the Navigation Menu on the HMI and select Login. Enter the username MAINT, the password 1234, and select Login. Select Setup and access the Camera Calibration screen. Select Trigger Camera Calibration. Calibration will take 5-8 minutes to complete.	0.13	1	0.13	
170	If Camera Calibration passes, skip to Line 200.	0.01	1	0.01	
180	IF Camera Calibration fails AND Lines 220-330 have been completed, THEN return the robot to auto mode, cycle start, replace pallet 3, and skip to Line 340.	0.06	1	0.06	
190	Skip to Line 220.	0.01	1	0.01	

200	Camera Calibration and Calibration check can fail independently. If Camera Calibration passes and no scribe marks were found on the camera, use a paint marker to apply a fine line down the side of the camera for future reference once all vision issues are resolved.	0.03	1	0.03	
210	Return to Line 70 for Calibration Check.	0.01	1	0.01	
Hardware and cabling check					
220	Request access to the cell, remove pallet 5, and return the robot to operation. Select Navigation Menu (1) on the HMI and select Login. Enter the username MAINT and the password 1234, and select Login. Tap Login in the popup menu. Select Setup and access the Robot Control screen. Press the cycle stop and fault reset pushbuttons on the HMI pedestal. Place the machine in Manual Mode (2), and move the robot to Maintenance Position 1 (3).	0.04	1	0.04	
230	Turn the air supply to EXH to remove the air from the system. Turn off the main power switch on the Fanuc controller. Apply LOTO to the air supply and the Fanuc controller.	0.04	1	0.04	
240	The work cell and EoAT should appear as in the photo. Press the e-stop pushbutton at the trap key interlock, request access to the cell, apply the coil wristband, and enter the cell.	0.02	1	0.02	
250	Check the calibration grid (APN N44358). Make sure the calibration plate next to the infeed pick position is level and clean. Ensure that the x+ axis mark is facing the direction of the infeed conveyance. Tighten any loose hardware. Clean with appropriate materials, such as a soft cloth and general glass cleaner. Do not use cleaners that contain harsh chemicals such as alcohol or abrasives.	0.06	1	0.06	
260	Remove the camera guard (MPN JR0000487290) to properly access the camera mounting hardware, thumbscrews, and scribe marks. The EoAT should appear as in the photo.	0.08	1	0.08	
270	Clean the camera lens (APN 43153) with canned air or a microfiber cloth, if necessary. Physically touch all components outlined in the diagram. Visual inspection is not sufficient. a) Ensure the lens is firmly connected at the c-mount and hand-tightened. Note: Lenses are often overtightened, causing thread damage. b) Ensure the thumb screws for locking focus and aperture are snug. Note: Loose thumbscrews can cause calibration check to fail even if the scribe lines are aligned. c) Ensure the front lens ring is secured	0.05	1	0.05	

280	Check that the camera (APN 42850) is not damaged anywhere on the camera itself, at its mounting points and fasteners, and that the camera mounting hardware and fasteners are not loose or damaged. Be very thorough in this process. Check the camera mount bracket, camera mount plate, camera assembly mount block, and camera clamp forearm. Refer to the large screenshot at the end of this job plan for part specifics. Check that the scribe marks on the side of the camera are lined up. These marks were made by the installer after tuning focus and aperture. See Line 200 for example. Re-install the cover.	0.14	1	0.14	<p>Camera Mounting Hardware Diagram</p> 
290	Clean the right lights (APN N27257) with canned air or a microfiber cloth. Inspect the mounting brackets for any looseness or signs of damage.	0.05	1	0.05	
300	Inspect the pallet height sensor and hardware for looseness or signs of damage. A poor initial read of the pallet can cause vision errors by dropping the totes at an improper height when stacking layers 2-5. Ensure that the pallet height sensor setpoint is 500.	0.04	1	0.04	
FOR THE NEXT STEP, THE FANUC CONTROLLER MUST BE POWERED DOWN. FUSE DAMAGE WILL OCCUR BY MANIPULATING VISION CABLES.					
310	<p>If you are seeing excessive "Robot Faulted" faults on the HMI as described in Line 10 or the camera does not turn on, re-seat the connectors and inspect the short camera cable (APN 1001073) and the long camera cable (APN 1001074 or APN 1001385).</p> <p>The faults below all indicate cable connection issues with the camera.</p> <p>CVIS-774 Camera Command ID Does Not Match: Poor signal from the camera to the controller. Re-seat camera cables and replace if faults continue.</p> <p>CVIS-085 Camera Time Out: Poor signal from the camera to the controller. Re-seat camera cables and replace if faults continue.</p> <p>CVIS-454 Communication Error: Camera is not connecting to controller. Ensure all cables are plugged in and the camera fuse was not blown at the controller.</p>	0.08	1	0.08	
320	IF the parts are available in your store AND both cables have not been replaced, THEN replace one cable and return to Line 70.	0.10	1	0.10	
330	If both cables have been replaced, return to Line 160.	0.01	1	0.01	
340	If the vision issue is still present after completion of these steps, please escalate to ETS for additional support by cutting a ticket to AR-ETS/ RWC4/General	0.01	1	0.01	
Return To Operations					
350	Before returning machine to operation, ensure all guards are in place and all safety devices are functioning properly. Ensure none of these were removed or damaged during machine service.	0.05	1	0.05	
360	Remove all tools from area and ensure they are all accounted for	0.04	1	0.04	
370	Make sure the area is clean and free of any debris	0.04	1	0.04	
380	Remove Lock Out/Tag Out	0.02	1	0.02	
390	Restart equipment, verify proper operation, no unusual noises or vibrations	0.04	1	0.04	
Total Job Plan Duration:		1.50	Total Backlog Labor Hours:		1.50
Safety Requirements					
Permits:	Confined Space Entry		Hot Work		Lockout/Tagout
PPE:	Safety Glasses, Safety Shoes, Gloves				

JR0000487300				CLAMP ASM - CAMERA				DIAMETER	HEIGHT	WIDTH	LENGTH	JR AUTOMATION	ASM	
ITEM	JR PART NUMBER	QTY	DESCRIPTION/ CUT ANGLE/ WALL/ MANUNUM/ PROCESS									MAT/MANU	TYPE	
1	JR0000487225	1	CLAMP MOUNT BLOCK	----				2.250	2.50	3.11		6061 ALUM	PRT	YES
2	JR0000487285	1	CAMERA MOUNT BRACKET	----				0.856	1.38	2.44		6061 ALUM	PRT	YES
3	JR0000487333	1	CAMERA MOUNT PLATE	----				0.313	3.29	3.69		6061 ALUM	PRT	YES
4	JR0000487345	1	CAMERA ASSY MOUNT BLOCK	----				1.079	1.53	4.63		GARDLITE G-10	PRT	YES
5	JR0000487352-1	1	CLAMP ARM SHOULDER	----				1.750	2.57	4.55		6061 ALUM	PRT	YES
6	JR0000487352-2	1		----									PRT	YES
7	JR0001371153	2	CAMERA CLAMP FOREARM	----				0.500	1.00	3.38		4140-SCM435	PRT	YES
8	JR0000487290	1	CAMERA GUARD	__LASER CUT&BEND				0.134				304SS #4FINISH	PRP	NO
9	JR0000487303	1	LIGHTING MOUNT	__LASER CUT&BEND				0.188				304SS #4FINISH	PRP	NO
10	JR0000486964	1	40mm NAAMS CLAMP - ADJUSTABLE ANGLE	V 40 BR2 A00 T12 _								TUNKERS	PCH	NO
11	JR0000562383	6	KEY INSERT (PACKAGE OF 2)	90245A161_								MCMaster	PCH	NO
12	JR0000662623	4	SHCS M6X1.00 - 65MM LONG - 25/PKG	91502A177_								MCMaster CARR	PCH	NO
13	JR0001068727	4	M2 X 0.4 MM SHCS. 6MM L - PKG OF 100	91290A013_								MCMaster CARR	PCH	NO
14	JR0001854843	4	BELLEVILLE WASHER (SOLD IN PACKS OF 100)	93501A001_								MCMaster	PCH	NO

