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Document #: SD-TD-ATP-003

Title/Desc:

ACCEPTANCE TEST PROCEDURE FOR THE LIGHT DUTY
UTILITY ARM OVERVIEW VIDEO CAMERA SYSTEM

Pages: 36

22

ENGINEERING DATA TRANSMITTAL

Page 1 of 45

1. EDT № 612352

2. To: (Receiving Organization) Remote System and Sensor Applications (8A800)		3. From: (Originating Organization) Remote System and Sensor Applications (8A800)		4. Related EDT No.: 608196, 608197							
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8. Originator Remarks: Acceptance Test Procedure for testing the Light Duty Utility Arm (LDUA) Overview Video Camera System (OVS).				9. Equip./Component No.: LDUA/6210							
				10. System/Bldg./Facility: 4706/400							
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1	WHC-SD-TD-ATP-003		0	Acceptance Test Procedure for Light Duty Utility Arm Overview Video Camera System (OVS)	NA	1/2	1				
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(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)						(G)	(H)		
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
1	1	Cog. Eng. A. F. Pardini	<i>A.F. Pardini</i>	10/18/95	N1-21	R. A. Huckfeldt	<i>R.A. Huckfeldt</i>	10/30/95	E6-01	1	1
1	1	Cog. Mgr. D. S. Dutt	<i>D.S. Dutt</i>	10/18/95	N1-21	C. M. Monasmith	<i>C.M. Monasmith</i>	10-31-95	E6-27	1	1
1	1	QA J. J. Verderber	<i>J.J. Verderber</i>	10/30/95	S1-57	R. L. Guthrie	<i>R.L. Guthrie</i>	10-31-95	H4-65	1	1
1	1	Safety M. N. Islam	<i>M.N. Islam</i>	10/31/95	R3-08	J. A. Harvey	<i>J.A. Harvey</i>	10-31-95	S7-07	1	1
		Env.									
1	1	B. A. Carteret	<i>B.A. Carteret</i>	10/18/95	H4-21						
3		LDUA File 6.2.12									
18. A. F. Pardini Signature of EDT Originator		19. D. S. Dutt Authorized Representative for Receiving Organization		20. D. S. Dutt Cognizant Manager		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments					

REVIEW COMMENT RECORD (RCR)	1. Date 10/23/95	2. Review No. 95-0738
	3. Project No.	4. Page 1 of 2

5. Document Number(s)/Title(s) WHC-SD-TD-ATP-003, REV. 0, "ATP FOR LDUA OVERVIEW VIDEO CAMERA SYSTEM"	6. Program/Project/ Building Number LDUA	7. Reviewer J. VERDERBER	8. Organization/Group TWRS OPERATIONS QA	9. Location/Phone 200E-M0234 373-3644
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17. Comment Submittal Approval:

10. Agreement with indicated comment disposition(s)

11. CLOSED

Organization Manager (Optional)

10/30/95
Date

Charles L. Samer for J. Verderber
Reviewer/Point of Contact
A.F. Pordini
Author/Originator

10/30/95
Date

Charles L. Samer for J. Verderber
Reviewer/Point of Contact
A.F. Pordini
Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1.	General - Per WHC-CM-6-1, Section 1.12, the document revision number must also be identified with the document number.	JJV	Accepted. Will incorporate.	
2.	Section 3.1 - In Appendix A you probably do not provide ample space to define the exception, statement on how the exception is to be resolved and finally space for sign-off of the exception resolution.	JJV	Accepted. More space will be provided.	
3.	Section 4.0 - For the pressure and temperature sensor calibration, the calibration of these items shall be verified prior to test performance. As a prerequisite to the test add space to enter the instrument manufacturers name, model # and calibration due date.	JJV	Accepted. Space will be allocated for calibration data.	
4.	Section 9.0 - Add to this section the specific responsibilities of all involved parties.	JJV	Accepted. Further clarification will include responsibilities of all parties.	
5.	Procedure Step 13a - Near the bottom of page A-5 there is a note notifying those performing the test that the glass covering the light assembly will be hot. This should probably be more of a large bold caution to alert someone of the potential dangers.	JJV	Accepted. Will make this note stand out.	

EDT 10/23/95
2075

REVIEW COMMENT RECORD (RCR)	1. Date 10/23/95	2. Review No. 95-0738
	3. Project No.	4. Page 2 of 2

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
6.	Step 13a & 13b - Mentions that "... based on empirical data, 5 minutes provides " Please reference the basis document which supports this.	JJV	Reference to empirical data will be deleted from this document. Actual testing of the purge flow is part of this ATP.	
7.	TEMPERATURE DATA - It says to take temperature readings to assure that the temperature of the protected enclosure is sufficiently below the autoignition temperature of the flammable gas. However there is no value identified warning the person recording the data as to what that value is.	JJV	The ATP will provide the temperature data. Once it is completed, I will write an ATR (Acceptance Test Report) and will then discuss what the allowable temperature is. Those who approved the ATP will also get to review and approve the ATR.	
8.	TEMPERATURE DATA - It says to take readings until the temperature maximizes. Since you are probably not sure as to what the maximum value will be, you probably want to record until the temperature stabilizes (i.e. - temperature has stabilized when the delta-T over a 5-minute interval is 2 degrees or less for 3 consecutive readings).	JJV	Accepted. Will change to include statement on temperature stability.	

3063
 2107 612352

RELEASE AUTHORIZATION

Document Number: WHC-SD-TD-ATP-003, Rev. 0

Document Title: ACCEPTANCE TEST PROCEDURE FOR THE LIGHT DUTY UTILITY
ARM (LDUA) OVERVIEW VIDEO CAMERA SYSTEM

Release Date: 11/1/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Chris Willingham
C. WILLINGHAM

11/1/95

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SUPPORTING DOCUMENT1. Total Pages ⁵30 *W*

2. Title

Acceptance Test Procedure for the Light Duty
Utility Arm (LDUA) Overview Video Camera System
(OVS)

3. Number

WHC-SD-TD-ATP-003

4. Rev No.

0

5. Key Words

Acceptance Test Procedure
Overview Video Camera System
Light Duty Utility Arm

6. Author

Name: A. F. Pardini

Allen F. Pardini
Signature

Organization/Charge Code 8A800/H1B01

7. Abstract

Acceptance Test Procedure for testing the Light Duty Utility Arm (LDUA) Overview
Video Camera System (OVS).

8. RELEASE STAMP

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DATE NOV 01 1995*Station 35*

WHC-SD-TD-ATP-003, Rev 0

ACCEPTANCE TEST PROCEDURE
FOR
LIGHT DUTY UTILITY ARM OVERVIEW VIDEO CAMERA SYSTEM (OVS)

OCTOBER 10, 1995

BY

A. F. PARDINI
REMOTE SYSTEM AND SENSOR APPLICATIONS
WESTINGHOUSE HANFORD COMPANY
RICHLAND, WASHINGTON

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for
Light Duty Utility Arm Overview Video Camera System (OVS)

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ACCEPTANCE TEST PROCEDURE

LIGHT DUTY UTILITY ARM OVERVIEW VIDEO CAMERA SYSTEM (OVS)

1.0 TEST ITEM IDENTIFICATION

The system under test is the Light Duty Utility Arm (LDUA) system 6210, Overview Video Camera System (OVS). The property number is a Westinghouse Savannah River Company number, 00363303, and the serial number is 002. The system to be tested includes the camera, and deployment mechanism.

2.0 GENERAL DESCRIPTION

The objective of the test is to show by demonstration that the camera system is fully operational to perform the task of surveillance activities during operations within a Hanford waste tank. The test will not include radiation testing or all environmental testing. These factors were reviewed during the design phases of the project and were deemed acceptable based on published data on radiation and environmental components used in the camera designs. Testing of the purge system to meet the requirements of NFPA 70 National Electrical Code (1993), Class 1 Division 1, Group B requirements, NFPA 496, Standard for Purged and Pressurized Enclosures for Electrical Equipment (1993), and Hanford Safety Class 1 requirements for shutdown of the system will be performed. An additional test to verify maximum temperature of the camera under normal operations will be performed and documented. Upon completion of this acceptance test, the OVS will be ready for integration testing with the LDUA Supervisory Data Acquisition System (SDAS).

3.0 TEST CONDITION LIMITS

Test conditions which could cause the test to be aborted would be a loss of power in the facility, or complete failure of the camera system to perform its intended functions. If either of these occur, the test will be aborted until the problems are resolved. Once resolved the test will be repeated.

3.1 EXCEPTIONS

Exceptions noted during the execution of the test procedure shall be recorded in the spaces provided in Appendix A. If an exception is noted, applicable signatures must be obtained prior to continuing the test procedure. If no exceptions occur, write "none" and continue the procedure.

4.0 INSTRUMENTS AND CALIBRATION

A temperature indicating device will be used to measure the temperature of the outside of the camera from initial startup until a stabilized maximum temperature is reached. This device will have a current calibration sticker from the Standards Laboratory. During purge system testing, a pressure sensor will be used to verify that the pressure

inside of the protected volume remains greater than 0.1 inch of water. This sensor shall have a current calibration sticker from the Standards Laboratory.

5.0 FACILITIES, EQUIPMENT, AND MATERIALS

The OVS will be tested in the Fuels and Materials Examination Facility (FMEF) on the 42' -6" level, utilizing an existing simulated riser located there. The equipment and materials listed below are necessary to perform this acceptance test:

- OVS camera system, including deployment mechanism and control electronics
- Fiber optic cable (minimum of 100 feet) to connect control electronics to the OVS camera
- 110VAC power source and power strip
- Calibrated temperature indicating device and thermocouple
- Pressure sensor and calibrated pressure gauge
- Miscellaneous (e.g. duct tape, common tools, etc.)

6.0 SAFETY

The OVS system is a completely enclosed camera system, therefore no external wires or mechanical assemblies will be exposed as a shock hazard. During testing the camera will be deployed vertically up and down into the decon cell located just below the mezzanine (42' -6" level). Anyone in the lower cell witnessing operation must wear a hard hat. During temperature testing, the surface of the camera will reach approximately 140 degrees Celsius, therefore care must be taken by test personnel during this testing. A sign reading "HOT, DO NOT TOUCH", will be located next to the camera.

7.0 MAINTENANCE AND FAILURES

There are no components within the OVS which should require maintenance during the testing period. If any component fails during the testing period, and it can be replaced immediately, then the condition shall be documented under the exception portion of Appendix A and testing shall continue. If the failure is catastrophic (component cannot be readily replaced or needs to be reordered) then the procedure will be stopped and repeated at a later date.

The extent of the OVS acceptance test should be short in duration, so no test interruptions are expected.

8.0 TEST DATA

Test data from the temperature measurements will be logged into the temperature readings section of Appendix A. A graphical plot depicting temperature versus time will be documented in an Acceptance Test Report. During the acceptance test the witnesses will signoff in appropriate

sections of the test procedure to indicate that the equipment is operating as expected.

9.0 PERSONNEL REQUIREMENTS

All personnel involved in the performance of this test shall print and sign their name, initials, position, and date of signature prior to beginning the testing in the personnel record section of Appendix A.

The operation of the equipment will be performed by the LDUA end effector cognizant engineer and/or designated end effector technician. This person will perform the operations and the LDUA end effectors cognizant engineer will sign off the associated steps as to their acceptance. Quality Control will witness each step of the procedure and sign off the associated steps as to their acceptance. Temperature and pressure data will be transcribed by the end effector technician.

10.0 WITNESSES

All witnesses will be notified immediately proceeding the beginning of the test. They shall witness the procedure and concur the successful completion of specific steps with either their signature or their initials and date. If exceptions are noted and are acceptable then the LDUA cognizant engineer shall record the exception, write in the resolution, and sign and date. All other specific witnesses addressed in the exception shall also sign and date. If the exception is such that no immediate resolution is attainable, the test will be aborted until the problems are resolved. Once resolved the test will be repeated at a later date.

It is expected that the complete test will last no more than 8 hours.

11.0 PROCEDURE

Appendix A provides the step-by-step procedure for testing the camera system. Appendix A also includes the personnel record and the temperature data sheet. Appendix B provides pictures of the components used as part of this acceptance test. It provides a visual reference to those components described in the test procedure.

12.0 DISPOSITION OF TEST ITEM

All test materials such as the simulated riser will remain in the FMEF test facility for future use. The actual camera system tested will now be ready for integration testing with the LDUA SDAS system.

13.0 DATA SHEETS

No further data sheets will be necessary to support the testing of this camera system. All verifications of testing will be signed directly within this procedure under Appendix A.

APPENDIX A

LIGHT DUTY UTILITY ARM OVERVIEW VIDEO CAMERA SYSTEM

This procedure will be used to perform the actual acceptance testing of the OVS system. As each step is performed signatures shall be logged onto the procedure in the blank spaces as indicated.

- Step 1: Notify all witnesses (to include End Effector Cognizant Engineer, End Effector Technician, and Quality Control) immediately prior to commencing the test.
- Step 2: Connect the fiber optic umbilical between the electronics box and the control box. Plug in the power cord on the control box.
- Step 3: Plug in the power cord from the electronics box.
- Step 4: Turn on the power switch on the control box front panel.
- Step 5: Turn on power to the OVS by switching "ON" the power toggle located in the electronics box on the camera enclosure.
- Step 6: Verify that live video is being presented on the monitor located in the OVS control box. This will occur after the purge system 5 minute time delay.

Verification:

EE Cog.	_____	/	_____	Date
QC	_____	/	_____	Date

Exceptions:

Step 7: The camera has been set so that the pan position and mirror tilt can be easily viewed. Move the pan toggle horizontally to the right and verify that camera assembly rotates clockwise. Pan in the clockwise direction until the pan stops which will be indicated on the monitor as the video image stops moving. Verify that the relay (located in the electronics box on the camera enclosure) has been tripped by looking to see that the "Red" indicator light on the relay is on. Pan the motor in the counterclockwise direction until the pan stops moving. Verify that the relay has been tripped. Verify that this rotation is approximately 360 degrees.

Verification:

EE Cog. _____/_____
Date

QC _____/_____
Date

Exceptions:

Step 8: Toggle the Aux 1 button (tilt on) to the "ON" position. Using the up/down toggle, tilt the mirror which is located on the bottom of the camera assembly. Using the video image verify that the image moves up and down on the screen. Toggle down so that the image you see is the floor directly below the camera assembly. Toggle the mirror up approximately 45 degrees so that the image you see is approximately 90 degrees from the floor image.

(Note: The trip switch for the mirror tilt (switch located on the bottom) is not operational since no encoder exists for this function. This system will be modified next fiscal year and all drawings will be changed accordingly.)

Verification:

EE Cog. _____/_____ Date

QC _____/_____ Date

Exceptions:

Step 9: Toggle the Aux 1 (tilt on) button to the "OFF" position. Using the lever toggle located on the right side of the control box, verify that the camera assembly lowers the camera towards the floor. Reverse position of the lever toggle and verify that the camera assembly raises.

Verification:

EE Cog. _____/_____ Date _____

QC _____/_____ Date _____

Exceptions:

Step 10: Continue to raise the camera assembly until it automatically shuts off. This will occur when the top of the camera housing nearly touches the upper deployment frame. Verify that the "upper" trip point has been reached by looking to see that the "Red" indicator light on the relay (located in the electronics box on the camera enclosure) has been tripped. Now lower the camera system to trip the lower relay. This should occur as the camera approaches the floor. These trip points are operator set and can be adjusted to match field conditions.

Verification:

EE Cog. / Date

QC / Date

Exceptions:

Step 11: Shut off the switch on the OVS camera control box. Using the "Retrieve" toggle located in the electronics box raise the camera system until it automatically shuts off. This demonstrates retrieval of the system if any of the camera components fail.

Verification:

EE Cog. _____ / _____
Date

QC _____ / _____
Date

Exceptions:

This completes the camera functionality test.

Step 12: Move the camera so it can be easily viewed. Restart the camera system. Camera system will come on line after 5 minutes. Connect the temperature indicating device to the camera using a thermocouple under the cap screw next to the lighting.

Instrument name and manufacturer: _____

Model Number: _____

Standards Lab Number: _____

Expiration Date: _____

Record the initial temperature (no camera lights). Using the A/I button located on the top right of the control box, verify that the camera lights are working. Leave the camera lights on and begin taking temperature data. Data will be taken every 5 minutes until the temperature stabilizes (temperature has stabilized when the temperature change over a 5 minute interval is 2 degrees or less for three consecutive readings). With the lights on, verify that the zoom, focus, and iris functions are working. This can be verified by looking at the image quality on the monitor. After completed shut off the control box and the electronics box and remove the thermocouple.

Verification: _____/_____
 EE Cog. _____ Date _____
 _____/_____
 QC _____ Date _____

Exceptions:

This completes the temperature test.

Step 13: Purge system test.

Step 13a: Camera Head Purge Air Pressure Test. To test the purge system for proper operation, a hex wrench and adjustable wrench will be necessary. Unscrew one of the cap screws that retains the glass cover plate over the lights. Insert the cap screw and attach the calibrated pressure sensor and tighten.

Instrument name and manufacturer: _____

Model Number: _____

Standards Lab Number: _____

Expiration Date: _____

Remove relay K50 and insert the prefabricated jumper into the socket. This will remove the flow meter safety shutdown system from the circuit. The pressure switch shutdown system can now be tested independently. Turn on the control box. Turn on the electronics box. No video should come up on the monitor. Immediately try to turn on the lights. Lights should not come on. The time delay relay (relay K8) is set for 5 minutes and will not allow electronic components in the camera to energize. After 5 minutes the system will be operable and the camera pressure ready lamp (lamp in pressure switch circuit) will light up red.

Verification: _____/_____
EE Cog. Date

_____/_____
QC Date

Exceptions:

Record the flow meter reading: _____

Record the pressure sensor reading: _____

When the camera pressure ready light comes on line, turn on the lights to demonstrate that the system is fully operational. Using the hex wrench, begin taking off the glass covering the light assembly (NOTE: the assembly will be hot). This test will simulate a loss of pressure within the protected volume. Verify that the camera assembly immediately shuts off (camera lights will immediately turn off) and the alarm lamp in the pressure switch circuit goes off indicating the purge system has shutdown the camera power. Record the flow meter reading and the pressure sensor reading at the time the lights shut off.

Record the flow meter reading: _____

Record the pressure sensor reading: _____

Try to turn the lights back on the camera. All camera functions should be inoperable from the control box. The entire front face of the control box should be blinking red indicating the need for a complete restart of the system.

Verification: _____ / _____
EE Cog. Date

_____ / _____
QC Date

Exceptions:

Turn off the power on the control box and the electronics box. Retighten the hex screw on the light assembly. Remove the prefabricated jumper and reinsert the K50 relay. This completes the pressure switch test of the purge system.

Step 13b: High Flow Purge Air Test. Remove relay K8 and insert the prefabricated jumper into the socket. This will remove the camera's internal pressure switch shutdown system from the circuit. The flow meter shutdown system can now be tested independently. Turn on the control box. Turn on the electronics box. No video should come up on the monitor. Immediately try to turn on the lights. Lights should not come on. The time delay relay (relay K50) is set for 5 minutes and will not allow electronic components in the camera to energize. After 5 minutes the system will be operable and the camera purge air flow ready lamp (lamp in flow meter circuit) will light up red.

Verification:

EE Cog. _____/_____ Date

QC _____/_____ Date

Exceptions:

Record the flow meter reading: _____

Record the pressure sensor reading: _____

When the camera purge air flow ready light comes on line, turn on the lights to demonstrate that the system is fully operational. Using the hex wrench, begin taking off the glass covering the light assembly (NOTE: the assembly will be hot). This test will simulate an increase of flow through the protected volume and will simulate a breach in the hose or a broken lamp covering. Verify that the camera assembly immediately shuts off (camera lights will immediately turn off) and the alarm lamp in the flow meter circuit goes off indicating the purge system has shutdown the camera power. Record the flow meter reading and the pressure sensor reading at the time the lights shut off. This is the "high" flow trip point.

Record the flow meter reading: _____

Record the pressure sensor reading: _____

Try to turn the lights back on the camera. All camera functions should be inoperable from the control box. The entire front face of the control box should be blinking red indicating the need for a complete restart of the system.

Verification: _____ / _____
EE Cog. Date

_____ / _____
QC Date

Exceptions:

Turn off the power on the control box and the electronics box. Retighten the hex screw on the light assembly. This completes testing of the "high" flow shutdown.

Step 13c: Low Flow Purge Air Test. Restart the camera system. After 5 minutes the system will be operable and the camera purge air flow ready lamp (lamp in flow meter circuit) will light up red.

Verification:

EE Cog. _____/_____
Date

QC _____/_____
Date

Exceptions:

Record the flow meter reading: _____

Record the pressure sensor reading: _____

When the camera purge air flow ready light comes on line, turn on the lights to demonstrate that the system is fully operational.

After the system is fully operational, using an index finger, slowly begin to plug the purge hole at the bottom end of the camera. This demonstrates a pinched hose or a low flow condition. Verify that the camera assembly immediately shuts off (camera lights will immediately turn off) and the alarm lamp in the flow meter circuit goes off indicating the purge system has shutdown the camera power. Record the flow meter reading and the pressure sensor reading at the time the lights shut off. This is the "low" flow trip point.

Record the flow meter reading: _____

Record the pressure sensor reading: _____

Verification:

EE Cog. _____ / _____ Date

QC _____ / _____ Date

Exceptions:

Try to turn the lights back on the camera. All camera functions should be inoperable from the control box. The entire front face of the control box should be blinking red indicating the need for a complete restart of the system.

Verification:

EE Cog. _____ / _____ Date

QC _____ / _____ Date

Exceptions:

This completes testing of the "low" flow shutdown. Shut power to the camera box and the electronics box off. Remove the prefabricated jumper and reinsert the K8 relay. Remove the pressure sensor in the lamp cover and restore the hex screw. Now both purge safety shutdown systems are operable.

Step 13d: Reassembled Purge Air Test. Restart the camera system.
After 5 minutes the system will be operable and the camera
flow and pressure ready lamps (lamps in flow meter and
pressure switch circuits) will light up red.

Verification:

EE Cog. _____ / _____
Date

QC _____ / _____
Date

Exceptions:

When the system comes on line turn on the lights to demonstrate that the system is fully operable. Remove the hex screw in the lamp cover. Verify that the camera assembly immediately shuts off (camera lights will immediately turn off) and one or both alarm lamps go off indicating the purge system has shutdown the camera power.

Verification:

EE Cog. / Date

QC / Date

Exceptions:

Step 13e: Purge Volume Test. To test the actual time required to purge 10 volumes of the camera system, we will use a plastic bag which is of known length and diameter, placed over the purge gas exit, and record the time it takes to fill the bag. Using this data, a reasonably accurate estimate can be made of the time required to purge 10 volumes of the camera system.

Unplug the power cord to the compressor. Turn on the camera system. Complete operation of the camera is not necessary for this test. Note that the camera functions will be inoperable (no purge gas flow into camera).

Place the plastic bag over the end of the camera module just above the purge hole and tape seal. Plug in the compressor. Using a stop watch record the time required to fill the plastic bag completely.

Time: _____

Calculation: Bag length = 120" (measured)
Bag diameter = 4.5" (measured)
Bag volume = $\pi(4.5/2)^2(120) = 1.08 \text{ ft}^3$

The volume of the camera system (includes 60' of 3/4" (ID) flex conduit, and camera module) is 0.28 ft³.

The required time to purge 10 volumes therefore is: _____

The relay settings of 5 minutes therefore provide sufficient time to insure that greater than 10 volumes of the camera system have been purged.

Verification:

EE Cog. _____ / _____
Date

QC _____ / _____
Date

Exceptions:

This completes testing of the purge system.

FINAL ACCEPTANCE TEST APPROVAL RECORD

This acceptance test has been completed and all exceptions resolved to the satisfaction of all applicable witnesses and that the Overview Video Camera System is now available for integration with the Light Duty Utility Arm Supervisory Data and Acquisition System and operational testing.

LDUA End Effector Cognizant Engineer _____ Date _____

Quality Control _____ Date _____

TEMPERATURE DATA

The temperature of the camera system is taken to verify that the external temperature of the protected enclosure is sufficiently below the autoignition temperature of the flammable gas within the waste tank. The temperature reading is taken with the thermocouple located adjacent to the lights on the camera module which is expected to be the hottest area.

TIME (MIN)	TEMPERATURE READING (degrees C)
0	
5	
10	
15	
20	
25	
30	
35	
40	
45	
50	
55	
65	
70	
75	
80	

PERSONNEL RECORDS

NAME PRINT	NAME SIGN	INITIALS	POSITION	DATE

APPENDIX B

LIGHT DUTY UTILITY ARM
OVERVIEW VIDEO CAMERA SYSTEM COMPONENTS

Figure 1: Electronics Box

BEST COPY AVAILABLE

Figure 2: Control Box

Figure 3: Alarm Electronics Box

Figure 4: Plastic Bag Test