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ACCEPTANCE & OPERATIONAL TEST PROCEDURE 104AN TANK
CAMERA PURGE SYSTEM & 104AN VIDEO CAMERA SYSTEM

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1	1	Cog. Mgr. DB Smet		9-1-95	N1-46	JE Dunks		9-1-95	E6-27	3	
1	1	QA JJ Verderber		9-1-95	S1-57	LT Pedersen		9-1-95	N1-46	3	
1	1	Safety RM Nelson		9-1-95	N1-46	RA Harding		9-1-95	N1-46	3	
3		Central Files		9-1-95	48-07	OSTL (4)		9-1-95	48-04	3	
3		TL Moore		9-1-95	H5-09						

18. Signature of EDT Originator Date 9/1/95		19. Authorized Representative Date for Receiving Organization Date 9/1/95		20. Cognizant Manager Date Date 9-1-95		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-OTP-182, REV 0

Document Title: Acceptance/Operational Test Procedure 104-AN Tank
Camera Purge System and 104-AN Video Camera System

Release Date: 9/5/95

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz

9/5/95

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SUPPORTING DOCUMENT

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2. Title

Acceptance/Operational Test Procedure 104-AN Tank
Camera Purge System and 104-AN Video Camera System

3. Number

WHC-SD-WM-OTP-182

4. Rev No.

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5. Key Words

AN-104 Camera Purge Control System
Purge Panel
Purge Control Panel

6. Author

Name: JL Castleberry

Signature

Organization/Charge Code
74940/N2089

7. Abstract

This Acceptance/Operational Test Procedure will document the satisfactory operation of the 104-AN Camera Purge Control System and 104-AN Video Camera System

8.

RELEASE STAMP

WHC-SD-WM-OTP-182
REV. 0

ACCEPTANCE/OPERATIONAL TEST FOR 104-AN CAMERA AND CAMERA PURGE CONTROL SYSTEM

Impact Level SQ

Jim Castleberry
August 1995

ETN-94-0171

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ACCEPTANCE/OPERATIONAL TEST PROCEDURE
104-AN TANK CAMERA PURGE SYSTEM
AND 104-AN VIDEO CAMERA SYSTEM

1.0 PURPOSE

This Acceptance/Operational Test Procedure (ATP/OTP) will document the satisfactory operation of the camera purge panel, purge control panel, color camera system and associated control components destined for installation. The final acceptance of the complete system will be performed in the field. The purge panel and purge control panel will be tested for its safety interlock which shuts down the camera and pan-and-tilt inside the tank vapor space during loss of purge pressure and that the correct purge volume exchanges are performed as required by NFPA 496. This procedure is separated into seven sections (6.1, 6.2, 6.3, 6.4, 6.5, 7.1, 7.2 and 7.3) identified below:

- 1) Section 6.1 is performed in the 400 Area on the AN-104 purge panel prior to delivery to the 306 building for system shop testing. This section involves the following:
 - Leak checking all fittings on the Purge Panel for leakage using a "Snoop" solution and resolving the leakage at a pressure of 10 ± 2 psig.
 - Purge panel instrumentation has been calibrated and calibration stickers have been affixed.
- 2) Sections 6.2, 6.3, 6.4, and 6.5 test the purge panel and purge control panel for pressure settings, time delay relay settings, camera interface and camera system operation. Sections 6.2, 6.3, 6.4, and 6.5 will be performed in the 306E building.
- 3) Section 7.1 verifies that PR-1, the regulator which maintains a positive pressure within the volume (camera and pneumatic lines), is properly set. In addition the yellow light (PRESSURIZED) (located on the Purge Control Panel) is verified to turn on at 10 ± 2 in. w.g. and after the time delay relays (TDR-1 and TDR-2) have timed out. Section 7.1 will be performed in the AN tank farm at 200 East Area.
- 4) Section 7.2 verifies that the purge cycle functions properly, the green light (PURGING) comes on, and that the correct flowrate is obtained to trip the flowswitch. Section 7.2 will be performed in the AN tank farm at 200 East Area.

- 5) Section 7.3 verifies that the pan and tilt, camera, associated controls and components operate correctly. This section also verifies that the safety interlock system operates correctly during loss of purge pressure. Section 7.3 will be performed in the AN tank farm at 200 East Area.

2.0 TEST OBJECTIVES

- 2.1 The objective of this procedure is to demonstrate and document the acceptance and operability of the 241-AN-104 camera system and Camera Purge System (CPS). The camera focus, zoom, and iris remote controls will be functionally tested. The resolution and color rendition of the camera will be verified using standard reference charts. The pan-and-tilt unit will be tested for required ranges of motion, and the camera lights will be functionally tested.

3.0 REFERENCES

P&ID	H-14-020601
Electrical Drawings	H-14-030601
Mechanical Drawing	H-14-100157

4.0 RESPONSIBILITIES

4.1 SYSTEMS SURVEILLANCE ENGINEERING

A Systems Surveillance Engineering (SSE) Test Engineer shall be responsible for the coordination, scheduling, performance and documentation of this test procedure. The Purge System Engineer will be responsible for acceptance of section 6.1.

4.2 TEST WITNESSES

Tank Farm Operations and Quality Assurance will provide a representative to witness the satisfactory completion and approval of pertinent steps identified in this ATP/OTP.

Witnesses are responsible for verifying that organizational requirements are met throughout the testing and documentation sequences of the procedure.

5.0 DOCUMENTATION

5.1 TEST RECORD

All personnel involved in the performance of this test including the SSE Test Engineer shall fill out a line in Section 9.0 RECORDS.

Test results shall be recorded by the SSE Test Engineer. Unless specific data is required, the initials of the person accepting the item will be entered in each test sheet blank to indicate compliance with the stated requirements or the successful completion of the given test step. Unacceptable conditions or readings are to be referred to Section 8.0, EXCEPTIONS. A complete working copy of this procedure and all exception records generated shall be maintained as permanent records in accordance with WHC-CM-3-5.

5.2 EXCEPTIONS

Exceptions by step number, and other notes are to be recorded under Section 8.0. This section must be dispositioned (including the generation of any required ECNs) and signed off prior to final ATP/OTP acceptance. If no exceptions are encountered, this section shall be so noted and closed out with the required signatures. During the performance of this test, errors in text may be encountered which require correction/adjustment to complete the test. The correction is to be noted in the ATP/OTP and listed as an exception in Section 8.0.

5.3 TEST EXECUTION RECORD

Approval of the ATP/OTP results shall be accepted by the Tank Farm Manager as indicated by signature in Section 10.0.

6.0 PREREQUISITES

6.1 TEST PURGE PANEL

NOTE: Sequence of steps in section 6.1 can be altered per the Purge System Engineer discretion.

- 6.1.1 Pressurize each leg (supply and return side) of the Purge Panel to approximately 10 psig and "Snoop" each fitting and resolve any leakage by tightening the fitting. If the leakage continues then replace the fitting. Purge System Engineer signoff below that the Purge Panel is acceptable.

Purge System
Engineer _____ Date _____

- 6.1.2 Purge System Engineer signoff below that the instrumentation listed below has been calibrated and a calibration sticker has been affixed.

- Pressure Switch Pt. No. H-14-100157-11 is set to 10 ± 2 in. w.g..
- A 4-20mA Calibration Curve performed on pressure transmitter Pt. No. H-14-100157-10.
- Pressure Gage, Pt. No. H-14-100157-14.
- Pressure Gage, Pt. No. H-14-100157-15.
- Flowmeter, Pt. No. H-14-100157-9.
- Flowswitch, Pt. No. H-14-100157-7 set to 1.5 cfm.

Purge System
Engineer _____ Date _____

6.1.3 Test Relief Valve, Pt. No. H-14-100157-62.

- A. Attach a hose or hard line to the pressure relief valve vent line and insert it into a beaker of water. (See Figure 1).
- B. With the relief valve installed on the purge panel, slowly supply an air or argon pressure of up to 20 ± 2 psig on the return side and record below the pressure where the bubbles are first noticed. Continue to increase pressure and record below the flow as read from the flowmeter at 20 ± 2 psig.

Pt. No. H-14-100157-62

Pressure: _____

Flow at 20 ± 2 psig: _____

6.1.4 Purge System Engineer signoff below that Section 6.1 has been performed satisfactorily.

Purge System Engineer _____/Date _____

6.2 SHOP TEST - PURGE PANEL

NOTE: Sections 6.2, 6.3, 6.4, and 6.5 are performed in the 306E building.

- 6.2.1 Connect a full K-size N₂ bottle or dry air to the purge panel and 120 VAC power to the Purge Control Panel (PCP). Connect camera and lighting circuits to PCP switched power outlet.
- 6.2.2 Open the N₂ bottle or dry air supply valve and adjust PR-2 to 45 ± 5 psig.
- 6.2.3 Adjust PR-1 to 15 ± 3 in. w.g read off of pressure transmitter, H-14-100157-10. It may be necessary to open the calibration port valve, Pt. No. H-14-100157-20 to decrease pressure.

- 6.2.4 SSE Test Engineer signoff below that Section 6.2 has been performed satisfactorily.

SSE Test Engineer _____/Date _____

6.3 SHOP TEST - PURGE CONTROL PANEL

NOTE: The volume of the camera housing, purge panel lines and the hoses is approximately 2.0 ft.³ [1.1 ft.³ (camera volume) + .16 ft.³ (purge panel lines volume) + .41 ft.³ (hose volume)]. Per NFPA 496 requirements, ten volumes of purge gas, 20 ft.³, must flow through the assembly. PR-2 will be adjusted so that the flowswitch is tripped at a min. flow of 1.5 cfm through the camera system. TDR-2 is adjusted to 14 minutes (20 ft.³/1.5 cfm) to flow 20 ft.³.

- 6.3.1 TDR-1 and TDR-2 will be adjusted to 5 minutes instead of 14 minutes to save purge gas. At the Purge Control Panel set the time delay relays (TDR 1 and TDR 2) to 5 minutes and turn the Control Switch (CS) to "Purge" and hold momentarily until the green light (PURGING) comes on indicating that the purge has just begun.

- 6.3.2 Signoff below that the green light comes "ON".

SSE Test Engineer _____/Date _____

- 6.3.3 Slowly adjust the purge pressure at PR-2 to a flowrate of 1.5 - 2.0 cfm as read off of (H-14-100157-7), this will trip the flowswitch (H-14-100157-7).

- 6.3.4 Record the pressure, off of H-14-100157-14, and the flowrate, off of H-14-100157-9, and H-14-100156-7 below where the flowswitch trips.

Pressure (H-14-100157-14): _____ Flowrate (H-14-100157-9): _____

Flowrate (H-14-100157-7): _____

SSE Test Engineer: _____/Date _____

6.5 SHOP TEST - CAMERA AND PAN & TILT

NOTE: During this portion of the test the SSE Test Engineer shall verify each camera control is satisfactory and will then initial in the space provided for each step.

- 6.5.1 Using the remote pan and tilt controls, pan in the clockwise direction. Verify that the pan electronic break holds ____.
- 6.5.2 Pan in the opposite direction. Verify that the pan electronic break holds ____ . Verify that the panning operation has covered approximately 360°.
- 6.5.3 Tilt the camera to the extreme down position. Verify that the camera is pointing downward and that the electronic break holds ____.
- 6.5.4 Tilt camera up to the extreme upward position. Verify that the camera is approximately vertical and that the electronic break for the pan and tilt holds ____.
- 6.5.5 Using remote camera zoom control, manipulate the zoom control to wide angle. Verify the zoom moves towards wide and when operated towards "wide" ____.
- 6.5.6 Manipulate the zoom control to telephoto. Verify the zoom moves towards the telephoto when operated towards "tele" ____.
- 6.5.7 Using the remote camera iris control, manipulate the iris control to open. Verify that the iris opens when operated towards "open" ____.
- 6.5.8 Manipulate the iris control to close. Verify that the iris closes when operated towards "close" ____.
- 6.5.9 Using remote camera focus control, manipulate the focus control to far. Verify that the focus adjusts to far when operated towards "far" ____.
- 6.5.10 Manipulate the focus control to near. Verify that the focus adjusts to near when operated towards "near" ____.

- 6.5.11 Verify that camera will focus on object in the range of 3 feet to infinity.

SSE Engineer Initials_____

- 6.5.12 Focus the camera on a standard resolution chart. Adjust the lens or camera distance so that the border of the chart just fills the monitor display. Observe the converging black and white lines near the center of the chart. Determine the point at which the individual vertical lines become indistinct. The numbers at the sides of the converging lines correspond to the number of TV lines resolved at that point. Record the number which corresponds to the locations where the vertical lines become indistinct.

NOTE: Horizontal resolution is expressed in terms of the vertical dimension of the picture. Therefore, the horizontal resolution number (measured by the vertical lines on the chart) must be multiplied by $4/3$ (1.33) to obtain the actual number of resolvable horizontal lines.

Horizontal resolution number:_____

SSE Engineer Initials_____

- 6.5.13 Verify the horizontal resolution equals or exceeds 400 TV lines.

SSE Engineer Initials_____

- 6.5.14 While the camera is focused on the standard resolution chart, verify that the picture is free of image defects such as ghost images, picture lag, distortion, hum, or smearing.

SSE Engineer Initials_____

- 6.5.15 Focus the camera on a standard color reference chart. Adjust the lens or camera distance so that the border of the chart just fills the monitor display. Simultaneously view the monitor and the chart. Verify colors are accurately rendered on the monitor display.

SSE Engineer Initials_____

6.5.16 Steps 6.5.1 through 6.5.15 are acceptable.

SSE Test Engineer: _____/Date _____

7.0 ACCEPTANCE/OPERABILITY TEST

NOTE: Sections 7.1, 7.2, and 7.3 are performed in the 200 East Area at 241-AN Tank Farm.

7.1 PURGE PANEL ACCEPTANCE

7.1.1 Turn on breakers #2, #4, and #11 in the new distribution panel (EDS-DP-110) located inside the 241-AN-271 Instrument building.

7.1.2 Open and adjust PR-2 to 45 ± 5 psig.

7.1.3 Adjust PR-1 to 15 ± 3 in. w.g read off of pressure transmitter, H-14-100157-10. It may be necessary to open the calibration port valve, Pt. No. H-14-100157-20 (return side) to decrease pressure.

7.1.4 Step 7.1 is complete _____ SSE Test Engineer.

7.2 PURGE CONTROL PANEL ACCEPTANCE

NOTE: This portion of the test will be performed with the camera system outside the tank.

NOTE: The volume of the camera housing, purge panel lines and the hoses is approximately 2.0 ft^3 [1.1 ft^3 (camera volume) + $.16 \text{ ft}^3$ (purge panel lines volume) + $.65 \text{ ft}^3$ (hose volume)]. Per NFPA 496 requirements, ten volumes of purge gas, 20 ft^3 , must flow through the assembly. PR-2 will be adjusted so that the flowswitch is tripped at a min. flow of 1.5 cfm through the camera system. TDR-2 is adjusted to 14 minutes ($20 \text{ ft}^3/1.5 \text{ cfm}$) to flow 20 ft^3 .

7.2.1 At the Purge Control Panel set the time delay relays (TDR-1 and TDR-2) to 14 minutes and turn the Control Switch (CS) to "Purge" and hold momentarily until the green light (Purge ON) comes on indicating that the purge has just begun.

7.2.2 Signoff below that the green light comes "ON".

OPS _____/Date _____

SSE Test Engineer: _____/Date _____

7.2.3 Verify the flow rate is _____CFM as obtained from step 6.3.4 from Pt. No. H-14-100157-7.

SSE Test Engineer: _____/Date _____

7.2.4 Record the pressure, off of Pt. No. H-14-100157-14, and the flowrate, off of Pt. No. H-14-100157-9 below.

Pressure/Flowrate _____/ _____

SSE Test Engineer: _____/Date _____

7.2.5 Plug pan and tilt and camera control unit into Purge Control Panel controlled power sources. Turn on the power switches to the pan and tilt and camera controls.

7.2.6 After the purge has completed its purge cycle verify green light is "OFF" and that power is being provided to the pan and tilt and camera.

7.2.7 Verify that camera lights are operational.

7.2.8 On the Purge Control Panel, located in the 241-AN-271 Instrument building, verify the yellow light (system pressurized above 10" w.g.) is "ON".

SSE Test Engineer: _____/Date _____

7.2.9 Step 7.2 is complete _____ SSE Test Engineer.

7.3 CAMERA AND PAN AND TILT ACCEPTANCE

NOTE: During this portion of the test the SSE Test Engineer shall verify each camera control is satisfactory and will then initial the space provided with each step.

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- 7.3.1 Using remote pan and tilt controls, pan in the clockwise direction. Verify that the pan electronic break holds _____.
- 7.3.2 Pan in the opposite direction. Verify that the pan electronic break holds _____. Verify that the panning operation has covered approximately 360°.
- 7.3.3 Tilt the camera to the extreme down position. Verify that the camera is pointing down approximately vertically and that the electronic break holds _____.
- 7.3.4 Tilt camera up to the extreme upward position. Verify that the camera is approximately vertical and that the electronic break for the pan and tilt holds _____.
- 7.3.5 Using remote camera zoom control, manipulate the zoom control to wide angle. Verify zoom moves towards wide and when operated towards "wide" _____.
- 7.3.6 Manipulate the zoom control to telephoto. Verify zoom moves towards telephoto when operated towards "tele" _____.
- 7.3.7 Using the remote camera iris control, manipulate the iris control to open. Verify that the iris opens when operated towards "open" _____.
- 7.3.8 Manipulate the iris control to close. Verify that the iris closes when operated towards "close" _____.
- 7.3.9 Using remote camera focus control, manipulate the focus control to far. Verify that the focus adjusts to far when operated towards "far" _____.
- 7.3.10 Manipulate the focus control to near. Verify that the focus adjusts to near when operated towards "near" _____.
- 7.3.11 Plug the video monitor, video recorder and video printer into power source. Verify the video monitor, video recorder, frame store integrator and the video printer have power and are operational _____.

- 7.3.12 Verify that there is a color image on the Video Camera System monitor located in the 241-AN-271 Instrument building _____. Verify that color image is acceptable per QC and Camera Cog. Engineer.

QC /Date

SSE Test Engineer /Date

- 7.3.13 Turn off valve PR-2 and allow the gas to bleed off to the setpoint on PS (low pressure switch) 10 ± 2 in. w.g. Verify that power is no longer being supplied to the pan and tilt and camera. QC signoff below that power was no longer supplied to pan and tilt and camera at 10 ± 2 in. w.g.

QC /Date

- 7.3.14 Step 7.3 is accepted _____ SSE Test Engineer.

8.0 EXCEPTIONS

ITEM	STEP	PAGE	DESCRIPTION/REASON	DISPOSITION/ RESOLUTION

TEST APPROVED WITH EXCEPTIONS

SSE Test Engineer

Quality Control

Tank Farm Operations

9.0 RECORDS

DATA/VERIFICATION LIST

NAME PRINT	NAME SIGN	INITIALS	POSITION	DATE

10.0 TEST EXECUTION RECORD

REFERENCE SECTION	ACCEPT / REJECT	REMARKS
6.1		
6.2		
6.3		
6.4		
6.5		
7.1		
7.2		
7.3		

TEST WITNESSES:

SSE Test Engineer / Date

Quality Control / Date

Tank Farm Operations /Date

10.1 FINAL ACCEPTANCE

Testing per this procedure is completed satisfactorily and the camera is ready for installation and service.

East Tank Farm Manager /Date

11.0 POST INSTALLATION TEST

Repeat sections 7.1, 7.2, and 7.3 of this procedure to ensure that the Tank Camera Purge System and Video Camera System are operating satisfactorily after installation of the camera into the 20" multi-flange located in riser 5B. During the performance of sections 7.2 and 7.3, verify that the flowrate is the same flowrate from (H-14-100157-7) as was established in Step 6.3.4 of this procedure. Any discrepancies found with the Tank Camera Purge System and Video Camera System in accordance with this section of the ATP/OTP shall be noted below. Section 11.0 shall not be complete without SSE Test Engineers signature.

SSE Test Engineer /Date

FIGURE 1