VCP 69-02
TPS MQF 3-019

LANDING AND RECOVERY DIVISION

RECOVERY SYSTEMS BRANCH

PROJECT APOLLO
RECOVERY QUARANTINE EQUIPMENT

VEHICLE CHECKOUT PROCEDURES FOR THE MOBILE QUARANTINE FACILITY

April 1, 1969

This Procedure was ran & TPS MQF-3-019 Attached

accepted

Prepared by: _____
Brock R. Stone
Systems Evaluation Section

Approved by: _____
James D. Shannon
Head, Systems Evaluation Section

Approved by: _____
I. S. Alexander
Head, Test Support Section

APR 9 1969

TABLE OF CONTENTS

1. INTRODUCTION

The Mobile Quarantine Facility (MQF) is an independent, completely self-contained, skid-mounted unit containing systems which will biologically isolate and sustain the flight crew and their support personnel from retrieval in the recovery area through transfer into the Lunar Receiving Laboratory at NASA-Manned Spacecraft Center.

The Vehicle Checkout Procedures will verify the operational status of all systems (power and sustainment) of the MQF.

II. SCOPE

This document establishes the procedures for accomplishing a systems checkout of the MQF. With this document, all vehicle checkouts can be performed, from the first delivery acceptance checkout through the final pre-retrieval checkout aboard the recovery vessel.

This VCP supercedes VCP-68-304.

III. APPLICABLE DOCUMENTS

The following listed drawings form a part of this checkout procedure:

Melpar Drawings

Nomenclature	Number
Recovery Quarantine Equipment	R536706
Sling Assembly	R536713
Water System	R452572
Schematic, MQF	R536712
Power Distribution	R536720
Wiring Diagram, MQF	R630902
Panel	R536964
Schematic, Essential B Emergency	R453431
Schematic, Essential A Emergency	R453443

IV. MATERIALS AND EQUIPMENT

The following listed materials and items of equipment are required to perform the tests specified in this document. Items of equipment having equivalent or superior characteristics or ratings may be substituted providing no degradation in test capabilities is encountered:

Quantity	Description
1	Vacuum pump, industrial vacuum cleaner
1	Water manometer gauge, 0-5 inch range
1	Stop watch, 0-10 minute range with sensitivity of $\pm$ 0.2 sec.
1	Vacuum pump 0-30" Hg.
1	Gauge 0-30" $\pm$ .5" Hg.
1	Thermometer 0 - 230^{0}F $\pm$ .5^{o}

Quality Assurance will verify test equipment calibrations.

V. EQUIPMENT LOG

A chronological record of all testing and operating time shall be maintained for the following components of the MQF:

air conditioners
exhaust fans
Auxiliary Power Unit (APU)
rotary converters
decontamination lock pump
water pump
refrigerator
space heater blowers

The operating time of each component shall be entered on MSC Form 772, revised July 1967, entitled "System and Component Historical Record". One form for each component is located in the log accompanying the MQF.

	AC Lounge	Fan Left	AC Bunk	Fan Right	
Start	27.4	102.8	63.6	73.6	6-20-66
Finish	27.8	103.9	64.2	74.5	

VI. SPECIAL REQUIREMENTS

Safety:

The safety of all personnel participating in the vehicle checkout and those others within the test area is the direct responsibility of the project engineer. Safety standards shall be defined and enforced.

Quality Control:

A representative of the Quality Control Office shall monitor the tests as required to assure conformance with procedures and specifications; this representative shall also verify test results, sign applicable documents and initiate discrepancies as applicable.

Test Personnel:

The personnel involved in this vehicle checkout are listed below:

a. Test Conductor
b. MQF Systems Engineer (2)
c. Electrical Technician (optional)
d. Quality Assurance Representative

VII. PRETEST CONFIGURATION, CONTROLS AND DISPLAY:

SEQUENCE		DESCRIPTION
1.00		Inspect the MQF visually for any damage and/or irregularities. All irregularities shall be noted by discrepancy records initiated by Q. C.
	NOTE:	All circuit breakers, switches, and loads not specifically called out in this checklist sequence shall be positioned in an OFF position. (The refrigerator shall be turned off inside the unit itself, the water heater turned off, with the switch on its face, and the exhaust fan's speed controller set at the greatest no load setting _____.)
1.01		Set the following circuit breakers located on the external supervisory panel to the indicated position.

Circuit Breaker	Position
CB1	Open
CB2	Open
CB3	Open
CB4	Open
CB5	Open
CB6	Open
CB7	Open
CB8	Open
CB9	Open
CB10	Open
CB11	Open
CB12	Open
CB13	Open

1.02 Set the following circuit breakers located on the mode panel.

Circuit Breaker	Position
CB1	Open
CB2	Open
CB3	Open
CB4	Open
CB5	Open
CB6	Open
CB7	Open
CB8	Open
CB9	Open

(Circuit Breaker)	(Position)
CB10	Open
CB11	Open
CB12	Open
CB13	Open
CB14	Open
CB15	Closed

(Sequence)	(Description)
1.03	Set the following switches located on the mode panel to the indicated position.

SWITCH	POSITION
Main Buss #1 - Normal/Alternate	Normal
Main Buss #1 - Normal/APU	Normal
Essential Buss #1 - Normal/Alternature	Normal
Essential Buss #1 - Normal/APU	Normal
Utility Buss #1 - Normal/Alternate	Normal
Lounge Lights - Normal/Alternate	Normal
Lounge Lights - Normal/APU	Normal
Bunk Lights - Normal/Alternate	Normal
Lavatory Lights - Normal/Alternate	Normal
Lavatory Lights - Normal/APU	Normal
Main Buss #2 - Normal/Alternate	Normal
Main Buss #2 - Normal/APU	Normal
Essential Buss #2 - Normal/Alternate	Normal
Essential Buss #2 - Normal/APU	Normal
Utility Buss #2 - Normal/Alternate	Normal
Chair Lights - Normal/Alternate	Normal
Chair Lights - Normal/APU	Normal
Ceiling Lights - Normal/Alternate	Normal
Galley Lights - Normal/Alternate	Normal
Galley Lights - Normal/APU	Normal
Water Pump - Normal/Alternate	Normal
Water Pump - Normal/APU	Normal
Climatic Control - Lounge	Air Conditioner
Climatic Control - Bunk	Air Conditioner
Buss Selector	Main 1

1.04 Fill the water tank by opening the tank fill valve located under the forward bottom bunk. Attach a hose to the water inlet and fill the tank until an overflow is observed. Close the tank fill valve.

1.05 Fill the remainder of the water system (including the water heater) by opening all water outlets to release trapped air. When water runs continuously from the outlets,

(1.05) close all the water outlets.

1.06 Verify each passenger seat is functional for reclining, swiveling, and locking operations.

1.07 Verify proper operation of the communication handsets mounted adjacent to the transfer lock and mode panel.

_____

Turn on each handset to the LOW mode.

_____

Press outside buzzer button located on the handset box _____

Verify voice communication through both handsets. _____

VIII. 440 VAC FUNCTIONAL TEST

This sequence provides a checkout of the circuitry supplying power to the MQF from an external 440 VAC power source (simulating shipboard power):

SEQUENCE	DESCRIPTION
2.00	Open the switches which supply power to the 440 VAC receptacles. time _____ Connect the two mode cable plugs (P5 and P6) to Ship/LRL receptacles (J5A and J6A) located on the junction box.
2.01	Connect service cable plugs, P1 and P2, to the 440 V receptacles. Close the receptacle switches.
2.02	Set the following circuit breakers located on external supervisory panel to the indicated position.

Circuit Breaker	Position
CB1	Closed _____
CB2	Closed _____
CB3	Closed _____
CB5	Closed _____
CB6	Closed _____
CB7	Closed _____
CB9	Closed _____
CB10	Closed _____
CB11	Closed _____
CB12	Closed _____

2.03	The test conductor and vehicle engineer shall enter the MQF and close each door at this time.
2.04	Set the following circuit breakers located on the mode panel to the position indicated.

Circuit Breaker	Position
CB1	Closed _____
CB2	Closed _____
CB3	Closed _____
CB4	Closed _____
CB5	Closed _____
CB6	Closed _____
CB7	Closed _____
CB8	Closed _____
CB9	Closed _____
CB10	Closed _____
CB11	Closed _____
CB12	Closed _____
CB13	Closed _____
CB14	Closed _____

2.05 Verify that the following power indicator lights located on the mode panel are ON.

Main Buss #1	
Essential Buss #1	_____
Utility Buss #1	_____
Lounge	_____
Bunk	_____
Lavatory	_____
Main Buss #2	_____
Essential Buss #2	_____
Utility Buss #2	_____
Ceiling	_____
Chair	_____
Galley	_____
Water Pump	_____

2.06 Turn ON all the lounge lights (Reference: Drawing R536720).

Verify that all lounge lights are ON.

_____

Turn ON all the bunk lights (Reference: Drawing R536720).

Verify that all bunk lights are ON.

_____

2.07 Turn ON the microwave oven; confirm that the oven functions in all the heating modes.

2.08 Confirm by heating 1000 c.c.'s of water in a glass breaker for 5 minutes noting temperature change of the water.

Turn OFF the microwave oven.

2.09 Turn ON the water heater. The ON/OFF switch is located on the face of the unit, under and aft of the lavatory sink.

Confirm that the water heater is functioning by noting temperature at hot water tap after 30 min.

2.10 Momentarily depress the Press-To-Test button for the OXYGEN ALARM SYSTEM.

Verify that the alarm sounds (two locations, bunk area and lounge area) and the alarm light illuminates when the switch is depressed.

Momentarily depress the Press-To-Test button for the EMERGENCY POWER alarm. Verify that the alarm sounds and the alarm light illuminates when the button is depressed.

2.11 Hold the tank lamp test selector switch to the RIGHT TANK position. Verify that the right tank FULL light illuminates when depressed.

Press the right tank EMPTY light and verify that it illuminates.

2.12 Hold the tank lamp test selector switch to the LEFT TANK position. Verify that the left tank FULL light illuminates when depressed.

_____

Press the left tank EMPTY light and verify that it illuminates.

_____

2.13 Rotate right and left fan controls to 50%. Verify that the EXHAUST FAN #1, located by the decontamination lock, is operating.

_____

Verify that the EXHAUST FAN #2, located by the galley sink, is operating.

_____

2.14 Turn ON the refrigerator.

NOTE: The ON/OFF controls are inside the unit.

Verify the refrigerator works by freezing water.

_____

2.15 Turn ON air conditioner #1.

Verify that the unit operates correctly.

_____

Turn OFF air conditioner #1.

2.16 Place the CLIMATIC CONTROL LOUNGE switch to the SPACE HEATER position.

2.17 Turn ON SPACE HEATER #1.

Verify that this unit functions properly. _____

Turn OFF SPACE HEATER #1.

2.18 Turn ON AIR CONDITIONER #2.

Verify that this unit operates correctly. _____

Turn OFF AIR CONDITIONER #2.

2.19 Place the CLIMATIC CONTROL BUNK switch to the SPACE HEATER position.

2.20 Turn ON SPACE HEATER #2.

Verify that this unit functions properly.

Turn OFF SPACE HEATER #2.

2.21 Turn ON all bunk lights.

Verify that all the bunk lights operate.

2.22 Turn ON all ceiling lights.

Verify that all ceiling lights (Reference: Drawing R536720) operate.

2.23 Turn ON all Galley lights (Reference: Drawing R536720).

Verify that all Galley lights operate.

2.24 Turn ON all the chair lights.

Verify that all the chair lights operate.

2.25 Turn OFF the external water source.

Turn ON the water pump switch located over the sink in the Galley.

Verify that water flows, under pressure through the water outlets.

Turn OFF the water pump switch.

2.26 Operate the decontamination/transfer lock system through a complete cycle. Confirm that the decontamination lock and solution pump operates properly by

(2.26) performance of the following procedures.

Fill the decontamination/transfer lock reservior with 20 gallons of water prior to the following procedures.

DECONTAMINATION/TRANSFER LOCK OPERATION

Outside Operator

1. Open outside lock door.
2. Place contents on rack in lock.
3. Close and lock outside door.
4. Communicate with inside operator and inform him to remove contents from the lock.

Inside Operator

1. Depress OUTSIDE LOCK button.
2. Open the inside lock door.
3. Remove contents from lock.
4. Place item to be passed out on rack in lock.
5. Close and lock inside door.
6. Move INSIDE LOCK lever towards the inside operator.
7. Place the pump switch to FILL.
8. Open the SOLUTION FILL VALVE.
9. After flow is observed in the OVER-FLOW INDICATOR, the pump should remain on for an additional 15 minutes.
10. Close the SOLUTION FILL VALVE.
11. Place the pump switch to OFF.
12. Open the SOLUTION DRAIN valve.
13. Place the pump switch to EMPTY.
14. Allow solution to drain from lock.
15. Close the SOLUTION DRAIN valve.
16. Place the pump switch to OFF.
17. Push the RESET lever to its stop pull back to reset.
18. Communicate with outside operation and have him remove contents from the lock

Outside Operator

1. Open the outside lock door and remove contents.
2. Close and lock outside door.

2.27 Momentarily depress the Press-To-Test button for the MIN DIFFERENTIAL PRESSURE alarm.

Verify that the alarm sounds and the alarm light illuminates when the button is depressed. _____

2.28 Turn OFF 440 V receptacle switch to Source I

→ Open all Source I circuit breakers

2.29 Place all Source I Normal/Alternate switches to Alternate.

→ Close all Source I circuit breakers

2.30 Verify the following indicator lights on the mode panel are ON.

Main Buss #1 _____
Essential Buss #1 _____
Utility Buss #1 _____
Lounge _____
Bank _____
Lavatory _____

2.31 Turn ON 440 V receptacle switch to Source I.

Open all Source I C.Bs

Place all Source I Normal/Alternate switches to Normal _____

Close all Source I C.Bs

2.32 Turn OFF 440 V receptacle switch to Source II.

Open all Source II CBs

2.33 Place all Source II Normal/Alternate switches to Alternate.

Close all Source II CBs

2.34 Verify the following indicator lights on the mode panel are ON.

Main Buss #2 _____
Essential Buss #2 _____
Utility Buss #2 _____
Ceiling _____
Chair _____
Galley _____
Water Pump _____

2.35 Turn ON 440 V receptacle switch to Source II

Open All Source II CBs

2.36 Place all Source II Normal/Alternate switches to Normal.

Close all Source II CBs

2.37

Outside operator, uncover the 300 watt converter located on the service platform. Place the MG5-SK emergency power switch ON.

Inside operator, verify that the READY light on the EMERGENCY POWER alarm panel is illuminated. _____

Outside operator, turn OFF the 440V receptacles to sources I and II.

Verify that the EMERGENCY POWER alarm sounds and the alarm light is ON. _____

Reset the alarm.

Verify that both fans are operating.
Right _____
Left _____

Turn ON 440V receptacles.

Place the emergency power switch and the 300 watt converter to OFF. Replace the cover.

IX. APU FUNCTIONAL TEST

This sequence provides a checkout of the circuitry receiving power from the Auxiliary Power Unit (APU).

NOTE: Confirm that the proper amounts of fuel and oil are in the APU prior to starting, by dipstick indicators.

SEQUENCE	DESCRIPTION
3.00	Start the APU by means of the PREHEAT and START switches located on the mode panel. Monitor the voltage meter and verify that the APU is running smoothly. Verify 120 VAC ± 5 VAC _____ time _____
3.01	Place the following NORMAL/APU switches in the APU position. After confirming that the proper indicator lights illuminate return that particular switch to the NORMAL position. *

Switch	Verify Lights
Essential Buss #1	_____
Main Buss #1	_____
Essential Buss #2	_____

3.02	Place the following NORMAL/APU switches to the APU position. After confirming that the proper indicator lights function return that particular switch to the NORMAL position. *

Switch	Verify Indicator Lights
Lavatory	_____
Lounge	_____
Galley	_____
Chair	_____

3.03	Place the WATER PUMP - NORMAL/APU switch in the APU position. *

* Note: Open circuit breaker before changing switches

(Sequence)	(Description)
3.04	Verify that the WATER PUMP indicator light is illuminated _____ Place the WATER PUMP - NORMAL/APU switch in the NORMAL position.
3.05	Place APU - MAIN BUSS SELECTOR to the MAIN BUSS #2 position. Place the MAIN BUSS #2 - NORMAL/APU switch to the APU position. Verify that the MAIN BUSS #2 indicator light is ON. _____ Place MAIN BUSS #2 NORMAL/APU switch to the NORMAL position.
3.06	Turn OFF the APU from the remote start/ stop panel located on the mode panel time _____
3.07	Outside Operator Set the following circuit breakers located on the external supervisory panel to the indicated position.

Circuit Breaker	Position
CB1	Open _____
CB2	Open _____
CB3	Open _____
CB5	Open _____
CB6	Open _____
CB7	Open _____
CB9	Open _____
CB10	Open _____
CB11	Open _____
CB12	Open _____

3.08	Open Switches which supply power to 440 V receptacles
3.09	Disconnect the service cable plugs (P_1 & P_2) from the 440 U receptacles.

X. 28 VDC FUNCTIONAL TEST

This sequence checks out the circuitry supplying power to the MQF from a 28 VDC power source (simulating aircraft power).

SEQUENCE	DESCRIPTION
4.00	Outside Operator Open the switch which provides power to the 28 VDC receptacles. Connect the two mode cable plugs (P_5 and P_6) to aircraft receptacles on the junction box. (J5B and J6B)
4.01	Connect a service cable plug, P3, to the 28 VDC power receptacle. Close the switch which was opened in 5.00 above.
4.02	Set the following circuit breakers located on the external supervisory panel to the indicated position.

CIRCUIT BREAKER	POSITION
CB4	Closed _____
CB8	Closed _____
CB11	Closed _____
CB12	Closed _____

time _____

4.03	Inside Operator Verify that the ESSENTIAL BUSS #1 indicator light is ON _____
4.04	Verify that the following lights are ON

LIGHTS	VERIFY
BUNK	_____
LOUNGE	_____
LAVATORY	_____

4.05	Open the switch which provides power to the 28 VDC receptacles

time _____

Disconnect the service cable, P3, from the 28 VDC receptacle.

(Sequence)	(Description)
4.06	Connect the service cable, P4, to the 28 VDC receptacle. Close the switch which provides power to this 28 VDC receptacle time _____
4.07	Verify that the ESSENTIAL BUSS #2 indicator light is ON _____
4.08	Verify that the following lights are ON

LIGHTS	VERIFY
CEILING	_____
GALLEY	_____
CHAIR	_____
Water Pump	

4.09 Turn OFF all lights and loads (refrigerato controls inside unit; water heater switch on face of unit under lavatory sink)

time _____

4.10 Position all switches on the internal switching panel in the lavatory to the indicated position.

Switch	Position
Main Buss #1 - Normal/Alternate	Normal _____
Main Buss #1 - Normal/APU	Normal _____
Main Buss #2 - Normal/Alternate	Normal _____
Main Buss #2 - Normal/APU	Normal _____
Essential Buss #1 - Normal/Alternate	Normal _____
Essential Buss #1 - Normal/APU	Normal _____
Essential Buss #2 - Normal/Alternate	Normal _____
Essential Buss #2 - Normal/APU	Normal _____
Utility Buss #1 - Normal/Alternate	Normal _____
Utility Buss #2 - Normal/Alternate	Normal _____
Water Pump - Normal/Alternate	Normal _____
Water Pump - Normal/APU	Normal _____
Bunk - Normal/Alternate	Normal _____
Lavatory - Normal/Alternate	Normal _____
Lavatory - Normal/APU	Normal _____
Lounge - Normal/Alternate	Normal _____
Lounge - Normal/APU	Normal _____
Galley - Normal/Alternate	Normal _____
Galley - Normal/APU	Normal _____
Ceiling - Normal/Alternate	Normal _____
Chair - Normal/Alternate	Normal _____
Chair - Normal/APU	Normal _____
APU Main Buss Selector	Main Buss 1 _____

Switch	Position	
Climate Control Lounge	Air Conditioner	____
Climate Control Bunk	Air Conditioner	____

4.11 Set the following circuit breakers located on the mode panel to the indicated position.

CIRCUIT BREAKER	POSITION	
CB1	Open	____
CB2	Open	____
CB3	Open	____
CB4	Open	____
CB5	Open	____
CB6	Open	____
CB7	Open	____
CB8	Open	____
CB9	Open	____
CB10	Open	____
CB11	Open	____
CB12	Open	____
CB13	Open	____
CB14	Open	____
CB15	Closed	____

4.12 Outside Operator

Set the following circuit breakers located on the external supervisory panel to the position indicated

CIRCUIT BREAKER	POSITION	
CB4	Open	____
CB8	Open	____
CB11	Open	____
CB12	Open	____

4.13 Open the switch which provides power to the 28 VDC receptacles. Disconnect the service cable, P4, from the 28 VDC receptacle.

4.14 Drain all fluids from tanks

time _____

XI. LEAKAGE TEST

This sequence checks the MQF for structural leakage. NOTE: This test required for pre-acceptance checkout only.

SEQUENCE	DESCRIPTION
5.00	Connect the vacuum pump (vacuum cleaner) and differential pressure gauge to the MQF. Verify that all interconnects are air tight.
5.01	Seal all intake and exhaust ports with plastic sheets and tape. Close all the doors, escape windows, and transfer lock.
5.02	Generate a vacuum of 2 inches of water (plus 0.05 and minus 0.0 inches of water). Maintain the vacuum for a three minute period (the refrigerator door shall be open). Seal off the evacuation port and turn off the vacuum pump.
5.03	Observe the gauge and time. Record the time required for the pressure to decay from 2 inches to 0.2 inches of water.
5.04	Repeat this test for a total of 3 times and record the decay times.
5.05	Remove the sealing material from all the intake and exhaust ports. Disconnect vacuum pump and differential pressure gauge.

XII. EMERGENCY OXYGEN SYSTEM TEST

This sequence provides a checkout of the emergency oxygen system, which provides oxygen when the pressure altitude within the MQF reaches 13,500 feet.

SEQUENCE	DESCRIPTION
6.00	Remove the plug from the test port on the oxygen regulator valve. Connect a vacuum line to the vacuum pump. Turn on oxygen system.
6.01	Using a regulator valve on or near the vacuum pump, slowly increase the vacuum until the oxygen regulator valve is actuated.
6.02	Verify that the activation occurred at 12 $\pm$ 1.5 inches of mercury _____
6.03	Verify that the sound alarms operate (emergency buss must be powered) _____
6.04	Press the alarm reset button (located on the forward bulkhead in the lounge area) and verify that the alarm ceases.
6.05	Release the vacuum on the oxygen regulator valve.
6.06	Repeat steps 7.01, 7.02, and 7.03 above.
6.07	Press the alarm reset button (located on the forward bulkhead in the bunk area) and verify that the alarm ceases.
6.08	Release the vacuum on the oxygen regulator valve. Disconnect the vacuum line and install the plug on the test port.
6.09	Place the oxygen regulator valve in the manual mode. Verify that oxygen is available at each mask. _____
6.10	Return the oxygen regulator valve to the automatic mode. Turn off the system.