

CR 5402040
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SAAD9GS10-001
B/L: 40U.02
SYS: Breathing
Air at RPSF
MAY 12 1966

Critical Item: CO & O2 Monitor/Alarm System

Find Number: none

Criticality Category: 15

SA# No: 09GS10-001

System/Area: Breathing Air at RPSF

NASA

PNL/ A77-1364

Part No: None

NAME: UNIT, Air Purifying, Mobile

Mfg/ EKHET Corporation

Drawing/ EKHET ISA-44-0.D.

Model ISA-44-0.D.

Sheet No: 1

Part No: 045J3-004

FUNCTION: Monitors the purified breathing air for low oxygen concentration and high carbon monoxide concentration. Controls and energizes both audible and visual alarms in the event of CO present in air or low O2 in air.

Critical Failure Mode: FM No. 09GS10-001.002 through 09GS10-001.007

Failure of discrete component in the circuitry.

ISA-44-00 Power Supply Fuse	Fails open	FMD9GS10-001.002
	Fails to open	FMD9GS10-001.003
DC Power Supply	No output	FMD9GS10-001.004
O2 Monitor and Alarm Controller	Inoperative	FMD9GS10-001.005
CO Monitor and Alarm Controller	Inoperative	FMD9GS10-001.006
Alarm Annunciators and Indicators	Inoperative	FMD9GS10-001.007

Failure Cause: Structural failure/Contamination

Failure Effect: Failure of O2 and CO monitoring and alarm capability. Possible loss of life during a hazardous condition.

880506s1M3-780

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240751
SAA096S10-001
B/L: 400.02
SYS: Breathing
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CO & O2 Monitor/Alarm System (Continued)

Acceptance Rationale

Design:

- Maximum power: 117V ac - 60 Hz - 25 watts
12V ac - 25 watts
- Relay current: 2 amp steady, 5 amp surge
- NOS Sensor life: Up to 3 years in clean air (no oil)
- Response time: Up to 5 minutes for low-level carbon dioxide gas calibrations
- Maximum air line pressure: 300 psig (ISA-44 RAL-DD)
- Sample flow rate: Approximately .4 scfh (standard cubic foot hour)

Oxygen Micro-Fuel Cell:

- Output
 - linearity error (0-100% O2).....less than 0.5%
 - at 0% oxygen.....less than 2.0 uA
 - nominal (in air 25°C).....350 uA
 - variation from nominal.....±20%
 - temperature coefficient.....+2.5%/°C
- Response Time 25°C (typical)
 - 67%.....6 sec.
 - 90%.....13 sec.
 - 98%.....22 sec.
 - 99%.....34 sec.
 - 99%.....48 sec.
- Operating Temperature Range.....32-125°F
- Expected Life.....up to 12 months in air

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SAA09GS10-001
B/L: 400.02
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CO & O2 Monitor/Alarm System (Continued)

Typical Calibrations

Hazardous Gas	Low-level Alarm Threshold	High-level Alarm Threshold
Carbon Monoxide (low pressure air)	20 ppm	50 ppm
Carbon Monoxide (high pressure air)	10 ppm	20 ppm or 50 ppm
Oxygen	19.5% oxygen by volume (single alarm level)	

Inspection:

The oxygen cell is replaced semi-annually.
The CO detector and the O2 detector are calibrated semi-annually.
The alarms are checked monthly and prior to each use.

Test:

... OHSO File Y1 requires the testing of the O2 and CO alarm system semi-annually.

Failure History:

A search of the PRACA data base identified the following PRs:

- PY-6-090269 - Problem description: During oxygen circuit calibration of JTS A77-1364-00-001-003 pg. 21 steps 8 and 9, oxygen gain potentiometer would not adjust to 2.000V dc.

Disposition: Open

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8/L: 400.02

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CO & O2 Monitor/Alarm System (Continued)

Failure History: (Continued)

- PV-6-089804 - Problem description: While replacing oxygen cell, noted that printed circuit board was found to be shorted.

Disposition: Oxygen cell was shorted against housing, thus PC board was destroyed. This condition was as shipped from manufacturer. New oxygen cell had shorter contacts and will not protrude through board. No chance for shorting. LSS concurrence to close this PR. Close this PR.

- PV-6-019926 - Problem description: Corroded monitor.

Disposition: Old CO/O2 monitor received water damage from cooling water line break and was sent to factory approved repair center in Tampa. Repair center advised that repair would be more than 2/3 the cost of a new unit. LSSC Management approved the purchase of a new unit. The new unit was installed, calibrated, and is performing normally as designed.

No GIDEP failure history in the critical failure mode has been recorded.

Operational Use:

The CO/O2 monitor and alarm assembly is necessary to warn personnel of a high carbon monoxide level or a low oxygen level in the breathing air. There is no corrective action available to circumvent the actual failure of the assembly; however, an alarm to warn personnel that the assembly is inoperative would eliminate the critical items and failure modes because personnel have ample time to leave the area. The present configuration does not always inform the personnel of a failure in the monitor/alarm assembly. The installation of EUG2 to 79KZ1365 with an O2 alarm circuit will eliminate this critical item.

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