FUNCTIONAL TEST PROCEDURE

WARNING

TESTING OF THIS INSTRUMENT MAY INVOLVE ELECTROSTATIC SENSITIVE DEVICES (ESD), HIGH VOLTAGE, HAZARDOUS GASES, AND/OR CHEMICALS. PERSONNEL WHO ARE NOT FAMILIAR WITH PROCEDURES FOR THE ABOVE <u>MUST</u> CHECK WITH THEIR SUPERVISOR PRIOR TO BEGINNING THE TEST.

CONCURRENCE DATE	CONCURRENCE DATE
ORIGINATOR	SENSOR DEPARTMENT
PRODUCTION ENGINEER	QUALITY ASSURANCE
TEST DEPARTMENT	OTHER

1.0 INTRODUCTION

This functional test is performed as the final check of the model HE/O2 percent oxygen & percent helium analyzer prior to shipment.

2.0 APPLICABLE DOCUMENTS

(a) Schematic B75027 , Main PC Board
(b) Instruction Manual, MIXCHEK, M75030 Percent Oxygen & Helium Analyzer

3.0 TEST OBJECTIVE

The objective of this test is to exercise all the functions of the analyzer to ensure it performs to the specifications as outlined in the above reference documents.

4.0 TEST DESCRIPTION

The Q drawing will list any options that this unit has installed. Preliminary Alignment and sub-assembly procedures for all these options must have been performed prior to the start of this test. The test will consist of a comprehensive check of the electrical Characteristics to specified tolerances. Following successful completion of the electrical functionality, the unit under test will be subjected to gas sample only if required by customer/Sales Order. The test steps indicated with asterisk (*) are data collection points(see attachment 1and 2).

5.0 TEST EQUIPMENT

5.1 <u>Power Requirement</u>- Power to be supplied by the 115VAC power adapter (US version).

5.2 <u>Equipment Requirements</u>.

(A) AC power adapter (A558)
(B) RD33-D1 sensor
(C) DMM Fluke Model 8020A or equivalent
(D) Oscilloscope
(E) 100% Helium Gas
(F) Variac
(G) AIR (20.9% O2/ N2)
(H) programmed PIC (A75418, and A76058)

6.0 TEST SETUP

Set up the unit to be tested per Figure 1. Verify that all options and jumpers have been installed and all special instructions accomplished per the running sheet and applicable drawings.
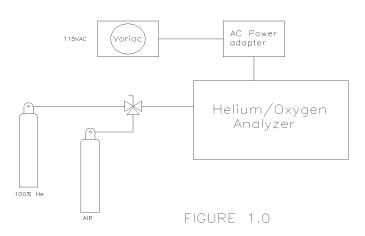
SYSTEM TEST SETUP

FIGURE 1.0

STEP #	OPERATOR ACTION	EXP RESULT	TOLERANCE
	SYSTEM SETUP:		
1.	Remove the cover of the analyzer to access the circuit board.	N/A	
2.	Verify that JP1, & JP2 are installed. **Select and Install a pre-programmed PIC U5.**	N/A	
3.	Install a O2 sensor plug into J1 on PCB. Verify that the T/C sensor is installed and plugged into J4.	N/A	
4.	Connect the AC power adapter, and turn on the power switch.	N/A	
5.	Verify that the power switch works properly in all positions.	N/A	
6.	Verify that the switch has the correct number of positions.	N/A	
7. *	Verify that the power supply rails are +/- 5 VDC +/- 0.2 (JP1 - JP2), & (TP1 – JP2)	5.0vdc	0.2+/-vdc
8. *	Use an oscilloscope to verify the power supply rails are noise free. Use JP2 for ground, check TP1, & JP1	<40mv	< 70mv noise
9.	Verify that all the DPM digits are displayed.	N/A	
10.	Adjust the O2 SPAN dial on the front cover fully CCW	18.1% O2	20.7% -15.7%
11.	Adjust the O2 span dial fully CW	25.0%	27% - 23%
12.	Adjust the O2 Span to 20.9% O2	N/A	
13.	Connect the DVM to TP3 (U3 pin7) and ground.	N/A	

14. *	Adjust R21 to set the DVM to 1.55VDC	1.55VDC	+/-0.002VDC
15.	Attach the DVM to TP2 and ground	NA	
16. *	Adjust R18 **(ZERO)** to set the voltage to zero	0.00mv	+/-2mv
17. *	Verify that the Helium Display reads 00.0	00.0%	+/-0.1%
18.	**(portable only)** Attach the AC power adapter to the Variac.	N/A	
19.	**(portable only)** Attach the DVM to TP4, & JP2.	N/A	
20.	**(portable only)** Turn on the Variac and the analyzer. Increase the Variac voltage (FROM ZERO) until the low battery indicator goes out, and the unit is operating.	N/A	
21. *	Turn down the voltage until the low voltage indicator lights. Note the voltage on the DVM	5.1	+/- 0.15
22.	Set the Variac to 115Vac	N/A	
23.	Attach 100% Helium gas to the analyzer, & adjust the gas flow to 1 SCFH	N/A	
24. *	Verify that the O2 reading is 00.0	00.0% O2	+/- 0.2% O2
25. *	Adjust R16 SPAN to set the Helium DPM to 100	100.0% He	+/- 0.1% He
26.	Attach air to the analyzer, and adjust the flow rate to 1.0 SCFH	N/A	
27. *	Verify that the Helium display indicates 00.0% helium	00.0% He	+/-0.1% He
28. *	Set the O2 SPAN to 20.9% O2	20.9 O2	+/- 0.1% O2
29. *	Use DVM to verify the Zero set point @ TP2 (ref. step16)	0.00mv	+/-2mv
	Portable units only: electrical test	N/A	
30.	Attach the DVM to TP4, & JP2, and select BATT. TEST with the power switch.	N/A	
31.	Adjust The VARIAC until the DVM = 5.5Vdc	5.5 Vdc	+/-.05
32. *	Verify that the Oxygen display indicates 104.8	104.8	+/- 3
33.	Select the ON position with the Power Switch	N/A	
34. *	Verify that the Helium display indicates 00.0% helium	00.0% He	+/-0.2% He
35.	Remove AC power adapter	N/A	
36.	Measure the resistance between JP2 & the negative (BLACK) leaded end of the battery pack	0.0 ohms	0.25 ohms max.

37.	Measure the resistance between TP4 & the positive (red) leaded end of the battery pack	0.0 ohms	0.25 ohms max
38.	**Gas test**: Calibrate the O2 sensor with air to 20.9% +/-.0 Verify the accuracy of the analyzer using the a mixture of Helium and Air at three points (near 70%, 50%, & 30% Helium). Calculate the correct Helium values based on the O2 reading (ref. Air_test.xls spread sheet or the Air/He chart in the manual). The actual reading and the calculated reading must match within +/- 2% Helium. Allow a minimum of 30 sec. for the reading to stabilize. If the error exceeds 2%, verfy the calibration of the O2 sensor, & Helium analyzer and re-test. **If the error exceeds 2% replace the software with another version of the code.** Note if the T/C sensor fails to repeat it's Zero or Span settting it may be defective.		
39.*	Record % Helium, and % O2 reading	70% He / 6.27% O2	+/-2% He
40.*	Record % Helium, and % O2 reading	50% He / 10.45% O2	+/-2% He
41.*	Record % Helium, and % O2 reading	30% He / 14.63% O2	+/-2% He
42.*	Record the version of code on the TP (A76028, A75418, ect)	N/A	
43.	Remove the O2 sensor	N/A	
44.	End of Test	N/A	
45.	Install cover and retaining hardware.	N/A	
46.	Program the I590 with the version of code recorded in step 42 and retain for the next analyzer as required.	N/A	

Date(s) of Test_____

TEST PROCEDURE DATA SHEET

Model Number_____   Serial Number_____

Test Personnel_____   QC Witness (if applicable)_____

Test Proc. Number_____   Revision___   Rev. Date_____

TEST EQUIPMENT

INSTRUMENT	MFG/MODEL	SERIAL NO.	CAL.DUE DATE
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

TEST PROCEDURE DATA POINTS							
Step #	Data	Step #	Data	Step #	Data	Step #	Data
7.							
8.							
14.							
16.							
17.							
21.							
24.							
25.							
27.							
28.							
29.							
32							
34							
39							
40							
41							
42							

FORM 288A REV. 0

Date(s) of

Test_____

TEST PROCEDURE DATA SHEET
(Continuation Page)

Model Number_____   Serial Number_____

TEST PROCEDURE DATA POINTS

Step #	Data	Step #	Data	Step #	Data	Step #	Data