

# **SUPERPRESSURE**

## **LEAK DETECTION MICROPHOTOMETER**

### **INSTRUCTION MANUAL**

**CATALOG NO.**  
**47-16224 US Version**  
**47-16225 EU Version**

**Customer Name:** \_\_\_\_\_

**Purchase Order No.:** \_\_\_\_\_

**Sales Order No.:** \_\_\_\_\_

**Serial No.:** \_\_\_\_\_

**Date of Manufacture:** \_\_\_\_\_

**FOR LEAK DETECTION MICROPHOTOMETERS  
STARTING IN 1997**

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# 1. INTRODUCTION

## 1.1. Scope

This manual contains instructions for the operation of the Superpressure 47-1622X series Solid State Digital Leak Detection Microphotometer.

## 1.2 Application

This instrument is used to detect oil in compressed gases. Oil contamination may be present in filtered or scrubbed compressed gases, or may indicate diaphragm failure in diaphragm type compressors.

## 1.3 Features

- Solid state circuitry reduces warm-up time and drift
- Display damping reduces display fluctuations while maintaining fast response.
- Digital LED Display indicates relative contamination level.
- Fixed alarm thresholds for low and high limits.
- Alarm light provides visual indication of alarm.
- Relay output to control compressor or remote alarm indicator.
- Recorder output to monitor contamination level.

## 1.4 Specifications

Upper Alarm Threshold	75
Lower Alarm Threshold	25
Alarm Hysteresis	10
Decade Selections	100, 10, 1, 0.1
Recorder Output	0-50mV adjustable
Alarm Output	NO and NC dry contacts Pins 1-2 normally open Pins 2-3 normally closed
Power Requirements	
47-16224	120VAC $\pm$ 10%, 50/60Hz 0.1A
47-16225	220VAC $\pm$ 10%, 50/60Hz 0.1A

Operating Ambient

60° F to 90° F, 10% to 60% RH

Millivolt Output Impedance

5K Typical

### 1.5. Theory of Operation

Compressed gas passes through the Detector Assembly and over the Target that is illuminated with ultraviolet light. When contamination soils the Target, fluorescence occurs due to the naphthalene quinoline content of the oil. Fluorescent emission passes through the refraction blocking filter to the PM tube where it is converted to a weak electrical signal. The Microphotometer amplifies this signal and provides a digital readout of the relative contamination level. This signal also controls the alarm output that can be used for compressor control.

## 2. SET-UP AND OPERATION

### 2.1 Detector Alignment

1. Make sure the Microphotometer POWER switch is OFF.
2. Check that lamp is secure in its socket. Access to lamp is obtained by removing nuts holding top of lamp housing.
3. Slip the PM tube into the PM tube housing. Tighten screw to secure PM tube into housing.
4. Place Excitation Filter in front of the Lamp.
5. Put fluorescence filter (yellow) into filter holder on PM Tube housing.
6. Connect cable between mercury lamp housing and power supply.
7. Connect PM tube connector to PM tube receptacle at rear of Microphotometer.
8. Close shutter on PM tube housing by turning plunger until plunger springs up.
9. Turn microphotometer POWER switch ON.

#### **NOTE:**

**Lamp requires 15 minutes warm-up time to reach full brilliance. When lamp is turned OFF, it must be allowed to cool before it will restart.**

10. Remove Aminco 9/16-inch tubing connector assembly from port next to PM Tube housing.
11. Remove the Allen set-screw from the corner of cell. A 6-32 tapped hole is provided in back of target for easy target removal. Remove target and place a smear of Solnus 150 or 300 oil on target face. Replace target and reinstall the set-screw.

12. Sight down port. A blue line should be seen on the target.
13. If the line is more than 1/8-inch off center or does not cover the full length of the target, adjust with lamp adjustment nuts. Raising or lowering the lamp base moves the line along its length. In raising or lowering the image, rotate all nuts in the same direction. Tilting the lamp base to left or right moves the line side to side. To tilt, lighten or loosen both nuts on one side of base. When adjustment is finished tighten all nuts.
14. Remove target and rinse thoroughly with Isopropanol Alcohol #2. Replace target and Allen set-screw.

## 2.2. Microphotometer Calibration

### **CAUTION:**

**Do not expose PM tube to intense light (such as ambient light) while the Microphotometer is ON. Always turn POWER OFF before removing the PM Tube from its housing. Always have shutter closed and/or Excitation Filter installed when Microphotometer is on.**

1. Turn POWER on, DECADE to 0.1.
2. Close shutter on PM Tube housing by turning plunger one-quarter turn CCW until plunger springs out. Allow 15 minutes for the Mercury Vapor Lamp to stabilize.
3. Adjust ZERO knob for a zero reading on the DIGITAL DISPLAY (see Operating Hints if zero cannot be obtained).
4. Switch decade to 100.
5. Open shutter by pressing plunger in and turning one-quarter turn CW to lock.
6. Adjust sensitivity knob for approximately 50.0 on the digital display. If 50.0 cannot be reached or if display is offscale, switch DECADE to 10 and adjust SENSITIVITY for 50.0 on the display. (See operating hints if 50 cannot be obtained in DECADE 10.)
7. With the digital display approximately 50.0, the ALARM light should be off.

## 2.3. Alarm Testing

1. Close shutter to simulate PM tube/Mercury Vapor Lamp failure. ALARM light should be on
2. Open shutter. ALARM light should be off.
3. Increase SENSITIVITY until digital display exceeds 80.0. This simulates fluorescence on the Detector Target. ALARM light should be on.
4. Adjust SENSITIVITY knob until the DIGITAL DISPLAY indicates approximately 50.0. Alarm Lamp should be off.

## 2.4. Operating Hints

### If you cannot get a zero reading with the shutter closed:

- Check the shutter assembly for proper operation.
- Check PM Tube housing for light leaks by turning off ambient lights or covering PM Tube housing with a box.

### If you cannot get 50 in DECADE 1:

- High readings may indicate target contamination.
- Check for proper filter installation.
- Higher DECADE setting can be used if everything checks OK.

### If the lower setpoint has caused an alarm:

- Check the power supply to the Mercury Vapor Lamp. Make sure lamp is lit.
- Make sure shutter is open.
- Check PM Tube connection at back of Microphotometer.

### If the higher setpoint has caused an alarm:

- Contamination of the Target may have occurred, indicating a possible oil leak.
- Inspect PM Tube housing for light leaks by turning off ambient lights or covering PM Tube housing with a box.

After contamination has occurred, all lines connected to the Detector and the Detector itself must be thoroughly cleaned of oil, using perchlorethylene or other suitable agent.

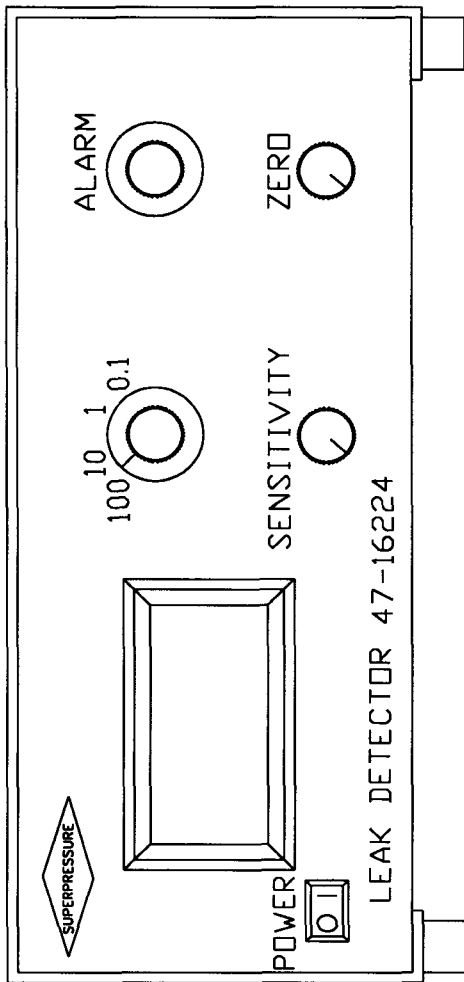
#### **WARNING:**

**During operation of the Microphotometer, the PM Tube should never be removed from its housing when the POWER switch is ON. Failure to comply will result in damage to the PM Tube. Equal care should be exercised to ensure that the shutter on the PM Tube housing is never removed from its frame during operation unless the POWER switch is in the OFF position.**

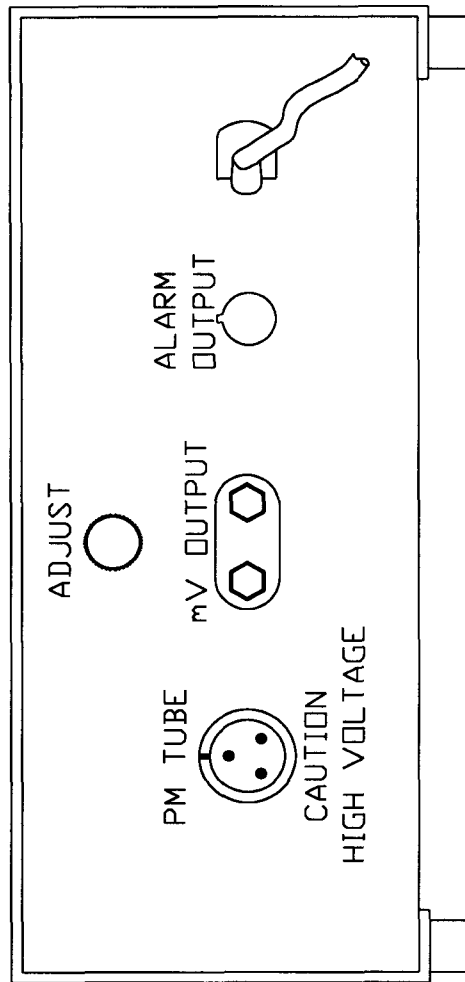
## 3. PARTS REQUIREMENTS:

The Superpressure Leak Detection Microphotometer requires the following additional items for most applications:

Description	Catalog No.
Photomultiplier Tube	47-16216



FRONT PANEL



REAR PANEL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES:  
 FRACTIONS ±  
 DECIMALS ±  
 ANGLES ±

REMOVE ALL BURRS AND SHARP EDGES

DO NOT SCALE THIS DRAWING

BY	NAME	DATE	FINISH:
PREPARED			
CHECKED			
ENGR/DSGN			
APPROVED			
MATERIAL			

SCALE: \_\_\_\_\_ WEIGHT: \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

CODE IDENT. NO. 59505

PART NO. 47-16224PANEL

DRAWING NO. 4716224PN

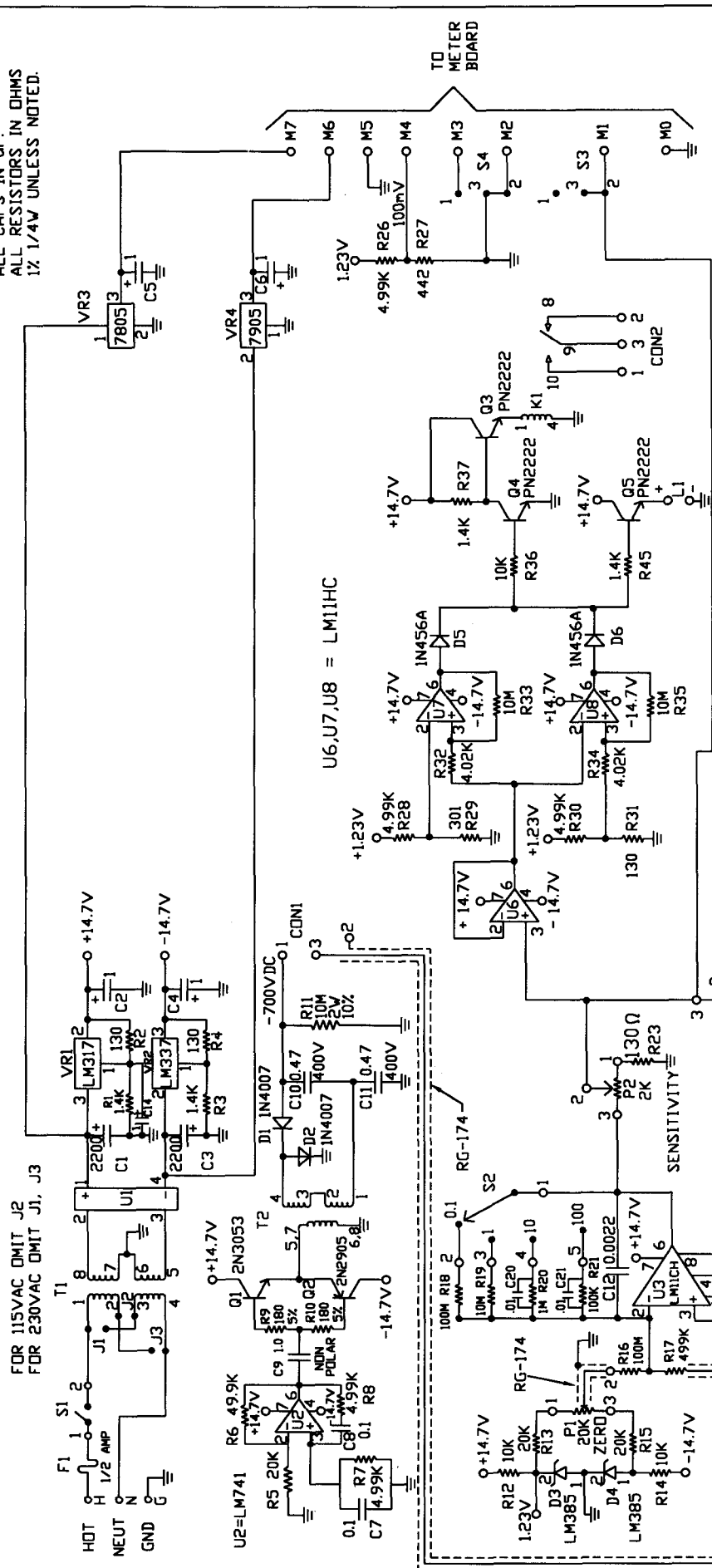
TITLE MICROPHOTOMETER 4-5807 FRONT/REAR PANEL

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**SUPERPRESSURE** **NEPPORT SCIENTIFIC INC.**

THIS DWG APPLIES TO UNIT MFG AS OF NOV.1997

ALL CAPS IN  $\mu$ F  
 ALL RESISTORS IN OHMS  
 1% 1/4W UNLESS NOTED.



UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE IN INCHES  
 FRACTIONS  $\pm$   
 DECIMALS  $\pm$   
 ANGLES  $\pm$

REMOVE ALL BURRS AND SHARP EDGES  
 DO NOT SCALE THIS DRAWING

BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DESIGNED: \_\_\_\_\_  
 CHECKED: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_  
 MATERIAL: \_\_\_\_\_

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CODE: 47-16224AS  
 SIZE: A  
 SHEET NO. 47-16224AS  
 DRAWING NO. 47-16224AS

SCALE: \_\_\_\_\_ WEIGHT: \_\_\_\_\_ SHEET: \_\_\_\_\_ OF \_\_\_\_\_

THIS DWG APPLIES TO UNIT MFG AS OF NOV 1997

TO METER BOARD

RECORDER OUTPUT  
 P3 2K  
 1 O-RED  
 2 O-BLACK

SENSITIVITY  
 P2 2K  
 1 O-RED  
 2 O-BLACK

BALANCE  
 P6 5K  
 O-14.7V

U6,U7,U8 = LM11HC