Instruction Manual

Model 320 Series

Portable Oxygen Detectors

320A
320B
320BRC
320P

DANGER

HIGHLY TOXIC AND OR FLAMMABLE LIQUIDS OR GASES MAY BE PRESENT IN THIS MONITORING SYSTEM.

PERSONAL PROTECTIVE EQUIPMENT MAY BE REQUIRED WHEN SERVICING THIS SYSTEM.

HAZARDOUS VOLTAGES EXIST ON CERTAIN COMPONENTS INTERNALLY WHICH MAY PERSIST FOR A TIME EVEN AFTER THE POWER IS TURNED OFF AND DISCONNECTED.

ONLY AUTHORIZED PERSONNEL SHOULD CONDUCT MAINTENANCE AND/OR SERVICING. BEFORE CONDUCTING ANY MAINTENANCE OR SERVICING CONSULT WITH AUTHORIZED SUPERVISOR/ MANAGER.

P/N M320
02/18/98
ECO # 98-0092

Warranty

This equipment is sold subject to the mutual agreement that it is warranted by us free from defects of material and of construction, and that our liability shall be limited to replacing or repairing at our factory (without charge, except for transportation), or at customer plant at our option, any material or construction in which defects become apparent within one year from the date of shipment, except in cases where quotations or acknowledgements provide for a shorter period. Components manufactured by others bear the warranty of their manufacturer. This warranty does not cover defects caused by wear, accident, misuse, neglect or repairs other than those performed by Teledyne or an authorized service center. We assume no liability for direct or indirect damages of any kind and the purchaser by the acceptance of the equipment will assume all liability for any damage which may result from its use or misuse.

We reserve the right to employ any suitable material in the manufacture of our apparatus, and to make any alterations in the dimensions, shape or weight of any parts, in so far as such alterations do not adversely affect our warranty.

Important Notice

This instrument provides measurement readings to its user, and serves as a tool by which valuable data can be gathered. The information provided by the instrument may assist the user in eliminating potential hazards caused by his process; however, it is essential that all personnel involved in the use of the instrument or its interface, with the process being measured, be properly trained in the process itself, as well as all instrumentation related to it.

The safety of personnel is ultimately the responsibility of those who control process conditions. While this instrument may be able to provide early warning of imminent danger, it has no control over process conditions, and it can be misused. In particular, any alarm or control systems installed must be tested and understood, both as to how they operate and as to how they can be defeated. Any safeguards required such as locks, labels, or redundancy, must be provided by the user or specifically requested of Teledyne at the time the order is placed.

Therefore, the purchaser must be aware of the hazardous process conditions. The purchaser is responsible for the training of personnel, for providing hazard warning methods and instrumentation per the appropriate standards, and for ensuring that hazard warning devices and instrumentation are maintained and operated properly.

Teledyne Electronic Technologies/Analytical Instruments (TET/AI), the manufacturer of this instrument, cannot accept responsibility for conditions beyond its knowledge and control. No statement expressed or implied by this document or any information disseminated by the manufacturer or its agents, is to be construed as a warranty of adequate safety control under the user's process conditions.

Table of Contents

Models 320BRC and 320P are complying with all of the requirements of the Commonwealth of Europe (CE) for Radio Frequency Interference, Electromagnetic Interference (RFI/EMI), and Low Voltage Directive (LVD).

Models 320A and 320B are *not* complying with the requirements of the Commonwealth of Europe.

The following International Symbols are used throughout the Instruction Manual for your visual and immediate warnings and when you have to attend CAUTION while operating the instrument:

GROUND
Protective Earth (Located inside the case assembly near case handle)

CAUTION, The operator needs to refer to the manual for further information. Failure to do so may compromise the safe operation of the equipment.

CAUTION, Risk of Electric Shock

Introduction

1.1 Description

The Teledyne Electronic Technologies/Analytical Instruments (TET/AI) Series 320BRC and 320P Portable Oxygen Detectors meet or exceed all of the requirements of the Commonwealth of Europe (CE) for Radio Frequency Interference and Electromagnetic Interference (RFI/EMI) protection. Models 320A and 320B are *not* complying with the requirements of the Commonwealth of Europe. The analyzers are designed to continuously measure the percentage of oxygen in a gas atmosphere. The measurement is specific for oxygen and no special standardization or zero gases are required. A letter designation, after the model number, indicates a specific version as specified by the customer at time of purchase.

The 320A requires 115VAC *or* 220VAC 50/60Hz

The 320B uses four replaceable D-size batteries.

The 320BRC is powered by two permanently mounted rechargeable nickel-cadmium batteries.

The 320P is powered by two permanently mounted rechargeable nickel-cadmium batteries and has an integral sample pump. This analyzer is designed to make spot check measurements of oxygen in flue gas and process gas streams.

Oxygen is sensed using a TET/AI patented micro-fuel cell (MFC), that consumes oxygen from the atmosphere surrounding the measuring probe and generates a proportional electric current. The generated current is amplified and read out on a built-in meter. A voltage output is available for driving an external recorder. A selective range attenuation circuit and a temperature compensation circuit provide temperature compensated outputs.

The standard operating ranges for Models 320A, 320B and BRC are 0-5%, 0-25% and 0-100% oxygen. The standard operating ranges for the Model 320P are 0-5%, 0-10% and 0-25% oxygen.

1.2 Features

1.2.1 Multiple Sampling Modes

The 320 series detectors sample by diffusion in three different modes.

- The probe assembly is mounted in the probe holder on the side of the unit. The sample flows over the probe, using the accessory flow-through adapter (P/N A9689).
- This is done remotely by removing the probe assembly from its holder and extending the coiled probe cable up to six feet.
- An accessory probe mounting bar (P/N A8657) which is part of the optional probe (P/N B16952) can be used to mount the probe in a fixed position (remote location) if the application warrants at the time of ordering the unit.
- In the case of Model 320P, the analyzer's integral pump draws the sample through the analyzer. If the sample is at a positive pressure, it is not necessary to operate the pump.

1.2.2 Micro-Fuel Cell

The MFC carries a warranty that covers its normal life expectancy. However, far greater life expectancy can be achieved with the cell-saver feature. The cell-saver is a sealing cap that keeps oxygen from the cell when the instrument is not in use. With the cell-saver cap in place, the output drops to less than 10% overnight and continues to drop as long as the cell-saver cap remains in place.

1.2.3 External Output Capability

A simultaneous voltage output signal is available to supplement the detector's integral meter. This permits indicating and/or recording the oxygen level at a remote location.

1.2.4 Accessory Flow-through Adapter

The flow-through adapter designed for the Series 320 Portable Oxygen Analyzers has radially and axially oriented flow-through hoses. The axial inlet provides rapid purging of the dead volume at relatively low flow rates. At high flow rates, the radial inlet is used.

Operation and Maintenance

CAUTION: If the instrument is used in a manner not specified by TAI, the protection provided by the instrument may be imapired.

2.1 Multiple Sampling Modes

2.1.1 Sampling By Diffusion

1. Mount the probe assembly in the probe holder on the side of the unit. The sample flows over the probe, using the accessory flow-through adapter (P/N A9689).
2. To sample remotely, remove the probe assembly from its holder and extend the coiled probe cable up to six feet.
3. Use an accessory probe mounting bar (P/N A8657) to mount the probe in a fixed position if the application warrants.

2.1.2 Sampling by Eduction (Model 320P)

1. Connect a piece of plastic tubing, such as Tygon, of 0.25 in inside diameter, to the inlet port fitting with the other end connected to the sample source.
2. Use the analyzer's integral pump to educt the sample for analysis. (Maximum vacuum is 60 in water column.)

NOTE: If the sample is at a positive pressure of 0.5 #/in2 or more, it is not necessary to operate pump.

2.2 Cell Saver

A sealing cap is provided to keep oxygen from the cell when the instrument is not in use. With the cell-saver cap in place, the cell slowly consumes the trapped oxygen, and the output drops off towards zero. Overnight the output will drop to less than 10% and will continue to drop as long as the cell-saver cap remains in place.

The equilibrium oxygen level depends upon the integrity of the seals in the probe assembly. The better the seals, the closer to zero the output will drop. (The seals were designed to achieve an equilibrium of 2% or less.)

2.3 Calibration

1. Remove the flow-through adapter, and place the range switch in the 0-25% range. On the standard 320P, this is the HI position of the Range switch.
2. Rotate the Span control until the meter indication pointer coincides with the red mark extending into the scale of the meter.
3. Repeat this procedure after the cell has been in the instrument at least 24 hours.
4. After initial calibration, check the span setting before each use.

NOTE: The calibration mark on the 0-25 % range of the detector meter coincides with the normal oxygen concentration of the atmosphere. Therefore, calibration using this mark as a standard should not be undertaken in any area where the oxygen content of the atmosphere surrounding the probe assembly is being controlled.

2.4 Micro-Fuel Cell

2.4.1 Cell Replacement

When the detector cell nears the end of its useful life, meter readings will become erratic. Shortly thereafter, the cell output will drop off sharply to zero. Replace the cell at this point.

NOTE: A spare cell should be ordered soon after receipt of the detector, and each time the cell is replaced thereafter.

2.4.2 Cell Life and Warranty

The MFC carries a warranty that covers its normal life expectancy. However, far greater life expectancy can be achieved with the cell-saver feature already discussed. See the specifications section below for warranty, response time and electrical output of the various cells.

Customers having warranty claims must return the cell in question immediately to the factory for evaluation. If it is determined that failure is due to faulty workmanship or parts, the cell will be replaced at no cost to the customer. Any evidence of tampering, or damage through mishandling, will render the cell warranty null and void.

If a cell was working satisfactorily, but ceases to function before the warranty period expires, the customer will receive credit, on a prorated basis, towards the purchase of a new cell.

The cell is furnished in a controlled atmosphere package that extends its useful life by a factor of 20. A spare cell can be stored without appreciably shortening its useful life as long as the seal on the package is not broken.

NOTE: Orders for replacement cells must include the cell class. Refer to the Specifications section below.

To install the new cell:

1. Remove probe assembly from the probe holder.
2. Unscrew the cap from the top of the probe assembly.
3. Place the cell in the probe with the terminal end of the cell facing down towards the probe contacts.
4. Replace the probe cap.

NOTE: Be sure that the probe cap is tightened all the way down and that the probe body is sealing on the gasket of the probe cap. (Screw down the cap until resistance of the gasket is just felt and then tighten an additional 1/8 turn.

2.5 External Output

A simultaneous voltage output signal is available to supplement the detector's integral meter. This permits indicating and/or recording the oxygen level at a remote location.

TheModel 320A is provided with an external output of 0-1VDC. The Models 320B, 320B/RC, and P are provided with an external output of 0–100 mV dc unless otherwise requested at the time of purchase.

NOTE: Remote indicating and/or recording equipment must have a minimum input impedance of 10KΩ. A self-balancing potentiometer device is ideally suited to the detector output circuitry.

2.6 Accessory Flow-through Adapter (P/N A9689)

The flow-through adapter designed for the Series 320 Portable Oxygen Analyzers has three hose connectors: two radially and one axially oriented.

NOTE: In the following instructions, the crossover point of 3 liters/minute is not critical.

1. For flow rates less than 3 liters/minute use the axial connector as the inlet. The axial inlet provides rapid purging of the dead volume at relatively low flow rates.

NOTE At high flow rates, the axial inlet should not be used, since the total pressure can be elevated and cause an erroneously high oxygen reading.

2. For flow rates greater than 3 liters/minute use one of the radial connectors as the inlet.

2.7 Battery Charging (320P & B/RC only)

WARNING: Do not overcharge the batteries.

To charge the batteries:

1. Make certain that the selector switch is in the OFF position. The batteries cannot be charged in any other switch position.
2. Connect the power cord to the instrument and connect to 115VAC, 50/60 Hz power.

NOTE ***An overnight charge (14 hours) should be enough for one month of continuous operation. It will not damage the batteries to charge them for up to 24 hours. However, the instrument should not be stored with the batteries being charged.***

2.8 Samples Containing CO_2

With samples that contain CO_2, such as flue gas, the maximum sampling time for any one sample taken is 5 minutes.

CAUTION

Ensure that the sampling time is as short as possible. One minute per sample is normally more than adequate. Frequent sample exposure for more than five minutes will shorten cell life.

After each sample exposure, set the range switch to the 0-25 % position. (This is the HI position on the standard 320P.) Then purge the instrument with air using the built-in pump.

In applications where intermittent samples are taken in one location, expose the cell to air (20.9 % oxygen) until a constant reading is obtained. Then the flow-through adapter can be removed.

Leave flow-through adapter off until next measurement is required. This is done in lieu of purging the instrument with air. However, after final measurements are taken, purge the instrument with air before replacing the flow-through adapter.

Abnormally slow recovery to the air calibration point (5-30 minutes) is characteristic of cells operated in CO_2 containing atmospheres for periods of longer than five minutes.

2.9 Storing the Instrument

When the instrument is not in use, keep oxygen from the cell by removing the flow-through adapter and installing the cell saver.

Place the range switch in the OFF position to conserve the batteries. Do not charge the batteries continuously during storage.

2.10 Filter Maintenance

A small in-line filter has been provided on the sample inlet to protect the pump. This filter is located on the outside of the analyzer on the rear of the unit. The filter media is polyester wool. If the filter becomes clogged with dirt or saturated with moisture, the filter media must be changed. To change filter media:

1. Grasp end of filter tube (which is also sample inlet port) and pull out while using a slight up and down rocking motion.
2. Remove old filter media with a bent pair of tweezers or a small stiff wire with a hook bent in the end.
3. Replace with new polyester wool (aquarium filter material). If this is not available, use cotton and be sure not to pack too tightly. (It will cause excessive restriction.)

Troubleshooting

3.1 General

3.1.1 Erratic Reading (Meter Pointer Jumps)

Cell contacts may be dirty. Remove cell and wipe off contact area (concentric metallic rings on back of cell) with a tissue moistened with water or alcohol. Also wipe off contacts in cell holder.

If contacts are worn or corroded, replace with new contacts (see Spare Parts List).

3.1.2 Can't Span (Meter won't reach CAL mark)

If the meter will not reach the CAL mark with the Span Pot in full clockwise position, replace cell. Return the old cell to factory if it has been in use less than 6 months. (Possible warranty credit due).

3.2 Pump Problems

3.2.1 Pump Does Not Run

Check condition of batteries. If batteries test OK, check the voltage at the metal wire terminals on the rear of the motor (be sure to push pump switch 9). Voltage at the pump should be about 5V.

If the voltage is OK but the pump will not run, replace the pump.

If there is not voltage at the pump, check all wiring for breaks and bad joints.

3.2.2 Removal of Water from Pump

If water is accidentally drawn into the analyzer and gets into the pump, it will cause excessive noise and vibration.

Water can be purged from the pump by holding the analyzer on its end with the sample connection port pointing up. Running the pump with the analyzer in this position will drive out any trapped water.

It may be necessary to put dry filter media in filter.

3.2.3 Pump Removal/Installation

Removal

1. Loosen the cover plate mounting screws and remove the instrument coverplate.
2. Disconnect the pump motor wires from the circuit terminals.
3. Tag the pump inlet and outlet tubings and then disconnect both from the pump assembly.
4. Loosen and remove the four screws securing the pump assembly to the instrument chassis and remove the pump.

Installation

1. With the instrument cover plate removed, set the pump assembly in place.
2. Insert and tighten the four screws to secure the pump assembly to the instrument chassis.
3. Connect the tagged pump inlet and outlet tubings to the pump assembly.
4. Connect the pump motor wires to the circuit terminals.
5. Replace the instrument cover plate and then insert and tighten the cover plate mounting screws.

Appendix

Specifications

Standard Ranges

320A, 320B, B/RC: 0-5%, 0-25% and 0-100% Oxygen
BRCD: 0-100% Oxygen
320P: 0-5%, 0-10% and 0-25% Oxygen

Sensitivity

320A, 320B, B/RC, BRCD: 0.5 % of full scale
320P: 1.0% of full scale

Accuracy

320A, 320B, B/RC, BRCD: ±2% of full scale at constant temperature.
±5 % of reading throughout the operating temperature range, once temperature equilibrium has been achieved.

320P: ±2 % of full scale or ±0.2% oxygen, whichever is greater at constant temperature and pressure of calibration.
±5 % of reading throughout the operating temperature range (once temperature equilibrium has been achieved).

Reproducibility

±1% of full scale at constant temperature

Response Time

320A, 320B, B/RC, BRCD: 90% < 10 Seconds (Class B-1)
90% < 15 Seconds (Class B-3)
90% < 32 Seconds (Class C-3)
90% < 45 Seconds (Class A-5)
320P: 90% < 10 Seconds (Class B-1)

NOTE: ***Response Time is calculated from sample inlet of analyzer.***

System Operating Temperature

32-122°F (0-50°C)

Sensor Types

Standard:	Class B-1 Micro-Fuel Cell (MFC)
Alternates:	Class A-5 MFC
	Class B-3 MFC
	Class C-3 MFC

Signal Output

Internal:	Analog Meter	(320B, B/RC)
	Digital LCD	(320BRCD)
External:	0-100mVDC	(320B, B/RC, P)

Power Requirements

320A:	115VAC *or* 220VAC @ 50/60Hz
320B:	Four "D"-Size Batteries
320B/RC:	Two Rechargeable NiCad Batteries
	0.05 Amps @ 220 VAC
	0.10 Amps @ 110 VAC
320BRCD:	Three Rechargeable NiCad Batteries
	0.10 Amps @ 220 VAC
	0.20 Amps @ 110 VAC
320P:	Two Rechargeable NiCad Batteries
	0.05 Amps @ 220 VAC
	0.10 Amps @ 110 VAC

NOTE: NiCad batteries require approximately 14 hours to fully recharge. Fully charged batteries provide up to 30 days continuous operation.

WARNING: Do not overcharge the batteries.

Recommended Spare Parts List

(Items with model numbers in parentheses apply to those models only.)

QTY	PART NO.	DESCRIPTION
1	0-55	O-Ring Cell Saver Gasket—Haskel No. 568-022
4	B-73	Battery 1.5 V D-Size Mallory No. MN1300 *(320B)*
3	B-71	Battery 2.5 V,4.0 amp-hours, NI-CAD *(320BRC/D & P/D)*
2	B-71	Battery 2.5 V,4.0 amp-hours, NI-CAD *(320B/RC, P)*
1	A-9549	P.C. Board, Amplifier *(320A & B)*
1	A-9551	P.C. Board, Amplifier *(320B/RC)*
1	A-9736	P.C. Board, Amplifier *(320P)*
1	B-23685	I.C. Board, Amplifier *(320BRC/D)*
1	C-6689-	Micro-fuel Cell: Customer Must specify the class

Class	Color Code	Ck
A-3	Black	___
A-5	Gray	___
B-1	Tan	___
C-3	Red	___

1	A9340A	Cell Saver Cap with Chain
2	B-60	Battery Holder *(320A & B)*
4	B-39	Bumper
1	A-9899	Probe Holder
1	P-150	Span Potentiometer
1	S-894	Range Switch (320A)
1	S-139	Range Switch *(320B, B/RC, P)*
1	K-4	Knob
1	H-25	Handle
1	B-30717	Digital Meter Assembly *(320BRC/D & P/D)*
1	M-23	Meter *(320A & B)*
1	M-53	Meter *(320B/RC)*
1	M-61	Meter *(320P)*
5	F-6	Fuse 1/4A (0.25A) 100-125V, 3AG Type,Slow Blow (US Standard)
5	F-7	Fuse 1/8A (0.125A) 200-250V, 3AG Type, Slow Blow (US Standard)
2	A-6544	Cell Contact Pin *(320P)*
2	A-7023	Cell Contact Spring *(320P)*
1	B-64442	Pump Assembly (complete) *(320P, P/D)*
5	F-1128	Fuse 1/4A (0.25A) 100-125V, 5x20mm Type, Slow Blow (International)
5	F-1127	Fuse 1/8A (0.125A) 200-250V, 5x20mm Type, Slow Blow (International)

A minimum charge applies to spare parts orders.

Orders for spare parts must include the model and serial number of the instrument for which the parts are intended. Orders should be sent to:

Teledyne Electronic Technologies/Analytical Instruments
16830 Chestnut Street
City of Industry, CA 91749-1580

Phone (626) 934-1500, Fax (626) 961-2538
TWX (910) 584-1887 TDYANYL COID

Web: www.teledyne-ai.com

Drawing List

(Items with model numbers in parentheses apply to those models only).

320A

B-9509	Outline Diagram
B-9540	Schematic Diagram
B-9542	Schematic Diagram *(320B/RC)*
C-9652	Wiring Diagram
B-9490	Probe Assembly and Wiring

320B,B/RC

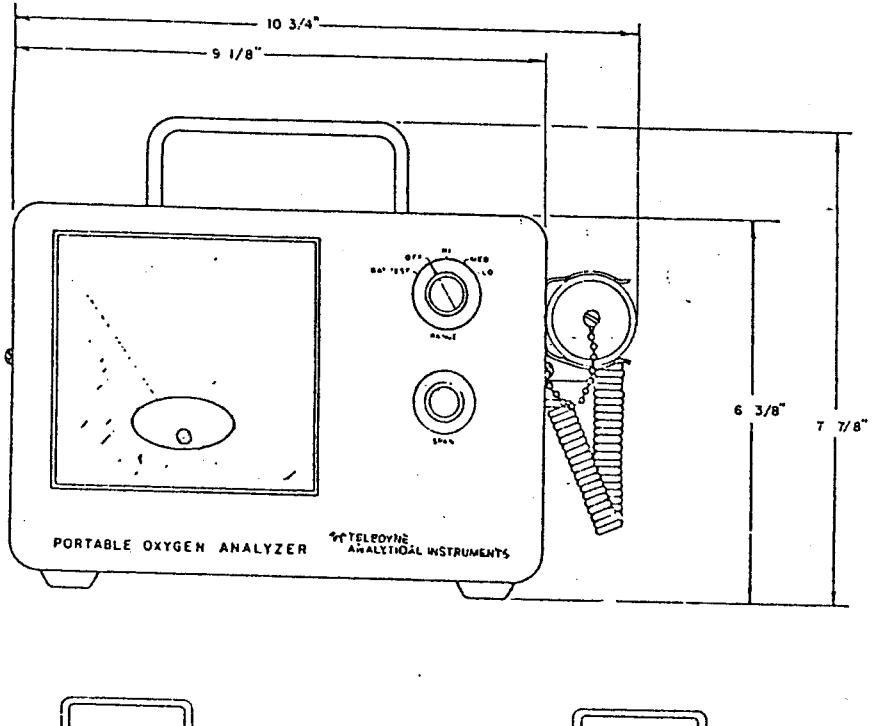
B-9509	Outline Diagram
B-9541	Schematic Diagram *(320B)*
B-9542	Schematic Diagram *(320B/RC)*
B-9490	Probe Assembly and Wiring
B-9650	Wiring Diagram *(320B/RC)*
C-9651	Wiring Diagram *(320B)*

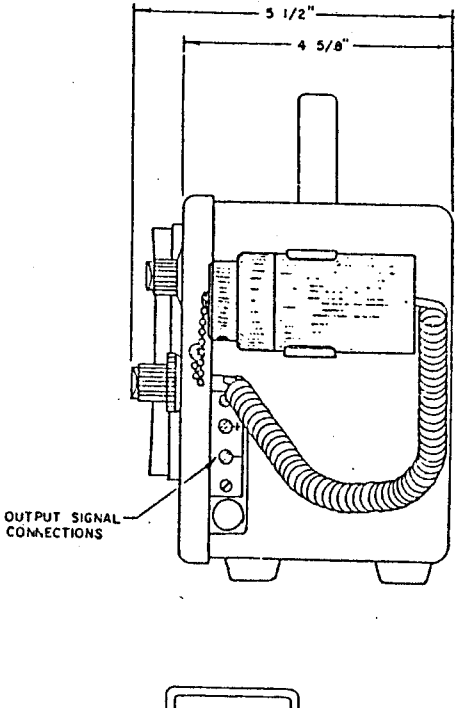
320P

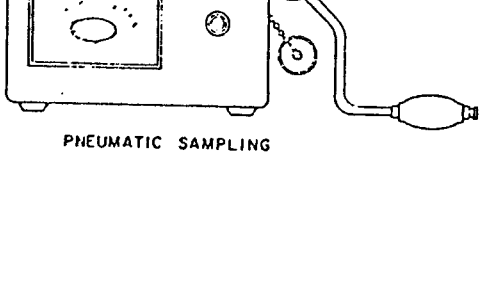
B-9734	Outline and Interconnect Diagram
C-12537	Wiring Diagram
B-9490	Probe Assembly and Wiring

NOTE: The MSDS on this material is available upon request through the Teledyne Environmental, Health and Safety Coordinator. Contact at (626) 934-1592

ISSUE NO	APP
1 6-3-69	
REV PROBE	
2. 3-19-70	







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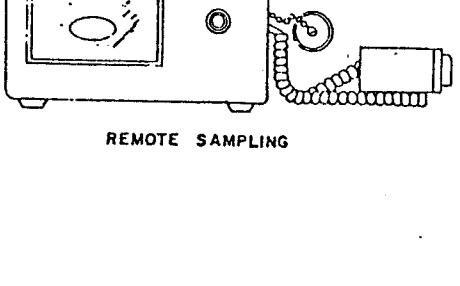

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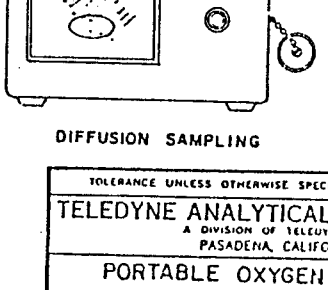
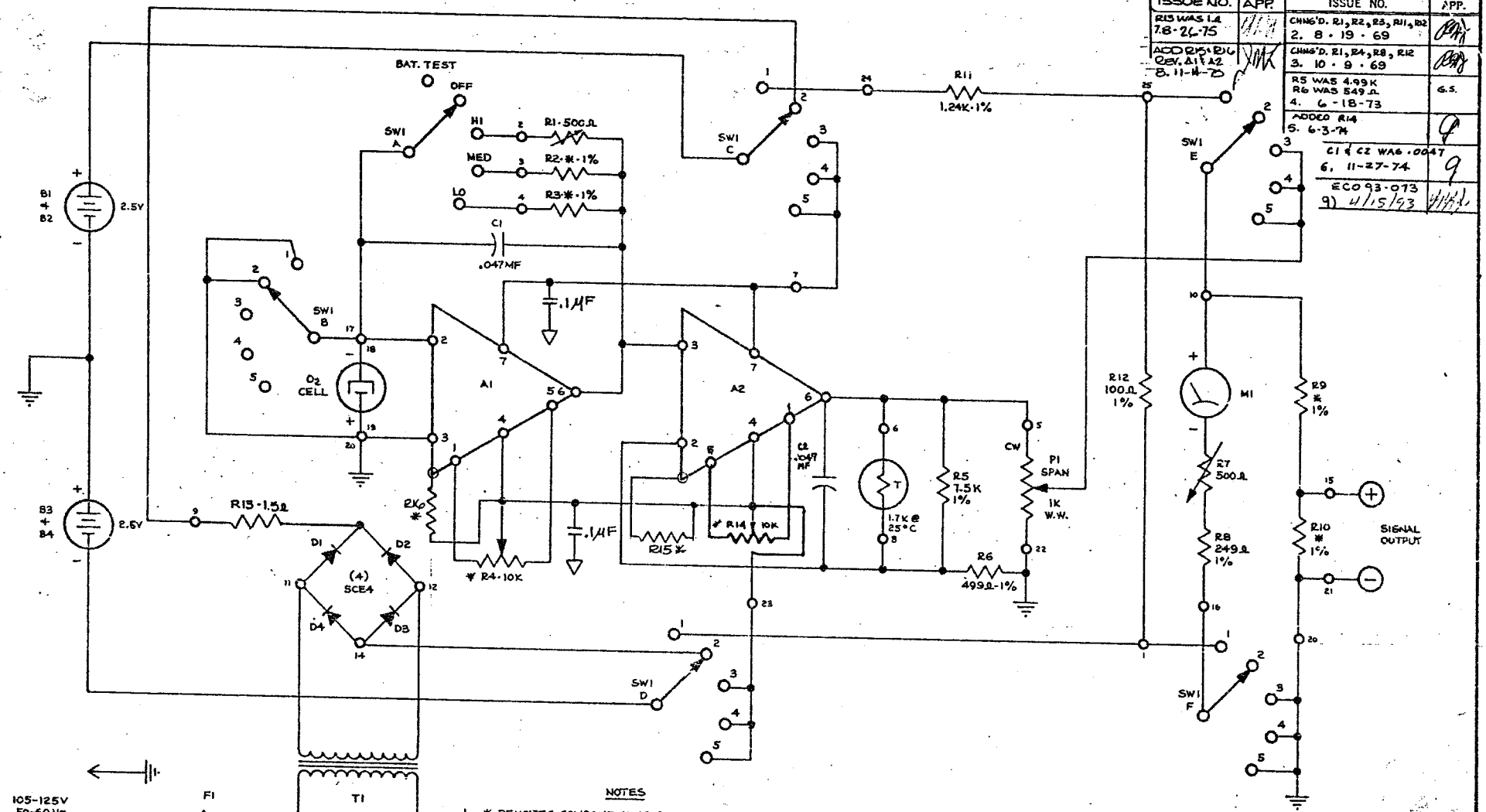


DIFFUSION SAMPLING

TOLERANCE UNLESS OTHERWISE SPECIFIED	FRACT. ± 1/64	DEC. ± .03	ANGULAR ± 1/2°
TELEDYNE ANALYTICAL INSTRUMENTS A DIVISION OF TELEDYNE INC. PASADENA, CALIFORNIA		SCALE	6-3 DATE 69
		MATL:	
PORTABLE OXYGEN ANALYZER MODEL 320 B, B/RC OUTLINE. DIAGRAM		FINISH:	
		DR S ENGR	APP
		DWG No. B-9509	



NOTES

1. * DENOTES COMPONENT IS SELECTED PER APPLICATION:

A1:	R2 :	R9 :	R15:	
A2:	R3 :	R10:	R16:	
	R4 :	R11:		

2. RESISTORS ARE 1/4W, 5% UNLESS OTHERWISE SPECIFIED.

ISSUE NO.	APP.
R13 WAS 1.4 7-8-26-75	
ADD R15, R16 REV. A1 & A2 8-11-M-76	

ISSUE NO.	APP.
CHNG'D. R1, R2, R5, R11, R12 2. 8-19-69	
CHNG'D. R1, R4, R8, R12 3. 10-9-69	
R5 WAS 4.99K R6 WAS 549Ω 4. 6-18-73	G.S.
ADDED R14 5. 6-3-74	
C1 & C2 WAS .0047 6. 11-27-74	
ECO 93-073 9) 4/15/93	

TOLERANCE UNLESS OTHERWISE SPECIFIED | FRACT. ± 1/64 | DEC. ± .003 | ANGULAR ± 1/2°

TELEDYNE ANALYTICAL INSTRUMENTS
A DIVISION OF TELEDYNE INC.
PASADENA, CALIFORNIA

SCALE ~ | 5-22-69

MATL: ~

FINISH: ~

DR RJ | ENGR MR | APP

OXYGEN ANALYZER MODEL 320B/RC SCHEMATIC

DWG No. B-9542

NOTES: UNLESS OTHERWISE SPECIFIED.

1)

2) ASSEMBLE ITEMS 3,4,5 & 8 INTO ITEM 6. FILL REAR CAVITY OF ITEM 6 WITH DOW CORNING 3110 RTV MIXED WITH RTV CATALYSTIC "S" ACCORDING TO INSTRUCTION ON CAN.

(3) SEE DWG. No A-9900 FOR DETAILED ASSEMBLY.

(4) PLACE SLEEVING OVER WIRES GN AND WH TO PREVENT SHORTING.

REVISIONS				
REV	DESCRIPTION	DATE	APP.	REV. BY
8	ECO# 92-398	11-9-92	T.Ch	LG
9	INCORP. ECO# 96-717	8/16/96	J.G.	M.V.

ITEM	QTY	PART No.	DESCRIPTION
(3) 13	1	W 1	GASKET
(3) 12	1	A-11209	CAP
(3) 11	1	A-8894	S.S. SCREEN
10	6FT	C 175	CABLE, BELDEN #8409, 4-COND. 28 GA. RETRACTILE
9	2	-----	SCREW, SCZSBDPH BINDER HD., 2-56 x .25 LG
8	1	A-9341	BACK COVER
7	A/R	-----	SPOT TIE
6	1	B-11039	PROBE HOUSING
5	1	T 305	THERMISTOR, 1.5K Ω @ 25°C
4	1	A-6542	CONTACT PLATE ASSEMBLY
3			
2	1	C-6689	CELL ASSEMBLY
1	REF	B9490-RS	ROUTE SHEET

BILL OF MATERIAL

TOLERANCE UNLESS OTHERWISE SPECIFIED: ANGULAR ±1/2°
LINEAR .X = ±.1, .XX = ±.02, .XXX = ±.010

Teledyne Analytical Instruments
A business unit of Teledyne Electronic Technologies
CITY OF INDUSTRY, CALIFORNIA 91748

	SIGNATURES	DATE
N/	DRFT: Maritza	8/8/96
I/	CHK:	
P/	APPR: G.	4-21-69
O/	ENGR:	
F/	S.O.:	
REFERENCE	CAD I.D. B9490-9	

TITLE: PORTABLE OXYGEN ANALYZER MODEL 320A,B,C B/RC PROBE ASS'Y & WIRING

SCALE ---

SIM

SHEET 1 OF 2

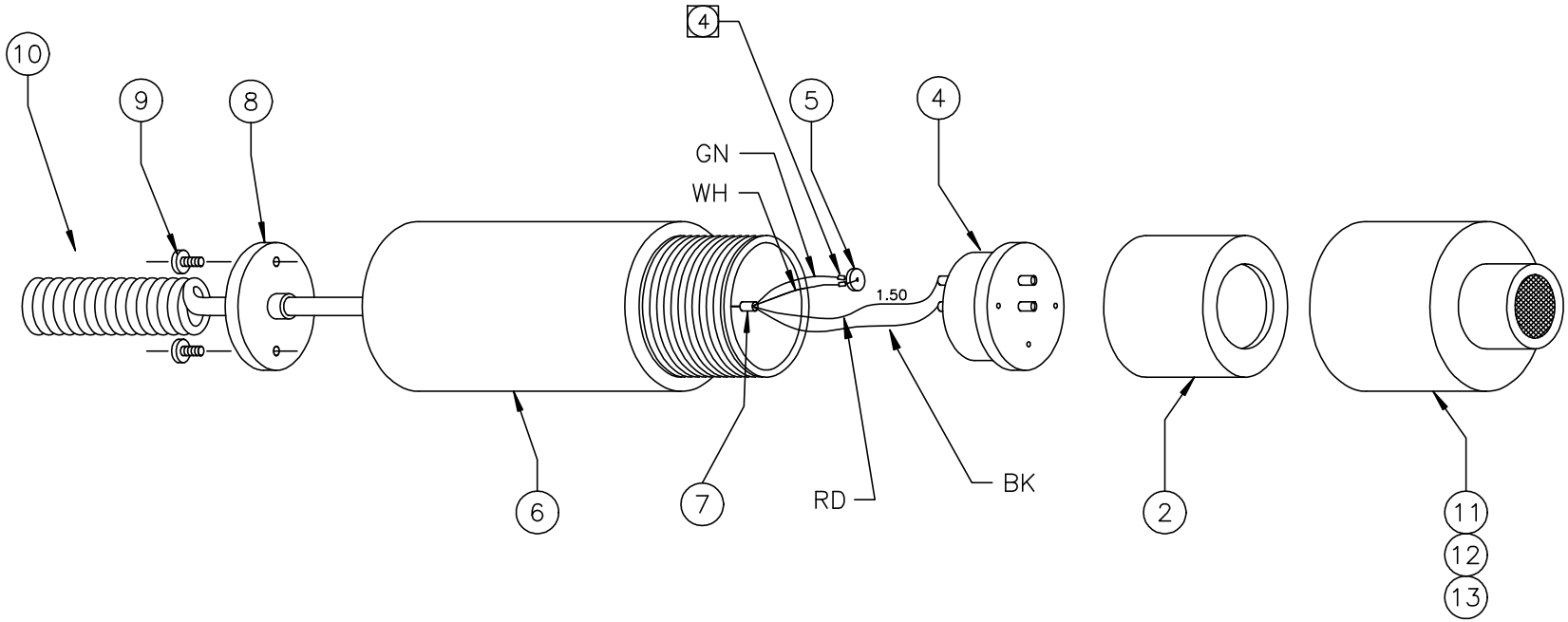
MATL. - LISTED -

DWG NO. B-9490

REV 9

NOTES: UNLESS OTHERWISE SPECIFIED.

REVISIONS
SEE SHEET 1

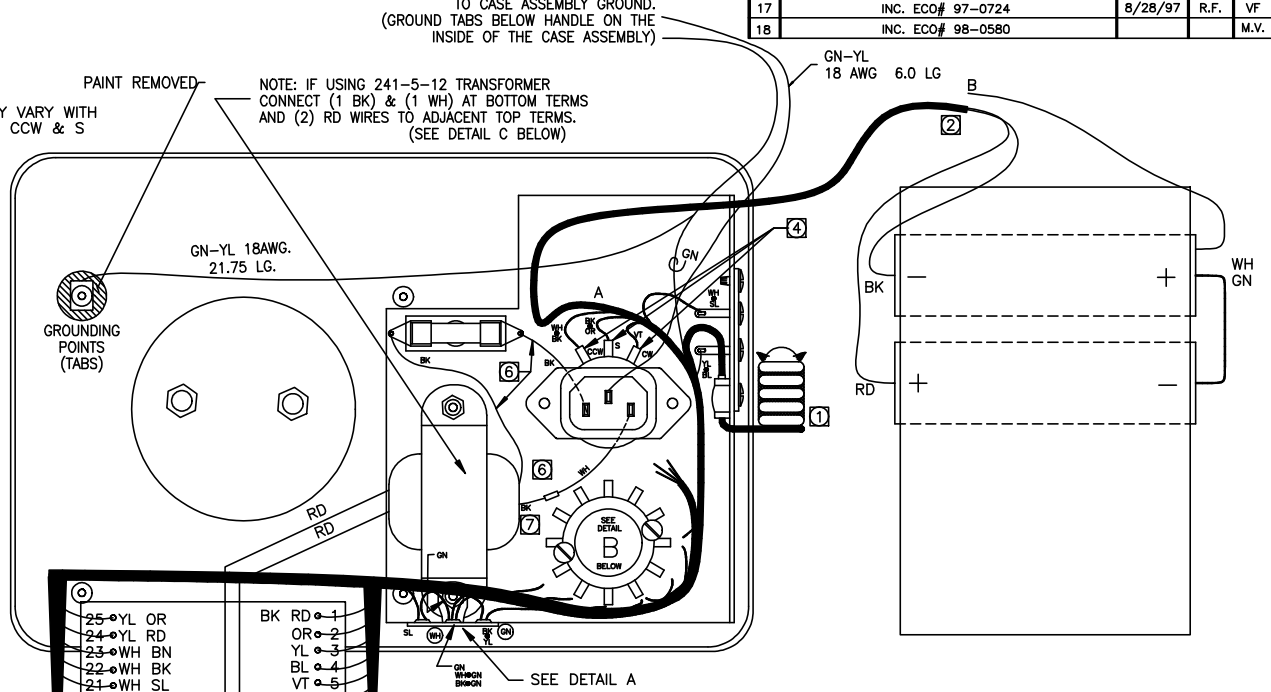


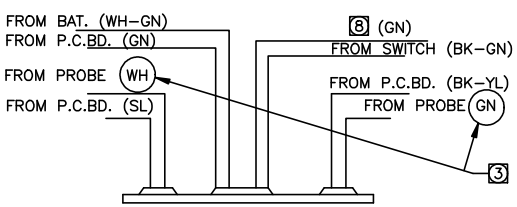
SHEET	DWG NO.	REV
2 OF 2	B-9490	9

NOTES: UNLESS OTHERWISE SPECIFIED.

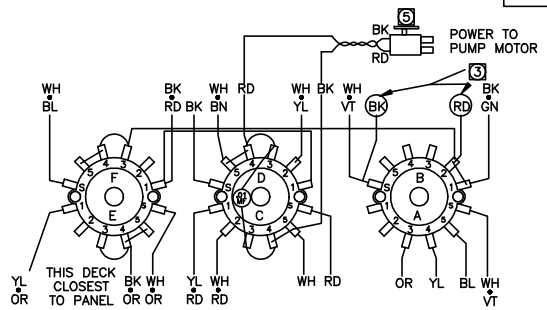
1. STRIP OUTER JACKET OF PROBE CABLE 8" FROM END.
2. DISTANCE FROM POINT "A" TO POINT "B" SHOULD BE 6.0 – 6.50.
3. WIRE COLORS DESIGNATED ◯ ARE WIRES FROM COILED PROBE CABLE.
4. LOCATIONS OF TERMINALS ON POTENTIOMETER MAY VARY WITH VENDORS. CONNECT COLOR CODED WIRES TO CS, CCW & S TERMINALS AS INDICATED.
5. CUT WIRE 6 INCHES LONG
6. –ADD GROUND WIRE (GN–YL, 18 AWG, 21.75) FROM FRONT PANEL ASSYEMBLY (GROUNDING TAB) TO GROUNDING TABS BELOW HANDLE ON THE INSIDE RIGHT OF CASE ASSY.
   –GN WIRE WILL NOW GO TO CASE ASSEMBLY GROUNDING TAB (GROUNDING TABS BELOW HANDLE ON THE INSIDE RIGHT OF CASE ASSY)
   –SPIRAL WRAP (REF. TT13) WIRES WH, BK, GN AND GN–YL (GOING TO GROUNDING TABS BELOW HANDLE ON THE INSIDE RIGHT OF CASE ASSY.)
   –HEAT SHRINK (SPIRAL WRAP (REF. TT13) WIRES COMING FOR TRANSFORMER (BK (FUSE HOLDER) BK TO WH (TO AC POWER CONNECTOR) AND FUSE HOLDER (BK TO AC POWER CONNECTOR)
7. MAY BE JUST WHITE WIRE COMING FROM TRANSFORMER TO AC POWER CONNECTOR (OR ADDITIONAL WHITE WIRE MAY BE NEEDED)
8. SIZE WIRE (GN, 22 AWG, STD.) LENGHT TO POWER RECEPTACLE (NOT CONNECTED TO POWER RECEPTACLE) WITH PUSH–ON LUG AT THE FREE END.

REVISIONS				
REV	DESCRIPTION	DATE	APP.	REV. BY
17	INC. ECO# 97–0724	8/28/97	R.F.	VF
18	INC. ECO# 98–0580			M.V.

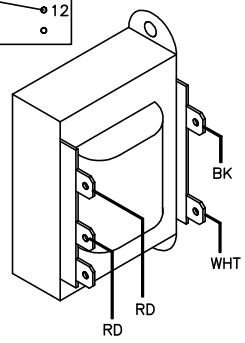




DETAIL A



SWITCH WIRING DETAIL B



DETAIL C

ITEM	QTY	PART NO.	DESCRIPTION

BILL OF MATERIAL

DO NOT SCALE DWG

TOLERANCE UNLESS OTHERWISE SPECIFIED: ANGULAR ±1/2° LINEAR .X = ±.1 .XX = ±.02 .XXX = ±.010

TELEDYNE ELECTRONIC TECHNOLOGIES
Analytical Instruments
An Allegheny Teledyne Company
CITY OF INDUSTRY, CALIFORNIA 91748

	SIGNATURES	DATE
S/		
I/	DRFT: R. WHITLOCK	4/6/94
N/	CHK:	
P/	APPR:	
O/	ENGR: ROBIN FONG	
F/	S.O. 148738	
REFERENCE	CAD ID C1253718	

TITLE: WIRING DIAGRAM OXYGEN ANALYZER MODEL 320P

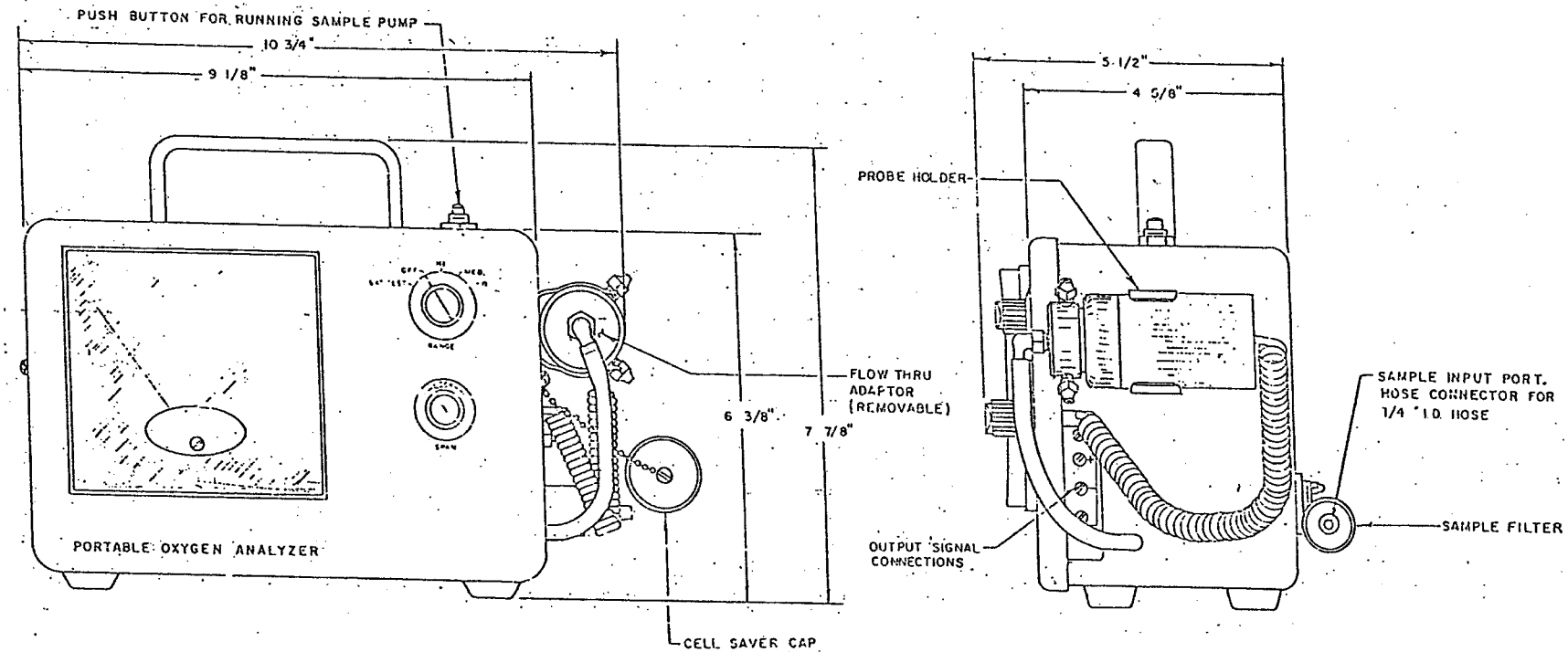
SCALE 1/1 | SIM | SHEET 1 OF 1

MATL. | DWG NO. C–12537 | REV 18

NOTES: UNLESS OTHERWISE SPECIFIED.

1. POWER CORD FOR RECHARGING BATTERIES SUPPLIED WITH INSTRUMENT.

REVISIONS				
REV	DESCRIPTION	DATE	APP.	REV. BY
3	ADD EXTERNAL FILTER	3/19/71	G	--
4	ECO# 95-737	10/27/95		TS



ITEM	QTY	PART No.	DESCRIPTION

BILL OF MATERIAL

DO NOT SCALE DWG

TOLERANCE UNLESS OTHERWISE SPECIFIED: ANGULAR ± 1/2°
LINEAR X = ± .1, XX = ± .02, XXX = ± .010

TELEDYNE BROWN ENGINEERING
Analytical Instruments
CITY OF INDUSTRY, CALIFORNIA 91748

	SIGNATURES	DATE
N/	DRFT: S	6/3/69
I/	CHK:	
P/	APPR:	
O/	ENGR:	10/27/95
F/	S.O.:	
REFERENCE	CAD I.D.	

TITLE
PORTABLE O_2 ANALYZER MDL 320P OUTLINE DIAGRAM

SCALE ---
SIM
SHEET 1 OF 1

MATL.

DWG NO. B-9734

REV 4