

882

OPERATION AND MAINTENANCE MANUAL

FOR

COMBUSTIBLE GAS DETECTION SYSTEM

MODEL 130

(Units 101 & Subs)

GENERAL MONITORS, INC.

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1.0 INTRODUCTION

The purpose of this manual is to outline calibration, operation, and maintenance procedures.

1.1 The Model 130 Combustible Gas Detection equipment represents a new approach to the old problem of discovering potentially hazardous gas concentrations before they become explosive.

The Model 130 is a unique application of miniaturized solid-state electronics to a catalytic AC bridge. The bridge, which is completely surrounded by a sintered flame arrester, is located in the hazardous area. Continuous gas sampling is accomplished by diffusion and convection.

1.2 There are two types of detectors:

TYPE I - General hydrogen, propane, and similar hydrocarbons except for methane.

TYPE II - Hydrogen, will not respond to hydrocarbons.

1.3 The readout and controls can be situated up to 2000 feet from the hazardous area without the need for additional amplification.

2.0 DESCRIPTION

2.1 The Model 130 consists of a Control Panel, a Remote Detector Probe, and a Sensing Element.

2.1.1 The Remote Detector Probe houses the Sensing Element that is a catalytic AC bridge element. The Sensing Element is completely surrounded by a sintered flame arrester.

- 2.1.2 The Control Panel has all the adjustments, indicators and controls for complete operation of the system.
- The Control Panel is a standard 19 inches wide and 3 1/2 inches high. The chassis extends to the rear a maximum of 7 inches.
- 2.1.2.1 The meter reads 0 to 100% of L.E.L. of gas being detected.
- 2.1.2.2 ALARM LEVEL adjustment is used to establish the point at which the alarm will actuate. The ALARM LEVEL is adjustable from 0 to 100% of the Lower Explosive Limit (L.E.L.)
- 2.1.2.3 ALARM light is illuminated whenever the concentration of gas being detected reaches the setting on the ALARM LEVEL adjustment.
- 2.1.2.4 UNIT TEST is a press-to-test the system switch. The switch is pressed to test the system, simulating an alarm condition.
- 2.1.2.5 POWER toggle switch is system power ON-OFF switch.
- 2.1.2.6 ELEMENT ON light indicates when the Sensing Element is functioning properly.
- 2.1.2.7 AUXILIARY ALARM toggle switch is used to turn on or off an external alarm, if connected, and an internal buzzer.
- 2.1.2.8 ALARM RESET switch gives the option of a latching alarm system or automatic reset position.
- 2.1.2.9 ZERO potentiometer is used to balance detection bridge.
- 2.1.2.10 CALIBRATE potentiometer is used to calibrate system.
- 2.1.2.11 PHASE potentiometer compensates for capacitance unbalance in connecting line.
- 2.1.2.12 Located on the printed circuit board are three potentiometers and a variable resistor.

- a. FILTER TUNE (R20) - Factory set
- b. ALARM CALIB (R37) - Factory set
- c. METER BIAS (R42) - Factory set
- d. R39 - Adjusts element current.

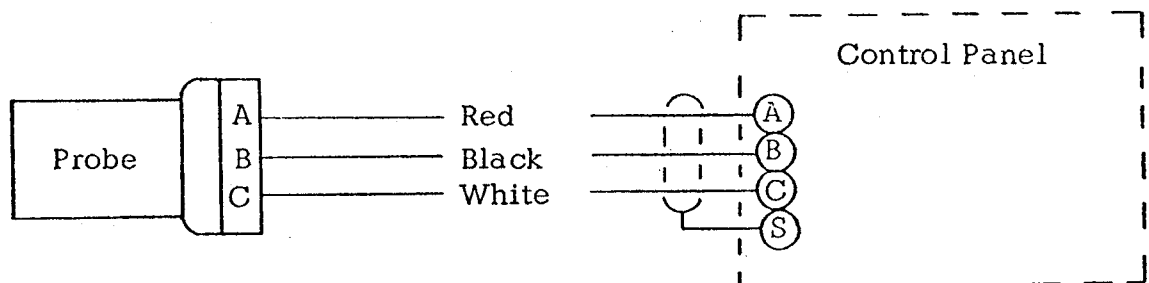
2.1.2.13 The Control Panel has a relay which provides 5 ampere alarm contact closures and a 5 ampere 117 VAC alarm signal.

3.0 INSTALLATION

3.1 Install the Remote Detector Probe in the area to be monitored and connect to the control unit with 2000 feet or less of three conductor, 18 gauge, shielded cable using standard electrical techniques. Do not ground the shield at the probe end.

Contact factory for applications over 2000 feet.

The cable shall be connected as follows:



3.2 The Remote Detector Probe should be installed with sintered guard pointing down.

3.3 The control panel can be mounted in any standard 19 inch cabinet.

3.3.1 Connect 117 VAC $\pm 10\%$ 50-60 $\sim$ power source to the terminals at the rear of printed circuit board as follows:

117VAC LINE to terminal 12

117VAC NEUTRAL to terminal 13

EARTH GROUND to terminal 14

DO NOT TURN POWER SOURCE "ON"

3.4 If external alarms are to be connected, see Figure 1 for correct terminals.

4.0 OPERATION

4.1 Calibration

Do not change any adjustments not called for in the following procedure as they are factory pre-set.

4.1.1 Ensure POWER switch is OFF. Position AUXILIARY ALARM switch to OFF. Set pointer knob on ALARM LEVEL adjustment to 100% L.E.L.

4.1.2 Loosen sliding wiper on R39 and slide wiper to bottom and re-tighten.

4.1.3 Check to see if proper bulb is installed in ELEMENT ON light socket.

TYPE I Sensing Element uses bulb #1815

use flame 1815 Bulbs

TYPE II Sensing Element uses bulb #43

4.1.4 Turn on 117VAC power source and position POWER switch to ON. ALARM light may illuminate.

4.1.4.1 After ELEMENT ON light is illuminated, set element current by adjusting R39 for normal brightness (bright-yellow-orange) of ELEMENT ON light. Raising wiper on R39 increases brilliance

- of ELEMENT ON light. Note: If element current is set too high, ELEMENT ON light will burn out, protecting sensing element.
- 4.1.5 Wait approximately one minute and adjust CALIBRATE potentiometer for approximately 80% full scale reading on meter. ALARM light will extinguish. Adjusting CALIBRATE potentiometer clockwise (CW) will raise reading and counter-clockwise (CCW) will lower reading.
- 4.1.6 Slowly adjust ZERO potentiometer for lowest reading on meter. When no further improvement can be noted, adjust PHASE potentiometer for minimum reading on meter. Turn CALIBRATE potentiometer CW and repeat.
- 4.1.7 Repeat steps 4.1.5 and 4.1.6 until CALIBRATE potentiometer is full CW.
- 4.1.8 Extend Sensing Element to Calibration Chamber (General Monitors Part No. 14 00 100) using extension cable furnished with Calibration Chamber and mix gas sample of 50% L.E.L.
- 4.1.8.1 Adjust CALIBRATE potentiometer until meter reads 50% L.E.L.
- 4.1.8.2 Replace Sensing Element into probe.
- 4.1.8.3 Slowly adjust ZERO potentiometer for lowest reading on meter. When no further improvement can be noted, adjust PHASE potentiometer for minimum reading on meter.
- Unit is calibrated.
- 4.1.9 Set ALARM LEVEL pointer to desired alarm level.

4.2 Calibration required

Unit must be recalibrated if:

4.2.1 The Sensing Elements are changed.

4.2.2 The cable connecting the detection probe to the Control Panel is greatly shortened or lengthened.

4.2.3 Unit should be recalibrated every 60 days.

5.0 MAINTENANCE

5.1 ELEMENT ON light will not illuminate.

5.1.1 Possible Cause: Defective bulb

Corrective Action: Replace bulb

5.1.2 Possible Cause: Remote detector probe not connected to control panel properly.

Corrective Action: Connect to Control Panel per Paragraph 3.1

5.1.3 Possible Cause: Sensing Element not installed in remote detector probe.

Corrective Action: Install Sensing Element

5.1.4 Possible Cause: Fuse defective

Corrective Action: Replace fuse

5.2 ELEMENT ON light illuminates very brightly or burns out.

5.2.1 Possible Cause: Sensing Element or interconnecting cable shorted.

Corrective Action: Repair as necessary

5.2.2 Possible Cause: R39 adjusted improperly

Corrective Action: Lower setting on R39

5.3 ALARM light illuminated constantly

5.3.1 Possible Cause: ALARM LEVEL set at 0% L.E.L.

Corrective Action: Set ALARM LEVEL above 0% L.E.L.

5.3.2 Possible Cause: Gas present at detector probe

Corrective Action: Remove source of gas

5.3.3 Possible Cause: Relay malfunction

Corrective Action: Replace relay K1

PARTS LIST

GENERAL MONITORS, INC.

MODEL 130 - 1 CHANNEL SYSTEM

<u>Item Number</u>	<u>Ref. Desig.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Qty/Assy.</u>
1	40	13 01 000	Control Panel	General Monitors, Inc.	1
2	40	10 11 500	Sensing Element (Type II)	General Monitors, Inc.	1 of Either
		or			
		10 11 700	Sensing Element (Type I)	General Monitors, Inc.	
3	40	13 04 000	Remote Probe	General Monitors, Inc.	1 of Either
		or			
		13 04 100			

PARTS LIST

GENERAL MONITORS, INC.

Part No. 13 01 000, Control Panel

Item Number	Ref. Desig.	Part Number	Description	Manufacturer	Qty/Assy.
1	M1	13 01 015	Meter	General Monitors, Inc.	1
2		13 01 017-1	Decal	General Monitors, Inc.	1
3		13 01 018-1	P. C. Board Assy.	General Monitors, Inc.	1
3a		13 01 019-1	P. C. Board	General Monitors, Inc.	1
3b	C1	BR2000-25	Capacitor	Cornell-Dublier	1
3c	C2, 3	P5P5D	Capacitor	Hopkins	2
3d	C4, 11, 12	K10C20K	Capacitor	Kemet	3
3e	C5, 6	WMF1S47	Capacitor	Cornell-Dublier	2
3f	C7	WMF1P1	Capacitor	Cornell-Dublier	1
3g	C8	K1C35K	Capacitor	Kemet	1
3h	C9, 10	NLW100-15	Capacitor	Cornell-Dublier	2
3i	C13	DMF2P1	Capacitor	Cornell-Dublier	1
3j	CR1, 2, 6, 7	IN4002	Diode	Motorola	4
3k	CR3	IN2977B	Diode	Texas Instruments	1
3l	CR4, 5	OMC550	Diode	Ohmite	2
3m					
3n	DS3	BU-115VAC	Buzzer	Potter-Brumfield	1
3p	F1	3AG-1 Amp	Fuse		1
3q	F2	3AG-5 Amp	Fuse		1
3r	K1	R10-T2-X3-S450	Relay	Parelco	1
3s	R2, 23, 31	RC20GF411J	Resistor		3
3t	R3, 4	995-3A-470	Resistor	Ohmite	2
		Matched $\pm$.1%			
3u	R5, 27, 34, 38	RC20GF102J	Resistor		4
3v	R6	995-3A-1	Resistor	Ohmite	1
3w	R7	RC42GF200J	Resistor		1
3x	R9	RC20GF106J	Resistor		1

PARTS LIST

GENERAL MONITORS, INC.

Part No. 13 01 000, Control Panel

Item Number	Ref. Desig.	Part Number	Description	Manufacturer	Qty/Assy.
3y	R10, 11, 12	RC20GF562J	Resistor		3
3z	R13	RC20GF153J	Resistor		1
3aa	R15	RC20GF305J	Resistor		1
3ab	R16, 24	RC20GF103J	Resistor		2
3ac	R17	RC20GF683J	Resistor		1
3ad	R18, 19	RC20GF104J	Resistor		2
3ae	R20	PA10B-10K	Potentiometer	Nucleonics	1
3af	R21	RC20GF472J	Resistor		1
3ag	R22	RC20GF225J	Resistor		1
3ah	R25	RC20GF101J	Resistor		1
3ai	R29	RC20GF222J	Resistor		1
3aj	R30	RC20GF223J	Resistor		1
3ak	R32	RC20GF271J	Resistor		1
3al	R33	CEC-T-O-2940	Resistor	I. R. C.	1
3am	R36	RC42GF470J	Resistor		1
3an	R37	U39-75	Potentiometer	Clarostat	1
3ap	R39	2-K-40-D	Resistor (Dividohm)	Ohmite	1
3aq	R40	RC20GF681J	Resistor		1
3ar	R41	RC20GF152J	Resistor		1
3as	R42	PA10B-100	Potentiometer	Nucleonics	1
3at	Q1, 2, 3, 4, 5	2N3391	Transistor	General Electric	5
3au	T1, 2	F40X	Transformer	Triad	2
3av	TB1	4-140Y	Terminal Strip	Cinch-Jones	1
3aw	TB2	15-140Y	Terminal Strip	Cinch-Jones	1
3ax	TP1	TF303R	Jack	Raytheon	1
3ay	XX1	77-MIP-11	Socket	Amphenol	1
4		13 01 022-1	Panel	General Monitors, Inc.	1
5		13 01 023-1	Chassis	General Monitors, Inc.	1

PARTS LIST

Part No. 13 01 000, Control Panel

GENERAL MONITORS, INC.

Item Number	Ref. Desig.	Part Number	Description	Manufacturer	Qty/Assy.
6		13 01 024-1	Card	General Monitors, Inc.	1
7	DS1	1815	Lamp		1
8	DS2	6S6-135	Lamp		1
9	R1,14	RQL11-114	Potentiometer	C. T. S.	2
10	R8	RQL11-116	Potentiometer	C. T. S.	1
11	R35	Type 58-20	Potentiometer	Clarostat	1
12	S1,3,4	7580K6	Switch	Cutler Hammer	3
13	S2	913	Switch	Switchcraft	1
14	XDS1	95-2710-09-102	Lampholder	Dialco	1
15	XDS2	31-18-16-111	Lampholder	Dialco	1
16		17419-S	Cord	Belden	1
17		70-4-29	Knob	Raytheon	1
18		1291-1	Handle	Cambion	2
19		1212-1	Ferrule	Cambion	4
20		135-1435	Lens	Dialco	1
21		1912 1/4H	Cardholder	Corbin	1

PARTS LIST

GENERAL MONITORS, INC.

REMOTE DETECTOR PROBES

Part No. 13 04 000

<u>Item Number</u>	<u>Ref. Desig.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Qty/Assy.</u>
1		CA3102E10SL-3S-F26-F42	Connector	Cannon	1
2		10 04 016	Sintered Guard (Bronze)		
3		13 04 010-1	Ring-Conn. Mtg.	General Monitors, Inc.	1
4		13 04 012-1	Nut	General Monitors, Inc.	1
5		EYS-3	Conduit Seal	General Monitors, Inc.	1
				Crouse Hinds	1

Part No. 13 04 100

<u>Item Number</u>	<u>Ref. Desig.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Qty/Assy.</u>
1		CA3102E10SL-3S-F26-F42	Connector	Cannon	1
2		10 04 016	Sintered Guard	General Monitors, Inc.	1
3		13 04 010-1	Ring-Conn. Mtg.	General Monitors, Inc.	1
4		10 11 113-1	Nut	General Monitors, Inc.	1
5		REC32	Reducer	Crouse Hinds	1
6		DB614	Cable Connector	Pyle National	1

RECOMMENDED SPARE PARTS

GENERAL MONITORS, INC.

Model 130 System

Item No.	Ref. Desig.	Part Number	Description	Manufacturer	Qty. Recommended Per 10 Chan. System	Price/Ea.*
1		10 11 700	Sensing Element (Type I)	General Monitors Incorporated	2 of either	\$59.00
		or				
		10 11 500	Sensing Element (Type II)			

* Prices f.o.b. shipping point and subject to change without notice.

RECOMMENDED SPARE PARTS - COMPONENTS

GENERAL MONITORS, INC.

Part No. 13 01 000 - Control Panel

Item No.	Ref. Desig.	Part Number	Description	Manufacturer	Qty. Recommended Per 10 Chan. System	Price/Ea.*
1	F1	3AG 1 Amp	Fuse	Littelfuse	5	\$.15
2	F2	3AG 5 Amp	Fuse	Littelfuse	5	.15
3	DS1	1815	Lamp	Gen. Electric	5	.45
4	DS2	6S6-135	Lamp	Gen. Electric	3	.45
5	M1	13 01 015	Meter	G. M. I.	1	9.75
6	Q1-Q5	2N3391	Transistor	Gen. Electric	5	1.45
7	CR3	IN2977B	Diode	Texas Instr.	1	10.35
8	K1	R10-T2-X3-S450	Relay	Parelco	2	8.75
9		13 01 024-1	Card	G. M. I.	10	.10

* Prices f.o.b. Shipping Point and subject to change without notice.

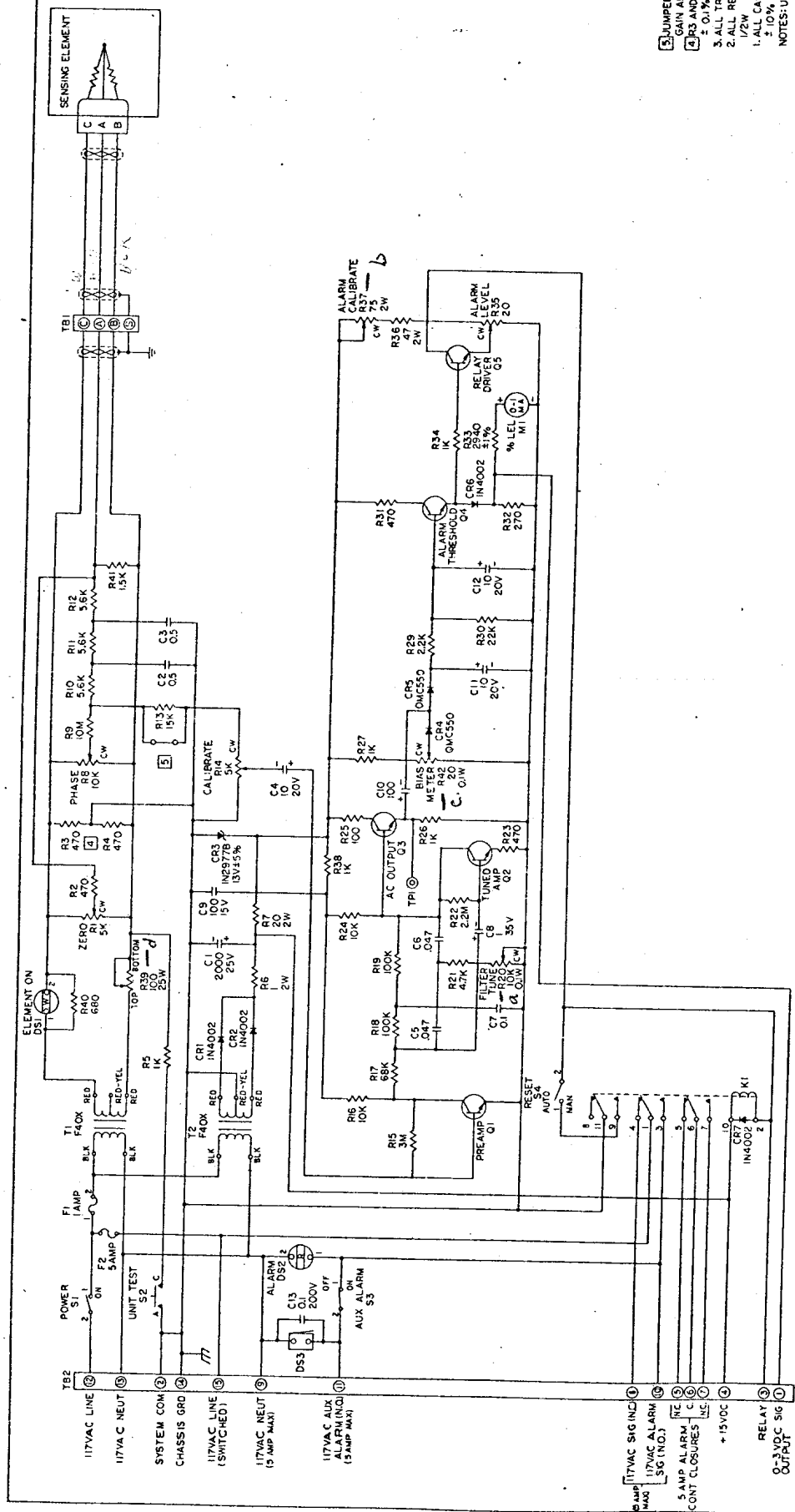
RECOMMENDED SPARE PARTS - COMPONENTS

GENERAL MONITORS, INC.

Part No. 13 04 000 or 13 04 100
Remote Probe

<u>Item No.</u>	<u>Ref. Desig.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Qty. Recommended Per 10 Chan. System</u>	<u>Price/Ea.*</u>
1		10 04 016	Sintered Guard (Bronze)	G. M. I.	3	\$ 7.00

* Prices f.o.b. shipping point and subject to change without notice.



1. JUMPER TO BE REMOVED FOR LOW GAIN AMPLIFIER TO 100% LEL
2. R33 AND R4 TO BE MATCHED TO $\pm 0.1\%$
3. ALL TRANSISTORS ARE 2N3391
4. ALL RESISTANCE IN OHMS $\pm 5\%$, $1/2W$
5. ALL CAPACITANCE IN MICROFARADS $\pm 10\%$, 100V

NOTES: UNLESS OTHERWISE SPECIFIED
FIG. 1
SCHEMATIC - CONTROL PANEL

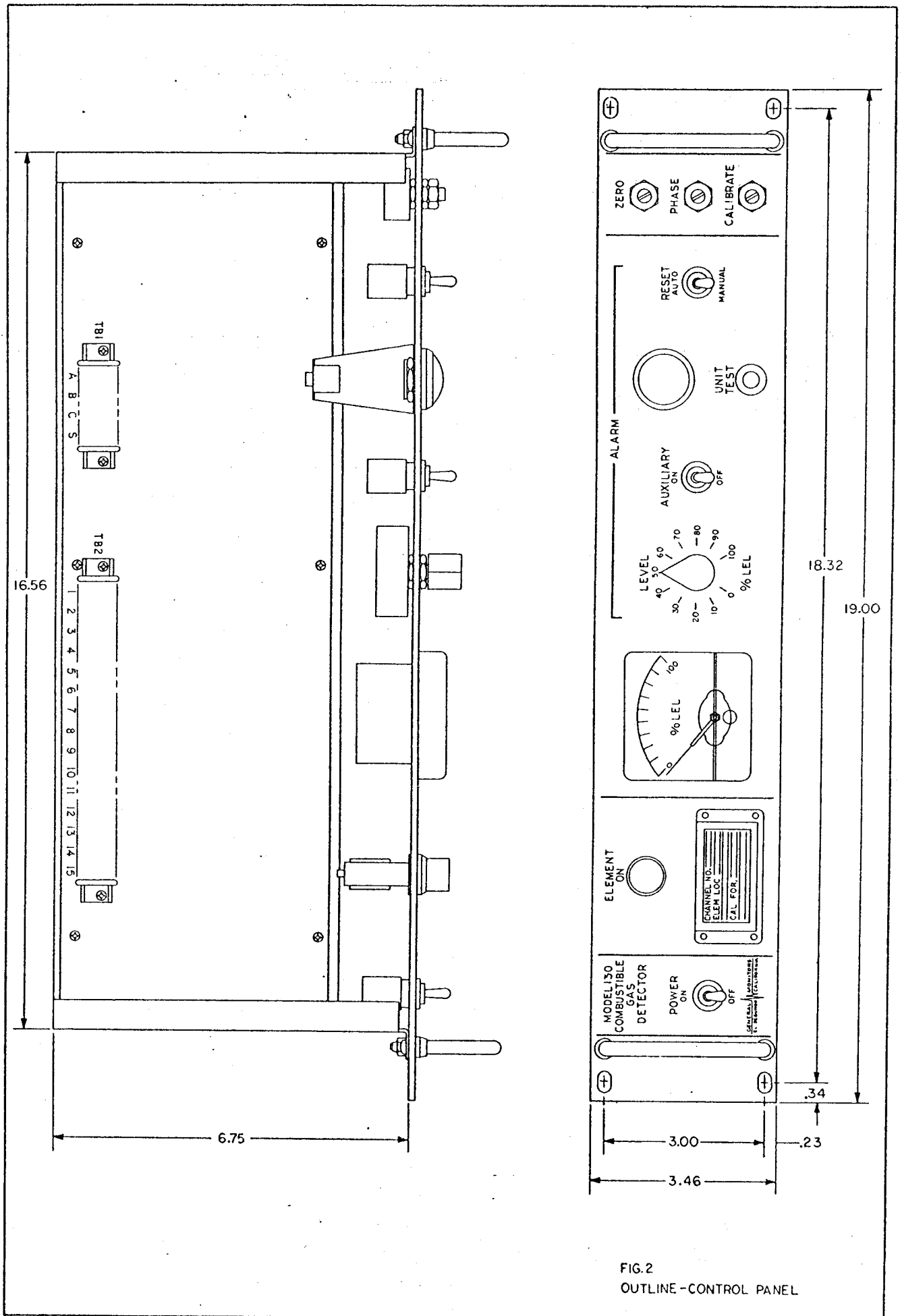


FIG.2
OUTLINE-CONTROL PANEL