

**FLUKE®**

**Biomedical**

# **Victoreen® 05-437**

## **Primalert® 35 Area Radiation Monitor**

### **Operators Manual**

**Fluke Biomedical  
Radiation Management Services**

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# Table of Contents

Section 1:	<b>Introduction</b> .....	<b>1-1</b>
1.1	Product Description .....	1-1
1.2	Specifications.....	1-2
Section 2:	<b>Getting Started</b> .....	<b>2-1</b>
2.1	Receiving Inspection.....	2-1
2.2	Mounting .....	2-1
2.3	Power.....	2-1
2.4	Optional Power .....	2-2
2.5	Routine Cleaning .....	2-2
2.6	Attaching a Ground Wire.....	2-2
Section 3:	<b>Operation</b> .....	<b>3-1</b>
3.1	Set up .....	3-1
3.2	Testing .....	3-1
3.3	Setting the Alarm Level.....	3-1
3.4	Alarm Reset .....	3-1
Section 4:	<b>Maintenance</b> .....	<b>4-1</b>
4.1	Maintenance .....	4-1

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## Section 1 Introduction

### 1.1 Product Description

The Primalert® 35 Area Radiation Monitor provides reliable, continuous monitoring of radioactive materials. Six front panel, color-coded LED's (1, 2, 4, 8, 16, and 32 mR/h) indicate an increase or decrease in radiation level. The LED for each level lights as the radiation reaches that level and goes out as the radiation drops below that level.

Visual and aural alarms are user-set to activate at anyone of the six levels via a front-panel screwdriver-adjustable control. When the preset level is exceeded, bright flashing red lights (visible over a 1800 field) and a loud intermittent signal are activated. The alarms stop automatically when the radiation level falls below the preset value. The aural alarm indicators may be selected/deselected via a front panel switch.

Fail-safe operation is assured by continuous visual (front panel LED) indication of background radiation. The unit is designed not to jam or indicate false readings at high radiation levels.

The Primalert 35 includes a jack to allow attachment of an optional Primalarm (Model 05-434) at a remote location up to 100 feet from the main unit. The Primalarm provides both audible and visual warnings.



Figure 1-1 Primalert 35 Area Radiation Monitor

## 1.2 Specifications

<b>Detector</b>	Energy-compensated G-M tube														
<b>Energy Dependence</b>	10% to 40% from 50 KeV to 2 MeV, as referenced to <sup>137</sup> Cs														
<b>Overload Protection</b>	Alarms in fields higher than 100 R/h when detector is completely blocked for pulse operation.														
<b>Operation Indicator</b>	Provide continuous visual indication of background radiation.														
<b>Range/Indicators</b>	1 mR/h: Green 2 mR/h: Green 4 mR/h: Yellow 8 mR/h: Yellow 16 mR/h: Red 32 mR/h: Red														
<b>Response Time</b>	<table><thead><tr><th><u>Level</u></th><th><u>Response Time</u></th></tr></thead><tbody><tr><td>1 mR/h</td><td>3 seconds</td></tr><tr><td>2 mR/h</td><td>1.5 seconds</td></tr><tr><td>4 mR/h</td><td>800 milliseconds</td></tr><tr><td>8 mR/h</td><td>400 milliseconds</td></tr><tr><td>16 mR/h</td><td>200 milliseconds</td></tr><tr><td>32 mR/h</td><td>100 milliseconds</td></tr></tbody></table>	<u>Level</u>	<u>Response Time</u>	1 mR/h	3 seconds	2 mR/h	1.5 seconds	4 mR/h	800 milliseconds	8 mR/h	400 milliseconds	16 mR/h	200 milliseconds	32 mR/h	100 milliseconds
<u>Level</u>	<u>Response Time</u>														
1 mR/h	3 seconds														
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4 mR/h	800 milliseconds														
8 mR/h	400 milliseconds														
16 mR/h	200 milliseconds														
32 mR/h	100 milliseconds														
<b>Alarms</b>	<p>Alarm may be preset by user at any indicated discrete level by means of the front panel selector switch; front panel switch selects all alarms or visual only.</p> <p><b>Visual Alarm:</b> bright incandescent red lamps flashing on/off approximately 1/sec.</p> <p><b>Aural Alarm:</b> 400 Hz tone, alternating 1/sec; sound level = 76 db at one foot.</p>														
<b>Operating Conditions</b>	10° C to 40° C (50° F to 104° F) Maximum of 90% relative humidity (non-condensing)														
<b>External Connectors</b>	Jack located on case bottom allows attachment of external aural/visual alarm (Primalarm) at remote location.														
<b>Power Supply</b>	Part 14-314 (United States, Canada) Input 117 VAC, 60 Hz, 12 W Output 12 VDC, 500 mA  Part 14-400 (Europe) Input 230 VAC, 50 Hz, Output 12 VDC, 500 mA  Part 14-417 (United Kingdom)														

Input 230 VAC, 50 Hz, 13.8 W  
Output 12 VDC, 580 mA

Part 14-417, Part 14-416 (Australia)

**Dimensions**

5.9 in. high x 3.4 in. wide x 13 in thick Unit clips to wall with removable mounting clip.

**Accessories Supplied**

Appropriate 115V (230) CE approved converter

P/N 102007: Wall Mounting Bracket

P/N 74: Spare Lamp

Available:

P/N 05-441: PrimaPak™ II Backup Battery Pack

P/N 05-434: Primalarm™ Remote Alarm unit.

P/N 62-103: Check-source, <sup>137</sup>Cs, 10 μCi, License Exempt

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## Section 2

# Getting Started

### 2.1 Receiving Inspection

Upon receipt of the unit:

1. Inspect the carton(s) and contents for damage. If damage is evident, file a claim with the carrier and notify Fluke Biomedical, Radiation Management Services at 440.248.9300.
2. Remove the contents from the packing material.
3. Verify that all items listed on the packing list have been received and are in good condition.

NOTE

If any of the listed items are missing or damaged, notify Fluke Biomedical.

### 2.2 Mounting

The mounting bracket supplied (P/N 102007) may be attached to any convenient vertical mounting surface. Before mounting the bracket to the wall, however, make sure that the 6 ft. converter power cord will reach the nearest power outlet.

The wall-mounting bracket comes supplied with double-sided foam tape already attached. Just peel off the protective paper covering and firmly apply to the mounting surface.

CAUTION

Once in place the bracket cannot be moved or removed without destroying the tape. Make sure of your installation site before applying.

### 2.3 Power

The plug on the end of the converter power cord should first be inserted into the larger jack on the bottom of the Primalert. The converter should then be plugged into the wall outlet.

Note that when first connected to power, the Primalert may alarm for as long as three seconds before the automatic reset is actuated.

## **2.4 Optional Power**

The Primapak II storage battery supplies a source of 12-16 Volt DC power to the Primalert using the converter plug connection. The plug is a Switchcraft #760, or equivalent, with the sleeve negative and pin positive. The current drain at background radiation levels is about 25 mA, and about 250 mA at full alarm levels.

The optional Primapak II Back-up Battery Pack, Model No. 05-441, is available as an optional power source for the Primalert. The Primapak II consists of rechargeable gel cells and circuitry that switches the Primalert to battery operation if line power is lost. When AC power is present, the battery is automatically recharged. Fully charged cells provide approximately eight hours of operation under alarm conditions or more than 32 hours of operation. The Primapak II includes a 120VAC/16VAC converter and interconnect cable.

## **2.5 Routine Cleaning**

**CAUTION**

Do not immerse the Model 05-437 Primalert. The unit is not waterproof. Liquid could damage the circuits. The unit should be kept clean and free from dirt and contamination. The unit may be cleaned by wiping with a damp cloth using any commercially available cleaning or decontaminating agent.

## **2.6 Attaching a Ground Wire**

If required, use the following procedure to attach a separate ground wire to the instrument:

1. Loosen the screw in the center of the back cover.
2. Remove the back cover.
3. Attach a wire to the ground terminal by running it up through the small hole between the jacks.

**NOTE**

At least #16 gauge wire should be used for this purpose.

4. Replace and secure the back cover.

## **Section 3**

# **Operation**

### **3.1 Set Up**

The only set-up required for the Primalarm is the attachment of one end of the power cord (converter) to the unit and the other end into a properly grounded AC outlet as noted in Section 2.

When power is first applied to the unit, the alarm and one or more of the LED's may light. After a maximum of three seconds, the indicators will extinguish and the alarm will reset.

The unit should now be operational with the OPERATION INDICATOR LED flashing on or off with each background pulse received.

The Primalert 35 is a fully digital preset count instrument. The measurement and reset time are dependent on count rate. Refer to the response time specifications listed in Section 2.

### **3.2 Testing**

Test the unit for proper operation by positioning the check source (P/N 62-103) as indicated on the front panel. With the check source label down, the Primalert 35 should indicate between 2 and 8 mR/h; with the label up, it should indicate between 1 and 4 mR/h.

### **3.3 Setting the Alarm Level**

The Alarm Level may be set with a small screwdriver from the front panel. Alarm levels from 1 to 32 mR/h may be set. When the radiation exceeds the setting, the alarm will be actuated.

### **3.4 Alarm Reset**

The alarm reset on the Primalert 35 is automatic and both aural and visual alarms will stop when the radiation level drops below the Alarm Level setting.

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## Section 4 Maintenance

### 4.1 Maintenance

WARNING

This instrument contains CMOS integrated circuits. No service should ever be attempted unless by a qualified service technician thoroughly familiar with these devices. Static charges normally present in a dry atmosphere or leakage current in soldering irons or other non-grounded tools can instantly destroy CMOS integrated devices. If this device has I.C. sockets, do not even attempt to remove or replace them.

WARNING

Failure to conduct periodic performance test in accordance with ANSI N323.1978, Paragraphs 4.6 and 5.4, and to keep records thereof in accordance with Paragraph 4.5 of the same standard, could result in erroneous readings or potential danger. ANSI N323.1978 becomes, by this reference, a part of this document.

An assembly drawing (Figure 4-1), schematic diagram (Figure 4-2), PC board component layout (Figure 4-3), and applicable parts lists (Tables 4-1 and 4-2) are provided for the user's reference.

*Table 4-1. Main Assembly (126028) Parts List*

Item No.	Part No.	Description	Qty
5	126021	PC B Assembly	1
6	126026	Panel	1
7	126027	Case	1
8	102009	Reflector	1
9	102008	Lens	1
12	500002	SPDT Switch	1
14	0960008	Parker 2-006 O-ring	1
16	5-1078	Screw, 5-20 XI	1
17	5-99	Screw, 1-72 x 3/16	2
18	5-26	Screw, 4 x .25	3

**Table 4-2. PC Board Assembly (126021) Parts List**

<b>Item No.</b>	<b>Ref. No.</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty</b>
6	V1	010054	Tube Shield Assembly	1
7	U1, 4	630001	IC, Quad Nor Gate, 4001 UB	2
8	U7	630002	IC, Quad Nand Gate, 4011 UB	1
9	U5, 6	630006	IC, Quad Latch, 4043B	2
10	U2, 3	630008	IC, 12 Stage Counter, 4040BE	2
12	D1	600005	Diode 1N5243B	1
13	D2, 3,4	600001	Diode 1N4006RL	3
14	D5, 6	600003	Diode 1N414B	2
15	Q1, 2	620001	Transistor 2N4124	2
16	Q4-9	620003	Transistor, S.C.R. MCR-103	6
17	Q11, 12	620003	Transistor, MPS-A13	2
18	11,2	680009	REDT-1 Hi-Intensity LED	2
19	13,4	680008	Yellow T-1 LED	2
20	15-7	680007	Green T-1 LED	3
23	A1	710002	12 VDC Audio Alarm	1
24	U8	640001	IC, +6 V Regulator, 78M06	1
25		5-196	Screw, PH, 4-40 x .38	1
26		5-764	Washer, INT, 4, s, CP	1
27		5-850	Nut, Hex, 4-40, 5, CP	1
28		0911403	Screw, BH, 6-32 x .25, 5	1
29		5-766	Washer, INT, 6, 5, CP	1
30		0976002	Binding Post, 6-32 PCB MNT	1
31	110-11	780006	Lamp Holder, T-1 3/4 PCB MNT	2
32	110-11	680010	Lamp, T-1, 3/414 V @ 1A, #74	2
33	T1	780013	Microphone Jack	1
34	A1	780014	Power Jack	1
35	C1	212221	Cap, Film, 2200 PF, 250 V, 10%	1
36	C8, 14,16, 17	211031	Cap, Film, .01 $\mu$ F, 250 V, 10%	4
37	C13, 15,23	211032	Cap, .01 $\mu$ F, 100 V, 20%	3
38	C5, 7,20	211041	Cap, Film, .1 $\mu$ F, 160 V, 10%	3
39	C6, 22	232252	Cap, Tant, 2.2 $\mu$ F, 16 VDC, 20%	2
40	C9, 10,11	201031	Cap, .01 $\mu$ F, 1000 V, 20%	3
41	C21	214741	Cap, Film, .47 $\mu$ F, 100 VDC, 10%	1
42	C3, 4	201021	Cap, 1000 PF, 500 V, 20%	1
45	R2, 5-10,37	185-1434	Resistor, Film, 510k, .25W, 5%	8

46	R22, 23	302041	Resistor, Film, 200k, .25W, 5%	2
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47	R20, 26,30, 32,33,38,	341041	Resistor, Film, 100k, .25W, 5%	6
49	R27, 29,31, 34,40	341032	Resistor, Film, 10k, .25W, 5%	5
50	R13-18, 28	185-1448	Resistor, Film, 200, .25W, 5%	7
51	R24	185-2496	Resistor, Film, 2k, .25W, 5%	1
52	R25, 41	342031	Resistor, Film, 20k, .25W, 5%	2
53	R21, 39	303351	Resistor, Film, 3.3m, .25W, 5%	2
54	R3	391052	Trim Pot, 1M, .5w, 20%, Open	1
55	R36	300501	Resistor, Film, 5.1, .25W, 5%	1
57	T1	700003	Transformer, H.V., OSC	1
58	S1	560009	Switch, Rotary, 6-pos,	1
59		44-16	Washer, Flat, .25 ID/.41 OD	1
60		33-139-16	Socket, 16-Pin IC, PCB MNT	4
61		33-139-14	Socket, 14-Pin IC, PCB MNT	3
63		0998002	Double-sided Tape, 3/4 x 1 1/16	1RL

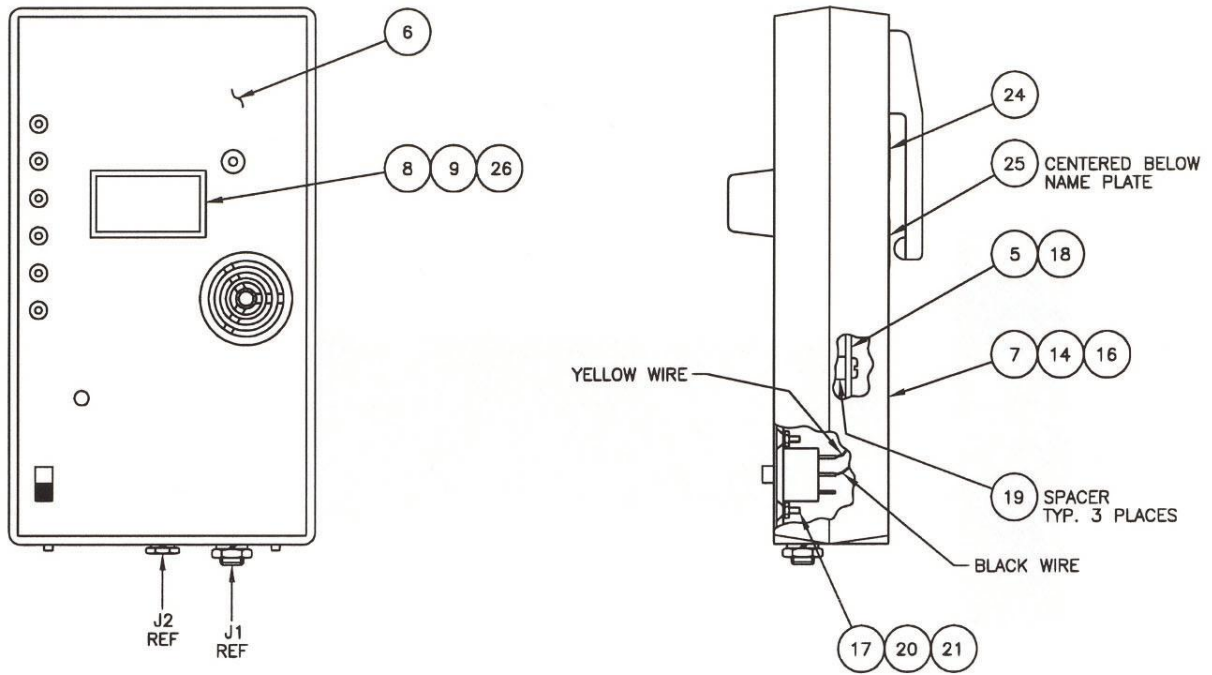


Figure 4-1 Primalert 35 Assembly (126028)



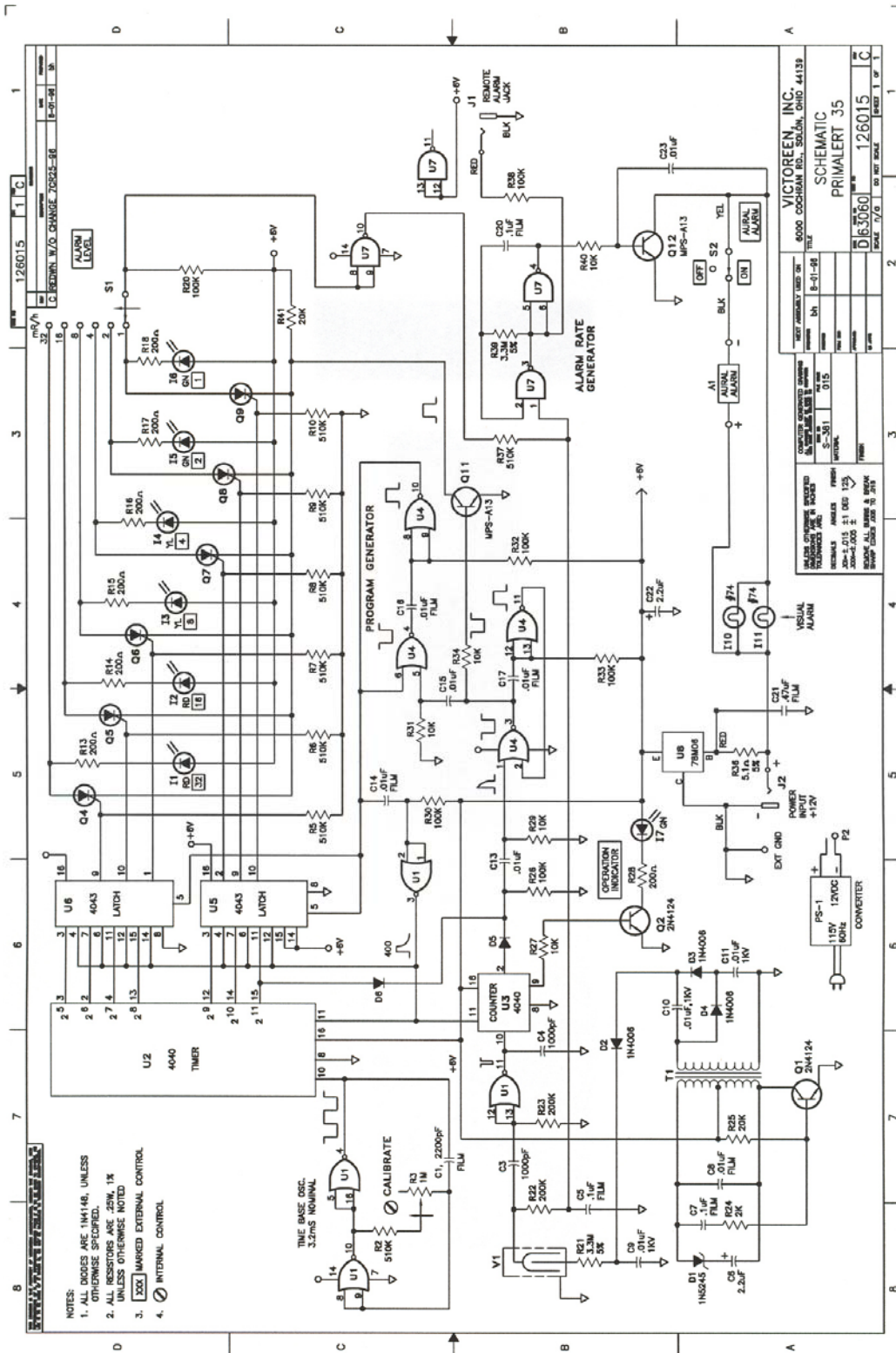


Figure 4-2 Primalert 35 Schematic (126015)

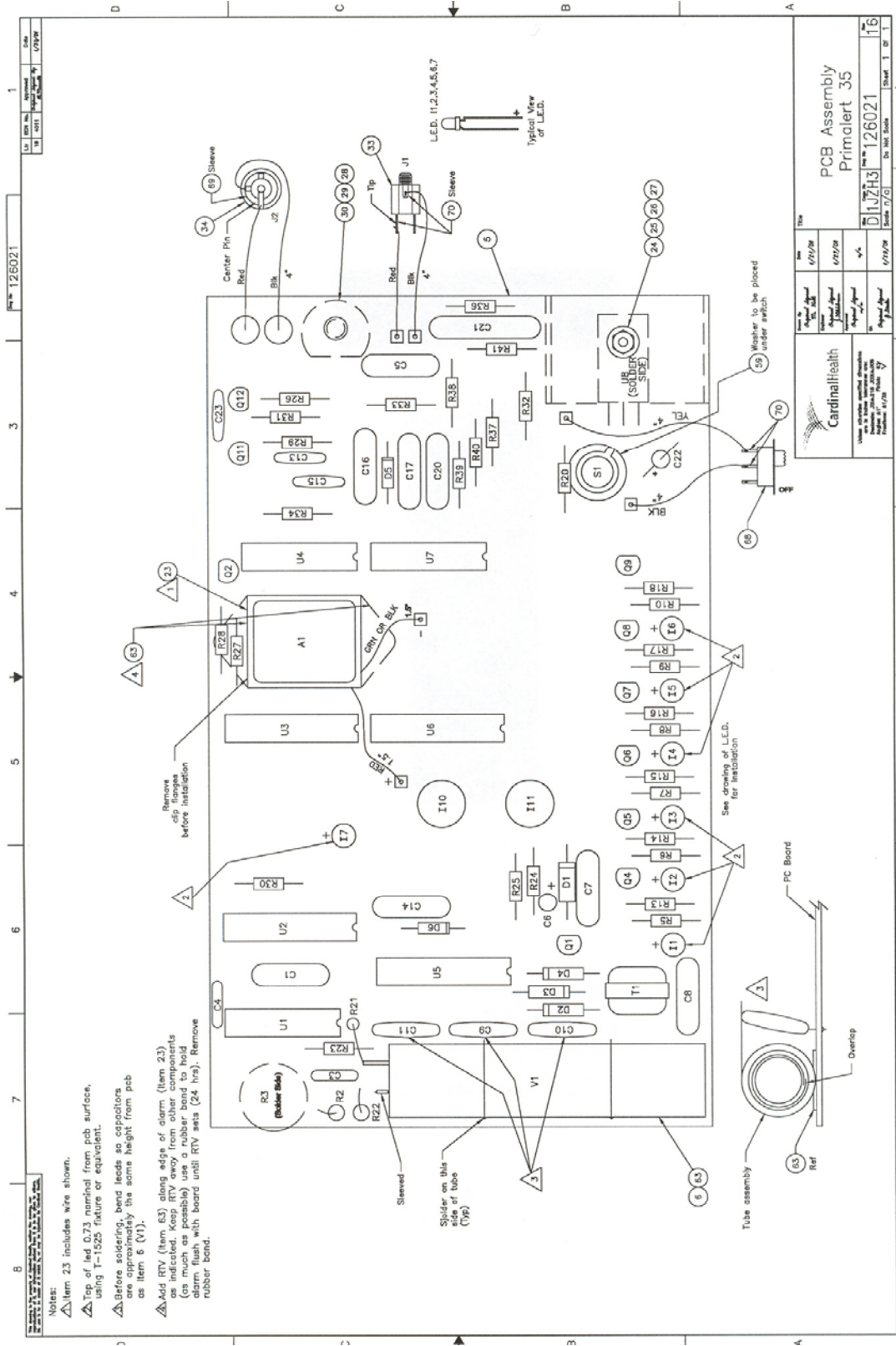


Figure 4-3 PC Assembly (126021)



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