CANARY III REPAIR MANUAL

October 1998

Health Physics Instruments

GENERAL INFORMATION

The Canary III Model 4083 is manufactured by:

Health Physics Instruments

330 D South Kellogg Ave.

Goleta, CA

USA

Tel: 1.805.964.3615

Fax: 1.805.964.3162

e-mail: info@fwt.com

Health Physics Instruments is a division of Far West Technology.

Health Physics Instruments is sometimes abbreviated HPI.

REPAIR SERVICE

If service is needed on this instrument please call our service department before shipping the instrument to us for repair. Often we can help you with simple problems. If you do decide to return it to us for repair then please include:

1. Contact person's name
2. Organization or Company name
3. Address
4. Phone number of Contact person
5. Description of the problem
6. Anything else you may think important

We will inform you of the repair charges and wait for your authorization before we repair your instrument.

For overseas returns please obtain an authorization first. We do not usually accept charges from overseas repairs without the authorization.

I.   INTRODUCTION

The Canary III is an electronic personnel dosimeter that measures integrated dose in mR. The instrument is small, light, and rugged. In addition it has several features:

- ■ Variable Beeper
- ■ Variable Integrate Alarm
- ■ Long Battery Life
- ■ Memory Feature
- ■ 6 Digit Display
- ■ Battery Test Button

II.   OPERATION

Operation of the Canary III is very easy. It is supplied with batteries already installed. To turn the instrument on, turn the switch on the top marked ON in the direction of the arrow. The display will display 0. To check the condition of the battery push the button on the top marked BAT TEST. If the battery is good the beeper will beep. If the battery is bad the beeper will not beep at all. When the beeper warbles the instrument has at least 8 hours remaining on the battery.

To reset the instrument and the display, turn the instrument off for 5 seconds then back on. The display should now show 0.

The beeper beeps every preset interval. The integrate alarm turns the beeper on continuously when its level is reached. To turn it off it is necessary to turn the instrument off. Note: this will of course also destroy the radiation reading. As supplied, the integrate alarm is turned off and the beeper is set to beep every mR. To change these settings see below.

III.   BATTERY CHANGE

To change the batteries the front of the instrument needs to be removed. First make sure the instrument is off. Turn the instrument over and place it face down on a table and look at the back. on the end opposite the clip is a slot for a screwdriver. Insert a medium size screwdriver into the slot about 1/8 inch. The screwdriver should be vertical. Twist the screwdriver to pry the bottom out. Then keeping the screwdriver only 1/8 inch into the case pry the back away from the front. The two tabs holding the front on are located on each side of the bottom.

The batteries are 2 ea. # BR2325. They are Lithium coin cells. To remove the old batteries insert the tapered end of the battery removing tool between the two batteries and gently pull the top battery out. Insert the tool under the bottom battery and pull it out. The new batteries are slipped in one at a time. The polarity is marked on the battery holder.

To replace the front, put the switch end on first, then snap it over the bottom.

IV.   INTERNAL CONTROLS

There are four internal controls, Alarm and beeper set, display memory and calibration adjust. They are accessed by removing the front panel as described under the battery change section.

DISPLAY

A B C D E F G
H I J K L M N

	Integrate Alarm Red Wire	BEEPER White Wire
A	1	2
B	XX	aprox .1
C	4	8
D	8	16
E	64	128
F	16	32
G	XX	1
H	OFF	OFF
I	2	4
J	256	512
K	128	256
L	512	1024
M	1024	2048
N	32	64

Levels in mR
XX DO NOT USE

A.   ALARM AND BEEPER SET

The alarm and beeper set are located in the center of the instrument and consist of two jumper wires, one red and one white that are pushed into the holes in the switch block. The white wire is the Beeper and the red wire is the integrate alarm. The table shows the levels for each position on the block for each wire. A copy of this table is inside the front cover. Note that the same position has different meanings for each wire. Both wires cannot occupy the same position. The integrate alarm should be set higher than the beeper or the beeper/alarm may not function properly. If no alarms or beepers are wanted we suggest setting the beeper to off and the integrate alarm to 1024. This will result in the instrument beeping only if 1024 mR was reached which is a good safety alarm.

B.   DISPLAY MEMORY

The display has two possible modes of operation, normal and memory. These are set by a jumper to the left of the display. When the jumper is on the two lower pins it is in the memory mode. In this mode the display is powered all the time. When the instrument is turned off the display will not turn off and the data that was in the display will be retained. When the instrument is turned on the display will reset to zero. Since the display is on all the time the instrument will appear to be turned on even if it is turned off. An operational check for the instrument is to push the battery test button, If the beeper does not beep then either the instrument is off or the instrument is on and the batteries are dead. Either way the instrument is not operative.

If the jumper is on the top two pins then the display is in the normal mode and the display will turn off when the instrument is turned off.

NOTE: For long term storage use the normal mode. With the instrument turned off the batteries will still operate after 10 years in the normal mode but will be dead after 1 year in the memory mode.

V.   CALIBRATION

The instrument is calibrated in a known radiation field. Expose the instrument from the front. With the instrument standing up the center of the detector is centered front to back, 5/8 in from the bottom and 1/4 in from the left side if the display is facing you. If the cover is removed during calibration, lay it in front of the detector module. The detector should be exposed through the cover just as it would be in normal operation.

The instrument can be exposed at any dose rate from 10 to 1000 mR/h for calibration purposes. We recommend exposing it to 600 mR/h (10 mR/minute) and timing the exposure for 1 minute. The display should read 10 mR. Longer times of 10 minutes should result in a display of 100. The calibration pot on the lower left hand side of the circuit board controls the sensitivity of the instrument. Adjust it for a correct reading. If the reading is off more than + or - 40% it may be necessary to change the divide by solder jumpers on the bottom of the board. Please consult the factory for this change.

VI.   CIRCUIT DESCRIPTION

The module M17 is a solid state detector and amplifier. The pulses from this module are amplified by U1A and then discriminated by the base voltage of Q1. The resulting pulses are squared up by U4 and fed to the binary counter U2. This counter divides the counts by 12 before they are counted by the display or fed to the beeper counter.

The display is also a module that contains a display and counter. The integrate alarm is U5, a binary counter. The selection of which tap on the divider determines the alarm and beeper level. The beeper circuit is a pulse stretched R16 and C16 with three stages of U4 driving the beeper.

The discriminator for the pulses, Q1, is biased to the proper level by the calibrate pot, R9. D2 is a voltage reference. U1B is the discriminator for the battery test button. R13 and C7 form a power on reset signal.

VII. PARTS LIST

DESIGN	QUAN	PART NO	TYPE	DESCRIPTION	MFG
B1	1	BR2325	Lithium	Battery, Coin Cell	
B2	1	BR2325	Lithium	Battery, Coin Cell	
BZ1	1	MEB-12C-5		Buzzer, Mono	
C01	1		0.001 uF	Capacitor, Mono	
C02	1		0.001 uF	Capacitor, Mono	
C03	1		0.1 uF	Capacitor, Mono	
C04	1		0.01 uF	Capacitor, Mono	
C05	1		0.1 uF	Capacitor, Mono	
C06	1		0.01 uF	Capacitor, Mono	
C07	1		0.1 uF	Capacitor, Mono	
C08	1		10 uF 6 VDC	Capacitor, Tant	
C09	1		0.001 uF	Capacitor, Mono	
C10	1		0.1 uF	Capacitor, Mono	
C11	1		33 uF 6 VDC	Capacitor, Tant	
D1	1	1N4148		Diode, Hi Speed	
D2	1	1N4148		Diode, Hi Speed	
D3	1	1N4148		Diode, Hi Speed	
D4	1	1N4148		Diode, Hi Speed	
J1	1	9299375-01-36		Header	3M
M01	1	KFS2-256	2-56	Pem Nut	PEM
M02	1	BH906S		Battery Holder	
M03	1	4083-005		Circuit Board	HPI
M04	1	4083-002		Case, Front Cover	HPI
M05	1	4083-001		Case, Back Cover	HPI
M06	1		2-56x3/16	Screw, But Hd Cap	
M07	1	POS-7001130S27		Potting Shell	
M08	1	4083-MAN		Instruction Manual	HPI
M09	1	4083-TOOL		Bat Removing Tool	HPI
M10	1	1/2 x 1/8 thk		Tape, Foam DS	3M
M11	2	1/2 x 1/8 thk		Tape, Foam SS	3M
M12	1			Rivet	Harco
M13	1			Washer, Clip	
M14	1			Clip	
M15	1			Bag, Storage	
M16	1			Jumper, Shorting	
M17	1	4083-Module		Module, Detector	HPI
P1	1	929835-12-36		Plug, RA male	3M
P2	1	929835-12-36		Plug, RA Male	3M
P3	1	T44		Stake	Vector
P4	1	T44		Stake	Vector
P5	1	T44		Stake	Vector
Q1	1	2N3392		Transistor, NPN	
R01	1		100K	Resistor, 1/8W 5%	
R02	1		750K	Resistor, 1/8W 5%	
R03	1		470K	Resistor, 1/8W 5%	
R04	1		1M	Resistor, 1/8W 5%	
R05	1		2.2M	Reisitor, 1/8W 5%	
R06	1		100K	Resistor, 1/8W 5%	
R07	1		300K	Resistor, 1/8W 5%	
R08	1		200K	Resistor, 1/8W 5%	
R09	1	36C15	100K	Resistor, Trimmer	Panasonic
R10	1		1M	Resistor, 1/8W 5%	
R11	1		91K	Resistor, 1/8W 5%	
R12	1		1M	Resistor, 1/8W 5%	
R13	1		1M	Resistor, 1/8W 5%	
R14	1		1M	Resistor, 1/8W 5%	
R15	1		1M	Resistor, 1/8W 5%	
R16	1		1M	Resistor, 1/8W 5%	
R17	1		1K	Resistor, 1/8W 5%	
S1	1	TSS11DGRA	SPDT	Switch, Finger Slide	Alco
S1	1	TSS11DG1RA	SPDT	Switch, Recessed	Alco
S2	1	EVQ-QS205K	SPST	Switch, Push 5mm	Panasonic
U1	1	TLC27L2CP	IC	Dual Op Amp	TI
U2	1	CD40103BE	IC	8 Bit DN CTR	RCA
U3	1	SCUB 1000	MONO	DIAPLAY/COUNTER	RD LYN CTR
U4	1	MC14584BCP	IC	Hex Sch Trig	Mot
U5	1	CD4040BE	IC	14 Bit Bin Ctr	RCA