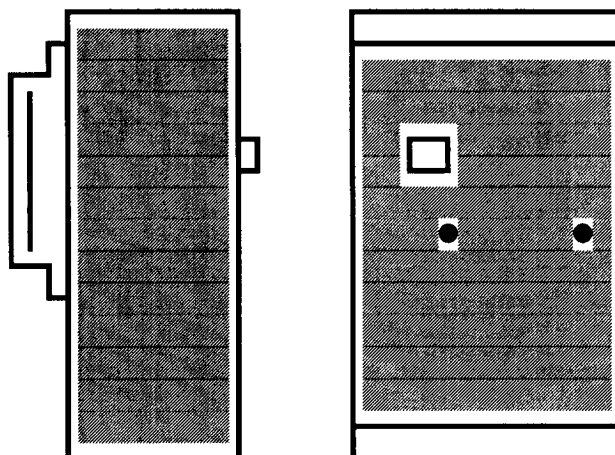


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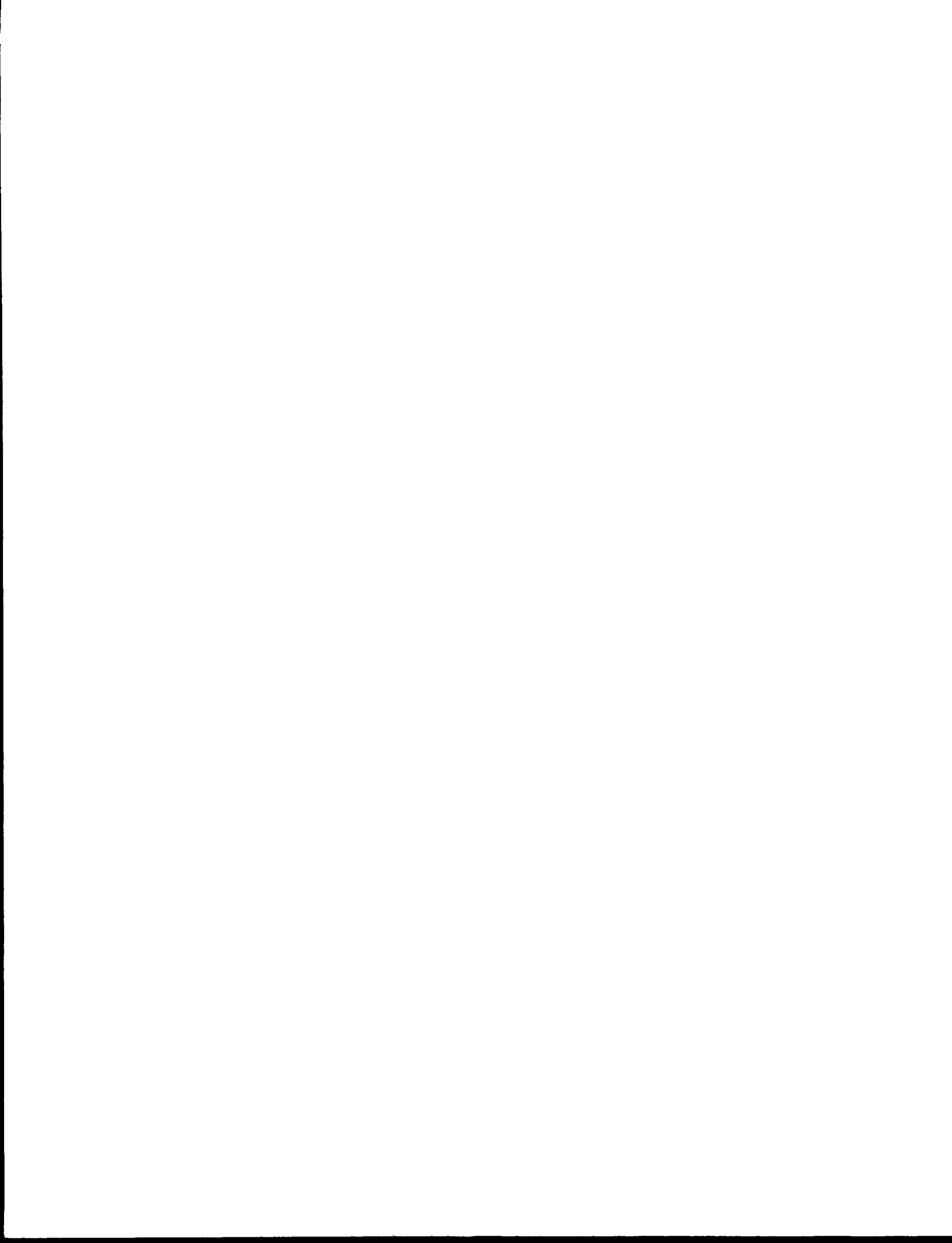
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info@ndsproducts.com



RA-500 PERSONAL RATE ALARM OPERATION MANUAL

(OPTIONS INCLUDED)

111 ANDERSON, PASADENA TX 77506, PHONE 713/475-2986, FAX 713/477-6741



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RA-500

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NOTE: DUE TO NDS PRODUCTS' CONTINUING PROGRAM OF RESEARCH & DEVELOPMENT, ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE AND MAY BE VARIED AT OUR DISCRETION.

RA-500

1.0 USER CAUTION AND WARNINGS:

THE EQUIPMENT HEREIN IS DESIGNED AND MANUFACTURED IN COMPLIANCE WITH ALL APPLICABLE SAFETY STANDARDS; NEVERTHELESS, CERTAIN HAZARDS ARE INHERENT IN THE USE OF ALL ELECTRONIC EQUIPMENT. ADEQUATE WARNINGS ARE INCLUDED IN THIS MANUAL AND ON THE PRODUCT ITSELF TO COVER HAZARDS THAT MAY BE ENCOUNTERED IN NORMAL USE AND SERVICING OF THIS EQUIPMENT. NO OTHER PROCEDURES ARE WARRANTED BY NDS PRODUCTS. IT SHALL BE THE OWNER'S OR USER'S RESPONSIBILITY TO ASSURE THAT THE PROCEDURES HEREIN ARE METICULOUSLY FOLLOWED, AND ESPECIALLY THAT THE WARNING AND CAUTIONARY NOTES ARE HEEDDED. FAILURE ON THE PART OF THE USER IN ANY WAY TO FOLLOW THE PRESCRIBED PROCEDURES SHALL OBSOLVE NDS PRODUCTS AND ITS AGENTS FROM ANY RESULTING LIABILITY.

READ YOUR OPERATION MANUAL

2.0 WARRANTY:

NDS PRODUCTS WARRANTS THAT THE PRODUCTS COVERED HEREBY SHALL BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR FROM DATE OF NDS PRODUCTS' SHIPMENT (GM TUBE IS WARRANTED BY THE OEM FOR 90 DAYS). THE FOREGOING WARRANTY DOES NOT APPLY TO ANY PRODUCTS WHICH HAVE BEEN SUBJECT TO MISUSE (INCLUDING STATIC DISCHARGE), NEGLIGENCE, ACCIDENT, OR MODIFICATION. NDS PRODUCTS' SOLE OBLIGATION TO BUYER HEREUNDER FOR PRODUCTS FAILING TO MEET THE AFORESAID WARRANTY SHALL BE, AT NDS PRODUCTS' DISCRETION, TO REPAIR AND RECALIBRATE THE NONCONFORMING PRODUCT OR TO REPLACE THE NONCONFORMING PRODUCT WHERE WITHIN THE WARRANTY PERIOD: 1) THE BUYER HAS RETURNED THE NONCONFORMING PRODUCT TO NDS PRODUCTS, FREIGHT PREPAID, & 2) NDS PRODUCTS HAS DETERMINED THE PRODUCT IS NONCONFORMING AND THAT SUCH NONCONFORMITY IS NOT A RESULT OF IMPROPER USE, REPAIR, MODIFICATION OR OTHER MISUSE BY BUYER.

THE FOREGOING WARRANTY AND REMEDIES ARE EXCLUSIVE AND ARE MADE EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE. NDS PRODUCTS NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OR USE OF ITS PRODUCTS, AND NDS PRODUCTS MAKES NO WARRANTY WHATSOEVER FOR PRODUCTS NOT MANUFACTURED BY NDS PRODUCTS. NDS PRODUCTS SHALL NOT BE LIABLE FOR DAMAGES DUE TO DELAYS IN DELIVERIES OR USE AND SHALL IN NO EVENT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND; WHETHER ARISING FROM CONTRACT, TORT, OR NEGLIGENCE, INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF GOODWILL, OVERHEAD OR OTHER LIKE DAMAGES.

3.0 DESCRIPTION:

THE MODEL RA-500 IS A BELT WORN RATE ALARM WHICH PROVIDES AN IMMEDIATE AUDIBLE INDICATION IN RADIATION FIELDS IN EXCESS OF 500 mR/hr.

THE SIGNALS ARE HIGH PITCHED "CHIRPS" AT 450 mR/hr WHICH BECOMES A SOLID TONE AS THE RADIATION INCREASES. THE RA-500 MEETS 10 CFR 34.33 FOR PERSONAL MONITORING.

FEATURES INCLUDE: A RUGGED TWO PIECE DIE-CAST ALUMINUM CASE; A SYSTEM TEST WHICH INCLUDES BATTERY TEST (RED LED LIGHTS WHEN BATTERY IS GOOD) COUPLED WITH AN AUDIBLE ALARM TEST; CONTROLS ARE RECESSED OR PROTECTED WITH A GUARD TO MINIMIZE BREAKAGE AND ACCIDENTAL TURN OFF.

4.0 SPECIFICATIONS:

4.1 RADIATION DETECTED:.....GAMMA & X-RAY, 60-1500 KeV

4.2 CONTROLS:.....ON/OFF SWITCH
BATTERY INDICATOR LIGHT
BATTERY AND AUDIO PUSHBUTTON CHECK SWITCH4.3 DETECTOR:.....HALOGEN QUENCHED, ENERGY
COMPENSATED, GEIGER MUELLER TUBE

4.4 ALARM OUTPUT:.....100 dB MINIMUM AT 6 INCHES

SOLID STATE AUDIO TONE TRANSDUCER. ACTIVATES
AT 450 mR/hr WITH A CHIRPING SOUND,
BECOMES A SOLID TONE AS FIELD INTESIFIES.
ACCURACY +/- 20%

4.5 POWER:.....9 VOLT BATTERY (EVEREADY EN22 OR EV22)

4.5 BATTERY LIFE:.....APPROX. 6 MONTHS IN NORMAL USE.

BATTERY LIFE IS SHORTENED WHEN ALARM IS
ACTIVATED. WITH FULL LOAD (CONSTANT ALARM
AT 500 mR/hr) BATT LIFE WILL BE 50 HOURS
USING EN22 (ALKALINE BATT), EV22 SUPPLIED.4.6 DIMENSIONS:.....2.5 INCHES WIDE x 4.25 INCHES LONG
x 1.25 INCHES DEEP (NOT INCLUDING BELT LOOP)

4.7 WEIGHT:.....8 OUNCES INCLUDING BATTERY

4.8 EXPOSURE RATE LIMIT:.....GREATER THAN 1000 R/hr

4.9 ENVIRONMENTAL EFFECTS:

TEMPERATURE:.....-10 TO +50 DEG C

RELATIVE HUMIDITY:..... 0-90% OVER TEMP RANGE

4.10 CALIBRATION:.....ONE POTENTIOMETER ADJUSTMENT

EACH UNIT IS CALIBRATED AND CERTIFIED FOR ONE YEAR

4.11 WARM UP TIME:.....NONE REQUIRED

4.12 OPTIONS:

BELT LOOP (STANDARD) OR CLIP

SINGLE EARPHONE WITH EAR LOOP, 3 FOOT PLUG-IN CORD

SUN-BRIGHT RED FLASHING L.E.D., INTESIFIES WITH RADIATION FIELD

5.0 INSTRUMENT LIMITATION (SATURATION) * CAUTION *

IT IS A WELL KNOWN PHENOMENON THAT ALL GEIGER-MUELLER TUBE INSTRUMENTS SATURATE OR OVERLOAD AT SOME POINT (THIS MAY ALSO BE CALLED FLOODING OR JAMMING). THIS PARTICULAR MODEL WILL SATURATE WHEN IN A RADIATION FIELD IN EXCESS OF 1000 R/hr WHEN IT HAS BEEN PROPERLY MAINTAINED. IF THE RADIATION FIELD IS IN EXCESS OF 1000 R/hr, ONE OF TWO EVENTS WILL OCCUR: 1) THE INSTRUMENT WILL EMIT A CONTINUOUS ALARM TONE AND ONCE IT REACHES SATURATION, IT WILL STOP, OR 2) IF THE INSTRUMENT IS TURNED ON IN A FIELD IN EXCESS OF 1000 R/hr, THE INSTRUMENT WILL NOT REACT.

ALTHOUGH A 1000 R/hr FIELD IS EXTREMELY HIGH AND MAY NEVER BE ENCOUNTERED, PROPER RADIATION SAFETY PROCEDURES AND REGULATIONS SHOULD BE OBSERVED WHEN MAKING ANY TYPE OF RADIATION SURVEY.

6.0 INSTRUMENT OPERATION:

PRESS THE ON-OFF SWITCH TO THE ON POSITION. CHECK THE BATTERY AND AUDIO TONE BY PRESSING THE PUSH BUTTON AT THE ARROW, USING A SMALL DIAMETER OBJECT SUCH AS A PAPER CLIP OR JEWELER'S SCREWDRIVER. THE RED BATT LED WILL LIGHT IF THE BATTERY IS OK AND THE ALARM WILL SOUND. REPLACE BATTERY IF INDICATED. DO NOT USE IF EITHER TEST FAILS.

NOTE: IT IS RECOMMENDED THAT THE UNIT BE TESTED PERIODICALLY IN A RADIATION FIELD.

7.0 MAINTENANCE:

7.1 WHEN THE INSTRUMENT IS ON, YOU WILL HEAR A CONTINUOUS, LOW FREQUENCY "MOTOR-BOATING" SOUND WHEN HELD NEAR THE EAR. IF THERE IS NO SOUND, CHANGE THE BATTERY BY UNSCREWING THE BACKPLATE AND REPLACING BATTERY WITH A FRESH 9V BATTERY.

7.2 KEEP INSTRUMENT FREE OF DIRT AND DUST.

7.3 KEEP INSTRUMENT DRY. IF IT SHOULD GET WET, DO NOT USE UNTIL COMPLETELY DRY.

7.4 THE INSTRUMENT IS DESIGNED TO BE WORN ON THE BELT. THIS WILL REDUCE UNNECESSARY VIBRATIONS THAT MAY CAUSE DAMAGE SUCH AS FALLS FROM A LEDGE OR TABLE.

7.5 REMEMBER: THE RA-500 IS A SAFETY DEVICE DESIGNED TO REDUCE YOUR OVEREXPOSURES. WITH PROPER CARE, IT WILL GIVE YOU LONG AND DEPENDABLE SERVICE.

7.6 WARNING: THIS INSTRUMENT CONTAINS CMOS DEVICES. NO SERVICE SHOULD EVER BE ATTEMPTED BY OTHER THAN A COMPETENT TECHNICIAN THOROUGHLY FAMILIAR WITH THESE COMPONENTS. CURRENT LEAKAGE IN SOLDERING IRONS OR OTHER NON-GROUNDED TOOLS ALONG WITH STATIC ELECTRICITY CAN INSTANTLY DESTROY CMOS ICs. SINCE THIS UNIT HAS IC SOCKETS DO NOT ATTEMPT TO REMOVE OR REPLACE THE ICs WITHOUT OBSERVING ESD PRECAUTIONS.

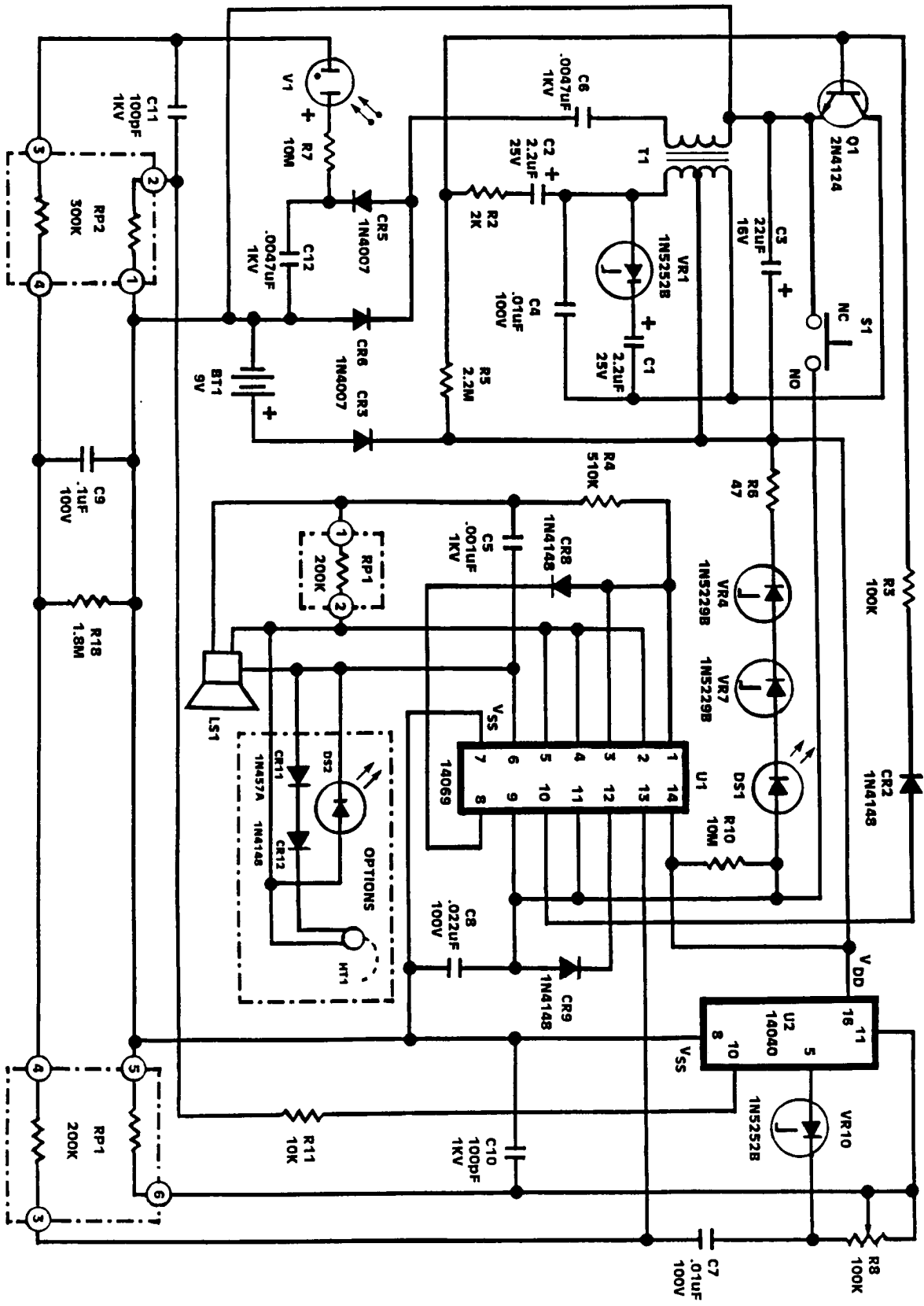
8.0 CALIBRATION:

8.1 INSTALL A FRESH 9 VOLT BATTERY, LEAVING IT OUTSIDE OF THE CASE. LOOK INSIDE AT THE EXPOSED END OF THE CIRCUIT BOARD. THE CALIBRATION POTENTIOMETER WILL BE FACING YOU AND MAY HAVE A THUMBWHEEL OR AN ADJUSTMENT SCREW.

8.2 WHEN THE POWER SWITCH IS TURNED ON, A SINGLE CHIRP SHOULD BE HEARD. IF THE UNIT IS OPERATING PROPERLY, A LOW FREQUENCY MOTORBOATING SOUND SHOULD BE AUDIBLE WHEN HELD CLOSE TO THE EAR IN A QUIET LOCATION. IF THIS DOES NOT OCCUR, DO NOT CONTINUE UNTIL UNIT IS REPAIRED.

8.3 THE INSTRUMENT IS CALIBRATED BY PLACING THE UNIT IN A 450 mR/hr Cs-137 RADIATION FIELD, IF NECESSARY, ADJUST THE POTENTIOMETER UNTIL A CRACKLING CHIRP IS HEARD. MOVE THE UNIT TOWARD THE RADIATION FIELD, THE ALARM SHOULD BECOME A CONTINUOUS TONE.

14-Aug-98		BILL OF MATERIAL	
980-0500-001		RA-500 PC ASSY WITH L/E OPTIONS	
		REV F	
ITM	PART NUMBER	DESCRIPTION	QTY REF DESIG
1	100-1000-102	CAP CER DISC .001 uF 1 KV	1 C5
2	100-1000-472	CAP CER DISC .0047 uF 1 KV	2 C6,12
3	100-0100-103	CAP CER DISC .01 uF 100V	2 C4,7
4	100-0050-223	CAP CER DISC .022 uF 100V	1 C8
5	100-1000-101	CAP CER DISC 100.0 pF 1 KV	2 C10,11
6	110-0025-225	CAP ELE TANT 2.2 uF 25V	2 C1, 2
7	110-0016-226	CAP ELE TANT 22.0 uF 16V	1 C3
8	115-0100-104	CAP PLY FILM .10 uF 100V	1 C9
9	150-0100-001	DIODE 1N4007 STANDARD RECOVERY	3 CR3,5,6
10	150-0150-001	DIODE 1N4148 HIGH SPEED SWITCHING	3 CR2,8,9
11	150-0250-001	DIODE 1N5229B ZENER	2 VR4,7
12	150-0300-001	DIODE 1N5252B ZENER	2 VR1,10
13	200-0200-001	IC 14040 16 PIN	1 U2
14	200-0300-001	IC 14069 14 PIN	1 U1
15	580-0200-001	LED RED DIFFUSED	1 DS1
16	250-0100-185	RES CF 1/4W 5% 1.8 M OHM	1 R18
17	250-0100-202	RES CF 1/4W 5% 2.0 K OHM	1 R2
18	250-0100-225	RES CF 1/4W 5% 2.2 M OHM	1 R5
19	250-0100-103	RES CF 1/4W 5% 10.0 K OHM	1 R11
20	250-0100-106	RES CF 1/4W 5% 10.0 M OHM	2 R7,10
21	250-0100-470	RES CF 1/4W 5% 47.0 OHM	1 R6
22	250-0100-104	RES CF 1/4W 5% 100.0 K OHM	1 R3
23	250-0100-514	RES CF 1/4W 5% 510.0 K OHM	1 R4
24	255-0004-304	RES NET 4 PIN 2 RES 300 K	1 RP2
25	255-0006-204	RES NET 6 PIN 3 RES 200 K	1 RP1
26	260-0200-104	RES POT MULTI TURN 100 K	1 R8
27	225-0100-014	SOCKET IC 14 PIN	1 XU1
28	225-0100-016	SOCKET IC 16 PIN	1 XU2
29	300-0500-001	SWITCH PUSHBUTTON MOMENTARY SPST	1 S1
30	450-6816-001	TRANSFORMER MINI 50VRMS	1 T1
31	475-0100-001	TRANSISTOR 2N4124 NPN	1 Q1
32	500-0714-001	TUBE GM 714	1 V1
33	551-0500-005	RA-500 PC BOARD	1
34	405-0100-001	TRANSDUCER CASE	1 XLS1
35	400-0100-001	TRANSDUCER ELEMENT	1 LS1
36	605-0009-001	BATTERY CLIP 9.0V	1
OPT	150-0150-001	DIODE 1N4148 HIGH SPEED SWITCHING	1 CR12
OPT	150-0200-001	DIODE 1N457A SWITCHING	1 CR11
OPT	020-0500-001	EARPHONE/EAR LOOP/3 FT CABLE	1 HT1
OPT	050-0500-001	EARPHONE JACK	1 J1
OPT	580-0200-005	LED RED SUNBRIGHT	1 DS2
OPT	581-0200-005	LED SOCKET STRAIGHT	1 XDS2
990-0500-000		RA-500 UNIT ASSY	
		REV F	
ITM	PART NUMBER	DESCRIPTION	QTY REF DESIG
1	600-0V22-001	BATTERY 9.0V EV22	1 BT1
3	670-0500-001	ALARM CASE ALUM	1
4	690-0500-RA1	DECAL RA-500	1
15	980-0500-001	RA-500 PC ASSY	1
16	300-0500-100	SWITCH RECESSED PUSHBUTTON	1 S2



DESIGNED BY	H. SMITH	DATE	1/88
CHECKED BY	<i>[Signature]</i>	DATE	2/88
ENGINEER	<i>[Signature]</i>	DATE	1/88
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<p>CIRCUIT DIAGRAM</p>			
DATE	870-0500-000	SHEET	1 of 1
REV	F		

