SECRET

ORD-2144-74

20 May 1974

MEMORANDUM FOR THE RECORD

SUBJECT: Discussion with [redacted], 9 May 1974, [redacted] California

1. [redacted] was taken to the sponsor's [redacted] office, and a review was made of TKH photography of [redacted] and the photos of the model of the Square Pair radar.

2. After a detailed study of the photography and the sketches sent there by [redacted], the following approach was suggested by [redacted] First, build the small antenna with the five helical elements in full scale (4' x 4 1/2') and reinforce training of the birds to it. Then, move this antenna from place to place. Subsequently, build a crude mock-up of the other elements of the radar on top of a van to train the birds for orientation in final picture taking.

3. A flashing beacon was purchased in [redacted] and [redacted] will verify its effect on the birds. If there are no ill effects (spoofing, etc.), then OTD will attempt to reduce the 6.3-ounce package to about 2 ounces (≈56 grams), mainly by a reduction in the weight of the batteries used to power the flasher. A brochure describing this flasher is attached. [redacted] is addressing this problem, and I am scheduling a meeting on 21 May 1974 with [redacted] and his staff.

4. The radar beacon was investigated and is available and compatible with the Decca Super 101 Radar on board our SOG boat in California; however, there are some minor problems. The radar beacon itself costs $750 to $1,000, and an HP receiver package compatible with the radar costs $2,500 (90-day delivery from time of order). [redacted] is gathering engineering field test results and I will get this on 24 May 1974. The

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transponder receives at "X" band and transmits back at HF or VHF frequencies. At the present time, the boat's Decca Super 101 Radar antenna is being repaired after being damaged in a windstorm (repair time is five weeks from 8 May 1974). This unit should be checked out with our radar and would be a worthwhile backup to the flashing beacon. As an additional backup to this Ocean Applied Research (OAR) unit, [redacted] submitted a quote for the development of a similar beacon, and the development costs would be about $12,500 with a three-month delivery time. This quote is included for completeness; however, the OAR units are available and possibly a unit could be borrowed from [redacted] of the Navy undersea group in San Diego for test and evaluation. When this becomes available, an SOG man and I should check this unit out.

5. While determining the status of bird training, the subject of motor-sailer type boats was discussed. I told [redacted] of my concern about the size or color of the jib sail and asked whether or not the birds might be spoofed by it. [redacted] explained that the birds could adjust to it quite easily, but it would be worthwhile training them to it early as they would have to be retrained to land on a boat with sails. Since we will eventually be using sailboats, we should make provisions for getting boats with the same color jib for all boats used. I asked [redacted] to generate a list of questions he would like answers to during the rehearsal cruise. [redacted] and I will generate a list of questions for the SOG people to answer during the rehearsal phase as well as the log format desired by us.

[redacted]
Operations Technology, ORD

Attachment:
A/S

. radar transponder tracking system developed
r contract with U.S. Navy in 1972)

OAR

ystem Description

The function of the system is to mark a flying animal n such a way that its range and bearing can be determined. system block diagram is shown in Figure 1. The system onsists of an X band radar set of standard design which s used to interrogate the remote package and to display he range and bearing, and a remote transponder capable of eceiving the radar's interrogation and responding. In his specific system the response to the radar's interro- ation is a short pulse of radio frequency not in the radar and (9350 MHz) but in the H. F. band. Tests for Phase I ere run with a response at 31 MHz, the center frequency of he radar's intermediate frequency amplifier. In operation a 31 MHz receiving antenna is connected to the input of the adar I.F. amplifier so that the return pulse is displayed in the same manner that the normal radar return would be. Since the normal radar receiver is disconnected, the normal adar return is not displayed leaving the screen blank ex- cept for the transponder's signal.

Transponder Design

A block diagram of the transponder is shown in Figure 2. It consists of an X band monopole antenna, a stripline matching network, a video preamplifier, a triggered pulse generator, and an H.F. 2-stage transmitter. A skematic of the transponder is shown in Figure 3. The battery stack supplies 3 volts for the video amplifier and 9 volts for the transmitter.

Radar Modifications

The radar ultimately furnished for this program is a Karr Voyageur Marine Model LN55. Mounts for the radar components were fabricated into one module so that the unit may be moved easily by two men. Electrical modification included analysis of the IF amplifier and disconnection from the X Band mixer; design of a matching network and band pass filter to connect a 150 MHz, 1/2 wave whip antenna.

DESCRIPTION

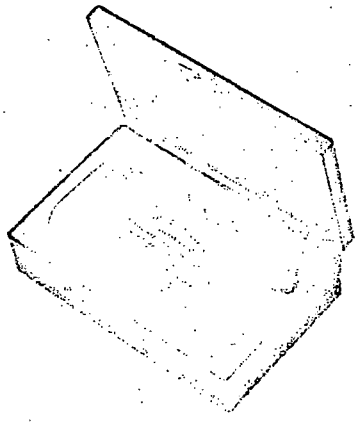
The Save Ur' Lif'r is a compact, self contained pocket sized, high intensity strobe flasher that is designed for the search and rescue of individuals who are lost on land or sea. It was designed to meet the very rigid test requirements of the Department of Defense and is mandatory equipment for all fliers.

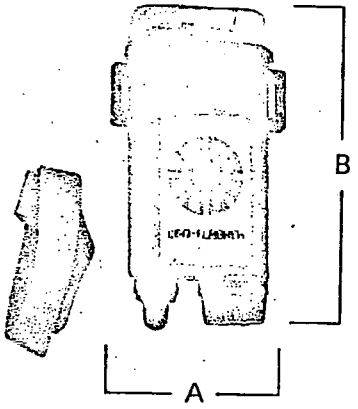
It provides very brilliant flashes of strobe light, fifty times per minute, of approximately 500,000 peak intensity candlepower and can be seen for great distances.

It is waterproof (operates submerged) – It is shock and vibration proof – It operates at both very low and high temperatures and has a special mercury battery that will provide up to 12 hours of continuous flashing.

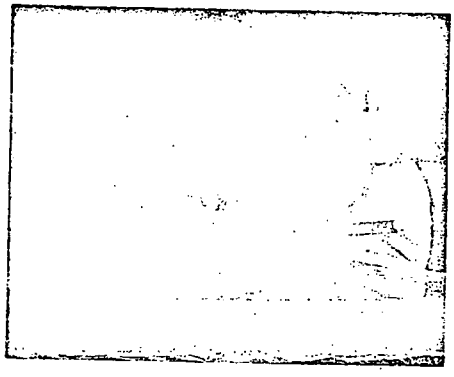
The case is molded of high impact, bright, orange plastic and the reflectorized xenon lamp flashes through a clear plastic lens, giving wide angle visibility. The battery screws into the case for easy replacement.

It comes equipped with a woven loop to permit its being attached to a belt or other parts of clothing or a military type of carrying pouch is available at slight extra cost.





SAVE UR' LIF'R
Distress Marker Light
Model SDU – 5/E



ENGINEERING DATA			
LIGHT INTENSITY (CANDELAS)		DIMENSIONS (INCHES)	
		A	B
Light, Peak Intensity	500,000	2½	4½
Flashes Per Minute	50		
Lamp	Xenon		
Battery, Sealed	Mercury		
Voltage	5.2 volts		
Hours, Flashing	10		
		Materials:	
		Case	Orange Cycolac Plastic
		Weight: w/Battery – 4 oz.	

6-3

BATTERIES 2.62oz ≈ 73.5g

SPECIALIST IN LIGHTING and COMMUNICATIONS

NEO-FLASHER ELECTRONICS INC. 11975 SHERMAN RD., NO. HOLLYWOOD, CA. 91605

May 3, 1974

U.S. Government
Washington, D.C.

Gentlemen:

The following information is submitted for the development of a miniature X-band transponder which will meet the following characteristics.

Input Frequency Range	9.415 to 9.475 GHz
Input Trigger Sensitivity	-40 dbm
Input Pulsewidth	.5 µsec nominal
Input PRF	1500 pulses per second
Output Frequency (Fixed)	150 MHz
Output	A pulse pair for every input trigger pulse
Output Pulse Code	A 2 µsec pulse followed by a 1 µsec pulse separated by a 2 µsec off period
Output Pulse Peak Power	100 mw +3 db
Output Frequency Stability	+ 1.0 MHz
DC Input Power	30 ma average max from a 5V. battery, battery end life 4V. DC
Input & Output RF Connectors	3 mm Female OSSM
DC Supply	Solder pins
Size	1x1x3 inches excluding 2 ounces connectors

Prototype cost is $12,500 and delivery is to be three months ARO.

We have reviewed the proposed power budget and the results of our review are as follows:

[redacted]

Assuming a transmitter power of 3 KW (+64 dbm) for the X-band transmitter and 24 db transmitter antenna gain, a 136 db path loss, and a 0 db receiver antenna gain, we note that at best we have -48 dbm left at the receiver terminal. Further assuming that the receiver will be designed around a biased hot carrier detector, we can only depend on a -52 dbm tangential sensitivity for the detector. Allowing a 2 db preselector loss and a 10 db signal to noise ratio being necessary for reliable operation, the calculated minimum input level required is -40 dbm. This gives us a discrepancy of 8 db which either has to be accounted for by obtaining an equivalent antenna gain for the transponder receiver or will result in the reduction of the operating range from 10 miles to 4 miles.

We have additionally examined the adequacy of the 100 mw peak output power at 150 MHz and concur that any reasonable superhet receiver and reasonable antenna should be adequate.

Should we be able to provide you with any additional information, please do not hesitate to contact us.

Sincerely,

[redacted]

Vice President

[redacted]