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**APPLICATION NOTE NO. 8**

**Revised March 2001**

**SBE 28 UNIVERSAL OPTO-ISOLATED JUNCTION BOX  
INSTRUCTIONS FOR APPLICATION AND USE**

The SBE 28 Opto-Isolated Junction Box is a multi-purpose accessory that provides a convenient power and/or data interface between many Sea-Bird instruments and the user's computer serial port. The opto box is AC powered, and configured for either 115 VAC operation (PN 90123) or 230 VAC operation (PN 90124). The interface box provides an optically coupled RS-232C standard interface and supplies an isolated +15 volt DC power supply to permit working without interference from shipboard power circuits and grounds.

The SBE 28 is intended to optically isolate a user's AC-powered computer from an SBE 16, 19, 20, 21, or 26 and provide power, up to 1 ampere, to a CTD or other real-time instrument and associated auxiliary sensors, without relying on internal batteries. The maximum cable length will be limited by the voltage drop due to the cable's resistance and the operating current requirement. SEACATs with the internal opto-isolated line driver option for real-time telemetry over long cables cannot be powered by the SBE 28 opto box due to there being no connection between internal and external ground. Internal opto-isolation is a standard feature in the SBE 25 SEALOGGER CTD.

Instruments not equipped with the internal opto-isolated line driver option can receive external power through a data I/O connector with an external power pin which is diode-OR'd with the internal battery supply. Since the 15 volts from the opto box is greater than the normal battery voltage, the instrument will automatically draw power from the SBE 28, not its internal batteries. The Thermosalinograph does not have batteries, so it is always powered from the opto box.

Four cables are supplied when the SBE 28 is ordered:

- (1) PN 80437, 2.5 m cable with 4-pin MS3106A-14S-2P connector to 4-pin RMG-4FS underwater connector used to connect the instrument directly to the opto box. A 10 m long cable PN 80438 is supplied with the SBE 21. (Drawing 31063B)
- (2) PN 80073, 1.5 m cable with DB-25P to DB-25S for connecting the opto box to the serial interface port of the computer.
- (3) PN 17130, 12" cable with DB-25P to DB9S adapter is supplied for use with 'AT' and laptop computers.
- (4) PN 17015, 2 m AC mains power cable. The AC power cable should be connected white to NEUTRAL, black to LINE, and green to EARTH (ground).

To operate your instrument with the SBE 28, connect the instrument to the opto box using cable PN 80437 or PN 80438. Connect the opto box to the computer serial port using cable PN 80073; use cable PN 17130 if necessary. Connect the AC power cord PN 17150 from the opto box to the power source.

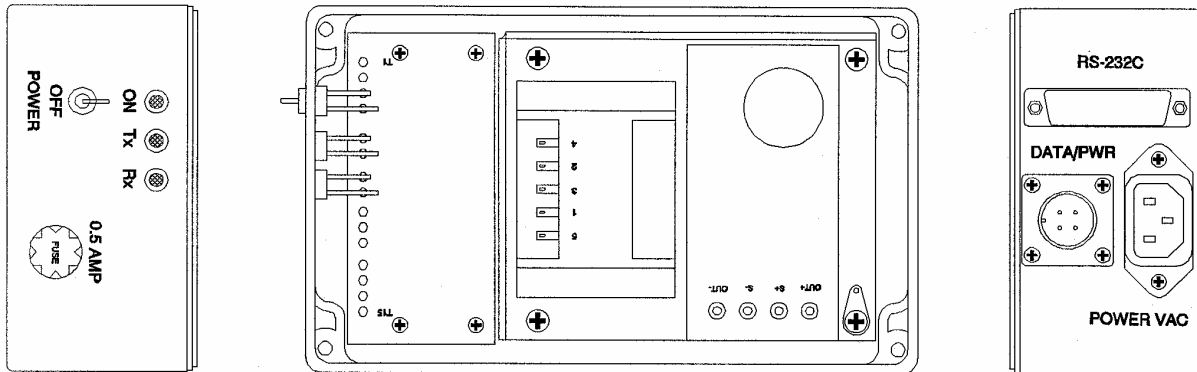
**SBE 28 opto box PN 90123 is configured for a power source of 115 VAC.**

**SBE 28 opto box PN 90124 is configured for a power source of 230 VAC.**

**DO NOT PLUG 230 VAC INTO AN OPTO BOX RATED FOR 115 VAC.**  
**SEVERE DAMAGE WILL OCCUR IF THIS HAPPENS!**

Turn the opto box power ON with the toggle switch. The red LED should light up when the switch is flipped to the 'ON' position. Run the terminal program that is appropriate for your instrument and communicate with the instrument via the computer keyboard. When communication is being received from the CTD, the yellow LED will flash. The green LED will flash when communication from the computer is being sent to the CTD.

### SBE 28 UNIVERSAL OPTO-ISOLATED JUNCTION BOX

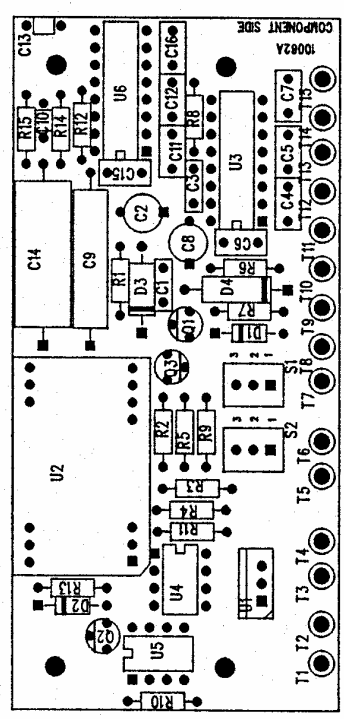


DATE	SYN	REVISION RECORD	APPR.	DR.	CR.
		REVISED			
		REVISED			
		REVISED			
		REVISED			

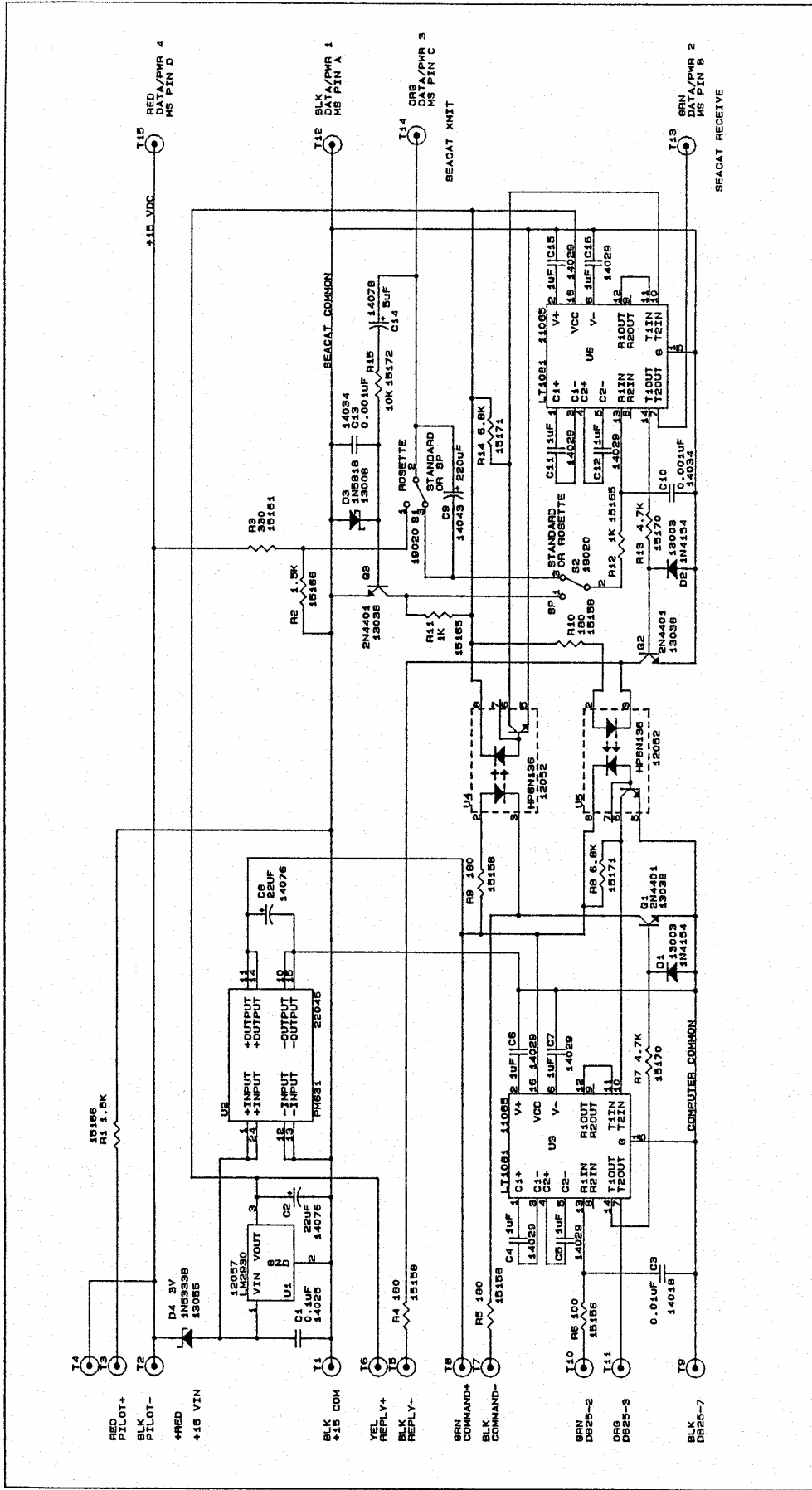
SLA PRINTED ON 15:35:32 15 OCT 1991

PART NUMBER DESCRIPTION..... OPA..... ITH REF DESIG..... NBR

80444	SBE 28 UNIT-BOX PCB ASS'Y, /DMG				
40610C	IC, LITHOICN, LINEAR TECH,	2.0000	U3	U6	
RS237	IC, HERM136, OPTO COUPLER	2.0000	U4	U5	
12052	IC, LM7331A, 5.0 SV REG.	1.0000	D1	D2	
13007	DIODE, 1N5814, UNIDIR	1.0000	D3		
13008	DIODE, 1N5818, SCHOTTKY	1.0000	Q1	Q2	Q3
13038	RESISTOR, 2W401	3.0000	R1	R2	R3
13055	ZENER DIODE, 1N5313B, MOTOROLA	1.0000	R4	R5	R6
14018	GAP, .01 uf, 100V CER.	1.0000	C1	C2	C3
14025	SR211C103KAA, X7R	1.0000	C4	C5	C6
14029	SR305E105HAA, Z5U	8.0000	C7	C8	C9
14034	GAP, .001 uf, 200V CER.	2.0000	C10	C11	C12
14043	C322C102J2G5CA, NFO	2.0000	C13	C14	C15
14076	HTT227H015P1C	1.0000	C9	C8	C7
14078	TAP226K035HER	2.0000	C2	C8	C14
15156	SPRAGUE	1.0000	C14	C14	C14
15158	RES, 100 OHM, 5%, 1/4 W	1.0000	R6	R5	R10
15159	RES, 150 OHM, 5%, 1/4 W	4.0000	R4	R5	R10
15160	RES, 1K OHM, 5%, 1/4 W	2.0000	R1	R2	R12
15161	RES, 1K OHM, 5%, 1/4 W	2.0000	R1	R2	R12
15166	RES, 1.5K OHM, 5%, 1/4 W	2.0000	R1	R2	R12
15170	RES, 4.7K OHM, 5%, 1/4 W	2.0000	R7	R13	R14
15171	RES, 6.8K OHM, 5%, 1/4 W	2.0000	R8	R14	R15
15172	RES, 10K OHM, 5%, 1/4 W	1.0000	R15	R14	R15
17236	TERMINAL, PCB, 1/16" FORKED, USEFCO 2001B	15.0000	T1	T2	T3
			T4	T5	T6
			T7	T8	T9
			T10	T11	T12
			T13	T14	T15
19020	SU, SPDT, PROF. RESET, ALCO	2.0000	S1	S2	
21088	TTLING-MM-2T	1.0000	PCB1		
22045	PCB, UNIV. OPTO BOX, /DMG	1.0000	PCB1		
	10062A				
	PWR. SPLY, 12V TO 5V, COMP	1.0000	U2		
	PROD PM631				



TOLERANCES		SEA-BIRD ELECTRONICS, INC	
DECIMAL	P/M	SCALE	DRAWN BY
FRACTIONAL		3:1	KL
ANGULAR		10/16/91	APPROVED BY
		DATE	KL
		DRAWING NUMBER	40410
		REV	1



NOTES: 1. S1 & S2 IN SP POSITIONS FOR SURFACE POWER APPLICATIONS  
 2. CHECK INSTRUMENT DATA IS RECEIVED  
 3. REPLY LED ON WHEN INSTRUMENT REPLY OR DATA IS RECEIVED

SEA-BIRD ELECTRONICS, INC  
 ASSEMBLY 40410

UNIVERSAL OPTO BOX  
 Size Document Number 31098  
 B

PCB 21088

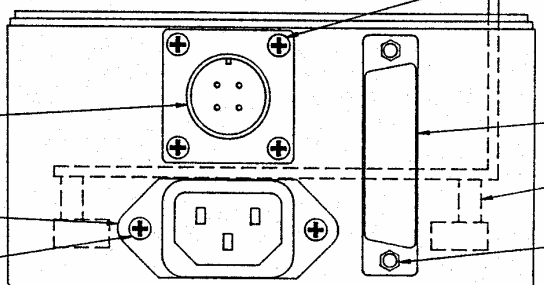
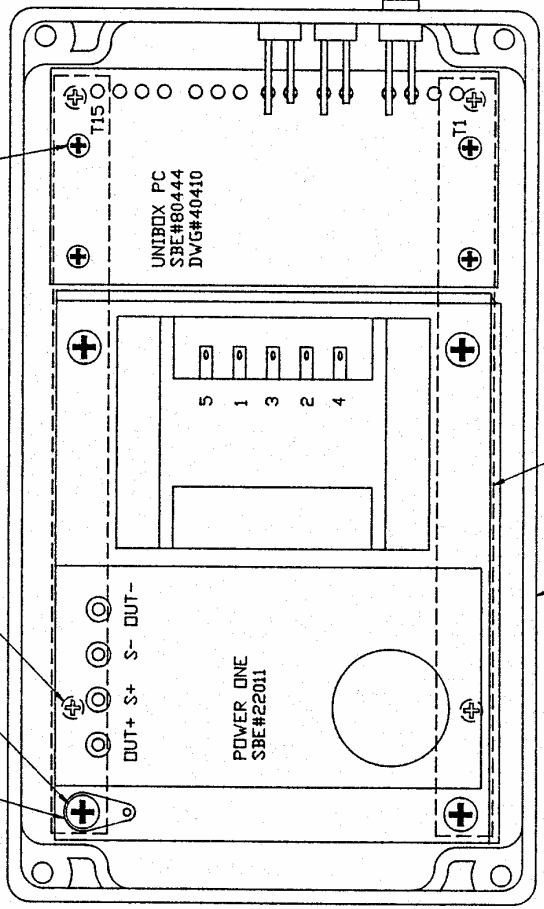
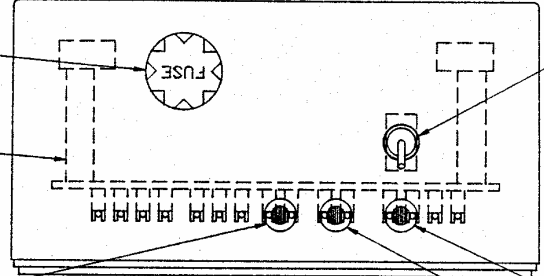
10062

REV C

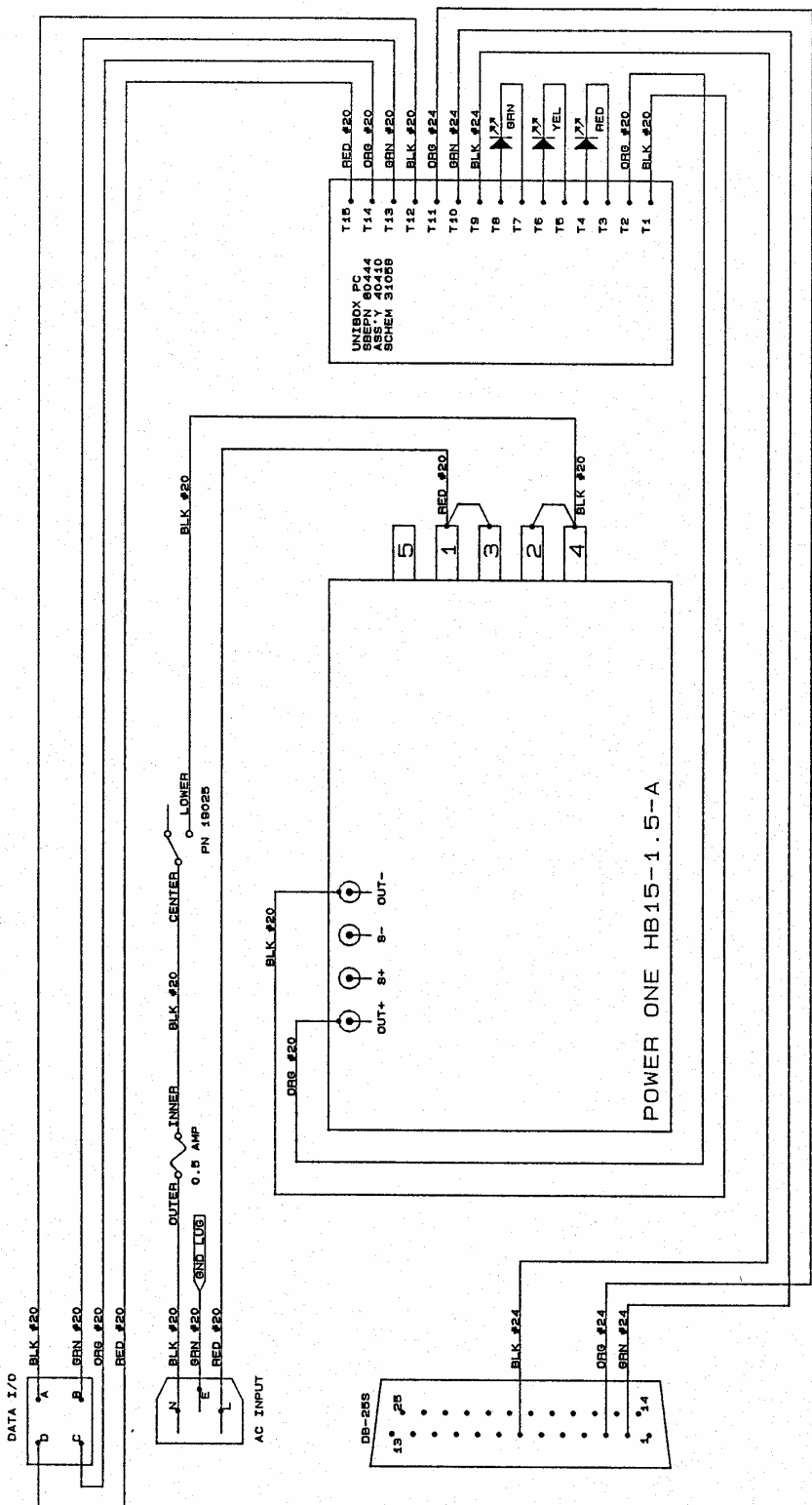
DATE: OCTOBER 3, 1991 BR/ST 1 OF 1

DATE	SYN	REVISION RECORD	AUTH.	DR.	CK.

- 6-32 X 1/2 SBE#30145
- 6-32 LOCK NUT SBE#30362
- AC CONNECTOR SBE#17016
- MS3102A14-2S SBE#17416
- SOLDER LUG (AC GROUND)
- 8-32 X 5/16 4 PL SBE#30359
- 4-40 X 1/4 SBE#30123 4 PL
- 4-40 X 1/2 SBE#30129 4 PL
- GREEN LAMP AND HOLDER SBE#20002, 30386
- UNIBOX PC SBE#80444 DWG#40410
- POWER ONE SBE#22011
- UNIBOX MOUNT RAIL SBE#23453 2 PL DWG#20476
- UNIBOX SBE#23452 DWG#20477
- 4-40 X 3/8 SBE#30125 4 PL
- 4-40 LOCK NUT SBE#30212 4 PL
- 8-32 X 3/8 STANDOFF SBE#30461
- HARDWARE SBE#17007
- 4-40 X 1 STANDOFF SBE#30462
- FUSE HOLDER SBE#20001
- RED LAMP AND HOLDER SBE#20004, 30386
- YELLOW LAMP AND HOLDER SBE#20003, 30386
- SWITCH SBE#19025

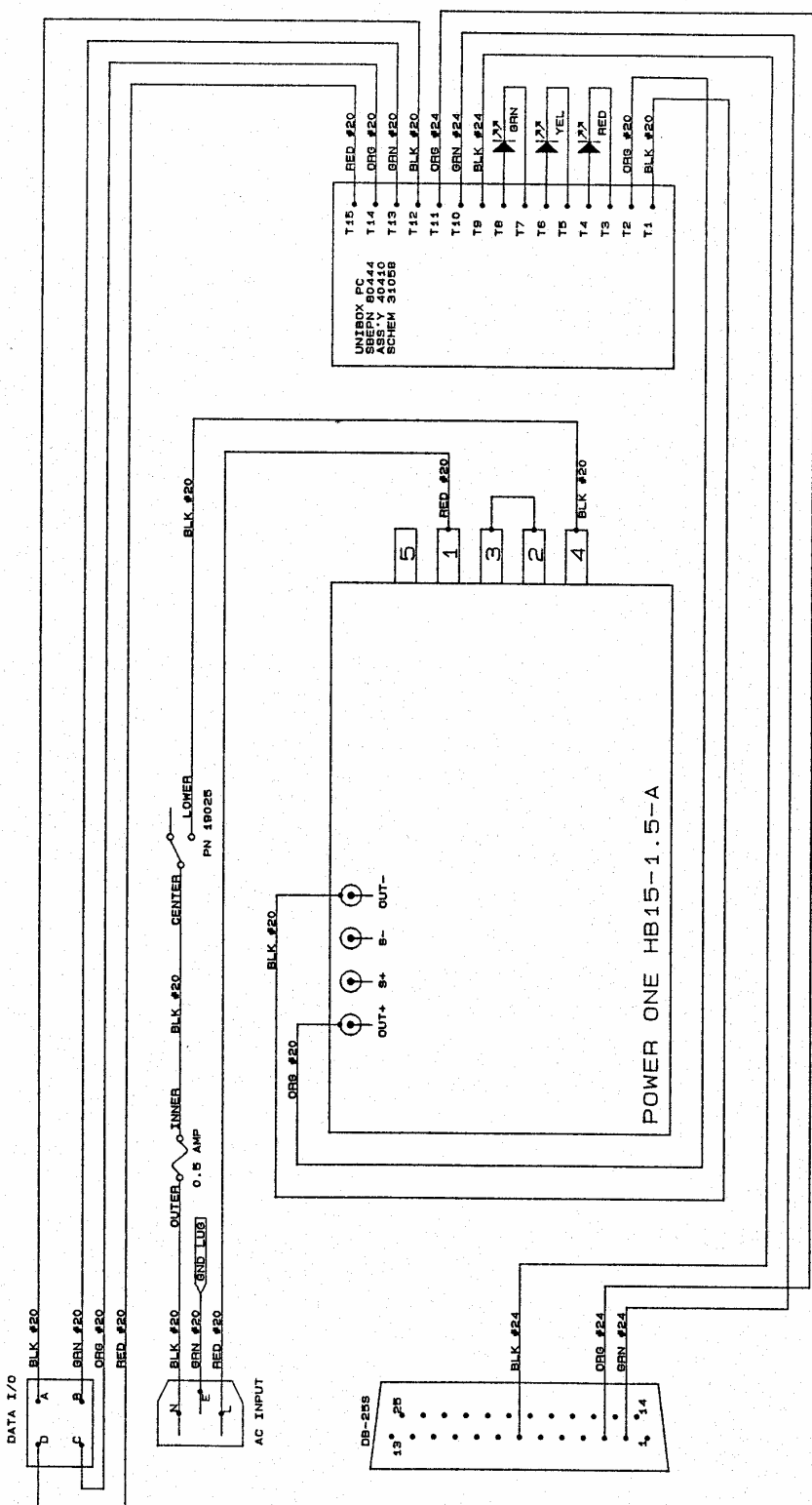


<b>SEA-BIRD ELECTRONICS, INC</b>	
TOLERANCES	UNLESS OTHERWISE SPECIFIED
FRACTIONAL	P/N
DECIMAL	SCALE
ANGULAR	DRAWN BY DW
DATE	APPROVED BY
UNIBOX ASSEMBLY 230 VAC	
3-19-91	DRAWING NUMBER 40415
	REV



UNIBOX PC  
 SBEPN 90444  
 SCHEM 31071  
 UNIBOX WIRING, 116 VAC

SEA-BIRD ELECTRONICS, INC  
 ASSEMBLY 40418  
 UNIBOX WIRING, 116 VAC  
 Size Document Number 31071  
 REV B  
 DATE: March 20, 1991 Sheet 01



T15 . RED #20  
 T14 . ORG #20  
 T13 . GRN #20  
 T12 . BLK #20  
 T11 . ORG #24  
 T10 . GRN #24  
 T9 . BLK #24  
 T8 . GRN #24  
 T7 . GRN #24  
 T6 . YEL #24  
 T5 . YEL #24  
 T4 . RED #20  
 T3 . ORG #20  
 T2 . BLK #20  
 T1 . BLK #20

5  
 1  
 3  
 2  
 4

POWER ONE HB15-1.5-A  
 OUT+ S+ B- OUT-  
 BLK #20  
 ORG #20

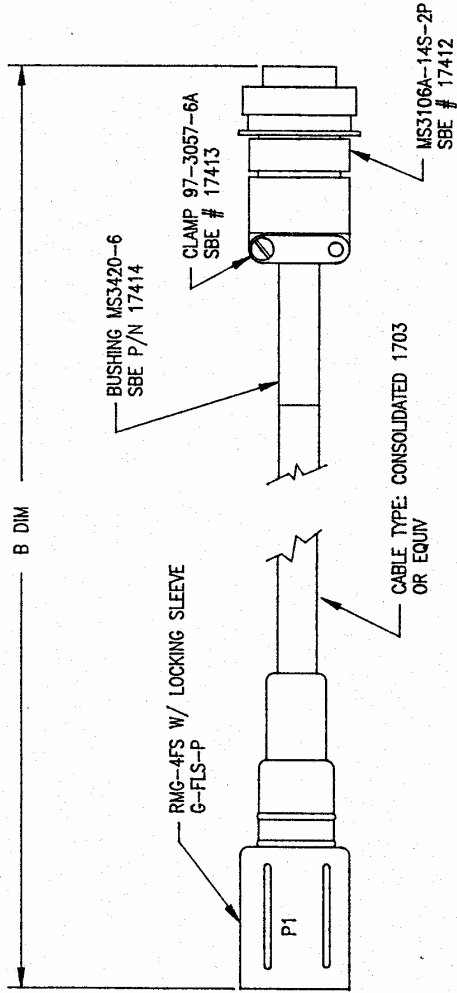
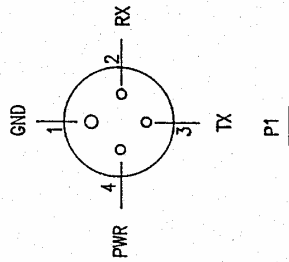
DB-256  
 13  
 14  
 15

DATA I/O  
 A  
 B  
 C  
 D  
 E  
 F  
 BLK #20  
 GRN #20  
 ORG #20  
 RED #20

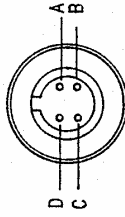
AC INPUT  
 N  
 E  
 L  
 BLK #20  
 GRN #20  
 ORG #20  
 RED #20  
 OUTER  
 INNER  
 CENTER  
 LOWER  
 0.5 AMP  
 PN 19026

SEA-BIRD ELECTRONICS, INC  
 ASSEMBLY 40415  
 UNIBOX WIRING, 230 VAC  
 Size Document Number 31069  
 REV B  
 MARCH 20, 1981

DATE	SW	REVISION RECORD	APPR.	DR.	CL.
4/91	A	REDRAWN SEE HISTORY	KL	BMC	
3/93	B	ADDED COLOR 1	KL	BMC	



P2



SHIELDED ASSY P/N	PIGTAIL P/N	LENGTH		KEVLAR ASSY P/N	KEVLAR LENGTH
		'B' (FT)	'B' (m)		
80437 *	17031**	8	2.5		
80438	17204	33	10		
80455	17221	66	20		
80456	17232	100	30	80464	20 M
80457	17350	132	40	80465	30 M
80458	17351	165	50	80466	40 M
80459	17187	200	60	80467	50 M
80460	17148	330	100	80468	90 M
80461	17369	492	150	80469	140 M
80462	17244	660	200	80470	190 M
80463	17216	1500	455	80471	445 M
80693	17696	984	300		
80720	17723	500	152		
80755	17744	820	250		
	17640	363	110	80757	100 M
	17608	250	76	80801	61 M
80823	17614	462	140	80824	130 M
	17890	433	131	80843	121 M / #16 AWG

SBE 28 I/O, RMG-4FS TO MS CABLE ASSEMBLY

WIRING CONNECTIONS	
P1	* COLOR 1 COLOR 2 P2
PIN 1	WHITE SHIELD A
PIN 2	BLACK BLACK B
PIN 3	GREEN WHITE C
PIN 4	RED RED D

\* COLOR 1: 80437 ONLY  
 COLOR 2: ALL OTHER

PIGTAILS ARE PURCHASED PER DWG 30585  
 KEVLAR COATING PER DWG 20252  
 \*\* P/N 17031 IS NOT SHIELDED AND DOES NOT REQUIRE THE BUSHING (17414)

TOLERANCES	SEA-BIRD ELECTRONICS, INC
FRACTIONAL	P/N SEE TABLE
DECIMAL	SCALE 1:1
DRAWN BY	BMC
APPROVED BY	KL
TITLE	UNIOPTOBOX DATA CABLE ASSY
DATE	4/3/91
DRAWING NUMBER	31063
REV	B