Sea-Bird Electronics, Inc.
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APPLICATION NOTE NO. 22 **March 1991**

Pump Speed Adjustment Instructions

The pump housing must be disassembled. Referring to drawings 40065 and 40020:

1. Remove the 4 screws holding the **housing cap** to the **motor housing** (2-56 UNC X 3/4).

2. Pull the **housing cap** out of the **motor housing**, using a rotating motion. It is not necessary to unsolder the wires leading to the underwater connector.

3. Most Sea-Bird SBE 5 Submersible Pumps with serial numbers below 125 have Cannon motors (round, brass-colored casing), while most with serial numbers above 125 have Pittman motors (rectangular, black-colored casing marked 'elcom'). Remove the four M3X8 (metric) screws holding the motor to the **housing cap** (Pittman motors will be mounted with only 2 screws).

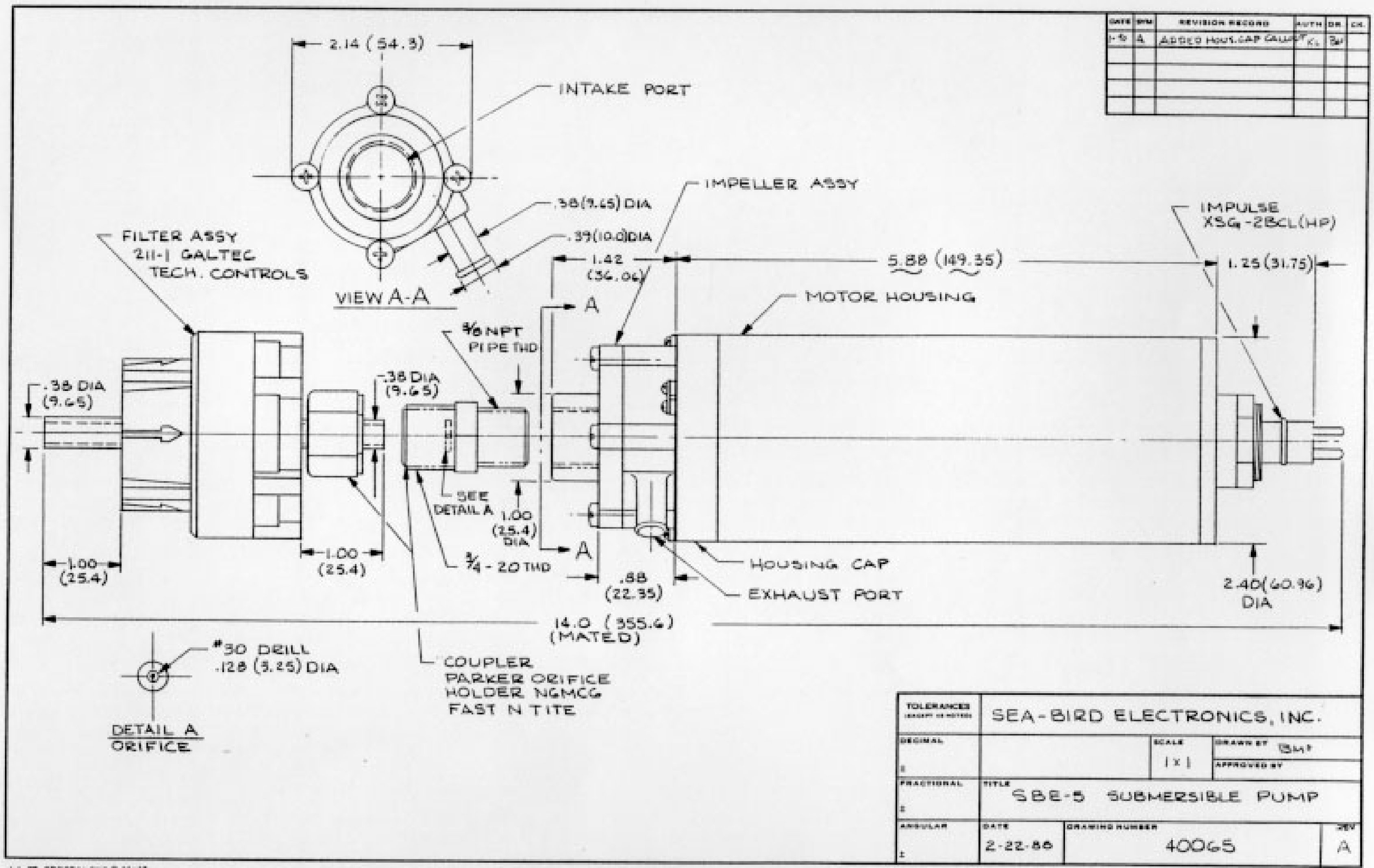
4. Supply 12 - 15 volts DC power at the 2-pin bulkhead connector (small pin +; large pin -), and use an ammeter (0 - 300 milliamperes range or greater) to measure the pump current.

5a. **Speed adjustment, Cannon motor**. Refer to schematic 30161. Use a counter to monitor the frequency at Pin 10 (brown motor wire); connect the counter ground to pump power supply (-). Motor speed in RPM is 5 times the frequency in Hz measured at Pin 10. Adjust the frequency with the 2K potentiometer (R1). **Do not adjust the other pot (R2)!.** For 3000 RPM the frequency would be 600 Hz, however the Cannon motor cannot run faster than about 2700 RPM. Load the motor (using light thumb and finger pressure on the rotating magnet) to increase the current to about 300 milliamperes. If the measured frequency changes by more than about 2 Hz, set a lower speed and try again.

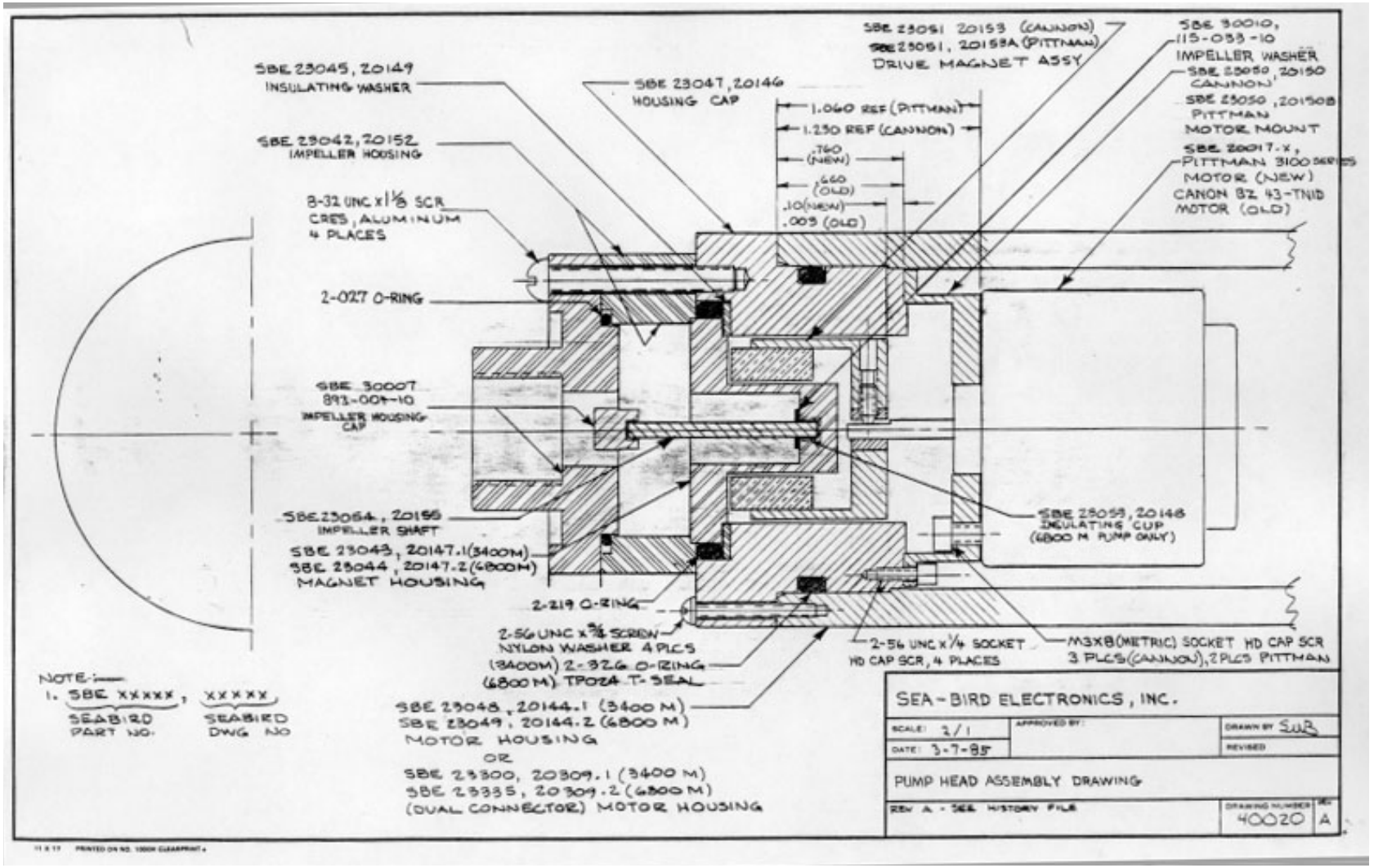
5b. **Speed adjustment, Pittman motor**. Refer to schematic 30392. Use a counter to monitor the frequency at the blue motor wire (some units have a turret to which the counter can be connected); connect the counter ground to pump power supply (-). The motor speed in RPM will be 30 times the frequency in Hz. If the desired speed cannot be set, change R9 to 2.21K and R16 to 453 ohms (R16 is on the underside of the printed board, which will have to be unbolted from the motor for access; apply LockTite to the printed board mounting screws when re-mounting the board to the motor). Adjust the potentiometer to give the desired speed (for example, 100 Hz at the test point for 3000 RPM). Load the motor (using light thumb and finger pressure on the rotating magnet) to increase the current to about 300 milliamperes. If the measured frequency changes by more than about 0.5 Hz, set a lower speed and try again. **Note: pumps marked 'WDG #4' or 'WDG #5' may not be adjustable to the speed desired; contact Sea-Bird for further information**.

6. Disconnect the counter and power supply. Reassemble the pump, reversing steps 1, 2, & 3. **Be sure the O-ring and O-ring surfaces are clean and lightly greased before inserting the housing cap into the main housing**.

drawings 40065, 40020, 30161, 30392, 40092 attached

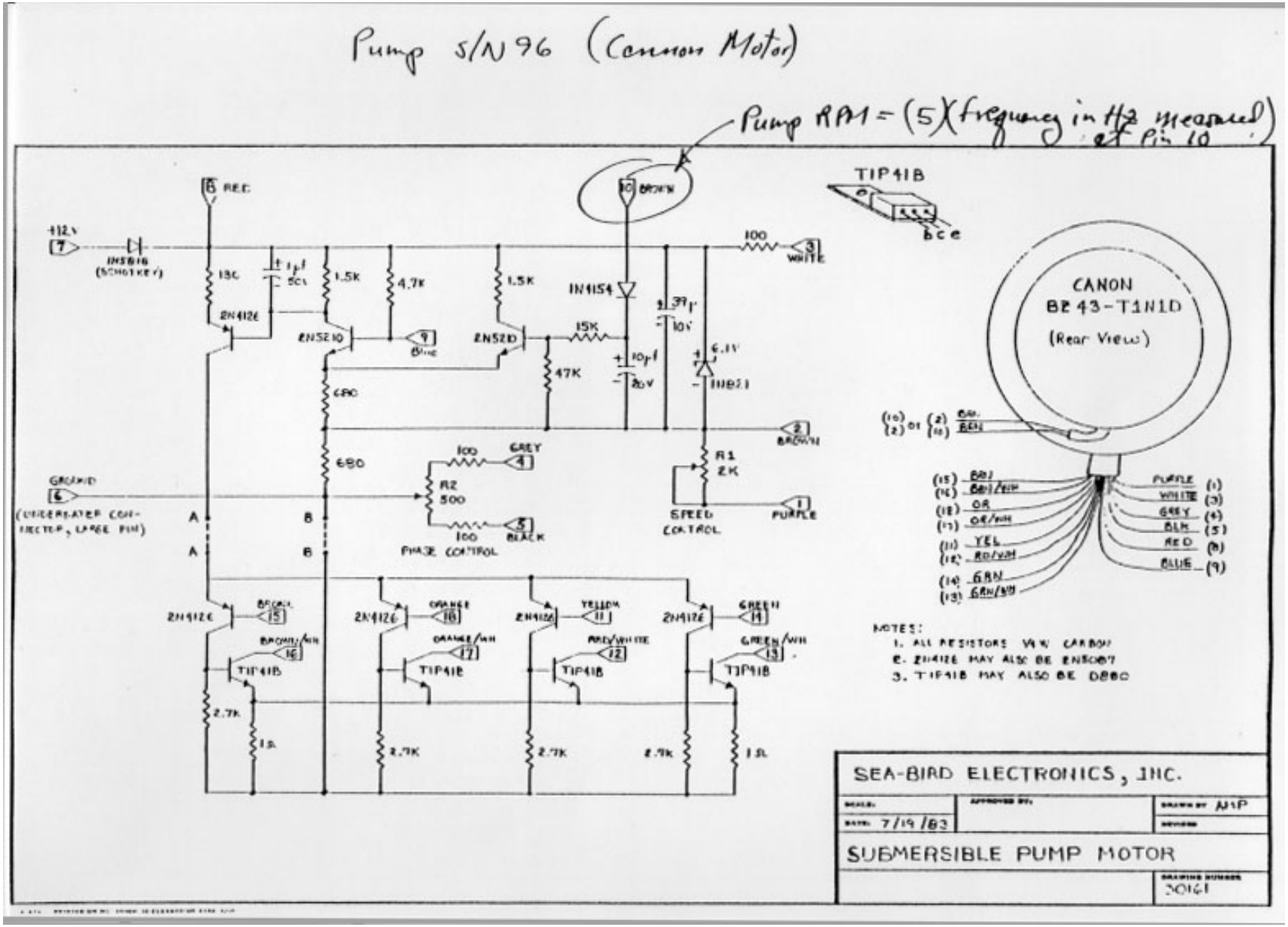


2.14 (54.3)
INTAKE PORT
.38 (9.65) DIA
.39 (10.0) DIA
VIEW A-A
FILTER ASSY
211-1 GALTEC
TECH. CONTROLS
IMPELLER ASSY
IMPULSE
XSG-2BCL(HP)
1.42
(36.06)
5.88 (149.35)
1.25 (31.75)
MOTOR HOUSING
A
3/8 NPT
PIPE THD
.38 DIA
(9.65)
.38 DIA
(9.65)
SEE
DETAIL A
1.00
(25.4)
DIA
1.00
(25.4)
1.00
(25.4)
3/4 - 20 THD
.88
(22.35)
HOUSING CAP
EXHAUST PORT
2.40 (60.96)
DIA
14.0 (355.6)
(MATED)
#30 DRILL
.128 (3.25) DIA
COUPLER
PARKER ORIFICE
HOLDER NGMCG
FAST N TITE
DETAIL A
ORIFICE
DATE | SYM | REVISION RECORD | AUTH | DR | CK
1-90 | A | ADDED HOUS. CAP CALLOUT
TOLERANCES
DECIMAL ±
FRACTIONAL ±
ANGULAR ±
SEA-BIRD ELECTRONICS, INC.
SCALE 1 X 1
DRAWN BY BMP
APPROVED BY
TITLE SBE-5 SUBMERSIBLE PUMP
DATE 2-22-88
DRAWING NUMBER 40065
REV A
K-E CRYSTALENE ® 11x17
ENGINEERS' STANDARD FORM
MADE IN U.S.A.

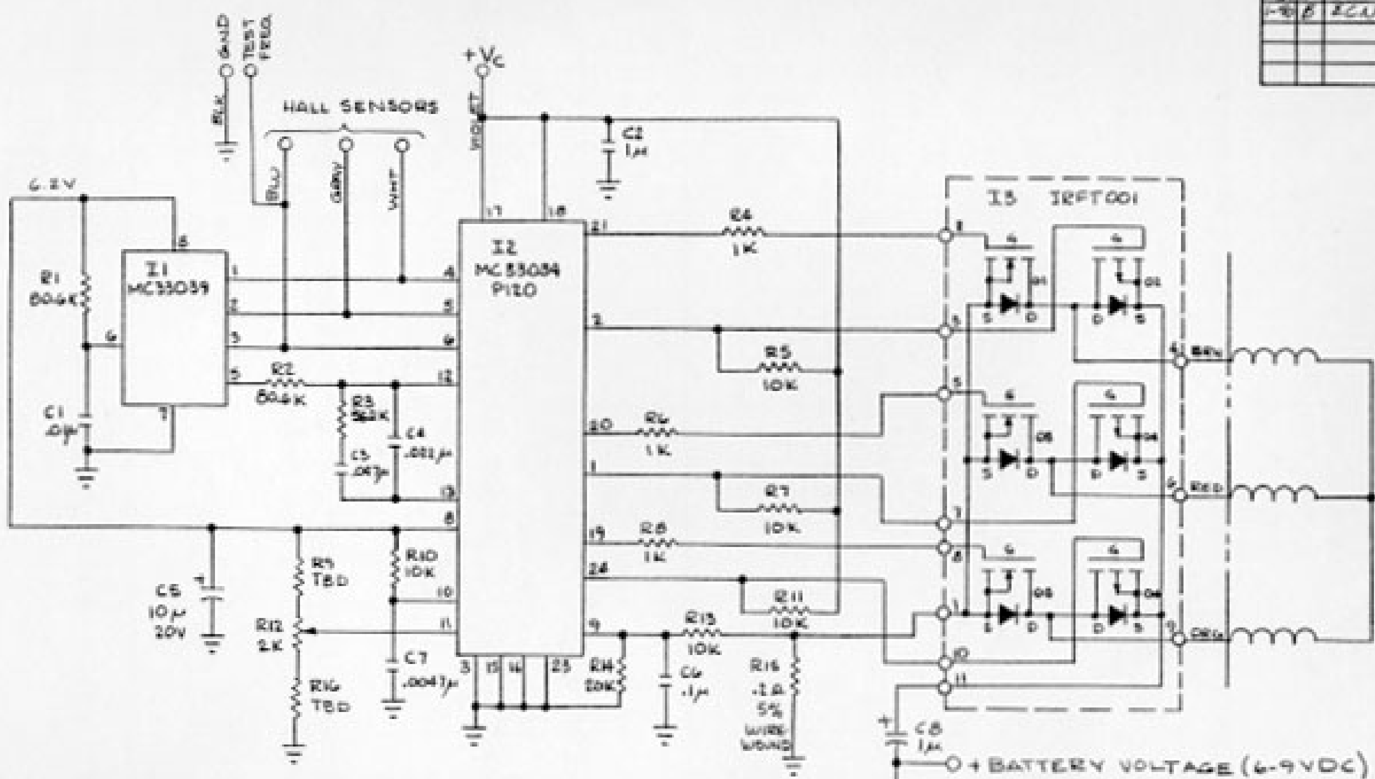

SBE 23045, 20149
INSULATING WASHER
SBE 23047, 20146
HOUSING CAP
SBE 23051 20153 (CANNON)
SBE 23051, 20153A (PITTMAN)
DRIVE MAGNET ASSY
SBE 30010,
115-033-10
IMPELLER WASHER
SBE 23050, 20150
CANNON
SBE 23050, 20150B
PITTMAN
MOTOR MOUNT
SBE 23042, 20152
IMPELLER HOUSING
1.060 REF (PITTMAN)
1.250 REF (CANNON)
.760 (NEW)
.660 (OLD)
.10 (NEW)
.003 (OLD)
SBE 20017-X,
PITTMAN 3100 SERIES
MOTOR (NEW)
CANON BZ 43-TN1B
MOTOR (OLD)
8-32 UNC x 1/8 SCR
CRES, ALUMINUM
4 PLACES
2-027 O-RING
SBE 30007
893-004-10
IMPELLER HOUSING CAP
SBE 23054, 20155
IMPELLER SHAFT
SBE 23043, 20147.1 (3400M)
SBE 23044, 20147.2 (6800M)
MAGNET HOUSING
SBE 23053, 20148
INSULATING CUP
(6800 M PUMP ONLY)
2-219 O-RING
2-56 UNC x 3/16 SCREW
NYLON WASHER 4 PLCS
(3400M) 2-326 O-RING
(6800 M) TP024 T-SEAL
2-56 UNC x 1/4 SOCKET
HD CAP SCR, 4 PLACES
M3X8 (METRIC) SOCKET HD CAP SCR
3 PLCS (CANNON), 2 PLCS PITTMAN
SBE 23048, 20144.1 (3400 M)
SBE 23049, 20144.2 (6800 M)
MOTOR HOUSING
OR
SBE 23300, 20309.1 (3400 M)
SBE 23335, 20309.2 (6800 M)
(DUAL CONNECTOR) MOTOR HOUSING
NOTE:
1. SBE XXXXX, XXXXX
SEABIRD PART NO.
SEABIRD DWG NO
SEA-BIRD ELECTRONICS, INC.
SCALE: 2/1
APPROVED BY:
DRAWN BY SWB
DATE: 3-7-85
REVISED
PUMP HEAD ASSEMBLY DRAWING
REV A - SEE HISTORY FILE
DRAWING NUMBER 40020
REV A

Pump S/N 96 (Common Motor)

Pump RPM = (5)(frequency in Hz measured at Pin 10)



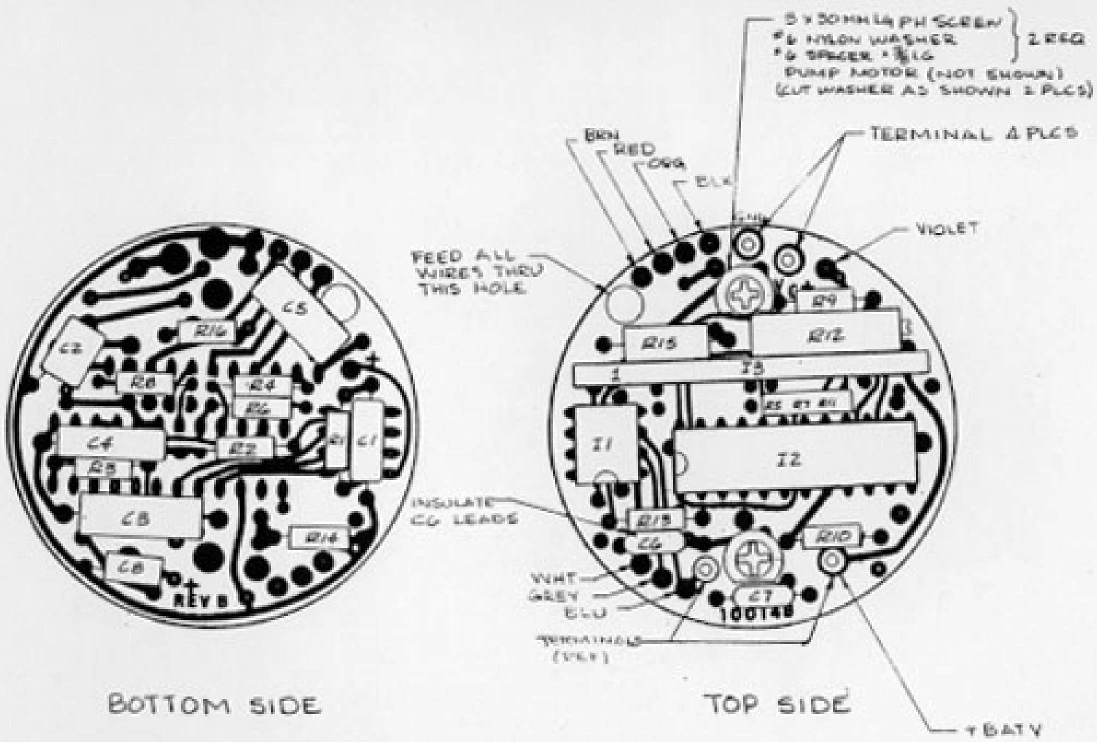
NOTES:
1. ALL RESISTORS 1/4W CARBON
2. 2N4126 MAY ALSO BE 2N5087
3. TIP41B MAY ALSO BE D88C



MOTOR TYPE	RPM RANGE	R7	R16
WDG 5 PITTMAN 3111B505	1000 - 2000	9.09K	1K
WDG 4 PITTMAN 3111B245	2000 - 3000	6.98K	2.21K
WDG 3 PITTMAN 3111B283	3000 - 4500	4.75K	2.74K

NOTES:

SEA-BIRD ELECTRONICS, INC.			
PCB ASSY - 40092 PCB 10014A	SCALE NONE	DRAWN BY BMS	APPROVED BY
TITLE PUMP DRIVER, SCHEMATIC			
DATE 4-18-88	DRAWING NUMBER 30392	REV B	



DATE	REV	REVISION RECORD	AUTH	DR	CK
	A	ECN #34	PG		
	B	ECN 278	AWF		

SLA PRINTED ON 17:19:18 23 JAN 1990

PART NUMBER	DESCRIPTION	QPA W/SCRAP	STR NBR	REF DESIG.
80011	PUMP MOTOR DRIVER, 3000 RPM, #4 WHDC	0.0000		
11083	IC, MC33034P120, MOTOR CONTROLLER	1.0000		I2
11086	IC, MC33039, MOTOR REG.A	1.0000		I1
11087	IC, SAF7001, INT. RECT. MOT. DRVR.	1.0000		I3
14013	CAP, .0047 uf, 80V POLYESTER, 192P47298S	1.0000		C7
14019	CAP, .01 uf, 80V POLYESTER, 192P10398S	1.0000		C1
14020	CAP, .022 uf, 80V POLYESTER, 192P22398S	1.0000		C20
14025	CAP, .1 uf, 100V CER, SR211C104KAA, X7R	1.0000		C6
14029	CAP, 1 uf, 50V CER, SR305E105MAA, Z5U	1.0000		C2
14030	CAP, 1 uf 50V TANT, CSR13G105KP	1.0000		C8
14035	CAP, 10 uf, 20V TANT, 405S106K020K1A	1.0000		C5
14067	CAP, .047 uf, 80V POLYESTER, 192P47398S	1.0000		C3
15029	RES, .2 OHM, 3%,WIREWOUND, RWO5.20	1.0000		R13
15030	RES-NET, 10K X 3, SIP, CSC04A-01-103G	1.0000		R5, 7, 11
15056	RES, 1K OHM, 1%, 1/4 W	3.0000		R4 R6 R8
15070	RES, 2.21K OHM, 1%, 1/4 W	1.0000		R16
15086	RES, 4.99K OHM, 1%, 1/4 W	1.0000		R9
15087	RES, 10K OHM, 1%, 1/4 W	3.0000		R10 R11 R13
15097	RES, 20K OHM, 1%, 1/4 W	1.0000		R14
15115	RES, 80.6K OHM, 1%, 1/4 W	2.0000		R1 R2
15141	RES, 562K OHM, 1%, 1/4 W	1.0000		R3
16003	POT, 2K OHM, BOURNS 3006P-1-202	1.0000		R12
17072	TERMINAL, PCB, 1/16", USECO 2520B-1	3.0000		
20017.A	MOTOR, WDG#4, 3000 RPM, PITTMAN 3111B245	1.0000		
21027	PCB, PUMP DRIVER (10014A)	1.0000		
30099	MACH SCREW, M3 X 30MM PH PHIL, SS	2.0000		
30241	WASHER, # 6 NYLON	2.0000		
30280	SPACER, # 6 X 3/8", NYL, KSN-6/6	2.0000		

TOLERANCES	SEA-BIRD ELECTRONICS, INC.			
DECIMAL	SCHEM - 30392 PCB - 10014	SCALE 2:1	DRAWN BY BMT	APPROVED BY
FRACTIONAL	TITLE PCB ASSY - PUMP DRIVER			
ANGULAR	DATE 4-20-88	DRAWING NUMBER 40092.X	REV B	

H-E CRYSTALENE ENGINEERS' STANDARD FORM

MADE IN U.S.A.