

**Argo program IDG SOLO Engineering Table  
SOLO V1.1**

**Last updated December 18<sup>th</sup>, 2013 Adapted from SBE601 SOLO Rev.1.7 28 Mar 2006**

**John Gilson**

<b>Cycle 0 (diagnostic dive “C” message)</b>	
<b>Char</b>	<b>Contents</b>
1	ID: Diagnostic message identifier 'C'
2-3	LIMsw: 8 bits of limit switch status. Bit 0 = LSB Bits 7,6 IN,OUT state at start of BIT (Built-in-Test) Bits 5,4 IN,OUT state at end of BIT Bits 3,2 IN,OUT state when mission starts Bits 1,0 IN,OUT state at 1 <sup>st</sup> surface XMIT
4-6	SPRXL: BIT pressure counts after resetoffset ARGO TECHNICAL NAME: PRES_SurfaceOffsetAfterReset_dbar PRES_SurfaceOffsetAfterReset_5cbarResolution_dbar
7-9	diagP0: Pressure counts when “in water” sensed.
11-13	diagT0: Temperature counts when “in water” sensed.
14-17	diagS0: Salinity counts when “in water” sensed.
18-20	diagP1: Shallowest pressure counts in profile (Corrupted)
21-24	diagT1: Shallowest temperature counts in profile (Corrupted)
25-28	diagS1: Shallowest salinity counts in profile (Corrupted)
29-30	BTVac: Built-in-Test vacuum at startup (0.01 inHg)
31-32	VACb: Internal vacuum before fill air bladder (0.1 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumAirBladderEmpty_inHg
33-34	VACa: Internal vacuum after fill of air bladder (0.1 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumAirBladderFull_inHg
35-36	BTPcur: Built-in-Test motor current OUT at startup (mA=10*BPcur)
37-38	OUTcur: Motor current OUT to ascend (mA=10*OUTcur) ARGO TECHNICAL NAME: CURRENT_BatteryPumpLastValueAsAscends_mA
39-41	BTPsecs: BIT motor seconds OUT at startup
42-44	Insecs: motor seconds IN to sink
45-47	OUTsecs: motor seconds OUT to ascend
48-49	Btpb: BIT pump battery at startup (LSB=0.1V)
50-51	Vple: Pump batter at end ASCEND (LSB=0.1V) ARGO TECHNICAL NAME: VOLTAGE_BatteryPumpLastValueAsAscends_volts
52-53	Btcp: Built-in-Test CPU battery at startup (LSB = 0.1V)
54-55	Vcpu: CPU battery voltage counts (LSB=0.1V) on surface at start of Xmit after data processed ARGO TECHNICAL NAME: VOLTAGE_BatteryCPUStartXmit_volts
56-59	Stsecs: .01*(seconds from BIT bladders empty to start of mission)
60-62	DURsecs: .01*(seconds from start of mission to end of 1 <sup>st</sup> profile)

<b>Standard dive “E” message</b>	
<b>Char</b>	<b>Contents</b>
1	ID: engineering message identifier 'E'
2	BST 4-bit status of miscellaneous operations
3-6	P1: Pressure at the end of park or start of ascent (see below)
7-10	T1: temperature at the end of park or start of ascent (see below)
11-14	S1: Salinity at the end of park or start of ascent (see below)
15-18	SBNscan: # scans recorded by SBE CTD (1 Hz) ARGO TECHNICAL NAME: TIME_ToAscend_seconds
19	Sbntry: Number of tries to start SBE
20	Sbstat: SBE Start/stop status
21-22a	VACb: Internal vacuum before fill air bladder (0.1 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumAirBladderEmpty_inHg
22b-24a	VACa: Internal vacuum after fill of air bladder (0.1 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumAirBladderFull_inHg
24b	LIMsw: Pair of limit switch status (In lim @ XMIT start, OUT lim @ascend start)
25-26	PMPc: Pump motor current taken at the end of pumping at the start of ascent (mA=10*PMPc) ARGO TECHNICAL NAME: CURRENT_BatteryPumpLastValueAsAscends_mA
27-28	Vcpu: CPU battery voltage counts (LSB=0.1V) on surface at start of Xmit after data processed (LSB=0.1 V) ARGO TECHNICAL NAME: VOLTAGE_BatteryCPUStartXmit_volts
29-30	Vpmp: Pump Battery voltage on last reading before surface (LSB=0.1volts) ARGO TECHNICAL NAME: VOLTAGE_BatterySurfaceNoLoad_volts
31-34	Savg1: Average S counts over the first half of drift time. Trajectory Measurement.
35-36	DS: Change in S counts in second half of drift time (from first half). Trajectory Measurement.
37-38	num_bad: Number of bins in the profile with invalid data. ARGO TECHNICAL NAME: NUMBER_BinsWithBadData_COUNT
39-41	ATE: Air pressure inside float at the end of the previous cycles surface interval. (mmHG)
42-44	ATS: Air pressure inside float at the start of the current cycles surface interval. (mmHG)
45-47	PFS: Pressure counts at the start of the SOLO falltime, after any reset of pressure offset. ARGO TECHNICAL NAME: PRES_SurfaceOffsetAfterReset_5cBarResolution_dbar
48-50	PFE: Pressure counts at the end of the SOLO fall time
51-53	PRE: Pressure counts at the end of the SOLO rise time
54-56	TSK: seconds that piston ran during first settling (SEEK) cycle. ARGO TECHNICAL NAME: TIME_PistonRanDuringFirstSeek_seconds
57-59	PSK: (signed) dbar change in 1 <sup>st</sup> settling cycle (SEEK) ARGO TECHNICAL NAME: PRESSURE_ChangeInFirstSeek_dbar
60-62	TIP: seconds to run piston UP to get to SEEK depth. ARGO TECHNICAL NAME: TIME_PistonRanDuring DescentFrom100db_seconds

<b>Other Technical information found in other SOLO messages</b>	
<b>Msg</b>	<b>Contents</b>
0 / 2-4	Pavg1: Average pressure counts over first half of drift – Trajectory Information
0 / 5-6	Tavg2: 8 LSB of Average temperature over second half of drift – Trajectory Information
1 / 2-4	Tavg1: Average temperature counts over first half of drift – Trajectory Information
1 / 5-6	Pavg2: 8 LSB of average pressure over second half of drift – Trajectory Information
2 / 2-4	SPRX: Average P counts at the surface at the end of transmitting in the previous cycle before any reset. ARGO TECHNICAL NAME: PRES_SurfaceOffsetBeforeReset_dbar or PRES_SurfaceOffsetBeforeReset_5cbarResolution_dbar
2 / 5-6	FallT: 0.01* (seconds elapsed from opening of air valve to sinking from surface to 50dbar ARGO TECHNICAL NAME: TIME_DescentTo50Decibars_seconds
3 / 2	Err: 4-bit error code. signifying a spurious interrupt, stack overflow or spurious reset.
3 / 3-4	Imin: Minimum depth bin with valid data according to the float In TS12: If the first bin is filled, Imin=0; Thus Imin=Imin+1. ARGO TECHNICAL NAME: NUMBER_MinimumDepthBinWithValidData_COUNT
3 / 5-6	Bmax: Maximum depth bin with valid data according to the float In TS12: The number of good bins are stored in Bmax. Thus after Imin=Imin+1 is applied; Bmax=Bmax+(Imin-1) ARGO TECHNICAL NAME: NUMBER_MaximumDepthBinWithValidData_COUNT

### **IDG Manual Errors which this document attempts to fix.**

The IDG manual SBE601 states P1,T1, and S1 are taken at the start of ascent. This is incorrect for firmware version prior to 04May04. Floats before this date are taken at end of Park. SOLO V1.0 is defined as floats with this incorrect setting of P1,T1, and S1. SOLO V1.1 is defined as those floats with fixed P1,T1,S1.

The IDG manual SBE601 does not indicate that in the determination of T1, S1, Savg1, and Savg2 the counts must be divided by 4 before converting to the standard units.

<b>Argo program measurement codes (MC)</b> <b>SOLO floats return the following Measurements and no other. However, enough spots in the Measurements array must be reserved for possible DMQC modification.</b>			
<b>Code (timing)</b>	<b>SOLO I Variable</b>	<b>Description</b>	<b>Units</b>
0	Cy 0	Deployment (Metafile)	Time,position
150	Cy>0: Eng "E"	PFE: Pressure taken at end of SOLO fall time (Eng "E", bytes 48-50)	P(0.5db)
200	Cy=0: Eng "C"	P,T,S triplet taken when float realizes it is under the surface and pumps to return to the surface (Eng "C" bytes 7-17)	P(0.5db),T(0.001° C), S(0.001psu)
296	Cy>0: Msg 0,1	Drift broken into two averaged halves. Stored in Msg 0,1 Bytes 2-6; Time is fill value.	P(0.5db),T(0.001° C), S(0.001psu)
500	Cy>0: Eng "E"	P,T,S triplet taken at start of ascent (Eng "C", bytes 3-14)	P(0.5db); P(0.04db),T(0.001 °C), S(0.001psu)
600	Cy>0: Eng "E"	PRE: Pressure taken at end of SOLO rise time (Eng "E", bytes 51-53)	P(0.5db)
702, 704	ARGOS messages	Time of first/last ARGOS messages received	
703	ARGOS positions	ARGOS positions received	
<p>SOLO floats return the previous Measurements and no other. Enough spots in the Measurements array must be reserved for DMQC modification.</p> <p>For Cycle 0: 100(fillvalue),200(fillvalue),500(fillvalue),600(fillvalue),700(fillvalue),800(fillvalue)</p> <p>For Cycle&gt;0: 100(fillvalue),200(fillvalue),150(fillvalue),250(fillvalue),296,296,300(fillvalue),400(fillvalue), 500(fillvalue),600(fillvalue),700(fillvalue),800(fillvalue)</p>			