

Argo program IDG SOLOII Engineering Table**Manual/Decoder Version 1.4****Last updated December 18th, 2013 Adapted from SOLO2_Xformat_v1.4_19Dec12.doc****John Gilson****Applicable ROMS: 14Dec12**

| Byte | Contents |
|-------------|--|
| | ID=0xe0, Engineering message in first diagnostic dive at start of mission |
| 0 | ID/Mission phase = 0xe0 |
| 1-2 | Number of bytes= 76 = 0x4C |
| 3 | Engineering message version |
| 4 | # packets in current cycle |
| 5-6 | empty |
| 7-8 | empty |
| 9-10 | empty |
| 11-12 | EP -> SatTime (seconds float connected to satellite) |
| 13-14 | DP->Vcpu: CPU battery voltage counts (0.01V), on surface at start of Xmit after data processed ARGO TECHNICAL NAME: VOLTAGE_BatteryCPUStartXmit_volts |
| 15-16 | DP->Vpmp: Pump battery counts at surface (0.01V) ARGO TECHNICAL NAME: VOLTAGE_BatterySurfaceNoLoad_volts |
| 17-18 | DP->Vple: Pump battery counts at end of last pump on ascent (0.01V) ARGO TECHNICAL NAME: VOLTAGE_BatteryPumpLastValueAsAscends_volts |
| 19-20 | Btvac: Built-in-Test vacuum at startup (0.01 inHg) |
| 21-22 | DP->Air[1]: Pressure case vacuum before filling bladder on surface (0.01 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumAtStartSurface_inHg |
| 23-24 | DP->Air[2]: Pressure case vacuum after filing bladder on surface (0.01 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumOilBladderFull_inHg |
| 25-26 | DP->ISRID: i.d. of last interrupt |
| 27-28 | DP->HPavgI: Average pump motor current taken at start of ascent (LSB=1ma) ARGO TECHNICAL NAME: CURRENT_BatteryAvgPumpOnStartAscent_mA |
| 29-30 | DP->HPmaxI: Maximum pump motor current taken at start of ascent (LSB=1ma) ARGO TECHNICAL NAME: CURRENT_BatteryMaxPumpOnStartAscent_mA |
| 31-32 | Total seconds pumping to get to the surface |
| 33-34 | seconds pumped at the surface |
| 35-36 | DP -> P[5]: Surface pressure counts at end of ascent (LSB = 0.04 dbar) |
| 37-38 | SPRX: Surface pressure before resetoffset (pertains to BIT) (dbar) ARGO TECHNICAL NAME: PRES_SurfaceOffsetBeforeReset_dbar or ...Reset_4mBarResolution_dbar |
| 39-40 | SPRXL: Surface pressure after resetoffset (pertains to BIT) (dbar) ARGO TECHNICAL NAME: PRES_SurfaceOffsetAfterReset_dbar or ...Reset_4mBarResolution_dbar |
| 41-42 | diagP[0]: Pressure when "in water" sensed by float after deployment Argo MEASUREMENT_CODE=199 |
| 43-44 | diagT[0]: Temperature when "in water" sensed by float after deployment Argo MEASUREMENT_CODE=199 |

| ID=0xE2, Engineering message in normal dive cycle | |
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| Byte | Contents |
| 0 | ID/Mission phase = 0xe2 |
| 1-2 | Number of bytes= 98 = 0x62 |
| 3 | Engineering Message Version...IDG ID for the decoding of this engineering message |
| 4 | #packets in current surface session |
| 5-6 | #tries to connect in previous surface session |
| 7-8 | parse_X_reply status in previous surface session (low order byte: number of messages; upper byte bit field of errors) |
| 9-10 | ATSBD return status in previous surface session |
| 11-12 | EP->sattime: seconds taken in previous surface session to send all SBD messages |
| 13-14 | DP->Vcpu: CPU battery voltage counts (0.01V), on surface at start of Xmit after data processed ARGO TECHNICAL NAME: VOLTAGE_BatteryCPUStartXmit_volts |
| 15-16 | DP->Vpmp: Pump battery counts at surface (0.01V) ARGO TECHNICAL NAME: VOLTAGE_BatterySurfaceNoLoad_volts |
| 17-18 | DP->Vple: Pump battery counts at end of last pump on ascent (0.01V) ARGO TECHNICAL NAME: VOLTAGE_BatteryPumpLastValueAsAscends_volts |
| 19-20 | DP->Air[0]: Pressure case vacuum during sinking at 50db (0.01 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumDuringDescent50dbar_inHg |
| 21-22 | DP->Air[1]: Pressure case vacuum before filling bladder on surface (0.01 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumAtStartSurface_inHg |
| 23-24 | DP->Air[2]: Pressure case vacuum after filing bladder on surface (0.01 inHg) ARGO TECHNICAL NAME: PRESSURE_InternalVacuumOilBladderFull_inHg |
| 25-26 | DP->ISRID: i.d. of last interrupt |
| 27-28 | DP->HPavgl: Average pump motor current taken at start of ascent (LSB=1ma) ARGO TECHNICAL NAME: CURRENT_BatteryAvgPumpOnStartAscent_mA |
| 29-30 | DP->HPmaxl: Maximum pump motor current taken at start of ascent (LSB=1ma) ARGO TECHNICAL NAME: CURRENT_BatteryMaxPumpOnStartAscent_mA |
| 31-32 | Total seconds pumping to get to the surface |
| 33-34 | seconds pumped at the surface |
| 35-36 | SPRX: Surface pressure before resetoffset (pertains to previous dive) (dbar) ARGO TECHNICAL NAME: PRES_SurfaceOffsetBeforeReset_dbar or ...Reset_4mBarResolution_dbar |
| 37-38 | SPRXL: Surface pressure after resetoffset (pertains to previous dive) (dbar) ARGO TECHNICAL NAME: PRES_SurfaceOffsetAfterReset_dbar or ...Reset_4mBarResolution_dbar |
| 39-40 | diagP[0]: Pressure at the start of ascent ARGO MEASUREMENT_CODE=499 |
| 41-42 | diagT[0]: Temperature at diagP[0] ARGO MEASUREMENT_CODE=499 |
| 43-44 | diagS[0]: Salinity at diagP[0] ARGO MEASUREMENT_CODE=499 |
| 45-46 | diagP[1]: Shallowest CTD Pressure reading upon ascent ARGO MEASUREMENT_CODE=599 |
| 47-48 | diagT[1]: Shallowest CTD Temperature reading upon ascent ARGO MEASUREMENT_CODE=599 |

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| 49-50 | diagS[1]: Shallowest CTD Salinity reading upon ascent ARGO MEASUREMENT_CODE=599 |
| 51-52 | Sbnbad: # scans that had bad data and were not sent from float |
| 53-54 | Snnscan: # scans recorded by CTD (1 Hz): // -1 (0xFFFF) indicates unable to get scan count from SBE // -2 (0xFFFE) indicates SBE never started so SBE didn't reset scan count before returning an old value ARGO TECHNICAL NAME: TIME_ToAscend_seconds |
| 55-56 | Compacted Sbntry, Sbstrt, Sbstop status (see misspec.h) ((DP->SBntry&0xF) ((DP->SBstrt&0x3)<<2) DP->SBstop&0x3)) |
| 57-58 | DP->P[0]: Pressure counts before begin of descent to park (LSB = 0.04 dbar) |
| 59-60 | DP->P[1]: Pressure counts at end of descent to park (LSB = 0.04 dbar) |
| 61-62 | DP->P[2]: Pressure counts at beginning of drift (park) (LSB = 0.04 dbar) |
| 63-64 | DP->P[3]: Pressure counts at end of drift (park) (LSB = 0.04 dbar) |
| 65-66 | DP->P[5]: Surface pressure counts at end of ascent (LSB = 0.04 dbar) |
| 67-68 | DP->PAVG[0]: Average pressure over first half of drift ARGO MEASUREMENT_CODE=296 |
| 69-70 | DP->TAVG[0]: Average temperature over first half of drift ARGO MEASUREMENT_CODE=296 |
| 71-72 | DP->SAVG[0]: Average salinity over first half of drift ARGO MEASUREMENT_CODE=296 |
| 73-74 | DP->PAVG[1]: Average pressure over second half of drift ARGO MEASUREMENT_CODE=296 |
| 75-76 | DP->TAVG[1]: Average temperature over second half of drift ARGO MEASUREMENT_CODE=296 |
| 77-78 | DP->SAVG[1]: Average salinity over second half of drift ARGO MEASUREMENT_CODE=296 |
| 79-80 | DP-> fall_time = seconds from open air valve (surface) to end of sink ~ 50dbar |
| 81-82 | DP-> fall_rate = avg mm/sec while sinking during fall_time to ~50dbar |
| 83-84 | DP->SeekT= tenths of pumping in first seek of drift ARGO TECHNICAL NAME: TIME_PistonRanDuringFirstSeek_seconds |
| 85-86 | DP->SeekP = change of depth (signed 0.1dbar) in first seek ARGO TECHNICAL NAME: PRESSURE_ChangeInFirstSeek_dbar |
| 87-88 | Exception flags (can be added to) 0x0001 Valve failed to open 0x0002 Valve failed to close 0x0004 Questionable pressure 0x0008 Antenna was toggled 0x0010 Antenna switch failure (no satellites even after toggling) 0x0020 GPS communication error (can talk to GPS unit) 0x0080 Float took too long to leave the surface (toggled valve) 0x1000 Valve failure during sinking phase 0x2000 Valve failure during ascend phase of mission |
| 89 | Vent (air bubble) data: # 0.1 seconds vent motor ran |
| 90 | Vent (air bubble) data: LLD status before and after vent ran |
| 91-92 | SBE P offset (times 800): Cumulative auto-pressure offset correction ARGO TECHNICAL NAME: PRES_SensorAutoAdjustment_dbar |
| 93-94 | PP->SeekSc: # of seconds pumped to target (park) depth |

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| 95-96 | Number of Packets sent previous cycle |
| 97 | ; terminator |
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| | ID=0xe3, Engineering message following mission abort |
| Byte | Contents |
| 0 | ID/Mission phase = 0xe3 |
| 1-2 | Number of bytes= 30 = 0x1e |
| 3 | Engineering message version |
| 4 | #packets in previous surface session |
| 5-6 | #tries to connect in previous surface session |
| 7-8 | parse_X_reply status in previous surface session |
| 9-10 | ATSBD return status in last surface session |
| 11-12 | seconds taken in sending last SBD message |
| 13-14 | current CPU battery voltage Counts (0.01V) |
| 15-16 | current pump battery counts (0.01V) |
| 17-18 | DP->Air[1]: pressure case vacuum at beginning of abort (0.01inHg) |
| 19-20 | DP->Air[0]: pressure case vacuum at end of last xmit (previous cycle) (0.01inHg) |
| 23-24 | DP->ISRID: i.d. of last interrupt |
| 25-26 | AbtCd = code for what caused abort mission 0 = no error 1 = current time is later than RTCabort 2 = unable to WakeOST 3 = unable to Send dive number to SOLOII (LodiveNo) 4 = Iridium ground station commanded to go to abort 5 = Final dive was completed. Mission is done. 6 = Diagnostic dive ailed to get GPS fix, pressure never > dbarGo, or unable to send message to Iridium 7 = pressure sensor failure |
| 29 | ; terminator |
| | |
| | ID=0xe5, Engineering message following BITest |
| Byte | Contents |
| 0 | ID/Mission phase = 0xe5 |
| 1-2 | Number of bytes= 58 = 0x3a |
| 3 | Engineering message version = 2 |
| 4 | #packets in current surface session |
| 5-6 | SBE P offset(*800) |
| 7-8 | CPU battery voltage (0.01V) |
| 9-10 | no load pump battery voltage (0.01V) |
| 11-12 | Pump battery voltage at end of last pump (0.01V) |
| 13-14 | DP->HPavgl = average pump current at bottom, LSB=1mA |
| 15-16 | seconds pumped out during test |

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| 17 | Oil Vacuum before filling bladder 0.01inHg |
| 18 | Oil Vacuum after filling bladder 0.01inHg |
| 19-20 | DP → Air[0] = Pcase Vacuum at beginning of BIT (Oil bladder Empty) 0.01 inHg |
| 21-22 | DP → Air[1] = Pcase Vacuum at end of BIT with air bladder inflated 0.01 inHg |
| 23 | Number of tries needed to open valve |
| 24 | Number of tries needed to close valve |
| 25-26 | i.d. of last interrupt |
| 27-56 | string returned from SBE pt command |
| 57 | ; terminator |

| ID=0xf0 Argo cycle configuration (mission) | |
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| Byte | Contents |
| 3 | Data Version: Matches Decoder/Manual to use |
| 4-5 (i) | Target profile depth Argo CONFIG name: CONFIG_ProfilePressure_dbar |
| 6-7 | Target parking depth Argo CONFIG name: CONFIG_ParkPressure_dbar |
| 8-9 (a) | Maximum rise time Argo CONFIG name: CONFIG_AscentToSurfaceTimeOut_hours |
| 10-11 (b) | Target (maximum) fall to parking depth time Argo CONFIG name: CONFIG_DescentToParkTimeOut_hours |
| 12-13 (c) | Maximum fall-from-parking-to-profile depth time Argo CONFIG name: CONFIG_DescentToMaxPresTimeOut_hours |
| 14-15 (d) | Target drift time Argo CONFIG name: CONFIG_ParkTime_hours |
| 16 | Float Type == 0 for SOLOII |
| 17 (e) | Target ascent rate while profiling Argo CONFIG name: CONFIG_TargetAscentSpeed_cm/s |
| 18-19 (f) | Number of Seeks Argo CONFIG name: CONFIG_SeeksToParkPeriods_COUNT |
| 20-21 (g) | Surface Time Argo CONFIG name: CONFIG_SurfaceTimeOut_hours |
| 22-23 (h) | Seek Period Argo CONFIG name: CONFIG_SeeksToParkPeriodsIntervals_seconds |
| CONFIG_CycleTime_hours can be computed as (after converting to same units): min((a), (i)/(e))+ (b)+(c)+(d)+(f)*(h)+(g). This will be greater than the actual cycle time. | |

| Argo program MEASUREMENT_CODEs (MC) | | | |
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| Code (timing) | SOLO II Variable | Description | Units |
| 100 (DST) | Cy>0: Fall ID=0x40 | First T,P pair [taken as valve opened to leave surface] | Time,P(0.04db) |
| 199 | Cy=0: Eng ID=0xe0 | P,T,S triplet taken when float realizes it is under the surface and pumps to return to the surface (Eng ID=0xe0 bytes 41-46) | P(0.04db),T(0.001 °C), S(0.001psu) |
| 189/190 | Cy>0: Fall ID=0x40 | All T,P Fall pairs pre-DET not assigned to other MC (189 indicates buoyancy adjustment) | Time,P(0.04db) |
| 200 (DET) | Cy>0: Fall ID=0x40 | Choice of T,P pair that is first within 3% of pressure at beginning of drift (see Eng ID=0xe2 bytes 67-68) | Time,P(0.04db) |
| 489 | Cy=1: Fall ID=0x40 or any cycle without park phase | If n is the number of stabilizations (see Argo ID=0xf0), the T,P n+1 from end of Fall record is a stabilization. Each later T,P pair excluding the last will be an additional stabilization. | Time,P(0.04db) |
| 239 | Cy>1: Fall ID=0x40 | | |
| 250 (PST) | Cy>0: Fall ID=0x40 | Last T,P Fall pair when Park Phase follows | Time,P(0.04db) |
| 296 | Cy>0: Eng ID=0xe2 | Drift broken into two averaged halves. Stored in Eng ID=0xe2 bytes 67-78; Time estimated from the last Fall ID=0x40 T,P pair [note: not DET] and first Rise ID=0x50 T,P pair | P(0.04db),T(0.001 °C), S(0.001psu) |
| if profile pressure > drift pressure (typical) NOTE: DPST is never defined in SOLO/SOLOII | | | |
| 300 (PET) | Cy>0: Rise ID=0x50 | First T,P Rise pair [taken as valve opened] | Time,P(0.04db) |
| 390 | Cy>0: Rise ID=0x50 | All pre-AST T,P Rise pairs | Time,P(0.04db) |
| 400 (DDET) | Cy>0: Rise ID=0x50 | DDET is determined by a) 2 nd derivative of Rise pair series or b) within 3% of profile depth (see Eng ID=0xe2 bytes 39-40). | Time,P(0.04db) |
| 490 | Cy>0: Rise ID=0x50 | All post-DDET/pre-AST T,P Rise pairs | Time,P(0.04db) |
| 500 (AST) | Cy>0: Rise ID=0x50; Eng ID=0xe2 | AST is determined by 2 nd derivative of Rise pair series. P,T,S triplet taken at start of ascent (Eng ID=0xe2 bytes 39-44) | Time,P(0.04db); P(0.04db),T(0.001 °C), S(0.001psu) |
| else (Cy=0 or float rises from drift depth) | | | |
| 500 (AST) | Cy=0: Rise ID=0x50; | First T,P Rise pair [taken as valve opened] | Time,P(0.04db); |
| | Cy>0: Rise ID=0x50; Eng ID=0xe2 | AST is determined by 2 nd derivative of Rise pair series. P,T,S triplet taken at start of ascent (Eng ID=0xe2 bytes 39-44) | Time,P(0.04db); P(0.04db),T(0.001 °C), S(0.001psu) |
| endif | | | |

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| 589/590 | Cy>-1: Rise ID=0x50 | All T,P Rise pairs post AST excluding last; 589 indicates buoyancy adjustment. | Time,P(0.04db) |
| 599 | Cy=0: Eng ID=0xe0 | last P,T,S triplet taken before turning off CTD (Eng ID=0xe0 bytes 51-56) | P(0.04db),T(0.001 °C), S(0.001psu) |
| | Cy>0: Eng ID=0xe2 | last P,T,S triplet taken before turning off CTD (Eng ID=0xe2 bytes 45-50) | P(0.04db),T(0.001 °C), S(0.001psu) |
| 600 (AET) | Cy>-1: Rise ID=0x50 | Last T,P Rise pair | Time,P(0.04db) |
| 703 | Cy=0: GPS ID=0x00 | GPS Fix | Time, Position |
| | Cy>0: GPS ID=0x02 | GPS Fix | Time, Position |
| 700 (TST) 702 (FMT) | Time in SBD email | Time of first SBD message | Time |
| 704 (LMT) 800 (TET) | Time in SBD email | Time of last SBD message | Time |
| 703 | Cy>0: GPS ID=0x01 | GPS Fix | Time, Position |