METOCEAN DATA SYSTEMS LTD.

SVP Technical Manual

TD 13-050, Ver. 1.2

2/14/2014

This manual covers all technical details of the MetOcean Data Systems Ltd. SVP product line; specifically, the SVP-I-BDGS, SVP-I-BDGS-L, SVP-I-XDGS, SVP-I-XDGS-L, SVP-I-BXGS, SVP-I-BXGS-L, SVP-I-BXGS-LP, SVP-I-XXGS, SVP-I-XXGS-L and the SVP-I-XXGS-LP

Revision History

Version	Description of Change(s)	Release Date
1.0	Initial Release	10/1/2012
1.1	Update for new release	10/11/2013
1.2	Updated for FID changes as per ECP 101721	2/14/2014

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Warranty Policy

MetOcean warrants products manufactured by MetOcean to be free from defects in materials and workmanship under normal use and service for twelve (12) months from the date of shipment, unless specified otherwise, subject to the following conditions:

MetOcean's obligation under this warranty is limited to repairing or replacing (at MetOcean's option) products that have been returned prepaid to MetOcean. MetOcean will return warranted equipment by surface carrier, prepaid. This warranty shall not apply to any MetOcean products that have been subjected to modification, misuse, neglect, accidents of nature, or shipping. Batteries are not warranted. Under no circumstance will MetOcean reimburse the claimant for costs incurred in removing and / or reinstalling equipment. This warranty, and MetOcean's obligation hereunder, is in lieu of all other warranties, expressed or implied, including warranties of suitability and fitness for a particular purpose. MetOcean is not liable for consequential damages.

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Introduction

The MetOcean Iridium Surface Velocity Program buoy, or SVP, is an ocean drifter designed to track ocean currents while providing sensor data and global position through Iridium satellite telemetry. There are two mechanical configurations: the SVP which consists of a spherical surface unit and an underwater drogue that is attached by a long tether, and the iSphere which is a spherical surface unit with no drogue. The SVP is designed to track currents at a depth of 15 m while the iSphere tracks surface current. All models of SVP and iSphere have a sea surface temperature sensor, battery voltage sensor and an optional barometric pressure sensor. The SVPs also have a drogue loss sensor. Additional battery and firmware configurations are available to accommodate battery type and polar conditions.

Specifications

Packaging Specifications										
Model	**SVP-I-BDGS**	**SVP-I-BDGS-L**	**SVP-I-XDGS**	**SVP-I-XDGS-L**	**SVP-I-BXGS**	**SVP-I-BXGS-L**	**SVP-I-BXGS-LP**	**SVP-I-XXGS**	**SVP-I-XXGS-L**	**SVP-I-XXGS-LP**
Packaged Dimensions										
Packaged Mass										

General Configuration										
Model	**SVP-I-BDGS**	**SVP-I-BDGS-L**	**SVP-I-XDGS**	**SVP-I-XDGS-L**	**SVP-I-BXGS**	**SVP-I-BXGS-L**	**SVP-I-BXGS-LP**	**SVP-I-XXGS**	**SVP-I-XXGS-L**	**SVP-I-XXGS-LP**
Family	SVP	SVP	SVP	SVP	iSphere	iSphere	iSphere	iSphere	iSphere	iSphere
Barometer	✓	✓			✓	✓	✓			
Drogue	✓	✓	✓	✓						
GPS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sea Surface Temperature	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Polar Capable							✓			✓

Deployed Specifications										
Model	**SVP-I-BDGS**	**SVP-I-BDGS-L**	**SVP-I-XDGS**	**SVP-I-XDGS-L**	**SVP-I-BXGS**	**SVP-I-BXGS-L**	**SVP-I-BXGS-LP**	**SVP-I-XXGS**	**SVP-I-XXGS-L**	**SVP-I-XXGS-LP**
Hull Color	Blue				Orange					
Hull Size	16 in				13 in					
Hull Material	ABS Plastic									
Anti-Fouling on Submerged Hull Half	✓	✓	✓	✓	NA					
Drogue Drag Area Ratio	40:1				NA					
Drogue Midpoint Depth	15 m									
Drogue Material	Coated Cordura Nylon									
Tether Material	Spacelay Wire Rope				NA					

Hardware Specifications										
Model	**SVP-I-BDGS**	**SVP-I-BDGS-L**	**SVP-I-XDGS**	**SVP-I-XDGS-L**	**SVP-I-BXGS**	**SVP-I-BXGS-L**	**SVP-I-BXGS-LP**	**SVP-I-XXGS**	**SVP-I-XXGS-L**	**SVP-I-XXGS-LP**
Telemetry	Iridium 9602 SBD Transceiver									
Battery Type	Alkaline	Lithium	Alkaline	Lithium	Alkaline	Lithium	Lithium	Alkaline	Lithium	Lithium
Barometer	Vaisala PTB 110		NA		Vaisala PTB 110			NA		
Drogue Loss Sensor	Strain Gauge				NA					
Battery Voltage Sensor	Precision Resistive Divider									
GPS Receiver	Navman Jupiter 32									
Sea Surface Temperature Sensor	US Sensor Ultra Precision Thermistor									

Condition Specifications										
Model	**SVP-I-BDGS**	**SVP-I-BDGS-L**	**SVP-I-XDGS**	**SVP-I-XDGS-L**	**SVP-I-BXGS**	**SVP-I-BXGS-L**	**SVP-I-BXGS-LP**	**SVP-I-XXGS**	**SVP-I-XXGS-L**	**SVP-I-XXGS-LP**
Storage Temperature	-40°C to 40°C									
Operaional Temperature	-2°C to 35°C							-2°C to 35°C		
Survival Temperature	-2°C to 60°C									
Operational Sea State	Sea State 5									
Survival Sea State	Sea State 7									
Barometric Pressure			NA					NA		
Shelf Life	24 Months									

Note:

Operational specifications indicate conditions under which the SVP will operate correctly.

Survival specifications indicate the maximum conditions under which the SVP will operate but, is likely to experience catastrophic failures.

Storage specifications are the conditions recommended for storage and transportation to ensure optimum performance once deployed.

Deployment

Iridium Activation

Prior to deployment of the SVP, the end user must contact an Iridium service provider to activate this device with an Iridium account before deployment. Failure to activate with an Iridium VAR will result in no data transmission from the unit. If there are any questions, contact MetOcean sales at sales@metocean.com.

Pre-Deployment Operations

The operator will need to remove the SVP from the box and plastic bag.

There are no pre-deployment checks to perform or settings to configure. Do not unravel the tether from the cardboard spool. Do not remove the drogue bands. (Both the tether spool and the drogue bands are held in place with water soluble tape that will release once in the water. Unraveling the tether or removing the drogue bands can be dangerous for the operator upon deployment.

SVP Deployment instructions

Immediately before deployment the operator must remove the magnet to turn the SVP on. The magnet is found on the underside of the flange about the middle of the SVP and is covered by the label shown below. Remove both the magnet and the label.

The SVP is designed for a maximum free fall height of 10 m. The SVP and drogue should be held and dropped together.

Data Sampling and Transmission

The SVP begins sampling sensor data at 10 minutes before the top of the hour at xx:50:00. The unit will power up GPS at the top of the hour, (xx+1):00:00 and begin the Iridium transmission as soon as the GPS finishes. The SVP is inactive until the next scheduled sampling / transmission. The default data sampling / transmission schedule is hourly.

Optional Data Sampling / Transmission Schedules

For customers who require a different transmission interval for their specific purposes. The optional transmission interval configurations as listed below can be arranged with MetOcean during the sales process or at a later date with an 'over the air command:'

- Sampling and transmitting at 30 minute intervals
- Sampling and transmitting at hourly intervals
- Sampling and transmitting at 2 hour intervals
- Sampling and transmitting at 3 hour intervals
- Sampling and transmitting at 4 hour intervals
- Sampling and transmitting at 6 hour intervals
- Sampling and transmitting at 8 hour intervals
- Sampling and transmitting at 12 hour intervals
- Sampling and transmitting at 24 hour intervals
- Sampling and transmitting at 48 hour intervals

Over the Air Commands for Data Sampling / Transmission Schedule Changes

If your Iridium VAR is JouBeh Technologies, then there will be a drop down menu with your assets where you can select the interval you desire:

- WAKEINTERVAL 30 sets the unit to 30 minute intervals
- WAKEINTERVAL 60 sets the unit to hourly intervals, this is the default configuration
- WAKEINTERVAL 120 sets the unit to 2 hour intervals
- WAKEINTERVAL 180 sets the unit to 3 hour intervals
- WAKEINTERVAL 240 sets the unit to 4 hour intervals
- WAKEINTERVAL 360 sets the unit to 6 hour intervals
- WAKEINTERVAL 480 sets the unit to 8 hour intervals
- WAKEINTERVAL 720 sets the unit to 12 hour intervals
- WAKEINTERVAL 1440 sets the unit to 24 hour intervals
- WAKEINTERVAL 2880 sets the unit to 48 hour intervals

When an OTA command is sent, it will be received and acted upon at the next scheduled transmission interval. Depending on the current interval, this may result in a delay of up to 48 hours before the command is actioned.

If you do not use JouBeh Technologies for your Iridium VAR, contact MetOcean at sales@metocean.com to arrange for an over the air command to be sent to your unit or units.

Operation and Maintenance

Unique Identification Number

Each SVP will have a 15 digit identification number, also known as the IMEI number. This number is unique to that particular unit and is attached to the devices Iridium 9602 transceiver. This number should be used at all times when referencing a specific SVP. The IMEI is labelled on the SVP and on the shipping box.

Battery Life

The battery life of the SVP depends on the sensor configuration and the data sampling and transmission rate. Battery life depends largely on the deployment conditions.

Please use the mission lifetime calculator found here to estimate the life expectancy of your specific SVP: http://lifetimeestimator.metocean.com

If the SVP has not been deployed, then MetOcean recommends returning your SVP for servicing every 2 years. Contact sales@metocean.com to arrange for service.

User Maintenance

No user maintenance is necessary.

Recommended Service Schedule

All SVPs have the 'manufacturing date' and 'expiry date' printed on the labelling. The manufacturing date refers to when the SVP was produced at MetOcean; the expiry date, two years later, refers to when MetOcean recommends the SVP be returned for servicing. Contact sales@metocean.com to arrange for service.

Servicing will renew the warranty period. Any non-serviced SVPs used after the expiry date will not be considered as a valid warranty case.

Message Format

The following message formats are required for users who will de-code their own data.

- BP = Barometric Pressure, mbar
- BPT = Barometric Pressure Tendency, mbar
- SST = Sea surface temperature, ^{o}C

- TTFF = Time to first GPS fix
- SBD Time = Time for Iridium message transmission
- VBAT = Remaining battery voltage, V
- RANGE = Drogue Loss Strain Gauge Sensor Data
- CSQ = Iridium signal strength of the previous transmission
- S/N Ratio = GPS signal strength

SVP-I-BDGS and SVP-I-BDGS-L Message Format

Display Name	Min	Max	Start Byte	Start Bit	Bit Length	Decoding Equation
Format ID	0	255	1	8	8	Y = x (set to 0)
Year	2000	2127	2	8	7	y = x + 2000
Month	0	15	2	1	4	y = x
Day of Month	0	63	3	5	6	y = x
Hour of Day	0	31	4	7	5	y = x
Minute of Hour	0	63	4	2	6	y = x
Barometric Pressure	850	1054.7	5	4	11	y = 0.1x + 850
SST	-5	35.95	6	1	12	y = 0.01x - 5
Barometric Pressure Tendency	-25.5	25.6	8	5	9	y = 0.1x - 25.5
Range	0	63	9	4	6	y = x
VBAT	5	17.6	10	6	6	y = 0.2x + 5
SBD Time	0	255	11	8	8	y = x
CSQ	0	255	12	8	8	y = x
Time Since Last Fix	0	4095	13	8	12	y = x
GPS Latitude	-90	90.35499	14	4	20	y = 0.000086x - 90
GPS Longitude	-180	180.71006	17	8	21	y = 0.000086x - 180
TTFF	0	254	19	3	7	y = 2x
S/N Ratio	0	60	20	4	4	y = 4x

SVP-I-XDGS and SVP-I-XDGS-L Message Format

Display Name	Min	Max	Start Byte	Start Bit	Bit Length	Decoding Equation
Format ID	0	255	1	8	8	Y = x (set to 0)
Year	2000	2127	2	8	7	y = x + 2000
Month	0	15	2	1	4	y = x
Day of Month	0	63	3	5	6	y = x
Hour of Day	0	31	4	7	5	y = x
Minute of Hour	0	63	4	2	6	y = x
SPARE 1	0	2047	5	4	11	y = x
SST	-5	35.95	6	1	12	y = 0.01x - 5
SPARE 2	0	511	8	5	9	y = x
Range	0	63	9	4	6	y = x
VBAT	5	17.6	10	6	6	y = 0.2x + 5
SBD Time	0	255	11	8	8	y = x
CSQ	0	255	12	8	8	y = x
Time Since Last Fix	0	4095	13	8	12	y = x
GPS Latitude	-90	90.35499	14	4	20	y = 0.000086x - 90
GPS Longitude	-180	180.71006	17	8	21	y = 0.000086x - 180
TTFF	0	254	19	3	7	y = 2x
S/N Ratio	0	60	20	4	4	y = 4x

SVP-I-BXGS and SVP-I-BXGS-L Message Format

Display Name	Min	Max	Start Byte	Start Bit	Bit Length	Decoding Equation
Format ID	0	255	1	8	8	Y = x (set to 0)
Year	2000	2127	2	8	7	y = x + 2000
Month	0	15	2	1	4	y = x
Day of Month	0	63	3	5	6	y = x
Hour of Day	0	31	4	7	5	y = x
Minute of Hour	0	63	4	2	6	y = x
Barometric Pressure	850	1054.7	5	4	11	y = 0.1x + 850
SST	-5	35.95	6	1	12	y = 0.01x - 5
Barometric Pressure Tendency	-25.5	25.6	8	5	9	y = 0.1x – 25.5
SPARE 1	0	63	9	4	6	Y = x
VBAT	5	17.6	10	6	6	y = 0.2x + 5
SBD Time	0	255	11	8	8	y = x
SPARE 2	0	255	12	8	8	y = x
Time Since Last Fix	0	4095	13	8	12	y = x
GPS Latitude	-90	90.35499	14	4	20	y = 0.000086x - 90
GPS Longitude	-180	180.71006	17	8	21	y = 0.000086x - 180
TTFF	0	254	19	3	7	y = 2x
S/N Ratio	0	60	20	4	4	y = 4x

SVP-I-BXGS-LP Message Format

Display Name	Min	Max	Start Byte	Start Bit	Bit Length	Decoding Equation
Format ID	0	255	1	8	8	Y = x (set to 0)
Year	2000	2127	2	8	7	y = x + 2000
Month	0	15	2	1	4	y = x
Day of Month	0	63	3	5	6	y = x
Hour of Day	0	31	4	7	5	y = x
Minute of Hour	0	63	4	2	6	y = x
Barometric Pressure	850	1054.7	5	4	11	y = 0.1x + 850
SST	-25	15.95	6	1	10	y = 0.01x - 25
Barometric Pressure Tendency	-25.5	25.6	8	7	9	y = 0.1x – 25.5
SPARE 1	0	1023	9	6	10	y = x
VBAT	5	17.6	10	4	6	y = 0.2x + 5
SBD Time	0	255	11	6	8	y = x
SPARE 2	0	255	12	6	8	y = x
Time Since Last Fix	0	4095	13	6	12	y = x
GPS Latitude	-90	90.35499	14	2	20	y = 0.000086x - 90
GPS Longitude	-180	180.71006	17	6	21	y = 0.000086x - 180
TTFF	0	254	19	1	7	y = 2x
S/N Ratio	0	60	20	2	4	y = 4x
SPARE 3	0	63	21	6	6	y = x

SVP-I-XXGS and SVP-I-XXGS-L Message Format

Display Name	Min	Max	Start Byte	Start Bit	Bit Length	Decoding Equation
Format ID	0	255	1	8	8	Y = x (set to 0)
Year	2000	2127	2	8	7	y = x + 2000
Month	0	15	2	1	4	y = x
Day of Month	0	63	3	5	6	y = x
Hour of Day	0	31	4	7	5	y = x
Minute of Hour	0	63	4	2	6	y = x
SPARE 1	0	2047	5	4	11	y = x
SST	-5	35.95	6	1	12	y = 0.01x - 5
SPARE 2	0	622	8	5	9	y = x
SPARE 3	0	63	9	4	6	y = x
VBAT	5	17.6	10	6	6	y = 0.2x + 5
SBD Time	0	255	11	8	8	y = x
SPARE 4	0	255	12	8	8	y = x
Time Since Last Fix	0	4095	13	8	12	y = x
GPS Latitude	-90	90.35499	14	4	20	y = 0.000086x - 90
GPS Longitude	-180	180.71006	17	8	21	y = 0.000086x - 180
TTFF	0	254	19	3	7	y = 2x
S/N Ratio	0	60	20	4	4	y = 4x

SVP-I-BXGS-LP Message Format

Display Name	Min	Max	Start Byte	Start Bit	Bit Length	Decoding Equation
Format ID	0	255	1	8	8	Y = x (set to 0)
Year	2000	2127	2	8	7	y = x + 2000
Month	0	15	2	1	4	y = x
Day of Month	0	63	3	5	6	y = x
Hour of Day	0	31	4	7	5	y = x
Minute of Hour	0	63	4	2	6	y = x
SST	-25	15.95	6	1	12	y = 0.01x - 60
Barometric Pressure Tendency	-25.5	25.6	8	7	9	y = 0.1x - 25.5
SPARE 1	0	1023	9	6	10	y = x
VBAT	5	17.6	10	4	6	y = 0.2x + 5
SBD Time	0	255	11	6	8	y = x
SPARE 2	0	255	12	6	8	y = x
Time Since Last Fix	0	4095	13	6	12	y = x
GPS Latitude	-90	90.35499	14	2	20	y = 0.000086x - 90
GPS Longitude	-180	180.71006	17	6	21	y = 0.000086x - 180
TTFF	0	254	19	1	7	y = 2x
S/N Ratio	0	60	20	2	4	y = 4x
SPARE 3	0	63	21	6	6	y = x