SED-29

Technical Report
Hydrographic Survey and Sediment Probing, 18 Mile Creek, Burt, New York

SPONSOR

CH2MHill
135 South 84th Street,
Suite 325
Milwaukee, WI 53214

DRAFT

SURVEY COMPANY

Aqua Survey Inc.
469 Point Breeze Rd.
Flemington, NJ 08822

ASI Project Number 29-119

June 26, 2009

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This report, as well as all records and raw data were audited and found to be an accurate reflection of the study. Copies of raw data will be maintained by Aqua Survey, Inc., 469 Point Breeze Road, Flemington, NJ 08822.

Kenneth Hayes **Date**
President

Mark Padover **Date**
Lead Field Scientist

Draft

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I. EXECUTIVE SUMMARY

A hydrographic and sediment thickness probing survey was conducted covering the area where future sampling activities will potentially be conducted on 18 Mile Creek, in Burt, New York. The area surveyed extended from shoreline to shoreline for more than 8,175 feet upstream from the Burt Hydroelectric Dam along 18 Mile Creek. The primary goal of the survey was to establish bottom elevations and contours within the impoundment and to collect water depth and sediment thickness data to support the development of a sediment sampling plan.

The geophysical survey was conducted on June 4 and June 5, 2009. Technologies and techniques employed included real-time kinematic differential global positioning (RTK-DGPS) or equivalent system, with a horizontal accuracy of better than 1 meter and a vertical accuracy of better than 0.2 feet, fathometer, and sediment probe. Survey lines spaced 25 feet apart were run perpendicular to the shoreline using the fathometer. Five lines with 3 locations per line were probed to determine representative sediment thicknesses from 4,800 feet above the Burt Dam to 8,150 feet above the dam.

The hydrographic and probing surveys were conducted using the positioning system with horizontal accuracy of better than 1 meter and a vertical accuracy of better than 0.2 feet. The RTK-DGPS system consisted of a stationary base station operating over a known control point. Positioning corrections calculated by the base station were transmitted at 10 times per second via radio modem to another GPS receiver on the survey vessel. This allows the positioning accuracy for the survey vessel using RTK-DGPS to be on the order of 3-cm in the horizontal and 2-cm in the vertical planes.

During the survey, the PDOP as well as the status of the RTK-DGPS was monitored. If the PDOP exceeded 5.0 or the RTK-DGPS lost fix, survey activities were suspended or data was not used. The rover antenna was mounted directly over the remote sensing device to eliminate offset errors and insure positions tied directly with the collected data.

Survey lines spaced 25 feet apart were created based on the centerline of the river. A single centerline was drawn. Survey lines were then created perpendicular to the centerline, which resulted in lines that created transects of the river. These survey lines were labeled with their distance from the Burt Dam. For example line 1+00 is 100 feet upstream from the dam and line 77+00 is 7,700 feet upstream from the dam.

An Innerspace Technologies model 455 fathometer was used to conduct the hydrographic survey. Positioning data was collected from the positioning system and electronically paired with the soundings from the fathometer in Hypack Max 2009 survey control software. Prior to the commencement of survey operations, a bar check was conducted to adjust for draft and speed of sound in order to ensure

accurate sounding data. A bar check was also conducted during the day and at the end of each day to be sure the settings continued to be correct. The antenna for the positioning system was mounted directly above the transducer, eliminating any positioning offset errors. In areas where the water was too shallow for the fathometer or areas with dense aquatic vegetation, a lead line was used to take spot measurements. These areas included the waters less than 3 feet deep from transect 61+25 to 81+75. Following the survey, the data was processed, point plotted, and contoured.

The impoundment was found to have water depths ranging from 1.0 foot to 37.4 feet. The shorelines typically have steep to near vertical slopes. The historic creek channel is still readily apparent in the contoured hydrographic data results through most of the survey area.

A sediment probing survey was conducted to determine the thickness of soft sediments. The probe, consisting of a 10 foot piece of steel re-bar welded to the end of sections of marked ¾ inch galvanized pipe, was pushed into the sediment until refusal was encountered. In many cases, the type of material causing refusal could be detected through feedback from the probing device. Five transects, with 3 probes per transect were conducted at lines 48+00, 58+00, 67+00, 77+00, and 81+50. Sediment thickness ranged from a minimum of 6.2 feet to a maximum of 12.8 feet, with an average sediment thickness of 10.7 feet at the locations probed. The most commonly detected material causing refusal was clay, with sand and rock at several of the locations.

II. MATERIALS, METHODS, AND RESULTS

A. Horizontal and Vertical Positioning

All aspects of the remote sensing survey were conducted using a real-time kinematic differential global positioning system (RTK-DGPS), or equivalent system, with a horizontal accuracy of better than 1 meter and a vertical accuracy of better than 0.2 feet. The RTK-DGPS system consisted of a stationary base station operating over a known control point. Positioning corrections calculated by the base station were transmitted at 10 times per second via radio modem to another GPS receiver on the survey vessel. This allows the positioning accuracy for the survey vessel to be on the order of 3-cm in the horizontal and 2-cm in the vertical planes.

The base station, consisting of a Trimble 5700 24-channel dual frequency GPS receiver, Trimble TSCe survey controller, and Trimble Trimmark 3 radio modem, was set up over a known control point, USGS benchmark AH9233. The rover, consisting of a Trimble MS-750 9-channel dual frequency GPS receiver and Teledyne radio modem, was set-up on the survey vessel and supplied positioning data to all the survey instruments during the geophysical remote sensing surveys.

During the survey, the PDOP as well as the status of the RTK-DGPS was monitored. If the PDOP exceeded 5.0 or the RTK-DGPS lost fix, survey activities were suspended or data was not used. Results of the survey were produced in New York West State Plane feet NAD83.

During the survey, a control point was transferred to the bridge on Wilson Burt Rd. over 18 Mile Creek. The control point was established on the southern guard rail over the 8th vertical rail support from the western end of the bridge. Prior to the beginning of the survey, a marked water level staff was installed in the survey to check and monitor surface water elevations during the survey. The water lever staff was checked before survey operations began, in the middle of each day, and at the end of each day to insure vertical accuracy of the survey data.

The vertical datum supplied for USGS benchmark AH9233 was North American Vertical Datum 1988 (NAVD88). As the required vertical datum for the project is the International Great Lakes Datum of 1985 (IGLD85), NOAA's NAVD88/IGLD85 transformation tool was used to convert the datums at the transferred control point on the bridge. The difference between NAVD88 and IGLD85 is on the order of 0.09 feet in the survey area. Water level was found to be constant at an elevation of 291.40 feet NAVD88 which equals 291.31 feet IGLD85.

Figure 1. Survey area on 18 Mile Creek, Burt, NY.

B. Hydrographic Data Collection and Results

A bathymetric survey was conducted along the entire length of the project area. Survey lines spaced 25 feet apart were to ensure high-resolution coverage of the entire survey area. These lines were created based on the centerline of the river. A single centerline was drawn. Survey lines were then created perpendicular to the centerline at 25 foot intervals, which results in lines that create transects of the river. These survey lines were labeled with their distance from the Burt Dam. For example line 1+00 is 100 feet upriver from the dam and line 77+00 is 7,700 feet upriver from the dam. In areas where the river bends, gaps in the survey lines are created on the outside of the bend. In these gaps, additional data was gathered to insure complete coverage of the area to be surveyed.

Horizontal positioning was collected from the positioning system and electronically paired with soundings from an Innerspace Technologies IT-455 single beam fathometer in Hypack Max 2009 survey control software at a rate of 10 points per second. The optional 200khz 3 degree tranducer was used to help insure accurate readings in the impoundment due to the step sides and potential water depth.

Prior to the commencement of survey operations, a bar check was conducted to adjust for draft and speed of sound in order to ensure accurate sounding data. A bar check was also conducted during the day and at the end of each day to be sure the settings continued to be correct. The antenna for the positioning system was mounted directly above the transducer, eliminating any positioning offset errors. In areas where the water was too shallow for the fathometer or areas with dense aquatic vegetation, a lead line was used to take spot measurements. These areas included the waters less than 3 feet deep from transect 61+25 to 81+75.

Post processing involved removing bad sounding points created by propeller turbulence and aquatic vegetation. The lead line data and fathometer data were then combined into a single data set. The data was then sorted to eliminate points closer than 10 feet apart and to reduce the data to an X, Y, Z file. Finally, the sorted data was point plotted and contoured on a geo-referenced AutoCAD drawing.

The impoundment was found to have water depths ranging from 1.0 foot to 37.4 feet. The shorelines typically have steep to near vertical slopes. The historic creek channel is still readily apparent in the contoured hydrographic data results through most of the survey area.

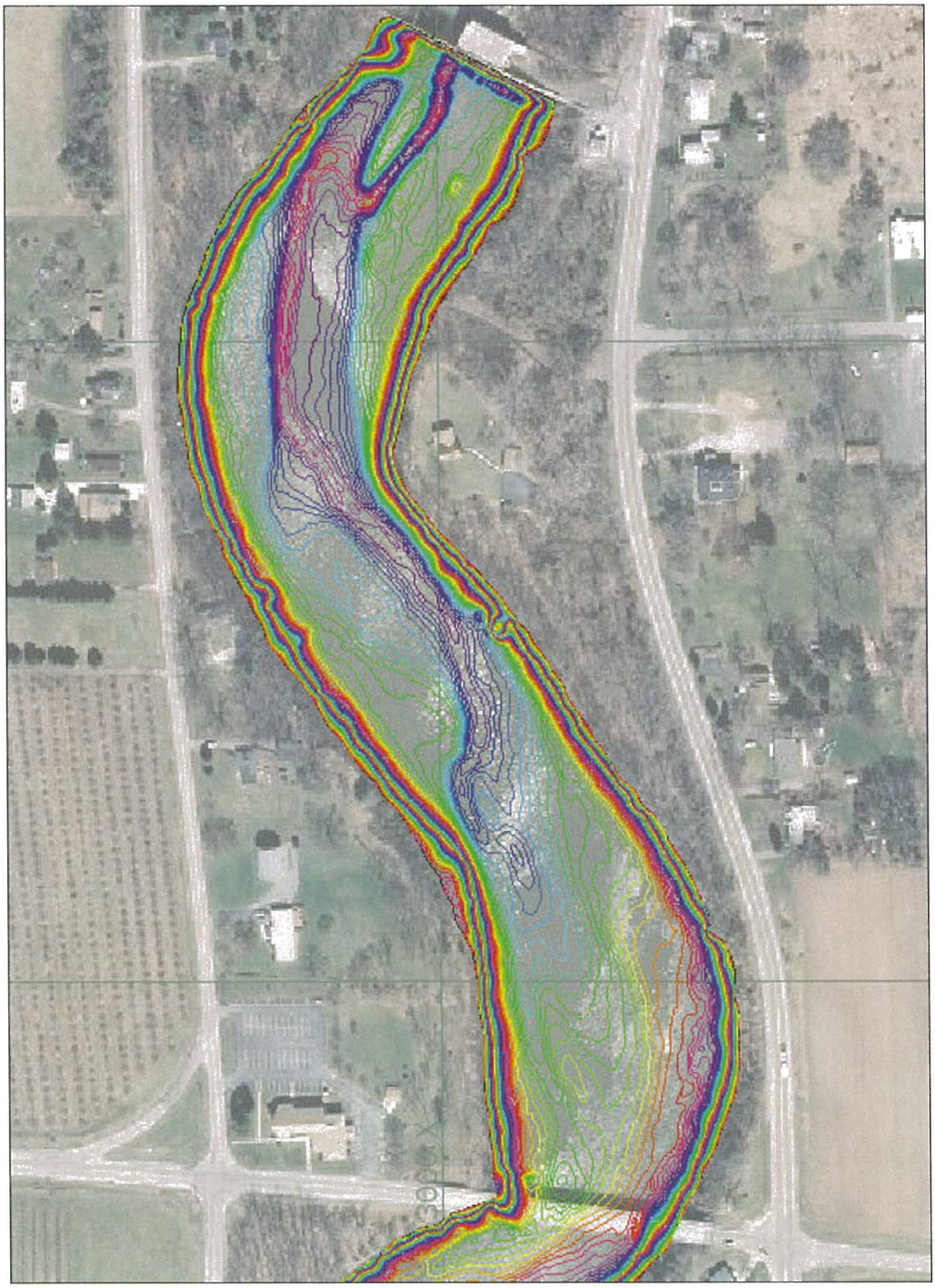

Figure 2. Contours at 0.5 foot intervals from 0+00 to 21+00.

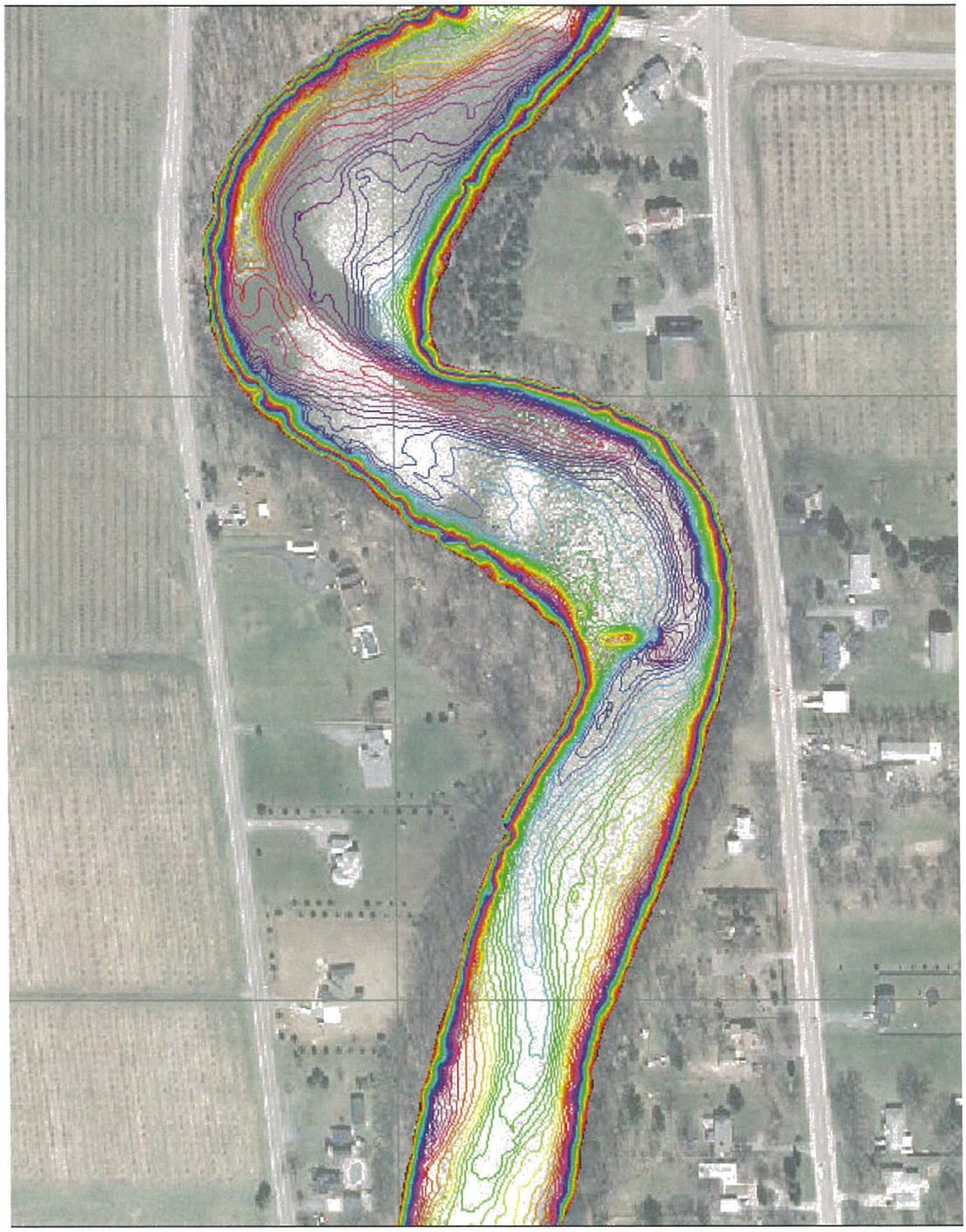

Figure 3. Contours at 0.5 foot intervals from 20+00 to 44+00.

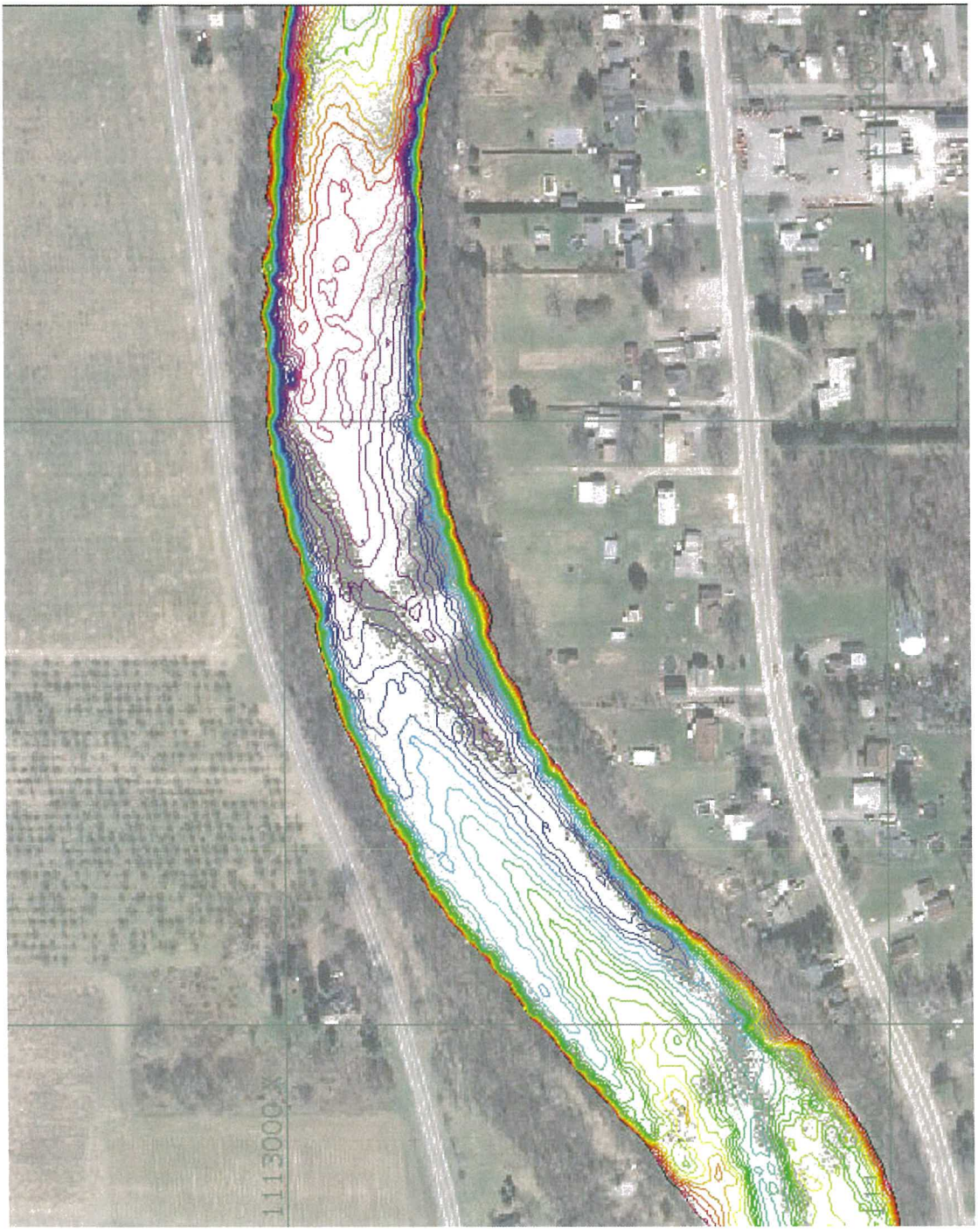

Figure 4. Contours at 0.5 foot intervals from 44+00 to 64+00.

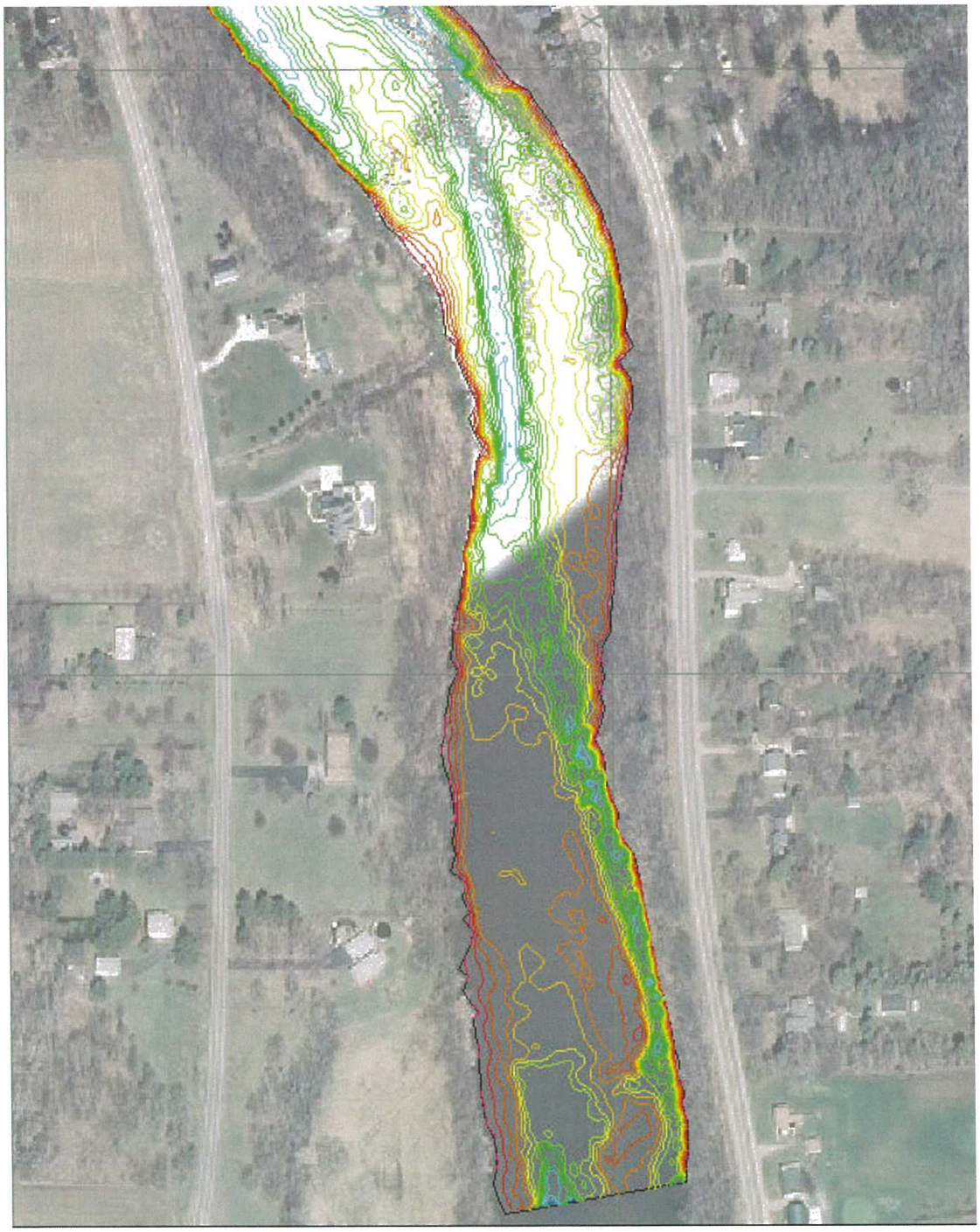

Figure 5. Contours at 0.5 foot intervals from 60+00 to 81+75.

C. Sediment Thickness Probing Data Collection and Results

A sediment probing survey was conducted to determine the thickness of soft sediments to support the development of a sediment sampling plan. The probe, consisting of a 10 foot piece of steel re-bar welded to the end of sections of marked ¾ inch galvanized pipe, was pushed into the sediment until refusal was encountered. In many cases, the type of material causing refusal could be detected through feedback from the probing device. Five transects, with 3 probes per transect were conducted at lines 48+00, 58+00, 67+00, 77+00, and 81+50. Sediment thickness ranged from a minimum of 6.2 feet to a maximum of 12.8 feet, with an average sediment thickness of 10.7 feet at the locations probed. The most commonly detected material causing refusal was clay, with sand and rock at several of the locations.

Transect	Easting NY West SP feet	Northing NY West SP feet	Top of Sediment Depth	Refusal Depth	Refusal material
48+00	1113020.9	1203280.9	12.7	24.4	Sand
48+00	1113082.2	1203281.3	11.6	20.1	Clay
48+00	1113131.3	1203282.5	12.0	20.5	Sand
58+00	1113280.6	1202270.7	7.0	16.8	Rock
58+00	1113334.5	1202308.7	6.0	18.0	Clay
58+00	1113420.7	1202362.0	9.0	18.5	Rock
67+00	1113810.8	1201575.0	6.5	17.9	Clay
67+00	1113917.2	1201604.2	2.2	15.0	Clay
67+00	1113985.0	1201633.5	4.5	17.5	Clay
77+00	1113817.8	1200592.0	1.9	13.6	Clay
77+00	1113904.3	1200603.2	1.4	13.7	Clay
77+00	1114017.2	1200616.1	5.5	16.9	Rock
81+50	1113906.2	1200154.7	5.5	11.7	Clay
81+50	1113998.9	1200169.5	1.4	12.9	Rock
81+50	1114094.0	1200180.2	3.4	14.8	Rock

Table 1. Probing Results.

III. PROJECT CONCLUSIONS

A hydrographic and sediment thickness probing survey was conducted covering the area where future sampling activities will potentially be conducted on 18 Mile Creek, in Burt, New York. The area surveyed extended from shoreline to shoreline for more than 8,175 feet upstream from the Burt Hydroelectric Dam along 18 Mile Creek. The primary goal of the survey was to establish bottom elevations and contours within the impoundment and to collect water depth and sediment thickness data to support the development of a sediment sampling plan.

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Appendix A

Equipment Specifications

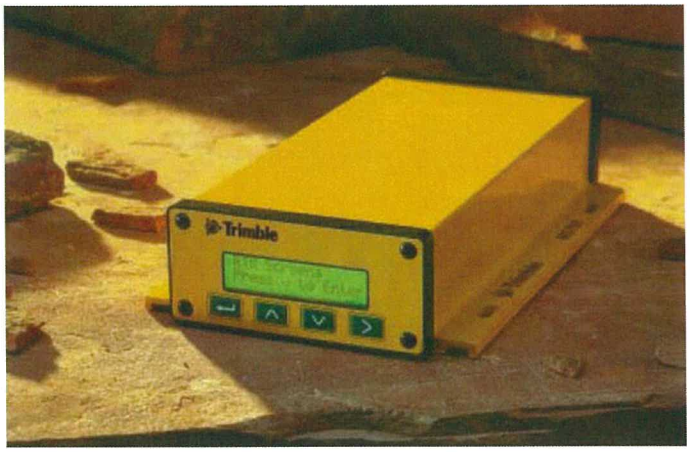
MS750

Dual Frequency RTK Receiver for Precise Dynamic Positioning

Key features and benefits

- **20 Hz position update rate**
- **Less than 20 milliseconds position latency**
- **Centimeter-level position accuracy**
- **Front panel display & keypad for status monitoring and configuration**
- **User-defined local coordinates direct from receiver**
- **Industry standard CAN bus interface**

The MS750™ represents the highest level of accuracy and response available from a dual frequency GPS receiver. The receiver is specifically designed to allow the easy integration of reliable centimeter-level positions to any guidance or control application.



Dual Frequency RTK Receiver for Precise Dynamic Positioning

Accuracy and Response Times

Dynamic platforms, require virtually instantaneous position reports multiple times per second. The MS750 delivers positions to guidance or control loop software twenty times per second with a latency of less than 20 milliseconds. This responsiveness is matched with a horizontal accuracy of two centimeters and vertical accuracy of three centimeters. For the most precise applications, the MS750 provides one centimeter accuracy horizontally at a 5 Hz rate with a small increase in latency.

Interfacing and Configuration Ease

The MS750 is designed to plug right into your application with minimal development. An easy to-use application file interface enables the user to completely program receiver operation with a single command. Alternately, the receiver can be configured via the user-friendly built-in display and keyboard interface, or by the included Windows-based Configuration Toolbox software. Multiple configurations can be stored in the receiver as files and activated when desired. Local datum and transformation parameters may be loaded directly into the receiver. Therefore, output grid coordinates are compatible with GPS and traditional survey systems that may be in use on the same site. ASCII or Binary messages may be output through any of the three bi-directional serial ports. The receiver also includes support for the industry standard CAN (Controller Area Network) interface.

Advanced Technology

The accuracies, update rates and latencies available in the MS750 are made possible through a GPS architecture specifically designed for demanding dynamic positioning applications. Reliable operation in the most adverse environments, such as radio interference experienced at construction or mining sites, is a strict requirement. Custom designed hardware with Supertrak™ multibit GPS signal technology and Everest™ advanced multipath suppression provide superior tracking especially for weaker, low elevation satellites.

Both the RTCM format for differential GPS corrections and Trimble's published Compact Measurement Record (CMR) differential data can be received simultaneously, allowing the receiver to choose the optimum source and provide seamless navigation. Available as an option is the ability to calculate the baseline vector between two moving receivers to centimeter accuracy. The MS750 addresses a vast range of applications in the field of machine positioning, guidance and control.

Trimble

MS750

Dual Frequency RTK Receiver for Precise Dynamic Positioning

STANDARD FEATURES

- Centimeter accuracy, real-time positioning
- 20 Hz position updates
- < 20 ms position latency
- Front panel display & keypad
- User-defined local coordinates direct from receiver
- 3 serial I/O ports
- 2 CAN ports
- 1 PPS Output
- Trimble CMR Input/Output
- RTCM Input/Output
- One year hardware warranty
- Compact, easy mounting design
- Synchronized 5 Hz position updates

OPTIONS AND ACCESSORIES

- Moving Base RTK
- Rugged L1/L2 machine mount antenna
- Micro-Centered Antenna
- 5 m, 7.5 m, 10 m, 24 m & 30 m antenna cables
- Data extension cable
- Extended hardware warranty
- Firmware and Software update service

ORDERING INFORMATION

MS750 **Part Number 36577-00**

Includes MS750 receiver, Configuration Toolbox software, operating manual, power/data cable, data/1 PPS cable

PHYSICAL CHARACTERISTICS

Size	14.5cmW × 5.1cmH × 23.9cmD (5.7"W × 2.0" H × 9.4"D)
Weight	1.0 kg (2.25 lbs)
Power	12VDC/24VDC, 9 Watts

ENVIRONMENTAL CHARACTERISTICS

Operating temp	-20°C to +60°C
Storage temp	-30°C to +80°C
Humidity	MIL 810 E, Meth. 507.3 Proc III, Aggravated, 100% condensing
Vibration	MIL 810 D, Tailored Random 3gRMS Operating Random 6.2gRMS Survival
Mechanical Shock	MIL 810 D ± 40 g Operating ± 75 g Survival
EMC	
Radiated Emissions	CISPR 12
Conducted Emissions	SAE J1113/41
Radiated Immunity	ISO/DIS 13766, 30V/m
ESD	±15KV
Input Voltage Transients	ISO 7637-2

TECHNICAL SPECIFICATIONS

Tracking	9 channels L1 C/A code, L1/L2 full cycle carrier Fully operational during P-code encryption		
Signal processing	Supertrak Multibit Technology Everest Multipath Suppression		
Positioning mode	**Accuracy**[1]	**Latency**[2]	**Max Rate**
Synchronized RTK	1cm + 2ppm Horizontal 2cm + 2 ppm Vertical	300ms[5]	5 Hz Std
Low Latency	2cm + 2ppm Horizontal[4] 3cm + 2 ppm Vertical	< 20ms	20Hz
DGPS	< 1m	< 20ms	20Hz

[1] 1 sigma level
[2] At maximum output rate
[3] Dependent on data link throughput
[4] Assumes 1 second data link delay

Initialization	Automatic OTF (on-the-fly) while moving
Time required	Typically < 1 minute
Range	Up to 20 km from base for RTK
Start-up	< 90 seconds from power on to positioning < 30 seconds with recent ephemeris
Communications	3 × RS-232 ports. Baud rates up to 115,200 2 × CAN/J1939
Configuration	Via front panel display & keypad, Configuration Toolbox Software or user definable application files
Output Formats	NMEA-0183: GGK, GGA, ZDA, VTG, GST, PJT and PJK Trimble Binary Streamed Output

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YOUR LOCAL TRIMBLE OFFICE OR REPRESENTATIVE

Trimble 5700 GPS System

One receiver, many configurations, for greater flexibility and choice

The Trimble® 5700 GPS receiver is an advanced, but easy-to-use, surveying instrument that is rugged and versatile enough for any job.

Combine your 5700 with the antenna and radio that best suit your needs, and then add the Trimble controller and software of your choice for a total surveying solution. The powerful 5700 GPS system will provide all the advanced technological power and unparalleled flexibility you need to increase your efficiency and productivity in any surveying environment.

Advanced GPS receiver technology

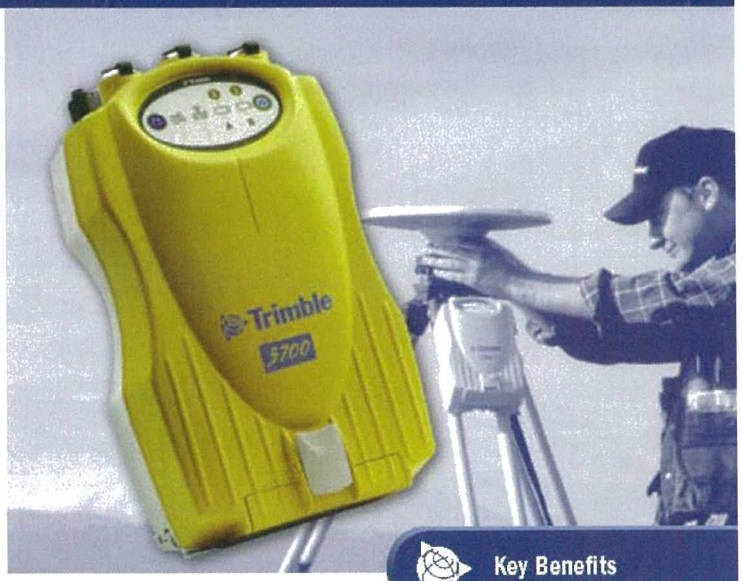
The 5700 is a 24-channel dual-frequency RTK GPS receiver featuring the advanced Trimble Maxwell™ technology for superior tracking of GPS satellites, increased measuring speed, longer battery life through less power use, and optimal precision in tough environments. WAAS and EGNOS capability lets you perform real-time differential surveys to GIS grade without a base station.

Modular design for versatility

For topographic, boundary, or engineering surveying, clip the receiver to your belt, carry it in a comfortable backpack, or configure it with all components on a lightweight range pole. With the receiver attached to your site vehicle, you can survey a surface as fast as you can drive! For control applications, attach the receiver to a tripod...it's designed to work the way your job requires.

Full metal jacket...and lightweight

The 5700 GPS receiver boasts the toughest mechanical and waterproofing specs in the business. Its magnesium alloy case is stronger than aluminum,



but also 30% lighter—the 5700 weighs just 1.4 kg (3 lb) with batteries. Whether you're collecting control points on a tripod, or scrambling down a scree slope collecting real-time kinematic data, the receiver is light enough and tough enough to carry on performing.

Fast and efficient data storage and communications

Use the receiver's CompactFlash memory to store more than 3,400 hours of continuous L1/L2 data collection at an average of 15-second intervals. Transfer data to a PC at speeds of more than 1 megabit per second through the super-fast USB port. Your choice of UHF radio modem is built in to the receiver to provide RTK communications receiving without the need for cables or extra power!

Your choice of Trimble antenna

Choose the high-accuracy Trimble GPS antenna that best suits your needs: the lightweight and portable Zephyr™ antenna for RTK roving, or the Zephyr Geodetic™ antenna for geodetic surveying.

The Zephyr Geodetic antenna offers submillimeter phase center repeatability and excellent low-elevation tracking, while the innovative design of its Trimble Stealth™ ground plane literally burns up multipath energy using technology similar to that used by stealth aircraft to hide from radar. The Zephyr Geodetic antenna thus provides unsurpassed accuracy from a portable antenna.

Key Benefits

- Industry-leading technology provides superior performance
- Flexible configurations put you in total control
- Rugged, high-performance hardware is built to last
- With the Trimble controller and software of your choice, enjoy seamless integrated surveying

Trimble.

Draft

Trimble 5700 GPS System

General

- Front panel for on/off, one-button-push data logging, CompactFlash card formatting, ephemeris and application file deletion, and restoring default controls
- LED indicators for satellite tracking, radio-link, data logging, and power monitoring
- Tripod clip or integrated base case

Performance specifications

Measurements

- Advanced Trimble Maxwell technology
- High-precision multiple correlator L1 and L2 pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurement data for low noise, low multipath error, low time domain correlation, and high dynamic response
- Very low noise L1 and L2 carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- L1 and L2 Signal-to-Noise ratios reported in dB-Hz
- Proven Trimble low-elevation tracking technology
- 24 Channels L1 C/A Code, L1/L2 Full Cycle Carrier, WAAS/EGNOS.

Code differential GPS positioning[1]

Horizontal	±(0.25 m + 1 ppm) RMS
Vertical	±(0.5 m + 1 ppm) RMS
WAAS differential positioning accuracy typically <5 m 3DRMS[2]	

Static and FastStatic GPS surveying[1]

Horizontal	±5 mm + 0.5 ppm RMS
Vertical	±5 mm + 1 ppm (× baseline length) RMS

Kinematic surveying[1]

Real-time and postprocessed kinematic surveys

Horizontal	±(10 mm + 1 ppm) (× baseline length) RMS
Vertical	±(20 mm + 1 ppm) RMS
Initialization time	Single/Multi-base minimum 10 sec + 0.5 times baseline length in km, up to 30 km
Scalable GPS infrastructure initialization time	<30 seconds typical anywhere within coverage area
Initialization reliability[3]	Typically >99.9%

Hardware

5700 GPS receiver

Physical:	
Casing	Tough, lightweight, fully sealed magnesium alloy
Waterproof	Tested to IPX7 standards
Shock and vibration	Tested and meets the following environmental standards:
Shock	MIL-STD-810F to survive a 1 m (3.28 ft) drop onto concrete
Vibration	MIL-STD-810-F on each axis
Weight	With internal batteries, internal radio, internal battery charger, standard UHF antenna: 1.4 kg (3 lb)
	As entire RTK rover with batteries for greater than 7 hours, less than 4 kg (8.8 lb)
Dimensions (W×H×L)	13.5 cm × 8.5 cm × 24 cm (5.3 in × 3.4 in × 9.5 in)
Electrical:	
Power	DC input 11 to 28 V DC with over voltage protection
Power consumption	2.5 W receiver only, 3.75 W including internal radio
Battery	Greater than 10 hours data logging, or greater than 7 hours of RTK operation on two internal 2.0 Ah lithium-ion batteries
Battery weight	0.1 kg (3.5 oz)
Battery charger	Internal with external AC power adapter; no requirement for external charger
Power output	11.5 to 20 V DC (Port 1), 11.5 to 27.5 V DC (Port 3) on external power input
Certification	Class B Part 15 FCC certification, CE Mark approved, C-Tick approved, Canadian FCC
Environmental:	
Operating temperature[4]	-40 °C to 65 °C (-40 °F to 149 °F)
Storage temperature	-40 °C to 80 °C (-40 °F to 176 °F)
Humidity	100%, condensing

Communications and data storage:

- 2 external power ports, 2 internal battery ports, 3 RS232 serial ports
- Integrated USB for data download speeds in excess of 1 Mb per second
- External GPS antenna connector
- CompactFlash advanced lightweight and compact removable data storage. Options of 64 MB or 128 MB from Trimble
- More than 3,400 hours continuous L1+L2 logging at 15 seconds with 6 satellites typical with 128 MB card
- Fully integrated, fully sealed internal UHF radio modem option
- GSM, cellphone, and CDPD modem support
- Dual event marker input capability
- 1 Hz, 2 Hz, 5 Hz, and 10 Hz positioning and data logging
- 1 pulse per second output capability
- CMR®, CMR+, RTCM 2.x and 3.x input and output standard
- 14 NMEA outputs

Zephyr antenna

Dimensions	16.2 cm (6.38 in) diameter × 6.2 cm (2.44 in) height
Weight	0.55 kg (1.20 lb)
Operating temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Humidity	100% humidity proof, fully sealed
Shock and vibration	Tested and meets the following environmental standards:
Shock	MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
Vibration	MIL-STD-810-F on each axis

- 4-point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain

Zephyr Geodetic antenna

Dimensions	34.3 cm (13.5 in) diameter × 7.6 cm (3 in) height
Weight	1.31 kg (2.88 lb)
Operating temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Humidity	100% humidity proof, fully sealed
Shock and vibration	Tested and meets the following environmental standards:
Shock	MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
Vibration	MIL-STD-810-F on each axis

- 4-point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain
- Trimble Stealth ground plane for reduced multipath

1. Accuracy may be subject to conditions such as multipath, obstructions, satellite geometry, and atmospheric parameters. Always follow recommended survey practices.
2. Depends on WAAS/EGNOS system performance.
3. May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
4. Receiver operates normally to -40 °C (-40 °F) but some office-based functions such as USB download or internal battery charging are not recommended at temperatures below freezing.

Specifications subject to change without notice.

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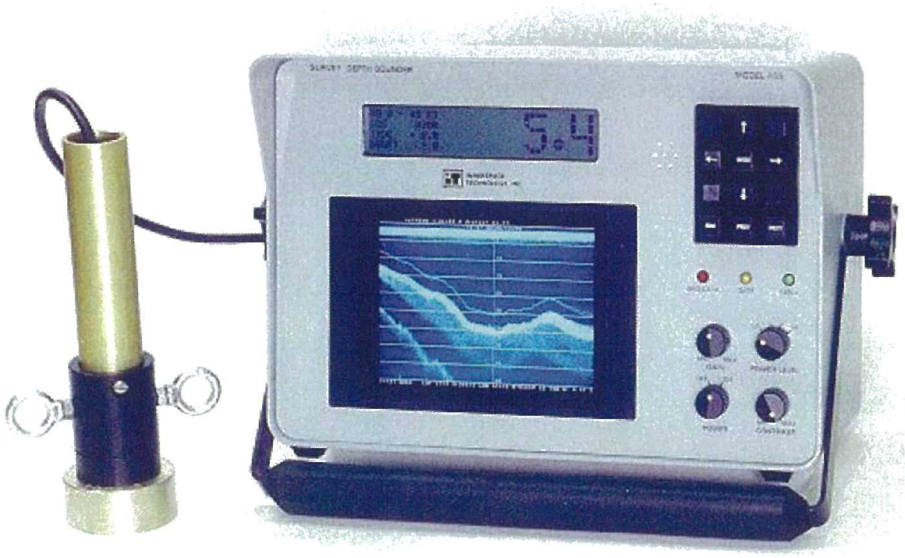
Trimble.

DESCRIPTION

The Innerspace Technology Model 455 Survey Depth Sounder provides analog and digital depth on high resolution LCD display screens. The small, lightweight unit is ideal for use on small boats for hydrographic and GIS surveys, and also has applications on general purpose workboats and Corps of Engineers reconnaissance vessels. The 455 has most of the capabilities of Innerspace's legendary thermal printing depth sounder recorders, except for the thermal chart recording, plus it has many new features. Designed with the operator in mind, the easy-to-use menu is controlled via up / down, left / right arrows; no numerical entries are required and, when power is turned off, all entries are saved for next power on. In the operation mode, operator entries are always in view on the LCD display screen, along with the large numeral, digitized depth. The 455's analog display provides a continuous, high resolution bottom profile with alphanumerical annotation of pertinent information including: Speed-of-Sound, Tide, Draft, Time and Fix Number. For a hard copy, a screen print of the analog data may be sent to a standard computer printer or it can be stored internally on a 24 or 48 mb integrated circuit for later recall.

MODEL 455



SPECIFICATIONS

GRAPHIC DISPLAY

- 640 x 480 Pixel Monochrome Transflective LCD with Backlight and Contrast Control
- 5 ¾ in. x 4 ¾ in. viewing area
- Emulates paper chart recorder

NUMERIC DISPLAY

- 4 lines x 40 characters with large 1 in. high numerics and Backlight

OPERATION

- Menu driven parameter selection on alphanumeric display

PARAMETER SELECTION

- Speed-of-Sound, Tide, Draft, Gate Width, Scale, Backlight, Com Ports and many more

RESOLUTION

- .1 Unit graphic and numeric

DEPTH RANGES

- 0-45, 40-85, 80-125, 120-165, 160-205 Feet or Meters (dm and cm selection)
- Multipliers: 1, 2, 10
- Auto Ranging

ANNOTATION

- LCD graphic display numerically displays Speed-of-Sound, Tide, Draft, Date, Time, Depth, Fix number and GPS Data

TRANSMITTER

- Front panel switch selectable power levels: 250 watts to 10 watts in 4 levels

RECEIVER

- Time varied automatic gain adjustment under microprocessor control 20 or 30 Log
- Front panel manual gain control 20db
- Adjustable Blanking

DIGITIZER

- Range Gated (selectable widths)
- Initial Depth Entry
- 4 Modes of Operation
- Gate Mark on Graphic Display

UTILITIES

- Depth Simulator
- Chart Speed
- Screen capture to memory

INPUTS/OUTPUTS

- RS232 Port A
- RS232 Port B
- RS232 Port C
- Parallel Port
- Keyboard and VGA Port
- GPS Antenna with GPS option
- Floppy Port

TRANSDUCER

- 200kHz 3°

POWER

- 12VDC, 2½ Amp

ENCLOSURE

- Drawn aluminum case
- Aluminum panel painted to resist corrosion.
- Removable handle and soft carry bag included.

OVERALL SIZE

- 13 in. Wide x 9 in. High x 9 in. Deep
- 38.1 cm Wide x 22.86 High x 22.86 Deep

WEIGHT

- 15 lb.
- 6.8 kg

OPTIONS:

- Heave sensor
- Remote VGA display
- Tabletop / overhead mounting bracket
- Custom annotation (1 Line 40 Characters)
- Remote readout (large numeric)
- Continuous analog storage, 48mb
- AC power supply
- Portable transducer mounts
- Floppy Disk Drive in travel case
- Mini keyboard (89 key) and adapter cable
- 125 kHz transceiver and transducer 125kHz 7°
- Laplink software
- Color graphic display