



# LAND-PAK™

## All-in-One RTK Land Survey Solution

gps products

NavCom's LAND-PAK is a complete NavCom-qualified end-user system designed for land survey applications. The LAND-PAK pairs NavCom products with complementary technologies and solutions, providing land surveyors a complete turn-key system that does everything from field data collection to office processing.

### APPLICATIONS

The LAND-PAK is a highly integrated solution designed for productivity with minimal setup time and maximum portability. Covering the entire land survey process, it contains a complete base station and rover setup for field data collection and comes with software for data analysis and processing.

The LAND-PAK delivers precise results by combining NavCom's leading edge dual frequency receiver with radio modems, a rugged data collector and processing software. The rover and base configurations can be powered from portable, rechargeable batteries, which allow for a full day's operation. The rugged controller and fully featured survey software allow you to easily perform everything from stake-out to boundary surveys.

The LAND-PAK supports high precision survey applications providing RTK centimeter-level accuracy for immediate results in the field - great for any application from cadastral to as-built surveys.

### FEATURES & BENEFITS

The LAND-PAK system takes the guesswork out of integrating solutions from different vendors. Land-PAK is a robust, easy to use end-user solution integrated, tested and approved by NavCom.

#### *A Solution That Works*

The LAND-PAK's controller solution provides cutting edge hardware with the most popular and easy to use software on the market. Powerful radio modems give the LAND-PAK a wider coverage area, allowing longer distances between the stations.

#### *RTK Positioning*

The RTK algorithm developed by NavCom provides fast, reliable initialization. The NavCom binary RTK data format ensures robust data throughput. LandPAK's SF-2040 GPS receiver can also utilize RTCM, CMR and CMR+ data streams from other base stations to allow for flexibility integration with pre-existing GPS survey systems.

#### *Proven GPS Performance*

Our NCT-2100D Engine utilizing a fourth generation Touchstone™ GPS ASIC powers the Land-PAK SF-2040 GPS receiver. This same technology powers the more than 40,000 GPS receivers sold worldwide. The GPS engine incorporates our patented interference suppression and multi-path mitigation, up to 50Hz raw data rate, and geodetic quality positioning up to 25Hz.

The SF-2040 is a 24-channel dual frequency GPS sensor with two additional channels for receiving Satellite Based Augmentation System (SBAS) signals and an L-Band demodulator for reception of NavCom's StarFire Network correction service.

Utilizing NavCom's StarFire service Land-PAK can deliver 10 cm global accuracy without the need of a base station for applications that don't require RTK accuracy. Both the base and the rover can be configured with a StarFire license, allowing them both to be used as StarFire rovers for applications when decimeter level accuracy is sufficient. This provides even more flexibility for customers that perform a variety of survey and mapping work.

#### *RTK Extend™*

RTK Extend™ enables continuous RTK-level positioning accuracy during radio communication outages by utilizing NavCom's global StarFire™ corrections.

Traditionally, when an RTK rover loses communication with the base station, it is unable to continue to provide position updates for more than a few seconds, resulting in user down-time and reduced productivity. With RTK Extend™, Land-PAK maintains centimeter level positioning even during communication outages of up to 15 minutes. RTK Extend™ allows more efficient and uninterrupted work, enabling focused concentration on the work rather than the tools.

#### *A Complete Portable System*

The LAND-PAK is a highly integrated solution designed for productivity with minimal setup time and maximum portability. Covering the entire land survey process, it contains a complete base and rover system for field data collection and also comes with software for data analysis and processing.



**Complete Land  
Survey System with  
RTK Extend™**

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# LAND-PAK™

## TECHNICAL SPECS

### PRODUCT BREAKDOWN

#### Base Station Transit Case

- SF-2040 GPS Receiver
- Installed Software Options: RTK Software; RTK Extend
- Two Lithium-Ion Battery Packs, 10.8 VDC, 4.4 Ah
- Serial Cable, 6 Ft Coiled
- Tribrach, w/ Optical Plummet, black
- Adaptor, Tribrach, Fixed
- Base Transit Case
- 3ASd EPIC Radio Modem, 10W o/p Power
- Bag for 3ASd EPIC Radio Modem
- 12V 8Ah Bag Battery for 3ASd EPIC Radio Modem
- Antenna, Gainflex 435-470 MHz, TNC
- RG58/U Radio Antenna Cable, 12 ft
- NavCom Base Cable, 3m
- Tape Measure & Pocket Rod Combo, 12ft

#### Base Bag Parts

- Tripod Bag
- Tripod, Dual Lock, Fiberglass, Waterproof, 72 in Legs
- Bracket, Radio Antenna To Tripod
- Snap-Lock Radio Antenna Pole, 6ft
- Pole Extension, 6 inch: 1 inch diameter
- Antenna Adaptor

#### Rover Transit Case

- SF-2040 GPS Receiver
- Included and Installed Software Options:  
RTK Software  
RTK Extend
- Two Lithium-Ion Battery Packs, 10.8 VDC, 4.4 Ah
- Serial Cable, 6 Ft Coiled
- TruBlu™ Module
- Carlson Explorer 600+, Carlson SurvCE w/GPS installed
- Rover Transit Case
- Extra Orange Styli (Set of 3) for Carlson Explorer 600+
- Screen Protectors for Carlson Explorer 600+, Set of 5
- Vehicle Charger for Carlson Explorer 600+
- 3ASd Radio Modem, 1W o/p Power
- Bag for 3ASd Radio Modem
- 9.6V 2Ah NiMh Battery for 3ASd Radio Modem, w/ Switch
- Battery Cradle
- Antenna, Gainflex 435-470 MHz, TNC
- NavCom Cable, DB-9

#### Rover Bag Parts List

- Rover Bag
- Pole, Carbon Fiber and Aluminum, 8.5'
- Bipod, Carbon Fiber, Open Clamp
- Cradle for Carlson Explorer 600+



### SF-2040G SPECIFICATIONS

#### PHYSICAL/ENVIRONMENTAL

- Size: .....10.4"W x 5.5"H (264mm x 140mm)
- Weight: .....5.5lb (2.5kg)
- External Power:  
Input Voltage: .....10 VDC to 30 VDC  
Consumption: .....< 8 W
- Connectors:  
I/O: .....2 x 7 pin Lemo  
DC Power: .....4 pin Lemo
- Temperature (ambient):  
Operating: .....-20° to +50°C (-4° to +122°F)  
Storage: .....-20° to +70°C (-4° to +158°F)
- Humidity: .....95% non-condensing
- Tested in accordance with MIL-STD-810F for: low pressure, solar radiation, rain, humidity, salt fog, sand & dust, and vibration

#### PERFORMANCE <sup>1</sup>

- Measurement Precision (RMS):  
Raw C/A code: .....20 cm @ 42 dB-Hz  
Raw carrier phase noise: .....L1: 0.95 mm @ 42 dB-Hz  
.....L2: 0.85 mm @ 42 dB-Hz
- Velocity: .....0.01 m/s
- Real-time StarFire Accuracy (RMS):  
Position (H): .....<10 cm  
Position (V): .....<15cm
- Enhanced SBAS (WAAS/EGNOS) Positioning Accuracy (RMS):  
Horizontal: .....0.5m  
Vertical: .....0.7m
- RTK Positioning <10kms (Software option)(RMS):  
Horizontal: .....1 cm + 1ppm  
Vertical: .....2 cm + 1ppm
- RTK Extend (Software option) (RMS):  
Horizontal: .....2 cm + 1ppm  
Vertical: .....4 cm + 1ppm
- Code Differential GPS Positioning <200kms (RMS):  
Horizontal: .....12 cm + 2ppm  
Vertical: .....25 cm + 2ppm
- User programmable output rates:  
Position Velocity Time: .....5 Hz (10Hz, 25Hz Optional)  
Raw measurement data: ..5 Hz (10Hz, 25Hz, 50Hz Optional)
- Data Latency:  
Position Velocity Time: .....< 20 ms at all rates  
Raw measurement data: .....< 20 ms at all rates
- Time-to-first-fix:  
Cold Start, Satellite Acquisition: .....< 60 seconds (typical)  
Satellite Reacquisition: .....< 1 second
- Dynamics: (Speed & Altitude restricted by export laws)  
Acceleration: .....up to 6g  
Speed: .....< 1,000 knots (515 m/s)  
Altitude: .....< 60,000 ft (18.3km)

<sup>1</sup> Performance dependent on location, satellite geometry, atmospheric conditions and GPS corrections.

# LAND-PAK™

## TECHNICAL SPECS

### SF-2040G COMMUNICATIONS

- Messages:
  - Data/Control: .....NCT Binary Messages
  - NMEA: .....ALM, GGA, GLL, GSA, GST, GSV, RMC, VTG, ZDA
- Corrections: .....RTCM Code (Msg. 1, 3 & 9)
  - SBAS (WAAS/EGNOS)
  - StarFire™
- RTK Corrections: .....NCT Proprietary (Optional)
  - RTCM (Msg. 18/19 or 20/21)
  - CMR (Msg. 0, 1, 2)
  - CMR+

### CARLSON EXPLORER 600+ SPECIFICATIONS:

- Power:
  - Nickel Metal Hydride rechargeable batteries: .....(2500 mAh, 7.2V)
  - AA Alkaline batteries: .....6
  - Recharge/Line Power: .....11 to 18 VDC, 1.5A
  - 8 hours minimum operating time
- Display:
  - QVGA-TFT color sunlight readable display, with white LED Backlight
  - Resolution: .....320 x 240 pixels color
  - Touch Screen
- Environmental:
  - Operating temperature: .....-20 to +50°C (-4 to 122°F)
  - Storage temperature: .....-20 to +70°C (-4 to 158°F)
  - Charging Temperature: .....-20 to +40°C (-4 to 104°F)
  - Humidity: .....5% - 95% Non-condensing
  - IP65 ingress protection
- CPU:
  - Type: .....Intel PXA270 processor with Xscale technology
  - Speed: .....624 MHz
  - Operating System: .....Windows CE .NET 4.2 or 5.0 professional
- Memory and Mass Storage:
  - SDRAM: .....128MB
  - Internal Compact Flash: .....512MB
  - Compact flash card slot
- Connectivity:
  - Wireless .....Bluetooth®
  - USB Client (mini USB A/B Connector)
  - RS-232 Serial Port
- User Input: .....Touch screen, Full function alpha numeric elastomeric keyboard
- Indicators: .....5 programmable LED Indicators including Charge/Low Battery Indicator
- Physical:
  - Size: .....4.75"W x 9.84"H x 1.83"D (120.7mm x 250mm x 46.5mm)
  - Weight with NiMH Batteries: .....1.81lb (0.82kg)

### SATELLINE-3AS(d) EPIC SPECIFICATIONS <sup>2</sup>

- Transceiver:
  - Frequency range: .....400 to 470 MHz <sup>3</sup>
  - Channel spacing: .....12.5 / 25 kHz
  - Communication mode: .....Half-duplex
- Transmitter:
  - Carrier power: .....1 W to 10 W / 50 ohm
- Receiver:
  - Sensitivity: .....-116 to -110 dBm (BER < 10 E-3)

Adjacent channel selectivity: .....> 60 dB /> 70 dB  
 Diversity scheme: .....Space diversity, selection combining

- Data Modem:
  - Interface: .....RS-232 or RS-422. RS-485
  - Interface connector: .....D 15, female
  - Data speed of RS interface: .....300 - 38400 bps
  - Data speed of radio interface: 9600 bps (12,5 kHz channel)
  - Data formats: .....Asynchronous data
- General:
  - Operating voltage: .....+11.8 to + 30 Vdc
  - Power consumption: .....3 VA typical (receive)
  - 25 VA typical (transmit)
  - 0.05 VA typical (when DTR is "0")
  - Temperature range: .....-25 to +55°C (-13 to 131°F)
  - Antenna connector: .....TNC, 50 ohm, female
  - Construction: .....Aluminum enclosure
  - Size: .....4.84"W x 5.94"H x 1.22"D (123mm x 151mm x 31mm)
  - Weight: .....1.21lb (0.55kg)

<sup>2</sup> Compliance with broadcast requirements and licensing are the responsibility of the user.

<sup>3</sup> User to specify 20 MHz band within frequency range.

### SATELLINE-3AS(d) SPECIFICATIONS <sup>4</sup>

- Transceiver:
  - Frequency range: .....380 to 470 MHz <sup>5</sup>
  - Channel spacing: .....12.5 / 25 kHz
  - Communication mode: .....Half-duplex
- Transmitter:
  - Carrier power: .....10 mW to 1 W / 50 ohm
- Receiver:
  - Sensitivity: .....-116 to -110 dBm (BER < 10 E-3)
  - Adjacent channel selectivity: .....> 60 dB /> 70 dB
- Data Modem:
  - Interface: .....RS-232 or RS-422. RS-485
  - Interface connector: .....D 15, female
  - Data speed of RS interface: .....300 - 38400 bps
  - Data speed of radio interface: 9600 bps (12,5 kHz channel)
  - Data formats: .....Asynchronous data
- General:
  - Operating voltage: .....+9 to + 30 Vdc
  - Power consumption: .....1.8 VA typical (receive)
  - 6.0 VA typical (transmit)
  - 0.05 VA typical (when DTR is "0")
  - Temperature range: .....-25 to +55°C (-13 to 151°F)
  - Antenna connector: .....TNC, 50 ohm, female
  - Construction: .....Aluminum enclosure
  - Size: .....2.64"W x 5.39"H x 1.14"D (67mm x 137mm x 29mm)
  - Weight: .....0.55lb (0.25kg)

<sup>4</sup> Compliance with broadcast requirements and licensing are the responsibility of the user.

<sup>5</sup> User to specify 20 MHz band within frequency range.