

GPS Surveying - SR9400



*Equipment List: SR9400, CR333, CR344,
Accessories and Software*

Leica

SR9400 Sensor, AT201 Antenna, Controllers Memory Cards, Batteries and Chargers

Stock No. **SR 9400 GPS Sensor with AT201 Antenna**

- 664 612 SR9400 GPS Sensor with AT201 Antenna, comprising:
- 664 611 SR9400 GPS Sensor.
- 636 958 AT 201 External Antenna.
- 636 959 2.8m cable, SR9400 to AT201 Antenna.

AT201 External Antenna Accessories

- 632 372 10m cable, SR9400 to AT201 Antenna.
- 632 390 30m cable, SR9400 to AT201 Antenna.
- 664 813 50m cable, SR9400 to AT201 Antenna

Mounting Adapters for Sensor and External Antenna

- 560 118 Adapter for fitting AT201 Antenna on stop & go/kinematic pole (560 134/560 135) or carrier GRT44 (560 112).
- 560 119 Adapter with 5/8 inch thread for fitting AT201 Antenna on non-Leica accessories.

(Note: An Adapter **has** to be fitted to the AT201 Antenna)

Time-mark output and Event Input for SR9400 Sensor

- 664 615 Time-mark output, fitted to SR9400 Sensor at factory before delivery to customer.
- 664 617 Event Input, to be fitted to SR9400 Sensor at factory.
- 403 448 2.0m cable for connecting GPS Sensor time-mark output to another device.

CR333 GPS Controller

- 639 940 CR333 GPS Controller without 1MB internal memory.
- 639 941 CR333 GPS Controller with 1MB internal memory.

CR344 GPS Controller

Connects to data link. Supports RTCM SC104 v.2.0 and NMEA 0183 v.2.0. Runs optional RT-SKI centimetric real time software.

- 639 942 CR344 GPS Controller without 1MB internal memory.
- 639 943 CR344 GPS Controller with 1MB internal memory.

1MB Internal Memory for GPS Controller. For subsequent fitting in a workshop

- 560 126 1MB internal memory for GPS Controllers CR333 or CR344. For subsequent fitting in a service workshop. (Fitting time not included).

PCMCIA Cards for CR333 or CR 344 GPS Controllers, PCMCIA Cardreader

- 639 948 PCMCIA Memory Card, 512KB.
- 639 949 PCMCIA Memory Card, 2MB.
- 639 950 PCMCIA Memory Card, 4MB.

- 563 814 PCMCIA Card Reader, 230V (Europe).
- 639 993 PCMCIA Card Reader, 110V (USA, Japan).

Stock No. **Hard Container**

- 664 620 Hard container for 1 complete set of GPS equipment. Holds SR9400 Sensor, AT201 Antenna, Controller, battery, tribrach, carrier and height hook.

Essential item, must be ordered.

Batteries for GPS equipment

Recommended Battery:

- 409 667 Large 12V 7Ah NiCd battery GEB71. Powers SR9400 Sensor and Controller for about 7 to 8 hours continuously.
- 402 210 Small 12V 2Ah battery GEB70. Powers SR9400 Sensor and Controller for about 2.5 hours continuously.
- 560 122 Integral NiCd battery, 8V 0.6Ah for GPS Controller **only**. Powers Controller for about 1 hour. Will **not** power GPS Sensor.

Chargers for GPS Batteries

GKL 23 recommended charger. Can be used for all batteries. Intelligent, microprocessor controlled. Two batteries can be simultaneously connected.

- 636 984 Charger GKL23, 230V (Europe).
- 639 961 Charger GKL23-1, 115V (Japan, USA).

GKL 22 simple charger for batteries 402 210 and 560 122. One battery can be connected.

- 636 983 Charger GKL22, 230V (Europe).
- 639 959 Charger GKL22-1, 115V (USA).
- 639 960 Charger GKL22-2, 100V (Japan).

Note: In early 1995, the GKL22 and GKL23 chargers replaced the former GKL12 and GKL14 chargers.

From this date, all batteries have a 5 pin charging socket for the GKL22 and GKL23 chargers. New GEB70 or integrated Controller batteries with 5 pin charging sockets cannot be charged by the GKL12 charger without an adapter cable. Similarly, old style batteries cannot be charged by the GKL22 or GKL23 charger without the correct adapter cable or conversion kit. New GEB71 batteries with 5 pole charging sockets can be charged by the old GKL14 charger via the LEMO connections as previously.

Please contact your local Leica representative for further information on adapter cables and conversion kits.

- 636 985 Adapter B for old 2 pole battery (old GEB70 or old integrated Controller battery) to GKL22/GKL23 charger.
- 636 986 Adapter A for new 5 pole battery to old GKL12 charger. Connects new GEB70/Integrated Controller battery to old GKL12 charger.
- 636 987 Modification kit for old GEB71 battery to new GKL23 charger.

Cables, Accessories and Software

Stock No. **Cables**

- 560 130 1.8m cable for connecting 12V NiCd batteries GEB70 (402 210) or GEB71 (409 667) to Controller/Sensor. Alternatively, can be used for connecting Sensor to Controller.
- 560 131 2.8m cable. For connecting 12V NiCd batteries GEB70 (402 210) or GEB71 (409 667) to Controller/Sensor. Alternatively, can be used for connecting Sensor to Controller.
- 560 132 10m extension cable. Use for extending cables 560 130, 560 131 or 560 254.
- 563 758 30m extension cable. Use for extending cables 560 130, 560 131, or 560 254. For communication only. Power cannot be transmitted along this cable.
- 439 038 4m car battery cable. Connects to 12V car battery or other 12V DC power source for supplying power to Sensor and/or Controller via cable 560 130 or 560 131.
- 560 254 2.8m cable, LEMO1 to 9 pin RS232. Connects PC to Controller or Sensor for data download, firmware updates, running SPCS or WILD Base Software. **Essential cable, should be ordered.**
- 563 809 Cable for connecting CR344 Controller or SR9400 Sensor to a radio modem for Real time operations. Lemo 8 pin to 9 pin RS232.

Tripods, Poles, Height hook etc.

- 296 632 Tripod GST20, heavy duty, wooden, telescopic.
- 399 244 Tripod GST05, lightweight, wooden, telescopic
- 563 630 Tripod GST05L, lightweight, aluminium, telescopic. With carrying strap.
- 664 621 Holder for hanging SR9400 Sensor on tripod leg.
- 563 766 Aluminium hook for hanging Controller on tripod leg.
- 506 299** Tribach GDF22 with optical plummet.
- 664 828 Tribach GDF12 with optical plummet
- 560 112 Carrier GRT44 for mounting GPS Sensor or external antenna on WILD tribach. Accepts height hook (455 291). (Can also be used with EDM reflectors and targets).
- 455 291 Height hook. Used when working with a tripod/tribrach/GRT44 carrier combination. Reading in millimetres.
- 560 134 Stop/go kinematic pole, aluminium, 1.50m section
- 560 135 0.40m extension for stop/go kinematic pole (560 134).
- 560 137 Holder for attaching Controller to stop/go kinematic pole (560 134).
- 560 138 Quick-stand for stop/go kinematic pole (560 134).
- 663 235 Adapter for fitting AT201/202/302 Antenna on vehicle roof rack

Softbag, Backpack

- 563 807 Carrying frame for softbag.
- 563 806 Small Softbag for SR9400 Sensor and battery
- 639 970 Adapter for fitting AT201, AT202 or AT302 GPS Antenna on Carrying Frame (563 807).

Stock No. **Computer based Software**

All software is supplied on 3.5 inch diskettes.

SKI-L1 Post-processing software for L1 only

- 636 941 SKI-L1, Static Kinematic Software for L1 only. Standard package on 3.5in, 1.44MB diskettes. Contains 1 manual, 1 set of diskettes, 1 software protection connector. Comprises of Configuration, Preparation, Project, Import/Export, Data Processing, View/Edit.

Options for SKI Software

- 560 141 Datum/Map option for SKI software.
- 560 142 Network Adjustment option for SKI software.
- 560 143 RINEX import option for SKI software.

SPCS Software

- 560 146 SPCS Sensor PC-Control Software for controlling GPS Sensor from a PC. Contains 1 manual, 1 set of disks, 1 software-protection connector.
- 636 836 SPCS Sensor PC-Control Software as above but also supporting RTCM SC104 v.2.0 output and NMEA 0183 v.2.00 message output.
- 636 837 Upgrade from 560 146 SPCS to 636 836 SPCS

Reference station software

- 639 910 Multistation I, base station software for controlling SR260, SR261 or SR9400 Sensor from a PC and logging L1 data. Contains 1 manual, 1 set of disks, 1 software protection key.
- 663 210 RTCM v.2.1 and Leica proprietary (RT-SKI) output option for Multistation software

Note on SKI Software

Note that the standard SKI software 639 918 for processing L1 and L2 data can also be used for processing L1-only data

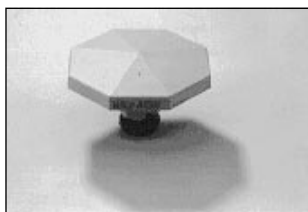
Illustrations - GPS Surveying



SR9400 Sensor (664 611)



GKL23 Battery charger (636 984)
GKL 23-1 Battery Charger (639 961)



AT201 External Antenna (636 958)



PCMCIA Memory Card
(639 948/639 949)



Adapter for stop/go kinematic pole
and GRT44 carrier (560 118)



PCMCIA Card Reader
(563 814/639 993)



Adapter with 5/8 inch thread for
non WILD accessories (560 119)



4m Car Battery cable (439 038)



CR333 GPS Controller
(639 940/639 941)
or
CR344 GPS Controller
(639 942/639 943) for Real-Time
applications



2.8m cable Lemo1 to 9 pin RS232.
Connects Controller or Sensor to
PC. (560 254)



1. GEB71 12V 7Ah NiCd battery
(409667)
2. GEB70 12V 2 Ah NiCd battery
(402 210)



Aluminium hook for hanging
Controller on Tripod leg (563 766)



Integral NiCd battery for GPS
Controller. 8V 0.6Ah (560 122)



GRT44 Carrier (560 112)

Illustrations - GPS Surveying



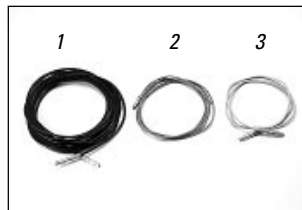
Height Hook (455 291)



Tribrach GDF12 (664 828)



1. Stop/go pole 1.50m section.
Aluminium (560 134)
2. Stop/go pole 0.40m section.
Aluminium (560 135)



Cables
1. 10m extension cable (560 132)
2. 2.8m cable Controller to Sensor
(560 131)
3. 1.8m cable battery to Controller or
Sensor (560 130)



Aluminium holder for Controller on
stop/go pole (560 137)



Tripods GST05 (399 244) and GST05L
(563 630)



1. Quickstand for stop/go kinematic
pole (560 138)
2. Stop/go pole, 1.50m section
(560 134)



Small softbag (563 806) mounted on
carrying frame (563 807) with antenna
adapter (639 970) attached.

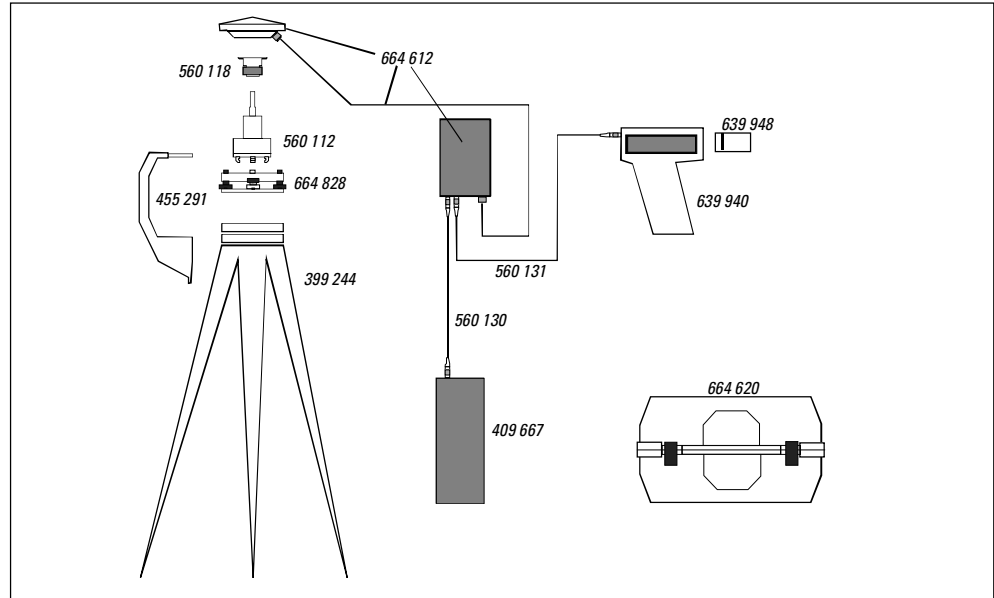


Hard Container for 1 complete set
of GPS equipment (560 117)

Suggested Equipment Sets

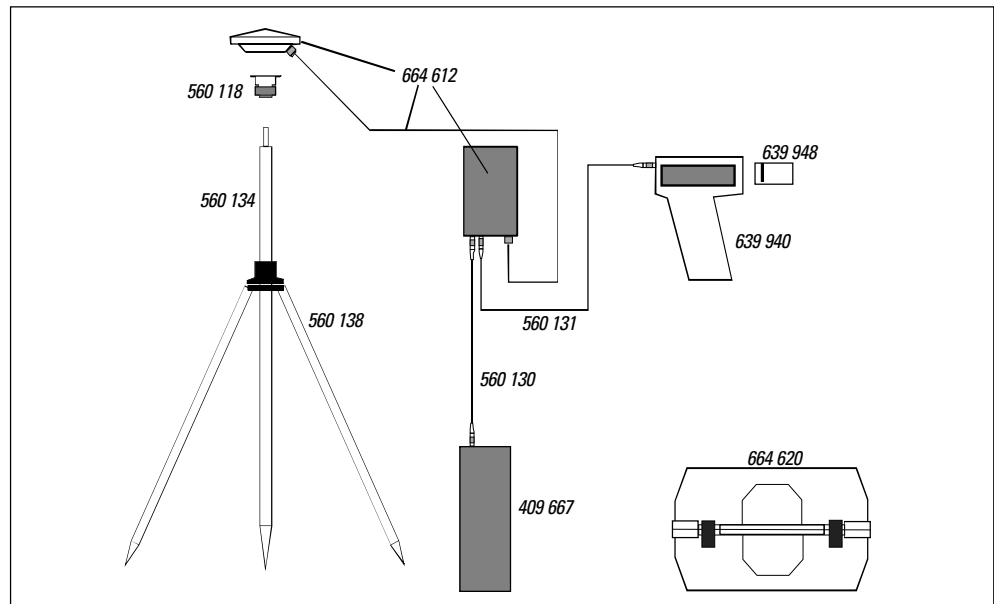
Minimum equipment for setting up on a tripod as a reference or rover in Static or Rapid Static mode.

664 612 SR9400 GPS Sensor with AT201 External Antenna
 560 118 Adapter for fitting External Antenna on GRT44 Carrier.
 560 112 Carrier GRT44 for mounting GPS Antenna on WILD tribrach.
 664 828 Tribrach GDF12 with optical plummet.
 399 244 Tripod GST05.
 455 291 Height hook.
 639 940 CR333 GPS Controller without 1MB internal memory.
 639 948 PCMCIA card, 512KB.
 560 130 1.8m cable for connecting battery to Controller or Sensor.
 560 131 2.8m cable for connecting Controller to Sensor.
 409 667 Large 12V 7Ah NiCd battery GEB71.
 664 620 Hard container.



Minimum equipment for setting up with a quick stand as a reference or rover in Static or Rapid Static mode.

664 612 SR9400 GPS Sensor with AT201 External Antenna
 560 118 Adapter for fitting External Antenna on Stop/go kinematic pole.
 560 134 Stop/go kinematic pole, 1.50m section.
 560 138 Quick-stand for stop/go kinematic pole.
 639 940 CR333 GPS Controller without 1MB internal memory.
 639 948 PCMCIA card, 512KB.
 560 130 1.8m cable for connecting battery to Controller or Sensor.
 560 131 2.8m cable for connecting Controller to Sensor.
 409 667 Large 12V 7Ah NiCd battery GEB71.
 664 620 Hard container.



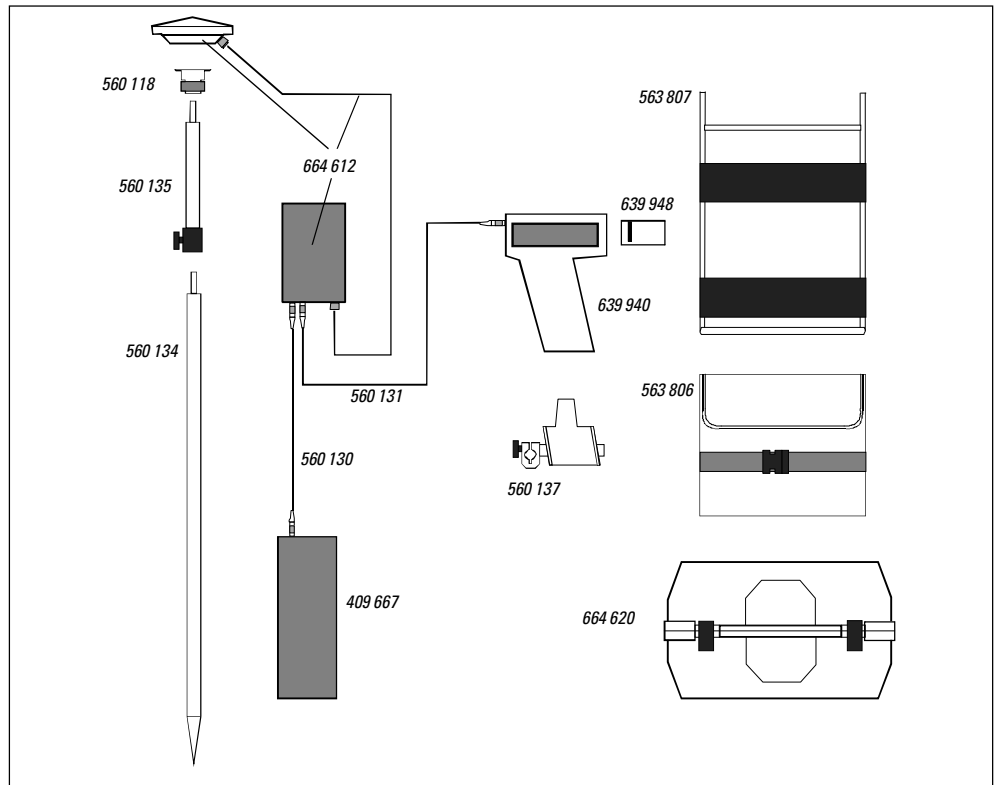
Miscellaneous equipment

636 984 Charger GKL23 230V.
 (Europe). or
 636 961 Charger GKL23-1 115V
 (Japan, USA)
 563 814 PCMCIA Card Reader 230V
 (Europe). or
 639 993 PCMCIA Card Reader 110V
 (Japan, USA).
 560 254 2.8m cable. LEMO1 to 9 pin
 RS232. Connects PC to Controller
 or Sensor.

Suggested Equipment Sets

Minimum equipment for setting up on a hand held pole for Stop and Go or Kinematic surveys.

664 612 SR9400 GPS Sensor with AT201 External Antenna.
 560 118 Adapter for fitting Sensor or External Antenna on stop/go kinematic pole
 560 134 Stop/go kinematic pole, 1.50m section.
 560 135 Stop/go kinematic pole, 0.40m section.
 560 137 Holder for attaching GPS Controller to stop/go kinematic pole.
 639 940 CR333 GPS Controller without 1MB internal memory.
 639 948 PCMCIA card, 512KB.
 560 130 1.8m cable for connecting battery to Controller or Sensor.
 560 131 2.8m cable for connecting Controller to Sensor.
 409 667 Large 12V 7Ah NiCd battery GEB71.
 664 620 Hard container.
 563 806 Small Softbag for fitting on Carrying Frame (563 807).
 563 807 Carrying Frame for large Softbag or small Softbag.



Miscellaneous equipment

636 984 Charger GKL23 230V.
 (Europe), or
 636 961 Charger GKL23-1 115V
 (Japan, USA)
 563 814 PCMCIA Card Reader 230V
 (Europe), or
 639 993 PCMCIA Card Reader 110V
 (Japan, USA).
 560 254 2.8m cable. LEM01 to 9 pin
 RS232. Connects PC to Controller
 or Sensor.

GPS Surveying in Real Time

This section covers only the software and accessories that are related specifically to GPS surveying in real time.

Real Time software for L1 only

- 664 619 RT-SKI-L1 Real Time Static Kinematic software for L1 only for CR244 or CR344 Controller. For Real Time Differential GPS - gives centimetric co-ordinates in real time. Each set of software is protected and will run on ONE Controller only. ie. For a system comprising of two Controllers, you need to order two sets of RT-SKI-L1.

CR344 GPS Controllers with RT-SKI-L1

- 664 622 CR344 GPS Controller without 1MB internal memory, with RT-SKI-L1 Real Time Static Kinematic software, comprising:
- 639 942 CR344 GPS Controller without 1MB internal memory.
- 664 619 RT-SKI-L1 Real Time Static Kinematic software for CR344.
- 664 623 CR344 GPS Controller with 1MB internal memory, with RT-SKI-L1 Real Time Static Kinematic software, comprising:
- 639 943 CR344 GPS Controller with 1MB internal memory.
- 664 619 RT-SKI-L1 Real Time Static Kinematic software for CR344.

Accessories for Real Time GPS Surveying

- 639 962 Sateline 1AS Radio Modem
- 639 963 Sateline 2AS Radio Modem
- 639 964 Gainflex Radio Antenna for use with Sateline 1AS and 2AS Radio Modems
- 639 966 Weather Protection Box for Sateline 1AS and 2AS Radio Modems
- 563 808 Interface Box GEV112 for connecting Sensor, Battery, Controller and Radio Modem
- 636 972 0.5m Cable 5pin LEMO to 5pin LEMO for connecting Battery, Sensor, Interface Box
- 636 805 1.8m Cable 8pin LEMO to 8pin LEMO for connecting CR344 Controller to Interface Box
- 639 968 1.8m Cable 15pin RS232 to 8pin LEMO for connecting Sateline 1AS and 2AS Radio Modems to CR344 Controller or to Interface Box
- 639 967 Adapter with Cable for fitting Gainflex Radio Antenna on Carrying Frame or on Weather Protection Box
- 563 807 Carrying frame for Softbag.

Data link

Any radio modem with an RS232 interface and a data-transmission rate of at least 4800 baud that operates in transparent mode without handshake can normally be used.

The following Radio Modems are available from Leica AG, Heerbrugg:

Sateline 1AS, frequency 433.425 MHz, radiated power 0.5 W.

Sateline 2AS, frequency 433.425 MHz, radiated power 1W.

(Other frequencies available on request.)

Gainflex Antenna for Sateline 1AS or 2AS

You should select either TWO Sateline 1AS or TWO Sateline 2AS. (Do not order ONE 1AS and ONE 2AS.)

Note on licensing for Radio Modems

Many countries have strict licensing arrangements for radio equipment. Before purchasing a Sateline or any other radio modem, you should ensure that it is licensed for use in the area in which you will work.

Connecting Real-Time Equipment

Weather Protection Box

An optional protection box is available for the Satelline 1AS or 2AS. The Satelline fits inside and is fully protected from the weather.

The Weather Protection Box will fit inside the softbag (636971) and can also be clipped onto the tripod. The Adapter with integral cable (639967) and Gainflex Antenna will fit onto the Weather Protection box.

Connecting the equipment without using the Interface Box

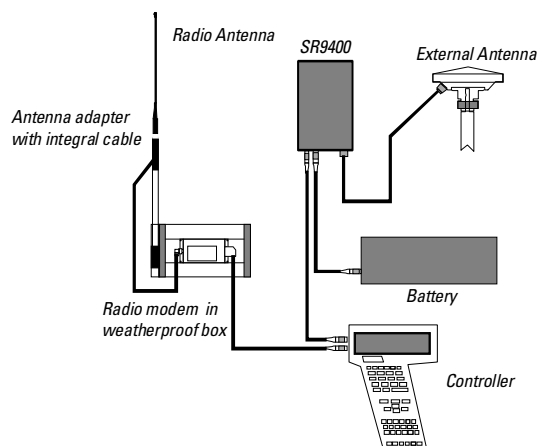
Connect the equipment in the normal way, i.e.

Battery to Sensor or Controller

Sensor to Controller

Then connect the Satelline to the Controller using cable 639 968. 12V power is supplied to the Satelline via the Controller.

The equipment will normally be connected in this way at the reference station, or at the rover if the backpack (carrying frame + softbag) is not used.



Suggested connection regime for reference station

Connecting the equipment via the Interface Box when the equipment is in the back pack (carrying frame plus softbag)

When using the back pack (carrying frame plus softbag) for the rover unit, it is advantageous to connect the equipment together via the Interface Box as there is then only ONE cable from the back pack to the Controller.

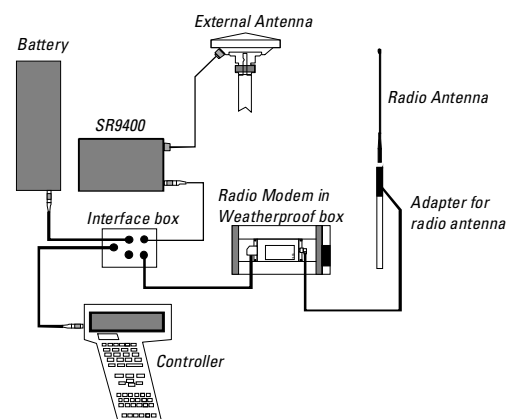
Connect as follows:

Battery to Interface Box using 0.5m cable 636972

Sensor to Interface Box using 0.5m cable 636972

Satelline to Interface Box using 1.8m cable 639968

Controller to Interface Box using 1.8m cable 636805

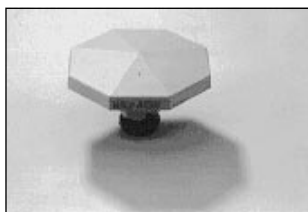


Suggested connection regime for rover

Illustrations - Real Time GPS



SR9400 Sensor (664 611)



AT201 External Antenna (636 958)



*CR344 GPS Controller
(639 942/639 943)*



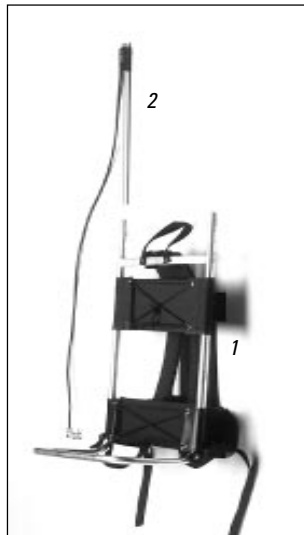
*Satelline 1AS/2AS Radio modem
(639 962/639 963) and Gainflex
Antenna (639 964)*



*Weather protection box (639 966)
for Satelline radio modems*

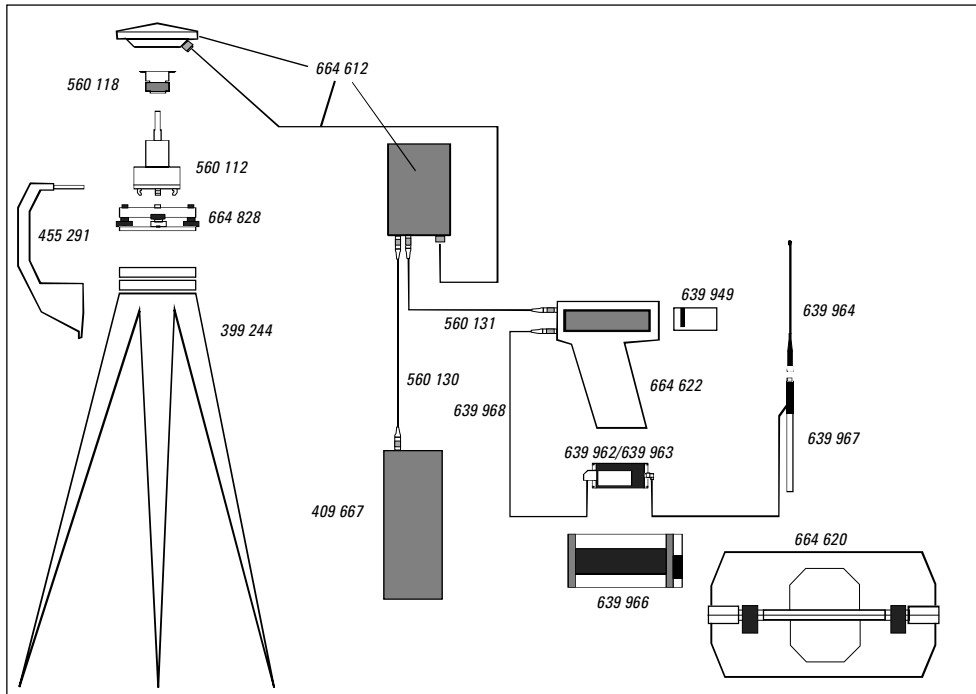


GEV 112 Interface box (563 808)



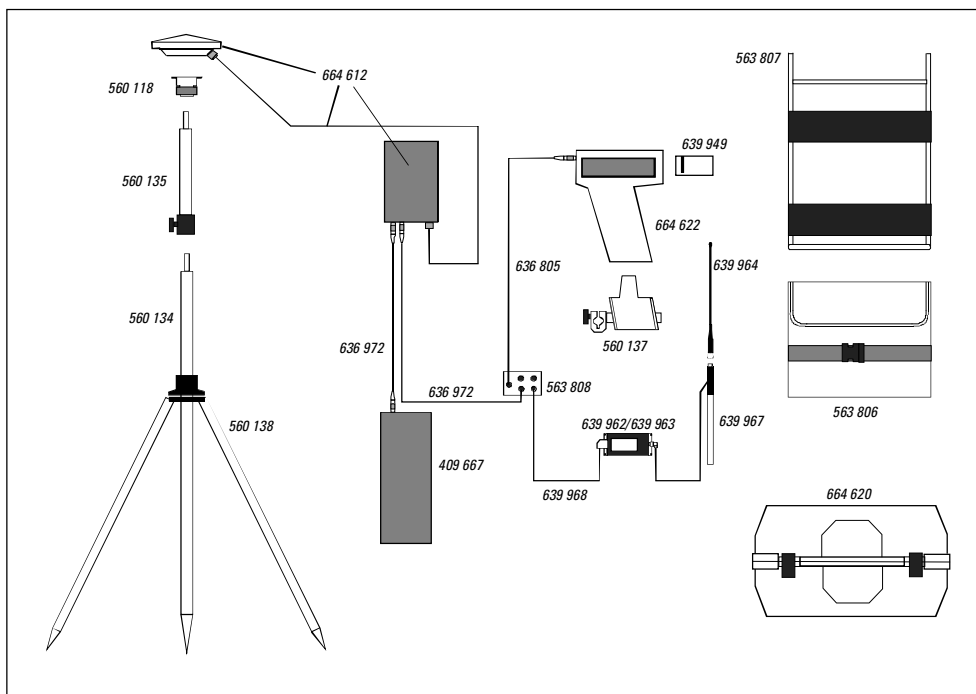
*1. Carrying frame (563 807)
2. Adapter with integrated cable (639
967) for fitting Gainflex Antenna on
Weather protection box or carrying
frame*

Illustrations - Real Time GPS



Typical setup at real time reference station

664 612 SR9400, AT201 and cable
 560 118 Antenna Adapter
 455 291 Height Hook
 664 828 Tribrach GDF12
 399 244 GST05 Tripod
 409 667 GEB71 Battery
 664 622 CR344 without internal memory, with RT-SKI-L1.
 639 949 PCMCIA Card 2MB
 560 130 1.8m cable. 5 pin Lemo to 5 pin Lemo
 560 131 2.8m cable. 5 pin Lemo to 5 pin Lemo
 639 968 1.8m cable. 8 pin Lemo to 15 pin RS232
 639 962/639 963 Sateline radio modem
 639 966 Weather protection box for Sateline radio modem.
 639 967 Radio Antenna adapter and cable.
 639 964 Gainflex radio antenna
 664 620 Hard Container



Typical real time Rover setup

664 612 SR9400, AT201 and cable
 560 118 Antenna Adapter
 560 135 0.4m extension pole
 560 134 1.5m stop/go kinematic pole
 560 138 Quickstand for pole
 409 667 GEB71 Battery
 664 622 CR344 without internal memory, with RT-SKI-L1.
 639 949 PCMCIA Card 2MB
 560 137 Holder for mounting Controller on stop/go kinematic pole
 563 808 GEV112 Interface box
 636 972 0.5m cable 5 pin Lemo to 5 pin Lemo
 636 805 1.8m cable 8 pin Lemo to 8 pin Lemo
 639 968 1.8m cable 8 pin Lemo to 15 pin RS232
 639 962/639 963 Sateline radio modem
 639 967 Radio antenna adapter and cable
 639 964 Gainflex radio antenna
 563 807 Carrying Frame for 563 806
 563 806 Small Softbag
 664 620 Hard Container

Miscellaneous equipment

636 984 Charger GKL23 230V. (Europe), or
 636 961 Charger GKL23-1 115V (Japan, USA)
 563 814 PCMCIA Card Reader 230V (Europe), or
 639 993 PCMCIA Card Reader 110V (Japan, USA).
 560 254 2.8m cable. LEMO1 to 9 pin RS232. Connects PC to Controller or Sensor.

Suggested Equipment Sets - Real Time GPS

Minimum equipment for Real Time reference station.

(Assumes Satelline 1AS or 2AS radio modem purchased locally.)

- 664 612 SR9400 GPS Sensor with AT201 External Antenna
- 560 118 Adapter for fitting Sensor or External Antenna on GRT44 Carrier.
- 560 112 Carrier GRT44 for mounting GPS Sensor on WILD tribrach.
- 664 828 GDF12 Tribrach with optical plummet.
- 399 244 Tripod GST05.
- 455 291 Height hook.
- 639 942 CR344 GPS Controller without 1MB internal memory.
- 663 122 RT-SKI Software for ONE GPS Controller.
- 639 949 PCMCIA memory card, 2MB.
- 560 130 1.8m cable for connecting battery to Controller or Sensor.
- 560 131 2.8m cable for connecting Controller to Sensor.
- 409 667 Large 12V 7Ah NiCd battery GEB71.
- 664 620 Hard container.
- 639 964 Gainflex radio antenna.
- 639 966 Weather protection box for Satelline 1AS or 2AS.
- 639 967 Adapter for fitting gainflex radio antenna on weather protection box. Includes cable for connecting radio antenna to radio modem.
- 639 968 1.8m cable. 8 pin LEMO to 15 pin RS232. Connects Satelline radio modem to CR344 Controller.

Minimum equipment for a real time Rover setup.

(Assumes Satelline 1AS or 2AS radio modem purchased locally.)

- 664 612 SR9400 GPS Sensor with AT201 External antenna.
- 560 118 Adapter for fitting Sensor or External Antenna on stop/go kinematic pole.
- 560 134 Stop/go kinematic pole, 1.50m section.
- 560 135 0.40m extension for stop/go kinematic pole.
- 560 137 Holder for attaching Controller to stop/go kinematic pole.
- 639 942 CR344 GPS Controller without 1MB internal memory.
- 663 122 RT-SKI Software for ONE GPS Controller.
- 639 949 PCMCIA memory card, 2MB.
- 563 808 GEV112 Interface box.
- 409 667 Large 12V 7Ah NiCd battery GEB71.
- 636 972 0.5m cable. Connects battery to interface box.
- 636 972 0.5m cable. Connects SR399E GPS Sensor to interface box.
- 636 805 1.8m cable. Connects interface box to CR344 Controller.
- 639 968 1.8m cable. Connects radio modem to interface box.
- 639 964 Gainflex radio antenna
- 639 967 Adapter for fitting gainflex radio antenna on carrying frame. Includes cable for connecting radio antenna to radio modem.
- 563 807 Carrying frame for small softbag.
- 563 806 Small Softbag.
- 664 620 Hard container.

Miscellaneous

- 636 984 Charger GKL23 230V. (Europe). **or**
- 636 961 Charger GKL23-1 115V (Japan, USA)
- 563 814 PCMCIA Card Reader 230V (Europe). **or**
- 639 993 PCMCIA Card Reader 110V (Japan, USA).
- 560 254 2.8m cable. LEMO1 to 9 pin RS232. Connects PC to Controller or Sensor.



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