Appendix B   Instrument settings

B.1   ## Sokkia instruments

When using the SDR33 with Sokkia theodolites and total stations, there are simple guidelines to correctly store your data. There is also a difference in operation between two-way SETs and older instruments. This information is discussed in the following sections.

B.1.1   ### Non-two-way instruments

Units
Both the SDR33 and the total station or theodolite must be set to the same measurement units (i.e., feet/meters, gons/degrees, and vertical angle zenith/horizontal).

Prism constant
The prism constant should be set on <u>either</u> the SDR33 or the instrument, but NOT both. Otherwise, the correction is applied twice. If the prism constant is entered in the SDR33, a record of this appears on every printout.

PPM correction
PPM should be set <u>either</u> on the instrument or via SDR33 pressure and temperature entries at the station setup, but NOT both.

Tracking
The tracking mode on the instrument can be switched on or off — it does not affect the SDR33. However, if the SDR33 tracking parameter in the *"Configuration"* menu is set to *"Yes,"* the SDR33 does not stop the EDM after a distance measurement.

B.1.2   Two-way SETs (SETB, SETC, SET with Two-way comms, etc.)

There are currently two types of two-way SETs. The older ones have two single-line LCD displays and simple two-way capabilities, limited to unit checking and setting out facilities. You should set units, prism constant, and PPM correction as for a SET without two-way comms (see previous section).

The newer, two-way SETs have a three-line LCD display and a separate, small display for the PPM and P.C. These SETs have full two-way communications. Target height, backsight azimuth, temperature and pressure, and other values can be manually entered. Avoid confusion about where to enter information by following this simple guideline: enter all your survey information into the SDR33, not the SET. The SDR33 creates a permanent record of your field work, sends all this information to the SET, and checks to make sure no data has been inadvertently changed.

Set values such as the PPM and prism constant the same in both the SDR33 and the SET, contrary to the instructions for non-two-way SETs.

SET parameters
The SET's RS232 parameter may be set at 1,200 or 2,400 baud (2,400 baud reduces communication time). The SDR33 automatically detects this during the first reading. The SET should also be set to NO parity. The checksum may be on or off.

The SET's C&R parameter may be on or off. It does not affect the SDR33 because it is only used for the SET's internal coordinate calculations.

SDR parameters
Steps for setting parameters include:

1. Set up the SDR33 with the correct angles and distance units.

2. In the *"Instrument"* menu, choose *"Two-way SET."* If the SET is connected, it immediately sends its serial number, vertical angle type, and prism constant. The latter two may be changed if required.

3. Choose the orientation option required (see Section 3.5.1, **"Selecting instrument types,"** page 26).

4. Set up on a station and take a backsight reading. The SDR33 sends all relevant unit settings and values to the SET and gives an "**Instr params set**" message.

5. On each subsequent reading, the units and PPM are checked.

B.2 Non-Sokkia instruments

With all non-Sokkia instruments, it is recommended that you enter corrections (PC, etc.) in the SDR33 rather than in the instrument. As a result, a record of corrections is maintained in the SDR33's database.

B.2.1 Geodimeter

Cabling
The standard SDR33 (top) cable with a male DB-25 (Sokkia Product No. 5300–08) connects to the female 25-pin connector on the Geodimeter's Y-cable. Plug the connector at the junction of the "Y" into the Geodimeter. You can also plug the remaining connector into an external battery pack.

SDR33 setup
Before you use the Geodimeter, follow these steps to set up the SDR33:

1. Go to *"Instrument"* in the *"Functions"* menu and select the Geodimeter instrument.

2. Enter the prism constant in the *"Instrument parameter setup"* menu. (See **"Geodimeter setup,"** step 4, page 325 for more information.

3. Enter information for serial number, vertical observation mode, and prism constant, if necessary.

4. Enter the *"Units"* menu to make sure distance and angle units are set up as required.

Geodimeter setup

Steps for setting up the Geodimeter include:

1. Connect the Geodimeter Y-cable to both the SDR33 and the Geodimeter.

2. Turn the Geodimeter instrument on and set it up for compensation, collimation, etc. as described in the Geodimeter manual. (An abbreviated version of this procedure is included under **"Test setup,"** page 326.

3. Set the Geodimeter to communicate with the SDR33 at 1200 baud and even parity. Note this only has to be done once, not every time the instrument is turned on. If you have a Geodimeter 440, press the following keys; otherwise consult your Geodimeter manual. The interface to the Geodimeter uses the standard table 0 so you do not need to set up any tables on the Geodimeter.

Geodimeter Display	Key to press	Comments
Menu	MNU	Menu selection
1 Set		
2 Editor 400		
3 Coord	ENT	
Menu		
4 Data com	4	Select data communications menu
5 Test		
Data com	/	
1 Select device	1	
2 Create table		
Data com		
1 Geodat		
2 RS-232		Select serial communications
3 Ext. mem	2	
RS-232 ON?	YES	
COM = 1.7.2.1200	ENT	1200 baud, even parity

U.D.S. ?	NO	No recording program required
Table No =	0 ENT	Select standard table 0
Request ?	YES	

4. Set the atmospheric and prism corrections. We recommend that you set them in the SDR33 and disable them in the Geodimeter. Do not set them in both! Entering corrections in the SDR33 gives you a permanent record of the values.

   Enter the prism constant in the "*Instrument parameter setup*" menu of the SDR33 (at the time you select the Geodimeter instrument); enter the pressure and temperature during station setup.

5. Enter temperature and pressure values. Default values are 22°C and 760 mmHg. (Set these values with the instrument switched on.)

6. Set the offset value and the horizontal reference angle.

   As an alternative to steps 5 and 6, you can use **PRG** (program 0) to set the temperature, pressure, offset, and horizontal reference.

7. Set the PPM value by entering menu (MNU); select "*1.Set*" and then "*1.PPM.*"

Note: It is not necessary to enter an accurate HA ref; zero will suffice because the SDR considers the backsight azimuth.

You are now ready to read and record observations.

Operation
Steps for making observations include:

1. Aim the Geodimeter at the target.

2. Press the **<READ>** key on the SDR33 to initiate a full (angles + EDM) reading. The SDR33 displays the message "**Press the A/M button.**"

3. Press the Aim/Measure button on the Geodimeter to start the EDM. If a long-range reading is required, hold down the A/M button in the usual way. When the reading is completed, it is automatically transmitted to the SDR33 and displays.

4. Store the reading by pressing **<OK>**.

5. For an angles-only reading, press the **<ANGLE>** softkey on the SDR33's "***Take Reading***" screen; you will not have to press the Geodimeter's A/M button.

When the Geodimeter 440's non-coaxial EDM is used with a combined prism/target at short range, and the theodolite is aimed at the target's center, the EDM beam misses the prism. Use the SDR33's offset-reading facility to record the angles and distance to the target separately.

Test setup
As a shortcut for testing-purposes only, press the keys in the list below to set up the Geodimeter quickly. This procedure avoids setting up compensation and leveling.

Geodimeter Display	Keys to press
	Switch ON>
The electronic level is displayed	F22 ENT
Comp = 1	0 ENT
Temp=22.0	ENT
Press=760:00	ENT
Offset=0.000	ENT
Hz Ref =	0 ENT

The standard table now displays. Connect the SDR33 to the Geodimeter 440 (see "**Cabling**," page 323) and take simple readings to verify that the connection is working.

Tracking
Tracking can be performed by setting the Geodimeter to its tracking mode (TRK). The SDR33 tracking mode does not have to be enabled. Press READ, then A/M. The Geodimeter will take continuous readings, which can be stored in the SDR33 by pressing READ.

Trouble-shooting
If you have problems, check the serial communications in the Geodimeter and/or switch the printer/comms switch on the DB-25 plug.

B.2.2

Nikon instruments

The SDR33 supports the Nikon DTM–A series of instruments and the Nikon D–50 instrument.

Cabling
A special cable (Sokkia Product No. 5306–66) is required to convert the Nikon pin configuration to the SDR33 pin configuration. Even though the same type of connector is used, do not connect the SDR33 connector directly into the Nikon instrument!

Operation
The SDR33 and Nikon instrument must be set up to use the same angle and distance units. Corrections should be applied in the SDR33 only, so that a permanent record is maintained.

Note: Inconsistent unit or correction settings cannot be detected by the SDR33, but will result in erroneous data! No automatic unit conversion is done in the SDR33!

The SDR33 cannot shut off the Nikon's EDM. Select the desired cutoff time from the Nikon setup to preserve battery time.

Nikon D–50
The Nikon D–50 instrument does not automatically send data when a distance reading is complete. Therefore, a message will appear on the SDR33, "Press OK when done". When the Nikon finishes the reading (usually signalled by an audible beep), press the OK button on the SDR33. It will then retrieve the data from the instrument.

Note: It is important to wait for the instrument to complete the reading! If OK is pressed too soon, it will abort the reading and return the distance of the previous measurement!

Nikon DTM–A Series
The Nikon DTM–A series instruments will automatically send data to the SDR33 when a reading is complete, so no operator interaction is required beyond pressing the Read key.

Communications parameters

Make sure the Nikon is set to INTERFACE=RS232 (not NK–NET). The communications parameters are permanently set to 4800 baud, no parity, 8 data bits, 1 stop bit, so no setup is required for this.

B.2.3   Pentax instruments

The SDR33 provides software to interface with the Pentax PTS–10, PTS–II, and PTS–III.

Cabling

A special cable (Sokkia Product No. 5306–20) is required to convert Pentax cabling to the SDR33's Hirose standard cabling configuration.

Pentax PTS–10

The three Pentax instruments all operate in the same way, but the older PTS–10 instrument is slightly different. Special instructions for the PTS–10 include;

- To record distance observations, the PTS–10 <u>must</u> be in distance mode.

- Angles-only measurements can be taken in any mode, but take considerably longer if the PTS–10 is in distance mode. Use angles-mode if you need to make many angles-only observations.

- When taking distance readings, the SDR33 automatically puts the PTS–10 into **AIM** mode until the signal is satisfactory. The SDR33 captures the reading from the PTS–10 when it is available.

Operation

Instrument checks include the following:

- The SDR33 checks that the prism constant and/or atmospheric correction(s) are not set on <u>BOTH</u> the SDR33 and the Pentax instrument(s). If they are, an error message displays.

- You need to manually check that the Pentax is not applying the curvature and refraction correction. It is not transmitted by the Pentax instruments.

- The SDR33 checks that the instrument is operating in the appropriate vertical angle mode (i.e., zenith or horizontal).

- The SDR33 also checks the instrument's units and raises an error message if units are different than expected.

Note: The SDR33 does <u>NOT</u> automatically convert from the Pentax's units to its own.

The SDR33 can not turn off the EDM after a distance-reading. Manually turn off the EDM after each reading to conserve the PTS batteries if it needs to remain aimed at a prism.

Communication Parameters
On the PTS–II/III, make sure the instrument is configured to communicate in standard mode (1,200 baud, no parity, 8 data bits, 1 stop bit). Consult your Pentax operations manual to achieve this configuration.

B.2.4

Topcon Instruments

The GTS–3 setting supports the older GTS–3 instruments, although a special hardware interface is required (Sokkia Product no. 5306–40).

The GTS/ET1 setting is used for any of the following: GTS–3B, GTS–4, GTS–6 and ITS–1

The GTS–300 setting is used for the latest GTS–300 series.

Cabling
No special cabling is required; the SDR33's top cable has a Hirose connector that plugs directly into the Topcon data port.

Operation
The Topcon can work in any combination of units. The SDR33 checks each reading transmitted by the Topcon and warns you if the Topcon units are incompatible with the SDR33's. To correct this alter the total station's or SDR33's units.

!

Note: The SDR33 will <u>NOT</u> automatically convert the units of transmitted values into its own units.

Set up the Topcon in slope distance mode, when EDM is selected.

Configure the Topcon's basic distance mode as Slope Distance (SD). Otherwise it will not work with the SDR33. Set this parameter by holding down the **<F2>** key while turning on the total station. The SDR33 will set the slope distance mode of the GTS300 itself so it is not necessary to set it on the topcon at startup. The SDR33 cannot change the GTS3 from theodolite mode to slope distance mode or vice versa, thus the mode must be set in the instrument to reflect the type of reading being taken.

Atmospheric corrections may be applied in either the SDR33 or the total station, but the SDR33 issues an error message if corrections are applied twice. It is recommended that corrections be applied in the SDR33 so there will be a record of them in the SDR33's database. If you have trouble, maintaining 0 PPM in the Topcon, set the SDR33 so that it does not apply atmospheric corrections.

Similarly, the prism constant may be set in either the SDR33 or the total station, but an error message displays if it is non-zero in both.

Communication parameters
Set the Topcon to communicate in standard (1,200 baud; even parity; 7 bits; 1 stop bit) mode. Consult your total station manual to achieve this configuration.

B.2.5

Wild instruments

The SDR33 supports the following Wild instruments:

> T1000
> T1000+DI
> T1600
> T1600+DI
> T2000
> T2000+DI
> T1010/1610
> T1010/1610+DI

The "DI" selections support either an external EDM or integrated Total Station (TC series). For example, the T1000+DI supports either a T1000 with DI connected or a TC1000.

Cabling
A special cable (Sokkia Product No. 5306–12) is required.

Operation
The SDR33 and Wild instrument must be set up to use the same angle and distance units. Corrections may be applied in one or the other, but not both.

Note: Inconsistent unit settings result in an SDR33 error message. The SDR33 does NOT automatically convert data from the Wild into SDR33 units.

Wild instruments will operate in the fast reading mode (referenced in the Wild manuals). If you are using a TC series instrument, configure the units to work with a GRE and not the Rec module.

Communications parameters
Before using a Wild instrument, configure it to communicate with an external device in standard mode, (2,400 baud; 7 bits; even parity; 1 stop bit). Consult your Wild manual to achieve this configuration.

B.2.6

Zeiss Elta 2/3, Elta 46R

Cabling
A special connector (Sokkia Product No. 5306–30) is required to connect the SDR33.

Operation

With the Elta 46R the SDR33 cannot initiate a reading automatically, this must be done by pressing the read lever on the Elta 46R. It is advisable to press the **<READ>** or **<ANGLE>** key on the SDR33 before starting the instrument On other Elta instruments the SDR33 automatically sets the correct mode for observations and initiates each reading. Supported modes are **M1** (slope distance, vertical angle, and horizontal observation) and **M2** (angles only). The **<READ>** and **<ANGLE>** keys on the SDR33 work in the normal way.

The SDR33 and Elta must be configured to use the same angle and distance units, or the SDR33 issues an error message. Corrections may be applied in either the Elta or in the SDR33, but not both; an error message occurs if corrections are applied twice.

Communication parameters

Configure the Elta to communicate in standard mode (1,200 baud; odd parity; 7 bits; 2 stop bits). Consult your Elta manual to achieve this configuration.