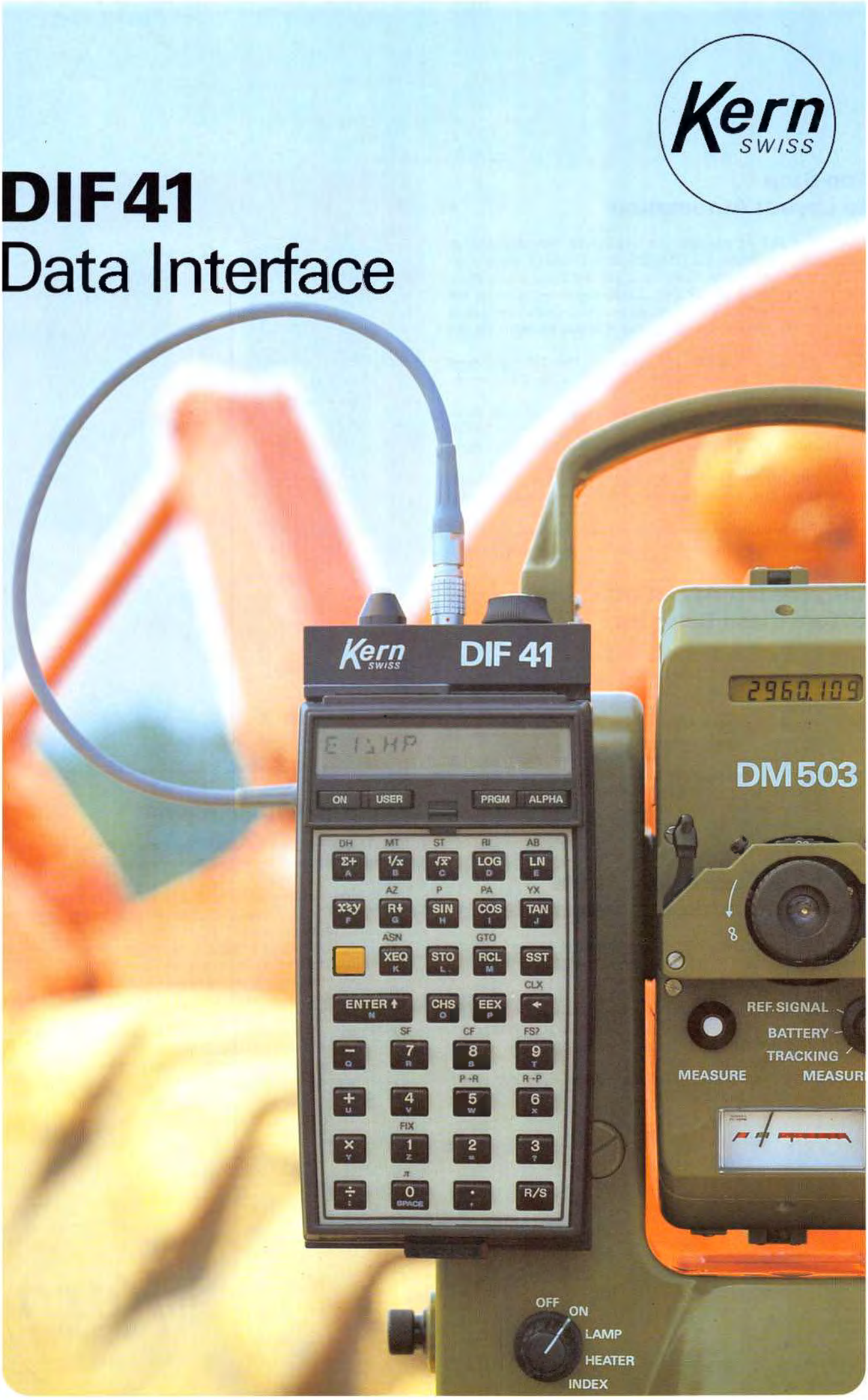
Modular
Instrument
System
Kern

DIF 41
Data Interface



The Step to Layout Automation

The DIF 41 permits the automatic transmission of measurements from the DM 502 and DM 503 electro-optical distance meters or from the E1 and E 2 electronic theodolites to a Series 41 HP calculator. The programmed HP calculator processes these values and transmits the results to the RD 10 remote receiver at the reflector location via the DM 502/DM 503.

Data communications between the HP calculator and a peripheral device are possible with a RS-232 C interface (Data Link DL 40).

The DIF 41 converts deta arriving in BCD code from field instruments E1/E 2 and DM 502/DM 503 into ASCII-code needed for computations in pocket calculator or computer.

The DIF 41 is also designed to house the HP calculator, and its low weight makes it easily attachable to the theodolite.

The calculator's flexibility permits the user to adapt data processing in the field to his individual requirements.

Only the DIF 41 / HP-41 Combination Offers these Benefits

- Horizontal distance instantly available
- Elevation difference instantly available
- Excellent reliability thanks to automatic data transmission
- Rapid and reliable execution of all calculations required at the measuring station
- Reliable communication with the assistant via the RD 10 remote receiver
- A component of the modular instrument system Kern. Existing Kern measuring equipment can be conveniently upgraded to an automated laying out system

DIF 41, a Component of the Modular Instrument System Kern

The modular instrument system Kern allows users to assemble the most effective measuring equipment combination for given surveying assignment.

As a component of the modular instrument system Kern, the DIF 41 can be used in combination with the E1 or E 2 electronic theodolites alone or with the DM 502/DM 503 electro-optical distance meters on K1-S, K1-M, DKM 2-A, E1 and E 2 theodolites.

The DIF 41 is also interface in the computer aided surveying system Kern SICORD.

Numerous Applications

The DIF 41 can be used to great advantage wherever calculations have to be made at the station point. This includes:

- Slope distance reduction with reference to meteorological corrections, projection distortion and reduction to sea level
- Height difference calculation under consideration of refraction and earth curvature
- Point measurement and setout
- Free stationing
- Computation of a traverse
- Entry of measurements (horizontal and vertical angles in both telescope positions)
- Averaging of several sets, error calculation
- Intersection for industrial survey

Kern SWISS

Horizontal Instead of Slope Distance

The distances measured by the DM 502 / DM 503 can be rapidly and reliably reduced with the DIF 41 and the HP pocket calculator.

When optical theodolites used, vertical angle is read and keyed in while the distance measurement is in progress. After the measured distance has been automatically transmitted to the calculator, the horizontal distance appears on the display. Meteorological corrections, projection distortion and reductions to sea level are also taken into account during reduction.

The DIF 41 and the HP calculator employed are simply attached to the theodolite and connected by cable to the distance meter via the theodolite lighting fixture. Both the alidade and the telescope with the distance meter attached remain freely rotatable. The DIF 41 can be used in combination with the DM 502 / DM 503 on K1-S, K1-M, DKM 2-A, E1 and E 2 theodolites.

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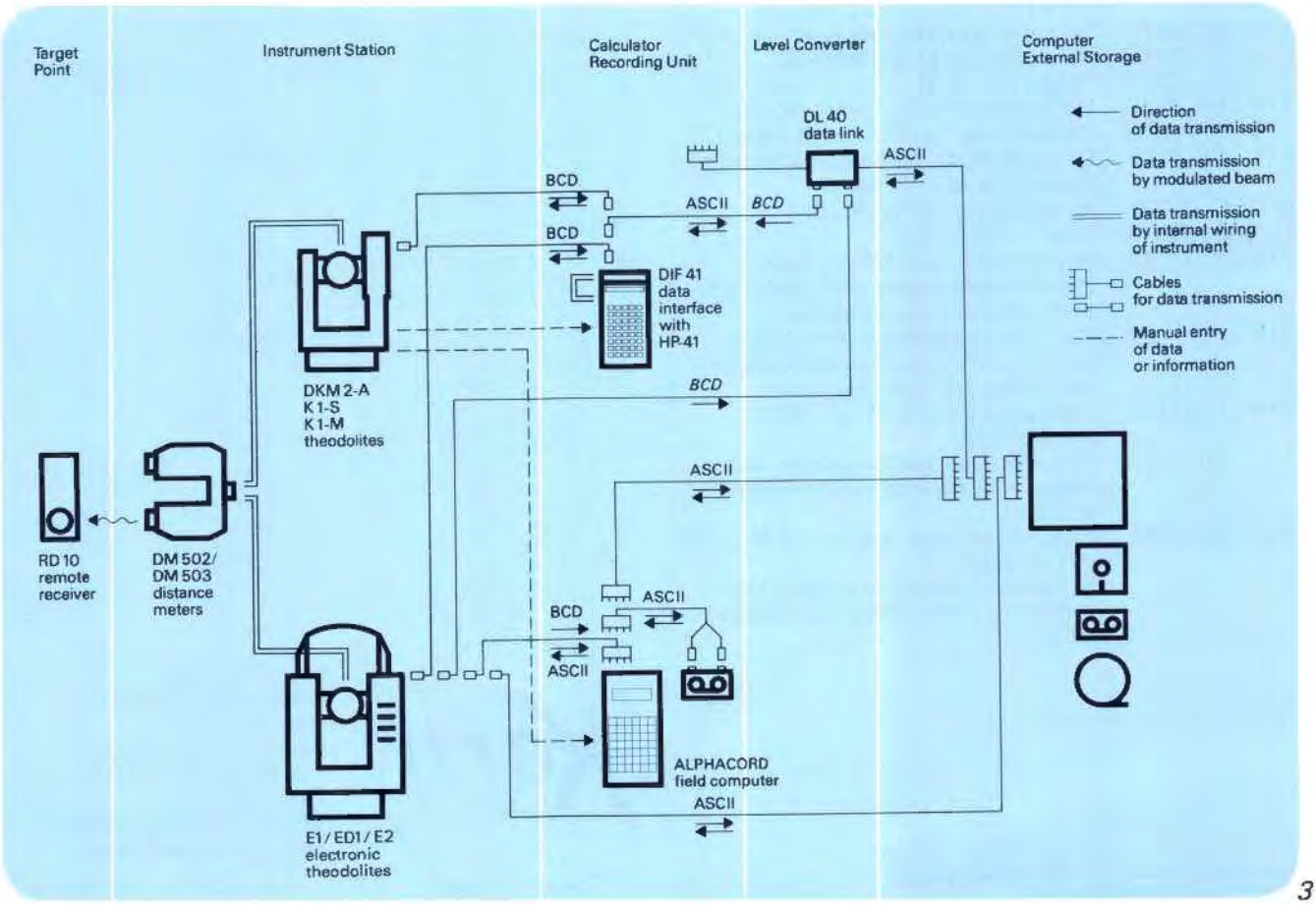

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RS-232C Interface, Data Link DL40

A RS-232C interface (Data Link DL40) supports data exchange (such as coordinate lists) between the HP calculator and a layer computer with a compatible input port. This offers the possibility of processing measurements on-line for special applications (such as industrial, throwing distances in sporting events, etc.).

Coordinate Listing on Digital Cassette

The coordinates necessary for a layout assignment (tie-in points, points to be laid out) are transmitted from the computer's data bank via the RS-232C interface directly to the HP calculator. If the data to be stored exceeds the calculator's memory capacity, individual data packages can be offloaded on digital cassette and reloaded into the HP calculator in the field when needed.

RD10 Remote Receiver

The RD10 remote receiver receives values transmitted by the distance meter and displays them digitally at the reflector location. The received data remains stored until the next measurement is made. The value to be displayed can be selected by actuating a rotary switch. An acoustic signal tells the receiver attendant when the RD10 is located within the transmission beam of the distance meter. Transmitted data include slope distance, horizontal distance and elevation difference determined by the E1/E2 or any values calculated by the HP (such as longitudinal and transverse deviations).

Detailed brochure No. 149e

5 The HP calculator is connected to a peripheral via a standard RS-232C interface (Data Link DL 40)

6 RD10 remote receiver

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Kern SICORD, Automated Laying Out with the DIF41

The following instruments from the modular system Kern are required for automated laying out and for transmission of the layout corrections to the target point:

- Data interface DIF 41 with HP-41
- Optomechanical theodolite DKM 2-A, K1-S, K1-M or electronic theodolite E1/E2
- Electro-optical distance meter DM 502/DM 503
- Remote receiver RD10

Angular values are transmitted to the calculator automatically if the E1/E2 electronic theodolite is used. When a DKM 2-A, K1-S or K1-M is used, the values are read off and keyed into the calculator.

Laying Out Procedure

The HP calculator determines the polar layout elements from the station coordinates and the coordinates of the point to be laid out. A reflector is located at an assumed point and its position is determined. After the measured values are transmitted to the HP calculator they are compared with the calculated layout elements. The resulting longitudinal and transverse deviations are transmitted via the distance meter to the RD10 remote receiver and digitally displayed to the assistant.

Station Coordinates

If the layout cannot be carried out from the designated station, the HP calculator offers the option of easily defining an arbitrary station. The coordinates of any given station can be determined from directions or from directions and distances to known points.

Orientation

The unknown element of orientation arising from the preceding calculation does not have to be set on the theodolite. It remains in the HP calculator memory and is automatically taken into account when the laying out elements are calculated.

Tracking

Distances are repeated every two seconds when the DM 502/DM 503 is operating in the tracking mode. The advantages of tracking can be fully exploited when an electro-optical distance meter is used together with an electronic theodolite connected to the DIF 41/HP-41.

When measuring in the tracking mode, the current longitudinal and transverse deviations are continuously determined by the HP calculator and transmitted to the RD10. The observer uses the telescope to follow the reflector moved by the assistant until the longitudinal and transverse deviations are zero.

Detailed brochure No. 113 e and 114 e.

1 DIF 41 data interface

2 For reduction, the slope distance measured by the DM 502/DM 503 is automatically transmitted via the DIF 41 to the HP-41

3 Modular instrument system Kern

4 When the DIF 41 is connected to an electronic tachymeter, the measured values (slope distance, vertical angle, horizontal direction) are automatically transmitted to the HP calculator

Technical Specifications

Data interface DIF 41 for calculators HP-41 C and HP-41 CV (included Kern basic programs)
Connectable to the DM 502/DM 503 electro-optical distance meters via K1-S, K1-M, DKM 2-A, E1 or E 2 theodolites
Connectable to the E 1 or E 2 electronic theodolites
Connectable to a peripheral device with RS-232 C interface
Fixed Baud rate = 1200 Baud.
Programmable parameters (parity, header line, line terminator, STX/ETX, ENQ, ACK/NAK)
Transmission of measured values to registers: distance = register 07, vertical angle = register 08, horizontal direction = register 09
Dimensions and weight: 175 × 75 × 35 mm; 0.35 kg

Order Information

Order No.	Description
115.508.7253	Data interface DIF 41 (included Kern basic programs)
115.835.0002	Plastic protective covering for DIF 41 and HP-41
115.508.7204	Pocket calculator HP-41 CV and HP-41 CX including bag
115.508.7903	Magnetic card reader for HP-41
115.508.7950	Magnetic cards for HP-41
115.508.7914	Printer for HP-41
115.508.8501	Digital cassette recorder HP 82104 A
115.508.7953	IL-Module HP 82160 A
115.508.7951	Extended X-FUNCTION Module HP 82180 A
115.508.7952	Extended X-MEMORY Module HP 82181 A
115.508.8082	Cable 37 cm (DIF 41 — E1, E 2 or DIF 41 — lighting fixture)
115.508.8084	Cable 2.8 m (DIF 41 — converter)
115.505.2106	Lighting fixture 5 V (for connecting DIF 41 to K1-S, K1-M, DKM 2-A)
115.580.0077	Holder for DIF 41 on K1-S, K1-M
115.580.0075	Holder for DIF 41 on DKM 2-A
115.508.7021	Holder for HP-41 on K1-S, K1-M only
115.508.7022	Holder for HP-41 on DKM 2-A only
115.803.4504	Carrying bag for HP-41 with holder
115.508.8087	Data Link DL 40 for data transfer from R 48 or DIF 41 to computer
976.700.0002	AC power supply for DL 40)
115.508.8088	Plug for RS-232 C
718.310.0138	Basic programs for HP-41, 360°, Set of program cards with overlay kit with labels and documentation
718.310.0139	Basic programs for HP-41, 400 gon, Set of program cards with overlay kit with labels and documentation
718.310.0200	Basic programs for HP-41, 360° and 400 gon, digital cassette with programs, with overlay kit with labels and documentation
718.310.0137	Program package AA for HP-41, 360° and 400 gon, digital cassette with programs, with overlay kit with labels and documentation

Manufacturing Program

For more than 160 years Kern has manufactured surveying instruments and drawing equipment that have an outstanding reputation in all parts of the world.

The present manufacturing program includes:

Levels
Optical-mechanical and electronic theodolites
Reduction tachymeters
Electro-optical distance meters
Planetable equipment
Industrial measuring systems
Computer-aided systems for surveying and photogrammetry
Photogrammetric equipment
Compasses
Technical pens Prontograph
Lettering and drawing templates
Lenses for motion pictures and still cameras
Binoculars
Optical instruments for military use
Special optical equipment

Worldwide Kern Service

The proverbial reliability of Kern instruments is ensured by the dependable service offered by our foreign representatives. They maintain efficient repair facilities, staffed with factory-trained personnel and are supported by an adequate supply of spare parts.

Kern SWISS

Kern & Co. Ltd.
Mechanical, Optical
and Electronic
Precision Instruments
Telephone 064 25 11 11
Telex 981106
Telefax II/III 064 24 80 22
Telegrams Kern Aarau

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