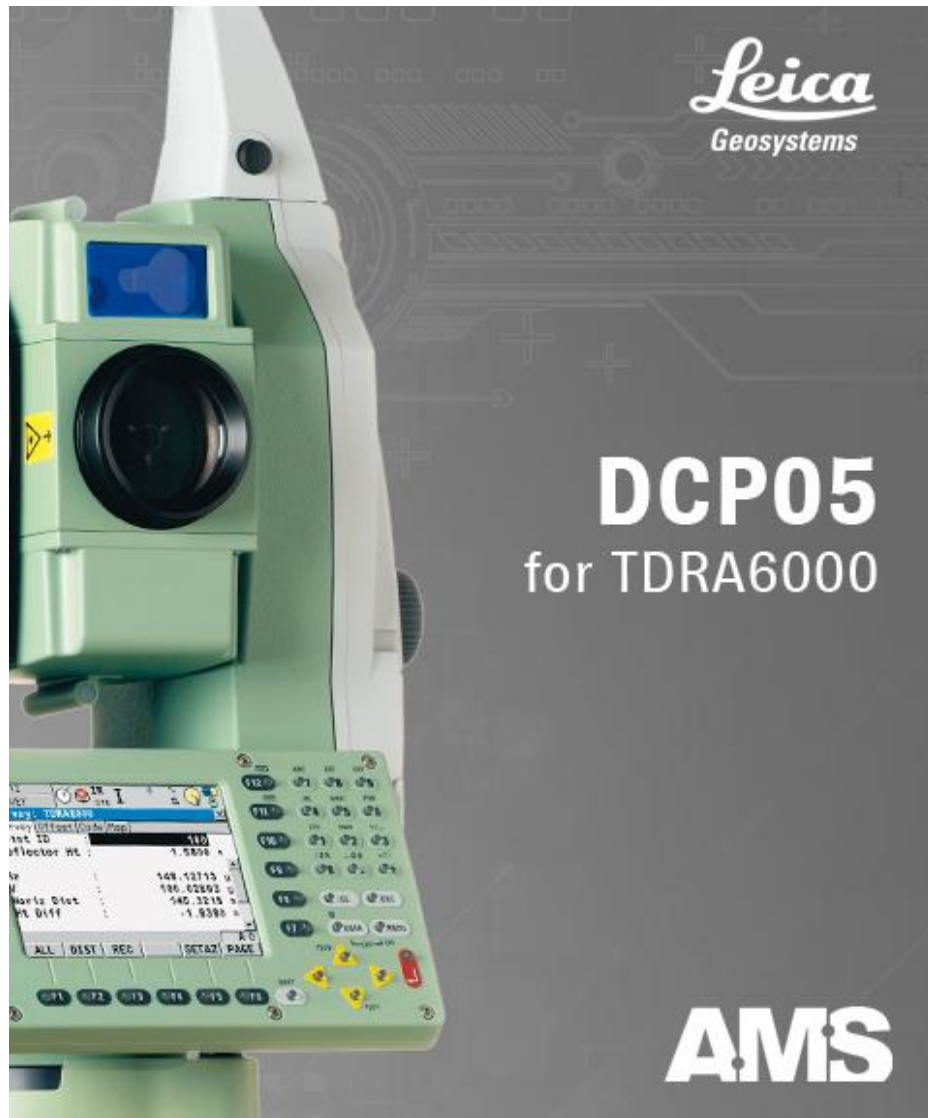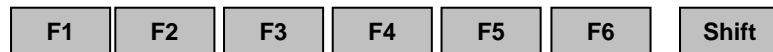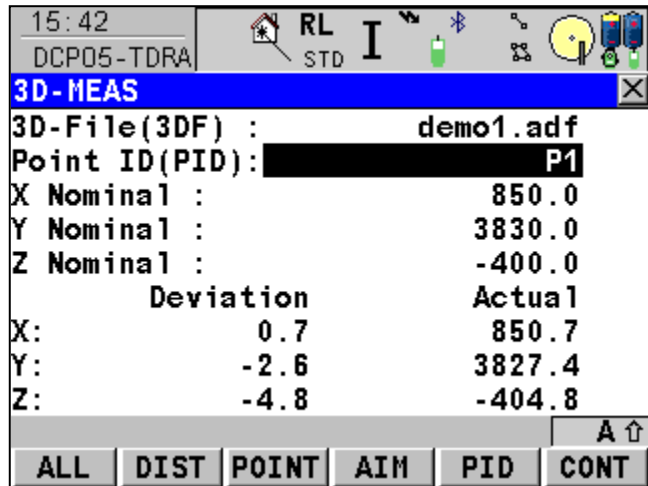# DCP05 for TDRA6000 – Software Structure V8.9

DCP 05 for TDRA6000 – Basics

Navigation and function selection is done via **Arrow** and Function Keys **F1-F6**. The 2nd layer of function keys can be displayed by pressing the **Shift** key.

```
15:42          RL    I          *
DCP05-TDRA      STD
3D-MEAS                                    ✕
3D-File(3DF) :          demo1.adf
Point ID(PID):                      P1
X Nominal :                      850.0
Y Nominal :                     3830.0
Z Nominal :                     -400.0
        Deviation           Actual
X:              0.7          850.7
Y:             -2.6         3827.4
Z:             -4.8         -404.8
                                   A ⇧
  ALL  | DIST |POINT| AIM | PID | CONT
```

| F1 | F2 | F3 | F4 | F5 | F6 | Shift |

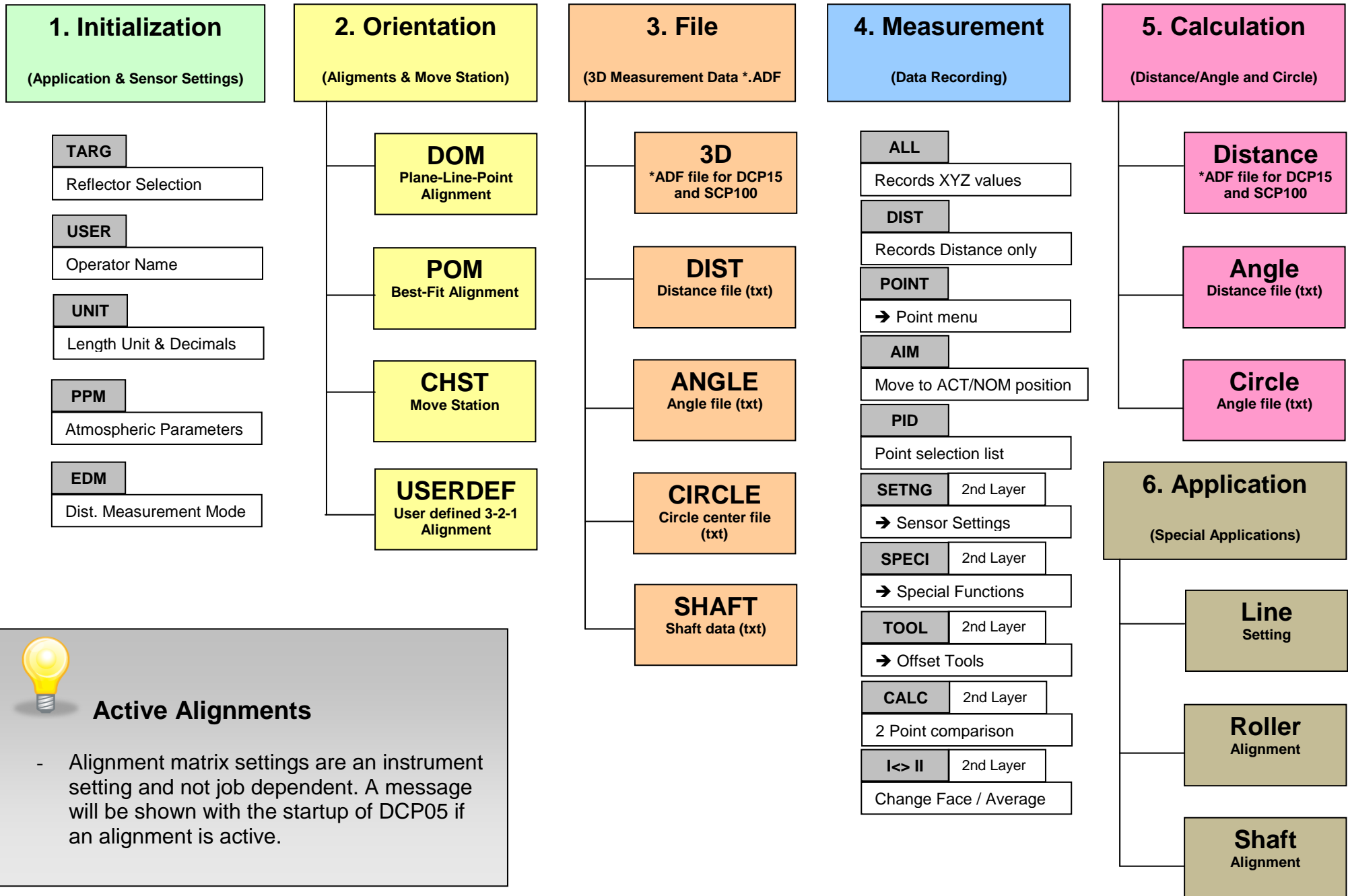| CONT | Use the CONTINUE key for function or data selection. |
| HELP | Context sensitive HELP is available on the 2nd layer (use SHIFT key) |

Reference Manual

- Refer to the DCP05 for TDRA6000 Reference Manual for details!

DCP 05 for TDRA6000 – Software Structure

1. Initialization
(Application & Sensor Settings)

- **TARG** — Reflector Selection
- **USER** — Operator Name
- **UNIT** — Length Unit & Decimals
- **PPM** — Atmospheric Parameters
- **EDM** — Dist. Measurement Mode

2. Orientation
(Aligments & Move Station)

- **DOM** — Plane-Line-Point Alignment
- **POM** — Best-Fit Alignment
- **CHST** — Move Station
- **USERDEF** — User defined 3-2-1 Alignment

3. File
(3D Measurement Data *.ADF)

- **3D** — *ADF file for DCP15 and SCP100
- **DIST** — Distance file (txt)
- **ANGLE** — Angle file (txt)
- **CIRCLE** — Circle center file (txt)
- **SHAFT** — Shaft data (txt)

4. Measurement
(Data Recording)

- **ALL** — Records XYZ values
- **DIST** — Records Distance only
- **POINT** — → Point menu
- **AIM** — Move to ACT/NOM position
- **PID** — Point selection list
- **SETNG** | 2nd Layer — → Sensor Settings
- **SPECI** | 2nd Layer — → Special Functions
- **TOOL** | 2nd Layer — → Offset Tools
- **CALC** | 2nd Layer — 2 Point comparison
- **I<> II** | 2nd Layer — Change Face / Average

5. Calculation
(Distance/Angle and Circle)

- **Distance** — *ADF file for DCP15 and SCP100
- **Angle** — Distance file (txt)
- **Circle** — Angle file (txt)

6. Application
(Special Applications)

- **Line** — Setting
- **Roller** — Alignment
- **Shaft** — Alignment

Active Alignments

- Alignment matrix settings are an instrument setting and not job dependent. A message will be shown with the startup of DCP05 if an alignment is active.
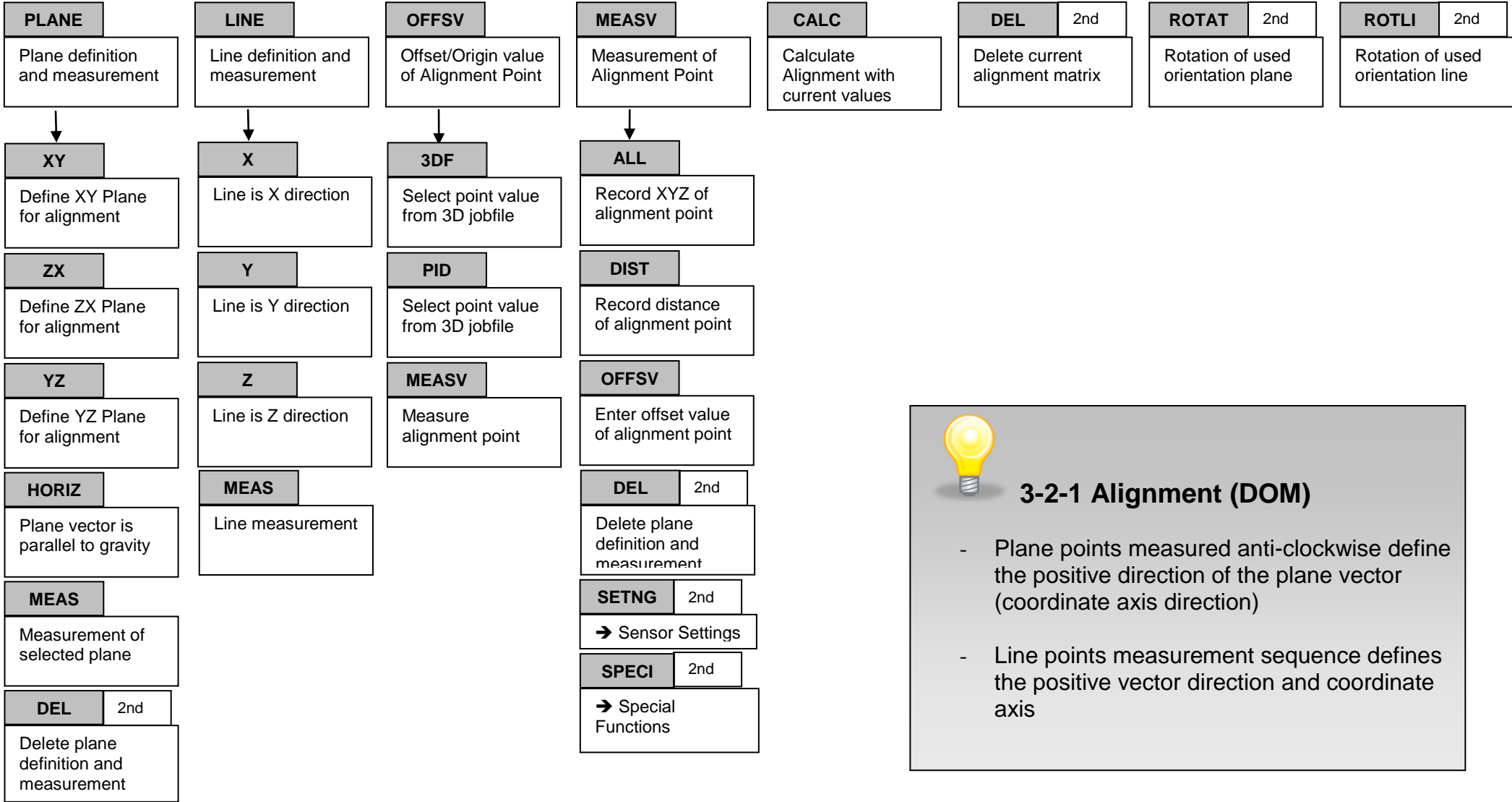
2. Orientation

(Aligments & Move Station)

DOM Plane-Line-Point Alignment	**POM** Best-Fit Alignment	**CHST** Move Station	**USERDEF** User defined 3-2-1 Alignment

---

PLANE

Plane definition and measurement

↓

XY

Define XY Plane for alignment

ZX

Define ZX Plane for alignment

YZ

Define YZ Plane for alignment

HORIZ

Plane vector is parallel to gravity

MEAS

Measurement of selected plane

DEL | 2nd

Delete plane definition and measurement

LINE

Line definition and measurement

↓

X

Line is X direction

Y

Line is Y direction

Z

Line is Z direction

MEAS

Line measurement

OFFSV

Offset/Origin value of Alignment Point

↓

3DF

Select point value from 3D jobfile

PID

Select point value from 3D jobfile

MEASV

Measure alignment point

MEASV

Measurement of Alignment Point

↓

ALL

Record XYZ of alignment point

DIST

Record distance of alignment point

OFFSV

Enter offset value of alignment point

DEL | 2nd

Delete plane definition and measurement

SETNG | 2nd

➔ Sensor Settings

SPECI | 2nd

➔ Special Functions

CALC

Calculate Alignment with current values

DEL | 2nd

Delete current alignment matrix

ROTAT | 2nd

Rotation of used orientation plane

ROTLI | 2nd

Rotation of used orientation line

3-2-1 Alignment (DOM)

- Plane points measured anti-clockwise define the positive direction of the plane vector (coordinate axis direction)

- Line points measurement sequence defines the positive vector direction and coordinate axis
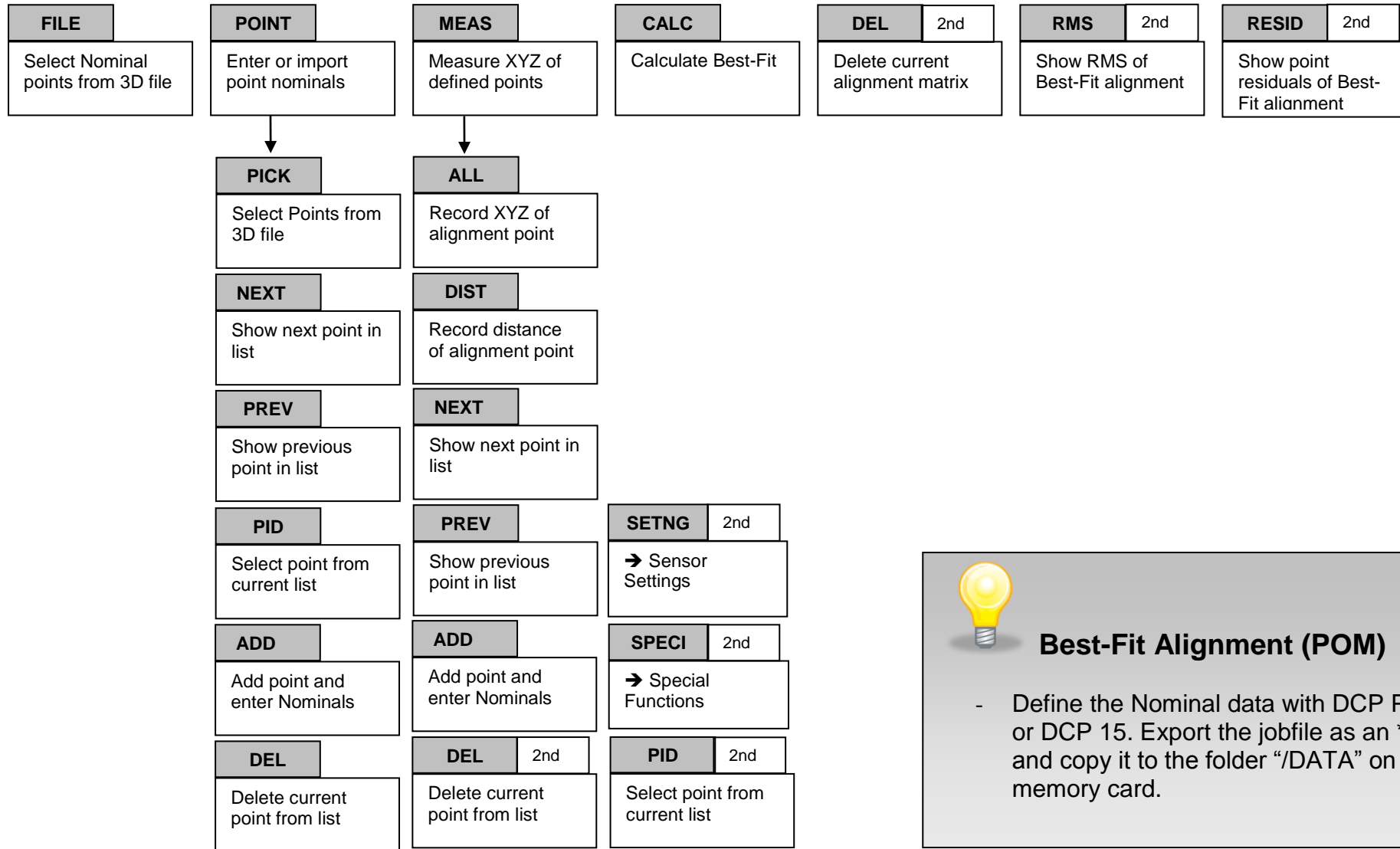
2. Orientation

(Aligments & Move Station)

DOM	POM	CHST	USERDEF
Plane-Line-Point Alignment	Best-Fit Alignment	Move Station	User defined 3-2-1 Alignment

FILE	POINT	MEAS	CALC	DEL	2nd	RMS	2nd	RESID	2nd
Select Nominal points from 3D file	Enter or import point nominals	Measure XYZ of defined points	Calculate Best-Fit	Delete current alignment matrix		Show RMS of Best-Fit alignment		Show point residuals of Best-Fit alignment	

PICK
Select Points from 3D file

ALL
Record XYZ of alignment point

NEXT
Show next point in list

DIST
Record distance of alignment point

PREV
Show previous point in list

NEXT
Show next point in list

PID
Select point from current list

PREV
Show previous point in list

SETNG 2nd
➔ Sensor Settings

ADD
Add point and enter Nominals

ADD
Add point and enter Nominals

SPECI 2nd
➔ Special Functions

DEL
Delete current point from list

DEL 2nd
Delete current point from list

PID 2nd
Select point from current list

Best-Fit Alignment (POM)

- Define the Nominal data with DCP Project or DCP 15. Export the jobfile as an *ADF file and copy it to the folder "/DATA" on the SD memory card.

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2. Orientation

(Aligments & Move Station)

DOM	POM	CHST	USERDEF
Plane-Line-Point Alignment	Best-Fit Alignment	**Move Station**	User defined 3-2-1 Alignment

SELPT

Select reference points from file

↓

PICK

Select Points from 3D file

NEXT

Show next point in list

PREV

Show previous point in list

PID

Select point from current list

ADD

Add reference point to list

DEL | 2nd

Delete current point from list

MEAPT

Measure reference points

↓

ALL

Record XYZ of alignment point

DIST

Record distance of alignment point

NEXT

Show next point in list

PREV

Show previous point in list

ADD

Add reference point to list

DEL | 2nd

Delete current point from list

PNTS

Re-measure reference points

NEWST

Create a new station

DEL | 2nd

Delete Move Station measurements and stations

RMS | 2nd

Show RMS of Best-Fit alignment

RESID | 2nd

Show point residuals of Best-Fit alignment

Move Station

- Measure the Reference Points from STA 1 (minimum 3 points) with [MEAPT].
- Move the station, re-level the sensor and create a new station with [NEWST]. Measure Reference Points from STA1 and optionally add new points to the list with [ADD] for the next STA3 (optional)
- Make sure you confirm the calculation with [CONT] in order to save the new station orientation.

2. Orientation (Aligments & Move Station)	DOM Plane-Line-Point Alignment	POM Best-Fit Alignment	CHST Move Station	USERDEF User defined 3-2-1 Alignment

CONF

Select Feature points

↓

PLANE

Select points and direction for alignment plane

LINE

Select points and direction for alignment line

OFFSV

Set coordinates of alignment origin point

CALC

Calculates 321 Alignment

CONT

Go to next logical menu item

ROTAT	2nd

Rotation of used orientation plane

DEL	2nd

Delete current point from list

ROTLI	2nd

Rotation of used orientation line

MEAS

Measure Feature Points

↓

ALL

Record XYZ of alignment point

DIST

Record distance of alignment point

NEXT

Show next point in list

PREV

Show previous point in list

ADD

Add reference point to list

User defined Alignment

- A User Defined alignment is basically a 321 alignment as DOM.
- In this case the operator is first measuring all feature points for the required 321 alignment, consisting of a Plane, a Line and an Offset (origin) point.
- Line and Plane features may consist of more than the minimum number of points (best-fit features).

HOW TO:
- Measure all feature points with [MEAS]
- Define Line and Plane feature direction and used points for feature calculation with [CONF].
- Calculate the alignment with [CALC].

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3. File
(3D Measurement Data *.ADF)

3D
*ADF file for DCP15 and SCP100

DIST
Distance file (txt)

ANGLE
Angle file (txt)

CIRCLE
Circle center file (txt)

SHAFT
Alignment file

OPEN

Open an existing 3D file

NEW

Create a new 3D file

COPY

Copy the current 3D file

SWAP

Copies measured data to nominal

CLOSE

Close a 3D file

SAVE | 2nd

Saves the current 3D file as *.DAT

DEL | 2nd

Delete current 3D file

VIEW | 2nd

Data viewer

DIST/ANGLE/CIRCLE Files

- Distance, Angle, Circle and Shaft files can not be viewed with DCP05/15 or Project. These files are text files for further use in Excel or Notepad.
- Distance and Angle results can be viewed within DCP05 with the [VIEW] function.

4. Measurement

(Data Recording)

ALL

Records XYZ values

DIST

Records Distance only

POINT

➔ Point menu

AIM

Move to ACT/NOM position

PID

Point selection list

SETNG | 2nd

➔ Sensor Settings

SPECI | 2nd

➔ Special Functions

TOOL | 2nd

➔ Offset Tools

CALC | 2nd

2 Point comparison

I<> II | 2nd

Change Face / Average

PREV

Show previous point in list

ADD

Add new point for measurement

NEXT

Show next point in list

SWAP

Copies actual values to nominals

3DF

➔ Opens the 3D file selection menu

CLEAR | 2nd

Deletes Actual measurement of current point

Point measurements

- Always use the [POINT] [ADD] keys to add measurements to your jobfile.
- The option "Auto-increment" under [SETNG] will automatically increment Point IDs.

4. Measurement

(Data Recording)

ALL

Records XYZ values

DIST

Records Distance only

POINT

→ Point menu

AIM

Move to NOM position

PID

Point selection list

SETNG | 2nd

→ Sensor Settings

SPECI | 2nd

→ Special Functions

TOOL | 2nd

→ Offset Tools

CALC | 2nd

2 Point comparison

I<> II | 2nd
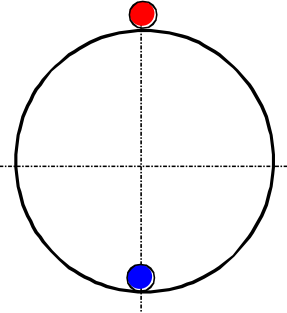
Change Face / Average

Hidden Point
Measurement of a linear Hidden Point Device

X or Y or Z
Individual Recording of X,Y and Z

Circle
Circle measurement mode

Separate Recording
Separate recording of distance and angles

4. Measurement	Hidden Point	X or Y or Z	Circle	Separate Recording
(Data Recording)	Measurement of a linear Hidden Point Device	Individual Recording of X,Y and Z	Circle measurement mode	Separate recording of distance and angles

ALL

Records XYZ values
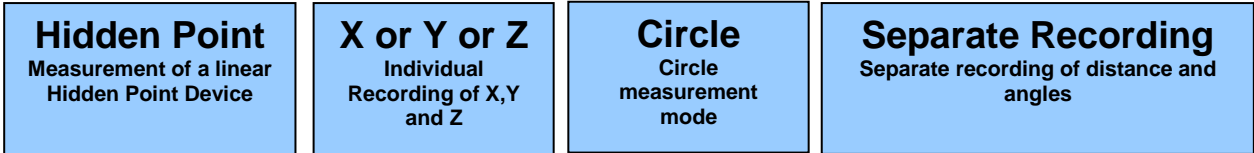
DIST

Records Distance only

NEXT

Select next device point

PREV

Select previous device point

CALC

Calculates the hidden point

CLEAR | 2nd

Delete the current device point

CONF | 2nd

Hidden Point device definition

SETNG | 2nd

➔ Sensor Settings

Point 5/5

500

Point 4/5

400

Point 3/5

300

Point 2/5

200

Point 1/5

100
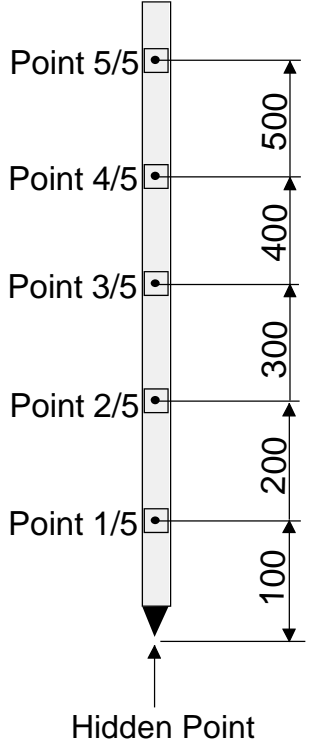
Hidden Point

Hidden Point Measurement

- A linear Hidden Point Device consists of multiple targets. A Hidden Point location can be calculated with 2 points.
- Define the Hidden Point Device distances with [CONF] and measure 2 positions on the device with [ALL].
- [CALC] will calculate the Hidden Point position.

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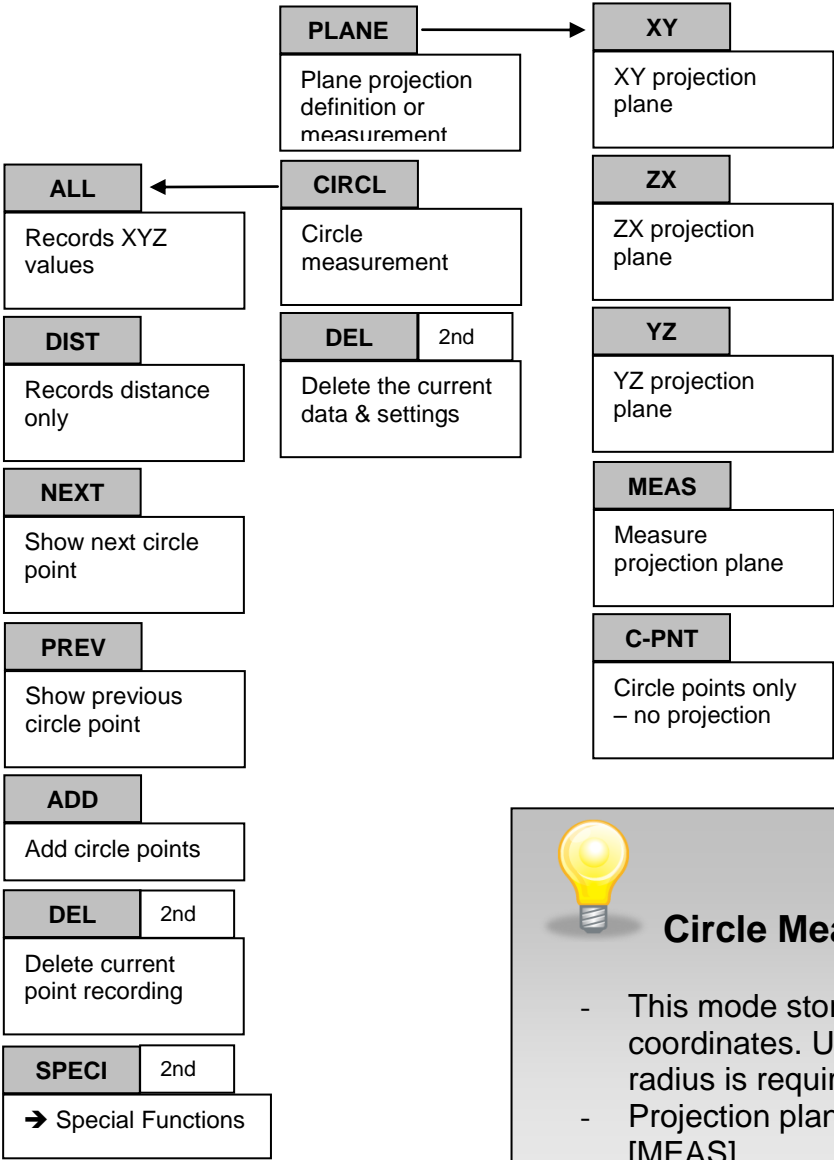| 4. Measurement (Data Recording)	Hidden Point Measurement of a linear Hidden Point Device	X or Y or Z Individual Recording of X,Y and Z	Circle Circle measurement mode	Separate Recording Separate recording of distance and angles

ALL
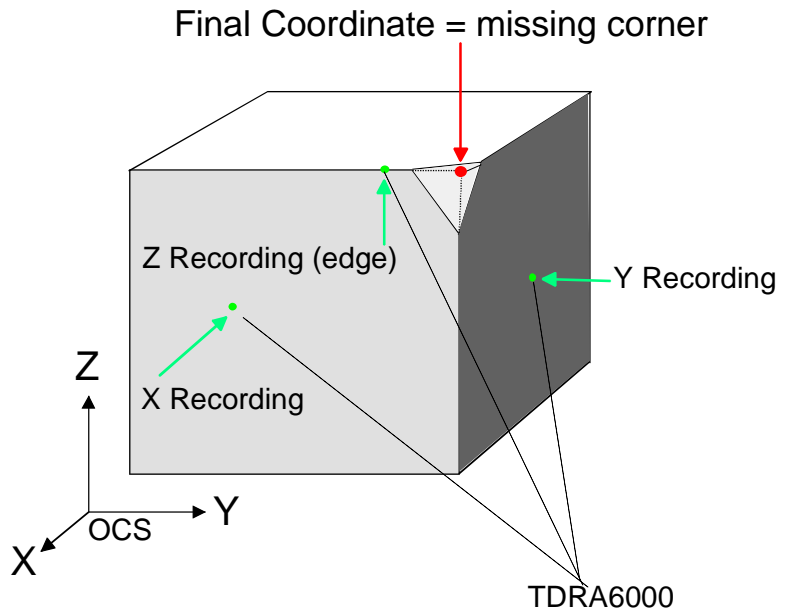
Records XYZ values

X

Records X direction only

Y

Records Y direction only

Z

Records Z direction only

DEL

Delete the current device point 2nd

SETNG 2nd

➜ Sensor Settings

TOOL 2nd

➜ Offset Tools

Final Coordinate = missing corner

Z Recording (edge)

Y Recording

X Recording

Z

Y

X OCS

TDRA6000

Individual Recording

- Edges or corners can often not be measured directly. Using a Hidden Point is occasionally a solution. If a corner can not be measured directly, the separate recording of the individual surfaces/coordinates is a helpful measurement mode.
- Measured surfaces must be parallel to the current coordinate system axes when using the "X or Y or Z" mode.

| 4. Measurement (Data Recording)	Hidden Point — Measurement of a linear Hidden Point Device	X or Y or Z — Individual Recording of X,Y and Z	Circle — Circle measurement mode	Separate Recording — Separate recording of distance and angles

Tool radius (+) if measured outside

Tool radius (-) if measured inside

PLANE
Plane projection definition or measurement

XY
XY projection plane

ZX
ZX projection plane

YZ
YZ projection plane

MEAS
Measure projection plane

C-PNT
Circle points only – no projection

CIRCL
Circle measurement

DEL | 2nd
Delete the current data & settings

ALL
Records XYZ values

DIST
Records distance only

NEXT
Show next circle point

PREV
Show previous circle point

ADD
Add circle points

DEL | 2nd
Delete current point recording

SPECI | 2nd
➔ Special Functions

Circle Measurement

- This mode stores only the circle center coordinates. Use the circle application if a radius is required for reporting.
- Projection plane is usually measured [MEAS].

4. Measurement	Hidden Point	X or Y or Z	Circle	Separate Recording
(Data Recording)	Measurement of a linear Hidden Point Device	Individual Recording of X,Y and Z	Circle measurement mode	**Separate recording of distance and angles**
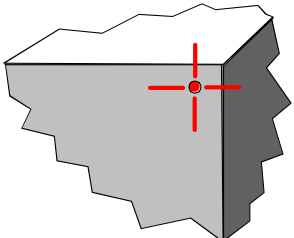
1. Measure the distance near the edge
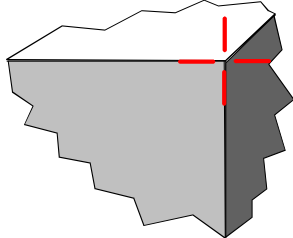
2. Record the angles of the edge point
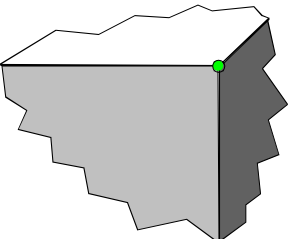
3. Result is the XYZ value of the edge point

DIST	
Records distance only	

REC	
Records angles only	

DEL	2nd
Delete current recording	

SETNG	2nd
➔ Sensor settings	

TOOL	2nd
➔ Offset Tools	

Separate Recording

- Measurements of corners or circle edge points are usually measured with this measurement mode.

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4. Measurement

(Data Recording)

ALL
Records XYZ values

DIST
Records Distance only

POINT
→ Point menu

AIM
Move to NOM position

PID
Point selection list

SETNG | 2nd
→ Sensor Settings

SPECI | 2nd
→ Special Functions

TOOL | 2nd
→ Offset Tools

CALC | 2nd
2 Point comparison

I<> II | 2nd
Change Face / Average

TID
Select tool definition from list

ADD
Add new tool definition to list

TARG
Define the used target type for this tool

NEXT
Select next tool definition in list

PREV
Select previous tool definition in list

DEL | 2nd
Delete current tool definition

Usage of a Tool with 30mm offset in Z-direction (Retro Tape)
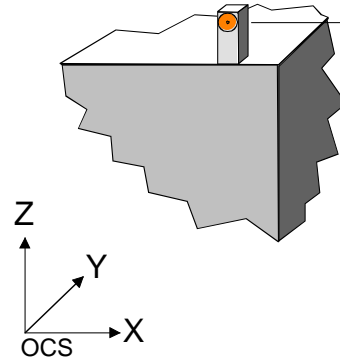
Tool Definition:
TARG: Leica ReflTape
TID: X30mm
X: 0.0
Y: 0.0
Z: 30.0

Z
Y
X
OCS

The measurement with a Tool definition will be offset compensated and stored
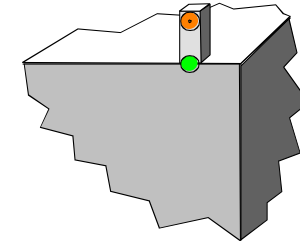
Offset Tools

- Tool definitions are basically a set or individual offset values of a tool device.
- Activated tools are shown in the tool info box.
- Measured points with activated tool definitions will be compensated accordingly.
- Tool compensation must be based on the object coordinate system OCS.

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5. Calculation

(Distance/Angle and Circle)

Distance
*ADF file for DCP15 and SCP100

Angle
Distance file (txt)

Circle
Angle file (txt)

3DF

Open 3D file with data

DISTF

Create a Distance file

REF

Select 1. point from file

TARG

Select 2. point from file

SAVE

Save calculated distance

CLEAR | 2nd

Clear selected points

VIEW | 2nd

View stored list with distance values

3D Distance Calculation

- A simple application that allows quick verification of 3D distances on site.
- Distance files can not be used with DCP Project.

5. Calculation
(Distance/Angle and Circle)

Distance
ADF file for DCP15 and SCP100

Angle
Distance file (txt)
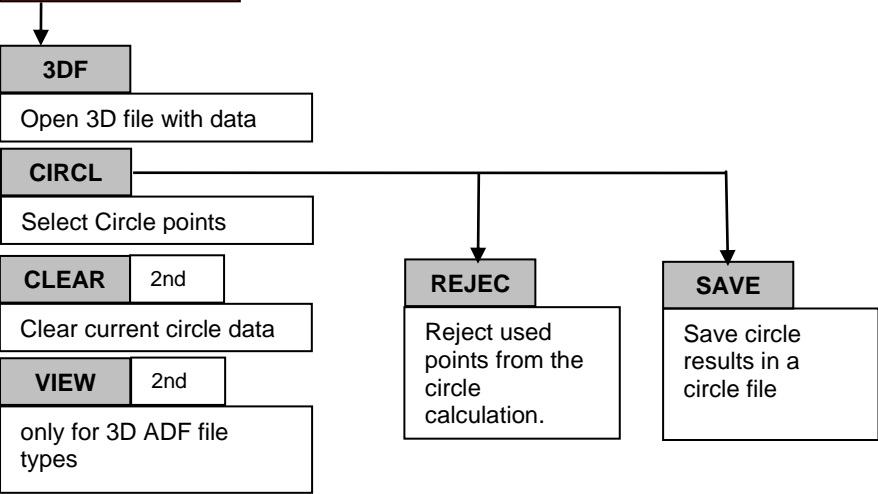
Circle
Angle file (txt)

3DF

Open 3D file with data

ANGF

Create an Angle file

REF

Select Line or Plane feature from file

LINE

PLANE

TARG

Select Point or Line feature from file

POINT

LINE

SAVE

Save calculated distance

CLEAR | 2nd

Clear selected features

VIEW | 2nd

View stored list with angle values
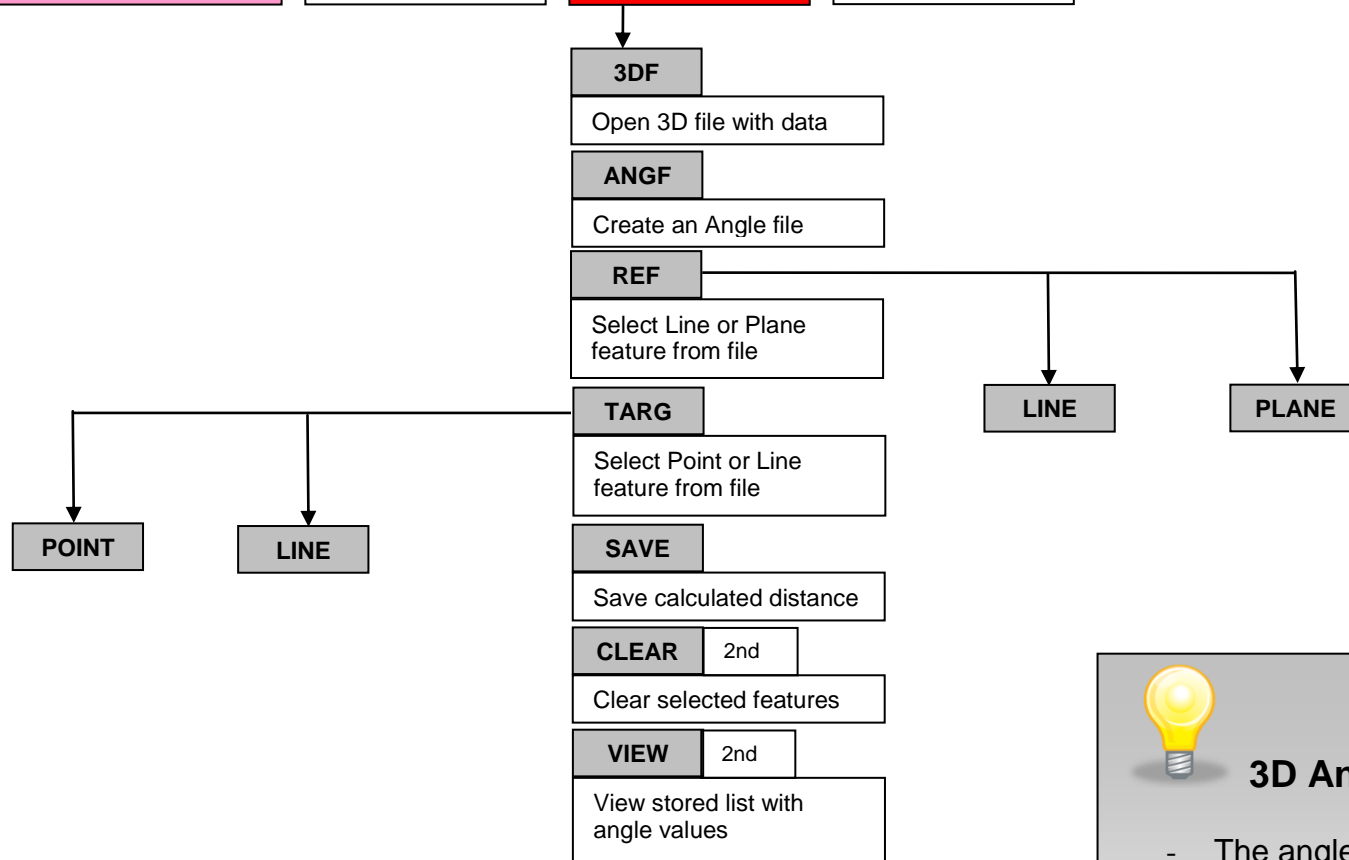
3D Angle Calculation

- The angle in case of a Line-Point is defined as follows: Line origin point and selected single point define the second line.
- Stored angles can be reviewed with the viewer.

5. Calculation

(Distance/Angle and Circle)

Distance
*ADF file for DCP15 and SCP100

Angle
Distance file (txt)

Circle
Angle file (txt)

3DF

Open 3D file with data

CIRCL

Select Circle points

CLEAR	2nd

Clear current circle data

VIEW	2nd

only for 3D ADF file types

REJEC

Reject used points from the circle calculation.

SAVE

Save circle results in a circle file

Circle Calculation

- Circle files cannot be viewed with DCP Project. Use any text editor program for data viewing.

6. Application
(Special Applications)

Line Setting

Roller Alignment	Shaft Alignment

SET

Angle Setting

0

Parallel direction

90

Perpendicular direction

180

Parallel direction

270

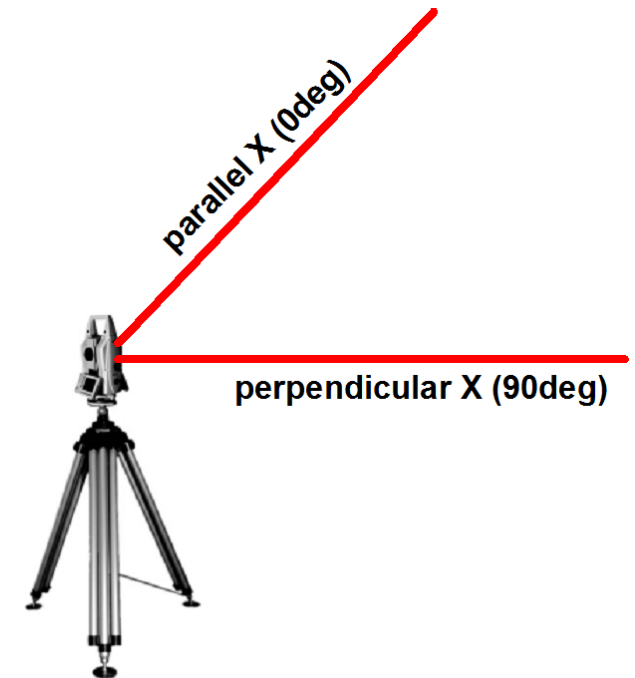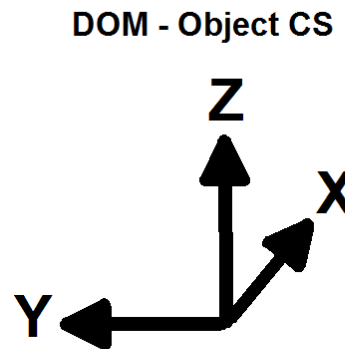Perpendicular direction

CONT

Instrument will drive to entered horizontal/vertical direction

Line Setting

- This application was created for the paper industry.
- Main task is the setting-out of parallel or perpendicular lines relative to the current coordinate system.
- DOM Alignment must be performed prior to the Line Setting application.

DOM - Object CS

Z

X

Y

parallel X (0deg)

perpendicular X (90deg)

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| 6. Application	Line	Roller	Shaft
(Special Applications)	Setting	Alignment	Alignment

Roller Alignment

- This application was created for the paper and steel industry.
- Main task is the adjustment of parallelism between multiple rollers.
- Alignment to the machine coordinate system must be performed prior to the Roller Alignment measurement.

HOW TO:
- Enter an Point ID with an "f" or "F" at the end (e.g. 1F) for the front end point of roller 1. DCP05 will automatically create a point ID 1B (back end of roller 1)
- Measure the first Front point 1F and then Back end B1 with [ALL]
- Deviations in X/Z direction are displayed
- Switching between the F and B positions of roller 1 can be made by setting the ID with [F<>B] button and [AIM]
- Next roller position can be selected from the point list with [PID] or entered.

⇨ Roller Alignment requires the special target kit 575940
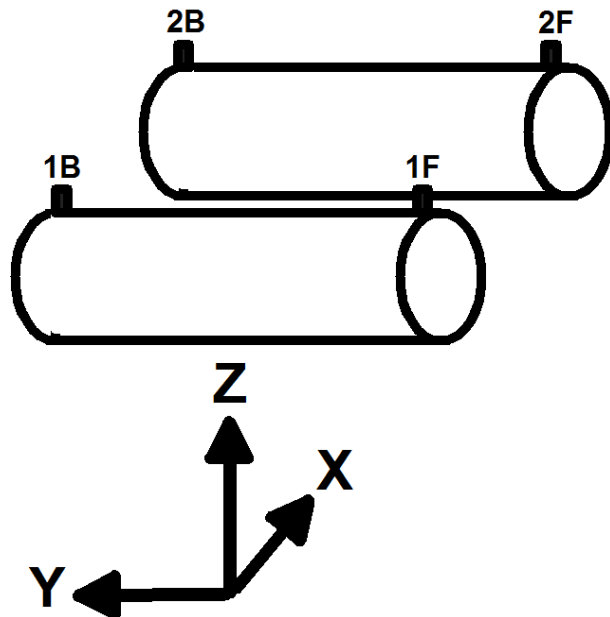
ALL
Records XYZ values

AIM
Move to ACT/NOM position

POINT
➔ Point menu

F<>B
Toggle Forward/Backward

PID
Point selection list

SETNG	2nd

Measurement Settings

SPECI	2nd

➔ Special Functions

TOOL	2nd

➔ Offset Tools

CALC	2nd

2 Point comparison

I<> II	2nd

Change Face / Average

2B   2F
1B   1F

Z
X
Y

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6. Application

(Special Applications)

Line Setting	Roller Alignment	**Shaft Alignment**

Shaft Alignment

- This application was created for the paper and steel industry.
- Main task is the adjustment of shafts to a reference direction.
- Alignment to the machine coordinate system must be performed prior to the Shaft Alignment measurement.

HOW TO:
- Select the alignment direction [XYZ]
- Select [SHAFT] and measure the shaft points with [ALL]. Continue with [CONT]
- Circle results and circular deviations are displayed.
- Continue with [CONT]
- The deviations (directional) of the circle plane points compared to the reference plane are displayed. Adjust the shaft accordingly.
- Re-measure the Shaft points

X
Align Shaft along X axis

Y
Align Shaft along Y axis

Z
Align Shaft along Z axis

MEAS
Measure axis direction

SHAFT
Measure circular points

Reference plane located at circle center

Center of circle

Reference axes (normal to the reference plane), measured or one of the coordinate axes in OCS

Point on the circle edge and the distance to the reference plane