

Jefferson Lab Alignment Group

ME5000 DISTANCE MEASURING PROCEDURE

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Author: Dahlberg

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Procedure Overview

This procedure describes the steps necessary to perform ME5000 distance measurements using the Meko5000 software developed in 1997. The software is written so that measurements can be recorded for one station only. For each additional station, the program must be closed down and re-started.

Safety issues

The mekometer is a class 2 laser. Do not look directly into beam. Warn people in the area verbally and set out signs as directed in step 1, and follow procedures to avoid looking into the beam as in step 2. Laser training and eye protection is not necessary for class 2 lasers. Refer to EH&S manual section 6410 for more detail.

Also, if necessary, ensure power and communication cords are secured to prevent trip hazards.

Prerequisites

Basic skills in proper survey techniques including:

Setting up over a reference point using optical plummet in an accurate and stable manner. Attention to detail leveling equipment and ensuring instrument and target are collinear.

Understanding the effects of refraction, temperature, barometric pressure, and humidity.

EQUIP. LIST:

Meko5000 software loaded on computer. ME5000, Prism, Two sets of meteorology (met) equipment. Depending on setup, trivets with level vial and spheres or tripods with hardware, plummet, translation stage, socket pins. Metric tape, safety cones and signs, power pack, 4 pin power cable with opposite end six pin communication, and 5 pin communication to serial port cable, or a

complete combination cable. Extension cord with 2 outlets, backup power if necessary, and a rubber matt if desired for setting up trivets.

Procedure Steps

Step by step description of actions taken.

STEP 1 Set equipment up

Select starting station and target. Set up laser safety signs and cones. At this time , position and level tripods with translation stages over the reference points. Or if using trivets, set up the trivets with the instrument/prism, cables, all attached, see note on cables in step 2. This will avoid having to check the level twice during the next step as mounting the instrument may disturb the trivet. It is crucial that translation stages are tight, and there is proper contact between the tribrachs and mounting sockets.

STEP 2 Power up, level equipment, and collimate line of sights.

With power and communication cables attached, turn on mekometer to remote mode and set to low range (few distances on site would be in the high range of over 500 m). **Note:** The power/communication cable has a four and six pin connector at opposite ends with identical lemo connectors on the outside. Make sure correct ends are connected to prevent damage to pins. This is a good time to level the instrument/prism as it takes a few minutes for the instrument to warm up. Also, because the laser beam is not yet turned on, the mekometer and prism can be pointed at each other at this time using the sight pointers on the underside. The pointer should be lined up with the lower target center, not the prism center. **Note:** Do not look into direct laser beam while collimating lines of sight. Operator and target man should communicate to avoid turning on the laser in step 4 while lining up target.

STEP 3 Start program

Start up the Meko5000 program and follow through each of the buttons to enter the Job/weather, instrument info, station/target names, and type of distance/number of measurements. Station and target names should start with an "H" prefix. The number of measurements is usually 3. Normally, if the height of the instrument and target stations are known (i.e. levels have been run to them), and the same type of supports are used as with trivets or bolt down tripods, the heights are entered as 0. Certain situations may require heights to be entered such as when a wooden tripod is used. In this case, a height from the monument center to the prism or instrument center should be entered.

STEP 4 Begin measurements

Select the “take measurements” button. You will be prompted to select a location for the file to be stored (default is mek\data), and then initially save. If there is trouble establishing communication, the communication port may have to be changed under the options menu. Follow the screen prompts, when laser comes on, optimize the signal strength using the tangent screws, and begin measurement. For distances which are in the lowest range, you may be asked for a rough distance (in meters), between the station and target. After the measurement is taken, you will be asked to enter the metrological data at the instrument and target stations. The air temperature and humidity should be taken at the height of the line of sight. **Note:** When working outdoors, make sure the thermometer (or temperature probe) is out of direct sunlight. Pressure will most likely be constant throughout the entire area. Barometer readings should be entered into the computer with the calibration corrections applied. For distances other than the lowest range (i.e. less than 20 m), or if there is an obvious difference, measurements should be taken at both the instrument and target. Take note of the 3 measurements on screen to ensure they are consistent and do not follow a trend of shortening or lengthening. Additional measurements can be taken through the options menu in this case.

STEP 5 Additional target stations and ending the program.

Additional targets can be measured through the home screen. Follow through each of the buttons for Station/target, and Distance/number. You will not have to re-enter Instrument and weather equipment serial numbers unless the new target height needs to be entered. Continue as in step 4. Each set of distances for the individual targets is stored automatically in the current file. When finished, exit the program. Additional instrument stations require that the program is closed down and re-started.