

EDM PROTOCOLS



Operational Protocols

for

Leica 1100 Series EDM

Athletics Throws/Horizontal Jumps Events



- Check all equipment (incl. Batteries are charged)
- (Prior to competition day Competition Director should ensure that equipment is ready for use)
- Set up in safe position(at least 30 minutes prior to Warm-up)
- Level up and turn on
- Select Program eg: Throws
- Ensure all settings are correct (ATR is ON (icon should appear on screen), Correct Reflector/prism is nominated, Log is ON & sufficient space is available)
- Select Event eg: Discus
- Physically locate circle centre (Hammer & shot circle radius = 1.0675m,Discus circle radius = 1.250m, Javelin radius = 8.00m)
- Take measurement to circle centre **DIST (F2)**
- Move to Distance Measure screen Press Cont (F5)
- Check the Rim/Arc Measurement (In fine mode (Shift F4), check the measure (F2) to edge of circle (at sector lines) and store (F3). The distance should be close to 0.000m)
- Establish Check Measure (Place a marker in sector at distance appropriate for event, measure with steel tape and EDM (in fine mode) before & after event. Store (F3) and Record the measurement and point number on the recording sheet.)
- Check that Log file is On and accepting stored measures (Shift (F2) LOG and view Log file)
- Establish that correct truncation (RoundDown) is occurring.
- Measure each attempt, (F2) and store (F3), including fouls
- At completion of competition, measure to the check mark (in Fine) and compare to the distance measured prior to commencement of competition. Store the EDM measurement and record the distance and point number.

- Complete Manual Record Sheet and compare with First recorder, Sign At major Meets a more frequent crosscheck should be undertaken.
- At completion of competition, close instrument down, remove battery and place on charge, pack prism and instrument in box and remove to storage NB if instrument is moist/wet do not leave in its case. Remove the instrument, wipe down and stand in an airy place at least overnight.

Where reference to Fine mode is made it relates to measurement to mm (3 decimal places of a metre)

See attached detailed comments/explanation of the above procedures.

Detailed Comments relating to Operational Protocols

• Set up In safe position

• Set up needs to commence at least 30 minutes prior to the start of athlete arrival time and be completed before the scheduled athlete warm up commencement time.

• Level up and turn on

- The EDM should be set up in a position that is safe and allows for a direct line of sight to the circle centre and both points of the sector where it intersects with the rim for shot, hammer or discus. For Javelin, an unobstructed line of sight of the 8m radius centre point and both sides of the throwing arc are required. The EDM should be set up on grass and not on any part of a synthetic surface and the legs oriented so that all throws can be sighted without the need to straddle the legs.
- How Do I Set Up The EDM?
- Extend the legs and tighten the screws enough to ensure the legs don't slip, but not overly tight. Set up at a suitable height, remembering that you will be using the gun sight on the top of the telescope. The tripod legs should be sufficiently wide enough to ensure that the EDM is stable. Orientate the tripod legs so that you can stand between two legs to measure most of the throws. Push the legs firmly into the grass to ensure that the instrument is stable and unlikely to go off level during competition. Adjust the legs so that the top plate is close to level.
- While holding the EDM by the top handle, fasten the clamping screw to attach the EDM to the legs. Ensure it is securely attached by gently lifting it by the handle. Use the bullseye bubble on the EDM to adjust the 3 adjusting knobs so that the unit is horizontal.
- Insert the battery and press the 'ON' button. Press Shift & the button with the level icon (beside the Code key). This will display the electronic bubble on the screen. Level the EDM using the foot screws. Adjust two foot screws at the same time, moving in

opposite directions. (The bubble will move in the same direction as your left thumb). Rotate the EDM 90° and adjust with the third foot screw only. Repeat this procedure until the bubble is in the centre of the target.



• Select Program eg: Throws

0

- Ensure all Settings are correct
 - What Settings Do I Have To Check Before I Can Set Up For An Event?
 - Check that the Log file is 'ON' by pressing **Shift F2** CONFIG. If it is not on, press the key to turn it on then press the **CONT** key. The log file cannot be turned on once an event has begun you need to be at the throws menu to access this function.
 - Check that the **Log File has sufficient space**. From the Main Menu press **F4** DATA key. Press the ESC key to exit back to the main menu.
 - Check Reflector / Prism type. It is important that the correct prism type is set in the program. The reflector used with this EDM is a Leica Mini-prism with a 17.5mm additive constant. Any other prism type (with a different additive constant) will measure the thrown distance incorrectly. To check the reflector / prism type press the F4 TARGT key from the Throws Event Measurement Screen or Main Menu). Press F1 PRISM to select the correct type.
 - Check that ATR (Automatic Target Recognition) is ON. If on, the ATR icon is shown on the right side of the Screen (a circular shape with a tick in it, as seen in photo above). If the ATR icon is not present press FNC key then F1 (ATR on or off).
- Select Event eg: Javelin

o How Do I Select The Correct Event?

- When you first turn on the EDM it should automatically start at the main menu. If it does not, press the **Prog** key. If it is already in an event press the ESC key to return to the main menu.
- From the main menu select **3** Throwing Events. (Either by pressing "3" or using down arrow)
- Select the required event:
- o 1. Discus
- o 2. Shot Put
- o 3. Hammer
- o 4. Javelin
- \circ 5. End of Throwing Events



- Physically locate circle centre (establish Baseline)
- How Do I Identify The Centre Of The Circle?
- (Refer to Diagram 1 below). The simplest way to manually determine the centre of the throwing circle is to scribe two arcs of radius (R) with a steel tape from the edge of the rim on the inside of the sector line. (Points 1 & 2 in the diagram). For Shot Put and Hammer, the radius (R) scribed should be 1.0675m, Discus 1.25m and Javelin 8.00m.
- For precise measurement, it is good practice to hold the tape at the 1m mark (i.e. not the end of the tape) and scribe the arcs from this point. The point where these two arcs intersect is an approximation of the centre (Point **C** in the diagram).
- Mark this point and check again from points 1 & 2. Check the distance from the centre (C) through the centre of the sector to the rim / throwing arc (Point B) this distance should be very close to 1.0675 (SP & HT), 1.25 (DT) or 8.00m (JT) (IAAF Rules allow for a +/- 5mm variation in the throwing circle diameter i.e; radius +/- 2.5mm).
- Take measurement to circle centre DIST (F2)

- How Do I Set the Centre Of The Circle In The EDM?
- (Refer to Diagram 1 below). Once the EDM has been set up, turned on, event chosen, and the centre has been marked, place the mini prism at the marked centre (C) of the circle and press the F2 DIST key then press the CONT (under F5) key. Once this is done the EDM is essentially ready to measure distances relative to that centre point.
- **Note**: Two methods are available in the software for determining the Centre Point. The manual method described above is the preferred method for all competitions.



- Move to Distance Measure Screen Press Cont (F5)
 - o The screen should now display as Distance Measure
 - Check Rim measurements

In fine mode (Shift F4), check the measure (F2) to edge of circle and store (F3). The distance should be close to 0.000m

• The next step is critical to undertake to ensure that the EDM has been set up correctly. (See Note (i))

Place the reflector at the intersection of one of the sector lines and the rim of the circle (1). (See Note (ii) below.) Set the EDM to show the result in millimetres (mm) by pressing the **Shift** the **F4** keys, then press **F2** DIST. The result should be 0.000m. Press the **F3** STORE key. Repeat this on the other intersection point of the sector line and rim (2). Again the measurement should be 0.000m. Repeat this again on the edge of the rim through the centre of the sector (3), again the result should be 0.000m. Remember to press the **F3** STORE key after each measurement.

- If these check distances are not 0.000m (See Note (ii)) the magnitude and sign of the error need to be considered. It is preferable that the distance shown is negative and less than a few millimetres (this ensures that any distance measured is not greater than that actually thrown).
- If these checks are unsatisfactory, then it is necessary to exit out of the event and begin the set up process again. That is, manually measure and mark the centre, restart the event from the throws menu, set the centre point and make check measurements.
 - Note (i) By undertaking these measures a number of potential errors will be detected:
 - a) That the centre is not offset
 - b) That truncation is being correctly applied
 - c) Potentially, the correct event has been selected/circle is correctly configured
 - Note (ii) The state of the rim can be such that the actual measurement will vary. Selection of the spot on the rim and placement of the prism can have an effect on this measurement.

It may be helpful for the EDM Operator to carry a small device that can be placed against and over the rim so that the prism point can be correctly positioned over the inside edge of the rim. (See Diagram 2).





- Establish Check Measure. (Place a marker in sector & measure with steel tape and EDM (in fine mode) before & after event. Record the measurement and point number on the recording sheet.)
 - The EDM Is Set Up. What Do I Do Now?
 - Before the event can begin you need to check that the EDM is measuring correctly. The simplest way to check this is to place a suitable marker adjacent to the sector line at a distance similar to that expected to be thrown in the competition. Measure this distance with a steel tape to the nearest millimetre and measure the same point with the EDM (in fine mode). Write down both distances and store the EDM distance. Both of these distances should be comparable. The check mark should be left in for the duration of competition and at completion of the competition, a check measurement with EDM (in fine mode) and tape should be made to this same mark to ensure that EDM measurements have been consistent. Again, store and record the EDM distance. Note: The Referee should be present when the Steel tape measurement is made and should sign against the record of start and finish check measure details on the Recording Sheet.
 - You are now ready to start measuring athlete's throws. Ensure that the Official marking each throw with the reflector is clear on how you will signal that the measurement has been taken and stored. (The usual signal is to hold your arm vertically to attract the prism holder's attention then to wave your arm between your head and shoulder two or three times).

Ensure that the Official with the reflector understands that all throws will be measured, regardless of them being a foul or not.

- Check that Log file is On and accepting stored measures
 - The easiest way to ensure that the measures are in fact stored and available is to view the log file. Shift f2 (Log) and then examine the log file to view the last distance stored.

• Establish that correct truncation (RoundDown) is occurring.

 Any measurement in fine will display the distance in millimetres and should revert to coarse which should then display the distance in centimetres (two decimal places) having rounded down (truncated) to the next whole centimetre.

• Measure each attempt (F2) and store (F3) including fouls.

- Why Should I Store Each Measurement?
- The ability to save each measurement (including fouls) helps in resolving recording errors or protests. It is an electronic record of the actual measurement so it is free of any misreading of the display or error in writing the distance on the recording sheet. By noting down the stored point number of the first and last throw of the event, it is simple to compare EDM (logged) distances with those on the recording sheet.
- At completion of event, measure to the check mark (in Fine Mode) and compare to the distance measured prior to commencement of competition. Store the EDM measurement and record the distance

(fine) and point number.

 Complete Manual Record Sheet and compare with First recorder, Sign

At major Meets a more frequent crosscheck should be undertaken.

• At completion of competition, close instrument down, remove battery and place on charge, pack prism and instrument in box and remove to storage

NB if instrument is moist/wet do not leave in its case. Remove the instrument, wipe down and stand in an airy place at least overnight.

Additional Advisory Comments

• I Am Spiking / Marking the Throw With The Reflector. What Do I Do?

The usual IAAF rules apply to marking the position of the throw with the following additional points to make certain that each measurement is recorded accurately.

- Ensure that the mini prism is located at the bottom of the pole, this ensures that any error in the pole not being precisely level is minimised.
- Stand with your feet spread apart at a comfortable distance this helps with balance and keeping the pole steady.
- Always go to the "mark" (position where implement first touches the ground on landing) and remain there until waved off by EDM operator. This is particularly important where the Javelin may be called flat. (In this case the position is where the front of the head of the Javelin was when the Javelin first impacted with the ground).
- The spike should rest on the ground it should not be pushed into the ground.
- Ensure that the bubble on the pole is centred while the measurement is being taken.
- Ensure that the reflector is not obscured by long grass.
- Ensure that the reflector is facing towards the EDM and not rotated up or down.
- Ensure that the reflector is being held steady while the measurement is being taken, excessive movement of the reflector will require the measurement to be taken again.
- Keep a look out for the signal from the EDM operator signifying that the measurement has been taken and recorded. **Do NOT leave the "mark"** until the EDM operator has given the signal. If the signal has not been given and another athlete has been called, immediately advise the EDM operator/Chief, mark the position, do not move.

• What Do I Do When Competition Commences?

- Measure and store each athlete's attempts by pressing the F2 DIST key, announce the distance to the recorder, record the distance on the second recorder's sheet and press the F3 STORE key. THEN
- Signal to the Official with the reflector that the measurement has been made, recorded and stored. Note: if you wave the prism off the mark before you have done all the above you risk losing the mark should there be a protest or need to remeasure.
- Continue this procedure until completion of competition. Record the last stored point number on the recording sheet. Measure, compare and store the distance to the check mark placed prior to the beginning of competition.
- Press the ESC key you will be prompted with a warning message advising that you will lose the current setup are you sure? Yes / No. If competition is complete press
 Yes key. Press 5 End Throwing Events. This will then exit back to the Main Menu.

• Is The Distance Shown On The Screen The Thrown Distance?

After each measurement, the distance shown on the screen is the correct thrown distance. (The radius of the circle has already been subtracted by the software). The software also rounds down the distance to the nearest lower centimetre in accordance with IAAF Rules.

Care needs to be taken that the measurement has in fact been taken. By always storing measures the presence of a message to the effect that the previous distance has been sent will alert you to the possibility that the measure displayed is not the current measure.

• The EDM Isn't Measuring A Distance – What Now?

There can be a number of things that can cause this to happen:

- Incorrect pointing of the EDM
- The reflector pointing up or down, or not facing the EDM
- Long grass in front of the reflector or prism spike has been pushed into the ground
- Too much movement of the reflector during measurement
- The ATR setting is not on
- Flat battery
- Shimmer/false reflection
- What Do I Do If Things Go Wrong?

Most importantly, don't panic. Check onto your check mark, & if things don't seem quite right, the safest option is to spike and manually measure each athlete's attempt with a tape measure. This guide is intended to help users (hopefully) eliminate common errors in set up or use, and help them identify if things aren't right (by carrying out manual check measurements and confirming with the EDM).

• What Should I Do If The Battery Goes Flat?

Preferably this should not happen. Before the event commences, check the battery level. Each EDM has a spare battery, as each battery goes flat, it should be rotated with the spare and charged. It is imperative that flat batteries are recharged ASAP. If the battery goes flat during

competition, immediately advise the Chief of the situation. The options are to replace the battery (if a charged one is available) and reset (centre, & rim checks) – this will not lose any data but will disrupt the competition, or spike and manually measure all subsequent throws.

• What Should I Do If The EDM Goes Off Level?

The primary reasons for the EDM to go off level is if the legs are not pushed sufficiently into the ground when set up, the tripod leg screws were not tightened adequately or the tripod is bumped during use. Accordingly, sufficient care should be exercised in setting up and using the EDM to reduce the chance of this occurring. If the EDM goes off level, advise the Chief and either re-set up or spike & manually measure.

• How Do I Recall A Measurement Recorded On The Memory Card?

To recall a measurement from the Log File, press **Shift F2** LOG. Press **F4** to scroll Right or **F3** to scroll left. (Alternatively, the arrow keys on the keypad may be used.) The screen should show <eof> (end of file) at the bottom left hand corner. The measurement shown should be the last measurement recorded. The file can be scrolled through by pressing the **PGUP** (**F2**) **OR PGDN** (**F5**) keys. The point number and thrown distance (**D**) is displayed on the screen – having a record of the start and end point number assists in finding the required information.

Press the **ESC** key to return to Throws / Measure Screen.

• What Items Are Useful To Have With Me?

- Golf tee or similar item to use as a check marker
- Texta to mark circle centre
- Clipboard & pen as the EDM operator is also the second recorder.
- Small device to place against inside and over top of rim for accurate placing of prism Ie; A rim locator block (see Diagram 2 above)

• Important Points to Remember:

- Set up the EDM in a safe location where you can see the circle centre, circle rim & landing area without obstruction.
- Check the battery has sufficient charge.
- Ensure there is a spare charged battery.
- Check the memory card has sufficient space available to save the results.
- Check that the log file is 'on', ATR is on, and correct prism is selected
- Take a check measurement in the landing area in fine mode and store it. Record the distance and stored point number & check with steel tape.
- Remember to save each measurement to the memory card (F3 STORE).
- Make sure that you read the digits on the display correctly (0,6 & 8 can be easily confused in difficult light)

- Take a check measurement at the conclusion of the event & compare to the initial check measurement.
- If a battery goes flat or almost flat, ensure that it is charged at the conclusion of the event.
- Prior to the event, ensure that the Official holding the reflector is aware of how you will signal that you have successfully measured and recorded the athlete's trial. Also advise that each attempt should be measured even if it is recorded as a foul throw.
- An EDM is expensive & relatively fragile. Care should be taken to avoid any knocks or bumps, as this can render the instrument unreliable and in need of calibration and certification to ensure accuracy of measurements.

• What About Horizontal Jumps?

The EDM can be used to measure horizontal jumps. The setup for this event is slightly different as you need to identify either side of the leading edge of the take-off board. Take a measurement at one side of the runway where it intersects with the take-off board– press **F2** DIST then **F4** CONT. Take a measurement on the other side of the runway where it intersects with the take-off board– press **F2** DIST then **F4** CONT. Place a marker out of the pit at the back of it, to use as a check before & after competition. Check with a steel tape.

Move the reflector up one segment on the pole so the prism can be seen when the pole is pushed into the sand.

Caution: EDM can only be used for triple jump if all athletes are jumping from the same takeoff board.

Acknowledgements

The original of this document was prepared by Rob Jones ANSW with acknowledgement to documentation prepared by Graham Dwight ANSW and initially directed towards the operation of the Lieca series 1100 Total Station instruments used by ANSW. Additions and inclusions also made by Neil Hinton ANSW OAP, Elaine Bowman ANSW & Warren Bowman ANSW.

Users of model Series 1200 and above may find the interfaces vary but the principles remain the same.

The current modifications to the document have been made principally by relocating text and the addition of some further explanatory text and diagrams.