Quick Guide for TX-8 / TX-20 with TL-400 (20x20m)

FOR 60Hz REGIONS

This Quick Guide is used to configure an ABEM WalkTEM 2 (plus TX-8 or TX-20) with the correct lay-out and measurement parameters for successful soundings with a TL-400 transmitter loop (20 x 20 m) as well as the RC-5 receiver coil. For more detailed and in-depth instructions plus other important information please consult *ABEM WalkTEM 2 User Manual*.

CENTRE LOOP LAYOUT PROCEDURE (TL-400 transmitter loop & RC-5 receiver coil)

A. Lay out the TL-400 transmitter loop

– to ensure current flow and measurements are all positive, everything will be laid out in the same direction: clockwise from bottom left;
– a compass, optical square or tapes can be used to help make the loop square - it does not need to be a perfect square to still perform acceptably;
– leave loose end of the loop near TX unit and walk around with cable drum;
– use the black markers on the loop as a guide for the corner positions.
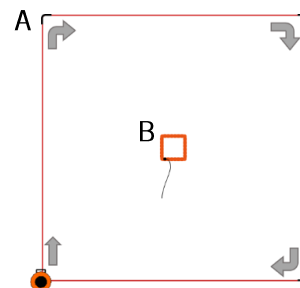
B. Lay out RC-5 receiver coil

– the RC-5 is relatively simple to locate centrally;
– either use people on the corners of the transmitter loop to align someone in the middle **OR** (easier) walk from the middle of one side, toward the middle of the other side, measuring the distances as you walk (see "Layout Overview" on last page for details).
– RC-5 is the correct way up when black connector box is above the seam (see image,right)
– ensure that the RC lead-in cable is not coiled and crosses other loops at close to 90°

C. Connect TX loop & RX coil to WalkTEM TX & RX units

– A 1.5 Ω 'choke' resistor is used to limit current flow in this smallest TX loop;
– a 3.0 m lead-in cable connects the TL-400 to the TX unit via the 'choke' resistor;
– at the TX loop end of the the lead-in cable, the black connector attaches to the cable drum, and the red connector attaches to the loose end of the TX loop;
– at the RX end of the receiver loop
– the RC-5 connects to Input A on the RX.
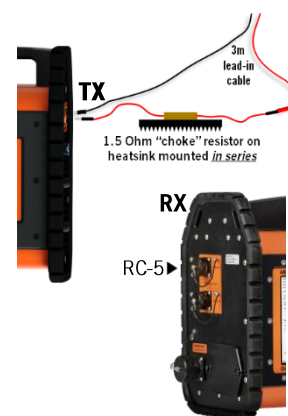
D. Connect the WalkTEM TX & RX units together

– use the 1.5m TX sync cable to connect the WalkTEM RX and TX units together.
– although it is advisable to connect this cable before powering up the instruments, the units will sync at any time the connection is made.

E. Connect external power to the TX (and RX, if required)

– the minimum requirement for the TX-8 / TX-20 unit is a single 12V battery an additional 6V battery can be connected in series for 18V on the TX-20;
– anything above 18V will not be appropriate on the TL-400.
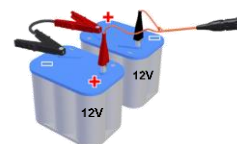
F. RC-200 antenna

– the RC-200 is not necessary, or advisable, to use with the 20x20 m transmitter loop;
– the RC-200 would be too close to the transmitter loop and cause interference.

USER INTERFACE AND MEASUREMENT CONFIGURATION

Configuration
Tab for setting up measurement parameters. **1**

Measurement
Tab for initiating and monitoring data collection. **2**

Post Processing
Tab for file management and inversion. **3**

Administration
Tab for instrument settings and error logging. **4**

Project
Select existing project to add in additional stations or create a new one. **5**

Script
Choose your preferred measurement script with this drop-down and how many repetitions on the right; total time is shown on the right and details of the script are summarised below. **6**

Transmitter Loop
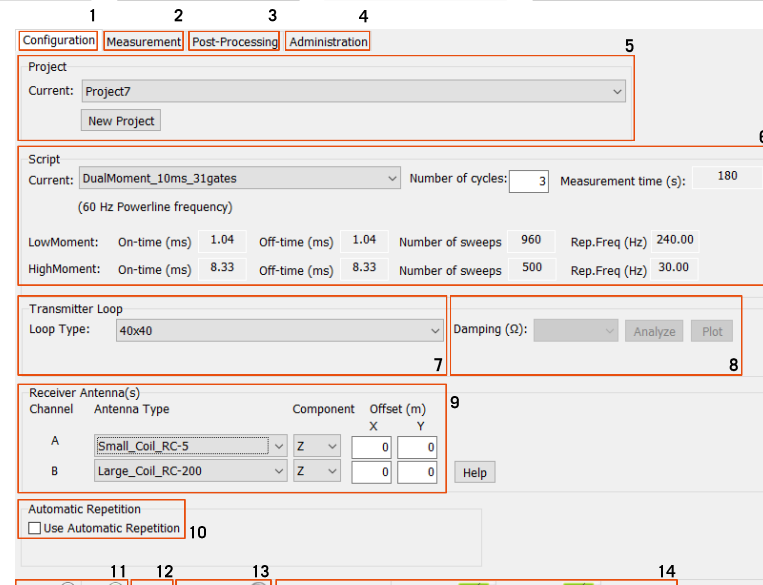Select the loop you will use for measurement. The choice is limited on an RX Standard. **7**

Receiver Antenna(s)
Select which coils and input you will use; RC-5 on A is only option on an RX Standard. **9**

Automatic Repetition
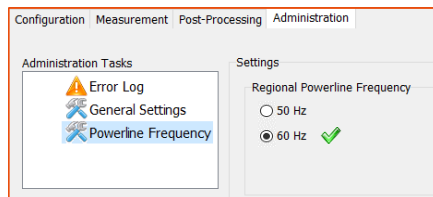Set-up a schedule for repeated measurements. **10**

Transmitter/Receiver Status
Yellow shows TX is initialising, green means everything is okay with the TX / RX and ready to measure. During measurement, icons change to show system is active. **11**

Log
Notifies of issues recorded on the Administration tab. **12**

Damping
Select one of the internal damping resistors from the drop-down or choose to use a custom external resistor.

Selecting "Analyze" provides instructions on performing a Rogowski Coil test to assess which damping resistor to use. This feature is included on the RX Advanced and an optional extra on the RX Standard.

"Plot" will show the results of the Rogowski Coil tests so you can choose the most suitable damping resistor. **8**

GPS Status
Shows number of satellites in use for positioning. **13**

| Configuration | Measurement | Post-Processing | Administration | 5 |

Project
Current: Project7
New Project   **6**

Script
Current: DualMoment_10ms_31gates   Number of cycles: 3   Measurement time (s): 180
(60 Hz Powerline frequency)

LowMoment: On-time (ms) 1.04   Off-time (ms) 1.04   Number of sweeps 960   Rep.Freq (Hz) 240.00
HighMoment: On-time (ms) 8.33   Off-time (ms) 8.33   Number of sweeps 500   Rep.Freq (Hz) 30.00

Transmitter Loop
Loop Type: 40x40   **7**   Damping (Ω):   Analyze   Plot   **8**

Receiver Antenna(s) **9**
| Channel | Antenna Type | Component | Offset (m) X | Y |
| A | Small_Coil_RC-5 | Z | 0 | 0 |
| B | Large_Coil_RC-200 | Z | 0 | 0 | Help

Automatic Repetition
☐ Use Automatic Repetition   **10**

11 12   13   14
TX: ⚫ RX: 🟢 Log: ⚫ GPS: Sats 0 Ext Power: 16.3 V Bat 1: 92 % Bat 2: 92 % TX-20: 12.8 V

Battery Status
"Ext Power" shows if the office power supply is attached or the voltage of externally connected 12V batteries (when connected) – any external battery will take over from the "Bat 1" internal battery.

"Bat 1 / Bat 2" shows the voltage of the internal battery pair. These run the computer, screen and receiver if there is no external power source. To do a 'hot swap', keep one battery in place whilst changing the other.

"TX-8 / TX-20 / TX-60" indicates voltage on the TX unit (when attached). **14**

HARDWARE AND SCRIPT SETUP

| Configuration | Measurement | Post-Processing | Administration | **A**

Administration Tasks
⚠ Error Log
📋 General Settings
📋 Powerline Frequency

Settings
Regional Powerline Frequency
○ 50 Hz
◉ 60 Hz ✓

| Configuration | Measurement | Post-Processing | Administration | **B**

Project   **C**
Current: Project7
New Project

Script
Current: DualMoment_10ms_31gates   Number of cycles: 3   Measurement time (s): 180
(60 Hz Powerline frequency)

LowMoment: On-time (ms) 1.04   Off-time (ms) 1.04   Number of sweeps 960   Rep.Freq (Hz) 240.00
HighMoment: On-time (ms) 8.33   Off-time (ms) 8.33   Number of sweeps 500   Rep.Freq (Hz) 30.00

Transmitter Loop   **D**
Loop Type: Damping (Ω):   Analyze   Plot

Receiver Antenna(s)   **E**
| Channel | Antenna Type | Component | Offset (m) X | Y |
| A | Small_Coil_RC-5 | Z | 0 | 0 |
| B | Large_Coil_RC-200 | Z | 0 | 0 | Help

A. Choose powerline frequency
– navigate to the "Administration" tab (*PgUp / PgDn*) and choose the correct powerline frequency for the country you are surveying in;
– this ensures that only compatible scripts are shown, i.e. those designed to minimise electricity grid transmission noise.

B. Select or create a project
– return to the "Configuration" tab, and select an existing project or create a new project with "New Project".

C. Choose a suitable measurement script
– the table overleaf provides an overview of available scripts. In hot weather, a script with a lower duty cycle can reduce heat build-up in the transmitter. "Number of cycles" dictates how many times the script will be repeated which will increase survey times; 3 - 5 is typical.

D. Choose the transmitter loop
– select from the drop-down list which loop you have connected and undertake a Rogowski Coil test (if available); see the separate "ABEM WalkTEM 2 Rogowski Coil Tests" guidance document for more information.

E. Identify the receiver antenna connections
– map receiver coil (RC-5 only) to correct input channel; there is an option for "none" when only one is connected.
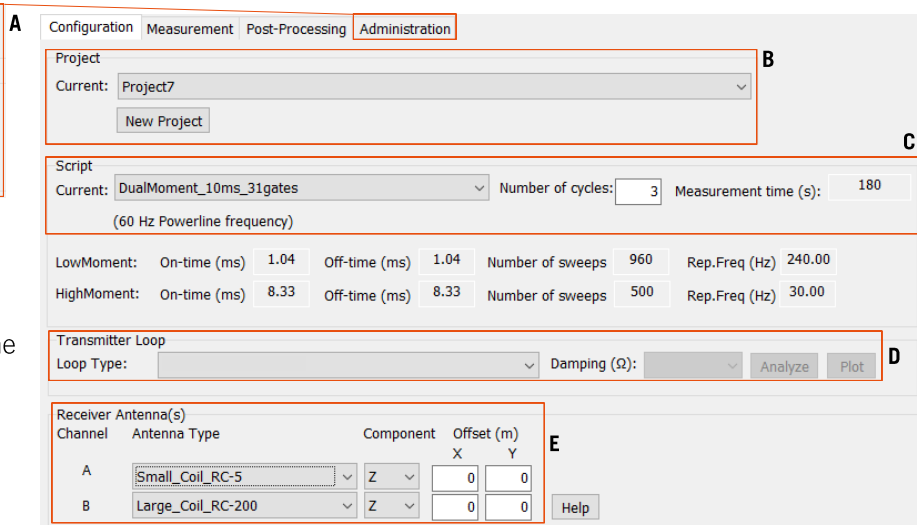
SCRIPT NAME	BRIEF DESCRIPTION	MOMENT SUMMARY	DUTY CYCLE	CYCLE TIME
DualMoment_Testscript	Fast measuring script, useful for quick tests of equipment, set-up and the survey location.	High: 50 stacks Low: 160 stacks Noise: 50 stacks	50%	4s
HighMoment_Testscript	Fast script with only High and Noise moment. Useful for quick tests of equipment, set-up and the survey location.	High: 100 stacks Noise: 50 stacks	50%	5s
DualMoment_10ms_31gates	Measuring script for shallow to deep data collection, divided into 31 gates with slightly longer first gate.	Noise: 250 stacks High: 1250 stacks Low: 2400 stacks	50%	60s
DualMoment_10ms_39gates	Measuring script for shallow to deep data collection, divided into 39 gates, shorter gating start.	Noise: 250 stacks High: 1250 stacks Low: 2400 stacks	50%	60s
DualMoment_25ms_45gates	45 gate measuring script with a longer measuring time for medium to deep data collection. Useful in hot conditions to lessen heating of transmitter unit.	Noise: 605 stacks High: 1625 stacks Low: 6240 stacks	25%	145s
High Moment_25ms_45gates	Measuring script for medium to deep data collection with no low moment pulses.	Noise: 125 stacks High: 1625 stacks	25%	117s
HighMoment_Noise_10_90ms_51gates	Measuring script for deepest data collection, divided into 51 gates, with now low moment.	Noise: 125 stacks High: 500 stacks	10%	125s

MEASUREMENTS

A. Initiate measurements

– switch to the "measurement" tab, review settings and press "Start" to begin running the script.
– a progress bar will appear and provide an estimation of time remaining.
– the instrument provides both audio (for which the supplied Bluetooth speaker is required) and visual notifications when the measurement is complete.

B. View incoming data

– use the tab key (⇆) to select the first tab above the data plot on the right-hand side of the screen. The left and right arrow will now switch between the different real-time measurement views.
– "ChA-All" refreshes each time a new high moment, low moment or noise measurement is made. "ChB-All" will not be visible as the RC-200 is not in use.
– the remaining tabs show only one of the measurement phases (high moment, low moment or noise) for Channel A (there is no channel B without the RC-200). These refresh each time the measurement phase is completed.
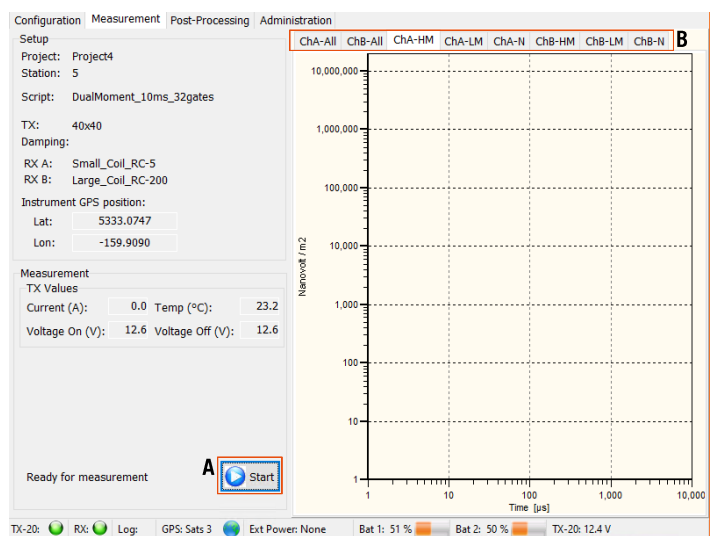

FILE MANAGEMENT

A. Project / Station list

– use the Down Arrow to select a project.
– the Right Arrow will expand the 'tree' to show Stations (soundings) measured within a project.
– When a station is selected, a summary of the main measurement parameters are shown on the right side.
– an "X" next to a Station indicates that the measurement was not completed.

B. File management options

– the Menu button (▤) will give a series of file management options for the Project or the Station depending upon which is highlighted.
– most of the tasks have a shortcut button associated with them.
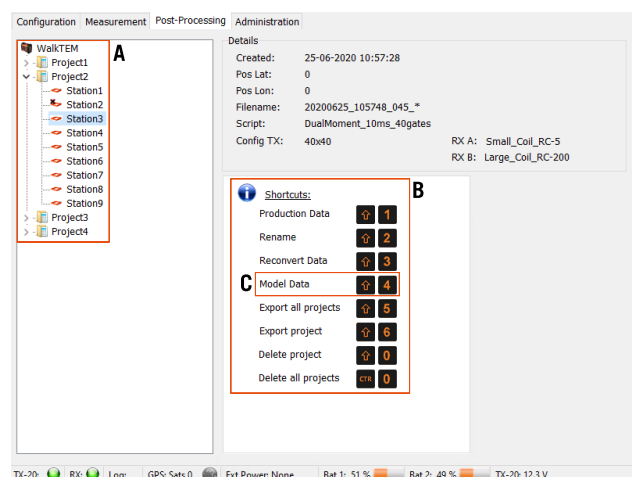
C. Initiating the onboard SPIA TEM inversion software

– inversion of Station data is undertaken in a special automated version of SPIA TEM. Use the menu button or shortcut key combination to select "Model Data" to launch SPIA TEM.

CREATING A RESITIVITY MODEL

A. Review data
- after initiating SPIA TEM (see above) the initial view shows the stacked sounding curves.
- the inversion software automatically discards poor quality readings: coloured data will be carried through for inversion, grey ones will be discarded.
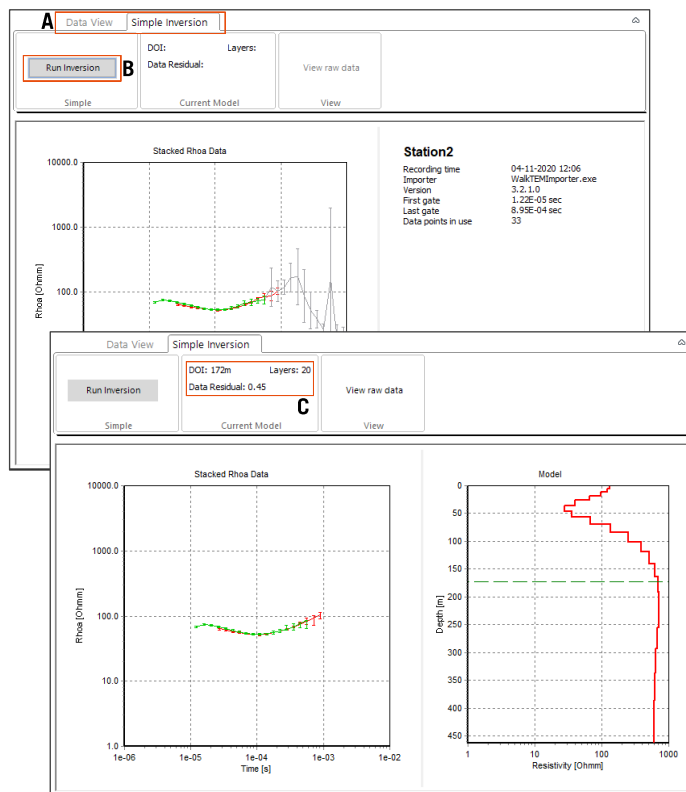- you can look at alternative data displays in the "Data View" tab.

B. Run inversion
- select "Run Inversion" to generate a 1D resistivity model from the active data.
- if too few data points remain active after the automated filtering, inversion will not be possible.

C. Review model
- when the inversion completes the model will be displayed as a smooth (many layer) model.
- Look at the residual for an indication of the model fit, i.e. how well it matches the raw data; values below 1 would indicate a reasonable fit at this stage.

D. Return to WalkTEM 2 UI
- To exit the inversion software and return to WalkTEM UI, press the "Esc" key.

KEYPAD FUNCTIONS

Numerical keyboard	0 ... 9	For entering values into settings boxes and shortcuts in the Post-Processing tab
Backspace	⌫	Deletes the character on the left of the cursor
Navigation arrows	↑ ↓ ← →	Moves the cursor in desired direction. Primarily used in drop-down menus
Tab	⇤⇥	Jumps to next configuration item or command; jumps backwards in combination with Shift key
Shift key	⇧	Similar to a Shift key on a standard keyboard and used for shortcuts on Post-Processing tab
Ctrl and Alt	CTR ALT	Works as Control and Alt keys on a standard keyboard
On/Off button	⏻	A short press turns the instrument on; within WalkTEM UI, another short press opens a dialog with an option to shutdown the instrument.

Esc	ESC	Works as a regular Escape key on a standard keyboard
Start/Stop measuring	▶❚❚	Used as a quick command to start or stop a measuring cycle on the Measurement tab
Menu	▤	Displays a pop-up menu in WalkTEM UI; used in combination with Shift key, the Windows menu appears
+/- sign	+	For entering a plus or minus sign; hold Shift key to enter + sign
Page Up/Down	PgUp PgDn	Used to move between different tabs in the WalkTEM user interface (Configuration, Measurement, Post-Processing, Administration)
Enter	ENT	Acts like the Enter key on a standard keyboard; used to execute commands
Space	␣	Acts like the Space bar on a standard keyboard; used to tick check boxes

LAYOUT OVERVIEW

A. Measurements for setting out loops
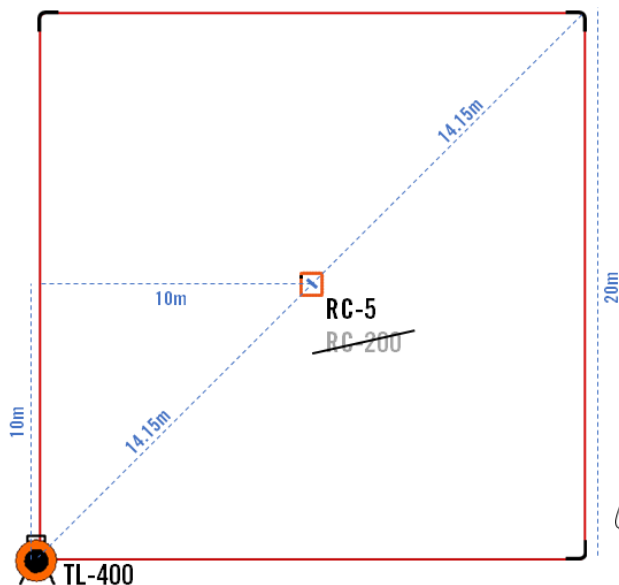
B. Generalized centre-loop layout

NB: FIGURES NOT TO SCALE