95-0015 User Guide- TD-GC-Lonestar: How to run a Cold Trap Blank

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1 Introduction

The TD-GC-Lonestar system sold by Owlstone Medical Ltd gives the capability to analyse thermal desorption tubes using FAIMS on the Lonestar equipment. The Gas Chromatograph (GC) system used is the Thermo Trace 1310 and the thermal desorption (TD) used is the Markes UNITY-xr.

Samples are loaded onto the tube oven, which heats the tube and applies a backflush of clean Helium (carrier) gas. The He flow drives the sample towards a focusing cold trap (Markes U-T12ME-2S), which is packed with Tenax and Carbograph. The cold trap splits and recollects the analytes. A second desorption step takes place on the cold trap, in where a backflush of He transports and introduces the re-collected sample into the GC column via a transfer line.

The U-T12ME-2S Cold Trap is usually used with the temperature ranging from 290-320°C, with maximum operating temperature is 335°C that never should be exceeded. The cold trap requires to be blanked periodically, preferably daily, to assess trap saturation and to prevent sample carryover. Sample carryover is due to sample accumulation, which can affect following sample analysis.

This user guide gives guidelines on how to run and evaluate a cold trap blank in the TD-GC-LNS system.

2 Definitions

Abbreviation/Term	Definition
CT	Cold Trap
CTB	Cold Trap Blank
VOC	Volatile Organic Compounds
TD	Thermal Desorption
UNITY-xr	Thermal desorption platform with a sorbent tube oven integrated in where sample tubes can be loaded and desorbed for VOCs injection onto the GC column.
MIC	Markes Instrument Control – TD sequence builder software
GC	Gas Chromatograph. The GC integrated in the TD-GC-LNS system is the Thermo Trace 130 Gas Chromatographer
LNS	Lonestar System – its FAIMS chips enables to detect chemical species in gaseous state based on its characteristic ion mobility speed under an asymmetric electric field.
FAIMS	Field Asymmetric Ion Mobility Spectrometry.
He	Helium, acts as carrier gas in the TD-GC-LNS system
N2	Nitrogen, acts as purge gas in the TD-GC-LNS system

3 Procedure

3.1.1 Ensure that the carrier (He) and purge (N2) gas cylinders are not empty and that the installation has been leak checked. Replace if the cylinder pressure is less than 200PSI. Both gases should be 5.5 grade (i.e. 99.9995%). Check that the gas line toggle valves are opened.

	Cylinder (primary) regulator	GAS01 (secondary) regulator
Carrier gas pressure	50psi	20psi
Purge gas pressure	50-60psi	50psi

Table 1. Gas line pressure settings.

3.1.2 Demonstrate the TD instrument is leak tight by running a leak test on the TD system following the manufacturer supplied user manual.

3.1.3 Ensure the GC oven ramps settings coincide with those used when analysing samples. Adjust if required (see 95-0012 TD-GC-Lonestar How to run a sample tube)

3.1.4 Demonstrate the GC column is blank by running a GC column blank (see 95-0013 TD-GC-Lonestar How to run a column blank). This is essential for later CTB data evaluation.

3.1.5 Ensure the ATLAS pneumatic and heat boxes are on. The LNS flow should be 2800mL/min and the pressure 0.25bar.

3.1.6 Log the data collected on the LNS system. See 95-0012 TD-GC-Lonestar How to run a sample tube)

3.2 Cold Trap Blank sequence on MIC TD software.

3.2.1 Open the MIC. Wait until the instrument status is “Idle” and select the “Sequence” option from the software homepage (Figure 1).

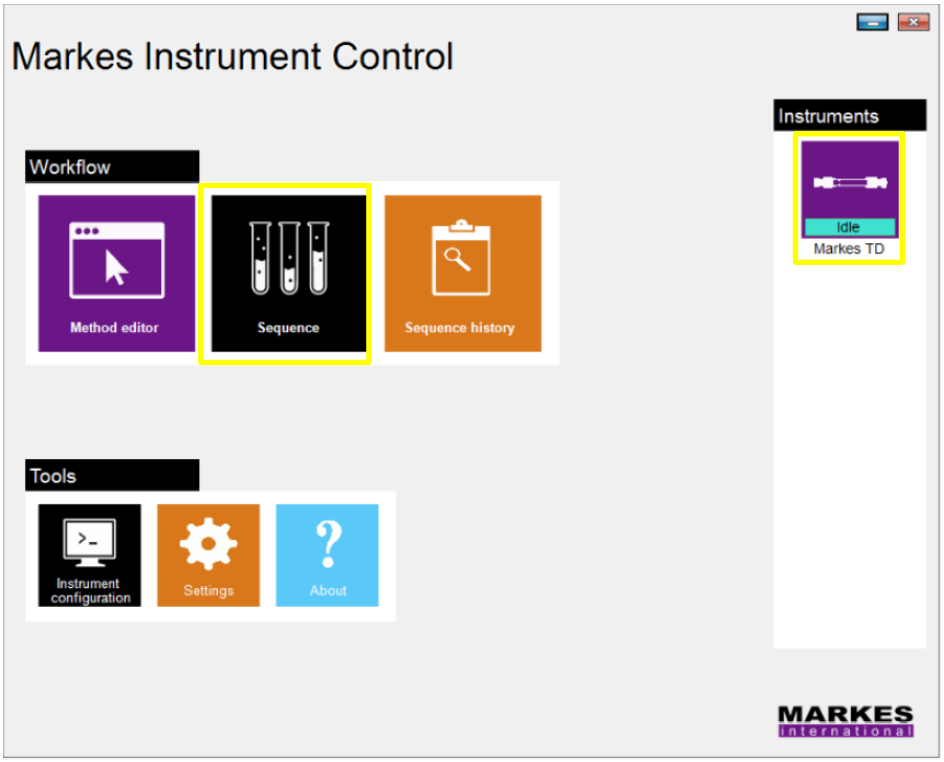

Figure 1. MIC homepage.

3.2.2 The menu screen shown in Figure 2 will be displayed. Click on the “Instruments” tab to open the UNITY-xr schematic diagram and parameters panel. From the “Edit” tab, double-click on the “Method” column. A window listing all the methods in the system will appear. Select the method named “TD – Unity Trap Heat 110C” and press “OK”.

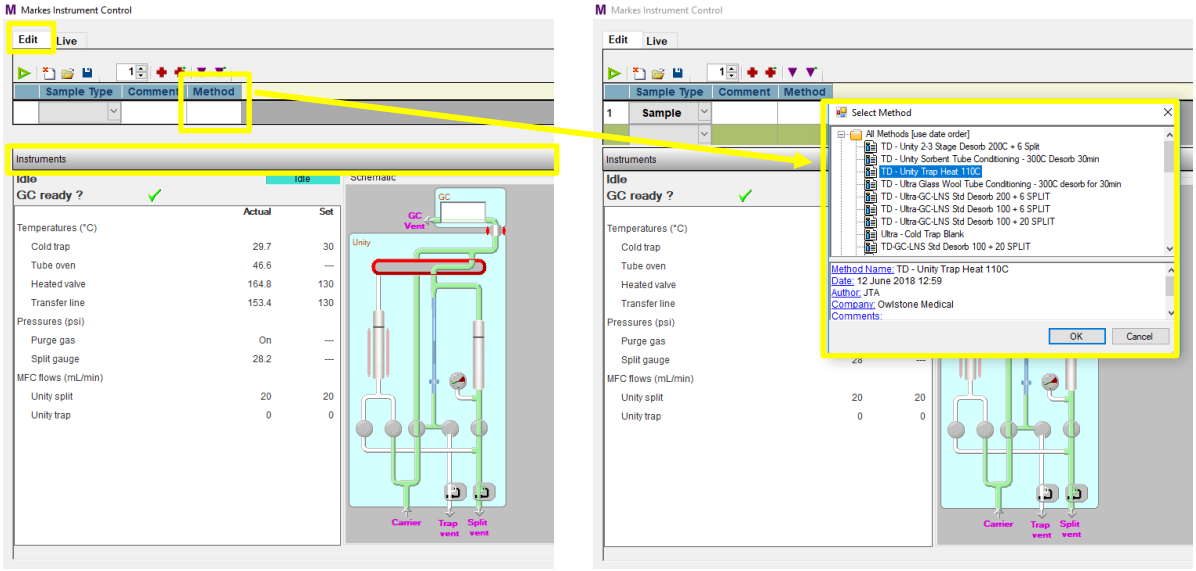

Figure 2. Sequence builder screen.

3.2.3 If the method is not available or cannot be found, it is possible to create it from a template by using the “*Method Editor*” (purple button in Figure 1) and entering the parameters shown in Figure 3

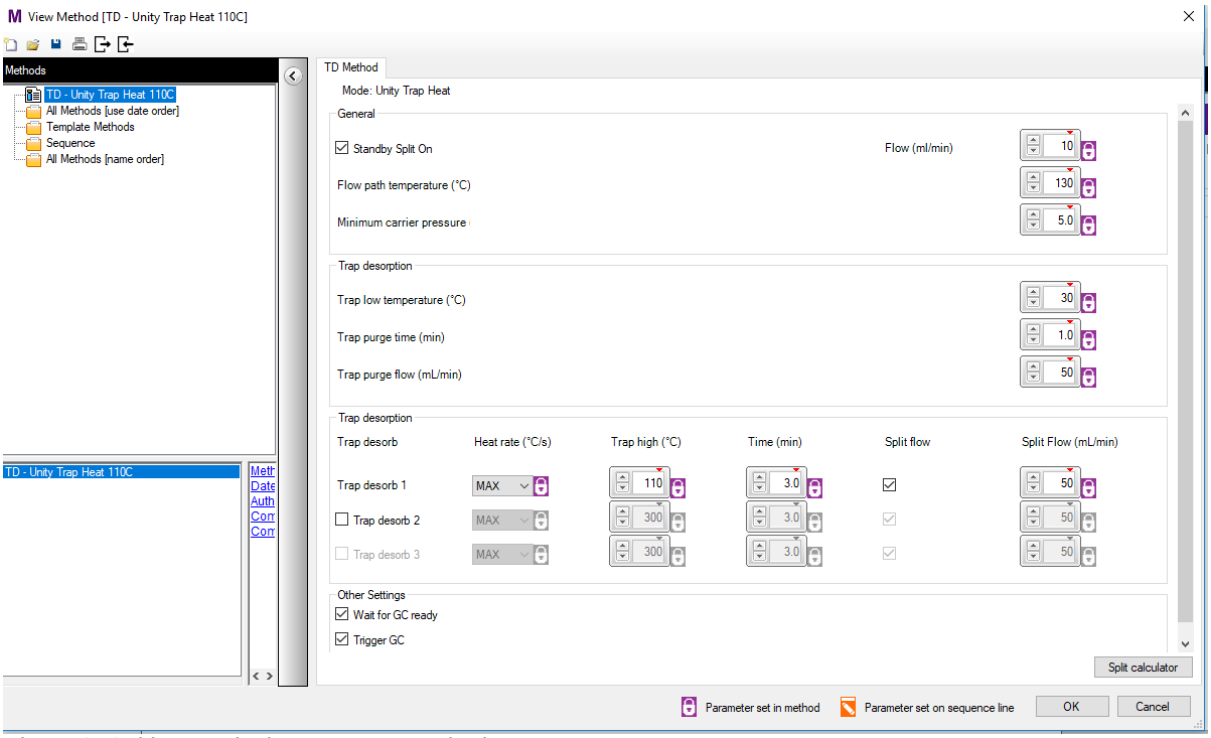

Figure 3. Cold Trap Blank - UNITY-xr method.

3.2.4 The CTB method will be then loaded in the sequence. The instrument must be in “Idle” and the “GC ready?” message must be ticked (Figure 4). Press the green button to start the sequence. A “Run Sequence” window will pop up. Make sure all the options are unticked and press “*OK*”.

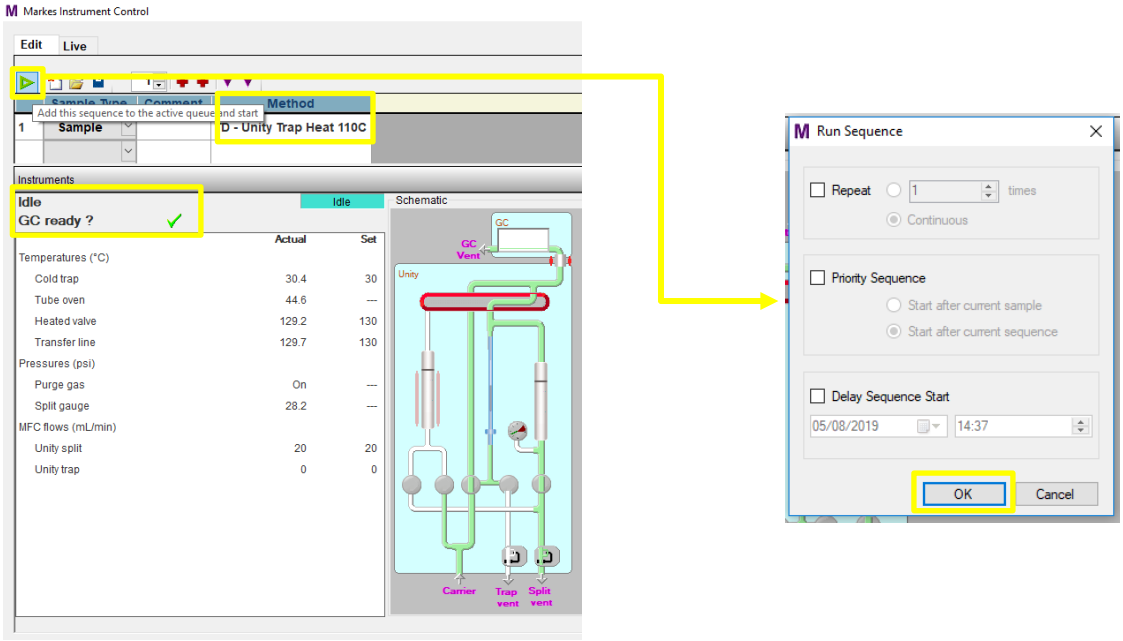

Figure 4. How to begin a TD sequence.

3.2.5 The instrument’s status will change to “Active” and the thermal desorption cycle will begin (Figure 5).

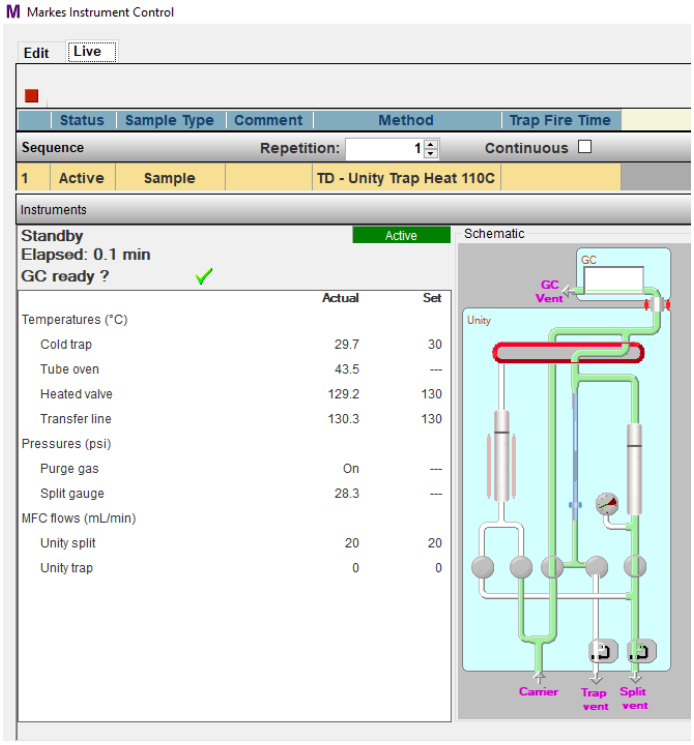

Figure 5. MIC sequence builder menu once the sequence has begun.

3.3 Cold Trap Blank Data Evaluation.

3.3.1 Export the LNS matrix data using the FAIMS Viewer (see 95-0011 TD-GC-Lonestar Data processing with FAIMS Viewer). Any background peaks should be <2pA (Figure 6).

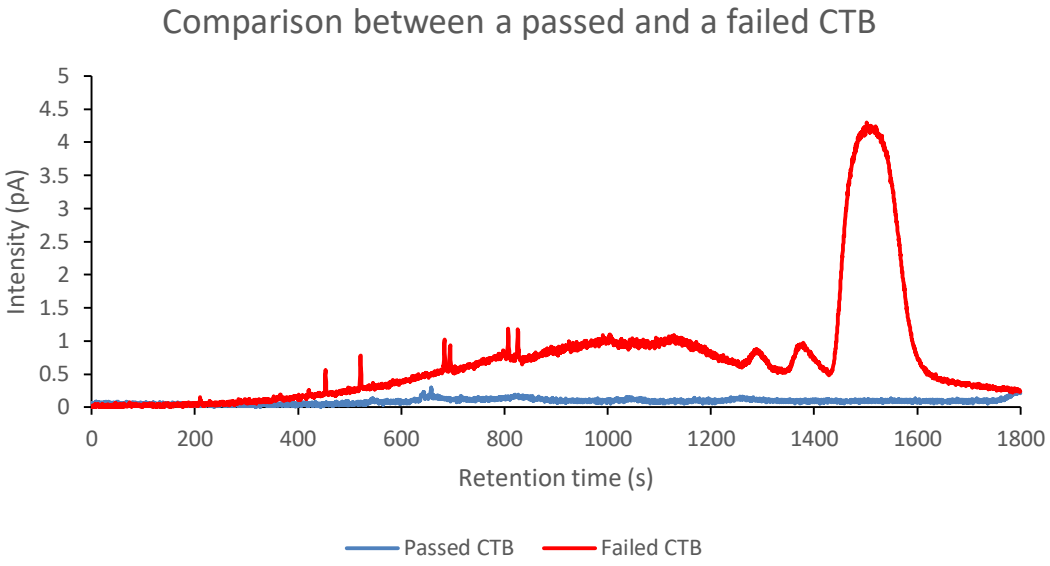

Figure 6. Examples of a passed and failed CTB

3.3.2 If the first CTB fails, repeat it. The CTBs usually require a second repeat to confirm the trap is washing out with each thermal cycle.

3.3.3 If the CTBs have failed repeatedly, follow the troubleshooting diagram provided in the appendix.

3.4 How to Condition a Cold Trap.

3.4.1 Repeat TD-GC-LNS system prechecks specified in section 3.1.1.

3.4.2 Typical conditioning temperature ranges from 290 to 300 °C, with a maximum operating temperature of 335°C. This temperature must not be exceeded. The TD method settings used must be within these temperature limits.

3.4.3 Set and run a sequence using selecting the method “TD-Unity Trap Condition” (Figure 7).

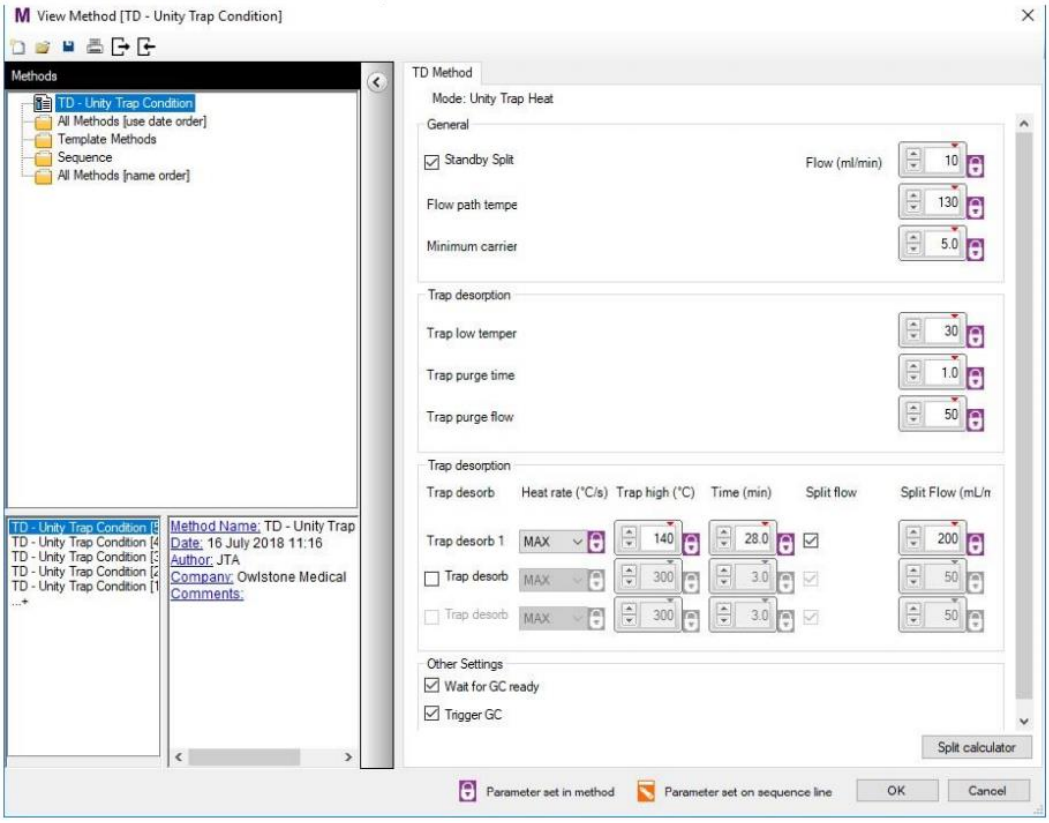

Figure 7. TD method used for CT conditioning.

3.5 How to Replace the Cold Trap.

Follow the manufacturer supplied user manual for the TD system.

4 Appendix

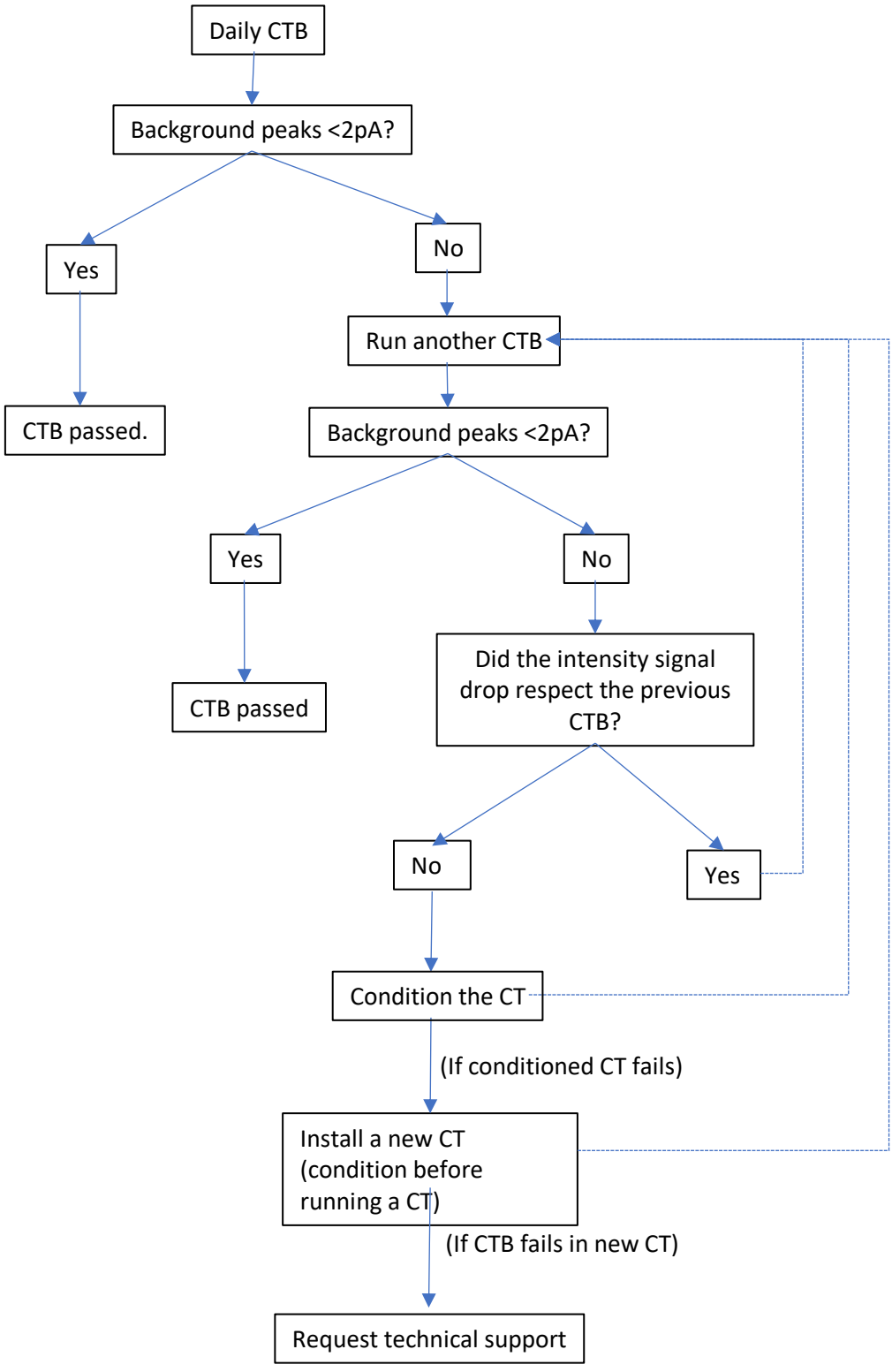

Figure 8. CTB troubleshooting diagram.

5 Contacts and support

The Owlstone Medical Ltd team is dedicated to providing excellent support. For all technical and safe use question relating to this manual, contact as at:

Owlstone Medical Ltd.
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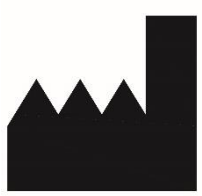

Or email support at **support@owlstone.co.uk**