

Changes in Firmware for upgrades from versions 5000 to 6010 and above: Information for Users

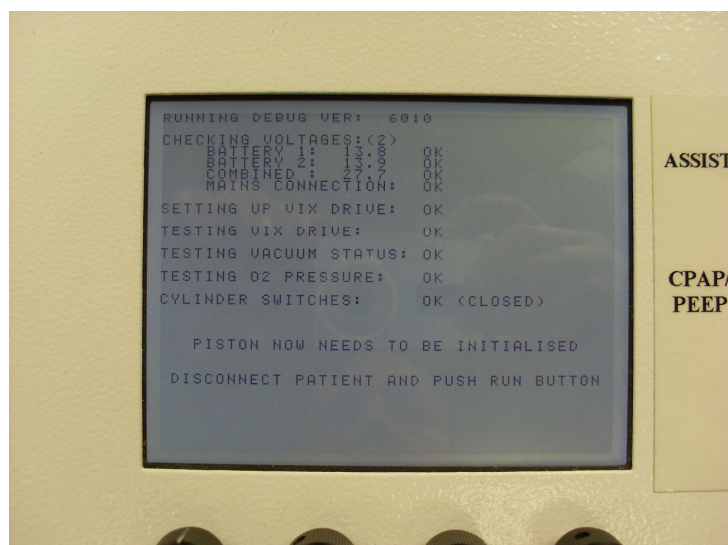
Scope: This document refers to changes in the code used for the **Auxiliary Operating System** of Tafonius or Junior. It does not contain information relating to the PC Tafonius Software

Start-up

The first change to be noticed is in the start-up procedure and self-testing that the machine performs every time it is turned on. Every test procedure that is successful results in a short double-beep. If there is a condition which needs attention then a long single beep is heard. If there is any condition which means that the machine is unable to run then the error will be shown on the screen and the machine will repeatedly give two long beeps at 2 second intervals.

Screen Information

The machine now goes through a set sequence of tests and reports the outcome on the screen. For a normal start-up all checks will return the response "OK"

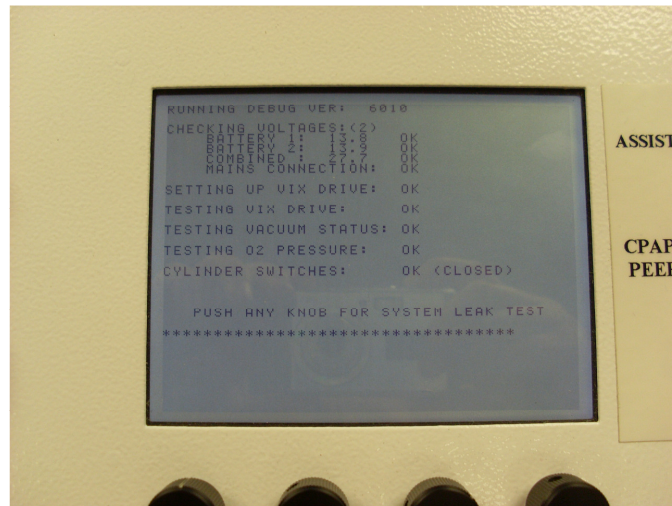


The test sequence is:

- a) The upper and lower battery voltages
- b) The combined battery voltage
- c) Mains or Battery connection
- d) Setting up the VIX Drive
- e) Testing the VIX Drive
- f) Testing the Vacuum status
- g) Testing the supplied oxygen pressure
- h) Testing that the cylinder is closed



Once these tests are performed the user can choose to enter two setup screens. The first option is to enter the Pressure Sensor Setup screen. A triple beep is heard when this option is reached. The user must press any of the control knobs within 5 seconds to enter the setup, otherwise the machine will continue to the next stage. The 5 seconds duration is marked by a growing row of * characters across the screen.



The second option is to enter the System Leak Test screen. A triple beep is heard when this option is reached. On entering this option the patient circuit can be tested for leaks in the usual way.

Assist mode

When Assist mode is selected the Mandatory Minute Volume is reduced to a third of the existing setting. This is achieved by changing the Respiratory Rate setting, which will therefore show a value one third of the original setting. When leaving Assist Mode the original Respiratory Rate setting will be restored **unless** the user has explicitly made changes to the RR setting whilst in Assist mode in which case the new values will be retained.

Setting CPAP values

This procedure is the same as normal for the user in that the CPAP button is pressed and the required CPAP value selected and then confirmed by pressing the knob. There has been a change in the way that the CPAP value is applied. The transition to the new CPAP value is now made in small steps, each step taking 50ms. So, setting a new CPAP value of 20 when the existing value is 0 will produce a slow ramp up to the 20cm CPAP over 1 second. This new feature prevents abrupt changes in patient airway pressure.



Battery/Mains Indication

The supply to the machine is clearly indicated at the top of the Auxiliary Screen. When mains power is applied the word **MAINS** appears. In the absence of mains power the word **BATT** appears and is now flashed to increase awareness of the battery status

Expiratory Time Limitation and I:E Ratio

The minimum setting of the expiratory time has been limited to **0.5** seconds. The user cannot explicitly set the expiratory time; it is calculated from the Respiratory Rate and Inspiratory Time settings. In previous versions it was possible to set a RR resulting in a zero value for expiratory time, resulting in possible breath stacking.

In addition I:E ratios of less than 1:1 are now highlighted by the I:E Ratio flashing on the screen. The set I:E ratio will be active but the flashing text highlights the potential problems when using I:E ratios of less than 1:1

Automatic detection of missing or faulty position sensors

If a position sensor (Forward or Reverse) is found to be missing, either during start-up or during normal running then corrective action will be taken and a warning message will appear on the screen. In some cases this may result in a reset of the VIX drive. This process is automatic and requires no action from the user. During a VIX drive reset the piston will be halted and the Dump Valve opened, so there can be no restriction to spontaneous breathing. Once reset the warning at the top of the screen will remain until acknowledged by the user.

Vacuum Held Time and Leak Warning

The time between runnings of vacuum pump is now measured and reported on the screen. This value is shown in parentheses just before the Vacuum information at the top right of the Auxiliary Screen. At the start of the program this is set to 60 by default and when the first measurement is made the value is updated. The largest value reported is 255 (4 minutes, 15 seconds). For normal operation a pump interval of 60 seconds is expected. A warning will appear on the screen if the interval gets to less than 30 seconds as this indicates a moderate leak in the vacuum circuit. To detect vacuum circuit leaks, see the document "Tafonius Troubleshooting".

Serious faults affecting Performance

If a fault occurs that will seriously affect performance then a new Fault screen will be displayed. This fault screen will give details of the fault and the action to be taken if the fault persists. Usually the system can recover from faults within about 30 seconds, so if the fault persists beyond that time it is advisable to change to Manual mode of ventilation.



The types of faults that will give rise to the Fault Screen are:

- Loss of vacuum
- Critically low battery voltages
- Cylinder open
- VIX Drive faults

Hardware Changes

A VIX Power Adaptor interface has been added to improve stability of the supply voltages to the VIX drive and remove any fluctuations due to varying battery voltages.

Manual shutter valve

An optional manual shutter valve is now available to fix to the manual take-off port on the absorber pan. This manual shutter valve allows the user to switch over to manual mode in seconds and replaces the previous hose connections.



Pulling the lever upwards immediately connects the manual breathing circuit to the main patient circuit.