SOFTWARE REVISION HISTORY

TITAN VERSA HELUM LEAK DETECTORS

Version 1.06.5

New Features:

- Automatic Serial Streaming: The Versa can now be configured in Advanced Settings to send a serial message similar to data logging (containing its status, leak rate, inlet pressure, etc.) at an interval chosen by the user. This allows for remote capture and recording of data without the user having to set up periodic serial queries on their end.
- Added "=@ECH" command to echo messages back to the user, for marking remote capture of data with any message up to 64 characters in length.
- Added "=@LOG" command to record any message up to 64 characters in length to the next USB Data Stream log entry, allowing the user to mark an event or otherwise record a message to the data log at a particular moment in testing.
- Data Stream log files now save in the format [Year][Month][Day][Hour][Minute][Second] so that saved files self-arrange in chronological order.
- Reformatted Data Stream output: cleaned up headers, added a space between header and beginning of stream body, added timestamp in addition to elapsed time, added pass/fail status, improved exponent formatting for high values of Leak Rate / Inlet Pressure, and generally made things easier to read.

Fixes:

- Fixed issue where longer serial messages were not being received properly.
- Fixed issue where Data Streaming in 30 and 60 second intervals would not record any entries.
- Data Streaming now starts logging from the moment it begins, rather than waiting one time interval to record first entry.
- Fixed issue where Data Streaming did not record the last 1-10 seconds of data when stopping the Data Stream.
- Calibration History now correctly displays Filament 2 as selected filament when applicable.
- Warning messages now display correct filament is needed when required.
- Fixed issue with Leak Rate graph not preserving settings during shutdown/startup.

Version 1.06.4

Fixes:

- -Temporarily disabled oil suckback valve on TVT (tower wet pump) models.

---

* Note: Unless otherwise specified, all fixes and features are limited to the UI and communication interfaces and do not affect the core functionality of the mass spectrometer without explicit input from the user. Items that automatically affect the ability of the detector to read a helium signal will be marked with an asterisk(*).

Version 1.06.3

New Features:

- Support added for Version 2 of the Versa Remote I/O module accessory.

Fixes:

- Fixed issue where User ID fields could be initialized improperly, causing a crash when stopping the Leak Detector cycle or when viewing the User ID page.

Version 1.06.2

New Features:

- Save button added to Manual Cell Tune screen. Changing the Gain and Offset values in the Manual Tune screen would update these values in the Leak Detector's volatile memory but would not be saved to flash, causing these values to reset during shutdown. This save button causes the Gain/Offset values to be stored in flash, keeping them after shutdown.
- "Open Leak" button added to Manual Cell Tune Screen. Allows the operator to turn on/off the internal calibrated leak while performing the cell tuning process. A brief delay occurs when turning on the internal calibrated leak allowing the mass spectrometer filament to turn off during the valve transition, preserving the life of the filament.

Fixes:

- Fixed issue with Manual Cell Tune entry fields for Gain and Offset. Previously Gain and Offset values had to be entered in exact 6-decimal format for said values to be accepted. Values are now correctly parsed allowing for partial entries to be interpreted and entered properly.

Note: Unless otherwise specified, all fixes and features are limited to the UI and communication interfaces and do not affect the core functionality of the mass spectrometer without explicit input from the user. Items that automatically affect the ability of the detector to read a helium signal will be marked with an asterisk(*).

Version 1.06.1

New Features:

- Advanced Cell Tuning functions
    - Manual Tuning
    - Autotune
    - Characterization
    - 2 Leak Cell Calibration
- Roughing time counter
    - Better method of tracking roughing pump wear
- Headless mode with Virtual HMI over VNC
- Event Logging
    - Events are logged to the internal SD card
        - Calibrations, maintenance items, etc.
    - UI and Communication Events are integrated with the mass spec events.
    - Event log can be backed up to a USB drive at any time
- GHI Firmware updated to 2.2.0.4 (Production Release)
    - Significant performance improvements
    - Significant ethernet connection stability improvement
    - CPU usage profiling tools enabled

Fixes:

- Fixed issue where Ethernet will stop working if detector is restarted in shutdown
- Fixed issues with maintenance items resetting on their own with a zero due date
- Fixed blank on screen messages
- Fixed various HMI bugs
- Fixed bug in due date calculation for maintenance items
- Improved startup messaging (now includes software items, in case there are issues in startup that can be reported to us)
- Includes firmware fix to improve Ethernet connection stability
- Improved VNC stability and speed
- Improved CPU usage at idle
- Improved crash messaging
- Fixed issue with calibrated leak data being overwritten on gas change
    - There are a total of 7 leaks stored in memory on the mass spec, our HMI now properly interfaces with that storage
- Date and Time no longer re-initialized on Factory Reset

Note: Unless otherwise specified, all fixes and features are limited to the UI and communication interfaces and do not affect the core functionality of the mass spectrometer without explicit input from the user. Items that automatically affect the ability of the detector to read a helium signal will be marked with an asterisk(*).

Version 1.05.1 Hotfix

Fixes:

- Fixed issue with flash memory overrun with TVTD pumps
- General cleanup of pump maintenance item logic
    - Confusing inheritance structure for pump objects
    - Reworked flash memory to not use magic strings
    - Fixed issue where due dates were calculated before date was retrieved from canbus

Version 1.05.0

New Features:

- Remote Screen
    - Implemented via a slimmed version of the VNC protocol.
    - User can select to prioritize framerate or frame quality on the LACO remote screen
    - Runs alongside standard VNC
    - Physical buttons use key events, so pressing the S or O key on the keyboard when connected with a PC will trigger the buttons.

Fixes:

- Fixed RS485 serial protocol.
    - Now properly responding to commands on 485
- Fixed built in LD communication via terminal
- Rewrote logic for number pads
    - Uses multiple variations based off what the user is entering (double, integer, IP, etc.) and hides and shows the buttons they need
    - Uses pattern matching regular expressions in the background to make sure the user can't enter gibberish, and alerts the user if their input is invalid
    - Reworked logic for special characters (E and .) to ensure they can't be entered improperly
- Extensive HMI visual bugs and typos
- Added various screen specific CAN commands to run behind certain screens for better data entry responsiveness
- Fixed settings that needed to be able to be set in cycle
- Fixed delay in Remote IO responsiveness
- Pass/Fail clarity improved on autotest
- All hotfix changes

Version 1.04.4 hotfix

- Fixed leak rate bar graph for Mbartech
    - Faulty string conversion
    - Repaired autoscaling feature

---

* Note: Unless otherwise specified, all fixes and features are limited to the UI and communication interfaces and do not affect the core functionality of the mass spectrometer without explicit input from the user. Items that automatically affect the ability of the detector to read a helium signal will be marked with an asterisk(*).

Version 1.04.2

Major fix:

- Rewrote Canbus state machine.
    - Fixed <ACK> location in about a third of all can commands used
    - Eliminated shortcuts in Can code that can cause the bus to come out of sync.
    - Moved CAN bus to run in its own thread of execution and the main loop can now stop and restart the CANbus if it errors out.
    - Added additional functionality to better determine if the CANbus is working properly.

Minor Fixes:

- Removed faulty conditional statement that kept the IFU from operating
- Various UI bugfixes
- Added visual feedback on screen touch
- Ethernet communication protocol performance improvements

Version 1.04.1 Hotfix

- Fixed certain broken serial commands

Version 1.04

New Features:

- TCP/IP ASCII command protocol over ethernet.
- VNC capability for remote screen viewing.
- Added compatibility for LACO's Remote Screen.
- On screen alert capability has been expanded.
- Hardware watchdog timer implemented to automatically recover system if faulted.
- Event storage on onboard SD card
- Method correction.

Major Fixes:

- Data logging for long periods of time no longer crashes leak detector.
- High Flow Vent valve no longer occasionally dumps turbo pump.
- Pirani Calibration process reworked
- Leak detector no longer occasionally crashes when entering graph screen.
- Maintenance Items reworked and now reset and are saved to flash properly.
- General speed and responsiveness improvements
- Leak detector no longer crashes if filament turns off while main screen is active

Minor bugfixes:

- Units properly displayed on test summary file
- Pressure graph crossover bars now properly display
- Inconsistent volume button behavior fixed.

---

* Note: Unless otherwise specified, all fixes and features are limited to the UI and communication interfaces and do not affect the core functionality of the mass spectrometer without explicit input from the user. Items that automatically affect the ability of the detector to read a helium signal will be marked with an asterisk(*).

- Stop Calibration now working.
- Data logging now properly starting when LD is put in cycle using serial
- RS485 crash fixed
- Pirani calibration no longer runs data logging.
- Decimal Place option no longer reads "Hydrogen"
- Shutdown properly displays while shutting down
- Floating text bug after calibration fixed
- Fixed delay in Remote DI where Gross, Fine, and Ultra settings wouldn't apply for several seconds
- User can properly cancel out of the logout popup
- Vent Open Verify "OK" button now properly works
- Various minor UX/UI bugs

New Features:
- TCP/IP ASCII command protocol over ethernet.
- VNC capability for remote screen viewing.
- On screen alert capability has been expanded.
- Event storage on onboard SD card

Major Fixes:
- Pirani Calibration process reworked
- Maintenance Items reworked.
- Various crashes fixed.

Minor bugfixes:
- Fixed delay in Remote DI on Gross, Fine, and Ultra outputs.
- Various other minor UX/UI bugs and typos fixed.

Version 1.03

- Alternate language support added. Languages will be added in future updates.
- Fixed bug where persistent external serial communication would stop working
- Fixed various text alignment and formatting errors
- Various stability and bug fixes

Version 1.02.1

- Fix for random crashes due to memory capacity
- Fix for random resets due to improper button reading

Note: Unless otherwise specified, all fixes and features are limited to the UI and communication interfaces and do not affect the core functionality of the mass spectrometer without explicit input from the user. Items that automatically affect the ability of the detector to read a helium signal will be marked with an asterisk(*).

Version 1.02

- Massive Mode - detects when in Massive mode, displays Massive Mode status with pressure bar graph
- Remote IO verified for function
- Long button press for Zero submenu. Settings allow enable. When enabled, operator must hold the touch to activate Zero function. Zero can only be activated during a cycle
- Volume settings - beep feedback corresponds to current volume setting
- Summary log - Test ID fields are moved to the right
- Fixed data logging for Test Summary flashing when not in cycle
- Implemented buzzer on touch. Can be Enabled/Disabled through settings?
- Updated Firmware to V2.00 production

Version 1.01

- Updated Firmware

Version 1.00

- Initial Release

---

* Note: Unless otherwise specified, all fixes and features are limited to the UI and communication interfaces and do not affect the core functionality of the mass spectrometer without explicit input from the user. Items that automatically affect the ability of the detector to read a helium signal will be marked with an asterisk(*).