New Technologies in Air Balance

Jeff Baker
Sales Manager
TSI Inc.

Siva Iyer
Senior Product Manager
TSI Inc.
Using Technology In TAB/Commissioning

+ Same Standards, changing economic environment – time and resource constraints: need for increased productivity
+ New Technologies used effectively can be the answer
Brief Technology History in TAB

- Pitot Tubes
- Vane Anemometers
- TA Probes
- Analog and Digital Airflow Capture Hoods
- Digital Capture Hoods w/ Multi-functional features & data logging
Productivity Imperatives

+ TAB/Commissioning is the final step before owner takes possession
+ Owners are eager to get their asset making returns for them
+ Trades that work on a building are often running behind due to various logistical reasons

*Need A Way To Do The Job Quicker*
Measurements in TAB

+ Flow
+ Temperature
+ Differential Pressure
+ Available sensor technologies well developed, quick and meet accuracy requirements

How do we address the situation?

Follow the Process!!
Process Issue #1

- Precarious ladder that needs to be moved to each one
- Bunch of tall diffusers in a row
Sometimes adjustments need to be made after diffusers are checked:

• Climb down ladder
• Go to the controls (Distance Away)
• Adjust
• Climb up ladder and check to see if reading is desired
• Repeat until desired adjustment is reached
Process Issue #3

Measuring all day

Afterward, enters data into report

Print or email report to supervisor
Solution...

+ Capture Hood Stand to enable hood to access high diffusers without ladders

+ Use Wireless Technology (Bluetooth) to:
  • Remotely Access Data from instrument
  • Record readings and name test IDs
  • Analyze data graphically
  • Print data for on the spot signatures and audits
  • Apply voice notes and pictures
  • Email results
Wireless Connectivity

Wheeled stand for capture hood

Android phone connected via Bluetooth to EBT
System Features

- Enable 1 person operation and have fewer ladder climbs
- CH Stand goes up to 15 ft (with Hood attached)
- Height adjustable with air cushioning for gentle stand motion
- Bluetooth has line of sight range of at least 100 feet
EBT731 Balometer
New Accessories

+ Capture Hood Stand
  • Reach ceiling diffusers up to 15 ft high with Balometer attached
  • Results in more measurements in less time

+ LogDat™ Mobile
  • Android based Smart app
  • Remote reader and data logger
Capture Hood Stand

+ Can be used without LogDat Mobile
  • Detach the meter from the base
  • Connect two 8’ sections of tubing (included with the EBT731) directly to the base manifold and micromanometer pressure ports
  • Actual/Standard setup
    - Set Temp Source to Entered
    - Enter temperature
  • Disable headphone jack input
Remote Reader

- Displays current sample data
- Customizable measurement displays
- Customizable analog meter to help visualize primary measurement
- Multiple ways of reading
  - Button
  - Finger swipe (motion/touch events)
  - “Shaking” (accelerometer)
Capture Hood Stand and LogDat Mobile

+ Why important

+ Enhanced productivity
  • Reach ceiling diffusers and grills up to 15 ft high

+ Enhanced safety
  • Eliminates using a ladder

+ Hood stand ideally suited for use with LogDat Mobile
  • Read and data log results in real-time remotely
  • Save data to a test ID
  • Review statistics or individual samples
  • Attach notes, photos or voice notes to test ID
  • Email data for report generation
LogDat™ Mobile Remote Reader and Data Logger Overview

+ Android based Smart App
  • Applicable to the EBT731 Balometer and EBT730 Micromanometer
+ Supports multiple languages
  • English, French, German, Korean, Simplified Chinese, and Spanish
+ Remotely displays EBT readings in real-time via Bluetooth
+ Customizable analog meter to help visualize primary measurement
  • User adjustable scale
+ Multiple ways of reading
  • Button
  • Finger swipe (motion/touch events)
  • “Shaking” (accelerometer)
  • Optional vibrator / Text-to-Speech support
LogDat™ Mobile Remote Reader and Data Logger Overview

+ View Test ID’s
  • Custom name configuration
  • Attach comments, photos and voice notes
+ View statistics
+ Graphing capability
LogDat™ Mobile Remote Reader and Data Logger Overview

+ Export data
  • Test IDs (raw text and delimiter formats)
  • Pictures
  • Voice notes
  • Single and multi-file attachments supported
+ Configure default email address
  • Eliminate repetitive typing
+ Also export data via
  • Google Drive
  • Bluetooth
  • Skype
What Android devices does LogDat Mobile support?

+ Android based Smartphones Operating Systems 2.3.3 or newer
  • NOTE: we have seen some Android based Smartphones (HTC) that are incompatible with LogDat Mobile

+ Tablets
  • Nexus 7/Nexus 10
  • Motorola Xoom
Why does LogDat Mobile not support the iPhone?

+ iPhone does not support Serial Port Profile (SPP)
  • SPP is the Bluetooth protocol that we need to support wireless communication
Detailed Operation: Connecting the Android Device to the EBT

+ To use LogDat™ Mobile, it will be necessary to pair the EBT instrument to the Android device.

+ EBT setup
  - Configure Bluetooth functions menu:
    - Turn ON the EBT instrument
      + Note the serial number that appears on the startup screen
  - Press menu button
    - Scroll down to Bluetooth Functions - Press Enter
    - Scroll down to Discoverability and set to Enable
    - Note PIN code (default is set to 0000)
Detailed Operation: Connecting the Android Device to the EBT

+ To use LogDat™ Mobile, it will be necessary to pair the EBT instrument to the Android device

+ Android device setup

• Turn ON the Android Device
  - Go to Settings
  - Select Bluetooth
  - Turn Bluetooth ON
  - Select “Scan for Devices”
  - Select the serial number of the EBT on the list of devices that appears

*NOTE: The EBT instrument must be in the main running screen in order to communicate with the Android device*

• Pin code screen
  - Appears when Android device attempts to pair with EBT instrument
  - Enter 0000 and press enter or done

• Your device should now be paired to the EBT
Detailed Operation: Connecting the Android Device to the EBT

+ Note: If the Android device does not find the EBT, have the EBT instrument find the Android device by selecting Discover Device in the EBT instruments Bluetooth Functions menu.
Detailed Operation: Initiating LogDat Mobile

+ Load LogDat Mobile onto the Android device
+ Turn on EBT
  • **NOTE:** The EBT instrument must be in the main running screen in order to communicate with the Android device
+ Activate LogDat Mobile icon
  • Device will show “Connecting…”
+ Device will then ask for “**Bluetooth pairing request**”
  • Enter “0000”, press OK
+ Device will show “Connecting” … then “Connected”
  • The EBT will now have the Bluetooth icon displayed on the main running screen
  • Once “Connected” LogDat Mobile can be utilized
Detailed Operation: Initiating LogDat Mobile

+ If the device shows “Not Connected”, then select “Scan Devices”
  • Displays list of paired devices
  • Select EBT model with correct serial number

+ Device will ask for “Bluetooth pairing request”
  • Enter “0000”
+ Once “Connected” LogDat Mobile can be utilized
Detailed Operation: Using LogDat Mobile

When LogDat Mobile is successfully paired with the EBT and is activated:

- It will communicate to the EBT to detect what probes and instrument settings are
- Popup display will appear after a few seconds
  - Set primary measurement type and up to four secondary measurements
  - Imperial or metric units is determined by the EBT setup
Detailed Operation: Camera

+ Take photos and attach to current Test id
  • Press the 📷 icon on the action bar to launch the device’s Camera app
  • The picture will be saved in the /TSI/Img directory
  • Picture will be part of Test ID
Detailed Operation: Voice Notes

+ Take voice notes and attach to current Test id
  • Press the microphone icon to record a voice note.
  • Press the “Begin recording” button to start recording.
+ Press “Stop recording” to save the recorded note in the /TSI/Audio directory in the form of: voice-id-<T>-<N>.amr
  • <T> is the current test id
  • <N> is an integer corresponding to the next unused number starting from zero.
Detailed Operation: Remote Reader

+ Display EBT measurements in real-time
  - One primary measurement
  - Up to four secondary measurements
+ Customizable analog meter to help visualize primary measurement
  - User-configurable scale range
Detailed Operation: Remote Reader

+ Multiple ways to take sample data:
  - Button press - READ
  - Finger swipe
  - “Shaking” via device accelerometer
  - Text-to-speech audio
Detailed Operation: Remote Reader

+ Sample data can be saved to customizable Test ID names
  - Save individual readings
    - Button press - SAVE
    - Finger swipe
  - Automatic data logging at various user-selectable intervals
+ Press Next Test to advance Test ID
Detailed Operation: Scan Devices

+ Use to connect to a different EBT instrument already paired to the Android device
  • Press “Scan devices”.
  • Select the desired device from the scrollable list of paired devices.
Detailed Operation: Scan Devices

- Use to connect to a different EBT instrument already paired to the Android device
  - Press “Scan devices”.
  - Select the desired device from the scrollable list of paired devices.
Detailed Operation: Stats

+ Select a Test ID to view
  • Selected Test ID samples will load
  • When finished loading, a list will be displayed
  • Selecting any of the samples will display information pertaining to that particular sample.
Detailed Operation: Stats - Text Notes

- Add text notes to Test ID
- Customize Test ID Name
Detailed Operation: Email/Export

+ The Email application allows for quickly attaching sample data, generated reports, pictures or voice notes made within the application to an email
  - A default destination address and subject can be configured in the Preferences activity.
Detailed Operation: Email/Export

+ Export files associated with a Test ID:
  - Select Test ID
  - Check which types of files to include and press OK
  - Select desired application to launch
Detailed Operation: Graph

+ Plots up to three Test IDs at the same time
+ Press “Edit Graph” button on the action bar to compare Test IDs for each series
+ The primary measurement can be set by pressing “Set Primary” on the
+ Other graphing options can be found in the Preferences activity
Capture Hood Stand and LogDat Mobile

+ **Why important**
+ Enhanced productivity
  - Reach ceiling diffusers and grills up to 15 ft high
+ Enhanced safety
  - Eliminates using a ladder
+ Hood stand ideally suited for use with LogDat Mobile
  - Read and data log results in real-time remotely
  - Save data to a test ID
  - Review statistics or individual samples
  - Attach notes, photos or voice notes to test ID
  - Email data for report generation