



Manual and Troubleshooting Guide

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Review of Supplementary Components

The following components are included with the display, located in the Pelican Case

1x Power Cable

1x Power Strip

1x Package of J-28419-1 Vibration Damping Mounts

1x Package of J-4624-109 Vibration Damping Mounts

2x Clear PVC Piston Housing

2x 1,621 RPM Planetary Gear Motor w/ Encoder

1x Package Adjustable Weights

1x Package Replacement Shafts

1x Hex Key Set (mm)

1x Hex Key Set (in)

2x Crescent Wrench

1x Philips Head Screwdriver

1x Loctite Blue 242

1x Roll Shurtape Hold-it

1x RGB LED Strip

2x Microfiber Towel

Setup Instructions

1. Open the Pelican Case and remove the acrylic cover from both the units. Then take out the vibration units, cables and the electronic box.
2. Place one hand down each of the cutouts in the Pelican Case foam to either side of the display and grip from the bottom base plate. Evenly pull upward to remove the display from the Pelican Case, being sure to steady the case as it is lifted.
3. Place both units on a flat surface for the trade show
4. Use the provided microfiber towels to clean the surface the display will be placed on. Be sure to remove or firmly attach any covering which may cause the display to slide on the surface (such as a tablecloth).
5. Place the display on the cleaned surface where it will be run with the TVA system facing out toward the audience, and the motor encoders pointing back toward the presenter. Ensure the wires from the display exit out the right side (from the presenter's view)
6. Once the TVA unit is on the table, unscrew the shipping pin, then gently pull up the TVA mass and remove the compression stop. Set the shipping pin and the compression stop aside for repackaging
7. Carefully lift and tip the vibrating units forward and use the microfiber towels to wipe off the grip tape beneath the units.
8. Use the microfiber towels to wipe off the area where the electrical box will be placed (if it is to be displayed)
9. Tilt the electrical box and use the microfiber towel to wipe off the grip tape underneath.

10. Place the electrical box where it is to be displayed, within ~5ft of the display.
11. Remove the Power Strip, 2 Black Cords (amphenol connectors), Power Supply Cable, tools and USB Cord from the pelican case
12. Ensure all switches on the display are in the "Off" position
13. Plug the power strip into an outlet and turn the strip on
14. Plug the Power Supply Cable into the power strip and into the power supply on the display
15. Plug in one of the black cables from the electrical box TVA amphenol connector to the TVA vibration unit.
16. Plug in the other black cable from the electrical box Non-TVA amphenol connector to the Non-TVA vibration unit
17. Plug the USB cable into the USB Hub on the electrical box, and into a USB drive on the laptop which will be used to run the display.
18. Boot the laptop to Windows and double click the LORDTradeShow.pro file.
19. Once the software is open hit the green play button to start the GUI.
20. Turn on the black Power Supply Switch on the back of the electrical box, the fan will turn on inside the electrical box.
21. Turn on the two individual systems in the display using the TVA and Non-TVA switches on the back of the electrical box. The systems will run a short startup script during which they will ramp up to the initial frequency. This will take ~5 seconds.

The system is now in its normal operating state. The frequency of the motors can be adjusted via buttons on the GUI. GUI windows may be shifted between screens as desired. The two systems and the LEDs may be toggled on/off via the switches on the right side of the Electrical Box. The power supply switch may be used as a kill switch for the entire system if needed. When restarting the system from a complete power down, ensure all switches are in the "OFF" position before turning on the power supply.

Teardown Instructions

1. Switch "OFF" both of the systems
2. Switch "OFF" the power supply
3. Close the GUI and shutdown the Laptop
4. Unplug the USB cable from the laptop and the USB Hub on the Electrical Box
5. Unplug the Black Cords from both the Displays and the Electrical Box by twisting and pulling the head of the amphenol connectors
6. Turn off the Power Strip and unplug it from the outlet.
7. Unplug the Power Supply Cable from the Power Supply and the Power Strip.
8. Push the compression stop under the TVA mass and then screw in the shipping pin. Once done, cover both the vibrating units with their respective acrylic covers.
9. Grip the baseplate beneath the display at the 9 o'clock and 3 o'clock positions and lift the display and place it safely inside the pelican cases
10. Ensure that the Display is sitting level on top of the Foam.
11. Place two hands beneath the Electrical Box at 9 o'clock and 3 o'clock and place it into the Pelican Case.
12. Place the cords and the tools inside the respective pelican cases

13. Close and Lock the Pelican Case.

Operating Instructions

After switching both systems on, allow them to run through their startup scripts (~5 sec.). Once startup is complete, the systems will run at their steady state operating condition.

The 2 toggle switches on the right side of the Electrical Box may be used to turn on/off the individual system. *Note that the systems will re-run their startup scripts after each restart with their associated toggle switch.

The Power Supply Switch may be used as a kill switch for the system if necessary. Ensure all toggle switches on the right side of the Electrical Box are in the “OFF” position before turning the Power Supply Switch on again.

Motor frequency may be tuned by using the up/down arrows on the GUI. Any further tuning must be done manually with the systems powered down. See the next section.

Tuning the System

The LORD TVA Tradeshow Display has three tunable aspects. The frequency of operation can be modified via the GUI software, the vibration force can be changed by adjusting the radius at which the connecting rod is attached to the wheel, and the mass of the system can be adjusted by adding or removing steel plates below the piston housing. Each adjustment is covered below in detail.

Changing Operating Frequency

Operating frequency is modified in the GUI and can be changed while the system is running.

1. Ensure the GUI software and both systems are running

2. Click the up/down arrows to the right of the frequency value printing on the GUI display to change the frequency of the motors.
3. The motors will hold this new frequency until it is changed, or the GUI is restarted. The default frequency is set at 12 Hz.

Adjusting Vibration Force

Vibration force is adjusted by changing the position of the connecting rod along the slot in the rotating wheel.

1. Fully power down the system and ensure that the Power Supply Switch is in the "OFF" position. (Recommended that the user unplug the system as well)
2. Carefully remove the Plexiglas cover over the display and set aside.
3. Retrieve the large Philips Head screw driver and one of the crescent wrenches from the Electrical Box Drawer.
4. Firmly grasp the wheel by hand and hold it still, while using the crescent wrench to loosen the jam nut on the back side of the wheel, closest to the shaft support
5. Once the jam nut has been released the connecting rod will slide along the slot
6. Align the connecting rod along the slot where it should be tightened
7. Use the Philips Head screw driver to turn the Philips head screw until loose
8. Turn the Philips head screw in the opposite direction until it snugs, then back off $\frac{1}{4}$ to $\frac{1}{2}$ turn
9. Using the Phillips head screw driver to prevent the Philips head screw and the wheel from rotating, tighten down the jam nut until tight
10. Check the rotation of the wheel by hand to confirm that the wheel spins freely without binding
11. Power on the system

Adjusting System Mass

1. Remove the two screws on the side of the piston housing clamp which hold in the ballast masses
2. Add or remove the small steel plates until the desired weight is met
3. Fasten the two screws back in place and tighten with an Allen wrench

Replacing Components

Numerous components on the display can be replaced. The most common are listed below.

LORD Micro Mounts

1. Remove the four Hex Socket Machine Screws which hold the Upper Piston Housing Clamps together and support the TVA mass. (The hex sockets are metric, will need M3)

2. Turn the TVA and the attached plate over so that the counter bored TVA nuts are visible.
3. Use the two provided crescent wrenches to hold onto the base of each LORD Micro Mount while loosening the TVA nut.
4. Remove all 4 TVA nuts and pull the TVA off of the aluminum plate
5. Each Micro mount can now be removed from the TVA with a crescent wrench
6. Replace all of the mounts with new ones
7. Screw each mount into the holes in the TVA
8. Place the aluminum plate upside down on top of the mounts, so that the counter bores are visible
9. Use the two crescent wrenches provided to hold on to the base of the micro mount while tightening the nut in the counter bore
10. Flip the assembly over so the counter bores are down and the TVA and micro mounts are above the aluminum plate
11. Use the four metric hex socket machine screws to secure the assembly on top of the Upper Piston Housing Clamps

Clear PVC Piston Housing

1. To access the Piston Housing Clamp Screws you will need to remove the relevant System from the base plate
2. Tilt the system up and disconnect the motor cable for the system being modified
3. Using a Philips Head Screwdriver, unscrew the two screws holding the accelerometer onto the standoffs for the system being modified
4. Tilt the system up and use a crescent wrench to remove the 4 nuts securing the grommet mounts of the system to be modified to the base plate
5. Lift the system to be modified off of the base plate
6. On the underside of the system plate, locate the four hex socket machine screws which hold the piston housing clamps together (these are metric sockets)
7. Remove the Grommet isolator that partially covers the counter bore on one of the screws
8. Loosen all four screws until the piston housing can be replaced. Ensure that pairs of screws are loosened equally so that undue stress is not placed on the screws or piston housing clamps
9. Replace the PVC piston housing. Ensure the slotted end faces toward the wheel, the non-slotted end is flush with the piston housing clamp, and the connecting rod travels evenly through the slot in the piston housing.
10. Tighten down each of the 4 hex socket cap screws which hold the piston housing clamps together. Tighten pairs of screws evenly to minimize binding.
11. Do not overtighten the screws as this will constrict the PVC housing and cause the piston to bind.

12. Manually check the rotation of the wheel and oscillation of the piston by moving the wheel by hand. The piston should move freely and not bind within the piston housing
13. Screw in the Grommet Mount which was removed to access the final hex socket screw, then place the system back onto the base plate
14. Use the crescent wrench to screw each of the 4 hex nuts onto the grommet isolators from beneath the base plate
15. Reconnect the motor cable below the baseplate and reattach the accelerometer above the base plate using the Phillips Head screwdriver

Motors

1. Disconnect the motor below the baseplate
2. Loosen the Hex Socket Set Screw on the shaft coupler closest to the motor
3. Loosen the hex socket screw on the motor clamp
4. Slide the motor out of the clamp and carefully pull the wires through the pass-through in the base plate
5. Pass the wires of the new motor through the pass through in the base plate
6. Slide the new motor into the motor clamp and into the shaft coupler until the motor cannot be inserted any farther
7. Tighten the hex socket screw on the Motor clamp, ensuring that the wires from the motor are pointed down towards the pass-through in the base plate
8. Rotate the wheel until the set screw on the shaft coupler lines up with the groove on the motor shaft
9. Tighten the set screw
10. Rotate the wheel by hand to ensure that both the motor and wheel turn, are connected, and do not bind.

Links and Instructions to download and setup all software

Qt5

1. Go to <https://www.qt.io/download>
2. Scroll down and click the green go open source button
3. Click the green download button and you'll be prompted to save the qtunified executable.
4. Run the executable.
5. Click next.
6. Click Skip to skip signing up for a Qt Account.
7. Click Next.
8. Accept or change the default install filepath.
9. When Select Components pop up expand Qt, Qt 5.9.0 and click MinGW 5.3.0 32 bit and Qt Charts and click next.

10. Agree to the terms and conditions and click next.
11. Click next again.
12. Click install.
13. Click finish.

Arduino w/ TimerOne Library

1. Go to <https://www.arduino.cc/en/Main/Software>
2. Click the Windows Installer.
3. Donate money or click just download and you'll be prompted to save the arduino executable.
4. Run the executable.
5. Agree to terms.
6. Click Next.
7. Click Install.
8. Click Close.
9. Click Arduino shortcut on the desktop.
10. Click Sketch ▾ Include Library ▾ Manage Libraries...
11. In the searchbar type TimerOne
12. Click to install TimerOne by Jesse Tane

K-Lite Codec Pack Basic

1. Go to
https://www.codecguide.com/download_klite_codec_pack_basic.htm
2. Click Mirror 1 and save the executable.
3. Follow prompts to install software. No need to make changes.