One Round Chamber - Specification

A. Introduction

The One Round Chamber specification is derived the original invention document. One Round Chamber is the devices tester chamber which has multi-level drum rotating back-and-forth in 360° in one round circle and kept the wires in shortest length without twisting to provide greatest capacity of loading for testing devices with temperature and humidity environment plus vibration control option. The One Round Chamber provides at least 4 times of current chambers or testers in loading capacity around all sides in 360° surface instead of traditional one side loading with the drum rotating around in 360° to provide the testing devices with convectional and equal temperature and humidity environment.

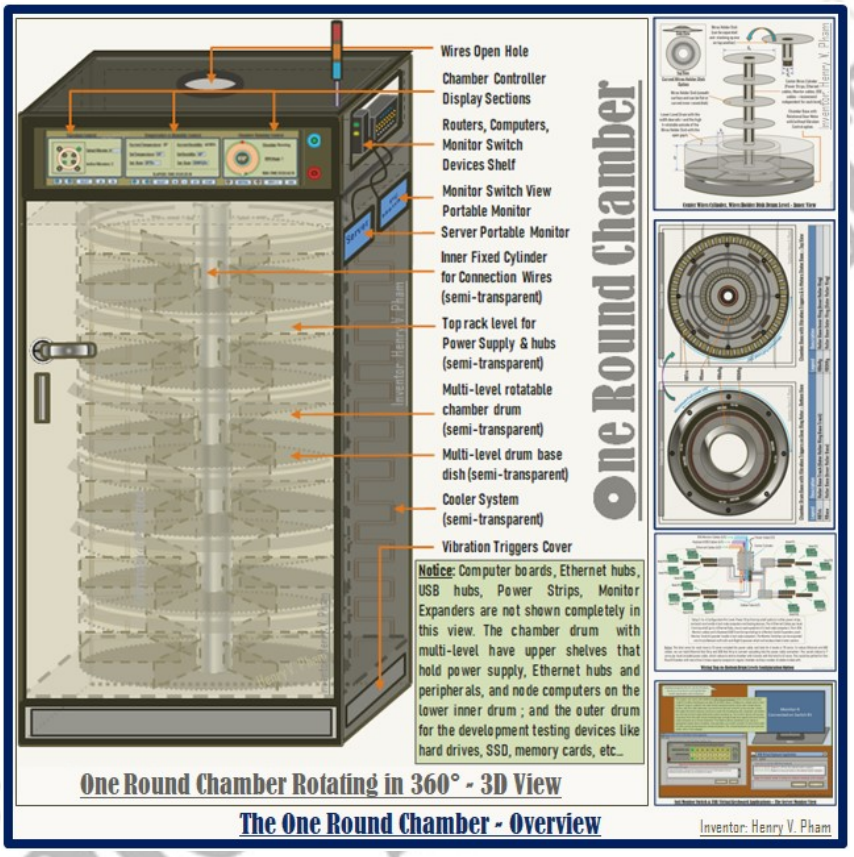

Figure-A1: One Round Chamber - Overview

One Round Chamber not only provides convectional testing environment, the chamber also provides with the built-in vibration mechanism option with 4 inner vibration triggers and 4 outer vibration triggers which can provides up to 63 combinations of vibrations patterns. This great function is provided by the natural design of rotating around feature of the chamber. One Round Chamber is designed with the center cylinder which provides easy to have all the wires installed and connected from the Ethernet Router and Switches, Monitor Switches and the computer server with USB Virtual Keyboard and Webcam options that allow the users to control, setup, install and view every single node computer via switching monitors and the computer server where the users can access remotely for a great support of Automation Testing in Manufacturing.

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One Round Chamber with 6 levels, and each level with 16 node computers, provides a great testing capacity compare to other chambers which could help to reduce more than 4 times of space in manufacturing; with the common testing devices like Hard Drives and each node computer can handle 4 Hard Drives, the chamber can have the testing capacity up to 384 drives; and one node computer handle 8 drives with total capacity up to 768 drives. Figure-A1: One Round Chamber - Overview shows the overview of the One Round Chamber with great Look-and-Feel with the display controller on top with the top shelf for the server, switches and other devices and portable monitors with all the wires wiring in the center cylinder that can provide clean space for the manufacture. One Round Chamber is the great promise for future of testing devices tester or testing devices chambers that can provide great in capacity, great in testing convectional environment, great in controlling, setting, installing, debugging and viewing the node computers from anywhere with the plus of built-in vibration mechanism option.

B. One Round Chamber Look & Feel

Figure-B1: One Round Chamber – 3D View shows One Round Chamber with multi-level rotatable drum and the center cylinder for wiring, with the top shelf for computer server and other computer supported controlling devices.

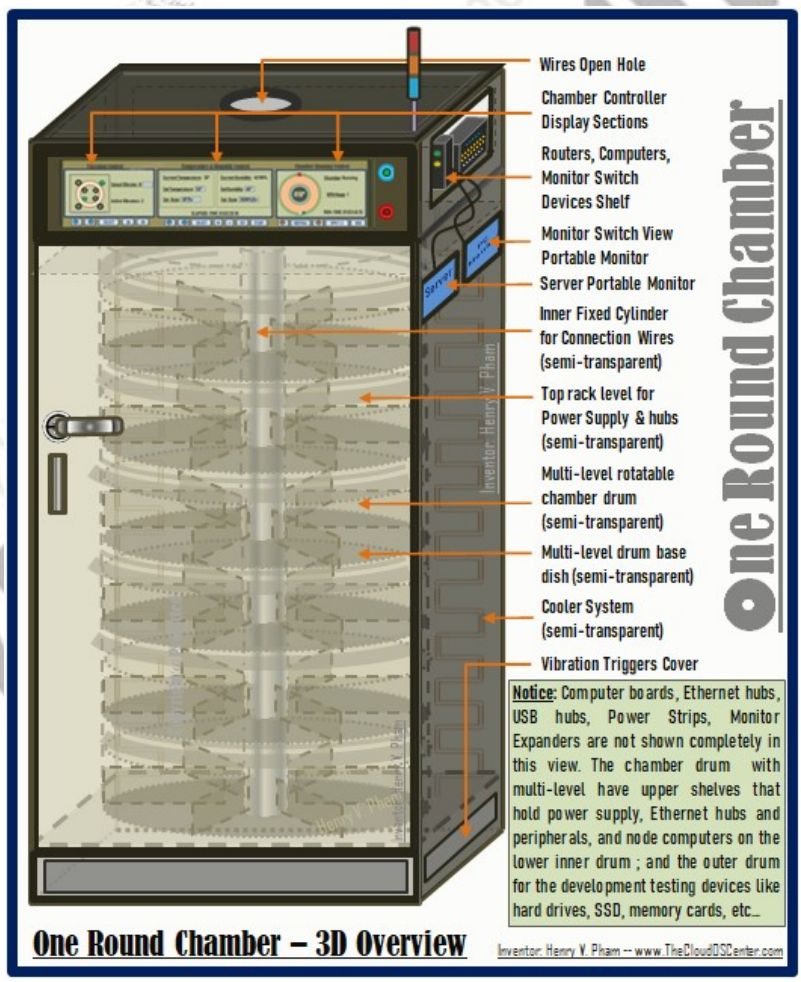

Figure-B1: One Round Chamber – 3D View

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This figure shows the 3D view with inner parts in semi-transparent view from top to bottom with the wires open hole, Chamber Controller Display, the top shelf with Routers, Monitor Switch and computer server, the inner fixed cylinder with wire holder dish on each level, the air compressor for temperature and humidity control, the Vibration Triggers in overview.

Figure-B2: One Round Chamber – Front and Back View shows the front and back views of the chamber. The front view shows the display controller as mentioned above with the temperature insulation sealed and secured door and the vibration triggers cover; and the back view shows the top shelf with its back view open and the air vents for environment control of condensers and evaporators, and the bottom with vibration triggers cover which will be described more detail in Vibration Control section. The Display Controller is recommended to build on top in front of the top shelf which provides easy controlling functions and buttons for the operators to control the chamber and move the drum back-and-forth while the door is opened for loading or for debugging; note that the drum can be rotated by hands. The chamber also provides the alert notification lights in a light pole on top of the chamber with 3 different colors to indicate the chamber is running, in maintenance or in alert for service.

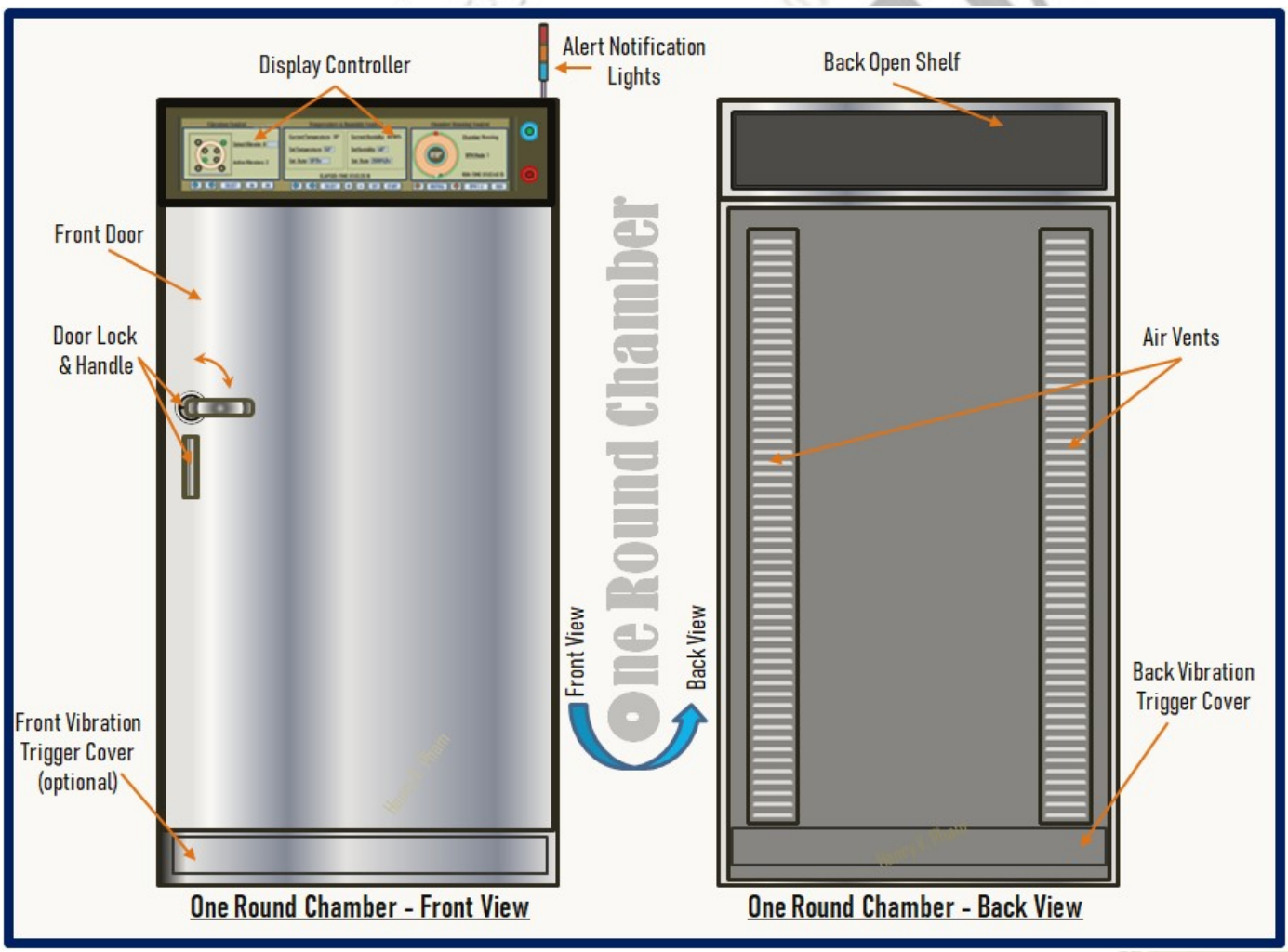

Figure-B2: One Round Chamber – Front and Back View

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One Round Chamber is designed to provide with saving spaces with the top shelf plus the portable monitors are recommended to be built with monitor hanger ready on both sides of the chamber, and the testing devices manufacture or company can choose a convenient side to hang the monitors to have a webcam for remote control and view the node computers to setup or debug easily from remotely.

Figure-B3: One Round Chamber – Left & Right Sides View shows the left and right sides views of the chamber. The right side view shows the top shelf with open view with the front display chamber controller on the left of the top shelf as recommended; while the left side view shows the front display chamber controller on the right of the top shelf; and similar for the door, monitor hanger areas and the side vibration triggers covers. Note that the vibration triggers can be built with power control and manual control options. The vibration manual control option is built with extended handles to push or pull the vibration triggers with 2-sides handle option or with 4-sides handle option which will be described more detail in later section.

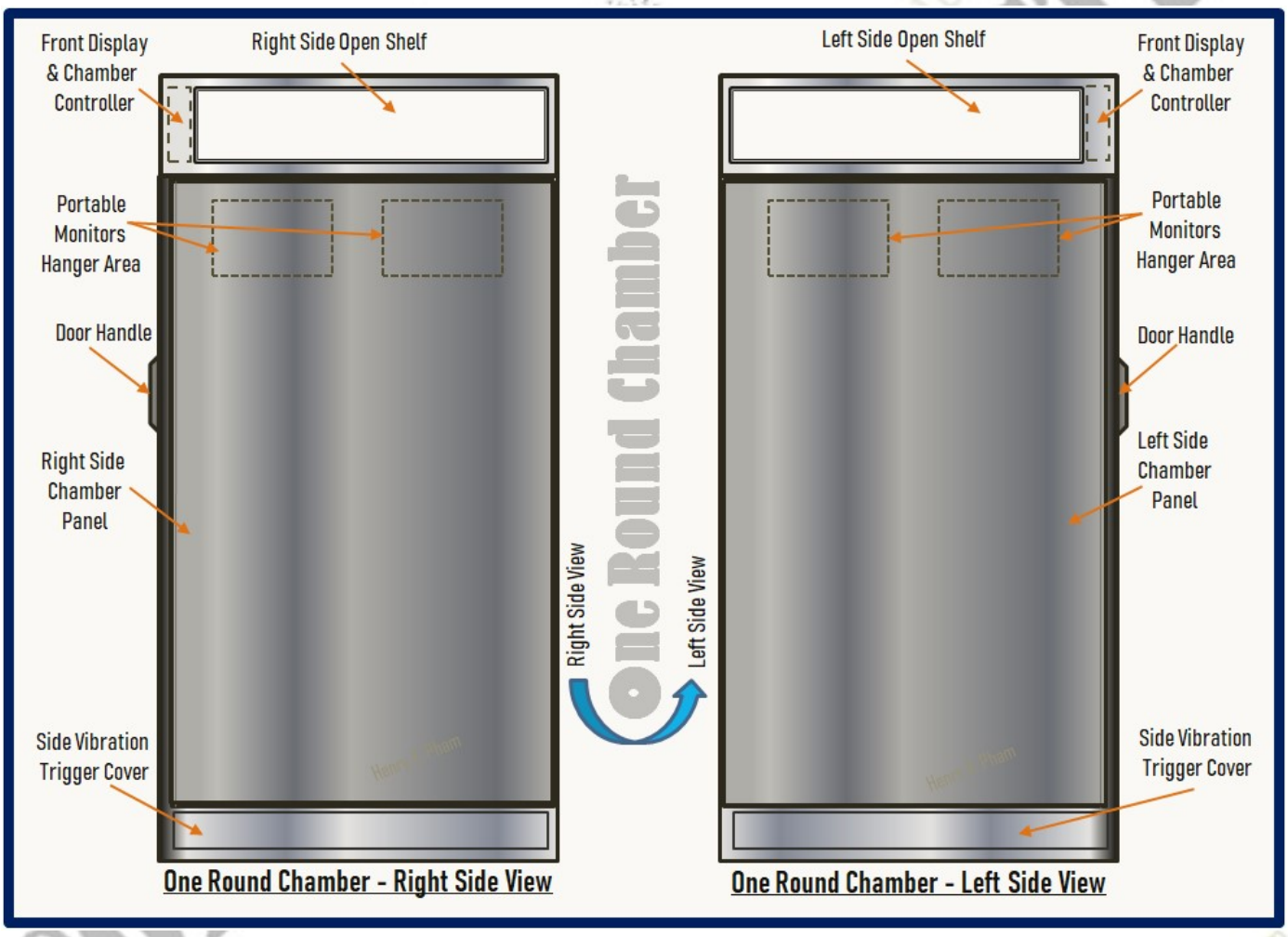

Figure-B3: One Round Chamber – Left & Right Sides View

Figure-B4: One Round Chamber – In Manufacturing Sample View shows a sample layout in series of the One Round Chamber in a row with electrical power cables and Ethernet cables running from the ceiling and the water pipe on the side option for more leak protection on top or inside of the chamber for humidity control. The

water pipe should be small and enough to provide for humidity control and the valve regulator should be controlled by the chamber controller. One Round Chamber is designed to provide great capacity with saving spaces for manufacture with the center cylinder for wiring from the top; and all the power wires and Ethernet wires are recommended to install from the ceiling running into a tube to the top shelf center cylinder open hole for all the wires connecting to the node computers, Ethernet Routers or Hubs, Monitor Switches and the computer server. The electrical power cables for each drum level can be connected to a control power socket switch that allowing to install, control and debug each drum level easier. The webcams which are connected directly to the computer sever for each chamber is shown in this drawing that are focusing on 2 monitors, one for the computer server and the other monitor for the selected node computer which can be selected remotely via a Master & Slave Hard & Soft Monitor Switch application when the users or operators connected to the computer server remotely. However, to control a node computer for setting BIOS or debugging when a test node computer is hanging, the USB Virtual Keyboard is needed and connected from the node computer through the monitor switches with the USB Virtual Keyboard application provided. The USB Virtual Keyboard is new and is part of this invention. This USB Virtual Keyboard option will be described more detail in later section.

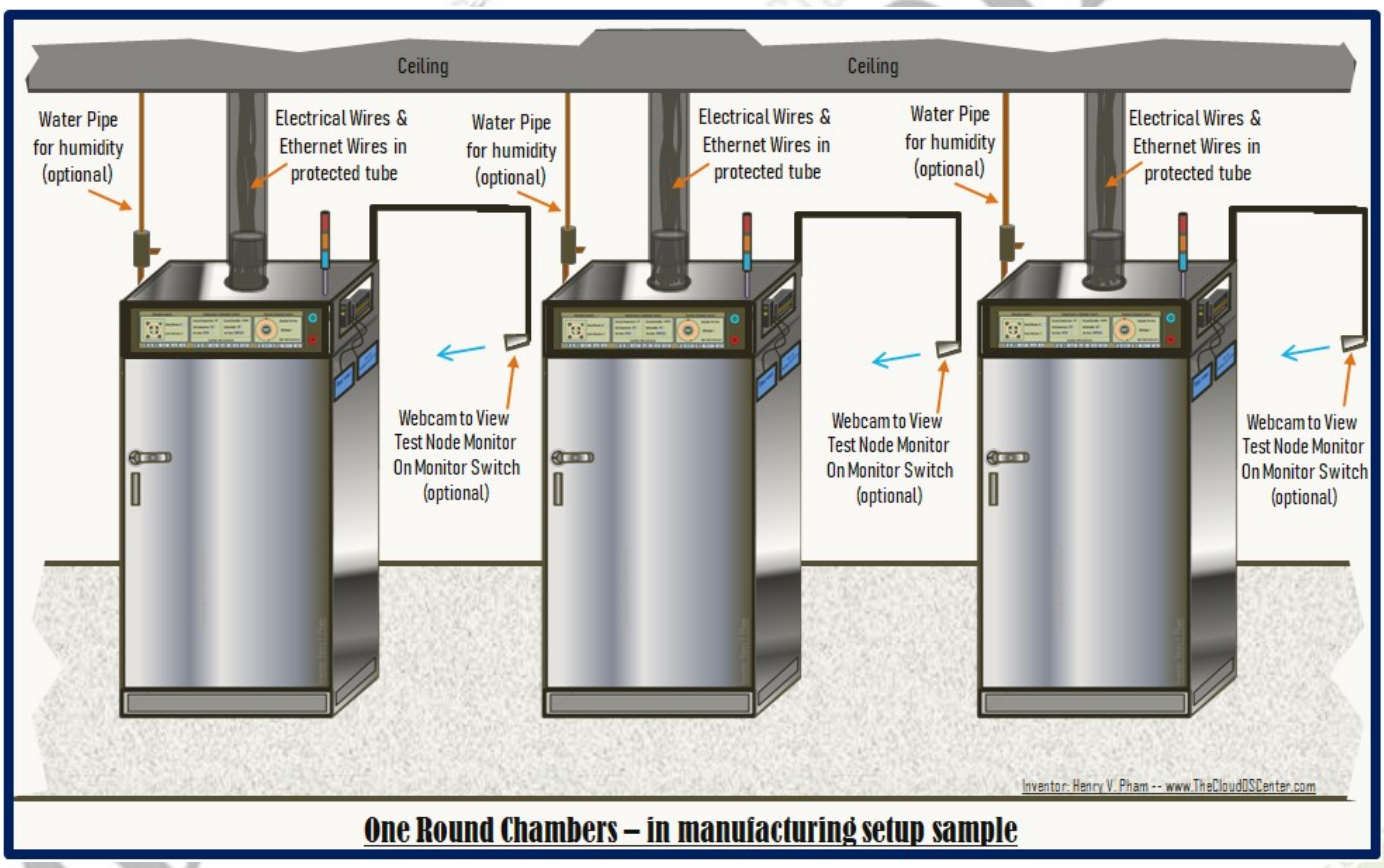

Figure-B4: One Round Chamber – In Manufacturing Sample View

One Round Chamber display controller is required to provide at least Chamber Rotation Control. The Vibration Control can be omitted if the chamber is not built with vibration option or built with manual option without powered control. Note that with the natural design of One Round Chamber rotating in

360°, the Vibration Control is great to have when the chamber has this feature built-in, but the customers or manufacturers can choose without Vibration Control. The in-house chambers or chambers for devices during developing process can be built without the Temperature and Humidity Control; this case the Temperature & Humidity Control can be omitted and the chamber can be build without insulation, or the chamber can be built smaller with node computers and testing devices shared in the same section zone to simplify space and to keep full circle loading capacity of testing devices if the customers required. However, most manufactures should have chambers or tester to test their developing devices with temperature and humidity to test the reliability of their products.

Figure-B5: One Round Chamber Microcontroller & Display Controller View shows the time in standard 24-hours format with 2-digit each field as shown "DD:HH:MM:SS" which can be described in words as "Days : Hours : Minutes : Seconds". The Left and Right arrow buttons can be used to iterate through the selectable items; the Plus [+] and Minus [-] buttons can be used to increase or decrease the integer values; The 'NEUTRAL' button is used to move the drum to initial neutral position, the position that is desired with the Rotation Latch on the drum right at the center of the door, and the Rotation Lock on the Stator Base right at the center of the back of the chamber. At this position, the drum should be free or opened from the Vibration Pattern position to prevent from accidentally set vibration trigger on. The 'RPM 1-3' button is used to switch drum speed with supported modes (1 to 3) as recommended 1°, 2° and 3° degrees per second or approximately 0.5, 1.0 and 1.5 inches rotation of the outer drum circumference dimension. To start the chamber and run the drum, both buttons 'NEUTRAL' and 'RUN' must be pressed at the same time which will put the chamber to neutral position before start rotating the drum, and this would prevent accidentally press one button to run the chamber; note that the drum should rotate to the left first at neutral. The left and right arrow buttons of the Chamber Rotation Control allow the operator to move the drum, and move with constant speed and stop based on the duration of the press of the button.

The Chamber Rotation Control shows the "R10°" as a sample that the drum rotating to the Right at 10° toward the lock position shown in red square, and turning back to initial neutral position as shown with white color circle at the bottom then rotate Left toward the lock position; when rotating to the Left, the inner circle symbol would show L following degree value as recommended. Note that the red square shows the rotation lock on top and the rotation latch shows at the bottom orientation respectively to the position that the operator standing right in the front and the door side is right below, and the back side right on top for better reference.

The Temperature & Humidity Control shows the Current Temperature and Current Humidity values for view only, and the Set Temperature and Humidity and Set Rate fields can be selected by the Left and Right arrow buttons. The values of temperature and humidity can be changed by the Plus [+] and Minus [-] buttons, and set by the 'SET' button. When all the values are set and confirmed, the 'START' button can be used to start the thermal control system. The temperature ramping rate and range are recommended with default standard settings as 1°C per minute and 5°C to 85°C respectively; the humidity ramping rate, and range are recommended with default standard settings as 40%RH per hour and 10%RH to 95%RH respectively.

The Vibration Control shows the circle with 4 inner vibration triggers and 4 outer vibration triggers with labels in numbers which provide up to 63 vibration combinations, and these vibration triggers can be selected and set by the Left and Right arrow buttons with the 'SELECT' button to select and confirm, and to turn on or off with 'ON' or 'OFF' button respectively.

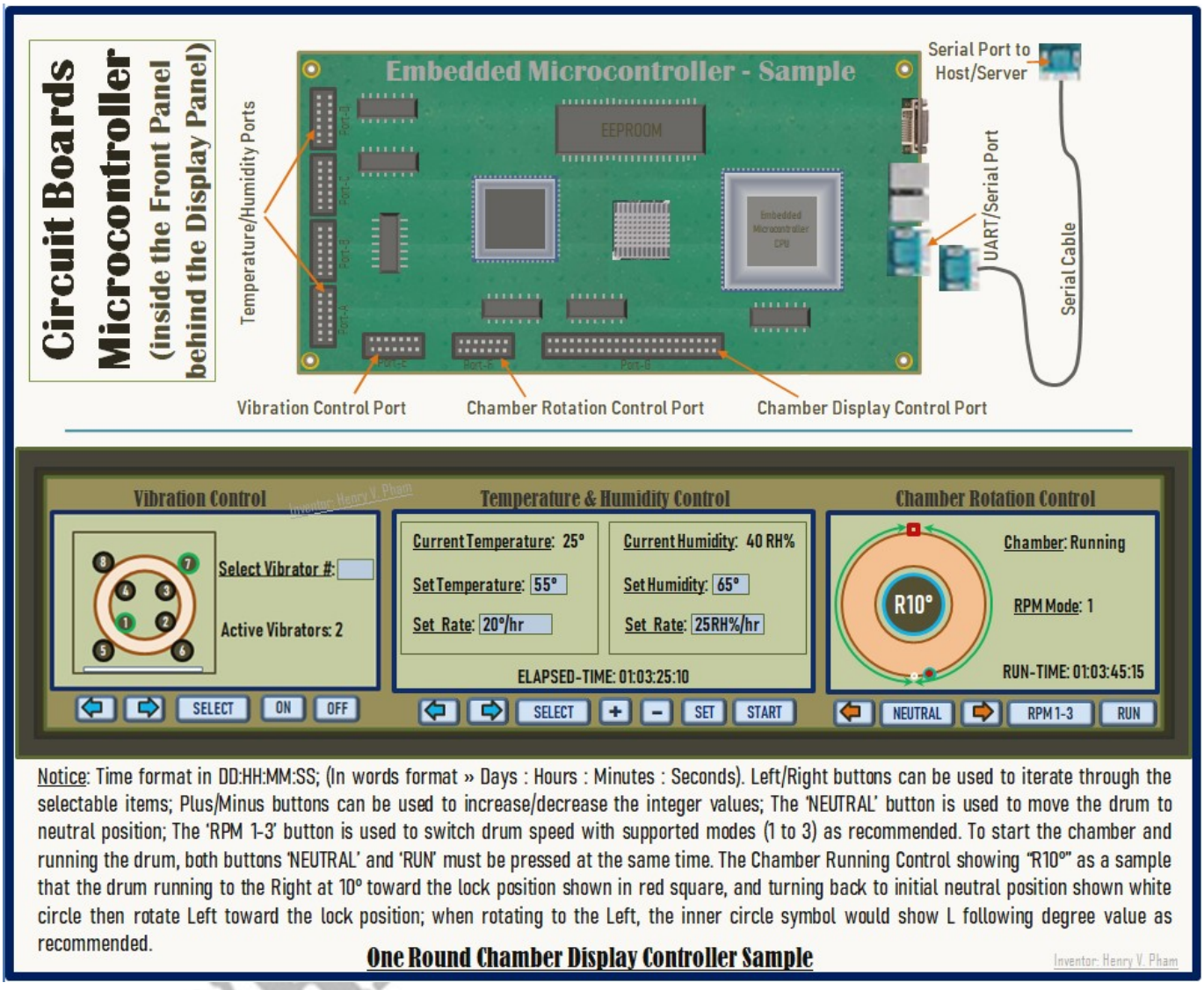

Figure-B5: One Round Chamber Microcontroller & Display Controller View

One Round Chamber with full features is shown with the display controller in the above figure with Vibration Control, Temperature & Humidity Control and Chamber Rotation Control. However, the buttons and the layout of the display controller can be re-arranged by the One Round Chamber manufacturers for convenient design of the layout. All these features and functions can also be controlled by test software; the chamber with the microcontroller should provide an UART Serial Communication cable which can be connected to the host PC or computer server to allow communication via serial port. The figure above shows the microcontroller with a serial port that can be used to connect to the host computer to control

Temperature, Humidity, Vibration Control, Chamber Rotation Control and the Chamber Display Controller via the serial communication protocol without having to provide custom software drivers.

The chamber is designed to provide serial communication with the host PC or computer server with standard UART Serial Communication by the simple commands defined in the Table B1: Chamber UART/Serial Communication Commands. The commands in this table are defined for the host computer and the chamber to communicate via serial communication; the command format with the first byte stands for the command ID, the second byte stands for the request or response ID, the last byte with value 0x03 stands for EOT; and the data in bytes are packed within the request or response ID and the EOT. The host request command with request ID '0x00' is expected to response with all parameters as possible for the same suppose. When the host requests to set or turn on certain thing, the chamber should return with an "ACK' command for success; the "ACK" command should have the same first byte as command ID following 0x03, and 0x06 (stands for an Ack), and ending with 0x03. When error encountered, the chamber responds to the host with the same first byte command ID following 0x03, 0x15 (stands for a Nak), Error code and ending with 0x03. For instance, when the host requests to set new list of vibration patterns without requesting to set the chamber drum to initial neutral position and turning off the rotation before changing the vibration patterns, then the chamber would respond with a Nak command as following, "2F03151F03" where '2F' is the command ID, '03' is the response Ack/Nak command ID, '15' is Nak, '1F' is Error code, and '03' is EOT. When successful requested to set new vibration patterns, the chamber would respond with an Ack command as following, "2F030603" where '2F' is the command ID, '03' is the response Ack/Nak command ID, '06' is Ack, and '03' is EOT. This rule of error responding can be applied similarly to other cases. Note that the chamber needs to check for the conditions of the chamber before allowing for setting or turning the vibration control or chamber rotation on or off for safety purposes.

Command Format	Command Type	Command Data Length	Command Description
1A0003	Host Request	N/A	Get Current Temperature and Ramping Rate °C/Hr
1A01<Temp><Rate>03	Chamber Response	Temp: 1 byte; Rate: 1 byte	Response Current Temperature and Ramping Rate (2 bytes)
2A01<Temp><Rate>03	Host Request	Temp: 1 byte; Rate: 1 byte	Set Temperature and Ramping Rate °C/Hr
1B0003	Host Request	N/A	Get Current Humidity and Ramping Rate %RH/Hr
1B01<Hmid><Rate>03	Chamber Response	Hmid: 1 byte; Rate: 1 byte	Response Current Humidity and Ramping Rate %RH/Hr
2B01<Hmid><Rate>03	Host Request	Hmid: 1 byte; Rate: 1 byte	Set Humidity and Ramping Rate %RH/Hr
1C0003	Host Request	N/A	Get Current Chamber Drum RPM mode & On/Off Status
1C01<RPMMode><OnO>03	Chamber Response	RPMMode: 1 byte; OnO: 1 byte	Response Current Chamber Drum RPM mode & On/Off Status
2C01<RPMMode>03	Host Request	RPMMode: 1 byte	Set Chamber Drum RPM mode
5C01<OnO>03	Host Request	OnO: 1 byte	Turn Chamber Drum Rotation On/Off
1F0003	Host Request	N/A	Get Current Active Vibration Pattern List
1F01<Len><List><OnO>03	Chamber Response	Len: 1 byte; List: var; OnO: 1 byte	Response Current Active Vibration Pattern List (1 byte/pattern)
2F01<Len><List>03	Host Request	Len: 1 byte; List: var	Set Active Vibration Pattern List (1 byte/pattern)
5F01<OnO>03	Host Request	OnO: 1 byte	Turn Chamber Vibration Triggers On/Off
Notice: All values are in hexadecimal; Len: is the length of the data not include EOT 0x03; List: list of bytes with 1 byte per vibration pattern; OnO: is On (0x01)/Off (0x00);			

Table B1: Chamber UART/Serial Communication Commands

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C. Temperature & Humidity with Insulation Support

Figure-C1: One Round Chamber Insulation Rubber Rings View shows these rubber insulation rings with square border which is connected and sealed with the wall insulation layer of the chamber; the door is also sealed with insulation layer and should come with the lock and door handle strong enough to prevent from thermal leaking. One Round Chamber with Temperature and Humidity Control support would have top and bottom rubber insulation rings which are connected and sealed with the wall insulation layer of the chamber, and these rubber insulation rings like brim with strong insulation material and smooth surface and curved inward would help to protect the temperature and humidity leaking while the rotator drum spinning.

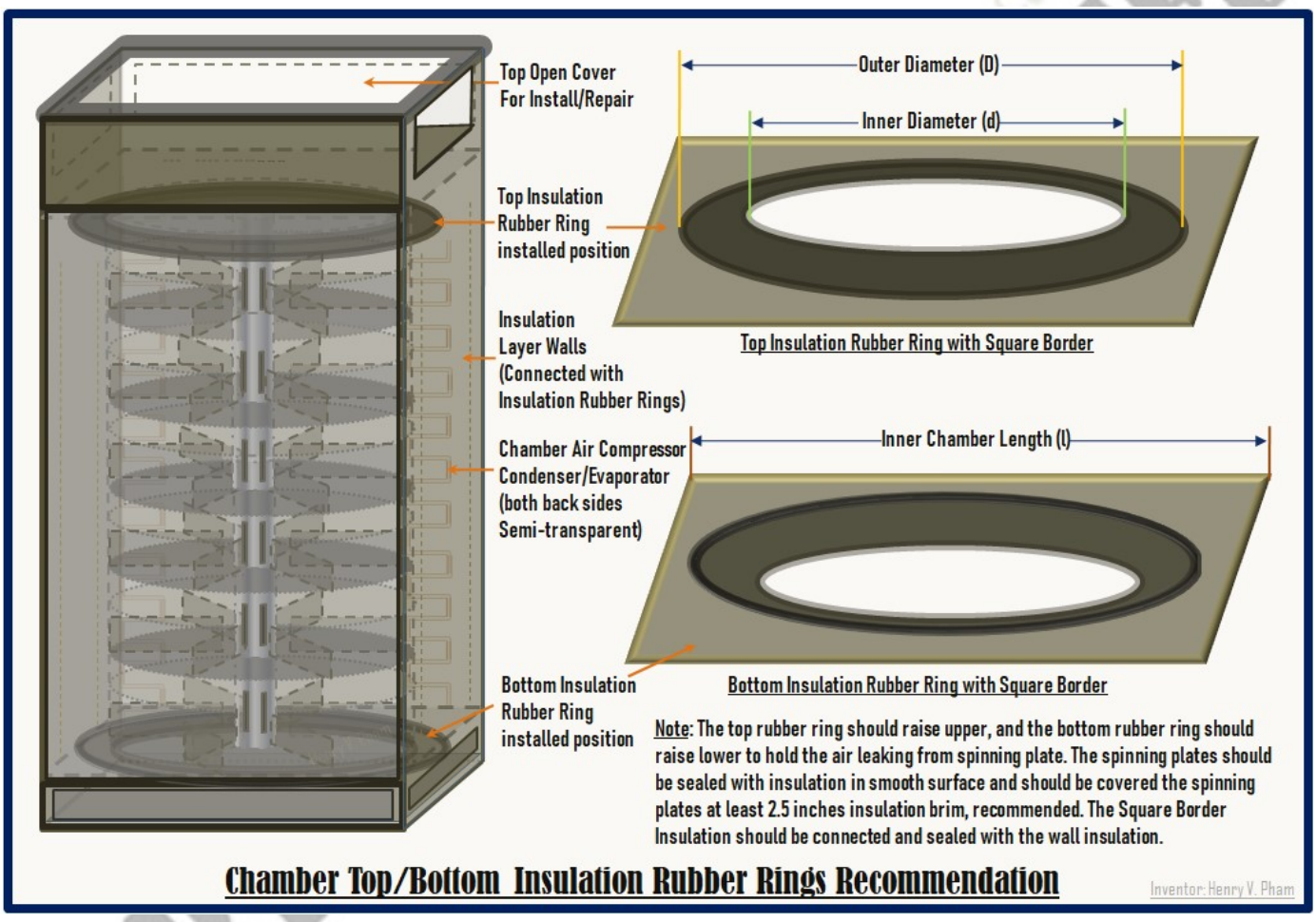

Figure-C1: One Round Chamber Insulation Rubber Rings View

Note that the back insulation panel of the chamber can be built separately with strong insulation material with multiple insulation layers to protect the thermal inside the chamber. This drawing shows the rubber insulation ring with outer diameter 'D' which is similar to the dimension of the top and bottom of the drum with strong material insulation dish, and the inner diameter 'd' would be smaller than the outer diameter with recommended of 2.5 inches to have enough sliding surface cover and prevent from the air leaking. There are numerous of insulation materials beside rubber material in the insulation

industry like polystyrene, polyisocyanurate and other polymer materials; the metal materials with lowest thermal conductivity like stainless steel, aluminum oxide, and titanium alloy can be used for frame, dish or border. This figure also shows the chamber Air Compressor Condenser and Evaporator which are recommended to install on the back of the chamber; both back corners of the chamber with the default dimension shown in this invention have the space of a right triangle with the dimension up to 23.33 inches sides and 33.00 inches base side with the high of 16.5 inches which is more than enough to install the air compressor with condenser and evaporator for both sides. The chamber thermal controller is recommended to build with inner air vents at the 4-corners of the chamber vertically distribution with 3 air vents for each corner of the chamber for hot or cool air inside the testing devices sectors of the drum. The calculation of the chamber corner spaces will be shown more details in the Chamber Dimensions Calculations in later section. Note that the insulation and air compressor system is available in the current market and not shown in details in this invention.

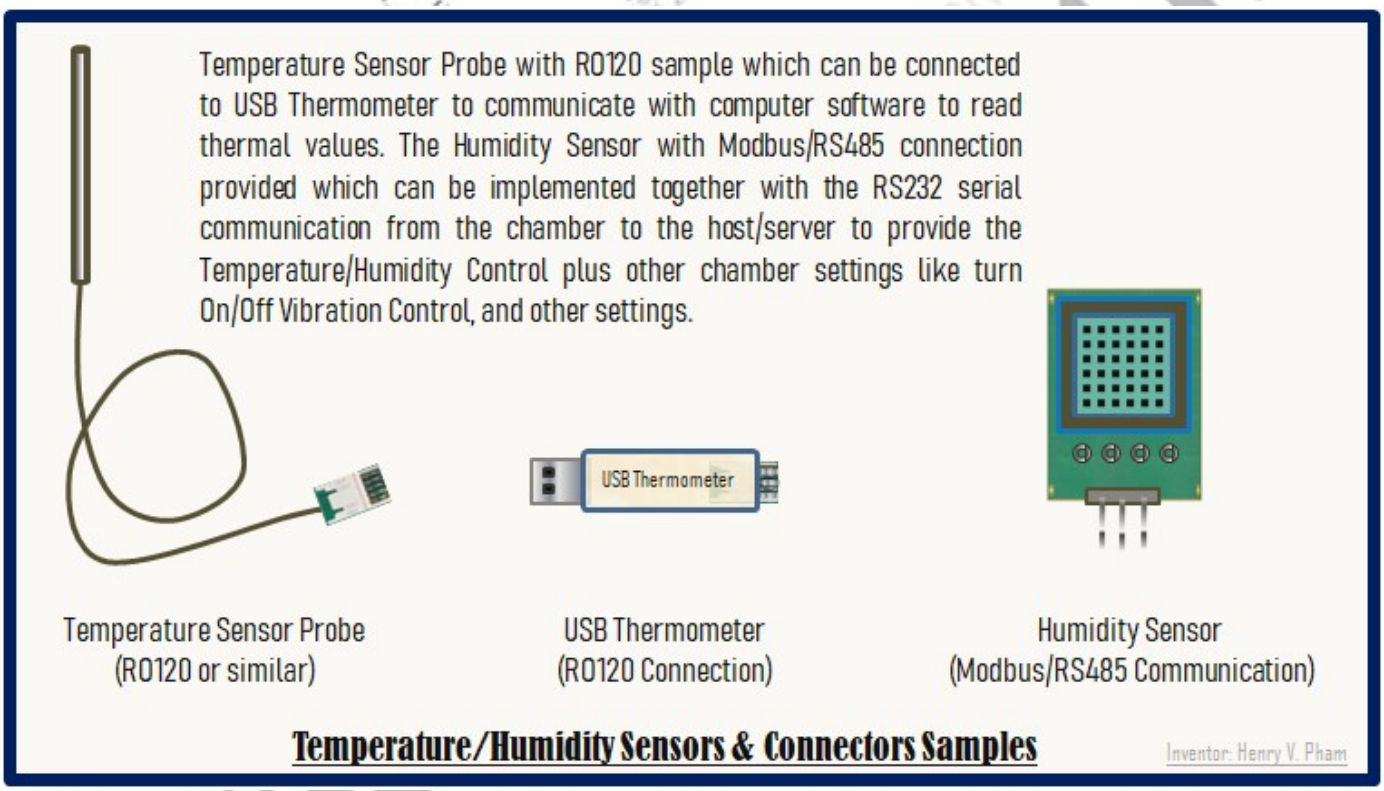

Figure-C2: Temperature/Humidity Sensors Sample

Figure-C2: Temperature/Humidity Sensors Sample shows the temperature sensor probe and the humidity sensor with USB thermometer which is good to use to connect to a computer for testing the thermal convention during developing of the chamber. One Round Chamber with Temperature and Humidity Control is recommended to have 3 sets of thermal sensors; one at the top part of the chamber, another at the bottom part of the chamber and the other in the middle part of the chamber and installed on the sides alternately. With these 3 sets of thermal sensors, the chamber can check and provide the average temperature and humidity values to the computer server and display on the screen better. This figure shows a sample of temperature sensor probe RO120 which can be used to connect to the chamber

thermal controller to read, check and control the setting based on the user inputs. Similar to the humidity sensor with RS485 communication sample shown in this drawing, the thermal sensor can also be connected to the chamber thermal controller to control the thermal settings. However, there are thermal sensors in the market that can read both temperature and humidity values with a communication connection provided; the chamber thermal controller can be implemented to read both thermal values and accept input request from the users via a RS232 communication port. This provides the chamber with capability of controlling temperature and humidity from the host computer with the simple serial communication commands like get temperature and/or humidity values and set temperature and/or humidity values from the host computer or the computer server. The reference section in this invention document would provide the links to show more details about the temperature and humidity sensors.

D. Chamber Inner Structure & Mechanical Parts

Figure-D1: Rotatable Drum with Top & Bottom Roller Rings shows the drum in semi-transparent with 6 levels and the rollers that support the drum rotation with the powered gears on the bottom stator base that rotates the gear ring at bottom of the drum.

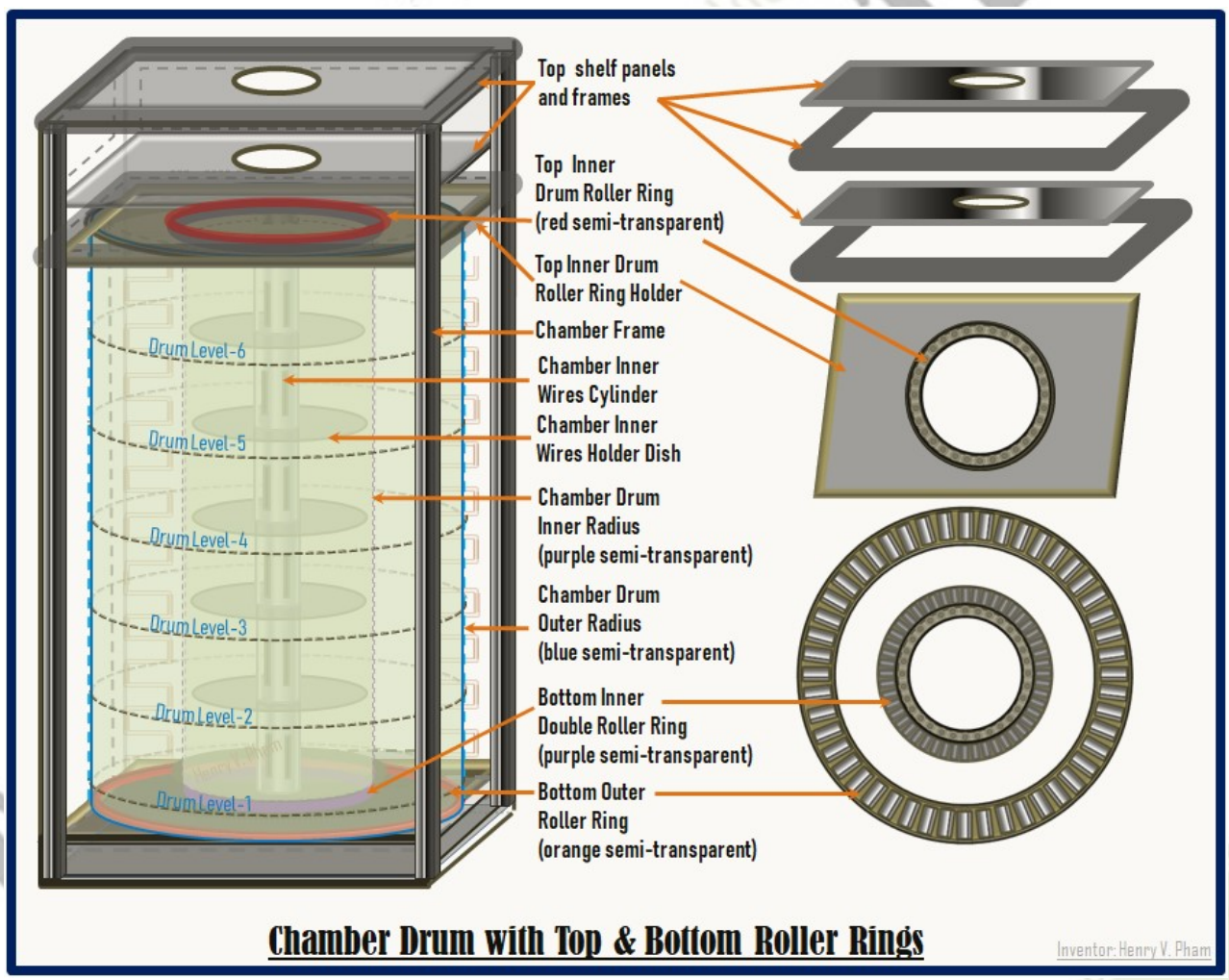

Figure-D1: Rotatable Drum with Top & Bottom Roller Rings

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The gear ring and gear motors will be described more detail in later section, 'Stator Base & Rotator Drum with Vibration Support'. One Round Chamber has rotatable drum which is divided into multiple levels, each level is recommended to divide into 8 sectors for easier to build, maintain and repair. The rotatable drum rotates on the based with the inner bottom double roller ring and the bottom outer roller ring, plus the top inner drum roller ring. The top inner drum roller ring with its holder in square which is fixed and connected to the frame of the chamber on top that hold the drum. This top inner drum roller ring is designed to hold the drum while it spins around back-and-forth, but not recommended to use as a hanger to hang the drum; and it would be recommended to have at least 1/8 inch vertical tolerance for the drum to spin by the gear motors at the bottom of the drum when the vibration trigger is in place which may needs some vibrations tolerance of the drum.

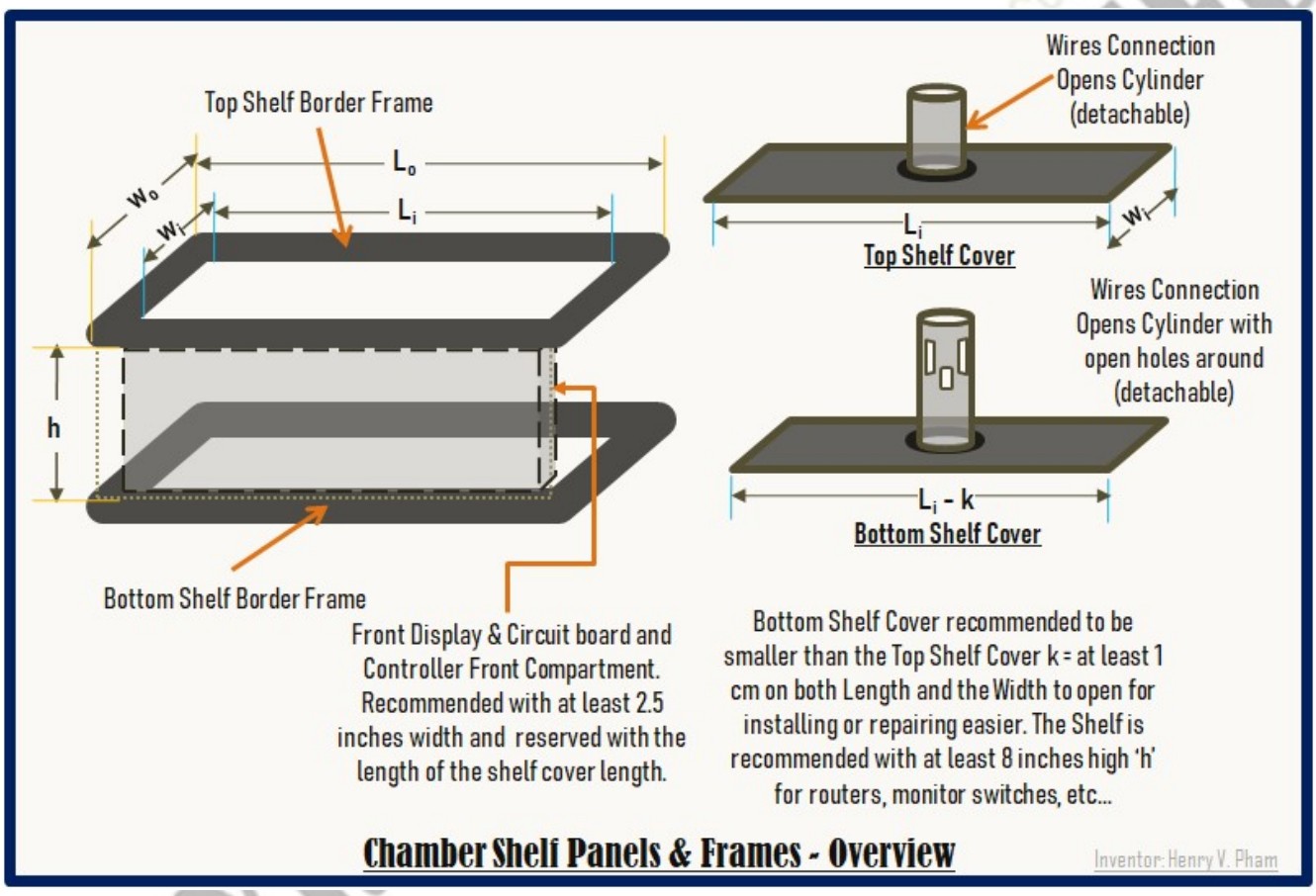

Figure-D2: Chamber Top Shelf with Panels & Frames

Figure-D2: Chamber Top Shelf with Panels & Frames shows the top shelf panels and frames; the top and bottom panels would have the wires open cylinder which is used to secure the wires from the ceiling to the shelf and to the node computers; the top shelf which is used to store computer server, power switches, Ethernet Router and Monitor Switches. The wires open cylinder on the bottom shelf cover panel should have open holes for the wires from the switches on the shelf to the node computers. The top shelf cover panel is designed to be larger than the bottom shelf cover panel by at least 1cm to allow removing the bottom shelf panel easier when repairing. The outer width 'W_o' and outer length 'L_o' of the frame

should be equal and equal to the side dimension of the chamber, and the frame width is recommended with at least 2 inches and strong enough to hold the top shelf with all the computer devices. Note that the inner width 'W_i' is smaller than the outer width at least 2.5 inches included the frame border width, and inner length 'L_i' is smaller than the outer length by at least 1cm included the frame border width. The front compartment with the width at least 2.5 inches of the top shelf is designed for the chamber display controller, circuit board controllers and the main chamber microcontroller. The main chamber microcontroller would control the display, the thermal system, the chamber vibration triggers and the rotation of the drum of the chamber.

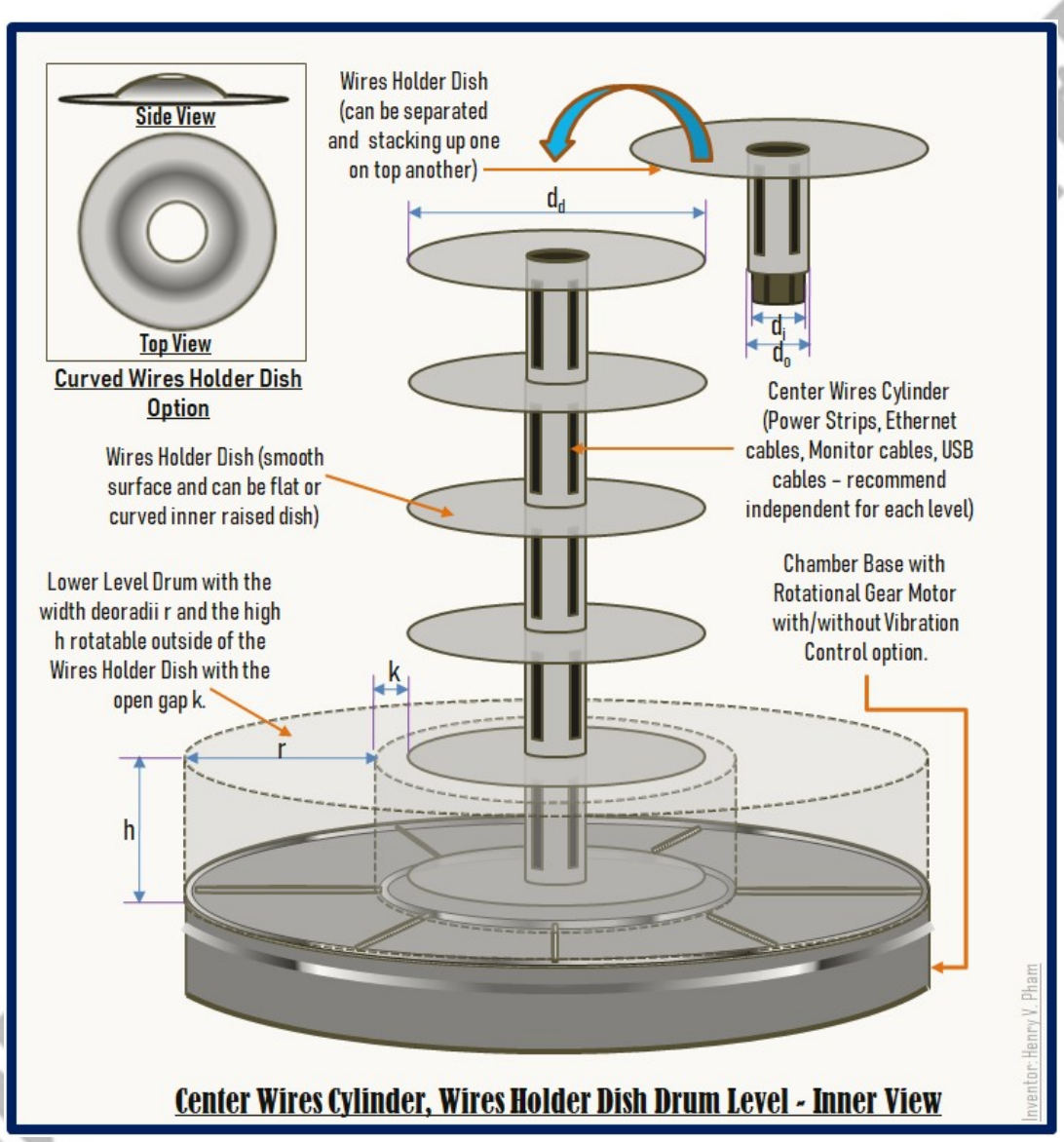

Figure-D3: Drum Base, Wires Cylinder and Wires Holder Dishes

Figure-D3: Drum Base, Wires Cylinder and Wires Holder Dishes shows the inner fixed cylinder with recommended diameter 'd_o' of 6 inches with the thickness of ¼ inch with open holes for wiring, and the wires holder dish for each level can be stacked up with the cylinder part comes with smaller size at the bottom portion with

inner diameter 'd_i' with 2.5 inches deep to connect to another level with lock-lanes as shown in black lanes and screws for stronger structure. The top part would be connected to the bottom shelf panel with screws and open through the cylinders for wiring. Each level of the fixed inner cylinder would have a wires holder dish with diameter 'd_d' of 20 inches, the wires holder dish can be in curved shape as shown on the top left of this drawing for better holding the wires separately on each level and prevent twisting wires while the drum is rotating around. The open gap 'k' recommended with 2 inches which is required space for the drum to rotate around; and the drum deoradii 'r' recommended with 20 inches width and the high 'h' with 10 inches which will be shown more detail in later section. The high of the chamber base is recommended within 12 inches for better momentum of the drum rotation and is enough for the gear motors, vibration triggers, base protection and other mechanical parts. Note that the drum base is in circle shape, and the outer base of the chamber would in square.

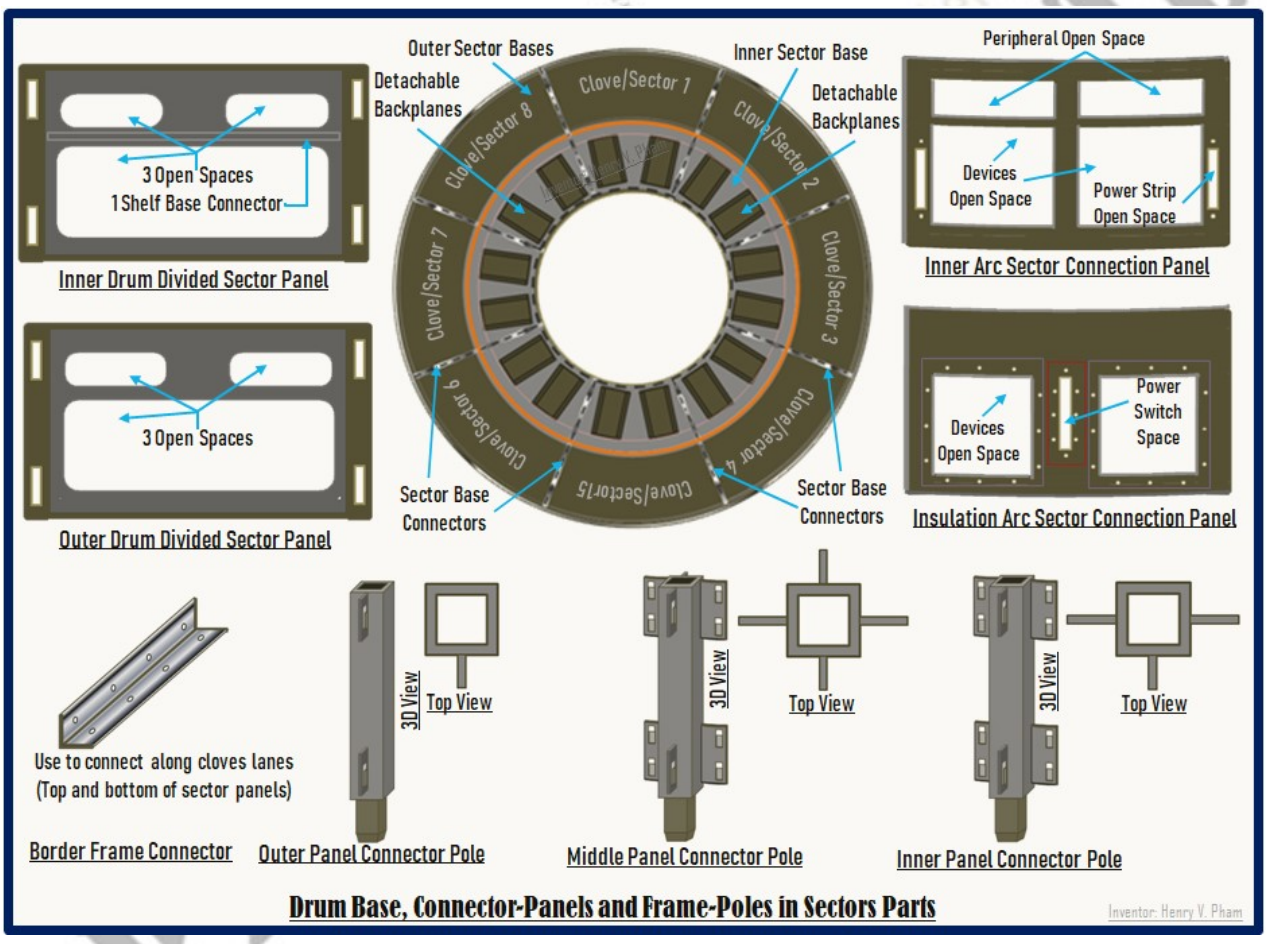

Figure-D4: Drum Base with Connector Panels and Frame Poles

Figure-D4: Drum Base with Connector Panels and Frame Poles shows the drum base is divided into 8 sectors with inner and outer sector bases with the connector poles, connector panels and the insulation panels. The drum base can be in a competed circle dish for strengthness of drum structure, and the metal ring connectors for each level around the inner circle of the drum which can be tied with the connector poles. The drum base shows the inner sectors with detachable backplanes which are used for node computers,

each sector with 2 node computers and each node computer can handle to test 2 or more testing devices. The inner arc sector connection panel which is shown on the top right corner is used to connect the inner circle drum with open space for computer supported devices like Ethernet Hubs, Monitor Expanders and power supply for the node computers; this panel is recommended to use strong and lightweight material with at least ¼ inches thickness to form a strong circle structure of the rotator drum. The inner circle shown in orange color would be the insulation circle which is used with the insulation material arc sector connection panel that is also recommended to use strong lightweight and low-conductivity material with the outer insulation layer that use to isolate heat transferring to the node computers and other devices inside the inner sectors. The drum base on each level is divided into 8 sectors, and each sector is divided with the inner and outer drum divided sector panels which are shown on top left corner of this drawing. The inner connector is recommended to use strong and lightweight material with at least ¼ inches thickness to form a strong circle structure of the rotator drum; and the outer connector is recommended to use strong lightweight and low-conductivity material. All these panels or connector panels are connected by the inner panel connector poles, middle panel connector poles and outer panel connector poles with support of the border frame connectors as shown on the bottom of the drawing.

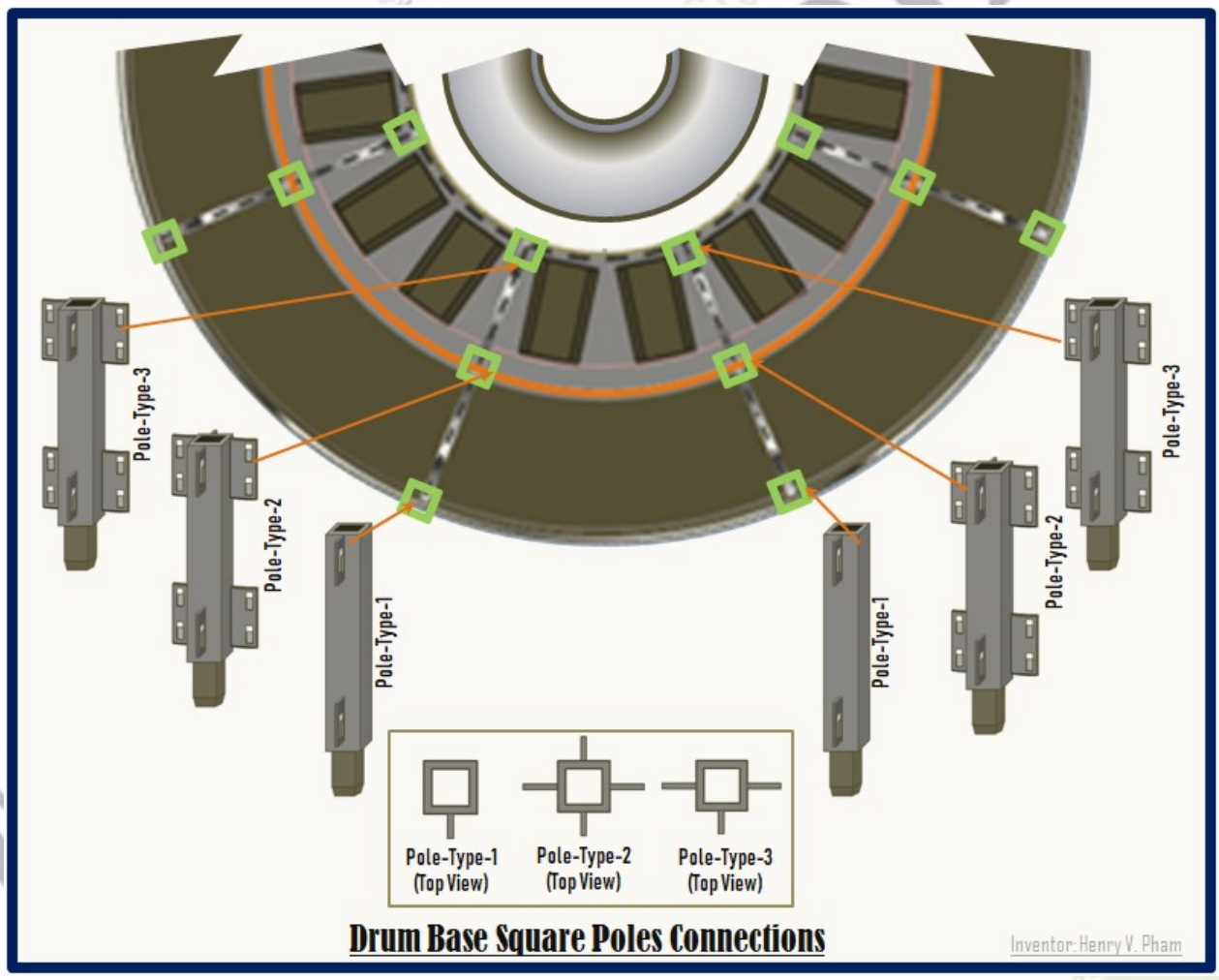

Figure-D5: Drum Base Frame Poles Connections

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Figure-D5: Drum Base Frame Poles Connections shows the drum sectors connections with square poles on the recommended positions along the 8-sector dividers. The square poles are recommended with at least 1 inch square and ¼ inch thickness with strong and low-conductivity material.

Figure-D6: Node Computer Power Switch & LED Light shows a sample of node computer power switch and main computer board powered one LED light. The drum base with 8 sectors, and each sector is reserved for 2 node computers; this power control switch and LED light panel provides to control 2 node computers in a drum base sector; the power wires should be connected to control power on/off for the node computer, and the LED wires should be wired to powered pins of the main computer board and showing green light when node computer is on. The node computers that are stored inside the insulation circle are needed to have the power switches to turn on and off with the LED indicators for each node computer. One Round Chamber is designed with Temperature and Humidity testing environment, and it is required to have insulation and the node computer power switches are installed right on the insulation panel within the thermal testing environment. The power switches are recommended to have waterproof and heat protection with industrial grade that can handle beyond the temperature range from -40°C to 85°C.

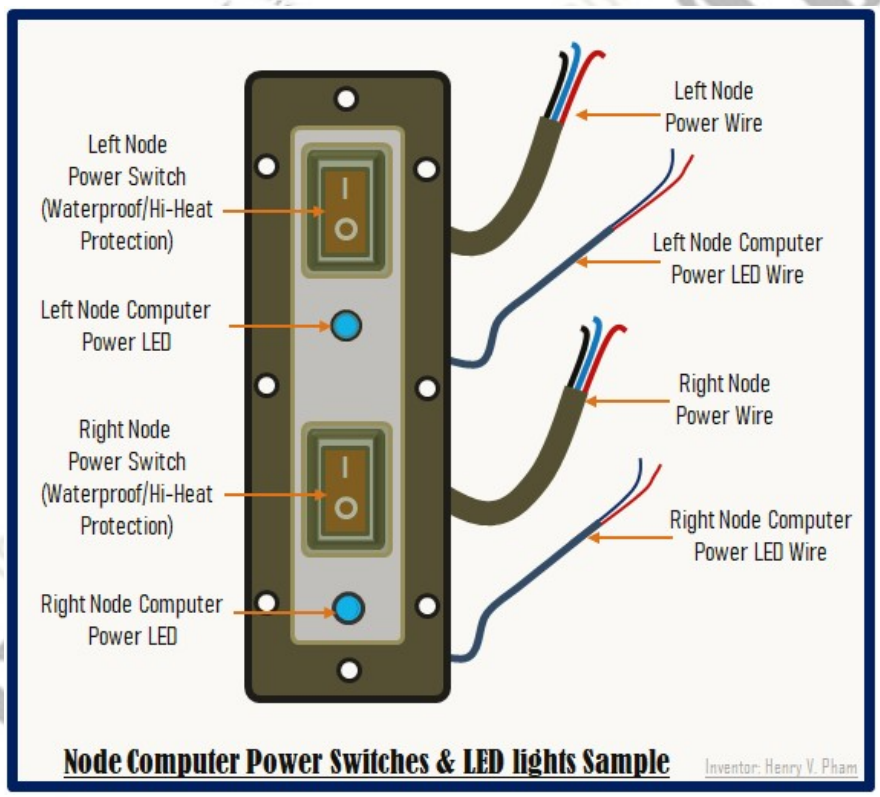


Figure-D6: Node Computer Power Switch & LED Light

Figure-D7: Drum Clove/Sector Connection Parts shows a drum sector with its connection parts including connection panels, insulation panels and the node computer power switch panel. The node computer power switch and LED light panel is recommended to install with shortest wires as possible. This panel is recommended with option 1 installation and installed right in the middle of the insulation arc sector panel where both sides are opened and reserved for the testing devices connector holder modules. Another

option to install this power switch and LED light panel is installed vertically along on the drum outer connection poles when the power switch and LED light panel is well secured and protected from extreme temperature and humidity environment with the high industrial grade certification. However, the power switch can be built with lower voltage, waterproof and heat protection for longer wires to control the relay circuit inside the insulation environment to turn on/off the power switch of the node computer. This drawing shows a sample of the drum sector with the inner arc sector connector panel which is installed on the inner drum circle; the insulation arc sector connector panel is installed on the middle circle line of the drum to isolate the hot or cool air with the thermal testing environment to protect node computers and other electronic devices and the data wires cables; the inner drum connection panel and the outer drum connection panel are connected with the square poles to form the drum sector divider for the 8-sectors for stronger structure of the circle drum.

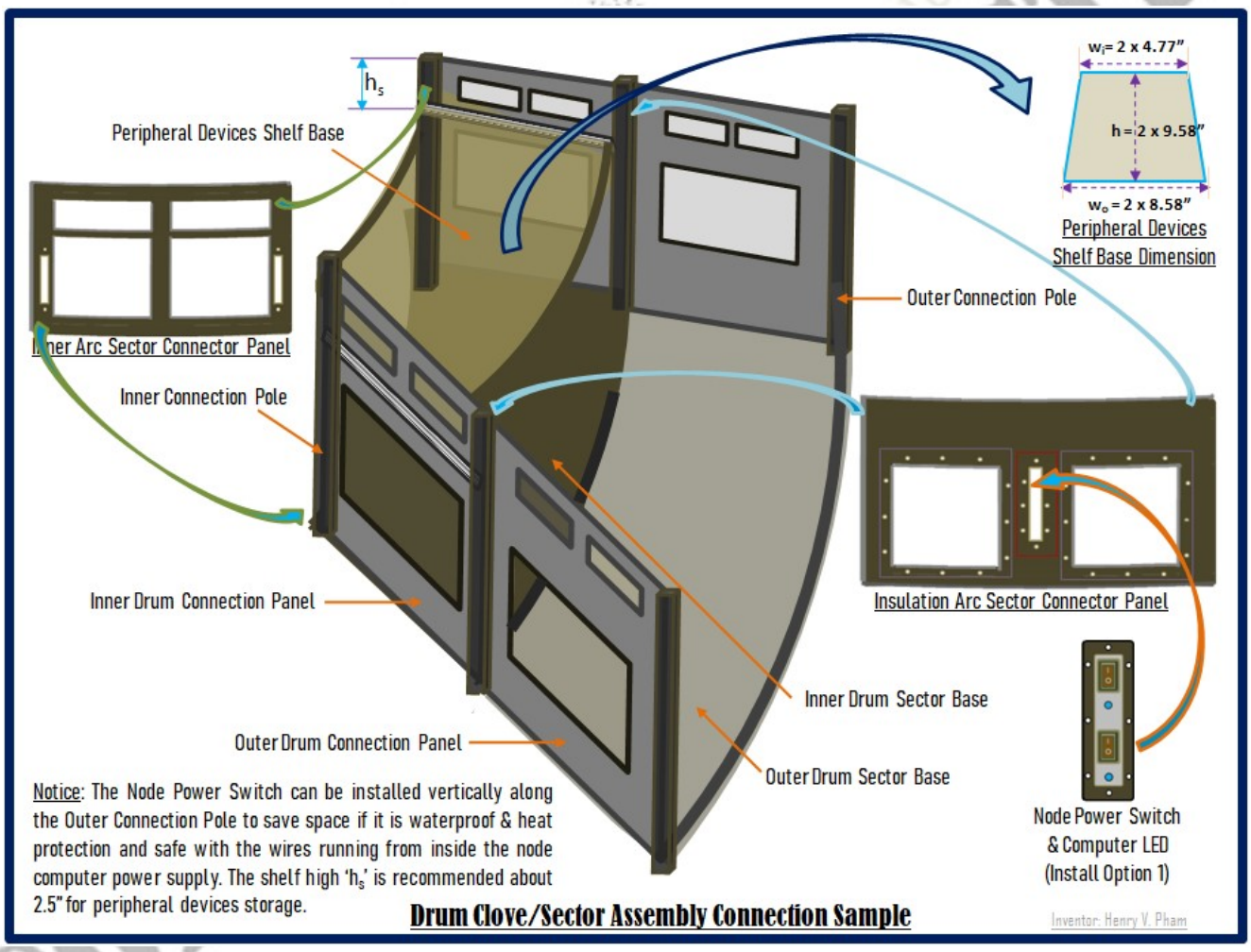


Figure-D7: Drum Clove/Sector Connection Parts

The drum sector with the default dimension shown in this invention document would have the size of the drum sector in trapezoid shape with the inner width w_i = 2x4.77 inches; outer width w_o = 2x8.58 inches; and the high h = 2x9.58 inches. These dimensions will be shown detail in the 'Chamber

Dimensions Calculations' section and should be good enough to install 2 node computers and the supported devices.

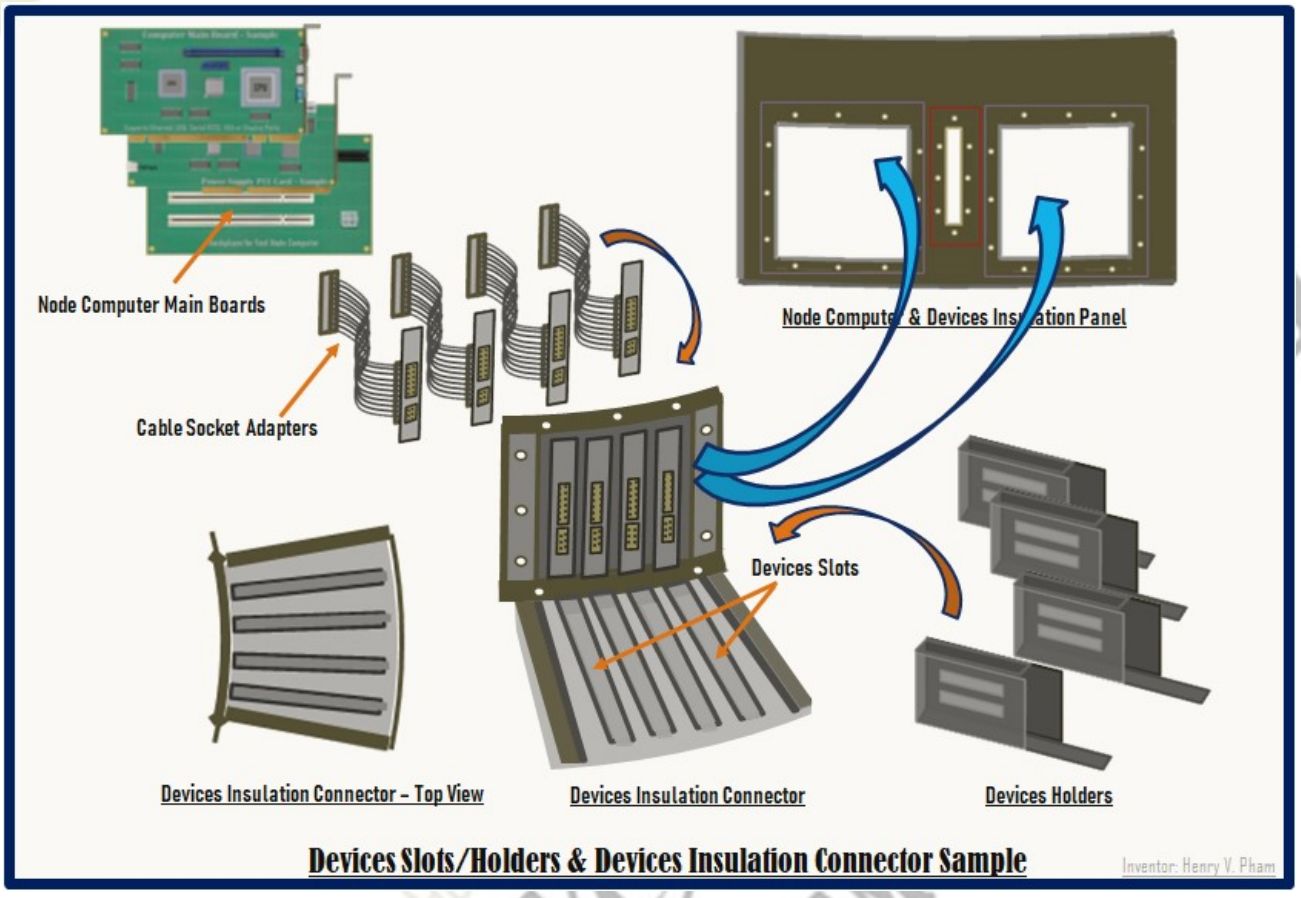
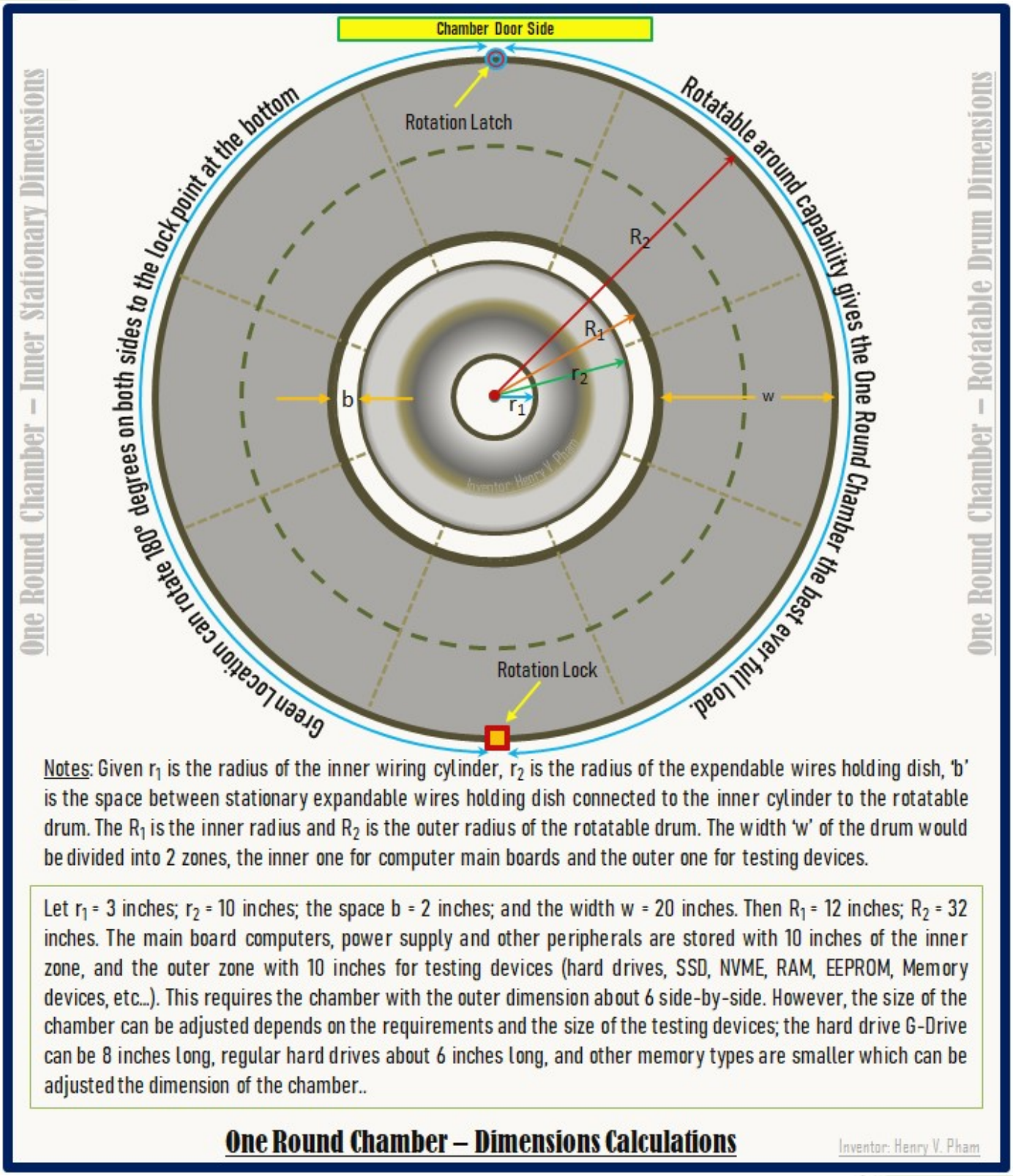


Figure-D8: Testing Devices Slots/Holders with Insulation Panel

Figure-D8: Testing Devices Slots/Holders with Insulation Panel shows the devices insulation connector panel in arc shape with devices slots which can be built-in with device holder for each device slot or can be built to support separate devices holders as shown in the drawing. The devices insulation connector panel is recommended to build in arc sector where the outer curved circumference is larger than then inner curve which would give more space to remove the testing devices easier by hand or by robot. One Round Chamber is invented to support testing any devices like HDD hard drives, SSD drives, NVMe memory, DRAM memory or any other devices. Note that the testing devices can come with many different sizes, the new Greatest Performance Hard Drive G-DRIVE can come with larger size 4"x8" compare to the regular 3.5" hard drives 4"x6" approximately; the device insulation connector panel can be customized to fit the customer requirements for the size and the data and power cable adapters or sockets of the testing devices. The testing devices can be connected to test in vertical or horizontal orientation, and this invention document shows the vertical oriental layout as a sample which is recommended for testing HDD hard drives. Note that some devices cannot be connected directly through the devices insulation panel, and the testing devices can be layout on a testing devices switch circuit board which may come with a built-in connector to connect to the node computer via devices insulation panel.

One Round Chamber - Specification

E. Chamber Dimensions Calculations



Notes: Given r_1 is the radius of the inner wiring cylinder, r_2 is the radius of the expendable wires holding dish, 'b' is the space between stationary expandable wires holding dish connected to the inner cylinder to the rotatable drum. The R_1 is the inner radius and R_2 is the outer radius of the rotatable drum. The width 'w' of the drum would be divided into 2 zones, the inner one for computer main boards and the outer one for testing devices.

Let r_1 = 3 inches; r_2 = 10 inches; the space b = 2 inches; and the width w = 20 inches. Then R_1 = 12 inches; R_2 = 32 inches. The main board computers, power supply and other peripherals are stored with 10 inches of the inner zone, and the outer zone with 10 inches for testing devices (hard drives, SSD, NVME, RAM, EEPROM, Memory devices, etc...). This requires the chamber with the outer dimension about 6 side-by-side. However, the size of the chamber can be adjusted depends on the requirements and the size of the testing devices; the hard drive G-Drive can be 8 inches long, regular hard drives about 6 inches long, and other memory types are smaller which can be adjusted the dimension of the chamber..

One Round Chamber – Dimensions Calculations

Inventor: Henry V. Pham

Figure-E1: Chamber Rotator Drum & Stator Dimensions Calculations

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One Round Chamber - Specification

Figure-E1: Chamber Rotator Drum & Stator Dimensions Calculations shows drum rotating back-and-forth in 360° with the Rotation Latch right at center of the chamber door and the Rotation Lock right at the middle of the back of the chamber with additional option of shock/push sensor with spring right at the Rotation Lock, to support full load in 360°, recommended with the dimensions. The inner cylinder with radius r_1 is recommended with 3", wires holder dish with radius r_2 is recommended with 10", the space 'b' is recommended with 2", the inner drum circle with radius R_1 is recommended with 12", the outer drum circle with radius R_2 is recommended with 32" while the width 'w' of the drum is 20" which are good enough to support most of the testing devices including the G-DRIVE with 4"x8" inches approximately. However, depends on the requirements of the customers, the chamber dimensions can be adjust to fit the requirements.

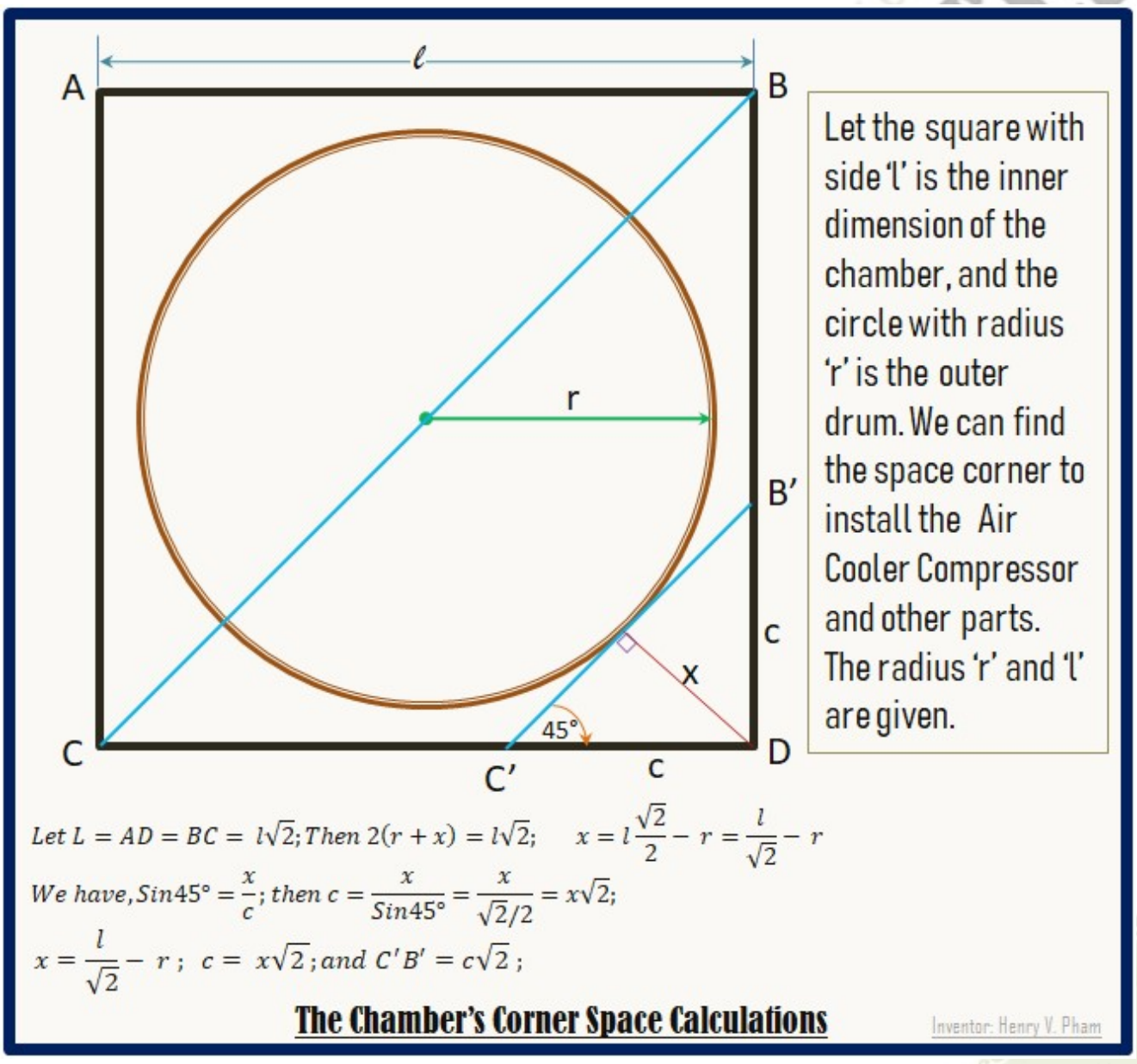

Figure-E2: Chamber Corner Spaces Dimensions Calculations

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One Round Chamber - Specification

Figure-E2: Chamber Corner Spaces Dimensions Calculations shows the calculations of the corners with assumption that the outer rotator drum plus protector panels with the radius r = 33", the square sides with length l= 70" of the inner chamber. Based on the formulas on the figure above, we have x =16.5"; c = 23.33"; and C'B' = 33.0" which are the sides of the triangle C'B'D. These dimensions are large enough to install 2 sets of the air compressor with condensers and evaporators plus fans vertically on both back corners.

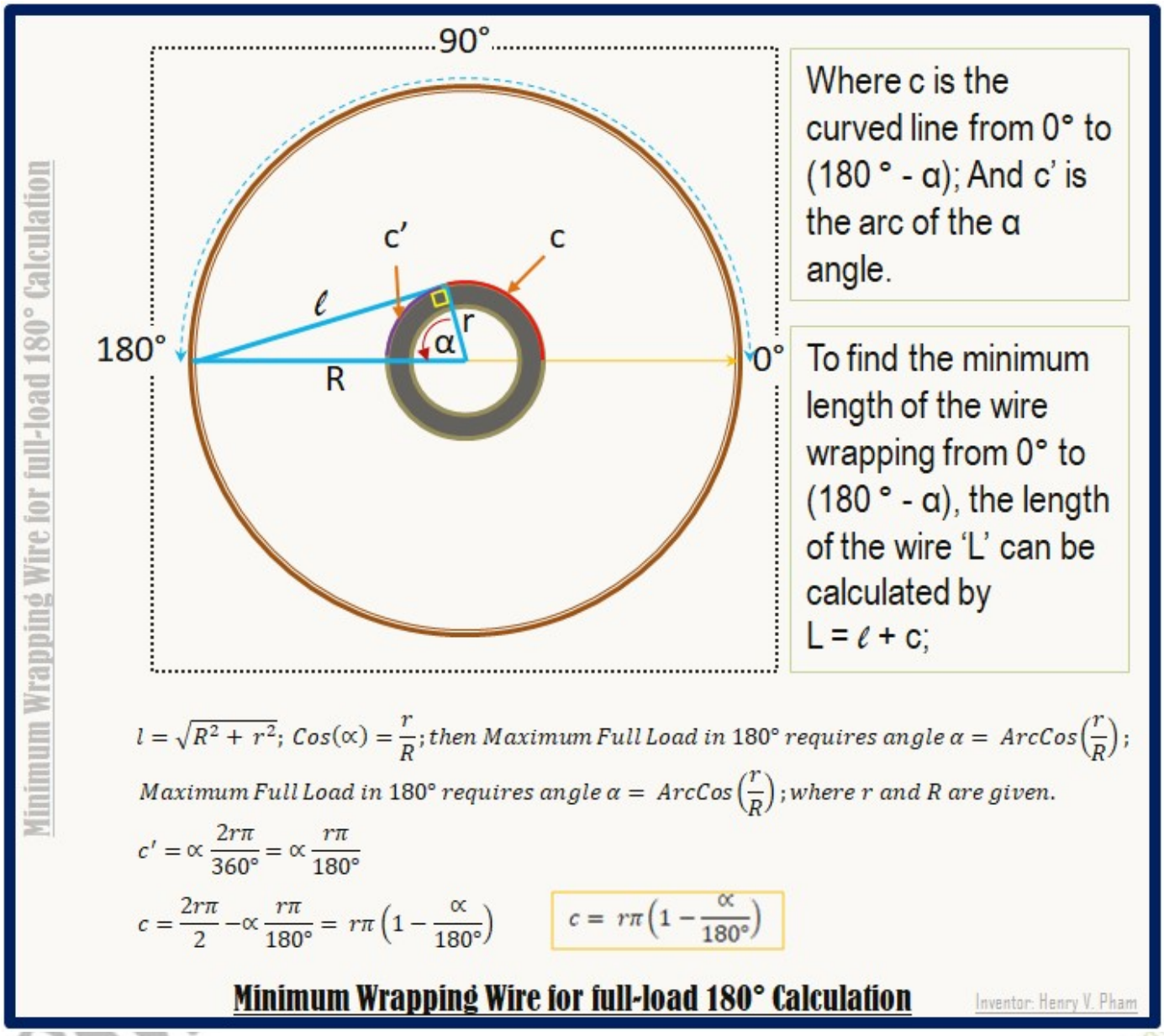

Figure-E3: Chamber Minimum Length of Wrapping Wires Calculations

One Round Chamber - Specification

Figure-E3: Chamber Minimum Length of Wrapping Wires Calculations shows the calculations requirements for minimum length of the wires that allow the drum to rotate to the lock position at 180° starts from 0° position. When the drum rotates to the lock position, we have the right triangle with the 3-sides as shown r, R and l. With the given default chamber dimensions shown in this invention document, Let r = 3"; R = 12". Based on the formulas shown in the above figure, we have l = 12.37"; α = 75.5°; and c = 5.47"; then we can find the total wire length equal to 17.8" which is the sum of 12.37" plus 5.47". The drum is rotating with support of the wires holder dish; the tolerance with 6" approximately is recommended for the length of the wires. So, the 2 feet cable should be good fit to connect from the center cylinder to the node computer.

The drum which is rotating around with the load is recommended to have the gear ring installed on the Mass Center Line or Mass Center Radius of the brim or the deoradii of the drum to have more stability and reliability for the mechanical parts moving the drum back-and-forth. Figure-E4: Chamber Rotator Drum Mass Center Radius Calculation shows the calculations to find the Mass Center Radius of the drum with assumption that the drum load with even distribution.

From the figure below, we have, $A_r = r_1^2\pi$; $A_0 = r_0^2\pi$; $A_c = r_c^2\pi$;

Then, $A_r - A_0 = r_1^2\pi - r_0^2\pi = (r_1^2 - r_0^2)\,\pi$; and $A_c - A_0 = r_c^2\pi - r_0^2\pi = (r_c^2 - r_0^2)\,\pi$;

Let $A_c - A_0$ is the area to be equal for mass center circle.

Then $A_c - A_0 = ½(A_r - A_0) = ½(r_1^2 - r_0^2)\pi$;

$A_c = ½(r_1^2 - r_0^2)\pi + A_0 = ½(r_1^2 - r_0^2)\pi + r_0^2\pi = ½(r_1^2 - r_0^2 + 2r_0^2)\pi = ½(r_1^2 + r_0^2)\pi$;

So, $r_c^2 = ½(r_1^2 + r_0^2)$; or $r_c = [½(r_1^2 + r_0^2)]^{½}$;

So, we have,

$$r_c = 70.71\%\sqrt{(r_1^2 + r_0^2)}$$

The detail of the Mass Center Line and Mass Center Point calculation for real life applications can be referred to the Parallel Transforming Percentage (PTP) Theorem with the Mass Center Line was introduced and can be viewed from the link in the reference section in this invention document. Based on the chamber dimensions mentioned above with radius r_0 = 12"; r_1 = 32"; we can find the mass center radius r_c = 24.17" based on the formula shown in Figure-E4: Chamber Rotator Drum Mass Center Radius Calculation. The gear ring for the chamber drum is recommended with the width of 2"; and the round motor gear is recommended with at least 2.5" diameter and 2" width to have enough dimensions for the torque of the motor to drive the rotator drum smoothly with the set of 4 gear motors which will be shown more detail in later section.

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One Round Chamber - Specification

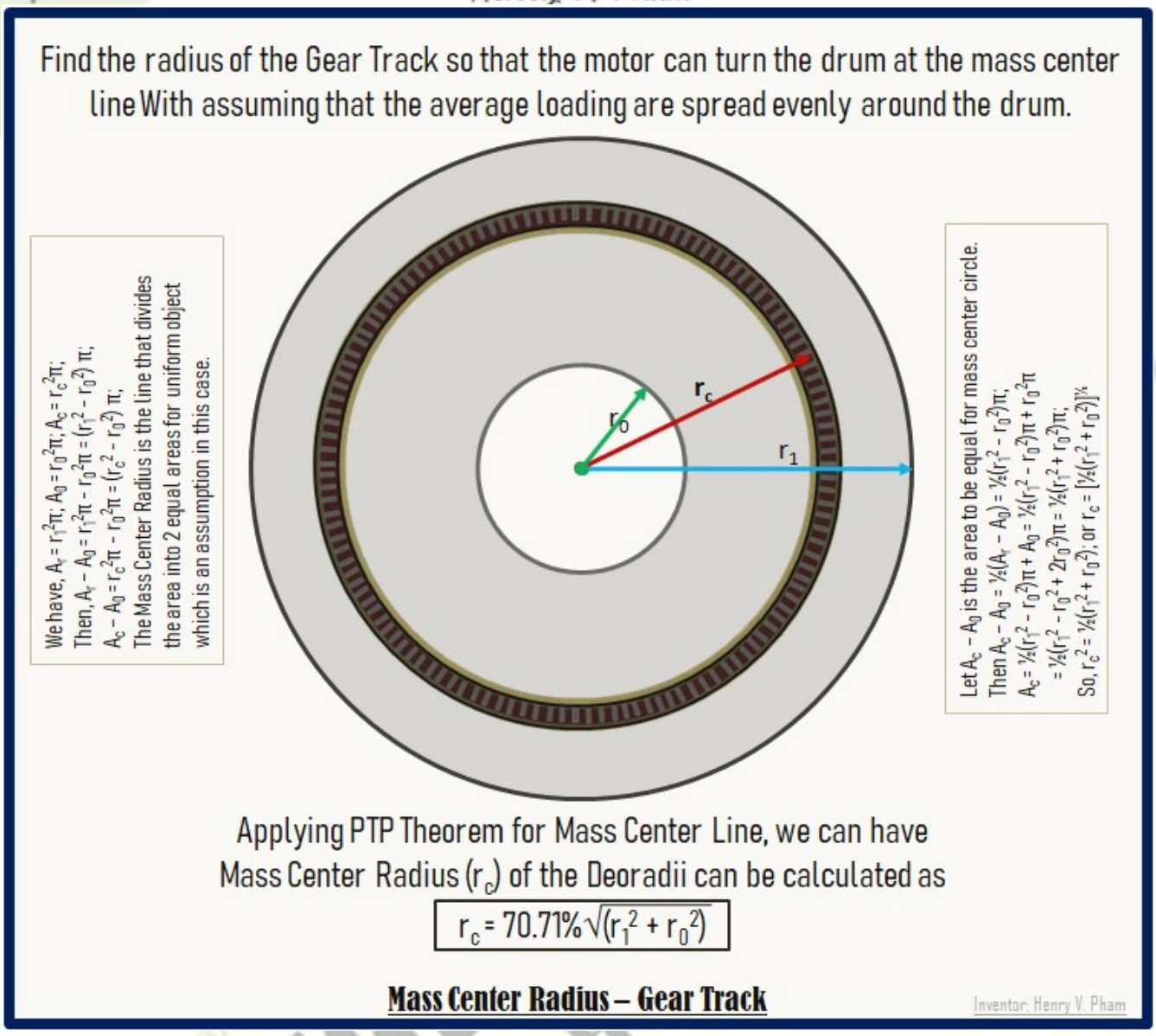


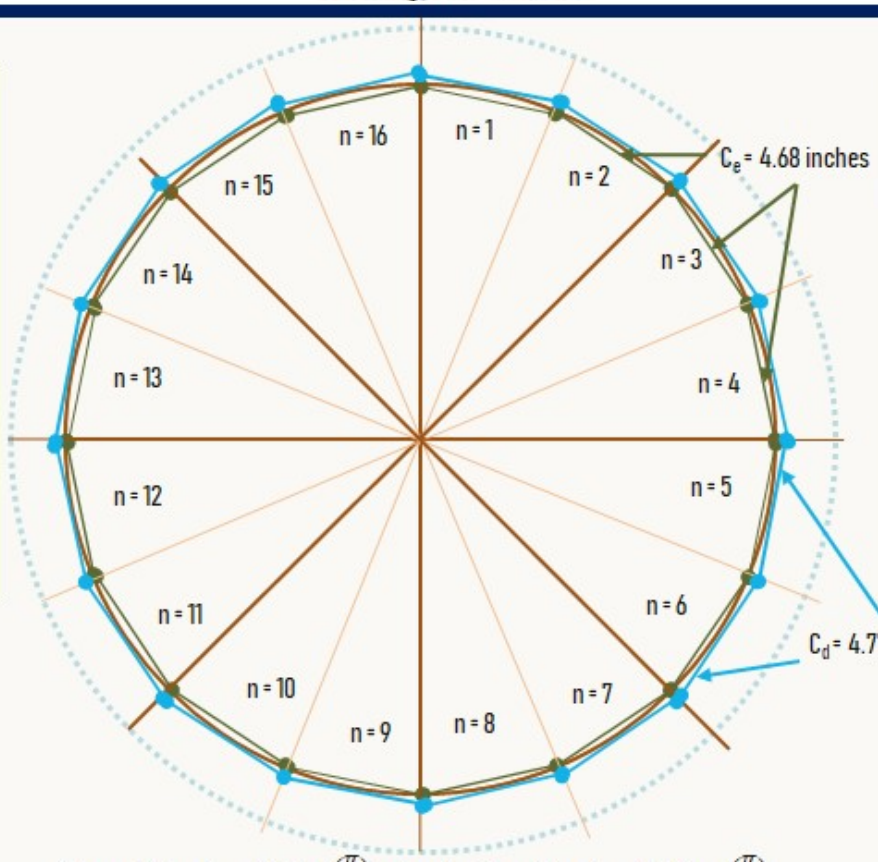
Figure-E4: Chamber Rotator Drum Mass Center Radius Calculation

One Round Chamber is designed with the rotator drum base which is divided into 8 sectors and each sector is divided into 2 equal subsectors which is total of 16 node computer sectors for calculation easier. To determine the number of node sectors and the minimum length around the inner circle of the drum, Figure-E5: Chamber Node Computers and Testing Devices Number Calculations shows the formulas which are used to calculate and adjust the length or e-chord (equal-chord) that required for fit the backplane for each node computer. Let n = 16 sectors (C_e: e-chords); R = 12 inches; then Equal-Chord C_e = 4.68 inches, and Derivative-Chord C_d = 4.77" and e-chord length 8.58" at radius 22" and width equals 9.58"; note that the drum width is 20 inches. This sector size (4.77" x 8.58" x 9.58" in trapezoid shape) is good enough to fit a backplane for a main computer board (test node computer), and one test node computer can handle 2 or more testing devices.

One Round Chamber - Specification

Henry V. Pham

$$CircleChord = 2R\ Sin\left(\frac{\theta}{2}\right);$$
$$CircleChord = DerivativeChord * Cos\left(\frac{\theta}{2}\right);$$
where θ is the chord angle.



$$DerivativeChord = 2R\ Tan\left(\frac{\theta}{2}\right);$$
$$DerivativeChord = \frac{CircleChord}{Cos\left(\frac{\theta}{2}\right)};$$
where θ is the chord angle.

$$EqualChord = 2R\ Sin\left(\frac{\pi}{n}\right);\ DerivativeChord = 2R\ Tan\left(\frac{\pi}{n}\right);$$

Let n = 16 sectors (C_e: e-chords); R = 12 inches; then Equal-Chord C_e = 4.68 inches, and Derivative-Chord C_d = 4.77 inches and chord length 8.58" at radius 22" and width equals 9.58"; note that the drum width is 20 inches. This sector size (4.77x8.58x9.58) is good enough to fit a backplane for a main computer board (test node computer), and one test node computer can handle 2 or more testing devices. The One Round Chamber is invented to 6 levels or more, and each level can be 10 inches high which gives the chamber 5 feet tall without the bottom part and the top shelf. With these default givens, the table below showing the total number of testing devices for types of test node computers.

Inventor: Henry V. Pham

# of Levels	# of Test Node Computers per Level	# Testing Devices per Node	Total Testing Devices per Level	Total Testing Devices entire chamber
5	16	2	32	160
5	16	4	64	320
5	16	8	128	640
6	16	2	32	192
6	16	4	64	384
6	16	8	128	768

One Round Chamber – Test Node Computers & Number of Test Devices Calculations

Figure-E5: Chamber Node Computers and Testing Devices Number Calculations

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One Round Chamber - Specification

The One Round Chamber is invented with multi-levels which is designed with 6 levels in this invention document, and each level can be 10 inches high which gives the chamber about 5 feet tall without the bottom part and the top shelf. With these default parameters givens, the table in the figure above shows the total number of testing devices for types of test node computers. A common test node computer can handle to test 4 hard drives at a time; the One Round Chamber with 6 levels with total of 16 test node computers per level can handle up to 384 hard drives. The loading capacity for One Round Chamber is much larger more than 4 times compare to the regular tester or chamber. This is great benefit with One Round Chamber, and the chamber can also provide great vibration feature with better convection temperature and humidity distributed evenly when the drum rotates around in 360° which provides the equal opportunity for every testing device goes through similar testing environment. These great features of One Round Chamber would give this chamber the outstanding tester in the world.

F. Test Node Computers & Testing Devices

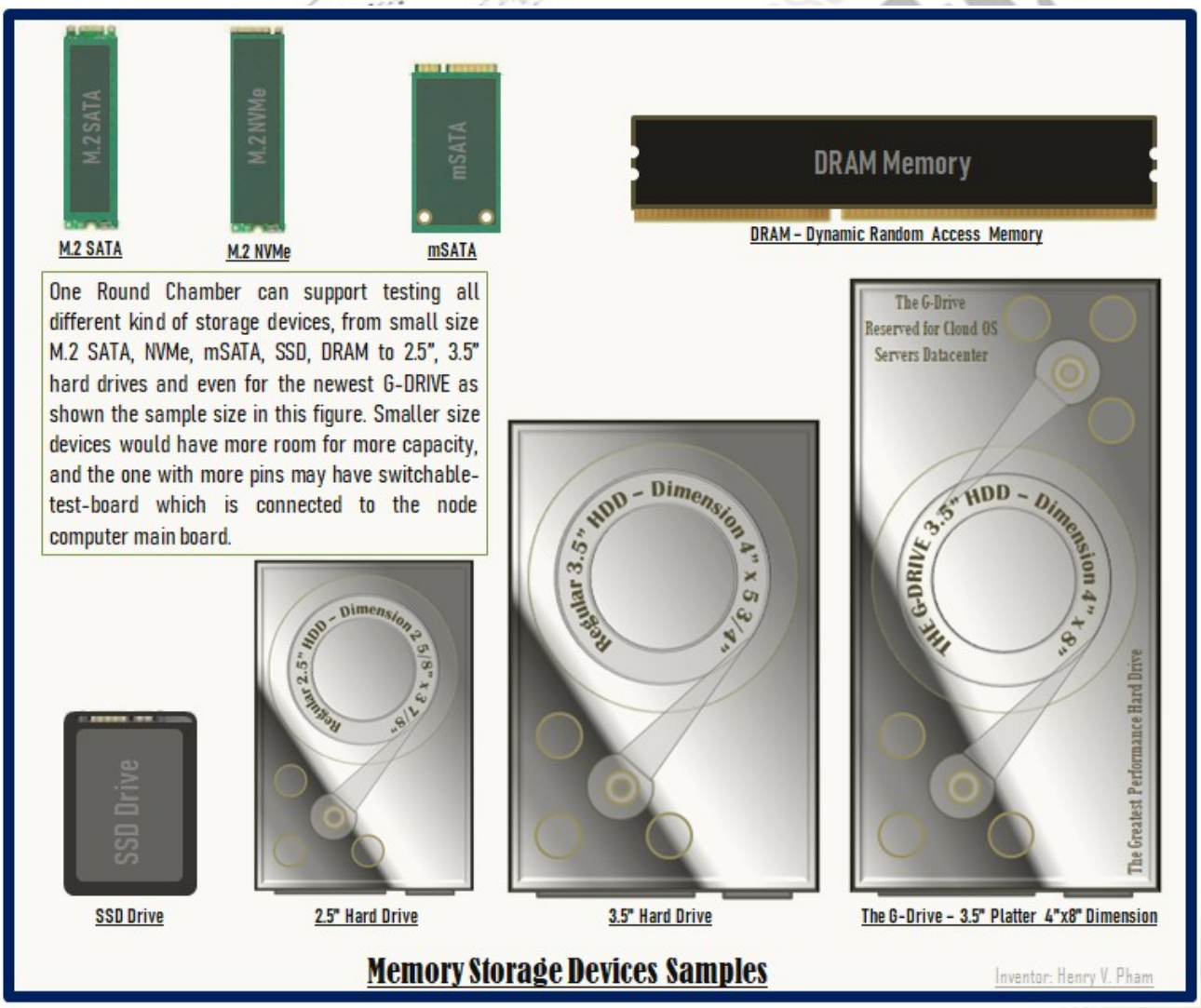

Figure-F1: Memory Storage Devices Samples

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One Round Chamber - Specification

When developing a chamber, the target testing devices can be a key to play with; however, the One Round Chamber can be built to support different testing devices with the same chamber structure layout with the same features and functions. The chamber which is built to test HDD hard drives should build the devices holders with hard drives slots and the insulation devices panel which is used to connect testing devices to the test node computers with devices holder. The chamber which is built to test SDD drives can be similar to the one testing HDD hard drives but with different devices holder and different slots or device connection sockets. The chamber which is built to test DRAM memory can be built with switchable devices test board with heat protection certification which is used to connect all the DRAM memory on the test board with one connector socket that connect to the test node computer through the insulation devices panel. However, the One Round Chamber is designed to fit all these with the same great features provided; the devices holders, devices connectors or sockets and the insulation devices panel modules can be prebuilt to support replaceable testing devices. Figure-F1: Memory Storage Devices Samples shows sample of several devices types which are commonly used in current market except for the G-DRIVE, the Greatest Performance Hard Drive which has Sequential and Random operation with the same performance which was invented and submitted for patent in year 2021 and posted on the website www.TheCloudOSCenter.com.

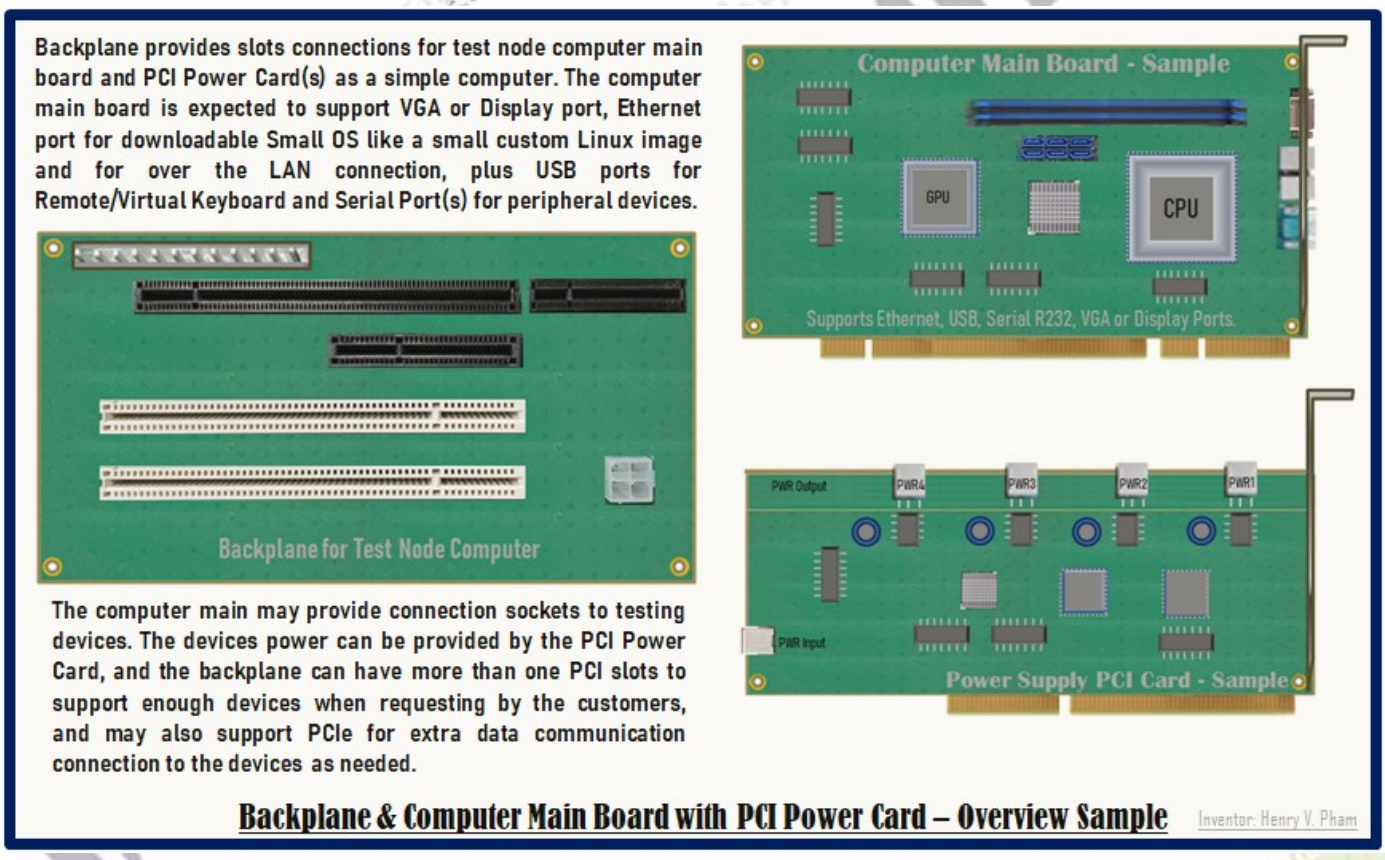

Figure-F2: Node Computer Circuit Boards Samples

The test node computers which have been mentioned above are required to install inside the insulation panels circle within the inner drum sectors to isolate from the extreme testing environment

which is designed for testing devices to test endurance and reliability of the customer devices. Figure-F2: Node Computer Circuit Boards Samples shows an overview of the backplane with test node computer and the PCI/PCIe cards to support power and communication to the testing devices. These circuit boards are widely available in current market, the power supply or power cards for the devices can be customized to fit the customer requirements of the devices.

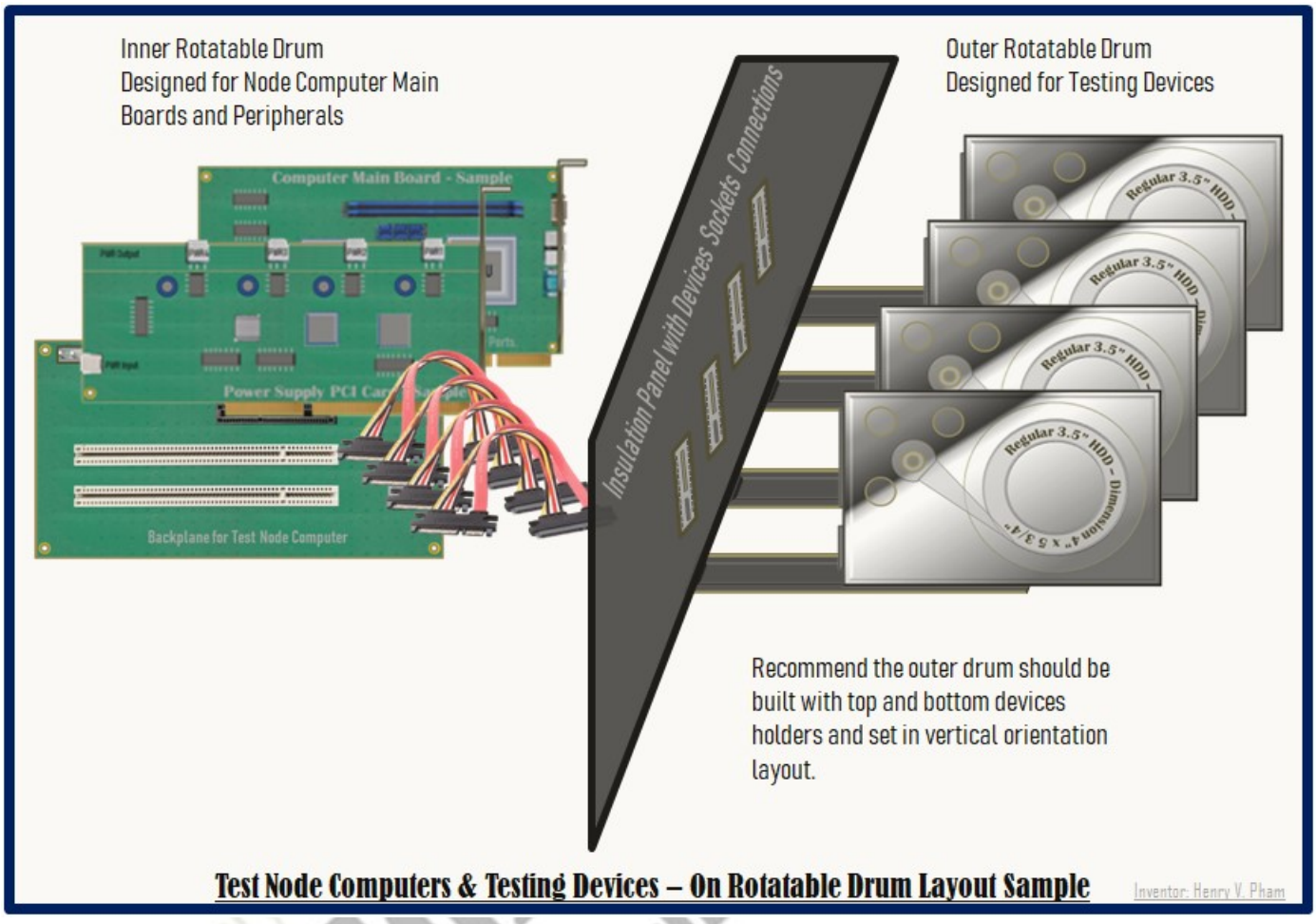

Figure-F3: Node Computers & Testing Devices Layout Sample

Figure-F3: Node Computers & Testing Devices Layout Sample shows a sample layout of the test node computers and the testing devices which are separated into 2 zones, one for test node computers and other supported devices, and one for the testing devices. One Round Chamber is designed with rotator drum spinning in 360°, the wires and adapters or sockets are recommended to have latch/lock to protect from losing the cable or connector from the devices. For HDD hard drives with common SATA connectors, the cable sockets are recommended to build with a latch-lock and the hard drives connection socket should support latch-lock cable connectors. Note that the testing devices can be in vertical or horizontal layout, and the devices holder modules can be prebuilt to fit the support devices.

One Round Chamber - Specification

G. Rotator Drum Wires & Wiring Levels

One Round Chamber is invented with all wires connected through the center cylinder and the chamber drum rotating around back-and-forth in 360° without twisting the wires. Figure-G1: Rotator Drum in 360° with Wrapping Wires in 8 Positions View shows 8 positions of rotation of the drum started from the initial neutral position which provide a clear picture how the chamber drum rotating without twisting the wires to provide the best ever tester with highest loading capacity. The drawing on top shows the initial neutral position where point (1) is right on top at 12 O'clock, point (2) is right at 3 O'clock, point (3) is right at 6 O'clock and point (4) is right at 9 O'clock. Note that the chamber is designed with the rotation latch attached to the drum at point (1) or at the middle door of the chamber; and the rotation lock is built-in or attached to the chamber base right at the point (3) or at the middle back of the chamber.

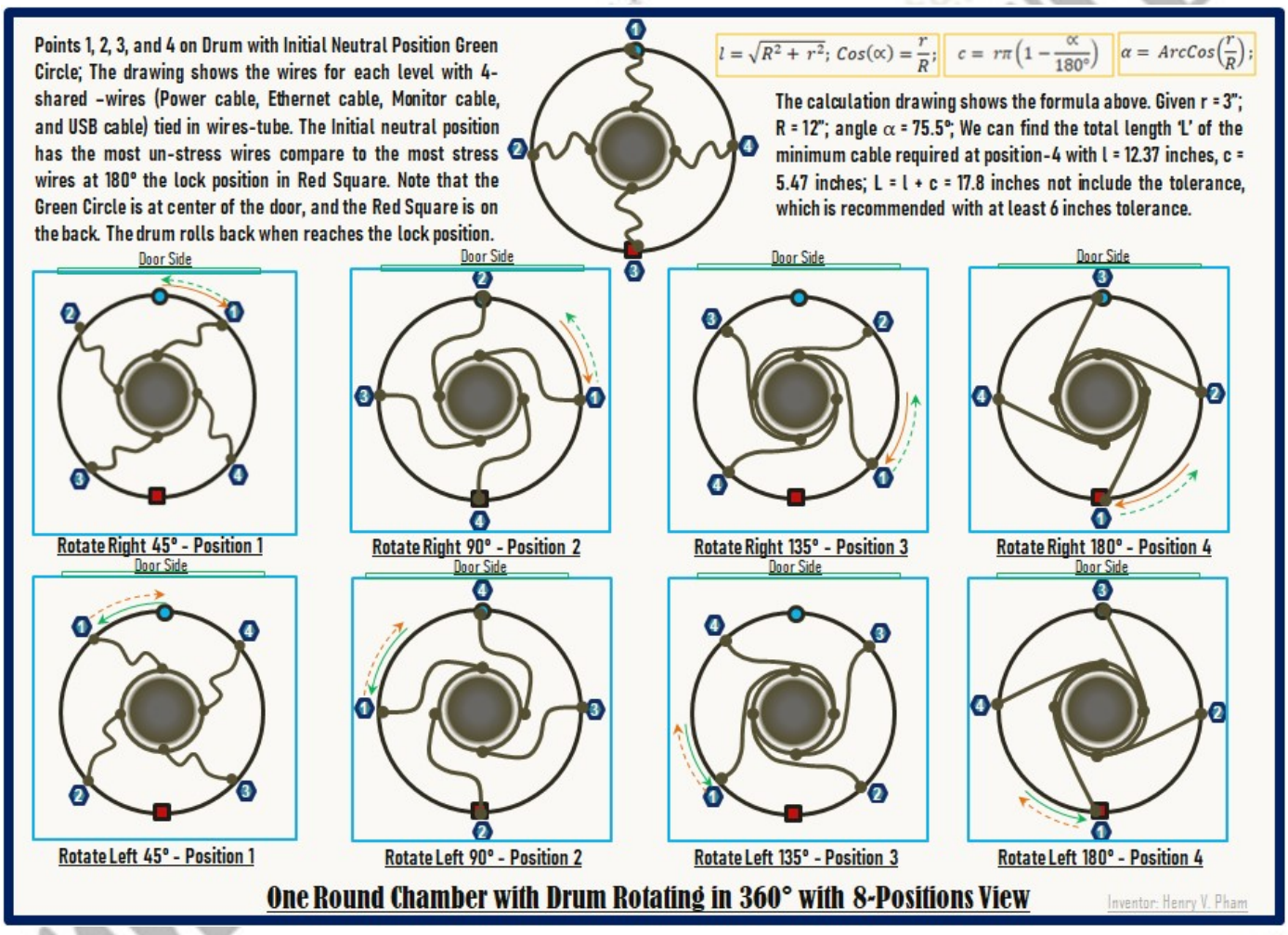

Figure-G1: Rotator Drum in 360° with Wrapping Wires in 8 Positions View

The rotation starting and moving at snapshot of every 45° angle is described in the following movements. For clockwise direction, RR-Position-1 shows point (1) moved 45° clockwise direction (rotate right direction in solid orange color arrows), point (2) moved 45° clockwise direction, point (3) moved 45° clockwise direction and point (4) moved 45° clockwise direction. RR-Position-2 shows point (1) moved 90°

clockwise direction, point (2) moved 90° clockwise direction, point (3) moved 90° clockwise direction and point (4) moved 90° clockwise direction. Similarly, the RR-Position-4 shows point (1) moved 180° clockwise direction, point (2) moved 180° clockwise direction, point (3) moved 180° clockwise direction and point (4) moved 180° clockwise direction; and the rotator drum stopped at this position and turning backward and back to the initial neutral position as shown in dash green color arrows with the same constant RPM. For counterclockwise direction, RL-Position-1 shows point (1) moved 45° counterclockwise direction (rotate left direction in solid green color arrows), point (2) moved 45° counterclockwise direction, point (3) moved 45° counterclockwise direction and point (4) moved 45° counterclockwise direction. RL-Position-2 shows point (1) moved 90° counterclockwise direction, point (2) moved 90° counterclockwise direction, point (3) moved 90° counterclockwise direction and point (4) moved 90° counterclockwise direction. Similarly, the RL-Position-4 shows point (1) moved 180° counterclockwise direction, point (2) moved 180° counterclockwise direction, point (3) moved 180° counterclockwise direction and point (4) moved 180° counterclockwise direction; and the rotator drum stopped at this position and turning backward and back to the initial neutral position as shown in dash orange color arrows with the same constant RPM. The chamber drum keeps rotating around back-and-forth in 360° as shown above to provide the great features for full loading in 360° surface with the shortest cable length which was already calculated in the previous section, compare to the traditional testers with only one side loading.

One Round Chamber is required to wires with secured, tied and neat with tubing as possible and group the wires in tubes with 4 test node computers per wires-tube (4-to-1 wiring) which provide 4 wires-tubes per level to prevent wires twisting from one test node computer to another and one level to another. Figure-G2: Top-to-Bottom Drum Levels Wiring Configuration shows the wires configuration with 4-to-1 wiring that group the power cable, Ethernet cable, USB Keyboard and VGA monitor cable together into one tube; note that the tube should be flexible with cut-off length rubber tube and protected with tape or similar protection. The drawing shows 1 power cable for one power strip to support one level, 4 VGA monitor cables, 4 USB Keyboard cables and 4 Ethernet cables from the top; these wires are divided into 4 groups of wires-tubes with one wires-tube for 4 test node computers with their supported devices. This wiring configuration needs total of 78 wires for entire chamber with 13 wires per level. To reduce Ethernet and USB cables, we can build Ethernet Hub Strip and USB Hub Strip to connect cascading like the power cable connection. This would reduce to 7 wires per level included power cable, which reduce to entire chamber with 6 levels with the total to 42 wires. This would be perfect for One Round Chamber with more than 4 times capacity compare to regular chamber and less number of cables to deal with. The 4 VGA Monitor cables and 4 USB Keyboard cables from the top shelf go to 4 Monitor Switch Expanders, each Monitor Switch Expander handle 4 test node computers. The Monitor Switches can be expanded wider with Left-and-Right Circle Network to reduce more wires; the Left-and-Right Circle Network would provide all the Monitor Switch Expanders to connect all together in a circle with Left-and-Right connections. With this circle network, just one VGA and USB Keyboard cable set can connect to all 16 test node computers on 1 level, this Left-and-Right Circle Network for Monitor Switch Expanders will be described in later section.

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One Round Chamber - Specification

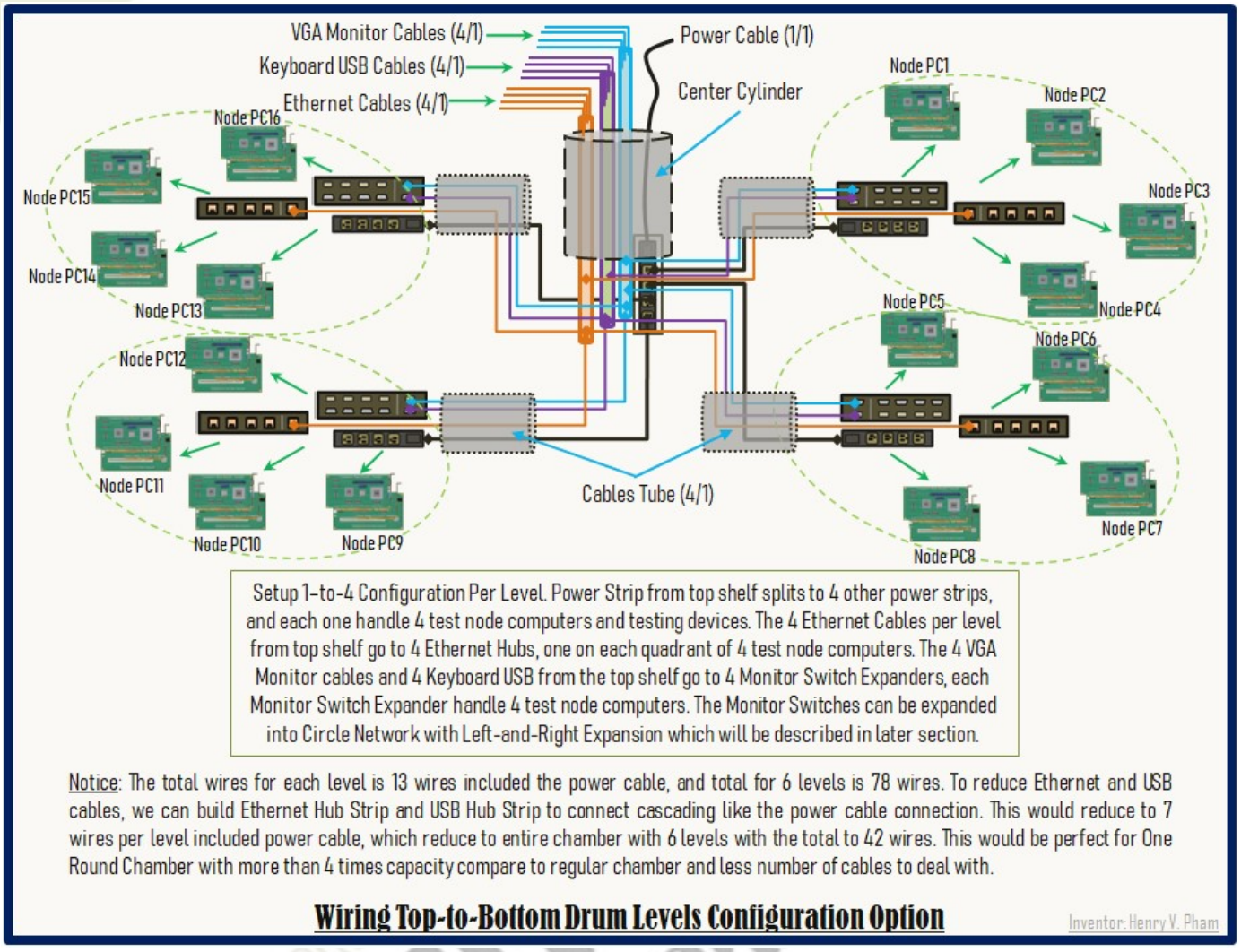
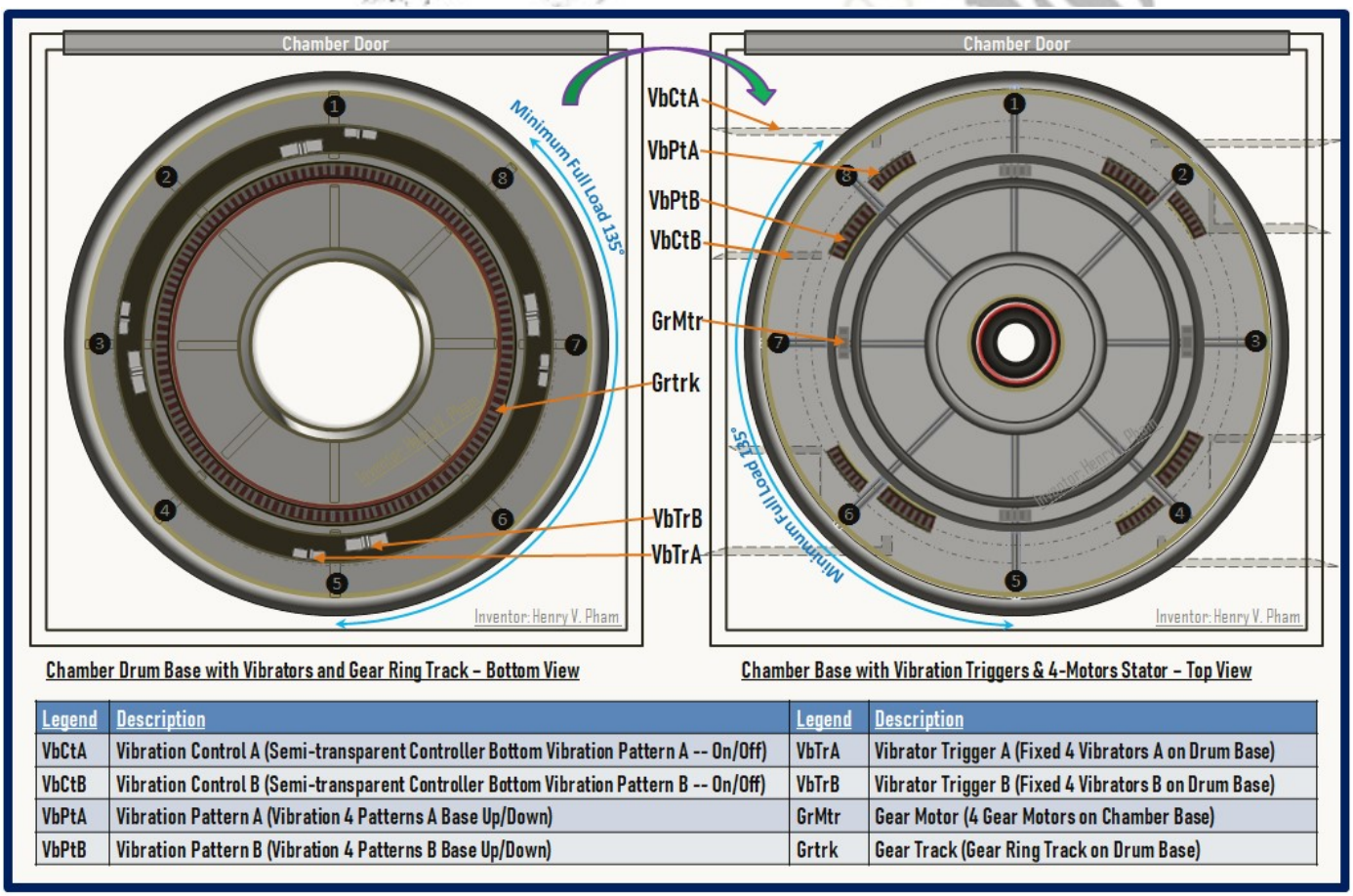


Figure-G2: Top-to-Bottom Drum Levels Wiring Configuration

H. Stator Base & Rotator Drum with Vibration Support

Figure-H1: Rotator Drum Base & Stator Chamber Base without Rollers View shows the drum base on the left and the chamber stator base on the right with the frame layout in 45° arms structure with inner and outer circle rings. The frame structure arms and circle rings are recommended with 1 inch square which are connected to the base circle plates and built with strong material to make the strong structure of the circle base. The motor gears on the chamber base are recommended with at least 2.5" diameter and 2" width plus the pitch, the width and the deep of the gear teeth should be good enough to rotate the drum without losing gears when vibration triggers are in place. Note that the drawing shows the vibrators A and vibration patterns A referring to the outer vibration circle, and the vibrators B and vibration patterns B are referring to the inner vibration circle. The chamber stator base is designed with 4 motor gears with 90° angles different arrangement, and designed with 4 inner vibration patterns and 4 outer vibration patterns and the inner vibration patterns should be heavier than the outer vibration patterns and each one of

them can be different in length of sliding pulse to provide with 63 combinations of vibration patterns. The layout of the vibration patterns for inner and outer are recommended at the 45°, 135°, 225°, and 315° where 0° is started at the chamber door. The drum base is designed with vibrators which are similar circles layout as the vibration patterns but different in 45°. The initial neutral position is where the drum base vibrators are in 45° phase of from the vibration patterns on the chamber stator base. The vibration mechanism will be described more in later section. The chamber base is recommended to have a protection gear circle track that match with the gear ring on the bottom of the drum base along the motor gears to protect debris get into the motor gears. The chamber drum base is shown on the left of the drawing with the numbers labels in opposite with the chamber base and should be matched on positions perfectly when the chamber drum is flipped over and put on top of the chamber base. The chamber base is shown with semi-transparent vibration trigger handles on the side and will be described more details in later section. Note that the chamber base should be covered, and the center hole showing this drawing can be built with a protection cover to protect from dusts.



Chamber Drum Base with Vibrators and Gear Ring Track – Bottom View

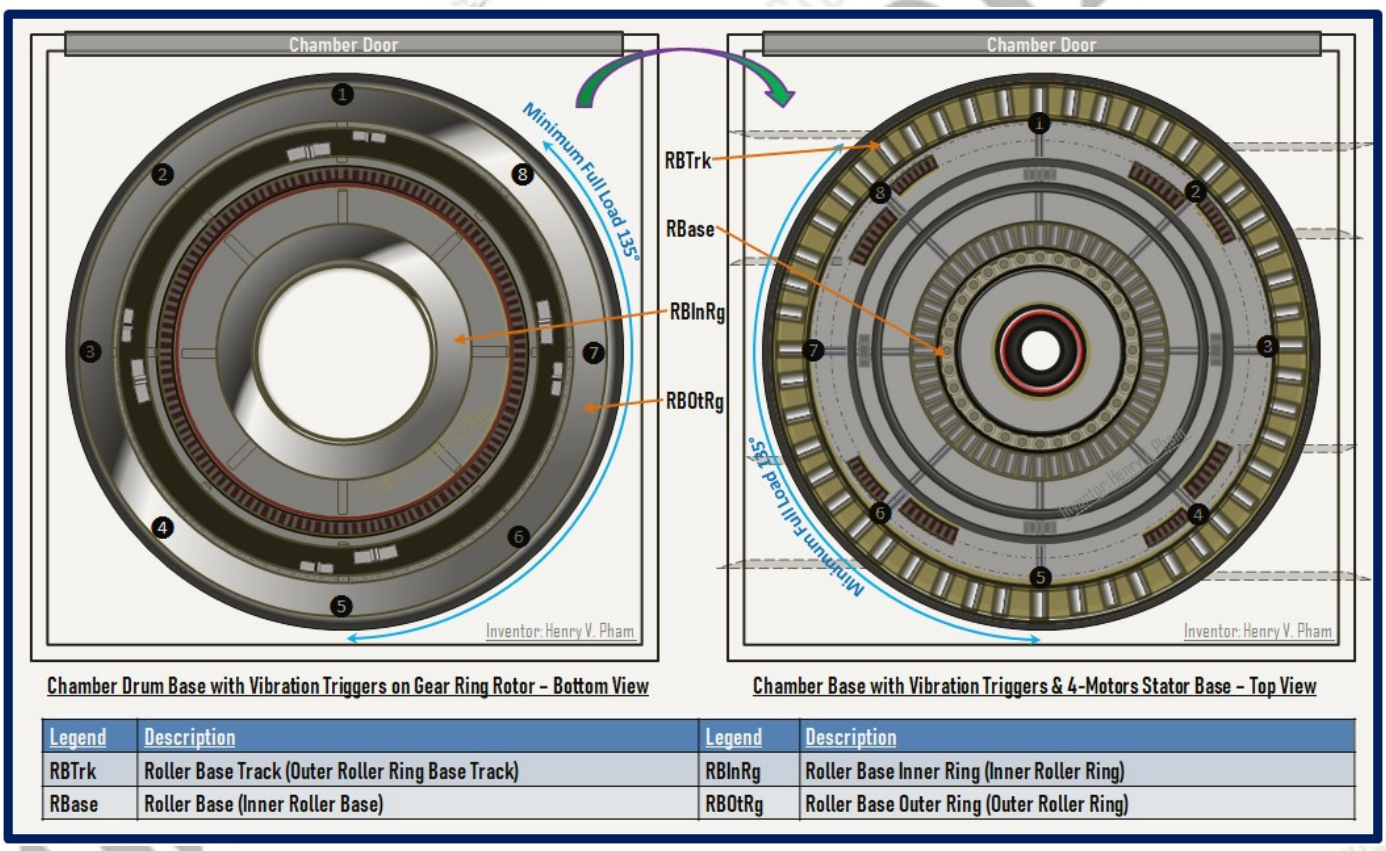
Chamber Base with Vibration Triggers & 4-Motors Stator – Top View

Legend	Description	Legend	Description
VbCtA	Vibration Control A (Semi-transparent Controller Bottom Vibration Pattern A -- On/Off)	VbTrA	Vibrator Trigger A (Fixed 4 Vibrators A on Drum Base)
VbCtB	Vibration Control B (Semi-transparent Controller Bottom Vibration Pattern B -- On/Off)	VbTrB	Vibrator Trigger B (Fixed 4 Vibrators B on Drum Base)
VbPtA	Vibration Pattern A (Vibration 4 Patterns A Base Up/Down)	GrMtr	Gear Motor (4 Gear Motors on Chamber Base)
VbPtB	Vibration Pattern B (Vibration 4 Patterns B Base Up/Down)	Grtrk	Gear Track (Gear Ring Track on Drum Base)

Figure-H1: Rotator Drum Base & Stator Chamber Base without Rollers View

The chamber base would have inner and outer roller rings. The inner roller ring is recommended to build with horizontal and vertical supports; the horizontal rollers support the rotation and the vertical rollers support the inertia and to keep the drum rotating smoothly around the center. The outer roller

ring is recommended to install at the outer edge of the chamber circle base to support the chamber with full load while the vibration mechanical is on; the vibration mechanical and the vibration patterns should be collaborated to support the maximum vibration when all the vibration patterns are triggered to make sure the motor gears can rotate the chamber drum with all 3 different speeds of RPM modes that have been mentioned in earlier section. Note that for the common heavy load for HDD hard drives with this default chamber dimension with total of 384 hard drives as shown in the earlier section above Figure-E5: Chamber Node Computers and Testing Devices Number Calculations; each 3.5" hard drive weight approximately 650 grams, and the total weight for entire chamber drum with full load is 250 kg approximately; the chamber with 4 gear motors is should be able to rotate the chamber drum around back-and-forth without any problem even with vibration mechanical is on; however, the chamber with lighter weight testing devices can be built with 2 gear motors. The chamber drum base should be also built with the roller base inner ring and outer ring to work with the rollers of the chamber base as mentioned above. Figure-H2: Rotator Drum Base & Stator Chamber Base with Roller Rings View below shows the roller rings installed on the chamber base as shown on the right of this drawing, and the roller base ring tracks installed on the chamber drum base as shown on the left of this drawing.



Chamber Drum Base with Vibration Triggers on Gear Ring Rotor – Bottom View

Chamber Base with Vibration Triggers & 4-Motors Stator Base – Top View

Legend	Description	Legend	Description
RBTrk	Roller Base Track (Outer Roller Ring Base Track)	RBInRg	Roller Base Inner Ring (Inner Roller Ring)
RBase	Roller Base (Inner Roller Base)	RBOtRg	Roller Base Outer Ring (Outer Roller Ring)

Figure-H2: Rotator Drum Base & Stator Chamber Base with Roller Rings View

The chamber vibration mechanism can be built with or without powered control. The vibrators are built fixed on the bottom of the chamber drum base, and the vibration patterns are built on the chamber stator base. The vibration patterns are recommended to build with the arms to push or pull the vibration

patterns blocks in or out of the vibration places; each vibration pattern should be built independently with the gear arm attached to the circle gear, and the circle gears can be controlled by hand or with powered control buttons on the chamber display or by programming with the controllable software by the test application that running on the computer server via chamber serial communication. Figure-H3: Chamber Vibration Trigger Base with 4 Setting Options View shows a sample of 4 movement positions of the vibration patterns blocks.

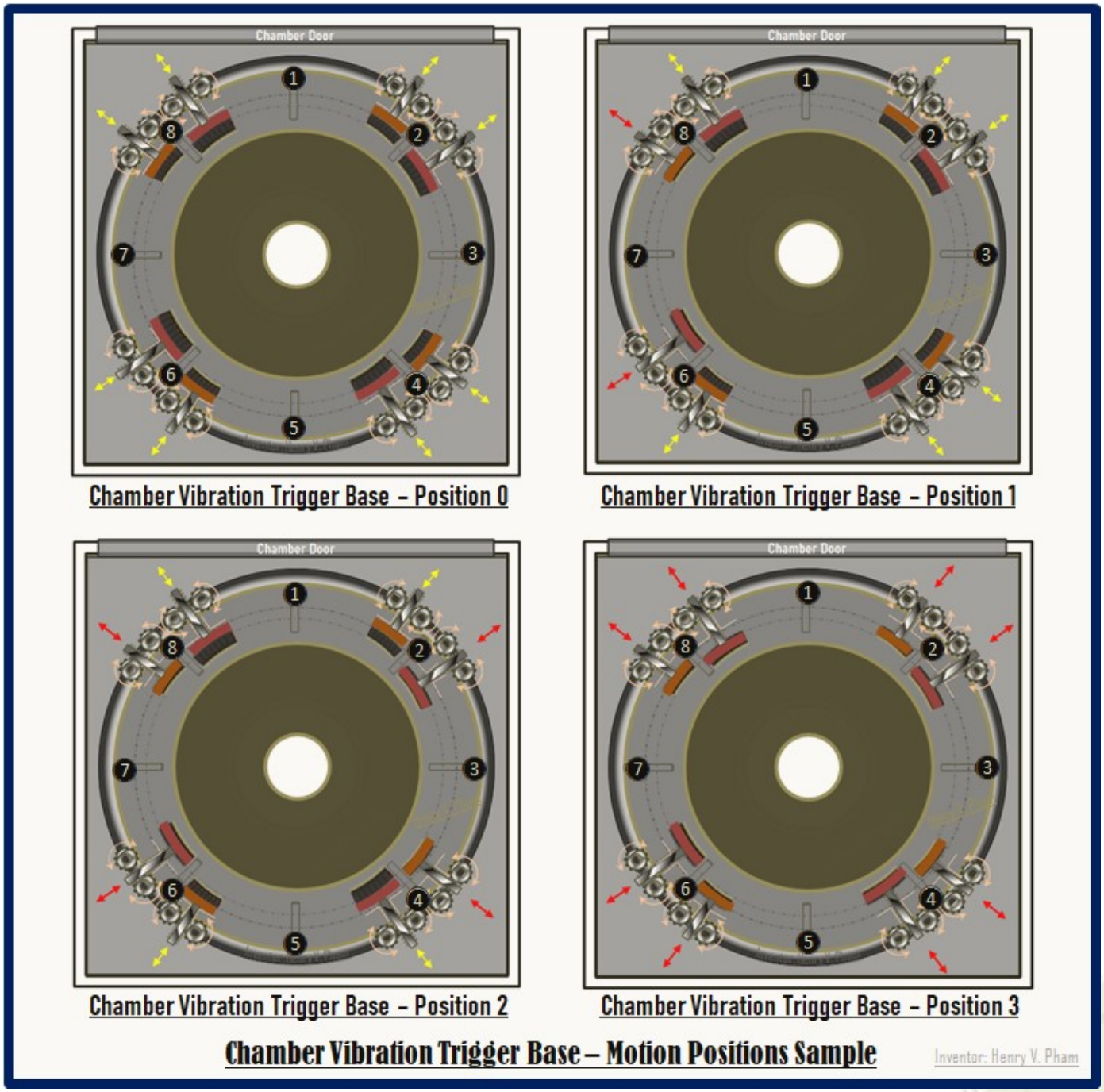


Figure-H3: Chamber Vibration Trigger Base with 4 Setting Options View

One Round Chamber - Specification

The drawing shows position-0 with all vibration patterns are at their neutral position; position-1 from the drawing shows the outer vibration pattern block at point (8) and inner vibration pattern block at point (6) moved into their triggered place; position-2 from the drawing shows the outer vibration pattern block at point (4) and inner vibration pattern block at point (2) moved into their triggered place; and position-3 from the drawing shows all outer and inner vibration pattern blocks moved into their triggered place. The vibration pattern blocks can also be built to handle by hand as a manual option; and there are 2 options to move the vibration pattern blocks in and out with handle and with additional extended handle which can be folded along the chamber sides inside the vibration trigger covers. Figure-H4: Chamber Vibration Trigger Base in 2 Manual Options View shows the left drawing with 2-sides manual controller with handles, and the right drawing with 4-sides manual controller with handles which are more straight and easier to push and pull by hand but use the front and back of the chamber space at the bottom.

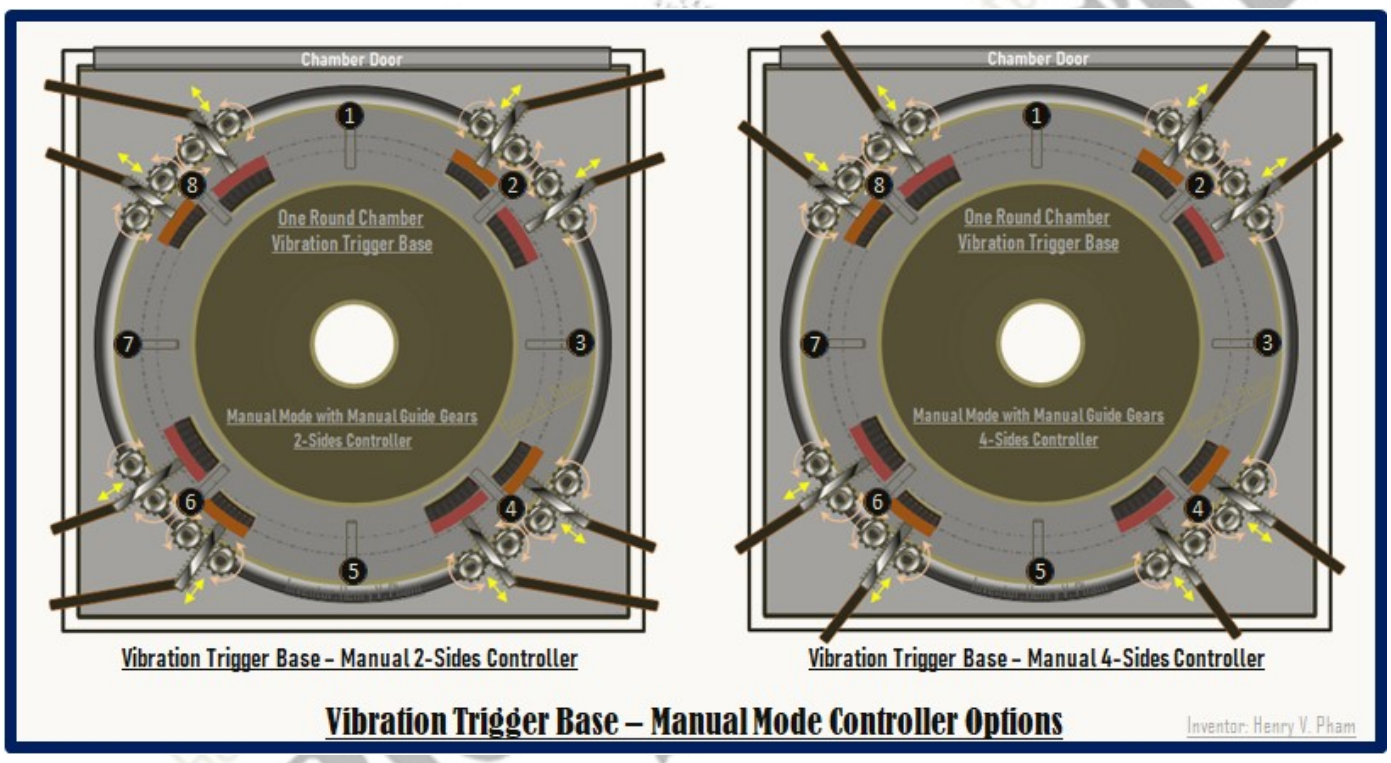


Figure-H4: Chamber Vibration Trigger Base in 2 Manual Options View

The manual mode needs to have the handle long enough to push in and pull out of the triggered position. The handles are needed to connect with the extended handles to have the maximum length that are needed to push and pull from the minimum length of the handles when the vibration triggers are pulled all the way out to the maximum length when the triggers are pushed all the way in. The extended handles can be built with 360° turning pivot plus 180° angle pivot to have a complete free of movement to fold in any direction. Figure-H5: Chamber Vibration Trigger with Extended Handles Option shows the pivot joint to allow the minimum length of the handles to connect with the extended handles to support manual vibration control by hands with foldable handles. The top 2 drawings show the pivot joint which is attached both sides by the handle and the extended handle; the 360° pivot should be built with a bolt with thread to connect to

the other end which should have double nuts to screw on the thread bolt; and the 180° angle pivot can be built with a thread bolt and a nut to screw on the other side to have pivot joint for foldable handle. The bottom 3 drawings show the handles with folded shape inside the cover and without folding when they are in un-use position and in-use position respectively; note that the extended handles can be built with latch/lock to keep the vibration pattern blocks in place when there are in vibration triggered position.

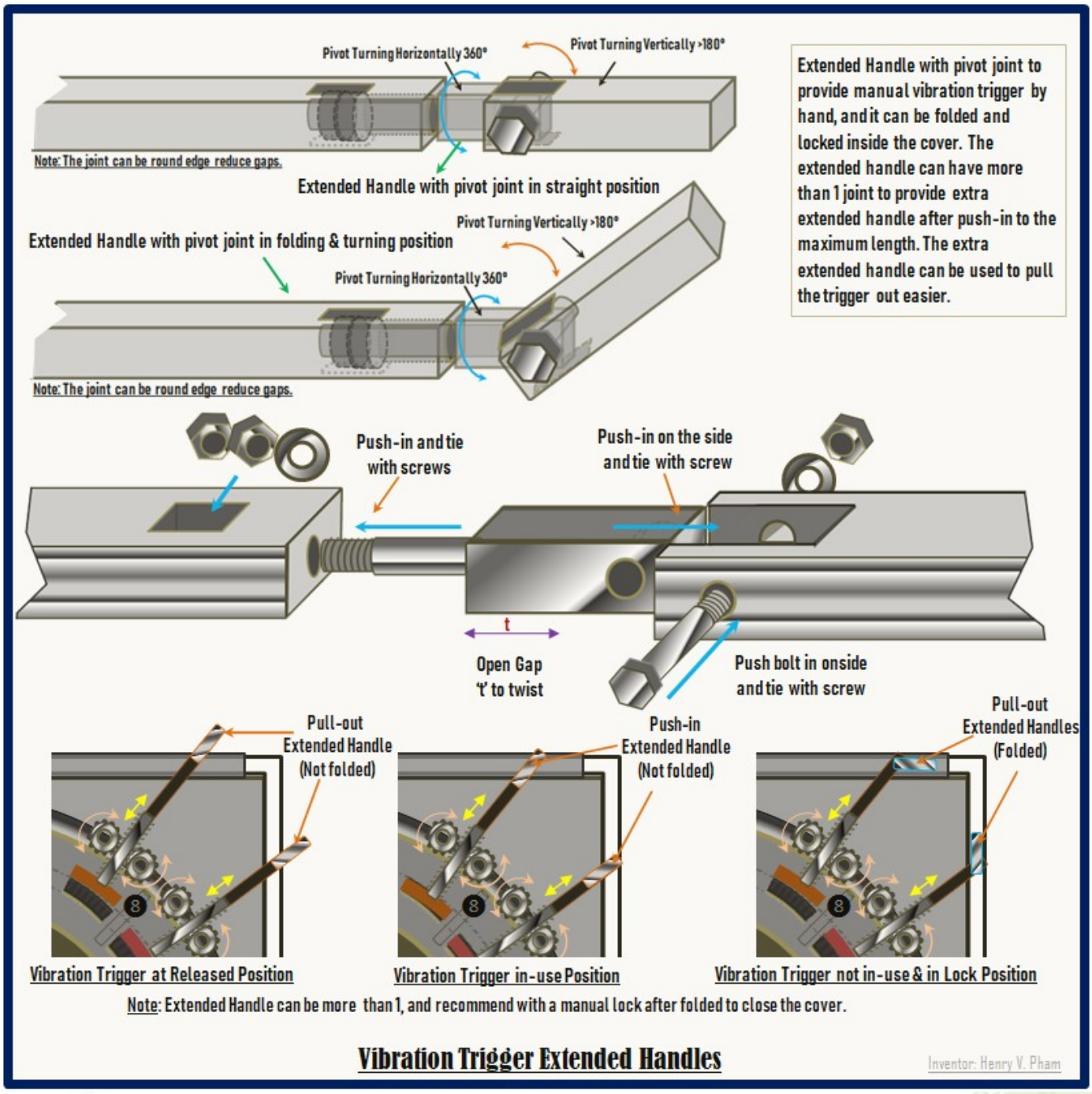


Figure-H5: Chamber Vibration Trigger with Extended Handles Option

One Round Chamber - Specification

I. Node Computer Keyboards & Monitors Switching Control

One Round Chamber is invented with State-of-the-Art and designed to support Automation Testing in Manufacturing; the Master & Slave Hard & Software monitor switch is introduced in this invention will allow the manufacture to control, view and debug the node computers remotely by Software Application running on the computer server which is accessible remotely via internet connection. The chamber with the desired dimension with 6 levels of testing devices loading drum as shown in this invention, has 96 node computers to handle testing hundred of devices. These node computers are needed to view, manage and also needed to debug when a test node computer is crashed. The monitor switch expanders or slavers are required to allow the users to view and control a node computer of the chamber. Figure-I1: Hard & Soft Monitor Master Switch Option shows a sample of the master monitor switch with front and back views. The master monitor switch is named as "Master & Slave Hard & Soft Monitor Switch" which is controllable by hard buttons in the front panel of the monitor switch or by software application; the software application would run on a computer server and control the master monitor switch remotely. The drawing shows a sample of the master monitor switch front view with 8 input slave monitor ports and 16 monitors to view for each monitor switch number; the right side of the front panel of the master switch has 2 output ports to support monitor VGA display adapter and a USB adapter; the master switch also supports serial port for Software Control which is used to connect to a host PC or computer server. Note that the buttons showing in this drawing are LED-buttons with yellow color means connected, green color means selected and no color or gray means not connected; however, these buttons can be built with regular buttons with LEDs associated with the buttons or similar. The drawing shows the back view with 8 sets of input ports and each set with Serial Port, VGA display port and USB Keyboard port which are used to connect to the slave monitor switch; the input Serial Port on the back panel is used to connect to front panel with input Serial Port the slave monitor switch.

The slave monitor switch comes with buttons in front panel which is allowed select a monitor and the output ports for VGA display port and USB keyboard port with a Serial Port for Software Control; the back of the slave monitor switch would provide set of inputs for VGA display ports and USB keyboard ports; note that VGA display cable supports long length compare to other monitor display cables like HDMI, DP or other monitor display cables. Figure-I2: Hard & Soft Monitor Slaver Switch Option shows 16 LED-buttons which are selectable and used for each set of node computer for the VGA display port and USB keyboard port; the drawing shows the slave monitor switch supports 16 input node computers. The slave monitor switch comes with a Serial Port in the front panel which is used to connect to the master monitor switch which supports Software Control and is used select a monitor that connected to the slave monitor switch to view or control the selected node computer.

The master monitor switch should support with the maximum number of monitors that the slave monitor switch support in order to view all the node computers that connected to the slave switch. The drawing shows the master switch support 8 input slave monitor switches and with the maximum number of node computer monitors to view which is 16. Note that the slave monitor switches are stored inside

the chamber drum shelves and recommended to build the select buttons laid on the surface of the panel to prevent easy touch to select by wires or other components.

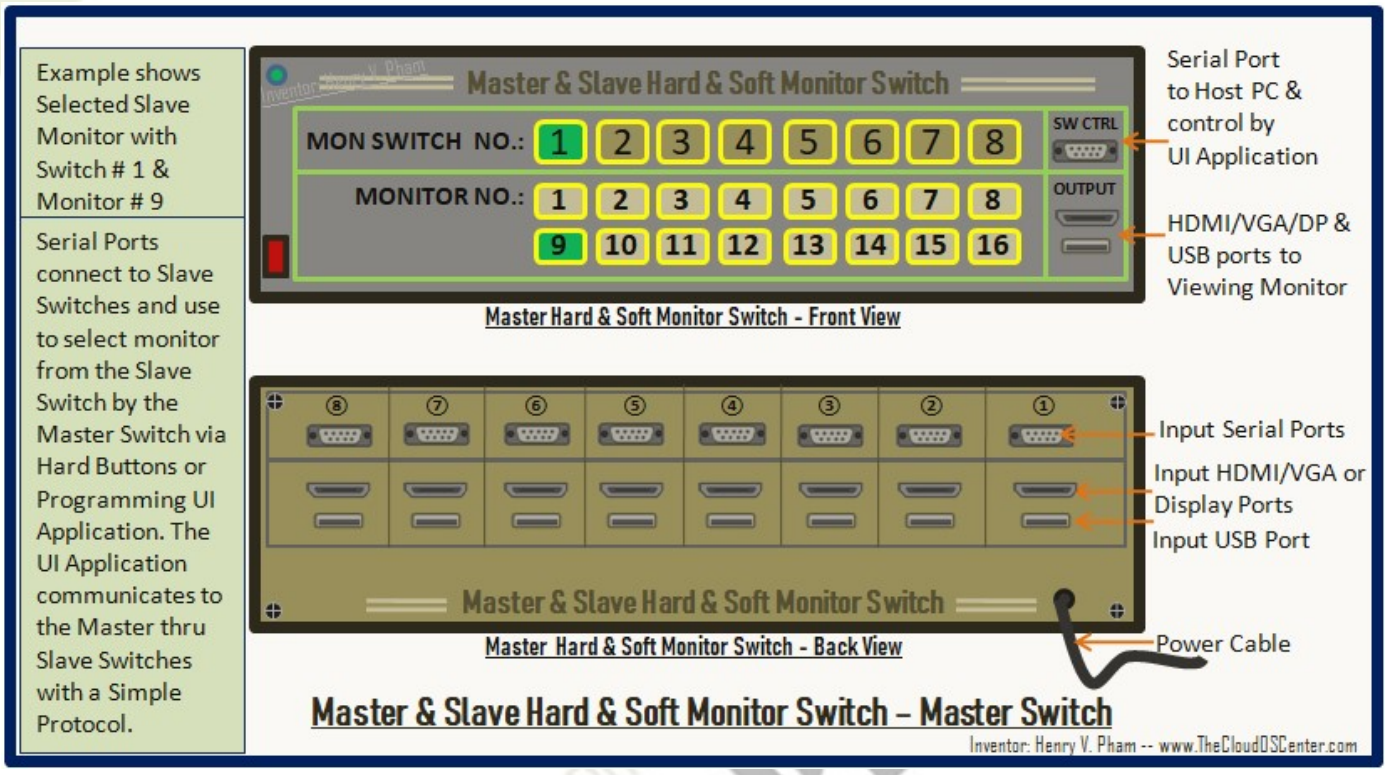


Figure-I1: Hard & Soft Monitor Master Switch Option

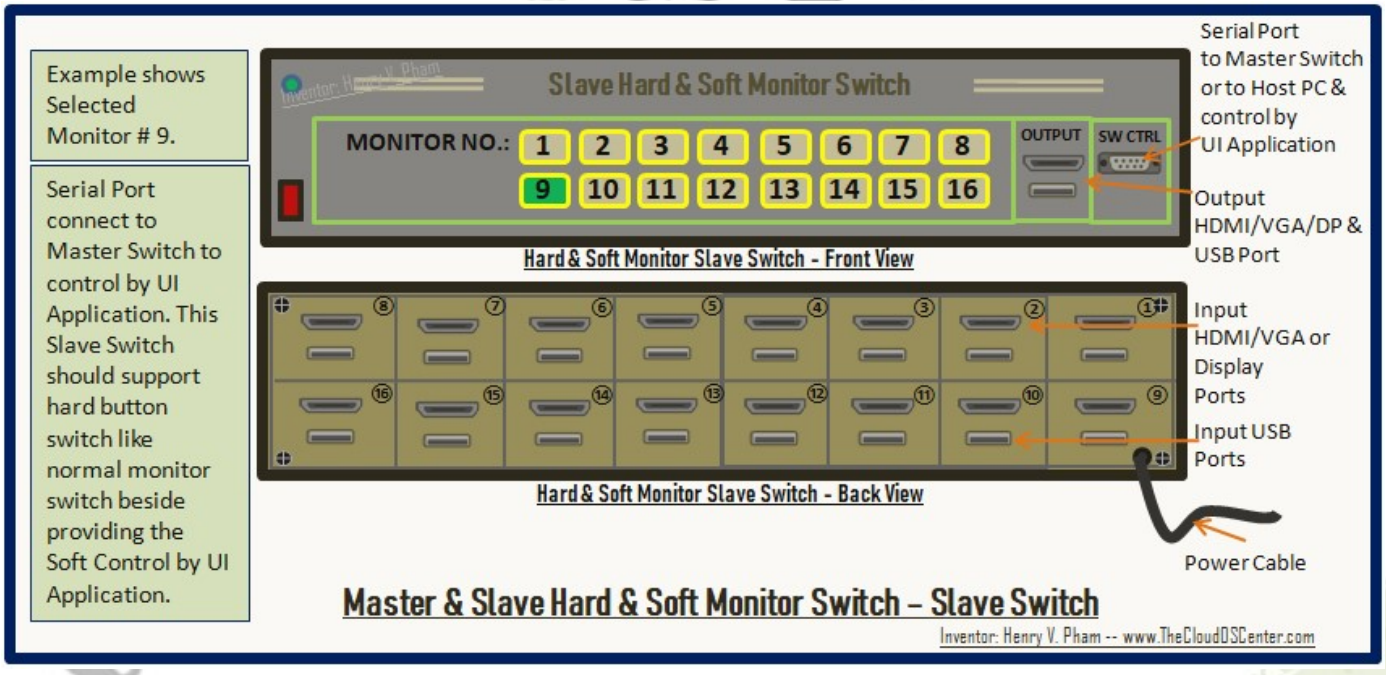


Figure-I2: Hard & Soft Monitor Slaver Switch Option

One Round Chamber - Specification

The monitor switches can be built with Left-and-Right Circle Network, the network in combination with Hexacell Structure of Star-Tree Topology network that was introduced to use for the Cloud OS Webwork which was mentioned on the website www.TheCloudOSCenter.com to reduce wires; the Master & Slave Hard & Soft Expander Monitor Switch is introduced in this invention with the left and right connections to expand the monitor switch to reduce wires with the Serial Port that is used for Software Control. Figure-I3: Hard & Soft Left-and-Right Expender Monitor Switch Option shows a sample connection of 3 monitor expander switches and only one expander switch (Expander-2) connected to the master switch which allows the master switch to query and select a monitor that is connected to the left or right of the connected expander switch. The expander switch is required to have a set of input for display port and USB keyboard on both left and right; this way the users can set to view in the same order of layout from left to right. The drawing shows 3 expanders connected to port 1 as shown in green button, and each one has 4 input port;, and the master switch connected to expander-2 and shown with 12 connected monitors which are shown with 12 yellow buttons after query the expander-2 for its left and right expanders. However, the monitor expander switches can be connected completely in circle and only one expander is needed to connect to a master switch; the connection protocol in later section will described detail for circle connection. Note that when an input port is selected from the monitor switch, the internal hardwires will be wired the selected input to the output wires with IC circuit control; and this is similar to the expander which is programmed to switch for controlling and selecting by master switch or by software application.

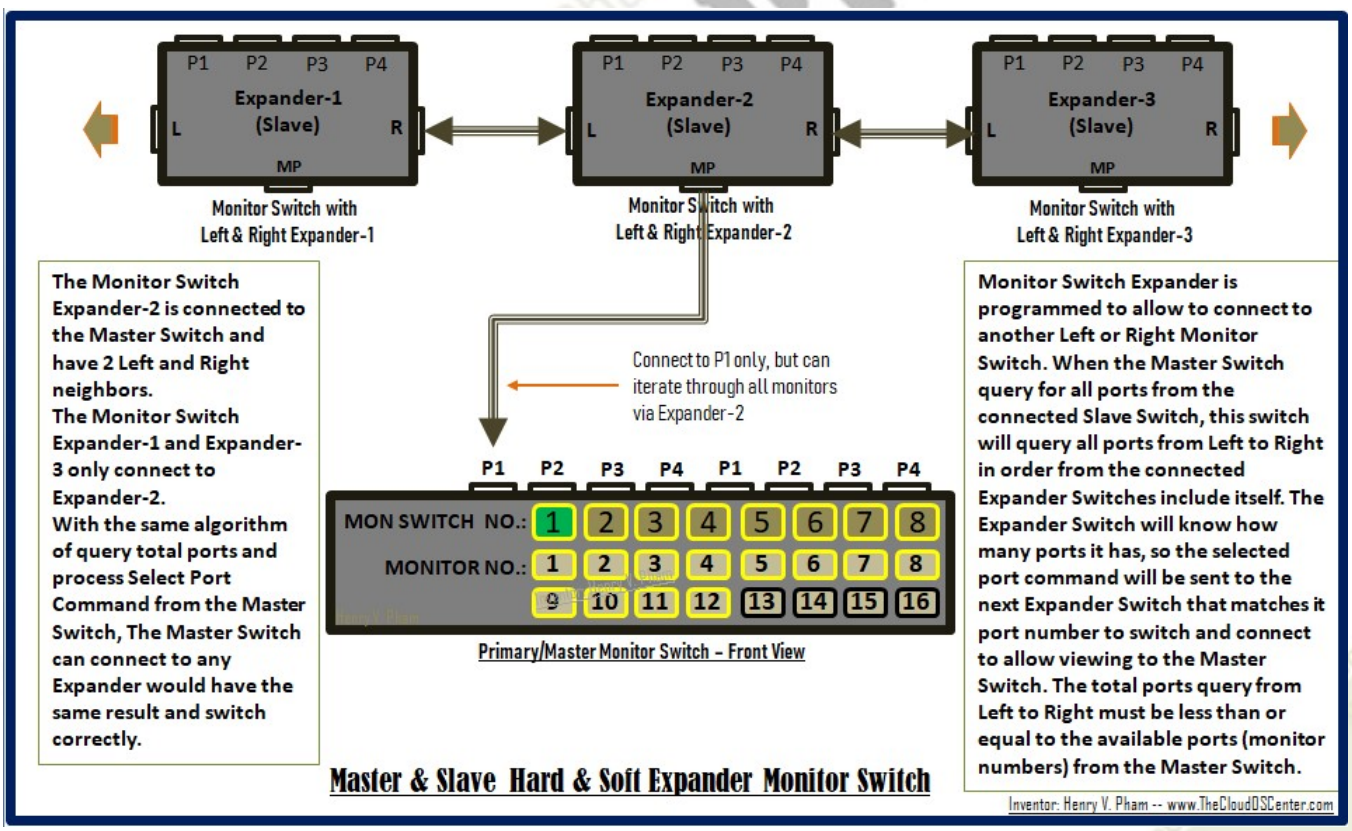


Figure-I3: Hard & Soft Left-and-Right Expender Monitor Switch Option

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One Round Chamber - Specification

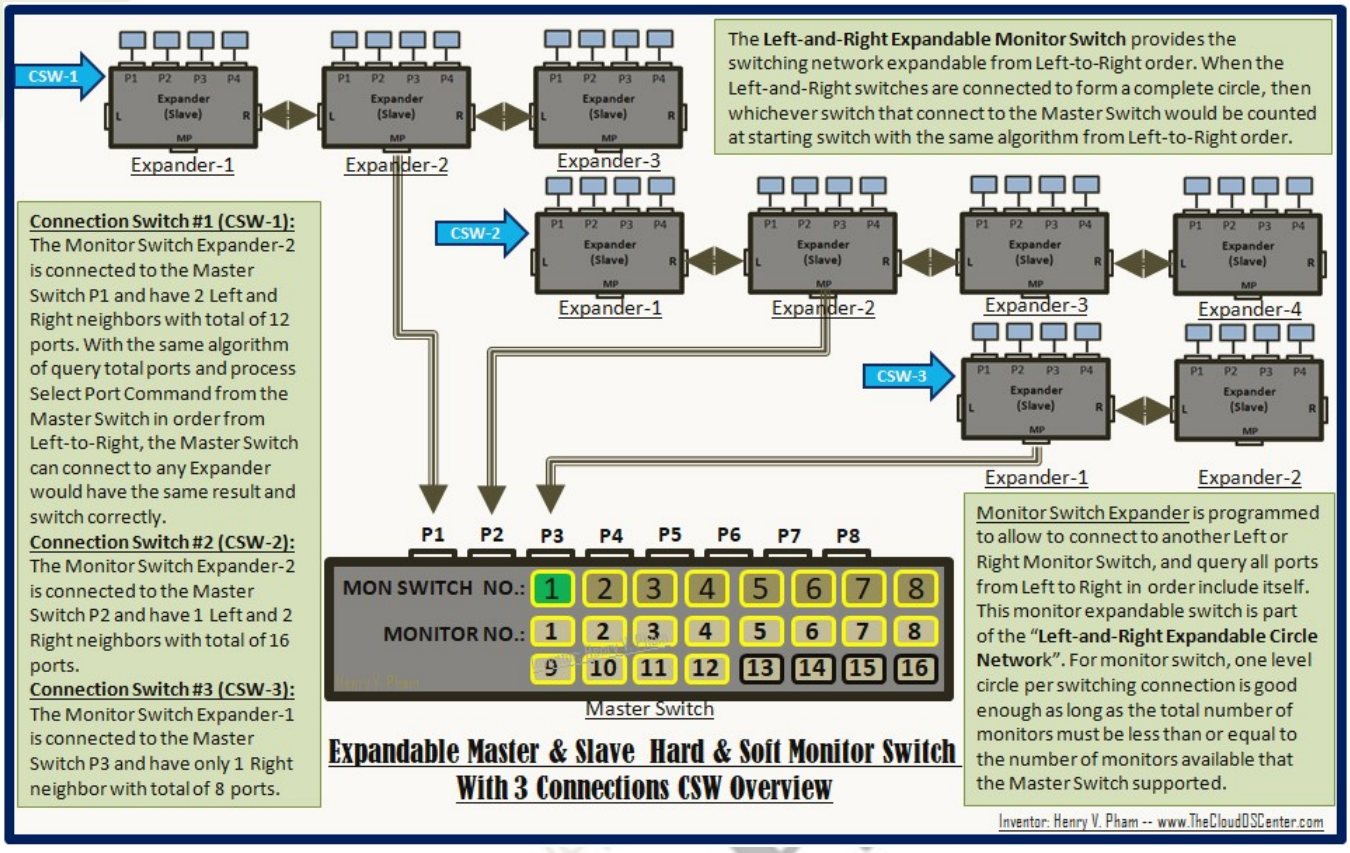
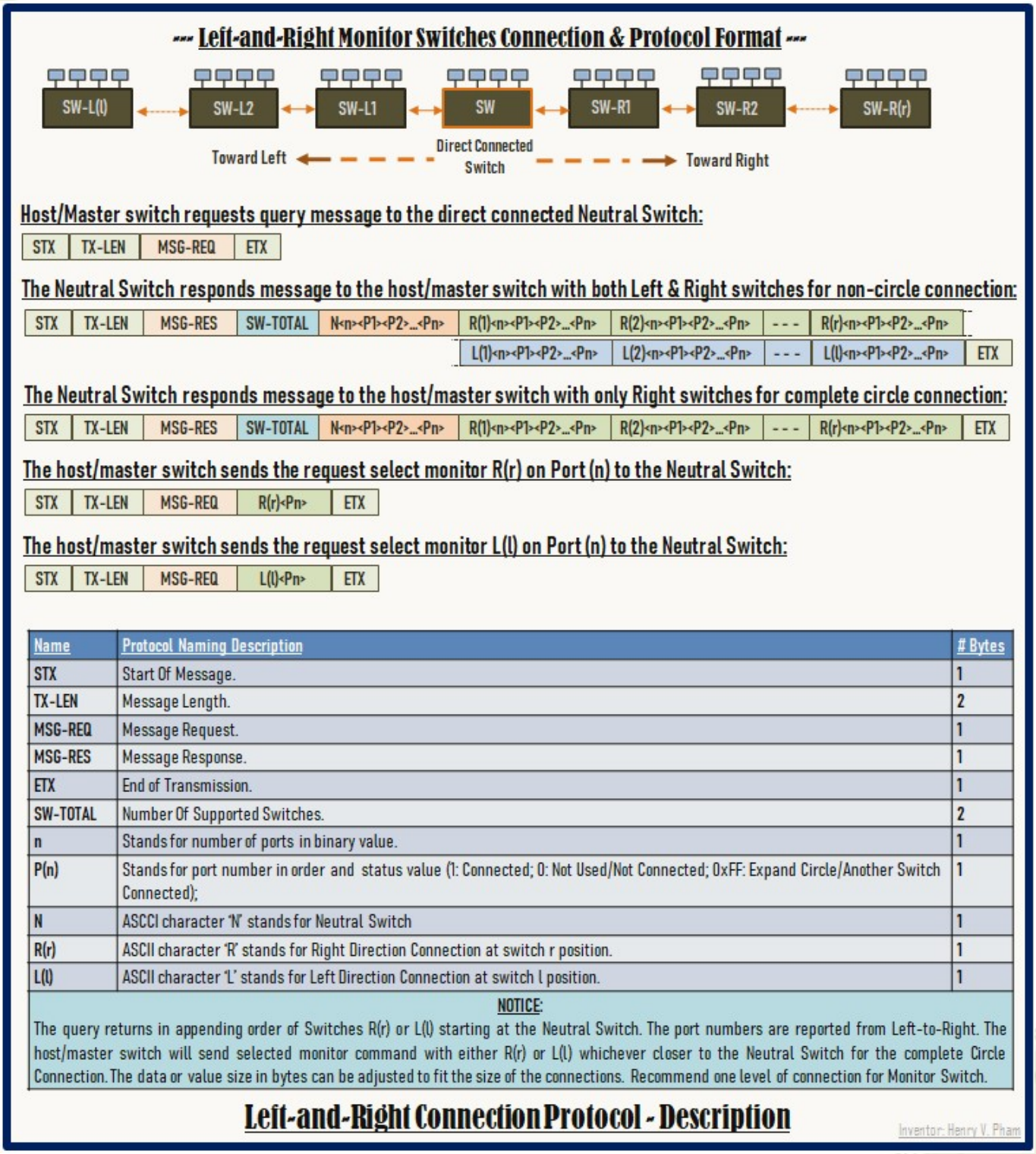


Figure-I4: Hard & Soft Left-and-Right Multi-Expander Monitor Switches

The Left-and-Right expander monitor switch is recommended to expand in one circle level and each circle level can have one or more expanders that connected to the master switch; the master switch connects to which expander switch that expander will respond to the query and selection command from left to right order. Figure-I4: Hard & Soft Left-and-Right Multi-Expander Monitor Switches shows 3 expander switch circle connections; the first connection with Expander-2 connected to port-1 (P1), the second connection with Expander-2 connected to port-2 (P2), and the third connection with Expander-1 connected to port-3 (P3) of the master switch. The master switch shows selected port-1 for the first connection with 12 connected monitors for all 3 expanders which are shown with 12 yellow LED-buttons and the other 4 LED-buttons are gray means not connected. Similar for the other connections, the second connection would show 16 monitors on port-2 when the master switch query the Expander-2 of this connection; the third connection would show only 8 monitors on port-3 when the master switch query the Expander-1 of this connection. One Round Chamber would have up to 96 node computers monitors to query and select; with this expander switch connection in complete circle, 16 node computers in one drum level can be connected together in one complete circle network with the left-and-right connection to allow users to select only one monitor expander switch to view 16 node computers; and the chamber only needs 6 monitor switch number on the master switch to query and select a node computer on any drum level. To query or select a node computer monitor connection, the master switch or software application on the computer server

will send query command or select command to the monitor expander switch with the Left-and-Right connection protocol. Figure-I5: Left-and-Right Connection Communication Protocol shows the Left-and-Right expander connection protocol format.



Name	Protocol Naming Description	# Bytes
STX	Start Of Message.	1
TX-LEN	Message Length.	2
MSG-REQ	Message Request.	1
MSG-RES	Message Response.	1
ETX	End of Transmission.	1
SW-TOTAL	Number Of Supported Switches.	2
n	Stands for number of ports in binary value.	1
P(n)	Stands for port number in order and status value (1: Connected; 0: Not Used/Not Connected; 0xFF: Expand Circle/Another Switch Connected);	1
N	ASCCI character 'N' stands for Neutral Switch	1
R(r)	ASCII character 'R' stands for Right Direction Connection at switch r position.	1
L(l)	ASCII character 'L' stands for Left Direction Connection at switch l position.	1

NOTICE:

The query returns in appending order of Switches R(r) or L(l) starting at the Neutral Switch. The port numbers are reported from Left-to-Right. The host/master switch will send selected monitor command with either R(r) or L(l) whichever closer to the Neutral Switch for the complete Circle Connection. The data or value size in bytes can be adjusted to fit the size of the connections. Recommend one level of connection for Monitor Switch.

Figure-I5: Left-and-Right Connection Communication Protocol

Monitor Switch Expander is programmed to allow it to connect to another Left or Right Monitor Switch. When the Master Switch query for all ports from the connected Slave Switch, this switch will query all ports from Left to Right in order from the connected Expander Switches and include itself. The Expander Switch will know how many ports it has, so the selected port command will be sent to the next Expander Switch that matches it port number to switch and connect to the Master Switch. The expander monitor switch connection is recommended to configured so that the total ports query from Left to Right must be less than or equal to the available ports (monitor numbers) from the Master Switch in order to view completely. The protocol shows the query returns in appending order of Switches R(r) or L(l) starting at the neutral connected expander switch, and the port numbers are reported from Left-to-Right. P(n) is the port number at position 'n', and the status value can be '1' for connected, '0' for not connected, and 'FF' for another connected expander. The host/master switch will send selected monitor command with either R(r) or L(l) whichever closer to the neutral connected switch for the complete Circle Connection. Note that the data or value size in bytes can be adjusted to fit the size of the connections with number of monitors supported; and the expander monitor switch connection is recommended with one level of connection for Monitor Switch.

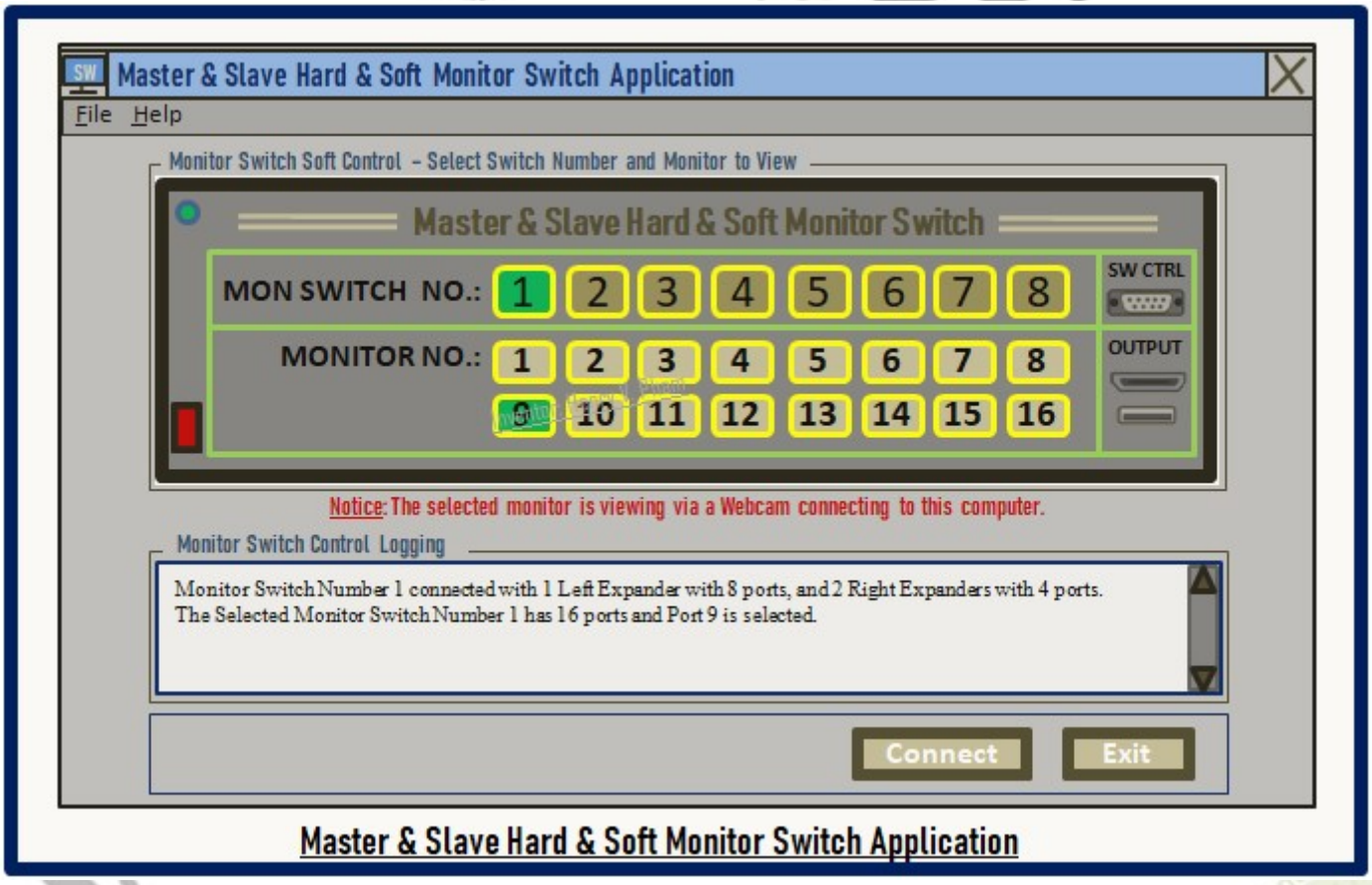


Figure-16: Master & Slave Hard & Soft Monitor Switch Application Sample

To control or select a node computer monitor remotely via internet or local network connection, the computer server must have a software application to communicate with the master switch to send

query or select command to the expander switch with plus of a webcam running on the computer server to view the selected monitor that connected to the expander switch in the chamber; note that the UI application will query the master switch first for number of expander witches. Figure-I6: Master & Slave Hard & Soft Monitor Switch Application Sample shows a sample of Master & Slave Hard & Soft Monitor Switch UI application which allows the users to click on the UI buttons to send selected command to the expander switch. The UI application can have the same Look & Feel of the front panel of the master switch for user friendly support; however, the software developers can implement the UI application similarly with suggestion of logging panel on the UI application to log the current action, query command and selection command for more interactive functions of the application. The 'Connect' button can be used to query the selected expander switch for the number of monitors that connected to that expander switch.

To debug when a node computer is crashed or configure settings a node computer remotely via internet or local network connection, the USB Virtual Keyboard is introduced in this invention to handle these functions. Figure-I7: User Control a Remote Node Computers remotely via USB Virtual Keyboard Option shows a sample of the USB Virtual Keyboard and the application that allow the users to control a node computer remotely via internet or local network connection. Note that the USB Virtual Keyboard device is recommended with built-in with short USB connection cable, and the other side can be with attachable USB cable which allows for cable extension for better wiring.

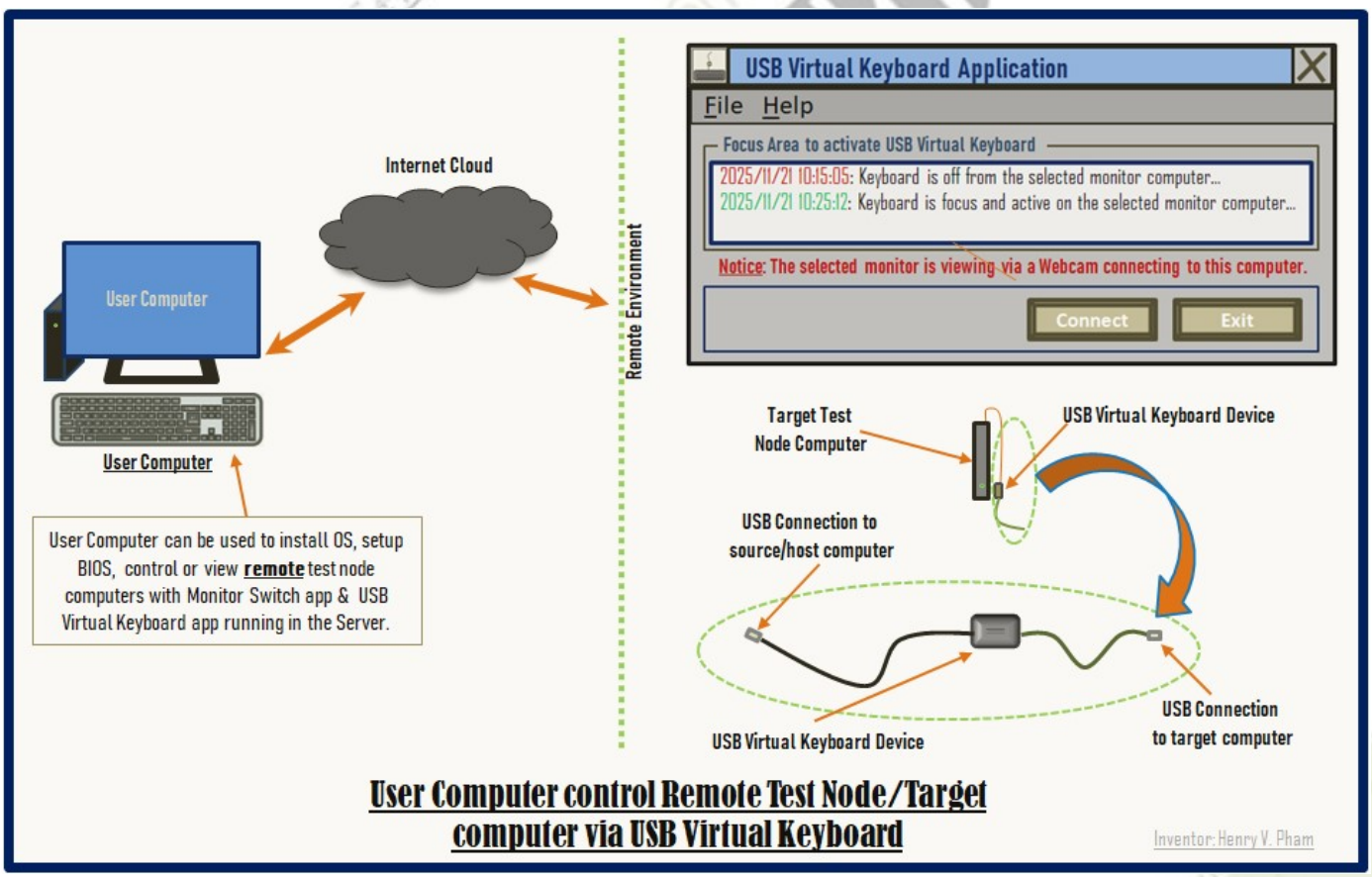


Figure-I7: User Control a Remote Node Computers remotely via USB Virtual Keyboard Option

The USB Virtual Keyboard would come with a HID device that acts similar function of the existing hard keyboard when it receives any keys that were sent via USB serial communication with the same as USB keyboard support. The HID device with one side USB connector adapter to connect to the host or master switch to receive keyboard commands keys, and one side connected to the target computer and represented as a keyboard device and always ready even when the target computer is just booted up, where HID device stands for Human Interface Device which is available with driver ready on every computer. When the users want to control the selected monitor test node computer by keyboard, the users have to click on this app to have focus as an intended to control; this way the users can always see the app and actively control the selected monitor of the node computer and prevent from confusing when the app is hidden typing wrong keys to the different application on the computer server.

Figure-I8: User with Full Remote Control to Install/Setup/Configure the Remote Node Computers shows a sample of remote user with full control to install, setup, configure or debug a test node computer with the USB Virtual Keyboard and Monitor Expander Switch which have the UI application running on the computer server. Note that the USB Virtual Keyboard will transfer every keys that the remote users typing on their keyboard to the target node computer when it is in active duty. With support of USB Virtual Keyboard and the Master & Slave Hard & Soft Monitor Switch application running on the computer server plus a webcam, the users can install, setup, configure settings and debug a test node computer remotely via internet or local network connection which provide the powerful remote features that can save money and resources of travelling for the manufacturers and companies. Note that when we have Cloud OS ready to use, the remote connections would be more secured with all the network configurations will be secured in a Cloud OS gateway that can be accessed to the existing local network with existing computer servers that running Linux or other OS for the new great World of Computing Infrastructure Modern.

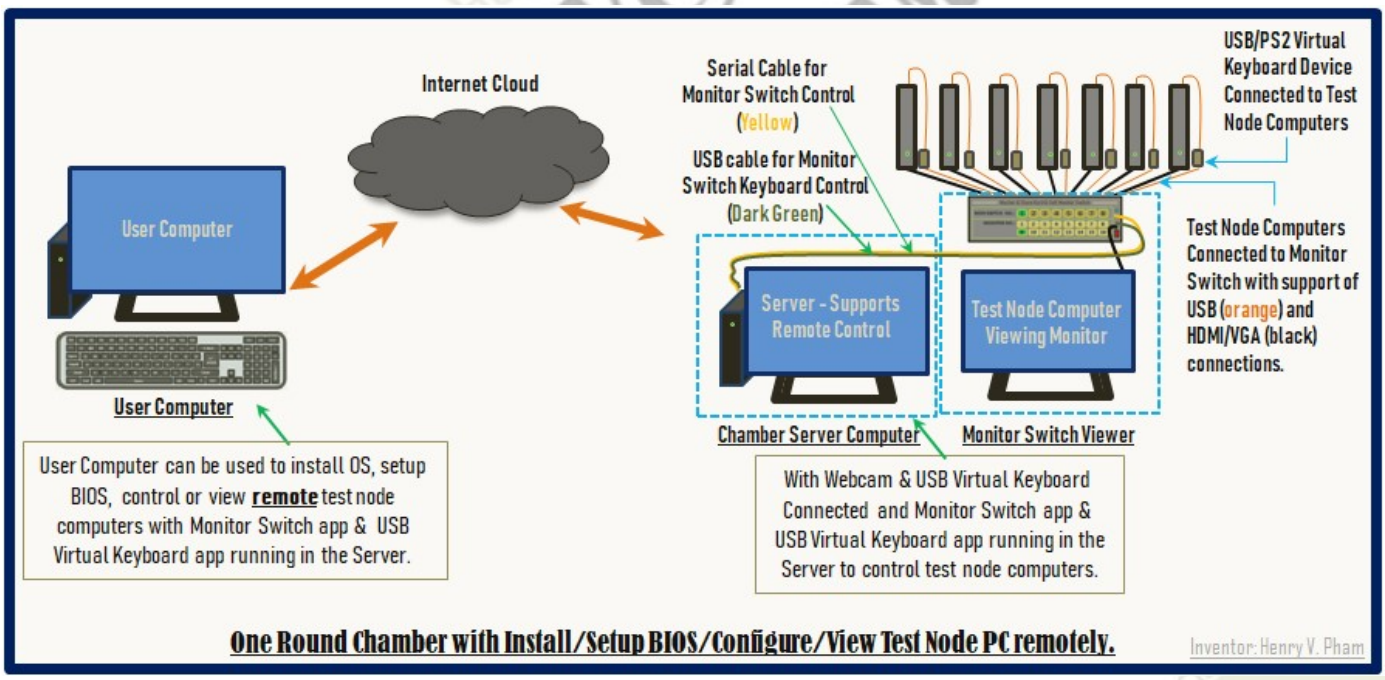


Figure-I8: User with Full Remote Control to Install/Setup/Configure the Remote Node Computers

One Round Chamber - Specification

Figure-I9: User with Full Remote Control to Install/Setup/Configure One Round Chamber shows a sample of One Round Chamber with the USB Virtual keyboard, Expander Monitor Switch and UI applications supported. The One Round Chamber will be more useful and more powerful functions for automation testing in manufacturing with these USB Virtual keyboard, Expander Monitor Switch and the UI application plus the webcam become available.

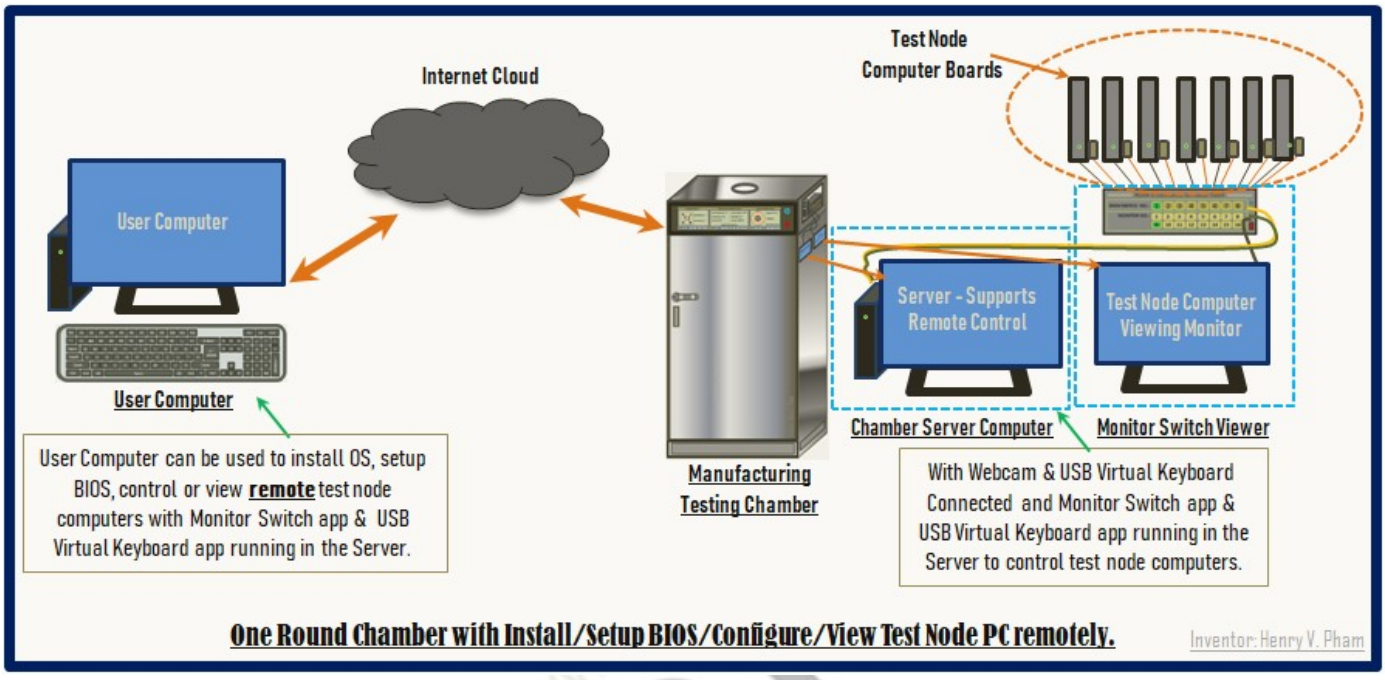


Figure-I9: User with Full Remote Control to Install/Setup/Configure One Round Chamber

The computer server is recommended to run with Linux OS with 1 Serial Port connected to One Round Chamber for the Temperature and Humidity control, Chamber Drum Rotation Control and Chamber Vibration Control; 1 USB connection for USB Virtual Keyboard; 1 Serial Port connected to Master Monitor Switch; and 1 USB port for webcam. The chamber configuration should have 1 monitor for the computer server to view and control chamber controller, to select a target node computer monitor and the UI applications; and 1 additional monitor to view the selected monitor of the node computers. Note that the webcam is connected to the computer server and can be use to view both monitors or can only set to view the switch monitor for all the node computers. Figure-I10: Monitor Switch Application & Webcam running on the Server shows a sample a Linux Desktop showing a webcam view with the selected monitor-9 on switch # 1 and the Monitor Switch UI application view. This is what the remote users expected to see when they login into the computer server. Figure-I11: Monitor Switch and USB Virtual Keyboard Applications with Webcam running on the Server shows with additional USB Virtual Keyboard UI application view that running on the computer server. These configurations would allow the remote users control and configure the chamber; and allow the remote users view and debug a node computer without having to be to the chamber physically and reduce costs for companies and manufacturers. The new USB Virtual Keyboard, Master & Slave Hard & Soft Expander Switch and the UI applications can be used for other purposes that need the users to work from remote sites.

One Round Chamber - Specification

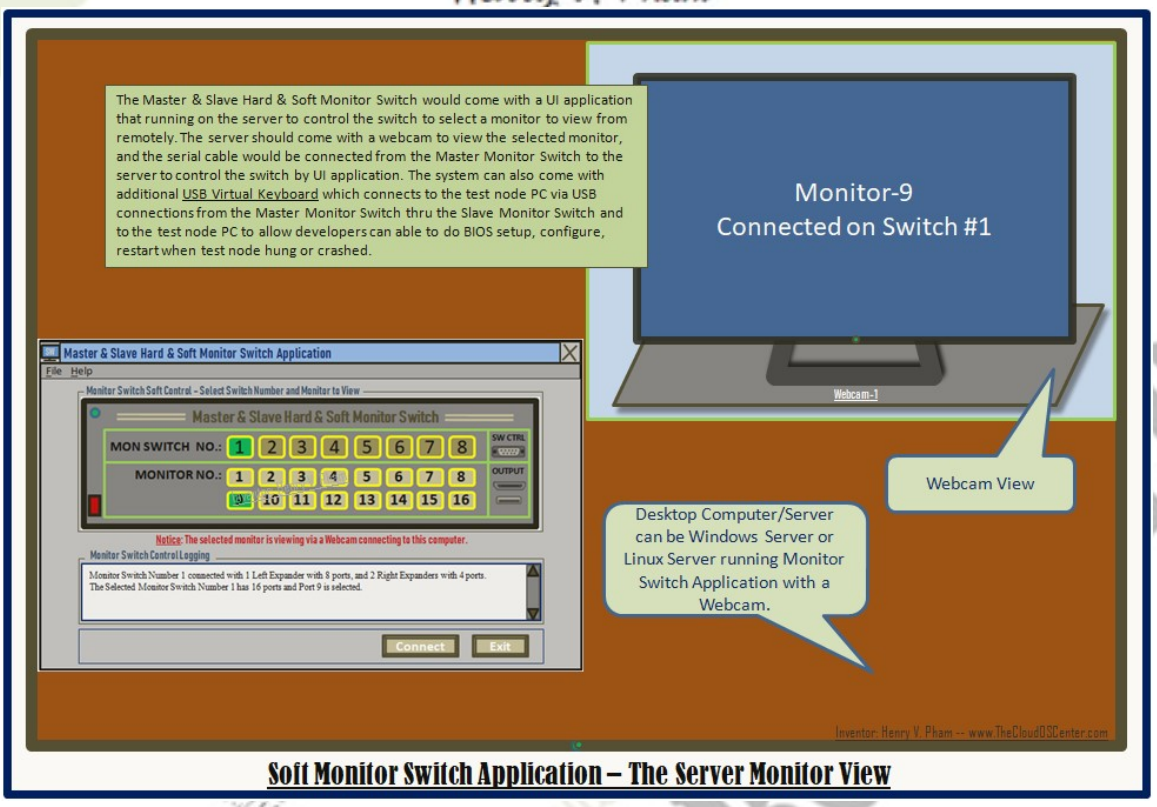


Figure-I10: Monitor Switch Application & Webcam running on the Server

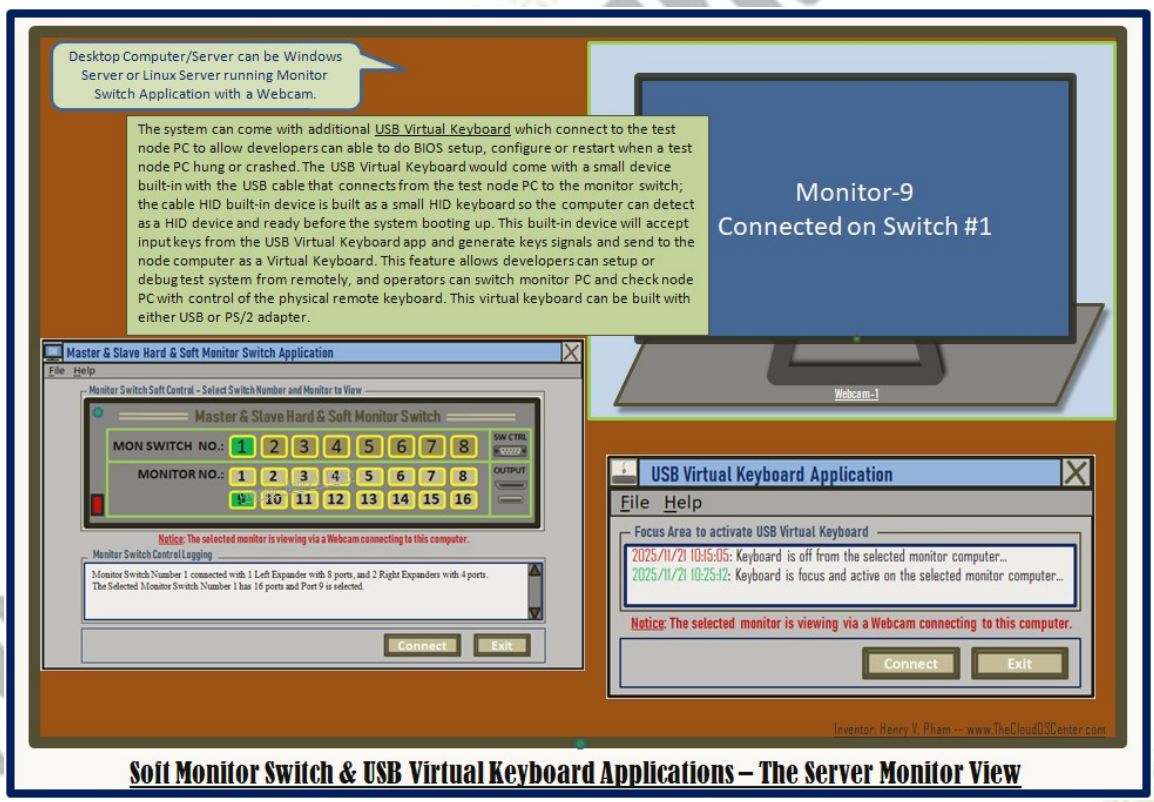


Figure-I11: Monitor Switch and USB Virtual Keyboard Applications with Webcam running on the Server

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One Round Chamber - Specification

J. Chamber Vibration Trigger Mechanism

The mechanical that requires to the vibration pattern block into its vibration place is also important; the vibration mechanical should come with the trigger blocks and the vibration slide-lock base are recommended to build with 45° angle one-to-one sides matching for sliding to form one on top another from the side. Figure-J1: Vibration Pattern Block Motion Calculations shows the vibration pattern block movement from initial position to the vibration position. The vibration protection metal cover with open on top to allow the block raise and lower down to the flat surface of the protection cover with the recommended ¼ inch thickness. The vibration block is recommended to rise up with 1" high to reach the maximum vibration level; the drawing shows the vibration slide-lock base with the high 'h_0' with 1"; the high 'h' with 2"; and the vibration block width 'c' is recommended with 1.5" to 2" width and the length with 4" to 5" long. The drawing shows the left position before the base slide in with $h_1 = h_2 = h$; and these sides h_1 and h_2 must be the high of the open space from the base o the lower surface of the protection cover; and the angle $\alpha = 30°$ which can be calculated based on those parameters.

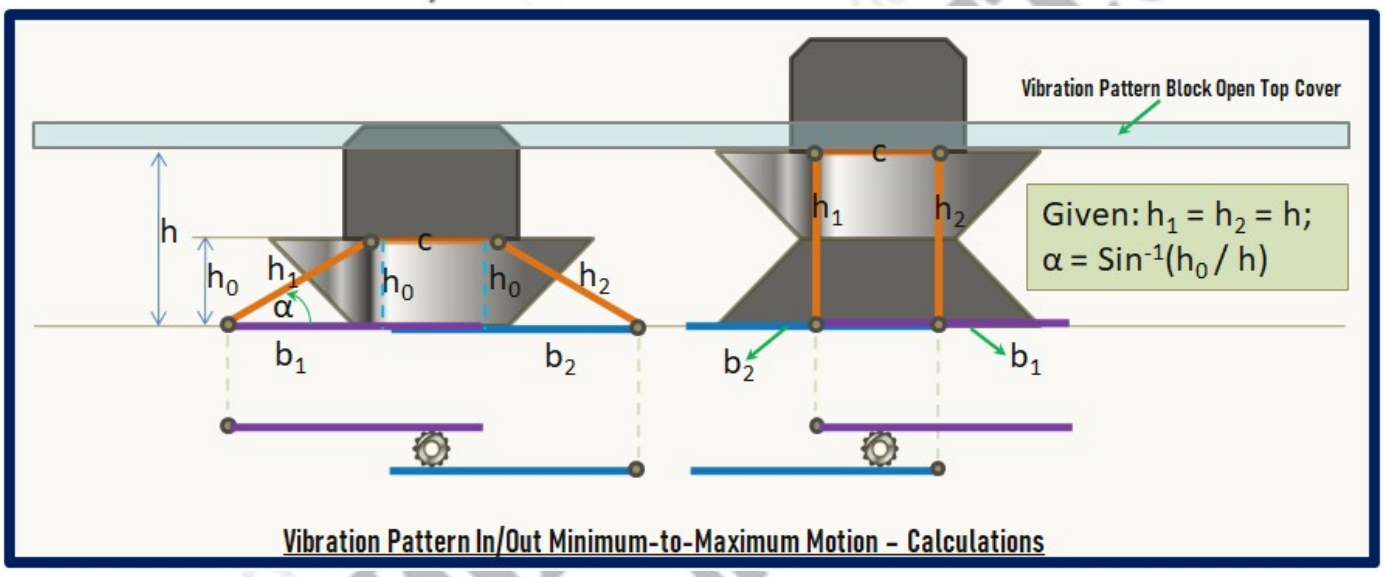

Figure-J1: Vibration Pattern Block Motion Calculations

The vibration slide-lock base has a slide track on the side with latch/lock mechanical which are used to lock from sliding on track when the block is still outside and not on the ready position to pull right on the vibration pattern block and used to unlock and allow to slide through when the vibration pattern block reaches the high that is good for the base to slide in. Figure-J2: Vibration Pattern Block Motion Overview shows an overview of the vibration trigger motions with vibration slider holder, the horizontal slider bars 'b1' and 'b2' equal to $h_0/\tan(\alpha)$ plus additional length for gear rolling on the side but cannot exceeded the inner wall width. The latch is installed on slider bar 'b2', and the lock is installed on the joint of slider bar 'b1'; when the slider bar 'b2' slide forward with the latch on attached on it at the position will kick off the lock on the joint and allow the raider bar 'h1' to slide with the joint where the vibration pattern block is raised to the maximum level with both raider bars 'h1' and 'h2' on their vertical position.

One Round Chamber - Specification

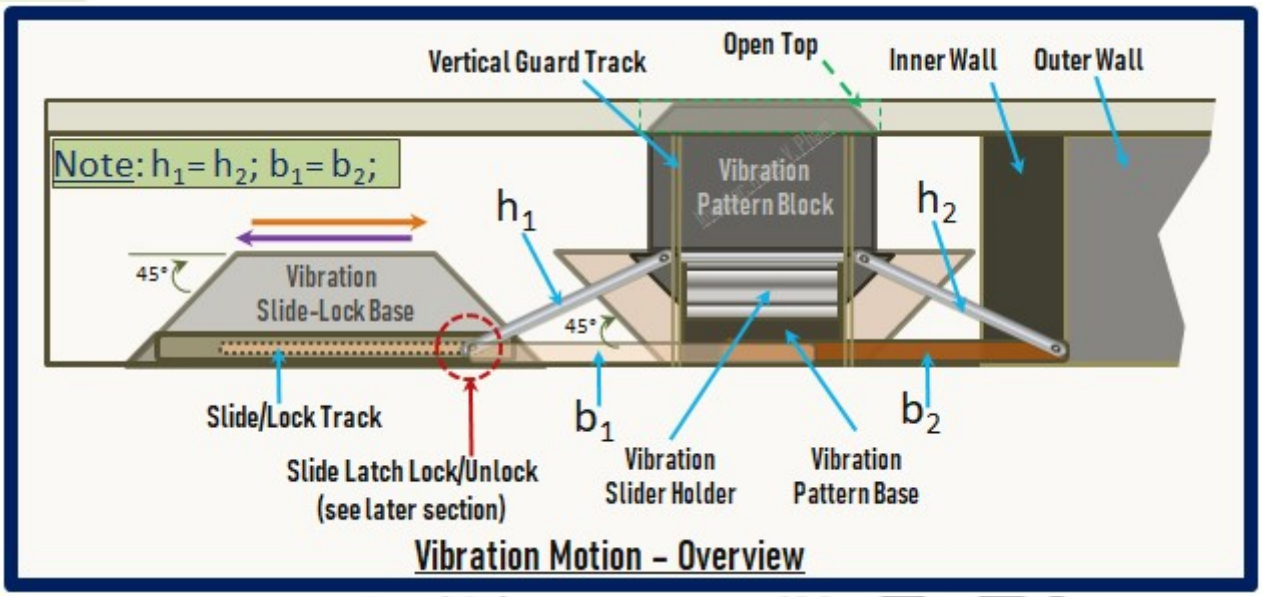

Figure-J2: Vibration Pattern Block Motion Overview

The vibration slide-lock base can move inward by either powered or manual mode with the same mechanical. Figure-J3: Vibration Pattern Block Motion Step-1 View shows the slide-lock base starts moving inward at the initial position with orange color arrow. When the slide-lock base is moving inward, the raider bar 'h1' and 'h2' will be pushed to rise the block upward; and the horizontal gear bars 'b1' and 'b2' are sliding in opposite direction through the rolling gear; note that the gear sliders can be shorten with 2 rolling gears. The movement showing step-1 view is the starting of inward direction, and the slide-lock base moves forward and pushes the raider bars 'h1' and 'h2' to rise the block higher.

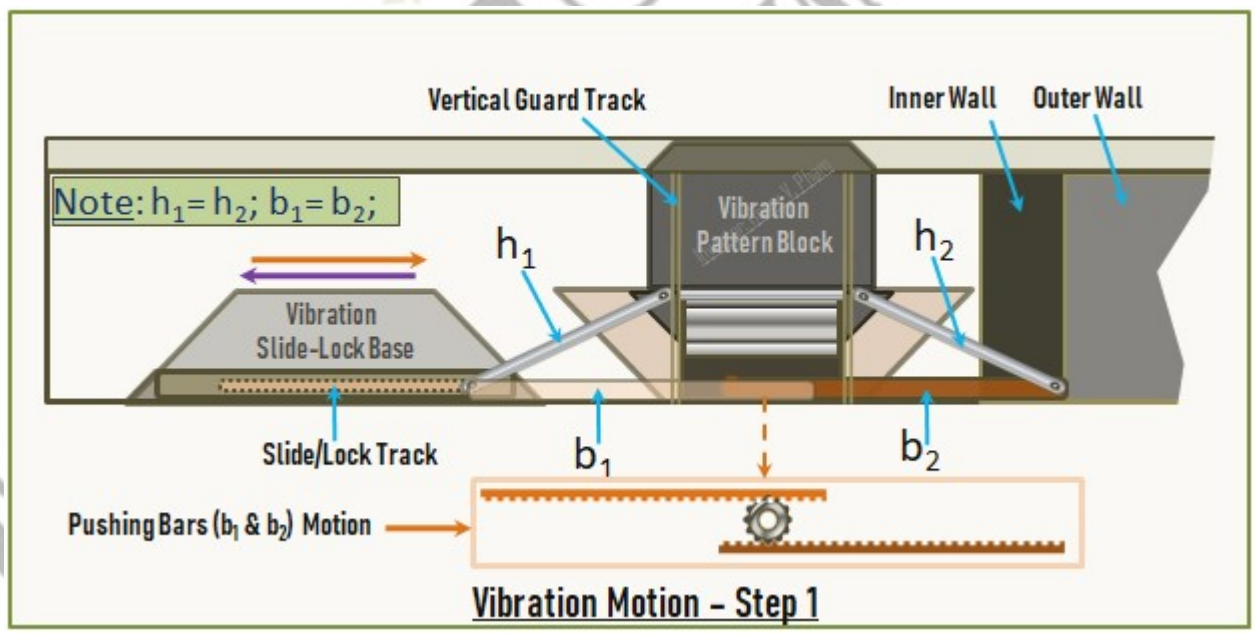

Figure-J3: Vibration Pattern Block Motion Step-1 View

Figure-J4: Vibration Pattern Block Motion Step-2 View shows the next step of movement of the slide-lock base as shown in orange arrow; the vibration pattern block is now raised higher. Figure-J5: Vibration Pattern Block Motion Step-3 View shows the next step when the slide-lock base moving forward into the vibration position.

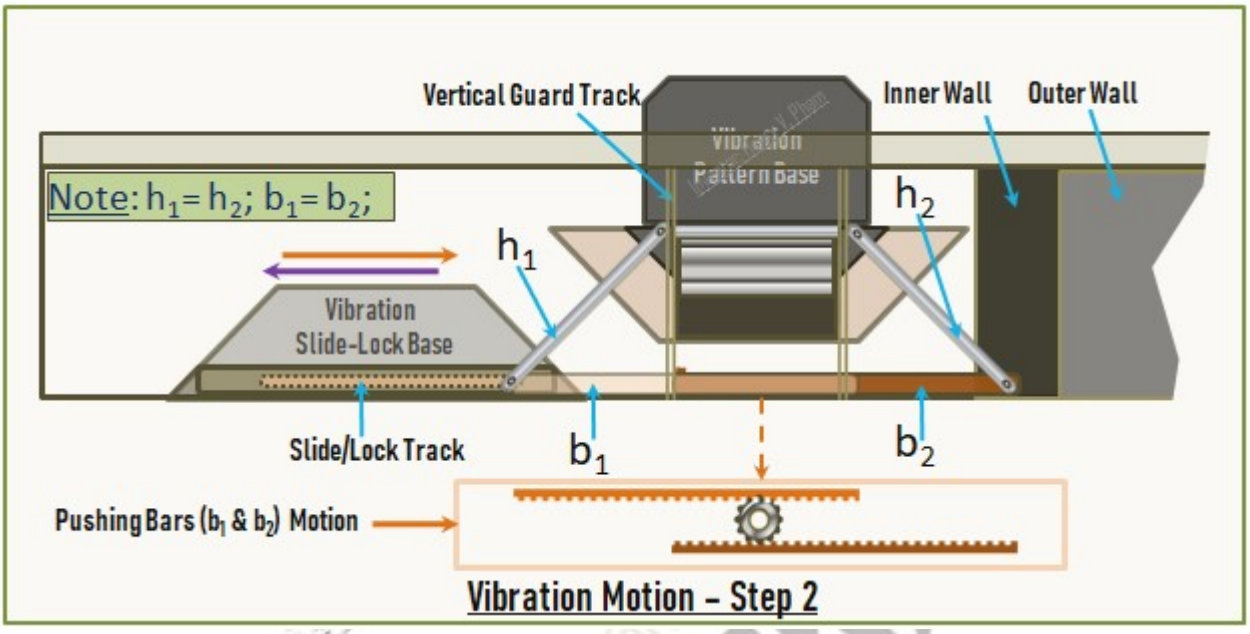

Figure-J4: Vibration Pattern Block Motion Step-2 View

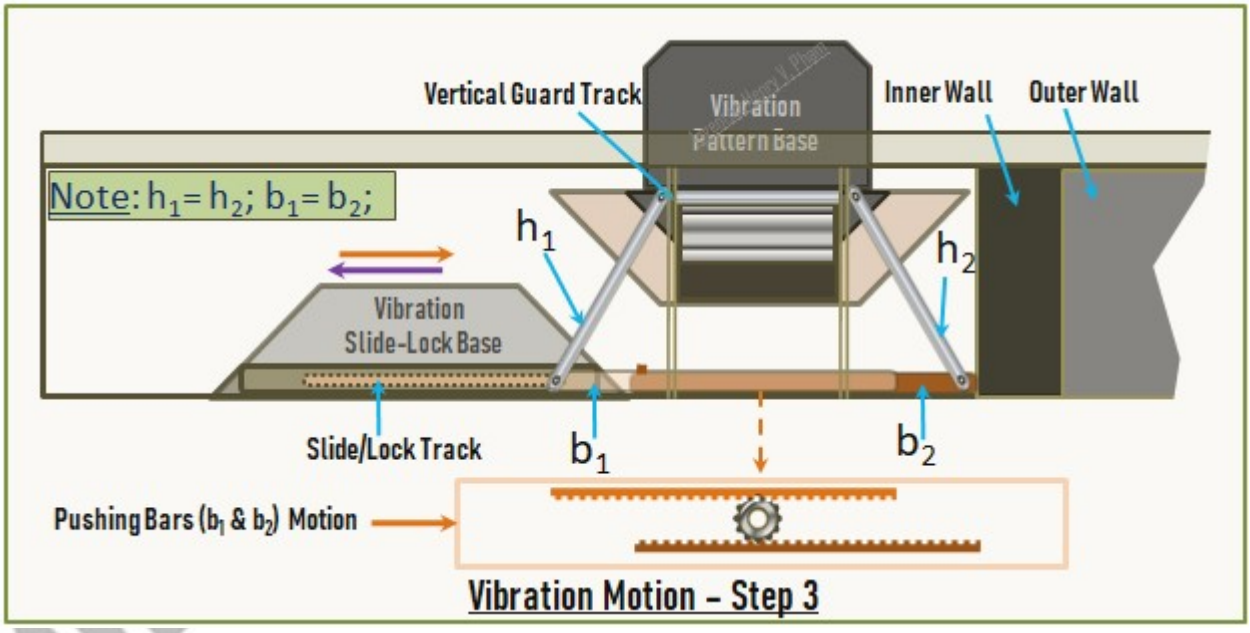

Figure-J5: Vibration Pattern Block Motion Step-3 View

The slide-lock base pushes the raider bars 'h1' and 'h2' to the vertical position, and this is the moment that the latch and lock get kick off to allow the joint of the 'h1' raider bar to slide and open for the slide-lock base to move in to its vibration position; note that the slider lock and latch will be shown in later figures. Figure-J6: Vibration Pattern Block Motion Step-4 View shows the raider bars 'h1' and 'h2' in vertical

position and the latch on the horizontal gear bar 'b2' will kick off the lock to open and allow the joint of the raider bar 'h1' slide through. The vibration pattern block is raised to the highest position and the slide-lock base continue to move inward to its vibration position to protect as a base for the vibration pattern block when vibrators on the chamber drum slide through. Figure-J7: Vibration Pattern Block Motion Step-5 View shows next movement of the vibration trigger mechanical with the slide-lock base slides closer to the vibration pattern block.

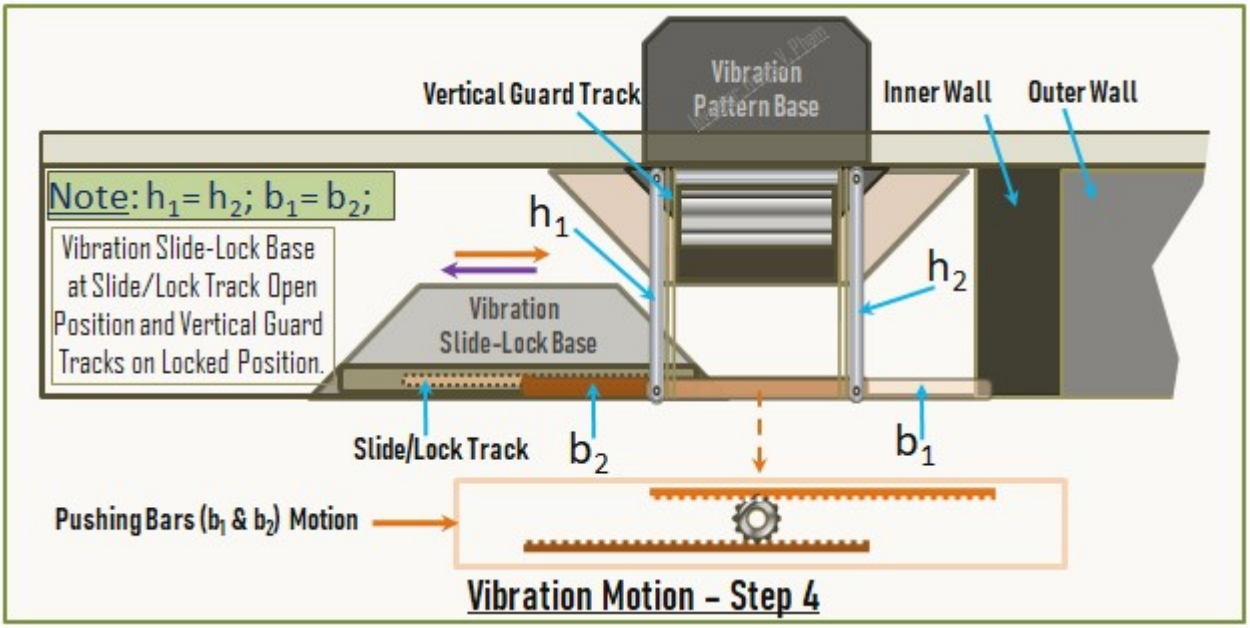

Figure-J6: Vibration Pattern Block Motion Step-4 View

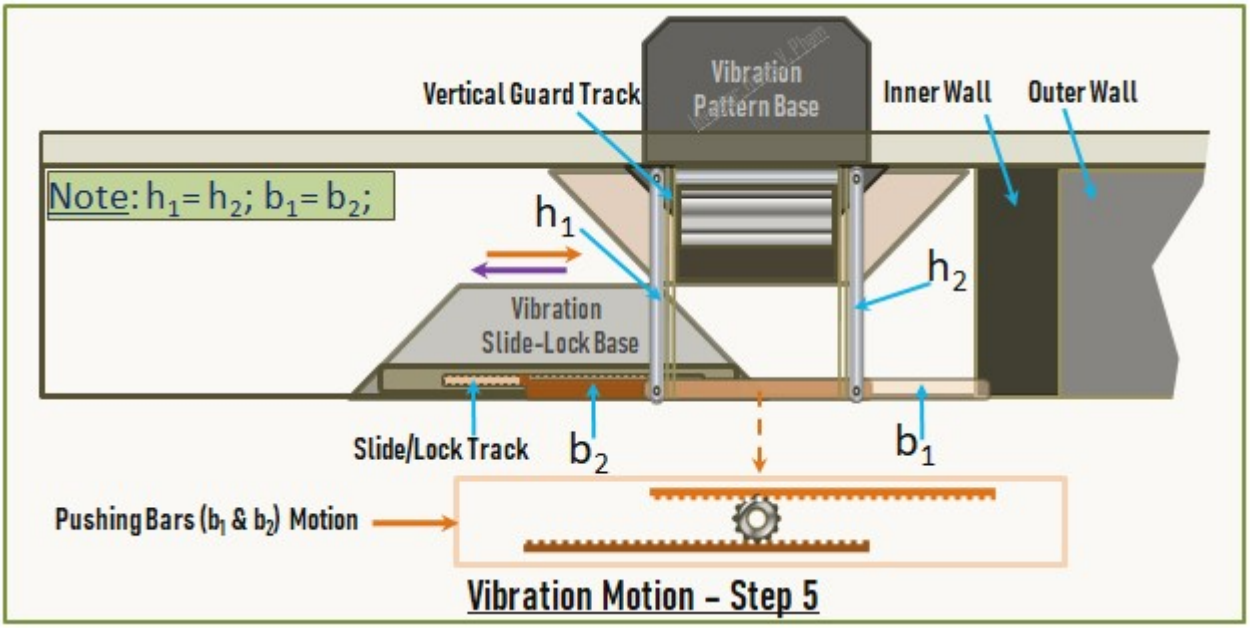

Figure-J7: Vibration Pattern Block Motion Step-5 View

One Round Chamber - Specification

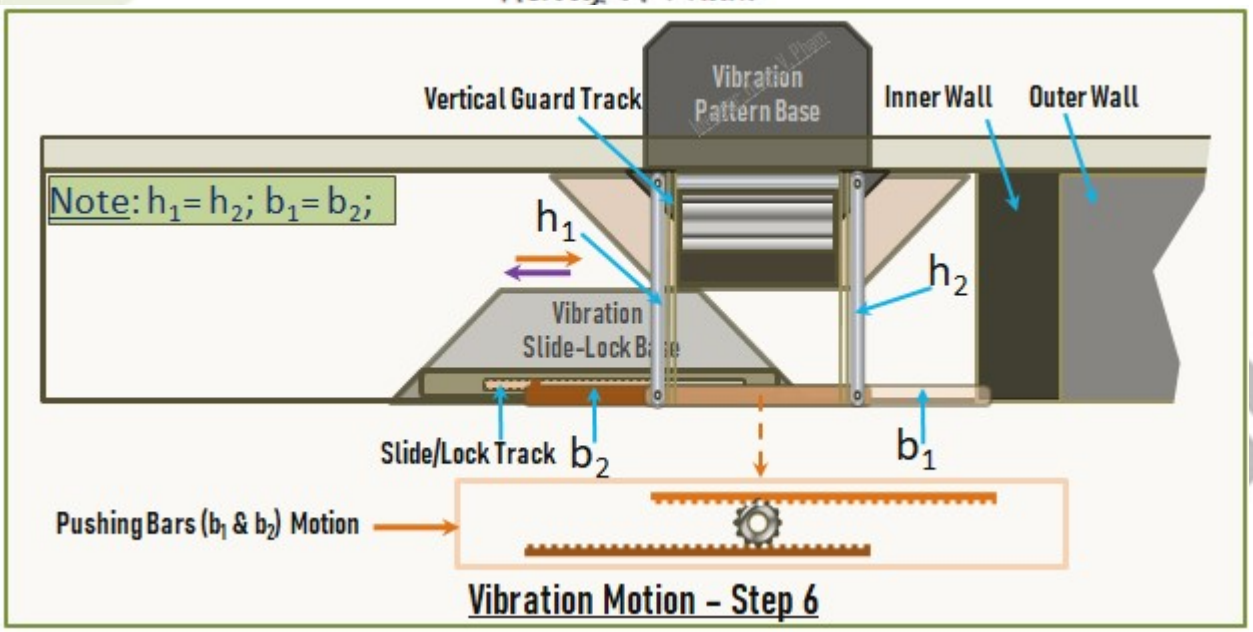

Figure-J8: Vibration Pattern Block Motion Step-6 View

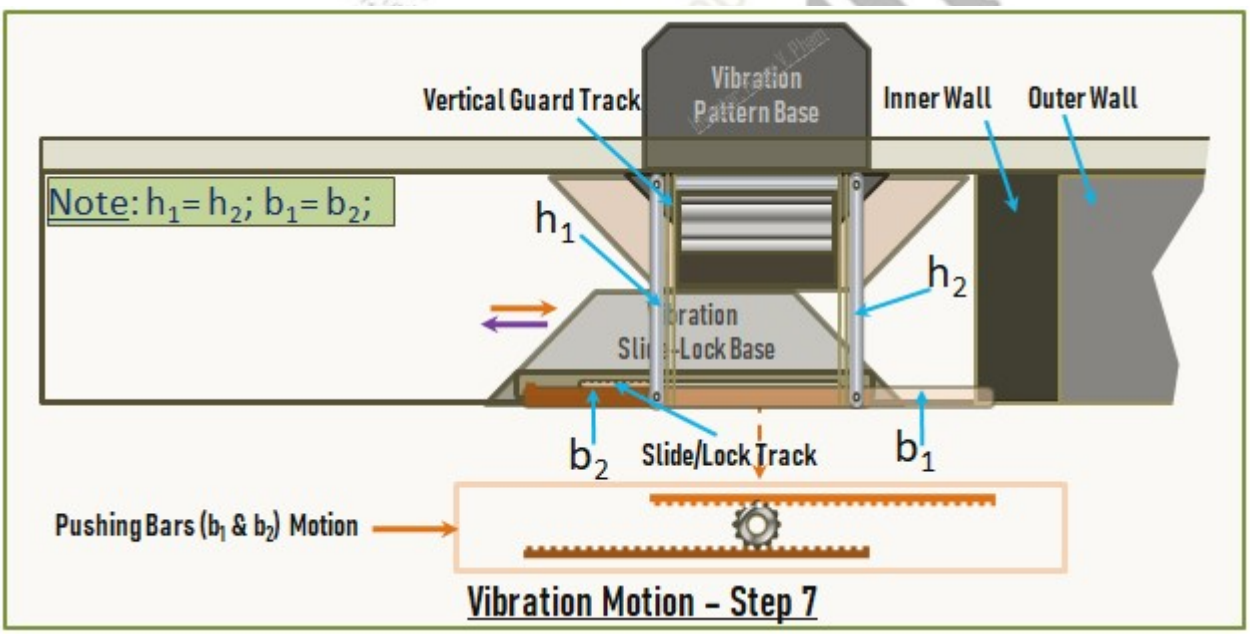

Figure-J9: Vibration Pattern Block Motion Step-7 View

The slide-lock base continue moves inward direction, and it is expected to slide on the bottom of the vibration pattern block which is recommended and not having any tolerance as designed for better protection at the bottom of the vibration pattern block while the chamber drum is rotating with vibration triggers are on as shown in Figure-J8: Vibration Pattern Block Motion Step-6 View and Figure-J9: Vibration Pattern Block Motion Step-7 View. The slide-lock base is expected to slide at the way into its vibration place and touch the inner wall as the perfect position to secure and protect the base better. Note that the vibration trigger mechanical is recommended to build with a lock either by gear motor with powered mode or by hand

with manual mode. Figure-J10: Vibration Pattern Block Motion Step-8 View shows the last position that the slide-lock base should be on its ready for vibration position.

When the chamber is stopped running and the vibration triggers are needed to release from their positions, the operators or the Automation Test Software need to set the chamber back to its initial neutral position first before release the vibration triggers out from their vibration positions to prevent from stuck or holding by the vibrators of the chamber. The steps to show releasing of vibration pattern block are similar to the above steps with moving outward in opposite directions in purple color arrows as shown in the above figures. The slide-lock base can slide out to the position shown in Figure-J6: Vibration Pattern Block Motion Step-4 View and the lock on the joint of the raider bar 'h1' will lock back on track by its spring where the slider is at the last position of the track then the raider bar 'h1' and 'h2' will be pulled out the by force of the mechanical that pull the slide-lock base either by gear motors with powered mode or by hands with manual mode. Note that the vibration pattern blocks are recommended with the dimensions of 1.5" to 2" inches width and 4" to 5" in length; and they are recommended to build with strong steel material which may not be able to slide with 45° slopping side angle without lifting supporters and can be used with this mechanical or similar lifting and sliding mechanicals.

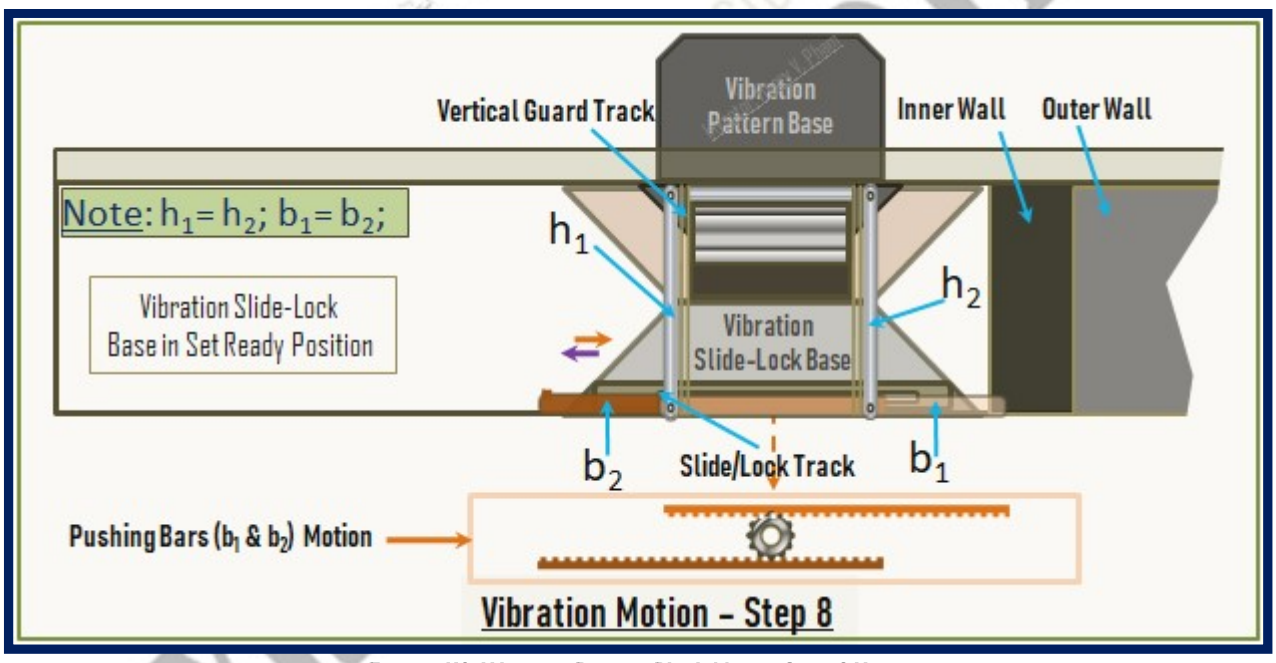

Figure-J10: Vibration Pattern Block Motion Step-8 View

The slide lock is designed with a spring to push the lock bolt in locked position and the lock bolt can be released upward when the slider bar 'b2' slide over the roller and its latch pushes the slide lock holder upward which has the lock bolt attached on it would help to release the lock and let the joint and the raider bar 'h1' slide through. Figure-J11: Vibration Pattern Block Motion Control with Slider Lock Sample shows the overview of the slider latch/lock mechanical in both directions; the gear bar 'b2' slides out to unlock the lock bolt in green color arrow to move the base to its vibration position, and the gear bar 'b2' slides in to release the lock bolt when it passes the lock position of the track in purple color arrow to move the base

to its neutral released position. Note that the chamber vibration trigger mechanism is designed to handle both sides of the vibration pattern blocks.

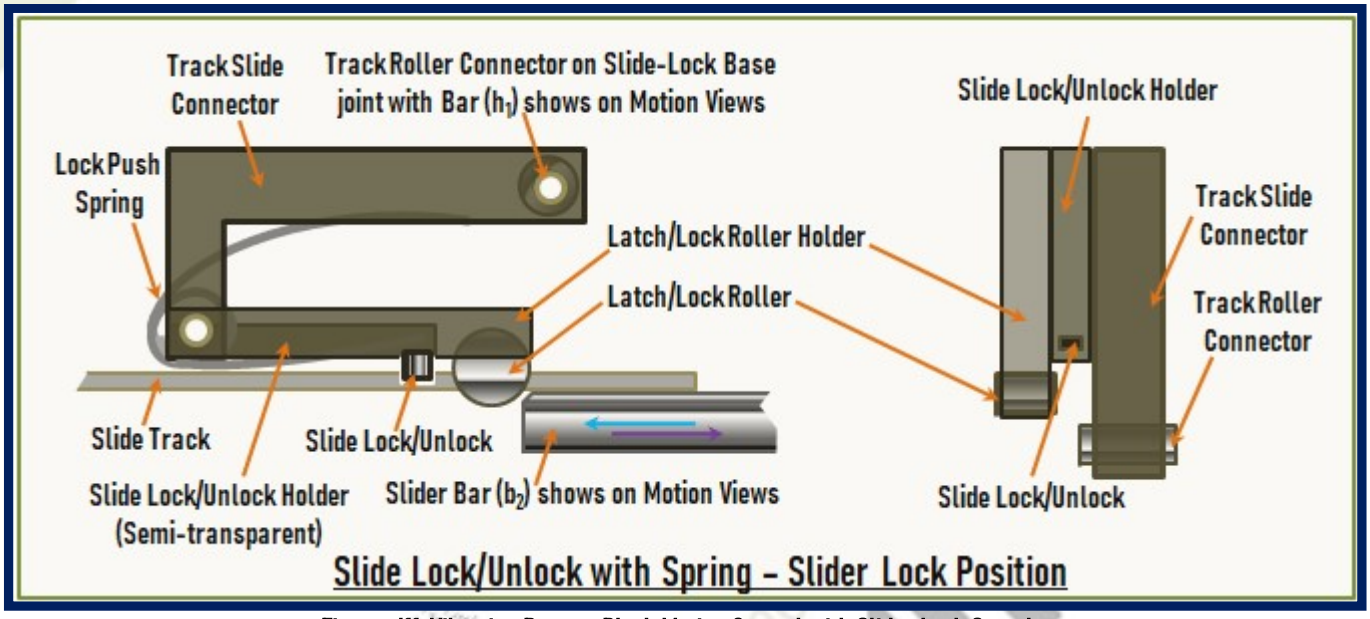

Figure-J11: Vibration Pattern Block Motion Control with Slider Lock Sample

The slider latch and lock movement can be described with 2 positions. Figure-J12: Vibration Pattern Block Motion Control with Slider Un-Lock Position-1 shows the slider bar 'b2' slides and raises the latch/lock roller holder, and the lock bolt is lifted up. Figure-J13: Vibration Pattern Block Motion Control with Slider Un-Lock Position-2 shows the lock bolt is completely raised and the gear bar 'b2' continue to slide and lift up the lock bolt to allow raider bar 'h1' slides on track. The unlock mechanical movement is shown in green color arrow, and the lock mechanical movement is in reverted as shown in purple color arrow.

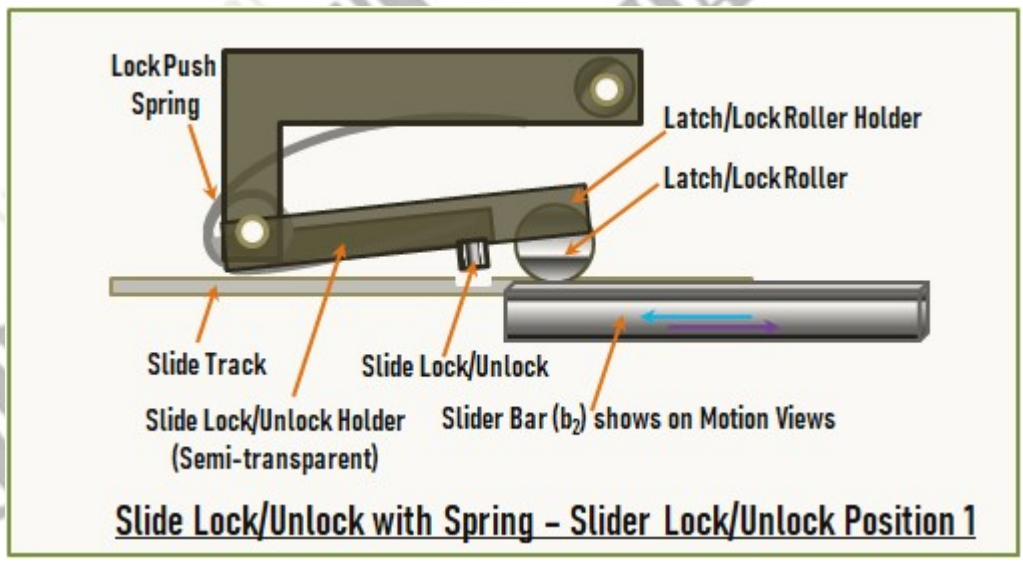

Figure-J12: Vibration Pattern Block Motion Control with Slider Un-Lock Position-1

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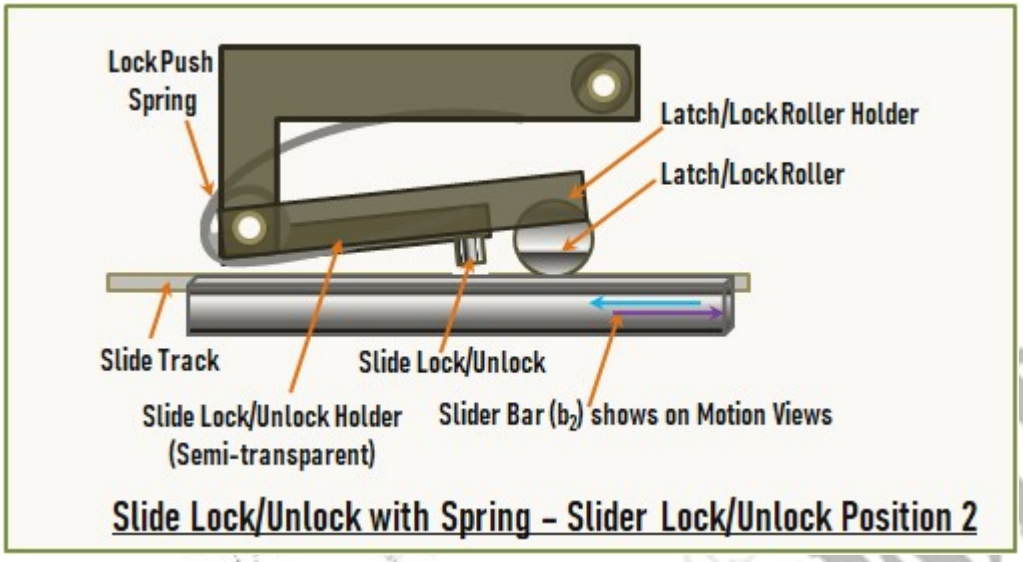

Figure-J13: Vibration Pattern Block Motion Control with Slider Un-Lock Position-2

The chamber is designed with 4 inner circle vibration patterns and 4 outer circle vibration patterns; and the vibrators can come with different shapes, can be roller vibrators or with slider vibrators in different sizes. The inner patterns are recommended to build bigger pattern with wider and deeper vibrator patterns and the pattern length can be different dimension but recommended with the length longer than the touching surface of the vibrator; and the outer patterns are recommended to build smaller pattern with shorter and lower vibration patterns compare to the inner ones. Figure-J14: Vibrator with Vibration Types Sample shows a sample of 2 different vibrators. The left one shows the vibrator in roller, and the right one shows the vibrator in slider; the pattern deep plays the vibration level and the pattern length plays the rates of the vibration. Note that the chamber drum is required to rotate both directions, so the vibration pattern is recommended with slopping angle which is roll-able or slide-able for the vibrators to move forward and backward in both directions of the drum movement.

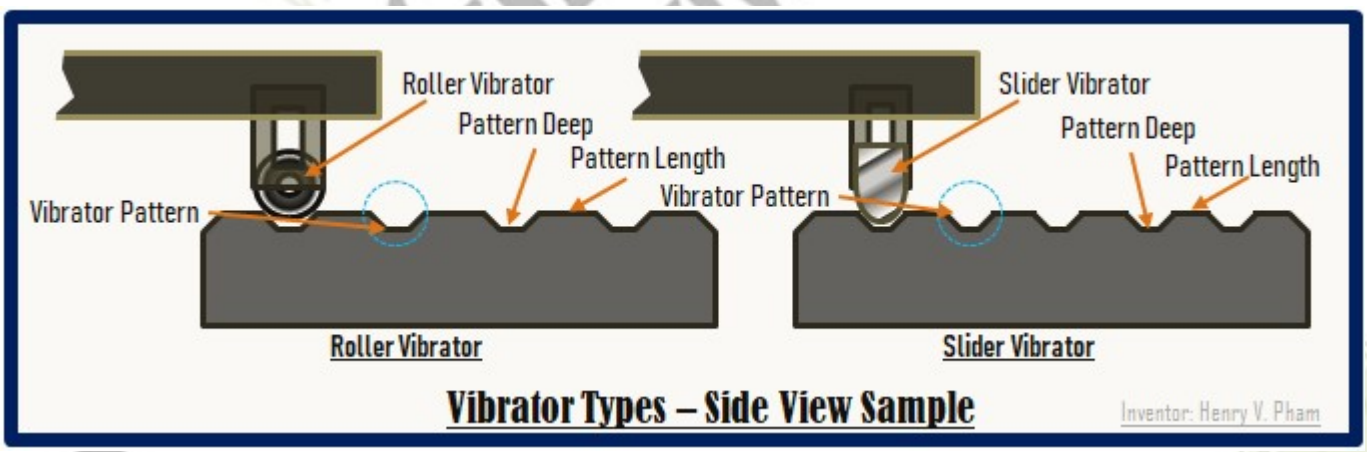

Figure-J14: Vibrator with Vibration Types Sample

One Round Chamber - Specification

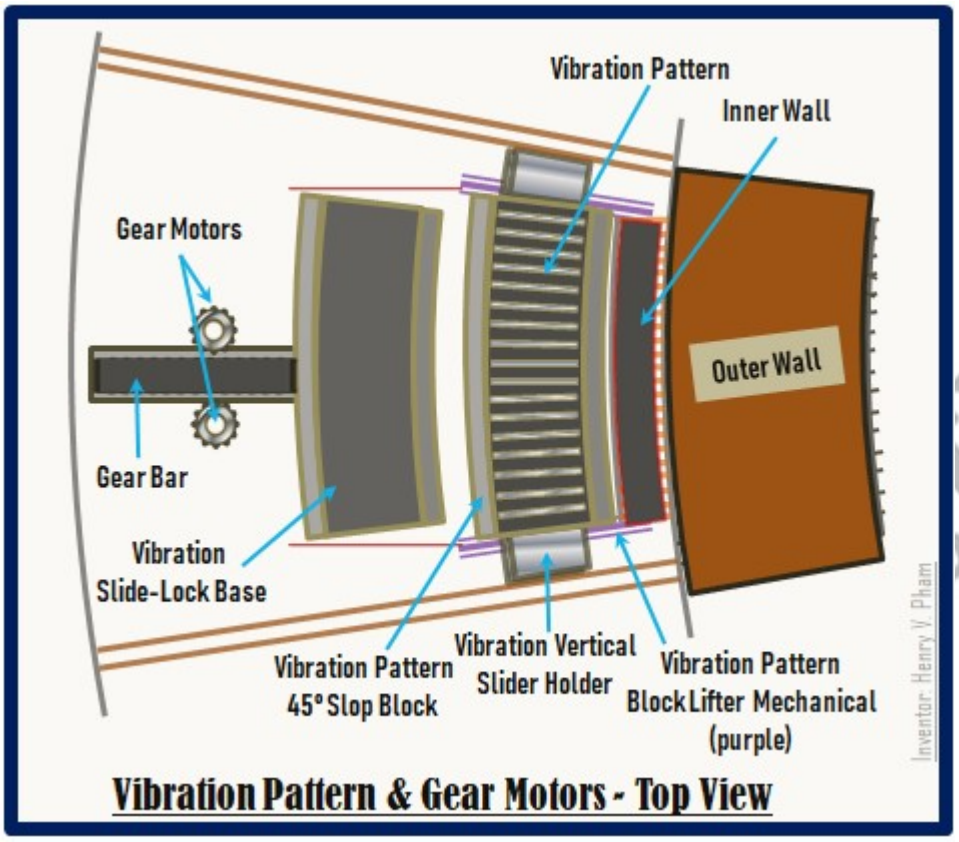

Figure-J15: Vibration Pattern Block with Gear Motor Sample

Figure-J15: Vibration Pattern Block with Gear Motor Sample shows the vibration patterns with the gear motors and gear bars with the mechanical. The gear motors are used for powered control mode and can be used as rolling gears for manual mode without power. The gear motors or rolling gear can drive the gear bar to move the vibration slide-lock base inward or outward. The vibration pattern with the vertical slider holder which is used by the raider bars to lift up or pull down, is shown in short arc shape with the length from 4" to 5" inches long with the width from 1.5" to 2" inches wide. The inner wall is designed to provide more space to build and install the vibration trigger mechanical easier; and the outer wall is designed to protect from the chamber drum motors which was mentioned in earlier sections.

K. Chamber Lifting & Carrying Support

One Round Chamber is invented with rotation drum to provide maximum load capacity in 360° surface with the motor powered control base with plus of vibration control feature. The chamber base is recommended to build within 1 foot high, and the bottom base with vibration mechanical and gear motors, is recommended to build with adjustable, removable and replaceable. However, the chamber with 6 levels drum and the height could be up to 7 feet included the base and the top shelf; the chamber lifting and carrying support is needed for setup, maintenance and repair. Figure-K1: Q-Liftier & Carrier Introduction for Maintenance Option shows a new introduce Q-Liftier & Carrier with a cubic container sample which can be

used to lift the chamber up for repair or maintenance and can be used to carry with an option of powered motors and drive by hands with the hand brake on the hand handles. The hand handles can be folded; the Q-Liftier & Carrier can be built with battery powered wheels; and the gear lifter can be built-in with battery powered lifter or with external power source. The Q-Liftier & Carrier is commended to build with 2 frames structures; the inner frame structure is used for lifting with adjustable feature to fit the chamber, and the outer frame structure is used for strong support structure of entire liftier and carrier while lifting and carrying. The liftier and carrier is designed with the back frame support panels with removable and adjustable panels.

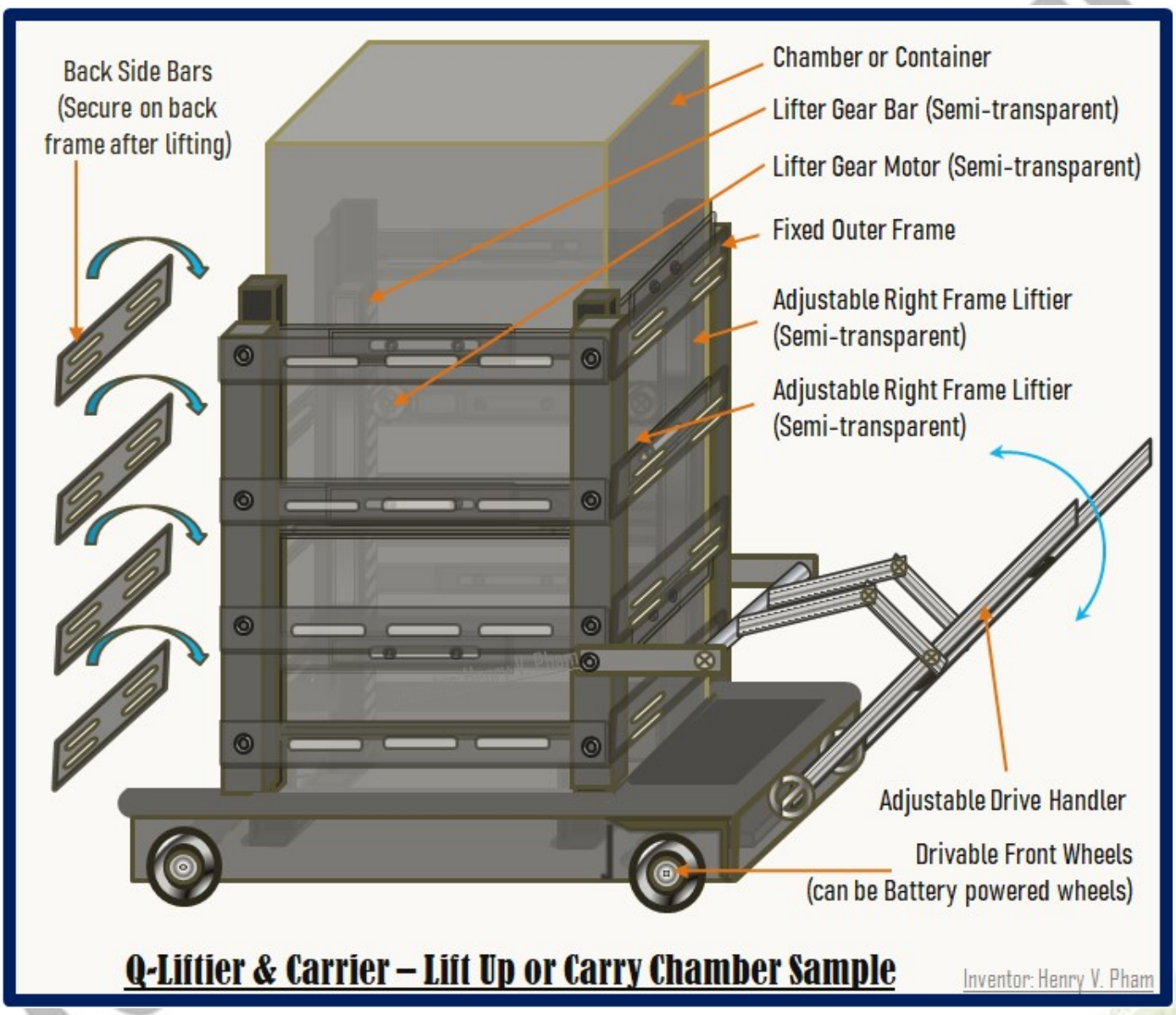

Figure-K1: Q-Liftier & Carrier Introduction for Maintenance Option

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Figure-K2: Q-Liftier & Carrier Outer Fixed Frame shows the outer fixed frame of the Q-Liftier & Carrier with outer frames bars/panels which are attached to the 4-poles and strongly tied to the base frame of the liftier and carrier. The back support frame panels are removable and used to open to push the liftier and carrier to fit on the chamber before lifting; the bottom support frame panel is stronger and also removable and used to hold the inner lifting frame structure which will be shown more detail in later section. The front wheels can be powered wheels with battery support to help the technician carries the chamber easily, and the front wheels should be drivable which can be built together into one axle with enough spaces on both sides to turn left and right. Note that the wheels should be big and strong enough to handle the weight of the chamber, and they are commended with at least 8" diameter and 2" width.

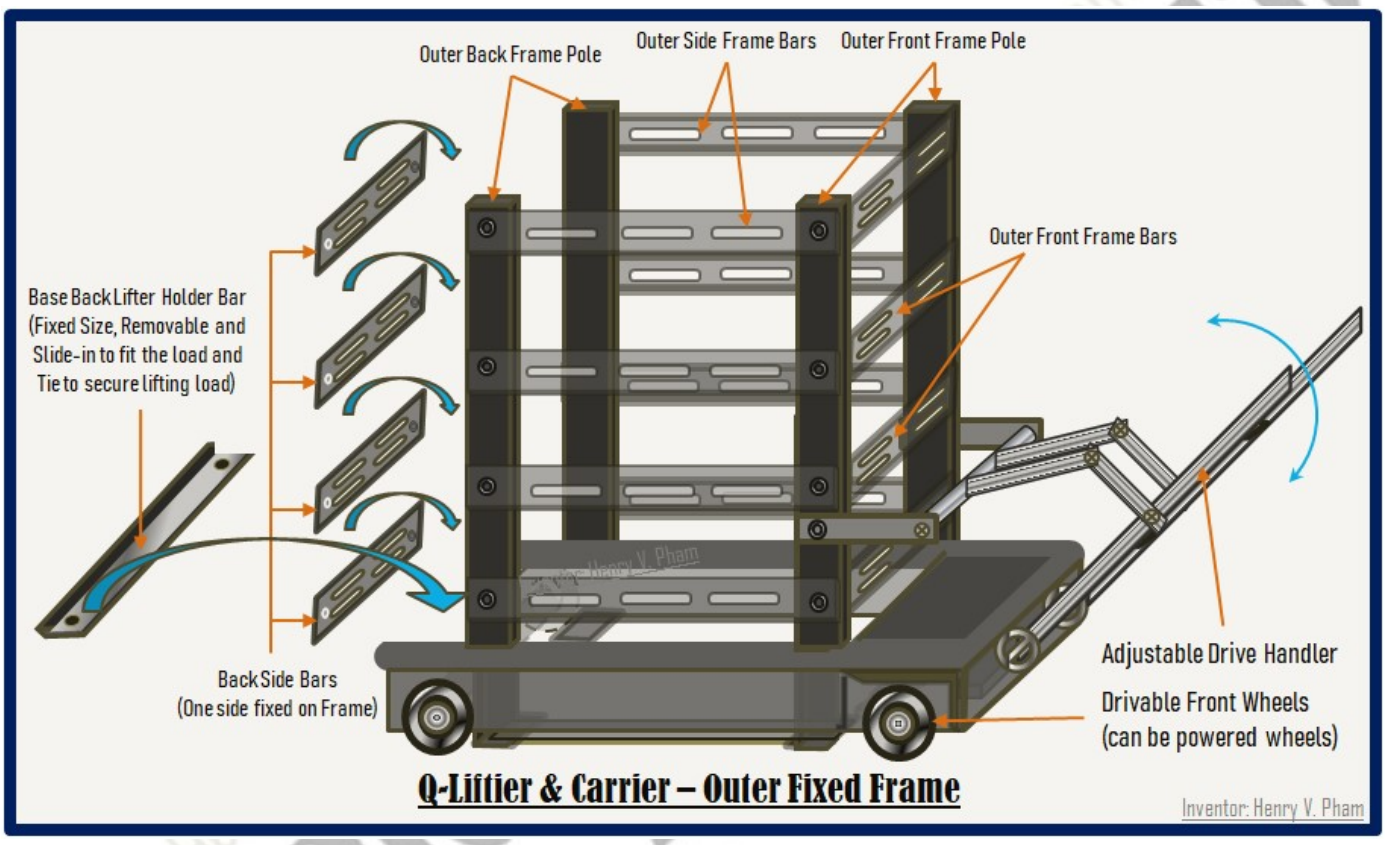

Figure-K2: Q-Liftier & Carrier Outer Fixed Frame

The Q-Liftier & Carrier is designed with adjustable inner frame to fit the chamber or the cubic load container with adjustable on both sides and the back support frame bar before lifting; note that the chamber base should be built with some spaces at the 4-corners that would fit the lifter leg/foot size which is built-in on the at the bottom of the lifter bar. Figure-K3: Q-Liftier & Carrier Inner Adjustable Frame shows the inner liftier and carrier adjustable frame with gear motors on the vertical lifter gear bars at the 4-corners. The lifter gear bars are slide-able and secured on the 4-corner poles while the gear motors roll the gear bars up or down. The side retractable bar which is used to support frame is retractable/adjustable to fit the size of the chamber on the side, and the left and right lifter frames with 2 gear motors on one frame should be adjustable to fit the size of the chamber on front or back. Note that the Q-Liftier & Carrier can

be built with powered control with gear motors to adjust both sides and pushing the back side of the inner frame to fit the chamber size; however, the back side bars and the base back lifter holder bar are required to remove and put back and secure by hands. Before lifting the chamber, the Q-Lifter & Carrier is recommended to push from the front or from the back of the chamber which allows the technician or operator adjusts the inner frames to fit the liftier and carrier easier.

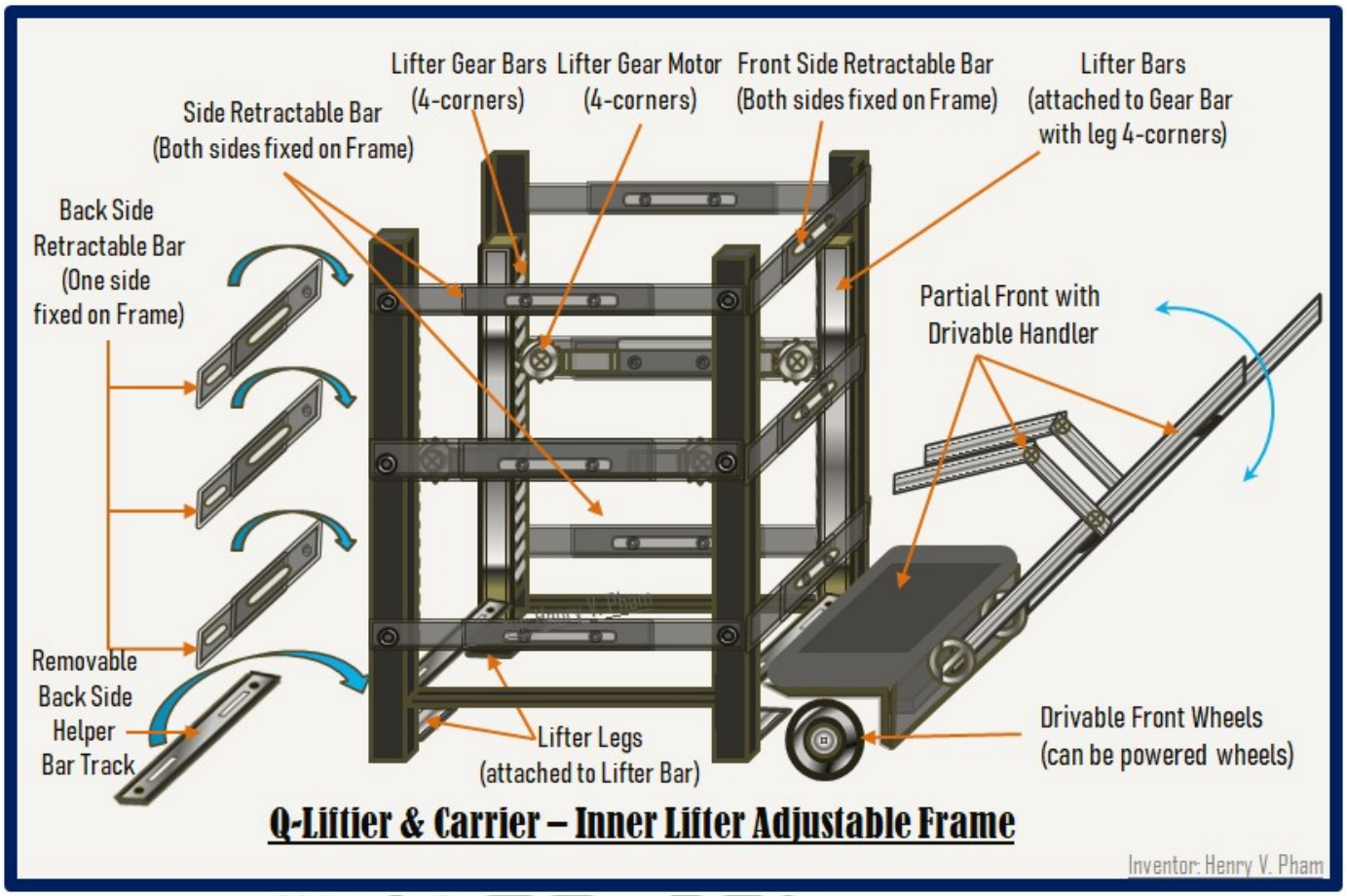

Figure-K3: Q-Liftier & Carrier Inner Adjustable Frame

Figure-K4: Q-Liftier & Carrier Frame Base View shows how the lifting mechanical works on the base of the Q-Liftier & Carrier. The top drawing shows the frame base with open on the back to prepare before push the liftier and carrier to fit on the chamber. The center adjustable left-and-right frame shows the 2 tracks that allow the left and right lifter frames to slide the lifter vertical gear bar/poles with frames to the center to fit the width of the chamber. The left and right lifter frames also have the length size adjustable tracks which allow the back left and right lifter gear bars to slide inward to reduce the length or slide outward to increase the length to its maximum supported length. The inner base bar is designed with removable and used to attach or detach on the inner frame after adjusting to fit the size of the chamber on both ways; and the outer base bar is also designed with removable and used to attach or detach on the outer frame after adjusting to fit the size of the chamber before preparing to lift the chamber. The bottom 3 drawings show the 3 positions sample that the lifter and carrier is needed to adjust; the first one shows the closed

frames position after the chamber of the load container is fitted inside, the second one shows the left and right lifter frames moving closer to the center position to fit the width of the chamber, and the third one shows the back lifter frame bars moving inward to the front to fit the length of the chamber.

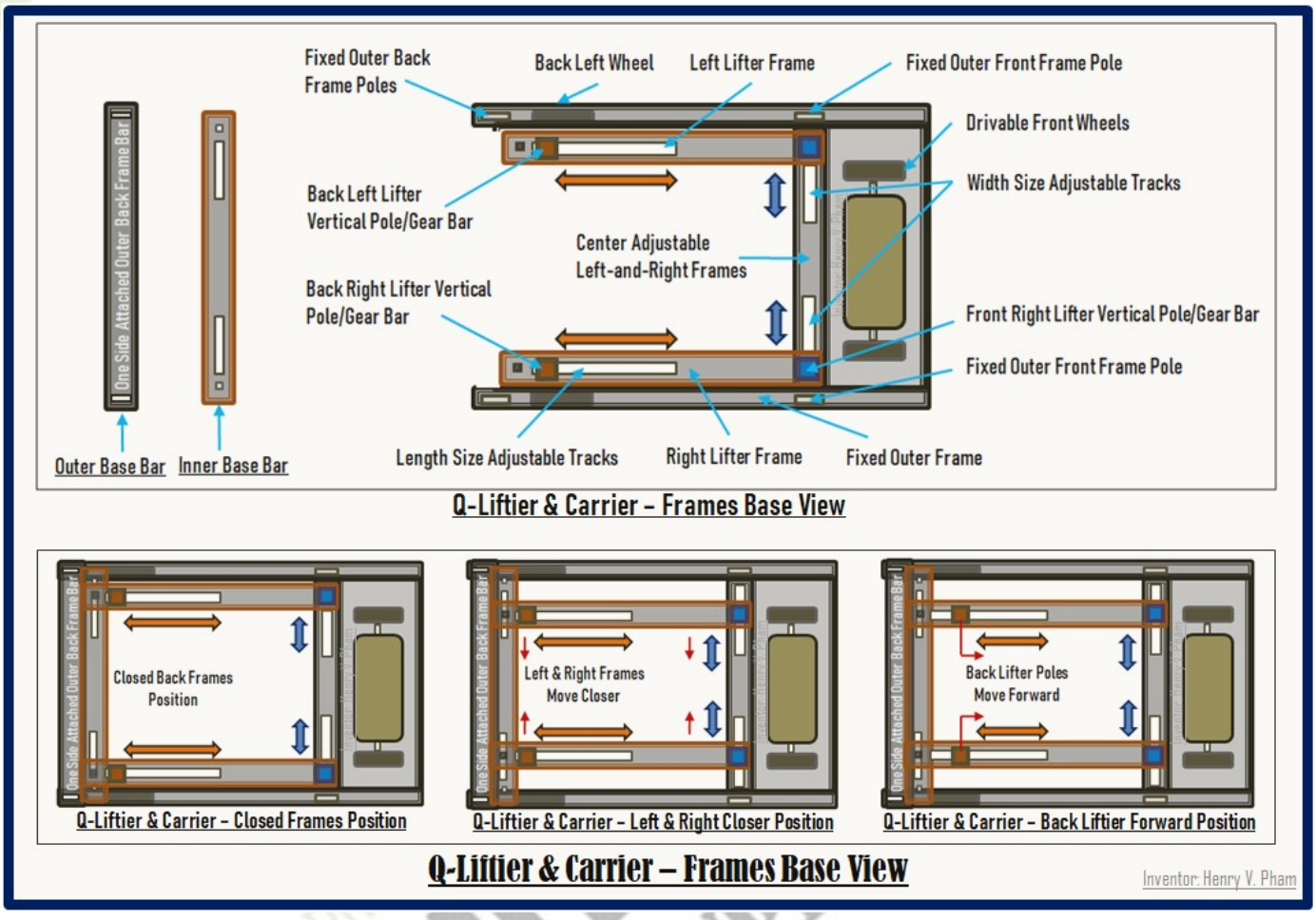

Figure-K4: Q-Liftier & Carrier Frame Base View

Figure-K5: Q-Liftier & Carrier Upward/Downward Lifting Positions shows the left and right frames with gear bars which are controlled with upward and downward direction to lift the chamber by the gear motors. The first drawing shows the lifter frame is at the preparing position to upward in red color arrows direction as shown at position-1; the gear bars on both sides are at the highest position. The second drawing shows the lifter frame is at moving upward direction which is shown in red color arrows at position-2. The third drawing shows the lifter frame is at the top position where the gear bars at the shortest length at the bottom. Note that the lifter can be built with motor gear lock and with plus manual lock option to secure the chamber or the cubic container while lifting or moving the chamber. The lifter frame movements of the motor gears and gear bars in downward can be similar movements as mentioned above with reverted direction as shown in green color arrows.

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Figure-K6: Q-Liftier & Carrier Base Tracks, Gear Bars and L-Frame Pole Detail View shows the detail of the gear bars with leg and the corner pole in L shape with tracks. The L-frame bar is designed with L-frame tracks to hold the gear bar, and these tracks can be replaced by the edge angle holders on both sides or similar to hold the gear bar while the gear bar sliding up and down.

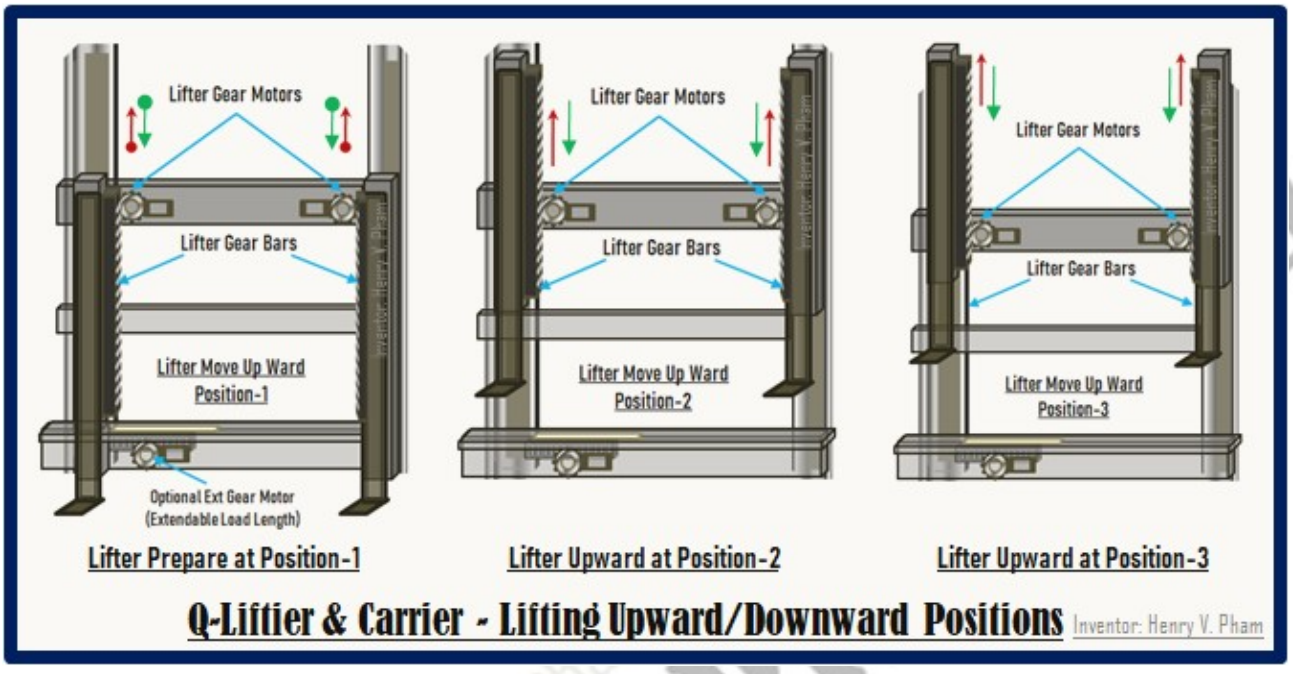

Figure-K5: Q-Liftier & Carrier Upward/Downward Lifting Positions

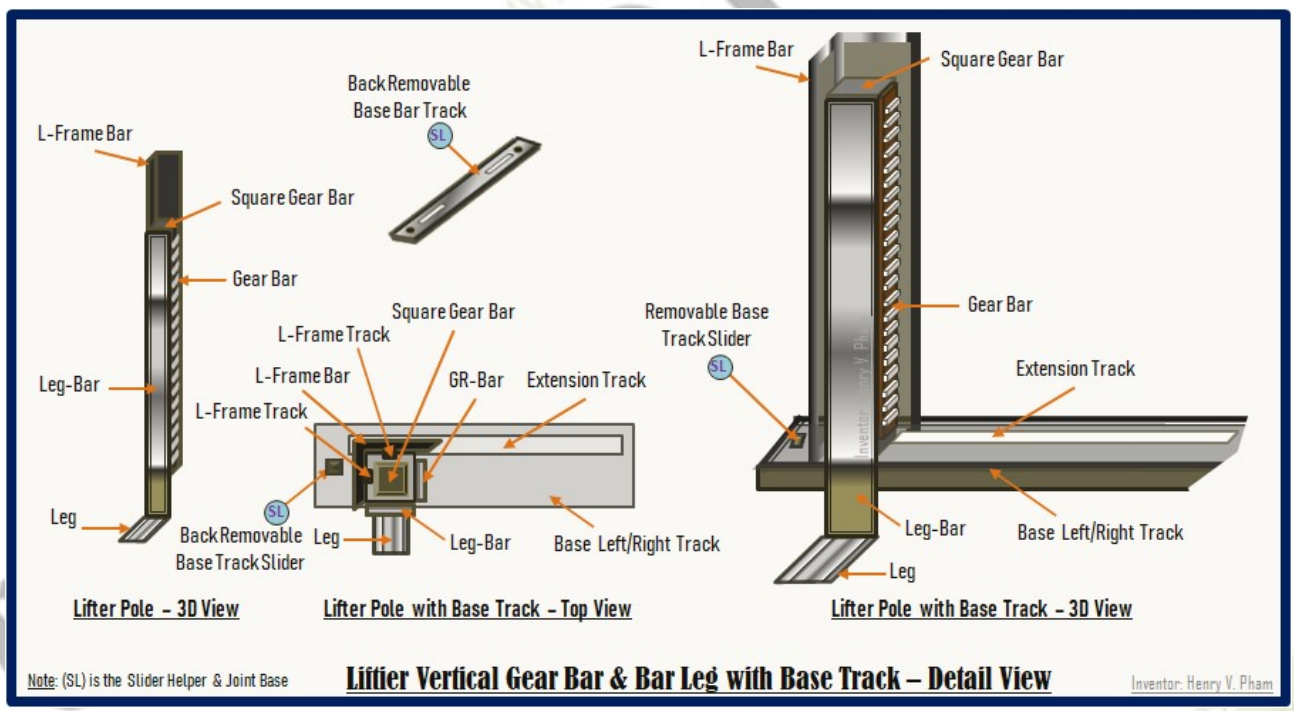

Figure-K6: Q-Liftier & Carrier Base Tracks, Gear Bars and L-Frame Pole Detail View

The L-frame bar is attached to the frame of the lifter and can be slide on the extension track of the base frame to shorten the length to fit on the chamber width. The back removable base track bar is designed to attach on the removable base track slider to allow the left and right frames slide to the center and to support the weight of the load. Note that the leg bar is built attached on the gear bar which allows the bar leg and the leg bar moving along with the gear bar when the gear motor rolls the gear bar up or down; and the gear bars should be long enough to allow the lifter raise up with commended 2 feet high to provide enough space for a person to get in under the chamber from the back of the Q-Liftier & Carrier for repair with at least the bottom base frames secured on the back of the liftier and carrier or carry to a repair and maintenance location for better space with a well prepared spaces and equipments.

L. One Round Chamber Important Items Check List

1. Make sure the EM emergency button can control to turn off power of the chamber included the Chamber Rotation Control, Chamber Vibration Control, Temperature/Humidity Control. Note that power sockets for computer server, Ethernet Router/Switch, Monitor Switches, and Power Strips for node computers and power supply for testing devices can be separated but should be connected to one power switch with one main switch to control the power switch for all devices.
2. Make sure all the wires connection are safe and secured with well tied into their desired positions to prevent from losing when the chamber is running with the drum rotating around.
3. Make sure the chamber is programmed to check for all good conditions before operating; make sure the door with sensor checking for closed or opened; make sure the chamber drum is at the initial neutral position or move the drum to neutral position before operating;
4. Make sure to test the chamber rotation RPM modes before testing with the load or dummy loads to ensure the drum is properly rotating around back-and-forth in 360°, and when the chamber stop running the drum should be returned to the initial neutral position. Note that One Round Chamber is invented with the drum rotating in 360° or the start point of the drum at front door can rotate with 180° left and 180° right to have a complete 360° round; however, the minimum requirement for the One Round Chamber to rotate is 270° round or the start point of the drum at front door can rotate with 135° left and 135° right.
5. Make sure the chamber drum is divided into 8 sectors, each sector with 45° angle and make sure the start point with the Rotation Latch located right at the middle of the chamber door is the middle point of the sector to ensure that when the chamber drum is built with rotation of a point with 135° left and 135° right to have full load and can be loaded to the ending devices wall of the sector.
6. Make sure to load with dummy load for maximum load of the desired testing devices to test the chamber with all possible provided functions and features like rotation speed drum RPM modes, all vibration patterns triggers, and all the temperature and humidity values and rates within the support ranges.

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7. Make sure to test all temperature and humidity corners as possible for thermal convection distribution with the thermal USB devices that are current available in the market or with similar devices as possible.
8. Make sure the insulation rings on both top and bottom are properly installed and tested for air leaks with temperature and humidity control on.
9. Make sure the insulation arc panels are installed properly, and the desired testing devices insulation module panel is properly insulated; and recommend to check the temperature inside the insulation where the node computers are mounted for any temperature leaking to this area when testing with temperature and humidity on.
10. Make sure all the roller rings, bottom stator base dishes, and the drum level dishes are provided and installed in order; and the chamber can be provided with the hooks to hang the dishes, the base rings when installing the chamber as needed. And provide a plastic or rubber brim cover to cover the ring gap between the stator wires holder dishes to the inner circle of the drum to prevent screws or tools dropping down to the lower levels.
11. Make sure the bottom base of the chamber should be built with removable and can be opened to replace the vibration patterns when the chamber is lifted up or carried to a repair place with the Q-Liftier & Carrier.
12. Make sure the Q-Liftier & Carrier is built with strong gear motors to lift up the chamber, and the high of the frames tall enough to secure the chamber while moving; and make sure connect and secure all the back protection bars before carrying the chamber.
13. Make sure the Monitor Switches can support USB connections to support USB Virtual Keyboard for remote control, and support master and slave mode or setup with the new Master & Slave Hard & Soft Monitor Switch with expander supported to provide enough USB cables and VGA display monitor cables. Note that without USB Virtual Keyboard, the node computers cannot be able to control or debug from remote location even with internet or local network available.
14. Make sure the computer server can run with Linux OS and supports with 1 Serial Port connected to One Round Chamber for the Temperature and Humidity control, Chamber Drum Rotation Control and Chamber Vibration Control; 1 USB connection for USB Virtual Keyboard to support remote control by users; 1 Serial Port connected to Master Monitor Switch for monitor expander switch; and 1 USB port for webcam. The test node computers can be downloaded and run Lightweight Linux in small size images distribution to communicate with the computer server running Linux OS with users' scripts and applications to test the devices. Note that Linux OS is best fit for current existing Operating Systems in this case to run in test node computers. However, to have remote or internet secured connection to configure, monitor and control the entire devices testing chambers for manufacturers, the Cloud OS would provide high secured internet for remote connections to configure, monitor and control the devices testing chambers which is the promise for future of the World of Computing Infrastructure Modern.

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One Round Chamber - Specification

M. Summary

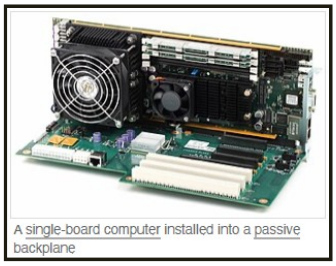
The One Round Chamber is invented with multi-level drum rotating back-and-forth in 360° in one round circle and kept the wires in shortest length without twisting to provide greatest capacity of loading for testing devices with temperature and humidity environment plus vibration control option.

The One Round Chamber provides at least four times of current chambers or testers in loading capacity around all sides in 360° surface instead of traditional one side loading. One Round Chamber is designed with the center cylinder which can easy have all the wires installed and connected from the Ethernet Router and Switches, Monitor Switches and computer server with USB Virtual Keyboard and Webcam options that allow the users to control, setup, install and view every single node computer via switching monitors and the server where the users can access remotely for a great support of Automation Testing in Manufacturing. One Round Chamber with 6 levels and each level with 16 node computers, provides a great testing capacity compare to other chambers with total capacity up to 768 drives. Some manufacturers use robot to load/unload drives; robot arm built-in attached on the chamber is one option. However, the test devices or drives can come with many different sizes, and it's hard to calibrate the robot arms. The **Robot Carrier** which was mentioned in '**THE LPS – Local Positioning System**' invention which was submitted on 2021/11/23 with Initial U.S. Patent Number PCT/US21/72562 and International Patent Number PCT/IB21/000949, is great option to carry drives for an operator to load/unload the drives faster and easier.

One Round Chamber is the great promise for future of the devices tester or testing devices chambers that can provide great in load capacity which can help to reduce more than 4 times in space of the manufacturing, provide great in testing thermal convectional environment, great in controlling, setting, installing, debugging and viewing the node computers from anywhere remotely via internet or local network connection to save money and resource for companies and manufacturers.

N. References

1. https://en.wikipedia.org/wiki/Backplane shows types of backplane which can be used for node computer main boards and PCI/PCIe devices connections. Below is a sample figure from the wiki page that shows a single board computer installed into a passive backplane. The Raspberry PI https://en.wikipedia.org/wiki/Raspberry_Pi also provides some single board computers and other hardware modules that are suitable for the node computers. Other common devices like Ethernet Hub/Switch and Power Supply can be easier bought in current market.



Single Board Computer on Backplane Reference

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2. https://en.wikipedia.org/wiki/Comparison_of_lightweight_Linux_distributions shows the Lightweight Linux in small size images distribution that can be used to run on the node computers to test the devices. These lightweight Linux images should be handled by a server which is recommended to use the standard with desktop support Linux Server to host and control the node computers which are open source with free license. These lightweight Linux images allow the node computers can be run with small size with 2GB RAM memory.
3. https://www.axiomtek.com/Default.aspx?MenuId=Products&FunctionId=ProductMain&Cat=202 shows the samples of computer main boards with several versions which can be used for node computers.
4. https://en.wikipedia.org/wiki/Peripheral_Component_Interconnect shows the local bus computer connections for PCI Peripheral Component Interconnect which can be used for node computers as a reference. Other websites like www.picmg.org showing other high performance computing systems, and www.pinoutguide.com showing the common connectors pin out diagrams.
5. https://en.wikipedia.org/wiki/KVM_switch shows the Keyboard Video and Mouse switch with current monitor switch without the monitor expander to connect more than one level of switch. Note that the One Round Chamber invention document provides the new Master & Slave Hard & Soft Monitor switch that the system can expand to more than one levels of switch control to reduce wires connections for the chamber with many node computers.
6. https://en.wikipedia.org/wiki/Hard_disk_drive, https://en.wikipedia.org/wiki/SATA and https://en.wikipedia.org/wiki/NVM_Express show samples of the testing devices which the One Round Chamber is invented to handle for testing memory storage devices for current testing device chambers industry with high capacity support and vibration control built-in option as a reference.
7. https://atlas-scientific.com/blog/temperature-sensor-arduino/?srsltid=AfmBOopyog_osgFk-o0UdKG_U44DKXpvceDtjl4aKX320z9YIYupEDXQ shows an example of connecting and calibrating Temperature Sensor to a Temperature Testing Circuit.
8. https://kb.unavco.org/article/how-to-build-a-simple-digital-temperature-sensor-with-rs232-serial-interface-743.html shows an example how to build digital temperature sensor with RS232 interface.
9. https://TheCloudOSCenter.com/documents/The%20Cloud%20OS%20Details%20Description%20&%20Inventions%20Information.html#SECTION-3.10 shows the calculation of Mass Center Line or Mass Center Point based on the Parallel Transforming Percentage (PTP) Theorem – Mathematics Invention which can be viewed from the main website https://www.TheCloudOSCenter.com.
10. The One Round Chamber Trademark application has been submitted for Trademark Registration on November 8 2025 with U.S. Trademark Serial Number 99486159 which can be viewed via www.uspto.gov website.

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One Round Chamber - Specification

Biography

About myself, my full name is Henry Viet Pham, original name was 'Viet Hong Pham', changed in 1996 when I obtained U.S. citizenship, and currently live in Anaheim, California. I am a divorced single father of 3 sons, Alexander Le Pham (born in 2009) & Andrew Le Pham (born in 2012) who were born during my old marriage which was divorced in year 2013, and Harry Quoc Pham (born in 2018) who was born during my marriage with my ex-wife Celine Nguyet Tran and divorced in February 2025. I was born in Vietnam at Da Nang city in 1972/08/23 then moved to my grandfather's hometown with the family right after the South Vietnam collapsed in 1975 and grown up at Thach An thorp, Binh My commune, Binh Son district, Quang Ngai province, Vietnam. When I was 9 years old in fifth grade in 1981, the local school requested to adjust birth date year to 1971 to match education age; my father used the original Birth Certification before 1975 for the HO for POW program paperwork for immigration to live in United States. Then, I came to United States in 1991 as a military and political immigrant with my father and family members. My father Nu Pham (1935-2018) who served as a Senior Lieutenant-Colonel in the South Vietnam military during Vietnam War in 1975, and my mother is Thong Thi Tran (born in 1935) with my sisters are Nguyet Thi Pham, Jessie Nga Pham and Tiffany Tuyen Pham, and my brothers are Duc Hong Pham, Kevin Tri Pham, Danny Phuc Pham, and Andy Quy Pham.

About Education, I came to United States after finished my high school at TPTH Binh Son in 1989 at Quang Ngai, Vietnam; and I continued my education right after came to U.S. and I got my Bachelor Degree in Electrical and Computer Engineering at Calpoly Pomona, California in 1998. I am interested in Engineering and Science with more specific in Computer Programming, Physics, Mathematics plus Philosophy, and I have done many researches and self-study since I graduated in 1998 and continue researching and inventing with total of 18 inventions which have been submitted for patents from June 2021 to May 2026, and I still have many other inventions to work on and open the Cloud OS Company for business.

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About my works and inventions, I have 28 years plus of professional experience in high technology industry since 1998. I have worked for Eden Airport Ground Service Company in Los Angeles International Airport in 1995; worked for Caltrans in 1997; worked for Raytheon, a defense company from May 1998 to 2005; worked for Marshal 8e6, an internet security company from January 2006 to 2010; worked for Pace America, a Satellite Set Top Box in 2010; and worked for Western Digital, a storage technology company, from June 2010 to May 2026. I am the sole inventor of a total of 18 inventions which have been submitted from June 2021 to May 2026 as followings.

1. Invention Title: New Way to protect WiFi Network from Hackers -- First submission with U.S. Patent #: 29/788,607; Submitted on 2021/07/01 with USPTO Confirmation # 1396; then Resubmitted on 2024/02/27 to WIPO International office with Initial U.S. PCT Patent #: PCT/US24/17533 and International Patent #: PCT/IB2024/000110 with USPTO Confirmation # 9715;
2. Invention Title: THE G-CODE -- First submission with U.S. Patent #: 29/806,573; Submitted on 2021/09/03 with USPTO Confirmation # 6641; then Resubmitted on 2022/02/17 to WIPO with Initial U.S. PCT Patent #: PCT/US22/70704 and International Patent #: PCT/IB2022/000112 with USPTO Confirmation # 8530;
3. Invention Title: The Cloud OS - Operating System -- Initial U.S. PCT Patent #: PCT/US21/71689; and International Patent #: PCT/IB2021/000683; Submitted on 2021/10/02 with USPTO Confirmation # 2919;
4. Invention Title: The LPS - Local Positioning System -- Initial U.S. PCT Patent #: PCT/US21/72562; and International Patent #: PCT/IB2021/000949; Submitted on 2021/11/23 with USPTO Confirmation # 4809;
5. Invention Title: Greatest Performance Hard Drive (G-Drive) -- Initial U.S. PCT Patent #: PCT/US21/72563; and International Patent #: PCT/IB2021/000961; Submitted on 2021/11/23 with USPTO Confirmation # 7441;
6. Invention Title: Cell eMap Live Updates System -- Initial U.S. PCT Patent #: PCT/US22/79368; and International Patent #: PCT/IB2022/000685; Submitted on 2022/11/07 with USPTO Confirmation # 1421;
7. Invention Title: LPS Navigation System -- Initial U.S. PCT Patent #: PCT/US22/79369; and International Patent #: PCT/IB2022/000671; Submitted on 2022/11/07 with USPTO Confirmation # 2843;
8. Invention Title: Emergency Traffic Lights Routing System -- Initial U.S. PCT Patent #: PCT/US22/82343; and International Patent #: PCT/IB2022/000791; Submitted on 2022/12/23 with USPTO Confirmation # 5870;
9. Invention Title: G-ROUTING ALGORITHM METHODOLOGY -- Initial U.S. PCT Patent #: PCT/US22/82347; and International Patent #: PCT/IB2022/000800; Submitted on 2022/12/23 with USPTO Confirmation # 6674;
10. Invention Title: Parallel Transforming Percentage Theorem -- Initial U.S. PCT Patent #: PCT/US23/77057; and International Patent #: PCT/IB2023/000611; Submitted on 2023/10/23 with USPTO Confirmation # 8830;
11. Invention Title: Auto Following Motion Security Camera -- Initial U.S. PCT Patent #: PCT/US24/13660; and International Patent #: PCT/IB2024/000177; Submitted on 2024/01/31 with USPTO Confirmation # 7016;
12. Invention Title: Wall Security Camera System -- Initial U.S. PCT Patent #: PCT/US24/13663; and International Patent #: PCT/IB2024/000096; Submitted on 2024/01/31 with USPTO Confirmation # 8953;
13. Invention Title: OH SMART AIRPORT -- Initial U.S. PCT Patent #: PCT/US24/43532; and International Patent #: PCT/IB2024/000451; Submitted on 2024/08/23 with USPTO Confirmation # 7659;

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14. Invention Title: Touch Slide & Landing Board for Aircraft Carrier -- Initial U.S. PCT Patent #: PCT/US24/52509; and International Patent #: PCT/IB2024/000586; Submitted on 2024/10/23 with USPTO Confirmation # 8106;
15. Invention Title: Cybercopter Flyer -- Initial U.S. PCT Patent #: PCT/US24/52515; and International Patent #: PCT/IB2024/000800; Submitted on 2024/10/23 with USPTO Confirmation # 6976;
16. Invention Title: Hybrid Air & Rubber Cells Layer Tire -- Initial U.S. PCT Patent #: PCT/US24/61635; and International Patent #: PCT/IB2024/000780; Submitted on 2024/12/23 with USPTO Confirmation # 5672;
17. Invention Title: One Round Chamber -- Initial U.S. PCT Patent #: PCT/US25/61100; and International Patent #: PCT/IB2025/000695; Submitted on 2025/12/23 with USPTO Confirmation # 4867;
18. Invention Title: 360° Stand G-Rotator Fan -- Initial U.S. PCT Patent #: PCT/US26/12287; and International Patent #: PCT/IB2026/000045; Submitted on 2026/01/23 with USPTO Confirmation # 4148;

My other inventions are listed as followings, 'Emergency Cylinder Helical Stair' for personal and emergency purposes, 'Personal One Step Escalator' for personal use like elevator in compact space, and 'Smart Cart Gear Belt System' for Smart Cart Exchanger were part of the "OH SMART AIRPORT" invention. "Transpond License Plate" which is intended to use for tracking license plate within a desired distance; "Auto Tracking Target Network Security Cameras System" which is intended to use in the crowd areas like airport to follow and track the suspect/target for crowd security camera system; "Robot Medical Doctor" which is intended to help family doctors and hospital to check up patients faster with better medical statistic data with built-in Machine Intelligence (MI); and direct business related inventions, "Matrix Base Keyboard" to prevent wire/wireless keystrokes logger plus 'USB Virtual Keyboard' and 'Master & Slave Hard & Soft Monitor Switch' were part of the "One Round Chamber" plus the 'Q-Liftier & Carrier' which can be used for lifting and carrying.

About my business, the Cloud OS Company with the websites www.TheCloudOSCenter.com or www.TheCloudOSCompany.com business uses mainly Invention #3: The Cloud OS – Operating System, Invention #5: Greatest Performance Hard Drive (G-Drive) with the website www.TheGreatestDrive.com, and Invention #9: G-ROUTING ALGORITHM METHODOLOGY. The Cloud OS Company business brings the world to the next level of World Computing Infrastructure Modern with the main purposes to secure users' data and secure entire computer networking around the world or the World eWeb with the new technology of Neighbor-to-neighbor checking methodology and Neighbor-to-neighbor routing technology, and applying the new dynamic protocol technology for data transferring with the high secure of the 4K Number Encryption. And there are my other 3 businesses related websites www.TheGCODECreator.com which is used for the G-CODE labels/profiles/products/logos creator application; www.ThePatrolCircle.com which is used to patrol the points of interests for security camera system with Patrol Circle Unmanned Aircraft; and www.TheCybercopterFlyer.com which is used for Cybercopter Flyer, the Cybercopter flyer is intended to replace the current helicopters and for future of aviation transportation in circle shape like UFO flyers which can support both turbofan and turbojet engines with cell fuel and solar energy.

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