Versa® TUBE
Technical Manual

ELEMENTLABS

Versa® TUBE Technical Manual
Rev. 1.00, January, 2007
Part #117-0151

Contact Info

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INTRODUCTION

This chapter introduces you to the Versa TUBE system and covers the following topics:

- [System Components](#) (p. 1-2)

System Components

The following table lists all the components of a typical Versa TUBE system.

Table 1.1 Versa TUBE System Components

Part	Description	Details
1 Meter Versa TUBE HD	Brightest tube, greatest pixel density	• 36 pixels • 56 watts • 27.8mm / 1.09" per pixel • 1000mm x 50mm x 92mm / 39-3/8"x 2"x 3-5/8"
1 Meter Versa TUBE	The original standard Versa TUBE	• 16 pixels • 28 watts • 62.5mm / 2.46" per pixel • 1000mm x 50mm x 92mm / 39-3/8"x 2"x 3-5/8"
2 Meter Versa TUBE	Two standard Versa TUBEs in one package	• 32 pixels • 56 watts • 62.5mm / 2.46" per pixel • 2000mm x 50mm x 92mm / 78-3/4"x 2"x 3-5/8"
Versa DRIVE D2	Primary control unit for Versa TUBE system; drives up to 8,192 pixels	• DVI-D or DVI-I input (must use D type cable) • 4 x 6pin XLR serial data output • 1 x 4pin JYC local data output • Programmable with RasterMAPPER
Serial Data Splitter	Splits a single line of serial video data to feed multiple buffer boxes from a central source	• Single serial data input via 6pin XLR • Four identical serial data outputs via 6pin XLR • Power input only via IEC/UPC • 216mm x 140m x 45mm / 8-1/2"x 5-1/2"x 1-3/4"
Buffer Box B2	Converts serial data from Versa DRIVE into local data for tubes; starting address from 0001 - 2048	• Serial data input and output via 6pin JYC • Local data output via 4pin JYC • Power input and output via 3pin JYX • 222mm x 178mm x 35mm / 8-3/4"x 7"x 1-3/8"
Serial to Local Data Amplifier	Converts serial data into local data; fixed starting address of 0001	• Serial data input and output via 6pin JYC • Local data output via 4pin JYC • Power input only via 3pin JYX • 105mm x 60mm x 29mm/ 4-1/8"x 2-3/8"x 1-1/8"
Local Data Amplifier	Amplifies local data signal for non-HD tube chains greater than 20m	• Local data input and output via 4pin JYC • Power input and output via 3pin JYX
Serial Data Amplifier	Amplifies serial data signal for cable runs greater than 100m	• Serial data input and output via 6pin JYC or XLR • Power input only via 3pin JYX

SYSTEM PLANNING

This chapter covers Versa TUBE system planning. The following topics are discussed:

Basic Signal Flow

Figure 2.1 is an example of a basic Versa TUBE System. In this example, a computer set up as a media server sends an image to the DVI input of the Versa DRIVE D2. The computer is also running Element Labs' Raster-MAPPER™ software (downloadable from our website, www.elementlabs.com). RasterMAPPER downloads a Map, which the user creates, into the D2 and controls the features of the D2 via an RS-232 connection. Coming from one of the D2's outputs is serial data, which carries the mapped video information to the connected Buffer Box.

The Buffer Box converts serial data from the D2 into local data to drive the TUBEs. The Buffer Box also takes AC power in, and passes that power to the tubes along with the local data. Once the local data has passed through all the tubes in the first array, it needs to be refreshed, and so it is passed through a Local Data Amplifier (DA) before feeding the second array of tubes. The Local DA also provides a convenient place to feed AC power to the second array of tubes.

Versa DRIVE C1 Note: A Versa DRIVE C1 may be used to replace the computer and the Versa DRIVE D2. The C1 (not pictured) provides a single output of serial data allowing pre-programmed video content to playback without a DVI input. The C1 also adds DMX and contact-closure functionality for triggering pre-programmed video content. Please see www.elementlabs.com for support documents on the C1.
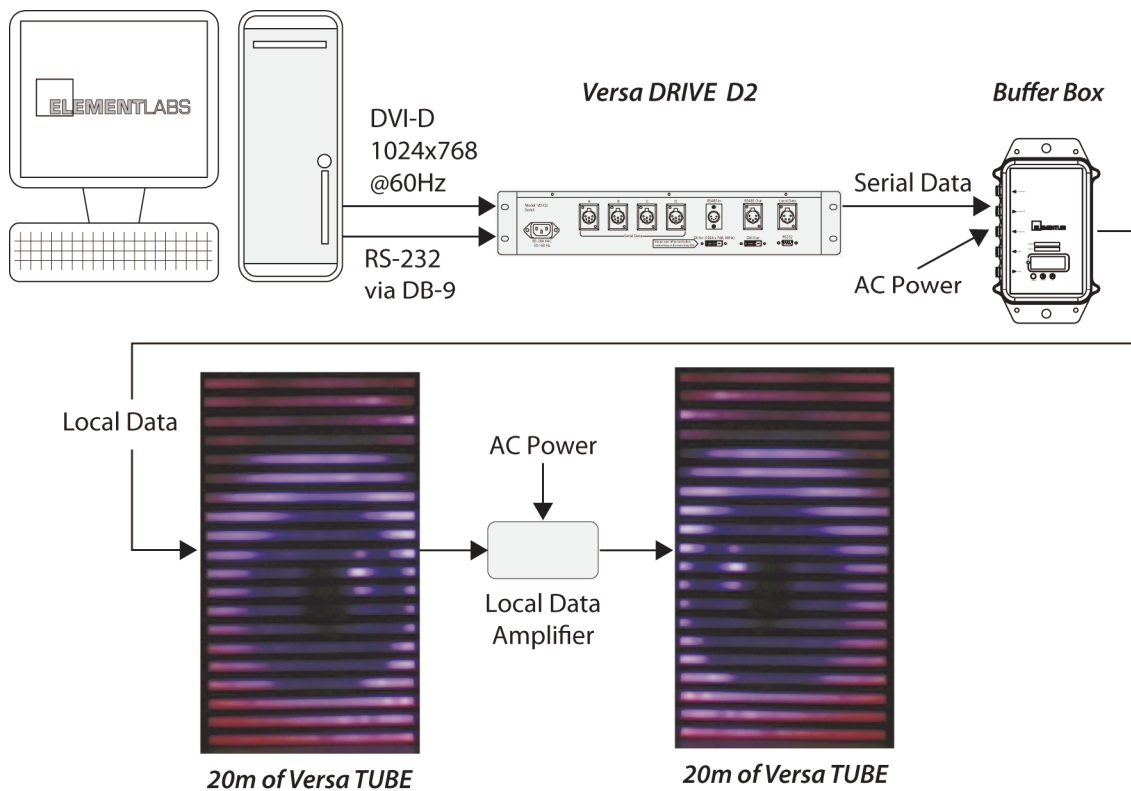
Figure 2.1 Basic Signal Flow

Data Amplifier Types and Applications

Local Data Amplifier

About the size of a deck of cards, the Local DA refreshes the local data signal after every 20 meters of standard Versa TUBE, independent of tube length. The following diagram shows proper Local DA placement.

1m VersaTube
Local DA Every 20 Meters

2m Versatube
Local DA Every 20 Meters

1m VersaTube HD
No Local DA Required
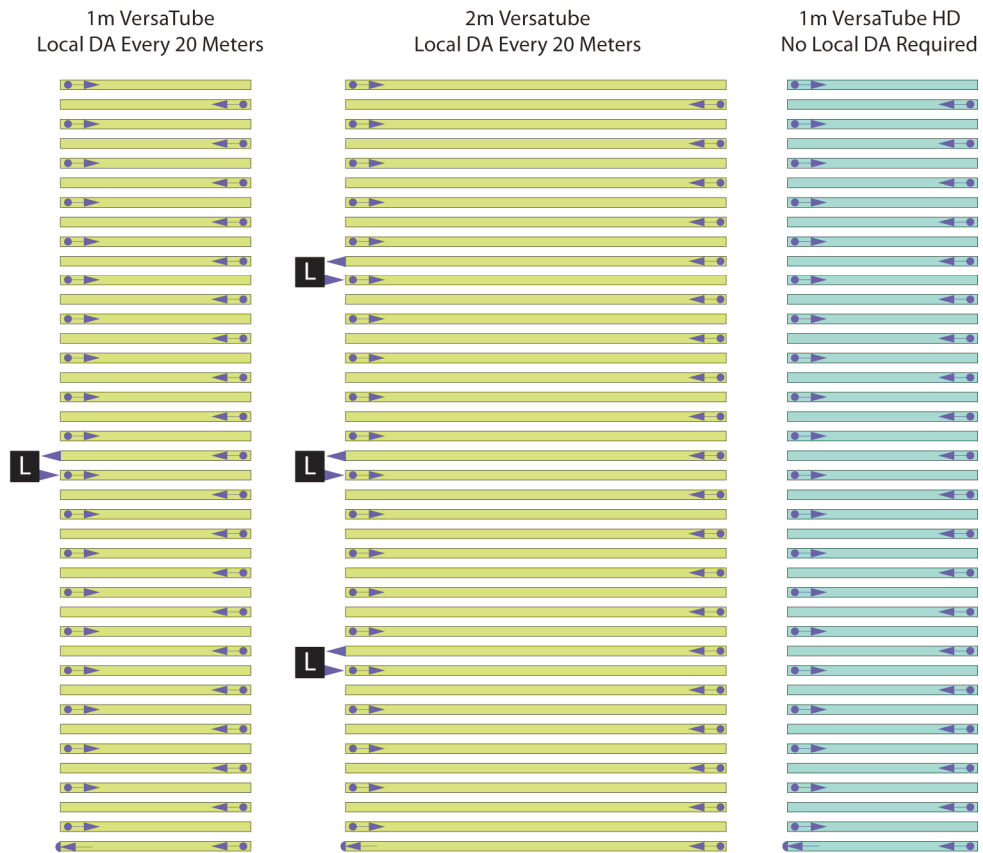
Figure 2.2   Local Data Amplifier Placement

The Local DA may be used as both a power and data pass-through. However, if more than 5 or so AC amperes of electricity are flowing through the tubes on any one power circuit, the tubes are at risk for damage. The AC bus connectors within each tube are rated at approximately 5 amps, and the initial tube in a chain will bear the combined load of every subsequent tube. Therefore, it is good design practice to supply fresh power to each Local DA, using its power pass-through to feed the next bank of tubes. Please see Recommended Tube Circuit Loading, p. 4-6, for details in your country's voltage.

Local data likes to see a new tube within a meter or two after leaving the preceding tube. However, there are some occasions when three-meter or longer local data

cables are used between each tube. In that event, increase Local DA frequency slightly; i.e., every 12 to 18 meters, instead of every 20 meters.

The Versa TUBE HD does not require use of Local DAs, because it has stronger internal data buffering capabilities than the standard Versa TUBE. When an unusually long piece of local data cable is used to connect widely-separated banks of tubes, a Local DA may be used at the receiving HD tube bank's input to sustain data integrity.

Please adhere to the HD TUBE's power limitations documented in Troubleshooting (p. 4-1) when planning your system, as the HD TUBE draws twice the amperage per meter of a standard TUBE.

Serial Data Amplifier

The Serial Data Amplifier (DA) serves two purposes. It is primarily used to refresh serial data from the Versa DRIVE after every 100m of cable length. It is also useful as a data monitor. Like all data amplifiers, it has a red power light and green data light. If placed in an easily accessible location for technicians, this DA can be quickly checked to ensure that serial data coming down the line from the Versa DRIVE is stable and correct. Please see Page 10 for a diagram of how the Serial DA can be used to extend serial data runs up to 300 meters.

Serial to Local Data Amplifier

Both the Buffer Box and Serial to Local DA (S2L DA) convert serial data from the Versa DRIVE into local data that the tubes can respond to. They both pass serial data to subsequent Buffer Boxes, and they both have LEDs on them that indicate whether or not they are receiving proper power and data. Otherwise, they are completely different:

Table 2.1   Buffer Box / Serial to Local DA Comparison

Buffer Box	Serial to Local DA
Can be addressed to any starting pixel between 0001 and 2048	Fixed address of 0001
LCD w/controls for all functions	No user options
Passes power to tubes	Does not pass power
8 3/4" x 7" x 1 3/8"	4 1/8" x 2 3/8 x 1 1/8"

Generally a Serial to Local DA is used whenever an initial bank of tubes must be placed where there is no room for a Buffer Box. This kind of tight situation arises (for example) in ultra-portable tube framing systems built for concert touring, or in architectural applications where a Buffer Box would be incompatible with the surrounding visual elements. The S2L DA is somewhat impractical in rental inventory because of its inflexibility, though it may be sent as part of a rental package if its particular use is specified.

Designing Systems for Stability

The Versa TUBE system designer must be concerned not only with application-specific artistic and structural guidelines, but also with how to make a system virtually bulletproof. There are a variety of tricks you can use to ensure that your show will keep running under minor cable problems or gear failures – and still look acceptable.

Signal Flow Routing Techniques

Pictured in the diagrams that follow are four ways of cabling a small portion of any Versa TUBE system. All are correct, all have been used in successful large systems, and all will display video the exact same way; however, they vary in theoretical stability.

Adequate: This column is cabled in the simplest way possible. One local data chain passes through all the tubes. One "twofered" AC power circuit feeds all the tubes. If a tube or connection were to fail at any point, all of the subsequent tubes would be affected.

Adequate
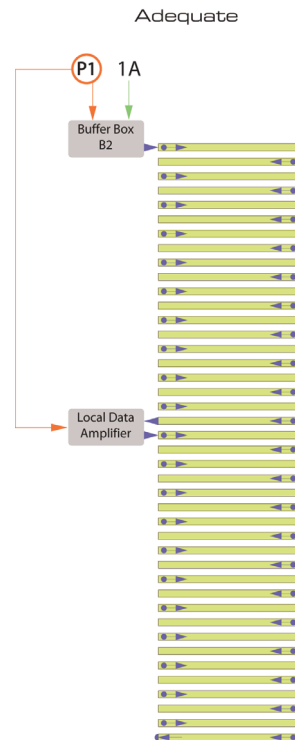
Good

Good: A Buffer Box replaces the Local DA midway down the column. It is tied to the top Buffer Box with a serial data cable. If a tube or cable in the top half of the column stops passing power or local data, the bottom half of the column will continue to function normally.

Better

1A (P1)   (P2)
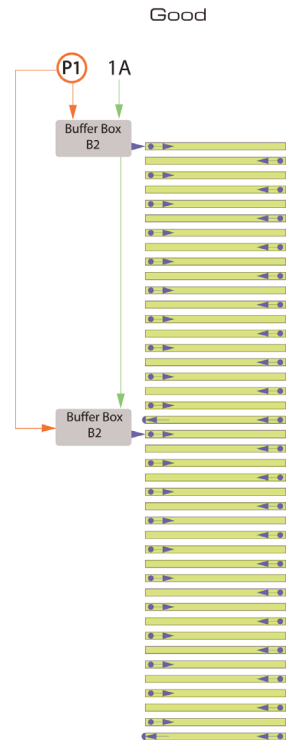
1A   Buffer Box
       B2

Better: A Serial Data Splitter is added, to remove the bottom Buffer Box's dependence on the top Buffer Box being powered. The SDS and each Buffer Box are powered by three discrete circuits; if the top half of the column were to blow a breaker, the bottom half would continue to function normally, and vice versa.

(P3)

Buffer Box
B2
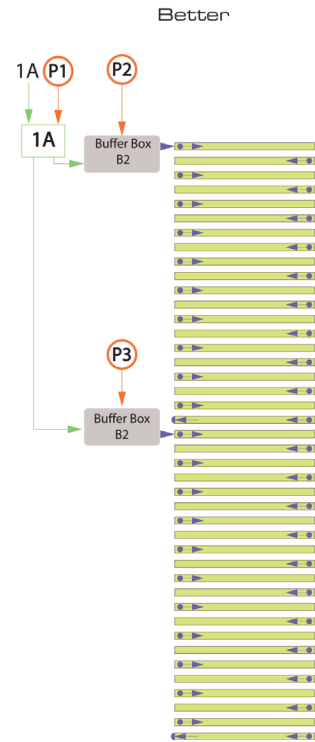
Best: The column is now interlaced; the two halves of the column are overlaid, but still cabled and addressed the same as in the last example. RasterMAPPER is told to offset the two banks by one vertical pixel, and the display result is the same. If either tube bank or Buffer Box develops a problem, the column will continue to display its video content (at half brightness and pixel density), and the show will go on. A technician backstage may turn off the breaker feeding the offending tube bank.
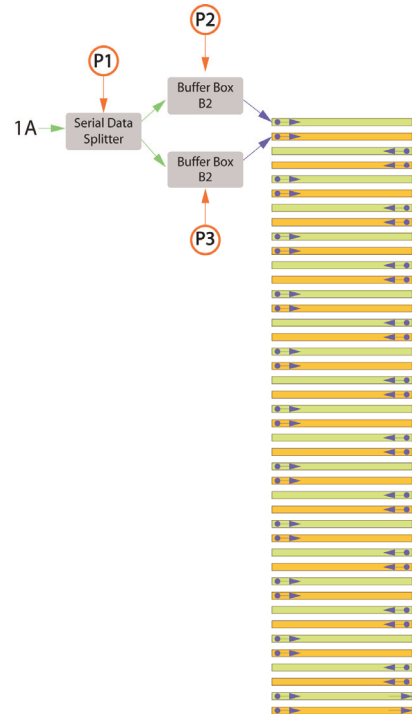
Maximum Stability (not pictured): Draw the serial data for the two interlaced tube chains from two separate outputs on two separate Versa DRIVEs. This ensures that if a Versa DRIVE were to fail during a show (unlikely), the system would continue to display its video content at half brightness and pixel density.

Serial Data Splitter

The Serial Data Splitter (SDS) is an essential tool in designing a rig for maximum stability. Analogous to an optosplitter in the world of DMX lighting and video, the SDS takes one line of serial data and splits it four ways, with no loss of signal strength. It does not assign pixels in the manner of a Buffer Box.

Figure 2.3   Serial Data Splitter

Two SDSs may be bolted together side-by-side and rack mounted in a 1U 19" space with the included hardware. They may also be gaff-taped atop one another, mounted inside of truss or set pieces, hung from a pipe, or permanently mounted inside of custom Versa TUBE hanging structures. Two SDSs ganged together will provide a total of seven free serial data outputs. Three SDSs ganged together will provide a total of ten free serial data outputs.

Sending Video Signal from Control to Distribution

Serial Data to 300 Meters

The Versa DRIVE's serial data outputs are stable for about 100m. The Serial Data Amplifier allows reliable extension of 6pin serial data cables to approximately 300m, though greater lengths have been achieved under laboratory conditions.
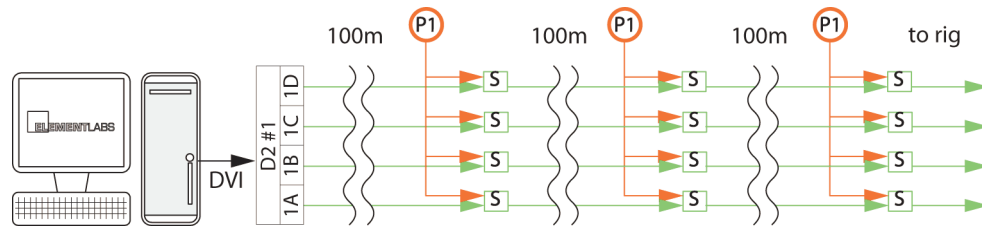
Figure 2.4   Video Signal Distribution Example #1

Third-Party Options for Distances

DVI-D over Fiber. This is the simplest way to get the Versa DRIVEs away from Control and close to your rig. A Gefen DVI Detective is necessary at the input end of the cable.

Figure 2.5   Video Signal Distribution Example #2

DVI-D conversion to Fiber. Fiber optic conversion units have the capability to send the DVI-D signal 10 kilometers. Remote serial control of the Versa DRIVE is also possible with some fiber send-and-receive products, or a separate serial control converter may be used.
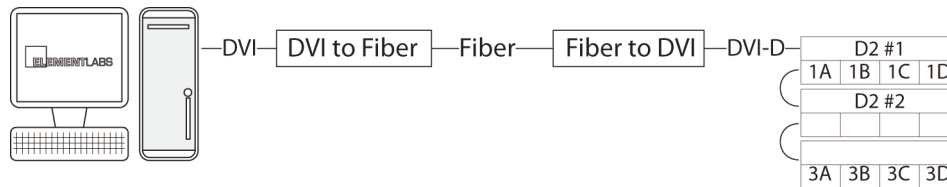
Figure 2.6   Video Signal Distribution Example #3

KVM switching allows the programmer remote access to the media server, while a backstage technician has direct physical access to both the server and the Versa DRIVEs.
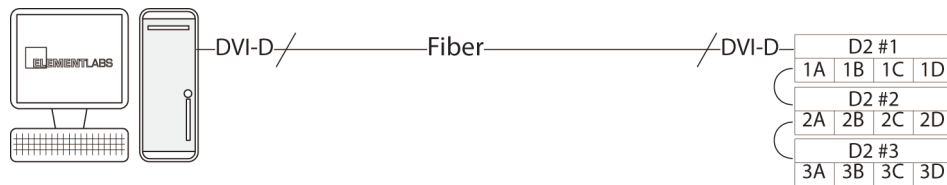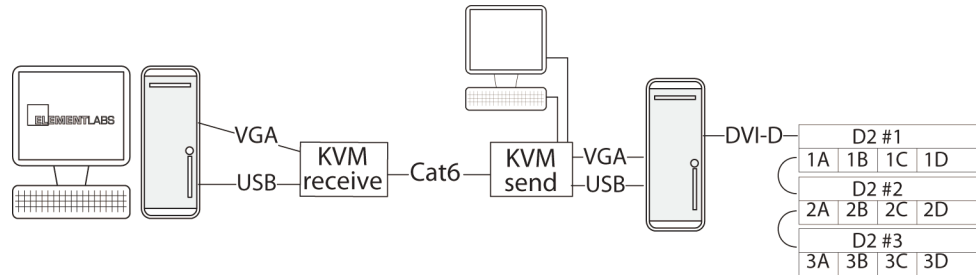

Figure 2.7   Video Signal Distribution Example #4

The next option uses scan converters at both the media server and Versa DRIVE ends. The most flexible and commonly used converter is the Folsom Image Pro, though there are several streamlined DVI/SDI scan converters on the market. Element Labs' Video Processing Unit (VPU) may be used on the receiving end.
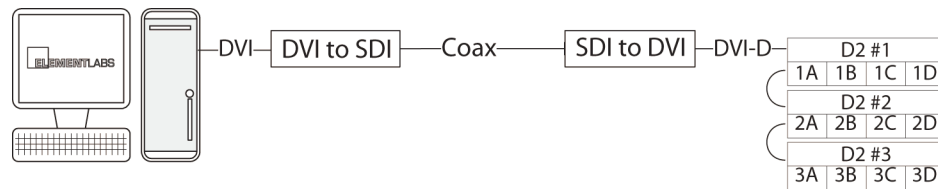
Figure 2.8   Video Signal Distribution Example #5

For large architectural installations, it is possible to leave the media server and RasterMAPPER control at the Versa DRIVE location, and control all aspects of the system remotely using KVM over IP, DMX over IP, or remote desktop software.

Cabling the System

Element Labs stocks the cables listed in the table below. Custom bulk orders are an option. Clients are welcome to make their own custom cables or adaptors.

Table 2.2   Stock Cables

| Cable	.3m	1m	3m	10m	30m
6pin XLR Male to Female		✔	✔	✔	✔
6pin JYC Male to Female - Molded[1]		✔	✔	✔	✔
4pin JYC Male to Female - Molded	✔	✔	✔		
3pin JYX Male to Female - Molded	✔	✔	✔		

1. 6pin JYC is available by custom bulk order in 100m lengths; each cable requires a Serial Data Amplifier at the female end.

Cable Notes

Standard 6pin XLR to 6pin JYC serial data adaptors are .3m, and are available in Male to Female and Female to Male configurations

1.5 meter, 18awg, 3-conductor Male power adaptors to 3pin JYX Female are available for 100V to 240V in Edison, Schuko and 13 Amp

1.5 meter, 18awg, 3-conductor Male power adaptors to IEC/UPC Female are available for 100V to 240V in Edison, Schuko and 13 Amp

Large touring systems with multiple D2s: It is easier and possibly cheaper to use an extended DVI or KVM option as a FOH snake, than to commission a custom serial data snake. Always include a spare line in your snake.

Serial and Local Data Cable Applications

The following diagrams help illustrate which cable to use in serial and local data cable applications.

D2			
A	B	C	D

4 x 6 pin XLR
serial outputs

6pin XLR

to tubes

SDS

1 x 6pin XLR serial input
4 x 6pin XLR serial output

6pin JYC

to tubes

BB

1 x 6pin JYC serial input
1 x 6pin JYC serial output
1 x 4pin JYC local output

6pin JYC

Buffer Box link

to tubes   to tubes

* 6pin serial adaptor, XLR>JYC
or JYC>XLR as appropriate

SDS

D2			
A	B	C	D

*

BB

4pin
JYC

4pin
JYC

4pin
JYC
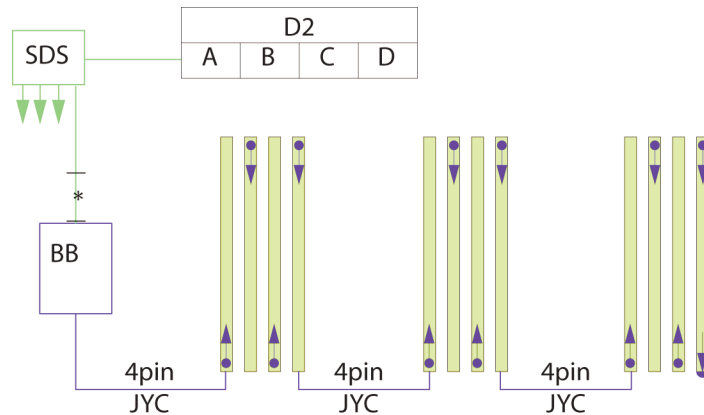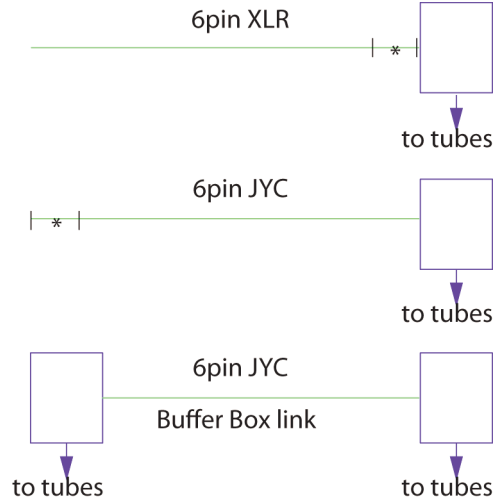
Power Distribution Suggestions

If you cable a system for maximum stability, your power distro will have a fairly low draw on each breaker's circuit. Consider using (for example) a 96-way/1.2kW distro instead of a 48-way/2.4kW distro. Allocate at least one breaker per Buffer Box and associated tubes.

Use the highest voltage available (100V to 240V) to feed your tubes. When using three-phase power, balance the load on each phase.

As a vendor, if you use Socapex in your rental inventory, consider producing a Socapex breakout for Buffer Boxes, made with one male Soca connector and six JYX

power cables. It will be a useful tool for both the designer and technician. This can be made with all 1m JYX, or staggered to taste.

For compatibility with existing non-TUBE rental cable stock, cut our molded .3m JYX in half, and make your own adaptors. Attach each end to a Male or Female Edison, Stage Pin, L6-20, L5-15, 13amp, 16amp, Schuko et al.

REPAIRS AND UPGRADES

This chapter covers the Versa TUBE repairs and upgrades. The following topics are discussed:

Learning the Versa TUBE

Required Tools

These tools, plus a good multimeter, are all you will need for tube maintenance and repair. Any individual component may be rapidly replaced; PCP ("board-level") troubleshooting is unnecessary.
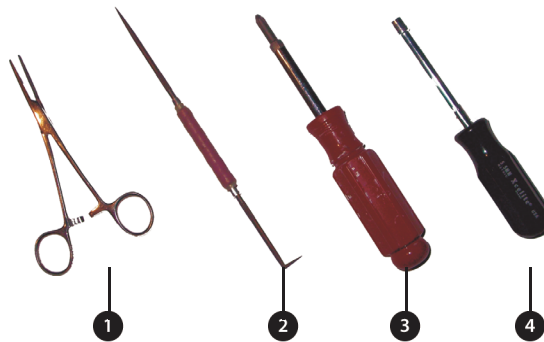
Figure 3.1   Tools Required for Maintenance

Legend #	Function
1	Hemostat
2	Dental Pick
3	#2 Phillips Screwdriver
4	5.5mm Hex Driver

Opening the Versa TUBE

Unscrew the Versa TUBE's end cap with a #2 Phillips driver, and slide the diffuser completely out of the rails. Before diving into a repair or upgrade, understand the tube's internal signal and power flow.

Versa TUBE Signal Flow

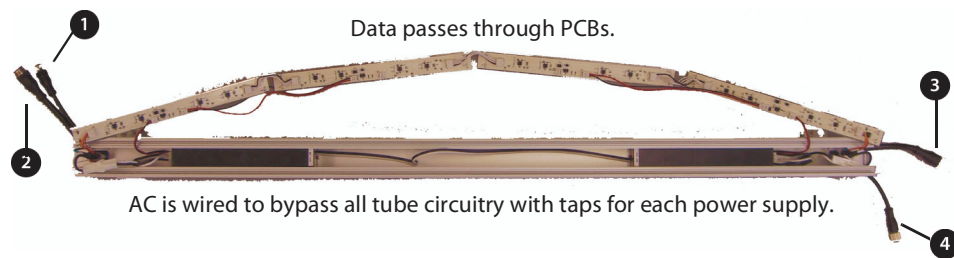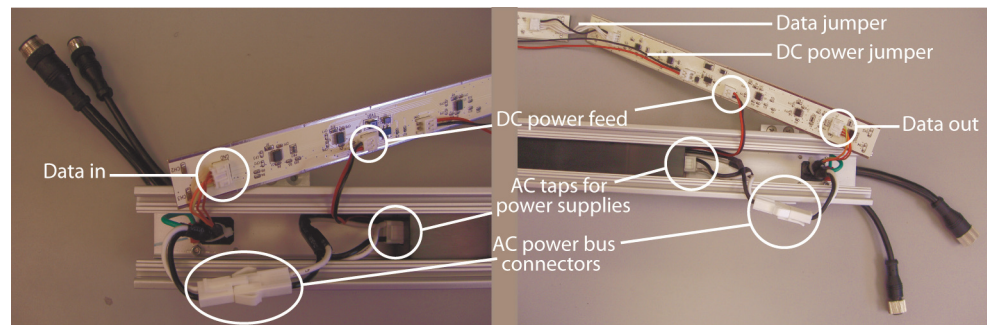The following illustration provides information on the basic Versa TUBE signal flow:

Data passes through PCBs.

AC is wired to bypass all tube circuitry with taps for each power supply.

Figure 3.2 Versa TUBE Signal Flow

Legend #	Function
1	Data In (Male JYC 4pin)
2	AC In (Male JYX 3pin)
3	Data Out (Female JYC 4pin)
4	AC Out (Female JYX 3pin)

Input/Output Details

Data jumper
DC power jumper
DC power feed
Data out
Data in
AC taps for power supplies
AC power bus connectors

Damage Prevention and Shop Maintenance

Some technicians choose to assemble tube systems with the power on, which can be both necessary and dangerous. The tube's JYX power connectors can handle hot-plugging to an extent; it is generally acceptable to do this with a handful of tubes at a time. When more than five or so tubes are hot-plugged, the JYX connectors will show arcing and, in extreme cases, can become fused together.

A common mistake with both JYX and JYC connectors involves turning the connectors against each other in an attempt to plug them in. Or, the connectors will be jammed together without regard for the locating tabs. Production staff will always demonstrate proper connector handling to stagehands prior to system

assembly; however, tubes will inevitably come back to the vendor with damages resulting from these mistakes.

Tubes returning to rental inventory after a job may have developed a number of problems. As with any piece of rental or touring gear, preventative shop and on site maintenance of Versa TUBE system components will ensure continued reliability of the products:

- Set up a test bench with a Versa DRIVE, Buffer Box, and at least four or five tubes. You are testing for both the input and output abilities of each tube.

- Check power and data connectors. Look for cross-threaded connectors and bent pins; touch up threads and straighten pins if necessary. Look for damaged locating tabs; replace the pigtail if the tab is too smashed to serve its purpose. Look for arcing of power connectors; clean with a pipe cleaner and non-lubricating contact cleaner spray. Extreme arcing requires pigtail replacement, as does channeling of the plastic between pins of the female JYX.

- Have a stash of spare parts available: pigtails, DC power supplies, PCBs (all three types), data jumpers, power jumpers, pigtails, pigtail bolts/nuts, and end cap screws.

PCB General Info and Replacement

There are four LED PCBs in the 1m Versa TUBE and Versa TUBE HD, and eight PCBs in the 2m Versa TUBE.

The placement of each PCB within the tube is indicated by its type. There are three types of PCBs: input, middle and output. Middle PCBs are interchangeable.

PCBs for standard Versa TUBEs are numbered 208 (input), 209 (middle), and 210 (output). Prior to mid-2006, these PCBs were numbered 135/136/137 (see Figure 3.3), and did not have the additional ground Molex.

PCBs for HD Versa TUBEs are numbered 182 (input), 183 (middle), and 184 (output).
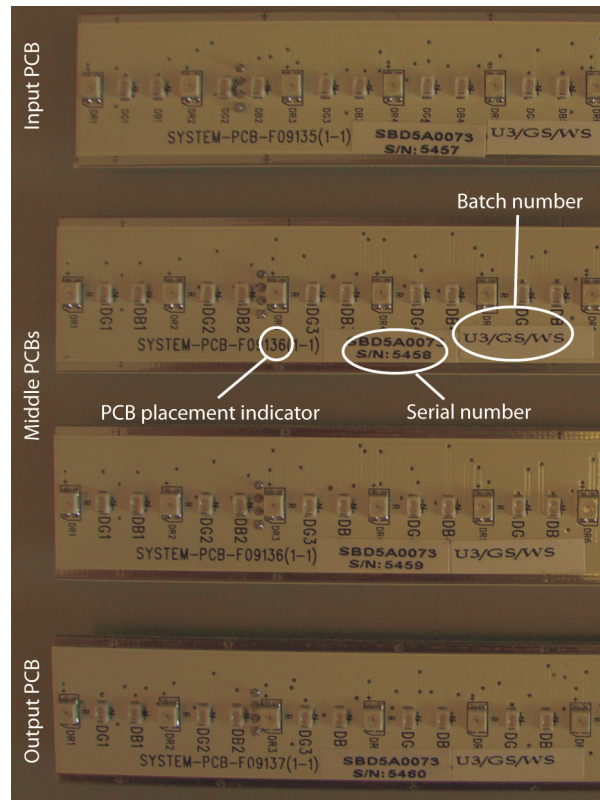
Figure 3.3   Standard 1m Versa TUBE PCB Set

The standard and HD Versa TUBEs utilize different LEDs. The standard tubes have separate red, green and blue LEDs, while the HD tubes use brighter 3-in-1 LEDs to achieve color mixing within each discreet LED package.

PCBs for standard and HD tubes can be quickly differentiated by their batch number. The standard tubes have a three-section batch number, while the HD tubes have a single batch number.

A tube's batch number is also printed on the input end of the tube's exterior housing, providing a convenient way to tell the difference between whether the tube is a standard or HD model.

Pixel default failure modes include: dark or stuck-on pixels; pixels whose red, green or blue component has ceased to function; pixels whose individual response to video or test data are markedly different than the surrounding pixels.

PCBs have been known to stop receiving or passing data, but more frequently a "bad PCB" will actually be a faulty or partially disconnected inter-PCB black-and-white data jumper. A problem jumper may also be the cause of pixel issues across multiple PCBs.

Accessing the Versa TUBE's Internal Components

Unscrew the end caps from both ends of the tube, and slide off the diffuser.

Great care must be taken when preparing to slide a tube's PCB set out of the PCB retaining rails. If the PCB set doesn't want to come out, it is still connected, and you will damage the power or data connectors at the input or output end by using force.
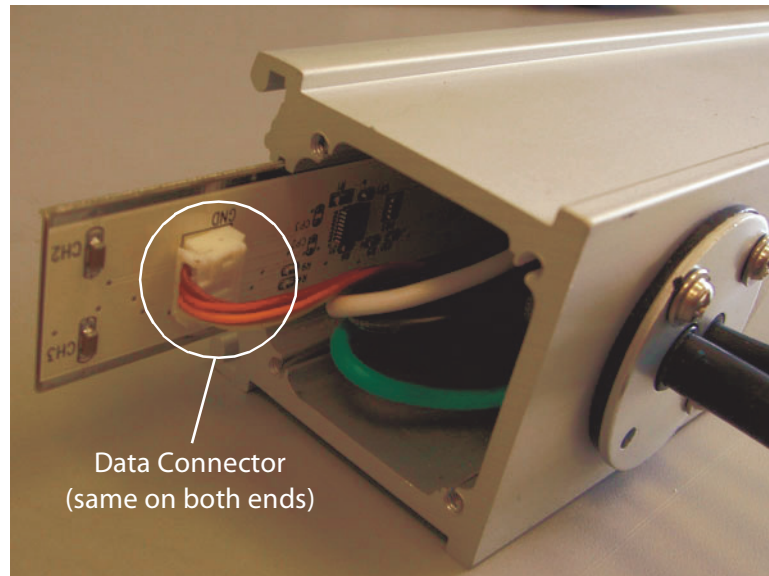

Data Connector
(same on both ends)

Figure 3.4 Versa TUBE Data Connector Location

1 Unplug the data connectors (see).

    a Slide the entire PCB set in unison to one side by 3 cm.

    b Unplug the red/orange/yellow/peach data connector.

    c Slide the entire PCB set in unison to the other side by 3cm.
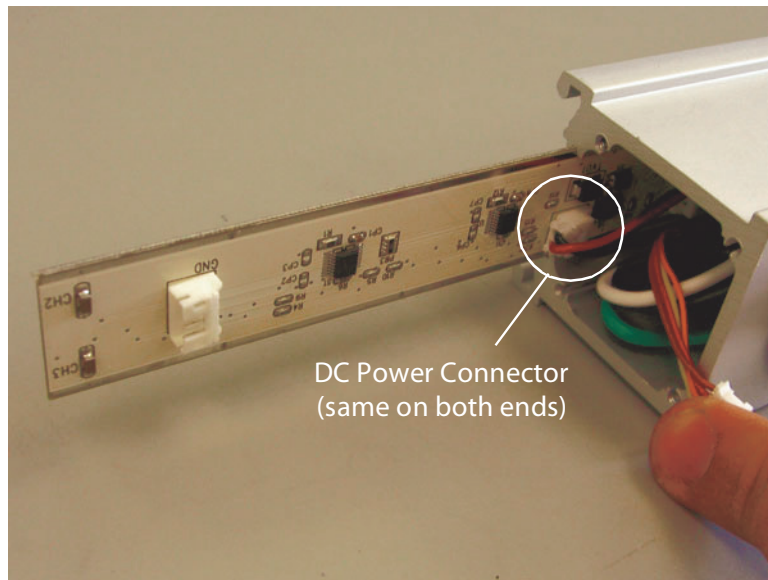
    d Unplug the other data connector.

Figure 3.5 Versa TUBE DC Power Connector Location

2 Unplug the DC power connectors (see Figure 3.5).

    a Slide the entire PCB set out a bit further, revealing the black/red-wired DC power connector.

    b Unplug the DC power connector.

    c Slide the entire PCB set to the other side.

    d Unplug the other DC power connector.

**3** Slide the entire PCB set out of its rails in unison.

If you are opening the tube to investigate a data problem, you may find a slightly-unplugged data jumper. Hand-check these connections as you slide out the PCB set; you may not need to disassemble the tube any further. Similarly, a dark PCB may be caused by a poorly-connected DC power jumper rather than a bad DC power supply.

Once the PCB set is removed from the tube, you will have access to the AC power bus connectors and the DC power supplies. If you are opening the tube to replace a DC power supply, check to make sure that the AC tap to the DC power supply is seated properly; you may not need to replace the power supply.

Replacing a DC Power Supply

Follow the steps below to replace a DC power supply.
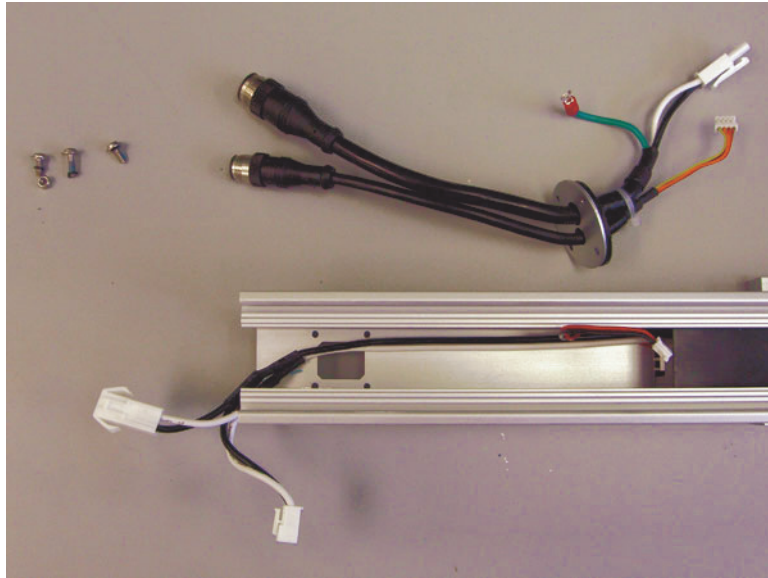
1 Using a 5.5mm hex driver, unscrew pigtail mount and AC ground wire.
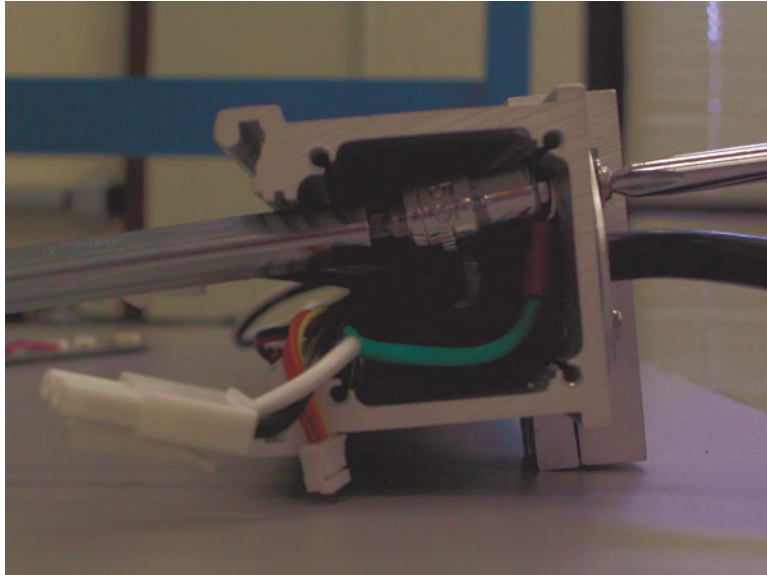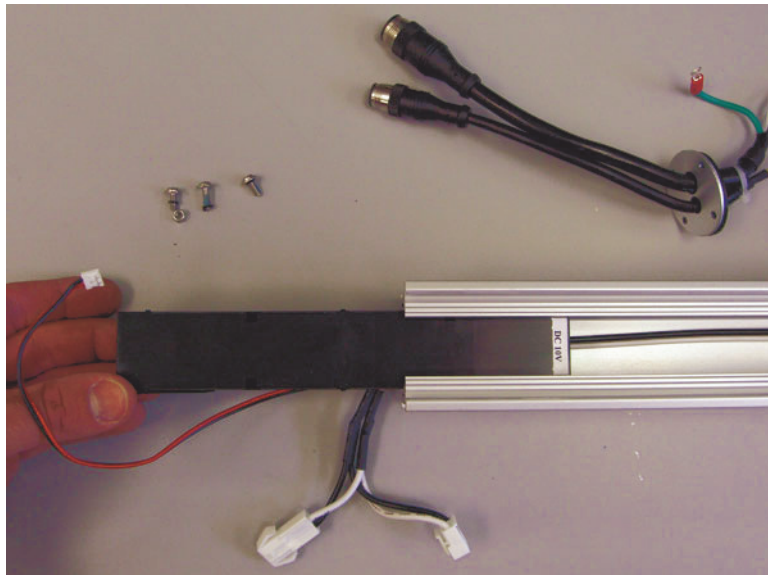

2 Remove pigtail.
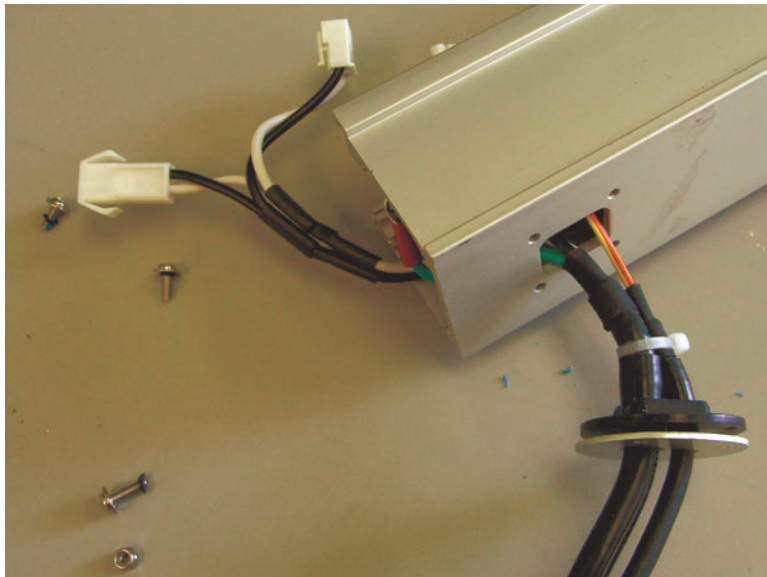
3 Clear AC bus and tap connectors.

4 Slide out DC power supply.

TROUBLESHOOTING

This chapter covers troubleshooting the Versa TUBE system. The following topics are discussed:

- System Troubleshooting Examples, (p. 4-2)
- Recommended Tube Circuit Loading, (p. 4-6)

System Troubleshooting Examples

As with any lighting or video system, follow conventional signal flow procedure when troubleshooting a Versa TUBE system. Whether you are experiencing a lack of data or power, start at the end of the signal chain and work your way back to its source. Before the load-in, make a signal flow diagram of your system to aid in both installation and troubleshooting.

It is good practice to assume that cable problems (air gaps, partially-plugged-in connections, poorly made third-party connectors, arced JYX, etc.) will be the culprit of a majority of system malfunctions. Careful system assembly, and education of production staff and stagehands, will prevent a majority of these cable issues from arising.

Example #1
Tubes are in black, or have no power
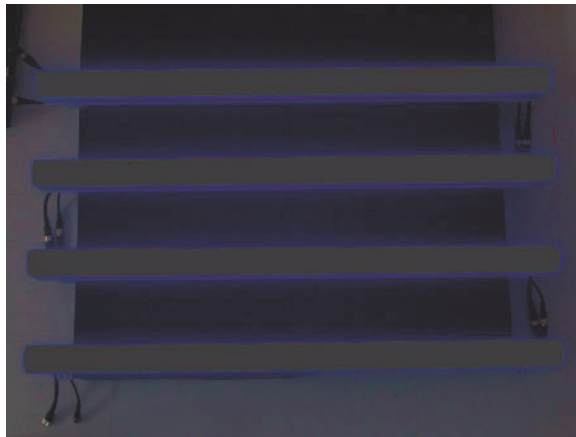
1. Is the Versa DRIVE outputting a Black test pattern? If set to Video input, is it receiving a black video source? If HD tubes, also see "Example #2" below.

2. Is the first tube connected to the Buffer Box?

3. Is the Buffer Box receiving power?

4. Are all cables leading from the Buffer Box back to the circuit breaker connected well?

5. Is the breaker for this circuit on? Has it tripped? If the breaker has tripped, where is the short circuit? Is there a poorly-connected JYX or other power connector?

Example #2
Tubes have no data
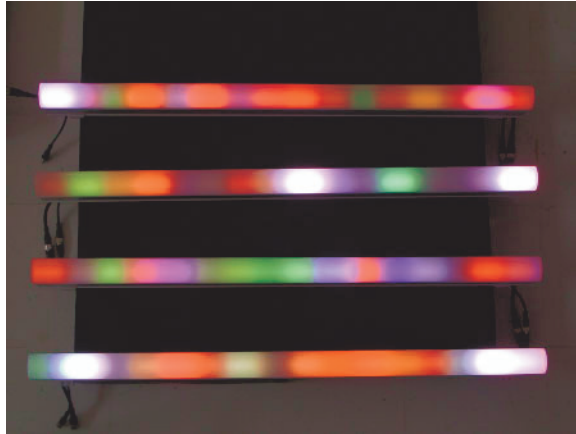
1. Is the first tube's data input connected to the Buffer Box?

2. Does the Buffer Box show a rapidly-flashing green LED, indicating correct data? Is the serial data line connected to the Buffer Box's input?

3. Are there any breaks in the serial data line running from the Buffer Box back to the Versa DRIVE?

4. If you have a Serial Data Amplifier or Serial Data Splitter in line between the Buffer Box and the Versa DRIVE, is the unit receiving power? Is it showing a rapidly-flashing green LED, indicating correct data?

Example #3
Input half of a tube has no power, and will not pass data
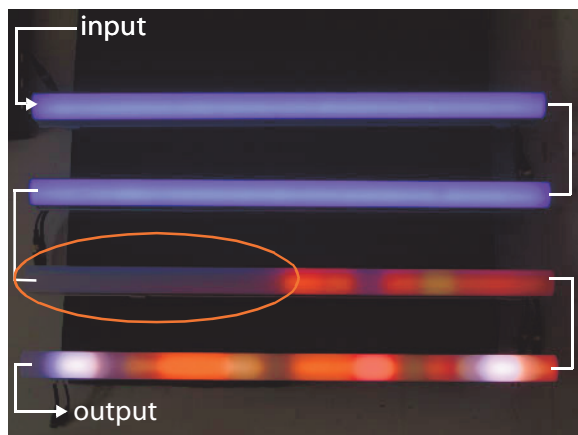
The input power supply is faulty, and will no longer provide DC power to the first half of the tube. Replace the tube with a known good spare, and repair the bad tube with a good power supply.

Before installing a new power supply, check to make sure that the "bad" power supply is actually connected to the AC tap on the AC bus, and that the "bad" power supply's DC output is actually connected to the tube's first PCB.

Example #4
Output half of a tube has no power, and will not pass data

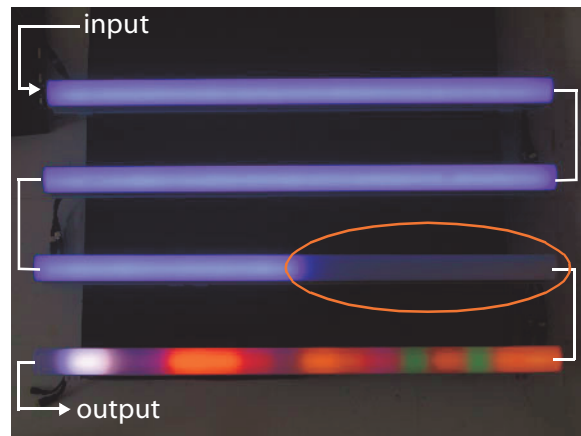The output power supply is faulty, and will no longer provide DC power to the last half of the tube. Replace the tube with a known good spare, and repair the bad tube with a good power supply.

Before installing a new power supply, check to make sure that the "bad" power supply is actually connected to the AC tap on the AC bus, and that the "bad" power supply's DC output is actually connected to the tube's last PCB.
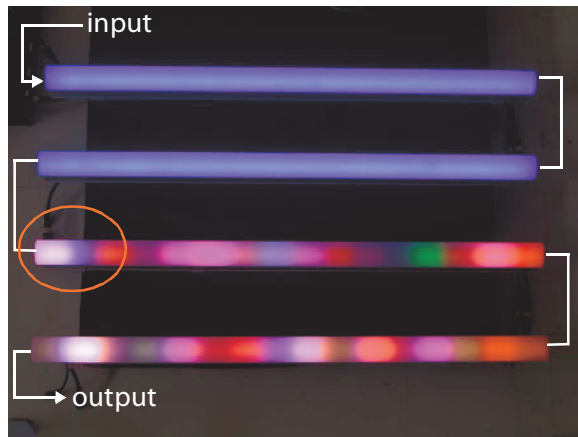
Example #5
No data to tube

It is most likely that the data connection between the last "good" tube and the first "bad" tube has been broken, or was not plugged in properly. Check this connection.

If the data connection is good, then either a) the internal data connector from the last PCB in the "good" tube is loose or disconnected, or b) the internal data connector to the first PCB in the "bad" tube is loose or disconnected.

In rare instances, it is last PCB of the "good" tube that will not pass data, or the first PCB of the "bad" tube that will not receive data...in which case you will replace the offending PCB.

Example #6
Data stops midway through a tube
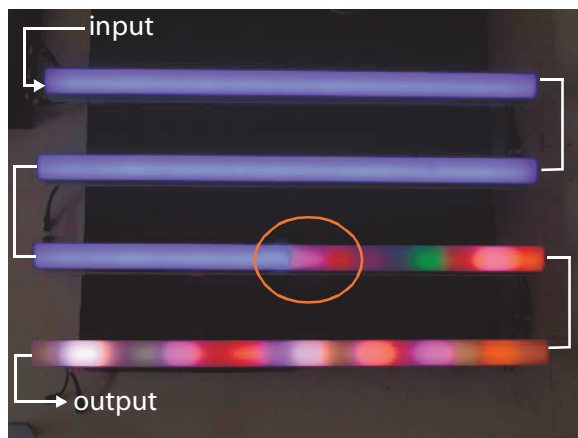
The data jumper at the midpoint of the tube has become loose or disconnected, and should be re-seated, or replaced if it still will not pass data when re-seated.

In rare instances, the PCB before the midpoint of the tube will not pass data, or the PCB after the midpoint of the tube will not receive data, and will require replacement.

Recommended Tube Circuit Loading

The following tables list the recommended Versa TUBE circuit loading techniques.

For non-HD Tubes, a Local DA should be used every 20m.

120V Single Phase

Tube Type	#	Length	Watts	Amps
Versa TUBE	20	1m	560	4.6
Versa TUBE	10	2m	560	4.6
Versa TUBE HD	10	1m	560	4.6

240V Single Phase

Tube Type	#	Length	Watts	Amps
Versa TUBE	40	1m	1120	4.6
Versa TUBE	20	2m	1120	4.6
Versa TUBE HD	20	1m	1120	4.6

208V Three Phase Circuit Tube Loading

Tube Type	#	Length	Watts	Amps
Versa TUBE	36	1m	1008	4.8[1]
Versa TUBE	18	2m	1008	4.8[1]
Versa TUBE HD	18	1m	1008	4.8[1]

1.Per phase across two of three phases.

100V Single Phase

Tube Type	#	Length	Watts	Amps
Versa TUBE	16	1m	448	4.5
Versa TUBE	8	2m	448	4.5
Versa TUBE HD	8	1m	448	4.5

220V Single Phase

Tube Type	#	Length	Watts	Amps
Versa TUBE	36	1m	1008	4.6
Versa TUBE	18	2m	1008	4.6
Versa TUBE HD	18	1m	1008	4.6

RASTERMAPPER WITH MULTIPLE D2S

This chapter covers using the RasterMAPPER software with Multiple Versa DRIVE D2s. The following topics are discussed:

- RS-232 Control, (p. A-2)
- RS-485 Control, (p. A-3)

RS-232 Control

The most common manner of interfacing RasterMAPPER with the Versa DRIVE D2 is by single port, direct RS-232 communication. A technician may use a DB-9 cable to connect a PC running RasterMAPPER to the RS-232 port on the D2. If using a Macintosh laptop, or a PC laptop that has no serial port, the technician may use a Keyspan USB-to-Serial adapter. The model number for the single-port Keyspan adaptor that has been in consistent, widely-compatible use by Element Labs technicians is the USA-19HS (Figure A.1), which is available from Keyspan (www.keyspan.com).

Figure A.1   Single port USB to DB9 Adaptor

A Keyspan adaptor that may be useful for systems with up to four D2s is the USA-49W (Figure A.2), a four-port USB-to-serial adaptor for Macintosh or PC. If the adaptor's drivers are installed properly, the RasterMAPPER user should be able to select each port in the Serial Port drop-down menu in the Versa DRIVE Control window.

Figure A.2   Four port USB to DB9 Adaptor

Another method of controlling up to four D2s is by rotary switch. A four-way DB-9 switch (Figure A.3) may be used to interface with one D2 at a time. It will allow for fast disconnection and recondition to the next D2, without replotting of cables. This type of switch is a standard item at professional computer supply stores. It is

usually beige, 5" x 6" x 2", with the rotary switch on one side and five DB-9 ports on the other side.

Figure A.3   Four port DB9 Switch

RS-485 Control

RasterMAPPER is capable of communicating with up to 32 Versa DRIVE D2s. On the left-hand side of the Versa DRIVE Control window, one may choose a particular D2 with which to communicate, and groups may be stored so that the user can click one lettered button (A through H) to send data to multiple D2s at one time.

The D2s in a large system may be daisy-chained using standard 5-pin XLR (Neutrik, Switchcraft, or Element Labs' own provided XLR connectors will do), most commonly available to lighting vendors as 5-pin DMX cable. The protocol used to control multiple D2s at one time is RS-485, as indicated on the D2 with the RS-485 In and RS-485 Out ports.

To our knowledge, there is only one adaptor known to reliably convert the RS-232 signal from a Macintosh or PC's built-in DB-9 port or USB-to-Serial adaptor, into an RS-485 signal suitable for use by the D2. That adaptor is Advantech's Adam-4520 RS-232/RS-485 converter (Figure A.4). It is a terminal block requiring custom cabling and non-RasterMAPPER software setup.

Figure A.4   RS-232 to RS-485 Terminal Block Adaptor