UN # 17 Rev 3

VersaBell and ServoBell
Paint Systems Applicator Update Notice
Subject: High Voltage System Troubleshooting

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Enclosed is a new HIGH VOLTAGE TROUBLESHOOTING GUIDE for VersaBell and ServoBell Applicators. Both High Voltage Controller and PaintTool faults are covered. Basic diagrams are provided to show the layout of the system components for different robot/applicator installations. Refer to the system prints for exact wiring information, these drawings are only provided as a quick reference guide. The faults in the guide may not be order due to different system faults that occur under varying circumstances. The guide is written for a system that has been left by FANUC Robotics as a standard system. Any changes to high voltage system parameters, system color change cycles, and any system mechanical devices that are non-standard or use of other non FANUC Robotics approved components may not lead to a quick resolution of the problem.

High Voltage Troubleshooting Guide

FANUC Robotics High Voltage Troubleshooting Guide
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1. HIGH VOLTAGE CONTROLLER FAULTS

A. Switched-Off because of CABLE BREAK or CASCADE –

This fault occurs if there is broken wire or improper connection in any of the low voltage electrical circuits, this includes internal cascade wiring that may break. Continuous broken wire faults due to actual broken wiring will burn out a cascade. The broken wires must be fixed immediately. Possible causes are:

1. **Cause:** A broken low voltage wire section between the high voltage power supply and the cascade. In a P155/P200 robot with VersaBell 1 or ServoBell the most frequent cause is the low voltage cable in the wrist breaking or by broken wires in the catrac cable. P500 problems may arise in the catrac only as no low voltage cable runs through the wrist.
   Remedy: Check out the wiring for continuity and replace the broken wire or cable. See the appropriate quick reference diagram below for cable locations in your particular system. Refer to the system electrical prints for exact wiring connections.

2. **Cause:** A loose connection at the one of the low voltage terminal strips or plugs for one of the low voltage cables.
   Remedy: Check screw connections on all terminal strips, this includes the Phoenix connector within the Robot FRP unit in the P155/P200 and Amp connectors in the P500.

3. **Cause:** All applicators - A loose or damaged connection/pin at the cascade low voltage connector.
   Remedy: Check the pins on the cables to see if they are bent or broken or the solder joint is loose.
   Attempt to straighten if bent, if the pins are broken replace the cable or if on the cascade replace the cascade.
   If the solder joint is loose replace the cable.

4. **Cause**: On the P500, the black cascade holder bolts or the aluminum hosing that the black holder connects to are loose causing intermittent connection of the cascade to the connector.
   Remedy: Tighten all the bolts. Use Loctite 242 thread locker on all the threads that hold the both aluminum housing and the black cascade holder to the aluminum housing.

5. **Cause**: On the P500, the black cascade holder component parts have separated. This will cause cable breaks due to the gap allowing the cascade to move up and down in the holder. The gap should be no larger than 1mm.
   Remedy: Replace the black cascade holder. Then reinstall the black cascade holder using Loctite 242 thread locker on the threads that hold the cascade holder to the aluminum housing.

6. **Cause**: On the P500, the low voltage cable connector at the top of aluminum housing that the cascade connects to is loose. This causes intermittent connection of the cascade to the connector. A loose connector may also occur in P155/P200 robots with VersaBell 1 and ServoBell.
   Remedy:
   P500: Remove the black cascade holder from the aluminum housing. Check the connection nut for tightness at the back of the aluminum hosing. If the connector is loose remove the aluminum housing from the FRP unit. Remove the nut from the connector and place a small amount of Loctite 242 thread locker on the threads of the low voltage connector. Tighten the nut with tool EO-4526-700-004. Reinstall the aluminum housing and using Loctite 242 thread locker on the aluminum housing bolts. Replace the black cascade holder using Loctite 242 thread locker on the threads that hold the black cascade holder to the aluminum housing.

   On the P155/P200 with VersaBell 1 and ServoBell, remove the applicator and check that the connector is tight. If loose apply Loctite 242 thread locker to the threads and tighten with tool EO-4526-700-004.

7. **Cause:** On the VersaBell 1 or ServoBell applicator (P155/P200), the manifold /applicator quick disconnect nut is not properly tightened. The looseness allows the cascade connection to the connector to be marginal thus allowing the cascade to jump around in the manifold.
   Remedy: Tighten the applicator using the correct spanner wrench.

8. **Cause:** All applicators. A loose or broken wire connection on the high voltage power supply back-plane.
   Remedy: Check all wires to see if they are properly connected into the terminal strips and are correctly tightened.

9. **Cause:** All Applicators. A defective high voltage cascade. The internal wiring or components have failed.
   Remedy: Remove the cascade and replace with a new one.

B. These two faults share common causes

Switched-Off because of di/dt FAULT

This fault indicates that the rate of current change in the VOLTAGE MODE OF OPERATION is rising faster than expected over time. The high voltage is switched off and the HV Fault is activated.

OR

Switched off because of Imax OVERLOAD –

This fault indicates that the operating current has exceeded the maximum allowed value for the requested voltage. The high voltage is switched off and the HV Fault is activated.

1. **Cause:** Applicator covers are built up with excessive paint over spray and are conductive.
   Remedy: Replace the cover with a clean one.

2. **Cause:** Clean washed covers vs. new covers were placed on the applicator and faults occurred.
   Remedy: Replace with unwashed covers and insure that the cover suppler provides covers that are non conductive.

3. **Cause:** Distance between the applicator bell cup and/or shaping air assembly is too close to a vehicle.
   Remedy: Check for the following possible situations and/or problems and correct it:
   A. Check that the proper job is in the booth.
   B. Vehicle gas door is open or out of position.
   C. Vehicle door or tailgate is open or out of position.
   D. Door clip or fixture is out of position and is too close to applicator,
   E. Vehicle is skewed in the booth on the carrier. Check the vehicle and skid tolerance.
   F. Vehicle skid is bent. Tag skid for repair.
   G. Vehicle may have slipped on the conveyor and is not being tracked correctly.
   H. Path may have been adjusted and is now too close to the vehicle.
   Target should be 1 inch per 10KV + 1 inch between vehicle bell cup and side of the shaping air assembly.
   Check to see if changes were made and return to original path.

4. **Cause:** Path preset step value was changed (increased) without regard to target distance.
   Remedy: Check the Change Log to see if values have changed. Re-enter the original value.

5. **Cause:** Step setting voltage values have been changed without regard to target distance or proximity to other parts of the vehicle such as a door clip, fixture or carrier. The high voltage setting is now too high for the path.
Remedy: Return to original or lower high voltage value.

6. **Cause:** Booth humidity too high. Humidity conditions over 75% may cause voltage faults as the moisture level increases on the equipment and provides for a conductive path to ground. Extreme humidity may cause condensation.
Remedy: Adjust humidity to lower level if possible or decrease voltage until humidity is lowered.
Reducing voltage may decrease transfer efficiency.

7. **Cause:** Paint resistivity/conductivity/formulation is out of specification for one or more colors.
The general rule for resistivity for electrostatic painting is:
Ransburg Resistiviohmeter: 0.29 – 0.86 M Ohm
SAMES AP200 Resistivity Meter: 0.20 – 0.60 M Ohm x cm.

Remedy:

A. Check the paint resistivity in the paint kitchen. Check with you paint supplier to find out the normal specification for your paint and if the paint in your system has changed.
B. Check if new paint or solvent may have been added to the paint tanks. I
C. High aluminum flake colors may cause problems. Has the flake content changed?
D. Lower the voltage settings for the color having the problem.

8. **Cause:** Applicator had excessive solvent used for cleaning and that has seeped between the applicator components. High voltage problems will usually occur at a start up after cleaning.
Remedy: Clean only with rags that are dampened with solvent and wipe with a clean lint free cloth to dry**.** ***DO NOT*** *use solvent soaked rags, sponges, spray applicators with a solvent hose or gun, spray bottles or pour buckets of solvent on the applicator or robot arm*.

9. **Cause:** Paint or solvent leak in wrist.
Remedy:

A. Ensure that the quick disconnect nut for the applicator is tight. Tighten correctly using the spanner wrench.
B. Check for a loose hose connection on a paint or solvent fitting. Replace the hose and fitting with new.
C. Check that an o-ring on a fitting is not missing or cut. Replace with a new o-ring, fitting and hose.
D. Check that any applicator pipettes are not damaged and that their o-ring is in good shape. Look for possible high voltage etching on the pipette. Replace the pipette and o-ring.
E. Check the applicator manifold and plates for any electrostatic etching that occurred due to the paint/solvent leaks. If etched it cannot be repaired – replace the component.

F. Check for electrostatic pinholes on a paint or solvent hose. Replace with the correct size and type of FEP hose. DO NOT USE Nylon or other hose materials or pin holing will result. See the applicator manual for correct specification hose.

G. If replacing an applicator be sure to run a purge and blow out all circuits with air prior to removing. If not properly purged paint or solvent may leak out onto the Manifold face. This will cause high voltage arcing, faults and etching of the manifold surfaces fittings and pipettes if not cleaned and a new applicator installed. If the applicator is not able to be purged be sure to clean 100% any paint or solvent that has leaked prior to replacing with a new applicator or cascade. Apply a light coat of di-electric grease to the manifold surface before installing the new applicator.

If paint or solvent has leaked into the robot wrist clean the wrist, hoses and applicator manifold of all these materials before installing the applicator. If not cleaned high voltage problems will continue.

10. **Cause:** Wash line is not properly purged with air after a color change.
Remedy:
   A. Check that no one changed the purge cycle values. If it has changed find out by who and why. It should not need to be changed. Place back the original values.
   B. Check the purge cycle to insure the wash line it is blown down. If not find out why. (see D and E below)
   C. Check that one or more of the applicator paint valves (Paint Enable, Trigger, Wash, or Bell Wash) is leaking externally or internally or not opening at all. Replace the defective valve.
   D. Check that the Solv-Air valve is functioning correctly. Check each valve to be sure they are opening and closing correctly. Ensure that the air valve is opening and that the air pressure is correct. It should be 10 psi less than the solvent air pressure. Recommend setting for air is 85 psi therefore solvent should be set at 95psi.
   E. Check that the external dump valve is opening. If not replace the valve.
   F. Check that purge cycle timing for the pump on and enable and trigger has not been altered. The valve must open first than the pump turned on.
   G. Check that the Solvair valve is not leaking and that the Solvair check valves are functioning correctly.

11. **Cause:** Possible electrical noise from improper shield or ground connections. This is a rare problem.
Remedy:
   A. Check all ground and shield connections to ensure they are properly connected.
   B. Check the continuity of the ground and shield connections.

C. *These two faults share common causes*

Switched-Off because of dv/dt FAULT

This fault indicates that the rate of voltage change in the CURRENT MODE OF OPERATION is rising faster than expected over time. The high voltage is switched off and the HV Fault is activated.

Switched off because of Vmin OVERLOAD –

This fault indicates that the output Voltage is below the minimum allowed for the requested current when in the CURRENT MODE OF OPERATION. This occurs when excessive current draws the voltage output below the Vmin setting. The high voltage is switched off and the HV Fault is activated.

1. **Cause:** Applicator covers are built up with excessive paint over spray and are conductive.
   Remedy: Replace the cover with a clean one.

2. **Cause:** Clean washed covers vs. new covers were placed on the applicator and faults occurred.
   Remedy: Replace with unwashed covers and insure that the cover suppler provides covers that are non conductive.

3. **Cause:** Distance between the applicator bell cup and/or shaping air assembly is too close to a vehicle.
   Remedy: Check for the following possible situations and/or problems and correct it:
   A. Check that the proper job is in the booth.
   B. Vehicle gas door is open or out of position.
   C. Vehicle door or tailgate is open or out of position.
   D. Door clip or fixture is out of position and is too close to applicator,
   E. Vehicle is skewed in the booth on the carrier. Check the vehicle and skid tolerance.
   F. Vehicle skid is bent. Tag skid for repair.
   G. Vehicle may have slipped on the conveyor and is not being tracked correctly.
   H. Path may have been adjusted and is now too close to the vehicle.
   Target should be 1 inch per 10KV + 1 inch between vehicle bell cup and side of the shaping air assembly.
   Check to see if changes were made and return to original path.

4. **Cause:** Path preset step value was changed (increased) without regard to target distance.
   Remedy: Check the Change Log to see if values have changed. Re-enter the original value.

5. Cause: Step setting voltage values have been changed without regard to target distance or proximity to other parts of the vehicle such as a door clip, fixture or carrier. The high voltage setting is now too high for the path.
Remedy: Return to original or lower high voltage value.

7. **Cause:** Booth humidity too high. Humidity conditions over 75% may cause voltage faults as the moisture level increases on the equipment and provides for a conductive path to ground. Extreme humidity may cause condensation.
Remedy: Adjust humidity to lower level if possible or decrease voltage until humidity is lowered. Reducing voltage may decrease transfer efficiency.

7. Cause: Paint resistivity/conductivity/formulation is out of specification.
The general rule for resistivity for electrostatic painting is:
Ransburg Resistiviohmeter: 0.29 – 0.86 M Ohm
SAMES AP200 Resistivity Meter: 0.20 – 0.60 M Ohm x cm.

Remedy:

A. Check the paint resistivity in the paint kitchen. Check with you paint supplier to find out the normal specification for your paint and if the paint in your system has changed.
B. Check if new paint or solvent may have been added to the paint tanks.
C. High aluminum flake colors may cause problems. Has the flake content changed?
D. Lower the voltage settings for the color having the problem.

8. Cause: Applicator had excessive solvent used for cleaning and that has seeped between the applicator Components. High voltage problems will usually occur at a start up after cleaning.
Remedy: Clean only with rags that are dampened with solvent and wipe with a clean lint free cloth to dry**.** ***DO NOT*** *use solvent soaked rags, sponges, spray applicators with a solvent hose, gun, spray bottle or pour buckets of solvent on the applicator or robot arm*.

9. Cause: Paint or solvent leak in wrist**.**

Remedy:

A. Ensure that the quick disconnect nut for the applicator is tight. Tighten correctly using the spanner wrench.
B. Check for a loose hose connection on a paint or solvent fitting. Replace the hose and fitting with new.
C. Check that an o-ring on a fitting is not missing or cut. Replace with a new o-ring, fitting and hose.
D. Check that any applicator pipettes are not damaged and that their o-ring is in good shape. Look for possible high voltage etching on the pipette. Replace the pipette and o-ring.
E. Check the applicator manifold and plates for any electrostatic etching that occurred due to the paint/solvent leaks. If etched it cannot be repaired – replace the component.

F. Check for electrostatic pinholes on a paint or solvent hose. Replace with the correct size and type of FEP hose. DO NOT USE NYLON or other hose materials as pin holing will result. See the applicator manual for correct specification hose.

G. If replacing an applicator be sure to run a purge and blow out all circuits with air prior to removing. If not properly purged paint or solvent may leak out onto the Manifold face. This will cause high voltage arcing, faults and etching of the manifold surfaces fittings and pipettes id bot cleaned and a new applicator installed. If the applicator is not able to be purged be sure to clean 100% any paint or solvent that has leaked prior to replacing with a new applicator or cascade. Apply a light coat of di-electric grease to the manifold surface before installing the new applicator. If paint or solvent has leaked into the robot wrist clean the wrist, hoses and applicator manifold of all these materials before installing the applicator. If not cleaned high voltage problems will continue.

10. Cause: Wash line is not properly purged with air after a color change.

Remedy:

A. Check that no one changed the purge cycle values. If it has changed find out by who and why. It should not need to be changed. Place back the original values.

B. Check the purge cycle to insure the wash line it is blown down. If not find out why. (see D and E below)

C. Check that one or more of the applicator paint valves (Paint Enable, Trigger, Wash, or Bell Wash) is leaking externally or internally or not opening at all. Replace the defective valve.

D. Check that the Solv-Air valve is functioning correctly. Ensure that the air valve in it is opening and that the air pressure is correct. It should be 10 psi less than the solvent air pressure. Recommend setting for air is 85 psi therefore solvent should be set at 95psi.

E. Check that the external dump valve is opening. If not replace the valve.

F. Check that purge cycle timing for the pump on and enable and trigger has not been altered. The valve must open first than the pump turned on.

G. Check that the Solvair valve is not leaking and that the Solvair check valves are functioning correctly.

11. **Cause**: Possible electrical noise from improper shield or ground connections. This is a rare problem.

Remedy:

A. Check all ground and shield connections to ensure they are properly connected.

B. Check the continuity of the ground and shield connections.

D. Switched-Off because of EXCEEDING POWER DISIPATION –

An Exceeding Power Dissipation fault occurs when the High Voltage Cascade cannot output the voltage commanded from the Low Voltage Command Signal (drive +wire = 0 to 24vdc) from the High Voltage Controller. The Cascade voltage feedback and current feedback circuits (Ufb and Ifb) signals are sent back to the controller where it compares the input to the cascade against the output of cascade. If the values are out of range the high voltage is switched off and the HV Fault Exceed Power Dissipation is activated.

Causes for this failure should be looked at first and considered to insure that replacing the cascade is necessary. Often cascade replacement is the first item considered during troubleshooting of HV problems. However, improper handling or frequent replacement procedures could lead to cascade failures. It is recommended to test other fault contributors prior to replacing the cascade. Reasons for cascade failure over time that cause Exceed Power Dissipation faults are due to dielectric stress and improper use. In most cases where the safety settings have been tampered with, the cascade internal components break down and the Exceeded Power Dissipation fault indicates a cascade failure. The break down occurs over time and use. These breakdowns are attributed to the improper operation or installation of the cascades.

Intermittent Exceeding Power Dissipation Faults are due to 1.) Compromised Safety Settings, 2.) a Short Circuit During Ramp-up, 3.) Low Voltage Connection Problems, 4.) Arcing due to Mechanical Issues, and 5.) Arcing due to Paint and Solvent Resistivity/Conductivity/Formulation issues.

Continuous Exceeding Power Dissipation Faults that are unable to be reset are the result of a cascade that has been stressed and failed due to the intermittent Exceeding Power Dissipation Faults.

1. Cause: Compromised Safety Settings - Disabling of the IMAX or di/dt fault settings.

Disabling the over-current (IMAX) or disabling the dI/dt (arc detection) safety systems is a leading contributor to the occurrence of this fault and to eventual cascade failure. When the over-current and di/dt systems are disabled, the “exceeded power dissipation” is the last safety feature in the system available to detect a system safety condition, it cannot be disabled or altered by the user. If the safety system is compromised, the cascade voltage/current can be driven beyond the acceptable operating conditions of the high voltage system. The safety settings should NEVER be adjusted. There is no NORMAL condition where it is acceptable to run the VersaBell applicator with the over-current or dI/dt detection turned off. Please see the VersaBell manual high voltage section for the correct step setting parameters.

Remedy:

A. Enable the IMAX and/or di/dt if disabled.

B. Set step setting voltage and current values to correct specification as outline in the VersaBell manual.

2. Cause: Short Circuit During Ramp-Up or HV ON Condition.

This fault may occur if you start up with a very high load on the system and the HV does not come up fast enough. When the HV system is initially ramping up and if there is a short circuit condition, the Exceeded Power Dissipation Fault may occur. In most cases the IMAX (over-current) or dI/dt (arc detection) will shut the system down first. The short circuit condition may occur if the system is turned on and a component with high voltage has a easy path to ground. This can occur if the applicator is in close proximity to a grounded object (vehicle, part out of alignment, path change without regard to correct safety distance) or if there is a failed component in the equipment (power supply, cascade).

Another cause may be if the cascade or applicator is contaminated with a conductive material such as paint, solvent, water, or dirty covers. This cause is more common with waterborne systems when there is a failure in the isolation system but can occur also in solvent based systems when using more conductive paints or solvents.

Remedy:

A. Insure that IMAX and di/dt are enabled.
B. Check path to insure it is not to close to the vehicle at ramp up.
C. Check vehicle to insure parts are in correct position.
D. Check that there is no path to ground from the applicator.
E. Be sure purge cycle is correct and not leaving solvent or paint in the wash line.
F. Insure there are no paint or solvent leaks on or in the applicator, contaminating the cascade or robot wrist.
G. Be sure all applicator covers are clean.

3. Cause: Low Voltage Connection Problems.

It is possible that problems with the low voltage connections can cause the Exceeded Power Dissipation fault. The wire broken detection system has a delay in the circuit to prevent nuisance faults. Fast acting and intermittent disconnection of the cascade from the low voltage connection circuitry may create this fault. Cable failures or connections that are marginal could be contributors to this fault.

Remedy: Check all the items in Item 1 (*Switched off because of Cable Break or Cascade Fault*) on Page 4.

4. Cause: Constant or Intermittent Arcing due to Mechanical Issues as broken or loose wires, and loose connections.

Constant arcing from a HV component to ground will cause cascade failure. If many IMAX or di/dt faults occur prior to the exceeded power dissipation fault, arcing is most likely the cause of the fault and cascade failure. This constant arcing can also occur undetected when the safety system is turned off or modified.

Remedy:

A. In P500 systems check that the black cascade housing, aluminum housing and low voltage connector are correctly tightened and Loctite 242 thread locker applied to all threads. Loose connections will cause the cascade to “rattle” in the applicator making intermittent connections and sparks.

B. In P155/P200 systems with VersaBell 1and ServoBell insure that the quick disconnect nut is properly tightened. Loose connections will cause the cascade to “rattle” in the applicator making intermittent connections and sparks. Tighten the quick disconnect properly.

C. Insure that correct application of dielectric grease to components is followed for all VersaBell and ServoBell applications.

D. Insure that applicator covers are clean. Replace if dirty.

E. Insure that the cascade is clean and free of paint and solvent. In P200 systems with VersaBell 1 insure that the applicator manifold that contains the cascades is clean, free of paint, solvent and has dielectric grease applied to its inner wall. Check the Teflon encapsulated o-ring condition on the manifold to see if it is in place and in good condition. If it is missing or damaged replace it.

F. Arcing can occur if the cascade is not properly installed that is contaminated or improperly greased. Arcing can occur in the following areas: HV connection in nose (2 places), along the cascade wall to rear due to lack of grease or contamination with paint or solvent. in some portion of the bell at the HV connection points, outward to ground through the HV cable, inside the fluid delivery lines, outward from the fluid delivery lines, outward of fluid control devices including pumps and valves, and also from the applicator to the part or other grounded components in the spray booth. If the cascade has paint or solvent on it the problem leading to the leaking paint or solvent must be corrected prior to installing a new cascade.

G. The low voltage wires leading to the cascade are broken due to flexing causing intermittent connections. These cables MUST be replaced before they totally break. Ring out all low voltage cables from applicator to controller.

H. The low voltage connectors are not fully engaged or have faulty pins/sockets. Check the connector condition.

5. **Cause:** Constant Arcing due to Paint and Solvent Resistivity/Conductivity/Formulation issues.

Remedy:

A. Constant arcing can occur if conductive paints are not handled properly. Arcing in the fluid stream can be significantly harmful to the cascade due to the inertia of the discharge. Checking the resistivity of the paint is helpful but not always a good troubleshooting method because many metallic type paints become more conductive as the electrostatic voltage is applied. Again, turning off the safety system is under this condition will eventually lead to a failed cascade. The high voltage should be reduced to a lower level or turned off when paint is not

flowing with some conductive paints. Paint suppliers should check resistivity of their paints and can modify the solvents used to lesson the sensitivity of some metallic paints if they continue to be a problem.
The general rule for resistivity for electrostatic painting is:
Ransburg Resistiviohmeter: 0.29 – 0.86 M Ohm
SAMES AP200 Resistivity Meter: 0.20 – 0.60 M Ohm x cm

8. **Cause:** Poor robot path planning and high voltage selection. Voltage commands are to frequent.
It may take from one to two seconds for voltage to rise from 0 to 90Kv and the same amount of time to decrease from 90 to 0Kv. Other incremental steps are faster but do not happen instantly. The electronic circuitry within the cascade generator needs time to both increase and decrease voltage values. At the same time the speed of the robot path must be considered in planning voltage changes. The applicator may be well beyond the point where the high voltage change is made due to this timing requirement. Excessive voltage level changes will cause dielectric stress on the cascade and cause it to fail. This can be compared to driving a car in the city vs. the highway. The frequent and high acceleration starts and stops in the city are much harder on the drive train than continuous speed of the highway.

Remedy: Although it is sometimes necessary to vary the voltage level, quick and wide changes in voltage level changes must be avoided. It is best practice to maintain proper part to applicator painting distance than to adjust voltage levels to account for applicator to part distance. On door cut-in paths the robot moves so quickly that multiple changes never really occur where they may be wanted. It is best to maintain as few as possible voltage for the cut-in paths. On exterior base coat applications the same can also be said. The fluid flows are generally so low that changing voltage is not required. For clear coat applications where flow may be higher it is best to adjust fluid flow than adjust the high voltage. The fluid flow change with metering pumps will occur faster than a voltage change.

7. Cause: Failed Cascade - Failed cascades will not allow for resetting of the Exceed Power Dissipation Fault.
Remedy: Replace the cascade. See installation guidelines for proper replacement procedures. To prevent future cascade failures follow the procedures above.

8. Cause: Defective High Voltage Cable – On some occasions the high voltage cable from the cascade to the applicator if worn out will display this fault. If the high voltage cannot transfer to the bell the “Exceed Power Dissipation Fault” will display. The voltage at the applicator should be checked at a minimum one time per month. The high voltage cable must be replaced yearly
Remedy: Measure voltage at the applicator if not correct check the connections in the cascade holder and in the applicator. If connections are OK replace the cable.

2. PaintTool High Voltage Faults –

Refer to the your *SYSTEM RJ3iB Controller Error Codes Manual* for more information. Different software versions have different fault codes. The following faults are displayed on both the teach pendent and on the GUI Alarms screen.

A. ESTAT CONTROLLER WARNING -

Cause: The FB-200-HVU High Voltage Controller detected a Warning. This indicates a potential system fault that is not yet at the fault level.
Remedy: Check the status screen on the FB-200-HVU High Voltage Controller. Monitor for conditions such as high current or low voltage while painting that may cause the warning to occur.

B. ESTAT CONTROLER FAULT –

Cause: The FB-200-HVU High Voltage Controller detected a fault. The FB-200-HVU sends this fault signal to the robot controller so that all painting is stopped.
Remedy: Check the operator console GUI for a fault and/or fault status on the panel and display of the FB-200-HVU High Voltage Controller. It the fault is not displayed on the GUI after 5 seconds check the FB-200 HVU display for fault details.

C. ESTAT DISABLED –

Cause: The Estat Disconnect Switch if off or the Enable Key Switch on the FB-200-HVU High Voltage Controller is off.
Remedy: Turn the Disconnect switch to ON or turn the FB-200-HVU High Voltage Controller, Enable Key Switch to ON.

D. ESTAT CONTROLLER NOT IN REMOTE –

Cause: The Local/ Remote toggle switch on the FB-200-HVU High Voltage Controller is in the Local Mode.
Remedy: Turn the toggle switch on the FB-200-HVU High Voltage Controller to the REMOTE mode.

E. ESTAT HVON FAILED –

Cause: This is a real alarm not a nuisance because when this message occurs the paint job quality is poor because no high voltage is present at the applicator. The root cause of the problem is that the robot controller sent the HVON signal to the FB-200-HVU High Voltage Controller but did not get a signal back indicating it received the signal. The HV On Alarm is a PaintTool generated alarm not an actual high voltage alarm from the FB-200 HVU High Voltage Controller. When the robot controller commands voltage, the robot controller turns on the HV ON *output* that is wired to the FB-200-HVU High Voltage Controller *input*. The FB-200 HVU High Voltage Controller sends the voltage command to the cascade when it receives the HV ON signal. When the FB-200-HVU High Voltage Controller senses any energy in the system, it turns on the HV On output that is wired to the input card in the robot controller. When PaintTool turns on the

HV ON *output*, it looks for the HV ON input echo from the FB-200-HVU High Voltage Controller. If it does not get the signal after a predetermined time, the robot controller issues a Warning.

Remedy: Confirm that this is a real problem by monitoring the display on the FB-200-HVU High Voltage Controller. If the step value is between 1 and 7 and the HV ON signal is on and the Actual KV value is 0, then there is a problem in the system. To debug this problem, start by looking at the FB-200 HVU High Voltage Controller. If the HV On signal is on only when there is a valid step command and the feedback is correct, look at the pendant and confirm the Digital Input HV ON signal is on. For the P500 check (DI 257 (Eq1) DI 385 (Eq2)). For P155 and P200 compare with another robot to check these Digital Input Signals as many configurations are possible. If any signals are missing, check the wiring to the I/O card and back plane. If this doesn't clear the problem, start checking ALL the cable connectors and terminal connections associated with the low voltage wiring of the high voltage system.

Possible causes of the alarm:

- Cascade is defective.
- Defective high voltage cable (purple) from the cascade to the applicator.
- Problem with FB-200-HVU High Voltage Controller.
- Problem with wiring on FB-200-HVU High Voltage Controller back plane or FANUC I/O card (HV On signal or
- step signal) in the robot controller cabinet.
- Defective robot controller I/O card.
- The FB-200 High Voltage Controller not seeing feedback from the cascades(cable / wiring problem)
- The FB-200 High Voltage Controller not commanding Voltage (cable / wiring problem - see cable break fault)
- No Step command with HV On command. Possible causes are: The preset is set to an invalid value, a wiring
- problem exist, or the step I/O was mapped incorrectly at the robot controller).
- Cascade is defective.

F. ESTAT SET POINT NOT REACHED –
Cause: The set point reached signal from the FB-200-HVU High Voltage Controller was not received by the robot controller within the appropriate time limit.

Remedy: Check the voltage and set point reached light on the FB-200-HVU High Voltage Controller. The system may be having trouble reaching the requested voltage. If not adjust the set point reached time out setting.

P 200E VersaBell I High Voltage System

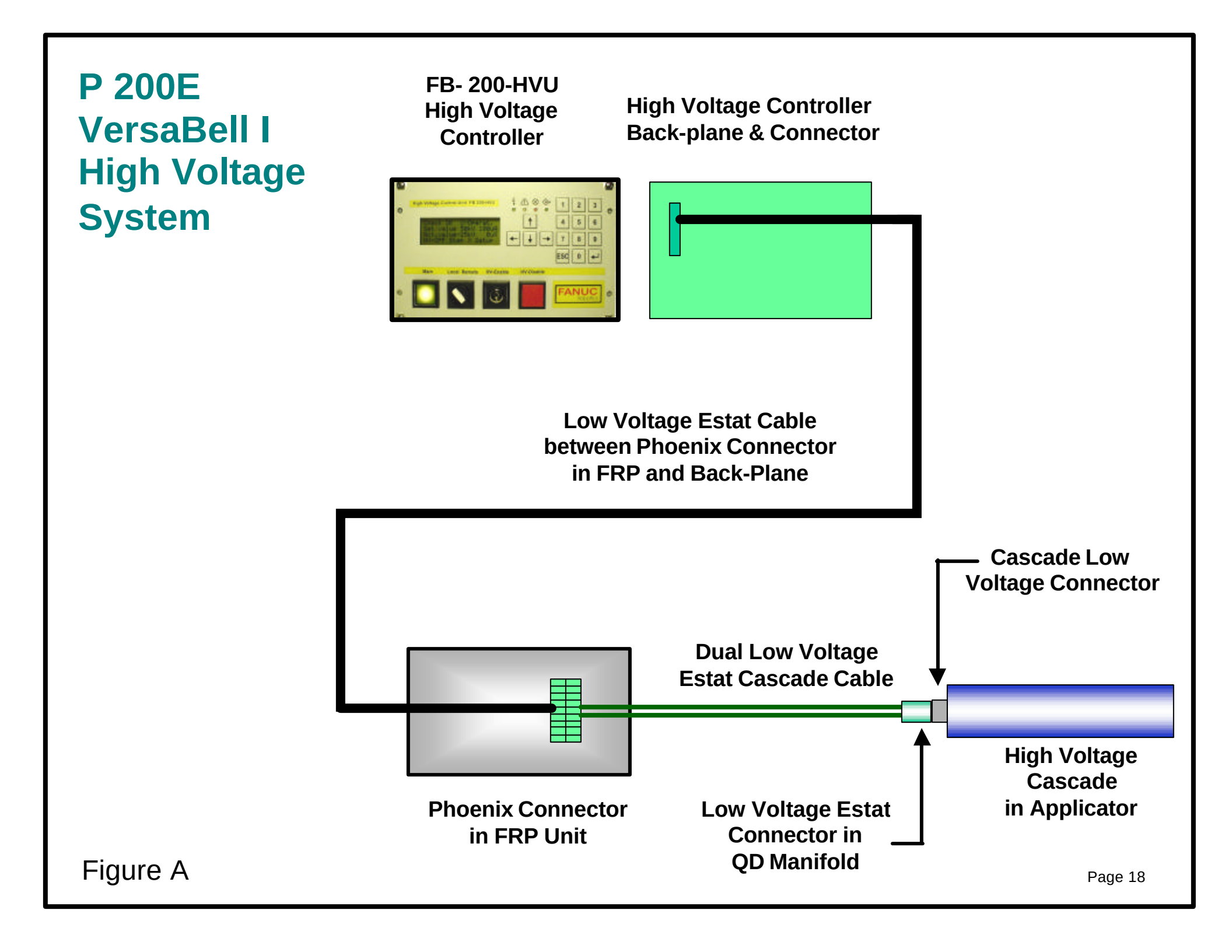

Figure A

P 155 & P200 Retrofit VersaBell I High Voltage System

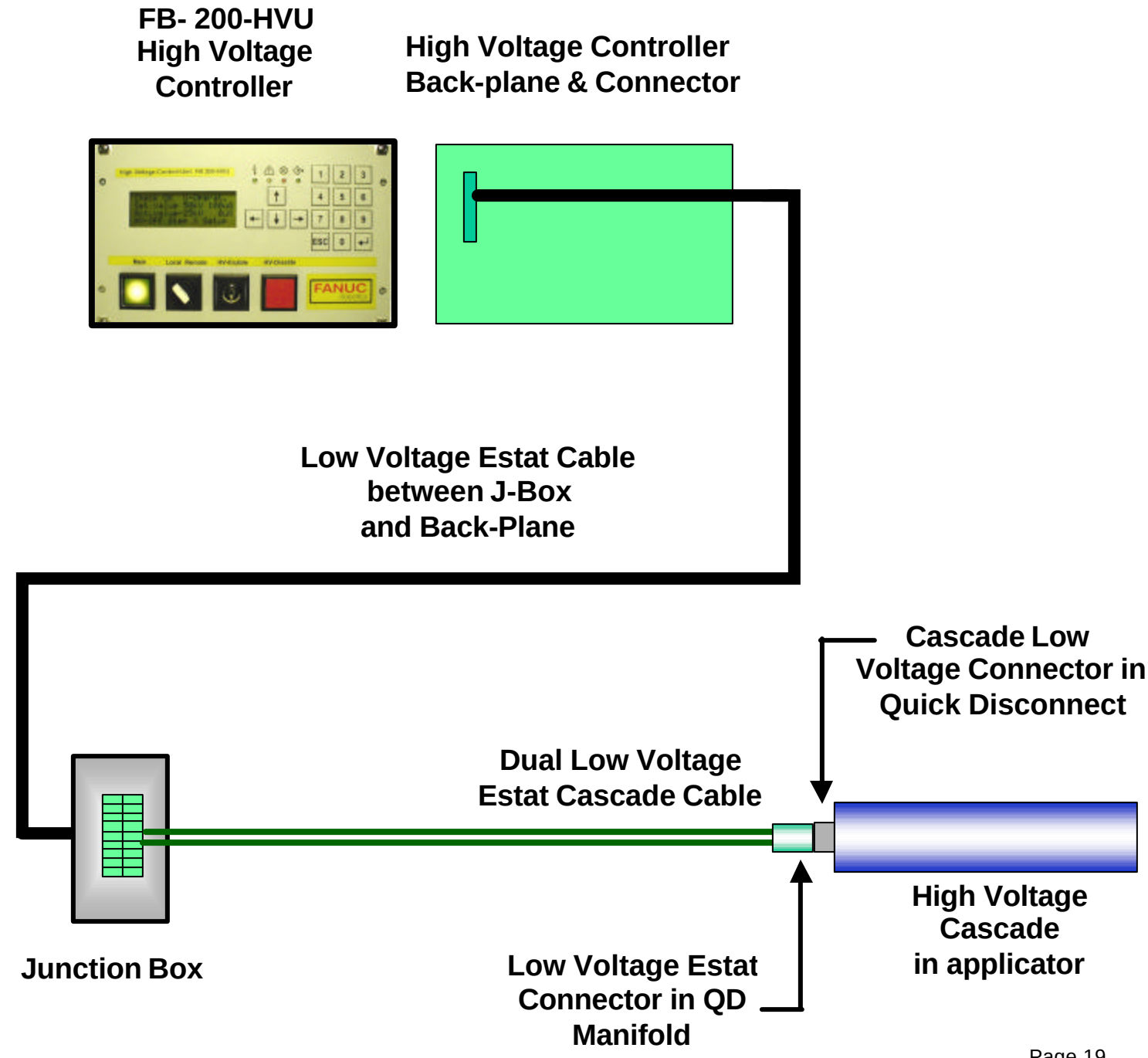

Figure B

P 200 VersaBell I High Voltage System

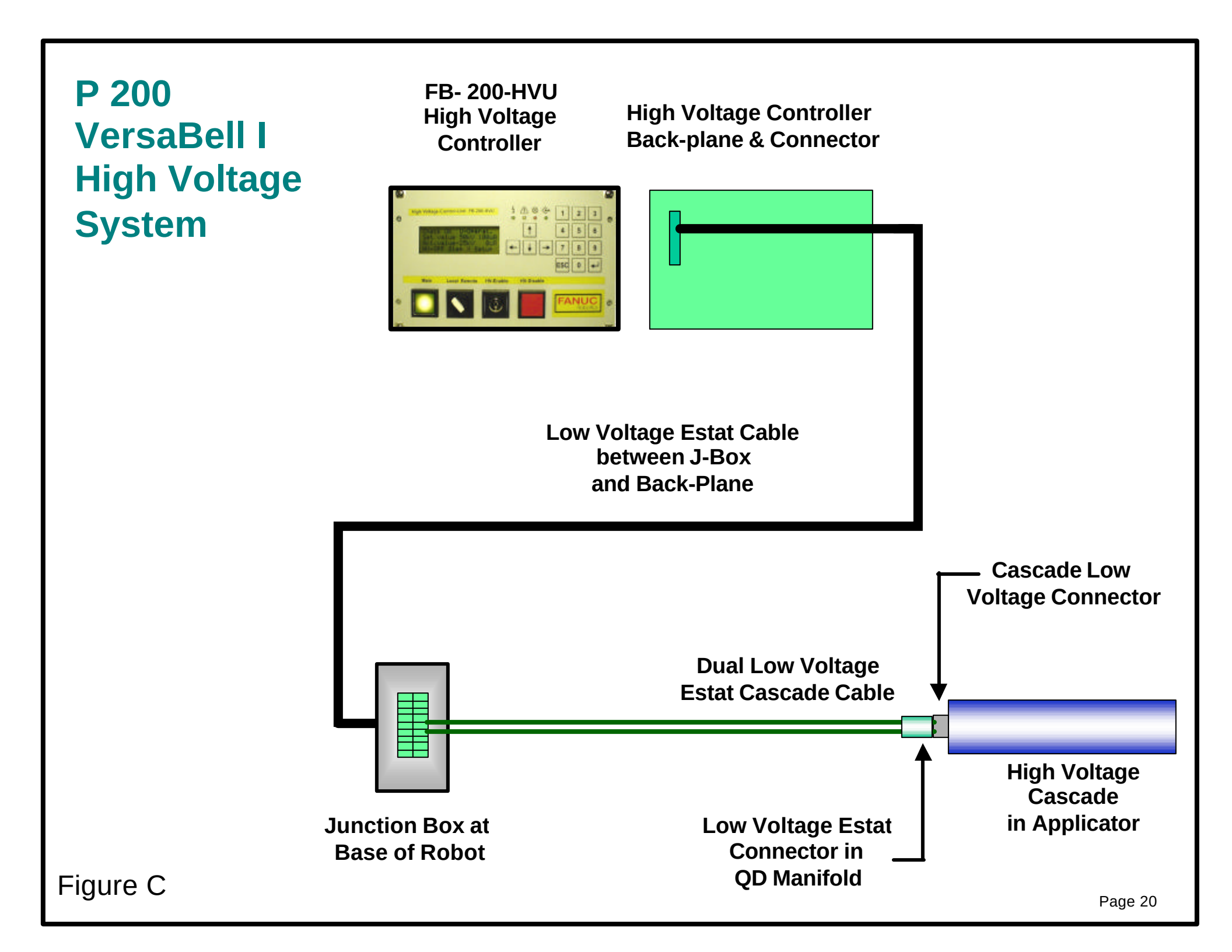

Figure C

ServoBell High Voltage System

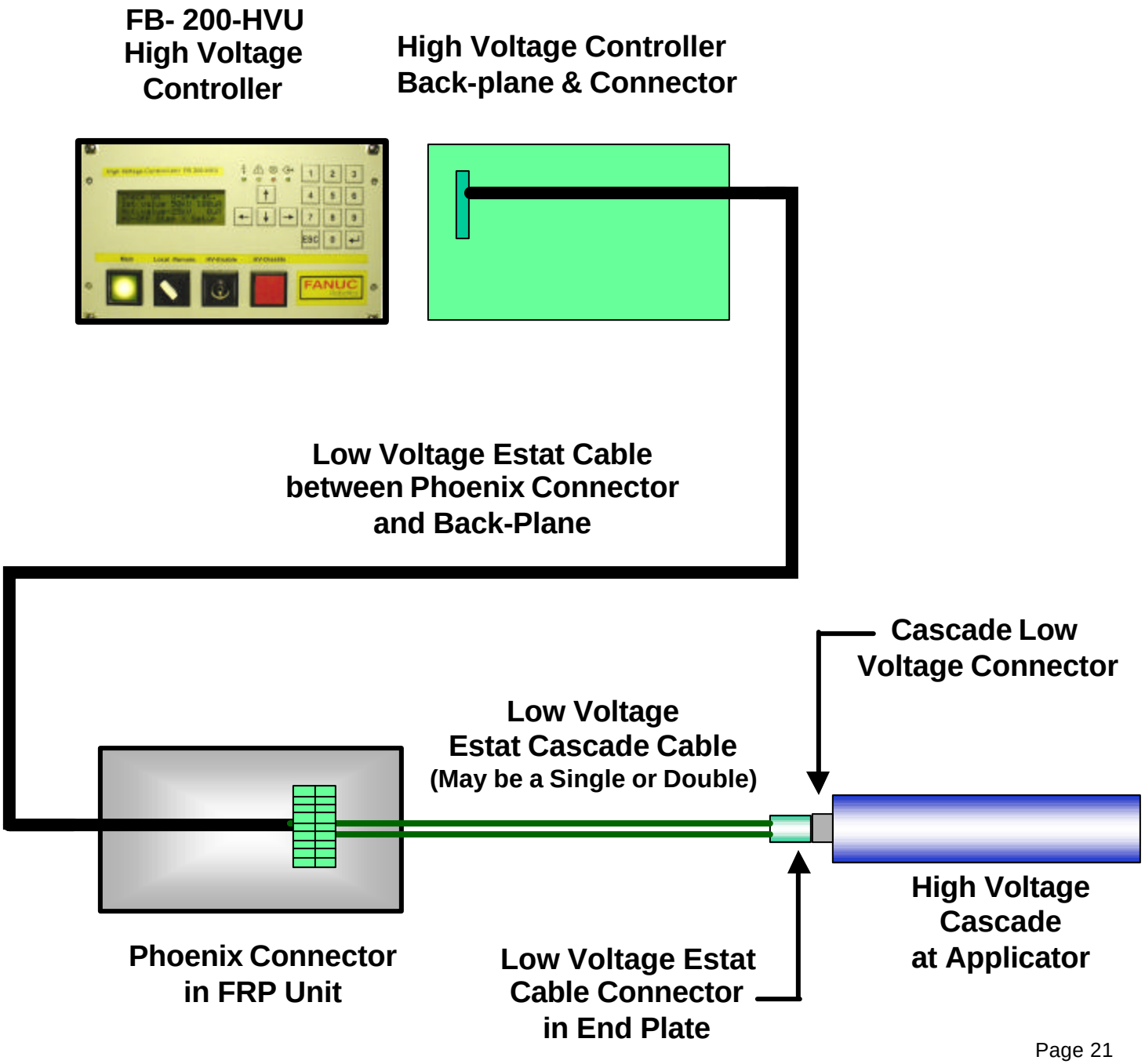

Figure D

P500 VersaBell II High Voltage System

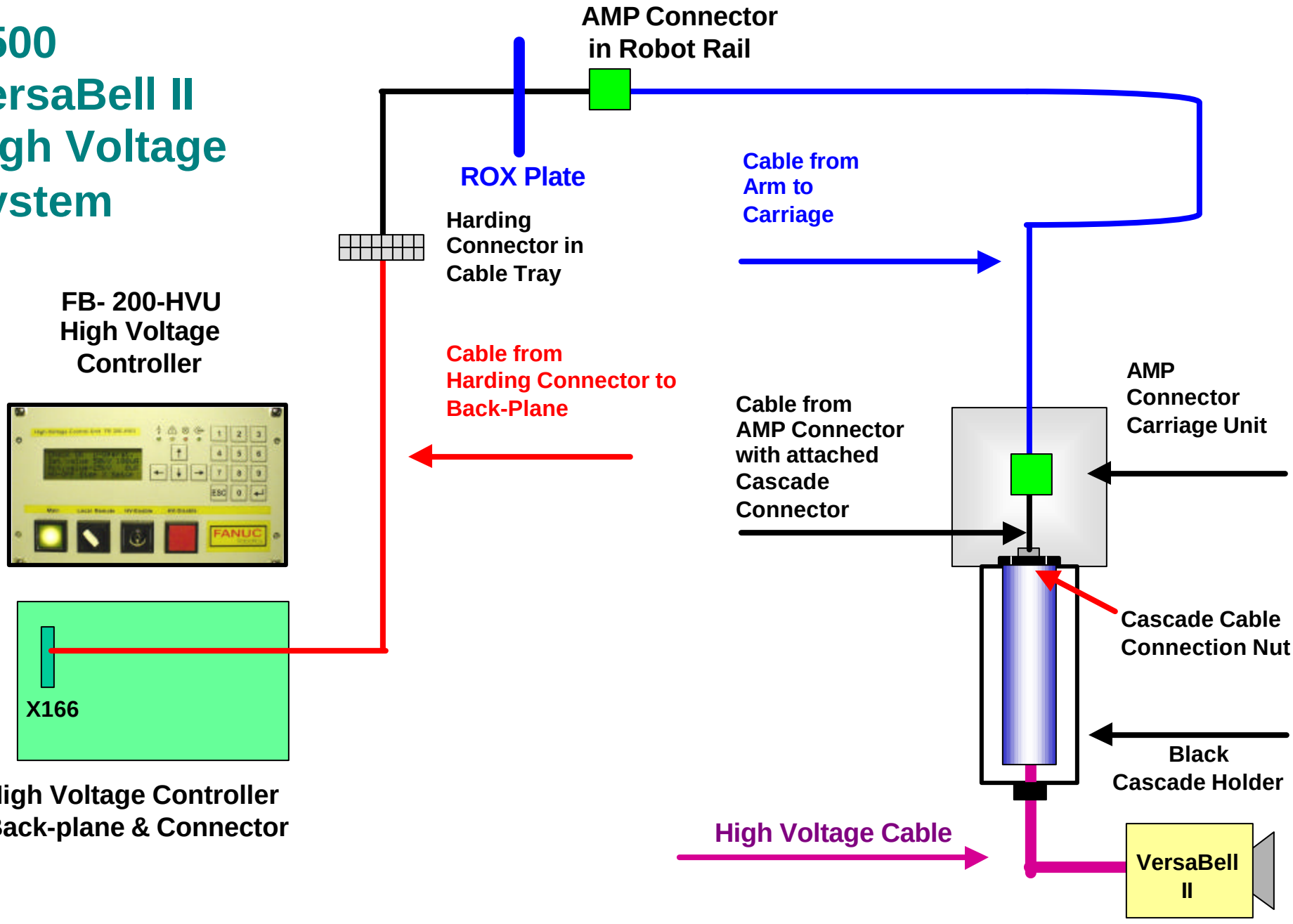

Figure E