




<b>NAME</b> Special Specification for: JEA Relay Panels		<b>CODE:</b> EE-23	<b>REV:</b> 2_20181010
<b>Company:</b> JEA		<b>Engineering Group:</b> System Protection and Control Projects 20413	
<b>AREA</b>	<b>DESCRIPTION</b>		
<b>Project Management</b>	This specification describes the requirements for equipment, wiring and construction of protective relays and control panels. All panels will be built according to the detail drawings of the plans. All notes in drawings (schematic, layout and wiring diagrams) will be considered as part of this specification.		
<b>Mechanical Engineering</b>	<div>1. The design, dimensions and manufacturing of panels must be as indicated in the structural diagrams supplied by the customer. Type of panel can be:</div> <div>a. Open Rack     30” W x 90” H x 27.125” D</div> <div></div>		

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b. Dual Panel 36" W x 90" H x 42" D



2. For Dual panels a grounding bar must be provided in each panel in the position specified by the structural diagram. The grounding bar must be mounted on the bottom of the panel as indicated in the structural diagrams of the customers. The ground bar size shall be 1/4" x 22.625" x 1" with 40-10/32" tapped holes. Additional ground bars shall be provided on both sides of the panel near the top opening for incoming wires 1/4" x 11" x 2" with 24-10/32 tapped holes. Each one of this ground bars shall be connected to the Bottom ground bus with cable

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	<p>10AWG.</p> <p>3. For Open Rack panels bottom ground bar must be provided, it shall be ¼” x 27 ½” x 1” with 27-10/32 tapped holes. All panels will have an opening on the two sides so that when panels are assembled in the control room, the ground buses of all the panels of a row can be connected by copper links using anodized nut bolts and spring washers. Plates with rubber gaskets will be used to block the sidewall openings of the panels (two in each row). Each panel will be supplied with its ground bus joining copper links and required hardware. Additionally, there must be a vertical ground bar on each side of the panel to be use for termination and grounding of all the incoming cable shields, it shall be ¼” x 78 ¾” x ½” with 38-10/32 tapped holes and shall be connected to the Bottom ground bus with cable 10AWG.</p> <div style="text-align: center;">   </div> <p>4. Plates to install ABB test blocks shall be manufactured by SEL to ensure color uniformity on panel front, they will always be 3RULo version.</p>	

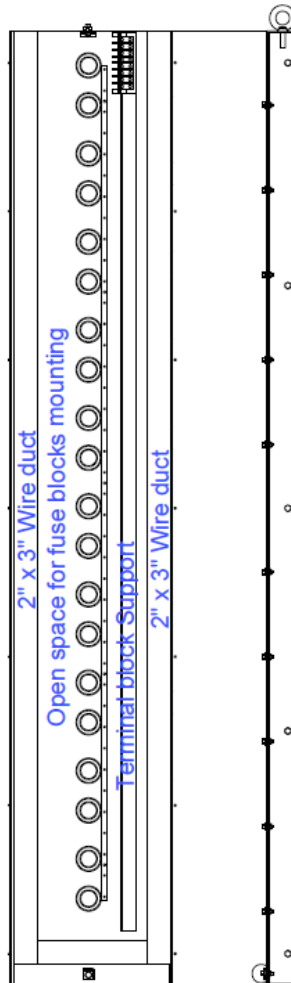
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5. All panels shall be mounted on sills made from inverted structural steel channel of suitable size. The panels mounted on the same sill shall be properly aligned with each other. All shipping sections shall be wired per JEA supplied wiring diagram and will be bolted together at the site to form one completely rigid assemblage. No more than two panels along with panel-to-panel interconnections shall be shipped together on a sill as a unit or a shipping section.
6. All control panels shall be constructed from 1/8" especially smooth cold rolled steel or 11 gauge hot rolled, pickled and oiled sheet steel. Panels shall be 90" high (not including the base channel), with other dimensions as specified in Panel Material List and on the attached drawings. The edges of the panels shall be rounded. All corners shall be welded and ground smooth to increase the rigidity and to improve the appearance. End plates shall be provided as necessary to cover all bolts and screws. Sufficient care will be taken in designing the panel door. Liberal stiffeners will be used to make the door strong and rigid. The door and hinges design shall take into account the existing load on the door with 100% margin for future additions. This design will ensure years of smooth operations of the door without any sagging, buckling, deformation and its ability to close and seal without any gap. The door operation shall be extra smooth to avoid miss-operation of sensitive relays due to vibrations and jerks. The doors shall be equipped with a mechanical latch to prevent accidental closure. All of these aspects of strength, rigidity and appearance shall be quality checked before shipping the equipment. Any structural modifications needed to any panels, after shipment to JEA sites, shall be made at the contractor's expense. The contractor shall reimburse JEA for all such modification/rectification expenses, as soon as JEA has incurred them. Panel doors shall open as specified in the Panel Layout Drawings.
7. The steel panels shall be thoroughly cleaned, given a rust prohibitive treatment, painted with a suitable rust-resistant primer followed by suitable numbers of light gray A.S.A. No. 61 (Munsell notation 8.3G6.10/0,54) finish coats.



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	<p>8. All panels shall be provided with internal PVC wiring channels with covers. All internal wiring shall be routed through these wiring channels. A 4 in. X 6 in. opening with gasket and a removable cover-plate shall be provided on each side of every panel at the top for inter-panel wiring (on dual panels only). A 4 in. x 3 in. wiring channel with cover shall be provided next to the terminal blocks on both sides of each panel for internal cable wiring. For the control cable containment, metal braces shall be welded to the sides of the panel to create a 4 in. X 12 in. space (for incoming wires), as shown on drawing TYP_DU_PAN_FAB / TYP_OR_PAN_FAB. For top / bottom cable entry two 4 in. X 24 in. openings with cover plates and rubber gaskets shall be provided on the left and right sides of the <u>top/bottom</u> panel of the switchboard. This panel will be reinforced to support the weight of the cables entering the panels. The top panel shall have welded supports for attachment of the inter-panel wiring. Cables will be entering from the top of the relay panels. All wires including wires to the door mounted equipment and sub-panel mounted equipment, which cannot be routed through the wiring channels, shall be neatly bundled into braided expandable sleeves.</p> <div data-bbox="521 995 1393 1575" data-label="Image"> </div> <p>9. All sub-panels shall be hinged at one end and will be constructed using 1/8 in. especially smooth cold rolled steel. It shall have welded stiffeners, per <a href="#">section 5.4</a> above to provide rigidity and improve appearance.</p> <p>10. The switchboards provided shall be constructed so that all meters, relays and control switches shall be located as per attached drawings. Where there is a conflict between locations of devices due to JEA drawings not being to scale or any other reason the contractor shall consult the project manager for clarification.</p>	

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	<p> <b>11.</b> Shrink fit rubber sleeves (minimum 2 layers) will be used to protect the delicate wires of a device running between the faceplate mounted outside of the panel to the part of device mounted inside of the panel. The sleeve will cover the portion of wires passing through the hole in the metallic door of the control panel. Care will be taken to locate these delicate wires so that the hard thick wires do not crush them.         </p> <p> <b>12.</b> For Open Rack and Cabinet Style panels each side wing must have enough space to install 1 line of terminals and one line of vertically mounted fuse blocks, grommets between the 2 lines are required for external connections. Space shall be enough to accommodate (29) 12-point terminal blocks plus (9) 4-pole CT terminal blocks (the actual numbers may vary and will be dependent upon the wiring diagram of the panel).         </p> <div data-bbox="774 884 1062 1860" data-label="Diagram">  </div>	



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	<p>13. Covers for cutouts for future devices must be provided.</p> <p>14. All test switches shall be ABB type FT-1 rack-mounted. These switches shall have an acrylic transparent cover to allow an inside view unless otherwise specified.</p> <p>15. The control panels shall be furnished completely wired.</p> <p>16. No splicing of wire used in panel wiring is permissible.</p> <p>17. DC control buses, ground bus, and potential buses shall be provided in accordance with good engineering practice and standards.</p> <p>18. No more than two (2) wire lugs shall be terminated on any one terminal or stud of a device.</p> <p>19. All terminal blocks referred to shall be Buchanan type B-112, or Marathon. Terminal blocks mounted vertically at the sides of the panel shall be offset at a 45-degree angle to facilitate accessibility for wiring.</p>	

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**Electrical Engineering**

1. There is no Special Spec required relays.
2. FT-19 test blocks shall be ordered without mounting plate. For example, if BOM list FT19 (FRX08300100) numbers to be ordered are:  
  
 For position "A" R837A407G01 (without cover)  
 For Position "B" & "C" R129A501G01 (without cover)  
 Full Length Cover w/thumb nuts 9676A28g01
3. JEA wish to have all ET-16 lamps with transparent caps, however red and green models request Translucent Cap. Ensure order models are the ones on the far right column (for red and green).

0116B6708G3C TRANSPARENTE	LC GE ET-16 125VCD	CLEAR TRANSPARENT	
0116B6708G3R GE ET-16	IDICATING LAMP INCAND.	RED TRANSLUCENT	0116B6708G3E
GE ET-16 0116B6708G3G	IDICATING LAMP INCAND.	GREEN TRANSLUCENT	0116B6708G3D
0116B6708G5C 120 VCA	LAMPARA GE TIPO ET-16	CLEAR TRANSPARENT	
0116B6708G7C 70VCA,750OHM	LAMPARA GE TIPO ET-16	CLEAR TRANSPARENT	



4. All switches shall be provided with on mounting screws so that the switches are flush with the panels. All switches shall have engraved escutcheon plates or labels showing function (i.e., Trip, Close, On, Off, etc.) and device and/or breaker number. These labels shall be in accordance with "System Relay Standards" drawing TYP\_CS.
5. The control switches for the circuit breakers, circuit switchers, and motor operated switches shall be equipped with pistol-grip handles and shall be of the pullout type (switches shall pull straight out from normal). The control switches' escutcheon plates shall have red and green flags to indicate the last



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operation of the control switches. In the operating position, they shall provide for local control and indications of the equipment. In the pull-out position, they shall provide for supervisory control of the equipment served. In the supervisory position, local indication shall be in operation, but local control shall be disconnected. Unless otherwise stated, General Electric Company type SB-10 shall be used. The only exception 25kV breaker switches will have is as following: The 25kV control switches for the breakers shall not be of pullout type..

NP SEL	Actual Model	Engraving	Application	Right model
150-08029	376A1127G1X2	TITLE: PULL OUT FOR SUPV 10:30hrs POS = TRIP 1:30hrs = CLOSE	Breaker contro Switch for breakers above 25 KV	376A1127G1X2
150-08031	16SB10127A7118G1X16	TITLE: PULL OUT FOR SUPV 10:30hrs POS = RAISE 12hrs POS = OFF 1:30hrs = LOWER	OLTC control switch	16SB10127A7118G1X2
150-01898	16SB1AB300SSS16L	TITLE: BREAKER CONTROL 10:30hrs POS = TRIP 1:30hrs = CLOSE	Breaker control switch for breakers on 25KV	16SB1AB300SSS2P

6. For “BUILD” projects Panel Manufacturer is responsible for providing markups for wiring diagrams under the as-built version incorporating all changes approved by the customer that was generated during the construction of the panel.

7. For “Partial” projects following workflow is expected (*refer to [Appendix A for Engineering Procedures](#)*):

- JEA shall provide Panel Manufacturer with AC, DC schematics such that with panel to panel cable designations, JEA panel to panel wiring (e.g. P1P2/CX) shall be filled out by the Panel Manufacturer during the development of wiring diagrams.
- Each relay type (Primary, Secondary, Breaker failure) would have its own set of control cable as stipulated by JEA cable standard being provided as a part of this document. Panel Manufacturer shall keep counts of panel to panel cable used and update the Microsoft Word Document.
- Once wiring diagrams have been developed, Panel Manufacturer will transmit wiring diagrams and updated AC, DC prints (filled with updated terminal block notations, device designations and cable designations) to JEA’s Project Manager in Microstation format and updated cable schedule in Microsoft Word format.



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	<p>d. JEA’s Project Manager shall be responsible for providing approvals and feedback.</p> <p>e. Once, approval from Project Manager has been received, Panel Manufacturer will commence wiring of the panels</p> <p>f. During wiring of the panel if any changes to previously approved drawing and cable package are required, Panel Manufacturer shall inform JEA Project Manager. JEA Project Manager shall be responsible to provide approval to above changes.</p> <p>g. Once, approval is received from JEA Project Manager, Panel Manufacturer shall proceed with approved changes and provide JEA with updated electronic Microstation drawings. Therefore, both JEA and Panel Manufacturer will have most up to date design drawings at all times.</p> <p>h. There shall be communication between JEA Project Manager and Panel Manufacturer during every step of wiring and point to point testing process.</p> <p>i. Imeson substation (MX160097) shall act as a terminal block, device designation “go-by” for open rack design.</p> <p>j. Cecil North Substation shall act as a terminal block, device designation for Dual cabinet style design</p> <p>k. JEA drawing legend: Red = Addition; Hatched Yellow: Removals</p> <p>l. JEA shall provide test switch name plate info within four (4) or five (5) weeks after issuance of PO.</p> <p>m. System Protection &amp; Controls Project 20413 Manager, Darrell Hamilton shall be copied on all correspondences during the life-cycle of above mention process between JEA and Panel Manufacturer.</p> <p>8. Ensure that all equipment that have two ground connection points (Chassis and Power) are shown in the wiring diagram in order to be wired in manufacturing.</p> <p>9. The following standards and procedures have been adopted in preparing the diagrams, furnished to the contractor by JEA with the exception of panel wiring diagrams, for the purpose of manufacturing the control panel. As an example, drawing TYP-W1 and TYP-W2 are attached.</p> <p>10. <u>PROCEDURES FOR DEVICE DESIGNATION</u></p> <p>a. List termination as shown on the example drawings provided.</p> <p>b. Label devices by levels.  Ex.: Level 1: “AB,” “AC,” “AD”...  Level 2: “BA,” “BC,” “BD” ...and so on.....Letter “R” as first</p>	

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	<p>character are reserved for resistors</p> <p>c. Do not use double letters for devices. Ex: Do not use “AA,” “BB,” “CC,” “DD” etc...</p> <p>d. Do not use “I,” “O,” or “Z” as a letter to designate the devices. Ex: Do not use “AI,” “AO,” “OA,” “ZA” etc...</p> <p>e. Delete the device label “GB” (it is reserved for Ground Bus).</p> <p>f. List each termination on a device separately. Ex.:AB 1-AC1 1-AC2 1-AC3 And not like AB 1-AC1, AC2, AC3</p> <p>12. Fuses shall begin with FU1.....FU16</p> <p>13. Each pot light shall be given a separate device label. All other lights associated with devices shall share the devices’ label and be designated by the light’s color. (See “CA,”“DA” and “HA” on TYP-W1).</p> <p>14. Devices on the sides of panels shall be labeled in such a way as to continue the sequence of the device labels around the panel, so that no label is repeated. On dual panels the same procedure shall be followed for devices on the back panel.</p> <p>15. Ground Bus shall be designated as “GND BUS” (see TYP-W2). Terminal blocks for landing control cable shields shall be identified as “shield wire bus.”</p> <p>16. Panel to panel wires shall go from terminal blocks only and not directly from devices and shall be listed by the destination’s panel number/terminal block number.</p> <p>17. The drawing numbers will comprise of 3 upper case characters followed by two digit numbers written in the following style. AAXNN</p> <p>The first two characters (AA) of the drawing number designate the substation and will be "BB" for Brandy Branch Substation. The third character (X) will be selected from the following list:</p> <table><tr><td>A</td><td>For AC Schematic Diagrams, Three Line Power Diagrams</td></tr><tr><td>D</td><td>For DC Schematic Diagrams</td></tr><tr><td>I</td><td>For Interconnection Diagrams</td></tr><tr><td>L</td><td>For Layout and General Arrangement Drawings</td></tr><tr><td>M</td><td>For Equipment (excluding control panels) Manufacturer’s Drawings</td></tr></table>			A	For AC Schematic Diagrams, Three Line Power Diagrams	D	For DC Schematic Diagrams	I	For Interconnection Diagrams	L	For Layout and General Arrangement Drawings	M	For Equipment (excluding control panels) Manufacturer’s Drawings
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Building Community.

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	S      For Single Line Diagrams W      For Wiring Diagrams The project manager will sequentially allot a two-digit number (NN). The practice of using sheet numbers with same drawing number will not be adopted under any circumstance.		




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<b>Miscellaneous Details</b>	<ol style="list-style-type: none"> <li>1. Miscellaneous items, such as fuses, test blocks, and nameplates and other identification means shall be provided in accordance with good industry practice and as required to build the circuitry as given in the AC and DC schematic diagrams to be supplied by JEA to the successful bidder.</li> <li>2. Indicating lights for each circuit breaker shall be provided as follows: <ol style="list-style-type: none"> <li>a. Red to indicate closed position and monitor trip coils (one for each trip coil).</li> <li>b. Green to indicate open position.</li> <li>c. Blue to indicate low air / breaker trouble.</li> <li>d. White to indicate an alarm on relay.</li> </ol> </li> <li>3. The contractor shall provide a copy of the completely filled “GE Specification form GED-3934-Part1” for all GE SB-1, SB-9, &amp; SB-10 switches along with the Bill of Material as stated in section 12.3.</li> <li>4. Space heaters shall be furnished within each switchboard cubicle of sufficient capacity to prevent condensation. Heaters shall be mounted at least 10 inches from the floor and away from wiring or electrical equipment, so the heaters will have no adverse effect on the life and ratings of wiring and equipment of the switchboard. Space heaters shall be mechanically and electrically protected and thermostatically controlled. Space heaters shall be provided with grid guards to prevent wiring from getting close to the heating surfaces. In no case shall the space heater be mounted on the floor of panel.</li> <li>5. For a substation with one battery bank, each panel shall be wired to accept only one single point incoming supply at 125VDC and one single point supply of 120VAC. For a substation with 2 battery banks, a panel may have two sets of DC input terminals. This will be clearly indicated in the wiring drawings to be supplied by JEA.</li> </ol>	
<b>Manufacturing</b>	<ol style="list-style-type: none"> <li>1. Internal wiring shall be routed through wire duct.</li> <li>2. All internal wiring Shall be AWG #12, tinned copper, 65 strands rated for 600V, 90°C, gray color, SIS cable.</li> <li>3. All wiring termination shall be made with ring-type un-insulated lugs only and must have tag on each end. The tag shall indicate on the first line the terminal</li> </ol>	


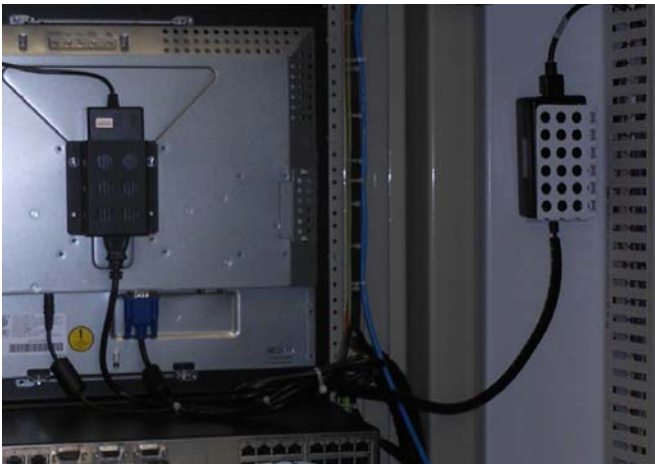


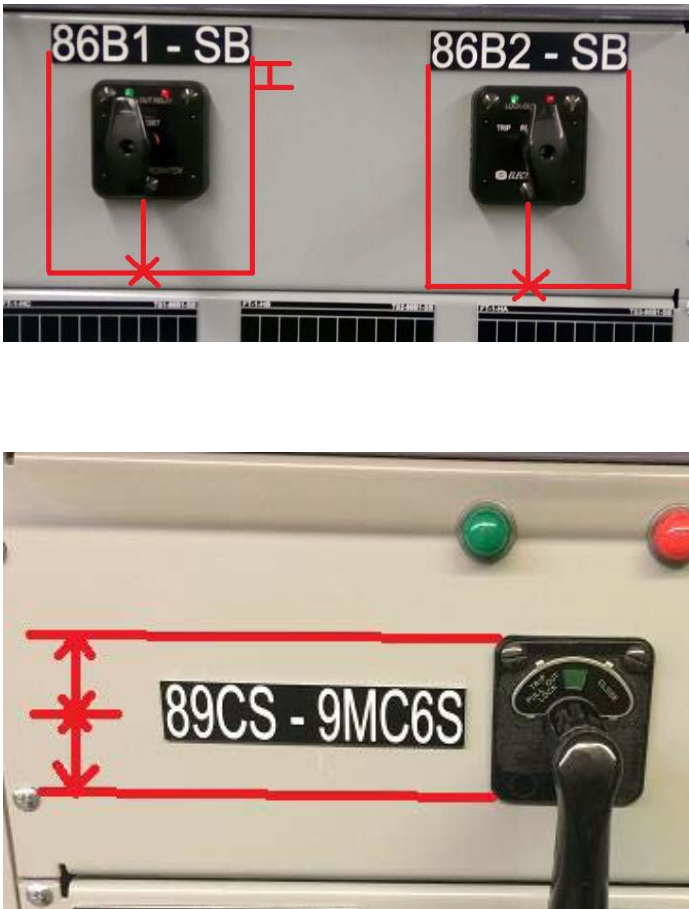
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	<p>number to which this end of wire is attached. The second line shall indicate the terminal number to which the remote end of the wires is connected.</p> <p>4. All the cables / wires connecting the devices on the door of the panel shall be protected by “flame retardant, Polyethylene Terephthalate (PET) braded expandable sleeve.” The sizes of these sleeves will be selected liberally to provide 50% space for future cables / wires. A minimum of one sleeve will be used for each protective relay and each lockout relay. To avoid any tension in the wire / cables and the terminals of the device on the door, enough slack will be provided in the wires. The two ends of the sleeve will be anchored to the panel fixed portion / panel door. To do a proper and clean job, the sleeves will be cut and sealed by the special tools provided by the manufacturer.</p>  <p>5. Care will be exercised in routing the panel wiring so that it does not pass near or over a heat emitting device like current limiting resistors, space heaters, incandescent lamp, etc.</p> <p>6. Four copies of instruction and operating manuals of all the items of furnished equipment, will be furnished by the contractor, and are considered an essential part of the requirements of this specification.</p> <p>7. External Nameplates shall be manufactured according with the size required on customer information, white letter on a black background. Affix to panel front with galvanized screws. Internal nameplates shall be manufactures according with size specified in costumer information, black letter on a white background, affix by adhesive. Nameplates for terminal boards shall be fix by means of screws, as showed.</p>	

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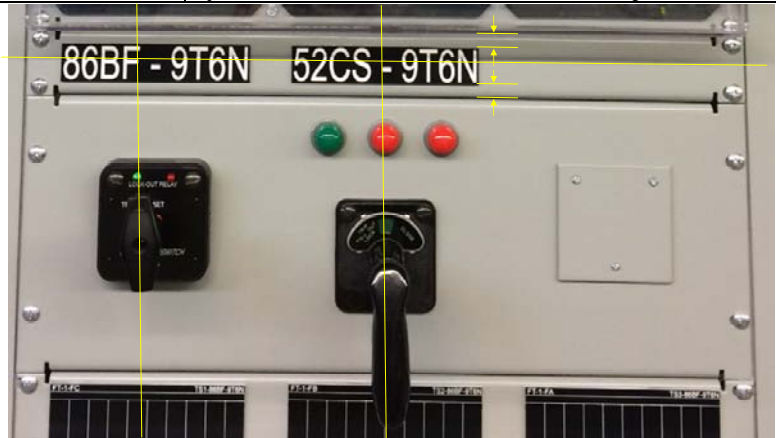
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<b>Mechanical Assembly</b>	<p>1. AC/DC converter for monitor or any other devices that requires such type of power sources must be installed on a special support, never inside the wire duct. This special support shall be screw / bracket solution to the panel body at the location shown below. Screw/bracket solution shall not protrude to panel front side.</p> <p><b>Note:</b>          JEA will consider the following modified power bracket solution as follows.</p> <ul style="list-style-type: none"> <li>* Bracket cannot be welded as the support is made of aluminum and the cabinet is of CRS and these materials cannot be welded.</li> <li>* In case the power brick needs to be replaced it is easier to remove it from its cage</li> </ul> <div style="text-align: center;">   </div>	

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	<p>2. Nameplate alignment shall be as follows: Each Control Switch, Lockout Relay, Test Switch, etc. will establish a midline Centerline. Nameplates will be centered according the center line of the device they represent. All nameplates shall follow a uniform justification from the left and right retima.</p> <div style="text-align: center;">  </div>	



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3. Alarm received indication nameplate shall be offset 1/2" to the left of the Alarm Received indicating light.



4. Shark meter test switch and test switch name plate shall be right aligned similar to the remaining of the test switches as shown below. Such that they have a uniform appearance from the right retina plate.

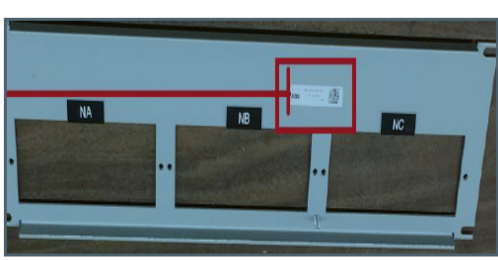
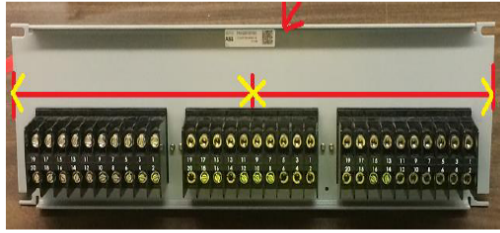



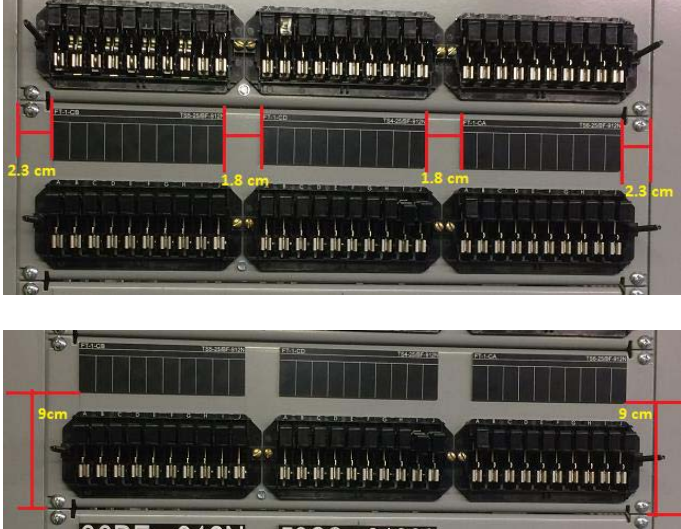

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	5. Controls Switch should be uniformly labelled with the Electros witch Lockout Relay. Below is a picture of incorrect levelling:	

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6. In cases when the main equipment obstructs the opening of the switches or the placement, removal of fuses, must be relocated to allow a free operation/access of this equipment and it must be first consulted with the electric project leader in charge.
7. For assembly of 97's equipment (Relay ON-OFF) #10 washers must be used between the sheet and the cover of the switch. See figure:
8. Should be placed duct Panduit of at a minimum distance of 1.5 inches of terminal blocks. See figure:
9. Front nameplates should be supplied when as indicated in the FMIN-04 and we have nameplate information posted in the first section of project. Internal nameplates will be made with the brand label Kroy and will be conducted per the wiring diagram.  
For test switch we should consider white nameplates as showed in the next

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	<p>image.</p> <p>10. Text and all tags must be minimum 8 size.</p> <p>11. Nameplates in ABB relays should place on the top of the equipment as shown: Terminal blocks should only take the function where wiring diagrams indicate it is not necessary to indicate numbering.</p> <p>12. All equipment should be measured and installed with reference to each other (i.e. – center line).</p> <p>13. Panel manufacturer logo stickers are not to be affixed to the panel front</p> <p>14. Label on FT19 test block plates shall be removed from original to the plate manufactured by SEL and located according to this image.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>15. Internal test block nameplate shall be center aligned and 1/16” above it.</p> <div style="text-align: center;">  </div> <p>16. External test block nameplates shall be installed according these images.</p>	

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	<div style="text-align: center;">  </div> <p>17. Special attention shall be paid to keep nameplates horizontally lined up, especially regarding test blocks nameplates.</p> <div style="text-align: center;">  </div>	



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	<div data-bbox="542 409 1313 798" data-label="Image">  </div> <p data-bbox="461 871 1516 947">18. All front 19" plates should have bended edges. All plates should be mounted and centered with adjacent plate slots aligning properly.</p>	

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<b>Testing</b>	<div><div>1. All equipment shall be designed, manufactured and tested in accordance with the latest published standards of the IEEE and NEMA.</div><div>2. Insulation test is required.</div><div>3. Power on test: This test will subject rated voltages and currents to all continuous rated electrical items (such as aux.-relays, indicating lamps, meters, protective relays, communication modules, switches, etc.) mounted in the panel or supplied as loose items, for at least one continuous 24-hour period. In this test the PT and CT circuits will also be energized with equivalent voltages and currents for the said continuous 24-hour period.</div><div>4. Functional test: This includes functional check of each circuit.</div><div>5. In case of a failure, the contractor shall replace/modify/repair the items that have failed to pass the test. In case of wiring mistake, the contractor shall make any necessary changes in the wiring of the circuit. The test under which the equipment/item has failed will be repeated and the final test results will be submitted to JEA.</div></div>		
<b>Cleaning, Package and Shipment</b>	<div><div>1. When for any reason there are loose items that needs to be shipped with the panel they must be properly packed in an independent pallet. Pack must include a detailed list of all material included.</div><div>2. Each crate will be marked boldly in red with the following label: The crates for the Panels and their associated loose items will be labeled “FOR XXXXXXXX SUBSTATION”, where XXXXXXXX stands for station name.</div><div>3. Panel manufacturer logo stickers are not to be affixed to the panel front</div></div>		