

**ADDENDUM NUMBER 1 TO INSTALLATION MANUAL  
AE/LZT 123 3264/1, Rev.C**

**GENERAL**

This addendum corrects documentation errors in the Low Band Orion Base Station Installation Manual, AE/LZT 123 3264/1, Rev. C. The changes to the manual are as follows:

**INFORMATION**

The Grounding Guidelines & Practices Manual LBI-39067 referenced in this manual has been replaced by the Site Grounding and Lightning Protection Guidelines Manual, AE/LZT 123 4618/1. In the event of a conflict, the information presented in AE/LZT 123 4618/1 takes precedence over any text, graphics, and/or references cited in this manual.

These references can be found on:

**Page 6**, Equipment Room Grounding





# M/A-COM Low Band Orion™ Base Station

## INCLUDES

**Title**

Standard For Site Grounding And Protection .....

**Publication**

AE/LZT 123 4618/1

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**NOTE**

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user’s authority to operate the equipment in addition to the manufacturer’s warranty.

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## **IMPORTANT SAFETY INFORMATION**

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specified warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. M/A-COM, Inc. assumes no liability for the customer's failure to comply with these standards.

1. **SAVE THIS MANUAL** - It contains important safety and operating instructions.
2. Before using this equipment, please follow and adhere to all warnings, safety and operating instructions located on the product and in the manual.
3. **DO NOT** expose equipment to rain, snow or other type of moisture.
4. Care should be taken so objects do not fall or liquids do not spill into the equipment.
5. **DO NOT** expose equipment to extreme temperatures.
6. **DO NOT** use auxiliary equipment not recommended or sold by M/A-COM. To do so may result in a risk of fire, electric shock or injury to persons.
7. **GROUND THE EQUIPMENT** - To minimize shock hazard, the station equipment cabinet must be connected to an electrical ground.
8. To reduce risk of damage to electrical cords, pull by plug rather than cord when disconnecting a unit.
9. Make sure all power cords are located so they will not be stepped on, tripped over or otherwise subjected to damage or stress.
10. An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, ensure:
  - a) The pins on the plug of the extension cord are the same number, size and shape as those of the plug on the power supply.
  - b) The extension cord is properly wired, in good condition, and
  - c) The wire is large enough for the AC ampere rating of the unit.
11. **DO NOT** operate equipment with damaged power cords or plugs - replace them immediately.
12. **DO NOT** operate this product in an explosive atmosphere unless it has been specifically certified for such operation.
13. To reduce risk of electric shock, unplug unit from outlet before attempting any maintenance or cleaning.
14. **DO NOT** operate this product with covers or panels removed. Refer all servicing to qualified service personnel.
15. Use only fuses of correct type, voltage rating and current rating as specified in the parts list. Failure to do so can result in fire hazard.
16. **GROUNDING AND AC POWER CORD CONNECTION** - To reduce risk of electrical shock use only a properly grounded outlet. The system components are equipped with electric cords having equipment grounding conductor and a grounding plug. Be sure all outlets are properly installed and grounded in accordance with all local codes and ordinances.
17. **DANGER** - Never alters the AC cord or plug. Plug into an outlet properly wired by a qualified electrician. Improper connection or loss of ground connection can result in an electrical shock.
18. **ELECTROSTATIC DISCHARGE SENSITIVE COMPONENTS** - This station contains CMOS and other circuit components, which may be damaged by electrostatic discharge. Proper precaution must be taken grounded wrist straps should be used at all times when handling circuits modules.

## INTRODUCTION

This manual is a guide to field installation and test of a M/A-COM Low Band Orion™ Base Station. It contains complete instructions for the assembly and installation. This process is accomplished by first installing a 110 Watt, low band Orion mobile radio into the base station panel. Then install the station panel in a 37-inch cabinet/rack. And finally, install of the Low Band Orion Base Station at the station site.

The Low Band Orion radio used in this application is designed for continuous duty at 110 watts. This radio as well as the 37-inch cabinet is available separately from M/A-COM's Service Parts.

Included in this manual are mounting instructions for the radio, as well as instructions for making the required cable connections.

Installation is made easy with the help of Installation/Assembly and Interconnection Diagrams, included as part of this manual.

## UNPACKING AND CHECKING EQUIPMENT

Hardware kits 344A3450G1, G2 & G5 are used to assemble the base station (*Refer to the Installation/Assembly Diagrams, Fixed land cabinet*). Any unused material was shipped with the station. Remove the kit and store for possible use.

Installation of the Low Band Orion Base Station includes three parts:

1. Installation of the Mobile Radio in the station panel assembly using Hardware Kit 344A3450 (*supplied*).
2. Installation of optional boards in the Base Station Panel Assembly, in accordance with options selected. Remote Interface Board Option, with one of the following remote boards:
  - DC Remote Board
  - 4 Channel Tone Remote Board
  - Standby Power Transfer Option
3. Installation of the Base Station in the place of operation with the necessary power, antenna, microphone and line connections.

## INSTALLATION OF RADIO IN STATION

### PREPARATION OF THE STATION

The following procedure is to be followed when an Orion Low Band Radio has **NOT** already been installed in the base station enclosure. If the radio has already been installed disregard the following procedure. Refer Maintenance Manual AE/LZB 119 3218 for Base Station Assembly Interconnection Diagram.

#### Procedure:

1. Remove and save the four (4) TORX® screws, holding the top cover on the base station enclosure. Remove the top cover by lifting straight up to allow clearance for the air-channel, a metal attachment to the top cover.
2. Remove and save the four (4) V TORX screws, holding the bottom cover on the base station. Remove the bottom cover.
3. On the bottom side, disconnect cable W2 from J202 and J215 on the Interconnect Board. This is to allow slack in the cable making it easier to connect the other end to the control unit and the radio.
4. On the top side, remove the side rails from the base station enclosure by removing the TORX screws holding the two side rails in place.
5. Using a TORX screwdriver, disconnect the high current Power Cable from the terminal block at power connector P3.
6. When external wires for options are to be connected, remove and discard the round knockout button in the rear of the station panel. Insert rubber grommet 549040P10 in the hole. Place cable clamp 344A3480P1 around the wires. Snap the cable clamp retainer into the hole adjacent to the grommet.

### INSTALLATION OF THE CONTROL UNIT

1. Using hardware provided, connect the control unit mounting bracket to the control unit.
2. Place the control unit in the opening provided in the station enclosure.
3. Position the holes in the mounting bracket over the mounting holes in the station enclosure.
4. Secure the control unit assembly to the enclosure using the screws provided in the hardware kit.

5. Plug control unit cable connector P3 into connector J3 of the control unit.
6. Using a 5 mm open-end wrench, tighten the cable fastening screws to secure the cable connection to the control unit.

## PREPARATION OF THE RADIO

1. This Low Band Orion Mobile Radio has been designed for continuous duty at 110 Watts. No other special modifications are required for the radio.
2. Attach the side rail mounting brackets, removed from the base station enclosure in step 4 above, to the sides of the Orion mobile radio with four (4) mounting screws (*2 per side*) in the sides of the radio. Use the hardware included in the hardware kit provided.

## INSTALLING THE RADIO

1. Connect the control cable to connector J1003 of the radio unit.
2. Using a small flatblade screwdriver, tighten the cable fastening screws to secure the cable to the radio.
3. Connect the high current power cable connector to J1002 of the radio unit.
4. Using a small flatblade screwdriver, tighten the cable fastening screws to secure the cable to the radio.
5. Connect and tighten connector P1001 of base station antenna cable W1 into the RF TNC connector on the radio.
6. Align the mounting holes in the mounting bracket side rails over the mounting holes in the station enclosure. Secure the bracket and radio unit with the screws removed earlier.
7. Observing polarity, re-connect the Black and Red high current leads of the power cable to the terminal block at Power Connector P3.
8. On the bottom side of the base station, connect P202 of cable W2 from the radio to J202 on the Interconnect Board. Also connect P215 to J215.
9. Replace bottom cover using screws removed earlier.
10. On the top side of the base station, position the air-channel of the top cover over the heat sink of the Orion Mobile Radio and replace the top cover using screws removed earlier.

## BASE STATION ASSEMBLY

The Low Band Orion Base Station assembly (KRD 103 139) is installed in a 19D902838P1 37-inch cabinet and uses only 5 rack units of space. The station rack-up has three possible configurations:

1. Orion Low Band Transmit/Receive Base Station in a 37-inch high indoor fixed land cabinet. Assembly Instructions for this basic combination is provided on Station Installation Diagram 1531-HRB 104 24, Sheet 1.
2. Orion Low Band Transmit/Receive Base Station with Automobile Battery Emergency Power in a 37-inch high fixed indoor fixed land cabinet. Assembly Instructions for this combination is provided on Station Installation Diagram 1531 HRB 104 24, Sheet 2.
3. Orion Low Band Transmit/Receive Base Station with Emergency GEL Cell Battery shelf and Battery Charger in a 37-inch high indoor fixed land cabinet. Assembly Instructions for this combination is provided on Station Installation Diagram 1531 HRB 104 24, Sheet 3.

Internal cabinet wiring for the three combinations is provided by Interconnection Diagram 193 13-HRB 104 24.

Instructions for cabinet hardware assemblies is provided on Station Installation Diagram 1531 HRB 104 24, Sheet 4.

## INSTALLATION OF STATION AT SITE

### EQUIPMENT ROOM GROUNDING

Proper grounding procedures should be observed in order to protect equipment and service personnel from lightning and other sources of electrical charges. All cabinets, lighting arrestors, and associated equipment should be connected to a common grounding point that is provided as a part of the building and/or tower structure. This common grounding point must be within twenty-five (25) feet of all cabinets (*or ground buses*) and it should have impedance of less than five (5) ohms to earth ground.

Insulated 6-gauge copper wire should be used between each cabinet and the common ground point or ground bus. If ground busses are used in a multiple cabinet installation, insulated 4-gauge copper wire should be used between each ground bus and the common ground point. All ground bus-to-common ground point

connections should be twenty-five (25) feet or less. For additional grounding recommendation, refer to manual *Standard for Site Grounding and Protection*, LBI-39067.

## **ORION BASE STATION**

### **AC Power**

The Base Station power supply must be connected to AC power with the fused and ON/OFF-switched AC power cable found at the back of the station assembly. The transformer straps of the power supply are shipped set for a 120 VAC power source:

120 Volts AC  $\pm$  10%, Single-Phase, 50/60 Hz, 4 amps, 500 watts.

Refer to Power Supply Maintenance Manual LBI-38550 for procedures to change the transformer straps to accommodate a 240 Volt power source:

240 Volts AC  $\pm$  10%, Single-Phase, 50/60 Hz, 2 amps, 500 watts.

Different station power supplies may have different current capabilities. Refer to the applicable power supply maintenance manual for current usage.

### **Microphone**

A Desk Top microphone or a standard mobile microphone can be used. The microphone connects to the Base Station at microphone connector J101 on the base station Front panel, between the control unit and the front panel controls.

### **Antenna**

A 50-ohm antenna is required. It should be connected through coax cable to the Type N connector mounted in the rear wall of the base station panel.

#### **CAUTION**

The Base Station may not operate properly with the antenna mounted near the radio. Always mount the antenna at least five (5) feet from the station.

## **ADJUSTING THE REMOTE OPTION**

### **Equipment Required**

1. AC Voltmeter with dBm scale

2. Audio Generator
3. Deviation Monitor

### **Receive Audio**

1. Remove the four (4) screws holding the bottom cover on the base station assembly. Remove the bottom cover.
2. Apply a 1000 Hz tone with a  $\pm$  3kHz deviation to the station receiver that is strong enough to fully quiet the receiver.
3. Adjust:
  - a. **DC Remote Control Board 19A704686P3** - Set potentiometer R2 for 0 dBm at J1-1 & J1-4.
  - b. **Tone Remote Control Board 19A704686P6** - Set potentiometer R35 for 0 dBm at J1-3 & J1-4.

### **Intercom Audio**

1. Apply 1000 Hz at 30 millivolts RMS to Microphone jack J101.
2. Turn Intercom switch ON.
3. On Remote Interface Board 19D901931G, set potentiometer R323 for 0 dBm at:
  - a. J1-1 & J1-4 on DC Remote Control Board 19A704686P3.
  - b. J1-3 & J1-4 on the Tone Remote Control Board 19A704686P6.

### **Tx Mic Audio**

1. Apply a 1000 Hz tone at 120 millivolts into the microphone jack of the Remote Controller with the largest line loss (*usually farthest from the station*).
2. If the mobile will not key from the remote and/or the Remote SF functions do not work, on Tone Remote Control Board 19A704686G6 - Adjust potentiometer R59 until they do.
3. On DC Remote Control Board 19A704686G3 - Set potentiometer R1 for the proper deviation.
4. On Tone Remote Board 19A704686G6 - Set potentiometer R60 for the proper deviation.

For detailed instructions, refer to the applicable maintenance manual for the board being adjusted. The audio levels on the Remote Board must be adjusted first, before the two intercom level adjustments can be made on the Remote Interface Board.



**Speaker Level**

1. After the Remote Board is set up so that the remote consoles are transmitting and receiving properly with the base station radio, adjust the intercom levels on the Remote Interface Board by adjusting potentiometer R325 for the proper station speaker level from the remote console microphone.
2. Replace the bottom cover and the four (4) screws holding the bottom cover on the base station assembly.

**INSTALLING THE KEYPAD BOARD OPTION**

1. Remove the four (4) screws holding the bottom cover on the base station assembly. Remove the bottom cover.
2. Mount the keypad Board onto the Interconnect Board, plugging it in so that P207 and P208 seat

directly on the horizontally oriented pins of J207 and J208 on the Interconnect Board.

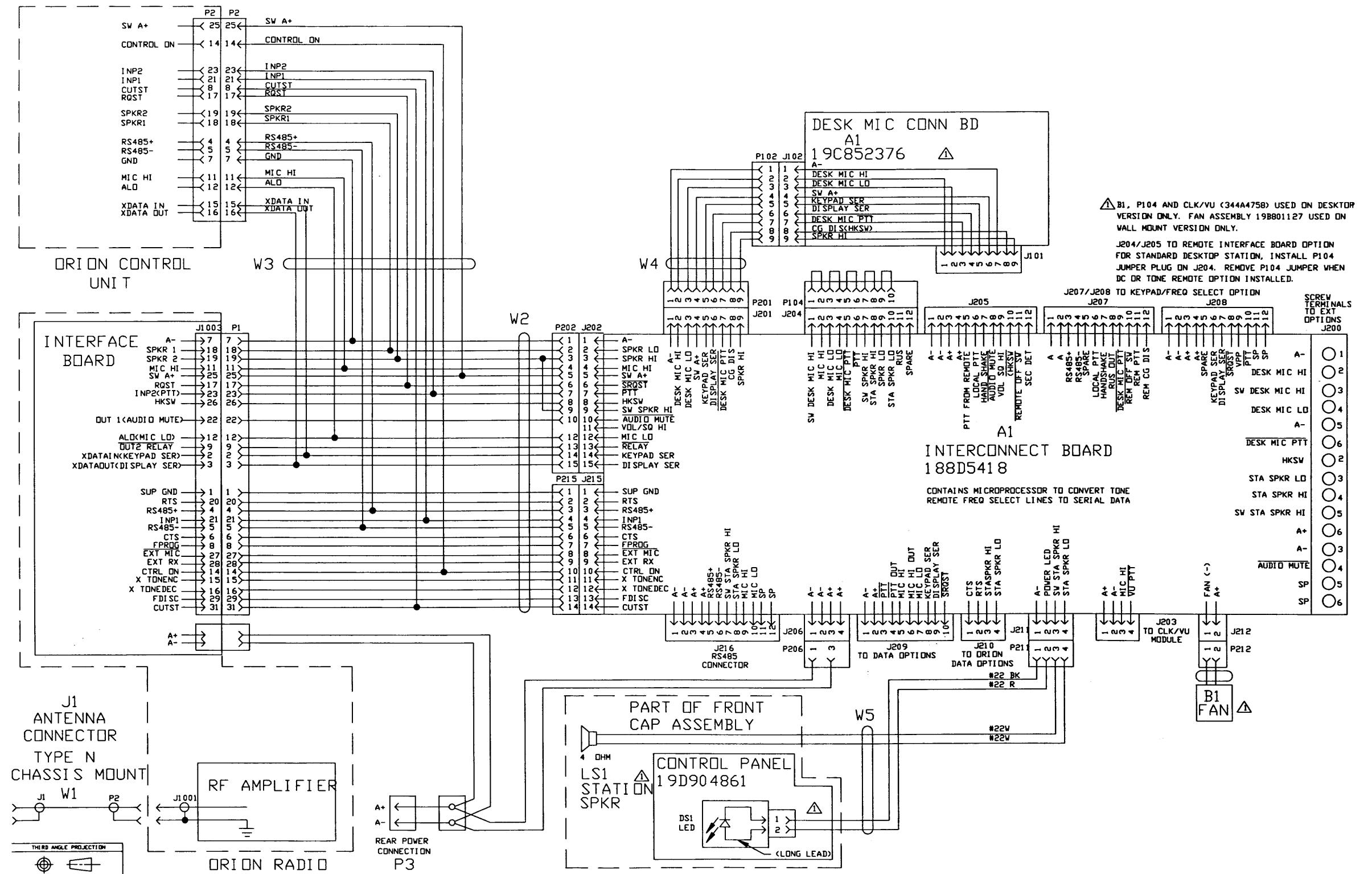
3. Connect the end of cable W9 marked "keypad" onto the keypad pins. Plug the other end into J401 of the keypad Board.
4. When remote options are used, connect cable W8 to P2 of the Remote Board. Connect the other end to J402 of the keypad board. Orient plug at J402 so the pin with no wire is toward J208.
5. On the Remote Interface Board connect jumpers as follows:
  - P303 on J303, Pins 2 and 3
  - P304 on J304, Pins 2 and 3
  - P305 on J305, Pins 2 and 3
  - P306 on J306, Pins 2 and 3
  - P307 on J307, Pins 2 and 3
6. Replace the bottom cover and the four (4) screws holding the bottom cover on the base station assembly.

**PROGRAMMING NOTES**

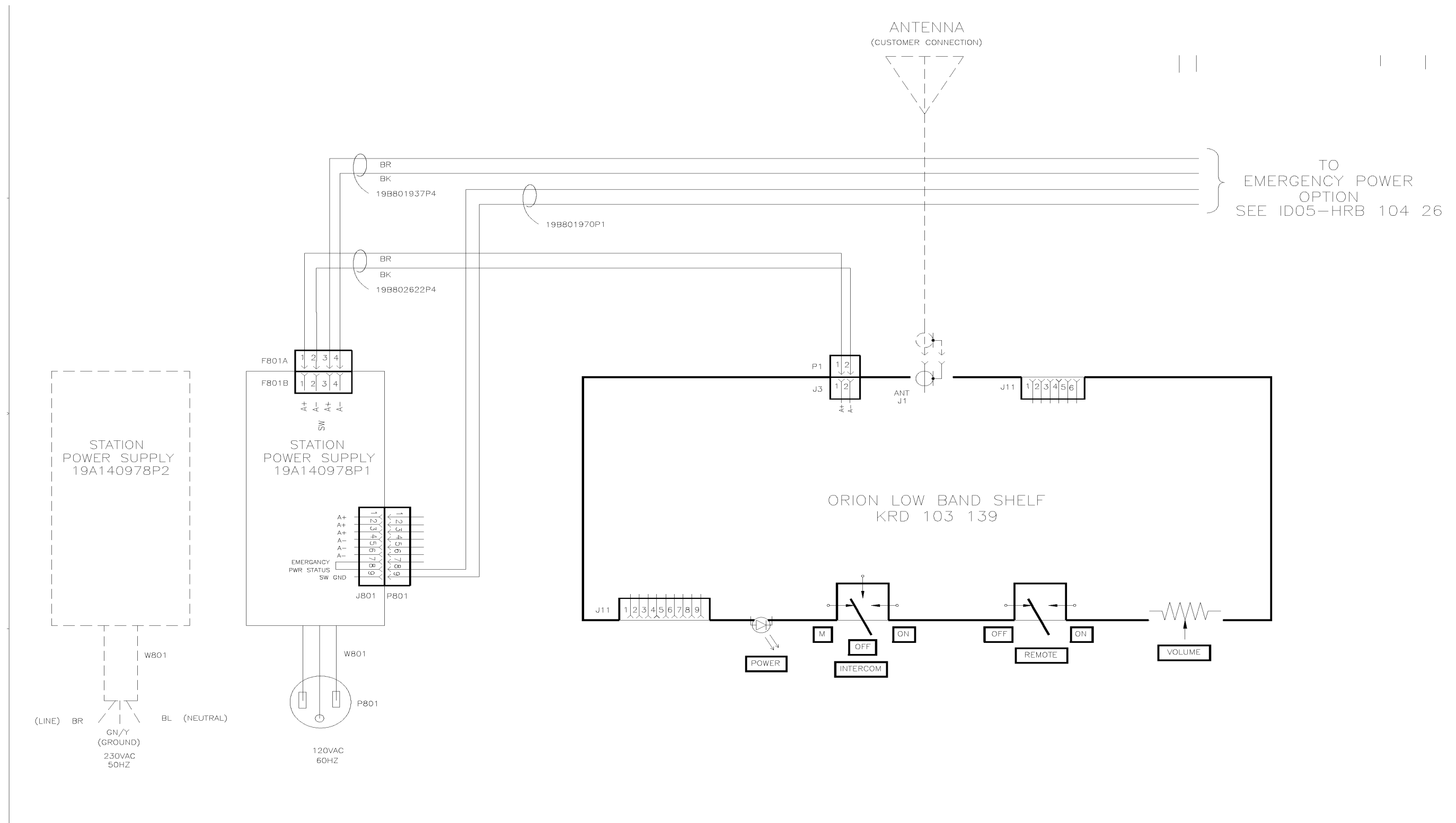
PC Programming is accomplished through station microphone connector J101 on the Orion base station.

1. Auxiliary input #2 must be set to PTT.
2. External Mute must be enabled on "Output 1" as an Active "High" control line.
3. The volume control is not fixed for the local control station. For remote stations, minimum volume should be set to 22. Desktop station fixed volume should be set to 22.
4. Auxiliary input #1 must be set to "Inverse Hookswitch", (IHKSW).

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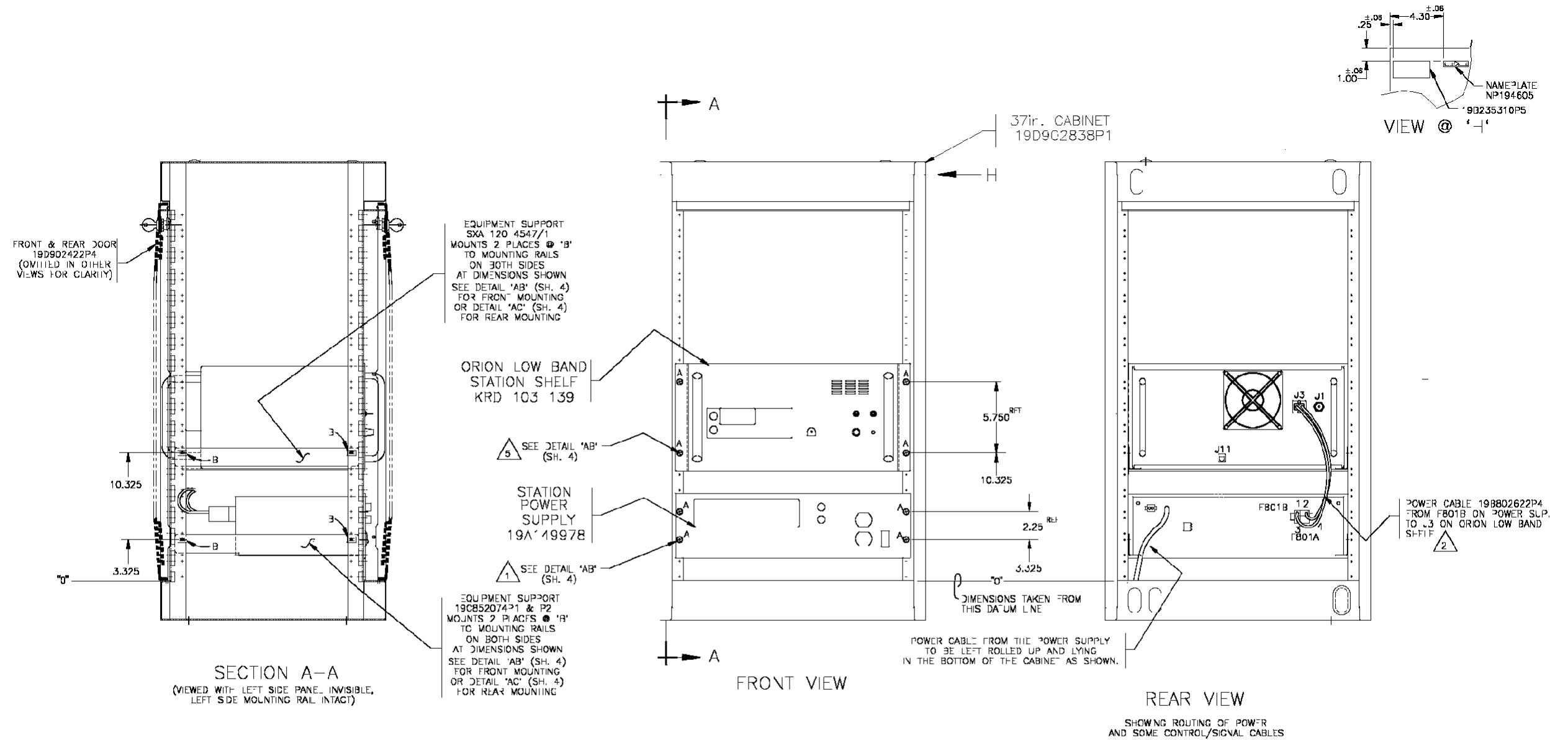


STATION PANEL INTERCONNECTION DIAGRAM



LOW BAND ORION BASE STATION

(ID-HRB 104 24, Rev. B)



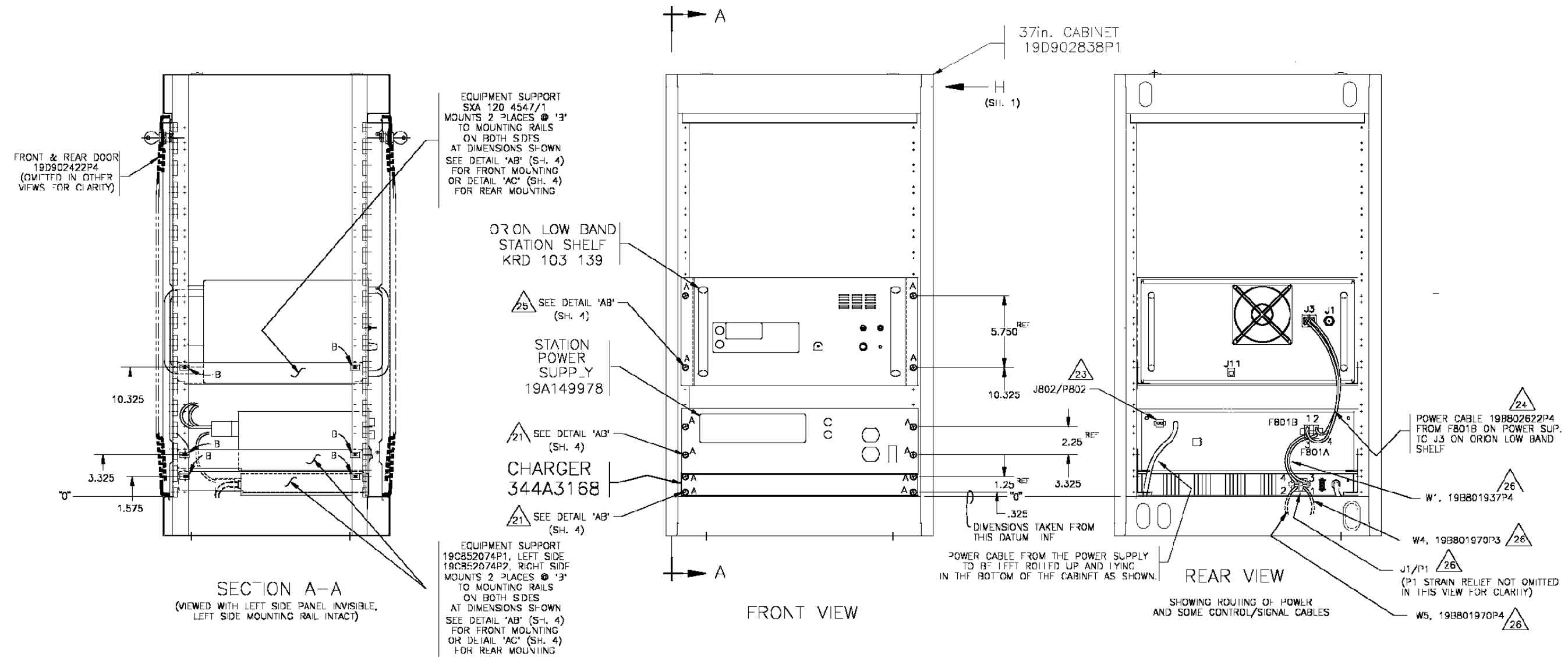
(1) ORION LOW BAND TRANSMIT/RECEIVE BASE STATION IN A 37in. HIGH INDOOR FIXED LAND CABINET

- NOTES:
- 1 ITEMS REFERENCING THIS CALLOUT ARE CALLED FOR ON HARDWARE KIT P.L. 344A3450G1.
  - 2 INSTALL CABLES AS SHOWN AND INTERCONNECT IN ACCORDANCE WITH INTERCONNECT DIAGRAM 193 13 HRB 104 24.

- 5 ITEMS REFERENCING THIS CALLOUT ARE CALLED FOR ON HARDWARE KIT P.L. 344A3450G2.

**ORION LOW BAND BASE STATION  
IN A 37-INCH HIGH INDOOR FIXED LAND CABINET**

(1531-HRB 104 24, Sh. 1, Rev. A)



② (1) ORION LOW BAND TRANSMIT/RECEIVE BASE STATION  
WITH AUTOMOBILE BATTERY EMERGENCY POWER  
IN A 37in. HIGH FIXED INDOOR LAND CABINET

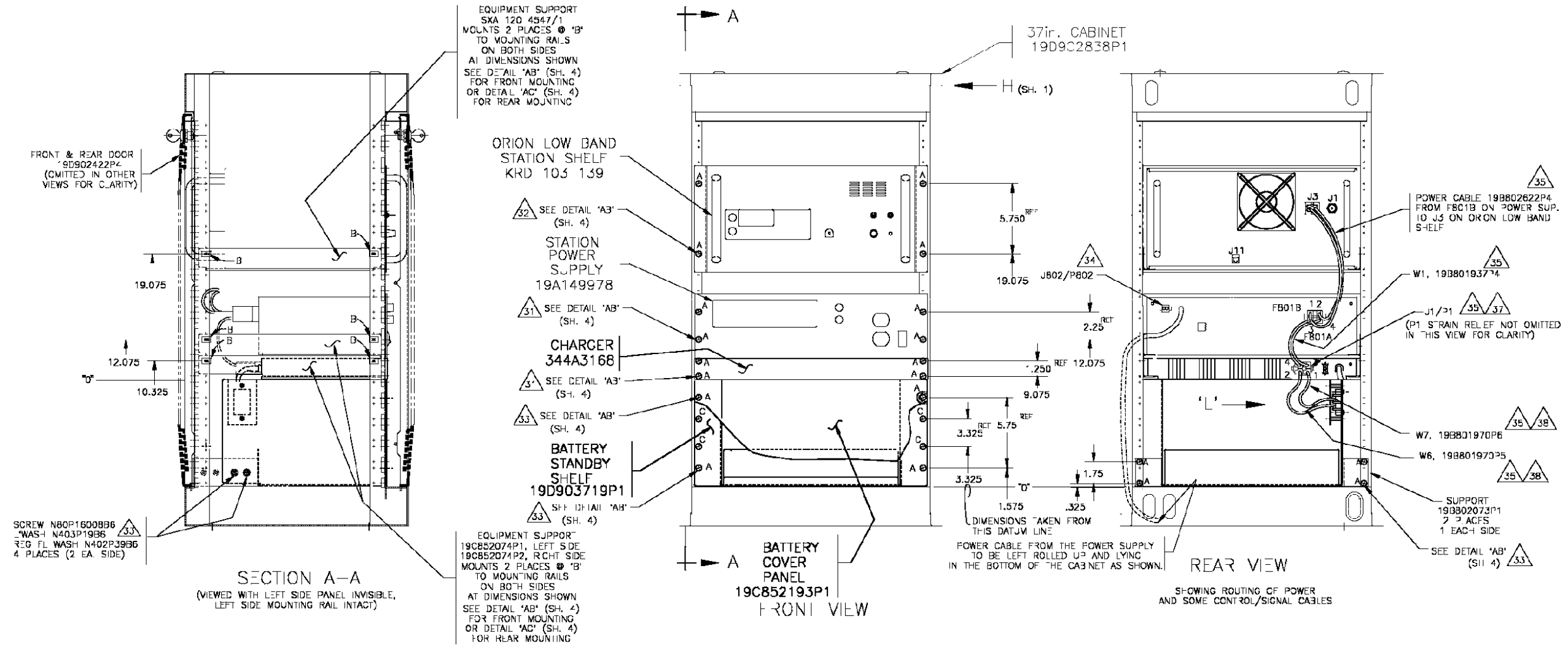
NOTES:

- 21. ITEMS REFERENCING THIS CALLOUT ARE CALLED FOR ON HARDWARE KIT PL344A3450G1
- 23. REMOVE P802 FROM J802 ON POWER SUPPLY 19A149978.
- 24. INSTALL CABLES AS SHOWN AND INTERCONNECT IN ACCORDANCE WITH INTERCONNECT DIAGRAM 193 13-HRB 104 24. ALSO SEE NOTE 26.
- 25. ITEMS REFERENCING THIS CALLOUT ARE CALLED FOR ON HARDWARE KIT PL344A3450G2

- 26. REMOVE FB01A OF PA LEAD ASSEMBLY 19B801937P1 FROM FB01B OF POWER SUPPLY. REMOVE STRAIN RELIEFS FROM FB01A AND FROM P1 OF W1. INSERT THE BROWN WIRE OF W1 INTO THE NUMBER 3 CAVITY OF FB01A. INSERT THE BLACK WIRE OF W1 INTO THE NUMBER 4 CAVITY OF FB01A. INSERT THE CONTACT END OF W4 INTO THE NUMBER 1 CAVITY OF P1 OF W1. INSERT THE CONTACT END OF W5 INTO THE NUMBER 2 CAVITY OF P1 OF W1. REINSTALL STRAIN RELIEFS FOR P1 OF W1 AND FB01A. PLUG P1 OF W1 INTO J1 OF THE CHARGER. PLUG FB01A INTO FB01B OF THE POWER SUPPLY. CABLES W4 AND W5 ARE TO BE LEFT ROLLED UP AND LYING ON THE FLOOR OF THE CABINET.

**AUTOMOBILE BATTERY EMERGENCY POWER**

(1531-HRB 104 24, Sh. 2, Rev. A



③ (1) ORION LOW BAND TRANSMIT/RECEIVE BASE STATION WITH EMERGENCY GEL CELL BATTERY SHELF AND BATTERY CHARGER IN A 37in. HIGH INDOOR LAND CABINET

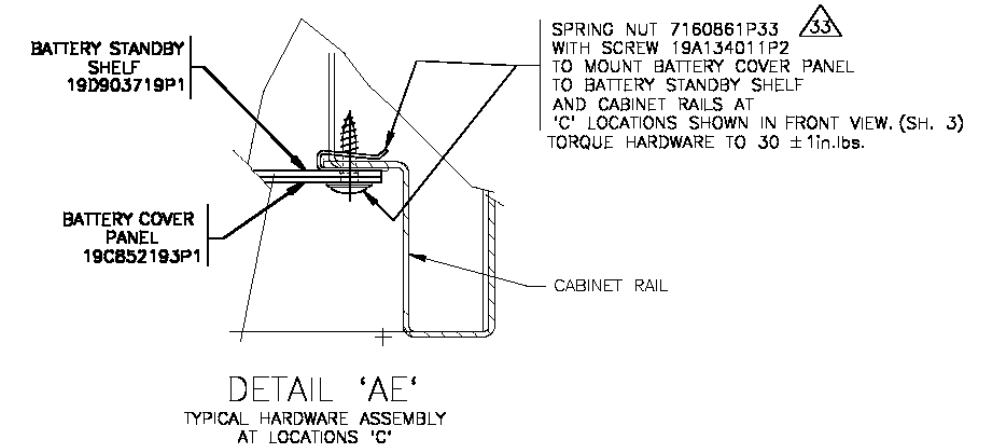
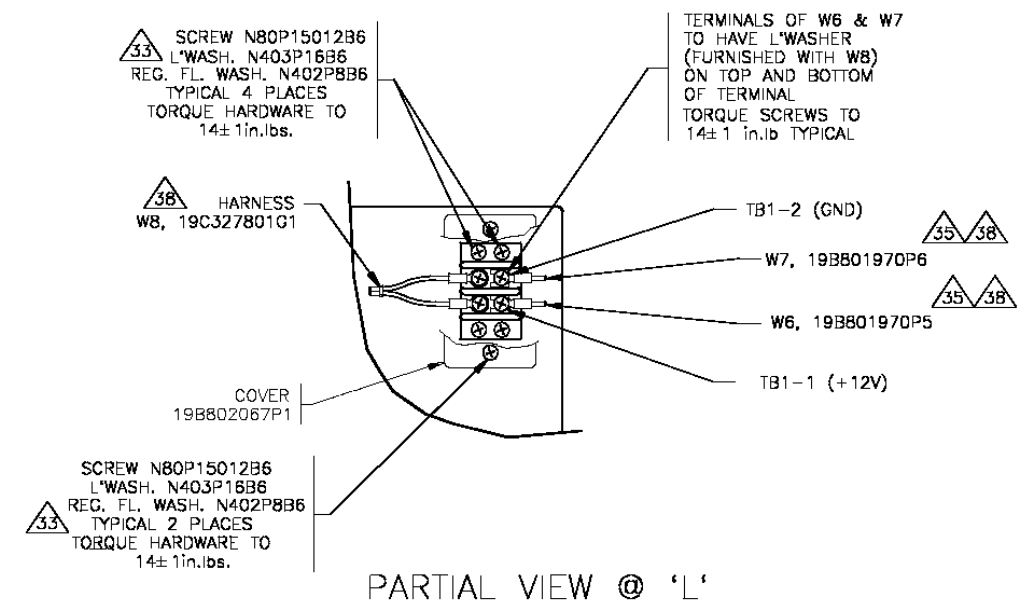
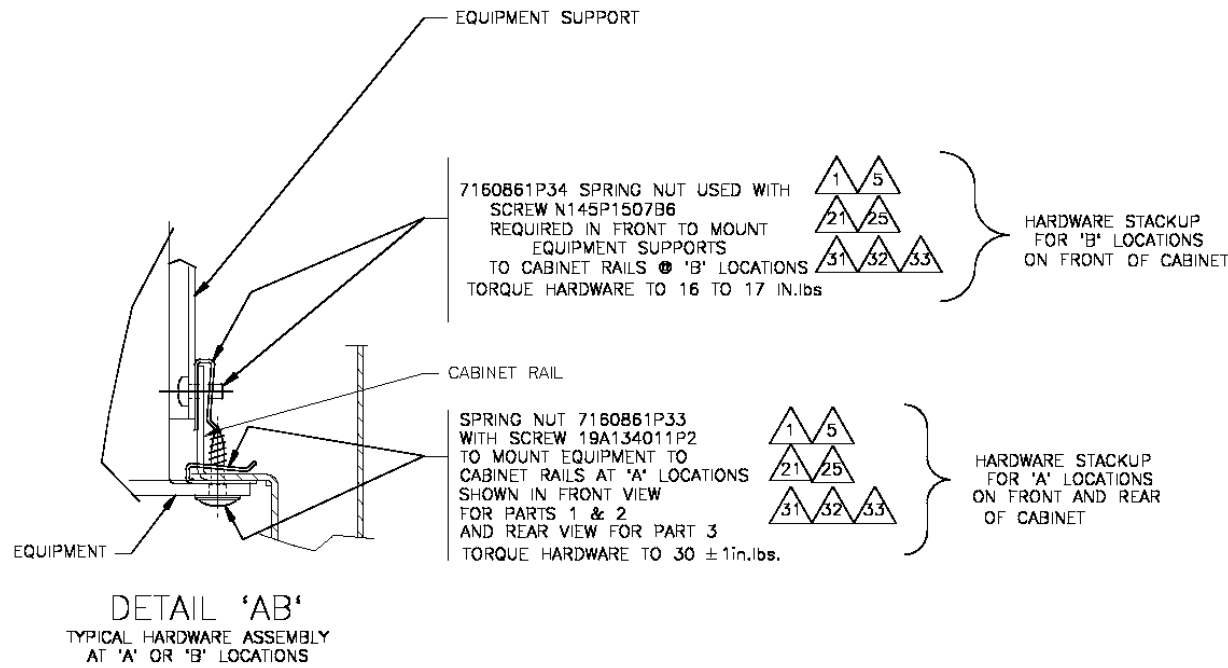
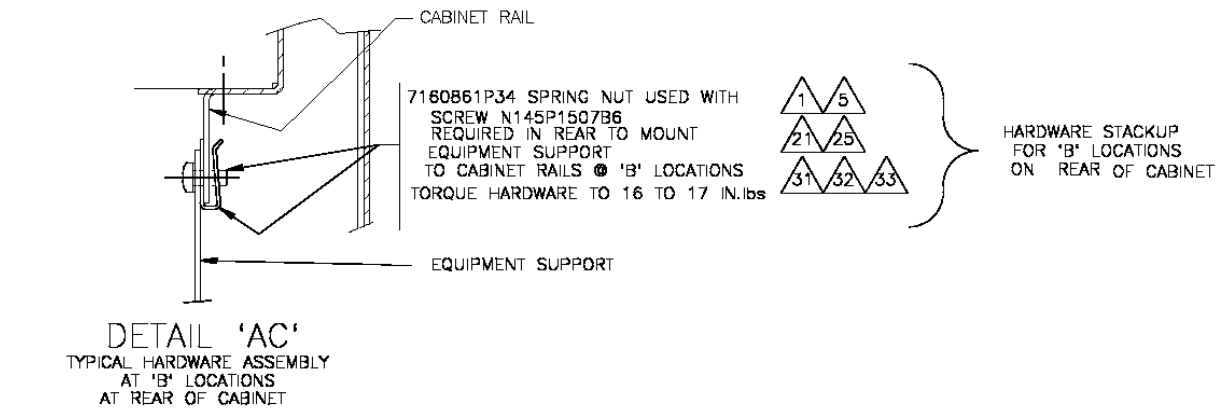
NOTES:

- 31. ITEMS REFERENCING THIS CALLOUT ARE CALLED FOR ON HARDWARE KIT PL344A3450G1.
- 32. ITEMS REFERENCING THIS CALLOUT ARE CALLED FOR ON HARDWARE KIT PL344A3450G2.
- 33. ITEMS REFERENCING THIS CALLOUT ARE CALLED FOR ON HARDWARE KIT PL344A3450G5.
- 34. REMOVE P802 FROM J802 ON POWER SUPPLY 19A149978.
- 35. INSTALL CABLES AS SHOWN AND INTERCONNECT IN ACCORDANCE WITH INTERCONNECT DIAGRAM 93 13-HRB 104 24. ALSO SEE NOTE 37.

- 37. REMOVE STRAIN RELIEFS FROM FB01A OF THE PA LEAD ASSEMBLY, 19B801937P1, AND FROM P1 OF W1 (19B801937P4). INSERT THE BROWN WIRE OF W1 INTO THE NUMBER 3 CAVITY OF FB01A. INSERT THE BLACK WIRE OF W1 INTO THE NUMBER 4 CAVITY OF FB01A. INSERT THE HERMAPHRODITIC CONTACT OF W6 (19B801970P5) INTO THE NUMBER 1 CAVITY OF P1 OF W1. INSERT THE HERMAPHRODITIC CONTACT OF W7 (19B801970P6) INTO THE NUMBER 2 CAVITY OF P1 OF W1. REINSTALL STRAIN RELIEFS FOR P1 OF W1 AND FB01A OF THE PA LEAD ASSEMBLY. PLUG P1 OF W1 INTO J1 OF THE CHARGER. PLUG FB01A INTO FB01B OF THE POWER SUPPLY.
- 38. CONNECT W6 TO THE "+12V" TERMINAL OF THE WB (19C327801G1) TERMINAL BOARD. (TB1-1). CONNECT W7 TO THE "GND" TERMINAL OF THE WB (19C327801G1) TERMINAL BOARD. (TB1-2).

**EMERGENCY GEL CELL BATTERY SHELF  
AND BATTERY CHARGER**

(1531-HRB 104 24, Sh. 3, Rev. A)



**CABINET HARDWARE ASSEMBLIES**

(1531-HRB 104 24, Sh. 4, Rev. A)



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Printed in U.S.A.