**David L. Huffman**

# Engineering Note

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**Project:** MINOS DC Power Supplies
**Doc. No:** H031008A

**Subject:** Master Crate Power Supply Wiring Harness


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# General Description

1.1. The Master Crate is a standard VME product from Wiener (part number OB02.0026) powered by one of their standard power supplies. The only voltage presently used is the +5V, however the crates are wired for all voltages available from the supply should they be needed in the future.

1.1.1. Output rails are 5V/230A; 3.3V/115A; 12V/46A; 12V/46A

1.1.2. The wiring is 90°C for the welding cable and 105°C for the 6AWG wiring.

1.1.3. Cable sizing is 230A-2/0; 115A-2/0; 46A-6AWG

## 2. Master Crate Backplane

2.1. Rear View of Backplane showing the power rail connections.

**Figure 1 VME Crate**

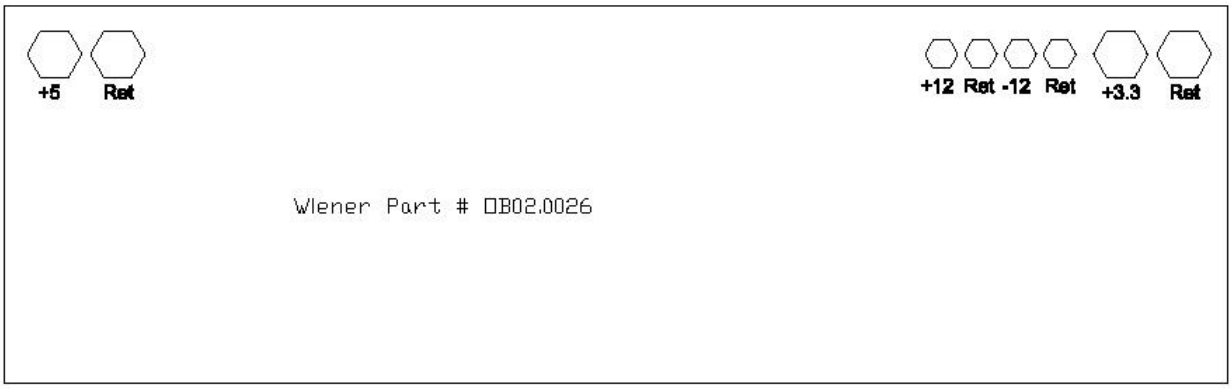


**Figure 2 Crate Voltage Connection Definitions**

# 3. Wiener Power Supply Connections

## 3.1. Rear View of the Wiener Power Supply.

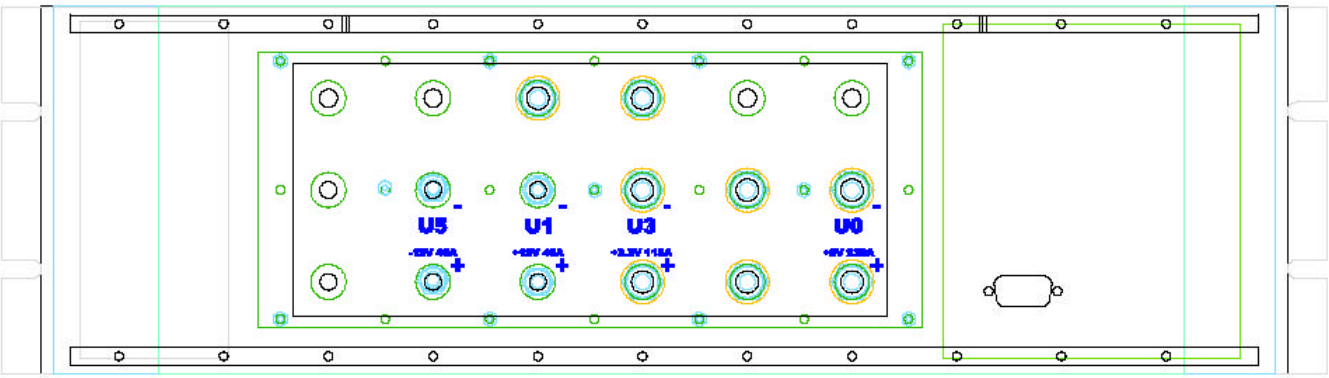


**Figure 3 Power Supply Back**

## 3.2. Wiener label defining the output terminal configuration.

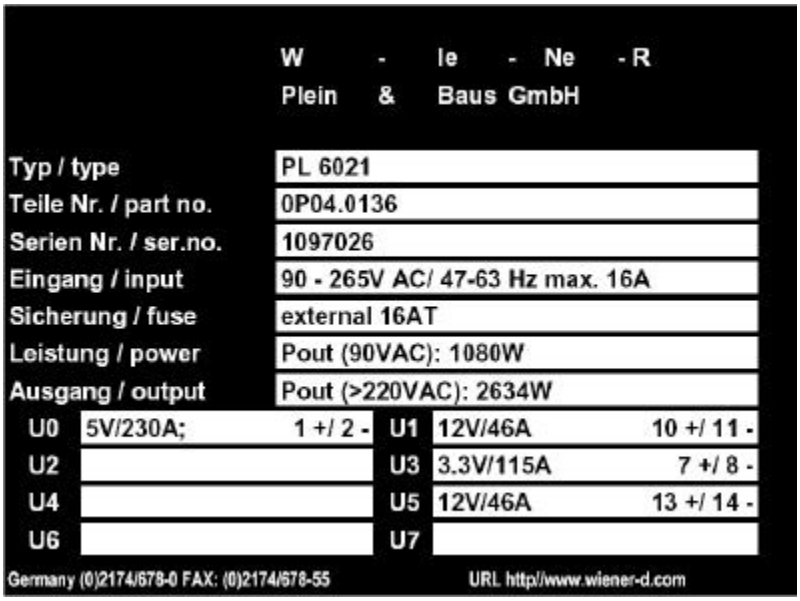


**Figure 4 Power Supply Output Configuration**

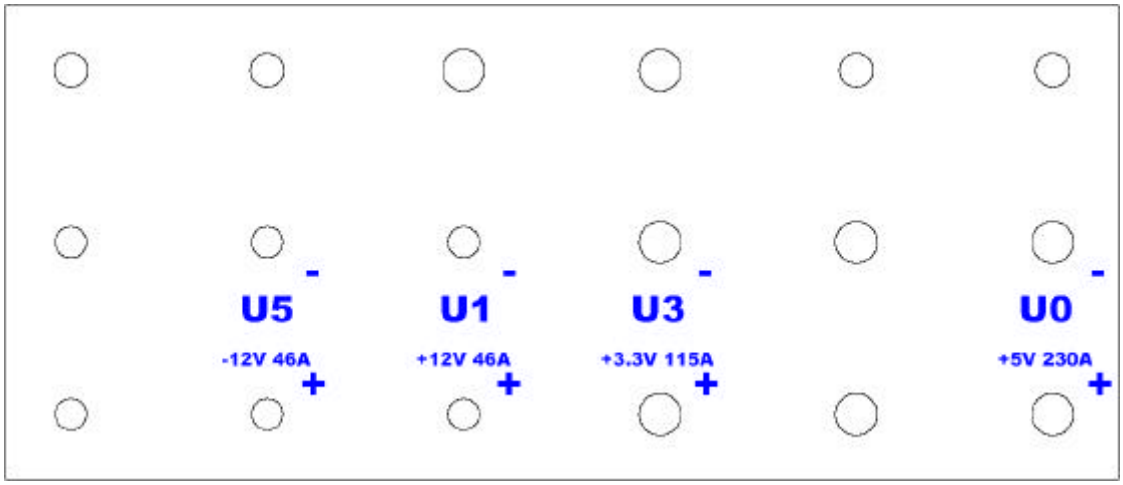


**Figure 5 Rail Voltages**

3.3. This is the output configuration of the power supply terminals as seen from the rear of the supply.

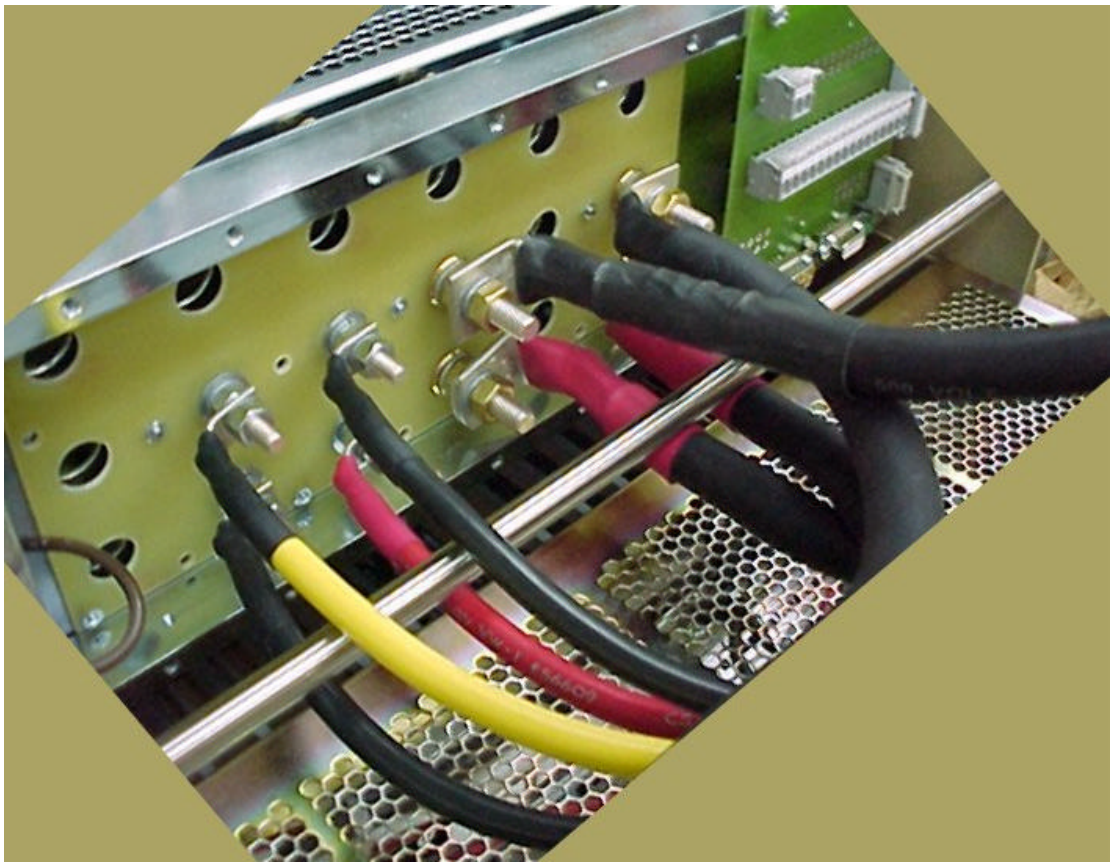

**Figure 6 Power Supply connections**

# 4. The Crate Wiring

4.1. The power supply is mounted above the crate and wired directly to it as seen in the photo below.

**Figure 7 Complete Unit**

The power supply mounting bar across the back and G10 insulating pieces on the crate connections prevent the lead lugs from turning and shorting to each other. Table 1 NEC 310-17 was used to select the wire gauge that will handle the full current available from the supply. The cables are less than 2 feet in length and in open air.

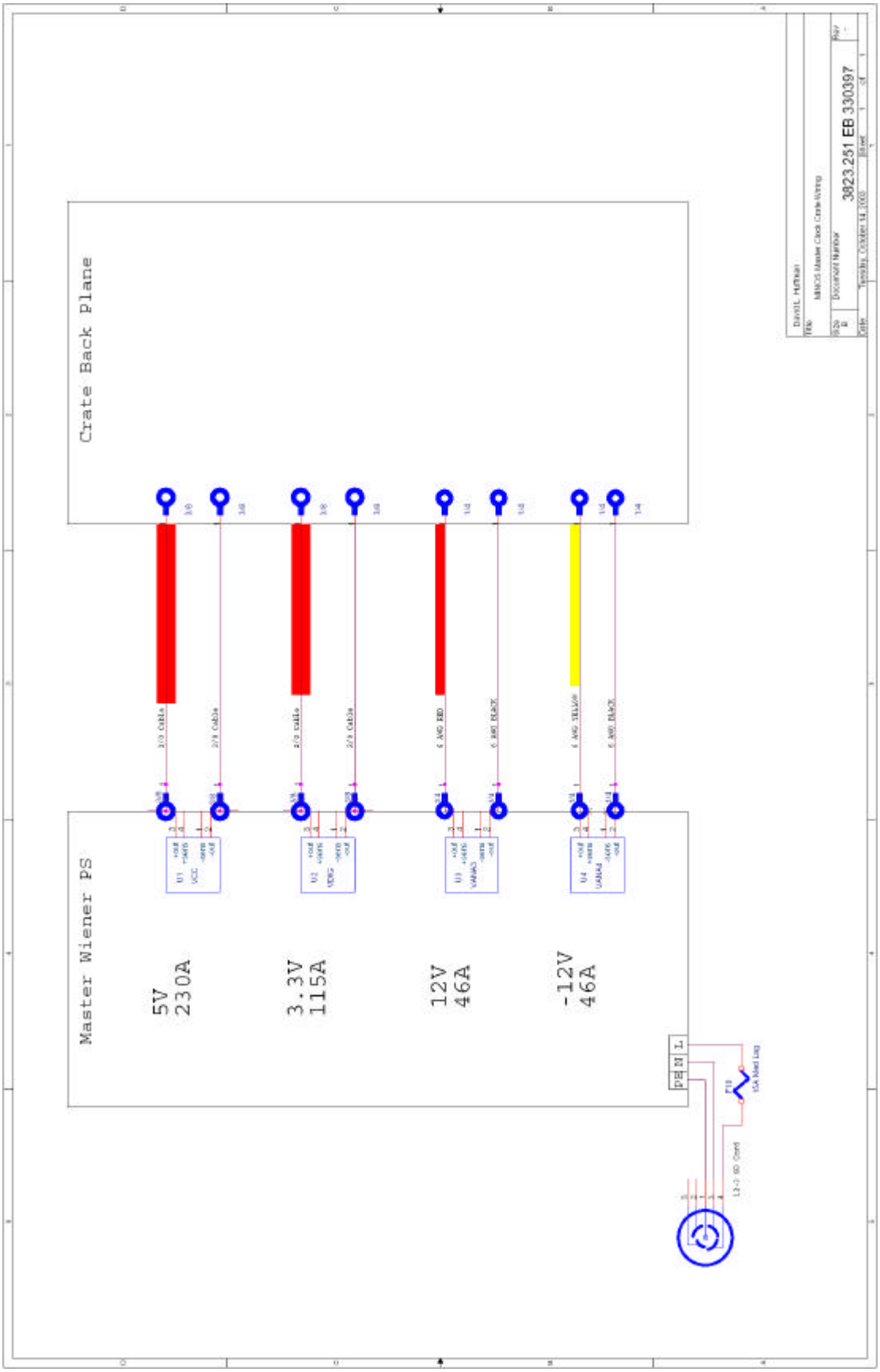


**Figure 8 Wiring Schematic**

5. Polycarbonate (Lexan) cover details

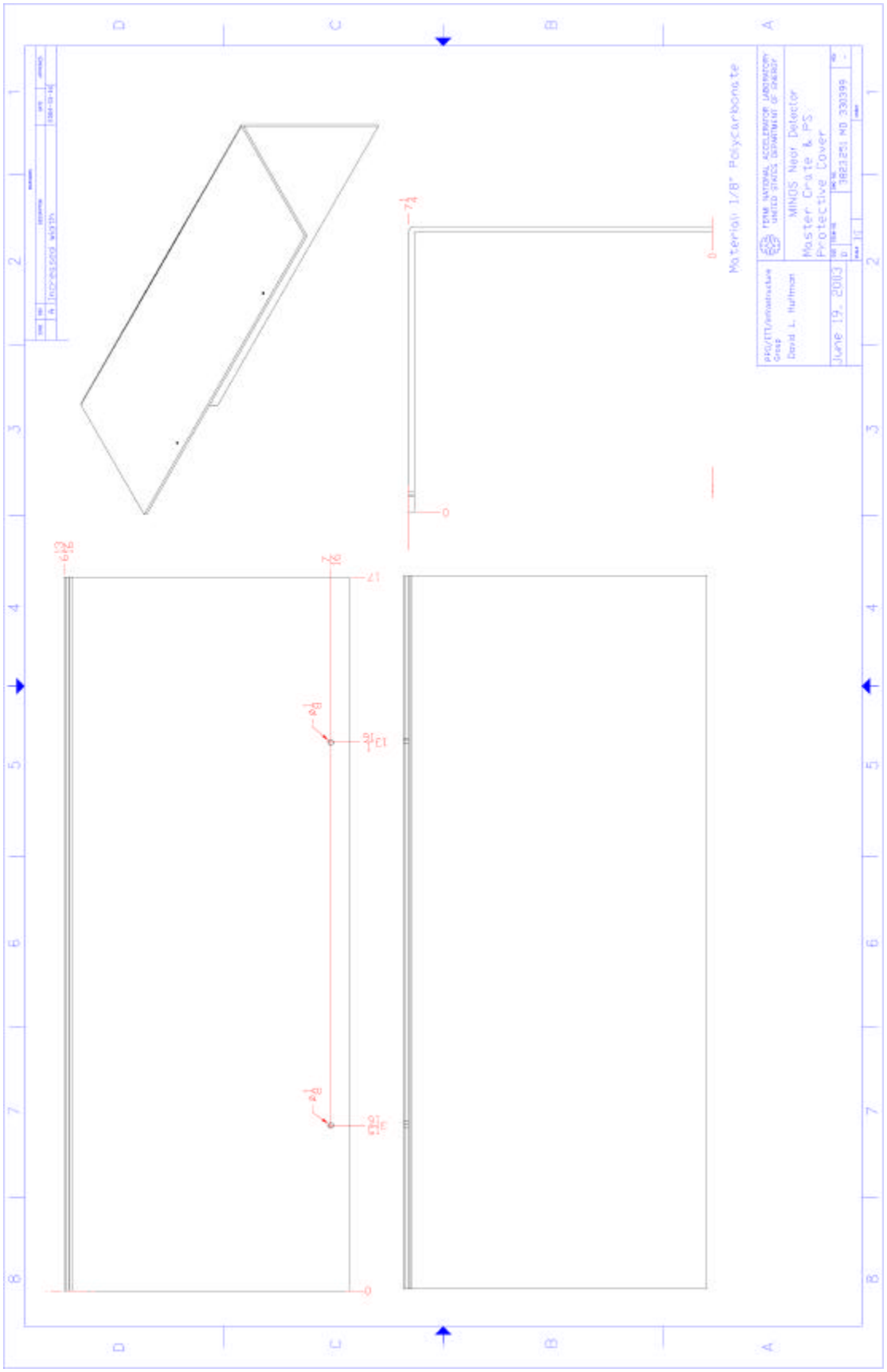


**Figure 9 Polycarbonate Cover**

6. Wiener chassis modification

6.1. Holes for the rear mounting bar and AC line cord strain-relief.

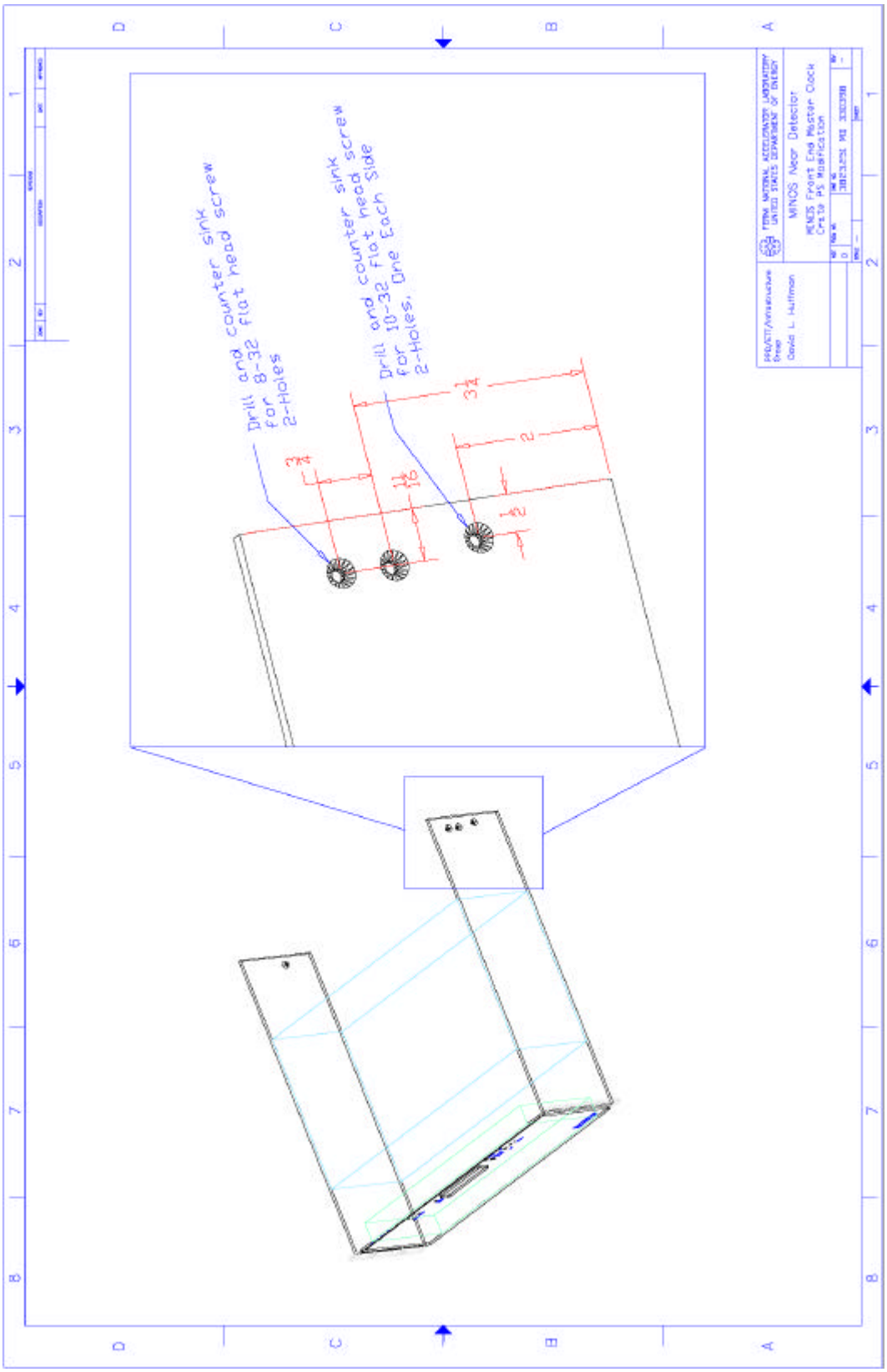


**Figure 10 Wiener Chassis Modifications**

7. AC input fusing.

7.1. The AC input requires fusing of the input circuit. An inline fuse is added to the input panel and a 15 Amp Medium Lag Fuse 250V installed. The AC cord to the supply is 12 AWG 3-wire SO type cord with a 20 Amp plug.

7.1.1. The brown wire is removed from the back of the input terminal and connected to one side of the fuse. A new brown wire on the other side of the fuse is attached back to the connector.

7.1.2. A hole is made in the panel and the fuse attached with a #6 screw and nut.

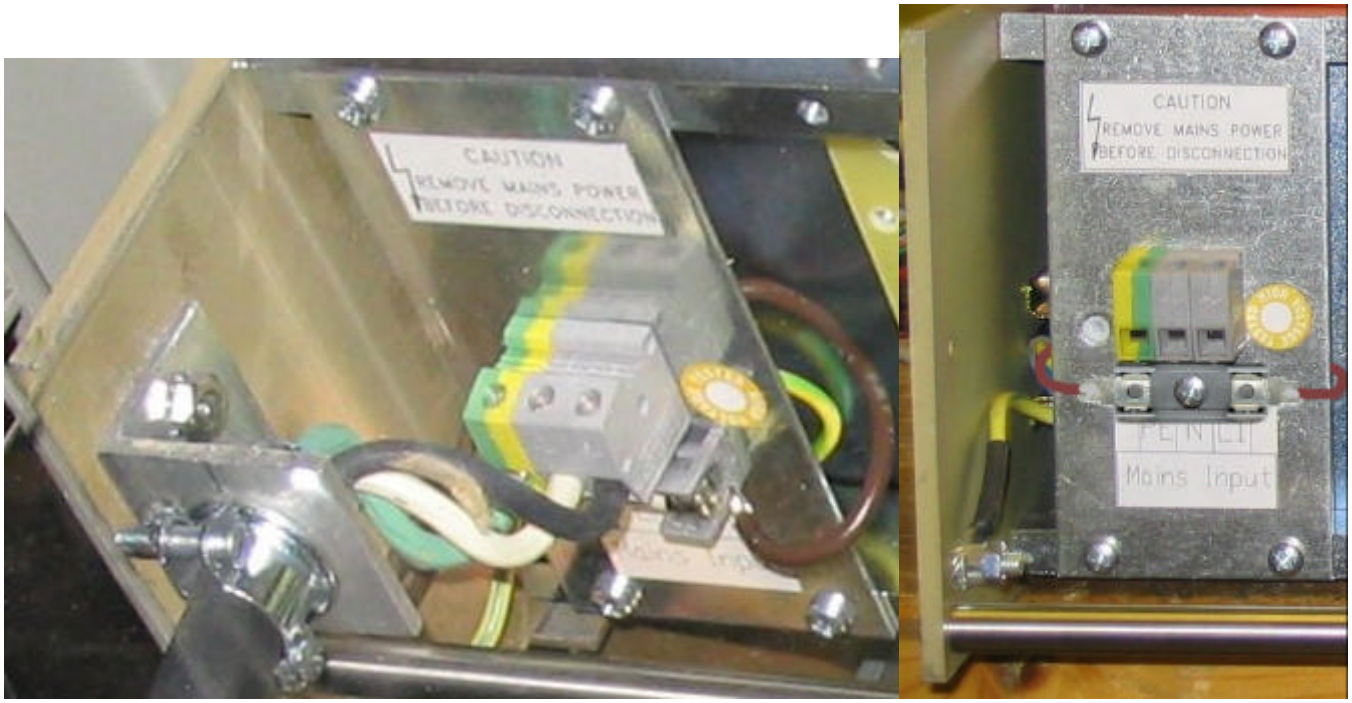


**Figure 11 AC Fusing**

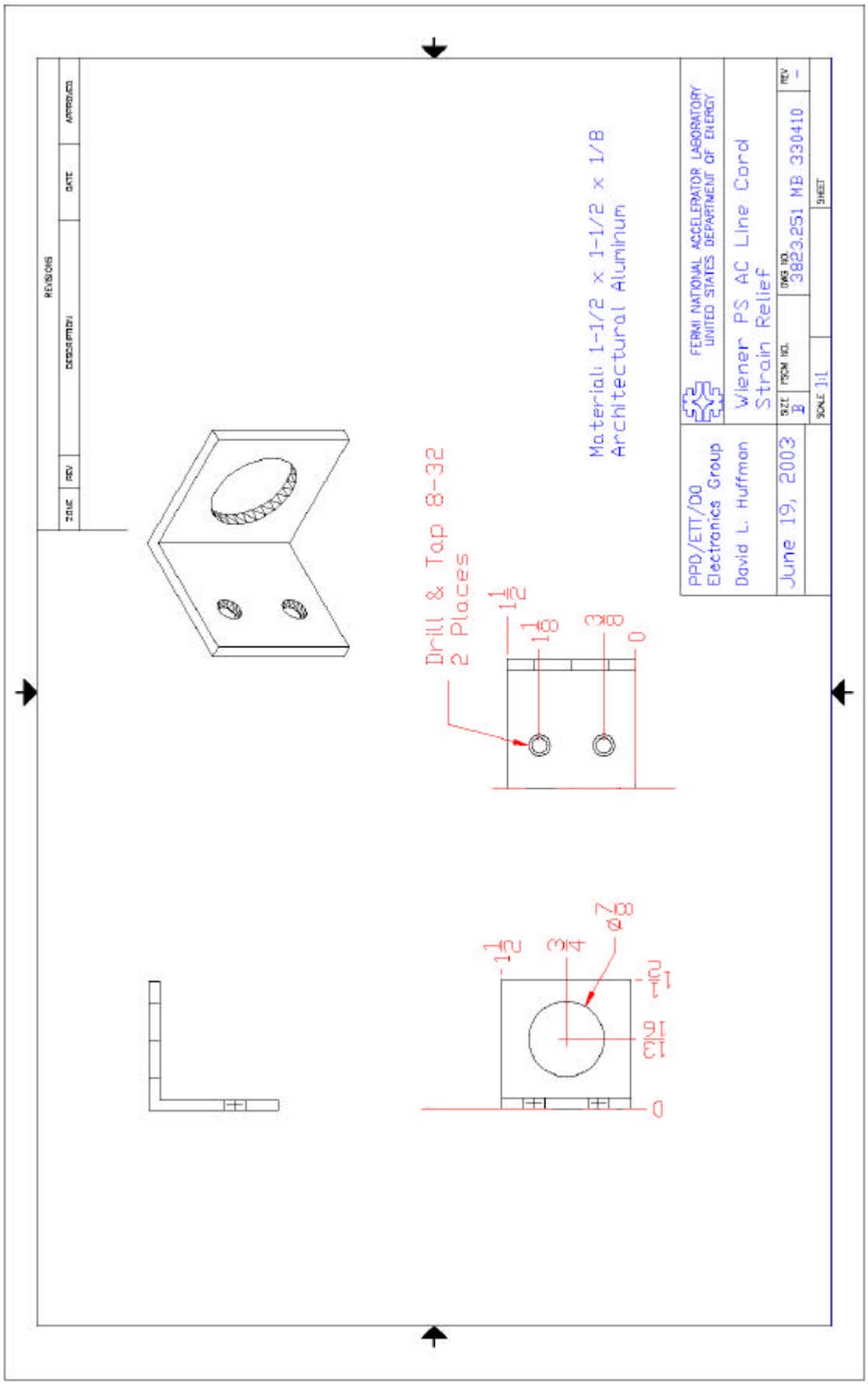


**Figure 12 AC Strain Relief**

8. Completed cabling with clear plastic (Lexan) cover

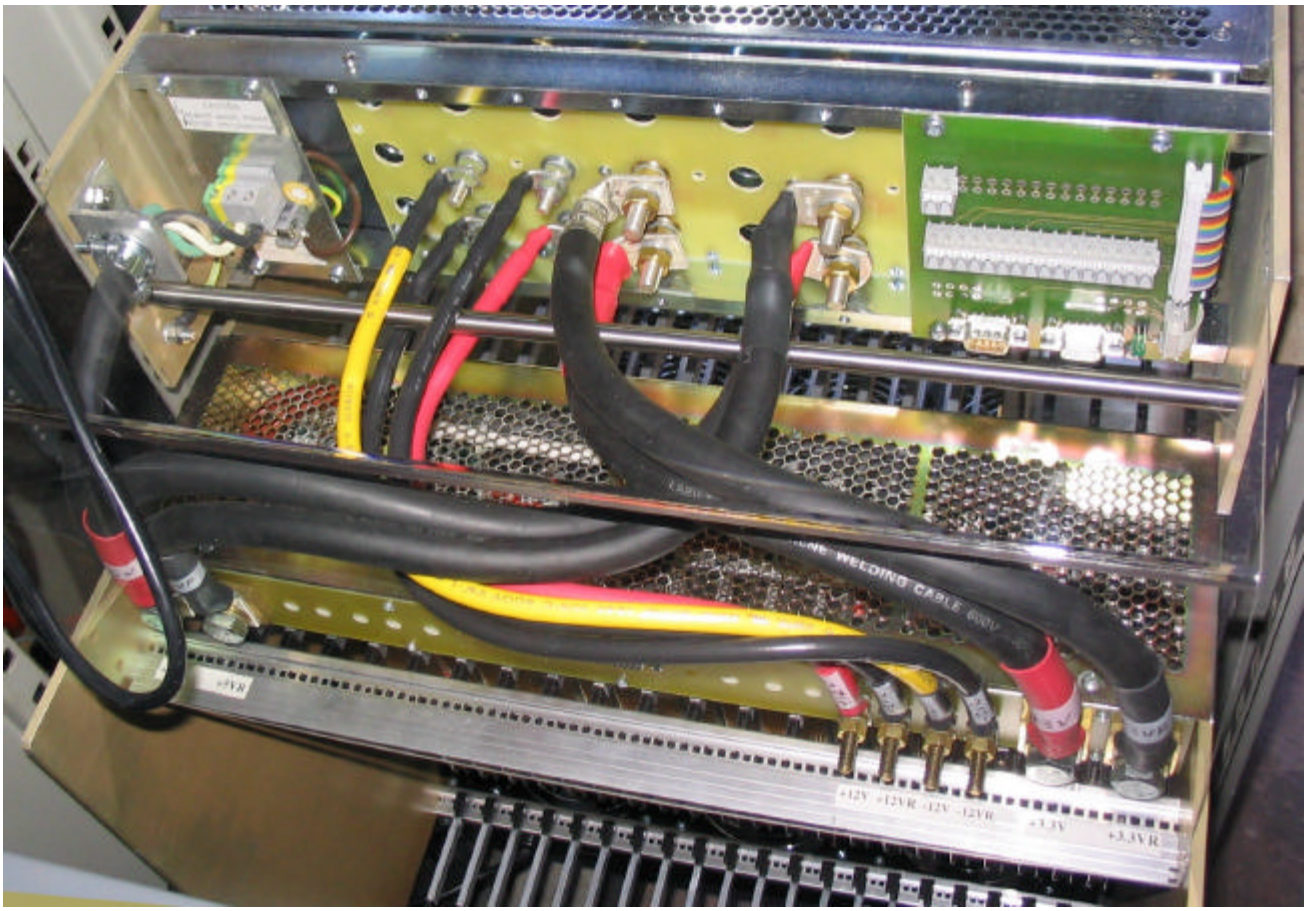


**Figure 13 Photo of Completed Unit**

9. Bill Of Materials for Additional parts

| Item | Quantity | Part | Manufacture | Description | Unit Cost | |
|---|---|---|---|---|---|---|
| | | | | **Wiring** | | |
| 1 | 8 | 1110- | Fermi Stock | 6 AWG 1/4" Ring Tongue Terminal | $ | 0.14 |
| 2 | 4 | 1110- | Fermi Stock | 2/0 5/16" Ring Tongue Terminal | $ | 0.16 |
| 3 | 4 | 1110- | Fermi Stock | 2/0 5/16" Ring Tongue Term. Right Angled | $ | 0.17 |
| 4 | | | | | | |
| 5 | 18 | | Prestoflex | 2/0 Welding Cable | $ | 1.00 |
| 6 | 18 | | Weico | 6 AWG Yellow | $ | 1.00 |
| 7 | 18 | | Weico | 6 AWG Red | $ | 0.70 |
| 8 | 18 | | Weico | 6 AWG Black | $ | 0.70 |
| 10 | | | | **AC Fusing** | | |
| 11 | 6 | 1210-111000 | Fermi Stock | 8-32 Nut with captured star washer | $ | 0.02 |
| 12 | 1 | 3823.251-MD-330410 | Custom | AC Line Cord Strain Relief Bracket | $ | 4.67 |
| 13 | 1 | 1115-153600 | Fermi Stock | Cord Strain Relief | $ | 1.65 |
| 14 | 1 | 1120-232000 | Fermi Stock | Fuse Holder 3AG | $ | 0.74 |
| 15 | 1 | 1120-106000 | Fermi Stock | 15 Amp Medium Lag Fuse 250V | $ | 0.73 |
| 16 | | | | **Protective Cover** | | |
| 17 | 1 | 3823.251-MD-330399 | Custom | Protective Cover, Polycarbonate | $ | 10.00 |
| 18 | 2 | 0965A2PG3X10 | | 3mm x 10mm flat head screw 18-8 SS | $ | 0.03 |

**Table 1 NEC 310-17**

**Table 310-17. Allowable Ampacities of Single-Insulated Conductors Rated 0 Through 2000 Volts in Free Air, Based on Ambient Air Temperature of 30°C (86°F)**

| Size | Temperature Rating of Conductor (See Table 310-13) | | | | | | Size |
|---|---|---|---|---|---|---|---|
| | 60°C (140°F) | 75°C (167°F) | 90°C (194°F) | 60°C (140°F) | 75°C (167°F) | 90°C (194°F) | |
| AWG or kcmil | Types TW, UF | Types FEPW, RH, RHW, THHW, THW, THWN, XHHW, ZW | Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2 | Types TW, UF | Types RH, RHW, THHW, THW, THWN, XHHW | Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2 | AWG or kcmil |
| | COPPER | | | ALUMINUM OR COPPER-CLAD ALUMINUM | | | |
| 18 | — | — | 18 | — | — | — | — |
| 16 | — | — | 24 | — | — | — | — |
| 14* | 25 | 30 | 35 | — | — | — | — |
| 12* | 30 | 35 | 40 | 25 | 30 | 35 | 12* |
| 10* | 40 | 50 | 55 | 35 | 40 | 40 | 10* |
| 8 | 60 | 70 | 80 | 45 | 55 | 60 | 8 |
| 6 | 80 | 95 | 105 | 60 | 75 | 80 | 6 |
| 4 | 105 | 125 | 140 | 80 | 100 | 110 | 4 |
| 3 | 120 | 145 | 165 | 95 | 115 | 130 | 3 |
| 2 | 140 | 170 | 190 | 110 | 135 | 150 | 2 |
| 1 | 165 | 195 | 220 | 130 | 155 | 175 | 1 |
| 1/0 | 195 | 230 | 260 | 150 | 180 | 205 | 1/0 |
| 2/0 | 225 | 265 | 300 | 175 | 210 | 235 | 2/0 |
| 3/0 | 260 | 310 | 350 | 200 | 240 | 275 | 3/0 |
| 4/0 | 300 | 360 | 405 | 235 | 280 | 315 | 4/0 |
| 250 | 340 | 405 | 455 | 265 | 315 | 355 | 250 |
| 300 | 375 | 455 | 505 | 290 | 350 | 395 | 300 |
| 350 | 420 | 505 | 570 | 330 | 395 | 445 | 350 |
| 400 | 455 | 545 | 615 | 355 | 425 | 480 | 400 |
| 500 | 515 | 620 | 700 | 405 | 485 | 545 | 500 |
| 600 | 575 | 690 | 780 | 455 | 540 | 615 | 600 |
| 700 | 630 | 755 | 855 | 500 | 595 | 675 | 700 |
| 750 | 655 | 785 | 885 | 515 | 620 | 700 | 750 |
| 800 | 680 | 815 | 920 | 535 | 645 | 725 | 800 |
| 900 | 730 | 870 | 985 | 580 | 700 | 785 | 900 |
| 1000 | 780 | 935 | 1055 | 625 | 750 | 845 | 1000 |
| 1250 | 890 | 1065 | 1200 | 710 | 855 | 960 | 1250 |
| 1500 | 980 | 1175 | 1325 | 795 | 950 | 1075 | 1500 |
| 1750 | 1070 | 1280 | 1445 | 875 | 1050 | 1185 | 1750 |
| 2000 | 1155 | 1385 | 1560 | 960 | 1150 | 1335 | 2000 |

**Table 2 Welding Cable Specs.**

**WELDING CABLE** PRESTOFLEX® INSULATED

90°C - 600 Volt.

Use... As power feed leads from the welding power source to the electrodes.

Conductor... Stranded bare copper.

Insulation... EPDM

Temperature Rating... 90°C.

Voltage Rating... 600 Volts

Features... High tear strength jacket with excellent resistance to abrasion and impact. Superior flexibility even down to -67°F with good flame resistance. Special stranded conductor for added flexibility and easy handling.

Specification Data:

| AWG | No. of Ends | Insulation Thickness (In.) | Nominal O.D. Inches | Approx. lbs/Mft. |
|---|---|---|---|---|
| 6 | 280 | 0.80 | .356 | 127 |
| 4 | 440 | 0.80 | .403 | 181 |
| 3 | 552 | 0.85 | .441 | 223 |
| 2 | 704 | 0.90 | .485 | 278 |
| 1 | 880 | 0.95 | .529 | 341 |
| 1/0 | 1112 | 0.105 | .591 | 429 |
| 2/0 | 1408 | 0.104 | .635 | 524 |
| 3/0 | 1760 | 0.105 | .685 | 640 |
| 4/0 | 2224 | 0.115 | .764 | 803 |

Note:
· All sizes available on 1000 foot or 500 foot reels. One length per reel.
· 34 gauge stranded conductors available on special orders.
· Black is standard, other colors are available on special orders.

Spark Tested for 600 volts.
Prestolite has established a voltage rating procedure incorporating the IPCEA-S-19-81 D.C. spark test.

| AWG | Voltage (KV) |
|---|---|
| 6-2 | 22.5 |
| 1-4/0 | 27.0 |

**Table 3 Weico Wire Specification**

weicowire.com

WIRE, CABLE & TUBING

ABOUT US
Corporate Info
Weico Services
Contact Weico

PRODUCTS
Wire & Cable
Magnet Wire
Tubing
Technical

# HOOK-UP WIRE

1015 MTW
CSA TEW

**Characteristics:**
- Temperature Range: -40°C to +105°C
- Voltage Rating: 600V
- Passes UL VW-1 Flame Test

**Description:**
Stranded Tinned Copper,
Color Coded Polyvinylchloride Insulation,
.032" Nominal Insulation Thickness

*Click on a part number below for pricing and ordering online

| WEICO NO. | CONDUCTOR SIZE | CONDUCTOR STRAND | NOM. O.D. (IN) |
|---|---|---|---|
| 3224 | 24 | 7/32 | .088 |
| 3222 | 22 | 7/30 | .095 |
| 3220 | 20 | 10/30 | .102 |
| 3218/1 | 18 | Solid | .104 |
| 3218 | 18 | 16/30 | .112 |
| 3216 | 16 | 26/30 | .125 |
| 3214 | 14 | 41/30 | .142 |
| 3212 | 12 | 65/30 | .156 |
| 3210 | 10 | 105/30 | .184 |
| 3208* | 8 | 133/29 | .265 |
| 3206** | 6 | 133/27 | .341 |

*UL 1028 **UL 1283

| COLORS | | | |
|---|---|---|---|
| 0 - Black | 3 - Orange | 6 - Blue | 9 - White |
| 1 - Brown | 4 - Yellow | 7 - Violet | |
| 2 - Red | 5 - Green | 8 - Gray | |

**STRIPES:** Any of the above colors are available in any combination of stripes up to a maximum of three stripes.

**Standard Put-Ups: 100 ft., 1000 ft.**