

## USER'S MANUAL

**MODEL: 5403**

## 76MM ELECTROMAGNET

**Date Sold:** \_\_\_\_\_

**Serial number:** \_\_\_\_\_

PROPRIETARY

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Continued...

## **DRAWINGS**

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Drawing 17612640 5403 Electromagnet Vertical Mount Bracket  
Drawing 17612650 5403 Electromagnet Angle Bracket  
Drawing 18900030 5403 Electromagnet Tool Kit  
Drawing 17612620 5403 Pole, Cylindrical (76mm)  
Drawing 17612630 5403 Pole, Tapered (38mm)  
Drawing 18800281 5403 Shipping Crate Assembly  
Drawing 17803500 5403 Pole Packing Box

**Section 1**  
**SPECIFICATIONS**  
**Table 1. Model 5403 Specifications**

---

<b>Pole Diameter:</b>	76mm (3 inch)
<b>Pole Gap:</b>	0 - 76mm (0 to 3 inch)
<b>Standard Pole Face:</b>	75mm (3 inch) cylindrical 38mm (1.5 inch) tapered
<b>Coils (series connection)</b>	
coil resistance (20°C)	0.45 Ohm
max resistance (hot)*	0.55 Ohm
max power (air)	20A/10V (0.2kW)
max power (water)	50A/25V (1.25kW)
<b>Self Inductance</b>	60mH
<b>Water Cooling (18°C)</b>	2 liters/m (0.5 US gpm) 0.5 bar (8 psid)
<b>Overtemperature Interlock</b>	Elmwood 3450G thermostat part number 3450G 611-1 L50C 89/16 mounted on each coil and wired in series. Contact rating 120Vac,0.5A. Closed below 50°C.
<b>Dimensions</b>	Drawing 11610500 604mm W x 270mm D x 359mm H 23.8 inch W x 10.6 inch D x 14.1 inch H
<b>Weight</b>	124 kg (275 lb)

**\*CAUTION - The value of maximum coil resistance given should not be exceeded. At this resistance the coils are at maximum safe temperature for continuous operation.**

**Section 1**  
**SPECIFICATIONS**

**Table 2. Model 5403 Electrical and Water Connections**

**DC Current** (as seen from the front refer to Drawing 11610500)

Right hand terminal:	Negative
Left hand terminal:	Positive

**Ground**

An M4 screw (Item 24 on drawing 11610500) is inside the terminal cover to enable the magnet frame to be grounded according to local safety regulations. It is normally appropriate to connect the magnet frame to the power supply ground.

**Interlocks** (refer to Drawing 11610500).

The temperature interlock wiring connections are made directly onto the temperature thermostats (Item 17 on drawing 11610500).

**Water** (refer to Drawing 11610500).

Outlet	1/8 inch NPT
Inlet	1/8 inch NPT

(mating couplings for 1/4 inch hose provided)

**CAUTION** - Ensure that the high current connections are tight. Loose connections may lead to oxidation and overheating. The field stability may be degraded and the current terminations damaged.

## Section 2

### WARNINGS

#### REFER TO WARNINGS BELOW BEFORE OPERATING ELECTROMAGNET

##### 1 Personnel Safety

In operation the magnet fringing field is in excess of 0.5mT (5G). This can cause malfunctioning of heart pacemakers and other medical implants. We recommend that the fringing field should be mapped and warning signs be placed outside the 0.5mT (5G) contour. Entry to this region should be restricted to qualified personnel.

##### 2 Draw/Clamp Bolts

Before operation always ensure that the draw bolts (item 5 on drawing 11610500) are properly engaged and have their heads firmly against the cap *and* that all clamp bolts (item 18 on drawing 11610500) are firmly tightened. Ensure that the poles are arranged so that that pole gap is approximately centered between the coils.

##### 3 Ferromagnetic Objects

During operation the magnet exerts strong magnetic attraction towards ferromagnetic objects in the near vicinity of its pole gap or coils. Loose objects can be accelerated to sufficient velocity to cause severe personnel injury or damage to the coils or precision pole faces if struck. Keep ferromagnetic tools clear!

##### 4 Arcing

This magnet stores considerable energy in its field during operation. Do not disconnect any current lead while under load or the magnetic field energy will be discharged across the interruption causing hazardous arcing.

##### 5 Coil Hot Resistance

Do not exceed the maximum coil hot resistance given in the specifications or coil overheating and possible damage may occur.

##### 6 Interlocks

These should *always* be connected if the magnet is operated unattended, to avoid the possibility of coil overheating caused by excessive power dissipation or inadequate cooling.

##### 7 Watches, Credit Cards, and Magnetic Disks

Do not move magnetically sensitive items into the close vicinity of the magnet. Even some anti-magnetic watches can be damaged when placed in close proximity to the pole gaps during operation. Credit cards, and magnetic disks are affected by magnetic fields as low as 0.5mT (5G). Depending on the previous operating field and the pole gap, the remanent field in the gap can be in excess of 50G (5mT) with the magnet power supply off or disconnected.

## Section 3

### INSTALLATION

**Caution:** This is a heavy system. All movement, lifting and installation of the 5403 Electromagnet must be under the supervision of an experienced person to prevent the possibility of serious injury or damage to the Electromagnet and associated equipment.

#### Unpacking Instructions and Damage Inspection

To unpack the electromagnet please use the following procedure (Refer to Drawing 18800281).

1. First remove all of the "Hex Head Screws" located at the lower edge of all the side panels of the "Crate Top Cover".
2. Gently rock the "Crate Top Cover" to work it loose from the shipping crate base.
3. Grip the side panels of the Crate Top Cover. Lift "Crate Top Cover" high enough to clear top of electromagnet, walk cover sideways to a clear area and place on floor.
4. Inspect the magnet to ensure that no damage has occurred to the magnet in shipment. If damage is evident report the damage in detail to the shipper for claim and simultaneously notify GMW in case assessment of the damage must be made. If no damage is found proceed with magnet unpacking and installation.
5. Remove the M12 hex head coach bolts that secure the magnet to the shipping crate base".
6. Install M12 lifting eyebolt and washer to top of magnet yoke, screw down firmly.
7. The magnet is now prepared for final installation. Follow the appropriate procedure for direct or base mounting listed below.

#### Direct Mounting

1. With suitable lifting equipment e.g. 250kg (550 lb) minimum safe lifting rating, lift magnet 50mm (2") clear of shipping crate base.
2. Slide shipping crate base clear.
3. Lower magnet to 50mm (2") above floor.
4. Move magnet to final location and bolt magnet down through the four mounting holes provided in the magnet angle bracket (Item 7 on drawing 1610500).

#### Rolling or Rolling/Rotating Base Mounting (refer to Drawing 11900270)

Caution do not attempt to move magnet and rolling base or rolling/rotating base until the magnet has been firmly bolted down to the base.

1. To mount on rolling base or rolling/rotating base lift magnet from BOTH EYEBOLTS high enough to clear top of base.
2. Slide rolling base or rolling/rotating base underneath, lower magnet to 12mm (0.5") above base top surface.
3. Position rolling base or rolling/rotating base so the tapped holes in the base are aligned with the angle mounting bracket holes. Lower the rolling base support legs until they contact the floor, to prevent the base from accidentally moving horizontally.
4. Lower magnet onto rolling base or rolling/rotating base assembly.
5. Secure magnet to rolling base or rolling/rotating base with M10 x 25 long Hex Head Bolts.
6. Raise the support legs and move magnet and rolling base or rolling/rotating base to desired location.

## Section 3

### INSTALLATION

#### **Rolling or Rolling/Rotating Base Mounting (Continued)**

7. Screw down the four support legs located on each corner of the rolling or rolling/rotating base until the wheels clear the floor by 6mm (.25").
8. Secure the support legs with the locknut.
9. Secure rolling/rotating base to an adequate concrete floor to prevent movement and possible injury to personnel during an earthquake.

#### **Pole Selection and Installation (Refer to drawing 11610500).**

Using the field uniformity and induction curves determine the most desirable pole; cylindrical or tapered.

In general:

If a uniform field is required use a cylindrical pole.

If a high field is required use a tapered pole.

Pole removal (refer to drawing 11610500).

1. Turn off the power supply.
2. Loosen the four pole clamping bolts (item 18 on drawing 11610500).
3. Adjust the 5403 magnet for maximum pole gap, i.e. 75mm (3 inch). To adjust the pole gap insert the 17mm hex key wrench (item 2 on drawing 1890030) into the drive bolt (item 5 on drawing 11610500). Rotate clockwise until the pole is fully retracted. Repeat this operation for the other pole.
4. Remove the six cap securing screws (item 28 on drawing 11610500).
5. Pull the pole and cap assembly about 75mm (3 inches) out of the magnet yoke.
6. Grip the cap with one hand and support the pole with the other hand. Remove the pole and cap assembly taking care that the pole face is not damaged by contacting the magnet yoke.
7. Remove the cap (item 4 on drawing 11610500).

Pole fitting (refer to drawing 11610500).

1. Ensure the poles and pole sleeves are clean and free from debris.
2. Reverse the above pole removal sequence above.

#### **Electrical Circuit**

Never connect or remove cables from the magnet with the power supply connected. The stored energy in the magnet can cause arcing resulting in severe injury to personnel or equipment damage.

The magnet has two coils which are connected in series, (Refer to drawing 11610500). The power supply cables should be connected directly to the dc current terminals marked + and -. Recommended current cable for the 5403 is stranded copper of 16mm<sup>2</sup> cross section (4 AWG).

Because the magnet stores a significant amount of energy in its magnetic field, special care should be taken to insure that the current terminations are secure and cannot work loose in operation. Local heating at the terminations can cause rapid oxidation leading to a high contact resistance and high power dissipation at the terminals. If left unattended this can cause enough local heating to damage the terminals and the coils.

## Section 3

### INSTALLATION

#### **The 5403 Interlocks**

The Model 5403 has two thermostats, Elmwood 3450G Part Number 3450G611-1 L50C 89/16. They are located on the center coil cooling plate and wired in series. The thermostats are normally closed, opening when the coil central cooling plate temperature exceeds  $50^{\circ}\text{C} +/3^{\circ}\text{C}$ .

#### **Cooling**

The Model 5403 can be operated to an average coil temperature of  $70^{\circ}\text{C}$ . Assuming an ambient laboratory temperature of  $20^{\circ}\text{C}$  and a temperature coefficient of resistivity for copper of  $0.0039/^{\circ}\text{C}$ , the hot resistance of the coil should not exceed 20% more than the ambient temperature "cold" resistance. The coil thermostat will open when either center coil cooling plate temperature exceeds approximately  $50^{\circ}\text{C}$ . Clean, cool ( $16^{\circ}\text{C} - 20^{\circ}\text{C}$ ) water at 2 l/min at 0.5 bar (8 psid) should be used to cool the 5403 magnet.

The cooling copper tubes are electrically isolated from the coils to avoid electrochemical corrosion. A 50 micron filter should be placed before the input to the magnet to trap particulate and avoid unreliable operation of the water flow switch interlock if fitted.

For continuous operation of the magnet it may be appropriate to use a recirculating chiller to reduce water and drainage costs. The chiller capacity will depend on whether cooling is required for the magnet alone or magnet and power supply. For the Model 5403 Electromagnet alone a suitable chiller is the Bay Voltex model: RRS-0550.

For recirculating cooling systems use distilled or deionized water with a biocide to prevent bacterial growth and corrosion. Do not use corrosion inhibitors in high quality electrical systems since the water conductivity is increased which can result in increased leakage currents and electrochemical corrosion.

#### **Cooling - continued**

At currents of approximately 20A and below the Model 5403 can be operated safely without water cooling. However the coil temperature will vary with the power dissipation. This results in dimensional changes of the magnet yoke and air cooling is not suitable when high field stability is required.

Freon, oil, ethylene glycol or other cooling mediums can be used. The flow required will be approximately inversely proportional to their specific heats. An experimental determination of the flow and pressure required will be necessary.

Avoid cooling the magnet below the dew point of the ambient air. Condensation may cause electrical shorts and corrosion.

During operation the resistance can be checked using a voltmeter across each coil. The voltage will rise to a constant value once thermal equilibrium has been reached. If it is desired to save water, the flow can be reduced until the hot resistance is approached. NOTE: This adjustment must be made slowly enough to allow for the thermal inertia of the coils.

## Section 4

### OPERATION

#### General

The magnet operates as a conventional electromagnet.

1. Adjust the poles to the desired gap with the poles approximately symmetrical about the center magnet line. To reduce mechanical backlash when the magnetic field is applied, it is best to set the poles by increasing the gap.
2. Adjust the cooling water flow to about 2 liters/min (0.5 USgpm) for the 5403. For operation at less than maximum power the water flow may be correspondingly reduced. Note that the inlet water temperature will determine the actual flow rate required. The above specified flow rates were determined with a water inlet temperature of approximately 18°C.
3. Turn on the power supply and increase the current until the desired field is reached.

#### Calibration

The induction curves may be used to estimate the field in the air gap to within four or five percent. More accurate field determination may be obtained by deriving experimentally a calibration curve for the particular pole and air gap combination being used. Magnetic hysteresis in the yoke and poles can cause an error of 30 to 70G (3 to 7mT) with an arbitrary application of such a calibration curve. This effect may be reduced to less than one percent by following a prescribed 'current setting schedule' designed to make the magnet 'forget' its prior magnetic history. The schedule should of course be used both in establishing the calibration curve and in its subsequent use. A possible schedule would be:

From zero current, increase to maximum current and reduce again to zero current. Increase again to maximum current and reduce to the current to give the desired field setting. Approaching the desired field from a higher setting will typically produce better field uniformity. This is because the field changes at the pole edges will normally lag the field change at the center thereby helping to compensate the radial decrease in field.

Greater precision in setting up the calibration curve will be achieved with the use of a digital teslameter and by making a numerical table. This table used with an interpolation routine will eliminate the error associated with reading a graph.

In any event, three points need to be remembered:

1. A calibration curve or table is only as good as the precision employed in generating it.
2. The field is defined only at the point it is measured. It will generally be different at a different point in the air gap. For example, the induction curves refer to the field on the pole axis and at the center of the air gap (median plane).
3. The field is most directly a function of the current in the magnet coils. Voltage across the coils is not a good measure of field since the electrical resistance of the coils depends on the temperature (about 0.4% per degree celsius).

## Section 4

### OPERATION

#### **Field Control Operation**

The necessity to use calibration curves can be avoided by using a field controller to sense the magnetic field and provide a corresponding power supply control signal through the power supply programming inputs. Contact GMW for suitable instrumentation.

## **Section 5**

### **MAINTENANCE**

Periodically check that the pole adjustment mechanism is clean, properly lubricated and free of grit and dirt, which may cause binding of the mechanism. Be very careful not to damage the relatively soft pole surface since this may degrade the magnetic field uniformity in the gap.

Note that the surface treatments used provide good corrosion protection but in order to maintain the inherent mechanical precision of the magnet, heavy build-up of plating materials is deliberately avoided. As a result, high humidity or otherwise seriously corrosive atmospheres can cause corrosion. Periodically apply an appropriate corrosion protection, particularly when the magnet is stored for an extended period.

Check the cooling water circuit to ensure the water is clean and free of debris and bacterial growth. Ensure the in-line water filter is clean.

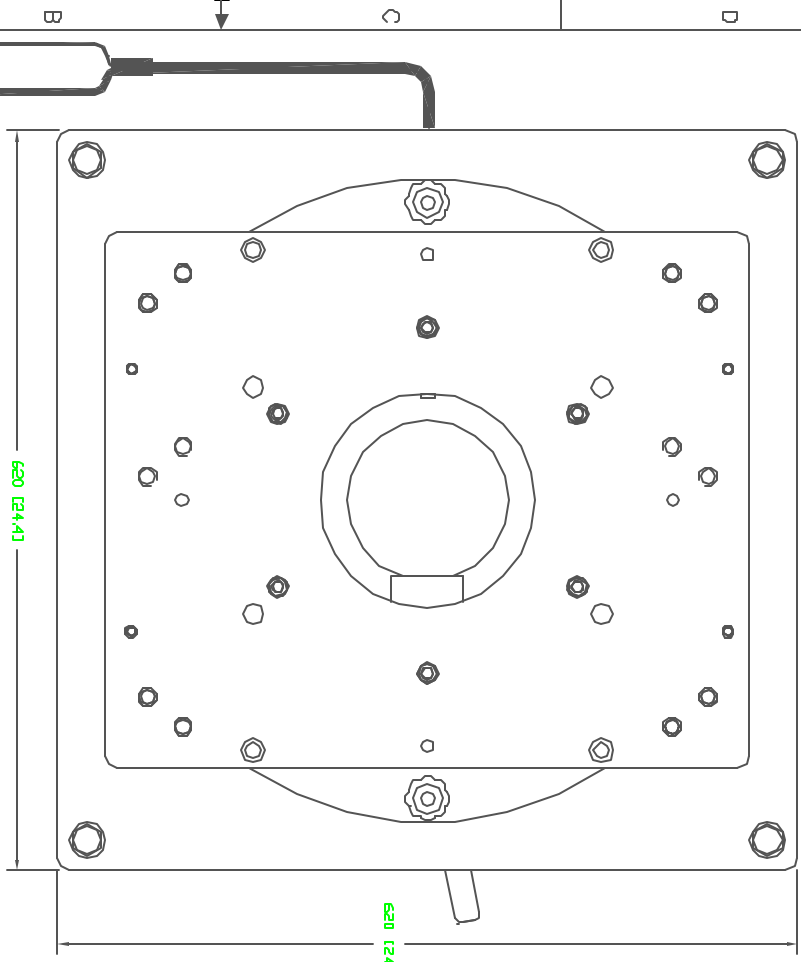
**Section 6**

**STANDARD OPTIONS**

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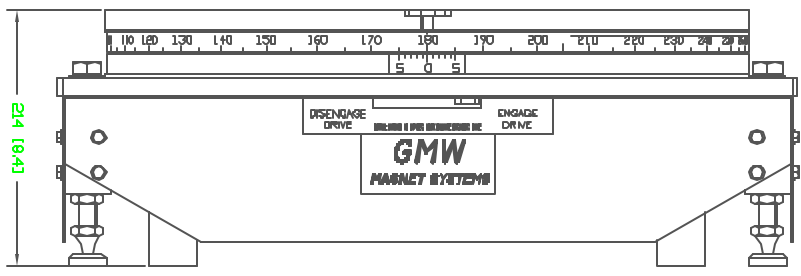
TOP VIEW

NOTE: ROTATING BASE SHOWN AT THE 180° POSITION



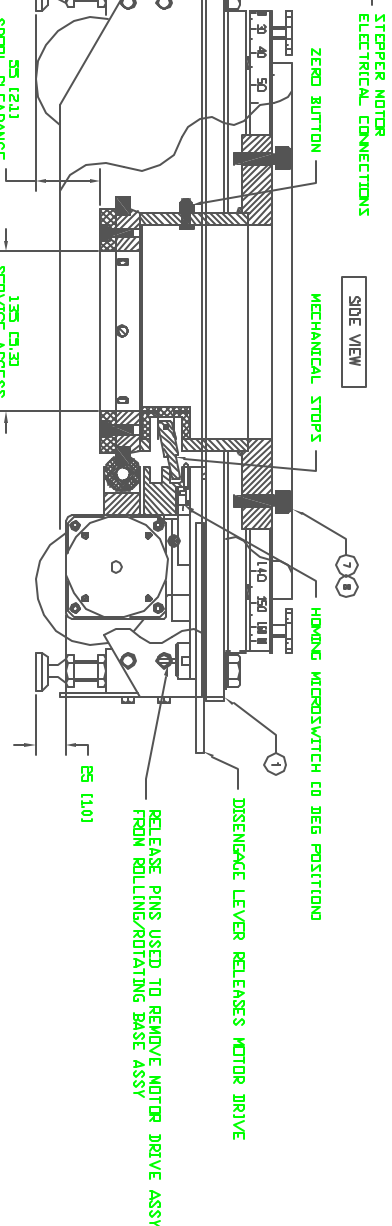
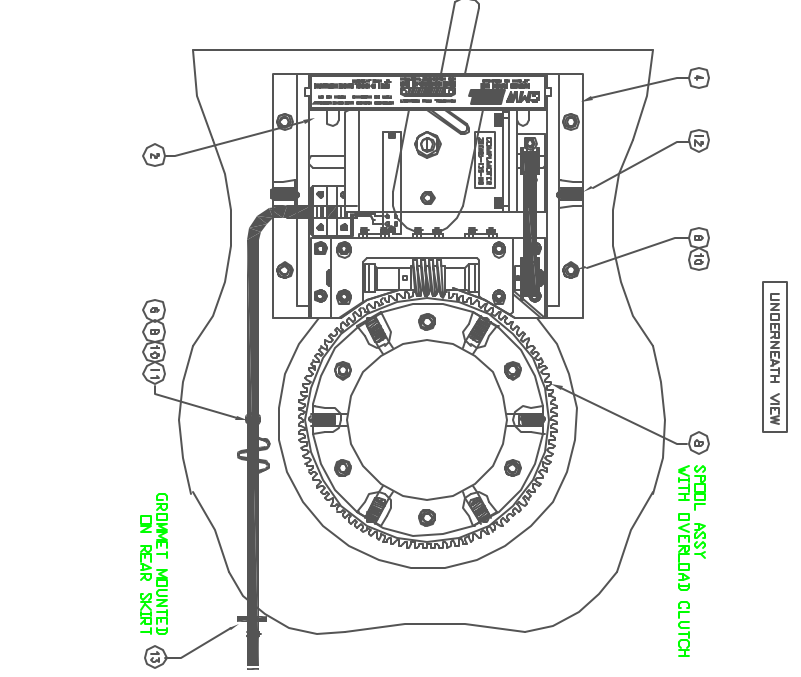
FRONT VIEW

NOTE: ROTATING BASE SHOWN AT THE 180° POSITION



UNDERNEATH VIEW

NOTE: ROTATING BASE SHOWN AT THE 180° POSITION



STEPPER MOTOR ELECTRICAL CONNECTIONS

ZERO BUTTON

SIDE VIEW

MECHANICAL STOPS

7 8

HOMING MICROSWITCH CO DEEG POSITIONING

DISENGAGE LEVER RELEASES MOTOR DRIVE

RELEASE PINS USED TO REMOVE MOTOR DRIVE ASSY FROM ROLLING/ROTATING BASE ASSY

135 (5.31)

620 (24.43)

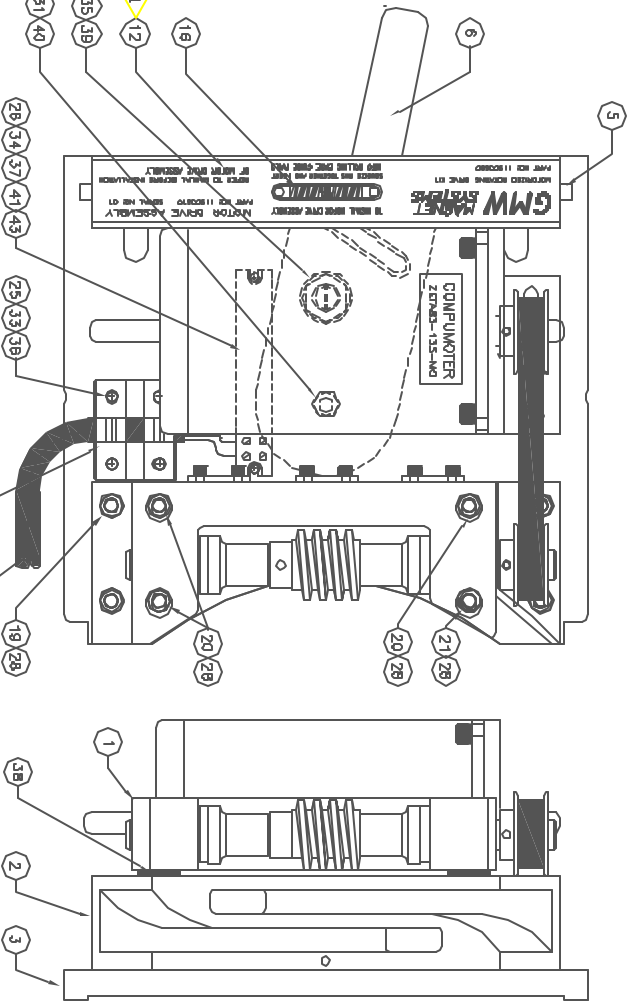
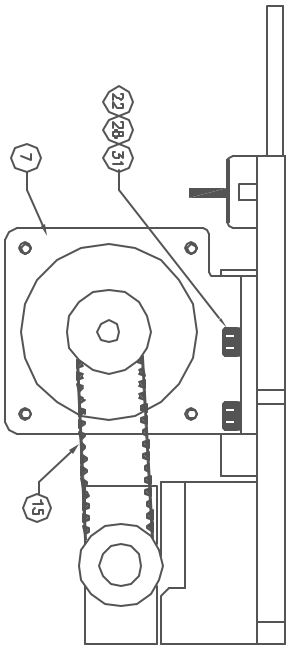
NOTE: ROTATING BASE SHOWN AT THE 180° POSITION

REV	DESCRIPTION	DATE	APPROVED
A	RELEASE	02/11/01	ENGORZAK

ITEM	QTY	DESCRIPTION	UNIT
13	1	GROMMET 25MM OD X 20MM D	
12	2	SCRUB-KON	
11	1	DN 4.33	
10	5	BN-7.92	
9	6	BN 7.92	
8	1	DN 9.12	
7	6	DN 9.12	
6	1	17.901.230	
5	1	109001.01	
4	2	17.901.020	
3	1	11.900.820	
2	1	11.900.811	
1	1	11.900.800	

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 GMW  
 P.O. Box 2578, Redwood City, CA 94064  
 Tel: (650)992-8292 Fax: (650)992-8298  
 MOTORIZED ROT. DRIVE  
 3473/3472/5403  
 A1 11900800  
 SCALE 1:2 IN 1:1

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NOTE:

- 1 INSTALL LABEL [ITEM 12] ONTO LOCK HOUSING [ITEM 4]. THEN TRIM AROUND CUTOUP FOR RELEASE PINS.
- 2 APPLY LODDITE TO THREADS ON [ITEM 24]. THEN ASSEMBLE LOCK HOUSING [ITEM 4], USING S/S SPACER [ITEM 10].
- 3 SCREW DOWN [ITEM 14] SO THAT [ITEM 8] IS RETAINED IN BOTH DEENTS. LOCK IN PLACE WITH [ITEM 39].
- 4 FIT [ITEM 44] OVER EXPOSED AREA OF [ITEM 17]

REV	DESCRIPTION	DATE	APPROVED
A	REVISION		
B	ADD ITEM 44, 49, MOTOR, ITEM 13	07/07/01	030923/AS
C	1.500 ITEM 1, 2, 4, 49, MOTOR &	11/29/01	030923/AS
		01/07/01	030923/AS

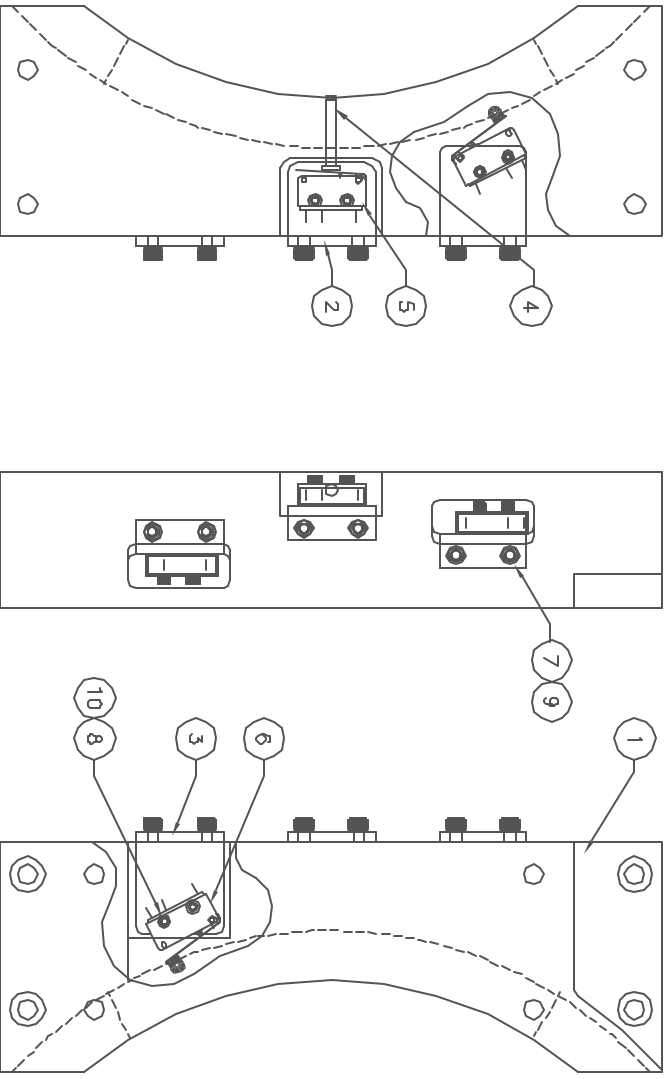
REV	DESCRIPTION	DATE	APPROVED
44	HEAT SHRINK SLEEVING, 4MM		
43	CAPACITOR		
42	SADDLE COPPER 3/8" 10MM		
41	TERMINAL BLOCK, 12 WAY WELDABLE		
40	NUT, M6, HEX HD B 5/5		
39	NUT, M10, HEX HD 5/5		
38	WASHER, SHIM M6 X 18 X 0.5 5/5		
37	WASHER, INT LOCK M3 X 0.5 5/5		
36	WASHER, INT LOCK M4 X 0.5 5/5		
35	WASHER, INT LOCK M10 X 0.5 5/5		
34	WASHER, FLAT M3 X 0.5 5/5		
33	WASHER, FLAT M4 X 0.5 5/5		
32	WASHER, FLAT M5 X 1.0 5/5		
31	WASHER, FLAT M6 X 1.6 5/5		
30	WASHER, FLAT M10 X 1.6 5/5		
29	WASHER, M6 X 1.1, REBED SPRING/STEEL		
28	WASHER, M6 X 1.2, REBED SPRING/STEEL		
27	SHCS M3 X 16 5/5		
26	SCREW PAN HD M3 X 18 5/5		
25	SCREW PAN HD M4 X 18 5/5		
24	SHCS, M6 X 16 LOW PROFILE HD		
23	SHCS, M6 X 12 5/5		
22	SHCS, M6 X 16 5/5		
21	SHCS, M6 X 30 5/5		
20	SHCS, M6 X 26 5/5		
19	SHCS, M6 X 45 5/5		
18	CABLE, 6 SHIELDED PAIRS, 22 AWG, BEBSEN		
17	SPRING, COMPRESSION, 5MM DIA X 50L		
16	BELT, TIMING, BERG 10" (250MM)		
15	BALL PLUNGER, M6		
14	MOTOR STEPPER, COMPUMOTOR		
13	PULLEY, TIMING BELT 18 TEETH, 3/8 SHAWT		
12	SPACER, 4MM LONG 5/5		
11	SPACER, 4MM LONG 5/5		
10	SPACER, 4MM LONG 5/5		
9	SPACER, CABLE CLAMP		
8	DERIVDAGE LEVER [for Model 3473 base]		
7	LOCK BAR		
6	BASE PLATE		
5	STOP BLOCK ASSEMBLY		
4	WORM MOUNT ASSEMBLY		
3			
2			
1			

REV	DESCRIPTION	DATE	APPROVED
1	DO NOT SCALE FROM THIS DRAWING		
2	SOFTWARE AUTOLOD 1.3		

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BOTTOM VIEW

REAR VIEW

TOP VIEW

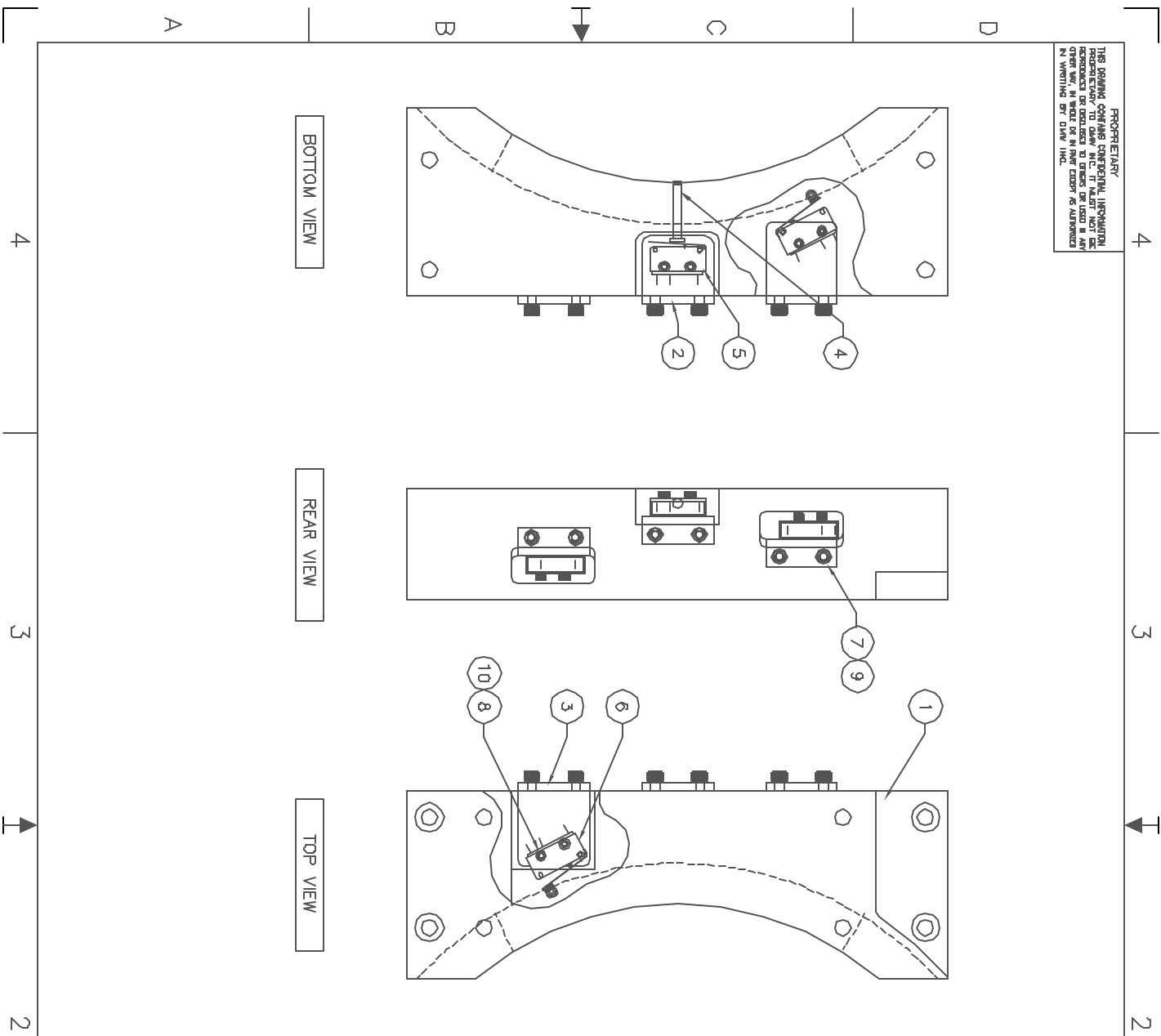
REVISIONS			
REV	DESCRIPTION	DRAWN	DATE
A	RELEASE		07/07/97
		G.DOUGLAS	

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
10	6	BN 752	WASHER, LOCK SP/S M2 X 0.5 SP/S	
9	6	BN 792	WASHER, LOCK SP/S M3 X 0.9 SP/S	
8	6	DN 912	BOLT, SHCS M2 X 10 S/S	
7	6	DN 912	BOLT, SHCS M3 X 10 S/S	
6	2	V4NT7	MICROSWTCH, BURGESS	
5	1	V4NT9	MICROSWTCH, BURGESS	
4	1	17901170	SHAFT, ZERO MICROSWTCH	
3	2	17901160	BRACKET, LIMIT MICROSWTCH	
2	1	17901150	BRACKET, ZERO MICROSWTCH	
1	1	17901070	STOP BLOCK	

DRAWN G. DOUGLAS	DATE 06/02/97	DO NOT SCALE FROM DRAWING	GMW P.O. Box 2578, Redwood City, CA 94064 Tel: (650)902-8292. Fax: (650)902-8298.
CHECK	DATE	PERFORM & DIMENSIONS	
ENGINEERING	DATE	VALUES DIMENSION SPECIES	
		LINEAR DIMENSIONS mm	
		ANGLES DEG	
		FINISH	
11900810	SYSTEM	THIRD ANGLE PROJECTION	
SOFTWARE	AUTOCAD 13		

**MOTORIZED ROT. DRIVE  
 STOP BLOCK ASSY**

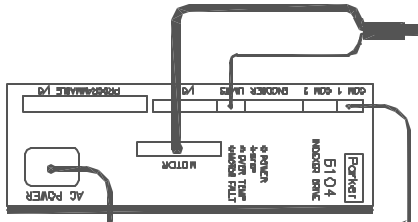
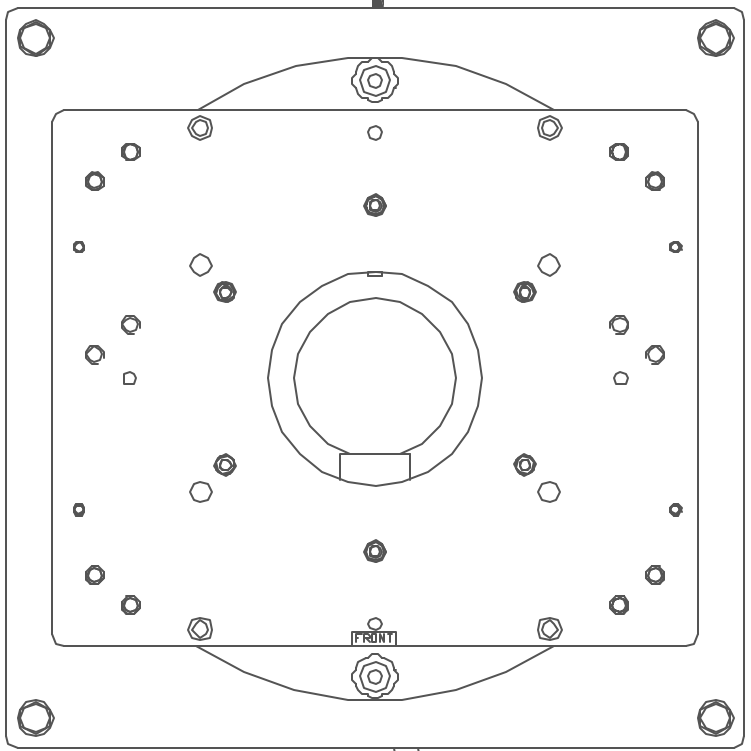
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 DRAWING NO.: 11900840  
 REV: A



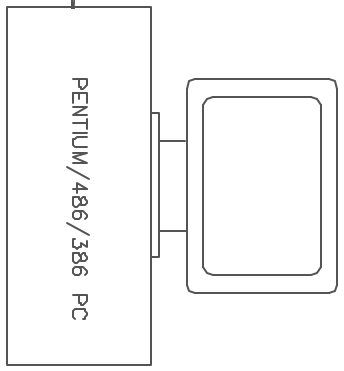


PROVISIONAL  
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TOP VIEW



STEPPER MOTOR CONTROLLER



CONTROL COMPUTER

REV	DESCRIPTION	DATE	APPROVED
A	RELEASE	02/17/91	EDWARDS

REVISIONS

ITEM	QTY	PART NUMBER	DESCRIPTION	REV
1				
2				
3				
4				
5				
6				
7				
8				

DO NOT SCALE	DATE	11/11/90
BY	EDWARDS	
CHECKED	EDWARDS	
APPROVED	EDWARDS	
DATE	11/11/90	
SCALE	1:1	
SHEET	1 OF 1	

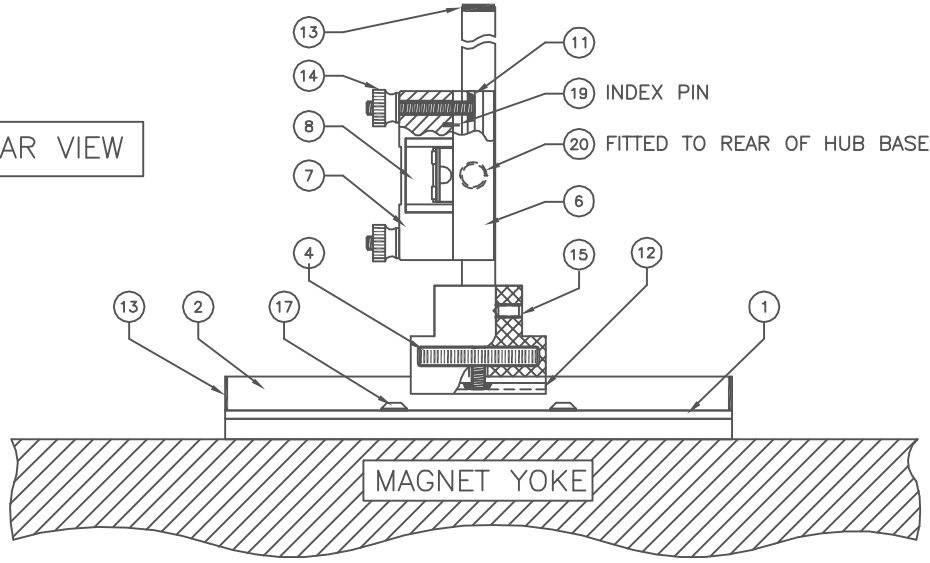
MOTORIZED ROT. DRIVE  
 ELECTRICAL ASSY  
 A1 11901020  
 SCALE 1:1



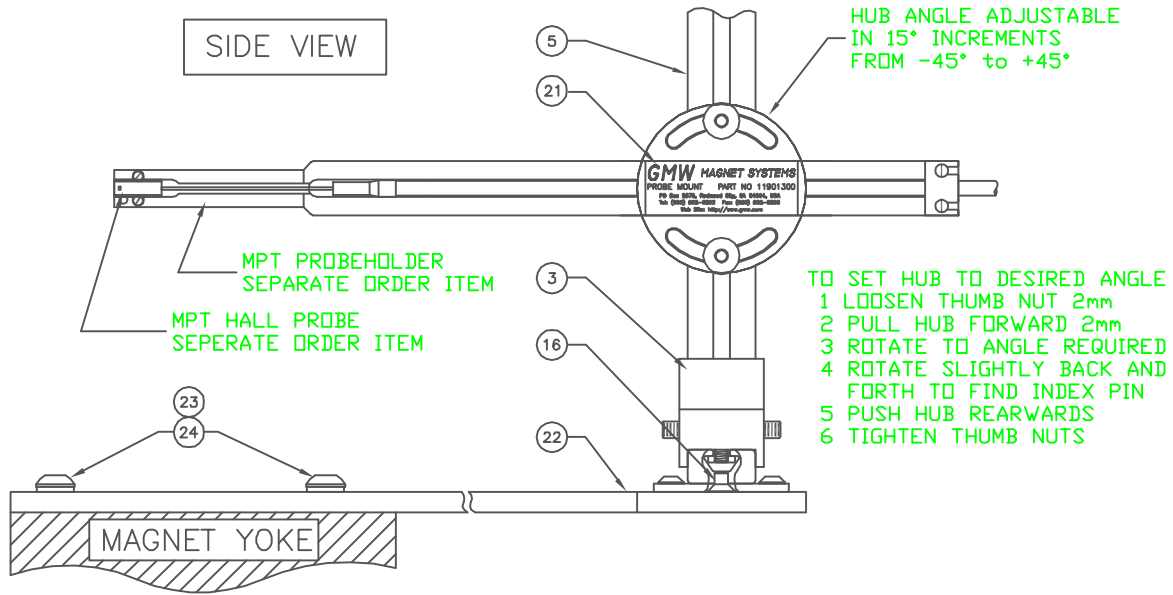


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REAR VIEW



SIDE VIEW



REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		09/16/98	G.DOUGLAS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
24	4	ISO 7380	SHCS M6 X 12 BUTTON HD S/S	
23	4	DIN 433	WASHER, M6 X 1.6 FLAT S/S	
22	1	17903000	MAGNET MOUNTING PLATE	
21	1	10900320	LABEL, IDENTIFICATION	
20	1	SBMH8	BALL PLUNGER, M8 S/S VLIER	
19	2	VSM 12771B	DOWEL PIN M1 X 5 S/S [Index Pin]	
18	1	BN 1073	SET SCREW, M6 X 5 SLOTTED HD NYLON	
17	4	ISO 7380	SHCS M4 X 8 BUTTON HD S/S	
16	5	DIN 7991	SHCS, M4 X 6 FLAT HEAD S/S	
15	2	DIN 917	SHSS M4 X 8 CONE POINT S/S	
14	2	08M040070TN	THUMB NUT, NYLON	
13	3	18-830	ITEM PRODUCTS, END CAP, PLASTIC	
12	1	17902010	BASE STUD	
11	1	17902000	HUB STUD	
10	1	17901990	HUB INSERT [For Sentron Hall Probes]	
9	1	17901980	HUB INSERT [For Metrolab NMR probes]	
8	1	17901970	HUB INSERT [for Grp3 MPT Hall Probes]	
7	1	17901960	HUB COVER	
6	1	17901950	HUB BASE	
5	1	17901943	VERTICAL MOUNTING EXTRUSION	
4	1	17901930	BASE NUT	
3	1	17901920	BASE SUPPORT	
2	1	17902090	BASE MOUNTING EXTRUSION	
1	1	17902080	BASE MOUNTING PLATE	

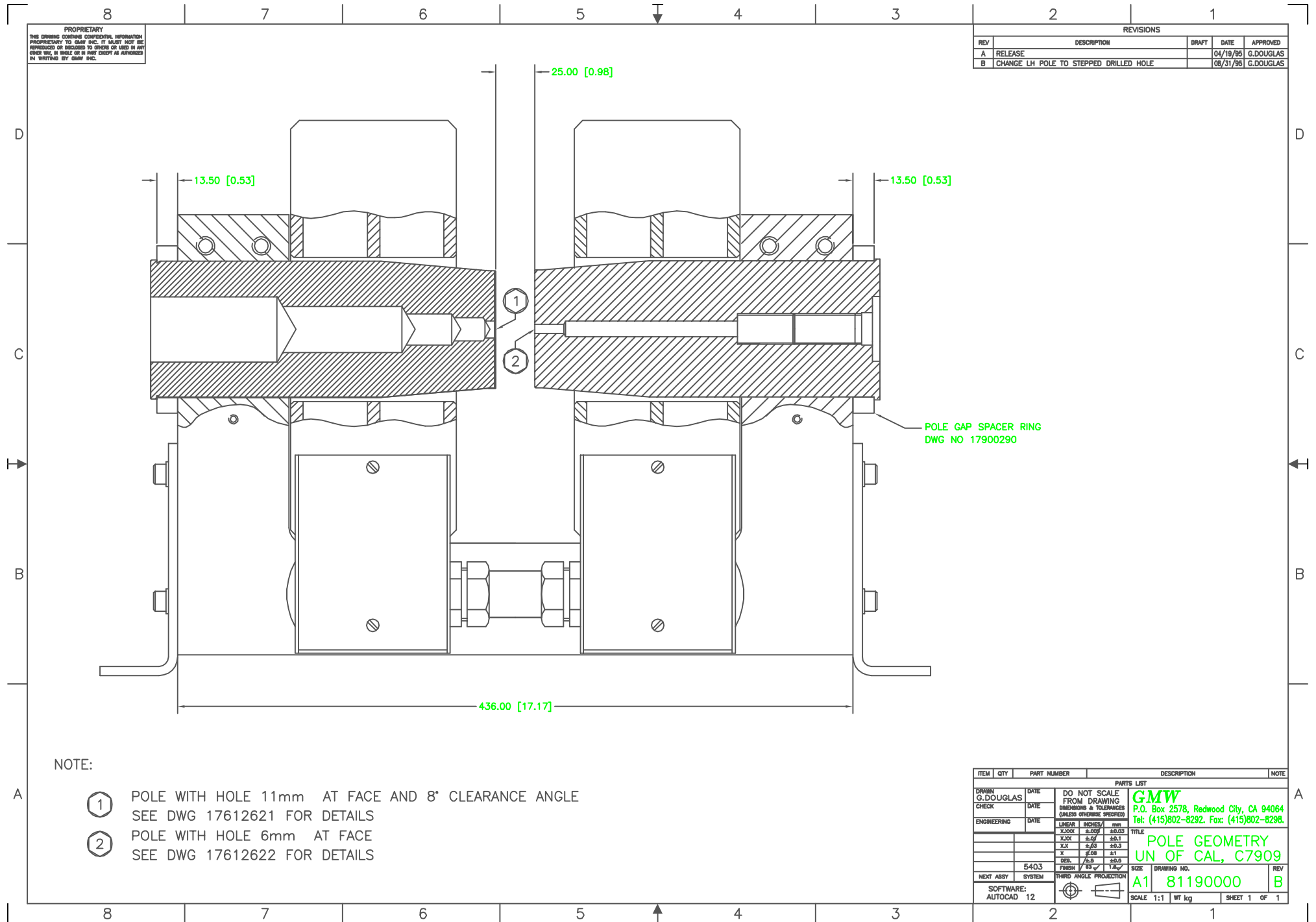
PARTS LIST				
DRAWN G.DOUGLAS	DATE 09/16/98	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)		
CHECK	DATE	LINEAR	INCHES	mm
ENGINEERING	DATE	X.XXX	±.007	±0.03
		X.XX	±.01	±0.1
		X.X	±.03	±0.3
		X	±.08	±1
		DEC.	±.5	±0.5
		FINISH	63 ✓	1.6 ✓
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION		
SOFTWARE AUTOCAD 13				
TITLE		<b>GMW</b> 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292. Fax: (650)802-8298.		
DRAWING NO.		SIZE <b>A2 11901280</b>		
SCALE 1:1		WT kg SHEET 1 OF 1		

**Section 7**

**CUSTOM OPTIONS**

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REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/19/95	G.DOUGLAS
B	CHANGE LH POLE TO STEPPED DRILLED HOLE		08/31/95	G.DOUGLAS



NOTE:

- ① POLE WITH HOLE 11mm AT FACE AND 8° CLEARANCE ANGLE  
 SEE DWG 17612621 FOR DETAILS
- ② POLE WITH HOLE 6mm AT FACE  
 SEE DWG 17612622 FOR DETAILS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				
DRAWN G.DOUGLAS		DATE		
CHECK		DATE		
ENGINEERING		DATE		
		DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)		
		UNITS: MILLIMETERS		
		TOLERANCES: ±0.05 ±0.1 ±0.3 ±0.5 ±1.0		
		SURFACE FINISH: RA 3.2		
NEXT ASSY SYSTEM		THIRD ANGLE PROJECTION		
SOFTWARE: AUTOCAD 12		SCALE 1:1 WT kg		
		SHEET 1 OF 1		

**GMW**  
 P.O. Box 2578, Redwood City, CA 94064  
 Tel: (415)802-8292. Fax: (415)802-8288.

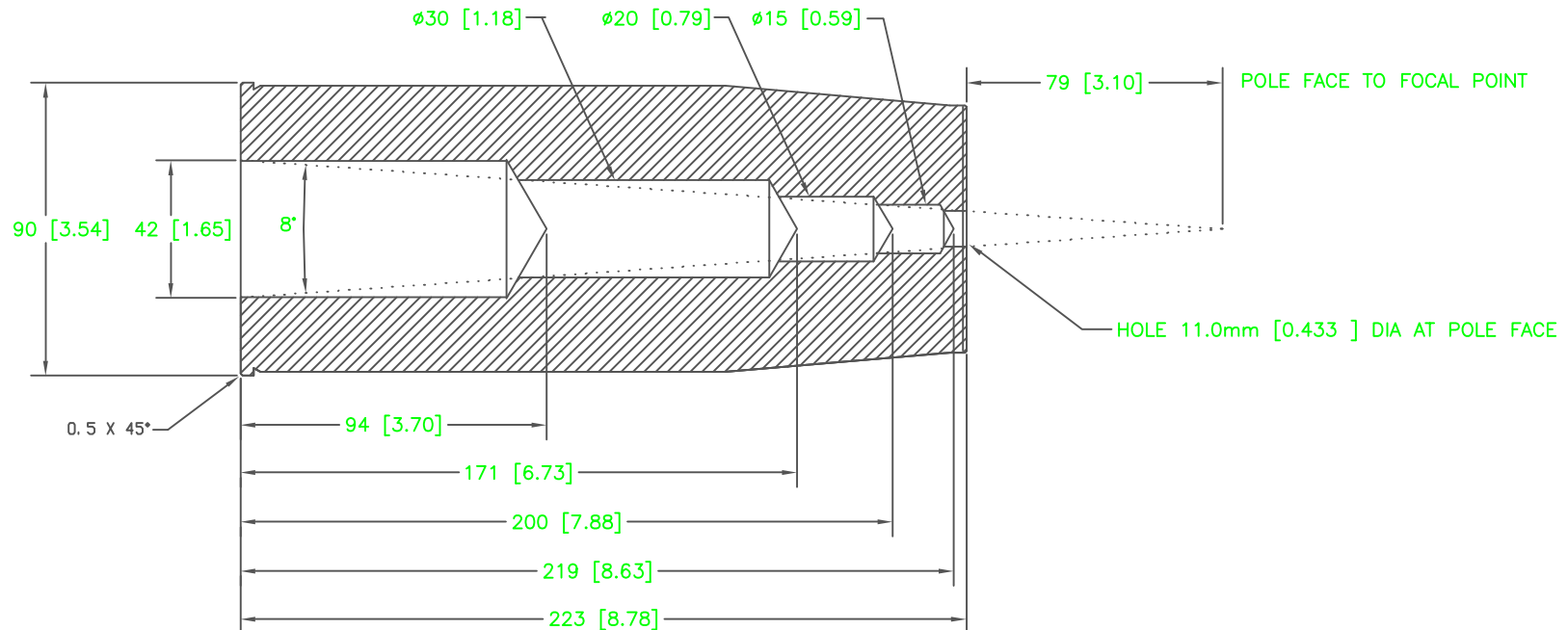
TITLE  
**POLE GEOMETRY  
 UN OF CAL, C7909**

SIZE OF DRAWING NO.  
**A1 81190000**

REV  
**B**

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REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/17/95	G.DOUGLAS
B	CHANGE TO STEPPED DRILLED HOLE		06/17/95	G.DOUGLAS



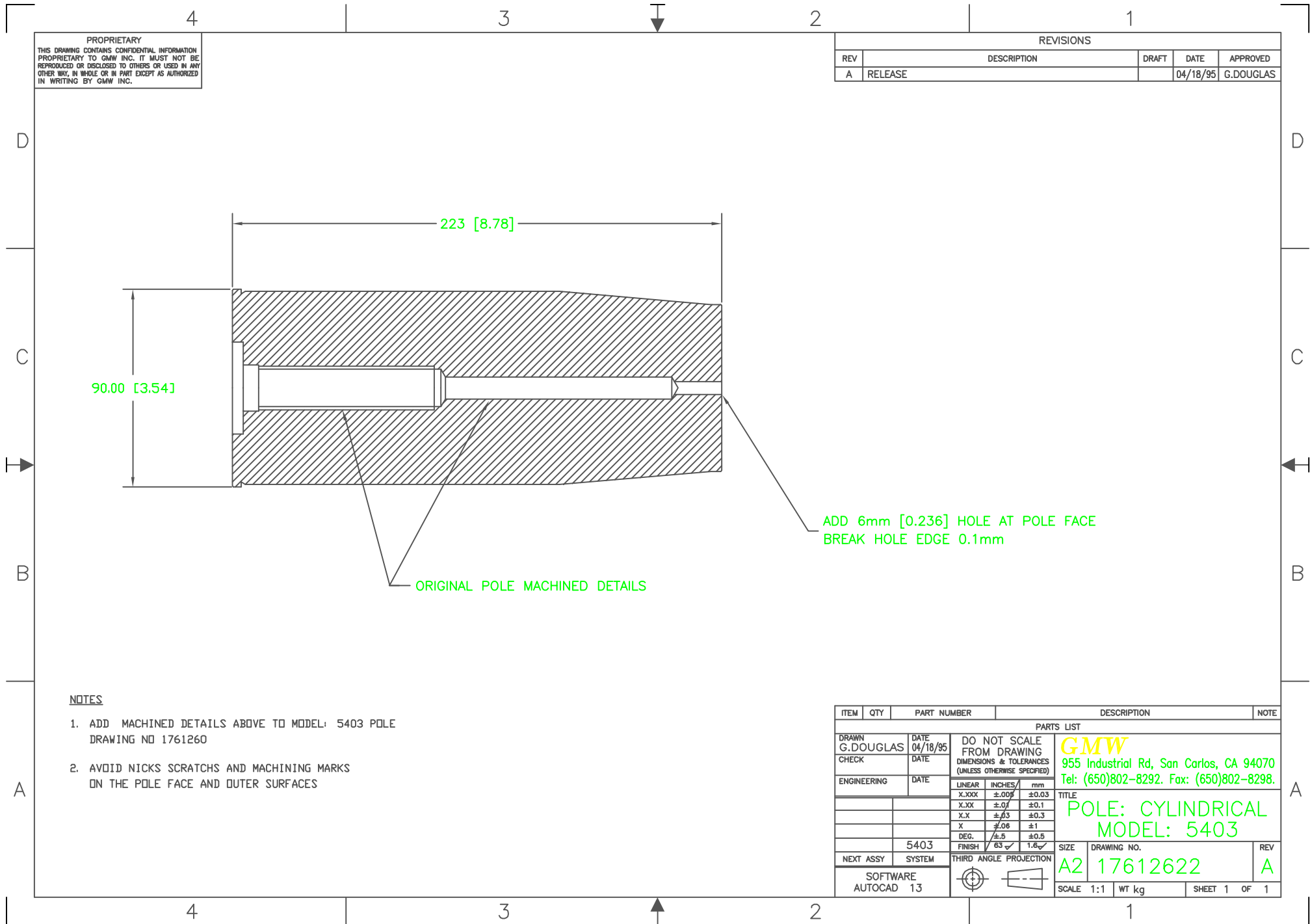
**NOTES**

1. ADD MACHINED DETAILS ABOVE TO MODEL: 5403 POLE  
DRAWING NO: 17612620
2. AVOID NICKS SCRATCHS AND MACHINING MARKS  
ON THE POLE FACE AND OUTER SURFACES

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				
DRAWN G.DOUGLAS	DATE 04/18/95	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)		<b>GMW</b> P.O. Box 2578, Redwood City, CA 94064 Tel: (415)802-8292 Fax: (415)802-8298.
CHECK	DATE	LINEAR	INCHES	
ENGINEERING	DATE	X.XXX	±.009 ±0.03	
		X.XX	±.01 ±0.1	
		X.X	±.03 ±0.3	
		X	±.06 ±1	
		DEC.	±.5 ±0.5	
		FINISH	63 ✓ 1.6 ✓	
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION		SIZE <b>A2</b>
SOFTWARE: AUTOCAD 12				DRAWING NO. <b>17612621</b>
		SCALE 1:1 WT kg		REV <b>B</b>
			SHEET 1 OF 1	

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REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/18/95	G.DOUGLAS



ADD 6mm [0.236] HOLE AT POLE FACE  
 BREAK HOLE EDGE 0.1mm

ORIGINAL POLE MACHINED DETAILS

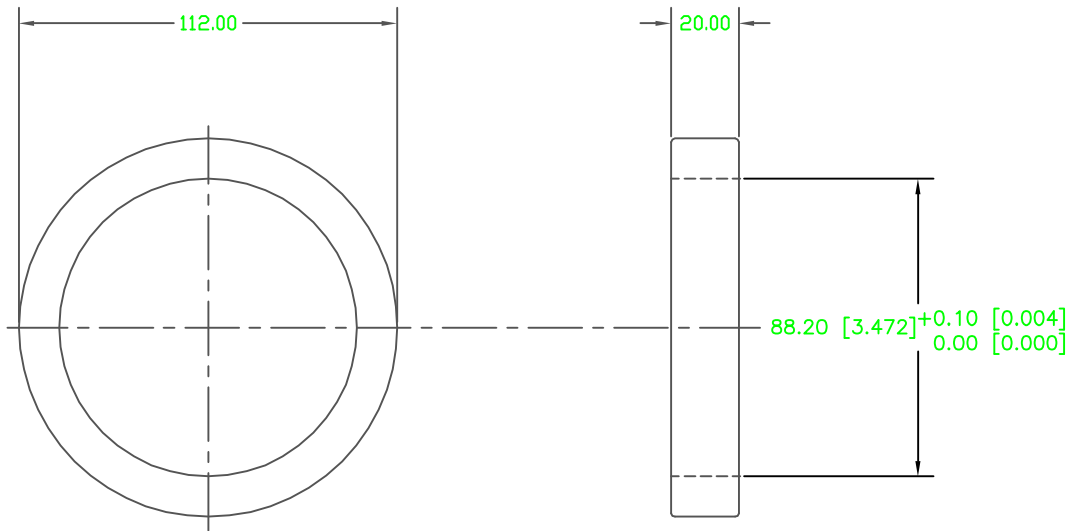
NOTES

1. ADD MACHINED DETAILS ABOVE TO MODEL: 5403 POLE  
DRAWING NO 1761260
2. AVOID NICKS SCRATCHS AND MACHINING MARKS  
ON THE POLE FACE AND OUTER SURFACES

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				
DRAWN G.DOUGLAS	DATE 04/18/95	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)		<b>GMW</b> 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE	LINEAR	INCHES / mm	
ENGINEERING	DATE	X.XXX	±.009 / ±0.03	
		X.XX	±.01 / ±0.1	
		X.X	±.03 / ±0.3	TITLE
		X	±.06 / ±1	POLE: CYLINDRICAL MODEL: 5403
		DEC.	±.5 / ±0.5	SIZE
		FINISH	63 ✓ / 1.6 ✓	DRAWING NO.
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION		REV
SOFTWARE AUTOCAD 13				A2 17612622
SCALE 1:1			WT kg	SHEET 1 OF 1

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REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		11/20/96	G.DOUGLAS

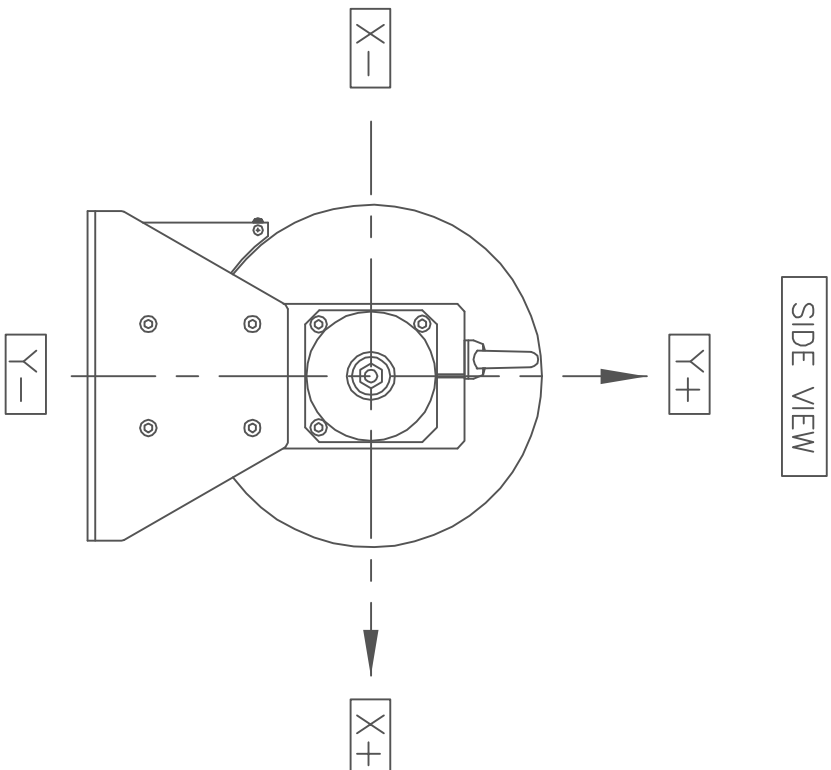
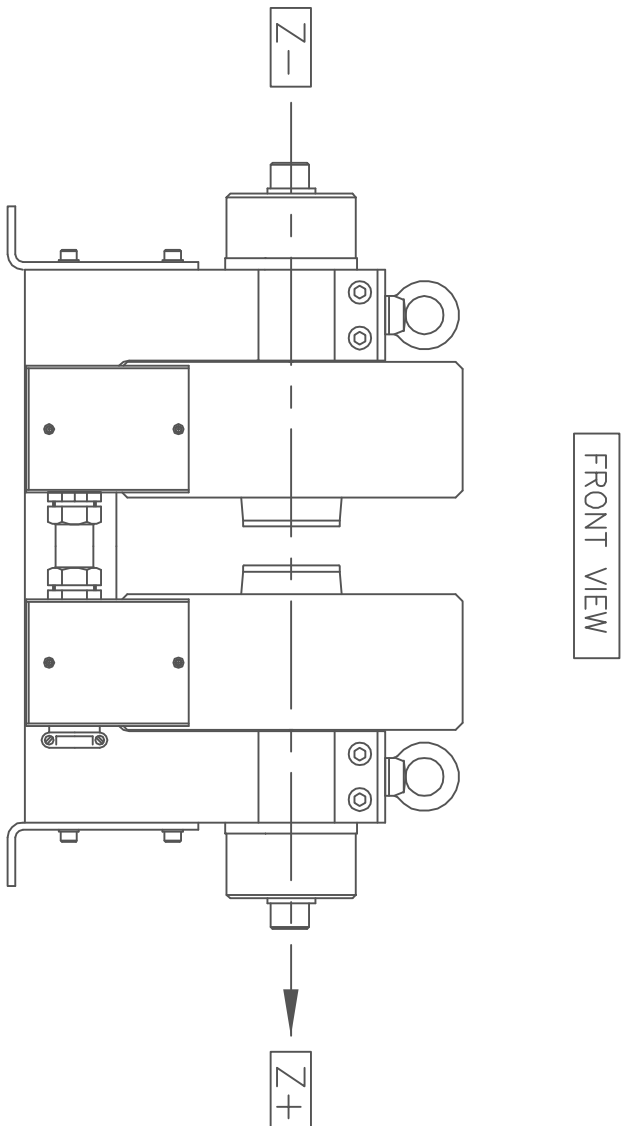


TWO POLE SPACER RINGS 20MM THICK INSTALLED ON 5403 MAGNET GIVE POLE GAP OF 38MM

NOTE:

1. MATERIAL CARBON STEEL
2. FINISH E.N PLATE 0.01 THICK
3. QUANTITY OF 2 RINGS PER MAGNET NEEDED.
4. DRAWING SHOWS DIMENSIONS BEFORE PLATING

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				
DRAWN G.DOUGLAS	DATE 11/20/96	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)		<b>GMW</b> P.O. Box 2578, Redwood City, CA 94064 Tel: (415)802-8292 Fax: (415)802-8298. <b>POLE SPACER RING            MODEL: 5403</b>
CHECK	DATE	LINEAR	INCHES	
ENGINEERING	DATE	X.XXX ±.009	±.03	
		X.XX ±.07	±0.1	
		X.X ±.03	±0.3	
		X ±.06	±1	
		DEC. ±.5	±0.5	
		FINISH 63 ✓	1.6 ✓	
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION		SIZE
SOFTWARE: AUTOCAD 13				DRAWING NO. <b>A2 17900290-20</b>
			SCALE 1:1	WT kg
			SHEET 1	OF 1



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MAGNETIC PLOTTING AXIS

809000040

A

SHEET 1 OF 1

# GMW ASSOCIATES

## LABORATORY ELECTROMAGNET UNIFORMITY PLOT

Model 5403  
Serial No 42

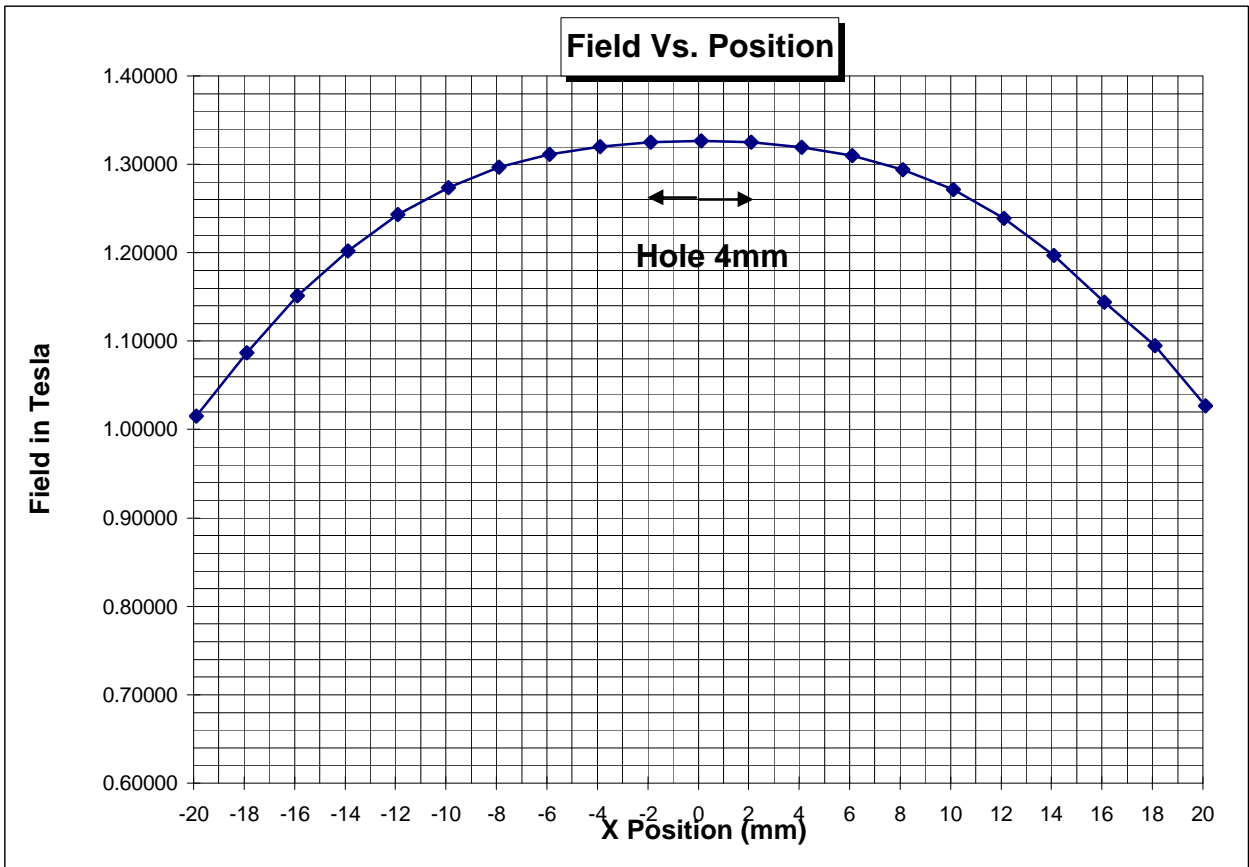
Pole Face 38 mm  
Pole Gap 25 mm  
Hole Dia 4mm  
US Army Redstone Arsenal

Engr Toomas Rett  
Date June 27, 1995

Magnet Current 50 Amps

C7915

Plot Y = 0.0 mm, Z = 0.0 mm				
X - mm	Magnet Field Tesla	X + mm	Magnet Field Tesla	Magnet Field Average Tesla
0	1.31090	0	1.31090	1.31093
-2	1.30950	2	1.30915	1.30933
-4	1.30475	4	1.30395	1.30435
-6	1.29600	6	1.29415	1.29508
-8	1.28145	8	1.27850	1.27998
-10	1.25845	10	1.25585	1.25715
-12	1.22800	12	1.22315	1.22558
-14	1.18620	14	1.18145	1.18383
-16	1.13550	16	1.12820	1.13185
-18	1.07110	18	1.07895	1.07503
-20	0.99980	20	1.01120	1.00550
0	1.31095	0	1.31090	1.31093



# GMW ASSOCIATES

## LABORATORY ELECTROMAGNET UNIFORMITY PLOT

Model 5403  
 Serial No 42

Pole Face 38 mm  
 Pole Gap 25 mm  
 Hole Dia 4mm

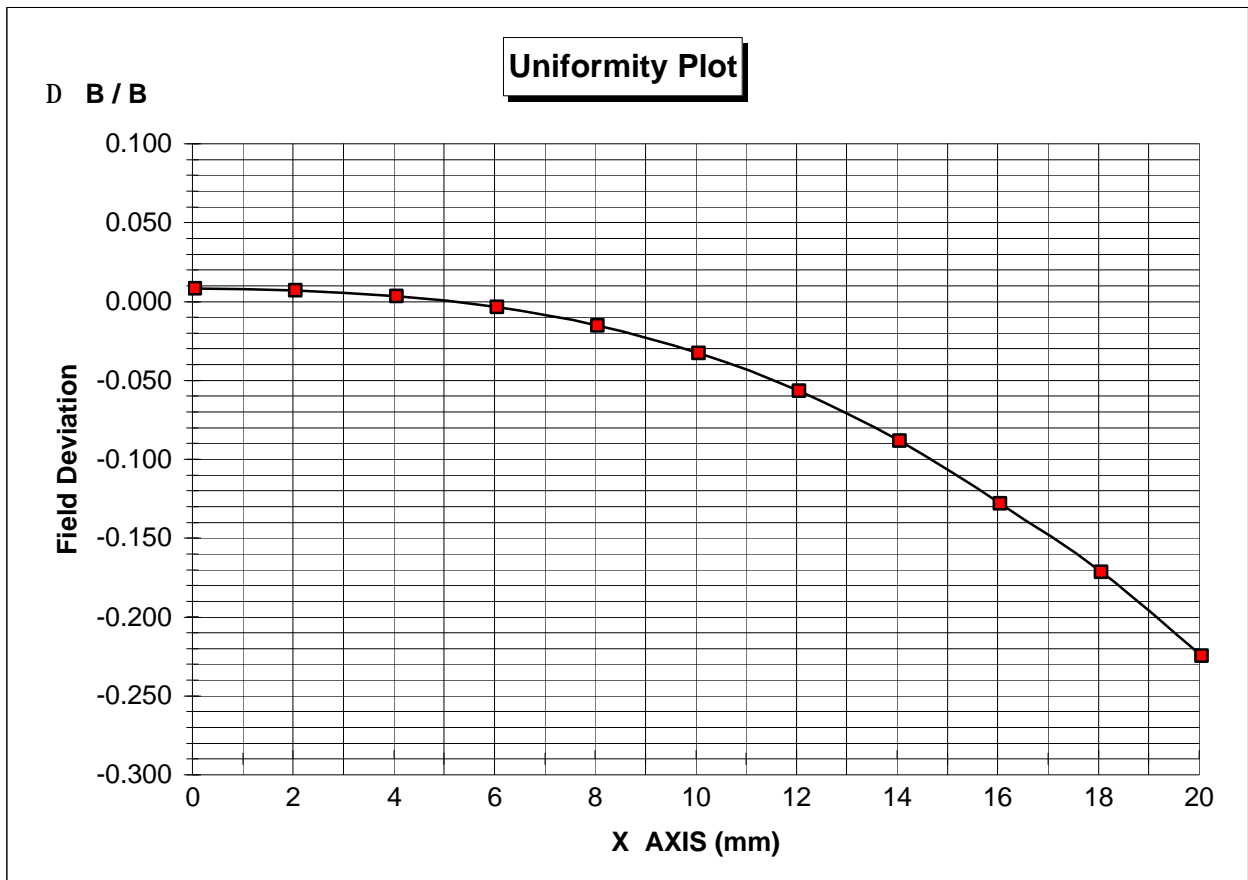
Engr Toomas Rett  
 Date June 27, 1995

Magnet Current: 50 Amps

US Army Redstone Arsenal

C7915

Plot Y = 0.0 mm, Z = 0.0 mm				
X - mm	Magnet Field Tesla	X + mm	Magnet Field Tesla	Magnet Field Average Tesla
0	1.31090	0	1.31090	1.310925
-2	1.30950	2	1.30915	1.309325
-4	1.30475	4	1.30395	1.304350
-6	1.29600	6	1.29415	1.295075
-8	1.28145	8	1.27850	1.279975
-10	1.25845	10	1.25585	1.257150
-12	1.22800	12	1.22315	1.225575
-14	1.18620	14	1.18145	1.183825
-16	1.13550	16	1.12820	1.131850
-18	1.07110	18	1.07895	1.075025
-20	0.99980	20	1.01120	1.005500
0	1.31095	0	1.31090	1.310925

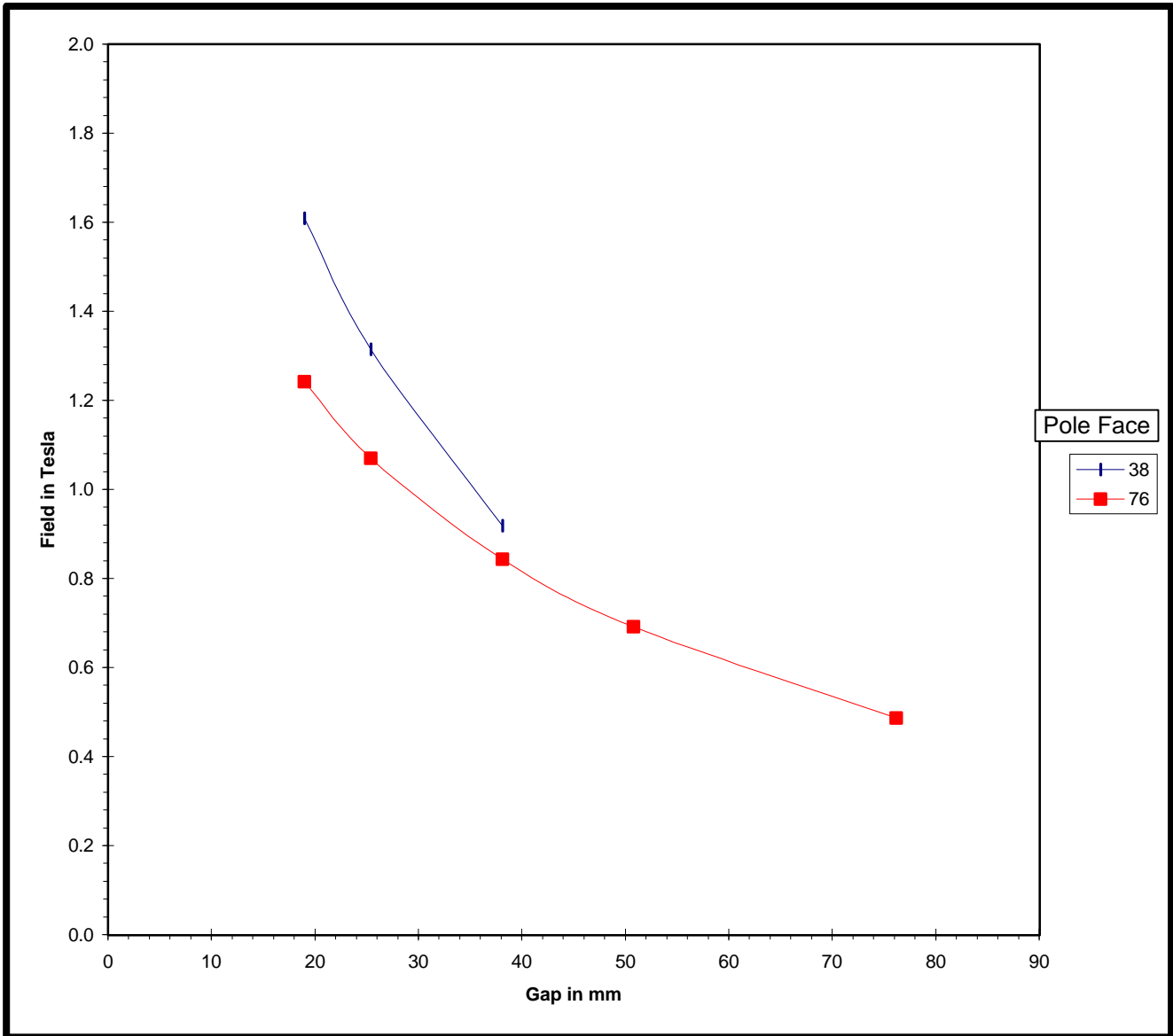


## **Section 8**

### **EXCITATION CURVES**

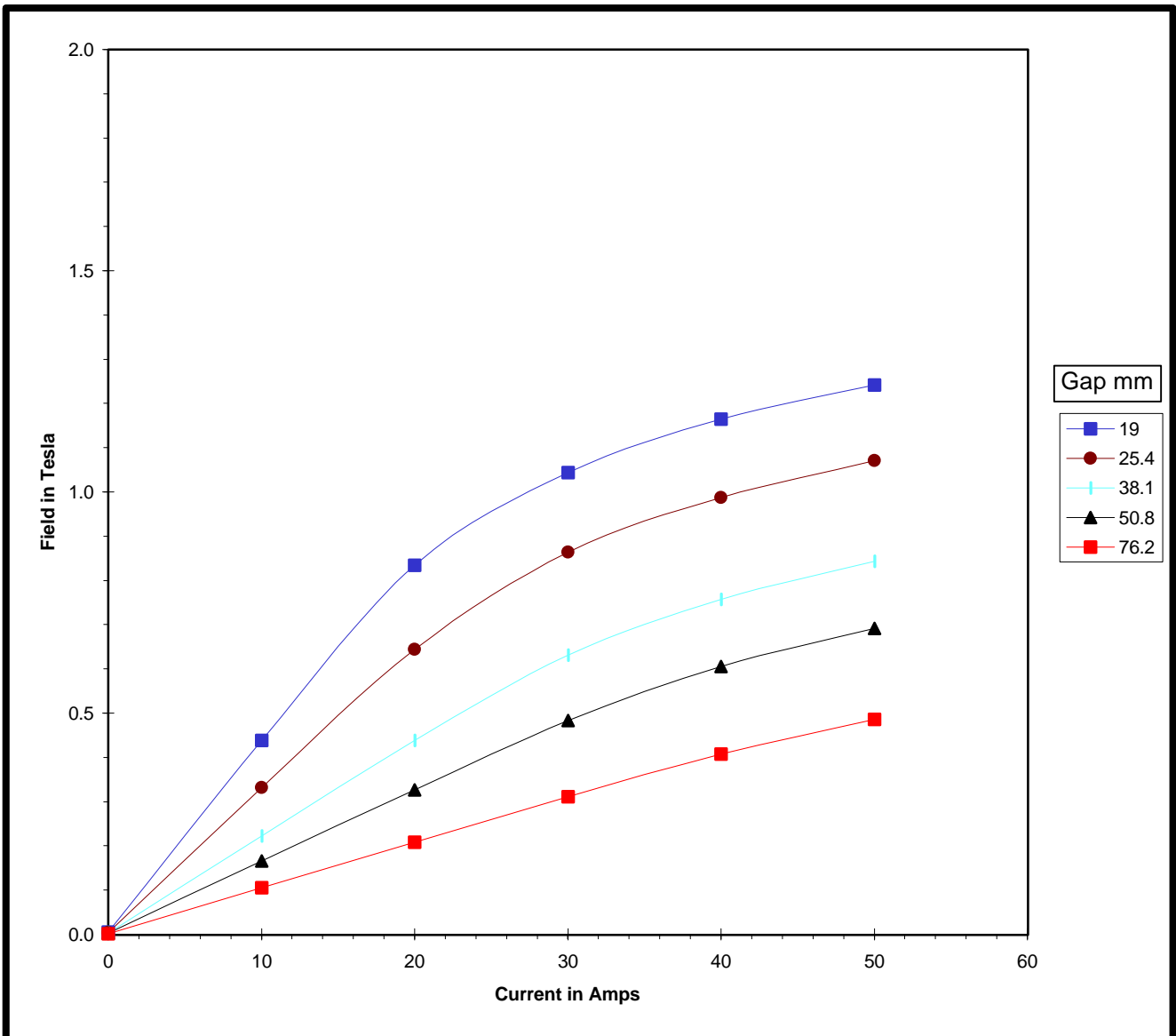
**GMW Associates**  
**Electromagnet Excitation Plot**  
**Field Vs Gap**

Contract No:		Page: 1 of 1	Date: May 18, 89
Customer:			Engr: G.Douglas
Model: 5403		Power Supply:	Set Current: 50 Amps
Serial No: 12		Serial No:	Target Field:
Pole Face: As per table below		Position: X=0, Y=0, Z=0	
Serial No: None		Notes:	
Pole Gap: As per table below			
Pole Spacers: None			



## GMW Associates Electromagnet Excitation Plot Field Vs Current

Contract No:	Page: 1 of 2	Date: May 19, 89
Customer:		Engr: G.Douglas
Model: 5403	Power Supply:	Set Current:
Serial No: 12	Serial No:	Target Field:
Pole Face: 76 mm	Position: X=0, Y=0, Z=0	
Serial No: None	Notes:	
Pole Gap: As per table below		
Pole Spacers: None		

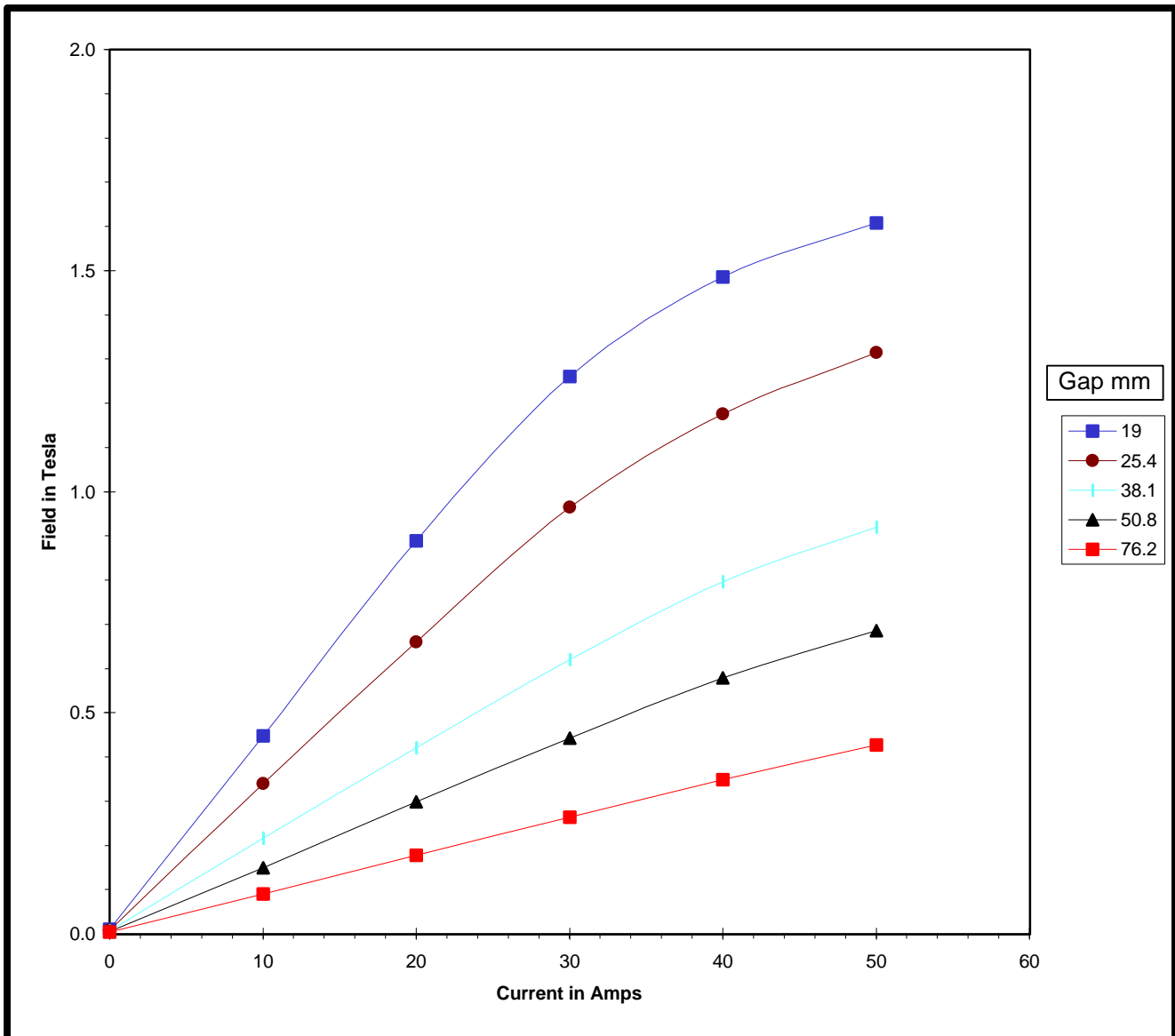


# GMW Associates

## Electromagnet Excitation Plot

### Field Vs Current

Contract No:	Page: 2 of 2	Date: May 19, 89
Customer:		Engr: G.Douglas
Model: 5403	Power Supply:	Set Current:
Serial No: 12	Serial No:	Target Field:
Pole Face: 38 mm	Position: X=0, Y=0, Z=0	
Serial No: None	Notes:	
Pole Gap: As per table below		
Pole Spacers: None		



**Section 9**

**TEST DATA**

**Section 10**

**DRAWINGS**

applications that require precision control of high electric loads to 8 Amp resistive.

The 3450R and 3455R have a patented metal insert rivet construction.

The 3455R (.484" or 12.5mm) overall, has higher spacing as required by European approval agencies. Model 3455RBV is an epoxy overmold version of the 3455R, specifically designed for electrical insulation or protection in a high humidity environment. Consult factory for performance qualifications.

To insure that a safe combination of thermostat and application is achieved, the purchaser must determine product suitability for their individual requirements.

A: Amps  
FLA: Full Load Amps  
LRA: Locked Rotor Amps  
Contacts are available for millivolt and milliamp applications.  
\*Includes UL and CSA ratings.  
Consult Elmwood Sensors for additional ratings.

**Key Features:**

- *Electric Rating to 15 Amp 120 VAC Resistive*
- *Environmental Exposure 0° to 350° F (-18° to 177° C)*
- *UL recognized and CSA certified and European Approved*
- *Single-Pole, Single-Throw (SPST)*
- *Pre-set and Tamperproof*
- *Variety of Mounting Brackets and Terminals Available*

# SERIES 3450/3450R/3455R/3455RBV 15 AMP THERMOSTATS

## Standard Temperature Characteristics

Operating Temperature Range The tightest specification determines the group	Tolerance Allowable <sup>a</sup> ± at mean temperature set points				Standard Mean Differential Nominal degrees between opening and closing points		Price Group <sup>a</sup>
	Open		Close		°F	°C	
	±°F	±°C	±°F	±°C			
32° to 79°F 0° to 25°C	5	2.8	8	4.4	30-50	16-28	I
	5	2.8	7	3.9	25-29	14-16	II
	5	2.8	6	3.3	20-24	11-13	III
	5	2.8	6	3.3	15-19	8-11	IV
80° to 200°F 25° to 95°C	5	2.8	8	4.4	30-50	16-28	I
	5	2.8	7	3.9	25-29	14-16	II
	5	2.8	6	3.3	20-24	11-14	III
	6	2.2	5	2.8	15-19	8-11	IV
201 to 250°F 96° to 120°C	6	4.4	8	4.4	30-50	16-28	I
	6	3.9	7	3.9	25-29	14-16	II
	6	3.3	6	3.3	20-24	11-14	III
	6	2.8	6	2.8	15-19	8-11	IV
251 to 302°F 121.7° to 148.9°C	7	3.9	8	4.4	30-50	16-28	I
	7	3.9	7	3.9	30-50	16-28	II
	7	3.9	7	3.9	20-29	11-16	III
	6	3.3	7	3.9	15-19	8-11	IV

<sup>a</sup>Grouped according to level of accuracy required. Group I with greatest latitude is less expensive than Group II, etc. Please consult factory for temperature ranges, tolerances and differentials not noted. The operating temperature ranges include tolerances.

The ± tolerances shown have been established after careful review of many thermostat applications. Attempts should be made to establish the widest acceptable tolerance possible. For example, the chart may list a tolerance of ±5°F (±2.8°C); however, ±6°F (±3.3°C) may be acceptable for the application at reduced cost.

Note: Temperature checking methods may be slightly different, and allowance for a 1.8°F (1°C) variance should be considered.

See Section B of the Terminal and Bracket Guide for dimensional characteristics.

## Operating Parameters

Dielectric Strength	MIL-STD-202 Method 301 -2000 VAC 60 Hz - Terminal to Case
Insulation Resistance	MIL-STD-202 Method 302 Cond. B - 500 Megohms - 500 Volts DC applied
Environmental Exposure	0° to 350°F (-18° to 177°C)
Operating Temp. Range	32° to 302°F (0° to 150°C)
Contact Resistance	MIL-STD-202, Method 307 - 50 Milliohms
Marking	MIL-STD-1285
Weight	6 Grams (Brackets and wire leads not included)
Materials	Base: Phenolic Terminals: Plated Brass or Steel Closure: Aluminum, Stainless Steel, or Brass Brackets: Aluminum, Stainless Steel, or Brass Contacts: Silver

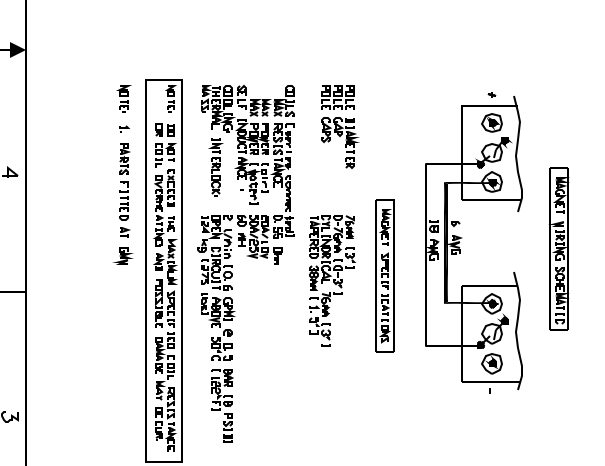
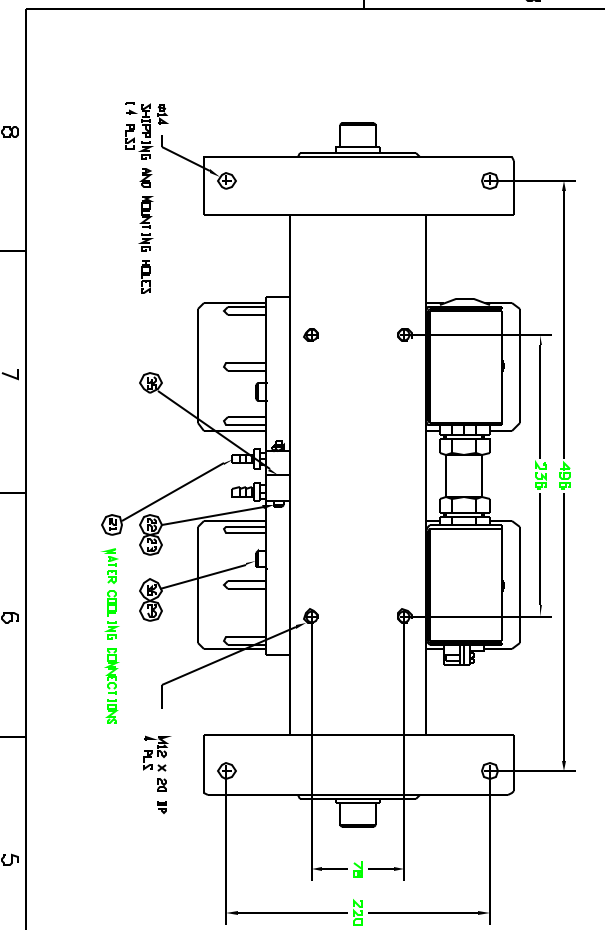
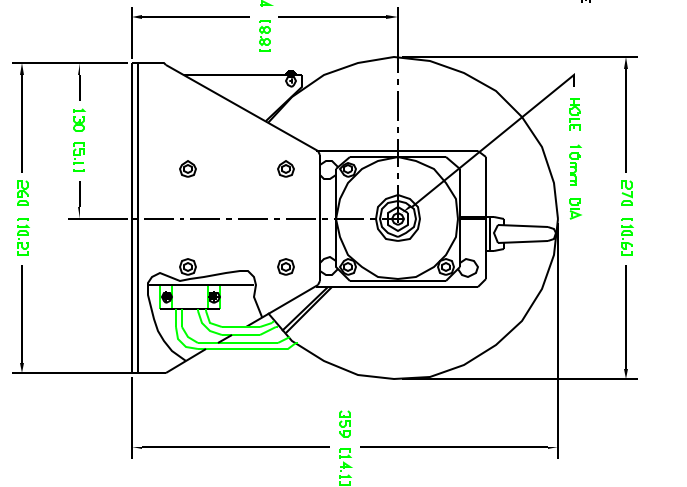
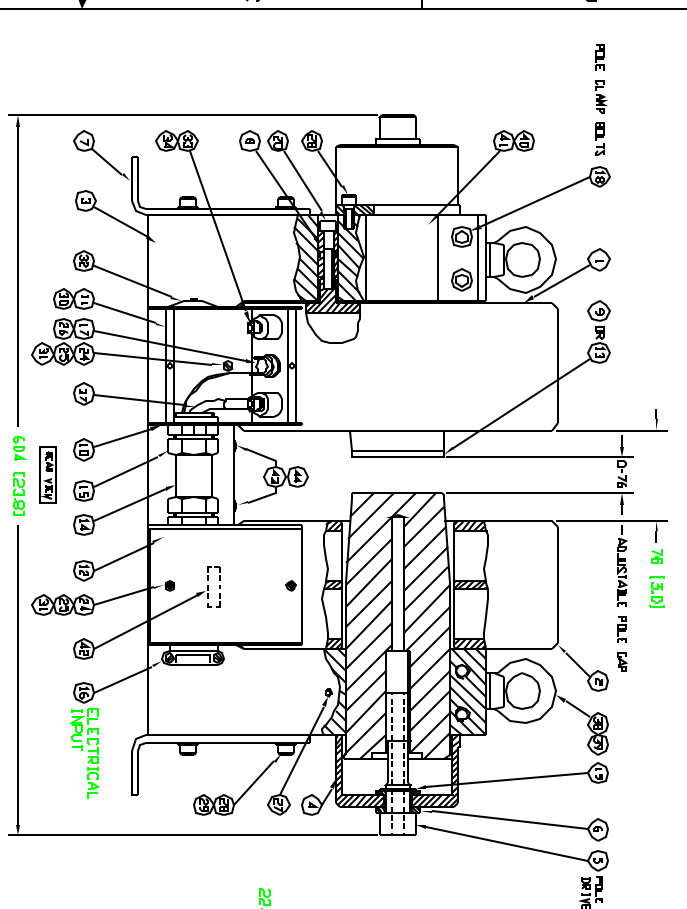
### UL and CSA Listings

UL and CSA Listings are for use in equipment where the acceptability of the combination of the thermostat and equipment is determined by Underwriters' Laboratories, Inc. and/or the Canadian Standards Association.

UL File E36103, UL File SA4469 (3455RBV only), UL File MH8267 (3455R only), CSA File 21048.

INSPECTION  
 ALL DIMENSIONS ARE IN MILLIMETERS  
 UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS IN PARENTHESES ARE IN INCHES  
 DIMENSIONS IN BRACKETS ARE IN FEET AND INCHES

USE STANDARD FINISHES UNLESS SPECIFIED OTHERWISE



REV	DESCRIPTION	SHEET	DATE	APPROVED
1	ISSUED	1		
2	REVISED	1		
3	REVISED	1		
4	REVISED	1		
5	REVISED	1		

**REVISED**

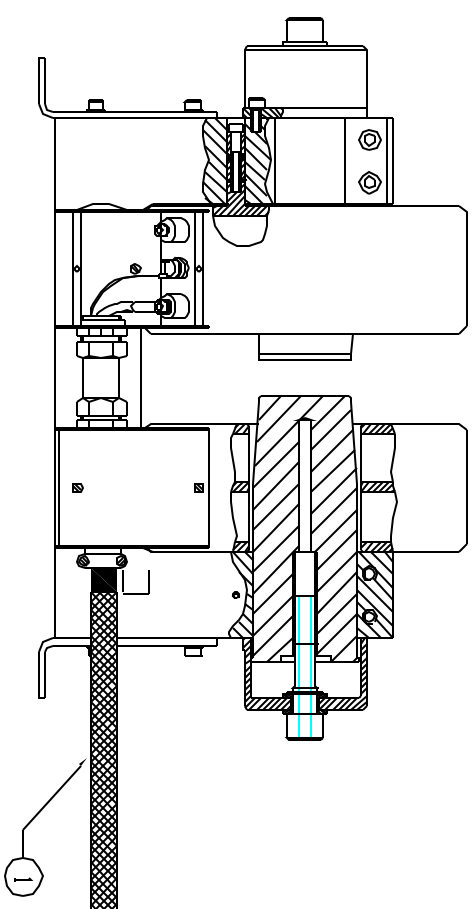
NO.	DESCRIPTION	QTY	UNIT	REVISION
1	POLE CLAMP	2	PCS	
2	POLE CLAMP BOLT	4	PCS	
3	POLE CLAMP NUT	4	PCS	
4	POLE CLAMP WASHER	4	PCS	
5	POLE CLAMP SPRING	4	PCS	
6	POLE CLAMP SHIM	4	PCS	
7	POLE CLAMP GASKET	4	PCS	
8	POLE CLAMP O-RING	4	PCS	
9	POLE CLAMP SEAL	4	PCS	
10	POLE CLAMP GROMMET	4	PCS	
11	POLE CLAMP BUSHING	4	PCS	
12	POLE CLAMP BRACKET	4	PCS	
13	POLE CLAMP MOUNTING HOLE	4	PCS	
14	POLE CLAMP MOUNTING HOLE	4	PCS	
15	POLE CLAMP MOUNTING HOLE	4	PCS	
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GMW  
 MAGNET ASSEMBLY  
 MODEL: 5403  
 A1 11610500  
 SHEET 1 OF 1

REVISIONS  
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REV	DESCRIPTION	DATE	APPROVED
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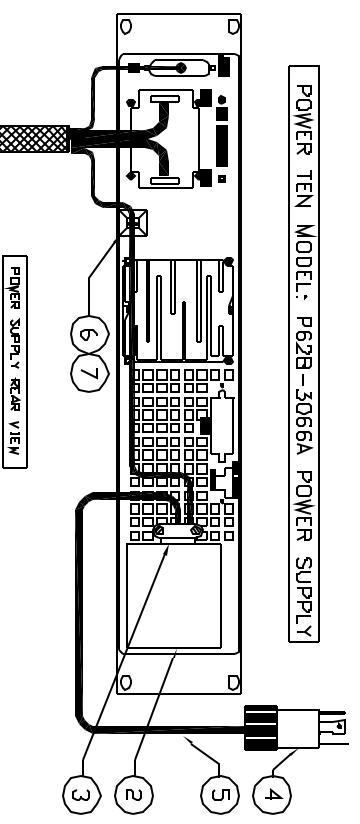
MODEL 5403 ELECTROMAGNET



FRONT VIEW LH TERMINAL COVER REMOVED

\*\*\* WARNING \*\*\*  
 CHECK AC POWER VOLTAGE AND FREQUENCY MATCH POWER SUPPLY  
 SPECIFIED REQUIREMENTS BEFORE APPLYING AC INPUT POWER

POWER TEN MODEL: P62B-3066A POWER SUPPLY



POWER SUPPLY REAR VIEW

- NOTE
1. POWER SUPPLY SHOWN WITH 2 PHASE 208V AC INPUT
  2. REFER TO TABLE ON DWG 139D0240 FOR AC INPUT RATINGS OTHER THAN 2 PHASE 208V.

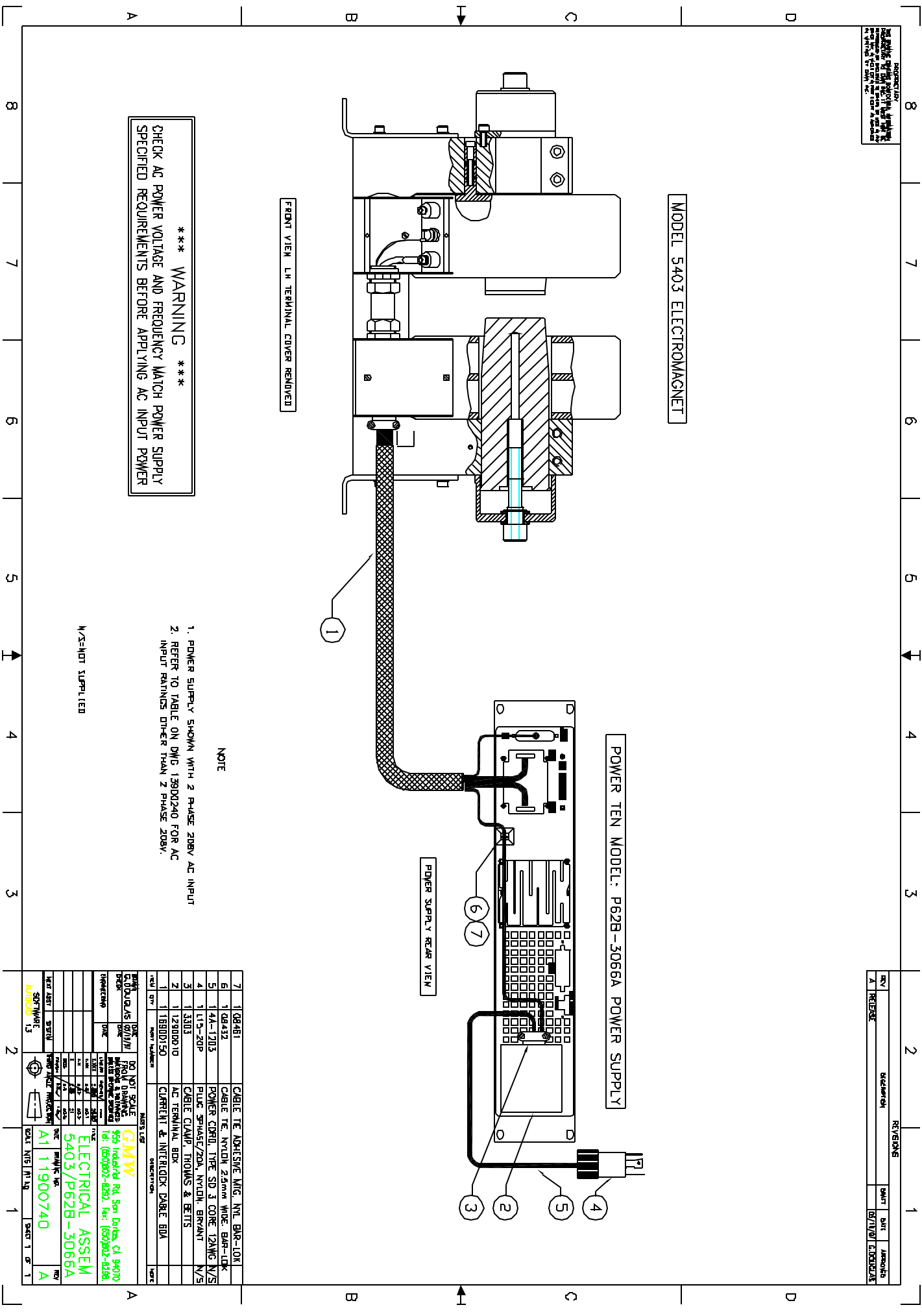
N/A=NOT SUPPLIED

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5	08/17/01	REVISED	EDWARDS	EDWARDS
6	08/17/01	REVISED	EDWARDS	EDWARDS
7	08/17/01	REVISED	EDWARDS	EDWARDS
8	08/17/01	REVISED	EDWARDS	EDWARDS

DO NOT SCALE  
 EDWARDS 08/17/01  
 455 Inverness Rd. San Diego, CA 94070  
 Tel: (650)902-4293 Fax: (650)902-4299

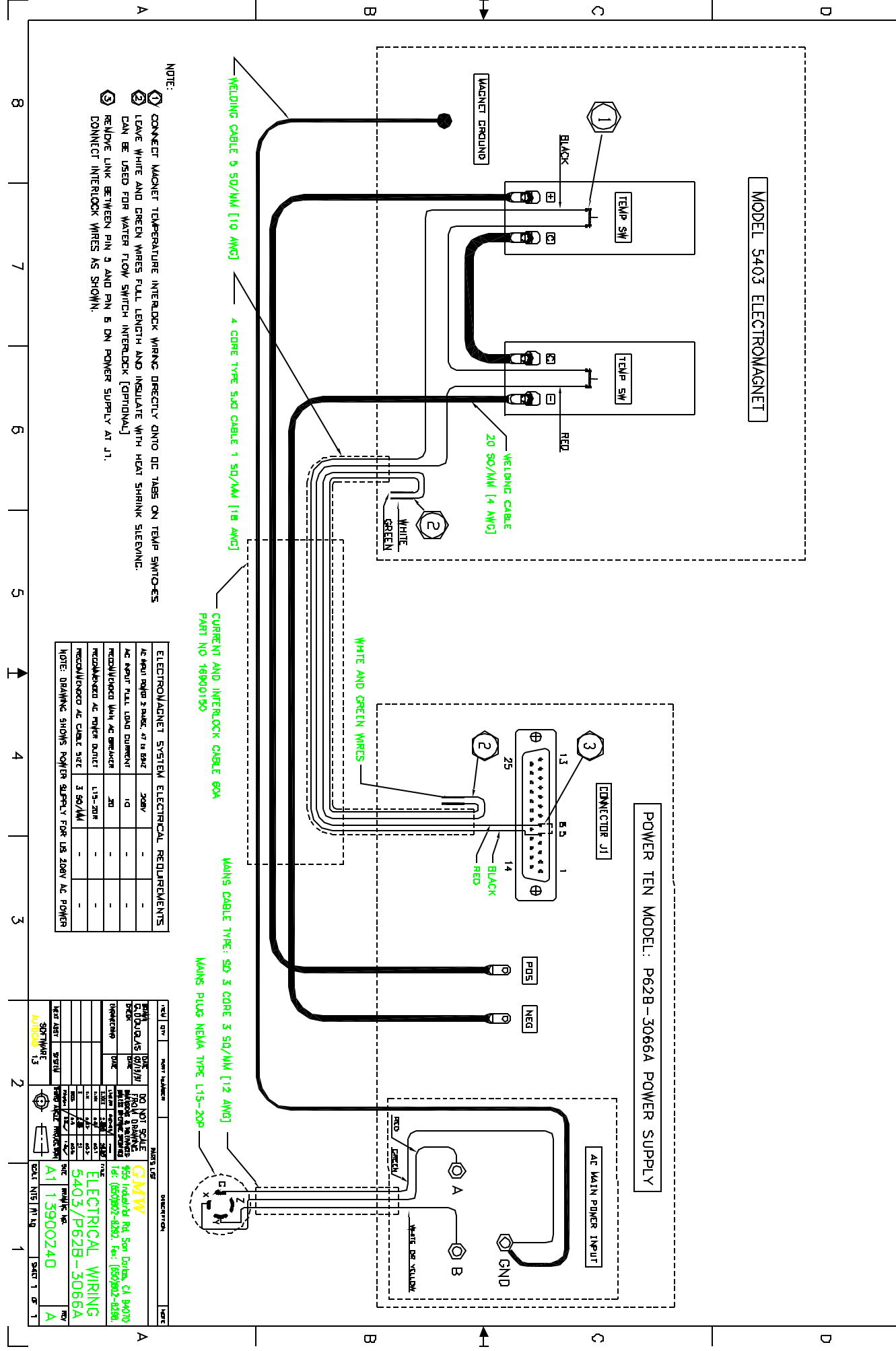
**GMW**  
**ELECTRICAL ASSEM**  
**5403/P62B-3066A**

REV A  
 DATE 08/17/01  
 DRAWN BY A1  
 CHECKED BY A1  
 11900740



REVISIONS  
 1. REVISED BY: [Name]  
 DATE: [Date]

REVISED BY: [Name]  
 DATE: [Date]



- NOTE:
- CONNECT MAGNET TEMPERATURE INTERLOCK WIRING DIRECTLY INTO DC TABS ON TEMP SWITCHES
  - LEAVE WHITE AND GREEN WIRES FULL LENGTH AND INSULATE WITH HEAT SHRINK SLEEVING. CAN BE USED FOR WATER FLOW SWITCH INTERLOCK (OPTIONAL)
  - REMOVE LINK BETWEEN PIN 3 AND PIN 5 ON POWER SUPPLY AT J1.

ELECTROMAGNET SYSTEM ELECTRICAL REQUIREMENTS

AC INPUT	208V	-	-
AC INPUT FULL LOAD CURRENT	1.0	-	-
RECOMMENDED MAIN AC BREAKER	20	-	-
RECOMMENDED AC POWER CABLE	1.15-20P	-	-
RECOMMENDED AC CABLE SIZE	3 SO/AMM	-	-

NOTE: DRAWING SHOWS POWER SUPPLY FOR US 208V AC POWER

DO NOT SCALE

GMW  
 465 Industrial Rd. San Diego, CA 94709  
 Tel: (650)992-8293 Fax: (650)992-8199

ELECTRICAL WIRING  
 5403/P62B-3066A

REV: A1 13900240

DATE: 11/13/03

BY: [Name]

CHECKED BY: [Name]

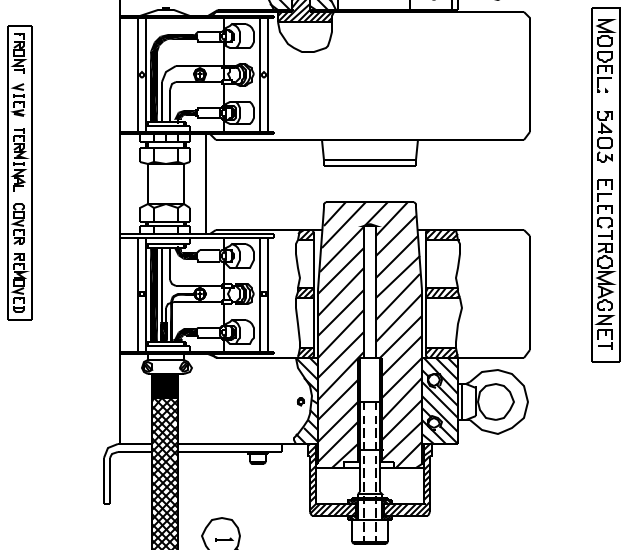
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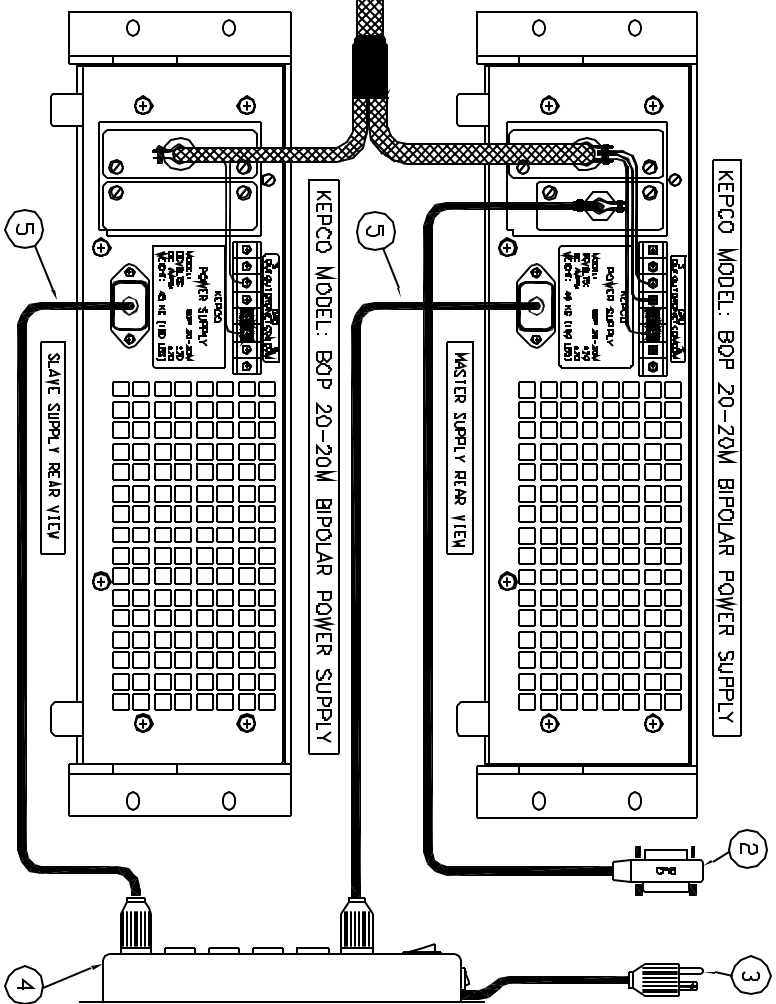
SHEET 1 OF 1

REVISIONS  
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REVISED SHEET 1 OF 1  
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FRONT VIEW TERMINAL COVER REMOVED



\*\*\* WARNING \*\*\*  
 CHECK AC POWER VOLTAGE AND FREQUENCY MATCH POWER SUPPLY  
 SPECIFIED REQUIREMENTS BEFORE APPLYING AC INPUT POWER

NOTE  
 1. POWER SUPPLY SHOWN WITH 115V AC INPUT  
 2. CABLE INTERFACE IS OPTIONAL EQUIPMENT  
 3. REFER TO TABLE FOR DWG 13900110 FOR AC  
 INPUT RATINGS OTHER THAN 115V AC INPUT  
 N/S=NOT SUPPLIED

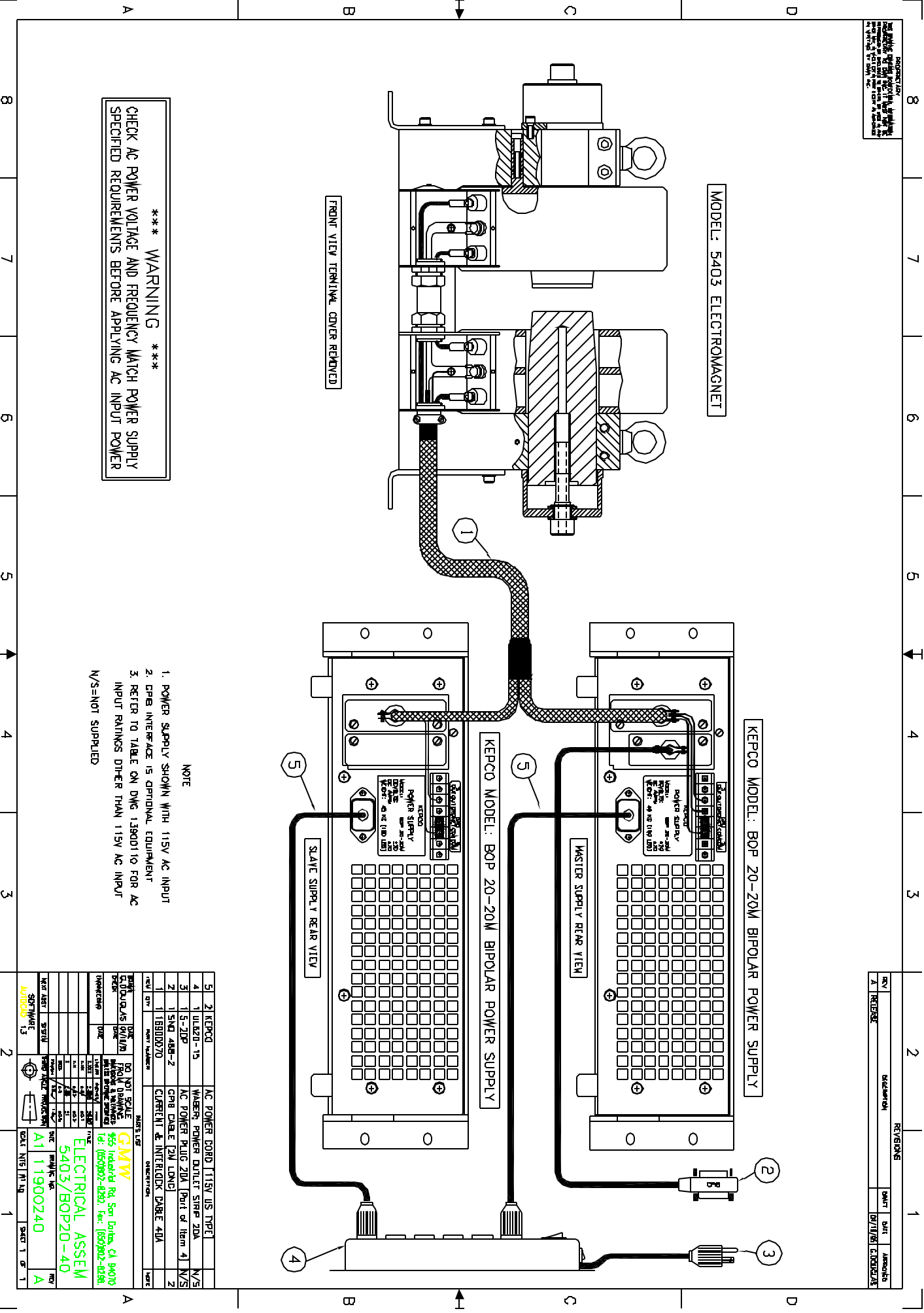
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REV	DESCRIPTION	DATE	BY	CHKD
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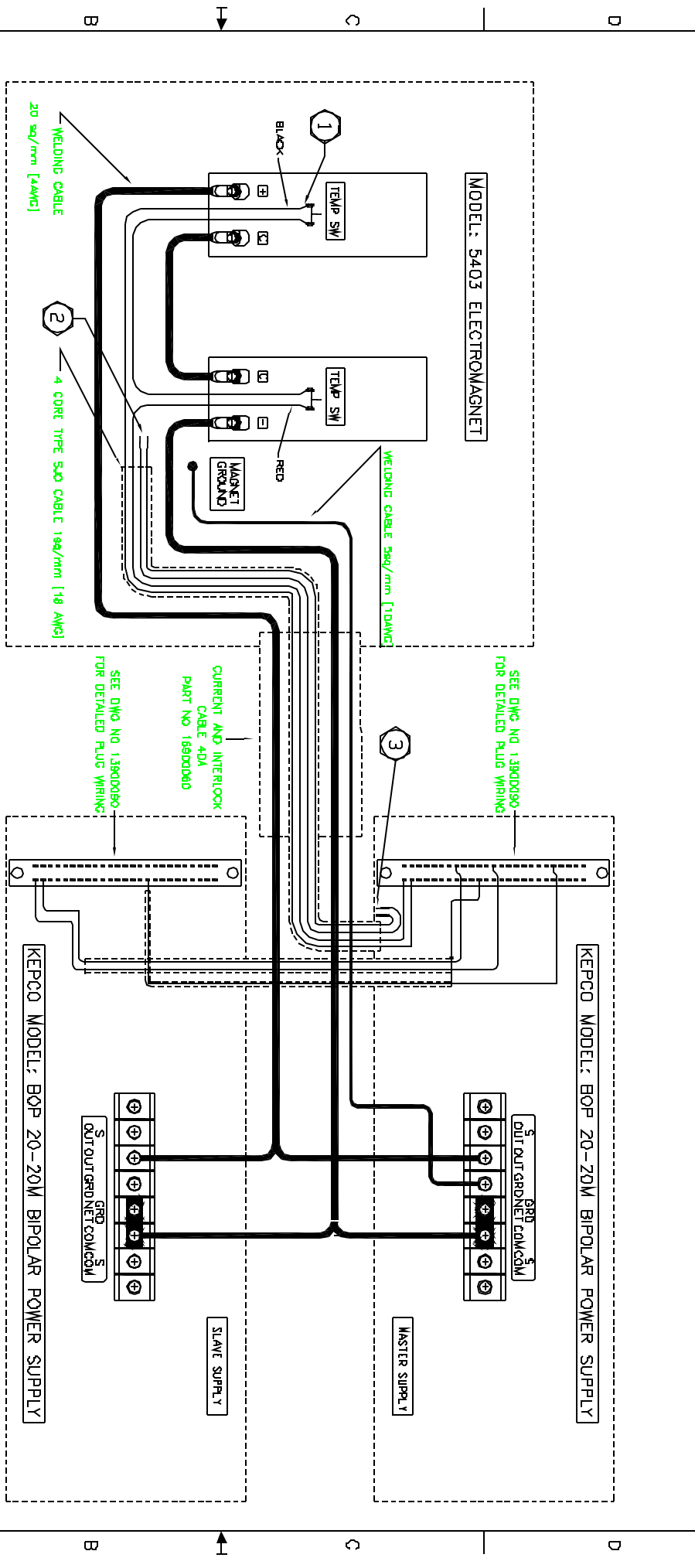
  

REV	DESCRIPTION	DATE	BY	CHKD
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REVISIONS  
 1. REVISED BY: [Name]  
 DATE: [Date]

REVISED BY: [Name]  
 DATE: [Date]



- NOTE:
- 1 CONNECT WAGON TEMPERATURE INTERLOCK WIRING DIRECTLY INTO DC TABS ON TEMP THERMISTATS
  - 2 LEAVE WHITE AND GREEN WIRES FULL LENGTH AND INSULATE WITH HEAT SHRINK SLEEVING CAN BE USED FOR WATER FLOW SWITCH INTERLOCK (OPTION)
  - 3 INSULATE WHITE AND GREEN WIRES WITH HEAT SHRINK SLEEVING (NOT USED)

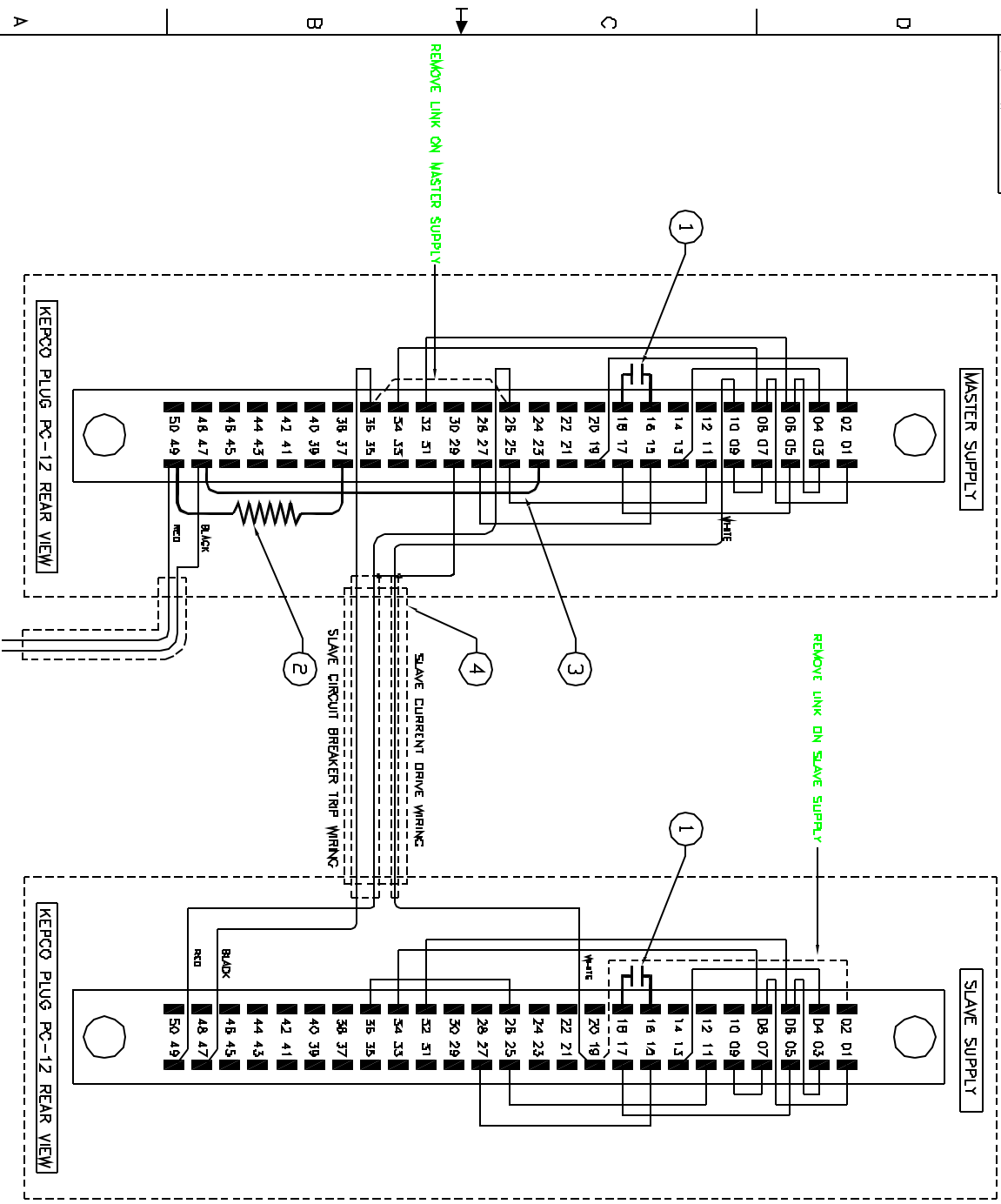
ELECTROMAGNET SYSTEM ELECTRICAL REQUIREMENTS

AC INPUT 1 PHASE, 50 Hz @ 230V	115V	230V	230V
AC INPUT FULL LOAD CURRENT	11.0*	4.5*	6.0*
RECOMMENDED MAIN AC BREAKER	25	15	15
RECOMMENDED AC POWER CIRCUIT	5-20S	-	-
RECOMMENDED AC CABLE SIZE	1-3 SQ/MM	1-3 SQ/MM	1-3 SQ/MM

NOTE: DRAWING SHOWS POWER SUPPLY SETUP FOR 1 PHASE 115V AC POWER  
 \* BASED ON THE DATA SHEET SPECIFICATIONS (SEE DRAWING FOR MORE DETAILS)

REVISIONS

REV	DESCRIPTION	SHEET	DATE	APPROVAL
1	REVISED	07/21/21	10/20/21	



NOTE:  
1. CUT OUT GREEN WIRE. USE WHITE, RED, BLACK ONLY.

WIRING TO MAGNET TEMP INTK

KEPCO PLUG PC-12 REAR VIEW

KEPCO PLUG PC-12 REAR VIEW

REV	DESCRIPTION	SHEET	DATE	APPROVAL
1	REVISED	07/21/21	10/20/21	

1	1	CABLE 4 CORE SHIELDED PAIRS, BEUDEN
2	1	WIRE LINK HOOK TP WIRE 0.5 SQ/MM
3	1	RESISTOR, 880 OHM/0.25 W
4	1	CAPACITOR, 100UF 0.33V

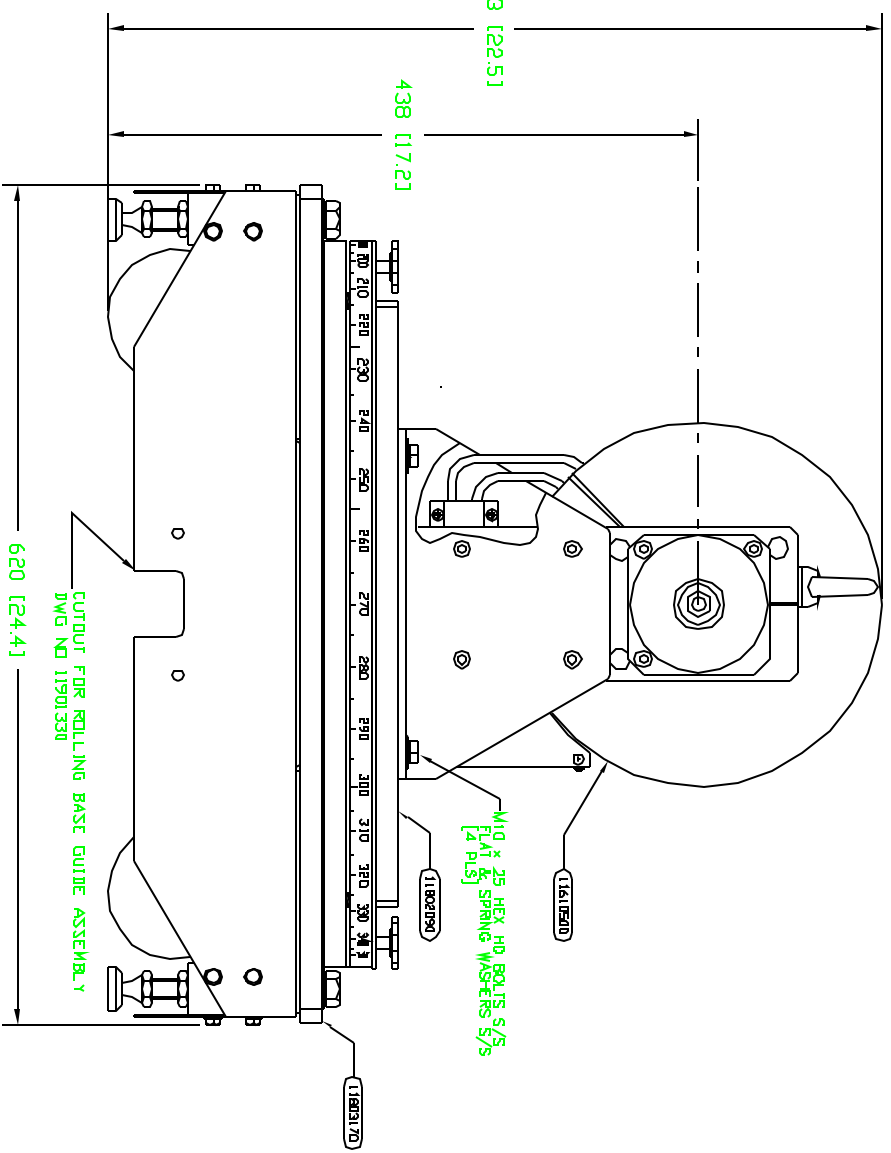
  

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 AS SET FORTH IN THE TERMS OF AGREEMENT  
 AGREED TO BY CLIENT AND GDMV, INC.



REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	RELEASE	05/13/95	G. DOUGLAS

REV	DATE	DESCRIPTION	BY
A	05/13/95	RELEASE	G. DOUGLAS

DRAWN	G. DOUGLAS	DATE	05/13/95
CHECK		DATE	
ENGINEERING		DATE	

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THIRD ANGLE PROJECTION	SCALE	1:2

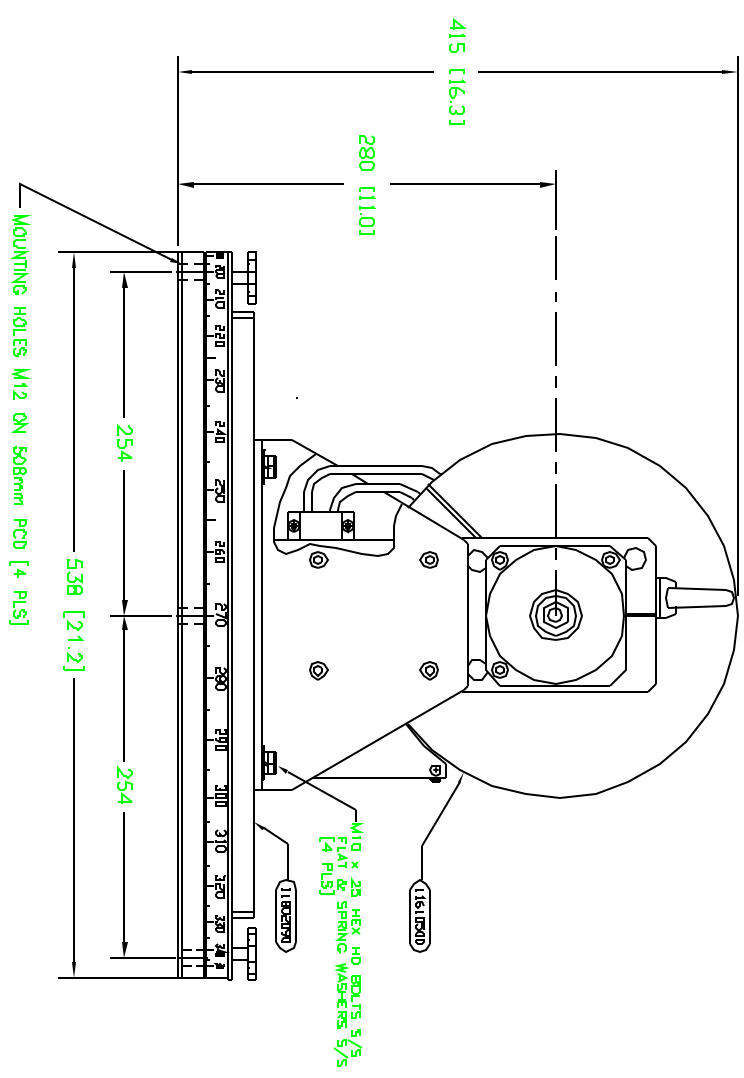
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DATE	05/13/95
BY	GDMV
CHECKED	
ENGINEERING	
DATE	

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SYSTEM	
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REV	A



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REVISIONS			
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A	RELEASE	05/13/95	G. DOUGLAS

REV	DATE	PART NUMBER	DESCRIPTION	NOTE
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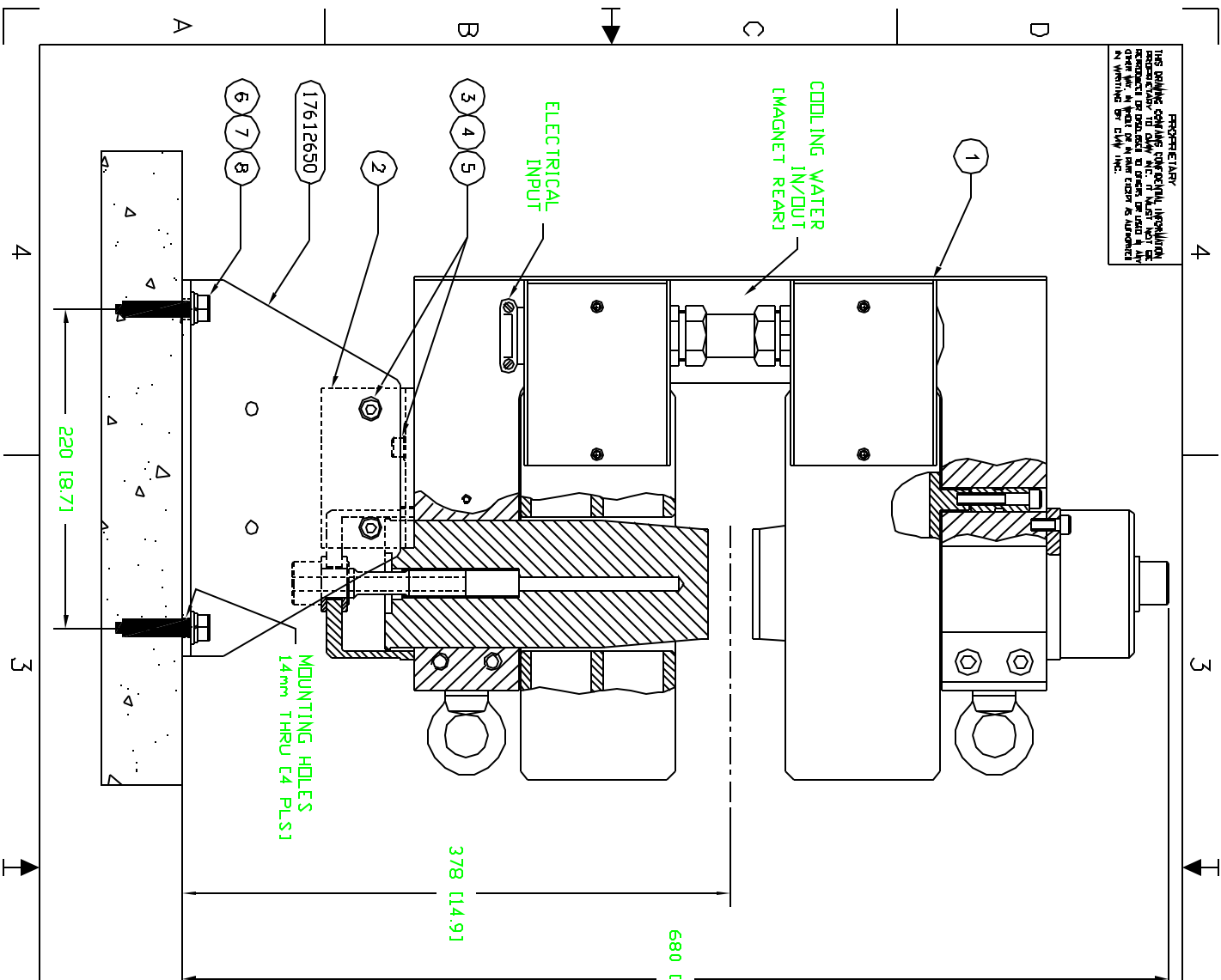
  

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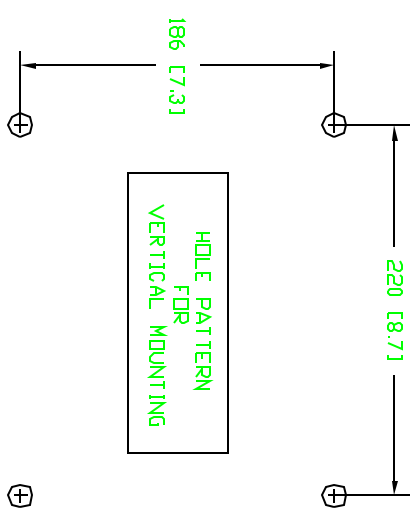
  

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REV	DESCRIPTION	DATE	APPROVED
A	RELEASE	06/12/95	G.DOUGLAS
B	CORRECT VIEW AND POSITION OF VERTICAL MFG BRK	08/09/99	G.DOUGLAS



\*\*\* WARNING \*\*\*  
 WHEN THE 5403 ELECTROMAGNET IS VERTICALLY MOUNTED  
 IT MUST BE BOLTED TO THE FLOOR SECURELY AS SHOWN.

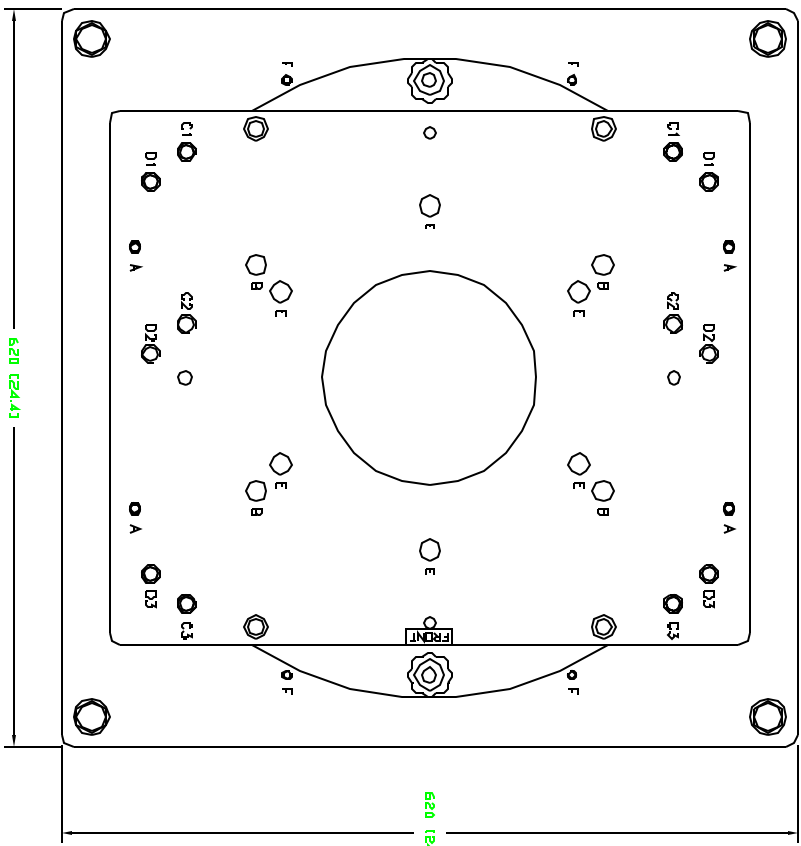
QTY	PART NUMBER	DESCRIPTION	NOTE
1	5403	ELECTROMAGNET, 78MM	
2	17612640	VERTICAL MOUNTING BRACKET	
3	6 DIN 125 A	WASHER, MB FLAT, S/S	
4	6 DIN 127 B	WASHER, MB SPRING LOCK, S/S	
5	6 DIN 912	SHCS, MB X 16 S/S	
6	4 DIN 125 A	WASHER, M12 FLAT, S/S	
7	4 DIN 127 B	WASHER, M12 SPRING LOCK, S/S	
8	4	BOLT, M12 or 1/2" EXPANSION	

DATE	SCALE	TITLE
06/12/95	1:2	VERT MOUNT ASSEM
08/09/99	1:2	MODEL: 5403

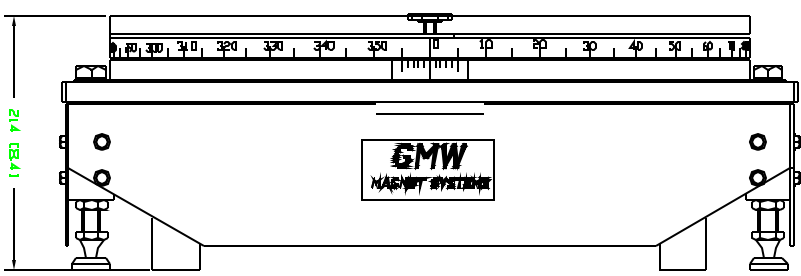
REV	DESCRIPTION	DATE	APPROVED
A2	SOFTWARE AUTOCAD 13		
B			

REVISIONS

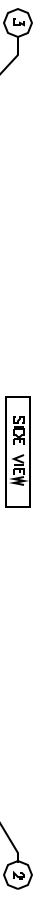
REV	DESCRIPTION	DATE	APPROVED
A	RELEASE	06/27/04	C DOUGLAS
B	ADD 3 HOLES IN SQUARE	09/17/04	C DOUGLAS
C	ADD MOUNTING HOLES TO ROLLING BASE	07/06/07	C DOUGLAS



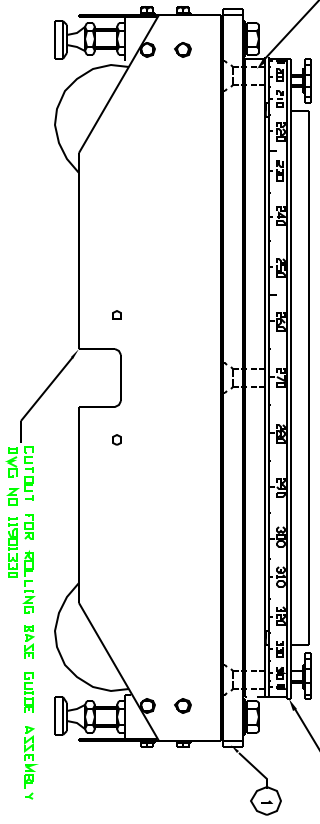
TOP VIEW



FRONT VIEW



SIDE VIEW



MOUNTING HOLES

- A-4405 DIRECT MOUNTING
- B-3473/3472 DIRECT MOUNTING
- C1/C2=34.72 45° MOUNTING
- D1/D2=34.73 45° MOUNTING
- C1/C3=34.72 HORIZ MOUNTING
- D1/D3=34.73 HORIZ MOUNTING
- E-WIND MOTOR DRIVE MOUNTING
- F-WIND MOTOR DRIVE MOUNTING

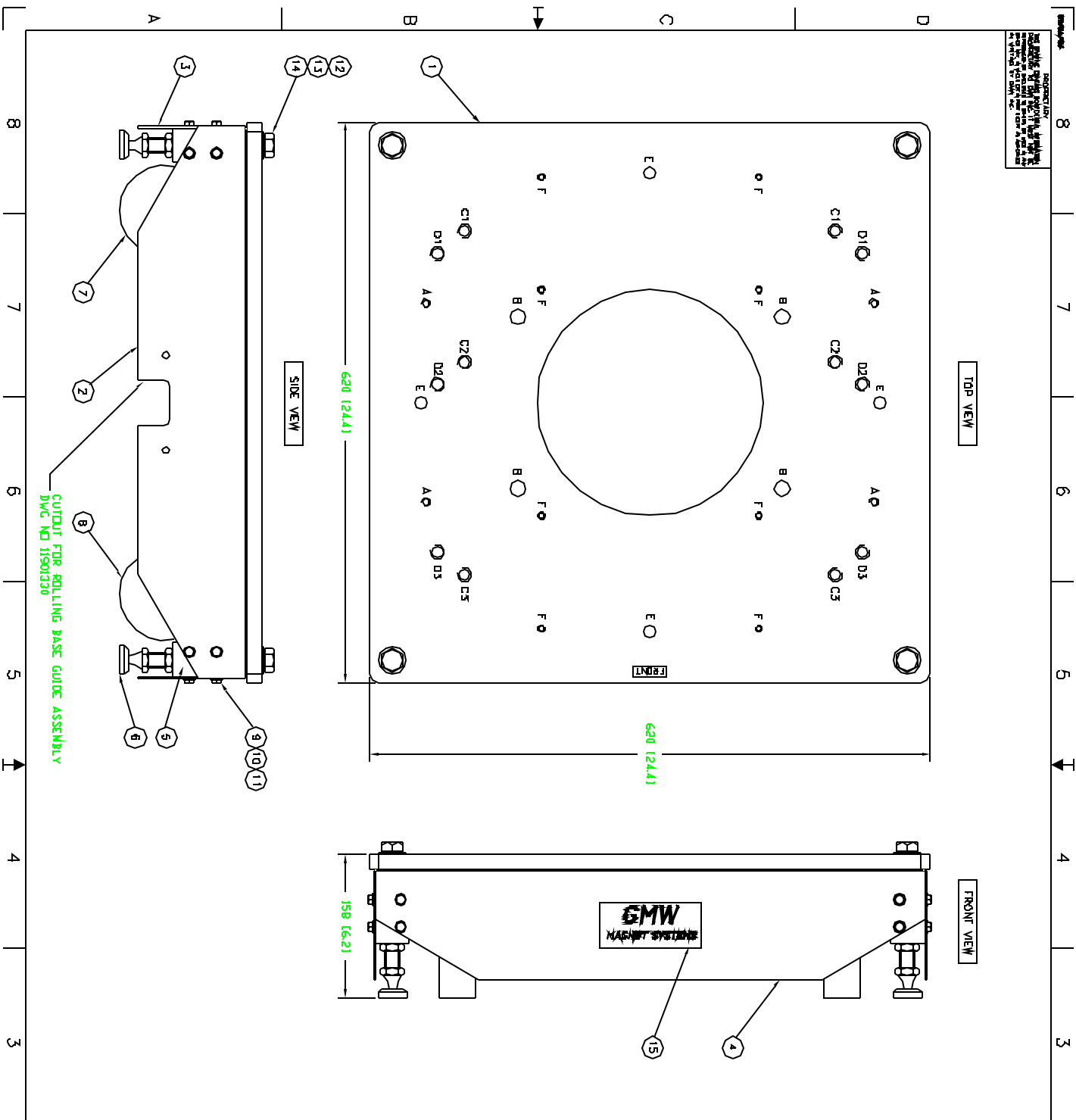
NOTE: 2 HOLES +HOLEN UNDER ROLLING BASE

REV	DATE	DESCRIPTION	BY
1	11/03/17	ROLLING BASE ASSEMBLY	
2	11/03/17	ROLLING BASE ASSEMBLY	
3	01/04/18	ROLLING BASE ASSEMBLY	

GMW  
 3473/3472/5403  
 11803430

REV	DATE	DESCRIPTION	BY
1	11/03/17	ROLLING BASE ASSEMBLY	
2	11/03/17	ROLLING BASE ASSEMBLY	
3	01/04/18	ROLLING BASE ASSEMBLY	

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TOP VIEW

SIDE VIEW

FRONT VIEW

MOUNTING HOLES	
A=5403	DIRECT MOUNTING
B=3473/3472	DIRECT MOUNTING
C1/C2=3472	45° MOUNTING
D1/D2=3473	45° MOUNTING
C1/C3=3472	HORZ MOUNTING
D1/D3=3473	HORZ MOUNTING
E=RD14MG	BASE MOUNTING
F=NRD	MOTOR DRIVE MOUNTING

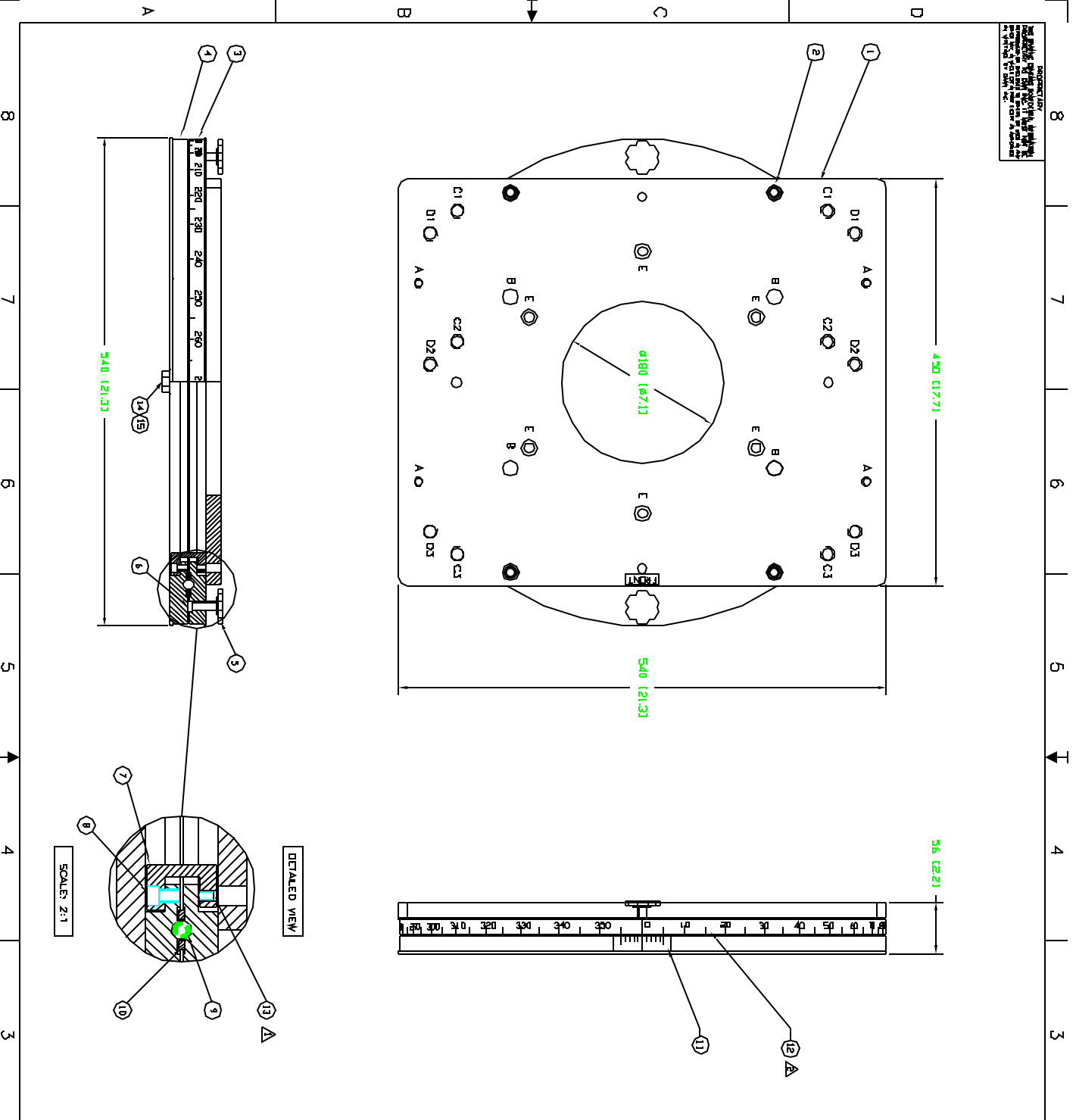
NOTE 1. PARTS FITTED AT GMW

REV	DESCRIPTION	SHEET	DATE	APPROVED
1	RELEASE			
2	REVISED FOR REV 1.6 W/REV 2.4 SMT "1" HOLES			
3	REVISED FOR REV 1.6 W/REV 2.4 SMT "1" HOLES			
4	REVISED FOR REV 1.6 W/REV 2.4 SMT "1" HOLES			
5	REVISED FOR REV 1.6 W/REV 2.4 SMT "1" HOLES			
6	REVISED FOR REV 1.6 W/REV 2.4 SMT "1" HOLES			
7	REVISED FOR REV 1.6 W/REV 2.4 SMT "1" HOLES			

REV	DESCRIPTION	DATE	BY	CHKD	APP'D
1	17802100				
2	17802101				
3	17802102				
4	17802103				
5	17802104				
6	17802105				
7	17802106				
8	17802107				
9	17802108				
10	17802109				
11	17802110				
12	17802111				
13	17802112				
14	17802113				

**GMW**  
 455 Industrial Rd San Diego, CA 94070  
 (650)802-8280 Fax: (650)802-8289  
**ROLLING BASE ASSY**  
 3473/3472/5403  
 A1 11803170  
 TOTAL 137 IN Lg SHEET 1 OF 1

REVISIONS  
 1. REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.  
 2. REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.  
 3. REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.



REV	DESCRIPTION	DATE	APPROVED
1	REVISION		
2	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
3	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
4	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
5	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
6	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
7	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
8	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
9	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
10	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
11	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
12	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
13	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
14	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		
15	REVISED TO ADD DIMENSIONS FOR THE NEW DESIGN OF THE ROTATING BASE.		

**MOUNTING HOLES**  
 A=540.5 DIRECT MOUNTING  
 B=347.3/347.2 DIRECT MOUNTING  
 C1/C2=347.2 45° MOUNTING  
 D1/D2=347.3 45° MOUNTING  
 C1/C3=347.2 HORIZ MOUNTING  
 D1/D3=347.3 HORIZ MOUNTING  
 E=MOTORIZED ROT BASE SPOOL

ITEM	DESCRIPTION	QTY	UNIT
1	WASHER M12 SPRING 5/5	4	
2	ROD M12 x 56 HEX HD 5/5	4	
3	SCREW M6 x B SHSS .0VAL P1 5/5	4	
4	UN 913	4	
5	UN 912	4	
6	UN 912	4	
7	UN 912	4	
8	UN 912	4	
9	UN 912	4	
10	UN 912	4	
11	UN 912	4	
12	UN 912	4	
13	UN 912	4	
14	UN 912	4	
15	UN 912	4	

**NOTES**  
 1. ADJUST SET SCREW FOR MINIMUM CLEARANCE ALLOWING FOR FULL FREE ROTATION; AND LOCITE  
 FROM DETAIL TO PLATE DIA TO PREVENT ENDS FROM SPRINGING LOOSE  
 2. GREASE BEARING SURFACES BEFORE ASSEMBLY  
 3. ITEM 14 AND ITEM 15 ONLY USED IF ROTATING BASE SOLD SEPARATELY. SEE DWG NO 11802430 FOR DETAILS ON MOUNTING ROTATING BASE TO ROLLING BASE



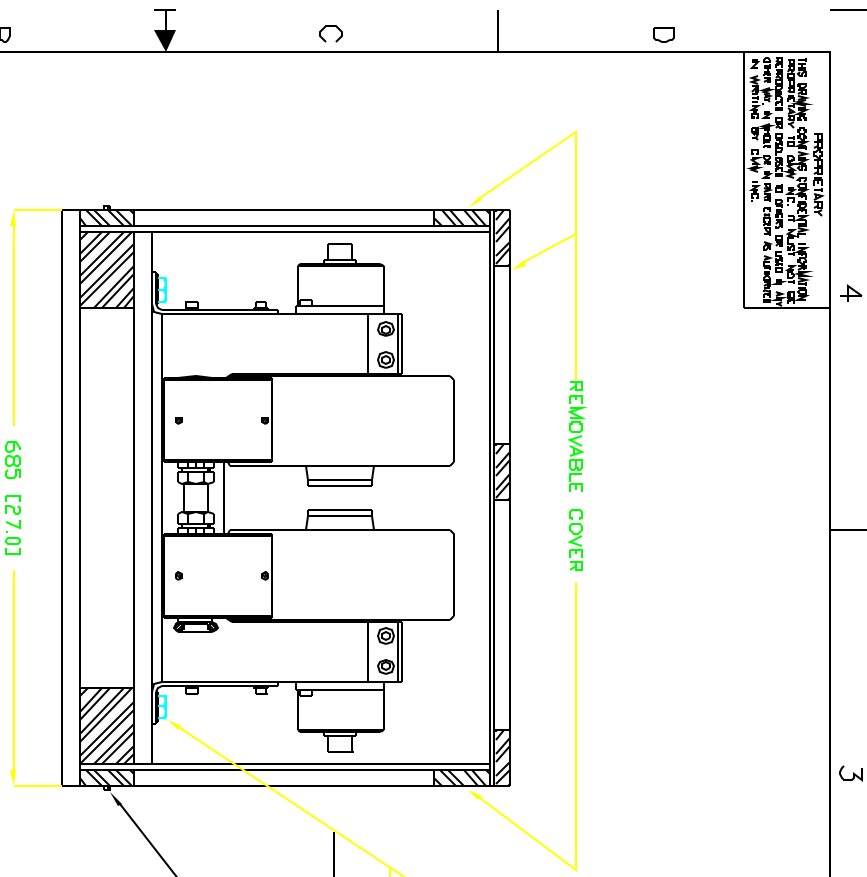




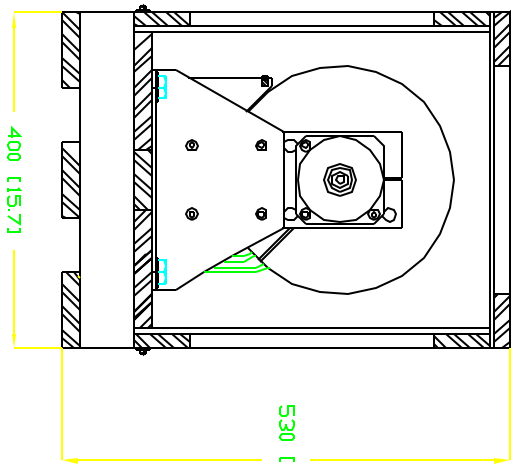


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REV	DESCRIPTION	DATE	APPROVED
A	RELEASE	04/23/95	A. MARTIN
B	ADD DIMS, AND NYLON PACKING WASHERS	06/10/95	C. DOUGLAS
C	ADD STEEL PACKING WASHERS, COVER REMOVAL NOTE	09/23/98	C. DOUGLAS



- COACH SCREW  
12 x 90 [4 PLS]
- STEEL WASHERS  
12 x 20 x 2 [4 PLS]
- NYLON PACKING WASHER  
14 x 20 [4 PLS]
- COVER SECURING SCREWS  
[8 PLS]



SHIPPING WEIGHT: 150 Kg [330 lbs]

NOTE:

1. THE 5403 SHIPPING CRATE HAS A ONE PIECE COVER
- COVER REMOVAL:
1. REMOVE THE COVER SECURING SCREWS
  2. GRIP THE COVER AT THE TOP LH AND RH CORNERS
  3. LIFT THE COVER VERTICALLY HIGH ENOUGH TO CLEAR THE MAGNET
  4. MOVE THE COVER SIDEWAYS AND PLACE ON FLOOR

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
DRWN	A. MARTIN	DATE	04/23/95	
CHKD		DATE		
ENGR		DATE		
SCALE	1:4	WT	Kg	
SCALE	1:4	WT	kg	
SHEET	1	OF	1	

**GMW**  
 P.O. Box 2578, Redwood City, CA 94064  
 Tel: (650)802-8292 Fax: (650)802-8298

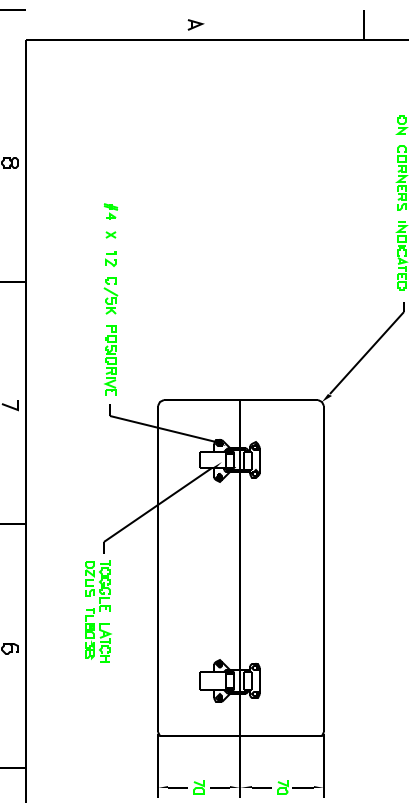
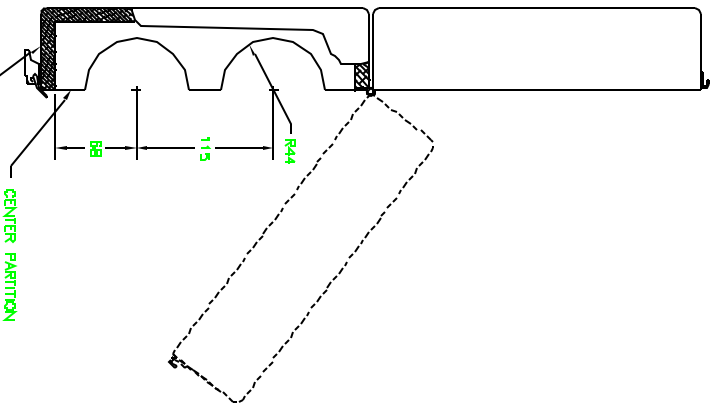
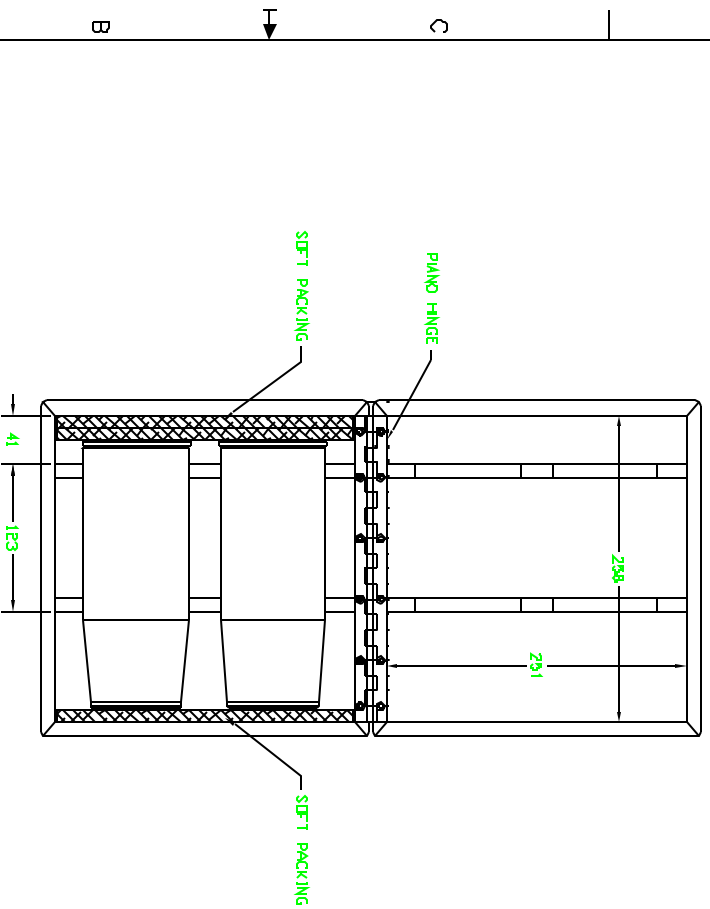
**SHIP CRATE ASSY**  
**MODEL: 5403**

SHEET **A2** DRAWING NO. **18800281** REV **C**

REVISIONS

NO.	REVISION	DATE	BY
1	REVISED		
2	INTERNAL LIDS AND SOFT PACKING		

REVISED	DATE	BY
INTERNAL LIDS AND SOFT PACKING		



REV	DATE	BY	DESCRIPTION
1			DO NOT SCALE
2			REVISED
3			INTERNAL LIDS AND SOFT PACKING

PROJECT: A117803500  
 DRAWING: POLE PACKING BOX  
 MODEL: 5403  
 SCALE: 1:2  
 SHEET 1 OF 1