USER'S MANUAL

MODEL: 5403

76MM ELECTROMAGNET

Date Sold: _____

Serial number: _____

GMW *955 Industrial Road, San Carlos, CA 94070 Tel: (650) 802-8292 Fax: (650) 802-8298*
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Section 1
SPECIFICATIONS
Table 1. Model 5403 Specifications

Pole Diameter:	76mm (3 inch)
Pole Gap:	0 - 76mm (0 to 3 inch)
Standard Pole Face:	75mm (3 inch) cylindrical 38mm (1.5 inch) tapered
Coils (series connection)	
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)
Self Inductance	60mH
Water Cooling (18°C)	2 liters/m (0.5 US gpm) 0.5 bar (8 psid)
Overtemperature Interlock	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.
Dimensions	Drawing 11610500 604mm W x 270mm D x 359mm H 23.8 inch W x 10.6 inch D x 14.1 inch H
Weight	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 ¼ 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.

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 16mm² 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°C +/3°C.

Cooling

The Model 5403 can be operated to an average coil temperature of 70°C. Assuming an ambient laboratory temperature of 20°C and a temperature coefficient of resistivity for copper of 0.0039/°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°C . Clean, cool (16°C - 20°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

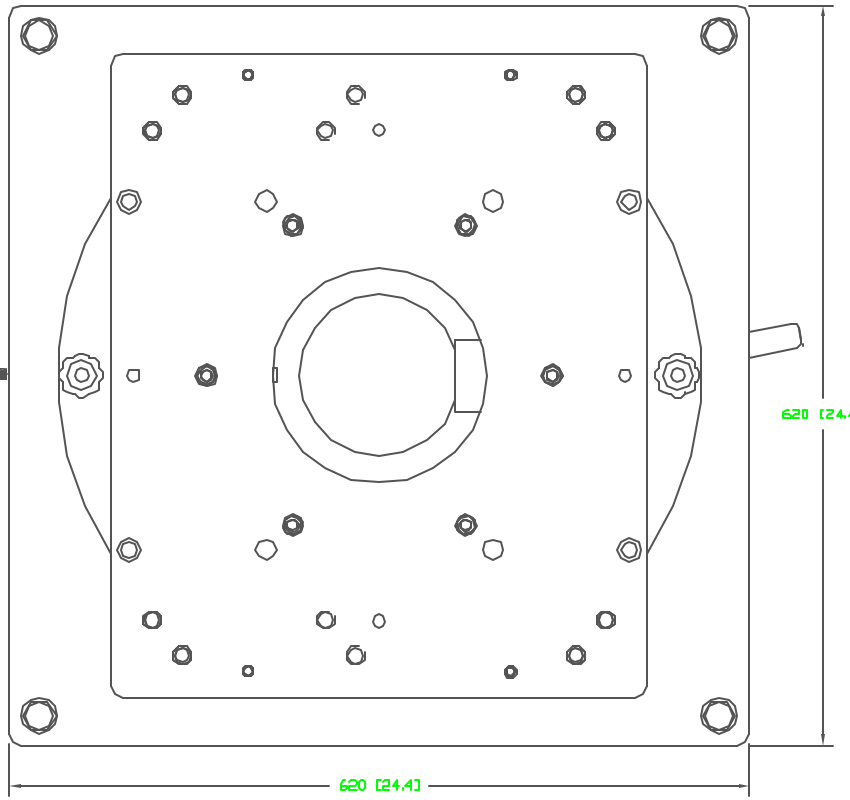
PROPRIETARY

THE INVENTIVE CONCEPTS CONTAINED IN THIS DRAWING ARE PROPRIETARY TO GMW INC. IT MUST NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED IN ANY WAY EXCEPT AS AUTHORIZED IN WRITING BY GMW INC.

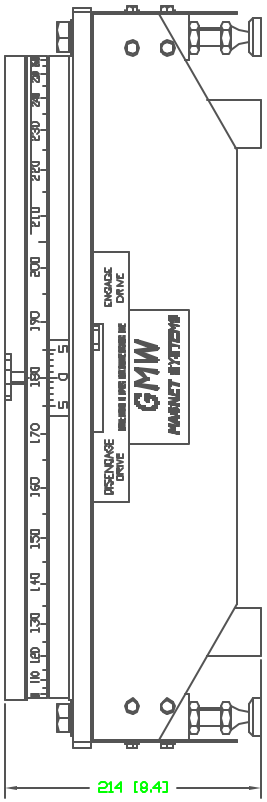
REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/11/01	G.DOUGLAS

TOP VIEW

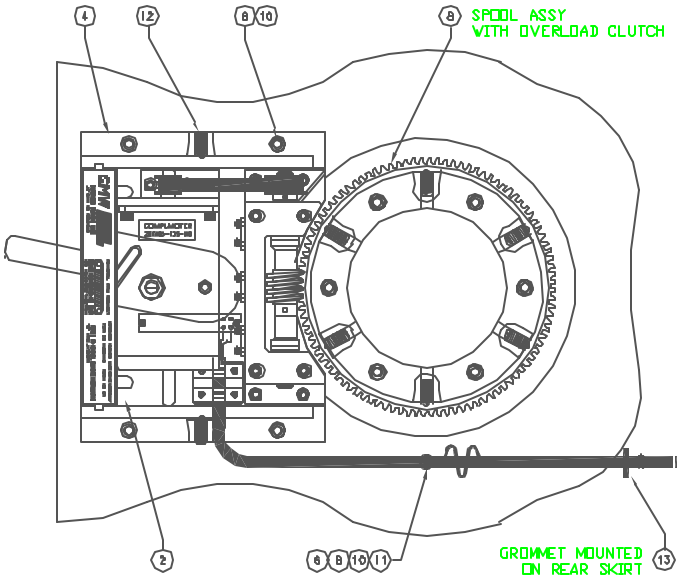
NOTE: ROTATING BASE SHOWN AT THE 180° POSITION



FRONT VIEW

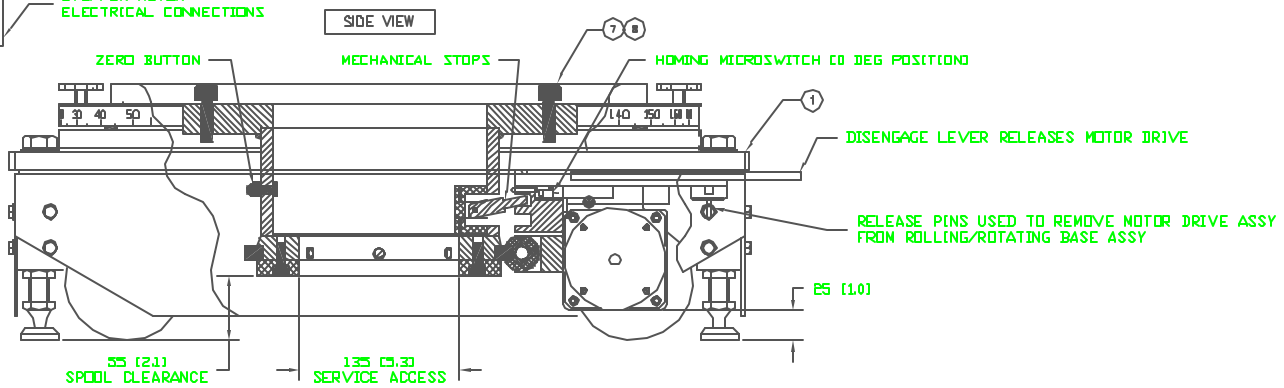


UNDERNEATH VIEW



STEPPER MOTOR ELECTRICAL CONNECTIONS

SIDE VIEW

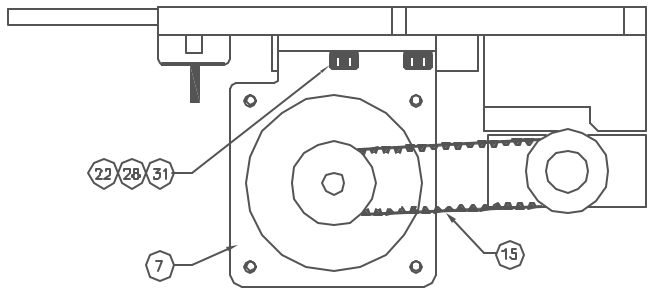


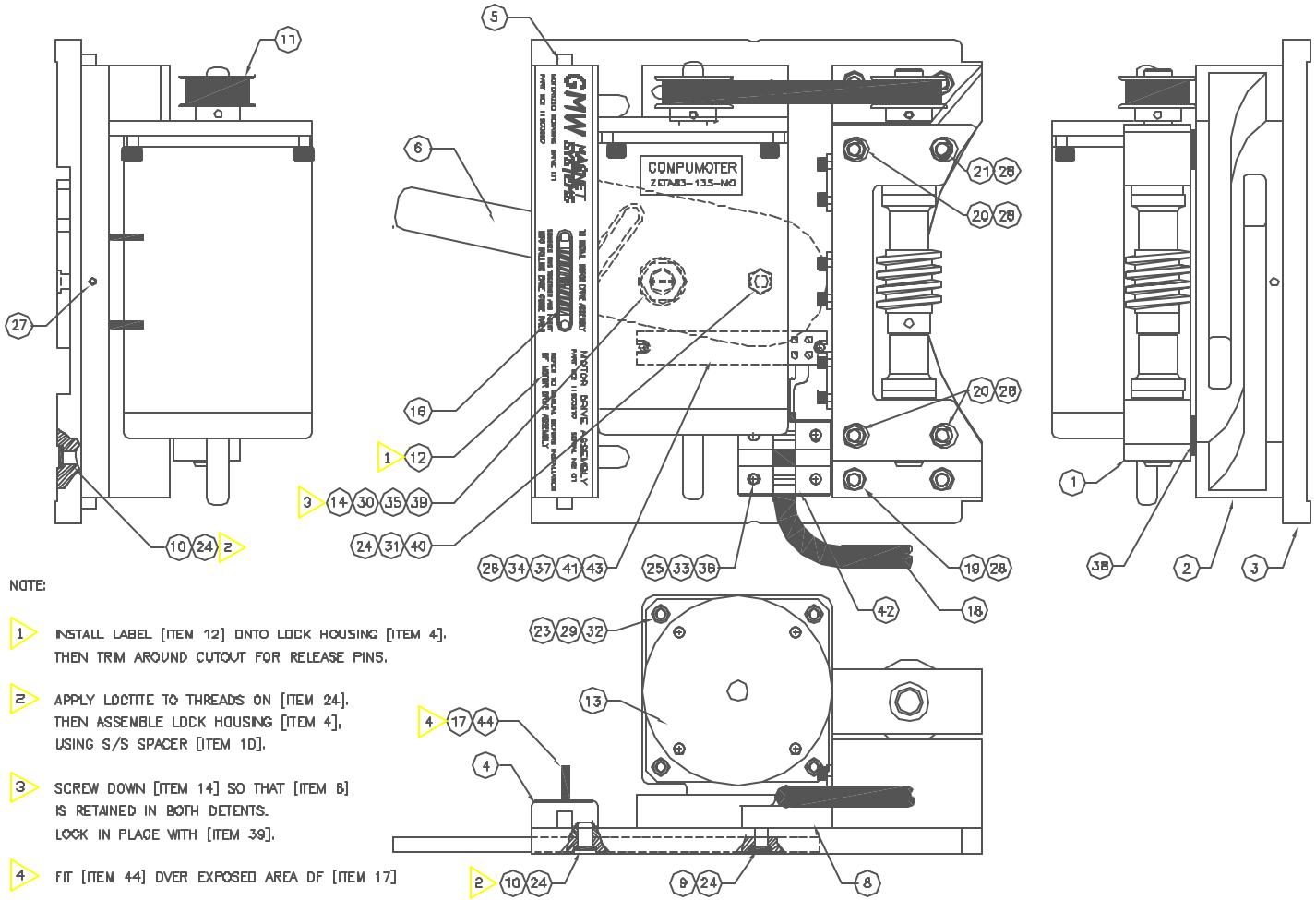
NOTE: ROTATING BASE SHOWN AT THE 180° POSITION

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
13	1		GROMMET 25MM OD X 20MM ID	
12	2	SBNH-10N	BALL PLUNGER, M6 S/S	
11	1	DIN 433	WASHER, FLAT M8 X 1.8 S/S	
10	5	BN-792	WASHER, M8 X XX RIBBED SPRING/STEEL	
9	8	BN 792	WASHER, M10 X XX RIBBED SPRING/STEEL	
8	5	DIN 912	SHCS, M8 X 20 S/S	
7	6	DIN 912	SHCS M10 X 30 S/S	
6	1	17901230	CABLE CLAMP	
5	1	10900101	RELEASE/ENGAGE LABEL	
4	2	17901020	BASE PLATE GUIDES	
3	1	11900820	MR8 SPOOL ASSY	
2	1	11900811	MR8 MOTOR DRIVE ASSY	
1	1	11900980	ROLLING/ROTATING BASE ASSY	

PARTS LIST

DRAWN G.DOUGLAS	DATE 02/11/01	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED	GMW P.O. Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8286.
CHECK	DATE		
ENGINEERING	DATE		TITLE MOTORIZED ROT. DRIVE 3473/3472/5403
NEXT ASSY	USED ON	THIRD ANGLE PROJECTION	SIZE A1 DRAWING NO. 11900800 REV A
SOFTWARE AUTOCAD 13			SCALE 1:2 WT kg SHEET 1 OF 1





NOTE:

1. INSTALL LABEL [ITEM 12] ONTO LOCK HOUSING [ITEM 4]. THEN TRIM AROUND CUTOUT FOR RELEASE PINS.
2. APPLY LOCTITE 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 DETENTS. LOCK IN PLACE WITH [ITEM 39].
4. FIT [ITEM 44] OVER EXPOSED AREA OF [ITEM 17]

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		07/07/97	G.DOUGLAS
B	ADD ITEMS 43,44, CHG NOTE3, ITEM 13		11/28/97	G.DOUGLAS
C	CHG ITEM 11,44, ADD NOTE 4		04/07/98	G.DOUGLAS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
44	A/R		HEAT SHRINK SLEEVING, 4MM	
43	1	0.33uF	CAPACITOR	
42	2	OHS	SADLE, COPPER 3/8" 10MM	
41	1	2412.6	TERMINAL BLOCK, 12 WAY WEIDMULLER	
40	1	DIN 934	NUT, M6, HEX HD B S/S	
39	1	DIN 934	NUT, M10, HEX HD S/S	
38	18	BN 748	WASHER, SHIM M8 X 18 X 0.5 S/S	
37	2	DIN 6797	WASHER, INT LOCK M3 X 0.4 S/S	
36	4	DIN 6797	WASHER, INT LOCK M4 X 0.5 S/S	
35	1	DIN 6797	WASHER, INT LOCK M10 X 0.5 S/S	
34	2	DIN 433	WASHER, FLAT M3 X 0.5 S/S	
33	4	DIN 433	WASHER, FLAT M4 X 0.5 S/S	
32	4	DIN 433	WASHER, FLAT M5 X 1.0 S/S	
31	3	DIN 433	WASHER, FLAT M6 X 1.5 S/S	
30	1	DIN 433	WASHER, FLAT M10 X 1.6 S/S	
29	4	BN 792	WASHER, M3 X 1.1, RIBBED SPRING/STEEL	
28	12	BN 792	WASHER, M6 X 1.2, RIBBED SPRING/STEEL	
27	1	DIN 916 A2	SHSC M3 X 16 S/S	
26	2	DIN 7985A	SCREW, PAN HD M3 X 16 S/S	
25	4	DIN 7985A	SCREW, PAN HD M4 X 16 S/S	
24	5	BN 1206	SHCS, M8 X 16,LOW PROFILE HD	
23	4	DIN 912	SHCS M5 X 12 S/S	
22	2	DIN 912	SHCS M6 X 16 S/S	
21	1	DIN 912	SHCS, M8 X 30 S/S	
20	3	DIN 912	SHCS, M6 X 35 S/S	
19	4	DIN 912	SHCS, M8 X 45 S/S	
18	6M	8778	CABLE, 6 SHIELDED PAIRS, 22 AWG, BELDEN	
17	2	DIN 1481	SPRING PIN, M4 X 26L	
16	1	IHI	SPRING, COMPRESSION, 6MM DIA X 50L	
15	1	TB20EFB-50	BELT, TIMING, BERG 10" [250MM]	
14	1	SBMH-10N	BALL PLUNGER, M6	
13	1	12800D52	MOTOR, STEPPER, COMPUMOTER	
12	1	10900D70	LABEL, SPECIFICATION	
11	1	12800D42	PULLEY,TIMING BELT 18 TEETH, 3/8 SHAFT	
10	1	17901202	SPACER, 9MM LONG S/S	
9	1	17901201	SPACER, 4MM LONG S/S	
8	1	17901180	SPACER, CABLE CLAMP	
7	1	17901D60	MOTOR MOUNT	
6	1	17901D51	DISENGAGE LEVER [For Model 3473 base]	
5	2	17901D40	LOCK BAR	
4	1	17901D30	LOCK HOUSING	
3	1	17901D10	BASE PLATE	
2	1	11900840	STOP BLOCK ASSEMBLY	
1	1	11900850	WORM MOUNT ASSEMBLY	

PARTS LIST

DRAWN	G.DOUGLAS 03/31/97
CHECK	DATE
ENGINEERING	DATE
DO NOT SCALE FROM DRAWING	DIMENSIONS IN BRACKETS [UNLESS METRIC SPECIFIED]
UNLESS OTHERWISE SPECIFIED	INCH [MM]
X	2.000 [50.80]
.XX	±.01 [±0.1]
.XXX	±.005 [±0.1]
ANGLES	±0.5°
FINISH	63
THIRD ANGLE PROJECTION	

11900800	3403
11900800	3472
11900800	3473
NEXT ASSY	SYSTEM
SOFTWARE AUTOCAD 13	

GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (650)802-8292. Fax: (650)802-8286.

TITLE: MOTORIZED ROT. DRIVE MOTOR DRIVE ASSY

SIZE	DRAWING NO.	REV
A1	11900810	C

SCALE 1:1 | WT kg | SHEET 1 OF 1

PROPRIETARY

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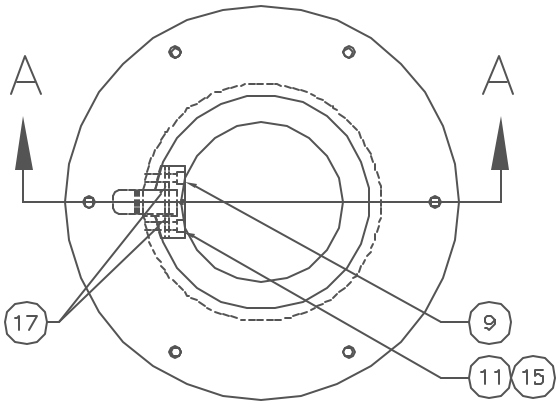
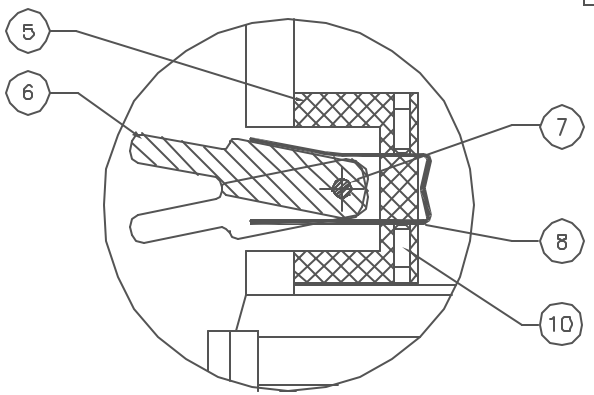
REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		07/07/97	G.DOUGLAS
B	ADD ITEM 17&18, MOD SPRING SHAPE		11/28/97	G.DOUGLAS

SCALE 4:1

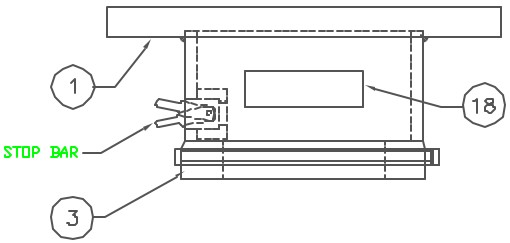
TOP VIEW

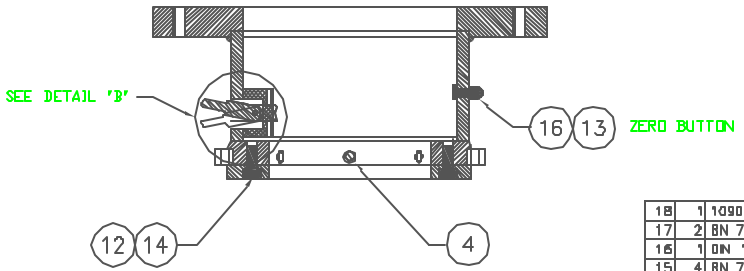




DETAIL "B"

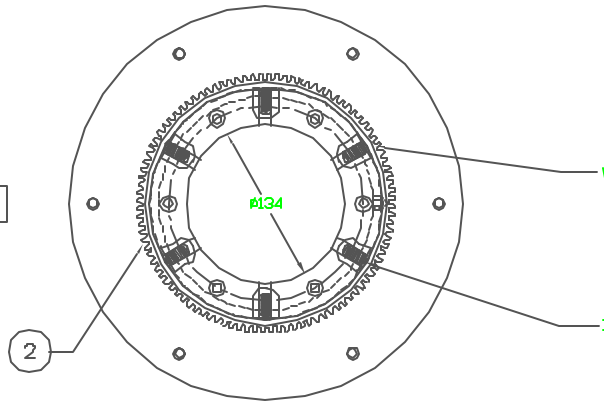
SIDE VIEW





SECTION A–A

BOTTOM VIEW



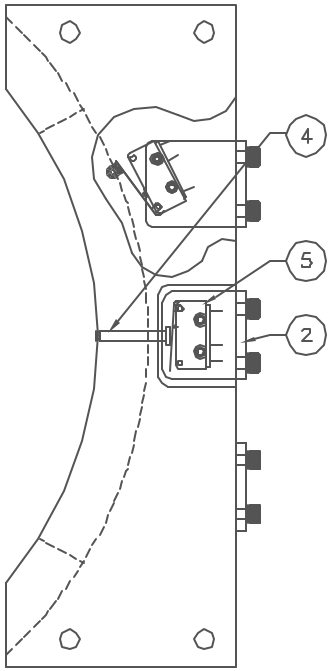
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
18	1	10900170	LABEL, SPOOL IDENTIFICATION	
17	2	BN 792	WASHER, FLAT M6 X 1.6 S/S	
16	1	DIN 1587	NUT, HEX DOMED M6 X 12 S/S	
15	4	BN 792	WASHER, LOCK M8 X 1.2	
14	5	BN 792	WASHER, LOCK M8 X 1.4	
13	1	BN80	BOLT, M6 X 16 HEX NYLON	
12	5	DIN 912	SHCS M8 X 16 S/S	
11	4	DIN 912	SHCS M6 X 25 S/S	
10	2	DIN 913 A2	SHSS M3 X 10 S/S	
9	2	DIN 913 A2	SHSS M4 X 12 S/S	
8	A/R	1.0MM	PIANO WIRE S/S	
7	1	DIN 6325	DOWEL PIN, M6 X 60	
6	1	17901090	STOP BAR	
5	1	17901100	STOP BAR GUIDE	
4	6	SBNH-10N	BALL PLUNGER, VLIER S/S	
3	1	17901130	SPOOL CLAMP RING	
2	1	12900020	WORM GEAR, BRONZE	
1	1	11900830	SPOOL WELDED ASSY	

PARTS LIST

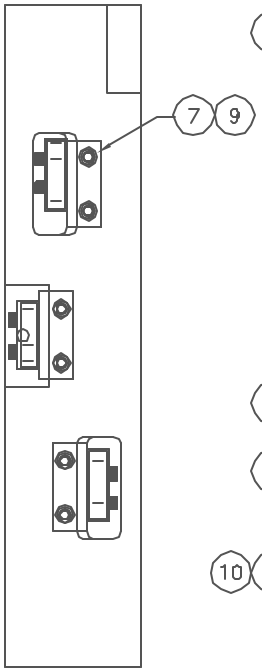
DRAWN G.DOUGLAS	DATE 01/21/97	DO NOT SCALE FROM DRAWING DIMENSIONS TOLERANCED UNLESS OTHERWISE SPECIFIED	GMW P.O. Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8286.
CHECK	DATE		
ENGINEERING	DATE		
		UNLESS OTHERWISE SPECIFIED: INCH / mm	TITLE: MOTORIZED.ROT.DRIVE SPOOL ASSEMBLY
		.XXX ±.005 / ±0.1	
		.XX ±.02 / ±0.5	
		.X ±.06 / ±1	
		ANGLES ±1°	
		FINISH 63 / 1.6	
11800800		THIRD ANGLE PROJECTION	SIZE A1 / DRAWING NO. 11900820 / REV B
NEXT ASSY	SYSTEM		
SOFTWARE AUTOCAD 13			SCALE 1:2 / WT kg / SHEET 1 OF 1

REVISIONS

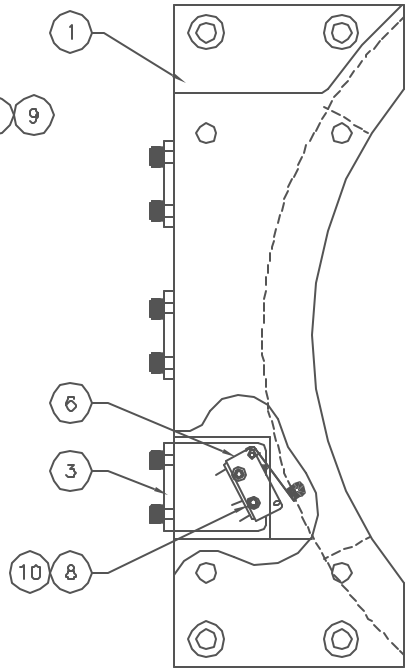
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		07/07/97	G.DOUGLAS



BOTTOM VIEW



REAR VIEW



TOP VIEW

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	DIN 912	BOLT, SHCS M2 X 10 S/S	
7	6	DIN 912	BOLT, SHCS M3 X 10 S/S	
6	2	V4NT7	MICROSWITCH, BURGESS	
5	1	V4NT9	MICROSWITCH, BURGESS	
4	1	17901170	SHAFT, ZERO MICROSWITCH	
3	2	17901160	BRACKET, LIMIT MICROSWITCH	
2	1	17901150	BRACKET, ZERO MICROSWITCH	
1	1	17901070	STOP BLOCK	

PARTS LIST

DRAWN G.DOUGLAS DATE 05/02/97
CHECK DATE
ENGINEERING DATE
11900810
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

	LINEAR INCHES	LINEAR mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

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

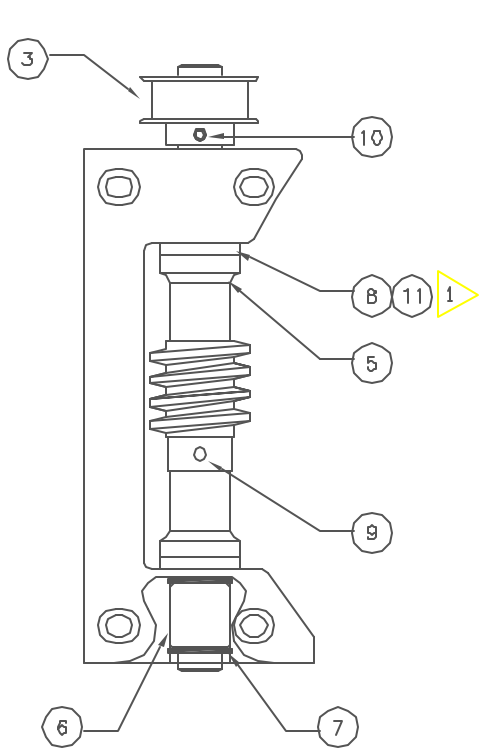
TITLE
MOTORIZED.ROT.DRIVE
STOP BLOCK ASSY

SIZE A2 | DRAWING NO. 11900840 | REV A

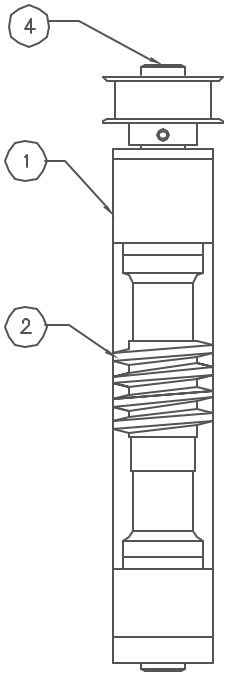
SCALE 1:1 | WT kg | SHEET 1 OF 1

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		07/07/97	G.DOUGLAS
B	ADD ITEM 11 AND NOTE: 1, CHG ITEM 3		11/27/97	G.DOUGLAS
C	CHG ITEM 3		04/08/98	G.DOUGLAS



TOP VIEW



FRONT VIEW

NOTE:

1. USE ITEM 11 TO PACK WORM DRIVE ASSEMBLY TO REDUCE SHAFT AXIAL MOVEMENT TO MINIMUM POSSIBLE. SHAFT MUST ROTATE FREELY.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
11	A/R	BN 748	SHIM WASHER, 14 X 26 X 0.1MM THICK	
10	1	DIN 1481	PIN, SPRING, M4 X 28L SP/S	
9	1	DIN 1481	PIN, SPRING M4 X 18L, SP/S	
8	2	BR5-3	BEARING, THRUST, BERG	
7	4	A 9Q28-6B	RETAINING RING [CIRCLIP], SDP	
6	2	S99NH2-BN1624	BEARING, NEEDLE ROLLER, SDP	
5	2	17901190	SPACER, WORM	
4	1	12900060	WORM SHAFT	
3	1	12900041	PULLEY, 18 TEETH [FOR 1/2" SHAFT]	
2	1	12900130	WORM	
1	1	17901080	WORM MOUNT	

PARTS LIST

DRAWN G.DOUGLAS DATE 05/03/97
CHECK DATE
ENGINEERING DATE
11800810
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

	INCHES	mm
LINEAR		
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.08	±1
DEB.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

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

TITLE
MOTORIZED.ROT.DRIVE WORM MOUNT ASSY

SIZE A2 | DRAWING NO. 11900850 | REV C

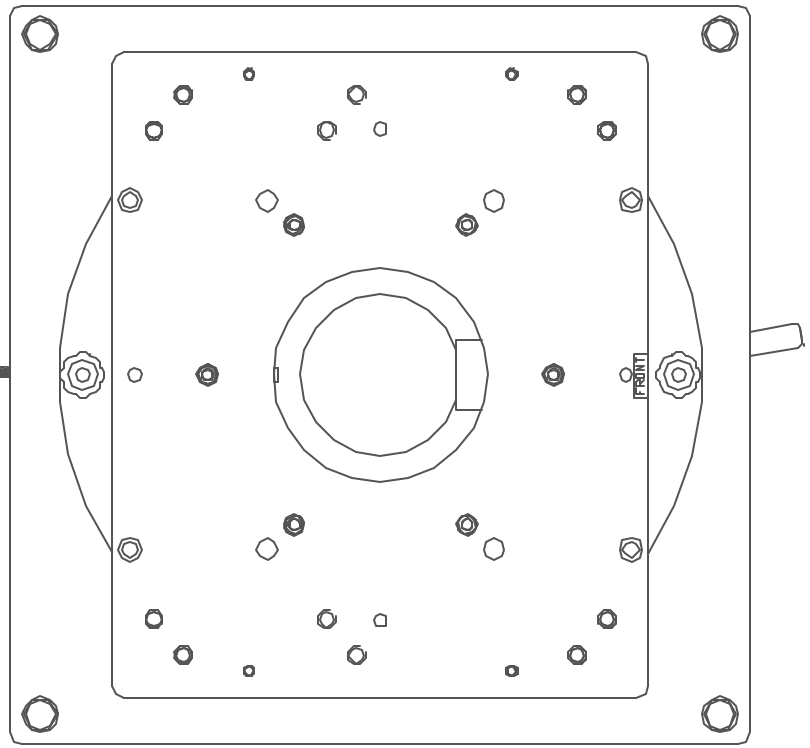
SCALE 1:1 | WT kg | SHEET 1 OF 1

PROPRIETARY

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY TO GMW INC. IT MUST NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED IN ANY WAY WITHOUT THE EXPRESS WRITTEN PERMISSION OF GMW INC.

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/17/98	G.DOUGLAS

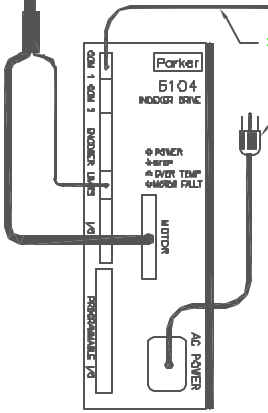
TOP VIEW



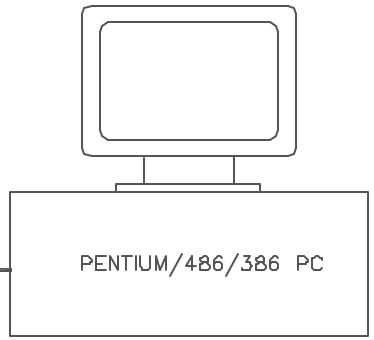
MOTOR AND LIMIT SWITCH CABLE PART NO 16900400

SERIAL COMMUNICATIONS CABLE PART NO 16900410

AC POWER INPUT



STEPPER MOTOR CONTROLLER



CONTROL COMPUTER

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN G.DOUGLAS	DATE 02/17/98	DO NOT SCALE FROM DRAWING DIMENSIONS IN TOLERANCED UNLESS OTHERWISE SPECIFIED	GMW P.O. Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8288.
CHECK	DATE		
ENGINEERING	DATE		

LINEAR	INCHES	mm
X.XXX	±.005	±0.10
X.XX	±.02	±0.5
X	±.06	±1
ANGLES	±0.5°	
FINISH	125	1.6µ

TITLE: MOTORIZED.ROT.DRIVE ELECTRICAL ASSY

NEXT ASSY	SYSTEM	SIZE	DRAWING NO.	REV
		A1	11901020	A

SOFTWARE AUTOCAD 13

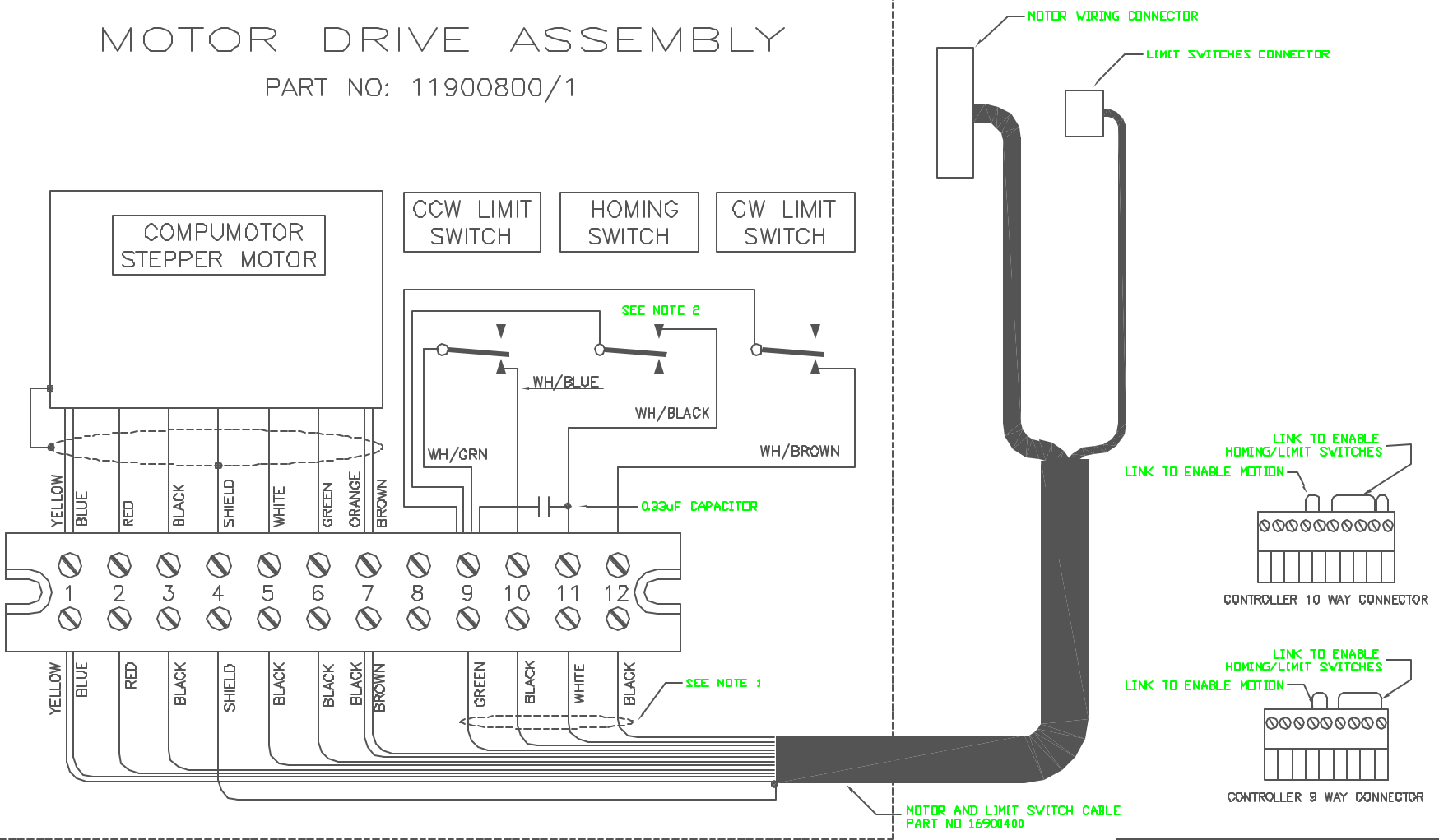
THIRD ANGLE PROJECTION

SCALE 1:2 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/13/01	G.DOUGLAS
B	ADD CONTROLLER CONNECTOR LINKING		11/12/01	G.DOUGLAS

MOTOR DRIVE ASSEMBLY

PART NO: 11900800/1



NOTE:
1. USE BLACK WIRES FROM GREEN AND WHITE PAIRS. DO NOT MIX WITH BLACK WIRES USED FOR STEPPER MOTOR.
2. HOMING SWITCH USES NORMALLY OPEN CONTACT. LIMIT SWITCHES USE NORMALLY CLOSED CONTACTS.

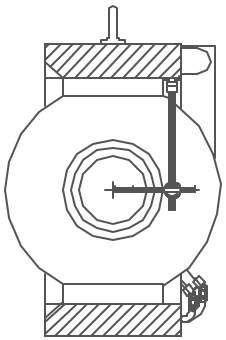
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

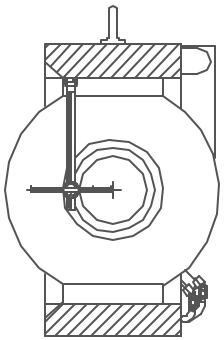
DRAWN G.DOUGLAS	DATE 02/13/01	DO NOT SCALE FROM DRAWING DIMENSIONS IN PARENTHESES ARE METRIC EQUIVALENTS	GMW P.O. Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		
			TITLE MOTORIZED ROT. DRIVE ELECTRICAL WIRING
			SIZE A1 DRAWING NO. 13900350 REV B
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	
SOFTWARE AUTOCAD 13			SCALE 2:1 WT kg SHEET 1 OF 1

REVISIONS

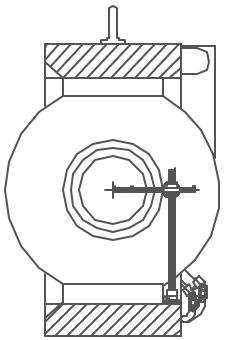
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		09/11/98	G.DOUGLAS



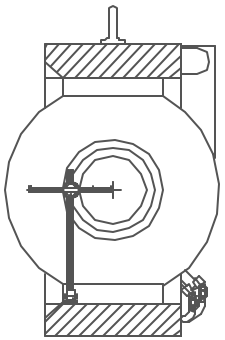
TOP/REAR INSTALLATION



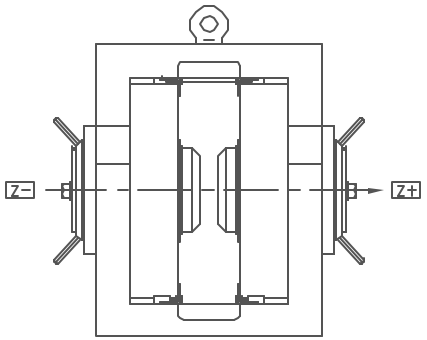
TOP/FRONT INSTALLATION



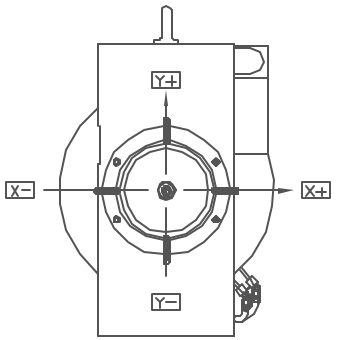
BOTTOM/REAR INSTALLATION



BOTTOM/FRONT INSTALLATION

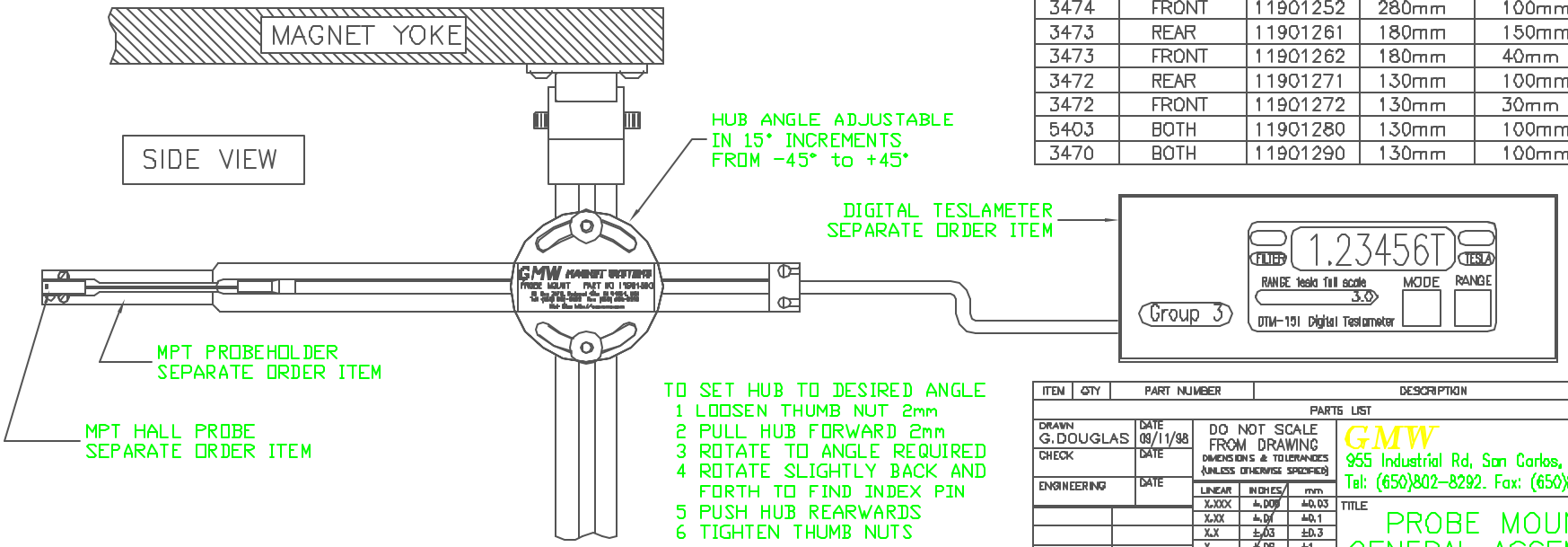


MAGNET FRONT VIEW



MAGNET SIDE VIEW

MAGNET MODEL	INSTALLATION POSITION	ASSEMBLY NUMBER	VERTICAL TRAVEL "Y"	HORIZONTAL TRAVEL "Z"
3474	REAR	11901251	280mm	200mm
3474	FRONT	11901252	280mm	100mm
3473	REAR	11901261	180mm	150mm
3473	FRONT	11901262	180mm	40mm
3472	REAR	11901271	130mm	100mm
3472	FRONT	11901272	130mm	30mm
5403	BOTH	11901280	130mm	100mm
3470	BOTH	11901290	130mm	100mm



TO SET HUB TO DESIRED ANGLE
1 LOOSEN THUMB NUT 2mm
2 PULL HUB FORWARD 2mm
3 ROTATE TO ANGLE REQUIRED
4 ROTATE SLIGHTLY BACK AND FORTH TO FIND INDEX PIN
5 PUSH HUB REARWARDS
6 TIGHTEN THUMB NUTS

NOTE: ABOVE PROBE MOUNT SHOWN INSTALLED ON MODEL: 3474 ELECTROMAGNET.
OTHER CONFIGURATIONS AND MOUNTINGS ARE AVAILABLE. CONSULT TABLE FOR GMW ELECTROMAGNETS.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN G.DOUGLAS DATE 09/11/98
CHECK DATE
ENGINEERING DATE
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

	INCHES	mm
LINEAR		
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
PROBE MOUNT GENERAL ASSEMBLY

SIZE	DRAWING NO.	REV
A2	11901300	A

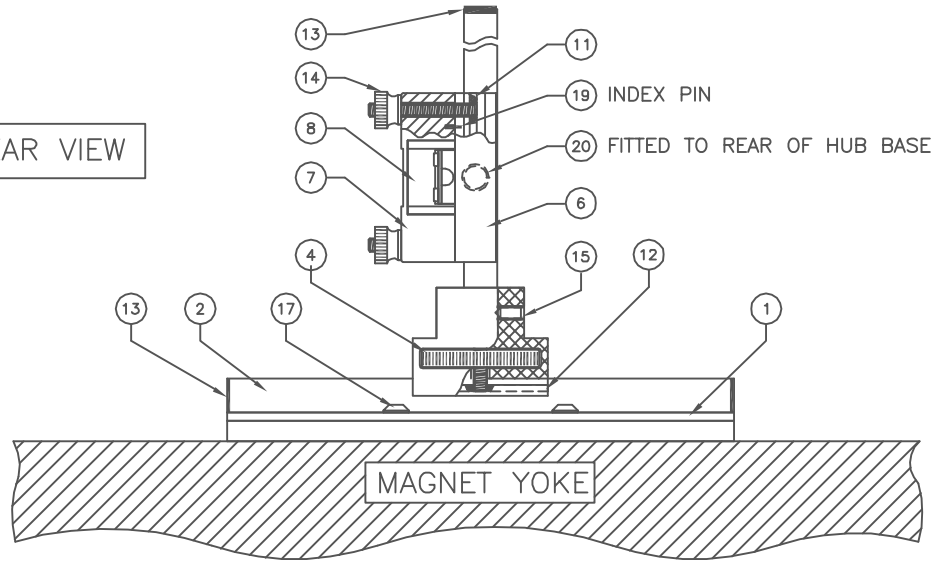
SCALE 1:1 | WT kg | SHEET 1 OF 1

ISO 7380

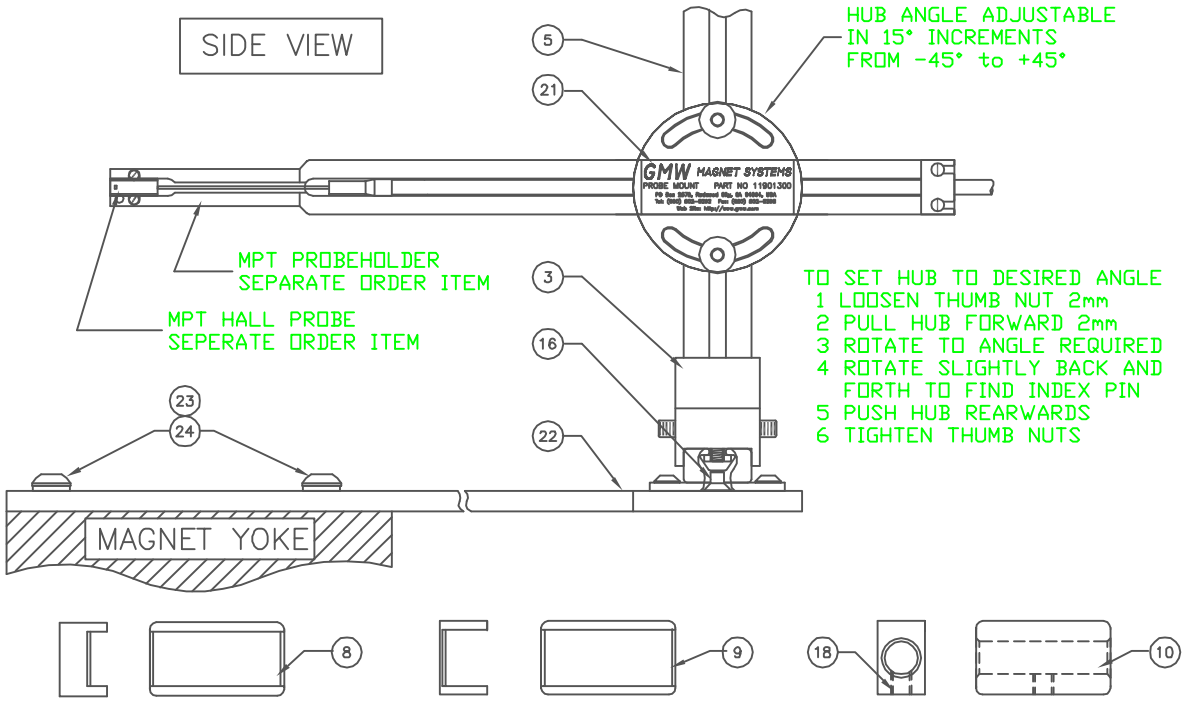
REVISIONS

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

REAR VIEW



SIDE VIEW



TO SET HUB TO DESIRED ANGLE
1 LOOSEN THUMB NUT 2mm
2 PULL HUB FORWARD 2mm
3 ROTATE TO ANGLE REQUIRED
4 ROTATE SLIGHTLY BACK AND FORTH TO FIND INDEX PIN
5 PUSH HUB REARWARDS
6 TIGHTEN THUMB NUTS

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, INDENTIFICATION	
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
CHECK	
DATE	
ENGINEERING	
DATE	
NEXT ASSY	
SYSTEM	
SOFTWARE	AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
PROBE MOUNT
MODEL: 5403

SIZE	DRAWING NO.	REV
A2	11901280	A

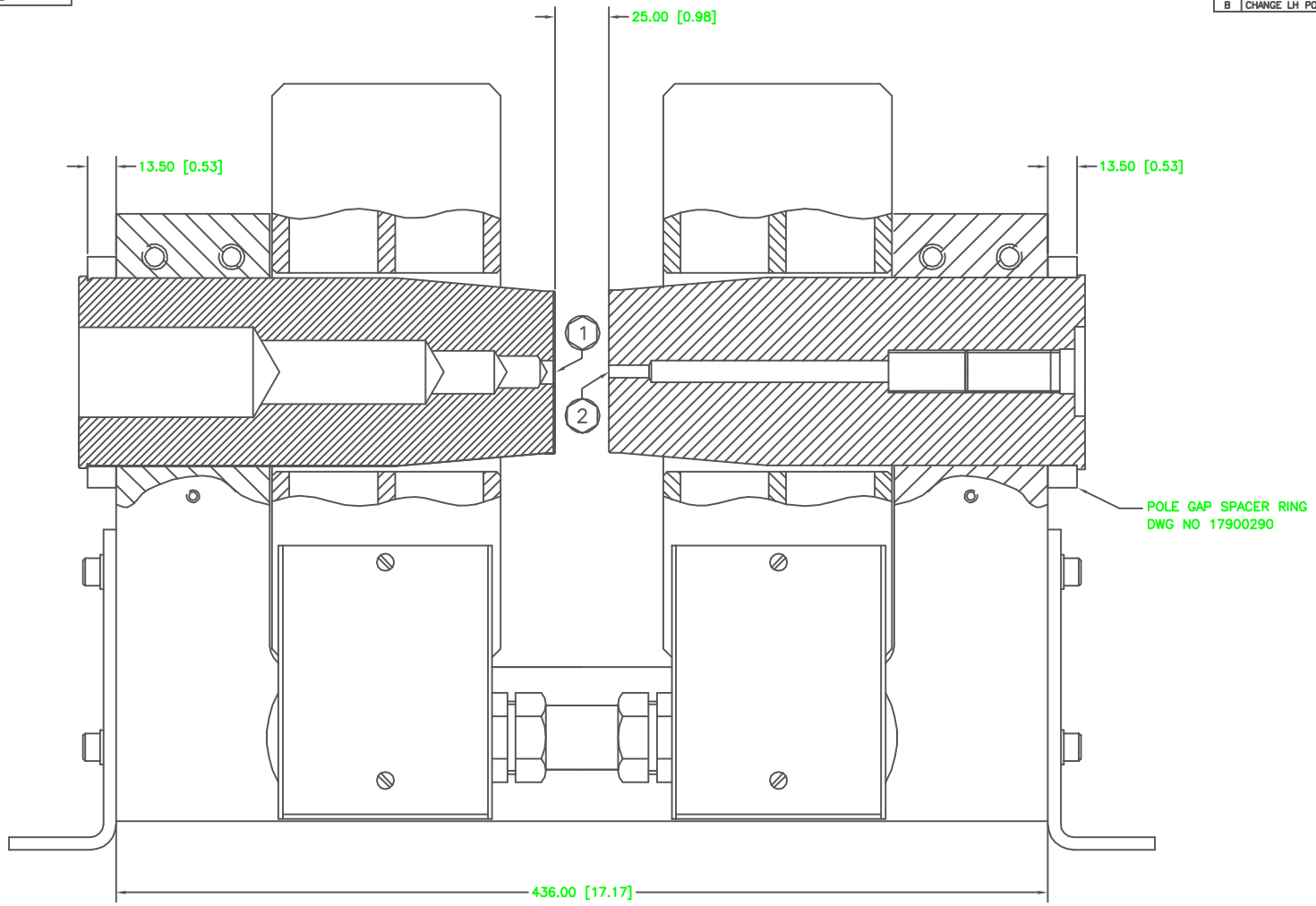
SCALE 1:1 | WT kg | SHEET 1 OF 1

Section 7

CUSTOM OPTIONS

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)

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEB.	±.5	±0.0
FINISH	63	1.6

NEXT ASSY 5403 SYSTEM

SOFTWARE: AUTOCAD 12

THIRD ANGLE PROJECTION

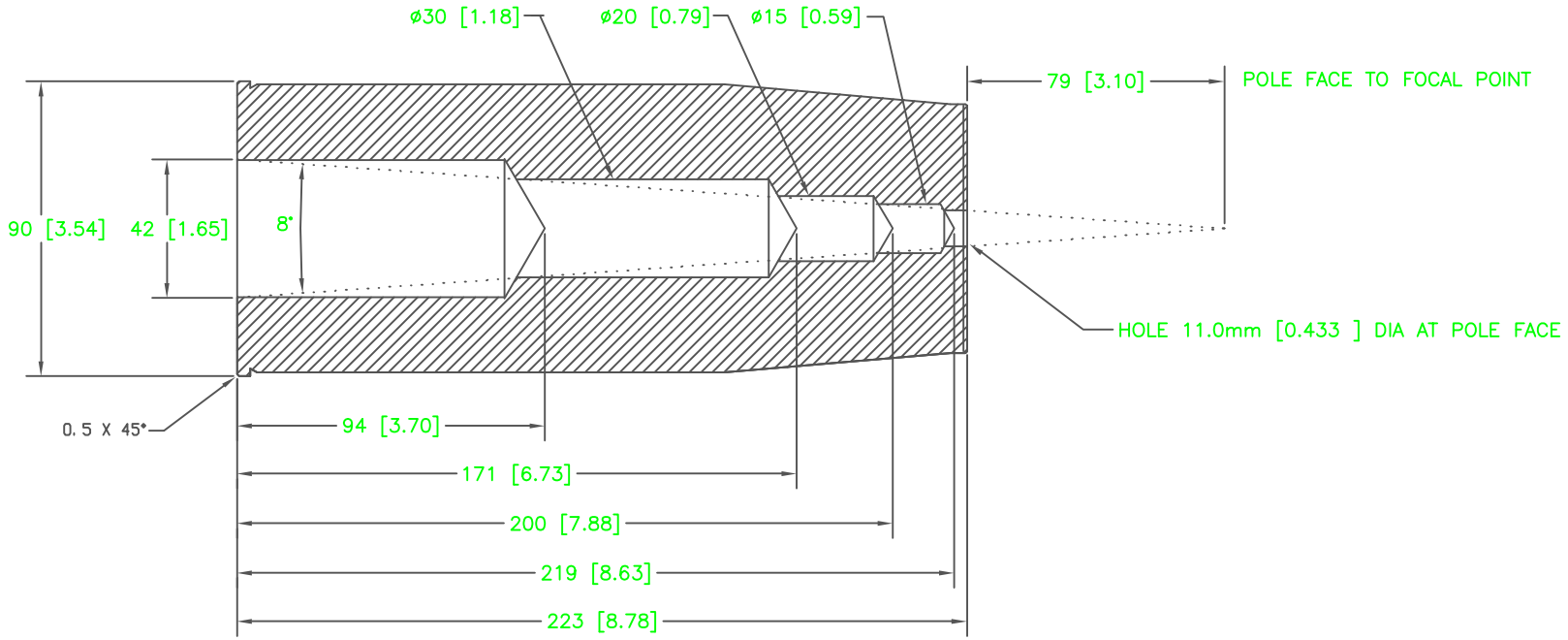
GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (415)802-8292. Fax: (415)802-8298.

TITLE
POLE GEOMETRY
UN OF CAL, C7909

SIZE A1 | DRAWING NO. 81190000 | REV B

SCALE 1:1 | WT kg | SHEET 1 OF 1

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
CHECK	DATE
ENGINEERING	DATE
	5403
NEXT ASSY	SYSTEM
SOFTWARE: AUTOCAD 12	

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

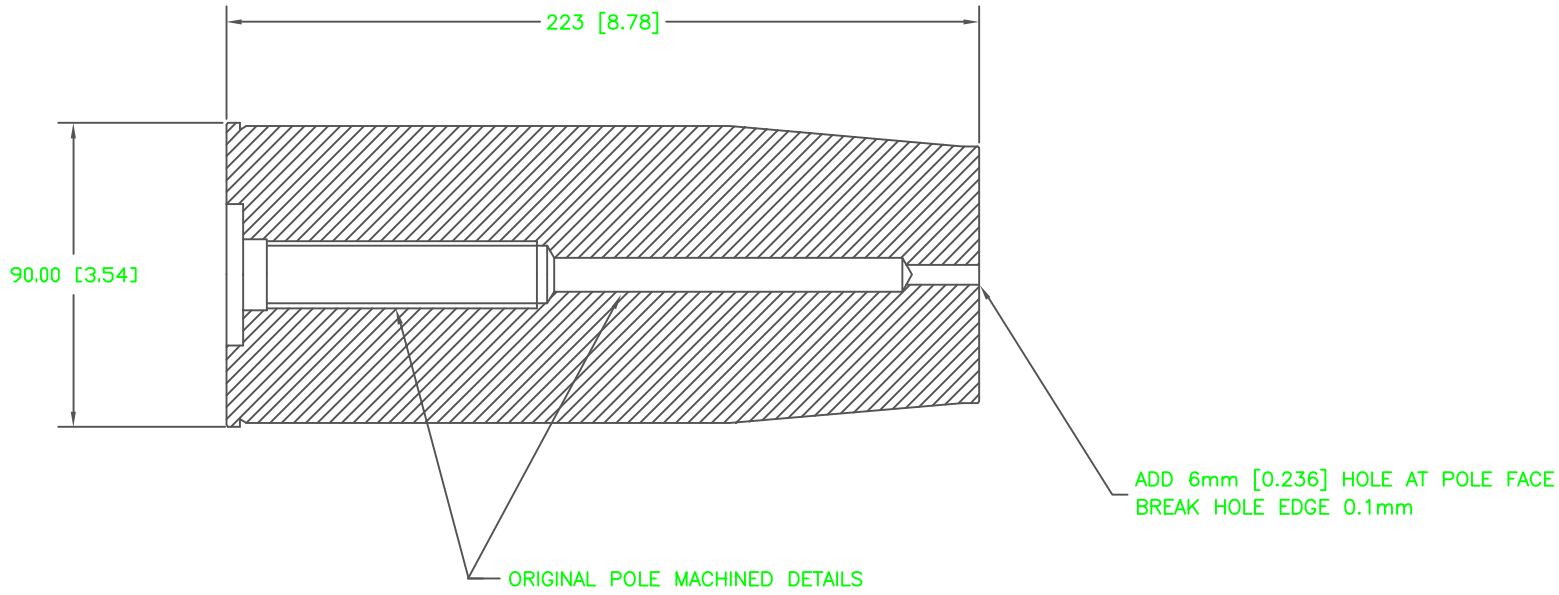
GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (415)802-8292 Fax: (415)802-8298.

TITLE
POLE: CYLINDRICAL
MODEL: 5403

SIZE	DRAWING NO.	REV
A2	17612621	B

SCALE 1:1	WT kg	SHEET 1 OF 1

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



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
CHECK	DATE
ENGINEERING	DATE
	5403
NEXT ASSY	SYSTEM
SOFTWARE AUTOCAD 13	

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

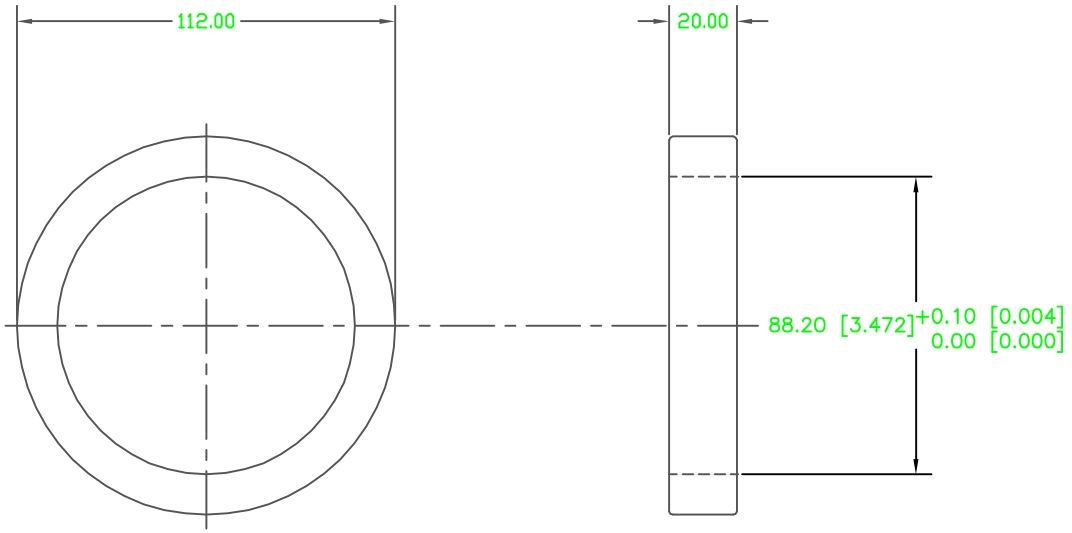
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
POLE: CYLINDRICAL
MODEL: 5403

SIZE	DRAWING NO.	REV
A2	17612622	A

SCALE 1:1	WT kg	SHEET 1 OF 1

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 DIAMENSIONS BEFORE PLATING

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN G.DOUGLAS DATE 11/20/96
CHECK DATE
ENGINEERING DATE
NEXT ASSY SYSTEM
SOFTWARE: AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

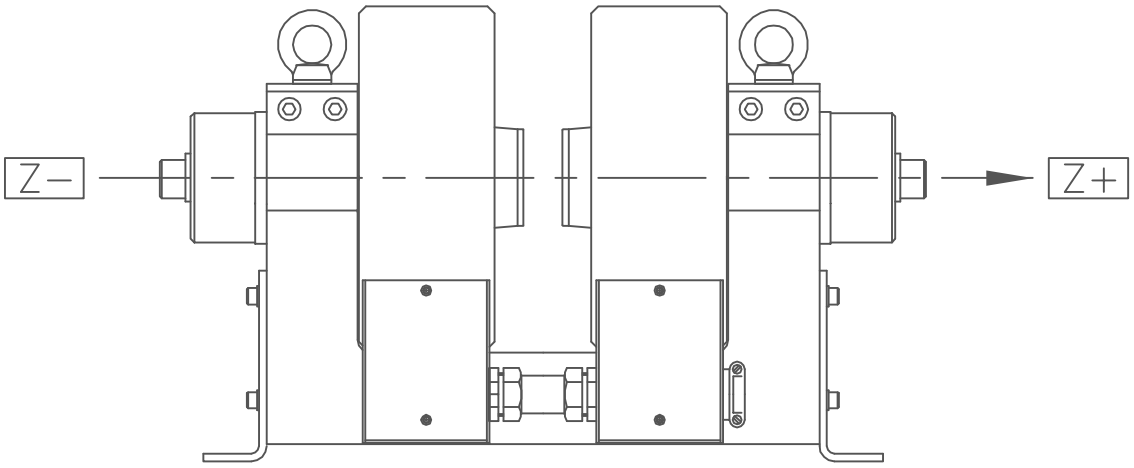
GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (415)802-8292 Fax: (415)802-8298.

TITLE
POLE SPACER RING
MODEL: 5403

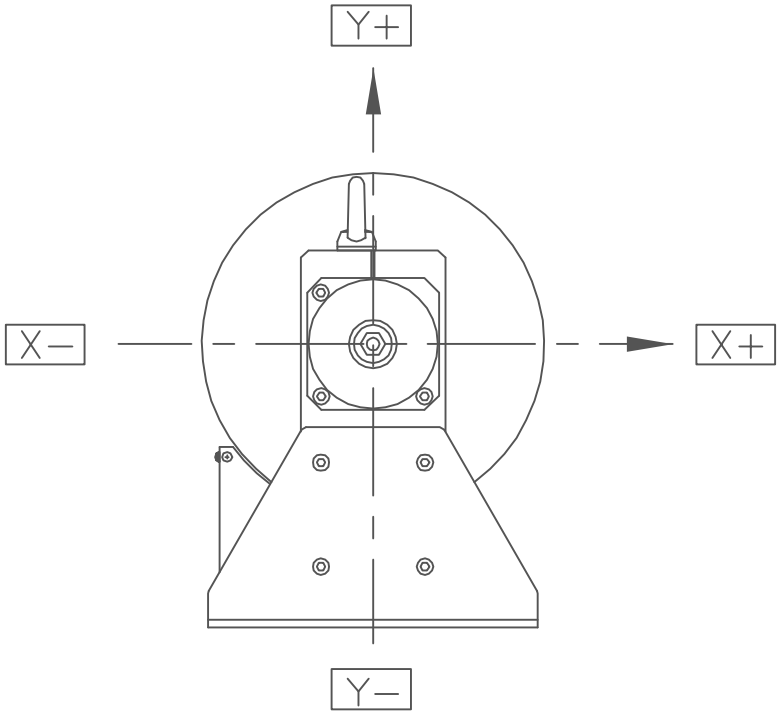
SIZE	DRAWING NO.	REV
A2	17900290-20	A

SCALE 1:1 | WT kg | SHEET 1 OF 1

FRONT VIEW



SIDE VIEW



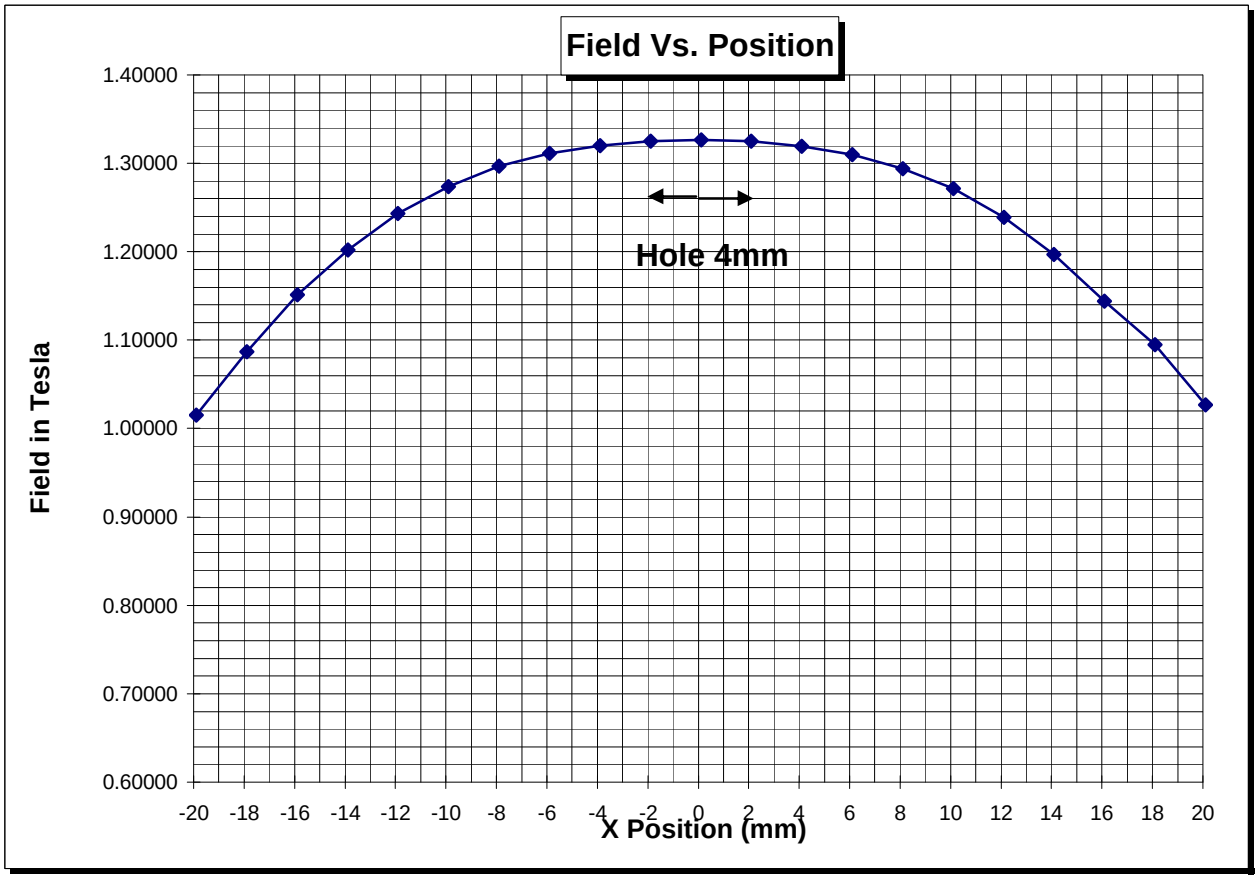
MAGNETIC PLOTTING AXIS

80900040	A	SHEET 1 OF 1

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT

Model	5403	Pole Face 38 mm	Engr Toomas Rett
Serial No	42	Pole Gap 25 mm	Date June 27, 1995
		Hole Dia 4mm	
Magnet Current	50 Amps	US Army Redstone Arsena	C7915

Plot Y = 0.0 mm, Z = 0.0 mm				
X -	Magnet Field	X +	Magnet Field	Magnet Field Average
mm	Tesla	mm	Tesla	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

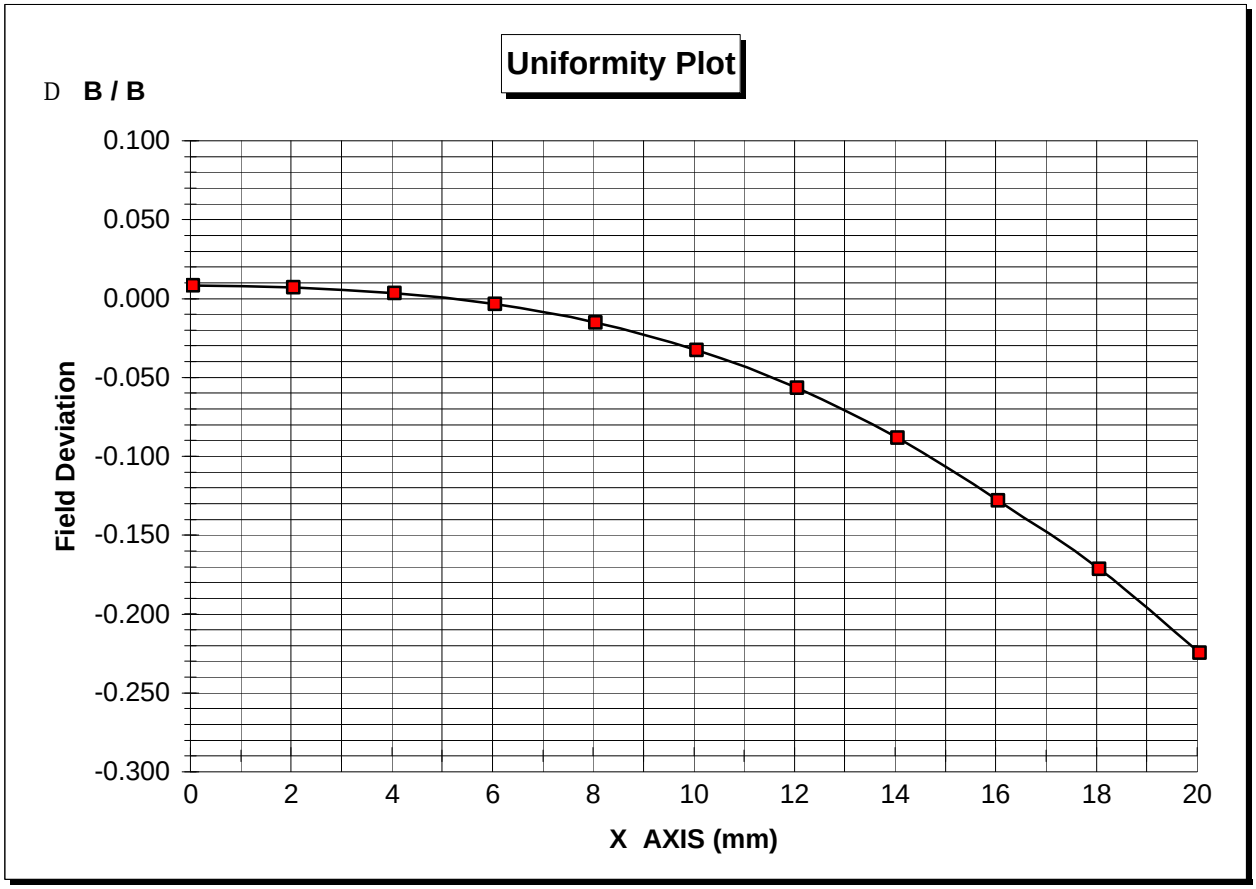


Doc no: SC7915U2.057

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT

Model	5403	Pole Face 38 mm	Engr Toomas Rett
Serial No	42	Pole Gap 25 mm	Date June 27, 1995
		Hole Dia 4mm	
Magnet Current	50 Amps	US Army Redstone Arsena	C7915

Plot Y = 0.0 mm, Z = 0.0 mm				
X -	Magnet Field	X +	Magnet Field	Magnet Field Average
mm	Tesla	mm	Tesla	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

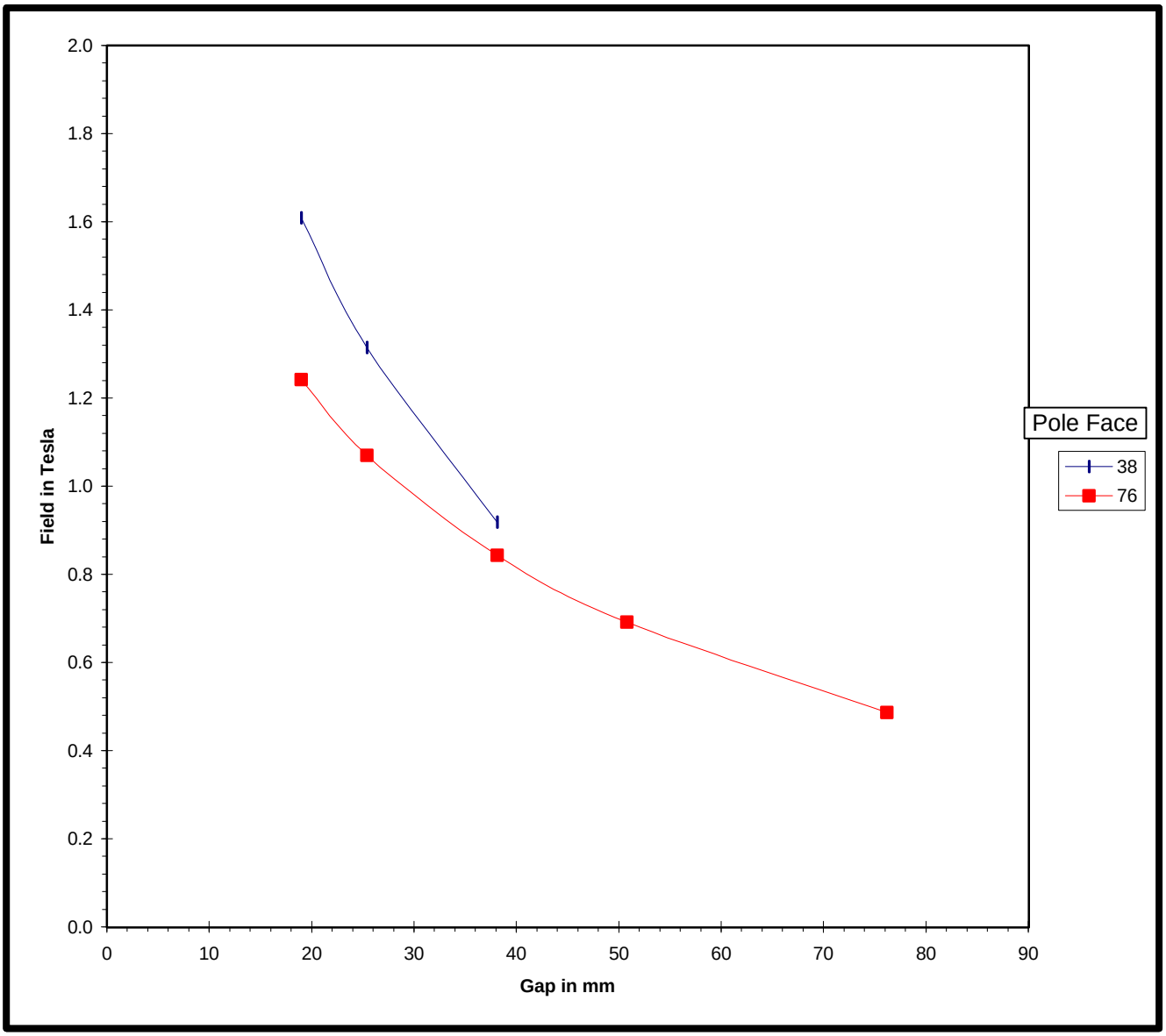


Section 8

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				

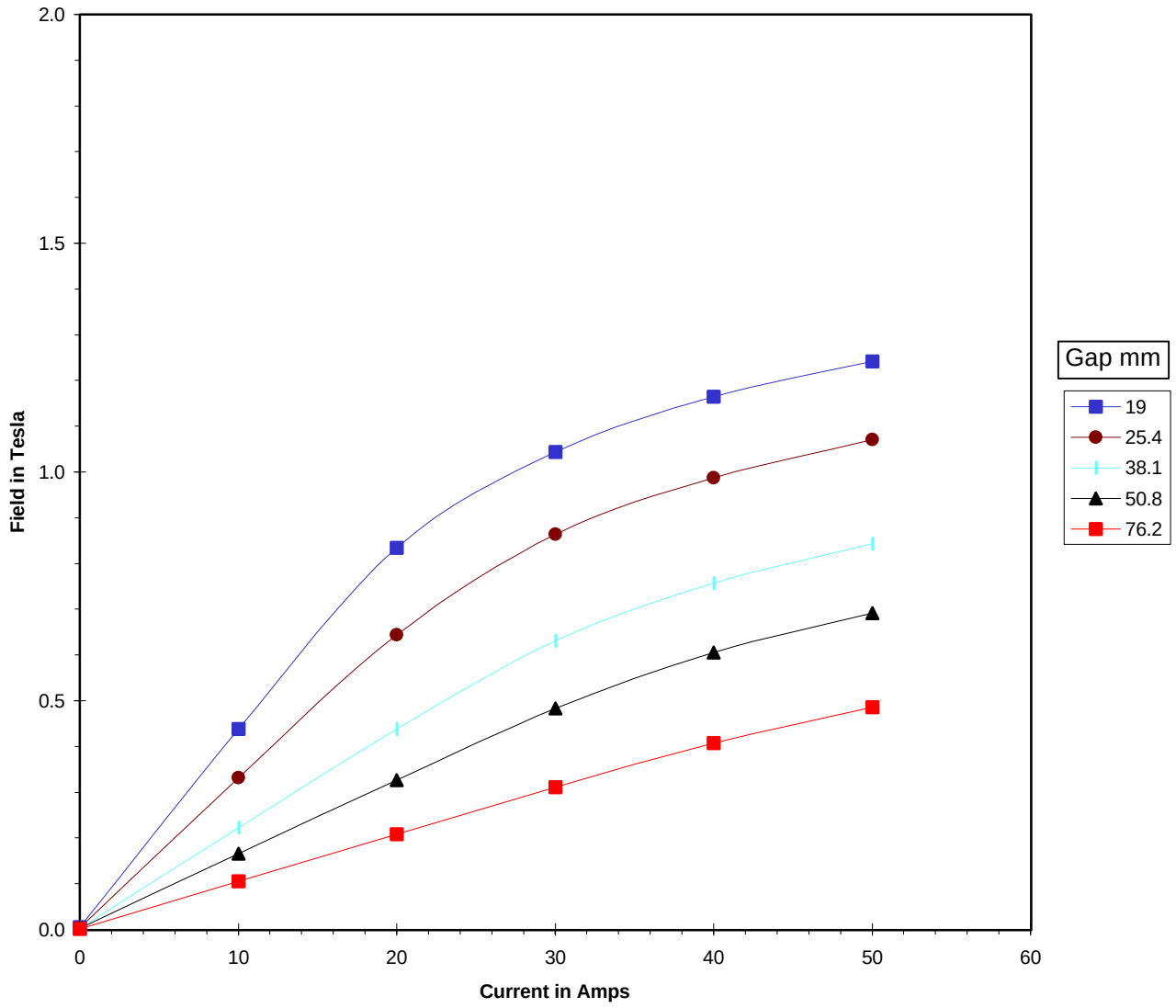


Filename: 5403 Gap-Field.xls

Revised: Feb 15, 2000

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

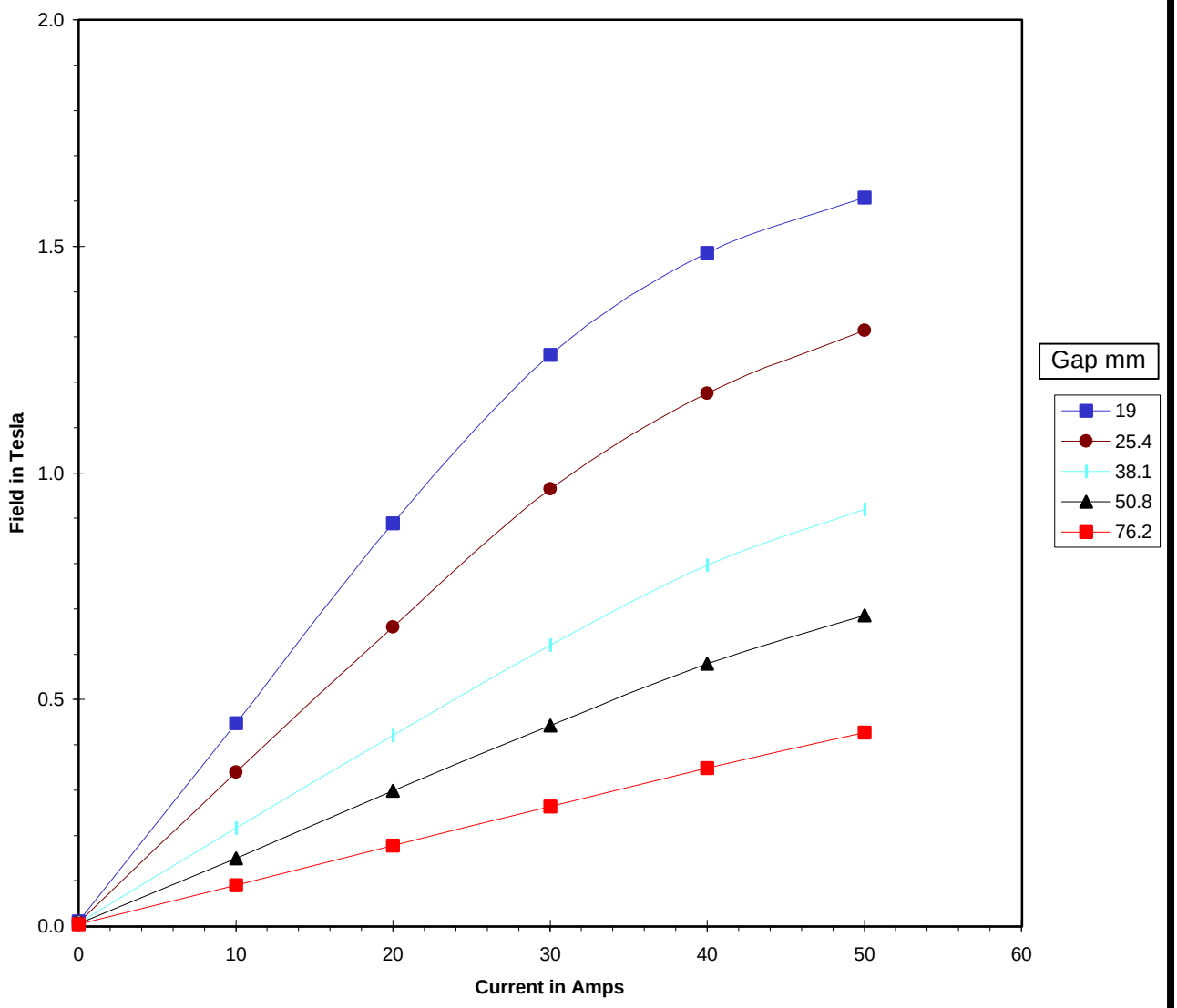
Contract No:		Page: 1 of 2		Date:	May 19, 89
Customer:				Engr:	G.Douglas
Model:	5403	Power Supply:		Set Current:	
Serial No:	12	Serial No:		Target Field:	
Pole Face:	76 mm	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 5403 Ex 76-19-76.xls

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				



Filename: 5403 Ex 38-19-76.xls

Section 9

TEST DATA

Section 10

DRAWINGS

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

Typical Applications:

Power Supplies

Communication Equipment

Medical Equiopment

Computers (Where High AMP Loads are Present)

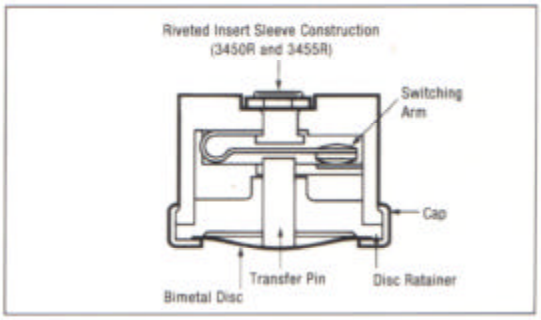
The Series 3450/3455R is a snap-acting, non-adjustable precision thermostat especially suited for industrial and electrical equipment.

The 3450 (.390" or 10mm overall) is ideal for 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.



***Series 3450/3450R/3455R/3455RBV**

MODEL	ELECTRIC LIFE CYCLES	120 VAC	240 VAC	277VAC
3450	100,000	8.0A	-	-
3450R/	100,000	15A	8.3A	7.2A
3455R	100,000	4.4FLA 26.4LRA	2.2FLA 13.2LRA	-
	6,000	5.8FLA 34.8LRA	2.9FLA 17.4LRA	-
3455RBV	100,000	15A	8.3A	-
	6,000	5.8A 34.8LRA	2.9A 17.4LRA	-

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* ± at mean temperature set points				Standard Mean Differential Nominal degrees between opening and closing points		Price Group*
	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

*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.

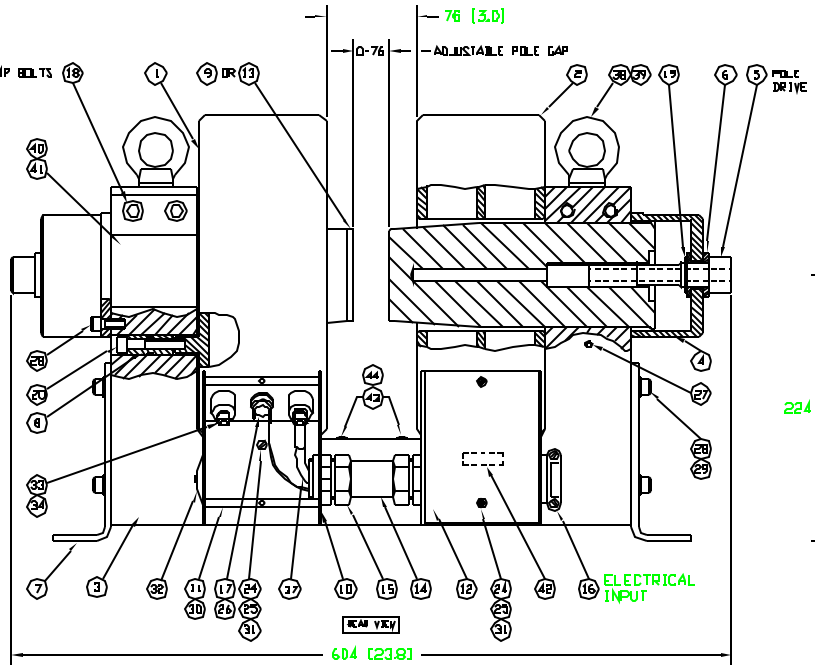
Operating Parameters

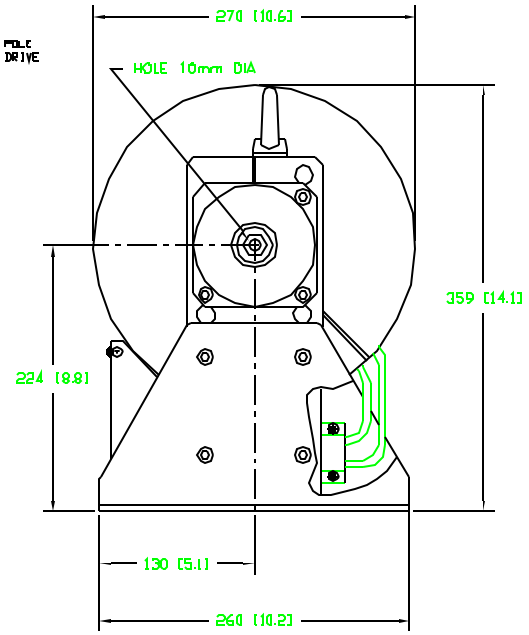
Dielectric Strength	Mil-STD-202 Method 301 -2000 VAC 60 Hz - Terminal to Case
Insulation Resistance	Mil-STD-202 Method 302 Cond. B - 500 Megohms - 500 Volts DC applied
Environmental Exposure	0° to 350°F (–18° to 177°C)
Operating Temp. Range	32° to 302°F (0° to 150°C)
Contact Resistance	Mil-STD-202, Method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

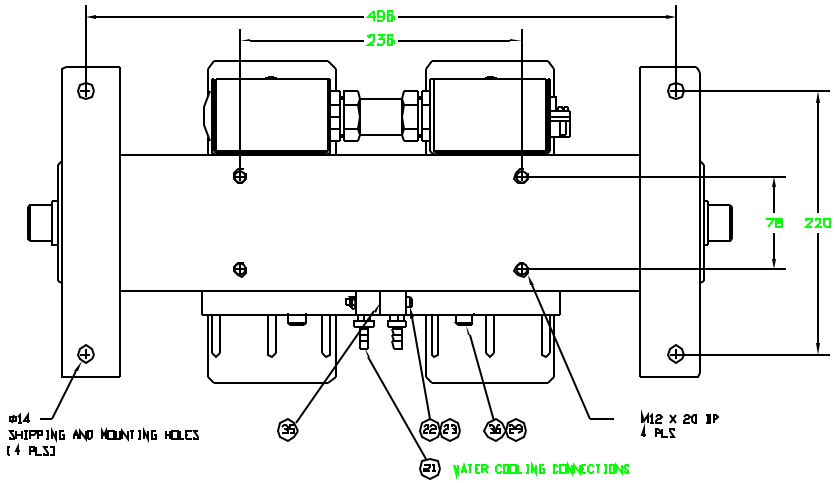
UL and CSA Listings

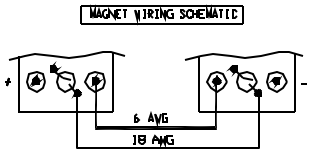
UL and CSA Listings are for use in equipment where the acceptability of the combination of the thermostat and equipment is determined by Underwriters' Laboratories, Inc. and/or the Canadian Standards Association.

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









MAGNET WIRING SCHEMATIC

MAGNET SPECIFICATIONS

POLE DIAMETER	76mm [3"]
POLE GAP	0-76mm [0-3"]
POLE CAPS	CYLINDRICAL 76mm [3"] TAPERED 38mm [1.5"]

COILS [series connected]

MAX RESISTANCE	0.56 Ohm
MAX POWER [air]	60A/10V
MAX POWER [water]	50A/25V
SELF INDUCTANCE	60 mH
COOLING	2 l/min [0.6 GPM] @ 0.3 BAR [8 PSI]]
THERMAL INTERLOCK	OPEN CIRCUIT ABOVE 50°C [122°F]
MASS	124 kg [275 lbs]

NOTE: DO NOT EXCEED THE MAXIMUM SPECIFIED COIL RESISTANCE OR COIL OVERHEATING AND POSSIBLE DAMAGE MAY OCCUR.

NOTE: 1. PARTS FITTED AT GMW

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		08/11/93	A.MARTIN
B	NEW T/B, CORRECT DIM @ A6, ADD ITEM 68 TO 42		04/18/96	G.DOUGLAS
C	ADD ITEM 43,44, CHG ITEM 37, ITEM 15 P/N CHANGE		08/31/98	G.DOUGLAS

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
44	4		M6 x 1.6 FLAT WASHER S/S	
43	4		M6 x 16 SHCS BUTTON HD S/S [For Probe Mount]	
42	1		LABEL, GROUND [RH side under cover]	1
41	1		LABEL, CAUTION [RH side]	1
40	1		LABEL, SPECIFICATION [LH side]	1
39	2		M12 FLAT WASHER, S/S	1
38	2	9-0503	M12 EYEBOLT	1
37	1	17610130	COIL JUMPER LEAD	
36	2		M8 X 30 SHCS, S/S	
35	2		O-RING -011 BUNA N	
34	4		M6 SPRING WASHER, S/S	
33	4		M6 X 12 SHCS, S/S	
32	1		GROMMET PLUG No 9, RUBBER	
31	6		M4 FLAT WASHER	
30	8		M4 x 8 FLAT HD SCREW, S/S	
29	10		M8 FLAT WASHER, S/S	
28	14		M8 X 20 SHCS, S/S	
27	6		M6 X 10 SHCS, S/S	
26	2		WASHER NEOPRENE 15 X 5 X 3	
25	4		M4 x TAB LOCK WASHER, S/S	
24	8		M4 X 10 PAN HD SCREW, S/S	
23	2		M5 X 30 SHCS, S/S	
22	2		M5 KEP NUT, S/S	
21	2	KAQ4-02W8	HOSE COUPLING, IMPERIAL EASTMAN	
20	6		M8 X 50 SHCS, S/S	
19	2		GROVED RETAINING RING, WALDES 5101-78	
18	4		M12 X 6 SHCS, S/S	
17	2	345006II-1	SENSOR, 50°C LO SCREW MTG ELMWOOD	
16	1	3304	CABLE COUPLING 1", T & B	
15	2	TC-213-SC	CONDUIT COUPLING 1", T & B	
14	1		CONDUIT 1" X 64mm LG, ZN	
13	2	17612630	POLE TAPERED END 1.5"	
12	2	17612670	COVER	
11	4	17612680	SPACER	
10	2	17612660	TERMINAL BOX	
9	2	17612600	POLE CYLINDRICAL 3"	
8	6	17612590	CLEVIS	
7	2	17612650	ANGLE BRACKET	
6	4	17612700	WASHER	
5	2	17610110	DRIVE SCREW	
4	2	17612610	CAP	
3	1	17612550	YOKE	
2	1	11610512	RH COIL	
1	1	11610511	LH COIL	

DRAWN	A.MARTIN	DATE	09/11/93
CHECK		DATE	
ENGINEERING		DATE	
NEXT ASSY		SYSTEM	5403

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES PER ASME Y14.5M-1994

UNLESS OTHERWISE SPECIFIED:	DECIMALS	FRACTIONS	—
1 PLACE	± .1	± 1/8	± 1°
2 PLACE	± .03	± 1/16	± 0°30'
3 PLACE	± .010	± 1/32	± 0°15'
4 PLACE	± .005	± 1/64	± 0°05'
ANGLES	± 1°		
FINISH	125		
MATERIAL	SEE BOM		
THIRD ANGLE PROJECTION			

GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (650)802-8292, Fax: (650)802-8296

TITLE: MAGNET ASSEMBLY MODEL: 5403

SIZE	DRAWING NO.	REV
A1	11610500	C

SCALE 1:2 | WT kg | SHEET 1 OF 1

SOFTWARE: AUTOCAD 13

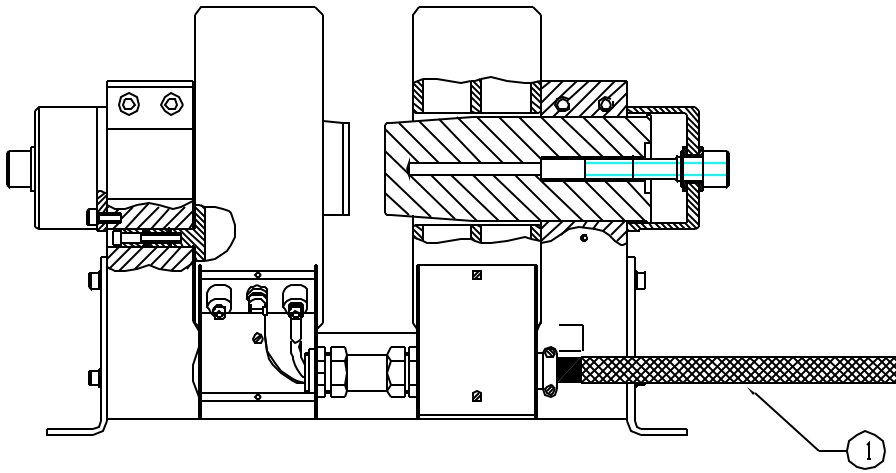
PROPRIETARY

THE DRAWING CONTAINED HEREON, INFORMATION DISCLOSED THEREIN AND THE ARTICLE OR APPARATUS TO BE CONSTRUCTED THEREFROM ARE THE PROPERTY OF GMW INC. IT MUST NOT BE REPRODUCED OR DISCLOSED TO OTHERS, OR USED FOR ANY PURPOSE EXCEPT AS SPECIFICALLY AUTHORIZED IN WRITING BY GMW INC.

REVISIONS

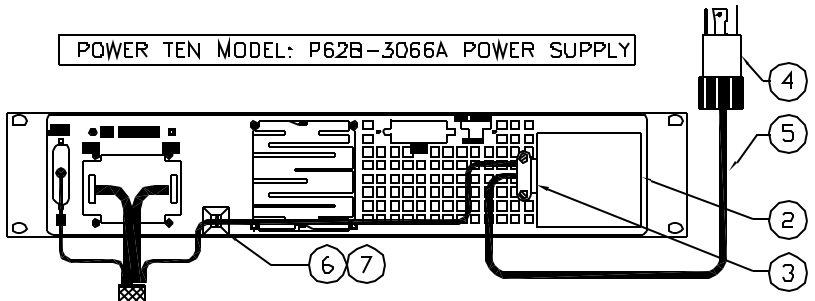
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		03/19/07	G.DOUGLAS

MODEL 5403 ELECTROMAGNET



FRONT VIEW LH TERMINAL COVER REMOVED

POWER TEN MODEL: P62B-3066A POWER SUPPLY



POWER SUPPLY REAR VIEW

*** WARNING ***

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

NOTE

1. POWER SUPPLY SHOWN WITH 2 PHASE 208V AC INPUT
2. REFER TO TABLE ON DWG 139D1240 FOR AC INPUT RATINGS OTHER THAN 2 PHASE 208V.

N/S=NOT SUPPLIED

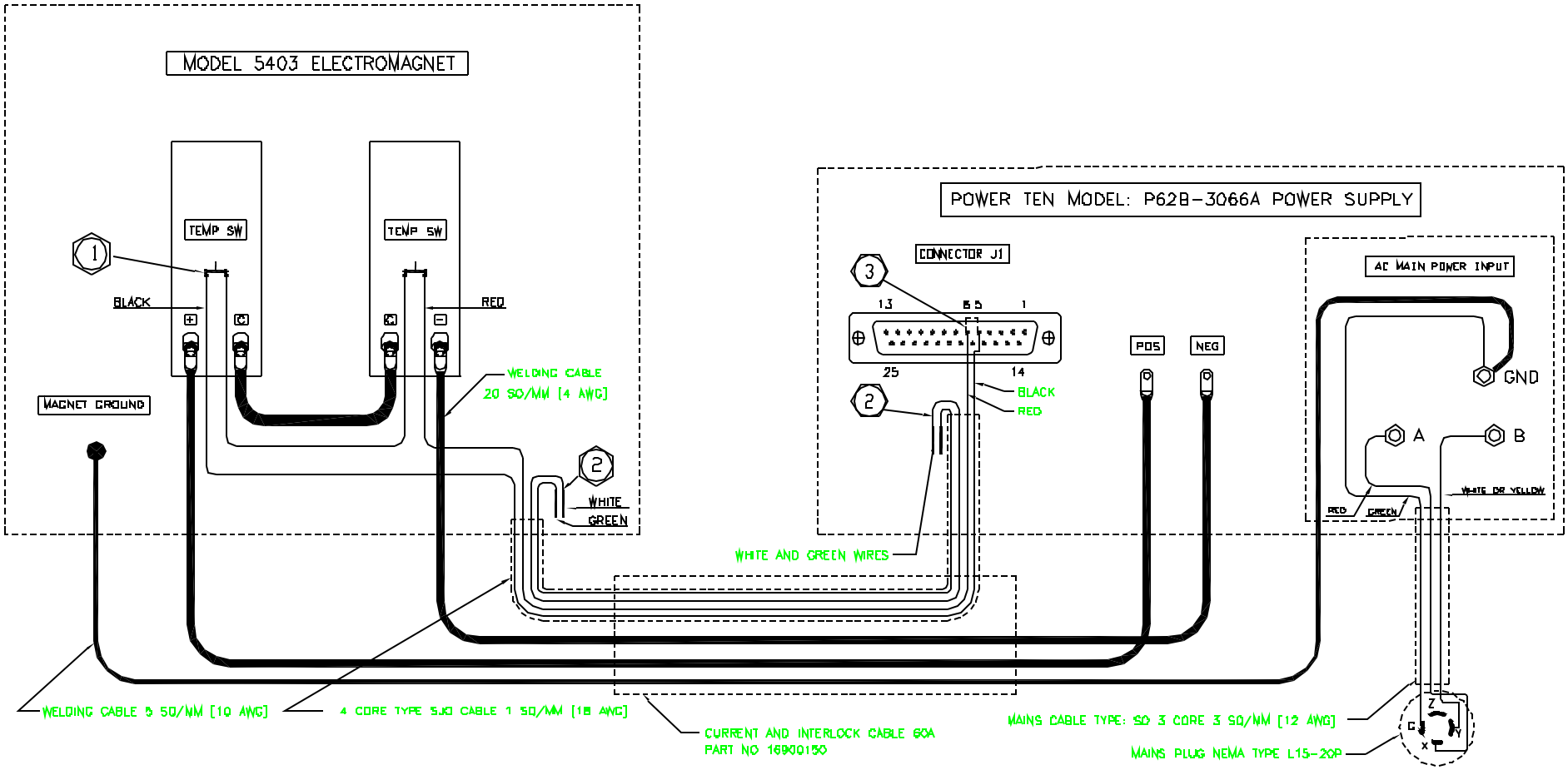
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	1	08461	CABLE TIE ADHESIVE MTG. NYL BAR-LOK	
6	1	08432	CABLE TIE, NYLON 2.5mm WIDE. BAR-LOK	
5	1	4A-1203	POWER CORD, TYPE SO 3 CORE 12AWG	N/S
4	1	L15-20P	PLUG 3PHASE/20A, NYLON. BRYANT	N/S
3	1	3303	CABLE CLAMP, THOMAS & BETTS	
2	1	129DD10	AC TERMINAL BOX	
1	1	69DD150	CURRENT & INTERLOCK CABLE 60A	

PARTS LIST

DRAWN G.DOUGLAS	DATE 03/19/07	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES PER ASME Y14.5M	GMW 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292, Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE ELECTRICAL ASSEM 5403/P62B-3066A
NEXT ASSY	USED ON	THIRD ANGLE PROJECTION	SIZE A1 DRAWING NO. 11900740 REV A
SOFTWARE AUTOCAD 13			SCALE NTS MASS kg SHEET 1 OF 1

PROPRIETARY

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/15/07	G.DOUGLAS



NOTE:

1. CONNECT MAGNET TEMPERATURE INTERLOCK WIRING DIRECTLY ONTO QC TABS ON TEMP SWITCHES
2. LEAVE WHITE AND GREEN WIRES FULL LENGTH AND INSULATE WITH HEAT SHRINK SLEEVING. CAN BE USED FOR WATER FLOW SWITCH INTERLOCK [OPTIONAL]
3. REMOVE LINK BETWEEN PIN 5 AND PIN 6 ON POWER SUPPLY AT J1. CONNECT INTERLOCK WIRES AS SHOWN.

ELECTROMAGNET SYSTEM ELECTRICAL REQUIREMENTS			
AC INPUT POWER 3 PHASE, 47 to 63HZ	208V	-	-
AC INPUT FULL LOAD CURRENT	10	-	-
RECOMMENDED MAIN AC BREAKER	20	-	-
RECOMMENDED AC POWER OUTLET	L15-20R	-	-
RECOMMENDED AC CABLE SIZE	3 SQ/MM	-	-

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

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

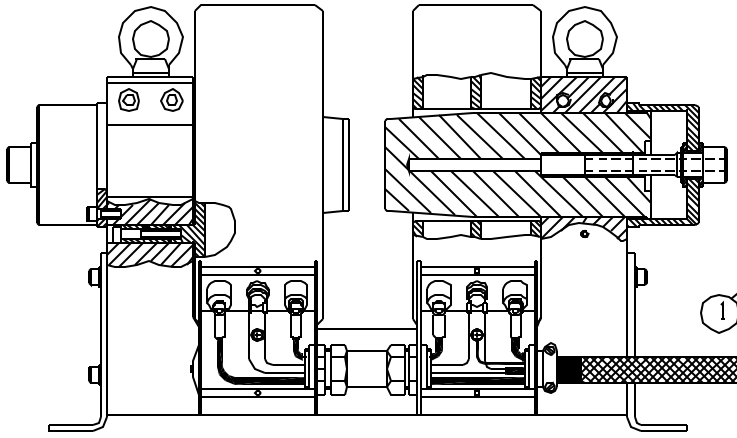
PARTS LIST

DRAWN G.DOUGLAS	DATE 05/15/07	DO NOT SCALE FROM DRAWING UNLESS OTHERWISE SPECIFIED	GMW 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292, Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE ELECTRICAL WIRING 5403/P62B-3066A
NEXT ASSY	USED	THIRD ANGLE PROJECTION	SIZE A1 DRAWING NO. 13900240 REV A
SOFTWARE AUTOCAD 13			SCALE NTS WT kg SHEET 1 OF 1

REVISIONS

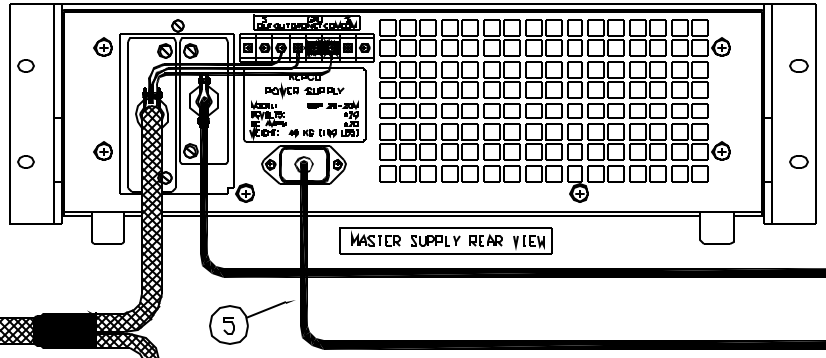
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/18/05	G.DOUGLAS

MODEL: 5403 ELECTROMAGNET



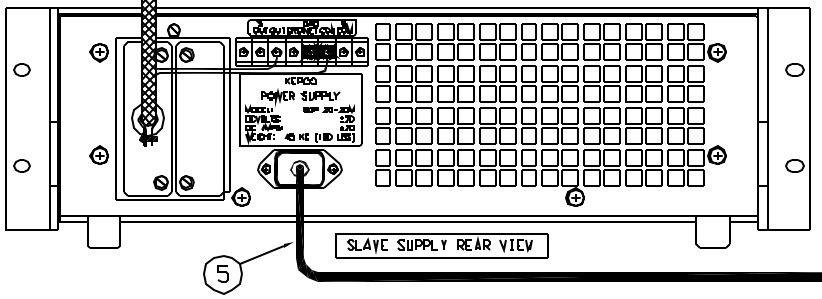
FRONT VIEW TERMINAL COVER REMOVED

KEPCO MODEL: BOP 20-20M BIPOLAR POWER SUPPLY

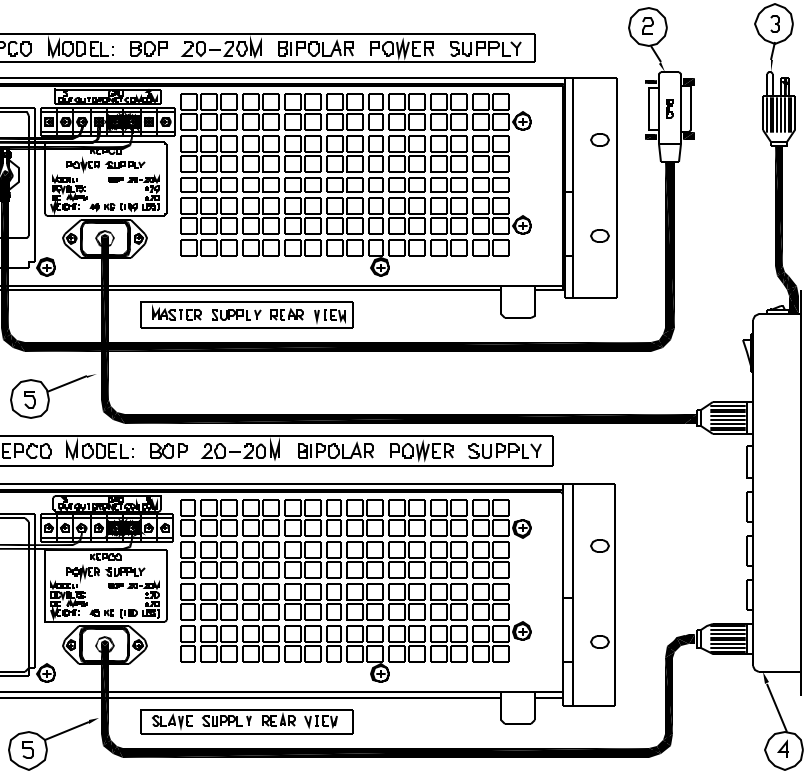


MASTER SUPPLY REAR VIEW

KEPCO MODEL: BOP 20-20M BIPOLAR POWER SUPPLY



SLAVE SUPPLY REAR VIEW



*** 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. GPIB INTERFACE IS OPTIONAL EQUIPMENT
3. REFER TO TABLE ON DWG 1390011Q FOR AC INPUT RATINGS OTHER THAN 115V AC INPUT

N/S=NOT SUPPLIED

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
5	2	KEPCO	AC POWER CORD [115V US TYPE]	
4	1	UL620-15	WABER; POWER OUTLET STRIP 20A	N/S
3	1	5-20P	AC POWER PLUG 20A [Part of Item 4]	N/S
2	1	SNO 488-2	GPIB CABLE [2M LONG]	2
1	1	16900070	CURRENT & INTERLOCK CABLE 40A	

PARTS LIST

DRAWN G.DOUGLAS	DATE 04/18/05	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES PER ASME Y14.5M-1994
CHECK	DATE	
ENGINEERING	DATE	
NEXT ASSY	SYSTEM	
SOFTWARE AUTOCAD 13		THIRD ANGLE PROJECTION

GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292, Fax: (650)802-8298

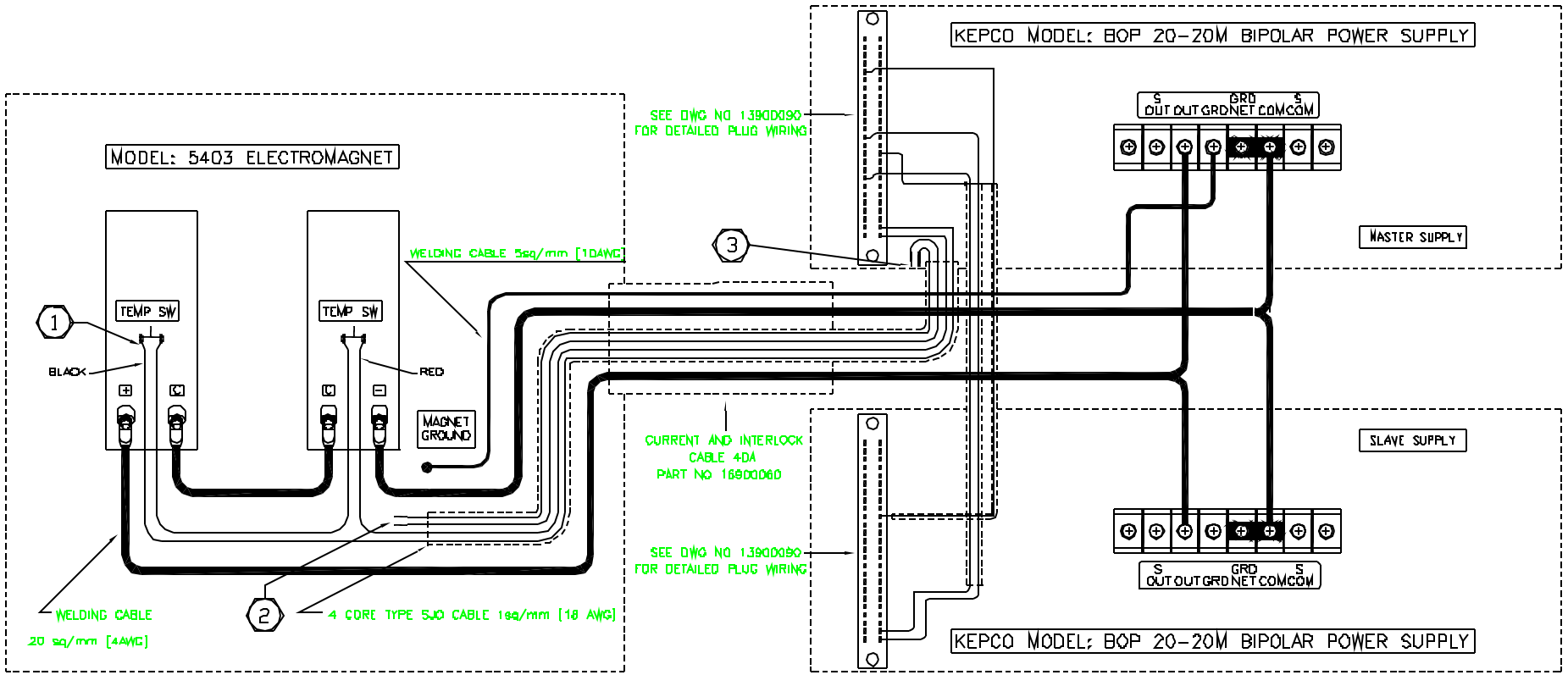
TITLE: ELECTRICAL ASSEM 5403/BOP20-40

SIZE	DRAWING NO.	REV
A1	11900240	A

SCALE: NTS | WT: kg | SHEET 1 OF 1

PROPRIETARY

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/26/05	G.DOUGLAS



NOTE:

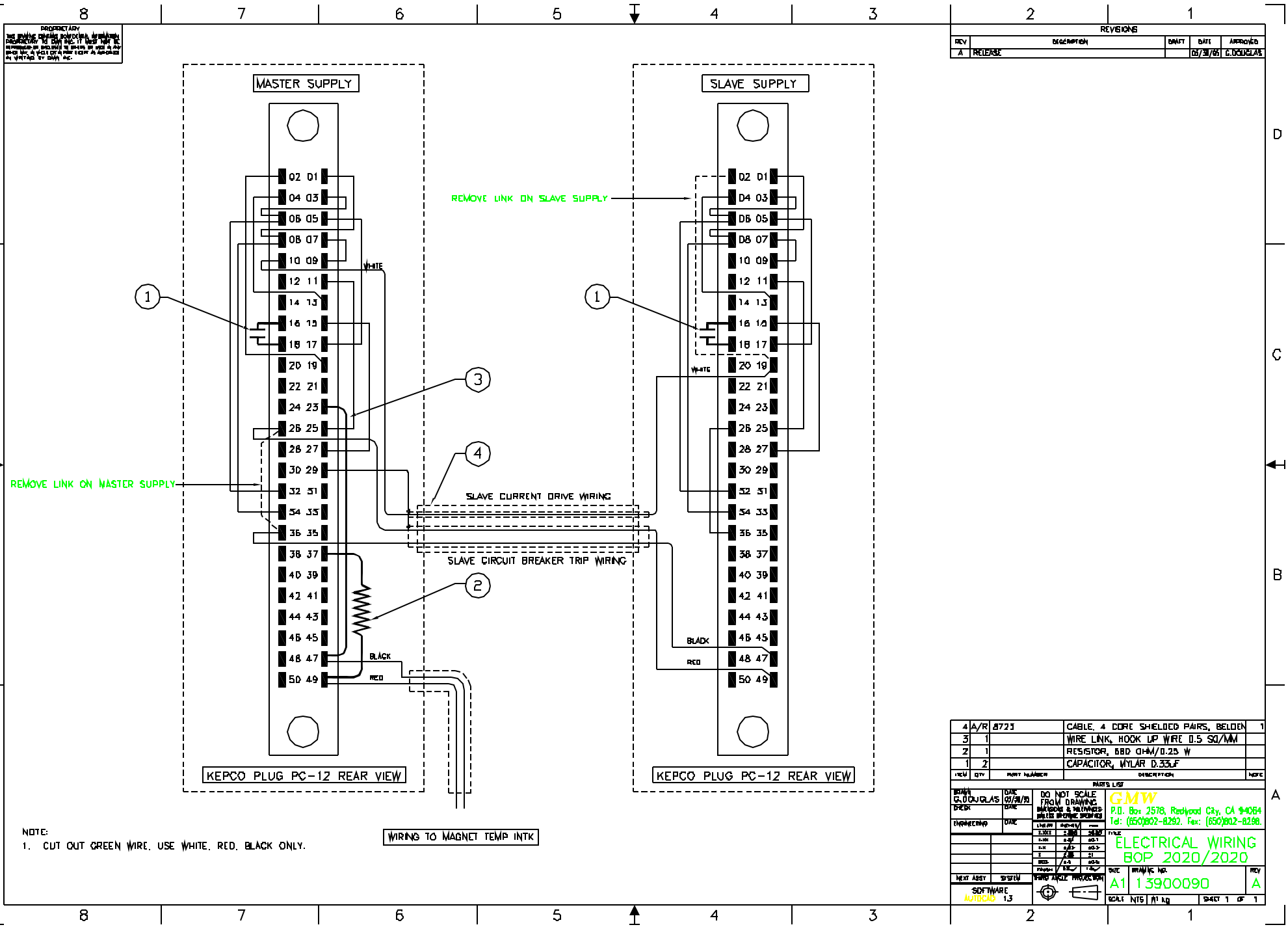
1. CONNECT MAGNET TEMPERATURE INTERLOCK WIRING DIRECTLY ONTO DC TABS ON TEMP THERMOSTATS
2. LEAVE WHITE AND GREEN WIRES FULL LENGTH AND INSULATE WITH HEAT SHRINK SLEEVING CAN BE USED FOR WATER FLOW SWITCH INTERLOCK [OPTION]
3. INSULATE WHITE AND GREEN WIRES WITH HEAT SHRINK SLEEVING [not used]

ELECTROMAGNET SYSTEM ELECTRICAL REQUIREMENTS			
AC INPUT POWER 1 PHASE, 50 to 60HZ	115V	208V	230V
AC INPUT FULL LOAD CURRENT	11.0*	6.5*	6.0*
RECOMMENDED MAIN AC BREAKER	25	15	15
RECOMMENDED AC POWER OUTLET	5-20S	-	-
RECOMMENDED AC CABLE SIZE	1.5 SQ/MM	1.0 SQ/MM	1.0 SQ/MM

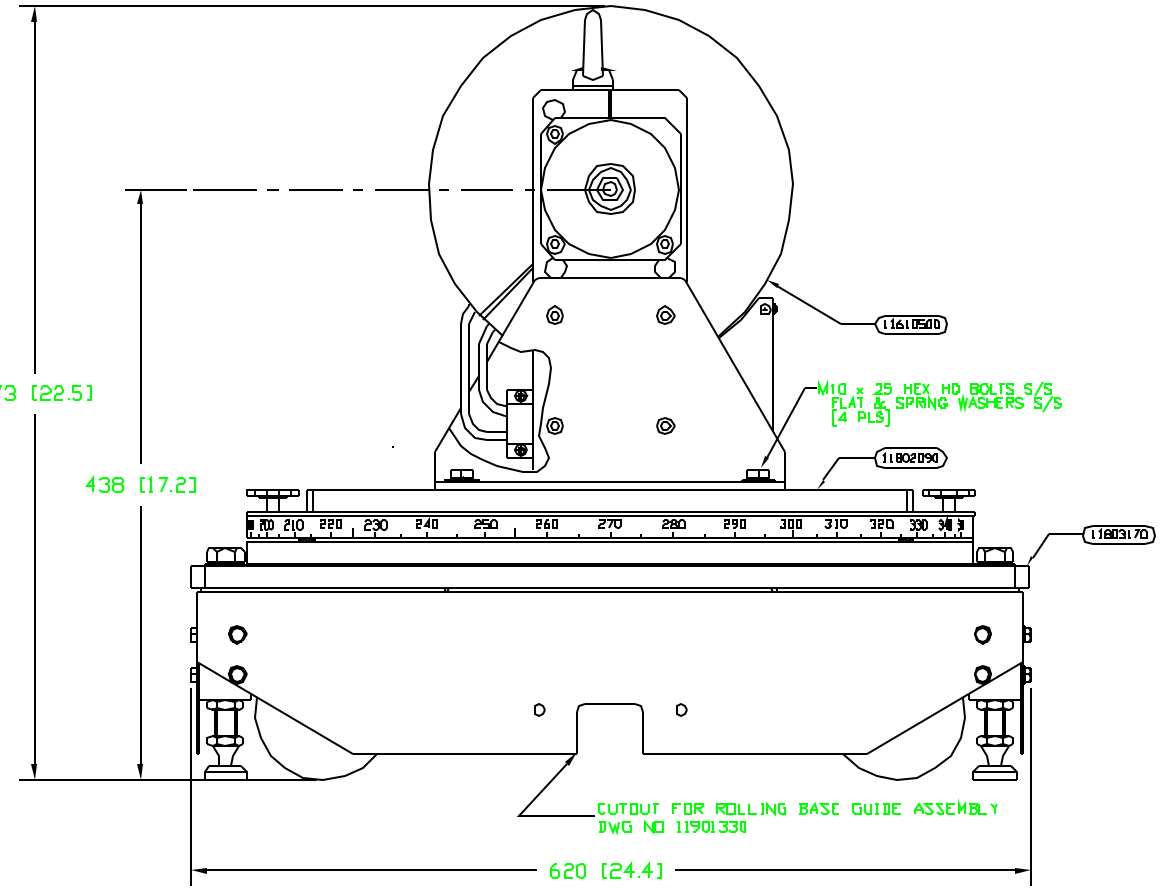
NOTE: DRAWING SHOWS POWER SUPPLY SETUP FOR 1 PHASE 115V AC POWER
* RATING GIVEN FOR EACH POWER SUPPLY, TOTAL SYSTEM CURRENT DOUBLE VALUES SHOWN

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

DRAWN G.DOUGLAS	DATE 04/26/05	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES UNLESS SPECIFICALLY SHOWN	GMW 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292, Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE: ELECTRICAL WIRING 5403/BOP20-40
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	SIZE A1 DRAWING NO. 13900110 REV A
SOFTWARE AUTOCAD 13			SCALE NTS MASS kg SHEET 1 OF 1


MASTER SUPPLY
SLAVE SUPPLY
REMOVE LINK ON SLAVE SUPPLY
REMOVE LINK ON MASTER SUPPLY
WHITE
BLACK
RED
SLAVE CURRENT DRIVE WIRING
SLAVE CIRCUIT BREAKER TRIP WIRING
KEPCO PLUG PC-12 REAR VIEW
KEPCO PLUG PC-12 REAR VIEW
WIRING TO MAGNET TEMP INTK
NOTE:
1. CUT OUT GREEN WIRE. USE WHITE, RED, BLACK ONLY.
REVISIONS
REV DESCRIPTION DRAFT DATE APPROVED
A RELEASE 03/31/05 G.DOUGLAS
4 A/R 8723 CABLE, 4 CORE SHIELDED PAIRS, BELDEN 1
3 1 WIRE LINK, HOOK UP WIRE 0.5 SQ/MM
2 1 RESISTOR, 680 OHM/0.25 W
1 2 CAPACITOR, MYLAR 0.33uF
ITEM QTY PART NUMBER DESCRIPTION NOTE
PARTS LIST
DRAWN G.DOUGLAS DATE 03/31/05
CHECK DATE
ENGINEERING DATE
DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES PER ASME Y14.5M-1994
GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (650)802-8292. Fax: (650)802-8298.
TITLE
ELECTRICAL WIRING
BOP 2020/2020
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 13
THIRD ANGLE PROJECTION
SIZE A1 DRAWING NO. 13900090 REV A
SCALE NTS WT kg SHEET 1 OF 1

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



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN G.DOUGLAS	DATE 05/13/95	DO NOT SCALE FROM DRAWING	GMW
CHECK	DATE	DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED	P.O Box 2578, Redwood City, CA 94064
ENGINEERING	DATE		Tel: (650)802-8292. Fax: (650)802-8298.

LINEAR	INCHES	mm
X.XXX	±.005	±0.05
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	64	1.6

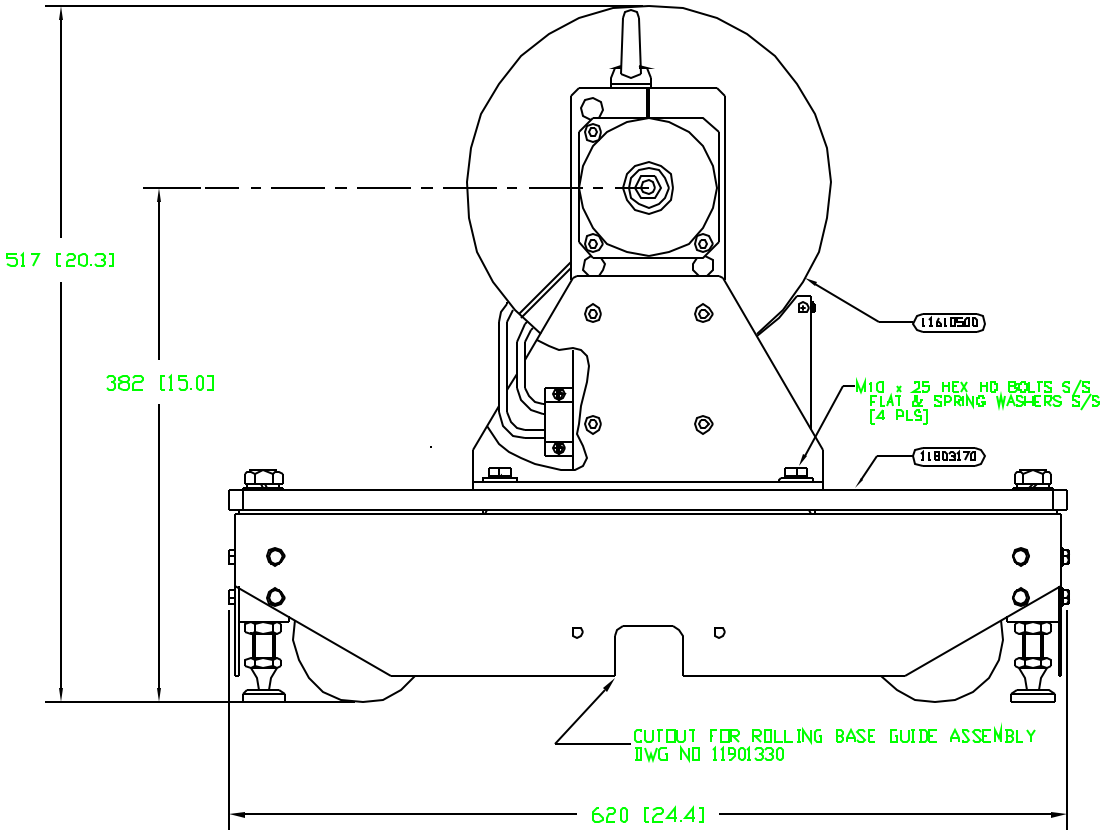
TITLE
ROL/ROT BASE ASSY
MODEL: 5403

NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	SIZE	DRAWING NO.	REV
			A2	11900270	A

SOFTWARE
AUTOCAD 13

SCALE 1:2.5 WT kg SHEET 1 OF 1

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



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN G.DOUGLAS	DATE 05/13/95	DO NOT SCALE FROM DRAWING	GMW
CHECK	DATE	DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED	P.O Box 2578, Redwood City, CA 94064
ENGINEERING	DATE		Tel: (650)802-8292. Fax: (650)802-8298.

LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	64	1.6

THIRD ANGLE PROJECTION

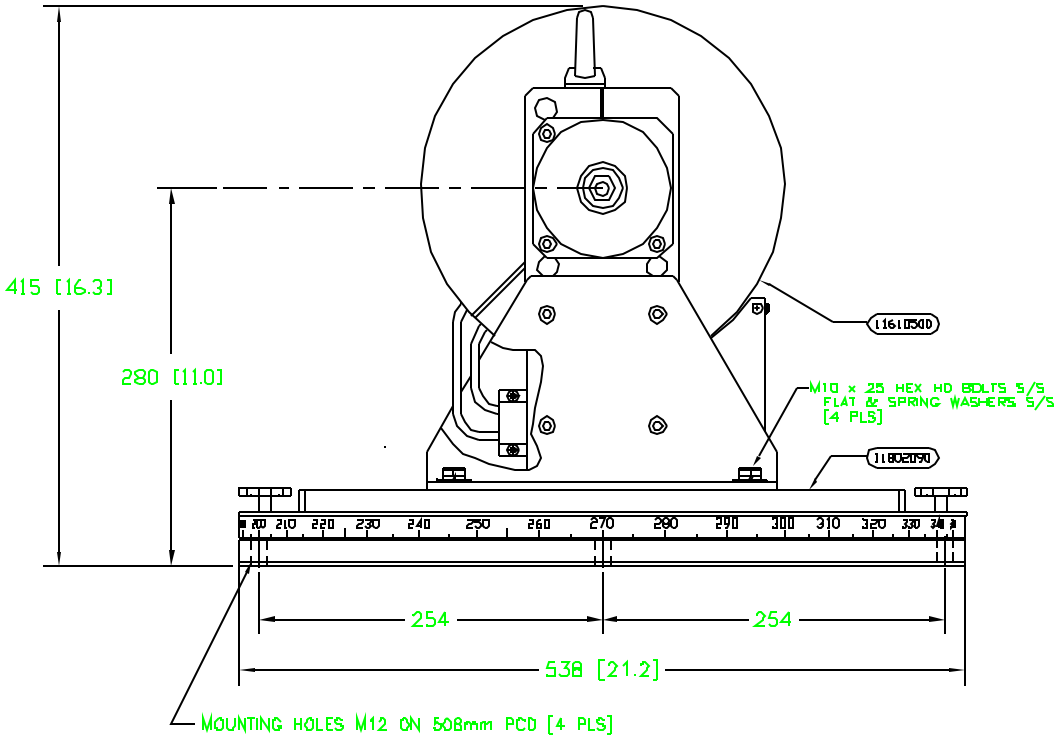
TITLE: ROLLING BASE ASSY MODEL: 5403

NEXT ASSY	SYSTEM	SIZE	DRAWING NO.	REV
		A2	11900280	A

SOFTWARE AUTOCAD 13

SCALE 1:2.5 WT kg SHEET 1 OF 1

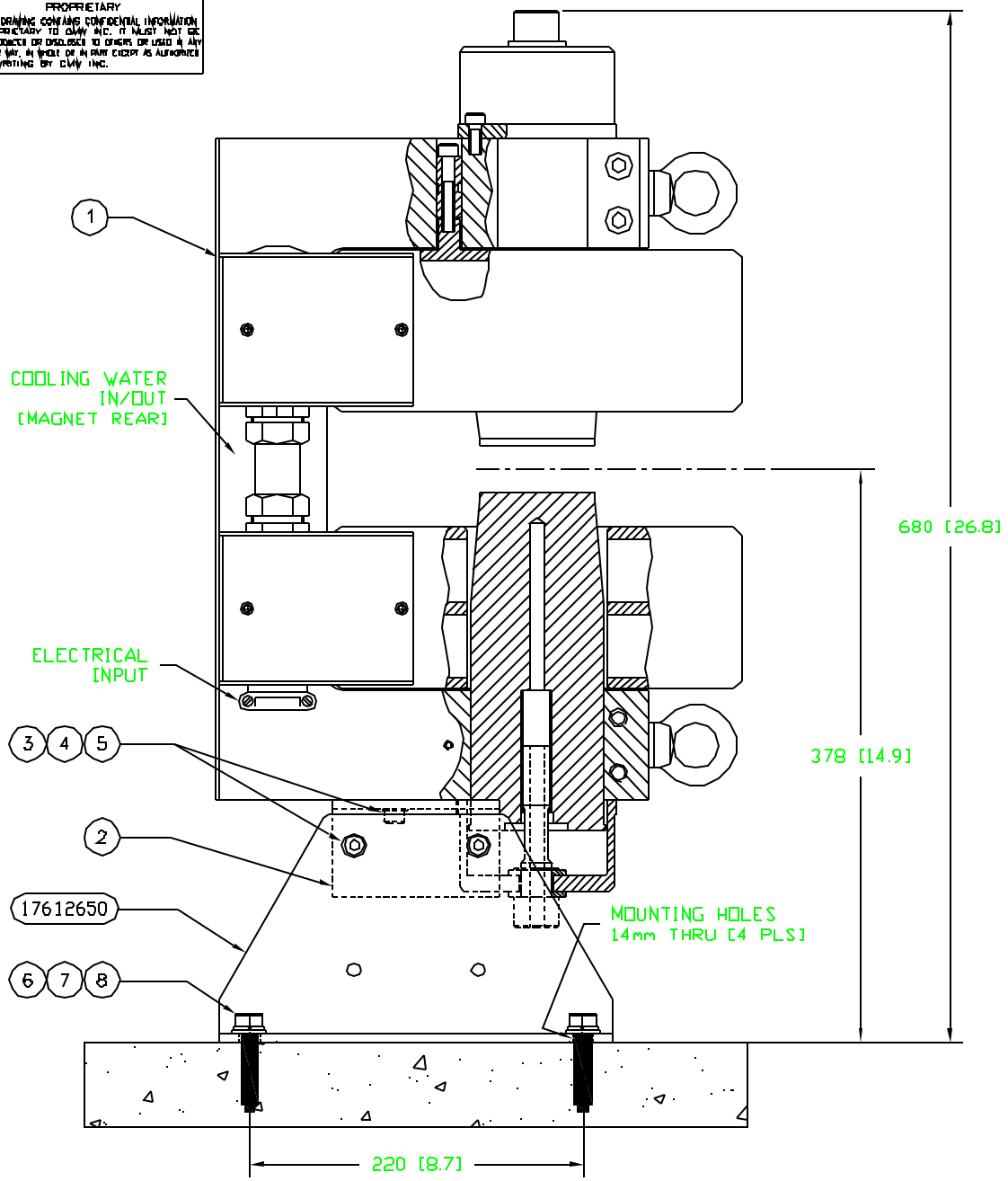
REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/13/95	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

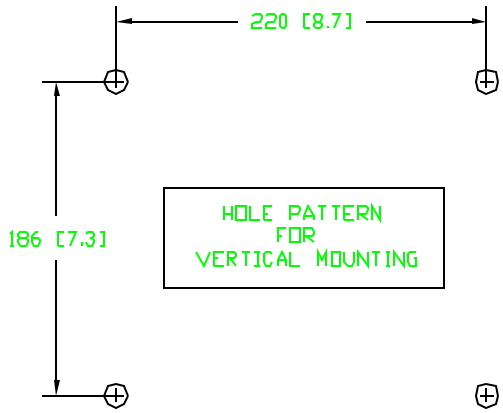
DRAWN G.DOUGLAS	DATE 05/13/95	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED	GMW P.O Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE ROTATING BASE ASSY MODEL: 5403
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	SIZE A2 / DRAWING NO. 11900290 / REV A
SOFTWARE AUTOCAD 13			SCALE 1:2.5 WT kg / SHEET 1 OF 1

LINEAR	INCHES	mm
X.XXX	±.005	±0.05
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	64	1.6



REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/12/95	G.DOUGLAS
B	CORRECT VIEW AND POSITION OF VERTICAL MTG BRK		08/09/99	G.DOUGLAS



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

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
8	4		BOLT, M12 or 1/2" EXPANSION	
7	4	DIN 127 B	WASHER, M12 SPRING LOCK, S/S	
6	4	DIN 125 A	WASHER, M12 FLAT, S/S	
5	6	DIN 912	SHCS, M8 X 16 S/S	
4	6	DIN 127 B	WASHER, M8 SPRING LOCK, S/S	
3	6	DIN 125 A	WASHER, M8 FLAT, S/S	
2	1	17612640	VERTICAL MOUNTING BRACKET	
1	1	5403	ELECTROMAGNET, 76MM	

PARTS LIST

DRAWN G.DOUGLAS DATE 05/12/95
CHECK DATE
ENGINEERING DATE
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED

	INCHES	mm
LINEAR		
X.XXX	±.005	±0.05
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	64	1.6

THIRD ANGLE PROJECTION

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

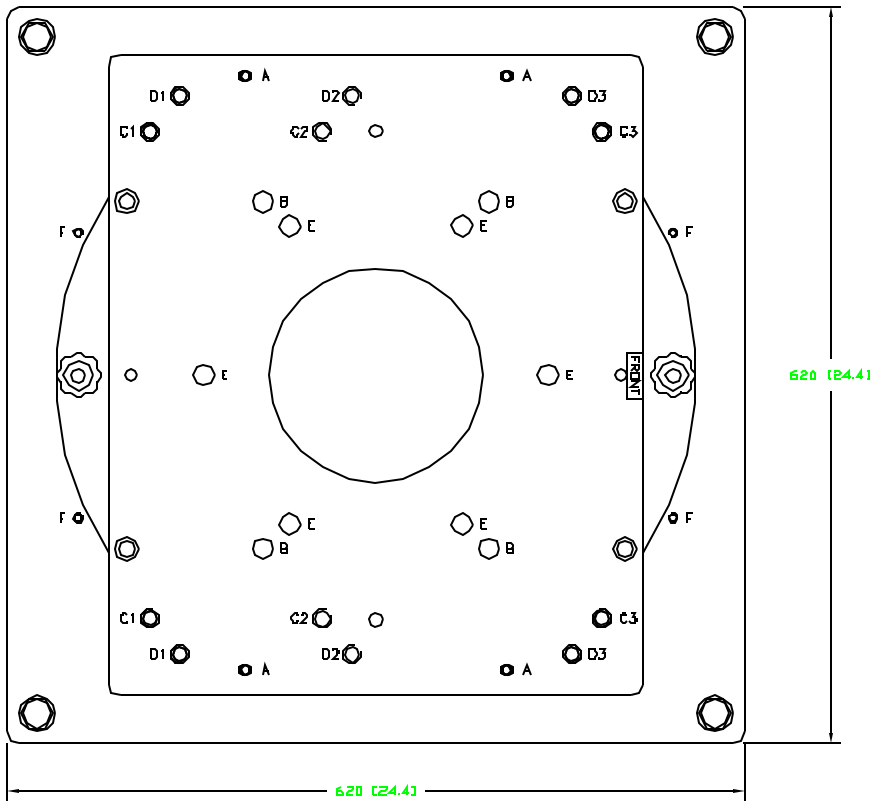
TITLE
VERT MOUNT ASSEM
MODEL: 5403

SIZE A2 | DRAWING NO. 11900260 | REV B
SCALE 1:2 | WT kg | SHEET 1 OF 1

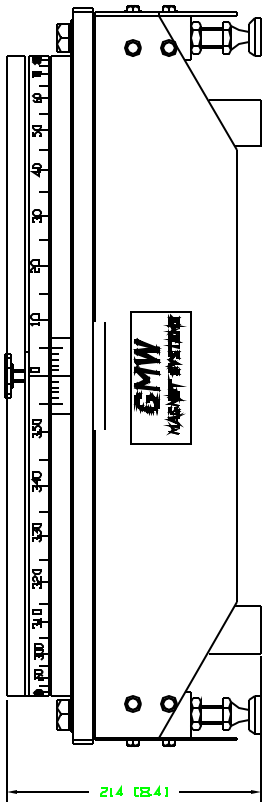
PROPRIETARY

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/27/94	C.DOUGLAS
B	ADD 5403 MTG HOLES		05/13/95	C.DOUGLAS
C	ADD MOTORIZED ROTATING BASE HOLES		07/05/97	C.DOUGLAS

TOP VIEW

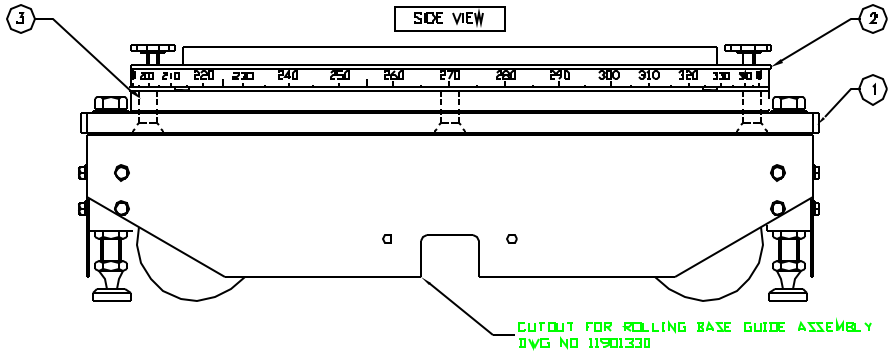


FRONT VIEW



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=MRD SPOOL MOUNTING
F=MRD MOTOR DRIVE MOUNTING
NOTE: 2 HOLES HIDDEN UNDER ROTATING BASE

SIDE VIEW



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
3	4	DIN 7991	SHCS, M12 X 35 FLAT HD S/S	
2	1	11802090	ROTATING BASE ASSEMBLY	
1	1	11803170	ROLLING BASE ASSEMBLY	

PARTS LIST

DRAWN: C.DOUGLAS DATE: 04/27/94
CHECK: DATE
ENGINEERING: DATE
DO NOT SCALE FROM DRAWING
UNLESS OTHERWISE SPECIFIED: DECIMALS ANGLES
THIRD ANGLE PROJECTION

GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (650)802-8202. Fax: (650)802-8298.

TITLE: ROT/ROLLING BASE 3473/3472/5403

NEXT ASSY: SYSTEM
SOFTWARE: AUTOCAD 13

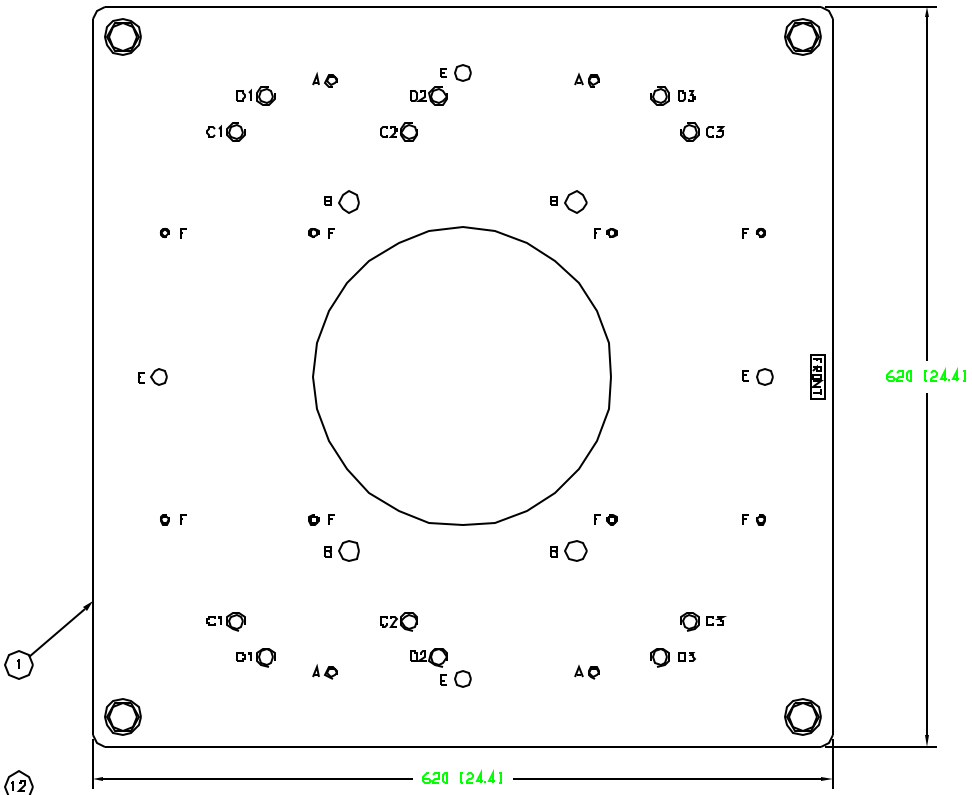
SIZE: A1 DRAWING NO.: 11803430 REV: C

SCALE: 1:2 WT kg SHEET 1 OF 1

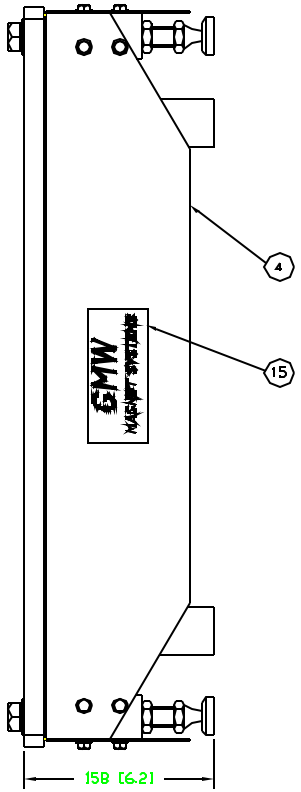
REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		08/04/93	A.MARTIN
B	NEW T/B, ADD ITEM 15, MOVE 2,5, SHIFT "A" HOLES		04/29/94	G.DOUGLAS
C	ADD MAGNET HORIZONTAL MOUNTING HOLES		05/06/94	G.DOUGLAS
D	ADD 5403 MTG HOLES		09/15/98	G.DOUGLAS
E	ADD NRD MOTOR DRIVE MOUNTING HOLES		10/27/98	G.DOUGLAS

TOP VIEW



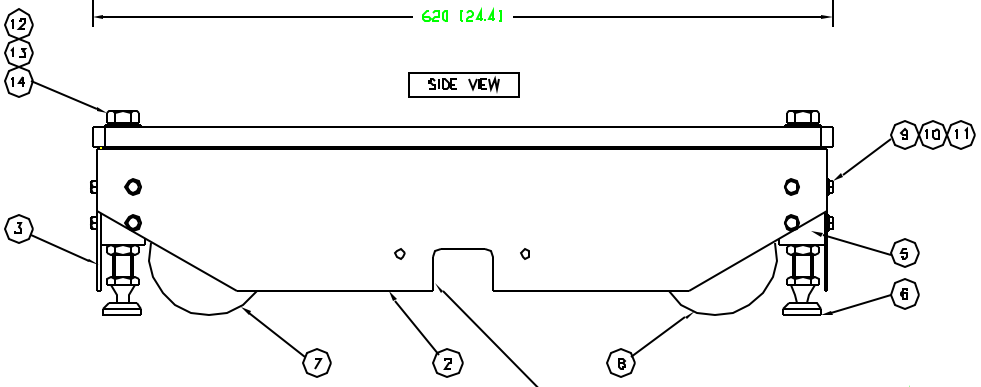
FRONT VIEW



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=ROTATING BASE MOUNTING
F=NRD MOTOR DRIVE MOUNTING

SIDE VIEW



CUTOUT FOR ROLLING BASE GUIDE ASSEMBLY
DWG NO 11901330

NOTE 1. PARTS FITTED AT GMW

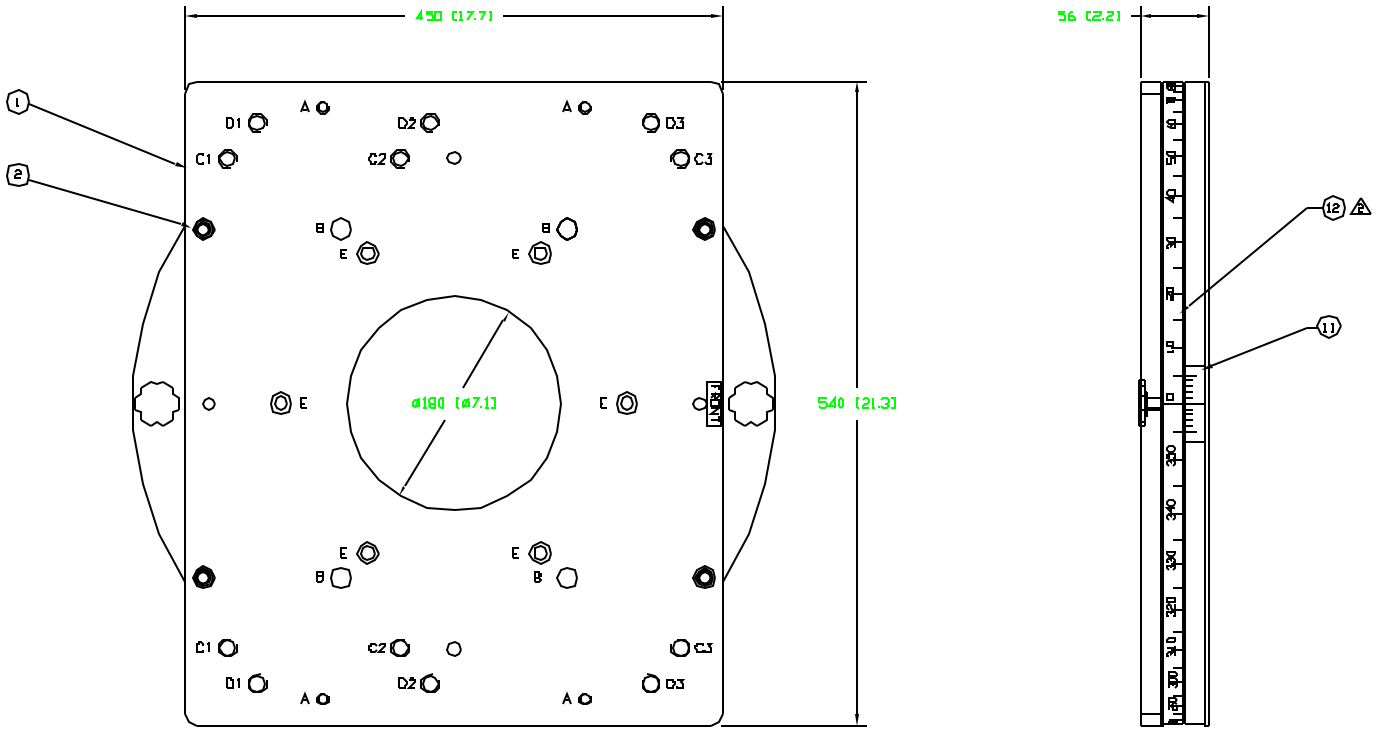
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
15	1		LABEL, GMW MAGNET SYSTEMS	1
14	4	DIN 125 A	M16 X 3 THICK WASHER, FLAT S/S	
13	4	DIN 127 B	M16 WASHER, SPRING S/S	
12	4	DIN 933	M16 X 40 HEX HD BOLT, S/S	
11	16	DIN 127 B	M6 WASHER, SPRING S/S	
10	16	DIN 433	M6 WASHER, FLAT S/S	
9	16	DIN 933	M6 x 8 HEX HD BOLT S/S	
8	2	REX CHDS 4RT	CASTER, SWIVEL	
7	2	REX CHDF 4RT	CASTER, FIXED	
6	4	17802180	LEVELLING FOOT	
5	4	17802160	SUPPORT LEG	
4	1	17802125	SKIRT PANEL, FRONT	
3	1	17802122	SKIRT PANEL, REAR	
2	2	17802121	SKIRT PANEL, SIDE	
1	1	17802110	BASE PLATE	

PARTS LIST

DRAWN A.MARTIN	DATE 08/04/93	DO NOT SCALE FROM DRAWING. DIMENSIONS & TOLERANCES PER ASME Y14.5M-1994	GMW 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292, Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE ROLLING BASE ASSY 3473/3472/5403
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	SIZE A1 DRAWING NO. 11803170 REV E
SOFTWARE AUTOCAD 13			SCALE 1:2 WT kg SHEET 1 OF 1

REVISIONS

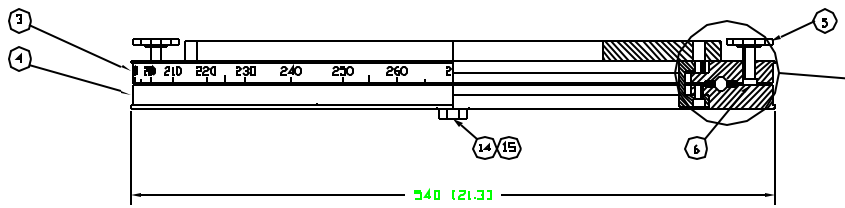
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/27/94	A.MARTIN
B	NEW T/B, SHIFT ITEM 11 & 12 TO FRONT OF BASE.		04/29/94	G.DOUGLAS
C	ADD HORIZONTAL MTG HOLES @ B6/D6		05/10/94	G.DOUGLAS
D	ADD 5403 MTG HOLES, DELETE BASE PLATE		04/26/96	G.DOUGLAS
E	ADD MOTORISED ROT BASE SPOOL HOLES @ C7		08/31/97	G.DOUGLAS
F	CHG ITEM 9 AND ITEM 13		07/21/98	G.DOUGLAS

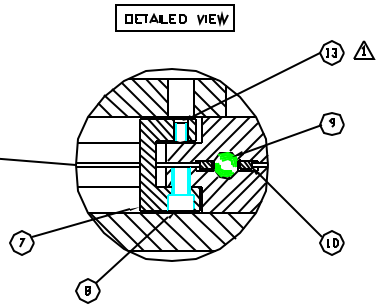


MOUNTING HOLES
A=5403 DIRECT MOUNTING
B=3473/3472 DIRECT MOUNTING
C1/C2=3472 45° MOUNTING
D1/D2=3473 45° MOUNTING
C1/C3=3472 HORZ MOUNTING
D1/D3=3473 HORZ MOUNTING
E=MOTORISED ROT BASE SPOOL

NOTES

1. ADJUST SET SCREW FOR MINIMUM CLEARANCE ALLOWING FOR FULL FREE ROTATION; AND LOCTITE
2. FORM DECAL TO PLATE DIA TO PREVENT ENDS FROM SPRINGING LOOSE
3. GREASE BEARING SURFACES BEFORE ASSEMBLY
4. ITEM 14 AND ITEM 15 ONLY USED IF ROTATING BASE SOLD SEPARATELY. SEE DWG NO 11803430 FOR DETAILS ON MOUNTING ROTATING BASE TO ROLLING BASE





15	4	DIN 7980	WASHER, M12 SPRING, S/S	4
14	4	DIN 933	BOLT, M12 x 35 HEX HD, 5/S	4
13	4	DIN 913	SCREW, M6 x 8 SHSS, OVAL PT S/S	
12	1		LABEL, ANGLE GRADUATIONS 0-360°	
11	1		LABEL, VERNIER INDEX	
10	1	17802140	SPACER, BEARING	
9	32	RB-11.906	BALL BEARING 11.91mm [15/32"] DIA SKF	
8	4	DIN 912	SCREW, M6 x 10 SK HD CAP, S/S	
7	4	17802150	CLAMP, RETAINING	
6	2	17901340	CLAMP PAD	
5	2	17802170	HANDWHEEL, M10	
4	1	17802132	LOWER THRUST BEARING PLATE	
3	1	17802131	UPPER THRUST BEARING PLATE	
2	4	DIN 912	SCREW, M12 x 20 SK HD CAP S/S	
1	1	17802100	TRANSITION PLATE	
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

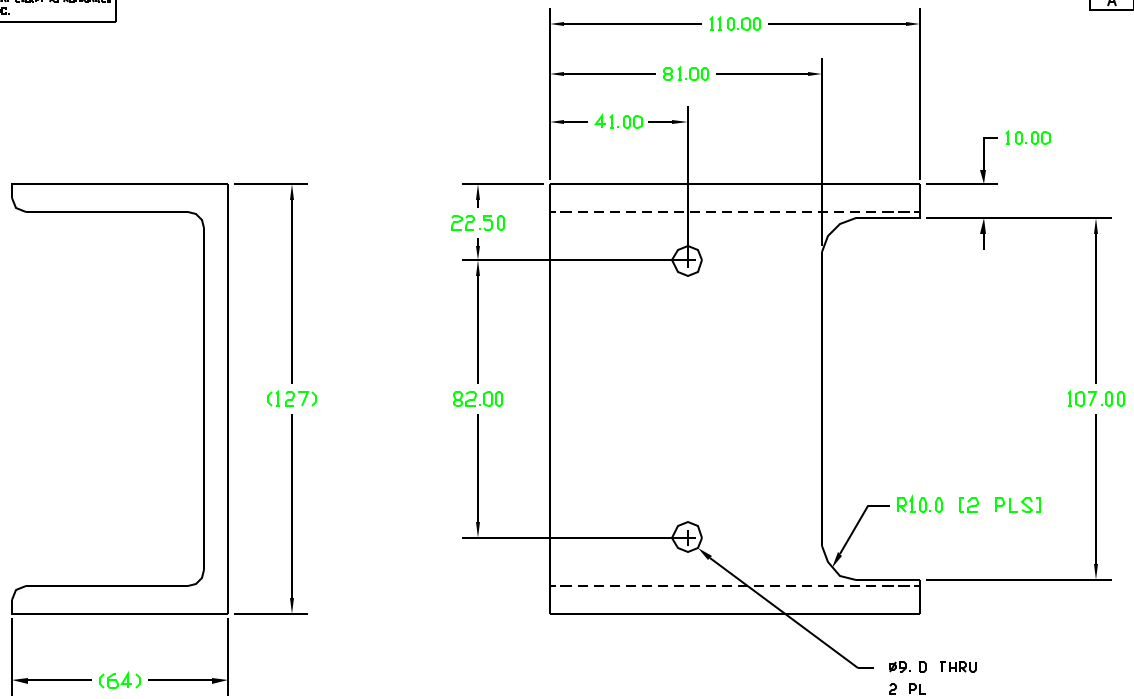
PARTS LIST

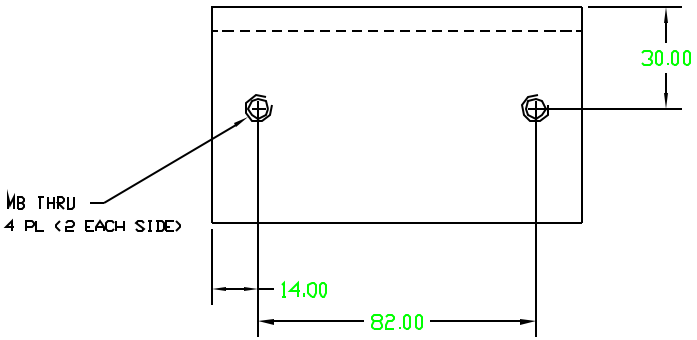
DRAWN A.MARTIN	DATE 04/27/94	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES PER ASME Y14.5M-1994	GMW P.O. Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		
NEXT ASSY	USED ON	THIRD ANGLE PROJECTION	TITLE: ROTATING BASE 3473/3472/5403
SOFTWARE AUTOCAD 13			SIZE A1 DRAWING NO. 11802090 REV F
			SCALE 1:2 WT kg SHEET 1 OF 1

PROPRIETARY

THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION PROPRIETARY TO GMW INC. IT MUST NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED IN ANY OTHER WAY, IN WHOLE OR IN PART EXCEPT AS AUTHORIZED IN WRITING BY GMW INC.

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/16/93	A.MARTIN





NOTES

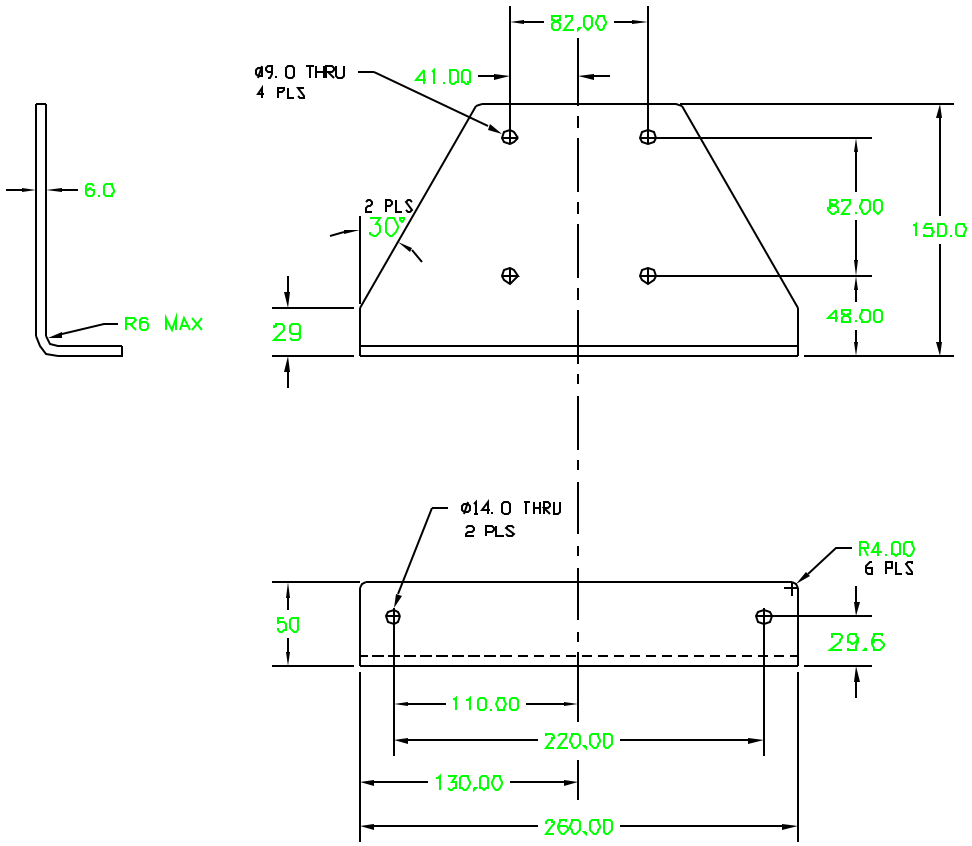
1. MATERIAL: 127 X 63 X 15 M.S CHANNEL
2. DE BURR & BREAK SHARP EDGES
3. FINISH: PAINT PRECISION TAN TO BSL: TP85B00010

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

DRAWN A.MARTIN	DATE 05/16/93	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED	GMW P.O Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE VERT MTG BRK MODEL: 5403
		5403	SIZE A2 / DRAWING NO. 17612640 / REV A
NEXT ASSY	SYSTEM		SCALE 1:1 / WT kg / SHEET 1 OF 1
SOFTWARE AUTOCAD 13		THIRD ANGLE PROJECTION	

	INCHES	mm
LINEAR		
X.XXX	±.005	±0.05
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/16/93	A.MARTIN



NOTES

1. MATERIAL: M/S PLATE 6MM THICK
2. DE BURR & BREAK SHARP EDGES 0.2MM
3. FINISH: PAINT PRECISION TAN TO BSL: TP85800010
4. NO REQD: 2 PER MAGNET.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

DRAWN A.MARTIN DATE 05/16/93
CHECK DATE
ENGINEERING DATE
5403
NEXT ASSY SYSTEM
SOFTWARE: AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED

LINEAR	INCHES	mm
X.XXX	±.005	±0.05
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	64	1.6

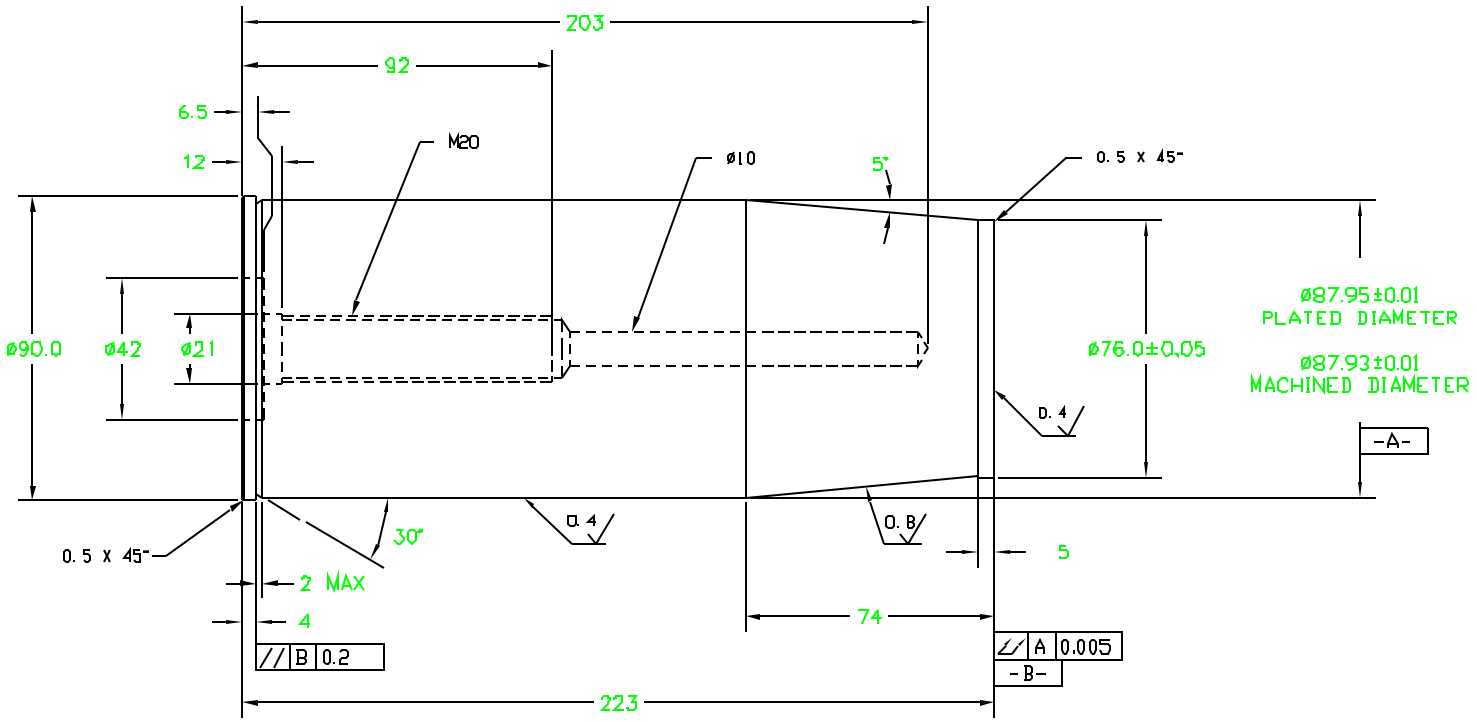
THIRD ANGLE PROJECTION

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

TITLE
ANGLE BRACKET
MODEL: 5403

SIZE A2 | DRAWING NO. 17612650 | REV A
SCALE 1:2 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/17/93	A.MARTIN
B	CHG POLE DIAMETER		08/24/98	G.DOUGLAS
C	CHG DEPTH OF UNDERCUT AREA ON REAR OF POLE		05/11/99	G.DOUGLAS



NOTES

1. MATERIAL: 1008 LOW CARBON STEEL
2. MATERIAL MUST BE CUT WITH THE AXIS OF THE POLE RUNNING IN THE SAME DIRECTION AS THE RAW PLATE GRAIN
3. ROUGH MACHINE THEN ANNEAL TO BSL: TP85800040
4. FINISH: E.N PLATE 0.01 THICK TO BSL: TP85800120

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN A.MARTIN DATE 05/17/93
CHECK DATE
ENGINEERING DATE
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED

LINEAR	INCHES	mm
X.XXX	±.005	±0.05
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	64	1.6

THIRD ANGLE PROJECTION

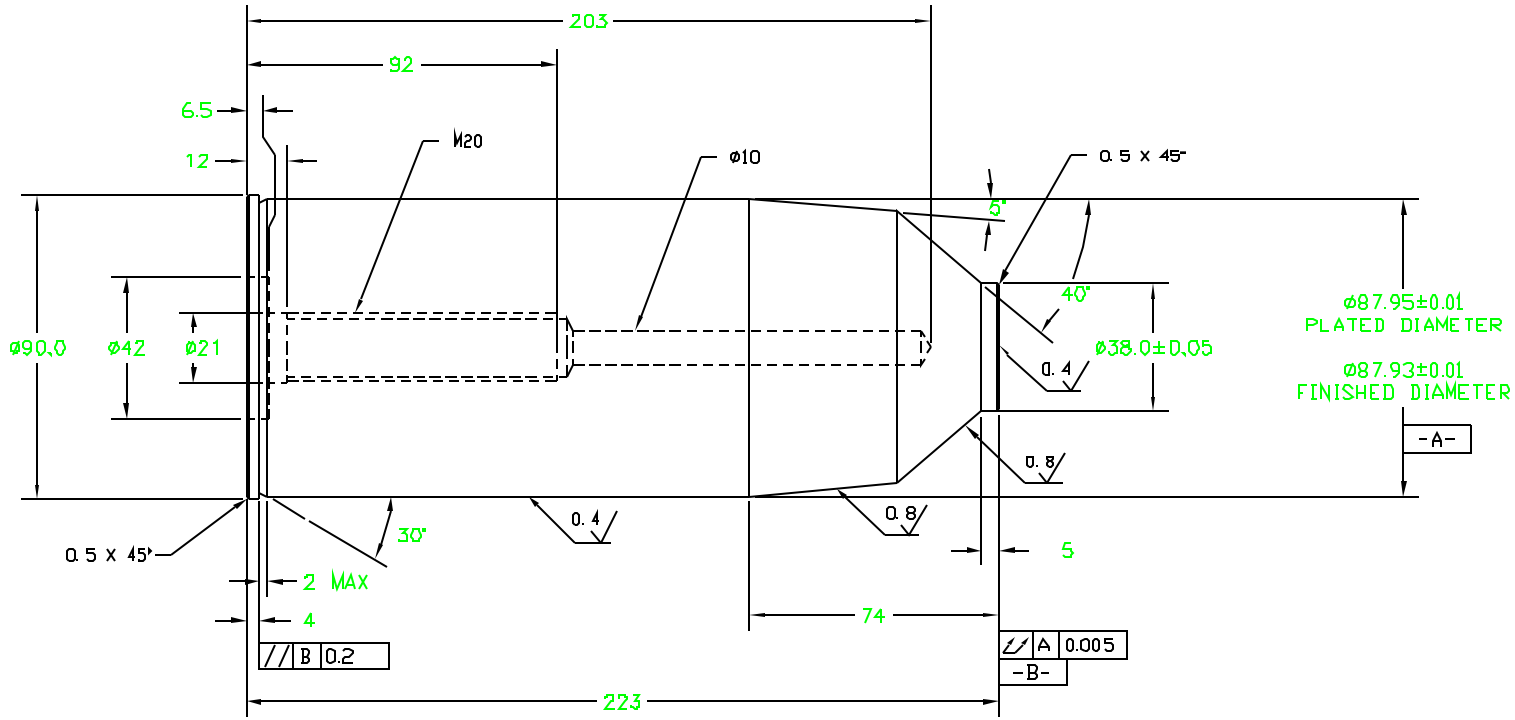
GMW
P.O Box 2578, Redwood City, CA 94064
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
POLE 76MM
MODEL: 5403

SIZE A2 | DRAWING NO. 17612620 | REV C

SCALE 1:1 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		05/17/93	A.MARTIN
B	CHG POLE DIAMETER		09/24/98	G.DOUGLAS
C	CHG DEPTH OF UNDERCUT AREA ON REAR OF POLE		05/11/99	G.DOUGLAS



NOTES

1. MATERIAL: 1008 LOW CARBON STEEL
2. MATERIAL MUST BE CUT WITH THE AXIS OF THE POLE RUNNING IN THE SAME DIRECTION AS THE RAW PLATE GRAIN
3. ROUGH MACHINE THEN ANNEAL TO BSL: TP85800040
4. FINISH: E.N PLATE 0.01 THICK TO BSL: TP85800120

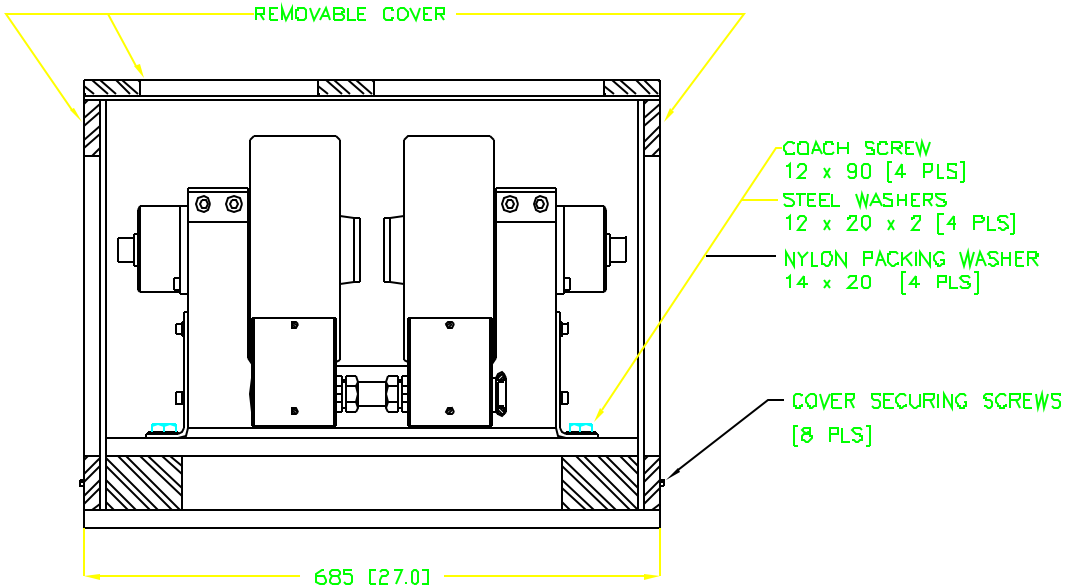
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

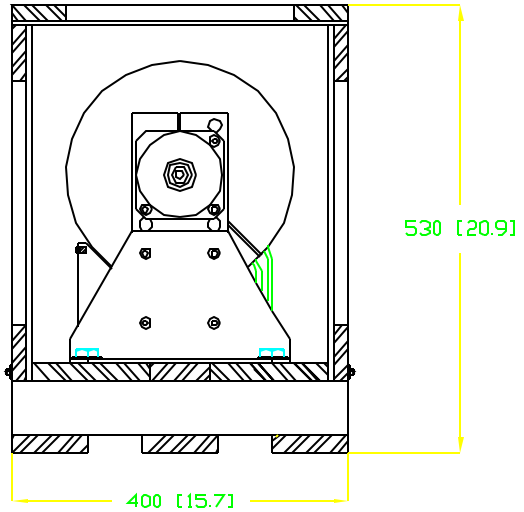
PARTS LIST

DRAWN A.MARTIN	DATE 05/17/93	DO NOT SCALE FROM DRAWING	GMW
CHECK	DATE	DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED	955 Industrial Rd, San Carlos, CA 94070
ENGINEERING	DATE		Tel: (650)802-8292. Fax: (650)802-8298.
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	TITLE: POLE 38MM MODEL: 5403
SOFTWARE AUTOCAD 13			SIZE A2 · DRAWING NO. 17612630 · REV C
			SCALE 1:1 · WT kg · SHEET 1 OF 1

	LINEAR	INCHES	mm
	X.XXX	±.005	±0.05
	X.XX	±.01	±0.1
	X.X	±.03	±0.3
	X	±.06	±1
	DEG.	±.5	±0.5
	FINISH	64	1.6

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/23/95	A.MARTIN
B	ADD DIMS, AND NYLON PACKING WASHERS		05/10/95	G.DOUGLAS
C	ADD STEEL PACKING WASHERS, COVER REMOVAL NOTE.		09/23/98	G.DOUGLAS





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

PARTS LIST

DRAWN	A.MARTIN	DATE 04/23/95
CHECK		DATE
ENGINEERING		DATE
	5403	
NEXT ASSY	SYSTEM	

SOFTWARE: AUTOCAD 13

DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES UNLESS OTHERWISE SPECIFIED

	INCHES	mm
LINEAR		
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	64	1.6

THIRD ANGLE PROJECTION

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

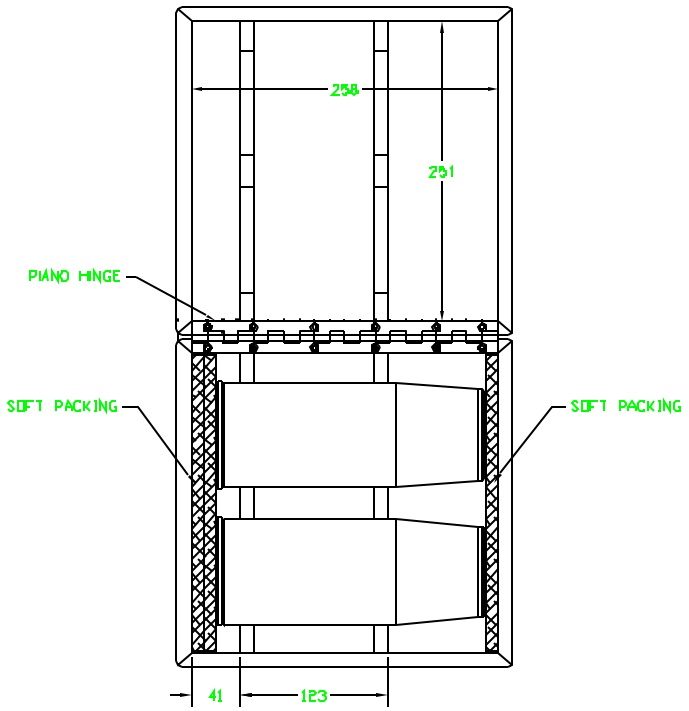
TITLE
SHIP CRATE ASSY
MODEL: 5403

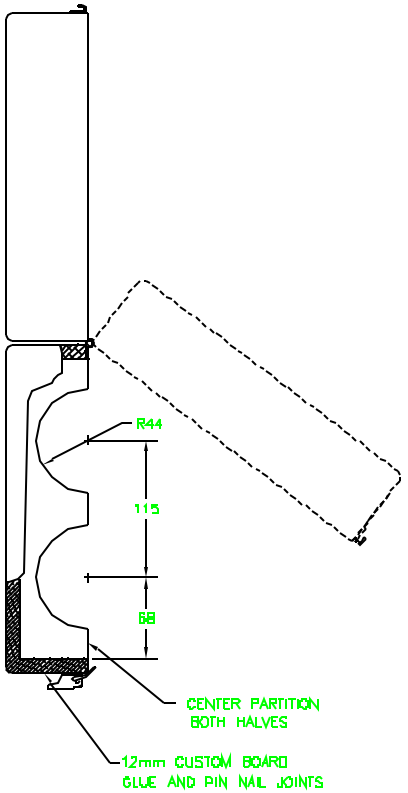
SIZE	DRAWING NO.	REV
A2	18800281	C

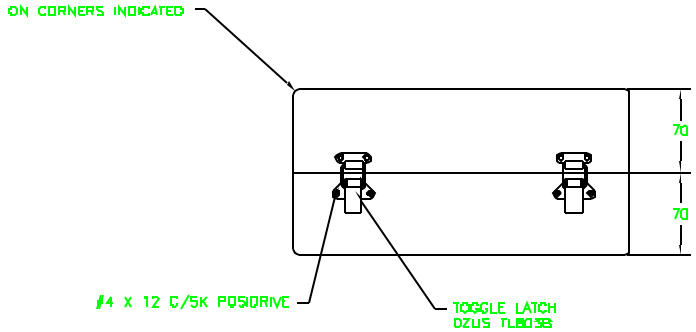
SCALE 1:4 | WT kg | SHEET 1 OF 1

PROPRIETARY

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE			
B	INVERT LATCHS, ADD SOFT PACKING		08/25/98	G.DOUGLAS







ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

DRAWN A.MARTIN	DATE 08/18/94	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES PER ASME Y14.5M	GMW P.O. Box 2578, Redwood City, CA 94064 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE POLE PACKING BOX MODEL: 5403
NEXT ASSY	USED ON	THIRD ANGLE PROJECTION	SIZE A1 DRAWING NO. 17803500 REV B
SOFTWARE AUTOCAD 13			SCALE 1:2 WT kg SHEET 1 OF 1