GMW

USER'S MANUAL

MODEL: 3474-140
MODEL: 3474FG-140

250MM ELECTROMAGNET

Date Sold _____

Magnet SN _____

File No:M3474h.407.doc Revision Date: July, 2009

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Section 1
SPECIFICATIONS
Table 1. Model 3474-140 General Specifications

Pole Diameter	250 mm (10 inch)
Pole Gap *	0 - 160 mm (0 to 6.3 inch)
Standard Pole Caps:	250 mm (10 inch) cylindrical 200 mm (8 inch) tapered 150 mm (6 inch) tapered 100 mm (4 inch) tapered 75 mm (3 inch) tapered 50 mm (2 inch) tapered 2 5 mm (1 inch) tapered
	series connection
Coil Resistance (20^{o} C)	0.44 ohm
Maximum Resistance (hot)**	0.54 ohm
Maximum Power [air]	40A/22V (0.88kW)
Maximum Power [water]	140A/76V (10.6kW)
Self Inductance	80mH (measured at 5Hz)
Water Cooling (18° C)	15 liters/m (4 US gpm) 2.0 bar (30 psid)
Overtemperature Interlock	Elmwood 3450G thermal sensor part number 3450G 611-1 L50C 89/16 mounted on each coil and wired in series. Contact rating 120Vac,0.5A. Closed below 50^{o} C.
Water Flow Interlock	Johnson Controls flow switch part number F61KD mounted on outlet side of water circuit. Contact rating 120Vac/16A, 240Vac/8A non-inductive Set to open at a flow of less than 10 liter/min (2.7US gpm)
Dimensions	Drawing 11801602/11801603 920mm W x 636 mm D x 864 mm H (36.2 inch W x 25.0 Inch D x 34.0 inch H)
Weight	**1**800 kg (3970 lb)

* The 3474FG-140 is a fixed pole gap magnet. Pole gap can be fixed in the range of 5 to 160mm

****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 3474-140 Electrical and Water Connections

DC Current (Refer to Drawing 11801602/11801603)

Right hand terminal Negative
Left Hand terminal Positive

Ground

An M6 screw is provided alongside the dc current connections 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 11801602/11801603)

1	Water flow	Normally open. Closed when flow
2	Water flow	over 10 l/min (2.7 USgpm)
3	Overtemperature	Normally closed. Open when coil
4	Overtemperature	temperature exceeds 50^{o}C.
5	No connection	
6	No connection	
7	No connection	
8	Control ground	

Water (Refer to Drawing 11801602/11801603)

outlet 3/8 inch NPT
inlet 3/8 inch NTP
(mating couplings for 1/2 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 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!

3 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.

4 Coil Hot Resistance

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

5 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.

6 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 gap 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.

Model 3474 System Installation; Minimum Facility Requirements for Systems with Field Reversal, High Precision Systems and High Power Systems installed in North America

Floor Space:

Magnet Floor Area: 830 x 830mm (33 x 33")
Floor Capacity: 1800kg (3,980lb)
Power Supply & Rack Floor Area: 700 x 900mm (28 x 36")
Floor Capacity: 100kg (220lb)
An area for access to the Magnet and Power Supply must be provided. The total area for the system and comfortable operation is about 3 x 3m (10 x 10ft). The area should be clean and free from obstructions.

Electrical Service:

	Systems with Field Reversal or High Precision Systems.	**High Power System**
MPS Power:		
Power Supply:	Power10 P83C-100150 Danfysik 853-160A/80V	Power10 P86C-100200
Voltage:	208Vac, Three Phase, 50 – 60Hz	208Vac, Three Phase, 50 – 60Hz
Current:	56 Amps per phase	74 Amps per phase
Circuit Breaker:	60 Amps minimum	80 Amps minimum
Power Cable:	4 Conductor, 4AWG Min.	4 Conductor, 3AWG Min.
Mains Outlet:	Nema 15-60R or equivalent	Hard-wired in to electrical panel
Mating Plug:	Nema 15-60P or equivalent	(no suitable plugs available)
Auxiliary Power for Rack:		
Voltage:	115Vac, Single Phase	
Current:	15A	

Note: Due to liability and insurance reasons, the mains power installation and connections must be completed by the facility electrician.

Water Cooling:

Water Temperature:	15°C to 20°C, non-condensing. Specifications given at 18°C
Flow Rate:	15 liters / minute (4 US gpm)
Pressure:	2 bar (30 PSID)
Water Hose:	12.5mm I.D. (½"), rubber, 2 x 5m long minimum
Plumbing Fittings:	To connect 12.5mm hose to water source and drain. (It is recommended to have a 50 micron water filter to trap debris on the facility water source and shutoff valves on the water source and drain.)

System Computer (if required and not provided by GMW):

Processor:	Intel Pentium III, 500MHz PC or better
Memory:	128MB RAM
Free Drive Space:	500MB
Interface:	IEEE-488 (GIPB), National Instruments GPIB-PCII/IIA, P/N: 777158-01
Monitor Resolution:	1024 x 768 or better
Operating System:	Windows ME / 2000 / XP pro / NT4

Lifting Equipment for Installation:

Forktruck or other lifting device with minimum safe lifting capacity of 2000kg
Nylon Slings with minimum safe lifting capacity of 2000kg

Continued…

General:

The Purchaser must provide all equipment and labor for delivering the equipment from the delivery dock to the installation site. You should have a User Manual for the Model 3474 250mm Electromagnet and for the magnet power supply. Please provide these to the person who will be responsible for the System installation. If you do not have the User Manual or need to discuss details of the installation please call GMW. If a GMW Engineer is to supervise the installation any delays caused by inadequate preparation may result in additional charges for Engineering Time.

Model 3474 System Installation; Check List

Site:

___ Floor space and work space cleared and ready for equipment installation.

___ Appropriate electrical services installed

Materials Required:

___ Power Plugs

___ Power Cable

___ Facility Electrician ready to make mains connections to power supply at the time of system install

___ Cooling water supply installed with shut-off valves

Materials Required:

___ 12.5mm I.D. (½") water hose, 5m for source and 5m for drain

___ Water hose fittings appropriate for installed plumbing

___ Water hose clamps

Misc. Items (to be provided by facility):

Tools:

___ Power Drill with 5/16" socket (to open magnet crates)

___ 24mm combination wrench (open and box end)

___ 24 mm socket wrench (for attaching the angle brackets to the magnet)

___ ¾" socket wrench (for removal of magnet from shipping crate)

___ Nylon lifting slings, chains, cables and other rigging equipment suitable for lifting magnet.

Other Items:

___ 4" x 4" x 3' wood blocks. (about 4 – 6 pieces)

___ 3' x 3' ¾" plywood

All required materials on this list are to be provided by the facility.

If you are providing your own equipment rack, it must be a minimum of 760mm (30") deep.

Note: The weight of an assembled 3474 magnet system is just over 4300 lbs. It is not possible to rig and move this magnet by hand, so use of proper lifting equipment is required (either an appropriately rated lift truck or a traveling crane). It is the responsibility of the facility to provide the means to move and lift the magnet for assembly on to its base and move it to its final installed position. If the means to do this is not available in-house, the customer may be required to hire an outside rigging company to lift and move the magnet. Scheduling of the riggers is the responsibility of the customer. Should the installation time be extended due to problems with the rigger scheduling, GMW reserves the right to bill for additional time beyond the original contracted amount.

Important: Due to liability and insurance reasons, the mains power installation and connections must be completed by the facility electrician. The GMW engineer will not complete the mains power connection. Please ensure that the facility electrician is available to do this work.

Section 3

INSTALLATION

Caution: This is a heavy system. The magnet mass is approximately 1800 kg (4000 lb) so lifting equipment of this capacity should be used to shift the magnet. Two lifting eyes threaded M33 are provided and they can be used in several holes. Be sure to ensure the eyes are screwed fully home before use. Flexible lifting slings of at least 4000kg (9,000 lb) lifting capacity are recommended to avoid damage to the magnet. All movement, lifting and installation of the 3474 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.

Mounting Position

The magnet can be operated in any position. 45 degree mounting angles are available to allow the field axis to be horizontal with the yoke inclined back at 45^{o} for access from the horizontal and vertical direction. Refer to drawing 11900930 for showing the 45^{o} mounting arrangement.

Alternatively, vertical mounting brackets can be used to position the field axis vertically. In each case the magnet should be oriented with the water lines below the electrical connections to reduce the chance of water leakage shorting electrical connections. Refer to drawing 11900490.

Unpacking Instructions and Damage Inspection

To unpack the electromagnet please use the following procedure (Refer to Drawing 18800191).

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. Use one person on each side of the shipping crate grip the side panels of the Crate Top Cover. Lift "Crate Top Cover" high enough to clear top of electromagnet, walk cover sideways to 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 M16 Hex Bolts that secure the magnet to the steel shipping angle brackets.
6. Remove the hex lag bolts that secure the steel "shipping angle brackets" to shipping crate base, and remove shipping angle brackets.
7. Install M16 lifting eye and washer to top of magnet yoke, screw down firmly.
8. The magnet is now prepared for final installation, follow the appropriate following procedure to install to 45°, vertical or direct mounting.

Direct Mounting

1. With suitable lifting equipment (e.g. 4000kg (9000 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 secure using the steel shipping angle brackets. The brackets can be modified to suit installation space needs.

Section 3

INSTALLATION

45° Mounting (Refer to Drawing 11900480)

1. With suitable lifting equipment (e.g. 4000kg (9000 lb.) minimum safe lifting rating), lift magnet 50mm (2") clear of shipping crate base.
1. Slide shipping crate base clear.
2. Lower magnet to 50mm(2") above floor.
3. Move magnet to desired final location and place on 12mm (0.5") plywood sheet and wooden 100mm x 100mm (4" x 4") blocks (refer to figure 2).
4. Install 45° Mounting Brackets using M16 x 30 Hex bolts, flat and spring washers (refer to figure 2).
5. Lift magnet from top lifting eye about 50mm (2") remove 100mm x 100mm (4") wooden block located next to 45° mounting bracket (refer to figure 2).
6. Lower magnet so that it rests only on the front 100mm x 100mm (4") wooden block (refer to figure 3).
7. Install shackles and lifting sling to BOTH FRONT EYEBOLTS. Caution, keep hands and feet clear of magnet and 45° brackets during the following operation. Take weight of magnet and push the top front of the magnet rearward. The magnet weight should move over center. Lower magnet so that it rests on the 45° mounts (refer to figure 3 and 4).

Rolling or Rolling/Rotating Base Mounting (refer to Drawing 11900480)

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 (refer to figure 6).

1. To mount on rolling base or rolling/rotating base lift magnet from BOTH FRONT EYEBOLTS high enough to clear top of base (refer to figure 5).
2. Slide rolling base or rolling/rotating base underneath, lower magnet to 12mm (0.5") above base top surface (refer to figure 5).
3. Position rolling base or rolling/rotating base so the tapped holes in the base are aligned with the 45° mounting bracket hole (refer to figure 5).
4. Lower magnet onto rolling base or rolling/rotating base assembly (refer to figure 5).
5. Secure magnet and 45° mounting assembly to rolling base or rolling/rotating base with M16 x 25 long Hex Head Bolts (refer to figure 6).
6. Move magnet and rolling base or rolling/rotating base to desired location.
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.

Section 3

INSTALLATION

Pole Cap Selection and Installation (Refer to Drawing 11801602/11801603)
Using the field uniformity and induction curves determine the most desirable pole cap; cylindrical or tapered. In general:

If a uniform field is required use a cylindrical cap.
If a high field is required use a tapered cap.

The pole caps are machined from low carbon steel. This material is relatively soft and easily damaged. Since the pole caps are heavy and awkward to manipulate it is advisable to cover the pole faces to protect them from damage.

Pole cap removal using lifting eye bolt. (Refer to Drawing 11801602/11801603)

1. Turn off the power supply
2. Draw pole caps about 20mm into the pole sleeves, so the tapped M10 holes on the pole cap are still clear.
3. Fit the pole cap lifting eye bolt firmly into the top tapped hole (M10) of the pole cap to be removed.
4. Draw in the pole cap that is not to be removed until it is flush with the pole sleeve.
5. Tape cardboard or something similar to the face of the pole cap that is not to be removed to protect it from damage.
6. Support the pole weight, using a sling and overhead crane (approx. weight 38kg/84lbs).
7. Remove the axial retaining stud nut (item 33 on drawing 11801602/11801603).
8. Place the pole cap retaining stud wrench (item 2 on drawing 18900010) onto the end of the retaining stud (item 6 on drawing 11801602/11801603).
9. Remove retaining stud (item 6 on drawing 11801602/11801603) while supporting the pole cap.
10. ***Carefully*** rock the pole cap to break the adhesion to the pole and remove from the magnet

If lifting equipment is not available, the pole cap can be removed using the pole cap removal tool, using the following procedure.

Pole cap removal using pole cap removal tool. (Refer to Drawing 11801602/11801603)

1. Turn off the power supply
2. Draw pole caps about 20mm into the pole sleeves, so the tapped M10 holes on the pole cap are still clear.
3. Fit the pole cap removal tools (item 11 on drawing 18900010) firmly into two opposite tapped holes (M10) on the pole cap to be removed.
4. Tape cardboard or something similar to the face of the other pole cap to protect it from damage.
5. Loosen the axial retaining stud nut 1 turn, but do not remove. (item 33 on drawing 11801602/11801603).
6. Use two people to support the weight of the pole cap (approx. weight 38kg/84lbs).
7. Place the pole cap retaining stud wrench (item 2 on drawing 18900010) onto the end of the retaining stud (item 6 on drawing 11801602/11801603).
8. Remove retaining stud (item 6 on drawing 11801602/11801603) while supporting the pole cap.
9. ***Carefully*** rock the pole cap to break the adhesion to the pole and remove from the magnet

Section 3

INSTALLATION

Pole cap fitting.

1. Ensure the pole caps, pole cores, and pole sleeves are clean and free from debris.
2. Reverse the above pole cap removal sequence.

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 or equipment damage.

The magnet has two coils which may be connected in series (140A/76V) Model: 3474-140 or in series/parallel (280A/38V) Model: 3474-280 to match different power supplies. Refer to drawing 11801602/11801603. The power supply cables should be connected directly to the DC current terminals marked + and -. Recommended current cable is stranded copper of 120mm² cross section (250MCM) for the 280A/38V coil connections. For 140A/76V coil connections use 70mm² cross section (2/0 AWG) standard copper current cables. Refer to drawing 13900030 for details.

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.

Interlocks

Six thermal sensors Elmwood 3450G Part Number 3450G611-1 L50C 89/16 are wired in series and terminated in positions 3 and 4 on the Interlock Terminal block. They are normally closed, opening when the coil central cooling plate temperature exceeds $50^{O}C +/3^{O}C$. The flow switch is connected to terminals 1 and 2. The contacts are normally open, closing when the water flow exceeds approx. 10 l/min.

Section 3

INSTALLATION

Cooling

The Model 3474 can be operated to an average coil temperature of 70^{O}C. Assuming an ambient laboratory temperature of 20^{O}C and a temperature coefficient of resistivity of 0.00393, the hot resistance of the coil should not exceed 20% more than the ambient temperature "cold" resistance.
The coil thermal sensor will open when the coil cooling plate temperature exceeds approximately 50^{O}C . Clean, cool (12^{O}C - 20^{O}C) water at 15 l/min and 2.0 bar (30 psid) should be used to cool the magnet. The cooling tubes are not electrically connected to the coils so no electrochemical corrosion will occur. If the water supply contains particulates, a 50 micron filter should be placed before the input to the magnet to avoid unreliable operation of the flow switch.

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 3474 Electromagnet alone a suitable chiller is the Neslab HX-300 with PD-2 pump. 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.

At currents of below 40A for coils that are series connected or 80A for series/parallel connected coils the Model 3474 can be operated safely without water cooling. However the coil temperature will vary with the power dissipation. This results in dimensional and permeability changes of the magnet yoke. 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 15 liters/min (4 US gpm). For operation at less than maximum power the water flow may be correspondingly reduced.

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 gaussmeter 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.

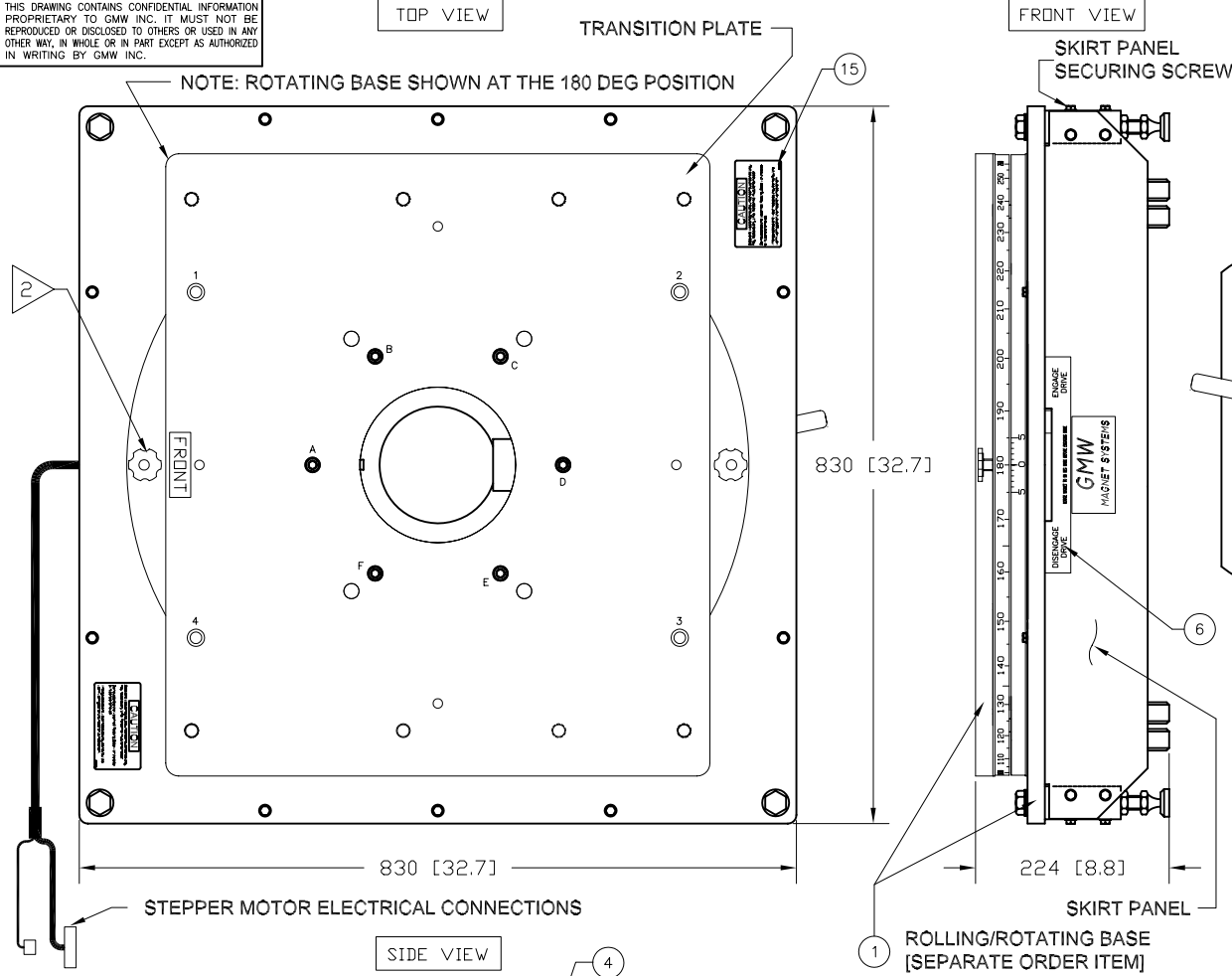
Note that the surface treatments used provide good corrosion protection but in order to maintain the inherent mechanical precision of the magnet, heavy build-up of plating materials is deliberately avoided. As a result, high humidity or otherwise seriously corrosive atmospheres can cause corrosion. Periodically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

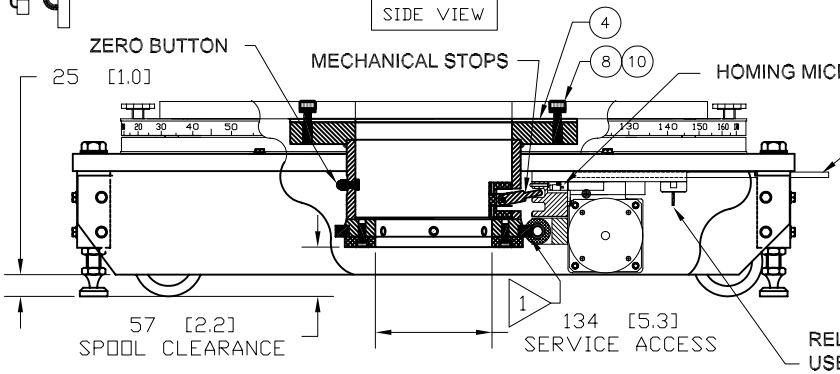
STANDARD OPTIONS

TOP VIEW



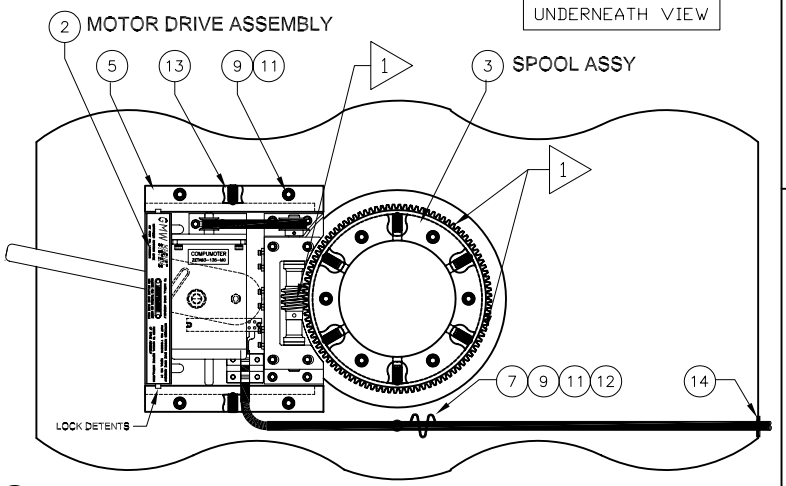
FRONT VIEW

SIDE VIEW



NOTE: ROTATING BASE SHOWN AT THE 180 DEG POSITION

UNDERNEATH VIEW



REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		11/30/97	G.DOUGLAS
B	CHG 45° MTG HOLES, ITEM 9 LENGTH TO 25MM		10/20/98	G.DOUGLAS
C	ADD ITEM 1 NOTES		04/10/08	G.DOUGLAS
D	ADD NOTE 2, ITEM 15		08/21/08	G.DOUGLAS

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
15	2	10900180	CAUTION LABEL	
14	1		GROMMET 25MM OD X 20MM ID	
13	2	SBMH-ION	BALL PLUNGER, M6 S/S	
12	1	DIN 433	WASHER. FLAT M8 X 1.6 S/S	
11	5	BN 792	WASHER, M8 x 1.4 RIBBED SPRING/STEEL	
10	6	BN 792	WASHER, M10 x 1.6 RIBBED SPRING/STEEL	
9	5	DIN 912	SHCS, M8 X 25 S/S	
8	6	DIN 912	SHCS M10 X 35 S/S	
7	1	17901230	CABLE SUPPORT	
6	1	10900161	DISENGAGE/ENGAGE LABEL	
5	2	17901020	MOTOR DRIVE ASSEMBLY GUIDES	
4	1	17901210	SPOOL SPACER	
3	1	11900820	SPOOL ASSY	
2	1	11900811	MOTOR DRIVE ASSY	
1	1	11900980	ROLLING/ROTATING BASE ASSY	

DRAWN	G.DOUGLAS	DATE	11/30/97
CHECK		DATE	
ENGINEERING		DATE	
NEXT ASSY		SYSTEM	
SOFTWARE	AUTOCAD 2000		

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.

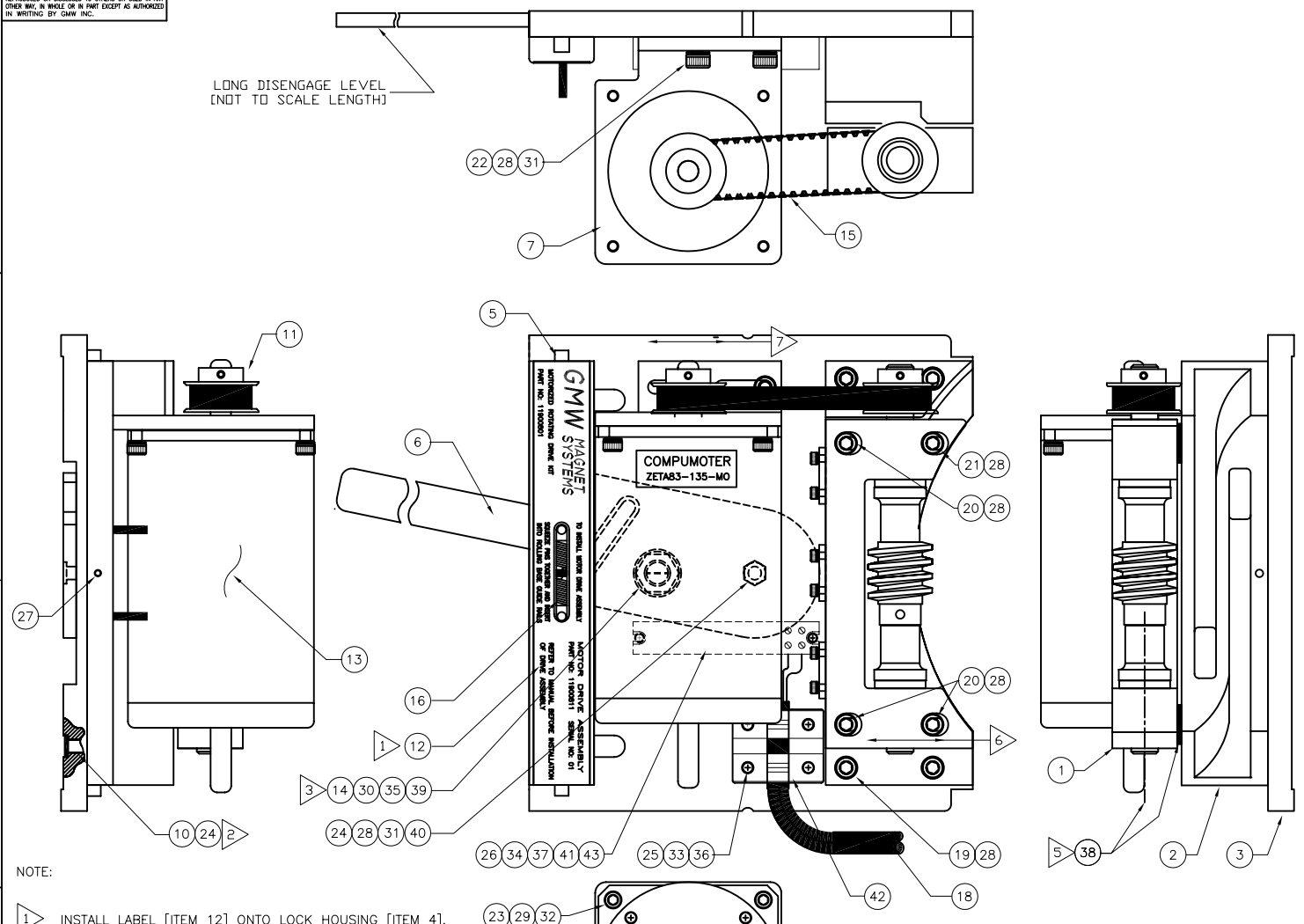
TITLE
MOTORIZED ROTATING DRIVE
MODEL: 3474

SIZE	DRAWING NO.	REV
A2	11900801	D

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

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/16/98	G.DOUGLAS
B	CHG ITEM 11, 44, ADD NOTE: 4		04/08/98	G.DOUGLAS
C	CHG ITEM 11,44, ADD NOTE: 4		04/07/98	G.DOUGLAS
D	CHANGE ITEMS 11, 12, 13, 15		03/11/08	G.DOUGLAS
E	ADD ITEM 45 & NOTE 5 & 6 CHG PULLEYS VIEW		08/21/08	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
45	1	17906300	LOCK HOUSING PLATE	
44	A/R		HEAT SHRINK SLEEVING, 4MM	
43	1	0.33uF	CAPACITOR	
42	2	OHS	PIPE SADDLE, 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	16	BN 748	WASHER, SHIM M6 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 1.6 S/S	
30	1	DIN 433	WASHER, FLAT M10 X 1.6 S/S	
29	4	BN792	WASHER, M5 X 1.1, RIBBED SPRING/STEEL	
28	11	BN792	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, M6 X 16, LOW PROFILE HD #1415670	
23	4	DIN 912	SHCS M5 X 12 S/S	
22	2	DIN 912	SCHS M6 X 16 S/S	
21	1	DIN 912	SHCS, M6 X 30 S/S	
20	3	DIN 912	SHCS, M6 X 35 S/S	
19	4	DIN 912	SHCS, M6 X 45 S/S	
18	6M	8778	CABLE, 6 SHIELDED PAIRS, 22 AWG, BELDEN	
17	3	DIN 1481	SPRING PIN, M4 X 26L	
16	1	IHI	SPRING, COMPRESSION, 6MM DIA X 50L	
15	1	TB20EF6-55	BELT, TIMING, BERG 11" [280MM]	
14	1	SBMH-10N	BALL PLUNGER, M10 [heavy pressure] VLIER	
13	1	ES33B-DFR10	MOTOR, STEPPER, ZETA, COMPUMOTER	
12	1	10900151	LABEL, SPECIFICATION	
11	1	TP20A6W6-18	PULLEY, TIMING BELT 18 TEETH BERG	
10	5	17901202	SPACER, 9MM LONG S/S	
9	1	17901201	SPACER, 4MM LONG S/S	
8	1	17901180	SPACER, CABLE CLAMP	
7	1	17901060	MOTOR MOUNT	
6	1	17901052	DISENGAGE LEVER [For Model 3474 base]	
5	2	17901040	LOCK BAR	
4	1	17901030	LOCK HOUSING	
3	1	17901010	BASE PLATE	
2	1	11900840	STOP BLOCK ASSEMBLY	
1	1	11900850	WORM MOUNT ASSEMBLY	

PARTS LIST

NOTE:

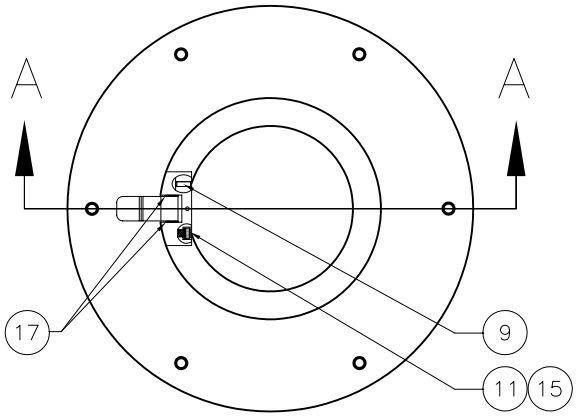
1. INSTALL LABEL [ITEM 12] ONTO LOCK HOUSING [ITEM 4]. THEN TRIM AROUND CUTOUT FOR RELEASE PINS.
2. APPLY LOCTITE TO THREADS ON [ITEM 24]. THEN ASSEMBLE LOCK HOUSING [ITEM 4], USING S/S SPACER [ITEM 10].
3. SCREW DOWN [ITEM 14] SO THAT [ITEM 6] IS RETAINED IN BOTH DETENTS. LOCK IN PLACE WITH [ITEM 39].
4. FIT [ITEM 44] OVER EXPOSED AREA OF [ITEM 17]
5. SHIM WASHERS USED FOR WORM CENTERLINE HEIGHT ADJUSTMENT.
6. MOVE WORM MOUNT ASSEMBLY FORWARDS/BACKWARDS FOR WORM MESHING ADJUSTMENT.
7. MOVE MOTOR MOUNT FORWARDS OR BACKWARDS TO ADJUST BELT TENSION.

DRAWN G.DOUGLAS	DATE 05/07/97	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	GMW 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE	LINEAR: X.XXX ±.005 ±0.03; X.XX ±.02 ±0.1; X.X ±.03 ±0.3; X ±.06 ±1; INCHES / mm	TITLE: MOTORIZED ROTATING DRIVE MOTOR DRIVE ASSEMBLY 3474
		DEG. ±.5 ±0.5	
11900801	3474	FINISH 63	SIZE A1 DRAWING NO. 11900811 REV E
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	
SOFTWARE AUTOCAD 2000			SCALE 1:1 WT kg SHEET 1 OF 1

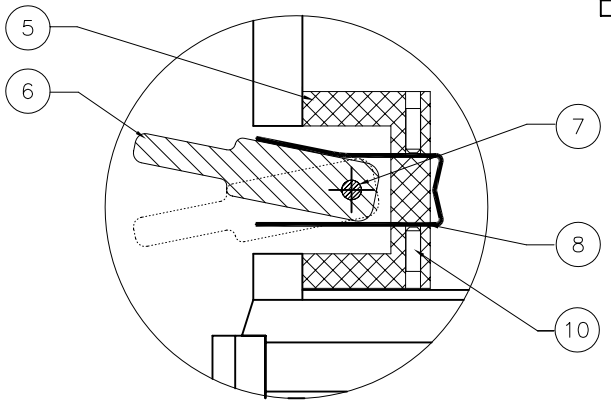
REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		07/07/97	G.DOUGLAS
B	ADD ITEM 17&18, MOD SPRING SHAPE		11/25/97	G.DOUGLAS
C	CHG ITEM 17, ADD ASSEMBLY NOTE		04/12/08	G.DOUGLAS

TOP VIEW

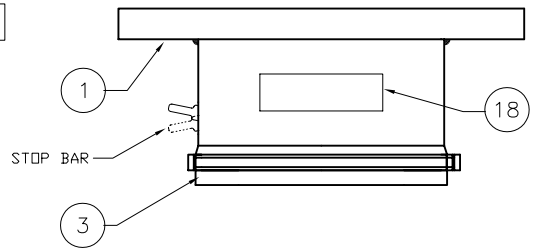


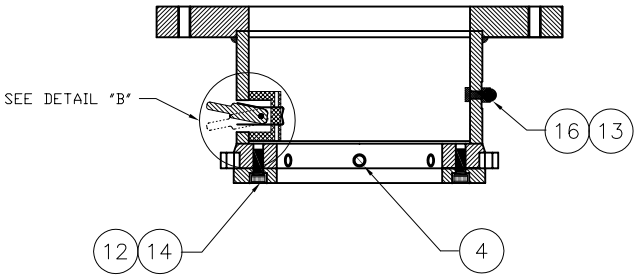
SCALE 4:1



DETAIL "B"

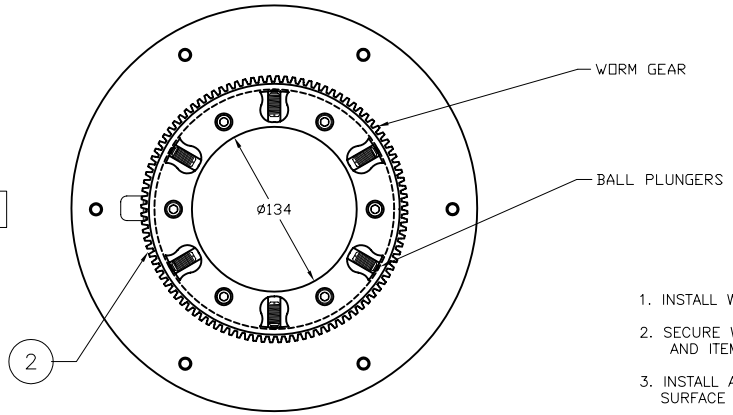
SIDE VIEW





SECTION A–A

BOTTOM VIEW



ASSEMBLY NOTES

1. INSTALL WORM GEAR [ITEM 2] ONTO SPOOL [ITEM 1].
2. SECURE WORM GEAR IN PLACE WITH SPOOL CLAMP RING ITEM 3 AND ITEM 12 & 14.
3. INSTALL AND TIGHTEN BALL PLUNGERS ITEM 4 AGAINST REAR SURFACE OR WORM GEAR ITEM 2 TO PREVENT WORM GEAR ROTATING.

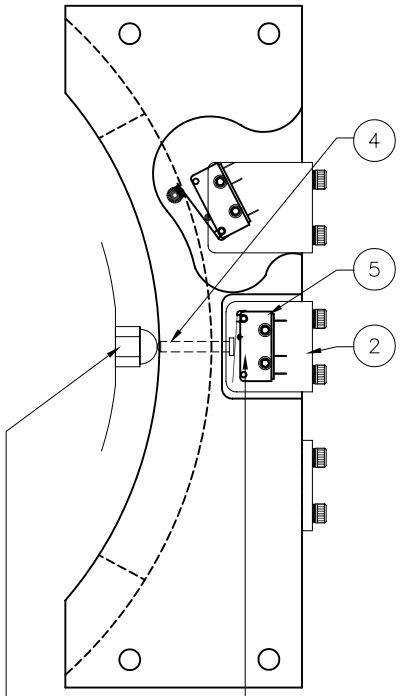
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
18	1	10900170	LABEL, SPOOL IDENTIFICATION	
17	2	DIN 137	WASHER, CURVED 6 x 11x 0.5 S/S	
16	1	DIN 1587	NUT, HEX DOMED M6 X 12 S/S	
15	4	BN 792	WASHER, LOCK M6 X 1.2	
14	6	BN 792	WASHER, LOCK M8 X 1.4	
13	1	BN80	BOLT, M6 X 16 HEX NYLON	
12	6	DIN 912	SHCS M8 X 16 S/S	
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	SBMH-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

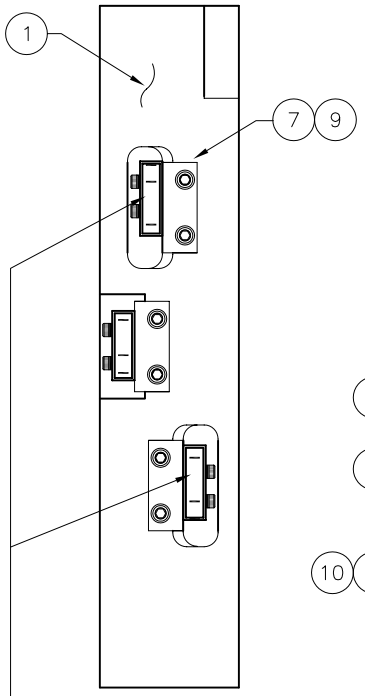
DRAWN G.DOUGLAS	DATE 04/27/97	DO NOT SCALE FROM DRAWING	GMW
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	955 Industrial Rd, San Carlos, CA 94070
ENGINEERING	DATE	LINEAR: INCHES / mm; X.XXX ±.005 / ±0.03; X.XX ±.01 / ±0.1; X.X ±.03 / ±0.3; X ±.06 / ±1; DEG. ±.5 / ±0.5; FINISH 63 / 1.6	Tel: (650)802-8292. Fax: (650)802-8298.
			TITLE: MOTORIZED.ROT.DRIVE SPOOL ASSEMBLY
1190080003472/3/4			SIZE A1 · DRAWING NO. 11900820 · REV C
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	
SOFTWARE AUTOCAD 2000			SCALE 1:2 · WT kg · SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		07/07/97	G.DOUGLAS
B	UPDATE VIEW OF MICROSWITCH CUTOUTS		03/10/08	G.DOUGLAS

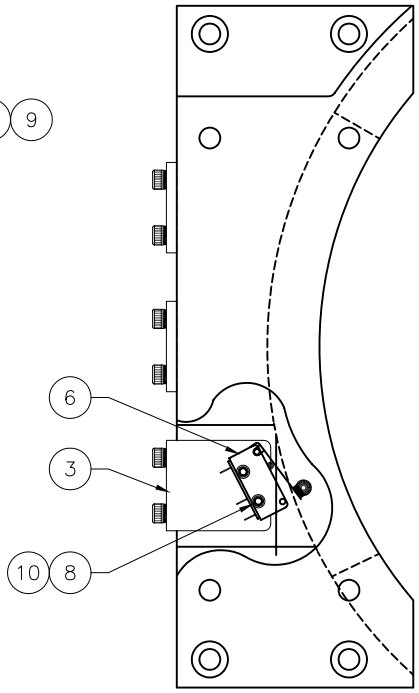
BOTTOM VIEW



REAR VIEW



TOP VIEW



MAXIMUM TRAVEL LIMIT MICROSWITCHES. NC CONTACT.
MICROSWITCH OPENS WHEN MAX TRAVEL POSITION IS REACHED.

HOMING MICROSWITCH NO CONTACT. MICROSWITCH CLOSES
CONTACT WHEN HOMING POSITION 0.0 DEG IS REACHED.

ZERO BUTTON (HOMING POSITION 0.0 DEG) MOUNTED ON SPOOL ASSEMBLY
SEE DWG NO: 119000820 FOR MORE DETAILS.

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 2000		

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.

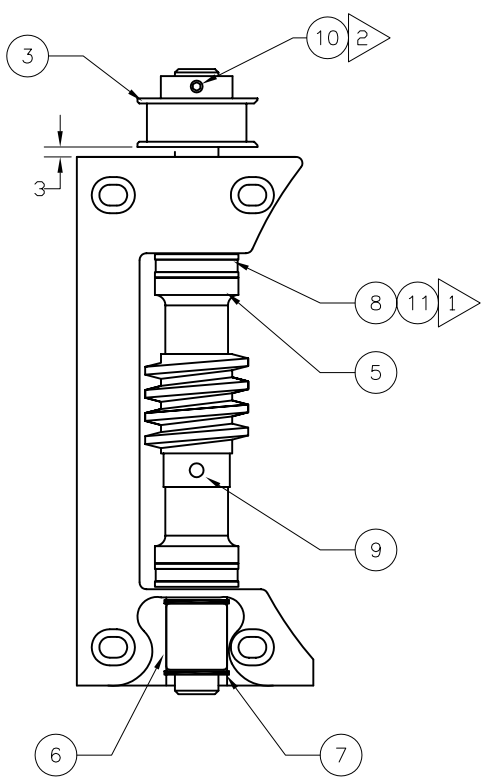
TITLE
MOTORIZED.ROT.DRIVE
STOP BLOCK ASSY

SIZE	DRAWING NO.	REV
A2	11900840	B

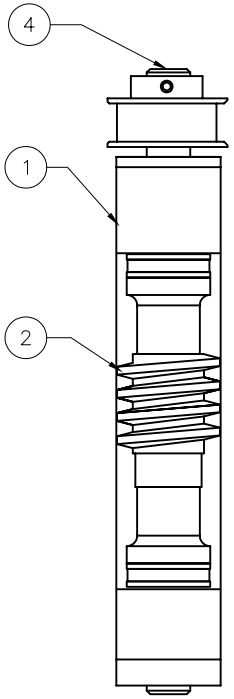
SCALE 1:1 | WT kg | SHEET 1 OF 1

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
D	CHANGE ITEM 3,7,8		03/07/08	G.DOUGLAS
E	CHANGE ITEM 10 & PULLEY/BEARING VIEW, ADD NOTE	2	08/21/08	G.DOUGLAS



TOP VIEW



FRONT VIEW

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
11	A/R	BN 748	SHIM WASHER, 14 X 26 X 0.1MM THICK	
10	1		SETSCREW 8-32 x 1/4" UNC	
9	1	DIN 1481	PIN, SPRING M4 X 18L, SP/S	
8	2	B5-6-SS	BEARING, THRUST 0.5" SHAFT, BERG	
7	4	Q9-71	BEARING RETAINING RING, BERG	
6	2	S99NH2-BN1624	BEARING, NEEDLE ROLLER, SDP	
5	2	17901190	SPACER, WORM	
4	1	12900060	WORM SHAFT	
3	1	TP20A8W6-18	PULLEY, 18 TEETH [for 0.5" shaft] BERG	
2	1	12900030	WORM	
1	1	17901080	WORM MOUNT	

PARTS LIST

NOTE:

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

2. ENSURE SETSCREW FITS ONTO SHAFT FLAT SURFACE.

DRAWN	G.DOUGLAS	DATE 05/03/97
CHECK		DATE
ENGINEERING		DATE
11800810		
NEXT ASSY	SYSTEM	
SOFTWARE	AUTOCAD 2000	

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
MOTORIZED.ROT.DRIVE
WORM MOUNT ASSY

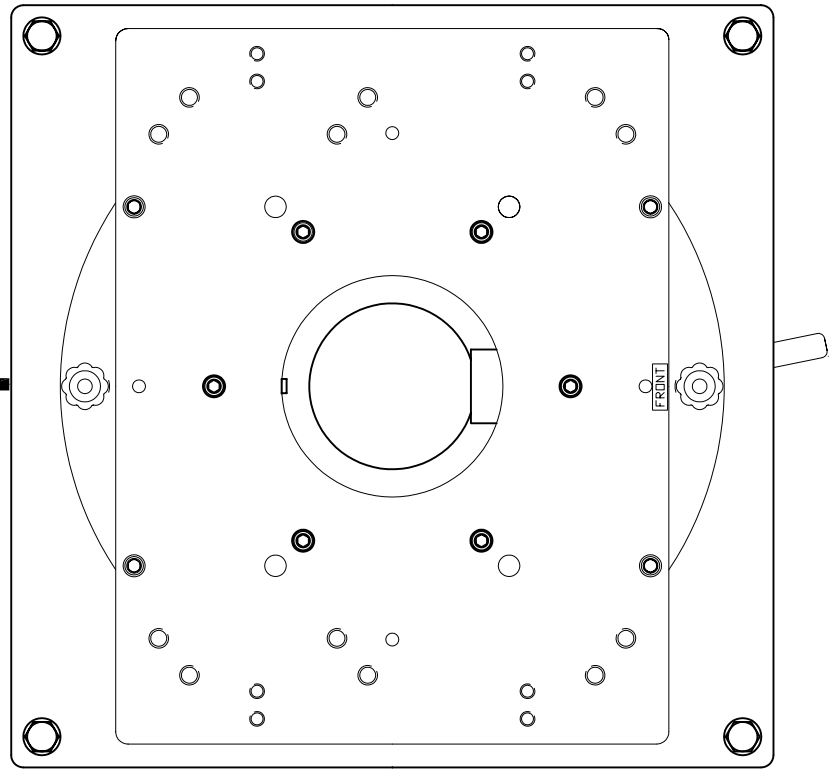
SIZE	DRAWING NO.	REV
A2	11900850	E

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

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/17/98	G.DOUGLAS
B	INCR SIZE OF TRANSISTION PLATE, ADD 5403EG MTG HOLES		07/02/03	G.DOUGLAS

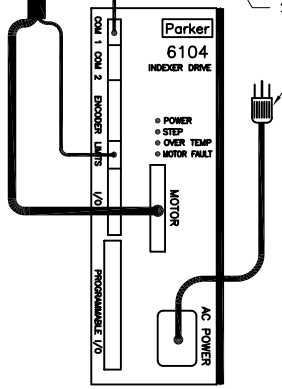
TOP VIEW



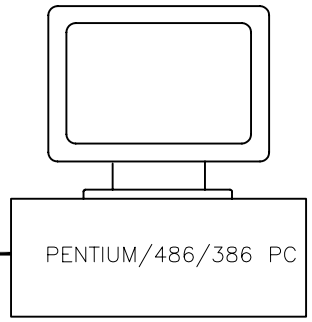
MOTOR AND LIMIT SWITCH CABLE PART NO 16900400

SERIAL COMMUNICATIONS CABLE PART NO 16900410

AC POWER INPUT



STEPPER MOTOR CONTROLLER



CONTROL COMPUTER

NOTE

1. THIS DRAWING SHOWS 3473/3472/5201 SYSTEM. WIRING IDENTICAL FOR 3474 SYSTEM.
2. SEE DRAWING NO: 13900350 FOR DETAILED ELECTRICAL WIRING.
3. MICROSWITCHES FUNCTIONS
   HOMING: ROTATES DRIVE TO 0.0 DEG POSITION
   LIMITS: STOPS ROTATION AT +/−200 DEG POSITION.
   MICROSWITCHES MOUNTED ON STOP BLOCK ASSEMBLY SEE DWG NO: 11900840 FOR DETAILS.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN G.DOUGLAS	DATE 02/17/98	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 MOTORIZED.ROT.DRIVE ELECTRICAL ASSY
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	SIZE A1 · DRAWING NO. 11901020 · REV B
SOFTWARE AUTOCAD 2000			SCALE 1:2 · WT kg · SHEET 1 OF 1

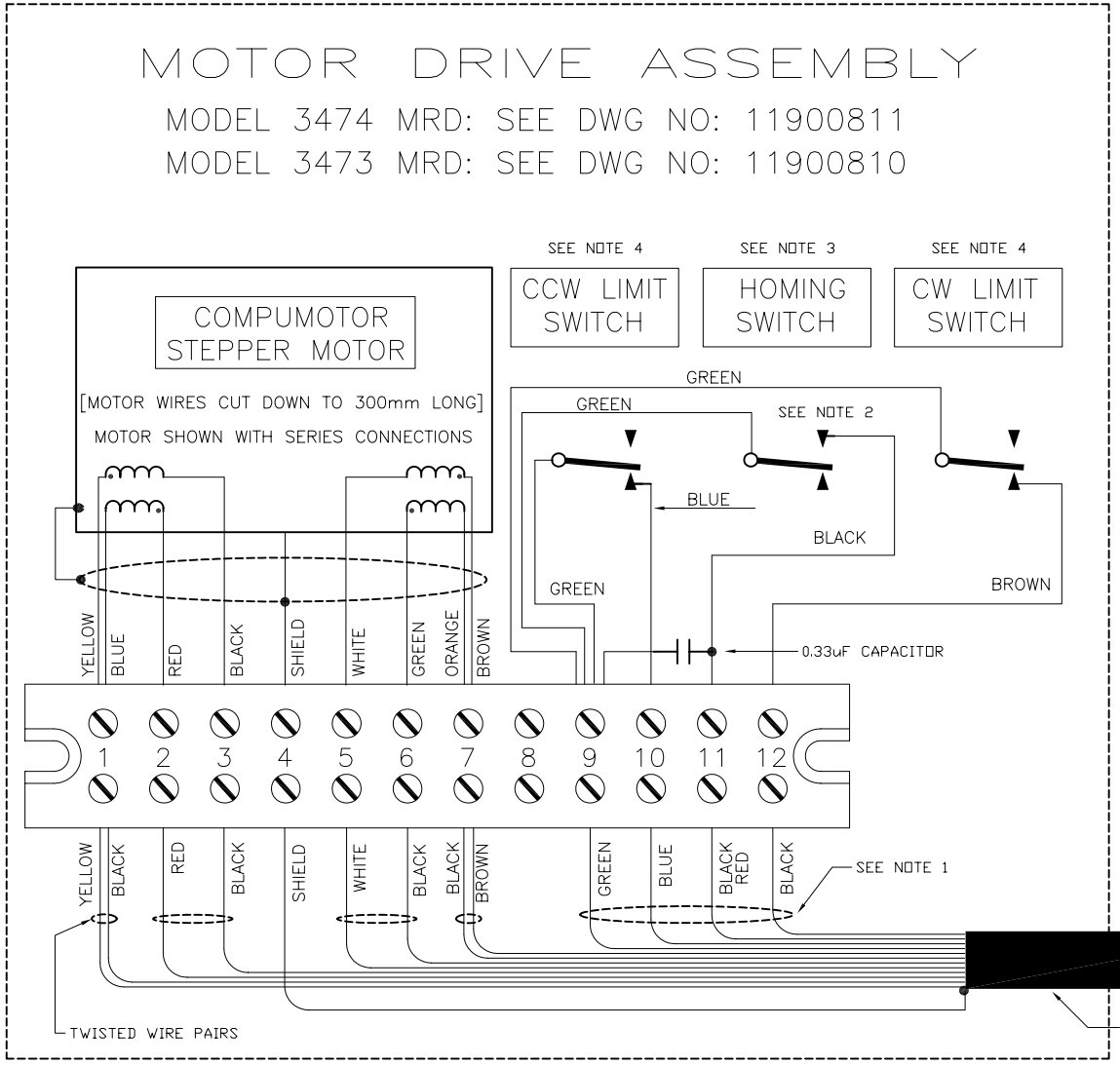
LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	√63	1.6√

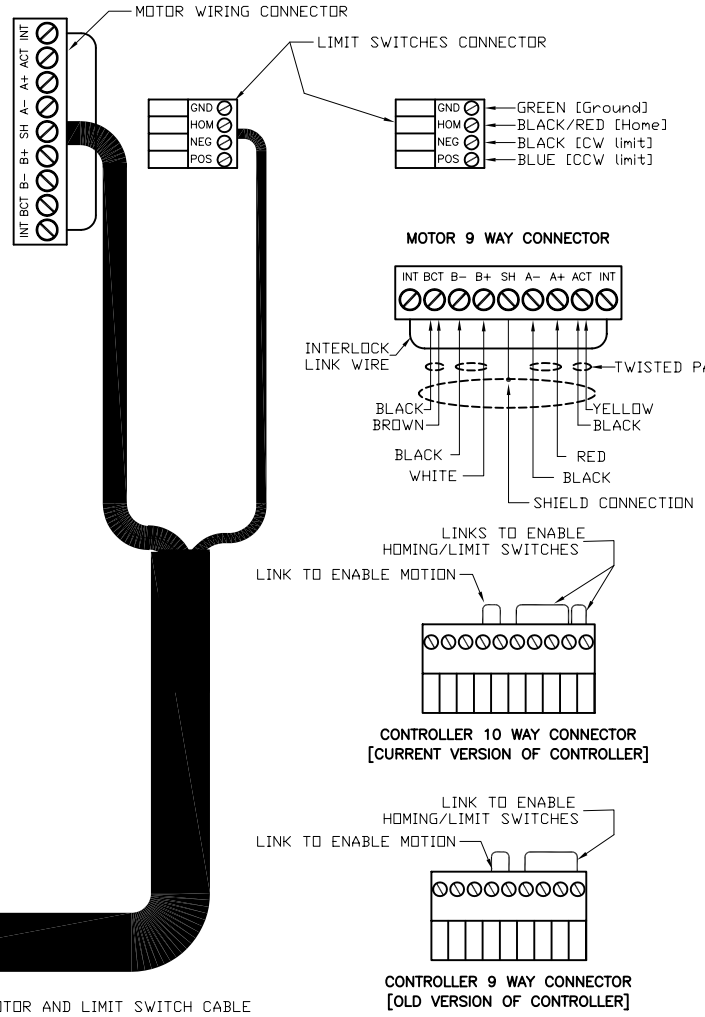
REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/13/98	G.DOUGLAS
B	ADD CONTROLLER CONNECTOR LINKING		10/12/01	G.DOUGLAS
C	ADD MOTOR & LIMIT SWITCH CONNECTIONS		06/18/08	G.DOUGLAS

MOTOR DRIVE ASSEMBLY

MODEL 3474 MRD: SEE DWG NO: 11900811
MODEL 3473 MRD: SEE DWG NO: 11900810





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. CCW/CW LIMIT SWITCHES USE NORMALLY CLOSED CONTACTS.
3. WHEN HOMING COMMAND IS GIVEN ROTATING BASE RETURNS TO ZERO DEG POSITION AND STOPS.
4. ROTATION DIRECTIONS CCW AND CW REFERENCED TO ROTATING BASE VIEWED FROM TOP SURFACE LOOKING DOWNWARDS.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
		PARTS LIST		

DRAWN G.DOUGLAS 02/13/98
CHECK
ENGINEERING
DO NOT SCALE FROM DRAWING
DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)

	LINEAR	INCHES	mm
	X.XXX	±.005	±0.03
	X.XX	±.02	±0.1
	X.X	±.03	±0.3
	X	±.06	±1
	DEG.	±.5	±0.5
	FINISH	63	1.6

11900800	5201
11900800	3473
11900801	3474
NEXT ASSY	SYSTEM

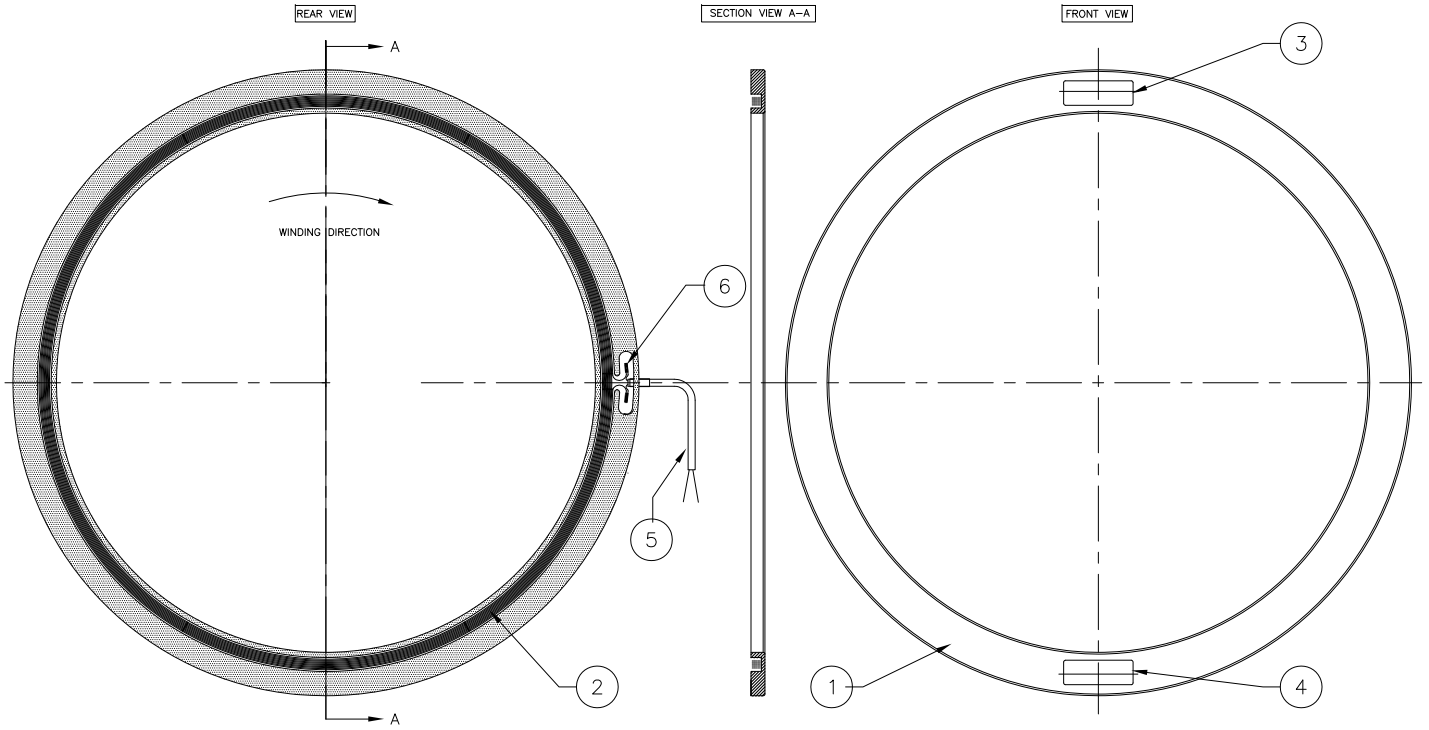
SOFTWARE AUTOCAD 2000
THIRD ANGLE PROJECTION

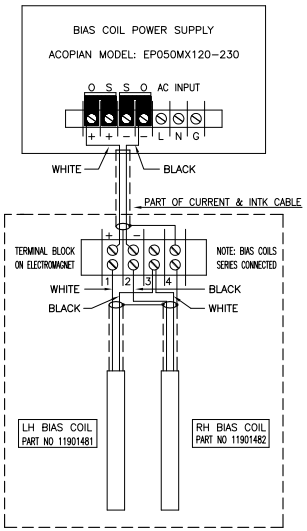
GMW
955 Industrial Rd San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE: MOTORIZED.ROT.DRIVE ELECTRICAL WIRING
SIZE A1 | DRAWING NO. 13900350 | REV C
SCALE 2:1 | WT kg | SHEET 1 OF 1

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		12/03/00	G.DOUGLAS





ASSEMBLY NOTES

1. ENSURE COIL WINDING IS FITTED TO SPOOL WITH WINDING DIRECTION AS SHOWN.
2. CONNECT START OF WINDING TO WHITE WIRE OF INPUT CABLE.
3. CONNECT FINISH OF WINDING TO BLACK WIRE OR INPUT CABLE.
4. HEATSHRINK INPUT CABLE & WINDING TERMINATIONS AS SHOWN.
5. TEST COMPLETED ASSEMBLY AT FULL POWER BEFORE POTTING.
6. POT COMPLETE ASSEMBLY AFTER PASSING FULL POWER TEST

SPECIFICATIONS

COIL RESISTANCE @ 20°C 30.0 OHMS [series connected]

SPOOL ID: 310mm [12.2"]

SPOOL OD: 360mm [14.2"]

SPOOL WIDTH: 6mm [0.24"]

FIELD @ MAX POWER: 150 GAUSS. Installed on model: 3474 WITH 15mm GAP]

MAX CURRENT: 1.0 AMPS.

MAX VOLTS: 50 VOLTS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	A/R	521	POTTING COMPOUND, EVERCOAT	
6	A/R		HEATSHRINK SLEEVING 5mm	
5	1m	5610B2401	CABLE, ALPHA 2 CORE, BLACK PVC	
4	1	10900420	LABEL, SPECIFICATIONS [LH SIDE]	
3	1	10900400	LABEL, MODEL & SERIAL NO.	
2	1	17904370	WINDING [100 turns 26AWG magnet wire]	
1	1	17904360	SPOOL	

PARTS LIST

DRAWN G.DOUGLAS DATE 12/03/00
CHECK DATE
ENGINEERING DATE
3474
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.

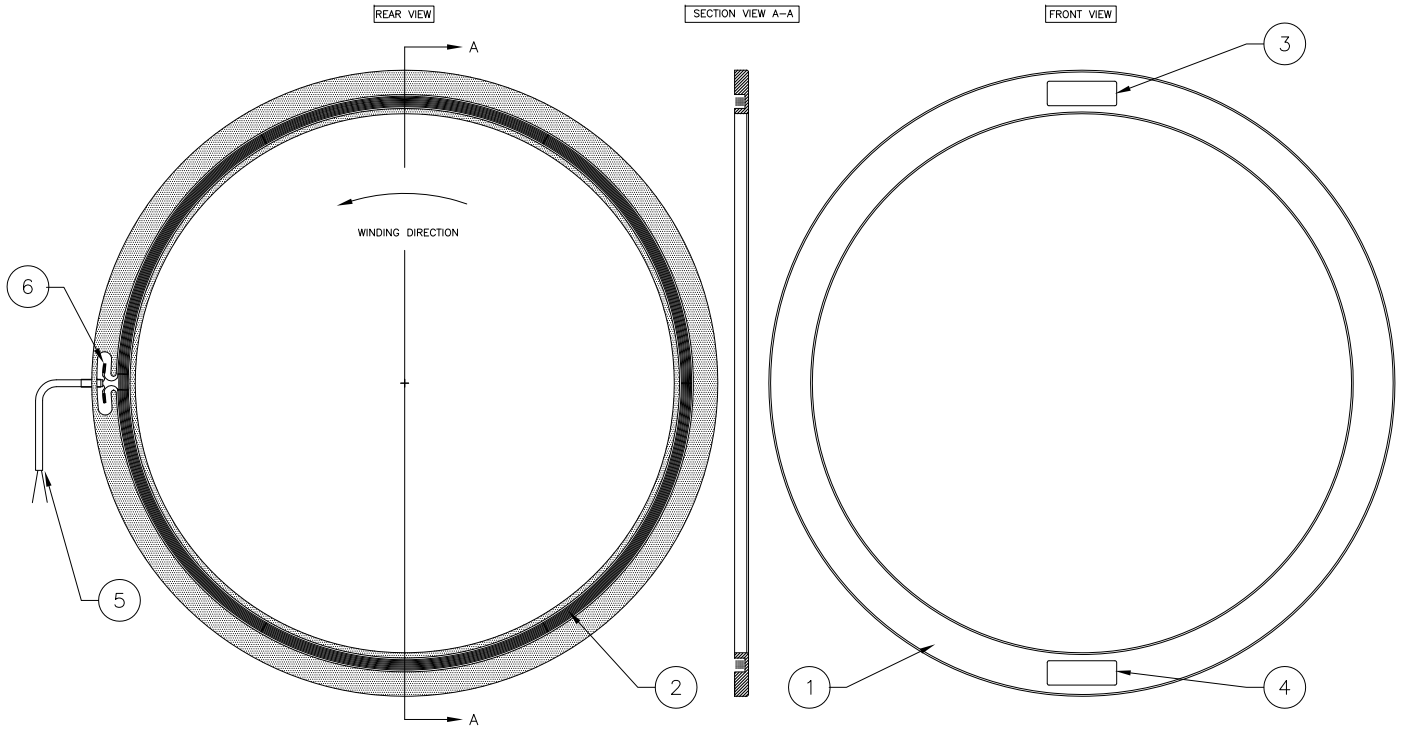
TITLE
BIAS COIL ASSY [RH]
MODEL: 3474

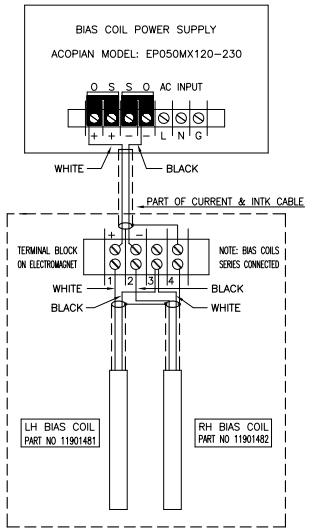
SIZE A2 | DRAWING NO. 11901482 | REV A

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

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		12/03/00	G.DOUGLAS





ASSEMBLY NOTES

1. ENSURE COIL WINDING IS FITTED TO SPOOL WITH WINDING DIRECTION AS SHOWN.
2. CONNECT START OF WINDING TO WHITE WIRE OF INPUT CABLE.
3. CONNECT FINISH OF WINDING TO BLACK WIRE OR INPUT CABLE.
4. HEATSHRINK INPUT CABLE & WINDING TERMINATIONS AS SHOWN.
5. TEST COMPLETED ASSEMBLY AT FULL POWER BEFORE POTTING.
6. POT COMPLETE ASSEMBLY AFTER PASSING FULL POWER TEST

SPECIFICATIONS

COIL RESISTANCE @ 20°C 30.0 OHMS [series connected]

SPOOL ID: 310mm [12.2"]

SPOOL OD: 360mm [14.2"]

SPOOL WIDTH: 6mm [0.24"]

FIELD @ MAX POWER: 150 GAUSS. Installed on model: 3474 WITH 15mm GAP]

MAX CURRENT: 1.0 AMPS.

MAX VOLTS: 50 VOLTS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	A/R	521	POTTING COMPOUND, EVERCOAT	
6	A/R		HEATSHRINK SLEEVING 5mm	
5	1m	5610B2401	CABLE, ALPHA 2 CORE, BLACK PVC	
4	1	10900410	LABEL, SPECIFICATIONS [LH SIDE]	
3	1	10900400	LABEL, MODEL & SERIAL NO.	
2	1	17904370	WINDING [100 turns 26AWG magnet wire]	
1	1	17904360	SPOOL	

PARTS LIST

DRAWN G.DOUGLAS	DATE 12/03/00
CHECK	DATE
ENGINEERING	DATE
	3474
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: (650)802–8292. Fax: (650)802–8298.

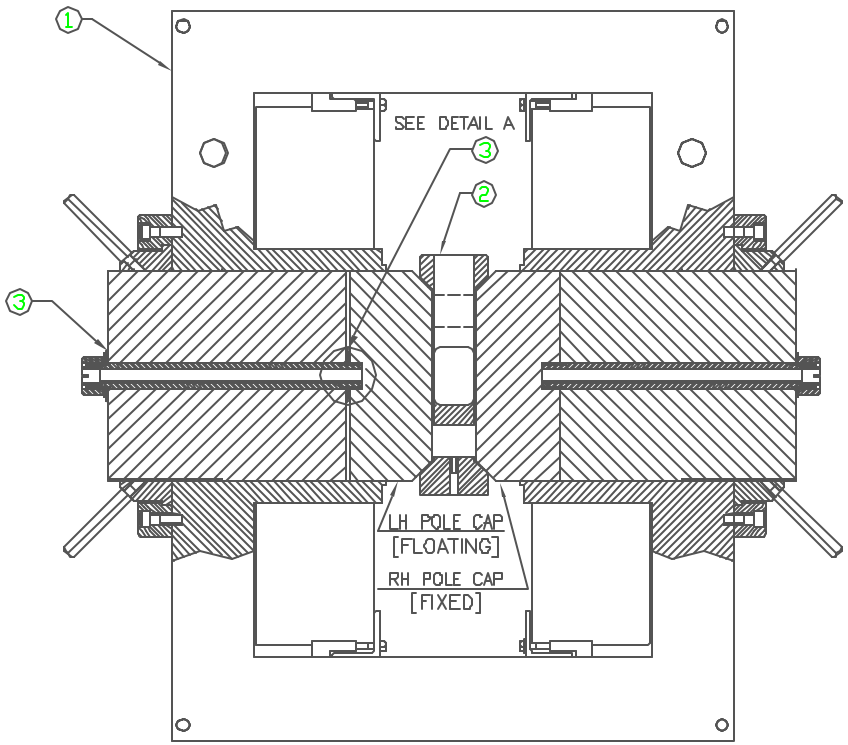
TITLE
BIAS COIL ASSY [LH]
MODEL: 3474

SIZE	DRAWING NO.	REV
A2	11901481	A

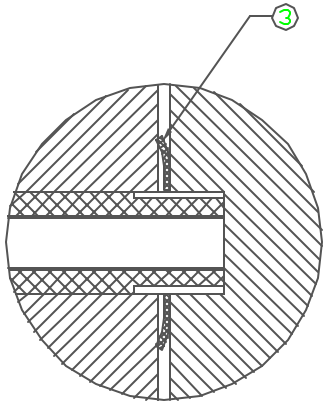
SCALE 1:2 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/28/97	G.DOUGLAS

MODEL: 3474 ELECTROMAGNET



FRONT VIEW



DETAIL A

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
3	2	BN1375	SPRING, DISC, SPRING STEEL, BOSSARD	
2	1	11900460	POLE SPACER RING ASSEMBLY	
1	1	3474	ELECTROMAGNET, 250MM	

PARTS LIST

DRAWN G.DOUGLAS DATE 02/28/97
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: (650)802-8292. Fax: (650)802-8298.

TITLE
POLE SPACER ASSEM
MODEL: 3474

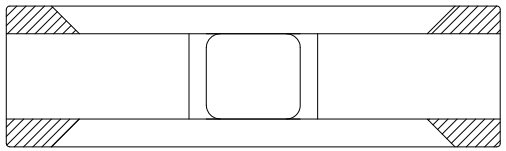
SIZE	DRAWING NO.	REV
A2	11900330	A

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

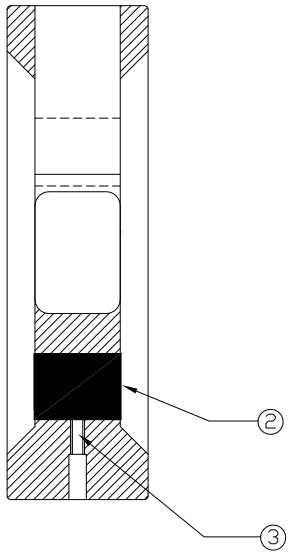
REVISIONS

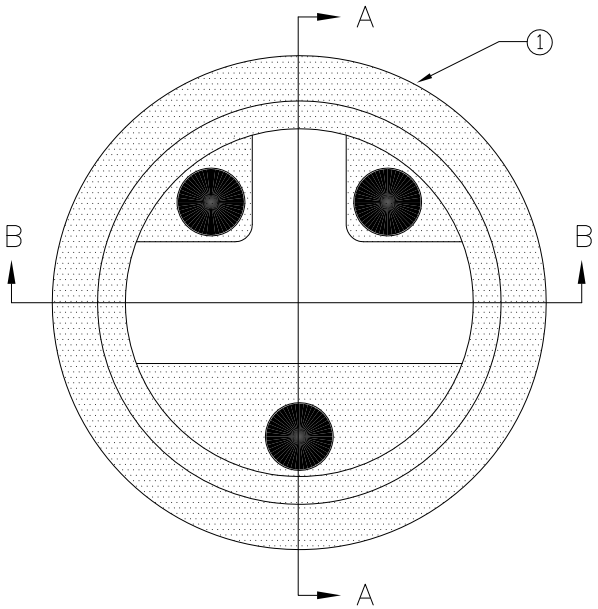
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/25/97	G.DOUGLAS

SECTION B–B



SECTION A–A





ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
3	3	BN1073	SET SCREW, SLOTTED HD, NYLON, BOSSARD	
2	3	17900690	POLE SPACERS, CERAMIC	
1	1	17900460	POLE SPACER RING, DELRIN	

PARTS LIST

DRAWN G.DOUGLAS DATE 02/25/97
CHECK DATE
ENGINEERING DATE
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 2000

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.0 Box 2578, Redwood City, CA 94064
Tel: (650)802–8292. Fax: (650)802–8298.

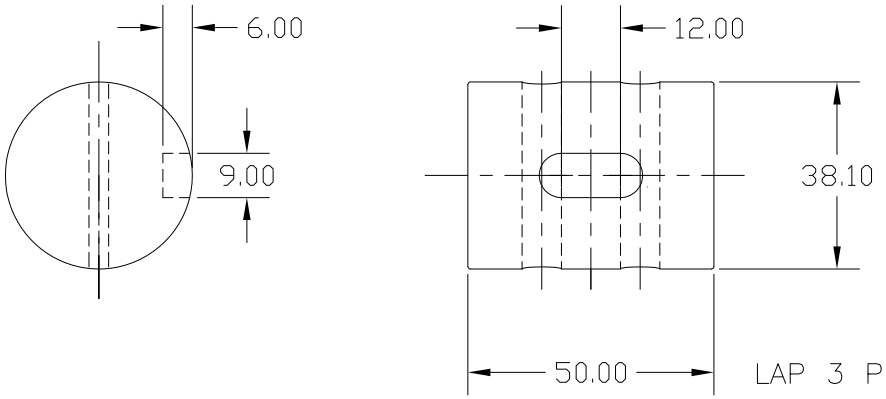
TITLE
POLE SPACER RING
MODEL: 3474

SIZE A2 | DRAWING NO. 11900460 | REV A

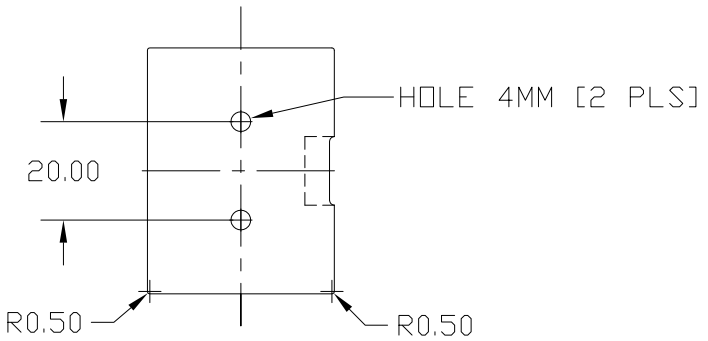
SCALE 1:2 | WT kg | SHEET 1 OF 1

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/07/96	G.DOUGLAS



LAP 3 POLE PIECES TO EQUAL LENGTH ± 0.001MM



MATERIAL: A1 ALUMINA ROD
NO REQD: 3
FINISH: NONE

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN G.DOUGLAS	DATE 10/07/96
CHECK	DATE
ENGINEERING	DATE
11900460	3474
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: (650)802-8292. Fax: (650)802-8298.

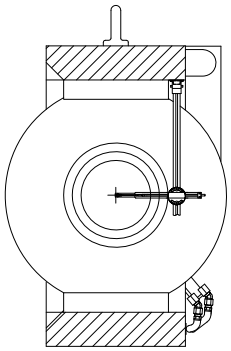
TITLE
POLE SPACERS
MODEL: 3474

SIZE	DRAWING NO.	REV
A3	17900690	A

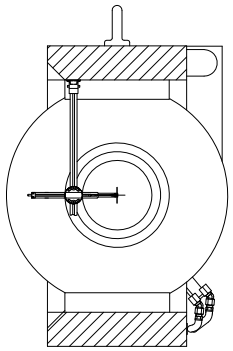
SCALE 1:1 | WT kg | SHEET 1 OF 1

REVISIONS

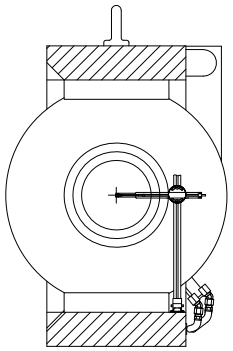
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		09/11/98	G.DOUGLAS
B	ADD 5451 TO SELECTION TABLE		10/07/03	G.DOUGLAS



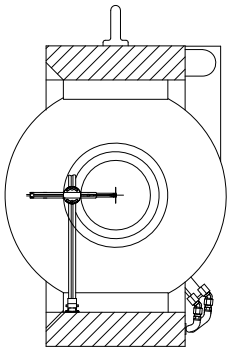
TOP/REAR INSTALLATION



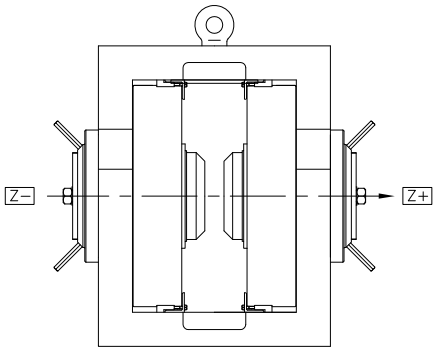
TOP/FRONT INSTALLATION



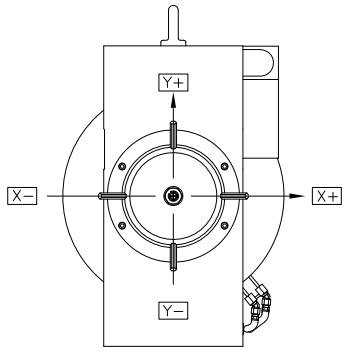
BOTTOM/REAR INSTALLATION



BOTTOM/FRONT INSTALLATION

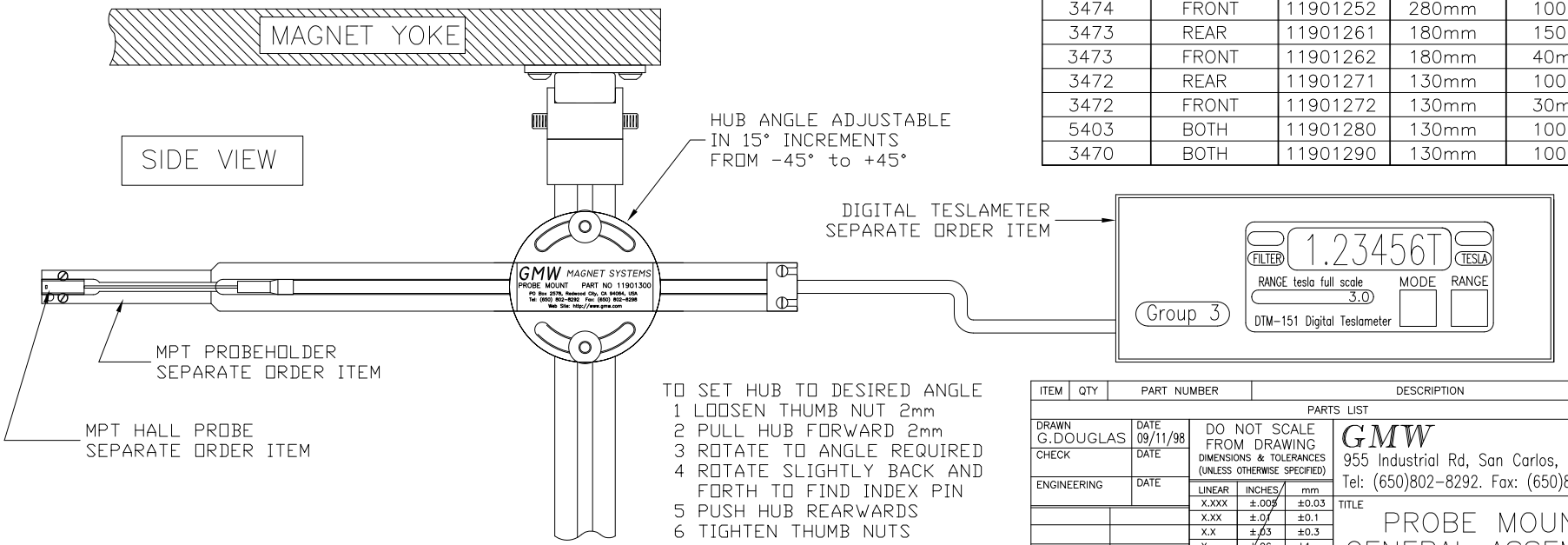


MAGNET FRONT VIEW



MAGNET SIDE VIEW

MAGNET MODEL	INSTALLATION POSITION	ASSEMBLY NUMBER	VERTICAL TRAVEL "Y"	HORIZONTAL TRAVEL "Z"
3474/5451	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 2000

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

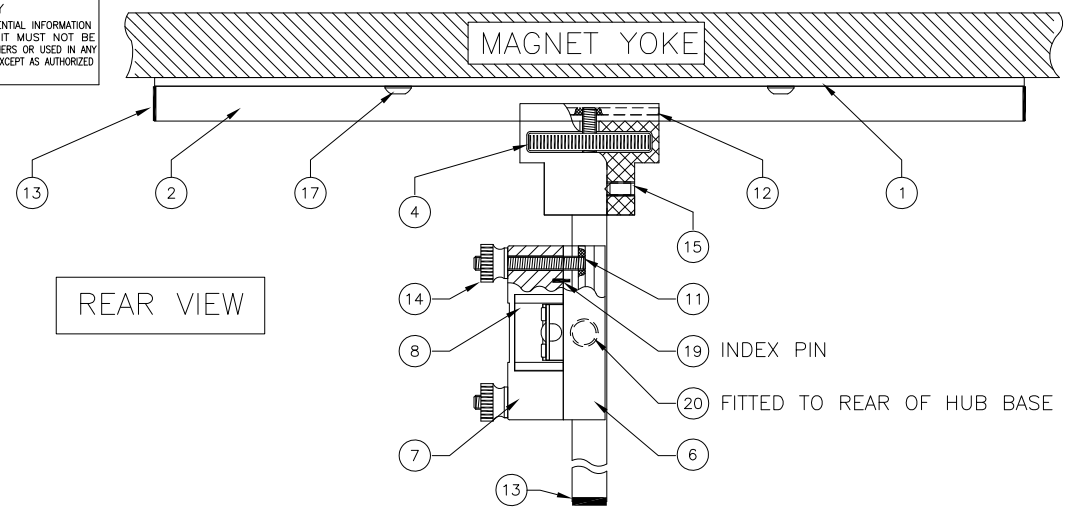
LINEAR	INCHES	mm
X.XXX	±.005	±0.03
X.XX	±.01	±0.1
X.X	±.03	±0.3
X	±.06	±1
DEG.	±.5	±0.5
FINISH	63	1.6

THIRD ANGLE PROJECTION

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

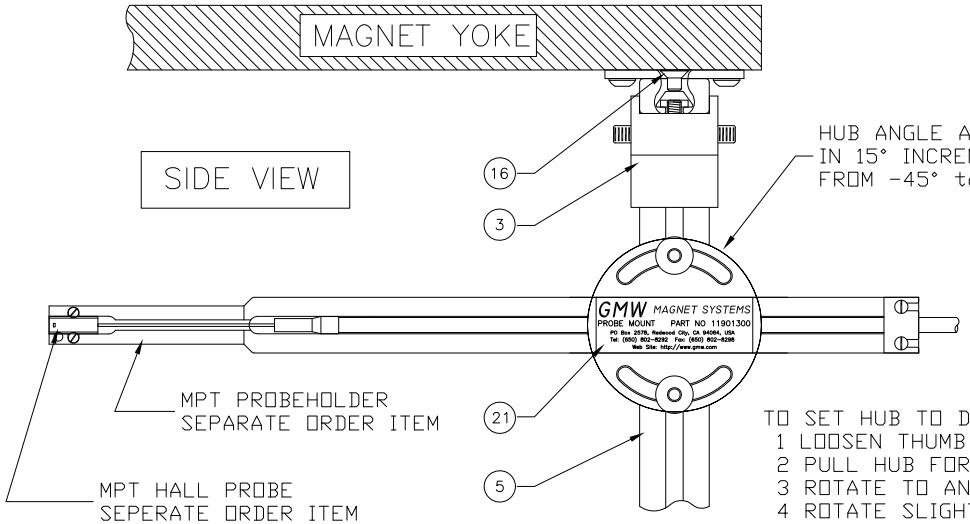
TITLE
PROBE MOUNT GENERAL ASSEMBLY

SIZE A2 | DRAWING NO. 11901300 | REV B
SCALE 1:1 | WT kg | SHEET 1 OF 1



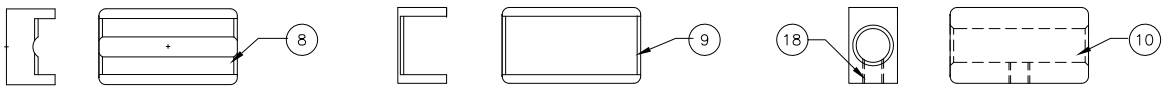
REAR VIEW

NOTE: THIS DRAWING SHOWS REAR INSTALLATION OF PROBE MOUNT
FOR FRONT INSTALLATION OF PROBE MOUNT SEE DRAWING NO 11901252



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



REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		08/26/98	G.DOUGLAS
B	UPDATE ITEM 8, P/N 17901970 TO REV. B		27 Jan, 09	M. Duffy

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
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	17901946	VERTICAL MOUNTING EXTRUSION [350mm long]	
4	1	17901930	BASE NUT	
3	1	17901920	BASE SUPPORT	
2	1	17901910	BASE MOUNTING EXTRUSION [250mm long]	
1	1	17901900	BASE MOUNTING PLATE [250mm long]	

PARTS LIST

DRAWN G.DOUGLAS DATE 08/17/98
CHECK DATE
ENGINEERING DATE
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 2000

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

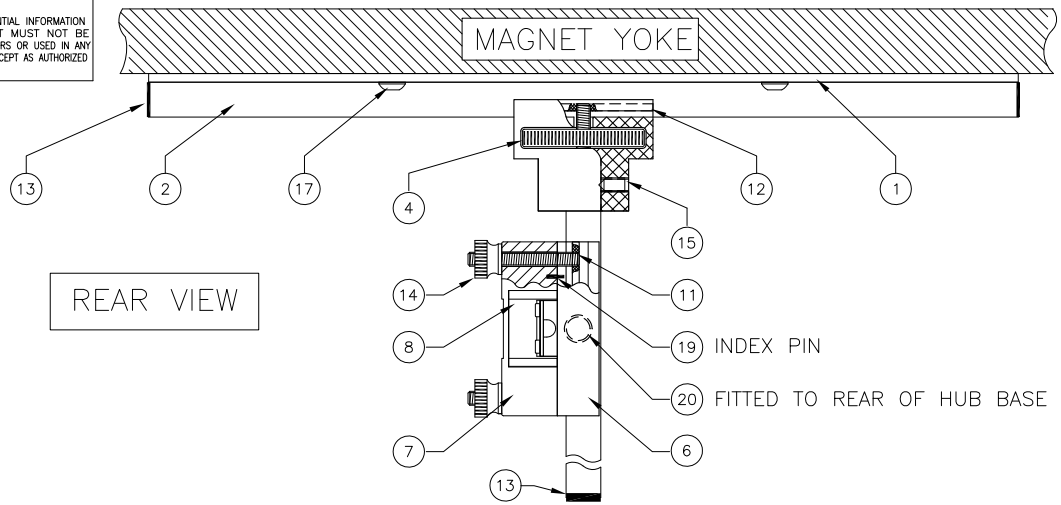
THIRD ANGLE PROJECTION

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

TITLE
PROBE MOUNT
MODEL: 3474

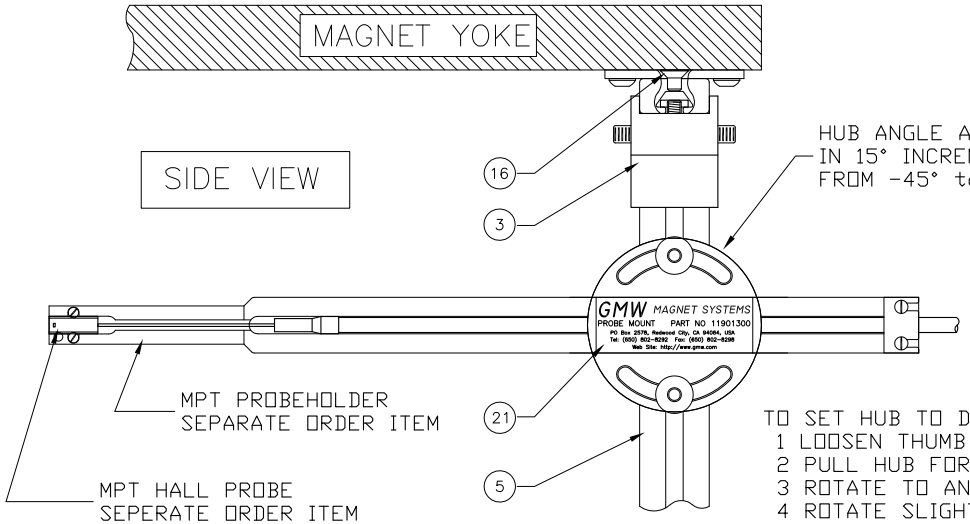
SIZE A2 | DRAWING NO. 11901251 | REV B

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



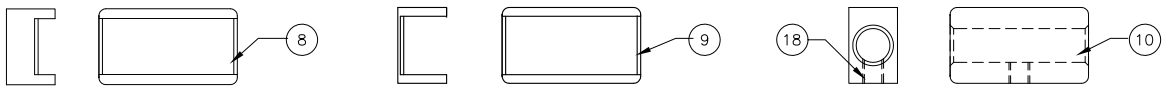
REAR VIEW

NOTE: THIS DRAWING SHOWS FRONT INSTALLATION OF PROBE MOUNT
FOR REAR INSTALLATION OF PROBE MOUNT SEE DRAWING NO 11901251



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



REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		08/26/98	G.DOUGLAS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
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	17901946	VERTICAL MOUNTING EXTRUSION [350mm long]	
4	1	17901930	BASE NUT	
3	1	17901920	BASE SUPPORT [150mm long]	
2	1	17901890	BASE MOUNTING EXTRUSION [150mm long]	
1	1	17901880	BASE MOUNTING PLATE	

PARTS LIST

DRAWN G.DOUGLAS	DATE 08/17/98	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	GMW 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802-8292. Fax: (650)802-8298.
CHECK	DATE		
ENGINEERING	DATE		TITLE: PROBE MOUNT MODEL: 3474/5451
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	SIZE A2 · DRAWING NO. 11901252 · REV A
SOFTWARE AUTOCAD 2000			SCALE 1:1 · WT kg · SHEET 1 OF 1

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

Section 7

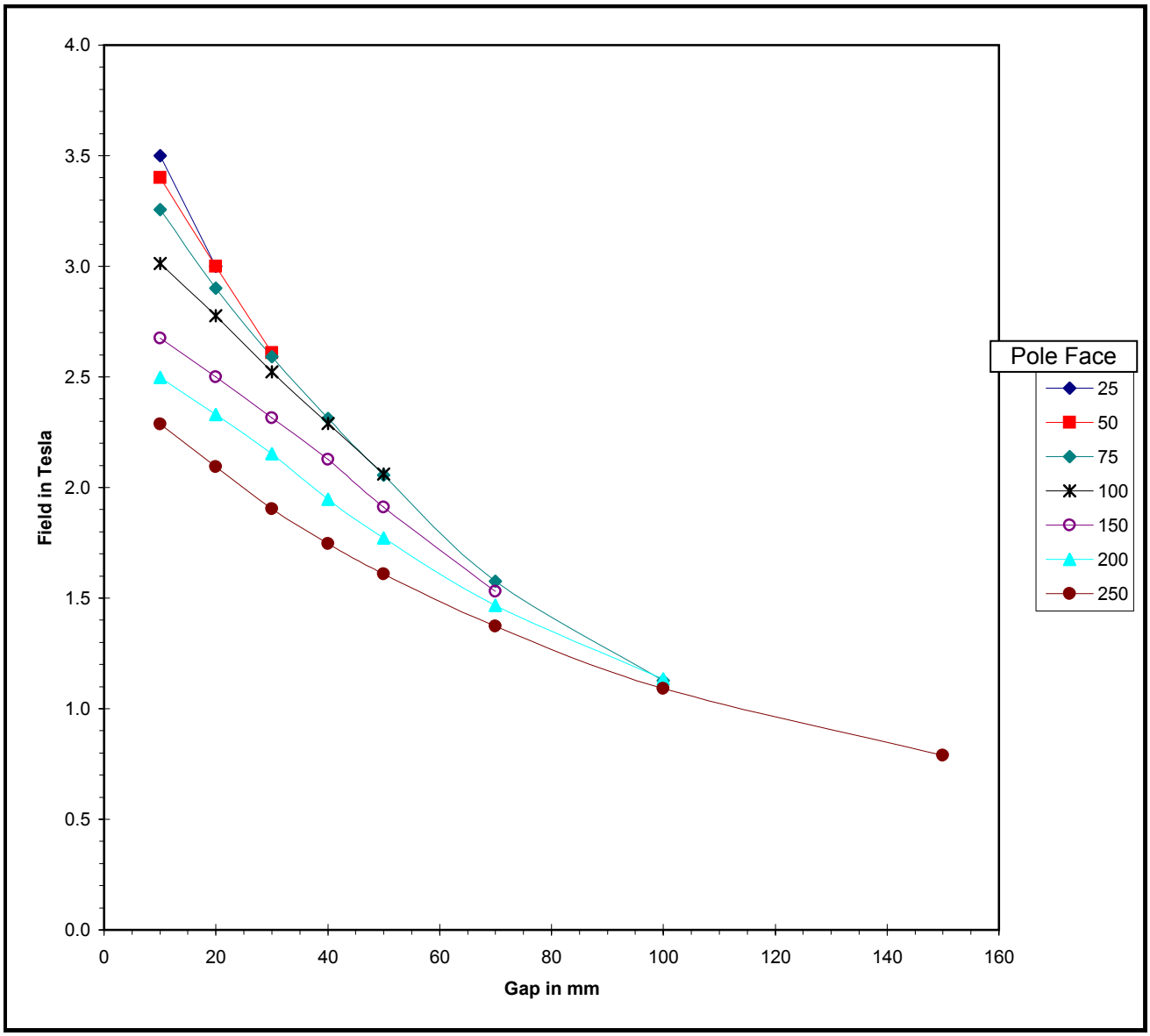
CUSTOM OPTIONS

Section 8

EXCITATION CURVES

GMW Associates
Electromagnet Excitation Plot
Field Vs Gap

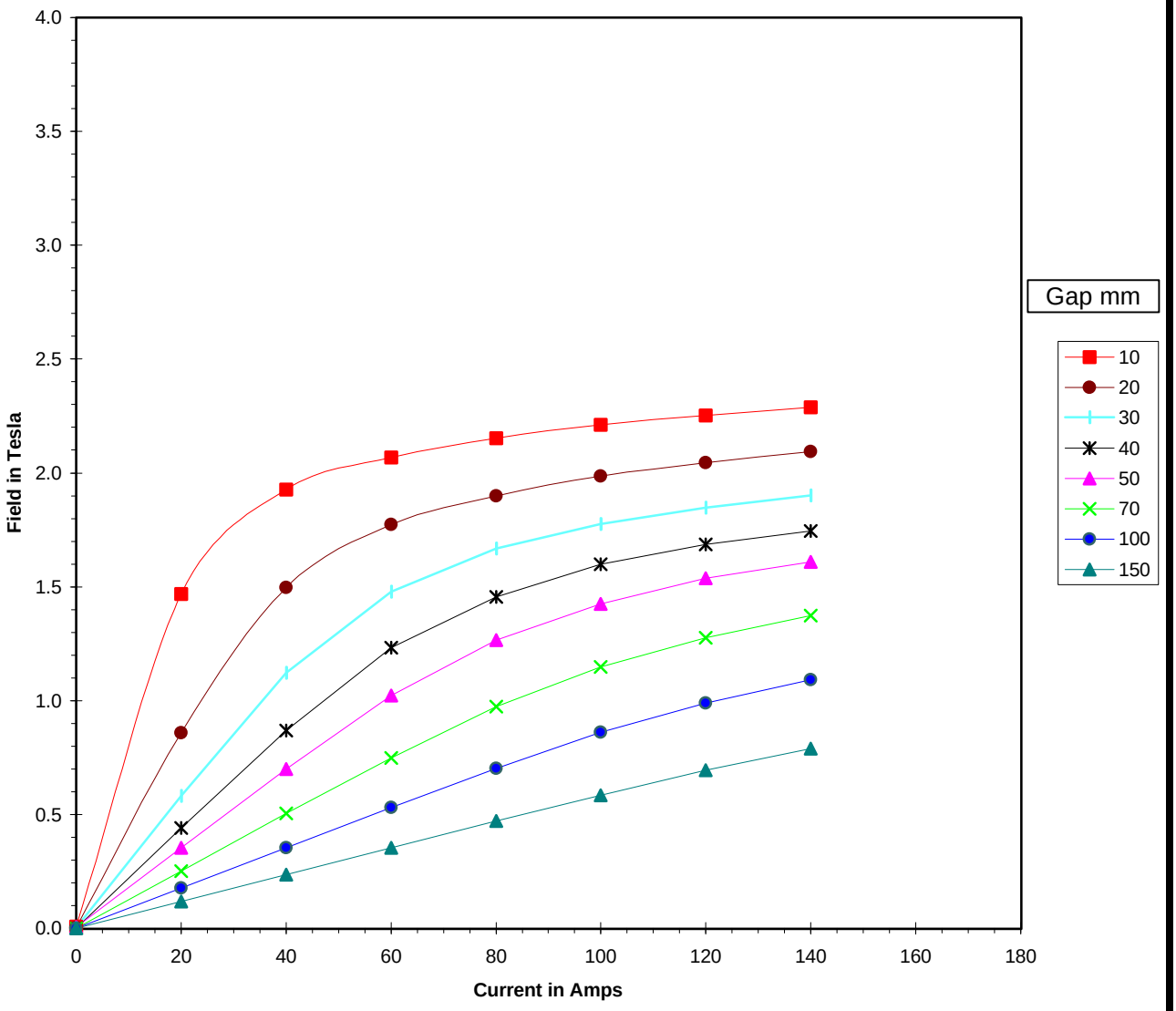
Contract No:		Page: 1 of 1		Date:	Feb 04,2003
Customer:				Engr:	Y. Qin
Model:	3474	Power Supply:		Set Current:	140 Amps
Serial No:		Serial No:		Target Field:	
Pole Face:	As per table below	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 3474 Gap-Field

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

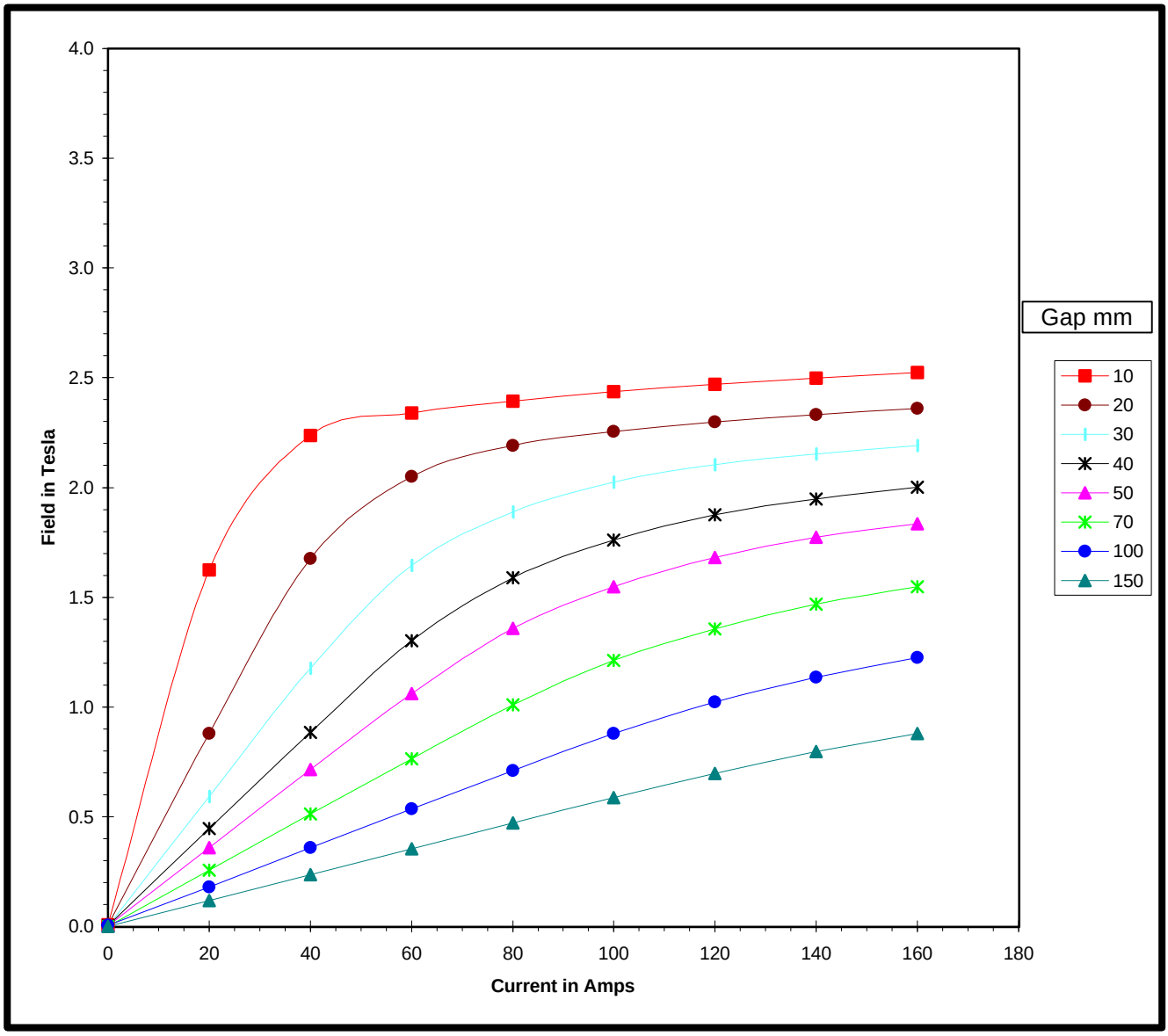
Contract No:		Page: 1 of 7		Date:	April, 93
Customer:				Engr:	G.Douglas
Model:	3474	Power Supply:		Set Current:	
Serial No:	07	Serial No:		Target Field:	
Pole Face:	250 mm	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 3474 Ex 250-10-150.xls

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

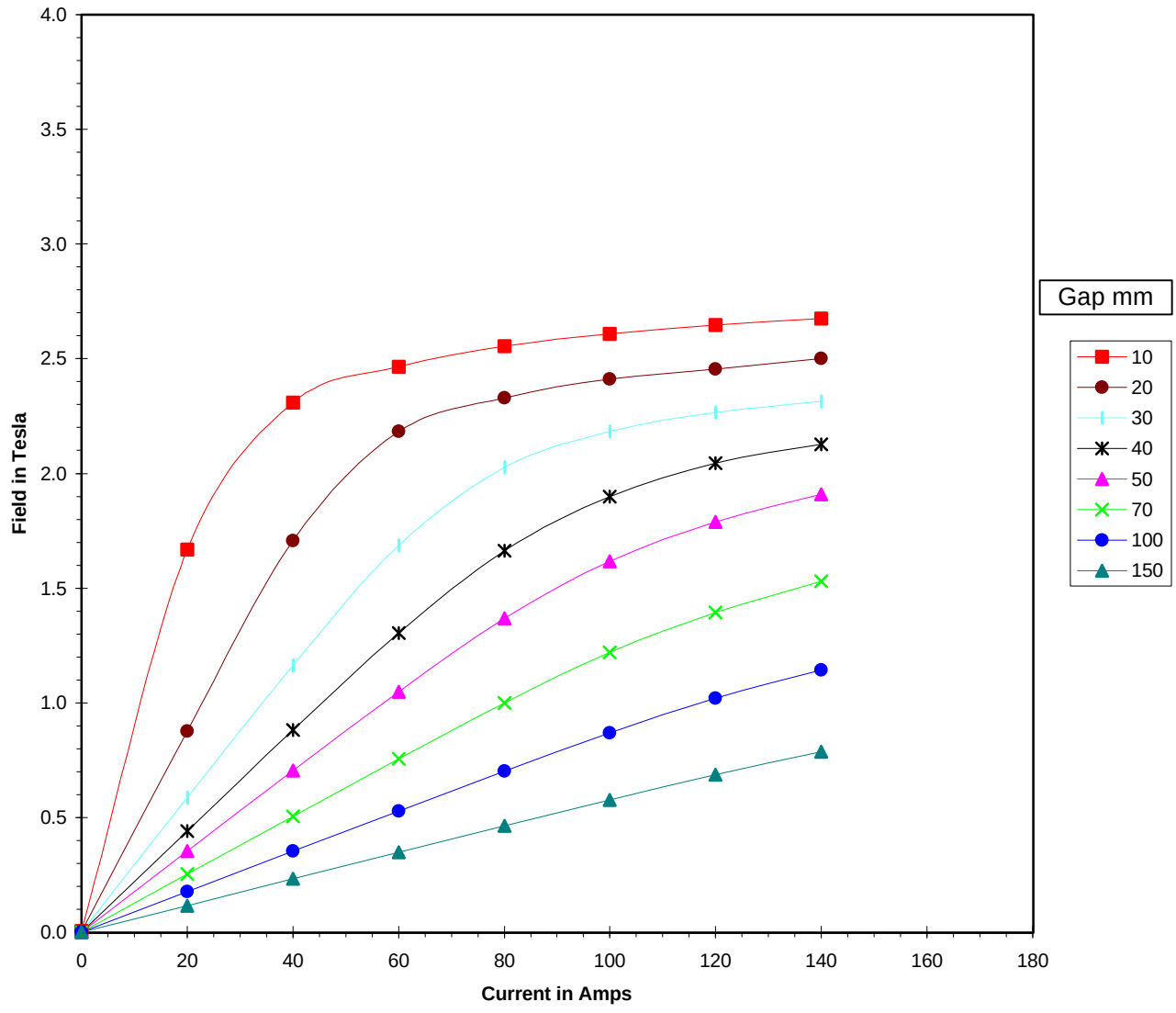
Contract No:		Page: 2 of 7		Date:	Feb 12, 97
Customer:				Engr:	E.Schulze
Model:	3474	Power Supply:		Set Current:	
Serial No:	09	Serial No:		Target Field:	
Pole Face:	200 mm	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 3474 Ex 200-10-150.xls

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

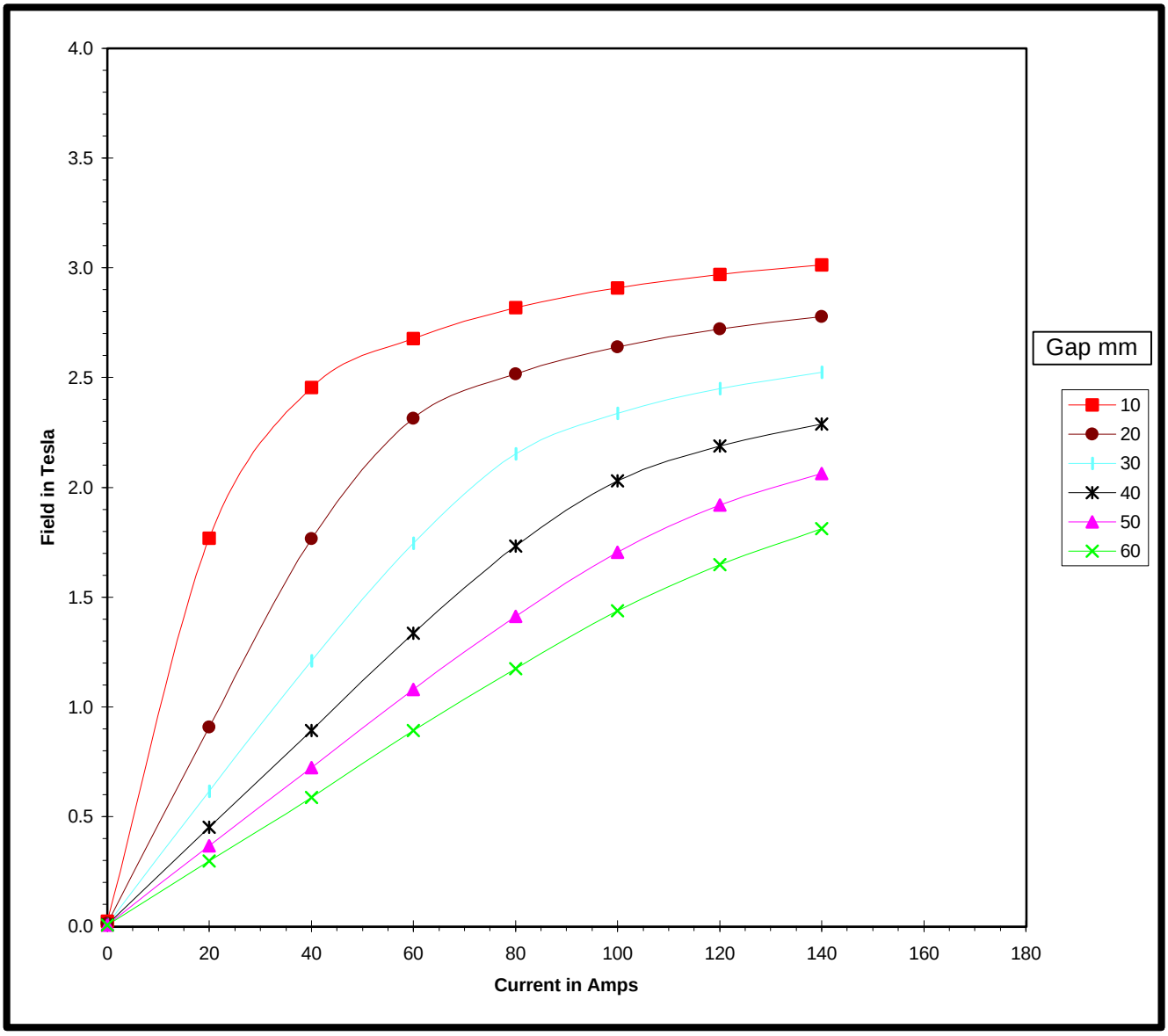
Contract No:		Page: 3 of 7		Date:	April, 93
Customer:				Engr:	G.Douglas
Model:	3474	Power Supply:		Set Current:	
Serial No:	07	Serial No:		Target Field:	
Pole Face:	150 mm	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 3474 Ex 150-10-150.xls

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

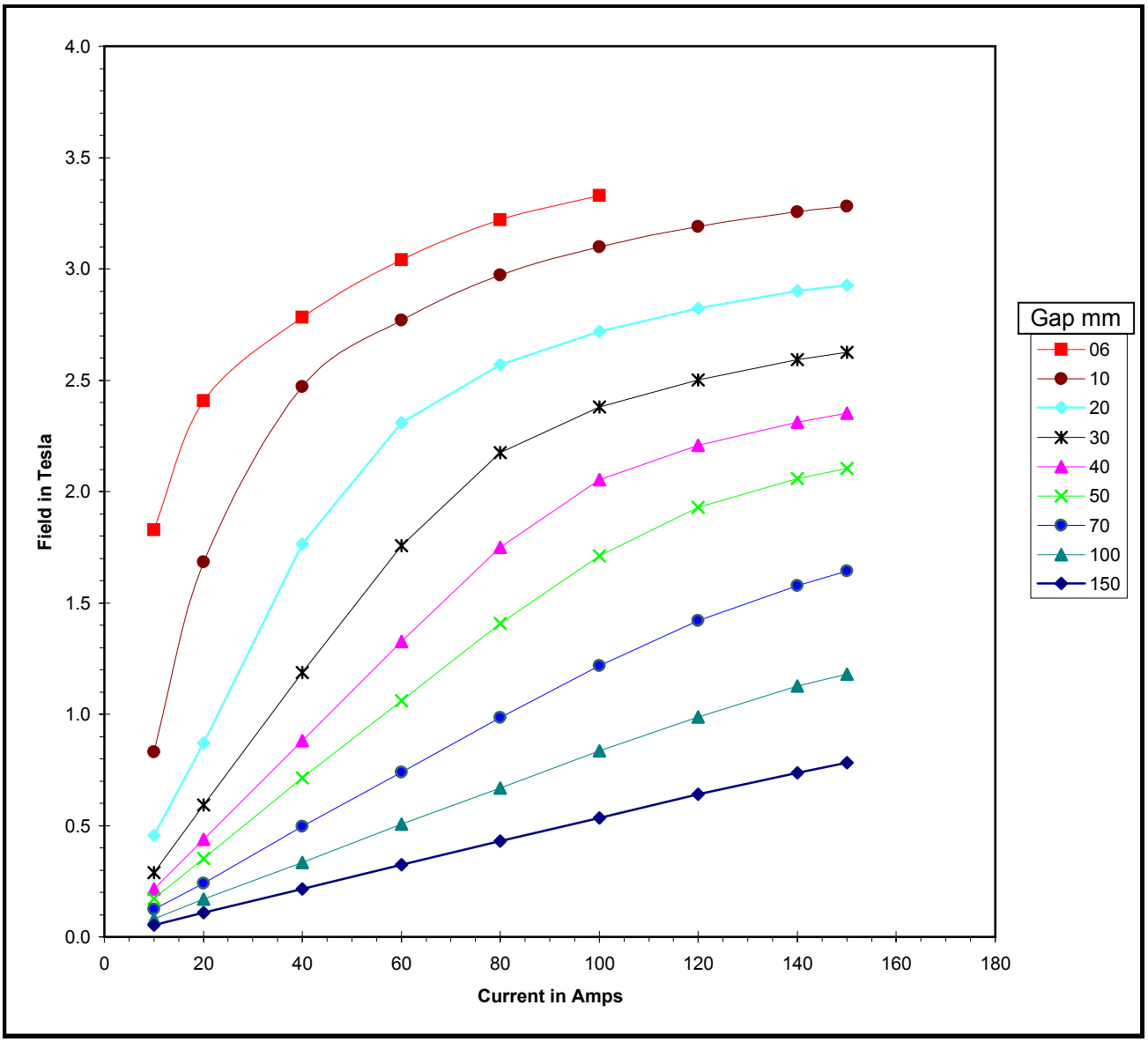
Contract No:		Page: 4 of 7		Date:	March 03, 86
Customer:				Engr:	R.Gummer
Model:	3474	Power Supply:		Set Current:	
Serial No:	01	Serial No:		Target Field:	
Pole Face:	100 mm	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 3474 Ex 100-10-150.xls

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

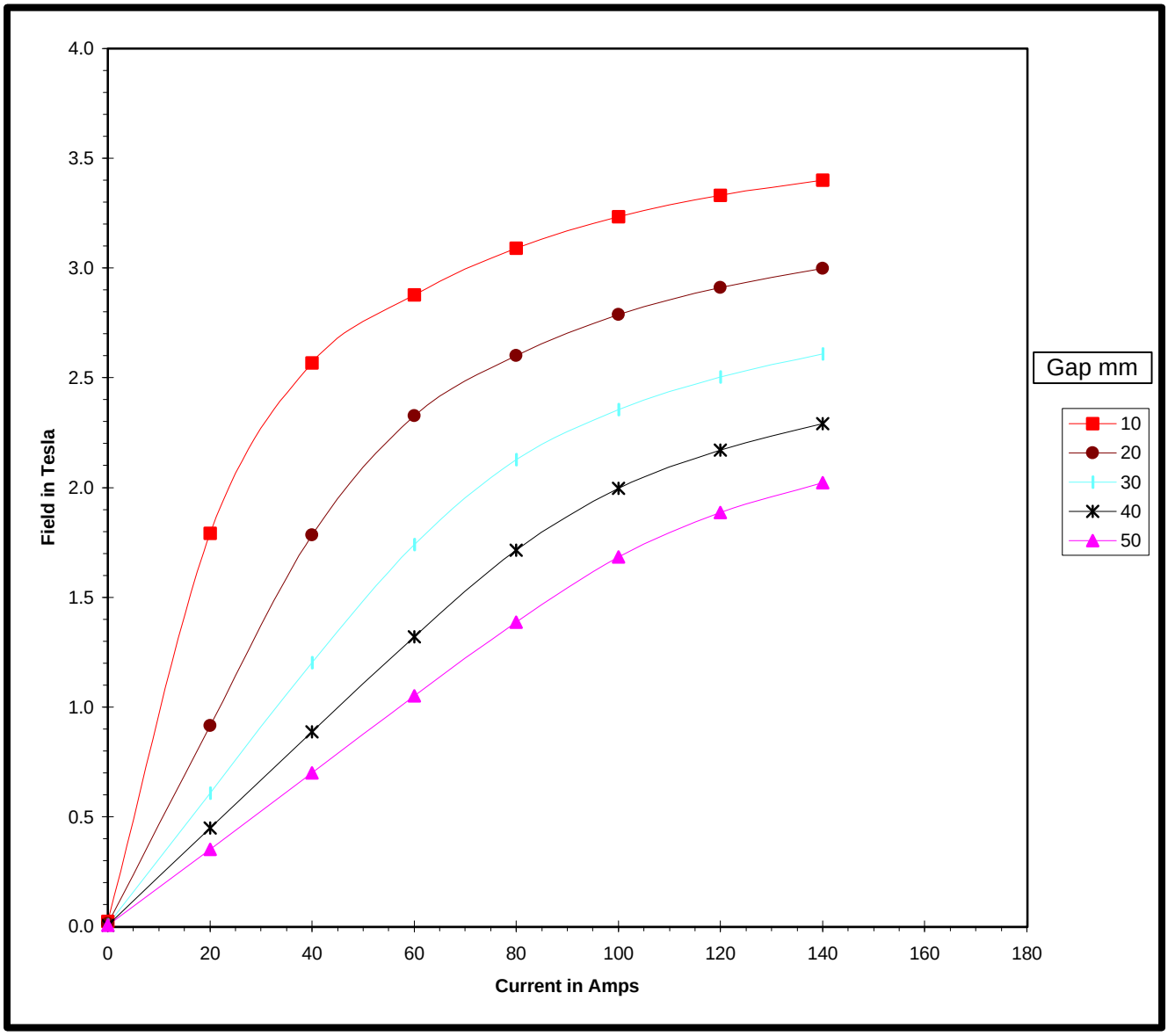
Contract No:		Page: 5 of 7		Date:	Feb 4, 03
Customer:				Engr:	Y.Qin
Model:	3474	Power Supply:		Set Current:	
Serial No:	48	Serial No:		Target Field:	
Pole Face:	75 mm	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 3474 Ex 75-10-150

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

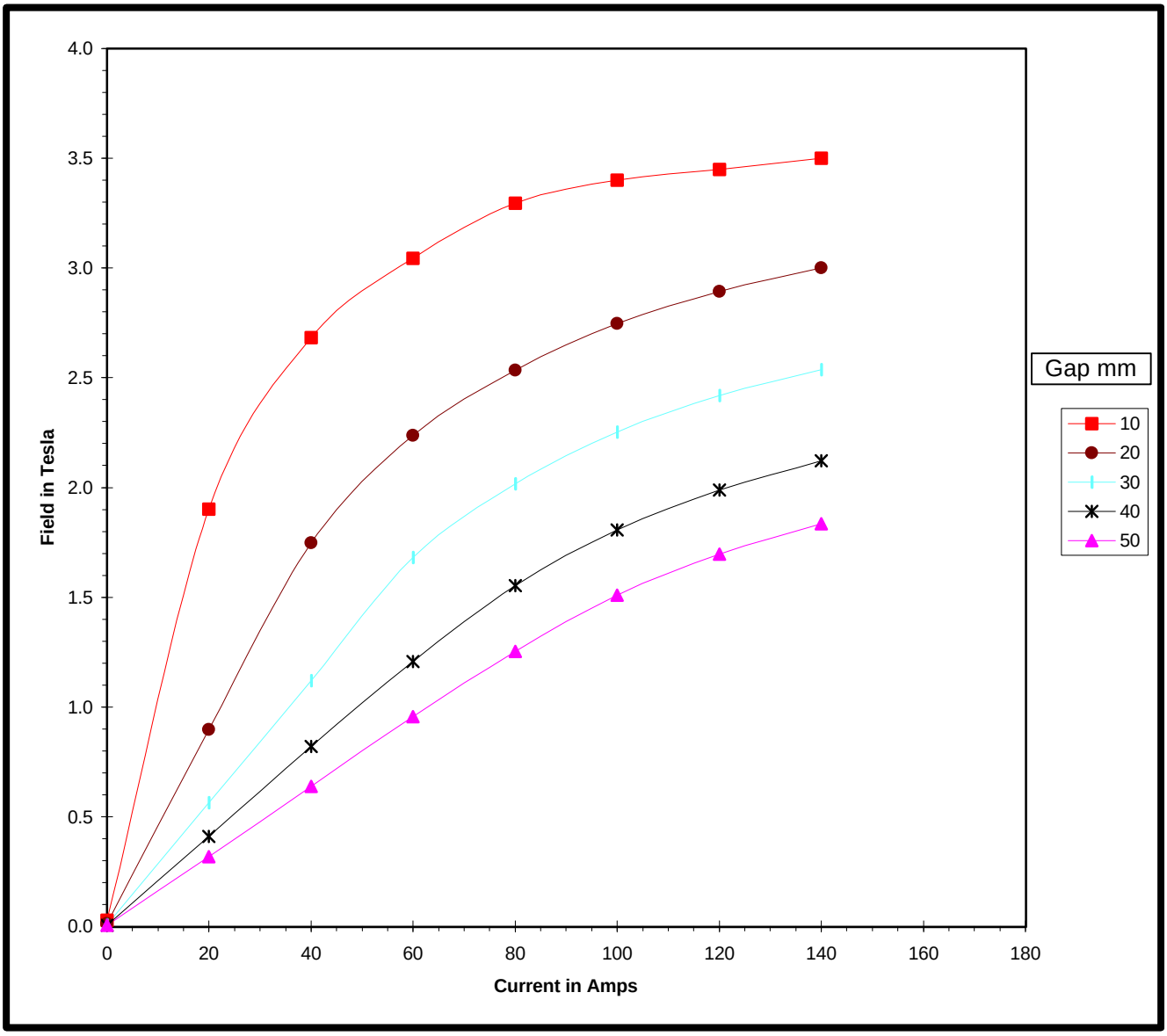
Contract No:		Page: 6 of 7		Date:	March 03, 86
Customer:				Engr:	R.Gummer
Model:	3474	Power Supply:		Set Current:	
Serial No:	01	Serial No:		Target Field:	
Pole Face:	50	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				



Filename: 3474 Ex 50-10-150.xls

GMW Associates
Electromagnet Excitation Plot
Field Vs Current

Contract No:		Page: 7 of 7		Date:	March 03, 86
Customer:				Engr:	R.Gummer
Model:	3474	Power Supply:		Set Current:	
Serial No:	01	Serial No:		Target Field:	
Pole Face:	25	Position:	X=0, Y=0, Z=0		
Serial No:	None	Notes:			
Pole Gap:	As per table below				
Pole Spacers:	None				

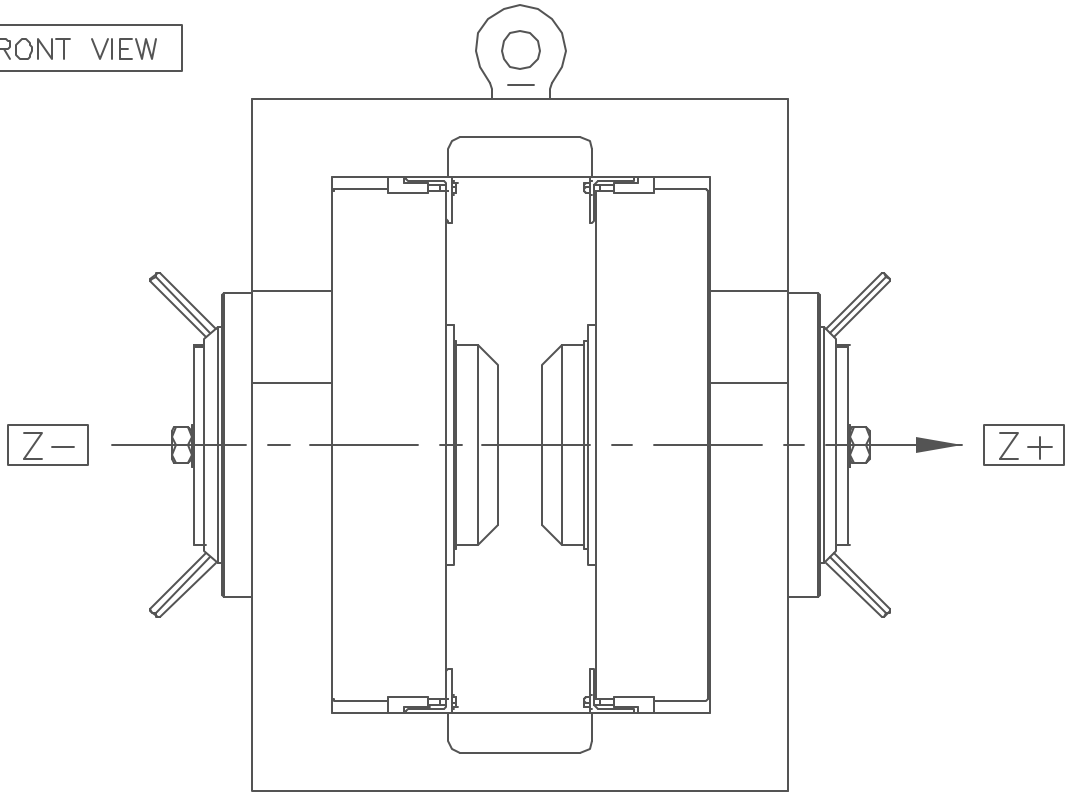


Filename: 3474 Ex 25-10-150.xls

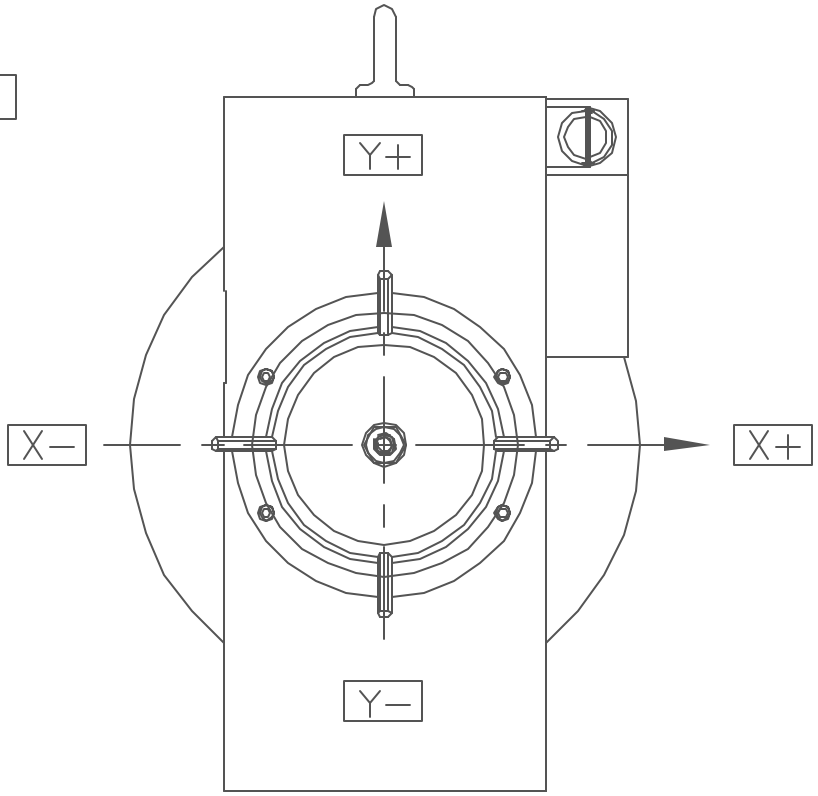
Section 9

TEST DATA

FRONT VIEW



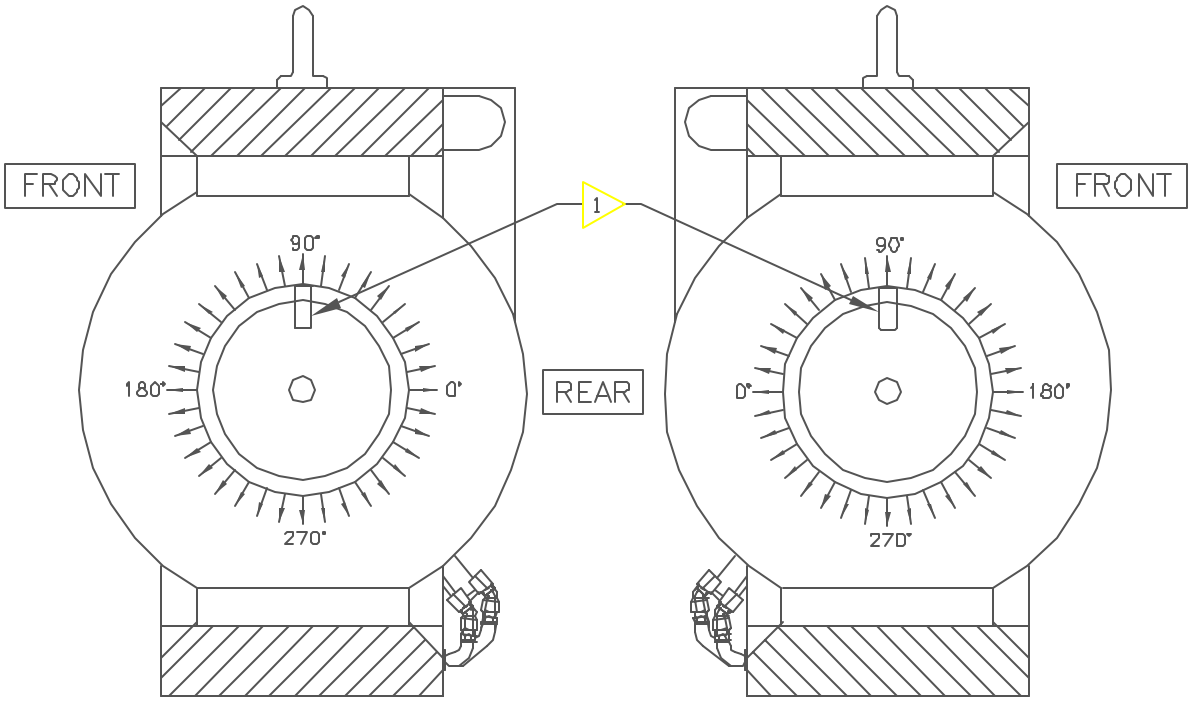
SIDE VIEW



MAGNETIC PLOTTING AXIS

80900010	A	SHEET 1 OF 1

1 SHIM SHOWN FITTED TO POLE AT 90 DEG POSITION



LH POLE: CAP REMOVED

RH POLE: CAP REMOVED

LH POLE SHIM DETAILS		
NUMBER	THICKNESS	POSITION
1	_____mm	_____deg
2	_____mm	_____deg
3	_____mm	_____deg
4	_____mm	_____deg

RH POLE SHIM DETAILS		
NUMBER	THICKNESS	POSITION
1	_____mm	_____deg
2	_____mm	_____deg
3	_____mm	_____deg
4	_____mm	_____deg

MAGNET MODEL: _____

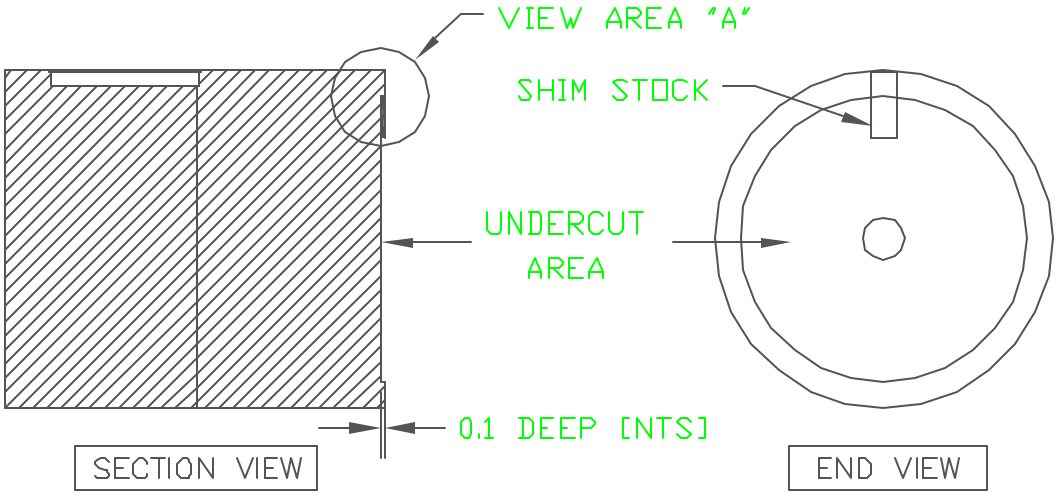
MAGNET SERIAL NO: _____

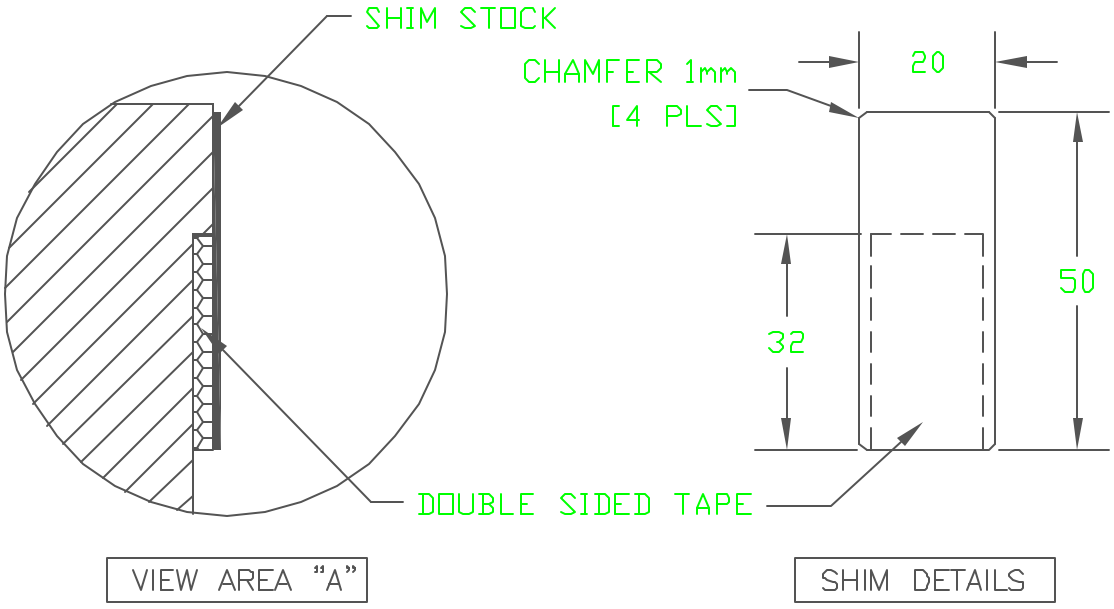
DATA LOGGED BY:_____

DATA LOGGED DATE:_____

MAGNET FINAL SHIMMING LOG

80900100 | C | SHEET 1 OF 1

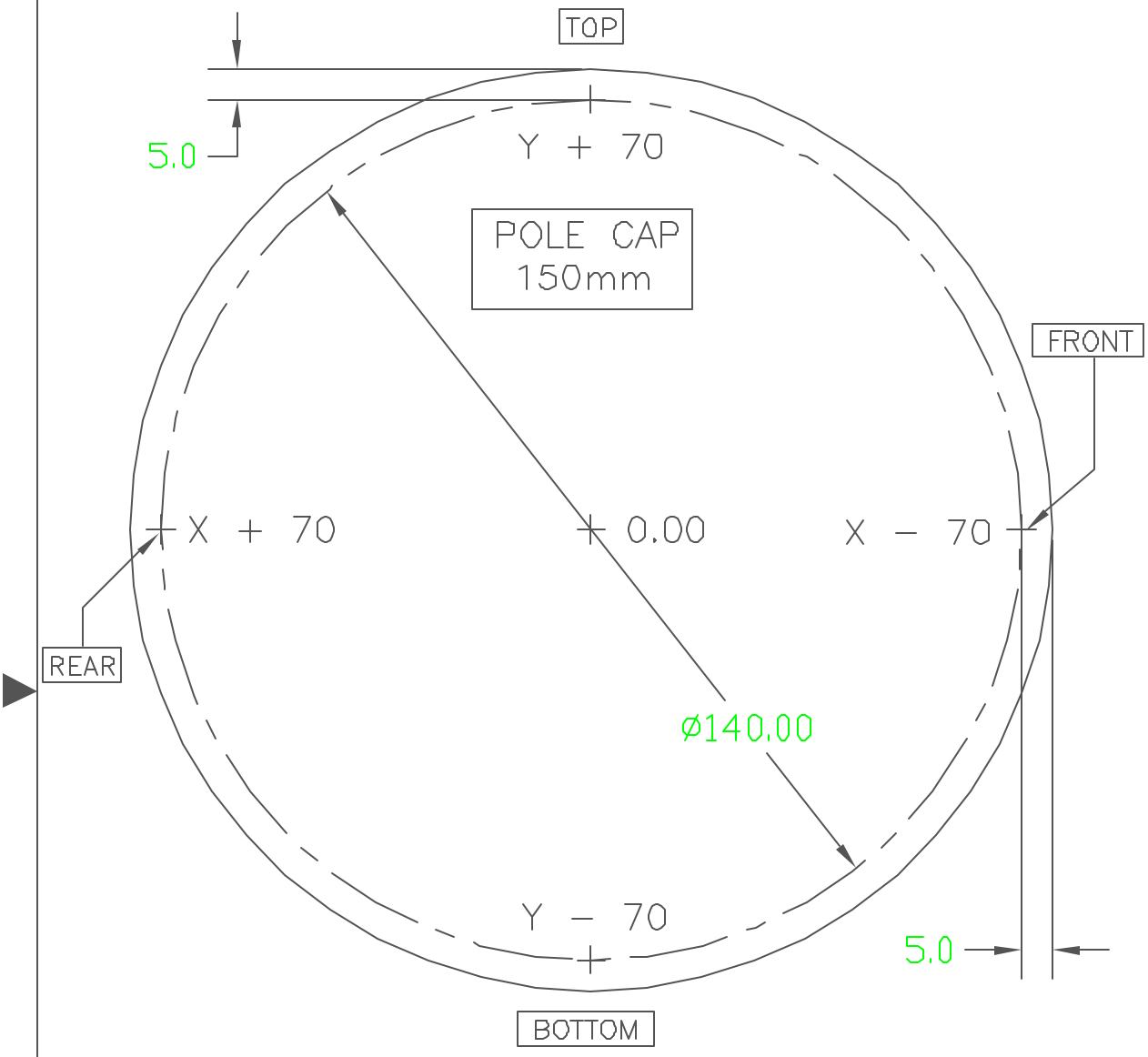




1. THROUGHLY CLEAN AND DEGREASE AREA WHERE SHIM IS TO BE FITTED.
2. CUT SHIM STOCK TO DIMENSIONS SHOWN.
3. APPLY DOUBLE SIDED TAPE 0.1mm THICK TO AREA SHOWN.
4. FIT SHIM TO POLE FACE, ENSURE TAPE IS KEPT WITHIN UNDERCUT AREA.
5. REASSEMBLE POLE CAPS ONTO MAGNET.
6. REMAP MAGNET, IF RESULTS WITHIN SPECIFICATION THEN GO TO ITEM 7. IF OUTSIDE SPECIFICATION ADJUST SHIMS, REMAP THEN GO TO ITEM 7.
7. FILL IN SHIMMING DETAILS ON SHEET NO 3474–0001.

FINAL SHIMMING METHOD		
80900110	A	SHEET 1 OF 1

TAKE MEASUREMENTS OF GAP TAPER AT POINTS MARKED WITH BORE GAUGE. RECORD RESULTS BELOW



MAGNET GAP TAPER LOG			
X + 70		Y + 70	
X − 70		Y − 70	
X DIFF		Y DIFF	

MAGNET MODEL: _____

MAGNET SERIAL NO: _____

DATA LOGGED BY: _____

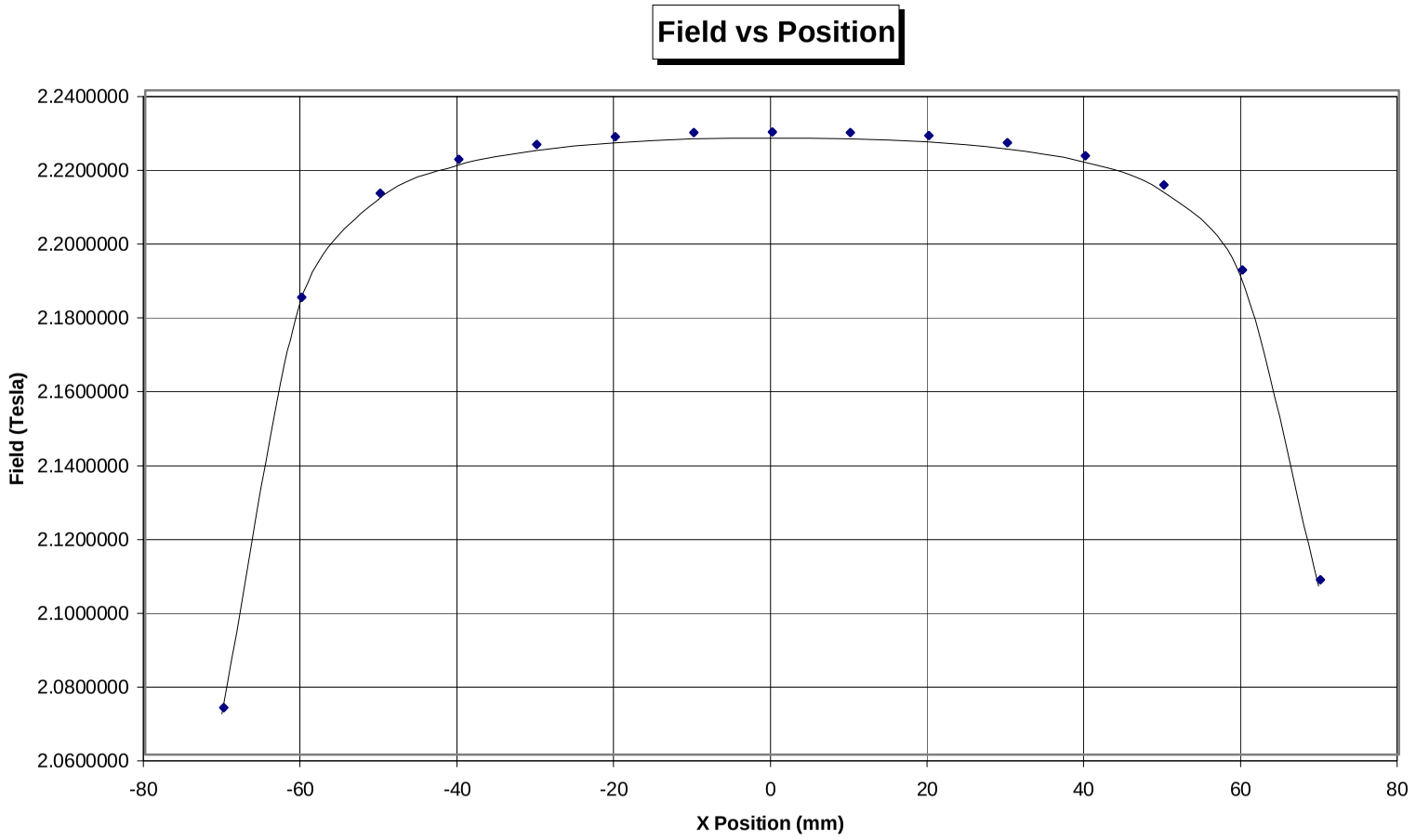
DATA LOGGED DATE: _____

MAGNET GAP TAPER TEST

80900120 | A | SHEET 1 OF 1

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

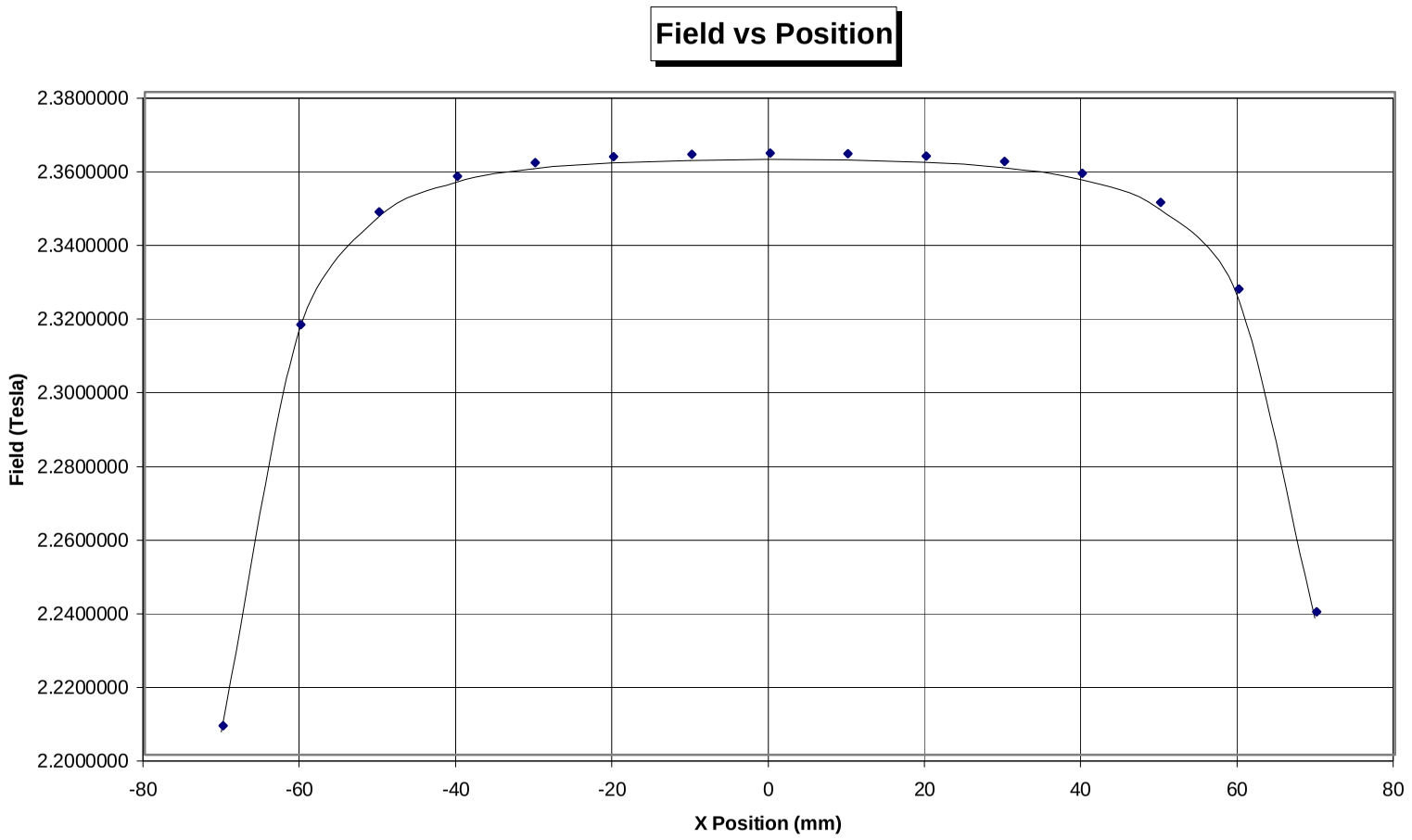
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 30 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100 Amp.	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 2.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

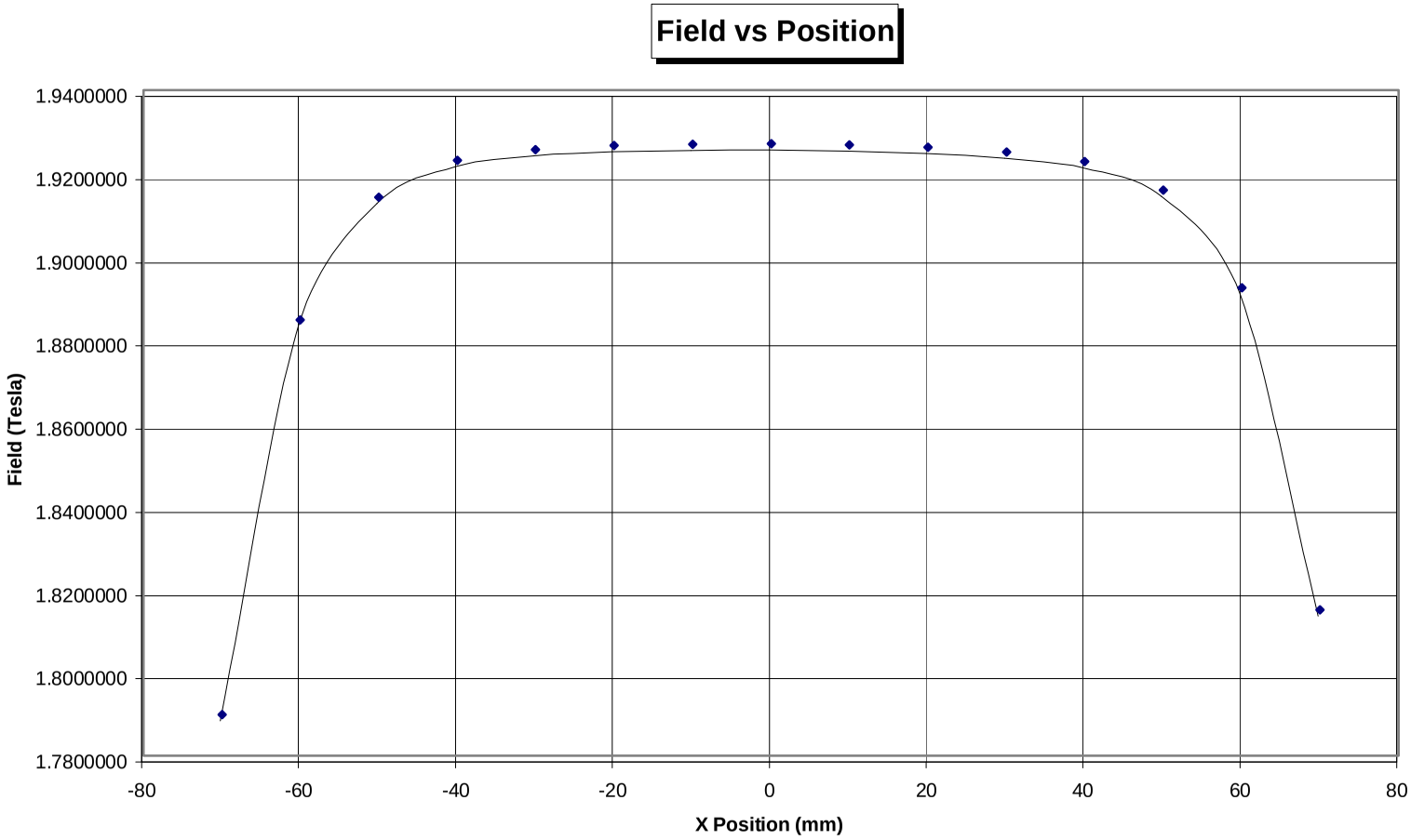
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 30 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140 Amp	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 2.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

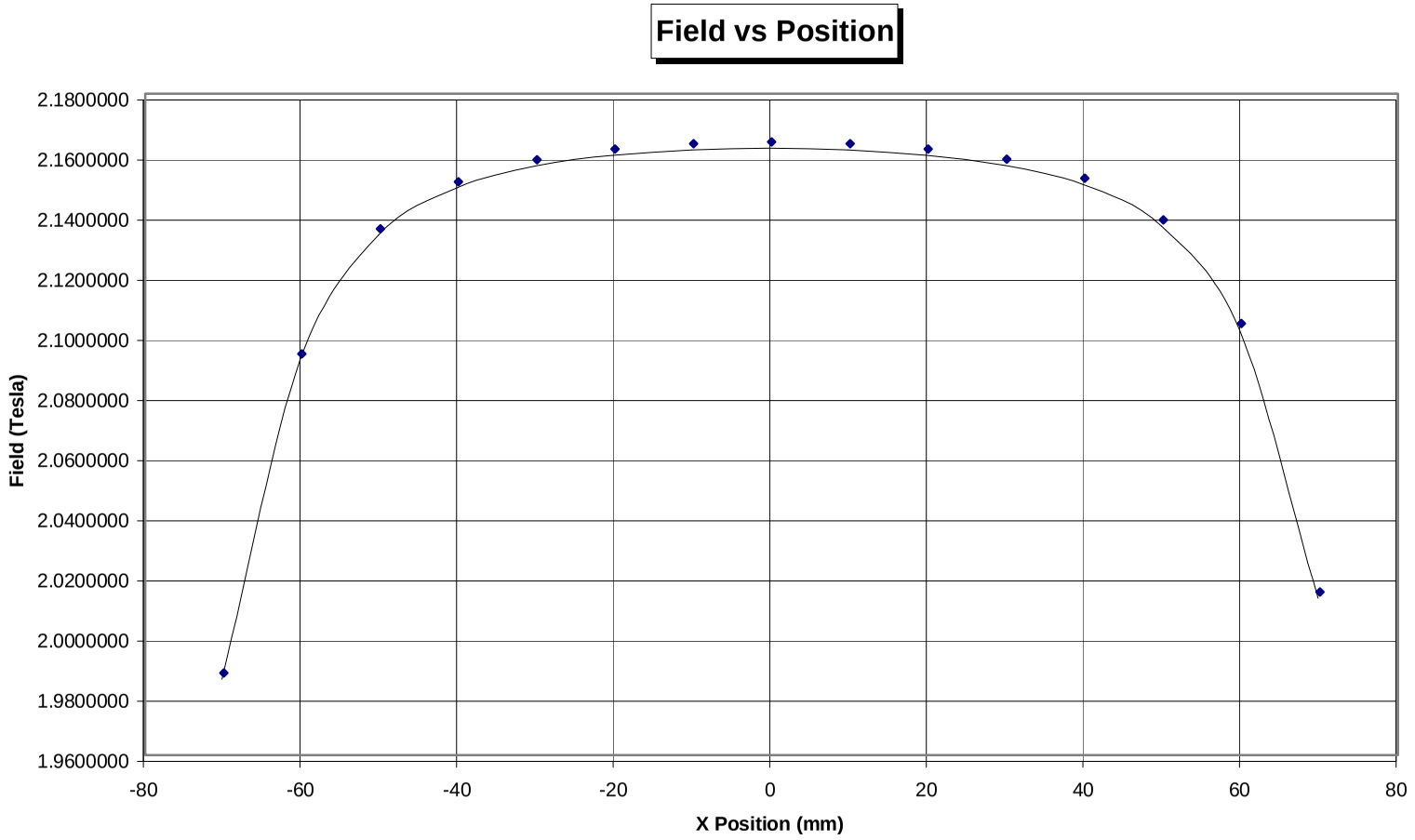
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 40 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100 Amp.	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 3.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

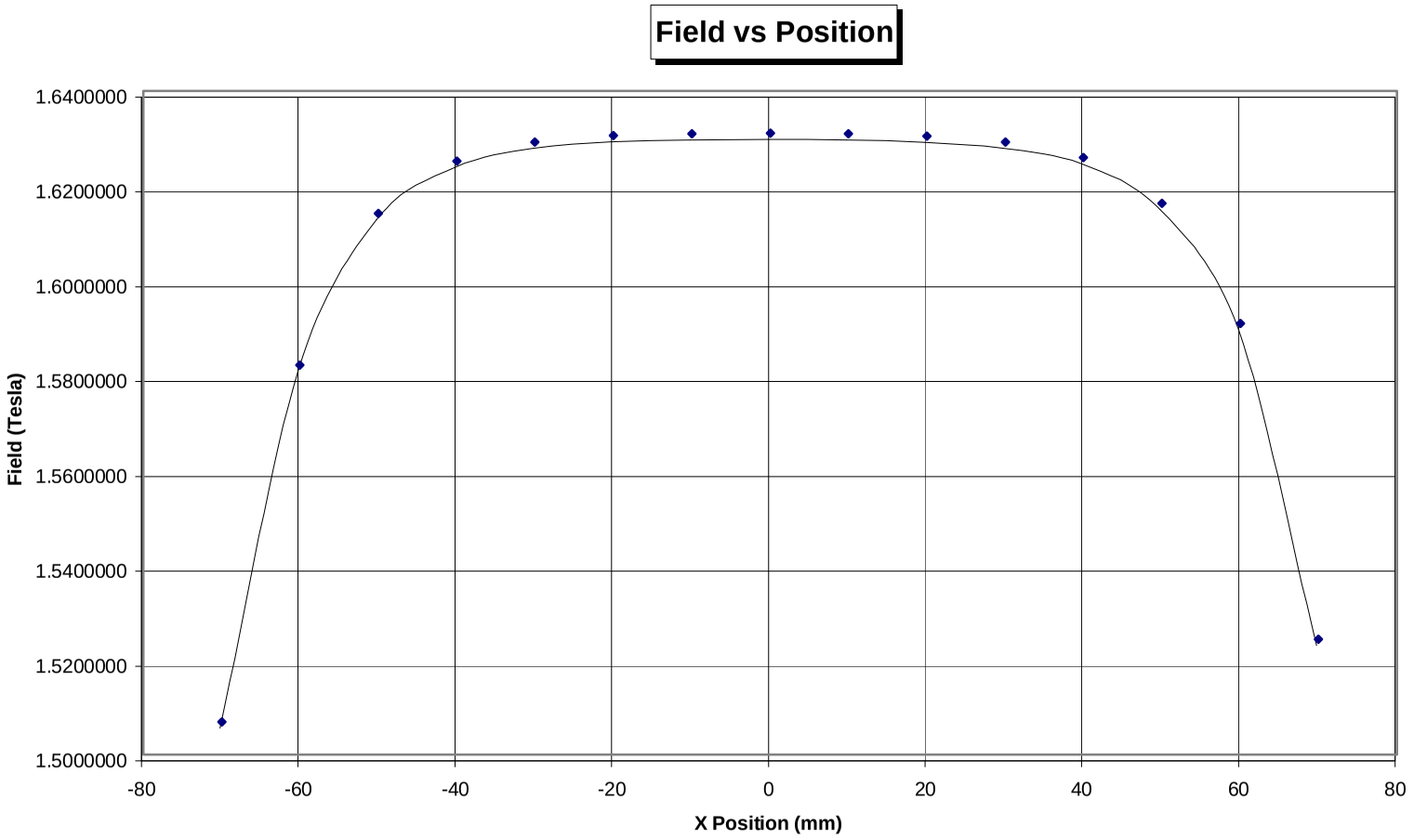
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 40 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140 Amp	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 3.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

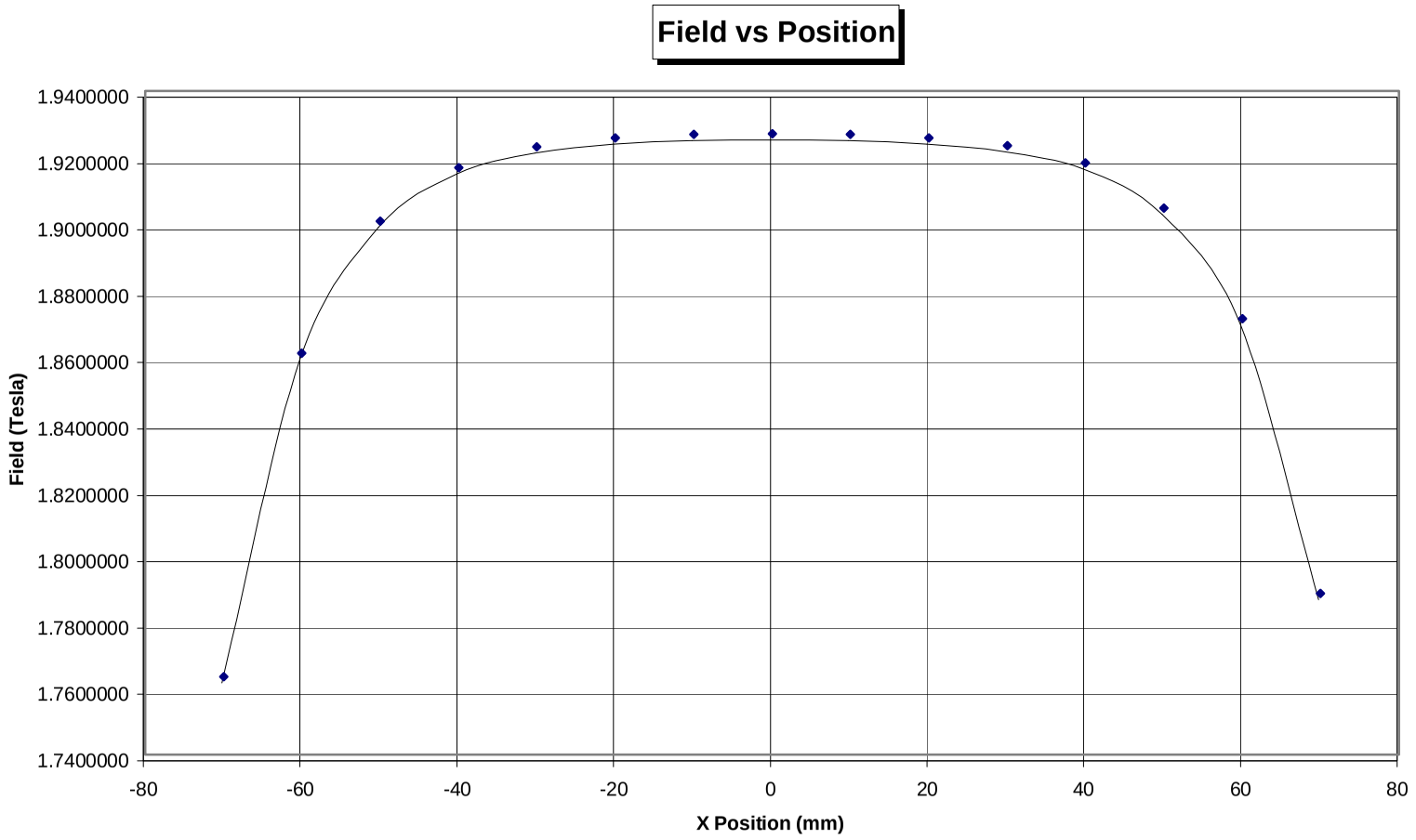
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 50 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100 Amp.	Fixed Axiz: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 4.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

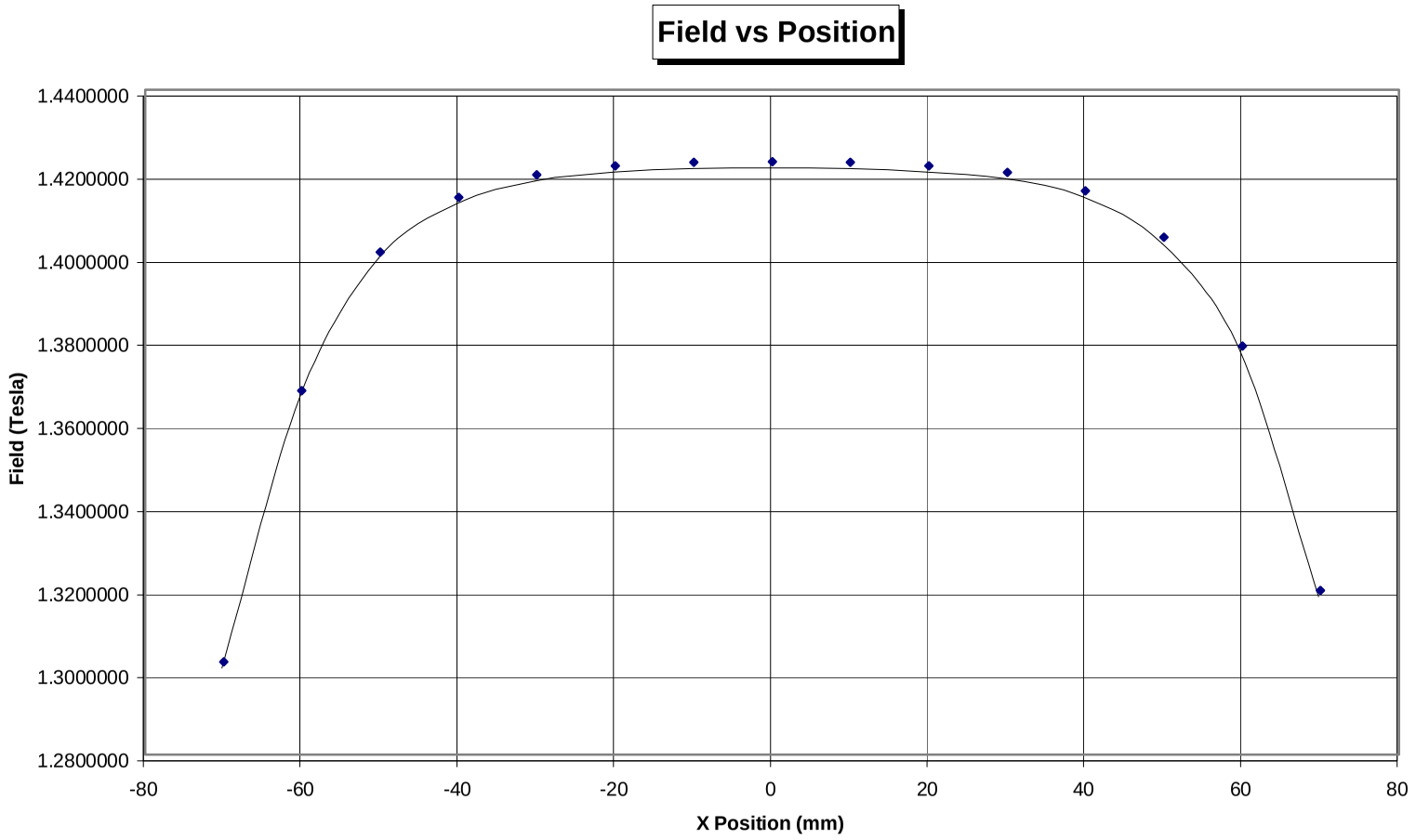
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 50 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140 Amp	Fixed Axiz: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 4.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

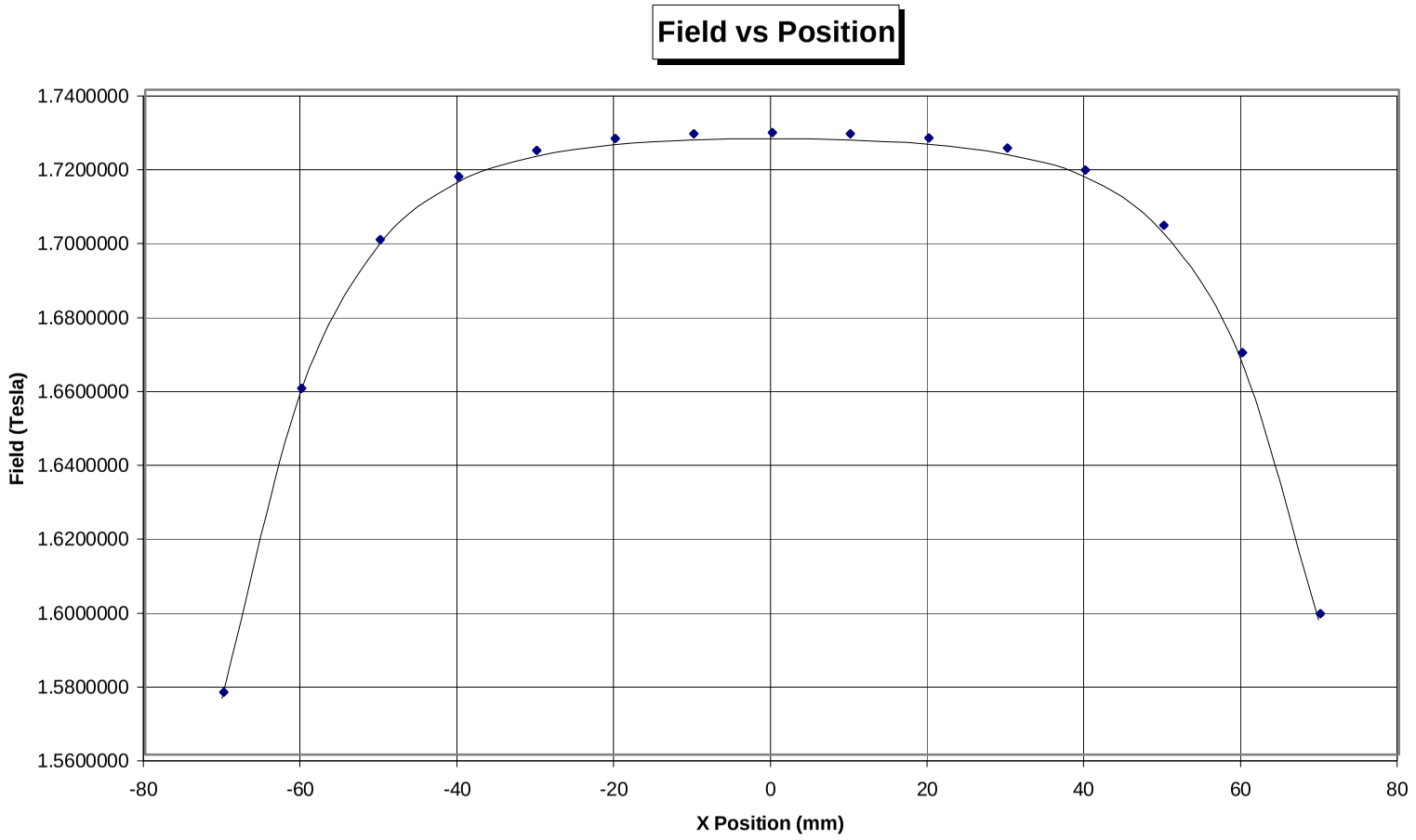
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 60 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100 Amp.	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 5.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

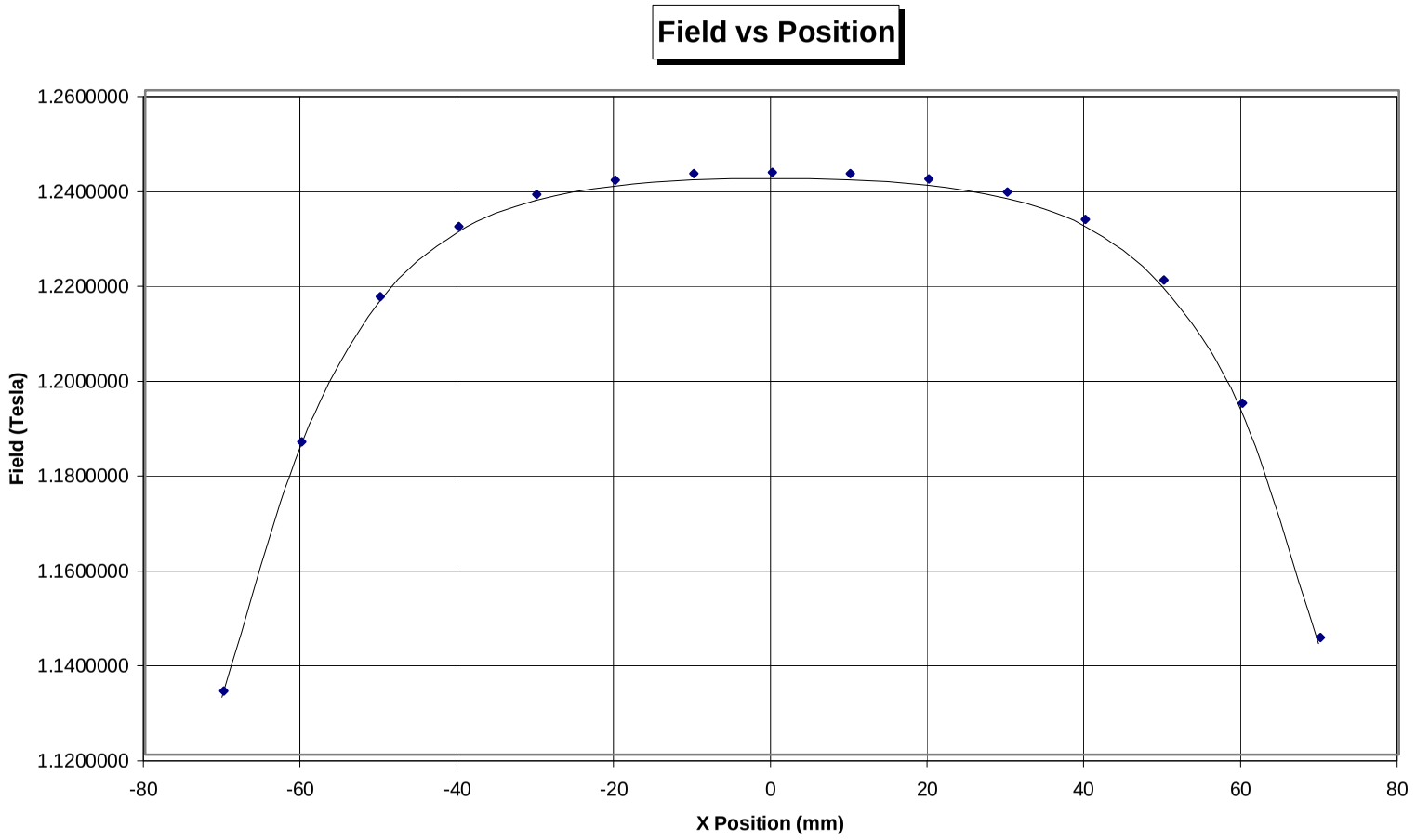
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 60 mm		Date: 29 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140 Amp	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 5.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

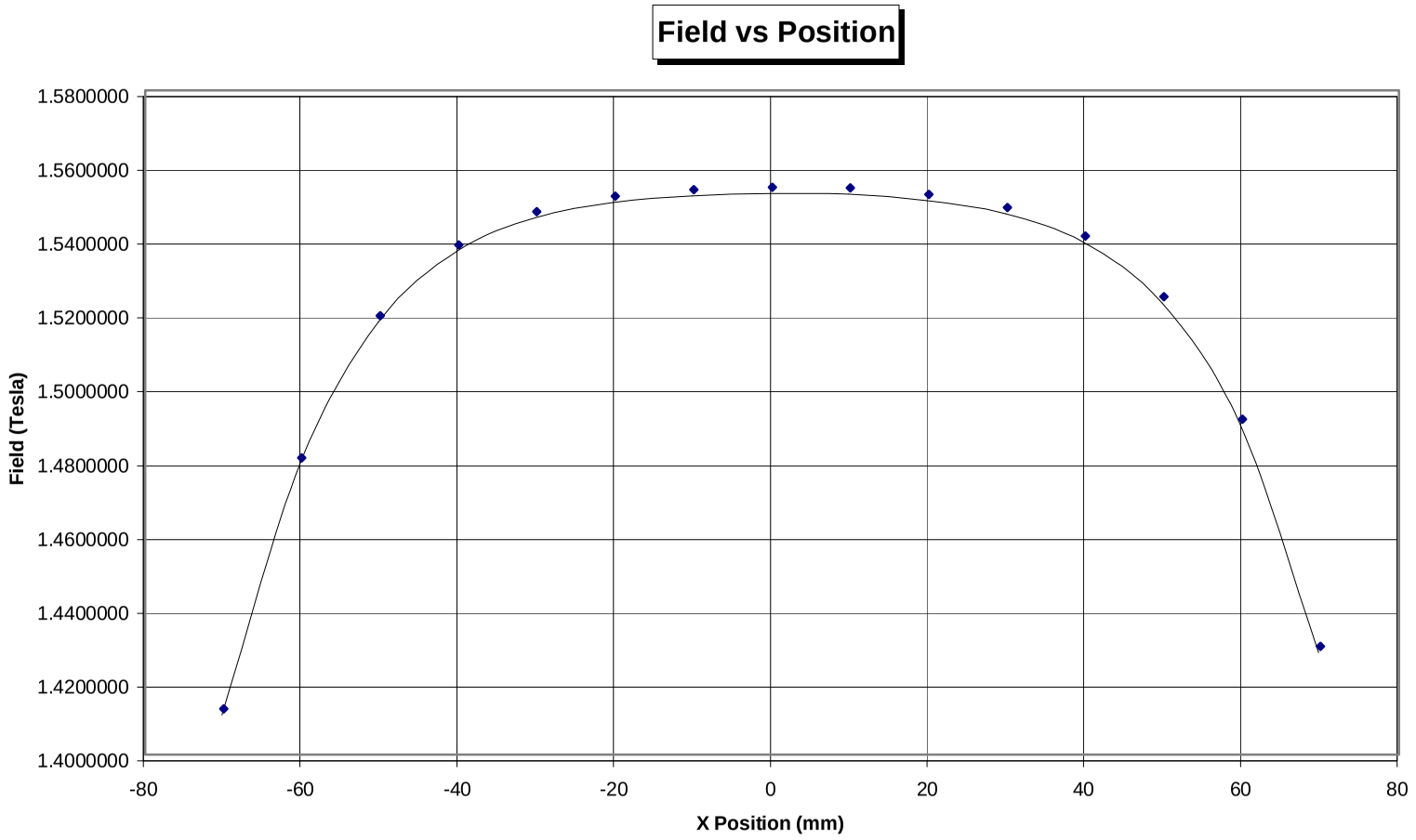
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: Mike Duffy
Serial No	09	Pole Gap: 70 mm		Date: 28 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100A	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 6.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

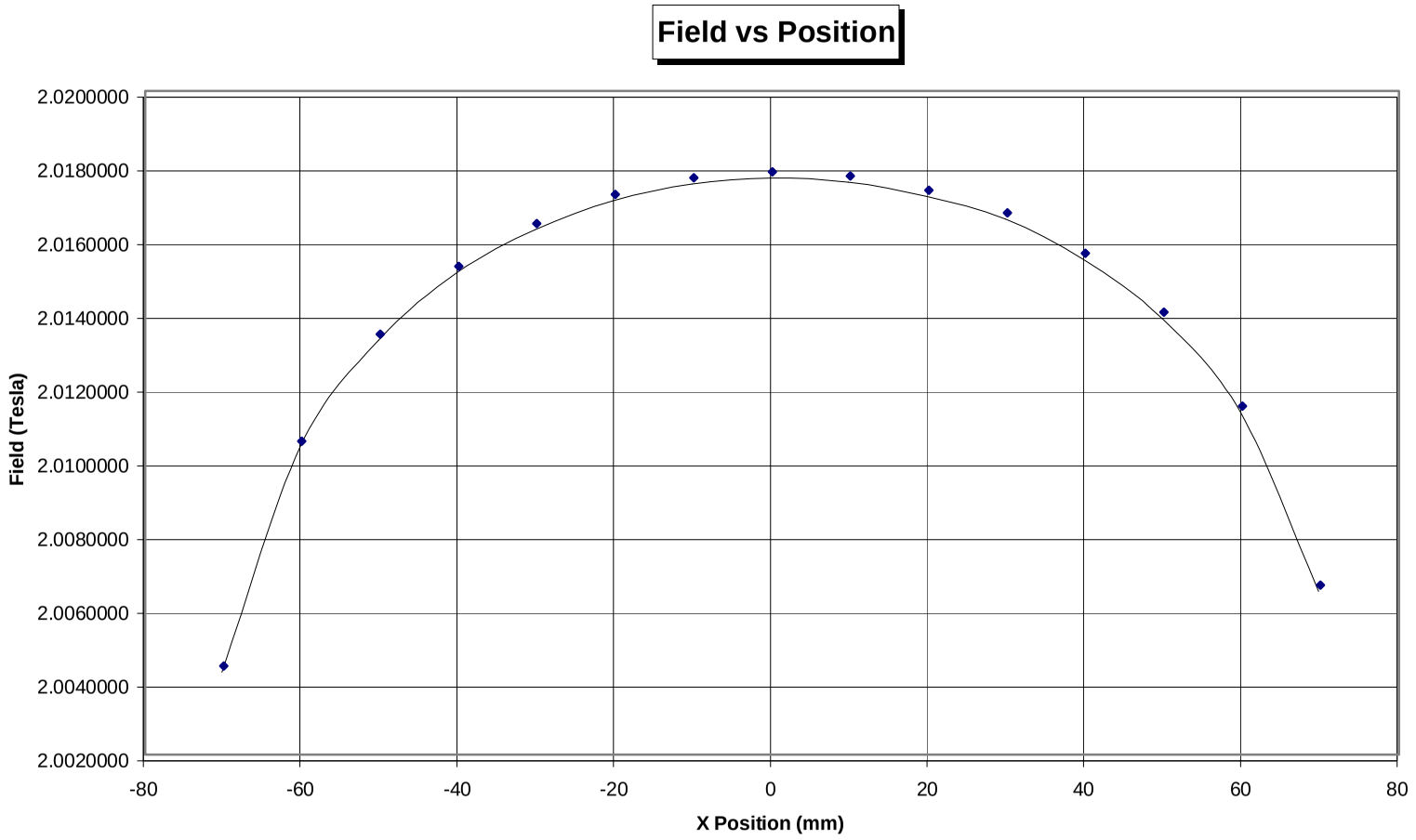
Model	3474-140	Pole Face: 150 mm	Pole SN:	Engr: Mike Duffy
Serial No	09	Pole Gap: 70 mm		Date: 28 January, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140A	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 6.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

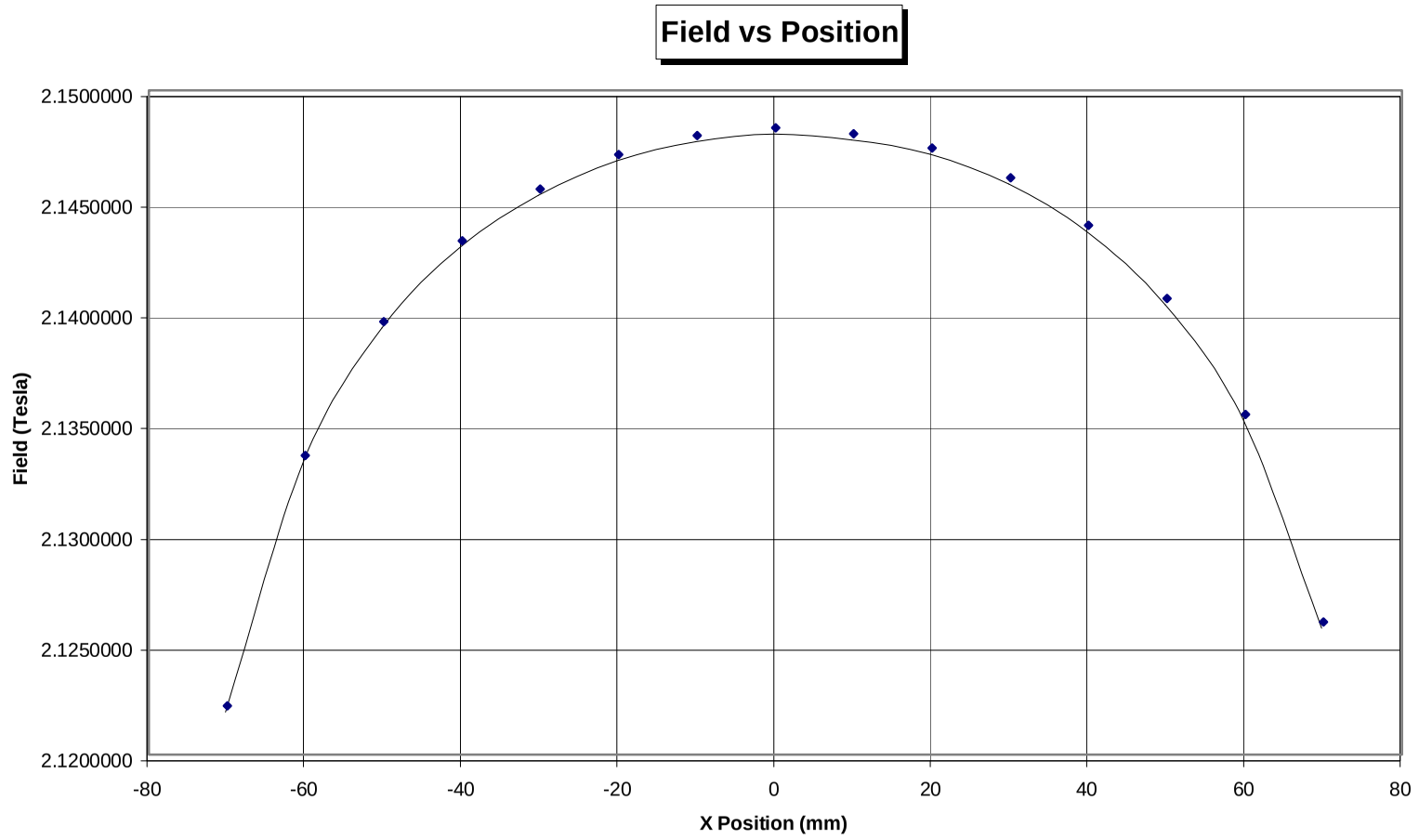
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 30 mm		Date: 12 February, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100 Amp.	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 12.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

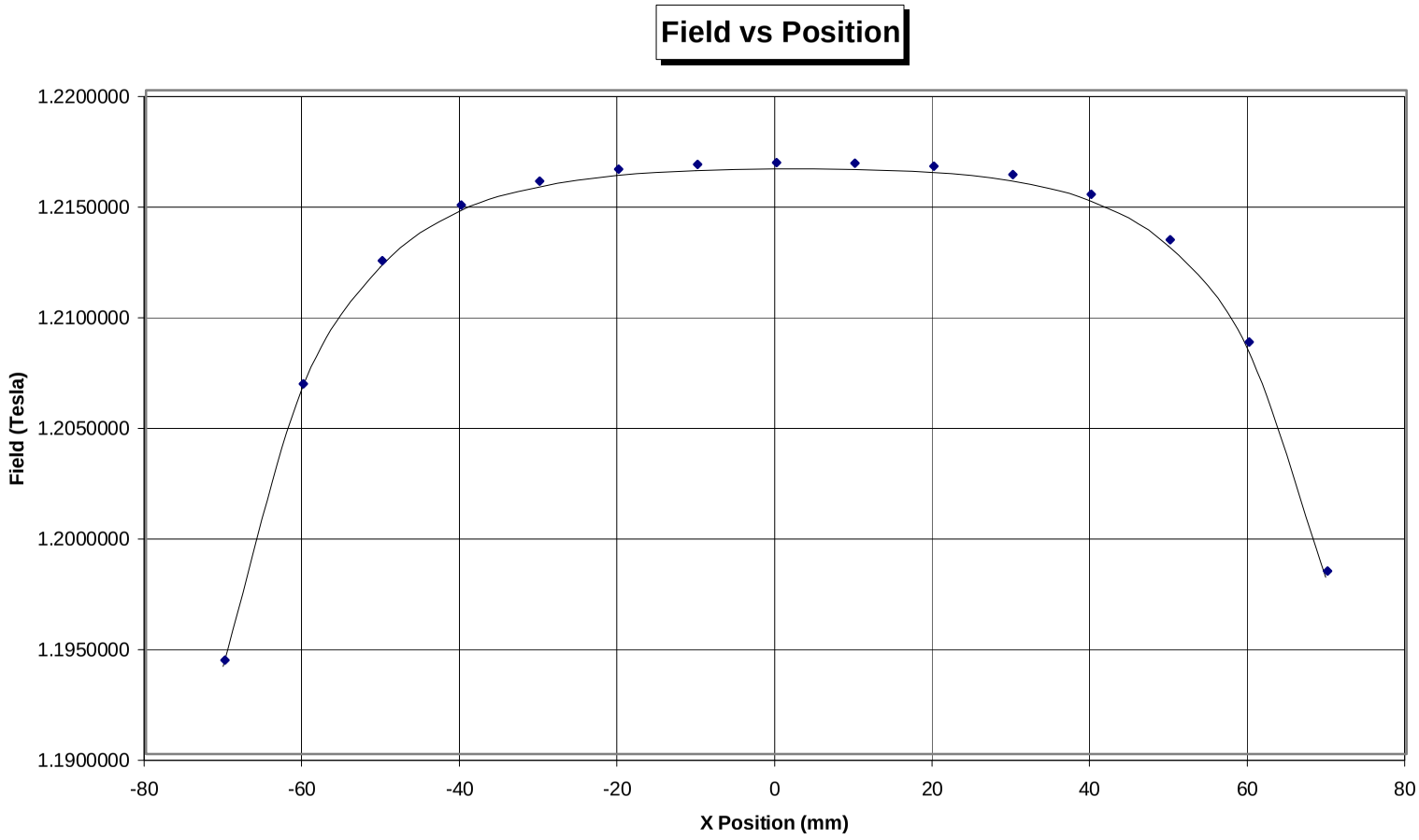
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 30 mm		Date: 12 February, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140 Amp	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 12.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

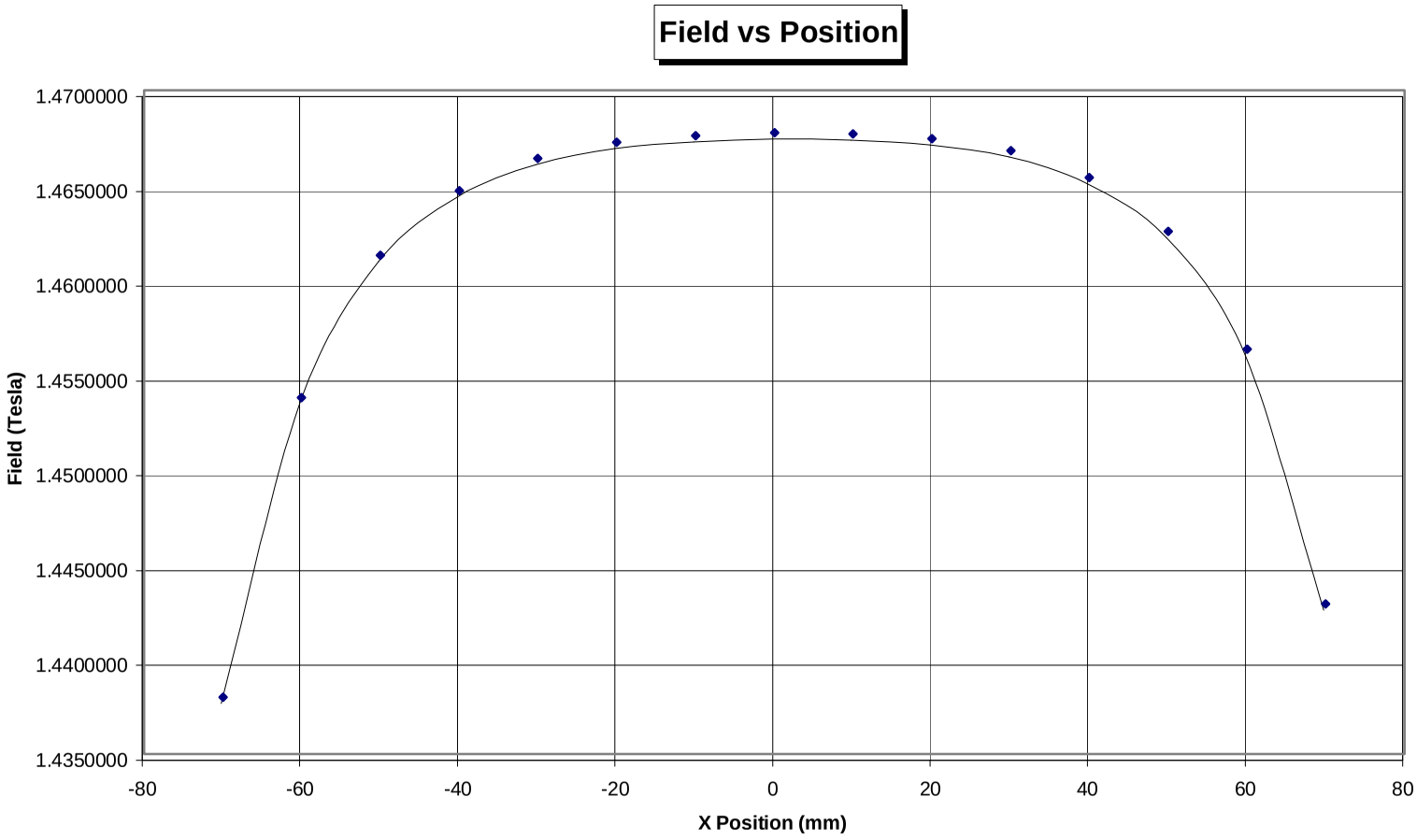
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 70 mm		Date: 12 February, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100 Amp.	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 15.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

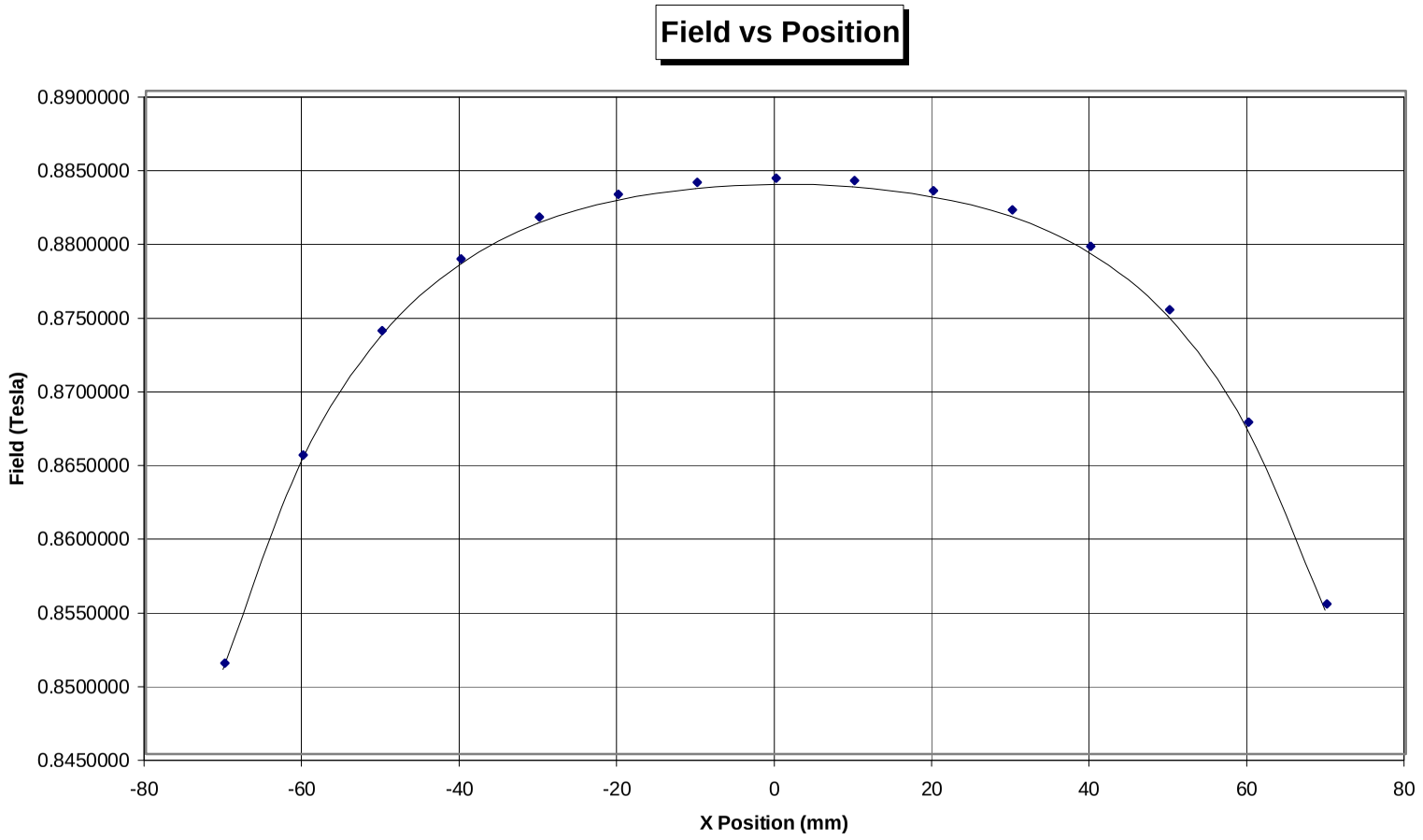
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 70 mm		Date: 12 February, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140 Amp	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 15.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

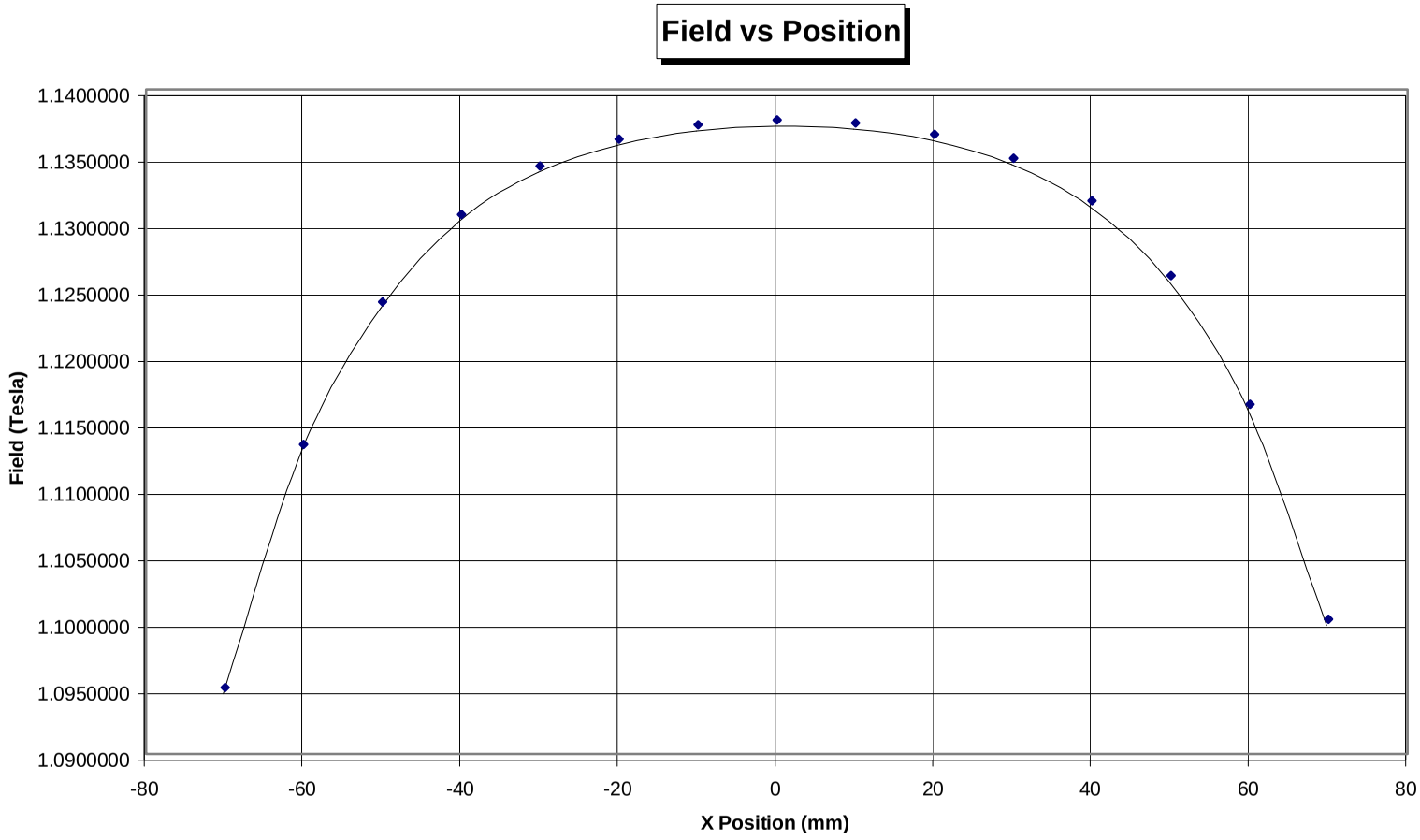
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 100 mm		Date: 12 February, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	100 Amp.	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 16.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - Field Vs Position

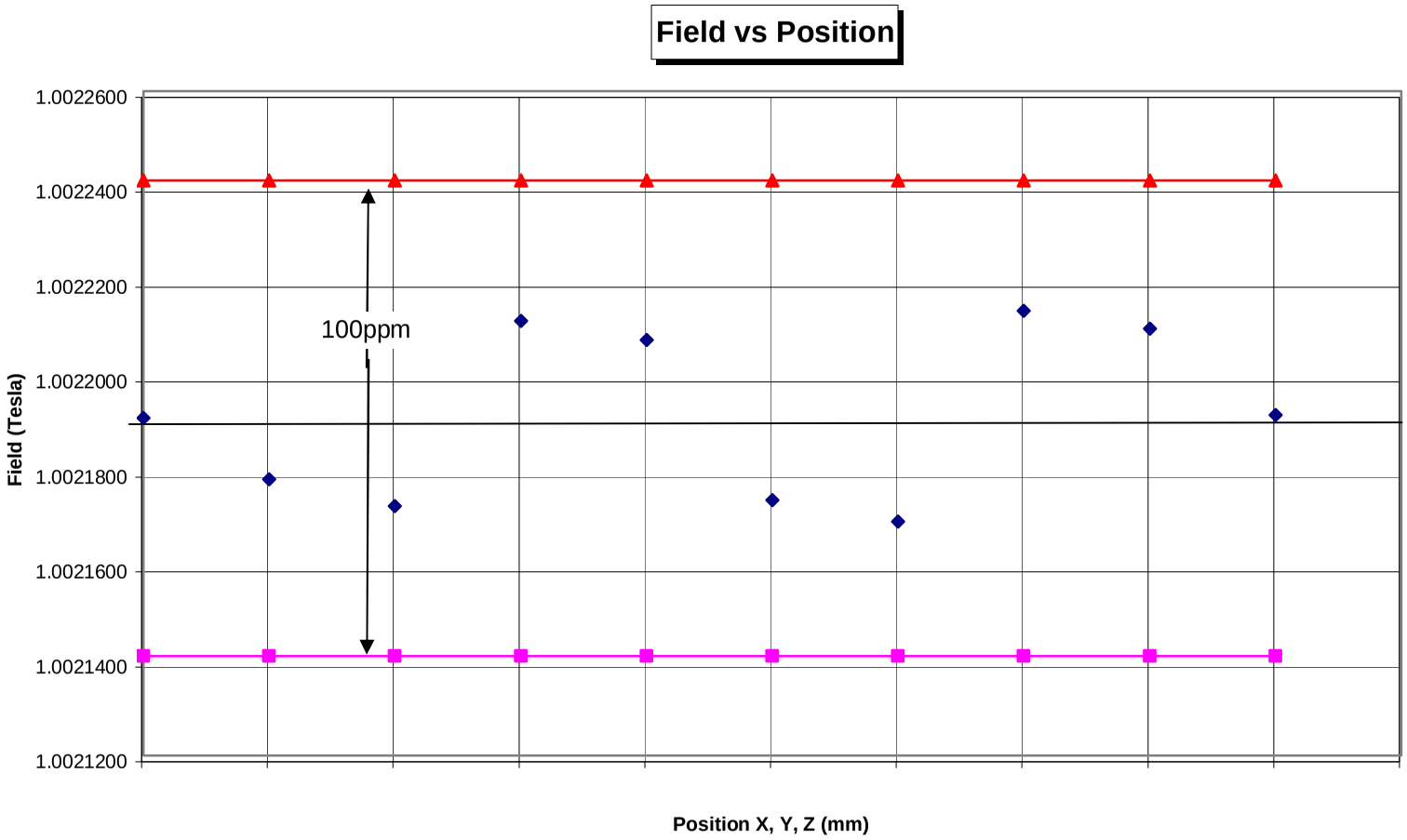
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 100 mm		Date: 12 February, 1997
Contract No:	C7955	Pole Spacers: Not fitted		
Note:	140 Amp	Fixed Axis: Y=0, Z=0		
		Variable Axis: X		



Filename: SC7955 Uniformity Plot 16.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - 10mm Cube

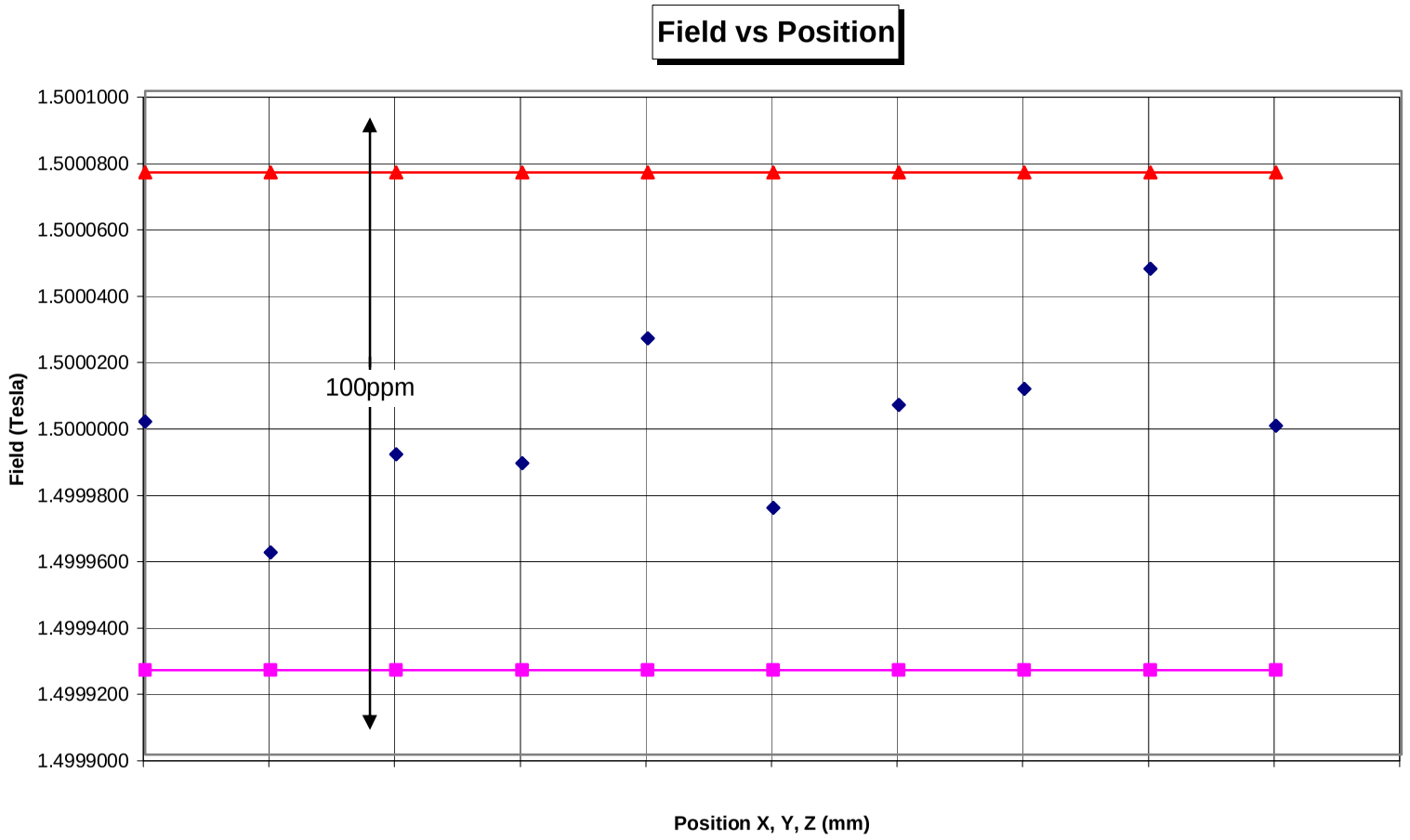
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 50 mm		Date: 14 February, 1997
Contract No:	C7955	Pole Spacers: Fitted		
Note:	1.0T	Fixed Axis:		
		Variable Axis: X, Y, Z		



Filename: SC7955 Uniformity Plot Cube @1.0T.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY PLOT - 10mm Cube

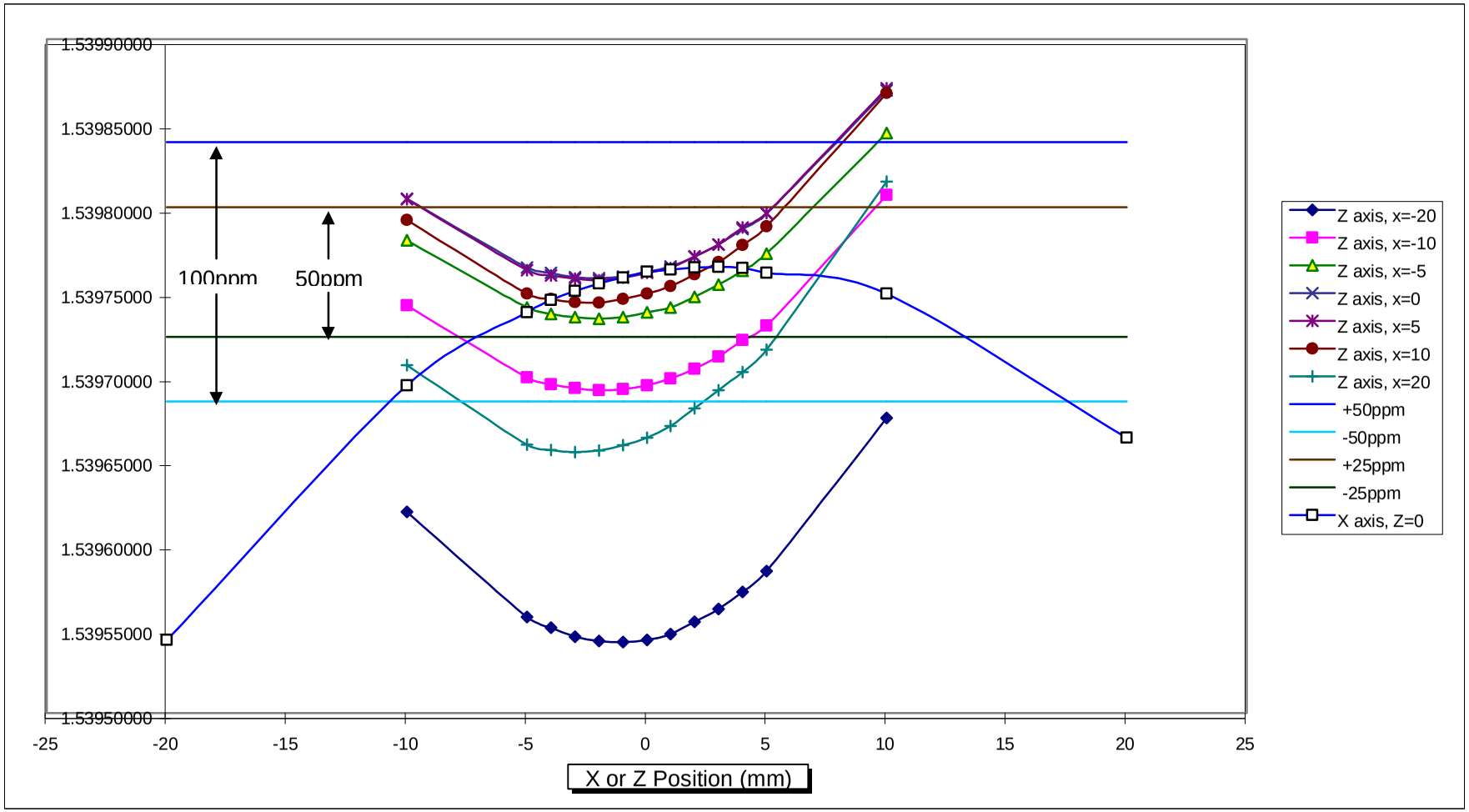
Model	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No	09	Pole Gap: 50 mm		Date: 14 February, 1997
Contract No:	C7955	Pole Spacers: Fitted		
Note:	1.5T	Fixed Axis:		
		Variable Axis: X, Y, Z		



Filename: SC7955 Uniformity Plot Cube @1.0T.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET UNIFORMITY Z-Axis as a function of X-Axis

Model:	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No:	09	Pole Gap: 50 mm		Date: 14 February, 1997
Contract No:	C7955	Pole Spacers: Fitted		
Note:	100A	Fixed Axis: Y=0		
		Variable Axis: X, Z		

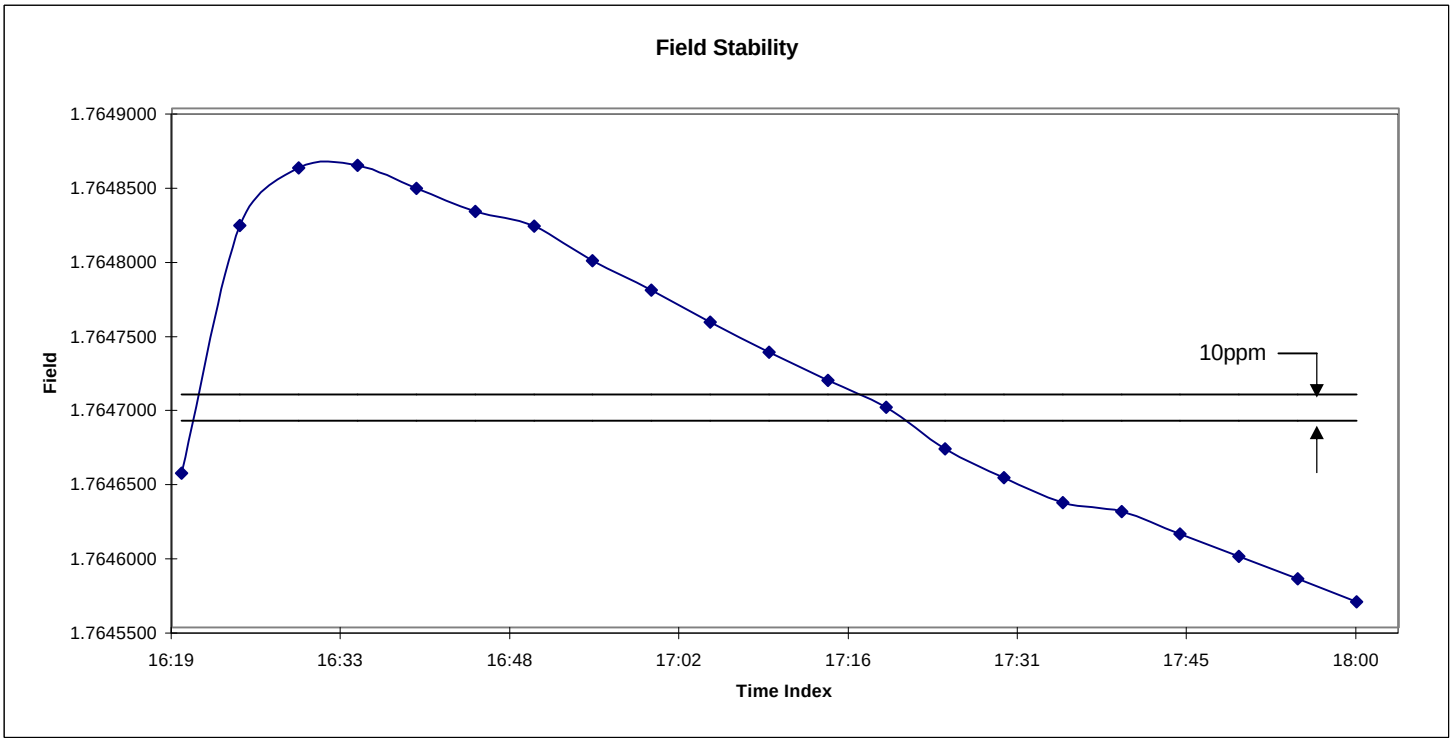


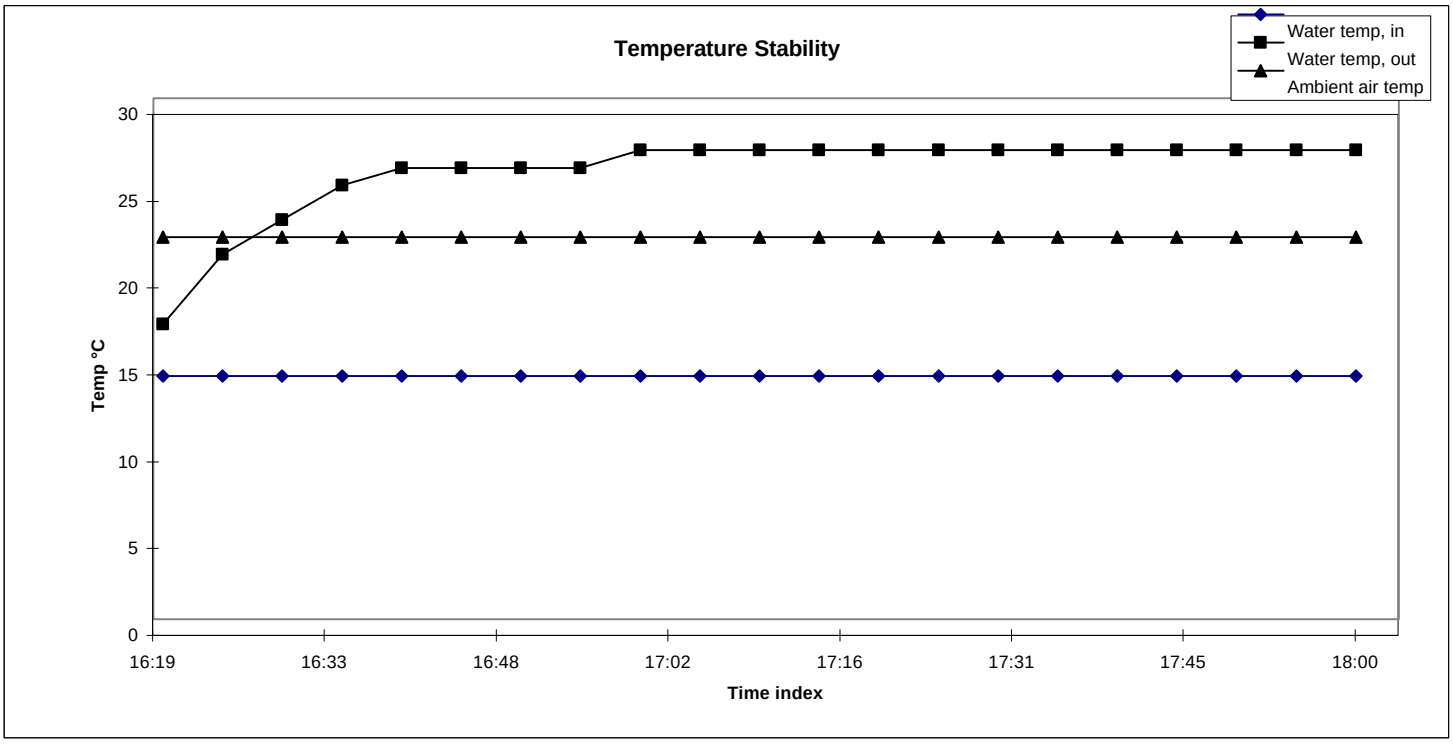
Filename: SC7955 Uniformity Plot with spacers x & z axis.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET STABILITY PLOT

Model:	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No:	09	Pole Gap: 50 mm		Date: 14 February, 1997
Contract No:	C7955	Pole Spacers: Fitted		
Note:	140A	Fixed Axis: X=0, Y=0, Z=0		

Field measurement done with MetroLab 2025 & 1062-5 NMR system.



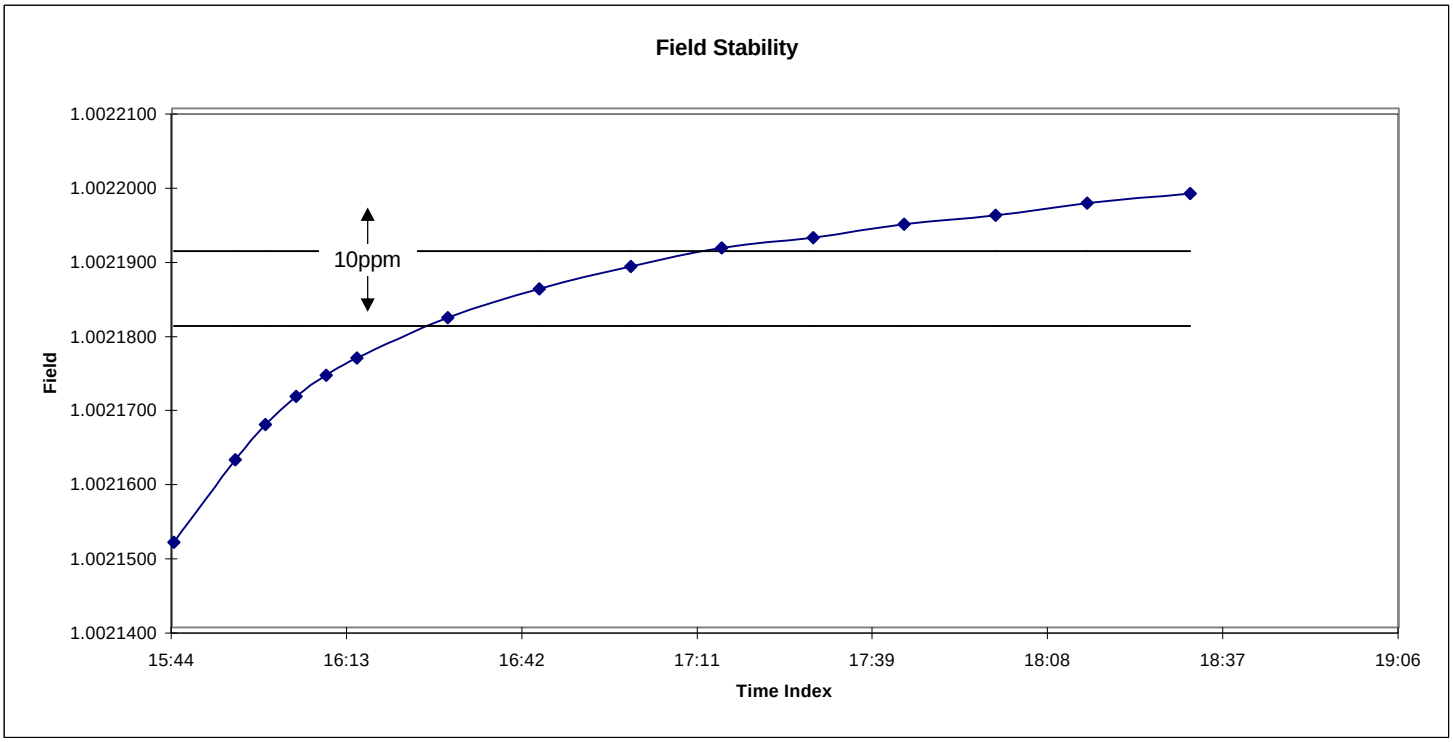


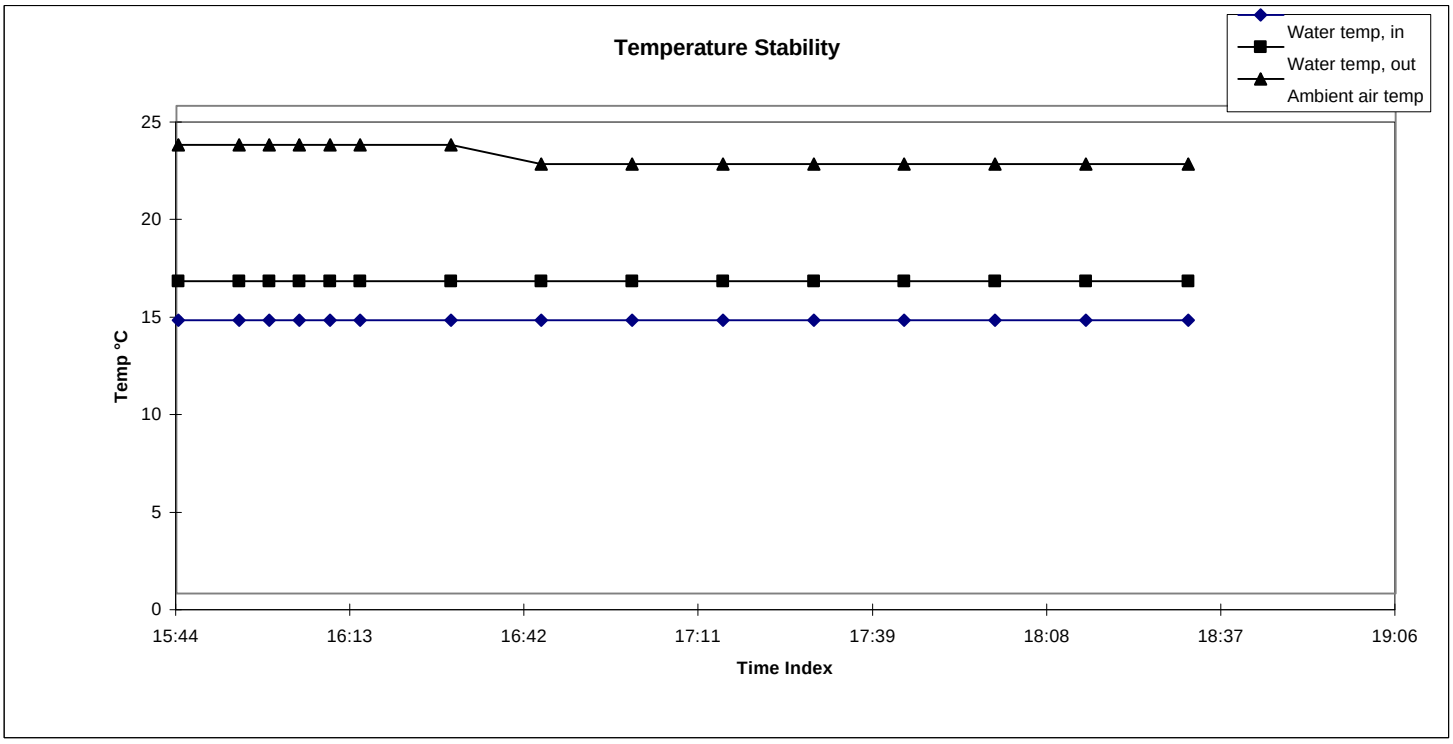
Filename: SC7955 Stability Plot, 140 Amps.507

GMW ASSOCIATES
LABORATORY ELECTROMAGNET STABILITY PLOT

Model:	3474-140	Pole Face: 200 mm	Pole SN:	Engr: E. Schulze
Serial No:	09	Pole Gap: 50 mm		Date: 25 February, 1997
Contract No:	C7955	Pole Spacers: Fitted		
Note:	56A	Fixed Axis: X=0, Y=0, Z=0		

Field measurement done with MetroLab 2025 & 1062-5 NMR system.





Filename: SC7955 Stability Plot, 1.0T.507

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)

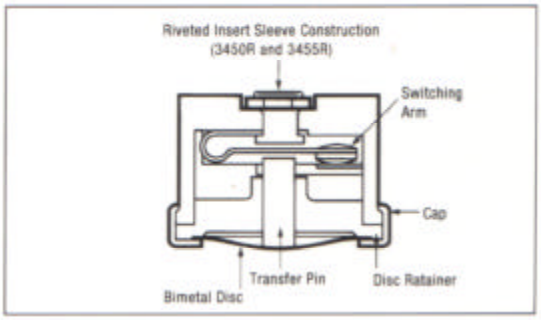
The Series 3450/3455R is a snap-acting, non-adjustable precision thermostat especially suited for industrial and electrical equipment.

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.

F61 SERIES FLOW SWITCH

STANDARD FLOW RATE — SPDT

The F61 flow switch is designed for use on liquid lines using water, ethylene glycol solutions, or other liquids not injurious to the brass and phosphor bronze parts that come in contact with the liquid. The SPDT contacts make or break an electrical circuit when flow starts or stops.

F61KB-11: NEMA 1 type enclosure.

F61MB-1: This flow switch meets NEMA type 4 requirements and is UL listed as raintight. Use on indoor or outdoor applications in high humidity atmospheres, on liquid lines handling fluids below dewpoint or below 32°F (0°C).

Use on lines carrying well water, swimming pool water, sea water, brine or ethylene glycol. Not for use with hazardous fluids or in hazardous atmospheres.

The bronze paddle is of three segments for use in pipes from 1 in. to 3 in. diameter. Paddle segments may be removed or trimmed as needed. Catalog No. F61KB-11 and F61MB-1 include a 6 in. paddle for pipes 4 in. to 6 in.

Pipe Connection: 1 in. NPT.

Max Liquid Pressure: 150 PSIG (1034 kPa).

Max Liquid Temperature: 250°F (121°C).

Min Liquid Temperature, F61KB-11: 32°F (0°C)

F61MB-1: -20°F (-29°C).

Dimensions:
F61KB-11: 8⅜ in. H (3 in. paddle), 4 in. W, 2 13/16 in. D.

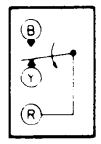
F61MB-1: 8 11/16 in. H (3 in. paddle), 4 51/64 in. W, 2 13/16 in. D.

TO ORDER: Specify F61KB-11 for NEMA 1 enclosure, F61MB-1 for NEMA 4 enclosure.

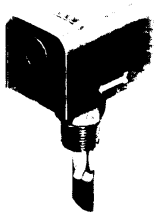
ELECTRICAL RATINGS

Motor Ratings VAC	120	208	240	277
Horsepower	1	1	1	—
AC Full Load amp	16.0	8.8	8.0	—
AC Locked Rotor amp	96.0	52.8	48.0	—
Non-Inductive or Resistance Load amp	16	16	16	16
Pilot Duty — 125 VA, 24/277 VAC				

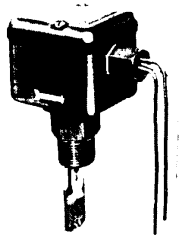
Series F61



ACTION ON INCREASE OF FLOW



F61KB-11
Replaces McDonnell & Miller FS4-3



F61MB-1
Replaces McDonnell & Miller FS8V-12

TYPICAL FLOW RATES — GPM (m³/hr) REQUIRED TO ACTUATE SWITCH

Line Pipe Size in.		1	1¼	1½	2	2½	3	4*	5*	6*	8*
Min Adj	Flow Increase R to Y Closes	4.2 (1.0)	5.8 (1.3)	7.5 (1.7)	13.7 (3.1)	18.0 (4.1)	27.5 (6.2)	65.0 (14.8) 37.0† (8.4)	125.0 (28.4) 57.0† (12.9)	190.0 (43.1) 74.0† (16.8)	375.0 (85.2) 205.0† (46.6)
	Flow Decrease R to B Closes	2.5 (0.6)	3.7 (0.8)	5.0 (1.1)	9.5 (2.2)	12.5 (2.8)	19.0 (4.3)	50.0 (11.4) 27.0† (6.1)	101.0 (22.9) 41.0† (9.3)	158.0 (35.9) 54.0† (12.3)	320.0 (72.7) 170.0† (38.6)
Max Adj	Flow Increase R to Y Closes	8.8 (2.0)	13.3 (3.0)	19.2 (4.4)	29.0 (6.6)	34.5 (7.8)	53.0 (12.0)	128.0 (29.1) 81.0† (13.4)	245.0 (55.6) 118.0† (26.8)	375.0 (85.2) 144.0† (32.7)	760.0 (172.6) 415.0† (94.2)
	Flow Decrease R to B Closes	8.5 (1.9)	12.5 (2.8)	18.0 (4.1)	27.0 (6.1)	32.0 (7.3)	50.0 (11.4)	122.0 (27.7) 76.0† (17.3)	235.0 (53.4) 111.0† (25.2)	360.0 (81.8) 135.0† (30.7)	730.0 (165.8) 400.0† (90.8)

* Flow rates for these sizes are calculated.
† These GPM figures are for switch with 6 in. paddle. For 4 in. and 5 in. line pipe the paddle is trimmed.

LOW FLOW RATE — SPDT

For use on liquid lines using water, ethylene glycol solutions, or other liquids not injurious to the brass and phosphor bronze parts. SPDT contact switch is activated by a low flow rate; however, it has a large flow capacity with minimum pressure drop. Typical applications include:

— Water purification and treatment systems.
— Booster pumps.
— Fast shut down on high input boilers to guard against circulation failure.
— Cooling systems for electronic tubes, bearings and compressors.

F61KD: NEMA 1 type enclosure.

F61MD: NEMA 4 (vaportight) enclosure.

Min Liquid Temperature, F61KD: 32°F (0°C)

F61MD: -20°F (-29°C).

Dimensions: 5 1/32 in. H, 4 in. W, 2 13/16 in. D.

TO ORDER: Specify Catalog Number only.

ELECTRICAL RATINGS

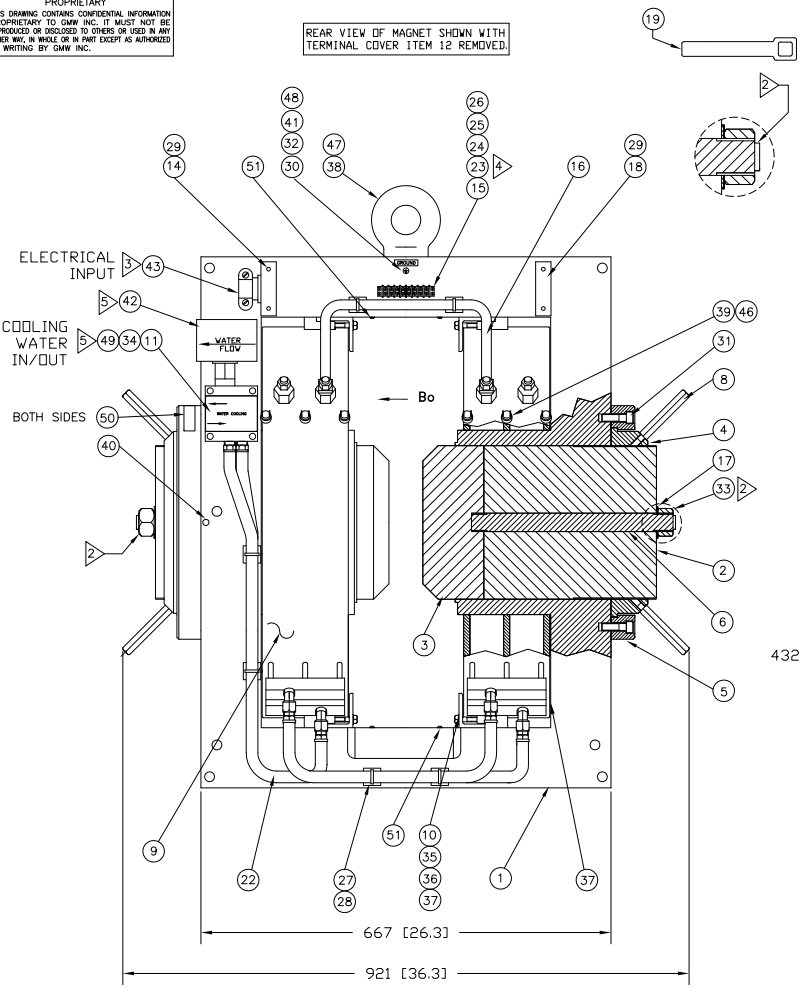
Motor Ratings VAC	120	208	240	277
Horsepower	1	1	1	—
AC Full Load amp	16.0	8.8	8.0	—
AC Locked Rotor amp	96.0	52.8	48.0	—
Non-Inductive or Resistance Load amp	16	16	16	16
Pilot Duty — 125 VA, 24/277 VAC				

F61KD

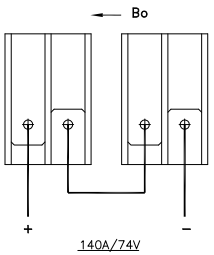
	Catalog Number	Inlet and Outlet Size Female NPT	Enclosure NEMA Type	Adjustment Range — GPM (m³/hr) R to Y Closes Flow Increase	Adjustment Range — GPM (m³/hr) R to Y Opens Flow Decrease	Maximum Liquid Temp °F (°C)	Maximum Liquid Pressure PSIG (kPa)	Ship wt lb
	F61KD-3	½ in. × ½ in.	1	Minimum .6 (0.14) Maximum 1.1 (0.25)	Minimum .3 (0.07) Maximum 0.9 (0.2)	250 (121)	150 (1034)	2.2
	F61KD-4	¾ in. × ¾ in.	1					
★	F61MD-2	¾ in. × ¾ in.	4					

★ **Non-Stock Item. Built to Order.**

REAR VIEW OF MAGNET SHOWN WITH TERMINAL COVER ITEM 12 REMOVED.



VIEW FROM REAR OF MAGNET



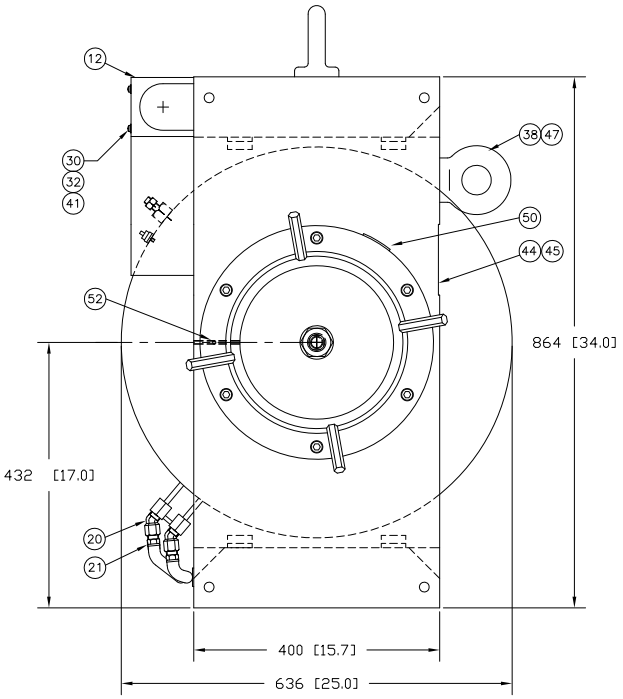
140A/74V

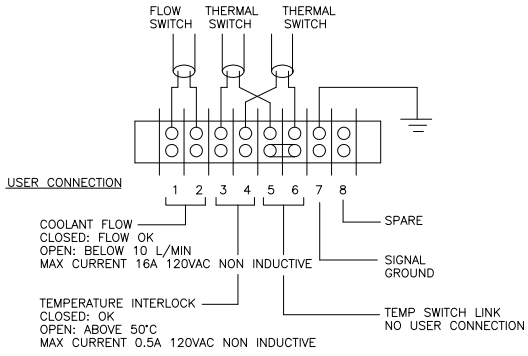
CURRENT CONNECTION

NOTE: THIS DRAWING SHOWS 140A COILS
FOR 280A COILS SEE DWG NO: 11801600

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

NOTES
1. USE GRAPHITE GREASE SPARINGLY ON CORE THREAD.
2. INSTALL POLE BOLT [ITEM 6] FULLY INTO POLE CAP. BACK OFF ONE TURN, HOLD WITH WRENCH [ITEM 19] AND TIGHTEN NUT [ITEM 33] SQUARE OF POLE BOLT SHOULD BE PROUD OF NUT WHEN ASSEMBLED CORRECTLY.
3. R.H CABLE ENTRY SHOWN, L.H CABLE ENTRY OPTIONAL.
4. SEE ELECTRICAL ASSEMBLY DWG NO 11901380 FOR WIRING DETAILS.
5. SEE I/O MANIFOLD ASSEMBLY DRAWING NO 11901360 FOR DETAILS.





INTERLOCK SCHEMATIC

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		11/03/99	G.DOUGLAS
B	CHANGED ITEM 12, 20,21,22, ADD NOTE 6.		08/09/05	G.DOUGLAS
C	INCR ITEM 32, 47,48, ADD ITEM 15, CHG ITEM 31		04/02/08	G.DOUGLAS

MAGNET SPECIFICATIONS

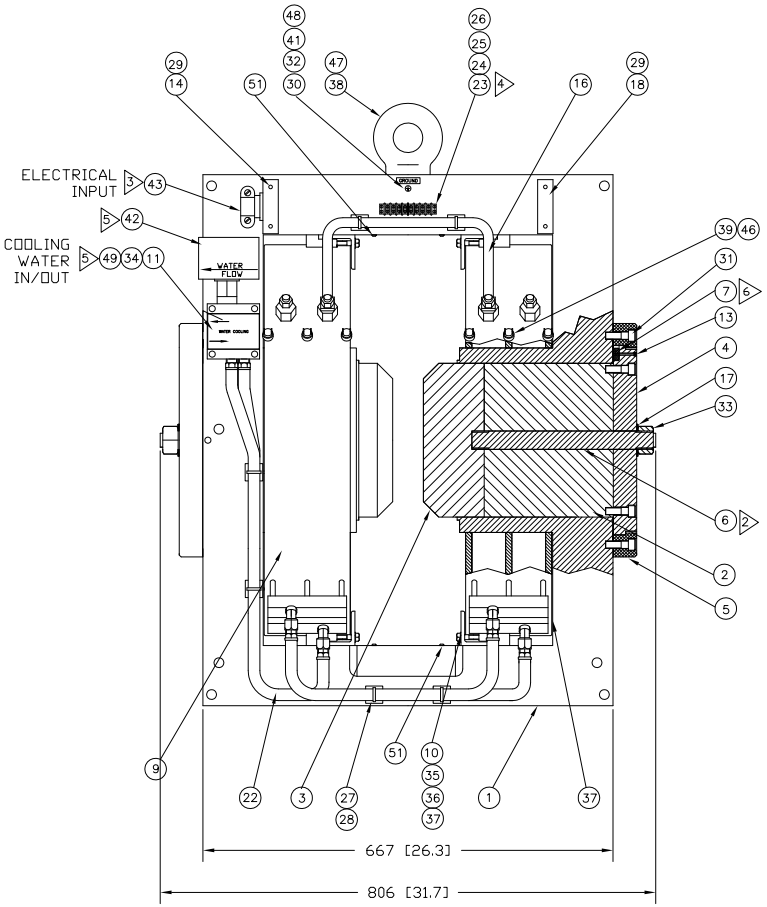
POLE DIAMETER:	250mm [10"]
POLE GAP:	0–160mm [0–6.3"]
COIL GAP:	186mm min [7.3"]
POLE CAPS:	CYLINDRICAL 250mm [10"] TAPERED 200, 150, 100, 75, 50, 25mm [8"][6"][4"][3"][2"][1"]
COILS	[series connected]
20°C RESISTANCE	0.44 ohm
MAX RESISTANCE	0.54 ohm
MAX POWER [air]	40A/22V
MAX POWER [water]	140A/74V
COOLING:	15 liter/min [4 US gpm] 2.0 bar (30 psid)
THERMAL INTERLOCK:	OPEN CIRCUIT ABOVE 50° C
FLOW INTERLOCK:	OPEN CIRCUIT BELOW 10 liter/min
MASS:	1800 kg [3970 lb]

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
52	2		M6 X 10 SHSS S/S	
51	16		M4 X 8 SHCS BUTTON DH S/S.[For Probe Mount]	
50	2	10900380	LABEL, POLE GAP ADJUSTMENT	
49	1	10900370	LABEL, WATER CONNECTIONS	
48	1	10900390	LABEL, GROUND	
47	3		M33 WASHER S/S	
46	6		NEOPRENE WASHER 16 O.D X 4 I.D X 4 THK	
45	1	10900360	LABEL CAUTION, [R.H Side]	
44	1	10900350	LABEL MAGNET SPECIFICATIONS, [L.H Side]	
43	1		CABLE CLAMP T & B 3307	
42	1	F61 KB–11C	JOHNSTON CONTROLS FLOW SWITCH, BRASS	
41	5		M6 LOCK WASHER S/S	
40	2		ø10 X 50 RETRACTABLE DOWEL (M6 X 10)	
39	6	3450G611–1	SENSOR, ELMWOOD 50°C, SCREW TYPE	
38	3		M33 LIFTING EYE	
37	A/R		NEOPRENE 1.6 mm	
36	8		M8 WASHER, S/S	
35	8		M8 X 50 HEX BOLT, S/S	
34	4		M6 X 80 SHCS, S/S	
33	2		M30 NUT, S/S	
32	5		M6 X 16 PAN HD SCREW S/S	
31	12		M12 X 40 SHCS, S/S	
30	5		M6 WASHER, FLAT S/S	
29	4		M6 X 12 HEX HD BOLT, S/S	
28	12		M4 X 10 PAN HD SCREW, S/S	
27	6		SELF ADHESIVE SCREW TIE PAD	
26	4		M3 WASHER, FLAT S/S	
25	4		M3 X 16 PAN HD SCREW, S/S	
24	1	MS 8–140	MARKER STRIP, CINCH	
23	1	8–140	TERMINAL BLOCK, CINCH	
22	A/R	PB–8–BK	HOSE, RUBBER COVERED 1/2" I.D SWAGELOK	
21	6	30182–6–8	PUSH ON COUPLING 1/2" HOSE 3/8NPT, PARKER	
20	4	2214P–8–8	STREET ELBOW 45° 3/8 NPT PARKER	
19	1	17802840	WRENCH [for removing item 6 Pole Bolt]	
18	1	17801781	BRACKET, TERMINAL COVER, BLANK END	
17	2		WASHER, FLAT 31MM ID X 2MM THICK S/S	
16	1	17801754	LINK, COIL	
15	4		M3 WASHERS, INTERNAL LOCK	
14	1	17801782	BRACKET, TERMINAL COVER, WITH HOLE	
13			DELETED	
12	1	11901410	TERMINAL COVER ASSEMBLY [cover + label]	
11	1	17801680	WATER INLET/OUTLET MANIFOLD	
10	4	17801640	CLAMP, COIL	
9	2	11801652	COIL ASSEMBLY [2 Terminal 140A only]	
8	8	17801293	HANDLE	
7			DELETED	
6	2	17801761	POLE BOLT	
5	2	17801720	POLE NUT RETAINER	
4	2	17801250	POLE NUT	
3	2	17801710	POLE CAP (various, 200mm shown)	
2	2	17801700	POLE CORE	
1	1	17801610	YOKE	

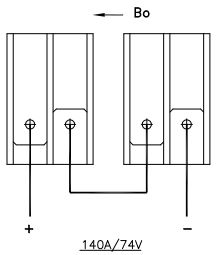
PARTS LIST

DRAWN G.DOUGLAS	DATE 11/03/99	DO NOT SCALE FROM DRAWING	GMW 955 Industrial Rd, San Carlos, CA 94070 Tel: (650)802–8292. Fax: (650)802–8298.
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	
ENGINEERING	DATE	LINEAR INCHES / mm: X.XXX ±.005 / ±0.03; X.XX ±.01 / ±0.1; X.X ±.03 / ±0.3; X ±.06 / ±1; ANGLE DEG. ±.5 / ±0.5; FINISH 63 ✓ / 1.6 ✓	TITLE: MAGNET ASSEMBLY MODEL: 3474–140
			SIZE A1 DRAWING NO. 11801602 REV C
NEXT ASSY 3474	SYSTEM	THIRD ANGLE PROJECTION	SCALE 1:4 WT kg SHEET 1 OF 1
SOFTWARE AUTOCAD 2000			

REAR VIEW OF MAGNET SHOWN WITH TERMINAL COVER ITEM 12 REMOVED.



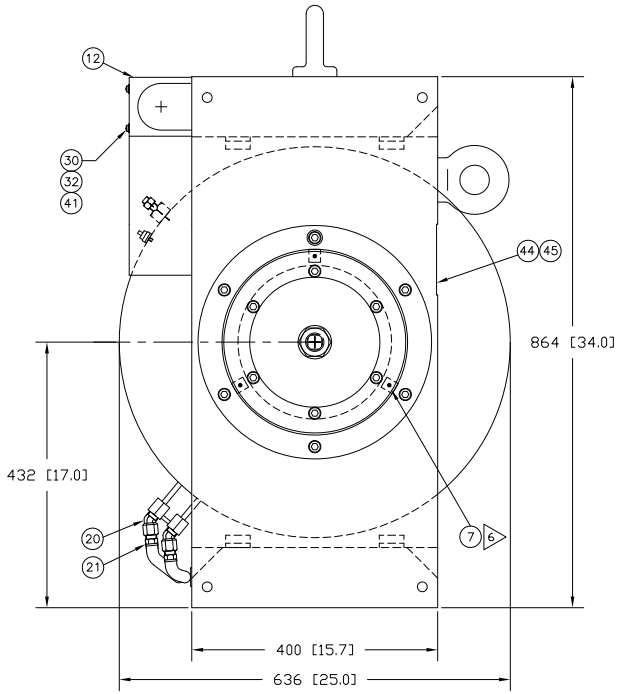
VIEW FROM REAR OF MAGNET

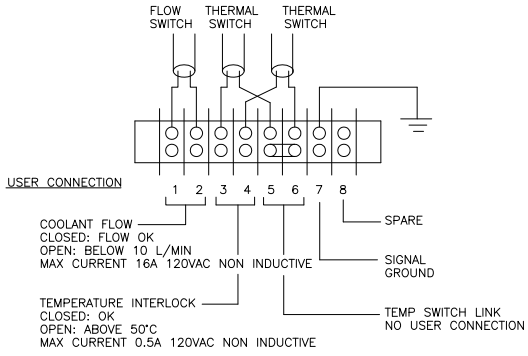


CURRENT CONNECTION

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

NOTES
1. USE GRAPHITE GREASE SPARINGLY ON CORE THREAD.
2. INSTALL POLE BOLT [ITEM 6] FULLY INTO POLE CAP. BACK OFF ONE TURN, HOLD WITH WRENCH [ITEM 19] AND TIGHTEN NUT [ITEM 4]
3. R.H CABLE ENTRY SHOWN, L.H CABLE ENTRY OPTIONAL.
4. SEE ELECTRICAL ASSEMBLY DWG NO 11901380 FOR WIRING DETAILS.
5. SEE I/O MANIFOLD ASSEMBLY DRAWING NO 11901360 FOR DETAILS.
6. SEE FIXED GAP POLE ASSEMBLY DRAWING NO 11901430 FOR DETAILS.





INTERLOCK SCHEMATIC

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		08/28/00	G.DOUGLAS

MAGNET SPECIFICATIONS

POLE DIAMETER:	250mm [10"]
POLE GAP:	FIXED 160mm max [0–6.3"]
COIL GAP:	186mm min [7.3"]
POLE CAPS:	CYLINDRICAL 250mm [10"] TAPERED 200, 150, 100, 75, 50, 25mm [8"][6"][4"][3"][2"][1"]
COILS	[series connected]
20°C RESISTANCE	0.44 ohm
MAX RESISTANCE	0.54 ohm
MAX POWER [air]	40A/22V
MAX POWER [water]	140A/74V
COOLING:	15 liter/min [4 US gpm] 2.0 bar (30 psid)
THERMAL INTERLOCK:	OPEN CIRCUIT ABOVE 50° C
FLOW INTERLOCK:	OPEN CIRCUIT BELOW 10 liter/min
MASS:	1800 kg [3970 lb]

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
52			DELETED	
51	16		M4 X 8 SHCS BUTTON DH S/S.[For Probe Mount]	
50			DELETED	
49	1	10900370	LABEL, WATER CONNECTIONS	
48	1	10900390	LABEL, GROUND	
47	2		M33 WASHER S/S	
46	6		NEOPRENE WASHER 16 O.D X 4 I.D X 4 THK	
45	1	10900360	LABEL CAUTION ,RH SIDE	
44	1	10900350	LABEL MAGNET SPECIFICATIONS ,LH SIDE	
43	1		CABLE CLAMP T & B 3307	
42	1	F61 KB	JOHNSTON CONTROLS FLOW SWITCH, BRASS	
41	5		M6 LOCK WASHER S/S	
40			DELETED	
39	6	3450G611–1	SENSOR, ELMWOOD 50°C, SCREW TYPE	
38	2		M33 LIFTING EYE	
37	A/R		NEOPRENE 1.6 mm	
36	8		M8 WASHER, S/S	
35	8		M8 X 50 HEX BOLT, S/S	
34	4		M6 X 80 SHCS, S/S	
33	2		M30 NUT, S/S	
32	2		M6 X 16 PAN HD SCREW S/S	
31	12		M12 X 50 SHCS, S/S	
30	5		M6 WASHER, S/S	
29	4		M6 X 12 HEX HD BOLT, S/S	
28	12		M4 X 10 PAN HD SCREW, S/S	
27	6		SELF ADHESIVE SCREW TIE PAD	
26	4		M3 WASHER, S/S	
25	4		M3 X 16 PAN HD SCREW, S/S	
24	1	MS 8–140	MARKER STRIP, CINCH	
23	1	8–140	TERMINAL BLOCK, CINCH	
22	A/R	B708	IE RUBBER COVERED HOSE 1/2" I.D	
21	6	KA–08–06–MB	IE PUSH ON HOSE COUPLING 1/2" HOSE 3/8NPT	
20	4	124–B–06	IE STREET ELBOW 45° 3/8 NPT	
19	1	17802840	WRENCH	
18	1	17801781	BRACKET, TERMINAL COVER, BLANK END	
17	2		WASHER, 31MM ID X 2MM THICK S/S	
16	1	17801754	LINK, COIL	
15			DELETED	
14	1	17801782	BRACKET, TERMINAL COVER, WITH HOLE	
13	6		M3 X 30 SHCS S/S	
12	1	17801780	TERMINAL COVER	
11	1	17801680	WATER INLET/OUTLET MANIFOLD	
10	4	17801640	CLAMP, COIL	
9	2	11801652	COIL ASSEMBLY [2 TERMINAL]	
8	8		DELETED	
7	6	17904150	SHIM PAD (VARIOUS)	
6	2	17801761	POLE BOLT	
5	2	17801720	POLE MOUNTING PLATE RETAINER	
4	2	17904130	POLE MOUNTING PLATE	
3	2	17801710	POLE CAP (VARIOUS)	
2	2	17904120	POLE CORE	
1	1	17801610	YOKE	

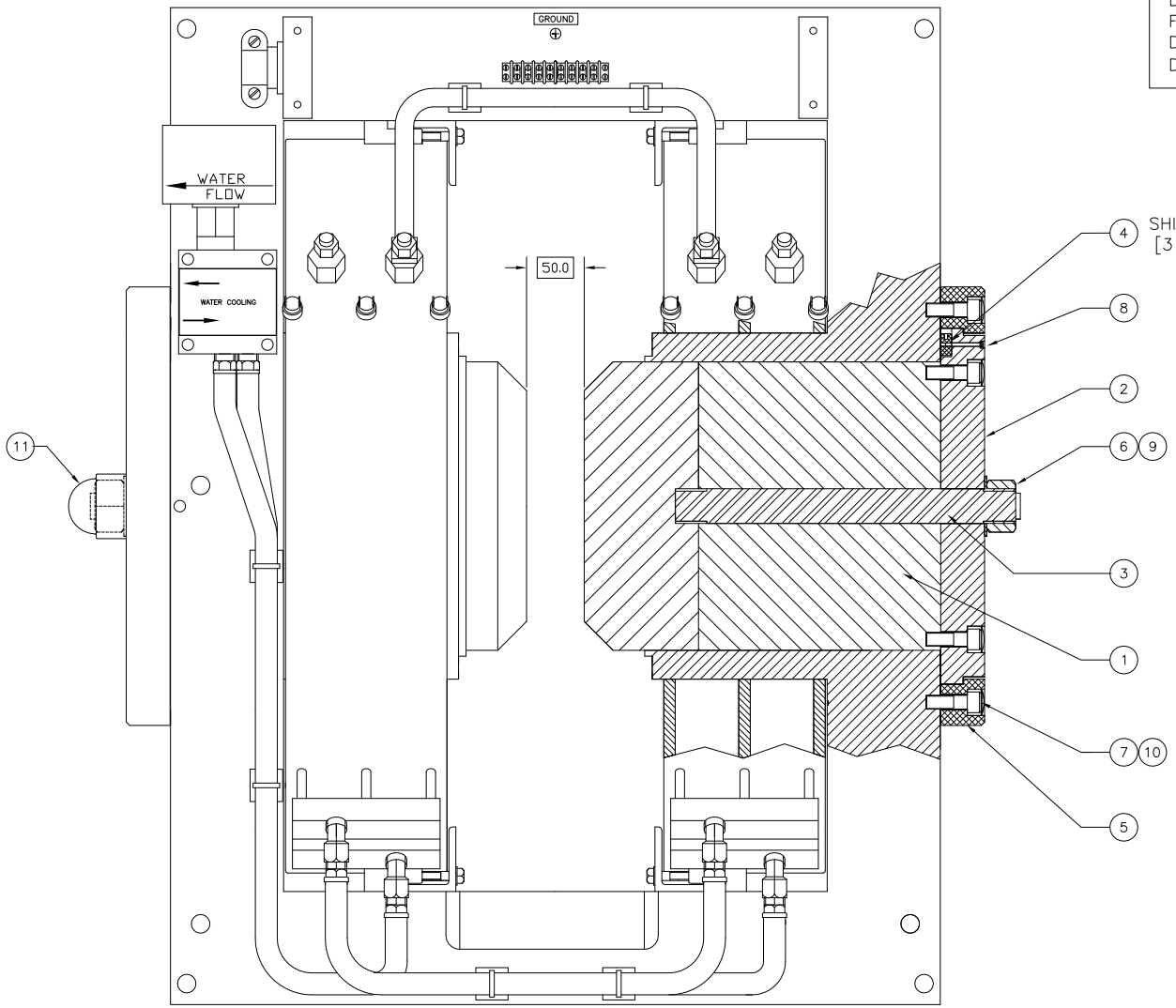
PARTS LIST

DRAWN G.DOUGLAS	DATE 08/21/00	DO NOT SCALE FROM DRAWING	GMW
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	955 Industrial Rd, San Carlos, CA 94070
ENGINEERING	DATE	LINEAR: INCHES ±.005, mm ±0.03; X.XX ±.01, ±0.1; X.X ±.03, ±0.3; X ±.06, ±1; DEG. ±.5, ±0.5; FINISH 63 ✓, 1.6 ✓	Tel: (650)802–8292. Fax: (650)802–8298.
			TITLE: MAGNET ASSEMBLY MODEL: 3474–140FG
	3474FG		SIZE A1 · DRAWING NO. 11801603 · REV A
NEXT ASSY	SYSTEM	THIRD ANGLE PROJECTION	
SOFTWARE AUTOCAD 2000			SCALE 1:4 · WT kg · SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		08/28/00	G.DOUGLAS

MODEL: 3474FG ELECTROMAGNET

*****WARNING*****
DO NOT DISTURB ANY SCREWS SECURING THE FIXED GAP ASSEMBLY AFTER MAGNET SHIMMING. DISTURBING THE FIXED GAP ASSEMBLY MAY DEGRADE THE MAGNET FIELD UNIFORMITY.



REAR VIEW

MODEL: 3474FG SELECTION TABLE	
FIXED GAP	ASSEMBLY NO
50mm	11901430
72mm	11901431
–	–
–	–
–	–
–	–
–	–
–	–
–	–
–	–
–	–

NOTE: 1 PARTS FITTED AT GMW

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
11	2	BN 1094	COVERS M30 NEX NUT, BLACK PLASTIC	1
10	24	BN 1064	COVERS, M12 SHCS, GRAY PLASTIC	1
9	2	BN 735	WASHER, M30 X 2 THICK FLAT S/S	
8	6	DIN 912	SHCS, M3 X 30 S/S	
7	24	DIN 912	SHCS, M12 X 50 S/S	
6	2	DIN 934	NUT, M30 S/S	
5	2	17904160	POLE RETAINER	
4	6	17904151	SHIM PAD	
3	2	17904140	POLE BOLT [for 50mm gap]	
2	2	17904130	POLE MOUNTING PLATE	
1	2	17904120	POLE CORE [for 50mm gap]	

PARTS LIST

DRAWN G.DOUGLAS 08/28/00
CHECK DATE
ENGINEERING DATE
11801603 3474FG
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 2000

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

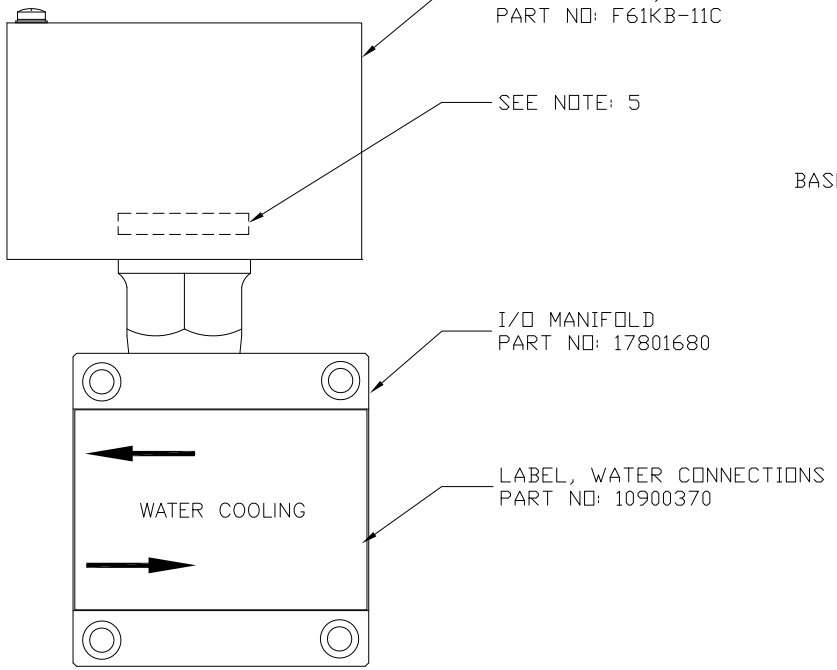
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

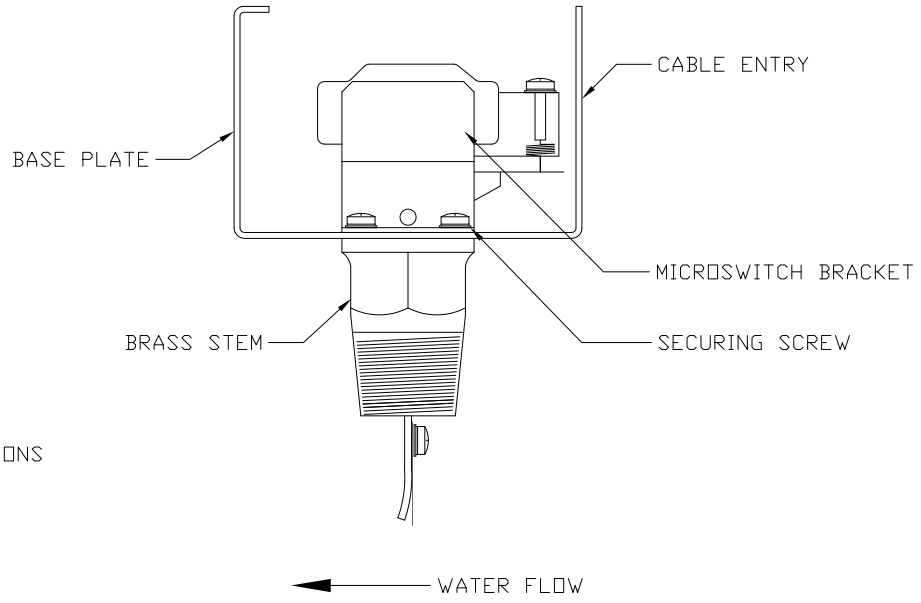
TITLE
FIXED GAP POLE GA
MODEL: 3474FG

SIZE A1 | DRAWING NO. 11901430 | REV A
SCALE 1:2 | WT kg | SHEET 1 OF 1

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		04/26/99	G.DOUGLAS
B	ADD LABEL PART NUMBER		08/27/07	G.DOUGLAS





INSTRUCTIONS ON MODIFICATION AND FITTING OF FLOW SWITCH

1. REMOVE FLOW SWITCH COVER.
2. REMOVE FOUR SECURING SCREWS AND ROTATE BASE PLATE 180 DEG.
3. REASSEMBLE MICROSWITCH BRACKET AND BASE PLATE ONTO BRASS STEM.
4. APPLY THREAD SEAL TAPE TO BASE STEM THREADED AREA.
5. REMOVE FLOW DIRECTION LABELS FROM FLOW SWITCH COVER [x2].
6. ASSEMBLE FLOW SWITCH ONTO WATER I/O MANIFOLD.
7. FIT COMPLETED FLOW SWITCH/WATER I/O MANIFOLD ASSEMBLY ONTO MAGNET.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN	G.DOUGLAS	DATE 04/26/99
CHECK		DATE
ENGINEERING		DATE
11801600	3474	
NEXT ASSY	SYSTEM	

SOFTWARE
AUTOCAD 2000

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

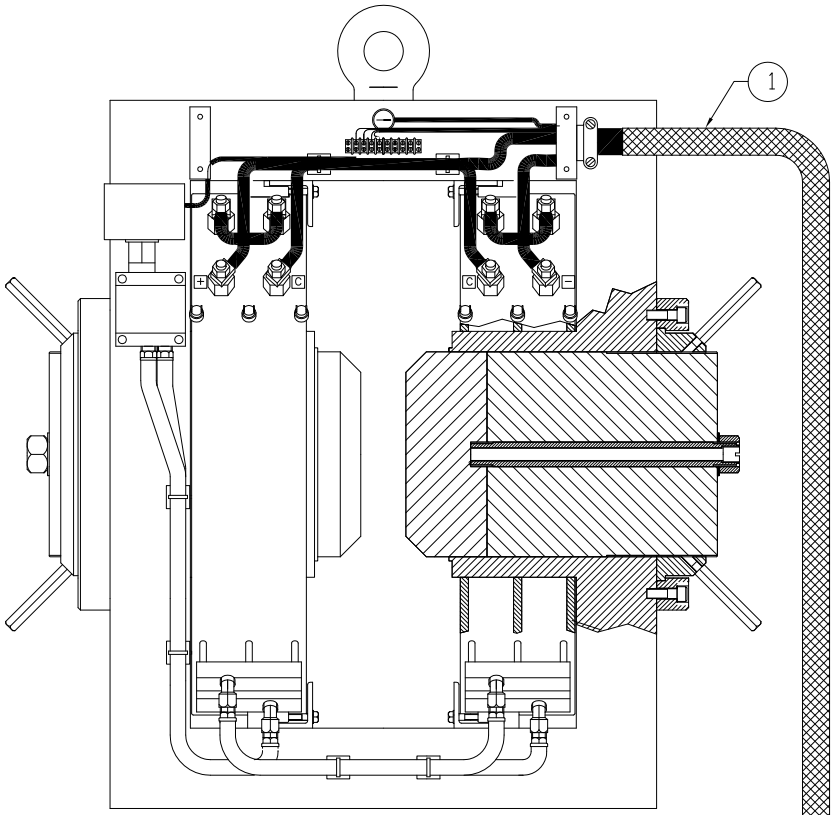
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
I/O MANIFOLD ASSEM
MODEL: 3474/5503

SIZE	DRAWING NO.	REV
A2	11901360	B

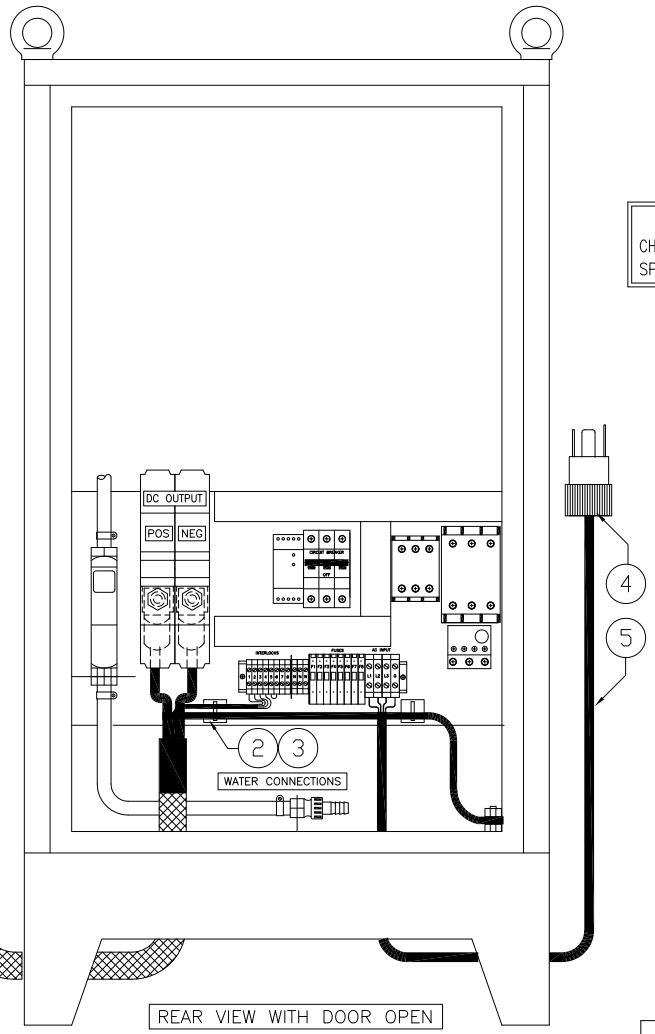
SCALE 1:1 | WT kg | SHEET 1 OF 1

MODEL: 3474 ELECTROMAGNET



REAR VIEW TERMINAL COVER REMOVED

DANFYSIK POWER SUPPLY MODEL: 853



REAR VIEW WITH DOOR OPEN

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

DANFYSIK MODEL: 853 GPIB SWITCH SETTINGS

POWER SUPPLY MOTHER BOARD		GPIB INTERFACE BOARD			
DIP SWITCH SW3		DIP SWITCH SW4	DIP SWITCH SW1		DIP SWITCH SW2
1 OFF		1 OFF	1 OFF	LSB	1 OFF
2 ON		2 OFF	2 ON	ADDRESS SWITCHES	2 OFF
3 ON		3 OFF	3 ON		3 ON
		4 ON	4 ON		4 OFF
		5 OFF	5 ON	MSB	5 ON
		6 OFF	6 OFF		6 ON
		7 ON	7 OFF		7 ON
		8 OFF	8 OFF		8 ON
DIP SW1 AND SW2 LOCATED ON M/B NOT USED FOR GPIB INTERFACE SW3/SW4 USE NORMAL LOGIC OFF=0			DIP SW1 SHOWN SET TO ADDRESS 1 [Default] SW1 1-5 USES INVERSE LOGIC OFF=1 SW2 USES NORMAL LOGIC OFF=0		

NOTE

1. POWER SUPPLY SHOWN WITH 3 PHASE 208V AC INPUT
2. REFER TO TABLE ON DWG 13900030 FOR AC INPUT RATINGS OTHER THAN 3 PHASE 208V
3. MAGNET SHOWN WITH 140 AMP CURRENT CONNECTIONS
4. MAGNET SHOWN WITH LH CABLE ENTRY, RH ENTRY OPTIONAL

N/S = NOT SUPPLIED

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/24/96	G.DOUGLAS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
5	1	4A-0404	CABLE, TYPE SO 4 CORE 4AWG, ANIXTER	N/S
4	1	8450NP	PLUG 3PHASE/50A, BRYANT	N/S
3	4	08461	CABLE TIE ADHESIVE MTG, NYL BAR-LOK	
2	3	10364	CABLE TIE, NYLON 5mm WIDE. BAR-LOK	
1	1	16900000	CURRENT & INTERLOCK CABLE 160A	

PARTS LIST

DRAWN G.DOUGLAS 02/24/96
CHECK
ENGINEERING
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

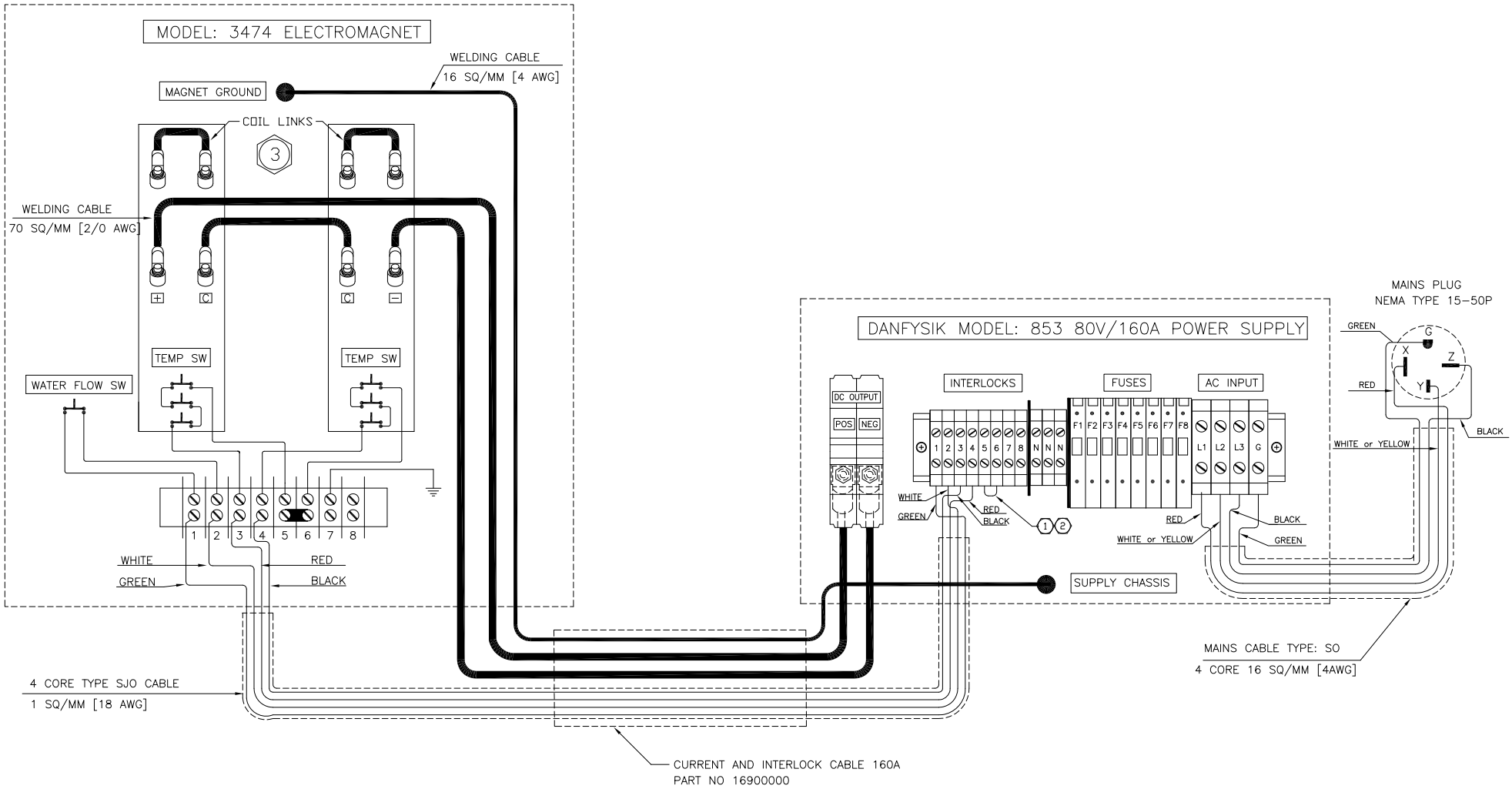
THIRD ANGLE PROJECTION

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

TITLE
ELECTRICAL ASSEM
3474/DF 853

SIZE A1 | DRAWING NO. 11900120 | REV A
SCALE NTS | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/24/97	G.DOUGLAS



NOTE:

1. REMOVE LINK BETWEEN TERM 1 & TERM 2 AND TERM 3 & TERM 4 ON POWER SUPPLY AND CONNECT INTERLOCKS WIRES AS SHOWN
2. DO NOT REMOVE LINK BETWEEN TERM 5 & TERM 6 UNLESS EMERGERGY STOP CONTROL IS CONNECTED TO THESE TERMINALS.
3. COIL LINKS SHOWN WITH SERIES CONNECTION. SEE DWG NO 11801600 FOR DETAILS

ELECTROMAGNET SYSTEM ELECTRICAL REQUIREMENTS			
AC INPUT POWER 3 PHASE, 48 to 62HZ	208V	400V	440V
AC INPUT FULL LOAD CURRENT	48	25A	23A
RECOMMENDED MAIN AC BREAKER	50	30	30
RECOMMENDED AC POWER OUTLET	15-50P	–	–
RECOMMENDED AC CABLE SIZE	16 SQ/MM	8 SQ/MM	8 SQ/MM
NOTE: DRAWING SHOWS POWER SUPPLY FOR US 3 PHASE 208V AC POWER			

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

DRAWN G.DOUGLAS 02/24/97
CHECK
ENGINEERING
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

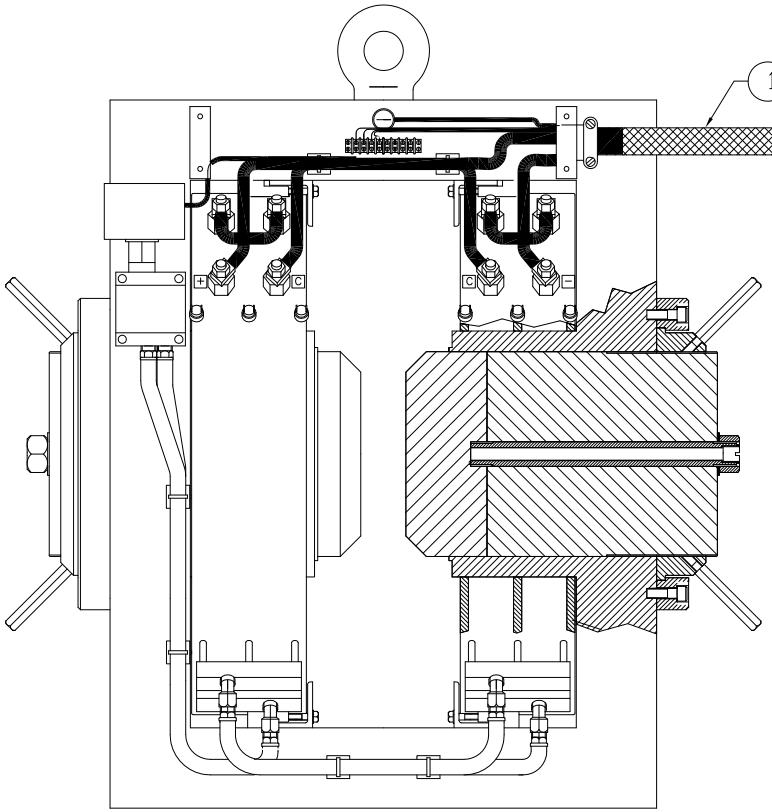
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
ELECTRICAL WIRING
3474/DF 853

SIZE A1 | DRAWING NO. 13900030 | REV A
SCALE NTS | WT kg | SHEET 1 OF 1

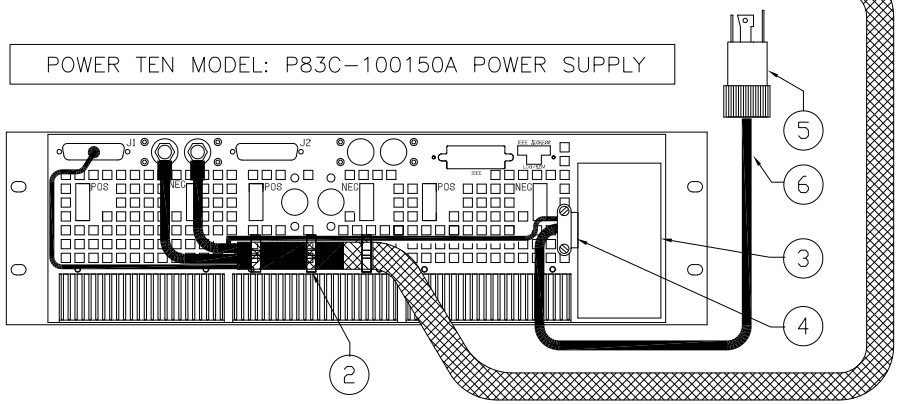
REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/02/98	G.DOUGLAS

MODEL: 3474 ELECTROMAGNET



REAR VIEW TERMINAL COVER REMOVED

POWER TEN MODEL: P83C-100150A 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 3 PHASE 208V AC INPUT
2. REFER TO TABLE ON DWG 13900380 FOR AC INPUT RATINGS OTHER THAN 3 PHASE 208V
3. MAGNET SHOWN WITH 140 AMP CURRENT CONNECTIONS
4. MAGNET SHOWN WITH LH CABLE ENTRY, RH ENTRY OPTIONAL

N/S = NOT SUPPLIED

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
5	1	4A-0404	CABLE, TYPE SO 4 CORE 4AWG, ANIXTER	N/S
4	1	8450NP	PLUG 3PHASE/50A, BRYANT	N/S
3	4	08461	CABLE TIE ADHESIVE MTG, NYL BAR-LOK	
2	3	10364	CABLE TIE, NYLON 5mm WIDE. BAR-LOK	
1	1	16900000	CURRENT & INTERLOCK CABLE 160A	

PARTS LIST

DRAWN G.DOUGLAS 10/02/98
CHECK
ENGINEERING
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

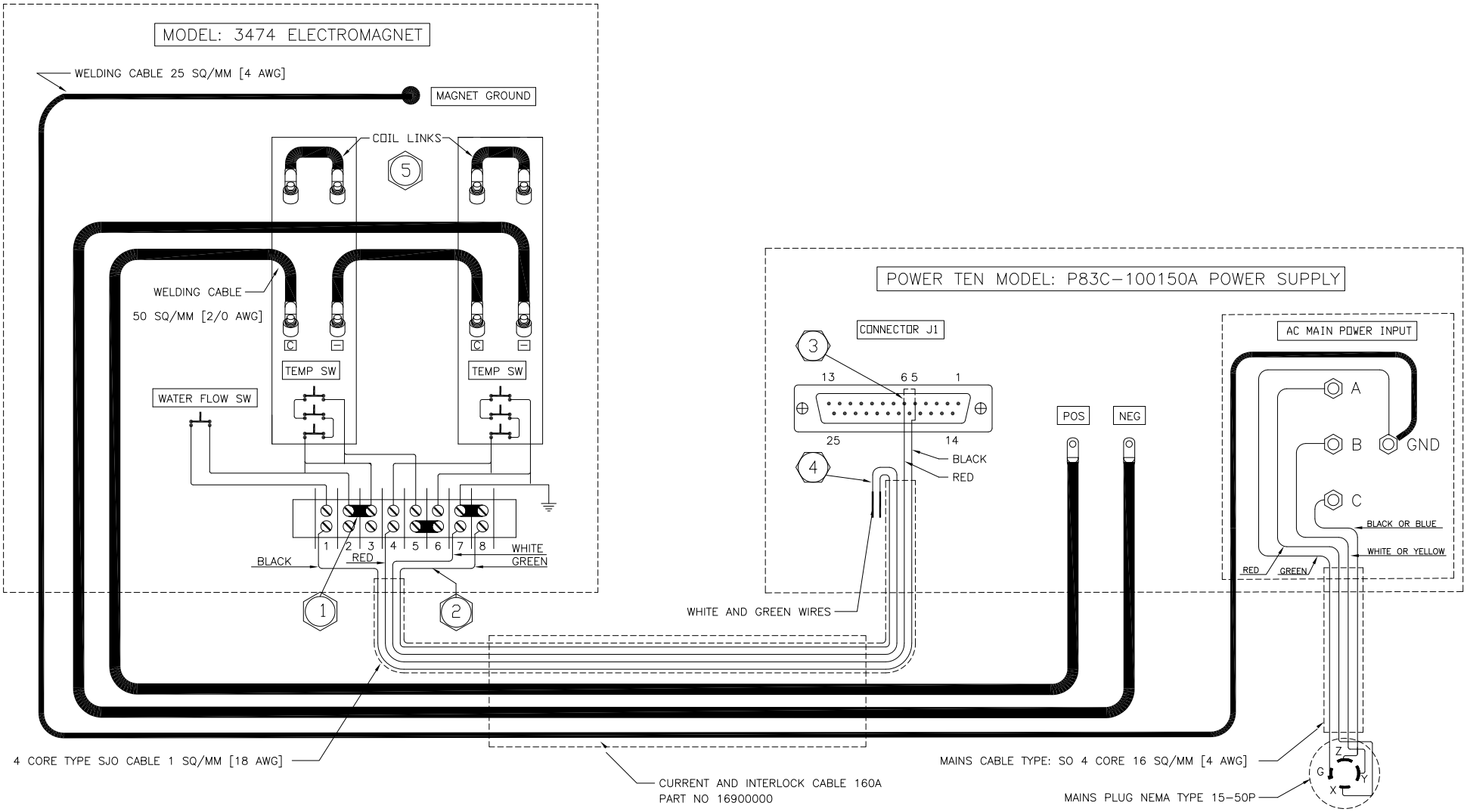
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
ELECTRICAL ASSEM
3474/P83C-100150A

SIZE A1 | DRAWING NO. 11901310 | REV A

SCALE NTS | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/03/98	G.DOUGLAS



NOTE:

1. MAGNET WATER FLOW AND TEMP INTERLOCKS LINKED IN SERIES ON MAGNET.
2. WHITE AND GREEN WATER FLOW INTERLOCK WIRES TIED TO TERM 7 & TERM 8.
3. REMOVE LINK BETWEEN PIN 5 & PIN 6 ON POWER SUPPLY AT J1, AND CONNECT INTERLOCKS WIRES AS SHOWN.
4. INSULATE WHITE AND GREEN WIRES WITH HEAT SHRINK SLEEVING [not used].
5. COIL LINKS SHOWN WITH SERIES CONNECTION. SEE DWG NO 11801600 FOR DETAILS

ELECTROMAGNET SYSTEM ELECTRICAL REQUIREMENTS			
AC INPUT POWER 3 PHASE, 48 to 62HZ	208V	400V	440V
AC INPUT FULL LOAD CURRENT	48A	25A	23A
RECOMMENDED MAIN AC BREAKER	50A	30A	30A
RECOMMENDED AC POWER OUTLET	15-50P	–	–
RECOMMENDED AC CABLE SIZE	16 SQ/MM	8 SQ/MM	8 SQ/MM
NOTE: DRAWING SHOWS POWER SUPPLY FOR US 3 PHASE 208V AC POWER			

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

DRAWN G.DOUGLAS 10/03/98 | CHECK | ENGINEERING | NEXT ASSY | SYSTEM: SOFTWARE AUTOCAD 2000

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: ELECTRICAL WIRING 3474/P83C-100150A

SIZE A1 | DRAWING NO. 13900380 | REV A

SCALE NTS | WT kg | SHEET 1 OF 1

ASSEMBLY SEQUENCE MODEL: 3474 ELECTROMAGNET ON TO 45° MOUNTING AND ROLLING/ROTATING BASE

FIGURE 1

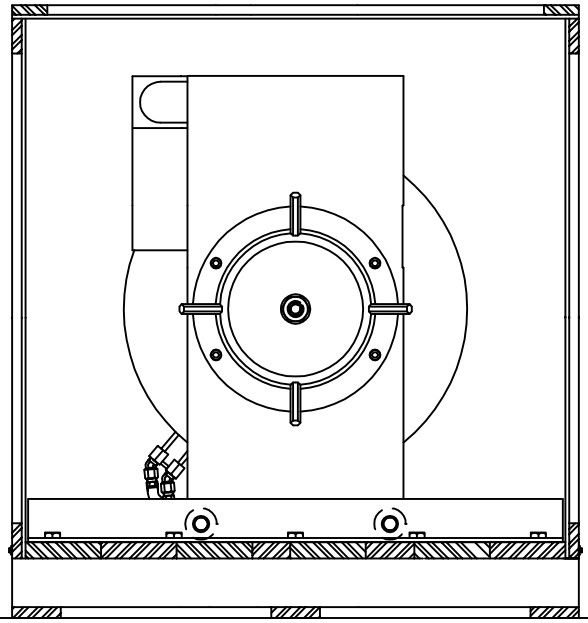


FIGURE 2

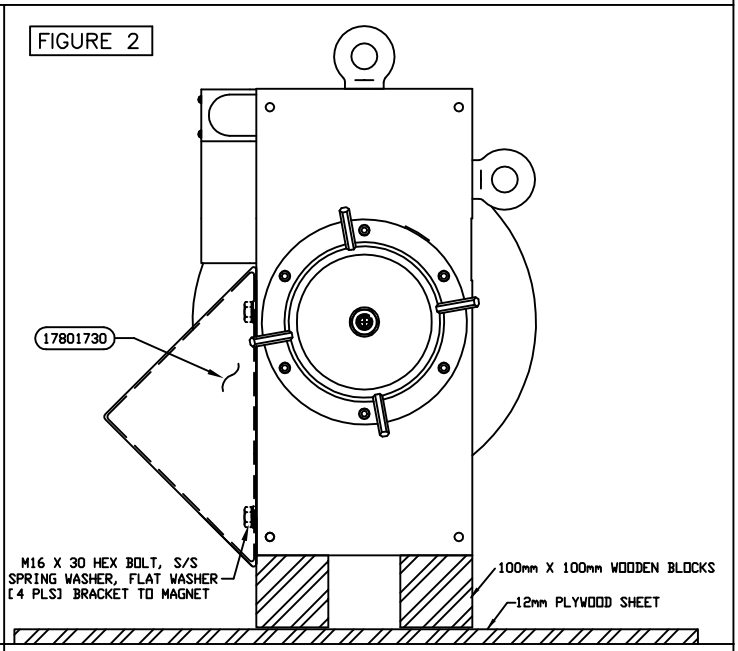


FIGURE 3

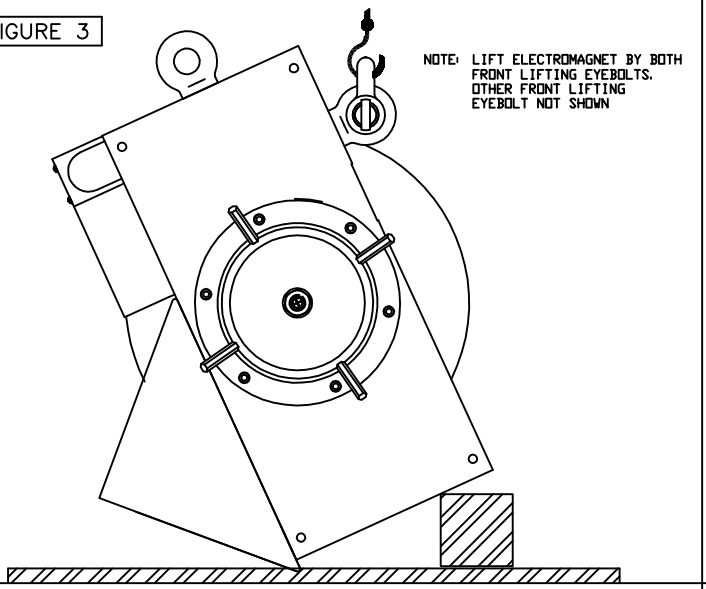


FIGURE 4

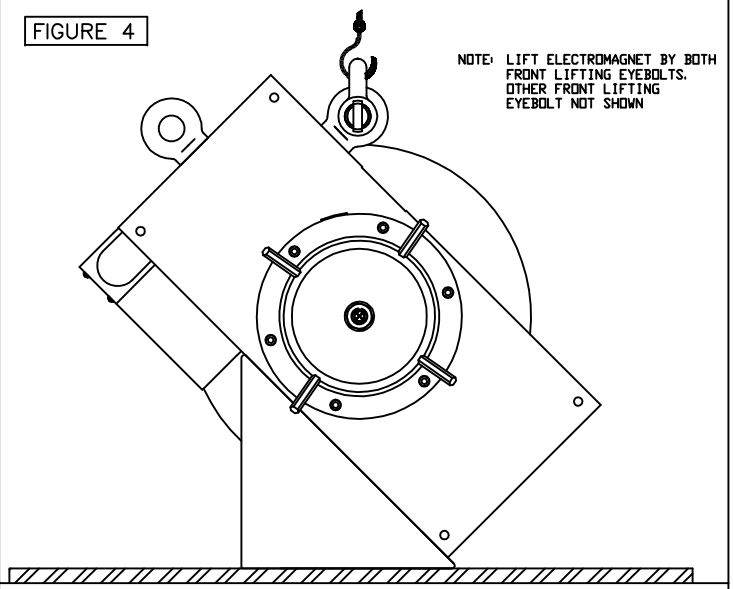


FIGURE 5

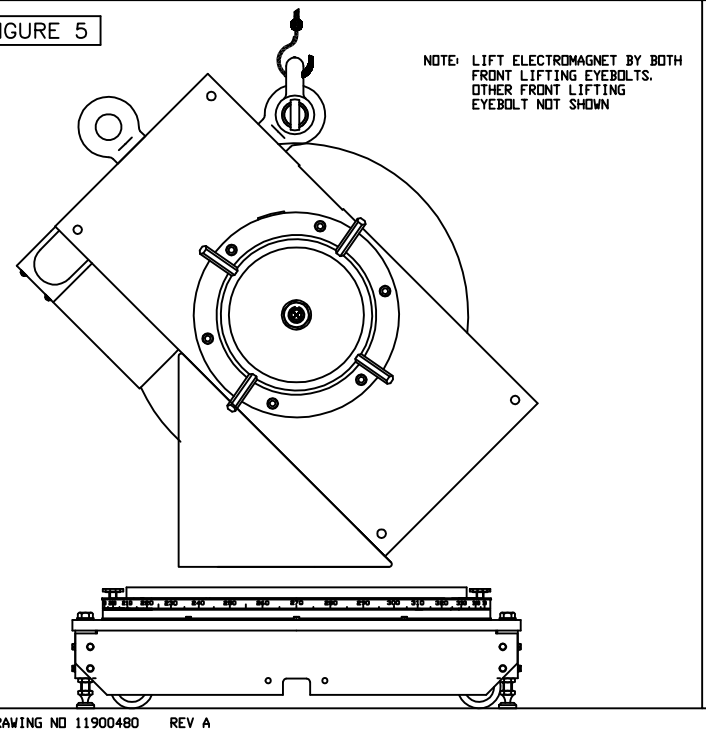
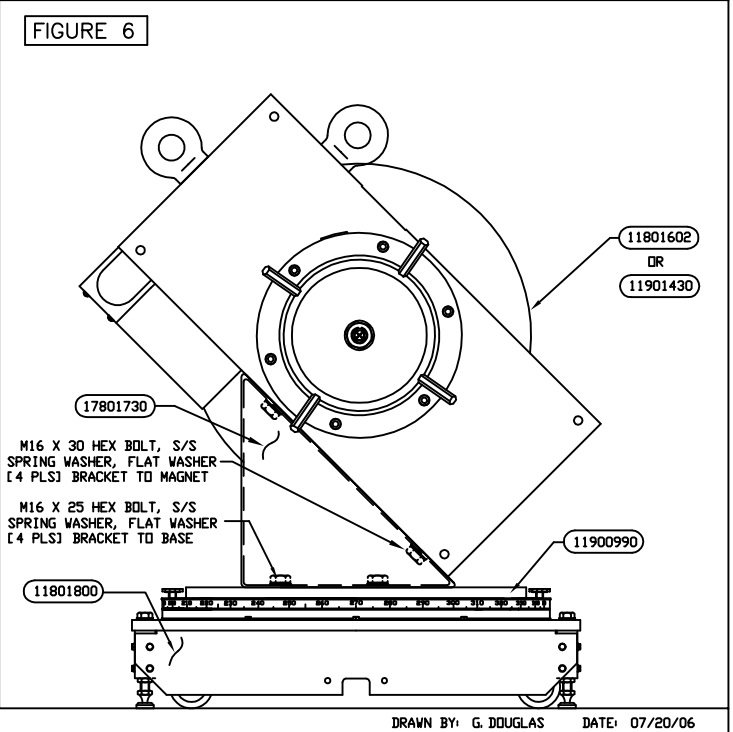


FIGURE 6

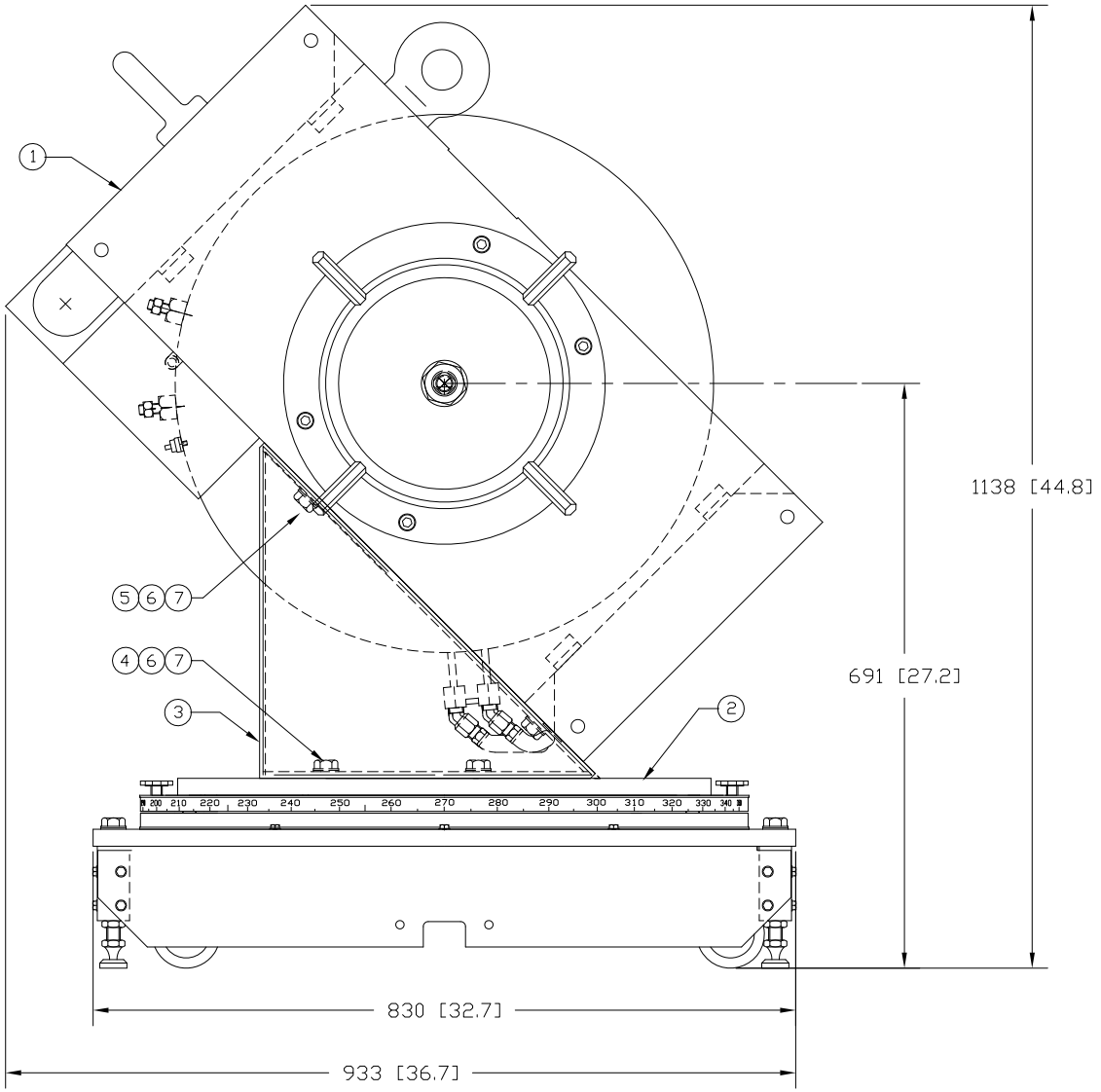


DRAWING NO 11900480 REV A

DRAWN BY: G. DOUGLAS DATE: 07/20/06

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/01/97	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	8	DIN 127 B	WASHER, LOCK M16, S/S	
6	8	DIN 125 A	WASHER, FLAT M16, S/S	
5	4	DIN 933	BOLT, HEX M16 X 30, S/S	
4	4	DIN 933	BOLT, HEX M16 X 25, S/S	
3	2	17801730	45 DEG MOUNTING BRACKET	
2	1	11900980	ROLLING/ROTATING BASE	
1	1	250 mm	ELECTROMAGNET	

PARTS LIST

DRAWN G.DOUGLAS — DATE 10/01/97
CHECK — DATE
ENGINEERING — DATE
3474
NEXT ASSY — SYSTEM
SOFTWARE AUTOCAD 2000

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

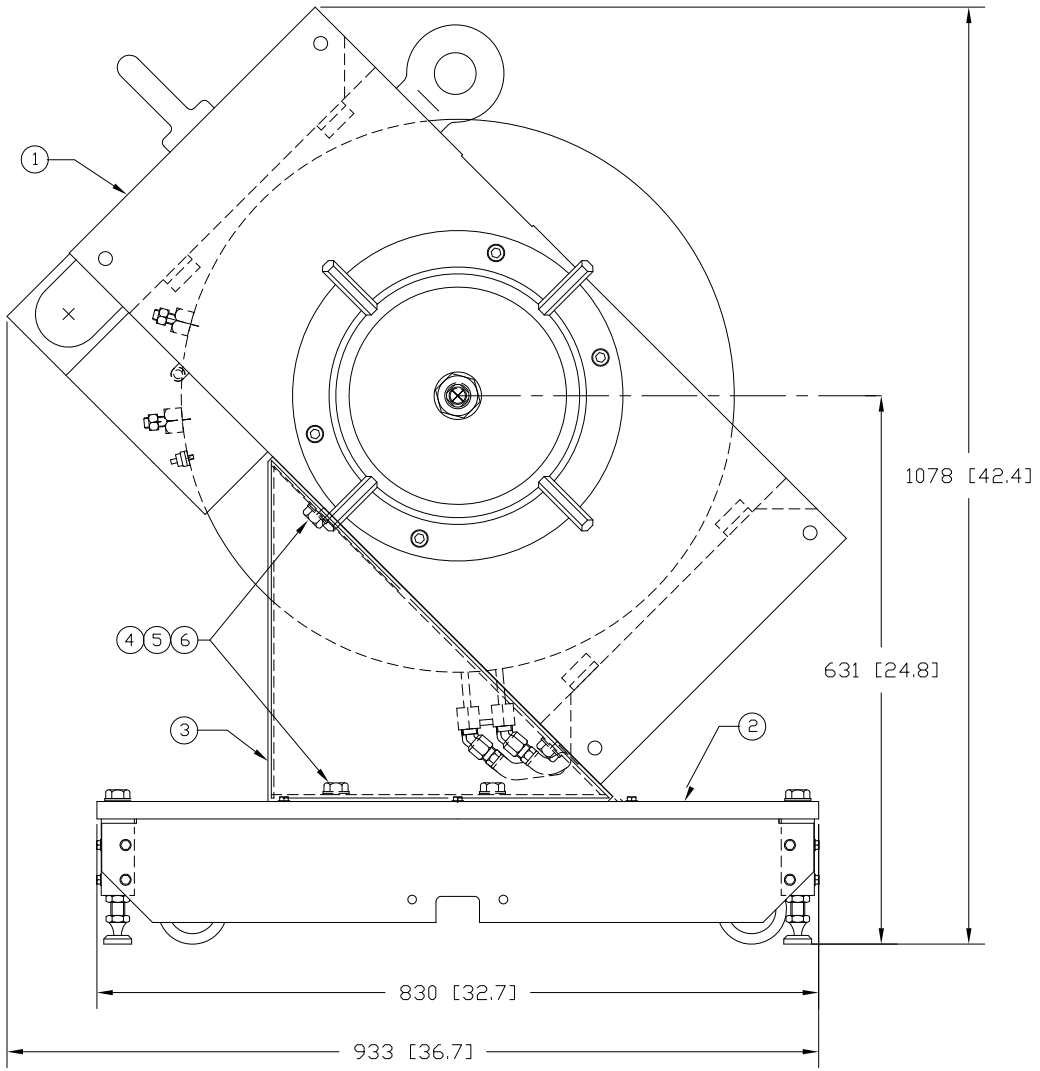
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
ROL/ROT BASE ASSY
MODEL:3474 45° MTG

SIZE A2 | DRAWING NO. 11900930 | REV A
SCALE 1:4 | WT kg | SHEET 1 OF 1

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		03/03/97	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
6	8	DIN 127 B	WASHER, LOCK M16, S/S	
5	8	DIN 125 A	WASHER, FLAT M16, S/S	
4	8	DIN 933	BOLT, HEX M16 X 30, S/S	
3	2	17801730	45 DEG MOUNTING BRACKET	
2	1	11801800	ROLLING BASE	
1	1	250 mm	ELECTROMAGNET	

PARTS LIST

DRAWN G.DOUGLAS — DATE 03/03/97
CHECK — DATE
ENGINEERING — DATE
3474
NEXT ASSY — SYSTEM
SOFTWARE AUTOCAD 2000

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

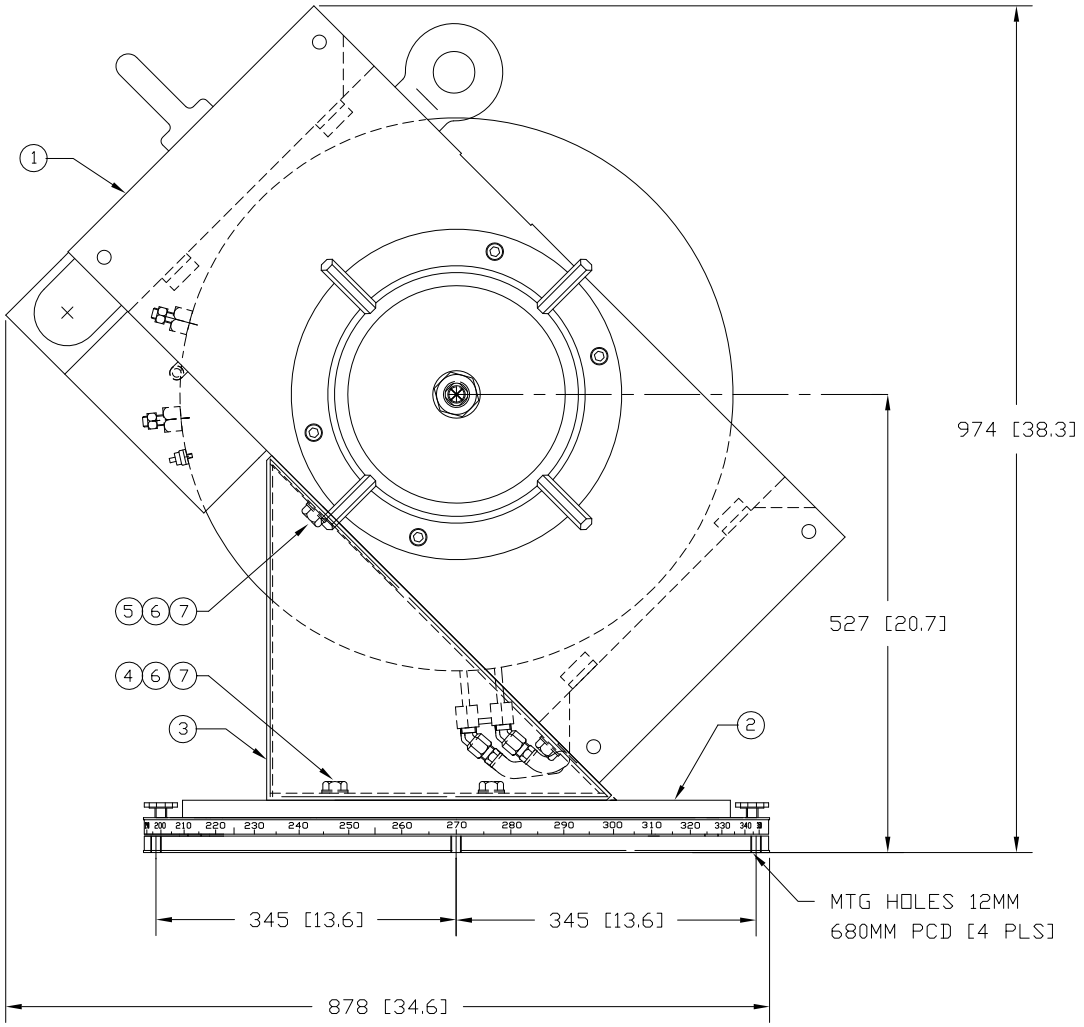
THIRD ANGLE PROJECTION

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

TITLE
ROLLING BASE ASSEM
MODEL:3474 45°MTG

SIZE A2 | DRAWING NO. 11900690 | REV A
SCALE 1:4 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/02/97	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	8	DIN 127 B	WASHER, LOCK M16, S/S	
6	8	DIN 125 A	WASHER, FLAT M16, S/S	
5	4	DIN 933	BOLT, HEX M16 X 30, S/S	
4	4	DIN 933	BOLT, HEX M16 X 25, S/S	
3	2	17801730	45 DEG MOUNTING BRACKET	
2	1	11900990	ROTATING BASE	
1	1	250 mm	ELECTROMAGNET	

PARTS LIST

DRAWN G.DOUGLAS — DATE 10/02/97
CHECK — DATE
ENGINEERING — DATE
3474
NEXT ASSY — SYSTEM
SOFTWARE AUTOCAD 2000

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

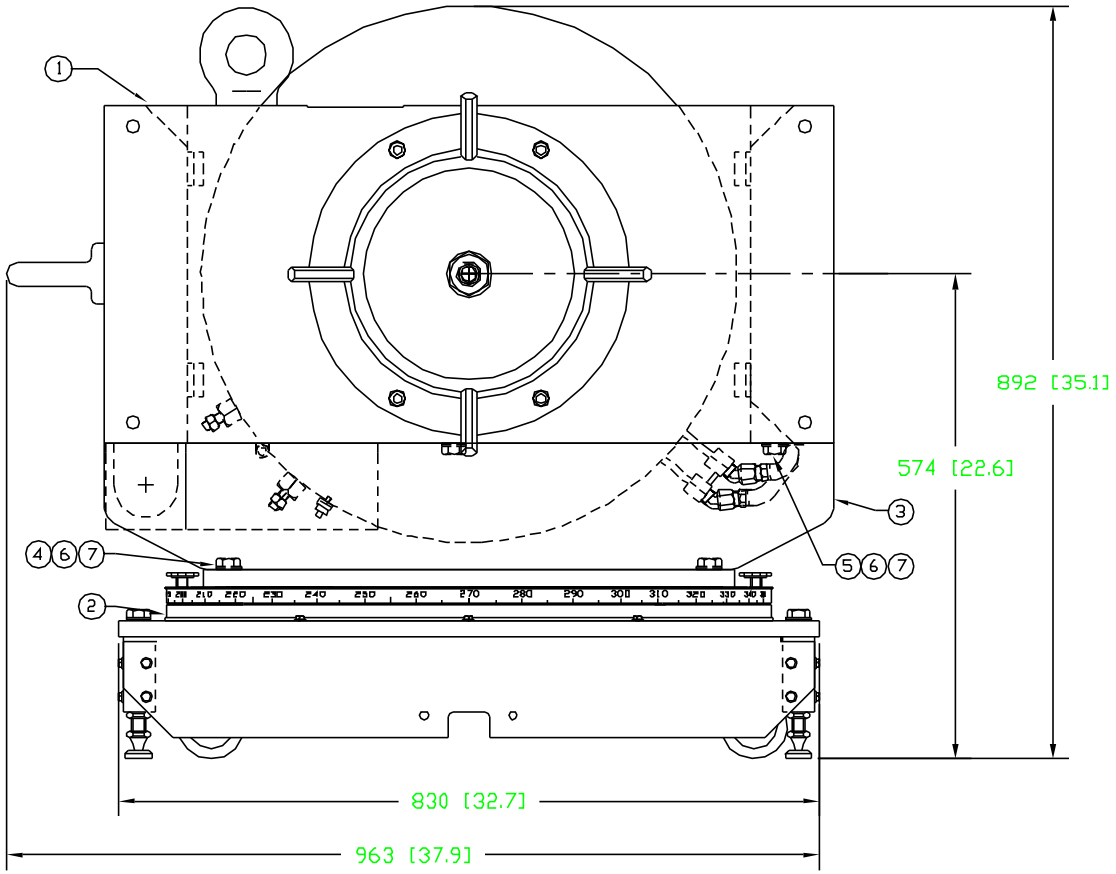
THIRD ANGLE PROJECTION

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

TITLE
ROLLING BASE ASSY
MODEL:3474 45° MTG

SIZE A2 | DRAWING NO. 11900940 | REV A
SCALE 1:4 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/02/97	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	8	DIN 127 B	WASHER, LOCK M16, S/S	
6	8	DIN 125 A	WASHER, FLAT M16, S/S	
5	4	DIN 933	BOLT, HEX M16 X 30, S/S	
4	4	DIN 933	BOLT, HEX M16 X 25, S/S	
3	1	17901250	HORIZONTAL MOUNTING BRACKET [PAIR]	
2	1	11900980	ROLLING/ROTATING BASE	
1	1	250 mm	ELECTROMAGNET	

PARTS LIST

DRAWN G.DOUGLAS	DATE 10/02/97	
CHECK	DATE	
ENGINEERING	DATE	
	3474	
NEXT ASSY	SYSTEM	
SOFTWARE: AUTOCAD 13		

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

	LINEAR INCHES	LINEAR mm
X.XXX	±.003	±0.05
X.XX	±.01	±0.1
X.X	±.03	±0.5
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.

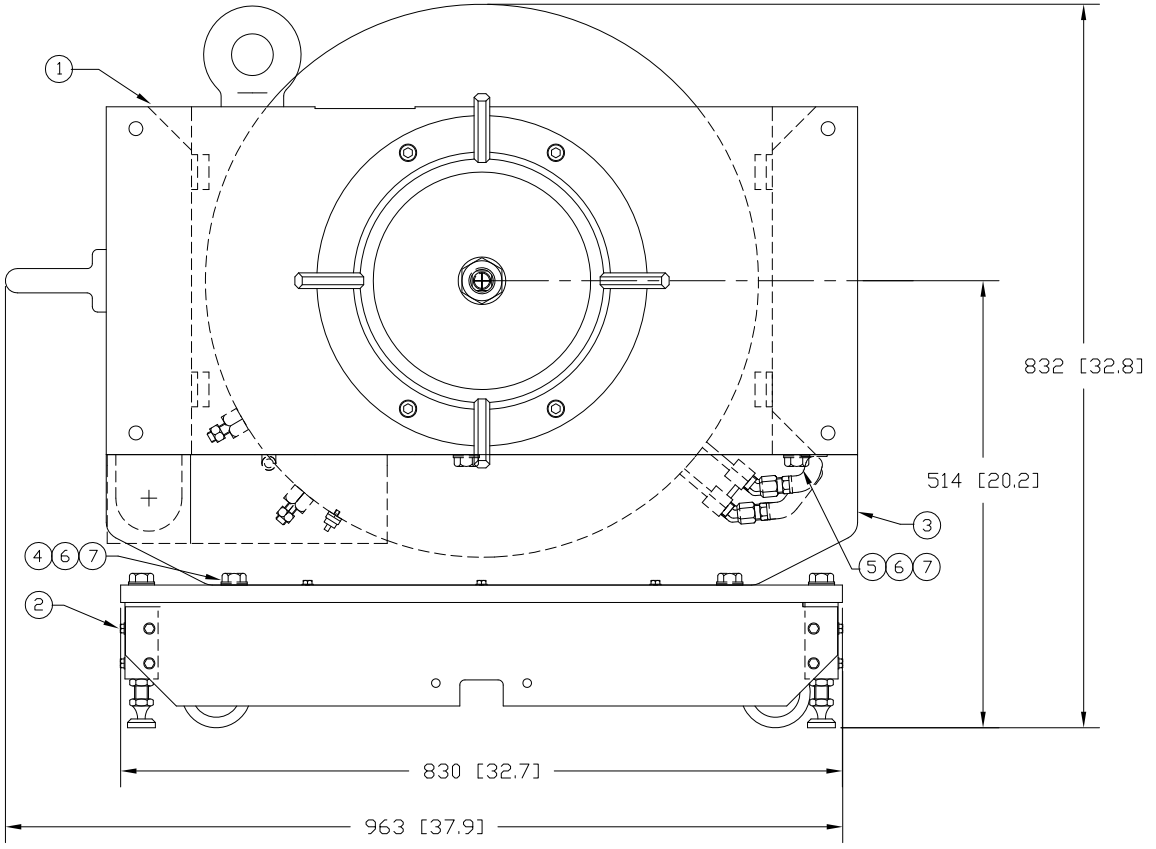
TITLE
ROL/ROT BASE ASSY
MODEL: 3474 H/MTG

SIZE	DRAWING NO.	REV
A2	11900950	A

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

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/02/97	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	8	DIN 127 B	WASHER, LOCK M16, S/S	
6	8	DIN 125 A	WASHER, FLAT M16, S/S	
5	4	DIN 933	BOLT, HEX M16 X 30, S/S	
4	4	DIN 933	BOLT, HEX M16 X 25, S/S	
3	1	17901250	HORIZONTAL MOUNTING BRACKET [PAIR]	
2	1	11801800	ROLLING BASE	
1	1	250 mm	ELECTROMAGNET	

PARTS LIST

DRAWN G.DOUGLAS	DATE 10/02/97
CHECK	DATE
ENGINEERING	DATE
	3474
NEXT ASSY	SYSTEM

SOFTWARE: AUTOCAD 2000

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: (650)802-8292 Fax: (650)802-8298.

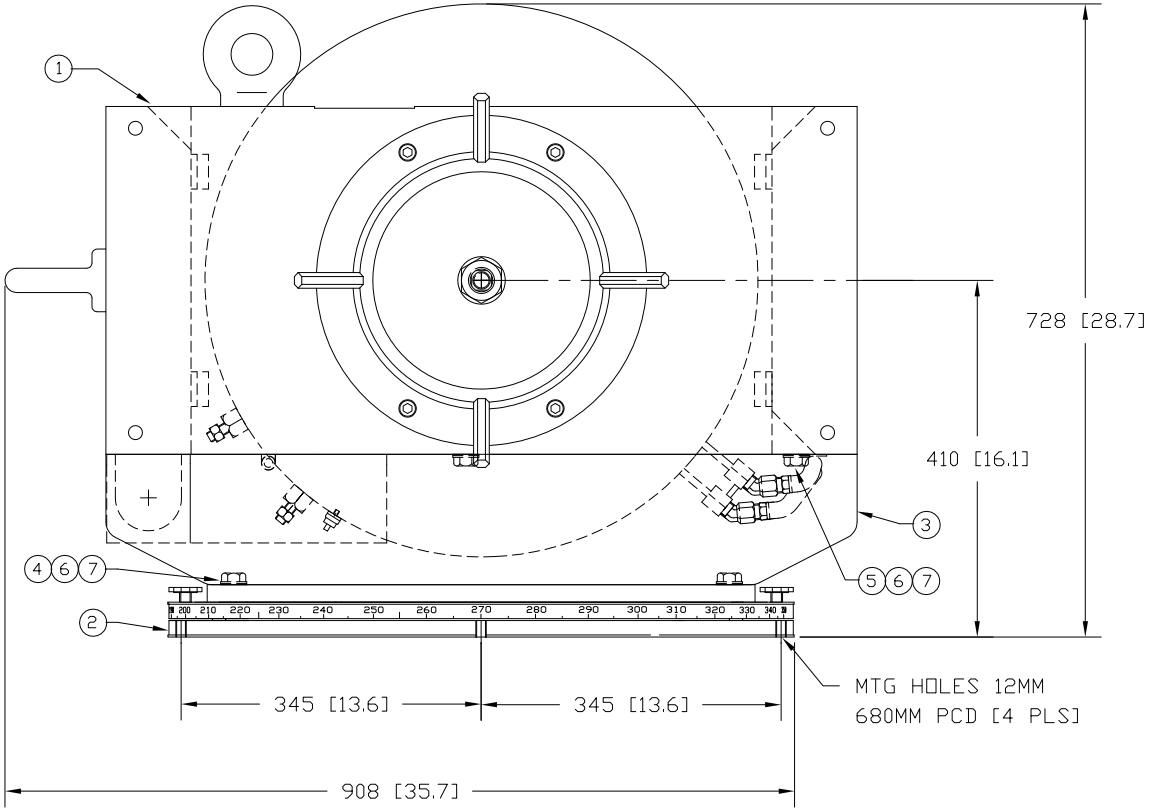
TITLE
ROLLING BASE ASSY
MODEL: 3474 H/MTG

SIZE	DRAWING NO.	REV
A2	11900960	A

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

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		10/02/97	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
7	8	DIN 127 B	WASHER, LOCK M16, S/S	
6	8	DIN 125 A	WASHER, FLAT M16, S/S	
5	4	DIN 933	BOLT, HEX M16 X 30, S/S	
4	4	DIN 933	BOLT, HEX M16 X 25, S/S	
3	1	17901250	HORIZONTAL MOUNTING BRACKET [PAIR]	
2	1	11900990	ROTATING BASE	
1	1	250 mm	ELECTROMAGNET	

PARTS LIST

DRAWN G.DOUGLAS	DATE 10/02/97
CHECK	DATE
ENGINEERING	DATE
	3474
NEXT ASSY	SYSTEM
SOFTWARE: AUTOCAD 2000	

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: (650)802-8292 Fax: (650)802-8298.

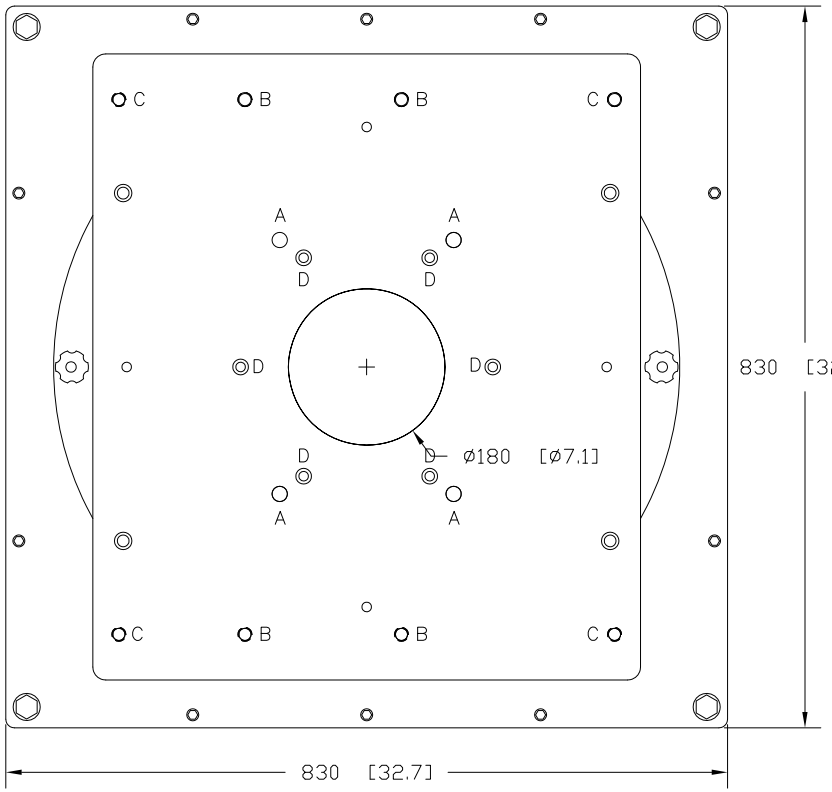
TITLE
ROTATING BASE ASSY
MODEL: 3474 H/MTG

SIZE	DRAWING NO.	REV
A2	11900970	A

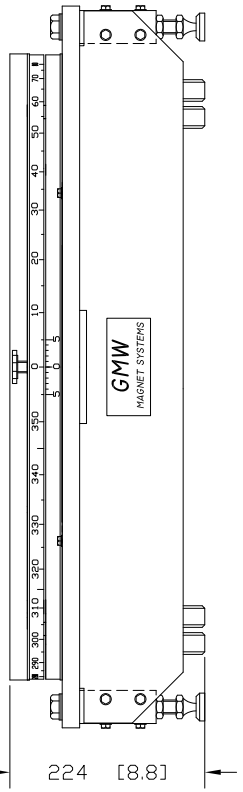
SCALE 1:4 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		11/17/93	G.DOUGLAS
B	ADD NOTE ON ROTATION LOCKS @ B4		08/24/08	G.DOUGLAS

TOP VIEW



FRONT VIEW

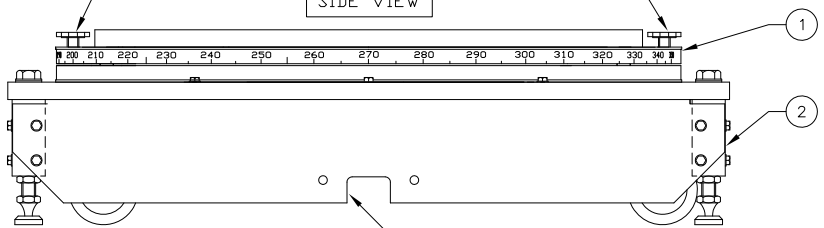


MOUNTING HOLES
A=3474 DIRECT MOUNTING
B=3474 45 DEG MOUNTING
C=3474 HORZ MOUNTING
D= MRB SPOOL MOUNTS

ROTATION LOCKS

UNDO TO ALLOW ROTATION
TIGHTEN TO STOP ROTATION

SIDE VIEW



CUTOUT FOR ROLLING BASE GUIDE ASSEMBLY
DWG NO 11901320

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
2	1	11801800	ROLLING BASE ASSY	
1	1	11900990	ROTATING BASE ASSY	

PARTS LIST

DRAWN G.DOUGLAS	DATE 11/17/93	DO NOT SCALE FROM DRAWING
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)
ENGINEERING	DATE	

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

NEXT ASSY | SYSTEM

SOFTWARE AUTOCAD 2000

THIRD ANGLE PROJECTION

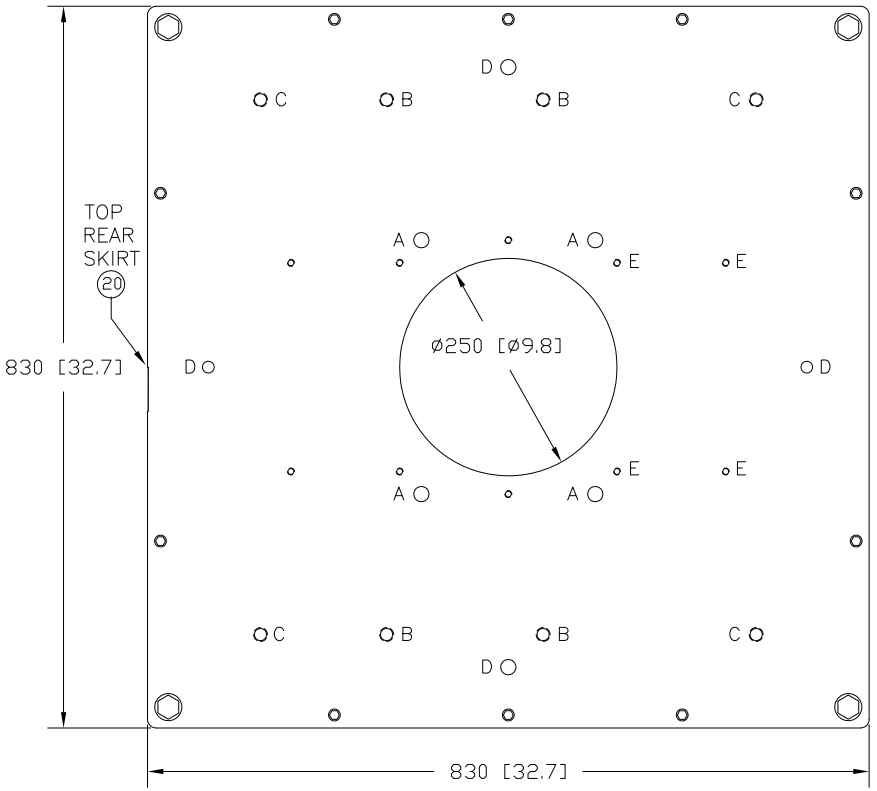
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
ROLLING/ROTATING BASE ASSY
MODEL: 3474

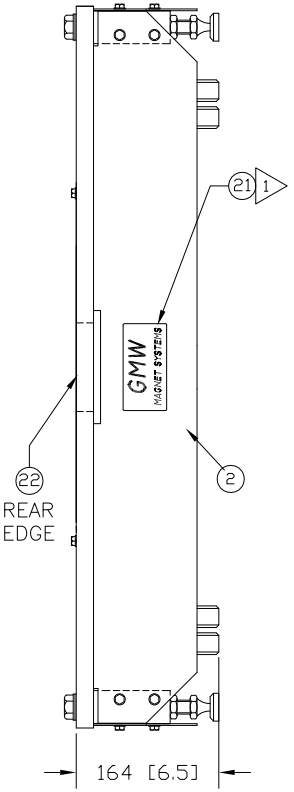
SIZE	DRAWING NO.	REV
A2	11900980	B

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

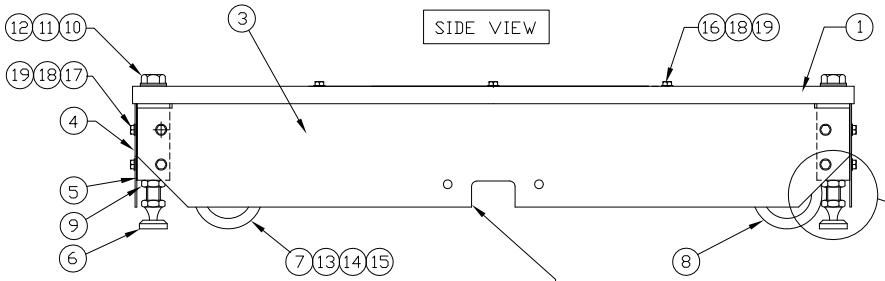
TOP VIEW



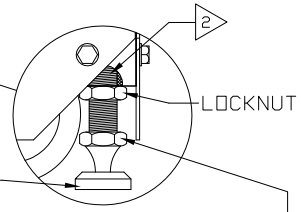
FRONT VIEW



SIDE VIEW



CUTOUT FOR ROLLING BASE GUIDE
ASSEMBLY DWG NO 11901320



SCREW NUT IN/OUT TO ADJUST HEIGHT
AND LEVEL OF ROLLING BASE

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
B	REDRAWN		12/06/92	A.MARTIN
C	ADD TOP VIEW, HORZ/MTG HOLES "C"		03/04/97	G.DOUGLAS
D	ADD MRD MOUNTING HOLES, CHG PARTS LIST		11/13/97	G.DOUGLAS
E	CHG POSITION OF ITEM 22, ITEMS 7 & 8 NOW FITTED	AT B/S	07/21/03	G.DOUGLAS
F	ADD DETAIL @ A2, AND NOTE 2		09/29/08	G.DOUGLAS

MOUNTING HOLES
A=3474 DIRECT MOUNTING
B=3474 45 DEG MOUNTING
C=3474 HORZ MOUNTING
D=ROTATING BASE MOUNTING
E= MRD MOTOR DRIVE MOUNTS

1 FIT LABEL ON CENTER LINE 35mm UP FROM BOTTOM OF SKIRT

2 APPLY GENERAL PURPOSE GREASE TO INTERNAL THREAD [x4]

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
22	1	10900210	LABEL, IDENTIFICATION	
21	1	10900200	LABEL, GMW MAGNET SYSTEMS	
20	1	605-677	RUBBER PLUG, 30MM DIA OD R-S	
19	26	DIN 127 B	WASHER, SPRING M6, S/S	
18	26	DIN 125 A	WASHER, FLAT M6, S/S	
17	16	DIN 933	BOLT, HEX M6 X 12, S/S	
16	10	DIN 933	BOLT, HEX M6 X 30, S/S	
15	16	DIN 127 B	WASHER, LOCK M10, S/S	
14	16	DIN 125 A	WASHER, FLAT M10, S/S	
13	16	DIN 933	BOLT, HEX M10 X 20, S/S	
12	4	DIN 127 B	WASHER, LOCK M16, S/S	
11	4	DIN 125 A	WASHER, FLAT M16, S/S	
10	4	DIN 933	BOLT, HEX M16 x 30, S/S	
9	4	DIN 439 B	NUT, M16 HALF S/S	
8	2		CASTER, SWIVEL ALBION 2-72-TM-03101-S	
7	2		CASTER, FIXED ALBION 2-72-TM-013101-R	
6	4	17904540	LEVELING FOOT	
5	4	17801820	SUPPORT LEG	
4	1	17801793	SKIRT PANEL, REAR	
3	2	17801792	SKIRT PANEL, LH & RH SIDE	
2	1	17801791	SKIRT PANEL, FRONT SIDE	
1	1	17801810	BASE PLATE	

PARTS LIST

DRAWN A.MARTIN	DATE 12/06/92	DO NOT SCALE FROM DRAWING
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)
ENGINEERING	DATE	
		3474
NEXT ASSY	SYSTEM	
SOFTWARE AUTOCAD 2000		

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

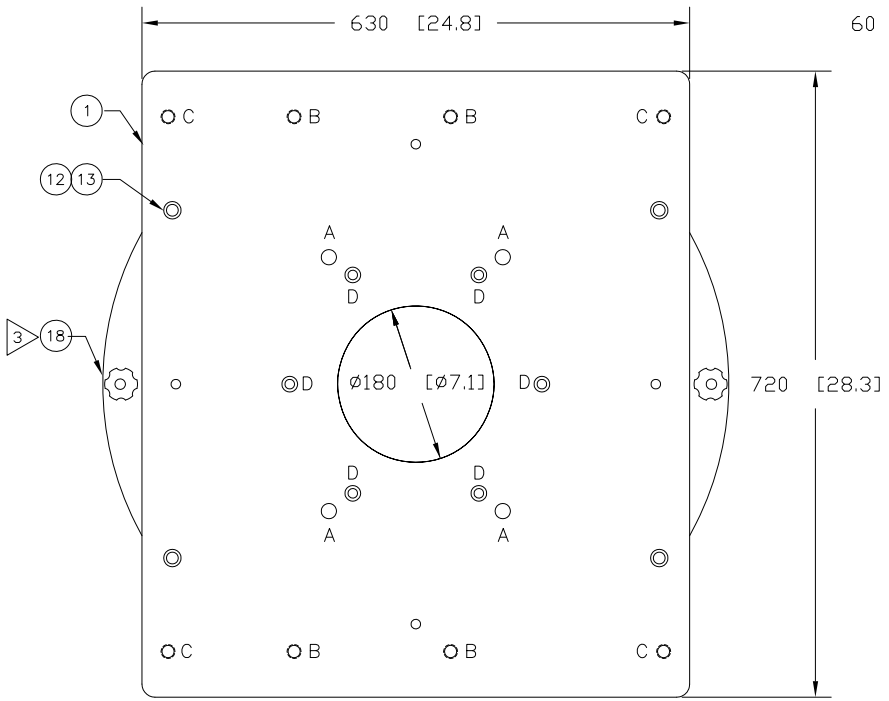
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
ROLLING BASE ASSY
MODEL: 3474

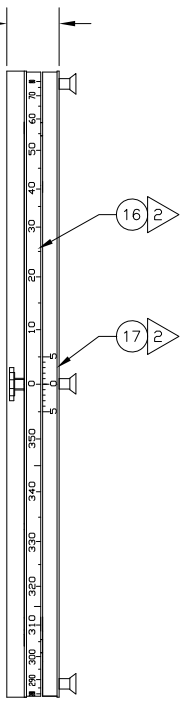
SIZE	DRAWING NO.	REV
A2	11801800	F

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

TOP VIEW



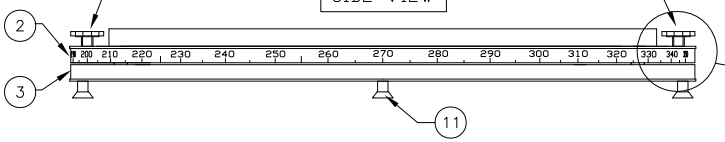
FRONT VIEW



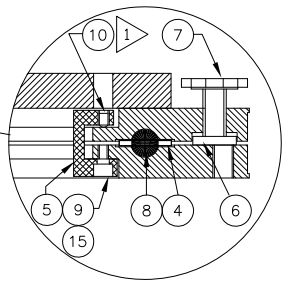
ROTATION LOCKS

UNDO TO ALLOW ROTATION
TIGHTEN TO STOP ROTATION

SIDE VIEW



DETAILED VIEW



SCALE 2:1

NOTES:

1. ADJUST SET SCREW FOR MINIMUM CLEARANCE. ALLOW FOR ROTATION WITHOUT BINDING, THEN LOCTITE SHSC.
2. FORM LABEL TO RING DIA, CLEAN SURFACE BEFORE FITTING.
3. FIT ITEM 18 DIRECTLY OPPOSITE ITEM 17 ON LOWER TRUST RING.
4. APPLY GREASE TO BEARING SURFACES BEFORE ASSEMBLY.

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		11/15/93	G.DOUGLAS
B	CHG BALL GROVE AND ITEM 8 FROM 15.00 TO 15.88		07/28/98	G.DOUGLAS
C	ADD ROTATION LOCK NOTE @ B4, DELETE ITEM 14		08/29/08	G.DOUGLAS

MOUNTING HOLES

A=3474 DIRECT MOUNTING
B=3474 45 DEG MOUNTING
C=3474 HORZ MOUNTING
D= MRB SPOOL MOUNTS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
18	1	10900140	LABEL, INDENTIFICATION	
17	1	10900130	LABEL, INDEX	2
16	1	10900120	LABEL, GRADUATIONS 0–360°	2
15	4	BN 792	WASHER, M6 INT RIBBED LOCK SP/S	
14			DELETED	
13	4	BN 792	WASHER, M12 INT RIBBED LOCK SP/S	
12	4	DIN 912	SHCS, M12 X 25 S/S	
11	4	DIN 7991	SHCS, M12 X 35 FLAT HEAD S/S	
10	4	DIN 916 A2	SHSS, M6 X 8 OVAL POINT S/S	1
9	4	DIN 912	SHCS, M6 X 10 S/S	
8	64	RB–15.875	BALL BEARING, 15.88MM DIA, [5/8"]SKF	
7	2	17802170	HANDWHEEL, M10	
6	2	17901330	CLAMP PAD	
5	4	17802150	RETAINING CLAMP	
4	1	17901320	BEARING SPACER	
3	1	17901312	LOWER THRUST RING	
2	1	17901311	UPPER THUST RING	
1	1	17901300	TRANSISION PLATE	

PARTS LIST

DRAWN G.DOUGLAS	DATE 11/15/93	DO NOT SCALE FROM DRAWING
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)
ENGINEERING	DATE	
NEXT ASSY	SYSTEM	
SOFTWARE AUTOCAD 2000		

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.

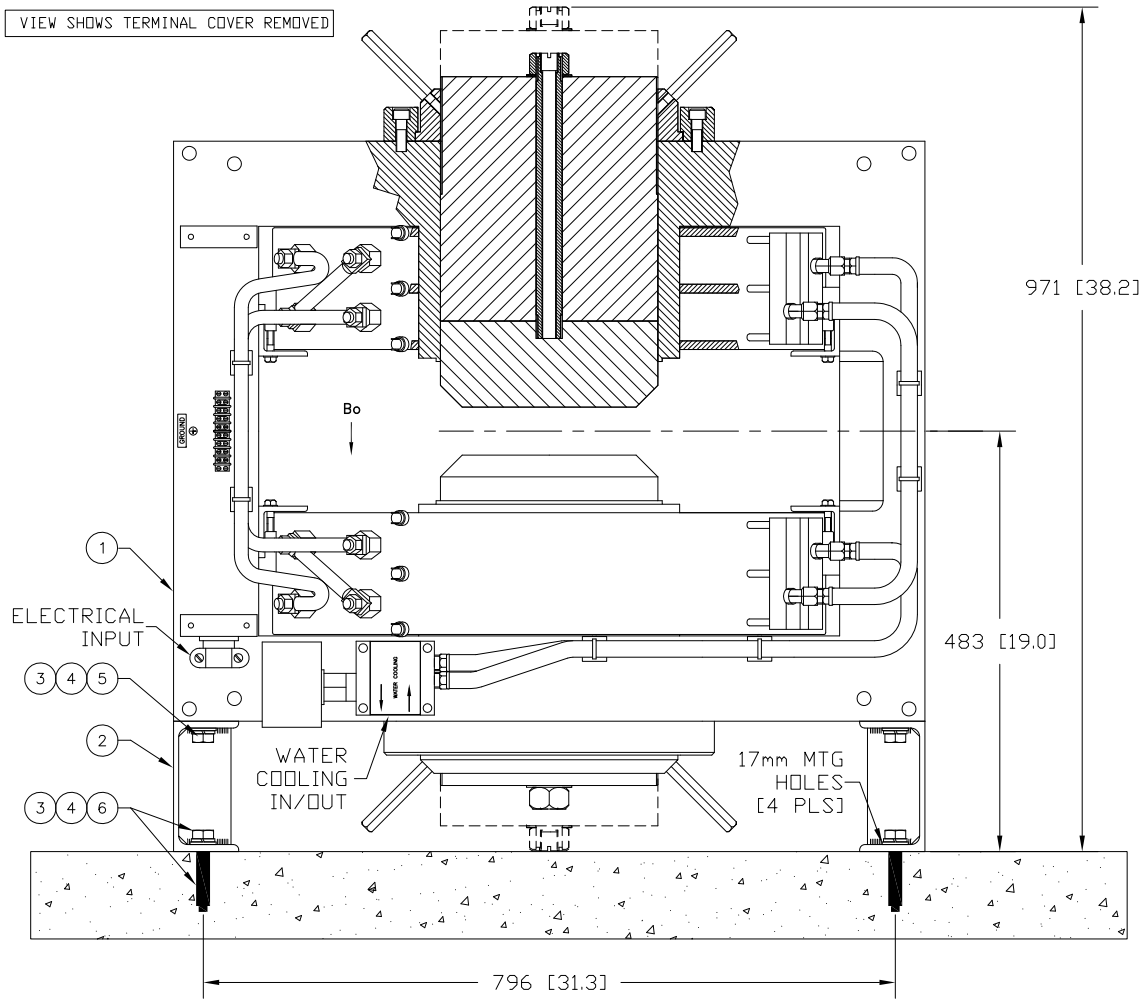
TITLE
ROTATING BASE ASSY
MODEL: 3474

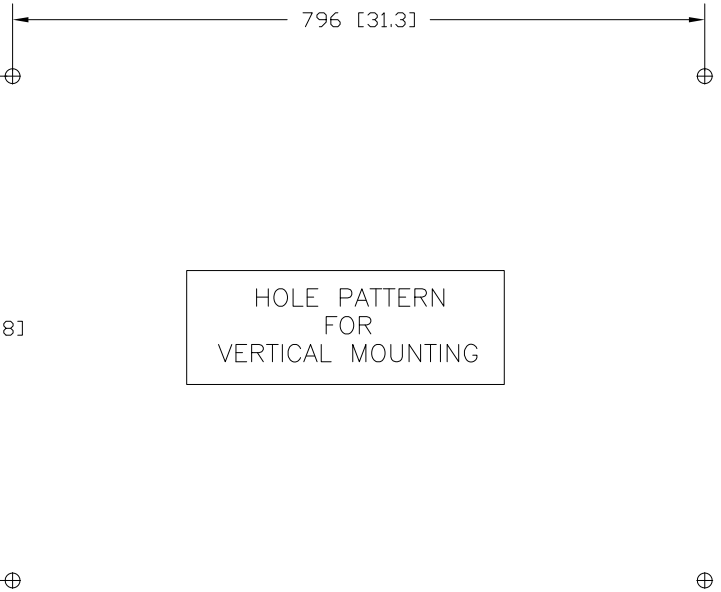
SIZE	DRAWING NO.	REV
A2	11900990	C

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

ELECTROMAGNET REAR VIEW

VIEW SHOWS TERMINAL COVER REMOVED





HOLE PATTERN
FOR
VERTICAL MOUNTING

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/27/97	G.DOUGLAS
B	ADD REAR YOKE CUTOUT, MOVE WATER HOSES		08/25/99	G.DOUGLAS

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
6	4		BOLT, MI6 or 5/8" EXPANSION	
5	4	DIN 933	BOLT, MI6 x 35 HEX HD S/S	
4	8	DIN 127 B	WASHER, M16 SPRING LOCK, S/S	
3	8	DIN 125 A	WASHER, M16 FLAT, S/S	
2	2	17802690	VERTICAL MOUNTING BRACKET	
1	1	3474	ELECTROMAGNET,250 mm	

PARTS LIST

*** WARNING ***

WHEN THE 3474 ELECTROMAGNET IS VERTICALLY MOUNTED IT MUST BE BOLTED TO THE FLOOR SECURELY AS SHOWN.

DRAWN G.DOUGLAS	DATE 02/27/97	DO NOT SCALE FROM DRAWING
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)
ENGINEERING	DATE	
		3474
NEXT ASSY	SYSTEM	
SOFTWARE AUTOCAD 2000		

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

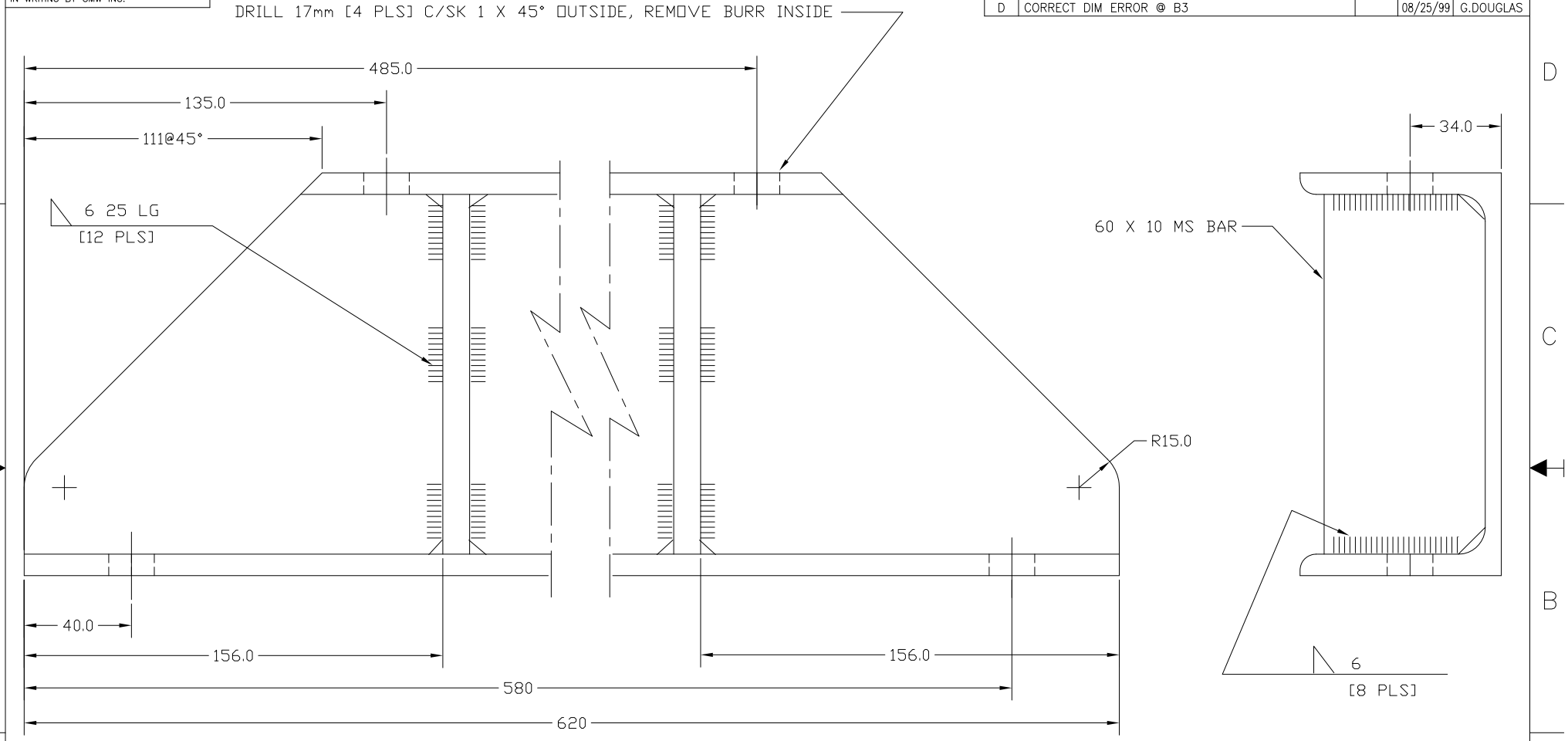
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

TITLE
VERTICAL MTG ASSY
MODEL: 3474

SIZE	DRAWING NO.	REV
A2	11900490	B

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

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
C	REDRAWN		12/03/92	A.MARTIN
D	CORRECT DIM ERROR @ B3		08/25/99	G.DOUGLAS



NOTE:

1. MATL. 150 x 75 M.S CHANNEL
2. BREAK ALL SHARP EDGES 0.2mm
3. PAINT 2 COATS POLANE T
   INSTRUMENT TAN, MEDIUM TEXTURE
   TO BSL TP85800010
4. TWO BRACKETS REQD PER MAGNET

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN A.MARTIN	DATE 12/03/92	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	63	1.6

TITLE: VERT MTG BRACKET MODEL: 3474

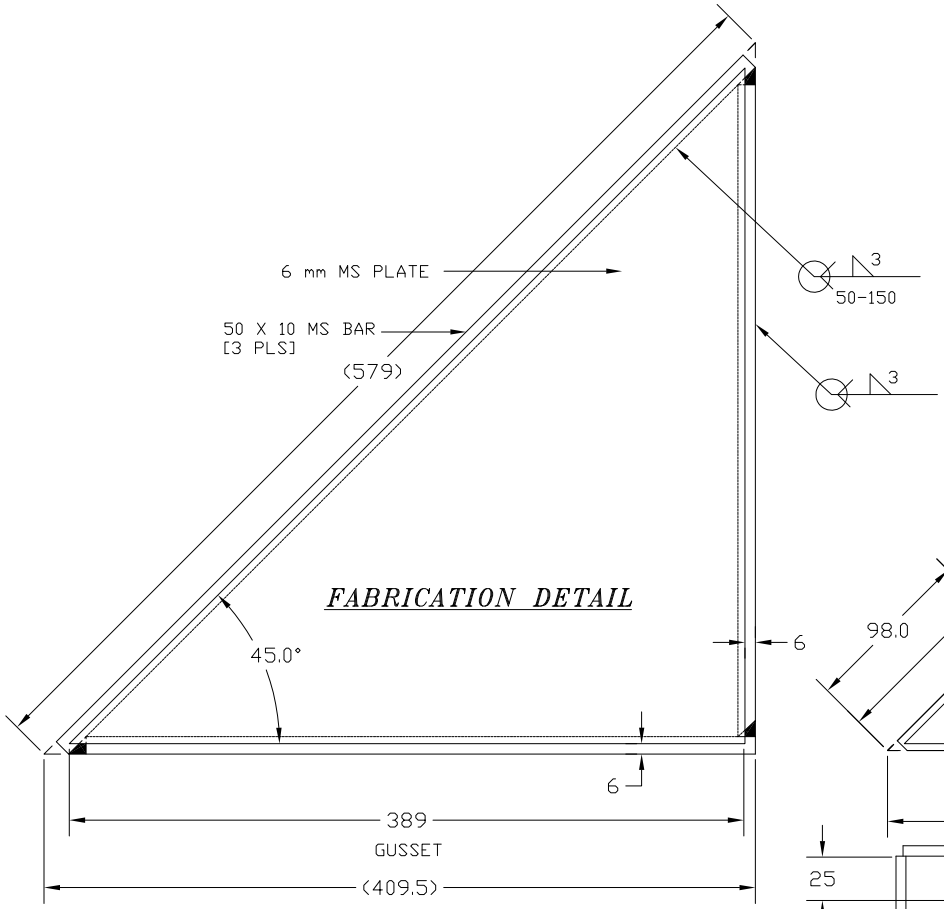
	3474	
NEXT ASSY	SYSTEM	
SOFTWARE: AUTOCAD 13	THIRD ANGLE PROJECTION	

SIZE	DRAWING NO.	REV
A2	17802690	D

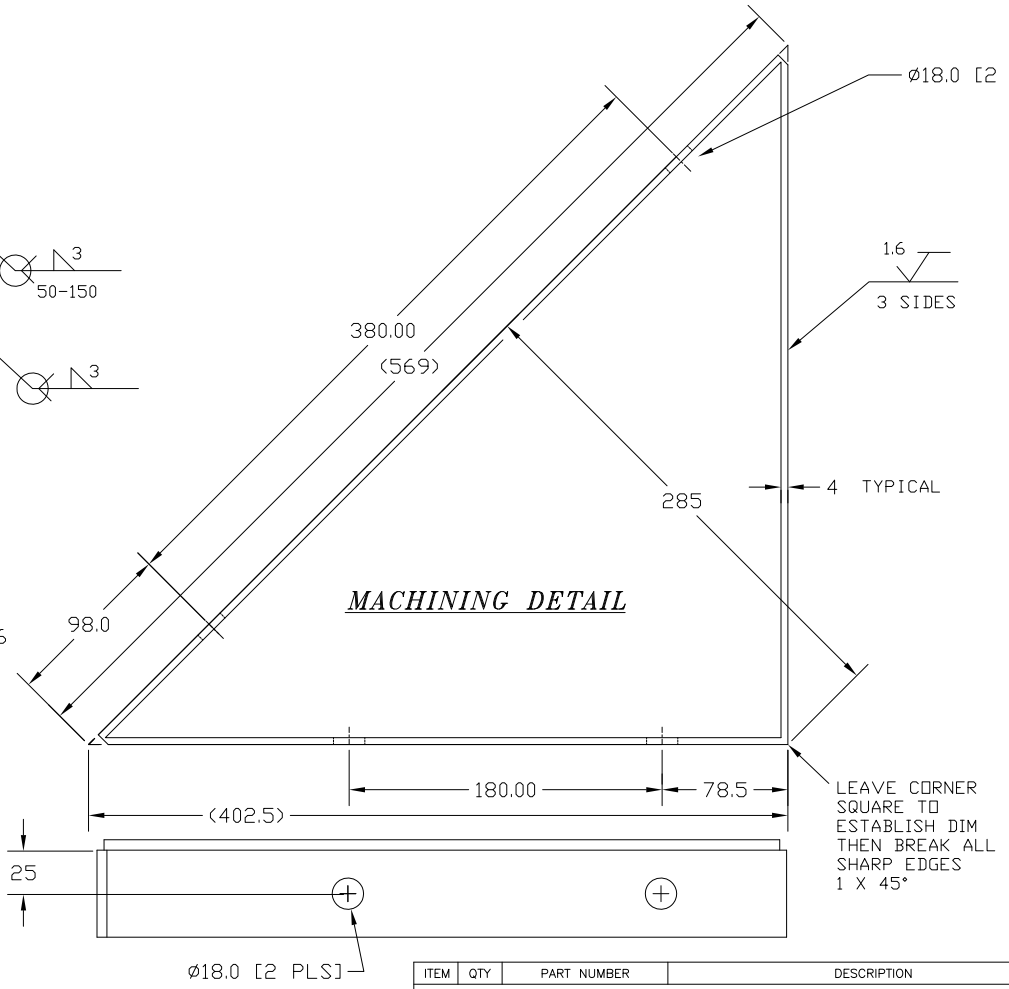
SCALE 1:1	WT kg	SHEET 1 OF 1

REVISIONS

REV	DESCRIPTION	DRAFT	DATE	APPROVED
B	REDRAWN		12/08/92	A.MARTIN



FABRICATION DETAIL



MACHINING DETAIL

NOTES

FINISH: PAINT INSTRUMENT TAN, MEDIUM TEXTURE
PER BSL TP85800010

PER MAGNET REQUIRES: 1 LEG AS DRAWN, 1 LEG MIRROR IMAGE

BOLT SET PER MAGNET REQUIRES:
QTY 8 M16 X 25 HEX BOLT S/S, FLAT WASHER S/S, SPRING WASHER S/S.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN A.MARTIN	DATE 12/08/92	DO NOT SCALE FROM DRAWING
CHECK	DATE	DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)
ENGINEERING	DATE	
		3474
NEXT ASSY	SYSTEM	
SOFTWARE: AUTOCAD 2000		

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

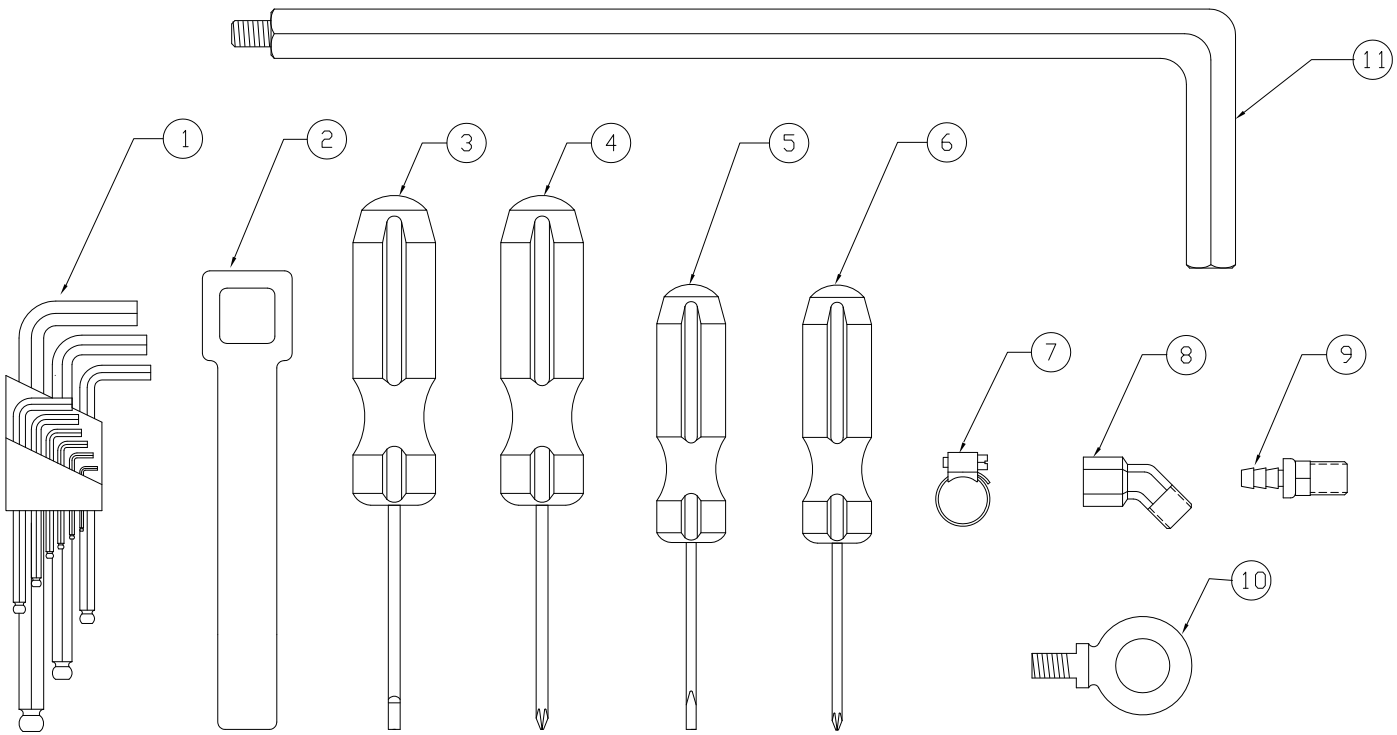
GMW
P.O. Box 2578, Redwood City, CA 94064
Tel: (650)802-8292 Fax: (650)802-8298.

TITLE
45 DEG MTG BRK
MODEL: 3474

SIZE	DRAWING NO.	REV
A2	17801730	B

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

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		02/25/97	G.DOUGLAS



ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
13	1	V701	STORAGE BOX, PLASTIC. FLAMBEAU	
12	1		LABEL, TOOL KIT	
11	2	17900010	POLE CAP REMOVAL TOOL	
10	2	DIN 580	EYE BOLT, M33	
9	2	KA08-06MB	HOSE COUPLING, 1/2"ID, BRASS, 3/8NPT	
8	2	124-B-06	ELBOW, 45° , BRASS 3/8NPT. IE	
7	2	350-006	HOSE CLIP, TRIDON	
6	1	62-021	SCREWDRIVER, PHILLIPS. STANLEY	
5	1	62-133	SCREWDRIVER, SLOTTED. STANLEY	
4	1	62-022	SCREWDRIVER, PHILLIPS, STANLEY	
3	1	62-036	SCREWDRIVER, SLOTTED. STANLEY	
2	1	17802840	WRENCH, POLE CAP RETAINING BOLT	
1	1	BLX 9mm	HEX KEY WRENCH SET, BONDHUS	

PARTS LIST

DRAWN G.DOUGLAS	DATE 02/25/97	DO NOT SCALE FROM DRAWING (DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)
CHECK	DATE	
ENGINEERING	DATE	
11801602	3474	
11801601	3474	
11801600	3474	
NEXT ASSY	SYSTEM	
SOFTWARE AUTOCAD 13		

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

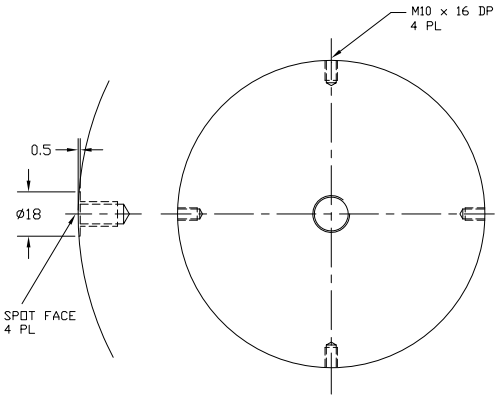
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

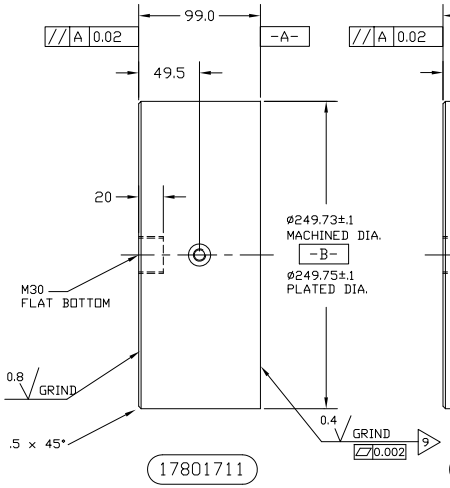
TITLE
TOOL KIT
MODEL: 3474

SIZE	DRAWING NO.	REV
A1	18900010	A

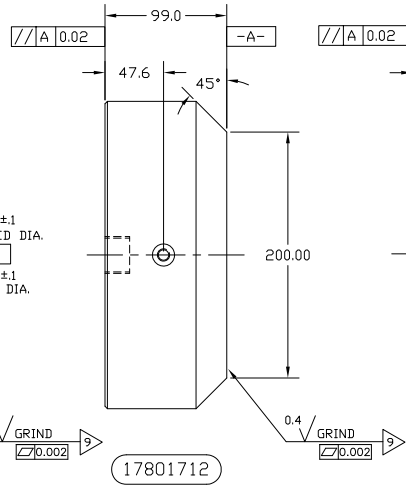
SCALE 1:1 | WT kg | SHEET 1 OF 1

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
E	REDRAWN		12/06/92	A.MARTIN
F	CHG SURFACE FINISH, TOLERANCE AND NOTES.		10/26/00	G.DOUGLAS

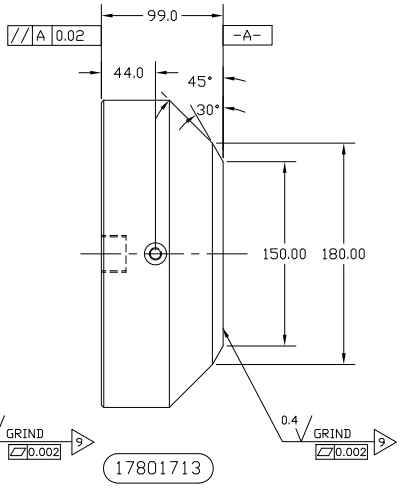




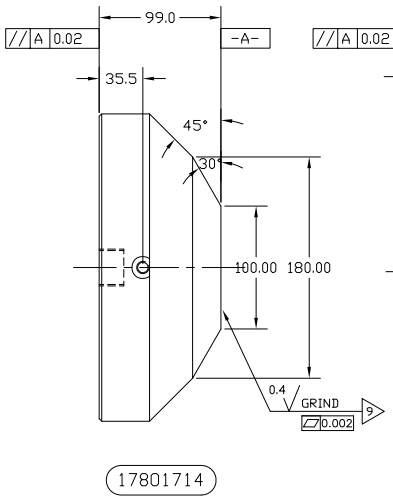
17801711



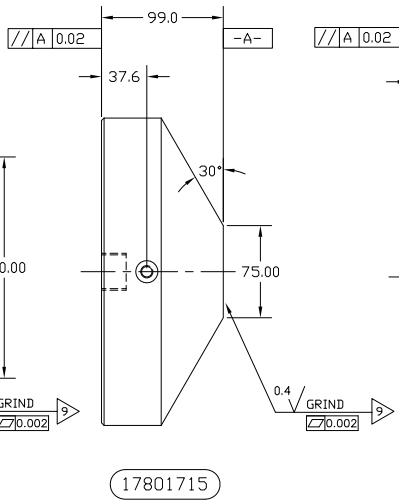
17801712



17801713



17801714



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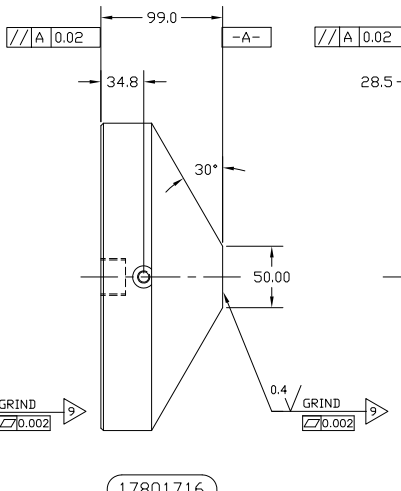
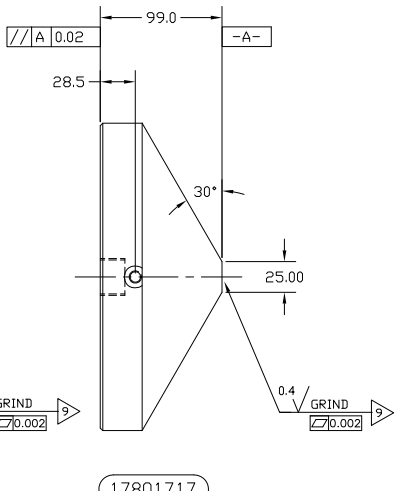


17801716



17801717

NOTES

1. MATERIAL: 1006 LOW CARBON STEEL PLATE.
2. POLE PIECES FOR EACH PRODUCTION RUN ARE TO BE CUT FROM THE SAME RAW PLATE AND SAME PROXIMITY
3. ROUGH MACHINE TO ø255 PRIOR TO HEAT TREATMENT.
4. ANY VOID, LAMINATION, OR OTHER SUCH DEFECT WHICH BECOME APPARENT DURING MACHINING WILL BE CAUSE TO REJECT THE PART.
5. ANNEAL TO BSL TP85800040.
6. BREAK ALL SHARP CORNERS 0.2 MAX UNLESS OTHERWISE STATED.
7. STAMP BACK FACE WITH S/NO AS DIRECTED.
8. SURFACE GRIND BOTH POLE FACES. GRIND POLE FRONT FACE LAST, TO AVOID SCRATCHING, OR SURFACE DAMAGE.
9. "ELECTROCLEAN ONLY AFTER GRINDING" TO BSL 85800120 DO NOT BEAD BLAST, OR ORBITAL SAND SURFACES.
10. FINISH: EN PLATE 0.01 THICK TO BSL TP85800120.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN	A.MARTIN
DATE	12/06/92
CHECK	
DATE	
ENGINEERING	
DATE	
11801600	3474
NEXT ASSY	SYSTEM
SOFTWARE	AUTOCAD 2000

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

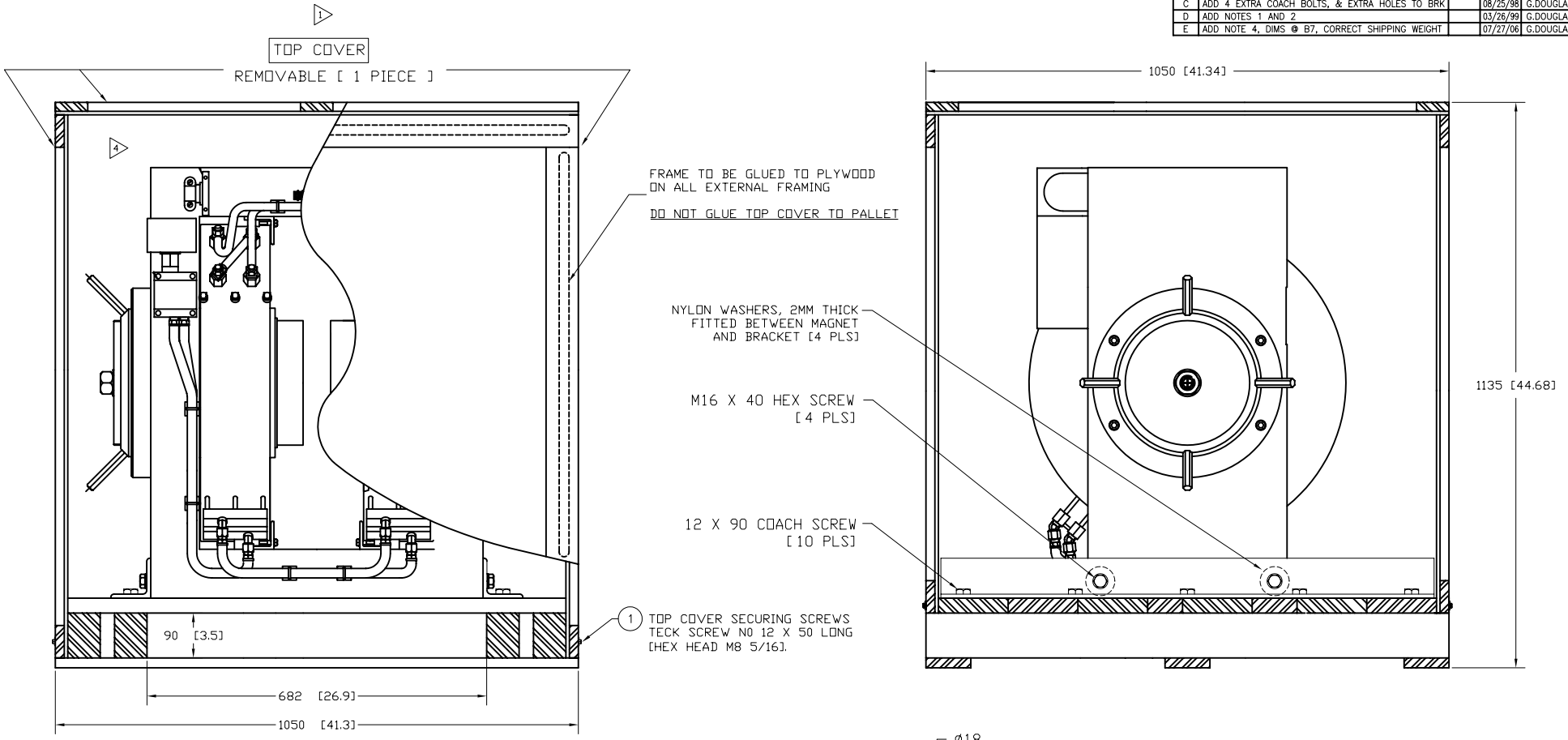
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

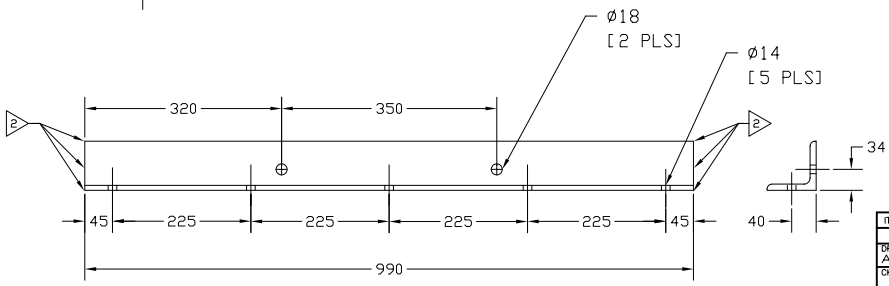
TITLE
POLE CAPS
MODEL: 3474

SIZE	DRAWING NO.	REV
A1	17801710	F

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

REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		12/14/93	A.MARTIN
B	ADD NOTE TO GLUE EXTERNAL FRAMES, ADD DIMS		11/03/97	G.DOUGLAS
C	ADD 4 EXTRA COACH BOLTS, & EXTRA HOLES TO BRK		08/25/98	G.DOUGLAS
D	ADD NOTES 1 AND 2		03/26/99	G.DOUGLAS
E	ADD NOTE 4, DIMS @ B7, CORRECT SHIPPING WEIGHT		07/27/06	G.DOUGLAS





MAGNET MOUNTING BRACKET [2 REQ]

SHIPPING WEIGHT: 1675 kg (3685 lb) 3

NOTE:

1. THE 3474 SHIPPING CRATE HAS A ONE PIECE TOP COVER
2. REMOVE ALL SHARP EDGES 0.5mm
3. MAGNET VIEW & WEIGHT GIVEN FOR 250mm POLE CAPS FITTED.
4. WRAP MAGNET WITH 0.125mm THICK PLASTIC SHEET PLACE SILICA GEL PACK NORDIC DESICCANT BAG 250-NPD-2501001141 INSIDE PLASTIC WRAP. SEAL SIDES SEAMS OF PLASTIC WRAP WITH HEAT GUN SO THAT MAGNET AND SILICA GEL PACK IS COMPLETELY SEALED INSIDE.

TOP COVER REMOVAL

1. REMOVE THE TOP COVER SECURING SCREWS. SEE ITEM (1)
2. GRIP THE TOP COVER AT THE TOP LH AND RH CORNERS
3. LIFT THE TOP COVER VERTICALLY HIGH ENOUGH TO CLEAR THE MAGNET
4. MOVE THE TOP COVER SIDEWAYS AND PLACE ON FLOOR

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN	A.MARTIN 12/14/93
CHECK	DATE
ENGINEERING	DATE
NEXT ASSY	3474 SYSTEM
SOFTWARE	AUTOCAD 2000

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

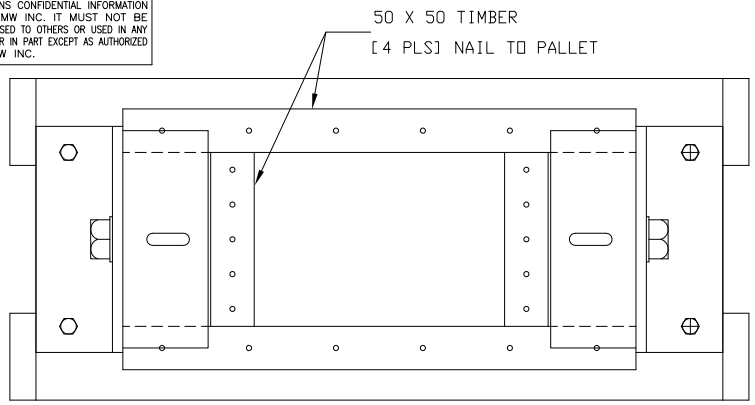
GMW
955 Industrial Rd, San Carlos, CA 94070
Tel: (650)802-8292. Fax: (650)802-8298.

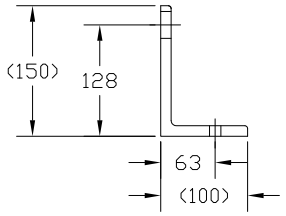
TITLE
SHIPPING CRATE ASSY
MODEL: 3474

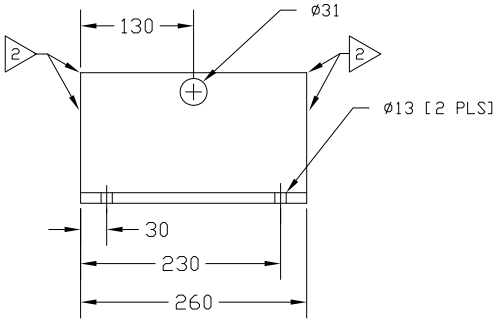
SIZE	DRAWING NO.	REV
A1	18800191	E

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

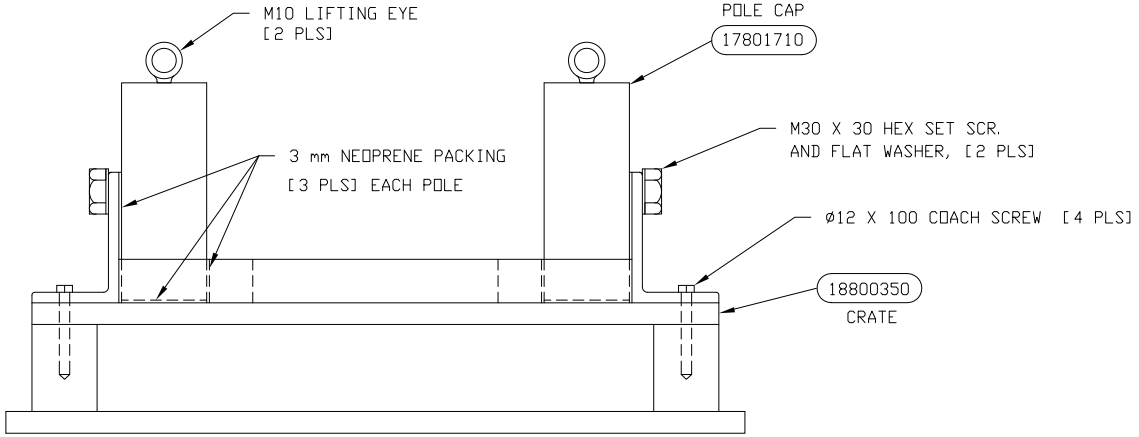
REVISIONS				
REV	DESCRIPTION	DRAFT	DATE	APPROVED
A	RELEASE		11/01/94	A.MARTIN
B	ADD NOTE 2		08/23/99	G.DOUGLAS







BRACKET
150 X 100 X 12 AL. ANGLE
2 REQ



NOTE:

1. THE 3474 POLE PACKING CRATE HAS A ONE PIECE COVER
2. REMOVE ALL SHARP EDGES 0.2mm

COVER REMOVAL:

1. REMOVE THE COVER SECURING SCREWS [NOT SHOWN]
2. GRIP THE COVER AT THE TOP LH AND RH CORNERS [NOT SHOWN]
3. LIFT THE COVER VERTICALLY HIGH ENOUGH TO CLEAR THE POLE CAPS
4. MOVE THE COVER SIDEWAYS AND PLACE ON FLOOR

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
PARTS LIST				

DRAWN A.MARTIN DATE 11/01/94
CHECK DATE
ENGINEERING DATE
3474
NEXT ASSY SYSTEM
SOFTWARE AUTOCAD 2000

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
PACKING CRATE
3474 POLE CAP PAIR

SIZE A2 | DRAWING NO. 18800430 | REV B
SCALE 1:4 | WT kg | SHEET 1 OF 1