ภาคผนวก ก

ตัวอย่าง Input data ของโปรแกรม POISSION

```
Alpha Magnet
con(67)=1.0D-8
&reg kprob=0,mat=1,mode=0,ktype=4,
epsila=1.0D-8,
xmin=-6.00,xmax=46.35
ymin=0.0,ymax=44.10,
dx=0.4,dy=0.4,
nterm=5,nptc=11,rint=8.00,angle=90,rnorm=1.00,anglz=0 &

&po x=-6.0000,y=0.0000 &
&po x=46.3500,y=0.0000 &
&po x=46.3500,y=32.6700 &
&po x=34.8900,y=32.6700 &
&po x=7.6300,y=44.1000 &
&po x=-6.000,y=44.1000 &
&po x=-6.000,y=0.0000 &

&reg mat=2,mtid=0,mshape=0,epsili=1.0D-8, &
&po x=-6.0000,y=0.0000 &
&po x=0.0000,y=0.0000 &
&po x=0.0000,y=13.3500 &
&po x=-1.0000,y=13.8500 &
&po x=-1.2200,y=13.8500 &
&po x=5.1780,y=29.2034 &
&po x=11.2800,y=26.6600 &
&po x=4.45000,y=10.2660 &
&po x= 6.3000,y=7.9360 &
&po x= 7.204,y= 6.940 &
```

&po x= 7.910,y= 6.321 &

&po x= 8.604,y= 5.811 &

&po x= 9.302,y= 5.375 &

&po x=10.000,y= 5.000 &

&po x=10.702,y= 4.672 &

&po x=11.405,y= 4.384 &

&po x=12.106,y= 4.130 &

&po x=12.804,y= 3.905 &

&po x=13.506,y= 3.702 &

&po x=14.204,y= 3.520 &

&po x=14.903,y= 3.355 &

&po x=15.610,y= 3.203 &

&po x=16.313,y= 3.065 &

&po x=17.001,y= 2.941 &

&po x=17.705,y= 2.824 &

&po x=18.409,y= 2.716 &

&po x=19.113,y= 2.616 &

&po x=19.802,y= 2.525 &

&po x=20.500,y= 2.439 &

&po x=21.204,y= 2.358 &

&po x=21.910,y= 2.282 &

&po x=22.604,y= 2.212 &

&po x=23.310,y= 2.145 &

&po x=23.8090,y=2.1000 &

&po x=25.6384,y=2.1000 &

&po x=32.2400,y=17.9550 &

&po x=38.3610,y=15.4601 &

&po x=32.2301,y=0.6807 &

&po x=32.2301,y=0.0000 &

&po x=46.3500,y=0.0000 &

```
&po x=46.3500,y=32.6700 &
&po x=34.8900,y=32.6700 &
&po x=7.6300,y=44.1000 &
&po x=-6.0000,y=44.1000 &
&po x=-6.0000,y=0.0000 &

&reg mat=1,cur=16400.0000, &
&po x=1.0290,y=16.5170 &
&po x=4.7110,y=14.9540 &
&po x=9.4000,y=26.0000 &
&po x=5.7180,y=27.5630 &
&po x=1.0290,y=16.5170 &

&reg mat=1,cur=-16400.0000, &
&po x=28.5290,y=5.0170 &
&po x=32.2110,y=3.4540 &
&po x=36.9000,y=14.5000 &
&po x=33.2180,y=16.0630 &
&po x=28.5290,y=5.0170 &
```

ภาคผนวก ข

ตัวอย่าง Output data ของโปรแกรม POISSION

```
Program POISSON.  Starting from file F-P2.T35 dump 0.
 Memory used for F-P2.T35 arrays:      1.114 M
 Memory used for other POISSON arrays:   1.376 M

 Problem description:
 Alpha Magnet
 Problem file: D:\WORK\DESIGN\POISSON\SHIM\250N\F-P2  2-18-2002  22:52
 Problem file length:       1922 bytes
 Originating program: AUTOMESH    Problem type: Magnetostatic

 Coordinates and lengths have dimensions of centimeters.

 Problem constants and variables, initial values.
 Code column indicates program where user input
 last changed a value:
  A = AUTOMESH
  P = POISSON

 CON      Value     Symbol  Code
  1         0     KPROB   A
  2         4     NREG
  3       111     LMAX
  4       132     KMAX
  5       134     IMAX
  6         0     MODE    A
  7  1.00000000     STACK
  9  1.00000000     CONV
 10 4.000000000E-03 FIXGAM
 11      2210     NAIR
 12     10084     NFE
 13       295     NINTER
 15     12817     NPINP
 16       228     NBND
 17         0     NSPL
 18  9.00000000     FIXEPS
 19         0     ICYLIN
 20         0     INPUTA
 21         0     NBSUP
 22         1     NBSLO
 23         0     NBSRT
 24         0     NBSLF
 25         0     NAMAX
 26     10543     NWMAX
 27     10383     NGMAX
 28     10148     NGSAM
 29        63     LCYCLE
 30    100000     MAXCY
 31         0     IPRFQ
 33 1.000000000E-03 OMEGAP
 36        60     NSEG
 37         1     MAP
 40         1     KBZERO
 41         1     LBZERO
 42         1     KMIN
 43       132     KTOP
 44         1     LMIN
 45         1     LTOP
 46         4     KTYPE   A
 47 1.256637061E-06 FMU0
 48 8.854187818E-12 EPS0
 49         0     NFIL
 50        -1     NPEG
 51     11902     NPONTS
 52 1.000000000E-03 OMEGAM
 53        25     IRMAX
 54       0.0     XMINF
 55       0.0     XMAXF
 56       0.0     YMINF
 57       0.0     YMAXF
 58 2.997924580E+10 CLIGHT
 59  3.14159265     PI
 60  16400.0000     SPOSG
 61 -16400.0000     SNEGG
 62 -2.182787284E-11 STOTG
 66  1.00000000     XJFACT
 67 5.000000000E-07 XJTOL
 69       0.0     RATIO
 70         0     ICAL
 71         0     NEGAT
 73         1     IPIVOT
 74  1.90000000     RHOPT1
 75  1.90000000     RHOAIR
 77  1.00000000     RHOFE
 78 8.000000000E-02 RHOGAM
 79  1.60000000     RHOXY
 80         1     ISKIP
 81         1     NOTE
 82      1307     NPBOUND
 83       683     MAXPPR
 84 1.000000000E-05 EPSO
 85 1.000000000E-08 EPSILA  A
```

```
 86 1.000000000E-08 EPSILI  A
 87        10     IVERG
 92 -6.00000000     XMING
 93  46.3500000     XMAXG
 94         0.0     YMING
 95  44.1000000     YMAXG
 96         0     IENERGY
101         0     IPERM
102    100000     IHDL
103         1     ICCC
105         1     LAST35
108         0     ICYSEN
109     15142     ITOT
110         5     NTERM   A
111        11     NPTC    A
112  8.00000000     RINT    A
113  90.0000000     ANGLE   A
114  1.00000000     RNORM   A
115         0.0     ANGLZ   A
116  2021.85630     XYAREA
117         0.0     VOLUME
120 0.399618321     DXMIN
121 0.400000000     DYMIN
122 0.399618321     DX1
123         0.0     TNEGC
124         0.0     TPOSC
125  1.00000000     RZERO
126 3.190269197E-02 TRIMIN
127 0.143397158     TRIMAX
128 8.034398172E-02 TRIAVG
139         1     NMATR
```

Material properties:
Material 1 corresponds to air regions.
Material 2 uses the internal table for 1010 steel
and Gamma = 0.0040000 to initialize material arrays.

	B(gauss)	GAMMA	η	H(oersted)	d(GAMMA)/dB
1	0.000	0.0006137	1629.3571	0.0000	-4.47825E-08
2	1890.000	0.0005291	1890.0019	1.0000	-1.03928E-07
3	2704.400	0.0004445	2249.9162	1.2020	-5.13229E-08
4	3649.300	0.0003960	2525.4694	1.4450	-2.38762E-08
5	4680.200	0.0003714	2692.8628	1.7380	-7.89415E-09
6	5757.200	0.0003628	2755.9598	2.0890	3.73646E-09
7	6846.200	0.0003669	2725.3972	2.5120	1.35143E-08
8	7918.100	0.0003814	2621.8849	3.0200	2.35890E-08
9	8949.300	0.0004057	2464.6933	3.6310	3.52026E-08
10	9921.500	0.0004400	2272.9649	4.3650	5.00489E-08
11	10821.100	0.0004850	2061.9492	5.2480	6.97789E-08
12	11639.800	0.0005421	1844.6577	6.3100	9.68399E-08
13	12373.000	0.0006131	1631.0314	7.5860	1.34836E-07
14	13020.600	0.0007004	1427.6965	9.1200	1.88807E-07
15	13585.600	0.0008071	1238.9962	10.9650	2.65398E-07
16	14073.900	0.0009367	1067.5788	13.1830	3.73223E-07
17	14494.000	0.0010935	914.5031	15.8490	5.22541E-07
18	14856.000	0.0012827	779.6359	19.0550	7.21644E-07
19	15171.100	0.0015100	662.2341	22.9090	9.71994E-07
20	15451.400	0.0017825	561.0130	27.5420	1.26377E-06
21	15708.900	0.0021079	474.4036	33.1129	1.57231E-06
22	15955.200	0.0024952	400.7743	39.8109	1.86798E-06
23	16201.000	0.0029543	338.4874	47.8629	2.13119E-06
24	16455.600	0.0034969	285.9659	57.5439	2.36056E-06
25	16726.400	0.0041362	241.7701	69.1831	2.56790E-06
26	17018.900	0.0048873	204.6132	83.1760	2.77658E-06
27	17336.200	0.0057683	173.3619	100.0001	3.01015E-06
28	17679.100	0.0068005	147.0489	120.2260	3.30005E-06
29	18045.600	0.0080099	124.8450	144.5440	3.67255E-06
30	18431.800	0.0094283	106.0640	173.7800	4.17153E-06
31	18831.301	0.0110948	90.1323	208.9295	4.85175E-06
32	19236.000	0.0130583	76.5796	251.1895	5.79840E-06
33	19636.300	0.0153794	65.0220	301.9945	7.13339E-06
34	20022.400	0.0181336	55.1462	363.0782	9.06799E-06
35	20384.200	0.0214144	46.6975	436.5154	1.19222E-05
36	20713.200	0.0253368	39.4683	524.8062	1.62336E-05
37	21003.000	0.0300413	33.2875	630.9574	2.27720E-05
38	21251.300	0.0356956	28.0147	758.5779	3.24137E-05
39	21461.100	0.0424960	23.5316	912.0109	4.40264E-05
40	21646.400	0.0506541	19.7417	1096.4789	4.32209E-05
41	21869.100	0.0602794	16.5894	1318.2562	4.23050E-05
42	22136.600	0.0715960	13.9673	1584.8920	4.12103E-05
43	22458.100	0.0848451	11.7862	1905.4597	3.99583E-05
44	22844.400	0.1002810	9.9720	2290.8593	3.85139E-05
45	23308.700	0.1181630	8.4629	2754.2259	3.68865E-05
46	23866.600	0.1387420	7.2076	3311.2998	3.50440E-05
47	24537.300	0.1622460	6.1635	3981.0788	3.30133E-05
48	25343.400	0.1888580	5.2950	4786.3038	3.07915E-05
49	26312.400	0.2186950	4.5726	5754.3903	2.84075E-05
50	27477.200	0.2517840	3.9717	6918.3193	

The fast-interpolation table generated from the above data for material 2
has maximum B of 2.74772E+04 G and 800 equal B increments of 3.43465E+01 G.
For fields above the maximum B, the permeability will be generated from the
equation B = Bsat + η0*H, where Bsat = 2.05589E+04 G.

Kmax = 132, Lmax = 111, Total number of mesh points = 15142

Over-relaxation factor: 1.9000E+00 in open space
1.0000E+00 in iron

```
Optimized O-R factor:     1.9789E+00    Lambda =  9.9995E-01
Solution matrix minimum = -1.8003E+04
          maximum =  1.7453E+04  Max gamma =  7.6791E-04
Residual:              1.9605E-02 in open space
                       2.4677E-02 in iron
Over-relaxation factor:   1.9789E+00 in open space
                       1.0000E+00 in iron
Elapsed time =   2.63 sec              End of cycle 50
-------------------------------------------------------------
Optimized O-R factor:     1.9884E+00    Lambda =  9.9999E-01
Solution matrix minimum = -6.8521E+04
          maximum =  6.0598E+04  Max gamma =  1.5486E-02
Residual:              1.5660E-02 in open space
                       2.1801E-02 in iron
Over-relaxation factor:   1.9884E+00 in open space
                       1.0000E+00 in iron
Elapsed time =   5.21 sec              End of cycle 100
-------------------------------------------------------------
Optimized O-R factor:     1.9936E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.2082E+05
          maximum =  1.1248E+05  Max gamma =  2.2546E-02
Residual:              2.1662E-03 in open space
                       4.4145E-03 in iron
Over-relaxation factor:   1.9936E+00 in open space
                       1.0000E+00 in iron
Elapsed time =  10.32 sec              End of cycle 200
-------------------------------------------------------------
Optimized O-R factor:     1.9926E+00    Lambda =  9.9999E-01
Solution matrix minimum = -1.2393E+05
          maximum =  1.0969E+05  Max gamma =  3.2441E-02
Residual:              3.5494E-04 in open space
                       5.3441E-04 in iron
Over-relaxation factor:   1.9926E+00 in open space
                       1.0000E+00 in iron
Elapsed time =  20.48 sec              End of cycle 400
-------------------------------------------------------------
Optimized O-R factor:     1.9955E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.2992E+05
          maximum =  1.0544E+05  Max gamma =  1.8828E-02
Residual:              6.8818E-05 in open space
                       1.7228E-04 in iron
Over-relaxation factor:   1.9955E+00 in open space
                       1.0000E+00 in iron
Elapsed time =  40.75 sec              End of cycle 800
-------------------------------------------------------------
Optimized O-R factor:     1.9947E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.3174E+05
          maximum =  1.0361E+05  Max gamma =  1.6356E-02
Residual:              2.2381E-05 in open space
                       7.2683E-05 in iron
Over-relaxation factor:   1.9947E+00 in open space
                       1.0000E+00 in iron
Elapsed time =  61.02 sec              End of cycle 1200
-------------------------------------------------------------
Optimized O-R factor:     1.9947E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.3209E+05
          maximum =  1.0327E+05  Max gamma =  1.6673E-02
Residual:              5.5952E-06 in open space
                       2.8785E-05 in iron
Over-relaxation factor:   1.9947E+00 in open space
                       1.0000E+00 in iron
Elapsed time =  81.29 sec              End of cycle 1600
-------------------------------------------------------------
Optimized O-R factor:     1.9947E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.3222E+05
          maximum =  1.0314E+05  Max gamma =  1.6802E-02
Residual:              2.4277E-06 in open space
                       1.4221E-05 in iron
Over-relaxation factor:   1.9947E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 101.50 sec              End of cycle 2000
-------------------------------------------------------------
Optimized O-R factor:     1.9950E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.3228E+05
          maximum =  1.0308E+05  Max gamma =  1.6858E-02
Residual:              1.0924E-06 in open space
                       7.7638E-06 in iron
Over-relaxation factor:   1.9950E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 121.77 sec              End of cycle 2400
-------------------------------------------------------------
Optimized O-R factor:     1.9951E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.3230E+05
          maximum =  1.0305E+05  Max gamma =  1.6885E-02
Residual:              5.4235E-07 in open space
                       4.4222E-06 in iron
Over-relaxation factor:   1.9951E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 142.03 sec              End of cycle 2800
-------------------------------------------------------------
Optimized O-R factor:     1.9953E+00    Lambda =  1.0000E+00
Solution matrix minimum = -1.3232E+05
          maximum =  1.0304E+05  Max gamma =  1.6899E-02
Residual:              2.8353E-07 in open space
                       2.5526E-06 in iron
Over-relaxation factor:   1.9953E+00 in open space
                       1.0000E+00 in iron
```

```
Elapsed time = 162.25 sec              End of cycle 3200
----------------------------------------------------------------
Optimized O-R factor:    1.9955E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3232E+05
        maximum =  1.0303E+05  Max gamma =  1.6907E-02
Residual:              1.5461E-07 in open space
                       1.4798E-06 in iron
Over-relaxation factor:  1.9955E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 182.51 sec              End of cycle 3600
----------------------------------------------------------------
Optimized O-R factor:    1.9956E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6911E-02
Residual:              8.5950E-08 in open space
                       8.5835E-07 in iron
Over-relaxation factor:  1.9956E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 202.78 sec              End of cycle 4000
----------------------------------------------------------------
Optimized O-R factor:    1.9957E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6913E-02
Residual:              4.8521E-08 in open space
                       4.9786E-07 in iron
Over-relaxation factor:  1.9957E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 223.05 sec              End of cycle 4400
----------------------------------------------------------------
Optimized O-R factor:    1.9958E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6914E-02
Residual:              2.7588E-08 in open space
                       2.8864E-07 in iron
Over-relaxation factor:  1.9958E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 243.32 sec              End of cycle 4800
----------------------------------------------------------------
Optimized O-R factor:    1.9958E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6915E-02
Residual:              1.5785E-08 in open space
                       1.6728E-07 in iron
Over-relaxation factor:  1.9958E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 263.53 sec              End of cycle 5200
----------------------------------------------------------------
Optimized O-R factor:    1.9959E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6915E-02
Residual:              9.0587E-09 in open space
                       9.6923E-08 in iron
Over-relaxation factor:  1.9959E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 283.80 sec              End of cycle 5600
----------------------------------------------------------------
Optimized O-R factor:    1.9959E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6916E-02
Residual:              5.2140E-09 in open space
                       5.6145E-08 in iron
Over-relaxation factor:  1.9959E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 304.06 sec              End of cycle 6000
----------------------------------------------------------------
Optimized O-R factor:    1.9959E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6916E-02
Residual:              3.0051E-09 in open space
                       3.2518E-08 in iron
Over-relaxation factor:  1.9959E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 324.28 sec              End of cycle 6400
----------------------------------------------------------------
Optimized O-R factor:    1.9959E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6916E-02
Residual:              1.7346E-09 in open space
                       1.8831E-08 in iron
Over-relaxation factor:  1.9959E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 344.54 sec              End of cycle 6800
----------------------------------------------------------------
Optimized O-R factor:    1.9959E+00   Lambda =  1.0000E+00
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6916E-02
Residual:              1.0018E-09 in open space
                       1.0904E-08 in iron
Over-relaxation factor:  1.9959E+00 in open space
                       1.0000E+00 in iron
Elapsed time = 364.81 sec              End of cycle 7200
----------------------------------------------------------------
Solution matrix minimum = -1.3233E+05
        maximum =  1.0302E+05  Max gamma =  1.6916E-02
Residual:              9.1101E-10 in open space
                       9.9092E-09 in iron
Over-relaxation factor:  1.9959E+00 in open space
```

1.0000E+00 in iron
Elapsed time = 368.38 sec End of cycle 7270

Solution converged in 7270 iterations.
Elapsed time = 368.44 sec
XJFACT = 1.000000

Field interpolation at cycle 7270.

K	L	Az (G-cm)	X (cm)	Y (cm)	Bx (G)	By (G)	B (G)	dBy/dy=-dBx/dx	dBy/dx	dBx/dy	Chi0/d.f.	Fn	
1	1	0.000000E+00	-6.00000	0.00000	0.000	-7715.113	7715.113	0.0000E+00	0.0000E+00	0.0000E+00	1.38E-07	25	
2	1	3.083821E+03	-5.60000	0.00000	0.000	-7709.552	7709.552	0.0000E+00	3.6072E+01	3.6072E+01	4.16E-07	25	
3	1	6.172786E+03	-5.20000	0.00000	0.000	-7700.501	7700.501	0.0000E+00	5.4251E+01	5.4251E+01	1.14E-08	19	
4	1	9.250709E+03	-4.80000	0.00000	0.000	-7679.706	7679.706	0.0000E+00	8.0231E+01	8.0231E+01	7.73E-09	19	
5	1	1.231827E+04	-4.40000	0.00000	0.000	-7650.356	7650.356	0.0000E+00	1.0631E+02	1.0631E+02	7.57E-09	19	
6	1	1.537204E+04	-4.00000	0.00000	0.000	-7612.382	7612.382	0.0000E+00	1.3242E+02	1.3242E+02	8.22E-09	19	
7	1	1.840854E+04	-3.60000	0.00000	0.000	-7565.759	7565.759	0.0000E+00	1.5854E+02	1.5854E+02	9.02E-09	19	
8	1	2.142432E+04	-3.20000	0.00000	0.000	-7510.477	7510.477	0.0000E+00	1.8462E+02	1.8462E+02	9.80E-09	19	
9	1	2.441590E+04	-2.80000	0.00000	0.000	-7446.536	7446.536	0.0000E+00	2.1065E+02	2.1065E+02	1.05E-08	19	
10	1	2.737981E+04	-2.40000	0.00000	0.000	-7373.958	7373.958	0.0000E+00	2.3656E+02	2.3656E+02	1.12E-08	19	
11	1	3.031261E+04	-2.00000	0.00000	0.000	-7292.798	7292.798	0.0000E+00	2.6230E+02	2.6230E+02	1.19E-08	19	
12	1	3.321083E+04	-1.60000	0.00000	0.000	-7203.196	7203.196	0.0000E+00	2.8772E+02	2.8772E+02	1.31E-08	19	
13	1	3.607100E+04	-1.20000	0.00000	0.000	-7104.776	7104.776	0.0000E+00	3.1292E+02	3.1292E+02	1.34E-08	19	
14	1	3.888972E+04	-0.80000	0.00000	0.000	-6996.618	6996.618	0.0000E+00	3.3974E+02	3.3974E+02	1.34E-08	19	
15	1	4.166095E+04	-0.40000	0.00000	0.000	-6872.771	6872.771	0.0000E+00	3.6697E+02	3.6697E+02	7.08E-09	19	
16	1	4.438229E+04	0.00000	0.00000	0.000	-0.557	0.557	0.0000E+00	4.0217E+02	4.0217E+02	5.20E-10	19	
17	1	4.434991E+04	0.40288	0.00000	0.000	161.023	161.023	0.0000E+00	4.0221E+02	4.0221E+02	3.97E-10	19	
18	1	4.425234E+04	0.80575	0.00000	0.000	322.267	322.267	0.0000E+00	4.0350E+02	4.0350E+02	9.62E-11	19	
19	1	4.408973E+04	1.20863	0.00000	0.000	484.893	484.893	0.0000E+00	4.0343E+02	4.0343E+02	6.91E-12	19	
20	1	4.386163E+04	1.61150	0.00000	0.000	647.502	647.502	0.0000E+00	4.0341E+02	4.0341E+02	7.61E-13	19	
21	1	4.356803E+04	2.01438	0.00000	0.000	810.074	810.074	0.0000E+00	4.0345E+02	4.0345E+02	2.22E-13	19	
22	1	4.320893E+04	2.41726	0.00000	0.000	972.648	972.648	0.0000E+00	4.0351E+02	4.0351E+02	1.00E-13	19	
23	1	4.278433E+04	2.82013	0.00000	0.000	1135.233	1135.233	0.0000E+00	4.0355E+02	4.0355E+02	5.32E-14	19	
24	1	4.229423E+04	3.22301	0.00000	0.000	1297.828	1297.828	0.0000E+00	4.0358E+02	4.0358E+02	3.08E-14	19	
25	1	4.173861E+04	3.62589	0.00000	0.000	1460.430	1460.430	0.0000E+00	4.0359E+02	4.0359E+02	1.95E-14	19	
26	1	4.111749E+04	4.02876	0.00000	0.000	1623.032	1623.032	0.0000E+00	4.0359E+02	4.0359E+02	1.37E-14	19	
27	1	4.043085E+04	4.43164	0.00000	0.000	1785.628	1785.628	0.0000E+00	4.0356E+02	4.0356E+02	1.06E-14	19	
28	1	3.967871E+04	4.83451	0.00000	0.000	1948.213	1948.213	0.0000E+00	4.0353E+02	4.0353E+02	8.48E-15	19	
29	1	3.886107E+04	5.23739	0.00000	0.000	2110.786	2110.786	0.0000E+00	4.0349E+02	4.0349E+02	6.69E-15	19	
30	1	3.797794E+04	5.64027	0.00000	0.000	2273.343	2273.343	0.0000E+00	4.0345E+02	4.0345E+02	5.36E-15	19	
31	1	3.702931E+04	6.04314	0.00000	0.000	2435.887	2435.887	0.0000E+00	4.0341E+02	4.0341E+02	5.13E-15	19	
32	1	3.601521E+04	6.44602	0.00000	0.000	2598.418	2598.418	0.0000E+00	4.0339E+02	4.0339E+02	6.73E-15	19	
33	1	3.493563E+04	6.84890	0.00000	0.000	2760.943	2760.943	0.0000E+00	4.0337E+02	4.0337E+02	1.07E-14	19	
34	1	3.379058E+04	7.25177	0.00000	0.000	2923.464	2923.464	0.0000E+00	4.0337E+02	4.0337E+02	1.71E-14	19	
35	1	3.258005E+04	7.65465	0.00000	0.000	3085.987	3085.987	0.0000E+00	4.0338E+02	4.0338E+02	2.48E-14	19	
36	1	3.130404E+04	8.05753	0.00000	0.000	3248.516	3248.516	0.0000E+00	4.0340E+02	4.0340E+02	3.12E-14	19	
37	1	2.996256E+04	8.46040	0.00000	0.000	3411.055	3411.055	0.0000E+00	4.0343E+02	4.0343E+02	3.22E-14	19	
38	1	2.855559E+04	8.86328	0.00000	0.000	3573.604	3573.604	0.0000E+00	4.0346E+02	4.0346E+02	2.53E-14	19	
39	1	2.708313E+04	9.26615	0.00000	0.000	3736.163	3736.163	0.0000E+00	4.0350E+02	4.0350E+02	1.35E-14	19	
40	1	2.554517E+04	9.66903	0.00000	0.000	3898.729	3898.729	0.0000E+00	4.0352E+02	4.0352E+02	4.58E-15	19	
41	1	2.394172E+04	10.07191	0.00000	0.000	4061.299	4061.299	0.0000E+00	4.0354E+02	4.0354E+02	3.94E-15	19	
42	1	2.227277E+04	10.47478	0.00000	0.000	4223.870	4223.870	0.0000E+00	4.0355E+02	4.0355E+02	8.62E-15	19	
43	1	2.053833E+04	10.87766	0.00000	0.000	4386.442	4386.442	0.0000E+00	4.0355E+02	4.0355E+02	1.52E-14	19	
44	1	1.873838E+04	11.28054	0.00000	0.000	4549.014	4549.014	0.0000E+00	4.0356E+02	4.0356E+02	2.64E-14	19	
45	1	1.687294E+04	11.68341	0.00000	0.000	4711.587	4711.587	0.0000E+00	4.0356E+02	4.0356E+02	4.40E-14	19	
46	1	1.494201E+04	12.08629	0.00000	0.000	4874.163	4874.163	0.0000E+00	4.0356E+02	4.0356E+02	8.75E-14	19	
47	1	1.294557E+04	12.48916	0.00000	0.000	5036.741	5036.741	0.0000E+00	4.0355E+02	4.0355E+02	2.49E-13	19	
48	1	1.088364E+04	12.89204	0.00000	0.000	5199.319	5199.319	0.0000E+00	4.0352E+02	4.0352E+02	7.33E-13	19	
49	1	8.756203E+03	13.29492	0.00000	0.000	5361.894	5361.894	0.0000E+00	4.0348E+02	4.0348E+02	2.31E-12	19	
50	1	6.563273E+03	13.69779	0.00000	0.000	5524.471	5524.471	0.0000E+00	4.0343E+02	4.0343E+02	9.55E-12	19	
51	1	4.304848E+03	14.10067	0.00000	0.000	5687.055	5687.055	0.0000E+00	4.0339E+02	4.0339E+02	4.55E-11	19	
52	1	1.980929E+03	14.50355	0.00000	0.000	5849.645	5849.645	0.0000E+00	4.0339E+02	4.0339E+02	1.29E-10	19	
53	1	-4.084903E+02	14.90642	0.00000	0.000	6012.243	6012.243	0.0000E+00	4.0340E+02	4.0340E+02	1.20E-10	19	
54	1	-2.863419E+03	15.30930	0.00000	0.000	6174.842	6174.842	0.0000E+00	4.0341E+02	4.0341E+02	4.47E-11	19	
55	1	-5.383860E+03	15.71217	0.00000	0.000	6337.440	6337.440	0.0000E+00	4.0339E+02	4.0339E+02	1.58E-11	19	
56	1	-7.969808E+03	16.11505	0.00000	0.000	6500.027	6500.027	0.0000E+00	4.0335E+02	4.0335E+02	6.02E-12	19	
57	1	-1.062125E+04	16.51793	0.00000	0.000	6662.575	6662.575	0.0000E+00	4.0333E+02	4.0333E+02	1.44E-12	19	
58	1	-1.333816E+04	16.92080	0.00000	0.000	6825.038	6825.038	0.0000E+00	4.0330E+02	4.0330E+02	4.10E-12	19	
59	1	-1.612054E+04	17.32368	0.00000	0.000	6987.405	6987.405	0.0000E+00	4.0317E+02	4.0317E+02	7.85E-12	19	
60	1	-1.896834E+04	17.72656	0.00000	0.000	7149.674	7149.674	0.0000E+00	4.0295E+02	4.0295E+02	7.28E-12	19	
61	1	-2.188147E+04	18.12943	0.00000	0.000	7311.803	7311.803	0.0000E+00	4.0275E+02	4.0275E+02	8.73E-12	19	
62	1	-2.485991E+04	18.53231	0.00000	0.000	7473.795	7473.795	0.0000E+00	4.0258E+02	4.0258E+02	7.54E-12	19	
63	1	-2.790362E+04	18.93518	0.00000	0.000	7635.739	7635.739	0.0000E+00	4.0230E+02	4.0230E+02	4.49E-12	19	
64	1	-3.101255E+04	19.33806	0.00000	0.000	7797.625	7797.625	0.0000E+00	4.0185E+02	4.0185E+02	5.27E-12	19	
65	1	-3.418667E+04	19.74094	0.00000	0.000	7959.309	7959.309	0.0000E+00	4.0114E+02	4.0114E+02	1.05E-11	19	
66	1	-3.742589E+04	20.14381	0.00000	0.000	8120.566	8120.566	0.0000E+00	3.9989E+02	3.9989E+02	2.69E-11	19	
67	1	-4.073000E+04	20.54669	0.00000	0.000	8280.953	8280.953	0.0000E+00	3.9770E+02	3.9770E+02	7.74E-11	19	
68	1	-4.409859E+04	20.94956	0.00000	0.000	8439.676	8439.676	0.0000E+00	3.9388E+02	3.9388E+02	2.27E-10	19	
69	1	-4.753091E+04	21.35244	0.00000	0.000	8595.456	8595.456	0.0000E+00	3.8705E+02	3.8705E+02	5.95E-10	19	
70	1	-5.102565E+04	21.75532	0.00000	0.000	8746.345	8746.345	0.0000E+00	3.7517E+02	3.7517E+02	1.54E-09	19	
71	1	-5.458039E+04	22.15819	0.00000	0.000	8888.676	8888.676	0.0000E+00	3.5519E+02	3.5519E+02	4.05E-09	19	
72	1	-5.819129E+04	22.56107	0.00000	0.000	9016.202	9016.202	0.0000E+00	3.2090E+02	3.2090E+02	9.69E-09	19	
73	1	-6.185207E+04	22.96395	0.00000	0.000	9119.952	9119.952	0.0000E+00	2.6121E+02	2.6121E+02	1.94E-08	19	
74	1	-6.555242E+04	23.36682	0.00000	0.000	9188.327	9188.327	0.0000E+00	1.6307E+02	1.6307E+02	3.31E-08	19	
75	1	-6.927554E+04	23.76970	0.00000	0.000	9204.921	9204.921	0.0000E+00	1.6180E+01	1.6180E+01	5.36E-08	19	
76	1	-7.299713E+04	24.17257	0.00000	0.000	9146.381	9146.381	0.0000E+00	-1.9005E+02	-1.9005E+02	8.44E-08	19	
77	1	-7.668480E+04	24.57545	0.00000	0.000	8987.200	8987.200	0.0000E+00	-4.7244E+02	-4.7244E+02	1.15E-07	19	
78	1	-8.029698E+04	24.97833	0.00000	0.000	8713.989	8713.989	0.0000E+00	-8.3927E+02	-8.3927E+02	1.10E-07	19	
79	1	-8.377860E+04	25.38120	0.00000	0.000	8331.088	8331.088	0.0000E+00	-1.2477E+03	-1.2477E+03	5.70E-08	19	
80	1	-8.706549E+04	25.78408	0.00000	0.000	7840.877	7840.877	0.0000E+00	-1.5858E+03	-1.5858E+03	3.07E-08	19	
81	1	-9.010827E+04	26.18696	0.00000	0.000	7246.362	7246.362	0.0000E+00	-1.7493E+03	-1.7493E+03	3.14E-08	19	
82	1	-9.288328E+04	26.58983	0.00000	0.000	6586.994	6586.994	0.0000E+00	-1.7395E+03	-1.7395E+03	2.22E-08	19	
83	1	-9.538606E+04	26.99271	0.00000	0.000	5922.377	5922.377	0.0000E+00	-1.6289E+03	-1.6289E+03	1.29E-08	19	
84	1	-9.762782E+04	27.39559	0.00000	0.000	5292.738	5292.738	0.0000E+00	-1.4803E+03	-1.4803E+03	7.57E-09	19	
85	1	-9.962835E+04	27.79846	0.00000	0.000	4715.426	4715.426	0.0000E+00	-1.3306E+03	-1.3306E+03	4.67E-09	19	
86	1	-1.014099E+05	28.20134	0.00000	0.000	4192.783	4192.783	0.0000E+00	-1.1971E+03	-1.1971E+03	2.88E-09	19	
87	1	-1.029935E+05	28.60421	0.00000	0.000	3719.538	3719.538	0.0000E+00	-1.0861E+03	-1.0861E+03	1.70E-09	19	
88	1	-1.043972E+05	29.00709	0.00000	0.000	3287.296	3287.296	0.0000E+00	-9.9880E+02	-9.9880E+02	9.34E-10	19	

89	1	-1.056355E+05	29.40997	0.00000	0.000	2886.703	2886.703	0.0000E+00	-9.3455E+02	-9.3455E+02	5.10E-10	19
90	1	-1.067191E+05	29.81284	0.00000	0.000	2508.161	2508.161	0.0000E+00	-8.9269E+02	-8.9269E+02	4.31E-10	19
91	1	-1.076549E+05	30.21572	0.00000	0.000	2141.563	2141.563	0.0000E+00	-8.7394E+02	-8.7394E+02	9.18E-10	19
92	1	-1.084459E+05	30.61859	0.00000	0.000	1774.826	1774.826	0.0000E+00	-8.8213E+02	-8.8213E+02	2.99E-09	19
93	1	-1.090893E+05	31.02147	0.00000	0.000	1383.897	1383.897	0.0000E+00	-9.3708E+02	-9.3708E+02	2.20E-08	19
94	1	-1.095794E+05	31.42435	0.00000	0.000	984.109	984.109	0.0000E+00	-1.0115E+03	-1.0115E+03	1.25E-08	19
95	1	-1.099055E+05	31.82722	0.00000	0.000	552.634	552.634	0.0000E+00	-1.1588E+03	-1.1588E+03	7.11E-09	19
96	1	-1.100018E+05	32.23010	0.00000	0.000	-890.453	890.453	0.0000E+00	-1.8794E+03	-1.8794E+03	9.65E-08	19
97	1	-1.094889E+05	32.62232	0.00000	0.000	-1714.357	1714.357	0.0000E+00	-1.8900E+03	-1.8900E+03	1.50E-07	19
98	1	-1.086492E+05	33.01454	0.00000	0.000	-2607.108	2607.108	0.0000E+00	-1.7256E+03	-1.7256E+03	1.94E-07	19
99	1	-1.074819E+05	33.40676	0.00000	0.000	-3461.792	3461.792	0.0000E+00	-1.5458E+03	-1.5458E+03	1.26E-07	19
100	1	-1.059967E+05	33.79898	0.00000	0.000	-4191.152	4191.152	0.0000E+00	-1.3975E+03	-1.3975E+03	4.92E-08	19
101	1	-1.042392E+05	34.19120	0.00000	0.000	-4808.682	4808.682	0.0000E+00	-1.2848E+03	-1.2848E+03	1.55E-08	19
102	1	-1.022495E+05	34.58342	0.00000	0.000	-5340.757	5340.757	0.0000E+00	-1.1891E+03	-1.1891E+03	5.18E-09	19
103	1	-1.000597E+05	34.97564	0.00000	0.000	-5806.781	5806.781	0.0000E+00	-1.1067E+03	-1.1067E+03	4.04E-09	19
104	1	-9.769399E+04	35.36786	0.00000	0.000	-6219.390	6219.390	0.0000E+00	-1.0378E+03	-1.0378E+03	7.33E-09	19
105	1	-9.517165E+04	35.76008	0.00000	0.000	-6587.628	6587.628	0.0000E+00	-9.7263E+02	-9.7263E+02	1.44E-08	19
106	1	-9.251094E+04	36.15229	0.00000	0.000	-6919.960	6919.960	0.0000E+00	-9.1021E+02	-9.1021E+02	2.33E-08	19
107	1	-8.972467E+04	36.54451	0.00000	0.000	-7217.107	7217.107	0.0000E+00	-8.6036E+02	-8.6036E+02	2.75E-08	19
108	1	-8.682550E+04	36.93673	0.00000	0.000	-7490.774	7490.774	0.0000E+00	-8.1289E+02	-8.1289E+02	3.10E-08	19
109	1	-8.382284E+04	37.32895	0.00000	0.000	-7742.121	7742.121	0.0000E+00	-7.6166E+02	-7.6166E+02	4.05E-08	19
110	1	-8.072624E+04	37.72117	0.00000	0.000	-7968.399	7968.399	0.0000E+00	-7.1389E+02	-7.1389E+02	5.21E-08	19
111	1	-7.754441E+04	38.11339	0.00000	0.000	-8171.063	8171.063	0.0000E+00	-6.7481E+02	-6.7481E+02	5.63E-08	19
112	1	-7.428590E+04	38.50561	0.00000	0.000	-8359.724	8359.724	0.0000E+00	-6.3782E+02	-6.3782E+02	5.60E-08	19
113	1	-7.095613E+04	38.89783	0.00000	0.000	-8537.453	8537.453	0.0000E+00	-6.0056E+02	-6.0056E+02	5.58E-08	19
114	1	-6.755947E+04	39.29005	0.00000	0.000	-8702.708	8702.708	0.0000E+00	-5.6187E+02	-5.6187E+02	6.00E-08	19
115	1	-6.410124E+04	39.68227	0.00000	0.000	-8852.684	8852.684	0.0000E+00	-5.2214E+02	-5.2214E+02	7.13E-08	19
116	1	-6.058757E+04	40.07449	0.00000	0.000	-8986.085	8986.085	0.0000E+00	-4.8570E+02	-4.8570E+02	8.36E-08	19
117	1	-5.702415E+04	40.46671	0.00000	0.000	-9104.866	9104.866	0.0000E+00	-4.5417E+02	-4.5417E+02	8.70E-08	19
118	1	-5.341642E+04	40.85893	0.00000	0.000	-9214.925	9214.925	0.0000E+00	-4.2307E+02	-4.2307E+02	8.74E-08	19
119	1	-4.976779E+04	41.25115	0.00000	0.000	-9317.284	9317.284	0.0000E+00	-3.9163E+02	-3.9163E+02	8.80E-08	19
120	1	-4.608132E+04	41.64337	0.00000	0.000	-9411.867	9411.867	0.0000E+00	-3.6004E+02	-3.6004E+02	8.87E-08	19
121	1	-4.236009E+04	42.03559	0.00000	0.000	-9498.648	9498.648	0.0000E+00	-3.2841E+02	-3.2841E+02	8.97E-08	19
122	1	-3.860717E+04	42.42781	0.00000	0.000	-9577.635	9577.635	0.0000E+00	-2.9684E+02	-2.9684E+02	9.10E-08	19
123	1	-3.482562E+04	42.82003	0.00000	0.000	-9648.855	9648.855	0.0000E+00	-2.6538E+02	-2.6538E+02	9.28E-08	19
124	1	-3.101847E+04	43.21224	0.00000	0.000	-9712.349	9712.349	0.0000E+00	-2.3405E+02	-2.3405E+02	9.55E-08	19
125	1	-2.718875E+04	43.60446	0.00000	0.000	-9768.171	9768.171	0.0000E+00	-2.0290E+02	-2.0290E+02	9.95E-08	19
126	1	-2.333944E+04	43.99668	0.00000	0.000	-9816.389	9816.389	0.0000E+00	-1.7192E+02	-1.7192E+02	1.06E-07	19
127	1	-1.947355E+04	44.38890	0.00000	0.000	-9856.824	9856.824	0.0000E+00	-1.4118E+02	-1.4118E+02	1.22E-07	19
128	1	-1.559420E+04	44.78112	0.00000	0.000	-9888.959	9888.959	0.0000E+00	-1.1107E+02	-1.1107E+02	1.67E-07	19
129	1	-1.169586E+04	45.17334	0.00000	0.000	-9939.897	9939.897	0.0000E+00	-1.0125E+02	-1.0125E+02	2.67E-07	25
130	1	-7.801279E+03	45.56556	0.00000	0.000	-9945.044	9945.044	0.0000E+00	-6.8463E+01	-6.8463E+01	1.17E-07	25
131	1	-3.900639E+03	45.95778	0.00000	0.000	-9945.044	9945.044	0.0000E+00	-3.7745E+01	-3.7745E+01	1.17E-07	25
132	1	0.000000E+00	46.35000	0.00000	0.000	-9948.910	9948.910	0.0000E+00	0.0000E+00	0.0000E+00	3.53E-08	25

Harmonic analysis
Interpolated points on an arc of radius = 8.00000
K,L is nearest mesh point to physical coordinates X,Y:

n	Angle	X	Y	K	L	Avector
1	0.0000	8.0000	0.0000	36	1	3.14902E+04
2	9.0000	7.9015	1.2515	36	4	3.21218E+04
3	18.0000	7.6085	2.4721	35	7	3.39547E+04
4	27.0000	7.1281	3.6319	34	10	3.68090E+04
5	36.0000	6.4721	4.7023	32	13	4.04046E+04
6	45.0000	5.6569	5.6569	30	15	4.43902E+04
7	54.0000	4.7023	6.4721	28	17	4.83920E+04
8	63.0000	3.6319	7.1281	25	19	5.20343E+04
9	72.0000	2.4721	7.6085	23	20	5.48830E+04
10	81.0000	1.2515	7.9015	19	21	5.66173E+04
11	90.0000	0.0000	8.0000	16	21	5.71862E+04

Vector potential coefficients
Normalization radius = 1.00000
A(x,y) = Re(sum (An + iBn) * (z/r)**n)

n	An	Bn	Abs(Cn)
2	-2.0154E+02	0.0000E+00	2.0154E+02
6	1.2448E-04	0.0000E+00	1.2448E-04
10	1.7300E-08	0.0000E+00	1.7300E-08
14	-4.4222E-14	0.0000E+00	4.4222E-14
18	-1.9672E-17	0.0000E+00	1.9672E-17

Field coefficients
Normalization radius = 1.00000
(Bx - iBy) = i[sum n*(An + iBn)/r * (z/r)**(n-1)]

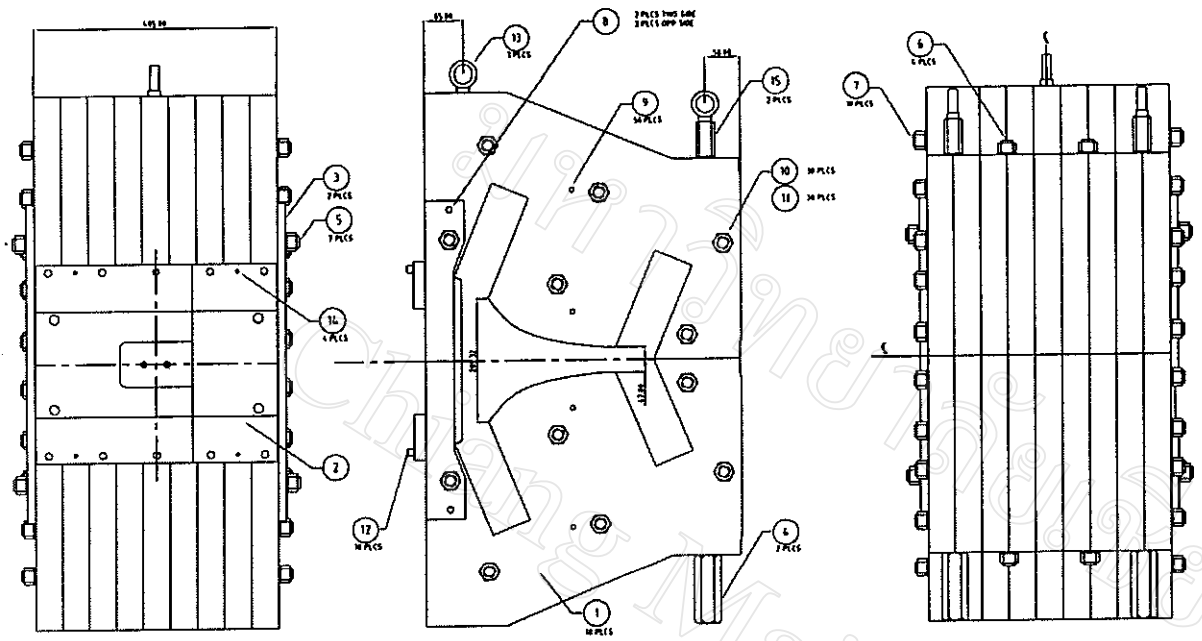
n	n(An)/r	n(Bn)/r	Abs(n(Cn)/r)
2	-4.0308E+02	0.0000E+00	4.0308E+02
6	7.4687E-04	0.0000E+00	7.4687E-04
10	1.7300E-07	0.0000E+00	1.7300E-07
14	-6.1911E-13	0.0000E+00	6.1911E-13
18	-3.5410E-16	0.0000E+00	3.5410E-16

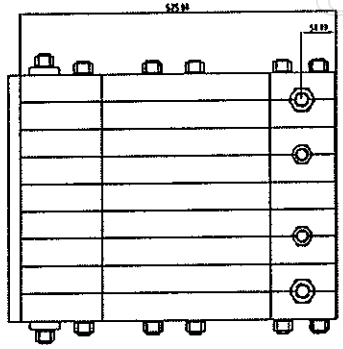
Problem CONs calculated by this code.

CON	Value	Symbol
63	16400.0000	SPOSA
64	-16400.0000	SNEGA
65	-2.169464608E-11	STOTA
75	1.99594778	RHOAIR
76	0.0	ENERGY
88	9.110112149E-10	RESIDA
89	9.909219288E-09	RESIDI
90	7270	ICYCLE
91	1	NUMDMP
106	0.998632605	ETAAIR
107	0.998634881	ETAFE

ภาคผนวก ค

แบบเขียนเชิงวิศวกรรมของแม่เหล็กแบบอัลฟา





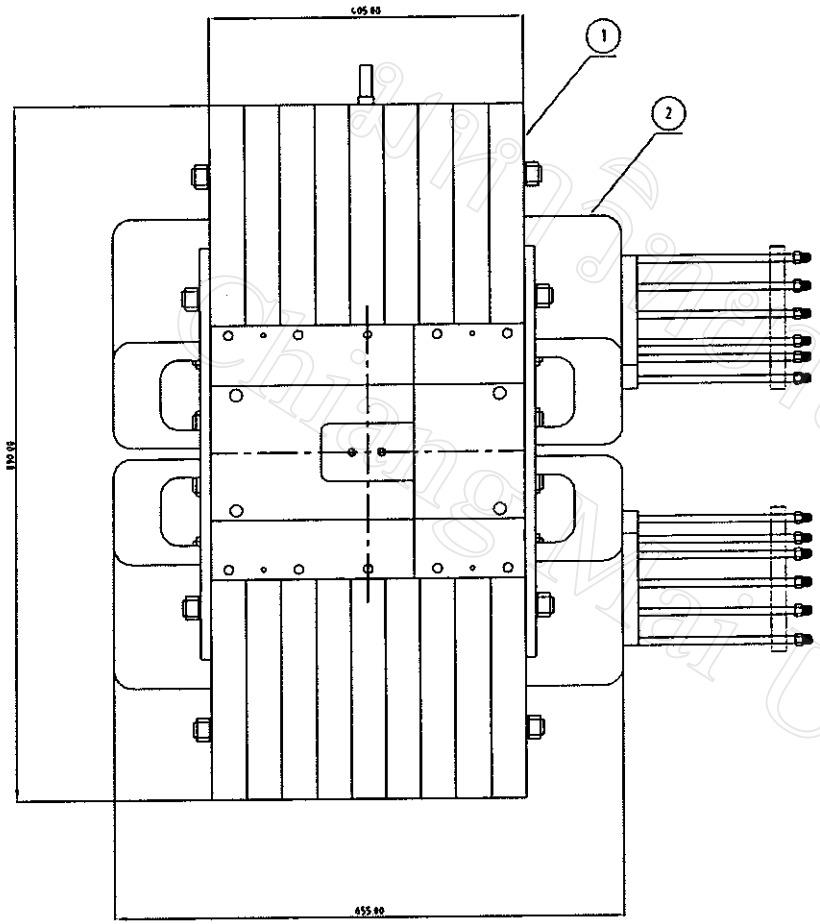
NO	DWG NO	DWG NAME	MATERIAL	PCS
1	AL-01-00	LAMINATION	440 STEEL	10
2	AL-00-03	FRONT PLATE	440 STEEL	1
3	AL-03-01	I.C BAR	STEEL	2
4	AL-04-01	BAR	STEEL	2
5		END ROD M20X2.5P373N.R.G	STEEL	4
6		END ROD M20X2.5P375 R.G	STEEL	2
7		END ROD M20X2.5P250 R.G	STEEL	10
8		DOWELL PIN 10 X 35 R.G	STEEL	4
9		SPRING PIN 8 X 75 R.G	STEEL	54
10		BAR HEX M20X2.5	STEEL	20
11		WASHER FLAT M20	STEEL	20
12		SCREW SHCS M8X1.5P X 35 R.G	STEEL	10
13		EYE BOLT	STEEL	2
14		SCREW SHCS M8X30 R.G	S S 1	4
15	AL-05-01	COUPLING BAR M20X2.5P X 57 R.G	STEEL	2

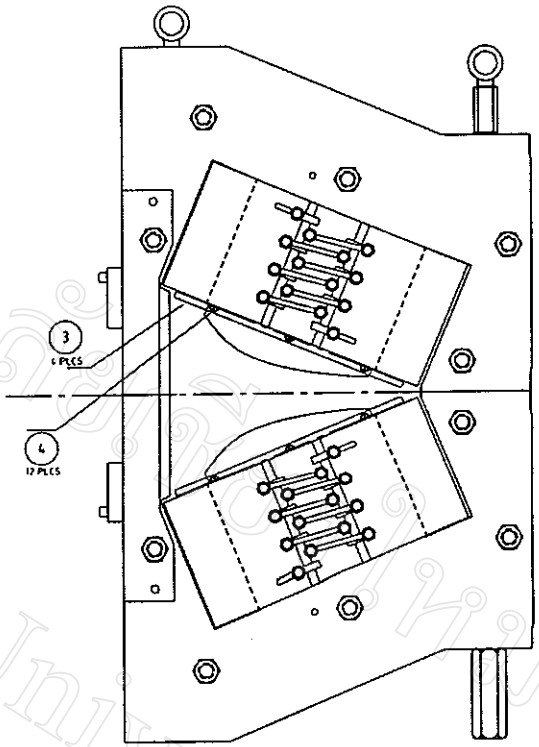
PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN / DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY / DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHA MAGNET ASSEMBLY DRAWING I		APP'D BY / DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION		DWG. No. AL-00-01 / ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

06



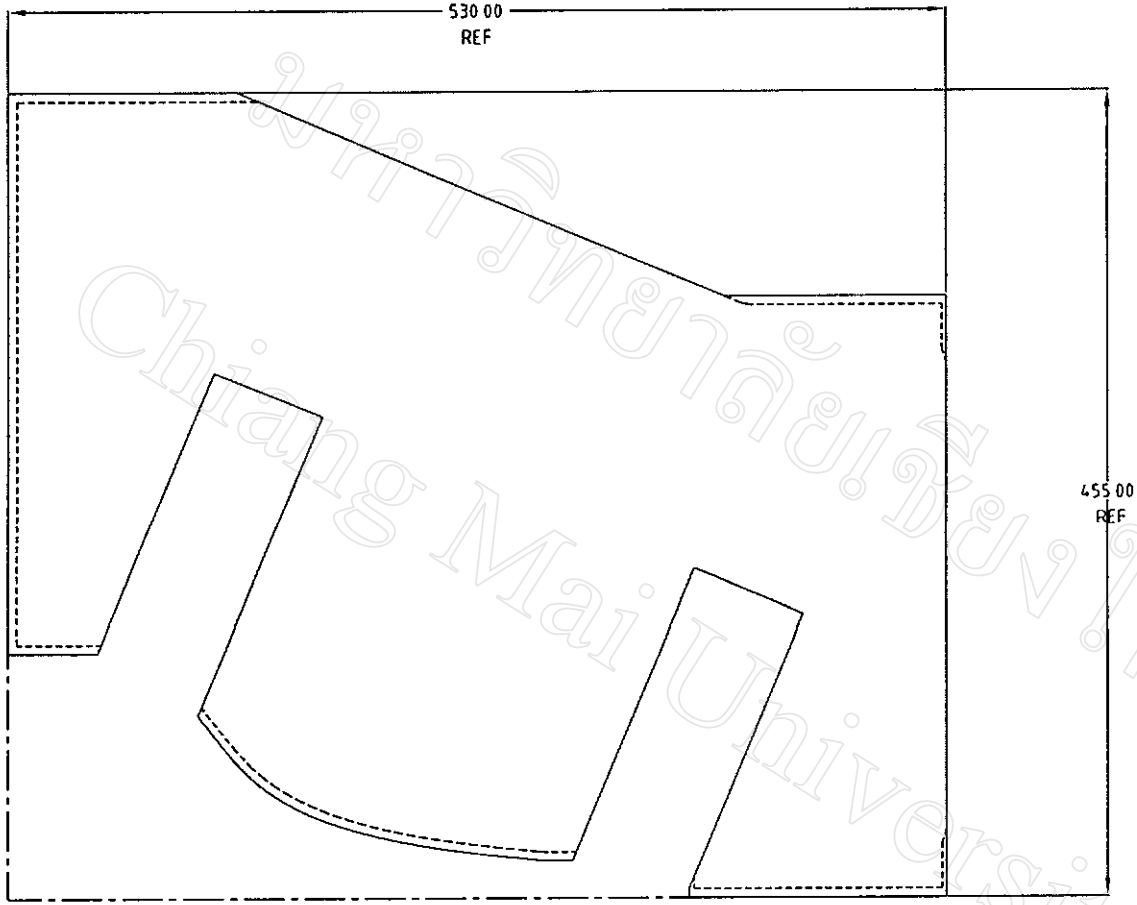


NO	DWG NO	DWG NAME	MATERIAL	PCS
1	AL-00-01	CORE ASSEMBLY		1
2	AL-01-01	COIL		1
3	AL-04-01	COIL CLAMPING BAR	SST	6
4		HEX BOLT M6X20 SLG	SST	12

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM / SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.03 3. Place Decimal ±0.005	SERIES No.	DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHA MAGNET ASSEMBLY DRAWING II	APP'D BY	DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL-00-02	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE



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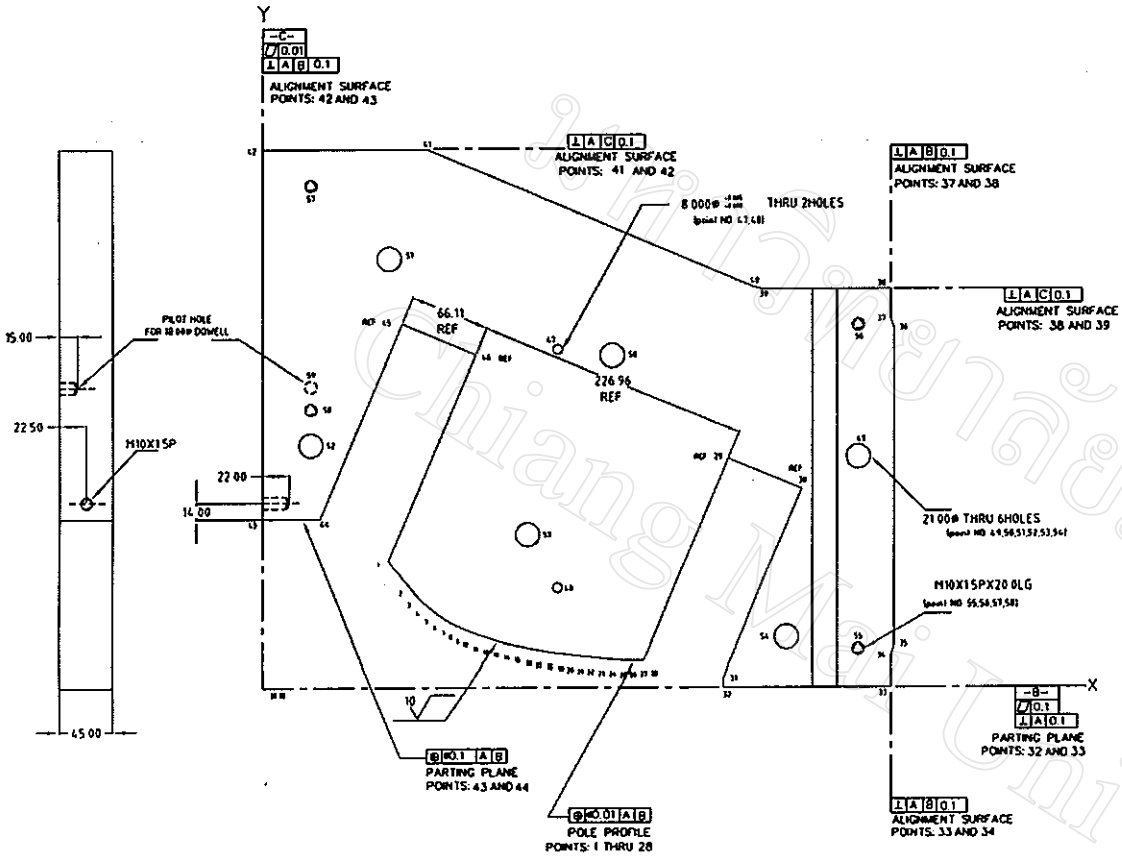
PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005 ANGULAR ± 0.5000" OTHER	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
	SERIES No.		DESIGN BY	DATE
	ASS'Y NAME ALPHATEMP		APP'D BY	DATE
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION		DWG. No. AL-01-00	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE



point no.	X (mm)	Y (mm)
1	104.50	102.66
2	173.00	79.36
3	157.04	69.40
4	139.18	63.20
5	140.04	58.31
6	153.87	53.25
7	160.00	50.08
8	167.02	46.12
9	174.05	43.84
10	181.06	41.30
11	188.04	39.05
12	195.05	37.07
13	202.01	35.20
14	209.03	33.55
15	216.10	32.03
16	223.13	30.62
17	230.01	29.43
18	237.05	28.24
19	244.09	27.16
20	251.13	26.16
21	258.02	25.25
22	265.06	24.49
23	272.04	23.58Ø
24	279.10	22.82
25	286.04	22.12
26	293.10	21.45
27	298.09	21.00
28	316.38	21.00
29	386.31	188.76
30	447.57	183.26
31	387.30	6.80
32	382.30	0.00
33	377.30	0.00
34	342.30	25.48
35	295.00	97.70
36	265.00	297.30
37	222.30	302.30
38	222.30	330.00
39	411.80	330.00
40	408.90	330.95
41	316.30	455.30
42	0.00	455.00
43	0.00	138.50
44	47.80	138.50
45	115.69	201.74
46	176.71	275.81
47	225.00	260.00
48	245.00	80.00
49	295.00	100.00
50	280.00	225.00
51	305.00	355.00
52	40.00	200.00
53	50.00	40.00
54	220.00	125.00
55	435.00	40.00
56	495.00	30.00
57	495.00	300.00
58	40.00	438.00
59	40.00	259.00

NOTES:

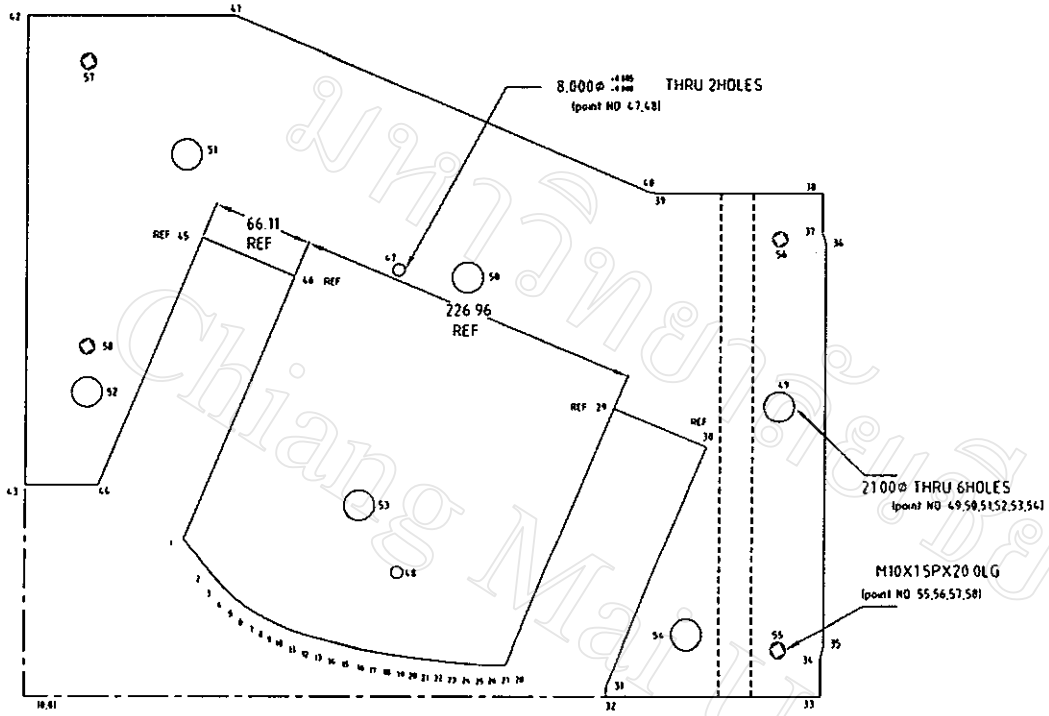
1- MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL-01-00

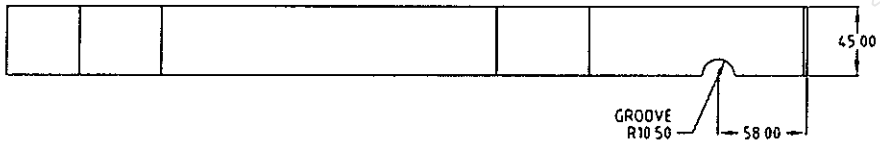
PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN / DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY / DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHALA01		APP'D BY / DATE
OTHER	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT
FILE LOCATION	DESCRIPTION		DWG. No. AL-01-01 / ISSUE DATE

FNRF
Chiang Mai University
Chiang Mai THAILAND

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE





NOTES:

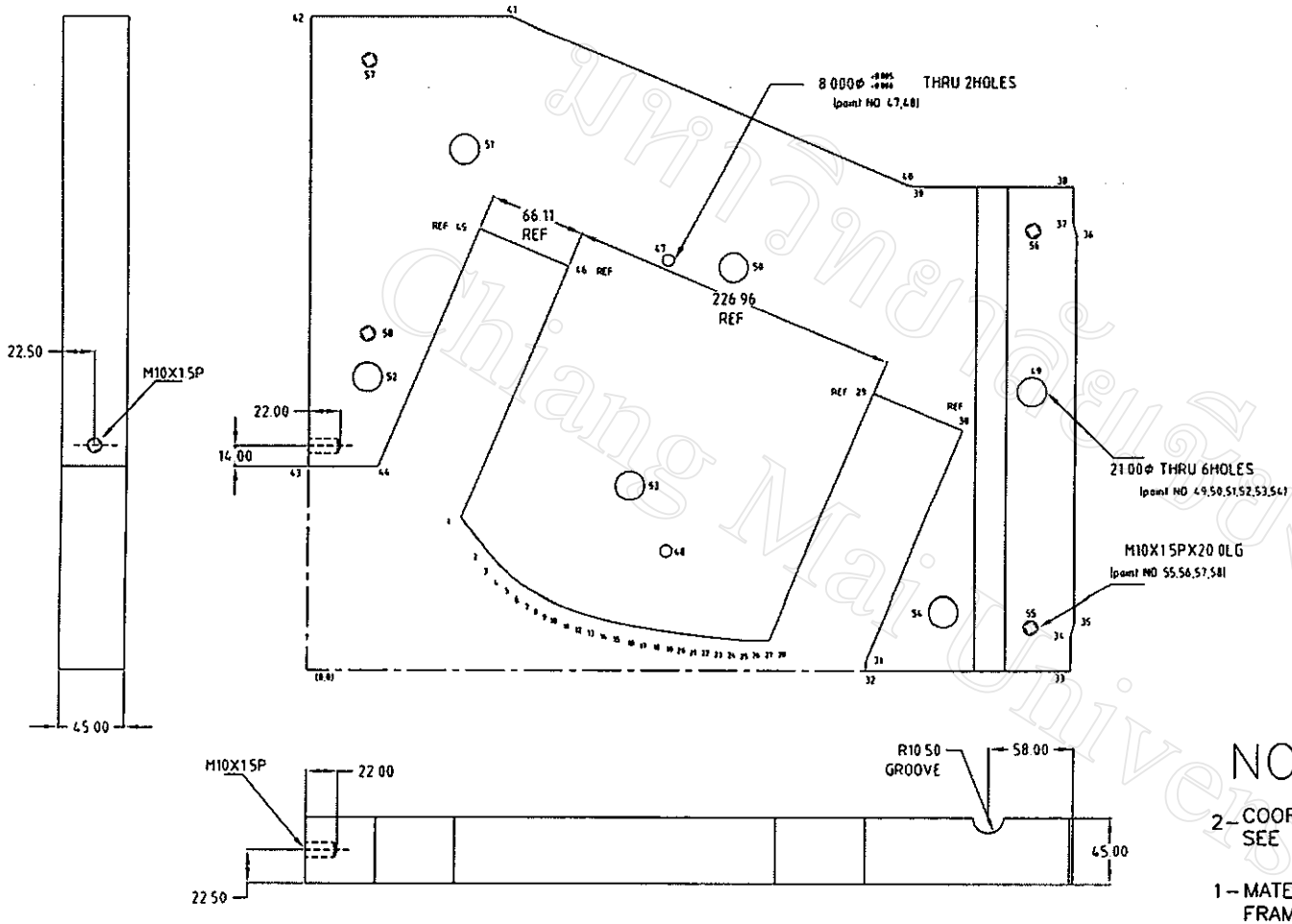
2- COORDINATE,TOLERENCE AND SURFACE ROUGHNESS
SEE DWG No. AL-01-01

1- MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL-01-00

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM / SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.	DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHALA02	APP'D BY	DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL-01-02	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE



NOTES:

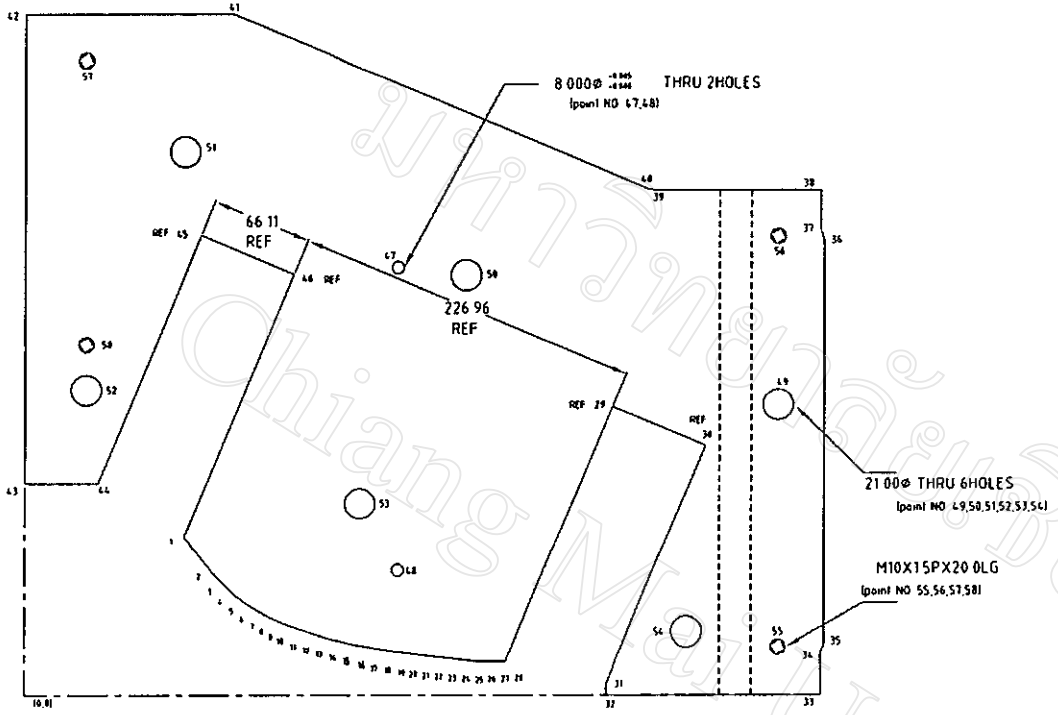
2- COORDINATE,TOLERENCE AND SURFACE ROUGHNESS SEE DWG No. AL-01-01

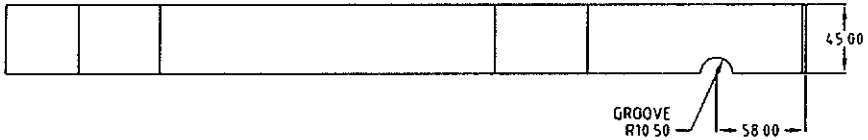
1- MATERIAL: 50 mm PLATE 1008 STEEL FRAME CUT PER TEMPLATE DWG No. AL-01-00

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005 ANGULAR ± 0.5000" OTHER	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
	SERIES No.		DESIGN BY	DATE
	ASS'Y NAME ALPHALA03		APP'D BY	DATE
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION		DWG. No. AL-01-03	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE





NOTES:

2-COORDINATE,TOLERENCE AND SURFACE ROUGHNESS
SEE DWG No. AL-01-01

1-MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL-01-00

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM / SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.	DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHALA04	APP'D BY	DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL-01-04	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

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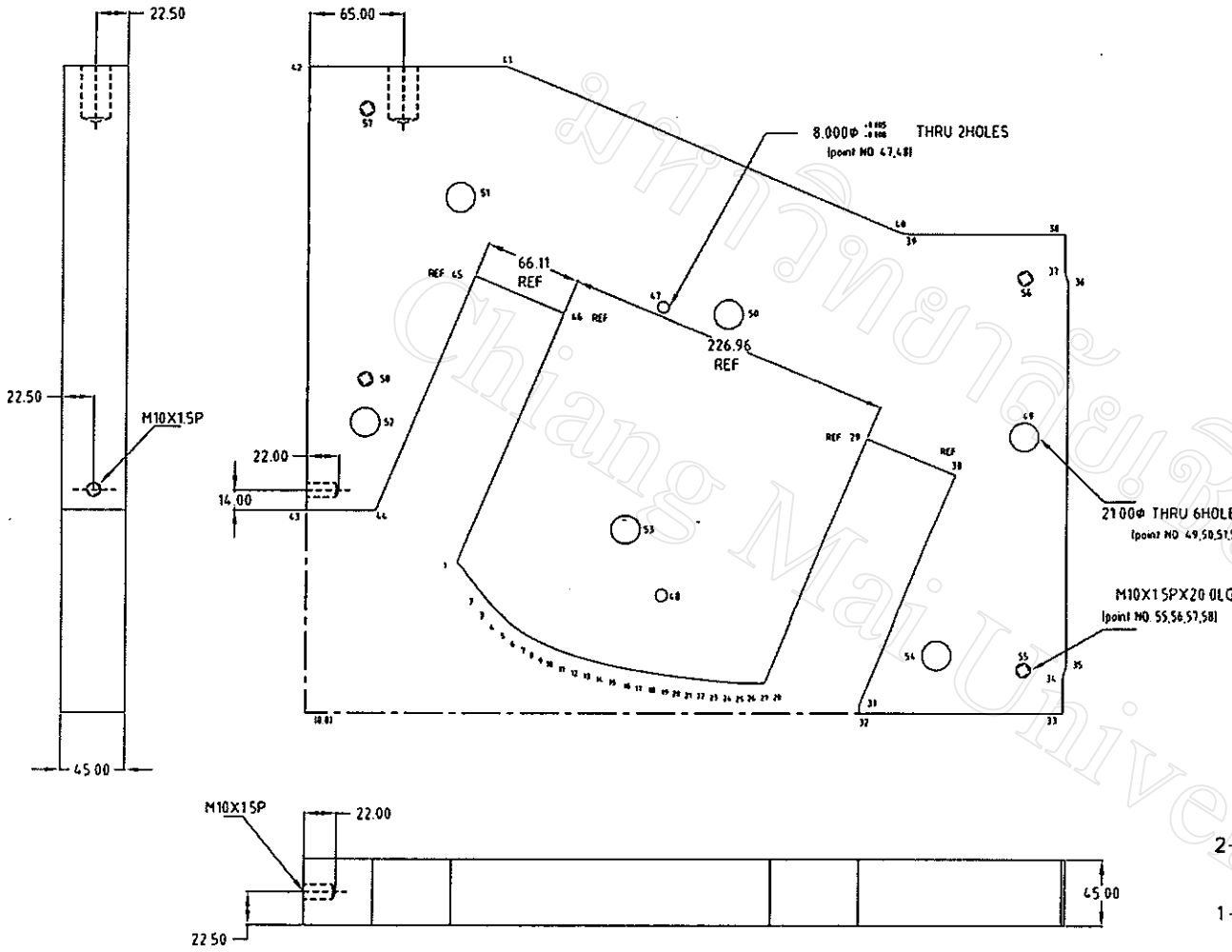


NOTES:

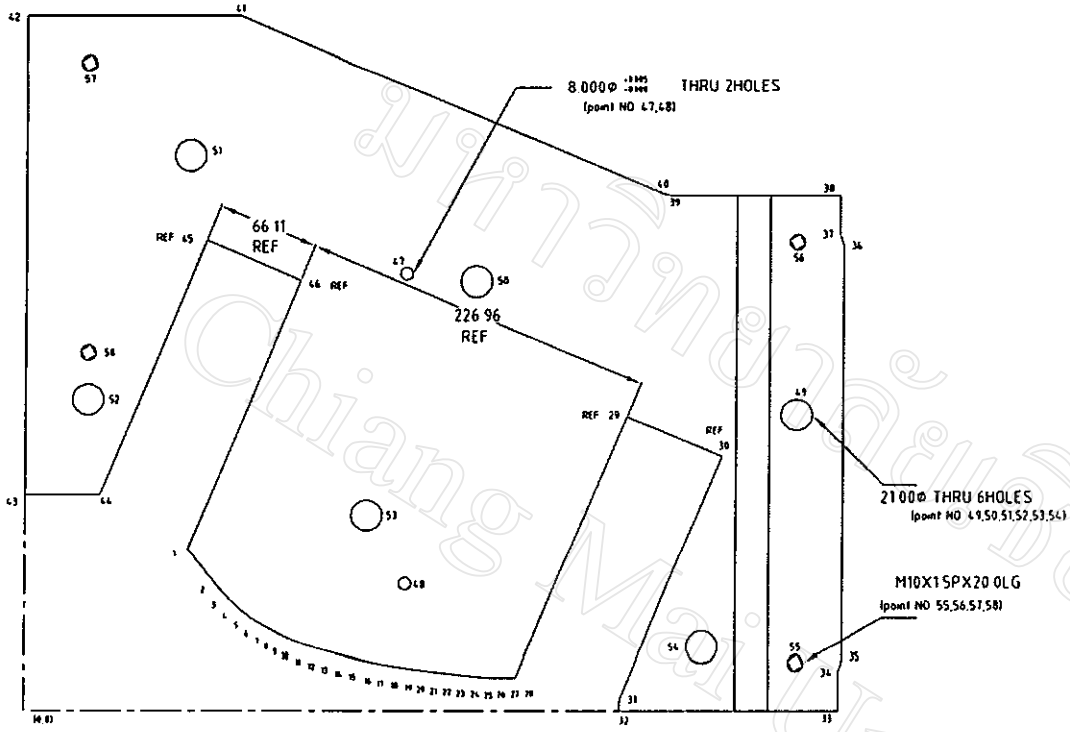
2– COORDINATE,TOLERENCE AND SURFACE ROUGHNESS SEE DWG No. AL–01–01

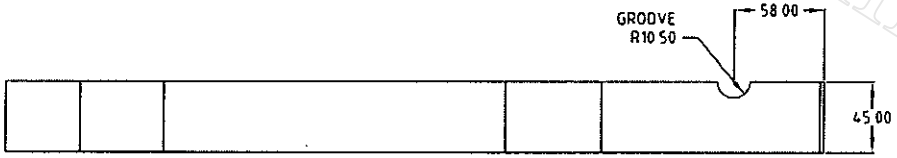
1– MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL–01–00

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM / SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.02 3. Place Decimal ±0.005	SERIES No.	DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHALA05	APP'D BY	DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL–01–05	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE





NOTES:

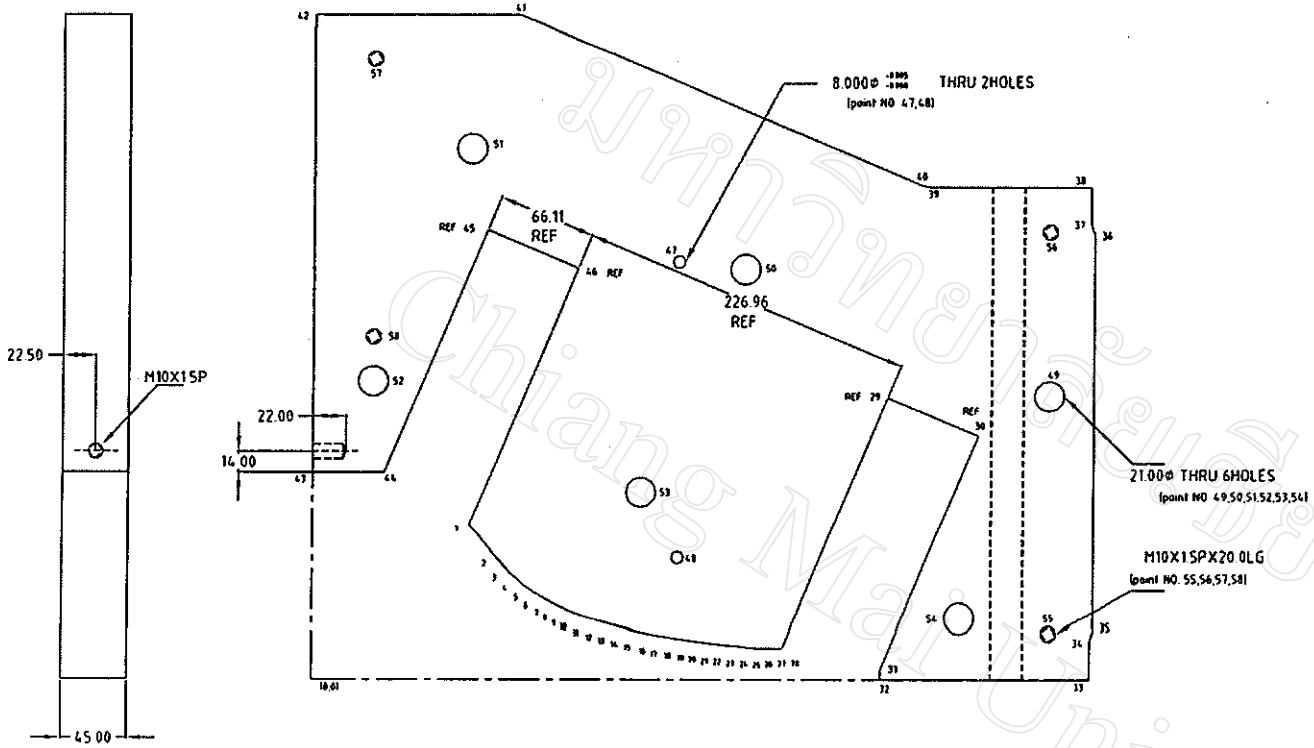
2- COORDINATE,TOLERENCE AND SURFACE ROUGHNESS
SEE DWG No. AL-01-01

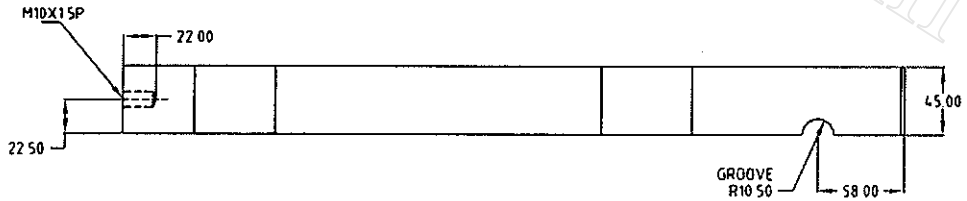
1- MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL-01-00

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005 ANGULAR ± 0.5000" OTHER	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
	SERIES No.		DESIGN BY	DATE
	ASS'Y NAME ALPHALA06		APP'D BY	DATE
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION		DWG. No. AL-01-06	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE





NOTES:

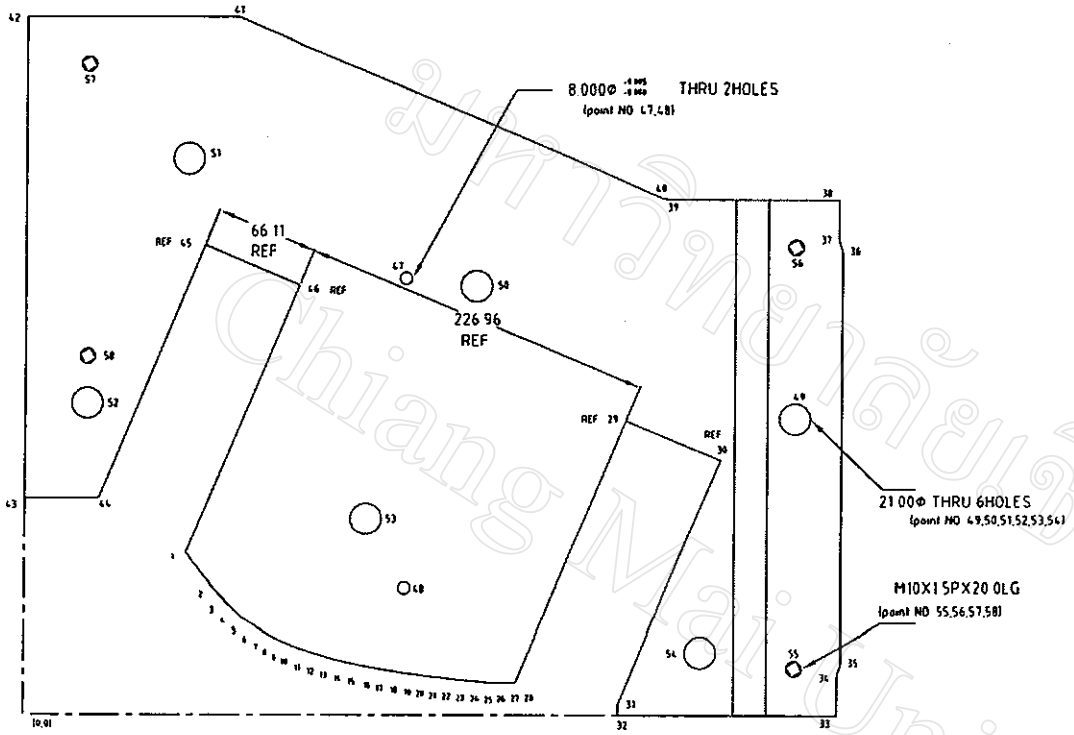
2- COORDINATE,TOLERENCE AND SURFACE ROUGHNESS SEE DWG No. AL-01-01

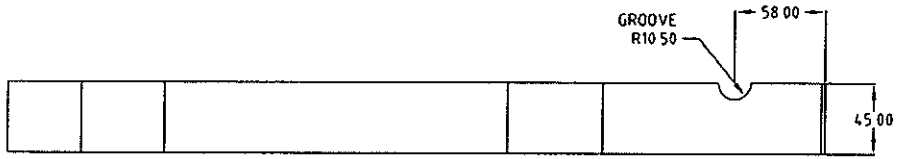
1- MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL-01-00

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM / SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1- Place Decimal ±0.1 2- Place Decimal ±0.05 3- Place Decimal ±0.005	SERIES No.	DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHALA07	APP'D BY	DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL-01-07	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE





NOTES:

2- COORDINATE,TOLERENCE AND SURFACE ROUGHNESS
SEE DWG No. AL-01-01

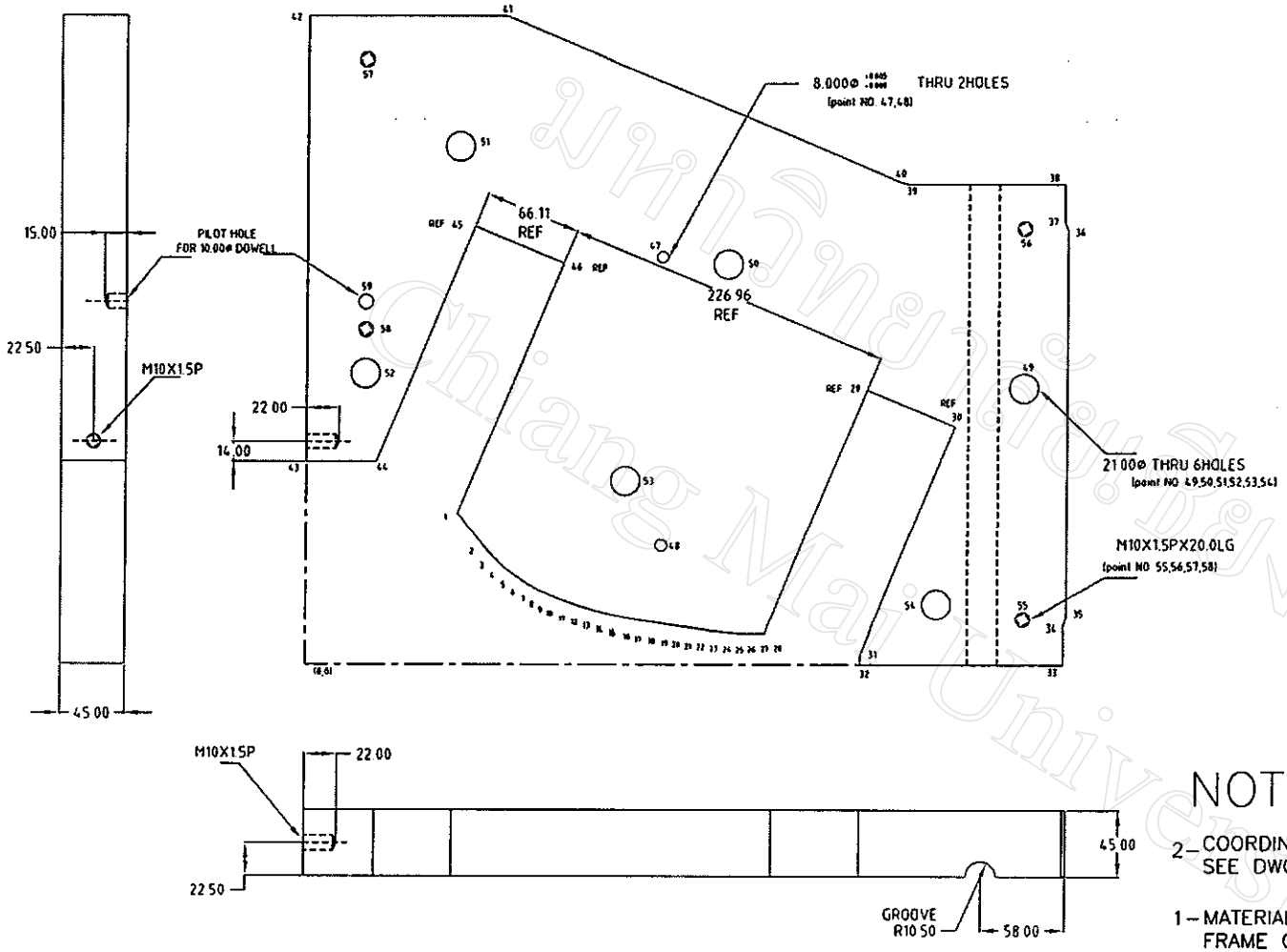
1- MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL-01-00

100

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHALA08		APP'D BY	DATE
OTHER				
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION		DWG. No. AL-01-08	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE



NOTES:

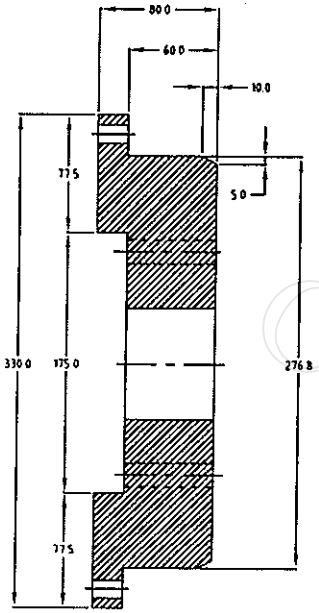
2–COORDINATE,TOLERENCE AND SURFACE ROUGHNESS
SEE DWG No. AL–01–01

1–MATERIAL: 50 mm PLATE 1008 STEEL
FRAME CUT PER TEMPLATE DWG No. AL–01–00

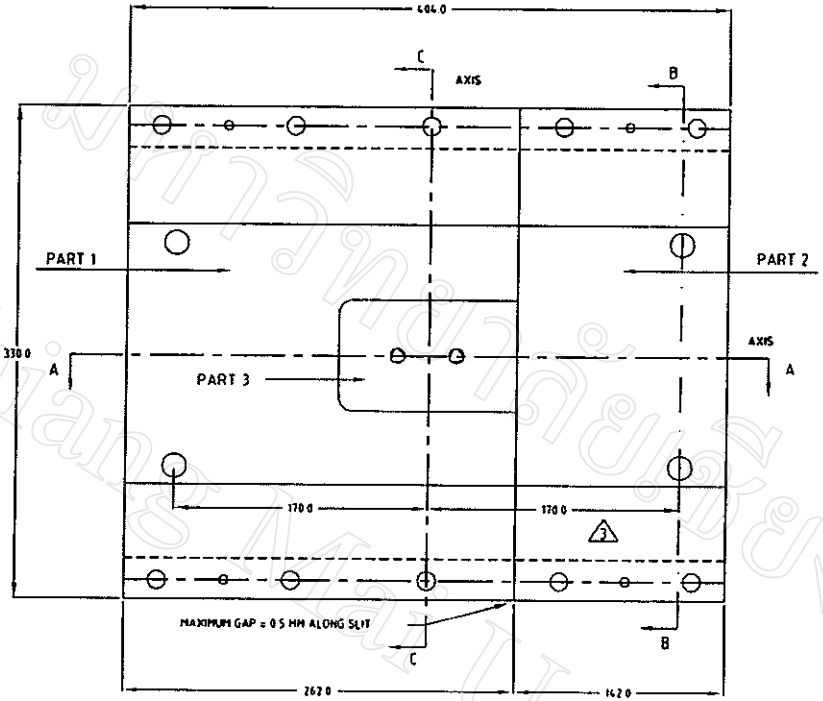
PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

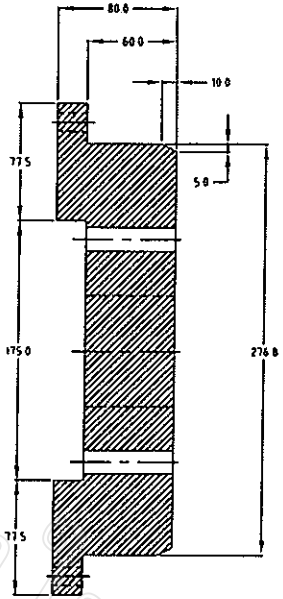
UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM / SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.	DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME ALPHALA09	APP'D BY	DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL–01–09	ISSUE DATE

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

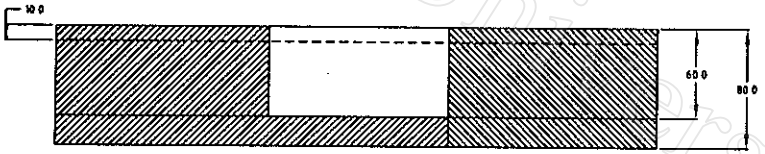


SECTION C-C





SECTION B-B



SECTION A-A

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS
PART 3	FRONT PLATE PART 3	1008 STEEL	1	AL-02-03
PART 2	FRONT PLATE PART 2	1008 STEEL	1	AL-02-02
PART 1	FRONT PLATE PART 1	1008 STEEL	1	AL-02-01

NOTES:

1. MATERIAL: 1008 STELL
2. BREAK ALL SHARP EDGES.
3. 170.00 dimension are measureed after plate is split & replace together

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

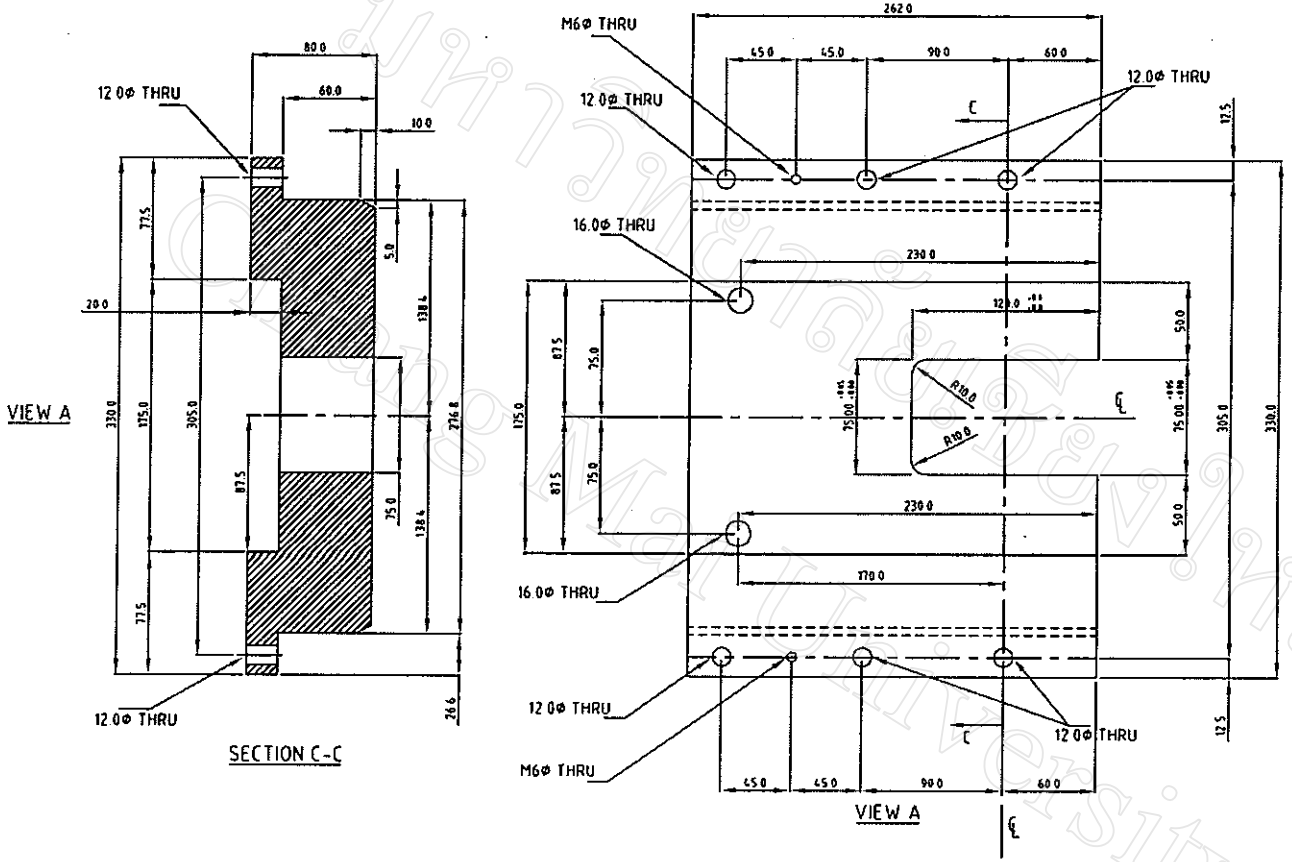
UNLESS OTHERWISE SPECIFIED
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005
ANGULAR ± 0.5000'
OTHER
FILE LOCATION

DIMENSIONS IN MM | SCALE NONE | DRAWN BY JATUPORN | DATE 01/10/2001
SERIES No. | DESIGN BY | DATE
ASS'Y NAME FRONT PLATE | APP'D BY | DATE
ASS'Y USED ON ALPHA MAGNET | PROJECT SURIYA PROJECT

FNRF
Chiang Mai University
Chiang Mai THAILAND

DESCRIPTION

DWG. No. AL-00-03 | ISSUE DATE



PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS
UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME FRONT PLATE PART 1		APP'D BY	DATE
OTHER	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FILE LOCATION	DESCRIPTION		DWG. No. AL-02-01	ISSUE DATE

FNRF
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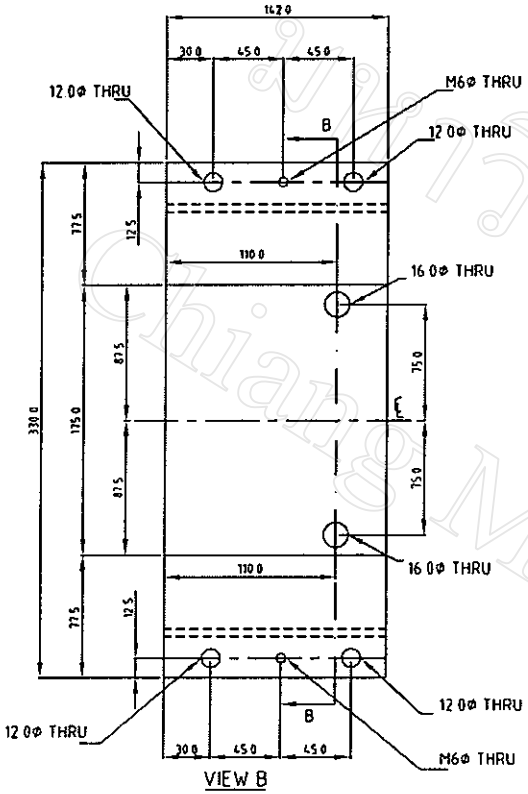
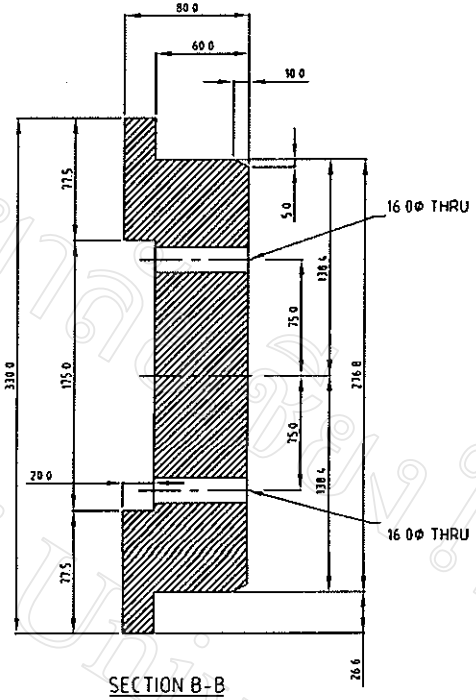
Chiang Mai THAILAND

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE



VIEW B

VIEW B



SECTION B-B

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS
UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME FRONT PLATE PART 2		APP'D BY	DATE
OTHER	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FILE LOCATION	DESCRIPTION		DWG. No. AL-02-02	ISSUE DATE

FNRF
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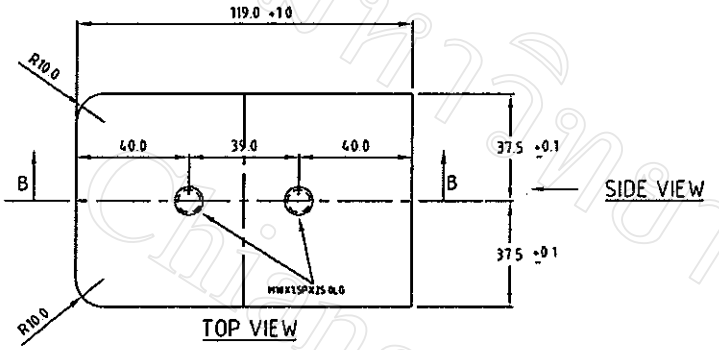
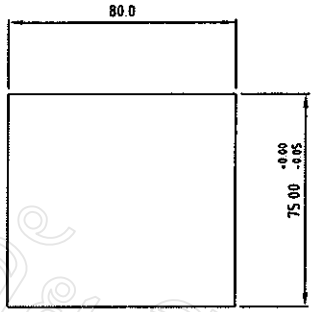
Chiang Mai THAILAND

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

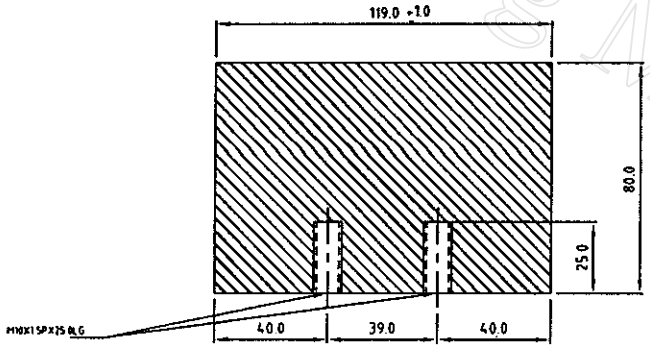


TOP VIEW



SIDE VIEW

SIDE VIEW

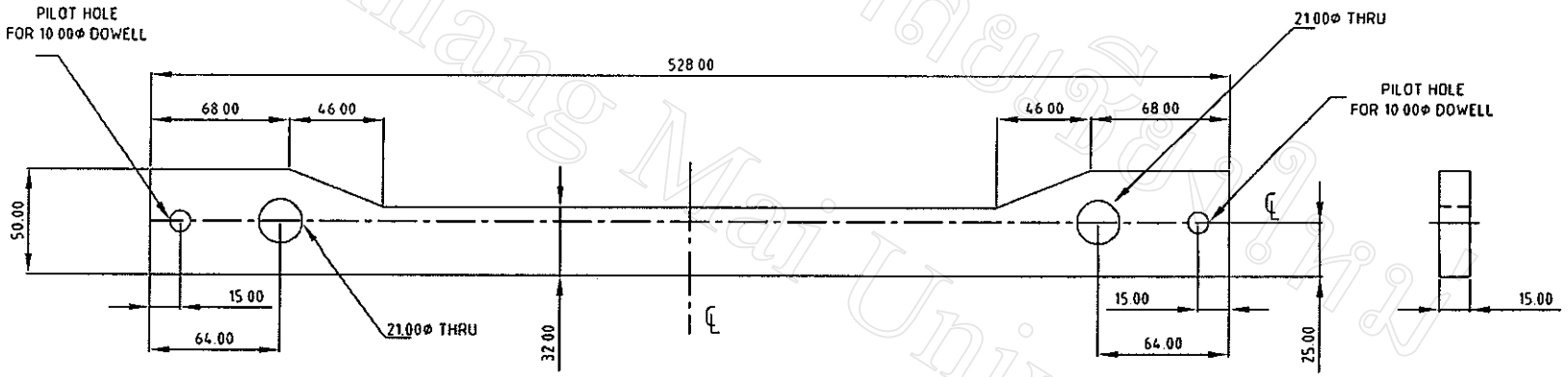


SECTION B-B

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM / SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.	DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME FRONT PLATE PART 3	APP'D BY	DATE
OTHER			
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL-02-03	ISSUE DATE



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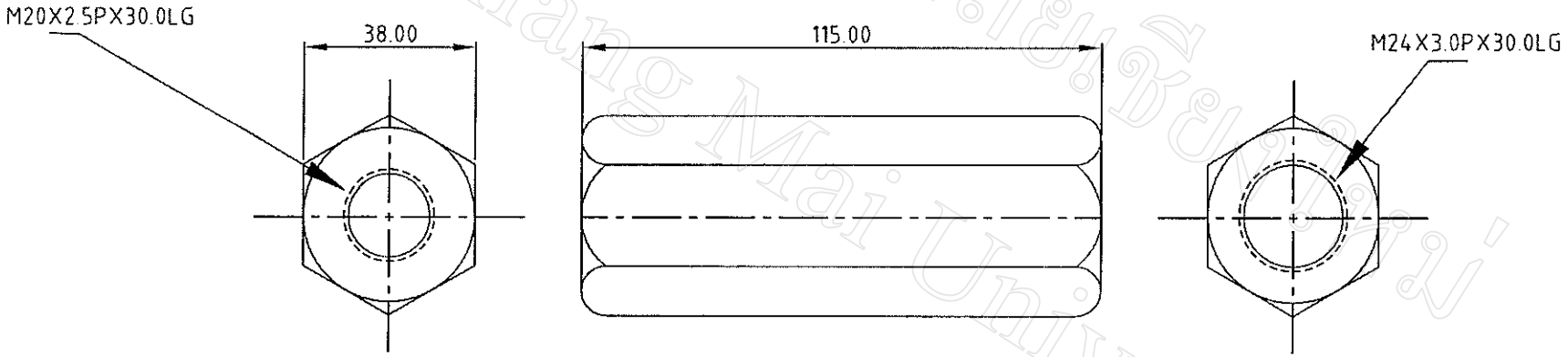
NOTES:

1. MATERIAL: STEEL (2 PLCS)
2. BREAK ALL SHARP EDGES.

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS
UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME TIE BAR		APP'D BY	DATE
OTHER	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FILE LOCATION	DESCRIPTION		DWG. No. AL-03-01	ISSUE DATE

FNRF
Chiang Mai University
Chiang Mai THAILAND



107

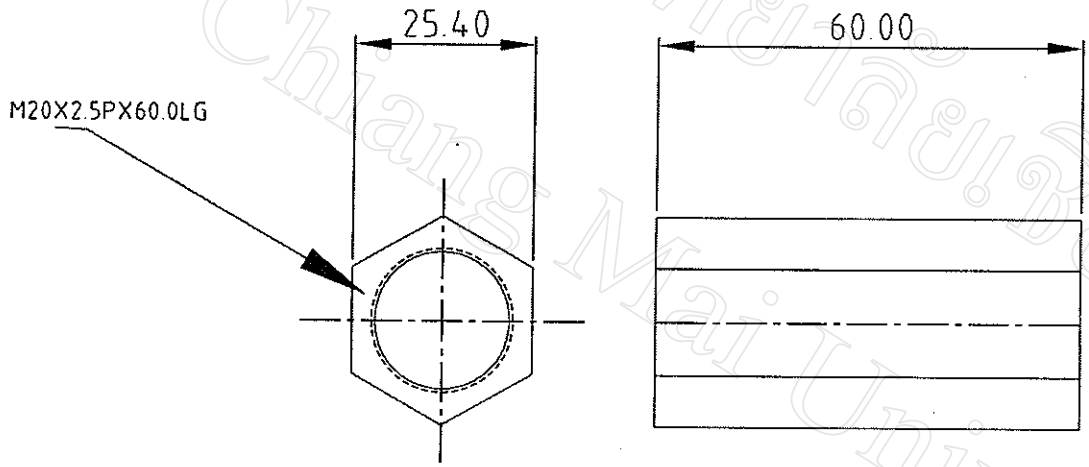
NOTES:

1. MATERIAL: STEEL (2 PLCS)

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY	DATE
ANGULAR ± 0.5000'	ASS'Y NAME NUT		APP'D BY	DATE
OTHER				
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION		DWG. No. AL-04-01	ISSUE DATE



NOTES:

1. MATERIAL: STEEL (2 PLCS)

PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS
UNLESS OTHERWISE SPECIFIED	DIMENSIONS IN MM	SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005	SERIES No.		DESIGN BY	DATE
ANGULAR ± 0.5000°	ASS'Y NAME COUPLING NUT		APP'D BY	DATE
OTHER	ASS'Y USED ON ALPHA MAGNET		PROJECT SURIYA PROJECT	
FILE LOCATION	DESCRIPTION		DWG. No. AL-05-01	ISSUE DATE

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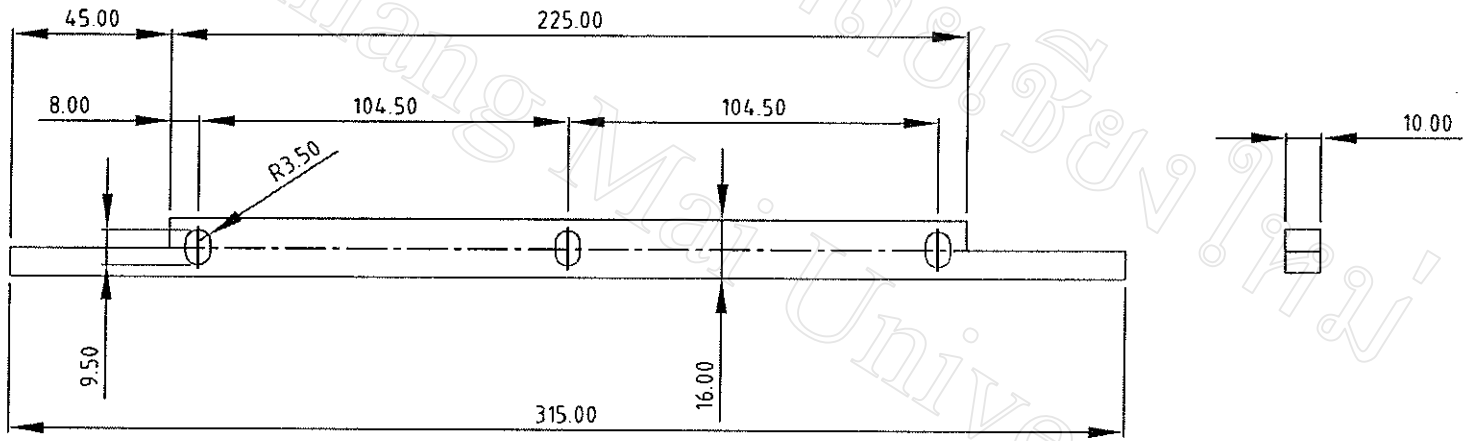
Chiang Mai University
Chiang Mai THAILAND

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE



NOTES:

1. MATERIAL: SSTL (4 PLCS)

REVISIONS	CHANGE OR ADDITION	MADE BY	DATE	APP'D BY	DATE

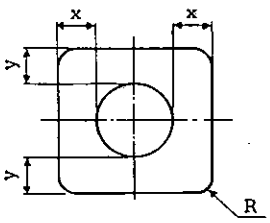
PART No.	PART NAME	MATERIAL	QUANTITY	REMARKS

UNLESS OTHERWISE SPECIFIED TOLERANCE 1. Place Decimal ±0.1 2. Place Decimal ±0.05 3. Place Decimal ±0.005 ANGULAR ± 0.5000' OTHER	DIMENSIONS IN MM SCALE NONE	DRAWN BY JATUPORN	DATE 01/10/2001
	SERIES No.	DESIGN BY	DATE
	ASS'Y NAME COIL CLAMPING BAR	APP'D BY	DATE
FILE LOCATION	ASS'Y USED ON ALPHA MAGNET	PROJECT SURIYA PROJECT	
FNRF Chiang Mai University Chiang Mai THAILAND	DESCRIPTION	DWG. No. AL-06-01	ISSUE DATE

ภาคผนวก จ

คุณสมบัติของลวดทองแดงที่ใช้สร้างขดลวดของแม่เหล็ก

SQUARE WITH A ROUND HOLE



Dimensions in mm

NO.	OD	ID	x = y	R	Kg/m
6844	4	2.5	0.75	0.5	0.098
8350	4.19	2.4	0.895	0.8	0.110
8301	4.3	2.34	0.98	0.76	0.120
8153	4.5	2.5	1	1	0.136
8206	4.62	2.39	1.11	0.76	0.150
8150	4.76	3.18	0.79	1	0.124
6867	5	2	1.5	1	0.179
8215	5	2.5	1.25	1	0.172
6831	5	3	1	0.7	0.157
8416	5.6	3.05	1.275	1	0.210
6881	5.6	3.6	1	1	0.183
8339	5.79	3.18	1.305	1	0.220
8235	6x6/5.6	3	1.5	1	0.250
8283	6	3	1.5	1	0.250
6860	6	3.5	1.25	0.8	0.230
6835	6	4	1	1	0.200
8408	6x6/5.6	4	1	1	0.197
8204	6	4.5	0.75	1	0.173
8405	6.15	2.54	1.805	0.635	0.290
8417	6.35	3.15	1.6	1	0.280
8149	6.35	4.75	0.8	1.27	0.190
8424	6.40	3	1.7	1	0.300
6873	6.4	4.4	1	1	0.230
8385	6.48	3.18	1.65	1	0.297
6858	6.5	3	1.75	1	0.300
8325	6.5	3.1	1.7	0.8	0.310
6869	6.5	3.5	1.5	1	0.280
8156	6.5	4	1.25	0.5	0.260
8125	6.5	4.5	1	1	0.220
8132	6.7	4	1.35	1	0.280
6851	7	3	2	1	0.360
6809	7	3.5	1.75	1	0.340
8141	7	3.7	1.65	1	0.330
6836	7	4	1.5	1	0.320
8371	7x7/6.8	4	1.5	1	0.315
8477	7	4.3	1.35	1	0.301
8393	7	4.5	1.25	1	0.288
6828	7	5	1	0.7	0.260
8481	7x7/6.6	5	1	0.7	0.252
8172	7.1	4	1.55	1	0.330
6872	7.1	4.5	1.3	1	0.300
8334	7.14	2.92	2.11	1	0.390
8105	7.5	3.14	2.18	0.5	0.430
8138	7.5	3.4	2.05	1	0.410
8504	7.5	4	1.75	1	0.380
6076	7.5	4.5	1.5	1	0.360
8213	7.5	5	1.25	1	0.320
8338	7.7	4.4	1.65	1	0.390
6068	7.87	4.57	1.65	0.76	0.400
8502	7.95	4.32	1.815	1	0.426
8318	8	3	2.5	1	0.500
8136	8	3.5	2.25	1	0.480
6817	8	4	2	1	0.450
8256	8	4.4	1.8	1	0.429
6090	8	4.5	1.75	1	0.440
8251	8	4.8	1.6	1	0.400
6829	8	5	1.5	0.5	0.390
6091	8	5	1.5	1	0.380
8480	8	5.5	1.25	1	0.350
8128	8	6	1	1	0.310
8349	8.25	4.6	1.83	1	0.450
6820	8.25	5.5	1.38	1	0.380
6830	8.3	5.2	1.55	1	0.430
6891	8.5	3.2	2.65	0.5	0.570
8441	8.5	4.5	2	1	0.496
8228	8.5	5.5	1.5	1	0.427
6892	8.5	6.5	1	2	0.320
8386	8.64	4.65	1.995	0.75	0.511
8286	8.64	4.66	1.99	1.5	0.497
111 8304	8.8	4	2.4	1	0.570
6843	8.8	6	1.4	1	0.430
8188	8.8	7	0.9	1	0.330
6070	8.89	4.77	2.06	0.76	0.520
8182	9	4.5	2.25	1	0.580
8106	9	5	2	1	0.540
8208	9	5.2	1.9	1	0.532
6807	9	5.5	1.75	1	0.500
6842	9	5.7	1.65	1	0.480
8458	9x9/8.6	6	1.5	1	0.456
6092	9	6	1.5	1	0.460
6834	9	6.5	1.25	1	0.420
8252	9.2	4	2.6	1	0.640
8415	9.26	5.18	2.04	1	0.570
8165	9.4	4.5	2.45	1	0.640
6866	9.4	4.5	2.45	2	0.610
8147	9.5	4.5	2.5	1	0.660
8452	9.5x9.5/9.1	5	2.25	1	0.567
8288	9.5	5	2.25	1	0.624
6889	9.5	5.5	2	1	0.590
8319	9.5	5.5	2	1.6	0.570
8157	9.5	5.7	1.9	1	0.560
8303	9.52	4.83	2.35	0.8	0.640
6096	9.52	6.35	1.58	1	0.520
8173	9.7	6	1.85	1	0.580
8214	9.7	7.6	1.05	1	0.430
8244	9.7	7.9	0.9	1	0.400
8237	10	4	3	1	0.770
6077	10	5	2.5	1	0.710
8139	10	5.7	2.15	1	0.660
6097	10	6	2	1	0.630
6067	10	6.5	1.75	1	0.600
8454	10x10/9.4	7	1.5	1	0.534
8254	10	7	1.5	1	0.540
8501	10	7.5	1.25	1	0.491
8366	10.16	4.78	2.69	1	0.755
6080	10.16	6.35	1.9	1.75	0.620
6894	10.3	6	2.15	1	0.690
8229	10.3	6.5	1.9	1	0.652
6808	10.31	7.92	1.2	1.6	0.490
8230	10.39	5.82	2.28	1.27	0.715
8205	10.5	5	2.75	1	0.803
8390	10.5x10.5/9.9	5	2.75	1	0.789
8450	10.5	5.25	2.625	0.5	0.730
8496	10.5	5.5	2.5	1	0.765
8406	10.5x10.5/9.9	6	2.25	1	0.712
6074	10.5	6	2.25	1.75	0.710
6848	10.5	6.2	2.15	1	0.710
8112	10.7	5.5	2.6	1	0.810
8127	10.9	6.15	2.38	2	0.760
8309	11	4.5	3.25	1	0.930
6884	11	5	3	1	0.900
6814	11	6	2.5	1	0.820
6060	11	6.5	2.25	1	0.770
6081	11	6.5	2.25	1	0.780
6847	11	6.7	2.15	1	0.760
8143	11	7	1.5	1	0.740
8178	11	7.3	1.85	1	0.700
8459	11	8.8	1.1	1	0.530
8323	11.11	5.56	2.78	2	0.860
8369	11.11	6.4	2.355	0.6	0.813
6853	11.2	5	3.1	1	0.940
6875	11.2	6	2.6	2	0.840
8111	11.2	6.15	2.53	2	0.820
6852	11.2	7.4	1.9	1	0.730
8484	11.5	5	3.25	1	1.000
6849	11.5	7.5	2	1	0.780
8438	11.6	6.5	2.55	1	0.910
6841	11.6	6.7	2.45	1	0.880
8411	11.68	5.72	2.98	1	0.980
8345	11.68	6.48	2.6	1	0.920
8347	11.89	7.42	2.24	1.27	0.860
8324	12	5	3.5	1	1.100
8475	12	5.5	3.25	1	1.060
6094	12	6	3	1	1.030
8361	12x12/11.7	6.5	2.75	1	0.975
6865	12	6.5	2.75	1.5	0.990

3M

Scotch® 69 Glass Cloth Electrical Tape

ภาคผนวก จ

แสดงคุณสมบัติของฉนวนที่ใช้พันรอบลวดทองแดง

Data Sheet

1. Product Description

Scotch 69 Glass Cloth Electrical Tape is a white glass cloth tape with a high-temperature thermosetting silicone adhesive. It has been designed for use in 600-volt dry location applications requiring both high mechanical strength and resistance to high temperatures. The thermosetting adhesive provides an increased bond, once applied in areas of high ambient temperatures. 69 Tape has a class "H" 180°C (356°F) temperature rating.

Meets requirements of:

- Military Specification No. MIL-I-19166C
- UL Recognized Component listing for 200°C (Guide OANZ2, File E17.85)
- CSA Accepted Component 180°C file LR93411

2. Applications

- Insulating electric and induction type furnace power supply leads
- Securing high-temperature, non-PSA insulations (such as asbestos and glass) in high-temperature areas
- Securing Scotch 77 Fire Retardant Electric Arc Proofing Tape
- Replacing 27 Tape in locations where a higher-temperature tape is needed
- Splicing wire that is rated 150C (302°F), 180°C (356°F), SF and SFF
- Reinsulating and repairing coils on mining machines
- Reinforcing insulation in electrical installations where heavy loads cause high heat and breakdown of original insulation (e.g. motor control exciter feeds)
- Splicing silicone-covered glass wire where splices require more abrasion resistance and mechanical strength than can be provided by silicone tapes
- Insulating Class "H" dry-type transformer leads
- Insulating splices made on SA type wire in heat treat areas.

3. Typical Data/Physical Properties

Test Method	Typical Value*
Physical Properties	
Thickness ASTM D-1000	7.5 mils (0,19mm)
Tensile Strength ASTM D-1000	150 lbs/in (26 kN/m)
Elongation ASTM D-1000	5% at break
Adhesion ASTM D-1000	40 oz/in (0.44 kN/m)
Electrical Properties	
Dielectric Breakdown ASTM D-1000	3500V
Insulation Resistance ASTM D-1000	250 megohms @ 96% RH
Electrolytic Corrosion Factor 3M Test Method	1.0

*These are typical values and should not be used for specification purposes at room temperature.

4. Shelf Life

Scotch™ 69 Glass Cloth Electrical Tape has a 3-year shelf life from date of manufacture when stored under the following recommended storage conditions. Store behind present stock in a clean dry place at a temperature of 70°F and 40-50% relative humidity. Good stock rotation is recommended.

5. Availability

69 glass cloth electrical tape is available from your local authorized 3M electrical distributor in the following sizes:

1/2 in. x 66 ft. (12,7 mm x 19,8m)
3/4 in. x 66 ft. (19mm x 19.8m) rolls

Important Notice:

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Litho in USA

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ประวัติผู้เขียน

ชื่อ นาย จตุพร สายสุด

วัน เดือน ปี เกิด 18 เมษายน พ.ศ.2519

ประวัติการศึกษา

สำเร็จการศึกษาชั้นประถมศึกษา โรงเรียนบ้านอนุบาลตาก อำเภอเมือง จังหวัดตาก ปีการศึกษา 2531

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