CHAPTER FIVE

RESULTS

5.1 PROGRAM TESTING USING DATA FROM KMITT

The program developed was tested and improved by using simulated data on NEC-300 Computer. After that, the data from experiments by Jewpraditkut,V.et.al.(77) of KMITT were used to test the image reconstructed by the program. The data used in this case are shown in Table 5.1. The initial input data were as follow

a. XPOS = 4.99, YPOS = 4.99

b. IY = 64, IX = 51

c. N = 50

d. M = 38

e. A = 0.263157894

The results are shown in Figure 5.1. The image obtained was sufficiently close to the one reported by Jewpraditkul et.al. as shown in Figure 5.2. Some distortions were observed because of the even numbers of projections were used in the experiment causing a little shift in centering the image.
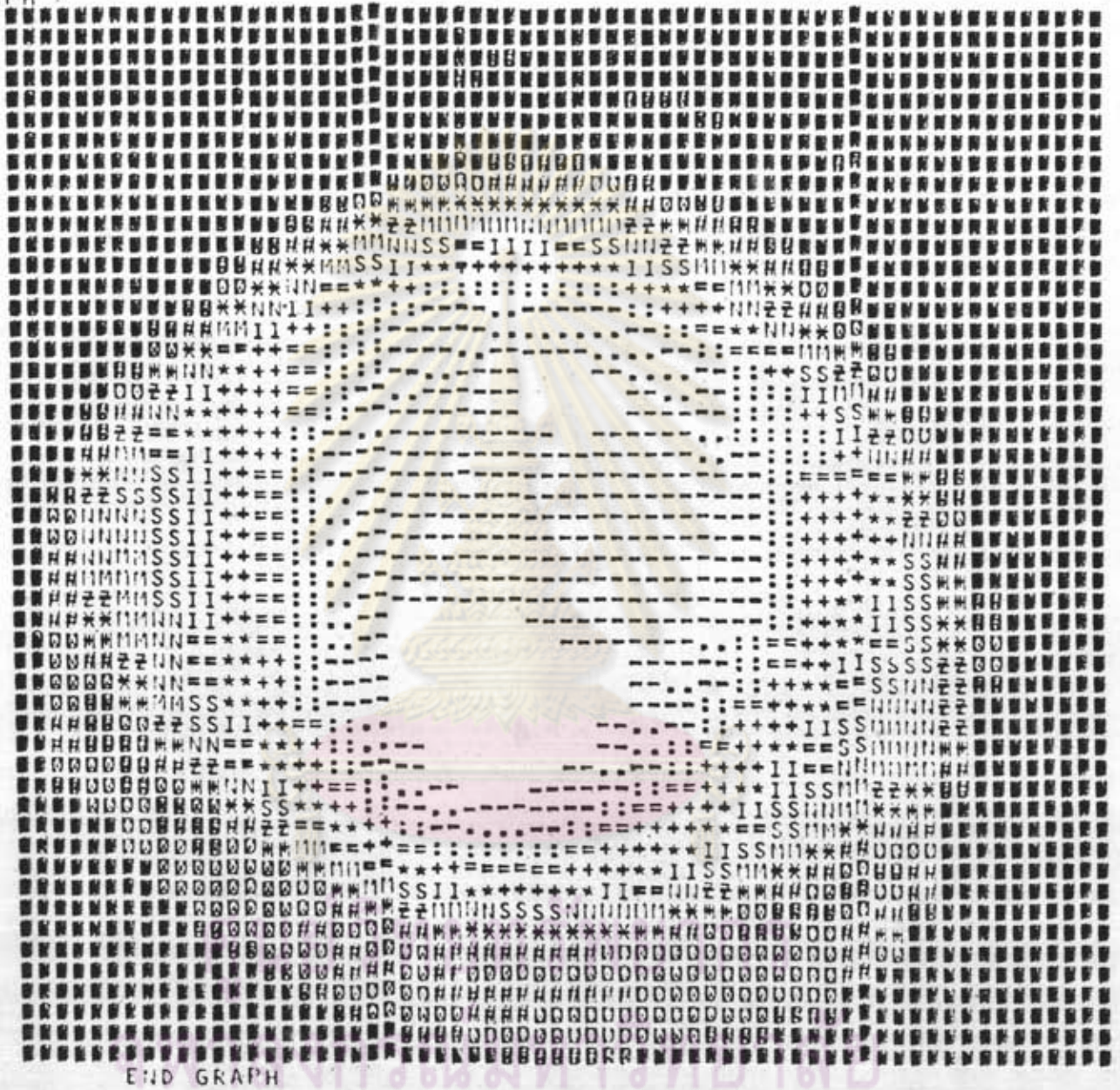
Table 5.1 Projection data from KMITT

```
14569147321472774501143311459712135  6445 4859 3796 3231 2785 2470 1498 1111 1082
  1827 1794 1773 1720 1730 1522 1603  700  544  542  515  743 1036 3650 4934 6952
12307145941401617014363146922
140141465114001017014577145311146-6  9353 5632 4259 3559 3136 2930 2170 1287 1046 1467
 1844 1744 1741 1783 1740 1744 1744  1180  603  498  537  581  637 1471 4155 5517 8065
1446147414111472717014714701400578
171747127921457614543141576014510
1460314425144500140447147  01450011803 5761 4337 3471 2993 2760 2290 1272 1108 1272
 1843 1750 1820 1715 1775 1750  832  581  521  509  616  908 1877 4180 5359 7668
14425145701460014581151445914425
140551472714011657140114534140506 12040 6416 4822 3766 3264 2604 2502 1885 1123 1075
 1654 1649 1772 1770 1800 1708  875  558  495  479  558  802 1505 4075 4982 7208
12952143021458001449140371405 6
1458014570145901453146291460 5  8934 5631 4340 3410 3011 2755 2417 1454 1078 1115
 1775 1810 1765 1743 1810 1381  692  522  453  505  675 1065 2896 4396 5477 8102
143841473014627147931461814640
147801462914020014841145281475 12071 6464 4852 3757 3230 2791 2430 2152 1187 1016
 1287 1033 1069 1706 1785 1397  714  487  452  476  619 1006 2295 4146 5038 6750
147094146141461514271145116149
14770145401455014830147   1637  9568 5530 4404 3522 3042 2785 2360 1823 1123 1036
 1403 1724 1730 1730 1656  651  619  450  486  507  724 1428 3490 4382 5641 8726
1451214503141441446014501146581462
150551455791441465514731403511875 6476 4933 3751 3217 2754 2535 2184 1406 1033
 1148 1709 1737 1705 1648  640  581  405  446  570  705 1324 3183 4002 4912 7057
12949147-1469514730146403
1460714714147791456140521460 7  8754 5579 4368 3596 2918 2710 2327 2069 1215 1004
 1214 1451 1742 1705  945  619  485  401  482  563  926 2443 3598 4337 5469 8431
14550144501476014715147  814647
1464014544560145601453414391407 11084 6612 4968 3668 3206 2745 2436 2223 1893 1073
 6441 1417 1773 1691 1005  597  444  438  482  561  886 2328 3255 4105 4994 7244
13005144591470146140114454145
1472144614605147731477147501445 8080 5633 4350 3595 2983 2741 2393 2152 1585 1022
  999 1569 1722 1352  562  490  431  390  517  767 1701 2954 3373 4336 5616 8599
146041461214679146601314105142
1458414450147791465148214731 11594 6471 4719 3787 3076 2798 2468 2268 2012 1361
  951 1046 1726 1520  660  662  395  457  664  684 1534 2772 3224 4299 5148 7013
13131450501464214533146014581
14535145233147001461511476140  6656 5546 4327 3437 3037 2788 2346 2184 1986 1204
  955 1115 1670  650  493  418  443  437  625 1635 2846 2983 3856 4462 5580 8787
14769145401639146601460214507
145711454513101114405147014572 11460 6430 4861 3697 3318 2790 2436 2287 2020 1867
 1024  953 1310  771  528  400  427  461  674 1075 2573 2827 3180 4036 5041 6951
131171451550145011453146533
14744146091472614701405814351  8728 5526 4270 3391 3037 2678 2423 2167 1957 1657
 1053 1207  785  493  441  428  442  521  923 2480 2637 3616 4478 5737 8809
146071417624175017214793146 4
146848140451474914913147731472 11507 6437 4795 3675 3220 2751 2561 2225 2037 1935
 1301  955  595  555  393  404  424  524  876 2005 2502 2839 3186 4010 4910 7148
1325014501479014450145200147941455
14476147491465146204614604614 8111 5443 4249 3573 3061 2675 2296 2203 2015 2000
 1103  672  333  444  402  391  462  602 1672 2367 2612 3049 3562 4316 5642 8585
14477142551450145671401474711516 6515 4726 3653 3207 2754 2438 2243 2076 1924
 1735  767  368  311  392  475  664 1658 2113 2488 2302 4213 4961 6969
13315140970146201450147079145
14019145531405321472514725146  8665 5652 4363 3566 2979 2679 2305 2177 2029 1902
 1351  845  290  294  434  439  590 1336 2123 2597 2669 2960 3498 4377 5572 8695
14507144553140590145916146501450
14209  9535  245  557  540  401  613 1509 2116 2342 2454 2958 3275 4213 4959 6759
130501450057140057145001469414027 8621 5557 4296 3547 2973 2779 2305 2169 1986 1676
  679  954  716  437  526 1932 2138 2530 2570 3026 3487 4431 5502 8610
14510145451446214509147  1450141450 11570 6417 4900 3510 3264 2681 2527 2361 2065 1792
  684  470  351  214  560  540 1075 1789 2103 2296 2469 2801 3235 4179 5085 6910
12996144614471466014514031415144
14437142221465147371461614487  8749 5530 4382 3577 3148 2718 2344 2063 1807  836
 1078 1474 2164 2343 2061 2044 3375 4293 5518 8397
145011450145001466014557126314634
1450145631461401451512014763 11085 6335 5002 3719 3266 2801 2495 2226 2026  872
  674 1248 1986 2029 2352 2542 2802 3254 4069 4929 6885
12391145401146014732146440147 7
14591146501472021471713407114402 11402 5542 4204 3558 3160 2647 2376 2187  902  530
  425  551  350  292  575 1203 1238 1908 2109 2464 2586 3030 3489 4360 5456 8343
145271450014757147514740141714656
14551140010517140160160146031145011032 6515 4818 3794 3262 2742 2480 2207 1060  561
```

Table 5.1 Projection data from KMITT (continue).

```
426   401   401   389   502   261  1516 1742 2033 2300 2485 2723 3252 4061 4975 6877
                                 0321 5712 438? 3479 3006 2945 2423 1208  611  433
439   412   466   533   737  1310 1533 1734 2172 2286 2632 2788 3485 4336 5439 8355
                                11260 6565 4918 2755 3244 2733 2473 1411  680  527
391   457   455   835   977   915 1113 1745 2000 2192 2377 2844 3118 4161 4847 6724
                                11479 5713 4381 3564 3040 2854 1651  703  506  423
                                 1116 1731 2058 2260 2541 3006 3518 4192 5538 8159
445   462   573  1409 1408  1018 1005 1514 2076 2240 2509 2772 3217 3903 4870 6809
                                11890 5731 4374 3467 3006 2706  877  550  439  435
459   541  1133  1744 1247  1027 1051 1534 2099 2330 2644 2969 3387 4230 5388 8072
468   563   956  1771 1615  1198 12629 6912 4845 3667 3272 2566 1169  674  481  415
                                  230 1169 2014 2234 2464 1783 3158 4053 4839 6632
                                12678 5722 4412 3663 3221 1493  697  473  442  420
                                  934 1196 2028 2394 2487 2823 3465 4200 5477 7956
503   711  1545  1770 1586  1761 12441 6482 5022 3807 3344 1654  775  518  492  432
                                 1064 1048 1542 2246 2507 2817 3184 4024 4778 6804
636  1445  1730  1789 1735  1555 10001 5889 4329 3594 3069  870  597  500  463  510
                                 1034 1092 1656 2349 2633 2956 3464 4150 5439 8063
552  1118  1749  1316 1723  1798 12500 6902 5014 3937 3144 1001  685  518  428  478
                                 1222 1007 1207 2161 2511 2743 3180 4036 4866 6544
                                 9456 5385 4322 3643 2205  767  548  514  488  608
                                 1153 1017 1314 2310 2579 2941 3487 4129 5367 7720
                                13011 7005 5093 3949 2222  881  593  522  480  516
623  1664  1811  1715 1772  1795 1576 1051 1138 1886 2481 2761 3112 3979 4782 6445
1369 1270  1671  1769 1703  1542 10068 5793 4439 3134 1479  701  518  500  510  644
                                 1466 1074 1213 2156 2485 3022 3311 4109 5285 7768
1031 1757         1328 1761  1741 13078 7126 4747 3649 1504  780  548  502  496  538
                                 1733 1085 1096 1508 2507 2707 3159 4093 4742 6436
                                10341 5891 4541 2125  966  732  503  523  503  768
1703 1768  1812  1731 1824  1889 1677 1145 1142 1974 2529 2850 3324 4225 5232 7561
                                13103 7044 5141 3197 1270  746  525  503  514  598
                                 1330 1220 1076 1422 2421 2669 3218 3823 4696 6364
1850 1310  1725  1737 1845       10375 5910 4531 2083 1118  601  530  493  590  846
                                 1383 1102 1162 1747 2531 2874 3403 4136 5208 7415
1615 1650  1751  1732 1630  1758 13206 7278 5141 2743 1151  725  571  551  510  639
                                 1325 1303 1123 1284 2392 2798 3144 3818 4600 6337
1788 1750  1801  1754 1786  1877 12946 6104 4524 1767 1097  609  532  500  601 1007
                                 1837 1190 1114 1555 2613 2827 3316 4086 5352 7226
1574 1618  1658  1757 1722  1447 13433 7223 5177 2660 1127  680  560  516  540  677
                                 1393 1467 1081 1304 2244 2693 3070 3775 4708 6318
1599 1755  1763  1835 1835  1845 10553 6127 4549 1748 1070  642  512  546  609 1011
                                 1675 1216 1154 1554 2513 2860 3249 4153 5219 7377
                                13422 7282 5383 2718 1204  706  549  508  524  662
1963 1771  1765  1830 1802  1745 1304 1313 1095 1315 2288 2755 3139 4000 4625 6192
                                13336 6106 4660 1946 1158  643  545  431  575  718
1161 1457  1472  1456 1471       1317 1217 1125 1651 2585 2722 3407 4226 5247 7173
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Figure 5.1   Image reconstruction from the data of Table 5.1

Figure 5.2 Image reconstruction by KMITT [77]

5.2   APPLICATION TO X-RAY RADIOGRAPHY

The program developed was applied to x-ray radiography by using the data obtained by simple experiments made at the Department of Nuclear Technology (Assistant Professors Nares Chankow, Suvit Punnachaiya and Somyot Srisatit). The experiments were based on a symmetric object where a tapered tube was used (unknown to the programmer at the beginning). The data used were as shown in Table 5.2. The initial data used were

a.   XPOS = 2.49, YPOS = 2.49

b.   IY = 32, IX = 26

c.   N = 180

d.   M = 61

e.   A = 0.081967213

The result of the image reconstruction was shown in Figure 5.3. The image obtained was quite acceptable both in terms of symmetry and resolution.

Table 5.2 Symmetry projection data from
Department of Nuclear Technology

No	Count rate	No	Count rate	No	Count rate
1	6944	2	6871	3	6937
4	6790	5	6753	6	3967
7	3299	8	3037	9	2867
10	2701	11	2652	12	2608
13	2526	14	2504	15	2442
16	2494	17	2476	18	2409
19	2417	20	2503	21	2469
22	2483	23	2522	24	2489
25	2563	26	2737	27	2688
28	2719	29	2577	30	2759
31	2809	32	2659	33	2728
34	2653	35	2609	36	2608
37	2660	38	2601	39	2655
40	2654	41	2617	42	2607
43	2700	44	2638	45	2572
46	2577	47	2443	48	2541
49	2467	50	2544	51	2657
52	2698	53	2888	54	2931
55	3136	56	3553	57	6564
58	6802	59	6815	60	6961
61	6821				

Figure 5.3 Image reconstruction using data from
Department of Nuclear Technology.