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**METSAT  
Advanced Microwave Sounding Unit -A1 (AMSU-A1)  
Structural Mathematical Model**

**Contract No: NAS 5-32314  
CDRL: 102b**

Submitted to:

National Aeronautics and Space Administration  
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## **SECTION 1**

### **INTRODUCTION**

This Structural Math Model for the Meteorological Satellites Project (METSAT) Advanced Microwave Sounding Units - A (AMSU-A), A1 Module, provides the description for the NASTRAN finite element model that is separately forwarded on computer disk. This is a description of the model at Critical Design Review (CDR), scheduled in April 1996. The report has been prepared in accordance with GSFC S-480-79, Performance Assurance Requirements (PAR) for the Earth Observing System (EOS) & Meteorological Satellites Project (METSAT) Advanced Microwave Sounding Units - A.

#### **1.1 IDENTIFICATION**

This is the Structural Math Model for the Meteorological Satellites Project (METSAT) Advanced Microwave Sounding Units - A (AMSU-A), Module A1. This report is submitted to fulfill the requirements of Contract NAS 5-32314 CDRL 102, Structural Math Model, for the METSAT AMSU-A1 Module. The Structural Math Model for the A2 module has been submitted under separate cover.

#### **1.2 PURPOSE AND OBJECTIVES**

The purpose of this report is to document the NASTRAN bulk data deck, transmitted under separate cover. The Structural Math Model is used to verify the structural adequacy of the AMSU-A1 instrument for loading environments specified in the GSFC S-480-79, Performance Assurance Requirements (PAR).

#### **1.3 DOCUMENT STATUS AND SCHEDULE**

This is the submittal of the Structural Math Model for the METSAT AMSU-A1 Module at CDR, April 1996.



## SECTION 2

### REFERENCE DOCUMENTS

The following documents were used in the preparation of this report:

#### SPECIFICATIONS

|                                   |                                                                                                                                                            |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GSFC-S-480-79<br>October 10, 1994 | Performance Assurance Requirements for the Earth Observing System (EOS) & Meteorological Satellites Project (METSAT) Advanced Microwave Sounding Units - A |
| GSFC 422-11-12-01                 | General Interface Requirements Document (GIRD) for EOS Common Spacecraft/Instruments EOS PM Project                                                        |

#### Aerojet

|                                             |                                                                                                            |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Report 10737<br>November 1995               | Advanced Microwave Sounding Unit-A (AMSU-A2), Structural Mathematical Model                                |
| Report 10805<br>March 1996                  | Integrated Advanced Microwave Sounding Unit-A (AMSU-A) METSAT Stress Analysis Report, A1 Module            |
| Report 10372A<br>February 1996              | Earth Observing System (EOS)/Advanced Microwave Sounding Unit-A (AMSU-A) Structural Math Model - A1 Module |
| Report 10381<br>June 1995                   | Earth Observing System (EOS)/Advanced Microwave Sounding Unit-A (AMSU-A) Stress Analysis Report, A1 Module |
| Report 10381<br>Addendum 1<br>February 1996 | Earth Observing System (EOS)/Advanced Microwave Sounding Unit-A (AMSU-A) Stress Analysis Report, A1 Module |



## SECTION 3

### MODEL DESCRIPTION

#### 3.1 FINITE ELEMENT MODEL

Figures 1a thru 1d display the NASTRAN finite element model of the METSAT AMSU-A1 structure. The basic coordinate system used in the METSAT analysis is identical to that used in the EOS analysis (Ref. Aerojet Report 10381). This orientation differs from the METSAT PAR document which utilizes the spacecraft coordinate system identified on GE ATN Spacecraft Assembly Drawing 3278200. A comparison of systems follows:

| Aerojet METSAT<br>Coordinate System | GSFC-S-79 PAR<br>Coordinate System |
|-------------------------------------|------------------------------------|
| +X-Axis                             | -Y-Axis                            |
| +Y-Axis                             | -Z-Axis                            |
| +Z-Axis                             | +X-Axis                            |

The METSAT AMSU-A1 finite element model is a modification of the EOS AMSU-A1 finite element model. The METSAT AMSU-A1 Module is mounted to the spacecraft through a sidemount bracket. The EOS AMSU-A1 Module is mounted from the lower baseplate. The design of the primary structure is essentially the same for the two units except for the following:

1. Lower Baseplate - Different designs and drawings.
2. Sidemount - Only on METSAT.
3. Top Panel - Different designs and drawings.
4. Left Panel - Different designs and drawings.
5. Radiator Panel - Only on METSAT.
6. Signal Processor - METSAT has 2 Cards in Upper Card Cage.  
EOS Upper Card Cage is empty. METSAT has 4 different Cards in Lower Card Cage.
7. Power Control/Monitor - Different designed enclosure and connectors.
8. Insulation and Mirror Tile representations - Modified.

The NASTRAN finite element model prepared for EOS AMSU-A1 and shown in Aerojet Report 10381 is modified for the METSAT AMSU-A1 design. In The current METSAT effort, a more refined NASTRAN model has been developed to more accurately represent the METSAT. The model statistics are:

|      |                                     |
|------|-------------------------------------|
| 9095 | Grids (GRID)                        |
| 1032 | Bar/Beam Elements (CBAR AND CBEAM)  |
| 8089 | Rectangular Plate Elements (CQUAD4) |
| 664  | Triangular Plate Elements (CTRIA3)  |
| 385  | Point Mass Elements (CONM2)         |
| 23   | Spring Elements (CELAS1)            |



The total mass of the model is 119.2 pounds (54.1 Kg). Mass properties, in the Aerojet METSAT Coordinate System Axes, at the center of gravity, are shown below. The cg is measured relative to the sidemount lower corner on the spacecraft side by the lower reflector (GRID 7508).

|                           |            |                            |
|---------------------------|------------|----------------------------|
| Mass                      | 119.2 lb.  | (54.1 kg)                  |
| Center of Gravity         |            |                            |
| x                         | 15.213 in  | (0.386m)                   |
| y                         | 8.839      | (0.225)                    |
| z                         | 9.918      | (0.252)                    |
| Moment of Inertia (at cg) |            |                            |
| Ixx                       | 7336 lb-in | (2.147 kg-m <sup>2</sup> ) |
| Ixy                       | 36         | (0.011)                    |
| Ixz                       | 1799       | (0.526)                    |
| Iyx                       | 36         | (0.011)                    |
| Iyy                       | 12574      | (3.679)                    |
| Iyz                       | 151        | (0.044)                    |
| Izx                       | 1799       | (0.526)                    |
| Izy                       | 151        | (0.044)                    |
| Izz                       | 9100       | (2.663)                    |

Concentrated mass elements (CONM2's) used in the model are listed in Table I. Material properties used in the model are shown in Table II. Parasitic mass, representing non-structural and miscellaneous items such as insulation, mirror tiles, wiring, mounting hardware, etc., are distributed throughout the model components by non-structural mass additions to the element properties or by increasing the mass density of the material.

Appendix A presents a detailed description of the METSAT NASTRAN finite element model.

### 3.2 BOUNDARY CONDITIONS

The model is constrained for static design load cases along the three orthogonal axes on the sidemount at each of the 16 spacecraft mounting bolt locations and along the two transverse axes (X and Z in Figure 1) at the 2 dowel pin locations. The constraints are imposed using NASTRAN single point constrain cards.



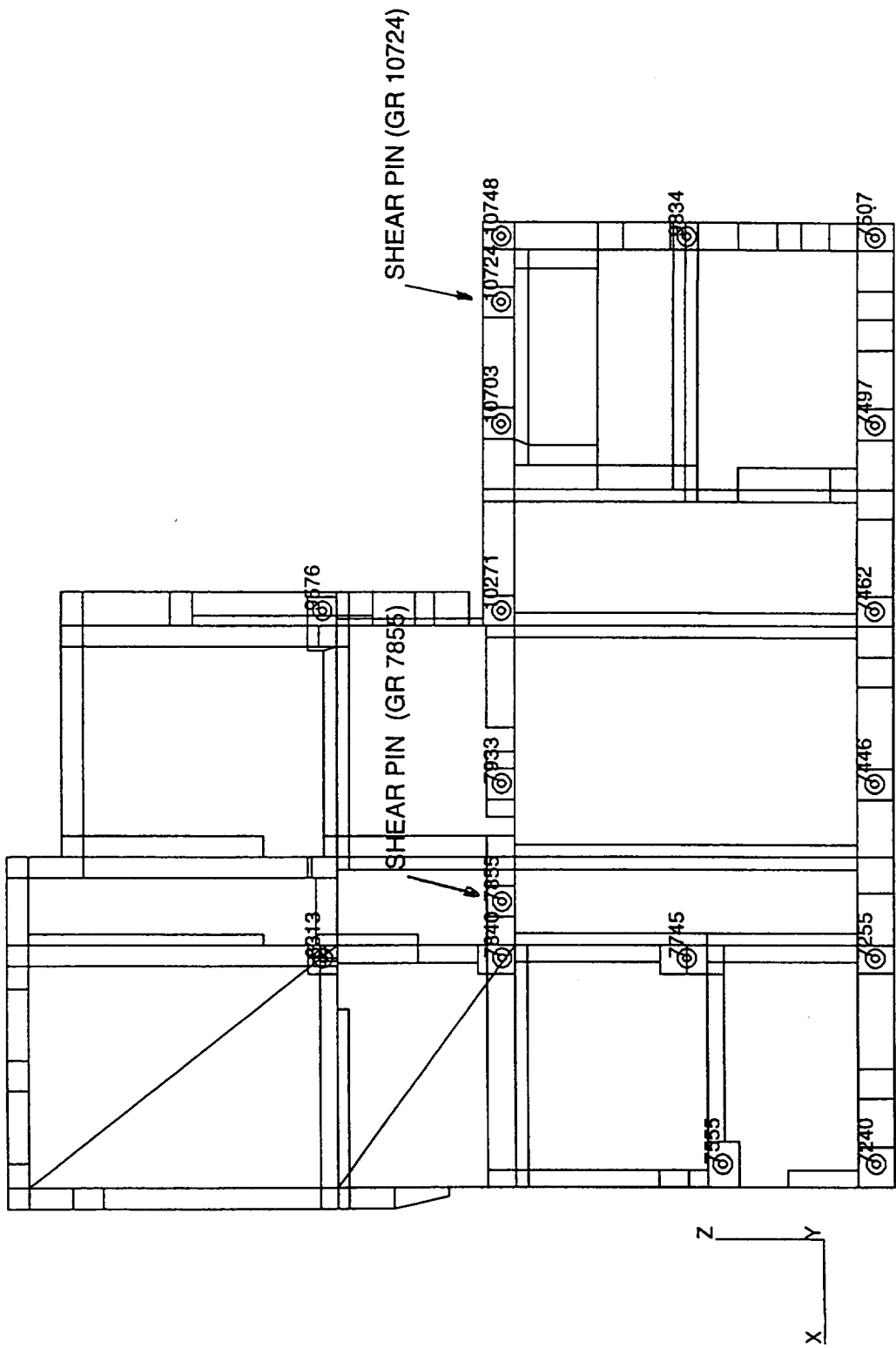




TABLE I CONCENTRATED MASS ELEMENTS (CONM2)

| CONM2<br>ELEMENT | GRID<br>POINT           | ITEM                     | NO.<br>CONM2<br>(LB) | INCR<br>WEIGHT<br>(LB) | TOTAL<br>WEIGHT<br>(LB) |
|------------------|-------------------------|--------------------------|----------------------|------------------------|-------------------------|
| 4957-4976        | 3001-3010, 3031-3039    | LOWER WARMLOAD           | 20                   | 0.1469                 | 2.938                   |
| 4977-4996        | 2941-2950, 2971-2980    | UPPER WARMLOAD           | 20                   | 0.1469                 | 2.938                   |
| 10341-10344      | 1345, 2154, 2130, 1365  | UPPER CAGE CARD RETAINER | 4                    | 0.034                  | 0.136                   |
| 5747-5748        | 3735, 3711              | LOWER CARD CAGE CARDS    | 2                    | 0.601                  | 1.202                   |
| 5749-5758        | 3706-3708, 3730-3732    | LOWER CARD CAGE CARDS    | 10                   | 0.475                  | 4.75                    |
|                  | 3749-3750, 3760-3761    |                          |                      |                        |                         |
| 5743-5744        | 3676-3677               | LOWER CARD CAGE CARDS    | 2                    | 0.057                  | 0.114                   |
| 5759-5760        | 3764, 3753              | LOWER CARD CAGE CARDS    | 2                    | 0.64                   | 1.28                    |
| 5761-5762        | 3663, 3665              | LOWER CARD CAGE CARDS    | 2                    | 0.251                  | 0.502                   |
| 5745-5746        | 3699-3700               | LOWER CARD CAGE CARDS    | 2                    | 0.294                  | 0.588                   |
| 1748-1750        | 2547, 2549, 2551        | UPPER SHELF COMPONENTS   | 3                    | 0.40333                | 1.20999                 |
| 1742-1745        | 2419, 2421, 2353, 2355  | UPPER SHELF COMPONENTS   | 4                    | 0.03543                | 0.14172                 |
| 1746-1747        | 2405, 2366              | UPPER SHELF COMPONENTS   | 2                    | 0.07085                | 0.1417                  |
| 1706-1717        | 2460, 2502, 2473, 2487  | UPPER SHELF COMPONENTS   | 12                   | 0.13445                | 1.6134                  |
|                  | 2475, 2489, 2314, 2300  |                          |                      |                        |                         |
|                  | 2302, 2287, 2289, 2275  |                          |                      |                        |                         |
| 1738-1741        | 2422, 2426, 2356, 2360  | UPPER SHELF COMPONENTS   | 4                    | 0.23668                | 0.9467                  |
| 1722-1725        | 2420, 2424, 2354, 2358  | UPPER SHELF COMPONENTS   | 4                    | 0.22168                | 0.8867                  |
| 1718-1721        | 2465, 2470, 2521, 2526  | UPPER SHELF COMPONENTS   | 4                    | 0.39656                | 1.58625                 |
| 1726-1737        | 2572, 2577, 2534, 2539  | UPPER SHELF COMPONENTS   | 12                   | 0.39656                | 4.75874                 |
|                  | 2520, 2525, 2464, 2469  |                          |                      |                        |                         |
|                  | 2318, 2323, 2241, 2242  |                          |                      |                        |                         |
| 859-862          | 1777, 1779, 1826, 1828  | LOWER SHELF COMPONENTS   | 4                    | 0.0001                 | 0.0004                  |
| 847-850          | 1774, 1776, 1842, 1844  | LOWER SHELF COMPONENTS   | 4                    | 0.53194                | 2.12775                 |
| 855-858          | 1727-1728, 1743-1744    | LOWER SHELF COMPONENTS   | 4                    | 0.1025                 | 0.41                    |
| 835-838          | 1778, 1800, 1827, 1850  | LOWER SHELF COMPONENTS   | 4                    | 0.39281                | 1.57125                 |
| 866-869          | 1629, 1631, 1647, 1649  | LOWER SHELF COMPONENTS   | 4                    | 0.1725                 | 0.69                    |
| 870-877          | 1634, 1637, 1641, 1652, | LOWER SHELF COMPONENTS   | 8                    | 0.24838                | 1.987                   |
|                  | 1659, 1671, 1677, 1678  |                          |                      |                        |                         |
| 878-881          | 1669-1670, 1699-1700    | LOWER SHELF COMPONENTS   | 4                    | 0.0635                 | 0.254                   |
| 882-885          | 1674, 1676, 1703, 1705  | LOWER SHELF COMPONENTS   | 4                    | 0.292                  | 1.168                   |
| 886-889          | 1781, 1783, 1811, 1814  | LOWER SHELF COMPONENTS   | 4                    | 0.12                   | 0.48                    |
| 890-893          | 1716, 1718, 1764, 1766  | LOWER SHELF COMPONENTS   | 4                    | 0.15925                | 0.637                   |
| 894-897          | 1731-1732, 1762-1763    | LOWER SHELF COMPONENTS   | 4                    | 0.19375                | 0.775                   |
| 898-903          | 1719, 1720, 1735, 1751  | LOWER SHELF COMPONENTS   | 6                    | 0.10333                | 0.62                    |
|                  | 1767-1768               |                          |                      |                        |                         |
| 843-846          | 1805, 1808, 1855, 1858  | LOWER SHELF COMPONENTS   | 4                    | 0.39031                | 1.56125                 |
| 851-854          | 1625, 1628, 1691, 1694  | LOWER SHELF COMPONENTS   | 4                    | 0.52856                | 2.11425                 |
| 863-865          | 1852-1854               | LOWER SHELF COMPONENTS   | 3                    | 0.22933                | 0.688                   |
| 839-842          | 1664, 1667, 1712, 1715  | LOWER SHELF COMPONENTS   | 4                    | 0.34                   | 1.36                    |



TABLE I CONCENTRATED MASS ELEMENTS (CONM2)

| CONM2<br>ELEMENT | GRID<br>POINT                                    | ITEM                    | NO.<br>CONM2<br>(LB) | INCR<br>WEIGHT<br>(LB) | TOTAL<br>WEIGHT<br>(LB) |
|------------------|--------------------------------------------------|-------------------------|----------------------|------------------------|-------------------------|
| 10677-10684      | 9561, 8876, 8315, 7842<br>7747, 7556, 9425, 9251 | SIDEMOUNT T-BLANKET     | 8                    | 0.04                   | 0.32                    |
| 10035-10037      | 2768, 2764, 2760                                 | ALIGNMENT CUBE          | 3                    | 0.116                  | 0.348                   |
| 4997-5000        | 2224, 2223, 2218, 2219                           | DC/DC CONVERTER         | 4                    | 0.91                   | 3.64                    |
| 4945-4956        | 1970-1981                                        | LOWER FEEDHORN & SHROUD | 12                   | 0.04167                | 0.5                     |
| 4933-4944        | 2036-2038, 2047-2050<br>2058-2062                | UPPER FEEDHORN & SHROUD | 12                   | 0.04167                | 0.5                     |
| 4630             | 4077                                             | LOWER REFL MOTOR ROTOR  | 1                    | 1.25                   | 1.25                    |
| 4629             | 4078                                             | LOWER REFL RESVLR ROTOR | 1                    | 0.31                   | 0.31                    |
| 4755-4770        | 4630-4645                                        | LOWER REFL MOTOR STATOR | 16                   | 0.1                    | 1.6                     |
| 4771-4786        | 4646-4661                                        | LOWER REFL RESOLVER     | 16                   | 0.047                  | 0.752                   |
| 4215             | 4391                                             | UPPER REFL MOTOR ROTOR  | 1                    | 1.25                   | 1.25                    |
| 4214             | 4392                                             | UPPER REFL RESVLR ROTOR | 1                    | 0.31                   | 0.31                    |
| 4707-4722        | 4597-4612                                        | UPPER REFL MOTOR STATOR | 16                   | 0.1                    | 1.6                     |
| 4723-4738        | 4613-4628                                        | UPPER REFL RESOLVER     | 16                   | 0.047                  | 0.752                   |
| 5001-5004        | 1961, 1963, 1885, 1883                           | DETECTOR PREAMP         | 4                    | 0.7225                 | 2.89                    |
| 5037-5054        | 1435, 1445, 1580-1586<br>1588, 1590-1596, 1598   | UPPER B-PLATE T-BLANKET | 18                   | 0.00257                | 0.04633                 |
| 5055-5706        | 2884-2899                                        | LOWER REFL T-BLANKET    | 16                   | 0.00182                | 0.02904                 |
| 5071-5086        | 4597-4612                                        | UPPER REFL T-BLANKET    | 16                   | 0.00182                | 0.02904                 |
| 10665-10676      | 5706, 5674, 5663, 5630                           | PWR CNTRL/MON CONNECTOR | 4                    | 0.017                  | 0.068                   |
| 10669-10672      | 5621, 5620, 5714, 5682                           | PWR CNTRL/MON CONNECTOR | 4                    | 0.017                  | 0.068                   |
| 10673-10676      | 11752, 11754, 11730, 11736                       | PWR CNTRL/MON CONNECTOR | 4                    | 0.017                  | 0.068                   |
| 6833             | 6669                                             | PWR CNTRL/MON CONNECTOR | 1                    | 0.044                  | 0.044                   |
| 6834             | 6670                                             | PWR CNTRL/MON CONNECTOR | 1                    | 0.022                  | 0.022                   |
| 6835             | 6671                                             | PWR CNTRL/MON CONNECTOR | 1                    | 0.022                  | 0.022                   |
| 6836-6838        | 5966, 5911, 5999                                 | PWR CNTRL/MON RELAY     | 3                    | 0.06                   | 0.18                    |
| 6839-6841        | 6044, 5994, 6015                                 | PWR CNTRL/MON RELAY     | 3                    | 0.06                   | 0.18                    |



TABLE I CONCENTRATED MASS ELEMENTS (CONM2)

| CONM2       | GRID                       | ITEM                   | NO.   | INCR   | TOTAL   |
|-------------|----------------------------|------------------------|-------|--------|---------|
| ELEMENT     | POINT                      |                        | CONM2 | WEIGHT | WEIGHT  |
|             |                            |                        | (LB)  | (LB)   | (LB)    |
| 5824-5832   | 2065-2067, 2077-2079       | TRANSISTOR ASSEMBLY    | 9     | 0.055  | 0.495   |
|             | 2089-2091                  |                        |       |        |         |
|             |                            |                        |       |        |         |
| 10122-10127 | 10963-10968                | RADIATOR PANEL BRACKET | 6     | 0.0053 | 0.0318  |
|             |                            |                        |       |        |         |
| 10742-10751 | 11275, 11323, 11315, 11307 | UP CARD CAGE CONNECTOR | 5     | 0.01   | 0.05    |
|             | 11307, 11299               |                        |       |        |         |
|             |                            |                        |       |        |         |
|             | 11187, 11890, 11882,       | UP CARD CAGE CONNECTOR | 5     | 0.01   | 0.05    |
|             | 11874, 11211               |                        |       |        |         |
|             |                            |                        |       |        |         |
|             |                            |                        |       |        |         |
|             |                            |                        |       |        |         |
|             |                            |                        |       |        |         |
|             |                            | TOTAL                  |       |        | 59.5823 |



TABLE II MATERIAL PROPERTIES

| MAT'RL                                                                       | MAT'RL    | COMPONENT                                | E        | $\mu$ | $\rho$                |
|------------------------------------------------------------------------------|-----------|------------------------------------------|----------|-------|-----------------------|
| ID                                                                           | TYPE      |                                          | (PSI)    |       | (LB/IN <sup>3</sup> ) |
|                                                                              |           |                                          |          |       |                       |
| 1                                                                            | 7075 ALUM | UPPER FRONT PANEL, MOTOR MT PANLES       | 1.03E+07 | 0.33  | 0.11                  |
| 2, 6, 7, 9                                                                   | 6061 ALUM | LOWER BASEPLATE, LOWER FRONT PANEL       | 9.90E+06 | 0.33  | 0.107                 |
|                                                                              |           | LOWER AFT PANEL, UPPER BASEPLATE         |          |       |                       |
|                                                                              |           | UPPER AFT PANEL, LOWER RIGHT PANEL       |          |       |                       |
|                                                                              |           | UPPER & LOWER RIGHT FRONT SUPPORTS       |          |       |                       |
|                                                                              |           | UPPER RIGHT PANEL, TOP PANEL, LEFT PANEL |          |       |                       |
|                                                                              |           | UPPER & LOWER WARMLOAD SHIELDS           |          |       |                       |
|                                                                              |           | UPPER & LOWER CARD CAGES                 |          |       |                       |
|                                                                              |           | UPPER & LOWER WARMLOAD STRUCTURES        |          |       |                       |
| 3                                                                            | FIBERGLAS | PWR CTRL/MONITOR PWB, UPPER SHELF BKTS   | 2.00E+06 | 0.12  | 0.07                  |
| 4                                                                            | 6061 ALUM | LOWER BASEPLATE                          | 9.90E+06 | 0.33  | 0.183                 |
| 5                                                                            | 6061 ALUM | SIDEMOUNT                                | 9.90E+06 | 0.33  | 0.12138               |
| 8                                                                            | BERYLLIUM | RF SHELVES                               | 4.25E+07 | 0.1   | 0.067                 |
| 10                                                                           | FIBERGLAS | LOWER CARD CAGE CIRCUIT CARDS            | 2.00E+06 | 0.12  | 0.16673               |
| 11                                                                           | CRES      | POWER CTRL/MONITOR STANDOFFS             | 2.60E+07 | 0.27  | 0.286                 |
| 12                                                                           | 6061 ALUM | POWER CTRL/MONITOR BKT, RADIATOR PANEL   | 9.90E+06 | 0.33  | 0.098                 |
| 13                                                                           | *****     | FICTITIOUS MASSLESS MATERIAL             | 1.00E+02 | 0.3   | 1E-06                 |
| 14                                                                           | FIBERGLAS | UPPER CARD CAGE CIRCUIT CARDS            | 2.00E+06 | 0.12  | 0.10876               |
| 15                                                                           | 6061 ALUM | TOP PANEL W/MIRROR                       | 9.90E+06 | 0.33  | 0.10366               |
| 30                                                                           | 6061 ALUM | REFLECTOR ASSEMBLIES                     | 9.90E+06 | 0.33  | 0.107                 |
| 106                                                                          | STEEL     | MOTOR SHAFT                              | 2.90E+07 | 0.3   | 0.283                 |
| *LOWER AFT AND UPPER AFT PANELS, MODELED AS 6061 ALUM, ANALYZED AS 2024 ALUM |           |                                          |          |       |                       |



## **APPENDIX A**

### **NASTRAN FINITE ELEMENT MODEL**

The NASTRAN finite element model of the METSAT AMSU-A1 Module is shown in its entirety in Figures A1a thru A1d in this appendix. Figure A1d is a section view of the model, showing the components modeled in the interior (i.e. shelves, card cages, warmload structures). Elements and grids are highlighted in the piece part models that are combined to form the METSAT AMSU-A1 Module model.

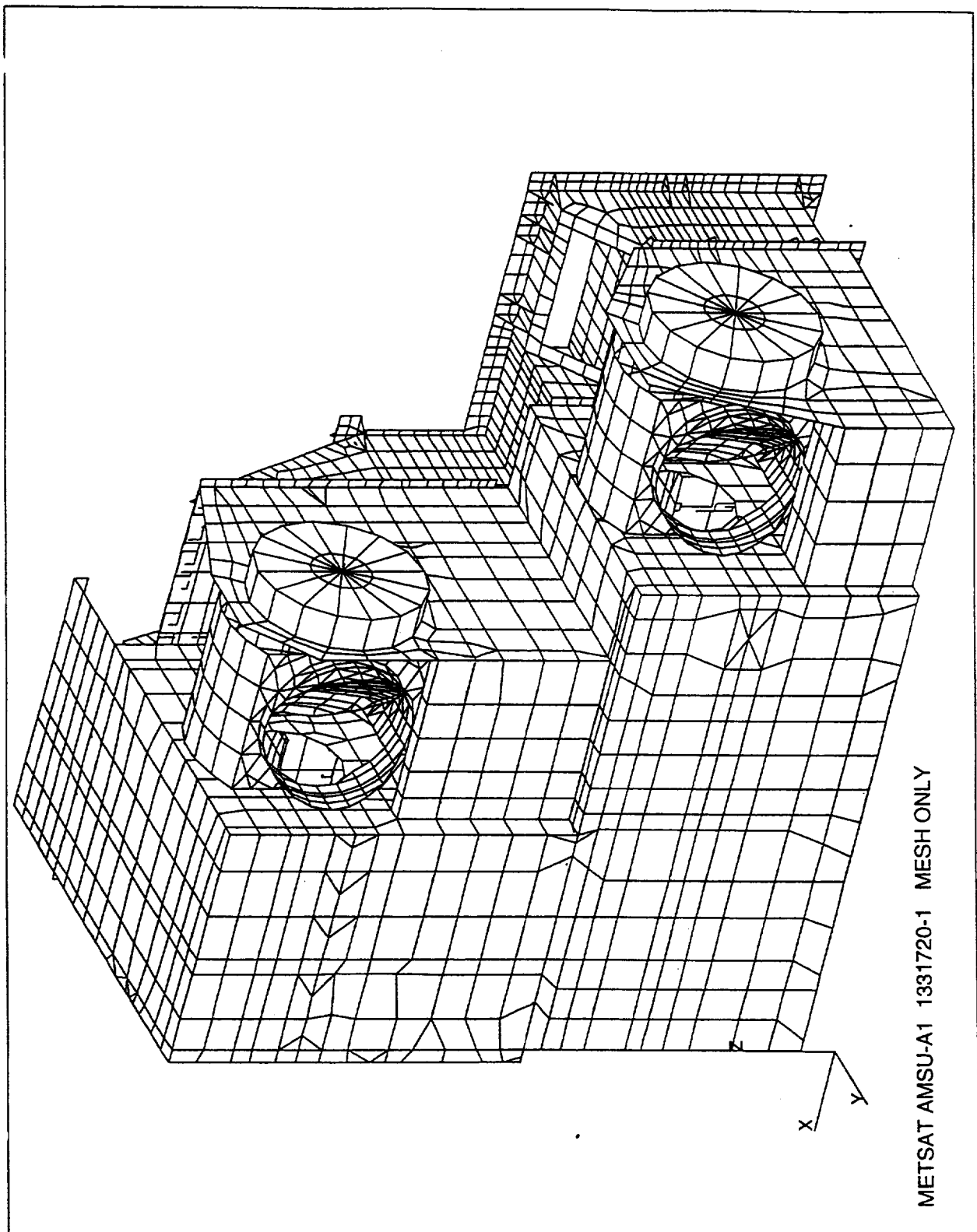


Figure A-1a METSAT AMSU-A1 1331720-1 Mesh Only

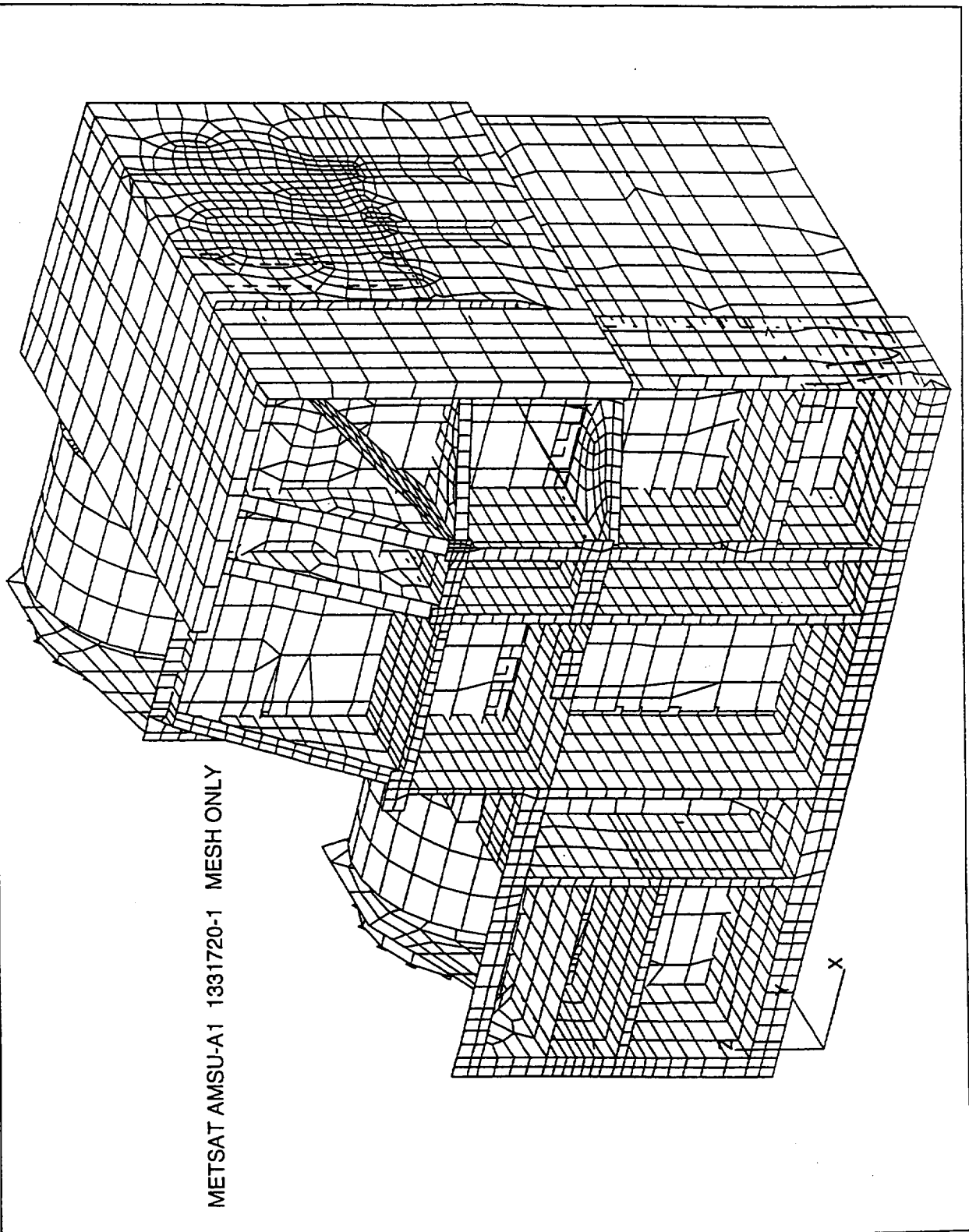


Figure A-1b METSAT AMSU-A1 1331720-1 Mesh Only

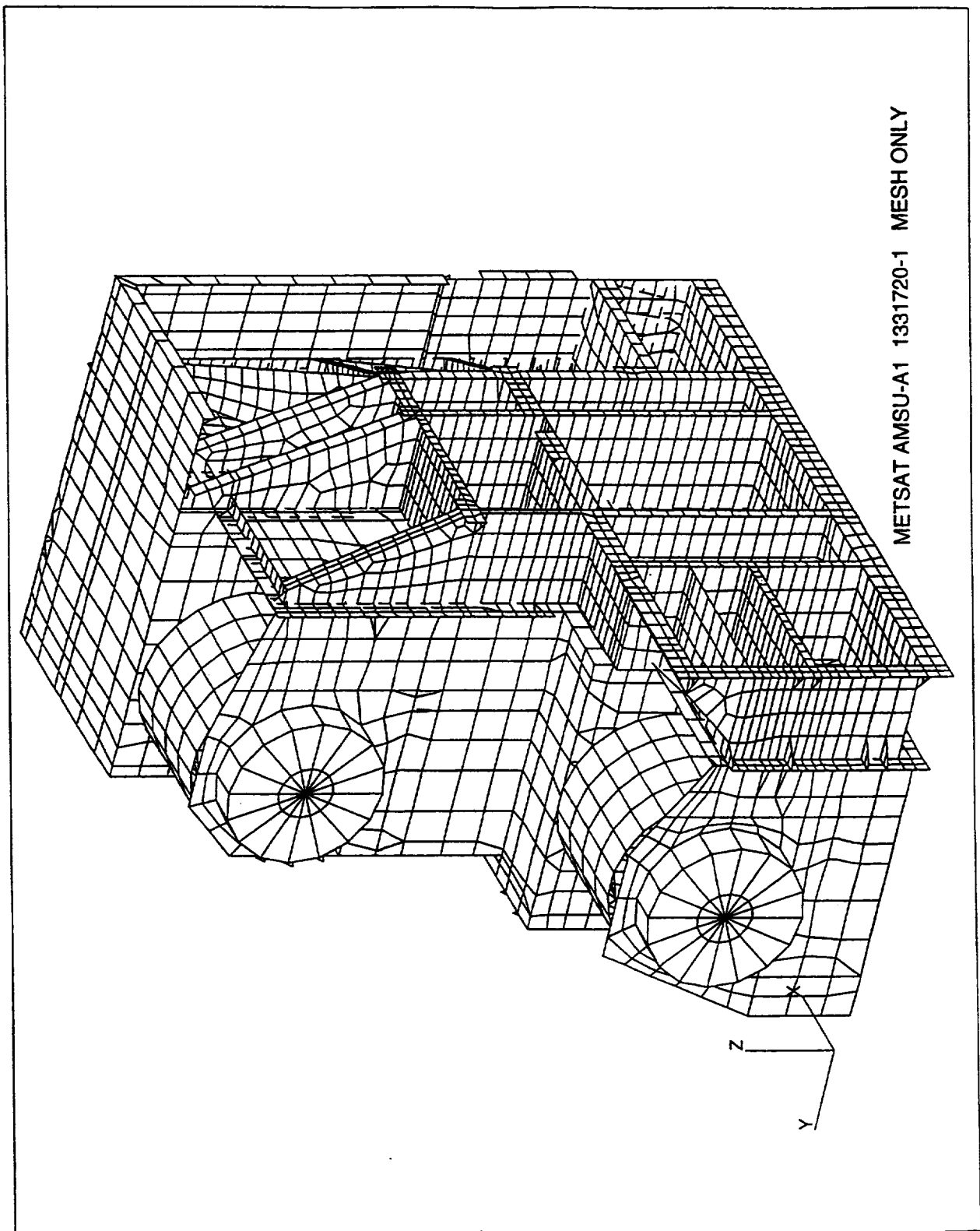


Figure A-1c METSAT AMSU-A1 1331720-1 Mesh Only

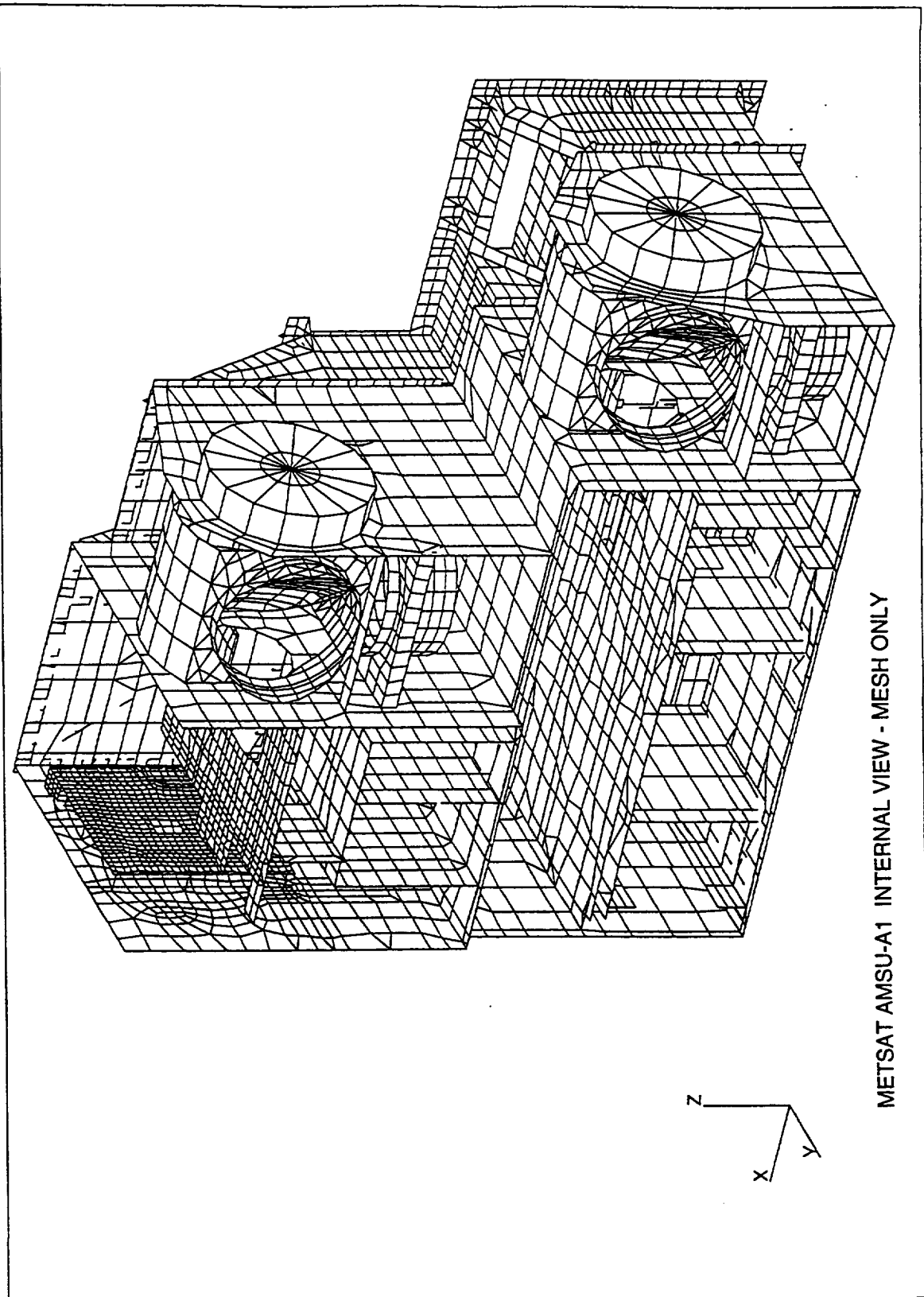


Figure A-1d METSAT AMSU-A1 1331720-1 Mesh Only

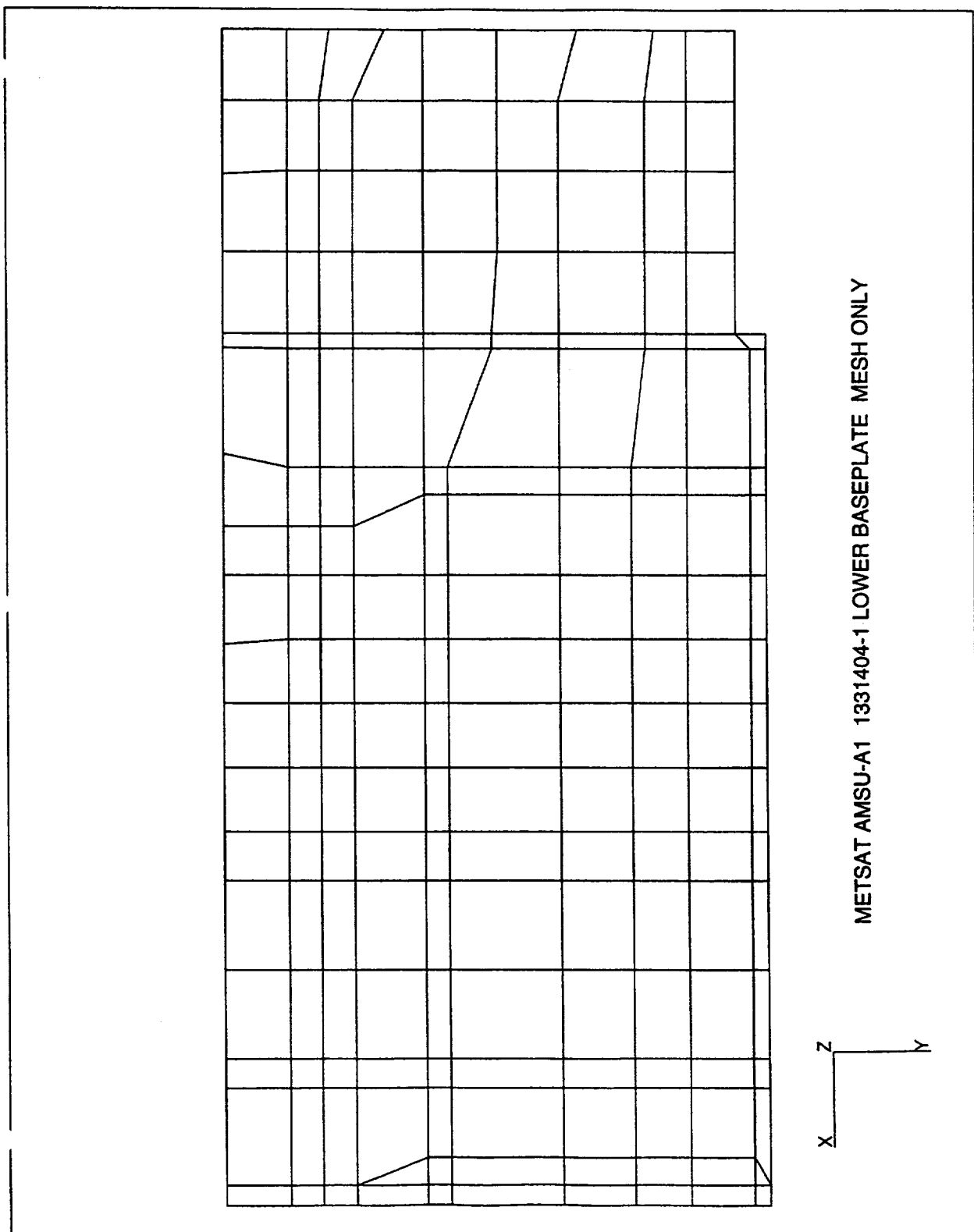


Figure A-2 METSAT AMSU-A1 1331404-1-1 Lower Baseplate Mesh Only

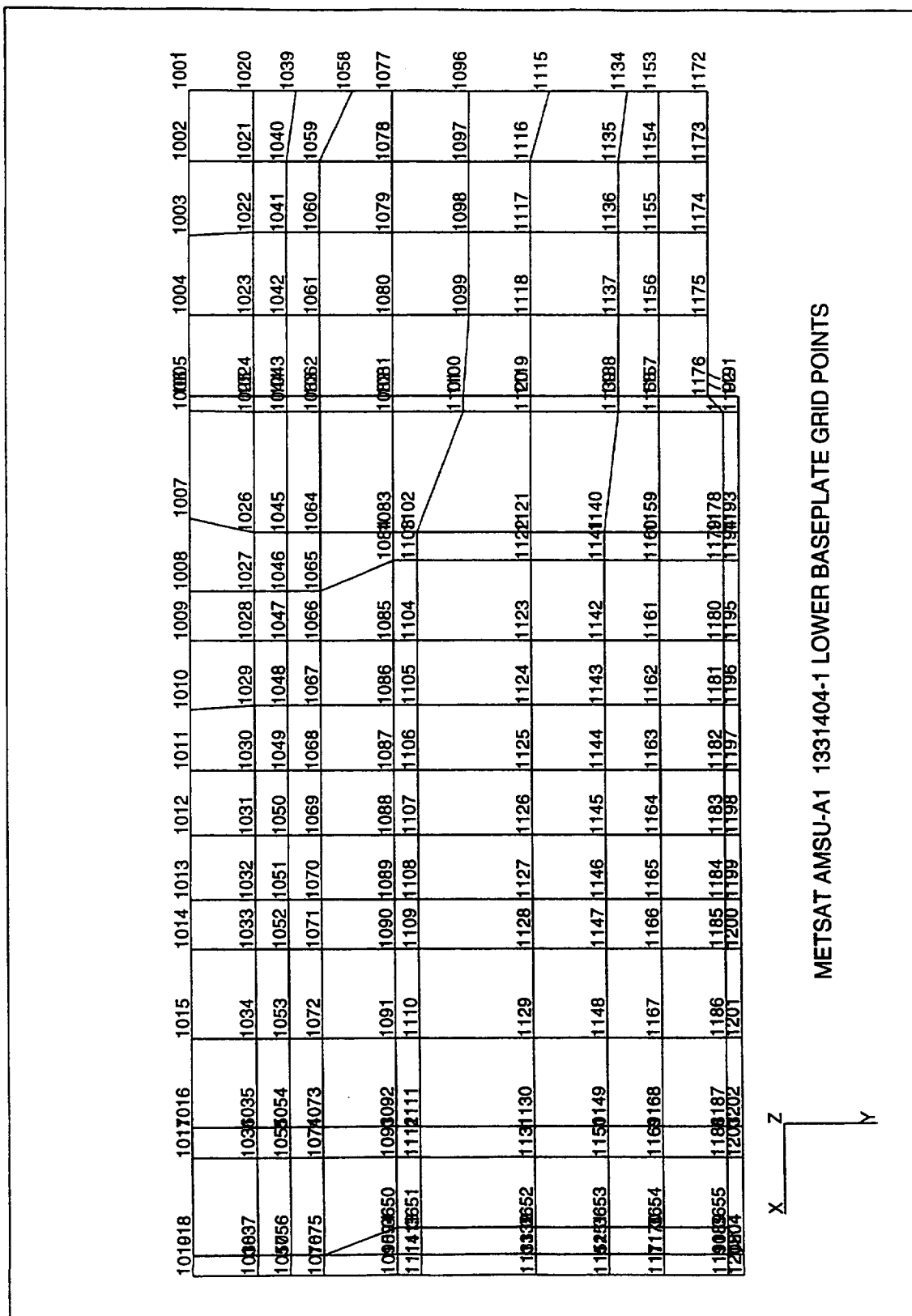


Figure A-3 METSAT AMSU-A1 1331404-1 Lower Baseplate Grid Points

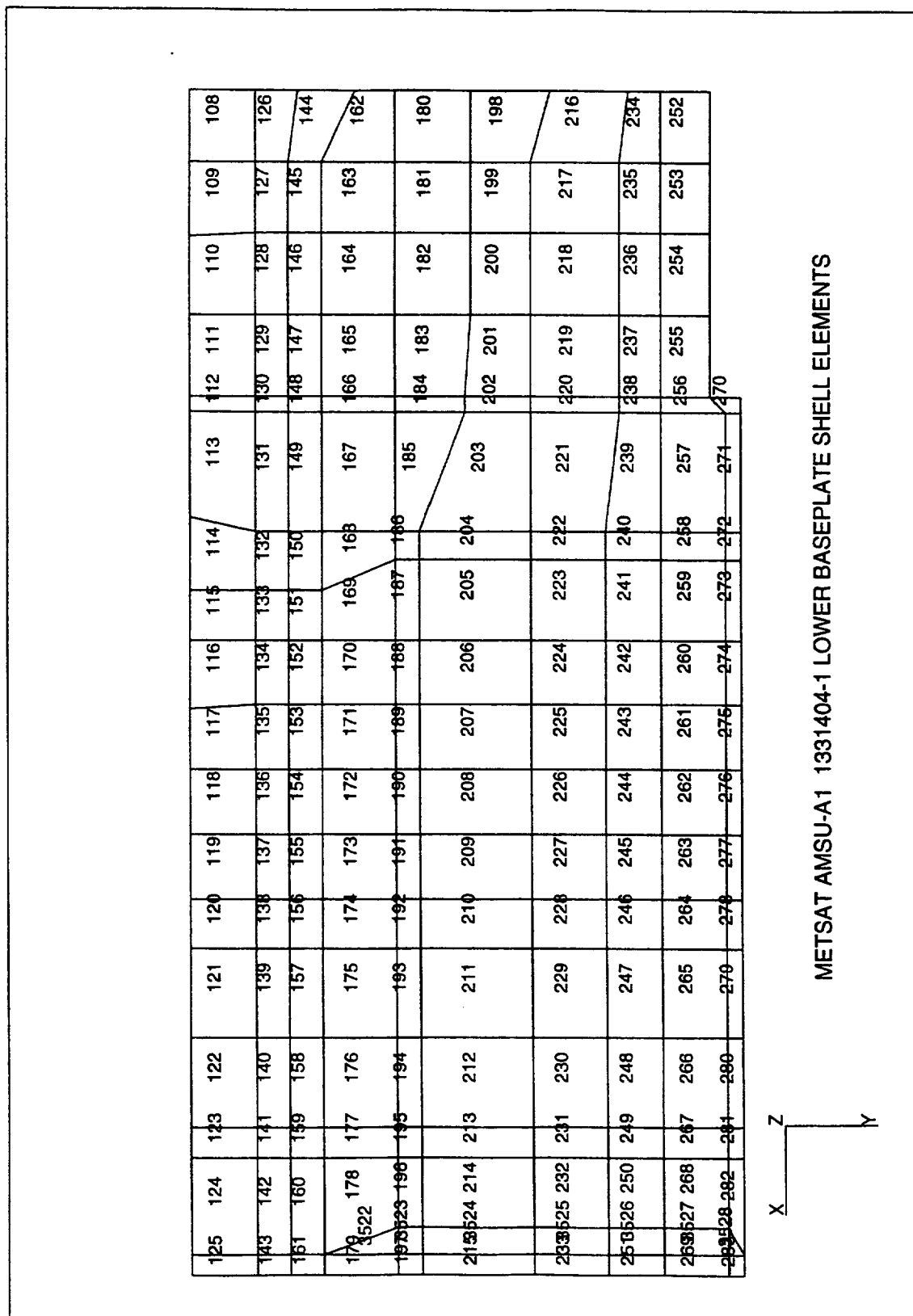


Figure A-4 METSAT AMSU-A1 1331404-1 Lower Baseplate Shell Elements

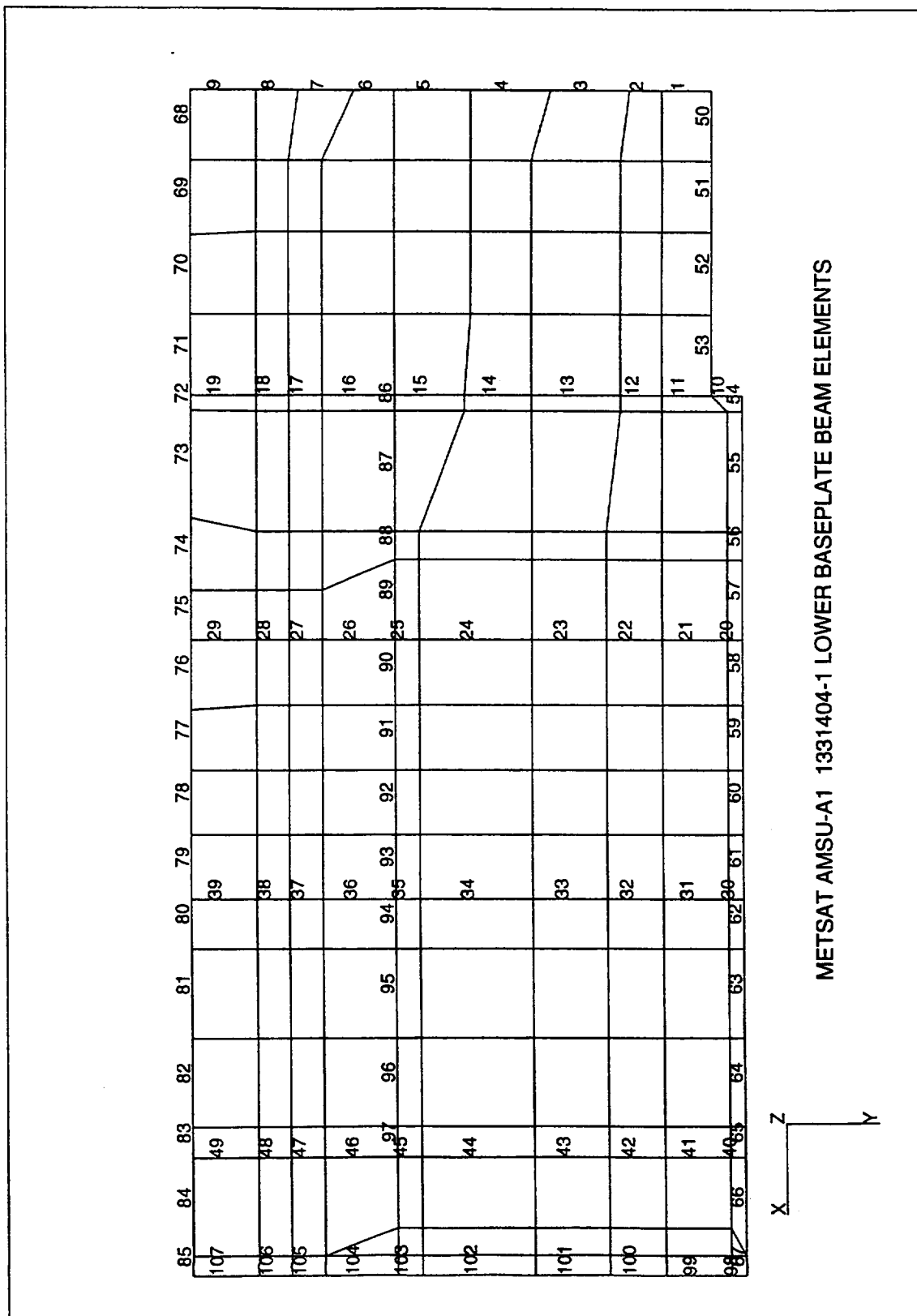
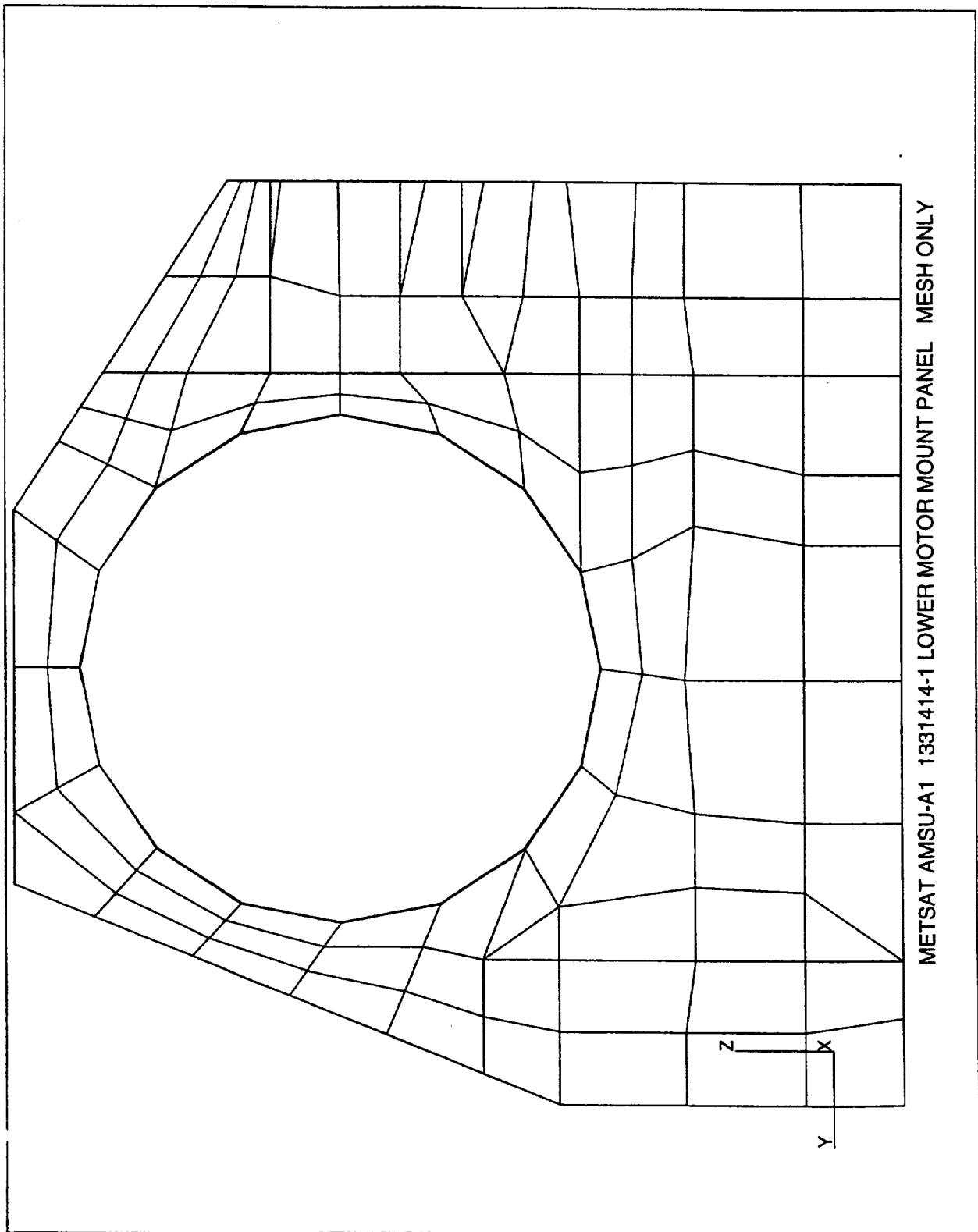


Figure A-5 METSAT AMSU-A1 1331404-1 Lower Baseplate Beam Elements



**Figure A-6 METSAT AMSU-A1 1331414-1 Lower Motor Mount Panel Mesh Only**

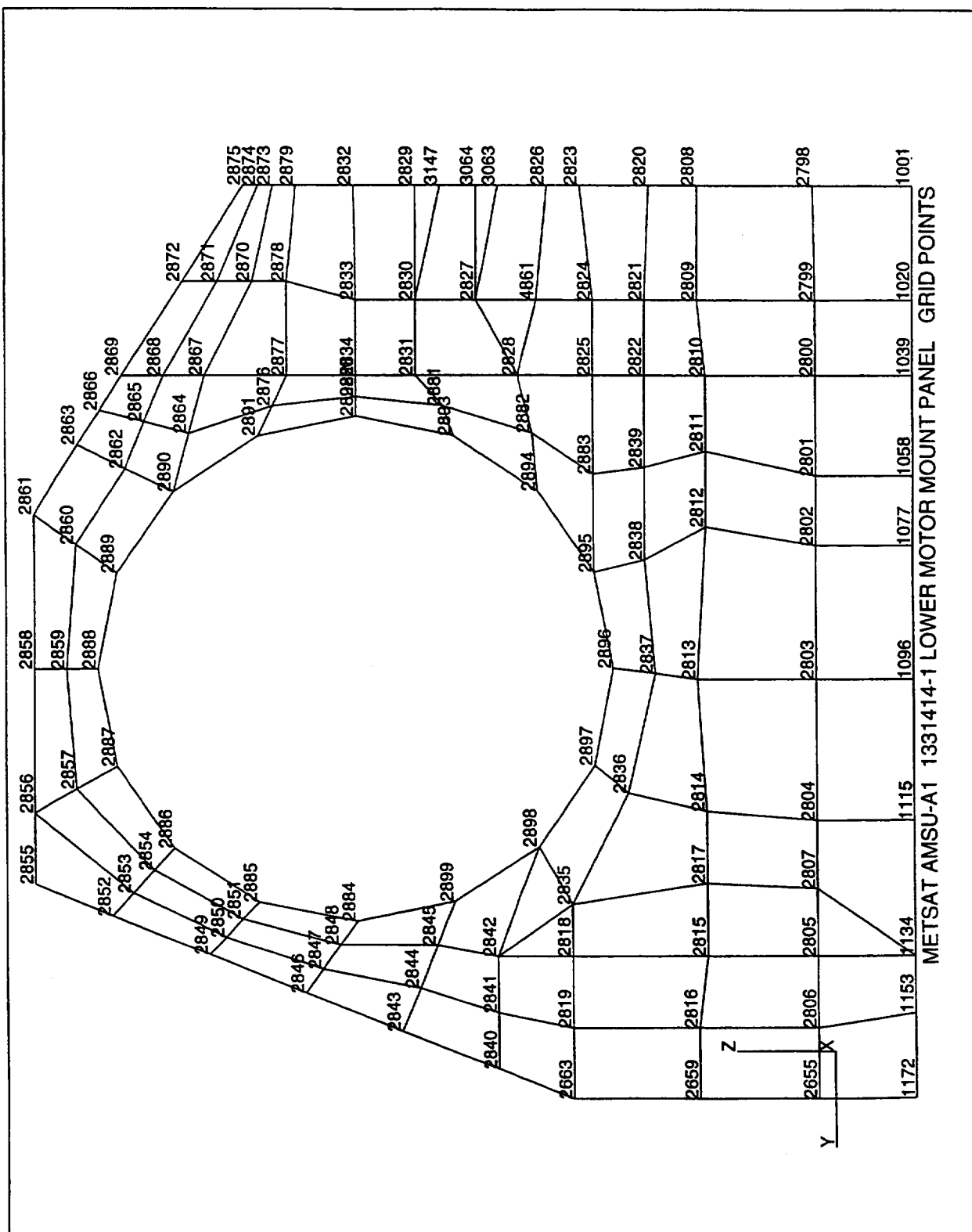


Figure A-7 METSAT AMSU-A1 1331414-1 Lower Motor Mount Panel Grid Points

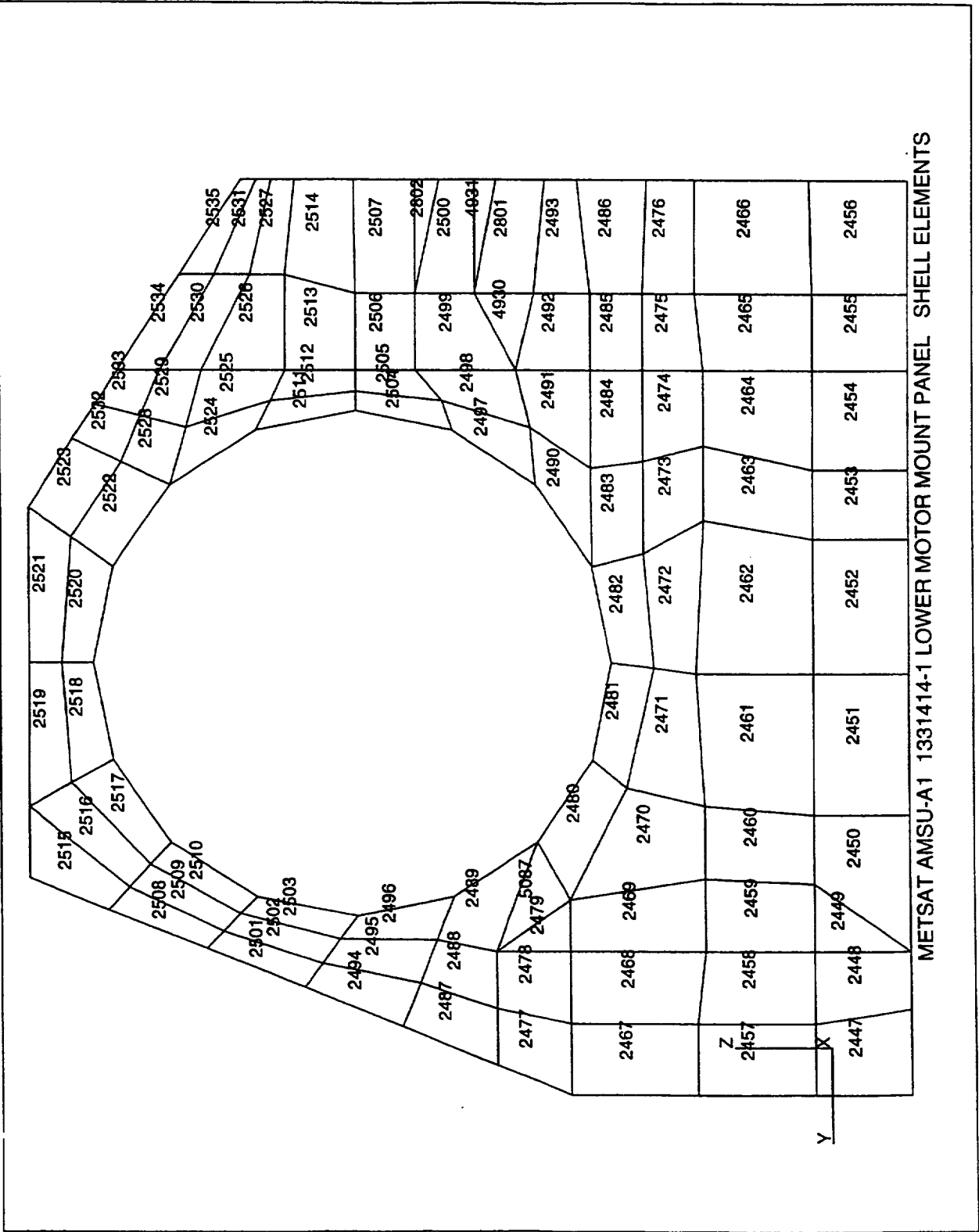


Figure A-8 METSAT AMSU-A1 13314141-1 Lower Motor Mount Panel Shell Elements

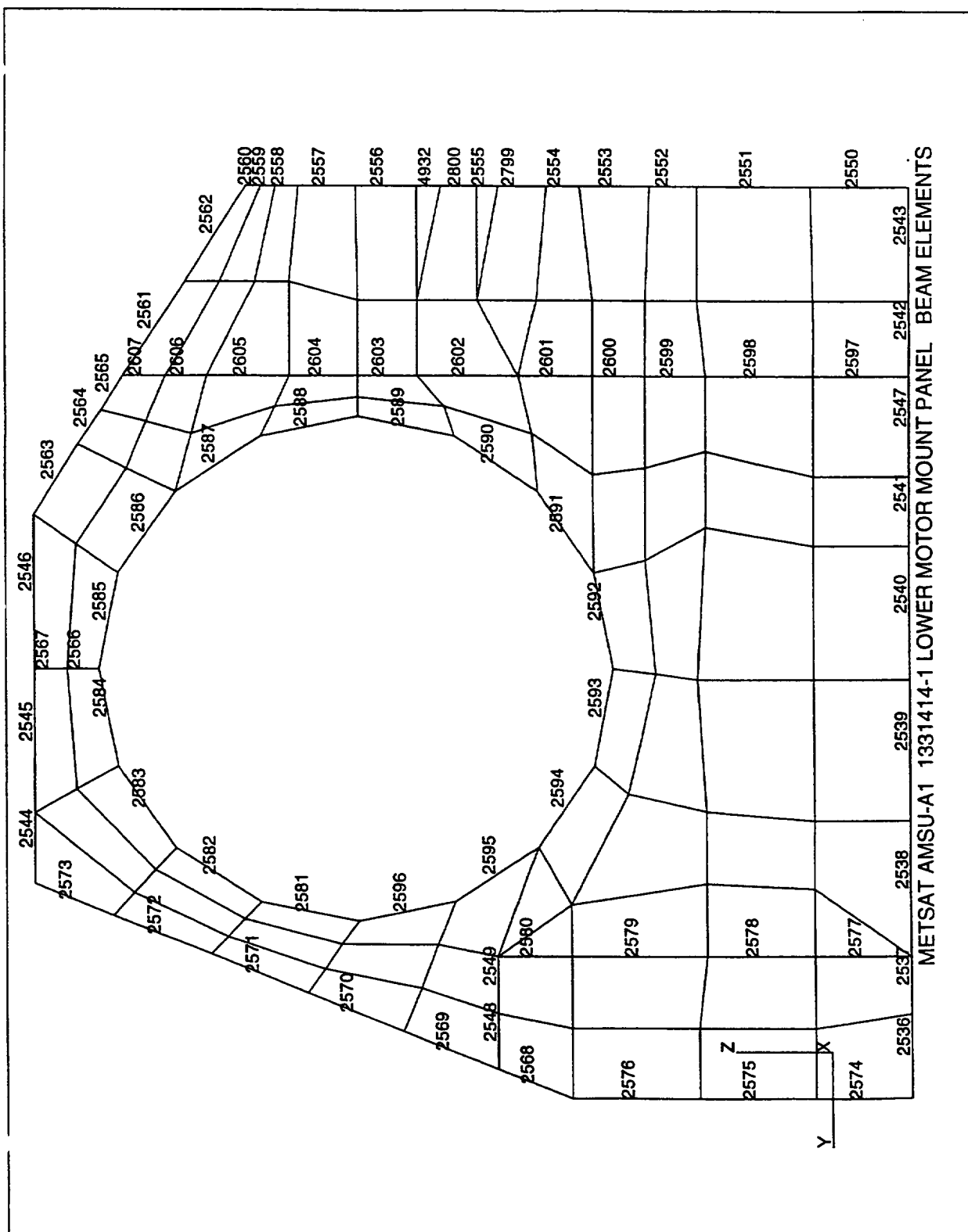
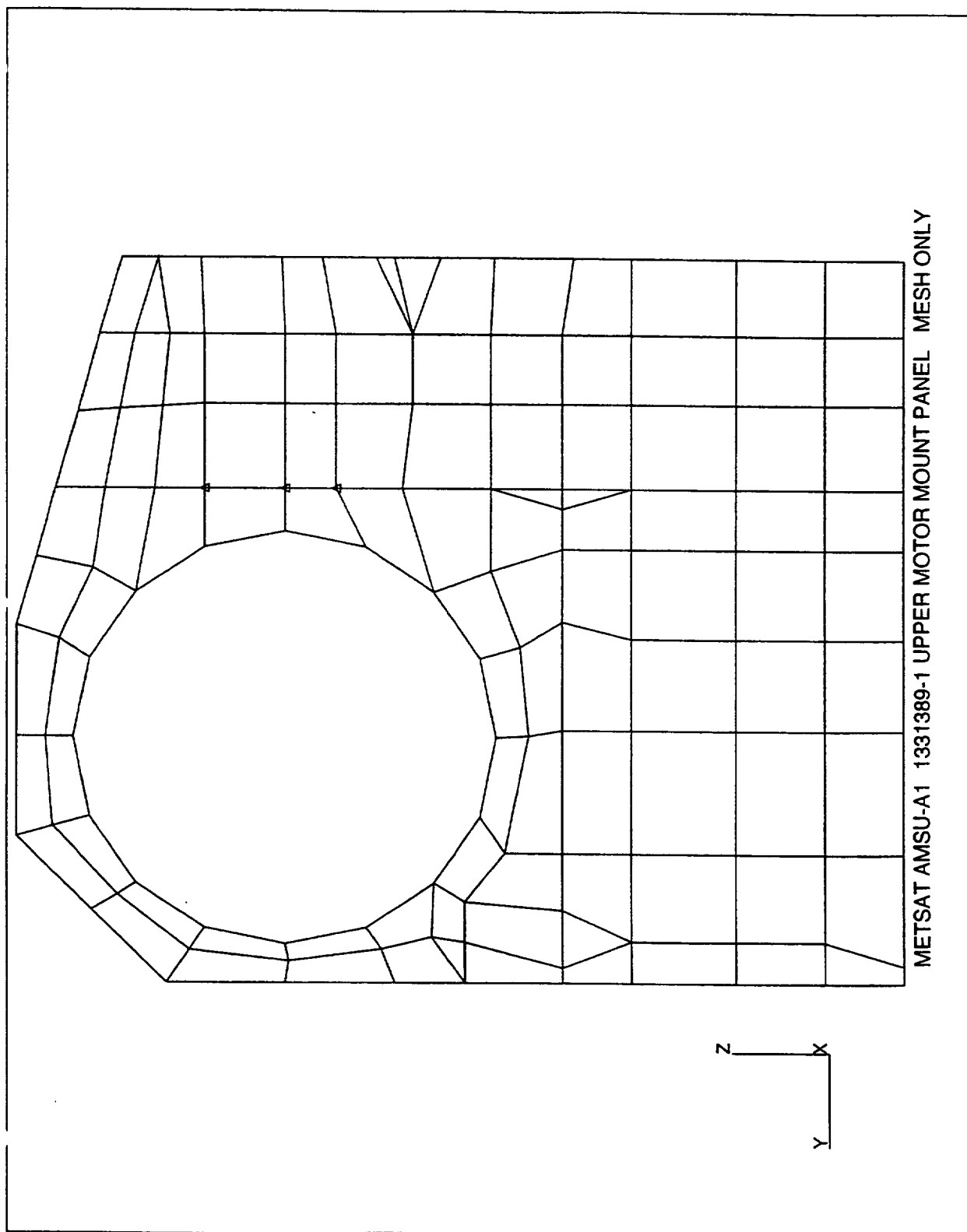
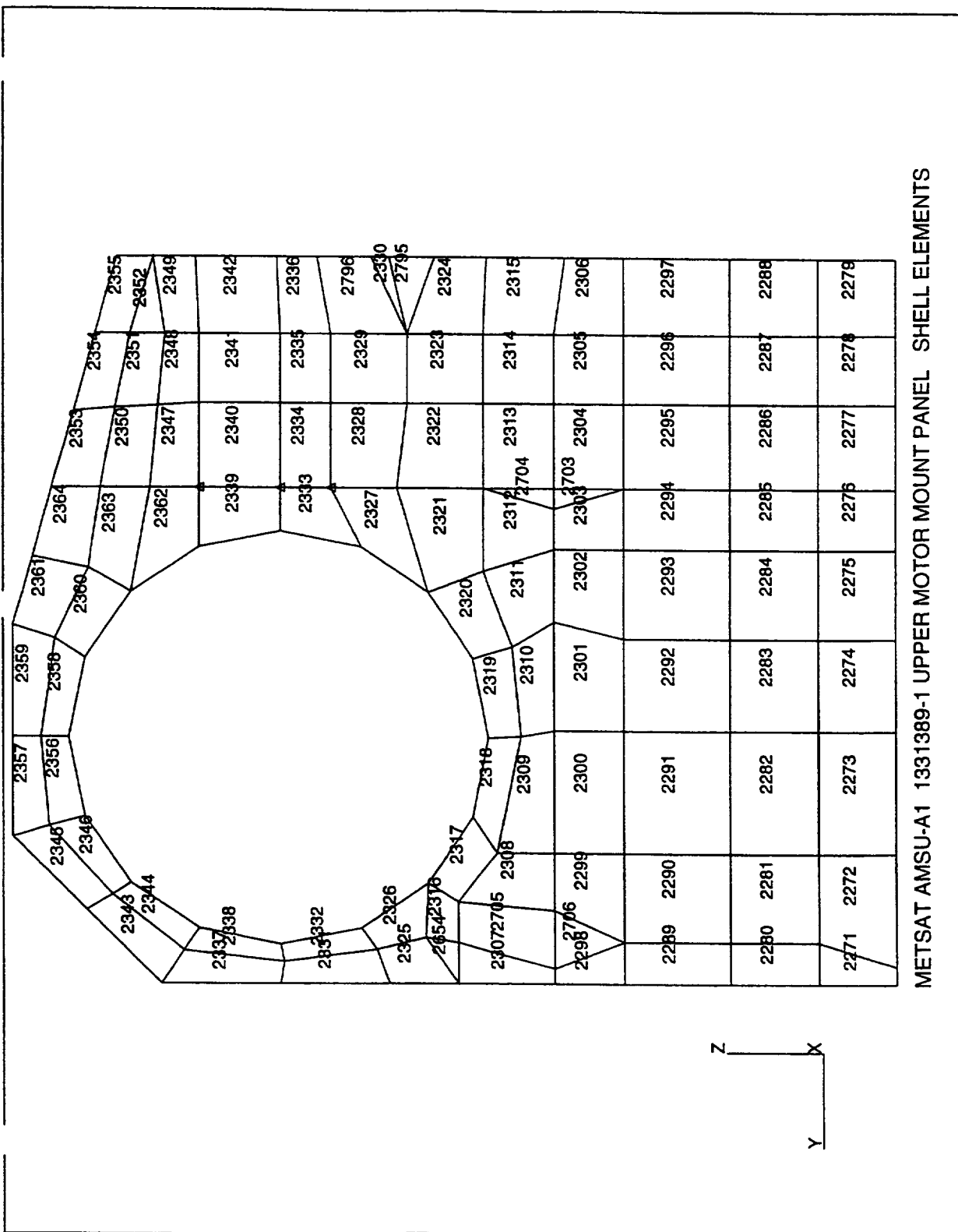


Figure A-9 METSAT AMSU-A1 13314141-1 Lower Motor Mount Panel Beam Elements

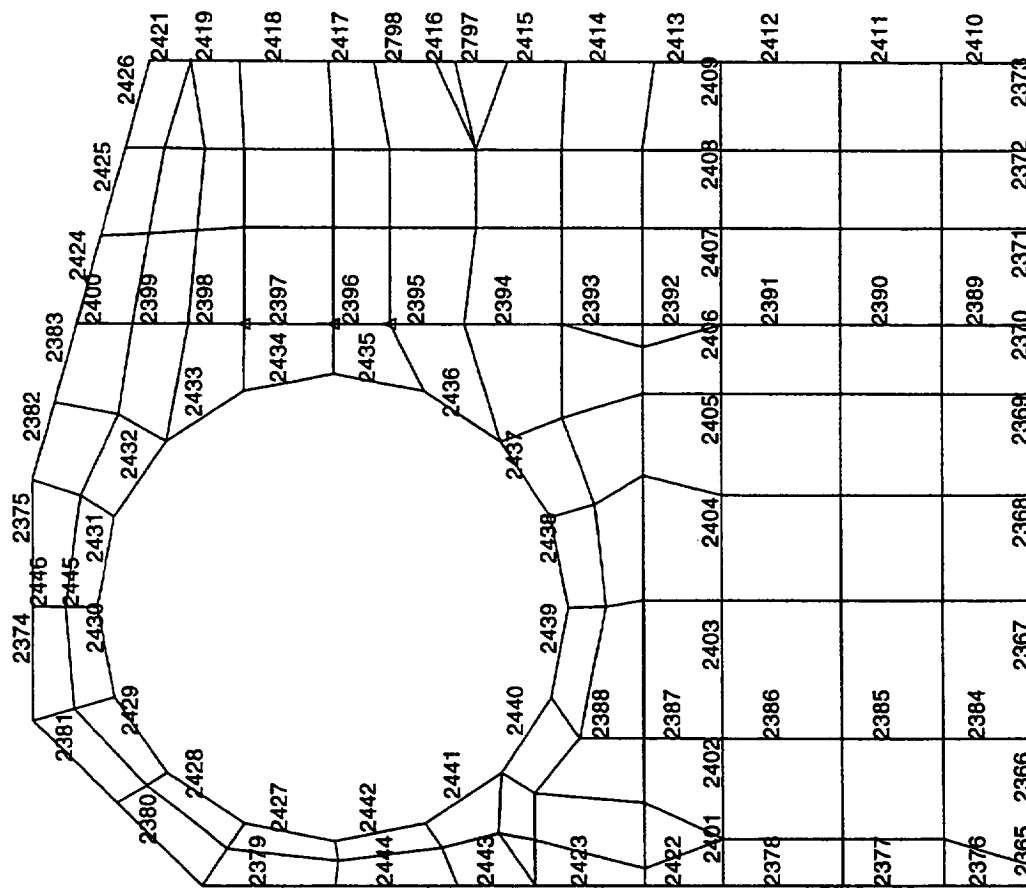


**Figure A-10 METSAT AMSU-A1 1331389-1 Upper Motor Mount Panel Mesh Only**

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**Figure A-12 METSAT AMSU-A1 1331389-1 Upper Motor Mount Panel Shell Elements**



**Figure A-13 METSAT AMSU-A1 1331389-1 Upper Motor Mount Panel Beam Elements**

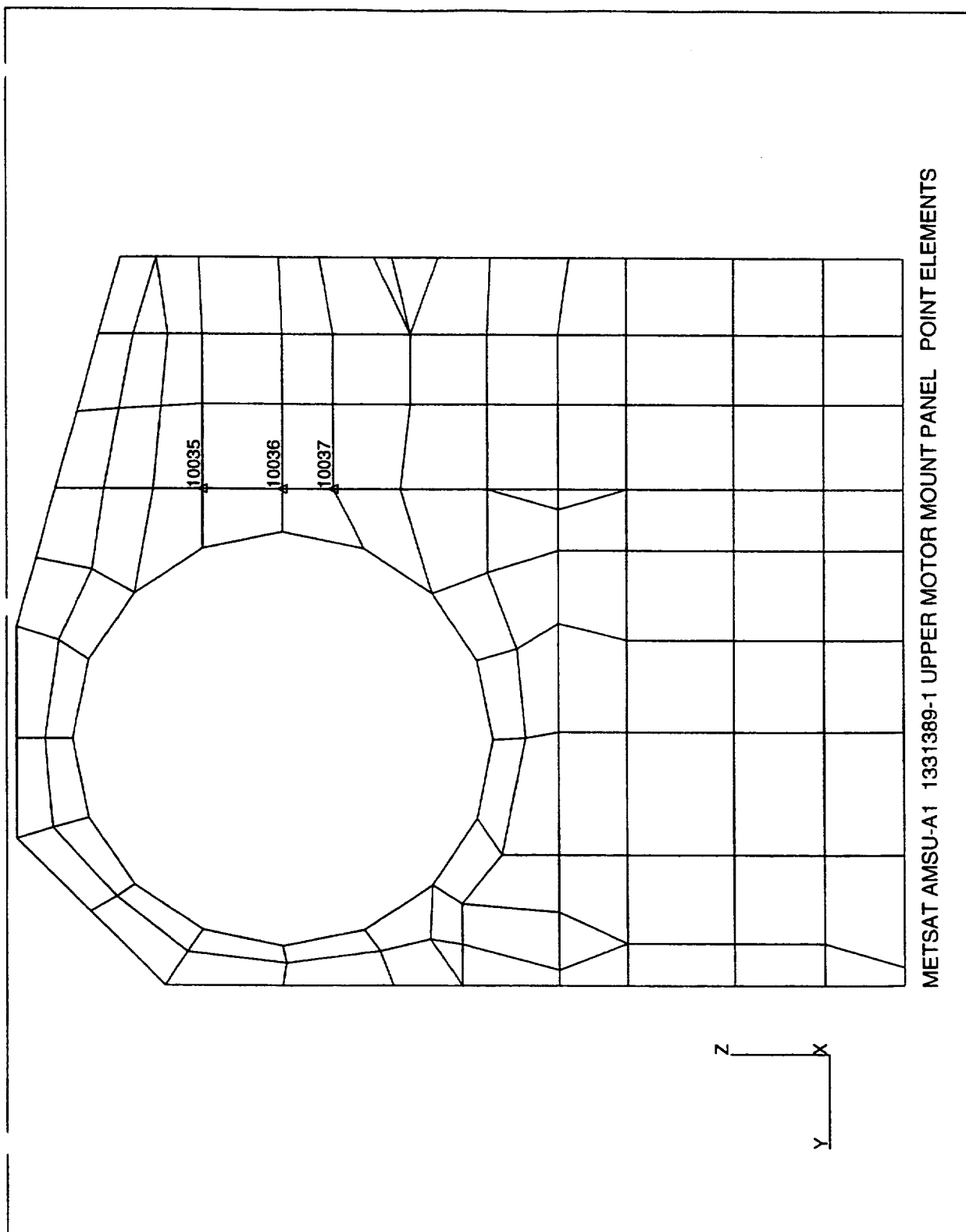
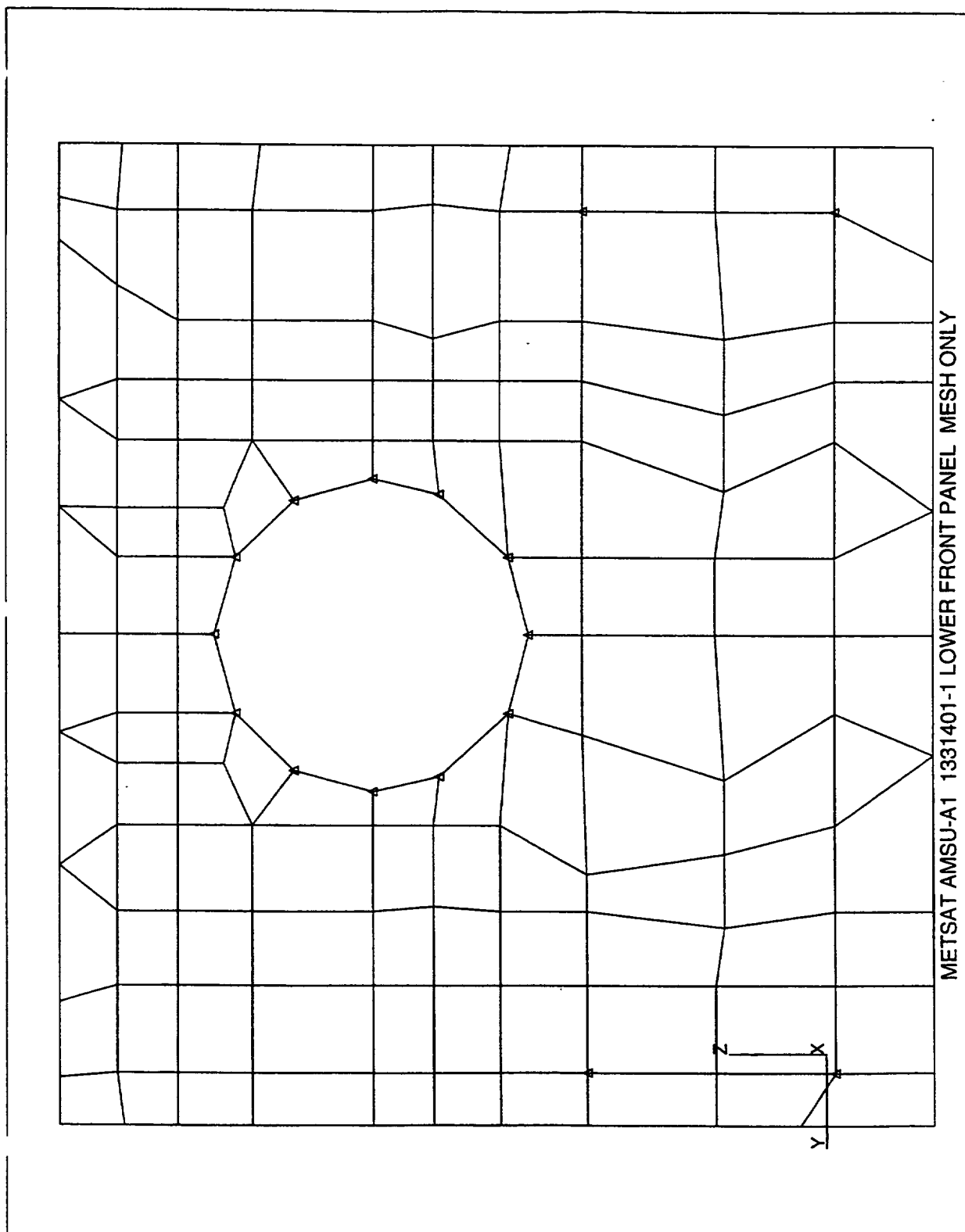


Figure A-14 METSAT AMSU-A1 1331389-1 Upper Motor Mount Panel Point Elements



**Figure A-15 METSAT AMSU-A1 1331401-1 Lower Front Panel Mesh Only**

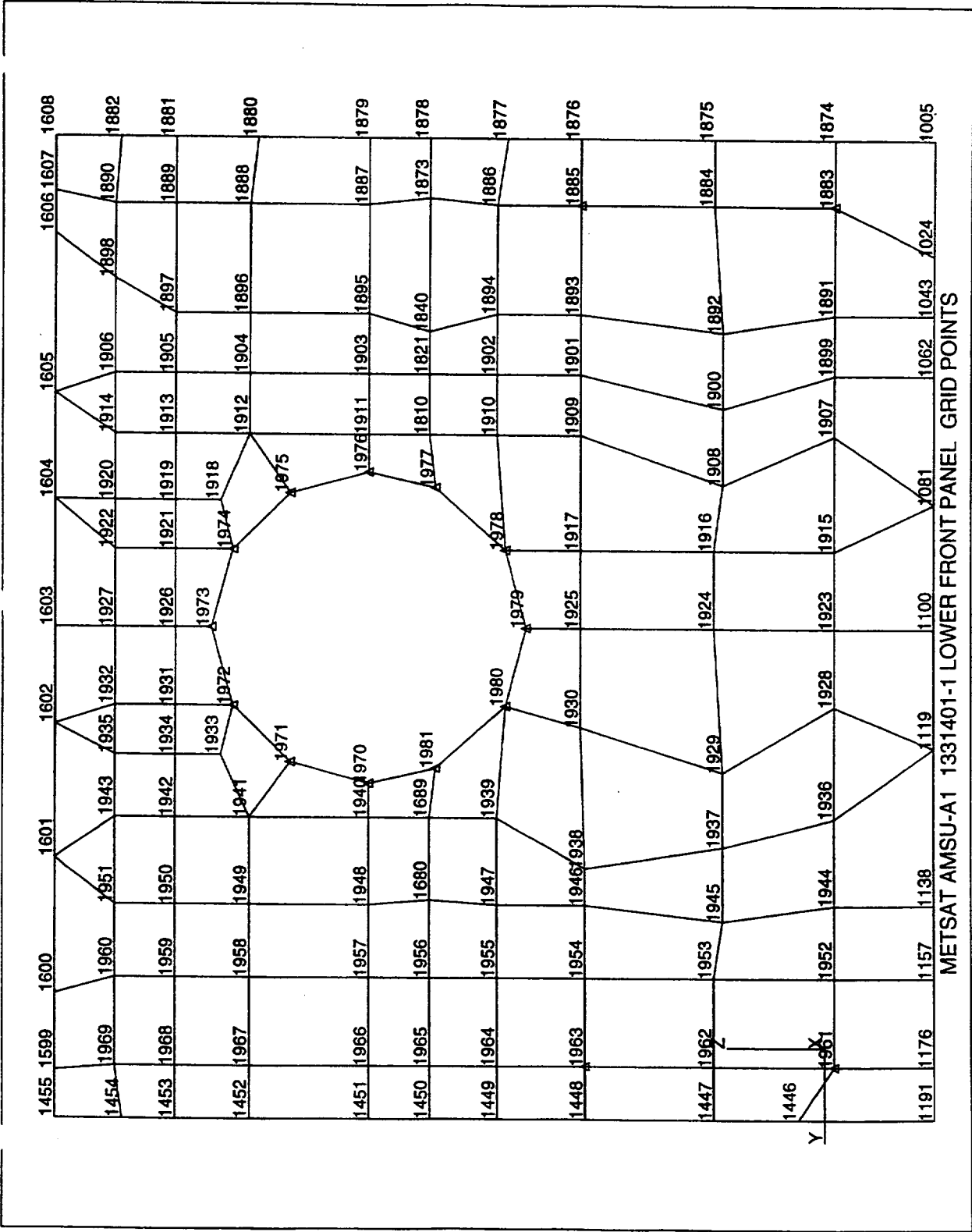


Figure A-16 METSAT AMSU-A1 1331401-1 Lower Front Panel Grid Points

A-21

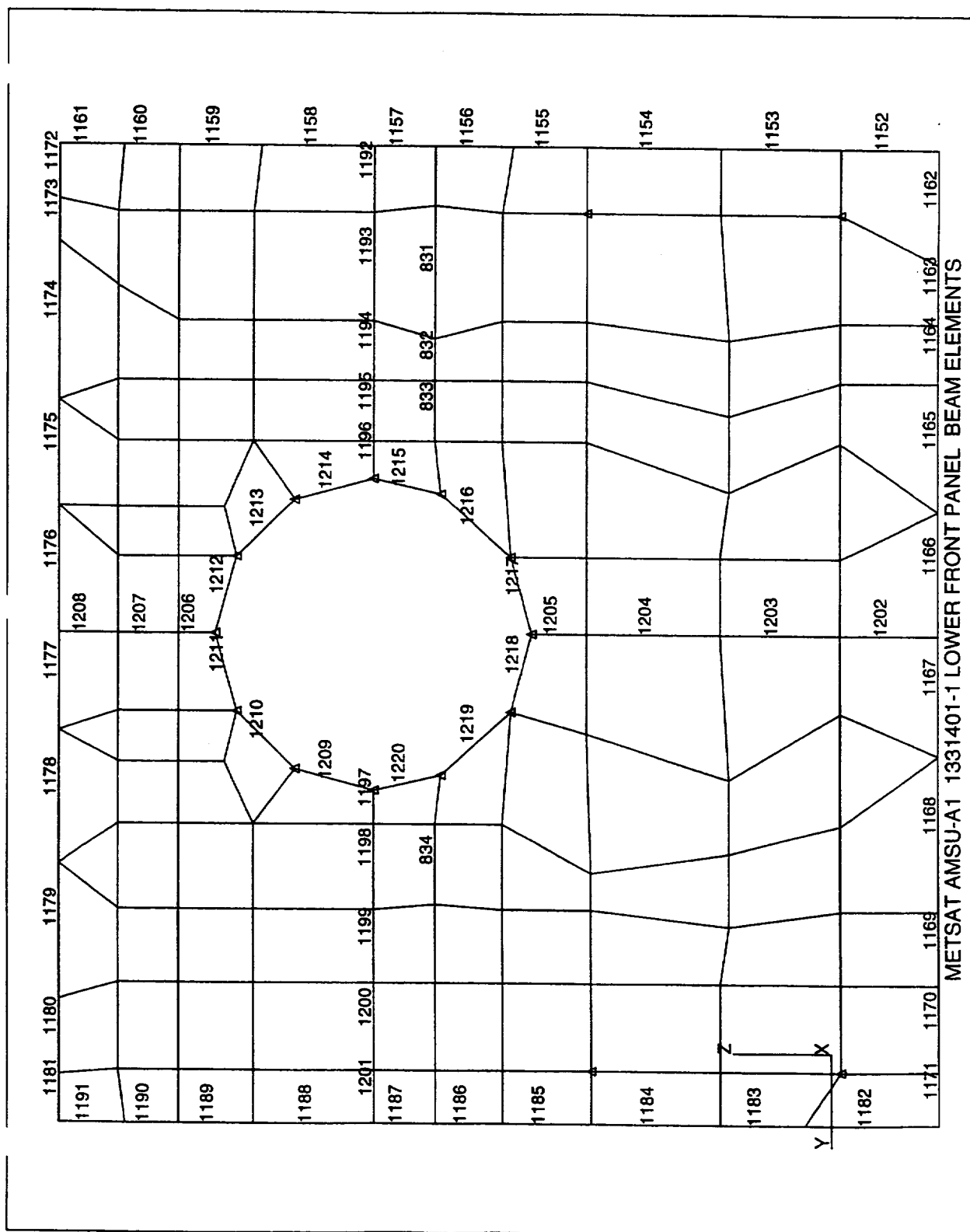


Figure A-18 METSAT AMSU-A1 1331401-1 Lower Front Panel Beam Elements

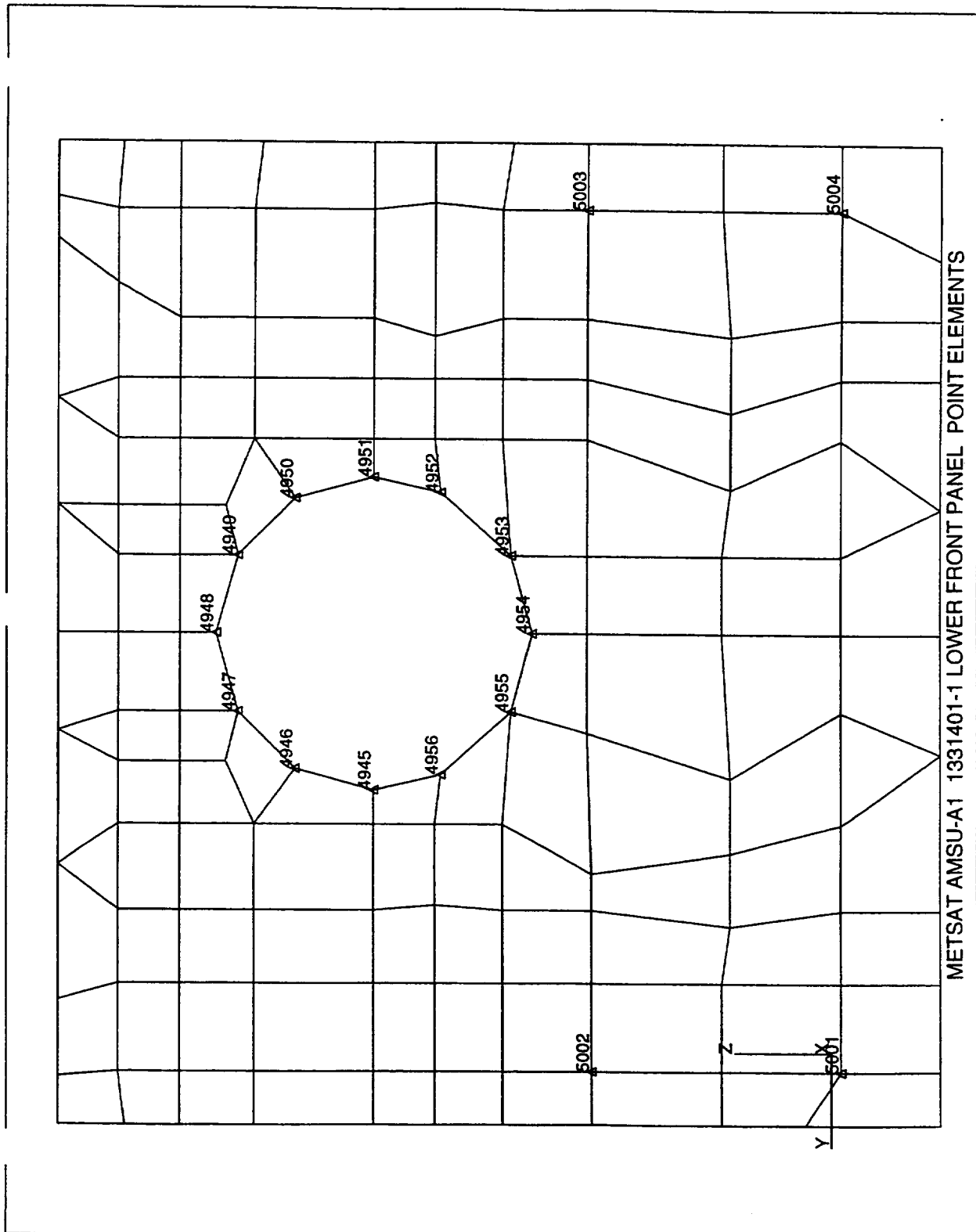


Figure A-19 METSAT AMSU-A1 1331401-1 Lower Front Panel Point Elements

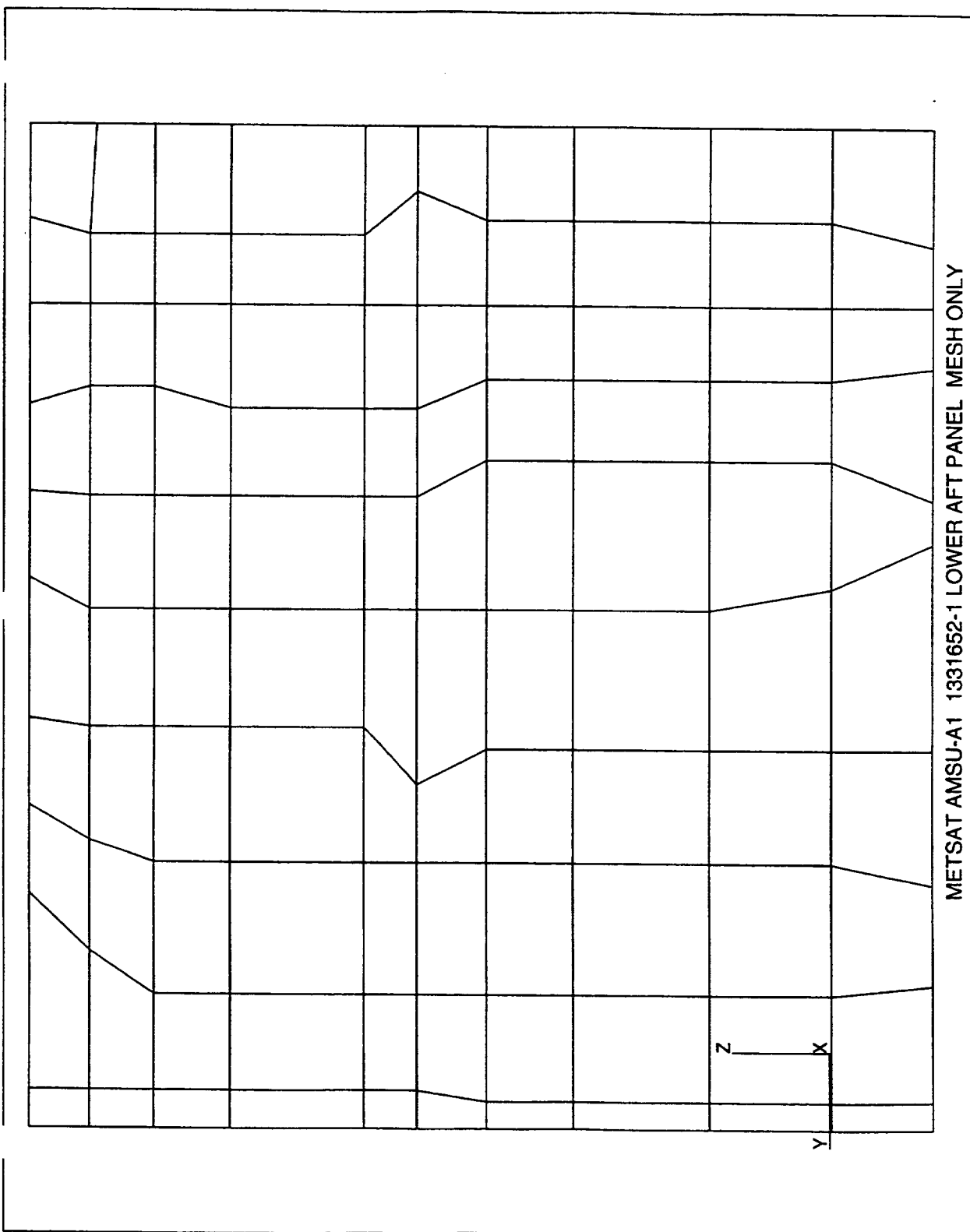


Figure A-20 METSAT AMSU-A1 1331652-1 Lower Aft Panel Mesh Only

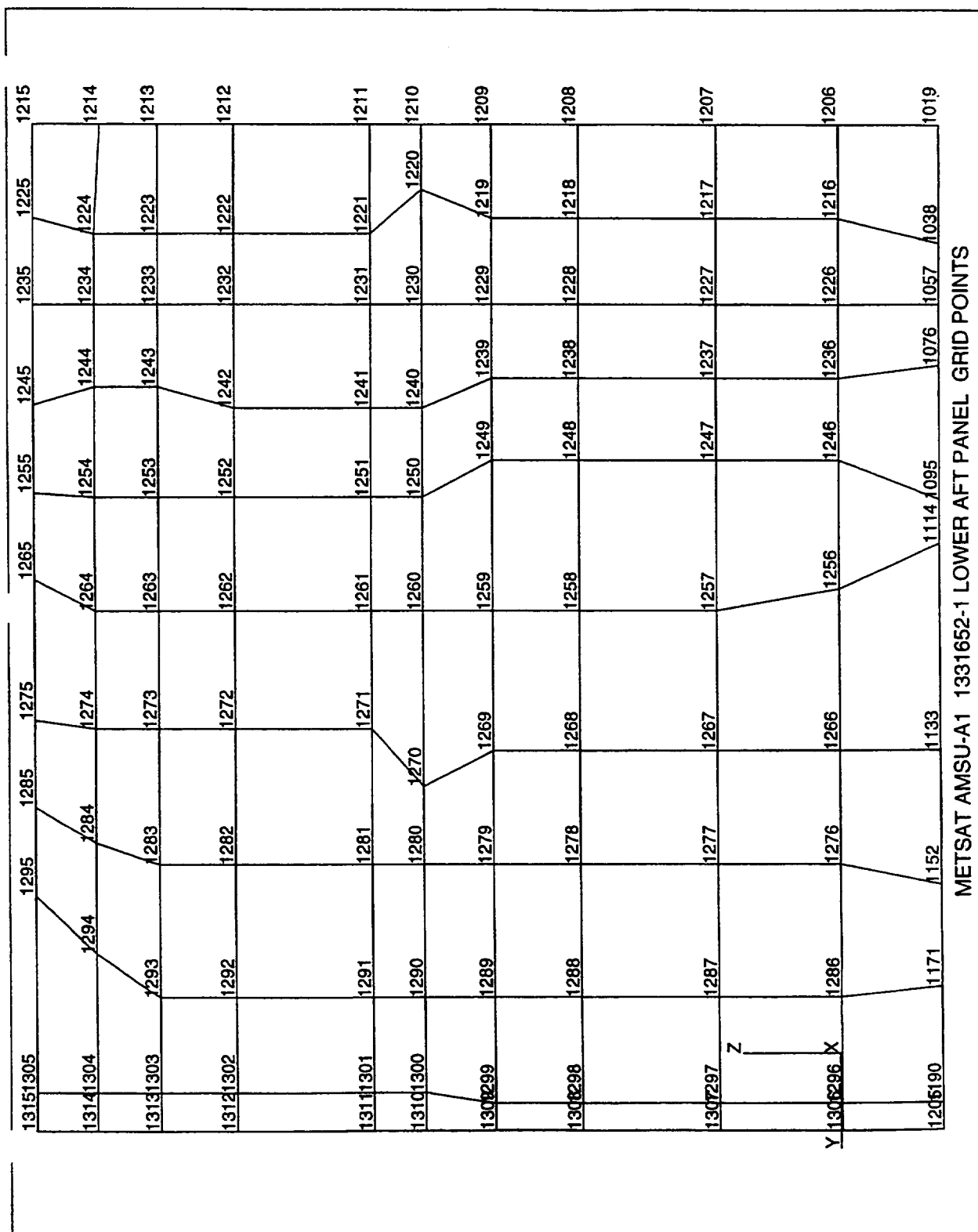


Figure A-21 METSAT AMSU-A1 1331652-1 Lower Aft Panel Grid Points

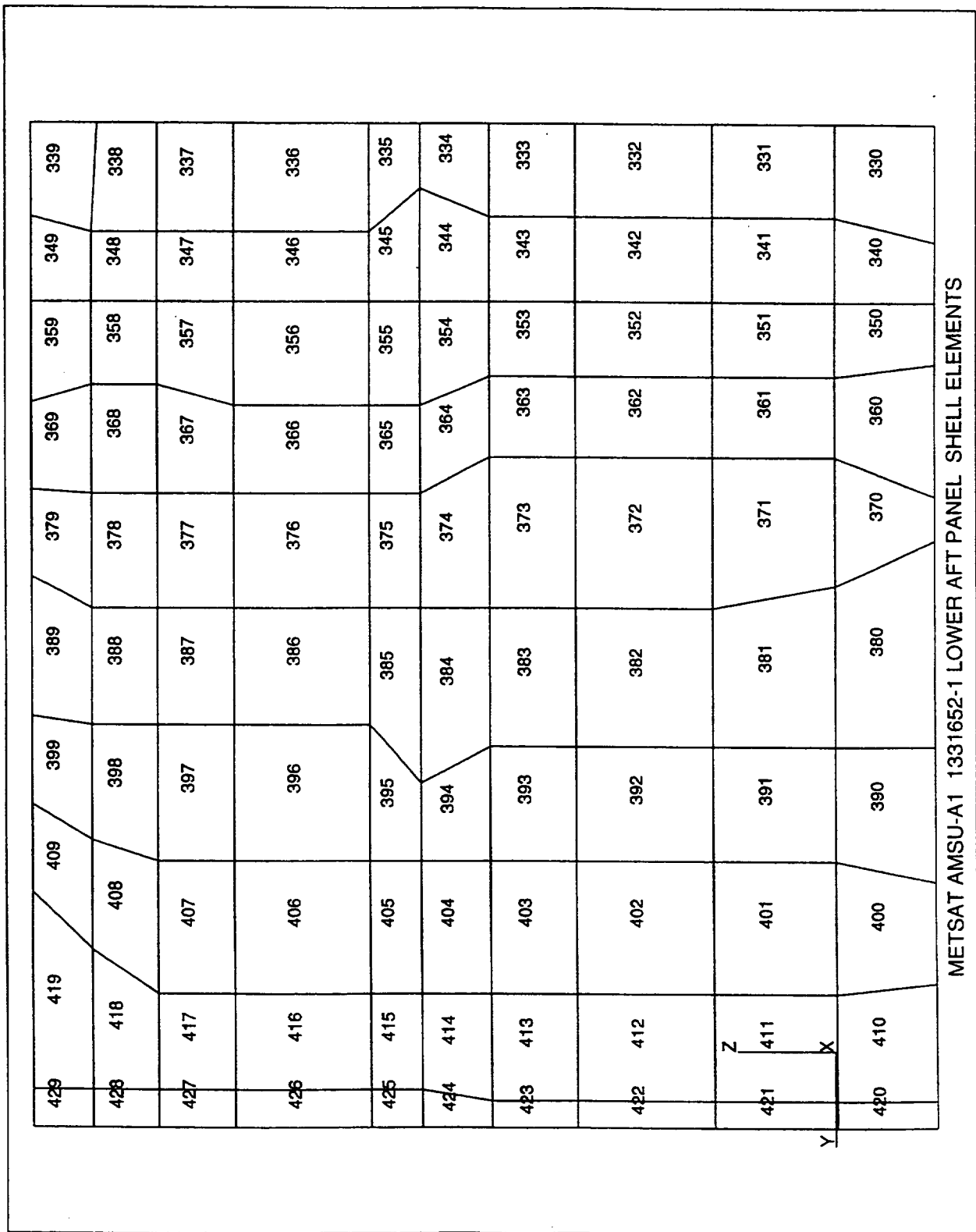


Figure A-22 METSAT AMSU-A1 1331652-1 Lower Aft Panel Shell Elements

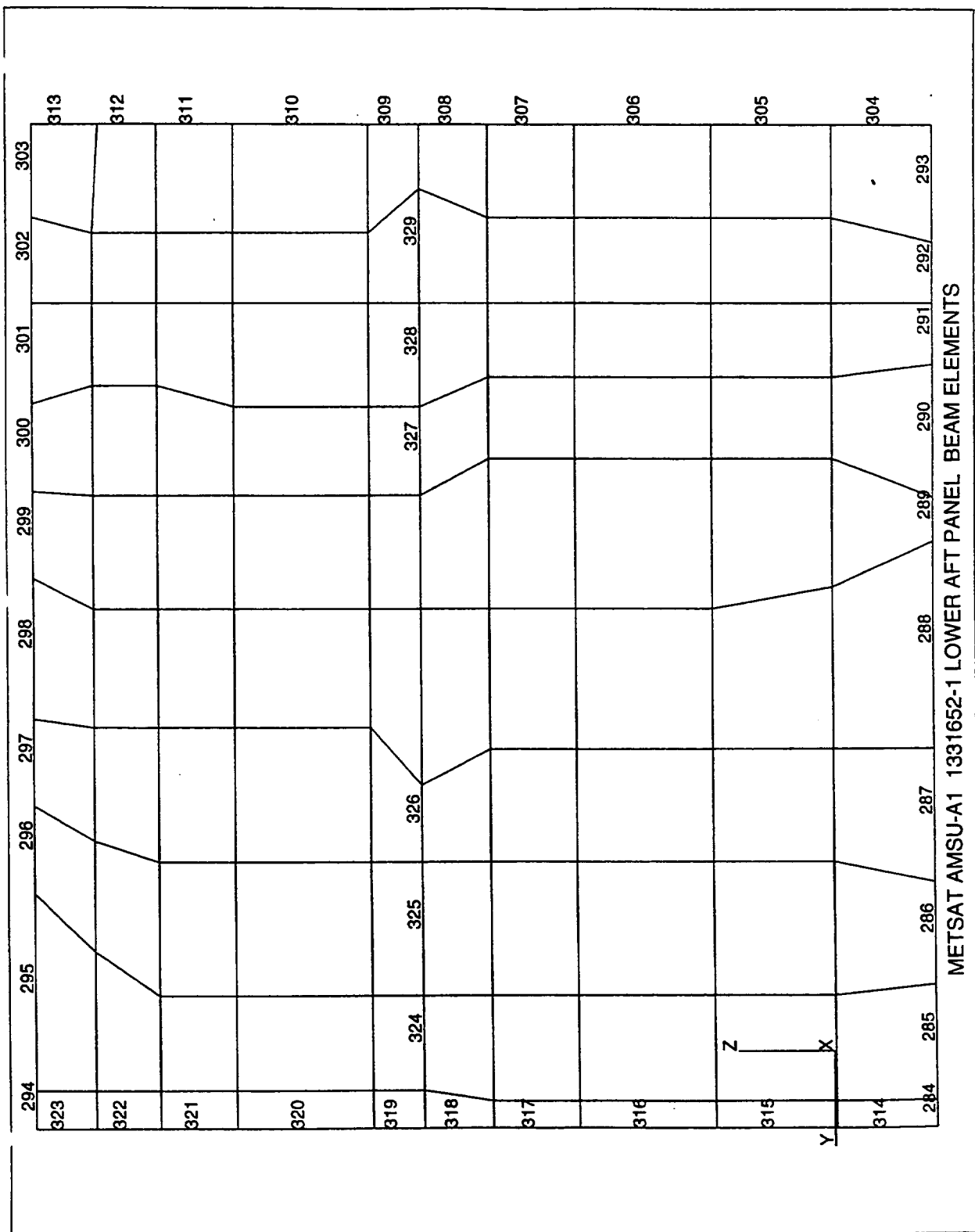


Figure A-23 METSAT AMSU-A1 1331652-1 Lower Aft Panel Beam Elements

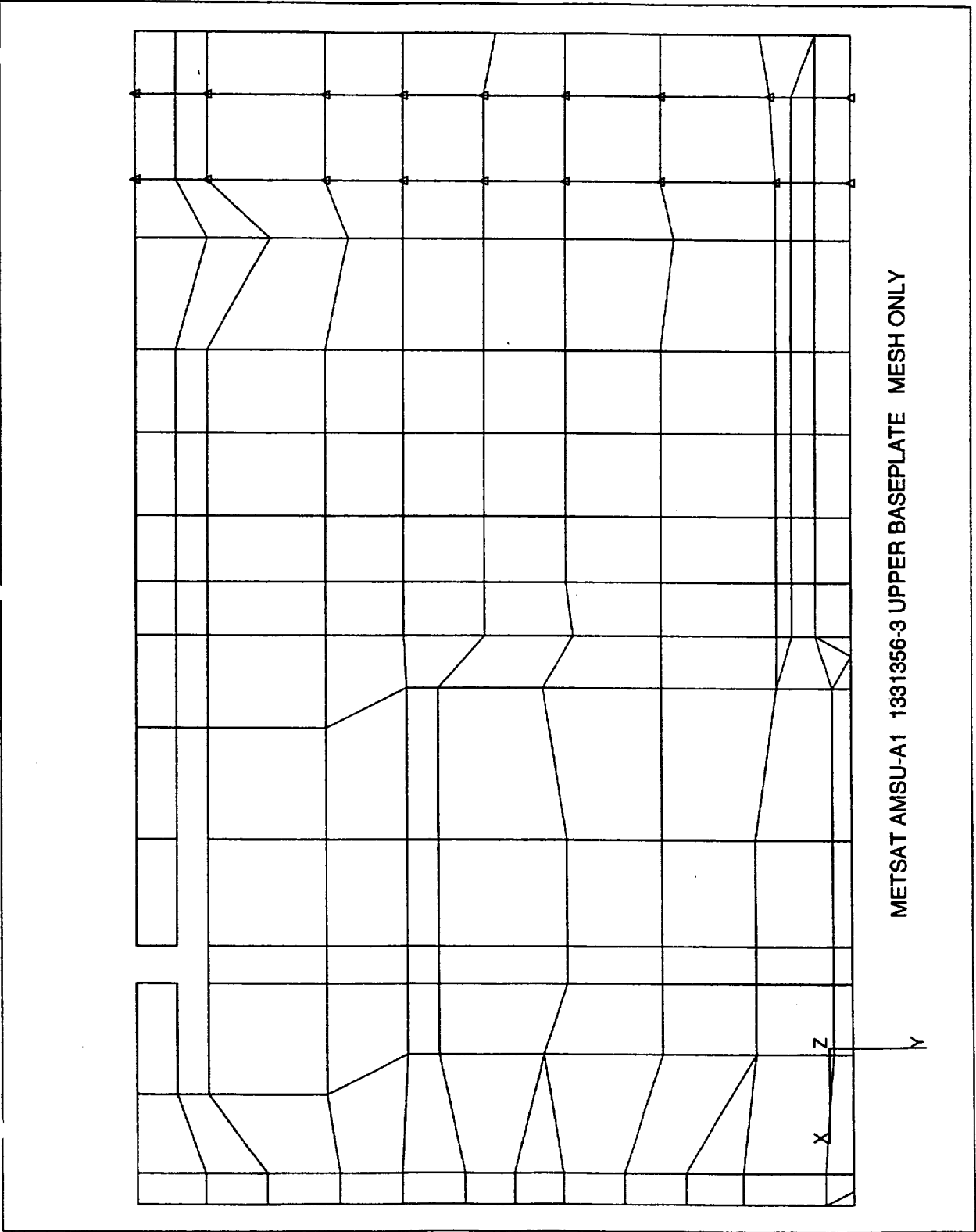
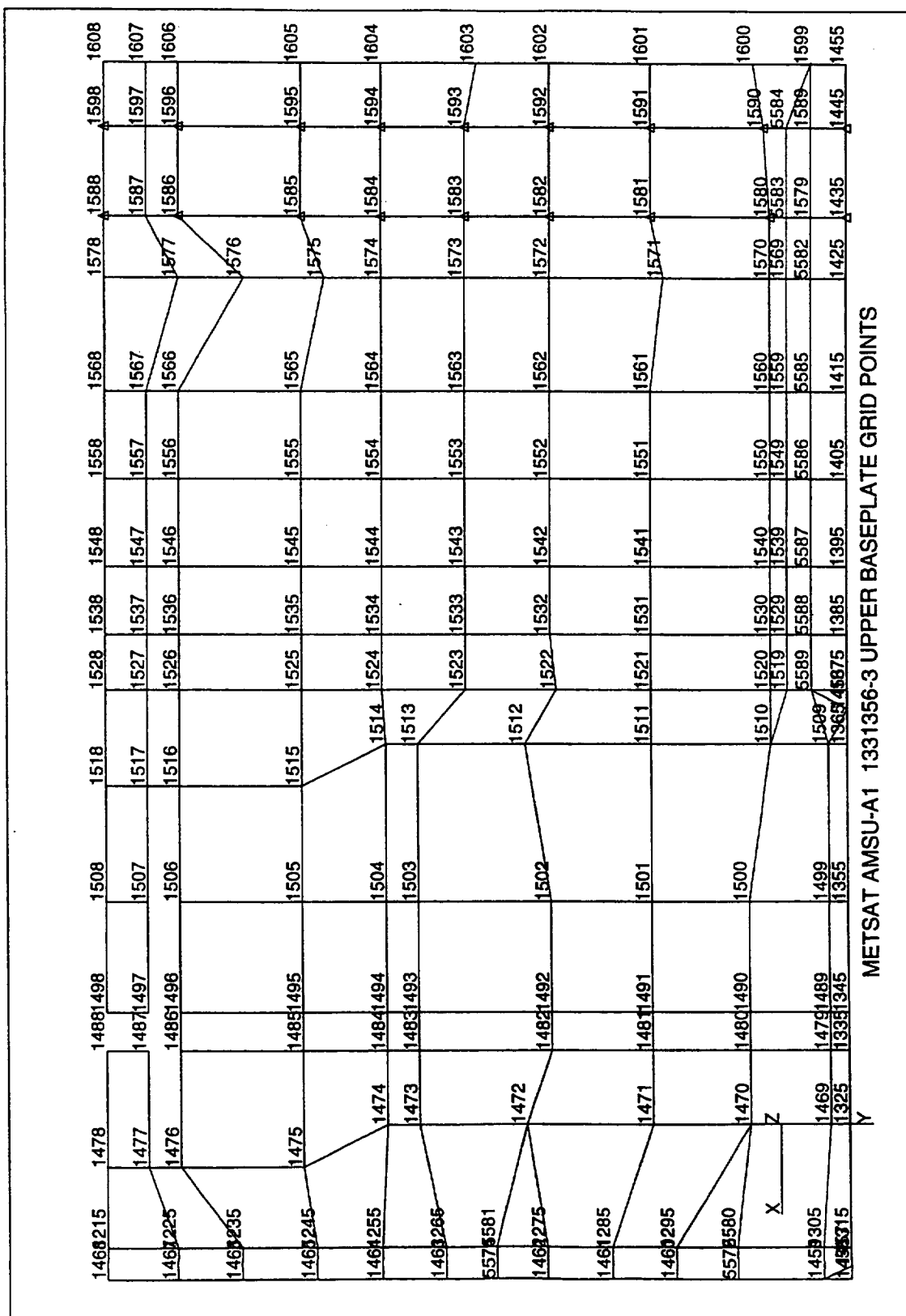


Figure A-24 METSAT AMSU-A1 1331356-3 Upper Baseplate Mesh Only



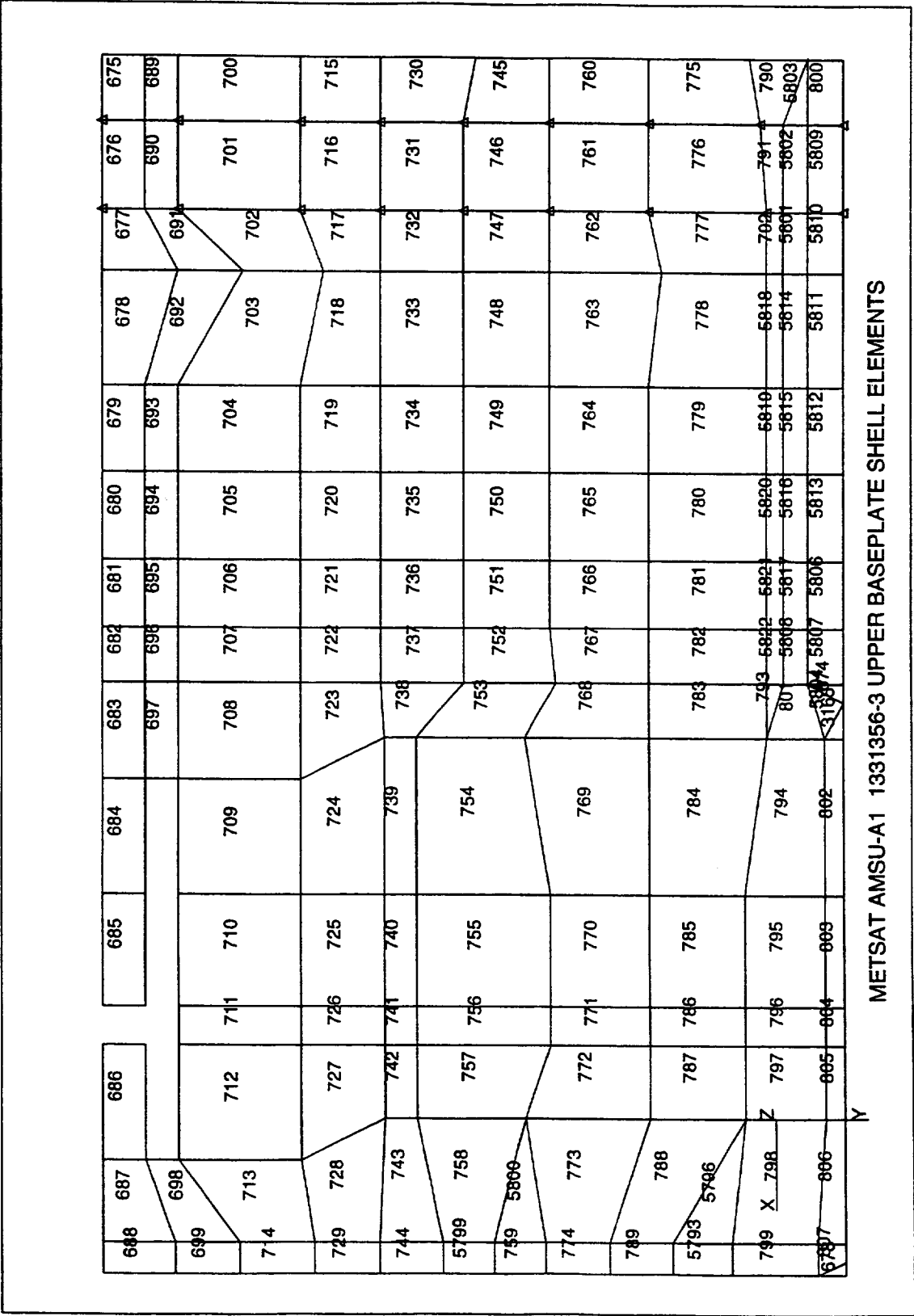


Figure A-26 METSAT AMSU-A1 1331356-3 Upper Baseplate Shell Elements

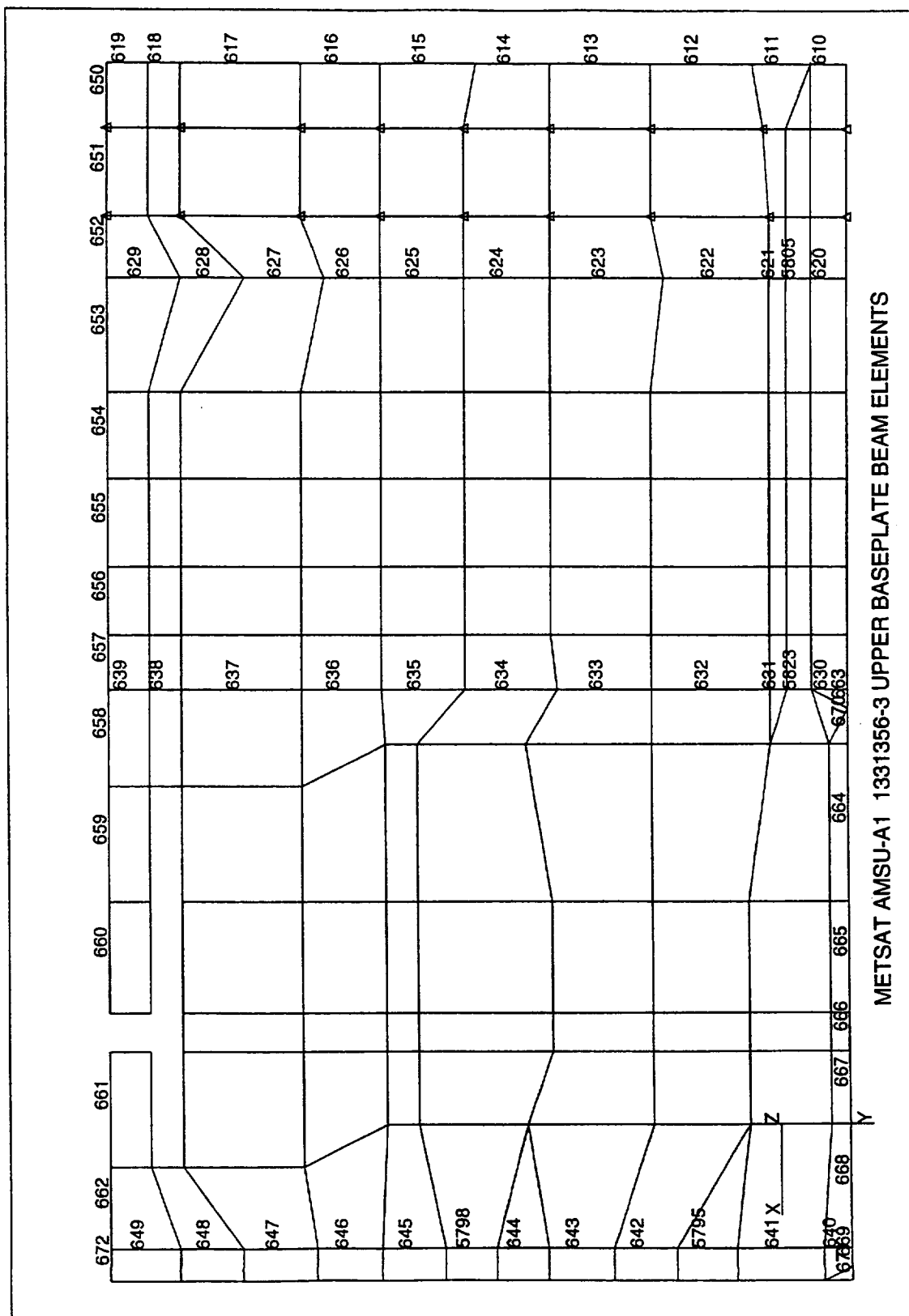


Figure A-27 METSAT AMSU-A1 1331356-3 Upper Baseplate Beam Elements

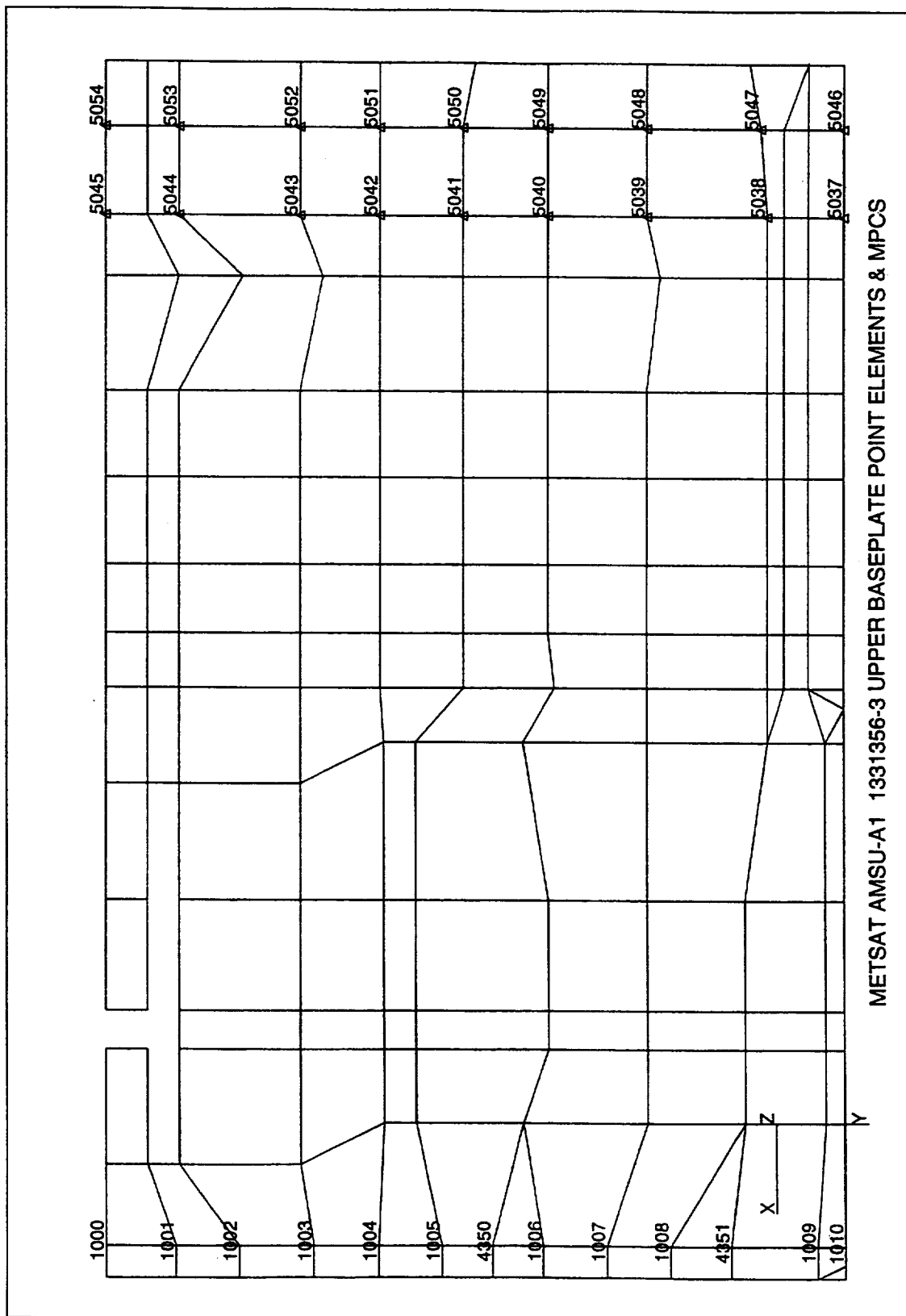
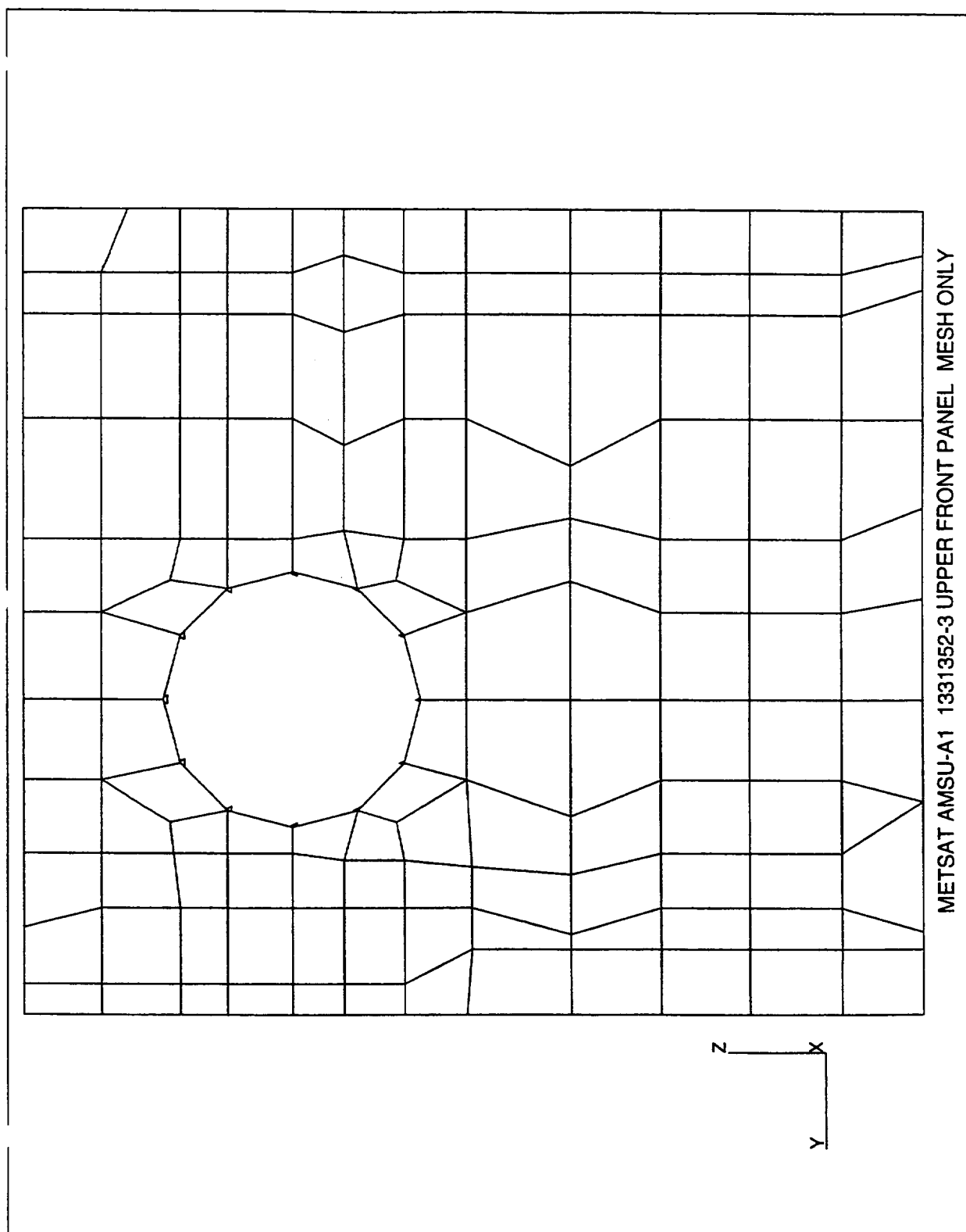


Figure A-28 METSAT AMSU-A1 1331356-3 Upper Baseplate Point Elements & MPCs



**Figure A-29** METSAT AMSU-A1 1331352-3 Upper Front Panel Mesh Only

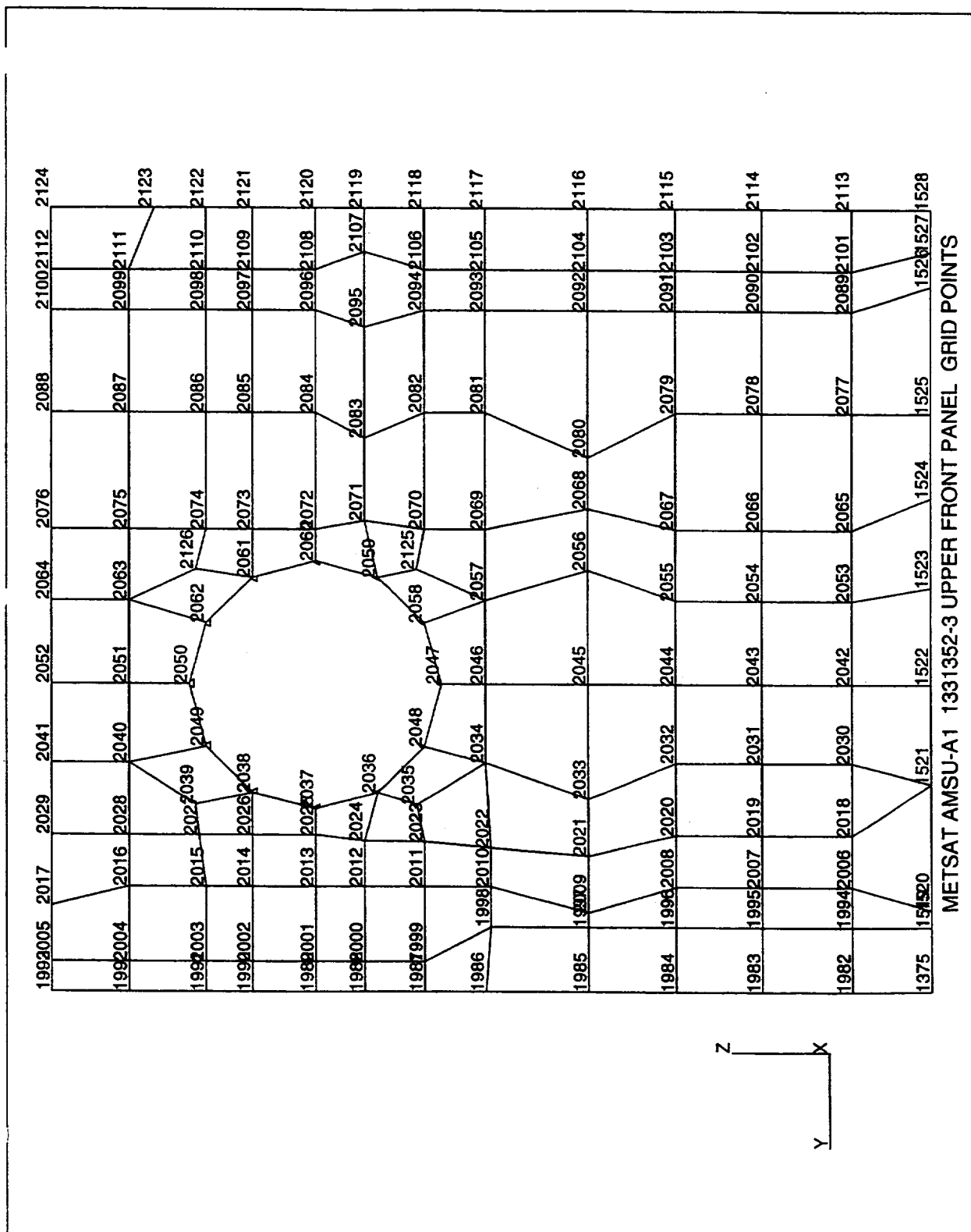


Figure A-30 METSAT AMSU-A1 1331352-3 Upper Front Panel Grid Points

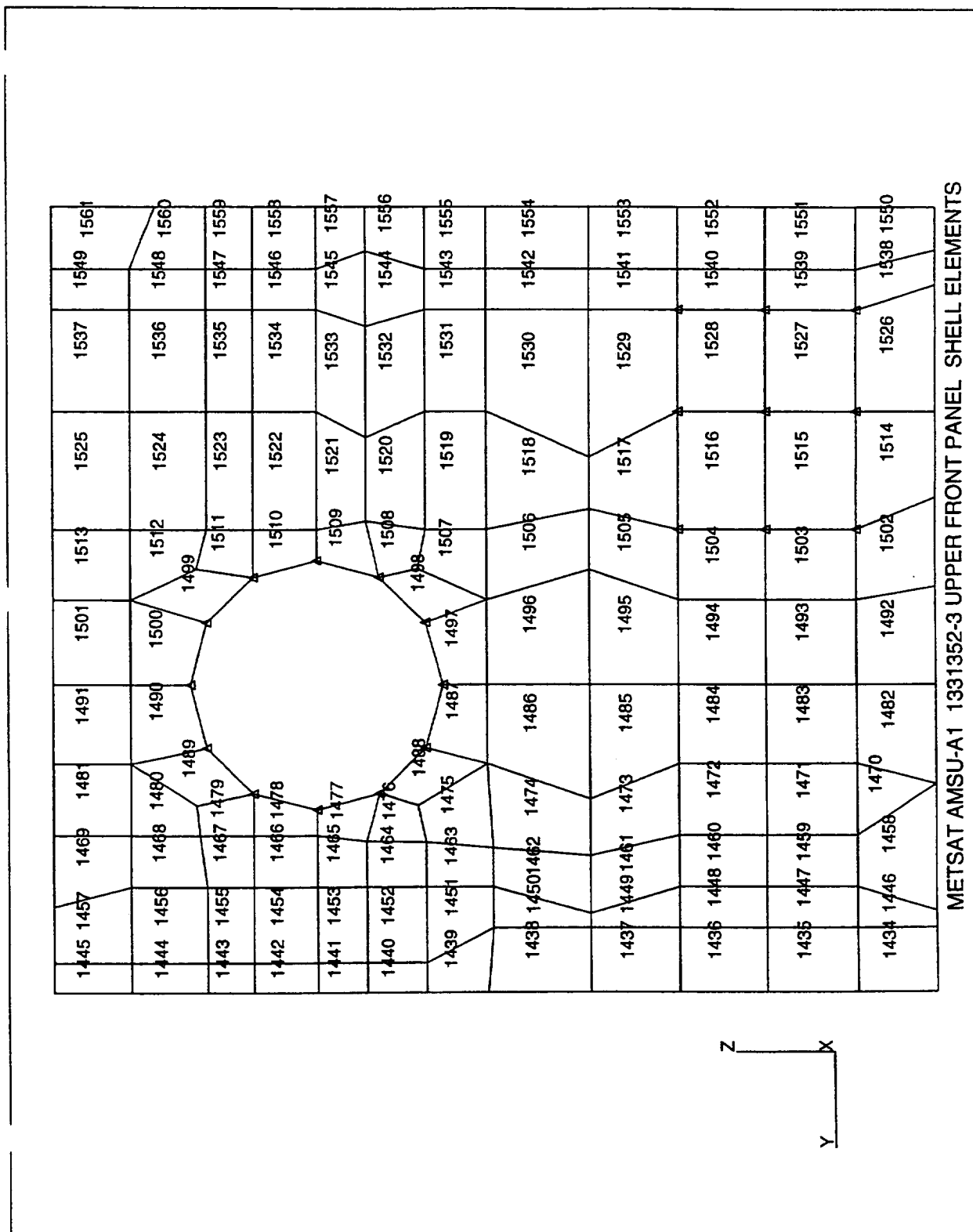


Figure A-31 METSAT AMSU-A1 1331352-3 Upper Front Panel Shell Elements

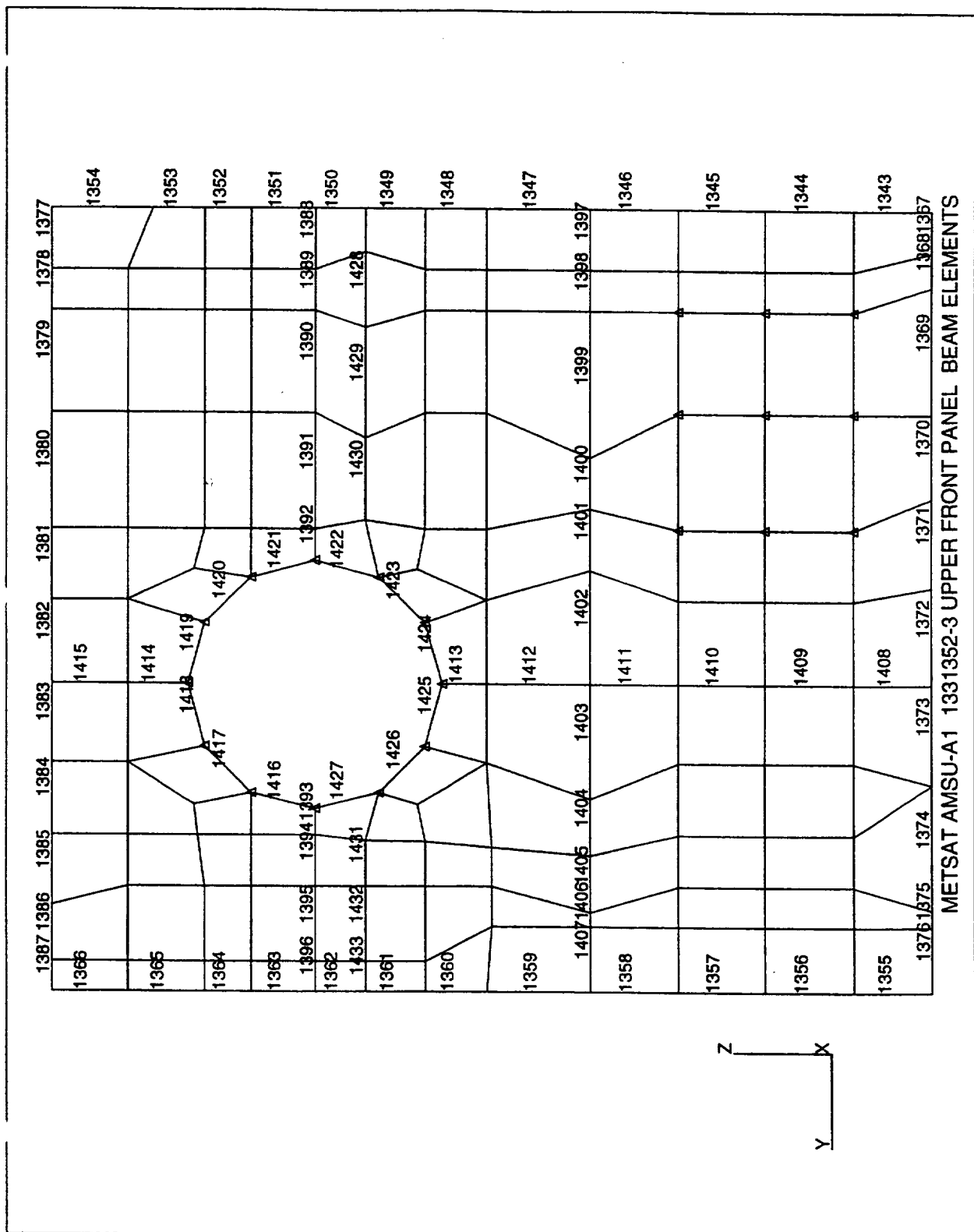


Figure A-32 METSAT AMSU-A1 1331352-3 Upper Front Panel Beam Elements

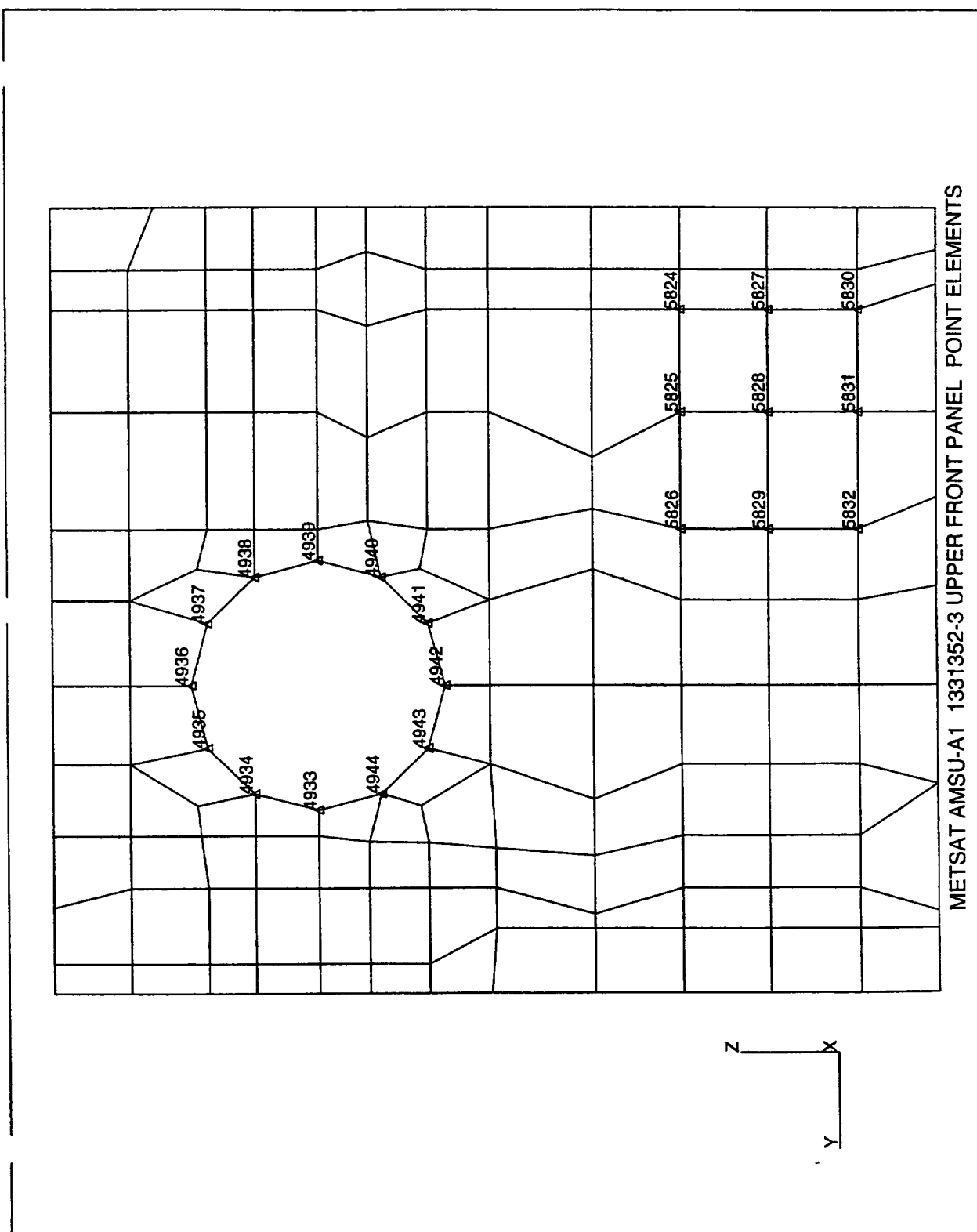
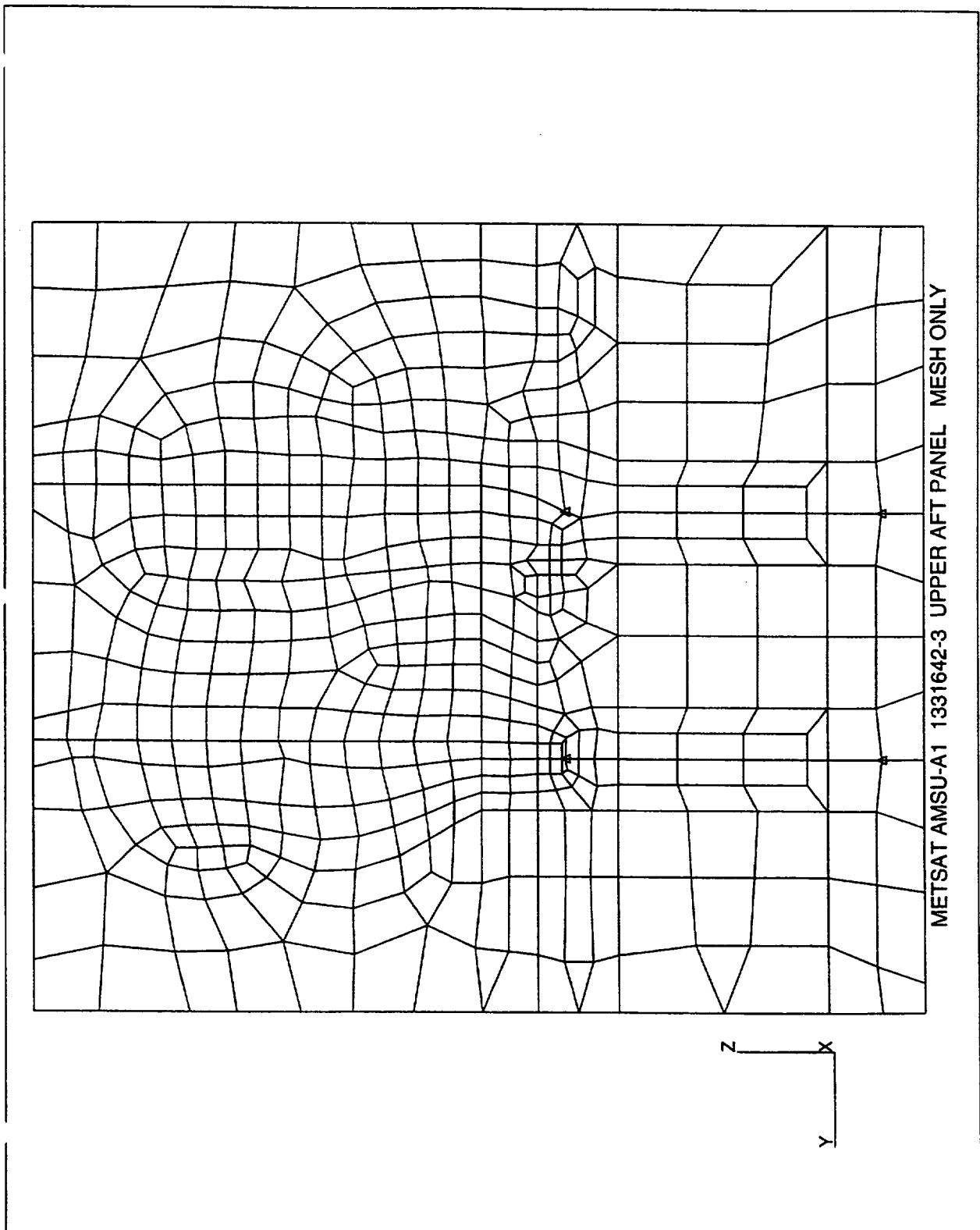


Figure A-33 METSAT AMSU-A1 1331352-3 Upper Front Panel Point Elements



**Figure A-34 METSAT AMSU-A1 1331642-3 Upper Aft Panel Mesh Only**

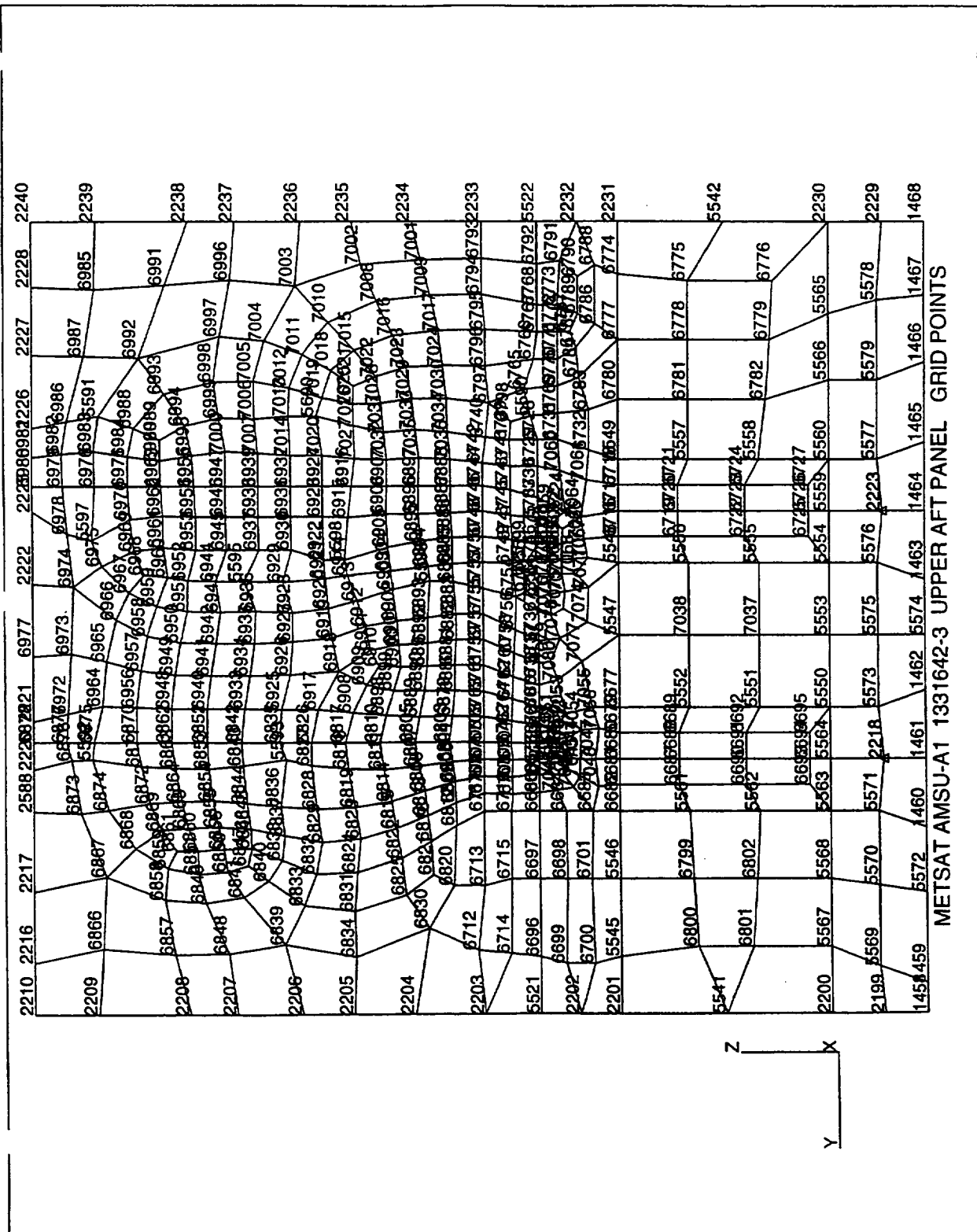
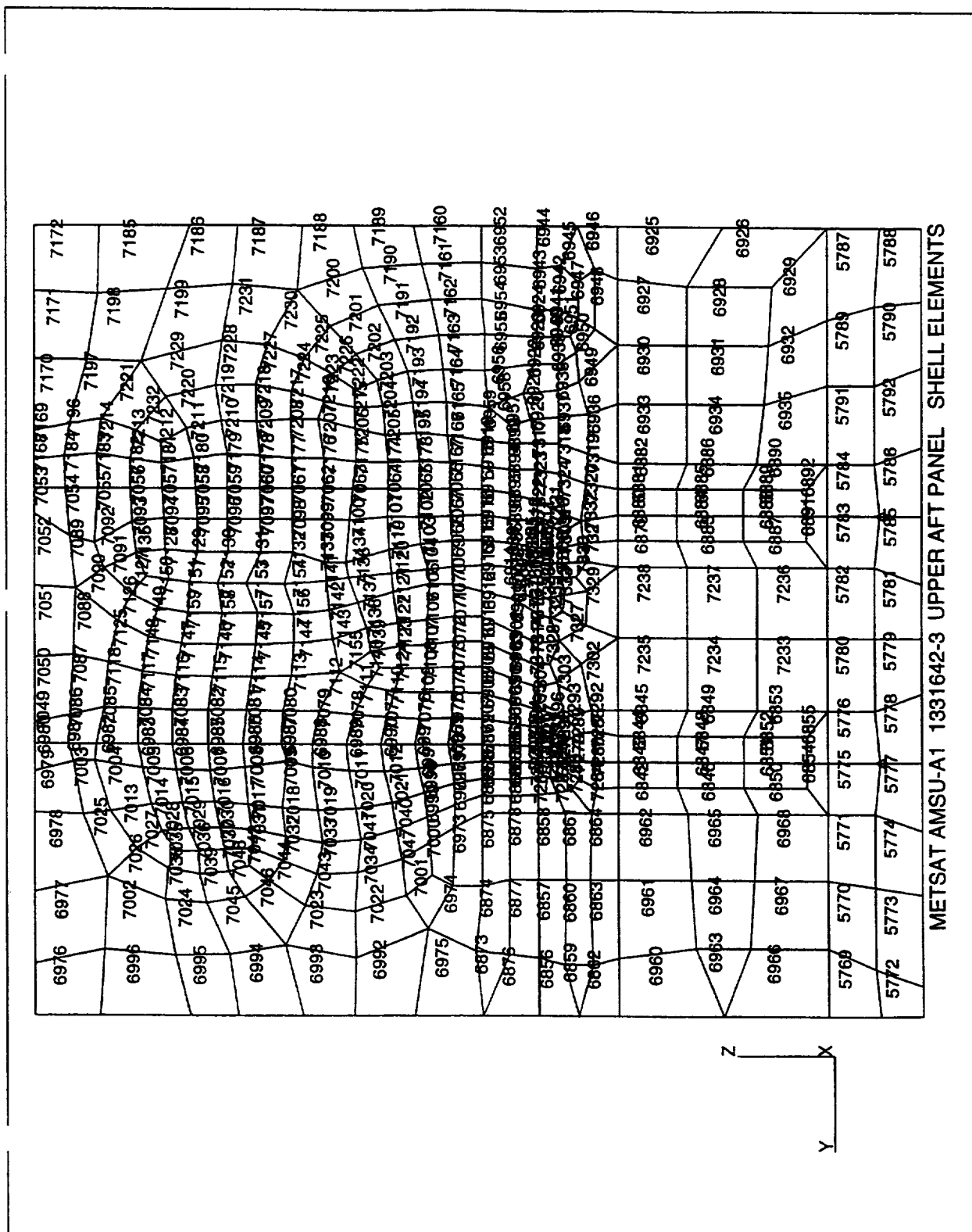
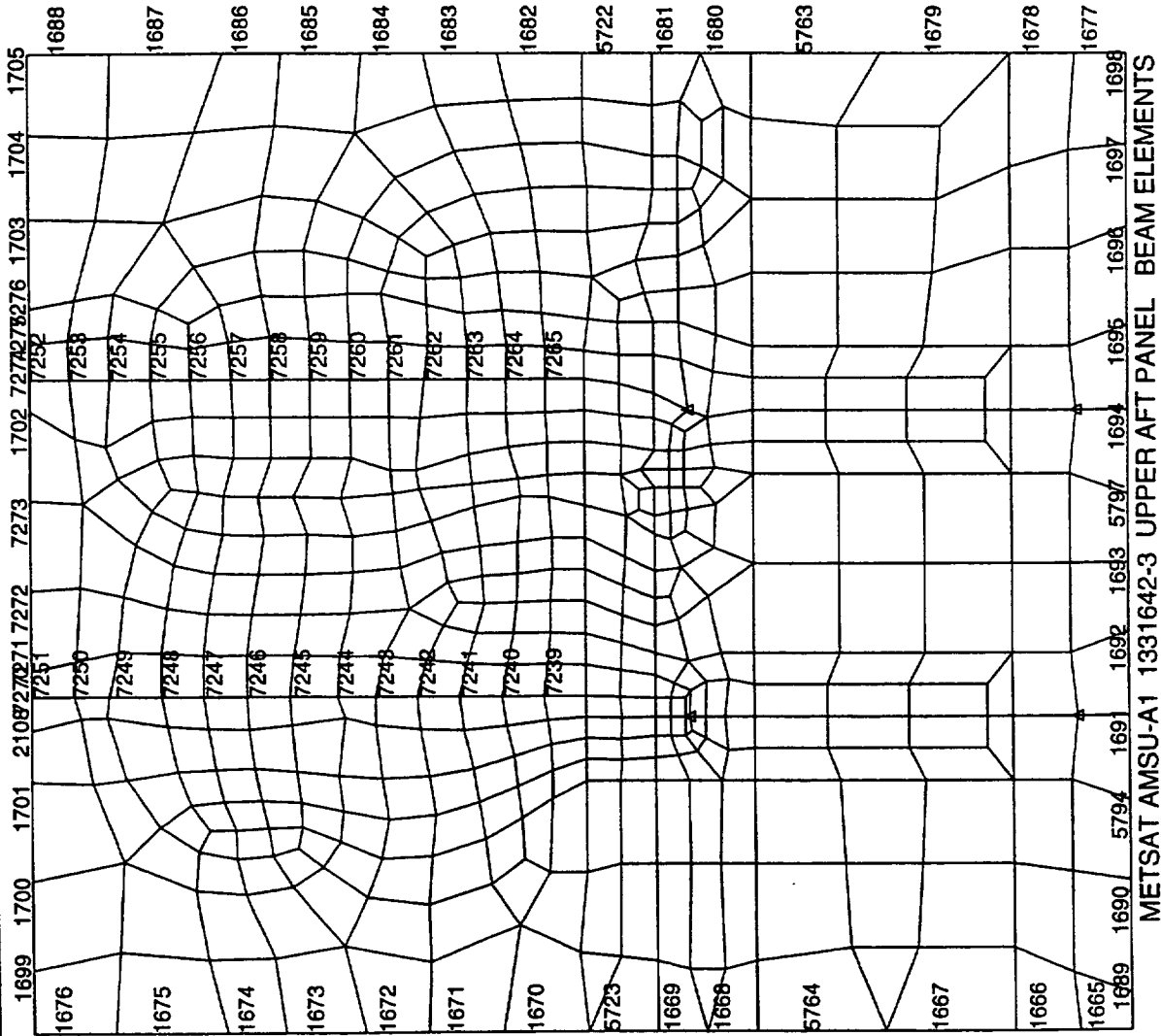


Figure A-35 METSAT AMSU-A1 1331642-3 Upper Aft Panel Grid Points



**Figure A-36 METSAT AMSU-A1 1331642-3 Upper Aft Panel Shell Elements**



**Figure A-37 METSAT AMSU-A1 1331642-3 Upper Aft Panel Beam Elements**

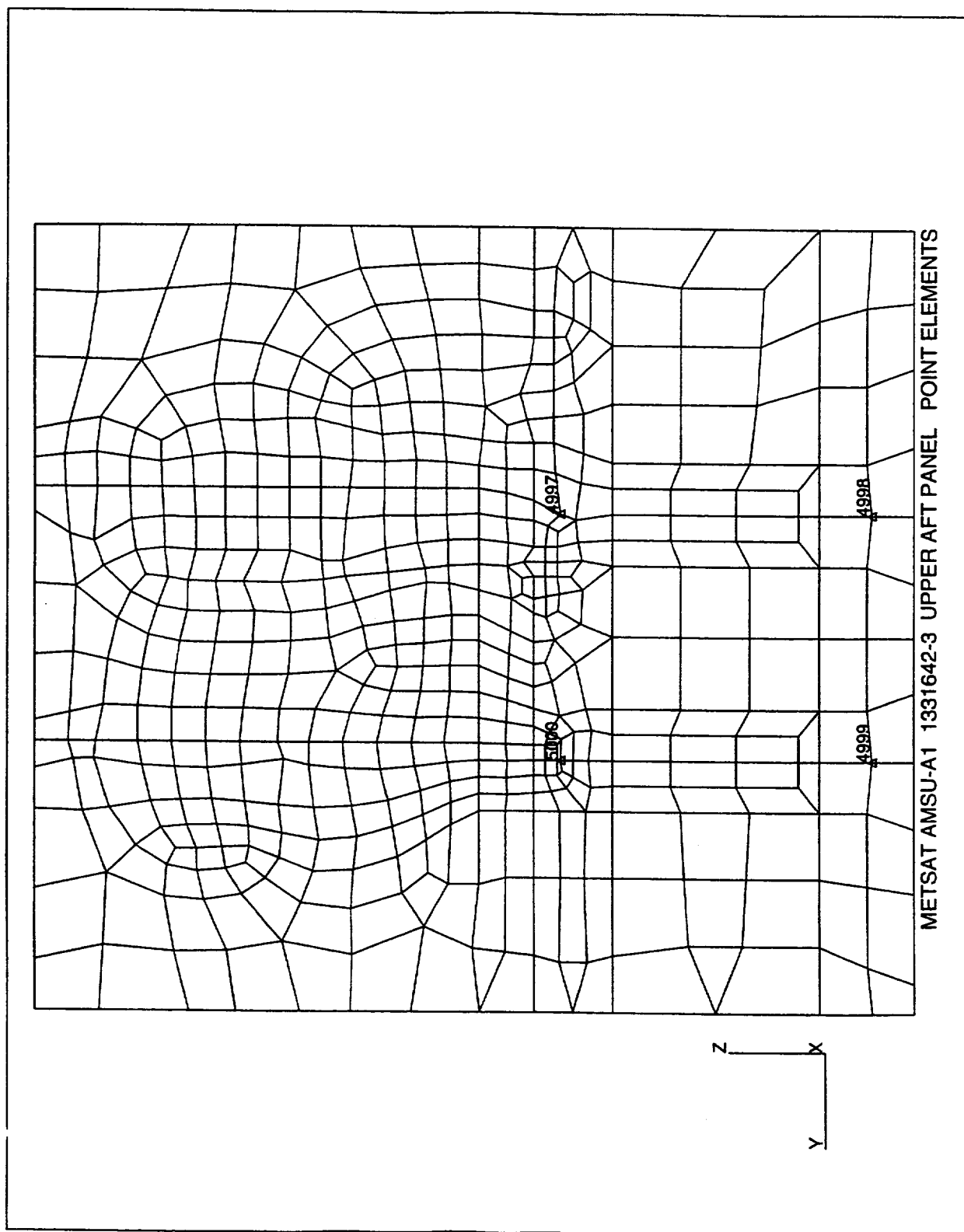
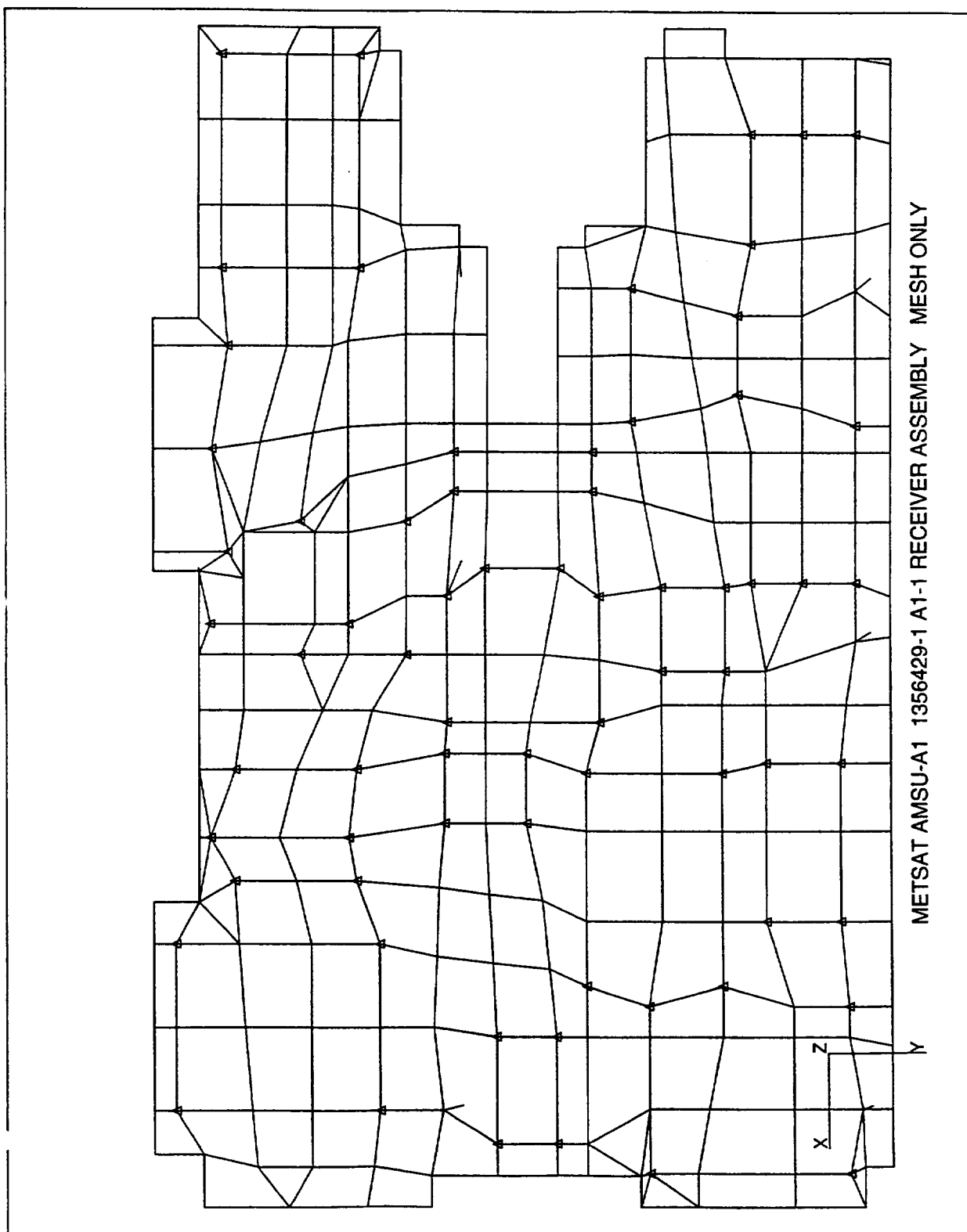


Figure A-38 METSAT AMSU-A1 1331642-3 Upper Aft Panel Point Elements



**Figure A-39 METSAT AMSU-A1 1356429-1 A1-1 Receiver Assembly Mesh Only**

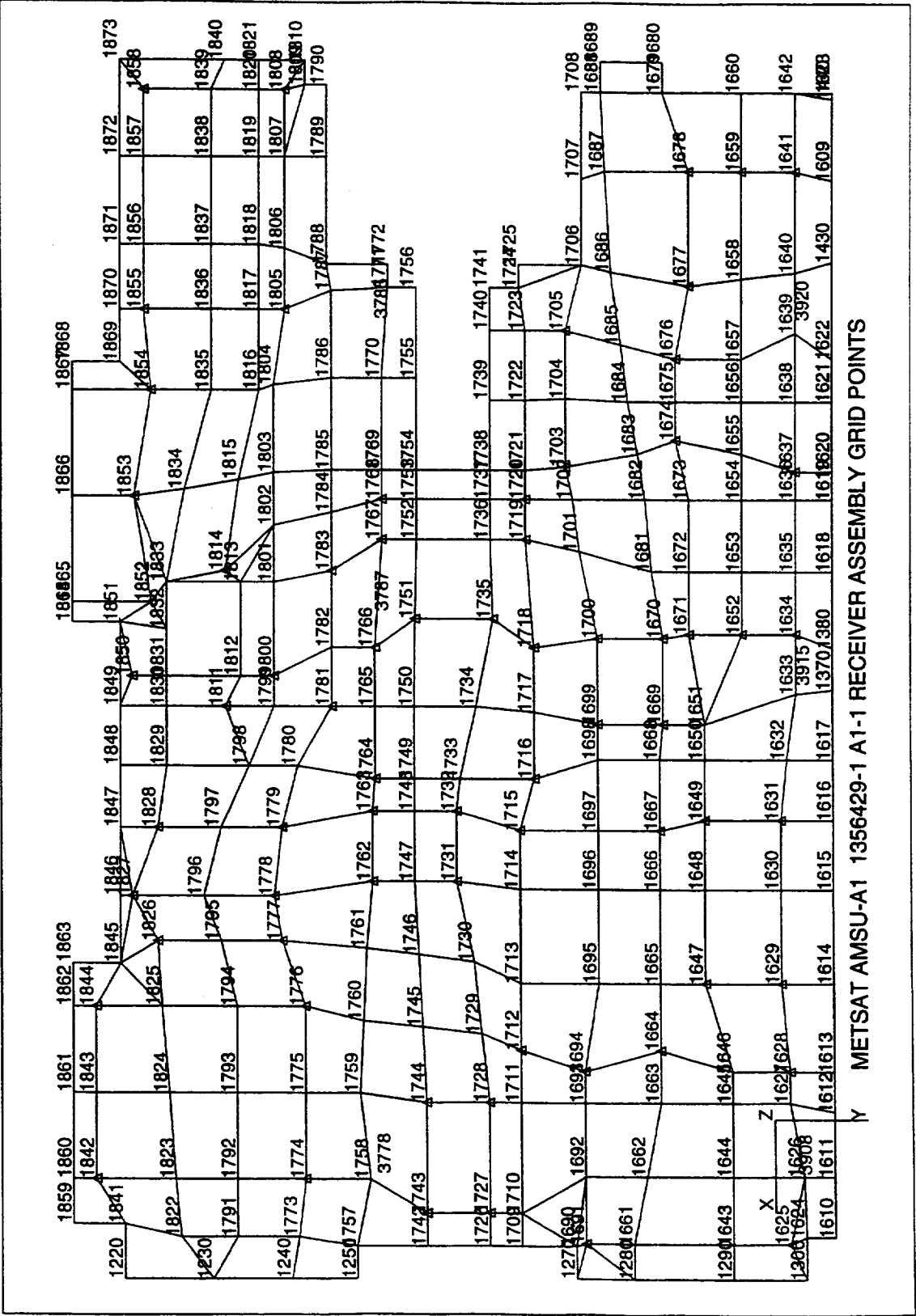


Figure A-40 METSAT AMSU-A1 1356429-1 A1-1 Receiver Assembly Grid Points

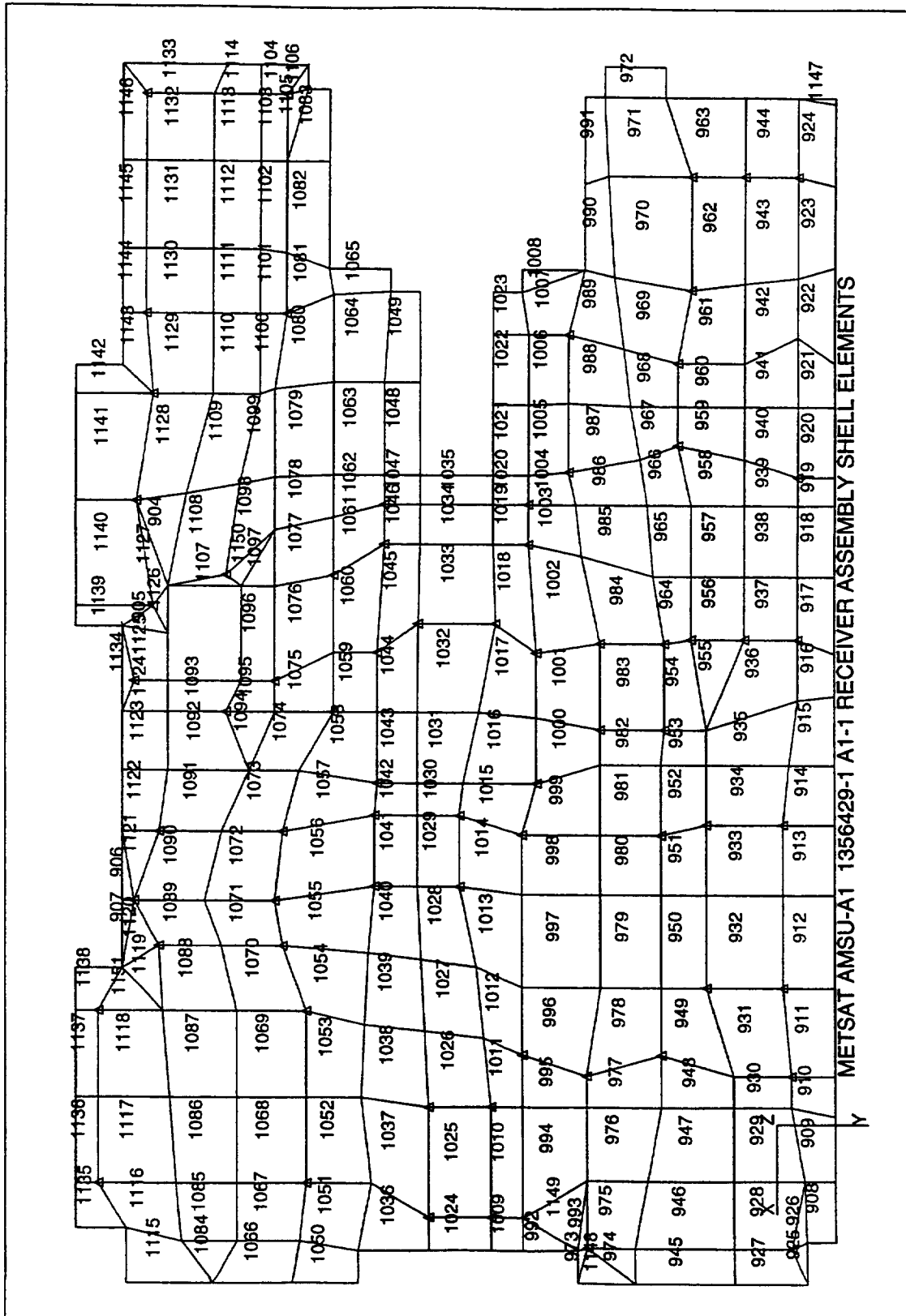


Figure A-41 METSAT AMSU-A1 1356429-1 A1-1 Receiver Assembly Shell Elements

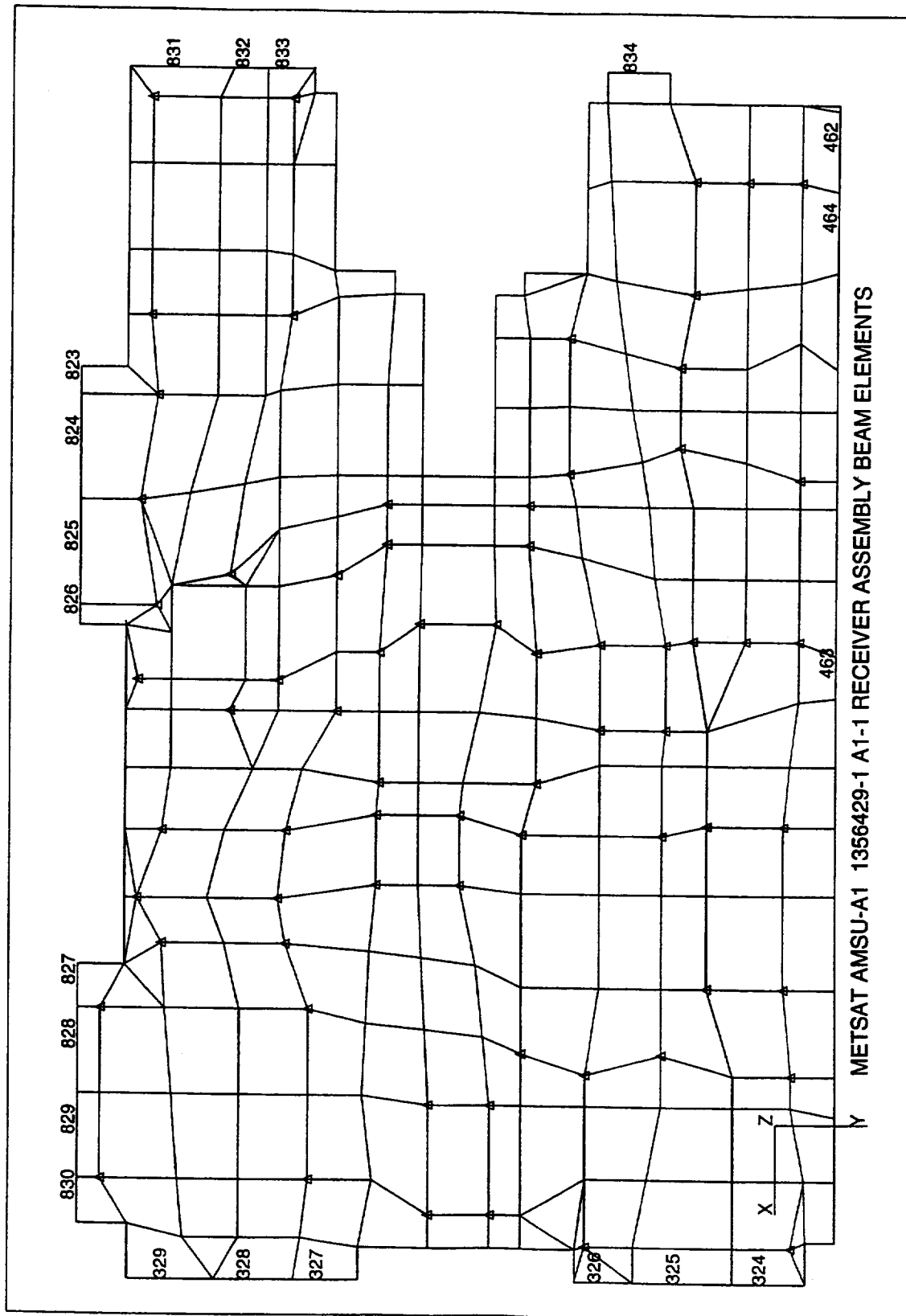
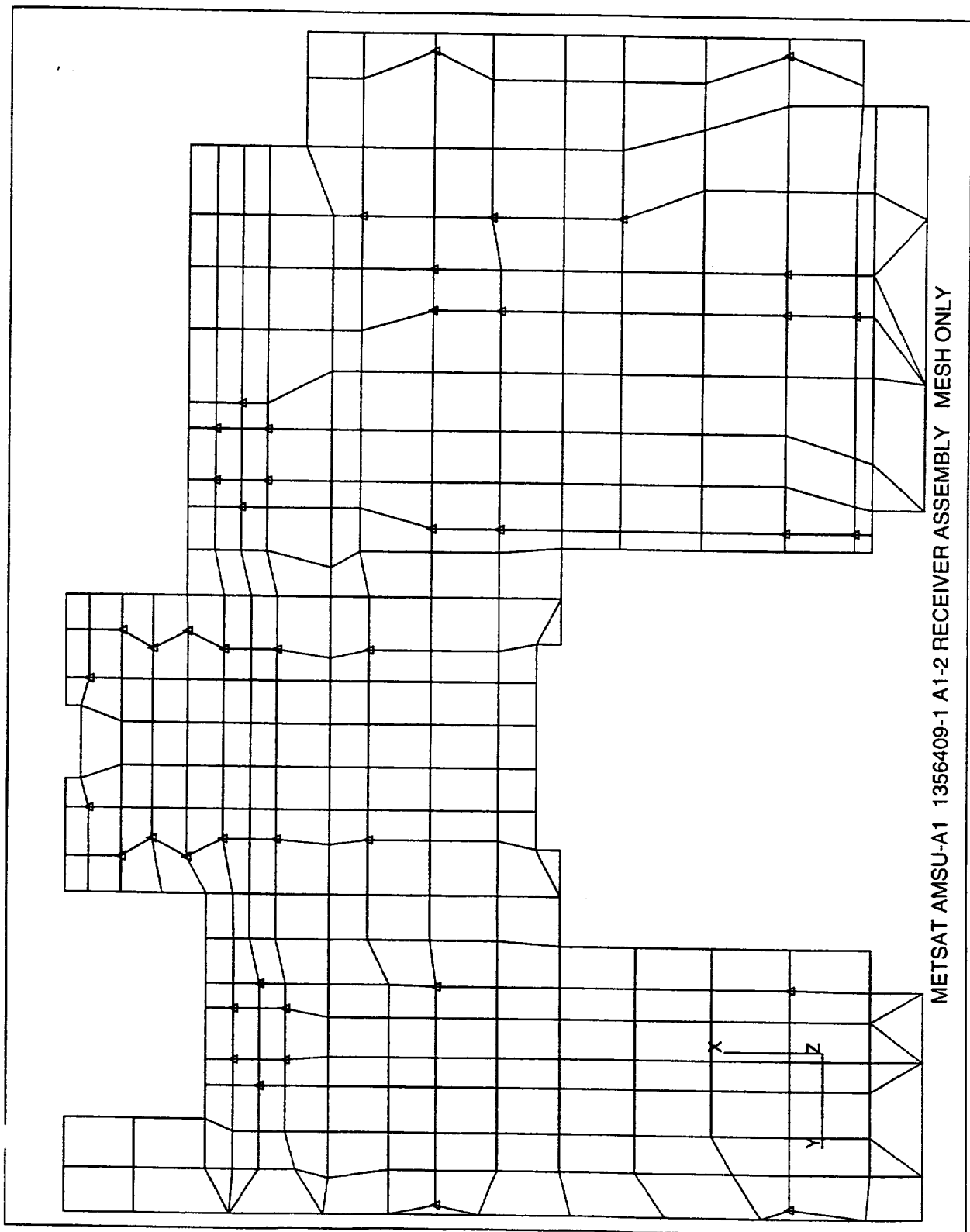


Figure A-42 METSAT AMSU-A1 1356429-1 A1-1 Receiver Assembly Beam Elements

A-47



**Figure A-44 METSAT AMSU-A1 1356409-1 A1-2 Receiver Assembly Mesh Only**

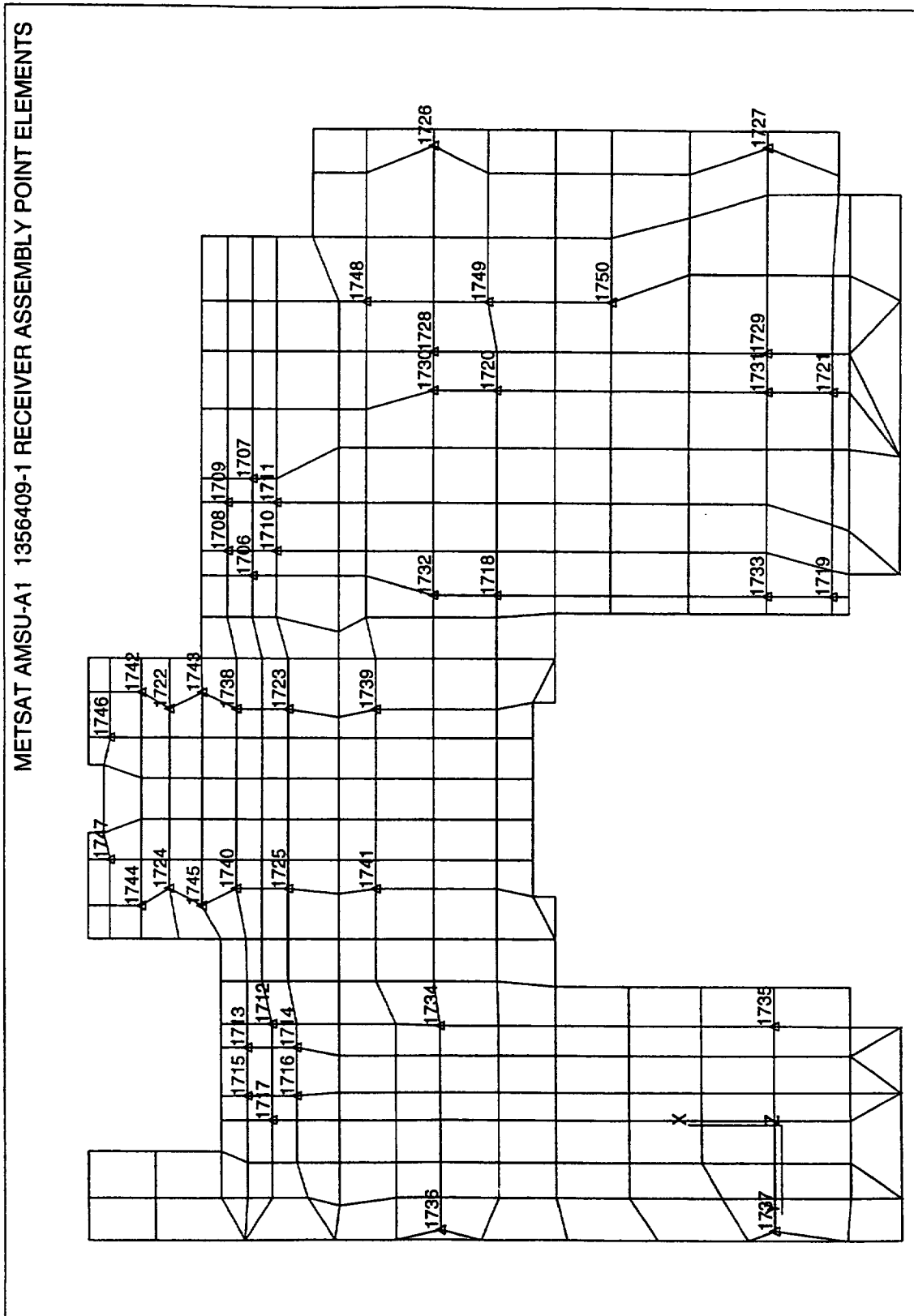
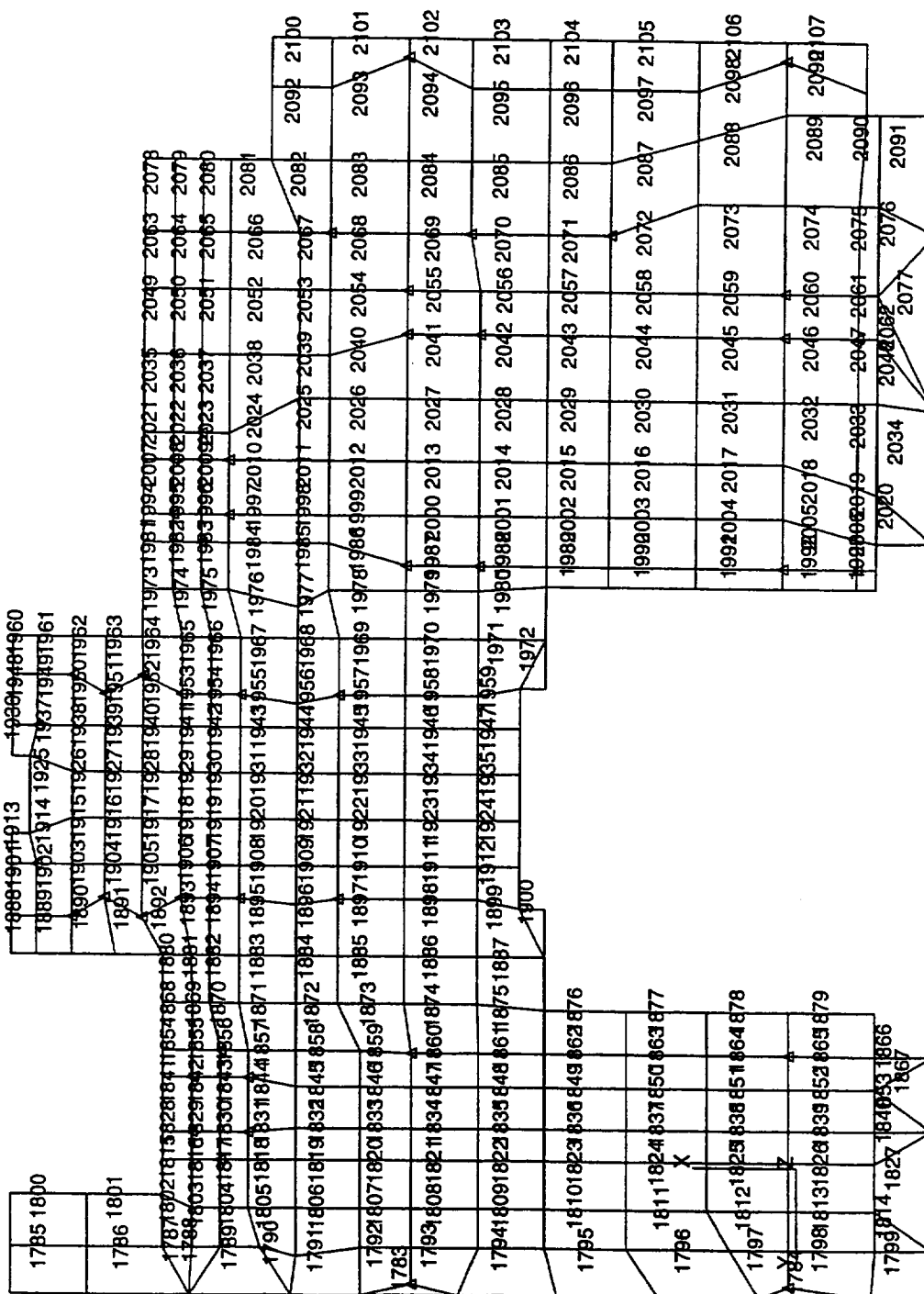


Figure A-45 METSAT AMSU-A1 1356409-1 Receiver Assembly Point Elements



**Figure A-46 METSAT AMSU-A1 1356409-1 Receiver Assembly Grid Points**



**Figure A-47 METSAT AMSU-A1 1356409-1 Receiver Assembly Shell Elements**

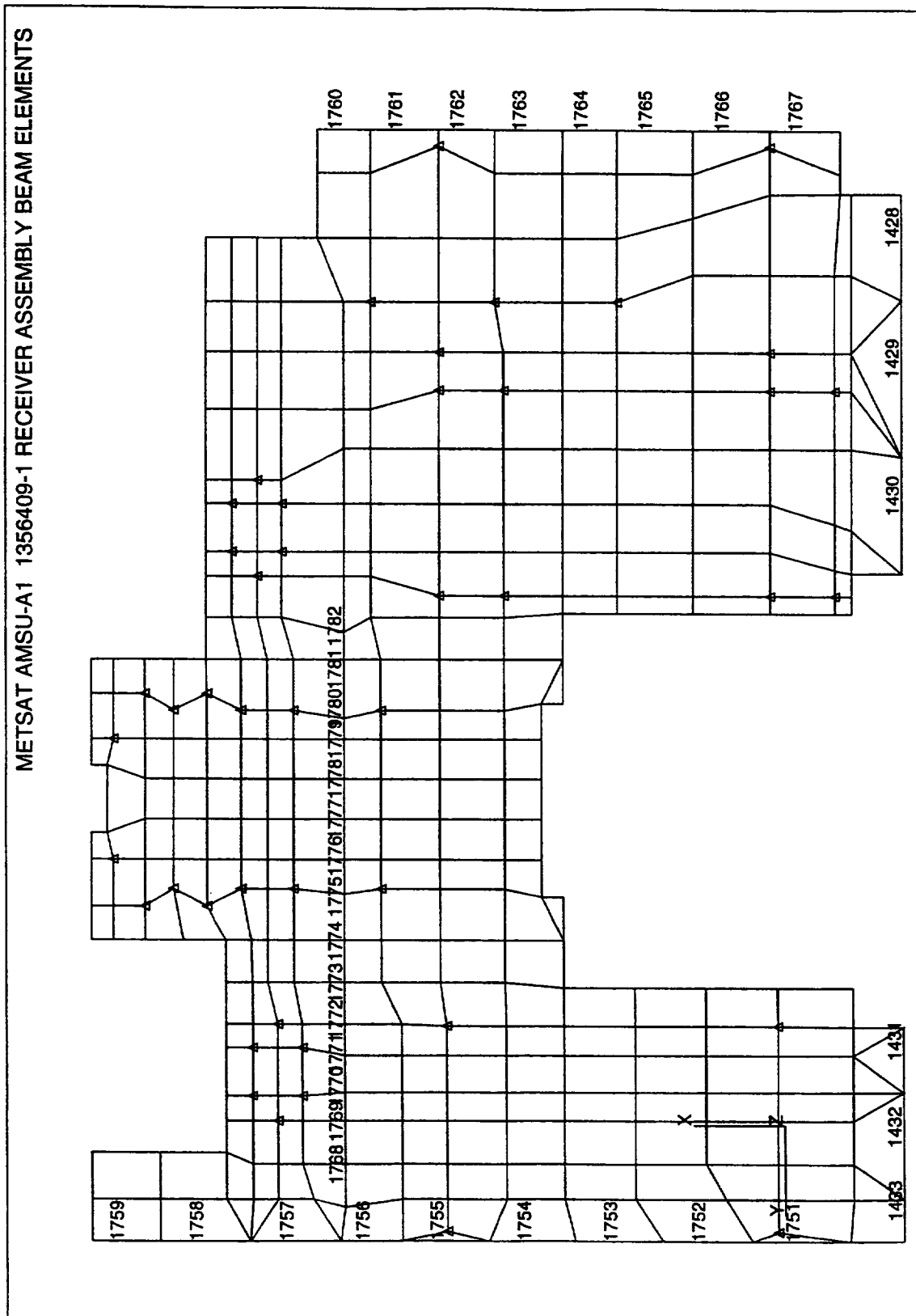


Figure A-48 METSAT AMSU-A1 1356409-1 Receiver Assembly Beam Elements

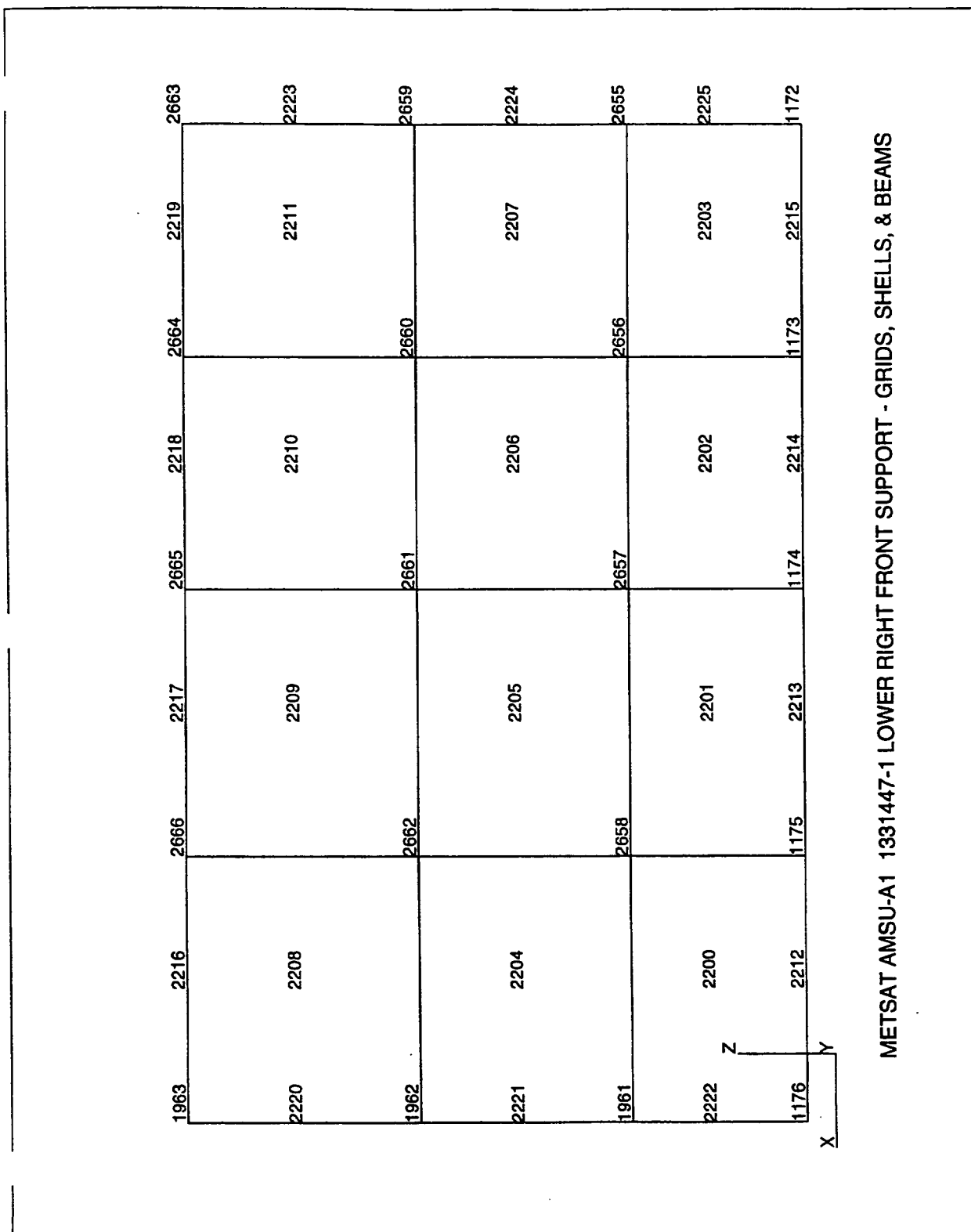


Figure A-49 METSAT AMSU-A1 1331447-1 Lower Right Front Support - Grids, Shells, & Beams

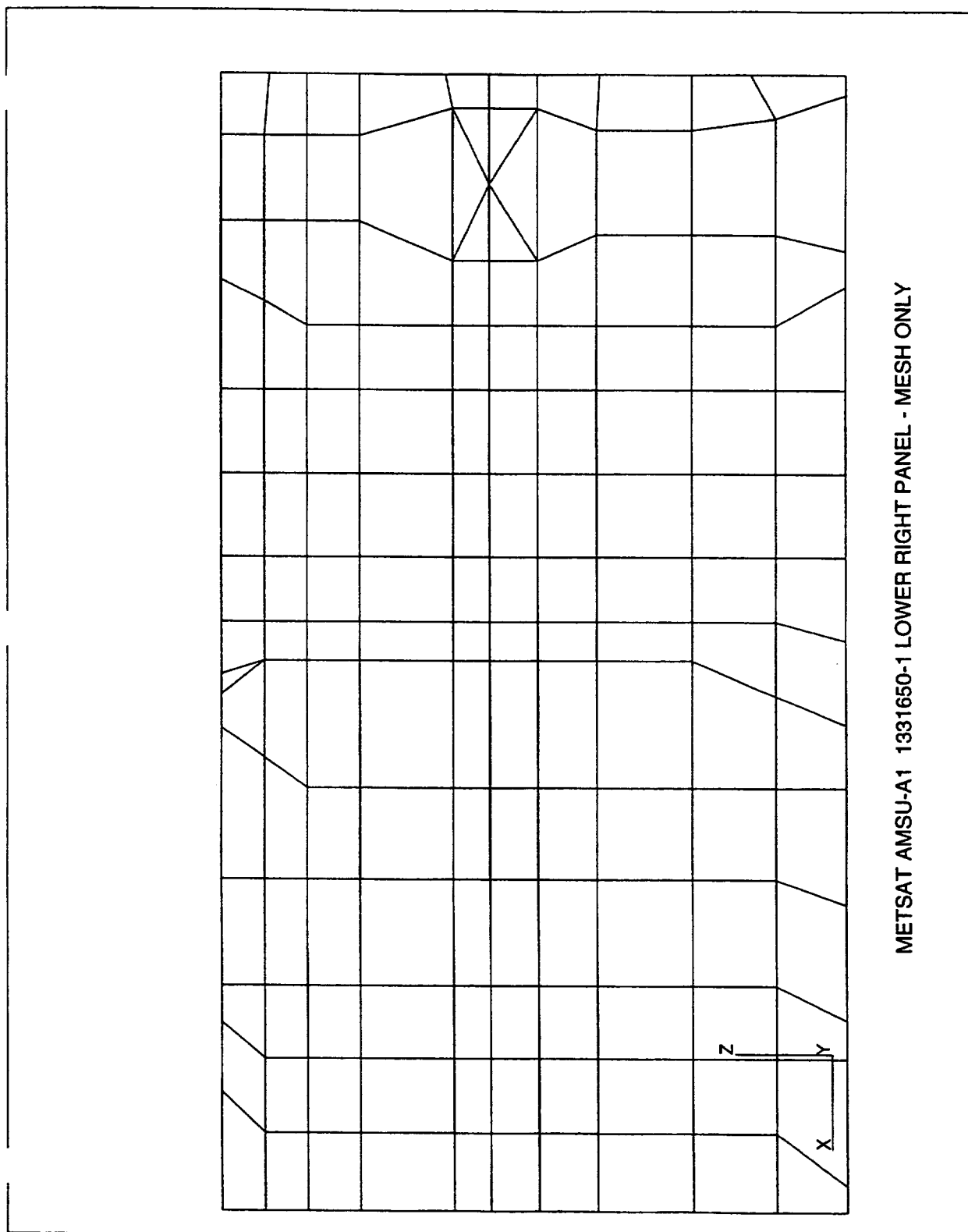
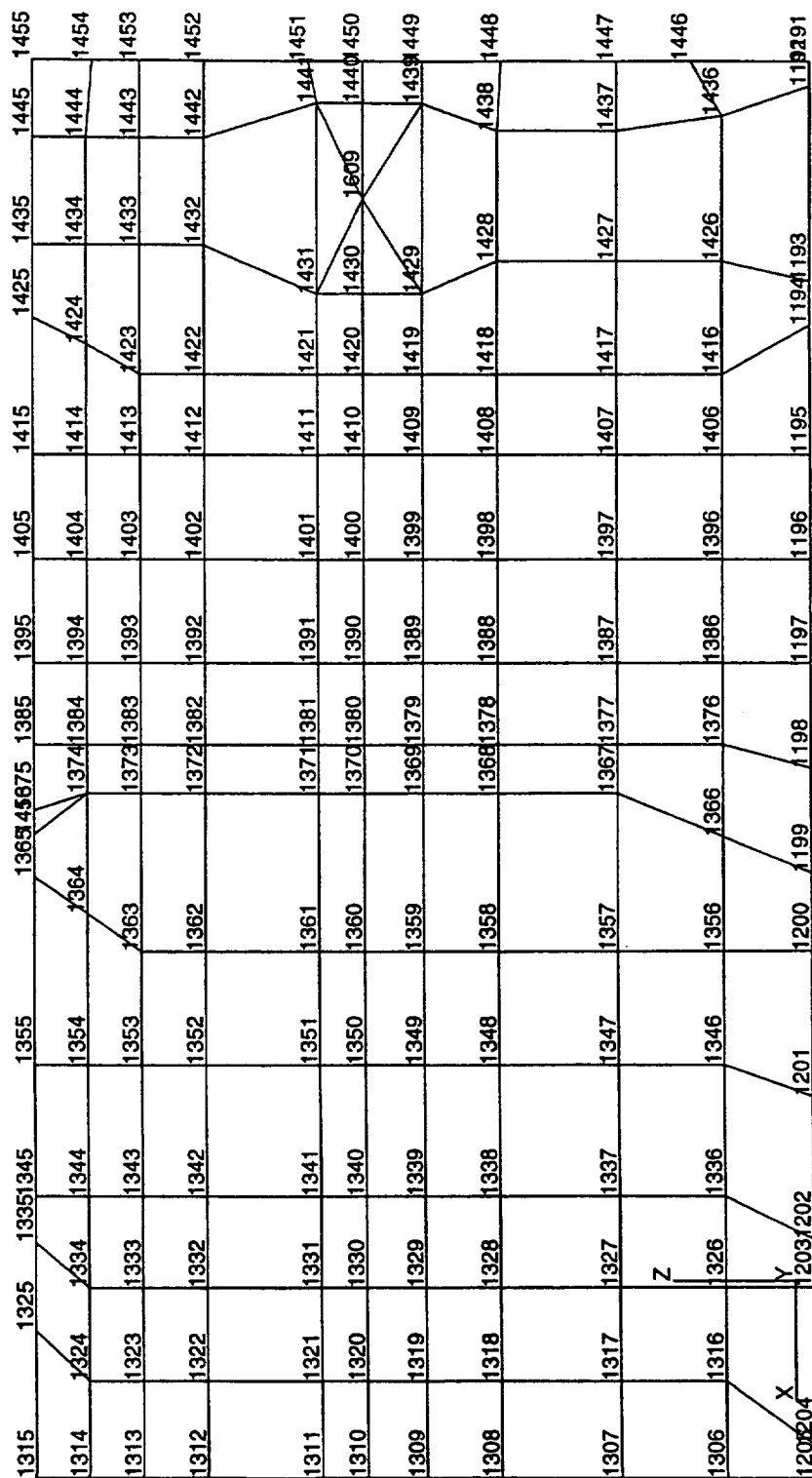
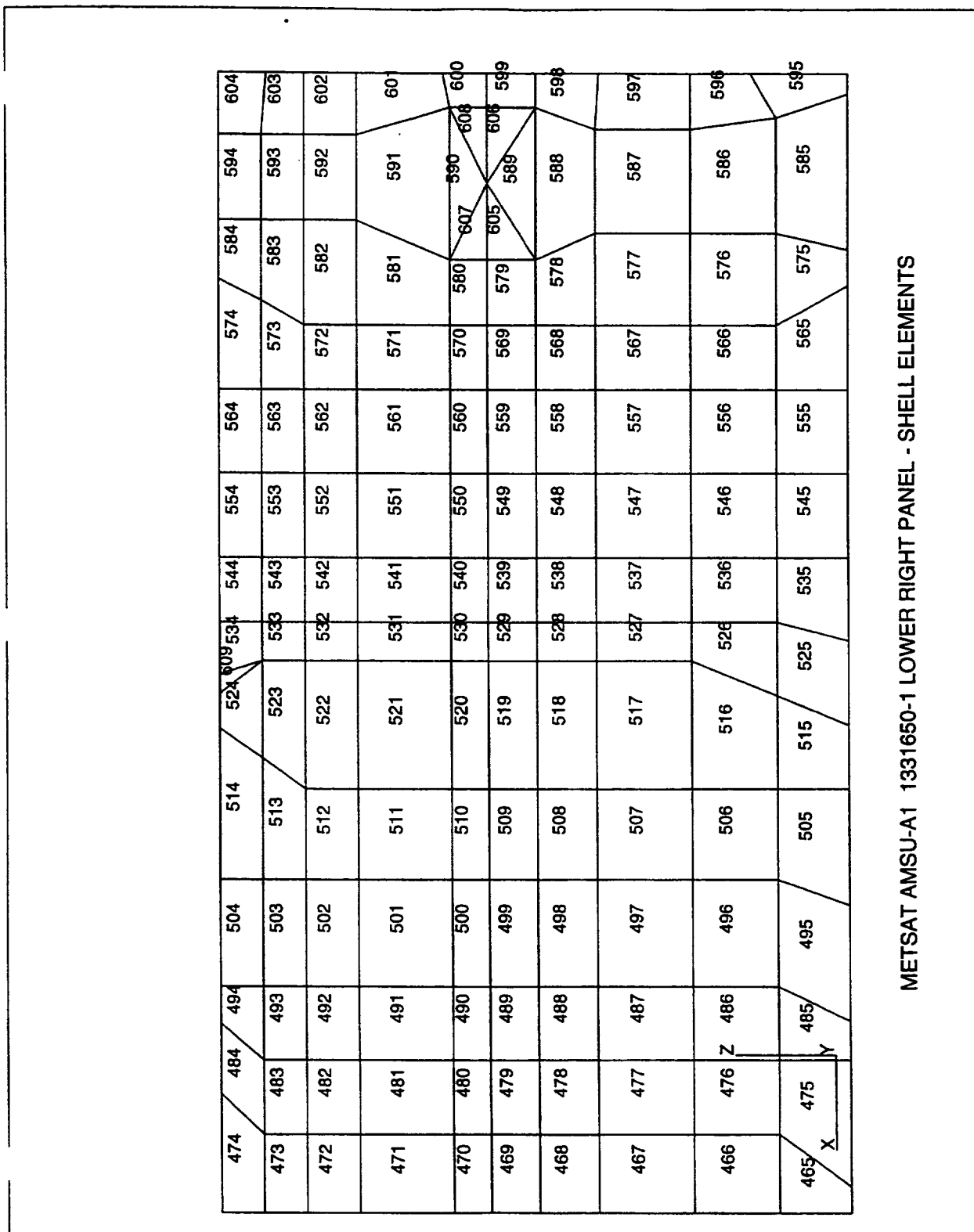


Figure A-50 METSAT AMSU-A1 1331650-1 Lower Right Panel Mesh only



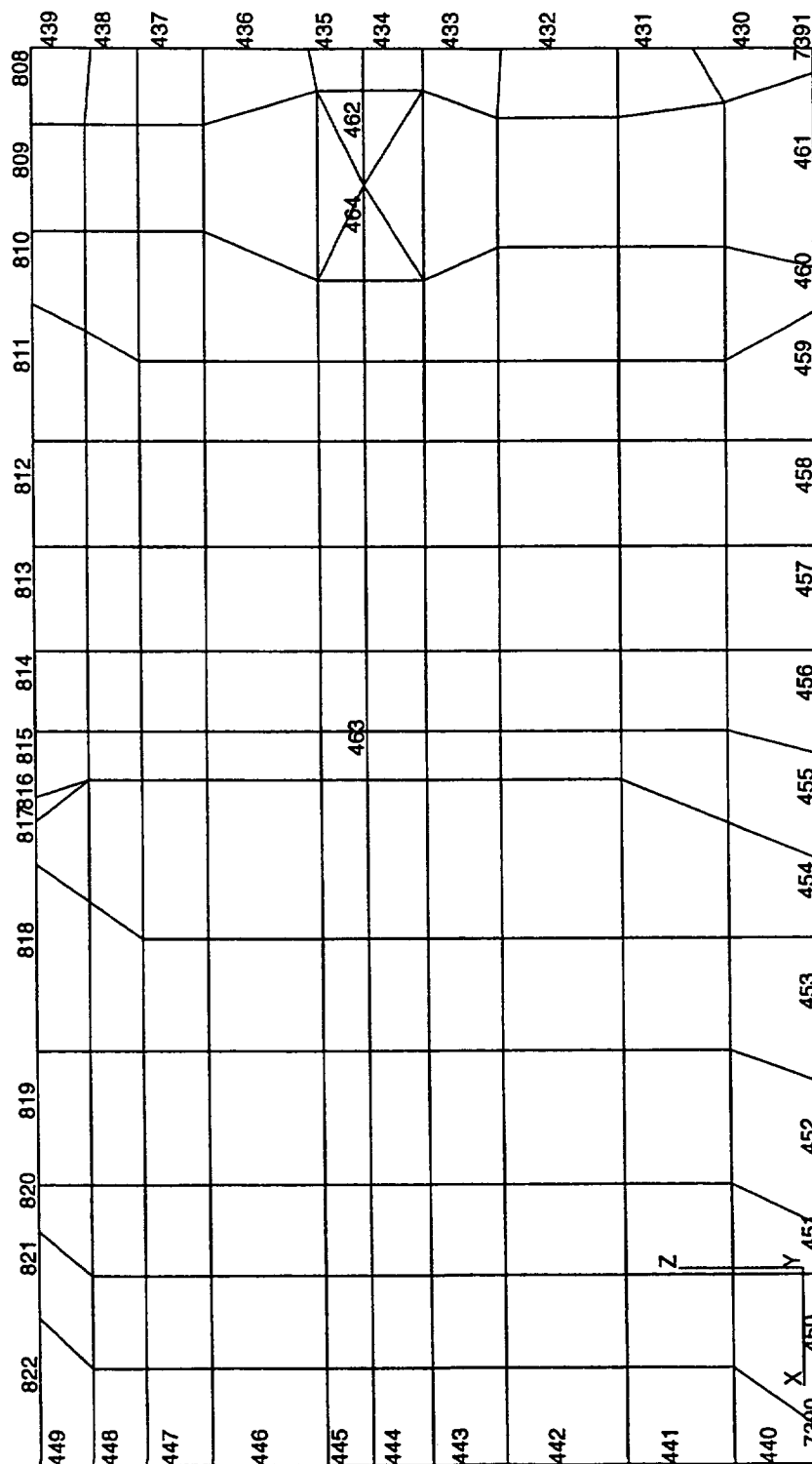
METSAT AMSU-A1 1331650-1 LOWER RIGHT PANEL - GRIDS POINTS

Figure A-51 METSAT AMSU-A1 1331650-1 Lower Right Panel - Grid Points



METSAT AMSU-A1 1331650-1 LOWER RIGHT PANEL - SHELL ELEMENTS

Figure A-52 METSAT AMSU-A1 1331650-1 Lower Right Panel - Shell Elements



METSAT AMSU-A1 1331650-1 LOWER RIGHT PANEL - BEAM ELEMENTS

Figure A-53 METSAT AMSU-A1 133650-1 Lower Right Panel - Beam Elements

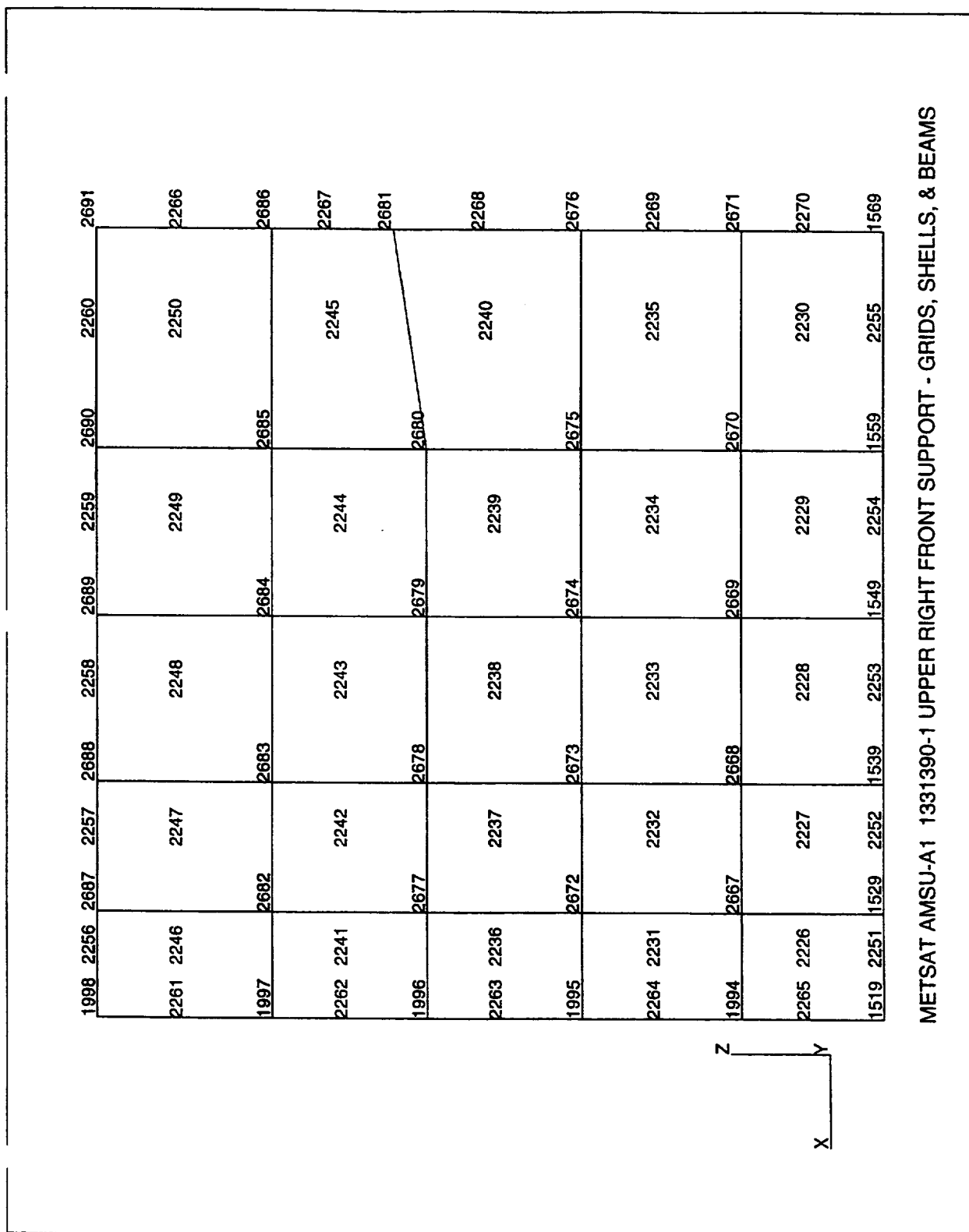


Figure A-54 METSAT AMSU-A1 1331390-1 Upper Right Front Support - Grids, Shells, & Beams

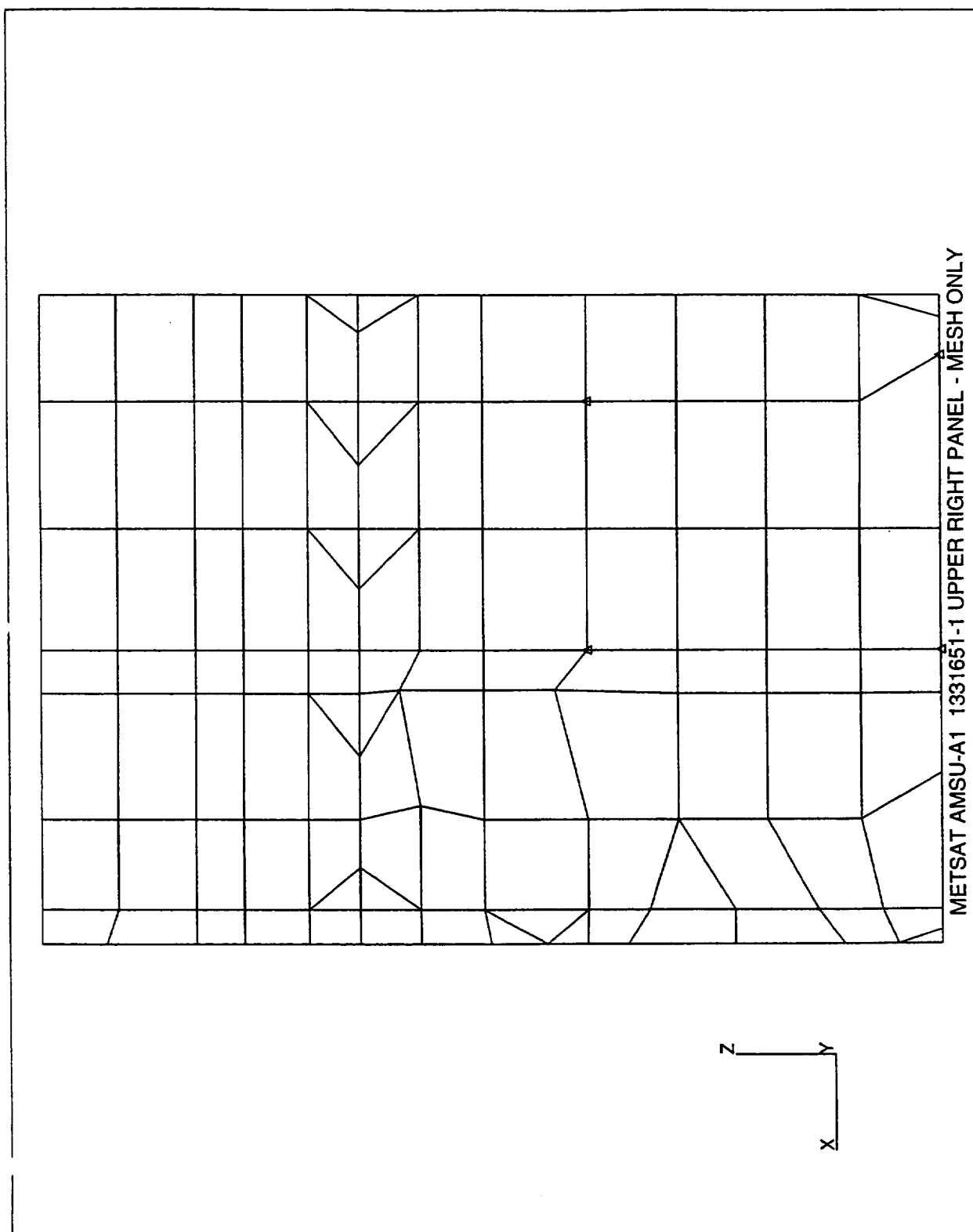


Figure A-55 METSAT AMSU-A1 1331651-1 Upper Right Panel Mesh Only

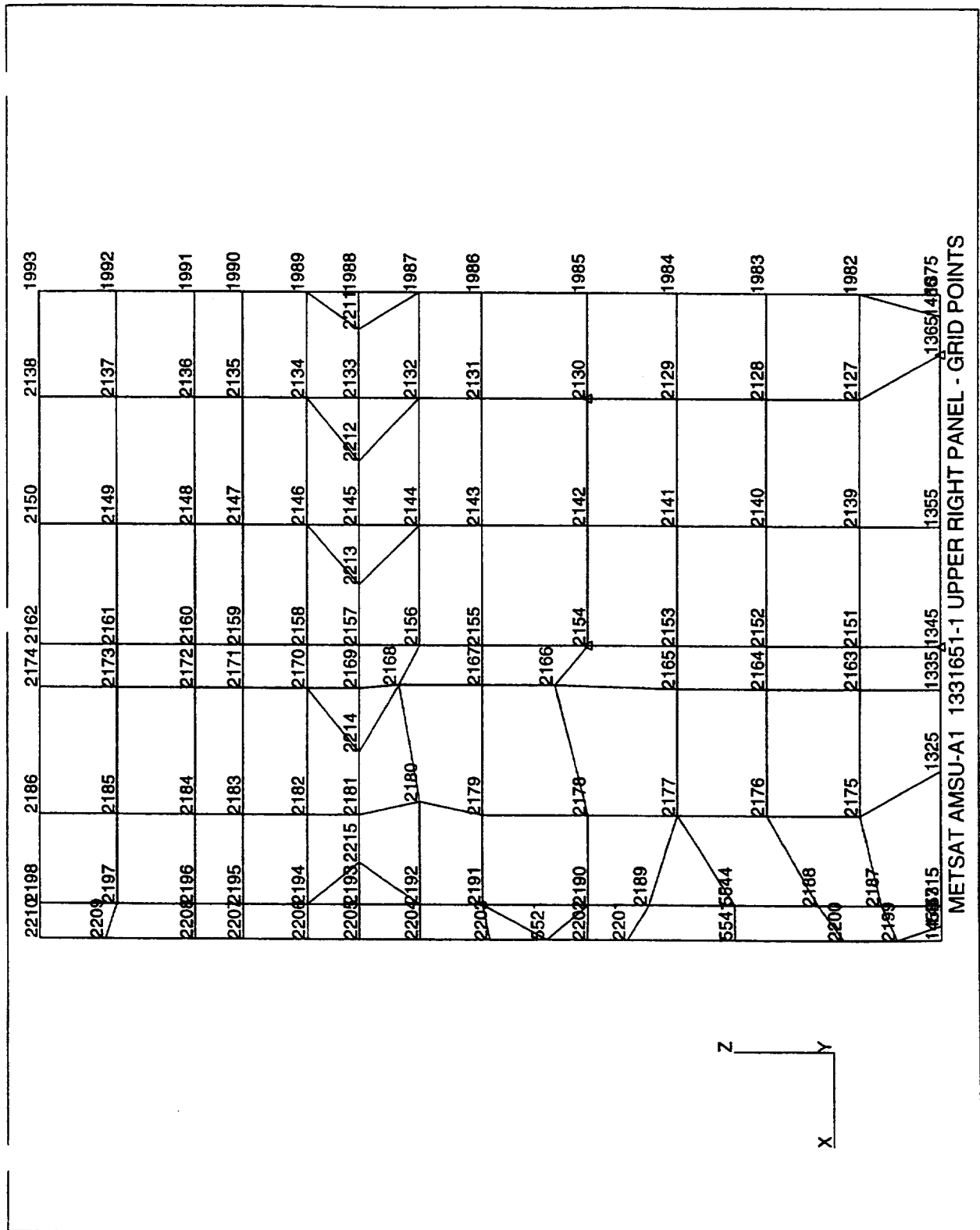


Figure A-56 METSAT AMSU-A1 1331651-1 Upper Right Panel Grid Points

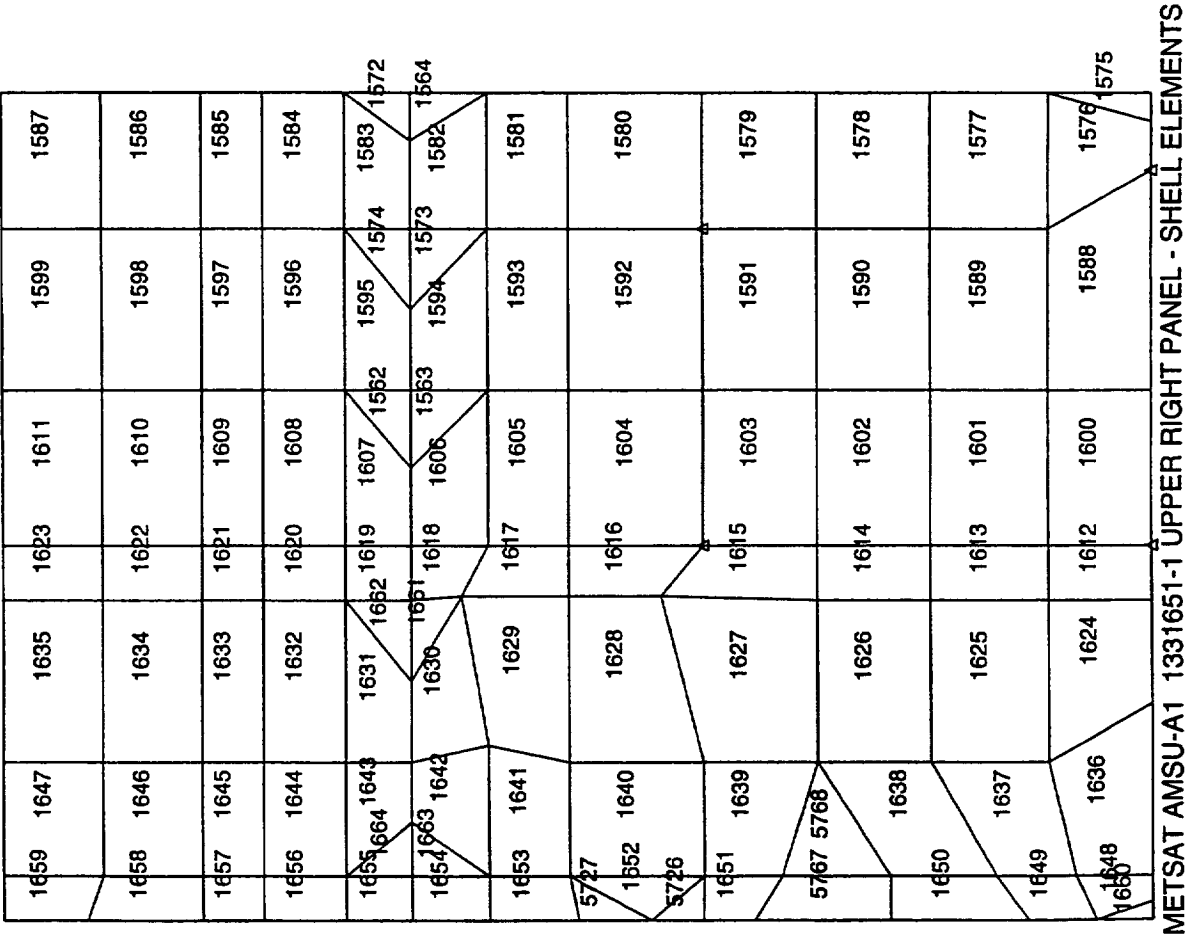


Figure A-57 METSAT AMSU-A1 1331651-1 Upper Right Panel Shell Elements

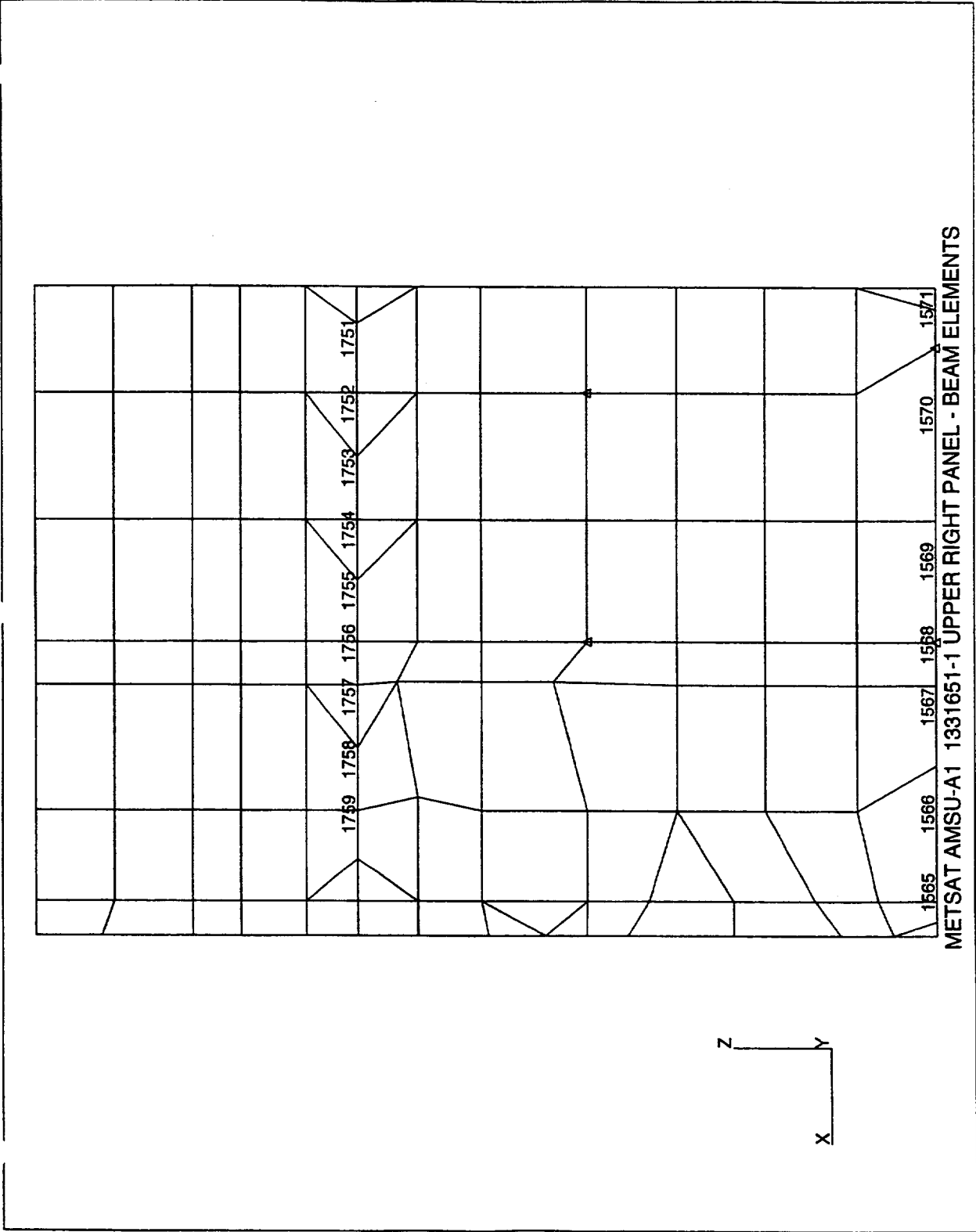


Figure A-58 METSAT AMSU-A1 1331651-1 Upper Right Panel Beam Elements

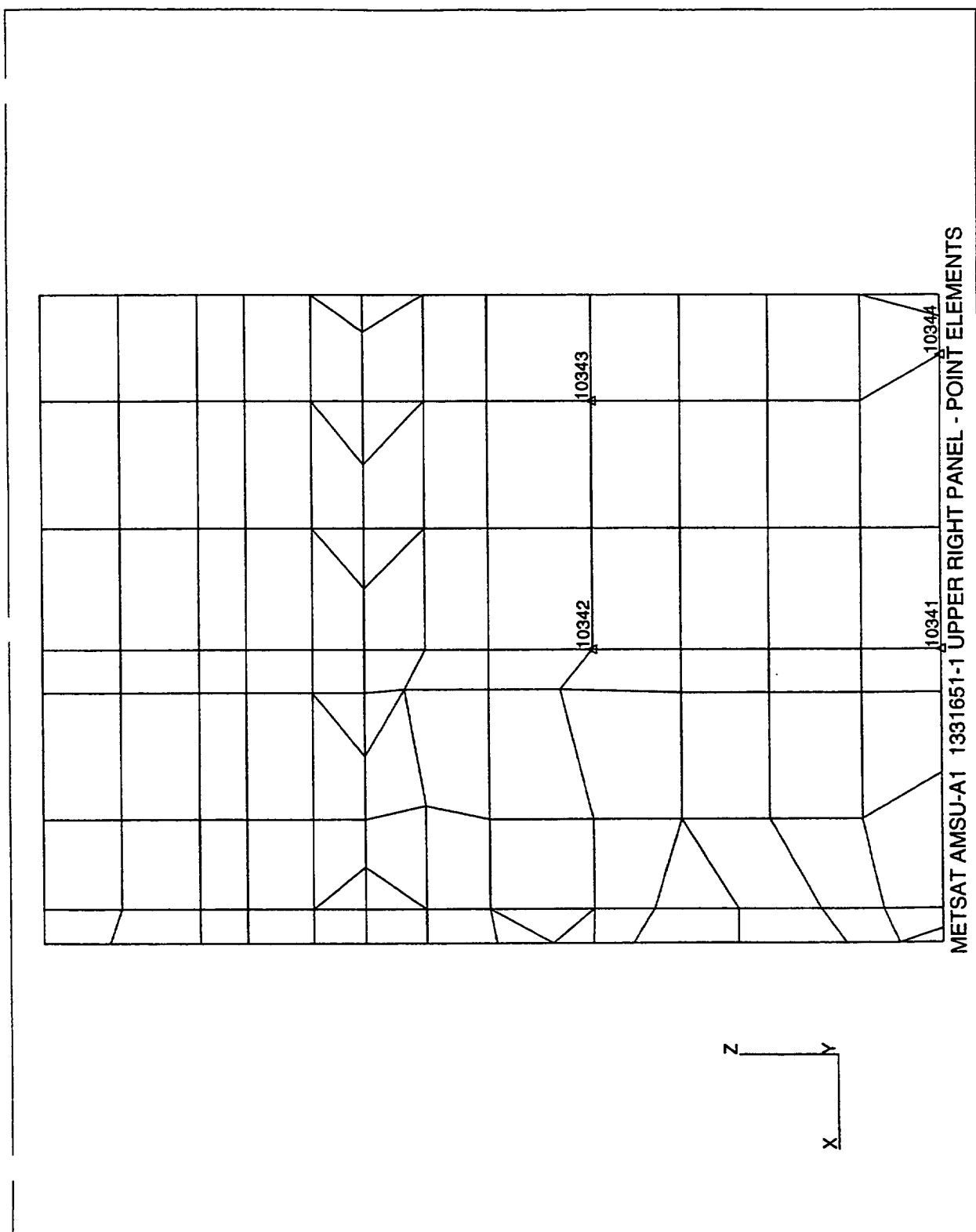


Figure A-59 METSAT AMSU-A1 1331651-1 Upper Right Panel Point Elements

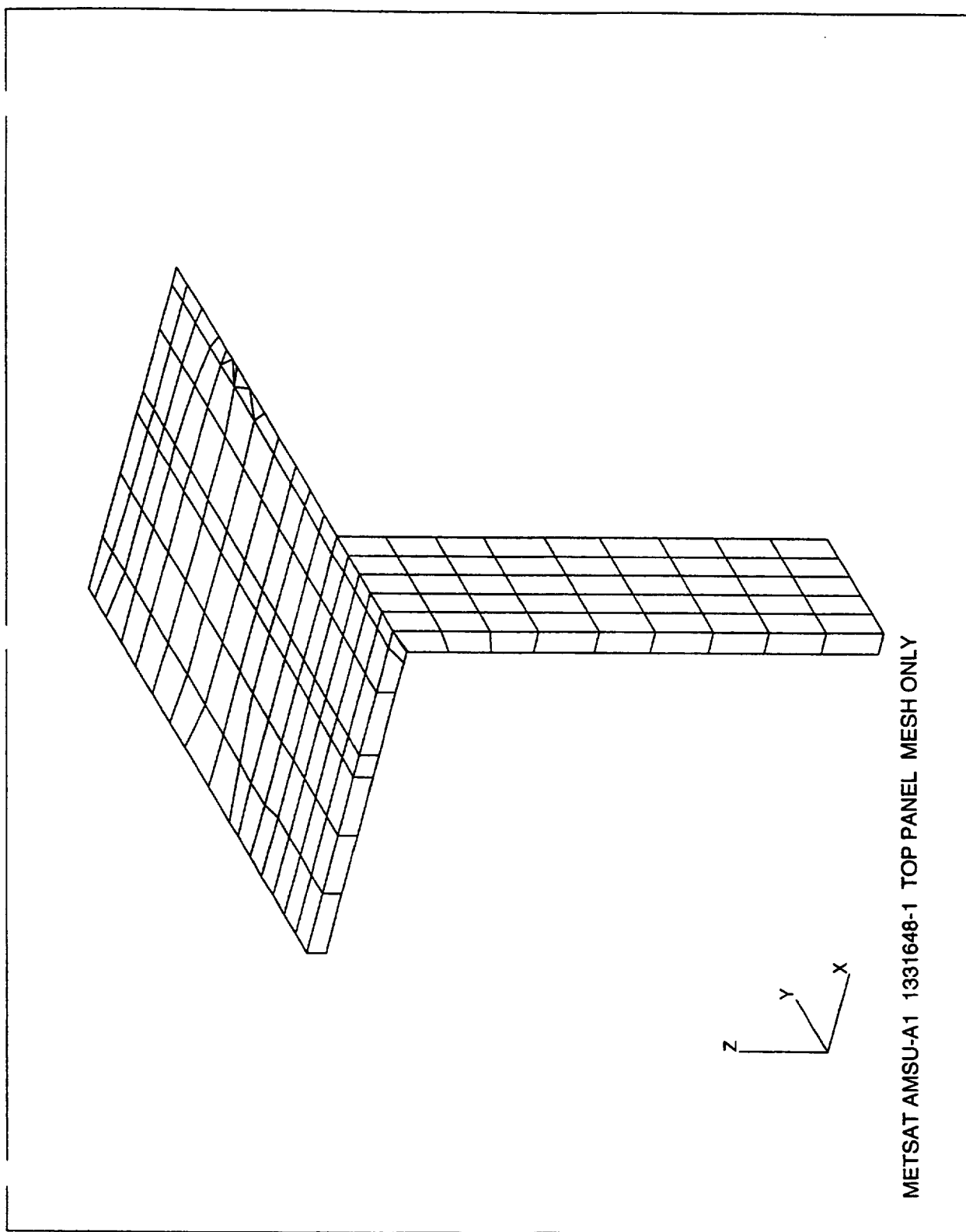
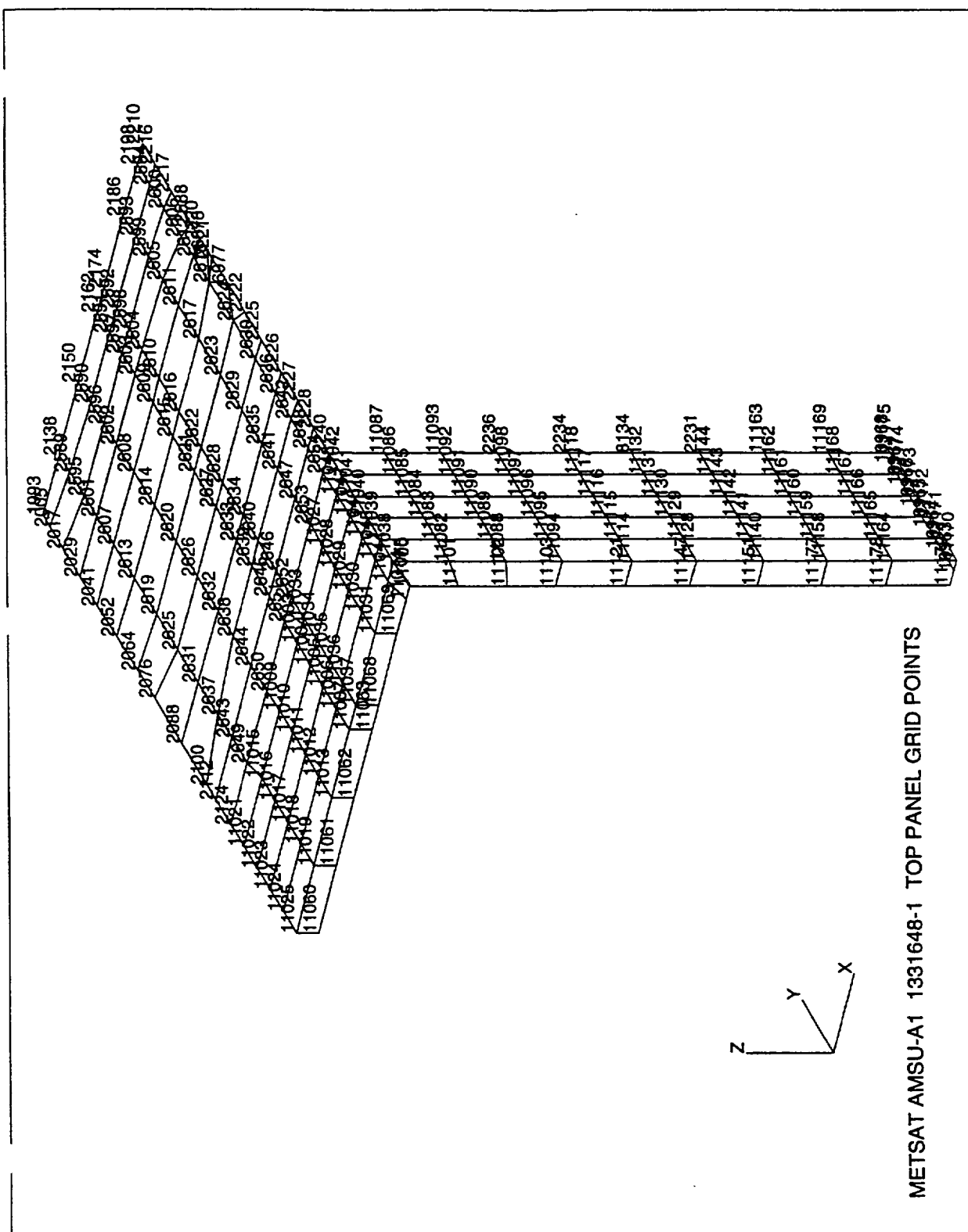


Figure A-60 METSAT AMSU-A1 1331648-1 Top Panel Mesh Only



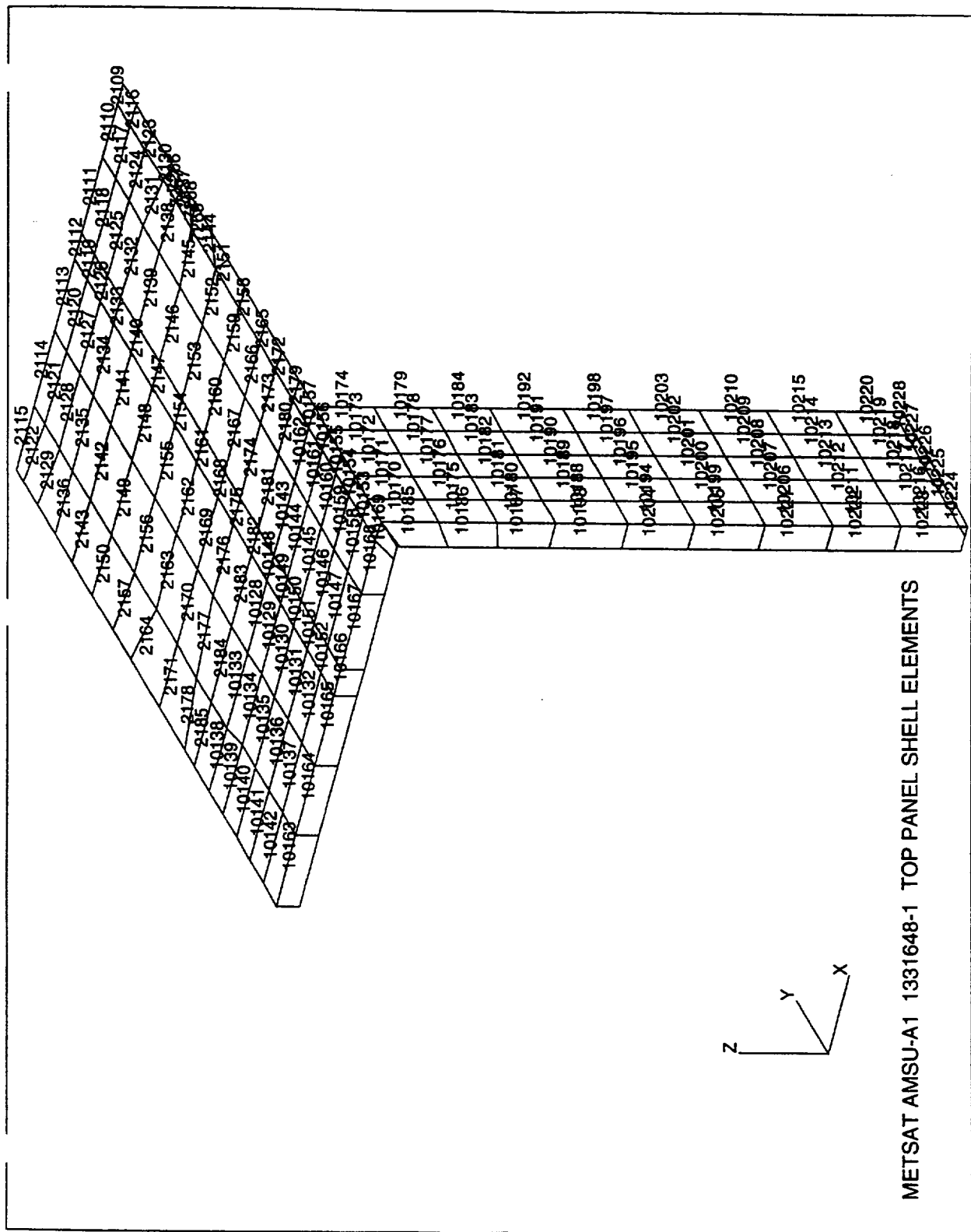
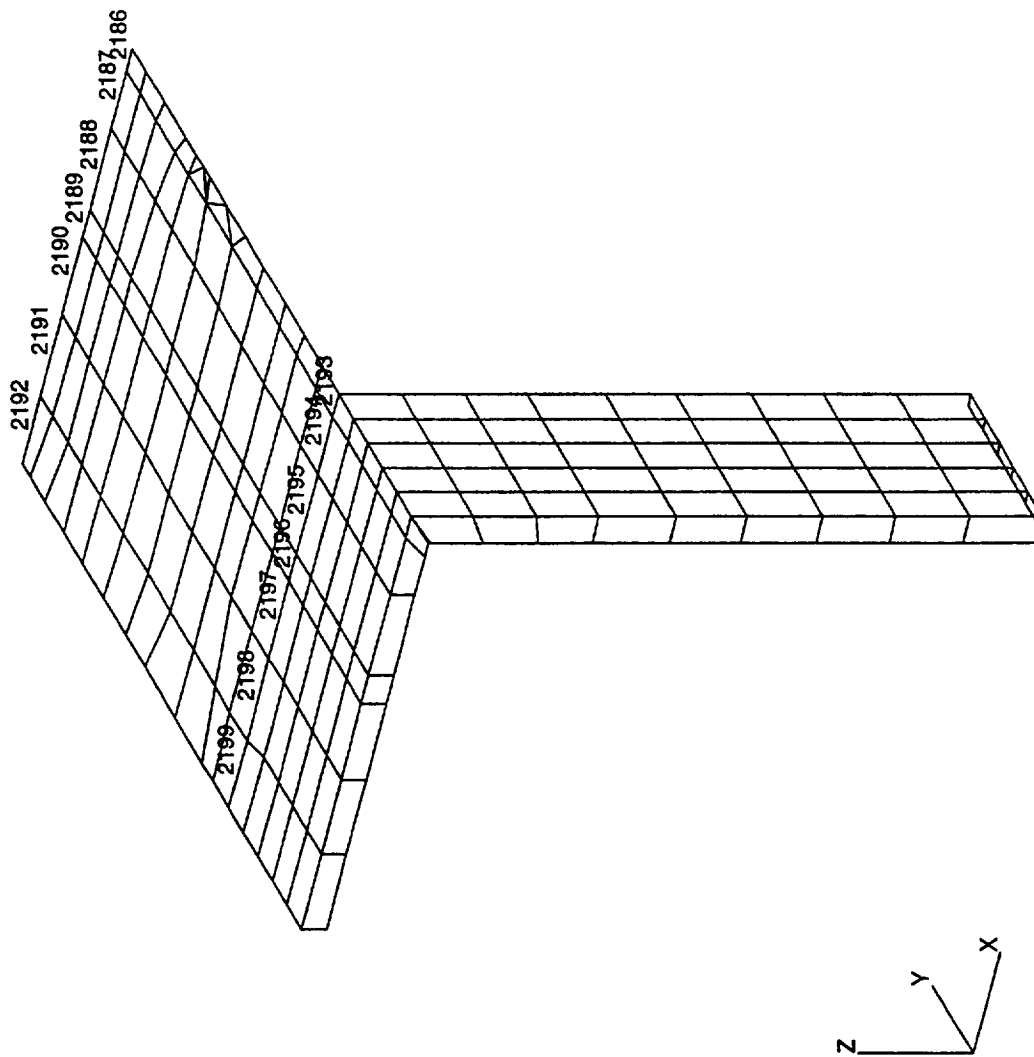


Figure A-62 METSAT AMSU-A1 1331648-1 Top Panel Shell Elements



METSAT AMSU-A1 1331648-1 TOP PANEL BEAM ELEMENTS

Figure A-63 METSAT AMSU-A1 1331648-1 Top Panel Beam Elements

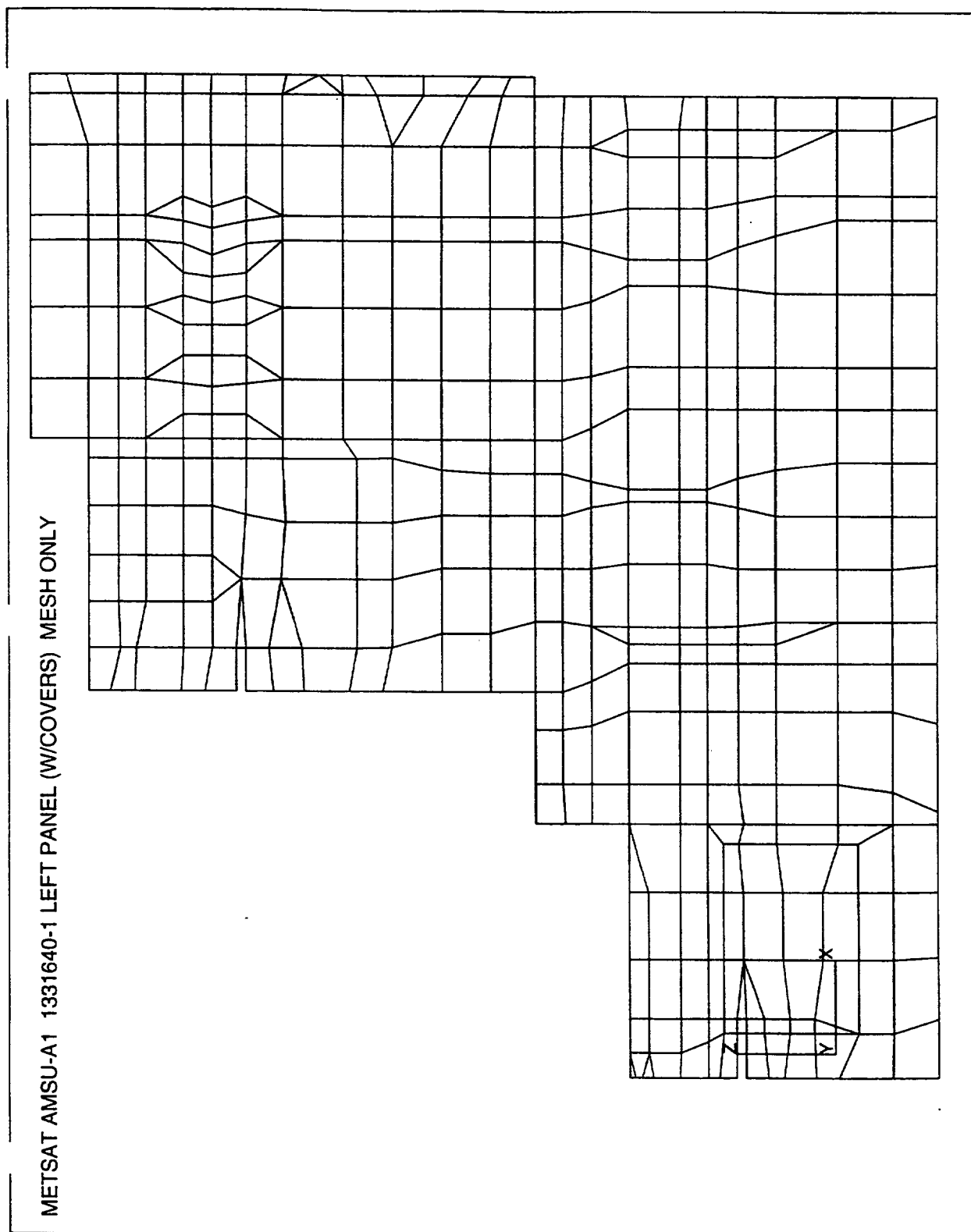


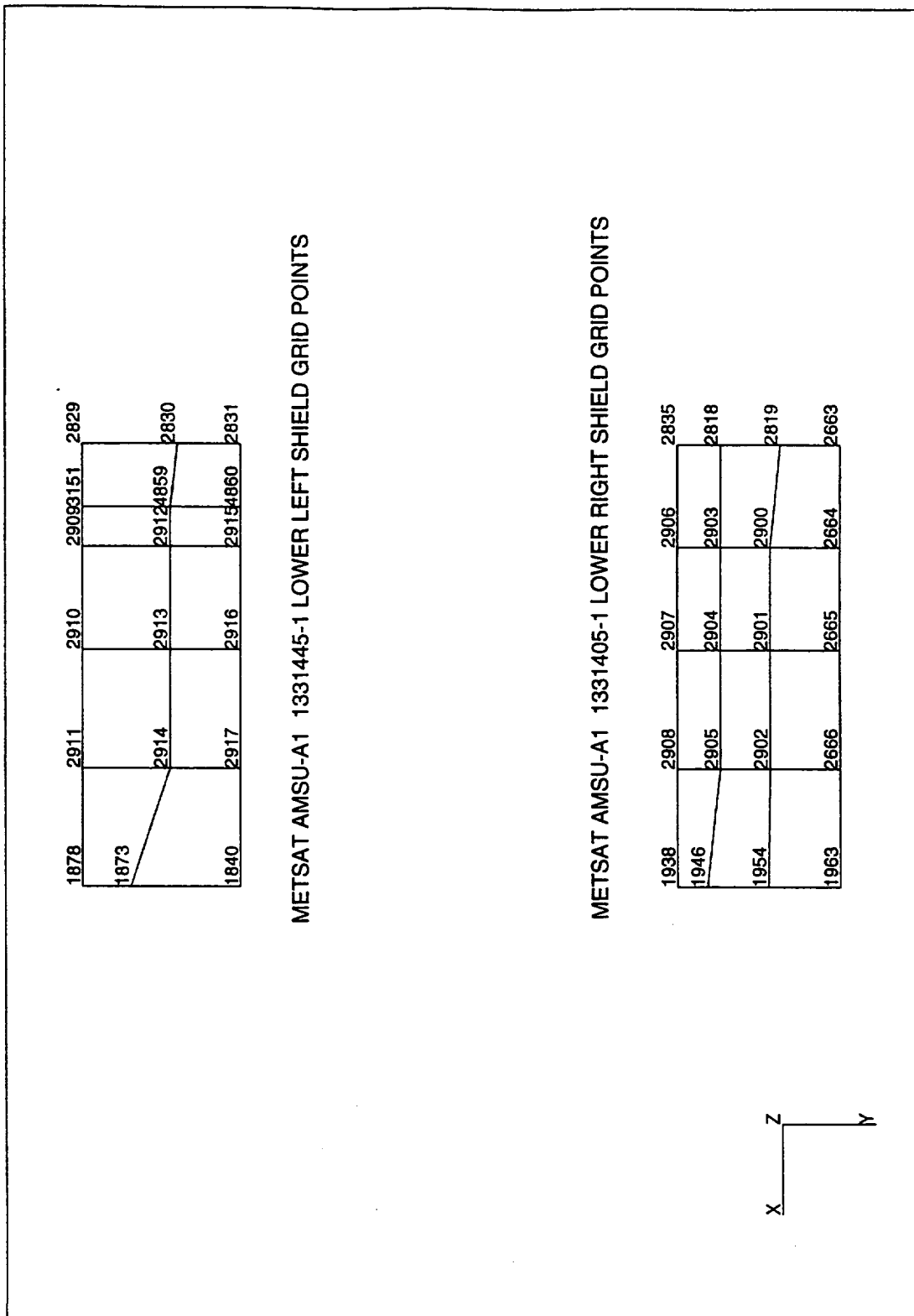
Figure A-64 METSAT AMSU-A1 1331640-1 Left Panel (W/Covers) Mesh Only

METSAT AMSU-A1 1331640-1 LEFT PANEL (W/COVERS) GRID POINTS

**Figure A-65 METSAT AMSU-A1 1331640-1 Left Panel (W/Covers) Grid Points**

| METSAT AMSU-A1 1331640-1 LEFT PANEL (W/COVERS) SHELL ELEMENTS |      |      |      |      |      |      |      |      |      |      |      |
|---------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| 3129                                                          | 3181 | 3132 | 3133 | 3134 | 3135 | 3136 | 3137 | 3138 | 3139 | 3140 | 3141 |
| 3142                                                          | 3143 | 3144 | 3145 | 3146 | 3147 | 3148 | 3149 | 3150 | 3151 | 3152 | 3153 |
| 3154                                                          | 3155 | 3156 | 3157 | 3158 | 3159 | 3160 | 3161 | 3162 | 3163 | 3164 | 3165 |
| 3166                                                          | 3167 | 3168 | 3169 | 3170 | 3171 | 3172 | 3173 | 3174 | 3175 | 3176 | 3177 |
| 3178                                                          | 3179 | 3180 | 3181 | 3182 | 3183 | 3184 | 3185 | 3186 | 3187 | 3188 | 3189 |
| 3190                                                          | 3191 | 3192 | 3193 | 3194 | 3195 | 3196 | 3197 | 3198 | 3199 | 3200 | 3201 |
| 3202                                                          | 3203 | 3204 | 3205 | 3206 | 3207 | 3208 | 3209 | 3210 | 3211 | 3212 | 3213 |
| 3214                                                          | 3215 | 3216 | 3217 | 3218 | 3219 | 3220 | 3221 | 3222 | 3223 | 3224 | 3225 |
| 3226                                                          | 3227 | 3228 | 3229 | 3230 | 3231 | 3232 | 3233 | 3234 | 3235 | 3236 | 3237 |
| 3238                                                          | 3239 | 3240 | 3241 | 3242 | 3243 | 3244 | 3245 | 3246 | 3247 | 3248 | 3249 |
| 3250                                                          | 3251 | 3252 | 3253 | 3254 | 3255 | 3256 | 3257 | 3258 | 3259 | 3260 | 3261 |
| 3262                                                          | 3263 | 3264 | 3265 | 3266 | 3267 | 3268 | 3269 | 3270 | 3271 | 3272 | 3273 |
| 3274                                                          | 3275 | 3276 | 3277 | 3278 | 3279 | 3280 | 3281 | 3282 | 3283 | 3284 | 3285 |
| 3286                                                          | 3287 | 3288 | 3289 | 3290 | 3291 | 3292 | 3293 | 3294 | 3295 | 3296 | 3297 |
| 3298                                                          | 3299 | 3300 | 3301 | 3302 | 3303 | 3304 | 3305 | 3306 | 3307 | 3308 | 3309 |
| 3310                                                          | 3311 | 3312 | 3313 | 3314 | 3315 | 3316 | 3317 | 3318 | 3319 | 3320 | 3321 |
| 3322                                                          | 3323 | 3324 | 3325 | 3326 | 3327 | 3328 | 3329 | 3330 | 3331 | 3332 | 3333 |
| 3334                                                          | 3335 | 3336 | 3337 | 3338 | 3339 | 3340 | 3341 | 3342 | 3343 | 3344 | 3345 |
| 3346                                                          | 3347 | 3348 | 3349 | 3350 | 3351 | 3352 | 3353 | 3354 | 3355 | 3356 | 3357 |
| 3358                                                          | 3359 | 3360 | 3361 | 3362 | 3363 | 3364 | 3365 | 3366 | 3367 | 3368 | 3369 |
| 3370                                                          | 3371 | 3372 | 3373 | 3374 | 3375 | 3376 | 3377 | 3378 | 3379 | 3380 | 3381 |
| 3382                                                          | 3383 | 3384 | 3385 | 3386 | 3387 | 3388 | 3389 | 3390 | 3391 | 3392 | 3393 |
| 3394                                                          | 3395 | 3396 | 3397 | 3398 | 3399 | 3400 | 3401 | 3402 | 3403 | 3404 | 3405 |
| 3406                                                          | 3407 | 3408 | 3409 | 3410 | 3411 | 3412 | 3413 | 3414 | 3415 | 3416 | 3417 |
| 3418                                                          | 3419 | 3420 | 3421 | 3422 | 3423 | 3424 | 3425 | 3426 | 3427 | 3428 | 3429 |
| 3430                                                          | 3431 | 3432 | 3433 | 3434 | 3435 | 3436 | 3437 | 3438 | 3439 | 3440 | 3441 |
| 3442                                                          | 3443 | 3444 | 3445 | 3446 | 3447 | 3448 | 3449 | 3450 | 3451 | 3452 | 3453 |
| 3454                                                          | 3455 | 3456 | 3457 | 3458 | 3459 | 3460 | 3461 | 3462 | 3463 | 3464 | 3465 |
| 3466                                                          | 3467 | 3468 | 3469 | 3470 | 3471 | 3472 | 3473 | 3474 | 3475 | 3476 | 3477 |
| 3478                                                          | 3479 | 3480 | 3481 | 3482 | 3483 | 3484 | 3485 | 3486 | 3487 | 3488 | 3489 |
| 3490                                                          | 3491 | 3492 | 3493 | 3494 | 3495 | 3496 | 3497 | 3498 | 3499 | 3500 | 3501 |
| 3502                                                          | 3503 | 3504 | 3505 | 3506 | 3507 | 3508 | 3509 | 3510 | 3511 | 3512 | 3513 |
| 3514                                                          | 3515 | 3516 | 3517 | 3518 | 3519 | 3520 | 3521 | 3522 | 3523 | 3524 | 3525 |
| 3526                                                          | 3527 | 3528 | 3529 | 3530 | 3531 | 3532 | 3533 | 3534 | 3535 | 3536 | 3537 |
| 3538                                                          | 3539 | 3540 | 3541 | 3542 | 3543 | 3544 | 3545 | 3546 | 3547 | 3548 | 3549 |
| 3550                                                          | 3551 | 3552 | 3553 | 3554 | 3555 | 3556 | 3557 | 3558 | 3559 | 3560 | 3561 |
| 3562                                                          | 3563 | 3564 | 3565 | 3566 | 3567 | 3568 | 3569 | 3570 | 3571 | 3572 | 3573 |
| 3574                                                          | 3575 | 3576 | 3577 | 3578 | 3579 | 3580 | 3581 | 3582 | 3583 | 3584 | 3585 |
| 3586                                                          | 3587 | 3588 | 3589 | 3590 | 3591 | 3592 | 3593 | 3594 | 3595 | 3596 | 3597 |
| 3598                                                          | 3599 | 3600 | 3601 | 3602 | 3603 | 3604 | 3605 | 3606 | 3607 | 3608 | 3609 |
| 3610                                                          | 3611 | 3612 | 3613 | 3614 | 3615 | 3616 | 3617 | 3618 | 3619 | 3620 | 3621 |
| 3622                                                          | 3623 | 3624 | 3625 | 3626 | 3627 | 3628 | 3629 | 3630 | 3631 | 3632 | 3633 |
| 3634                                                          | 3635 | 3636 | 3637 | 3638 | 3639 | 3640 | 3641 | 3642 | 3643 | 3644 | 3645 |
| 3646                                                          | 3647 | 3648 | 3649 | 3650 | 3651 | 3652 | 3653 | 3654 | 3655 | 3656 | 3657 |
| 3658                                                          | 3659 | 3660 | 3661 | 3662 | 3663 | 3664 | 3665 | 3666 | 3667 | 3668 | 3669 |
| 3670                                                          | 3671 | 3672 | 3673 | 3674 | 3675 | 3676 | 3677 | 3678 | 3679 | 3680 | 3681 |
| 3682                                                          | 3683 | 3684 | 3685 | 3686 | 3687 | 3688 | 3689 | 3690 | 3691 | 3692 | 3693 |
| 3694                                                          | 3695 | 3696 | 3697 | 3698 | 3699 | 3700 | 3701 | 3702 | 3703 | 3704 | 3705 |
| 3706                                                          | 3707 | 3708 | 3709 | 3710 | 3711 | 3712 | 3713 | 3714 | 3715 | 3716 | 3717 |
| 3718                                                          | 3719 | 3720 | 3721 | 3722 | 3723 | 3724 | 3725 | 3726 | 3727 | 3728 | 3729 |
| 3730                                                          | 3731 | 3732 | 3733 | 3734 | 3735 | 3736 | 3737 | 3738 | 3739 | 3740 | 3741 |
| 3742                                                          | 3743 | 3744 | 3745 | 3746 | 3747 | 3748 | 3749 | 3750 | 3751 | 3752 | 3753 |
| 3754                                                          | 3755 | 3756 | 3757 | 3758 | 3759 | 3760 | 3761 | 3762 | 3763 | 3764 | 3765 |
| 3766                                                          | 3767 | 3768 | 3769 | 3770 | 3771 | 3772 | 3773 | 3774 | 3775 | 3776 | 3777 |
| 3778                                                          | 3779 | 3780 | 3781 | 3782 | 3783 | 3784 | 3785 | 3786 | 3787 | 3788 | 3789 |
| 3790                                                          | 3791 | 3792 | 3793 | 3794 | 3795 | 3796 | 3797 | 3798 | 3799 | 3800 | 3801 |
| 3802                                                          | 3803 | 3804 | 3805 | 3806 | 3807 | 3808 | 3809 | 3810 | 3811 | 3812 | 3813 |
| 3814                                                          | 3815 | 3816 | 3817 | 3818 | 3819 | 3820 | 3821 | 3822 | 3823 | 3824 | 3825 |
| 3826                                                          | 3827 | 3828 | 3829 | 3830 | 3831 | 3832 | 3833 | 3834 | 3835 | 3836 | 3837 |
| 3838                                                          | 3839 | 3840 | 3841 | 3842 | 3843 | 3844 | 3845 | 3846 | 3847 | 3848 | 3849 |
| 3850                                                          | 3851 | 3852 | 3853 | 3854 | 3855 | 3856 | 3857 | 3858 | 3859 | 3860 | 3861 |
| 3862                                                          | 3863 | 3864 | 3865 | 3866 | 3867 | 3868 | 3869 | 3870 | 3871 | 3872 | 3873 |
| 3874                                                          | 3875 | 3876 | 3877 | 3878 | 3879 | 3880 | 3881 | 3882 | 3883 | 3884 | 3885 |
| 3886                                                          | 3887 | 3888 | 3889 | 3890 | 3891 | 3892 | 3893 | 3894 | 3895 | 3896 | 3897 |
| 3898                                                          | 3899 | 3900 | 3901 | 3902 | 3903 | 3904 | 3905 | 3906 | 3907 | 3908 | 3909 |
| 3910                                                          | 3911 | 3912 | 3913 | 3914 | 3915 | 3916 | 3917 | 3918 | 3919 | 3920 | 3921 |
| 3922                                                          | 3923 | 3924 | 3925 | 3926 | 3927 | 3928 | 3929 | 3930 | 3931 | 3932 | 3933 |
| 3934                                                          | 3935 | 3936 | 3937 | 3938 | 3939 | 3940 | 3941 | 3942 | 3943 | 3944 | 3945 |
| 3946                                                          | 3947 | 3948 | 3949 | 3950 | 3951 | 3952 | 3953 | 3954 | 3955 | 3956 | 3957 |
| 3958                                                          | 3959 | 3960 | 3961 | 3962 | 3963 | 3964 | 3965 | 3966 | 3967 | 3968 | 3969 |
| 3970                                                          | 3971 | 3972 | 3973 | 3974 | 3975 | 3976 | 3977 | 3978 | 3979 | 3980 | 3981 |
| 3982                                                          | 3983 | 3984 | 3985 | 3986 | 3987 | 3988 | 3989 | 3990 | 3991 | 3992 | 3993 |
| 3994                                                          | 3995 | 3996 | 3997 | 3998 | 3999 | 4000 | 4001 | 4002 | 4003 | 4004 | 4005 |

Figure A-66 METSAT AMSU-A1 1331640-1 Left Panel (W/Covers) Shell Elements



**Figure A-67 METSAT AMSU-A1 1331445-1 Lower Left Shield Grid Points**

**Figure A-68 METSAT AMSU-A1 1331405-1 Lower Right Shield Grid Points**

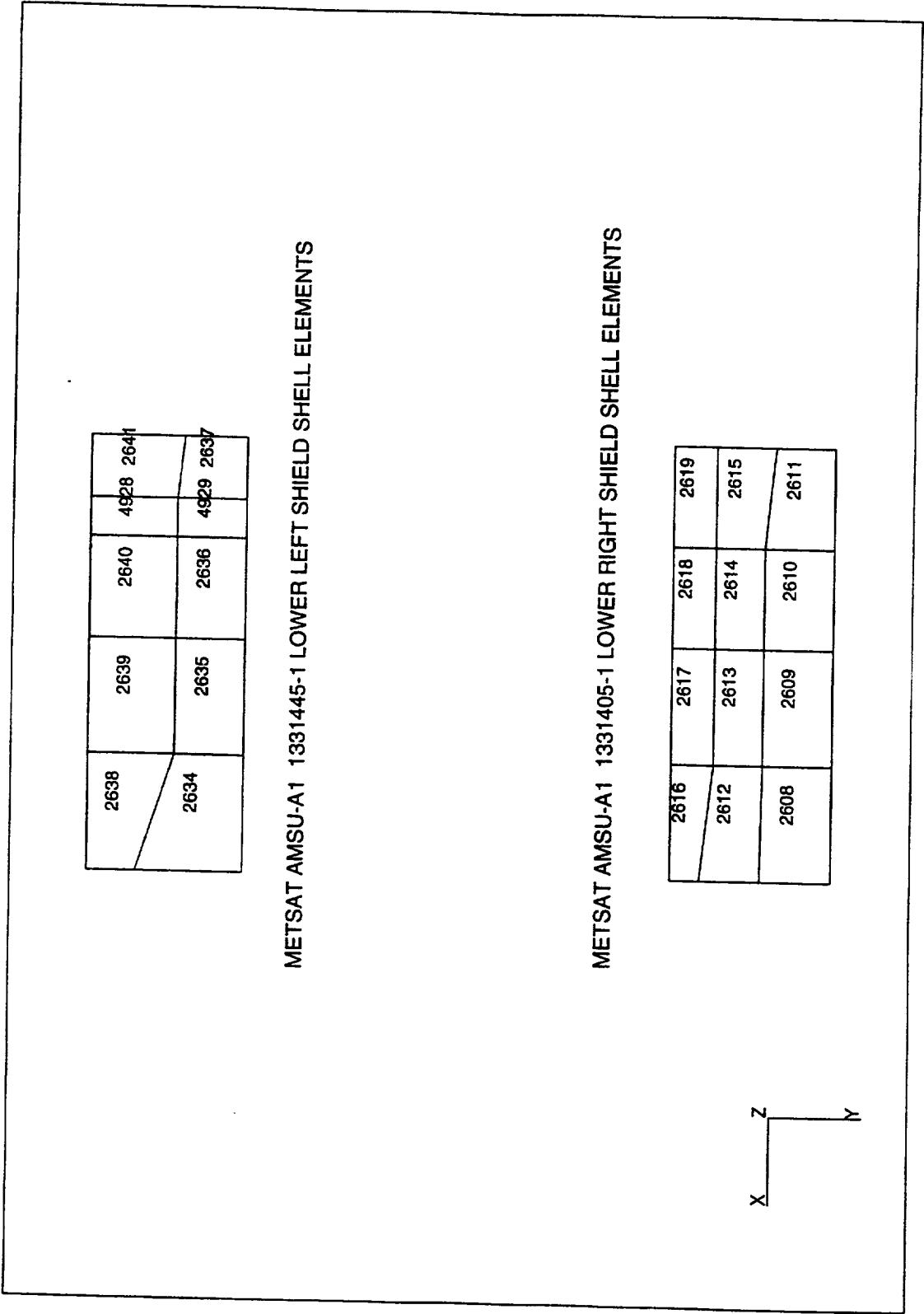
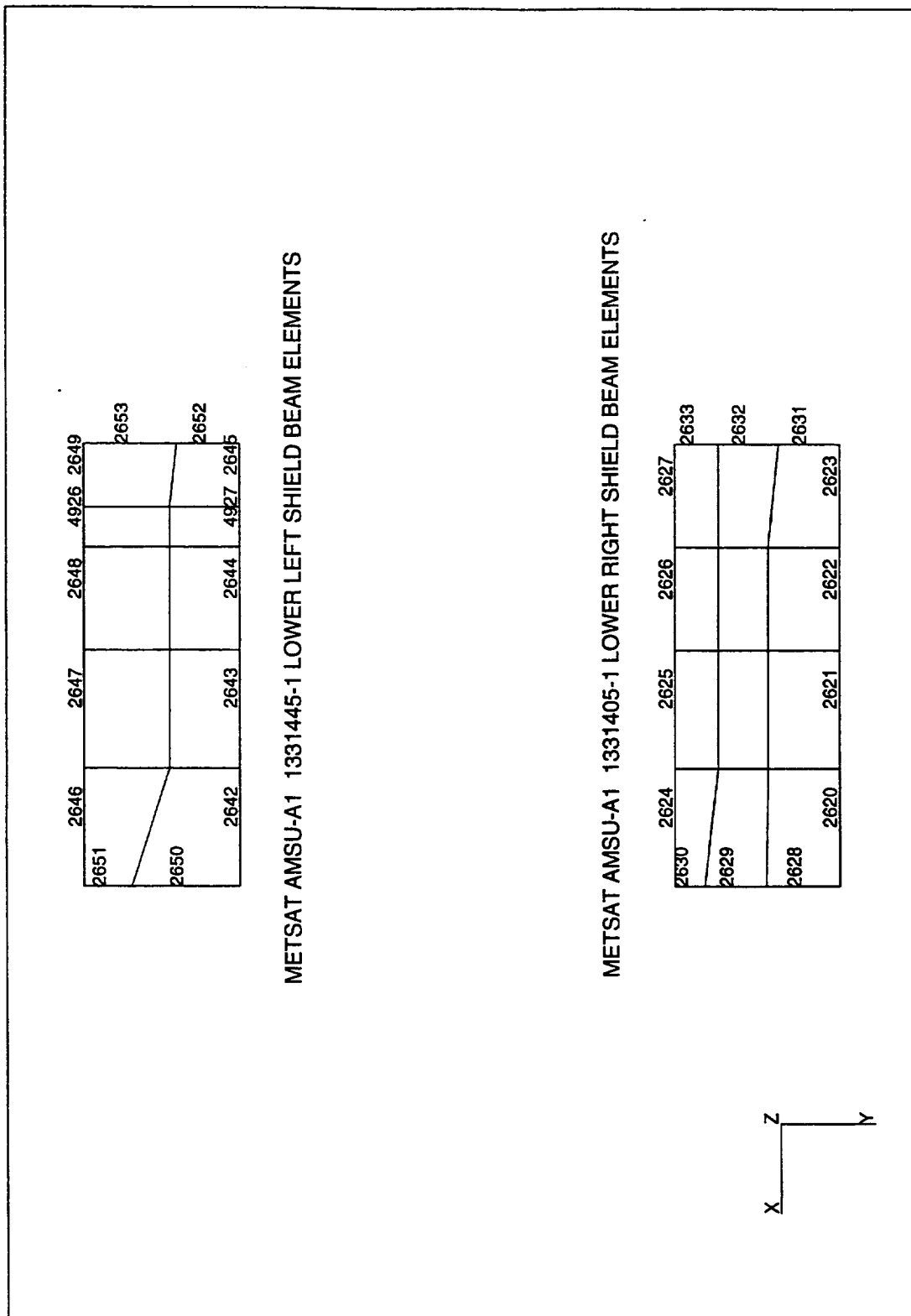


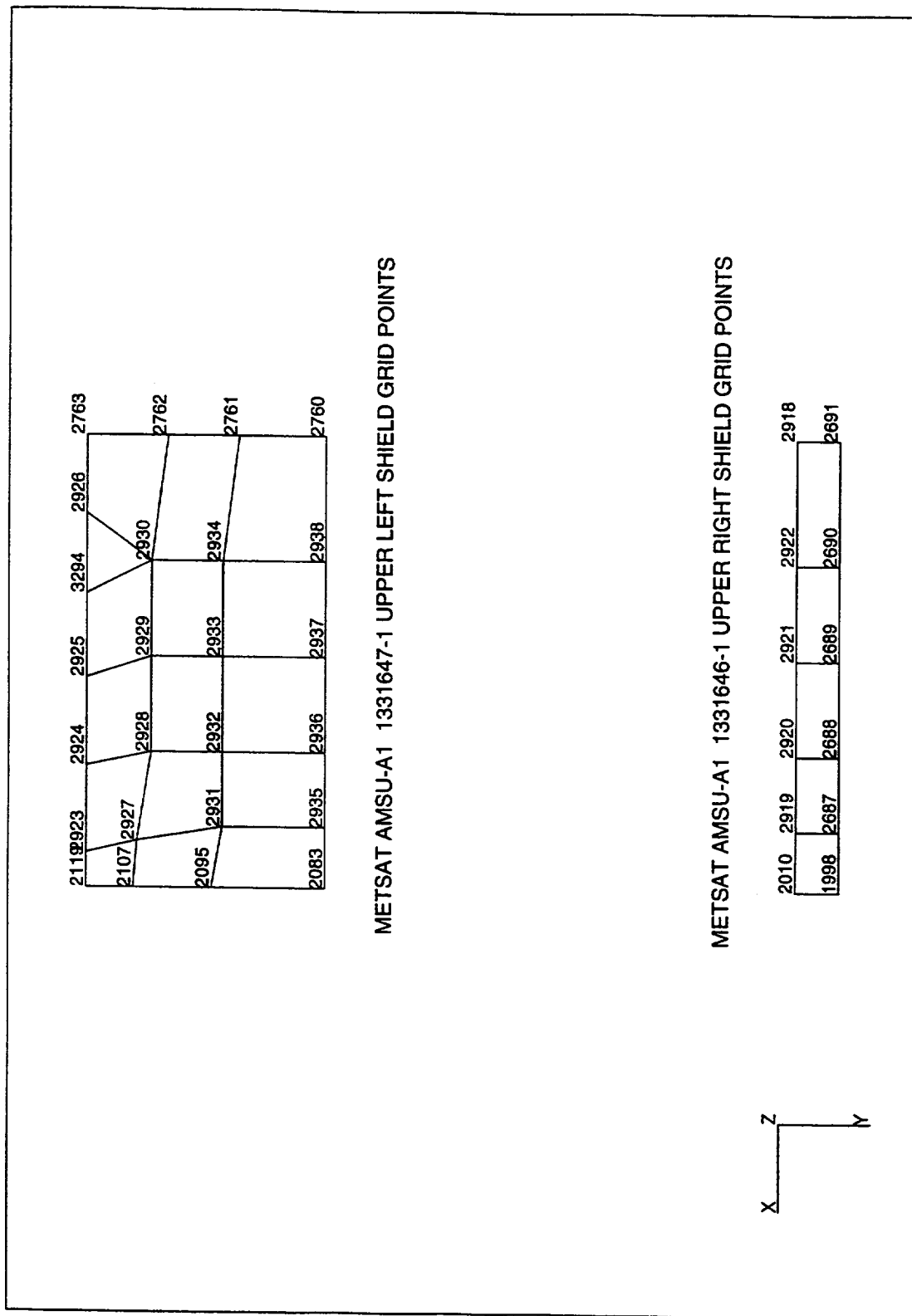
Figure A-69 METSAT AMSU-A1 1331445-1 Lower Left Shield Shell Elements

Figure A-70 METSAT AMSU-A1 1331405-1 Lower Right Shield Shell Elements



**Figure A-71 METSAT AMSU-A1 1331445-1 Lower Left Shield Beam Elements**

**Figure A-72 METSAT AMSU-A1 1331405-1 Lower Right Shield Beam Elements**



**Figure A-73 METSAT AMSU-A1 1331647-1 Upper Left Shield Grid Points**

**Figure A-74 METSAT AMSU-A1 1331646-1 Upper Right Shield Grid Points**

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 2682 | 2683 | 2684 | 2685 | 4924 | 2686 |
| 2677 | 2678 | 2679 | 2680 |      | 2681 |
| 2672 | 2673 | 2674 | 2675 |      | 2676 |

METSAT AMSU-A1 1331647-1 UPPER LEFT SHIELD SHELL ELEMENTS

METSAT AMSU-A1 1331646-1 UPPER RIGHT SHIELD SHELL ELEMENTS

|      |      |      |      |      |
|------|------|------|------|------|
| 2655 | 2656 | 2657 | 2658 | 2659 |
|------|------|------|------|------|

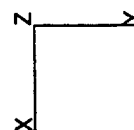


Figure A-75 METSAT AMSU-A1 1331647-1 Upper Left Shield Shell Elements

Figure A-76 METSAT AMSU-A1 1331646-1 Upper Right Shield Shell Elements

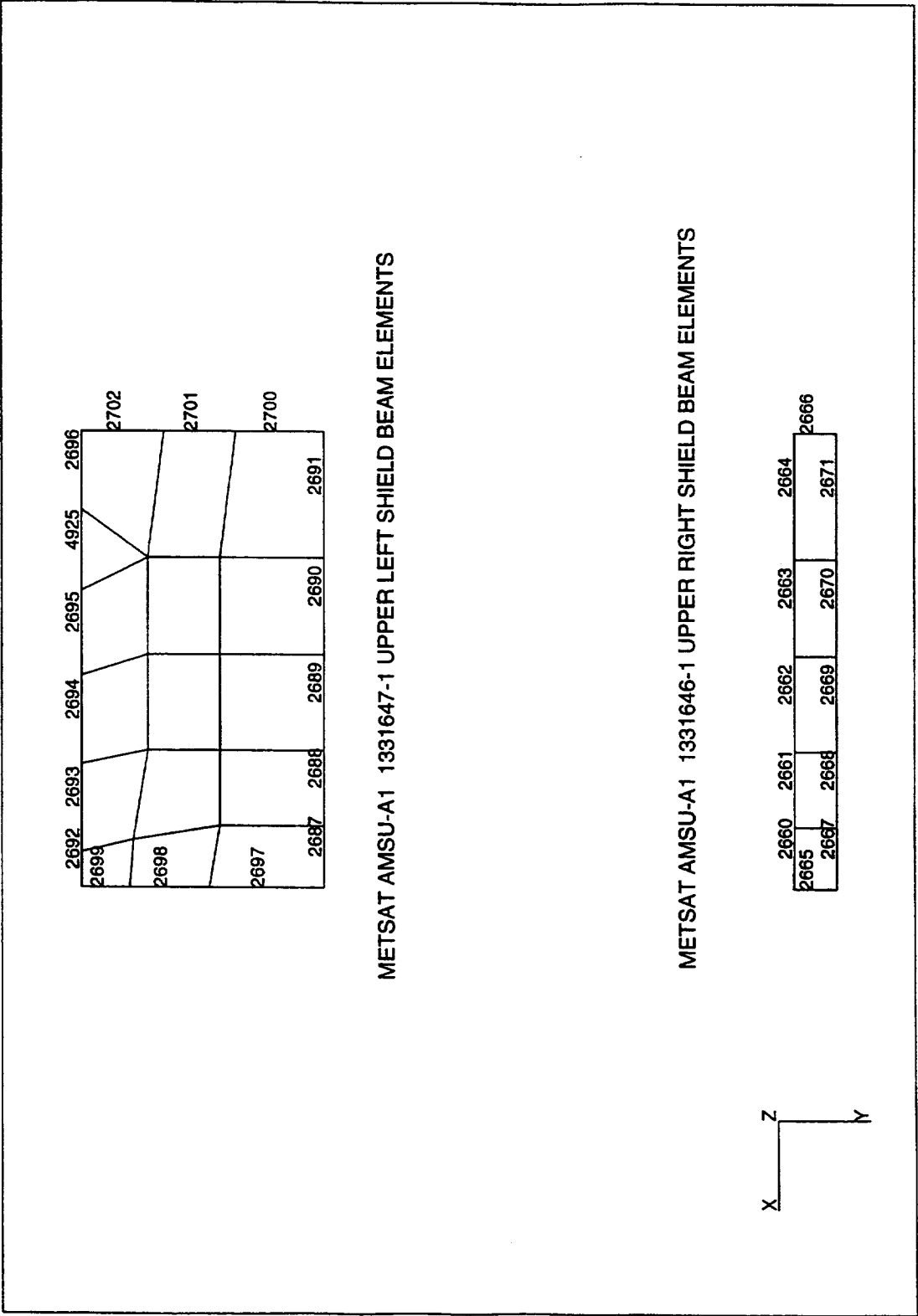
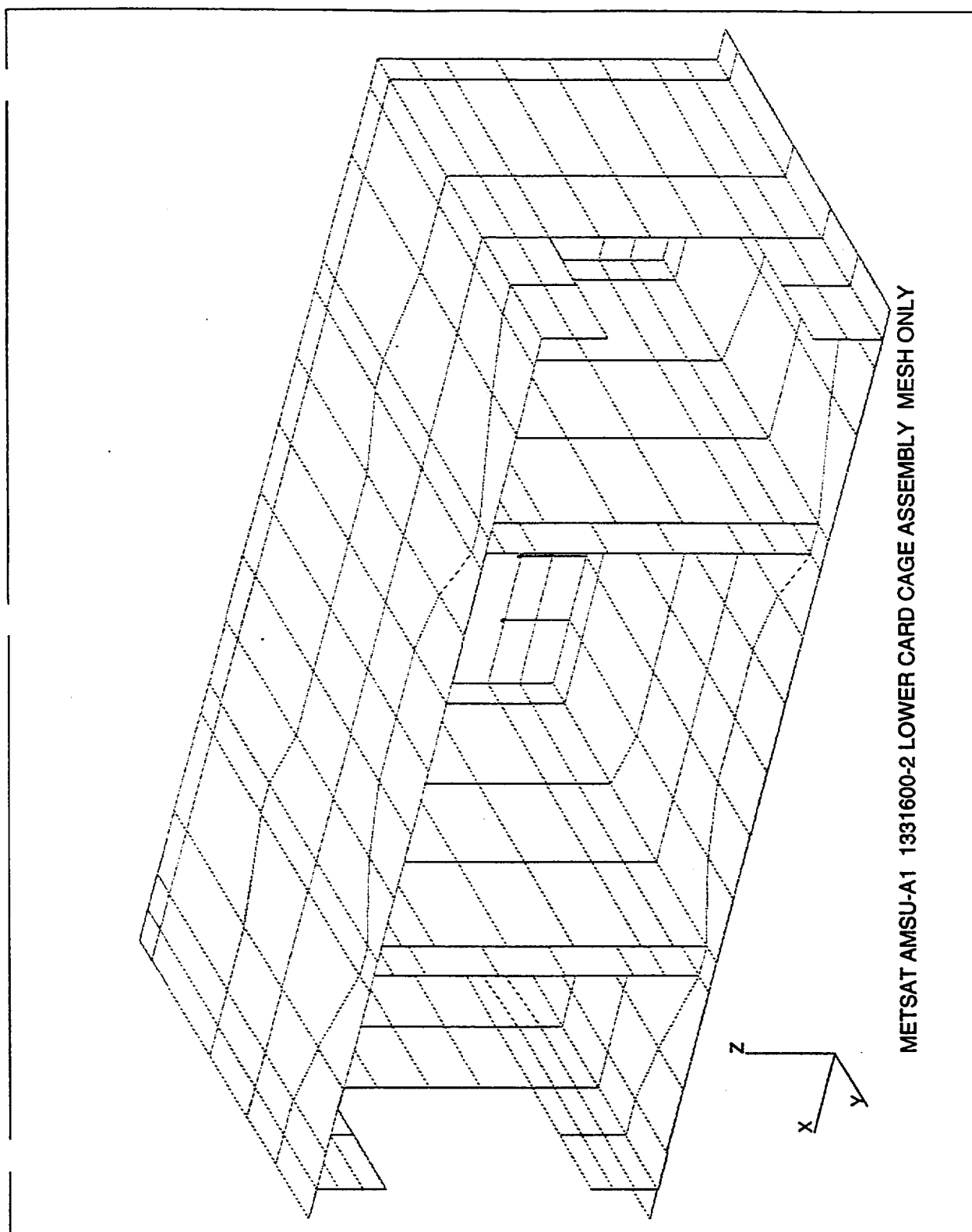


Figure A-77 METSAT AMSU-A1 1331647-1 Upper Left Shield Beam Elements

Figure A-78 METSAT AMSU-A1 1331646-1 Upper Right Shield Beam Elements



**Figure A-79 METSAT AMSU-A1 1331600-2 Lower Card Cage Assembly Mesh Only**

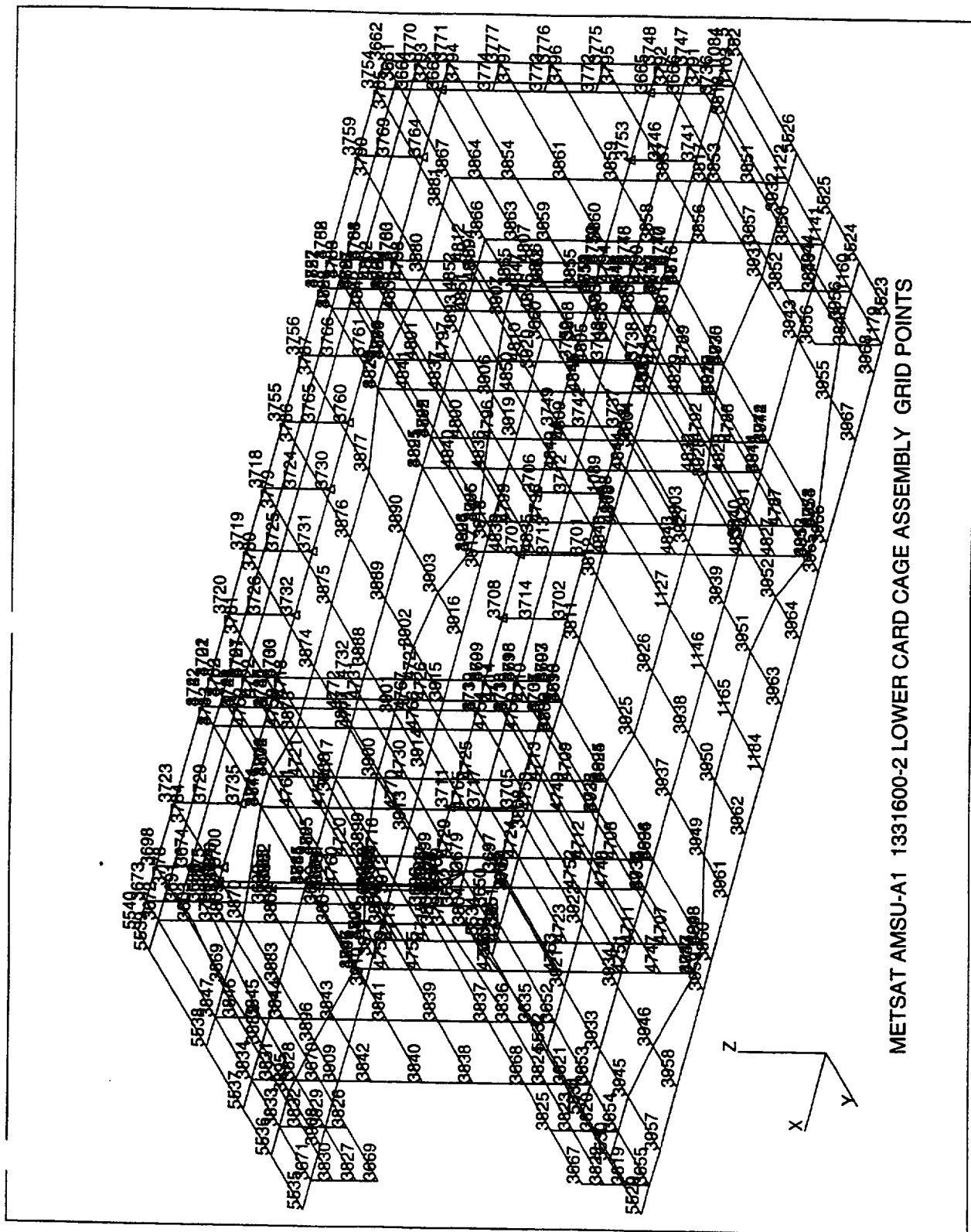


Figure A-80 METSAT AMSU-A1 1331600-2 Lower Card Cage Assembly Grid Points

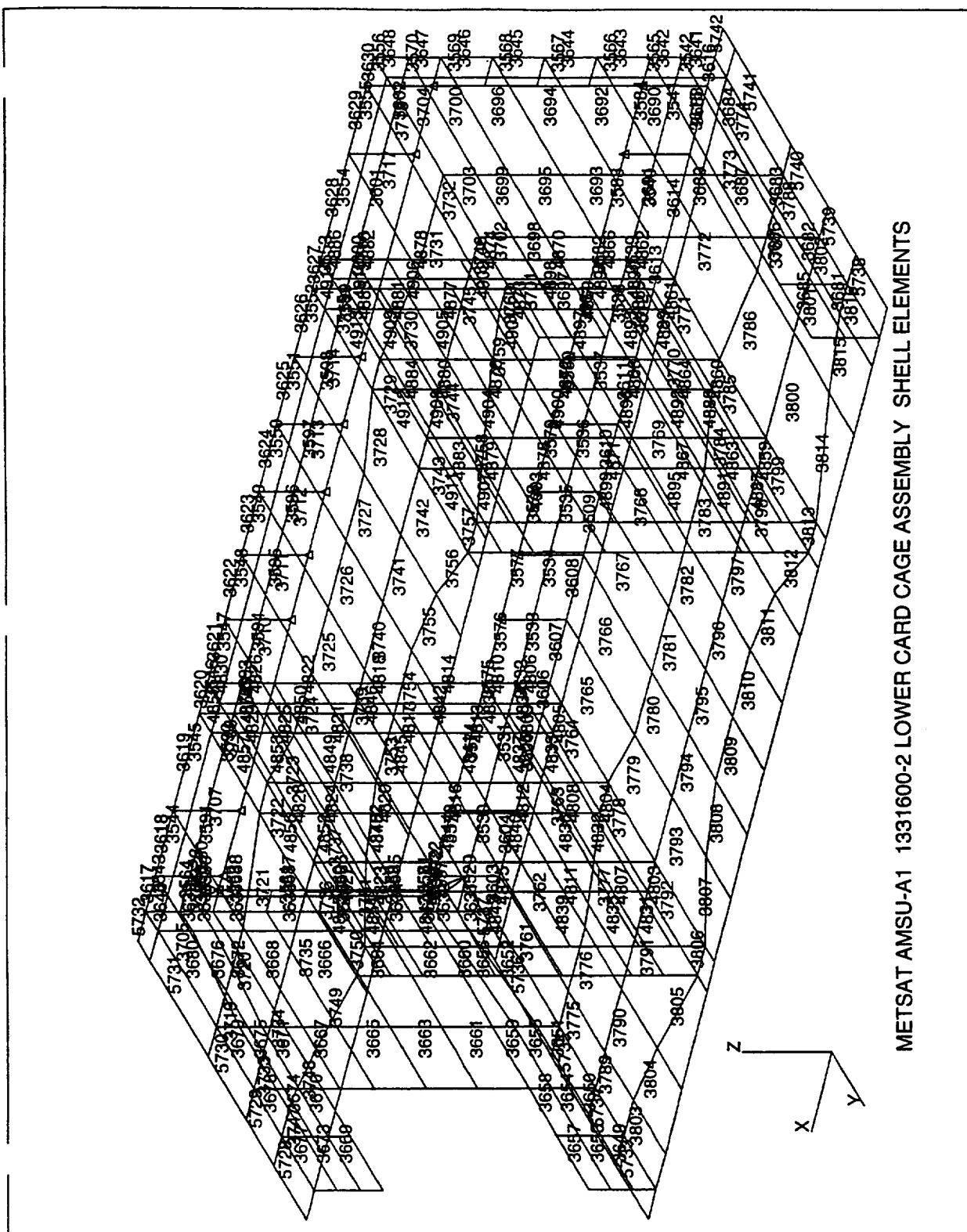
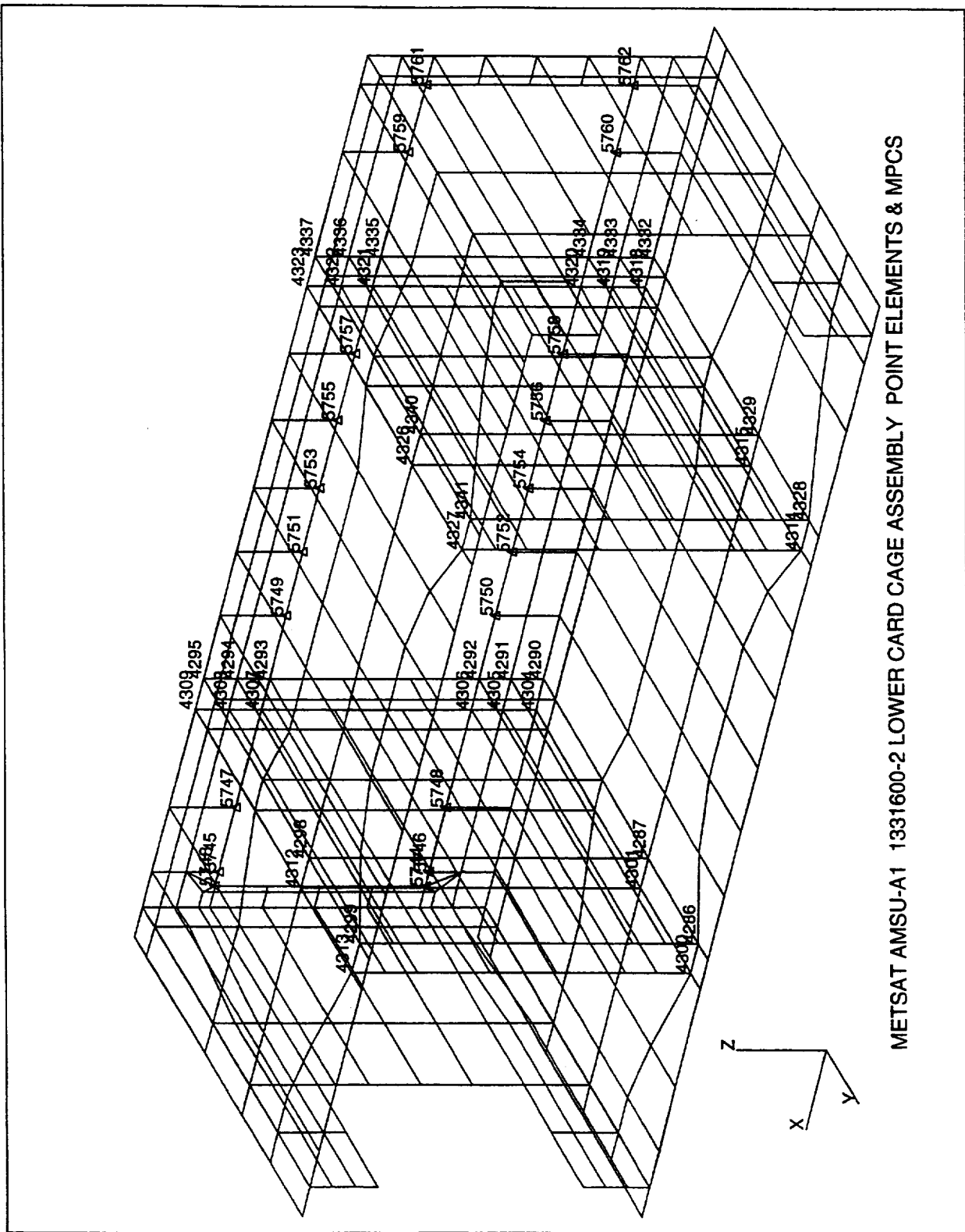


Figure A-81 METSAT AMSU-A1 1331600-2 Lower Card Cage Assembly Shell Assembly



**Figure A-82 METSAT AMSU-A1 1331600-2 Lower Card Cage Assembly Point Elements & MPCS**

|      |      |      |      |      |
|------|------|------|------|------|
| 4826 | 4825 | 4824 | 4823 | 4822 |
| 4911 | 4912 | 4913 | 4914 |      |
| 4839 | 4840 | 4841 | 4842 | 4821 |
| 4907 | 4908 | 4909 | 4910 |      |
| 4835 | 4836 | 4837 | 4838 | 4820 |
| 4903 | 4904 | 4905 | 4906 |      |
| 4848 | 4849 | 4850 | 4851 | 4852 |
| 4899 | 4900 | 4901 | 4902 |      |
| 4843 | 4844 | 4845 | 4846 | 4847 |
| 4895 | 4896 | 4897 | 4898 |      |
| 4837 | 4832 | 4833 | 4834 | 4819 |
| 4891 | 4892 | 4893 | 4894 |      |
| 4827 | 4828 | 4829 | 4830 | 4818 |
| X    | 4887 | 4888 | 4889 | 4890 |
| 4813 | 4814 | 4815 | 4816 | 4817 |

Y

METSAT AMSU-A1 1331600-1 LOWER CARD CAGE CARD 1 - GRIDS & SHELLS

Figure A-83 METSAT AMSU-A1 1331600-1 Lower Card Cage Card 1 Grids & Shells

|      |      |      |      |      |
|------|------|------|------|------|
| 4786 | 4785 | 4784 | 4783 | 4782 |
| 4883 | 4884 | 4885 | 4886 |      |
| 4799 | 4800 | 4801 | 4802 | 4781 |
| 4879 | 4880 | 4881 | 4882 |      |
| 4795 | 4796 | 4797 | 4798 | 4780 |
| 4875 | 4876 | 4877 | 4878 |      |
| 4808 | 4809 | 4810 | 4811 | 4812 |
| 4871 | 4872 | 4873 | 4874 |      |
| 4803 | 4804 | 4805 | 4806 | 4807 |
| 4867 | 4868 | 4869 | 4870 |      |
| 4784 | 4792 | 4793 | 4794 | 4779 |
| 4863 | 4864 | 4865 | 4866 |      |
| 4787 | 4798 | 4789 | 4790 | 4778 |
| 4859 | 4860 | 4861 | 4862 |      |
| 4773 | 4774 | 4775 | 4776 | 4777 |

Y

K

METSAT AMSU-A1 1331600-1 LOWER CARD CAGE CARD 2 - GRIDS & SHELLS

Figure A-84 METSAT AMSU-A1 1331600-1 Lower Card Cage Card 2 Grids & Shells

| 4706 | 4705 | 4704 | 4703 | 4702 |
|------|------|------|------|------|
| 4827 | 4828 | 4829 | 4830 | 4830 |
| 4719 | 4720 | 4721 | 4722 | 4701 |
| 4823 | 4824 | 4825 | 4826 | 4826 |
| 4715 | 4716 | 4717 | 4718 | 4700 |
| 4819 | 4820 | 4821 | 4822 |      |
| 4728 | 4729 | 4730 | 4731 | 4732 |
| 4815 | 4816 | 4817 | 4818 |      |
| 4723 | 4724 | 4725 | 4726 | 4727 |
| 4811 | 4812 | 4813 | 4814 |      |
| 4714 | 4712 | 4713 | 4714 | 4699 |
| 4807 | 4808 | 4809 | 4810 |      |
| 4707 | 4708 | 4709 | 4710 | 4698 |
| 4803 | 4804 | 4805 | 4806 |      |
| 4693 | 4694 | 4695 | 4696 | 4697 |

Y

METSAT AMSU-A1 1331600-1 LOWER CARD CAGE CARD 3 - GRIDS & SHELLS

Figure A-85 METSAT AMSU-A1 1331600-1 Lower Card Cage Card 3 Grids & Shells

|      |      |      |      |      |
|------|------|------|------|------|
| 4746 | 4745 | 4744 | 4743 | 4742 |
| 4855 | 4856 | 4857 | 4858 |      |
| 4759 | 4760 | 4761 | 4762 | 4741 |
| 4851 | 4852 | 4853 | 4854 |      |
| 4755 | 4756 | 4757 | 4758 | 4740 |
| 4847 | 4848 | 4849 | 4850 |      |
| 4768 | 4769 | 4770 | 4771 | 4772 |
| 4843 | 4844 | 4845 | 4846 |      |
| 4763 | 4764 | 4765 | 4766 | 4767 |
| 4839 | 4840 | 4841 | 4842 |      |
| 4754 | 4752 | 4753 | 4754 | 4739 |
| 4835 | 4836 | 4837 | 4838 |      |
| 4747 | 4748 | 4749 | 4750 | 4738 |
| 4831 | 4832 | 4833 | 4834 |      |
| 4733 | 4734 | 4735 | 4736 | 4737 |

Y

X

METSAT AMSU-A1 1331600-1 LOWER CARD CAGE CARD 4 - GRIDS & SHELLS

Figure A-86 METSAT AMSU-A1 1331600-1 Lower Card Cage Card 4 Grids & Shells

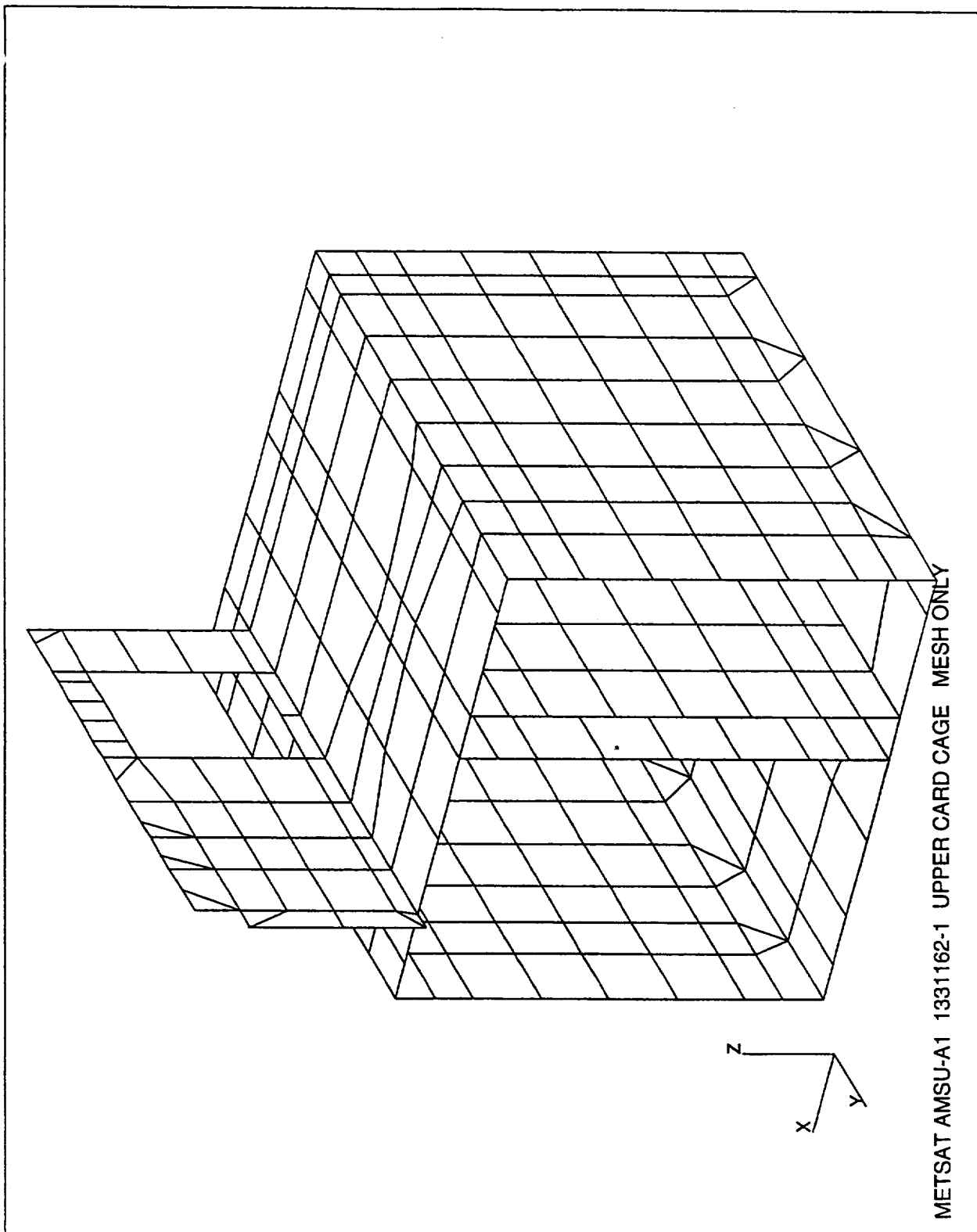


Figure A-87 METSAT AMSU-A1 1331162-1 Upper Card Cage Mesh Only

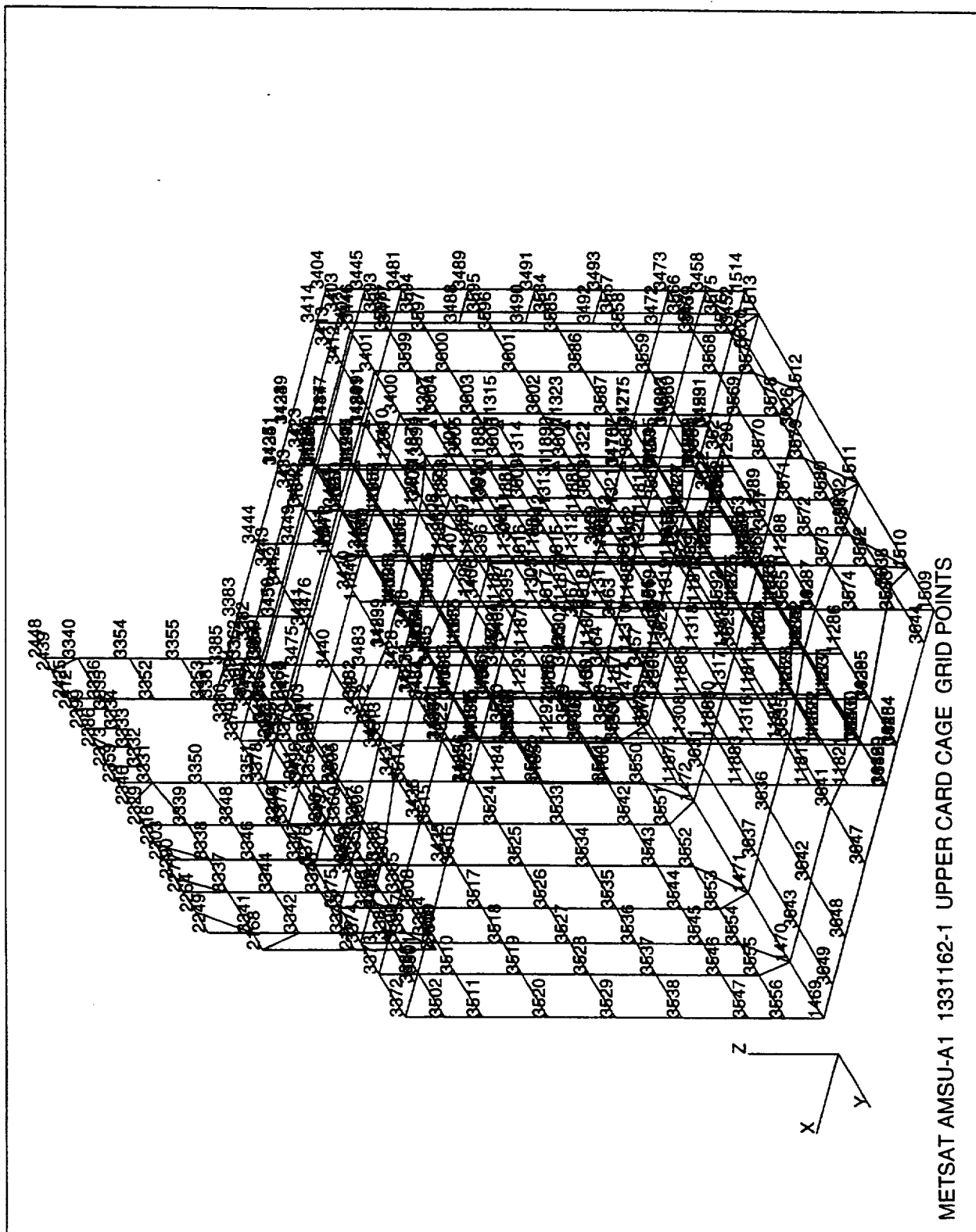


Figure A-88 METSAT AMSU-A1 1331162-1 Upper Card Cage Grid Points

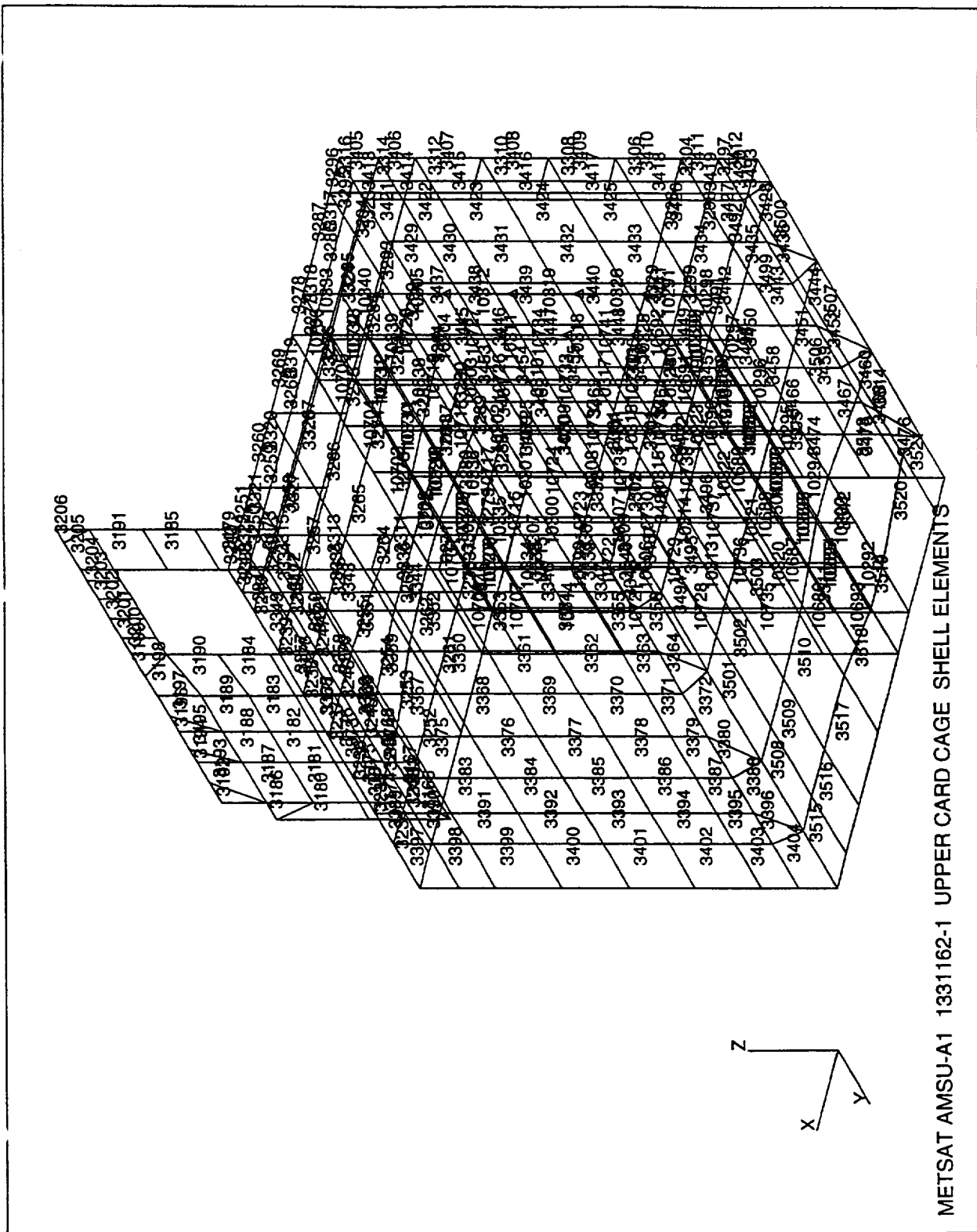


Figure A-89 METSAT AMSU-A1 1331162-1 Upper Card Cage Shell Elements

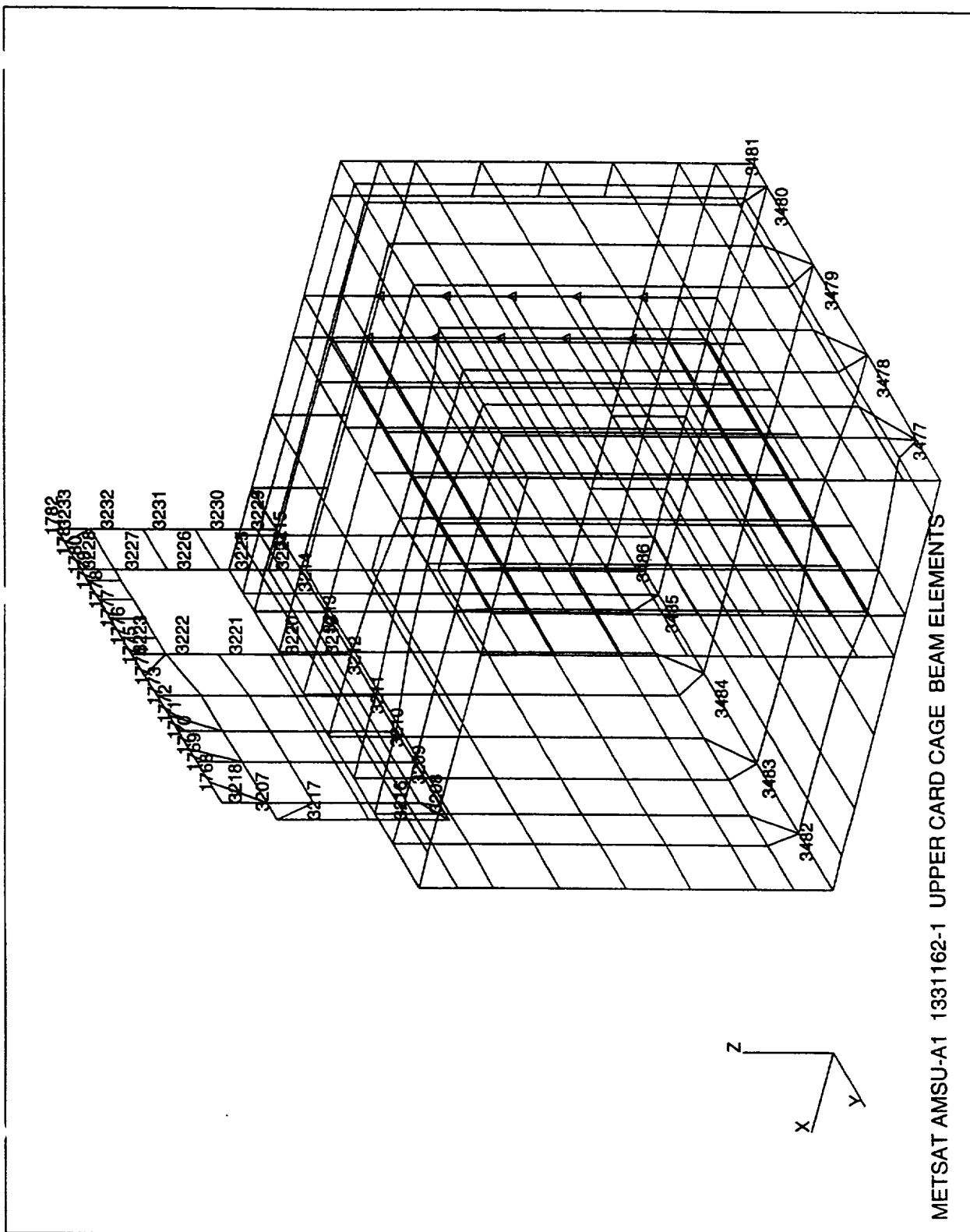


Figure A-90 METSAT AMSU-A1 1331162-1 Upper Card Cage Beam Elements

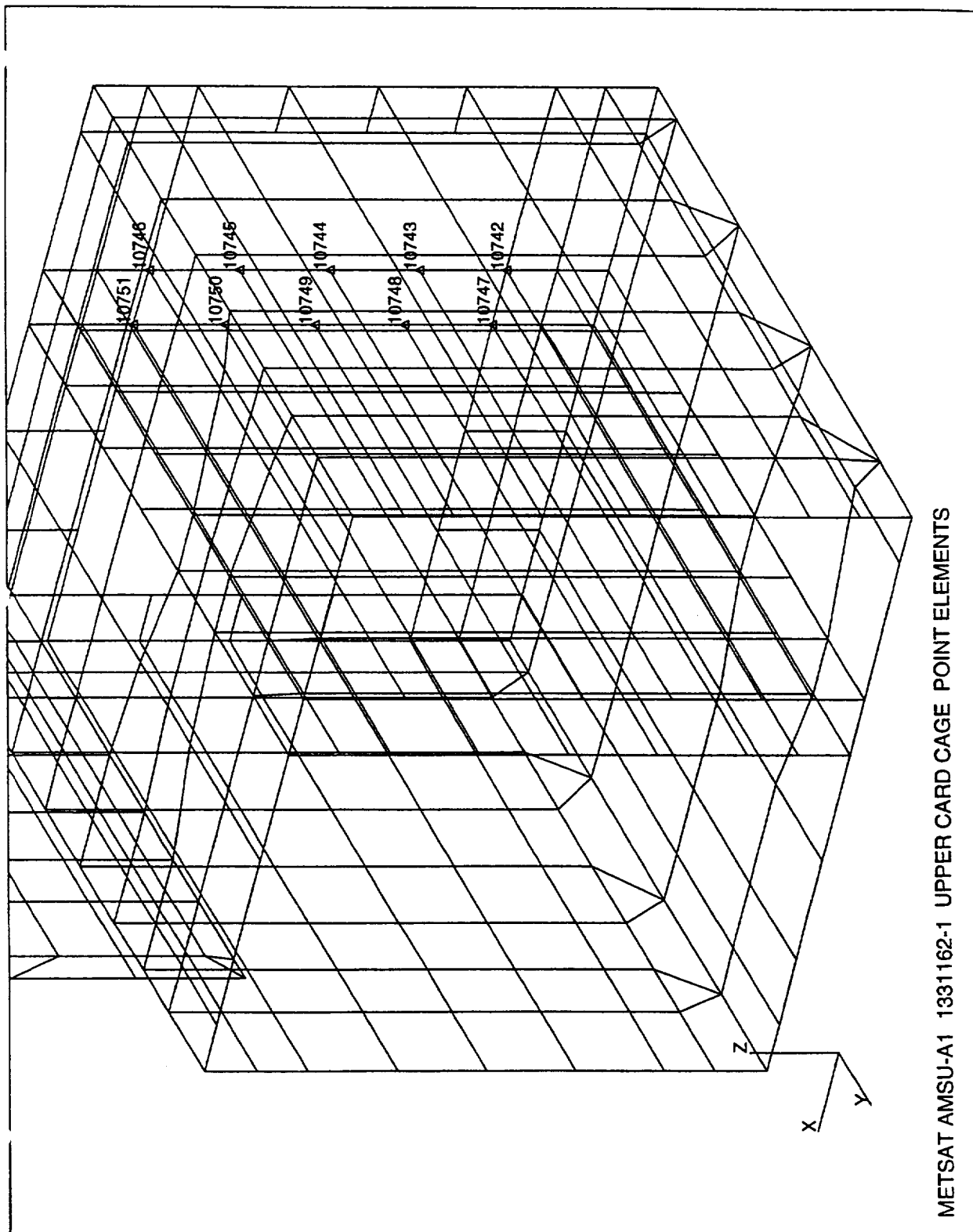


Figure A-91 METSAT AMSU-A1 1331162-1 Upper Card Cage Point Elements

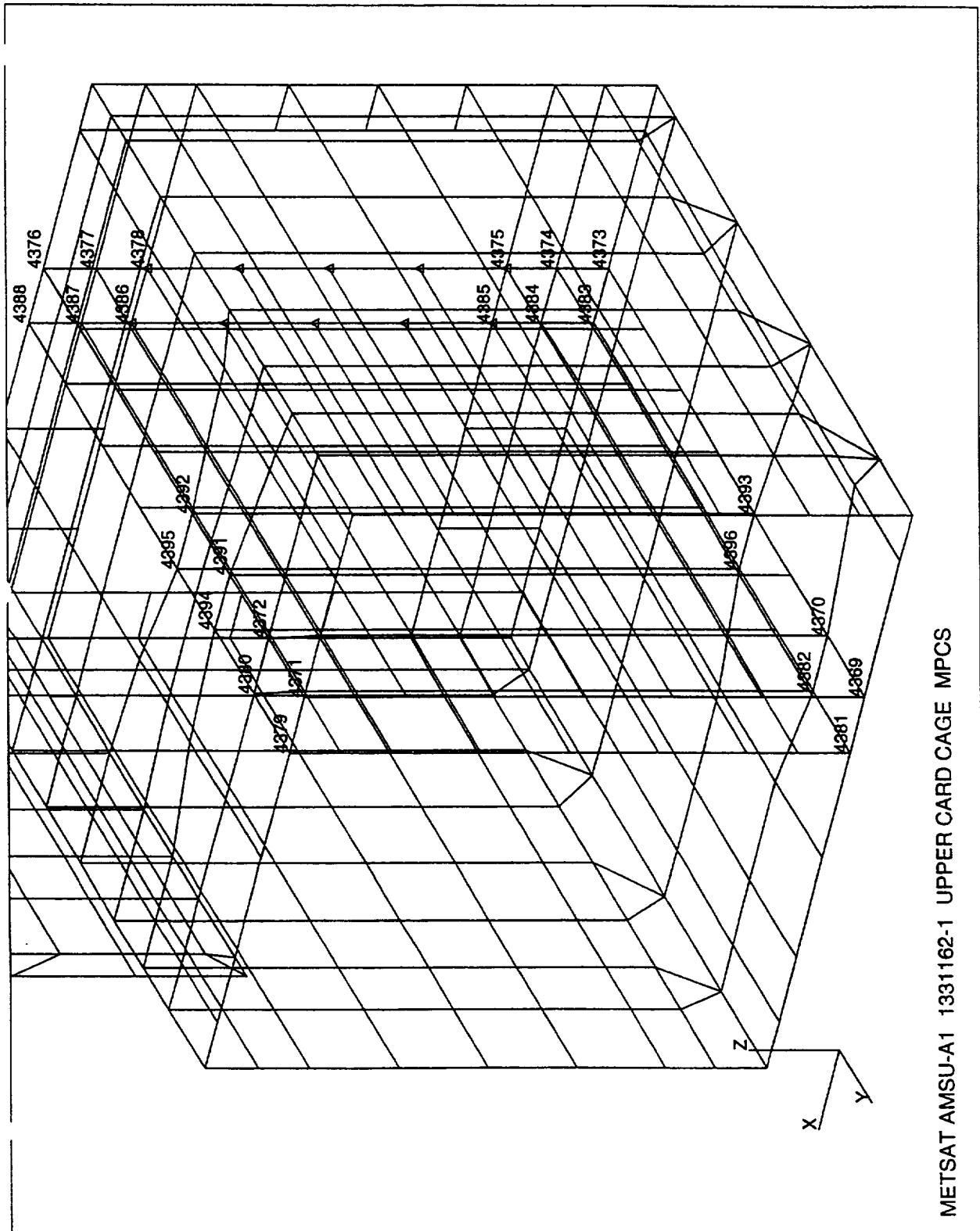


Figure A-92 METSAT AMSU-A1 1331162-1 Upper Card Cage MPCs

|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 11836 | 11837 | 11838 | 11839 | 11840 | 11841 | 11842 | 11251 |
| 10700 | 10701 | 10702 | 10703 | 10704 | 10705 | 10706 |       |
| 11844 | 11845 | 11846 | 11847 | 11848 | 11849 | 11850 | 11259 |
| 10707 | 10708 | 10709 | 10710 | 10711 | 10712 | 10713 |       |
| 11852 | 11853 | 11854 | 11855 | 11856 | 11857 | 11858 | 11211 |
| 10714 | 10715 | 10716 | 10717 | 10718 | 10719 | 10720 |       |
| 11867 | 11868 | 11869 | 11870 | 11871 | 11872 | 11873 | 11874 |
| 10721 | 10722 | 10723 | 10724 | 10725 | 10726 | 10727 |       |
| 11875 | 11876 | 11877 | 11878 | 11879 | 11880 | 11881 | 11882 |
| 10728 | 10729 | 10730 | 10731 | 10732 | 10733 | 10734 |       |
| 11883 | 11884 | 11885 | 11886 | 11887 | 11888 | 11889 | 11890 |
| 10735 | 10736 | 10737 | 10738 | 10739 | 10740 | 10741 |       |
| 11813 | 11814 | 11815 | 11816 | 11817 | 11818 | 11819 | 11187 |
| 10686 | 10687 | 10688 | 10689 | 10690 | 10691 | 10692 |       |
| 11821 | 11822 | 11823 | 11824 | 11825 | 11826 | 11827 | 11195 |
| X     | 10694 | 10695 | 10696 | 10697 | 10698 | 10699 |       |
| Y     | 10693 |       |       |       |       |       |       |
| 11829 | 11830 | 11831 | 11832 | 11833 | 11834 | 11835 | 11203 |

METSAT AMSU-A1 1331162-1 UPPER CARD CAGE CARD (+X) GRIDS & SHELLS

Figure A-93 METSAT AMSU-A1 1331162-1 Upper Card Cage Card (+X) Grids & Shells

|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 11332 | 11333 | 11334 | 11335 | 11336 | 11337 | 11338 | 11339 |
| 10327 | 10328 | 10329 | 10330 | 10331 | 10332 | 10333 |       |
| 11340 | 11341 | 11342 | 11343 | 11344 | 11345 | 11346 | 11347 |
| 10334 | 10335 | 10336 | 10337 | 10338 | 10339 | 10340 |       |
| 11292 | 11293 | 11294 | 11295 | 11296 | 11297 | 11298 | 11299 |
| 10299 | 10300 | 10301 | 10302 | 10303 | 10304 | 10305 |       |
| 11300 | 11301 | 11302 | 11303 | 11304 | 11305 | 11306 | 11307 |
| 10306 | 10307 | 10308 | 10309 | 10310 | 10311 | 10312 |       |
| 11308 | 11309 | 11310 | 11311 | 11312 | 11313 | 11314 | 11315 |
| 10313 | 10314 | 10315 | 10316 | 10317 | 10318 | 10319 |       |
| 11316 | 11317 | 11318 | 11319 | 11320 | 11321 | 11322 | 11323 |
| 10320 | 10321 | 10322 | 10323 | 10324 | 10325 | 10326 |       |
| 11268 | 11269 | 11270 | 11271 | 11272 | 11273 | 11274 | 11275 |
| 10285 | 10286 | 10287 | 10288 | 10289 | 10290 | 10291 |       |
| 11276 | 11277 | 11278 | 11279 | 11280 | 11281 | 11282 | 11283 |
| Y     | X     | 10292 | 10293 | 10294 | 10295 | 10296 | 10297 |
| 11284 | 11285 | 11286 | 11287 | 11288 | 11289 | 11290 | 11291 |

METSAT AMSU-A1 1331162-1 UPPER CARD CAGE CARD (-X) GRIDS & SHELLS

Figure A-94 METSAT AMSU-A1 1331162-1 Upper Card Cage Card (-X) Grids & Shells

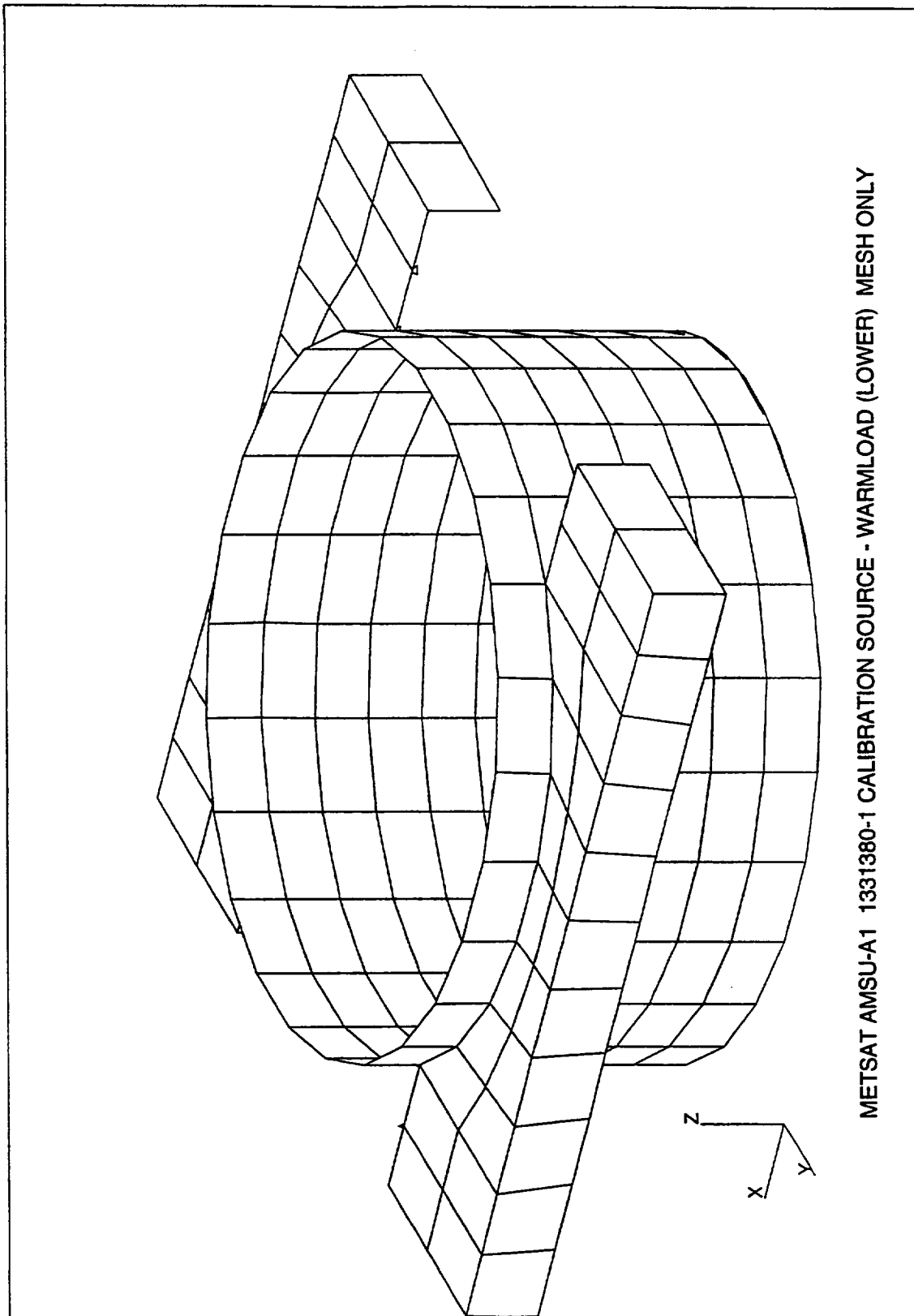
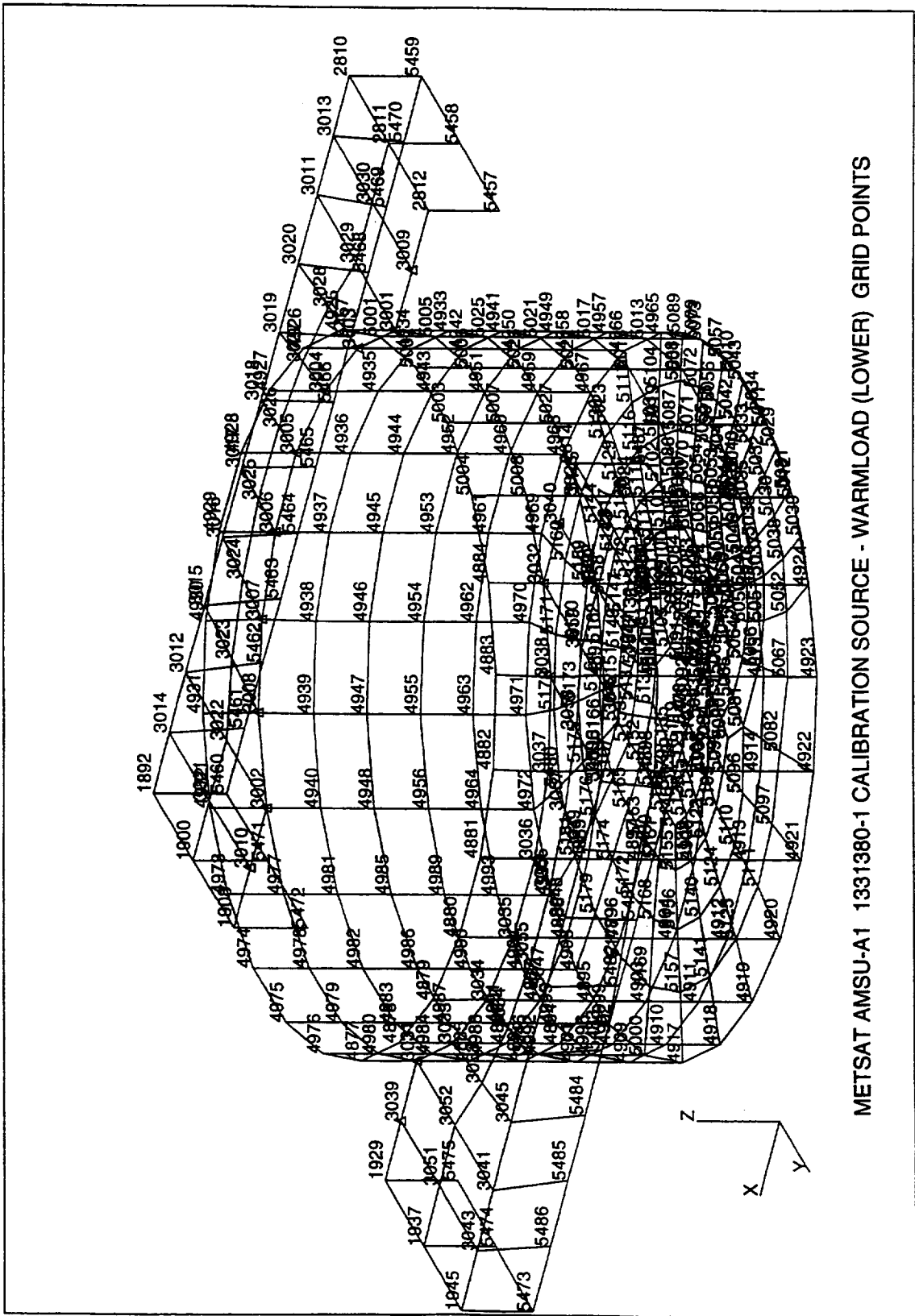
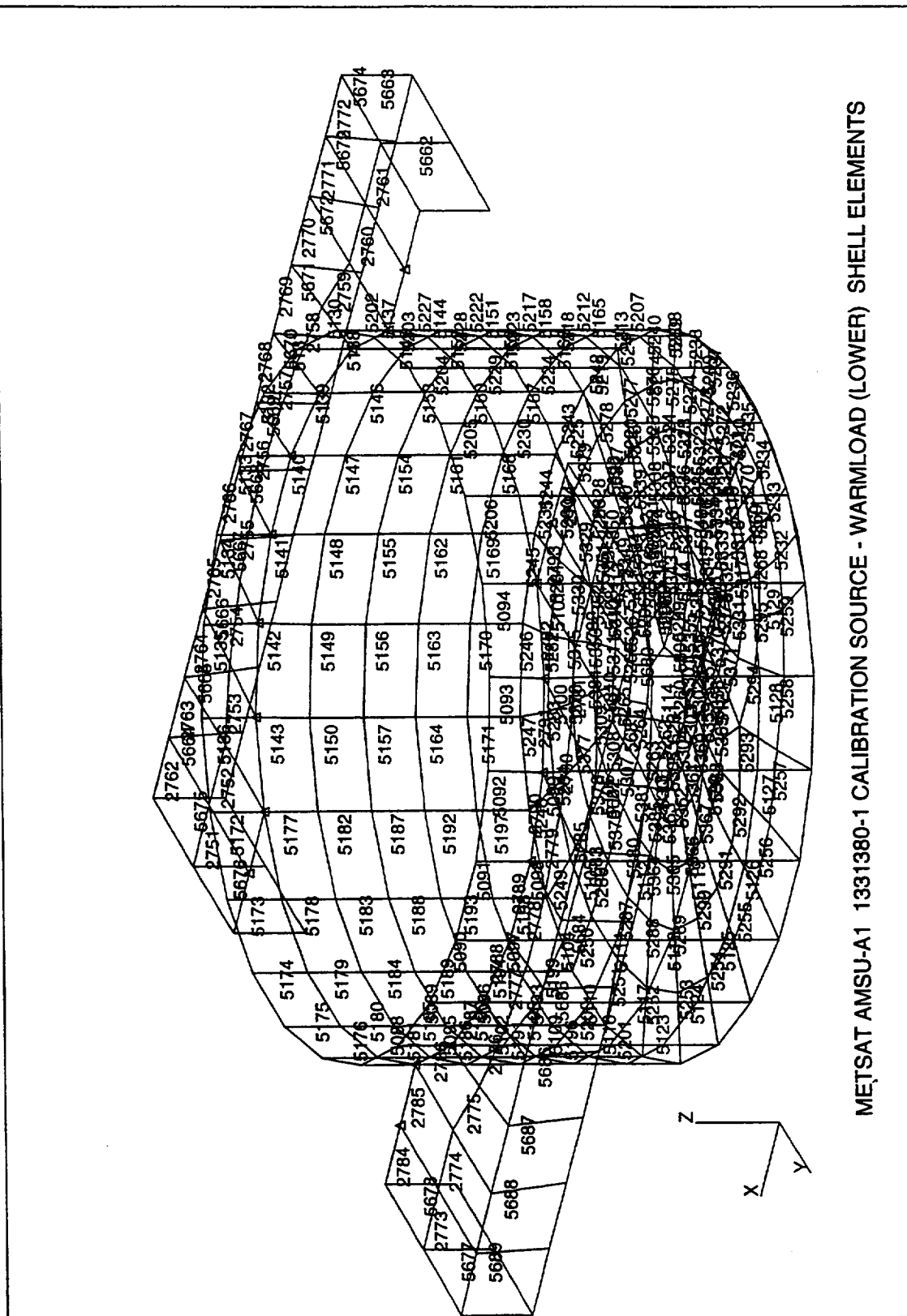


Figure A-95 METSAT AMSU-A1 1331380-1 Calibration Source-Warmload (Lower) Mesh Only



**Figure A-96 METSAT AMSU-A1 1331380-1 Calibration Source-Warmload (Lower) Grid Points**



METSAT AMSU-A1 1331380-1 CALIBRATION SOURCE - WARMLOAD (LOWER) SHELL ELEMENTS

Figure A-97 METSAT AMSU-A1 1331380-1 Calibration Source-Warmload (Lower) Shell Elements

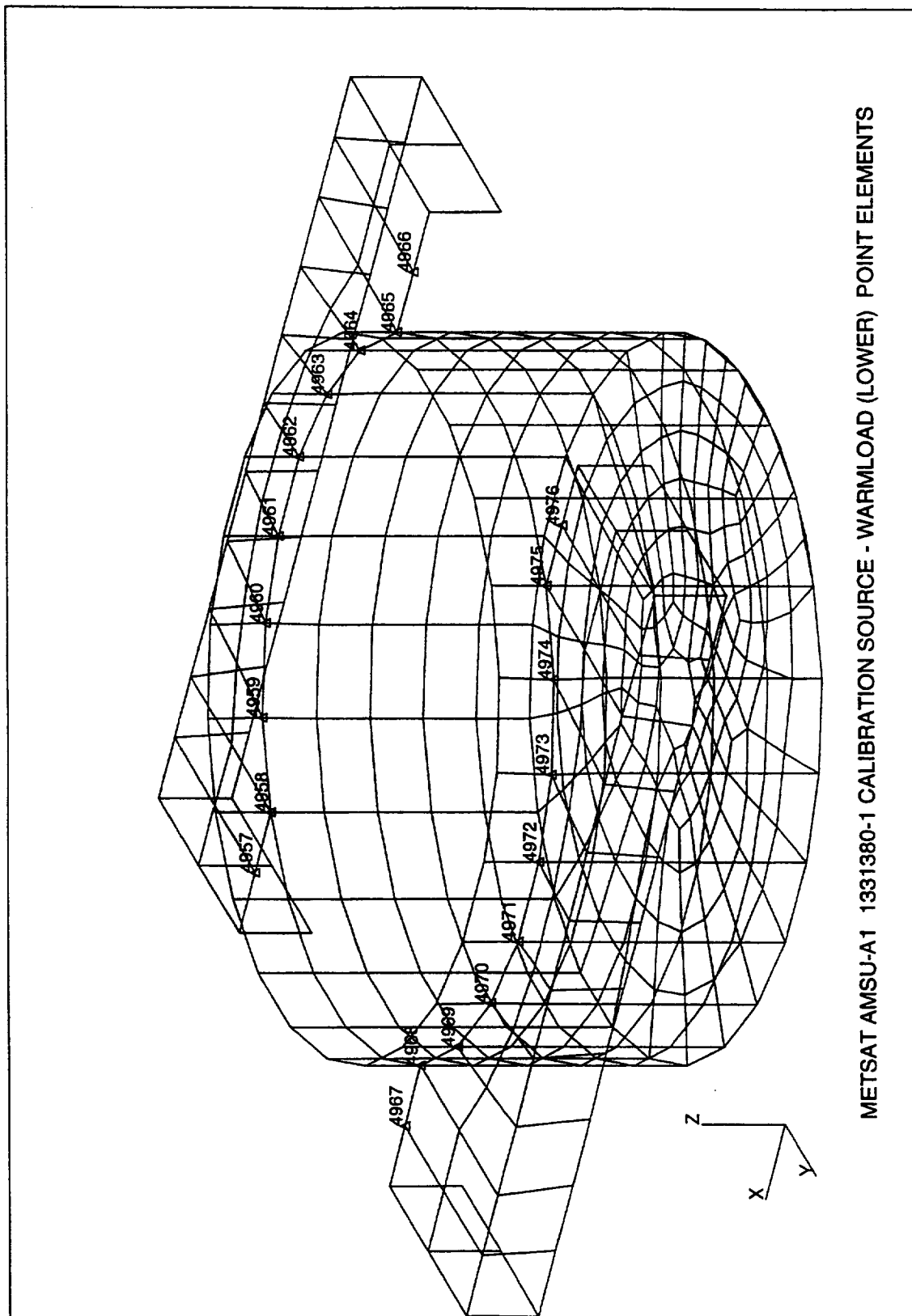


Figure A-98 METSAT AMSU-A1 1331380-1 Calibration Source-Warmload (Lower) Point Elements

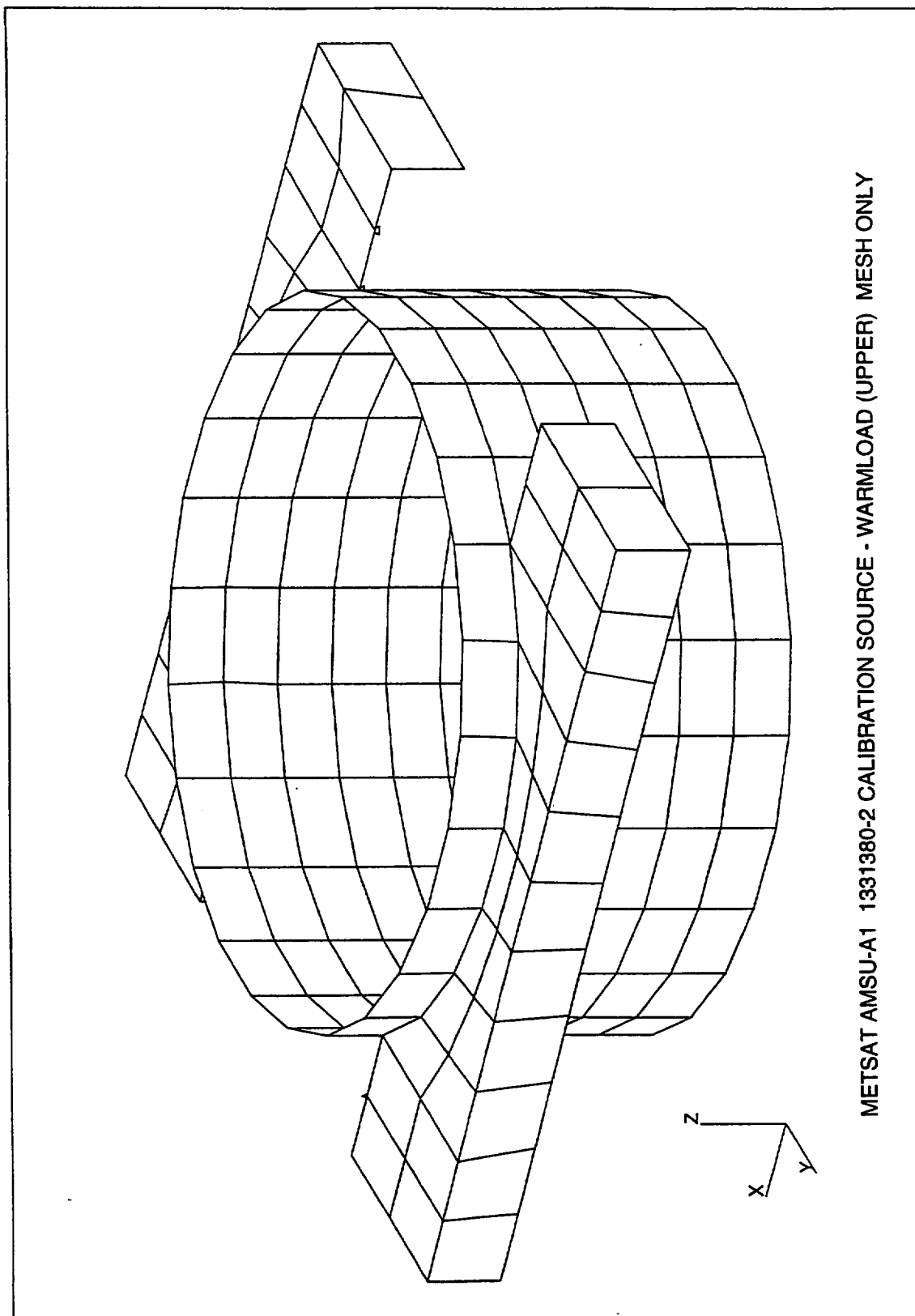


Figure A-99 METSAT AMSU-A1 1331380-2 Calibration Source-Warmload (Upper) Mesh Only

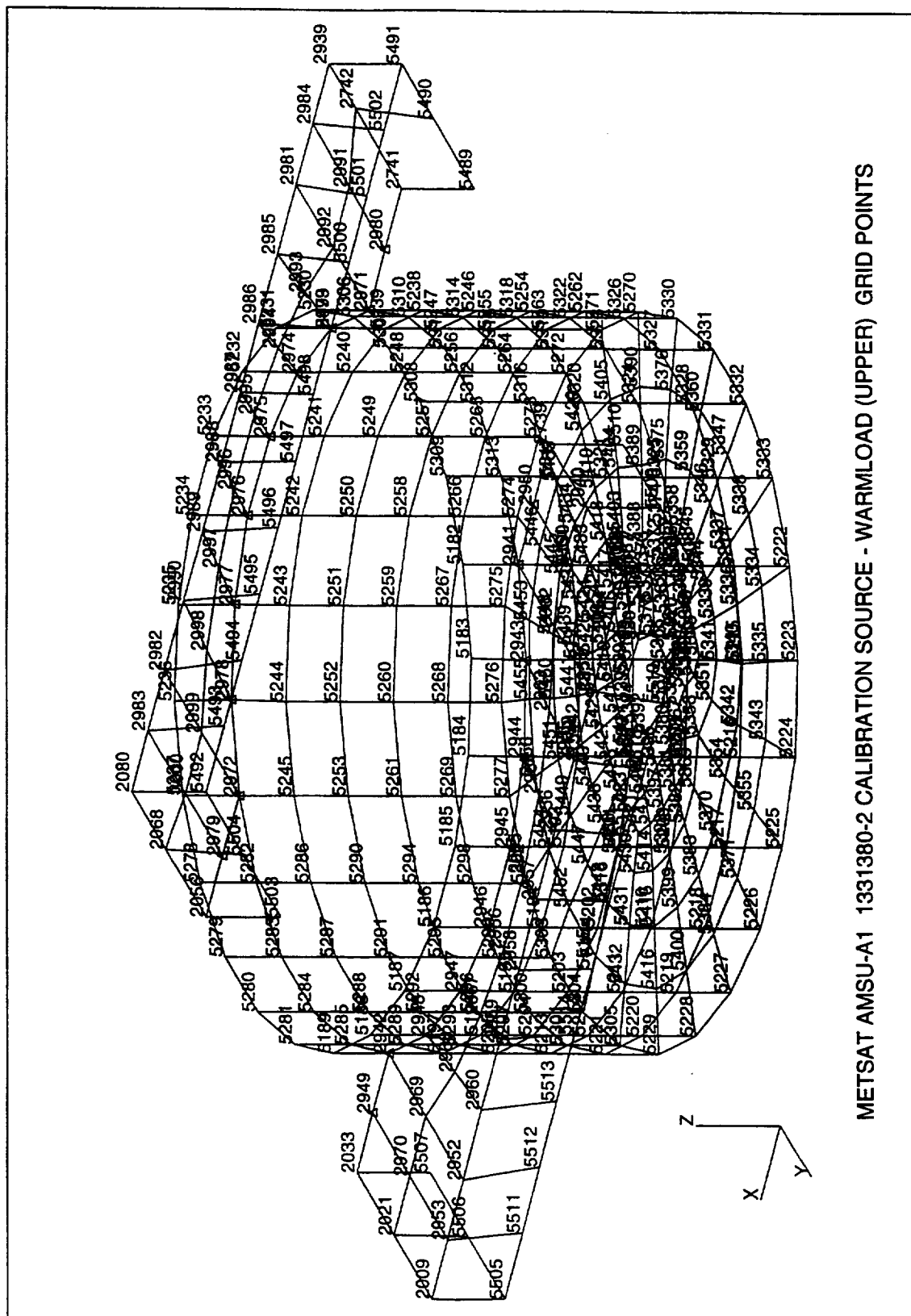


Figure A-100 METSAT AMSU-A1 1331380-2 Calibration Source-Warmload (Upper) Grid Points

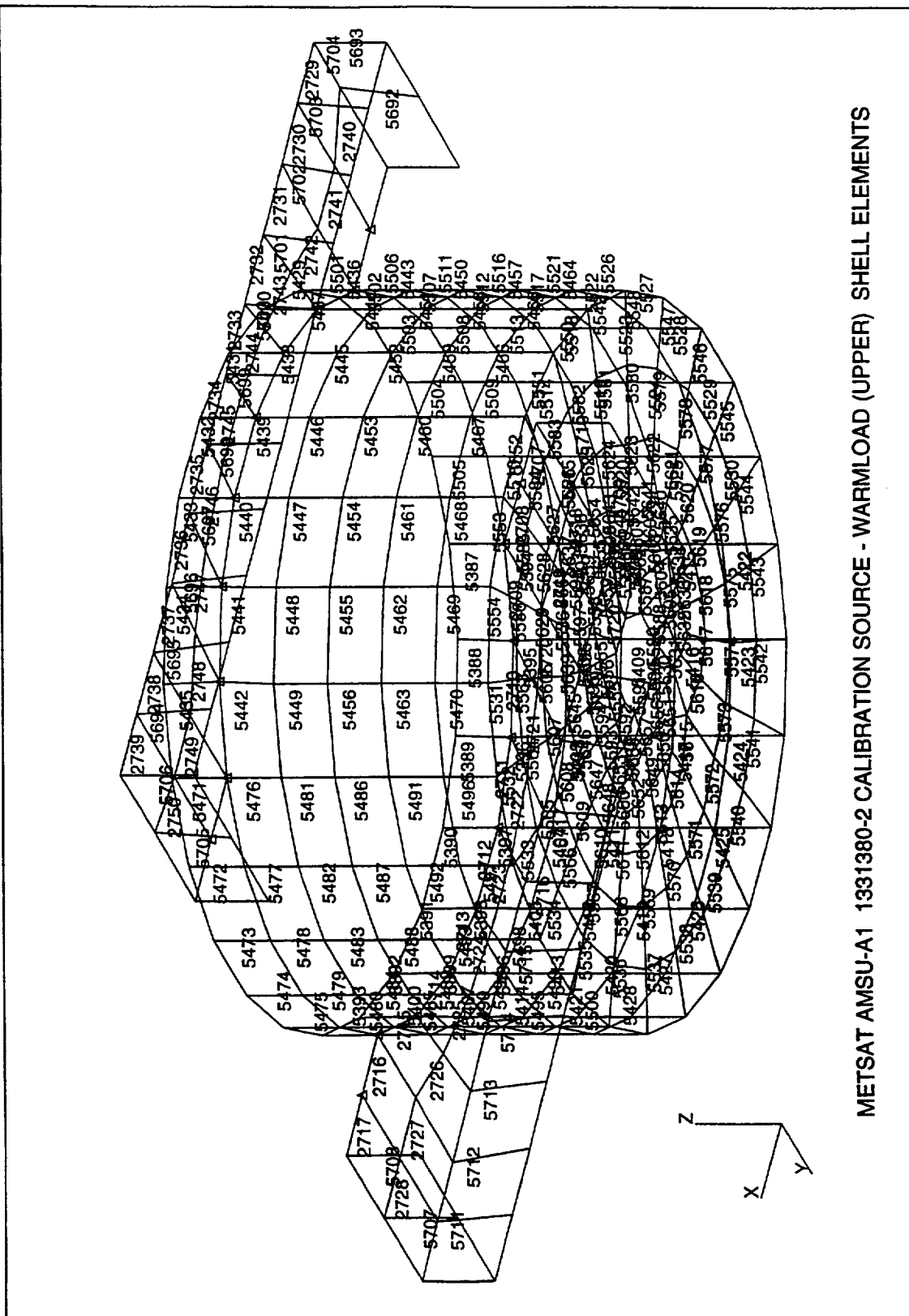


Figure A-101 METSAT AMSU-A1 1331380-2 Calibration Source-Warmload (Upper) Shell Elements

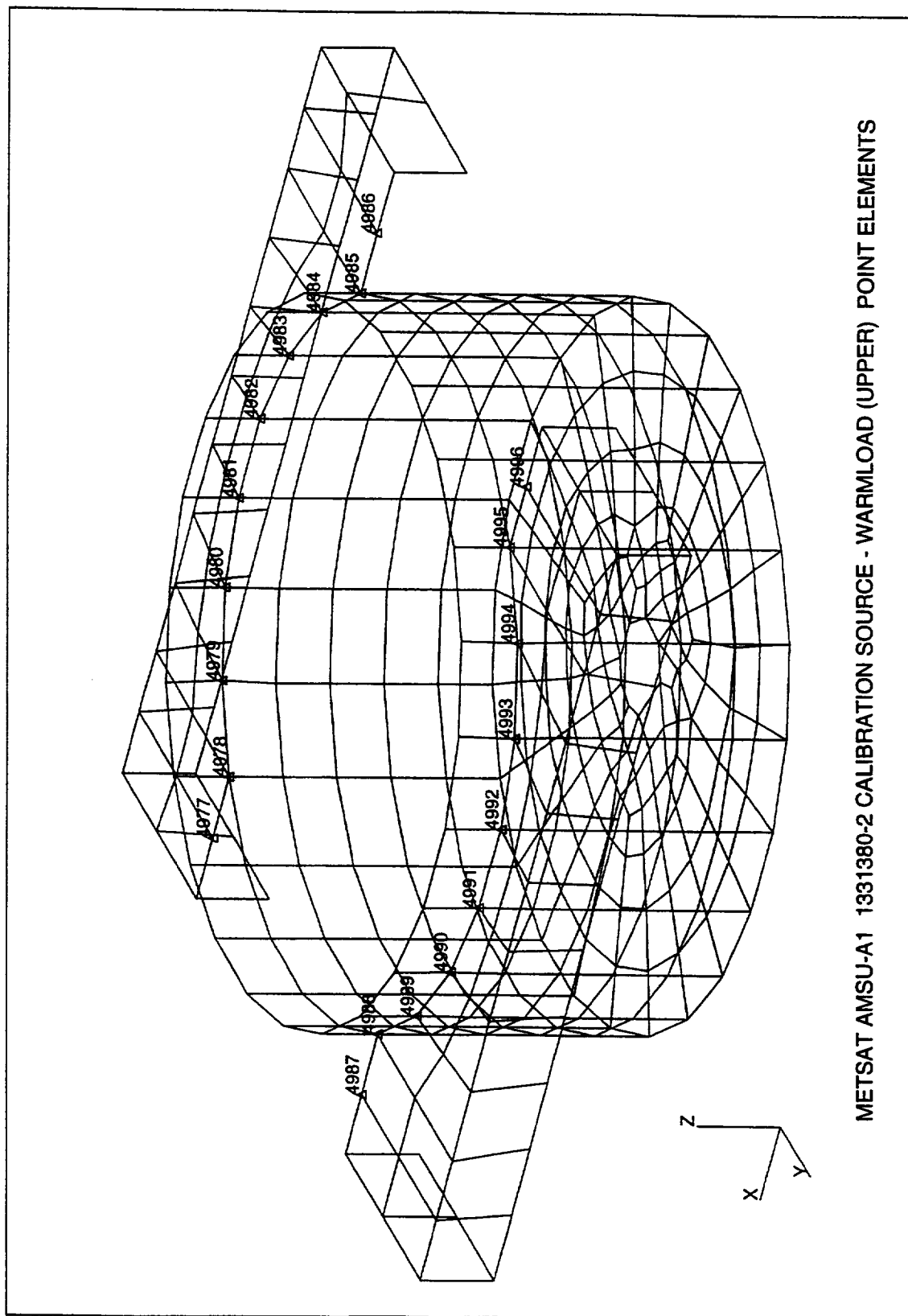


Figure A-102 METSAT AMSU-A1 1331380-2 Calibration Source-Warmload (Upper) Point Elements

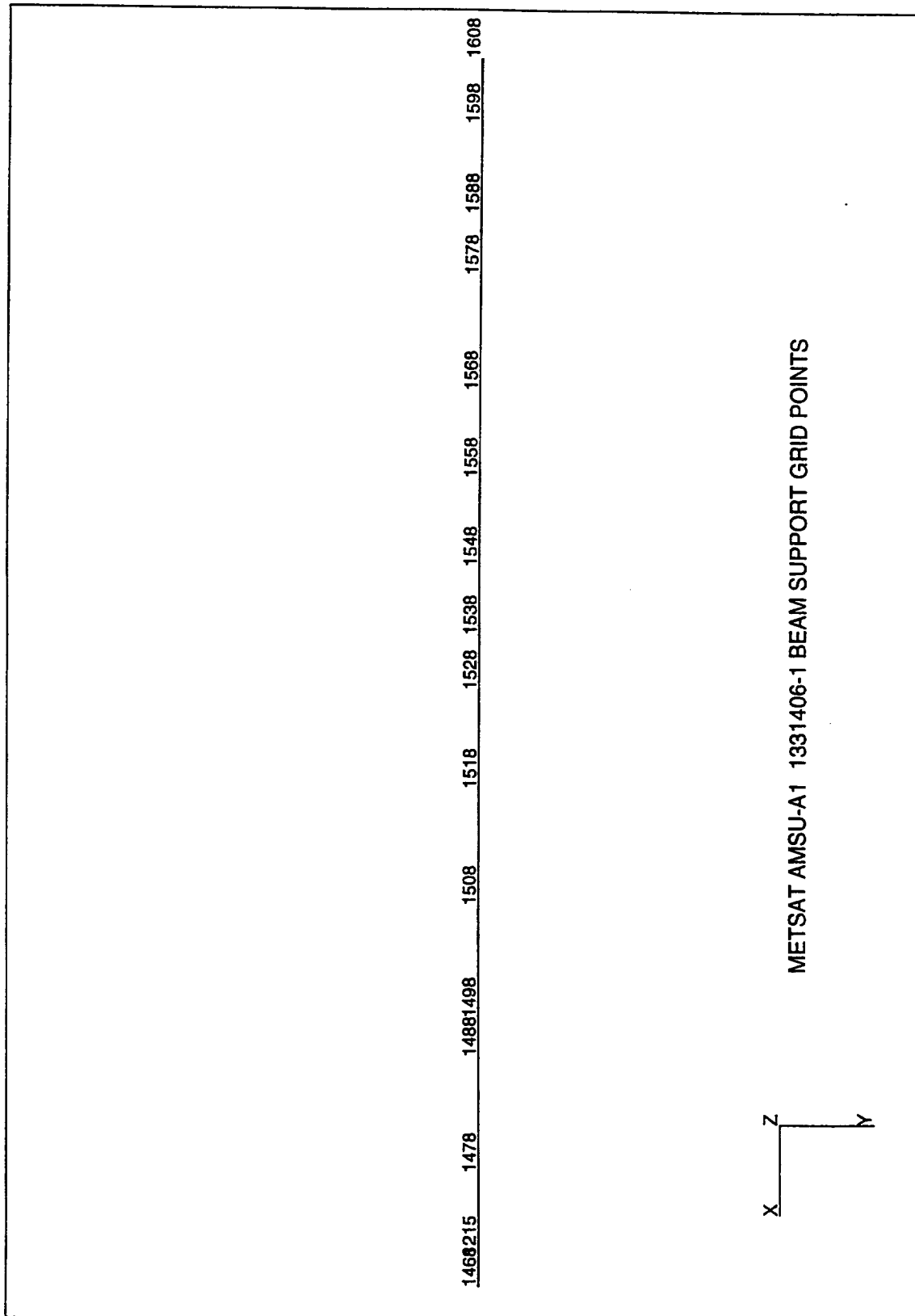


Figure A-103 METSAT AMSU-A1 1331406-1 Beam Support Grid Points

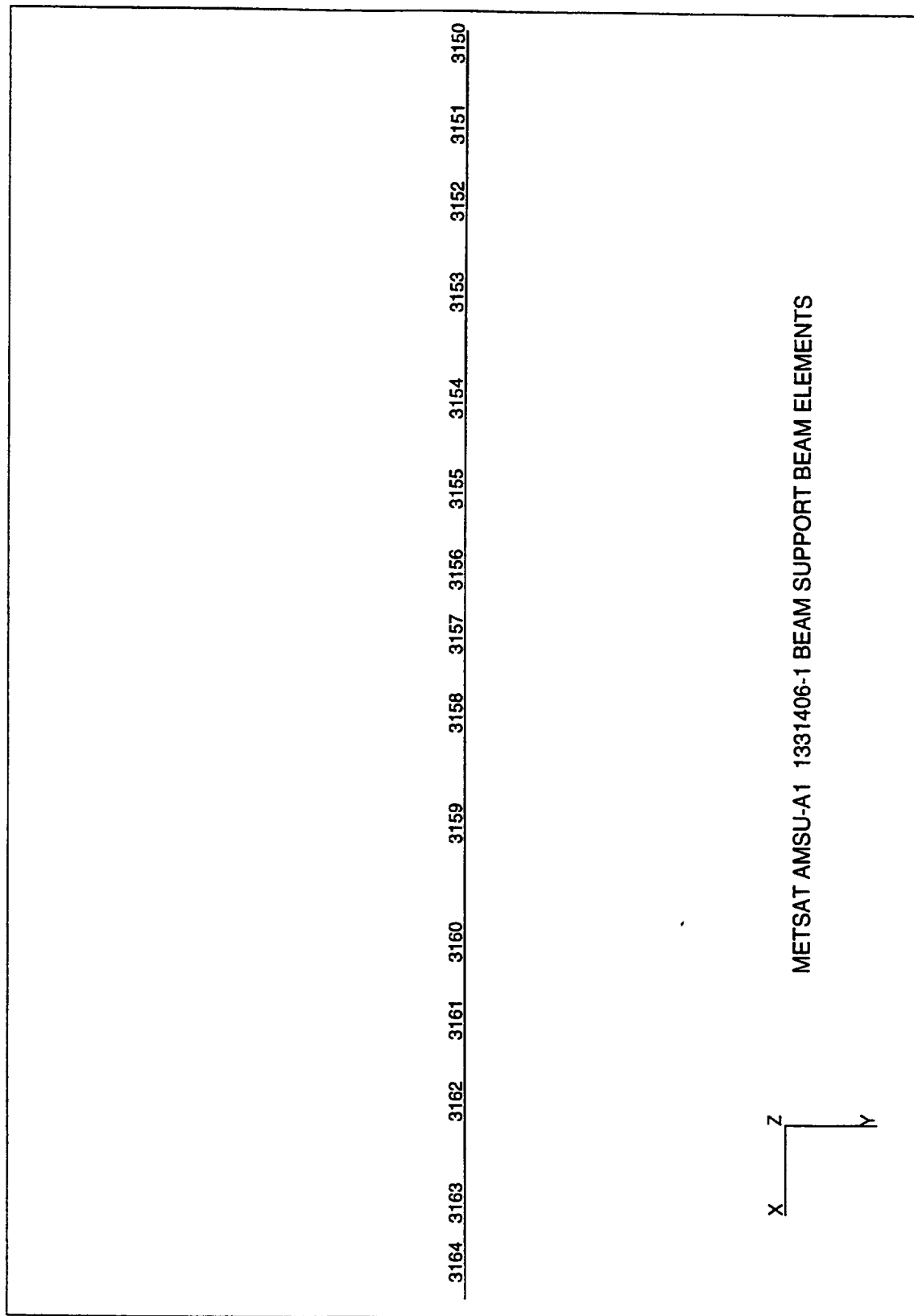
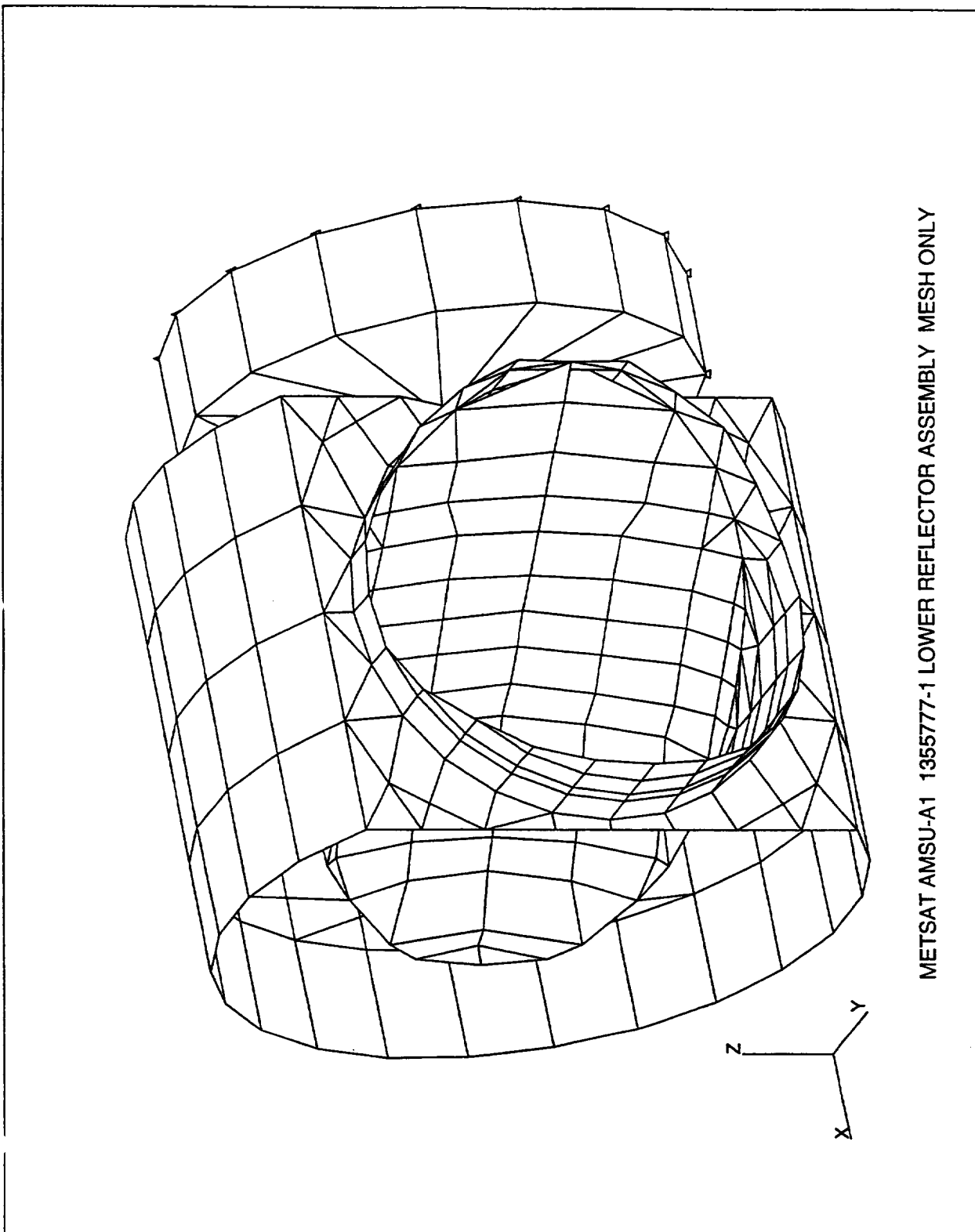


Figure A-104 METSAT AMSU-A1 1331406-1 Beam Support Beam Elements



**Figure A-105 METSAT AMSU-A1 1355777-1 Lower Reflector Assembly Mesh Only**

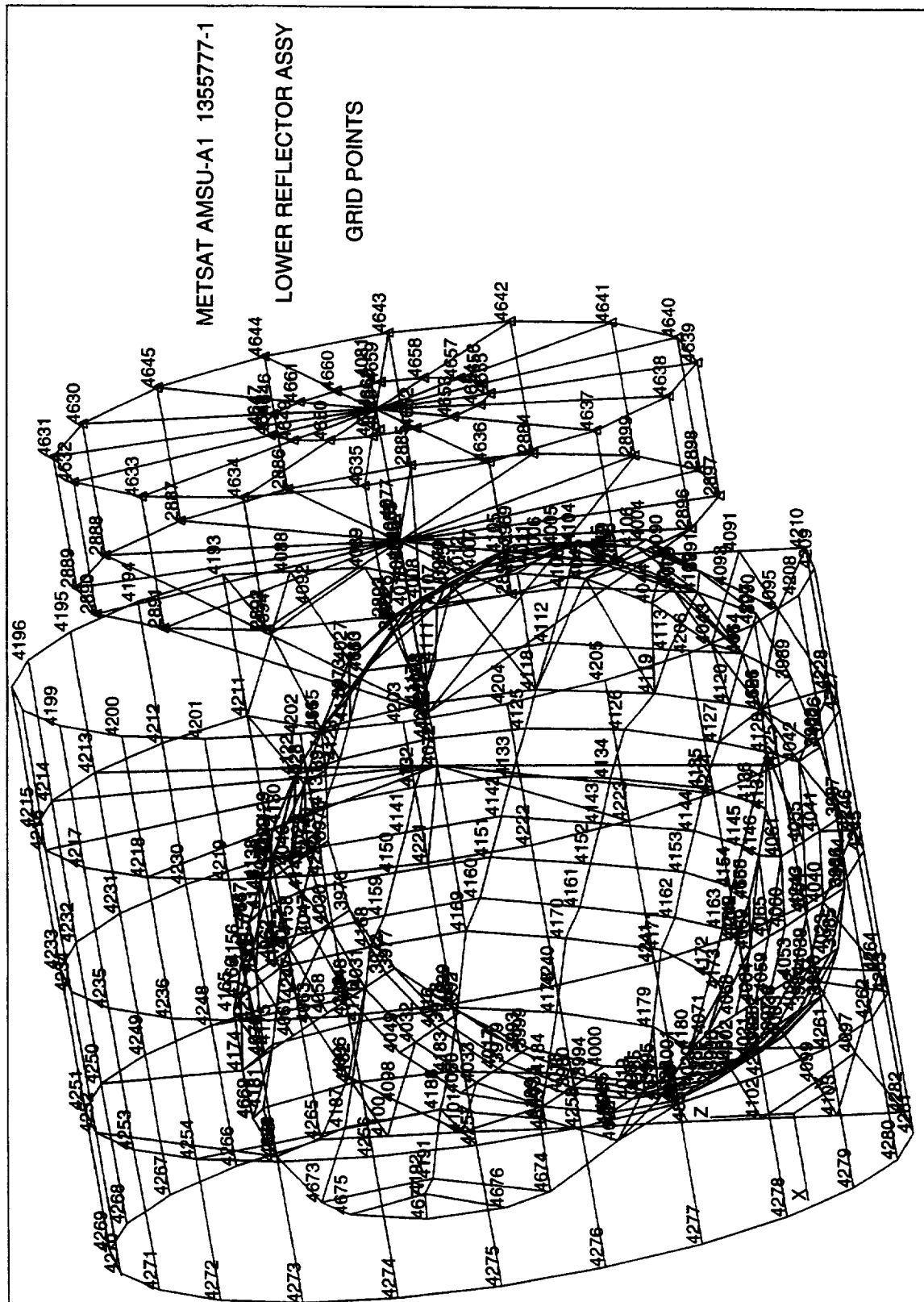
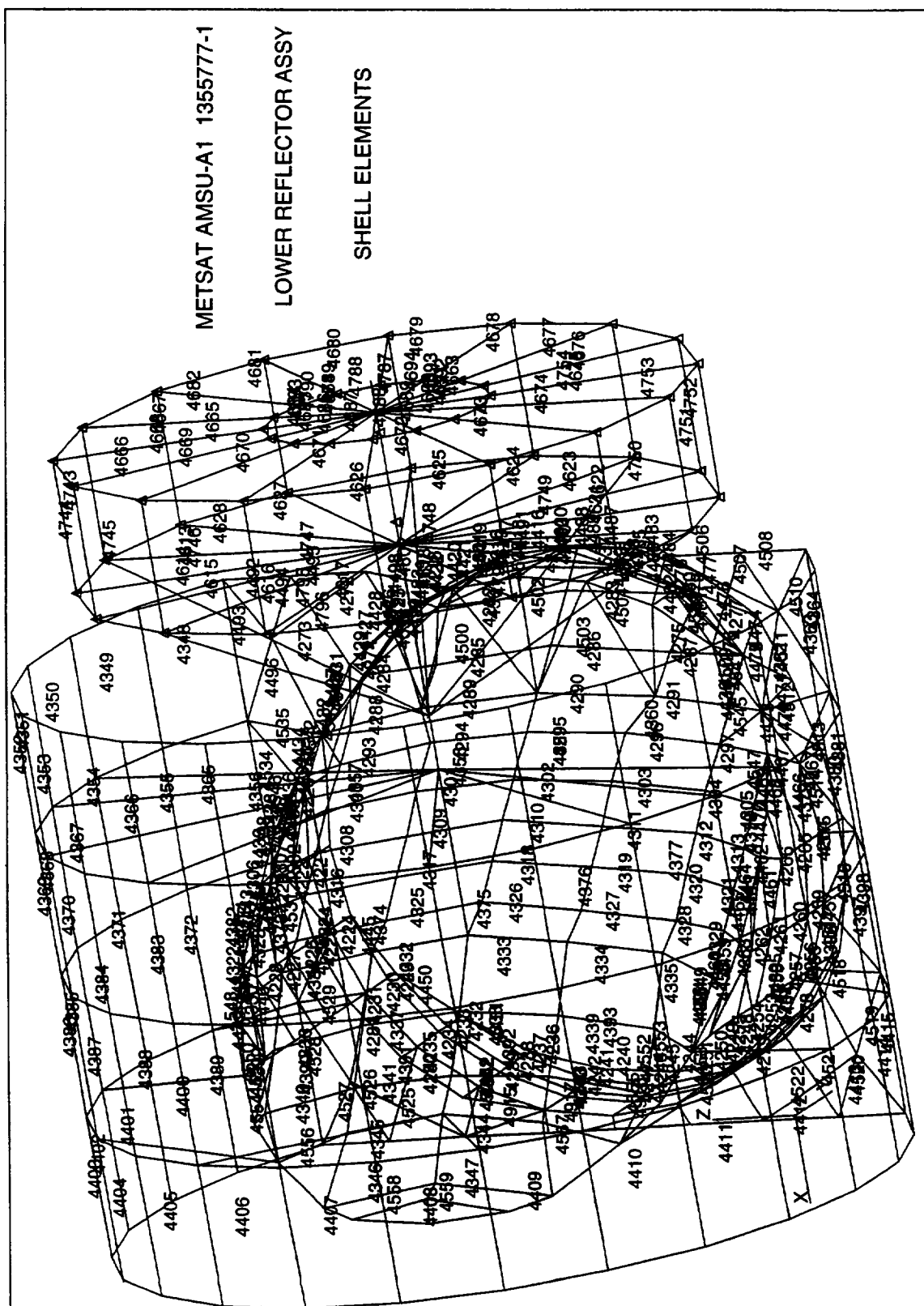


Figure A-106 METSAT AMSU-A1 1355777-1 Lower Reflector Assembly Grid Points



**Figure A-107 METSAT AMSU-A1 1355777-1 Lower Reflector Assembly Shell Elements**

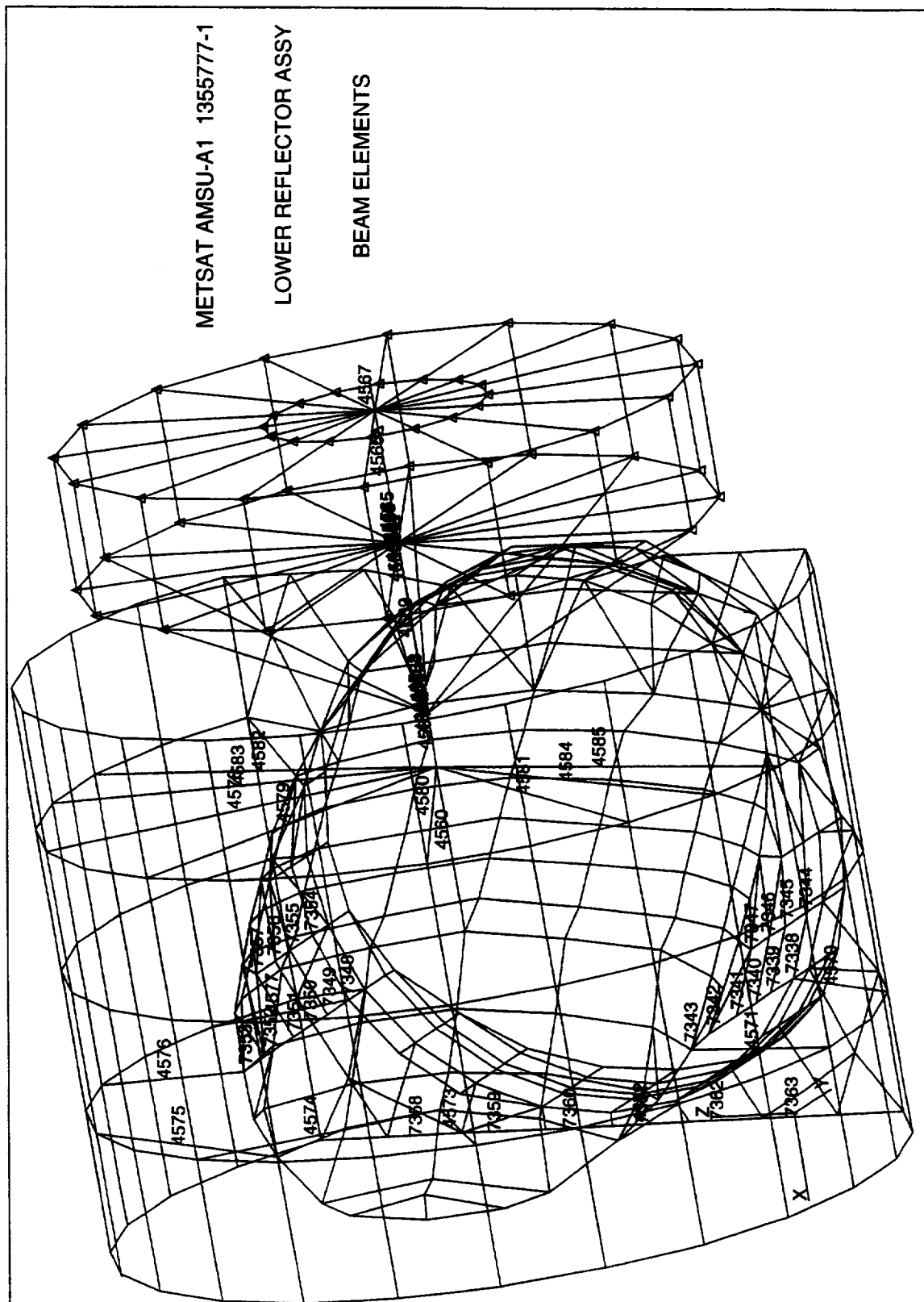


Figure A-108 METSAT AMSU-A1 1355777-1 Lower Reflector Assembly Beam Elements

A-107

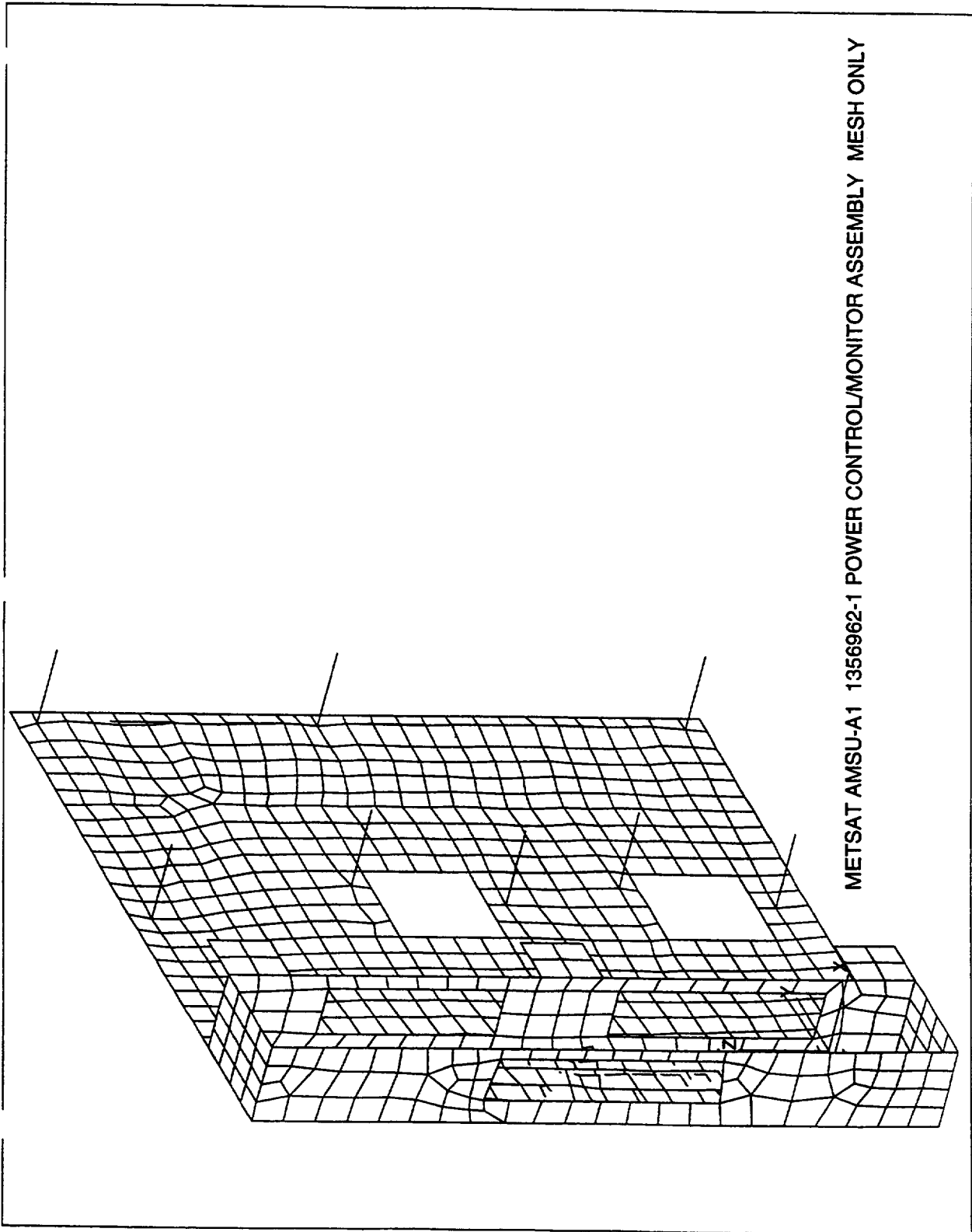


Figure A-110 METSAT AMSU-A1 1356962-1 Power Control/Monitor Assembly Mesh Only

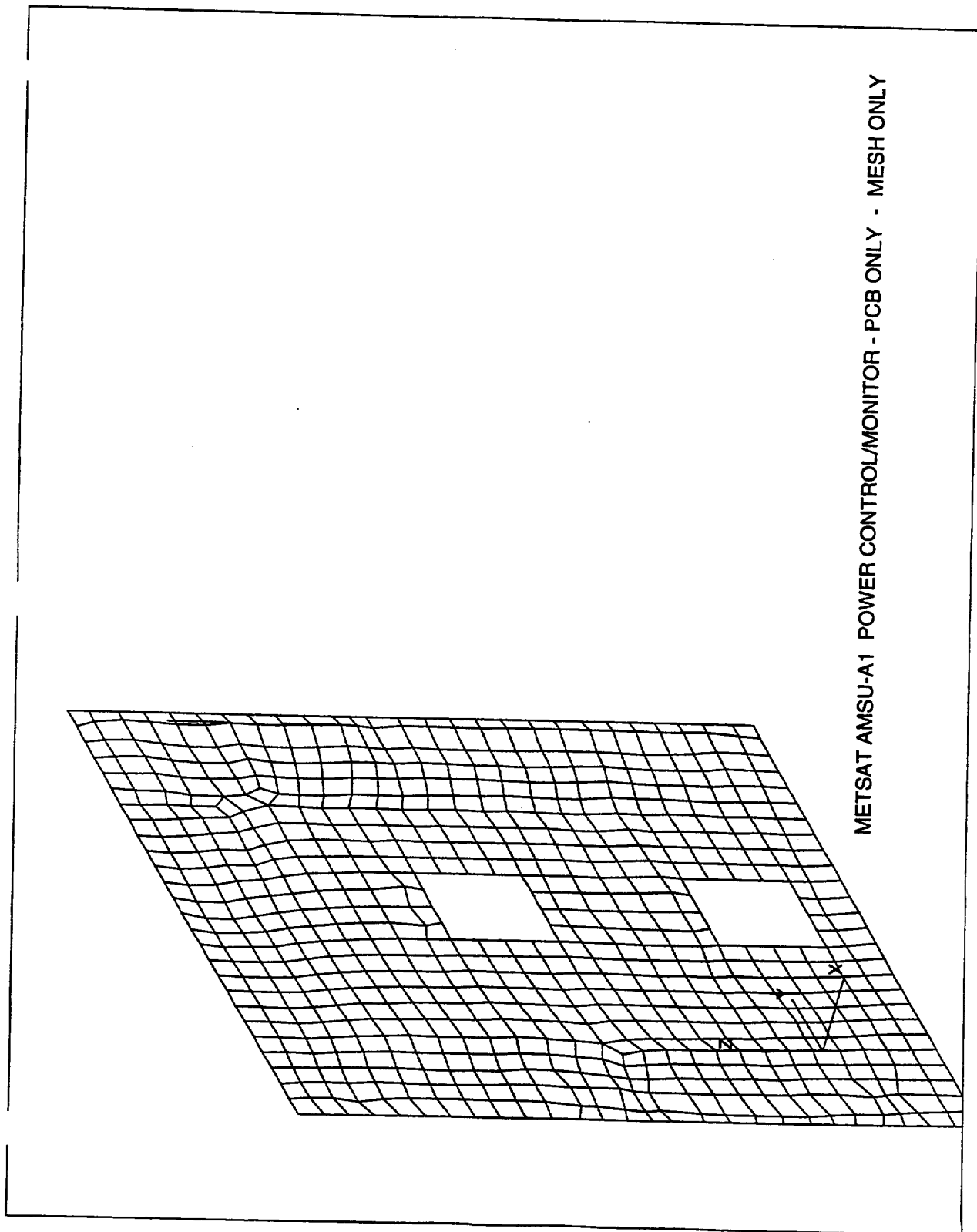
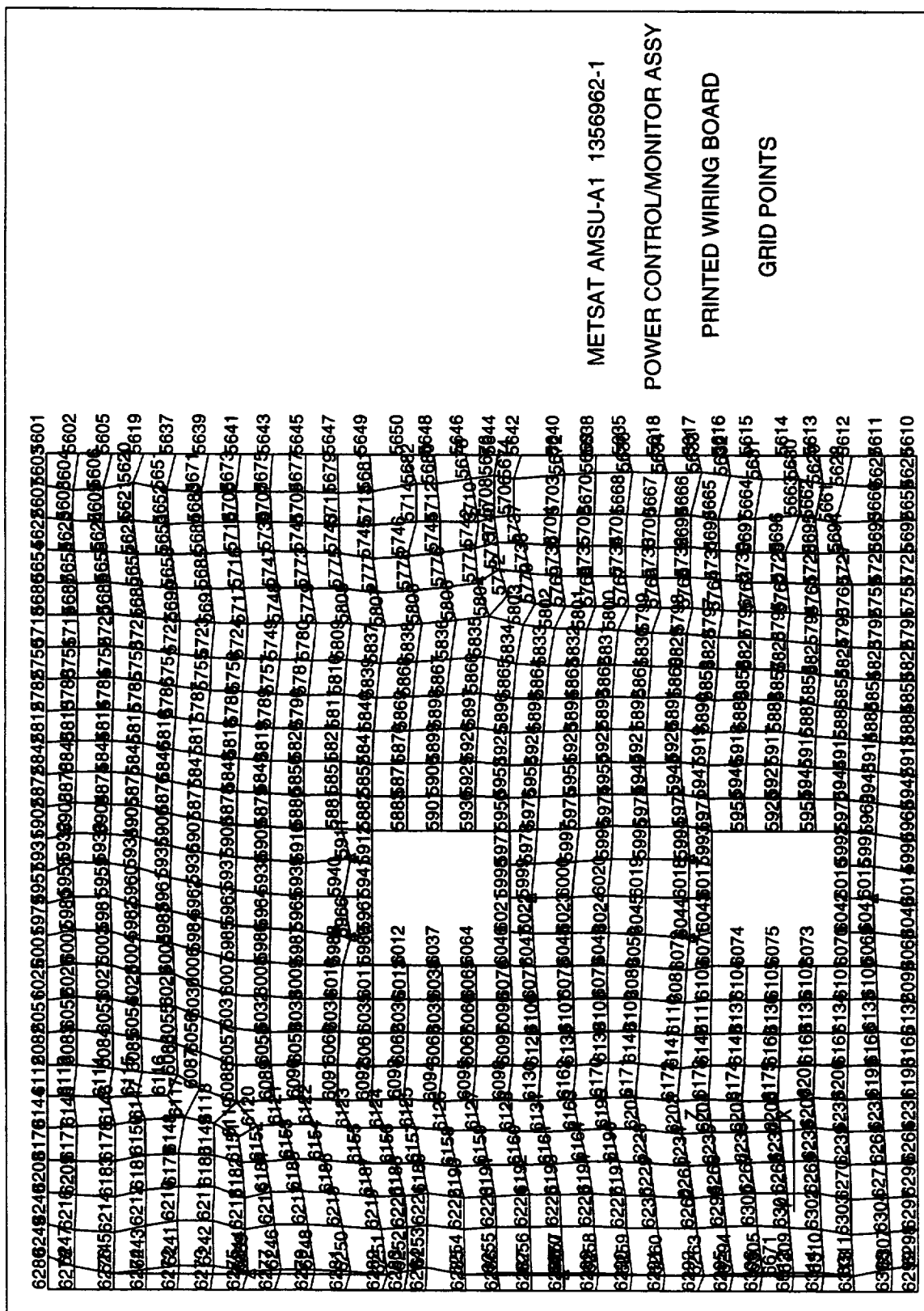


Figure A-111 METSAT AMSU-A1 Power Control/Monitor - PCB Only - Mesh Only



**Figure A-112 METSAT AMSU-A1 1356962-1 Power Control/Monitor Assembly Printed Wiring Board Grid Points**

[illegible]

A-111

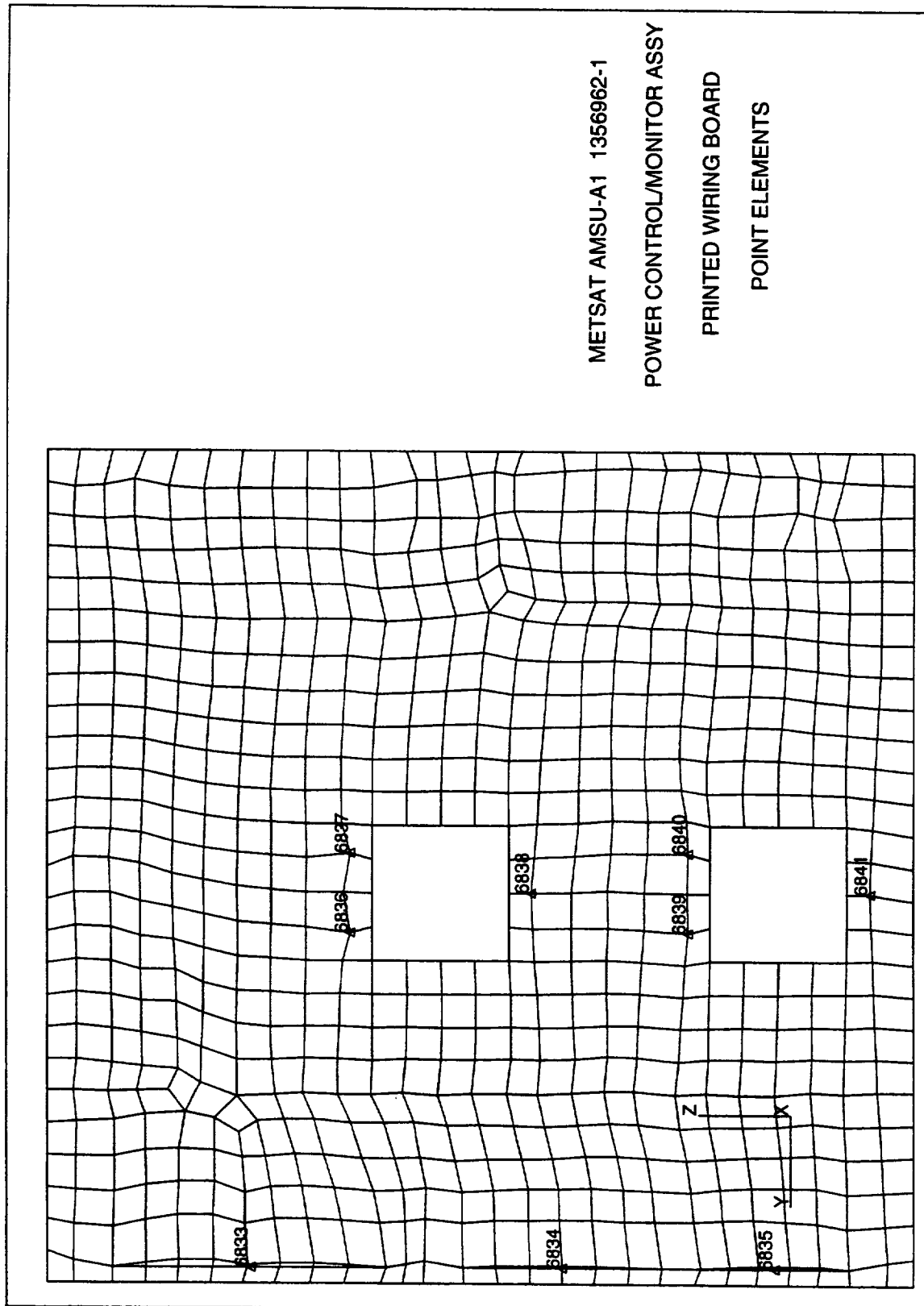


Figure A-114 METSAT AMSU-A1 1356962-1 Power Control/Monitor Assembly Printed Wiring Board Point Elements

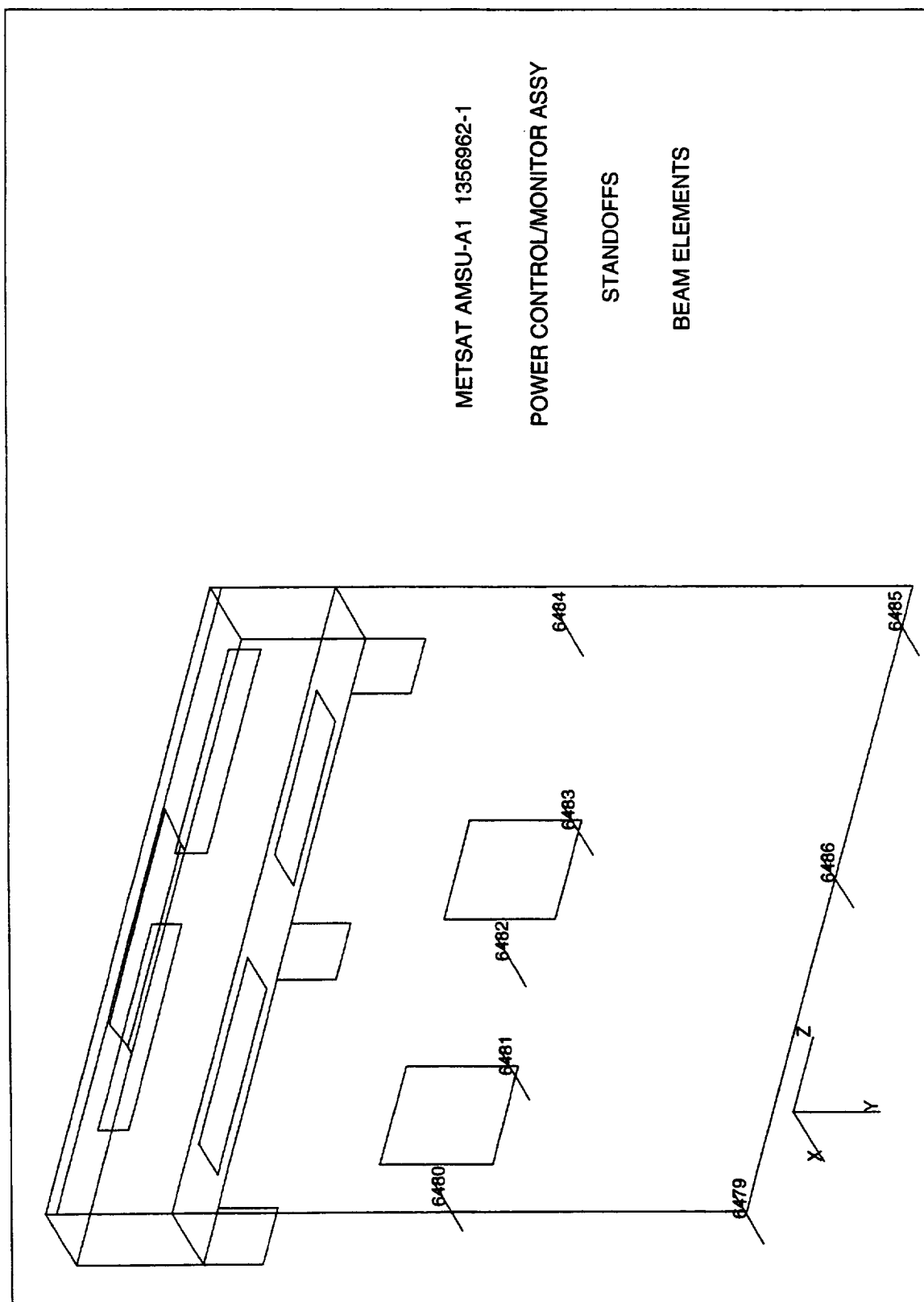


Figure A-115 METSAT AMSU-A1 1356962-1 Power Control/Monitor Assembly Standoffs Beam Elements

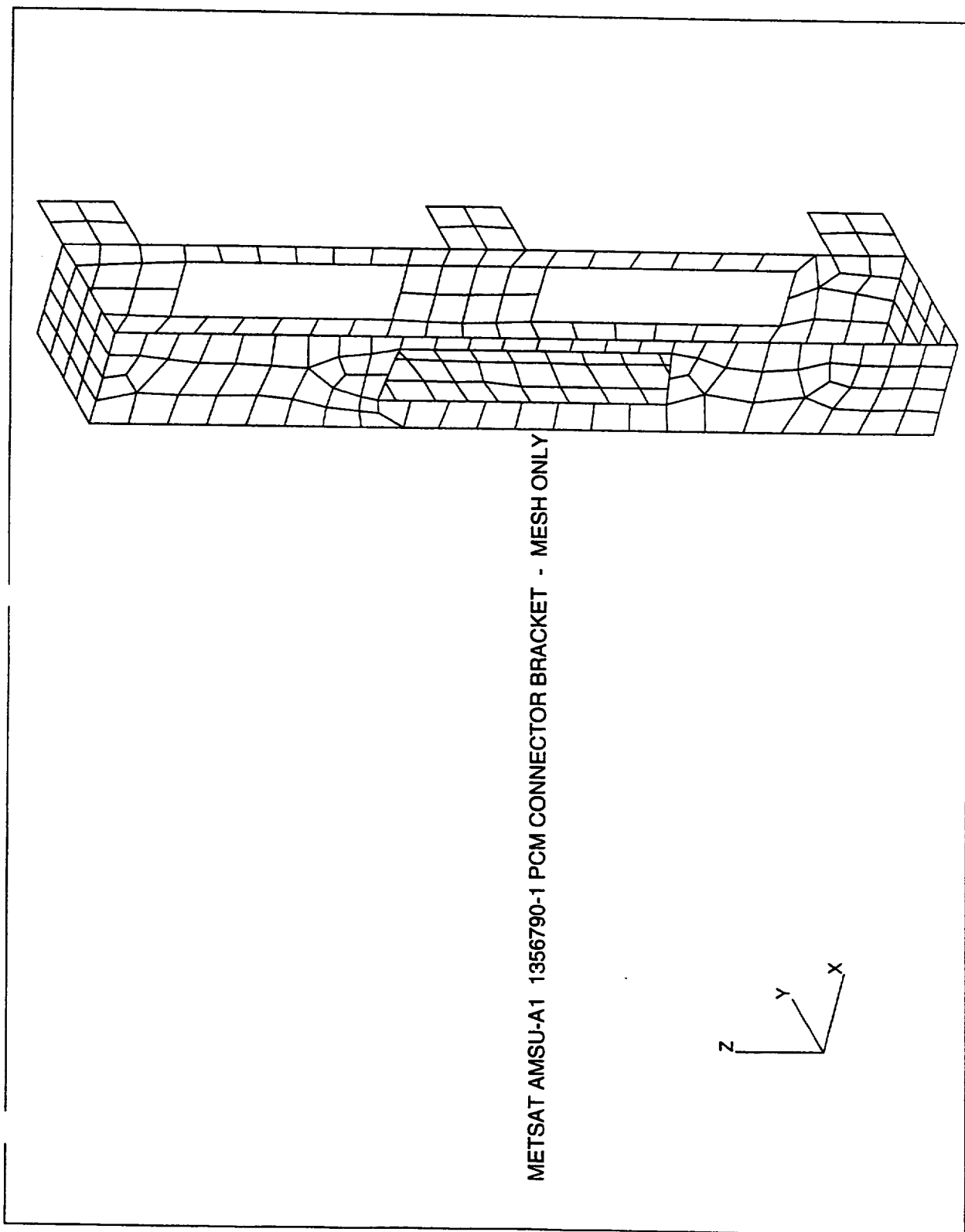
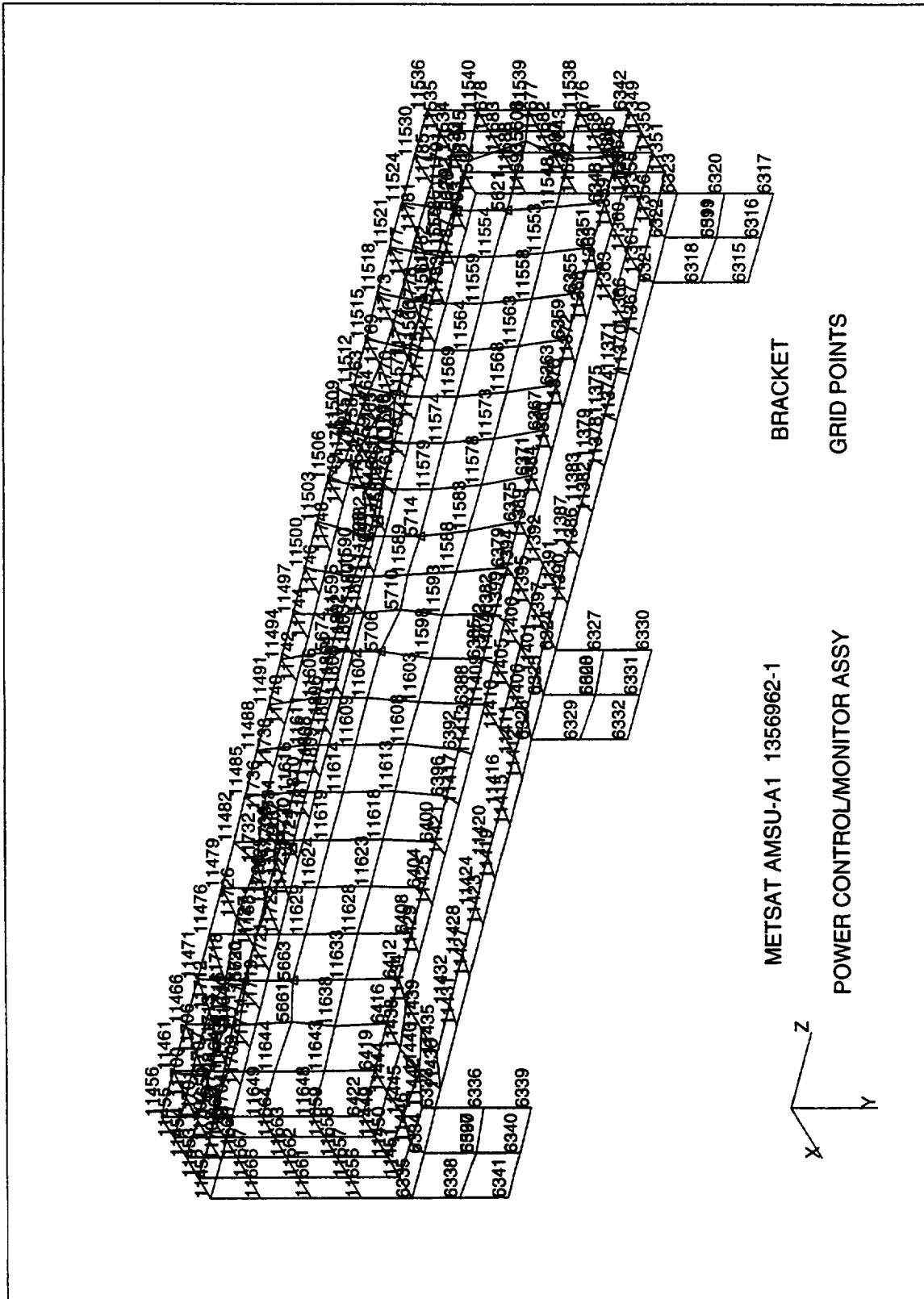
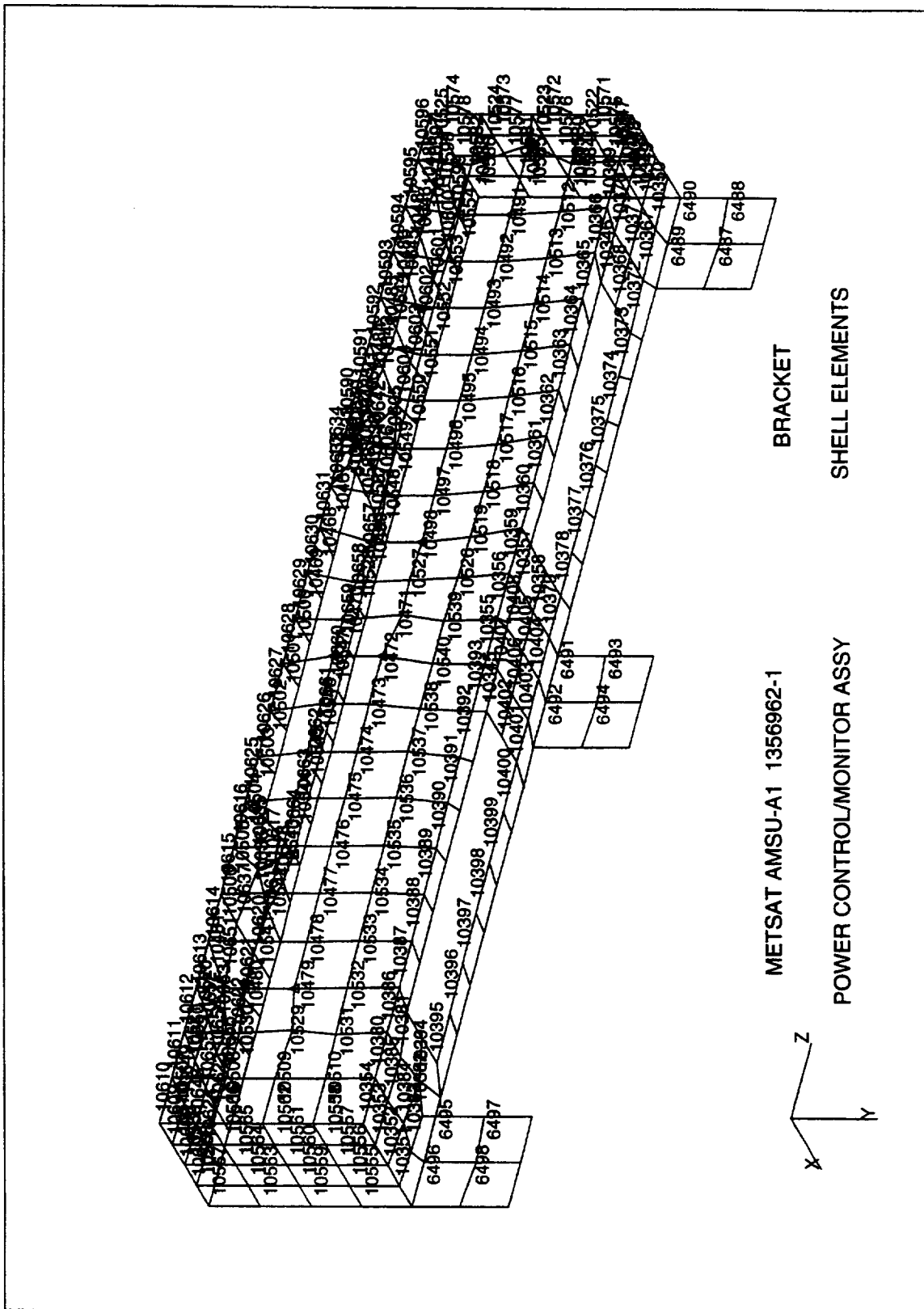


Figure A-116 METSAT AMSU-A1 1356790-1 PCM Connector Bracket Mesh Only





**Figure A-118 METSAT AMSU-A1 1356962-1 Bracket Power Control/Monitor Assembly Shell Elements**

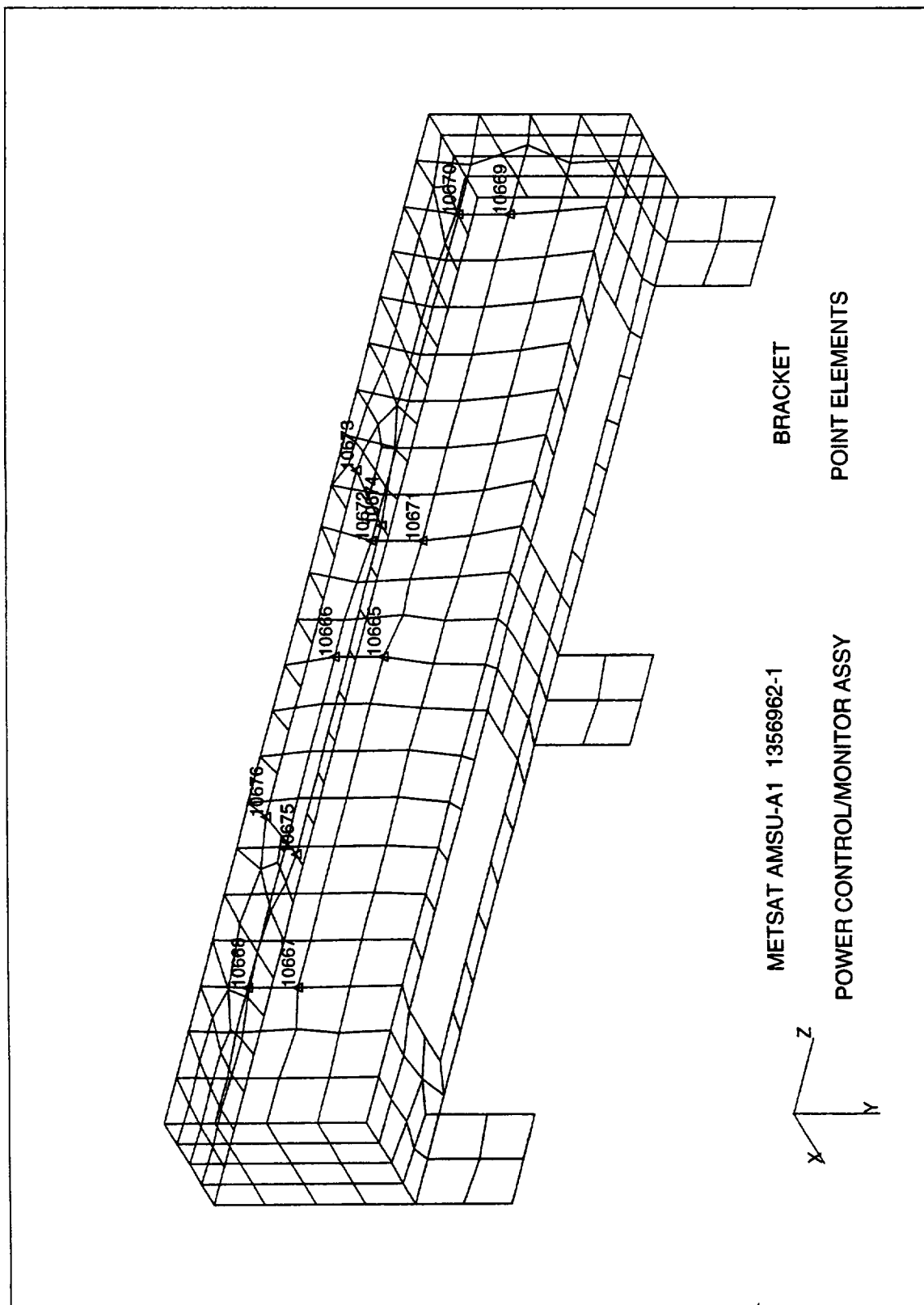
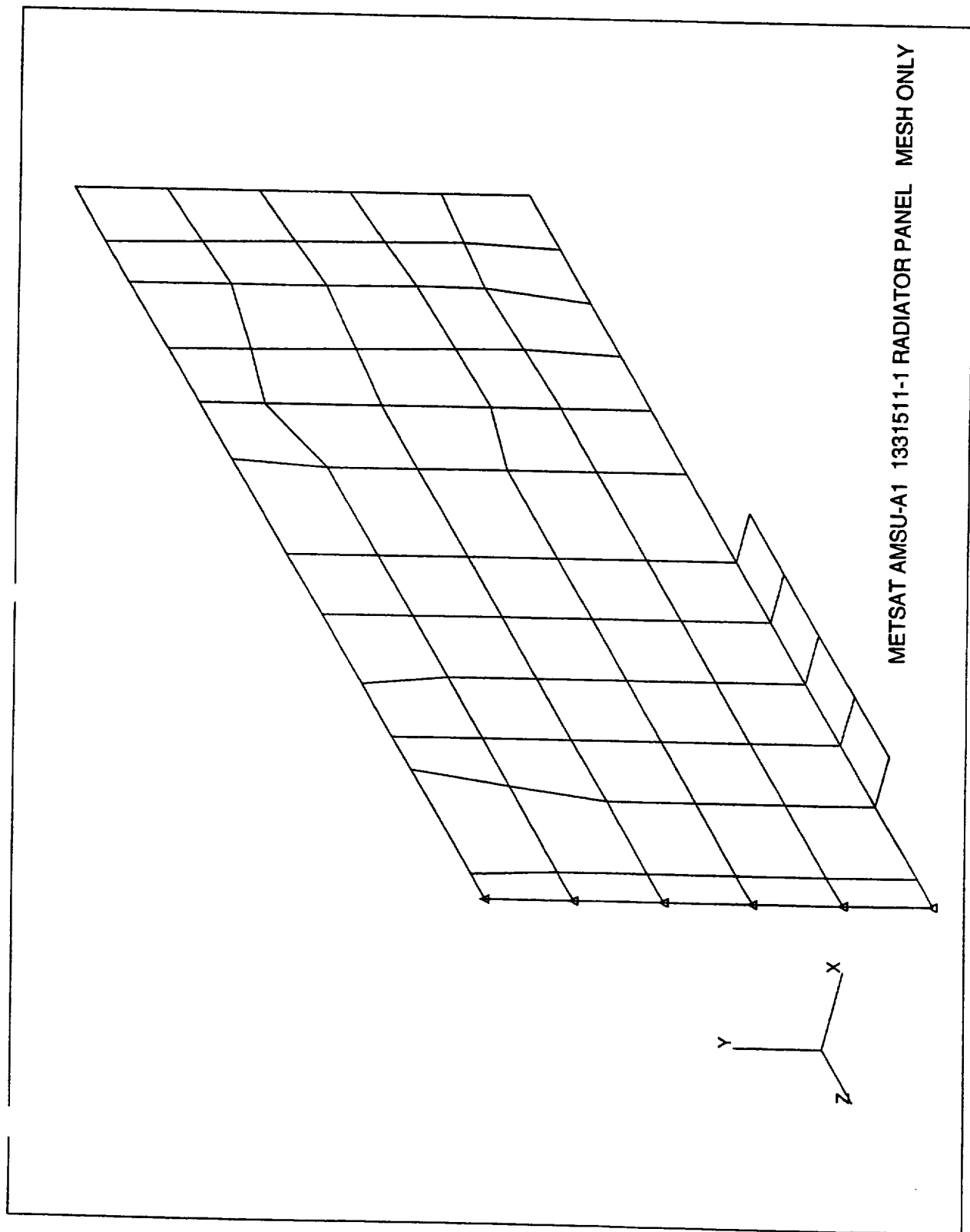


Figure A-119 METSAT AMSU-A1 1356962-1 Bracket Power Control/Monitor Assembly Point Elements



**Figure A-120 METSAT AMSU-A1 1331511-1 Radiator Panel Mesh Only**

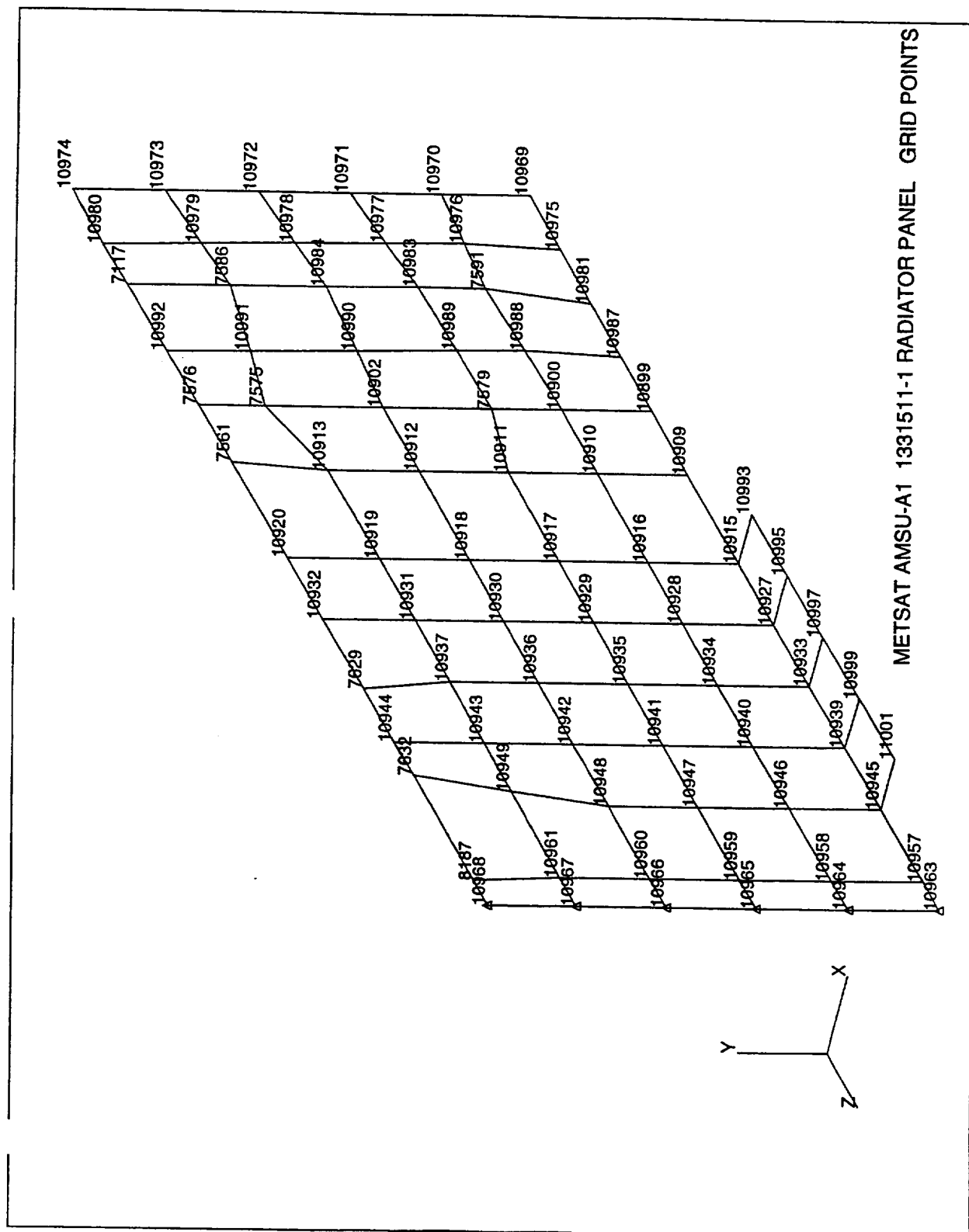


Figure A-121 METSAT AMSU-A1 1331511-1 Radiator Panel Grid Points

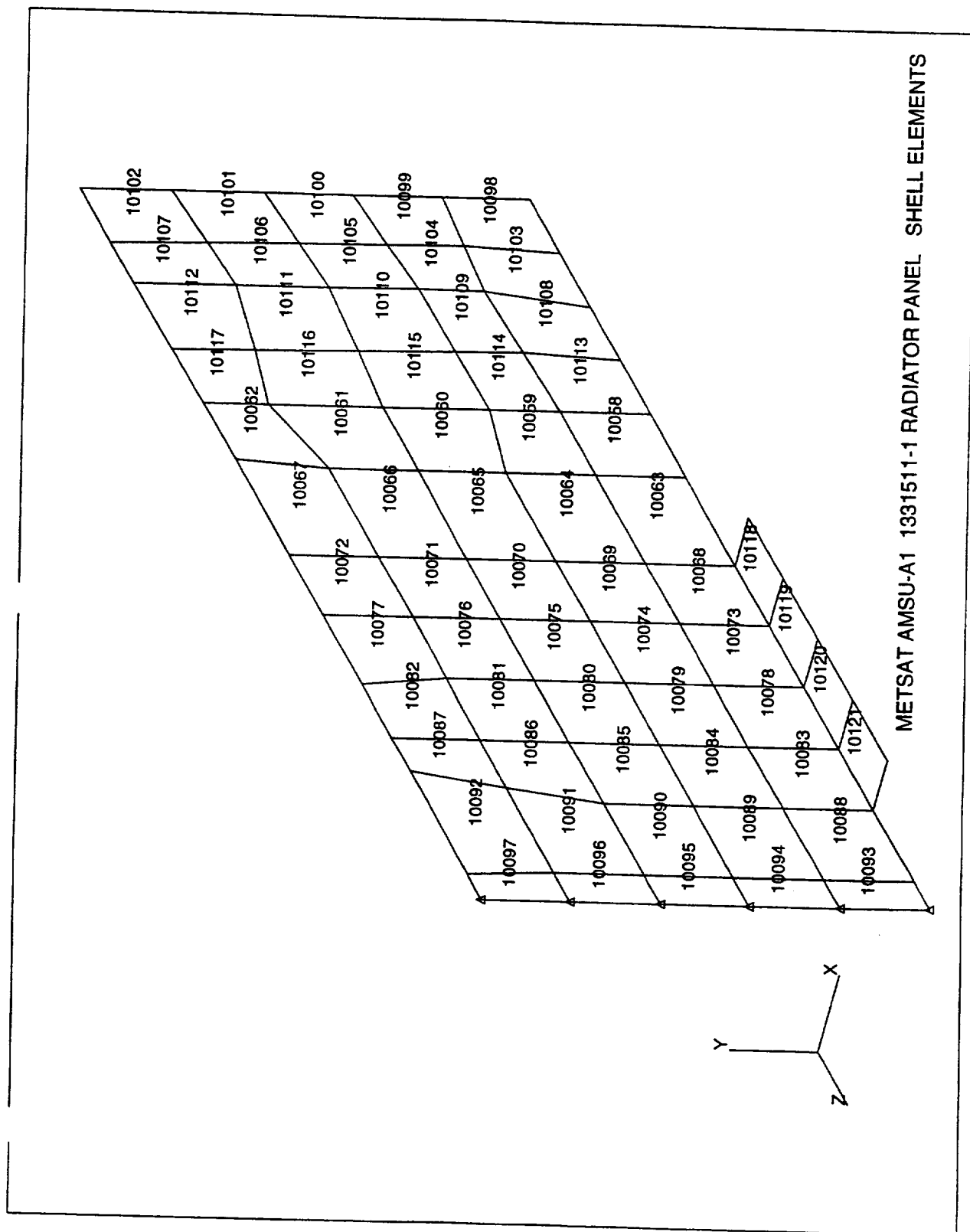


Figure A-122 METSAT AMSU-A1 1331511-1 Radiator Panel Shell Elements

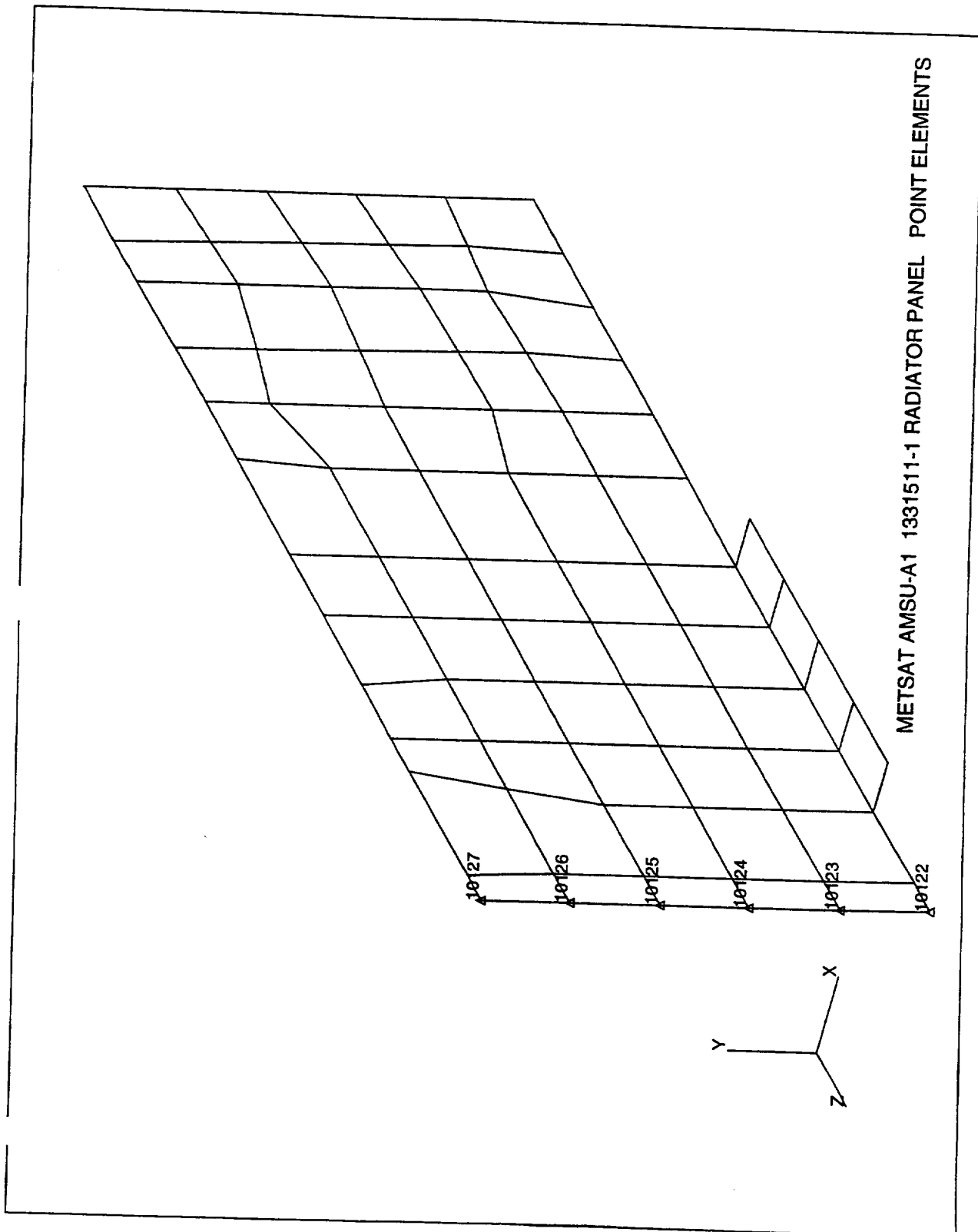


Figure A-123 METSAT AMSU-A1 1331511-1 Radiator Panel Point Elements

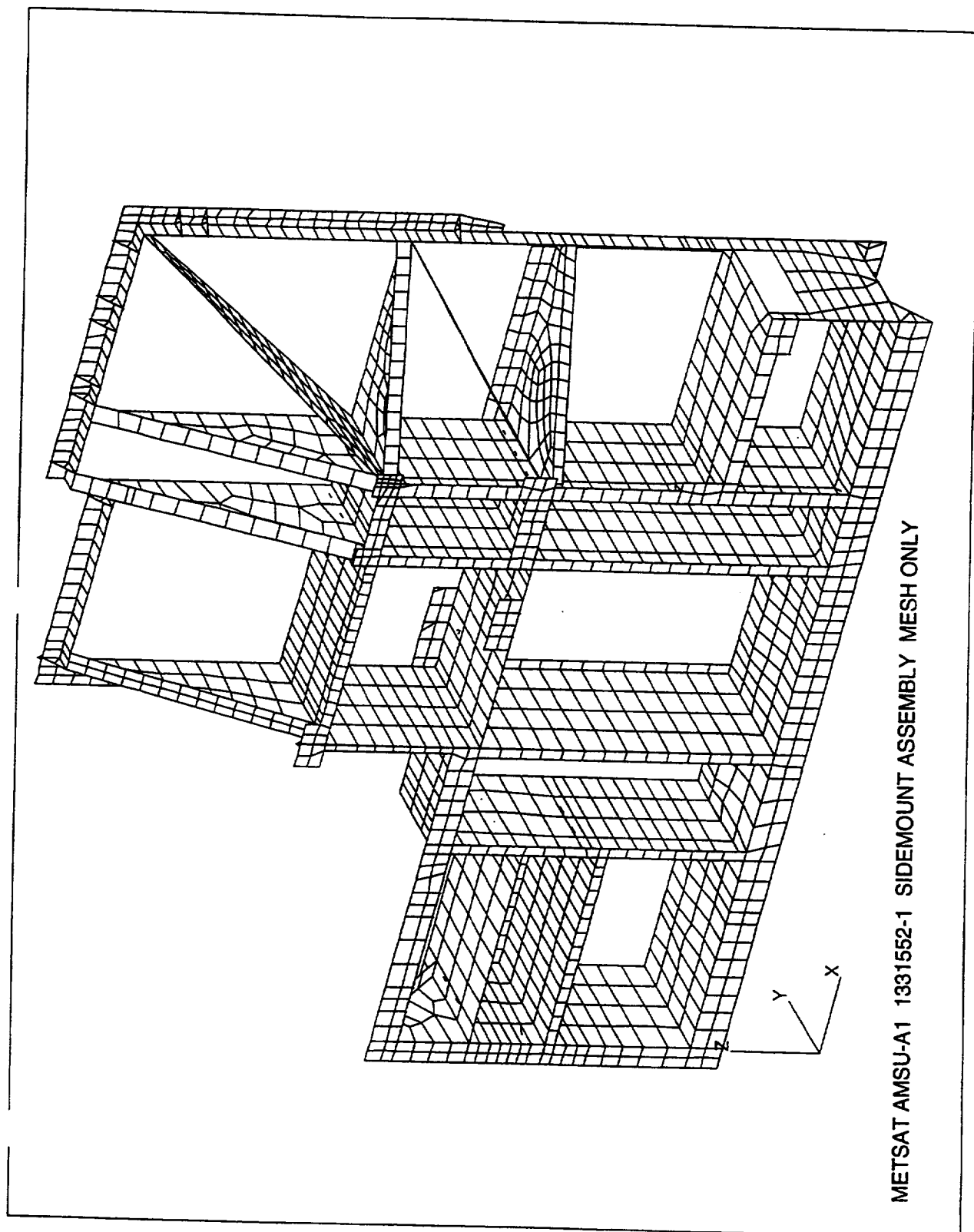
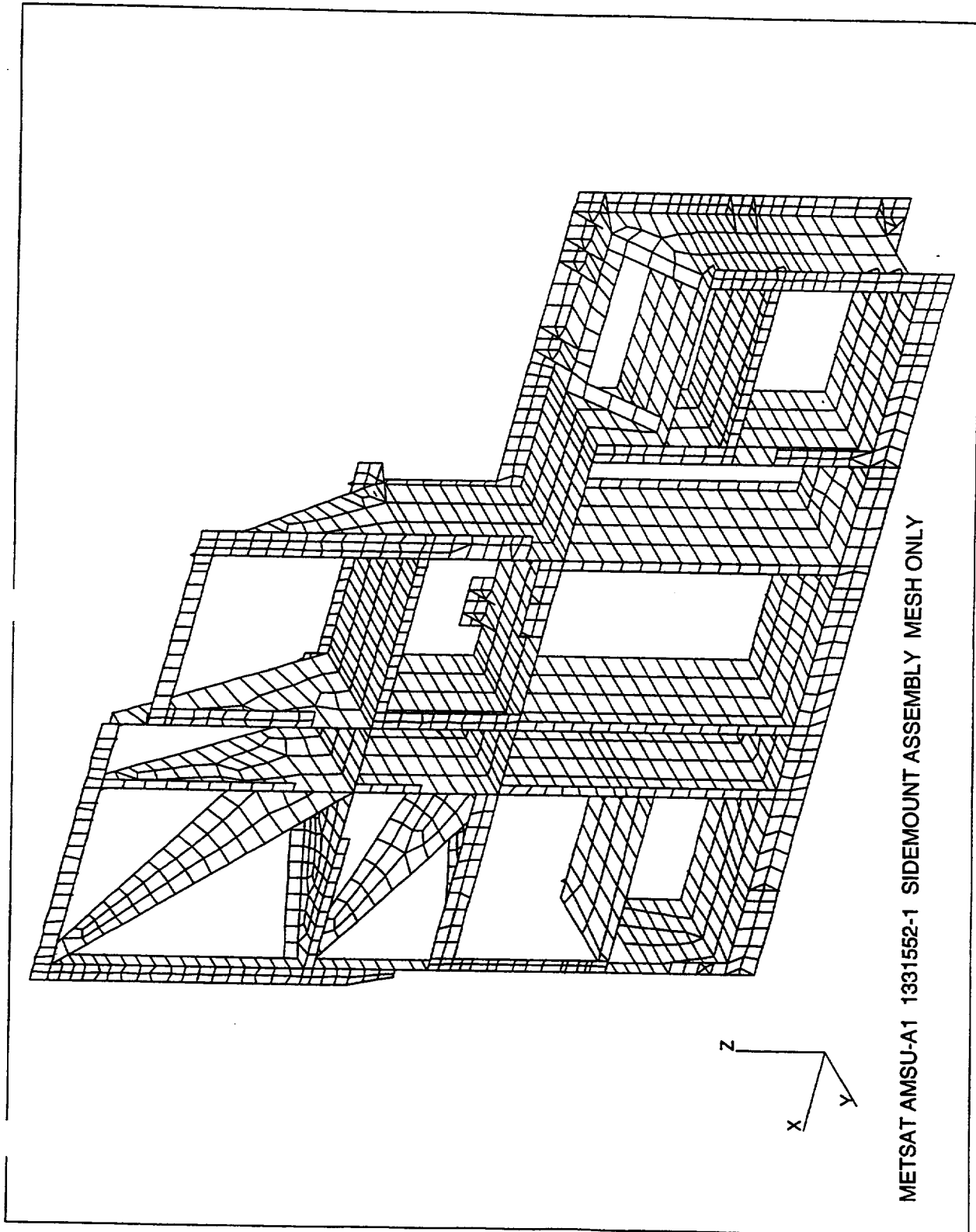


Figure A-124 METSAT AMSU-A1 1331552-1 Sidemount Assembly Mesh Only



**Figure A-125 METSAT AMSU-A1 1331552-1 Sidemount Assembly Mesh Only**

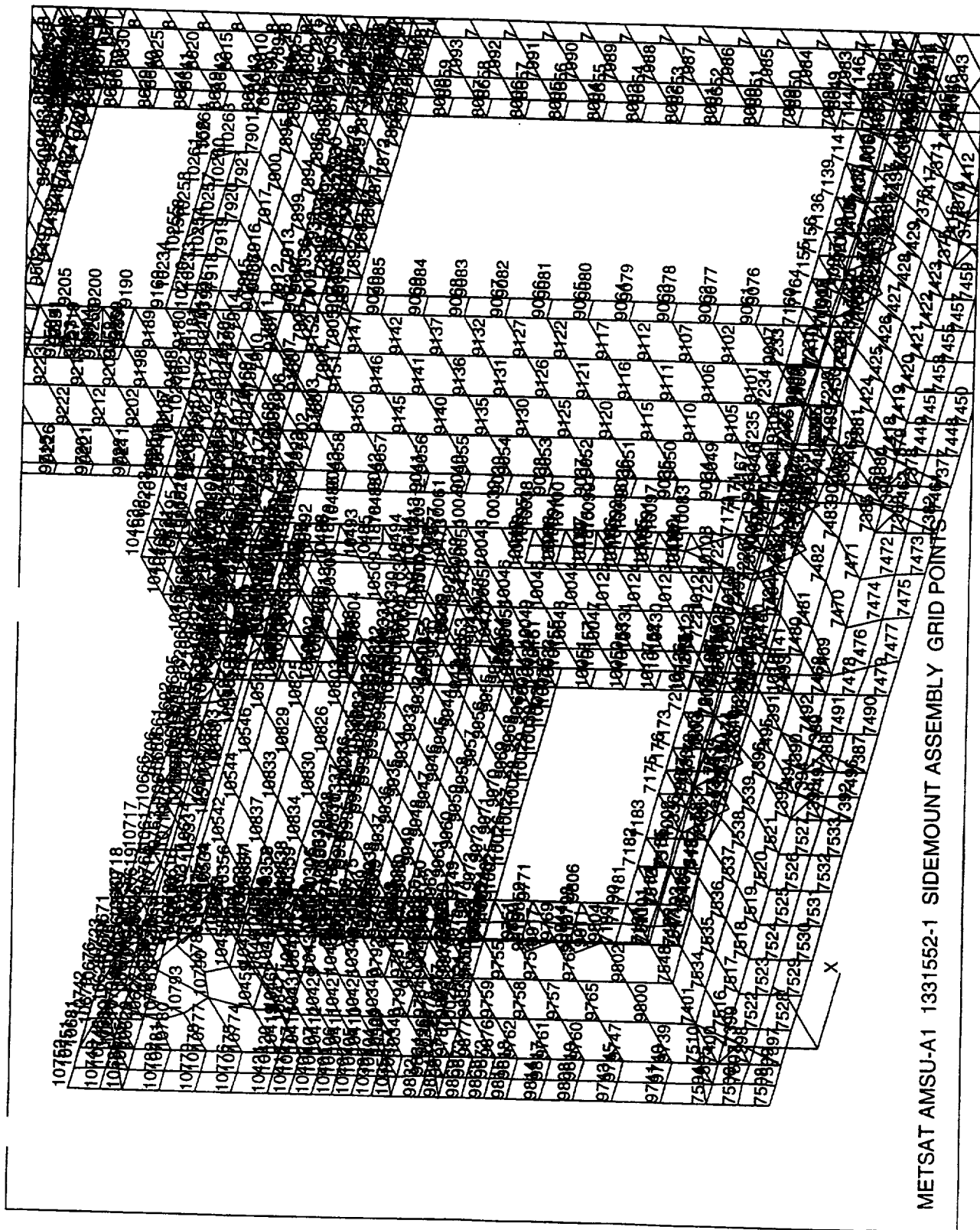


Figure A-126 METSAT AMSU-A1 1331552-1 Sidemount Assembly Grid Points

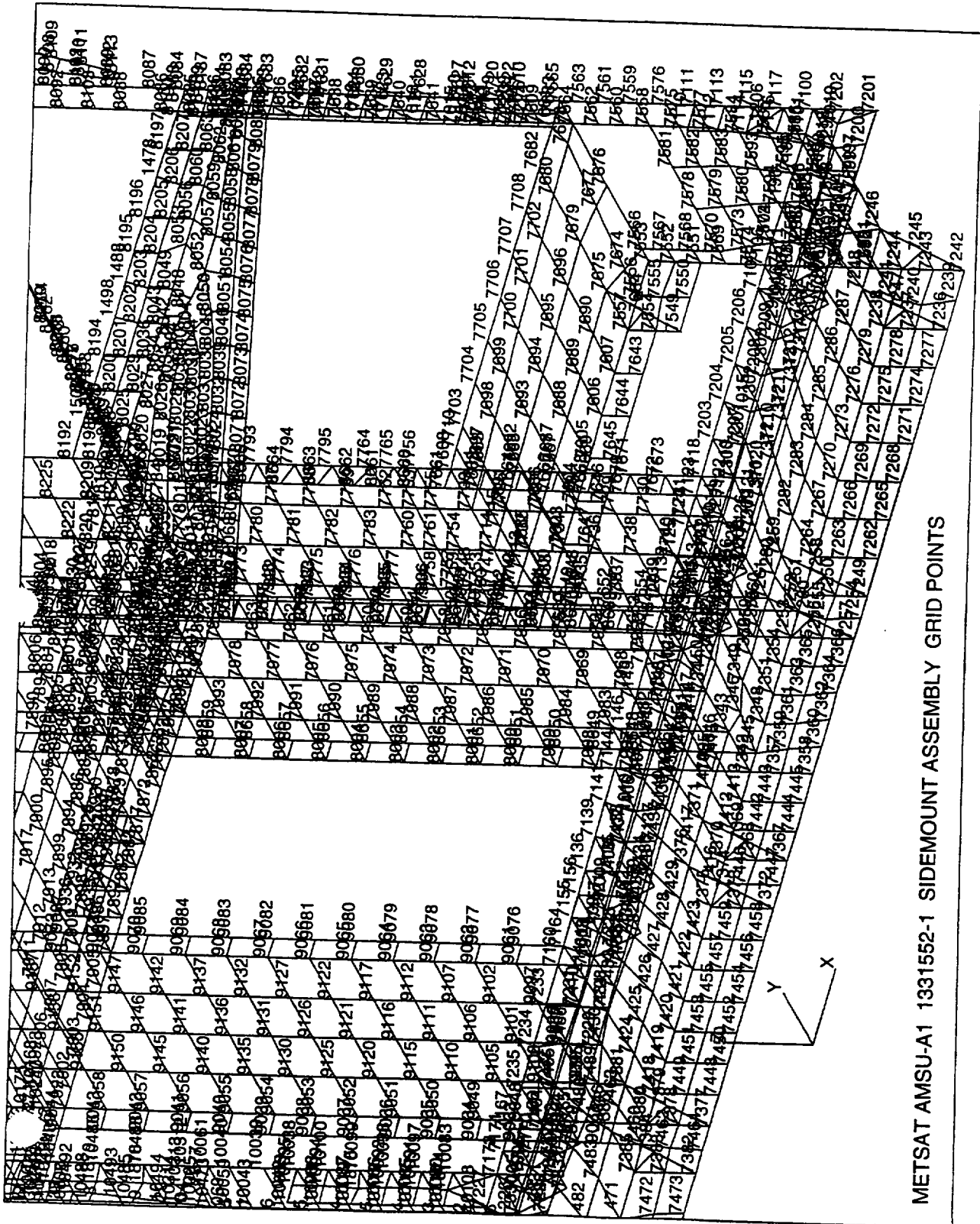


Figure A-127 METSAT AMSU-A1 1331552-1 Sidemount Assembly Grid Points

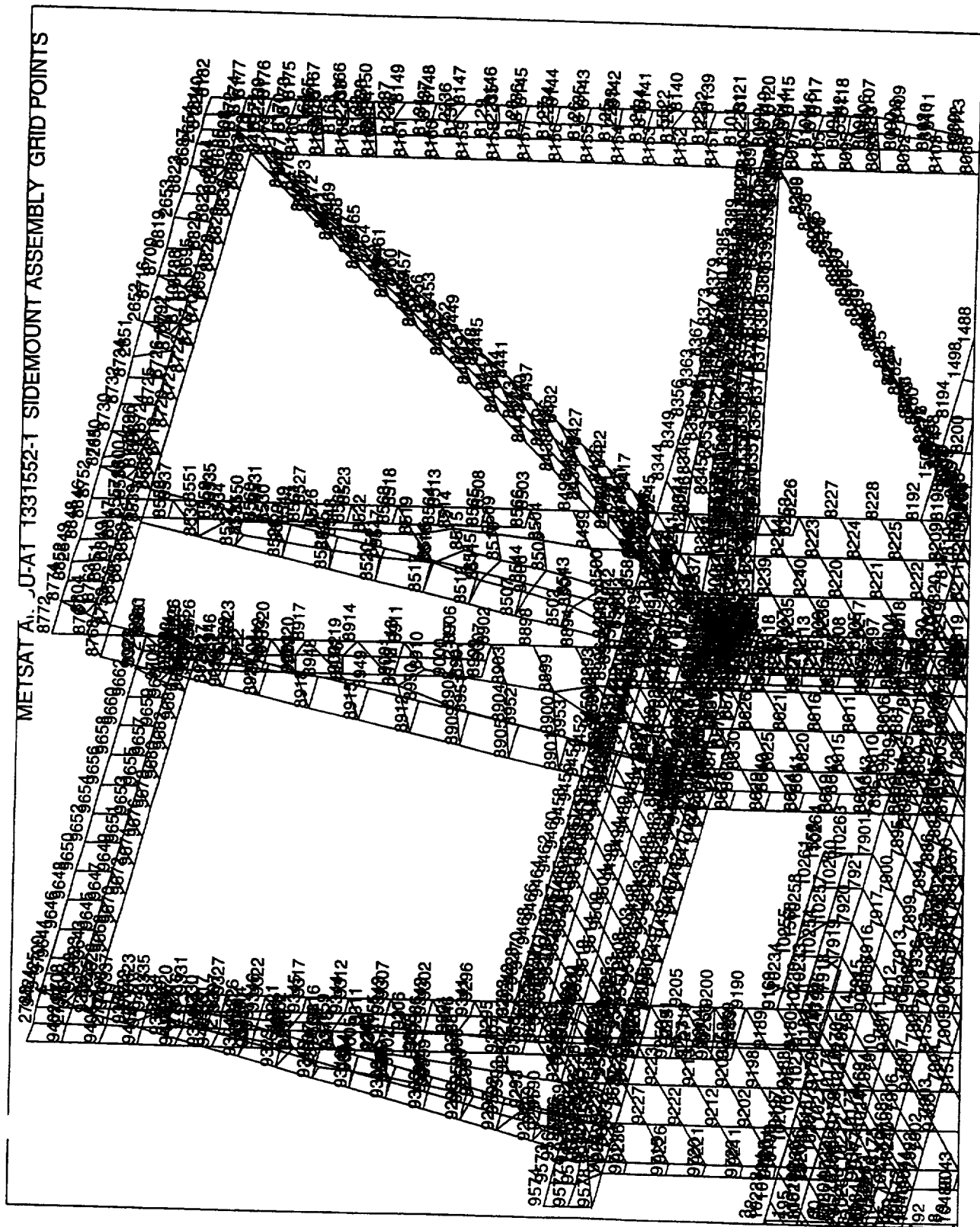


Figure A-128 METSAT AMSU-A1 1331552-1 Sidemount Assembly Grid Points

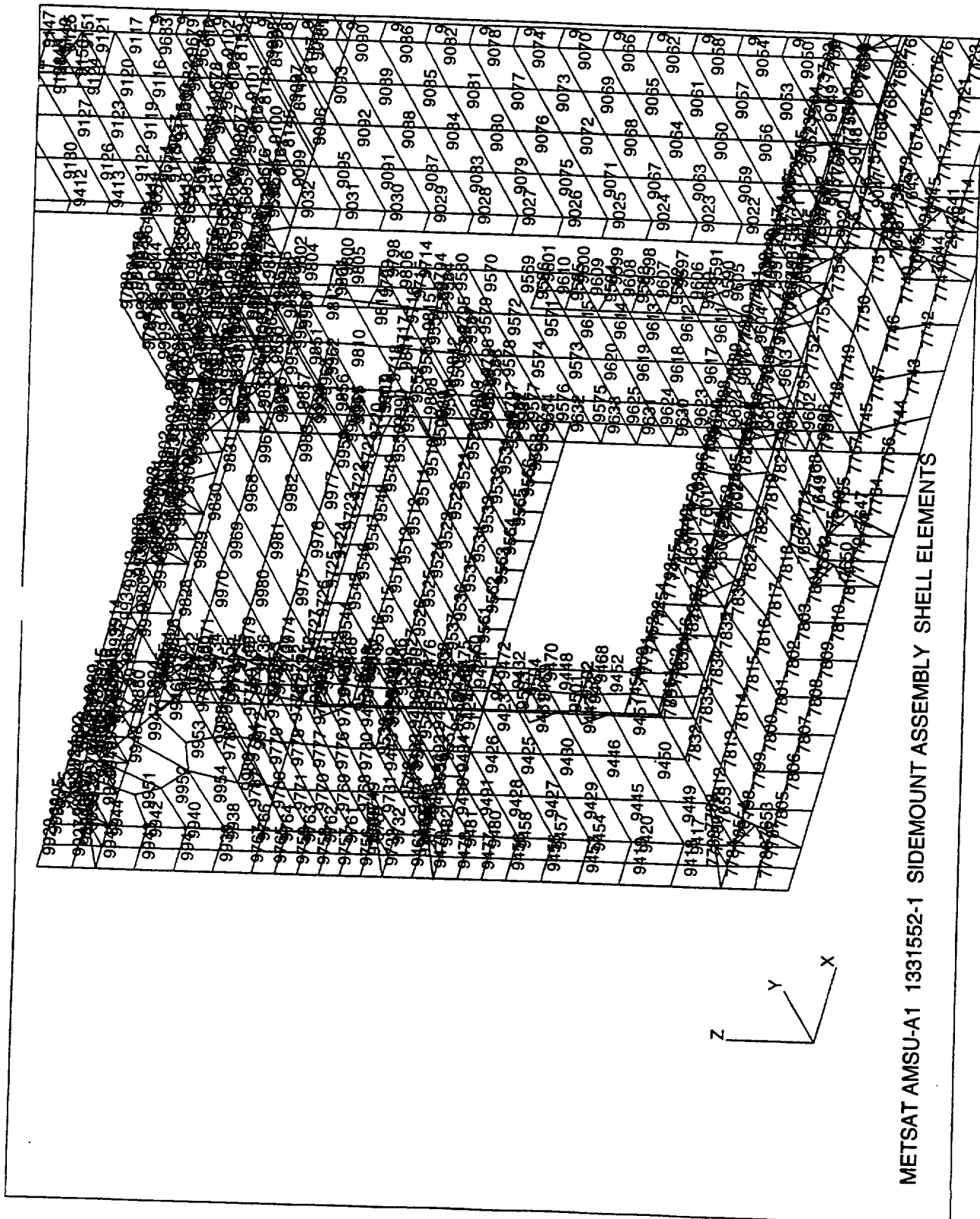


Figure A-129 METSAT AMSU-A1 1331552-1 Sidemount Assembly Shell Elements

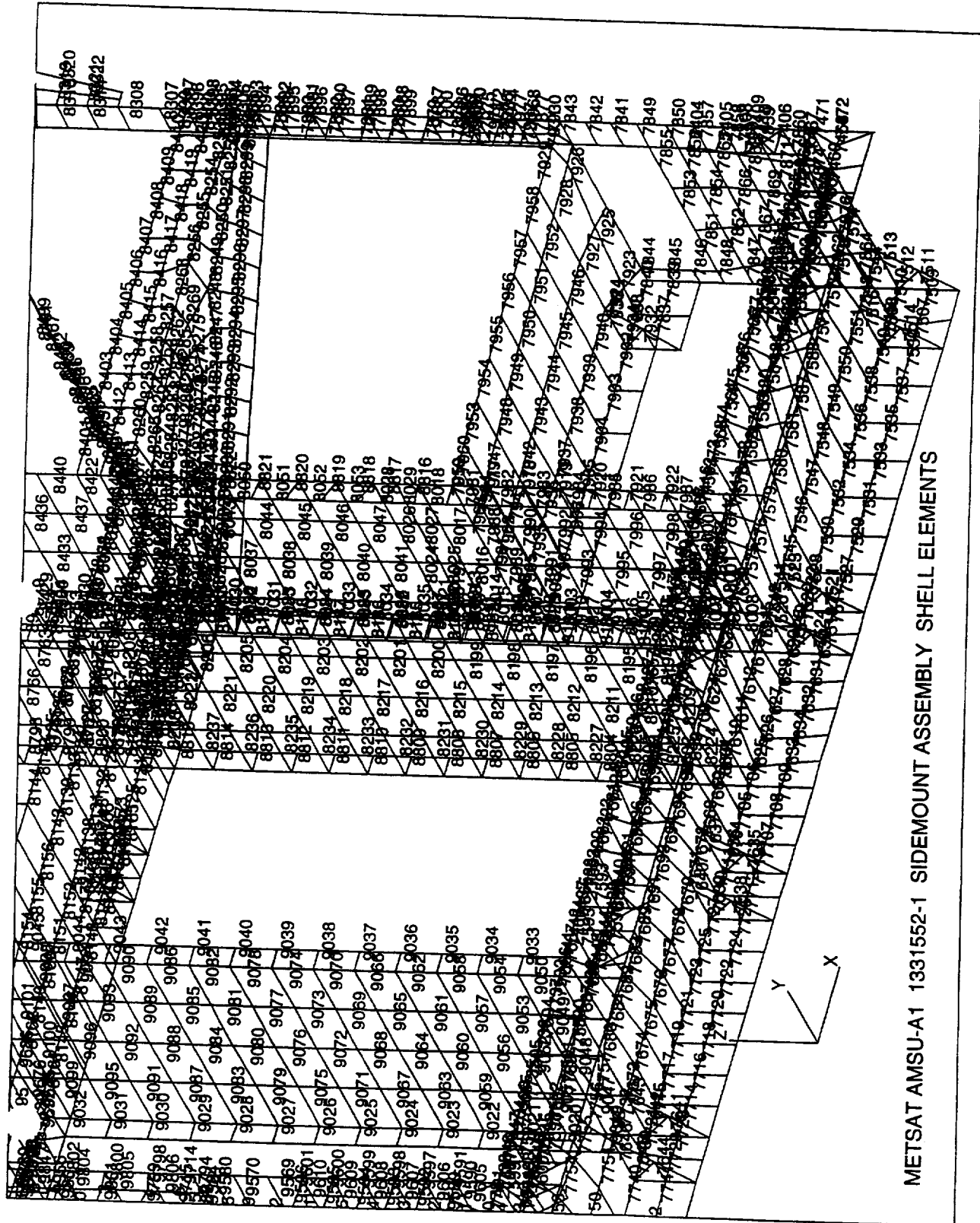


Figure A-130 METSAT AMSU-A1 1331552-1 Sidemount Assembly Shell Elements

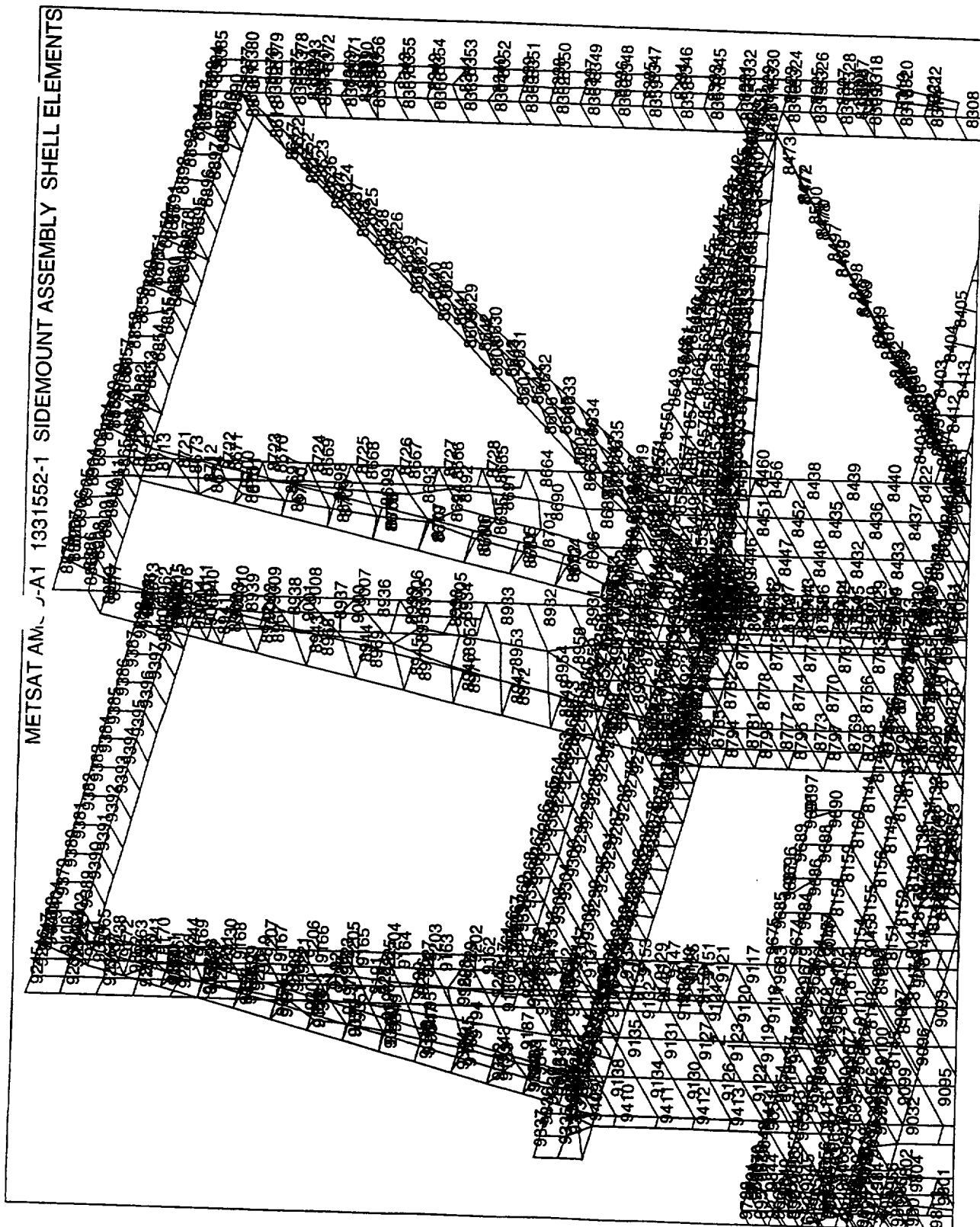
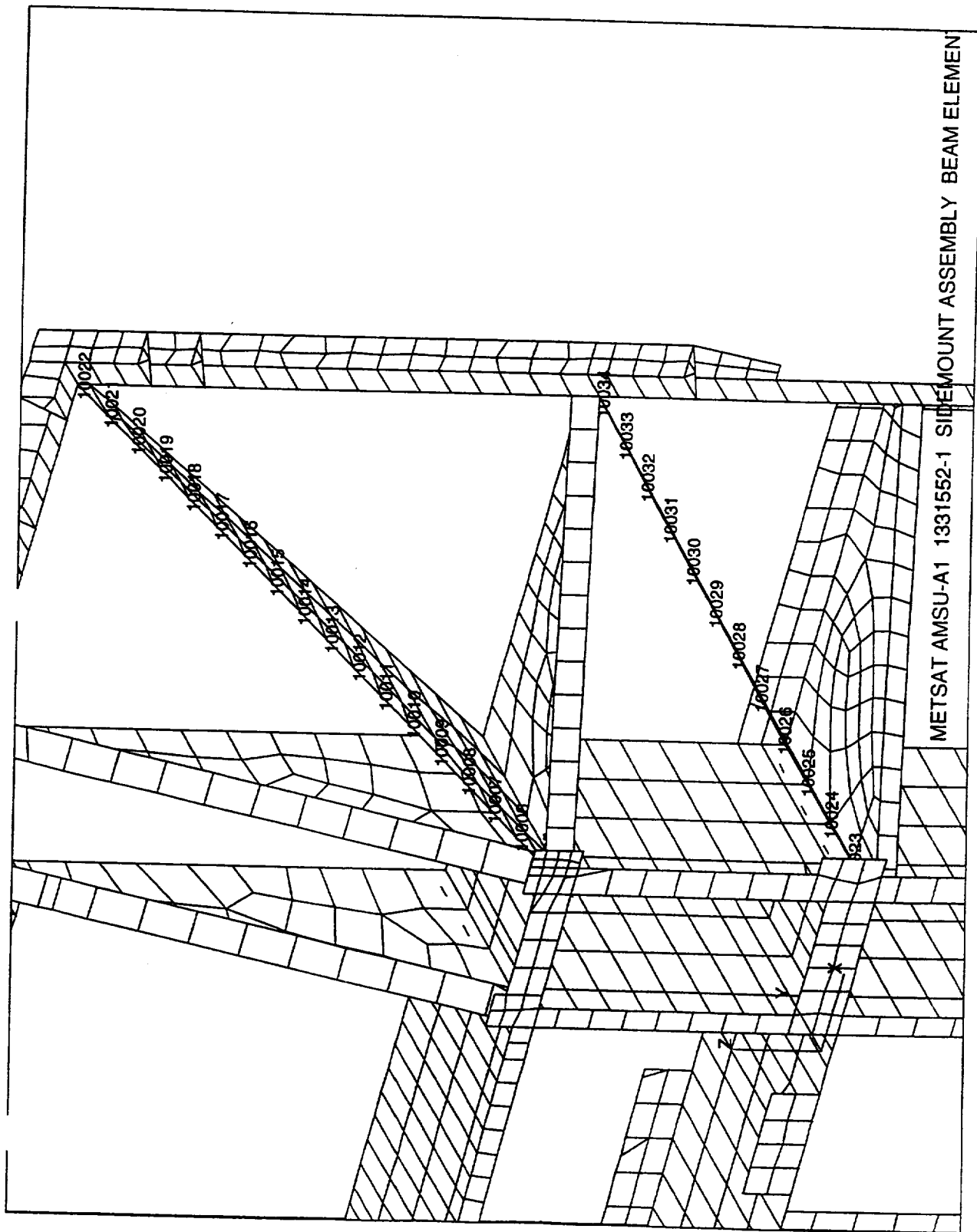
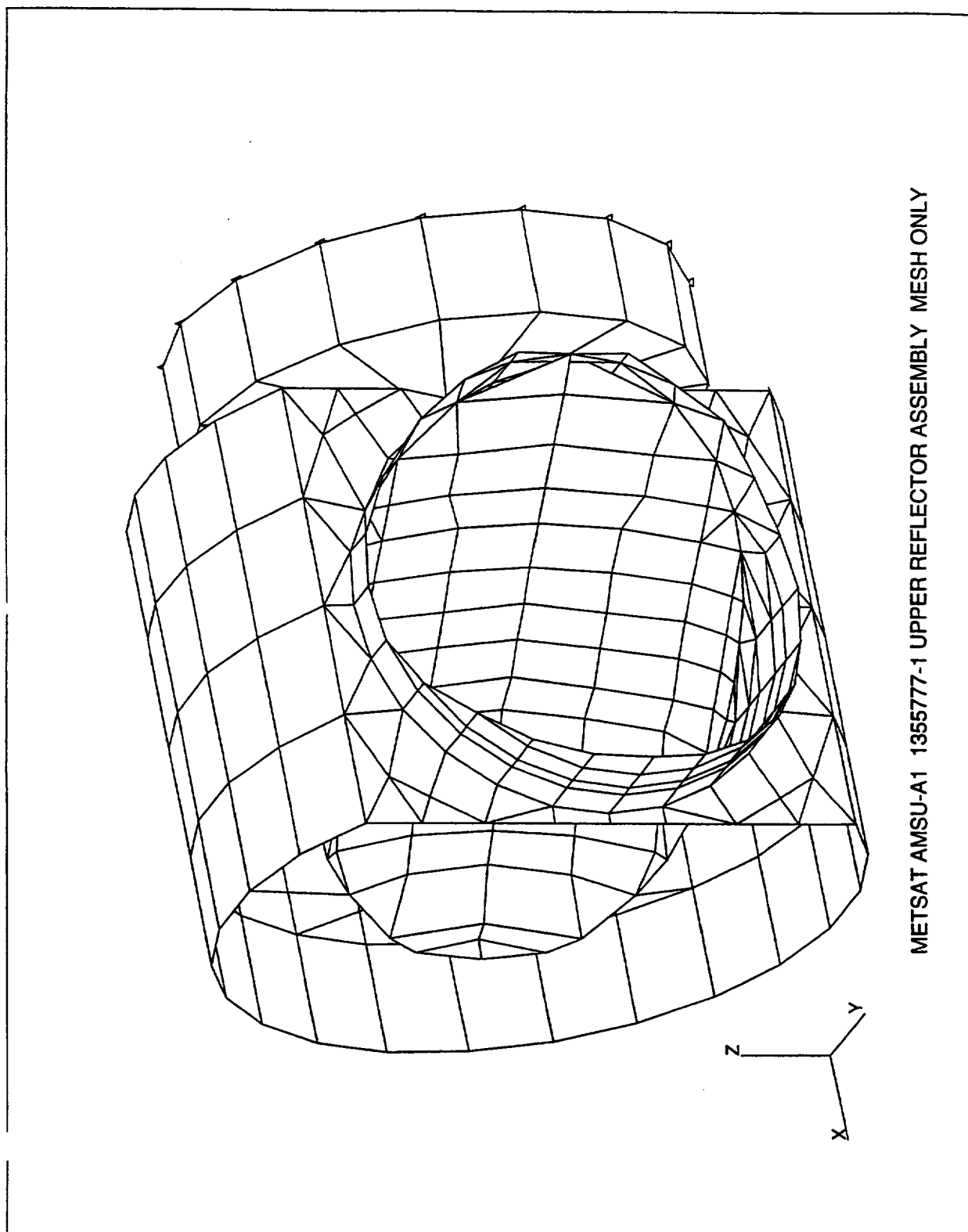


Figure A-131 METSAT AMSU-A1 1331552-1 Sidemount Assembly Shell Elements



**Figure A-132 METSAT AMSU-A1 1331552-1 Sidemount Assembly Beam Element**



**Figure A-133 METSAT AMSU-A1 1355777-1 Upper Reflector Assembly Grid Points**

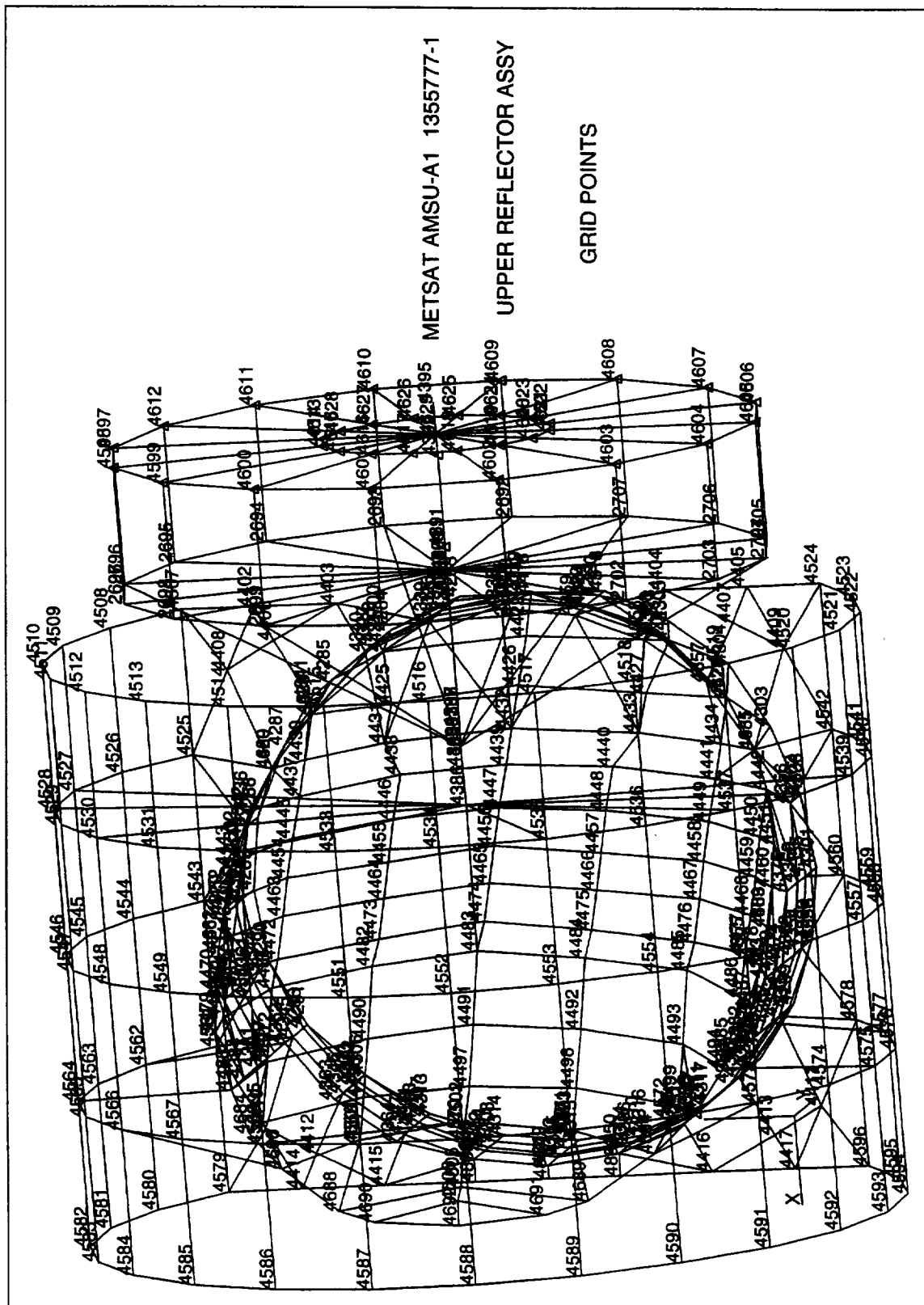


Figure A-134 METSAT AMSU-A1 1355777-1 Upper Reflector Assembly Grid Points

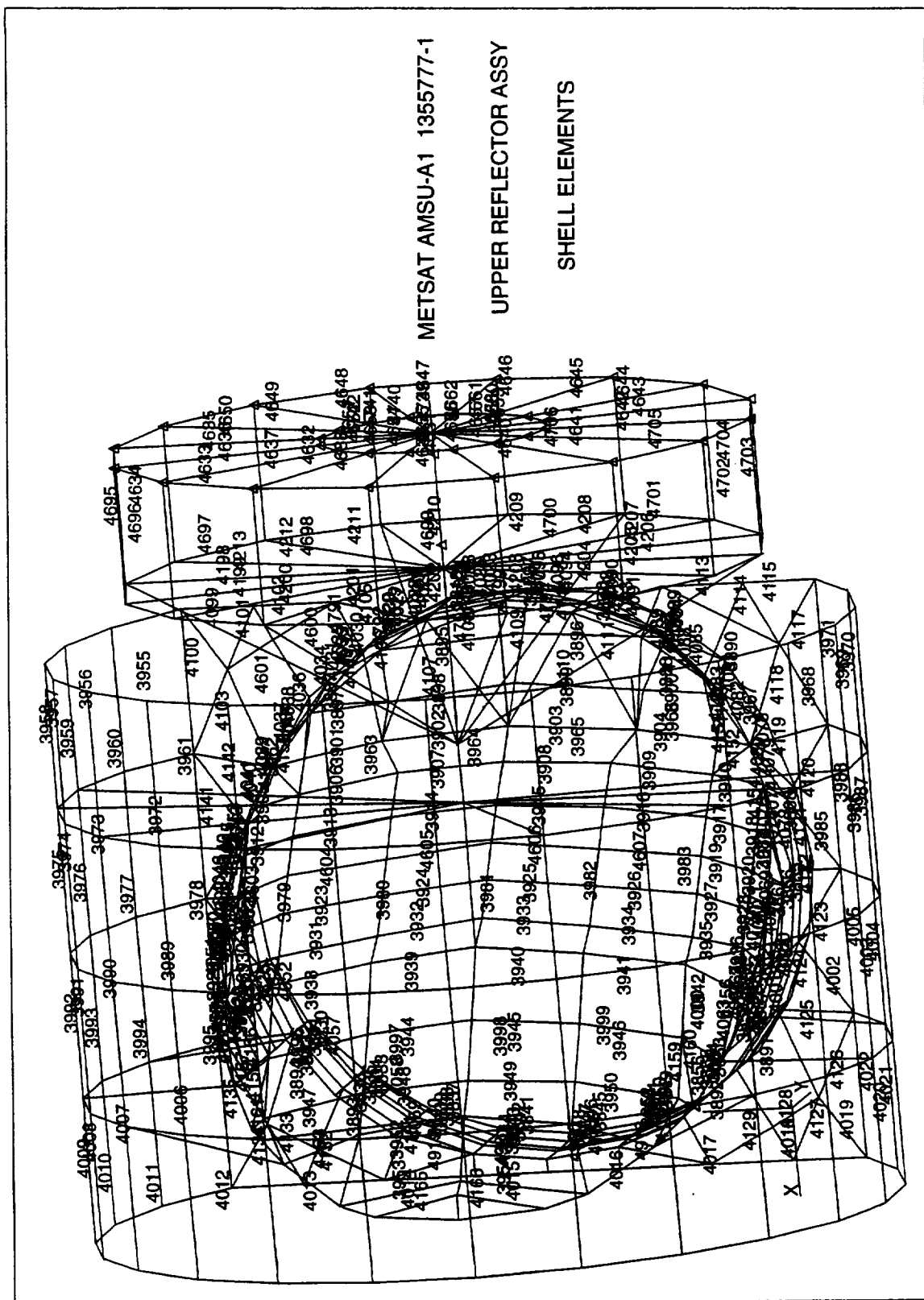


Figure A-135 METSAT AMSU-A1 1355777-1 Upper Reflector Assembly Shell Elements

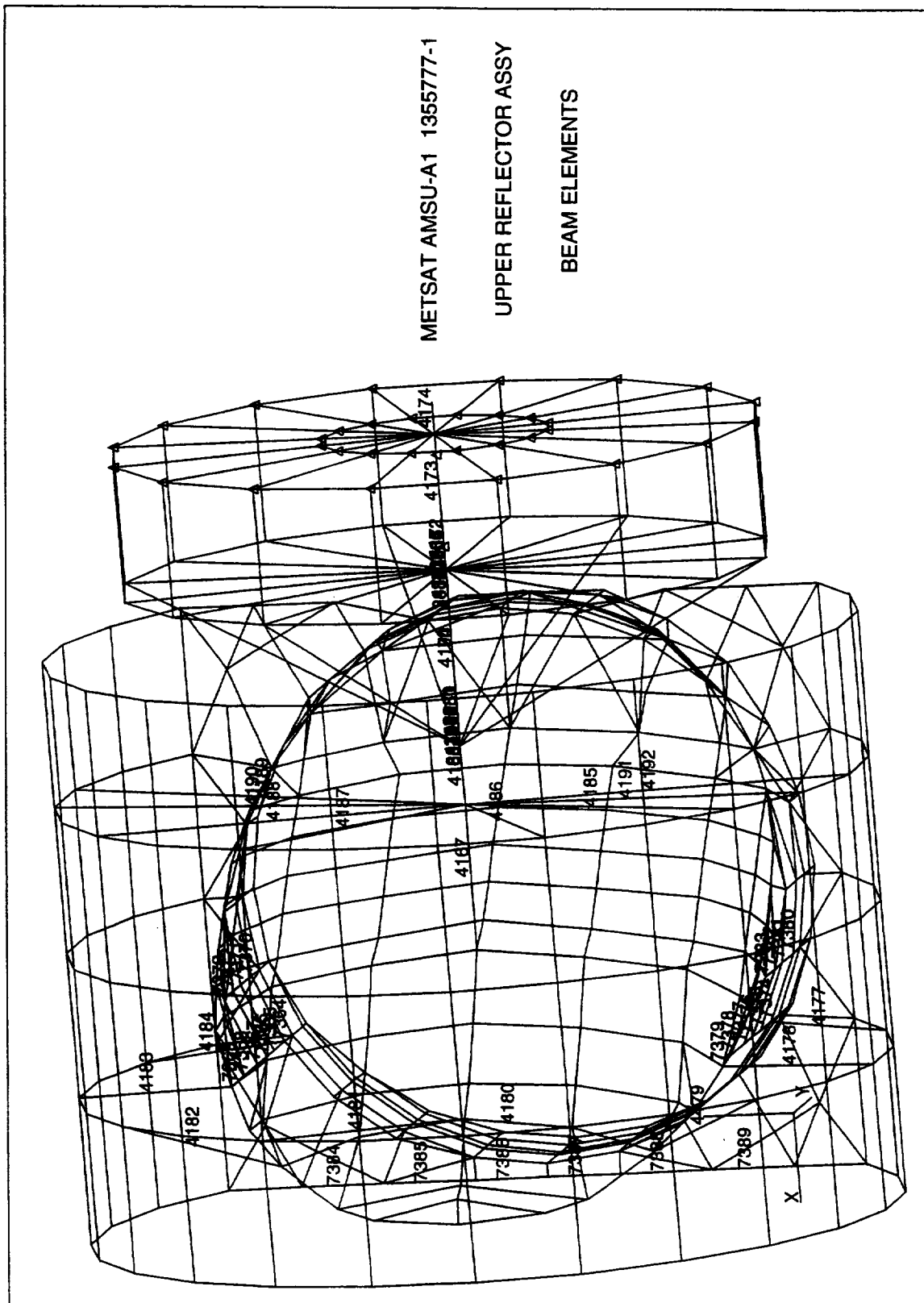
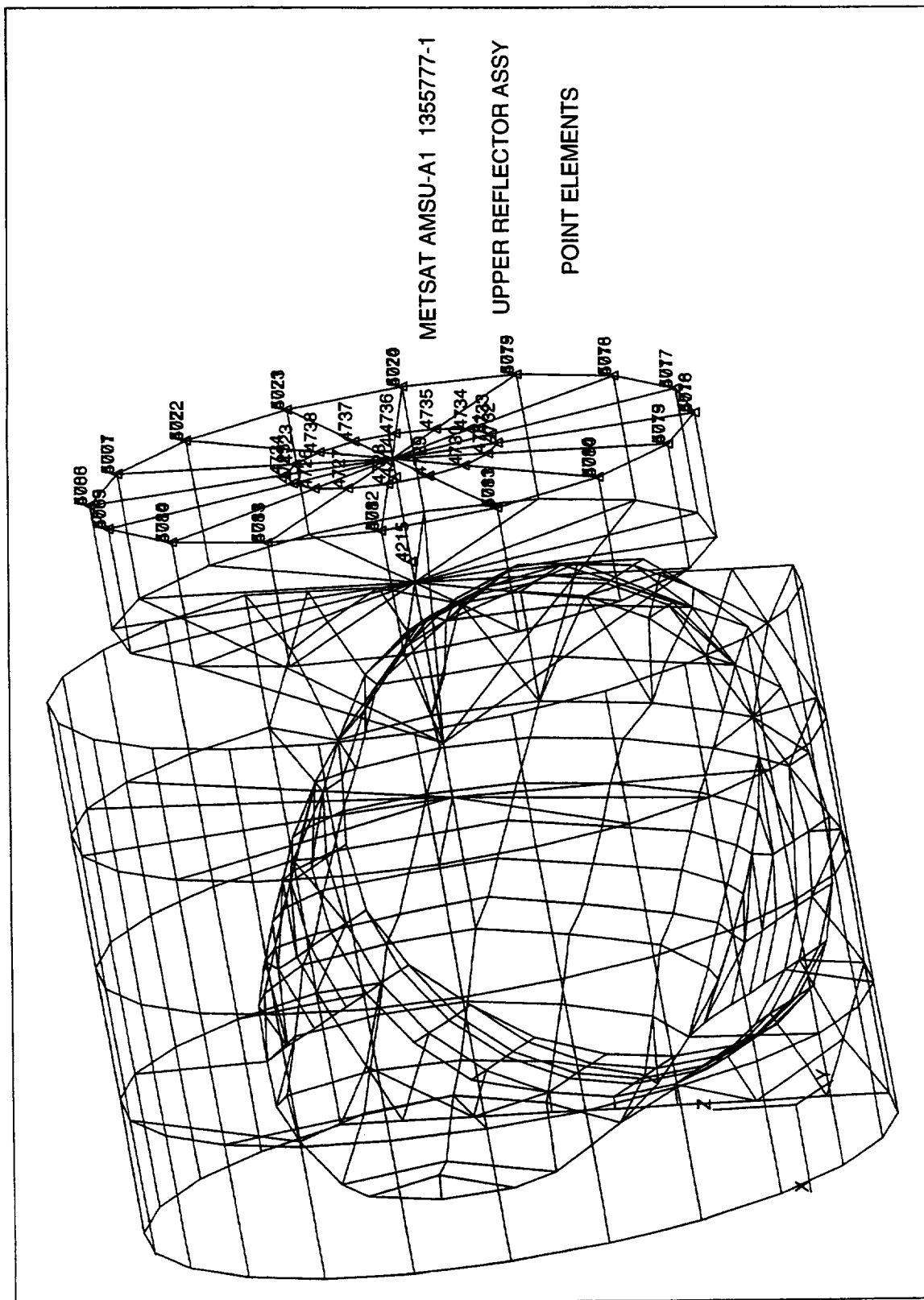


Figure A-136 METSAT AMSU-A1 1355777-1 Upper Reflector Assembly Beam Elements



**Figure A-137 METSAT AMSU-A1 1355777-1 Upper Reflector Assembly Point Elements**





## Report Documentation Page

|                                                                                                                                                   |                                                          |                                                            |                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------|----------------------|
| 1. Report No.<br>---                                                                                                                              | 2. Government Accession No.<br>---                       | 3. Recipient's Catalog No.<br>---                          |                      |
| 4. Title and Subtitle<br>METSAT Advanced Microwave Sounding Unit-A<br>(AMSU-A), Structural Mathematical Model, A1                                 |                                                          | 5. Report Date<br>1 April 1996                             |                      |
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| 7. Author(s)<br>R.J. Heffner                                                                                                                      |                                                          | 8. Performing Organization Report No.<br>10738             |                      |
|                                                                                                                                                   |                                                          | 10. Work Unit No.<br>---                                   |                      |
| 9. Performing Organization Name and Address<br>Aerojet<br>1100 W. Hollyvale<br>Azusa, CA 91702                                                    |                                                          | 11. Contract or Grant No.<br>NAS 5-32314                   |                      |
|                                                                                                                                                   |                                                          | 13. Type of Report and Period Covered<br>Final             |                      |
| 12. Sponsoring Agency Name and Address<br>NASA<br>Goddard Space Flight Center<br>Greenbelt, Maryland 20771                                        |                                                          | 14. Sponsoring Agency Code<br>---                          |                      |
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