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LOW CONCENTRATION RATIO
SOLAR ARRAY FOR LOW EARTH ORBIT
MULTI-100 kW APPLICATION

VOLUME 2—DRAWINGS

FINAL REPORT
JULY 1983

Prepared for:
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Northrop Grumman Corporation
Marshall Space Flight Center, AL 35812

Contract NAS8-34214

Shuttle Integration &
Satellite Systems Division
Rockwell
International

ORIGINAL PAGE IS
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LOW CONCENTRATION RATIO
SOLAR ARRAY FOR LOW EARTH ORBIT
MULTI-190 KW APPLICATION
FINAL REPORT
VOLUME 2 - DRAWINGS
JULY 1983

PREPARED FOR:
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER,
AL 35812

CONTRACT NAS8-34214
TECHNICAL REPORT INDEX/ABSTRACT

ABSTRACT

This report describes a preliminary design effort directed toward a low-concentration-ratio photovoltaic array system based on 1984 technology and capable of delivering multi-hundred kilowatts (300 kW to 1000 kW range) in low earth orbit. The array system consists of two or more array modules each capable of delivering between 113 kW to 175 kW using silicon solar cells or gallium arsenide solar cells, respectively.

The array module deployed area is 1320 square meters and consists of 4356 pyramidal concentrator elements. The module, when stowed in the Space Shuttle's payload bay, has a stowage volume of a cube with 3.24 meters on a side. The concentrator elements are sized for a geometric concentration ratio (GCR) of six with an aperture area of 0.5 meters x 0.5 meters.

Volume 1 discusses the structural analysis and design trades leading to the baseline design. It describes the configuration, as well as optical, thermal and electrical performance analyses that support the design and overall performance estimates for the array. Experimental results are also presented for a concentrator element using both silicon and gallium arsenide solar panels. They confirm the preliminary design analysis and performance estimates. Recommendations are provided for future development effort for low earth orbit application. Volume 2 provides drawings for the preliminary design configuration and for the test hardware that was fabricated for design evaluation and test.
FOREWORD

This report describes the effort performed for the preliminary design of low-cost concentrator multi-hundred kilowatt solar arrays. The Volume 1 report summarizes activities performed between June 18, 1981 and July 1983, as required by Contract NAS8-34214 Statement of Work. Volume 2 contains drawings prepared describing the preliminary design configuration, test hardware and manufacturing flow concept. The report was prepared by the Shuttle Integration and Satellite Systems Division of Rockwell International Corporation for the NASA George C. Marshall Space Flight Center (MSFC), Huntsville, Alabama. The NASA technical Contractor Officer Representative for the activity is Mr. W. L. Crabtree. The contents of this document are not necessarily endorsed by the NASA-MSFC.

Mr. S. J. Nalbandian is the project supervisor. Dr. E. F. French is the assistant project supervisor. Principal contributors to the project were:

J. B. Adkins  Mechanism Design
H. C. Ayers  Reflector Design
Z. Backovsky  Testing and Thermal Analysis
R. A. Bellgardt  Electrical Test Equipment
M. S. Biss  Overall Preliminary Design
J. L. Edwards  Structural Analysis
J. D. Eliot  Mechanical Test Equipment
Dr. E. F. French  Optical and Thermal Analysis
G. C. Frey  Materials
R. V. Frost  Reflector Panel Fabrication
H. S. Greenberg  Initial Structural Design and Analysis
K. M. Hicks  Manufacturing Planning
Dr. L. Hau  Solar Cell Technology
R. L. Long  Materials
M. W. Mills  Electrical Testing and Analysis
Dr. T. S. Nishimoto  Structural Analysis
F. A. Perry  Structural Analysis
A. M. Pope  Development Plans
D. A. Reed  Initial Preliminary Design
A. A. Sileski  Test Planning
L. Vega  Test Hardware
## CONTENTS

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## ILLUSTRATIONS

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<td>1-2</td>
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<td>2</td>
<td>2-2</td>
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**PRECEDING PAGE BLANK NOT FILMED**
1.0 PRELIMINARY DESIGN DRAWINGS

1.1 DISCUSSION

The solar array preliminary design developed under this program is described in a set of 30 level-one drawings. These drawings and their relationships are depicted in the drawing tree shown in Figure 1. Together with their associated callouts and specifications, the drawings provide a physical description of two variants of a 1320 m² solar array module (deployed area), one fitted with silicon solar cells and the other with gallium arsenide solar cells. The requirements, trades and analytical studies leading to the design are fully described in Volume 1 of this report.
Figure 1. Preliminary Design Drawing Tree (Updated)
1.2 DESIGN DRAWINGS

1. V416-935001
2. V416-935002, sheets 1 of 2 and 2 of 2
3. V416-935003
4. V416-935010
5. V416-935100, sheets 1 of 2 and 2 of 2
6. V416-935101, sheets 1 of 3, 2 of 3, and 3 of 3
7. V416-935102
8. V416-935103
9. V416-935200
10. V416-935201
11. V416-935202
12. V416-935203
13. V416-935204
14. V416-935205
15. V416-935400
16. V416-945001
17. V416-945100
18. V416-945101
19. V416-945103
20. V416-945200
21. V416-945202
22. V416-945203
23. V416-945204A
24. V416-945301
25. V416-945302
26. V416-945303
27. V416-945304
28. V416-945305
29. V416-945400
30. V416-945401
FOLDOUT FRAME

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OF POOR QUALITY
CONCENTRATOR ELEMENT  
(NO SCALE)
### PARTS LIST

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<td>[Part 011 Details]</td>
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**END CAP INTEGRAL BOLTS**

**FOLDOUT FRAME**

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**UNITS**

- Ends - 1, 2, 3, 4, 5
- Extends - 7, 8

**NOTE**

- Dimensions and tolerances are as per specifications provided in the engineering drawings.
2 FOLDOUT FRAME
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FOLDOUT FRAME
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3 FOLDOUT FRAME
ORIGINAL PAGE IS OF POOR QUALITY

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VIEW TYPICAL OF PRIMARY JOINT

VIEW TYPICAL OF PRIMARY JOINT
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2 FOLDOUT FRAME
FOLDOUT FRAME

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

NOTES:
FOLDOUT FRAME
2. Fab from graphite imregnated polysulfone

1. All dimensions are in mm, inches are in ( ).

NOTE: UNLESS OTHERWISE SPECIFIED

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-001 SHOWN

Slide Assembly—Extension Cable

LCR5A

1-33, 1-34
TENSION CABLE GUIDE

STORAGE DRUM 2 FL

CONSTANT FORCE SPRING (STOWED CONDITION) 2 FL

OUTPUT DRUM

CONSTANT FORCE SPRING (EXTENDED CONDITION REF)

EXTENSION CABLE SPOOL

-001 SHOWN

NEGATOR SUPPORT STRUCTURE fab FROM 1024 T ASHT R x MINE

HOUSING BOX CROSS BRACE

2. All Dims. are in mm, inches in (")
3. All parts molded from graphite reinforced PFA/PTFE
4. Unless otherwise specified

NEGATOR SPREAD DETAILS

<table>
<thead>
<tr>
<th>Tube</th>
<th>Stow OD Dia</th>
<th>Outer OD Dia</th>
<th>Thickness</th>
<th>Width</th>
<th>Height</th>
<th>Amt L</th>
</tr>
</thead>
<tbody>
<tr>
<td>.147NA</td>
<td>48.6</td>
<td>60.3</td>
<td>.36</td>
<td>22.3</td>
<td>14.75 (60)</td>
<td>3025 (120)</td>
</tr>
</tbody>
</table>

Notes:

- ALL DIMS. ARE IN MILLIMETERS, EXCEPT WHERE ANNOTATED IN INCHES.
- ALL PARTS MOLDED FROM CARBON-REINFORCED FEP/PTFE.
- UNLESS OTHERWISE SPECIFIED.
### Parts List

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Part or Identifying Number</th>
<th>Description</th>
<th>Notes</th>
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<tr>
<td>002</td>
<td></td>
<td>V416-935205-001</td>
<td>Trip Wire Assy - Reflector - Radiator</td>
<td>This part is used in the assembly of the Radiator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V416-935205 JOE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Unless otherwise specified, the dimensions are in inches.
- Tolerances on angles are ±0.05°.
- All holes are to be drilled and reamed to size.
- Notes: This part is used in the assembly of the Radiator.

---

### Dimensions

- 540 (21.26)
- 254 (100)

---

### Full Rotation Brushless DC Torque Motor

**Description:**
- Torque Tube
- 1. All Dims. in mm, inches in ()

---

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-001 SHOWN

3. Finish bottom, flanges, and bored area per MF004-001, III-2
   (47.25 x 8.9, max service temp 200°C)
2. Fab from 6061-T6 Al, heat treat to T6 condition
1. All dimensions are in mm, inches in ()
NOTES: Unless otherwise specified

1-49, 1-50

1975 (7.23)
1. All Dimensions are in mm, inches in ( ).

Notes: Unless otherwise specified.

- All Dimensions are in inches.
- Tolerances on:
  - Decimals: ±0.03
  - Angles: ±0°30'

Holes noted "Drill":
- .013 THRU .040 ±.001
- .041 THRU .130 ±.002
- .131 THRU .229 ±.003
- .501 THRU .750 ±.005
- 1.001 THRU 2.000 ±.010

RECD PER END ITEM

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

TOLERANCES ON:
- DECIMALS: ±0.03
- ANGLES: ±0°30'

HOLE NOTED "DRILL":
- .013 THRU .040 ±.001
- .041 THRU .130 ±.002
- .131 THRU .229 ±.003
- .501 THRU .750 ±.005
- 1.001 THRU 2.000 ±.010

RECD PER END ITEM

APPLICATION EFFECTIVITY
### REVISIONS

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<th>DATE</th>
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1.29 (051) DIA WIRE
(2.9 IN LB MAX TORQUE)

---

2 FOLDOUT FRAME

---

### PARTS LIST

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<th>QTY</th>
<th>QTY</th>
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<th>IDENT</th>
<th>PART OR IDENTIFYING NUMBER</th>
<th>NOMENCLATURE OR DESCRIPTION</th>
<th>MATERIAL</th>
<th>DATA: SPECIFICATIONS</th>
</tr>
</thead>
</table>

---

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES.

TOLERANCES ON:
- DECIMALS
  - TOLERANCES ON ANGLES
    - $30^\circ = 0.10$
    - $0^0 30'$
- HOLES NOTED “DRILL”
- HOLE SIZES
  - $0.013$ THRU $0.040 + 0.001 - 0.001$
  - $0.041$ THRU $0.130 + 0.002 - 0.001$
  - $0.131$ THRU $0.220 + 0.003 - 0.001$
  - $0.230$ THRU $0.500 + 0.004 - 0.001$
  - $0.501$ THRU $0.750 + 0.005 - 0.001$
  - $0.750$ THRU $1.000 + 0.007 - 0.001$
  - $1.001$ THRU $2.000 + 0.010 - 0.001$

---

Rockwell International Corporation
Space Division
12814 Lakewood Boulevard • Downey, California 90241

---

TORSION SPRING
SOLAR PANEL
LCRSA

---

SIZE CODE IDENT NO. DRAWING NO.
C 03953 V416-945200

---

SCALE FULL SHEET 1/1
CONCENTRATOR ELEMENT REF
Screw
SLIDE HOUSING P&D
SLIDE HOUSING ART
NUT: SELF LOCKING

FOLDOUT FRAME

VIEW A A
SCALE 1/1

12.7 (50)

4.33 (1/2)

12.7 DIA (.50)

18 (7)
2. Fab from graphite impregnated polysulfone
   I. All dimensions are in in., inches are in ( ).
   Notes: Unless otherwise specified

-001 SHOWN
3. Finish Per MF004-001, III-2 (WHITE Silicone Paint
d= .25, E = .84 Max., Service Temp 200°F)
2. Fab From .032 AL Heat Treat To T6 Cond
1. All Dimensions Are In mm, Inches In ( )

Notes: Unless Otherwise Specified
BOLT DETAIL

SECTION C-C

PIN DETAIL

PIN/BOLT ASSY

FOLDOUT FRAME

RETAILING RING

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIM IN INCHES IN ( )

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C - 2
DETAIL A-A
SCALE: 2:1

SECTION B-B
SCALE: 5:1

COPPER CONDUCTOR

KAPTON INSULATOR

FOLDOUT FRAME

1. ALL DIMENSIONS IN MM, NOTES IN ()

NOTES: UNLESS OTHERWISE SPECIFIED
## Foldout Frame

### Parts List

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<th>Dress Code</th>
<th>DESCRIPTION</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td>WIRE HARNESS - DIRECTION REVERSAL</td>
<td>LC/RA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- **Dimensions are in inches.**
- **Tolerances on Decimals and Angles:**
  - ±0.001
  - ±0° 30' ±0.010
- **Holes noted "Drill."**
- **Cycle Time:**
  - 1.5-62

**Drawing Information:**
- **Drawing No.:** V416-945303
- **Sheet:** 1-63, 1-64
- **Scale:** FULL
### Parts List

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<th>Data</th>
<th>Notes</th>
<th>Suppliers</th>
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</table>

**Notes:**
- All dimensions are in inches.
- Tolerances on decimals: 
  - $0.001 = 0.01'$
  - $0.002 = 0.02'$

**Manufacturers:**
- TCP International

**Scale:** 2:1/16

**Approval:**
- Date: 1-45-82
- Approved by: [Signature]

**Revision:**
- Original page is of poor quality.
-003 SHOWN
-004 OPP EXCEPT AS SHOWN

ALUMINIZE SURFACE TO 500A THICKNESS, SPECULAR REFLECTIVITY OF .90 AND AN EMISSIVITY OF .05

3. Finishes and wavefront may deviate
   at a rate of .005 in./per inch (.005 in./per inch)
2. All dimensions are in mm, inches in ( )
1. For all parts from graphite/impregnated phenol
   Nome: Unless otherwise specified

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VIEW E
SCALE: 1/1
(-004 ONLY)

VIEW D
SCALE: 1/1
(-002 ONLY)
2.0 TEST HARDWARE DRAWINGS

2.1 DISCUSSION

The hardware required to carry out experimental activities under this program are listed in the drawing tree depicted in Figure 2. There are a total of 21 drawings, of several types. Some provide information for subcontractors; others were used to construct Rockwell-fabricated components. The tests and experiments performed using the resulting hardware are fully described in Vol. 1 of this report.

2.2 TEST HARDWARE DRAWINGS

1. D416-340010
2. D416-340020
3. D416-450000
4. D416-450001
5. D416-451000
6. D416-451001
7. D416-451002
8. D416-451003
9. D416-451004
10. D416-451005
11. D416-451006
12. D416-451007
13. D416-452000
14. D416-452001
15. D416-453000
16. D416-454000
17. D416-454001
18. D416-454002
19. D416-454003
20. D416-454004
21. D416-455000
FOLDOUT FRAME
FRAME

3 FOLDOUT FRAME

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NOTE:
1. FABRICATE PER B O M. SHIP FABRICATED, THE ACCOMPANYING NOTE SHEETS AND
REMARKS DISCLOSURE.
2. CONTAIN NAIL AND CAP ASSEMBLIES
   TO BE OF LIGHTWEIGHT MATERIALS BUT
   STRUCTURALLY SOUND. FOR DEMONSTRATION
   AND TRANSPORTING, MAINTAIN THE EXTERNAL
   APPEARANCE DIMENSIONS TO SHOW ACTUAL
   MODULE SIZE. THE INTERNAL STRUCTURE
   CAN BE MADE TO ANY CONFIGURATION SO AS TO
   PROVIDE THE OPENING AND CLOSING OF THE
   CONCENTRATOR ELEMENTS.

2-3, 2-4
FOLDOUT FRAME

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2 FOLDOUT FRAME
**Foldout Frame**

1. **GaAs Solar Cell**
   - 45° read
   - Insulated stand-off REF

2. **Wire Termination Strips**
   - 2 mil thick

3. **Silver Foil**
   - Termination strips

4. **GaAs**
   - Cell

5. **D16-451003**
   - Diodes

**Parts List**

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<tr>
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<th>QTY</th>
<th>QTY</th>
<th>QTY</th>
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<th>NOMENCLATURE OR DESCRIPTION</th>
<th>MATERIAL</th>
<th>DATA, SPECIFICATIONS</th>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Notes:**
- Limit wire routing to this area only
- Use of 4 mil thick insulation
- All materials are specified

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- Page 2 of the document
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**Dimensions:**
- 624.0x804.0
3. Install rivets per MA0101-302.
   Finish per MF0001-001 Item 2-9
2. Make part No. as MA0101-301, code BL-08-N6-16
1. Contamination control per MF0001-001

Notes: Unless otherwise specified.
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-001 SHOWN

7. FINISH PER MFO004-001, ITEM I-1
6. MARK PART NO. PER MADI04-301 CORE BL-OB-NG-16
5. CONTAMINATION CONTROL PER MFO001-001
4. INSPECT PER MT0501-508 CLASS 2
3. STD DETAIL PER MAG-02-305
2. BREAK SHARP CORNERS & EDGES
1. BEND RADIUS .060 MAX

NOTES: UNLESS OTHERWISE SPECIFIED

FOLDOUT FRAME
**Parts List**

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<td>D416-451006</td>
<td>BRACKET</td>
<td>AL-SHT</td>
<td></td>
<td>LCESA TEST</td>
<td></td>
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</tbody>
</table>

**Tolerances on:**
- **Decimals:**
  - J00 = 0.001
  - JXX = 0.001

- **Angles:**
  - = 0° 30'

**Holes noted "Drill"**
- 0.013 THRU 0.040 + 0.001 - 0.001
- 0.041 THRU 0.130 + 0.002 - 0.001
- 0.131 THRU 0.229 + 0.003 - 0.003
- 0.230 THRU 0.500 + 0.004 - 0.001
- 0.501 THRU 0.750 + 0.005 - 0.001
- 0.751 THRU 1.000 + 0.007 - 0.001
- 1.001 THRU 2.000 + 0.010 - 0.001

**Effectivity**
- SHEET 1/1
- 12214 Lakewood Boulevard - Downey, California 90241

---

**Original Page is of Poor Quality**

**Foldout Frame**
6. Finish Panel Per MFC001-4-001, Item III-3
5. Mark Part No. Per MAC104-301 Code BL-08-NK-16
4. Contamination Control Per MFC001-001
3. Std Detail Per MAC102-305
2. Break Sharp Corners & Edges
1. Bend Radius .060 Max

Notes: Unless Otherwise Specified
<table>
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<tr>
<th>QTY</th>
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<th>PART OR IDENTIFYING NUMBER</th>
<th>NOMENCLATURE OR DESCRIPTION</th>
<th>MATERIAL</th>
<th>DATA: SPECIFICATIONS</th>
<th>SIZES, NOTES, SUPPLIERS</th>
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**UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES.**

**TOLERANCES ON:**

- **DECIMALS:** ±0.001
- **ANGLES:** ±0° 30'
- **HOLES NOTED "DRILL":**
  - .013 THRU .040 ±0.001
  - .061 THRU .130 ±0.003
  - .131-2.000 ±0.033

**CODE IDENT No.**

- .751 THRU 1.000 ±0.007
- 2.000 ±0.010

**EFFECTIVITY**

- .013 THRU .040 ±0.001
- 2.000 ±0.010

---

**Rockwell International Corporation**

**Space Division**

12214 La Mirada Boulevard • Downey, California 90241

**DRAWING NO.:** D416-45/007

**EFFECTIVITY:** 1/1

**SCALE:** 1/1

**DRAWN BY:** M.B.133

**CHECKED BY:** M. B. 133

**APPROVED BY:** M. B. 133

**DATE:** 6/14/80

---

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FOLDOUT FRAME

6. STD DETAIL PER MA0102-305
5. INSPECT PER M70501-508 CUS02
4. CONTAMINATION CONTROL PER M60001-001
3. FINISH PER MF0004-001, ITEM I-23
2. IDENTIFY PER MA0104-301
1. FAB TORSION SPRING FROM PART NO. TC51-270-359-R ASSOCIATED SPRING CATALOG P6.GO, OR EQUIV

NOTES: UNLESS OTHERWISE SPECIFIED
**FOLDOUT FRAME**

-051 DIA, 2.9 IN-LB TORQUE
x.52 AXIAL LENGTH, RIGHT HAND HELIX

---

**PARTS LIST**

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<td>SPRING TOXION</td>
<td>ST. ST.</td>
<td>[QQ-W-423 Comp FS 302, AMS 5688]</td>
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**Rockwell International Corporation**
Space Division

12341 Lansdowne Boulevard - Downey, California 90241

**TOPSIXN SPRING**
SOLHE PANEL
LCR.SA

<table>
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<td>C 03953</td>
<td>D416-452000</td>
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**SCALE**: 1/1

**EFFECTIVITY**: 1.000 THRU 2.000 +.010 -.001

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2-33, 2-34

-001 SHOWN

<table>
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<th>PARTS LIST</th>
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Rigid Reflector Panel

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Code</th>
<th>Quantity</th>
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</thead>
<tbody>
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</tbody>
</table>

FOLDOUT FRAME
FOLDOUT FRAME

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OF POOR QUALITY
FOLDOUT FRAME

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\[ \triangle \text{THIS AREA ONLY} \]

\[ \triangle \text{THIS AREA: 002 ONLY} \]

2 MIL ALUMINIZED KAPTON FILM

(ALUMINUM SIDE SHOWN)

SECTION BB

SCALE 1/1

\[ \text{BOND THIS AREA PER M&amp;P EQMTS 3M JETMELT ADHESIVE 3779} \]

\[ \text{\( \triangle \) DO NOT BOND THIS AREA} \]

1. MARK PART NO. PER MAG 104-301, CODE BL-OB-NG-16

NOTES: UNLESS OTHERWISE SPECIFIED

-OO1 SHC
-OO2 SMS
AS NOTED

\[ \text{ITEM GMT} \]

\[ \text{R20 PER END ITEM} \]
**Parts List**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
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<tr>
<td>1</td>
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<td>D416-454004</td>
<td>REFLECTOR PANEL</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>D416-454004</td>
<td>REFLECTOR PANEL</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>D416-454004</td>
<td>REFLECTOR PANEL</td>
</tr>
</tbody>
</table>

**Notes:**
- 002 shown (except as noted)
- 001 shown
- 002 shown overall

**Legend:**
- 002 shewn scale 1/4
- 002 shown

**Part Numbers:**
- D416-454004

**Dimensions:**
- Unless otherwise specified, dimensions are in inches
- Tolerances on decimals: ±0.03
- Tolerances on angles: ±0.5°

**Part List:**

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<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>D416-454004</td>
<td>REFLECTOR PANEL</td>
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</tbody>
</table>

**Approval:**
- Approved by [Signature]

**Drawings No.:**
- D 03953

**Scale:**
- 1/4 in. = 1 ft.

**Effective Date:**
- 2-41, 2-42
3.0 PRELIMINARY MANUFACTURING FLOW AND BUILD PLAN

3.1 DISCUSSION

In Section 8.3 of Volume 1 a test plan is described for a ground and flight demonstration array. The following two diagrams show the fabrication sequence for assembling the basic unit of such an array (see Section 4.0 of Volume 1), consisting of one pair of canister-mast assemblies and eight rows of concentrators. The first diagram shows assembly of concentrator rows and solar panels. The second diagram describes construction of the structural elements and their integration with the rows of concentrator elements.

3.2 FLOW AND BUILD DIAGRAMS

1. Assembly of Concentrator Elements
2. Assembly Sequence for Flight Test Configuration
ALTERNATE REFLECTOR PANELS
RIGID PANEL - VAPOR DEPOSITED ALUMINUM ON MOLDED POLYSULFONE GRAPHITE

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MOLD
REMOVE FLASH
PHYSICAL INSPECT
(INCLUDING FLATNESS)

BASELINE REFLECTOR PANELS
V416-945401
STRETCHED FILM ON RIGID FRAME

MOLD DETAILS
REMOVE FLASH
PHYSICAL INSPECT

18.21 cm (7.17)
16.42 cm (6.46)

FAB DETAILS
MASK AND PAINT PER MFG04-001-111-2
LOCATE AND BOND KAPTON FILM TO PANELS

FOLDOUT FRAME
REFLECTOR PANEL ASSEMBLY
V416-945400
ASSEMBLY AND TAPING SEQUENCES

SEQUENCE #1

- ALUMINIZE SURFACES
- PHYSICAL EMISSIVITY AND REFLECTIVITY INSPECT
- BOND RESILIENT BUTTONS ON -003 AND -004

SEQUENCE #2

- TAPE #1

TAPE #2

NOTE:
- TAPE IN SEQUENCE
- REVERSE TAPE IN TWO PLACES

- SUBASSEMBLE REFLECTOR PANEL WITH TAPE

APPLY METALIZED FILM

- PANEL-RADIATOR
  V416-945101
- SOLAR PANEL ASSEMBLY
  V416-945100

- BOND SOLAR CELLS TO PANELS
- ASSEMBLE PANEL SUBASSEMBLIES WITH SPRINGS, BOLTS, WASHERS AND NUTS

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2 FOLDOUT FRAME
ASSEMBLY 5400

- Assemble and bond solar panel assemblies and wire harnesses
- Install diodes

CONCENTRATOR TO CONCENTRATOR INTERFACE (TYPICAL, TWO PLACES, EACH PANEL JOINT)

- Tape #1 Ref.
- Tape #2

In sequence shown, place two places, use taping sequences.

ASSEMBLE PANEL SUBASSEMBLIES

REFLECTOR PANELS

WIRE HARNESS ASSEMBLIES

V416-945301
V416-945302

ASSEMBLE REFLECTOR INSTALL AND BOX

ORIGINAL PAGE OF POOR QUALITY
PRELIMINARY MANUFACTURING FLOW AND BUILD PLAN
LOW CONCENTRATION RATIO SOLAR ARRAY

PREPARED BY: K.M. HICKS DEPT.: 161 EXT.: 3618

CONCENTRATING ELEMENT STACK ASSEMBLY
V416-945001

ASSEMBLY OF
CONCENTRATOR
ELEMENTS

PRECEDING PAGE BLANK NOT FILMED

FOLDOUT FRAME

ASSEMBLY REFLECTOR PANEL ASSEMBLY AND SOLAR PANEL ASSEMBLY,
INSTALL AND SOLDER CLIPS
Representative Riveted Joint Configuration

Solar Panel Tripwire Mechanisms

Concentrator Stack Translation Mechanism (CSTM)

Cable Extension Mechanism (CEM)

Support Tubes

Foldout Frame
- FABRICATE AND ASSEMBLE BRACKETRY
- INSTALL BRACKETRY
- FABRICATE AND ASSEMBLE MECHANISMS
- INSTALL MECHANISMS

ORIGINAL PAGE 15
OF POOR QUALITY
MAST CANNISTER ASSEMBLIES
V416-935103
CHASE FROM ASTRO RESEARCH

FOLDOUT FRAME

- INSTALL WIRE HARNESS ASSEMBLIES
- INSTALL MAST/CANNISTER ASSEMBLIES

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FOLDOUT FRAME

HOUSING STRUCTURE

VIEW - A

END CAP ASSEMBLIES

- INSTALL CONCENTRATOR STACK ASSEMBLIES AND SLIDE ASSEMBLIES CONCURRENTLY
- PERFORM ELECTRICAL HOOKUP AND CHECKOUT

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- Install end cap assemblies - secure to mast/cannister assemblies
- Secure cables to end cap assemblies
- Install access panels (top, bottom and ends, as shown)
- Inspect complete

Foldout frame
ASSEMBLY SEQUENCE
FOR FLIGHT TEST
CONFIGURATION

MANUFACTURING FLOW AND BUILD PLAN
LOW CONCENTRATION RATIO SOLAR COLLECTOR

PREPARED BY: K.M. HICKS  DEPT: 761
3-2  3-4