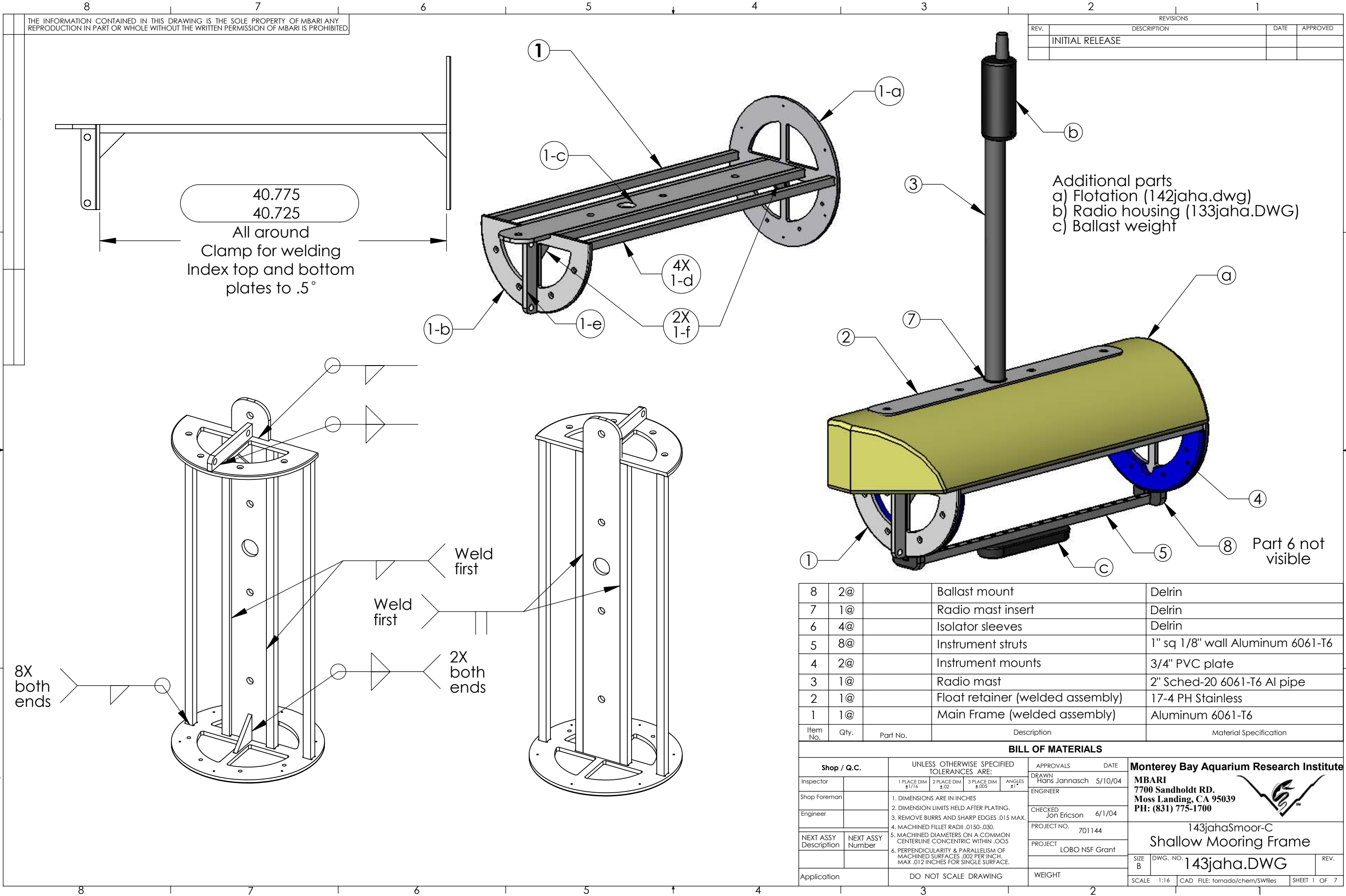




| REVISIONS |                 |      |          |
|-----------|-----------------|------|----------|
| REV.      | DESCRIPTION     | DATE | APPROVED |
| 1         | INITIAL RELEASE |      |          |

Additional parts  
a) Flotation (142jaha.dwg)  
b) Radio housing (133jaha.DWG)  
c) Ballast weight

|          |      |          |                                  |                                  |
|----------|------|----------|----------------------------------|----------------------------------|
| 8        | 2@   |          | Ballast mount                    | Delrin                           |
| 7        | 1@   |          | Radio mast insert                | Delrin                           |
| 6        | 4@   |          | Isolator sleeves                 | Delrin                           |
| 5        | 8@   |          | Instrument struts                | 1" sq 1/8" wall Aluminum 6061-T6 |
| 4        | 2@   |          | Instrument mounts                | 3/4" PVC plate                   |
| 3        | 1@   |          | Radio mast                       | 2" Sched-20 6061-T6 Al pipe      |
| 2        | 1@   |          | Float retainer (welded assembly) | 17-4 PH Stainless                |
| 1        | 1@   |          | Main Frame (welded assembly)     | Aluminum 6061-T6                 |
| Item No. | Qty. | Part No. | Description                      | Material Specification           |

| BILL OF MATERIALS     |                  |                                                                                                           |                  |
|-----------------------|------------------|-----------------------------------------------------------------------------------------------------------|------------------|
| Shop / Q.C.           |                  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                |                  |
| Inspector             |                  | 1 PLACE DIM ±1/16                                                                                         | 2 PLACE DIM ±.02 |
| Shop Foreman          |                  | 3 PLACE DIM ±.005                                                                                         | ANGLES ±1°       |
| Engineer              |                  | 1. DIMENSIONS ARE IN INCHES                                                                               |                  |
|                       |                  | 2. DIMENSION LIMITS HELD AFTER PLATING.                                                                   |                  |
|                       |                  | 3. REMOVE BURRS AND SHARP EDGES .015 MAX.                                                                 |                  |
|                       |                  | 4. MACHINED FILLET RADII .0150-.030.                                                                      |                  |
|                       |                  | 5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005                                       |                  |
|                       |                  | 6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH. MAX .012 INCHES FOR SINGLE SURFACE. |                  |
| NEXT ASSY Description | NEXT ASSY Number | APPROVALS                                                                                                 |                  |
|                       |                  | DATE                                                                                                      |                  |
|                       |                  | DRAWN Hans Jannasch 5/10/04                                                                               |                  |
|                       |                  | ENGINEER                                                                                                  |                  |
|                       |                  | CHECKED Jon Ericson 6/1/04                                                                                |                  |
|                       |                  | PROJECT NO. 701144                                                                                        |                  |
|                       |                  | PROJECT LOBO NSF Grant                                                                                    |                  |
|                       |                  | WEIGHT                                                                                                    |                  |
|                       |                  | DO NOT SCALE DRAWING                                                                                      |                  |
|                       |                  | SCALE 1:16                                                                                                |                  |
|                       |                  | CAD FILE: tornado/chem/SWfiles                                                                            |                  |
|                       |                  | SHEET 1 OF 7                                                                                              |                  |

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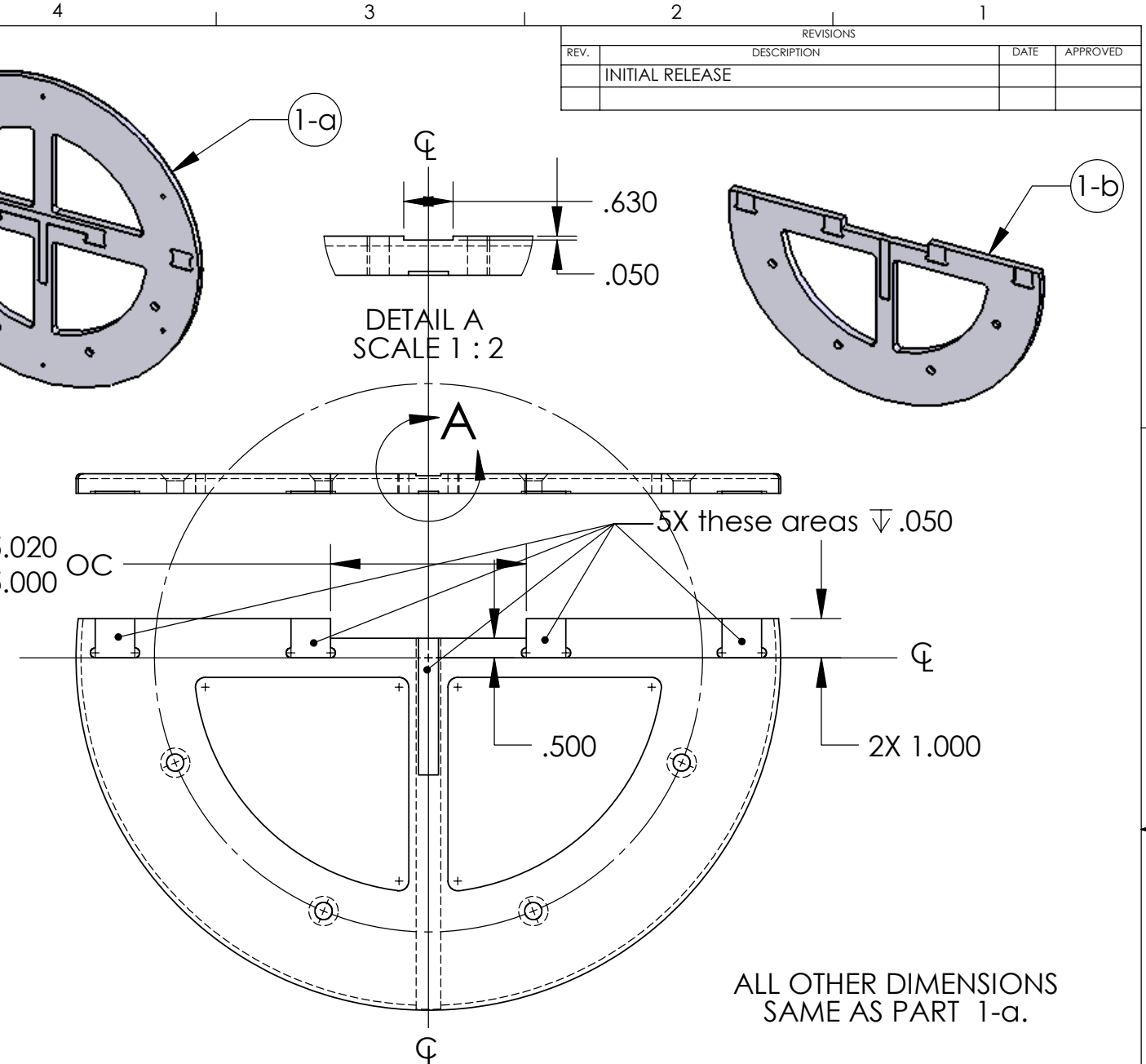
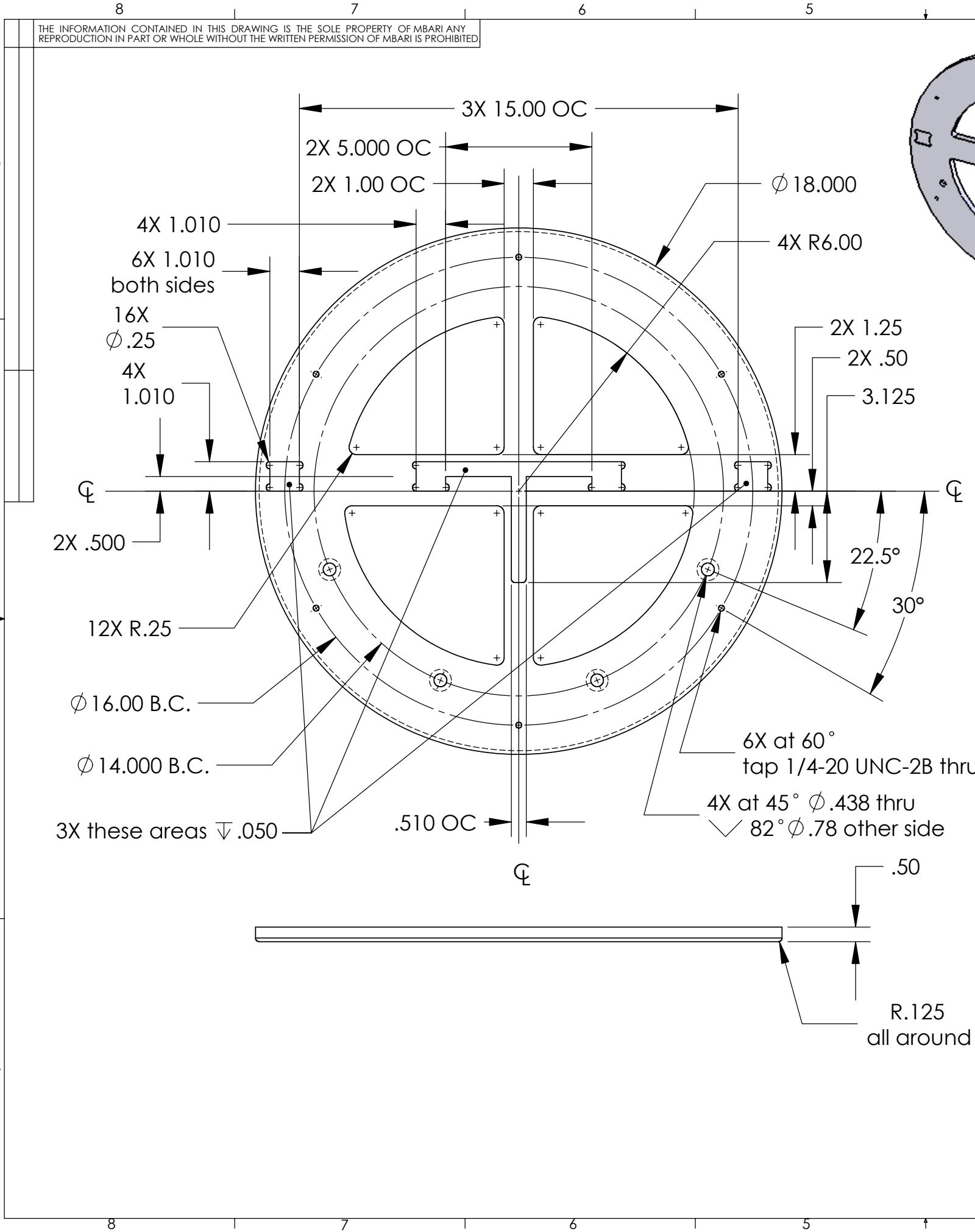
143jahaSmoor-C

Shallow Mooring Frame

SIZE B

DWG. NO. 143jaha.DWG

REV.



|          |      |          |                                  |                                  |
|----------|------|----------|----------------------------------|----------------------------------|
| 8        | 2@   |          | Ballast mount                    | Delrin                           |
| 7        | 1@   |          | Radio mast insert                | Delrin                           |
| 6        | 4@   |          | Isolator sleeves                 | Delrin                           |
| 5        | 8@   |          | Instrument struts                | 1" sq 1/8" wall Aluminum 6061-T6 |
| 4        | 2@   |          | Instrument mounts                | 3/4" PVC plate                   |
| 3        | 1@   |          | Radio mast                       | 2" Sched-20 6061-T6 Al pipe      |
| 2        | 1@   |          | Float retainer (welded assembly) | 17-4 PH Stainless                |
| 1        | 1@   |          | Main Frame (welded assembly)     | Aluminum 6061-T6                 |
| Item No. | Qty. | Part No. | Description                      | Material Specification           |

Shop / Q.C.

Inspector

Shop Foreman

Engineer

Next Assy Description

Next Assy Number

Application

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

1 PLACE DIM ±1/16

2 PLACE DIM ±.02

3 PLACE DIM ±.005

ANGLES ±1°

1. DIMENSIONS ARE IN INCHES

2. DIMENSION LIMITS HELD AFTER PLATING.

3. REMOVE BURRS AND SHARP EDGES .015 MAX.

4. MACHINED FILLET RADII .0150-.030.

5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005

6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH, MAX .012 INCHES FOR SINGLE SURFACE.

DO NOT SCALE DRAWING

APPROVALS

DATE

DRAWN Hans Jannasch 5/10/04

ENGINEER

CHECKED Jon Ericson 6/1/04

PROJECT NO. 701144

PROJECT LOBO NSF Grant

WEIGHT

Monterey Bay Aquarium Research Institute

MBARI

7700 Sandholdt RD.

Moss Landing, CA 95039

PH: (831) 775-1700

143jahaSmoor-C

Shallow Mooring Frame

SIZE B

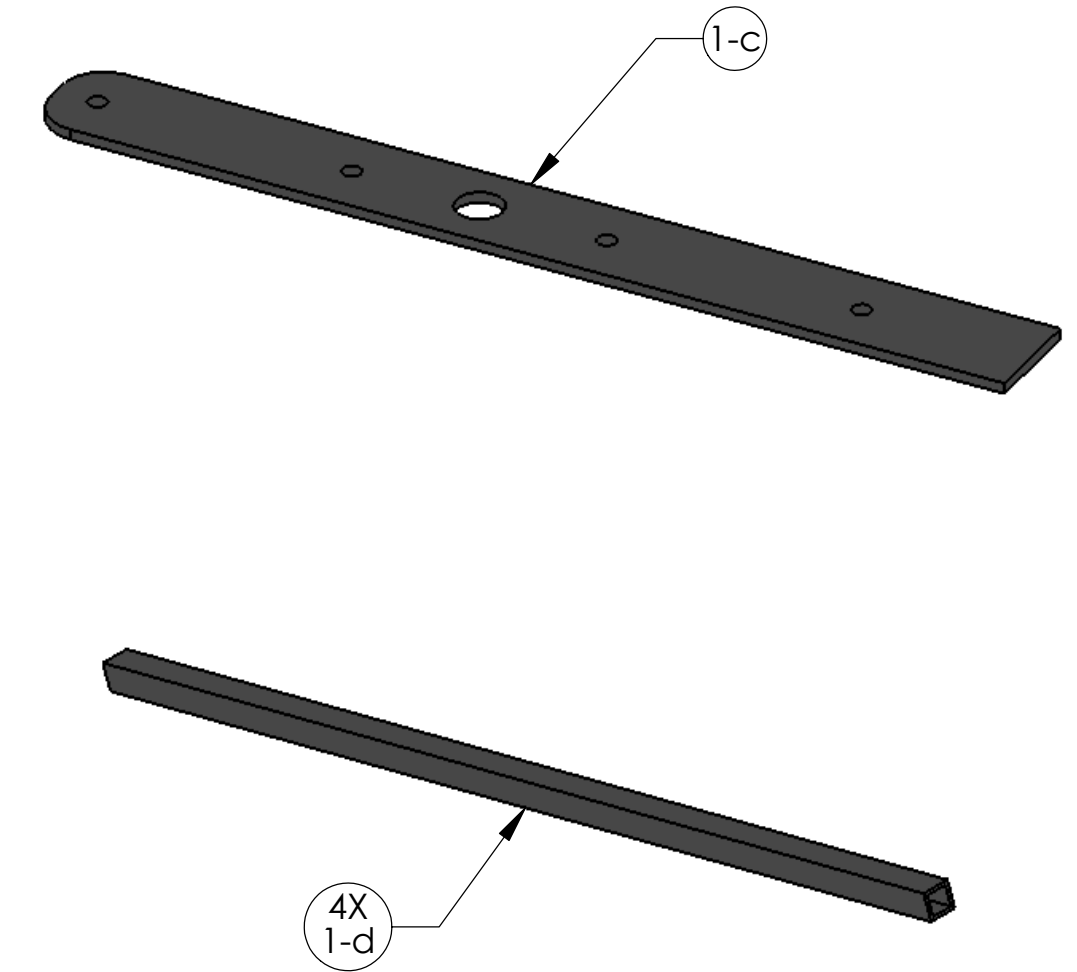
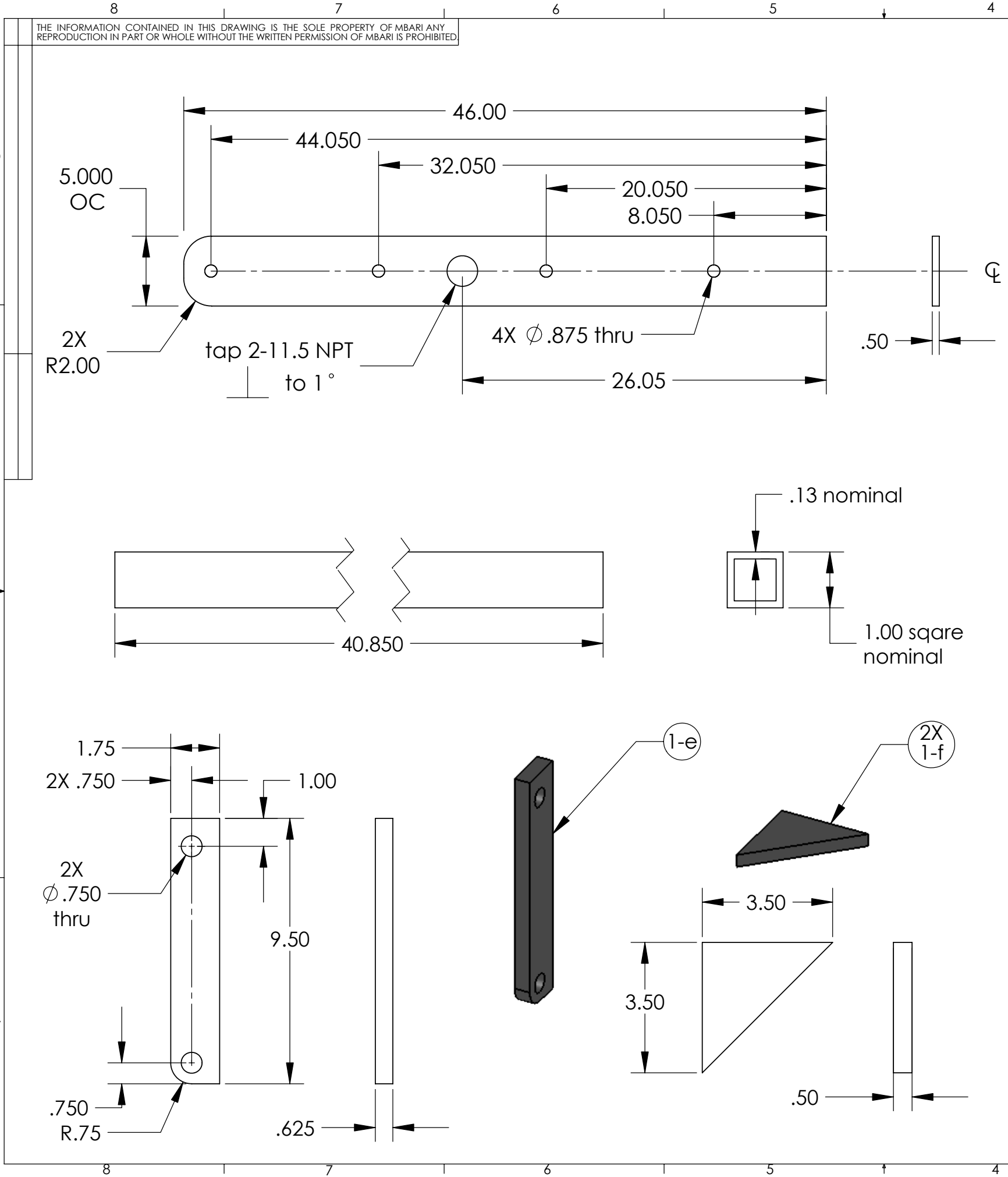
DWG. NO. 143jaha.DWG

REV.

SCALE 1:4

CAD FILE: tornado/chem/SWfiles

SHEET 2 OF 7



|          |      |          |                                  |                                  |
|----------|------|----------|----------------------------------|----------------------------------|
| 8        | 2@   |          | Ballast mount                    | Delrin                           |
| 7        | 1@   |          | Radio mast insert                | Delrin                           |
| 6        | 4@   |          | Isolator sleeves                 | Delrin                           |
| 5        | 8@   |          | Instrument struts                | 1" sq 1/8" wall Aluminum 6061-T6 |
| 4        | 2@   |          | Instrument mounts                | 3/4" PVC plate                   |
| 3        | 1@   |          | Radio mast                       | 2" Sched-20 6061-T6 Al pipe      |
| 2        | 1@   |          | Float retainer (welded assembly) | 17-4 PH Stainless                |
| 1        | 1@   |          | Main Frame (welded assembly)     | Aluminum 6061-T6                 |
| Item No. | Qty. | Part No. | Description                      | Material Specification           |

| BILL OF MATERIALS     |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               |                        |                |             |        |                                                                                                                                                                                                                                                                             |          |                                |              |
|-----------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|---------------|------------------------|----------------|-------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------|--------------|
| Shop / Q.C.           |                  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                                                                                                                                                                                                                                                      |                     |                      |               | APPROVALS              |                | DATE        |        | <div>Monterey Bay Aquarium Research Institute</div> <div><div>MBARI</div><div>7700 Sandholdt RD.</div><div>Moss Landing, CA 95039</div><div>PH: (831) 775-1700</div></div> <div></div> |          |                                |              |
| Inspector             |                  | 1 PLACE DIM<br>±1/16                                                                                                                                                                                                                                                                                                                            | 2 PLACE DIM<br>±.02 | 3 PLACE DIM<br>±.005 | ANGLES<br>±1° | DRAWN<br>Hans Jannasch | 5/10/04        | ENGINEER    |        |                                                                                                                                                                                                                                                                             |          |                                |              |
| Shop Foreman          |                  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILLET RADII .0150-.030.<br>5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH, MAX .012 INCHES FOR SINGLE SURFACE. |                     |                      |               | CHECKED<br>Jon Ericson | 6/1/04         | PROJECT NO. | 701144 | 143jahaSmoor-C<br>Shallow Mooring Frame                                                                                                                                                                                                                                     |          |                                |              |
| Engineer              |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               | PROJECT                | LOBO NSF Grant |             |        |                                                                                                                                                                                                                                                                             |          |                                |              |
| NEXT ASSY Description | NEXT ASSY Number |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               |                        |                |             |        | SIZE B                                                                                                                                                                                                                                                                      | DWG. NO. | 143jaha.DWG                    | REV.         |
| Application           |                  | DO NOT SCALE DRAWING                                                                                                                                                                                                                                                                                                                            |                     |                      |               | WEIGHT                 |                |             |        | SCALE                                                                                                                                                                                                                                                                       | 1:8      | CAD FILE: tornado/chem/SWfiles | SHEET 3 OF 7 |

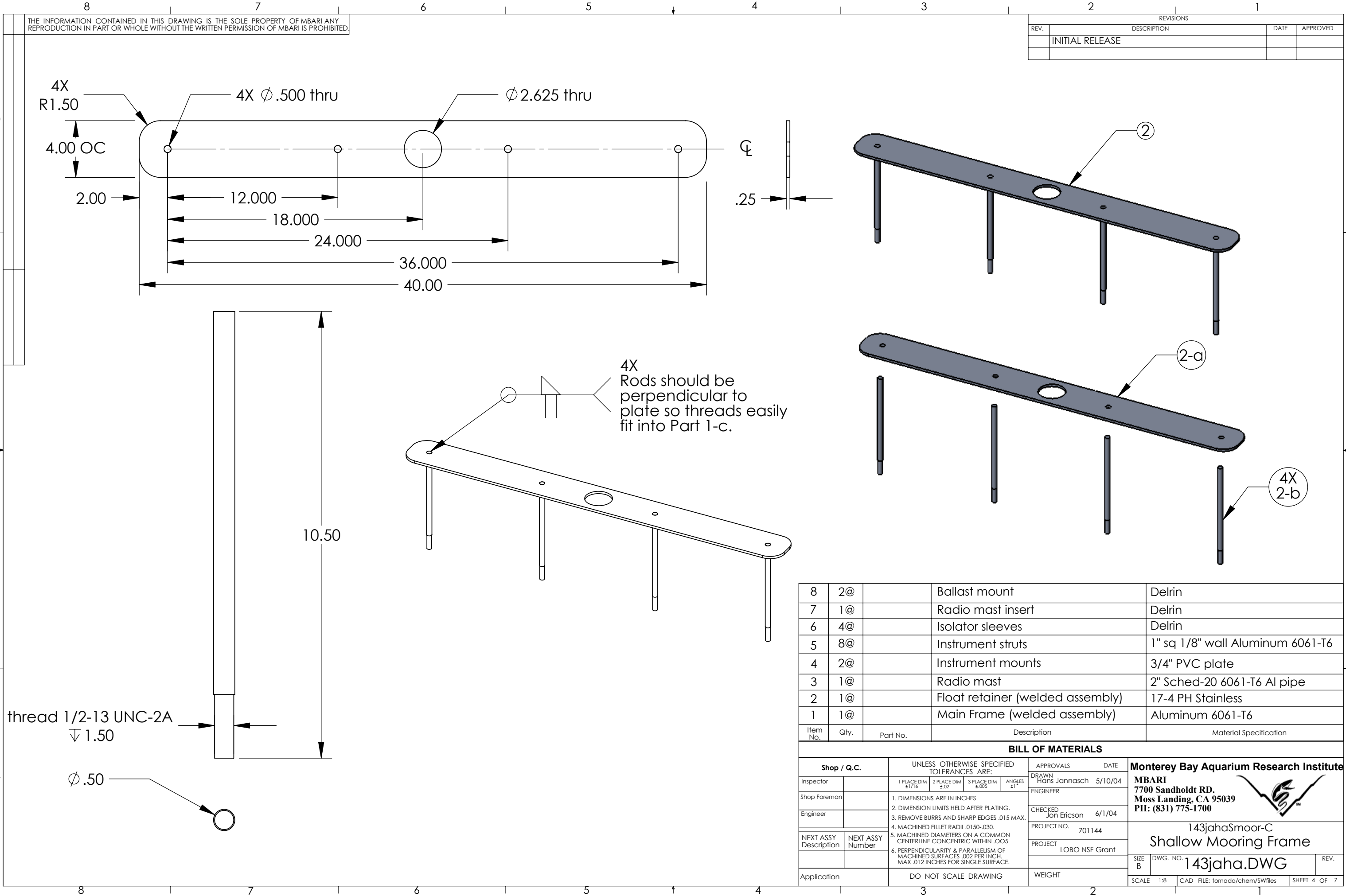
1

3

1

2

1

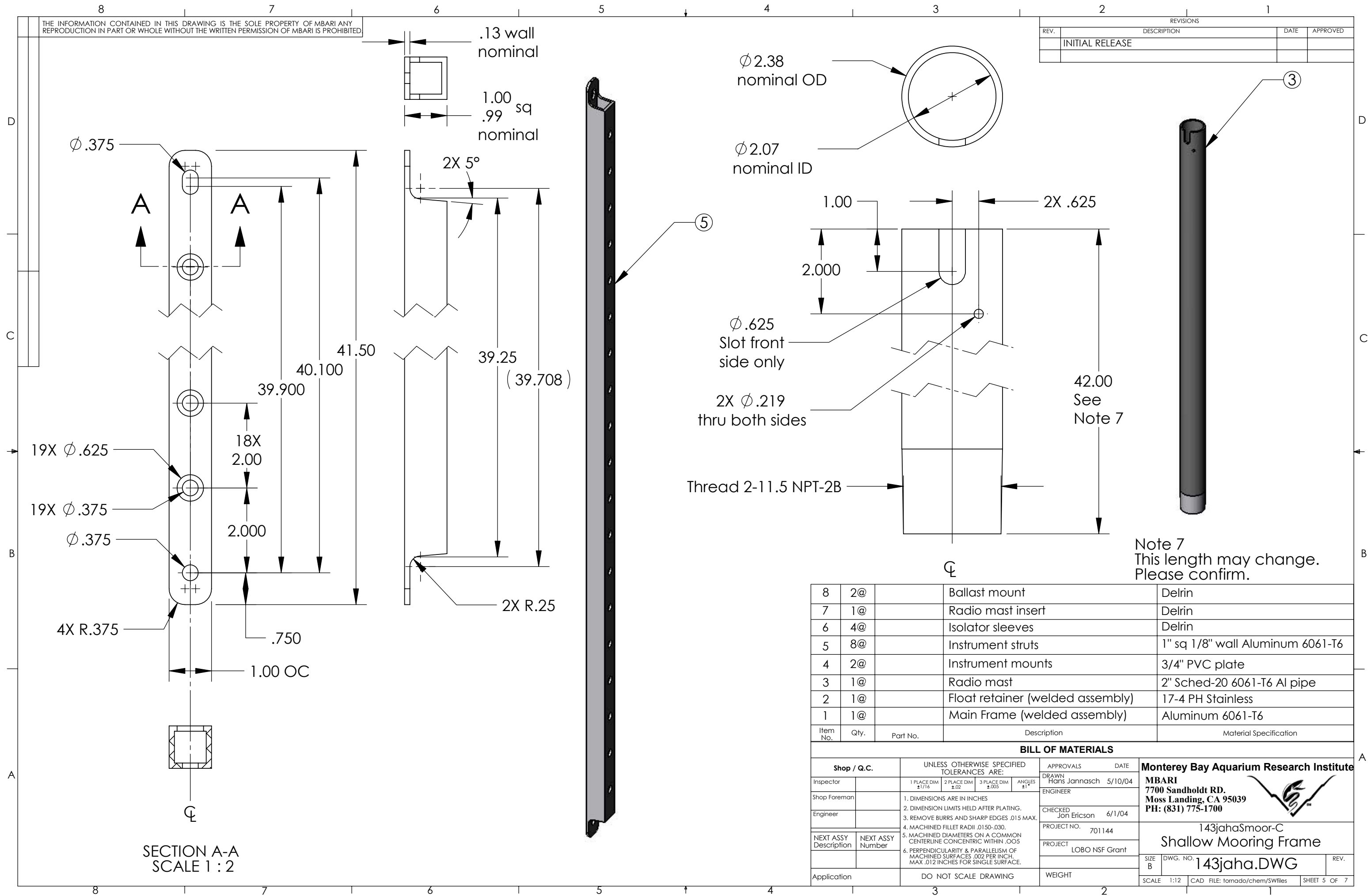


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| REVISIONS |                 |      |          |
|-----------|-----------------|------|----------|
| REV.      | DESCRIPTION     | DATE | APPROVED |
|           | INITIAL RELEASE |      |          |
|           |                 |      |          |

| 8        | 2@   |          | Ballast mount                    | Delrin                           |
|----------|------|----------|----------------------------------|----------------------------------|
| 7        | 1@   |          | Radio mast insert                | Delrin                           |
| 6        | 4@   |          | Isolator sleeves                 | Delrin                           |
| 5        | 8@   |          | Instrument struts                | 1" sq 1/8" wall Aluminum 6061-T6 |
| 4        | 2@   |          | Instrument mounts                | 3/4" PVC plate                   |
| 3        | 1@   |          | Radio mast                       | 2" Sched-20 6061-T6 Al pipe      |
| 2        | 1@   |          | Float retainer (welded assembly) | 17-4 PH Stainless                |
| 1        | 1@   |          | Main Frame (welded assembly)     | Aluminum 6061-T6                 |
| Item No. | Qty. | Part No. | Description                      | Material Specification           |

| BILL OF MATERIALS     |  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               |                        |         |                                         |                |                                                                                                                                                                                                                   |                                      |  |  |  |
|-----------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|---------------|------------------------|---------|-----------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--|--|--|
| Shop / Q.C.           |  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                                                                                                                                                                                                                                                      |                     |                      |               | APPROVALS              |         | DATE                                    |                | Monterey Bay Aquarium Research Institute<br><br>MBARI<br>7700 Sandholdt RD.<br>Moss Landing, CA 95039<br>PH: (831) 775-1700  |                                      |  |  |  |
| Inspector             |  | 1 PLACE DIM<br>±1/16                                                                                                                                                                                                                                                                                                                            | 2 PLACE DIM<br>±.02 | 3 PLACE DIM<br>±.005 | ANGLES<br>±1° | DRAWN<br>Hans Jannasch | 5/10/04 | ENGINEER                                |                |                                                                                                                                                                                                                   |                                      |  |  |  |
| Shop Foreman          |  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILLET RADII .0150-.030.<br>5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH, MAX .012 INCHES FOR SINGLE SURFACE. |                     |                      |               | CHECKED<br>Jon Ericson | 6/1/04  | 143jahaSmoor-C<br>Shallow Mooring Frame |                |                                                                                                                                                                                                                   |                                      |  |  |  |
| Engineer              |  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               | PROJECT NO.            | 701144  |                                         |                |                                                                                                                                                                                                                   |                                      |  |  |  |
| NEXT ASSY Description |  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               | NEXT ASSY Number       | PROJECT |                                         | LOBO NSF Grant |                                                                                                                                                                                                                   | SIZE B   DWG. NO. 143jaha.DWG   REV. |  |  |  |
|                       |  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               |                        |         |                                         |                |                                                                                                                                                                                                                   |                                      |  |  |  |
| Application           |  | DO NOT SCALE DRAWING                                                                                                                                                                                                                                                                                                                            |                     |                      |               | WEIGHT                 |         | SCALE 1:8                               |                | CAD FILE: tornado/chem/SWfiles                                                                                                                                                                                    | SHEET 4 OF 7                         |  |  |  |

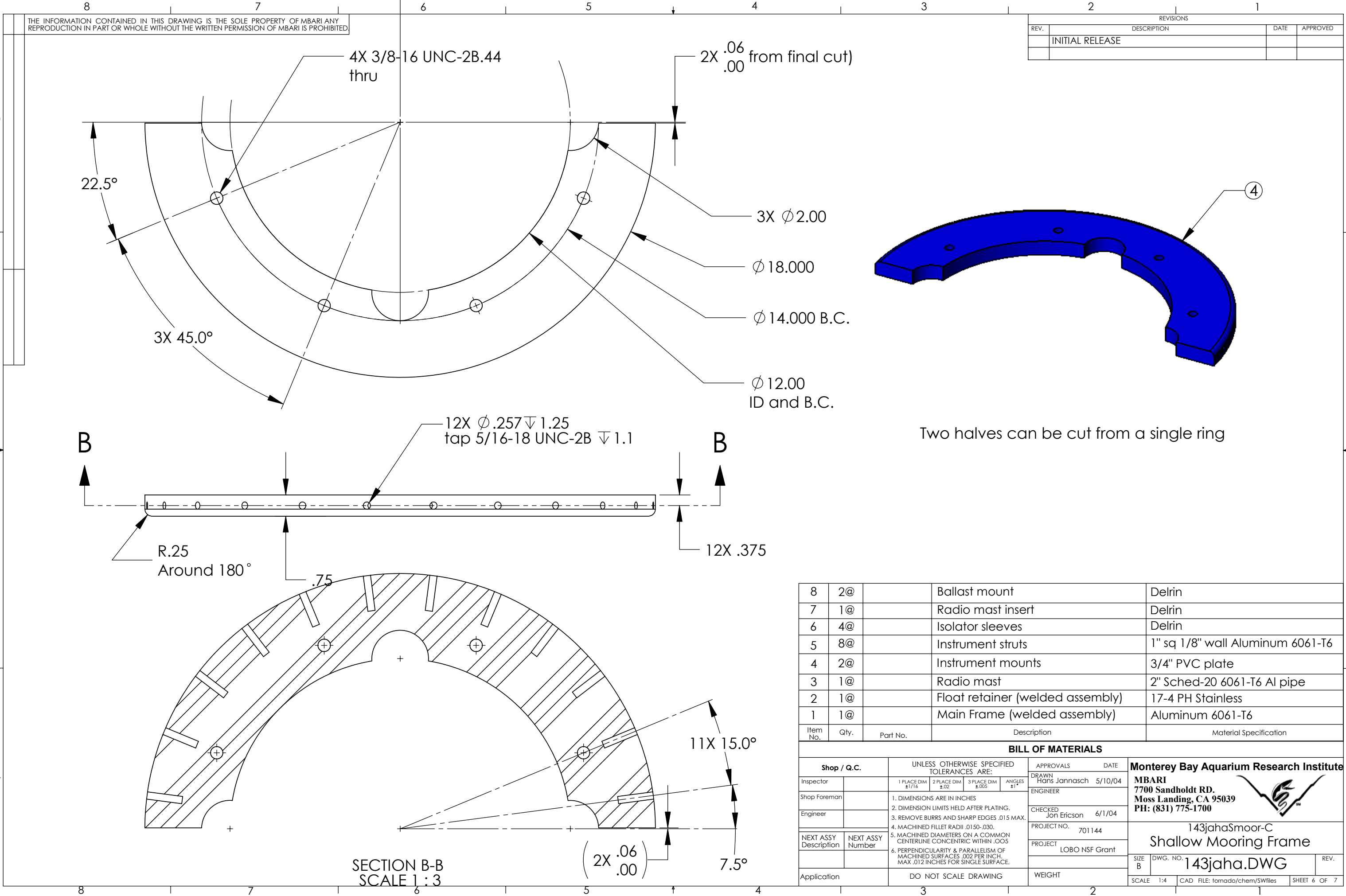


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|-----------|-----------------|------|----------|
| REV.      | DESCRIPTION     | DATE | APPROVED |
|           | INITIAL RELEASE |      |          |
|           |                 |      |          |

| 8        | 2@   |          | Ballast mount                    | Delrin                           |
|----------|------|----------|----------------------------------|----------------------------------|
| 7        | 1@   |          | Radio mast insert                | Delrin                           |
| 6        | 4@   |          | Isolator sleeves                 | Delrin                           |
| 5        | 8@   |          | Instrument struts                | 1" sq 1/8" wall Aluminum 6061-T6 |
| 4        | 2@   |          | Instrument mounts                | 3/4" PVC plate                   |
| 3        | 1@   |          | Radio mast                       | 2" Sched-20 6061-T6 Al pipe      |
| 2        | 1@   |          | Float retainer (welded assembly) | 17-4 PH Stainless                |
| 1        | 1@   |          | Main Frame (welded assembly)     | Aluminum 6061-T6                 |
| Item No. | Qty. | Part No. | Description                      | Material Specification           |

| BILL OF MATERIALS     |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               |                           |         |                         |  |                                                                                                                                                                                                                                                |  |
|-----------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|---------------|---------------------------|---------|-------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Shop / Q.C.           |                  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                                                                                                                                                                                                                                                      |                     |                      |               | APPROVALS                 |         | DATE                    |  | <div>Monterey Bay Aquarium Research Institute</div> <div>MBARI<br/>7700 Sandholdt RD.<br/>Moss Landing, CA 95039<br/>PH: (831) 775-1700</div> <div></div> |  |
| Inspector             |                  | 1 PLACE DIM<br>±1/16                                                                                                                                                                                                                                                                                                                            | 2 PLACE DIM<br>±.02 | 3 PLACE DIM<br>±.005 | ANGLES<br>±1° | DRAWN<br>Hans Jannasch    | 5/10/04 | ENGINEER                |  |                                                                                                                                                                                                                                                |  |
| Shop Foreman          |                  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILLET RADII .0150-.030.<br>5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH, MAX .012 INCHES FOR SINGLE SURFACE. |                     |                      |               | CHECKED<br>Jon Ericson    | 6/1/04  | PROJECT NO.<br>701144   |  |                                                                                                                                                                                                                                                |  |
| Engineer              |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               | PROJECT<br>LOBO NSF Grant |         |                         |  |                                                                                                                                                                                                                                                |  |
| NEXT ASSY Description | NEXT ASSY Number |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               |                           |         |                         |  | 143jahaSmoor-C<br>Shallow Mooring Frame                                                                                                                                                                                                        |  |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               | SIZE<br>B                 |         | DWG. NO.<br>143jaha.DWG |  | REV.                                                                                                                                                                                                                                           |  |
| Application           |                  | DO NOT SCALE DRAWING                                                                                                                                                                                                                                                                                                                            |                     |                      |               | WEIGHT                    |         | SCALE 1:12              |  | CAD FILE: tornado/chem/SWfiles                                                                                                                                                                                                                 |  |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                      |               |                           |         |                         |  | SHEET 5 OF 7                                                                                                                                                                                                                                   |  |



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|-----------|-----------------|------|----------|
| REV.      | DESCRIPTION     | DATE | APPROVED |
|           | INITIAL RELEASE |      |          |
|           |                 |      |          |

| 8        | 2@   |          | Ballast mount                    | Delrin                           |
|----------|------|----------|----------------------------------|----------------------------------|
| 7        | 1@   |          | Radio mast insert                | Delrin                           |
| 6        | 4@   |          | Isolator sleeves                 | Delrin                           |
| 5        | 8@   |          | Instrument struts                | 1" sq 1/8" wall Aluminum 6061-T6 |
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| 1        | 1@   |          | Main Frame (welded assembly)     | Aluminum 6061-T6                 |
| Item No. | Qty. | Part No. | Description                      | Material Specification           |

| BILL OF MATERIALS     |                  |                                                                                                           |                  | Monterey Bay Aquarium Research Institute |            |
|-----------------------|------------------|-----------------------------------------------------------------------------------------------------------|------------------|------------------------------------------|------------|
| Shop / Q.C.           |                  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                |                  | APPROVALS DATE                           |            |
| Inspector             |                  | 1 PLACE DIM ±1/16                                                                                         | 2 PLACE DIM ±.02 | 3 PLACE DIM ±.005                        | ANGLES ±1° |
| Shop Foreman          |                  | 1. DIMENSIONS ARE IN INCHES                                                                               |                  | DRAWN Hans Jannasch 5/10/04              |            |
| Engineer              |                  | 2. DIMENSION LIMITS HELD AFTER PLATING.                                                                   |                  | ENGINEER                                 |            |
|                       |                  | 3. REMOVE BURRS AND SHARP EDGES .015 MAX.                                                                 |                  | CHECKED Jon Ericson 6/1/04               |            |
|                       |                  | 4. MACHINED FILLET RADII .0150-.030.                                                                      |                  | PROJECT NO. 701144                       |            |
| NEXT ASSY Description | NEXT ASSY Number | 5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005                                       |                  | PROJECT LOBO NSF Grant                   |            |
|                       |                  | 6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH. MAX .012 INCHES FOR SINGLE SURFACE. |                  |                                          |            |
| Application           |                  | DO NOT SCALE DRAWING                                                                                      |                  | WEIGHT                                   |            |
|                       |                  |                                                                                                           |                  | SIZE B                                   |            |
|                       |                  |                                                                                                           |                  | DWG. NO. 143jaha.DWG                     |            |
|                       |                  |                                                                                                           |                  | REV.                                     |            |
|                       |                  |                                                                                                           |                  | SCALE 1:4                                |            |
|                       |                  |                                                                                                           |                  | CAD FILE: tornado/chem/SWfiles           |            |
|                       |                  |                                                                                                           |                  | SHEET 6 OF 7                             |            |

