

| INCH-POUND |

MIL-G-28673C

11 March 1994

SUPERSEDING

MIL-G-28673B

17 February 1987

MILITARY SPECIFICATION

GANTRIES, HOIST, PORTABLE (SHOP TYPE)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers portable type gantries mounted on casters for mobility, with provisions for a load lifting device or hoisting apparatus.

1.2 Classification. Gantries covered by this specification shall be of the following nominal fixed sizes and styles (see 6.2).

Size A - 1 ton capacity, 12-foot height, 6-foot span.
 Size B - 2 ton capacity, 10-foot height, 10-foot span.
 Size C - 5 ton capacity, 12-foot height, 10-foot span.
 Size D - 5 ton capacity, 14-foot height, 12-foot span.

Note: 1 ton = 2,000 pounds

Style 0 - Without trolley or chain hoist.

Style 1 - With plain trolley conforming to MIL-H-904.

Style 2 - With plain trolley and Type C link chain hoist conforming to MIL-H-904.

Style 3 - With plain trolley and Type D link chain hoist conforming to MIL-H-904.

Style 4 - With geared trolley and Type E link chain hoist conforming to MIL-H-904.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer (Code 156), Naval Construction Battalion Center, 1000 23rd Avenue, Port Hueneme, CA 93043-4301, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 3950

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

- 1.3 Part identification number (PIN). Gantries shall be identified by PIN. This part number is intended for cataloging (see 6.5) and ordering purposes (see 6.2). The PIN shall be as follows:

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

PPP-B-601 - Boxes, Wood, Cleated-Plywood.
PPP-B-621 - Box, Wood, Nailed and Lock-Corner.

MILITARY

MIL-P-116 - Preservation, Methods of.
MIL-H-904 - Hoists, Chain, Hand-Operated, Hook and Trolley
Suspension.

STANDARDS

MILITARY

MIL-STD-129 - Marking for Shipment and Storage.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

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2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents which are current on the date of the solicitation (see 6.2).

ASTM

- A36/A36M - Structural Steel.
- A194/A194M - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
- A325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- D3953 - Strapping, Flat Steel and Seals.

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

AMERICAN WELDING SOCIETY (AWS)

- D14.1 - Welding of Industrial and Mill Cranes and Other Material Handling Equipment.

(Application for copies should be addressed to the American Welding Society, 550 N.W. LeJeune Road, P.O. Box 351040, Miami, FL 33135.)

MONORAIL MANUFACTURERS ASSOCIATION (MMA)

- MH27.1 - Specifications for Underhung Cranes and Monorail Systems.

(Application for copies should be addressed to the Monorail Manufacturers Association, 8720 Red Oak Blvd., Suite 201, Charlotte, NC 28217-3992.)

(Non-Government standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The gantry shall be portable, knockdown type consisting of a crossmember I-beam supported at each end by an A-frame structure mounted on casters. The gantry shall be delivered unassembled and shall be furnished with instructions for assembly in the field. The gantry may include a trolley or a chain hoist.

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3.2 First article. When specified in the contract or purchase order (see 6.2), a sample shall be subjected to first article inspection (see 4.2.1 and 6.3).

3.3 Standard commercial product. The gantry shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the gantry being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

3.4 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specified.

3.5 Performance. The gantry shall be stable under all conditions of loading whether stationary or in motion. When subjected to static and dynamic loading (see 4.4.1) the gantry shall not show any permanent deformation, and the casters, trolley, or chain hoist shall have no indication of binding or damage.

3.6 Design and construction. The gantry shall be designed and fabricated into sub-assemblies which shall provide for maximum compactness for shipping. Prefabrication shall be such that the gantry can be assembled in the field without special tools. The gantry shall have a built-in reserve capacity of not less than 15 percent of the rated capacity (see 1.2) to compensate for the additional weight of a hoist and trolley assembly. Parts that are to be permanently joined together shall be welded. Assemblies that are to be put together in the field shall be bolted. Bolts shall be in accordance with ASTM A325. Bolt nuts shall be heavy-duty hexagonal, grade 2H in accordance with ASTM A194. The specified height shall be measured from the floor (bottom of caster wheels) to the top of the I-beam. The specified span shall be measured between the centerlines of the A-frame supports.

3.6.1 A-frame. The A-frame structure with diagonal braces located at each end of the crossmember I-beam shall be fabricated from heavy walled round, square, or rectangular steel tubing conforming to ASTM A500, Grade B. Each A-frame structure shall be of the same height to assure that when the gantry is assembled in a level surface, the crossmember I-beam shall be level (see figures 1 and 2).

3.6.2 Beam. The crossmember I-beam sizes (depth) shall be not less than 6 inches for size A gantry, 8 inches for size B gantry, 12 inches for size C

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gantry and 24 inches for size D gantry. Each end of the beam shall be provided with bolt trolley travel limit stops. A lifting lug centrally located on top of the beam shall also be furnished. The I-beam shall not exceed a vertical deflection of $L/600$ when subjected to the static load test (see 4.4.1.1) (L = length of beam between supports). The I-beam shall otherwise conform to MMA MH27.1.

3.6.3 Casters. Each caster shall be a 360 degrees ($^{\circ}$) swivel type with four position swivel locks and of extra heavy-duty replaceable commercial stock with load ratings of not less than 50 percent of gantry capacity. Casters shall have steel wheels and be provided with standard grease fittings for lubrication of bearings and moving parts. Bearings shall be sealed for dirt and dust protection. Caster wheel diameter shall be not less than 6 inches for size A and size B gantries, not less than 8 inches for size C and size D gantries. When specified (see 6.2), wheel brakes shall be furnished. When specified (see 6.2), elastomer caster wheels with the required type of material shall be furnished in lieu of steel wheels.

3.6.4 Trolley (without hoist). When required, the trolley to be furnished shall be of the same load rating as the gantry. The trolley shall be as specified herein and shall otherwise conform to MIL-H-904. The plain trolley is not powered; the geared trolley is powered. The trolley side frames shall be connected at the bottom by a heavy steel equalizer pin on which a steel hook plate or link is centrally located for attaching the hoist and to assure equal distribution of the load on the trolley wheels. Unless otherwise specified (see 6.2), trolley wheel diameter shall be a minimum of 3.4-inch for Size A and B gantries, and 4.6-inch for Size C and D gantries and the wheel treads shall be crowned so as to be suitable for operation on both slope-flanged and flat-flanged I-beams, and shall be for the size and style specified (see 1.2).

3.6.5 Chain hoist. When required, the chain hoist to be furnished shall be of the same load rating as the gantry. The hoist shall be class 2 of the type specified in 1.2 and 6.2 and shall conform to MIL-H-904.

3.6.6 System of measurement. The dimensions used in this specification are not intended to preclude the use of the metric system of measurement in the fabrication and production of the material, individual parts, and the finished product, provided form, fit, and function requirements are satisfied.

3.7 Identification marking. Identification shall be permanently and legibly marked directly on a corrosion-resisting metal plate securely attached (screwed or welded) to the gantry at the source of manufacture. Identification shall include the manufacturer's model and serial number, name, trademark, and load rating (TONS) to be readily identifiable to the manufacturer. Nonferrous screws, rivets, or bolts of not less than 1/8 inch in diameter shall be used to affix the plates. In addition, the specified load rating (TONS) shall be stenciled (painted) in bold letters centrally located on both sides of the crossmember I-beam. Height of letters shall not be less than 3-1/2 inches.

3.8 Cleaning, treatment, and painting. Surfaces normally painted in good commercial practice shall be cleaned, treated, and painted as specified herein. The color of the finish coat shall be as specified (see 6.2). Surfaces to be painted shall be cleaned and dried to insure that they are free from contaminants such as oil, grease, welding slag and spatter, loose mill scale,

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water, dirt, corrosion product, or any other contaminating substances. As soon as practicable after cleaning, and before any corrosion product or other contamination can result, the surfaces shall be prepared or treated to insure the adhesion of the coating system. The painting shall consist of at least one coat of primer and one finish coat. The primer shall be applied to a clean, dry surface as soon as practicable after cleaning and treating. Painting shall be with manufacturer's current materials according to manufacturer's current processes and the total dry film thickness shall be not less than 2.5 mils over the entire surface. The paint shall be free from runs, sags, orange peel, or other defects.

3.9 Workmanship.

3.9.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.9.2 Bolted connections. Boltholes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice, and all bolts, nuts, and screws shall be tight.

3.9.3 Welding. Welding procedures shall be in accordance with AWS D14.1. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

3.9.4 Castings. All castings shall be sound and free from patching, misplaced coring, warping, or any other defect which reduces the casting's ability to perform its intended function.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this document where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this document shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the

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contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. The first article inspection shall be performed on a gantry when a first article is required (see 3.2, 6.2, and 6.3). This inspection shall include the examination of 4.3 and the tests of 4.4. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.3, the tests of 4.4, and the packaging inspection of 4.5.

4.3 Examination. Each gantry shall be examined for compliance with the requirements specified in section 3 of this specification. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.4 Tests. The first article shall receive the tests of 4.4.1 and 4.4.2 and each production unit shall receive the test of 4.4.2. Failure to pass any test shall constitute cause for rejection.

4.4.1 Capacity test. The gantry shall be assembled on a concrete paved surface, such as a shop floor or parking lot, in a position where the beam is level with all casters touching the surface. Steel shims may be used under the casters, if necessary, for proper level bearing. The casters shall be locked.

4.4.1.1 Static test. A load not less than 200 percent of the applicable capacity (see 1.2) shall be applied to the center of the I-beam, through a load suspending device (trolley and chain hoist) as applicable, then moved to each end of the beam. The test shall be conducted for not less than 10 minutes at each location. The I-beam shall be checked for deflection (see 3.6.2).

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4.4.1.2 Dynamic test. With the gantry parked on a level concrete paved surface, a load not less than 150 percent of rated capacity shall be applied. The load shall be moved back and forth to the limits of trolley travel. The gantry shall be moved in all directions to cause rotations through 360° of each caster. This test shall be conducted for not less than 10 minutes. Any sign of the gantry being unstable, signs of damages or distortions, loosening of bolts, malfunctioning or distortion of casters and applicable trolley or chain hoist, shall constitute failure of this test.

4.4.2 Functional tests. The first article and each production gantry, including applicable trolley or hoist, shall be tested to determine the proper fit and function of all removable and movable parts. Casters and wheels shall turn freely. The trolley shall be moved, without load, to the limits of its travel, and observed for simultaneous contact at all times of all wheels on the supporting beam flange. The gantry shall then be disassembled and examined for damaged or stripped threads, forced or improper fittings, and missing or mismatched parts. Evidence of inadequate design or poor workmanship shall constitute failure of this test.

4.5 Packaging inspection. The preservation, packing, and marking of the item shall be inspected to verify conformance to the requirements of section 5.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or commercial as specified (see 6.2).

5.1.1 Level A. Unpainted ferrous metal surfaces, including threaded surfaces, shall be coated with type P-1 preservative conforming to the applicable specifications listed in MIL-P-116, and shall be applied in accordance with MIL-P-116. The chain hoist, trolley, and all bearings of the casters shall be lubricated as for service. Casters, bolts, nuts, washers, and any other small component parts require additional protection in accordance with MIL-P-116 for method 1C protection.

5.1.2 Commercial. The complete gantry shall be preserved in accordance with the contractor's standard practice in a manner to prevent deterioration and damage.

5.2 Packing. Packing shall be level A, B, or commercial as specified (see 6.2).

5.2.1 Level A. The larger structural components for each gantry shall be nested, arranged, and secured with steel strapping and bolting in combination with suitable wood block or battens, as required to form compact nonshifting bundles. Each bundle shall be strapped girthwise with 0.035 by 1-1/4 inch, type 1, finish B, grade 2, flat steel strapping conforming to ASTM D3953. A minimum of three straps shall be provided for each bundle. Strapping shall be spaced not to exceed approximately 36 inches on center, with end strapping placed not more than 18 inches from each end. The strapping shall be stapled to any wood blocking or battens provided. Metal edge protectors shall be used where strapping bears on sharp metal edges. The chain hoist, trolley, preserved and packaged items, and any other small unpackaged component parts not suitable for

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bundling shall be packed in close-fitting boxes conforming to PPP-B-621, class 2, or PPP-B-601, overseas type. The contents shall be blocked, and braced to prevent movement within the boxes.

5.2.2 Level B. The complete gantry shall be packed as specified for level A, except that boxes shall conform to PPP-B-621, class 1, or PPP-B-601, domestic type.

5.2.3 Commercial. The complete gantry shall be packed in a manner which will insure arrival at destination in satisfactory condition. Packing shall comply with applicable carrier rules and regulations.

5.3 Marking. Marking shall be in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The portable gantry is used indoor for support of lifting or hoisting apparatus in automotive, boat assembly and machine shops and to a limited extent, the transportation of workloads within the shop area.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Size and style required (see 1.2).
- c. PIN designation (see 1.3).
- d. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- e. When first article is required for inspection and approval (see 3.2 and 4.2.1).
- f. When casters shall be provided with wheel brakes (see 3.6.3).
- g. When elastomer caster wheels and the type of material required shall be furnished (see 3.6.3).
- h. When trolley wheels shall be different (see 3.6.4).
- i. Color of finish coat required (see 3.8).
- j. Level of preservation and packing required (see 5.1 and 5.2).

6.3 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.4 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DoD Federal Acquisition Regulations (FAR) Supplement, Part 27, Sub-Part 227.405-70 are invoked and the DD Form 1423 is not used, the data should be delivered by the contractor in accordance with the contract or purchase order requirements.

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6.5 Cataloging data. For cataloging purposes, PIN code numbers are assigned to sizes and styles.

Classification	PIN Code
Size A	A
Size B	B
Size C	C
Size D	D
Style 0	X
Style 1	1
Style 2	2
Style 3	3
Style 4	4
Style 5	5
Style 6	6
Style 7	7

6.6 Example of PIN.

Example 1. 5-ton gantry, 14-foot high, 12-foot span, without trolley or chain hoist - PIN designation: M28673-DX

Example 2. 2-ton gantry, 10-foot high, 10-foot span, with chain hoist (Type F) - PIN designation: M28673-B5

6.7 Subject term (key word) listing.

A-frame
Caster
I-beam
Trolley

6.8 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Navy - YD1
Air Force - 99

Preparing Activity:
Navy - YD1

(Project 3950-0294)

Review Activities:
Army - ME
Air Force - 84
DLA - CS

FIGURE 1. Example of I-beam and A-frame with inside diagonal braces.

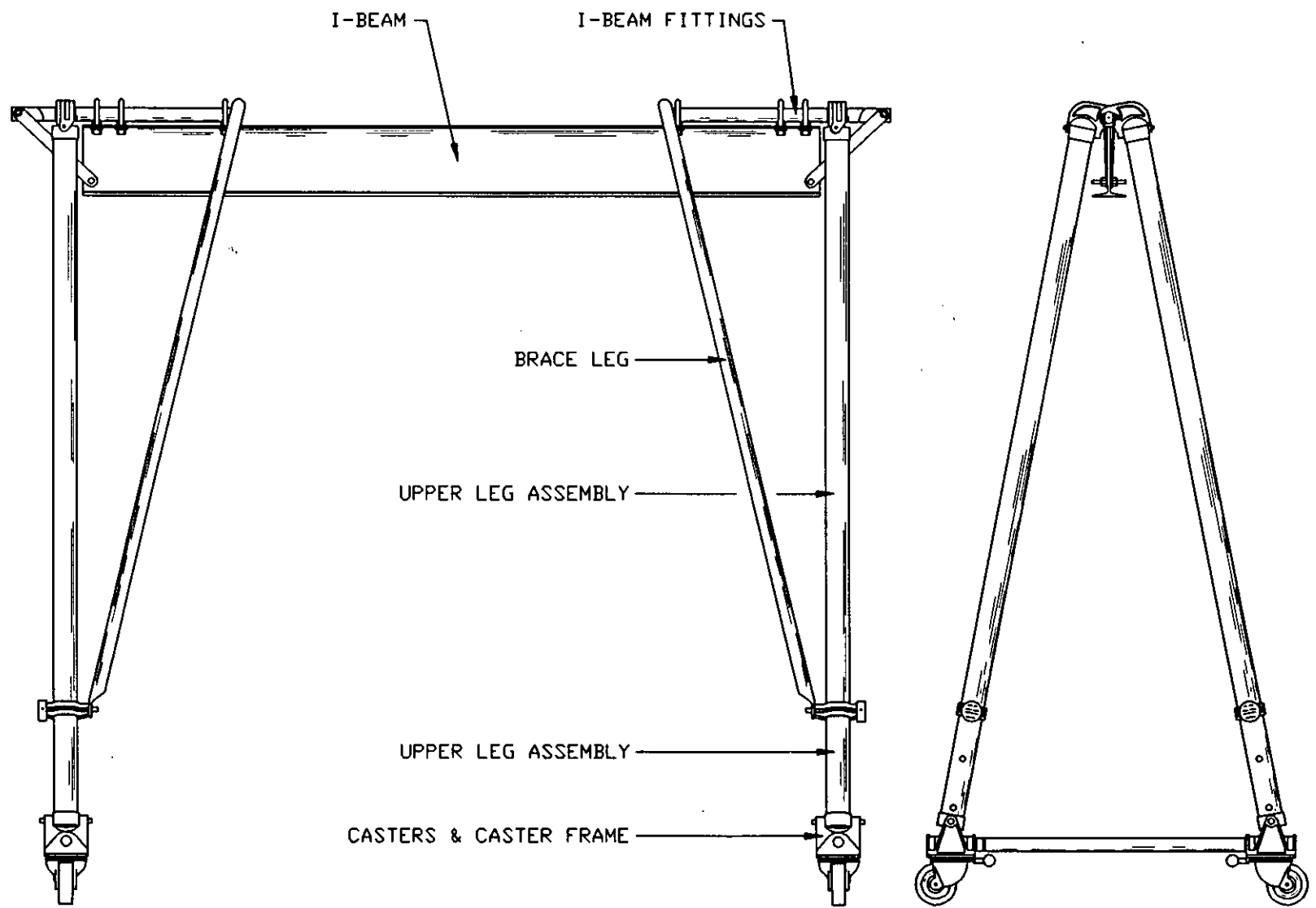
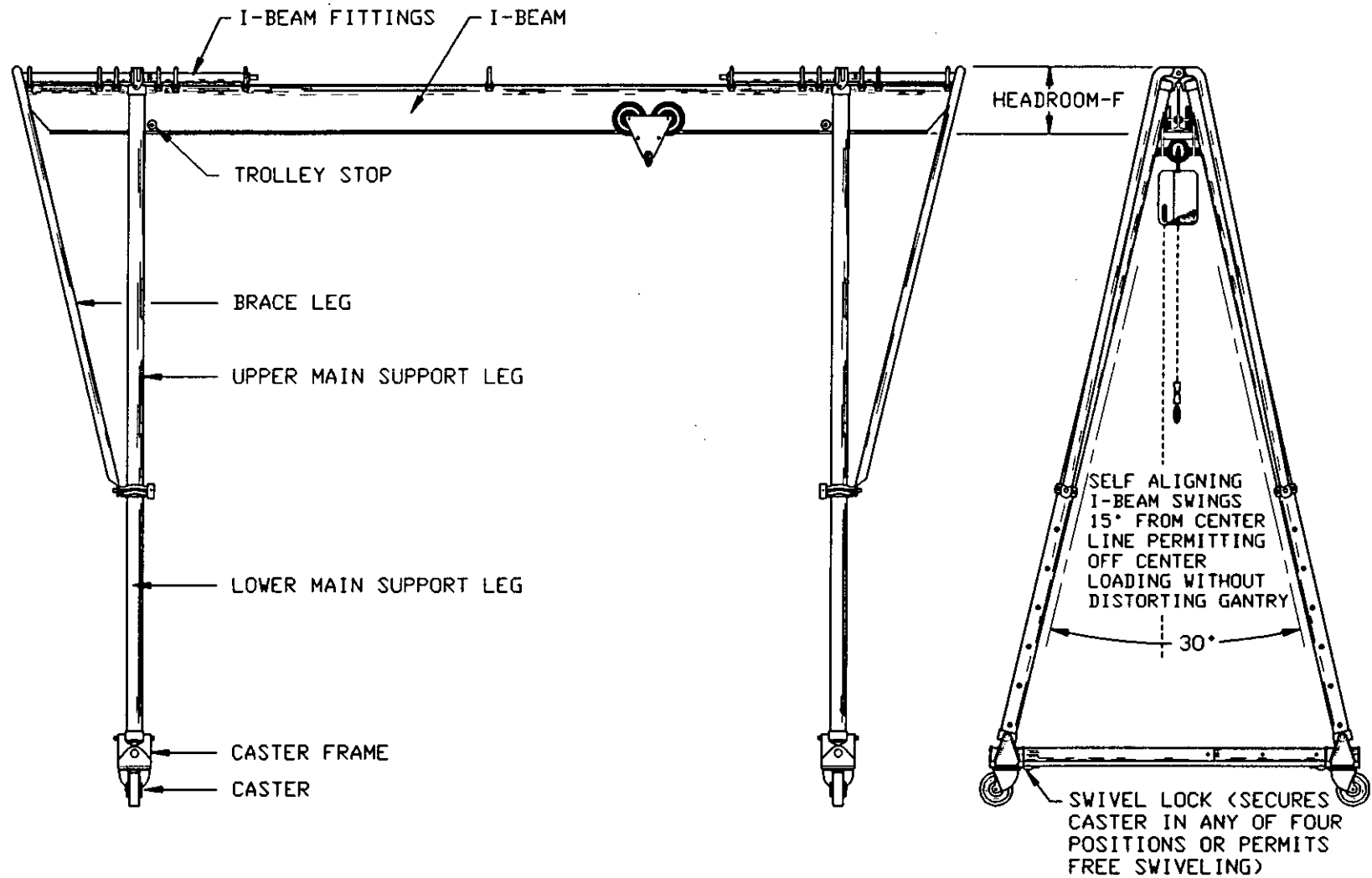


FIGURE 2. Example of I-beam and A-frame with outside diagonal braces.



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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-G-28673C	2. DOCUMENT DATE (YYMMDD) 940311
3. DOCUMENT TITLE GANTRIES, HOIST, PORTABLE (SHOP TYPE)			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME MR. RAY J. MAYER		b. TELEPHONE (Include Area Code) (1) Commercial 805-982-5615 (2) AUTOVON 551-5615	
c. ADDRESS (Include Zip Code) COMMANDING OFFICER 1000 23RD AVENUE, NCBC CODE 1564C PORT HUENEME, CA 93043-4301		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	