

INCH-POUND

A-A-59946

23 January 2014

## COMMERCIAL ITEM DESCRIPTION

## SCALE, WEIGHING SYSTEMS, AIRCRAFT TOP-OF-JACK

The General Services Administration has authorized the use of this commercial item description for all federal agencies.

1. **SCOPE.** This Commercial Item Description (CID) covers top-of-jack weighing systems, for weighing aircraft and helicopters. Each system includes 4 load cells, digital indicator and accessories. Each load cell has a capacity of 25,000 pounds. Accuracy is within +/- 0.1 percent of the applied axial load.

2. **CLASSIFICATION.** The weighing systems are classified by load cell capacity, as follows:

Type 25K (4 load cells, 25,000 lb capacity each)

### 3.0 SALIENT CHARACTERISTICS.

3.1 **General.** The weighing system shall be suitable for the intended use (see 6.1), easy to use, maintain, and repair. It shall be durable, reliable, and free of defects affecting performance, strength and safety. It shall be complete, including all items needed to weigh aircraft, except jacks and aircraft peculiar tooling. Service life shall be not less than 15 years under normal US Air Force operating and storage conditions and environments.

3.2 **Accuracy.** The scale (load cells, cables and indicator) shall measure loads accurately and repeatably, over the weighing range, within +/- 0.10 percent of the applied axial load or +/- 0.01 percent of capacity, whichever is greater. Only axial loads shall be displayed. The allowable error includes all error effects, including calibration uncertainty, display rounding, loading errors (such as off-center loading), creep over 30 minutes, temperature variation of +/- 5 degrees Fahrenheit, non-linearity, repeatability, zero shift, drift, etc.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: WR-ALC 404 SCMS/GUEEA, 235 Byron Street Suite 19A, Robins AFB, GA 31098-1670. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil/>.

AMSC N/A

FSC 6670

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## A-A-59946

3.3 Components. The weighing system shall include the following items in Table 1.

TABLE I. Weighing system components

Item	Quantity, Type 25K	See paragraph
Load cells	4	3.4
Jack adapters, stud	4	3.5.1
Jack adapters, adjustable	4	3.5.2
Cables	4	3.6
Indicator	1	3.7
Power cord	1	3.8
Accessory kit	1	3.9
Carrying case(s)	1	3.10
Calibration certificate and equip.	1	3.11.2

3.4 Load cells. Load cell size, weighing range and accuracy shall be in accordance with Table II. Readings shall not be affected by jack screw or ram diameters from 1.5 to 6 inches. The load cell base should have a raised area, so that the load is applied to a fixed area. The load cell shall withstand 50 percent overload with no change in calibration. It shall withstand 100 percent overload with no damage.

TABLE II. Load cell characteristics

Type	Diameter <sup>1</sup> (inches) max	Height (inches) max	Weighing Range (lbs)	Accuracy: within +/- 0.10 percent applied axial load or
25K	3	3.5	0 to 25,000	+/- 2.5 lbs

3.4.1 Socket. The load cell socket shall interface with aircraft jack points per SAE AS33559 (Adapter, Aircraft, Jacking Point, Design and Installation of), Types I through IV. The socket shall have approximately 0.75 inch spherical radius. Drawing 56B6129 is provided for information. Type 25K socket shall be 0.5 to 0.625 inches deep.

3.5 Jack adapters. The load cell shall mount on airframe jacks per MS33589 (Jack, Aircraft, Airframe (Unipod and Tripod)) and axle jacks per MS26566 (Jack, Aircraft Landing Gear (Axle)). The jack adapters shall be removable. The load cell and adapters shall withstand a horizontal load equal to 15 percent of rated capacity while loaded to capacity. The adapters shall have a safety factor of not less than 2 times the rated capacity. The load cell and adapters shall not separate from the jacks in all loading and overload conditions.

3.5.1 Stud adapters. Stud adapters, similar to the adapter shown on drawing 44A5184, shall be provided. The stud adapter shall fit the bottom of the load cell and the 1 inch diameter socket on the top of airframe jacks.

3.5.2 Adjustable adapter. Adjustable adapters, similar to the adapter shown on drawing 48A7153, shall be provided with Type 25K. The adjustable adapter shall fit the bottom of the load cell to the flat top of axle jacks.

## A-A-59946

3.6 Cables. Cables shall be provided to connect the load cells to the indicator. They shall be heavy duty with lock-type connectors. Weight readings shall not be affected by interference. The cables should be shielded and terminated at one end. Each cable length shall be not less than: Type 25K -- 25 feet.

3.7 Indicator. The indicator shall include an easy to read digital display, suitable for use in dim light and direct sunlight. It shall indicate weight in pounds. The resolution on the low weighing range shall be not greater than Type 25K -- 1 pound. It shall include self-test and error messages. It shall display 4 or more channels simultaneously. It shall include 6 channels. Any load cell shall be capable for being connected to any channel using any cable.

3.7.1 Gravitational correction factor. The scale shall be calibrated to standard gravity (acceleration due to gravity equals 32.174 ft/sec<sup>2</sup> at 45 degrees latitude and sea level). The stored latitude and elevation shall be automatically displayed when the scale is turned on. The user shall be able to input and store the local latitude and elevation. The indicated weight shall be automatically adjusted to standard gravity. Table III is provided for information. The indicator shall be marked to indicate that the weight has been adjusted to standard gravity.

TABLE III. Gravitational correction factors, for latitude and elevation

Scale is calibrated to standard gravity  
G=980.665 cm/sec (32.174 ft/sec) at 45 degrees latitude and sea level

LATITUDE (DEG)	ELEVATION ABOVE SEA LEVEL (FEET)							
	0	1000	2000	3000	4000	5000	6000	7000
0	1.0027	1.0028	1.0029	1.0030	1.0031	1.0032	1.0033	1.0034
5	1.0026	1.0027	1.0028	1.0029	1.0030	1.0031	1.0032	1.0033
10	1.0025	1.0026	1.0027	1.0028	1.0029	1.0030	1.0031	1.0032
15	1.0023	1.0024	1.0025	1.0026	1.0027	1.0028	1.0029	1.0030
20	1.0021	1.0022	1.0023	1.0024	1.0025	1.0025	1.0026	1.0027
25	1.0017	1.0018	1.0019	1.0020	1.0021	1.0022	1.0023	1.0024
30	1.0014	1.0015	1.0016	1.0017	1.0017	1.0018	1.0019	1.0020
35	1.0009	1.0010	1.0011	1.0012	1.0013	1.0014	1.0015	1.0016
40	1.0005	1.0006	1.0007	1.0008	1.0009	1.0010	1.0011	1.0012
45	1.0000	1.0001	1.0002	1.0003	1.0004	1.0005	1.0006	1.0007
50	0.9996	0.9997	0.9998	0.9999	1.0000	1.0001	1.0002	1.0003
55	0.9991	0.9992	0.9993	0.9994	0.9995	0.9996	0.9997	0.9998
60	0.9987	0.9988	0.9989	0.9990	0.9991	0.9992	0.9993	0.9994
65	0.9983	0.9984	0.9985	0.9986	0.9987	0.9988	0.9989	0.9990
70	0.9980	0.9981	0.9982	0.9983	0.9984	0.9985	0.9986	0.9987
75	0.9978	0.9979	0.9979	0.9980	0.9981	0.9982	0.9983	0.9984
80	0.9976	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981	0.9982
85	0.9974	0.9975	0.9976	0.9977	0.9978	0.9979	0.9980	0.9981
90	0.9974	0.9975	0.9976	0.9977	0.9978	0.9979	0.9980	0.9981

INSTRUCTIONS: To obtain weight adjusted to standard gravity:

- (1) Determine the latitude and elevation where the scale is being used.
- (2) Round to the nearest latitude and elevation shown on the chart.

## A-A-59946

(3) Multiply the weight indicated by the correction factor shown.

3.8 Power requirements. The scale shall operate off the following single phase power: 120V/ 60Hz; 220V/ 50Hz and 240V/ 50 Hz power. A fifty foot long, heavy duty power cord with US grounded type plug shall be provided.

3.9 Accessory kit. The accessory kit shall include the following items listed in Table IV:

TABLE IV. Accessory kit components

QTY	ITEM	DESCRIPTION
1	Leveling bar	3/8 x 7/8 x 37 inches long. Parallel and straight within 0.003 inches, corrosion resistant, 1 or 2 parts
1	Level	Digital protractor with 0.01 deg resolution
2	Plumb bobs	3.5 ounce, corrosion resistant, 15 foot cord
1	Marking chalk	for marking points on hanger floor
1	Ruler	12 inch, stainless steel, graduated in 1/10 inches
1	Chalk line reel	100 foot, with chalk
1	Tape measure	50 foot, steel, with reel, marked and numbered to 600 inches, graduated in 1/10 inches
1	Fuel dipper	For taking fuel samples from aircraft fuel tanks, includes chain and handle, corrosion resistant
2	Hydrometers	Covers 5.5 to 7.5 pounds per U.S. gallon
1	Hydrometer jar	Plastic cylinder with base, for use with hydrometer
1	Tools	As needed to assemble leveling bar and for jack adapters

3.10 Carrying case(s). Heavy-Duty case(s) shall be provided to store all weighing system items. The case(s) shall be padded, with storage locations for each item. Cases shall be suitable for 1 and 2 person carry. The loaded weight shall be not greater than 125 pounds. If the weight exceeds 82 pounds, the case shall include wheels, for 1 person transport. If more than 1 case is provided, they shall be marked "Box 1 of \_\_", etc.

3.11 Calibration. The scale shall be easily calibrated and the calibration protected against accidental destruction. The user shall not be required to use calibration curves. Calibration procedures and equipment shall be in accordance with NCSL Z540-3.

3.11.1 Force standard. The force measuring instrument used to calibrate the scale shall be a primary or secondary standard calibrated in accordance with ASTM E74. The uncertainty, as described in ASTM E74 Section 8.4, shall be not greater than 50 percent of the acceptable tolerance. (Example: the uncertainty of the standard used to calibrate the scale at 10,000 pounds shall not exceed +/- 5 lbf.) If the force standard uncertainty is greater than 25 percent of the tolerance, the calibration tolerance shall take the force standard uncertainty into account. (Example: If the standard uncertainty at 10,000 pounds is +/- 4 pounds, then the scale indication shall be within +/- 6 pounds.)

## A-A-59946

3.11.2 Documentation and equipment. Calibration tag(s) shall be placed on the scale. Calibration certificates or reports and any special tooling or equipment required for calibration shall be supplied with the weighing system, except press, force standard, 1.5 inch diameter loading ball and standard hand tools.

3.11.3 Calibration interval. The scale shall indicate within tolerance over a 1 year calibration interval.

3.12 Special marking. The weighing system and components shall be identified in accordance with MIL-STD-130 (Identification Marking of U.S. Military Property). The system shall be marked with the NSN. All marking shall be legible and permanent. Any item or loaded case weighing more than 37 pounds shall be marked with the weight. Weighing range and accuracy shall be marked on the load cell.

3.13 Data Transmission. In the event that the aircraft top-of-jack weighing system is used to transmit data in any manner, such as wireless transmission or local/network computer connection, Information Assurance policies/procedures, Air Force Instructions, and IT policy must be followed. Information Assurance polices, Air Force Instructions, and IT policy must also be followed if the weighing system requires any software updates provided by the manufacturer.

#### 4.0 PRODUCT CONFORMANCE PROVISIONS

4.1 Warranty: The weighing system shall be provided with a 3 year warranty on parts and labor. Warranty expiration date shall be marked on the indicator. Warranty information and instructions, including point of contact, shall be shipped with each piece of equipment.

4.2 Operation and Maintenance Manual: One copy of the commercial operation and maintenance manual, including top level illustrated parts breakdown and calibration procedures and adjustments, shall be shipped with each system.

4.3 Product conformance. The products provided shall meet the salient characteristics of this CID and conform to the producer's own drawings, specifications, standards, and quality assurance practices. The scale shall be the same product offered for sale in the commercial market except that minor modifications are permitted. The government reserves the right to require proof of such conformance.

4.4 Approval required: If a non-approved item is offered, evaluation by the cognizant engineering activity, WR-ALC 404 SCMS/GUEEA, is required prior to contract award. The CID is intended to describe a proven commercial item and does not identify all requirements. Therefore, the government reserves the right to reject an item for characteristics that are not stated in the CID but are required for acceptance form, fit, and function or suitability for use.

4.5 Evaluation Data: If a non-approved item is offered, the following information shall be provided with the quotation, for evaluation. Information that is proprietary and should not be released outside the Government should be marked with a proprietary statement.

- a. Part Number(s): System part number(s) and part number(s) for each item being offered.

## A-A-59946

- b. Descriptive literature: Commercial literature on items being offered (catalogs, specifications sheets, etc.). Description of features and performance that are not identified in the commercial literature, including (1) load cell and socket dimensions (reference CID Table II and 3.4.1). (2) discussion of how only axial loads are displayed (reference CID 3.2) and (3) discussion of how any load cell can be connected to any channel using any cable (reference CID 3.7).
- c. Minor Changes: Description of minor changes to the commercial items that will be incorporated to meet the CID requirements.
- d. Calibration: Calibration procedures, including equipment used and force standard calibration reports. A sample calibration report on the offered scale (reference CID section 3.11) shall be provided.
- e. Manual: Commercial operation and maintenance manual (reference CID 4.2).
- f. Warranty: Warranty information (reference CID 4.1).

4.6 Product sample. If the evaluation data appears acceptable, then a product sample of the complete weighing system may be required, for examination, testing and service testing with an aircraft, to determine whether it provides acceptable form, fit, function and suitability for use. If a product sample is required, shipping instructions will be provided. The following shall be provided with the product sample:

- a. Complete weighing system including all items. The system shall meet the requirements of the CID.
- b. Calibration report on the sample scales.
- c. Operation and maintenance manual.
- d. Warranty information.

4.6.1 Shipping Costs: The offerer shall be responsible for shipping costs to and from Robins AFB, GA or other US location.

4.7 Acceptance testing. After calibration, each load cell with indicator shall be acceptance tested at a minimum of 5 loads covering the weighing range. Any load cell that indicates out of tolerance shall be rejected and shall have documented corrective action and procuring agency approval before being resubmitted for acceptance testing. Re-calibration alone is not acceptable corrective action.

## 5.0 PACKAGING.

5.1 Preservation, packing and marking shall be as specified in the contract or order.

## A-A-59946

### 6.0 NOTES.

6.1 Intended use. The weighing systems will be used to determine aircraft and helicopter weight and center of gravity. Multiple systems are used to weigh some aircraft. The load cells mount securely on top of airframe and axial jacks. The jacks are raised and the load cell sockets contact the aircraft jack points. The aircraft is raised and leveled. The load cells transmit load information to the central display. Aircraft flex and shift during rising and lowering, resulting in non-axial loading and sudden load shifts.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number and date of the CID.
- b. Type of weighing system required (see 2).
- c. Whether a product sample is required (see 4.3).
- d. Packaging requirements (see 5)

6.3 Part or Identifying Number (PIN). The following part identification numbering procedure is for government purposes and does not constitute a requirement for the contractor.

Example of reference part number: A-A-59946-25K

Type: 25K -- 4 load cells, 25,000 lb capacity each

6.4 Source of documents.

6.4.1 Department of Defense and Federal documents may be obtained at <https://assist.dla.mil> or from the Document Automation and Production Service, Bldg 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia PA 19111-5094.

6.4.2 SAE documents may be obtained at <http://www.sae.org/servlets/index> or from SAE, Inc., 400 Commonwealth Drive, Warrendale PA 15096.

6.4.3 Air Force Drawings may be obtained from Robins Engineering Data Repository via email – [WRALC.Jedmics.Draw@Robins.AF.MIL](mailto:WRALC.Jedmics.Draw@Robins.AF.MIL) .

6.4.5 National Conference of Standards Laboratories documents may be obtained at <http://www.ncsli.org/> or from National Conference of Standards Laboratories, 1800 30th ST Suite 305B, Boulder, CO 80301 (303) 440-3339

6.4.6 ASTM documents may be obtained at [www.astm.org](http://www.astm.org) or from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken PA 19428-2959

6.5 Key Words.

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