

INCH-POUND
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COMMERCIAL ITEM DESCRIPTION

METER, FUEL FLOW, PORTABLE

The General Services Administration has authorized the use of this Commercial Item Description (CID) as a replacement for PD07WRGBZOENI27 Rev 3, for all federal agencies.

1. SCOPE.

SCOPE: The test set covered by this specification is intended to be a portable fuel flow meter unit and eight test cables. The Fuel Flow Meter Test Set (here on referred to as test set or flow meter) is a support equipment test set which is used for depot and flight line test of fuel flow meter system components. The test set complies with Class 1 according to MIL-PRF-28800, is used to test flow meter transmitters, indicators of the second harmonic type, total summation indicators, individual summation indicators and system power supplies.

2. SALIENT CHARACTERISTICS.

2.1 Components. The test set consists of a high brightness display, master transmitter assembly, linear transmitter, multi-meter, Test Selector Switch, Cables. Drawings of all cables will be provided. All cables and manuals shall fit within the case.

COMPONENT	Military Specification	Item Type
Indicator, Individual Rate	MIL-I-25906	EFU-3A
Indicator, Individual Summation	MIL-I-25324 MIL-I-25907	MA-7A, MA-7 EFU4/A
Indicator, Total Summation	MIL-I-25325 MIL-I-25908	MA-8 EFU-5/A
Transmitter	MIL-T-8249 MIL-T-25905 MIL-T-26298	MB-2 TRU-7/A TRU-6/A
Performance Specification	MIL-PRF-28800	

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: WR-ALC/404 SCMS/GUEEA, 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

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

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Cable Assembly	Part Number	Cage Code	Length
	5796297G700	See MIL-T-26298	
TJ-49,TJ-51	9172332-10	98750	10 inches
DJ-71	9172332-30	98750	10 inches
DJ-72	9172332-50	98750	10 inches
DJ-64	9172332-70	98750	10 inches
TJ-50	9172332-110	98750	22 feet
Main	9172332-130	98750	5 feet 5 inches
TJ-51E	9172332-150	98750	10 inches
GND-1	9172332-170	98750	10 feet
DJ-71A	9172332-190	98750	10 inches
TBD	Used to drive all 8 FFIs at the same time – B-52 requirement		
TBD	Used to test indicators from engine connector – B-52 requirement		

Function Selector/Switch	Function
Function Switch	Allows test set to perform: Self Test; 4Hz Power Supply Check; Transmitter; Individual, Linear and total indicator.
Mode Switch	Allows displays in DEGREES, 12K PPH, 15K PPH, LINE FREQ DISP, STEP MODE
Master XMTR	Sets master transmitter to desired settings
Linear XMTR PPH X 100	Checks scale error and operation of Type 8DJ72 total summation indicators.

2.2 Functional requirements. This test set shall be, at minimum, capable of:

- a. Test the output signals of flow-meter transmitters of the second-harmonic type.
- b. Generate a calibration signal used to test flow-meter indicators of the second-harmonic type.
- c. Measure the output voltage of individual summation indicators.
- d. Generate a calibration voltage used to test total summation indicators.
- e. Check output continuity of flow-meter system power supplies.
- f. Measure output frequency of flow-meter system power supplies.
- g. Isolate the malfunction of a defective system component through substitution of individual components.
- h. Identify the failed Components.

Per X-Technologies, there is a user desire to move the tester internal Circuit Breaker, exhibited by existing units, to the front panel to the location currently occupied by an unused 28 VDC input connector, and delete the associated 28 VDC connector, modules and circuitry. This would allow the CB to be easily reset. Per X-Technologies, none of the platforms use the 28 VDC function. If true, this 28 VDC function could be removed from applicable paragraphs below.

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2.3 Carrying Case. The carrying case shall be 24 X 14 X 22 inch or less. A handle for carrying the test set shall be attached to the case. A mechanism for locking the test set shall be provided. The weight of the test set including the test cables shall be 35 pounds or less. The case shall be airtight and a mechanism will be added for equalizing air pressure within the enclosure, when the enclosure is sealed. The mechanism provided shall not protrude beyond the enclosure.

2.4 Interface. An interface shall be provided. It shall display settings and test values in Degrees, flow rate in Pounds Per Hour(PPH), input voltage, the scale error of the flow meter indicators of the second-harmonic type, the scale error and operation of Total Summation Indicators, output voltage of individual summation indicators, frequency and output of the flow meter power supply, test selector positions.

2.5 Tested items: The test set shall test the following transmitters and indicators which were built according to the mil-specs:

COMPONENT	Military Specification	
Indicator, Individual Rate	MIL-I-25906	
Indicator, Individual Summation	MIL-I-25324	MIL-I-25907
Indicator, Total Summation	MIL-I-25325	MIL-I-25908
Transmitter	MIL-T-8249	MIL-T-25905
Performance Specification	MIL-PRF-28800	

2.5.1 Testing transmitters. The test set will be testing transmitters designated type MB-2, TRU-7/A, TRU-6/A. Info on such part can be found in Mil-T-8249, MIL-T-25905, and MIL-T-26298 respectively.

The test set will be powered from the aircraft through a cable from Mil Spec MS33678-14S-7P (P/N 9172332-130, Cage Code 98750) or 120V and 60Hz or 28V DC power supply. MS33678-14S-2P, 9172332-110, 98750, will be used for connection to the flow rate indicator. For bench testing, the system will use wall voltage.

As the flow through the transmitter is increased and decreased by operating the engine, or through a controlled environment, the test set is used to verify that the transmitter is functioning and that the voltage output varies when the fuel flow rate changes.

The test set shall have a function, XMTR that is used to check the operation of flow meter transmitters when installed in a flow meter system or to check transmitter accuracy when mounted on a test stand. The harmonic modulated outputs of the flow meter transmitter are demodulated by the master indicator circuit on the test set. Data is displayed in degrees to two decimal places or in pounds-per-hour for 12,000 and 15,000 PPH systems as selected by the user from the mode switch.

2.5.2 Testing indicators of the second-harmonic type. The test set will be testing indicators designated type EFU-3IA. Info on such part can be found MIL-I-25906.

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The test set will be powered from the aircraft through a cable from Mil Spec MS33678-14S-7P (P/N 9172332-130, Cage Code 98750 or wall voltage, 120V and 60Hz or 28V DC power supply) and connected through cable 9172332-70 to the indicator and is energized with 115V, +/- 1 volt, 400 cycle single phase alternating current which shall be verified by the user on a volt meter and frequency meter.

The test set shall be capable of selecting 12 K PPH or 15K PPH from a mode switch, as required by type of system on aircraft. The test set shall be capable of selection range 200 to 15000 PPH from the "Master Transmitter", labeled "Master XMTR", to test the indicator. When the indicator is checked, readings at each setting should be the same as the corresponding flow rates with tolerances +/-150 PPH.

With the function switch set to INDIV ID, the master XMTR is used to check the scale error of flow meter indicators of the second harmonic type. The transmitter may be set to any desired value. Internal calibration data is sent to the indicators. Data is displayed in degrees to two decimal places or in pounds-per-hour for 12,000 and 15,000 PPH systems as selected by the user.

2.5.3 Testing Individual Summation Indicators. The test set will be testing indicators designated types:

Type MA-7 which provides an auxiliary summation output signal.

Type MA-7A which is the same as MA-7 except it does not provide summation output signal. Both are described in Mil-Spec MIL-I-25324. Type EFU4/A is described in MIL-I-25907.

For B-52 testing, the test set will have the capability of driving eight EFU-4/A type indicators simultaneously using TBD test cable harness(s) such that the single test set generated signal can be used and read on each of the indicators simultaneously. The purpose of this test requirement is to have the ability to check the aircraft Fuel Flow Totalizer summation accuracy using inputs from one to eight indicators.

For B-52 testing, the test set will have the ability to test individual EFU-4/A indicators either at the indicator location inside the aircraft cockpit or at the engine transmitter location outside the aircraft.

The test set will be powered from the aircraft through a cable from Mil Spec MS33678-14S-7P (P/N 9172332-130 or 120V and 60Hz or 28V DC power supply and 9172332-190, Cage Code 98750) for connection to the flow rate indicator is energized with 115V, +/- 1 volt, 400 cycle single phase alternating current which shall be verified by the user.

The test set shall be capable of selecting 12K PPH or 15K PPH from a mode switch, as required by type of system on aircraft. The test set shall be capable of selection range 200 to 15000 PPH from the "Master Transmitter" to test the indicator. The Total Summation Indicator on the aircraft should display the same flow rate as the individual indicator and the test set with tolerances +/-150 PPH

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The linear indicator (LIN ID) position on the function switch is used to check the output voltage of individual summation indicators. The MASTER XMTR and the LINEAR XMTR PPH X 100 are used in conjunction with the display. The MASTER XMTR is used to simulate a flow rate to the summation indicator. The LINEAR XMTR is used to null the output voltage from the summation indicator. When the summation indicator is working properly, the display should indicate near zero. A positive display indicates output of summation indicator is greater than output of the LINEAR XMTR.

2.5.4 Testing total summation indicators. The test set will be testing total summation indicators designated type MA-8, and EFU-5/A. Info on such part can be found in MIL-I-25325 and MIL-I-25908 respectively.

The test set will be powered from the aircraft through a cable from Mil Spec MS33678-14S-7P (P/N 9172332-130 or 120V and 60Hz or 28V DC power supply and 9172332-50, Cage Code 98750) for connection to the flow rate indicator.

With the function switch set to Total, LINEAR XMTR PPH X 100 shall be capable of transmitting flow rates from 200 to 100,000 PPH. Indicator readings should be the same as LINEAR XMTR settings within tolerances +/-500 PPH.

The LINEAR XMTR is used to check scale error and operation of Total Summation Indicators. The transmitter output is a linear voltage, 0-100 volts, which corresponds to flow rates of zero to 100,000 PPH. Accuracy of the linear transmitter is +/- 0.3 volts or 300PPH.

The test set will have a user selectable switch, either soft-key or hard-key, that will turn ON/OFF a 4 Hz pulse feature required to accurately simulate B-52 aircraft system functionality. This pulse feature is defined as imparting a 4 Hz 66% duty cycle modulation to the test set signal which feeds the Fuel Flow Totalizer under test. This duty cycle is further defined as being on or connected 66% of the pulse period and off or disconnected for 33% of the pulse period. When in the 33% disconnected state, the physical signal wire to Pin G of the EFU-5/A Totalizer shall be open circuited and not grounded, thus accurately simulating aircraft operation.

2.5.5 Self-test. There shall be a self-test capability that tests the test set's internal circuitry and tells the user if something is wrong. The self-test shall test the 400Hz power supply to indicate rather the power supply output is correct.

2.6 AC Multi-meter. A 0-300 volt, 400Hz Multi-meter shall be connected across the switch controlled input power line. Incoming Power comes from either the aircraft power supply through the MAIN cable or from an external source through the 120 VOLTS 60Hz or 28V DC and GROUND terminal posts. Adjusting the line voltage can be set to 115 AC volts, 400Hz, as indicated on the VOLTS AC multi-meter, ensuring correct line voltage and frequency for the test set and component being tested.

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2.7 Function and Mode Selector.

The function selector shall have the following positions:

POSITION	FUNCTION
INDIV. IND	Connects test-set MASTER TRANSMITTER, LINEAR INDICATOR, and LINEAR XMTR into circuit being tested.
NULL CHECK	Connects test-set LINEAR INDICATOR to grounded input discriminator circuit.
TOTAL IND	Connects test-set LINEAR XMTR into circuit being tested.
XMTR	Connects test-set MASTER INDICATOR into circuit being tested.

Mode Selector: The mode selector shall have the following positions:

POSITION	FUNCTION
DEGREES	Test set indicates flow rate angle
12K PPH	Test set indicates flow rate of 12k flow meter system.
15KPPH	Test set indicates flow rate of 15k flow meter system.

A MASTER XMTR shall be capable of transmitting 0 to 15 PPH based on desired settings.

A LINEAR XMTR PPH X 100 Checks scale error and operation of type 8DJ72 total summation indicators.

Front panel display indicators designed to present change-of-state information to the operator shall be distinguishable at a distance of 1 m in a maximum ambient light level of 100 foot-candles (fc) and a minimum light level of 1 fc. All display indicators shall be discernible at viewing angles from 0 degrees to 45 degrees.

2.8 Connectors, electric. Provision shall be made to ensure that connectors will be mated only with the appropriate counterparts. Where design considerations require close proximity of connectors of similar configuration, the mating connectors shall be suitably coded or marked. The live or hot side of unmated connectors shall be protected against shorting.

2.8 Wiring, internal. Internal wiring practices shall be such that the wiring shall not be damaged during normal maintenance and calibration.

2.9 Self-test capability. The test set shall be able to provide automatic diagnostic self-test information. The information provided shall indicate whether the equipment is operating within the performance specification. If the equipment exceeds the performance specification bounds, the information provided by the self-test shall identify the associated lowest replaceable unit (LRU) failure causing the malfunction.

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2.10 Additional requirements. The following are additional requirements:

- a. Lexan or equivalent protective shield over glass tester screen.
- b. Mouse and switch configuration for tester operation to replace touch screen functions.
- c. Non-standard USB port and external device for tester updates to replace current AF wide banned thumb drives.
- d. Circular power input connector to replace fragile computer type adapter. Preferred: MIL-DTL-38999 series connector.
- e. Input power markings to include frequency values.
- f. WARRANTY: The Pressure Indicating System and related parts shall carry a one year, parts and labor, warranty from the date of purchase.

3. REGULATORY REQUIREMENTS.

3.1 Recycled recovered materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with 23.403 of the Federal Acquisition Regulation (FAR). However, used, rebuilt, or refurbished items shall not be provided.

3.2 Green Procurement Program. Green Procurement Program (GPP) is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable products and services. GPP requirements apply to all acquisitions using appropriated funds, including services and new requirements. FAR 23.404(b) applies and states the GPP requires 100% of EPA designated product purchase that are included in the Comprehensive Procurement Guidelines list that contains recovered materials, unless the item cannot be acquired: a) competitively within a reasonable timeframe; b) meet appropriate performance standards, or c) at a reasonable price. The prime contractor is responsible for ensuring that all subcontractors comply with this requirement.

4. PRODUCT CONFORMANCE PROVISIONS.

4.1 Contractor certification. The contractor shall certify and maintain substantiating evidence that the product offered meets the salient characteristics of this commercial item description, and the product conforms to the producer's engineering drawings, specifications, standards, and quality assurance practices. The government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be otherwise provided for under the provisions of the contract.

4.2. Internal Cooling. The equipment shall be capable of operating without interruption for at least 24 hours at the maximum operating temperature for the class that it is designed.

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4.3 Equipment operating voltage. The equipment shall operate at 120 Vrms single-phase 50 Hz and 60 Hz source (see Table 1 of MIL-PRF-28800F). Alternate power source requirements that maybe required for equipment are specified in a through e.

- a. 50 Hz, 60 Hz, and 400 Hz single-phase 120 Vrms.
- b. 50 Hz, 60 Hz, and 400 Hz single-phase with voltage selectable from a 100/120/220/240 Vrms range.
- c. 50 Hz, 60 Hz, and 400 Hz single-phase 120/240 Vrms (see 3.5.1.2.4 per MIL-PRF-28800).
- d. DC internal power source (see 3.5.1.2.5 per MIL-PRF-28800).
- e. DC external power source (see 3.5.1.2.6 MIL-PRF-28800).

Equipment designed to operate from both external and internal power sources shall conform to specified performance and accuracy requirements when operated from the external source with the internal battery removed. There shall be an external indication of the selected power range.

4.4 Environmental requirements. Environmental performance requirements shall be as specified in 3.8.1 through 3.8.13 and Table 2 per MIL-PRF-28800 for Class I equipment. Equipment shall conform to the specified performance when subjected to the environmental conditions of this specification. Combinations of environments beyond those covered by the specified test procedures (see 4.5 per MIL-PRF-28800) shall be as specified in the CID. Unless otherwise specified, the equipment shall comply with the specified performance requirements after a 20 minute warm-up period preceded by a 2-hour not operating temperature stabilization period, or as specified in the applicable test method.

4.5 Temperature. Test equipment shall conform to the specified performance and accuracy while being operated at temperatures specified for the applicable class in 3.8.2.2.1 to 3.8.2.2.4. per MIL-PRF-28800

Temperature Class 1 - Class 1 test equipment shall be subjected to operating temperatures in the range -40 to 55 degrees Celsius. Class 1 test equipment shall be required to operate for 20 minutes (see 6.5.2.16 per MIL-PRF-28800), at 71 degrees Celsius.

4.6 Humidity. Test equipment shall conform to the specified performance and accuracy for conditions where the relative humidity is 5 to 95±5 percent in the temperature range of 10 to 30 degrees Celsius, and as specified, for the applicable class in 3.8.2.3.1 to 3.8.2.3.2 per MIL-PRF-28800. At temperatures below 10 degrees Celsius, the humidity is uncontrolled, but the equipment shall conform to the specified performance (after the specified warm-up period) and shall withstand the effects of humidities up to 100 percent.

Humidity Class 1 - Class 1 test equipment shall be subjected to conditions where the relative humidity is 5 to 85±5 percent in the temperature range of 30 to 40 degrees Celsius, and where the relative humidity is 5 to 60±5 percent in the temperature range above 40 degrees Celsius.

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4.7 Vibration. See tables 3 and 4 for random and sinusoidal Class 1 requirements per MIL-PRF-28800.

4.8 Testing requirements. See Table 2 in MIL-PRF-28800F for complete listing of Class 1 testing requirements.

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

7. NOTES.

7.1 Source of documents.

7.1.1 Military Specifications, Standards, and Handbooks referenced herein may be obtained at <https://assist.dla.mil/> or available from the Standardization Documents Order Desk, 700 Robbins Ave, Bldg 4, Section D, Philadelphia, PA 19111-5094.

7.1.2 FAR may be obtained from the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Electronic copies of the FAR may be obtained from <https://www.acquisition.gov/far/>.

7.2 Key words.

Depot System Components
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Support Equipment
Transmitter tester

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