DATA ITEM DESCRIPTION

Title: Calibration and Measurements Requirements Summary (CMRS)

Number: DI-QCIC-80278B
AMSC Number: 7719
DTIC Applicable: N/A
Preparing Activity: F36
Applicable Forms:

Approval Date: 20070413
Limitation: N/A
GIDEP Application: N/A

Use, Relationships: The CMRS details the measurement requirements of the system, subsystem, or equipment; the Test, Measurement, and Diagnostic Equipment (TMDE); and the calibration standards and equipment required to assure traceability of all measurements through the individual military department metrology and calibration programs to approved national standards. The summary identifies and validates the adequacy of TMDE and the need for calibration standards and equipment.

a. The CMRS DID satisfies the requirements of the 5000-series DoD directives; AFI 21-113; AR 750-25; NAVELEX 4355.2 and MCO 4733.1B.

b. This DID contains the format, content, and intended use information for the data deliverable resulting from the work task described in MIL-STD-1839 and is applicable to the acquisition of all military systems, subsystems and equipment.

c. DI-QCIC-80278B supersedes DI-QCIC-80278A.

Requirements:

1. Reference documents. The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices and revision, shall be as specified in the contract.

2. Format. Contractor format is acceptable. The Summary Data Table will be in electronic format using Access or Excel. Contact the 588^{d} CBSG/AFMETCAL/Technical Applications Flight for sample formats, templates or related guidance.

3. Content. The CMRS shall document in detail the measurement requirements of the system, subsystem or equipment; the test, measurement and diagnostic equipment (TMDE); and the calibration standards and equipment required to assure traceability of all measurements to approved national standards. The data presented in the CMRS requires periodic updating to include changes in design, changes in engineering, changes required as a result of proposals (ECPs), etc., which affect system measurement requirements or TMDE. The CMRS shall ensure:

3.1. All operational system, subsystem and equipment calibration and measurement requirements are identified and traceable to the National Institute of Standards and Technology (NIST) or other DoD approved measurement sources.

3.2. All supporting TMDE identified are adequate to support the operational system, subsystem and equipment measurement requirements.

3.4. All supporting TMDE that require calibration are calibrated with calibration and measurement equipment of higher known accuracy.

3.5. Administrative information. Classified information shall not be listed in the CMRS. Classified parameters and information shall be addressed in a classified supplement or appendix and that document shall be appropriately controlled.

3.6. The CMRS shall be structured as follows:

a. Cover page
b. Revision status
c. Introduction
d. Table of contents
e. List of abbreviations, symbols and acronyms
f. Table of Category II TMDE
g. Table of Category III calibration equipment and standards
h. Table of Category IV (if applicable) highest level of calibration standards
i. List of manufacturer's code to name (Cage)
j. Summary data table of contents
l. Summary data

3.6.1. Cover page. The cover page (see sample CMRS, 3.7.5 below) shall include descriptive information such as system or program name, contract number, contractor's company name, current CMRS revision, date of submittal, Contract Data Requirements List (CDRL) number, etc.

3.6.2. Revision status. This section shall be included in the CMRS (see sample CMRS, 3.7.5 below). The initial CMRS submittal shall specify "original" on the revision status pages. Subsequent revisions shall be recorded on the cover page, in the revision status section and on pages affected by the revision. Other CMRS pages which are not affected by a revision shall not be resubmitted. Change bars on the revised CMRS pages may be used.

3.6.3. Introduction. This section (see sample CMRS, 3.7.5 below) contains general information, remarks or other information about the system, equipment or the CMRS which the preparer feels would be beneficial.

3.6.4. Table of contents. This table (see sample CMRS, 3.7.5 below) shall reflect the contents and page location numbers of each structural part of the CMRS identified in 5.4 (above).

3.6.5. List of abbreviations, symbols and acronyms. This list (see sample CMRS, 3.7.5 below) shall include all abbreviations, symbols and acronyms used in the CMRS with their meanings. Abbreviations shall be in accordance with ASME Y14.38M, where applicable.

3.6.6. Table of Category II TMDE. This table shall include an alphanumerical listing of equipment identified it the Category II column of the summary data section. Items of TMDE that are component parts of test stations or other TMDE shall be shown as an indenture under the overall test station or TMDE. Calibration intervals shall be recommended if they are not already established or if a different interval is recommended other than those established in Air Force TO 33K-1-100, Army TB 43-180, NAVAIR 17-35MTL-1 or Marine Corp TM-10510. The table shall include the following:

a. TMDE model, type or part number.
b. Nomenclature
c. Commercial and Government Entity Code (five-digit CAGE Code)
d. National Stock Number (NSN) if assigned.
e. Calibration interval in months
f. Calibration procedure applicable to contracting Military Department
g. Support Equipment Recommendation Data (SERD) number, if assigned.
h. Maintenance document applicable to contracting Military Department

3.6.7. Table of Category III calibration equipment and standards. This table shall include an alphanumerical listing of equipment identified in the Category III column of the summary data section. The table shall include the same type of information described in 3.6.6 a through h (above).

3.6.8. Table of Category IV (if applicable) calibration standards used for in-station transfer standards. This table shall include an alphanumerical listing of equipment identified in the Category IV column of the summary data section. The table shall include the same type of information described in 3.6.6 a through h (above).

3.6.9. List of manufacturers' code to name. This list (see sample CMRS, 3.7.5 below) shall contain the DoD assigned, five-digit CAGE code (reference DLA Cataloging website) and manufacturer's name for each equipment item identified in the CMRS.

3.6.10. Summary data table of contents. This table shall immediately precede the summary data section and shall reference the content number and hardware item for each system, subsystem and equipment entry shown in the summary data Category I column (see sample CMRS, 3.7.5 below).

3.6.11. Summary data. This section is an inline presentation of system, subsystem and equipment; TMDE; and calibration equipment and standards parameters which require measurement or calibration support (see sample CMRS, 3.7.5 below). The summary data are prepared as follows:

3.6.11.1. Category I operational equipment. These columns are for displaying the description, function, operational range or value and accuracy and test interval of the operational system, subsystem, equipment, assembly, module or component that has parameters that require measurement as specified in MIL-STD-1839.

3.6.11.2. Content number. Each Category I hardware entry shall be identified by a sequential locator and reference number. Sequential alphanumeric or decimal reference numbers

shall be used. When Logistics Support Analysis Records (LSAR) are a contractual requirement the LSA control number shall be used.

3.6.11.3. Function. The Category I function which must be measured, tested, verified, checked, adjusted or supplied shall be shown in the description column in a logical sequence.

3.6.11.4. In-line presentation. As each Category I function and measurement parameter is listed, complete the Category II, Category III and Category IV summary data before proceeding to the next Category I hardware measurement parameter. The parameters and tolerances in each line shall be expressed in consistent units of voltage, frequency, power, current, etc., or percentages. Where this is not the case, explain the inconsistency in an appropriate footnote.

3.6.11.5. Category II TMDE. This summary data represents the support TMDE used to measure, test, verify, check or adjust the Category I equipment as specified in MIL-STD-1839. The summary data Category II columns shall list the nomenclature and part or model number of the TMDE and its' specifications.

3.6.11.6. Peculiar TMDE. Items of TMDE developed specifically to support Category I measurement requirements. The first time an item of Category II peculiar TMDE is listed in support of a Category I measurement parameter, the complete measuring, generating and accuracy capabilities of the peculiar TMDE shall be listed. For subsequent requirements for the same item of Category II peculiar TMDE, only those capabilities required to satisfy the Category I measurement parameters shall be listed. Complete Category III requirements in 3.6.11.9. below before proceeding to the next Category II entry. First time entries for Category II peculiar TMDE may be listed in contractor elected format in a separate section of the CMRS.

3.6.11.7. ATE. The first time an item of Category II ATE is listed in support of Category I measurement requirements; all minimum use specifications of the replaceable TMDE in the ATE shall be listed. First time entries for Category II ATE may be listed in contractor format in a separate section of the CMRS. For subsequent requirements for the same ATE, only the most stringent of minimum use requirement and the specific replaceable TMDE need to be listed in the inline presentation. Complete Category III requirements in 3.6.11.9. below before proceeding to the next Category II entry. Integral items of ATE used for self testing or ATE calibration shall be identified.

3.6.11.8. Common TMDE. Items of Category II common TMDE that do not have DoD approved calibration procedures, technical orders or maintenance technical orders shall be handled like the peculiar TMDE in 3.6.11.6 above.

3.6.11.9. Category III calibration equipment and standards. This summary data represents the common and peculiar calibration equipment, standards and TMDE used for calibration, testing, troubleshooting or maintenance of Category II TMDE as specified in MIL-STD-1839. The summary data Category III columns shall list the description of the calibration equipment, standards and TMDE, and its specifications or the DoD approved calibration procedure, technical order or maintenance technical order for the Category II TMDE. Where no approved method of support exists for the Category II TMDE, all of the equipment and parameters required to show

measurement traceability, will be listed in the Category III column. For subsequent entries, reference notes may be used where the requirements are duplicated. Where multiple items of calibration equipment and standards are required to accomplish measurement traceability, the overall systematic error shall also be known.

3.6.11.10. DoD approved calibration procedures. For items of Category II TMDE that have an approved method of support, list the applicable military department approved calibration procedure, technical order or maintenance technical order in the Category III column opposite the Category II TMDE.

3.6.11.11. Category III peculiar calibration equipment and standards. Items developed specifically to support Category II TMDE measurement requirements. This equipment shall first appear in the Category III column opposite the Category II TMDE it is designed to support. It shall also be listed in the Category II column so the method of support and traceability can be established in the Category III column.

3.7. Additional information.

3.7.1. When two or more identical items of TMDE are required for a specific measurement, it shall be so noted in the applicable Category II or III item description column and tables of TMDE.

3.7.2. Transistor-Transistor Logic (TTL) level test requirements shall not be listed in the Category I or Category II summary data.

3.7.3.. When Category I input torque calibration requirements are listed, the test uncertainty ratio (TUR) of the Category II torque tool shall not be less that 1:1 and the need not be greater that 1:1. The TUR of the Category III torque calibration standard shall be 4:1 or better.

3.7.4. When Category I input stimuli requirements are listed and being supplied by Category II TMDE, the test accuracy ration shall not be less that 1:1 and need not be greater that 1, unless conducting pass, fail or fault tolerance test.

3.7.5. A sample CMRS template follows.

Document Number _____

Revision _____

Revision Date _____

CALIBRATION & MEASUREMENT REQUIREMENTS SUMMARY

FOR

SAMPLE SYSTEM

Contract Number _____

Date _____

Prepared by: _____

_____

Approved by: _____

_____

Company Name
and
Address

Document Number _____

Revision _____

Revision Date _____

CMRS Revision Status

Date: _____
Revision: _____

Page	Revision	Page	Revision	Page	Revision	Page	Revision
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8	A						
9	A						
10	A						
11	B						
12	B						
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INTRODUCTION

FOR

SAMPLE SYSTEM

CALIBRATION & MEASUREMENT REQUIREMENTS SUMMARY

[Company Name] submits a Calibration & Measurements Requirement Summary (CMRS) in accordance with the [Sample System Name] contract statement of work and contract data requirements list (CDRL) Item number [number] for data item description for CMRS.

This CMRS identifies the [Sample System] stimuli and measurement parameters; the common and peculiar Test, Measurement and Diagnostic Equipment (TMDE) parameters and the measurement parameters of the supporting TMDE. These data are required to assure measurement traceability through the services base or depot measurement laboratories to the National Institute of Standards and Technology (NIST).

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CALIBRATION & MEASUREMENT REQUIREMENTS SUMMARY

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LIST OF ABBREVIATIONS, SYMBOLS AND ACRONYMS

TERM	DESCRIPTION
A or AMP	Ampere
A/D or ADC	Analog to Digital Converter
AC	Alternating Current
ATE	Automatic Test Equipment
BITE	Built-in Test Equipment
BTI	Bus Test Instrument
CAGE	Commercial and Government Entity
CAL	Calibrate
CC	Constant Current
CITA	Calibration Interface Test Adapter
CMRR	Common Mode Rejection Ratio
CMRS	Calibration & Measurement Requirements Summary
Co	Company
Cont	Continued
CPU	Central Processing Unit
CR	Constant Resistance
CV	Constant Voltage
CW	Continuous wave
D/A or DAC	Digital to Analog Converter
dB or DB	Decibel
DC	Direct Current
DEG or Deg	Degree
DMM	Digital Multimeter
DTI	Digital Test Instrument
DTS	Digital Test Station
FS or F.S.	Full Scale
GHz	Gigahertz
HV	High Voltage
Hz	Hertz
I	Current

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kHz	Kilohertz
Kohms	Kilo ohms
kV	Kilovolts
kW	Kilowatts
LVDT	Linear Variable Differential Transformer/Transducer
MAX or max	Maximum
MHz	Megahertz
Mohms	Mega ohms
MIN or min	Minimum
MA or mA	Milliamps
MV or mV	Millivolts
mVDC	Millivolts direct current
NCR	No Calibration Required
ns or nS	Nanosecond
NO	Number
Pmax	Power maximum
p-p or pp	Peak-to-Peak (example Vpp)
ppm	Parts per million
Pwr Sup or P.S.	Power Supply
R	Resistance
SQ CM	Square Centimeters
TDR	Time Domain Reflectometer
TMDE	Test, Measurement, and Diagnostic Equipment
V	Volt
Vrms	Volt root mean square
VAC or Vac	Volt alternating current
VDC or Vdc	Volt direct current
W	Watt
us or uS	Micro Seconds
uV	Micro Volts

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Table of Category II [III, IV] TMDE

Model, Type or Part Number	Nomenclature	CAGE	National Stock Number	Cal Int	Calibration Procedure	SERD Number	Maintenance Document
123B	Digital Multimeter	12345	1234-56-789-1011	12	33K3-4-1234-1	123456	33D1-23-456-78
XYZ2	Oscilloscope	56789	1234-56-789-1011	6	AB123CD *	123456	Commercial Manual

- Commercial or Manufacturers Number

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LIST OF MANUFACTURERS CODE TO NAME

CODE	NAME
03LB1	VXI Technology
0VGU1	North Atlantic Instruments Inc
1LQK8	Agilent Technologies
21793	Racal Instruments
23350	Teradyne Inc.
25965	Elgar Electronics Corporation
57487	Ametek
57798	Trek Inc.
64667	National Instruments
89536	Fluke Corp.
ODRX9	ATTI
1RPN6	Maury Microwave
15542	MiniCircuit Labs

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SUMMARY DATA TABLE OF CONTENTS

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CALIBRATION AND MEASUREMENT REQUIREMENTS SUMMARY

SUMMARY DATA TABLE

Category I Operational/System Equipment					**Category II TMDE**			**Category III Calibration Equipment/Standards**		
Content No.	Description of Item	Operational Range/Value	Operational Tolerance	Cal Int	Description of Item	Specific Range/Value	Specific Tolerance	Description of Item	Range or Value	Tolerance
1.0	Radar System AN/FPS-XXX									
1.1	Transmitter Assy P/N 12345			6						
	Output Power (kW)	1 kW	±25%		Power Meter Model 1234 w/Power Sensor P/N 12345	0 to 5 W	±4% FS	33K3-4-1234-1 (AF Procedure)		
					Directional Coupler Model 1234	30 dB	±2% FS	AB1234CD (Commercial Manual)		
	Pulse Width (microseconds)	1 µS	±0.1 µS		Oscilloscope P/N 12345	0.2 µS per/div	±3% rdg	17-20WW-222 (Navy Procedure)		
	Transmitter High Voltage Power Supply P/N 12345			12						

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	CATEGORY I DETAILED SPECIFICATION FROM PERFORMANCE SPECS			CATEGORY II TEST / MEASUREMENT & DIAGNOSTIC EQUIPMENT				CATEGORY III CALIBRATION EQUIPMENT / STANDARDS			
Detailed Specification Reference	Description of Item	Operating Range or Spec. Value	Operating Tolerance	Description of Item	Operating Range or Spec. Value	Operating Tolerance	Test Uncertainty Ratio	Description of Item	Operating Range or Spec. Value	Operating Tolerance	Test Uncertainty Ratio
2.0 ADTS								PATEC			
2. 1 DC Power Supply				Agilent 3458A				Fluke 5700A Calibrator			
	DC Voltage	±0.1 to ±512 V ±0.05% Range or 100µV min		DC Voltage			*	DC Voltage			
		-0.1 Vdc	± 100 µV		-0.1 Vdc	± 50 µV	2		-0.1 Vdc	± 12.5 µV	4
		+0.1 Vdc	± 100 µV		+0.1 Vdc	± 50 µV	2		+0.1 Vdc	± 12.5 µV	4
		-1 Vdc	± 500 µV		-1 Vdc	± 50 µV	10		-1 Vdc	± 12.5 µV	4
		+1 Vdc	± 500 µV		+1 Vdc	± 50 µV	10		+1 Vdc	± 12.5 µV	4
		-2 Vdc	± 5 mV		-2 Vdc	± 250 µV	20		-2 Vdc	± 62 µV	4
		+2 Vdc	± 5 mV		+2 Vdc	± 250 µV	20		+2 Vdc	± 62 µV	4
		-10 Vdc	± 5 mV		-10 Vdc	± 500 µV	10		-10 Vdc	± 125 µV	4
		+10 Vdc	± 5 mV		+10 Vdc	± 500 µV	10		+10 Vdc	± 125 µV	4
		-20 Vdc	± 50 mV		-20 Vdc	± 1.50 mV	33		-20 Vdc	± 375 µV	4
		+20 Vdc	± 50 mV		+20 Vdc	± 1.50 mV	33		+20 Vdc	± 375 µV	4
		-31 Vdc	± 50 mV		-31 Vdc	± 3.35 mV	14		-31 Vdc	± 837 µV	4
		+31 Vdc	± 50 mV		+31 Vdc	± 3.35 mV	14		+31 Vdc	± 837 µV	4
		-114 Vdc	± 50 mV		-114 Vdc	± 10 mV	5		-114 Vdc	± 2.5 mV	4
		+114 Vdc	± 50 mV		+114 Vdc	± 10 mV	5		+114 Vdc	± 2.5 mV	4
		-512 Vdc	± 256 mV		-512 Vdc	± 256 mV	1		-512 Vdc	± 64 mV	4
		+512 Vdc	± 256 mV		+512 Vdc	± 256 mV	1		+512 Vdc	± 64 mV	4
				* TUR > 1 is for use as On-Station Standard for 3.7.4, 3.7.7, 3.7.8, 3.7.9, and 3.7.1							

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Category I Operational System					Category II Test/Measurement & Diagnostic Equipment			Category III Cal Equipment/Standards		
Sec.	**Description of Item**	**Operational Range or Value**	**Operational Tolerance**	**Interval**	**Description of Item**	**Specific Range or Value**	**Specific Tolerance**	**Description of Item**	**Specific Range or Value**	**Specific Tolerance**
1.0					**Self- Test/ Calibration Adapter (SK16850-727-1)**			***PMEL***		
1.1	Nitrogen Pressure System	30 to 50 psig	+/- 1.0 % of reading psig	6 mos	Pressure Transducer (AP121BN): (0 to 50 psig at +/- 0.1 % full scale accuracy)	30 to 50 psig	+/- 0.22 % of reading psig	Nitrogen Pressure Standard (2465)	30 to 50 psig	+/- 0.073 % of reading psig
1.2	Vacuum Pressure System	1 to 1000 Torr	+/- 6.25 % of reading Torr	6 mos	Vacuum Pressure Transducer (626A): (0 to1000 torr at +/- 0.25 % full scale accuracy)	1 to 1000 Torr	+/- 1.67 % of reading Torr	Vacuum Pressure Standard (690) Voltage Output (8840A)	1 to 1000 Torr 0 to 10 Vdc	+/- 0.556 % of reading Torr ± 0.0556% of reading Vdc
1.3	Hydraulic Pressure System	0-4500 PSIG	+/- 0.25 % of full scale	6 mos	Pressure Transducer (HPO-5000-GAUGE-10Vdc-1/4NPT M-2): (0 to 5000 psig at +/- 0.05 % full scale	0-4500 PSIG	+/- 0.05 % of full scale	Hydraulic Pressure Standard (2485)	0-4500 PSIG	+/- 0.0125 % of full scale

Category I Operational System					Category II Test/Measurement & Diagnostic Equipment			Category III Cal Equipment/Standards		
Sec.	Description of Item	Operational Range or Value	Operational Tolerance	Interval	Description of Item	Specific Range or Value	Specific Tolerance	Description of Item	Specific Range or Value	Specific Tolerance
					accuracy)					

4. End of DI-QCIC-80278B