

CHANGE

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SUBJ: MAINTENANCE OF DISTANCE MEASURING EQUIPMENT (DME) FACILITIES

1. PURPOSE. This change add standards and tolerances and performance check procedures for the FA-9783 Distance Measuring Equipment (DME) monitor master clock. This directive implements Configuration Control Decision (CCD) No. N17436, FA-9783 DME Master Clock Checks.

2. DISTRIBUTION.

a. This directive is distributed to selected offices and services within Washington headquarters, the William J. Hughes Technical Center, the Mike Monroney Aeronautical Center, regional Airway Facilities divisions, and Airway Facilities field offices having the following facilities/equipment: DME-Cardion FA-9783.

b. An electronic version and distribution report of this directive is available on an Intranet site located at <http://aos-ext.amc.faa.gov/> under the "Technical Documentation" heading.

3. DISPOSITION OF TRANSMITTAL. Retain this transmittal.

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CHAPTER 3. STANDARDS AND TOLERANCES

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Parameter	Reference Paragraph	Standard	Tolerance Limit	
			Initial	Operating
→ (3) Reply efficiency at ±900kHz (Noise decodes of less than 5 percent average)		No replies	≤5 percent	Same as initial
c. Decoder Aperture	208			
→ (1) Acceptance				
* (a) X Channel				
<u>1</u> 12.0µs		100 percent	≥ 95 percent	Same as initial
<u>2</u> 11.5µs		100 percent	≥ 95 percent	Same as initial
→ <u>3</u> 12.5µs		100 percent	≥ 95 percent	Same as initial
(b) Y Channel				
<u>1</u> 36.0µs		100 percent	≥ 95 percent	Same as initial
<u>2</u> 35.5µs		100 percent	≥ 95 percent	Same as initial
<u>3</u> 36.5µs		100 percent	≥ 95 percent	Same as initial
→ (2) Rejection Range				
(a) Decoder X channel				
<u>1</u> Lower limit range 9µs to < 11.5µs		0 percent	≤ 5 percent	Same as initial
<u>2</u> Upper limit range >12.5µs to 15µs		0 percent	≤ 5 percent	Same as initial
(b) Decoder Y channel				
<u>1</u> Lower limit range 33µs to <35.5µs	217	0 percent	≤ 5 percent	Same as initial
<u>2</u> Upper limit range >36.5µs to 39µs	218	0 percent	≤ 5 percent	Same as initial
d. Echo Suppression Gate	217	150µs	145 to 155µs	Same as initial
e. Echo Suppression Trigger Level	218	- 70dBm	-67 to -73dBm	Same as initial
f. Dead Time Gate	219	60µs	55 to 65µs	Same as initial

Section 3. FA-9783 CARDION (Continued)

Parameter	Reference Paragraph	Standard	Tolerance Limit	
			Initial	Operating
76. MONITOR.				
a. Monitor Power and Frequency Checks	223			
(1) Signal generator power		0dBm	+1 to -1dBm power	Same as initial
(2) Signal generator frequency		Assigned frequency	Within 0.002 percent of the assigned frequency	Same as initial
(3) Master clock frequency	223-1	20MHz	20MHz ±100Hz	Same as initial *
b. Monitor Alarm Parameters	209			
→ (1) Reply delay fault				
(a) Upper limit integral station				
<u>1</u> X Channel		50.4μs	50.30 to 50.50μs	Same as initial
<u>2</u> Y Channel		56.4μs	56.30 to 56.50μs	Same as initial
(b) Upper limit mountain top				
<u>1</u> X Channel		49.7μs	49.60 to 49.80μs	Same as initial
<u>2</u> Y Channel		55.7μs	55.60 to 55.80μs	Same as initial
(c) Lower limit integral station				
<u>1</u> X Channel		49.6μs	49.50 to 49.70μs	Same as initial
<u>2</u> Y Channel		55.6μs	55.50 to 55.70μs	Same as initial

Section 1. PERFORMANCE CHECKS (Continued)

<i>Performance Check</i>	<i>Reference Procedures</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
d. Annually.		
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(2) Check transmit frequency.....	65a(l)	182
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105. CARDION FA-9783 EQUIPMENT.		
a. Quarterly. Record the results of the following checks on FAA Form 6780-3.		
(1) Transponder reply delay.....	75a(6)	207
(2) Transfer/shutdown.....	77	210
b. Semiannually. Record the results of the following checks on FAA Form 6780-3.		
(1) Lamp test.....	NA	201
(2) Transmitter pulse characteristics.....	75A	202, 203
(3) Sensitivity check.....	75b	204, 205
(4) Identification.....	75a(5)	206
(5) Decoder aperture.....	75c	208
* (6) Monitor alarm parameters.....	76b	209
(7) Squitter.....	75a(4)	211
(8) Automatic monitor test.....	NA	212
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(a) Normal signal no. 1 or normal signal no. 2 input.....	83a	213
(b) Alarm delay.....	83b	214
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(10) Radio link shutdown timer.....	84	216

Section 1. PERFORMANCE CHECKS (Continued)

<i>Performance Check</i>	<i>Reference Procedures</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
c. Annually.		
(1) Check the echo suppression gate	75d	217
(2) Check the echo suppression trigger level	75e	218
(3) Check the dead time gate.....	75f	219
(4) Check status tones	79	220
(5) Check the monitor interrogation signal characteristics.....	78	221
(6) Check transmit frequency	75a(1)	222
(7) Check monitor power and frequency.....	76a	223
(8) Perform an equalization test	75a(5)	224
(9) Check power supply/converter	80	225
(10) Check transponder power supply.....	81	226
(11) Check RAM battery (1A2A17BT1)	82	227
* (12) Check the monitor master clock	76a(3)	223-1
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107. ASII MODEL 1118 DME SYSTEM.		
a. Quarterly.		
(1) Model 1118 DME Minimum Performance Check.....	87	240-12
(2) Alarm and Shutdown Performance Check.....	87	240-18
b. Annually.		
(1) Power Control Performance Check	87	240-13
(2) Monitor Performance Check	87	240-14

within operating limits. Refer to standards and tolerances, paragraph 79a(1).

(6) For a dual system key in ONL, 2 and repeat steps (3), (4), and (5) for 2940 Hz.

(7) Key in RAE and set the LOCAL/REMOTE switch to REMOTE.

(8) Disconnect all test cables.

221. MONITOR INTERROGATION SIGNAL CHARACTERISTICS.

a. Object. This procedure provides a method to verify the monitor interrogation signal characteristics:

b. Discussion. This procedure verifies the rf level, pulse spacing, pulse width, and rise and fall time of the monitor interrogation signal generator.

c. Test Equipment Required. Oscilloscope.

d. Conditions. Normally operating facility.

e. Detailed Procedure.

(1) Connect channel 1 of the oscilloscope to the SIG GEN ENVELOPE jack and external trigger to the TRIGGER OUT jack on the front panel. Set TRIG SEL to TRANS 1.

(2) Verify that the RF LEVEL (-dBm) reading is within operating limits. Refer to standards and tolerances, paragraph 78d.

(3) Using the delayed sweep function of the oscilloscope, observe both pulses of the interrogation and verify that the pulse spacing and pulse width measured at the 50-percent points are within operating limits. Refer to standards and tolerances, paragraph 78a and b.

(4) Determine that the rise and fall time measured from the 10-percent to 90-percent points is within operating limits. Refer to standards and tolerances, paragraph 78c.

(5) Disconnect all test cables.

222. TRANSMITTER FREQUENCY.

a. Object. This procedure provides a method to verify the accuracy of the transponder synthesizer output frequency.

b. Test Equipment Required. Frequency counter, Hewlett-Packard HP5300A/5305A or equivalent, and a 20-dB attenuator, Weinchel Model 50-20 or equivalent.

c. Conditions. NOTAM in effect.

d. Detailed Procedure.

(1) Connect the frequency counter to the transponder frequency synthesizer output A14J2 through a 20-dB attenuator.

(2) Record the reading on the frequency counter and verify that the frequency is within operating limits, using the following formula:

$$\% \text{ Freq. Dev.} = \frac{\text{Station Freq.} - \text{Measured Freq.}}{\text{Station Freq.}} \times 100$$

Refer to standards and tolerances, paragraph 75a(1).

(3) Restore original connections.

223. MONITOR INTERROGATION SIGNAL GENERATOR FREQUENCY AND POWER.

a. Object. This procedure provides a method to verify the monitor interrogation frequency for ON and OFF channel and the output power.

b. Test Equipment Required. Frequency counter, Hewlett Packard HP5300A/5305A or equivalent, and a power meter, Pacific Measurement Model PM 1018 or equivalent.

c. Conditions. Normally operating procedure.

d. Detailed Procedure.

(1) Set LOCAL/REMOTE switch to LOCAL.

(2) Connect the transponder SIG GEN OUT connector to the frequency counter.

(3) Key in CWT and verify a frequency counter reading within operating limits. Refer to standards and tolerances, chapter 3 paragraph 76a(2).

(4) Key in FDV to ± 200 and verify a frequency counter reading within operating limits. Refer to standards and tolerances, chapter 3 paragraph 76a(2).

(5) Key in FDV to +900 and verify a frequency counter reading within operating limits. Refer to standards and tolerances, paragraph 76a(2).

(6) Set the power meter to measure CW and connect the input to the transponder SIG GEN OUT connector.

(7) Key in EXL to -30.0 and verify that the signal generator power is within operating limits. Refer to standards and tolerances, paragraph 76a(1).

(8) Key in NOR, and FDV of +000.

(9) Set LOCAL/REMOTE switch to LOCAL and restore original connections.

* 223-1. MONITOR MASTER CLOCK FREQUENCY

a. Object. This procedure provides a method to verify the monitor master clock frequency.

b. Test Equipment Required. Frequency counter, Hewlett-Packard HP5300A/5305A or equivalent.

c. Conditions. NOTAM in effect.

d. Detailed Procedure.

(1) Turn transponder 1 and 2 POWER circuit breaker OFF. Extend the 1A2A7 on extender card 1A2A9.

(2) Using an SMA to BNC adapter, connect the frequency counter to 1A2A7J1.

(3) Turn the transponder 1(2) POWER circuit breaker ON and record the reading on the frequency counter. Verify that the frequency is within operating limits. Refer to the standards and tolerances, paragraph 76a(3).

(4) Turn the transponder 1 and 2 POWER circuit breakers to OFF. Reinstall 1A2A7.

(5) Turn the transponder 1 and 2 POWER circuit breakers to ON. Return the system to normal operation. *

224. EQUALIZATION.

a. Object. This procedure provides a method to verify the spacing of the equalization pulses during the identification signal.

b. Test Equipment Required. Oscilloscope.

c. Conditions. Normally operating facility.

d. Detailed Procedure.

(1) Set LOCAL/REMOTE switch to LOCAL.

(2) Key in TS4 and RP1 for transponder no. 1 or RP2 for transponder no. 2. Set the IDENT KEYING switch to CONT.

(3) Observe a function display within operating limits. Refer to standards and tolerances, paragraph 75a(5)(b).

(4) Connect channel 1 of the oscilloscope to the transponder PWR CAL OUT connector and verify a correct spacing between identification equalization pulse pairs. Refer standards and tolerances, paragraph 75a(5)(c).

(5) Set the IDENT KEYING switch to NORM and key in TS3.

(6) Set the LOCAL/REMOTE switch to REMOTE and disconnect cable from oscilloscope.

225. POWER SUPPLY/CONVERTER VOLTAGES.

a. Object. This procedure provides a method to verify the float and high current voltages.

b. Test Equipment Required. Digital voltmeter (dvm).

c. Conditions. NOTAM in effect.

d. Detailed Procedure.

(1) Turn all system circuit breakers to OFF and remove fuse 1A4A1F1.

(2) Connect a dvm, set to measure +28Vdc, positive (+) and negative (-) leads to the BATTERY 21-42Vdc test points (front panel of 1A4) TP2 (+) and TP1 (-), respectively.

(3) Set the AC POWER (1A4CB1) circuit breaker to ON and verify that the voltage reading is within operating limits. Refer to standards and tolerances, paragraph 80a.

(4) Leave dvm connected as in step (2) and connect a jumper between 1A4A1TP9 and 1A4A1TP13. Verify that the voltage reading is within operating limits. Refer to standards and tolerances, paragraph 80b.

(5) Return system to normal configuration.

226. TRANSPONDER POWER SUPPLY VOLTAGE.

a. Object. This procedure provides a method to verify the +5Vdc and +6.8Vdc transponder power supply voltages.

b. Test Equipment Required. Digital voltmeter (dvm).

c. Conditions. Normally operating facility.

d. Detailed Procedure.

(1) Connect a dvm, set to measure +5Vdc, between monitor 1A2 front panel test points GND and +5Vdc. Verify that the reading is within standards and tolerances, paragraph 81a.

(2) Connect dvm between monitor 1A2 front panel test points GND and 6.8Vdc. Verify that the reading is within standards and tolerances, paragraph 81b.

(3) Return system to normal configuration.

