INCH-POUND

MIL-D-70789A (AR)
AMENDMENT 2
09 November 1994
SUPERSEDING
AMENDMENT 1
14 April 1993

MILITARY SPECIFICATION

DYNAMIC REFERENCE UNIT (DRU)

This amendment forms a part of MIL-D-70789A (AR), dated 15 June 1992, and is approved for use by the US Army Armament, Munititons, and Chemical Command, and is available for use by all Departments and Agencies of the Department of Defense.

PAGE 11

3.5.3.1.1a:

Line 1: Add “S1/6,” after “S1/5,"

Line 6: Add “S1/6,” after “S1/5,"

3.5.3.1.1h: Delete in its entirety and substitute the following:

“h. Reset STATUS bit S1/7 and set STATUS bit S1/6 when the DRU is ready to proceed to Align.”

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3.5.3.2.2.1: Add the following new paragraph to end of section

“Orientation Transition in Process STATUS (S3/7) shall be set while switching between orientations 1 and 2. S3/7 shall be set within one second of detection of the event causing orientation transition. Orientation Transition in Process STATUS (S3/7) shall be reset when orientation transition is completed and position, velocity attitude, azimuth, and rate data are valid-for the new Orientation (1 or 2). The time to switch orientations and provide valid data in the new orientation (1 or 2) shall not exceed 3 seconds. DRU in Orientation 2 STATUS (S4/7) shall be set while the DRU is in Orientation 2 and reset while in Orientation 1. S4/7 shall transition when the orientation transition is complete and valid data are available in the new orientation.”

PAGES 24 and 25

* Table II, under FUNCTION column:

For pins 3, 25, 34, 43, 47, 51, 56, 62, and 66: Delete "Spare" and substitute “Wired Spare”.

For pins 11 and 44: Delete "Spare" and substitute "Signal Ground”.

For pins 48, 55, and 61: Delete "Spare" and substitute “Reserved Spare”.

PAGE 40

3.5.6, line 5: Add “.” after “S2” and delete the remainder of the paragraph.

PAGE 45

3.5.8.8e: Delete in its entirety and substitute the following:

“e. Shot detect. When set, the DRU shall activate Shot Detect STATUS (S2/3) as specified in 3.5.6. When reset, Shot Detect STATUS (S2/3) shall always be reset.”

PAGE *49*

3.5.8.9.2: Add the following at the end of the paragraph:

“When an ACCEPT CONFIGURATION DATA command is received while the DRU is in motion, the update shall be rejected and the Motion During Update Request Alert (D3/5) shall be set. When an ACCEPT CONFIGURATION DATA command is accepted:

a. The Position Update Request STATUS (S1/1) shall be set.

b. If the Pointing Device Boresight Angles configuration definition flag (D29/7) is set, the Pointing Device Boresight Angles Not Present Alert (D5/4) shall be set.

If the vehicle Boresight Angles configuration definition flag (D29/6) is set, the Vehicle Boresight Angles Not Present Alert (D2/7) shall be set."

PAGE 50

3.5.8.15, line 4: Delete “Travel lock references shall be corrected for vehicle rotations which occur during gun firing at the end of the Shot Detect Interval.”

3.5.9.1.1, line 14: Add the following sentence:

“When an ACCEPT VEHICLE BORESIGHT command is received while the DRU is in motion, the update shall be rejected and the Motion During Update Request Alert (D3/5) shall be set.”

PAGE 51

3.5.9.2.1, line 15: Add the following sentence:

"When an ACCEPT POINTING DEVICE BORESIGHT command is received while the DRU is in motion, the update shall be rejected and the Motion During Update Request Alert (D3/5) shall be set.“

PAGE 53

3.6.1.1, Paragraph 3, line 5: Delete "0.42262 secant latitude.: and substitute “0.283 secant latitude Probable Error.”

PAGE 67

Figure 11, Temperature Cycling: Delete in its entirety and substitute as included page 67.

PAGE 93

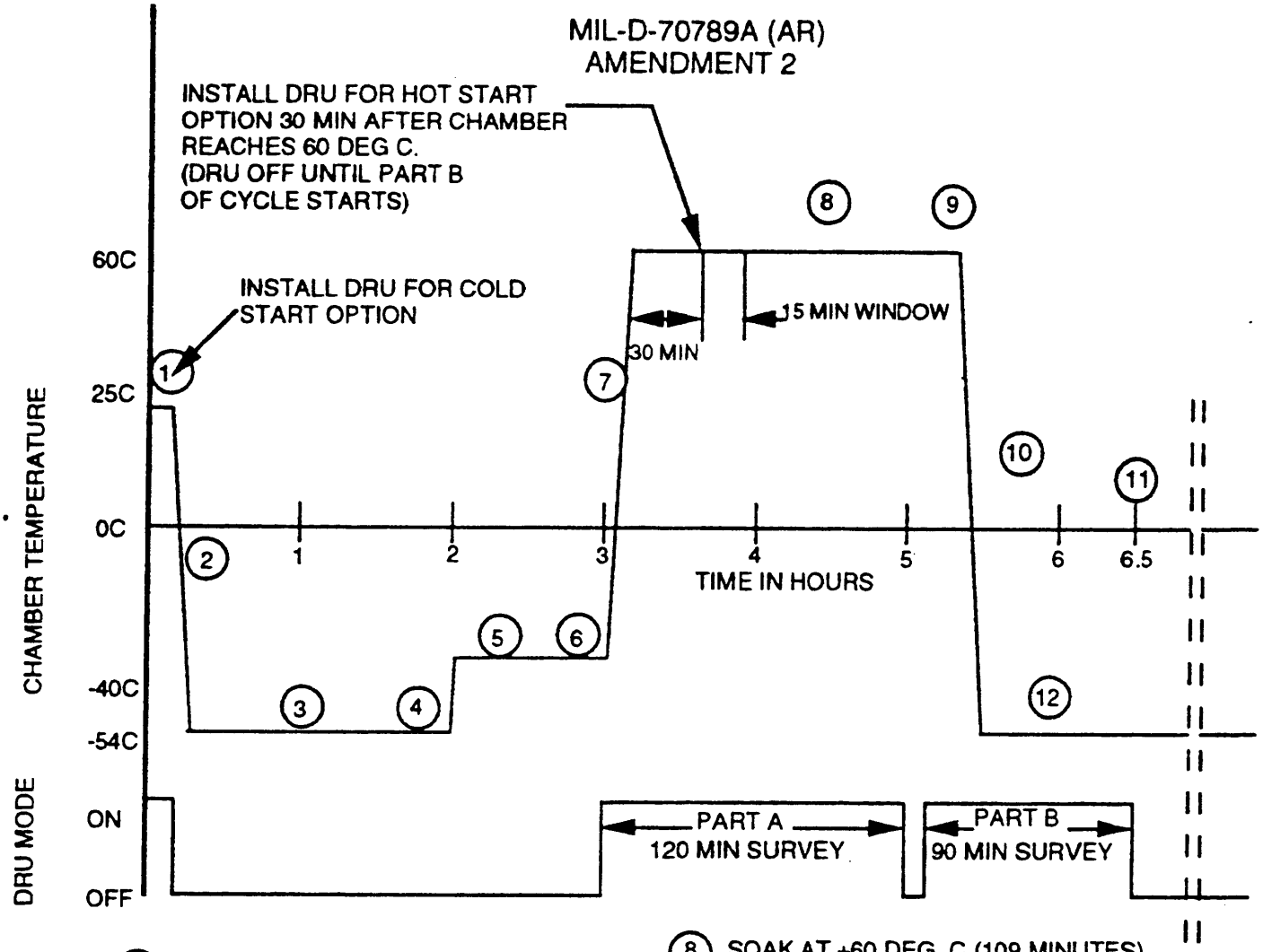
Table V, Data Bus Requirements for BCU Parameter Change Alert D4/5: Delete “Sets alert on both data buses.” and substitute “Sets Alert only on the data bus which sent the ACCEPT POSITITON or ACCEPT GEODETIC DATA command."

PAGE 137

6.7.9, line 8: Delete “In the case where the pointing device is a weapon, the reference is corrected for any vehicle chassis in motion resulting from weapon firing.”

PAGE 138

6.7.10, line 6: Delete "In the case where the pointing device is a weapon, the reference is corrected for any vehicle chassis motion resulting from weapon firing.”



1. START AT 25 DEG. C (5 MINUTES
2. RAMP TO -54 DEG. C AT 5 DEG/MIN
3. SOAK AT -54 DEG.C UNTIL HOUR 2
4. RAMP TO -40 DEG. C AT 5 DEG/MIN
5. SOAK AT -40 DEG. C UNTIL HOUR 3
6. TURN ON AT -40 DEG C (13 MINUTES)
7. RAMP TO +60 DEG. C (16 MINUTES)
8. SOAK AT +60 DEG. C (109 MINUTES)
9. AT 5 HOURS, TURN POWER OFF FOR 5 MIN.,THEN TURN ON AND ALIGN.
10. RAMP TO -54 DEG. C AT 5 DEG/MIN AFTER ALIGNMENT IS COMPLETE.
11. POWER OFF AT HR. 6.5
12. COLD SOAK AT -54 DEG. C FOR 2 HOUR 54 MIN. THEN LOOP BACK TO STEP 4
13. REPEAT PROFILE FOR A TOTAL OF 10 CYCLES.

NOTES: 1. TIMES ARE APPROXIMATE AND ANY ONE FUNCTION MAY DEVIATE BY UP TO 5 PER CENT. THE OVERALL CYCLE (AFTER THE FIRST CYCLE) SHALL BE 6 HOURS 30 MINUTES - 5, +15 PERCENT.

2. PROVISIONS ARE MADE TO START THE TEST AT ROOM TEMPERATURE OR AT HIGH TEMPERATU IN ORDER TO FACILITATE PRODUCTION TEST WITH MULTIPLE DRUS IN THE SAME CHAMBER. TH OVERALL ESS TEST TIME IS THE SAME FOR A HOT OR COLD START.

3. CHAMBER RAMP RATES ARE SPECIFIED AS MINIMUM RATES.

Figure 11
ESS Temperature Cycle

30.1.5 (Appendix A): Delete in its entirety and substitute the following:

"30.1.5 Command: ACCEPT GEODETIC DATA

From: Prime System To: DRU

Function: This user update command requests the DRU to accept position data from the prime system in geodetic coordinate form. The DRU accepts update data when the DRU is stationary.

DRU Response: STATUS DATA Message

COMMAND STRUCTURE

FLAG (F)	ECHO SEQ#(N)	COMMAND CODE (C)	DATA CHARACTERS(D)	ERROR DET. CODE CHARACTERS(E)	FLAG (F)
01111110	XXX	10100	D1-D19	16 bits	01111110

Numbers of Data Characters: 19

Data Format: Binary 2's Complement

D1, Character (8 bits)
Value: 14
— Command Subcode (unsigned binary)

D2, D3 Characters (16 bits)
Range: 0-15
— Prime System Spheroid (unsigned binary)

D4, D5 Characters (16 bits)
Range: ± 90 degrees
Resolution: 1 degree
— Latitude Degrees (signed binary *)
+ Northern Hemisphere
- southern Hemisphere

D6, D7, D8, D9 Characters (32 bits)
Range: 0 to 59.99999 arc minutes
Resolution: $1/2^{24}$ arc minute
— Latitude Minutes (unsigned binary)

D10, D11 Characters (16 bits)
Range: ± 180 degrees
Resolution: 1 degree
— Longitude Degrees (signed binary *)
+ East of Greenwich
- West of Greenwich

30.1.5 (Appendix A): (continued)

COMMAND STRUCTURE

FLAG (F)	ECHO SEQ#(N)	COMMAND CODE (C)	DATA CHARACTERS(D)	ERROR DET. CODE CHARACTERS(E)	FLAG (F)
D12,D13,D14,D15		Characters (32 bits) Range: 0 to 59.99999 arc minutes Resolution: $1/2^{24}$ arc minute		Longitude Minutes (unsigned binary)	
D16,D17,D18,D19		Characters (32 bits) Range: Resolution: 0.01 meters		Altitude	

* MSB = 0 for + and 1 for -. Remainder of field is unsigned binary."

30.4.16 (Appendix D): Delete in its entirety and substitute the following:

"30.4.16 Message: GEODETIC DATA

From: DRU To: Prime System

Number of Data Characters: 29

Data Format: Binary 2's Complement

MESSAGE STRUCTURE

FLAG (F)	ECHO SEQ#(N)	IDENTIFIER(I)	STATUS S1, S2 DATA(D)	ERROR DET. CODE (E)	FLAG (F)
01111110	XXX	10001	16 Bits D1-D29	*16* bits	01111110
D1,D2		Characters (16 bits) Range: ± 90 degrees Resolution: 1 degree		Latitude Degrees (signed binary *)	

30.4.16 (Appendix D): (continued)

MESSAGE STRUCTURE

FLAG (F)	ECHO SEQ#(N)	IDENTIFIER(I)	STATUS S1, S2	DATA(D)	ERROR DET. CODE (F)	FLAG (F)
D3, D4, D5, D6 Characters (32 bits) Range: 0 to 59.99999 arc minutes Resolution: $1/2^{24}$ arc minute				Latitude Minutes (unsigned binary)		
D7, D8 Characters (16 bits) Range ± 180 degrees Resolution: 1 degree				Longitude Degrees (signed binary *)		
D9, D10, D11, D12 Characters (32 bits) Range: 0 to 59.99999 arc minutes Resolution: $1/2^{24}$ arc minute				Longitude Minutes (unsigned binary)		
D13, D14, D15, D16 Characters (32 bits) Range: -32,768 to +32,767 meters Resolution: 0.01 meters				Altitude		
D17, D18, D19, D20 Characters (32 bits) Range: t 32,767 meters/see Resolution: $1/2^{16}$ meters/see				Velocity North		
D21, D22, D23, D24 Characters (32 bits) Range: ± 32,767 meters/see Resolution: $l/21^{6}$ meters/see				Velocity East		
D25, D26, D27, D28 Characters (32 bits) Range: ± 32,767 meters/see Resolution: $1/2^{16}$ meters/see				Velocity Up		
D29 Character (8 bits) Range: 0 to 14 Resolution: 1				DRU Spheroid (unsigned binary)		

* MSB = for + and 1 for -. Remainder of field is unsigned binary."

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30.5 (Appendix E), S1 Character table, BIT POSITION 6 MODE OR CONDITION:

Delete "Spare" and substitue “Startup Complete".

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30.5 (Appendix E):

S3 Character tabke, BIT POSITION 7 MODE OR CONDITION: Delete "Spare" and substitute "Orientation Transition in Process”.

S4 Character table, BIT POSITION 7 MODE OR CONDITION: Delete "Spare" and substitute “DRU in Orientation Two”.

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Table 30.5 (Appendix E):

CHAR/BIT S1/7, RESET CONDITION, line 3: Add "or Stored Heading” after “Normal”.

CHAR/BIT S1/6, SET CONDITION: Delete "Spare" and substitute “DRU operations are sufficient for proceeding with Normal or Stored Heading Align”.

CHAR/BIT S1/6, RESET CONDITION: Delete "Spare" amd substitute “Turn-on or RESTART”.

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Table 30.5 (Appendix E):

CHAR/BIT S3/7, SET CONDITION: Delete "Spare" and substitute “DFU transitioning between Orientations 1 and 2 **”.

CHAR/BIT S3/7, RESET CONDITION: Delete and "Spare" and substitute “DRU in Orientation 1 or 2“.

Below first note: Add “** After the DRU has switched to the new orientation, S3/7 shall remain set until position and orientation data are valid for the new orientation.”.

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Table 30.5 (Appendix E):

CHAR/BIT S4/7, SET CONITION: Delete "Spare" and substitute "DRU in orientation 2 *".

CHAR/BIT S4/7, RESET CONDITION: Delete "Spare" and substitute "DRU in Orientation 1 *".

Below table box: Add "* The indication provided by S4/7 may not be valid while Orientation Transition in Process STATUS (S3/7) is set.".

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Appendix F, POINTING DEVICE BORESIGHT ANGLES:

Orientation 1, after "B:": Delete "88.9" and substitute "0.0".

Orientation 2, after "B:": Delete "88.9" and substitute "0.0".

Appendix F, ZRP OFFSET DISTANCES, Orientation 1 (vehicle)

After" ΔX :": Delete "3.1" and substitute "0.0".

After " ΔY :": Delete "-2.1" and substitute "0.0".

After " ΔZ :": Delete "-2.2" and substitute "0.0".

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Appendix F:

D28/3, after "EXTENDED ALERT DATA": Delete "0" and substitute "1".

D28/2, after "BCU PARAMETERS": Delete "1" and substitute "on,

D29/7, after "POINTING DEVICE BORESIGHT ANGLES": Delete "0" and substitute "1".

PAGE 207 (continued)

D29/6, after “VEHICLE BORESIGHT ANGLES”: Delete "0" and substitute “1”.

D29/4, after “TRAVEL LOCK COMMANDS”: Delete "0" and substitute “1”.

D29/3, after “TRAVEL LOCK DISCRETE”: Delete "1" and substitute “0".

The margins of this amendment are marked with an asterisk or vertical lines to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

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