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E-SYSTEMS
Montek Division

Report No. 131500-618
12 August 1977

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RAIN TEST REPORT
FOR THE
AN/TRN-41 TACAN NAVIGATIONAL SET

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Department of the Air Force, Headquarters Electronic
Systems Division (AFSC), Hanscom Air Force Base,
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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ESD-TR-77-315 ✓	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) AN/TRN-41 TACAN Navigational Set		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes the rain test as defined in the Equipment Test Plan for Navigational Set, TACAN, AN/TRN-41. ↑		

RAIN TEST REPORT
for the
NAVIGATIONAL SET, TACAN, AN/TRN-41

This report describes the rain test as defined in the Equipment Test Plan for Navigational Set, TACAN, AN/TRN-41, 131500-415.

1. **Test Identification.** Rain test as defined in Appendix IV-H (rain test procedure) of the Equipment Test Plan for Navigational Set, TACAN, AN/TRN-41.
2. **Functional Purpose of Test.** This test forms a part of the AN/TRN/41 system qualification tests.
3. **Test Objectives.** To demonstrate that the AN/TRN-41 will meet the rain requirements of paragraphs 3.2.5.1.7 and 4.2.1.4.3.8 of Specification No. 404L-701-5017A, Part I of 2 parts (20 August 1976).
4. **Description of Test Article.** The AN/TRN-41 system consisting of the following was used for the tests:

Receiver-Transmitter	RT-1202/T
Antenna	AS-3132/T
Antenna Support	AB-1237/T
Filter, DC Power	F-1439/T
Interconnecting Cables	

ACCESSION FOR	NTIS	<input type="checkbox"/>	Whole Section	<input type="checkbox"/>
	DDC	<input type="checkbox"/>	Brief Section	<input type="checkbox"/>
UNANNOUNCED				
JUSTIFICATION				
BY				
DISTRIBUTION/AVAILABILITY CODES				
Dist. <input type="checkbox"/> SPECIAL				
B 73 628				

5. **Summary of Test Results.** Comparison of the pretest and post test operational data revealed no degradation of functional characteristics. Some water was found in the RT and the DC power filter.
6. **Description of Test Facilities and Procedures.** The test facilities and test procedures are described in Appendix IV-H of the Equipment Test Plan.
7. **Test Setup Diagrams.** The test setup diagrams are provided in Appendix IV-H of the Equipment Test Plan.

8. **Test Equipment.** See Attachment 1 for test equipment used for the rain test and the pretest and post test operational tests. Attachment 2 shows the test setup for the rain test with the RT installed.

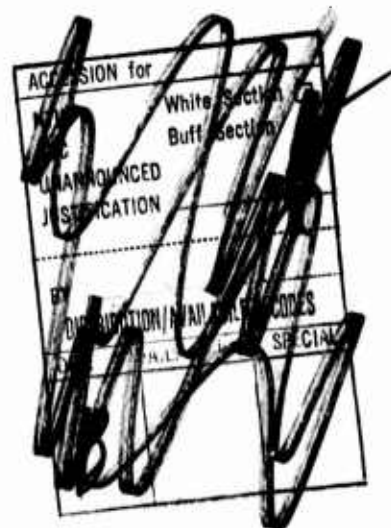
9. **Test Data.** Attachment 3 contains the data sheets for the rain test and the pretest and post test operational tests.

10. **Test Conditions.** The system was subjected to rain and wind as described in Appendix IV-H. The test was operated at ambient temperature.

11. **Test Result Analysis.** On the initial rain test of the RT and DC power filter, it was found that excessive water had got into both the RT and power filter. The gaskets for the RT were changed to a different material that would provide better sealing and still provide the heat transfer and EMI characteristics required.

The system was then rain tested again and functional tests were passed. A small amount of water was found in the RT and filter box as noted in the data sheet in Attachment 3. This water inside the unit would not constitute a failure since it does not affect the performance of the system.

12. **Certification.** The data sheets shown in Attachment 3 have been signed by a Montek Quality Assurance representative and a DCAS representative, certifying that the test results are authentic, accurate, current and in accordance with the related test plan.

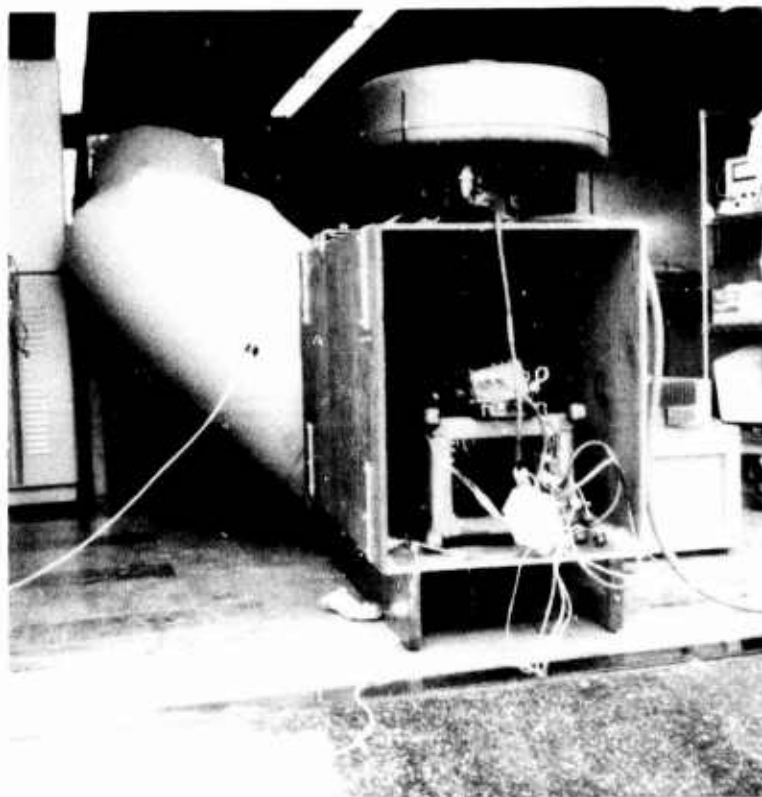


ATTACHMENT 1
TEST EQUIPMENT

TEST EQUIPMENT

<u>Description/Manufacturer</u>	<u>Model</u>	<u>Calibration Due Date</u>
Oscilloscope, Tektronix	465	7/6/77
Signal Generator, RF, H.P.	612A	6/23/77
Peak Power Meter, HP	8900B	9/19/77
Pulse Generator, Data Pulse	110B	5/12/77
Counter, Fluke	1953	8/12/77
Half-Ampl. Det. Montek	131500-702	N/A
RF Detector, Montek	135203-100	N/A
Monitor Ant., Montek	006300	N/A
Test Box - Interconnection - Montek	131500-703	N/A
Power Supply HP	6274B	1/16/78
Power Supply Acopian		12/9/77
Power Supply, Sorensen	QR4075A	9/19/77
Directional Coupler 20 dB, Narda	3042B	N/A
Directional Coupler 10 dB, Microlab	CBA-78	N/A
Variable Attenuator, Weinschel 0-10 dB	905	N/A
RF Attenuator, Weinschel	10 dB	N/A
Multimeter, Fluke	8120A	8/2/77
Rain Chamber, Univac	-	N/A
Velocity Multimeter, Datametrics	800 TP	12/12/77

ATTACHMENT 2
RAIN TEST CHAMBER



RAIN TEST SET-UP FOR RT-1202/T

ATTACHMENT 3

DATA SHEETS

APPENDIX IV-K
DATA SHEET
ENVIRONMENTAL TEST

131500-415

June 30, 1976

TEST RAIN TEST
SYSTEM 002

from 6/1/77
DATE to 6/1/77
ACCEPTABLE X
NOT ACCEPTABLE _____

REMARKS The system was subjected to the rain test as outlined by test procedure
131500-415 appendix IV-H. At the conclusion of the rain test the data was reviewed and
no degradation of performance was observed. A visual inspection found the following
amounts of water in the units. RT -- enclosure - 1 oz.
switch cover - 1 teaspoon
ANTENNA - no water
Filter Box - 4 drops

DISCREPANCIES

This small amount of water inside the unit does not constitute a failure since it in
no way affects the performance of the system.

SIGN OFF INFORMATION

ENVIRONMENTAL TEST ENGINEER _____ DATE _____

REPRESENTATIVE ENGINEER B G TAYLOR by J. M. Rogers DATE 6/1/77

QA REPRESENTATIVE M. B. Piment DATE 6-1-77

DCASD OR AF CONCURRENCE Paul W. Black DATE 6-1-77

I feel that this test should be rerun
on a production unit after the tighter
tolerance has been imposed on the production units
IV-K-1
Paul W. Black

June 30, 1976

DATA SHEET
OPERATIONAL TESTS
AN/TRN-41

1 OZ WATER IN RT
4 Drops in Filter Box
1 Teaspoon in Switch
Cover

Test **RAIN TEST**
System **AMTRN-41**
ser No. 002

1 Teaspoon in 50
cover
1 Jun 3, 1977

No water in ANT.

Para. No.	Description	Pre Test	R.T. Post Test FANT PRE	ANT Post Test	Requirements	Units
6.1	Calibrated RF insertion loss $P_L = 32.6$ dB Used in determining RF peak power.	N/A	N/A	33.4 N/A	N/A	N/A
6.2	System turn on normal operation	✓	✓	✓	Check if OK	N/A
6.3.1	Antenna radiated signal 15 Hz	✓	✓	✓	Check if OK	N/A
	135 Hz	✓	✓	✓	Check if OK	N/A
6.3.2	Antenna Speed	66.66	66.67	66.67	66.667 ± .133	ms
6.4.1.1	Correct identity code	OK	OK	OK	Check if OK	N/A
6.4.1.2	Identity period	37.5	37.5	37.5	37.5 ± 3.75	Seconds
6.4.2	Peak power (1) Reading of peak power meter $P_m = 61mw$ (2) Convert to dBm - 10 log $P_m \times 10^3 = P_m \text{ dBm}$ Total power output in dBm $P_{m \text{ dBm}} + P_L =$ *Insertion loss see 6.1 above.	61mw 17.85 50.45	66mw 18.17 50.79	55 17.4 50.8	N/A N/A 50 dBm	Watts dBm dB
6.4.3.3	Pulse count	7202	7250	7201	7200 ± 180	Counts
6.4.4.2	Pulse shape Width (50%) Rise time (10-90%) Fall time (90-10%)	3.4 2 2.5	3.4 2 2.5	3.35 2 2.5	3.5 ± 0.5 2 ± 0.25 2.5 ± 0.5	μs μs μs
6.4.4.4	Pulse spacing	12	12	12	12.0 ± 0.1	μs
6.4.5.2	Delay - 60 ± 10 μs 15 Hz trig to first burst pulse.	64	64	64	Check if OK	

June 30, 1976

DATA SHEET
OPERATIONAL TESTS
AN/TRN-41 (Continued)

Para. No.	Description	Pre Test	Test	Post Test	Requirements	Units
6.4.5.3	Correct north Burst - 12 pulse pairs spaced $30 \pm 0.1 \mu s$	OK	OK	OK	Check if OK	
6.4.5.5	Delay $60 \pm 10 \mu s$ - 135 Hz trig to first burst pulse	OK	64	64	Check if OK	
6.4.5.6	Correct Aux burst - 6 pulse pairs spaced $24 \pm 0.1 \mu s$	OK	OK	OK	Check if OK	
6.4.6.5	RT replies to 3300 interrogations	2667	2761	2758	≥ 2310 (Counts/Second)	
6.4.6.7	Demand only mode - times to switch from ON to STBY within 70 seconds	OK	66	67.5	Check if OK	
6.4.6.8	STBY mode	OK	OK	OK	Check if OK	
6.4.6.9	Demand Only mode - time to switch from STBY to ON <i>(≤ 18 sec) 20 4/19/77</i>	OK	14.2	14.5	Check if OK	
6.4.6.10	ON AIR mode	OK	OK	OK	Check if OK	
6.4.7.1	DME ONLY mode	OK	OK	OK	Check if OK	
6.4.7.2	Switch from DME to TACAN	OK	OK	OK	Check if OK	
6.4.8.1	Antenna Alarm - Within four seconds	OK	OK	OK	Check if OK	
6.4.8.2	Alarm Reset	OK	OK	OK	Check if OK	
6.4.8.3	RT Alarm - Within five seconds	OK	OK	OK	Check if OK	
6.4.8.4	Alarm Reset	OK	OK	OK	Check if OK	

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FACILITY:

ENVIRONMENTAL DATA SHEET ENVIRONMENTAL LABORATORY — DEPT. 330

Sheet 1 of 2

R-1

A.O. 298K-193

ENV. TECH. RK DAVIS

TEST SCHED.

ENGINEER OR O.C. M. Rogers (E system)

PHONE

TEST COMPLETED

TECHNICIAN

PHONE

TEST REMOVED

UNIT TITLE An/TRN-91

SER.

QTY. 1

TOTAL UTILIZATION

INSTRUCTIONS

TO
OPERATOR

TEST TO TERMINATE:

BY:

ENVIRONMENTAL
LABORATORY
SUPERVISORS
APPROVAL

TEST Rain Test

SPEC. Mil-Std-810

PAR. Method. 506.1

1. Conduct Rain Test per procedure I
 - A Expose to rain on 4 sides
 - B 5 ± 1 in/hr for 10 min.
 - C 12 ± 1 in/hr for 12 min.
 - D 5 ± 1 in/hr for 15 min.
 - E wind at 3500 ft/min for 15 min.

Dale Blue
SIGNATURE

DATE

DATE	TIME	CHRONOLOGICAL RECORD OF TEST	INITIALS (PRINT)
6/1/77	0820	Install RT in Rain chamber on side 1.	DWB
	0826	start side 1 at 5 ± 1 in/hr for 10 min.	DWB
	0831	start wind at 3500 ft/min.	DWB
	0836	increase rainfall to 12 ± 1 in/hr for 12 min.	DWB
	0846	stop wind.	DWB
	0848	decrease rainfall to 5 ± 1 in/hr for 15 min.	DWB
	0903	end of Side 1 Test.	DWB
	0910	Rotate RT 90° to Side 2.	DWB
	0916	Start rain on side 2 at 5 ± 1 in/hr for 10 min.	DWB
	0921	start wind at 3500 ft/min.	DWB
	0926	increase rainfall to 12 ± 1 in/hr for 12 min.	DWB
	0936	stop wind.	DWB
	0938	decrease rainfall to 5 ± 1 in/hr for 15 min.	DWB
	0951	end of Side 2 Test.	DWB
	1000	Rotate RT 90° to Side 3	DWB
	1008	start rain on side 3 at 5 ± 1 in/hr for 10 min	DWB
	1013	start wind at 3500 ft/min.	DWB
	1018	increase rainfall to 12 ± 1 in/hr for 12 min.	DWB
	1028	stop wind	DWB
	1030	decrease Rain fall to 5 ± 1 in/hr for 15 min	DWB
6/1/77	1045	end of Side 3 Test.	DWB

VERIFIED & RELEASED BY:

O.C. OR PROGRESS

COGNIZANT ENGINEER

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DATE	TIME	CHRONOLOGICAL RECORD	INITIALS
6/1/77	1052	Rotate RT to side 4	DWB
	1055	start rain on Side 4 at 5 ± 1 in/hr for 10 min	DWB
	1100	start wind at 3500 ft/min.	DWB
	1105	increase rainfall to 12 ± 1 in/hr for 12 min.	DWB
	1110	stop wind	DWB
	1112	decrease rainfall to 5 ± 1 in/hr for 15 min	DWB
	1127	end of Test for side 4.	DWB
	1140	Remove RT from Rain chamber.	DWB
	1200	install Antenna in Rain chamber.	DWB
	1250	start rainfall on Antenna at 5 ± 1 in/hr for 10 min.	DWB
	1255	start wind at 3500 ft/min.	DWB
	1300	increase rainfall to 12 ± 1 in/hr for 12 min.	DWB
	1310	stop wind	DWB
	1312	decrease rainfall to 5 ± 1 in/hr for 15 min.	DWB
	1327	end of Test of Side 1.	DWB
	1334	rotate Antenna 90° to side 2.	DWB
	1340	start rainfall of Side 2 at 5 ± 1 in/hr for 10 min	DWB
	1345	start wind at 3500 ft/min.	DWB
	1350	increase rainfall to 12 ± 1 in/hr for 12 min.	DWB
	1400	stop wind	DWB
	1402	decrease rainfall to 5 ± 1 in/hr for 15 min	DWB
	1417	End of Test for Side 2.	DWB
	1426	Rotate Antenna 90° to side 3.	DWB
	1430	start rainfall on Side 3 at 5 ± 1 in/hr for 10 min	DWB
	1435	start wind at 3500 ft/min.	DWB
	1440	increase rainfall to 12 ± 1 in/hr for 12 min.	DWB
	1450	stop wind	DWB
	1452	decrease rainfall to 5 ± 1 in/hr for 15 min.	DWB
	1507	end of Test for side 3	DWB
	1516	Rotate Antenna 90° to side 4.	DWB
6/1/77	1522	start rainfall on side 4 at 5 ± 1 in/hr for 10 min.	DWB

[illegible]

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