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Form Approved OMB No. 0704-0188

Public reporting burden for this collection of i gathering and maintaining the data needed, a collection of information, including suggesti Jefferson Davis Highway, Suite 1204, Arlingt	nformation is estimated to average 1 hour pe and completing and reviewing the collection o ons for reducing this burden, to Washingt on, VA 22202-4302, and to the Office of Man	r response, including the time for reviewing ins of information. Send comments regarding this I on Headquarters Services, Directorate for In agement and Budget, Paperwork Reduction Pro	structions, searching existing data sources, ourden estimate or any other aspect of this formation Operations and Reports, 1215 oject (0704-0188), Washington, DC 20503.	
1. AGENCY USE ONLY (Leave Bla	nk) 2. REPORT DATE	3. REPORT TYPE AND DA	3. REPORT TYPE AND DATES COVERED	
	17 MAY 1996	PROFESSIONAL PAI	-EK	
4. TITLE AND SUBTITLE		5. FUNDIN	G NUMBERS	
LONG ARC LIGHTNING SIMUL	ATOR			
6. AUTHOR(S)				
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7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES) COMMANDER NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION 22541 MILLSTONE ROAD PATUXENT RIVER, MARYLAND 20670-5304			MING ORGANIZATION NUMBER	
9. SPONSORING / MONITORING .	AGENCY NAME(S) AND ADDRESS	(ES) 10. SPONS	ORING / MONITORING	
COMMANDER NAVAL AIR SYSTEMS COMMA 1421 JEFFERSON DAVIS HIGHV ARLINGTON, VA 22243	NND WAY	AGENC	Y REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABIL	ITY STATEMENT	12b. DISTR	12b. DISTRIBUTION CODE	
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.				
13. ABSTRACT (Maximum 200 wor	ds)			
The Long Arc Lightning Simu River, Md. The Long Arc dev Simulator is operated by the El Base System. This presentatior	lator is part of the Electroma elopment was part of the Navy M Transient's Branch of the E will introduce the availability	gnetic Transient T&E Facility ( 's improvement and moderniza 3 division and is part of the DC of this simulator to the DOD and	EMTEF), located at Patuxent tion program. The Long Arc D Major Range Test Facility I commercial customer.	
14. SUBJECT TERMS Long arc lightning simulator; T&E			15. NUMBER OF PAGES 16	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT	
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	N/A	
NSN 7540-01-280-5500	L	IStar Pre	ndard Form 298 (Rev. 2-89) scribed by ANSI Std. Z39-18	

Prescribed by ANSI Std. 2 298-102



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	NAVEL AIR WARFURE CENTER 1				
LONG ARC LIGHTNING SIMULATOR					
Naval Air Warfare Center Aircraft Division Patuxent River, Maryland					
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Presented to the AMEREM 28 May 1996					
Approved For Public Release: 11 September 19 DEA UK-RN-N-94-9522	95				

1. The Long Arc Lightning Simulator is part of the Electromagnetic Transient T&E Facility (EMTEF), located at Patuxent River, MD. The Long Arc development was part of the Navy's improvement and modernization program. The Long Ac Simulator is operated by the EM Transients Branch of the E<sup>3</sup> division and is part of the DoD Major Range Test Facility Base System.

2. This presentation will introduce the availability of this simulator to the DoD and commercial customer.

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1. Today I will discuss the requirements of MIIL-STD-1757 as it refers to the Long Arc Lightning Simulator.

2. We will discuss our original design goals, uses for the simulator , and show some photographs of the simulator.



1. For qualification testing, there are three voltage waveforms (A, B, & D) which represent the electric fields associated with a lightning strike.

2. Voltage waveforms A and D are used to test for possible dielectric puncture and other potential attachment points. This is known as test method TO1.

3. Voltage waveform B is used to test for streamers. This is referred to as Test Method TO4.



1. All parameters/goals were considered when simulator was designed. To save money and reduce life cycle costs, existing in house capacitor and materials were used where possible.

2. Simulator was designed to work in air, but possible to upgrade to a closed systems using  $SF_6$  insulating gas. This would allow at least 3.0 MV on output.

3. Simulator design allows for removing stages for lower operating voltage and quick change out of capacitors to provide lower or higher energy in arc.



1. All design goals were achieved. Simulator is modular and easily reconfigured for the various waveforms.

2. The reliability has been extremely high, and the reliability issues associated with moving the system have not been a problem.



1. The Long Arc Lightning Simulator is a very versatile pulser for use during both the design and qualification of ground and air systems.

2. Among the more important applications ("Read from slide")



1. The simulator is capable of providing an arc 3-4 meters.

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1. The simulator with it's Long Arc is capable of testing larger than normal test objects.



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1. The photograph here demonstrates effective diverter strip placement an a large Radome.





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1. For a nearly Lightning Test, it becomes necessary to relocate simulator to the hangar door.



1. This photo demonstrates an Arc being produced to generate a E and H field to simulate nearby lightning.

2. This test method is very popular with the U.S. Army, particularly with ground based systems.

3. The Navy is considering this test method on some systems.



1. The pulser generates a vertically polarized electric field.

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2. The fields inside the test volume were measured then the test object was placed in the volume.

3. For example: *ⓐ* 11 meters we consider the 19 KV/m measured field to be the equivalent of a 50 percentile cloud to ground strike at 80 meters.

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1. (Brief from slide)