INCH-POUND
MIL-DTL-32028(OS)
3 November 1998

DETAIL SPECIFICATION

CORD, DETONATING ASSEMBLY

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Department and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for the manufacture and acceptance of the Detonating Cord Assemblies. Referred to in this document as DCA.

1.2 Application. These DCAs were developed for use in the Emergency Egress Hatch Removal System (EEHRS) on V-22 Aircraft. These DCAs were developed under Bell-Boeing specification 901-947-748.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents specified in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplements thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to the Commander, Indian Head Division, Naval Surface Warfare Center, Technical Information Division (Code 840), 101 Strauss Avenue, Indian Head, MD 20640-5035, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by sending a letter.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.
SPECIFICATIONS

FEDERAL

FED-STD-595	Colors used in Government Procurement

MILITARY

MIL-D-21625G	Design and Evaluation of Cartridges for Cartridge Actuated Devices

STANDARDS

MIL-STD-331	Fuze and Fuze Components, Environmental and Performance Tests for
MIL-STD-810D	Environmental Test Methods and Engineering Guidelines
MIL-STD-1168	Ammunition Lot Numbering
DOD-STD-2101	Classification of Characteristics

(Unless otherwise indicated, copies of Federal and Military specifications and standards are available from: Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

SPECIFICATIONS

NAVAL SEA SYSTEMS COMMAND (Code Ident 53711)

WS 5003F	Hexanitrostilbene (HNS), Explosive

DRAWINGS

NAVAL AIR SYSTEMS COMMAND (Code Ident 30003)

3205AS109	Cord, Detonating Assembly
3205AS110	Cord, Detonating Assembly
3205AS111	Cord, Detonating Assembly

3205AS182	Firing Fixture, Assembly
3205AS217	Closed Bomb Fixture

(Application for copies should be addressed to the Commanding Officer, Naval Air Technical Service Facility, 700 Robbins Avenue, Philadelphia, PA 19111-5079.)

2.3 Non-Government publications and drawings. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in solicitation. Unless otherwise specified, the issues of documents not listed in DODISS are the issues of the documents cited in the solicitation (see 6.2).

BELL-BOEING DOCUMENTS (Code Ident 77272)

901-947-784	Emergency Escape Hatch Removal System Specification
901-947-034	V-22 Vibration Test Report

(Application for copies of Bell-Boeing documents should be sent to Bell Helicopter Textron Inc., 600 E Huyrst Blvd, Fort Worth, TX 76101.)

OEA AEROSPACE INC. DRAWINGS (Code Ident 17610)

3.3.2-26	TLX Cord Acceptance Test Procedure
3.3.2-47.1	Standard for TLX Cord, Braided, Stabilized, and Vibrated, PN 46116-1-XXXXX, and PN 46117-1-XXXXX
52280	TLX Transfer Line, Primer/High Explosive
52275	TLX Transfer Line, High Explosive/Low Energy
52290	TLX Transfer Line, High Explosive/Gas Generating
25547-1	Primer, M42C1-979, Accepted

(Application for copies of OEA Aerospace Inc. drawings should be sent to OEA Aerospace Inc., Hwy 12 and ET Rd, P.O. Box KK, Fairfield, CA 94533-0659.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 1742	Standard Practice for Radiographic Inspection

(Application for copies of ASTMs should be sent to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, superseded applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order (see 6.2), a sample shall be subjected to first article inspection as specified in sections 4.2.1 and 6.3. A first article inspection shall be required if:

a. Two years or more has passed since the DCA or a similar item were manufactured.
b. There has been a major turn over in personnel.
c. There have been major changes to the production facility.
d. There has been a transfer of production to a new facility or site.

3.2 Flight critical part. These DCAs are flight critical items as defined in 6.4.2 and the technical data package shall be identified and procured as such.

3.3 Design and construction. The design and construction of the DCAs shall meet all the requirements of this specification with special effort to ensure inherent reliability so that the equipment will consistently perform as specified. The requirements of MIL-D-21625 shall apply as requirements of this specification for manufacturing, testing, and procurement with the exceptions and additions specified herein. All parts with the same dash number shall be dimensionally and functionally interchangeable. Aluminum end fittings shall withstand 90 inch-pounds minimum assembly torque without deformation and stainless steel end fittings shall withstand 120 inch-pounds. The DCAs shall be configured such that the energy stimulus shall be contained and shall not emit shrapnel when fired in the “as-installed” condition. The DCA end fittings shall remain intact in the port. Out-gassing of the DCA and fraying of the stainless steel overbraid are permissible provided that some of the overbraid remains intact and the aforementioned criteria is met. DCAs shall be constructed such that the portion of the assembly between the end fittings shall not separate or disengage from the end fitting when fired in the “as-installed” condition over the specified temperature range specified herein.

3.3.1 Item definition. The DCAs are the explosive transmission mechanism used to provide a transfer path of explosive stimulus from one pyrotechnic device to another. The percussion primer equipped DCA accepts mechanical energy input and transitions it into an explosive stimulus. The high explosive/low energy DCA acts as a one-way valve to explosive stimulus. The gas generator equipped DCA provides a pressure to function a thruster, converting the ballistic stimulus into mechanical work.

3.3.2 Configuration control. Only the DCAs procured from the vendor(s) listed on drawings 3205AS109 through 3205AS111, and to the drawing dash numbers in Table I are approved for the application specified. A substitute DCA shall not be used or procured without prior approval and testing by the Indian Head Division, Naval Surface Warfare Center.

3.4 Primary components. Primary components are the TLX Cord stabilized, braided, vibrated, the percussion primer, the loaded booster shell, and the ferrule check valve assembly. Only one lot of each primary component shall be used in a DCA lot. One primary lot may be used in more than one DCA lot.

Table I. Dash numbers.

Drawing No.	Drawing Dash Numbers					
3205AS109	-8	-9	-10	-11	-12	-13
3205AS110	-1	N/A	N/A	N/A	N/A	N/A
3205AS111	-1	N/A	N/A	N/A	N/A	N/A

3.4.1 Percussion Primers. Only M42C1-979 percussion primers which have meet the defined certification requirements per drawing 25547-1 shall be used. Only primers manufactured within the last 24 months or re-certified within the last 12 months shall be used in the DCAs.

3.5 DCA production. The DCAs shall be manufactured in accordance with drawings 3205AS109, 3205AS110 and 3205AS111 and the drawings listed thereon. Each production DCA shall meet the requirements of 3.4 and 3.5.1 through 3.5.4 as outlined in Table II. Failure of any DCA to meet the requirements of 3.4 and Table II shall result in rejection of the lot of DCAs

3.5.1 Visual inspection. The DCA shall be free of the following defects: illegible, missing or inaccurate markings, damage, burrs, dents, sharp edges, chipped or incomplete protective finish, or other defects which may prevent the installation of the DCA. Each DCA shall meet the requirements of the drawings 3205AS109 through 3205AS111.

3.5.2 Radiographic examination.

3.5.2.1 X-ray examination. Each DCA end assembly and approximately 3 inches of line behind the tips shall be x-rayed. When radiographically examined in accordance with 4.3.2, the DCA shall show proper assembly, presence of parts, uniformity of propellant, and sealing. In particular the x-rays shall be check for proper orientation of the primer anvil within the primer cup, and the presence of the check ball in the gas generator portion of that DCA. The radiographic inspection shall show no foreign materials present. All defects shall be identified on the film and defective DCAs removed from the lot.

3.5.2.2 N-ray examination. Each DCA shall be N-rayed along the full length of the longitudinal axis. When radiographically examined in accordance with 4.3.2, the DCA shall show the proper assembly, presence of parts, uniformity of propellants, and sealing. All defects shall be identified on the film and defective DCAs removed from the lot.

3.5.3 In-process inspections. The following are minimum in-process inspections required for product integrity.

3.5.3.1 Leakage. The leak rate of each DCA assembled end fitting shall not exceed 1.0×10^{-5} cc/sec of dry gas when tested in accordance with 4.3.3.

3.5.3.2 Halar tubing. Each roll of Halar tubing shall be internal pressure tested to (+) one (1) atmosphere and inspected to assure no leakage before coating with the HMX/Aluminum mixture. (see 4.2.1.2)

3.5.3.3 DCA cord. The spool of loaded cord proposed for use in production shall be tested on each end and every 500 feet to meet the detonation velocity requirement of 1400 to 2500 meters/second (see 4.2.1.3).

3.5.3.4 Corrosion. All components scheduled for use in production shall be free of corrosive products (see 4.2.1.5).

3.5.3.5 Explosive weight. Every 100 feet of loaded cord a 1 meter sample shall be taken to verify the requirement of 20 $\pm$ 10 mg of the HMX/Aluminum mixture per meter. (see 4.2.1.6)

3.5.3.6 End fitting tensile test. To meet the requirements of 4.2.1.4, the end fitting joint between the outer ferrule and the braided stainless steel casing shall be capable of withstanding a tensile load of 200 pounds when the load is applied at the rate not exceeding 20 pounds per minute. The post test lines shall be subjected to radiographic inspection and any unit showing a gap greater than 0.050 inch between the bottom center bore and the Halar tubing shall reject the lot. The complete lot may be subjected to the end fitting test and 100 percent screened to remove any DCA failing to meet the requirement for a gap less than 0.050 inch.

Table II. Production inspections.

Test Sequence	Test Paragraph	Requirement Paragraph
1. Visual	4.3.1	3.5.1, 3.5, 3.7
2. Radiographic Inspection	4.3.2	3.5.2
3. Leakage	4.3.3	3.5.3.1
4. Halar tubing	4.2.1.2	3.5.3.2
5. DCA cord	4.2.1.3	3.5.3.3
6. Corrosion	4.2.1.5	3.5.3.4
7. Explosive weight	4.2.1.6	3.5.3.5
8. End Fitting Test	4.2.1.4	3.5.3.6

3.6 DCA first article environmental exposure. The DCA shall meet all requirements of 3.6.1 through 3.6.8.5 and the acceptance criteria of 4.4.

3.6.1 Vibration. The DCA shall not initiate or incur any internal/external damage or degradation when vibration cycles are applied in accordance with 4.3.4.

3.6.2 Shock. The DCA shall not initiate or incur any internal/external damage or degradation when saw tooth shocks are applied in accordance with 4.3.5.

3.6.3 Temperature-shock/humidity/altitude (TSHA) cycling. The DCA shall not initiate or incur any internal/external damage or degradation when subjected to TSHA cycling in accordance with 4.3.6.

3.6.4 Salt fog. The DCA shall not initiate or incur any internal/external damage or degradation when subjected to salt fog testing in accordance with 4.3.7.

3.6.5 Six-foot drop. The DCA shall not initiate or incur any major internal/external damage or degradation as a result of the six-foot drop test in accordance with 4.3.8.

3.6.6 Forty-foot drop. The DCA shall not initiate or incur any internal/external damage which makes the DCA unsafe for disposal as a result of the forty-foot drop in accordance with 4.3.9.
3.6.7 Functioning. The DCA shall meet the requirements of 3.6.7.1, 3.6.7.2, or 3.6.7.3 when fired in accordance with 4.3.10.

3.6.7.1 The DCA (High-Gas). When initiated by a SMDC or TLX test tip, the DCA shall propagate and initiate the gas generator tip. At all temperatures, the gas generator shall produce a minimum pressure of 200 psig within 10 milliseconds in the 2.5 cubic centimeter closed bomb (3205AS217). The pressure remaining after 20 milli-seconds shall be greater than 200 psig. The peak pressure shall not exceed 3,000 psig for a duration greater than 200 microseconds.

3.6.7.2 The DCA (Primer-High). The DCA shall be initiated by energizing the solenoid firing mechanism in fixture 3205AS182. The DCA shall initiate and propagate along its length. The output end shall dent an 6061-T6 Aluminum dent block conditioned to 70 $\pm$ 5 °F to the following conditions:

a. At -65°F, a minimum indent depth of 0.035 inch.
b. At +70°F, a minimum indent depth of 0.040 inch.
c. At +200°F, a minimum indent depth of 0.040 inch.

3.6.7.3 The DCA (High-Low). The DCA shall initiate along its complete length. The high order output end shall dent a 6061-T6 Aluminum dent block conditioned to 70 $\pm$ 5 °F to the following conditions:

a. At -65°F, a minimum indent depth of 0.035 inch.
b. At +70°F, a minimum indent depth of 0.040 inch.
c. At +200°F, a minimum indent depth of 0.040 inch.

When reversed fired, initiating the high order end, the low order (energy) end shall not initiate a joined high order end.

3.7 Workmanship. The DCA shall be constructed and finished in a manner to assure compliance with all requirements of this specification. The DCA shall be free of the following defects: illegible, missing or inaccurate markings, damage, burrs, dents, sharp edges, chipped or incomplete protective finish, or other defects which may prevent the installation of the DCA. Each DCA shall meet the requirements of their respective drawing, 3205AS109 through 3205AS111.

4. VERIFICATION

4.1 Classification of inspections.

a. In-process inspection (see 4.2,1)
b. First article inspection (see 4.2.2)
c. Lot acceptance inspection (see 4.2.3)

4.2 Inspections.

4.2.1 In-process Inspection.

4.2.1.1 Interchangeability. The contractor shall conduct inspections of the production lot to verify total interchangeability of the lines and fittings as specified in 3.3.

4.2.1.2 Halar integrity. To meet the requirements of 3.5.3.2, one end of the tube will be sealed and a + 1 atmosphere of air pressure applied to the other end for 5 minutes with no pressure loss. A pressure gauge attached to one end shall be used to verify the initial and final pressure.

4.2.1.3 DCA cord velocity. To meet the requirements of 3.5.3.3, a forty inch length of cord at each end of the spool of loaded cord and then a 40 inch length section of loaded cord every 500 feet of the planned cord production shall be tested for velocity measurements prior to producing any DCAs.

4.2.1.4 End fitting strength. The complete lot acceptance test sample shall be subjected to the 200 pound load test per 3.5.4 to verify the fitting strength. The 200 pound load shall be applied at a rate not exceeding 20 pounds per minute. The post test lines shall be radiographically inspected and any unit showing a gap greater than 0.050 inch between the bottom center bore and the Halar tubing shall reject the lot. The complete lot may be subjected to the end fitting test and 100 percent screened to remove any DCA failing to meet the requirement for a gap less than 0.050 inch.

4.2.1.5 Corrosion. All parts shall be visually inspected to assure there is no corrosion products on the hardware and that the threads are coated with dry film lubrication.

4.2.1.6 Explosive weight. Every 100 feet of loaded production cord, a 1 meter sample shall be tested for explosive loading to the requirements of 3.5.3.5. The explosive shall be removed in a safe and approved procedure per OEAA Standards 3.3.2-26 and 3.3.2-47.1.

4.2.2 First article inspection. Unless otherwise specified in the contract or purchase order (see 6.2), a first article inspection sample of 33 DCA conforming to each drawing 3205AS109 through 3205AS111 shall be subjected to first article testing. Thirty of these DCAs shall be expended in the tests listed in Table III and the remaining DCA shall be retained by the government for investigative purposes. Any damage inflicted by the environmental exposures which would adversely affect the performance of the item in service application shall be cause for rejection of the first article sample. Any production prior to notification by the contracting agency of the first article sample acceptability shall be at the contractor's risk. Failure of any DCA to comply with the requirements of section 3 shall be cause for rejection of the first article represented.

4.2.3 Production inspection. To meet the requirements of 3.5, all production DCA manufactured under the contract shall be inspected and screened for defects. DCAs failing to meet the requirements listed in Table II shall be rejected and removed from the lot.

4.2.4 Lot acceptance inspection. Lot acceptance inspection shall consist of the examinations and tests specified in Table IV. Failure of any sample DCA to comply with the requirements listed in Table IV shall be cause for rejection of the lot represented.

4.2.4.1 Sample size. A random sample of DCAs from each production lot, including the samples retained for investigative purposes, shall be selected in accordance with Table V for lot acceptance inspection. Test sample and samples retained for investigative purposes shall not be applied as part of the quantity specified for delivery by the contract or purchase order.

4.3 Inspection requirements. Unless otherwise specified (see 6.2), all inspections shall be performed in accordance with the test conditions specified in 4.2.1, 4.2.2, 4.2.3 and 4.2.4.

TABLE III. First article test plan.

Test Sequence	Test Para.	Req. Para.	Sample Groups								
			I	II	III	IV	V	VI	VII	VIII	IX
1. Visual	4.3.1	3.5.1	6	3	3	3	3	3	3	3	3
2. Radiographic	4.3.2	3.5.2	6	3	3	3	3	3	3	3	3
3. Leakage	4.3.3	3.5.3.1	6	3	3	3	3	3	3	3	3
4. End Fitting Test	4.2.1.4	3.5.3.6	6	3	3	3	3	3	3	3	3
5. Vibration	4.3.4	3.6.1	6								
6. Shock	4.3.5	3.6.2		3							
7. TSHA	4.3.6	3.6.3			3						
8. Salt Fog	4.3.7	3.6.4				3					
9. 6 Foot Drop	4.3.8	3.6.5					3				
10. 40 Foot Drop	4.3.9	3.6.6						3			
11. Function test: -65°F ± 5°F 70 ± 5°F 200 ± 5°F	4.3.10	3.6.7	 2 2 2	 1 1 1	 1 1 1	 1 1 1	 1 1 1	 1 1 1	 3	 3 	 3

Table IV. Lot acceptance inspection and tests.

Inspection/Test	Test Paragraph	Requirement Paragraph	Quantity
1. Visual Inspection	4.3.1	3.5.1, 3.4, 3.7	Test and retain sample
2. Radiographic Inspection	4.3.2	3.5.2	Test and retain sample
3. Leakage	4.3.3	3.5.3.1	Test and retain sample
4. End Fitting Test	4.2.1.4	3.5.3.6	Test and retain sample
5. Function test: -65 ± 5°F 70 ± 5°F 200 ± 5°F	4.3.10	3.6.7	 1/3 sample 1/3 sample 1/3 sample

Table V. Lot acceptance sampling.

Lot Size	Test Sample Size	Retained Sample Size
2-50	9	1
51-90	15	1
91-150	24	2
151-250	27	2
251-500	30	3

4.3 Inspections and tests.

4.3.1 Visual inspections.

4.3.1.1 DCA inspection. The external condition and appearance of the DCA shall be determined by comparison to drawings NAVAIR 3205AS109 through 3205AS111. Specific inspections of the length, covering, booster tips, seals, and labels shall be conducted at a minimum. Each DCA shall meet the requirements of 3.5.1 and 3.7.

4.3.1.2 Packaging inspection. The condition of the packaging (inner container), packing (outer container), and markings shall be determined by comparison to the requirements of section 5.

4.3.2 Radiographic examination. Radiographic examination shall be conducted in accordance with ASTM E 1742. All DCA shall be identified with serial numbers beginning with 001 prior to examination. The DCA shall be arranged on boards or trays in consecutive order with any missing serial numbers identified on the radiographic plate. If these are too long to get on one plate the ends need to be identified as "A" or "B" ends. Each radiograph shall carry a permanent identification of the items displayed thereon in a 4 x 6 inch region maximum. The radiographic identification shall include the drawing number, the complete lot number in accordance with MIL-STD-1168, the contract number, and the span of serial numbers displayed. Radiographs of the entire production lot shall accompany the ballistic sample to the activity conducting the lot acceptance tests. Any observable imperfections as outlined in 3.5.2.1 and 3.5.2.2, shall be cause for rejection of the DCA. Defective DCA found during radiographic review are to be marked on the radiographic plate and removed from the production lot. Settings on the radiographic equipment shall be noted on the radiographic review sheets.

4.3.3 Leakage test. Each production unit shall be leak tested by bombing the DCA with Helium at a pressure of 14.7 $\pm$ 1.4 psig. The DCA shall then be washed with dry Nitrogen and placed in a vacuum chamber and checked for leakage at one atmosphere differential. Certification of the test results shall be supplied and Government witnessing will be as specified in the contract or purchase order. The DCA shall meet the requirements of 3.5.3.1.

4.3.4 Vibration. The DCA shall be subjected to the following vibration profiles: 2 units at -65°F, 2 units at 70°F, and 2 units at 200°F. Each DCA shall be subjected to the combined source dwell and random excitation environments or individual source dwell and random excitation environments as applicable at -65, +70 and +200°F in each axis for 20 minutes. The DCA shall meet the requirements of 3.6.1.

a. Conduct a resonance survey for each DCA configuration in each of the three mutually perpendicular axes both prior to and following exposure to the source dwell environment. Conduct a low level (0.5 g peak), 5-500 Hz sweep at a frequency rate of 1/2 octave per minute (15 minutes duration) with a tolerance equal to $\pm$ 10% on the vibration amplitude and $\pm$ 2% or 1 Hz, for determination of the DCA configuration's resonant frequency and transmissibility. The same DCA serial number of each configuration and same mounting location on the vibration fixture will be utilized for both the pre- and post-source dwell frequency survey. The resonant frequency shall be considered to be any natural frequency with an amplification factor of 2.0 or greater output response relative to the input level. The DCA response shall be measured on the least supported location or a location shown to have significant amplification. All resonance surveys will be conducted at ambient temperature. Following the completion of the source dwell vibration testing at -65°F and 160°F, the DCA must be returned to ambient temperature prior to completion of the post-source dwell resonance survey.

b. Predicated upon the outcome of the resonance survey, source dwell vibration and random vibration excitation are to be conducted simultaneously. If based upon the resonance survey, the four (4) Government desired test frequencies exceed the permitted test frequencies and the source dwell vibration and random excitation cannot be applied simultaneously, the source dwell vibration levels shall be increased by 0.5 g.

Source dwell vibration shall be performed at each of the four (4) amplitudes and frequencies established by the Government based upon the resonance survey along each of the three (3) mutually perpendicular axes. Source dwell input levels are shown in figure 1 and shall include the superimposed broad band random background levels of the random excitation as described in 4.3.4.c.

c. Random excitation shall be conducted in accordance with MIL-STD-810D, Method 514.3, Paragraph I-4.2.2, Technique 3. Random excitation shall be a flat spectrum at 0.02 g^2/Hz over the bandwidth from 10-2000 Hz as shown in figure 2.

d. The following tolerances apply to all vibration testing:

(1) Instantaneous random vibration acceleration peaks shall be limited to three (3) times the RMS acceleration (3 sigma clipping).

(2) The random vibration spectrum shall be within the tolerance range of $\pm$ 3 dB between 10 and 2000 Hz except that deviations of $\pm$ 6 dB are permissible over a cumulative bandwidth of 200 Hz maximum between 500 and 2000 Hz.

(3) Overall RMS acceleration levels must be within $\pm$ 1.5 dB of the nominal input level.

(4) Sine tones must be within $\pm$ 10% of the nominal value.

4.3.5 Shock. The DCA shall meet the requirements of 3.6.2. The DCA with protective caps installed on the ends, shall be submitted to the shock test outlined in MIL-STD-810D, Method 516.3 Procedure I to the levels in Figure 4, three (3) shocks in each direction along each of the three (3) axis for a total of eighteen (18) shocks. All shocks will be conducted at ambient temperature.

4.3.6 Temperature-shock/humidity/altitude (TS/H/A) cycling. The DCA shall meet the requirements of 3.6.3. Temperature recording charts shall be used on all conditioning chambers to verify temperature cycles. The DCA with protective caps installed shall be submitted to the TS/H/A cycling test outlined in MIL-D-21625G, paragraph 4.8.4 with the following requirements:

a. The DCA shall be supported in such a way that all areas are exposed to the prescribed atmospheric conditions at all times throughout the test. No DCA shall be in contact with another DCA during the cycling schedule shown in Table VI.

b. Failure of any DCA to comply with the requirements of 3.6.3 shall be cause for rejection of the lot and/or first article.

c. Thirty thousand (30,000) feet shall be used in lieu of 70,000 feet for the altitude test.

d. There shall be no interim withdraw of units.

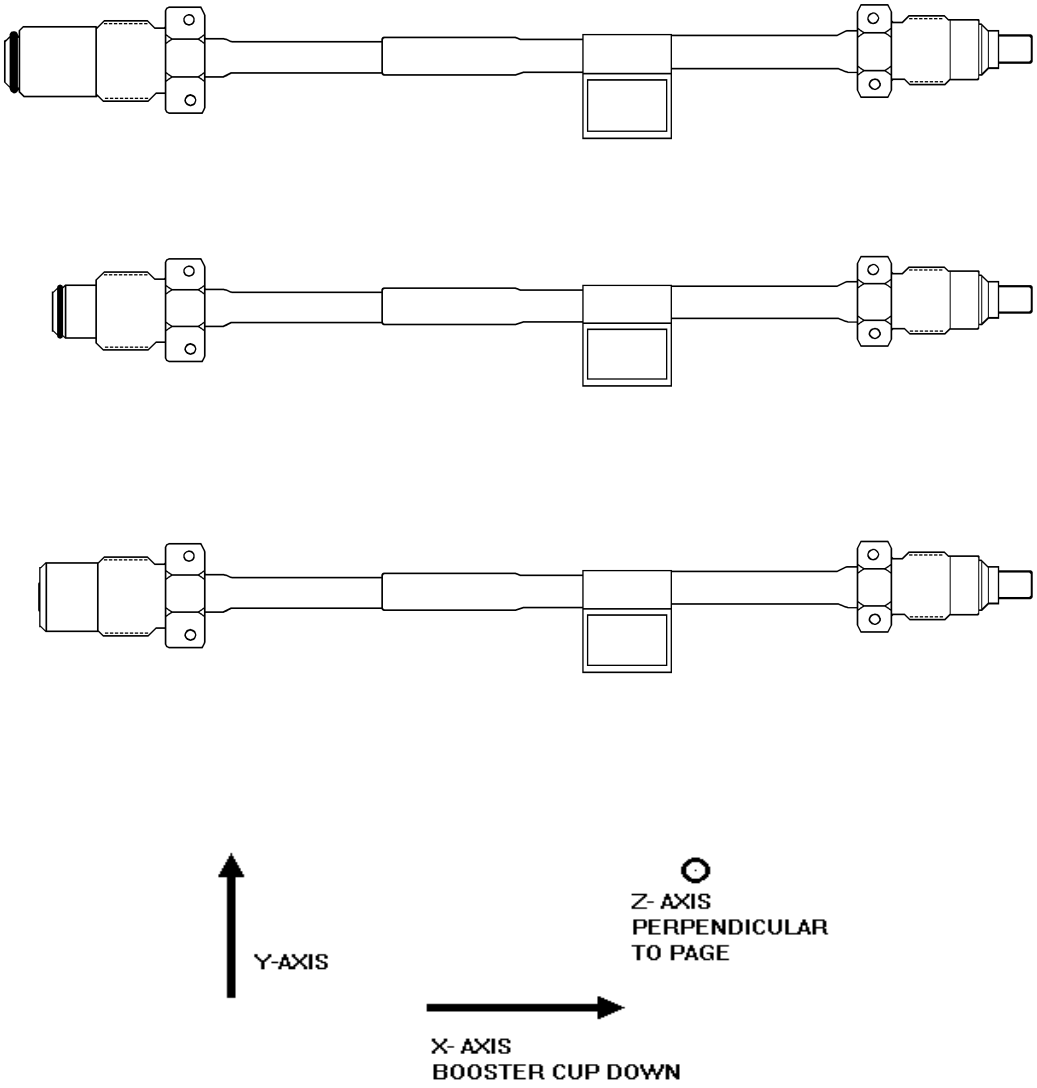

Figure 1. Shock / Vibration and Drop Axis

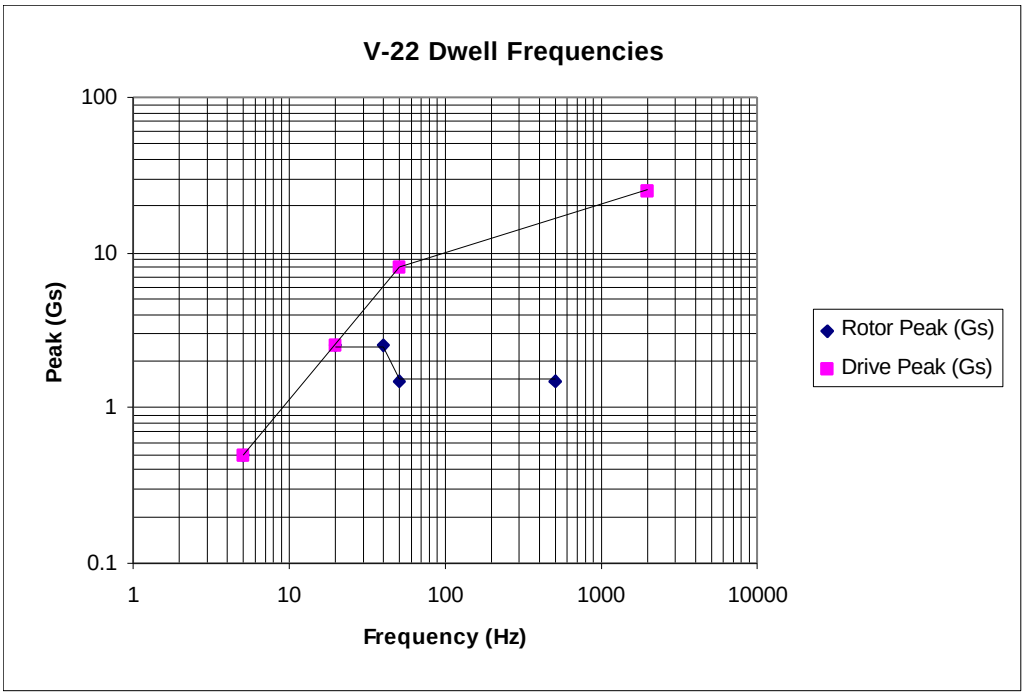

Figure 2. Source Dwell Input Levels

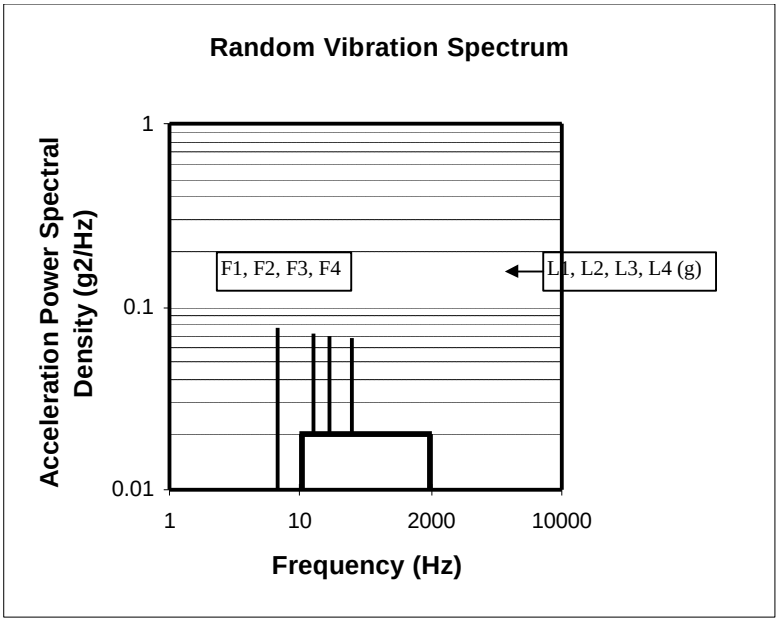

Figure 3. Random Vibration Spectrum

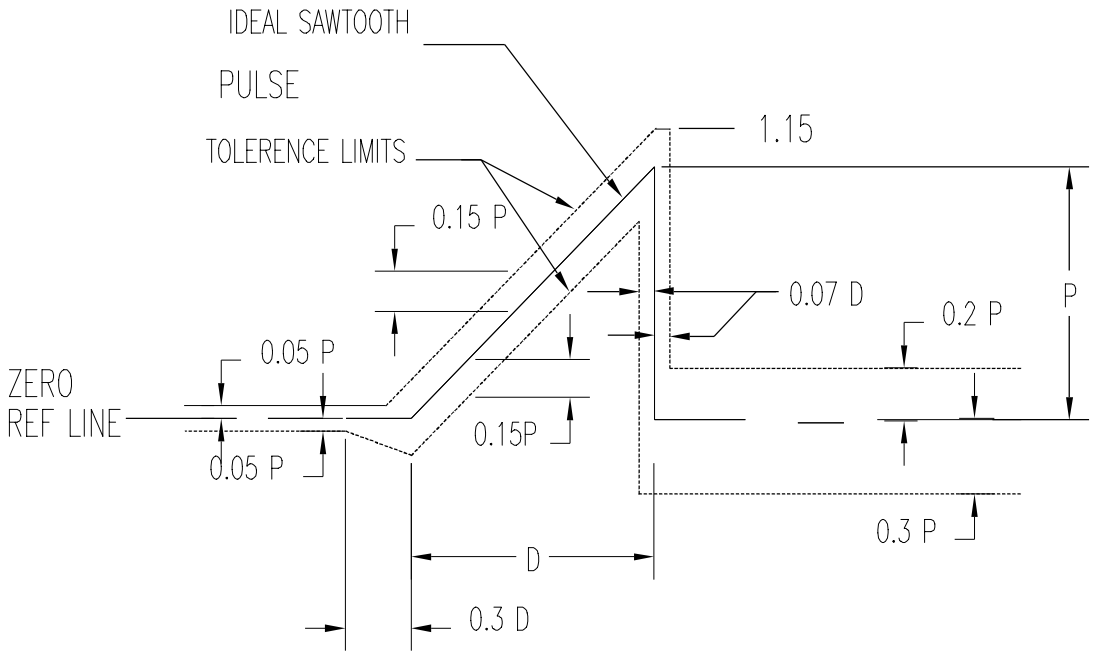

Figure 4. Terminal peak saw tooth shock pulse

Table VI. Temperature shock/humidity/altitude cycling schedule

Monday	0800	Place DCA in chamber at 70°F at 50% relative humidity (RH).
	1200	Raise chamber temperature to 160°F and a RH of 95%. The chamber shall reach 160°F no later than 1300.
	1600	Remove the DCAs from above chamber and immediately place in a chamber maintained at -65°F at a pressure altitude of 30,000 feet (4.36 psi)
Tuesday	0800	Remove DCAs from chamber and immediately place in chamber maintained at 70°F at 50% RH.
	1200	Remove the DCAs from above chamber and immediately place in a chamber maintained at -65°F at a pressure altitude of 30,000 feet (4.36 psi)
	1600	Remove DCAs from above chamber and immediately place in a chamber maintained at 160°F at 95% RH.
Wednesday	0800	Reduce chamber temperature to 70°F and RH to 50%. The chamber temperature shall reach 70°F at 50% RH no later than 0900.
	1200	Raise chamber temperature to 160°F and a RH of 95%. The chamber shall reach 160°F no later than 1300.
	1600	Remove the DCAs from above chamber and immediately place in a chamber maintained at -65°F at a pressure altitude of 30,000 feet (4.36 psi)
Thursday	0800	Remove DCAs from chamber and immediately place in chamber maintained at 70°F at 50% RH
	1200	Remove the DCAs from above chamber and immediately place in a chamber maintained at -65°F at a pressure altitude of 30,000 feet (4.36 psi)
	1600	Remove DCAs from above chamber and immediately place in a chamber maintained at 160°F at 95% RH.
Friday	0800	Reduce chamber temperature to 70°F and RH to 50%. The chamber temperature shall reach 70°F at 50% RH no later than 0900.
	1200	Raise chamber temperature to 160°F and a RH of 95%. The chamber shall reach 160°F no later than 1300.
	1600	Remove the DCAs from above chamber and immediately place in a chamber maintained at -65°F at standard ambient pressure.

This schedule shall be followed for a total of four (4) weeks (28 days) except that on the second and fourth weekend the soak time shall be from 1200 on Friday until 0800 on Monday at a temperature of 160°F at 95% RH.

4.3.7 Salt Fog. The DCA, with protective caps installed, shall be submitted to the salt fog test outlined in MIL-STD-810D, method 509.3, Procedure I with the following requirements:

a. Waxed string shall be used to support the DCAs in the chamber. The DCA shall be oriented in an end up position. No change in orientation is required during the test. The DCAs shall be exposed to a concentration of 5% salt corrosive agent for a constant wetting duration of 168 hours at 35°C (95°F). Condensed fog shall be collected at two (2) points every twelve (12) hours and the specific gravity, concentration and pH of the solution measured.

b. After completing the 168 hours of testing, the salt deposits, if any, shall be removed, if necessary, by a gentle washing with water not warmer than 100°F.

c. After completing the washing, the units shall be stored for a 48 hour drying period at 70°F. After 48 hours a visual inspection shall be conducted. Any signs of damage or degradation shall be noted.

d. The failure of any DCA to comply with the requirements of 3.6.4 shall be cause for rejection of the lot and/or first article.

4.3.8 Six-foot drop. The DCAs, with protective shipping caps removed, shall be submitted to the drop test outlined in paragraph 4.8.2 of MIL-D-21625G with the following requirements:

a. The DCAs shall be dropped from a height of 6 feet onto a 2 inch thick steel plate supported be reinforced concrete. One DCA shall be used for each drop orientation. All impact orientations are given in figure 1.

b. After each DCA is dropped, a visual inspection shall occur to document any external damage that occurred and to verify non-initiation of the DCA.

c. If it is determined that the damage sustained by any unit caused it to be unsafe for handling all testing shall be stopped.

d. Failure of any DCA to comply with the requirements of 3.6.5 shall be cause for rejection of the lot and/or first article.

4.3.9 Forty-foot drop. The DCAs, with protective caps removed, shall be submitted to the 40 foot test outlined in MIL-STD-331, test 103 with the following requirements:

a. The DCAs shall be dropped 40 feet onto a 2 inch thick steel plate supported by reinforced concrete. One new DCA shall be used for each drop orientation. All impact orientation are given in figure 1.

b. After each drop a visual inspection shall occur to document any external damage that occurred and to verify non-initiation of the DCA.

c. If it is determined that the damage sustained to a DCA causes it to be unsafe for handling all testing shall be stopped.

d. Failure of any DCA to comply with the requirements of 3.6.6 shall be cause for rejection of the lot and/or first article.

e. After the visual inspection, each DCA shall then be disposed of in a safe and approved manner in according with local, state and Federal regulations.

4.3.10 Functional performance. Sample DCAs for the functional performance test firings shall be conditioned for not less than 2 hours and no more than 24 hours at the specified temperature. The DCAs shall be removed from the conditioning chamber and fired in the appropriate test fixture within 5 minutes. If any DCA is not fired within the 5 minute time period after removal, it shall be reconditioned at the specified temperature for an additional 2 hours and then tested. The DCA shall meet the performance requirements of 3.6.7.

4.3.10.1 DCA (High-Gas). The closed bomb shall be maintained at 70 ± 5°F for all firings. The closed bomb shall be cleaned after each firing as specified in the standard operating procedure. The closed bomb volume shall be measured and recorded prior to the start of each lot acceptance test and at the conclusion of the lot acceptance test. The test firing set up is shown in Figure 6. The DCA shall not vent pass 2.0 inches from either end. The ballistic pressure shall meet the requirements of 3.6.7.1.

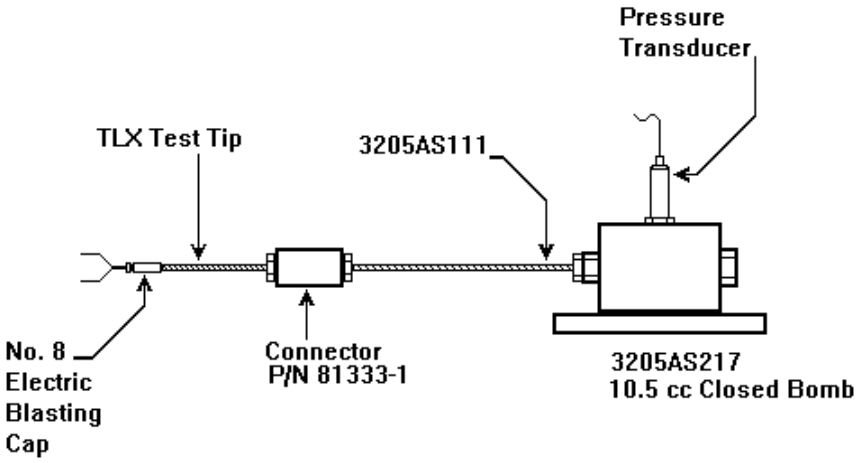

Figure 6. DCA (Gas/High) Test Setup

4.3.10.2 DCA (Primer-High). The firing fixture, 3205AS182, shall be used to function the percussion primer in the end of the DCA. The DCA shall not vent past 2.0 inches from the crimp at either end. The indentation in the dent block shall be measured from three reference location. The out put performance shall meet the requirements of 3.6.7.2. The test firing set up is shown in Figure 7.

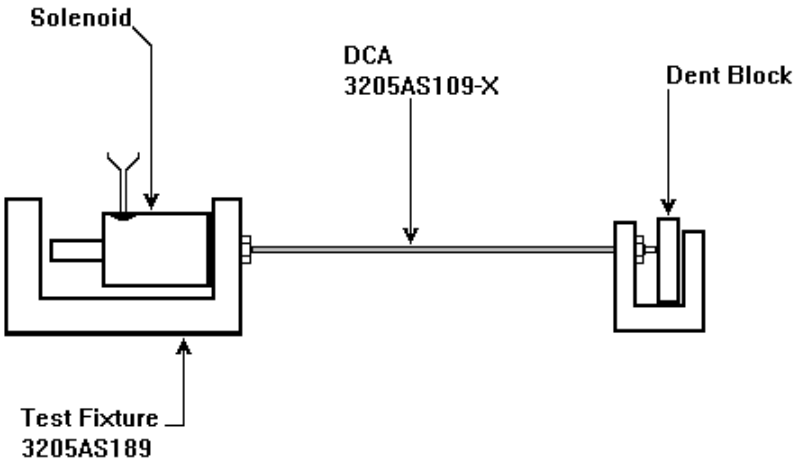

Figure 7. DCA (Primer/High) Test Setup

4.3.10.3 DCA (High-Low). The DCA shall accept a high order detonation signal from an explosive test tip and propagate the complete length. The DCA shall not vent within 2.0 inches of an end. The low energy end shall not be expelled from the connector. The ballistic out put of the high energy end shall meet the requirements of 3.6.7.3. The low energy end shall not function a high energy end. The test firing set up is shown in Figure 8.

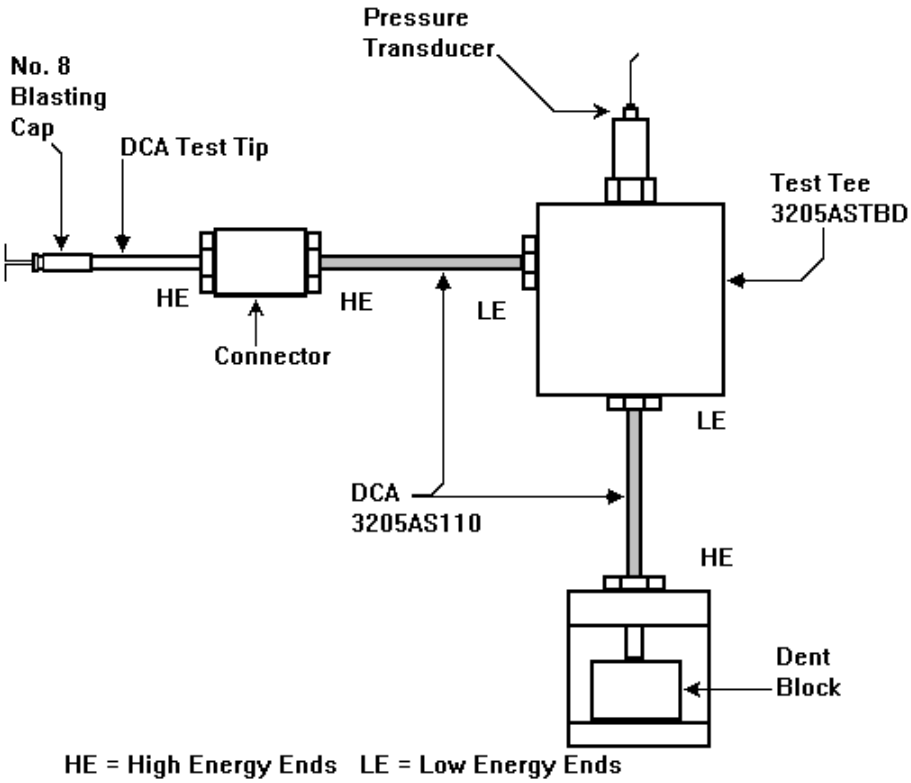

Figure 8. DCA(High/Low) Test Setup

4.3.11 Test Failure. If a test failure is attributable to an assigned cause, excluding the DCA, the test shall be declared a no-test and repeated.

4.4 Acceptance criteria. The DCAs shall meet the requirements of 3.6 when tested as specified in 4.3.3 through 4.3.11. The acceptable number of defects is 0 and the rejection number is 1.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DOD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military's Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that maybe helpful but is not mandatory.)

6.1 Intended Use. These DCA are components of the Emergency Egress Hatch Removal Systems installed in the MV-22, CV-22 and HV-22 Aircraft. They are the ballistic signal transmission components of the system. The system is designed to provide emergency egress in a post crash environment on land or water. The Primer-High DCA is used to accept mechanical energy from the initiators and convert it to explosive energy. The High-Low DCA acts as a one-way valve in the seat drop function. The High-Gas DCA provides the gas pressure to function the seat drop thruster. No changes to the configuration shall be permitted without the authorization from the Naval Air Systems Command Headquarters AIR-4.6.1, AIR-4.1.1.2 (V-22) and the Bell-Boeing Joint Program Office. Since the Emergency Egress Hatch Removal Systems are designed for use only in military aircraft, there are no commercial applications for the DCA.

6.2 Acquisition Requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1, 2.2.2 and 2.3).

c. Whether a first article inspection is required and. if so, specify the test activity (see 3.1 and 4.2.1).

d. Markings if other than as specified (see 5.2.1).

e. If bar coding is not required on outer container (see 5.2.2).

f. Inspection conditions if other than specified in 4.2.

g. Production lot size (quantity) and test facility (see 4.2.3.1).

h. Configuration of DCA required (see 2.2.2).

i. That the safety precaution requirements of the "Contractors' Safety Manual for Ammunition, Explosives and Related Dangerous Material," DOD 4145.26M are applicable. NOTE: When this specification is used as a part of the description of work to be accomplished by a Government activity the safety precautions requirements of " Ammunition and Explosives," OP 5, are applicable.

6.3 First Article. When a first article inspection is required, the contracting officer should provide specific guidance to bidders whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, standard production item from the contractor's current inventory (see 3.1) and the number of items to be tested as specified in 4.2.1. The contracting officer should also include specific instructions in acquisition documents of the first articles. Invitation(s) for bid(s) should provide that the U.S. Government reserves the right to waive the requirements for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the U. S. Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior U.S. Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Definitions.

6.4.1 Primary component. Primary components are all components in which a functional failure would result in a misfire or malfunction of the DCA.

6.4.2 Flight critical part. A part, the single failure of which, during any operating condition, could cause the loss of aircraft or one of its major components, loss of control, or which may cause significant personnel injury, including during flight.

6.4.3 Caps. Aluminum witness caps should be installed on the high explosive booster cup end, and plastic shipping caps should be installed on the other end of the DCA.

6.4.4 Level A packaging. The degree of preservation and packaging which will afford adequate protection against corrosion, deterioration and physical handling, shipment, indeterminate storage and world wide redistribution.

6.4.5 Level C packaging. The degree of preservation and packaging which will afford adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the first receiving activity for immediate use. This level may conform to the supplier's commercial practice when such meets the requirements of this level and MIL-STD-129.

6.4.6 Level A packing. The degree of packing which will afford adequate protection during shipment, handling, indeterminate storage and world-wide distribution.

6.4.7 Level C packing. The degree of packing which will afford protection against damage during direct domestic shipment from the supply source to the first activity for immediate use. This level in general will conform to the applicable carrier rules and regulations and may be the supplier's commercial practice when such meets the requirement of this level.

6.5 Contract packaging and markings. The following marking requirements should be specified in the contract.

6.5.1 Markings.

6.5.1.1 Special markings. Marking of interior, intermediate and exterior containers should be in accordance with 49 CFR 171-178 and MIL-STD-129-1.

6.5.1.2 Normal marking. Unless otherwise specified in the contract or purchase order (see 6.2), the marking on the container should be as specified below. The specified markings should be applied to the containers in accordance with the applicable provisions of MIL-STD-129-1.

Inner Container Marking

(a) National Stock Number and DODIC
(b) Nomenclature: Detonating, Cord Assembly
(c) Drawing and dash number
(d) Quantity: one
(e) Lot number in accordance with MIL-STD-1168
(f) Warning: Fuzes, Detonating UN0367

Outer Container Marking

(a) National Stock Number and DODIC
(b) Nomenclature: Cord Assembly, Detonating
(c) Drawing Number
(d) Dash Number
(e) Quantity
(f) Lot Number in accordance with MIL-STD-1168
(g) Gross weight and Cube
(h) Contract or Purchase Order
(i) Warning: Fuzes, Detonating UN0367

6.5.1.3 Bar Coding. Unless otherwise specified in the contract or purchase order (see 6.2), the outer container should be bar coded in accordance with MIL-STD-129-1, Part 2. Additionally, the above specified marking information should be applied to the containers in accordance with the provisions of MIL-STD-129-1.

6.5.1.4 Explanation of terms. For the purpose of this specification, NAVSUPINST 4030.28B should be used to clarify terms.

6.6 Subject term (key word) listing.

Aluminum
Booster Cups
Detonating, Cord Assembly
Flexible Detonating Cord
Gas Generator
Halar
HMX - Homocyclonite
HNS - Hexanitrostilbene
Percussion primer M42C1-979
Thin Layer Explosive (TLX)® Trademark of OEA Aerospace

Preparing Activity:
Navy - OS
(Project 1377-0086)