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A REVIEW OF SELECTED ELEMENTS OF THE FY73 PROGRAMS  
ON TEST AND EVALUATION OF AIRCRAFT SURVIVABILITY  
(TEAS). VOLUME II. APPENDIX A: BIBLIOGRAPHY FOR  
VULNERABILITY AND SURVIVABILITY OF MILITARY AIRCRAFT

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VOLUME II - APPENDIX A:  
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AND SURVIVABILITY OF MILITARY AIRCRAFT

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## APPENDIX A

### BIBLIOGRAPHY FOR VULNERABILITY AND SURVIVABILITY OF MILITARY AIRCRAFT

The following is an expanded version of "Aircraft Vulnerability References" compiled by R. E. Grill of the Northrop Corporation, Aircraft Division.

The subdivision of Grill's references was found useful and was retained.

The categories are:

- A-1. Vulnerability of Systems
- A-2. Weapon Data
- A-3. Crew, Structure, and Component Vulnerability
- A-4. Fuel Systems Vulnerability
- A-5. Armament and Stores Vulnerability
- A-6. Armor-Penetration



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## A-1. VULNERABILITY OF SYSTEMS

<u>DDC AD NO.</u>	<u>SFC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1947	BRL-634 Effectiveness of Anti-Aircraft Guns with Time Fuzed Ammunition
	U	1947	BRL-R-645 The Effect of Blast on Aircraft by Sperraza, Sarmousakis
	C	1949	BRL-TN-128 Vulnerability of Ground Attack Aircraft to Short Range AA
	U	1949	BRL-MR-490 Vulnerability of B-29 Aircraft to Internal Blast
	U	1950	RAND-RM-402 Aircraft Vulnerability in WW II
	C	1950	BRL-725 Estimated Effectiveness of Some Standard Development and Proposed Anti-Aircraft Weapons
161335	C	1950	BRL-MR-741 Damage to Aircraft by External Blast
378507	U	1950	BRL-513 Third Report of Working Conference on Aircraft Vulnerability
	C	1950	BRL-MR-528 Effectiveness of Existing and Developmental Weapons in the Inter- mediate AAA Role
377185	U	1950	BRL-R-741 Damage to Aircraft by External Blast, by W. E. Baker
	U	1950	BRL-TN-277 Vulnerability of A-35 A/C to External Blast

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1950	BRL-M-250 "Skystreak" D-558 Vulnerability to Internal Blast, Sperrazza
	C	1950	BRL-R-741 Damage to Aircraft by External Blast, Baker
	S	1950	CAL GI-634-G-8 Aerodynamic Vulnerability of Subsonic Aircraft
	C	1951	BRL-768 Methods for Obtaining Terminal Ballistic Vulnerability of Aircraft to Impacting Projectiles
377176	U	1951	BRL-MR-542 Vulnerability of Aircraft to Internal Blast, Cooney
	C	1951	BRL-M-561 Damage to B-17, B-29 External Blast, Baker
	C	1951	BRL-M-575 A-25 External Blast, Sperrazza
	U	1951	BRL-M-605 Internal Blast at High Altitude, Sperrazza
841,042	U	1951	CNO-OEG STUDY NO. 467 Damage Suffered by USN and USMC Ground Attack Aircraft in Korea
	C	1952	USAF (AMC/APCC/WADC/AFAC) Interim GUN-VAL Study
	C	1952	BRL-TN-726 Vulnerability of Aircraft to Weapons
103,890 97,653	C	1952	BRL-MR-606 Vulnerability of B-36 Aircraft to Internal Blast

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1953	BRL-TN-794 Effects of Fuze Performance on Vulnerability of Aircraft to 30 mm H.F.
	C	1953	BRL BIBLIOGRAPHY BRL Reports Pertaining to Aircraft Vulnerability and Weapons Analysis
	C	1953	BRL-MR-731 Vulnerability Diagrams of Foreign Aircraft
	C	1953	BRL-MR-737 Vulnerability of the F4U Aircraft to Ground Direct Projectiles
	U	1953	NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY Report #17012 Aircraft Damage Studies
	C	1954	INSTITUTE OF AIR WEAPONS RESEARCH F-86 vs MIG-15 - A Digest on the Briefing on the Analysis of the Korean Air War
	S	1954	BRL-TN-964 An Evaluation of Fighter Aircraft Guns Fired at a B-29 and B-47
	C	1954	DENVER RESEARCH INSTITUTE Skin Penetration Study, F-89D
82,640	C	1954	BUAER-ATM No. 3 Methods and Procedures for Determining the Vulnerability of Various Naval Aircraft
	C	1954	RAND-RM-1189 Aircraft Vulnerable Area Catalog W. E. Parriott
104954	C	1954	NAVORLAB-WHITE OAK Compilation of Survivability Probability of a Multicomponent Aircraft

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1954	BRL-TN-870 Blast Vulnerability Criteria for Several Operational Jet Aircraft, Baker, W. E.
	U	1955	USN/USAF-55AA-49787 Aircraft Combat Survival Symposium Johnsville, Pa.
	C	1955	DENVER RESEARCH INSTITUTE Replica Targets Study, F-89D
	C	1955	INSTITUTE OF AIR WEAPONS RESEARCH REPORT 55-4 A Comparison of the GUN-VAL Interim Study Air to Air Armament Kill Pre- diction Model with Korean Combat Data
	S	1955	USAF (AMC/APCC/WADC/AFAC) Final GUN-VAL Report
	C	1955	BRL-MR-877 Vulnerability of an Improved MIG-15 to Some 30 mm H.E. Projectiles
	S	1955	BRL-MR-905 Comparison of Different Warheads for the Hawk Missile Against IL 28-2 and B-29
384,616	C	1956	BRL-TN-1091 "A" Damage Vulnerability of the F-9F and AD4 Aircraft to Ground Fire Projectiles
	S	1956	BRL-MR-1022 Field Army Effectiveness of Several AA Weapons Against Low Flying Aircraft
	S	1956	ORDNANCE MISSILE LAB 5R2F Tactical Effectiveness Evaluation of Hawk and Sparrow Missile Systems
	C	1956	AFTAC/OA/WP-32 A Study of the Probability of Kill of Tactical Aircraft at Minimum Altitudes by Local Gun Defenses

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
55,817	C	1956	JOHNS HOPKINS UNIV. APL-CF-2570 Damage to F4U, AD and P9F Aircraft in Korean Operations
	U	1956	BRL-MR-1028 "A" Damage Vulnerability of the A4D Aircraft
	U	1956	NMIMT-RDD/T-923 Aircraft Vulnerability to Continuous Rod Warheads
111,408	C	1956	BRL-MR-1028 "A" Damage Vulnerability of the A-4D Aircraft
119,652	C	1956	BRL-MR-1036 Internal Blast Damage to Aircraft at High Altitude--Part II
	S	1957	BRL-CAYWOOD-SCHILLER ASSOC. The Effectiveness of Predicted Fire AA Weapons with VT Fuzing
161336	C	1957	BRL-MR-1091 Structural Vulnerability of F-84 Aircraft to Externally Detonated Explosives
142,305	S	1958	WADC-TR-58-26 Vulnerability Evaluation Manual
142341	U	1958	NADC-TR-58-53 Vulnerability Study of Weapon Systems, Part III, Vulnerability Bibliography, by Karl F. Kossack, PhD, Purdue
	C	1959	NOTS-TIN-40605-1 Vulnerability, Terminal Effects and Warhead Requirements for the Defeat of Aircraft
	C	1959	BRL-MR-1225 Passive Protection for L-19 Aircraft

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
373,077L	C	1959	ARMY COMBAT DEV CMD (Fort Ord) Vulnerability of Low Flying Aircraft to Forward Area Ground Fires
	S	1960	BRL-MR-1281 Single Shot Kill Probability of Nike- Hercules with T-45 Blast Frag Warhead at High Altitude Against Bison and Green Quail
	S	1960	BRL-MR-1297 An Evaluation of the Anti-Missile and Anti-Aircraft Capabilities of Several U.S. Surface to Air Systems, 1960 to 1970
	C	1960	BRL-TN-1305 Vulnerability of Army Aircraft and Helicopters to Impacting Projectiles
	S	1960	WADD-TR-60-392 The Effect of Speed on the Penetration Effectiveness of a Tactical Aircraft Operating at Low Altitude
	S	1960	WADD-TR-60-605 Attrition of High Altitude-High Speed Aircraft Penetrating European Soviet Bloc Defenses Without Penetration Aids
378,403	S	1960	CORNELL CJ-1191-G-10A Generalized Attrition to Conventional Anti-Aircraft Weapons
	C	1961	ATCDC-61-1512 S (Ft. Ord) Aircraft Survivability Against Redeye, Final Report of Experiment
327,015	C	1961	BRL-1151 Passive Protection of Aircraft
	S	1961	BRL-MR-1380 Effectiveness of the Redeye Weapon System Against Jet Aircraft

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1962	U.S. ARMY SURGEON GENERAL (617.1 U.S.) Wound Ballistics
	S	1962	AD HOC COMMITTEE REPORT Report of Ad Hoc Committee to Study the Vulnerability of Army Aircraft
330,026L	C	1962	TCREC-TR-62-70 Suppressive Fire and Allied Equipment Research Activities for Army Air Vehicles
	S	1962	BRL-MR-1414 Single Shot Pk of Hawk and Mauler vs Current U.S. Tactical Aircraft
	S	1962	BRL-MR-1415 Vulnerability of Tactical U.S. Jet Aircraft to Redeye Type Missiles
	C	1962	BRL (H. Kostiak) PAPER FOR NWL SYMPOSIUM Vulnerability of Parked Aircraft
	S	1962	RAND-RM-3295-PR An Operational Model for Estimating the Effectiveness and Attrition of Tactical Aircraft when Penetrating Defenses at Low Altitude
	C	1962	USNSC NAVAIR-00-25-524 Guide to the Reduction of Aircraft Vulnerability
344224	C	1963	BRL-MR-1495 Effectiveness of a Redeye-Type MSL vs Sev'l US Helicopters
345,047	C	1963	BRL-MR-1496 Reduction of Army Aircraft Vulnerability
347,479	C	1963	BRL-MR-1524 Lethal Area Estimates of Aircraft Launched 20 mm M56 H.E. Shell

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Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1963	PROJECT THOR-TR-53 A Survivability Study of Transporting Troops by HKB-1 in a Combat Environment
	S	1963	RAND-RM-3545-PR Tactical Aircraft for Limited War
336,168	C	1963	PEAT, MARWICKY, CAYWOOD, SCHILLER AND CO. Penetration and Target Destruction in Limited War
504763	U	1964	USAF ASD-TDR-63-764, Vol. I A Program to Determine High Blast- Induced Airloads
353139	U	1964	BRL Mem Rept. #1571 Single Shot P <sub>k</sub> for Hawk, Mauler Against 3 USN A/C (C. Gardner)
	S	1964	BRL-TN-1536 Single Shot Kill Probabilities of Various Warhead Weights of Mauler Type Missiles
365,302	S	1964	MACV STUDY Minimizing Aircraft Damage and Losses from Enemy Ground Fire
352,704	C	1964	NOLC REPORT-608 Evaluation of Aircraft Kill Criteria by Analysis of Aircraft Accident Records
348,907	S	1964	NWL-TM-T-3/64 Methodology of a Vulnerability Study
360,590	C	1965	BRL-MR-1628 The Vulnerability of Parked Aircraft to Blast from Small Explosive Charges and Infantry Ammo
363,197	C	1965	BRL-MR-1640 The Vulnerability of CH-47 Chinook Helicopter to Ground Fire and Recom- mended Crew Protection

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1965	AFTAC/OA/WP-125 Vulnerability of Helicopters in South Vietnam
	S	1965	NAWWEPS REPORT 8664, PART I Preferred Aircraft Loadings Based on the Predicted Combat Effectiveness of Conventional Air-to-Surface Weapons
	S	1965	RAND-RM-4547-PR Survivability of Tactical Reconnaissance Aircraft Against Soviet Surface- to-Air Defenses
369,081	C	1965	APCC-TR-65-79 Preliminary Aircraft Vulnerability Testing
370,967	C	1965	BRL-TN-1573 Correlations of Aircraft Hit Data in Vietnam
	S	1965	DDC-ARB 041046 Vulnerability of Fighters in Combat Areas, A Report Bibliography
362,034L	S	1965	USSTRICOM REPORT Tactical Aircraft Vulnerability/ Survivability in Varying Combat Situations
362,324	C	1965	BRL-MR-1647 Analysis of Combat Damage on UH-1 Helicopters in Vietnam ('62-'64)
474,145	U	1965	NADC-WR-6515 Mathematical Models for Computing Aircraft Kill Probabilities
	C	1965	BRL-MR-1668 The Vulnerability of the UH-1B Helicopter to Small Arms Fire

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
367,169L	S	1965	NADC-WR-6511 Vulnerability and Survival of A-7A Aircraft Encountering Weapon Systems of Their Operating Environment
370,873L	S	1965	NADC-AW-6532 Vulnerability and Survival of OV-10A Aircraft Encountering Weapon Systems of Their Operating Environment
370660	C	1965	BRL-MR-1713 Comments on Vulnerability of Heavy Transport Helicopter CH-54 Flying Crane
371964	C	1965	BRL-MR-1717 Vulnerability of the Light Observa- tion Helicopter (OH-6A) and Suggested Methods to Reduce its Vulnerability
161546	S	1965	NADC-WR-6521 Comparison Among the F-4B, F-111B, and A-7A and F-8D/E Naval Aircraft
365546	U	1965	NADC-AW-6518 Comparison of A-7A/A-7ILAS
	U	1965	NADC-AW-6536 Term Phase $P_k$ of Guided Missile and Aircraft Targets Separately Attacked by Surface-to-Air Weapons
	U	1965	NADC-WR-6506 Vulnerability and Survivability of F4B Aircraft Encountering Weapon Systems of Their Operating Environment
376,667L	S	1966	NADC-AW-6622 Vulnerability and Survival of A-4E, A-6A, F-8D/E and F-111D Aircraft in a Specific Maneuver Routine

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1966	RAND-RM-4440-PR A Method for Estimating Aircraft Attrition in Sustained Tactical Operations
	S	1966	RAND-RM-4774-PR Aircraft Design Features for Air- to-Air Combat: A Qualitative Approach
371,856L	C	1966	TECH OPS INC-STAFF MEMO 65-7 A Method of Obtaining Aircraft Attrition from Anti-Aircraft and Small Arms Fire
	S	1966	NOLC REPORT-654 Summary and Evaluation of U.S. Aircraft Combat Losses in South- east Asia
	C	1966	NOLC REPORT-660 Data on U.S. Aircraft Combat Damage in Southeast Asia
	S	1966	RAND-RM-5045 A Briefing on Aircraft Design Features for Air-to-Air Combat
	S	1966	AFFDL-TR-66-151 Structural Vulnerability of S.E.A., Aircraft to Ground Fire
	U	1966	USAAVIABS-TR-66-79 Investigation of Low-Level Aircraft Operational Hazards
	S	1966	US NAVY CNO-OP-05W2D Combat Analysis Staff Study 1-66. In-Flight Combat Damage to USN (CVA-Based) Aircraft in S.E. Asia
376,923	C	1966	BRL-TN-1589 Correlations of Aircraft Hit Data in South Vietnam

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
376,285	C	1966	RAND-RM-4882-ARPA Aircraft Vulnerability to Ground Fire - South Vietnam, 1/63 to 5/65
378,574	C	1966	BRL-TN-1631 Army Aircraft Losses from Ground Fire Damage in South Vietnam Operations
	U	1966	RAND-RM-4647-PR Basic Measures for Comparing the Effectiveness of Conventional Weapons
821,810	U	1966	USAAVCOM TR-66-4-CHAPTER 1 Aircraft Armor Design Data - Ch. 1, Aircraft Characteristics
384,772	C	1966	USAAVCOM-TR-66-4-CHAPTER IV Aircraft Armor Design Data, Ch. IV, Encounter Vulnerability Analysis
388,395L	C	1966	NADC-AW-6623 An Approach to the Efficient Protection of Military Aircraft
388,825L	S	1966	NADC-AW-6614 Efficient Protection of A-7A Aircraft Encountering Weapon Systems of Their Operation Environment
374,333	C	1966	BRL Aircraft Damage and Casualties from Ground Fire in South Vietnam
378,906L	S	1966	SRI PROJECT NR-274-008 FINAL REPORT Tactical Aircraft Survivability Volume II Apendices
377,196L	S	1966	NADC-AW-6625 A Compilation of Existing Vulnerability Data of Selected U.S. Military Aircraft

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
380,107	S	1966	BRL-MR-1803 Lethality Estimates of the SAM-D Against the F-111A for Several Encounter Conditions
380,226	S	1966	BRL-MR-1786 The Vulnerability of Several Aircraft and Missiles to Impacting Fragments and Ground Fired Projectiles
384,253 384,254	S	1966	US NAVY CNO-OP-05W/OEG Vol. I - Analysis of U.S. Navy, Marine Corps and Air Force Fixed Wing Aircraft Damage and Loss in Southeast Asia. Vol. II - Appendices A, B, C, D and E
	U	1966	USAFSC Manual No. 80-1 Handbook of Instructions for Aircraft Design, Sec. 9 -- Passive Defense
AD 378333	U	1966	APGC TR-66-43 Wild Weasel III (F-105s vs SAM-2)
373260	U	1966	ECOM Army A/C Vulnerability to AAA Shells
375199	C	1966	BRL Memo: Effectiveness of Small Arms Projectiles vs Aircraft
104,155 (S) 514,662 (S) 514,663 (C)	U	1966	BOEING-WICHITA D3-7307 AND D3-7037-1 B-52-C-F Vulnerability to Small Arms and Light Anti-Aircraft Fire
	U	1966	AFFDL Vulnerability of High Performance Aircraft

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
381,420	S	1967	RAND-RM-5178/1-PR High Survivability Aircraft Design Principles: A Close Support Aircraft Example Design
	S	1967	NOTS-TP-4151 Evaluation of a CH-47 Helicopter Infrared Countermeasures Device
378,152	S	1967	HqUSMACV-MACJ341 Helicopter Combat Loss and Damage Trends in South Vietnam, April - September 1966.
381,427	S	1967	HqUSMACV-00571 Differences in U.S. Army and U.S. Marine Helicopter Combat Loss Rates South Vietnam, April - September 1966
381,815L	S	1967	USAAVLABS Factors Influencing Aircraft Survivability
383,712L	S	1967	USAAVLABS-TR-67-7 (CORNELL) Unconventional Armor Systems Conceptual Study
384,386	C	1967	BRL-TN-1668 Correlations of Aircraft Hit Data in South Vietnam for 1966
385,779	C	1967	BRL-MR-1868 The Vulnerability of the AH-56A, AH-1G, A-7A and OV-10 Aircraft to Ground Fired Projectiles
385,882L	S	1967	AFFDL-TR-67-118 An Analysis of F-105 Combat Losses in SEA (Out Country)
386,905	C	1967	BRL-MR-1883 Analysis of Combat Damage on CH-47A Chinook Helicopters in Vietnam (1965, 1966)

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
386,417	S	1967	NASC-CREW SYSTEMS ' IV. Battle Damage and Casualty Information for Navy Air Operations in Southeast Asia
386,374L	S	1967	SAMSO-TP-67-17 Proceedings of the SAE Classified Sessions on Vulnerability and Survivability
387,281	C	1967	NAD/CRANE-RDTR No. 104 Threat and Loss Analysis for Marine Corps Helicopters in Vietnam
387,313	C	1967	BRL-TN-1671 The Effectiveness of Several Communist Anti-Aircraft Weapons Against the F-105 and F-4C Jet Aircraft
830,079	U	1967	CAYWOOD-SCHILLER ASSOC. CSA-67-P-112 Single Shot Kill Probability for an Aircraft Encounter with a Rod or Fragment Warhead
830,078	U	1967	CAYWOOD-SCHILLER ASSOC. CSA 67-P-114 Kill Probability for an Aircraft Engagement with a Fragment Warhead Activated by a Fixed Angle Proximity Fuze
389,590	S	1967	NWL REPORT TR-2099 Aerial Target Vulnerability Studies, Description of the FRESCO-D (MIG-17 PF).
389,779	S	1967	BRL-MR-1873 Lethality Estimates of the SA-2 Against the F-111A for Several Encounter Conditions
389,854L	S	1967	NWC-TP-4477 Soviet MIG-17 PF Aircraft Target Description and Vulnerability Analysis

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
390,259L	S	1967	NADC-AW-6701 Vulnerability, Survival, and Efficient Protection of A-4E Aircraft Encountering Weapon Systems of their Environment
392,528L	S	1967	NADC-AW-6738 Comparison of the Vulnerabilities of Selected U.S. Naval Helicopters
392,816L	S	1967	NADC-AW-6732 Vulnerability and Survival of the UH-34D Unprotected and Protected with Kit Armor
381,391L	S	1967	AF-SEG-PROJECT AF-5105 Evaluation Report on Current Aircraft Survivability Studies
AD 665454	U	1967	USAAVLABS 67-49 Reduction of Hazard from Secondary Fragments Created by Ballistic Penetration of Aircraft
	S	1967	USAAVLABS-Man/Mobility/Survivability Forum, Allison Division GMC Factors Influencing Aircraft Survivability
161516	S	1967	NADC-AW-6702 Vulnerability, Survival, and Efficient Protection of A-6A Aircraft Encountering Weapon Systems of Their Operating Environment
70289	C	1967	Helicopter Damage Trends in SVN by J. F. Gallagher
390,392	S	1968	BRL-MR-1904 Vulnerability of the Soviet 57 mm Anti-Aircraft Gun (S-60) to Single Shot Fragment Impacts

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
390,822	C	1968	CORNELL CAL-GM-2136-G-6 Evaluation of F-105F Wind Tunnel Aerodynamic Tests
393,422	S	1968	AMSAA-TR-16 Star-Aircraft Survivability Analysis
393,274	C	1968	AMSAA-TM-14 Correlations of Aircraft Hit Data in South Vietnam for Calendar Year 1967
393,801	C	1968	AMSAA-TM-19 Hits and Damage on Fixed Wing Utility Aircraft in South Vietnam thru FY 1967
	S	1968	WSEG REPORT 128 - 5 Volumes Analysis of Combat Aircraft Losses in S.E. Asia
500,592L	S	1968	NADC-CSA-68-F-180 Analysis of U.S. Navy S.E. Asia Aircraft Vulnerability and Comparison with Theoretical Vulnerability
390,945L	S	1968	ANSER-TB-68-2 Effectiveness of Air-to-Air Weapons in Southeast Asia
	S	1968	AFSC-SCL-6-67-4 Mission Analysis on Fighter-Bomber Penetration - Volume II - Penetration Scheme Evaluation
501,557L	S	1968	CAL-GM-2506-D-1 U.S. Aircraft Vulnerability Data
136419	C	1968	DDR&E Dept. of Defense Programs on Surviv- ability of Aircraft and Personnel Carriers
161519	S	1968	NADC-SD-6831 Vulnerability and Survivability of F-4B/J Aircraft with and without Kit Protection

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
161518	S	1968	NADC-SD-6836 Vulnerability and Survival of F-8D/E Aircraft with and without Kit Protection
161517	S	1968	NADC-SD-6823 Vulnerability and Survival of A-7/A Aircraft with and without Kit Protection
	U	1968	DDC-004940 Vulnerability of Tactical Targets
	U	1968	NASA-TM-X-1550 Effects of Simulated Damage on the Aerodynamic Characteristics of a Swept-Wing A/C Model
	S	1968	AFFDL-TR-68-151 Combat Damage Analysis of Air Force Marine and Navy F-4 Aircraft in SEA
500,396	C	1969	AMSAA-TR-18 Analysis of Combat Damage on OV-1 Mohawk Aircraft in S. E. Asia
500,381	C	1969	NAVAL CIVIL ENG. LAB. TN-N-1019 Requirements for Aircraft Protection in Vietnam
500,806L	S	1969	ASD-TR-69-14 USAF Helicopter Survivability/ Vulnerability Study
500,524L	S	1969	CNA/OEG STUDY 725 Prediction of U.S Navy Aircraft Losses Over North Vietnam
501,093	C	1969	AMSAA-TM-20 Combat Damage Analysis of the AH-1G Huey Cobra (Oct. 67 - Sept. 68)
501,604	C	1969	AMSAA-TM-32 Combat Damage on Light Observation Helicopters OH-13S and OH-23G in Vietnam (9/65 - 9/67)

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
852,886	U	1969	AMSAA-TR-14 The MAGIC-SAM C Target Analysis Technique: Vol. VI - The Application of Combined Geometry Technique to Armored Combat Vehicles
501,867	C	1969	AMSAA-TM-35 Analysis of Combat Damage of CV-2B Aircraft in Vietnam (1963 through 1966)
	S	1969	RAND-R-470-PR AND SUPPLEMENT Proceedings of the Symposium on Tech- nology and Applications for Increased Survivability of Aircraft
503,724	C	1969	AMSAA-TM-39 Combat Damage on CH-37 Aircraft in Vietnam (1963 through 1967)
503,807	C	1969	AMSAA-TM-44 Correlation of Aircraft - Hit Data in the Republic of Vietnam for CY 1968
	S	1969	NAVAL MATERIAL COMMAND REPORT An Advanced Planning Briefing for Industry on Naval Aeronautics and Astronautics
503,138L	C	1969	NWL-TR-2311 Effects of Fragment Number vs Initial Fragment Velocity on Probabilities of Kill Against a Bomber and a Missile
858,374	U	1969	AF INST. OF TECH. RPT. GNE/PH/69-10 A Gamma Probe Technique to Determine Aircraft Ballistic Hardness Against Small Arms Fire
504,978	C	1969	NWCCL-TP-888 Methodology for Estimating the Effects of Aerodynamic Surfaces on the Vulner- ability of Airborne Targets to Continuous Rods

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1969	AFSC-DH 2-7 System Survivability
	S	1969	AIAA REPORT Tactical Missile Systems Conference Redstone Arsenal, Feb. 10-12, 1969
504,604L	S	1969	UCM CNO OP-05W/OEG-CNA VOL. 2 PART 2 Analysis of U.S. Navy, Marine, Air Force Fixed-Wing Aircraft Damage and Loss in Southeast Asia 1962-69
	S	1969	USAFAS Project 68-C035 Survivability/Vulnerability Study of the UH-1N Helicopter
	U	1969	USAFASD TR 69-14 Survivability/Vulnerability Study of the UH-1F, CH/HH-3E, HH-43B and the CH/HH-53B/C Helicopters
	C	1969	DDR&E Dept. of Defense Programs on Surviv- ability of Aircraft and Personnel Carriers
144691	C	1969	US Army AMSAA-TM-46 Analysis of Combat Damage on US Army UH-1 Helicopters in Vietnam (1965 and 1966)
505,079L	S	1969	AFFDL TR-68-151 Combat Damage Analysis of Air Force, Marine Corps & Navy F-4 Aircraft in SEA
505,829	S	1969	AFAPL TR-69-55 Survivability of Tactical Stand-off Missiles Against Advanced SAM Systems
103,918	C	1969	NADC-SD-6920 Vulnerability of the Hawker Siddeley Carrier MK-50 Aircraft

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
512,915	C	1969	DASA-NWER-DC-001 Blast and Thermal Vulnerability of Aircraft
	U	1969	AFFDL Design of Fighter Aircraft for Combat Survivability
159282	C	1970	DDR&E DOE Programs on Survivability of Aircraft and Personnel Carriers
149003	S	1970	CAYWOOD-SCHILLER CSA REPORT 70-F-104 Analysis of US Navy SEASIA A/C Vulnerability and Comparison with Theoretical Vulnerability
148707	U	1970	RAND R-500-PR Proceedings of the Second Symposium on Increased Survivability of A/C (FOUC)
158817	C	1970	USN NAVAIR 00-25-524A Technical Manual, "Guide to the Reduction of A/C Vulnerability"
507,222L	S	1970	NADC CSA-70-F-104 Analysis of U.S. Navy SEA A/C Vulnerability and Comparison with Theoretical Vulnerability
508,208	C	1970	BRL-MR-2020 Vulnerability Analysis of UH-1F Helicopter to Impacting Ground Direct Projectiles and Recommended Protection
	C	1970	NASA TM-X-2006 Effects of Simulated Damage on Stability and Control Characteristics of a Swept-Wing Fighter Airplane at Mach 1.57 and 2.00
104,004	S	1970	RAND R-500-PR Vol. I, II Proceedings of the Second Symposium on Increased Survivability of Aircraft

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
58,334 Vols. I, II, III	U	1970	AFFDL TR-70-115 Vols I, II, III An Aircraft Structural Combat Damage Model
58,335	U	1970	AFFDL TR-70-116 An Aircraft Structural Combat Damage Model -- Design Handbook
	U	1970	AFFDL Aircraft Survivability Through Materials Application
155598	C	1971	BRL-MR-2098 Analysis of Combat Damage on CH-53A and HH-53B Helicopters in SEA (1967 through June 1969)
159108	S	1971	AFFDL-TR-72-15 Analysis of USAF Fixed-Wing Aircraft Losses, Aircrew Casualties and F-105 Damage in SEASIA Combat
158957	C	1971	USAAMRDL-TR-71-41B Survivability Design Guide for US Army Aircraft Vol. II
515,546	C	1971	Army Combat Development Command Air Mobility in the Mid/High Intensity Environment (AM/HI) Study, Vol. VI, Annex F&G Survivability Analysis
516,860L	S	1971	NADC-CSD-71-F-116 Vulnerability, Survivability and Protection Analysis of AV-8A Aircraft
517,246	S	1971	ASD-TR-71-42-Volume V Air Vehicle Survivability Study, F-111A Survivability (PENVAL Program)
517,236	S	1971	ASD-TR-71-42-Volume II Air Vehicle Survivability Study, Volume II, Vulnerability Analysis (PENVAL Program)

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
517,683L	C	1971	HEL-TM-10-71 Air-Ground Engagements in Vietnam (Study I--Interviews on Aircraft Survivability)
	C	1971	ASD-XR-72-3 Vulnerability Analysis of the A-7D
521,998L	S	1971	AFFDL-TR-72-15 Analysis of USAF Fixed-Wing A/C Losses, Aircrew Casualties and F-105 Damages in SEA Combat
	S	1971	AFFDL-TR-71-176 OV-10 Combat Damage Analysis
	C	1971	AFFDL(FBS)-WP-71-1 Combat Data to Support A-X Vulnerability Analysis
	S	1972	AFFDL-TR-72-15 Analysis of USAF Fixed Wing Aircraft Losses, Aircrew Casualties and F-105 Damages in SEAsia Combat
	C	1972	NATO AGARD-AR-47 Vol. I 213526 The Physical Vulnerability of Aircraft, Executive Summary NATO
	U	1972	NATO AGARD-AR-47, Vol. II The Physical Vulnerability of Aircraft, Volume II
162526	C	1972	BRL-MR-2254 Vulnerability of the CH-47 Helicopter to Impacting Projectiles and Steel Fragments and to External Blast
160342	S	1972	IDA P-871 Briefing, "Operational Test and Evaluation of Survivability/Vulnerability of Aircraft"

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## Vulnerability of Systems (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
520,529L	S	1972	AFFDL TR-71-176 OV-10A Combat Damage Analysis
520,501L	C	1972	BRL-MR-2175 The Vulnerability of Aircraft Targets to Impact by Soviet 23mm HEI-T Ammunition
520,562L	S	1972	ASD-XR-72-7 Vulnerability of Aeronautical Systems to External Non-Nuclear Blast Waves
521,803	S	1972	OEG-OP-05W Summary of Air Operations in SEA, April 1972
	S		AFFDL-TR- AC-130 Gunship Cobra, Damage Analysis
162414	C		BRL-R-1627 Aircraft Vulnerability Methodology
162471	C		BRL-MR-2258 Vulnerability of AH-1G
158829	C		Unknown A-7 Survivability Summary
377176	C		BRL-MR-542 Vulnerability of A/C to Internal Blast
377185	C		BRL-MR-741 Damage to A/C by External Blast
	U		BRL-TN-585 Comparative Vulnerability of Helicopter and Fixed-Wing Assault Aircraft
	U		BRL-MR-442 Blast Effects on B-17

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## A-2. WEAPON DATA

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1946	BRL-MR-437 Optimum Caliber Program
	U	1946	BRL-MR-436 Report on Tests of the Effect of Blast from Bare & Cased Charges on A/C: Sarmousakis
	U	1948	TM 9-1907 Ballistic Data Performance of Ammunition
	U	1950	Opt. Cal. Prog.
	U	1950	BRL-R-721 The Effect of Atm. Pressure and Temperature on Air Shock: Dewey, Sperrazza
	C	1951	NAVORD-2207 Bibliography and Synopsis of Rod Warheads
377,103	C	1951	BRL-R-783 Evaluation of Some Foreign and U.S. Ammo for Use in Fighter Armament
	C	1951	NAVORD-1297 NOTS 367: Evaluation of 2.75" Folding Fin Rocket
	C	1952	BRL-TN-587 Ricochet Off Aircraft Skin by Cal. 0.60 and 20 mm Projectiles
	C	1952	USAF (AMC/APGC/WADC/AFAC) Interim GUN-VAL Study
	C	1953	BRL-MR-710 Estimates of Visible Flashes from Incendiary Striking MIG-15
	U	1954	BRL-MR-810 Fragmentation Characteristics of AAA Shells
59,648	C	1954	BRL-MR-843 Some Terminal Ballistic Tests of Soviet 37 mm Projectiles for Aircraft and Anti-Aircraft Guns

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1955	USAF (AMC/APGC/WADC/AFAC) Final GUN-VAL Report
159,322 159,323 159,324 159,334	C	1956	FRANKFORD ARSENAL-R-1407, VOLS. 1 - 4 Small Arms Incendiary Ammunition
	U	1956	NMIMT/RDD/T-922 Guide to the Design of the Continuous Rod W/H
	C	1957	ORDNANCE PAMPHLET 20-245 Design for Terminal Effects
	U	1957	NOTS-TP-1798 Elastic and Plastic Behavior in a Simple Target-Projectile System
	U	1957	RAND-RM-1965 A Calculation of the Blast Wave from a Spherical Charge of TNT
	C	1958	NAVORD-6398 A Semi-Quantitative Analysis of Shaped Charge Vaporific Damage
	C	1959	ORDNANCE PAMPHLET 20-290 Warheads - General
	S	1959	PICATINNY-FREL-TM-208B64, Vol. I. (PAPERS) Comparison of Alternative Types of Anti-Aircraft G.M. Warheads (A. Walker - RAE, ENGLAND) Continuous Rod Warheads (C. Kobialka - PICATINNY) Anti-Aircraft Warheads other than Continuous Rod (M. HOCKENBURY - PICATINNY)
	C	1959	NOTS-IDP 777, No. 40-411 Preliminary Performance Data - Sidewinder IC-IRAH
	U	1960	ORDNANCE PAMPHLET 20-106 Sources of Energy

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1960	ORDNANCE PAMPHLET 20-107 Ballistics
	U	1960	ORDNANCE PAMPHLET 20-108 Weapon Systems and Components
	U	1960	ORDNANCE PAMPHLET 20-177 Properties of Explosives of Military Interest, Part I
	C	1960	ORDNANCE PAMPHLET 20-178 Properties of Explosives of Military Interest, Part II
	U	1960	ORDNANCE PAMPHLET 20-210 Fuzes, General and Mechanical
	U	1960	NAVWEPS-7592 Table of Initial Fragment Velocities Calculated from Gurney and Sterne Formulas for Various C/M Ratios and Explosive Energies
	U	1960	BRL-1092 Compiled Free-Air Blast Data on Bare Spherical Pentolite
	U	1960	OAK RIDGE NATIONAL LAB. - ORNL-2889 Non-Nuclear Uses for Depleted Uranium
	C	1961	CNO-NWIP 20-1 Naval Weapons Selection - Aircraft
361,256	C	1961	BRL-TN-1385 An Analysis of Vigilante Accuracy
	C	1962	RAC (ORD)-T-400, VOL. 2 Conventional AA Weapons and Small Arms Used in the AA Role
	U	1962	BRL-MR-1423 Calculated Peak Pressure-Distance Curves for Pentolite and TNT

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
332,700	C	1962	NAVWEPS-7673 - PART II Preliminary Warhead Terminal Ballistic Handbook - Part II - Warhead Terminal Ballistic Performance
	U	1962	USAMC AMCP 706-160 R&D of Materiel Engineering Design Handbook--Elements of Terminal Ballistics--Part One--Introduction Kill Mechanism and Vulnerability
	U	1962	USAMC AMCP 706-161 R&D of Materiel Engineering Design Handbook--Elements of Terminal Ballistics--Part Two--Collection and Analysis of Data Concerning Targets
345,880	S	1962	IDA UBG-62-374 Report on Micromissiles, Subtask of IDA/RESD Project Agile
	C	1962	IDA-TN-31 Addendum on the Design of Microrockets
	U	1963	ARPA - GM DEF. LABS TR-63-225 ARPA ORDER 70 Damage Mechanisms--Thin Targets--Hypervelocity Projectiles
	S	1963	AFTAC FWS Aerial Attack - GAR-8
	U	1963	PICATINNY ARSENAL TM-1279 Comparative Blast Evaluation of HE Compositions in a Standard W/H Configuration: H. Herman
	S	1963	RAND-RM-3768-1-PR The Evolution and Deployment of Soviet Surface-to-Air Missiles
	C	1963	DIA-DC 550/1-1 Physical Vulnerability Handbook - Non-Nuclear Weapons

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1963	ASD-TDR-63-1 Non-Nuclear Weapons Compatibility and Employment
433956	U	1964	BATTELLE/COLUMBUS 197-21-2 Hypervelocity Impact Data Index
	U	1964	BRL-1262 Incident and Reflected Blast Pressures for Pentolite
350,496L	C	1964	NAVWEPS-7673 - PART I Preliminary Warhead Terminal Ballistic Handbook - Part I - Terminal Ballistic Effects
	C	1964	NOLC-65-64-46 Sidewinder Missile Performance Report
	C	1964	NAVWEPS-8508 Shaped Charge Design Requirements Related to Lethality Effects in a Crosswind
	U	1964	ARMY INFANTRY SCHOOL, FT. BENNING Characteristics of Infantry Weapons
	U	1965	AFATL. ARM. MEMO RPT. 65-30 Air-to-Air Trajectory Tables for 7.62 mm, Cal. .50, and 20 mm Projectiles
358,849	S	1965	RAND-RM-4255-PR The Effectiveness of Micromissiles as Aircraft Area Munitions
360,714L	C	1965	NAVWEPS-8426 AIM-9C Aerodynamic Envelopes
	U	1965	ADVANCED SYSTEMS OFFICE - R-5-65-3 BuWEPS AA Gun Effectiveness
362727	U	1965	APL TG-684 Opening Characteristics of Explosively Oriented Warheads

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
363,414	S	1965	AFATL-TR-65-34 Air-to-Air Warhead Technology Study Summary Report
	U	1965	NOTS-TP-3902 Ballistic Handbook
364,689L	C	1965	NOTS-TP-2453 - REV. 1 Principal Results of a Study of the Effectiveness of Fragmentation War- heads Against Armor Plate
	U	1965	BRL-MR-1645 Measurement of Air Blast Parameters Above a Reflecting Surface
	C	1965	BRL-MR-1680 Measured Side-on Air Blast from Pentolite and TNETB Explosive Charges
363,371	S	1965	PICATINNY PA-TM-1497 The Statistical Evaluation of Lethal Area
	S	1965	PICATINNY PA-TM-1586, VOLS. 1 - 4 Proceedings of the Non-Nuclear War- head Symposium
367,864	C	1965	PICATINNY PA-TM-1689 Lethal Areas for Various Fragmentation Munitions
	S	1965	AFSTD-TS-64-2 Soviet Defensive Aerospace Warfare System
359863L	C	1965	BUWEPS R-5-65-3 AA Gun Effectiveness
370,513	C	1966	AFATL-TR-65-46 Characteristics of Non-Nuclear Warheads for Guided Missiles
373,247L	S	1966	USAAVLABS-TR-66-15 Study of Aircraft Fuel Protection Systems
	U	1966	BRL-MR-1744 Lethality Estimates of the SA-2 Against the F-4C for Various Encounter Conditions

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1966	ARMY MATERIEL COMMAND FSTC 381-3152 Exploitation Report - Projectile 57 mm, Frag HE, Model OR-281, MCN-24077, with Fuze, PD, Model MG-57, MCN-24078, Soviet
	C	1966	ARMY MATERIEL COMMAND FSTC 381-3144 Exploitation Report - Fragmentation and Lethality of Soviet 57 mm Frag-T Projectile, Model OR-281 (MCN-24077)
809,904	U	1966	BRL-1336 Handbook of Trajectory Data for Spin Stabilized Projectiles, Typical Fin Stabilized Flechettes, Spheres and Cubes
380,512L	S	1966	USAF-TAWC(TAC) Anti-Aircraft Threat in S.E. Asia, Joint Anti-Aircraft Effectiveness Conference 1-8 Nov. 1966
381,347	C	1967	NOL-WO-TR-65-218 Explosives - Effects and Properties
383,712L	S	1967	USAAVLABS-TR-67-7 (CORNELL) Unconventional Armor Systems Conceptual Study
387,167	C	1967	AFATL-TR-67-94 Development of 20 mm AP Cartridge Type MLU-36/C
386,992	C	1967	CARDE-TR-572/67 .50 Inch Calibre Armor Piercing Projec- tile. A Comparison of Various Designs Employing Tungsten Carbide Cores
391104L	U	1967	NWC W/H R&D NWC-TP-4446, VOL. II Transactions--Fifth NWC w/h R&D Symposium
384860	U	1967	PICATINNY ARSENAL TR-3625 Lethal Areas of 3 105 mm Rounds Wiesenfeld, P/A

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
823839	U	1967	BRL-MR-1866 Shape Charge Jets
389,705	C	1968	NWC-TP-4507 Parametric Studies for Fragmentation Warheads
841,541	U	1968	ADTC-TR-68-21 Static Fragmentation Test of Five 20 mm HEI Projectile Assemblies
391301L	S	1968	USAAVLABS 67-78 Dynamic Effects of Caliber .50 Projectile Impact on Armor and Support Structures
393444	U	1968	AMSAA TM-4 Effects of Blast on Personnel and Materiel
391719L	U	1968	NWC-TP-4557 Estimate of Anti-Aircraft Threat 1970-1980--Rodney Lubben
	S,C	1968	JOINT TASK FORCE TWO Reports on Low Altitude Tests - Gun Type Surface Based Air Defenses
	C	1968	ARMY MATERIEL COMMAND FSTC-CR-20-49-68 Exploitation Report - Light Anti- Aircraft Weapon System, Soviet, MCN-27422
395,524L	C	1968	NWL-TR-1864, REV. 1 Non-Nuclear Warhead Terminal Ballistic Handbook - Part II - Warhead Terminal Ballistic Performance
391,719L	S	1968	NWC-TP-4557 Estimate of Anti-Air Threat 1970-1980
104056	S	1968	DIA ST-CS-07-2-69-INT (VOL. I, II) Antiaircraft Gun Systems--Eurasian Communist Countries
395540L	S	1968	NWC TP-4642 Concepts for a Computer Program for Blast Effectiveness Predictions

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
687,863	U	1969	AIR FORCE ARL-69-0011 Tables of Blast Wave Parameters
851,109L	U	1969	ARMY MATERIEL COMMAND FSTC-HT-23-986-68 Capabilities of the 57 mm Anti- Aircraft Battery in Firing at Zoom Bombing Aircraft
	C	1969	ARMY MATERIEL COMMAND FSTC-CR-20-136-68 Exploitation Report - Projectile, 57 mm, Frag-T, Model OR-281U, MCN- 27850, with Fuze, P.D., Model MGZ-57, MCN-27851, Soviet
	S	1969	DDC BIBLIOGRAPHY USSR Anti-Aircraft Defense Systems
503,086	C	1969	RAND-RM-6004-PR Potential Guided-Gun Effectiveness as Determined from Project Combat Hassle Flight Test Data
503,920L	C	1969	AFATL-TR-69-1 Rod Lethality Studies
501,324L	S	1969	REDSTONE ARSENAL RD-TR-69-1 A Quantitative Postulation of Future Soviet Aircraft and Armament Systems Applicable to Air Defense System Design and Analysis
	C	1969	AMMRC ABI 150 Terminal Ballistic Tests with Soviet 7.62 mm Ball and API Projectile Impacting Various Lightweight Armor Materials
503920L	C	1969	AFATL TR-69-1 Rod Lethality Studies
501324L	S	1969	REDSTONE ARSENAL RD-TR-69-1 A Quantitative Postulation of Future Soviet Aircraft & Armament Systems Applicable to Air Defense System Design & Analysis
504571L	C	1969	AAI-ER-5462 Kill Mechanism Study

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
505623L	S	1969	USMC DEV. & EDUCATION REPORT - PROJECT CMC-44-68-12 Lightweight Air Defense System (LADS)
103976	C	1969	ARMY MATERIEL COMMAND FSTC ST-CS-07-21-69 Antiaircraft Gun Systems--Free World
504852L	S	1969	NWC TP-4719 The Short Range Air Combat Environment
103928	S	1970	NMC TM-69-58 Predicted Sparrow-III (AIM-7E-2) Lethality Against Soviet Fighter Aircraft
513132	S	1970	REDSTONE ARSENAL RF-TR-70-3 Redeye Systems Analysis Study
516720L	C	1970	NWL/DAHLGREN Results of Soviet Projectile Frag- mentation Tests
876431	U	1970	NWC TP-5020 Blast Wave Yields for an Explosion
519848L	U	1970	NWC TN-4561-129-70 Velocities of Fragments in the Gaseous Products Cloud of Fragmenting Warheads
511909	C	1970	ANSAA & EDGEWATER ARSENAL ...Data and Munitions Effectiveness Based on Battlefield Surveys in Vietnam
	U	1970	AFFDL-TR-71-70 Terminal Effects of Spinning and Non- Spinning Fragments Simulating Pro- jectiles on Unbonded Ballistic Nylon
	C	1970	FDFR-TM-70-2 Fragmentation Characteristics of 23 mm Soviet HE-T Air-to-Air Projectiles Under Dynamic Detonation Conditions

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## Weapon Data (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
516618	C	1971	NOLTR-71-37 Directed Blast Effectiveness at Simulated High Altitude
517754L	U	1971	ANSER TDN-71-2 The Anti-Aircraft Artillery Threat to A-X Close Air Support Operations
	U	1971	DIA ST-CR-20-95-71 Fragments, Surface-to-Air Missile, Soviet MCN 32916
517633L	C	1971	NWC TP-5252 Near-Field Blast Studies
	C	1971	AFFDL(FER)-WP-71-1 23 and 37 mm Projectile Characteristics
	U	1971	AFFDI.(FBS)-WP-71-4 Fragment Energy and Time Spread (Frets)
	C		BRL APG-TN-119 A Study of a Family of AA Weapons
	C		BRL TN-393 Results of a Light AA Study
	U		RAND RM-738 Calculated Attrition Due to Conventional Low-Altitude Def. (B. Augenstein)
	C		BRL M-484 Eff. of Inc. Ammo. Against A/C Fuel Tanks
	U		BRL MR-509 Effects of Blast on A/C Fuel Tanks
	U		BRL MR-482 Vulnerability of Aircraft to 75mm Airburst Shell
	U		BRL MR-687 Vulnerability of Aircraft to 105mm and 75mm HE Shell

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## A-3. CREW, STRUCTURE AND COMPONENT VULNERABILITY

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1949	BRL-MR-487 Damage by Controlled Fragments to Aircraft and Aircraft Components
	C	1949	BRL-701 Aircraft Skin Peeling Test
378,272	C	1950	BRL-MR-511 The Effect of Blast on Aircraft Jet Engines
377,167	C	1950	BRL-MR-509 The Effect of Blast on Aircraft Fuel Tanks
	C	1950	BRL-MR-524 Lethal Areas of Engines and Pilots to Standard and Developed VT Fuzed Shell
	C	1951	BRL-TN-483 Effect of 2.75" T-131 Rocket Against A/C Structure: Smith
	S	1951	BRL-M-531 Vulnerability of B-47B Wing to Internal Blast: Baker
	C	1951	NAVORD 1902, NOTS 426 B-29 Inner-Wing Panels/2.75" Folded Fin Rocket: Robins
	U	1951	NAVORD 1928, NOTS 459 B-29 Structure, 2.75" F.F. Rocket
378737	U	1951	NADC Effectiveness of 2.75" Rockets vs. Aircraft Structures
326,978	S	1951	GREAT BRITAIN RAE TN MECH. ENG. 333 Continuous-Rod Warhead Lethality Trials Against B-29 Aircraft Fuselage
378,275	C	1951	BRL-MR-575 Dependence of External Blast Damage to A-25 Aircraft on Peak Pressure and Impulse

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
103890 507261	C	1952	AFATL TR-69-104 Vulnerability of a MLU-44/B Flare Launcher System to Small Arms Fire
	C	1953	BRL-MR-729 Damage to B25-J Components by Fragments for Selected Values of Time after Impact
	C	1953	BRL-MR-747 Damage to B-47 Aircraft by Internal Blast
	C	1954	BRL-TN-870 Blast Vulnerability Criteria for Several Operational Jet Aircraft
	C	1954	BRL-MR-802 Comparative Vulnerability of Magnesium and Aluminum Alloy Outer Wing Panels of the T-6 and F9-F
	C	1954	BRL-MR-848 Vulnerability of the F-84, F-86, F-94 and F-6U Jet Aircraft to Internal Blast
	C	1954	NOTS-TM-1214 Structural Damage Assessment Analysis and Procedures for a B-47 Wing
	C	1955	BRL-MR-917 Blast Damage to Honeycomb Type Aircraft Components from Bare Charges with Internal and Outside Contact
	C	1955	BRL-TN-1052 The Use of Foamed Plastic to Reduce Blast Damage in Aircraft
	C	1956	BRL-1002 A Method for Predicting External Blast Vulnerability of Aircraft as a Function of Altitude with Application to the B-29

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
119652	U	1956	AFFDL TR-70-135 Survivable Flight Control System Program, Simple Actuator Package
	S	1956	BRL-TN-1095 Probability of Damage to Components of Aircraft Resulting from Breakup or Pre- mature Functioning of 20 mm Shell Fired by the Aircraft
	C	1956	NRL-MR-594 The Resistance of Materials to Fracture Propagation and Gunfire Damage
352,645	C	1960 1962	NEW MEXICO INST. OF MINING AND TECHNOLOGY - REPORTS T-940, T-942, T-947, T-949, T-951 Damage Studies of Airborne Targets
	C	1961	BRL-MR-1340 Provisional Vulnerable Area Estimates for a Light Aircraft Power Plant (T63)
	U	1961	NAVAL AIR MATERIAL CENTER - ASL-1044 Structural Vulnerability and Crack Propagation Characteristics of an F11-F Wing
	U	1962	WATERTOWN ARSENAL LABS Fracture of Structural Metals
	S	1962	NWL (F.L. DAVID) PAPER FOR NWL SYMPOSIUM The Effectiveness of Body Armor in Protection
352,645	C	1960 1962	NEW MEXICO INST. OF MINING AND TECHNOLOGY - REPORTS T-940, T-942, T-947, T-949, T-951 Damage Studies of Airborne Targets
	U	1963	USATRECOM 63-69 Army Aircrew Protection Systems
371,100	C	1964	NWL-TM-K-30/64 Estimates of Lethal Area for U.S. Navy Projectiles, Rockets and Bombs
	C	1964	NAVWEPS-8469 A Blast Damage Criterion

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
351,827	C	1964	RAND-RM-4126-PR A Method for Determining Single Hit Disablement Probability for Four Tactical Material Targets
	U	1965	SYRACUSE UNIV. METALLURGICAL RESEARCH LABS Crack Initiation in Metallic Materials - Final Report
	C	1965	NAVWEPS-8391 The Present Status of Blast Analysis, Experimental Procedures, and Vulner- ability Data
367,864	C	1965	PICATINNY PA-TM-1689 Lethal Areas for Various Fragmentation Munitions
461190	FUOU	1965	USAAVLABS 65-1 Vulnerability Study of CH-47A Helicopter Components
614-231	U	1965	USAAVLABS 65-2 Development of Crashworthy Armored Universal Seat for Army Helicopter
363408	C	1965	USAAVLABS 65-3 A Prototype Integrated Crew Survivability Seat for the CH-34 Helicopter
463278	FUOU	1965	USAVLABS 65-7 Integrated Crew Survivability Seat for UH-1B
359,774	S	1965	BRL-1269 Criteria for Incapacitating Soldiers with Fragments and Flechettes
504719	U	1965	AFFDL-TR-64-176 An Experimental Investigation of Blast- Induced Airloads and Response of Lifting Surfaces
110086	U	1965	NADC Aircraft Wing Structural Concepts with Improved Ballistic Damage Tolerance, Vol. II

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1966	ORDNANCE, SEPT. - OCT. 1966, PAGE 185-188 Projectiles vs Honeycomb
	S	1966	USAAVLABS-TR-66-20 Parametric Design Study, Ballistic - Resistant Aircraft Components
633,621	U	1966	AFML-TR-66-135 Ballistic Behavior of Adhesively Bonded Honeycomb Aluminum Panels for Aircraft: Part II
504660	U	1966	AFFDL-TR-66-164 Gunfire Tests on an F-105 Wing
	S	1966	AFFDL-TR-66-151 Structural Vulnerability of S.E.A. Aircraft to Ground Fire
	U	1966	NORTHROP NORAIR RPT. NOR 66-296 Effect of Small Arms Damage on Residual Strength of Aluminum and Titanium Alloy Sheet
504660	U	1966	AFFDL-TR-66-164 Gunfire Tests on an F-105 Wing
634525	U	1966	USAAVLABS 66-23 Design Study & Fabrication of Two Interchangeable UH-1 Aircrew Armor Systems
378,796L	C	1966	NWL-REPORT 2069 Blast Response of Damaged Aircraft, Part I
384,771	C	1966	USAAVCOM-TR-66-4 - CH. III Aircraft Armor Data, Chapter III, Critical Component Analysis
373,743	C	1966	BRL-TN-1601 Lethality of Fragmenting Infantry Munitions
380,760	C	1967	BRL-MR-1821 Vulnerable Study of the UH-1 Helicopter Power Train System to Small Arms Fire

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
380,550L	C	1967	USAAVLABS-TR-66-92 Ballistic-Resistant Aircraft Components
5. ,152	U	1967	AFFDL-TR-67-157 Vulnerability of Aircraft Structures Exposed to Small Arms Fire Projectile Impact Damage
812,881	U	1967	AFML-TR-67-4 Evaluation of Candidate Fire-Resistant Hydraulic Fluids
	S	1967	AFFDL-TR-67-17 Investigation and Development of Redundancy Techniques to Achieve Dual Fault Corrective Capability in Flight Control Actuators
381318L	C	1967	USAAVLABS 66-91 Aircrew Survivable Capsules for Future Army Aircraft
812994L	FOUO	1967	USAAVLABS 67-2 Study and Design of Armored Crash Survival Seat
819034	U	1967	NAR 61-289 Sandwich Structural Repair Manual
384,309	S	1967	AFFDL-TR-67-64 Investigation of Passive Defense Provisions for Aircraft Crews and Passengers
822,893	U	1967	AFML-TR-67-4, SUP. 1 Evaluation of Candidate Fire Resistant Hydraulic Fluids: Incendiary Gunfire Tests
385,587	C	1967	BRL-MR-1867 Vulnerability Study of the J57 Non- Afterburner Turbojet Engine
665,454	U	1967	USAAVLABS-TR-67-49 Reduction of Hazard from Secondary Fragments Created by Ballistic Pene- tration of Aircraft

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
391,238L	C	1967	USAAVLABS-TR-67-54 Flight Controls Survivability
830,861	U	1967	AFFDL-REPORT FOR SAE COMMITTEE Fly-By-Wire Flight Control Systems
389,105L	C	1967	GOODYEAR REPORT NO. 19-527 Gunfire Tests of Coated Liquid Containers and Fire Retardant Materials
	U	1968	AFAPL-TR-68-42 Hydraulic System Vulnerability Study
390,439	C	1968	BRL-TN-1681 Vulnerable Air Estimates for the J57-P-9 Turbojet Engine
392,254 392,236	S C	1968	AFFDL-TR-68-105, VOL. I, II Aircraft Structural Vulnerability to Conventional Weapons
858,883	U	1968	AFFDL-TM-68-8-FDCL, PART I Gunfire Vulnerability Tests on Flight Control Actuators
841794L	U	1968	USAAVLABS 68-51 An Evaluation of Armored Aircrew Crash Survival Seats
391,911	C	1968	BRL-R-1395 Handbook of Effectiveness for Multiple Projectile Rounds
843,216L	U	1968	AFML-TR-68-224 Evaluation of Small Arms Impact on F-111 Aircraft Bonded Aluminum Honeycomb Panels
393,000	S	1968	DDC-TAS-68-25 Wound Ballistics Bibliography
394,195	C	1968	BRL-MR-1944 Proceedings of Symposium on Vulnerability of V/STOL Engines and Related Aircraft Systems

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
394,126	C	1968	AVCO-LYCOMING TR-105.24.2 Aircraft Engine Vulnerability Reduction Study
393,444	C	1968	AMSAA-TM-4 Effects of Blast on Personnel and Materiel Targets
839,152	U	1968	NWC-TP-4422 Response of Structures to Blast: A New Criterion
500,166	C	1968	SIKORSKY-SER-50571 Evaluation of Armor Bearing Liners as a Method for Reducing the Ballistic Vulnerability of Helicopter Anti-Friction Bearing Installations
500,207	C	1968	BRL-MR-1952 Vulnerability Study of the T53 Gas Turbine Engine to Small Arms Fire
395,540L	S	1968	NWC-TP-4642 Concepts for a Computer Program for Blast Effectiveness Predictions
501,471	C	1968	SIKORSKY-SER-50570 Evaluation of Methods to Extend Opera- tions of Helicopter Transmission System Components After Loss of Normal Lubrication
	U	1968	AFAL-68-AVG-2915 Research on a Personnel IFF Technique
852,712	U	1969	NOL-TR-69-84 Structural Analysis of NOL Explosion Testing Facilities
854,508	U	1969	PROJ. AF-3145 INTERIM TECH. RPT. NO. 1 Hydraulic Circuit Breaker for Aircraft Hydraulic Systems
	U	1969	USAAVLABS-TR-70-22 Crash Survival Design Guide

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
503,000	S	1969	NWL-TR-2280 A Method for Computing the Vulnerability of Personnel Wearing Body Armor to Fragments
854,284L	U	1969	BRL-MR-6902 A Description of Three Additional Bodies for the MAGIC Conventional Vulnerability Program
859,277	U	1969	USAAVLABS-TR-68-83 Helicopter Transmission Oil/Heat Rejection Investigation
859,537	U	1969	PROJ. AF-3145 INTERIM TECH. RPT. NO. 2 Hydraulic Circuit Breaker for Aircraft Hydraulic Systems
505,145	C	1969	PRATT AND WHITNEY-A-3741 Turbofan Engine Infrared Suppression Feasibility Study
505,823	S	1969	AFWL-TR-69-57 Non-Nuclear Weapons Effects on Pro- tective Structures
503279	U	1969	AFFDL-TR-69-38 Human Factors Critical Incident Survey of Air Force Tactical Operations in Southeast Asia
	U	1969	AFFDL-TR-69-109 Research and Development of a Servo Actuator Package for Fighter Aircraft
	U	1969	FDT-69-1 Structural Test Data Report, F-111 Wing Carry Through Box - Conventional Weapon Vulnerability Tests
	U	1969	FDTS-TM-69-1 Gunfire Tests on the HC-130P Lox Bottle Armor Kit

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1969	NWC TP-4871 Transformation of Terminal Ballistic Threat Definitions into Vital Enforce- ment Malfunction Predictions
866206	S	1969	USAAVLABS TN-1 A Method for Preventing Catastrophic Failure in Aluminum Stress/Skin Panels
865651	U	1969	USAAVLABS TR-69-77 Evaluation of Mechanical Servo- Actuator for Flight Control Systems
506695L	C	1969	USAAVLABS TR-69-57 Increased Survivability for Flight Control Systems
508004	C	1969	NADC GDC-DDG- Aircraft Wing Structural Concepts with Improved Ballistic Damage Tolerance
867038	U	1969	AFFDL TR-69-109 Research & Development of an Integrated Servo-Actuator Package for Fighter Aircraft
500,446	C	1969	NWL-TR-2249 Vulnerability of Personnel to High Explosive Blast
	C	1969	USAAVLABS 69-57 Increased Survivability for Flight Control Systems
695648	U	1969	USAAVLABS 70-22 Crash Survival Design Guide
504718	U	1969	GEN DYNAMICS GDC-ERR-1404 Correlation of Residual Strength of Ballistically Damaged Panels with Fracture Toughness Theory
161228	C	1969	NADC Aircraft Wing Structural Concepts with Improved Ballistic Damage Tolerance, Vol. I

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
875136	U	1970	AFFDL TR-69-119, VOL. II Research on Flight Control Systems Fly-by-Wire B-47 Phases II and III
511685	C	1970	ARDC TM-16 A Statistical Study of Parameters Affecting the Probability of a Kill Given a Hit on a Jet Engine
877606	U	1970	AFATL TR-70-42 Hydraulic Fluid Flammability (MIL-H-5605 vs. MLO 68-5)
512537L	C	1970	NWC-TP-4734 Air Target Component Kill Criteria Phase I--Final Report
	S	1970	AFFDL TR-70-58, VOL. I Passive Defense Protection of Aircraft Crews from Fragments and...
879196	U	1970	AFFDL TR-70-48 Requirements for Minimum Backup Flight Control Systems
513292	C	1970	BRL-CR-20 Evaluation of Load & Speed Effects on Typical Helicopter Transmission Drive Shafts when Subjected to Ballistic Impact
513338	C	1970	AFFDL TR-70-135 Survivable Flight Control System Program: Simplex Activator Pckge-- Supplement for Survivability Analysis

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
		1970	AFFDL-TR-70-58 Passive Defense Protection of Aircraft Crews from Fragments and Spall
	S		Volume I, Threat Definition and Protec- tion Development
	U		Volume II, Test Plan and Plotted Fragment Data
	U	1970	AFFDL-70-96 Crew Protection Armor System Test Program, Volum. I, Ballistic Testing of An F89J Aircraft, Volume II, Design of Experimental Armor System for Ballistic Testing
	U	1970	AFFDL-TR-70-115 An Aircraft Structural Combat Damage Model, Final Report, Vols I, II, & III
	U	1970	AFFDL-TR-70-116 An Aircraft Structural Combat Damage Mode - Design Handbook
	U	1970	AFFDL-TR-70-132 Feasibility of a Nondestructive Testing Device for Aircraft Ballistic Hardness
	U	1970	AFFDL-TR-70-135 Survivable Flight Control System, Simplex Actuator Package
	U	1970	FDC/ADPO-TM-70-1 Survivable Flight Control System Devel- opment Program
	U	1970	AFFDL Survivable Flight Control System - Proceedings of the Second DOD/RAND Symposium on Technology and Applications for Increased Survivability of Aircraft

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## Crew, Structure, and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
152686	C	1970	BRL-MR-2082 Vulnerability Analysis of the F-79 Augmented Turbojet Engine
504123	U	1970	AFFDL-TR-70-115, VOL. III An Aircraft Structural Combat Damage Model--Vol. III, Appendices VI, VII, VIII
504179	U	1970	AFFDL-TR-70-115 An Aircraft Structural Combat Damage Model, Vol. I, Final Report
504142	U	1970	AFFDL-TR-70-116 (VOL. I) An Aircraft Structural Combat Damage Model, Design Handbook
504180	U	1970	AFFDL-TR-70-115, VOL. II An Aircraft Structural Combat Damage Model, Vol. II, Appendixes I, II, III, IV, and V
875980	S	1970	AMSAA-TM-87 A Method for Obtaining Probabilities of Various Types of Kill on Multiple- Component Targets
57863	U	1970	AFFDL TR-69-119, VOL. I Research on Flight Control Systems: 1970 - The Flow Difference Sensor
867806	U	1970	AFFDL TR-69-119, VOL. I Research on Flight Control Systems Volume I: The Flow Difference Sensor
58131	U	1970	AFFDL FDC/ADPO-TM 70-1 Survivable Flight Control System Development Program
508515L	C	1970	BRL-MR-2030 U.S. Army Casualties Aboard A/C in the Republic of Vietnam (1962-1967)
874039	U	1970	AFAPL TR-70-50-Pt. I Hydraulic Circuit Breaker for A/C Hydraulic Systems

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1970	AFFDL Ballistic Response of Structures and Materials
733582	U	1971	AFFDL-TR-71-20 Survivable Flight Control System Interim Report No. 1 - Studies, Analysis, and Approach
727762	U	1971	AFFDL-TR-71-20, SUPPLEMENT 1 Survivable Flight Control System Interim Report No. 1 - Studies, Analysis, and Approach; Supplement for Control Criteria Studies
729207	U	1971	AFFDL-TR-71-20, SUPPLEMENT 2 Survivable Flight Control System Interim Report No. 1 - Studies, Analysis, and Approach: Supplement for Control Law Development Studies
727763	U	1971	AFFDL-TR-71-20, SUPPLEMENT 3 Survivable Flight Control System Interim Report No. 1 - Studies, Analysis, and Approach; Supplement for Hydraulic Power and Actuation Studies
	U	1971	AFFDL-TM-71-3-PER Secondary Hazards to Combat Air Force Crewmen for Nonnuclear Weapons
	U	1971	AFFDL/FGL-TM-71-3 Designs to Reduce Aircraft Flight Control Vulnerability
	U	1971	ASD/AFFDL-WP-71-1 Crew Station Armor Test and Analysis
	U	1971	Techniques for Predicting the Structural Vulnerability of Combat Aircraft to Ballistic Impact
	U	1971	Interim Technical Report, Vulnerability of Composite Aircraft Structures - Pre- liminary Analysis
BHA 64603	S	1971	AFFDL TR-71-109, VOL. I Integral Armor Study, Volume I, Vulner- ability Effects on Survivable Design

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## Crew, Structure and Component Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1971	FTD-CR-20-40-70 Project Have Education. Aircraft Response to Fragment Impact, Phase III Report, Part V
	S	1971	AFFDL TR-71-109, VOL. II, BOOKS I,II Integral Armor Study, Volume II: Effect of Vulnerability on Combat Effective- ness; F-4C & A-4E Aircraft
	C	1971	AFFDL TR-71-109, VOL. V Integral Armor Study, Volume V: Combat Vulnerability/Survivability Bibliography
	U	1971	AFFDL TR-71-19 Research & Feasibility of an Integrated Servo-Pump Actuator Package for Aircraft Flight Control
888541L	U	1971	NWC-TP-5067 Analysis of the A-4 A/C Structure
885294	U	1971	AFFDL TR-71-14 Development of Battle Damage A/C Tires
518116L	C	1971	NWC-TP-4872 Air Target Component Kill Criteria Phase II--Determination of Specific Structural Element Vulnerabilities to Fragment Damage Mechanisms
	U	1972	AFFDL TR-72-8 Vulnerability of Composite Aircraft Structures
	U	1972	MC DONNELL MDC-A-1530 Advanced Development on Vulnerability/ Survivability of Advanced Composite Structures
	U	1972	NASA CR-120952 Examination of the Collision-Force Method for Analyzing Responses of Simple Con- tainment/Deflection Structures to Impact by One Engine Rotor Blade Fragments
155524	C	1971	BRL-MR-2102 Vulnerability Characteristics of the Helicopter Suction-Boost Fuel System

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## A-4. FUEL SYSTEMS VULNERABILITY

<u>DDC:</u> <u>AD NO.</u>	<u>SEC.</u> <u>CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1950	BRL-MR-510 Vulnerability of the B-29 to .60 Cal. and 20 mm Incendiary Ammunition
378,507	S	1950	BRL-MR-513 The Fuel Fire Problem in Aircraft Vulnerability
	U	1952	BOWDEN AND YAFFE - 541.39 B784 Initiation and Growth of Explosion in Liquids and Solids
366,813	C	1952	BRL-TN-759 Effectiveness of 20 mm Shell with Various HEI Fillers Against Aircraft Fuel Cells
	U	1952	NACA-RM-E52621 Preliminary Survey of Airplane Combat Problem
3825	C	1952	BRL REPORT 638 Some Tests of the Terminal Ballistic Performance of Russian 23 mm Projectiles (API and HEI-T)
480,207	U	1953	BRL-TN-828 Fragment Firings Against Aircraft Fuels at Simulated Altitude
366,242	C	1956	APG REPORT The Incendiary Effectiveness of HEI Fillers in 20 mm Projectiles
	C	1956	BRL-MR-988 Internal Blast Damage to Aircraft Structures, Enhanced by Hydraulic Shock in Fuel Tanks
	C		GOODYEAR REPORT 19-459 Self-Seal Coating for Aircraft Inflammable Liquid Lines and Tanks
	U	1956	NACA-TN-3276 Properties of Aircraft Fuels

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## Fuel Systems Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1957	NACA REPORT 1300 Basic Considerations in the Combustion of Hydrocarbon Fuels with Air
302156	C	1958	BRL-MR-1159 Passive Defense of Aircraft Fuel Tanks
	C	1961	BRL-MR-1324 Effectiveness of Lightweight Self Sealing Fuel Cell Material Against Cal. 0.30 Bullets
	U	1964	MIL-T-5578C Specification - Self Sealing Fuel Cells
	U	1965	USAF-APL-TR-65-18 Ignition Characteristics of Fuel and Lubricants
	U	1965	NASA-TN-D-3143 Investigation of Characteristics of Pressure Waves Generated in Water Filled Tanks Impacted by High Velocity Particles
378,608	C	1965	GOODYEAR REPORT 19-452 Vulnerability Testing of Aircraft Non- Metallic Fuel Tanks and Fire Suppression Materials
	C	1966	NASA-TM X-1224 Methods for Reduction of Fracture Damage of Projectile-Impacted Liquid-Filled Tanks
373,247L	S	1966	USAAVLABS-TR-66-15 Study of Aircraft Fuel Protection Systems
629,765	U	1966	USAAVLABS-TR-65-18 Rapid Gelling of Aircraft Fuel

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## Fuel Systems Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1966	NASA-TN-D-3627 Effect of Projectile Size and Material on Impact Fracture of Walls of Liquid Filled Tanks
377,657	C	1966	BRI-TN-1623 Effects of Incendiary Projectile Impacts on Vehicle Fuel Tanks
631610	U	1966	USAAVLABS 66-24 Aircraft Fuel Tank Design Criteria
	U	1966	AFAPL-TR-66-21 Ignition Characteristics of Fuels and Lubricants
	U	1966	WESTCO REPORT Feasibility Study of Turbine Fuel Gels for Reduction of Crash Fire Hazards
373,633	C	1966	AFAPL-TR-66-9 A Review and Analysis of the Safety of Jet Fuel
833,827	U	1966	ASJ-TM-66-1 Investigation of Polyurethane Foam for Aircraft Fuel System Applications
833,826L	U	1966	FIRESTONE REPORT NO. 1819 Development and Testing of Cellular Packing Material
	U	1966	AIRCRAFT ENGINEERING, APRIL 1966 The Ignition of Inflammable Fluids by Hot Surfaces
380,958L	C	1967	USAAVLABS-TR-67-5 Design and Application Techniques of Lightweight Foam Plastics for Fire Suppression in Army Aircraft
380,877L	S	1967	AFAPL-TR-67-36 Evaluation of Flame Arrestor Materials for Aircraft Fuel Systems

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## Fuel Systems Vulnerability (Continued)

<u>ADC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
382874L	C	1967	USAAVLABS 67-15 Fuel Gelling for Ballistic Protection of Aircraft Fuel Tanks
654816	U	1967	USAAVLABS 67-24 Investigation of Feasibility of Emulsified Fuels in Gas Turbine Engines
827051	U	1967	USAAVLABS 67-62 Investigation and Analysis of Aircraft Fuel Emissions
824,028L	U	1967	USAAVLABS-TR-67-39 Aircraft Fuel Cell Explosion Suppression Systems and Their Applicability to Army Aircraft
818,330L	U	1967	USAAVLABS-TR-67-33 Aircraft Fuel Systems Design Study
	U	1967	629-13443-A298 Aircraft Fluids Fire Hazard Symposium Proceedings 1966
	U	1967	ASD/SEJIF-67-2 Evaluation Report on Effect of 50 Cal. API Gunfire on JP-4, JP-5, WSX-7063 Emulsified Fuel and Petrolite Emulsified Fuel
	S	1967	ASD/SEJIF-67-3 (67-SEJ-139) O-2A Wing Tank Gunfire Tests
832,515	U	1968	NWL-TR-2157 Ballistic Test of a Rigid Polyurethane Foam Used as a Fire Suppressant and Fuel Cell Support for the OV-10A
389,808L	C	1968	USAAVLABS-TR-67-77 Improved Crash-Resistant Self-Sealing Fuel Tank Material
	U	1968	AFAPL-TR-68-44 Fibercell Overheat Hazard Detection System
	U	1968	AFAPL-TR-68-47 Investigation of Pyrotechnic Generated Gas Discharge Fire Extinguishing System

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## Fuel Systems Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
670,935	U	1968	USAAVLABS-TR-68-20 A Vulnerability Evaluation of Emulsified Fuels for Use in Army Aircraft
83-,176	U	1968	AFML-TR-68-125 Protection of Aircraft Fluid Systems
300,890L	C	1968	TAC-TR-67-237 Aircraft Fuel Cell Explosion Suppression (UH-1F, U-10B, C-47D, C-130B Aircraft)
845,269	U	1968	AFML-TR-68-223 Ignition Characteristics of the .50 Caliber API-M8 vs 2024-T3 Aluminum Plates
854,305	U	1968	AFML-TR-68-356, PART I Improved Materials for Aircraft Self- Sealing Fuel Cell Systems
504,823	U	1968	AFAPL-TR-67-148 (BuMines) Evaluation of Flame Arrestor Materials for Aircraft Fuel Systems
393,627L	C	1968	TAC-TR-67-243 Aircraft Fuel Cell Explosion Suppression (o-1G, A-1E, T-28D)
	U	1969	UNIROYAL-FC-1242-69 Demonstration Gunfire Test - Uniroyal Self-Sealing Covers for Power Plant Fuel and Oil Lines
	U	1969	AFAPL-TR-69-11 (BuMines ERC-4073) Fuel Tank Explosion Protection
852,712	U	1969	AFAPL-TR-69-16 Investigation of Aircraft Chemical Extinguishment Fire and Explosion Suppressant Systems
501,101L	C	1969	NWCCL-TP-819 Analytical Method for Predicting the Occurrence and Lethality of Aircraft Fuel Fires

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## Fuel Systems Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1969	AFAPL-TR-69-46 Aircraft Fuel Tank Inerting by Means of Fuel Cell Fuel Fogging
688,165	U	1969	USAAVLABS-TR-68-82 Development of Crash-Resistant Flammable Fluids System for the UH-1A Helicopter
687,325	U	1969	USAAVLABS-TR-69-2 Emulsified Fuels Combustion Study
855,633L	U	1969	USAAVLABS-TR-69-35 Field Application Study and Environ- mental and Ballistics Evaluation of Vithane Sealing Materials
844,931	U	1969	AFAPL-TR-69-1 Investigation of Perforated Plastic Spheres Concept for Fuel Tank Fire Suppression
	U	1969	AFML-TR-68-183, PART II Self-Sealing Systems for Integral Fuel Tanks
853,159L	U	1969	NAPTC-AED-1903 Development of an Aircraft Fuel Additive to Suppress the Bulk Flammability of Fuel
504,144	C	1969	ELNVAL REPORT PSR-358 Fire Extinguishment in Aircraft Void Spaces
860,068	U	1969	AFAPL-TR-69-66 Development of Full Scale Pyrotechnic Generated Gas Discharge Fire Extinguish- ing System
859,970	U	1969	GOODYEAR REPORT 19-607 Fuel Fire Protection Device for Small HEI Projectile Threat
865355	S	1969	AFFDL-TR-69-114 Survivable Fuel Tank Systems Selection Technique, R&D Interim Report (Phase I) Volumes 1 and 2

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## Fuel System Vulnerability (Continued)

<u>SBC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
507100	S	1969	AFFDL-TR-69-115 Survivable Fuel Tank Systems Selection Techniques, R&D Interim Report (Phase II) Volumes 1 and 2
	U	1969	AFFDL Variable Geometry External Fuel Tanks
	U	1969	WHITTAKER CORPORATION 1st Interim Report, Variable Geometry Fuel Tank
	U	1969	WHITTAKER CORPORATION 2nd Interim Report, V.G. Fuel Tank
864118	U	1969	USAAVLABS TR-69-73 Emulsified Fuel System Design Study
870435L	U	1970	MC DONNELL DOUGLAS MDCJ0044 Fuel Tank Vulnerability Reduction
504650	U	1970	AFAPL-TR-70-39 Fire Suppression for Aerospace Vehicles
889735L	U	1970	GENERAL DYNAMICS ERR-FW-1091 Hydraulic Ram Effect of Small Arms Fire on Aircraft Fuel Tanks
507099	S	1970	AFFDL TR-69-114 VOL. 2, PHASE I Survivable Fuel Tank Systems, Selection Techniques, Volume II
507100	S	1970	AFFDL TR-69-115, VOL. 2, PHASE II Survivable Fuel Tank Systems Selection Techniques, Volume II
865355	U	1970	AFFDL TR-69-114, VOL. I, PHASE ONE Survivable Fuel Tank Systems Selection Techniques, Volume I
865356	U	1970	AFFDL TR-69-115, VOL. I, PHASE II Survivable Fuel Tank Systems Selection Techniques, Volume I

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## Fuel System Vulnerability (Continued)

<u>DDC</u> <u>AD NO.</u>	<u>SEC.</u> <u>CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
509540	S	1970	AFEDL TR-70-6, VOLUME III (FINAL REPORT) Survivable Fuel Tank Systems Selection Techniques, Final Technical Report, Volume III
509584	S	1970	AFEDL TR-70-6, VOLUME II, FINAL REPORT Survivable Fuel Tank Systems Selection Techniques, Rand D Final Technical Report, Volume II
509605	S	1970	AFEDL TR-70-43, VOLUME II--DESIGN HANDBOOK Survivable Fuel Tank Systems Selection Techniques, Rand D Design Handbook Report, Volume II
870915	U	1970	AFEDL TR-70-6-VOL. I, FINAL REPORT Survivable Fuel Tank Systems Selection Techniques, Rand D Final Technical Report, Vol. I
8684151	U	1970	NADC MA-7017 External Fuel Tank Fuel Containment
866136	U	1970	AFAPL TR-69-107 An Ultraviolet Sensing Flame Detector for Use on High Performance Military Aircraft
874047	U	1970	AFAPL TR-70-40 Flame Arrestor Materials for Fuel Tank Explosion Protection
874046	U	1970	AFAPL TR-70-39 Fire Suppression for Aerospace Vehicles
	U	1970	AFAPL TR-69-108 Investigation of Additives for Vulnerability Reduction of JP-4 Fuel
869386	U	1970	AFAPL TR-69-115 Development of High Temperature Fire Sand Explosion Suppression System

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## Fuel System Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
876594	U	1970	APFH TM-70-34 Evaluation of JP-8 versus JP-4 Enhance- ment of Aircraft Combat Survivability
872035	U	1970	SAFML TR-70-4 Filament Wound Fiber Glass Wing Tank
	S	1970	AFDDI-TR-70-43 Survivable Fuel Tank Systems Selection Technique, R&D Design Handbook Report
870916	S	1970	Volume I
509606	S	1970	Volume II
	U	1970	AFDDI/AFAPL Survivable Fuel Systems
	U	1970	WHITTAKER CORPORATION 3rd Interim Report, V.G. Fuel Tank
	U	1970	ASNEE 20, ER-70-1 ASD Evaluation Report, Gunfire Testing of Nitrogen Fogged Fuel
	U	1970	AFAPL/APFH-TM-70-34 Evaluation of JP-8 Versus JP-4 Fuel for Enhancement of Aircraft Combat Survivability
	U	1970	ASD Technical Evaluation Report, Gun- fire Evaluation of Self Sealing Fuel Lines
	U	1970	MC DONNELL DOUGLAS CORPORATION A0242 Gunfire Evaluation of Self Sealing Fuel Cell Installation, F-4 Survivability

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## Fuel System Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
734238	U	1971	AFAPL TR-71-86 Ignition of Aircraft Fluids by Hot Surfaces Under Dynamic Conditions
883467	U	1971	AFAPL TR-70-89 Evaluation and Potential Aircraft Applications of Pulsating Flow
889485L	U	1971	NWC-TP-5227 Fluid Dynamic Analysis of Hydraulic Ram
880561	U	1971	SAFAPL TR-70-83, VOL. I, II Aircraft Fuel Tank Inerting Program
514248L 881510L	U	1971	AFAPL TR-70-85, VOL. I, II A Fuel Tank Inerting System for Military Aircraft
884043	U	1971	AFML TR-68-356 PT. II Improved Materials for Aircraft Self- Sealing Fuel Cell Systems
	U	1971	AFAPL - INTERIM TECHNICAL REPORT Flame Arrestor Materials and Fuel Tank Protection Systems
516762L	C	1971	BRI.-MR-2102 Vulnerability Characteristics of the Helicopter Suction-Boost Fuel System
725027	U	1971	AFAPL TR-71-7 Analysis of Aircraft Fuel Tank Fire and Explosion Hazards
729870	U	1971	USAAMRDL TR-71-35 Study to Determine the Application of Aircraft Ignition-Source Control Sys- tems to Future Army Aircraft
723988	U	1971	USAAVLABS TR-71-8 Crashworthy Fuel System Design Criteria and Analyses
894171	U	1971	RAE TR-71194 Environmental Tests of Reticulated Plastics Foam for Use in Aircraft Fuel Tanks

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## Fuel System Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1971	AFFDL-TR-71-145 Variable Geometry Fuel Tank
	U	1971	AFFDL(FVS)-WP-71-1 Fuel Tank Vulnerability Evaluation (Task I, SHots 1-4)
	U	1971	AFFDL(PTS)-WP-71-2 Fuel Tank Vulnerability Evaluation (Task I, Block 1, 2 Completion)
	U	1971	AFFDL(FBS)-WP-71-2 F-15 Voided Foam Evaluation Summary
	U	1971	AFFDL(FBS)-WP-71-3 A-X Fuel Tankage/System Vulnerability Consideration
	U	1971	AFFDL(PTS)-WP-71-3 Fuel Tank Vulnerability Evaluation (Task I, Blocks 3 and 4)
	U	1971	AFFDL/FBS/WHITTAKER R&D Variable Geometry External Fuel Tanks
	U	1971	AFFDL/FBS Integral Variable Geometry Fuel Tanks
520003L	C	1972	NWL-TR-2669 Minimum Hole Size Required for Ignition & Sustained Burning of Surface Target Fuel Tanks by Incendiary Projectiles
	U	1972	AFAPL TR-72-12 Advanced Flame Arrestor Materials and Techniques for Fuel Tank Protection
	U	1972	NADC 72039-SD Vulnerability Study of a Generic Air- craft Fuel Subsystem
	U	1972	AFFDL(PTS)-WP-72-1 Survivability Test Data Working Paper, F-4 Main Fuel Tank System Gunfire Tests

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## Fuel System Vulnerability (Continued)

<u>DDC</u> <u>AD NO.</u>	<u>SEC.</u> <u>CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
377167	C		BRL-MR-509 The Effect of Blast on Aircraft Fuel Tanks
	U		WHITTAKER CORPORATION 4th-6th Interim Reports, V.G. Fuel Tank
	U		AFAPL/APFL-TM-68-1 Evaluation of Western Research Company FR-3 Fuel Additive
	U		AFAPL/APFL-TM-68-10 Whiffle Ball Fire and Explosion Suppres- sion Concept, Program Report, Phase I Spheres

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## A-5. ARMAMENT AND STORES VULNERABILITY

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1947	BRL-MR-472 Vulnerability of Simulated Missile Warheads
	C	1949	BRL-REPORT-691 Vulnerability of Warheads to Single Fragments
	U	1949	BRL-MR-486 A Comparative Study of the Vulnerability of Warheads Loaded with TNT and COMP. B
	C	1951	BRL-MR-567 Vulnerability of Bombs and Warheads to Bullets
	U	1952	NOLR-1111 Ordnance Explosive Train Designer's Handbook
	C	1953	BRL-MR-698 Probability of a High Order Detonation of Certain G.P. Bombs when Struck by Cubical Steel Fragments
369,232	C	1958	BRL-TN-1188 Low Order Detonation of Sparrow Warheads by Projectile Impacts
	C	1959	NWL-TM-T-25/59 Hazard Classification Tests of Pre-Packaged Liquid Thrust Unit (Sparrow)
	U	1960	NASA-TN D-442 A Preliminary Investigation on the Destruction of Solid Propellant Rocket Motors by Impact from Small Particles
	C	1962	JOHNS HOPKINS UNIV.-SPIA-RP4 Sensitivity of Solid Rocket Propellants
	C	1962	AF-SSD-TDR-62-173 Explosive Classification of Solid Propellant Motors at Edwards Air Force Base

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## Armament and Stores Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1964	NAVWEPS-8507 Initiation of Explosives Through Metal Barriers
	C	1964	JOHNS HOPKINS UNIV.-CPIA PUB. 43 Liquid Propellants; Safety and Hazards - A Bibliography
365,493	C	1965	NAVWEPS REPORT-8755 A Feasibility Study of the Use of Plastic-Bonded Explosives in MK 80 Series Low Drag Bombs
472,661	U	1965	APGC-TR-65-68 Impact Sensitivity Test of MK 81 and MK 82 Bombs and Related Explosives, Fuzes and Boosters
644,461	U	1966	PICATINNY ARSENAL-TR-3485 Response of Explosive to Fragment Impact
804,898L	U	1966	DASA REPORT-1833 Study of the Behavior of Systems Containing High Explosives when Subject to Fire
381,500	C	1967	BRL-TN-1652 Vulnerability of Small Caliber H.E. Ammo to Projectile Impact
501,633	C	1967	AFATL-TR-67-134 Sensitivity of Explosive Loaded Ordnance
844,165	U	1968	PICATINNY ARSENAL TR-3826 Tritonal Explosive Sensitivity of the 750 lb. M117A1 Demolition Bomb
394,303	C	1968	ADTC-TR-68-36 Explosive Hazards Test of the ACM-12E Missile
849,540	U	1968	NWC-TP-4643 High Explosive Equivalency Tests of Large Solid Propellant Motors

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## Armament and Stores Vulnerability (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
850,680L	U	1969	GARD-PROJECT 1443 Practical Stowed Ammunition Fire Extinguishing System
503,992	C	1969	BRL-MR-1994 Vulnerability Testing of Ammunition in a Structural Mockup of AH-56A
508607	C	1970	BRL-MR-2031 An Empirically Based Analysis on the Response of HE Munitions to Impact by Steel Fragments
875057	U	1970	ADPC TR-70-174 Sensitivity Tests of the CBU 46A Munition
510256L	C	1970	NADC SD-7019 Vulnerability of Aircraft Armament
881781L	U	1970	FRANKFORD ARSENAL R-1980 Survey of Fundamental Ignition Concepts and their Application to Caseless Ammo Vulnerability
883919	U	1970	AFATL TR-70-60 Critical Mass-Velocity Determinations for 37, 40, 57, 76, and 90 mm Artillery Cartridges
518200	C	1971	DDC TAS-71-49 Explosive Materials: Safety
518201	C	1971	DDC TAS-71-50 Ammunition: Safety
893651L	U	1972	BRL-CR-65 Vulnerability of Propellant-Filled Munitions to Impact by Steel Fragments
901621L	U	1972	AFATL TR-72-32 25 mm Caseless Ammunition Vulnerability and Fire Extinguishing Study

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## A-6. ARMOR - PENETRATION

DDC AD NO.	SEC. CLASS.	DATE	REPORT
	U	1944	WATERTOWN ARSENAL-ACD 170 Aircraft Armor - An Empirical Approach to the Efficient Design of Armor for Aircraft
504636	U	1951	FRANKFORD ARSENAL R-903 Perforation Limits for Nondeforming Projectiles
3823	C	1952	BRL-REPORT 638 Some Tests of the Terminal Ballistic Performance of Russian 23 mm Projectiles (API and HEI-T)
	U	1954	NRL-MR-342 The Penetration Resistance of 24-S Alum Alloy to Sharp Edged Parallelopiped
	U	1956	NAVORD-5042 A Metallographic Study: Steel Missile Penetration into Aluminum Plate
143533	C	1957	BRL-MR-1083 An Empirical Analysis of the Perforation of Rolled & Cast Armor by Conventionally Shaped Kinetic Energy Projectiles of Cals. 37 mm through 155 mm
93,526	C	1957	BRL-MR-970 A Comparison of Soviet and American Armor Plate
162,749	C	1958	PROJECT THOR-TR-36 A Study of the Residual Velocity of Steel Fragments Impacting on Four Materials
	C	1959	WADC-TR-248 The Ballistic Properties and Use of Armor Materials
309,198	C	1959	PROJECT THOR-TR-41 A Comparison of the Performance of Frag- ments of Four Materials Impacting on Various Plates

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## Armor - Penetration (Continued)

<u>DDC AD NO</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1959	NASA-TN D-137 A Preliminary Investigation of the Penetration of Slender Metal Rods into Thick Metal Targets
358,229	C	1960	BRL-TN-1362 Ballistic Limit Evaluation of Armor Attacked by Flechettes
	S	1960	PROJECT THOR-TR-44 The Resistance of Two Nose Cone Materials to Perforation by Steel Fragments
384598	U	1960	BRL-TN-1339 Armor Protection of Airborne Assault Vehicles
	C	1960	NOTS-TP-2453 Principal Results of a Study of the Effectiveness of Fragment Warheads Against Armor Plate
321544	C	1960	BRL-MR-1309 Passive Protection for the Personnel of H-13 and H-23 Helicopters
322,781	C	1961	PROJECT THOR-TR-47 The Resistance of Various Metallic Materials to Perforation by Steel Fragments
327015	C	1961	BRL-MR-1151 Passive Protection of Aircraft
326719	C	1961	BRL-MR-1367 Passive Protection for the Personnel of HU-1A Helicopters
	C	1961	US ORD CORPS ORDP 20-170 Ordnance Engineering Design Handbook-- Armor and Its Application to Vehicles
324,076	C	1961	BRL-MR-1337 Steel and Aluminum Armor Perforation Capabilities of 14.5 mm API, Cal. 0.50 AP, Cal. 0.30 AP and Cal. 0.30 Ball Projectiles

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1965	GOODYEAR LETTER REPORT DATA -HFC Armor General Information -HFC Armor Design Data -HFC Armor Ballistic Design Information
	U	1965	MIL-S-46099 (MR) Military Specification - Steel Armor, Roll-Bonded, Dual Hardness
	C	1965	ALCOA RES. LAB 13-AXS-19 Aluminum Armor
360,764L	S	1965	AMRA-MS-65-01 Proceedings of Symposium on Lightweight Armor Materials
362956	C	1965	USAAVLABS 64-57 Environmental Ballistic Evaluation of HFC Armor for CH-34 Helicopter
363383	C	1965	USAAVLABS 64-64 CH-34 Component Armor Protection System Design
363412	C	1965	USAAVLABS 65-33 Improved Modular UH-1 Armor System
367,071L	S	1965	AMRA-TR-65-26 Ceramic Composite Armors
366960L	U	1965	FRANKFORD ARSENAL R-1823 State/Art Study of Armor Materials Appl. to Modular Construction
365,760	C	1965	AEROJET-GENERAL CORP. Transparent Composite Armor Materials for Aircraft Applications
	S	1966	UNITED STATES RUBBER CO. PD-107 Non-Metallic Armor-Data Sheets
376883L	C	1966	USAAVLABS 66-54 Study of Dynamic Effects of Caliber 0.30 and 0.50 Projectile Impacts on Ceramic Plastic Armor and Supporting Bracketry

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1962	ASTIA REPORT BIBLIO.-11923 Armor Defeat by Surface-to-Surface and Air-to-Surface Weapon Systems
328,796	C	1962	DENVER RESEARCH INST.-DRI-2025 The Dynamics of Terminal Ballistics Ballistic Evaluation Procedures for Armored Grille Designs
424303	U	1962	Analysis of Straight Path Pen. of Multilayer Bodies of Rotation
	U	1962	NAVWEPS-7812 Analytical Versions of Penetration Processes
	U	1962	NAVWEPS-7906 Linearized Theory of the Penetration of a Rod into a Thick Target
354,270	C	1963	AMRA-MS-63-03 Current Technology of Light Armor Materials for U.S. Army Aircraft
	U	1963	NAVWEPS-8088 Impact at Intermediate Velocities Involving Contact Phenomena
	C	1963	BRL-MR-1442 Performance of Long Rods Against Steel Armor Targets
343,439L	C	1963	USATECOM-DPS-1074 (AD 1367) (APG) Engineer Design Test of Titanium Armor
336,461	C	1963	PROJECT THOR-TR-51 The Resistance of Various Non-Metallic Materials to Perforation by Steel Fragments
354,853	C	1964	AMRA-MS-64-06 Proceedings of the Metallurgical Advisory Committee on Rolled Armor
601,200	U	1964	PHILCO RESEARCH LABS. RPT. - U-2500 Study of Mechanisms of Armor Penetration Resistance

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Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
350,361L	C	1964	PROJECT THOR-TR-56 The Characteristics of Particles Formed During the Perforation of Beryllium by Steel Fragments
351,289	C	1964	CARDE-TR-486/64 Studies in Armor Penetration
360,133	C	1964	AMRA-CR-64-06/1 Lightweight Dual Hardness Ausformed Armor Plate
	C	1964	USATRECOM 64-2 Aircraft Component and Structures Investigation UH-1B
356093L	U	1964	USAAVLABS 64-62 Aircraft Component and Structures Armor Investigation (UH-1B)
610587	U	1964	USAAVLABS 64-73 Armor Protection for Pilot/Co-Pilot Seat w/Crash-Safety Features for CH-47A Helicopter
357111	C	1964	USAAVLABS 64-72 Application of HFC Armor to the CH-34 Helicopter
356461	C	1964	CARDE TR-501-64 On the Perforation of Thin Armored Targets by Dense Spherical Projectiles
354,074	C	1964	AMRA-MS-64-07 Ballistic Technology of Lightweight Armor Materials
351,315	C	1964	FRANKFORD ARSENAL-TR-R-1719 Ballistic Performance of Cast Aluminum Alloy Plates
358,893	C	1964	PROJECT THOR-TR-57 The Characteristics of Particles Formed During the Perforation of Steel Armor by Steel Fragments

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	C	1966	AMMRC ABI 58 Armor Materials Assessment for Engineer- ing System Development On Lightweight Helmet
631,467	U	1966	USAAVLABS-TR-66-5 Feasibility of Armor Material as Basic Aircraft Structure
	C	1966	USAAVLABS-TR-66-14 Optimization of Armor Protection Coverage for Army Aircraft Aircrews
	S	1966	USAAVLABS-TR-66-20 Parametric Design Study, Ballistic- Resistant Aircraft Components
	U	1966	NASA-TN D-3468 Dimple, Spall and Perforation Character- istics in Aluminum, Columbium and Steel Plates under Hypervelocity Impact
800,200	U	1966	AFFDL-TR-66-160 USAF Guide to Parasitic Armor Installation
376,474	C	1966	BRL-MR-1777 Estimation of the Loss of Velocity and Mass of Fragments During Target Perforation
375,825L	C	1966	U.S. ARMY NATICK LABS.-TR-67-11-CM Studies in the Perforation of Thin Metallic Plates by Projectile Impact - II. Normal Impact by Military Projectiles
	S	1966	AMRA-MS-66-07 Proceedings of the Second Symposium on Lightweight Armor Materials
	U	1966	NADC-AW-6607 (CAYWOOD-SCHILLER ASSOCIATES) Methodology for Determining Efficient Armor for Military Aircraft
800200	U	1966	AFFDL-TR-66-164 USAF Guide to Parasitic Armor Installation

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## Armor - Penetration (Continued)

<u>DDC</u> <u>AD NO.</u>	<u>SEC.</u> <u>CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
384,773	C	1966	USAAVCOM-TR-66-4-CH.V Aircraft Armor Design Data, Ch. V, Armor Hit Evaluation
384,769	S	1966	USAAVCOM-TR-66-4-CH. II Aircraft Armor Design Data, Ch. II, Armor Material Evaluation
384,770	S	1966	USAAVCOM-TR-66-4-CH. VI Aircraft Armor Design Data, Ch. VI, Lightweight Armor Objectives
387,014	S	1966	CARDE-TN-1718/66 .50 Inch AP Projectile Lethality Assessment Study
378,570	C	1966	BRL-MR-1789 Penetration Capability of Various Spin and Fin Stabilized Projectiles into Armor Targets
376,494	S	1966	JOHNS HOPKINS-BAL-TR-63 The Characteristics and Lethality of Particles Formed During the Perforation of Steel Armor by Steel Fragments Supplement Project THOR TR-57
	U	1966	FRANKFORD 67-7-1 High Strength Aluminum Armor Composites
376765L	U	1966	FRANKFORD ARSENAL R-1823 Spaced Composite Armor Against Large Cal. Threats
379,243L	S	1966	USAAVLABS-TR-66-84 (NARMCO) Development of RAM-Armor Structures
382,142	C	1966	BATTLE REPORT-RACIC-TR-53 Development of Titanium Dual-Hardness Armor Plate Materials
380,935	S	1967	AMRA-CR-67-06(F) Ballistic Performance Variability of Various Composite Armor Materials

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
381,956	S	1967	BATTELLE REPORT-RACIC-TR-56 Current Status of Lightweight Armors
820,356	U	1967	AFML-TR-67-208 The Mechanics of Ballistic Impact - A Survey
384,694	C	1967	PROJECT THOR-TR-65 The Characteristics of Particles Formed During the Perforation of Alum Alloy by Steel Fragments
387,013L	S	1967	AMERICAN ORDNANCE ASSOCIATION PROCEEDINGS Conference on Fabrication and Utilization of Materials for Light Armor
381956	S	1967	ARPA RACIC-TR-56 Current Status of Lightweight Armor Materials
380091L	U	1967	ABERDEEN PROVING GROUND DPS-2344 Study of Relationships Between Penetra- tion Prob. and Bal. Lim. Wm. Phoeplus
823,537	U	1967	BRL-R-1379 Optimum Projectile Design for Armor Penetration
383712	S	1967	USAAVLABS 67-7 Unconventional Armor Systems Conceptual Study
384309	S	1967	AFFDL-TR-67-64 Investigation of Passive Defense Pro- visions for Aircraft Crews & Passengers
	S	1967	AMMRC ABI 80 Heat Treatable Dual Hardness Steel Armor
	S	1967	AMMRC ABI 88 Transparent Armor Materials Technology
386,694	C	1967	AFATL-TR-67-116 Multiplate-Damage Study

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## Armor - Penetration (Continued)

<u>DDC</u> <u>AD NO.</u>	<u>SEC.</u> <u>CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
661,833	U	1967	NWC-TP-4414 Penetration Mechanics and Post-Perforation Effects in an Aluminum-Aluminum Impact System
395,974L	C	1967	US ARMY FACOM-TR-16307 Statistical Test Procedures for Evaluating Penetration by Steel Fragments
386,611	S	1967	FRANKFORD ARSENAL REPORT Minutes of Armor and Armor Penetration Conference 22-23 Aug. 1967
385,676L	C	1967	NWC-TP-4333 Application of Ballistic Perforation Mechanics to Target Vulnerability and Weapons Effectiveness Analysis
390,880	C	1967	NWC-TP-4532 Ballistic Perforation Dynamics of Armor-Piercing Projectiles
391,080	C	1967	LITTLETON REPORT-10052 Armor Design for Protection Against High Explosive Fragments
386,633	S	1968	AMMRC-CR-67-17(F) Development of Armor System for Defeating 57 mm HEAT and 14.5 mm Ammunition
388,944	C	1968	AFFDL-TR-68-26, VOLUME 1 Analytical and Experimental Development of Design Techniques for the Installation of Parasitic Armor
389,744	C	1968	PROJECT THOR-TR-66 The Resistance of Steel Targets to Perforation by Small Caliber Armor-Piercing Projectiles
389,494	C	1968	ALCOA RESEARCH LABS. REPORT Ballistic Properties of Alum Alloy 7039 and 5083 Armor Plate Against Small Arms Ammunition

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
389,652L	S	1968	ARMY MATERIEL COMMAND-TIR-33.1.2.2 Personnel Armor for Ground Troops and Aircrews
388,597	C	1968	AFFDL-TR-68-5 Design Techniques for Installing Parasitic Armor
	S	1968	AMMRC ABI 108 Armor Materials R&D Review
	C	1968	AMMRC ABI 125 Armor Materials R&D Review
392023L	U	1968	HSEF-5035 Dynamic Armor Feasibility Study-- Donald Speed: Ham. Std. Sys. Ctr.
390,810L	C	1968	APG LTR REPORT-DPS-2770 Armor, Ballistic Data Summary
391,129L	C	1968	AMMRC-CR-68-03(F) Optimization of a Lightweight Armor System for Defeating 20 mm HVAP Ammunition
392,171L	S	1968	AFML-TR-68-147 Evaluation and Modification of Light- weight Armor Materials Systems and Data
391,871	S	1968	CARDE-T.R. 581/68 A Fragmentation Evaluation Technique for Small Caliber AP Projectiles
674,656	U	1968	U.S.A. WPNS. CMD.-TR-68-1865 Transparent Armor: A Literature Survey
391,860L	S	1968	AMMRC-CR-68-04(F) Evaluation of Lightweight Armor to Protect Against HEAT Ammunition
845,291	U	1968	AFATL-TR-68-97 Ballistic Evaluation of Tipping Plates - First Phase
394,512	C	1968	BRL-TN-1705 A Mathematical Model for Predicting Residual Velocities of Fragments After Penetrating Helmets and Body Armor

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
845,001L	U	1968	NWC-TP-4522 Simulation of Weapon-Target Encounters for Vulnerability Analyses
848,937	U	1968	AFML-TR-68-362 Evaluation and Development of Fluid Armor Systems
395,343	C	1968	CARDE-T.R. 589/68 A Fragmentation Evaluation Technique for Small Caliber Armor Piercing Projectiles
395,125L	C	1968	PICATINNY ARSENAL-TR-3751 Evaluation of Systems for Containing Frontal Spall Ejected From Hard-Faced Composites on Impact by Small Arms Fire
	U	1968	AFFDL Design Techniques for Parasitic Armor Attachments
	U	1968	ASD-68-ASZG-043 Gunfire Tests on Typical Gunship II Armor Installations
395,589	S	1968	NOL-TR-68-211 Research on a Lightweight Armor Material of Titanium Carbide in an Alloy Steel Matrix
395,474L	C	1968	FRANKFORD ARSENAL-FA-R-1900 Alumina-Aluminum Composite Vehicular Armor
391,301L	S	1968	USAAVLABS-TR-67-78 Dynamic Effects of Cal. .50 Projectile Impacts on Armor and Support Structure
395,865L	C	1968	FRANKFORD ARSENAL-R-1903 Comparative Performance of High L/D Ratio WC Penetrators Against Various Armors and Obliquities

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
395,652I	C	1969	APG-DPS-3046 Research Test of Lightweight Spaced Composite
853,845	U	1969	BRL-MR-1970 Yawing Motion of a Bullet After Pene- trating a Thin Plate
395,596L	C	1969	BATTELLE Development of Composite Dual-Hardness Titanium Armor Material
395,777L	C	1969	AFML-TR-68-384 Armor Materials Selection and Design Information
835,191L	U	1969	NWC-TP-4533 Deformation and Reduction in Weight of Compact Steel Fragments Perforating Thin, Mild Steel Plates
500,096L	C	1969	AMMRC-CR-68-14(F) Production Feasibility of Roll-Bonded Dual-Hardness Steel Armor Plate (U.S. Steel)
395,818	C	1969	PROJECT THOR-TR-70 The Resistance of Aluminum Alloy Targets to Perforation by Small Caliber Armor Piercing Projectiles
854769	U	1969	USAAVLABS 69-15 Manufacturing Technology - Dual Property Steel Armor for Aircraft Components
503387L	C	1969	USAAVLABS 69-52 Ballistic Test and Evaluation of Formed Sections of Heat Treatable Dual-Property Steel Armor
504360L	C	1969	AMMRC TR-69-17 Summary of Terminal Ballistic Data on Lightweight Armor Materials
	C	1969	AMMRC ABI 116 The Ballistic Performance of Potential Transparent Armor Materials

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
504302L	C	1969	AMMRC MS-69-02 Proceedings of Symposium on Lightweight Armor Materials
	U	1969	USAHEL TECH MEMO 18-69 Armor Systems Development/Evaluation Guideline
395777L	C	1969	USAFMI TR-68-384 Armor Materials Selection and Design Information
	U	1969	USAFSC-MAC Structural Design Guide for Advanced Composite Application by North American Rockwell Corp. under Contract F33615-69-C-1368
504226L	C	1969	FA-R-1911 Improved Preformed Penetrators, Part II: AVAP Type
509302L	C	1969	AMMRC MS-69-02 Proceedings of Symposium on Lightweight Armor Materials (Third)
505179L	S	1969	AMMRC MS-6902--SUPPLEMENT Supplement to Proceedings
505800L	S	1969	ARDC (APG) TR-2 A Parametric Analysis of Body Armor for Ground Troops
862368L	U	1969	NADC AC-6911 Evaluation of Ceramic Body Armor on Naval Air Development Center Ejection Seat Tower
508134L	C	1969	AMMRC CR-69-06(F) Transparent Armor (Glass-Plastic Composite) Final Report
505868L	C	1969	FRANKFORD ARSENAL FA-R-1920 Ballistic Evaluation of an Improved Calibration Cal. 0.50 AP Projectile

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<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1969	MC DONNELL G-814, VOL. I, II Integral Armor Study: Interim Report Covering Phase I
879347	U	1969	AFFDL TR-69-31 Parasitic Armor Attachment Methods
502,440	C	1969	BATTELLE DCIC-69-1 - PART II Ceramic-Armor Technology, Part II, Proceedings of Symposium Sponsored by AFML and DCIC, Jan. 29-30, 1969
503,996	C	1969	BRL-MR-1993 Ballistic Limit of Cubes Against Body Armor as a Function of Weight and Obliquity Angle
503,387L	C	1969	USAAVLABS-TR-69-52 Ballistic Test and Evaluation of Formed Sections of Heat-Treatable Dual-Property Steel Armor
504,529	C	1969	AFWL-TR-69-66 Testing of Ballistic Nylon for Use in Aircraft Shelter Doors
859,740	U	1969	NMC-TM-69-31 The Impulsive Rupture of Thin Plates Due to the Impact and Penetration of a Fragment Pattern
860,093	U	1969	AFATI.-TR-69-73 Numerical Solution of Ballistic Impact
505,599	C	1969	BRL-MR-2011 Expected Residual Velocities of Cubes Perforating Armor Material as a Function of Projectile Size and Obliquity Angle
504,200L	C	1969	AMMRC-CR-69-03(F) Ancillary Properties of Transparent Armor
504,360L	C	1969	AMMRC-TR-69-17 Summary of Terminal Ballistic Data on Lightweight Armor Materials

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Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1969	AFFDL-TR-69-31 Parasitic Armor Attachment Methods
	U	1969	FDFR-TM-69-6 Spall Suppression Methods for Personnel Protection
	U	1969	AFFDL Design Data and Procedures for Installing Ceramic Armor on Aircraft
	U	1969	AFFDL Design Techniques for Ceramic Armor Attachments
	U	1969	AFFDL Analysis of Ceramic Armor for Crew Station Applications
888846	U	1970	AFATL TR-70-38 Research Effort to Evaluate Target Vulnerability
508595	C	1970	THOR REPORT #71 Resistance of Steel to Perforation by Small Caliber Ball Projectiles
508077L	C	1970	PICATINNY ARSENAL TR-3865 Development of Composite Armor for Aircrewmembers Head Protection
510333	C	1970	AFML TR-70-81 Optimization of Aircrew Body Armor for Specific Aircraft Missions
	C	1970	AFML TR-69-105 An Armor System to Defeat the 14.5 mm API Projectile
	C	1970	AFML TR-69-201 Convertible Armor in Real A/C Geometries
877876	U	1970	DREV 619-70 The DREV (Canada) Uranium Development Program

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## Armor - Penetration (Continued)

<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	S	1970	JOURNAL OF DEF. RES. JDR-70-3 Light Armor
510455	C	1970	AMMRC CR-70-17 Development of a 14.5 mm BS-41 Composite Armor System
	U		BATFELL/DMIC Titanium Base Alloys--6Al-4V
381779	U	1970	AFATL TR-70-78 A Combined Theoretical and Experimental Investigation of Penetration Mechanics
713513	U	1970	ARMY ENG. WATERWAYS EXPERIMENT STATION Response of Selected Materials to High-Speed Fragment Impact
513973L	U	1970	ARMOR TACOM TR-11172 Anti-Personnel Mine Tests of Aluminum Armor
874888	U	1970	AFML TR-70-132 Melting and Casting of Lightweight Ceramic Armor
515262	C	1970	AFFDL TR-70-132 Feasibility of a Nondestructive Testing Device for Aircraft Ballistic Hardness
513316	C	1970	BRL-CR-21 Project Thor-75: The Resistance of Aluminum Alloy Targets by Perforation of Small Caliber Ball Projectiles
891285L	U	1970	AFATL TR-70-65 Test Methodology and Ballistic Testing of an Experimental Aircraft Passive Defense Armor System
891957L 891958L	U	1970	AFATL TR-70-112, BOOK I, II Ballistic Impact Mechanics of Selected Metallic and Composite Materials, Book I and II

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<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
	U	1970	FDTS-TM-70-1 Ballistic Damage Tolerance of Roll Bonded Titanium Panels
	U	1970	AFFDL TEST REPORT Ballistic Tests of the O-2 Aircraft Armored Seat
	U	1970	AFFDL Survivable Airframe and Armor
515116L	C	1971	NAVSHIPS 0913-000-0010 Design Handbook for Light and Medium Weight Ballistic Protective Systems
515917L	C	1971	USAAVLABS TR-70-61 Feasibility of Dual Hardness Steel as Structural Armor for Aircraft Components
517784L	C	1971	NWC TP-5229 Ballistic Penetration of Ship Structure
724289	U	1971	NWC TP-5110 High-Velocity Impact of Steel Spheres on Metallic Targets
886712L	U	1971	TACOM TR-11296 Feasibility of High-Energy Forming Large Armor Sections
889045L	U	1971	AFFDL TR-71-70 Terminal Effects of Spinning and Non- spinning Fragment Simulation Projectiles on Unbonded Ballistic Nylon
888839	U	1971	NRL-MR-2345 Effects of Heat Treatment Below the Beta Transus on Fracture Resistance of Ti-6Al-4V
888624L	U	1971	AFML RTD-200-1(I) Manufacturing Process for the Production of Tapered Titanium Alloy Plate and Sheet

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<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
518935L	C	1971	ASD XR-71-25 Crew Station Metallic Armor Test and Analysis
	U	1971	AFFDL TR-70-96, VOL. I Crew Protective Armor System Test Program, Volume I: Ballistic Testing of an F-89J Aircraft
	C	1971	MC DONNELL MDC-A-0027 Integral Armor Study: Interim Report Phase II
515239	S	1971	AFFDL TR-70-137 Fragment Suppression System for Air Crew Protection
518394L	C	1971	BRL-MR-7134 Penetration of Armor by Steel & High Density Penetrators
8894931.	U	1971	ANAL IB-Ti-9 Isothermal Forging of Reliable Structural Forgings
890364	U	1971	DREV R-624/71 Thermomechanics Treatment of High-Density Uranium Alloys
890370	U	1971	DREV M-2060-71 Proceedings of Uranium Alloy Research Conference at DREV, Feb. 12-13, 1970
886984	U	1971	AFML TR-70-54, PART II Ceramic Matrix Composites as Armor Materials
732305	U	1971	AFML TR-71-175 Plate Deformation by Projectile Titanium and Fiberglass
519230L	C	1971	AMMRC TR-71-21 Ballistic Technology for Lightweight Armor

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<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
518693L	C	1971	AMMRC CR-71-12 Transparent Armor Shields
891122L	U	1971	USAAMRDL TR-71-41-A Survivability Design Guide for US Army Aircraft, Vol. I: Small Arms Ballistic Protection
519060L	C	1971	USAAMRDL TR-71-41-B Survivability Design Guide for US Army Aircraft, Volume II: Classified Data for Small Arms Ballistic Protection
	U	1971	AFFDL-TR-70-137 Fragment Protection System Study
	S	1971	AFFDL-TR-70-159 Integral Armor Study for Fixed Wing Combat Aircraft
	C	1971	AFFDL-70-160 New Approaches to Armor Design for Combat Aircraft
	U	1971	AFFDL-TR-71-109 Integral Armor Study for USAF Combat Aircraft (5 Volumes)  Volume I - Aircraft Combat Vulnerability and Its Relation to Survivable Design  Volume II - Vulnerability and Vulner- ability Reduction As It Affects Combat Effectiveness of the F-4C and A-4E Aircraft  Volume III - Selection and Design of Lightweight Armor System for Tactical Airplanes

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<u>DDC AD NO.</u>	<u>SEC. CLASS.</u>	<u>DATE</u>	<u>REPORT</u>
			Volume IV - Integral Structural Armor for A Close Air Support Airplane
			Volume V - Combat Vulnerability/ Survivability Bibliography
	U	1971	AFFDL/FBS/MC DONNELL-DOUGLAS CORP. The Design and Test of an Integrally Armored Cockpit
	C	1971	ASD/XR, 71-25 Crew Station Metallic Armor Test and Analysis
	C	1972	AFFDL (FER) Wp-72-2 Ballistic Test of AC-130E Gunship Armor Installations
	U	1972	AFML TR-71-283 Mechanical Behavior of Reinforced Plastic Backing Materials for Composite Armor
	C	1972	ASD XR-72-2 Crew Station Ceramic Armor Test and Analysis
	C	1972	AFFDL(FER) PRELIMINARY REPORT Ballistic Tests of an Integral Armor Crew Station
104370	C	1972	NWC TP-5419 Ballistic Penetration of Ship Structure- Final Report
	C	1972	AFFDL(FER)-WP-72-2 Ballistic Test of AC-130E Gunship Armor Installations
	S		USAFML TR-66-271 Information for the Selection of Light- weight Armor Materials
	U		AFFDL(FER)-WP-72-3 Ballistic Tests of A-7D Armor System

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