DCN 189

DEPARTMENT OF THE ARMY
U.S. ARMY TOPOGRAPHIC ENGINEERING CENTER
7701 TELEGRAPH ROAD
ALEXANDRIA, VA 22310-3864

CETEC-ZA (10-5a) 19 OCT 1994

MEMORANDUM THRU Commander, U.S. Army Corps of Engineers, ATTN: CERD-ZA, 20 Massachusetts Ave N.W., Washington, DC 20314-1000

FOR Director of Management, Office of the Chief of Staff, ATTN: DACS-TABS, 20 Massachusetts Ave N.W., Washington, DC 20314-1000

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call

1. The U.S. Army Topographic Engineering Center (TEC) does not have any direct-funded efforts in the C4I functional area. TEC does perform reimbursable work and conduct support activities for PEO/PMs that fall under the C4I umbrella. Detailed information on those efforts should be provided by those offices.

2. TEC performs no work in the energetics functional area.

3. The information contained in this report is accurate and complete to the best of my knowledge and belief.

4. Point of contact is Ms. Cathy de Wolfe, CETEC-CS, (703)355-3703.

WALTER E. BOGE
Director

CF:
CERD-M

LIST OF ARMY ACTIVITY DATA CALLS RESPONSES FORWARDED TO LABORATORY-JCSWG:

1. Construction Engineering Research Laboratories, COE, Champaign, IL
2. Cold Regions Research & Engineering Laboraotry, COE, Hanover, NH
3. U.S. Army Topographic Engineering Center, COE, Alexandria, VA
4. Waterways Experiment Station, COE, Vicksburg, MS
5. U.S. Army Missile Command, Redstone, AL
6. U.S. Army Armament Research, Development & Engineering Center, Picatinny Arsenal, NJ
7. U.S. Army Communications-Electronics Command, Fort Monmouth, NJ

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF STAFF
200 ARMY PENTAGON
WASHINGTON DC 20310-0200

REPLY TO
ATTENTION OF

DACS-TABS

21 October 1994

MEMORANDUM FOR THE CHAIRMAN, LABORATORY JOINT CROSS SERVICE WORKING GROUP

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call for Functional Areas, C4I and Energetics.

The enclosed Laboratory data is provided in accordance with the Defense Base Closure and Realignment Act of 19990, as amended, which requires certification of the accuracy and completeness of all information provided to the Commission and the Secretary of Defense.

The attached data call has been certified at both the Installation and the Major Command level. The information contained in this report is true and complete to the best of my knowledge and belief.

If we can be of further assistance, please contact The Army Basing Study Office, Laboratory representative, Cathy Skidmore-Polmateer, (703)693-0077/8.

MICHAEL G. JONES
Colonel, U.S. Army
Director, The Army Basing Study

Printed on Recycled Paper

A

DEPARTMENT OF THE ARMY
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS
3909 HALLS FERRY ROAD
VICKSBURG, MISSISSIPPI 39180-6199

REPLY TO
ATTENTION OF

19 OCT 1994

CEWES-FV-Z (70)

MEMORANDUM FOR Department of the Army, Office of the Chief of Staff, ATTN: DACS-TABS (Colonel Michael G. Jones), Director, Army Basing Study, 200 Army Pentagon, Washington, DC 20310-0200

SUBJECT: Requests for Clarification to the LJCSG BRAC-95 Data Call

1. Reference memorandum, DACS-TABS, undated and received via fax, 13 October 1994.

2. This, the third request for clarification, addresses two functional areas, C4I and Energetics.

3. The U.S. Army Engineer Waterways Experiment Station is submitting a negative response to this supplemental data call since neither of these functional areas are applicable to our mission.

4. To the best of my knowledge and belief, the information contained in this supplemental report is accurate and complete.

ROBERT W. WHALIN, PhD, PE
Director

CF:
CERD-EA (Dr. Oswald)
CECRL-RM (Mr. Swart)

E

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

CHI Energetics

REPLY TO
ATTENTION OF:

20 OCT 1994

CERD-ZA

MEMORANDUM FOR DIRECTOR, THE ARMY BASING STUDY (DACS-TABS)

SUBJECT: Requests for Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call

1. Reference DACS-TABS memo, undated, subject as above.

2. The four U.S. Army Corps of Engineers Laboratories submits a negative report reference subject above.

3. POC is Ms. Eloisa E. Brown, CERD-L, (202)272-1834.

FOR THE COMMANDER:

4 Encls

ROBERT L. VANANTWERP
Colonel, Corps of Engineers
Chief of Staff

DEPARTMENT OF THE ARMY
COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, CORPS OF ENGINEERS
HANOVER, NEW HAMPSHIRE 03755-1290

CECRL-PP October 14, 1994

MEMORANDUM FOR Director of Management, Office of the Chief of Staff, Army, ATTN: DACS-TABS, Room 2A684, The Pentagon, Washington, DC 20310-0200

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call

1. Reference DACS-TABS Memorandum, subject as above.

2. The response to the subject data call requesting information on the two functional areas of C4I and Energetics is negative for USACRREL.

3. The information contained in this report is accurate and complete to the best of my knowledge and belief.

LEWIS E. LINK
Director

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. Box 9005
CHAMPAIGN, ILLINOIS 61826-9005

13 October 1994

REPLY TO
ATTENTION OF:

CECER-PP

MEMORANDUM FOR Director of Management, Office of the Chief of Staff, Army, ATTN: DACS-TABS (LTC Dave Powell), Room 2A684, The Pentagon, Washington, DC 20310-0200

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross Service Group (LJCSG) Data Call

1. Reference memorandum from DACS-TABS to Chief of Engineers, undated, subject as above which solicits information on two functional areas, C4I and Energetics.

2. The U. S. Army Construction Engineering Research Laboratories (USACERL) does not conduct research in C4I or Energetics and therefore cannot respond to the subject data call. This is accurate to the best of my knowledge and belief.

DAVID J. REHBEIN
LTC, EN
Commander and Acting Director

CF:
D. Leverenz/CERD-M
E. Brown/CERD-L

CLOSE HOLD/SENSITIVE

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MATERIEL COMMAND
5001 EISENHOWER AVENUE, ALEXANDRIA, VA 22333-0001

REPLY TO
ATTENTION OF

AMCRD-IT

OCT. 20 1994

MEMORANDUM FOR COLONEL MICHAEL G. JONES, DIRECTOR, THE ARMY BASING STUDY, OFFICE OF THE CHIEF OF STAFF, 200 ARMY PENTAGON, WASHINGTON, D.C. 20310-0200

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group Data Call - Command, Control, Communications, Computers and Information (C4I)

1. Reference memorandum, HQDA, DACS-TABS, undated, subject: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call.

2. Enclosed are two copies of the supplemental information on C4I, requested in referenced memorandum. The third copy was previously hand-delivered to Lieutenant Colonel Powell, DACS-TABS, on 13 October 1994. The disk will be provided by mail, separately, by 28 October 1994.

3. Exceptions to the data requirements are as follows:

a. Question 2a requested breakout of workyears by organizational element. For the U.S. Army Communications-Electronics Command (CECOM), we responded with on-board strength as we did in BRAC data call #5 - laboratories. We maintain workyear records by appropriation, not by organizational element. The on-board strength numbers should be very close to the workyear number. We tasked other C4I activities at Fort Monmouth for workyears and reported the number they provided us. This question also requested segregation of workyears by job category. We categorized workyears based on the overall function of the organizational element versus categorization by the job series of individual employees. For example, we listed all the workyears of the CECOM Legal Office as "legal," although some Legal Office employees are administrative and clerical. Please note, however, that the number of engineers and scientists we cite in our briefing (1,944) is the correct, actual number based on job series.

b. Question 2b requested square feet of space by type and organizational element. Our source for this information was the Installation Commander's Annual Real Property Utilization Survey which breaks out space by organization. The square footage we reported was all current space (permanent and temporary). This varies from the data we provided in the Installation Assessment

which called for only permanent space, included approved military construction through FY96 and was drawn from the Desktop Resource Real Property data base.

c. The response to question 2c is supplemented by the FY94 C4I Electronics Warfare Project Book we left with the LJCSG on 14 October 1994. It includes programs managed by CECOM, Program Executive Officer (PEO), Intelligence Electronics Warfare, and PEO, Command and Control Systems.

d. The maps annotated for question 3a show the current location of organizational elements. Some of these elements will move as a result of BRAC 93. The new locations are shown on the maps annotated for question 3b, space available in FY97.

e. As noted in our BRAC Data Call #5 - Laboratories, we do not have the initial cost of equipment which would be difficult to move or replicate (question 3c). We report, instead, our estimate of the replacement cost.

f. While not a Department of the Army "approved and programmed plan" (question 6), we are working an action to move the CECOM Communications Security Logistics Activity from Fort Huachuca, AZ, to Fort Monmouth in FY96. We plan to consolidate this agency and its national inventory control point into our Logistics and Readiness Center.

g. The "workyears" provided for tenant activities (question 8) are actually on-board strength figures.

4. Headquarters, CECOM has crosswalked the data for consistency with prior CECOM responses. As with previously submitted BRAC 95 data submissions, we have maintained auditable records at all levels of the command, which are on file in the RDTE Integration Division. The data was certified by CECOM and the U.S. Army Materiel Command (AMC) senior-level officials to assure accuracy and completeness.

5. I certify that the BRAC 95 Supplemental Data is complete and accurate to the best of my knowledge and belief.

6. The point of contact for this action is Ms. Jane Benskin, AMCRD-IT, (703) 274-9862.

AMCRD-IT
SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group Data Call - Command, Control, Communications, Computers and Information (C4I)

7. AMC -- America's Arsenal for the Brave.

Encl

RAY E. McCOY
Major General, USA
Chief of Staff

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DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS-ELECTRONICS COMMAND
AND FORT MONMOUTH
FORT MONMOUTH, NEW JERSEY 07703-5000

REPLY TO ATTENTION OF
AMSEL-PE-BR

20 OCT 1994

MEMORANDUM FOR Commander, U. S. Army Materiel Command, ATTN: AMCRD-IT, Ms. Jan Benskin, 5001 Eisenhower Ave., Alexandria, VA 22333

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call

1. Reference DACS-TABS memorandum, undated, subject as above.

2. Enclosed, as requested, is our response to subject data call. Clarification of the data follows:

a. Question 2a requested breakout of workyears by organizational element. For CECOM, we responded with on board strength as we did in BRAC data call #5-laboratories. We maintain workyear records by appropriation, not by organizational element. The on board strength numbers should be very close to the workyear number. We tasked other C4I activities at Fort Monmouth for workyears, and reported the number they provided us. This question also requested segregation of workyears by job category. We categorized workyears based on the overall function of the organizational element versus categorization by the job series of individual employees. For example, we listed all the workyears of the CECOM Legal Office as "legal" although some Legal Office employees are administrative and clerical. Please note, however, that the number of engineers and scientists we cite in our briefing (1,944) is the correct, actual number based on job series.

b. Question 2b requested square feet of space by type and organizational element. Our source for this information was the Installation Commander's Annual Real Property Utilization Survey (ICARPUS) which breaks out space by organization. The square footage we reported was all <u>current</u> space (permanent and temporary). This varies from the data we provided in the Installation Assessment which called for only permanent space, included approved military construction through FY96, and was drawn from the Desktop Resource Real Property data base (DR REAL). (The DR REAL feeds into the HQRPLANS but does not segregate space by organizational element.)

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20 OCT 1994

AMSEL-PE-BR
SUBJECT: Supplemental BRAC 95 LJCSG Data Call

c. Please note our response to question 2c on programs is supplemented by the FY94 C4IEW Project Book we left with the LJCSG on 14 Oct 94. It includes programs managed by CECOM, PEO Communications, PEO IEW, and PEO CCS.

d. The maps annotated for question 3a show the current location of organizational elements. Some of these elements will move as a result of BRAC 93. Their new locations are shown on the maps annotated for question 3b, space available in FY97.

e. As noted in our BRAC Data Call #5-Laboratories, we do not have the initial cost of equipment which would be difficult to move or replicate (question 3c). We report instead our estimate of the replacement cost.

f. While not a DA "approved and programmed plan" (question 6), we are working an action to move the CECOM Communications Security Logistics Activity from Fort Huachuca, AZ to Fort Monmouth in FY96. We plan to consolidate this agency and its NICP into our Logistics and Readiness Center.

g. The "workyears" provided for tenant activities (question 8) are actually on board strength figures.

3. The information contained in this report is accurate and complete to the best of my knowledge and belief.

4. My POCs for this action are Patricia Devine, (908) 532-5937, DSN 992-5937, and Susanna Nevin, 992-4742.

5. CECOM Bottom Line: THE SOLDIER.

Encls
as

OTTO J. GUENTHER
Major General, USA
Commanding

CF:
AMCSO

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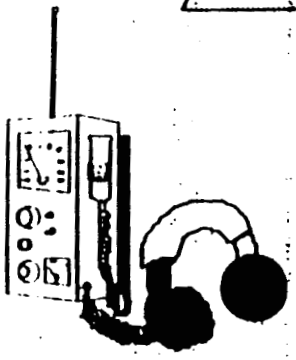
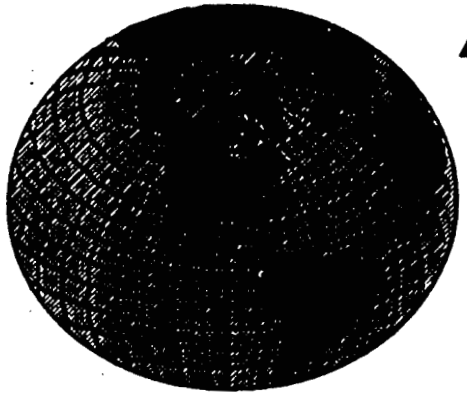
TEAM FORT MONMOUTH
INFORMATION BRIEFING TO JOINT CROSS-SERVICE GROUP





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PROVIDING & SUSTAINING THE ARMY WITH SUPERIOR COMMUNICATIONS, COMMAND & CONTROL, COMPUTERS, INTELLIGENCE AND ELECTRONIC WARFARE (C4IEW) EQUIPMENT AND SERVICES

PATRICIA DEVINE

CECOM

13 OCTOBER 1994

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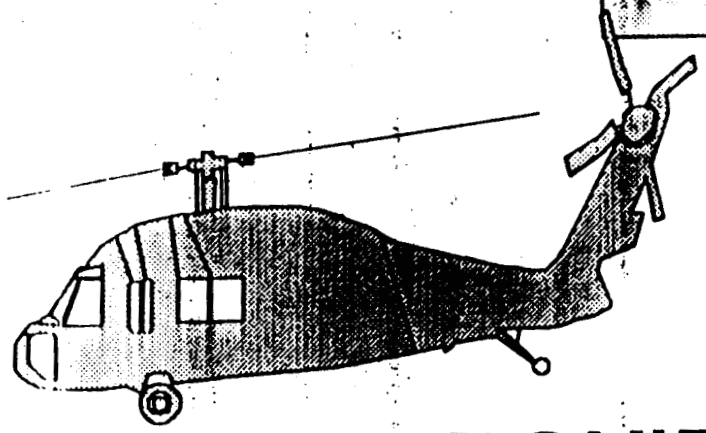
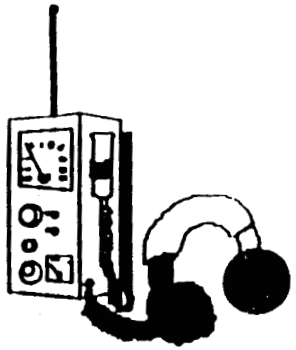
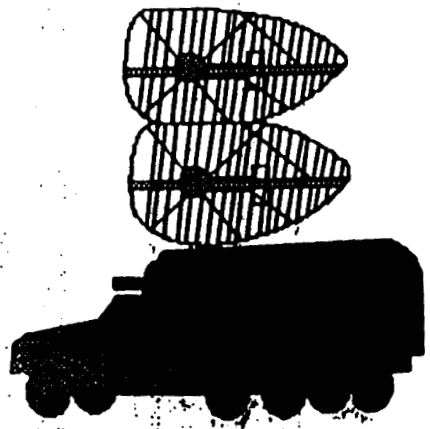
PURPOSE





TO PROVIDE INFORMATION ON FORT MONMOUTH TO FACILITATE C4I CROSS-SERVICE COLLOCATION DECISIONS



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OUTLINE

- STRATEGIC ASPECTS OF FT. MONMOUTH LOCATION
- TEAM FORT MONMOUTH
- OTHER TENANT ORGANIZATIONS
- BRAC IMPACT
- FT. MONMOUTH PHYSICAL CAPACITY
- SUMMARY

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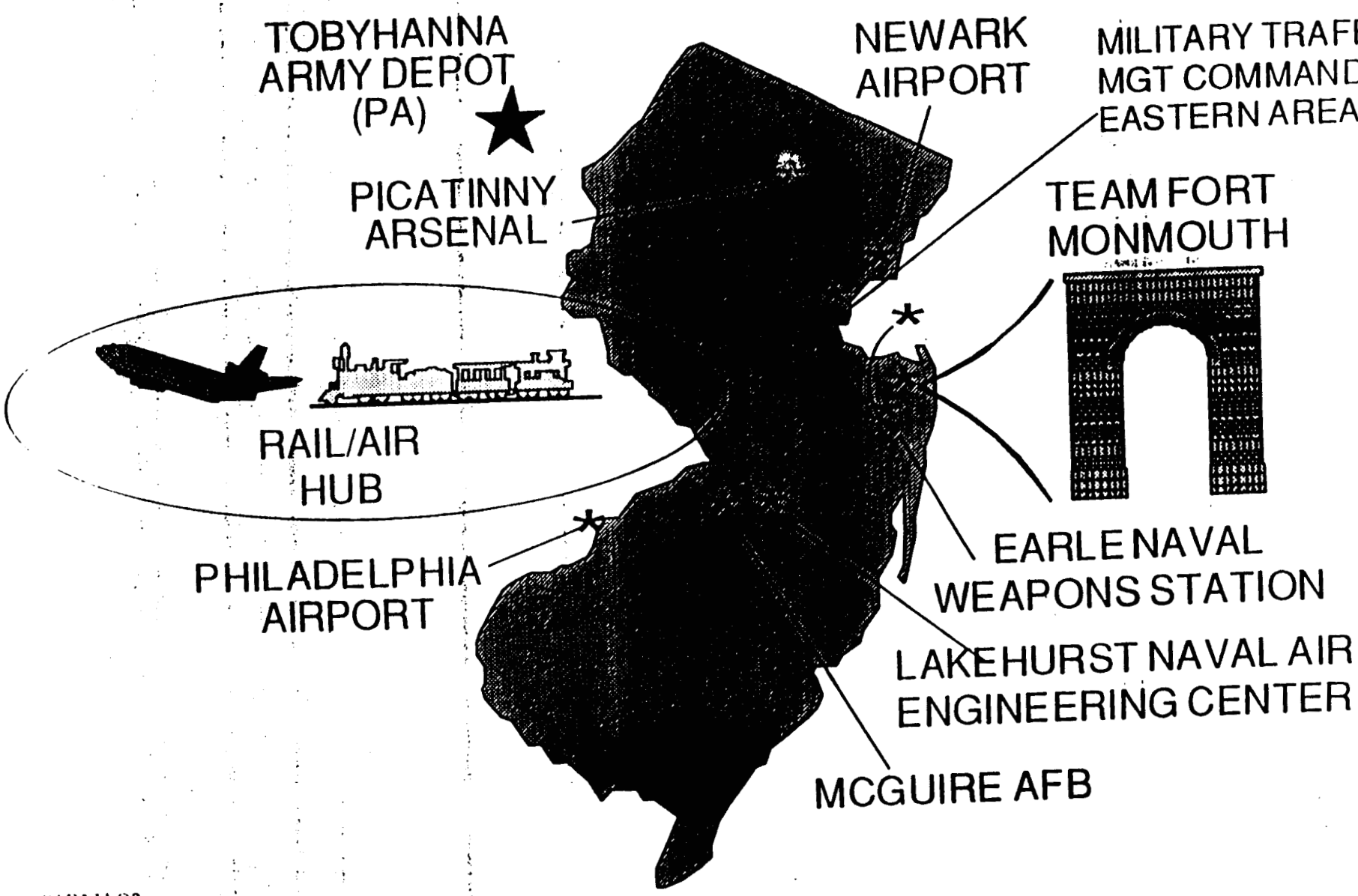
TEAM FORT MONMOUTH

STRATEGIC LOCATION - BASES & TRANSPORTATION



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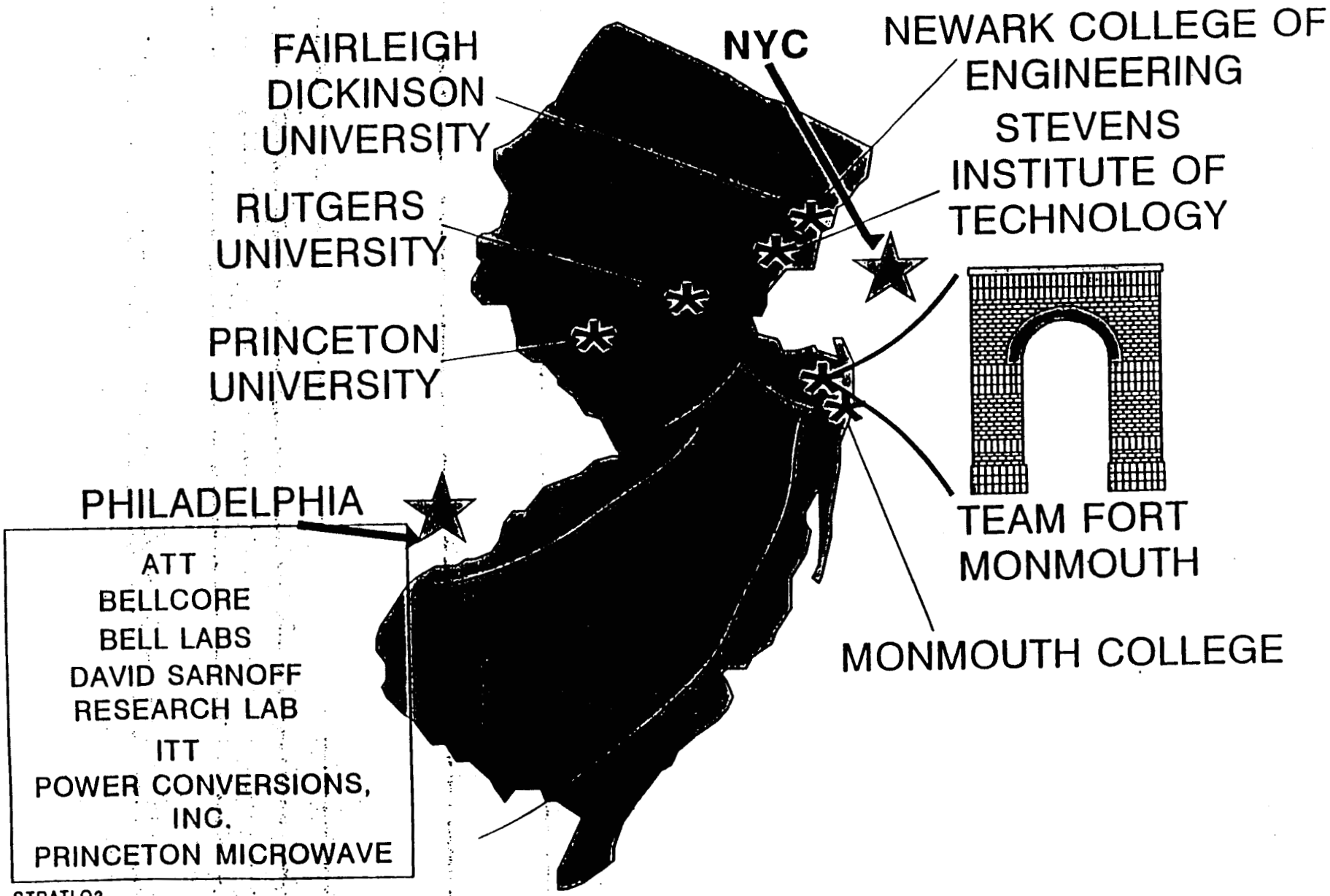
STRAT02

TEAM FORT MONMOUTH

STRATEGIC LOCATION - BUSINESS & ACADEMIA



STRATLO3

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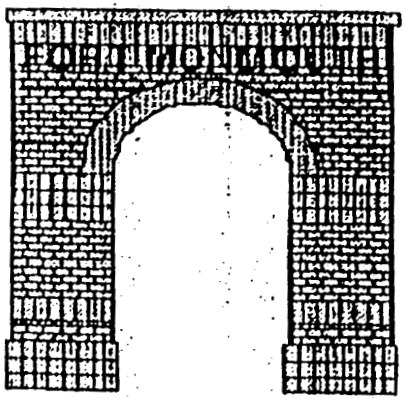
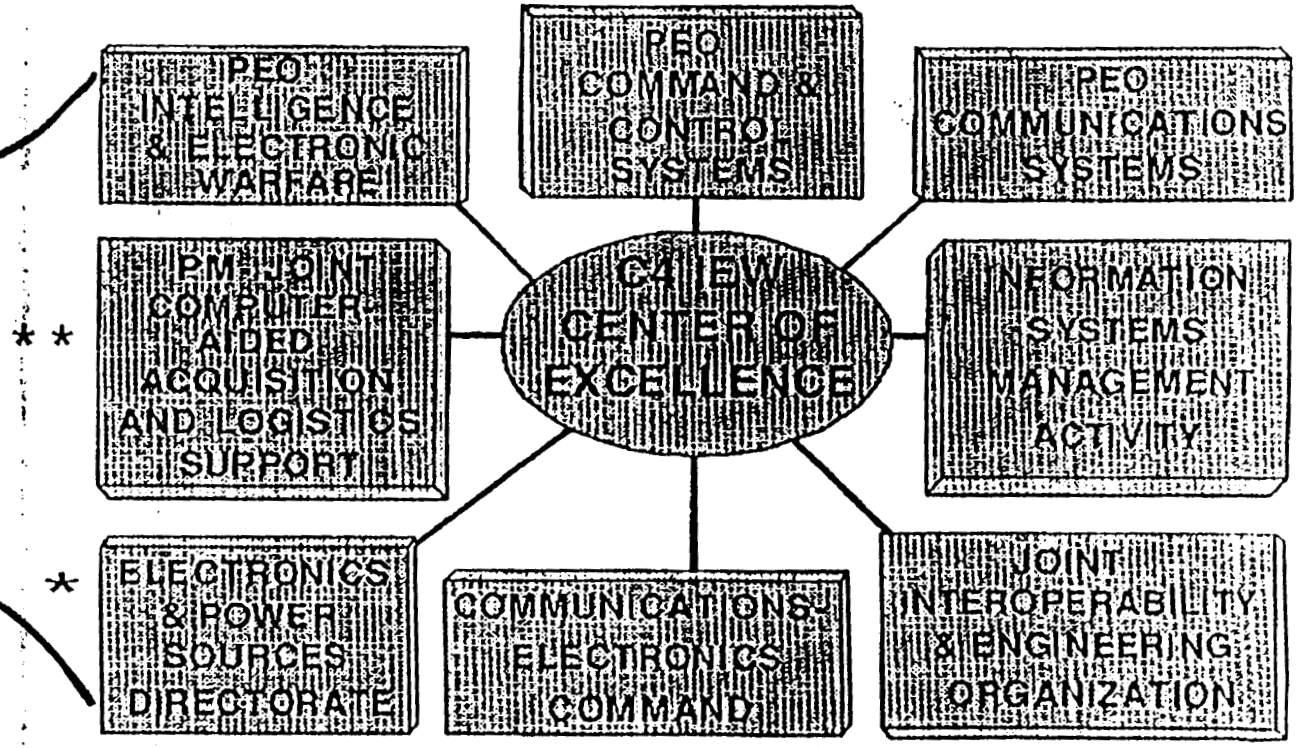
TEAM FORT MONMOUTH
TOTAL C4IEW SUPPORT

PROVIDING & SUSTAINING SUPERIOR C4IEW EQUIPMENT & SERVICES





* RELOCATES PER BRAC 91

** JOINT MISSIONS

TEAM SUL

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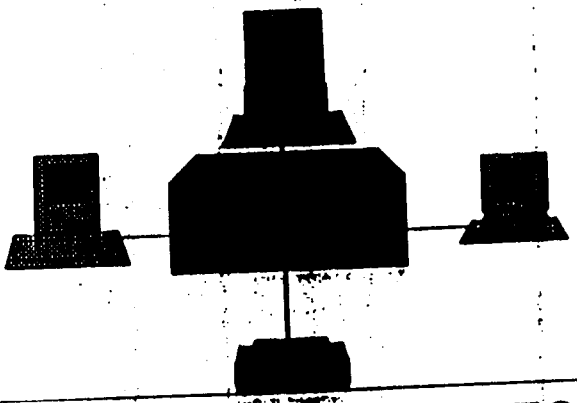
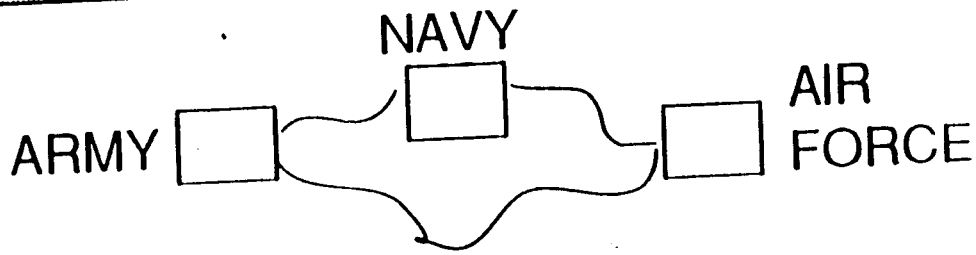
TEAM FORT MONMOUTH

EXISTING SUPPORT OF JOINT PROGRAMS



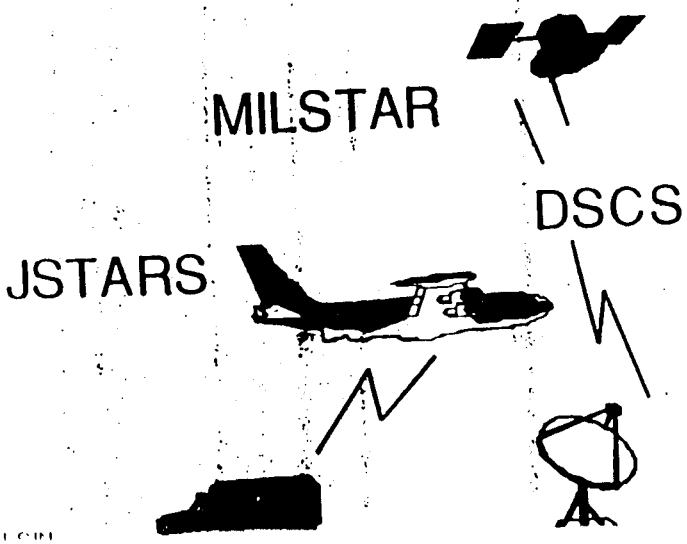
EXECUTIVE AGENT FOR TACTICAL SWITCHES

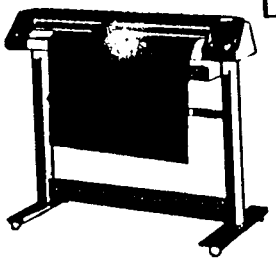


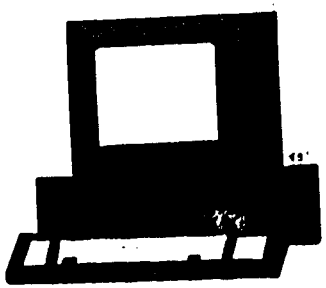
EXECUTIVE AGENT FOR JOINT TASK FORCE COMMUNICATIONS NETWORK MANAGEMENT SYSTEMS

JOINT PROGRAM/WORK

MANAGE MITRE C4I CONTRACT (EXCEPT AIR FORCE)







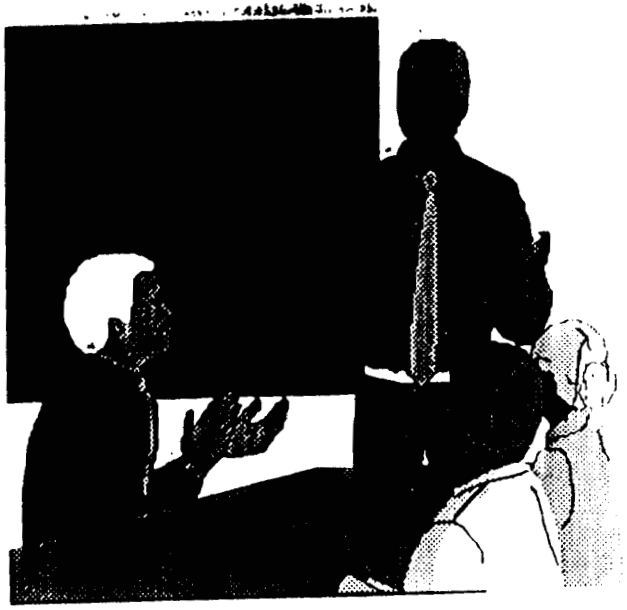
TEAM FORT MONMOUTH

PARTNERSHIP AGREEMENT-WORKING TO A COMMON GOAL

SUPPORTING NEEDS OF ARMY & DOD

THE FORT MONMOUTH COMMUNITY IS COMMITTED TO WORK TOGETHER TO SUPPORT THE VISION OF FORT MONMOUTH AS A PREMIER GLOBAL CENTER OF EXCELLENCE IN DEVELOPING AND SUPPORTING SUPERIOR C4IEW SYSTEMS AND EQUIPMENT AS WELL AS NEW ARCHITECTURE FOR STRATEGIC COMMUNICATIONS, AUTOMATION, AND DEFENSE INFORMATION INFRASTRUCTURE.

SIGNED: MARCH 1993



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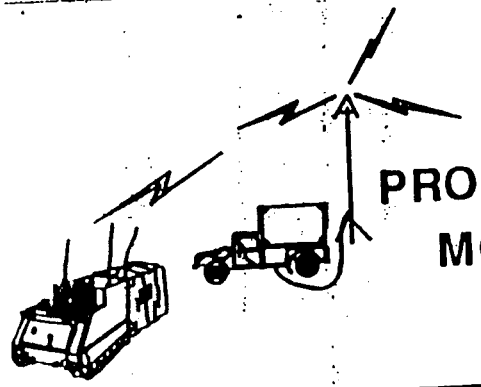
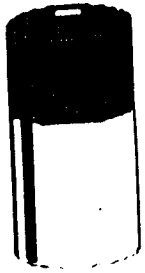
TEAM FORT MONMOUTH

PROVIDING TOTAL C4IEW INTEGRATED LIFE CYCLE SUPPORT



PROJECT MGR

PROJECT LDR



ITEM MGR

INVENT	DESIGN	PRODUCE	FIELD	SUSTAIN

TECHNOLOGY GEN & APPLICATION

ACQUISITION EXCELLENCE

LOGISTICS POWER PROJECTION

A SYNERGISTIC TEAM OF SYSTEM MANAGERS AND FUNCTION EXPERTS PROVIDING SUSTAINABLE, INTEROPERABLE, FLEXIBLE & TECHNOLOGICALLY SUPERIOR SYSTEMS

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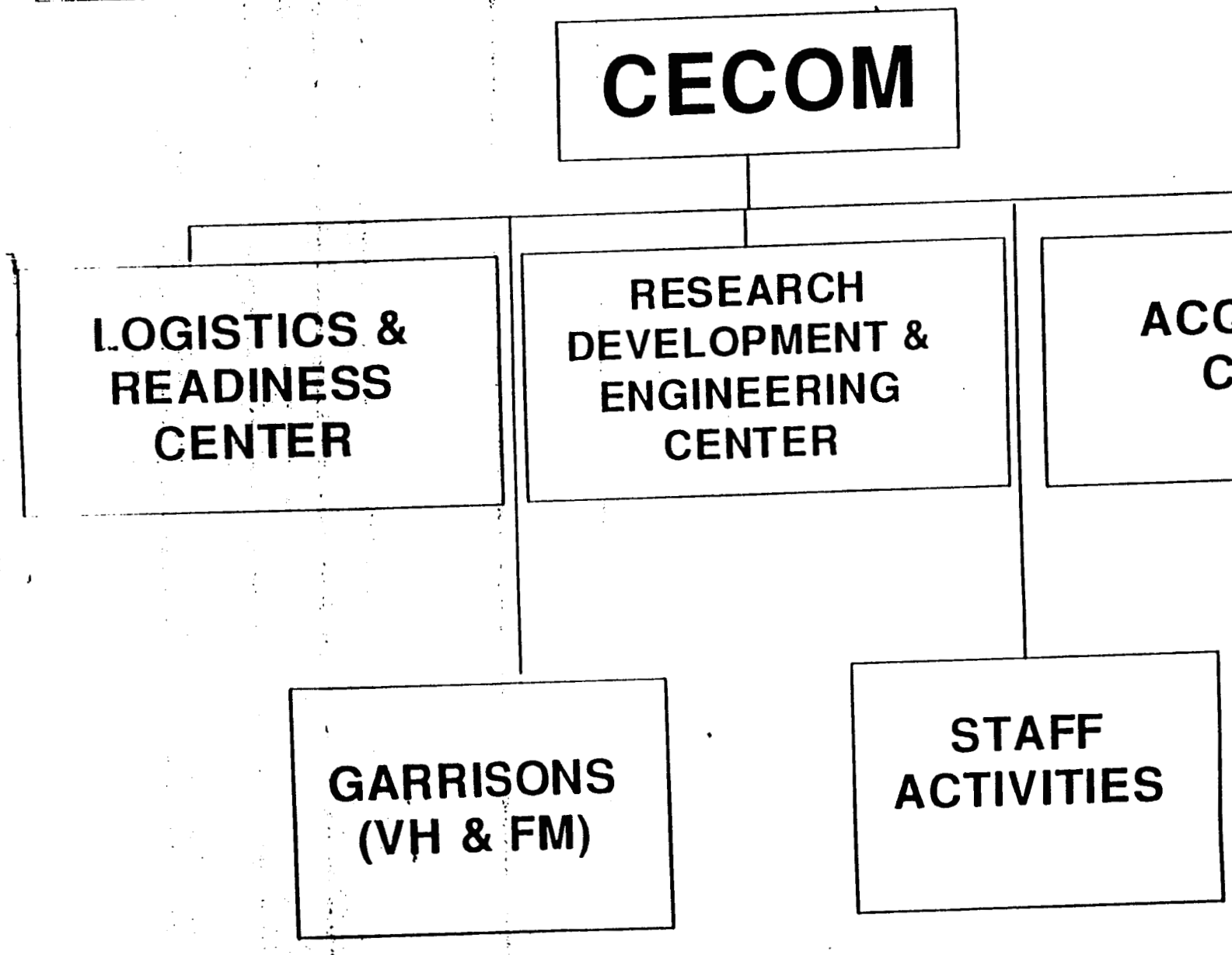
TEAM FORT MONMOUTH
COMMUNICATIONS-ELECTRONICS COMMAND



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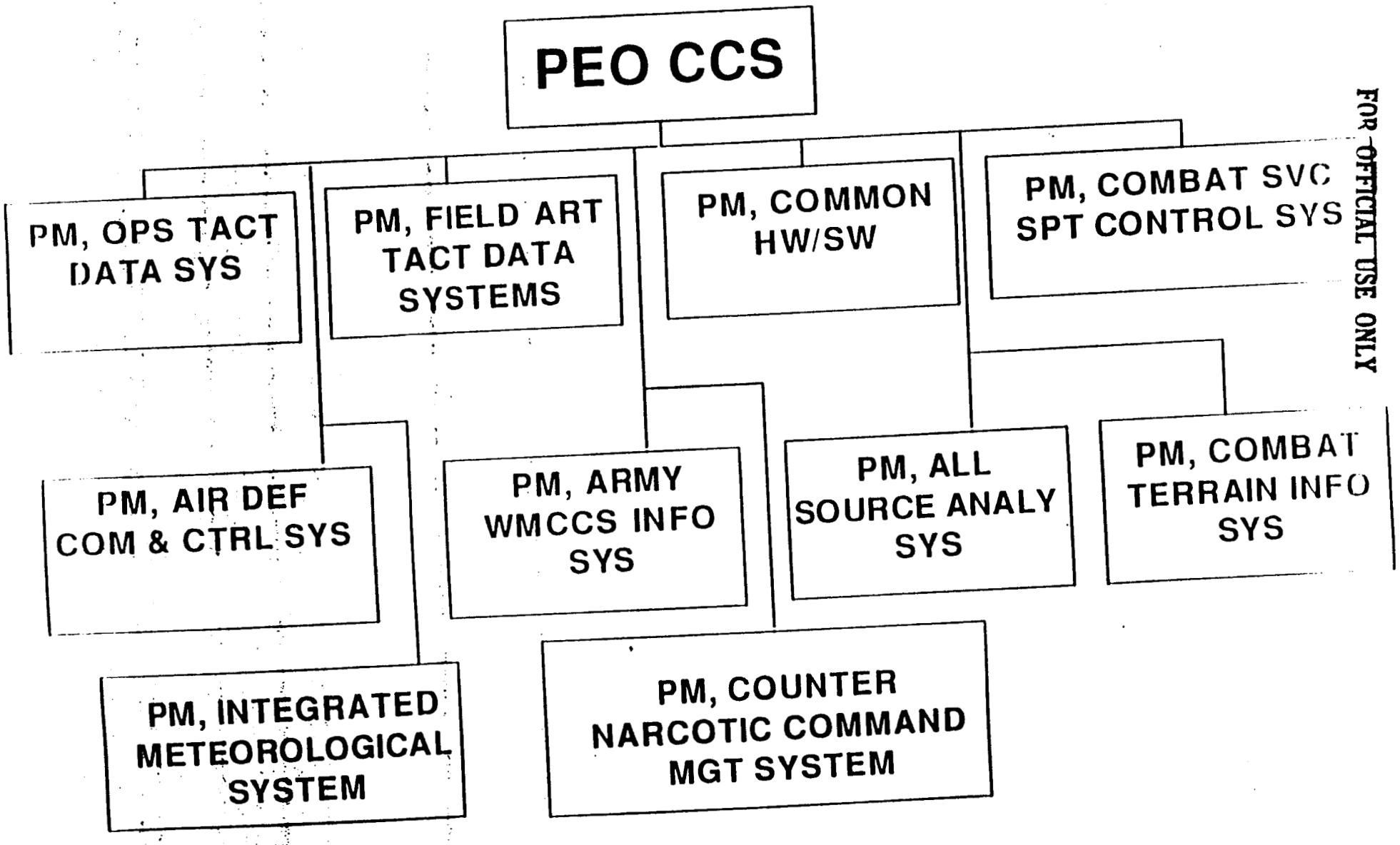
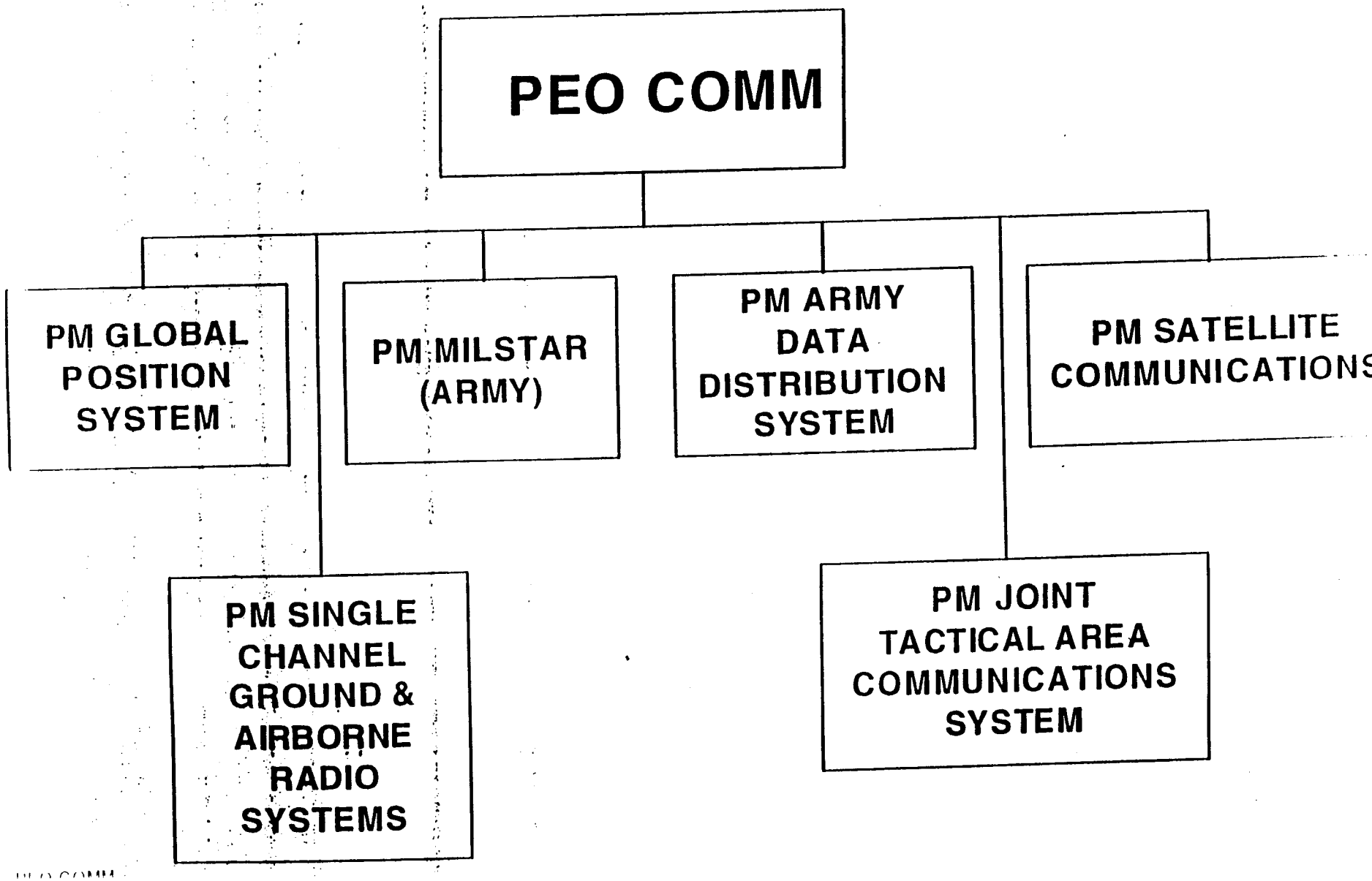
TEAM FORT MONMOUTH
PEO COMMAND & CONTROL SYSTEMS



TEAM FORT MONMOUTH
PEO COMMUNICATION SYSTEMS



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TEAM FOR MONMOUTH

PEO INTELLIGENCE & ELECTRONIC WARFARE

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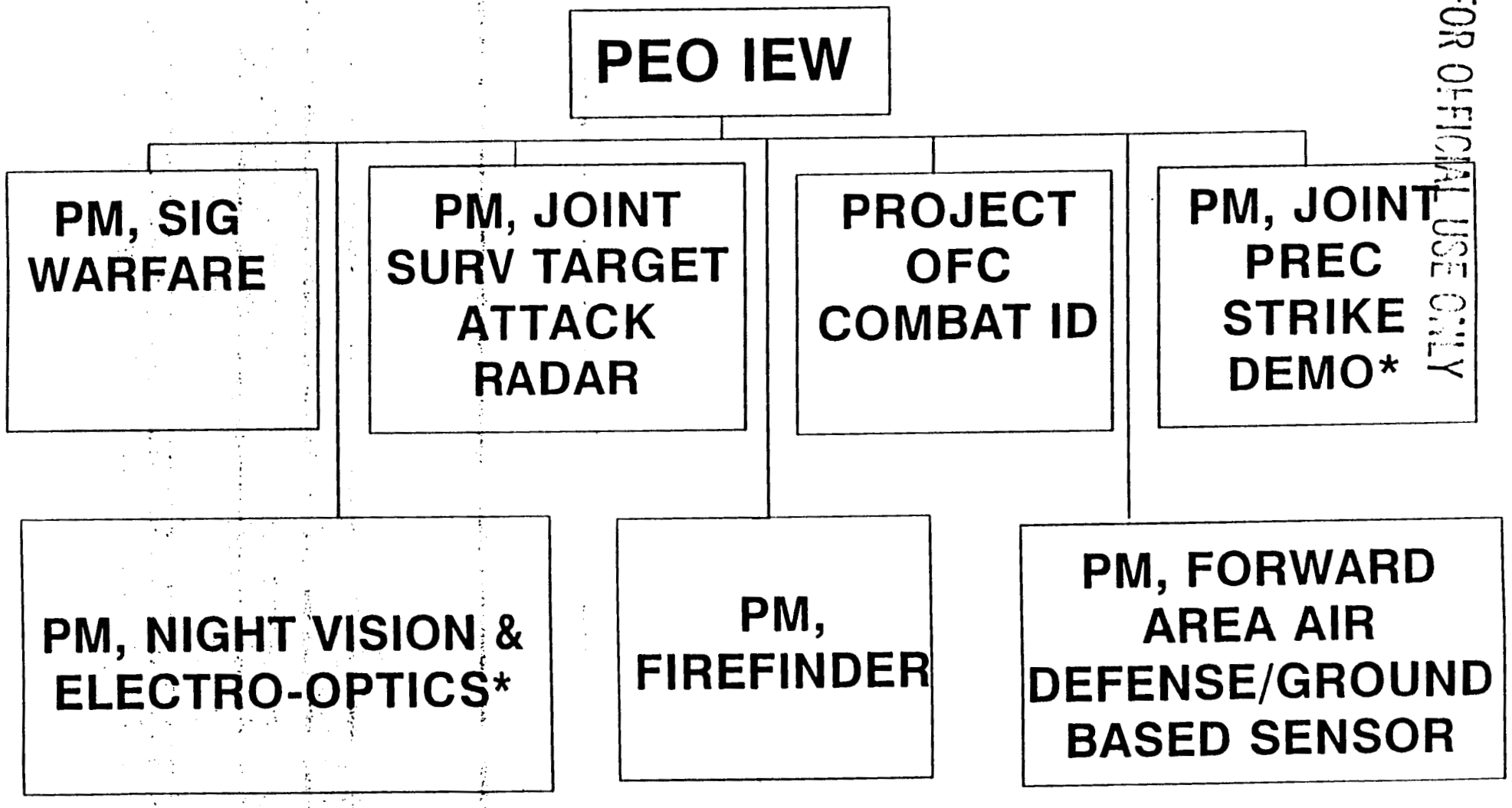

*NOT AT FT MONMOUTH

IEWORG

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TEAM FORT MONMOUTH
C4IEW ORGANIZATIONS

	WORKYEARS		
	GOV'T	SPT CONTRACTOR ON-SITE	SPT CONTRACTOR OFF-SIT
CECOM Defining, developing, acquiring and sustaining superior electronic and communications technologies, products and services	8116 (INCL 302 NAF)	1743	1415
PEO COMMUNICATIONS Responsible for managing tactical ground and space communications and Global Positioning System	280	20	73
PEO COMMAND & CONTROL SYSTEMS Responsible for managing and integrating synchronized tactical automated systems	385	99	287
PEO INTELLIGENCE ELECTRONIC WARFARE Responsible for managing tactical combat ID, signal intelligence, night vision, and electronic warfare systems	230	122	30

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ORGSING

TEAM FORT MONMOUTH
C4IEW ORGANIZATIONS

	WORKYEARS		
	GOV'T	SPT CONTRACTOR ON-SITE	SPT CONTRACTOR OFF-SITE
JOINT INTEROPERABILITY & ENGINEERING ORGANIZATION Develops architectures', standards, interfaces/testing and performing systems engineering (DISA Organization).	98	3	50
PM ARMY/INFORMATION SYSTEMS MANAGEMENT ACTIVITY Provides strategic communications and Army automation (information systems)(Army Info Systems Command Org)	276	45	27
ELECTRONICS AND POWER SOURCES DIRECTORATE Advanced micro-electronics, microwave and signal processing, frequency contorl and timing(Army Research Labs Org)	363 (INCL 40 OPS/ACAP ARL)	88	0
JOINT COMPUTER AIDED ACQUISITION AND LOGISTICS SUPPORT Digitization of logistics and support analysis processes(PEO Std Army Mgt Info Sys Org)	26	31	47

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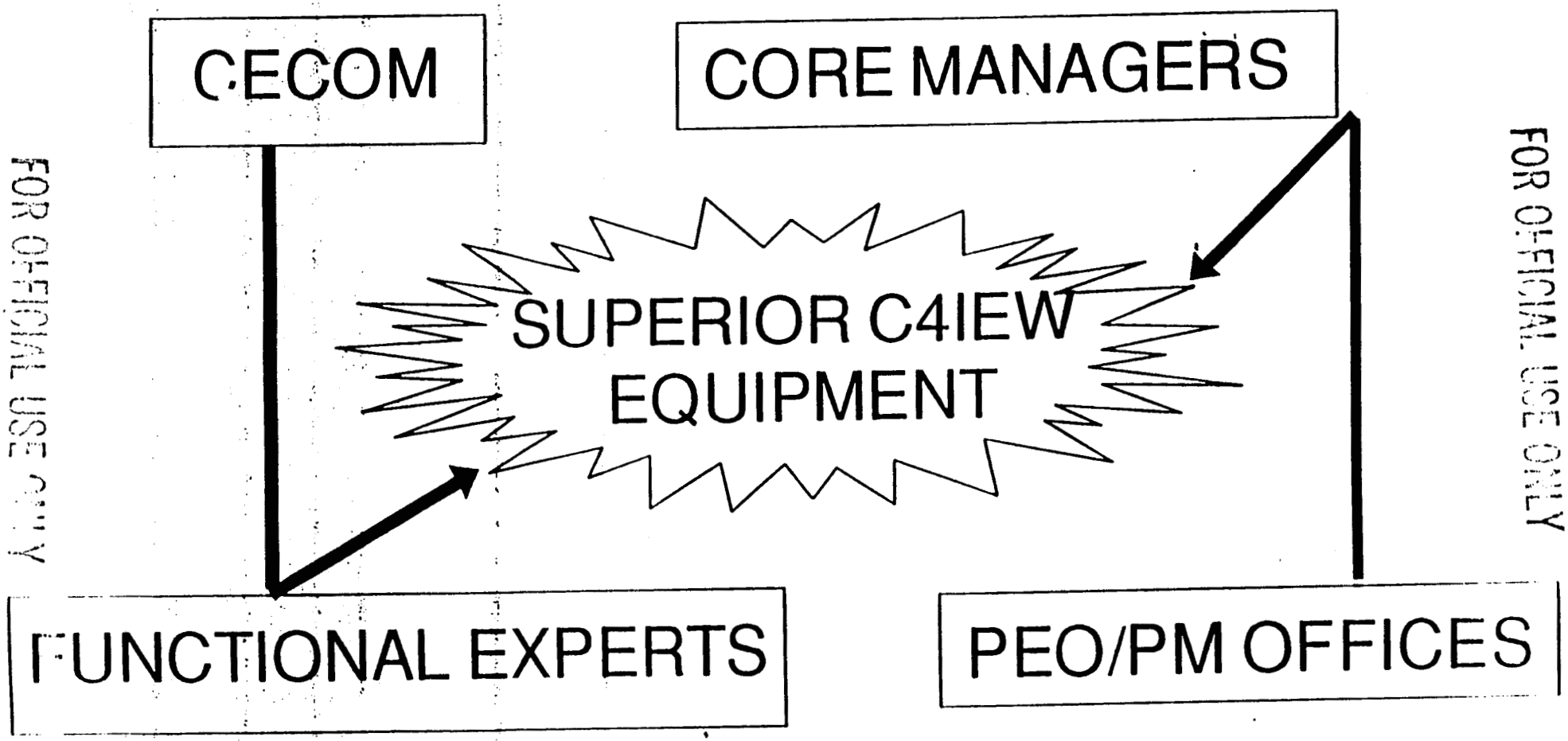
ORGSING2

TEAM FORT MONMOUTH
INTEGRATED RELATIONSHIPS



CECOM PROVIDES FUNCTIONAL EXPERTISE BASED ON TECHNICAL AND LIFE CYCLE REQUIREMENTS OF SYSTEM

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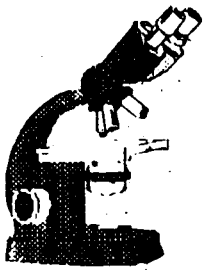
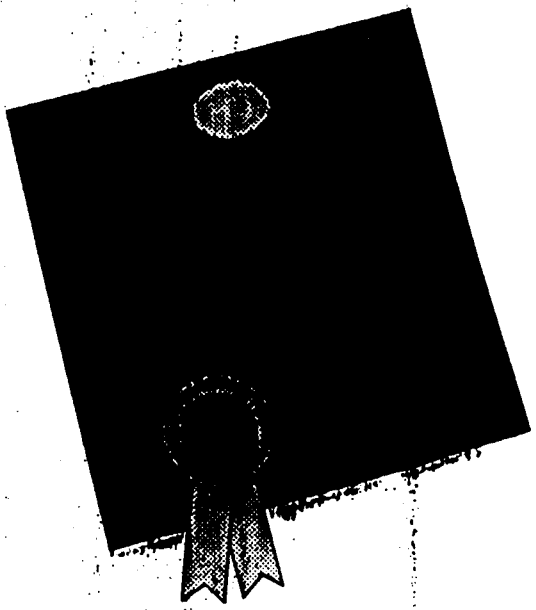
TEAM FORT MONMOUTH

C4IEW INTELLECTUAL CAPITAL



1944 - ENGINEERS AND SCIENTISTS

FROM 1987 TO PRESENT, 501 PATENTS ISSUED TO THE FORT MONMOUTH COMMUNITY



90 PATENTS ISSUED IN 1994 INCLUDE:

- IMAGE INTENSIFICATION SYSTEMS
- FIBER OPTIC COATINGS
- SITUATION AWARENESS
- OPTICAL DESIGNS

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TEAM FORT MONMOUTH
SUPERIOR C4IEW FACILITIES

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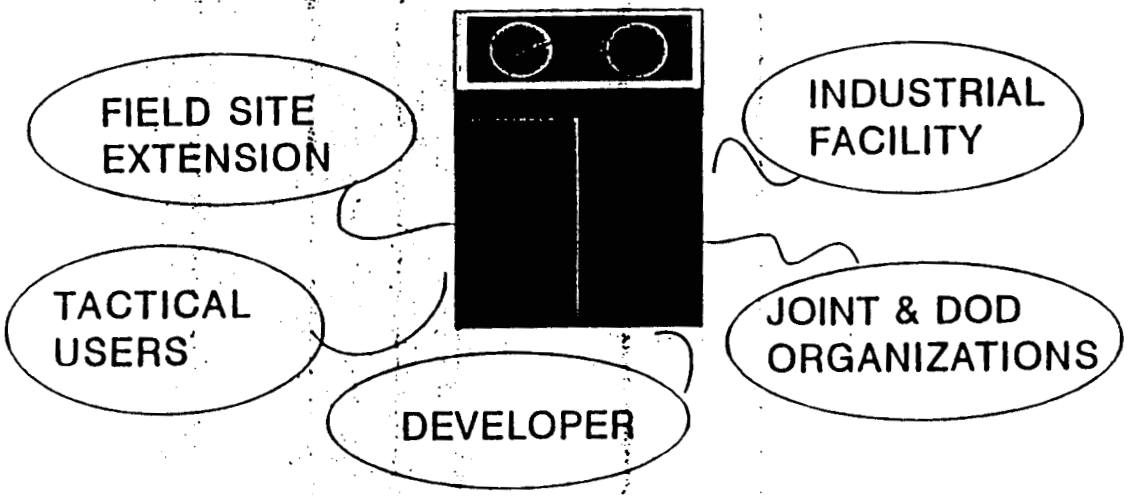
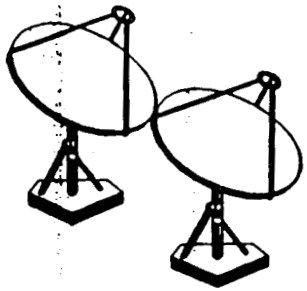
DIGITAL INTEGRATED LAB/ ARMY INTEROPERABILITY NETWORK



SPACE SYSTEMS INTEGRATED RESEARCH FACILITY



FOCAL PLANE ARRAY MICROFACTORY

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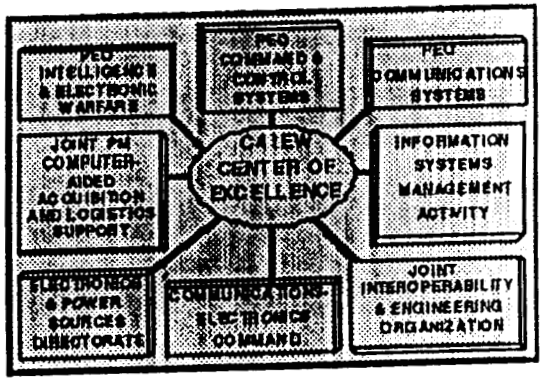
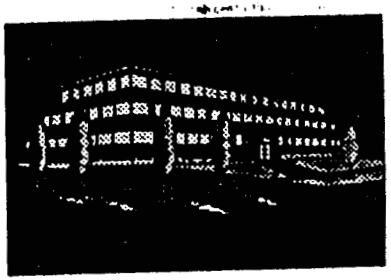
TEAM FORT MONMOUTH
OTHER TENANT ORGANIZATIONS

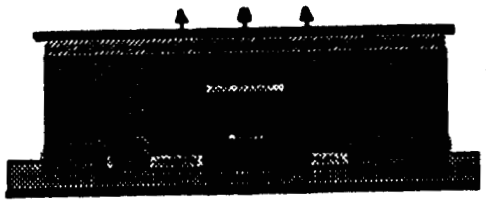
TEAM FORT MONMOUTH



US MILITARY
ACAD PREP SCHOOL



FBI
902ND MI
ARMY AUDIT AGENCY
DEFENSE FINANCE & ACCOUNTING SERVICE
ARMY CHAPLAIN SCHOOL*



COMMISSARY/PX

MEDDAC
DENTAC

TMDE FIELD OFFICE

* RELOCATING PER BRAC 93

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TEAM FORT MONMOUTH

BRAC AND ORGANIZATIONAL IMPACTS

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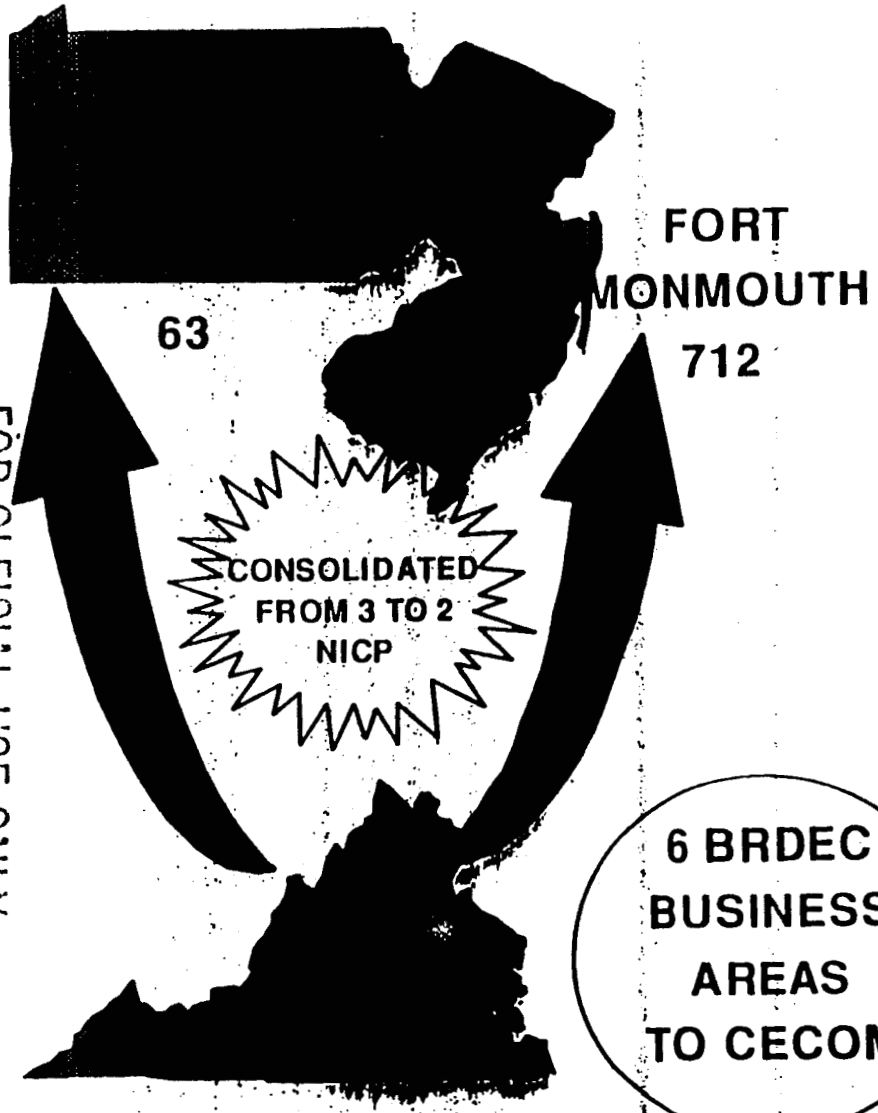
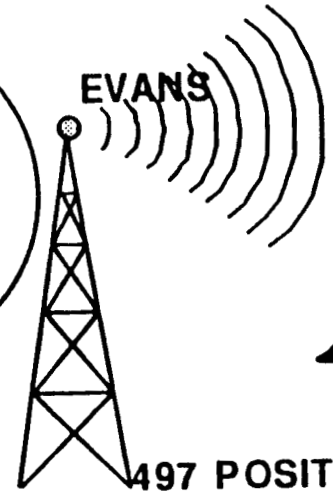


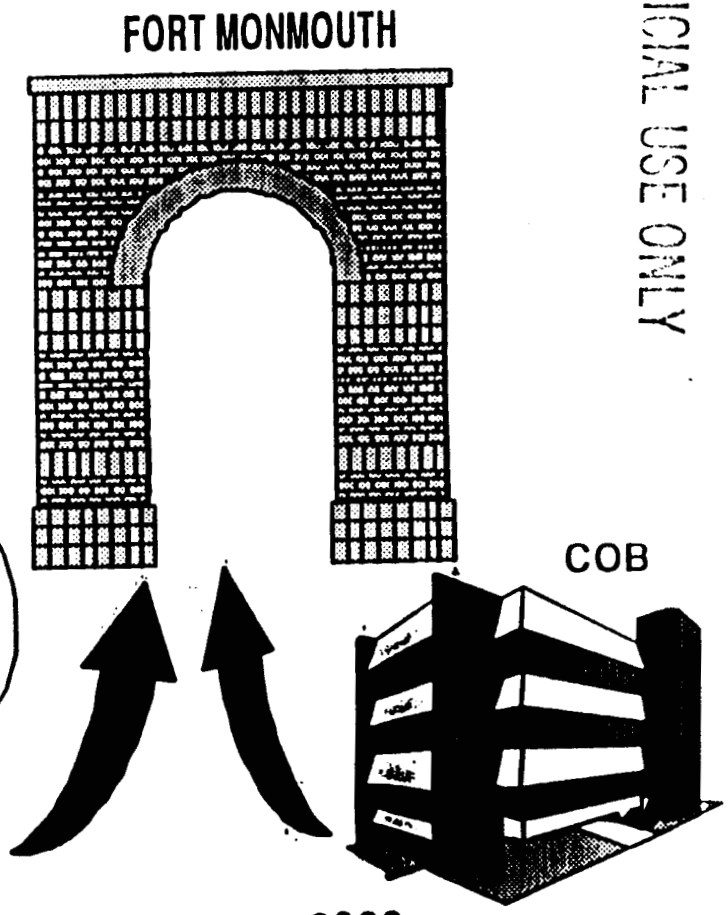
EPSD MOVES TO ADELPHI IN FY97

6 BRDEC BUSINESS AREAS TO CECOM

356 POSITIONS



497 POSITIONS



2339 POSITIONS

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TEAM FORT MONMOUTH

BRAC OFFERS ENHANCED SYNERGY & INTEGRATION OF CORE COMPETENCIES

VHFS INTELLIGENCE MATERIEL MANAGEMENT CENTER (IMMC)

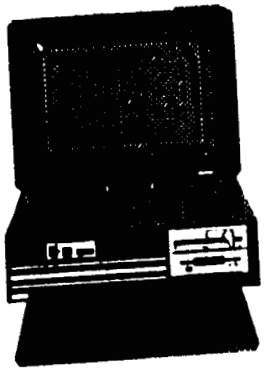
FORT MONMOUTH

LOG POWER PROJ

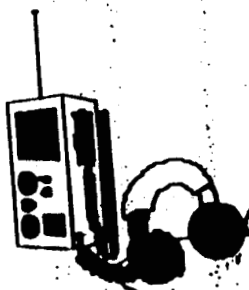
TECH GEN & APP

ACQ EXCEL-LENCE

VHFS ACQUISITION CENTER



VHFS IEWD



ALSO PEO IEW - PM SIGNAL WARFARE TO FORT MONMOUTH FY97

ENHANCED C4IEW COLOCATION

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TEAM FORT MONMOUTH

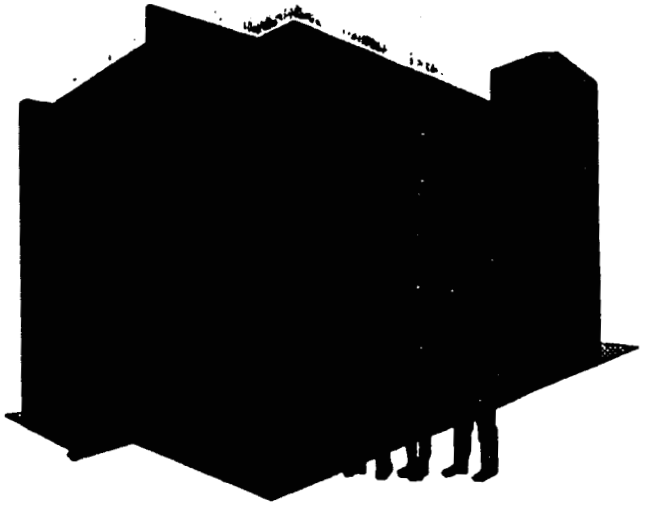
PHYSICAL PLANT - FY97

MAIN POST/CWA - 97

TOTAL [illegible]

TOTAL [illegible]

- OPERATIONS [illegible]
- RESEARCH [illegible]
- HOUSING [illegible]
- MEDICAL [illegible]
- COMMUNITY [illegible]



FY97 EXPANSION POTENTIAL

- 413 EXCESS [illegible] HOUSING
- + 530,000 [illegible] POST/CWA
- = OVER [illegible]
- + 281 BUILDING [illegible]

- RECOGNIZED AS AN ARMY COMMUNITY OF EXCELLENCE
- $200M+ INVESTED IN FACILITIES MODERNIZATION IN LAST 10 YEARS
- LABS AND PROFESSIONAL WORKSPACE [illegible] MODERNIZED

MODERN INFRASTRUCTURE

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TEAM FORT MONMOUTH
TOTAL COMMUNITY QUALITY OF LIFE

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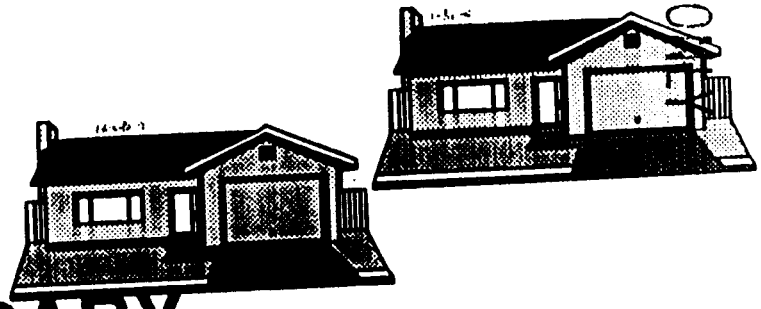
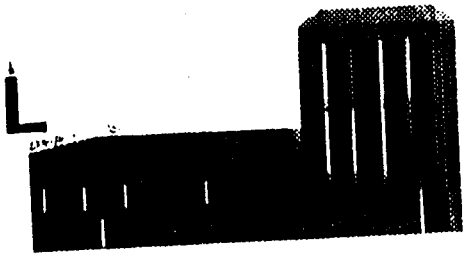
- COMPLETION OF BARRACKS/HOUSING UPGRADES

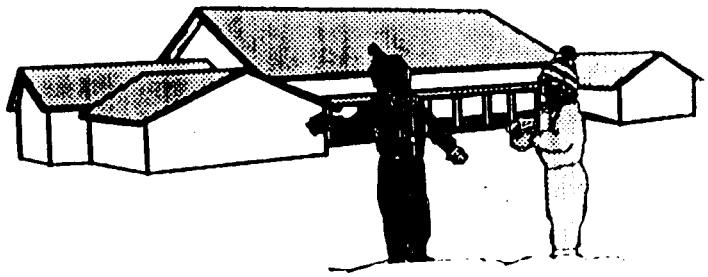


- REMODELED NCO CLUB
- MODERNIZED PX & COMMISSARY
- RENOVATED POST FIELD HOUSE

FIELD HOUSE



- CENTRALIZED MILITARY PERSONNEL SUPPORT CENTER
- BUILT YOUTH ACTIVITY CENTER
- NEW CHILD CARE FACILITY



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TEAM FORT MONMOUTH
LOCAL AREA CAPACITY - FY97

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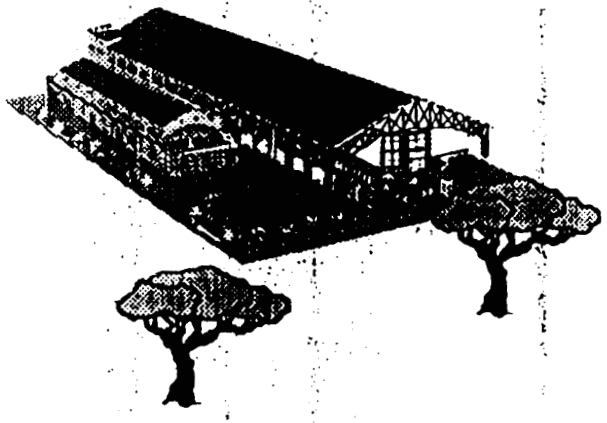
EVANS AREA

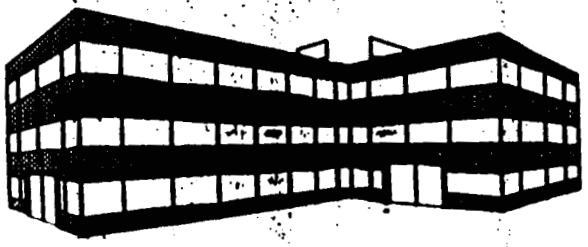


253 ACRES

190,369 SQ FT
OFFICE SPACE

39,181 SQ FT
R&D SPACE

FORMER COB

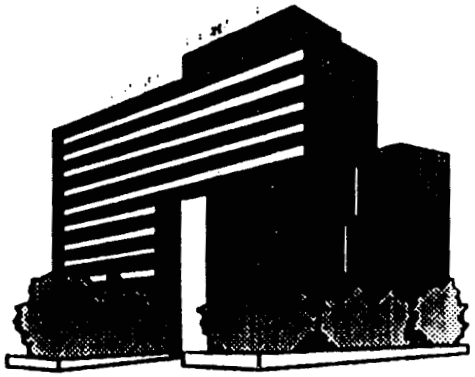


597,000 SQ FT

= 4200 PEOPLE

PLUS

LOCAL
AREA
EXCESS
OFFICE
CAPACITY



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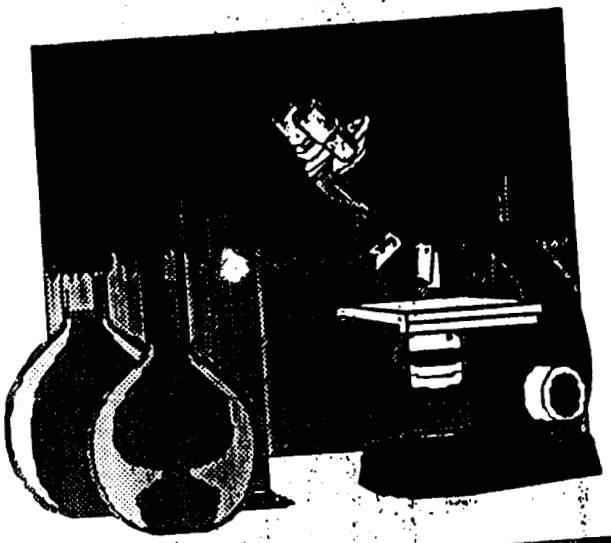
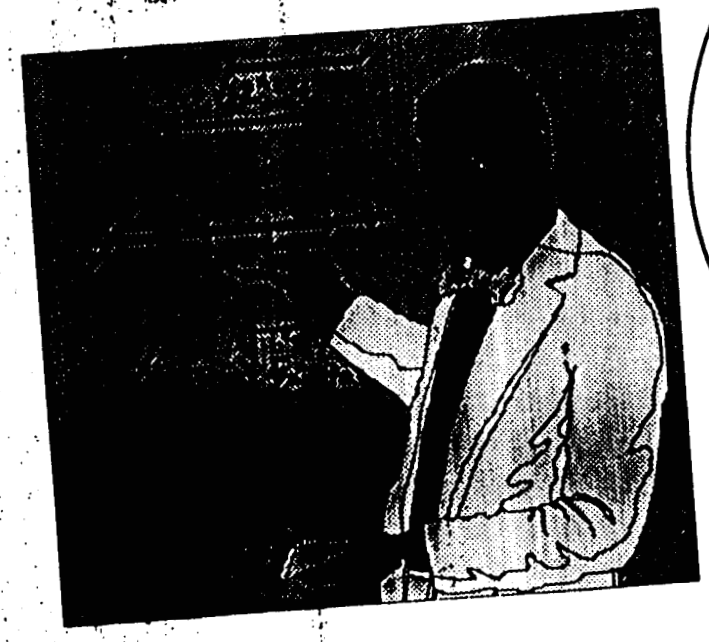
TEAM FORT MONMOUTH
EQUIPMENT REPLACEMENT VALUE



- ESTIMATED COST TO REPLACE EQUIPMENT $864,170,000



BASED ON AAA AUDITED DATA CALL FOR JOINT CROSS-SERVICE WORKING GROUP FOR LABS

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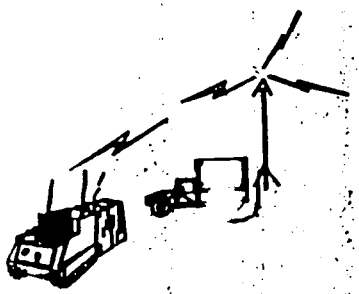
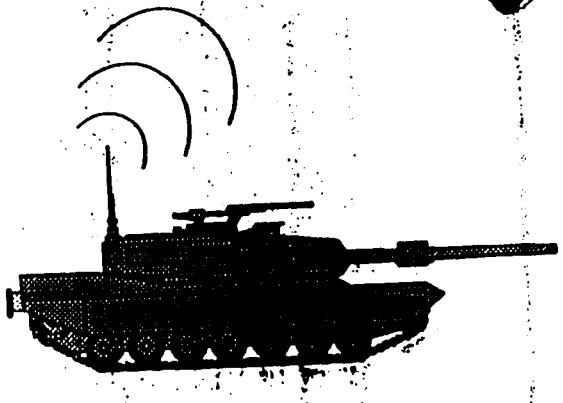
SUMMARY - TEAM FORT MONMOUTH

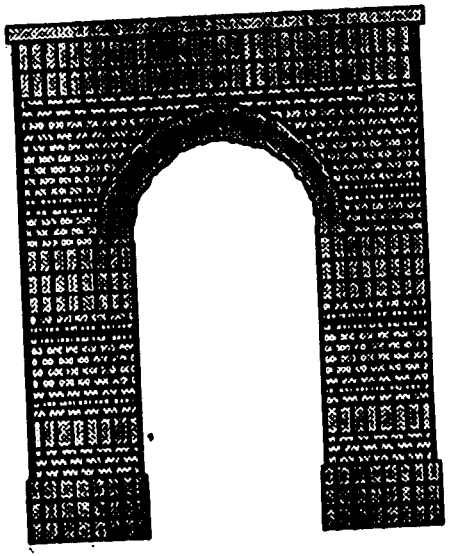
C4IEW LOCATION SYNERGY

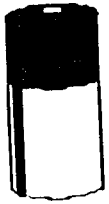
INVENT	DESIGN	PRODUCE	FIELD	SUSTAIN

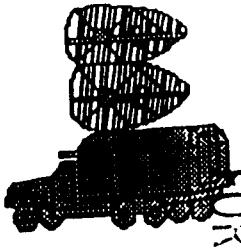




FORT MONMOUTH







MEETING THE NEEDS OF A RESHAPED DOD

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SUMMARY - TEAM FORT MONMOUTH

PREMIER C4IEW CENTER OF EXCELLENCE

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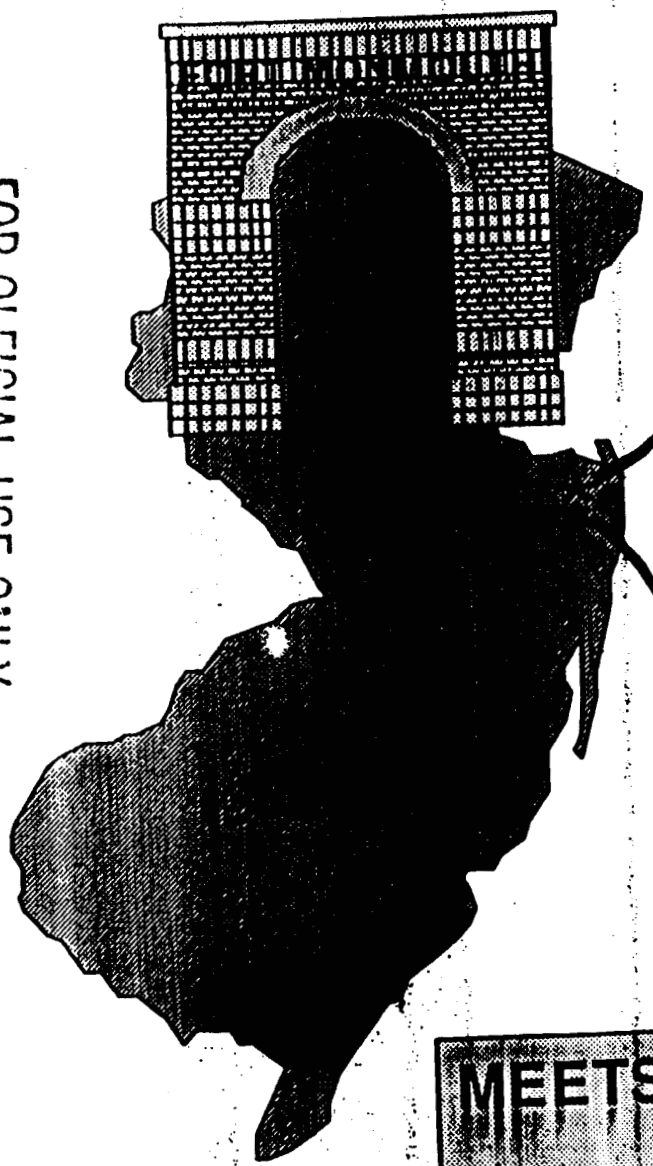

- EXTENSIVE EXPANSION CAPACITIES:
  - PHYSICAL PLANT AT MINIMUM COST
  - QUALITY/FLEXIBLE WORKFORCE
  - MATRIX BASED TO SUPPORT NEW MISSION
  - NATIONAL TELECOMMUNICATIONS INFRASTRUCTURE
- SURROUNDED BY SUPERIOR INDUSTRIAL & ACADEMIC ORGANIZATIONS
- ESTABLISHED JOINT RESPONSIBILITIES/ ASSOCIATIONS

MEETS DOD C4IEW RESHAPING NEEDS OF THE FUTURE

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Chart I - Title FOR OFFICIAL USE ONLY

Chart 2 - PURPOSE

* This briefing is to provide information on Ft. Monmouth and the various organizations located at the installation. The information will better inform you of the activities comprising the Ft. Monmouth community and how we meet our mission.

* Where appropriate, we will provide summary level information (in relation to the tasking). This is supplemented with a detailed package that includes all required details, maps, etc. for each question.

Chart 3 - OUTLINE

* The briefing is structured to provide information on Fort Monmouth's location, the organizations that make up the C4IEW team at Fort Monmouth, and some of the other tenants at this location. Finally, we will address the opportunities BRAC has provided to the C4IEW community, and what additional capabilities exist at the Fort.

Chart 4 - TEAM FT MONMOUTH - STRATEGIC LOCATION - BASES & TRANSPORTATION

* There are numerous military bases representing all the services in close proximity to Ft Monmouth. We are located close to major road and rail arteries, have both military and commercial airports close at hand, and are near deep water ports.

* Tobyhanna Army Depot in Eastern Penn. is a 2 hour drive from Ft Monmouth and is the Army's primary C4IEW maintenance depot. It is also co-

located with the DLA supply depot for C4IEW equipment

Chart 5 - TEAM FT MONMOUTH - STRATEGIC LOCATION - BUSINESS & ACADEMIA

* New Jersey has been referred to as the "invention state", with a history of excellence dating from Marconi's work in what became our Evans area, and Project Diana in 1946 which was the beginning of satellite communications. It has a variety of academic institutions and high technology businesses that support the cutting edge technologies required in the C4IEW area.

* Ft Monmouth works with many of these institutions. We are the co-founders of the Fiber Optics Materiel Research Lab at Rutgers, and support Rutgers Wireless Information Systems Network Lab. In addition, we work with Princeton University on Photonics for research in laser devices, and developed a Masters program in Software Engineering at Monmouth College, as well as many similar programs.

* We are also close to the cities of Philadelphia and New York, providing additional academic sources (such as Drexel, NYU, Columbia, University of Penn., and others).

* Our close proximity to various academic institutions provides us with a base to hire well educated personnel at Ft Monmouth and provides opportunities for advanced education for our workforce.

* In addition, there are numerous C4IEW companies along the "Princeton Corridor" that work with us in cooperative endeavors. For example, we formed a consortium of CECOM, Bellcore, and Sarnoff Labs and submitted a TRP dual use proposal to ARPA to

develop interoperability standards and applications for integrating video and data over existing telecommunications infrastructures and the emerging direct broadcast digital satellite services.

* In this environment, CECOM is well positioned as the Army's overall system engineer and lead acquisition center for C4I, the digital battlefield and Force XXI. In this role, CECOM is the technology leader in achieving the Army vision of horizontal integration of all combat forces through automation and communications, as the primary means of winning information-based wars on the digitized battlefield.

Chart 6 - TEAM FT. MONMOUTH - ORGANIZATIONS

* Ft. Monmouth is a unique C4IEW installation in that there exists, in one location, a variety of HQ Army Materiel Command, Dept. of Army, and Joint offices and organizations, all supporting C4IEW efforts and programs throughout their life cycle.

PEO COMMUNICATIONS: A Dept of the Army organization responsible for managing tactical ground and space communications and Global Positioning Systems.

PEO COMMAND AND CONTROL SYSTEMS: A dept of the Army organization responsible for managing and integrating synchronized tactical automated systems.

PEO INTELLIGENCE AND ELECTRONIC WARFARE: A Dept of the Army organization responsible for managing tactical combat ID, signal intelligence, night vision, and electronic warfare systems.

COMMUNICATIONS ELECTRONICS COMMAND: An Army Materiel Command organization responsible for defining, developing, acquiring and sustaining superior electronic and communications technologies, products and services.

JOINT INTEROPERABILITY AND ENGINEERING ORGANIZATION: A joint organization that develops Architectures, standards, interfaces/testing and performs systems engineering across all services.

INFORMATION SYSTEMS MANAGEMENT ACTIVITY: A United States Army Information Systems Command organization that provides strategic and sustaining base communications and Army automation (information systems).

PM, JOINT COMPUTER AIDED ACQUISITION AND LOGISTICS SUPPORT: An Army organization responsible for automation of logistics and support analysis processes for DOD.

ELECTRONICS AND POWER SOURCES DIRECTORATE: Part of Army Research Laboratory, responsible for advanced micro-electronics, microwave and signal processing, frequency control and timing technologies.

Chart 7 - TEAM FT MONMOUTH - EXISTING SUPPORT OF JOINT PROGRAMS

* Team Ft Monmouth has played a multi-service role for many years, and is very active on various joint programs, initiatives, and steering committees.

* Within DSCS, we are the representative for all ground satellite communications, to include engineering, fielding, and support to the systems. We manage the ground element of JSTARS, and the ground terminals for a variety of command and

control and communications systems. Fort Monmouth is the location for activities such as JCALS and ISMA. The $180 million dollar mitre Federally Funded Research Development Center, providing research for ALL services (except Air Force) is managed at our Ft Monmouth location.

* The military communications Electronics board concluded that a single organization within DOD should have COMPLETE responsibility for interoperability of tactical switches. CECOM was given the lead, in Jan. 1993, for all services tactical switches.

* CECOM was assigned executive agent manager for all Joint Task Force communications network management systems in Nov. 1993.

Chart 8 - TEAM FT MONMOUTH - PARTNERSHIP AGREEMENT

* The co-located C4IEW organizations realized the potential benefits of working together toward a common goal of SUPERIOR C4IEW equipment.

* This was formally recognized about two years ago through a partnership charter, signed by each of the C4IEW organizations located at Ft. Monmouth in March 1993.

* This charter forms the basis for the cooperative C4IEW enterprise that now exists within the team Ft Monmouth community. We have made the most of our concentrated expertise to ensure the Army and DOD have received technologically advanced and supportable C4IEW equipment. This document has helped focus our efforts to the changing needs and requirements of DA and DOD.

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Chart 9 - TEAM FT MONMOUTH - C4IEW INTEGRATED LIFE CYCLE SUPPORT

* Ft Monmouth is unique in that the organizations there collectively offer virtually one location for life cycle management and support of C4IEW equipment. This enables experts with various technical backgrounds to support a weapon system throughout its life cycle. This multi functional teaming approach ensures we provide optimum C4IEW equipment to our soldiers in the field.

* In the early phase of a life cycle, logistics engineers work hand in hand with research scientists, acquisition teams and review boards to ensure we are pursuing technologically advanced, supportable systems at the lowest possible life cycle costs.

* At the latter portion of the life cycle, we tap the expertise of engineers, and research ways to maintain the supportability of systems.

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(TEAM FT MONMOUTH - ORGANIZATION CHARTS - C4IEW ORGANIZATIONS)

Chart 10 - TEAM FT MONMOUTH - CECOM

* The Communications - Electronics Command (CECOM) is one of the commodity oriented major subordinate commands under Headquarters, Army Materiel Command. Our organizational structure emphasizes our core competencies with one center representing each of the core competencies:

Our Logistics and Readiness Center focuses on logistics power projection.

Our RDEC focuses on Technology Generation & Application

And our Acquisition Center on Acquisition Excellence

Staff activities, such as the Legal Office, report to the command group, with oversight provided by the Chief of Staff. Finally, the two garrison commanders report to the command group.

Chart 11 - TEAM FT MONMOUTH - PEO CCS

* Listed here are PMs who report to PEO CCS.

* We have provided, with our data call, a copy of the C4IEW "Project Book" which provides information on the entire spectrum of systems managed by CECOM and the co-located C4IEW PEOs.

* Each of the PEO organizations report to the Army Acquisition Executive, and receive functional support from CECOM's matrix personnel.

Chart 12 - TEAM FT MONMOUTH - PEO COMM

Chart 13 - PEO IEW

* PEO IEW is currently located at Vint Hill Farms Station and Fort Belvoir, VA, and Ft. Monmouth. With the implementation of BRAC 93, this organization, with most of its PMs, will be located at Ft Monmouth. PM Night Vision and PM Joint Precision Strike Demo remain at Fort Belvoir.

Charts 14 & 15 - TEAM FT MONMOUTH - C4IEW ORGANIZATIONS

* The following two charts provide a summary of the various C4IEW organizations located at Ft Monmouth, with a synopsis of their mission, and their gross level workyear figures. The contractor figures reflect SUPPORT contractors only and include federally funded research development center personnel. The full details for each organization, including segregation of workyears by job category, are in our data package.

Chart 16 - TEAM FT MONMOUTH - INTEGRATED RELATIONSHIPS

* As noted earlier, the PEO structure provides a core group of managers responsible for the overall management (Cost, schedule, performance) of each program.

* To ensure all requirements associated with a weapon system are met, a core - matrix personnel relationship exists at Ft Monmouth.

This is similar to a general contractor working with subs, where CECOM provides various subs to support the PM, and the workforce mix changes with the requirements of the system. This relationship ensures we make maximum use of resources in that technical people do not become embedded in the PM staffs and remain beyond the point where they are fully utilized.

* We have a history of working with various services, applying a wide diversity of technologies. Examples include the TESAR, which is a joint program managed by the Navy, and TRI-BAND programs. These integrated working teams have proven their ability to support a variety of situations and customers.

Chart 17 - TEAM FT MONMOUTH - C4IEW INTELLECTUAL CAPITAL

* Ft. Monmouth provides a highly technical and competent workforce in the C4IEW area. Many of our 1,944 scientists and engineers have been recognized through various initiatives.

* Over the past seven years, the CECOM and Ft Monmouth community, including ARL's Electronics and Power Sources Directorate, have been awarded 501 patents in a variety of areas. This includes 125 patents emanating from our Night Vision Electronic Sensors Directorate at Fort Belvoir. In the past year, we received 90 patents for our research in areas such as: radar (phase shift detection research), circuit board applications (ion beam etching), various optical and electronic image intensification systems, abrasion resistant coatings for fiber optics, and a multitude of others related to the C4IEW area.

* Our engineers and scientists are highly educated. In our Research and Development Center,

48% of the engineers and scientists have a masters degree or higher, and 25% of our scientists are enrolled in masters or doctorate programs.

* We work with a variety of institutions to ensure our workforce remains at the cutting edge of technology.

Chart 18 - TEAM FT MONMOUTH - SUPERIOR C4IEW FACILITIES

* We have state of the art facilities to provide the necessary support to complete our mission, including a variety of unique high technology facilities:

* The Digital Integrated Lab links CECOM labs and facilities with industry, academia, the Army Battle Labs, and Tri-service and joint labs. Government organizations include Rome labs, DISA, NRL, and NRAD (Navy labs at San Diego). Industry organizations include MITRE, ATT, GTE, and ITT.

* The digital integrated lab, working with the Army Integrated Network, provides us with the network and technology to link various C4IEW initiatives. Developing a seamless network linked by satellites, we have the ability to provide a single test that integrates live and virtual experiments on a single system or group of systems. This enables us to perform various tests beyond the physical limitations of the location of one specific piece of equipment or application.

* The Space Systems Integrated Research Facility utilizes satellite simulators, and in-orbit satellites for the test, analysis, and evaluation of new and upgrades to existing space communications systems.

* The world class laboratory facilities to be vacated by ARL's Electronic `and power Sources Directorate include 57,500 SF of premier technical space, 52,400 SF of administrative space, as well as a 5,400 SF Battery Test Facility.

* Our focal plane array micro factory at Fort Belvoir allows the entire CECOM community to produce complex semiconductor devices with an economic price to perform research and tests.

* Other Fort Monmouth facilities include a multifunction communications simulator, an electronics countermeasures lab, and a signal analysis lab.

Chart 19 - TEAM FORT MONMOUTH - OTHER TENANT ORGANIZATIONS

Having already addressed the C4IEW organizations comprising Team Fort Monmouth, this slide addresses the installation's other significant tenants. The Military Academy Prep School prepares selected candidates to qualify academically and physically for the challenge of competing for appointment to West Point. The FBI's Northeast Regional Computer Support Center provides on-line, automated support for investigative and administrative operations to field offices in the Eastern and Mid-Atlantic states. The 902nd MI Group conducts counterintelligence and provides foreign travel briefings for Fort Monmouth personnel. The Army Audit Agency operates a field office there. DFAS has approximately 200 people who provide finance and accounting services. The Army Chaplain Center and School trains Chaplains who minister to soldiers worldwide; however, the organization will relocate to Ft Jackson, SC in Jan 96 as part of BRAC 93. About 200 personnel combined are employed by the installation's commissary and post exchange. The Army, Test, Measurement, Diagnostic Equipment

Support Group has a field office at Fort Monmouth which provides TMDE calibration support. Finally, the U.S. Army Medical and Dental Activities at the installation tend to the health care needs of the post's eligible population.

Chart 20 -BRAC AND ORGANIZATIONAL IMPACTS

* BRAC 91 directed the movement of ARL's Electronic and Power Sources Directorate to Adelphi, MD. The move is currently scheduled for June 1997. BRAC 93 strengthened the command with the realignment of six business areas from the Belvoir RDEC to CECOM at Fort Belvoir, VA. It directed the closure of Vint Hill Farms Station, VA and transfer of the IEW mission and spaces to Fort Monmouth. The supply, repair and maintenance piece moves to Tobyhana Army Depot. Finally, BRAC 93 requires CECOM to move out of leased space in the CECOM Office Building and into space at Fort Monmouth, and dispose of excess facilities such as the Evans subpost. The Environmental Assessment of Fort Monmouth required by the National Environmental Policy Act was completed on schedule and revealed no environmental impediments to full and rapid implementation of movements onto Fort Monmouth.

Chart 21 - BRAC OFFERS ENHANCED SYNERGY AND INTEGRATION OF CORE COMPETENCIES

* BRAC 93 provided an opportunity to increase the synergies prevalent among the C4I activities at Fort Monmouth by collocating and consolidating the IEW elements from Vint Hill Farms Station at Fort Monmouth: the Intelligence Materiel Management Center of the C4I Logistics and Readiness Center; the Intelligence and Electronic Warfare Directorate of the RDEC, and the legal and acquisition spaces

which support them. It includes consolidation of PEO IEW personnel at Vint Hill with the PEO at Fort Monmouth, and movement of PM Signals Warfare to Fort Monmouth where other PEO IEW PMs already reside.

Chart 22 - PHYSICAL PLANT - FY97

* Fort Monmouth includes 1,097 acres on the main post and Charles Wood area with hundreds of thousands of square feet of fully modernized, professional workspace. BRAC and non BRAC related movements from the post create a significant expansion potential through FY97. For example, the Barker Circle Barracks complex consists of five modern, three-story, brick buildings in a campus-like setting and includes 179,000 SF of space which could be converted to administrative space for 1100 employees at a medium cost. Use of 115,000 SF of space to be vacated by ARL's Electronic and Power Sources Directorate, and more efficient use of existing space in the Charles Wood area yield over 200,000 SF of additional space at little or no cost. This office space is complemented by available housing for military families and the full range of medical, dental, military shopping, and recreational activities on post to support them.

Chart 23 -TEAM FORT MONMOUTH -- TOTAL COMMUNITY QUALITY OF LIFE

Fort Monmouth's continuing commitment to quality of life for its personnel and families is indicated by a sampling of the quality of life projects displayed on this slide. Barracks and family housing upgrades have improved and increased living spaces. An expanded and remodeled NCO Club improved recreational opportunities for our

enlisted soldiers. Our modernized PX and Commissary enhanced shopping convenience for all patrons. The emphasis an wellness has been facilitated with renovations to the Post Field House. Separate facilities for military pay and military personnel functions have been consolidated into a single military personnel support center. A new Youth Activities Center serves the recreational needs of the post's youth population. Finally, we have an approved and funded project for a new child care facility.

Chart 24 - LOCAL AREA CAPACITY - FY97

* Additional potential space for consolidation in close proximity to Fort Monmouth includes the Evans area, approximately 10 miles south and the CECOM Office Building, one mile from the Charles Wood area and two miles from the main post. The Evans area has the office space shown on this chart in permanent buildings. Additional square footage is available in buildings classified as temporary. The COB offers 597,000 SF of prime administrative space. The Army's lease on the building extends to Feb 99 and costs $15.1M per year including rent, maintenance, utilities, and GSA's service fee. CECOM is in the process of vacating the building as a result of BRAC 93. When we occupied the building at full capacity, it housed 4200 employees. Nearby towns report approximately 200,000 SF of excess office space in various buildings.

Chart 25 - EQUIPMENT REPLACEMENT VALUE

* The total, approximate replacement value of equipment and facilities which would be difficult to move or replicate is shown on this chart. The list of equipment comprising this total was included in our BRAC 95 Lab Data Call and is

duplicated in the data package which accompanies this briefing.

Chart 26 - SUMMARY -- TEAM FORT MONMOUTH -- C4IEW LOCATION SYNERGY

Fort Monmouth has capitalized for many years on the synergy of having integrated teams capable of providing support in the three core competencies of technology generation and application, logistics power projection and acquisition excellence throughout the life cycle at two locations: Fort Monmouth for C4, and Vint Hill Farms Station, VA for IEW. Implementation of BRAC '93 will combine these two locations into a single one at Fort Monmouth for Army C4IEW. However, there exists an opportunity, because of physical space and other availabilities at Fort Monmouth to further increase the synergy that can be realized from Team Fort Monmouth as a C4IEW Center of Excellence, in meeting the needs of a reshaped Department of Defense.

Chart 27 - SUMMARY -- TEAM FORT MONMOUTH

Decisions on collocations will not be simple. This chart lists the salient features of Fort Monmouth.

Fort Monmouth possesses extensive expansion capacities in terms of physical space that can be utilized at little or no cost. There will be over 500,000 square feet of space on Fort Monmouth in FY97, of which over 200,000 can be modified at an average of less than $25 per square foot, with the remainder at $25 - $50 per square foot.

A quality work force of scientists and engineers, logisticians, contracting personnel and other support personnel already exists there. Already structured under a matrix support concept for several years, the workforce has the flexibility to provide support to a variety of program demands.

Through its Digital Integrated Lab, Fort Monmouth can support C4IEW testing and experimentation requirements at that location while being electronically linked with various joint and other service facilities, industry facilities and user sites.

Fort Monmouth's strategic location surrounds it with a large number of superior industrial organizations, many of which Team Fort Monmouth capitalizes on through cooperative R&D agreements and other means, and excellent academic institutions.

Team Fort Monmouth has established joint responsibilities and other strong associations with the joint arena.

Fort Monmouth has been the center of gravity for C4IEW innovation for many years and is postured to meet the needs of a reshaping Department of Defense into the future.

2a. **For each organizational element, breakout five types of FY93 workyears by seven job categories.**

This section provides data as requested. For CECOM, it further notes the location of workyears (on board strength) as follows:

FM = Fort Monmouth, NJ
FT BEL = Fort Belvoir, VA
VH = Vint Hill Farms Station, VA
FT H = Fort Huachuca, AZ

ORGANIZATION:	RDEC* FM	RDEC FT BEL	RDEC VH	LRC FM	LRC FT H	LRC VH	ACQ CTR** FM	ACQ CTR VH	CoIS	DRM***	LEGAL	FMG ****	VHG ****	
GOVT (CIVILIAN + MILITARY)														TOTAL
ENGINEERING	1424	585	326	514	0	53	0	0	26	0	0	0	0	2928
LOGISTICS	0	0	0	1648	194	462	0	0	0	0	0	0	0	2304
CONTRACTING	0	0	0	0	0	0	590	68	0	50	0	0	0	708
FINANCIAL	0	0	0	0	0	0	0	0	0	164	0	0	0	164
LEGAL	0	0	0	0	0	0	0	0	0	0	75	0	0	75
MANAGEMENT	40	4	6	33	5	5	7	4	25	4	2	7	7	149
ADMIN/OTHER	0	0	0	0	0	0	0	0	641	24	0	472	249	1386
SUBTOTAL	1464	589	332	2195	199	520	597	72	692	242	77	479	256	7714
FFRDC ON-SITE														TOTAL
ENGINEERING	3	0	0	0	0	0	0	0	0	0	0	0	0	3
LOGISTICS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	3	0	0	0	0	0	0	0	0	0	0	0	0	3
FFRDC OFF-SITE														TOTAL
ENGINEERING	14	0	5	0	1	0	0	0	0	0	0	0	0	20
LOGISTICS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	14	0	5	0	1	0	0	0	0	0	0	0	0	20

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ORGANIZATION:	RDEC* FM	RDEC FT BEL	RDEC VH	LRC FM	LRC FT H	LRC VH	A C Q CTR** FM	A C Q CTR VH	CofS	DRM***	LEGAL	F M G ****	V H G ****	TOTAL
CONTRACT SPT ON-SITE														
ENGINEERING	689	125	93	40	0	0	0	0	4	0	0	0	0	951
LOGISTICS	0	0	0	81	0	70	0	0	0	0	0	0	0	151
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	0	1	0	0	0	0	0	0	0	0	0	0	0	1
ADMIN/OTHER	0	0	0	0	0	0	0	0	87	0	0	427	123	637
SUBTOTAL	689	126	93	121	0	70	0	0	91	0	0	427	123	1740
CONTRACT SPT OFF-SITE														TOTAL
ENGINEERING	962	12	87	1	0	45	0	0	0	0	0	0	0	1107
LOGISTICS	0	0	0	133	1	50	0	0	0	0	0	0	0	184
CONTRACTING	0	0	0	0	0	0	0	0	0	20	0	0	0	20
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	2	0	0	2
MANAGEMENT	78	0	0	0	0	0	0	0	0	0	0	0	0	78
ADMIN/OTHER	0	0	0	0	0	0	0	0	4	0	0	0	0	4
SUBTOTAL	1040	12	87	134	1	95	0	0	4	20	2	0	0	1395

* Does not include (95) at other locations.

** Includes SADBU (5) and CMO (11) Offices at Fort Monmouth.

*** Does not include (5) at other locations.

**** Admin/Other includes Baseops Support FM-Excludes 225 NAF VH-Excludes 77 NAF

NOTE: RDEC Contractor Support ---- 366 - SED (Software Engineering)
188 - C2SID (R&D Engineering)
135 - STCD (R&D Engineering)

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CHIEF OF STAFF ACTIVITIES

ORGANIZATION:	C G	DCI	DHS**	EEO	IG	IRAC	PAE	PAO	P&T	SFTY**	TAQ	TOTAL
GOV'T (CIVILIAN + MILITARY)												
ENGINEERING	0	0	0	0	0	0	0	0	0	26	0	26
LOGISTICS	0	0	0	0	0	0	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	11	4	0	0	0	0	3	0	4	3	0	25
ADMIN/OTHER	36	283	23	6	10	9	99	7	157	5	6	641
SUBTOTAL	47	287	23	6	10	9	102	7	161	34	6	692
FFRDC ON-SITE												TOTAL
ENGINEERING	0	0	0	0	0	0	0	0	0	0	0	0
LOGISTICS	0	0	0	0	0	0	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0
FFRDC OFF-SITE												TOTAL
ENGINEERING	0	0	0	0	0	0	0	0	0	0	0	0
LOGISTICS	0	0	0	0	0	0	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0

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CHIEF OF STAFF ACTIVITIES

ORGANIZATION:	C G	DCI	DIIS**	EEO	IG	IRAC	PAE	PAO	P&T	SFTY**	TAQ	TOTAL
CONTRACT SPT ON-SITE												
ENGINEERING	0	0	0	0	0	0	0	0	0	4	0	4
LOGISTICS	0	0	0	0	0	0	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0
ADMIN/OTHER	0	83*	0	0	0	0	0	0	0	4	0	87
SUBTOTAL	0	83	0	0	0	0	0	0	0	8	0	91
												TOTAL
CONTRACT SPT OFF-SITE												
ENGINEERING	0	0	0	0	0	0	0	0	0	0	0	0
LOGISTICS	0	0	0	0	0	0	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0

*Excludes Serv-Air.

** Excludes VA locations - 3-DIIS/5-Safety

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C4I TENANTS

ORGANIZATION:	ARL* ESPD	ARL OPS/ ACAP	ISMA ***	JCALS	JIEO	TOTAL
GOVT (CIVILIAN + MILITARY)						
ENGINEERING	162	1	128	7	73	371
LOGISTICS	0	6	41	5	0	52
CONTRACTING	0	13	6	2	7	28
FINANCIAL	3	5	16	5	6	35
LEGAL	0	0	1	0	0	1
MANAGEMENT	30	6	11	4	4	55
ADMIN/OTHER	43	9	37	3	8	100
SUBTOTAL	238	40	240	26	98	642
FFRDC ON-SITE						TOTAL
ENGINEERING	0	0	0	0	0	0
LOGISTICS	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0
FFRDC OFF-SITE						TOTAL
ENGINEERING	0	0	0	0	5	5
LOGISTICS	0	0	0	0	0	0
CONTRACTING	0	0	0	0	0	0
FINANCIAL	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	5	5

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ORGANIZATION:	ARL* ESPD	ARL OPS/ ACAP	ISMA ***	JCALS	JIBD	TOTAL
CONTRACT SPT ON-SITE						
ENGINEERING	71**	0	42	17	0	130
LOGISTICS	8	0	0	9	0	17
CONTRACTING	1	0	0	0	0	1
FINANCIAL	0	0	0	0	0	0
LEGAL	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0
ADMIN/OTHER	8	0	0	5	3	16
SUBTOTAL	88**	0	42	31	3	164
						TOTAL
CONTRACT SPT OFF-SITE						
ENGINEERING	0	0	22	27	37	86
LOGISTICS	0	0	0	6	0	6
CONTRACTING	0	0	0	0	0	0
FINANC AL	0	0	0	6	0	6
LEGAL	0	0	0	0	0	0
MANAGEMENT	0	0	0	0	0	0
ADMIN/OTHER	0	0	0	8	8	16
SUBTOTAL	0	0	22	47	45	114

* Excludes VA & MD locations - 47-Ft Belvoir/38-ALC, Adelphi, MD

** Includes NRC Post-Doctrinal on-site contractual support (EPSD)

*** Excludes (36) at other locations

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ORGANIZATION:		CCS*	COMM**	IEW***	TOTAL
GOVT (CIVILIAN + MILITARY)					
	ENGINEERING	0	0	0	0
	LOGISTICS	0	0	0	0
	CONTRACTING	0	0	0	0
	FINANCIAL	0	0	0	0
	LEGAL	0	0	0	0
	MANAGEMENT	305	210	198	713
	ADMIN/OTHER	80	70	32	182
	SUBTOTAL	385	280	230	895
FFRDC ON-SITE					TOTAL
	ENGINEERING	3	0	0	3
	LOGISTICS	0	0	0	0
	CONTRACTING	0	0	0	0
	FINANCIAL	0	0	0	0
	LEGAL	0	0	0	0
	MANAGEMENT	0	0	0	0
	ADMIN/OTHER	0	0	0	0
	SUBTOTAL	3	0	0	3
FFRDC OFF-SITE					TOTAL
	ENGINEERING	60	3	3	66
	LOGISTICS	0	0	0	0
	CONTRACTING	0	0	0	0
	FINANCIAL	0	0	0	0
	LEGAL	0	0	0	0
	MANAGEMENT	0	0	0	0
	ADMIN/OTHER	0	0	0	0
	SUBTOTAL	60	3	3	66

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ORGANIZATION:	CCS*	COMM**	IEW***	TOTAL
CONTRACT SPT ON-SITE				
ENGINEERING	21	13	51	85
LOGISTICS	17	12	13	42
CONTRACTING	0	0	0	0
FINANCIAL	12	3	1	16
LEGAL	0	0	0	0
MANAGEMENT	0	1	0	1
ADMIN/OTHER	46	0	57	103
SUBTOTAL	96	29	122	247
CONTRACT SPT OFF-SITE				TOTAL
ENGINEERING	168	35	12	215
LOGISTICS	45	30	0	75
CONTRACTING	0	0	0	0
FINANCIAL	6	0	0	6
LEGAL	0	0	0	0
MANAGEMENT	0	1	0	1
ADMIN/OTHER	8	4	15	27
SUBTOTAL	227	70	27	324

* Includes all PM's at Ft Monmouth, Redstone Arsenal, WSMR & VA locations

Redstone - 47 Core, 1 FFRDC, 15 Contr
WSMR - 2 Core, 0 FFRDC, 18 Contr
Belvoir - 79 Core, 12 FFRDC, 67 Contr
McLean, VA - 106 Core, 14 FFRDC, 111 Contr

** Includes all PM's

*** Incldues all PM's at Ft Monmouth, Hanscom, Wright-Patterson, Huntsville, and Scottsdale, and VA locations.

Hanscom - 1 Core, 0 FFRDC, 0 Contr
VHFS - 71 Core, 0 FFRDC, 33 Contr
Falls Church - 14 Core, 0 FFRDC, 0 Contr
Scottsdale - 1 Core, 0 FFRDC, 0 Contr
Wright-Pat - 3 Core, 0 FFRDC, 0 Contr
Belvoir - 16 Core, 0 FFRDC, 0 Contr
Huntsville - 22 Core, 0 FFRDC, 19 Contr

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1b. **Describe organizational relationships especially between support organizations and PEO/PMs.**

This section includes:

(1) A paper describing the relationship between CECOM and the PEO/PMs, between CECOM as the host organization and Fort Monmouth tenants, and between CECOM, ARL, and JIEO.

(2) Capstone MOU between CECOM and PEO CCS

(3) Partnership Charter between the C4I team at Fort Monmouth.

(4) A paper describing the results achieved by the relationships at Fort Monmouth among the C4I team in pacer acquisitions for TRIBAND and TESAR systems.

The U.S. Army Communications-Electronics Command (CECOM), with the mission of integrated life cycle management of assigned C4IEW systems/equipments, is a major subordinate command of the Army Materiel Command. In addition to providing technology generation and application, acquisition and integrated logistics support management of assigned materiel, CECOM provides functional matrix support to Program Executive Officers (PEOs), particularly to three PEOs whose programs are primarily managed at Fort Monmouth and Vint Hill Farms Station, VA: PEO Communications Systems, PEO Command and Control Systems and PEO Intelligence and Electronics Warfare. CECOM also provides matrix support to PM, JCALS.

The matrix support provided by CECOM includes the following functions: design engineering, contracting, program management support, legal support, software engineering, production engineering, safety engineering, cost analysis, systems analysis, product assurance and test support, maintenance engineering, inventory control and spare parts management.

The PEOs and their subordinate PMs are responsible for the management of cost, schedule and performance for assigned acquisition programs. CECOM, and other AMC commodity commands provide functional support services to the PEOs and PMs. In providing this functional matrix support, CECOM and each PEO sign a capstone memorandum of understanding each year which lays the overall features and guidelines for the support relationship (see sample at enclosure). In addition, each CECOM functional matrix support organization and a given PM it supports develop a functional support agreement which contains the specifics of the support to be provided by that organization to that individual PM: the functions/tasks to be accomplished, the number of work-years to be provided and the work-year rate (when the support is reimbursable).

The matrix support personnel may be identified to be on-site, direct support, in which case they physically perform the vast majority of their work within the PM's office environment and operate under the daily direction of some PM core manager on the PM's TDA (the "home" functional organization retains responsibility for training and professional development and rater responsibility, but the PM Office either provides letter input or is designated as the intermediate rater). The support work-year may also be identified to off-site, or general, matrix support, where they continue to work under the daily direction of the functional chain of supervision, but are fully dedicated to a given PM's program. In both cases, the matrix manpower authorization is carried on the functional organization's TDA.

CECOM is also the host organization for its two installations, Fort Monmouth and Vint Hill Farms Station, VA. As such, CECOM also provides a full range of base operations support to the PEO elements located at the two installations and to all other tenant activities. Included in this support are personnel management support, public affairs, facilities engineering, community and family activities, installation supply and logistics, family housing management, physical security and law enforcement, information management and equal employment opportunity support.

For the PM, Army Information Systems/Information Systems Management Activity (PM, AIS/ISMA), a subordinate element of the U.S. Army Information Systems Command, CECOM provides contracting and legal support and integrated logistics support management for PM, AIS/ISMA systems which transition to CECOM. This is in addition to the base operations support provided.

CECOM's support to the Army Research Laboratories Electronics and Power Sources Directorate (EPSD) and to the Joint Interoperability and Engineering Organization (JIEO) element at Fort Monmouth is confined to base operations and legal support. There is however, a unique supplier-customer relationship between EPSD and the CECOM RDEC in that the majority of EPSD technology effort "transitions" to the CECOM RDEC.

Team Fort Monmouth, having recognized the importance of having several organizations collocated on the installation and seeing the opportunities for increased cooperation and synergy that could be developed, entered into a Team Fort Monmouth C4IEW "partnership agreement" in March of 1992. A copy of the agreement appears at enclosure 2.

MEMORANDUM OF UNDERSTANDING (MOU)
BETWEEN
PROGRAM EXECUTIVE OFFICE, COMMAND AND CONTROL SYSTEMS (PEO CCS)
U. S. ARMY COMMUNICATIONS-ELECTRONICS COMMAND (CECOM)

SUBJECT: FY94 Functional Support

1. PURPOSE. This MOU establishes an agreement between CECOM, PEO CCS, and its subordinate Project Managers (PMs) concerning functional support to be provided by CECOM during FY94. Specific Functional Support Agreements (FSAs) between the PEOs/PMs and CECOM functional activities will be considered for negotiation on an individual basis using the CECOM Directorate for Resource Management "Funding Responsibility Booklet" as guidance for defining what is reimbursable. Published rates for each functional activity will be available. Functional Support Agreements will be developed using either an average annual workyear rate or an average annual overhead rate to be added to the actual labor and associated costs.

2. SCOPE. This MOU establishes a relationship between PEO CCS and CECOM that provides the most efficient use of resources for effective functional support. Functional support includes but is not limited to contracting, cost estimating, budgeting, requirements planning, systems engineering, design engineering, technology development, integration, logistics support, test, engineering support to include hardware, software, and production engineering of PEOs assigned systems. Functional support can also include the optional exchange of personnel for purposes of cross training, e.g. acquisition experience or developmental experience. Cross Training would be an assignment for no more than 120 day increments not to exceed one year in duration and would be mutually agreed upon by the participating activities.

3. PROCEDURES.

a. This MOU will be reviewed twice a year by the PEO and CECOM to determine the need for modification. The first review will be performed (for planning purposes) during March/April of each year and the second review (finalization) will take place during August/September, subject to final congressional budget approval. Mobilization and/or emergency requirements which affect the agreement will be cause for immediate review. Amendments or additions to this MOU may be made at any time during its life as a joint action.

b. Coordination between the PEO and CECOM will occur through designated Points of Contact (POCs). Issues concerning functional support that cannot be resolved through these mediators will be addressed as follows:

(1) The lowest level within the PM and CECOM functional support offices (Branch or Division Chief level) will be the first recourse for problem resolution.

(2) Issues that cannot be resolved at this lowest level will be raised to an intermediate level between the PM or Deputy PM and the Director or Deputy Director of the CECOM functional activity.

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3) Those items that remain unresolved at the intermediate level will be referred to the Deputy PEO and the Director, CECOM C3I Logistics and Readiness Center; the Director, CECOM Research, Development and Engineering Center; the Deputy Commander for Business, the CECOM Chief of Staff, the Deputy to the Commander or the Commanding General when there is no intermediary between the Director and the CG. Issues that cannot be resolved at this level will be discussed by the PEO and the CECOM Commanding General (CG) and if necessary, forwarded to the CG, Army Materiel Command (AMC) and Army Acquisition Executive (AAE) for review/solution.

4) The administration of this MOU and its documents will be through:

a) FOR PEO CCS — Program Executive Office,
Command and Control Systems
ATTN: SFAE-CC
Fort Monmouth, NJ 07703-5001

b) FOR CECOM: — Program Analysis and Evaluation Dir.
ATTN: AMSEL-PE-PD
Fort Monmouth, NJ 07703-5001

c. Operational relationships between the PEO, PMs and the functional support element will be fully described in detail within individual support agreements between PMs and CECOM functional activities. A technical point of contact and a programmatic point of contact in both the PM and Functional Organization should be established to facilitate coordination efforts. For the purpose of this document, general Operating Guidelines are:

(1) The PEO supervises assigned PMs and provides overall planning guidance, direction, control and support to field their systems within cost, schedule and performance. The PEO is responsible for executing assigned programs, and is also responsible for the planning, budgeting and execution necessary to guide his performance through all milestones.

(2) The PEO/PM will establish the support needed from CECOM and other sources. The PEO/PM will identify overall program plan/schedule/objectives and the CECOM functional will identify the tasks and resources required to successfully accomplish the mission. Funding will be provided to the functional activities at an agreed upon rate (determined yearly through negotiations between the PEO and CECOM) for the level of support requested that Fiscal Year (FY). The PMs will keep the CECOM functional activities apprised of any program deviations that would impact functional support requirements. CECOM will keep the PEO/PM informed of impacts to negotiated support due to personnel acquisition limitations such as mandated hiring freezes, high grade caps, etc. Support agreements will be re-negotiated to accommodate the PM's and Functional's program and personnel deviations.

(3) Functional support to the PEO structure is a CECOM responsibility within the negotiated funding levels identified in c.(2) above. Personnel providing this support remain under the supervision and administrative control of the CECOM functional manager. Functional matrix support will normally be resident in their respective functional areas. In some cases, because of the nature of the tasks, it would be desirous/advantageous to collocate functional support with the PM as mutually agreed to by the PM and the supporting functional manager. The PEO/PM will provide the physical environment and tools required to support any functional personnel serving on-site with PM. This support includes purchase of equipment and supplies, rental of office space or equipment, etc. In the event functional duties

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are at a standstill, the functional should elevate the condition to the cognizant functional manager and project manager and/or PEO for discussion/coordination with the possible outcome of the functional matrix returning to the home directorate and an adjustment to the support agreement being made. Other personnel (Non-collocated Matrix) will augment on-site support on an as required basis as mutually agreed to by the PM and the supporting functional manager.

4) CECOM supports the PEO/PMs by promoting sound program management. CECOM will provide functional support services, advice and assistance as required by the PM/PEO. CECOM will actively participate in and will directly impact deliberations leading to acquisition decisions through its advice and assistance.

5) This MOU concentates on CECOM functional support that is performed in connection with the materiel acquisition process. In accordance with Army Regulation 70-1, Army Acquisition Policy, 31 Mar 93: "The PEO or PM must give the materiel command the opportunity to meet the PEO or PM's functional support requirements. The PEO or PM will coordinate with the materiel command to determine the extent and nature of required contractor support (CS) services. In those cases where the materiel command cannot provide the necessary support, then the PEO or PM has the authority to use CS. If the materiel command disagrees with the PEO decision, then the command can elevate the issue through command channels to the AAE for resolution."

4. MANAGEMENT REPORTS.

a. The CECOM functional director will provide quarterly feedback to the PMs on the support provided at the project manager/product manager/system level outlined in the support agreement/or agreed to with the PEO. The report should include financial status, accomplishments, planned actions, and director's assessment (issues/problems/concerns). Dialogue between the functional manager and the PEO/PM manager may also be required or used in lieu of the written report if acceptable to both organizations.

b. CECOM will host a periodic CECOM/PEO Support Meeting at which both CECOM and the PEOs will have the opportunity to surface matrix support issues of mutual interest.

5. PERSONNEL MANAGEMENT. The following policies and procedures will apply to the personnel management of individuals providing functional support to the PEOs/PMs.

a. For civilian and military matrix support collocated with the PEO/PM, the functional support organization will serve as the rater and senior rater (approving official), while the PEO/PM will serve as the intermediate rater (reviewing official). In cases where non-collocated matrix support is provided to the PEO/PM, the PEO/PM may provide written input to the appropriate functional supervisor to ensure accurate and timely performance ratings. Functional supervisors will incorporate PEO/PM input into the performance appraisal.

b. Disciplinary actions will be initiated by the functional supervisor, with input from the PM office as appropriate. Such action will be reviewed and concurred in by the next level of supervision in the functional element. Decisions will be made by the functional Director or Chief. Disciplinary actions in cases pertaining to soldiers shall be initiated and administered by the soldier's military commander.

c. The supervisory chain of the functional organization will be responsible for performance awards, the identification of training needs and initiation of training requests (schedule of training will be coordinated with the PM office).

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Request for personnel actions (SF-52's), all salary increases or decreases , the selection to fill vacant positions, request for new job descriptions, changes to existing job descriptions, and the maintenance of time card/leave approval will be the responsibility of the functional activity.

5. In accordance with an AMSEL-PT Memorandum, SUBJECT: Coordination on Civilian Incentive Awards, dated 17 Jun 93, all external awards for CECOM personnel must be coordinated with the matrix employee's director to prevent the same matrix services from being used to justify more than one award.

6. FUTURE ASSESSMENT: The CECOM OMA and PEO research, development and acquisition funding outlook for the near term reflects the national trend of reduced funding for the DoD. The resultant "downsizing" currently being formulated will be reflected in the CECOM/PEO organizational relationships and support strategies of the future. Service levels may need to be adjusted in accordance with the MOU procedures. As the execution years approach, the support agreements will be revisited to accommodate the changing environment and solidified for signature.

7. EFFECTIVE DATE. The terms of this MOU become effective upon the date of the last approving signature and will remain in effect during FY94 until superseded, modified, or terminated by mutual consent of both parties. It is also understood that the terms of this agreement are subject to changes mandated by the Department of the Army, Headquarters AMC or the AAE.

William H. Campbell
WILLIAM H. CAMPBELL
Brigadier General, USA
Program Executive Officer
Command and Control Systems

7 Oct 93
Date

Otto J. Guenther
OTTO J. GUENTHER
Major General, USA
Commanding
CECOM

10/3/93
Date

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Partnership Charter

U.S. Army Communications-Electronics Command • PEO Command & Control Systems
PEO Communications Systems • PEO Intelligence & Electronic Warfare
Electronics and Power Sources Directorate, Army Research Laboratory
Joint Interoperability & Engineering Organization • PM, Joint Computer Aided Acquisition and Logistic Support
U.S. Army Information Systems Management Activity

Mission Statement: We, the leaders of the above organizations located at Fort Monmouth, commit to work together to support the vision of Fort Monmouth as a premier global Center of Excellence in developing and supporting superior C3IEW systems and equipment as well as new architecture for strategic communications, automation, and defense information infrastructure.

OBJECTIVES:

1. *Each organization, in its area of responsibility, will ensure that an environment for excellence and productivity is provided for its work force based on cooperation, communication, interdependence, value and quality.*
2. *Organizations will identify issues, problems or barriers impacting the Partnership and coordinate the development of integrated solutions based on the needs of the Army and the Department of Defense.*
3. *Organizations will share and be receptive to innovative ideas, methods, and techniques to improve processes.*
4. *The Partnership will establish enhanced training and development programs so that a quality professional military and civilian work force is ready to assume the challenges of new battlefield technologies.*
5. *The Cooperation and synergism developed through these close relations will posture Fort Monmouth to meet the needs of a reshaping Department of Defense and have a positive impact on the quality of equipment developed and fielded by the Army.*

Major General Otto J. Guenther

Brigadier General William H. Campbell

Brigadier General David R. Gust

A. R. D'Angelo

C. G. Thornton

Colonel Kenneth A. Thomas

James E. Tomlinson

Thomas J. Michelli

MARCH 1993

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FACT SHEET

AMSEL-PE-SA
Vincent Alfieri/x21222
28 September 1994

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SUBJECT: Pacer Acquisitions

PURPOSE:

Highlight an innovative proven process successful in streamlining the acquisition process whose lessons learned can be replicated in future high visibility COTS/NDI acquisitions.

FACTS:

1. CECOM successfully applied a highly focused technique to streamline the acquisition process on two high visibility procurements. The Pacer approach was employed to the acquisition of the Tri-Band Super High Frequency Tactical Satellite Terminal (TRIBAND) and the Tactical Endurance Synthetic Aperture Radar (TESAR) systems. The TRIBAND was awarded in 72 days and the TESAR in 96 days.

2. Both Pacer acquisitions programs had the backing at the HQDA level and above, which was reinforced by the local PEO / PM and CECOM Commanding General. In both cases, the program managers had authority over a wide range of activities, causing less time consuming oversight by their management chain. In each program smart, experienced people were recruited for their teams and retained through all phases of the acquisition. This assured continuity of corporate knowledge and eased the transition from one phase to another. Therefore, the same people involved in preparing the Acquisition Strategy, System Specification, Statement of Work, Source Selection Plan, etc., were the major players in the source selection process. Having an experienced, dedicated team available early-on allowed for advanced preparation which lightened the burden accompanying the release of the Request for Proposal (RFP) and Procurement Data Package.

3. Both Pacer acquisitions shared the same approach of developing and maintaining close ties with industry throughout all phases of the acquisition. Industry was encouraged to provide input to the draft RFP and Specification prior to their release. The same was true with regard to requesting Performance Risk Assessment information. Meetings were held twice with industry prior to release of the RFP. In both procurements, there were no protests, and industry representatives commented on the thoroughness and professional attitude of the Government team.

4. Both Pacer acquisitions made extensive use of the Electronic Bulletin Board as the vehicle for communicating with industry. In the case of the TRIBAND procurement, the Government team made concerted efforts to use the EBB to respond to offerors' questions within 24 hours of receipt. The TESAR SSEB used the EBB to communicate responses, and personal computers were used to establish a data base of Items For Negotiations.

5. Finally, both Pacer acquisition teams examined the processes they executed, with the intent of reducing time frames as much as possible. In both cases, waiver authority was exercised wherever feasible. In the case of TRIBAND, the face to face negotiations were waived saving 3 - 4 weeks. This may not always be feasible for other acquisitions. As a minimum, the EBB should be used as much as possible to reduce time frames of activities that cannot be eliminated.

REVIEWED/APPROVED BY: James J. Cuiffo
for LAWRENCE A. SMITH
Acting Director, Program Analysis
and Evaluation

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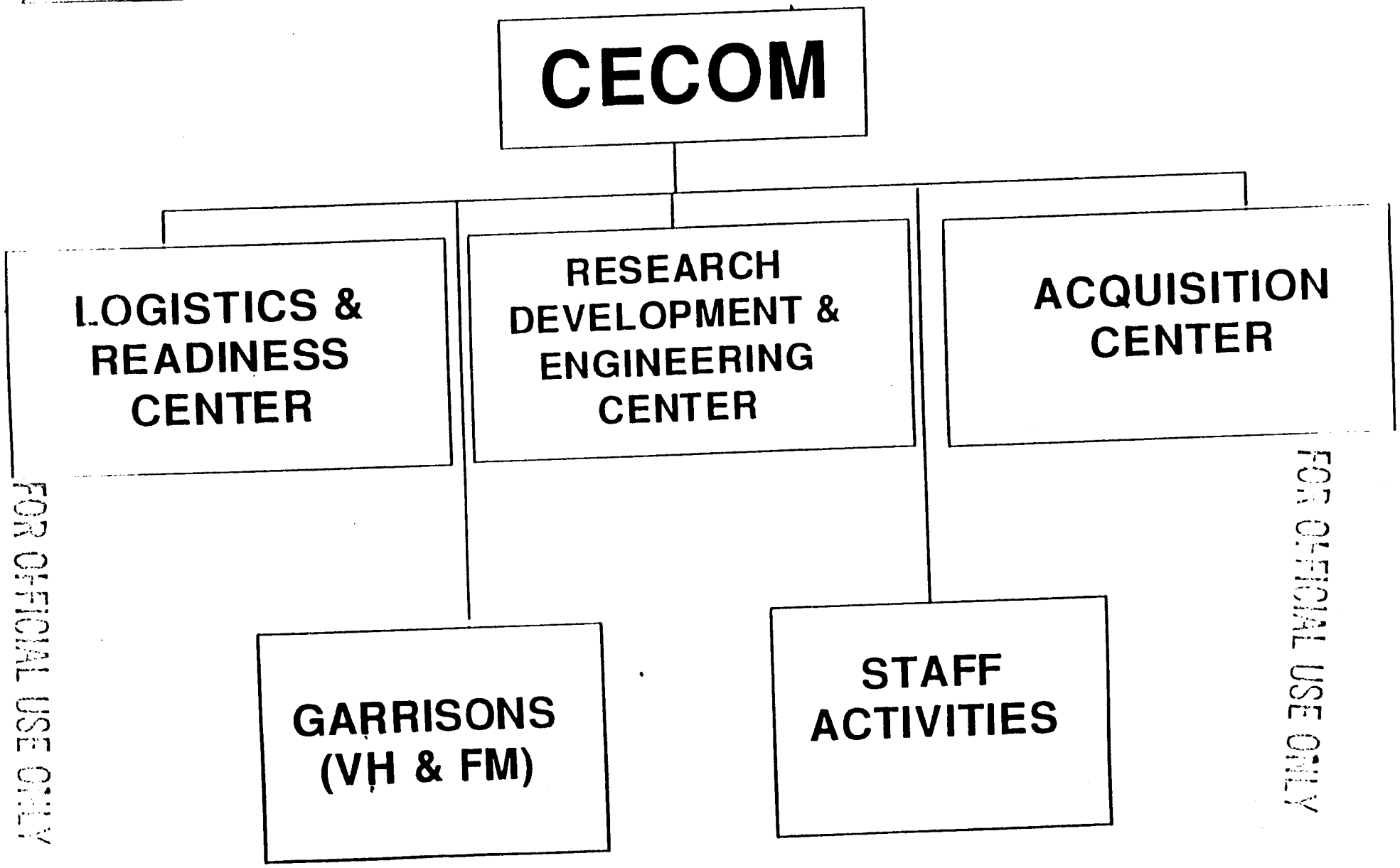
TEAM FORT MONMOUTH

COMMUNICATIONS-ELECTRONICS COMMAND



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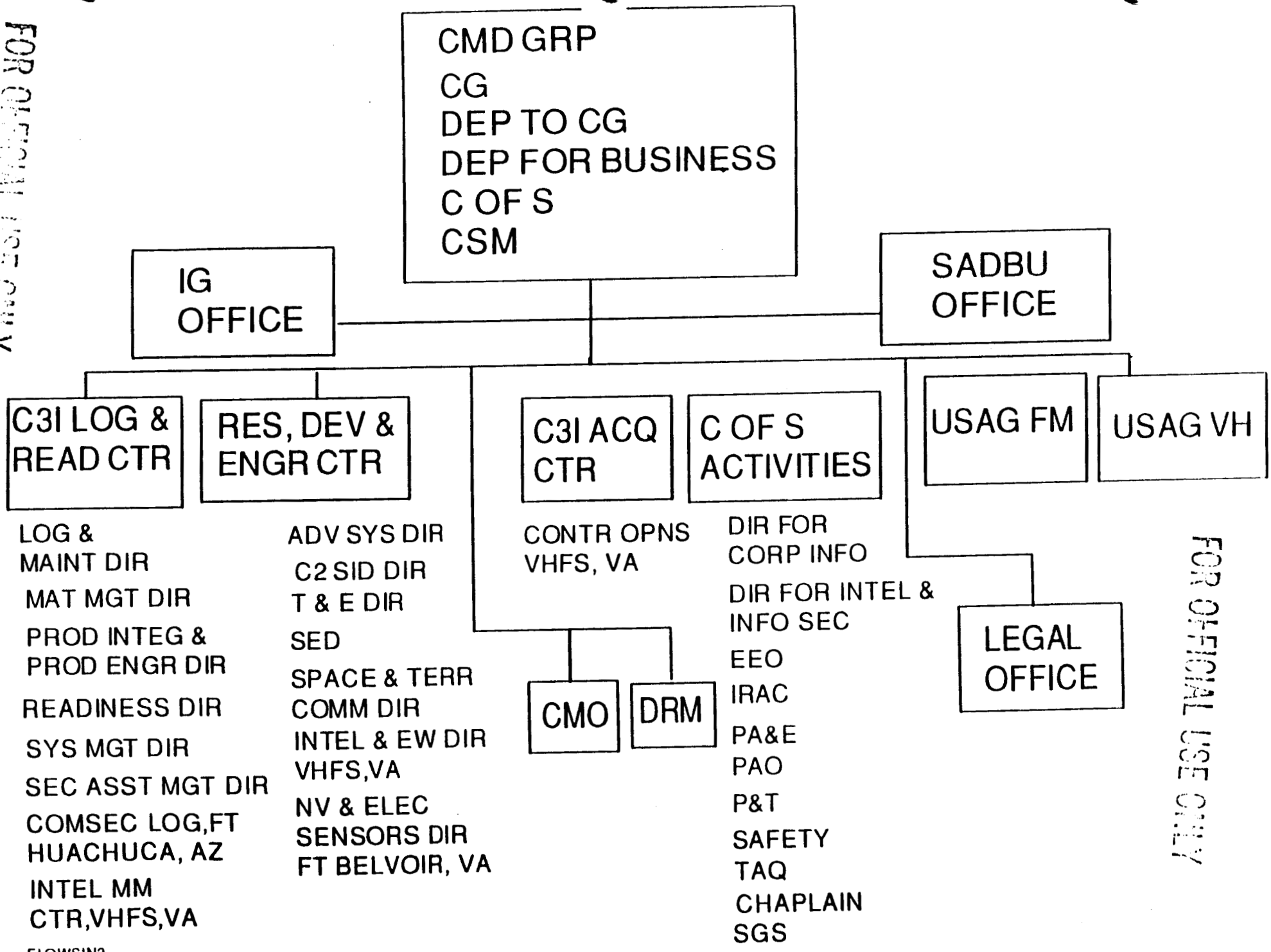

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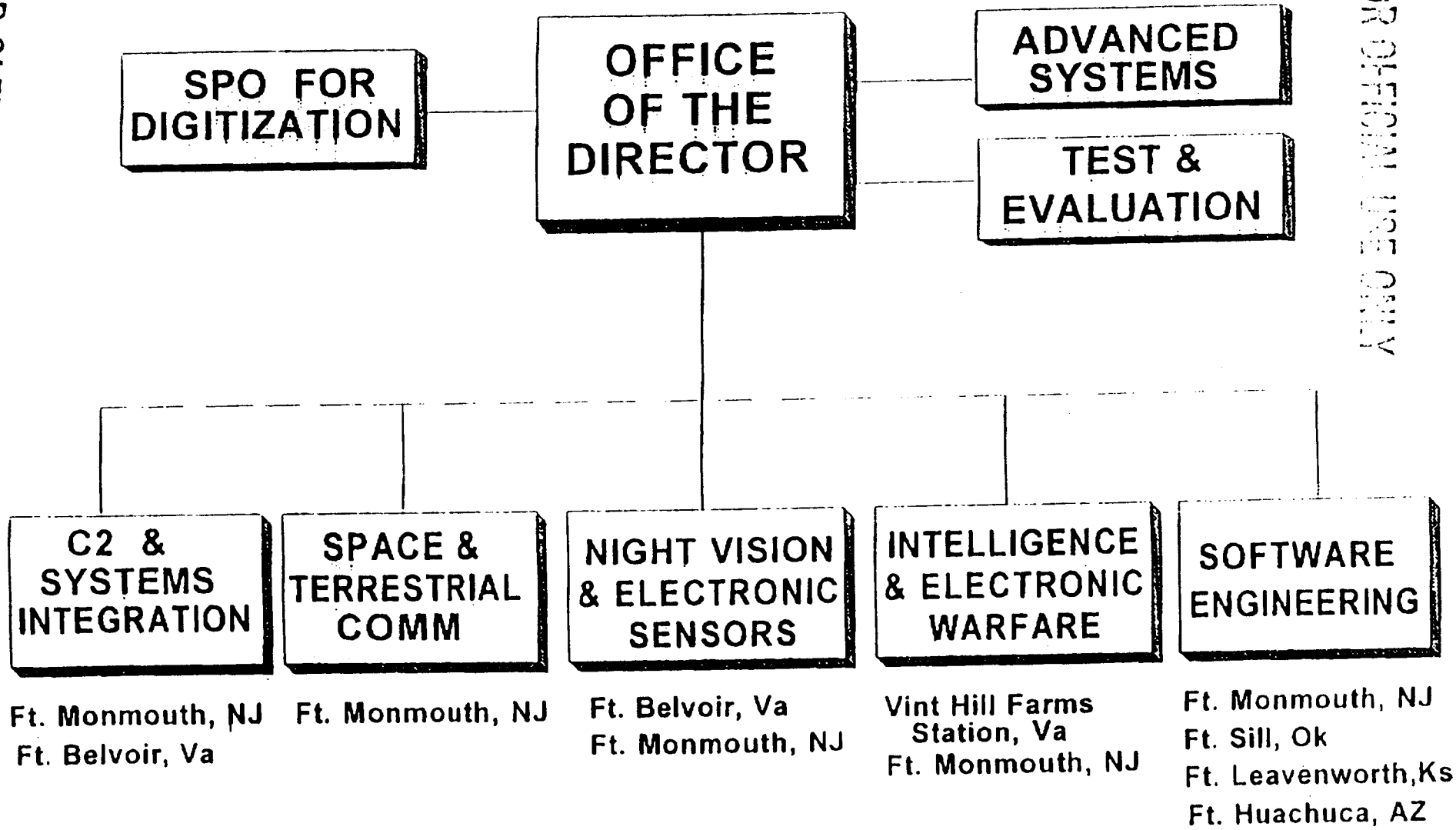
CECOM
RESEARCH, DEVELOPMENT AND ENGINEERING CENTER



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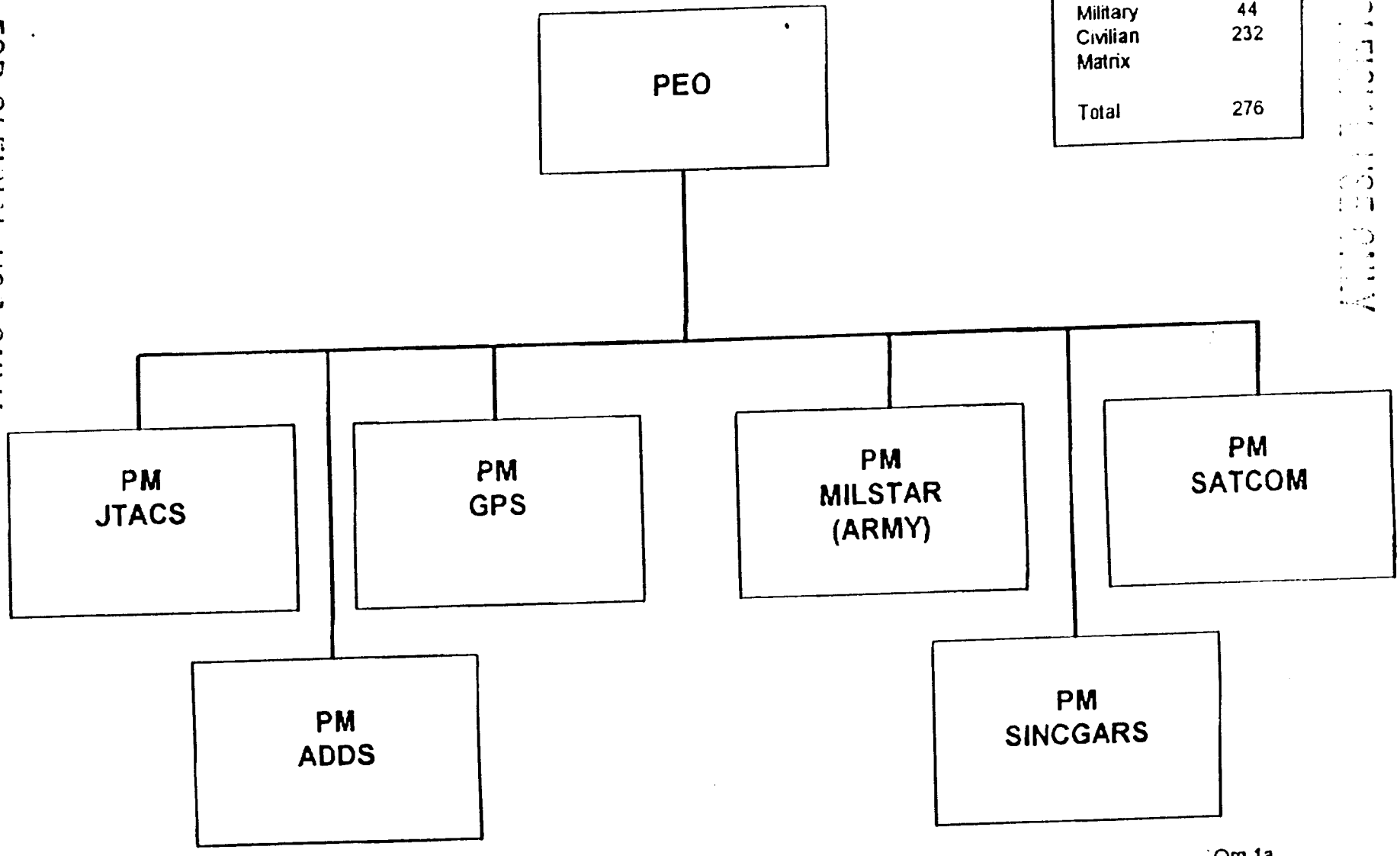
PEO COMMUNICATIONS SYSTEMS

MANPOWER	AUTH
Military	44
Civilian	232
Matrix	
Total	276



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30 September 1994

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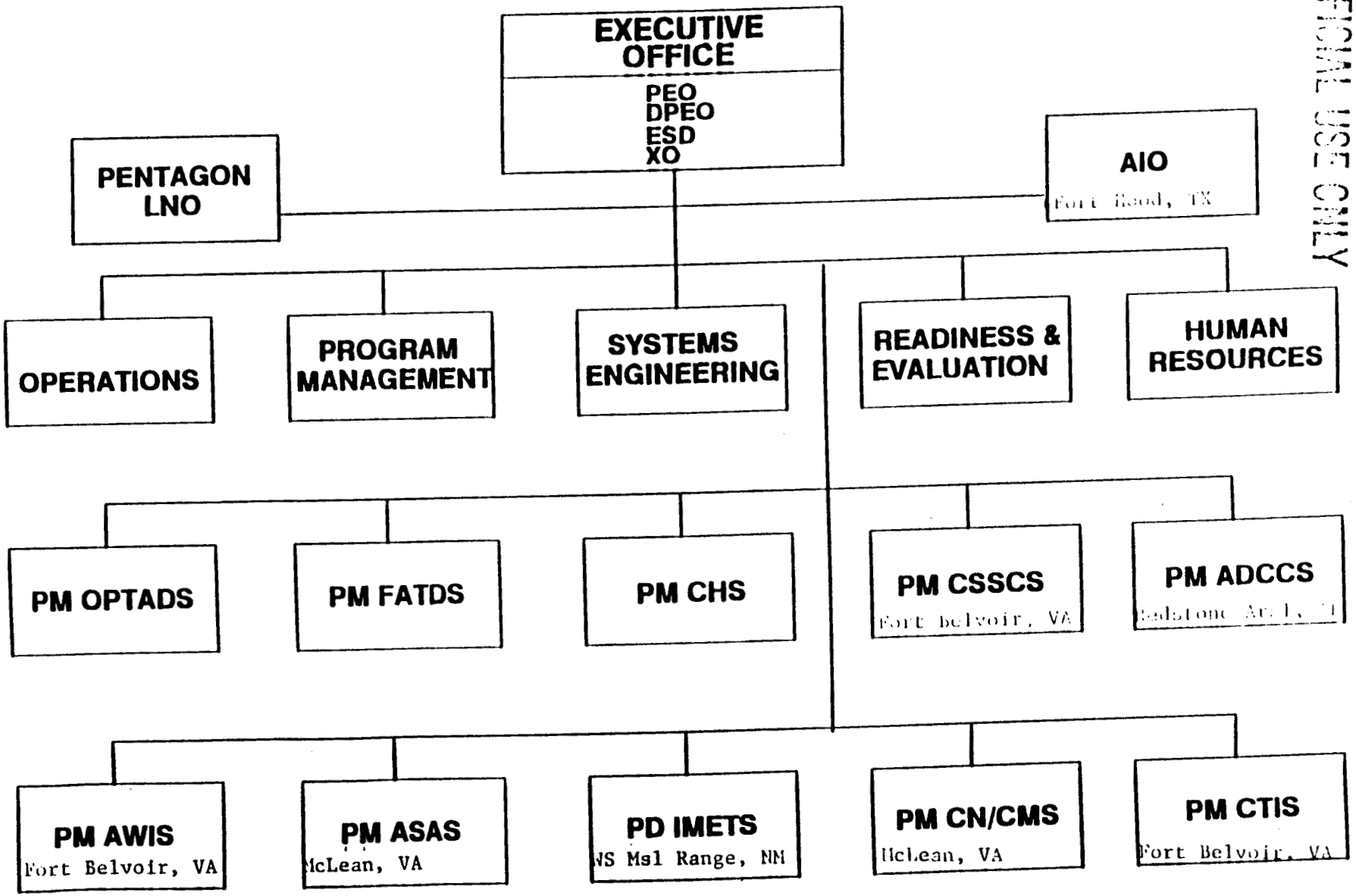
PROGRAM EXECUTIVE OFFICE COMMAND AND CONTROL SYSTEMS



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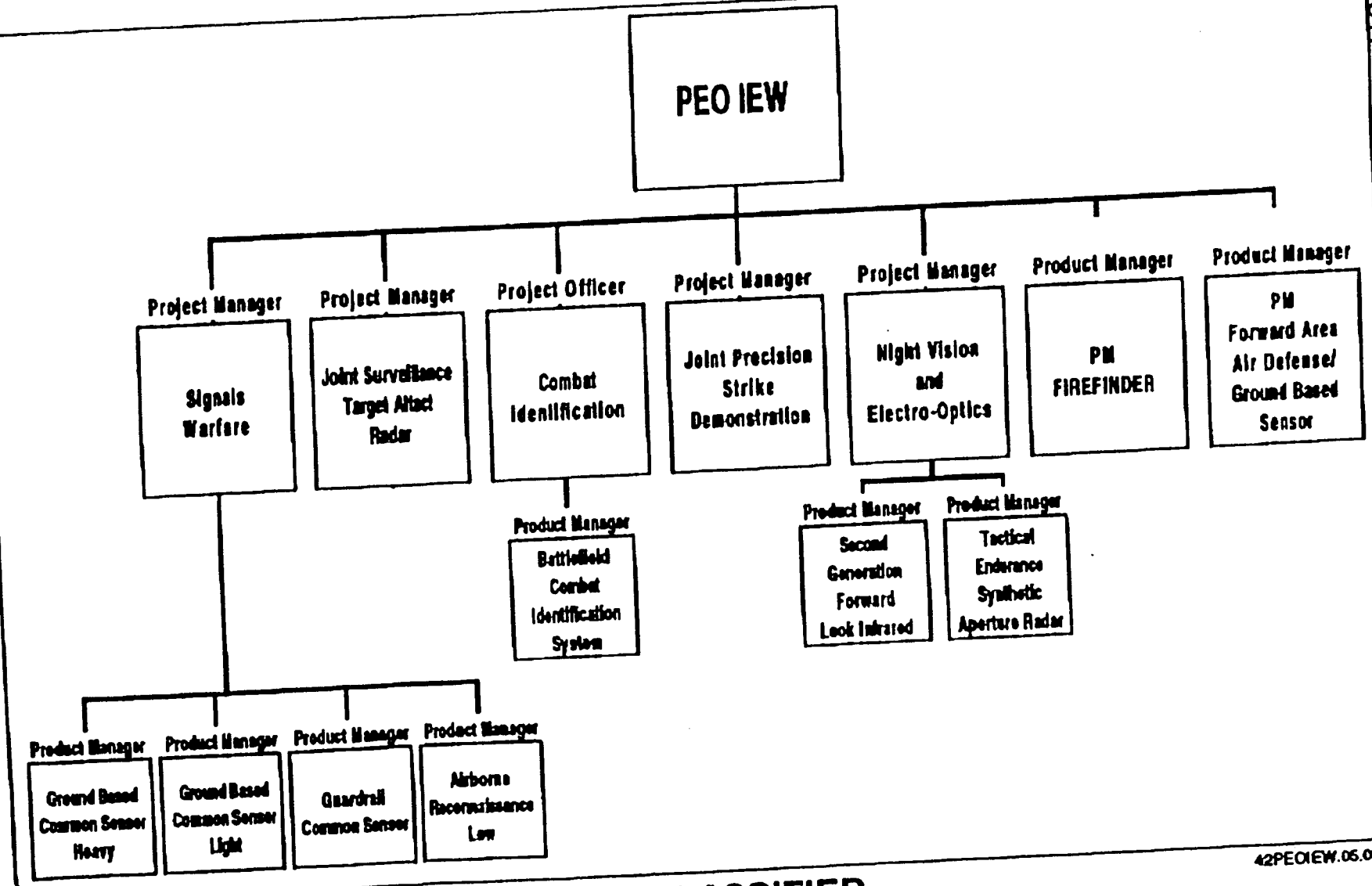
PROGRAM EXECUTIVE OFFICE

PEO IEW

Organization as of 30 Sep 94



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JIEO FT MONMOUTH OPERATIONS

CENTER FOR ARCHITECTURE

CINC SUPPORT DIVISION
MR. E. RICHARDS

DISA INFORMATION MGMT SYS

NETWORK OPS-DISA
MS. KIRLAN

CENTER FOR INFORMATION TECHNOLOGY STANDARDS

INFORMATION TRANSFER DEPARTMENT
MR. L PILLA

- SYS INTEG DIV — MR. BRINCKA
- TERM & SIG PROC DIV — MR. KOVANIC
- DATA SYS DIV — MR. MCLANE
- RADIO DIV — MR. BATTISTUZ
- STDS MGMT DIV — MR. RING

CORPORATE MANAGEMENT

PRODUCT INITIATIVE DIVISION
MR. MAZUK

CONTRACTS MANAGEMENT DIVISION
MR. CHUPEIN

FINANCIAL PLANING DIVISION
MR. PETITO

FINANCIAL EXECUTION DIVISION
MS. HAUGHTON

MANAGEMENT SUPPORT DIVISION
MS. STEWART

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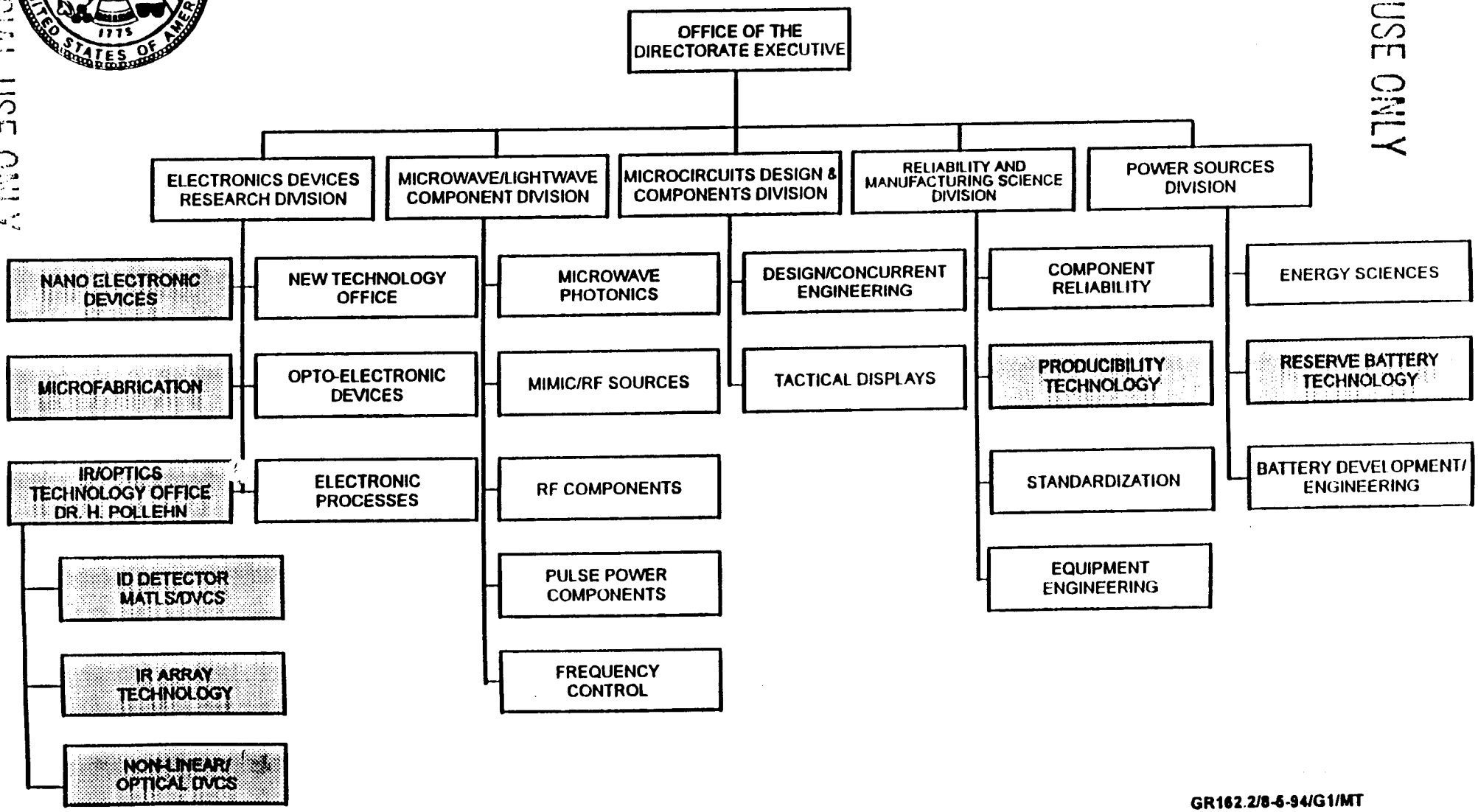
ELECTRONICS AND POWER SOURCES DIRECTORATE



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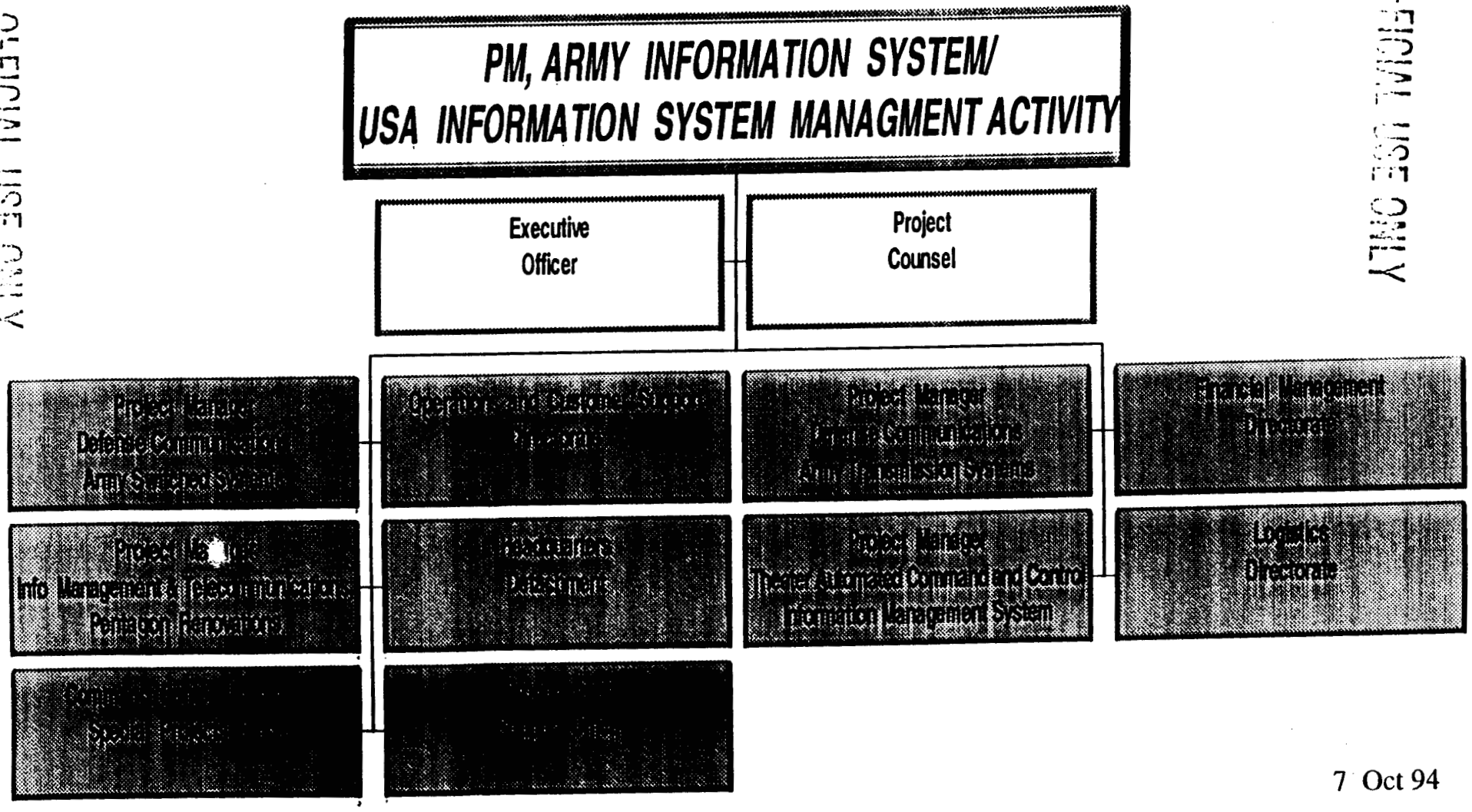
PM AIS/USAISMA ORGANIZATION CHART



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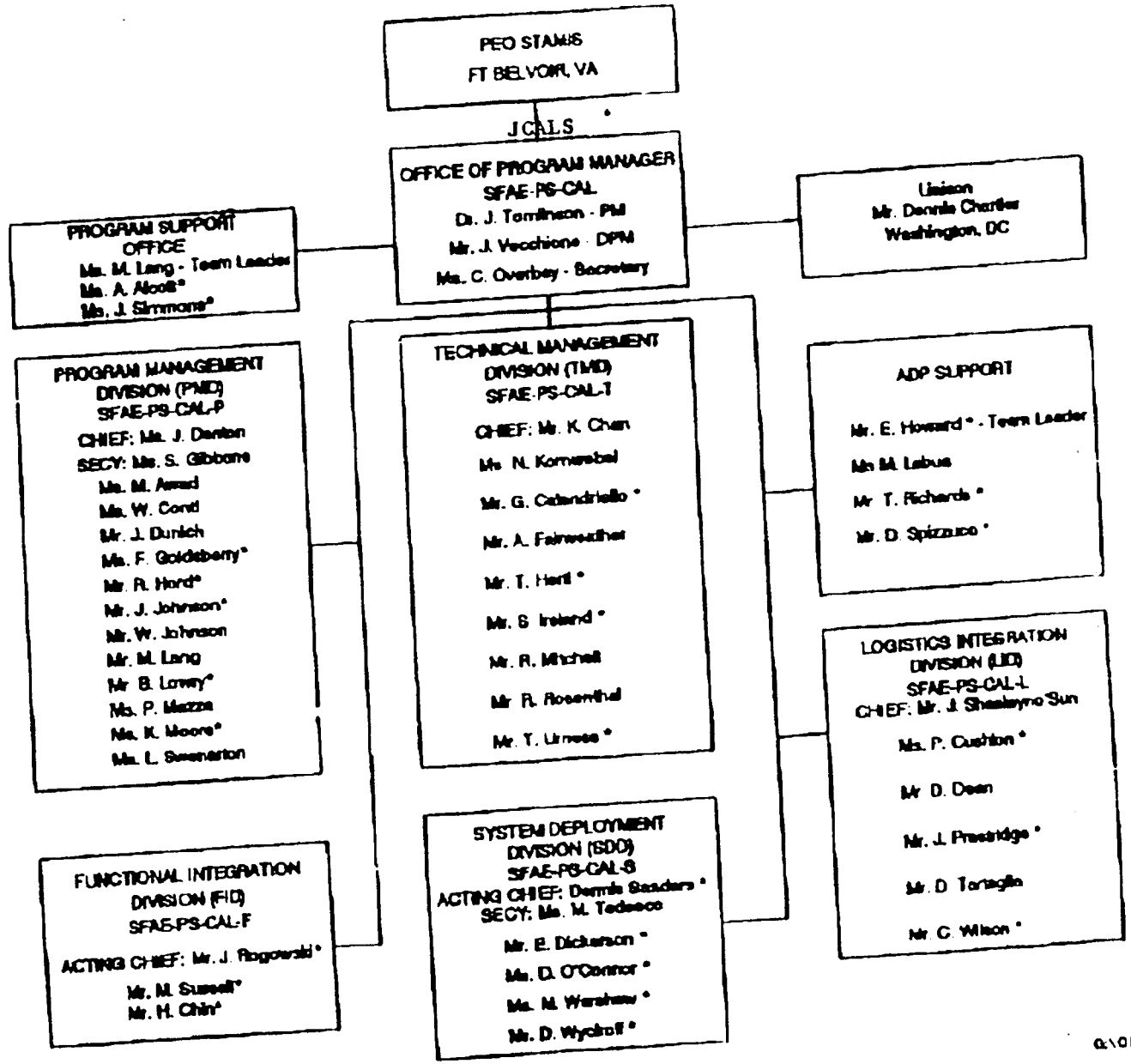

* CECOM Matrix Spt

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Fort Monmou... Space Data

Activity Name	Lease (Y/N)	Type of Space (SF) Administrative	Laboratory	Other (Describe)	Total Area	Comments
Headquarters CECOM					0	
Communications-Electronics Command Group	N	9,252			9,252	
Program Analysis and Evaluation Directorate	N	30,748			30,748	
Resource Management Directorate	Y	16,692			18,692	
	N	10,240		2,065	12,305	Training
C3I Acquisition Center	Y	86,240			86,240	
	N	20,917			20,917	
CECOM Safety Office	N	8,316	2,481		10,797	
Corporate Information Directorate	Y	86,600		11,500	98,100	Storage
Intelligence and Counterintellignece Directorate	N	11,050			11,050	
Personnel and Training Directorate	N	13,520		34,712	48,232	Training
	Y	20,210			20,210	
Legal Office	Y	17,650		2,040	19,690	Courthouse
CECOM Chaplain	N	20,801			20,801	
Inspector General	N	4,578			4,578	
Small and Disadvantaged Business Utilization Office	Y	1,081			1,081	
Competition Management Office	Y	3,250			3,250	
Equal Opportunity Office	Y	3,540			3,540	
Internal Review and Audit Compliance	N	1,600			1,600	
Total Army Quality Office	Y	968			968	
Directorate, C3I Log and Readiness Center	Y	7,500			7,500	
Logistics and Maintenance Directorate	Y	88,530			88,530	
	N	24,482			24,482	
Material Management Directorate	Y	110,400			110,400	
Systems Management Directorate	Y	10,770			10,770	
Security Assistance Management Directorate	Y	16,331			16,331	
Product Integrity & Production Engineering Directorate	Y	60,937			60,937	
	N	42,406	4,217		46,623	
Readiness Directorate	Y	30,625			30,625	
CECOM Research, Development & Engineering Center	N	17,363			17,363	
Software Engineering Directorate	N	64,470	67,001		131,471	
Night Vision & Electronic Sensors Directorate	N	30,320	33,962		64,282	
Intelligence and Electronic Warfare Directorate	N	35,326	32,634	9,035	76,995	Storage
Space & Terrestrial Communications Directorate	N	80,938	91,473	5,129	177,540	Storage
Command/Control & Systems Integration Directorate	N	65,877	223,782		289,659	
Test and Evaluation Directorate	N	16,400	8,800		25,200	
U.S. Army Garrison Fort Monmouth	N	2,100			2,100	
Directorate of Public Works	N	32,570	1,800	537,847	572,217	Maintenance, Shop
Directorate for Community & Family Activities	N	11,563		550,871	562,434	MWR, Community
Directorate for Plans, Training, and Mobilization	N	7,720		6,349	14,069	Training
Directorate for Resource Management	N	3,016			3,016	
Contract Management Office	N	950			950	

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Fort Monmouth Space Data

Activity Name	Lease (Y/N)	Type of Space (SF) Administrative	Laboratory	Other (Describe)	Total Area	Comments
Directorate for Installation Logistics	N	38,657	480	74,680	113,817	Maintenance, Storage
Provost Marshal Office	N	18,675			18,675	
Garrison Safety Office	N	1,008			1,008	
54th Ordnance Detachment	N	4,102		3,108	7,210	Maintenance
Fort Monmouth Post Exchange	N	6,471		78,542	85,013	Post Exchange
Fort Monmouth Commissary	N			69,913	69,913	Commissary
PEO Communications System	N	10,000			10,000	
PM JTACS	N	38,746		1,296	40,042	Storage
PM Army Data Distribution System	N	9,308		1,170	10,478	Storage
PM Single Channel Ground and Airborne Radio System	N	11,500		1,993	13,493	Storage
PM Satellite Communications	N	5,940		2,749	8,689	Storage
PM MILSTAR (Army)	N	8,474			8,474	
PM Global Positioning System	N	7,080			7,080	
PEO Command and Control Systems	N	11,500			11,500	
PM Operations Tactical Data Systems	N	11,500		9,440	20,940	Storage
PM Field Artillery Tactical Data Systems	N	11,500		1,144	12,644	Storage
PM Common Hardware Software	N	12,312	5,000		17,312	
PEO Intelligence and Electronic Warfare	N	4,670			4,670	
PM Joint Surveillance Target Attack Radar System	N	8,400			8,400	
PM Combat Identification	N	30,000			30,000	
PM Firefinder	N	7,754			7,754	
PM Electronic Warfare/Reconnaissance, Surveillance, and Target Acquisition	N	37,460			37,460	
Resident Activities					0	
U.S. Army Chaplain Center and School	N	18,000		133,286	151,286	Classroom, Auditorium
U.S. Military Academy Preparatory School	N	6,029		93,041	99,070	Classroom, Storage
Medical Department Activity	N	9,260		105,839	115,099	Medical
Dental Activity	N			8,863	8,863	Dental
Army Research Labs, (ARL) (EPSD)	N	83,438	71,875	3,600	158,913	Storage
Information Systems Management Agency	N	40,000			40,000	
TMDE Support Operations	N	2,360	7,148		9,508	
ARL C4I Systems Branch, (VAL)	N	2,565	1,500		4,065	
Human Research & Engineering Laboratory	N	1,000	500		1,500	
Joint Interoperability Engineering Office	N	33,554	2,000		35,554	
Defense Investigative Service	N	1,494			1,494	
902nd Military Intelligence Group	N	3,300			3,300	
Fort Monmouth Volunteer First Aid	N	400			400	
Criminal Investigation Division	N	4,720			4,720	
U.S. Army Audit Agency	N	4,720			4,720	
PM Joint Computer-Aided Logistics System	N	25,000	2,500		27,500	
Federal Bureau of Investigation	N	81,998			81,998	
TOTALS		1,742,742	557,153	1,748,212	4,048,107	

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HQ CECOM Vint Hill Farms Station Space Data

Activity Name	Lease (Y/N)	Type of Space (SF)				Comments
		Administrative	Laboratory	Other	Total Area	
Headquarters CECOM						
C3I Acquisition Center	N	18,000			18,000	
Legal Office	N	3,000			3,000	
Safety Office	N	1,000			1,000	
Intelligence Materiel Management Center	N	98,161		112,365	210,526	Maintenance,Storage
CECOM Research, Development & Engineering Center						
Intelligence/Electronic Warfare Directorate	N	57,159	21,135	6,000	84,294	Storage
TOTALS		**177,320**	**21,135**	**118,365**	**316,820**	

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PROGRAM OFFICE - TOTAL FY 93 PROGRAM FUNDS

PEO COMM		$ 699.2M
PEO IEW		$ 910.0M
PEO CCS		$ 399.6M
CECOM RDEC		$ 969.6M
R&D MISSION	$ 189.1M	
PA	$ 57.7M	
OMA	$ 105.5M	
REIMBURSABLE	$ 148.4M	
DIRECT CITE	$ 380.1M	
CUSTOMER DIRECT	$ 88.4M	
CECOM LRC		$ 1,756.6M
ISMA		$ 107.0M

MAIN PROGRAMS

CECOM RDEC
- SEE ENCLOSURE 1

CECOM LRC
- COMSEC
- DBOF
- LEVEL II/WEAPON SYSTEM SUPPORT
- ANVIS LIGHTING
- FLEXIBLE COMPUTER INTEGRATED MANUFACTURING
- MANUFACTURING SCIENCE PROGRAM
- TECHNOLOGY INSERTION PROGRAM
- FMS PROGRAM
- NEW EQUIPMENT TRAINING PROGRAM
- TOTAL PACKAGE FIELDING PROGRAM

PEO CCS
- PM AIR DEFENSE COMMAND & CONTROL SYSTEM
- PM ALL SOURCE ANALYSIS SYSTEM
- PM COUNTER NARCOTIC/COMMAND MANAGEMENT SYSTEM
- PM COMMON HARDWARE SYSTEM
- PM COMBAT SERVICE SUPPORT CONTROL SYSTEM
- PM FIELD ARTILLERY TACTICAL DATA SYSTEMS
- PM OPERATION TACTICAL DATA SYSTEMS
- PM ARMY WORLD-WIDE MILITARY INFORMATION SYSTEMS
- PM COMBAT TERRAIN INFORMATION SYSTEMS
- PM INTEGRATED METEOROLOGICAL SYSTEMS

PEO IEW
- PM SIGNALS WARFARE
- PO JOINT SURVEILLANCE TARGET ATTACK RADAR
- PM COMBAT IDENTIFICATION
- PM JOINT PRECISION STRIKE DEMO
- PM NIGHT VISION ELECTRO-OPTICS
- PM FIREFINDER
- PM FORWARD AREAS AIR DEFENSE/GROUND BASED SENIOR

PEO COMM
- PM JOINT TACTICAL AREA COMMUNICATIONS SYSTEMS
- PM GLOBAL POSITIONING SYSTEMS
- PM MILSTAR
- PM SATELLITE COMMUNICATIONS
- PM ARMY DATA DISTRIBUTION SYSTEMS
- PM SINGLE CHANNEL GROUND & AIRBORNE RADIO SYSTEMS

ISMA

MACOM TELEPHONE MODERNIZATION
DEFENSE MESSAGE SYSTEM
DEFENSE DATA NETWORK
SMALL COMPUTER PROGRAM
NORTH AMERICAN NUMBERING PLAN
COMMON USER INFO TRANSFER NETWORK
ENHANCED KOREA IMPROVEMENT PROGRAM
DEFENSE SATELLITE COMMUNICATION SYSTEM
FT BELVOIR IMA MODERNIZATION
TERRESTRIAL TRANSMISSIONS
COLLINS HALL INFO SYSTEMS
ADPE STRATEGIC WARGAMING
TACCIMS
PENTAGON RENOVATION

CECOM RDEC

CECOM FY94 6.2
PRIORITY LIST

PRI	DIV.	PE	PROJ LINE	WPKG NUMBER	WORKPACKAGE TITLE	START YEAR	END YEAR	1994	1995	1996	1997	1998	1999
1	NV/ES	62709	DH95	S008	Digital/Electronic Terrain Board	FY92	FY96	3700	3200	3200			
2	NV/ES	62709	DH95	A003	Advanced FPA (Technology for Affordability)	FY92	FY96	6223	5415	5600	1400		
3	S&TC	62782	AH92	IFMS	Modeling and Simulation	FY92	FY99	574	970	1533	1896	1102	1245
4	S&TC	62782	AH92	MMBR	Multiband Multimode Radio	FY93	FY94	1200					
5	NV/ES	62709	DH95	C001	Advanced Optics Development	FY94	FY99	500	4938	3242	3300	3300	4300
6	S&TC	62782	AH92	CDNR	Combat Net Radio	FY92	FY99	3081	3004	2409	2817	3434	3998
7	S&TC	62782	AH92	CONP	Distributed Communications	FY92	FY99	1662	1595	2295	2285	2755	3060
8	NV/ES	62270	A442	0430	Radar CM	FY92	FY99	3485	3777	3253	3202	3202	3894
9	S&TC	62782	AH92	CCFO	Tactical Fiber Optics	FY92	FY99	889	770	1264	859	752	1673
10	IEWD	62270	A906	0502	IEW Modeling & Simulation	FY92	FY99	370	400	320	340	360	380
11	S&TC	62782	AH92	CCCO	Army Common User System	FY92	FY95	479	790				
12	NV/ES	62709	DH95	C002	Adv. I2/Optics-Aviation	FY92	FY94	2473					
13	S&TC	62782	AH92	CONS	Improved Spectrum Efficiency	FY93	FY96	900	900	700			
14	C2SID	62211	AH85	AV2534	Aided Pilotage	FY92	FY99	2325	2143	2143	2187	2305	2150
15	NV/ES	62709	DH95	S008A	Digital/Electronic Terrain Board	FY97	FY99				2345	2501	2850
16	NV/ES	62709	DH95	A003A	Advanced FPA (Technology for Affordability)	FY97	FY99				3685	5382	5960
17	S&TC	62782	AH92	COIP	Integrated Photonic Subsystem	FY93	FY99	900	1500	900	1300	1200	1100
18	NV/ES	62709	DH95	N001	Low Observable Modeling	FY94	FY98	700	928	1000	776	785	
19	NV/ES	62709	DH95	D005	Adv. ATR Processing & Algorithms Exploitation	FY92	FY95	4588	4235				
20	IEWD	62270	A442	1002	IEW-M Technical Investigation	FY93	FY99	700	750	750	800	800	900
21	IEWD	62270	A906	0102	SW Technical Investigation	FY92	FY99	1332	1000	1000	1000	1000	1000
22	C2SID	62211	AH85	AV2706	Aviation in-house Electronics	FY92	FY99	2405	2436	2330	2310	2447	3709
23	C2SID	62211	AH85	AV2536	Aircraft Controls and Displays	FY94	FY99	369	804	800	820	859	676
24	NV/ES	62270	A442	0530	Laser Warning/CM	FY92	FY96	1800	1148	1180			
25	IEWD	62270	A906	0202	EW Critical Components	FY92	FY96	2624	2819	1480			
26	NV/ES	62270	A442	0631	Adv. EO/IR Countermeasures	FY97	FY99				2000	2090	2350
27	NV/ES	62709	DH95	S005	Adv. E-O Systems Performance Modeling	FY92	FY99	1057			766	775	1386
28	NV/ES	62709	DH95	M003	Diverse Wavelength Laser Source	FY92	FY95	700	700				
29	IEWD	62270	A442	0202	LPI ESM	FY92	FY97	1544	1500	1432	1050		
30	IEWD	62270	A442	0902	Precision False Target Generation Techniques	FY94	FY96	200	100	68			
31	NV/ES	62270	A442	0630	Adv. EO/IR Countermeasures	FY92	FY96	3604	2743	2510			
32	IEWD	62270	A442	0802	ESM Detection Techniques	FY94	FY96	400	134	68			
33	NV/ES	62270	A442	0531	Laser warning/CM	FY97	FY99				1532	1536	1728
34	IEWD	62270	A906	0302	New Signals EW	FY92	FY96	2176	2166	2348			
35	NV/ES	62709	DH95	M003A	Diverse Wavelength Laser Source	FY96	FY99			528	536	620	770
36	NV/ES	62709	DH95	D005A	Adv. ATR Processing & Algorithms Exploitation	FY96	FY99			2377	4096	4149	4168
37	IEWD	62270	A906	0402	EW Processing Techniques	FY92	FY95	2000	1100				
38	IEWD	62270	A906	0802	IEW Data Fusion Techniques	FY94	FY99	737	652	1093	2585	2420	3000
39	C2SID	62211	AH85	AV2535	Aircraft Mission Rehearsal	FY93	FY99	617	580	678	717	730	676
40	S&TC	62782	AH92	CCNU	Net Planner	FY93	FY95	391	575				
41	C2SID	62211	AH85	AV2031	Navigation Technology	FY92	FY99	998	873	879	921	958	890
42	C2SID	62211	AH85	AV2082	Expert Comm Link Manager	FY92	FY99		100	300	375	450	371
43	C2SID	62211	AH85	AV2081	Airborne Video Link	FY93	FY94	20					
44	IEWD	62270	A906	0702	Information Warfare Techniques	FY97	FY99				2175	2395	2450
45	IEWD	62270	A442	1502	Impulse Wideband ESM	FY97	FY99				380	1400	1300
46	IEWD	62270	A442	1602	SAR Deception Techniques	FY97	FY99				50	63	60
47	IEWD	62270	A906	0902	Network Countermeasures	FY99							167
								57023	55045	48680	48465	49772	56091

APPROVED BY: Robert F. Giordano

ROBERT F. GIORDANO, DIRECTOR

3-JUN 10 '94 03:07PM CECOM ASD OFFICE

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CECOM FY94 6.1A PRIORITY LIST

PRIO	DIR.	WPRS	WORKPACKAGE TITLE	START YEAR	END YEAR	1994	1995	1996	1997	1998	1999
1	CESID	9101	0101 CAC2 ATD	FY93	FY96	12000	13900	15800			
2	NV/ES	9281	0100 BATTLEFIELD COMBAT ID ATD	FY93	FY98	6131	8280	7012	7360	3514	
3	NV/ES	9870	5100 REMOTE SENTRY ATD	FY93	FY96	3550	4485	1000			
4	NV/ES	9016	9042 RADAR DEC & JAMMING ATD	FY92	FY95	2500	500				
5	NV/ES	9086	3101 ADVANCED I2 ATD	FY93	FY96	3611	2475	2500			
6	NV/ES	9870	6900 MULTISENSOR AIDED TARGETING/AIR ATD	FY92	FY95	4092	1100				
7	S&TC		Seamless C3 OTM	FY94	FY99	1500					
7	S&TC	9037	0101 GLOBAL GRID COMMUNICATIONS	FY94	FY99		14062	15913	17346	13888	10552
8	IEWD	9043	1010 COMMON GND STATION/INTELL DISSEMINATION	FY93	FY95	4726	1921				
9	NV/ES	9870	1303 Advanced Integrated Manportable System	FY94	FY95	1795	2450	4250	5350	2350	
10	S&TC	9047	0101 SURVIVABLE ADAPTIVE SYSTEM ATD	FY92	FY95	3935	4712				
11	NV/ES	9016	9052 Enhanced Survivability	FY94	FY96	1833	1286	1000			
12	NV/ES	9870	5301 SCOUT SENSOR ATD	FY94	FY99	7939	5842	12536	11611	4293	2204
13	NV/ES	9087	0202 TARGET ACQUISITION ATD	FY95	FY98		4960	4594	6496	1895	
14	NV/ES	9043	0100 BISTATIC RADAR FOR WPNS LOC. ATD	FY92	FY96	1250	3200	2500			
15	NV/ES	9086	0801 Advanced Helicopter Pilotage	FY92	FY95	5019	4498				
16	C2SID	9101	0301 Soldier C3	FY93	FY99		3595	5050	7015	3180	4000
17	NV/ES	9087	0203 Ground MTI Radar	FY94	FY97	500	2000	2000	2000		
18	IEWD	9015	1402 Intelligence Fusion Demo	FY92	FY95	500	550				
19	S&TC	9047	0108 Multiband Multimode Radio	FY94	FY97	1507	1700	2050	2400		
20	C2SID	9101	0302 Rapid Force Projection C2	FY95	FY98	500	2000	2000	4000	2000	
21	C2SID	9097	AV391 Hovercraft Pilot's Associate Support	FY93	FY96	979	841	850			
22	NV/ES	9086	1901 Aerial Scout Sensor	FY98	FY99		1000	2500	2704	2712	5969
23	NV/ES	9087	8701 Aerial Scout Sensor	FY96	FY99					1872	2374
24	NV/ES	9087	0401 Electronic Integ. Sensor Suite TD	FY94	FY96	1533	1970	2841			
25	NV/ES	9087	0201 2nd Generation Tank Sight Tech Demo	FY92	FY94	2172					
26	IEWD	9015	1102 Stand-Off Comm CM Demo	FY92	FY96	702	1384	1450			
27	IEWD	9015	0902 Stand-In Comm Jammer Demo	FY92	FY95	1010	1235				
28	IEWD	9015	1402A Multiple Source Correlated Intel Fusion	FY96	FY99			1100	1200	1300	1500
29	[illegible]	9047	0301 Enhanced Comm.Demos & Accessories	FY92	FY99	383	800	2881	5758	7273	9271
30	[illegible]	9047	0206 Advanced Interactive Interfaces (C3 Voic	FY92	FY96	1274	750	1200			
31	[illegible]	9101	0101 Air Land Battle Management	FY92	FY95	950					
32	[illegible]	9101	0301 Battlespace C2	FY97	FY99				11439	9000	11938
33	S&TC	9047	0106A Multiband Multimode Radio (STO follow-on	FY98	FY99					2500	3000
34	NV/ES	9016	9082 IRCM/Air	FY96	FY98			62	2574	2399	
35	NV/ES	9870	8901 Masked Target Kill	FY96	FY99			1202	2000	7889	17321
36	NV/ES	9870	8901 Masked Target Kill	FY97	FY97				2992		
37	NV/ES	9086	6803 Helmet Mounted Display	FY96	FY99			4424	3384	4175	2824
38	NV/ES	9016	9112 Adv. Land Combat ECM	FY99							1000
39	NV/ES	9043	0900 Ultra Wideband MTI/SAR	FY97	FY99				18	2474	4642
40	NV/ES	9016	9120 CM&DECEP. Against Adv. RADARS	FY99							3791
41	C2SID	9101	0502 Tactical Info Mgmt System (TIMS)	FY95	FY96		1164	1000			
42	[illegible]	9047	0122 IMF Applique to VHF Radio	FY92	FY94	200					
43	NV/ES	9043	8400 Airborne Multisensor Testbed	FY94	FY99	8	1122	806	2000	1845	1000
44	IEWD	9015	2202 Intel Dissemination Demo	FY99							1000
45	IEWD	9015	2102 Airborne ECM Demo	FY96	FY99			430	1800	2200	1700
46	IEWD	9015	2002 Ground ECM Demo	FY97	FY99				507	838	1013
						62099	96882	98951	99954	77297	85099

Robert F. Giordano

ROBERT F. GIORDANO, DIRECTOR

JUN 10 '94 03:08PM CECOM ASD OFFICE

The attached list of major customers would be inclusive of CECOM Staff activities and the C4I Acquisition Center customers.

CUSTOMERS	DIRECTORATES						
	SED	T&E	S&TC	NVESD	CCSED	IEWD	ASD
AAROC							
AMC							X
ARPA							
BATTLELABS							X
CECOM-LC-LM	X						
CECOM-LC-MM	X						
CECOM-LC-SA	X						
CECOM-LC-SM	X						
CENTRAL IMAGERY OFFICE						X	
CERDEC-CCSED	X		X				
CERDEC-HQ							X
CERDEC-IEW	X						
CERDEC-NVESD	X	X	X				
CERDEC-S&TC	X	X					
CERDEC-SOF	X	X					
DA							X
DARO						X	
DCSINT (DA)						X	
DEPT JUSTICE (DRUG ENFORCEMENT)						X	
DEPT TREASURY (U.S. CUSTOMS)						X	
INDUSTRY							X
INS				X			
INSCOM				X		X	
INTERNATIONAL LIAISON OFFICE							X
NRL							
NSA-ISS	X					X	
PD-IMETS	X		X				
PEO-CCS					X		
PM-AAH					X		
PM-ADOS	X	X	X		X		
PM-AEC	X		X	X	X		
PM-APACHE	X						
PM-ASAS	X	X				X	
PM-ATACMS	X						
PM-ATC	X				X		
PM-BFDC			X				
PM-CATT	X						
PM-CCACWS				X			
PM-CHS (C2V)		X					
PM-CHS (CHS)	X	X	X		X		
PM-COMANCHE				X	X		
PM-COMBAT ID	X	X	X	X			
PM-CSSCS			X				
PM-CTIS	X	X					
PM-OTSS	X						
PM-EW/RSTA	X		X	X	X		
PM-FATDS	X	X	X		X		
PM-FIREFINDER	X	X		X			
PM-GLOBAL POSITION SYSTEMS (NAVSTAR/GPS)	X	X	X		X		
PM-GUARDRAIL/COMMON SENSOR		X					
PM-ITAS				X			
PM-ITTS	X					X	
PM-JAVELIN				X			
PM-JCALS		X	X				
PM-JOINT STARS	X	X	X				
PM-JPSD				X			
PM-JTACS	X	X	X		X		
PM-LONGBOW	X	X		X	X		
PM-MILSTAR	X	X	X				
PM-MINES, COUNTERMINE & DEMOLITIONS	X			X			
PM-MLRS	X						
PM-NBC DEFENSE SYSTEMS	X		X				
PM-NVEO	X	X		X			
PM-OPTADS	X	X	X		X		
PM-RCAS			X				
PM-SATCOM	X	X	X				
PM-SIGNALS WARFARE	X				X	X	
PM-SINCGARS		X	X				
PM-SOA							
PM-SOLDIER		X		X			
PM-STINGRAY		X					
PM-SURVIVABILITY				X			
PM-TESAR		X		X			
PM-TMOE			X				
PM-TRADE	X						
PM-UGV			X				
PM-UTIL HEL					X		
PSEMO	X						
POME LABS - AIR FORCE			X				
SOCOM				X			
STRICOM	X						
USA INTELLIGENCE CENTER & SCHOOL						X	
USMC (MARCORSYSCOM)							

- To Recieve Customer Survey

CUSTOMERS	DIRECTORATES SED	T&E	S&TC	NVESD	C2SED	IEWD	ASD
AARDC							
AMC							X
ARPA							
ATTLELABS							X
COM-LC-LM	X						
COM-LC-MM	X						
CECOM-LC-SA	X						
CECOM-LC-SM	X						
CENTRAL IMAGERY OFFICE						X	
CERDEC-C2SED	X		X				
CERDEC-HQ							X
CERDEC-IEW	X						
CERDEC-NVESD	X	X	X				
CERDEC-S&TC	X	X					
CERDEC-SCF	X	X					
DA							X
DARO						X	
DCSINT (DA)						X	
DEPT JUSTICE (DRUG ENFORCEMENT)						X	
DEPT TREASURY (U.S. CUSTOMS)						X	
INDUSTRY							X
INS				X			
INSCOM				X		X	
INTERNATIONAL LIAISON OFFICE							X
NRL							
NSA-ISS	X					X	
PD-IMETS	X		X				
PEO-CCS					X		
PM-AAH					X		
PM-ADOS	X	X	X		X		
PM-AEC	X		X	X	X		
PM-APACHE	X						
PM-ASAS	X	X				X	
PM-ATACMS	X						
PM-ATC	X				X		
PM-BFDC			X				
PM-CATT	X						
PM-CCACWS				X			
PM-CHS (C2V)		X					
PM-CHS (CHS)	X	X	X		X		
PM-COMANCHE				X	X		
PM-COMBAT ID	X	X	X	X			
PM-CSSCS			X				
PM-CTIS	X	X					
PM-DTSS	X						
PM-EW/RSTA	X		X	X	X		
PM-FATDS	X	X	X		X		
PM-FIREFINDER	X	X		X			
PM-GLOBAL POSITION SYSTEM (NAVSTAR/GPS)	X	X	X		X		
PM-GUARDRAIL/COMMON SENSOR		X					
PM-ITAS				X			
PM-ITTS	X					X	
PM-JAVELIN				X			
PM-JCALS		X	X				
PM-JOINT STARS	X	X	X				
PM-JPSD				X			
PM-JTACS	X	X	X		X		
PM-LONGBOW	X	X		X	X		
PM-MILSTAR	X	X	X				
PM-MINES, COUNTERMEASURES/EXPLOSIVE DEMOLITIONS	X			X			
PM-MLRS	X						
PM-NBC DEFENSE SYSTEMS	X		X				
PM-NVEO	X	X		X			
PM-OPTADS	X	X	X		X		
PM-RCAS			X				
PM-SATCOM	X	X	X				
PM-SIGNALS WARFARE	X				X	X	
PM-SINCGARS		X	X				
PM-SOA							
PM-SOLDIER		X		X			
PM-STINGRAY		X					
PM-SURVIVABILITY				X			
PM-TESAR		X		X			
PM-TMDE			X				
PM-TRADE	X						
PM-UGV			X				
PM-UTIL HEL					X		
PSEMO	X						
ROME LABS - AIR FORCE			X				
SOCOM				X			
STRICOM	X						
USA INTELLIGENCE CENTER SCHOOL						X	
USMC (MARCORSYSCOM)							

To Receive Guide Survey

CUSTOMERS:

12TH AVN BDE, GERMANY
224TH MI, SAVANNAH, GA
3RD ACR, FT BLISS
513TH MI
AAE
ACM/BIG ADA ACQ SUBCOMMITTEE
AEL
AES
AJOP: ADA BOARD
AJPO: ADA 9X GOVT ADVISORY GROUP
ALLIANT
AMC FAST
ARL
ARMY NAT'L GUARD, NC
ARMY NAT'L GUARD, TX
ARMY TRAINING SUPPORT CTR, TRADOC
ATT
ATTC, FT RUCKER
AVNS R&D
AVSCOM
BAH
BRDEC
CDR NAVAIR
CDR NAVSEA
CDRAC
CECOM DMM
CED
CERDEC SED
CSC
CSLA
CTIS
DEA
DEF AGENCY
DEPT OF INTERIOR, EPA
DEPT OF TRANSPORTATION-FAA
DEPT. OF STATE, WASH. DC
DISA
DIST/LICA
DNA
DOD SOFTWARE TECH PLAN WORKING GROUP
DOE
DOIM
DSMO BMDO
ECAC
ENGINEERING TOPOGRAPHIC CENTER
EPS
FBI
FORSCOM
FT CAMPBELL
FT CARSON
FT DIX

FT DRUM
FT HOOD
GROUP TECH
GTE
HAZELTINE
HQ THIRD
ICORPS
IMETS
IMMG & NAT AGENCY
INFORMATION SYSTEMS ENG CENTER
ISMA
JIEO
JOINT WC
JOL COMPUTER SCIENCE PANEL SOFTWARE ENGR SUBGROUP
JPO-UAV
JPO-UGV
JSOC
LABCOM
LL
LOCKHEED
MC GUIRE AFB
MICOM
MITRE
MONMOUTH COLLEGE
NASA
NAV RSH
NAVAL AIR DEPOT
NAVAL AIR SYSTEMS COMMAND
NAVSE
NCCOSC
NESEA
NORTH CAROLLINA A&T UNIVERSITY
NRL
OPTEC
PEO A&M
PEO AVIATION
PEO AVIATOR
PEO COMM
PEO IEW
PM ABRAMS
PM AHIP
PM ARMOR GUN SYS
PM ATS
PM AVENGER
PM BLOCK 111 COMMON CHASSIS
PM BRADLEY
PM CAC
PM COBRA
PM FAAD
PM IMETS
PM JASORS
PM LOH
PM LOSAT
PM M-60

PM MSCS
PM MSE
PM NAVETARGETS
PM PHYSICAL SECURITY
PM RADAR
PM SMOKE OBSCURANT
PM TOW/ITAS
PSI
RCAS
ROCKWELL
ROME LABS
SEI STRG
SMD
SOF
STARS STRG
STATE
TAACOM
TACCIMS
TACMIS
TACOM
TAMSCO
TELOS
TEST & EVALUATION COMMAND
TEXCOM
TRADOC
TROSCOM
US AIRFORCE (INTELLIGENCE ACTIVITY)
US ARMY EUROPE
US ARMY INTELLIGENCE CENTER
US ARMY RCCO
US CUSTOMS
US INFORMATION SYSTEM MGT AGENCY
US MARINE CORPS
US MI &SM
US NAVY-NAVAL SECURITY GROUP. WASH. DC
USA INFS
USACMLS
USAISC
USAISMA
USAITAC
USAPPC
USATEC
XETRON

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LRC MAJOR CUSTOMERS

INFORMATION SYSTEMS COMMAND
SPECIAL OPERATIONS COMMAND
INTELLIGENCE AND SECURITY COMMAND
TRAINING AND SECURITY COMMAND
WHITE HOUSE COMMUNICATIONS AGENCY
JOINT CHIEFS OF STAFF
WORLDWIDE CINCS
SPACE COMMAND
NAVY SPACE COMMAND
US AIR FORCE NATO COMMAND
PEO AVIATION
MICOM
CHEMICAL BIOLOGICAL DEFENSE AGENCY
PM TACMIS
SAUDI ARABIA LAND FORCES
SAUDI ARABIA NATIONAL GUARD
PM SATCOM
PM JTACS
PM NIGHT VISION
PM SINCGARS
PM AIRCRAFT SURVIVABILITY EQUIPMENT
PM FATDS
PM GPS

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EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9111	54TH ORD DET	L-5
9113	54TH ORD DET	L-6
9025	C2SID	L-16
9041	C3I	K-17
9089	C3I	J-17
9045	CECOM SAFETY	L-19
9383	CECOM SAFETY	L-19
9007	DEH	Q-13
9124	DEH/RP	M-17
9380	DOL	
9116	DPTM	W-18
9004	DPW	T-11
9005	DPW	U-12
9011	DPW	P-14
9031	DPW	O-14
9034	DPW	P-17
9049	DPW	L-20
9063	DPW	J-18
9110	DPW	M-17
9120	DPW	P-16
9306	DPW	I-25
9312	DPW	P-16
9332	DPW	
9334	DPW	M-16
9342	DPW	P-16
9344	DPW	P-16
9359	DPW	M-21
9002	DPW - Housing	S-14
9003	DPW - Housing	S-13
9058	DPW/RP	L-16
9087	DPW/RP	L-13
9009	E SYSTEMS	M-20
9012	E SYSTEMS	P-15
9014	E SYSTEMS	N-15
9018	E SYSTEMS	
9020	E SYSTEMS	
9022	E SYSTEMS	edit
9024	E SYSTEMS	
9028	E SYSTEMS	N-15
9030	E SYSTEMS	O-14
9033	E SYSTEMS	R-15
9035	E SYSTEMS	Q-17
9038	E SYSTEMS	O-16
9048	E SYSTEMS	L-21
9057	E SYSTEMS	Q-17
9060	E SYSTEMS	J-18
9061	E SYSTEMS	N-20
9062	E SYSTEMS	L-20
9064	E SYSTEMS	I-19

EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9065	E SYSTEMS	R-14
9066	E SYSTEMS	R-14
9067	E SYSTEMS	R-14
9068	E SYSTEMS	P-15
9069	E SYSTEMS	P-15
9070	E SYSTEMS	O-15
9071	E SYSTEMS	O-17
9080	E SYSTEMS	S-9
9081	E SYSTEMS	Q-12
9082	E SYSTEMS	M-22
9083	E SYSTEMS	N-21
9094	E SYSTEMS	N-21
9112	E SYSTEMS	P-18
9114	E SYSTEMS	P-18
9127	E SYSTEMS	N-8
9181	E SYSTEMS	L-20
9182	E SYSTEMS	M-20
9183	E SYSTEMS	H-24
9184	E SYSTEMS	I-27
9186	E SYSTEMS	
9188	E SYSTEMS	U-18
9189	E SYSTEMS	W-19
9190	E SYSTEMS	T-12
9191	E SYSTEMS	K-13
9192	E SYSTEMS	H-22
9193	E SYSTEMS	S-9
9194	E SYSTEMS	K-18
9197	E SYSTEMS	L-17
9610	E SYSTEMS	
9619	E SYSTEMS	
9720	E SYSTEMS	N-8
9721	E SYSTEMS	L-15
9729	E SYSTEMS	I-25
9196	E-SYSTEMS	
9307	E-SYSTEMS	
9625	E-SYSTEMS	
9629	E-SYSTEMS	
9393	EW/RSTA	N-17
9396	EW/RSTA	L-18
9010	IEWD	Q-14
9017	IEWD	N-18
9019	IEWD	N-16
9021	IEWD	M-15
9036	IEWD	O-16
9037	IEWD	O-16
9037	IEWD	O-16
9037	IEWD	O-16
9037	IEWD	O-16
9079	IEWD	N-16

EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9084	IEWD	O-15
9086	IEWD	O-17
9088	IEWD	L-15
9090	IEWD	J-18
9100	IEWD	K-18
9118	IEWD	J-22
9164	IEWD	
9350	IEWD	K-18
9307	ILLI FILES RESP	I-25
9104	LEGAL	J-17
9400	LEGAL	Q-16
9053	LMD	L-21
9105	LMD	L-22
9047	LRC	K-20
9116	MUSEUM	W-18
9010	NIGHT VISION	Q-14
9015	NIGHT VISION	M-17
9115	NIGHT VISION	K-21
9345	NIGHT VISION	L-20
9401	NIGHT VISION	M-20
9006	PIPE	Q-12
9027	PIPE	M-15
9036	PIPE	O-16
9036	PIPE	O-16
9162	PIPE	U-17
9055	PM CHS	L-22
9029	PM EW/RSTA	O-14
9039	PM EW/RSTA	K-18
9040	PM EW/RSTA	K-17
9042	PM EW/RSTA	J-18
9044	PM EW/RSTA	J-19
9010	PM JOINT STARS	Q-14
9010	PM JOINT STARS	Q-14
9001	PM RADAR	R-14
9032	PM RADAR	R-15
9600	PMO	
9093	PROVOST MARSHAL	R-14
9155	PROVOST MARSHAL	L-16
9011	RDEC	P-14
9011	RDEC	P-14
9011	RDEC	P-14
9013	RDEC	N-15
9023	RDEC	M-17
9085	RDEC	P-15
9092	RDEC	P-13
9097	RDEC	P-15
9098	RDEC	P-15
9099	RDEC	N-14
9102	RDEC	K-16

EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9103	RDEC	L-16
9106	RDEC	P-18
9108	RDEC	P-18
9351	RDEC	O-19
9352	RDEC	O-18
9392	RDEC	N-17
9051	SPACE & TERR	K-21
9043	TMDE SPT OP	I-18
9059	USAISC	Q-13
9036	VAL	O-16
9008		R-14
9091		J-13
9123		
9302		
9375		
9602		
9614		
9617		

FOR OFFICIAL USE ONLY

EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9001	PM RADAR	R-14
9002	DPW - Housing	S-14
9003	DPW - Housing	S-13
9004	DPW	T-11
9005	DPW	U-12
9006	PIPE	Q-12
9007	DEH	Q-13
9008		R-14
9009	E SYSTEMS	M-20
9010	NIGHT VISION	Q-14
9010	IEWD	Q-14
9010	PM JOINT STARS	Q-14
9010	PM JOINT STARS	Q-14
9011	DPW	P-14
9011	RDEC	P-14
9011	RDEC	P-14
9011	RDEC	P-14
9012	E SYSTEMS	P-15
9013	RDEC	N-15
9014	E SYSTEMS	N-15
9015	NIGHT VISION	M-17
9017	IEWD	N-18
9018	E SYSTEMS	
9019	IEWD	N-16
9020	E SYSTEMS	
9021	IEWD	M-15
9022	E SYSTEMS	edit
9023	RDEC	M-17
9024	E SYSTEMS	
9025	C2SID	L-16
9027	PIPE	M-15
9028	E SYSTEMS	N-15
9029	PM EW/RSTA	O-14
9030	E SYSTEMS	O-14
9031	DPW	O-14
9032	PM RADAR	R-15
9033	E SYSTEMS	R-15
9034	DPW	P-17
9035	E SYSTEMS	Q-17
9036	PIPE	O-16
9036	PIPE	O-16
9036	VAL	O-16
9036	IEWD	O-16
9037	IEWD	O-16
9037	IEWD	O-16
9037	IEWD	O-16
9037	IEWD	O-16
9038	E SYSTEMS	O-16
9039	PM EW/RSTA	K-18

FOR OFFICIAL USE ONLY

EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9040	PM EW/RSTA	K-17
9041	C3I	K-17
9042	PM EW/RSTA	J-18
9043	TMDE SPT OP	I-18
9044	PM EW/RSTA	J-19
9045	CECOM SAFETY	L-19
9047	LRC	K-20
9048	E SYSTEMS	L-21
9049	DPW	L-20
9051	SPACE & TERR	K-21
9053	LMD	L-21
9055	PM CHS	L-22
9057	E SYSTEMS	Q-17
9058	DPW/RP	L-16
9059	USAISC	Q-13
9060	E SYSTEMS	J-18
9061	E SYSTEMS	N-20
9062	E SYSTEMS	L-20
9063	DPW	J-18
9064	E SYSTEMS	I-19
9065	E SYSTEMS	R-14
9066	E SYSTEMS	R-14
9067	E SYSTEMS	R-14
9068	E SYSTEMS	P-15
9069	E SYSTEMS	P-15
9070	E SYSTEMS	O-15
9071	E SYSTEMS	O-17
9079	IEWD	N-16
9080	E SYSTEMS	S-9
9081	E SYSTEMS	Q-12
9082	E SYSTEMS	M-22
9083	E SYSTEMS	N-21
9084	IEWD	O-15
9085	RDEC	P-15
9086	IEWD	O-17
9087	DPW/RP	L-13
9088	IEWD	L-15
9089	C3I	J-17
9090	IEWD	J-18
9091		J-13
9092	RDEC	P-13
9093	PROVOST MARSHAL	R-14
9094	E SYSTEMS	N-21
9097	RDEC	P-15
9098	RDEC	P-15
9099	RDEC	N-14
9100	IEWD	K-18
9102	RDEC	K-16
9103	RDEC	L-16

EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9104	LEGAL	J-17
9105	LMD	L-22
9106	RDEC	P-18
9108	RDEC	P-18
9110	DPW	M-17
9111	54TH ORD DET	L-5
9112	E SYSTEMS	P-18
9113	54TH ORD DET	L-6
9114	E SYSTEMS	P-18
9115	NIGHT VISION	K-21
9116	MUSEUM	W-18
9116	DPTM	W-18
9118	IEWD	J-22
9120	DPW	P-16
9123		
9124	DEH/RP	M-17
9127	E SYSTEMS	N-8
9155	PROVOST MARSHAL	L-16
9162	PIPE	U-17
9164	IEWD	
9181	E SYSTEMS	L-20
9182	E SYSTEMS	M-20
9183	E SYSTEMS	H-24
9184	E SYSTEMS	I-27
9186	E SYSTEMS	
9188	E SYSTEMS	U-18
9189	E SYSTEMS	W-19
9190	E SYSTEMS	T-12
9191	E SYSTEMS	K-13
9192	E SYSTEMS	H-22
9193	E SYSTEMS	S-9
9194	E SYSTEMS	K-18
9196	E-SYSTEMS	
9197	E SYSTEMS	L-17
9302		
9306	DPW	I-25
9307	ILLI FILES RESP	I-25
9307	E-SYSTEMS	
9312	DPW	P-16
9332	DPW	
9334	DPW	M-16
9342	DPW	P-16
9344	DPW	P-16
9345	NIGHT VISION	L-20
9350	IEWD	K-18
9351	RDEC	O-19
9352	RDEC	O-18
9359	DPW	M-21
9375		

EVANS AREA BUILDING DATA

BLDG NO.	ACTIVITY	MAP COORD.
9380	DOL	
9383	CECOM SAFETY	L-19
9392	RDEC	N-17
9393	EW/RSTA	N-17
9396	EW/RSTA	L-18
9400	LEGAL	Q-16
9401	NIGHT VISION	M-20
9600	PMO	
9602		
9610	E SYSTEMS	
9614		
9617		
9619	E SYSTEMS	
9625	E-SYSTEMS	
9629	E-SYSTEMS	
9720	E SYSTEMS	N-8
9721	E SYSTEMS	L-15
9729	E SYSTEMS	I-25

OR EQUIPMENT AND
ILITIES

F	MAJOR FACILITY OR EQUIPMENT DESCRIPTION	UNIQUE TO			
		DOD	FEDERAL GOV'T	U.S.	REPLACEMENT COSTS ($k)
C4I	Navigation Systems Test Lab				2026
C4I	C2 Audio Signal Process Lab				250
C4I	Tactical C2 Lab				5786
C4I	Battle Command C2 SW Lab				290
C4I	CAC2 Info Dist Tech Lab				26
C4I	AI/Decision Supt C2				2000
C4I	C2 Environ Test Lab				12000
C4I	Prototype Fabrication				15000
C4I	SCIF R&D Facility				10682
C4I	Limited Access R&D Fac				6758
C4I	Limited Access R&D Whse				1792
C4I	CSE Battlefield SW Facility	X	X	X	500,000
T	Army Interoperability Network	X			16500
I	Strategic Space Systems Fac	X	X		80,000
C4I	Tactical Space Systems Fac	X	X		80,000
C4I	Photonics Lab				1200
C4I	Fiber Optics Pro Lab				2000
C4I	Local Area Networks Lb	X	X	X	1500
C4I	NUH-60 STAR Facility	X			46500
C4I	Pulse Power Center	X	X	X	55000
C4I	Mobile Comm Lab				4250
C4I	Audio Lab				350
C4I	Comm Systems Design Lab				20000
C4I	Information Security Lab	X			260

Descriptions of laboratories and explanations of uniqueness are below.

ese facilities all support all subcategories of CSF C4I across the board. lacement costs above represent a true picture of cost to replace existing facilities.

esearch, development and testing of self-contained and radio navigation systems is erformed in the Navigation Laboratory. The Laboratory is a restricted area allowing storage and use of communication security equipment. The Laboratory hosts the Global Positioning System Test Environment System (GPST), Precision Navigation System (PNS), Doppler Navigation Test Set and the Global Positioning System AN/ASN-149 (V) 1 Bench Test Facility.

The GPST is used to characterize the performance of GPS receivers and GPS based navigation integrations. It simulates ten GPS satellite signals, host vechicle motion and navigation sensor aiding. Radio frequency signal generators and a spectrum analyzer are used with the GPST to test GPS jamming performance.

COMMAND AND CONTROL AUDIO SIGNAL PROCESSING LABORATORY

The ASP laboratory has been designed to facilitate the evaluation of automated speech recognition equipment and to this end is unique within the Army. Utilizing its vast libary of vechicle sound environments, automated evalutions of any form of speech recognition equipment can be preformed in an environment representative of that in which it would encounter in the field. The Audio Signal Processing (ASP) laboratory comprises an anechoic chamber, a sound absorption chamber and a suite of audio analysis equipment. The audio analysis equipment is under the control of a computer attached to the independent laboratory network.

TACTICAL COMMAND AND CONTROL LABORATORY

e Tactical Command and Control Laboratory, formerly known as the TASS (Tactical Avionics stems Simulator), contains facilities for the development, testing and demonstration of ystems such as the AMPS (Aviation Mission Planning System), and the ATCC (Advanced Tactical Operations Center). It also contains the hardware (cockpit simulator, control loaders, instrumentation, etc.) and software (six degree of freedom, non-linear aero model) required to perform real time, man in the loop, aircraft simulations.

THE BATTLE COMMAND C2 SOFTWARE INTEGRATION LABORATORY (BCC2 SIL)

Contains facilities for the development of integrated C2 software for Brigade and below. The BCC2 SIL focuses on the integration of in-house developed application software with PEO-CCS (PM OPTADS) contractor developed software. The BCC2 SIL resides as a node on the Myer Center's "digital battlefield" network providing command/soldier connection for man-in-the-loop simulation exercises with the user battlelabs. The BCC2 SIL work integration issues are associated with linking the Soldier System to other nodes on the digital battlefield.

CAC2 INFORMATION DISTRIBUTION TECHNOLOGY LABORATORY

The Information Distribution Laboratory contains facilities for developing, integrating, demonstrating and testing methods for horizontal integration of the battlefield and reducing the data being offered to tactical communications systems for the purpose of improving responsiveness and accuracy of command and control information. This facility is used primarily, as the testbed for the data base and data distribution functions being performed under the Combined Arms Command and Control (CAC2) Advanced Technology Demonstration (ATD). The laboratory has the capa lity of hosting data bases and applications at five tactical echelons and testing data base update techniques over real tactical communications systems interconnecting these hosts.

ARTIFICIAL INTELLIGENCE/DECISION SUPPORT COMMAND AND CONTROL LABORATORY

The AI/DS C2 Lab is an environmentally controlled lab providing engineers with lab work stations, computer and space necessary to conduct R&D Modeling, demonstrations, and prototyping of C2/Decision-Aid Technology to serve the needs of Army developmental C2 Systems.

COMMAND AND CONTROL ENVIRONMENTAL TEST LABORATORY

The C2 Environmental Test Laboratory possesses the capability of performing all MIL-STD-810 tests on Army C-E equipment and systems except road tests and fungus test, such as drive in, high temp/low temp/humidity, chamber, explosion, and Combined Environmental Reliability Test (CERT).

COMMAND AND CONTROL MACHINE, SHEETMETAL, WOODWORKING, ELECTRIC AND PAINT SHOPS

Provide quick reaction, creative, precision and standard shop services for prototype fabrication, pre-production evaluation and production base support. Typical projects include installation kits for any type of C-E equipment in any kind of vehicle (ground or air).

SENSITIVE COMPARTMENTALIZED INFORMATION FACILITY (SCIF)

The SCIF is comprised of the following:

Special Access Program (SAP) office and laboratory space have similar physical security requirements. The SAP laboratories are equipped with the latest state-of-the-art equipment which provides critical signal processing of high level priority threat signals of National intelligence interest. It embraces current statistical measurements and clustering processors that can examine numerous signals from a variety of recording mediums. This ability to provide signal processing expertise is due to the employment of substantial computer and graphical analysis equipment and techniques.

Signal Intelligence (SIGINT)/Data Fusion Lab - This space contains three separate laboratories as follows:

a. The Central Analysis Facility (CAF) is an Army owned analysis center to support research and development. The CAF allows IEWD personnel direct interface with users to maintain an awareness of present and future SIGINT problems. By bringing in real world signals for real time signals analysis, it provides the capability for quick response to tactical units on signals analysis/recognition problems. This is the first step in the development of methodology to support fielded units with signal recognition algorithms and software upgrades.

b. The Intelligence Data Fusion Test Bed integrates and incorporates diverse advanced fusion technology into the Army's diverse IEW systems. This effort involves interactive processes of specific applications for artificial intelligence technology, algorithms, rules, and software for manipulating fusion data bases in support of specific IEW fusion functions. The test bed is the U.S. Army nucleus for this major undertaking. This test bed develops and demonstrates the critical technology required to automate the manpower intensive nature of the tactical intelligence data fusion process and simultaes a realistic tactical fusion environment required to accurately test and evaluate fusion research. It relies on substantial computer and graphical analysis equipment and techniques to accomplish these efforts.

c. The Strategic Engineering Laboratory - Software and hardware are designed, developed and tested for strategic SIGINT systems applications in this facility.

Simulation and Modeling Lab: The IEW Simulation and Modeling Laboratory provides the capability to evaluate intercept and Electronics Countermeasures (ECM) systems effectiveness against both communications and radar targets when operating in or near an enemy location. Development of system evaluation techniques can be used to predict the performance of candidate systems by utilizing existing Government models, and provides support to IEWD engineers for development of systems, approaches and designs for countering hostile C3 threats systems, with emphasis on ground based threats.

Systems Integration Laboratory (SIL): SIL supports a multitude of projects and is a quick-reaction, in-house laboratory which can rapidly translate concepts into prototypes, integrate emerging technology into new or existing systems and bring ideas/concepts to the field for evaluation. With a high bay area, machine shop and laboratory space, the SIL offers the means and ability to support the integration of shelters and the building of prototypes.

Various Programs Lab: This laboratory supports two separate programs and contains both high bay space and office space.

STRATEGIC SPACE SYSTEMS FACILITY: Consists of two buildings comprising 17500 Sq ft (two structures) which house the Defense Satellite Communication System (DSCS)and equipment as well as a DSCS III satellite simulator. Also housed in the facility are the AN/GSC-52 satellite comm terminal and AN/GSC-39 prototype satellite comm terminal.

TACTICAL SPACE SYSTEMS FACILITY: 7500 square foot structure containing UHF, SHF, and EHF satellite communications equipment. The UHF are the military manpack systems, SHF include Ground Mobile Forces (GMF) systems, the AN/TSC-85 and AN/TSC-93. The EHF systems are the MILSTAR engineering development models terminals.

These two facilities provide a readily available system/equipment diagnostic interface and evaluation capability for assisting industry as well as government in satellite comm RDT&E.

Collocated at Ft. Monmouth, SATCOM evaluation facility and MILSATCOM equipment certification facility are the only facilities in DOD for MILSATCOM that provide this level of total system evaluation and integration. A complete suite of the ground environment for the DSCS strategic terminals, SHF tactical terminals, DSCS and tactical SATCOM network control, UHF manpack terminals, and EHF Milstar terminals are installed here, including DSCS II and III satellite simulators. Also included are terminals for the Advanced Comm Technology Satellite (ACTS) and commercial INMARSAT satellite that are being used to leverage and evaluate advanced and commercial technology for military application. When coupled with existing terrestrial communications facilities, integrated seamless communications across the battlefield can be evaluated and demonstrated.

Communications Systems Design Center (CSDC) : This support facility has been used to obtain system performance data and to emulate reported field problems for several organizations. Emulation of field problems is important because it enables the rapid deployment of solutions to problems for the development of temporary workarounds. The facility also has been used for performing interoperability testing; providing other organizations with hands-on instruction; testing associated developmental and prototype equipment; evaluating new concepts; and defining specification requirements. Coupled with these capabilities, the CSDC also includes an integrated modeling and simulation facility. This integration of systems hardware and modeling and simulation provides a unique capability within the Army. The M&S facility provides several areas of expertise to meet the requirements of the soldier and PM's. The M&S effort has and continues to provide new system simulation models which then transition to fieldable systems. The models allow a conceptual network to be established and tested without actually using resources of the system analyzed, providing a cost effective means to plan for and conduct large communications network tests. The results of simulations can be of use to other models and simulations that exist throughout the Army. The M&S facility is using the Distributed Interactive Simulation (DIS) network terminals connected via the Army Interoperability Network (AIN) circuits. The basic DIS network configuration is a collection of

distributed, interactive, warfighter in the loop simulators with semi automated forces simulation providing battalion level operations linked via DIS protocols. There will also the integration of realistic effects of C3IEW models to provide realism to the simulators.

INTEGRATED SYSTEM OF SYSTEMS LABORATORY FACILITY: This integrated testbed offers a unique networking capability linking not only the Communications labs (over 20 including mobile testbeds)but also their RDEC labs as well as other Army organizations, joint services, commercial, industry (AT&T, Bellcore, GTE), academia and allied services. This network infrastructure leverages off current lab investments and allows for greater sharing of resources, thereby reducing cost of purchasing duplicate equipment or travel and shipping costs of equipment associated with working off-site. Since CECOM is collocated with PEO COMM and PEO CCS, the integrated testbed further increases the efficiencies of seamlessly integrating emerging and legacy communications systems with Command and control (C2) systems in support of Digitization of Brigade 96 and Division 97. Hardware and software subject matter experts in PEO COMM systems, internet compliance, and modeling and simulation all reside locally. An example of unique capability of the integrated testbed is the support provided on B2C2 of the NTC94-97 rotation. CECOM used the integrated lab to load, verify, and stress test software prior to NTC rotation. This was the first time that B2C2 was literally exercised over SINCGARS and EPLRS networks.

LOCAL AREA NETWORKS LAB FACILITY: Facility is uniquely capable of running simulations of several army specific combat net radio protocols and storing of simulation data, capability to manage networks via the Army Automated Network Manager, interconnection of networks via the Tactical Multinet Gateway.

INFORMATION SECURITY LAB: Unique within the Army to include design, test, and production of installation kits, secure system integration, COMSEC chip embeddment, Computer security product evaluation and integration into Army platforms, network multilevel security for integration into tactical Army communciations systems and dtheir interconnect to DOD strategic and commercial comm systems, secure applications such as data base management, audit, key management, access control onto Army platforms. Video equipment, functions and applications are unique to DOD given very narrow comm bandwidths for compressed video to be transmitted, and displayed on tactical Army platforms.

AUDIO LABS: Equipped with semi-reverberant and anechoic chambers, the facility is used to survey, record,and analyze the acoustical noise environment on board vehicles, and then simulate the noise in the laboratory for evaluation of communication systems.

MOBILE COMMUNICATIONS LAB: The facility consists of a work area, work benches, screen room, VAX-11/730 computer and terminals, and channel simulator facility. The lab is devoted to the RDTE of HF and VHF radios, modems, and ancillary devices.

CECOM CSE BATTLEFIELD SOFTWARE SUPPORT FACILITY: These facilities provide life cycle support of software for battlefield automated systems, including Communications, intelligence/electronic warfare and avionics systems, fire support systems, training and manuever systems, and tactical fusion systems. It includes a unique wide area network using dedicated leased lines, fiber optics, and thickwire ethernet links remote sites to Ft. Monmouth computers. The CSE Battlefield Software Facility is actually 77,742 square feet of laboratory/system space, with 79 host and 132 target computer systems, unique wide area network linking remote sites to Ft. Monmouth computers, local area network links to contractor sites, electronic warfare environmental simulator, unique computer firmware replication facility, external pad facility, and a common/customized office automation and automated configuration management environment, housed in a secure, fenced in, television monitored area. The capital investment in host, target, and facilities is $500 Million.

ARMY INTEROPERABILITY NETWORK: This network of distributed communications and services supports software and interoperability for Army systems throughout the life-cycle. It is unique within Army and DOD.

NUH-60 SYSTEM TEST BED FOR AVIONICS RESEARCH (STAR): The STAR, NUH-60 helicopter, and associated hot bench, is designed to be used as a tool to develop and test advanced avionics concepts. It consists of core system which integrates all basic aircraft functions except flight controls. These functions include flight instructions, engine instruments, caution/warning systems, secondary system control, communications, and navigation systems. Extensive use of commercial hardware and software standards allow rapid and economical upgrade of systems as new technology evolves. The availability of existing sensor data in high power flexible processor, a wide variety of pilot interfaces, and the ease of interfacing new sensors makes this facility ideal for exploring new concepts which depend upon the integration processing and display of multiple sensor data. This facility permits the Army Aviation Research & Development community to develop and flight test *functional prototypes* of the future aviation systems.
PULSE POWER CENTER: The Pulse Power Center is a unique facility for research power electronics. It is a unique national research asset, used DOD wide and without equal in any other installation. DOD applications include electric guns, impulse radar, ECM & electric drives for combat vehicles. R&D efforts concentrate on high power components for a broad variety of missions, including high power switches and energy storage components for electric gun systems for DOD and the Defense Nuclear Agency.

All laboratories support CSF C4I 100%, as indicated above. The following laboratories have interconnectivity with other CSF's.

COMMAND AND CONTROL AUDIO SIGNAL PROCESSING LABORATORY
TACTICAL COMMAND AND CONTROL LABORATORY
Interconnects with Avionics function with respect to development, testing and demonstration of systems such as AMPS (Aviation Mission Planning System), and contains hardware (cockpit simulator, control loaders, instrumentation, etc.) and software (six degree of freedom, non-linear aero model) required to perform real time, man in the loop, aircraft simulations.

PROTOTYPE FABRICATION FACILITY
Interconnects with common support functions for air and ground vehicles with respect to projects for installation kits for air and ground vehicle platforms.

STRATEGIC SPACE SYSTEMS RESEARCH FACILITY (SSRF)
Provides interconnectivity with Space CSF with respect to test integration for strategic satellite systems.

TACTICAL SPACE SYSTEMS RESEARCH FACILITY (TSSRF)
Provides interconnectivity with Space CSF with respect to development, testing and field engineering for satellite communications terminals and tactical satellite platforms.

NUH-60 SYSTEM TESTBED FOR AVIONICS RESEARCH (STAR)
Provides interconnectivity with Avionics CSF with respect to avionics platforms for C4I equipment.

PULSE POWER CENTER
Provides interconnectivity with respect to electronic devices and ground vehicle platforms.

NAVIGATION VAN
PRECISION NAVIGATION TESTBED
Provides interconnectivity with avionics CSF with respect to providing a navigation test facility of avionics platform and airborne systems.

e above facilities support C4I equipment for avionics or space platforms, as indicated. A tempt to give percentages separating the CSF's is meaningless.

l other facilities have indirect connectivity with other CSF's to the degree that electronics, sensors, and C4I supported relate to platforms as described in mission statement.

3.4.1 Major Equipment and Facilities - Ft. Belvoir

MAJOR EQUIPMENT AND FACILITIES - FT. BELVOIR

CSF	MAJOR FACILITY OR EQUIPMENT DESCRIPTION	UNIQUE TO			
		DOD	FEDERAL GOV'T	U.S	REPLACEMENT COSTS ($M)
C4I	SENSOR EVAL/TEST SITE				15M
C4I	LASER TEST RANGE				10M
C4I	SMALL ARMS FIRING RANGE				5M
C4I	SENSOR PROCESS.TEST/EVAL				35M
C4I	ADVANCED OPTICS TEST/EVAL				15M
C4I	LASER MATERIAL. CHARC. EVAL				5M
C4I	OPTICAL COUNTER-COUNTER MEAS. TEST/EVAL				3M

The above facilities are applicable to all subcategories of CSF C4I.

SENSOR EVALUATION TEST SITE: A 6000 meter test zone located at Ft. A.P. Hill specifically signated and constructed for testing and performance evaluation of electro-optic uipment (stand alone and integrated). This test range is the only available test and valuation site that has sufficient length and size for ranging to targets and incorporates specialized electronic equipment required to effectively test and evaluate all aspects of E-O equipment.

LASER TEST RANGE: A 5000 meter range that is fully secured for the T&E of tactical laser systems. This is the only fully secure long range laser range on the east coast. It has been specially designed and constructed to allow testing of non-eyesafe laser systems in a tactical environment.

SMALL ARMS FIRING RANGE: A 125 foot in-house range constructed in building 305 of NVESD for evaluation of small arms sights on weapons systems (i.e. M16A2). This range is tunneled concrete structure with full sound proofing and vaulted access for maintaining, testing and evaluating weapons sights utilizing live fire rounds. The range is constructed on a stabilized concrete base.

SENSOR PROCESSOR TEST AND EVALUATION FACILITY: in-house sensor/processor test and evaluation facility in building 309 of NVESD. This facility is utilized to evaluate, test score, analyze and data base ATR's, sensors, and sensor suites in a completely controlled laboratory environment. This is the only DOD facility available for the test and evaluation of ATR/sensor suites in a controlled lab environment. This facility includes a complete to scale model simulation chamber where specific battlefield environment are laid out.

ADVANCED OPTICS TEST AND EVALUATION: In-house Laboratory to test and evaluate advanced optical structures for electro-optic sensors/sensor suites. The facility is established on fully isolated (vibration free) concrete platforms in building 305 of NVESD which is an essential aspect when testing advanced optical components to eliminate jitter, vibrations, etc.

LASER MATERIAL CHARACTERIZATION EVALUATION LAB: An in-house test and evaluation facility n building 357 to characterize and evaluate new laser materials for lasing capability,

3.d. Describe potential space for consolidation in close proximity to the activity available in FY 97, state distance to the activity, and any extenuating circumstances.

a. Implementation of the BRAC 93 decision as it relates to Fort Monmouth will result in consolidating activities currently occupying nearby facilities onto the main post and Charles Wood area by the end of FY 97.

b. This BRAC action will vacate approximately 700,000 gross square feet (GSF) of GSA leased space in what is now known as the CECOM Office Building. This building is within two miles of the Fort Monmouth main post, and is primarily used for administrative functions. The six story building currently provides approximately 597,000 net square feet (NSF) of administrative space, a cafeteria and private retail space, emergency power to critical areas, and parking for over 3,100 vehicles. The office building is located close to major highways, making commuting very easy.

c. The Fort Monmouth Evans area, located 10 miles south of the main post is a 253 acre subpost that will also be vacated as a result of BRAC 93. This parcel of land is currently utilized by CECOM logistics and readiness activities, CECOM RDEC, and PEO IEW PM offices. Of the 253 acre site, a 90 acre undeveloped parcel is beyond the fenced compound. This land is now only used for field exercises and some minor R&D testing. Most of the remaining area is within the existing fenced compound. Approximately 60 acres of this is open, and is used primarily for R&D test activities. The remaining area is built up with the majority of the roughly 459,000 GSF of building space (251,000 GSF permanent, 132,000 GSF semi-permanent, and 76,000 GSF temporary). 190,000 permanent GSF is devoted to administrative use and 39,000 permanent GSF devoted to communications and electronics R&D. Over 80% of the building space is permanent or semi-permanent. The Evans area is located close to major highways, making commuting very easy.

4. **Estimate the capacity of the installation to absorb similar workyear with little or no modification of facilities and with major modifications. Describe the nature of those modifications, and estimate cost.**

In FY 1997, Fort Monmouth will have the office space to absorb an estimated additional 3,266 employees. Approximately 530,000 GSF will be created by more efficiently consolidating personnel into existing office space, utilizing vacant space created by the departure of the ARL Electronics Power Sources Division (BRAC 91), conversion of unneeded unaccompanied personnel living space, converting unneeded community facilities, and converting hospital space for office use. An analysis of the degree of effort for creating this excess capacity follows:

a. **Ability to absorb workyear with little or no modification:** Office space for approximately 1,085 employees could be created with little or no modification or investment. Most of this space is found in the Myer Center (Bldg 2700), and the departure of EPSD creates space that is easily adapted to office or lab use without the need to consolidate activities to achieve vacant space.

BLDG NO.	USEABLE AREA (GSF)	CAPACITY (PERSONS)	COMMENTS
199	10,290	63	Available upon completion of MCA Project for Addition to Bldg 210.
502	10,658	66	Upon closure of Post Library.
1123	6,280	39	Upon closure of Arts and Crafts facility.
2700	59,275	365	Improved space utilization within existing administrative space.
	60,500	372	Administrative space created by departure of ARL (BRAC 91).
	18,750	115	Conversion of lab space upon departure of ARL (BRAC 91).
2705	4,450	27	Improved space utilization within existing administrative space.
2707	6,130	38	Improved space utilization within existing administrative space.
TOTALS	176,333	1,085	

Encl 7

b. **Ability to house additional military families and unaccompanied personnel:** Fort Monmouth currently has 1,142 units of military family housing. 246 of these units will be turned over to the Department of the Navy as a result of BRAC 93 to provide housing for their military personnel assigned to nearby Naval Weapons Station, Earle. Availability of housing amongst the remaining 894 units of on-post military family housing in FY 97 that can be used to house eligible military personnel is summarized below.

FY 1997 Army Family Housing Profile

TYPE OF UNIT	NO. EXISTING	NO. AVAILABLE
General Officer	6	1
Senior Officer	32	7
Field Grade	104	22
Company Grade	120	54
Senior NCO	206	96
Junior NCO	426	126
Off Post Housing	192	157
TOTALS	1,086	463

Additional unaccompanied military personnel can be permanently housed in Fort Monmouth facilities as summarized below.

FY 1997 Unaccompanied Personnel Housing Profile

TYPE OF UNIT	NO. EXISTING	NO. AVAILABLE
Officer	76	16
Enlisted	599	44
Off Post Housing		
TOTALS	675	60

c. **Ability to absorb workyear with major modification:** Office space for an additional 2,181 employees could be created by renovating or converting existing building space on Fort Monmouth. Most of this office space would result from conversion of unneeded unaccompanied personnel housing, a theater, revitalizing existing office space, and conversion of existing Myer Center excess R&D laboratory and shop space.

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BLDG NO.	USEABLE AREA (GSF)	CAPACITY (PERSONS)	ESTIMATED COST ($000)	COMMENTS
205	40,900	252	2,050	Convert existing barracks to office space. Provide handicapped access, install elevators, enclose open porches, reconfigure interiors for office space, upgrade HVAC, install voice and data communications.
206	30,800	190	1,540	Convert existing barracks to office space. Provide handicapped access, install elevators, enclose open porches, reconfigure interiors for office space, upgrade HVAC, install voice and data communications
207	42,700	263	2,140	Convert existing barracks to office space. Provide handicapped access, install elevators, enclose open porches, reconfigure interiors for office space, upgrade HVAC, install voice and data communications
208	36,000	223	1,800	Convert existing barracks to office space. Provide handicapped access, install elevators, enclose open porches, reconfigure interiors for office space, upgrade HVAC, install voice and data communications
287	28,400	175	1,420	Convert existing barracks to office space. Provide handicapped access, install elevators, enclose open porches, reconfigure interiors for office space, upgrade HVAC, install voice and data communications
292	19,500	120	780	Convert warehouse space into two story office space. Provide handicapped access, configure interior for office occupancy, install required HVAC, install voice and data communications.
1075	32,500	200	1,140	Convert excess hospital patient ward space to office space. Reconfigure interior for office occupancy, upgrade HVAC, install voice and data communications.

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BLDG NO.	USEABLE AREA (GSF)	CAPACITY (PERSONS)	ESTIMATED COST ($000)	COMMENTS
1077	9,750	60	600	Convert two story unaccompanied personnel housing building into office space. Upgrade structure to support second floor live load, provide handicapped access, reconfigure interior for office occupancy, upgrade HVAC, install voice and data communications.
1078	9,750	60	600	Convert two story unaccompanied personnel housing building into office space. Upgrade structure to support second floor live load, provide handicapped access, reconfigure interior for office occupancy, upgrade HVAC, install voice and data communications.
1215	22,400	138	1,120	Convert existing theater to two story office space. Provide handicapped access, configure interior for office occupancy, upgrade HVAC, install voice and data communications.
2525	23,300	143	900	Revitalize existing office space. Reconfigure interior for office occupancy, upgrade HVAC, install voice and data communications.
2700	3,840	30	150	Convert R&D fabrication shop space to office space. Reconfigure interior for office occupancy, upgrade HVAC, install voice and data communications.
	53,500	327	2,400	Convert R&D lab space to office space upon departure of ARL (BRAC 91). Reconfigure interior for office occupancy, upgrade HVAC, install voice and data communications.
TOTALS	353,340	2,181	16,640	

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5. **Impact of BRAC 91 and BRAC 93 decisions on the activity and installation.**

a. **BRAC 91** directed the realignment of Army laboratories (Lab 21 Study) to Adelphi and Aberdeen, MD including movement of the Electronic Technology and Device Laboratory (now known as the Electronic and Power Sources Directorate - EPSD, of the Army Research Lab - ARL) from Fort Monmouth to Adelphi, MD. Implementation of this directive was delayed by DOD IG Report No. 94-078, Apr 94, which concluded the new laboratory facility required to house EPSD and other ARL elements was unnecessary and redundant to existing DOD capability. The DDRE non concurred and subsequently secured release of the remaining lab construction funds. Design of the lab is now at or near completion and transfer of personnel and equipment is scheduled for Jun 97, just short of the six year statutory requirement for completion of BRAC implementation. When they move, EPSD will vacate 115,000 SF of laboratory and administrative space, primarily in the Myer Center and will relocate approximately 300 civilian personnel to Adelphi.

b. **BRAC 93** included three directives which affect CECOM and Fort Monmouth, and provided an opportunity to increase the synergies prevalent among the C4I activities at Fort Monmouth by collocating and consolidating C4I activities from Vint Hill Farms Stations (VHFS). The command has aggressively pursued BRAC 93 implementation and is on track for an accelerated implementation NLT Sep 97. The Environmental Assessment required by the National Environmental Policy Act was completed on schedule and revealed no environmental impediments to full and rapid implementation.

(1) The <u>disestablishment of the Belvoir RDEC</u> included the transfer of six business areas (Battlefield Deception, Physical Security, Electric Power, Mines, Environmental Controls, and Low Cost/Low Observables) and 356 mostly civilian spaces to CECOM at Fort Belvoir, VA. This group increased CECOM's presence at Fort Belvoir which already included the RDEC's Night Vision Electronic Sensors Directorate. The realignment involved no construction. CECOM took operational control of its business areas and personnel on 1 Feb 94 and completed the formal transfer on 30 Sep 94, approximately one year after BRAC 93 became law.

(2) The <u>closure of Vint Hill Farms Station, VA</u> involves relocation of CECOM's IEW activities to Fort Monmouth: the Intelligence Materiel Management Center (IMMC) of the C4I Logistics and Readiness Center (less the repair and maintenance piece), the IEW Directorate of the RDEC, and the legal and acquisition spaces which support them. It includes consolidation of PEO IEW personnel at VHFS with the PEO at Fort Monmouth, and movement of PM Signals Warfare to Fort Monmouth where the other PEO IEW PM already reside. These moves necessitate construction of a new, $19M, 105,000 SF IEWD facility on the main post; a $5.4M renovation for the IMMC of 84,000 SF in building 1201 on the main post vacated by the 513th MI Bde; and minor renovations to building 288 on the main post for PM Signals Warfare and to the PEO's existing space in the Myer Center for their VHFS personnel. These construction projects are currently in design. The facilities will be ready for occupancy at various times from FY96 through FY97. In all, 672 mostly civilian authorizations will transfer to Fort Monmouth from VHFS. The maintenance, repair, and supply functions of IMMC are on an accelerated track to transfer from VHFS to Tobyhana Army Depot, PA by Jun 95.

(3) The third mandate was to move CECOM HQ out of leased space (the CECOM Office Building - COB) and into space at Fort Monmouth, relocate the Chaplain School to Fort Jackson, SC, and dispose of excess facilities at Evans and Charles Woods subposts, as well as main post Fort Monmouth.

(a) The **disposal** process is underway. The Army declared the 253 acre Evans subpost, with its 190,369 SF of administrative space, surplus in Jun 94. The property is currently in Federal Screening to determine its ultimate disposition. Fort Monmouth declared 246 Army family housing units in the Charles Woods area as excess and it appears the Navy will acquire all the units. The Navy currently occupies 100 units of this housing. CECOM has begun the process of vacating the COB. The Army's lease on the six-story, 597,000 SF building runs through Feb 99 with a payment of $15.1M per year ($5.23 to the owner for rent and maintenance, $2.73M for utilities, $7.1M to GSA for their "administrative" fee).

(b) The realignment of activities from VHFS, the COB and Evans area onto the main post and Charles Woods area necessitated completion of an **Environmental Assessment**. This study evaluated factors to support the influx such as infrastructure, land/air space use, water resources, noise, hazardous materials, wildlife/vegetation, etc. It concluded the movements onto Fort Monmouth would have no significant impact on the environment.

(c) Finally, the realignment requires **renovation** of facilities on the main post and Charles Woods area. Project 42708 is for renovation of 469,000 SF of space on the main post at a cost of $19.5M. Space for renovation includes 262,500 SF in buildings 1202, 1207, and 1208 (to be vacated by the Chaplain School), 82,000 SF of space in building 1200 vacated by the 513th MI Bde, and other smaller buildings on the main post. The $3.05M project 42683 is for renovation of 42,300 SF in the Myer Center and construction of a High Bay Facility and Calibration Radiation Lab in the Charles Woods area. The realignments from VHFS, the COB, and the Evans area also required **information mission area upgrades** including a major telephone switch upgrade on the main post. Several buildings are currently in design with construction projected for Jan 95 and occupancy scheduled for late FY95/early FY96.

6. **Describe military department approved and programmed plans which will impact or have impacted the activity and installation.** The Sep 93 departure of the 235th Signal Company to Fort Gordon, GA, the Aug 94 transfer of the 513th Military Intelligence Brigade, to Fort Gordon, the Oct 94 movement of the 389th Army Band to Aberdeen Proving Ground, MD, and the projected drawdown in CECOM's military strength have created substantial excess capacity in the facilities and services at Fort Monmouth designed to support military personnel and their families.

a. Fort Monmouth has 894 on post, **family housing** units, excluding 246 units declared excess as a result of BRAC 93 and slated for acquisition by the Navy. Based on the above decreases to military strength, we project 306 of these units will be available to house new C4I units relocating to Fort Monmouth. 157 housing units off post have the requisite size, location and cost to support additional military families. (See also response to question 4.)

b. Existing **unaccompanied personnel housing** units on post will support 60 more service members.

c. The Barker Circle Barracks complex is currently underutilized. Projected occupancy rates will continue to decline sharply. These five modern, three-story, brick buildings in a campus-like setting include 179,000 SF of space which could be converted to **administrative space** for 1100 employees at a medium cost. (See also response to question 4c.) The office buildings occupied by the 513th MI Bde and two of the three buildings occupied by the band are slated for BRAC 93 renovation and use.

d. The full service Patterson Army **Hospital**, the **dental** activity, and military **shopping** and **recreational** facilities on post all have the capacity to support new tennants.

7. **Collocated C4I organizations.** This section lists the organizations and summarizes their overall mission. Please see tab 1b for a discussion of relationships between activities.

US ARMY COMMUNICATIONS ELECTRONICS COMMAND

ORGANIZATION	MISSION
STAFF ACTIVITIES	
COMMAND GROUP	Exercises Command control over all elements of CECOM. Serves as Installation Commander over Fort Monmouth and VHFS.
DCI	Plans, develops, coordinates, and integrates CECOM's information requirements and supporting information infrastructure. Provides integrated sustaining base information management services and support to CECOM and Fort Monmouth.
DIIS	Provides support to CECOM and its resident activities in intelligence and counter-intelligence programs.
EEO	Provides advice to the CG CECOM and Commanders of resident units located at Fort Monmouth on the status of EEO for civilian employees.
IRAC	Furnish internal audit services to CECOM and Fort Monmouth resident units.
PAE	Develops strategic long range plans to support the Command's goals for acquisition, business and organization planning, BRAC implementation, and operation of the CECOM Command and Control Center. Manage the Army's investment in MITRE Corporation and provide Systems Analysis support and staff coordination of Command-wide management matters and oversight of installation management issues.

US ARMY COMMUNICATIONS ELECTRONICS COMMAND

ORGANIZATION	MISSION
IG	Plans and executes general and special inspections for CECOM, and provides assistance to CECOM employees, military family members, retirees, and personnel assigned to resident units at Fort Monmouth.
PAO	Furnishes advice and services pertaining to public affairs matters within CECOM and Fort Monmouth.
P&T	Manages and administers the command military and civilian personnel programs for Fort Monmouth and its residents.
SAFETY	Provides advice and assistance to the CG CECOM and resident PEOs/PMs on all matters pertaining to the mission safety program. Other customers include the U. S. Army National Guard and the U. S. Army Center for Health Promotion and Preventative Medicine.
TAQ	Implements TAQ principles and philosophy to the CECOM community.
LEGAL OFC	Furnishes legal advice and services in all fields of the law and regulations in the interpretation, application, and execution thereof, and in the relationship of the law to the execution of the mission and management of activities at Fort Monmouth.
CMO	Advises CG CECOM on matters pertaining to increasing competition for contracts on a basis of cost and other significant factors and reducing the number and dollar value of noncompetitive contracts entered into by CECOM.

US ARMY COMMUNICATIONS ELECTRONICS COMMAND

ORGANIZATION	MISSION
SADBU CFC	Advises CG CECOM and Fort Monmouth activities on small business, small disadvantaged business, and socio-economic utilization matters.
CFM	Advises CG CECOM on the efficient and effective use of financial and manpower resources.
C3I ACQ CTR	Acquires equipment, services and supplies for CECOM and various PEOs, PMs, and other customers.
GARRISONS	
USAG-FM	Provides base operations support for CECOM and all resident activities.
USAG-VH	Provides base operations support for CECOM and all resident activities.
C3I LRC	Provides total life cycle log support planning/execution, production engineering and product quality management, requirements development and materiel inventory management, manufacturing science and technology, security assistance management, level II and III systems management, technical data/literature program execution/management, and materiel fielding and field technical assistance.
RDEC	Serves as the AMC Center for research, development and engineering in Command and Control, Communications, Computers and Intelligence (C4I); Electronic Warfare; Night Vision and Electro-Optics; and Avionics. Provides support to the PEOs/PMs; developing and acquiring superior technologies; developing, acquiring, testing and evaluating non-major systems; and sustaining and enhancing systems and equipment.

C4IEW ORGANIZATIONS

ORGANIZATION	MISSION
PEO Communications	Provides overall direction and guidance for the development, acquisition, testing, product improvements, and fielding of assigned programs; to coordinate, integrate, lead and directly control the Program/ Project Managers within the assigned mission area; to place primary management emphasis on cost estimating, planning, programming, budgeting, program integration, Interoperability and oversight.
PM JTACS	Acquires communications systems that support the Army at Echelons Above Corps (EAC) and Echelons Corps and Below (ECB), USAF and NSA.
PM ADDS	PM ADDS is a Command, Control and Communications (C3) Network consisting of the Enhanced Position Location Reporting System (EPLRS) and the Army portion of the Joint Tactical Information Distribution System (JTIDS).
PM SINCGARS	Responsible for project management of assigned SINCGARS, single channel radios and associated ancillary equipment whose primary uses are command and control of combat, combat support, and combat service support, in accordance with applicable regulations and directives.
PM SATCOM	Responsible for project management of materiel development and acquisition of satellite communications terminals and control system for Defense Satellite Communications System, Ground Mobile Forces/Tactical Satellite Communications Systems and other related programs.
PM MILSTAR (ARMY)	Provides project management of the materiel development and acquisition of MILSTAR EDM Terminal; Single Channel Anti-Jam Manportable Terminal; Secure Mobile Anti-Jam Reliable Tactical Terminal; and the introduction into the inventory of the Air Force Extremely High Frequency Command Post.

C4IEW ORGANIZATIONS

ORGANIZATION	MISSION
PM GPS	Responsible for providing the Army with an improving capability to navigate and determine the position of weapons' systems and fighting units under conditions of adverse weather, day or night, in all environmental conditions worldwide, to increase effectiveness on the battlefield.

C4IEW ORGANIZATIONS

ORGANIZATION	MISSION
PEO Command and Control Systems	Manages the development, acquisition testing, product improvement, and fielding of designated materiel programs.
PM OPTADS	Responsible for project management of the materiel development and acquisition program of assigned Operations Tactical Data Systems.
PM FATDS	Responsible for project management of the materiel development and acquisition program for the FATDS managed by the PM.
PM CHS	Responsible for project management of the materiel development and acquisition program for the Common Hardware/Software system

C4IEW ORGANIZATIONS

ORGANIZATION	MISSION
PEO Intelligence and Electronic Warfare	Manages the development, acquisition testing, product improvement, and fielding of the Army's tactical ground and airborne surveillance target acquisition, signals intelligence, night vision, electronic warfare, and weapons location missions.
PM Joint Stars	Exercises full line authority over all planning, direction, and control of research, development procurement and productions, distribution, and logistics support in order to field the Joint Stars system, Commander's Tactical Terminal and Common Ground Station programs to designated units.
PM Combat Identification	Responsible for overall direction and guidance for the design, development, testing, acquisition, and fielding of Combat Identification and Situational Awareness Programs.
PM Firefinder	Responsible for the centralized acquisition and life cycle management of several diverse radar systems being developed to meet Army needs in the areas of target surveillance and acquisition
PM EW/RSTA	Responsible for the centralized acquisition and life cycle management of EW/RSTA systems being developed to meet Army needs in the areas of airborne COMINT/ELINT, remote sensors, meteorological sensors, ground based ELINT and electroptic countermeasures.

C4IEW ORGANIZATIONS

ORGANIZATION	MISSION
PM AIS/USAISMA	Centrally manages Army programs involving information systems acquisition, implementation and engineering tasks.
Joint Interoperability and Engineering Organization (JIEO)	Serves as the systems engineer for the the Defense Information Systems Agency (DISA).
PM JCALS	Provides the planning, management, standardization, technology, and data system modernization efforts needed to help achieve the objective of digitized logistic technical information.

OTHER TENANTS/ACTIVITIES

ORGANIZATION	MISSION	OBS
US. Military Preparatory School	Provide instruction and training for selected soldiers to help them qualify for entrance into the United States Military Academy. * Includes 300 students.	*377
Medical Department Activity	Provides comprehensive health care to authorized personnel within the Fort Monmouth health service area.	576
Dental Activity	Provides routine dental care to active military personnel within the Fort Monmouth, Fort Hamilton, and Picatinny Arsenal areas.	33
Defense Investigative Service	Administers the Personnel Security Investigative, Defense Industrial Security, Arms, Ammunition and Explosive Security, and Key Asset Protection programs.	7
902nd Military Intelligence	Conducts counterintelligence/ counterespionage operations for activities and individuals falling under US Army investigative jurisdiction within New Jersey.	7
Criminal Investigation Division	Protects vital Army assets and ensures the Army is able to perform its combat role unimpeded by criminal acts.	3
US. Army Audit Agency	Assists the Army in achieving efficient and effective management by providing independent and objective audit service.	31
Federal Bureau of Investigation (FBI)	Provides field divisions with on-line direct access automated support for administrative and investigative operations by means of a secure operating computer facility and telecommunications network.	130

OTHER TENANTS/ACTIVITIES

ORGANIZATION	MISSION	OBS
Human Research and Engineering Directorate	Applies Human Factors Engineering (HFE) technology to the development and readiness programs and projects and support to MANPRINT efforts.	12

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DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MATERIEL COMMAND
5001 EISENHOWER AVENUE, ALEXANDRIA, VA 22333-0001

REPLY TO
ATTENTION OF

AMCRD-IT

OCT. 20 1994

MEMORANDUM FOR COLONEL MICHAEL G. JONES, DIRECTOR, THE ARMY BASING STUDY, OFFICE OF THE CHIEF OF STAFF, 200 ARMY PENTAGON, WASHINGTON, D.C. 20310-0200

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group Data Call - Energetics Information

1. Reference memorandum, HQDA, DACS-TABS, undated, subject: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call.

2. Enclosed is the supplemental information on Energetics requested in referenced memorandum. The U.S. Army Missile Command (MICOM) and the U.S. Army Armament Research, Development and Engineering Center (ARDEC) have crosswalked the data for consistency with prior BRAC 95 responses.

3. As with previously submitted BRAC 95 data submissions, we have maintained auditable records at all levels of the command, which are on file in the RDTE Integration Division. The data was certified by Headquarters (HQ) MICOM, ARDEC and HQ, U.S. Army Materiel Command (AMC) senior-level officials to assure accuracy and consistency with known previously submitted BRAC 95 data calls.

4. I certify that the BRAC 95 Supplemental Data is complete and accurate to the best of my knowledge and belief.

5. The point of contact for this action is Ms. Janet Benskin, AMCRD-IT, (703) 274-9862.

6. AMC -- America's Arsenal for the Brave.

Encl

for RAY E. McCOY
Major General, USA
Chief of Staff

DEPARTMENT OF THE ARMY
UNITED STATES ARMY MISSILE COMMAND
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

AMSMI-DC

17 October 1994

MEMORANDUM FOR Commander, U.S. Army Materiel Command,
ATTN: AMCRD-JL, 5001 Eisenhower Avenue,
Alexandria, VA 22333-0001

SUBJECT: Energetics Cross-Service Analysis - Data Requirements

1. References.

a. Memorandum (enclosure 1), Office the Director of Defense Research and Engineering, 6 Oct 94, SAB.

b. FONCON between Mr. Mike Sandusky, HQ, AMC, and Mr. John Finafrock, HQ, MICOM on 7 Oct 94, SAB.

2. Information contained in this report (enclosure 2) is accurate and complete to the best of my knowledge and belief.

3. Point of contact for this action is Mr. Gary Reas, DSN 645-7606.

2 Encls

Ernest A. Young
ERNEST A. YOUNG
Deputy to the Commanding General

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DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

WASHINGTON, DC 20301-3010

06 OCT 1994

MEMORANDUM FOR SECRETARY OF THE ARMY
SECRETARY OF THE NAVY
SECRETARY OF THE AIR FORCE

SUBJECT: Energetics Cross-Service Analysis - Data Requirements

Based on a thorough review of the data collected by the Military Departments in support of the Laboratory Joint Cross-Service Group, we have concluded that greater consolidation of Energetics RDT&E functions could not only reduce infrastructure costs, but contribute significantly to jointness and quality. Additional data is required to pursue this opportunity. In order to analyze all military department activities for potential cross-service collocation of this functional area, the attached certifiable data is requested to be prepared for briefing on October 20, 1994, at 8:30am, Room 3D129, Pentagon.

I would like to thank each of you for the outstanding work of your principals and support staff in formulating the attached data call.

Anita K Jones

ANITA K. JONES
Chair, Laboratory
Joint Cross-Service Group

Attachment

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ENCL 1

Energetics Cross-Service Analysis - Data Requirements

1. Organization Chart (as of 30 Sep 94):
   a. Show organizational elements (those which report directly to the activity commander).
   b. Describe organizational relationships especially between support organizations and any other organizations located on the Installation/Base.

2. For each organizational element:
   a. Breakout five types of FY93 workyears (government, FFRDC on-site, FFRDC off-site, contract support on-site and contract support off-site) by the following seven job categories: S&T Engineering Development, Production, In-Service Engineering & other (describe).
   b. Number of square feet of space occupied broken out by: laboratory specific space, general office space, and other space (describe). Note if government owned or leased.
   c. List total FY93 funds and list main programs, and customers.

3. Describe by major functional and product lines, the capabilities of your activity to perform energetic functions in terms of manpower, intellectual/skill capability and capacity, and major facilities and equipment.

4. Map of the installation to include elements listed in 2 and 3:
   a. Annotate buildings to show location of each organizational element.
   b. Show buildings with equipment/facilities which would be difficult to move or replicate. List such equipment with initial cost. Provide an estimate of the replacement cost of the facilities.

5. Estimate the capacity of the activity and installation (separately) to absorb similar workyears with little or no modification of facilities. Estimate the capacity of the activity and installation (separately) to absorb similar workyears with major modifications and describe the nature of those modifications and estimated cost. Use FY97 as the baseline for such estimates.

6. Describe the impact of BRAC 91 and BRAC 93 decisions on the activity and installation.

7. Describe military department approved and programmed plans which will impact or have impacted the activity and installation.

8. Remaining tenants and other activities on the installation: name of organization, mission, total workyears.

9. Summarize your overall mission.

AMSMI-RD

14 OCT 1994

MEMORANDUM FOR AMSMI-CA-PM

SUBJECT: ENERGETICS CROSS - SERVICE ANALYSIS - DATA REQUIREMENTS

1. Reference, memorandum, Director of Defense Research and Engineering, dated 06 Oct 94, sab.

2. Enclosed is RDEC's submission for the energetics data requirements.

Richard G. Rhoades

RICHARD G. RHOADES
Associate Director for Systems
Research, Development, and
Engineering Center

.10

ENCL 2

PROPULSION DIRECTORATE 13 Oct 94

ENERGETICS CROSS-SERVICE ANALYSIS - DATA REQUIREMENTS

1. Organization Chart (as of 30 Sep 94):

a. Show organizational elements (those which report directly to the activity commander).

Chart is enclosed.

b. Describe organization relationships especially between support organizations and any other organizations located on the Installation/Base.

The Propulsion Directorate's energetics efforts are primarily carried out by its Propulsion Research Function. The Propulsion Directorate is itself a key part of the Missile Research, Development, and Engineering Center (MRDEC), the Army's Missile Center of Excellence. The Missile Research, Development, and Engineering Center (MRDEC) has the mission and major capabilities to provide full spectrum support to all life cycle support needs of assigned missile systems, rocket systems, and directed energy systems. MRDEC is the Army's lead organization for technologies in missile propulsion, guidance and control/terminal homing, high energy lasers, and missile system simulation. The Center's mission in this area includes planning, managing, and conducting basic research and exploratory and advanced development in this common support mission area. Development engineering is conducted for missile systems, and selective research and component development is conducted to generate new manufacturable technology, reduce development lead time and system cost, and improve reliability. MRDEC is the lead Center within the Army Materiel Command for the Early Entry, Lethality, and Survivability Battle Lab at Ft. Monroe, Virginia. The Propulsion Directorate's energetic functions are an integral part of the overall MRDEC mission.

The Propulsion Directorate is very fortunate to be collocated in the same geographic area (most within no more than 15 miles) of significant mission-enhancing organizations. These organizations are governmental, industrial and academic in character and scope. The top 5 entities, not in any specific priority order, are: (1) Program Executive Officers and their associated Program Management Offices, (2) Thiokol, (3) the Redstone Technical Test Center, (4) the University of Alabama in Huntsville, and (5) the George C. Marshall Space Flight Center.

PROGRAM EXECUTIVE OFFICERS AND PROGRAM MANAGEMENT OFFICES

Directorate managers and engineers/scientists are within 2 to 5 miles of the Tactical Missile Program Executive Office and its eight project offices, and the Missile Defense Program Executive Office and its eight project offices. This closeness supports effective interfaces on a daily basis on such activities as development of scopes of work for future tasks, technical discussions, resolution of schedule problems associated with system development milestones, and personnel assignments. Face to face meetings are the rule rather than the exception.

THIOKOL CORPORATION

The Thiokol Corporation is a major propulsion company that occupies government owned facilities at Redstone Arsenal. Thiokol is located approximately 1/2 mile from the MRDEC Propulsion Directorate. Facilities occupied by Thiokol are qualified for the production of Class 1.1 and Class 1.3 energetic materials such as rocket motor propellants and warhead fills. These facilities include production size mixers (1 gallon to 420 gallons) for rocket motor production varying in propellant weight from 1 to 28,000 pounds. Thiokol performs R&D and production efforts for all three services and NASA. The current manpower level is approximately 250 employees, 58% professional/technical and 42% production. This government owned facility has enough capacity to produce all tri-service tactical, solid propellant motors. This facility has been used for five decades to produce tri-service rocket motors.

REDSTONE TECHNICAL TEST CENTER

The Redstone Technical Test Center is a unique test and evaluation facility located close to the research and development activities of the Missile RDEC. The Test Center provides modern flight, static, dynamic, climatic, electro-magnetic and component test facilities readily accessible to Missile RDEC programs. Technical test expertise and facilities/capabilities are provided for the conduct of research and development testing from the component/subsystem level to the weapon system level. The Test Center is physically located on Redstone Arsenal and occupies 14,000 acres. The Test Center consists of 3 outdoor missile firing ranges, 130 buildings, test stands, and climatic chambers for evaluating operational and environmental characteristics of developmental prototypes and in-service weapons. The Test Center employs 164 civil service personnel and 325 support contractors. The test Center facilities and equipment have a replacement value of $260M.

The Propulsion Directorate depends very heavily on the availability and use of the Test Center. Prior to 1990, the Test Center was a major Directorate of the Missile RDEC. However, one of the Defense Management Review Decisions removed it and placed it under the operational control of the Army's Test and Evaluation Command. However, this change of parent commands did not alter the interdependence links that exist between the RDEC and the Test Center.

The collocation of this lead Test Center with the missile development community is an incalculable asset. Weapon system and component designers can prepare an experiment on the test ranges or in the climatic chambers very easily. They are within several miles of spare components, test instruments, expert advice from other engineers, and specifications and standards. Travel costs are greatly reduced and development times are accelerated.

UNIVERSITY OF ALABAMA IN HUNTSVILLE

The Redstone Arsenal technical and scientific community has long recognized the importance of a highly educated technical workforce. Also of importance is the ability to have quick access to university professors and their graduate students who are working in research areas allied to the Arsenal missions. This recognition led to the establishment of the University of Alabama in Huntsville (UAH) as a technical center of excellence in applied optics, aerophysics, atmospheric science, rocket propulsion, automation and robotics, computer science, engineering, materials science, chemistry and physics.

The UAH has developed a Propulsion Research Center to provide an environment which connects the academic research community with the needs and problems of the propulsion community and which promotes interdisciplinary approaches to solving propulsion problems. This mission is pursued by individual researchers and research groups within the Center, and by collaboration with faculty members and students from various academic departments at UAH and in collaboration with researchers from government laboratories and across the propulsion industry. The result of this environment is that the Propulsion Research Center conducts leading edge research and scholarly activity in the pursuit of advanced technical knowledge and applications.

UAH has been particularly responsive to the Missile RDEC's special needs for tailored graduate courses to meet the needs of a part-time student population. Important courses are typically taught at night or via video tape. The most recent activity of UAH has been to develop a curriculum for a Missile

University that would respond to the Center's need to expand its number of employees with advanced degrees. This would give the Center a capability to increase the educational level of in-house personnel. This capability is particularly important in a downsizing environment when very few new employees can be hired, especially ones with advanced technical degrees.

GEORGE C. MARSHALL SPACE FLIGHT CENTER

The Marshall Space Flight Center and the MRDEC's Propulsion Directorate are physically located on the 38,658 acres of Redstone Arsenal, Alabama. Most facilities of both organizations are located within two to four miles of each other. Marshall has been focused on the civilian thrust into manned space flight with the associated technological endeavors of large rockets and the Space Shuttle. Whereas, the MRDEC has been focused to the development and support of small battlefield missiles, rockets, unconventional weapons, and unmanned vehicles. Over the past 40 years, Marshall and the Propulsion Directorate have collaborated on many technology endeavors. Currently there are 2 Joint Energetic Activities between Marshall Space Flight Center and Propulsion Directorate. The technical collaboration and shared use of facilities have proven very beneficial to both organizations.

2. For each organizational element:

a. Breakout five types of FY93 workyears (government, FFRDC on-site, FFRDC off-site, contract support on-site and contract support off-site) by the following seven job categories: S&T Engineering Development, Production, In-Service Engineering & other (describe).

Government FY 93 work years in energetics	-	7.5 (S&T)
Contractor support on-site FY 93 man years	-	5.0 (S&T)
Contractor support off-site FY 93 man years	-	33.0 (S&T)

b. Number of square feet of space occupied broken out by: laboratory specific space, general office space, and other space (describe). Note if government owned or leased.

Number of square feet supporting energetics (Government Owned)

Laboratory Space	370
General Office Space	1200
Energetics Processing	2915
Storage Space	4610
Test Area	6125

c. List total FY93 funds and list main programs, and customers.

FY 93 Funds:

PE 62303/A214	$ 500K	(Energetics S&T is only a part of this PE)
PE 63313A	$4,632K	(Program ended 30 Sep 94)

Main Programs

PE 6.2 High Performance Minimum Signature Propellant Development

PE 6.3 Insensitive Munitions for Missile Propulsion

Customers

Project Managers for Army Missile Systems, NASA, and other DoD services.

3. Describe by major functional and product lines, the capabilities of your activity to perform energetic functions in terms of manpower, intellectual/skill capability and capacity, and major facilities and equipment.

The unique energetic propulsion skills include laboratory technology for insensitive smokeless propulsion for tactical missiles, and smart, adaptable missile propulsion, the way of the future. No other service has deployed a smokeless propulsion system. The Army, which has three deployed smokeless missiles, has a ten year lead in this area. The other services rely on the Army to continue to develop this area. Under Project Reliance, the other services have basically given an exclusive franchise to the Army Propulsion Laboratory to develop smart adaptable missile propulsion. Manpower, intellectual/skill capabilities and capacity, and major facilities and equipment are available to meet the needs of all services requirements in minimum signature propulsion and smart adaptable propulsion.

4. Map of the installation to include elements listed in 2 and 3:

a. Annotate buildings to show location of each organizational element.

Annotated on attached map.

b. Show buildings with equipment/facilities which would be difficult to move or replicate. List such equipment with initial cost. Provide an estimate of the replacement cost of the facilities.

Buildings with equipment/facilities difficult to move or replicate.

Facility	Initial Cost	Replacement Cost
BUILDING 7120		
Solid Propellant R&D Facilities	$4,600K	$6,200K
Gelled Propellant R&D Facilities	$ 750K	$ 850K
Gel Propellant Development Facility	$2,500K	$3,000K
BUILDING 7145 Test Area	$2,500K	$5,000K

5. Estimate the capacity of the activity and installation (separately) to absorb similar workyears with little or no modification of facilities. Estimate the capacity of the activity and installation (separately) to absorb similar workyears with major modifications and describe the nature of those modifications and estimated cost. Use FY97 as the baseline for such estimates.

Expanding these facilities to include all service propulsion needs in reduced signature propulsion and smart adaptable missile propulsion would take advantage of existing Army expertise and leadership, and could be done within existing facilities and areas currently committed to propulsion.

6. Describe the impact of BRAC 91 and BRAC 93 decisions on the activity and installation.

BRAC 91 and BRAC 93 had no discernible impact on the MRDEC energetics activity. No transfers from Redstone Arsenal were directed by either commission. Realignments into Redstone Arsenal included:

1. Formation of the Army Materiel Command Logistics Support Activity (LOGSA), primarily from elements of the former Materiel Readiness Support Activity, the Logistics Control Activity, and the Catalog Data Activity.

2. Transfer of the Missile Fuze Production Support Mission to the MRDEC from the Army Research Laboratory.

MCA projects are underway for facilities to house these activities. LOGSA is an AMC tenant activity on Redstone Arsenal, currently housed in temporary facilities. The Missile Fuze Production Support Mission will be incorporated within the MRDEC on completion of facility construction.

7. Describe military department approved and programed plans which will impact or have impacted the activity and installation.

There are no known plans approved or programed which will impact the MRDEC energetics activity or Redstone Arsenal.

8. Remaining tenants and other activities on the installation: name of organization, mission, total workyears.

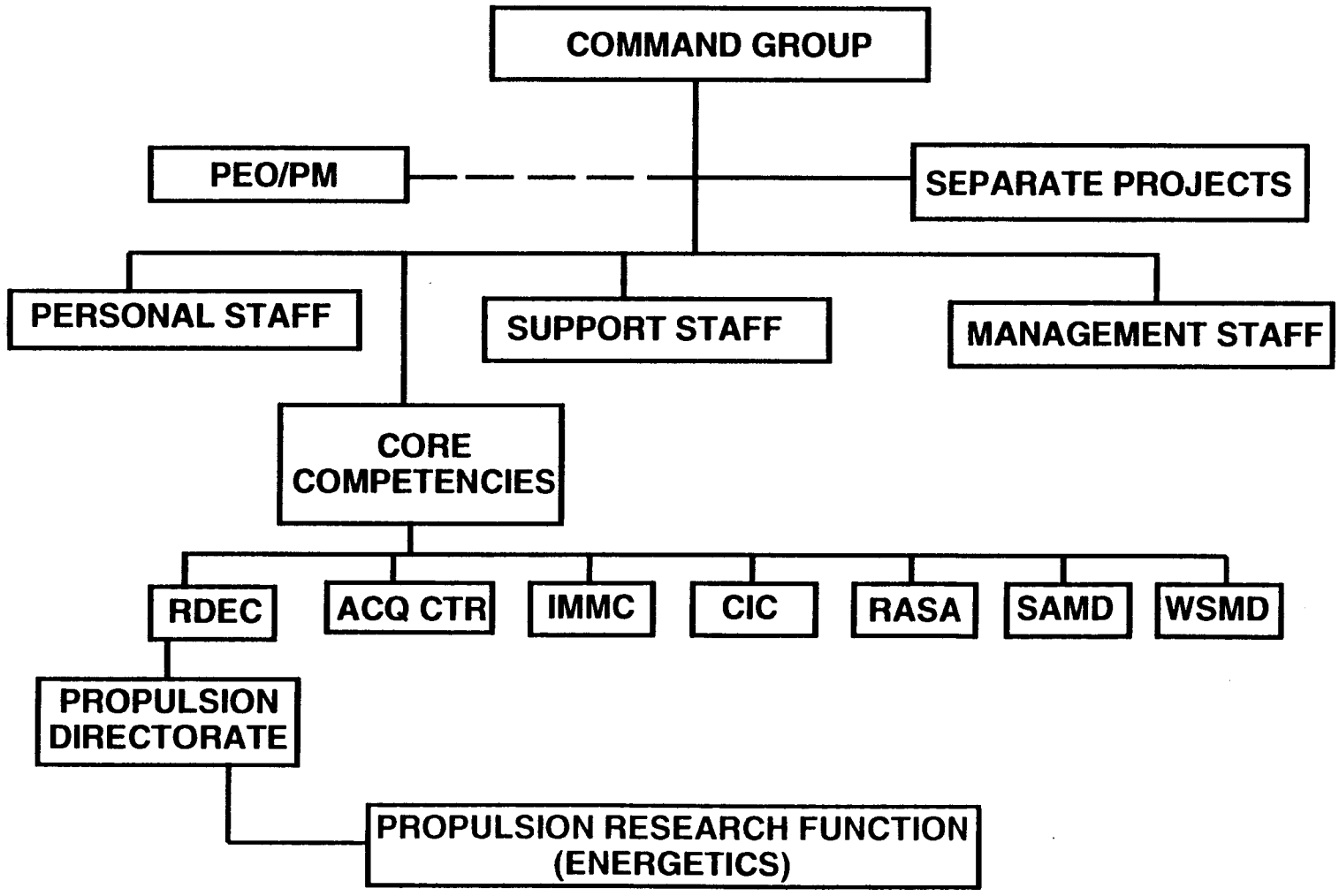
Redstone Arsenal has more than 22K military, civilian, and contractor personnel working or training daily. There are approximately 50 tenant activities located on Redstone Arsenal receiving base support from the Missile Command as host. Most of these tenants' missions are related to development, engineering, production, acquisition, sustainment, or operations of missiles and related technology. Major tenant activities include:

NASA Marshall Space Flight Center
US Army Ordnance Missile Munitions Center and School
Missile and Space Intelligence Center
US Army Test, Measurement, and Diagnostic Equipment Activity
Redstone Technical Test Center
PEO Tactical Missiles
AMC Logistics Support Activity
Defense Megacenter-Huntsville
Defense Finance and Accounting Service-Redstone
Thiokol Corporation (lease)

9. Summarize your overall mission.

The overall mission in energetics is to conduct research and development in the formulation and evaluation of propellants containing energetic materials for minimum signature and enhanced survivability/safety of propulsion systems.

U.S. ARMY MISSILE COMMAND ORGANIZATION STRUCTURE



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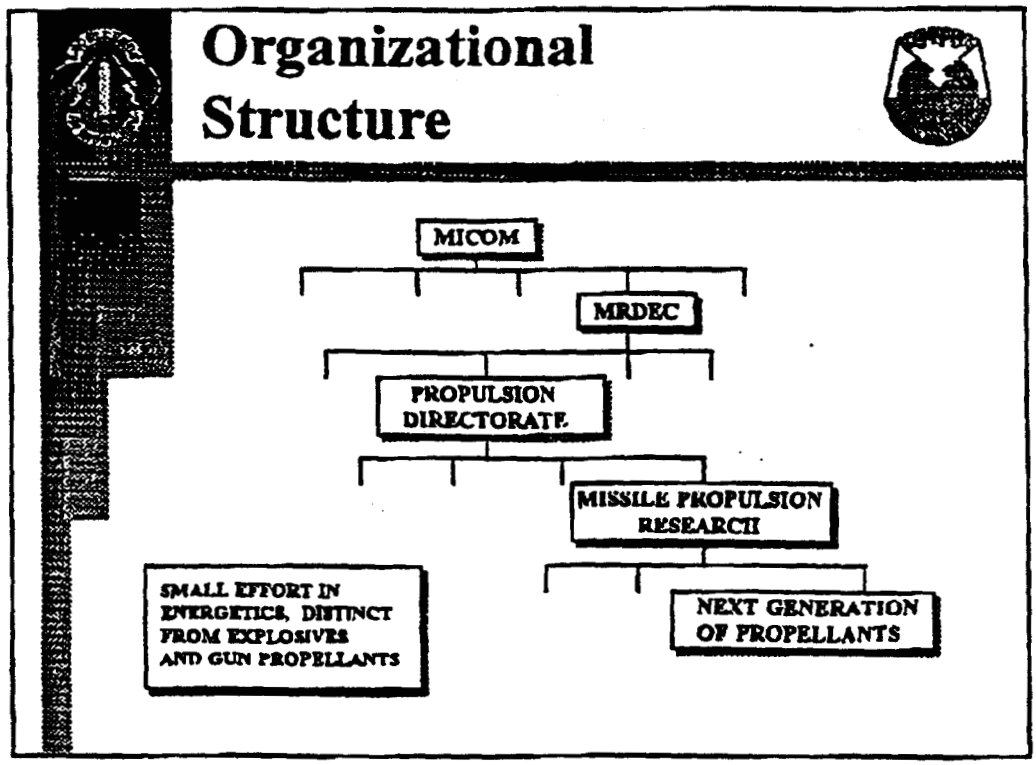
MICOM

ENERGETICS CROSS-SERVICE ANALYSIS

20 October 1994

Dr. W. D. Stephens
Propulsion Directorate
Research, Development, and Engineering Center
Redstone Arsenal, Alabama



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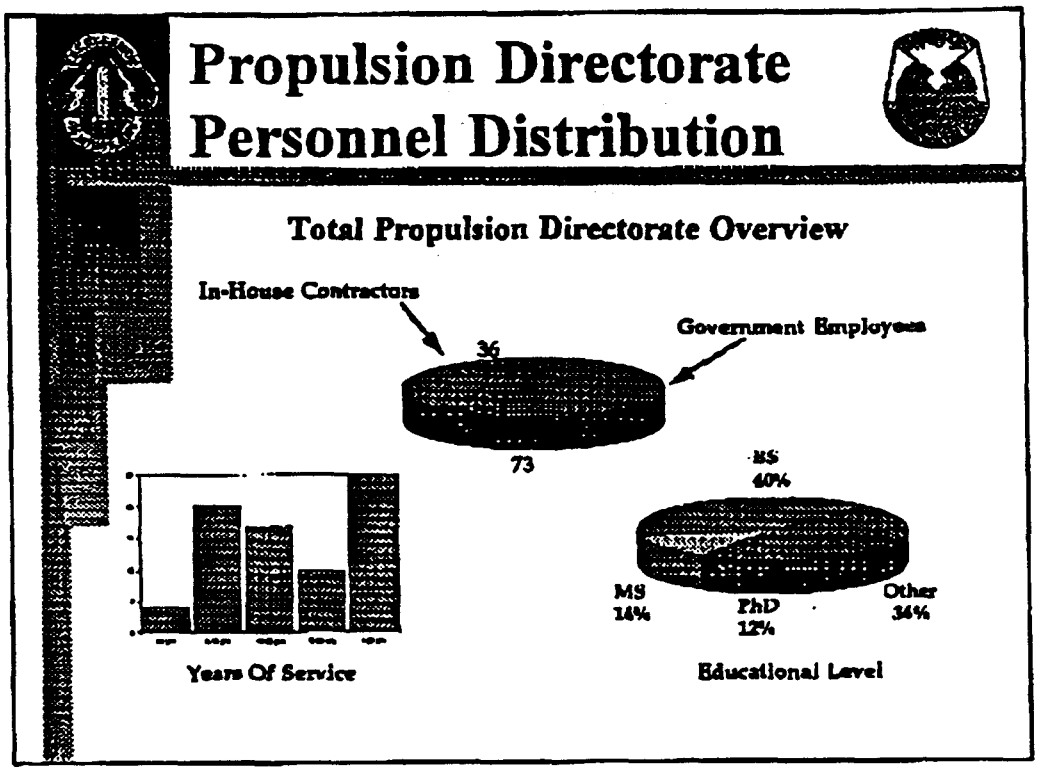
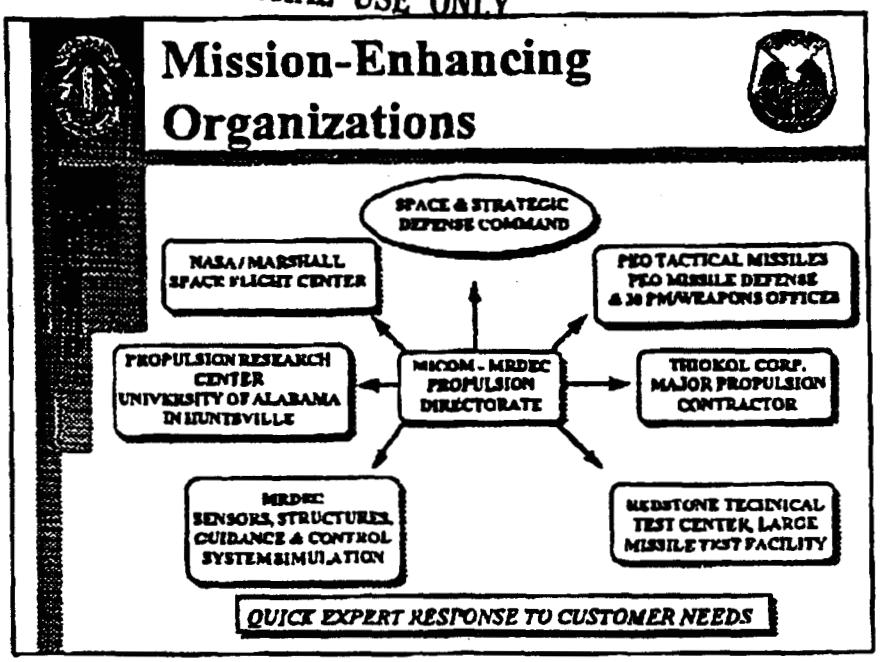


This chart shows the educational and work experience of the Propulsion Directorate as a whole, but the values also represent the subset of individuals working in energetics research and development.

During FY 93, there were 12 technical papers presented on Directorate energetics activities. In addition, 11 patents / disclosures were entered on our energetics work.

Technical data exchanges and coordination are made with the other services and NASA through the Joint Army-Navy-NASA-Air Force (JANNAF) Interagency Propulsion Committee and Project Reliance.



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Directorate managers and engineers/scientists are within 2 to 5 miles of Tactical Missile Program Executive Offices and its 8 project offices, and the Missile Defense Program Executive Office and its 8 project offices. This closeness supports effective interface on a daily basis on such activities as development of scopes of work for future tasks, technical discussions, resolution of schedule problems associated with system development milestones, and personnel assignments. Face to face meetings are the rule rather than the exception.

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This government owned facility has enough capacity to produce all tri-service tactical, solid propellant motors. This facility has been used for five decades to produce tri-service rocket motors.

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The Test Center consists of 3 outdoor missile firing ranges, 130 buildings, test stands, and climatic chambers for evaluating operational and environmental characteristics of developmental prototype and in-service weapons.

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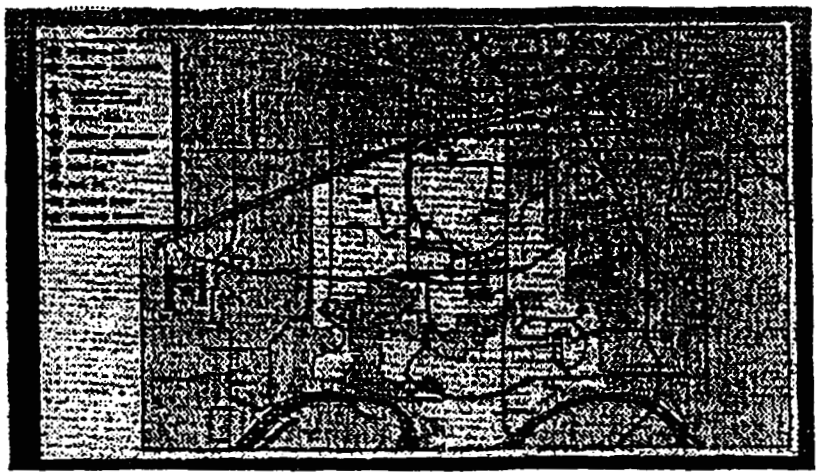
The UAH has developed a Propulsion Research Center to provide an environment which connects the academic research community with the needs and problems of the propulsion community and which promotes interdisciplinary approaches to solving propulsion problems.

GEORGE C. MARSHALL SPACE FLIGHT CENTER

Currently there are 2 Joint Energetic Activities between MSFC and the Propulsion Directorate. The technical collaboration and shared use of facilities have proven very beneficial to both organizations.

Installation Map



Redstone Arsenal, located in North Alabama, occupies approximately 38,000 acres and has more than 22,000 military, civilian, and contractor personnel working or training daily. There are approximately 50 tenant activities located on Redstone Arsenal receiving base support from the Missile Command as host. Most of these tenants' missions are related to development, engineering, production, acquisition, sustainment, or operations of missiles and related technology. Major tenant activities include:

NASA Marshall Space Flight Center
US Army Ordnance Missile Munitions Center and School
Missile and Space Intelligence Center
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Redstone Technical Test Center
PEO Tactical Missiles
AMC Logistics Support Activity
Defense Megacenter-Huntsville
Defense Finance and Accounting Service-Redstone
Thiokol Corporation (lease)

Propulsion Directorate Complex

The MICOM Propulsion Directorate consists of over 110,000 Square Feet of laboratories, offices, test facilities, and storage located on 41 acres in the southeastern area of Redstone Arsenal.

The large "L-shaped" building is home to 70 percent of the work force and contains a special explosion-proof propellant processing wing with reinforced concrete walls. An adjacent complex houses the propulsion mechanics activities and service life work.

To the rear of the major complexes lie the evaluation facilities, the signature characterization facility and numerous areas utilized in development of small diameter, air-breathing propulsion components and systems.

Propulsion Directorate FY 93 Energetics Funding

FY 93

■ GOVERNMENT	7.5 (S&T)
■ ON-SITE CONTRACTOR	5.0 (S&T)
■ OFF-SITE CONTRACTOR	33.0 (S&T)*

FY 93 FUNDS FOR ENERGETICS

■ PE 62303 / A214	$500K
(ENERGETIC S&T IS ONLY A PART OF THIS PE)	
■ PE 63313 A	$4632K*

*ENDED 30 SEP 94

SUPPORTS $4 BILLION WORTH OF MISSILE SYSTEMS ACQUISITION

The funding values shown on this chart reflect the substantial contractor activity in the 6.3a insensitive munitions arena which ended 30 Sep 94.

Energetics Development Floor Space

GOVERNMENT OWNED FLOOR SPACE (SQ - FT)

■ LABORATORY SPACE	370
■ GENERAL OFFICE SPACE	1200
■ ENERGETIC PROCESSING	2915
■ STORAGE SPACE	4610
■ TEST AREA	6125

The percentage of Propulsion Directorate floor space utilized in Energetics development is less than 14%, the balance being utilized in supporting technologies such as design, analysis, and mechanics. Similarly, the percentage of on-site workers involved in Energetics research is approximately 12%.

Energetics Propulsion Skills

CAPABILITIES

- UNIQUE TECHNOLOGY AREAS:
  - HIGH PERFORMANCE INSENSITIVE SMOKELESS TACTICAL PROPULSION
  - SMART ADAPTABLE MISSILE PROPULSION
- MANPOWER: ADEQUATE FOR CURRENT MISSION, EXCELLENT POOL FOR EXPANSION
- INTELLECTUAL CAPABILITY AND CAPACITY: WORLD CLASS
- FACILITIES & EQUIPMENT. EXCELLENT, WITH ROOM FOR EXPANSION

UNIQUE CAPABILITIES AND TECHNOLOGY

The unique energetics propulsion skills include laboratory technology for insensitive smokeless propulsion for tactical missiles, and smart, adaptable missile propulsion, the way of the future. No other service has deployed a smokeless propulsion system. The Army, which has three deployed smokeless missiles, has a ten year lead in this area. The other services rely on the Army to continue to develop this area. **The Navy has traditionally relied on the Army to develop infantry weapons for the Marine Corps, including HELLFIRE, STINGER, DRAGON, and TOW.** Under Project Reliance, the other services have basically given an exclusive franchise to the Army Propulsion Laboratory to develop smart adaptable missile propulsion. Manpower, intellectual/skill capabilities and capacity, and major facilities and equipment are available to meet the needs of all services requirements in minimum signature propulsion and smart adaptable propulsion.

Energetics Facility Costs

BUILDINGS, EQUIPMENT, FACILITIES, DIFFICULT TO MOVE OR REPLACE

FACILITY	INITIAL COST	REPLACEMENT COST
PROPULSION RESEARCH FACILITIES		
■ SOLID PROPELLANT R & D FACILITIES	$4,600K	$6,200K
■ SMART PROPELLANT RESEARCH FACILITIES	$750K	$850K
■ SMART PROPELLANT DEVELOPMENT FACILITIES	$2,500K	$3,000K
■ EVALUATION FACILITIES TEST AREA	$2,500K	$5,000K
	Total $10,350K	Total $15,050K

FACILITIES LINKED TO RESEARCH NICHE, INSENSITIVE SMOKELESS TACTICAL PROPULSION, AND SMART PROPULSION

Research, manufacture, and test of energetic materials requires dedicated, re-inforced buildings with earthen berms and positioned in accordance with established "quantity-distance" regulations.

The differences between the initial and replacement costs reflect the fact that MICOM's energetics facilities are relatively new.

Energetics Facilities Expansion Potential

- EXPANSION OF CAPABILITY
  IN THE SPECIALIZED AREAS OF INSENSITIVE SMOKELESS PROPULSION AND ADAPTABLE SMART PROPULSION, MICOM COULD EXPAND TO INCLUDE ALL OF THE SERVICES LABORATORY EFFORTS, PLUS THOSE OF NASA, WITHIN EXISTING FACILITIES
- IMPACT OF 91 & 93 BRAC
  NOT APPLICABLE
- IMPACT TO PLANS
  NOT APPLICABLE

GOOD EXPANSION CAPABILITY AVAILABLE

Expanding these facilities to include all service propulsion needs in reduced signature propulsion and smart adaptable missile propulsion would take advantage of existing Army expertise and leadership, and could be done within existing facilities and areas currently committed to propulsion.

BRAC 91 and BRAC 93 had no discernible impact on the MRDEC Energetics activity. No transfers from Redstone Arsenal were directed by either commission.

There are no known plans approved which will impact the MRDEC Energetics activity or Redstone Arsenal.

System Design Considerations

AIR-LAUNCH SYSTEMS REQUIRE

- AERO-HEAT DESIGN CONSIDERATION (FOR HIGH-PERFORMANCE A/C)
- HIGH BOOST ACCELERATION
- NO DEBRIS
- NO OVERPRESSURE ON A/C STRUCTURE
- OPERATION OVER MORE EXTREME, STEEPER GRADIENT TEMPERATURE AND ALTITUDE RANGE
- SOFT -LAUNCH

SURFACE-LAUNCH SYSTEMS REQUIRE

- NO SIGNATURE (SMOKE) FOR LINE-OF-SIGHT SYSTEMS
- NON-TOXIC EXHAUST
- SAFETY OF SHOULDER-LAUNCHED SYSTEMS
- NO OVERPRESSURE IN FIRING ENCLOSURE
- LOW COST (ARTILLERY ROCKETS)

PROVIDES UNIQUE INFANTRY WEAPON SYSTEMS

Whereas design philosophies between the air-launch and surface-launch worlds parallel each other in many respects, there are never-the-less significant differences which do not currently permeate between the camps.

Significant among these are the surface-launch requirements for non-toxic motor exhaust in shoulder launched systems and the need to protect the gunner. The Army's emphasis on minimum signature and high energy places yet further constraints on the energetic materials.

MICOM Energetics Mission Summary

THE OVERALL MISSION IN ENERGETICS IS TO CONDUCT RESEARCH AND DEVELOPMENT IN THE FORMULATION AND EVALUATION OF MISSILE PROPELLANTS CONTAINING ENERGETIC MATERIALS FOR MINIMUM SIGNATURE AND ENHANCED SURVIVABILITY, AND FOR FUTURE SMART, ADAPTABLE PROPULSION SYSTEMS, AND TO MAINTAIN A POOL OF TECHNICAL EXPERTS TO SUPPORT THE PEO AND PM OFFICES.

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DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MATERIEL COMMAND
5001 EISENHOWER AVENUE, ALEXANDRIA, VA 22333-0001

REPLY TO ATTENTION OF
AMCRD-IT

25 October 1994

MEMORANDUM FOR COLONEL MICHAEL G. JONES, DIRECTOR, THE ARMY BASING STUDY OFFICE, OFFICE OF THE CHIEF OF STAFF, 200 ARMY PENTAGON, WASHINGTON, D.C. 20310-0200

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group Data Call - Energetics Information

1. References:

a. Memorandum, HQ AMC, AMCRD-IT, 20 Oct 94, SAB.

b. Memorandum, HQDA, DACS-TABS, undated, subject: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call.

2. This memorandum transmits an expanded version of the U.S. Army Armament Research, Development and Engineering Center's (ARDEC) energetics data, which was previously certified by the U.S. Army Materiel Command (AMC), Chief of Staff (reference 1a). The interconnectivity, facilities and equipment sections have been expanded to better portray ARDEC's unique characteristics which mandate its retention in place at Picatinny Arsenal. Photos have also been provided (encl).

3. As with the previously submitted BRAC 95 data submissions, we have maintained auditable records at all levels of the command, which are on file in the RDTE Integration Division. The data was certified by Headquarters, AMC and ARDEC senior-level officials to assure accuracy and consistency with known previously submitted BRAC 95 data calls.

4. I recertify that the BRAC 95 Supplemental Data is complete and accurate to the best of my knowledge and belief.

5. The point of contact for this action is Ms. Janet Benskin, AMCRD-IT, (703) 274-9862.

6. AMC -- America's Arsenal for the Brave.

FOR THE COMMANDER:

Encl

THOMAS L. PRATHER, JR.
Major General, USA
Deputy Chief of Staff
for Research, Development
and Engineering

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SMCAR-TD

MEMORANDUM FOR Headquarters, U.S. Army Materiel Command,
ATTN: AMCRD-IT, 5001 Eisenhower Avenue,
Alexandria, VA 22333-0001

SUBJECT: Supplemental BRAC 95 Laboratory Joint Cross-Service Group (LJCSG) Data Call

1. Reference memorandum, HQDA, DACS-TABS, undated, subject sab.

2. As requested in reference cited above, supplemental BRAC 95 Energetics Cross-Service Analysis data applicable to the U.S. Army Armament Research, Development and Engineering Center is enclosed.

3. The readers attention is directed to our response to question number 3. This answer describes the U.S. Army Armament Research, Development and Engineering Center's (ARDEC) fully integrated energetics life cycle capability which supports all three services. The ARDEC, Picatinny Arsenal enjoys a unique physical synergy of world class facilities, and equipment used by nationally and internationally recognized technical experts. This unique synergy allows us to conceive, compute, synthesize, load and test full-up munitions without leaving the installation. ARDEC has full engineering life cycle responsibility from research and development to demilitarization, literally cradle to grave.

4. The information contained in this report is accurate and complete to the best of my knowledge and belief. The accuracy of the data has been validated by the U.S. Army Armament Research, Development and Engineering Center (ARDEC) Internal Review and Audit Compliance Office (IRAC), and a statement to that effect is at enclosure 7. Complete records used to provide requested information are being maintained in both the ARDEC, IRAC Office and Resources and Management Directorate.

5. The POCs for further information are Mr. Donald J. Whittam, SMCAR-TD, Associate for Planning (DSN 880-3957/201-724-3957) and Ms. Vicki Naujokas, SMCAR-RMM (DSN 880-6010/201-724-6010).

ENCL
as

CARMINE SPINELLI
Acting Technical Director

Update

Question 1. Organization Chart (as of 30 Sep 94):

a. Show organizational elements (those which report directly to the activity commander).

A Staff Directory chart at enclosure 1 (last updated 1 Feb 94 - represents the organization as of 30 Sep 94) shows the U.S. Army Armament Research, Development and Engineering Center (ARDEC), Picatinny Arsenal organizational elements which report directly to the activity commander. This chart also shows the remaining tenants on the installation.

b. Describe organizational relationships especially between support organizations and any other organizations located on the Installation/Base.

The Army's Armaments Research Development and Engineering center (ARDEC) is the major tenant on and operates Picatinny. The ARDEC has assigned the normal staff and support organizations found at all RDECs. These are shown on the accompanying organization chart and will not be described herein. ARDEC is one of two AMC RDECs which operates an installation and is thereby the host to other Army and non-Army tenants. The organization providing most of the physical support to the operation of the post is the "Installation Support Activity". Financial, legal, procurement, personnel and staff support are provided by the appropriate functional organizations.

The ARDEC does operate several unique activities which act on behalf of Department of Army in their specified areas: the Army Fuze Management Office coordinates the DA fuze development and acquisition programs; the Insensitive Munitions (IM) Office does likewise for the Army's IM Programs; the DOD Ammunition Logistics Activity develops and fields new and product-improved ammunition logistic systems and allied support equipment; the Joint Services Small Arms Program Office (JSSAP) is the five-Service executive agency for development and acquisition of small arms; The Environmental Technology Office manages for AMC, the DOD Pollution Prevention R&D mission; finally, the Electric Armaments Programs Office coordinates the Army efforts in this research and development program to include the FFRDC at the University of Texas' Institute for Advanced Technology.

The Army's Tank Automotive and Armaments Command (TACOM) has two PM Offices located at ARDEC, reporting to the ARDEC Commanding General. They are the Product Manager for Mortars and the Product Manager for Small Arms.

Three major tenants on the installation share in our involvement in the execution of the Army's RDA mission for armament/energetic systems, viz. the PEO for Field Artillery Systems and three of his Project Managers; PM Paladin/FAASV, PM SADARM and PM AFAS/FARV; two PMs from the PEO Armored Systems Modernization, Detroit Arsenal, Warren, MI; PM Mines, Countermines

and Demolitions and PM Tank Main Armament Systems; and the production Base Modernization Agency (PBMA) assigned to the Industrial Operations Command vice AMCCOM at Rock Island, IL. The PEO/PM Offices are our major customers for whom we provide considerable assistance via matrix management, both co-located at the PMO and more predominantly, non-collocated but dedicated support. The PBMA mission complements the ARDEC development and acquisition mission by managing, on behalf of DA, the program to maintain and improve the energetics/armaments industrial base, both government and GOCO/GOGO/COCO.

These are also noted on the color coded Organizational Chart in our briefing to DDR&E in which the organizations in yellow are at the Picatinny site, those in white at TACOM and those in blue at other places throughout the United States.

Beyond the resident tenants the ARDEC has a pervasive relationship with the government owned and operated (GOGO or GOCO industrial base through the Single Manager for Conventional Ammunition (SMCA) at Rock Island, and with the private industry sector directly through its indigenous procurement organization and through the SMCA for transitioned Army items. (Please see map on slides in enclosed DDRE Briefing) The acquisition and sustainment mission for energetic materiel for the three Services is executed through the SMCA, with ARDEC providing life-cycle engineering support to the Army/USMC items. Maps showing the nation-wide network of supporting activities were included in the visual presentation made to DDR&E and are available there. Beyond these relationships the ARDEC provides development and engineering services to eighteen other Program/Project/Product Management Offices. These customers are shown in the enclosed slides in the DDR&E Briefing.

In the execution of its mission the ARDEC has extensive relationships with business and academia throughout the "High Tech Corridor" in northern New Jersey and with numerous institutions throughout the rest of the United States. Again these are noted on our Strategic location slides of the DDR&E Briefing.

Question 2: For each organizational element:

a. Breakout five types of FY93 workyears (government, FFRDC on-site, FFRDC off-site, contract support on-site and contract support off-site) by the following job categories: S&T, Engineering Development, Production, In-Service Engineering and other.

Information provided at enclosure 2

b. Number of square feet of space occupied broken out by: laboratory specific space, general office space, and other space. Note if government owned or leased.

All ARDEC, Picatinny Arsenal facilities are government owned.

Occupied Space:	
Laboratory Space	970.7K
General Office (Admin)	1124.3K
Other Space (Storage, including energetic mat'l storage, housing, utility facilities, etc.)	1471.5K

c. List total FY93 funds and list main programs, and customers.

(see next two pages)

Question 3. Describe by major functional and product lines, the capabilities of your activity to perform energetic functions in terms of manpower, intellectual/skill capability and capacity, and major facilities and equipment.

BACKGROUND

Following the end of the Cold War, the U.S. Army has been transformed from a forward-positioned force to a deployable, CONUS-based force. The ARDEC Energetics program meets the requirement for advanced armaments which satisfy the dual needs of greater lethality for force multiplication and lighter weight for enhanced transportability. The survivability of friendly forces is also addressed in the ARDEC energetics program by the Insensitive Munitions thrust and environmental stewardship is the centerpiece of ARDEC's support to energetics production and demilitarization for the three services. The energetics capability at ARDEC is central to ARDEC's product line and the Army's ability to produce armaments and munitions for all three Services that is second to none in the world.

ARDEC is the Army's Lead Laboratory and Center of Excellence for Energetic Materials and, unlike the other Services, has unique integrated functional capabilities in synthesis, characterization and physical properties, formulation, hazards and sensitivity, producibility, warhead design, gun propulsion/charge design, propellant surveillance, demilitarization and environmental capability at one site. ARDEC expertise encompasses all of this expertise in that we design energetic materials in order to maximize performance in end items such as propelling charges, warheads and pyrotechnic munitions.

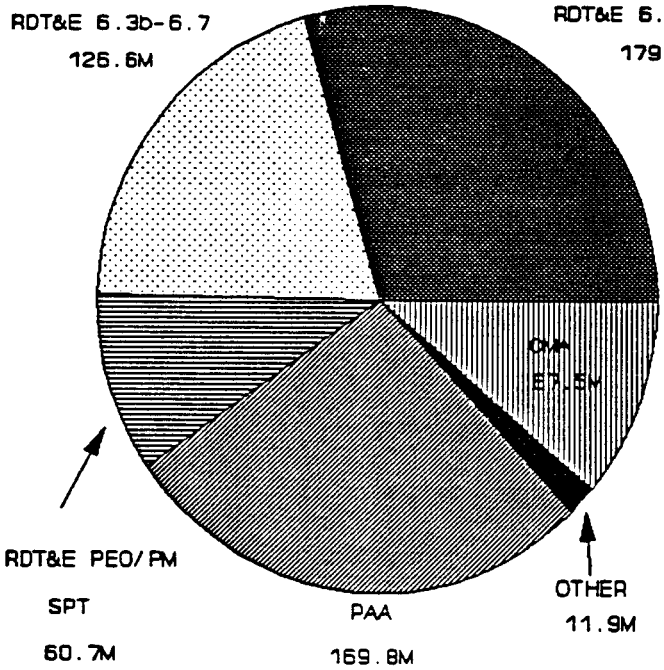
The following functional capabilities, together with the personnel, facilities and equipment to carry out these functions, define the energetic materials capabilities of ARDEC:

SYNTHESIS CAPABILITY

ARDEC TOP CUSTOMERS
($K)

	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
CAWCF	58,982	82,471	37,450	34,219	30,879	23,615	27,787	27,000	27,000
PM AFAS	19,772	30,314	15,923	13,032	17,626	17,447	7,966	7,966	7,966
USMC	229	4,525	1,520	13,020	11,020	18,020	24,020	27,020	16,020
ARPA	44,479	15,783	14,500	12,500	5,500	5,500	5,500	5,500	5,500
PM TMAS	19,648	14,741	10,051	6,507	6,405	5,905	6,770	6,770	6,770
PM MCD	11,511	7,449	9,445	7,741	7,855	7,471	7,471	5,971	5,971
PM FARV-A	4,755	6,966	5,200	5,100	5,300	5,600	5,600	5,600	5,600
PM PALADIN	9,639	10,394	11,501	6,100	2,100	1,100	600	100	100
PM SADARM	7,000	2,138	3,500	7,500	3,722	3,907	3,082	4,500	4,500
PEMA	2,193	2,055	2,720	2,225	2,365	2,610	2,610	2,610	2,610
ALL OTHER CUSTOMERS	33,688	64,109	50,842	45,401	44,948	39,665	45,282	34,602	35,198
DIRECT FUNDS	392,232	399,170	405,528	255,180	257,771	254,033	304,319	290,506	305,483
OTHER	12,528	33,849	12,561	12,196	12,270	12,028	11,854	11,854	11,854
TOTAL REVENUE	616,656	673,964	580,741	422,721	407,761	396,901	452,881	430,019	434,572

ARDEC PROGRAM - FY 93
($ MILIONS)



TOTAL $616.4M

71 TECH BASE PROJECTS
130 DEVELOPMENT PROJECTS
* 46 PEO-PM
* 57 AMC-PM
* 27 AMCCOM
162 PROJ SUPPORT PRODUCTION
1511 FIELDED SYSTEMS SUPPORTED
3500 TDPs/YEAR
CUSTOMERS
* 4 MSC
* 35 PM
* 13 AMMO PLANTS & ARSENALS
* OTHER SERVICES/AGENCIES

A. Synthesis is the ability to create, at the molecular level, new energetic materials or new routes to existing energetic materials to meet the performance, safety, insensitivity, and environmental requirements of weapons and munitions in development and production. It requires the specialized skills of synthetic organic chemists with knowledge of explosive compositions and reactions.

The Synthetic Group includes nine Ph.D.s and is composed of government and GEO Center contract personnel working side by side in our laboratory facilities. The Ph.D. scientists are recent graduates who studies with some of the best synthetic chemistry Professors in the country, such as, Dr. Phil Eaton, University of Chicago; Dr. H. Schecter, Ohio State University and Dr. Alan Marshand, University of Texas. Research is currently concentrating on synthesizing new cage molecule, such as, nitrocubanes, other novel molecular architecture, such as, trinitroazetidines and new synthetic routes for existing explosives to reduce environmental impact during production, such as, elimination of red water by a new catalytic synthesis of TNT, reduction of solvents and mixed acid waste in the GARDEC synthesis of HMX and development of new HAN synthetic process to help PEO Field Artillery better negotiate a price with an industrial producer. The effort includes theoretical computations/modeling as well as challenging experimental synthesis. It draws on contractual support from world authorities in academia and private industry. The effort over the past year has produced many papers and numerous patents and the group recently signed a Cooperative Research and Development Agreement with Albert Einstein Center to synthesis cubane derivatives for testing their anti HIV and anti cancer properties. The synthesis group is housed in a chemistry laboratory built in the 1980s which was equipped with special chemical hood facilities and state-of-the-art instrumentation for characterizing new compounds including Nuclear Magnetic Resonance Spectrometers. This facility and instrumentation is described in an enclosed facility package marked synthesis and scale-up of energetics. It also leads joint programs with other services. In addition, scale-up facilities exist to scale any energetic material up to 100 lbs of material that can readily be used for propellant and explosive formulation. The equipment capability at ARDEC is able to handle any military service Energetic material. Requirement for large scale quantities of materials are either obtained at existing GOCO or GOGO's plants or private industry. The Army philosophy is to have the producer of the energetic material involved in early development so that the producibility learning curve occurs in early development rather than later in production. Thus, we avoid large scale in-house facilities (thousands of pounds) at our centers and enhance the ease of process transition to production. Also note that the ARDEC scientists involved in the synthesis group have strong interaction with Holston and Radford and help solve production problems that occur. Their familiarity with these processes and capabilities at the production plants enable rapid solutions to problems.

CHARACTERIZATION AND PHYSICAL PROPERTIES CAPABILITY

B. Characterization and physical properties is the ability to take new or existing energetic materials and determine their response to thermal, chemical, electromagnetic radiation and shock stimuli and to determine their structure in the gas, liquid and solid and the particle size in the solid. As the Army's lead laboratory and Center of Excellence for Energetic Materials, ARDEC has developed scientists with unique expertise in characterizing and measuring the properties of energetic materials and explosive, propellant and pyrotechnic formulations. The group has fifteen Ph.D. scientists and engineers, as well as chemists and chemical engineers. Both expertise, equipment and facilities exist to study new energetic materials, such as, trinitroazidine, PAX-4, (new explosive formulation), liquid propellant for AFAS, M30 (solid propellant for Unicharge), XM 413 (new composition for IR decoy flares). The facilities exist (see facilities) at ARDEC to characterize this diverse range of energetic materials with state-of-the-art equipment (see characterization and properties equipment) and are manned with a work force that has the experience and training to measure the characteristics and properties of these materials. In addition, this same expertise is used to solve production plants at the GOCO and GOGO plants and malfunctions occurring in the field. One example of production problem that was solved is one with the TOW Missile Warhead production which was experiencing a wide variation in penetration from lot to lot. The ARDEC team brought LASER Holography to the load plant at Iowa and determined that the problem was in the alignment of the explosive train. Careful attention to the loading process enabled continued production of quality TOW Missiles. The facilities supporting these efforts were erected in the 1980s, conform to quantity distance regulations, and individual laboratories have the proper explosive allowances for the operations. Additionally, the operations produce quantities of hazardous and explosive hazardous waste and meet satellite and 90 day storage regulations. The operations required special construction, design and placement of facilities along with the infrastructure that provides proper support (i.e., environmentally approved incineration for explosive waste, 90 day storage facilities, hazardous waste shipping facilities). The buildings also have the required power to support instrumentation and adequate cooling capacity to maintain the temperature in the buildings that house the delicate instrumentation during the hot humid weather.

The scientists, engineers and technicians have years of experience, generally starting in research and development, but later branching into many technologies that directly support many of the PEOs and PMs on post, solve production problems and field malfunctions. Examples include the in-house expertise in liquid propellants for the new AFAS system. This expertise does not reside in the system contractor Martin Marietta, but at ARDEC. It has been built up over the past five years where teams of scientist have developed knowledge in compatibility of the liquid

propellant with materials; hazards of the liquid propellant in loading system, the on-board vehicle and the gun system; vulnerability of the liquid propellant to unplanned stimuli, such as, heat shock, electromagnetic radiation; interactions of liquid propellant with various chemicals; lifetime of the liquid propellant; chemical kinetics of decomposition under various conditions, etc. Similar knowledge and experience have been developed at ARDEC to support the Unicharge for artillery, future tank propulsion systems to maintain the United States advantage in tank bullets (such as silver bullet M829A1 in Desert Storm), expertise in designing explosive formulations that match the metal liners for Anti-Armor warheads, such as Hellfire, Javelin, TOW and TOW follow-ons, Smart mortar projectiles and STAFF. Desert Storm demonstrated the U.S. advantage in Anti-Armor warheads. Much of this technology expertise is maintained at ARDEC and the explosive and propellant expertise (the Mainstay of this expertise) has been uniquely developed to support these systems and to continue to advance this technology so that our advantage is maintained. The Army has been assigned to Anti-Armor mission under Project Reliance and thus has the responsibility for this technology for all services.

FORMULATION CAPABILITY

C. Formulation is the blending of energetic materials, such as, HMX, RDX, TNAZ, Nitrocellulose with binders, plasticizers and other ingredients to provide the required chemical properties for meeting producibility and end item requirements. For example, an end item might require dispersing metal fragments of a particular size and velocity about a given area and thus detonation properties would be required in the formulation; or the end item might be required to push a bullet out of a gun tube at a given kinetic energy and this would require the energetic material to burn at a given mass velocity; or the end item would require a certain light output at a given wavelength and this would require the addition of metal of a given particle size to an oxidizer. Formulation is a bit of science and art and requires modeling capability, the right equipment and years of experience to be able to maximize the output requirement for a given munition. ARDEC has a cadre of people that have developed this unique expertise to formulate explosives, propellants and pyrotechnics for maximizing the end item performance. This is the true expertise of ARDEC which does not exist in the other Services. Other Services can take our formulations and scale them to larger quantities once they are designed properly, but ARDEC expertise lies in interfacing these energetics with the munition or system to maximize performance in a given end item. ARDEC has available the equipment to scale this formulation to 100 lb quantities (sufficient amounts to demonstrate safety, sensitivity and performance in an end item and/or system). One hundred pounds quantities are sufficient to demonstrate initial producibility of the energetic materials as many of these energetic materials are made in batch processes in a given production plan of the order of 300 lbs and blended. After making 100 lbs of a given formulation

the process is transferred to a GOCO or GOGO Plant where it is made in pilot scales for additional development and testing of the end items. This early transition to the production plant greatly reduces the risk during full scale production. Experience has taught the Army that no matter how much one learns about a process at one site there is a learning curve for the accepting organization at another site before a process is smoothly integrated into full production. Thus larger scale pilot plants such as 10,000-20,000 lb lots produced at an in-house government facility do not transition to the GOCOs or GOGOs any easier than 100 lb scale pilot lots. ARDEC in its facility has numerous mixers including high shear mixers, planetary mixers, sigma mixers, glazing machines, dryers, including vacuum dryers, blenders, extruders, cutters, presses, casting equipment and state-of-the-art twin screw mixer/extruder all of which are described under formulation equipment. The unique expertise at ARDEC supports over 1511 items in the field. The scientists, engineers and technicians at ARDEC have been deeply involved with fielding these end items and have participated in maximizing the output of these end items from the earliest stages of development through type classification, to initial production, to full production and fielding. This is the reason when plant production problems or field malfunctions occur that these people have the highest success rate in solving the problems. Examples include: (1) In the early 1980s, the U.S. fielded High Zone Artillery Charge was a bag charge containing granular seven perforated, M30 propelling and the gun propelling charge had a wear life of 1700 rounds. This wear life was reluctantly accepted by the user as artillery wear lives were generally of the order of 5000 rounds. At this time the United States production was geared to granular propellant. The gun propellant formulators at ARDEC knew that if they lower the flame temperature of the propellant (used M31) and packed more into the chamber the wear life would greatly increase. This could only be done in a stick propellant geometry which the U.S. production base had had no previous experience. The ARDEC formulators were able to develop the stick propellant technology and transfer it to the Radford Army Ammunition Plant. The charge was fielded by ARDEC in the 1985 time frame and went through some initial production problems which were quickly solved. This charge was used in Desert Storm by both Army and Marine Force with great success. This artillery charge design expertise is unique to the Army; (2) The original LOVA propellant formulation fielded in the 105mm Tank KE Cartridge was designed at ARDEC and much of the small scale producibility work was performed at ARDEC before transitioning the product to Indian Head for production. Also recently when producible issues have arisen in production on this propellant, ARDEC has done studies in the ARDEC facilities which have been transitioned to Indian Head and worked into their production process. Again ARDEC has unique tri-service expertise in formulation and producing tank gun propellants that extends to all tank gun propellants in the field; (3) Rigid combustible case technology was first developed by ARDEC in the 1960s and since has been fielded in mortar increments, tank cartridges, and artillery propelling charges. This technology is unique to Army systems

which are also used by the Marines and the expertise resides at ARDEC; (4) Explosive formulation, such as, LX-14, A5, C-4, Comp B, TNT are widely used in numerous fielded items. Each formulation has to be matched to the particular warhead to obtain maximum performance. Again, the formulation of these explosives and matching to end items is readily done at ARDEC and engineering changes to formulation because of lack of ingredients, changes in suppliers, etc., have been routinely handled by the expertise at ARDEC throughout the years. Recently ARDEC has formulated less sensitive explosives with similar energy to replace the above explosives and has been matching them in various end items and testing. These formulae will be gradually substitute for the above explosives as new items are introduces into the field; (5) Lead styphnate a major ingredient of primary explosives has had a series of production problems over the past few years at Lake City. Again, unique expertise at ARDEC has kept this production running and allowed continued production of a series of primaries; (6) IR seeking missiles have become increasingly sophisticated in tracking low and slow flying aircraft (U.S. Army largest user) and have greatly reduced the effectiveness of U.S. Army decoys. New pyrotechnic compositions unique to the Army have been formulated and successfully tested against these advanced missile seekers. Again the expertise of matching the energetic material to the munition and the Army requirement are unique to ARDEC.

HAZARDS AND SENSITIVITY CAPABILITY

D. Hazards measurements of Energetic Materials are essential to determine if they are safe to handle at all temperatures of military use. Sensitivity measurements are performed on energetics to determine their response to a given level of stimulus so that the end item can be designed safely against such a response or protected from seeing a stimulus sufficient to cause an unwanted response or to determine what response is sufficient to initiate a given explosive formulation. These measurements are essential to any organization designing munitions for military use. Specialized equipment for machining explosives to desired shapes for testing and specialized equipment for coating explosives to reduce sensitivity are available. Impact testers, slapper sensitivity, electrostatic sensitivity, thermal sensitivity, flow apparati, set-back sensitivity, shock sensitivity are also available for determining properties of energetic materials, such as explosive, propellant and pyrotechnic formulations. The group consists of chemical and electrical engineers, chemical technicians, energetic material handlers, explosive operators and explosive test technicians. The ARDEC group has unique expertise in handling fuze trains, initiating devices, and performance parameters specific to Army munitions and mis ile systems. The group has been involved with the early development of these end items and thus can readily interact with production facilities on problems and field malfunctions. Again ARDEC unique expertise is in using this knowledge in munition design not just for the energetic material. This expertise does not exist at any one place in the other services.

PRODUCIBILITY CAPABILITY

E. Producibility involves the integration of process engineering and scale-up of formulations in quantities sufficient to produce items for the war reserve. This group uses the facilities at ARDEC and has intimate knowledge of GOCO and/or GOGO and/or contractor facilities and processes and serves to interface between the two so that smooth transition occurs between ARDEC and the production facility. Expertise exists in explosive, gun propellant and pyrotechnics formulation for munition and missile warheads and is unique to ARDEC and the Army. Knowledge exists for all munition items produced by the Single Manager, the Army and all items in development such as liquid propellant for AFAS, explosive formulations for advanced PAM (demolition munition), explosive formulation of TNAZ for anti-armor warheads, advanced gun propellants for M829A1 (silver bullet) for PM TMAS, propellants for Unicharge and pyrotechnics for IR decoys for low and slow aircraft. Expertise involves not only scale-up of energetic but loading and packaging as well. In these areas, ARDEC engineers, scientists and technicians have knowledge of the ARDEC procedures and the plant facilities and smooth the transition between the two. Buildings housing the equipment are of special construction to contain accidental explosive effects and would be expensive to reconstruct. Buildings have the required area to meet quantity distance requirements. Many buildings have been built around the equipment and are complex enough to require costly engineering redesign effort at a new location. Equipment such as; (1) A fully automated explosive chemical mix system capable of producing PBX explosive with a semi-automatic load, assemble and pack out system capable of loading large warheads; (2) Automated liquid propellant (LP) pumping, handling and storage system. System is used to develop safe procedures for transferring LP; (3) Presses for loading warheads; (4) Presses for pelletizing pyrotechnics; (5) Mixers for PBX and other explosive and propellant; (6) Casting equipment including vacuum for explosives; (7) Fluid energy mill for grinding energetics capable of processing a minimum of 300 lbs/hr; (8) Energetic material rework facility; (9) Gun Propellant Twin Screw Mixer/Extruder. Equipment is state-of-the-art generally capable of making 100 lb formulations of explosive, propellant or pyrotechnic and similar to larger scale equipment existing at GOCO's, GOGO's and Industrial Plants. The object of having this equipment and expertise is to reduce risk in transferring new formulations, loading, assemble and packaging procedures to production plants and providing a trained workforce capable of solving production and field malfunctions. Again ARDEC's expertise is in the producibility of the 1511 fielded munition items and those items under development not just the energetic material but all the interfaces of the energetic material in the munition. Pictures of the equipment in the facilities are listed under producibility equipment.

ANTI-ARMOR WARHEAD CAPABILITY

F. As examples of the direct application of ARDEC's energetics know how to mission responsibilities, the Army's warhead program is focused on anti-armor munitions and addresses both low-g (e.g., mines and missiles) to extremely high-g (e.g., gun launched projectiles). ARDEC has demonstrated the capability to design and develop unique, small but highly lethal anti-armor warheads (EFP and shaped charge) for the defeat of targets such as the T80U main battle tank in support of programs such as SADARM, STAFF, JAVELIN, SMART Mortar and TACAWS. This capability involves a team which includes 5 Ph.D. research physicists, engineers and physicists and technicians with demonstrated capabilities in innovation, precision fabrication and assembly techniques, advanced computational techniques, experimental diagnostics, detonation physics, design for the gun launch involvement, who are trained in an integrated design and development approach which takes advantage of a broad range of in-house explosive/warhead capabilities. The in-house facilities allow the fabrication by casting or pressing of all necessary explosive changes. Temperature controlled vacuum casting is conduced in the Bldg 230 complex (Fig 1). Pressing with vacuum and temperature (up to 420 tons) is conducted in the Bldg 236 area (Fig 2). High quality changes are routinely produced. A complete instrumented small scale testing facility is located in the Bldg 1600 area (Fig 3). Figs 4, 5, and 6 illustrate the broad capabilities of this facility. The total cost of the facilities necessary to accomplish this mission is about $27M (Bldg $9,111,250., infrastructure $766,125., equipment #17,007,357.). A full scale testing capability is provided by the advanced warhead development facility described separately. There is sufficient space and facilities to accommodate additional personnel. These in-house capabilities are complemented by an effective partnership with industry, the DOE and other services (under the auspices of Reliance). The Army has the JDL/Reliance responsible for anti-armor warheads for the three military services. Examples demonstrating these broad capabilities include:

- The development of a simple selectable multi-mode/multi-purpose warhead by a mechanical approach which modifies an aerostable long rod EFP which has been demonstrated to produce compact fragments with good fragment patterns and RHA perforation capability which would permit enhanced effectiveness (SADARM P3I and WAM P3I) against the entire range of expected targets. (See Figs 7 and 8)

- The development (and partial demonstration) of a concept for improving the lethality of STAFF. A 30%-70% increase in RHA penetration is a possibility. (see Fig 9)

- The development and demonstration of a warhead concept for improving the effectiveness of SADARM (by enhancing accuracy of the SADARM baseline EFP). (See Fig 10)

- Incorporation of state-of-the-art numerical optimization into warhead design codes with the ultimate goal of achieving superior warhead performance with dramatically reduced development costs. (See Fig 11a and Fig 11b)

- Development and transition (other services, the DOE, industry) of an advanced equation of state which has been incorporated into warhead design codes to enable proper modeling of the integration of multiple denotations. This capability was employed to design the warhead shown in Fig 12.

A number of their recent advances including the incorporation of the more powerful explosive TNAZ into a SADARM EFP configuration (no redesign), a Hellfire redesign for the ARDEC developed IM explosive PAX-2A and the innovative EFP concept the Ultra-Long EFP, Insensitive Munitions modeling are shown in Figs 13, 14, 15, and 16.

Gun-launch is an especially difficult and hazardous environment unique to many Army munitions. For example, anti-armor warheads must first survive the high-g launch, then be capable of forming a heavy-metal liner into a penetrator. ARDEC has the special explosive-warhead interface design skills necessary to create munitions which function successfully in this uniquely hostile environment, not found in bomb and torpedo applications. All our explosive formulations are geared to this end and herein lies the uniqueness of the ARDEC Energetics Group.

GUN PROPULSION/CHARGE DESIGN CAPABILITY

G. Gun propulsion technology including formulation, propelling charge design and producibility has been assigned by the JDL/Reliance to the Army/ARDEC to perform for all military services. This technology goes from the small caliber pistols/rifles, to cannon calibers, to tank guns, to artillery guns. This mission supports PEOs and PMs on post. Gun propellant research and development is currently working on more energetic less sensitive propellants for cannon caliber, tank guns and artillery charges. It should be noted that propelling charge design involve modeling the energy of the propellant and its grain geometry, the actual laboratory formulation of the propellant grain, the measurement of its characteristics and properties, the loading of the propellant grains into a container, the design of a ignition charge for initiation and the introduction of wear reducing additives, decoppering agents and flash reducers into the propelling charge and finally the test firing of this charge with a bullet in a gun. There are many interfaces in a propelling charge other than the propellant grain which influence the propellant formulation. ARDEC's unique expertise that does not exist in any other Service is that they design the whole propelling charge and understand the interfaces. This work is strongly coupled to the Close Combat and Fire Support Centers and the resident PEOs and PMs. Initial formulations are made in the laboratory and completely characterized. Scale-up is then

performed on promising formulation loaded into propelling charge and gun tested on post. ARDEC can fire guns from pistol/rifles up to 8" gun for ballistic evaluation. The interface of these propelling charges and the various bullets in the particular gun they will be fired are also assessed. All of this expertise exists at the Picatinny site and the customers are also on post allowing for rapid transition. PMs and PEOs are kept abreast of progress and plan out year development programs based on projected progress in our technology base programs. These same workers who work on technology base transition to development programs and have the expertise to solve production and field problems also associated with the Charge Design. The GOCO's plant (Radford) has the capability and capacity to produce any gun propellant currently in use or planned by the U.S. Army or any of the military services.

PROPELLANT SURVEILLANCE CAPABILITY

H. Gun Propellant Surveillance is the measurement of chemical reactions occurring in the propellant that result in a reduced lifetime of given propellant lot. The Propellant Surveillance Team provides technical support to the Single Manager for Conventional Ammunition, Rock Island, Illinois by performing complex aging and analytical testing of every propellant lot owned by the Army. This requires maintaining an inventory of over 6,000 propellant lots, nearly 15 tons of class 1.1 and 1.3 energetics in special above ground storage. Five pounds of every propellant lot produced by the single manager is sent to ARDEC. The team performs 8,000 analytical tests per year using an automated analytical technique called High Performance Liquid Chromatography. These tests are performed on accelerated aged samples. Eight to twelve reaction products are observed and kinetic calculations are made to estimate safe storage and retest intervals. An extensive data base is maintained on the stability behavior of over 32 different propellant formulations and configurations. Effective stabilizer levels and a 45 day fume failure test are also conducted.

Other agencies call upon the expertise of the Gun Propellant Surveillance Team. The Chemical Demilitarization Command has for some years relied upon the Team to assess the safe storage condition of the M55 Chemical Rocket. The Team recently presented its findings to the National Research Council and has provided support in an effort at CRDEC to establish a risk assessment for the potential self ignition of these munitions. Studies by the team have demonstrated that an incompatibility exists between the propellant and the chemical agents found in these munitions.

The Team provides analysis of propellant ready for open burning, open detonation to depots around the United States so that they can meet local environmental regulations. The Team provides support to private industry in establishing test procedures and laboratories for testing propellant for demil

operations. AMC demil contracts state that the Team is the only certifying laboratory for such operations.

The Team performed extensive testing of Desert Storm exposed propellants in support of the Predictive Technology Branch and continues to specially monitor these propellant lots under its own Master Sample Program. The Team provides expert advice to the Air Force on propellant issues, supports testing of Marine propellant assets and some Navy assets. The Team participates in a Navy Quality Management Board assessment of propellant safe storage and testing issues. The Team works closely with the Tri-services through a Joint Officers Command Group subcommittee. This on-going effort has produced a Tri-services joint criteria for propellant safe storage assessment.

The Propellant Surveillance effort requires experts in a number of disciplines. Analytical chemists must be proficient in chromatographic techniques especially High Performance Liquid Chromatography and the automated equipment use din this analytical approach. Experts in Gas Chromatography, UV spectroscopy, GC-Mass spectrometry, chemiluminescence and wet chemical techniques are required. Chemists must understand chemical kinetics and propellant degradation chemistry. Synthetic chemists must provide support in producing the many nitration derivatives required as standards for the analytical techniques used. Facilities and equipment are enclosed under Propellant Surveillance.

The extensive data base and complex laboratory information system developed by the team requires a systems and data base manager and data entry support. Support functions call upon chemical technicians, and energetics materials handlers, inventory control personnel and truck drivers.

DEMILITARIZATION

I. Demilitarization of Munitions involves the tear down and reuse of the components, the destruction of the components or some combination of the above of munitions because they have reached their useful lifetime. ARDEC currently is the lead laboratory for Conventional Ammunition Demilitarization R&D program and is examining Plasma Arc Furnices for Demil of Small Caliber Pyrotechnic Ordnance, Supercritical Water Oxidation for Demil of Carcinogenic/Toxic Colored Smokes/Dyes, Carbon Dioxide Blast-Out System for Press Loaded Explosives, Downloading/Rework Production Line Equipment for Recycling and Prototype Explosive Rework Facility for Press Loaded Explosives. The unique expertise at ARDEC in Energetic Technology, Development and Production as applied to Conventional Ammunition allow a wide variety of technologies to be addressed in solving the most critical problems first. Facilities at ARDEC and the GOCO's and GOGO's are extensively used. The large explosive allowances for buildings at these facilities allow demilitarization technologies to be

routinely examined in building previously used for loading, assembly and packaging.

ENVIRONMENTAL

J. In addition in recent years, the attention of this group has turned to environmental concerns including such areas as the toxicity of ingredients present in propellant compositions, the toxicity of gun propellant combustion residues (both airborne particulate and barrel residues), extensive studies to find replacement materials for toxic gun propellant ingredients, and the testing and characterization of new formulations containing these less toxic materials. Replacement compositions must be formulated in such a way as to provide the requisite ballistic performance, specified chemical and ballistic stability, required minimum hygroscopicity, equivalent production costs and a wide range of other parameters. Work conducted in this are had identified a compound, 2,4 dinitrotoluene, which is present in a number of gun formulations, that produces mutagenic combustion residues. Further, this compound is a known mutagen and suspected carcinogen and is therefore hazardous during the propellant manufacturing process. Recent identification of this compound by the EPA, as a toxic hazardous waste has made it difficult to manufacture. For these reasons it is important to find a replacement compound, of lower toxicity, that can perform the required ballistic functions. Such a program is now underway at ARDEC.

The use of biotechnology for both the synthesis and degradation of energetic materials has become a major effort of this group. Enzymes from both plant and animal sources are currently being used to modify the structure of energetic molecules. Biodegradation technology, being developed by this group, will find immediate application in the environmental area. Direct contributions to the remediation, DEMIL and waste stream treatment environmental thrusts are possible in the near term. Recent studies of the biodegradation of a double base gun propellant composition indicate that all of the ingredients are subject to microbial attack and that nitrocellulose can be rapidly degraded. The results of this study have been the subject of a number of open literature publication and patents. In the synthesis area, studies are underway directed toward the enzymatic preparation of a range of energetic materials. Enzymatic synthesis offers the potential for a safer, less costly and more environmentally friendly production method for energetic materials.

Personnel have been trained to perform these missions and are supplemented by contractor personnel working side by side in our laboratories. The requisite equipment has been purchased and placed into a new renovated facility in which biotechnology is applies to energetic materials.

These and other functional skills, combined with an intimate knowledge of these unique materials, constitute the fundamental core functional capabilities required to execute the energetics mission.

ARDEC has the life cycle responsibility for energetics (i.e., explosives, gun propellants and pyrotechnics) and over 1500 ammunition/weapon items using these materials, which provide 90% of the Army's lethality. This cradle to grave responsibility begins with RDT&E and extends through test and evaluation, production, field maintenance, and demilitarization as well as environmental compliance and pollution prevention.

ARDEC has a very diverse product line that provides the Army and Marine Corps with all Conventional armaments less missiles. That product line is divided into ten business areas, five focused on deliverable products and the other five on critical technical areas. The product oriented business areas include: Smart Munitions, Indirect Fire weapons and munitions, Direct Fire weapons and munitions, Soldier Weapons and munitions and Mines and Demolitions. The technical business areas are: Gun Propulsion, Fuzing & Lethal Mechanisms, Fire Control, Insensitive Munitions and Pollution Prevention R&D. Energetic material capability is central to all our business areas except Fire Control.

ARDEC, through the Single Manager for Conventional Ammunition (SMCA), provides full life cycle engineering support to the Army Ammunition Plants to introduce new energetic materials or processes into these plants. Full Scale pilot plants at these facilities are used during RDT&E to enable smooth transitions to production.

The ARDEC Energetics (i.e., explosives, propellants and pyrotechnics) and Warheads expertise of about 300 people resides in a single full life cycle spectrum organization. The mission of the organization includes technology, systems development and support to production, fielding, and demilitarization to include pollution prevention R&D. It includes the energetics (explosive, propellants and pyrotechnics) processing engineering support, including warheads load, assemble and pack (LAP) for the Army's Ammunition Plants (AAPs) which serve all three Services and testing operations. ARDEC serves to focus and leverage the dispersed national talent and capabilities of industry and academia in the special areas of explosives and warheads for the Army.

ARDEC's energetics capability is a unique synergy of highly-skilled scientists and engineers, utilizing unique facilities and equipment, all collocated with weapons systems designers in a geographic area rich in academic and trained manpower resources. The technical expertise of the workforce is attested by numerous R&D awards, many basic and applied research papers published in refereed journals, awards for technical

presentations at the Army Science Conference, and close technical interaction with academic researchers at leading research universities such as Princeton and MIT. Over the years ARDEC has modernized and upgraded these unique facilities, as exemplified by the new Armament Technology facility for small and cannon caliber weapon development and testing, the new Propellant Surveillance Facility, which, under the Single Manager for the Procurement of Ammunition, monitors the safety of propellant lots for the three services. Other unique facilities include the New Explosives and Warheads Development Facility, which houses modeling, formulation, and analysis of energetic materials, the Warheads Testing Facilities which houses indoors instrumentation and testing for warhead designs, and the Electric Armaments Research Facility, which houses the world's largest capacitor-based power supply dedicated to electric propulsion. (See answer to Q-4 for a comprehensive list of world class facilities).

ARDEC is supported by a highly competent and experienced scientific and engineering staff, complemented by state-of-the-art multi-million dollar facilities including research laboratories completed in the 1980s that are fully equipped with experimental facilities developing and advancing energetic materials, chemical and physical measuring instrumentation; pilot formulation facilities to scale-up energetic materials production processes to 50-100 lbs, mixers to prepare formulations, extruders for energetics, presses and cast equipment for loading warheads and munitions, sensitivity and performance testing equipment, testing warheads and munitions, and firing cartridges or propelling charges in small caliber and up to 8" guns.

There are over 3,000 people at ARDEC working on programs which involve energetics/armament systems and approximately 300 people, including 29 Ph.D.s and 32 with Master Degrees, that reside in a single full life cycle energetics organization and work directly on the development of the energetic material components. They are directly supported by about 25 contractor personnel. These specialists are employed throughout the life cycle to directly support the research, development, engineering and support to production and fielding of all the munitions systems assigned to ARDEC for ultimate fielding to the Army and the Marine Corps.

Further supporting information can be found in documents provided at enclosure 3. A copy of ARDEC's most recent Business Plan, 1993 Organization of the Year nomination package, and the 1995 application for the Presidential Award for Quality are provided.

Questions 4. Map of the installation to include elements listed in 2 and 3:

a. Annotate buildings to show location of each organizational element.

A map of Picatinny Arsenal is provided at enclosure 4.

b. Show buildings with equipment/facilities which would be difficult to move or replicate.

A spreadsheet listing facilities which would be difficult to move or replicate is at enclosure 5. Additionally at enclosure 5 is a General Site Map of Picatinny Arsenal which shows actual location of buildings listed.

Additionally, individual descriptions of a number of facilities are provided at enclosure 6.

Question 5. (a) Estimate the capacity of the activity and installation to absorb similar workyears with little or no modification of facilities. (b) Estimate the capacity of the activity and installation to absorb similar workyears with major modifications and describe the nature of those modifications and estimated cost. (c) Use FY97 as the baseline for such estimates.

a. Capacity to absorb similar workyears with little or no modification of facilities:

Laboratory Facilities	917 workyears
Ops/Admin Facilities	629 workyears

b. Capacity to absorb similar workyears with major modifications:

Based on current information no major modifications required.

c. Nature and cost of major modifications: N/A

Question 6. Describe the impact of BRAC 91 and BRAC 93 decisions on the activity and installation.

As a result of BRAC 91, the Fuze Division, HDL (30 people) were moved to ARDEC, Picatinny Arsenal.

Question 7. Describe military department approved and programmed plans which will impact or have impacted the activity and installation.

The ability of the ARDEC, Picatinny Arsenal to perform its mission has been/will be enhanced by a number of Military Construction Army (MCA) programs either recently completed or under construction. A synopsis of the Armament Technology Facility, the Advanced Warheads Development Facility, and the Explosives Development Facility and the Propellant Surveillance Facility were provided in Question 4b.

Question 8. Remaining tenants and other activities on the installation: name of organization, mission, total workyears.

The major remaining tenants, their mission and a breakout of workyears is provided in Questions 1b and 2a.

Question 9. Summarize your overall mission.

The mission of the U.S. Army Armament Research, Development and Engineering Center (ARDEC) is to conduct or manage research, development and life cycle engineering, including product assurance, engineering in support of items in production and integrated logistics support for assigned armaments & energetic munitions systems and materiel or through matrix support to items managed by the AAE/PEO/PM management echelons; to provide procurement and management of initial production quantities and technical support to soldiers and equipment in the field; and maintain a technology base to facilitate the design, development, procurement, production and life cycle support of assigned materiel or transitioned technologies. Life cycle responsibilities include research, development, acquisition support, support to producers in the national and international industrial base, support to field forces and fielded items, including the demilitarization of all items/systems.

ARDEC provides essential support to the National Industrial Base and is the national mobilization base in time of emergency. ARDEC's mission is applied to the following business areas and assigned materiel.

BUSINESS AREAS

Smart Munitions	Gun Propulsion (Incl. Elec. Arm)
Indirect Fire	Fuzing & Lethal Mechanisms
Direct Fire	Fire Control
Soldier Weapons	Insensitive Munitions
DoD Pollution Prevention R&D	Mines & Demolitions

ASSIGNED MATERIEL

Artillery Weapons	Fire Control Systems
Infantry Weapons	Demolition Munitions
Air Defense Guns	Mines, Bombs, Grenades
Surface Vehicle Mounted Wpns	Pyro Sys. & Munitions
Aircraft Mounted Weapons	Explosives & Propellants
Ammunition for Above	Launch & Dispenser Systems
Rocket & Missile Warheads	Practice & Training Munitions
Fuze/Safing & Arming	Electric Armaments

NOTE: ARDEC has dependent organization elements at Rock Island Arsenal and Watervliet Arsenal which support the overall ARDEC mission at those sites. Both elements report through the chain of command to the Commanding General of ARDEC and the functions are wholly integrated into the budgets and programs with other subordinate ARDEC elements. The Benet Laboratories, is a division within the ARDEC Close Combat Armaments Center, and is located at Watervliet, NY. Benet Laboratories conduct research primarily on

cannon tubes and their components in order to increase life expectancy of the tube and to develop greater firing accuracy. The data for Benet Laboratories has been shown in a separate Benet report and is not included herein.

ARDEC Center of Excellence
Information Briefing to
Joint Cross-Service Group

Vision Statement:

ARDEC will be a community where people are caring, well trained, empowered, and motivated to...

...Provide armament materiel that clearly "makes a difference" in ensuring that our military forces meet the challenge of a changing world;

...Achieve levels of excellence through continuous improvements that will place us in the forefront of the international armaments community;

...Create an organization that is committed to excellence in its work force and the attainment of the highest standards of integrity, Honesty, and Trust.

Presented by
Mr. Carmine J. Spinelli
Acting Technical Director, ARDEC
20 October 1994

FOUO

Briefing Outline

- Mission
  - Functions
  - Customers
  - Program Examples
  - Energetics
- Key Assets
  - Skilled Workforce
  - Facilities
  - Quality of Life
  - Physical Plant
- Summary

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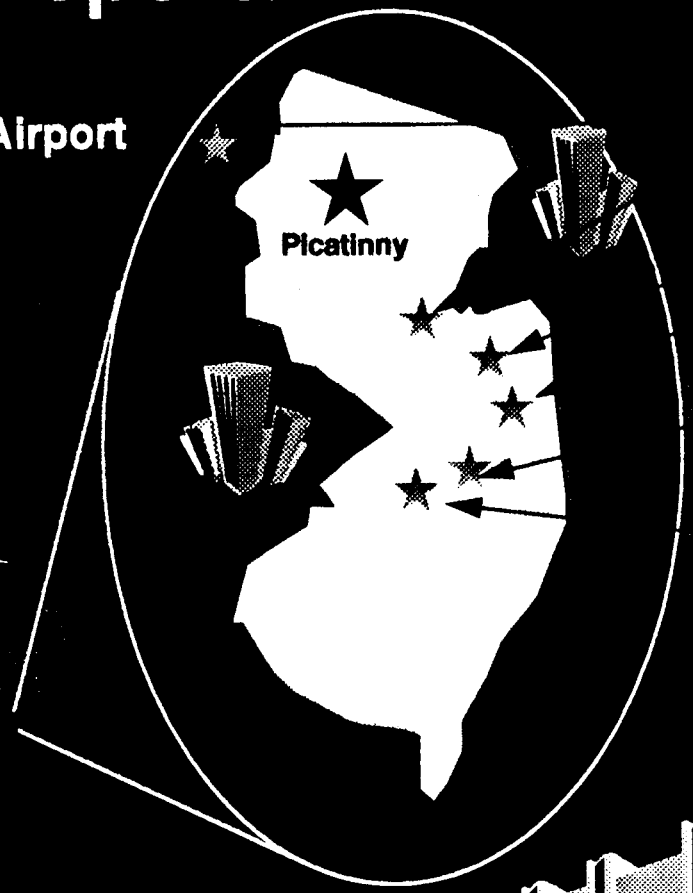
Strategic Location: Bases & Transportation

Rail / Air Hubs

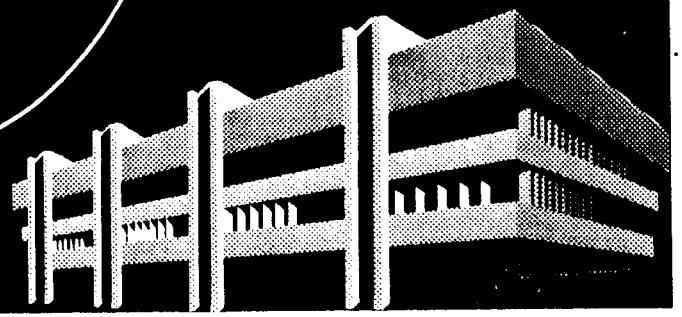
Allentown / Bethlehem Airport
JFK Airport
LaGuardia Airport
Newark Airport
Philadelphia Airport

Philadelphia, New York, Newark Rail Stations



Bases

Tobyhanna Army Depot
Military Traffic Command (East)
Fort Monmouth
Earle Naval Weapons Station
Lakehurst Naval Air Engineering Station
McGuire AFB



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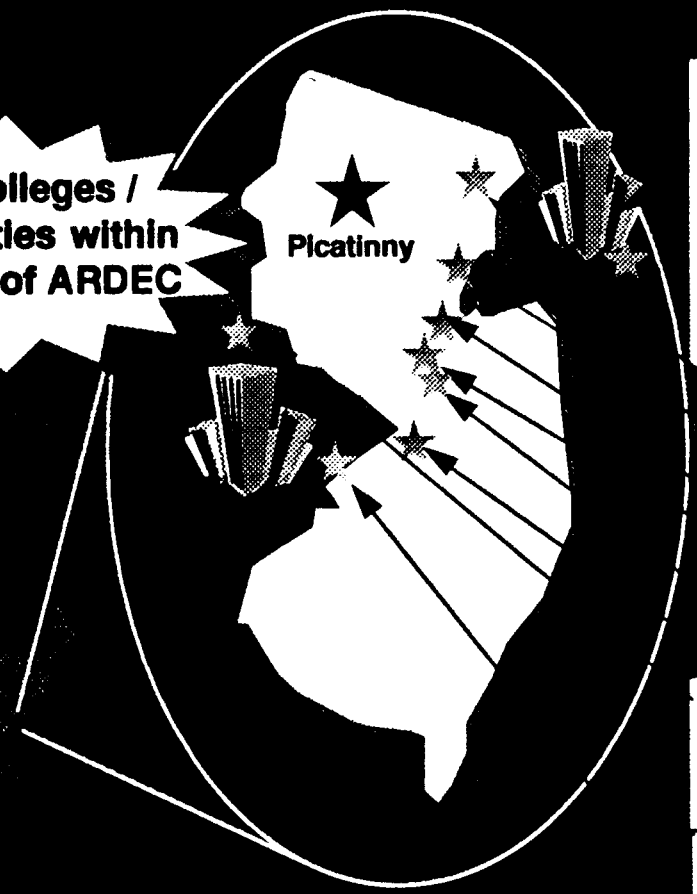
Strategic Location: Business & Academia

Business

- Bell Labs
- Exxon
- Allied Signal
- AT&T
- BASF
- MERCK
- Hoffman-LaRoche
- Warner-Lambert
- Johnson & Johnson
- Ciba-Geigy

111 Colleges / Universities within 50 Miles of ARDEC



Academia

- Manhattan
- Columbia
- Cooper Union
- CUNY
- St. Johns
- Polytechnic
- Farleigh Dickinson
- Stevens Institute
- NJ Institute of Tech
- Seton Hall University
- Rutgers University
- Princeton University
- Lehigh University
- Lafayette College
- Univ. of Scranton
- Villanova University
- Temple
- University of Penn
- Drexel

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ARDEC's Functions

Maintain Strong Technology Base

Conduct Development / Product Improvement

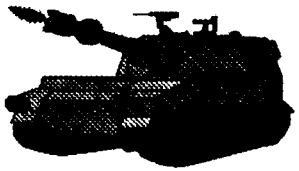
Support Production / Fielding

Provide Life-Cycle Engineering Support

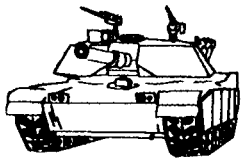
FOR

Air Defense Guns

Fire Support



Mounted Operations



Special Op Forces

Combat Service Support

Aviation Armament

Dismounted Operations

Insert Rifle Picture

Mobility / Counter

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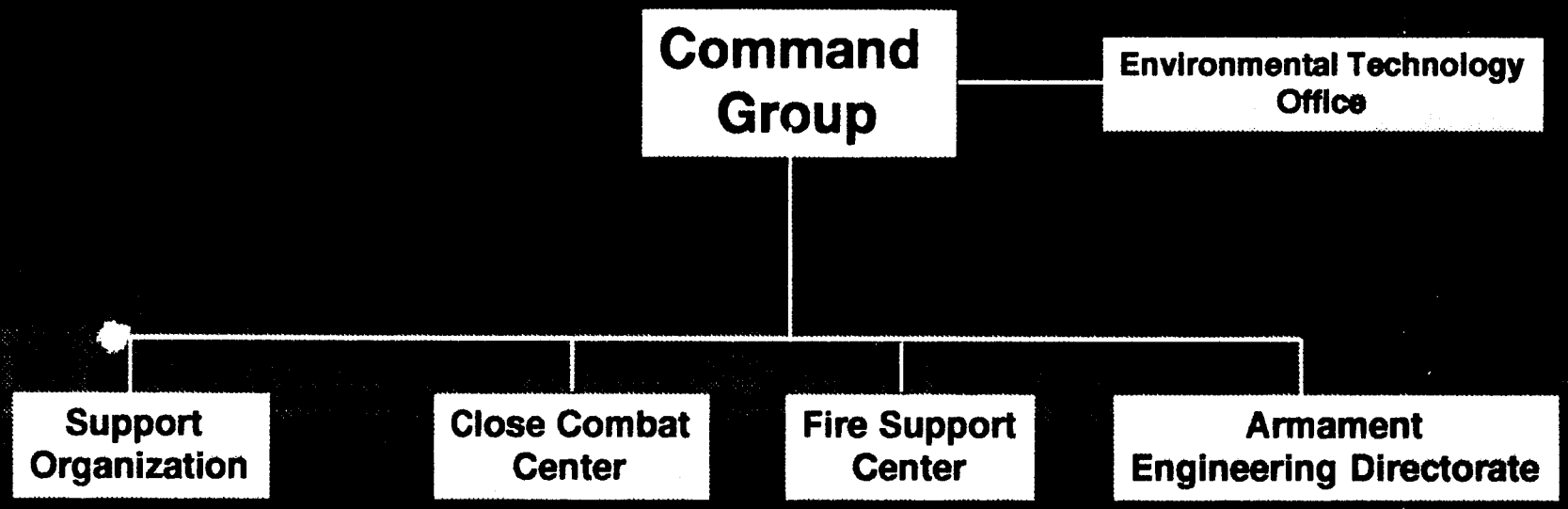
Organizational Chart



PEO Fire Support
- PM AFAS / FARV
- PM Paladin / FAASV
- PM SADARM

PEO ASM
- PM TMAS
- PM Mines & Demolition
- PM Abrams
- PM Bradley
- PM AGS
- PM Survivability Systems
- PM combat Mobility Systems

AMC Product Managers
- PM Mortars
- PM Small Arms
- PM Fuzes
- PM Ammolog

BRAC / Organizational Impact

- BRAC 91 - 30 People from HDL Fuze Division Transferred to ARDEC

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ARDEC's Customers

Major Subordinate Commands

IOC | TACOM | MICOM
CECOM ATCOM

PEO Program / Project / Product Managers

23 PMs supported, Including...
PM AFAS / FARV
PM TMAS
PM SADARM
PM Mines / Countermines

Also Support AMC PMs, Including...
PM Mortars
PM Small Arms

Other Services / Agencies

Navy, Air Force, Marines
ARPA, BMDO, DLA

ARDEC

Provide Support to Soldiers in the Field
Provide Matrix Support to PEO/PMs
Conduct Armament R&D for TACOM
Provide Production & Engineering Support to IOC
Provide Gun Armament R&D for all Services
Provide Engineering & Tech Transfer Support to Industry

CINCs

FAST Advisors

Govt. Production Plants & Arsenals

Including...
Iowa, Radford, Lake City, Holston, Milan, Lone Star

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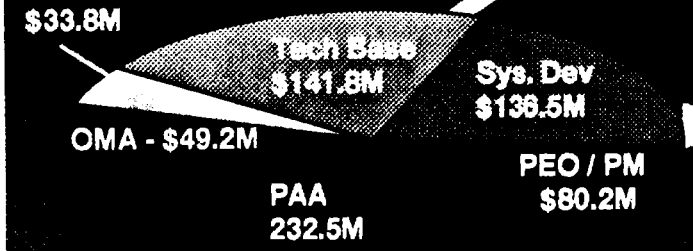
ARDEC Program

FY94 Project Funding Profile



Total: $674M

Picatinny Program FY 94
Total: $1.24B

Includes...

- ARDEC
- PEO Field Artillery System
- PEO Armored Sys Modernization
- AMC PM's
- Production Base Modernization
- Activity (PBMA)

Tech Base Projects
81 Projects, including...

RFPI
- Precision Guided Mortar Munition
- Advanced Sub-Munition Sensor Technology
- Intelligent Minefield
- Advanced Towed Cannon System

- Energetic Materials / Warheads
- Electric Gun Technology

AMC PMs / ARDEC / ARDEC PMs Development Projects
82 Projects, including...

- Soldier Enhancement Programs
- Bunker Defeat Munition
- Mortar Ballistics Computer , M23E1
- Ctg., 105mm, DPICM, XM915 / XM916
- 120mm Mortar Full Range Training Rnd, XM931

System Development Projects - PEO / PM,
38 Projects, including...

- Paladin
- SADARM
- AEI
- Family of Wide Area Mines
- AFAS / FARV
- X-Rod
- STAFF

Projects Supporting Production
162 Projects, including...

- Paladin
- 120mm Mortar System
- Volcano Mine System
- 155mm Ammunition

ARDEC's Jointness - FY93

Development

JSSAP - 8 (ALL)
Soldier Enhancement Prog - 22 (USMC)
MK-19 GMC - 7 (USMC/AF)
Tank Ammunition - 4 (USMC)
Bunker Defeat Munition (USMC/SOCOM)
105mm DPICM (USMC)
Cannon Caliber E-Gun (USMC)
Lt. Wt. 155mm Towed Howitzer (USMC)
Insensitive Energetics (ALL)
Ammo Packaging (ALL)
Mortar Ballistics Computer (USMC)
Modern Demolition Initiators (SOCOM)
Penetration Augmented Munition (SOCOM)
SLAM (SOCOM)
RAAWS (SOCOM)
Taggant for Plastic Explosives (All)

Acquisition

Initial Procurement of All Developed Guns & Ammo (All)

Engineering Support for All Procurements by SMCA:
- Ammunition - 155
- Weapons / other - 13

Field Support

Life Cycle Engineering Support for Over 1,000 Gun and Ammo Systems (All Services)

Environmental
Manage DoD's National Defense Center for Environmental Excellence

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Program Examples by Life Cycle Phase

MS 0	MS I	MS II	MS III	MS IV
Concept Exploration & Definition	Demonstration and Validation	Engineering & Manufacturing Development	Production & Deployment	Operations & Support 1511 Fielded Items Supported
81 Tech Base Programs	120 Engineering Development Programs		Since 1982 244 Items TC'ed	90% of Conventional Army Lethality

Adv. Sub. Sens. Tech.
Intel Mine Field
Prec Guid Mtr Mun
Lt. Wt. 155 Howitzer
Competent Munitions
HICAP
ERA Projectile
HERA Mortar
EM Launcher
HIPAS
Digitized Mortar FC
Energetic Material & EFP / Warheads

SADARM
AFAS
FARV
STAFF
X-ROD
XM 915/916
M2/3 Bradley
AGS
ATAS
WAM
SLAM
MOFA

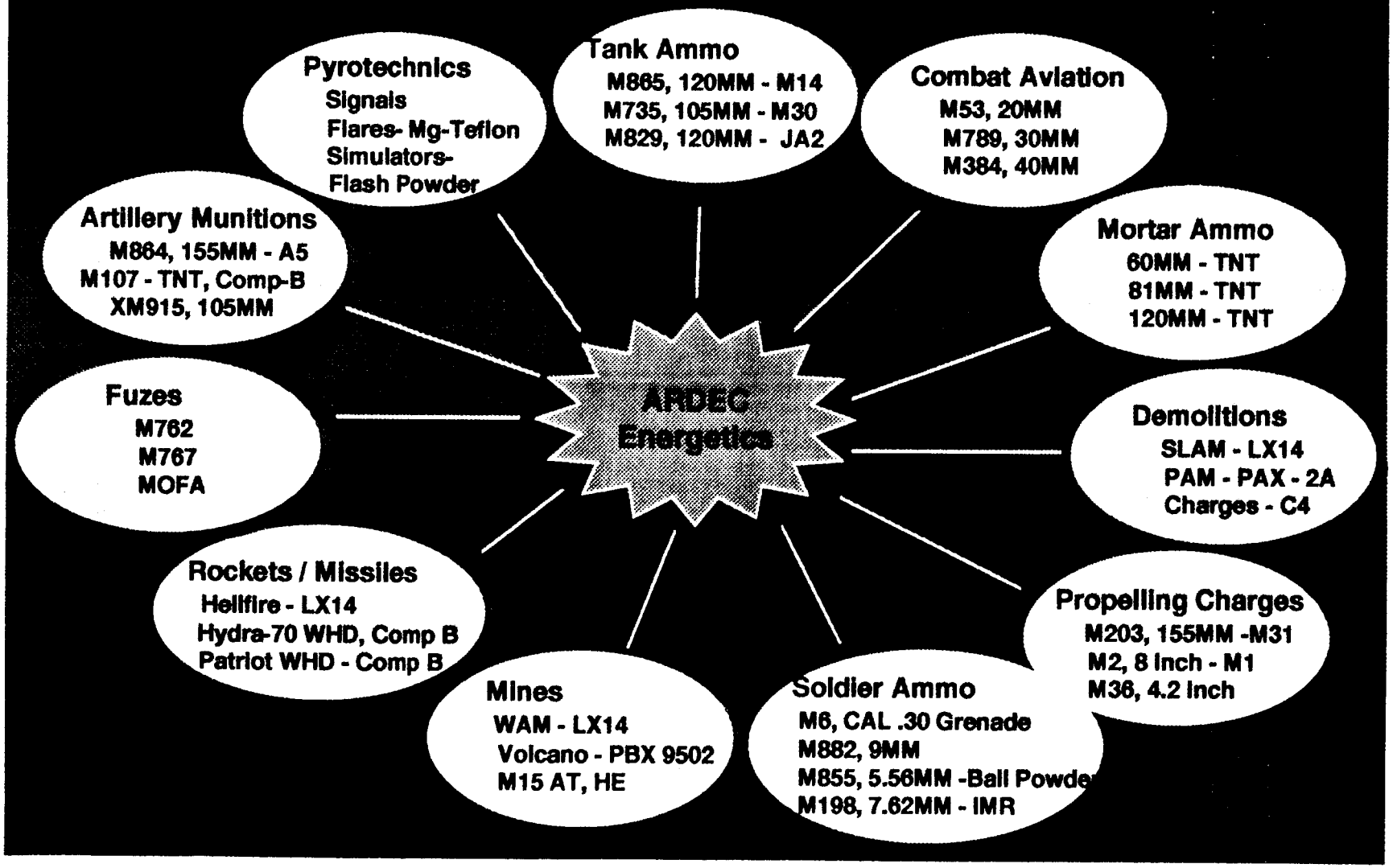
5.56mm / 7.62 Weapons / Ammo
50 Cal Weapons / Ammo
20mm PIVADS
25mm Weapon / Ammo Systems
30mm Weapon / Ammo Systems
Signals / Flares
Target Hit Simulators
Fuzes
Fire Control Systems
Binoculars
Mines & Mine Systems
Special Ops Forces Items
2.75 Inch Rocket Warheads
Mortar Systems
105mm / 120mm Tank Systems
105mm / 155mm Artillery Systems
155mm SP Howitzer - Paladin
8 Inch Nuclear Projectile

Since 1982, 180 Items Fielded

Desert Storm
155mm DPICM M864
60mm / 81mm Illum Mortar Rounds
155mm Artillery Ammo
105mm Tank Ammo
120mm Tank Ammo
Pursuit Deterrent Munition
MK19 Grenade Machine Gun
PATRIOT M143E1 S&A Device

More Recent Fieldings
81mm/120mm Mortar Systems
Tank Ammunition Packaging
Artillery Ammunition Packaging
105mm Light Howitzer - M119
VOLCANO Mine System
2.75 Inch Rocket Warheads

ARDEC Energetics



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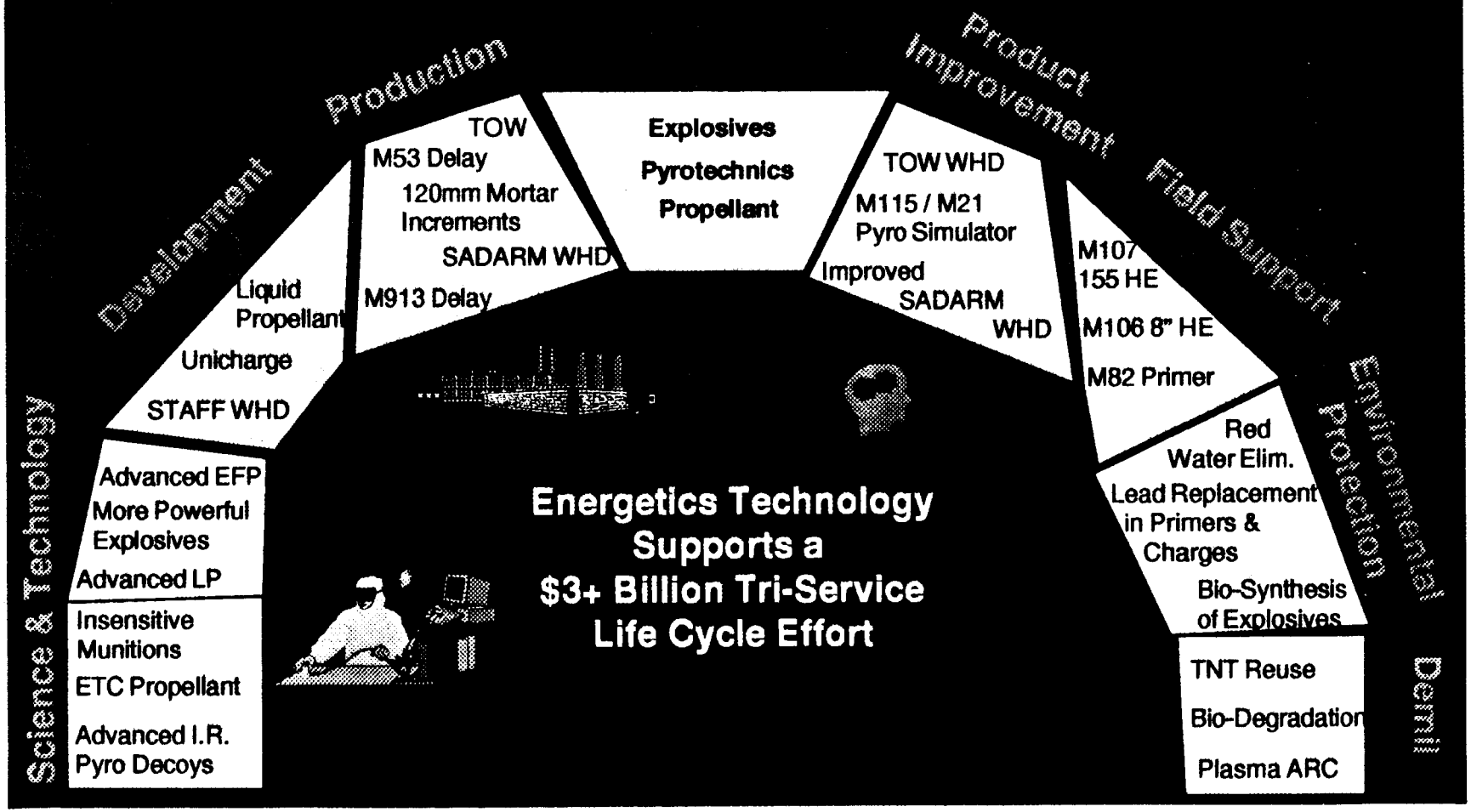
Energetics - Fundamental to Soldier's Warfighting Capability



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ARDEC Teaming with Ammunition / Energetics Plants / Industries & Universities

Industries

Alliant
Textron
Aerojet
Physics International
Hercules
Thiokol
Talley
Olin

Laboratories

ARL
LLNL
LANL

ARDEC

MICOM

Universities

IAT
Univ of Chicago
New Orleans
Ohio State
NDCEE
Lehigh
Stevens
NJIT
Princeton

Plants

Iowa
Lake City
Crane
McAllester
Milan
Radford
Holston
Pine Bluff
Lone Star

Scranton
Ravenna
Volunteer
Mississippi
Louisiana
Longhorn
Kansas
Sunflower
Cornhusker
Twin Cities
Badger
Joliete
Newport
Indiana

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Ammunition / Energetics Workyears

	Gov't	FFRDC Off-Site	Contractor On-Site	Contractor Off-Site	Total
➢ ARDEC – Defining, Developing, Acquiring and sustaining Superior Guns & Ammunition / Energetics	3,444	60	114	1,388	5,006
➢ PEO Field Artillery Systems – Responsible for Managing, Directing and Controlling all Tasks and Designated Associated Resources for a Major Portion of field Artillery Systems for Department of the Army	90	--	6	2,208	2,304
➢ PEO Armored Systems Modernization – Responsible for Managing Development, Acquisition, Fielding, and Support of Assigned Combat Vehicles / Systems / Programs and Ancillary Equipment	61	--	4	1,221	1,286
➢ AMCCOM/Single Manager f/ Conv Ammo – Responsible for Munitions Production Base and Execution of the Single Manager for Conventional Munitions Mission	2,817	--	7,169	6,649	16,635
[illegible]	6,412	60	7,293	11,466	25,231

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ARDEC's Key Assets

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A Skilled Workforce

Officers	39
Enlisted	23
Civilians	4378
S&E's	2033
Bachelors	1746
Masters	763
Doctorates	105

Men	72%
Women	28%
Minorities	16%
Handicapped	9%

Army Acquisition Corps

Civilian	313
Military	33

Official Recognition of Quality People

Center of Excellence
ARDEC in Top 5, 6 Out of Last 8 Years
Army R&D Achievement Awards: 24
ADPA Firepower Technical Awards
ASTM Awards of Merit
ADPA Moseley Awards for Value Engineering
DOD Manufacturing Technology Award
15 Papers Presented @Army Science Conference
Secretary of the Army Awards for Outstanding Achievement in Materiel Acquisition
Secretary of the Army "Top Suggester"
NJ Federal Executive Board Awards
Patent Applications:19 / Issued: 14
Recipient of Vice President Gore's NPR Hammer Award

Enhanced Learning Environment

ARDEC Training Program is...

Preparing Next Generation by...

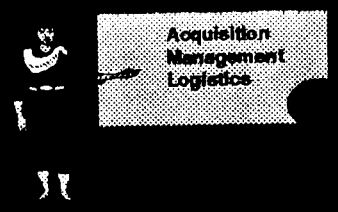
...focusing training on core competencies

...capturing ARDEC's corporate knowledge base,

...accelerating learning curve,

...enhancing continuous learning environment,

...establishing working friendships.



Training Program Consists of...

Stevens Institute of Tech
Polytechnic University
Florida Institute of Tech
New Jersey Institute of Tech
Lehigh University
American Institute Chem Eng.

Materiel Acquisition Management
Integrated Logistics Support
Producibility Planning
Quality Assurance
Configuration Management
Procurement
Armament Technology
Systems Analysis
Weapons & Tactics

Mandatory
700 Hours Training
In Core Skills
Required Advance
At ARDEC

Focused
Training on
Core Competencies

Combat
Developer

Materiel
Developer

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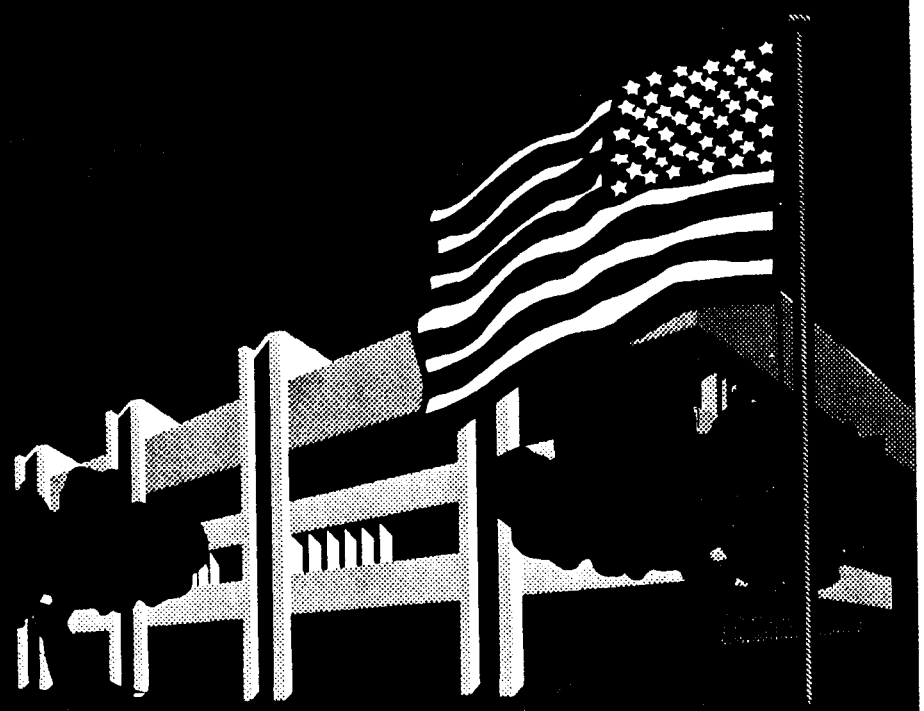
Total Community Quality of Life

- 1994 Army Community of Excellence Award
  - DA Most Improved Installation - Honorable Mention
- Fit To Win Wellness Program
  - Received FY94 OPM Directors Award for Outstanding Health Program
- Facility Improvements
  - Child Care Center
  - Teen Center
  - School Age Latch Key
  - On-Post Housing Upgraded
  - Gymnasium
  - Officer's Club
- Commissary / PX



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Modern Energetic Facilities

- Explosive Processing & Loading Facility
- Propellant Experimental Facility
- Pyrotechnic Experimental Facility
- Energetics Laboratories Built in 1980's
- Explosive Development Facility Built in 1990's
- Advanced Armament Technical Facility Built in 1990's
- Propellant Surveillance Facility Built in 1990'a
- Advanced Warhead Development Facility Built in 1990's

Current Value of Facilities: $135 Million

Support Facilities - Value: $800 Million

Incinerator for destruction of energetics Built in 1990s
Fabrication Facility
Rapid Prototyping Laboratory
Gun Testing & Warhead Laboratory
Radiological Analysis & Development Facility

Army Ammunition Plants - Value: 15.6 Billion

Holston
Radford
Milan
Lake City
Crane
Iowa
Lone Star
Pine Bluff
McAllister

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Picatinny Site Map

6,493 Acres

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Energetic Laboratory Facilities

- Built in 1980's with Special Safety Features for Handling Energetic Materials (e.g. Explosive Proof Hoods with Blow Out Walls).
- Equipped with Modern Instruments Including:
  - Laser Spectroscopy
  - Nuclear Magnetic Resonance Spectroscopy
  - Visible, UV, and IR Spectroscopy
  - Fourier Transform Spectroscopy
  - High Pressure Liquid Chromatography
  - Atomic Force Microscopy
  - Electron Spectroscopy for Chemical Analysis (ESCA)
  - Electron Microscopy
  - Electron Paramagnetic Resonance
  - Mass Spectroscopy (MS)
  - Gas Chromatography (GC)
  - GC-MS
  - etc.

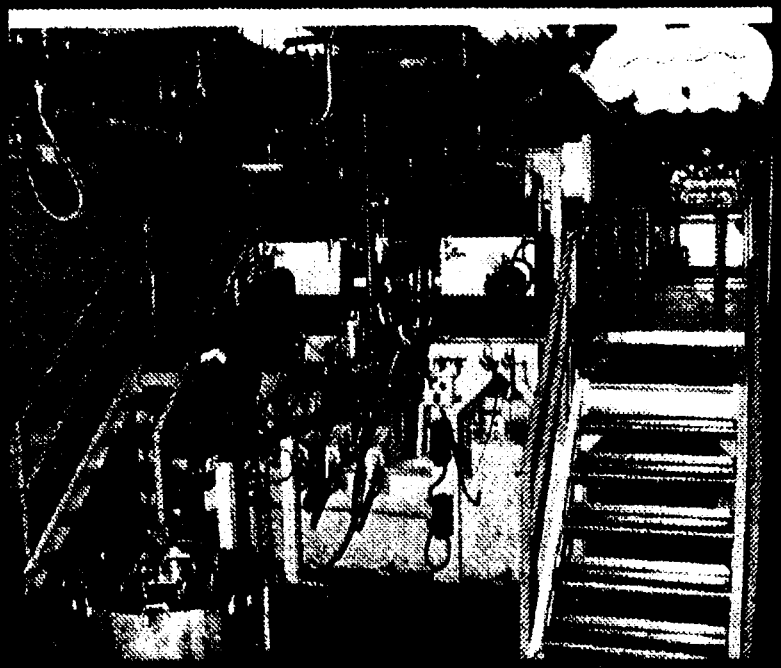
Energetic Material Demonstration Module Facility

- Used to Scale Up Energetic Materials Synthesized in the Laboratory (grams) to Quantities (50-100lbs) Sufficient for Formulating the Materials Into Propellant / Explosives for Testing in End Items.
- Used to Optimize Synthesis Process for an Energetic Materials on a Pilot Scale

FOUO

Gun Propellant Experimental Facility

- Permits Formulation of New Propulsion Concepts and Their Quick Transition to Development Because of Flexibility and Range of Software / Equipment which includes:
  - Thermochemistry Software
    - Laboratory Formulation
    - Closed Bomb Ballistic Evaluation
    - Ballistic Calculations software
  - Fluid Energy Mill Grinding of Energetic Materials to a Desired Particle Size
  - Formulation of Up to 100lbs of Propellant - STD Technique
  - State of the Art Twin Screw Extrusion (Picture)
  - Sensitivity Testing of Formulations



FOUO

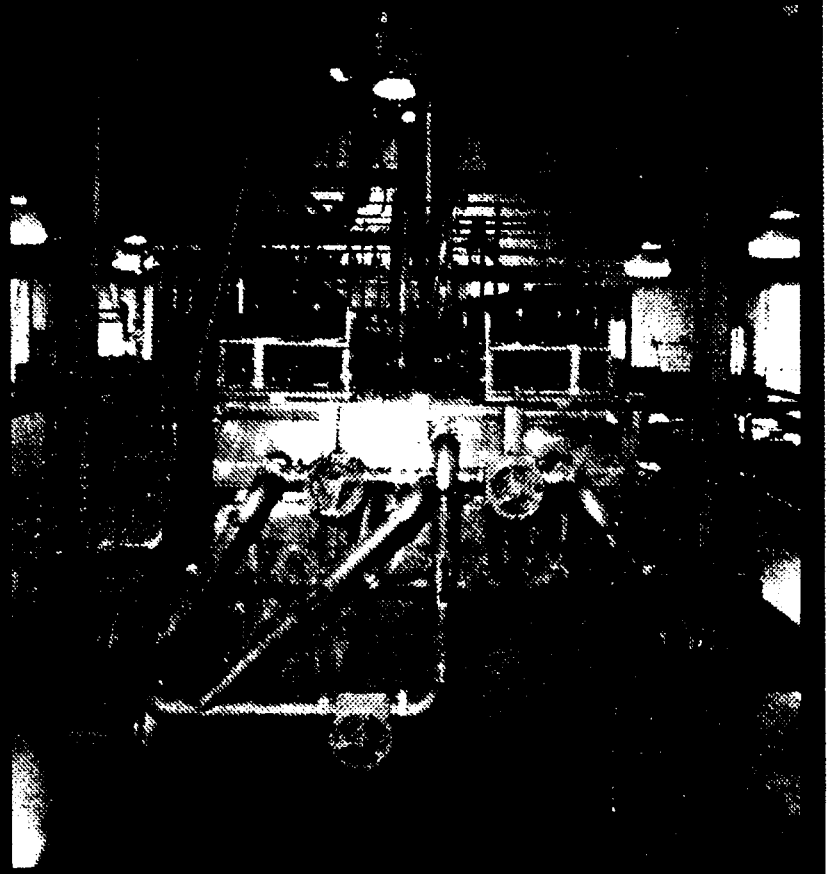
Ballistic R&D Area

- Ballistic Firing of Conventional & Experimental Munitions and Weapon Systems From 5.56MM Through 8"
- Data Evaluation in Real Time Includes (Data Evaluated as Round is Fired)
  - Pressure vs. Time
  - Muzzle Velocity
  - Real time Imagery
  - Acceleration
  - Stress / Strain
  - Muzzle Flash Evaluation
- Facilities for Loading Propelling Charges
- Service Magazines For Storage
- Temperature Conditioning Chambers

FOUO

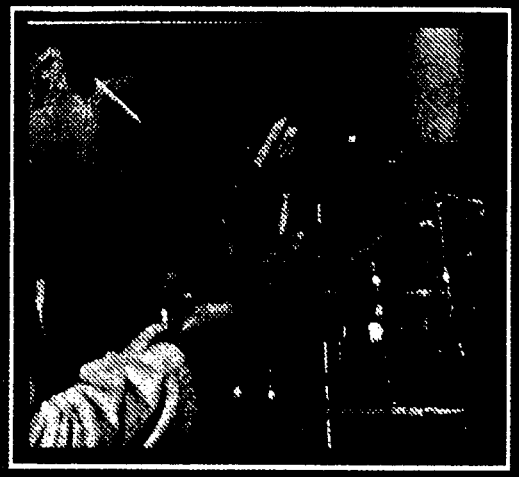
Energetic Material reclamation / Processing R&D Facilities

- Unique Construction
  - Blow Out Walls
  - Safety Distances (Interior & Exterior)
  - High Explosive Limit: 3500lbs of Class 1.1 Explosive
- Unique Equipment
  - Blow Out Plugs
  - Automatic Shut Down
  - Vapor Collection to Meet Clean Air Act
- Programs
  - Pink Water Treatment (TNT Issue)
  - High Explosive Wash Out
  - Melt Pour Castable Explosives



FOUO

Equipment Replacement Value



Estimated Cost to Replace Equipment: $935 Million

Plant Replacement Value: $15.5 Billion

Based on IRAC Audited Data Call for Joint Cross - Service Working Group for Labs

ARDEC - Physical Plant - FY97

Land

Total (Acres)	6,493
Buildable (Acres)	4,034
2 Lakes (Acres)	308
Wet Lands	1,183

Approximately 505 forested

Total Permanent Facilities (SF)

Operations / Admin	1,224,000
Research / Dev	1,338,000
Housing	181,004

FY97 Expansion Potential

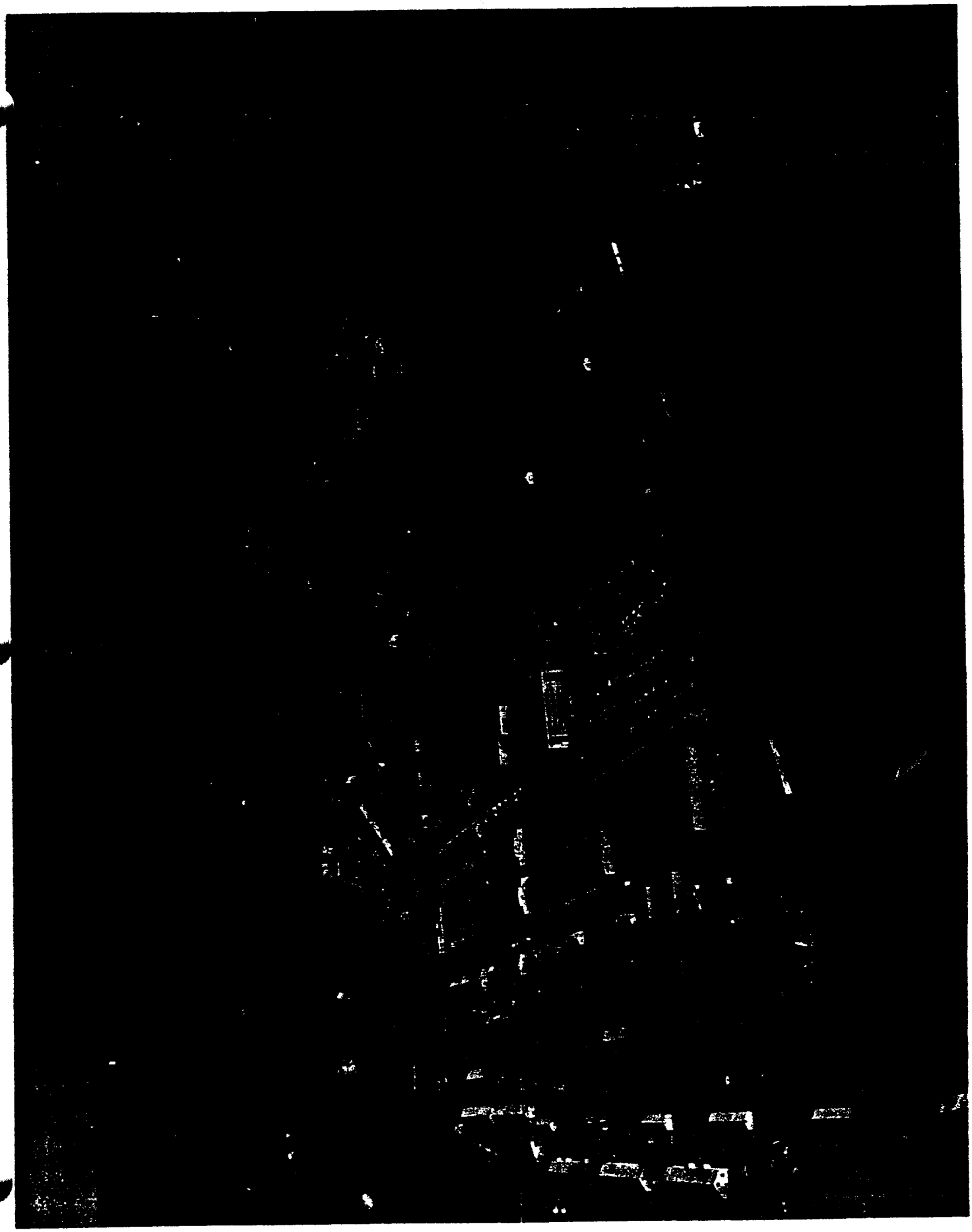
Available Laboratory Space (SF)	366,000
Available Operations / Admin (SF)	100,640
Available Land for Eng / Admin Expansion (Acres)	3070
Available Land for Housing Expansion (Acres)	286

Recognized as the 1994 Community of Excellence

$130+M Invested in Building Modernization in the Last 10 Years

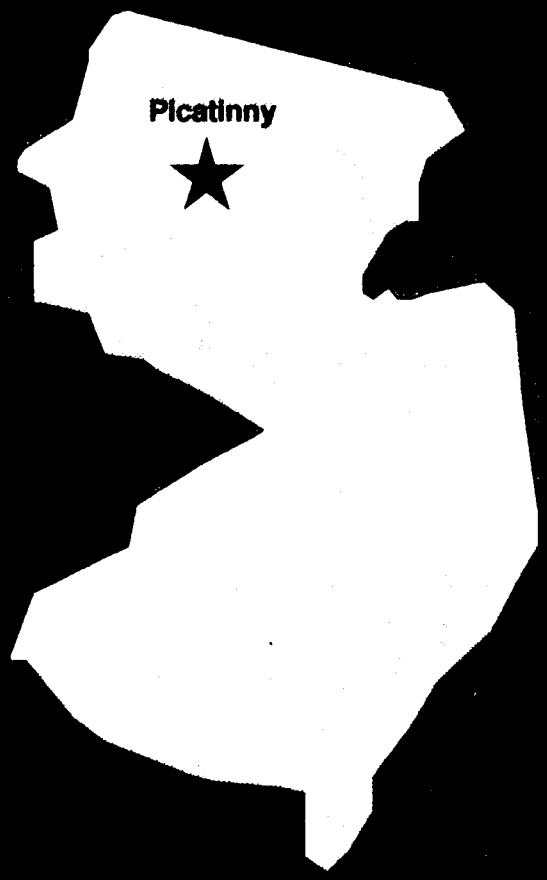
Laboratory and Professional Workspace Modernization

FOUO



Summary

- Energetics is the Basic ARDEC Business Involved in All Aspects of the Life Cycle
  - All Army Muniton System (90% of Conventional Army Lethality)
  - Tactical Missile Warheads
- Joint Service Efforts
  - JDL / Reliance
  - JSSAP / Others
- Strong Teaming to Industrial, Government & Academic Organizations Throughout the World
- Postured for the Future
  - Extensive Expansion Capabilities
  - First Class Training
  - Modern Facilities & Equipment
  - Excellant community Quality of Life



FOUO

F. ANTI-ARMOR WARHEAD CAPABILITY

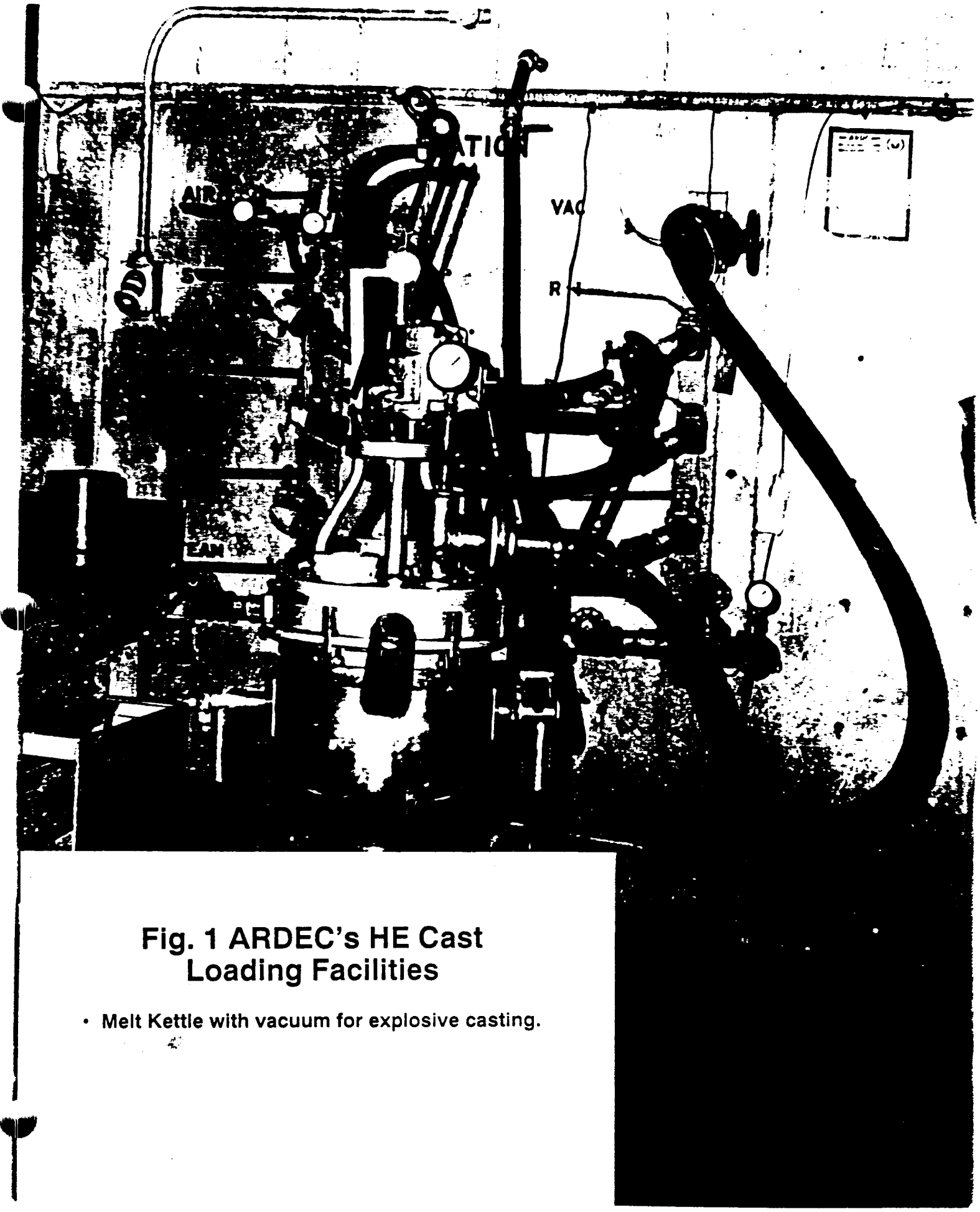


Fig. 1 ARDEC's HE Cast Loading Facilities

- Melt Kettle with vacuum for explosive casting.

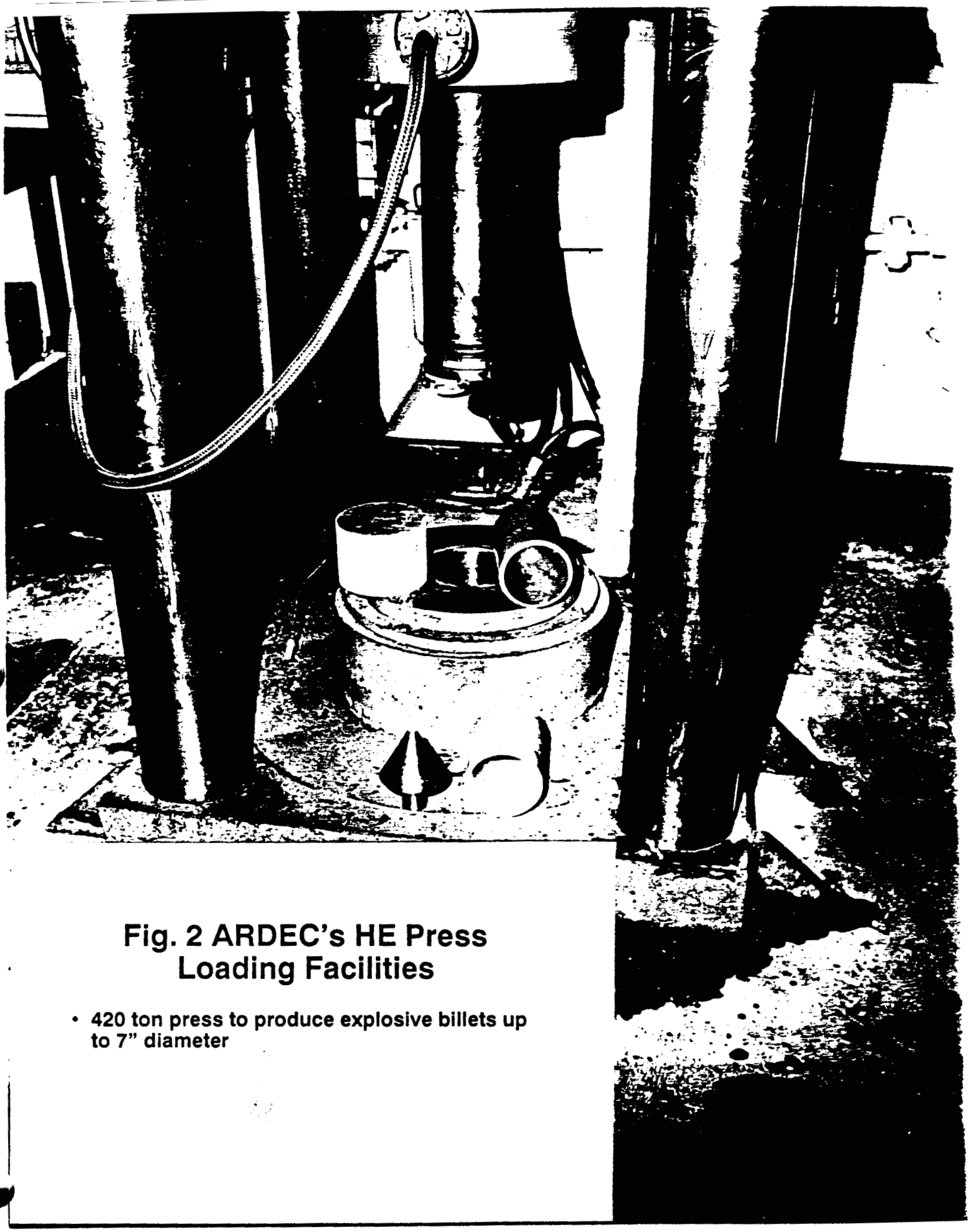
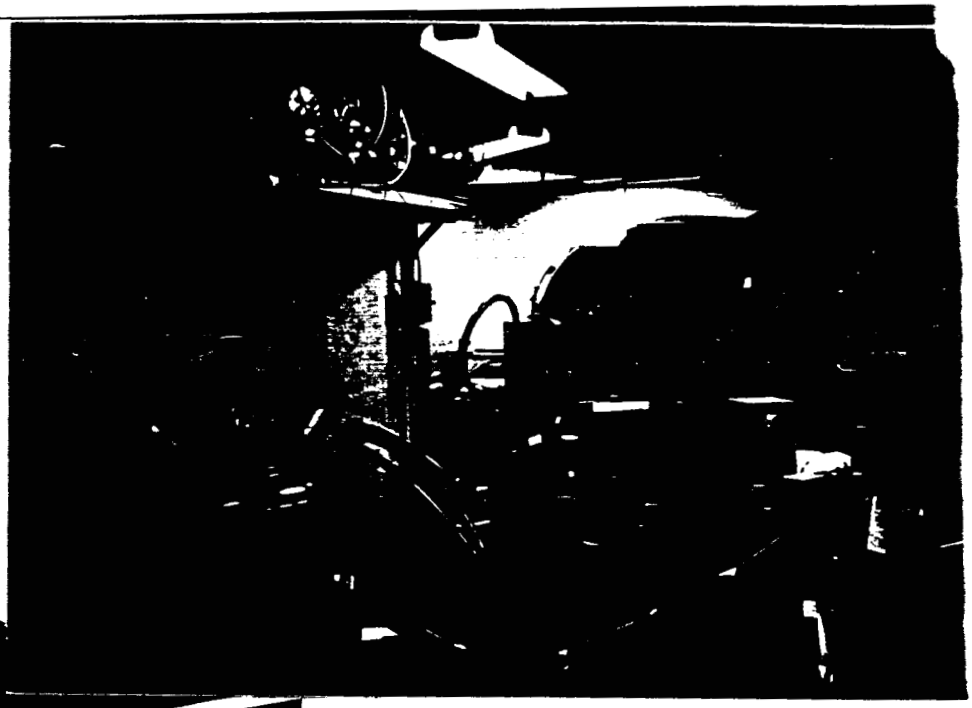
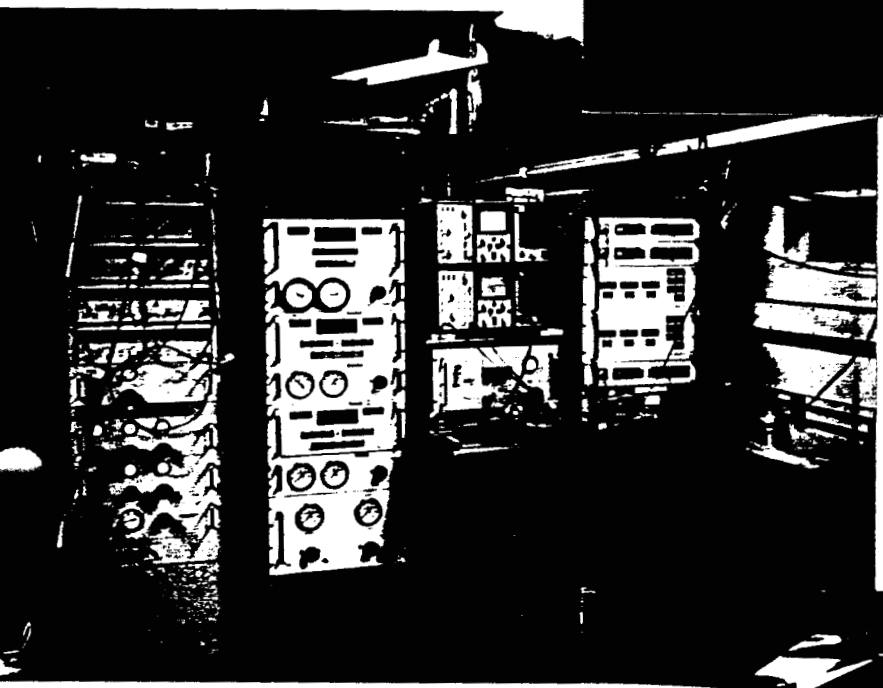
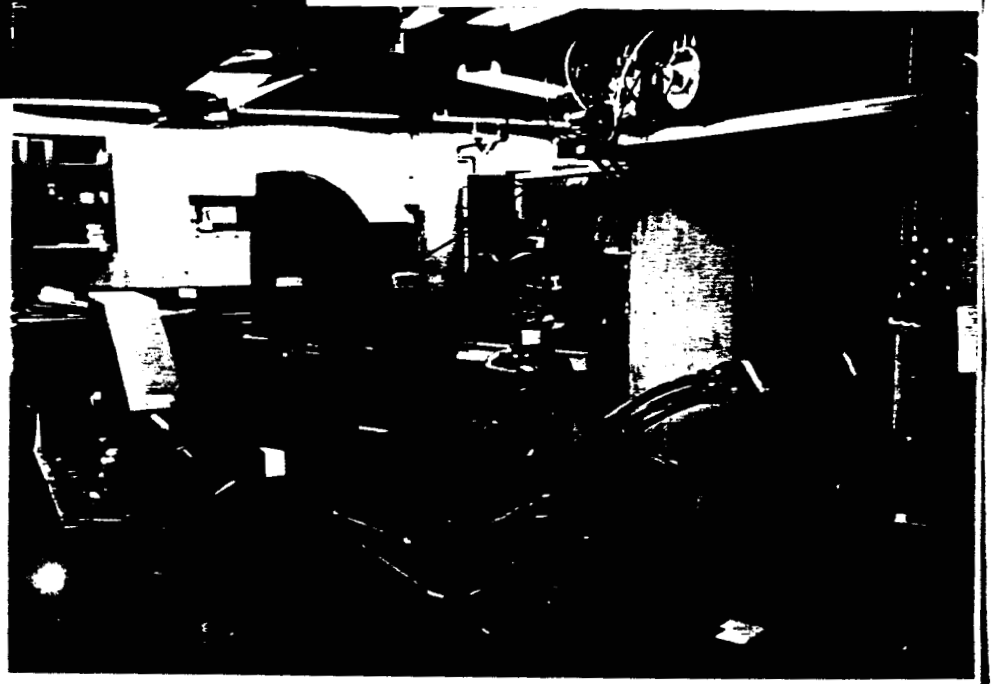


Fig. 2 ARDEC's HE Press Loading Facilities

- 420 ton press to produce explosive billets up to 7" diameter

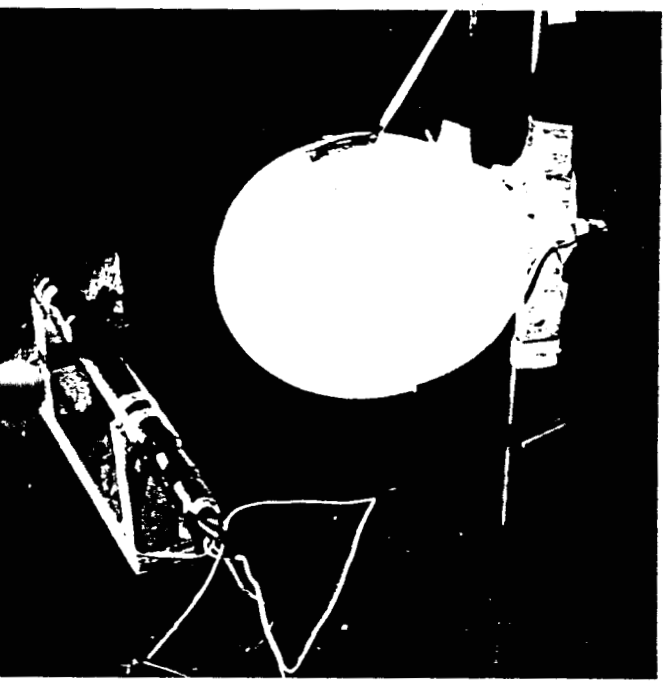


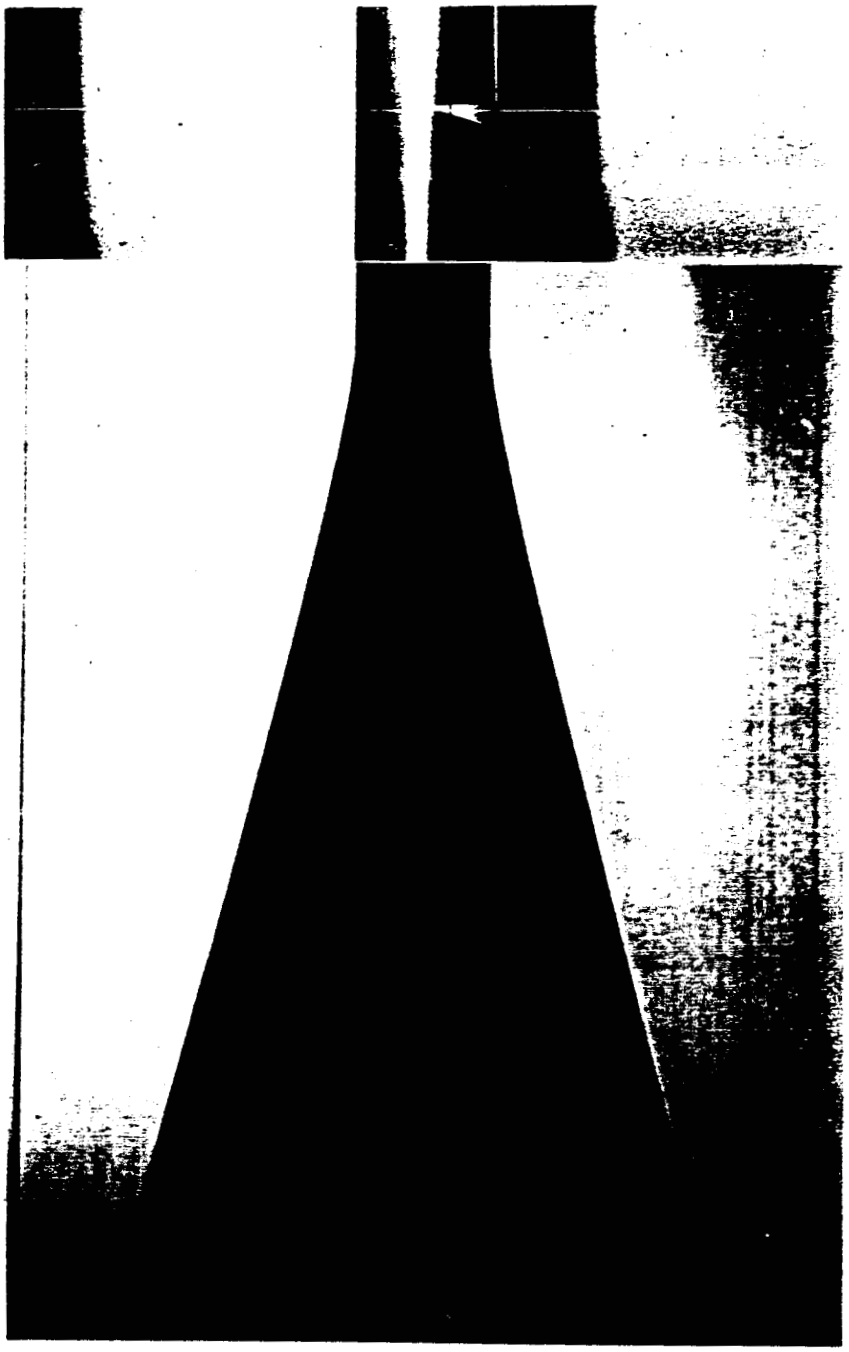




Explosives/ Warheads Testing Facilities

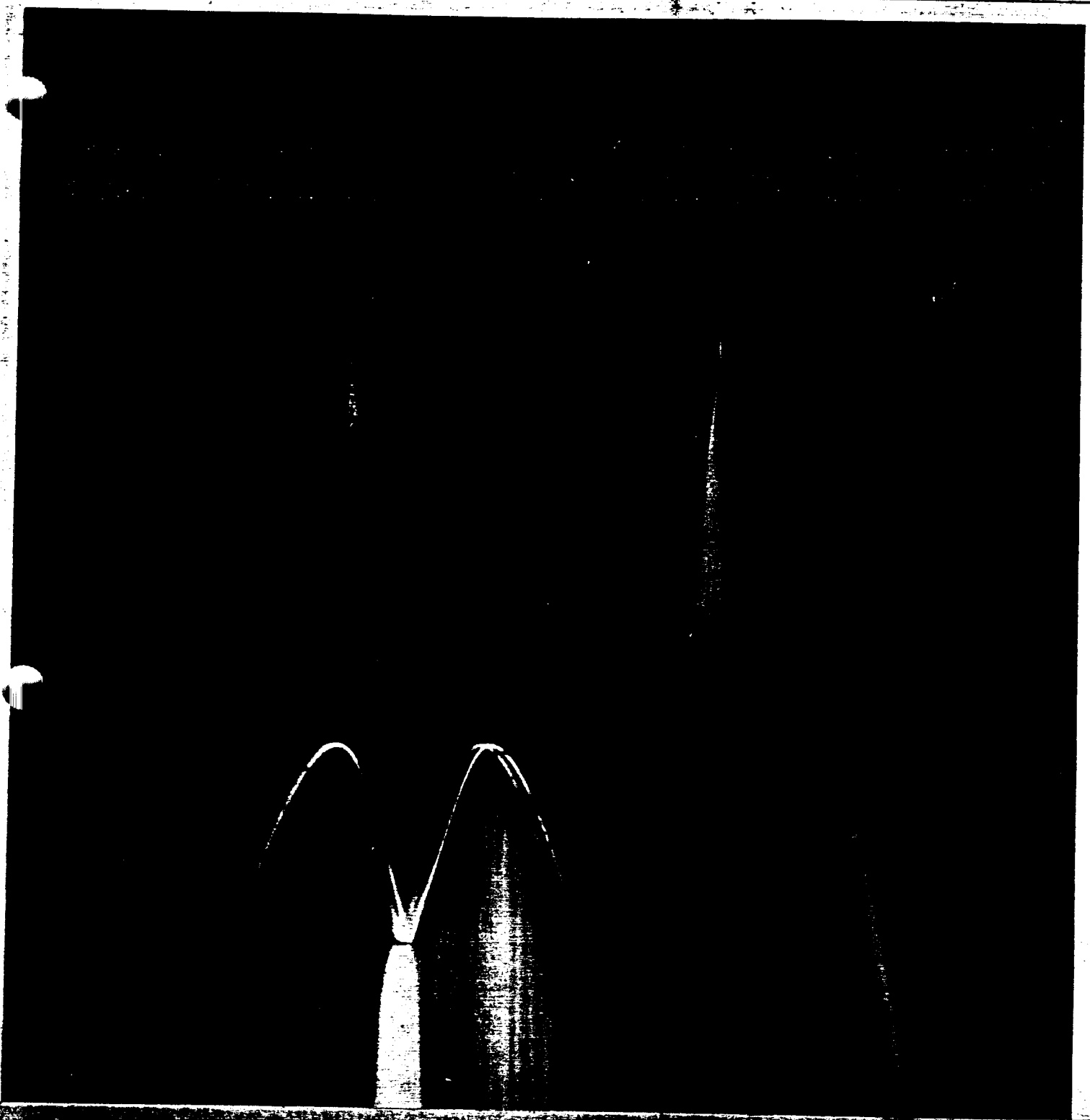
The 1600 test site is well equipped with modern instrumentation. This includes: two test chambers, 300 and 150 Kv flash radiographic systems, three ultra high speed rotating mirror cameras, high speed oscilloscopes, and environmental chambers.





Cylinder Expansion Test

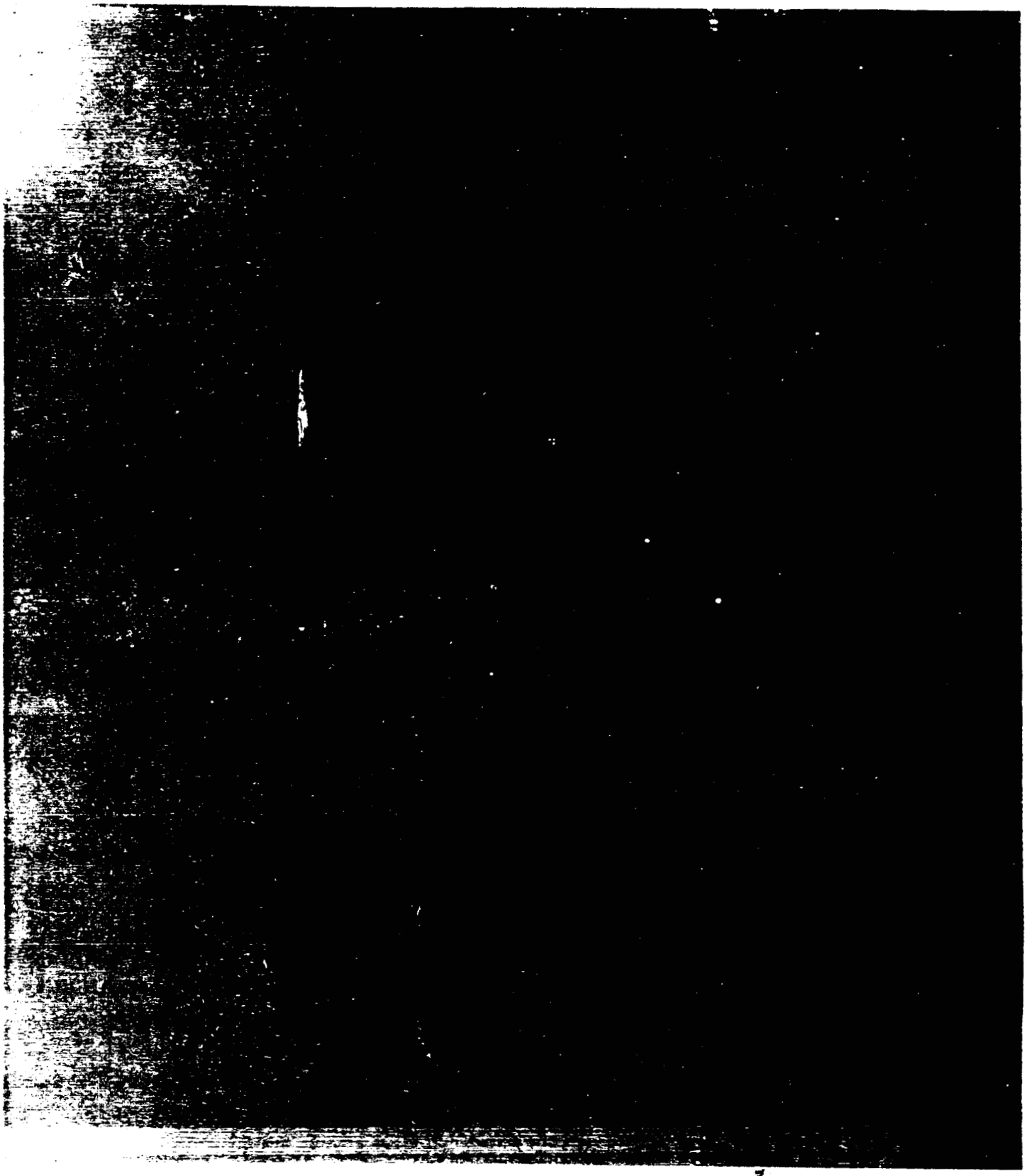
This test measures the ability of an explosive to propel metal at high velocities. ARDEC has developed a modified method of testing and analysis that utilizes less than half the explosive. The smaller sample size allows warhead performance data to be obtained sooner in development. Costs savings are achieved by the early down selection of promising materials.



Shaped Charge Diagnostics

Streak camera record of the detonation wave profile at the base of a truncated TOW-2 explosive billet. A mirror on the right side to allows the recording of the detonation velocity.

Figure 5



Insensitive Munitions Test: Shaped Charge Initiating Propellant

Flash radiograph of a shaped charge jet penetrating a propellant bed. This shows the interactions needed to be understood in developing more insensitive munitions.

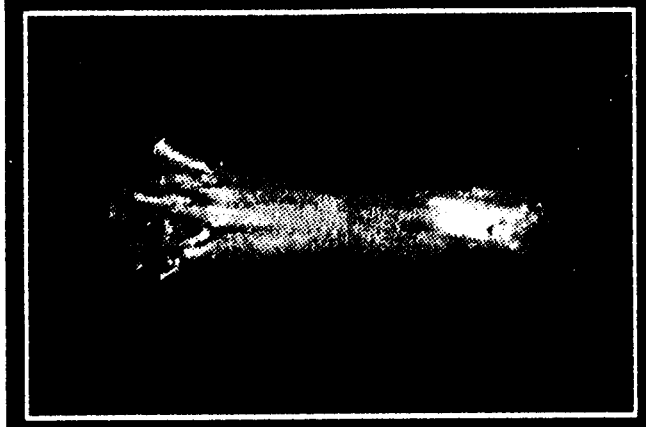
Figure 6

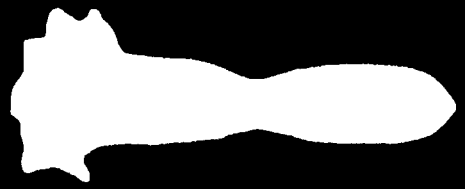
Fig. 8 ARDEC's Selectable/ Multi-Mode EFP Warhead (Aerostable EFP/Stretchy EFP Modes)

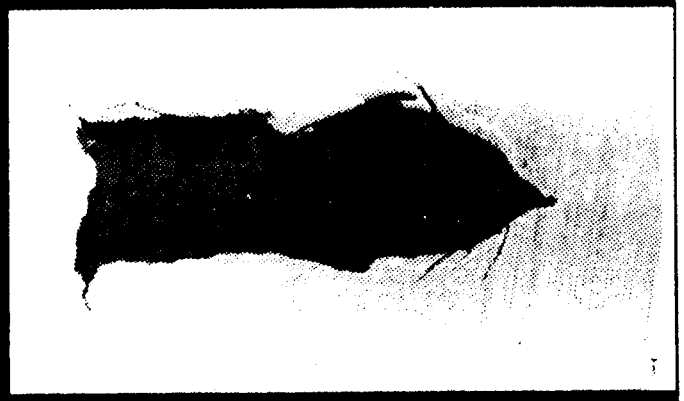
Innovative/Simple multi-mode EFP Warhead concept that produces three different kill mechanisms to defeat a wide range of targets. The warhead produces:

- 1. An Aerostable EFP when fired without grid in front to defeat heavy armor targets
- 2. Long Stretchy rod EFP when fired without grid and with multiple detonators in back of the warhead to defeat heavy Armor at short standoff

ARDEC's Multi-Mode/Selectable Warhead Aerostable and Stretchy EFP Mode







Aerostable EFP

Stretchy EFP

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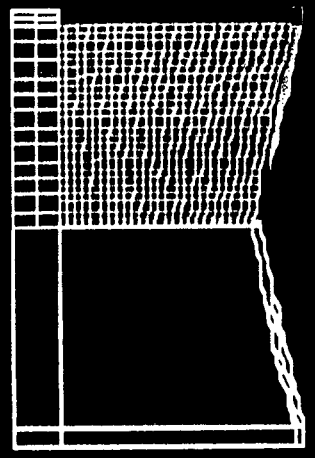
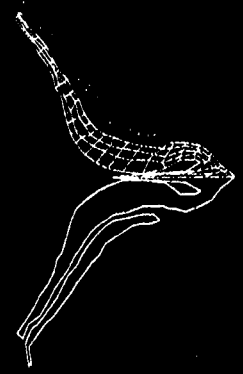
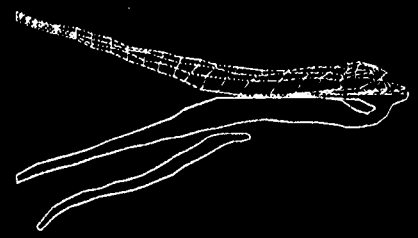
Fig. 9 ARDEC's Telescoping EFP Warhead

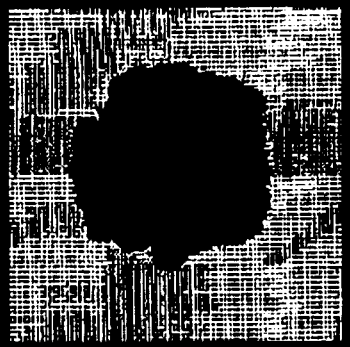
- Innovative warhead concept that uses two liners to produce a longer Aerostable EFP. The front liner (colored in blue) which forms the tail of the EFP has a hole in the center for the rear liner to come through to form the long rod. ARDEC has demonstrated 20% increased in penetration in a WAM warhead configuration

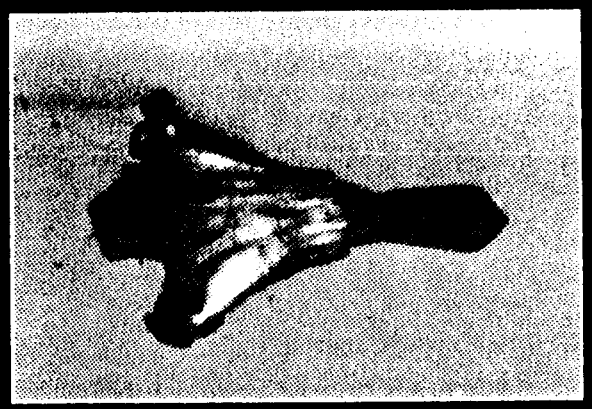
Telescoping EFP Warhead











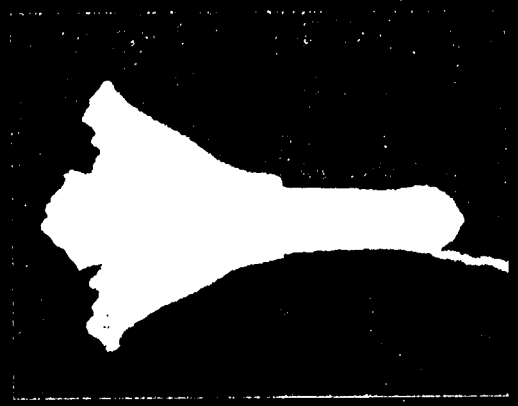


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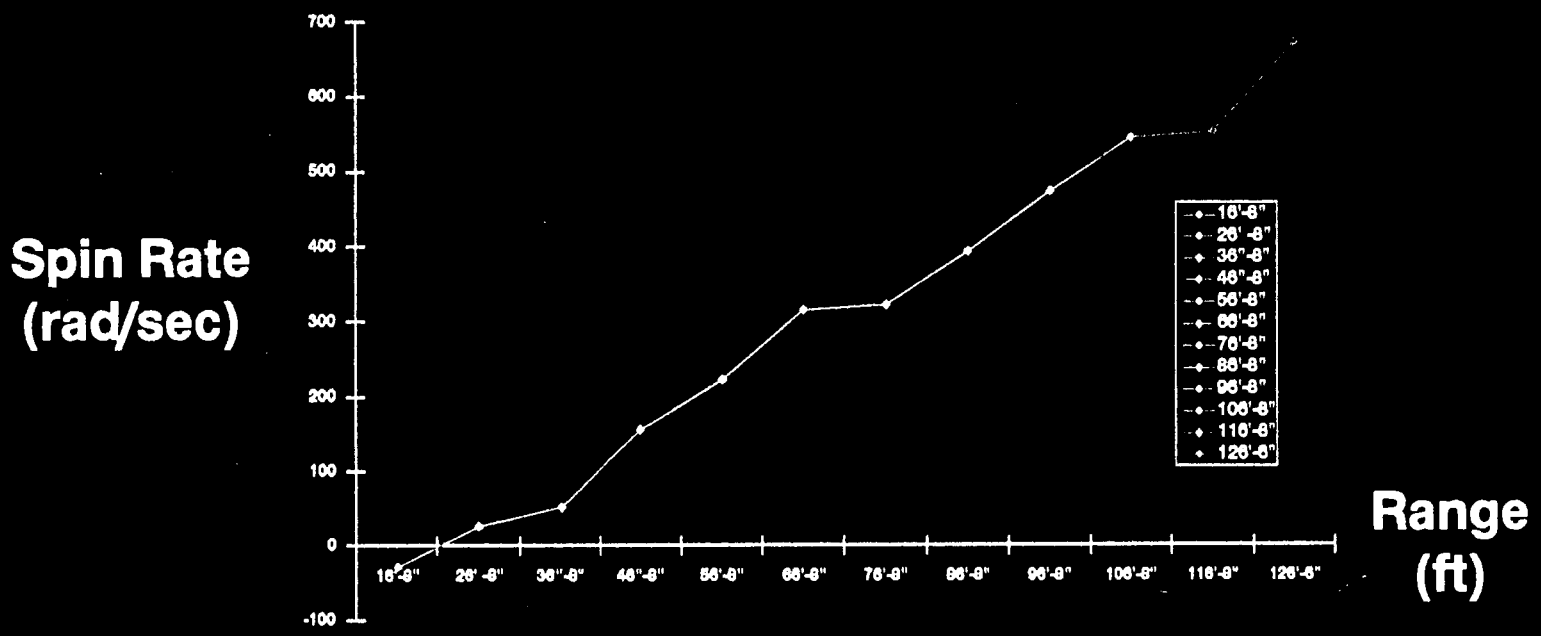
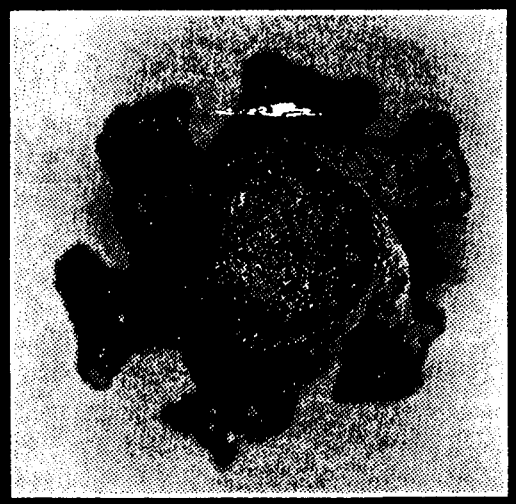
Fig. 10 Canted Fin Rod EFP

- Using innovative Waveshaping technology an EFP with canted Fins was formed and the resulting spin up was measured. This technology would significantly improve the accuracy of the baseline SADARM EFP and th

Canted Fin Rod EFP





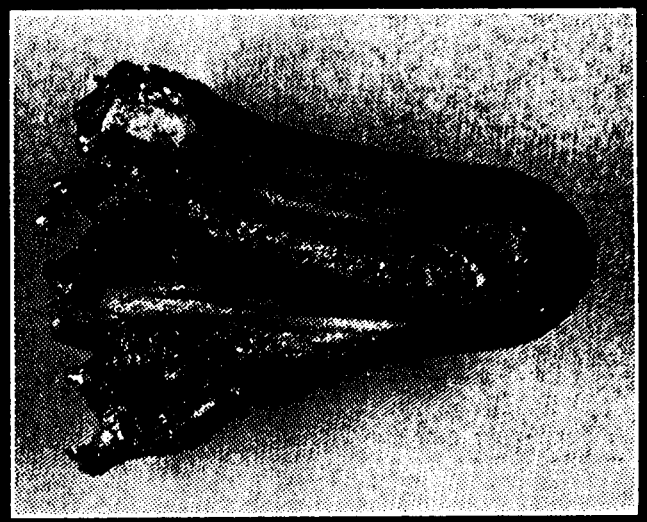


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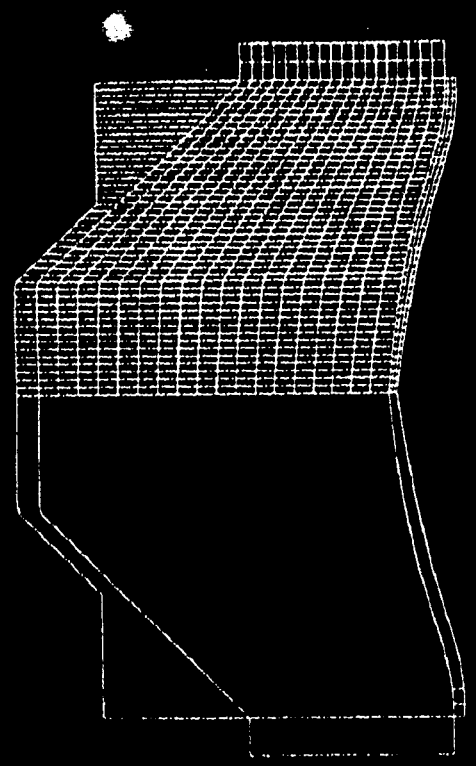
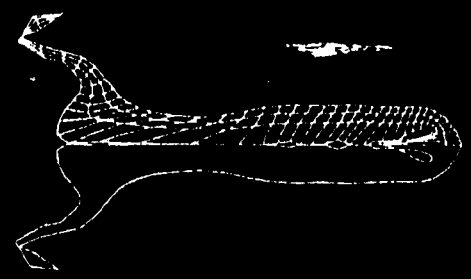
Fig. 11a. EFP Optimized for TNAZ

- First application of ARDEC non-linear optimized to the design of explosively formed penetrators which results in dramatically reduced development cost and fully optimized penetrator shapes producing up to 20% performance gains. Original EFP design generated with multiple manual computer design simulation

EFP Optimization for TNAZ



ORIGINAL DESIGN



OPTIMIZED DESIGN

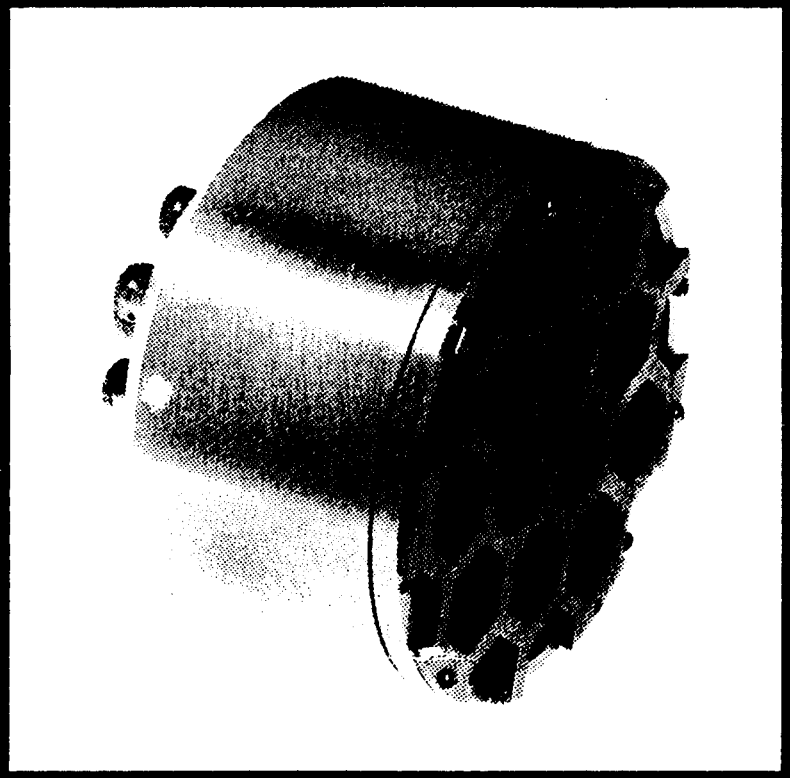
U.S. Army ARDEC

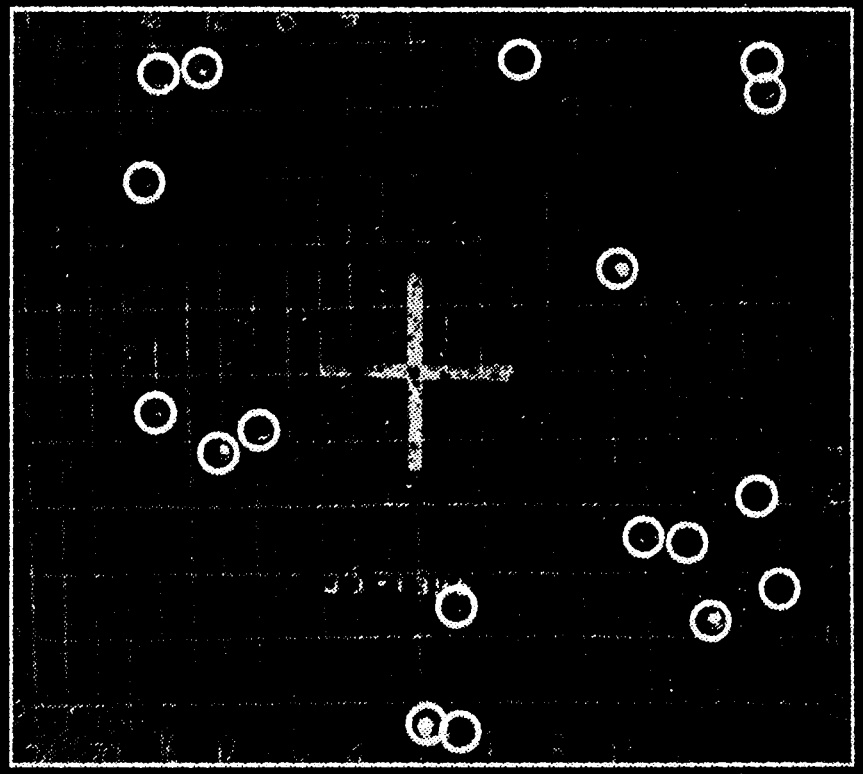
Fig. 7 ARDEC's Selectable/ Multi-Mode EFP Warhead (Compact Fragment Mode)

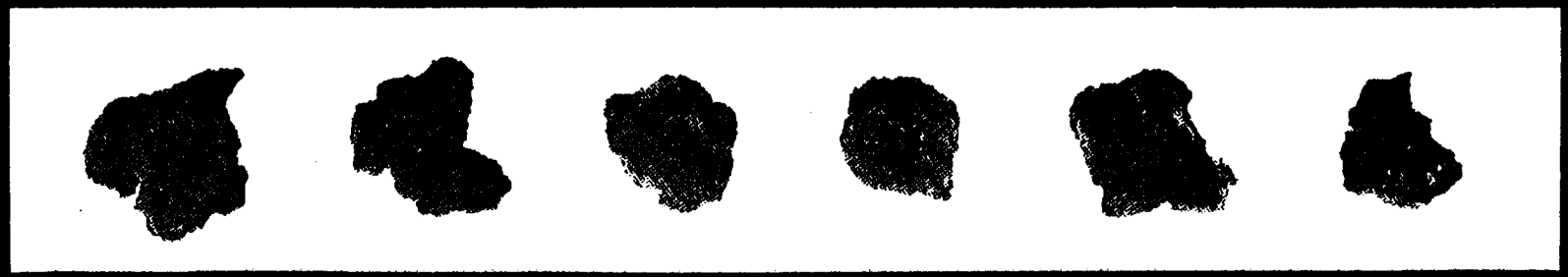
Innovative/Simple multi-mode EFP Warhead concept that produces three different kill mechanisms to defeat a wide range of targets. The warhead produces:

- **Multiple EFP when fired through grid which cuts the EFP liner to form multiple compact EFPs with good fragment patterns and RHA perforation capability.**

ARDEC's Multi-Mode/Selectable Warhead Compact Fragment Mode



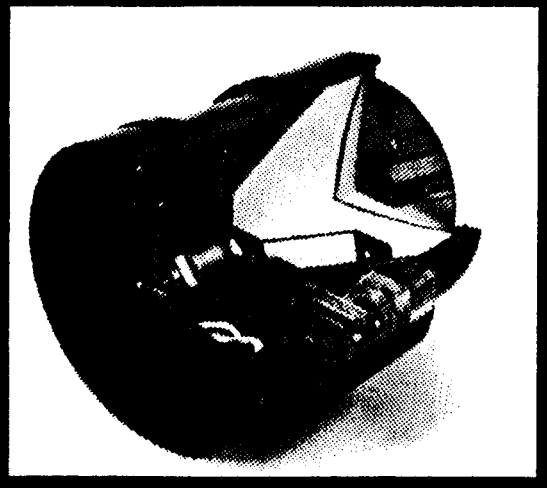


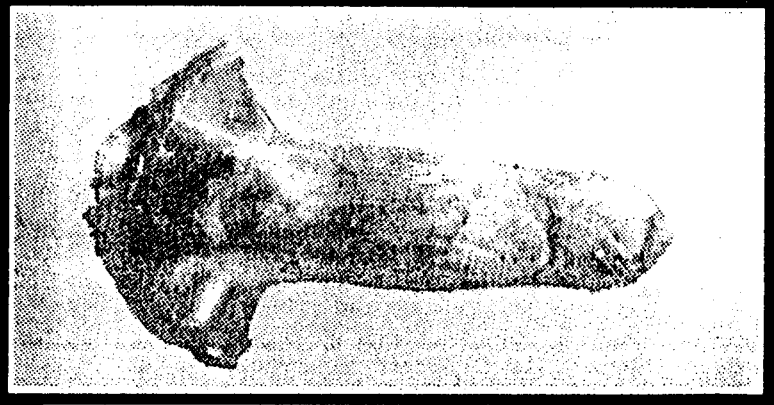


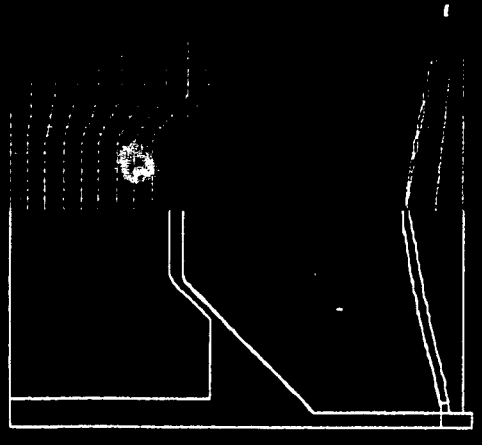
ARDEC's Advanced EFP Warhead Technology Demonstration Program

- Only DOD program to develop and evaluate component technologies and integrate into Anti-Armor systems to significantly enhance lethality
- Emphasis
  - Increase EFP length /penetration
  - Multi-Mode Warhead
  - Combined Effects warhead
  - Lightweight Warhead technology
- Major FY94 Accomplishments
  - Increased EFP Penetration Capability
    - Innovative Warhead Concepts
    - More Powerful Explosives
  - Waveshaping EFP Warhead Technology
    - Canted Fin EFP

EFP Warhead







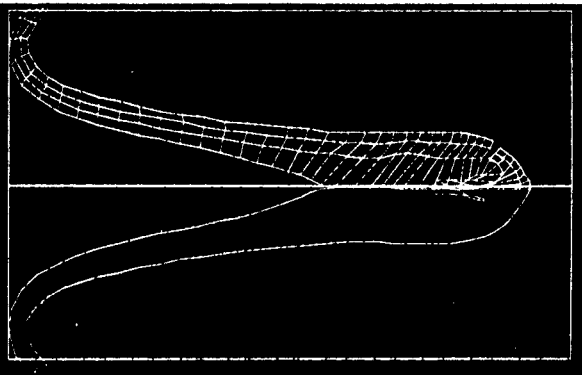


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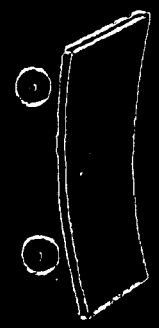
Fig. 12 Initiation Based Multi-Mode Non-Axi EFP Warhead

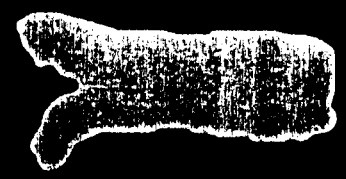
- Experimental demonstration of ARDEC's full scale nonaxisymmetric initiation based multi-mode warhead to produce either a single robust penetrator effective against heavy armor or multiple penetrators effective against light targets

Initiation Based Multi-Mode Non-Axi EFP

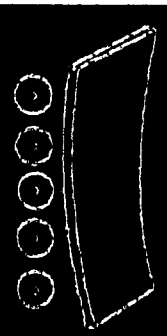
Flash Radiographs

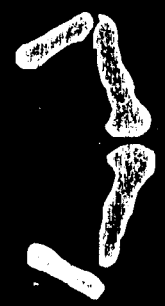
Target Pattern



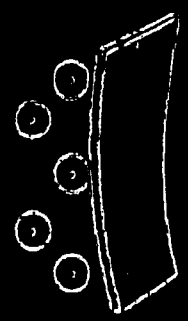


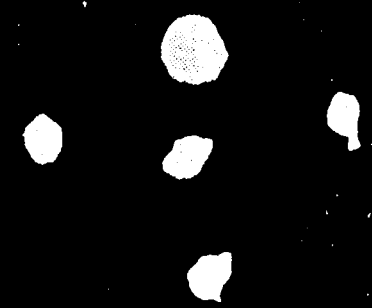
Original Non-Axi EFP





First Generation





Second Generation

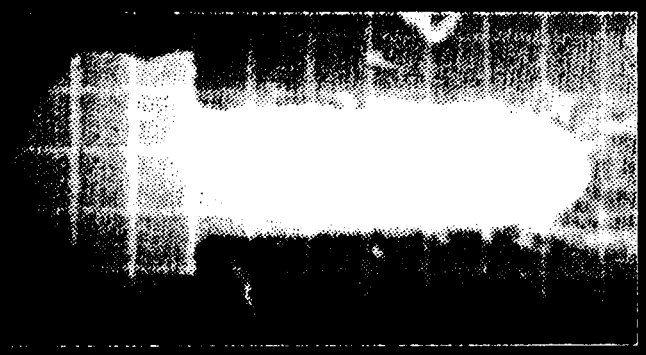
U.S. Army ARDEC

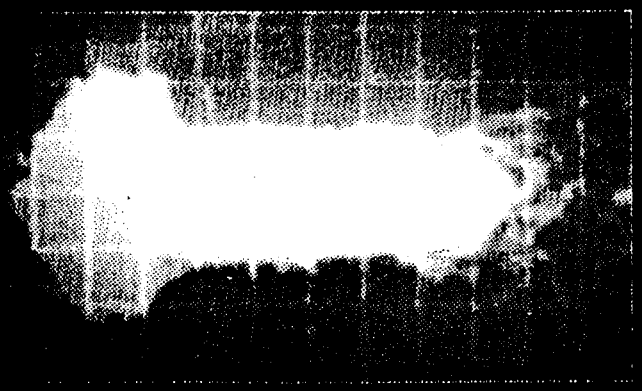
Fig. 13 Increased EFP Penetration Capability with More Powerful Explosive

- SADARM EFP warhead penetration comparison - baseline design with LX-14 explosive vs More Powerful Explosive (TNAZ). TNAZ was developed at ARDEC to produce significant increases in warhead penetration

LX-14 vs TNAZ EFP Comparison

TNAZ





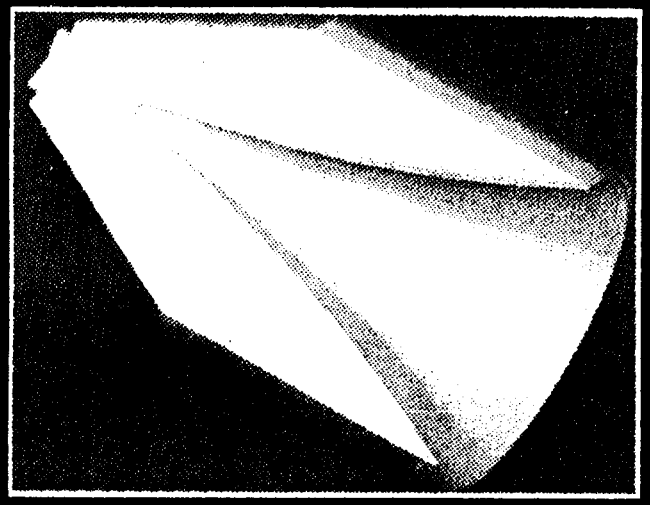
LX-14

U.S. Army ARDEC

Fig. 14 Hellfire Warhead Optimized for PAX-2A

- Performance of Hellfire Shaped Charge warhead optimized for PAX-2A, an insensitive explosive. developed by ARDEC. ARDEC demonstrated excellent performance results while reducing sensitivity to bullet impact and sympathetic detonation.

PAX-2A Hellfire Test Results



Characteristics	Goal	Test Results
Jet tip Velocity	Maximize	9.5
Total jet KE	>0.85 M265	0.94 - 0.98
Total jet length	>M265	0.96 - 1.00
7 CD penetration	+15.0	+19

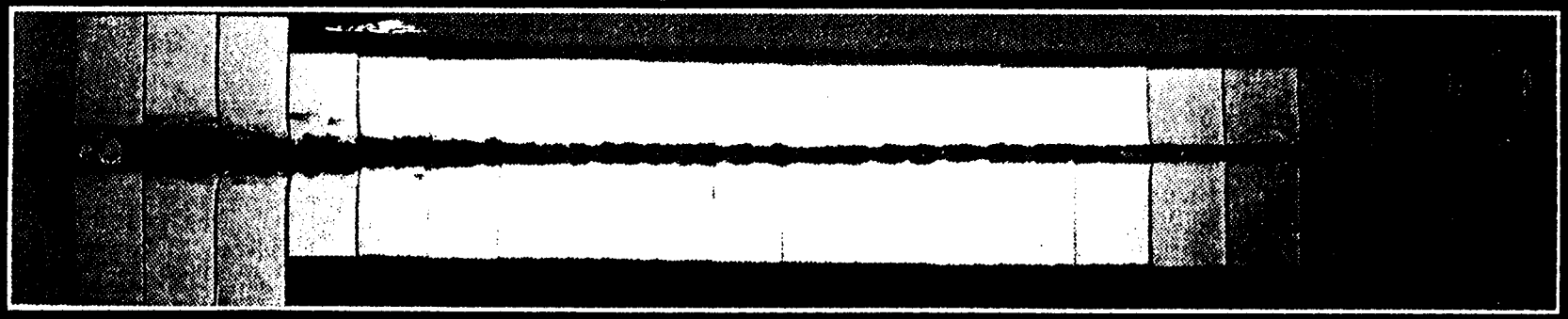
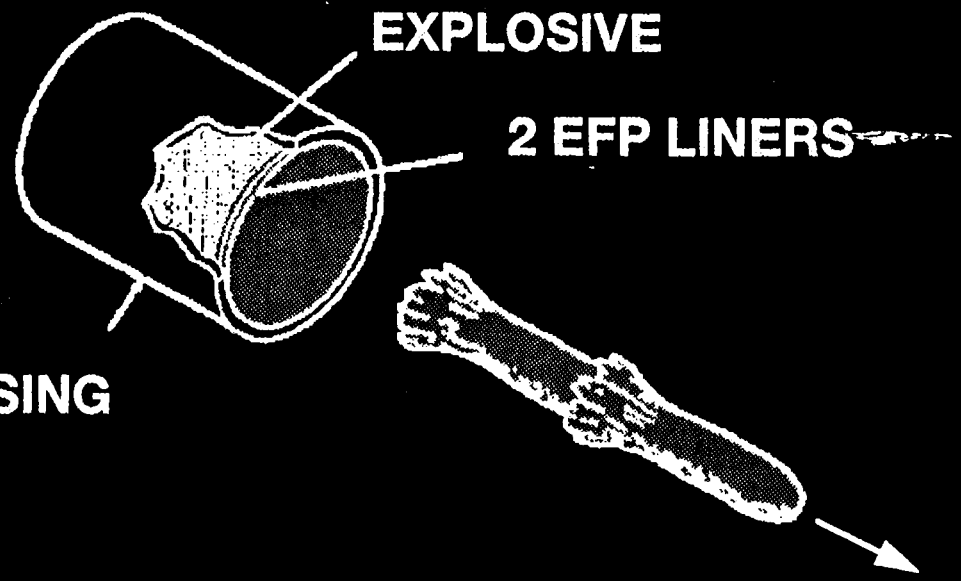
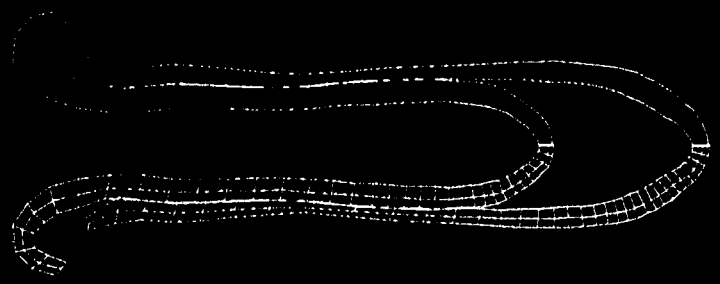


Fig. 15 Ultra Long EFP Warhead

- Innovative Warhead Concept that uses two EFP liners to form two rod EFPs fuzed together to produce a very long Aerostable EFP. This technology can produce 75-100% increase in penetration

ULTRA-LONG EFP WARHEAD





DYNA2D SIMULATION

FLASH RADIOGRAPHS

U.S. Army ARDEC

Insensitive Munitions Modeling
Projectile Impact Modeling and Experimentation

E.L. Baker, R. Campbell/(201)724-5097/ebaker@aed.pica.army.mil

The ARDEC Insensitive Munitions Program has successfully demonstrated Arbitrary Lagrange Eulerian (ALE) initiation modeling of high explosive munitions projectile impact. Computer modeling of initiation is now done using either a Lagrangian description or an Eulerian description. In a Lagrangian description, the computational mesh distorts with the material movement, whereas in an Eulerian description materials essentially flow through a stationary mesh. A new class of ALE models is now emerging which allows both mesh movement and material advection through the moving mesh. This allows a higher resolution of reacting materials required for proper modeling of explosive initiation. This new ALE initiation modeling capability has been used to model projectile impact experimentation of flat and pointed projectiles being fired at confined explosive billets. The results are used to prevent initiation and catastrophic sympathetic detonation of high explosive munitions.

INSENSITIVE MUNITIONS MODELING
PROJECTILE IMPACT INITIATION

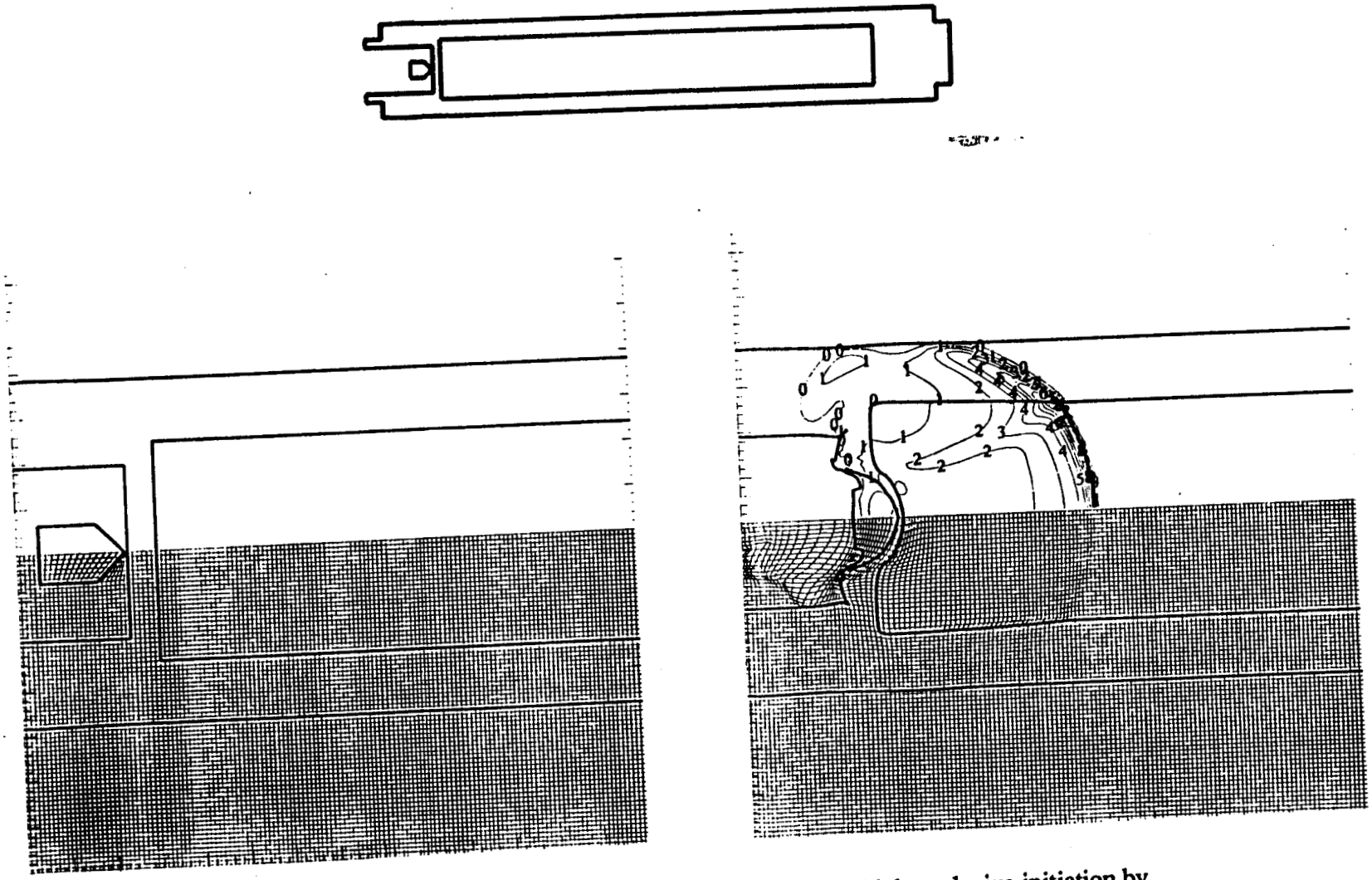


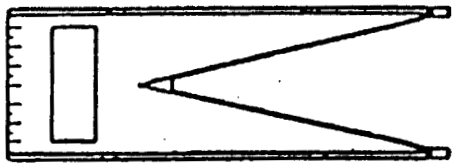
Figure 16. Insensitive Munitions modeling is used to predict high explosive initiation by projectile impact. The results are used to prevent initiation and catastrophic sympathetic detonation of high explosive munitions.

Shaped Charge Optimization

Dr. Ernest L. Baker/(201)724-5097/ebaker@aed.pica.army.mil

The ARDEC Target Defeat Program developed and demonstrated the application of nonlinear optimization to the design of shaped charge warheads. Computer simulation is currently used for the design of warheads. Presently, labor intensive multiple manual design iterations are used to develop shaped charges. The application of state-of-the-art variable metric nonlinear optimization technology developed at ARDEC allows shaped charge design to be done in a single manual operation. This new design tool will not only dramatically reduces design development time and cost (700% reduction), but will allow the development of fully optimized shaped charges producing up to 20% performance increases not previously possible using conventional design methodology. This new capability has been recently used for the design of ultra-high velocity molybdenum lined shaped charges, as well as a TNAZ (more powerful explosive) loaded copper shaped charge.

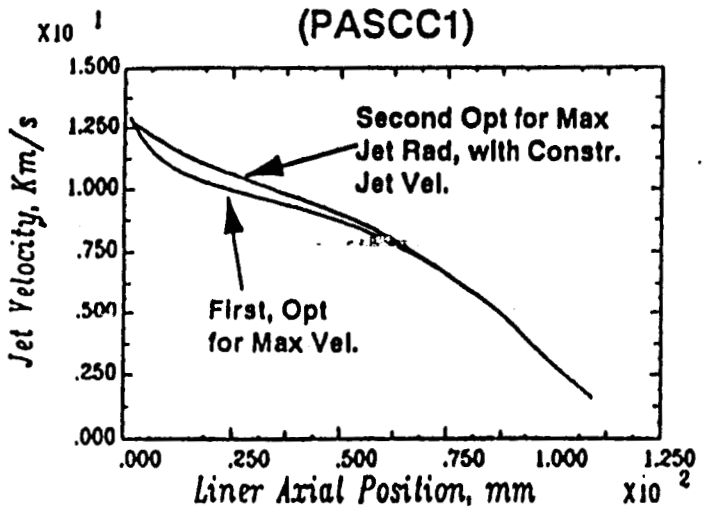
SHAPED CHARGE DESIGN OPTIMIZATION
MODELING AND EXPERIMENTATION



Selected Design

Tip Velocity
PASCC1 12.5 Km/s
CALE 11.6 Km/s
Experimental 12.0 Km/s

ALOGORITHIM RESULTS
(PASCC1)



CALE CODE Confirmation

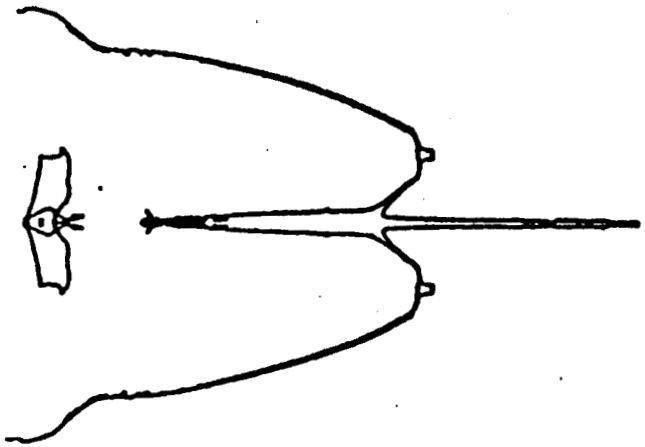


Figure 11b. Computer simulation coupled with design optimization replaces labor intensive multiple manual design iterations. Design development time and cost is reduced by 700%. ARDEC testing has shown 20% performance increases for optimized shaped charges.

Temperature Controlled Recirculating Water Systems (4)

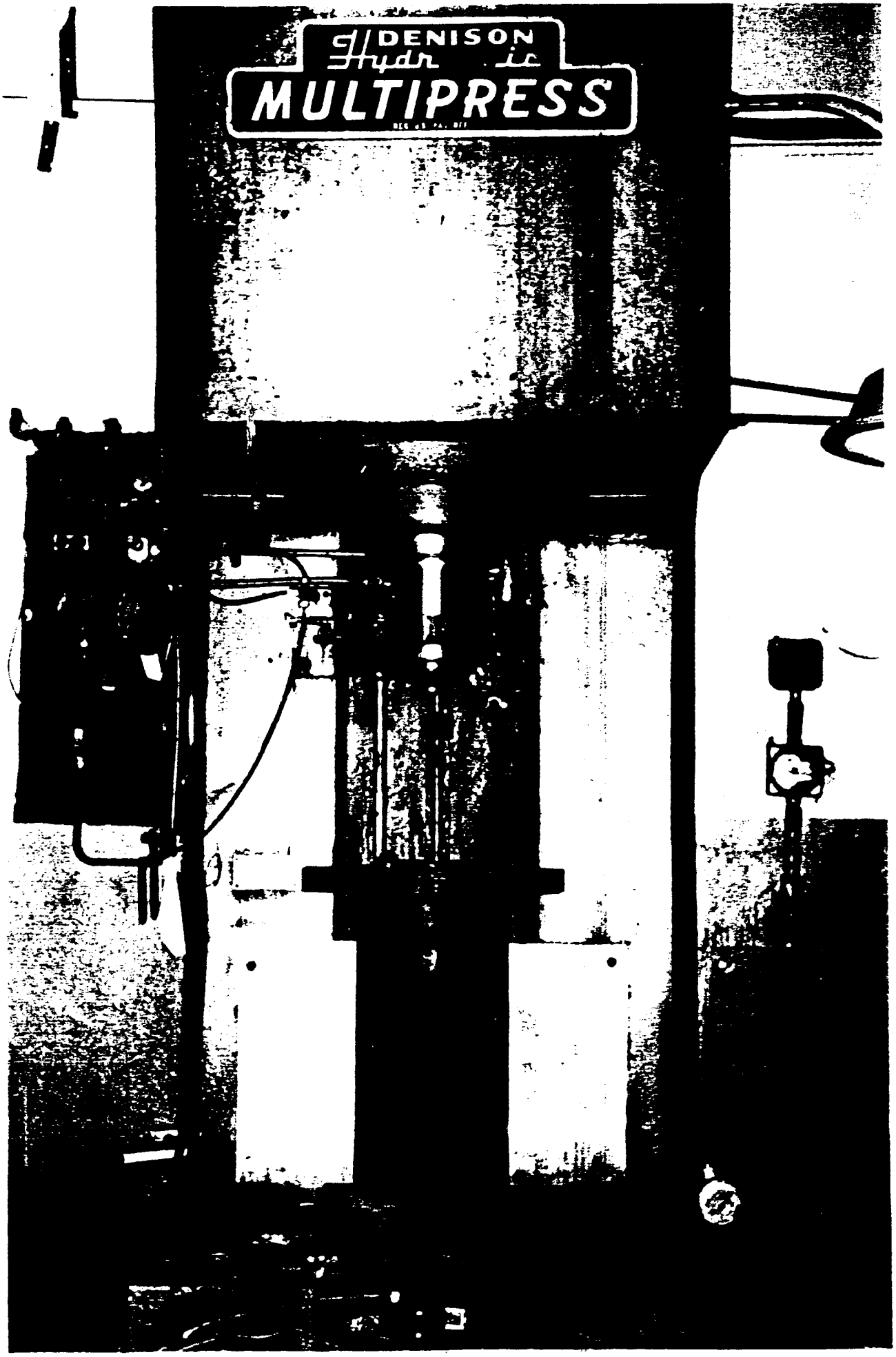
- Location - Bldg. 232F
  - High capacity one-pass and/ or recirculating temperature controlled water systems to support operations In Bldg. 232G; i.e. Modular Reactor System, High Shear Mixer & Loader, etc.

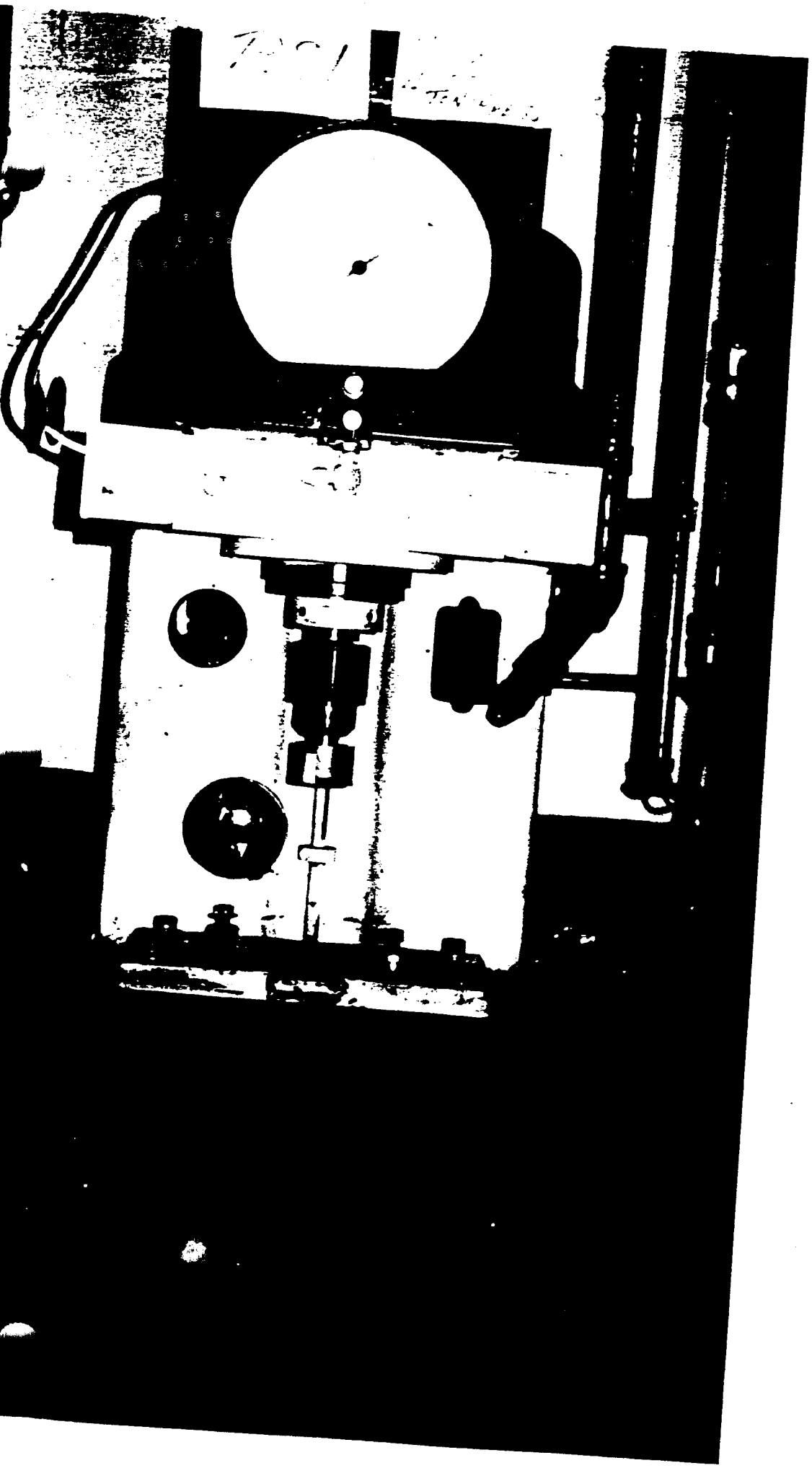
Shear Mixed Explosive Loader System

- Location - Bldg. 232G
  - Vertical injection loading system for loading highly viscous energetic formulations into prototype warheads.
  - Unique design directly uses the 10 Gal High Shear Mixer's vessel which eliminates inefficient energetic material transfer opearations.
  - Equipped with vacuum and remote control systems.
  - Typically used to produce 120+ lb batches.

DOUBLE ACTING PRESSES (3)

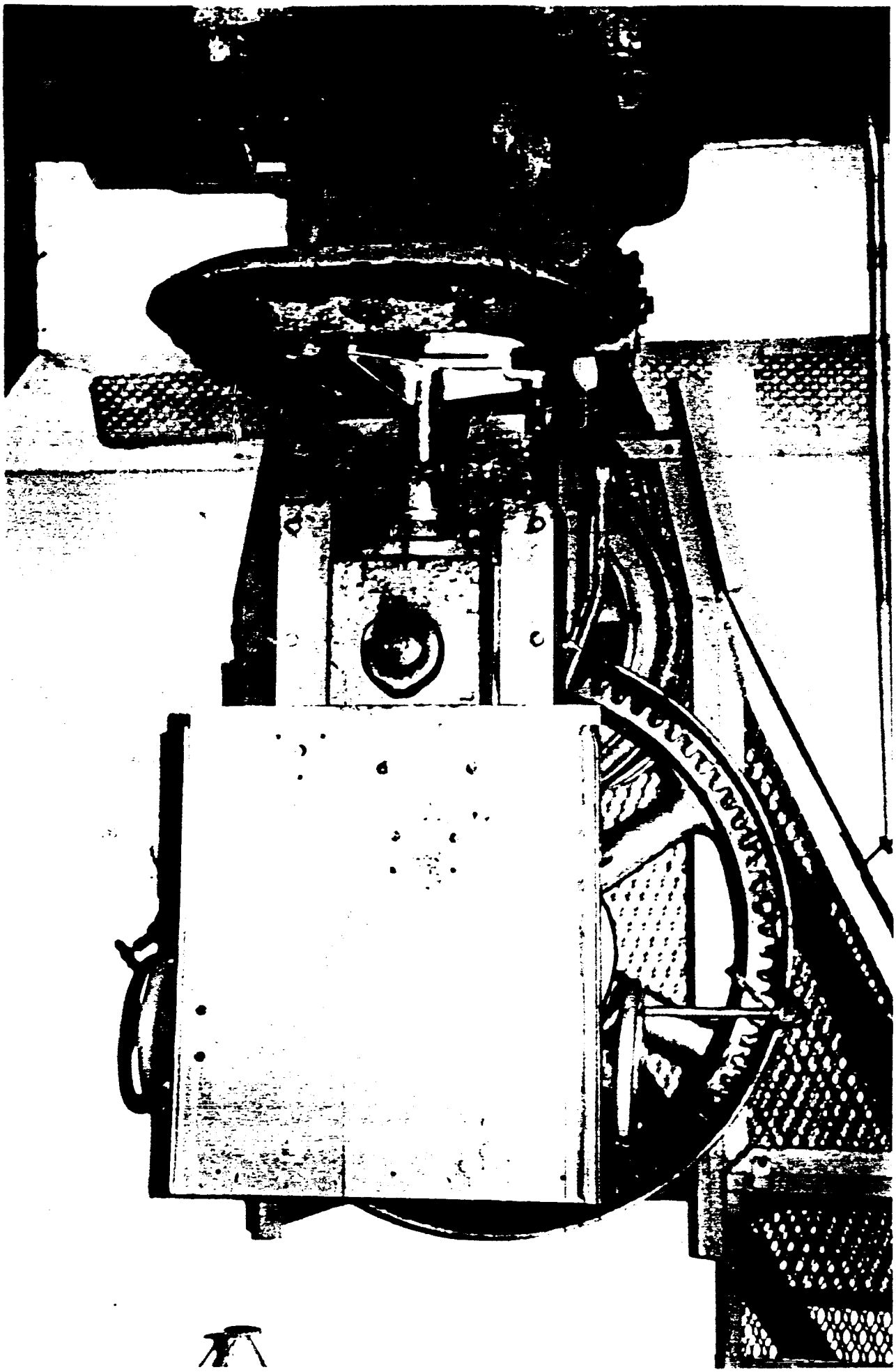
- BUILDING 252
  - Single acting 5 & 30 ton dennison presses and double-acting 50 ton Dennison press.
  - Used to investigate process parameters for high density pellet manufacture, to evaluate the processability of new or modified pressed explosive formulations, and to produce prototype explosive warheads.

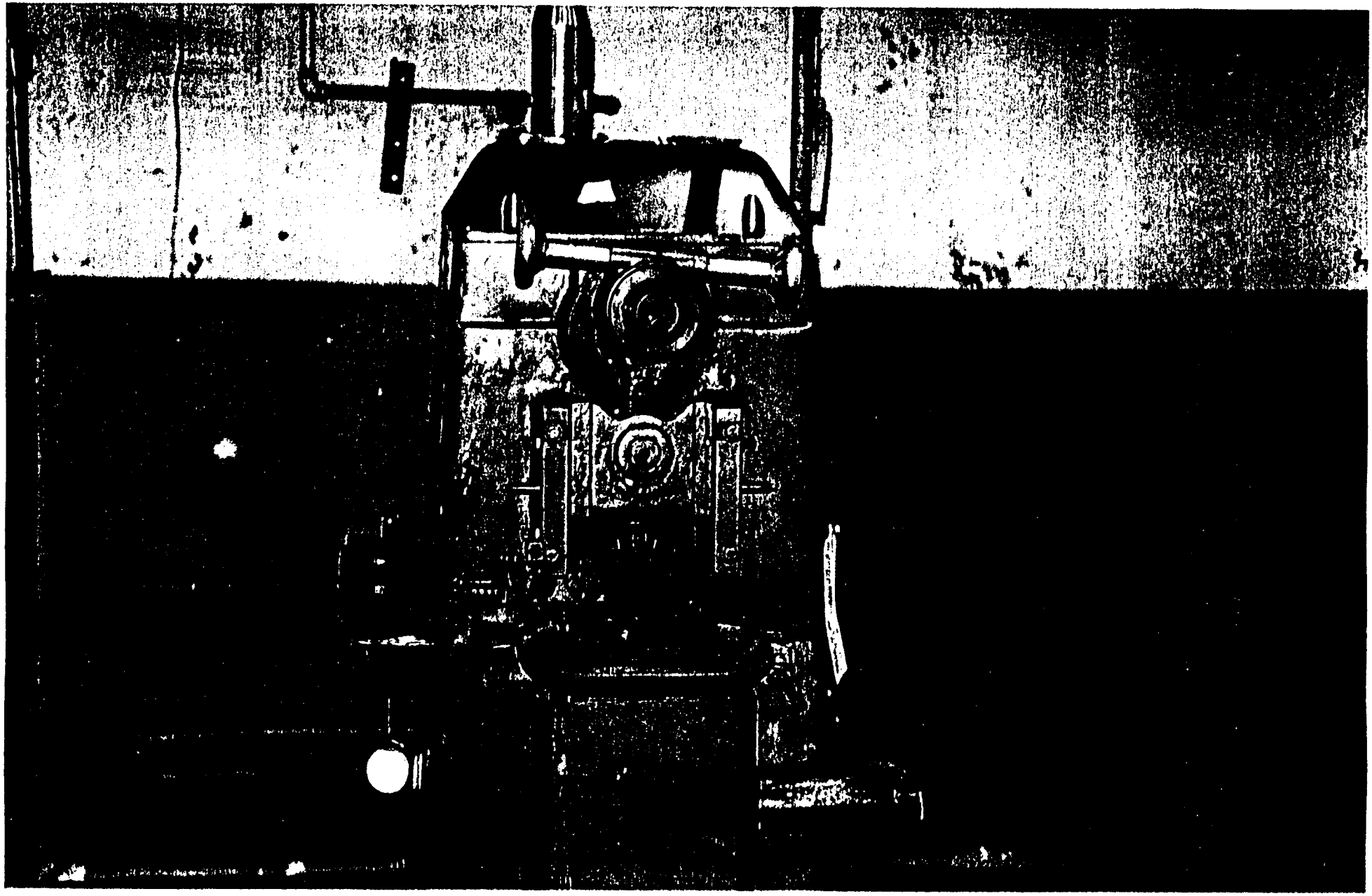

DENISON
Hydr ic
MULTIPRESS

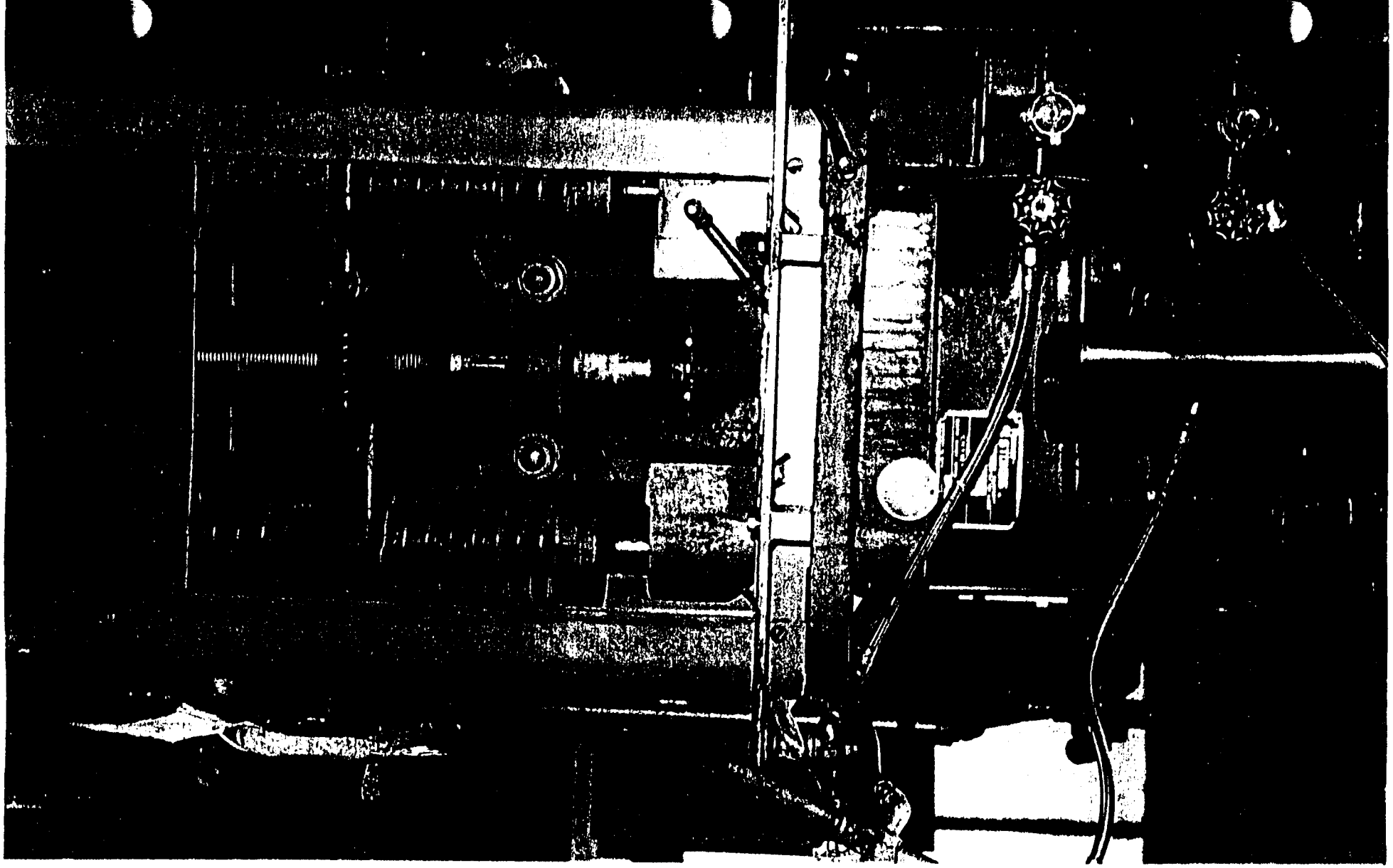


TABLETING PRESSES (3)

- BUILDING 252
  - High speed single acting Stokes F & R presses and double-acting Stokes T press.
  - Used to investigate process parameters for high volume pellet manufacture and to evaluate the processability of new or modified pressed explosive formulations.
  - Capable of producing pellets as large as 3" diameter at rates as high as 15 per minute

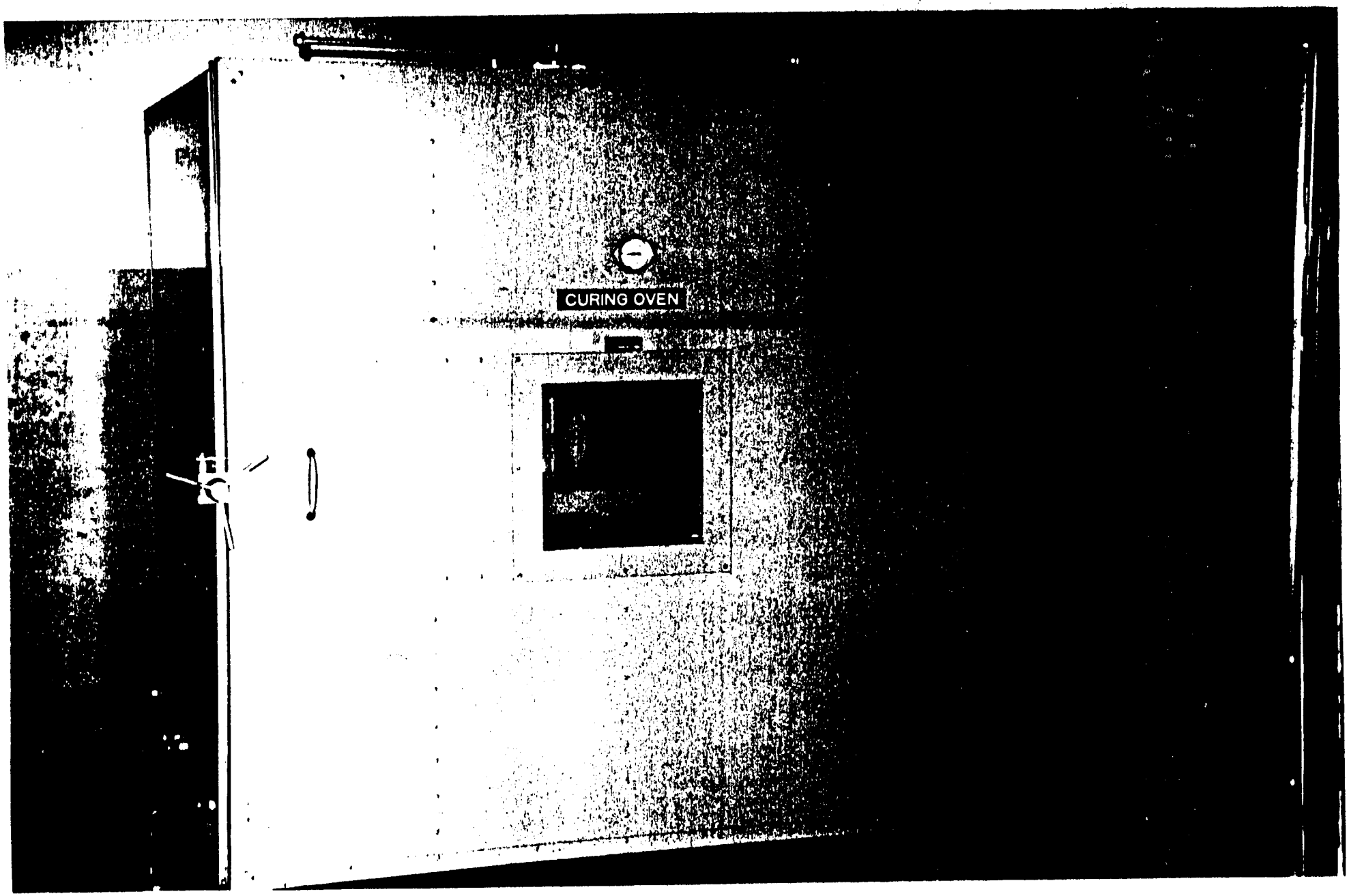






Curing Oven

- BUILDING 234
  - Large volume steam heated chamber for conditioning prototype warheads in order to cure the adhesives used in their assembly and/ or the polymer systems associated with certain types of plasticized explosives.
  - Typically used for item(s) requiring a heated environment up to 15' x 15' x 15'.


CURING OVEN

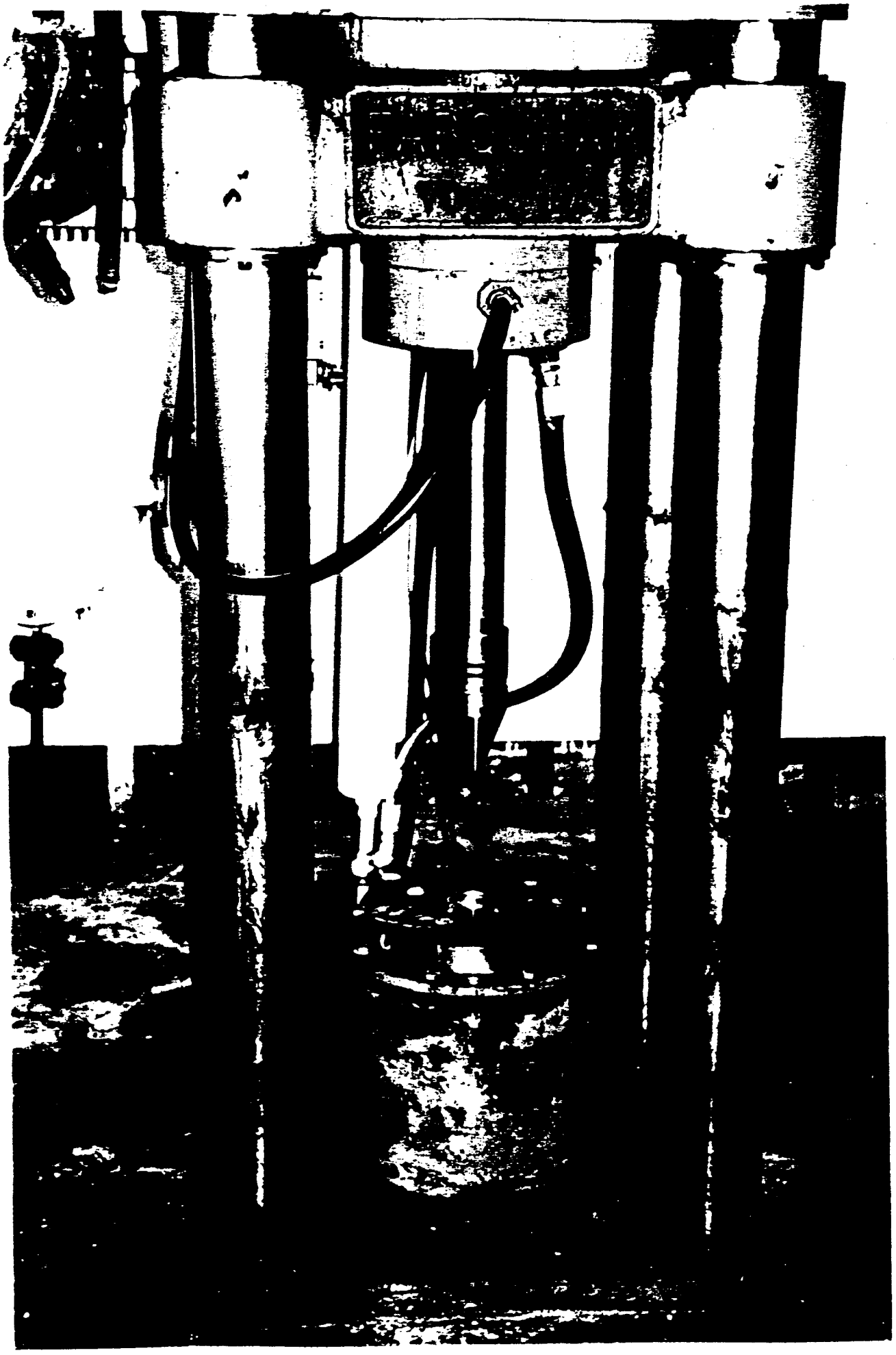
420 Ton Explosive Press

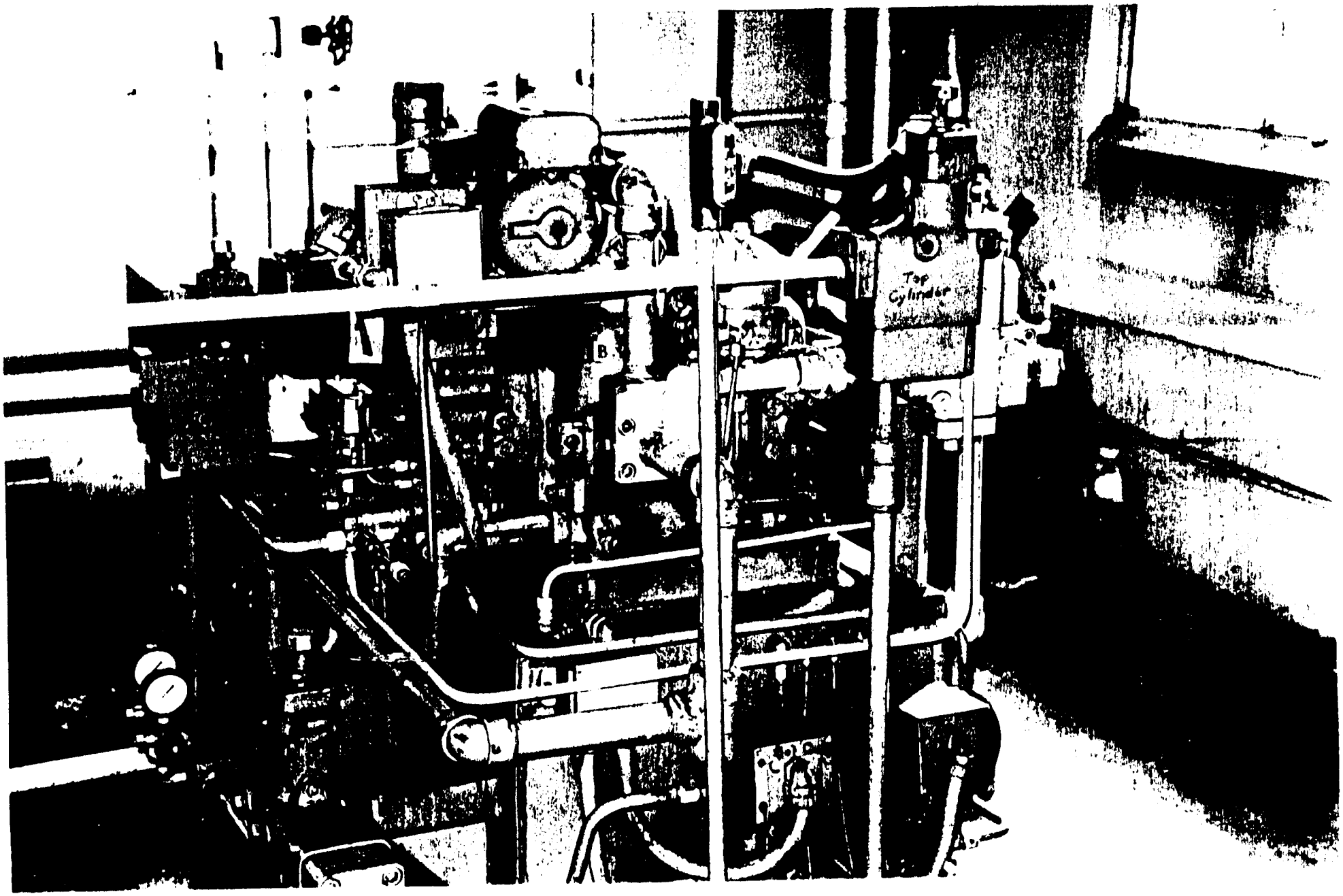
- Location - Bldg. 236
  - Double-acting press for fabricating prototype shaped charges, explosively formed penetrators, and explosive billets.
  - Unique tooling design affords maximum flexibility and permits the use of inexpensive quick change mandrels to speed the optimization of prototype warhead designs.
  - Equipped with high capacity hot oil heating, millitorr vacuum, and remote control systems.
  - Typically used for cylinderical warheads up to 6 " diameter and 18 " length.

OLIVER

190 Ton Explosive Press

- Location - Bldg. 236
  - Double-acting press for fabricating prototype shaped charges, explosively formed penetrators, and explosive billets.
  - Unique tooling design affords maximum flexibility and permits the use of inexpensive quick change mandrels to speed the optimization of prototype warhead designs.
  - Equipped with high capacity hot oil heating, millitorr vacuum, and remote control systems.
  - Typically used for cylinderical warheads up to 4 " diameter and 12 " length.




Top Cylinder
B
A

Remote Controls for 190 Ton Explosive Press

- Location - Bldg. 231
  - Controls permit both automatic and manual operation of 190 Ton Explosive Press.
  - Instrumentation of critical process parameters for pressing energetic materials.
  - Located in separate bunker to permit 100+ lb energetic allowance for pressing operations.

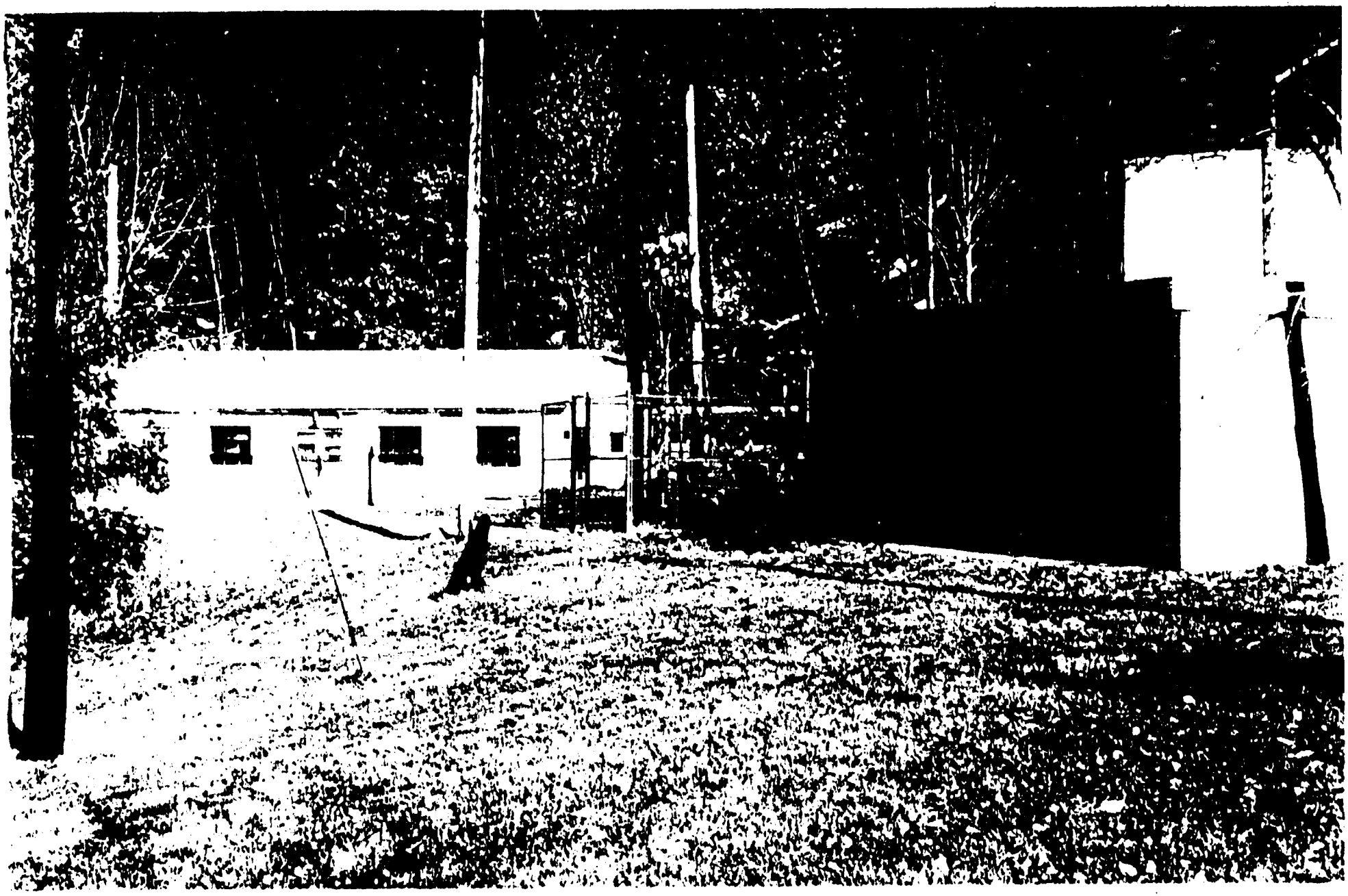
Remote Controls for 420 Ton Explosive Press

- Location - Bldg. 231
  - Controls permit both automatic and manual operation of 420 Ton Explosive Press.
  - Instrumentation of critical process parameters for pressing energetic materials.
  - Located in separate bunker to permit 100+ lb energetic allowance for pressing operations.

150 TON PRESS

ISOSTATIC PRESS INTENSIFIER & CONTROL PANEL

- BUILDING 231
  - Controls and pressurization system for Isostatic Press.
  - Capable of consolidating energetic materials into free-form billets at pressures as high as 40,000 psi.
  - Located in separate bunker to permit 100 plus pounds energetic allowance for pressing operations.



Environmental Chamber

The Webber environmental chamber is capable of both heating, cooling, and temperature cycling explosives for testing. The chamber can be computer controlled to allow an infinite number of temperature cycles.

Replacement Cost $23,000

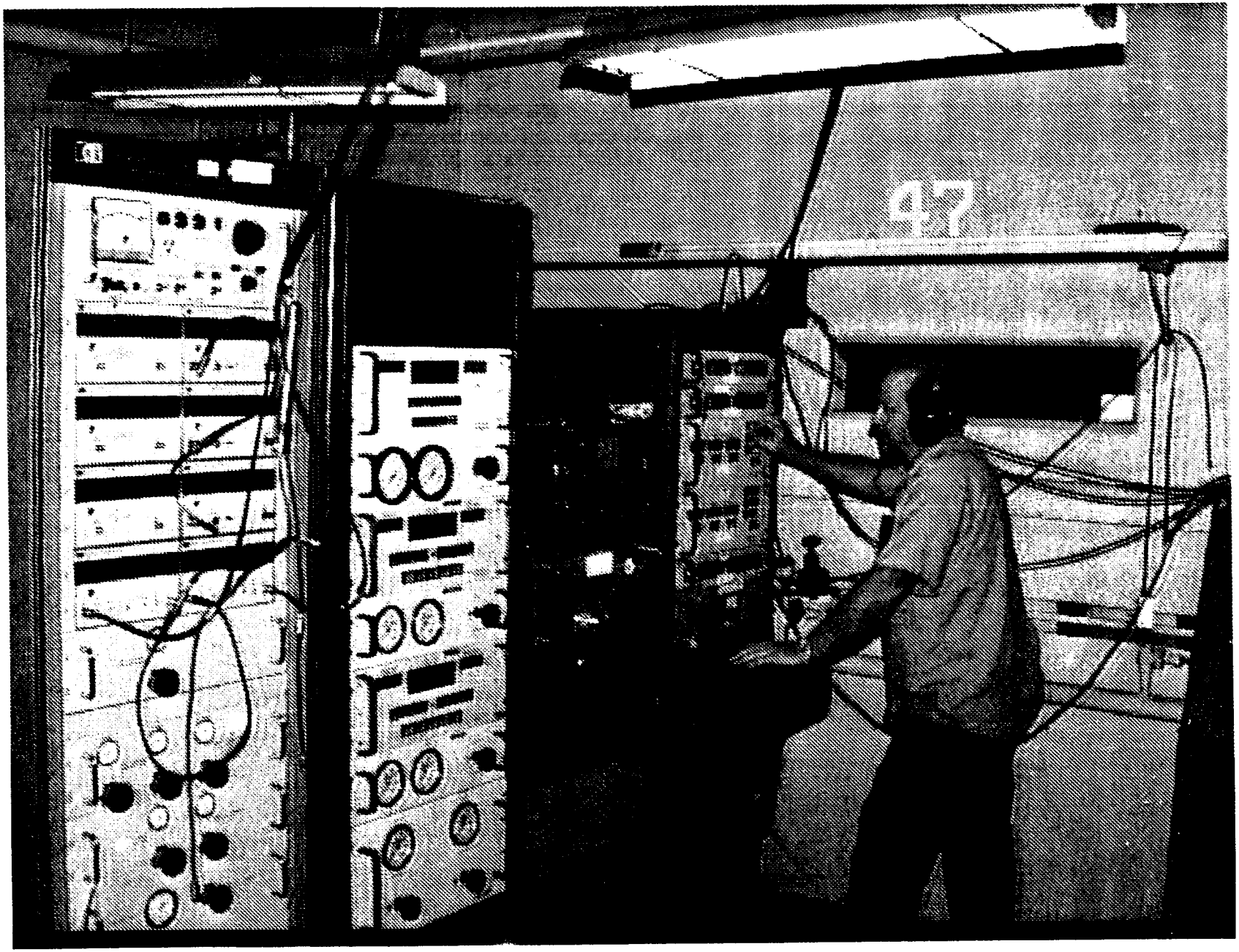
Building 1611

Explosive Testing Control Room

The controls for three high speed cameras, flash radiographic systems, and oscilloscopes are located in the control room. Four high voltage exploding bridgewire firing units with two time delay units are used to initiate most test firings.

Replacement Cost $69,908 Exploding Bridgewire Firing and Delay Systems

Building 1611


47

Digitizing System

The LeCroy digitizing Century Series digitizing system has five channels, three at 5 ns per point and two at 10 ns per point, with 32 K memory for each channel. It is used to record: camera speeds, flash x-ray timing, closure pins, pressure pins, etc.

Replacement Cost $61,398

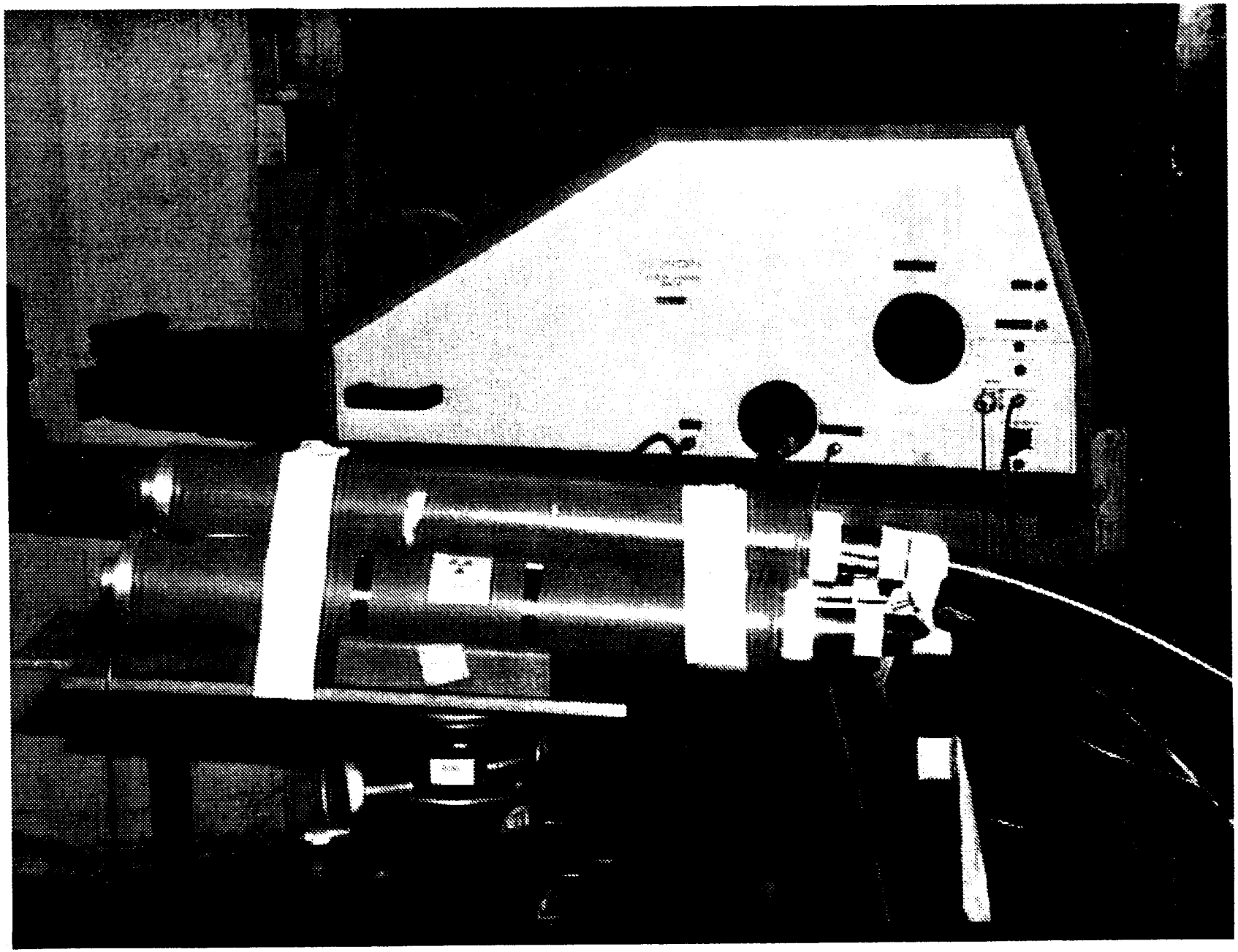
Building 1611

300 Kv Flash Radiographic System

The Hewlett Packard 300 Kv flash radiographic system produces a high power 20 ns of radiation. This allows detonation events to be radiographed. It is used to study detonations, shaped charges, EFP's, etc. A 150 Kv system is also available which produces softer radiation, useful in obtaining radiographs of detonation shock fronts.

Replacement Cost $ 150,000 300 Kv system
$68,710 150 Kv System

Building 1611

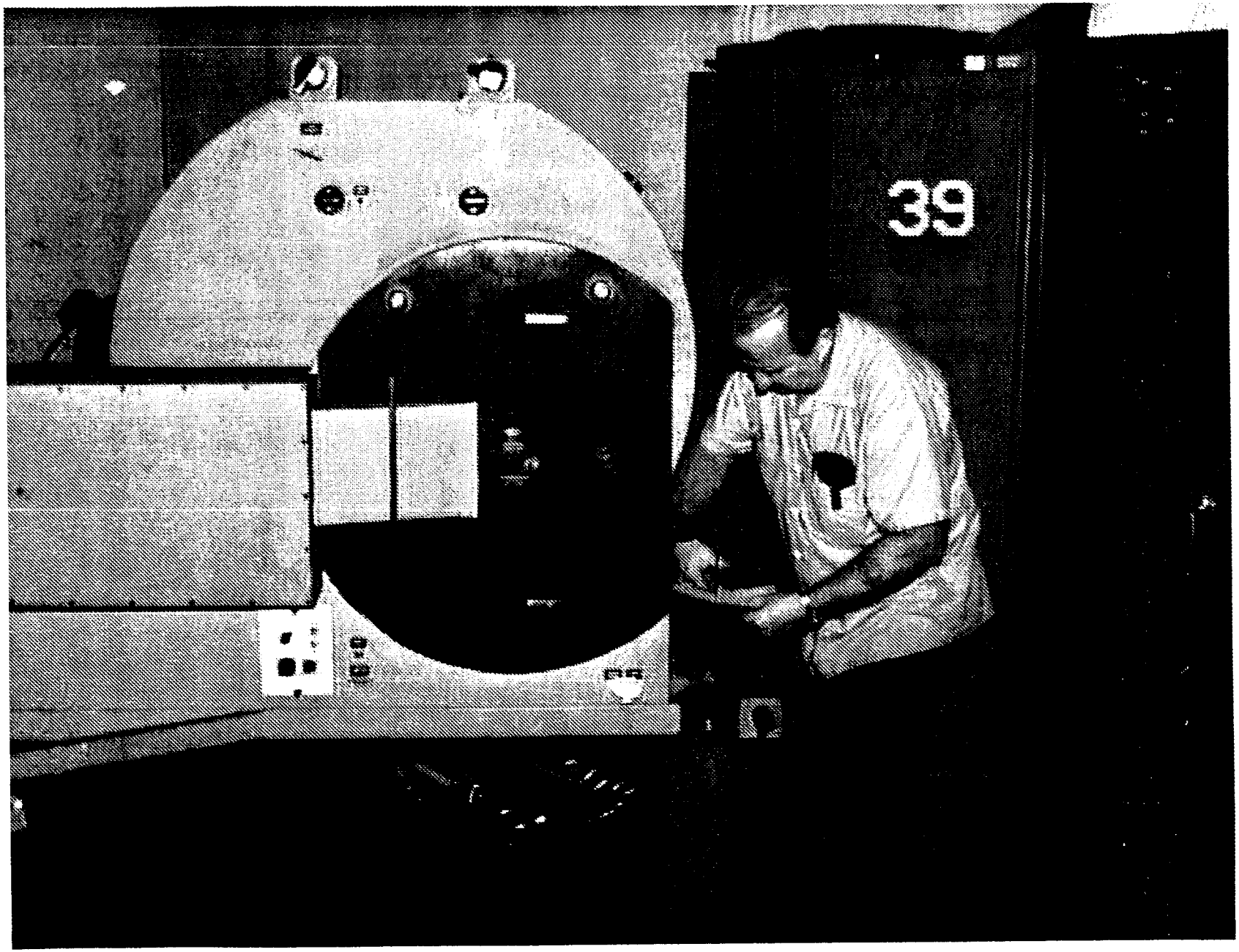


Combination Streak and Framing Camera

The Cordin model 150 streak/ framing camera obtains simultaneous streak and framing records from the same detonation event. The framing mode of the camera obtains 80 pictures on 35 mm film at rates of up to 8.8 million frames per second, with a 20,000 revolution per second mirror. The streak half has a mirror which rotates up to 5,000 revolutions per second.

Replacement Cost $200,000, estimated. One of three produced

Building 1611

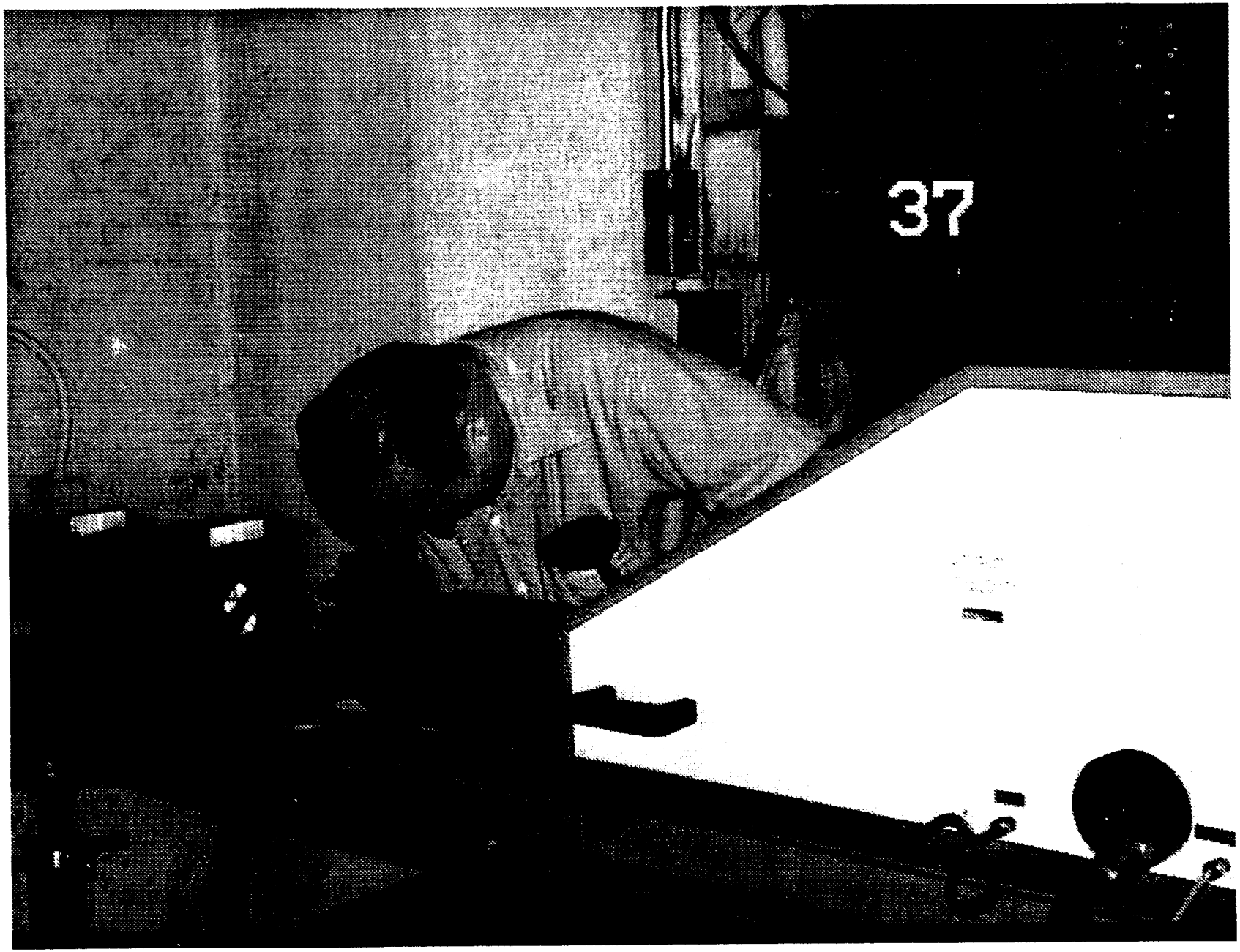

39

Streak Camera

The Cordin model 137 streak camera uses a mirror rotating at up to 5,000 revolutions per second. The camera is used to record explosive performance parameters such as detonation velocity, cylinder expansion testing, detonation breakout, wave tilt, synco-streak records, etc. The streak camera is the most versatile photographic method used in detonation testing.

Replacement Cost $127,002

Building 1611

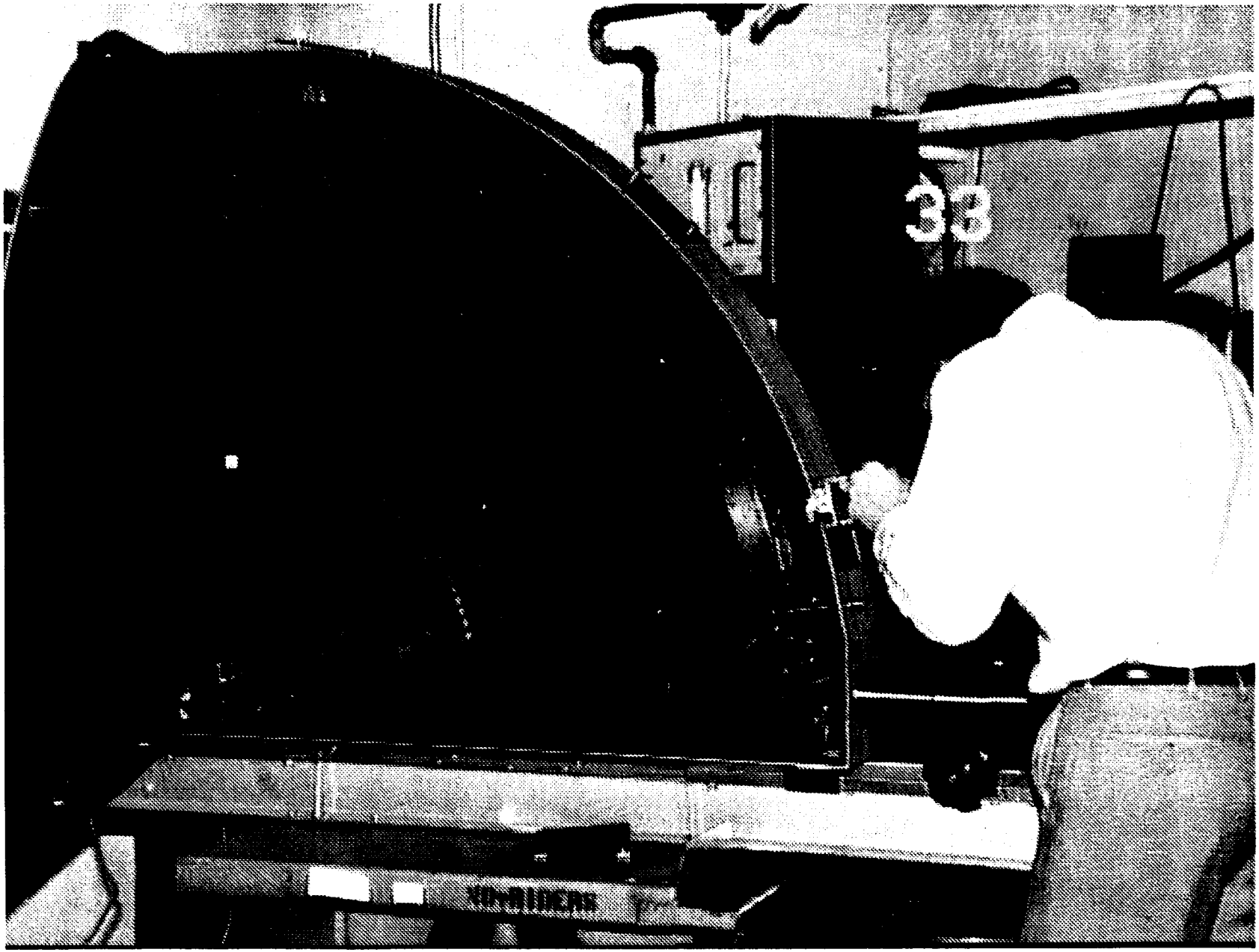

37

Framing Camera

The Cordin model 121 framing camera utilizes the Miller optical shuttering technique with a mirror rotating at 10,000 revolutions per second. The camera obtains 26 photographs of detonation events at a rate of up to 2.5 million frames per second on 70 mm film.

Replacement Cost $233,550

Building 1611


33
WALKERS

ENERGETIC MATERIALS LABORATORY COMPLEX

- BUILT IN THE LATE 1980's AND 1990's

- EQUIPPED WITH STATE OF THE ART INSTRUMENTATION

A. SYNTHESIS CAPABILITY

Modular Reactor System

- Location - Bldg. 232G
  - Process Demonstration Module for scaling up and studying processes for synthesizing, coating, agglomerating, crystallizing, and blending energetic materials and formulations.
  - Closed system design also permits hazardous waste minimization studies and solvent recycle.
  - Unique modular design affords maximum flexibility for current and future energetic material projects.
  - 30 gal glass lined steel main vessel is integrated with three 10 gal feed tanks, a packed bed distillation column, two-stage counterflow condensor, reflux and bottoms splitters, two 10 gal receiver tanks, a pressurized loop heating and cooling system, a 60 gal product recovery/ crash tank.
  - 300 pound capacity

Mini & Bench Reactor Systems

- Location - Bldg. 252
  - Rack mounted glassware systems for scaling up and studying processes for synthesizing, coating, agglomerating, and crystallizing energetic materials, formulations, and intermediates.
  - Closed system design also permits hazardous waste minimization studies and solvent recycle.
  - Mini and bench systems incorporate 1 liter and 5 liter reaction vessels, respectively.
  - Remotely controlled from outside of barricaded bay.
  - Unique modular design affords maximum flexibility for current and future energetic material projects.
  - Typically used for investigations on the 1 to 20 lb scale.

B. CHARACTERIZATION AND PHYSICAL PROPERTIES CAPABILITY

RAMAN SPECTROMETER

The Raman spectrometer in conjunction with the diamond anvil cell are used to investigate the chemical and structural stability of energetic materials under high pressures. The Raman spectrometer measures the vibrational frequencies of the molecules of the energetic materials. Studies of the effect of pressure on the material gives information about the chemical and structural stability of the materials. The Raman spectrometer is also used as an analytical tool to identify materials by their unique vibrational frequencies.

Replacement cost 200 k
Closed cycle cryogenic Dewer replacement cost 15 k
Diamond anvil high pressure cell replacement cost 10 k

ELECTRON PARAMAGNETIC RESONANCE SPECTOMETER

The instrument is used to study the chemistry of decompostion of energetic materials such as the chemistry involved in the initiation of detonation or shelf life degradation. It detects radical species which are formed as intermediates in the decomposition of organic energetic molecules. The instrument can also be used to measure directly electromagnetic absorption in materials.

Repacement cost 250K
Closed cycle cryogenic Dewar capable of achieving temperatures as low as 10K. Replacement cost 15K.

NANOSECOND EXCIMER LASER-DYE LASER SPECTROSCOPIC SYSTEM

Description: Consists of a Nanosecond Pulsed excimer laser coupled to a dye laser system, scanning monochromators, fast electronic instruments, storage oscilloscopes, pulse generator, box car averagers, pulsed xenon ARC lamps, vacuum system, computer systems for data acquisition and analysis, calculations of kinetic modelling and molecular dynamic processes.

Purpose: Allows time resolved absorption and laser induced fluorescence studies of decomposition reaction pathways of explosives and propellants in the time domain of a few billionths of a second. Knowledge is essential for control of sensitivity and rates of energy release.

Replacement Cost: $1,000 K

NOTE: The Nanosecond and picosecond laser spectrometers in the Energetics Research Facility are not available commercially. These systems were designed and assembled by highly specialized and trained scientific and technical personnel. Extensive computer programs were written for the acquisition, statistical analysis and kinetic interpretation of the experimental data obtained in the nanosecond and picosecond time regime. Individual components of each system were purchased from various manufacturing sources.

NANOSECOND CARBON DIOXIDE (CO2)-DYE LASER SYSTEM

Description: This system consists of a nanosecond pulsed CO2 laser, a nanosecond dye laser, fast electronic instruments, transient digitizers, UV, visible and infrared optical cells and components, vacuum systems and high vacuum monitoring gauges.

Purpose: Allows the study of infrared multiphoton decompostions of explosives and propellants as well as the characterization of evergetic molecular species and permanent products in the time domain of a few billionths of a second. Knowledge essential for control of sensitivity and rates of energy release.

Replacement Cost: $800K

CO2 Laser
DANCER

PICOSECOND LASER SPECTROSCOPY SYSTEM

Description: This system consists of a picosecond laser, two laser amplifiers, specially designed electronic equipment, a picosecond electronic equipment, a picosecond streak electronic camera and numerous optical components, multichannel analyzers, and other peripheral components.

Purpose; Allows the study of energetic electronic states and chemically reactive energetic species of explosives and propellants in the time domain of a few trillionths of a second. Knowledge essential for control of sensitivity and rates of energy release.

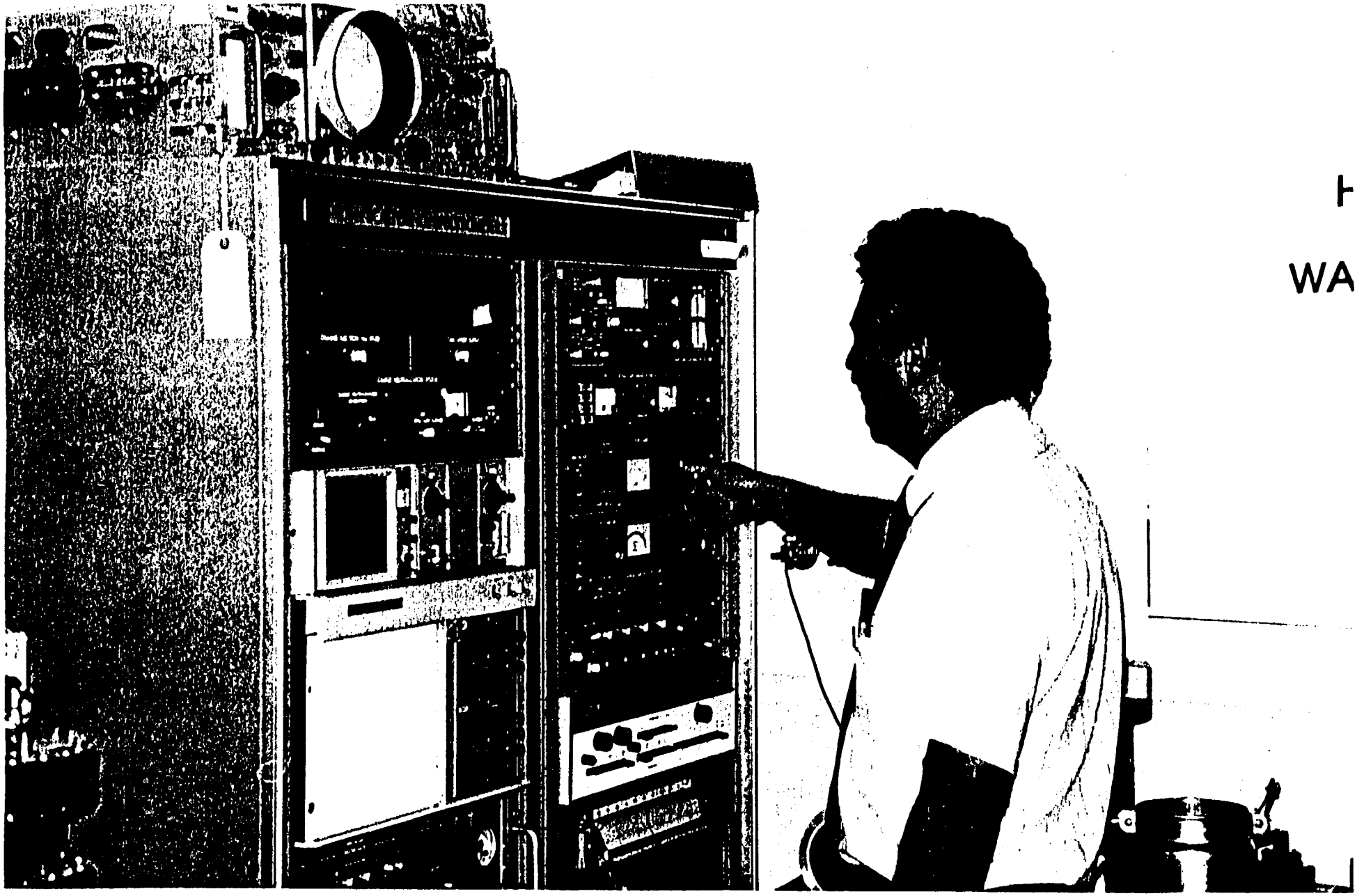
Replacement Cost: $1,200K

Secondary Ion Mass Spectroscopy (SIMS) Apparatus

1. Very sensitive technique to identify elements from the surface of compounds, in particular impurities and to obtain depth profiles of elements-depth form surface.

2. Unique capability to study the surface of energetic material and to determine trace amounts of energetic material.

3. Replacement Cost: $200,000.00



H

WA

X-Ray Photoelectron Spectroscopy Apparatus (XPS)

1. Unique method of identifying elements and their chemical states by determining their binding energies which serve as "finger prints".

2. Uniqueness:
   a) Capability of working with energetic material safely. This includes pheripheral facilities such as hoods etc.
   b) Capability of identifying energetic materials and their decomposition products after such events as accidental explosion, terrorist activities and other cases of munitions misuse or failure.

3. Other Uses:
   a) Studies of electronic structure of new energetic materials and their formulations.
   b) Studies of the chemistry and physics of the surfaces of energetic materials.

4. Replacement Cost: $300,000.00

Mechanical Properties Mesurement and Testing System

1. To determine and understand with predictive capability the mechanical failure conditions and other properties of energetic materials.

2. Uniqueness:
   a) High rate system with facilities for studying energetic materials safely and remotely.
   b) Wide range of strain rates and temperatures available.

3. Other Uses:
   a) Determine mechanical properties of energetic materials needed in modeling munitions in accidental scenarios involving mechanical failure due to impact, etc.
   b) Development of energetic materials with desired mechanical properties.

4. Replacement Cost $300,000.00

CAUTION
MTS

Energetic Materials X-Ray Crystallography Laboratory

Located in the Explosives Research Facility the X-Ray Crystallography Lab is centered around a fully automated, computer driven x-ray diffractometer. Peripherals include the latest software for data reduction and manipulation, peak calculations and search match routines compatible with a complete JCPDS data base as well as color graphics display and printer. Studies are performed to verify and characterize new energetic materials and their intermediates during synthesis development and scale-up. The laboratory also supports energetic material processing quality control studies and malfunction investigations.

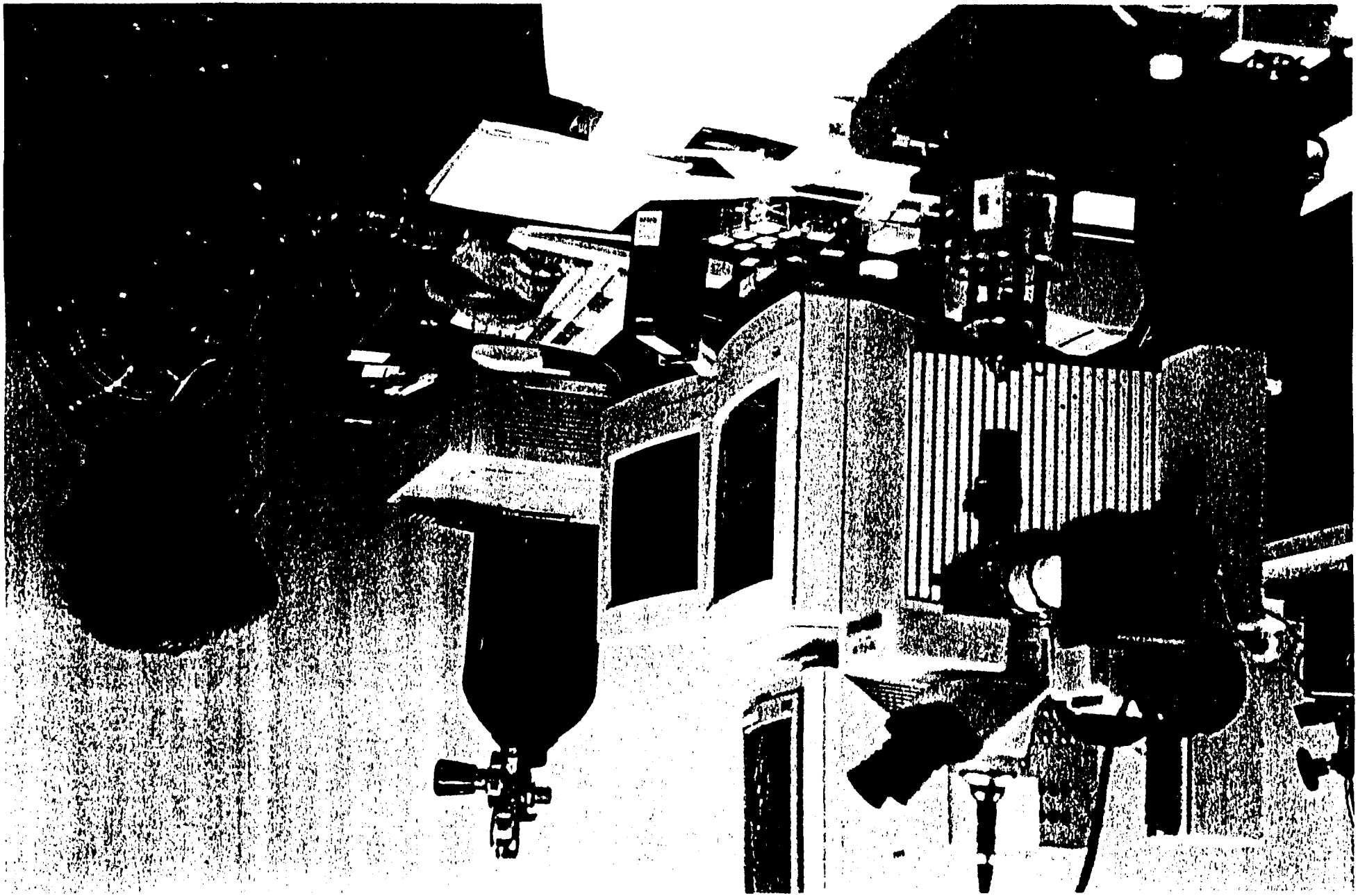
BEHAVIOR OF ENERGETIC MATERIALS DURING HIGH ACCELERATION IN ULTRACENTRIFUGE

- Simulates the high acceleration of the gun launch process in the laboratory
- Failure and chemical reaction of energetic materials during high acceleration
- Crystal growth of less sensitive energetic materials during high acceleration
- Temperature range: -20°C to 150°C
- Maximum acceleration: 500,000 *g*
- Replacement cost: $200K

KOH
361-3924
ANNEX
BECKMAN
LB-80 Ultracentrifuge
KMAN
LB-80M Ultracentrifuge

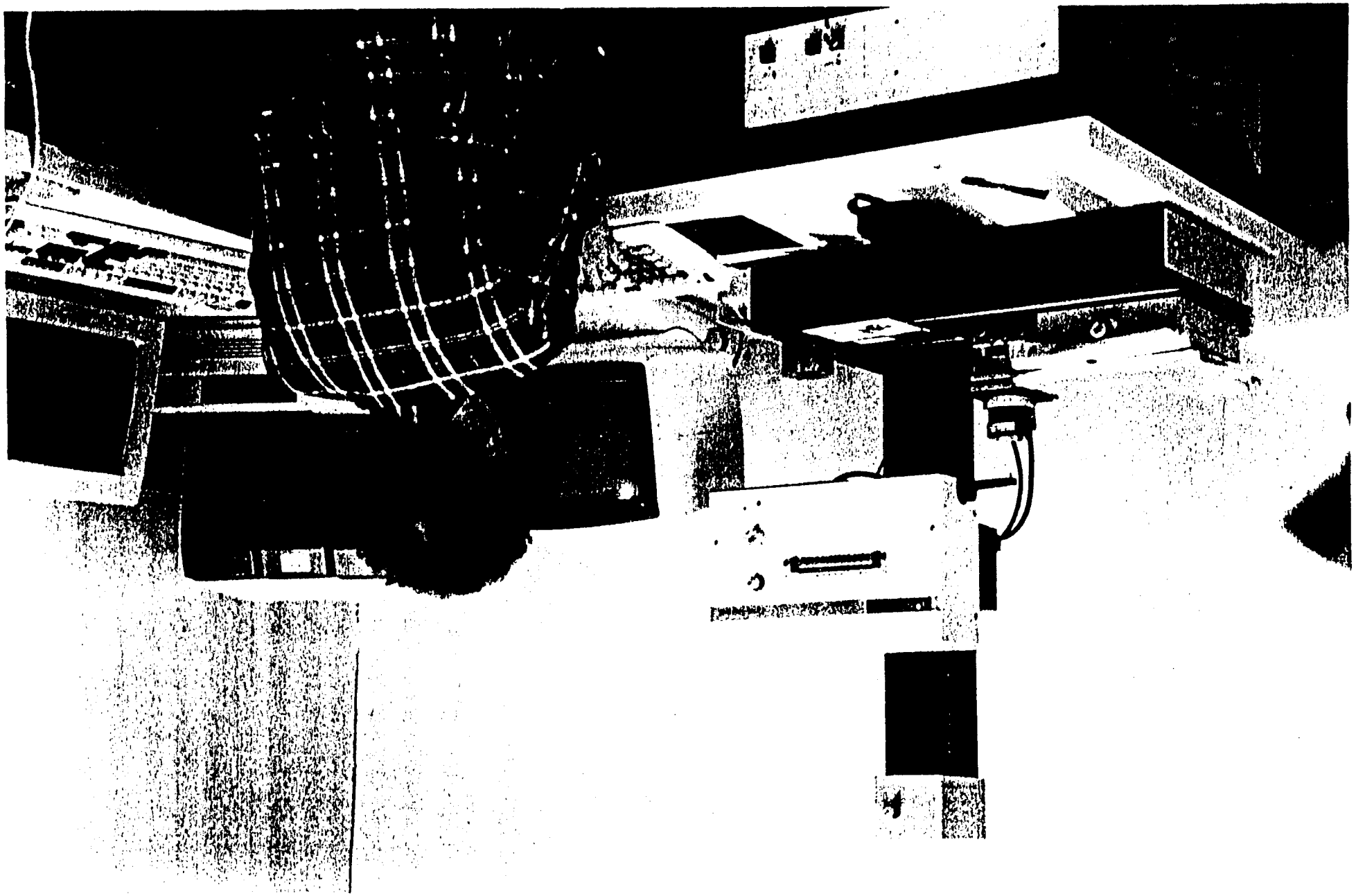
ATOMIC FORCE/ LATERAL FORCE/ SCANNING TUNNELING MICROSCOPE

- Surface topography of energetic materials on an atomic scale
- Tribology of energetic materials on an atomic scale
- Replacement cost: $200K



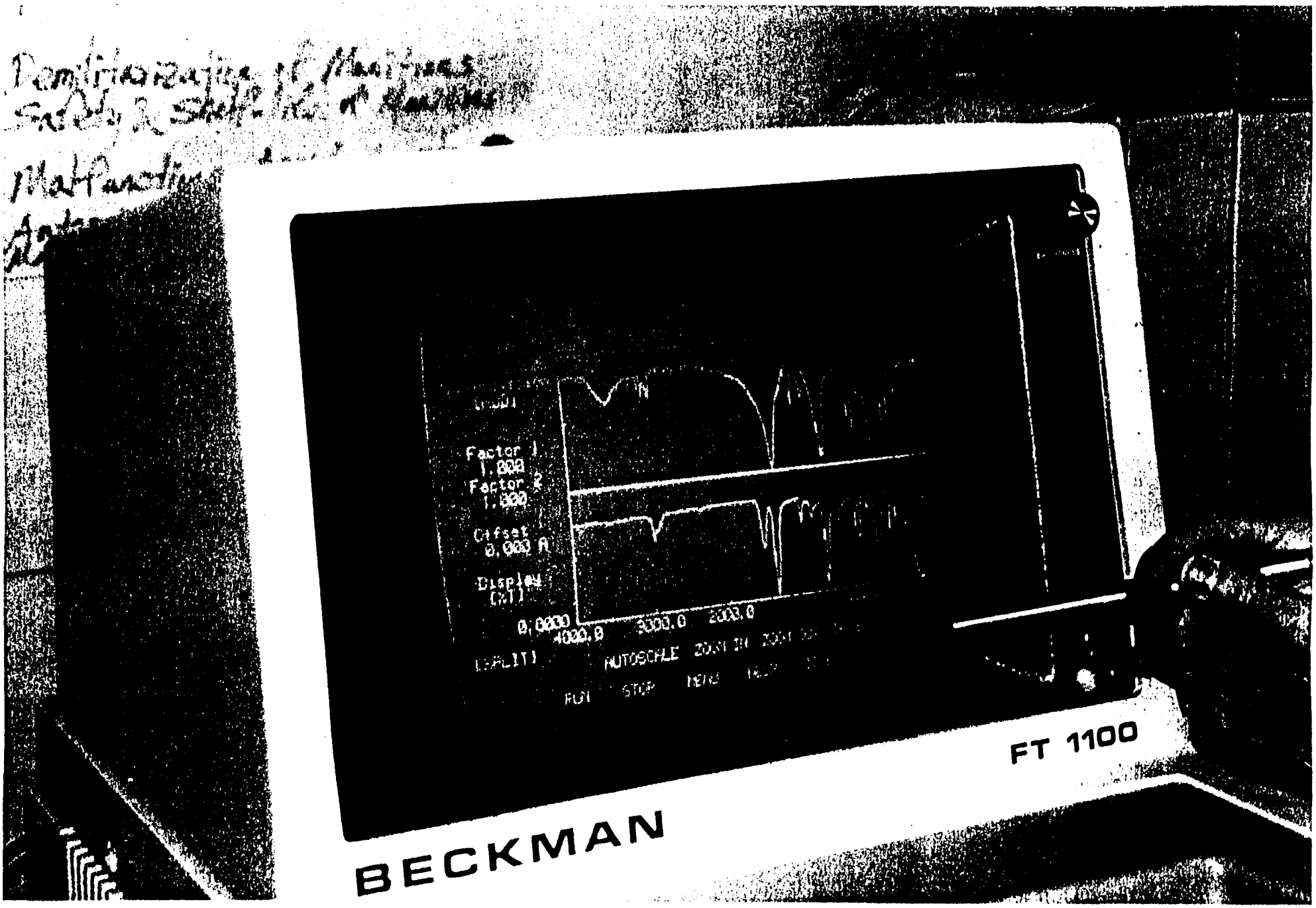
LASER PROFILOMETER

- Fracture surface topography of energetic materials
- Power spectral analysis of fracture surface of energetic materials
- Replacement cost: 150K



FOURIER TRANSFORM INFRA-RED SPECTROPHOTOMETER

- ENERGETIC MATERIALS RESEARCH FACILITY
  - Identification and analysis including multicomponent analysis of known and unknown energetic materials


Factor 1
1.000
Factor 2
1.000
Offset
0.000 N
Disp/N
[X1]
0.0000
-1000.0
3000.0
2000.0
AUTOSCALE
RUN
STOP
FT 1100
BECKMAN

LIQUID CHROMATOGRAPH - MASS SPECTROMETER

- ENERGETIC MATERIALS RESEARCH FACILITY
  - Separation and identification of trace quantities of unknown energetics and related materials

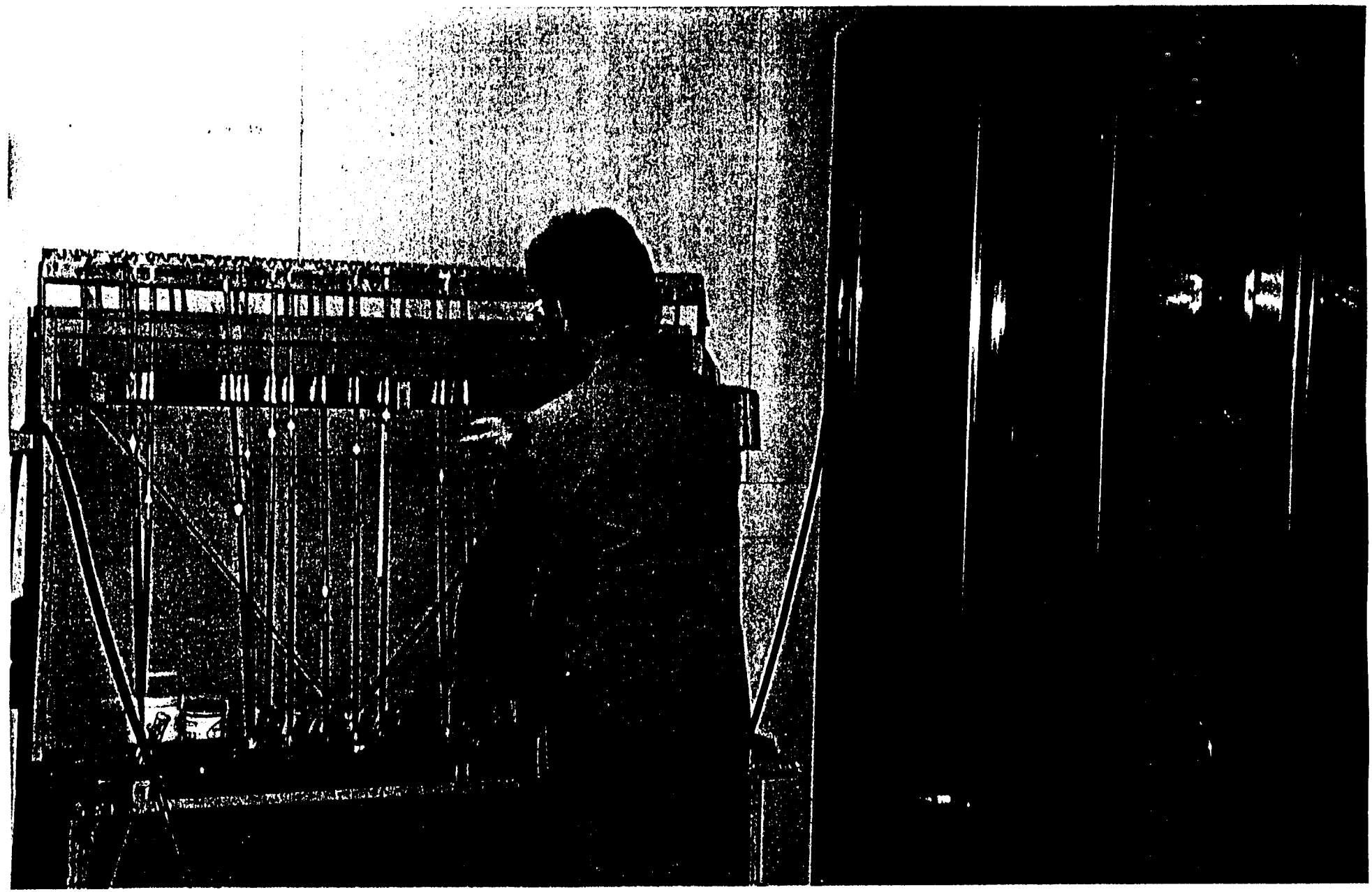
PRESIDENT'S
ANTENNA

DIFFERENTIAL SCANNING CALORIMETER

- ENERGETIC MATERIALS RESEARCH FACILITY
  - Determination of the thermal behavior including explosion temperature of energetic materials

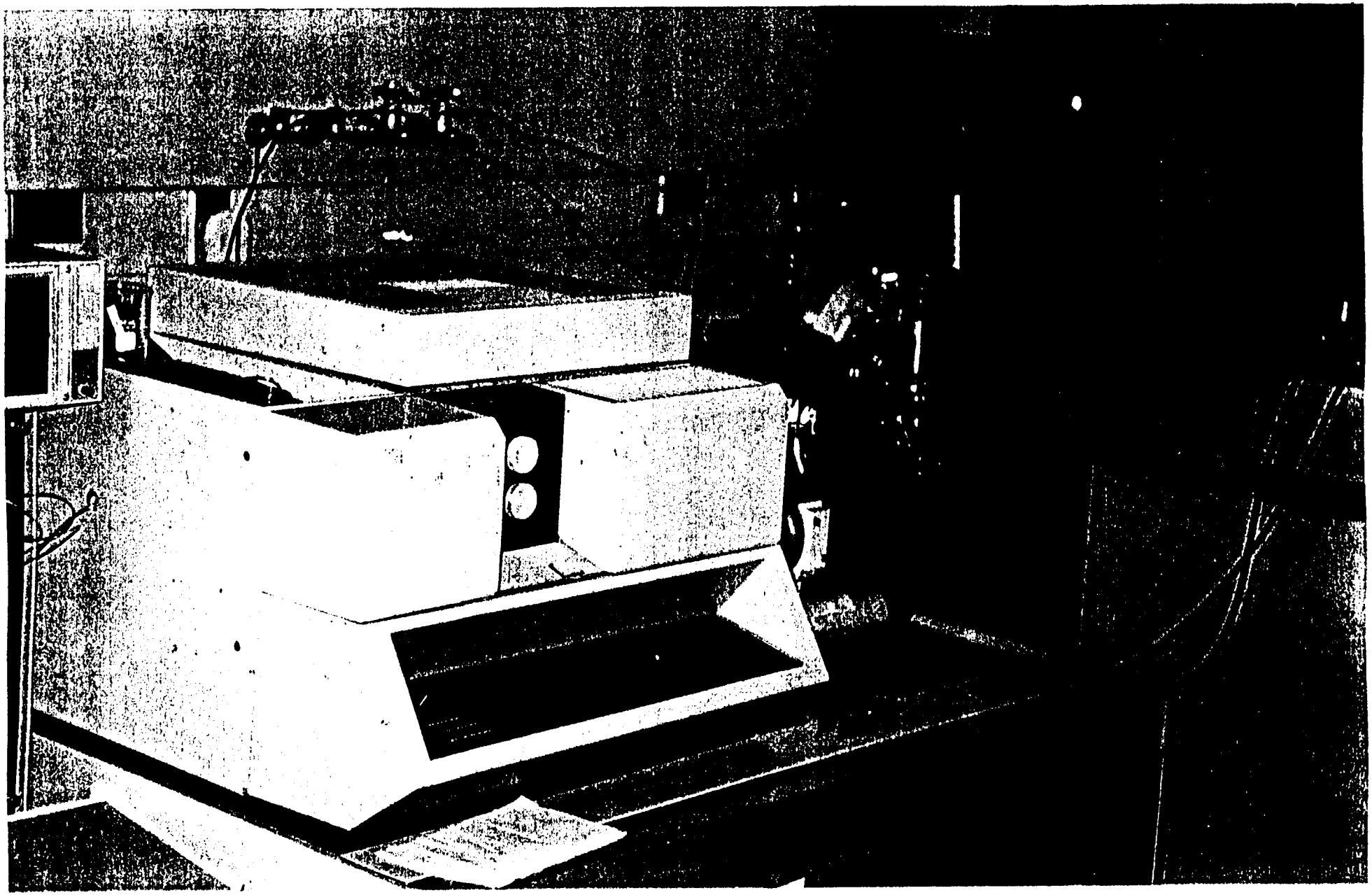
STABILITY TESTING

- ENERGETIC MATERIALS RESEARCH FACILITY
  - Determine the stability of energetic material and compatibility of energetic material with munitions components found in the weapons systems



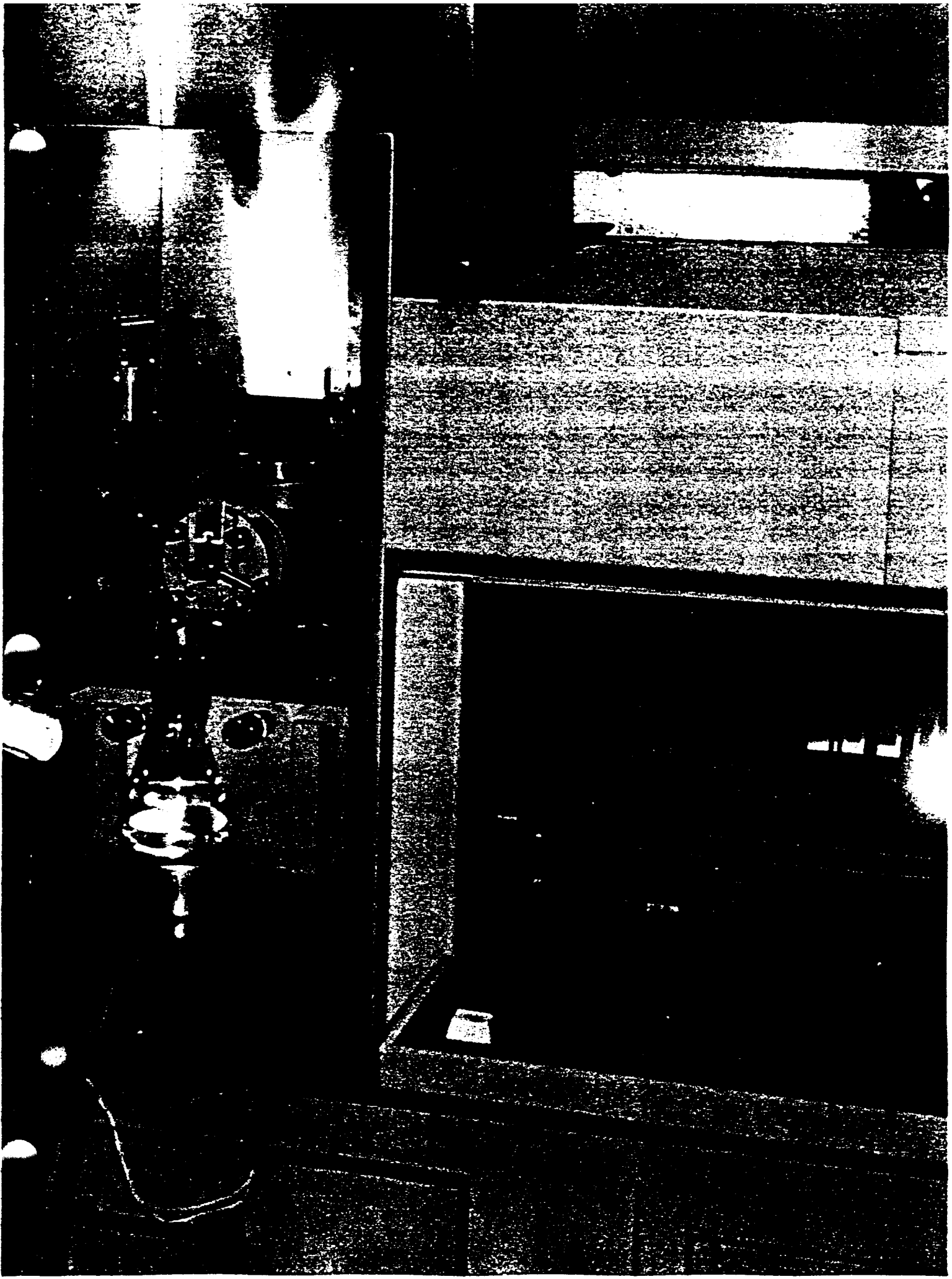
DIRECT EXPOSURE PROBE MASS SPECTROMETER

- ENERGETIC MATERIALS RESEARCH FACILITY
  - Identification of diverse trace quantities of organic unknowns



ATOMIC ABSORPTION SPECTROPHOTOMETRY

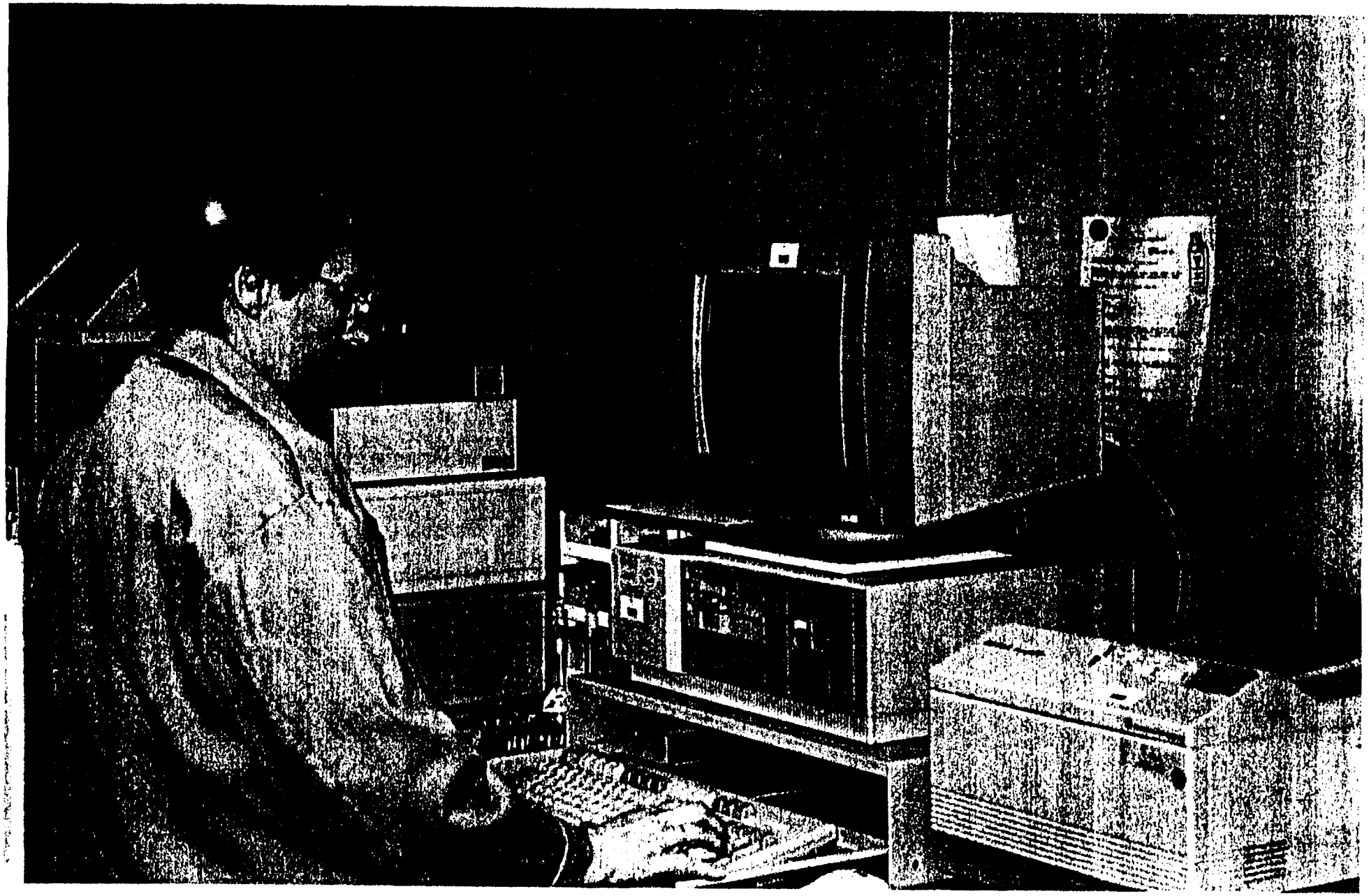
- ENERGETIC MATERIALS RESEARCH FACILITY
  - An analytical method for quantifying metals.



HIGH PERFORMANCE LIQUID CHROMATOGRAPH

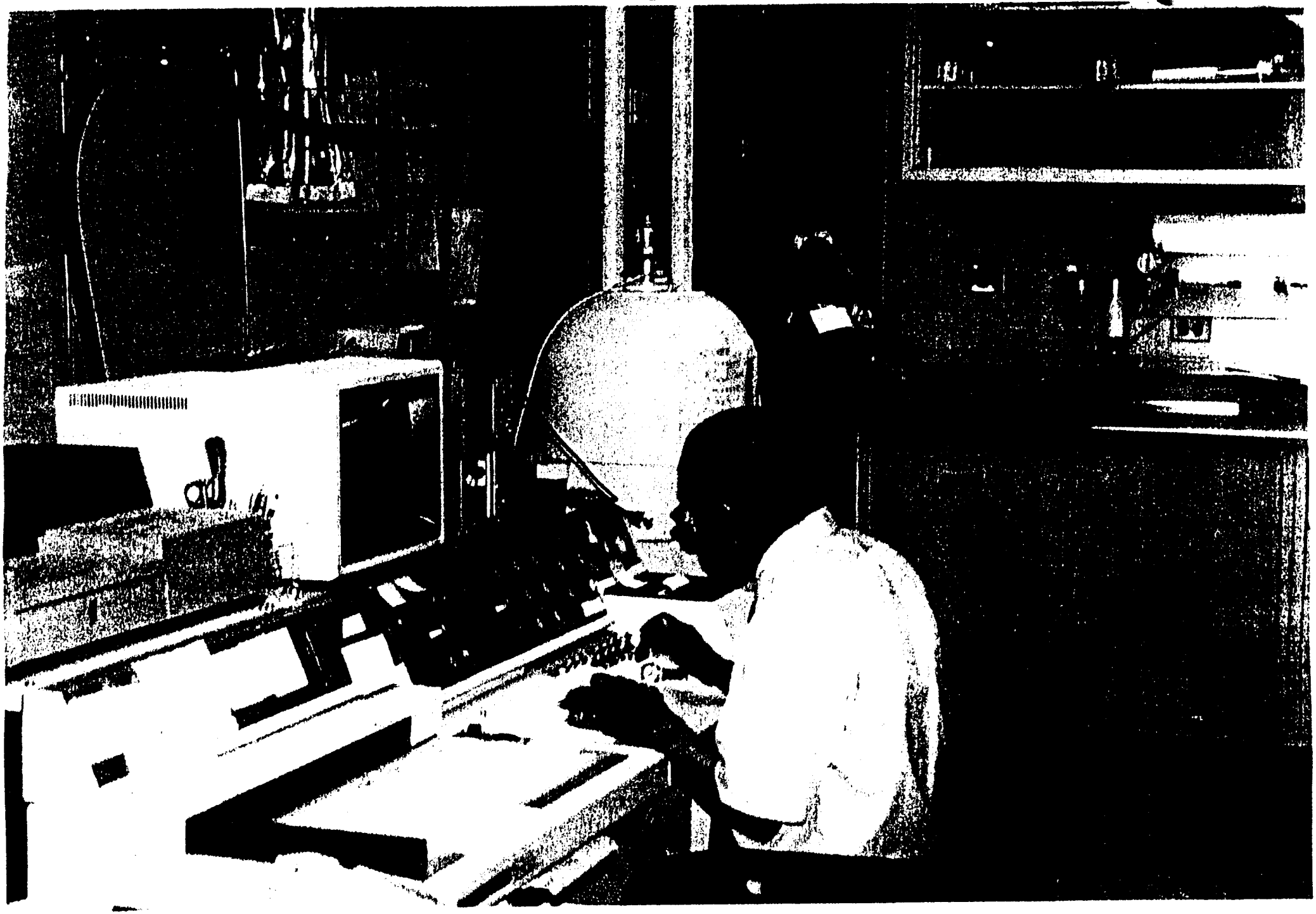
- Energetic Materials Research Facility

  - Separates components of complex mixtures for qualitative and quantitative analysis



NUCLEAR MAGNETIC RESONANCE SPECTROMETER

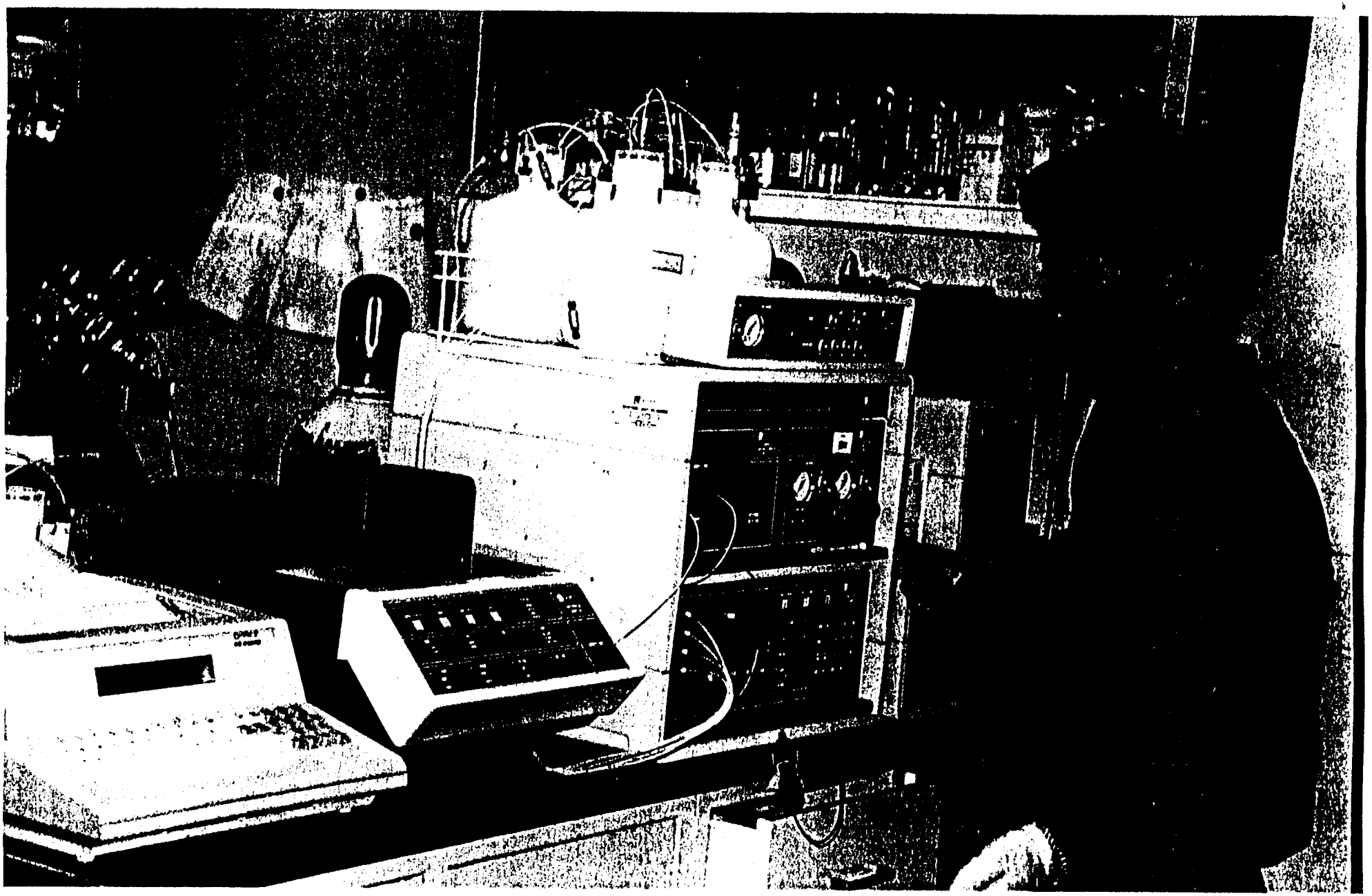
- ENERGETIC MATERIALS RESEARCH FACILITY
  - Study interaction of various ingredients of energetic materials.



ION CHROMATOGRAPH

- Energetic Materials Research Facility

  - Determines ionic substances in diverse matrices including energetic materials formulations and hazardous wastes



UV Visible Spectrophotometer

- Energetic Materials Research Facility

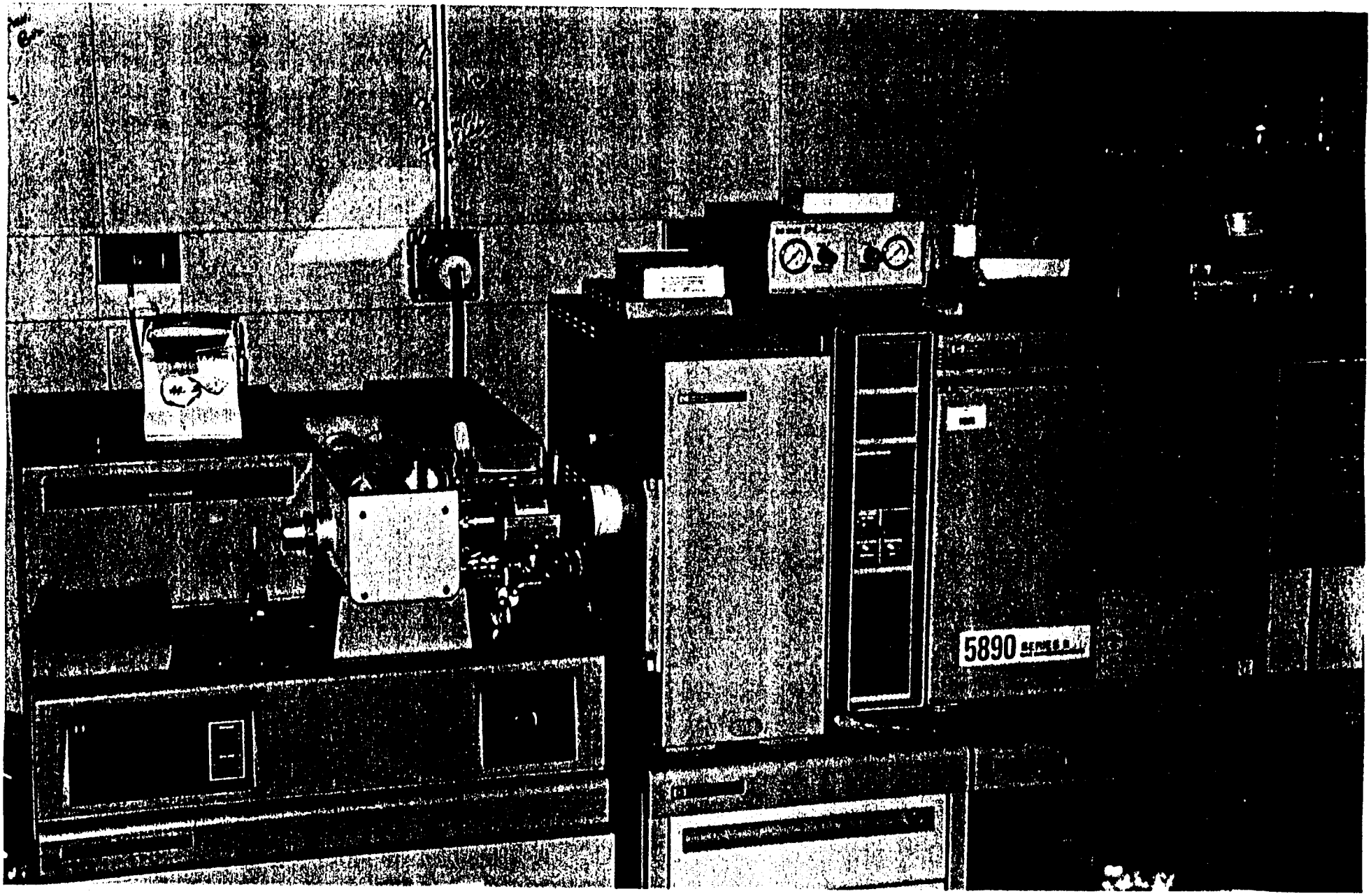
  - Determines the absorbance of substances in the ultra-violet and visible frequency ranges.

8450A UV/VIS SPECTROPHOTOMETER
HEWLETT PACKARD

GAS CHROMATOGRAPH FOURIER TRANSFORM INFRA-RED MASS SPECTROMETER

- Energetic Materials Research Facility

  - Separates complex mixtures of substances and identifies each by its infra-red and/or mass spectrum


5890

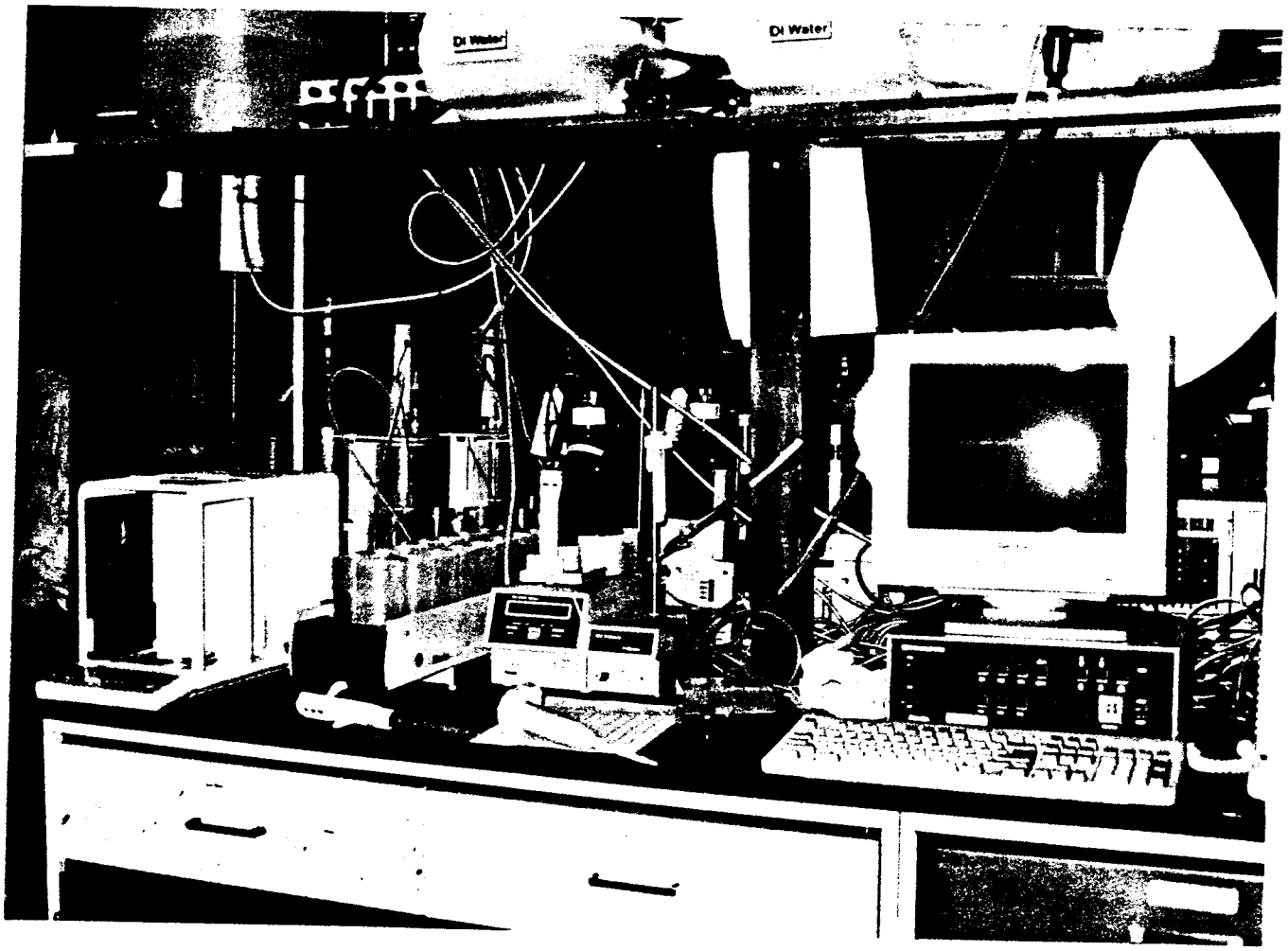
GAS CHROMATOGRAPH/MASS SPECTROMETER

- Energetic Materials Research Facility
  - Separates mixtures into component parts
  - Identifies and quantifies various chemical components

WORK TABLE
TITRATION AND LIQUID CHROMATOGRAPHY BENCH

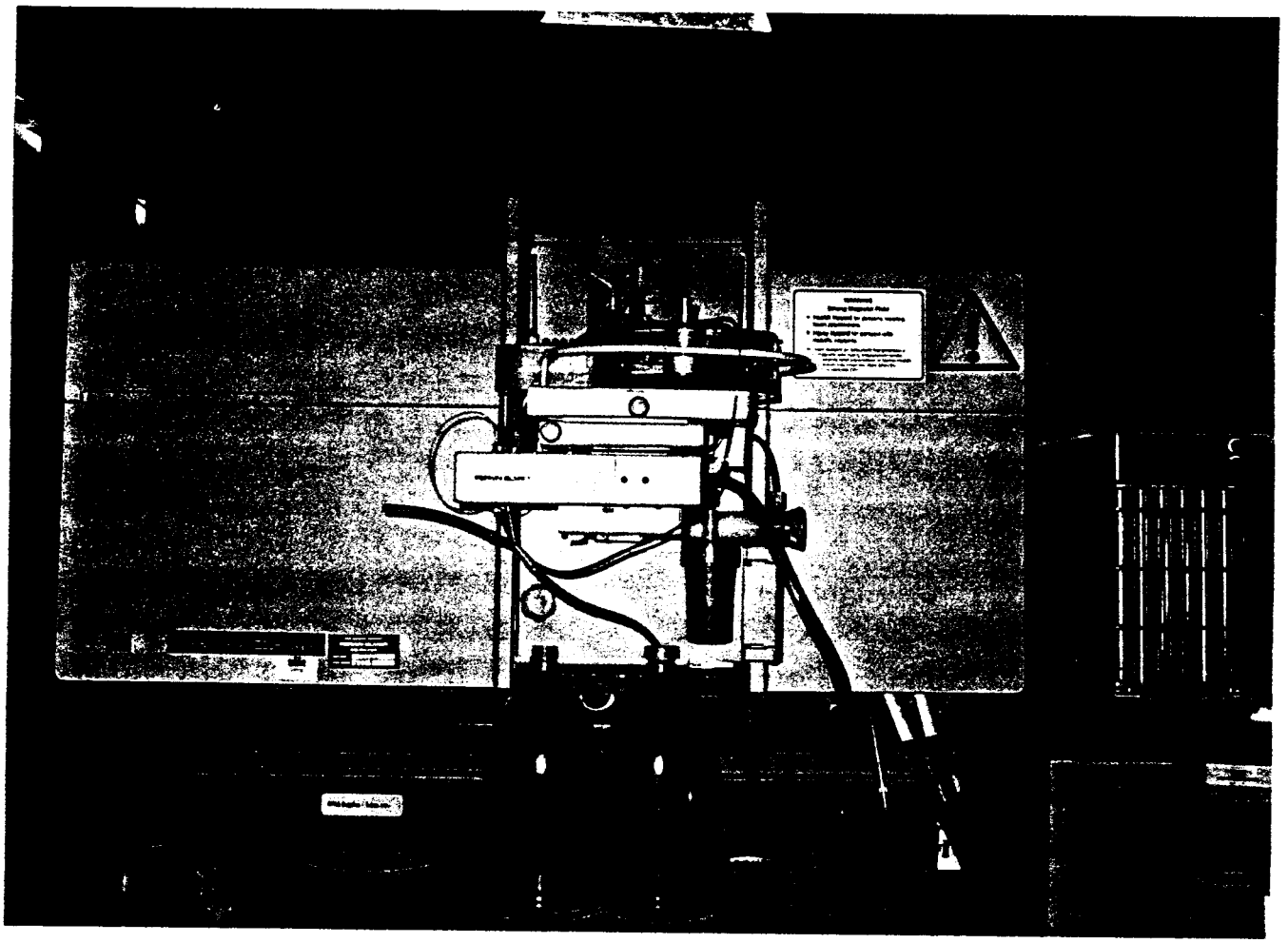
ANALYSIS OF PROPELLANT FOR FREE ACID, FREE BASE, MAJOR AND MINOR COMPONENTS, AND DEGRADATION PRODUCTS.

TITRATOR - AUTOMATED SYSTEM
DETERMINATION AND QUANTITATION OF NITRIC ACID, HAN, AND TEAN IN LIQUID PROPELLANT

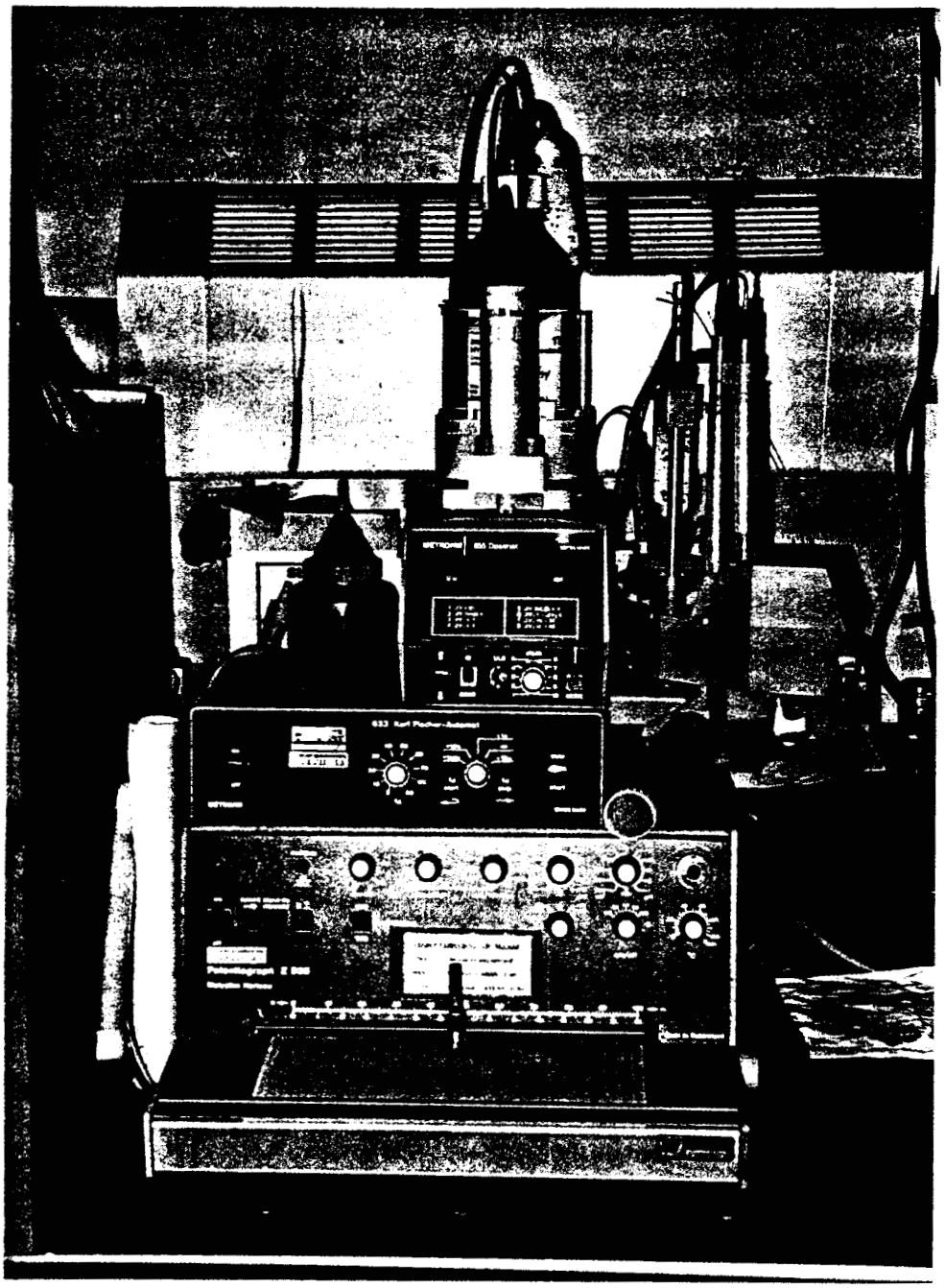


GRAPHITE FURNACE ATOMIC ADSORPTION SPECTROPHOTOMETER

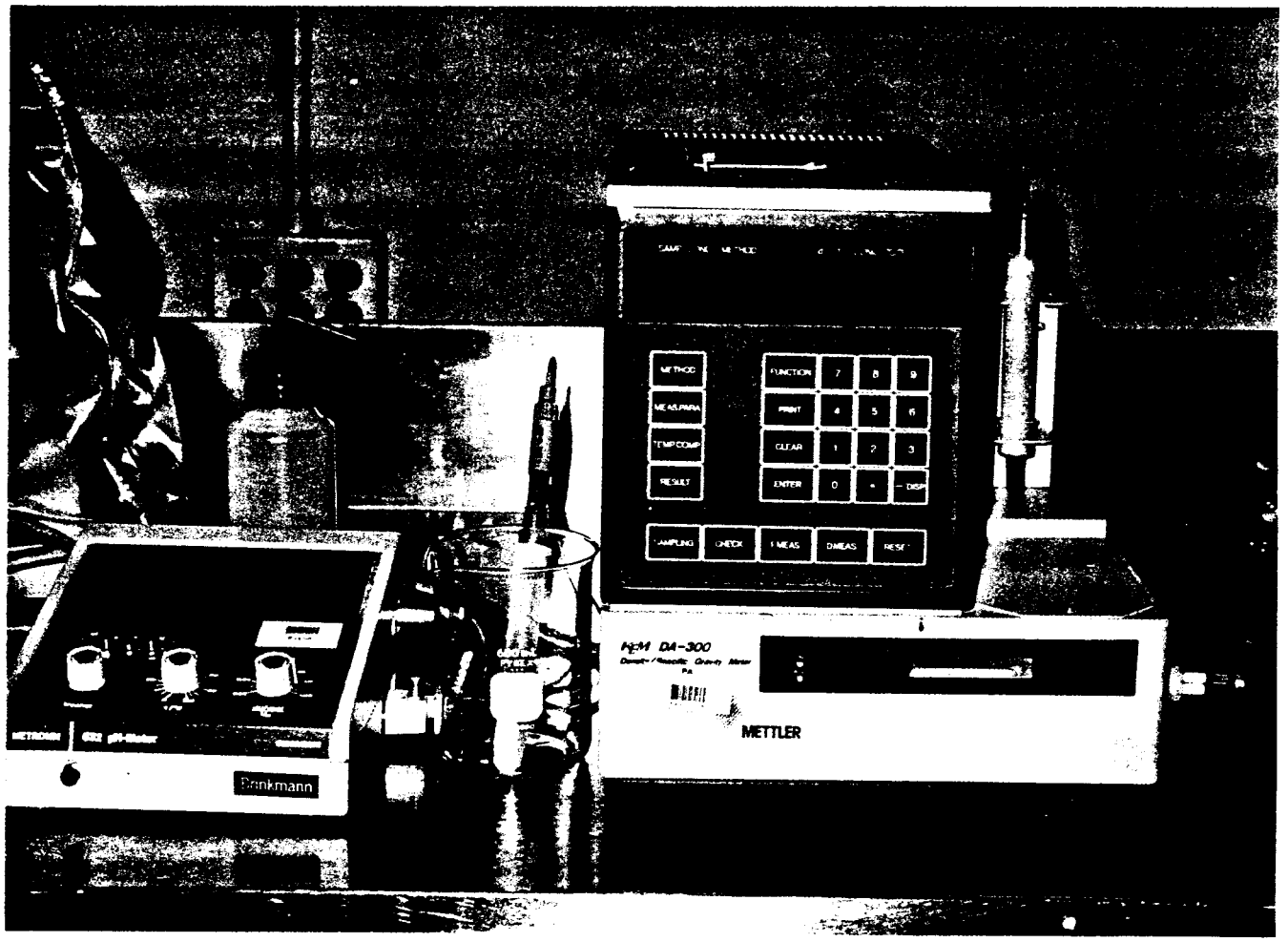
DETERMINATION OF METALS IN PROPELLANT SAMPLES



KARL FISCHER
QUANTITATION OF WATER IN LIQUID PROPELLANT BY KARL FISCHER TITRATION



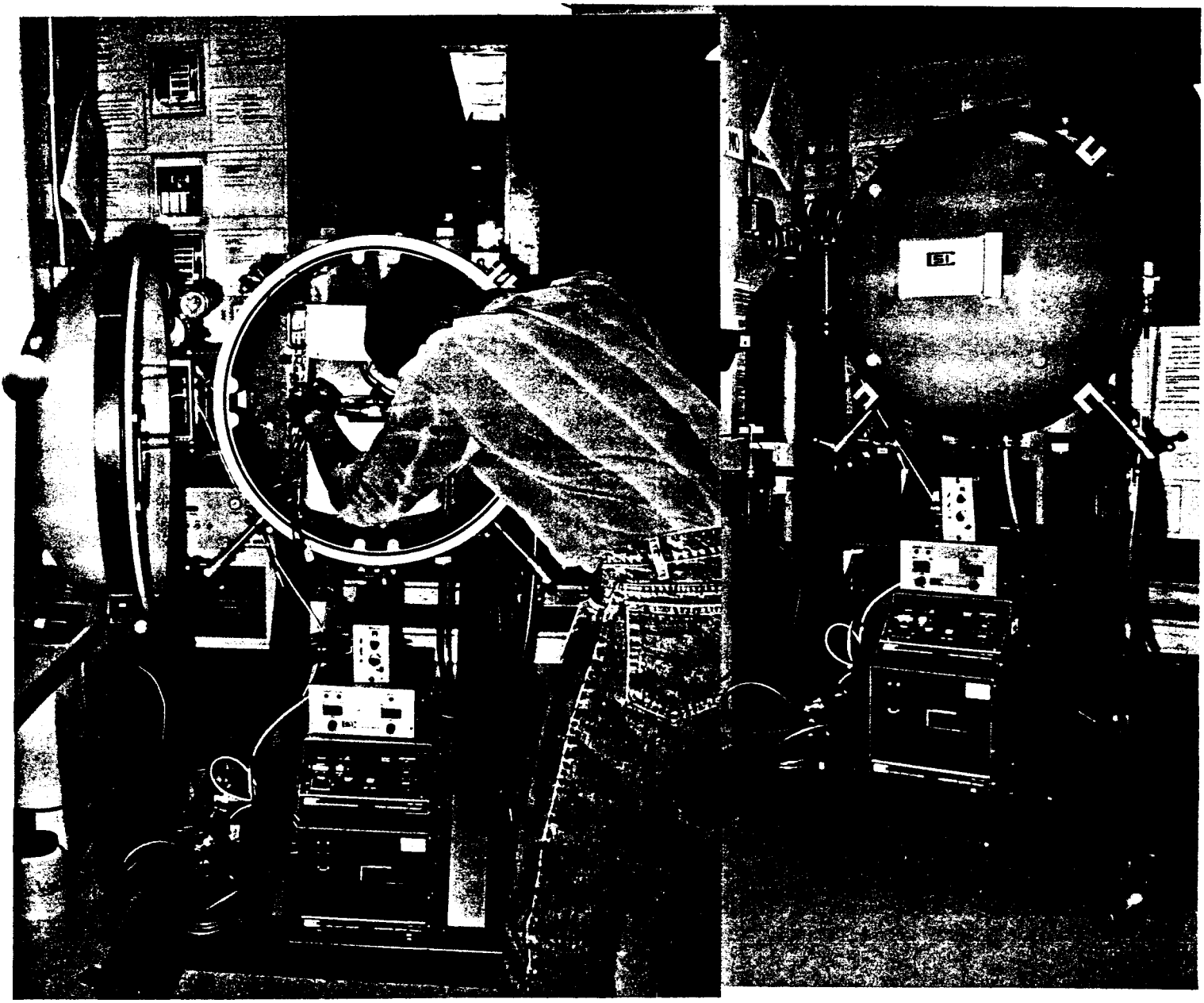
DENSITOMETER
DENSITY MEASUREMENTS OF LIQUID PROPELLANT



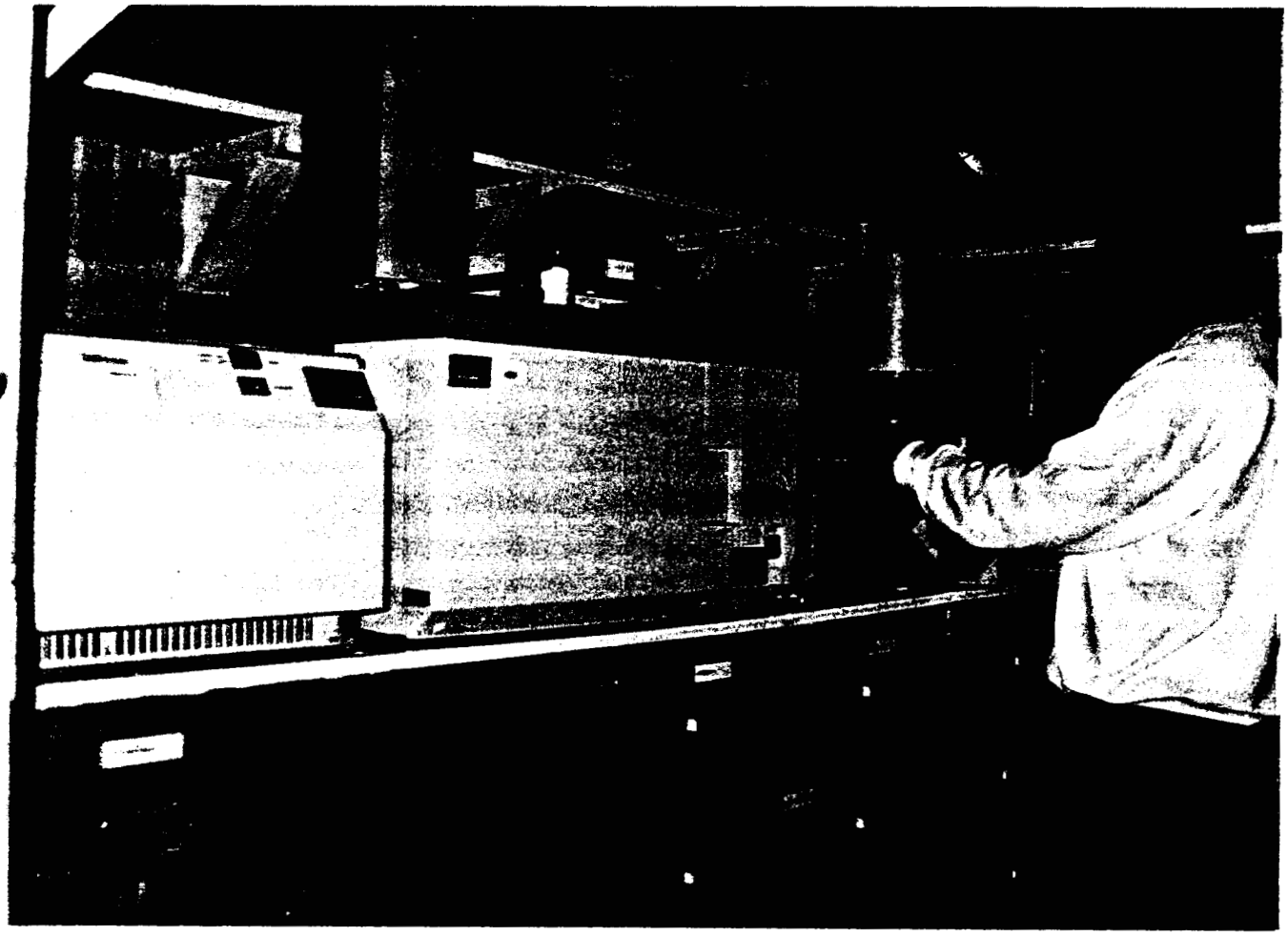
ICP/MS (INDUCTIVELY COUPLED PLASMA/MASS SPECTROMETER) IDENTIFICATION AND QUANTITATION OF METALS IN LIQUID PROPELLANT BY MASS SPECTROMETRY

GFAA (GRAPHITE FURNACE ATOMIC ABSORPTION SPECTROMETER) ANALYSIS OF METALS IN LIQUID PROPELLANT BY ATOMIC ABSORPTION

ARC (ACCELERATING RATE CALORIMETER) IGNITION TEMPERATURE AND PRESSURE PROFILES OF LIQUID PROPELLANT



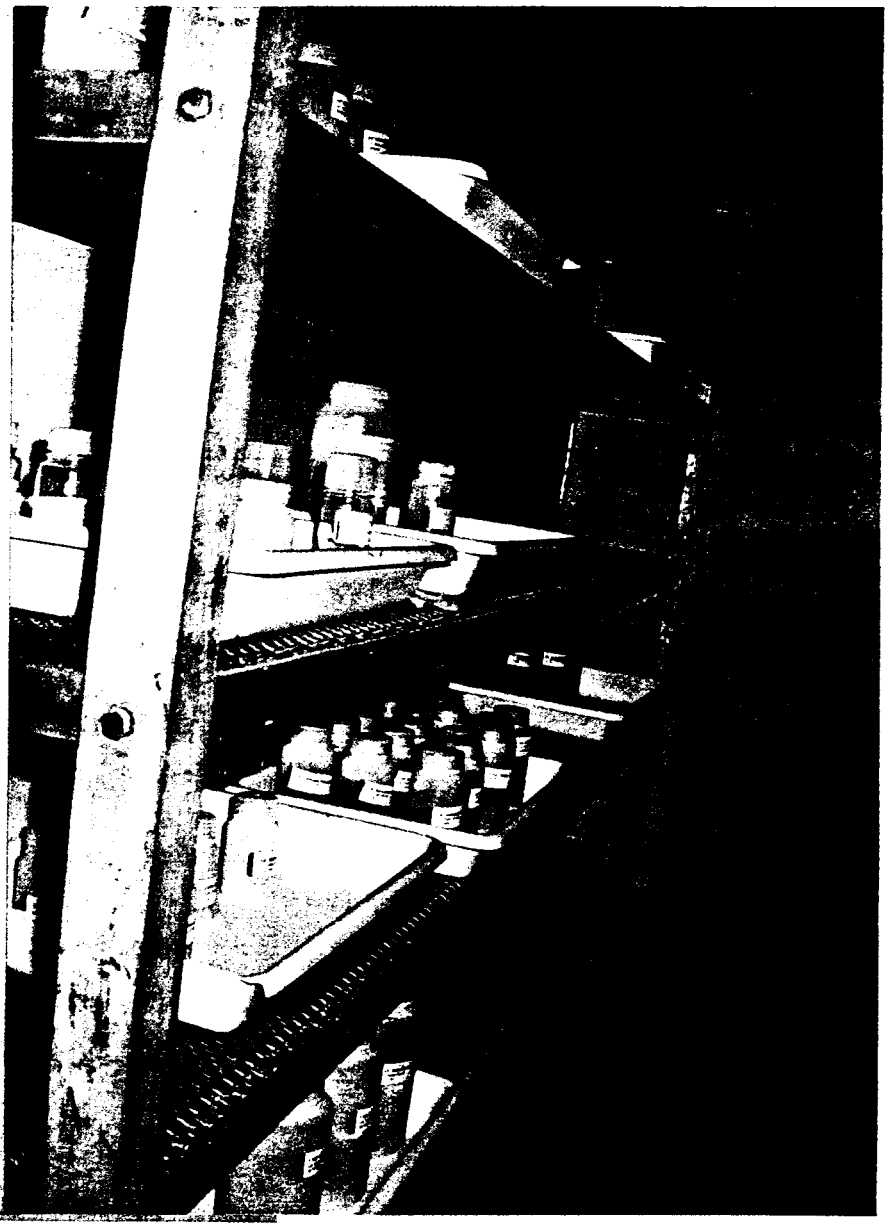
GC/MS (GAS CHROMATOGRAPHY/MASS SPECTROMETER) IDENTIFICATION OF GAS PHASE DEGRADATION PRODUCT S OF LIQUID PROPELLANT



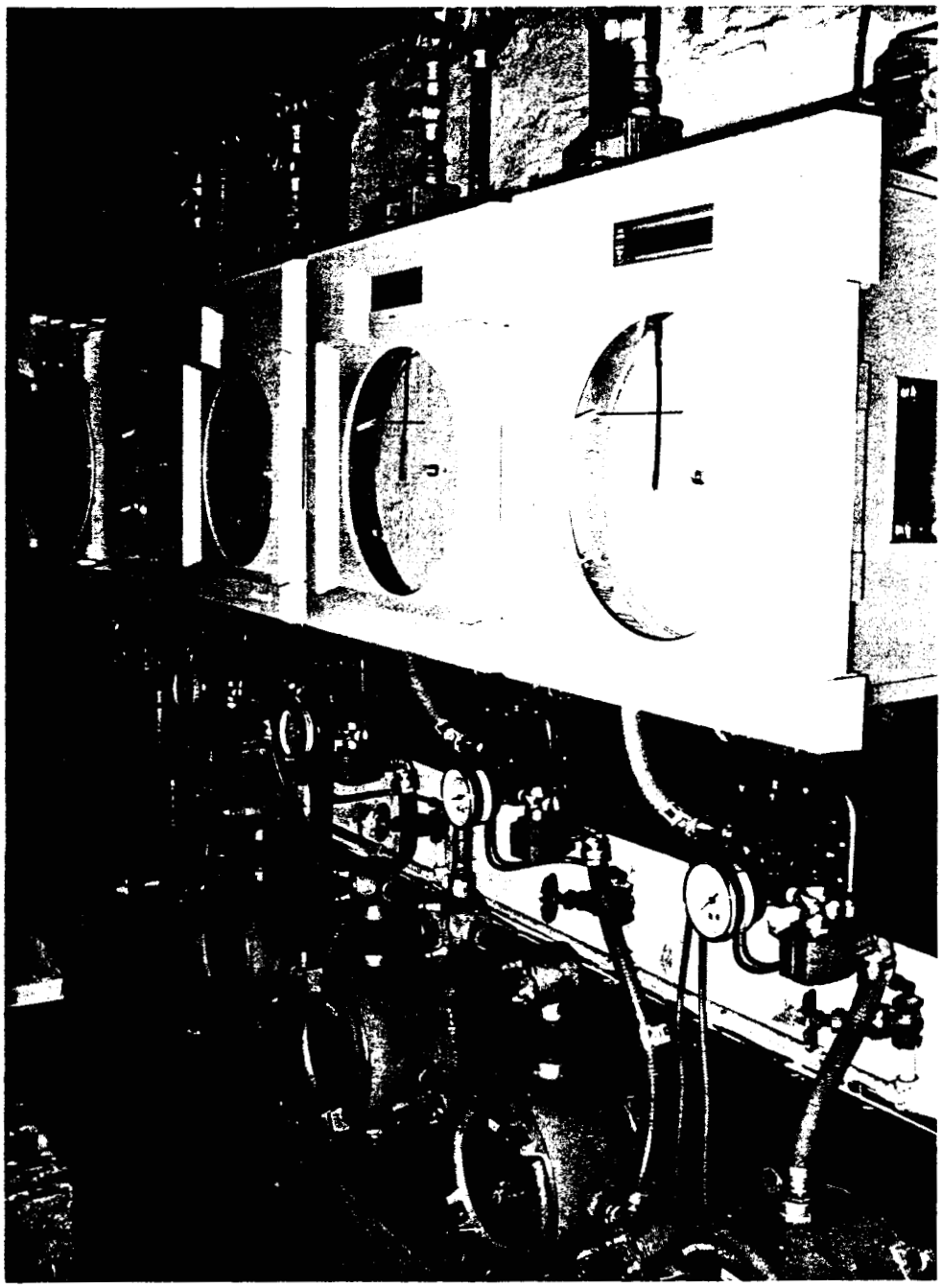
BUILDING 900

TEMPERATURE CONDITIONING CHAMBERS FOR LIQUID PROPELLANT SURVEILLANCE STUDIES

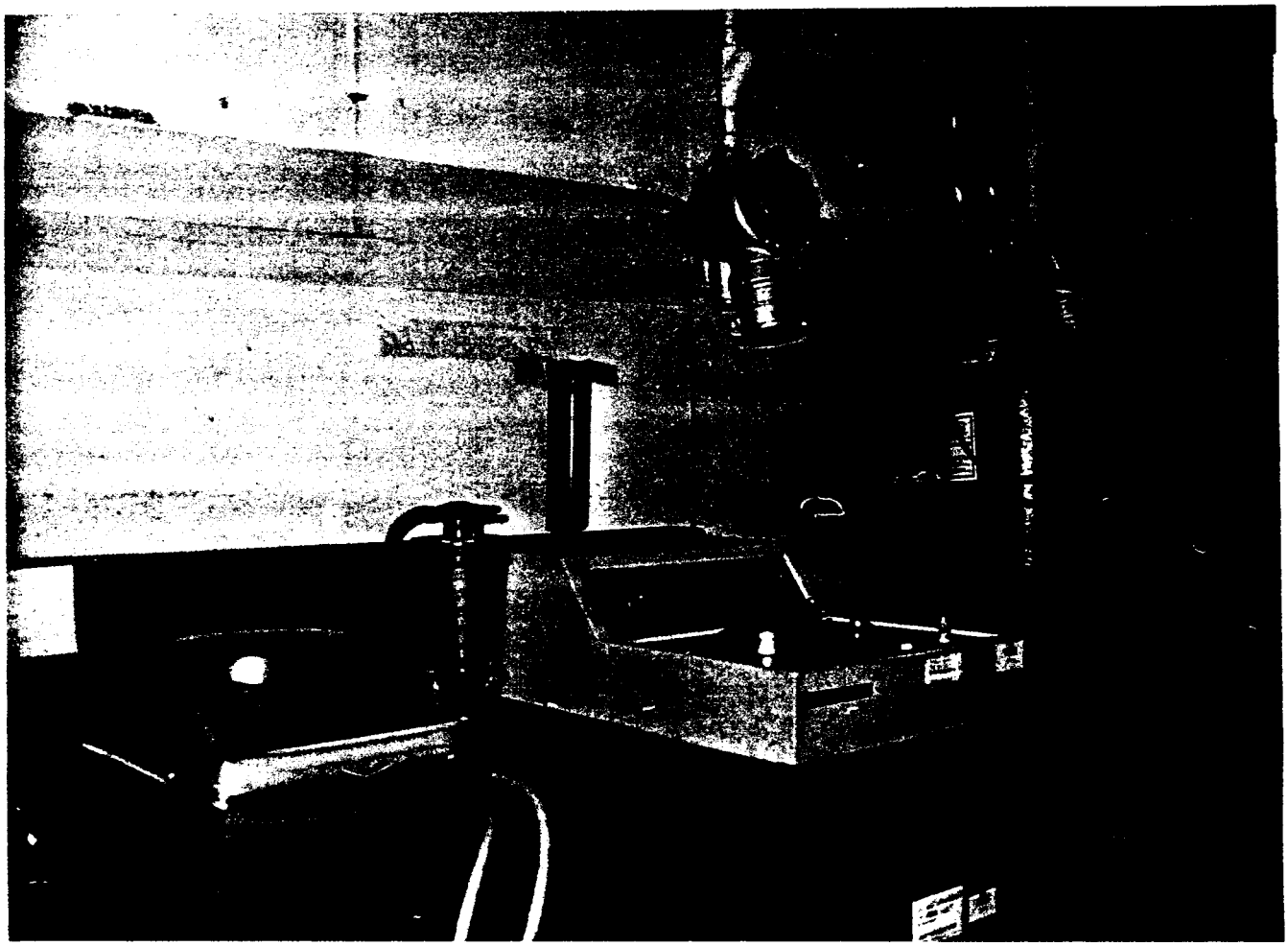
TEMPERATURE CONDITIONING CHAMBERS FOR LIQUID PROPELLANT SURVEILLANCE STUDIES



CONDITIONING CHAMBER TEMPERATURE CONTROLLERS

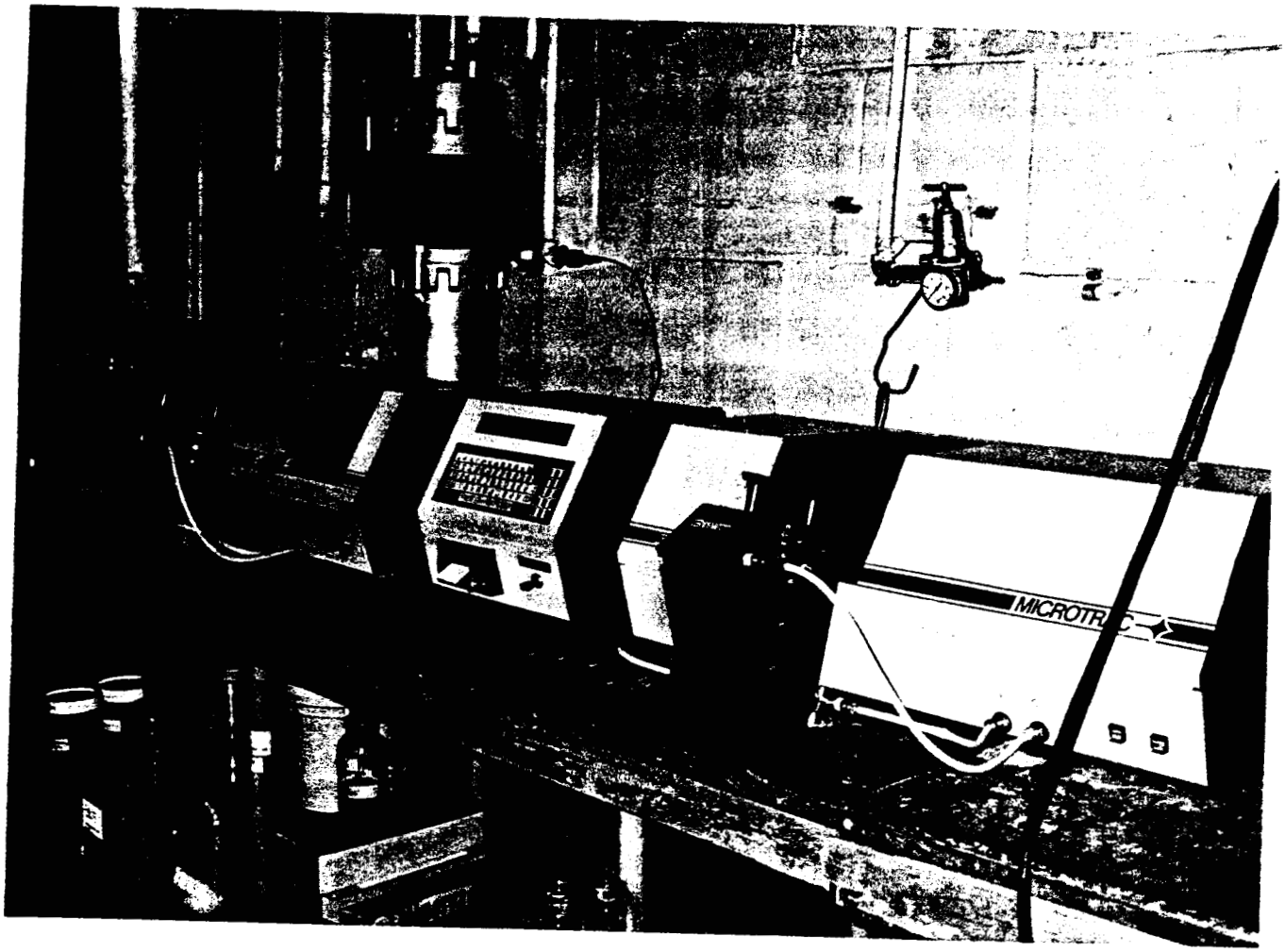


TEST EQUIPMENT USED FOR DETERMINING THE SPECIFIC GRAVITY OF PROPELLANT GRAIN SAMPLES

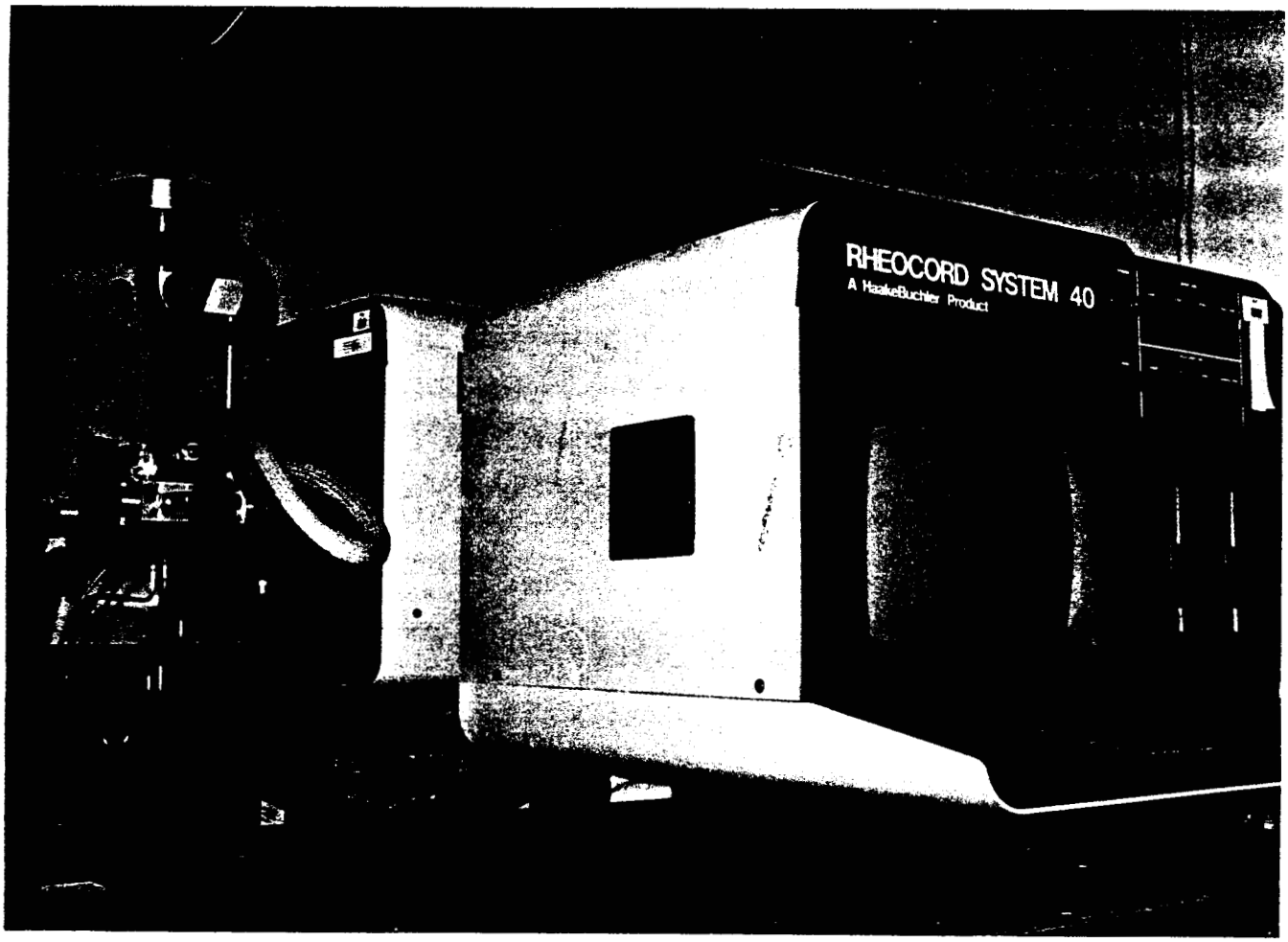


MICROTRAC PARTICLE SIZE ANALYZER

SMALL PARTICLE SIZE ANALYZER 0-4a MICRON AND STANDARD RANGE ANALYZER TO 300 MICRON. DETERMINES PARTICLE SIZE AND DISTRIBUTION

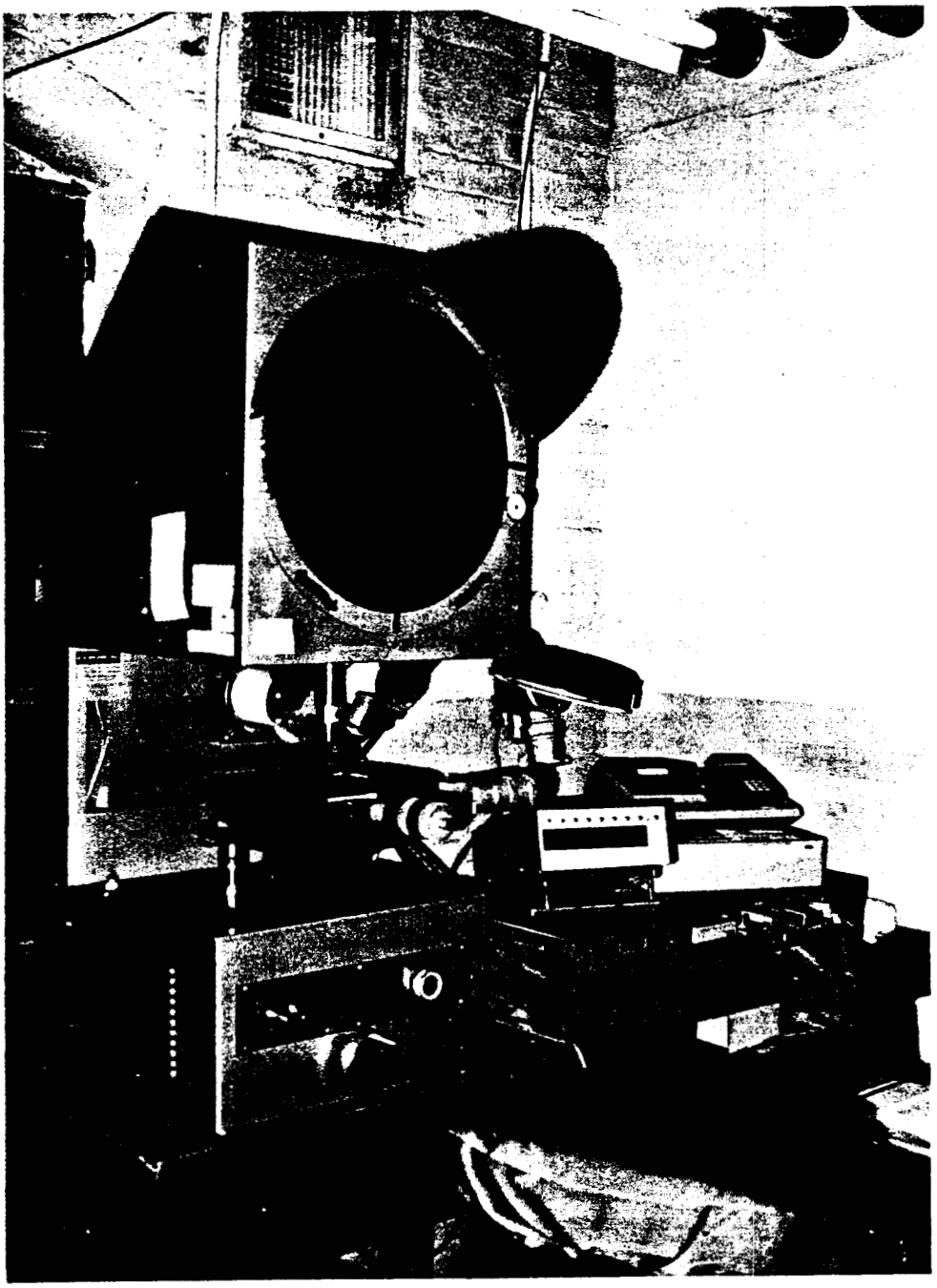


HAAKE RHEOMETER



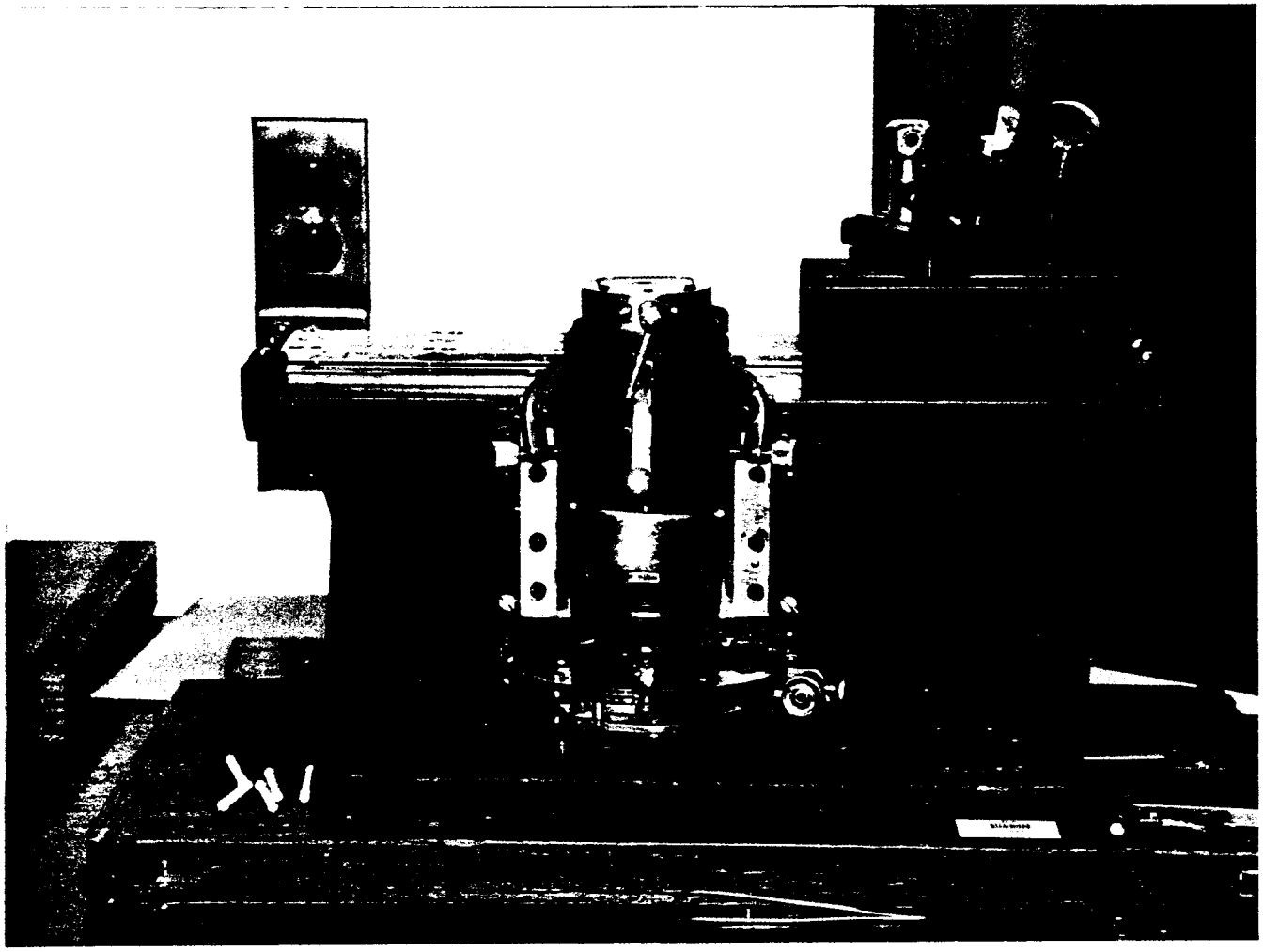
INSTRON TENSILE TEST
MECHANICAL PROPERTY STRENGTH OF MATERIAL TESTING

COMPUTERIZED TEST EQUIPMENT USED FOR DETERMINING THE DIMENSIONS OF PROPELLANT GRAIN SAMPLES

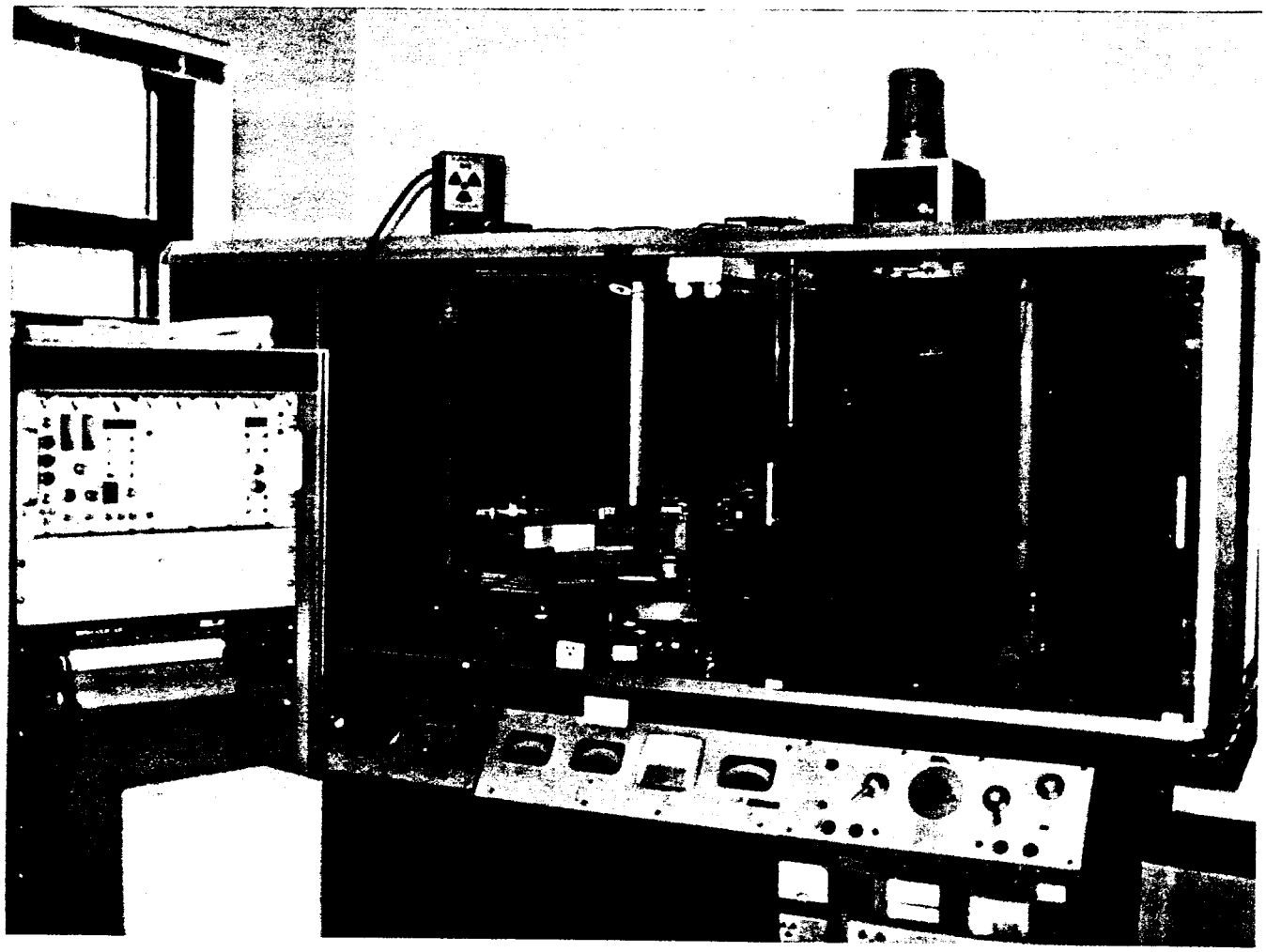


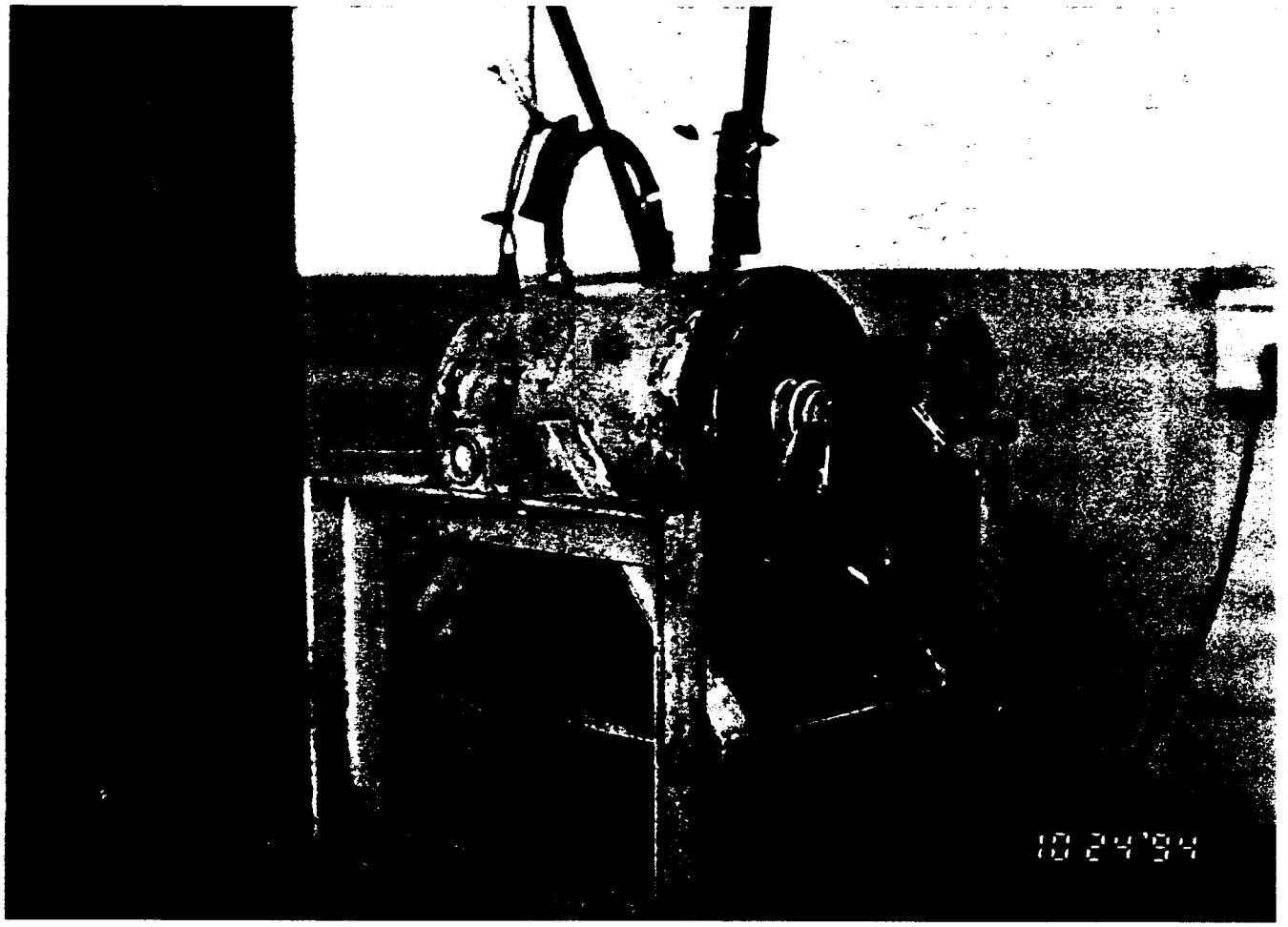
TEST EQUIPMENT USED TO PERFORM HOT FRAGMENT TESTING OF PROPELLANT SAMPLES

MICROTOME



X-RAY DIFFRACTOMETER



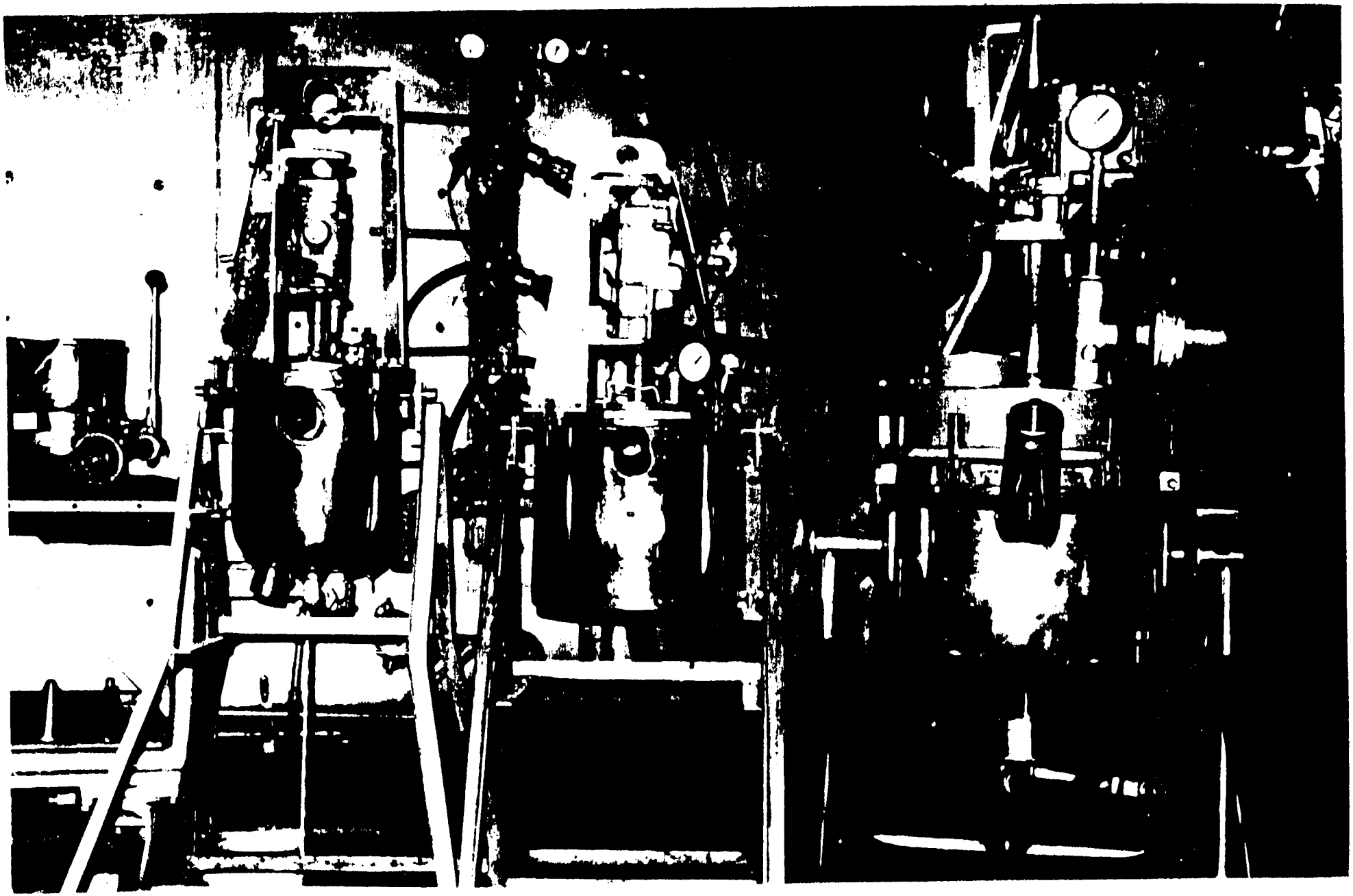


Instrumented Closed Bomb Test Fixture

C. FORMULATION CAPABILITY and PRODUCIBILITY CAPABILITY

MELT, CASTING, & CRYSTALLIZATION KETTLES

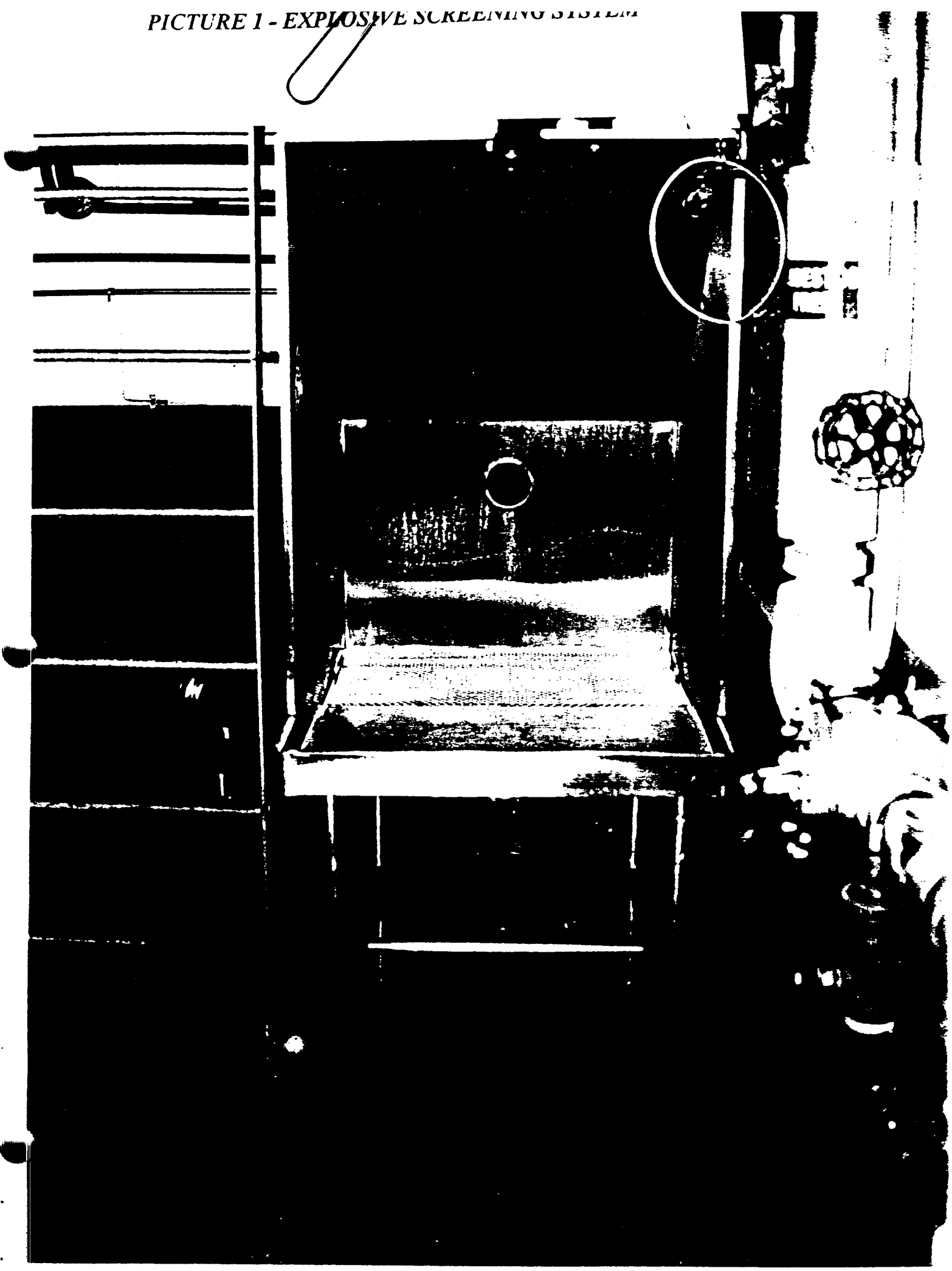
- BUILDING 230
  - Jacketed stainless steel kettles equipped with flat or round bottoms, and anchor, turbine, multi-mode agitator systems with capacities ranging from 10 to 100 gallons.
  - Used to formulate and load melt castable explosive formulations, and develop slurry coating processes and crystallization procedures for new explosive formulations.



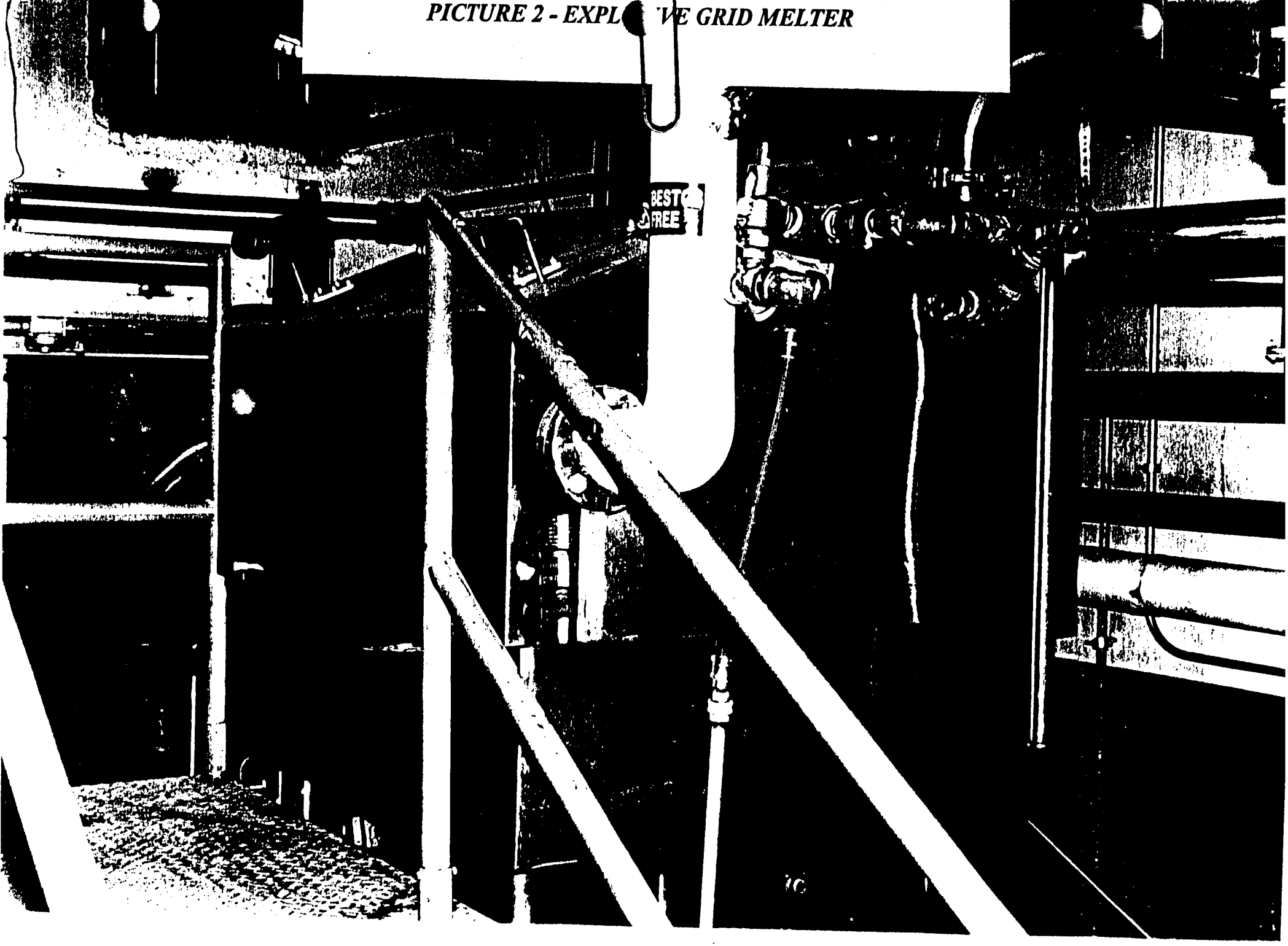
EXPLOSIVE MELT POUR FACILITY

- UNIQUE CONSTRUCTION
  - SAFETY DISTANCES (INTERIOR & EXTERIOR)
  - HIGH EXPLOSIVE LIMIT: 3500 LBS OF CLASS 1.1 EXPLOSIVES
  - REMOTE OPERATIONS
- UNIQUE EXPLOSIVES MELT POUR PILOT PLANT EQUIPMENT
  - SCREENERS (PICTURE 1)
  - GRID MELTERS (PICTURE 2)
  - VACUUM MELT KETTLES (PICTURE 3)
  - PROJECTILE POUR MACHINES
  - PROJECTILE CONTROLLED COOLING
  - ALLEN BRADLEY CONTROL SYSTEMS (PICTURE 4)
- PROGRAMS
  - CONTROLLED COOLING PROCESSES FOR MEDIUM AND LARGE CALIBER PROJECTILES
  - TNT CRYSTALLIZER SYSTEM

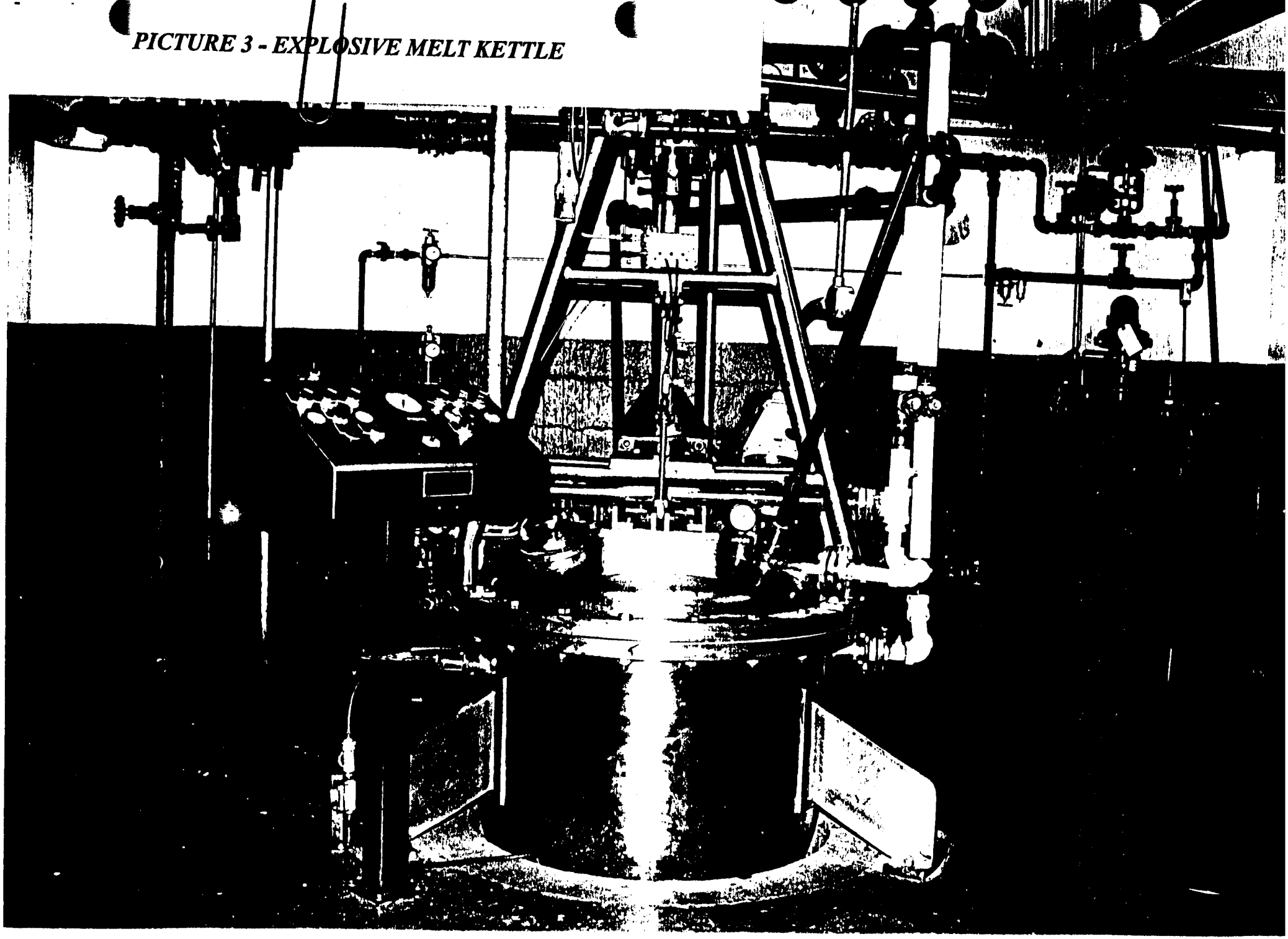
PICTURE 1 - EXPLOSIVE SCREENING SYSTEM



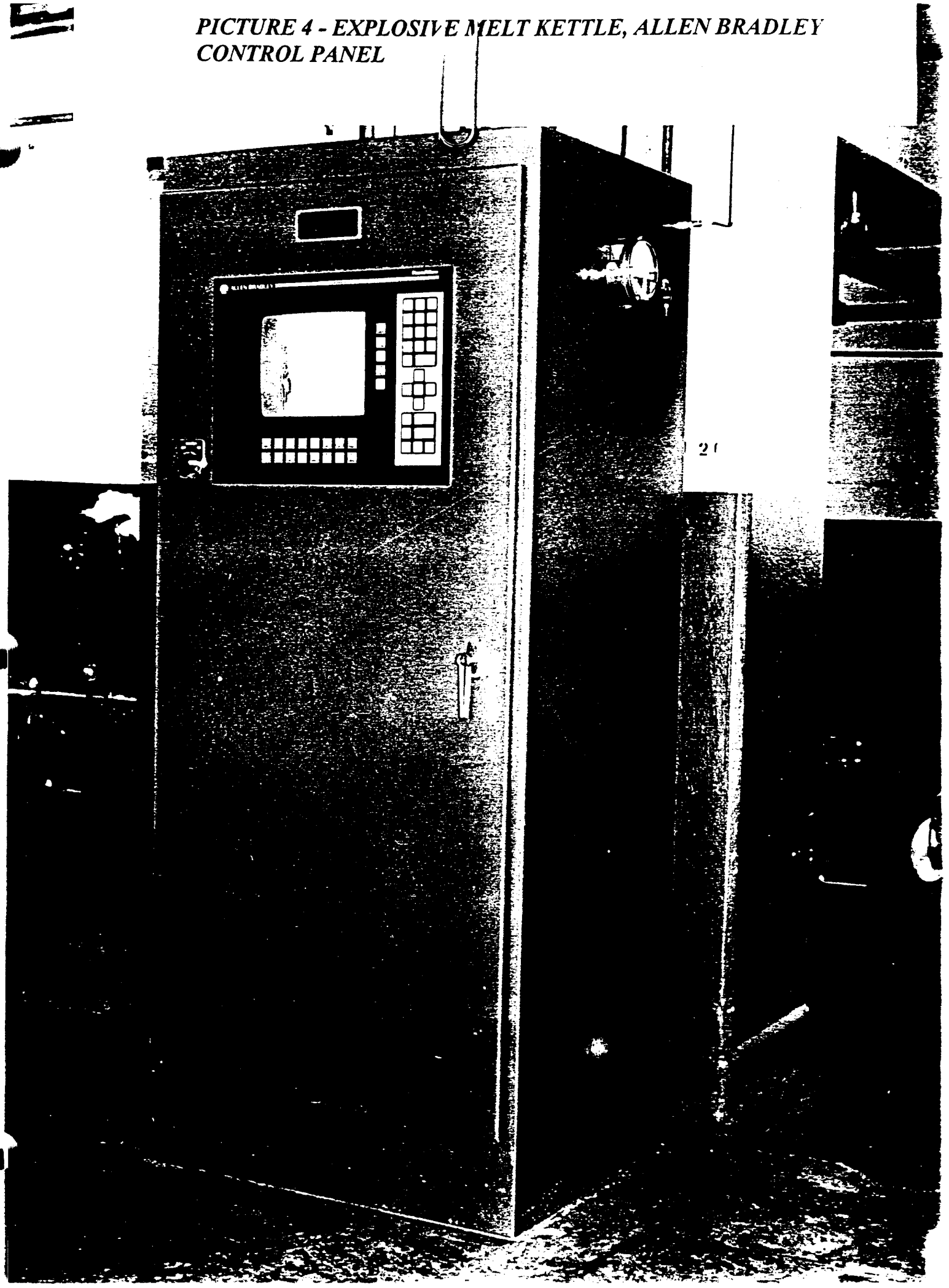
PICTURE 2 - EXPL[illegible]VE GRID MELTER



PICTURE 3 - EXPLOSIVE MELT KETTLE



PICTURE 4 - EXPLOSIVE MELT KETTLE, ALLEN BRADLEY CONTROL PANEL

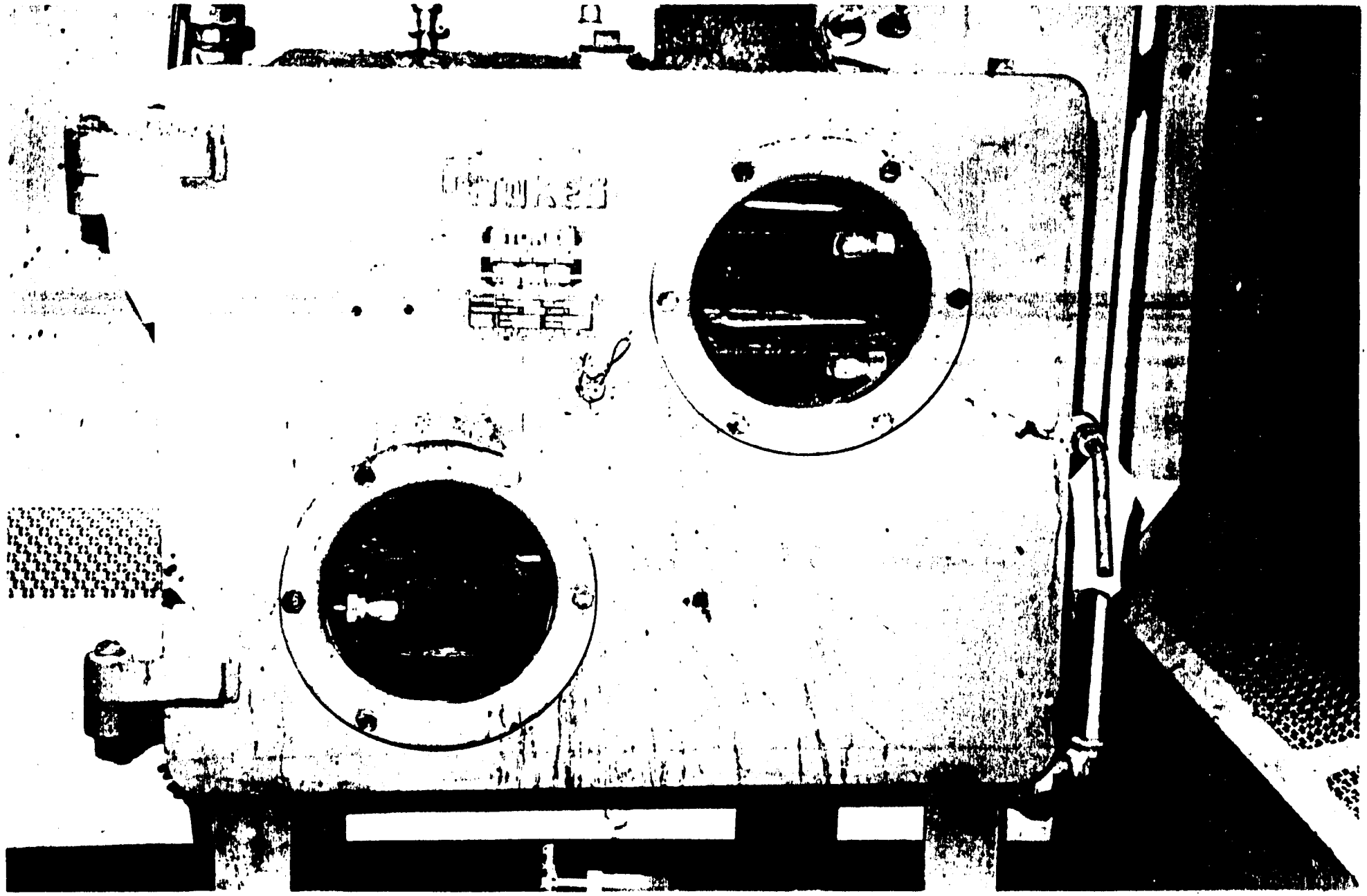


DRYING OVENS

- BUILDING 252
  - Hot oil heated vacuum chamber
  - Used to extract water and solvent from explosive powders and formulations.
  - Capable of drying 20 or more pounds of energetic materials at a time at full vacuum and temperatures as high as 350 F.

CURING OVENS

- BUILDING 252
  - Steam heated chamber for conditioning prototype warheads in order to cure the adhesives used in their assembly.

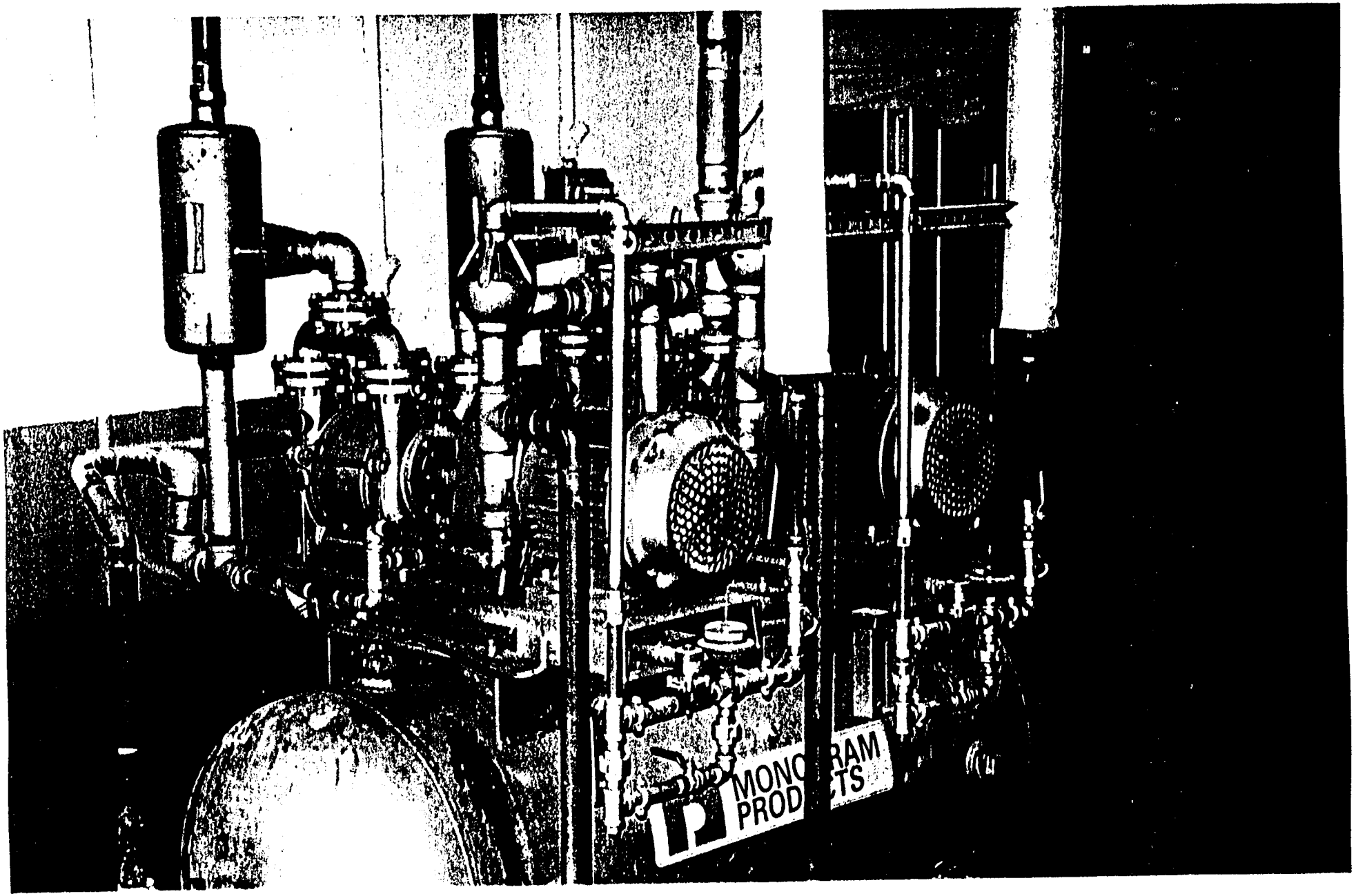


Fluidized Bed Spray Coater

- Location - Bldg. 252
  - Customized unit to investigate state-of-the-art manufacturing processes for coating and agglomerating explosive powders and granules.
  - Unique capability of producing dried product ready for use.
  - Existing slurry coating technology requires time consuming dewatering and drying steps to obtain useful product.
  - Controls permit both automatic and manual operation of the Fluidized Bed Spray Coater. Programmable process controllers control all process parameters.
  - Instrumentation of critical process parameters.
  - Capable of producing 2+ lb batches.

LIQUID PUMP VACUUM PUMP SYSTEM

- BUILDING 252
  - High capacity liquid ring vacuum pump system to support all operations such as Spray Coating, Reactor Systems, Melt, Coating, and Crystallization Kettles, Presses, Ovens, High Shear Mixers, etc.


MONOGRAM
PRODUCTS

MINI & 5 GALLON HIGH SHEAR MIXERS

- BUILDING 252
  - Vertical double planetary mixers for producing energetic formulations which require high shear blending. Useful for slurry coating operations.
  - Equipped with heating/cooling, vacuum, and remote control systems.
  - 20 plus pounds batches

ROSS

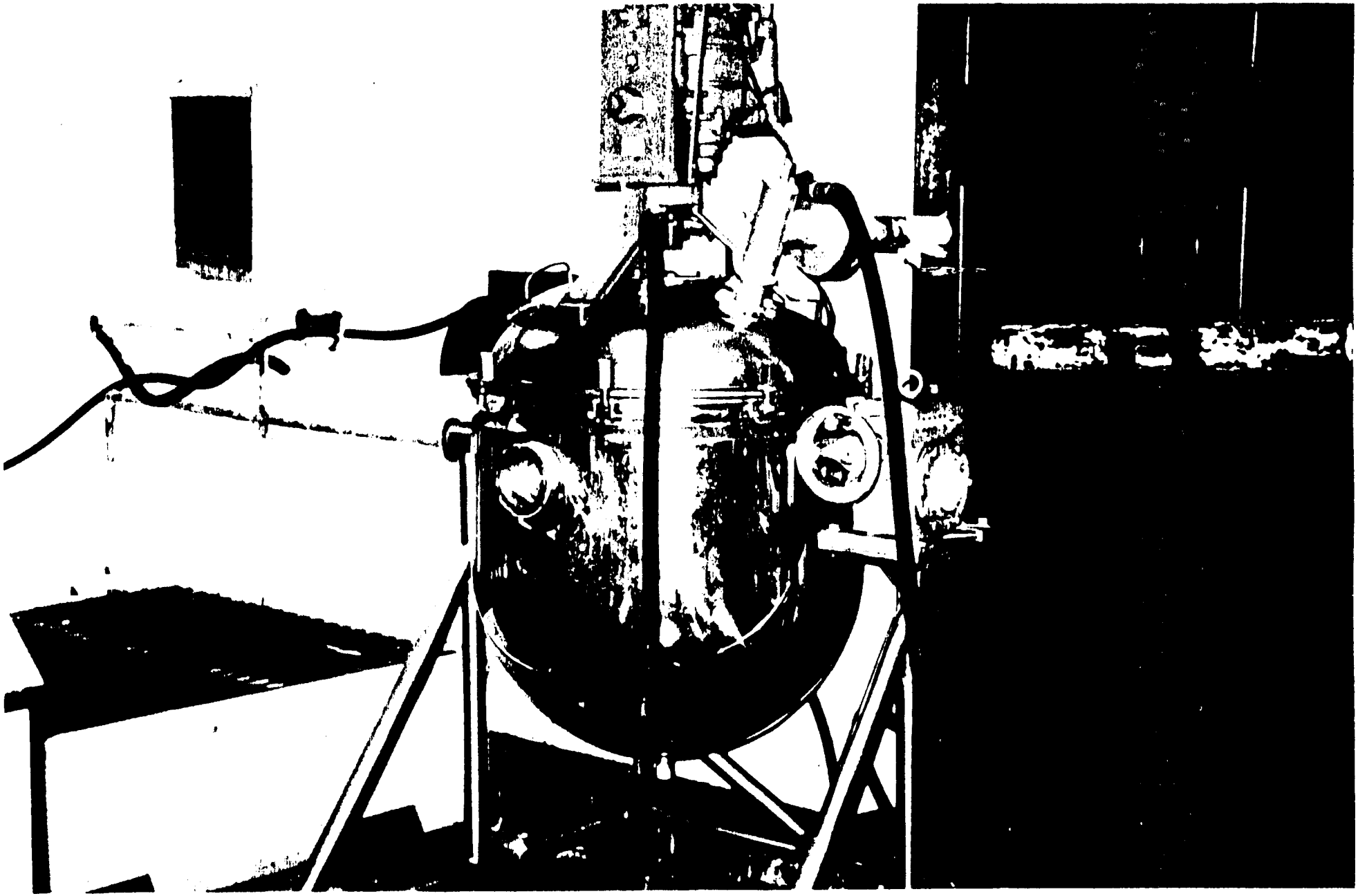
MINI & 5 GALLON HIGH SHEAR MIXERS

- BUILDING 252
  - Vertical double planetary mixers for producing energetic formulations which require high shear blending. Useful for slurry coating operations.
  - Equipped with heating/cooling, vacuum, and remote control systems.
  - 20 plus pounds batches

ROSS

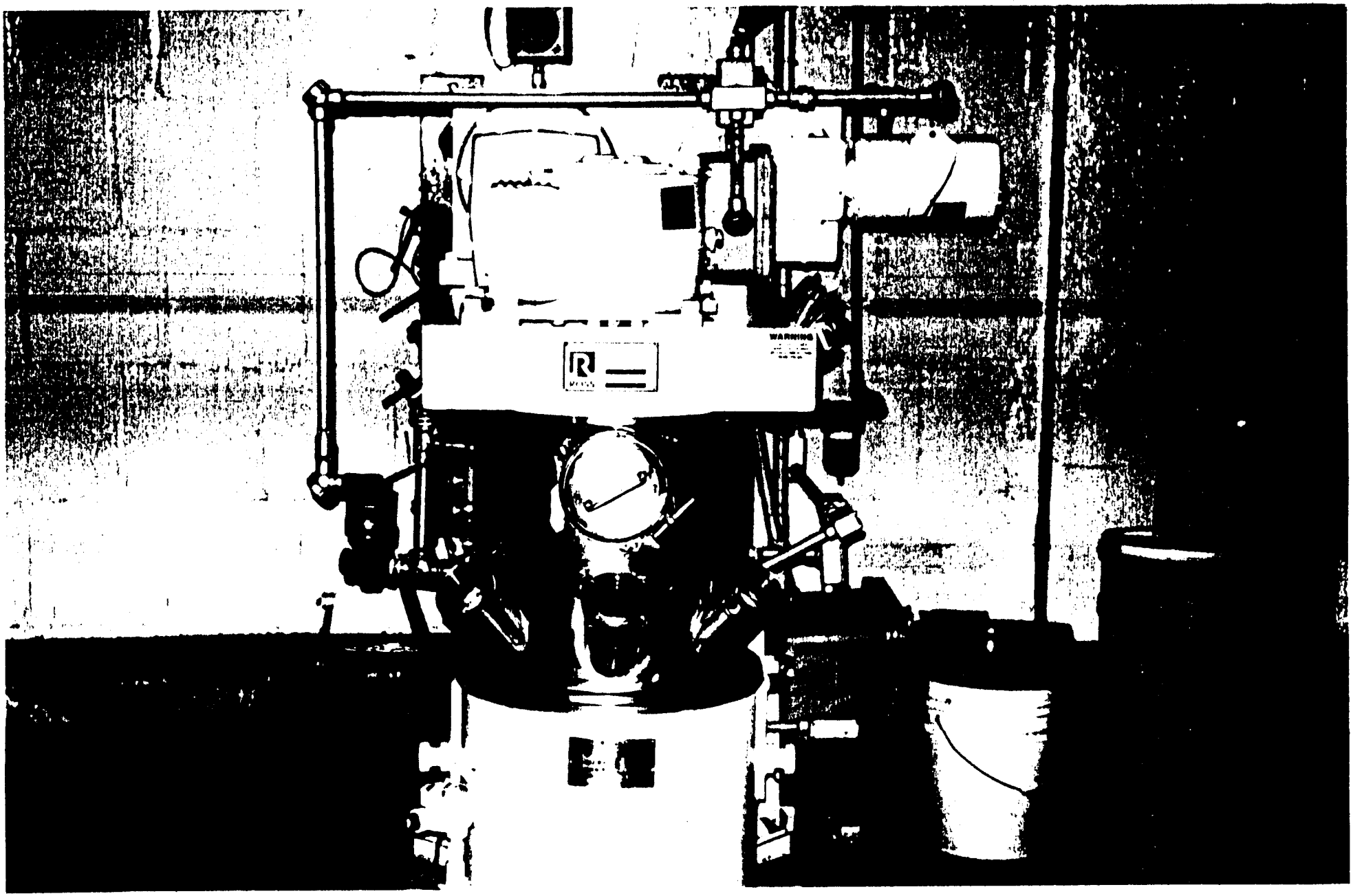
MELT, CASTING, & CRYSTALLIZATION KETTLES (5)

- BUILDING 252
  - Jacketed stainless steel kettles equipped with flat or round bottoms, and anchor, turbine, multi-mode agitator systems with capacities ranging from 1 to 10 gallons.
  - Used to formulate and load melt castable explosive formulations, and develop slurry coating processes and crystallization procedures for new explosive formulations.



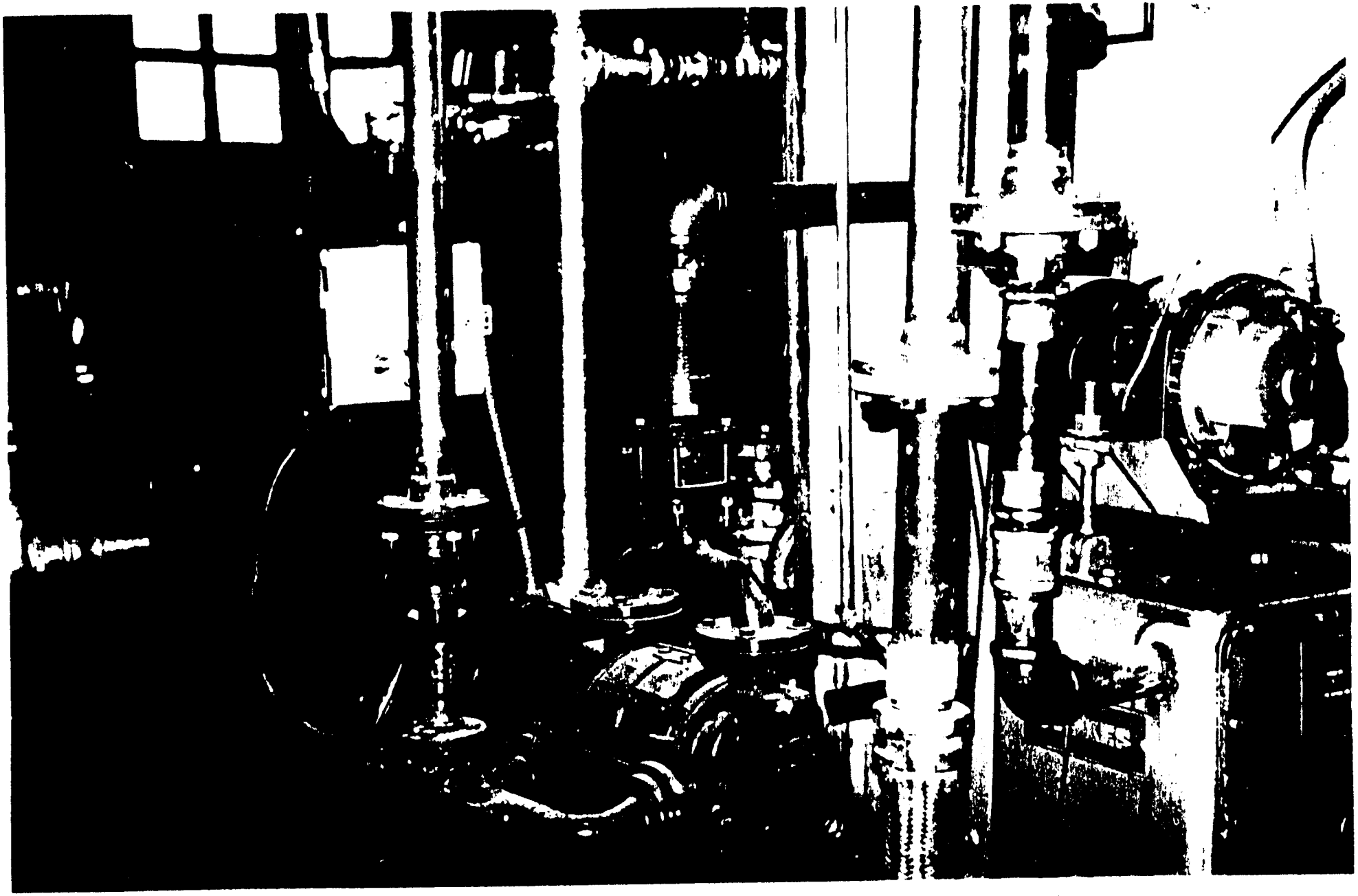
10 Gallon High Shear Mixer

- Location - Bldg. 232G
  - Vertical double planetary mixer for producing energetic formulations which require high shear blending. Also, useful for slurry coatings.
  - Unique design incorporates a mixing vessel which transfers into a loading system for filling prototype warheads with the mixes produced.
  - Equipped with heating/cooling, vacuum, and remote control systems.
  - Typically used to produce 120+ lb batches.


WARNING

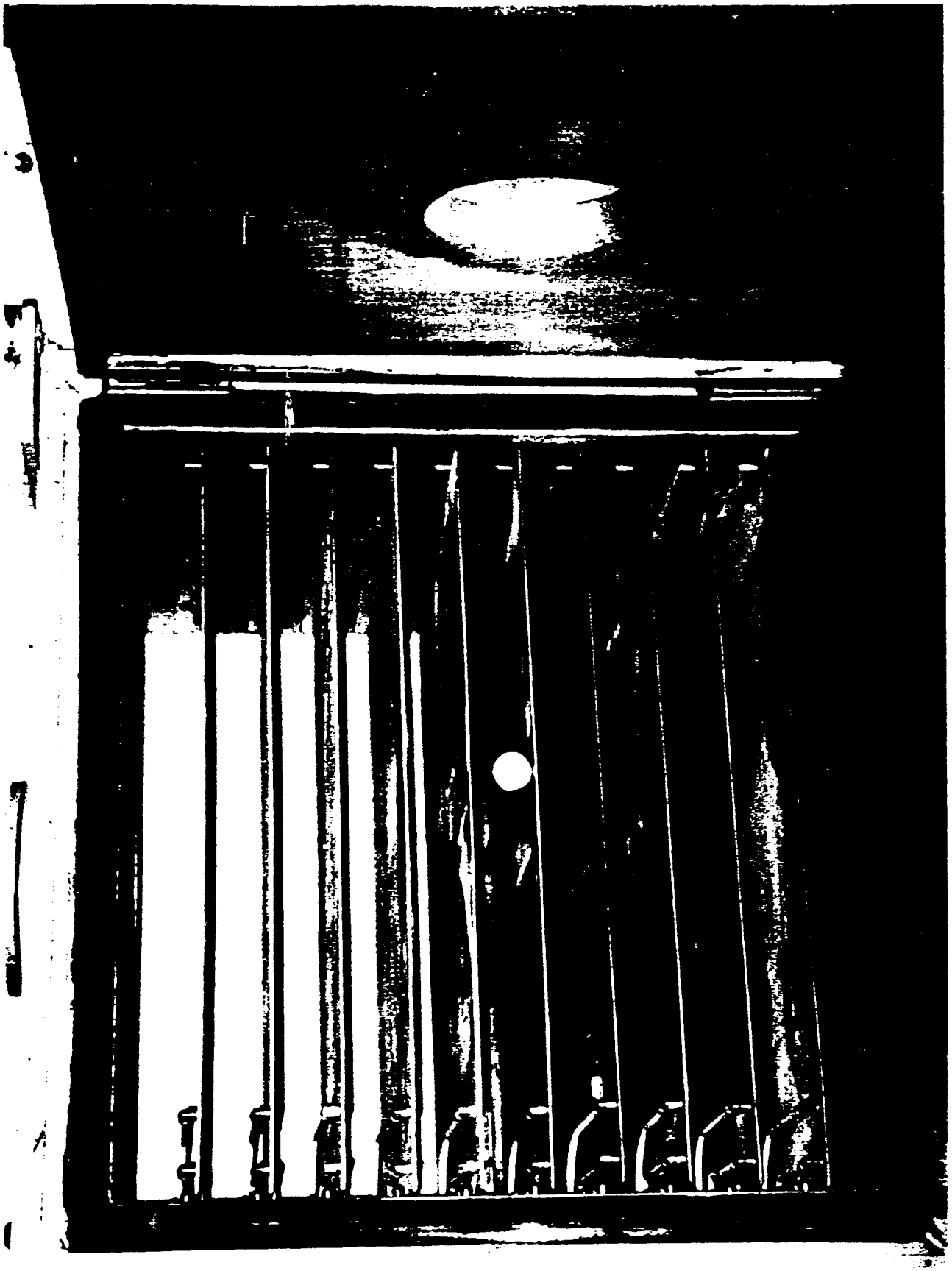
Liquid Ring Vaccum Pump

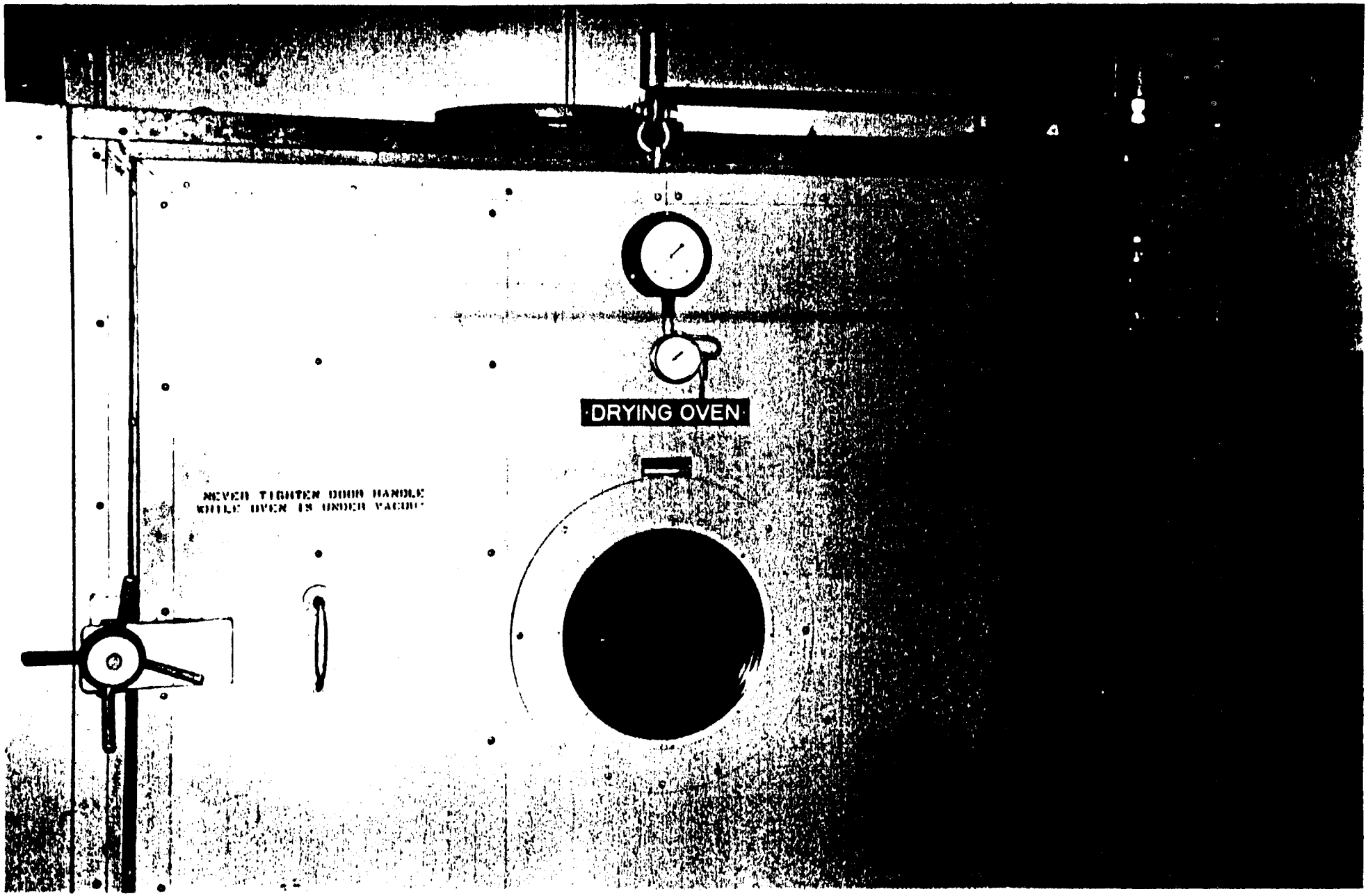
- Location - Bldg. 232F
  - High capacity liquid ring vacuum pump system to support operations In Bldg. 232G; i.e. Modular Reactor System, High Shear Mixer & Loader, etc.



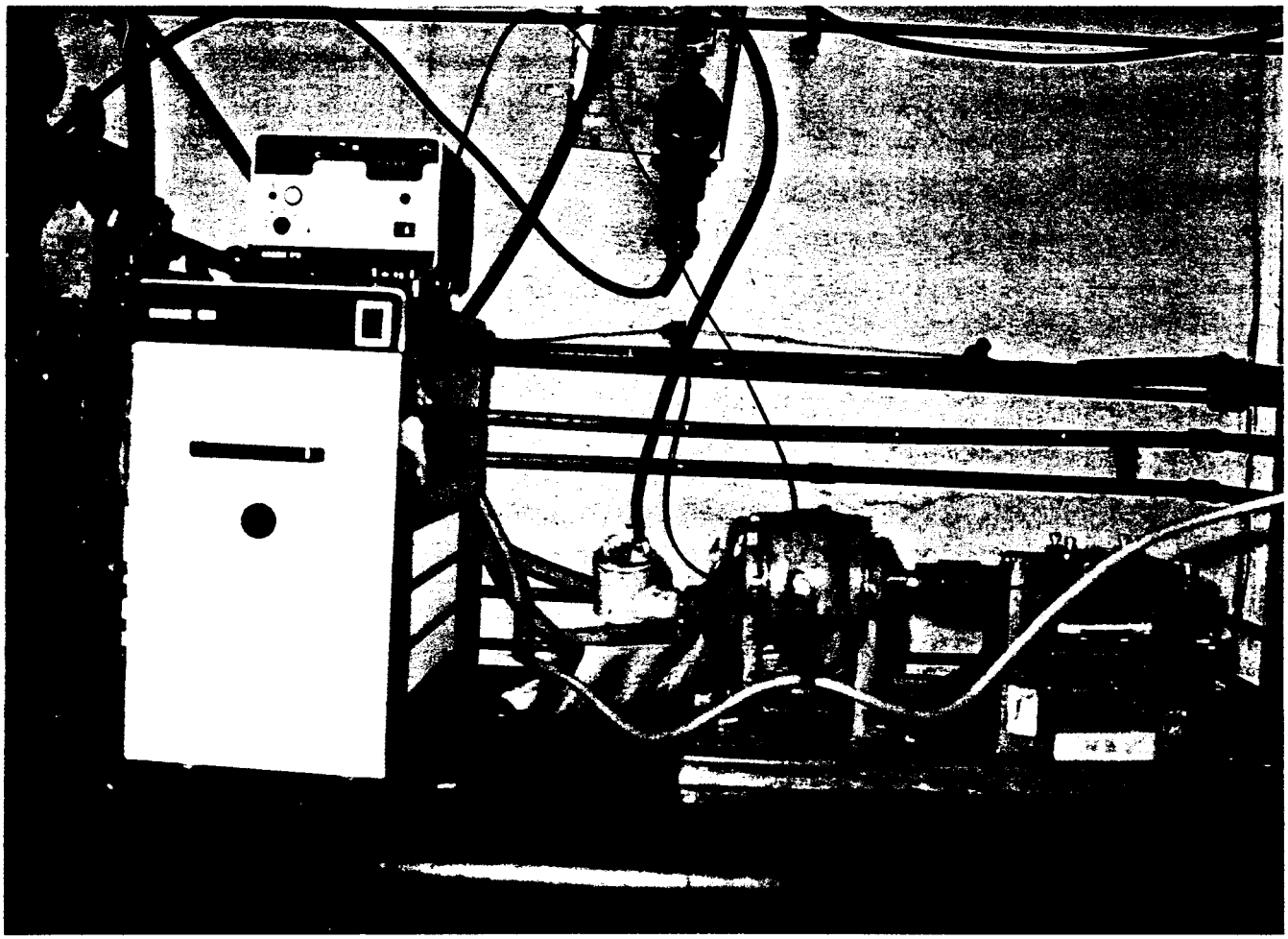
Vacuum Drying Oven

- Location - Bldg. 234
  - Large volume vacuum chamber heated via integral hot-oil heated flat plate heat exchanger shelves.
  - Used to extract water and solvents from explosive powders and formulations.
  - Capable of drying 100+ lbs of energetic materials at a time at full vacuum and temperatures as high as 350 F.

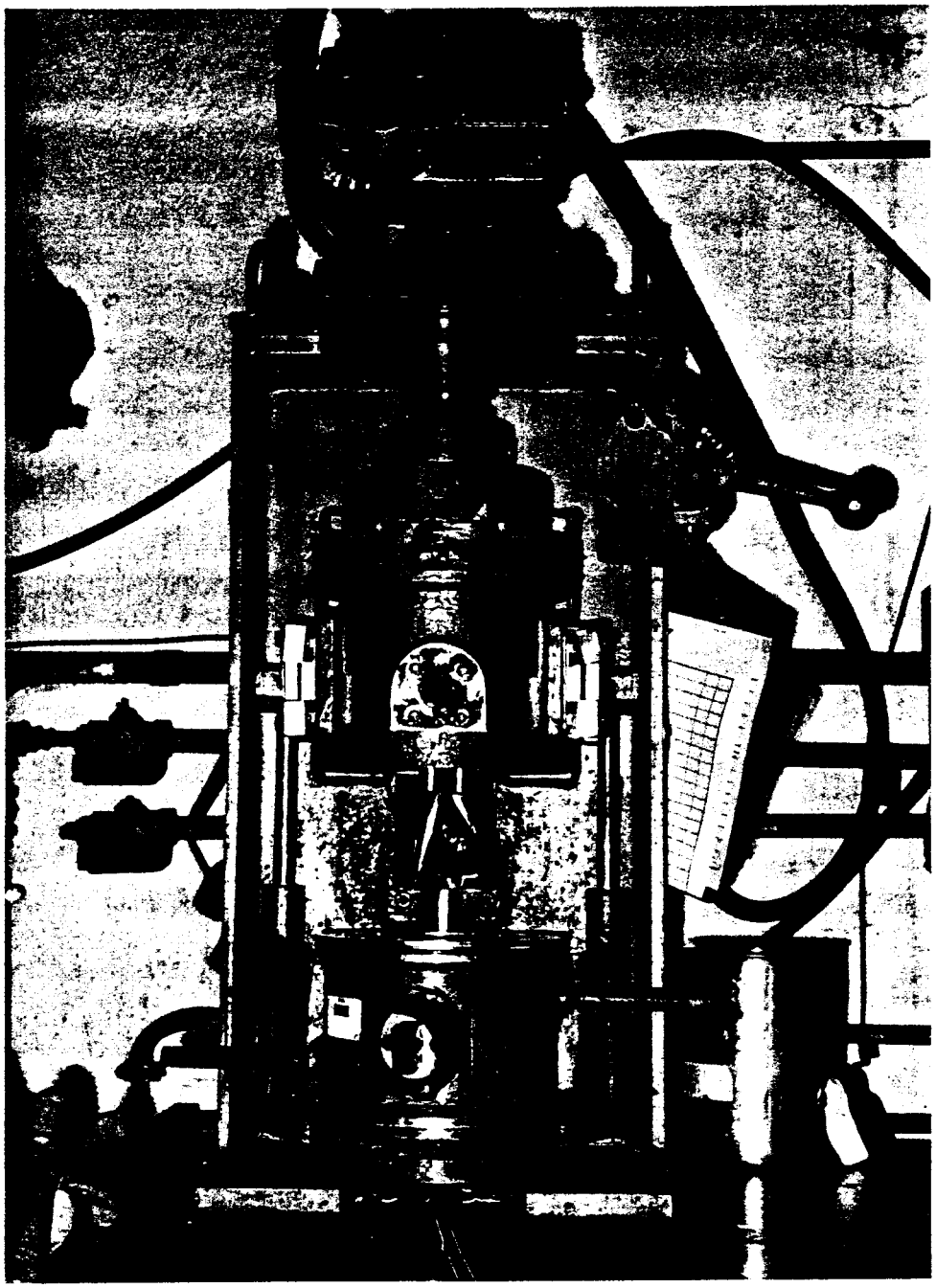



DRYING OVEN
NEVER TIGHTEN DOOR HANDLE
WHILE OVEN IS UNDER VACUU

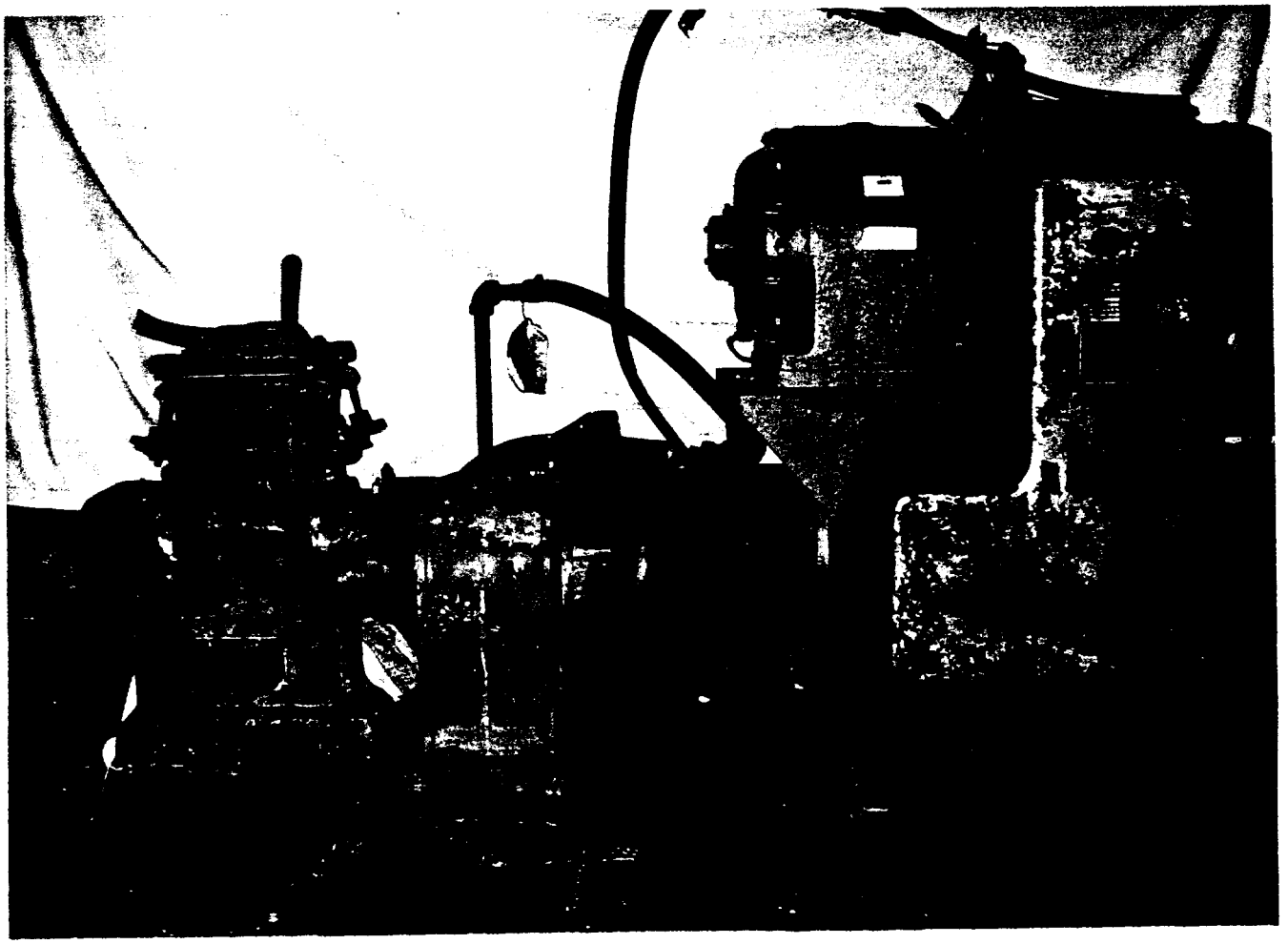
25 GRAM MIXER WITH TEMPERATURE CONTROL USED IN PROPELLANT FORMULATION COMPATIBILITY STUDIES AND INITIAL SMALL VOLUME TESTING OF NEW ENERGETIC FORMULATIONS



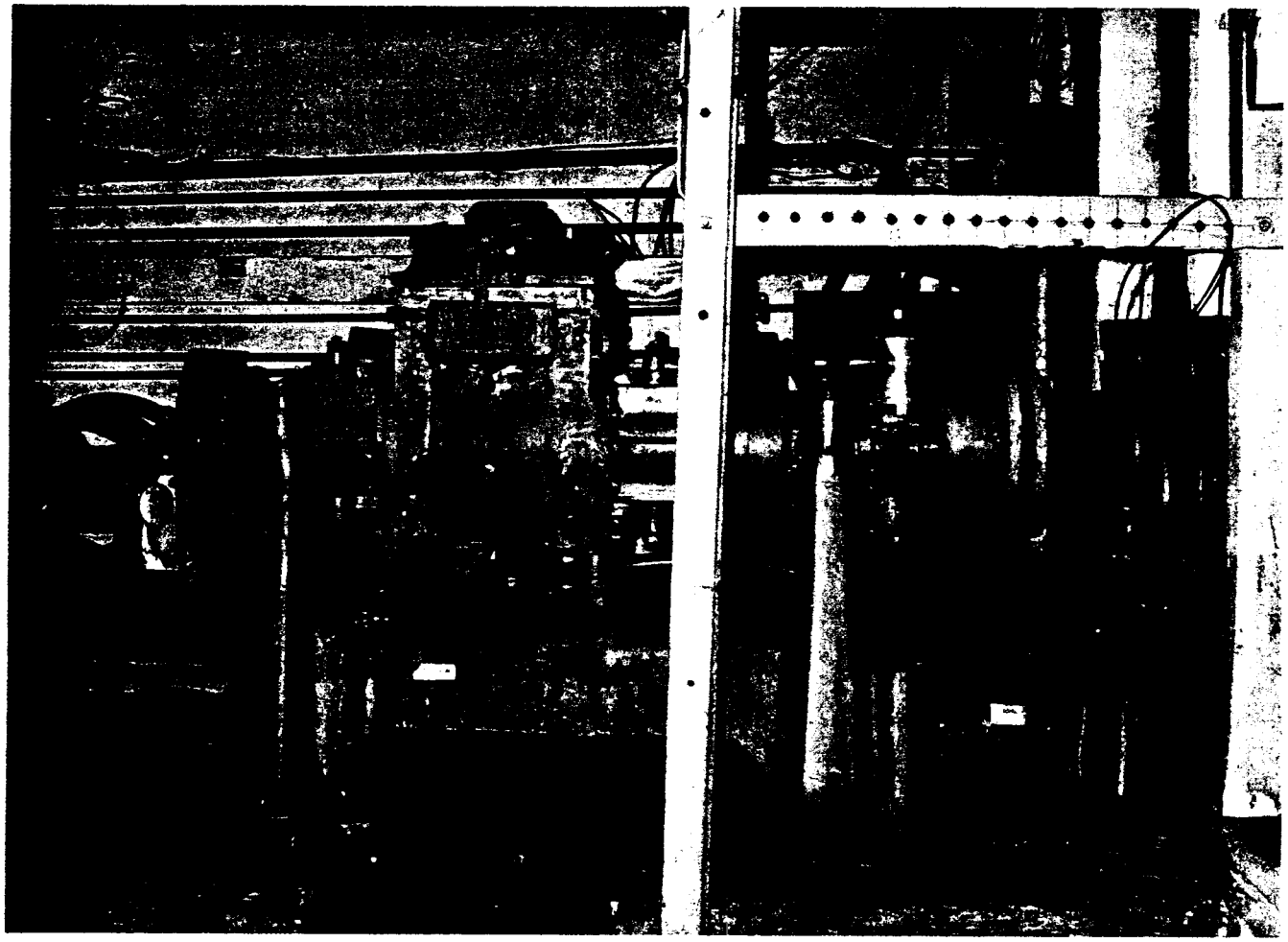
500 GRAM VERTICAL MIXER WITH TEMPERATURE CONTROL JACKET USED FOR PREPARATION OF PROPELLANT, PROPELLANT BINDERS AND GEL COMPOSITION SAMPLES



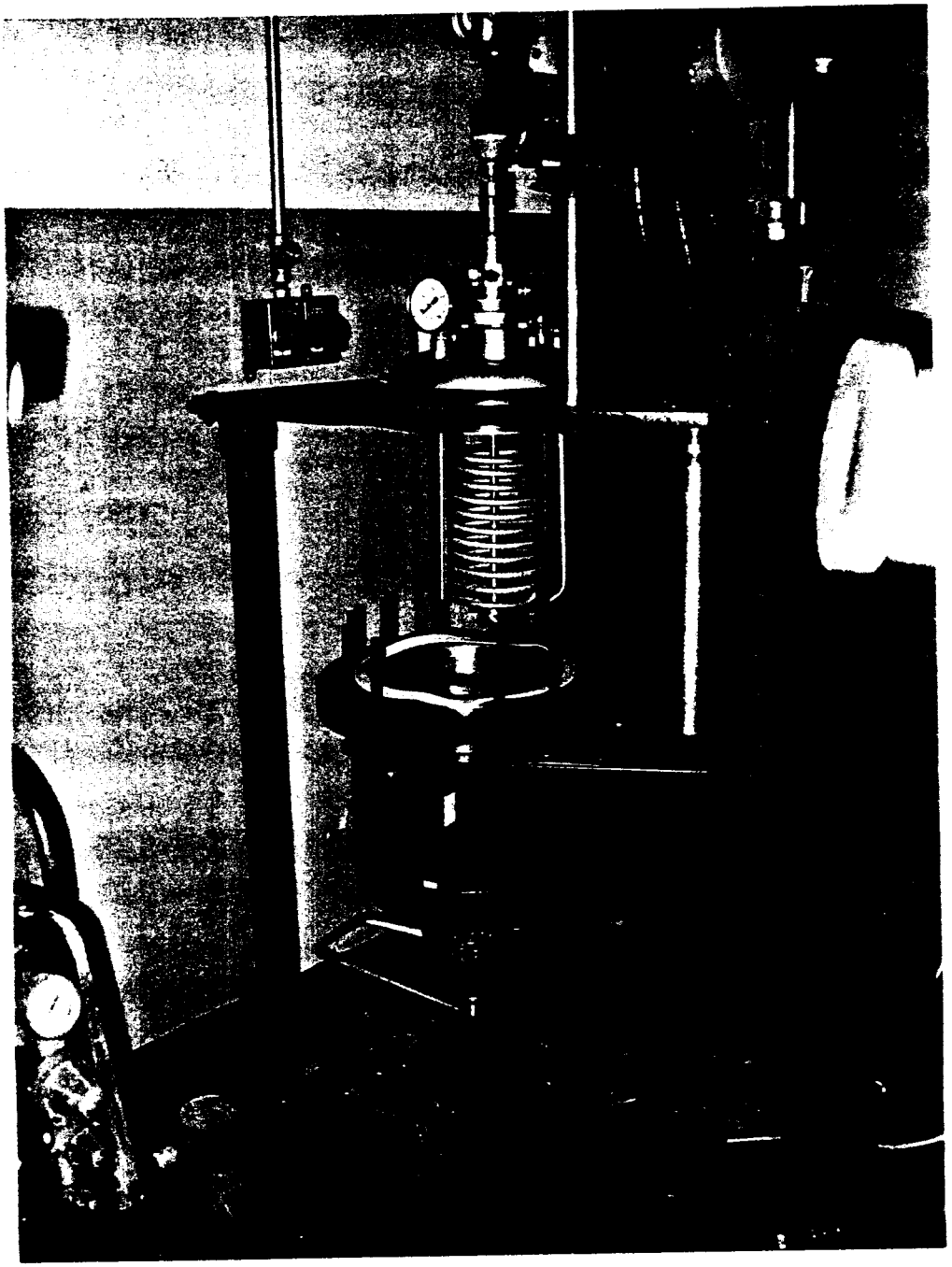
ONE KILOGRAM MIXER WITH TEMPERATURE CONTROL JACKET USED FOR INTERMEDIATE EVALUATION OF SAMPLE COMPOSITIONS



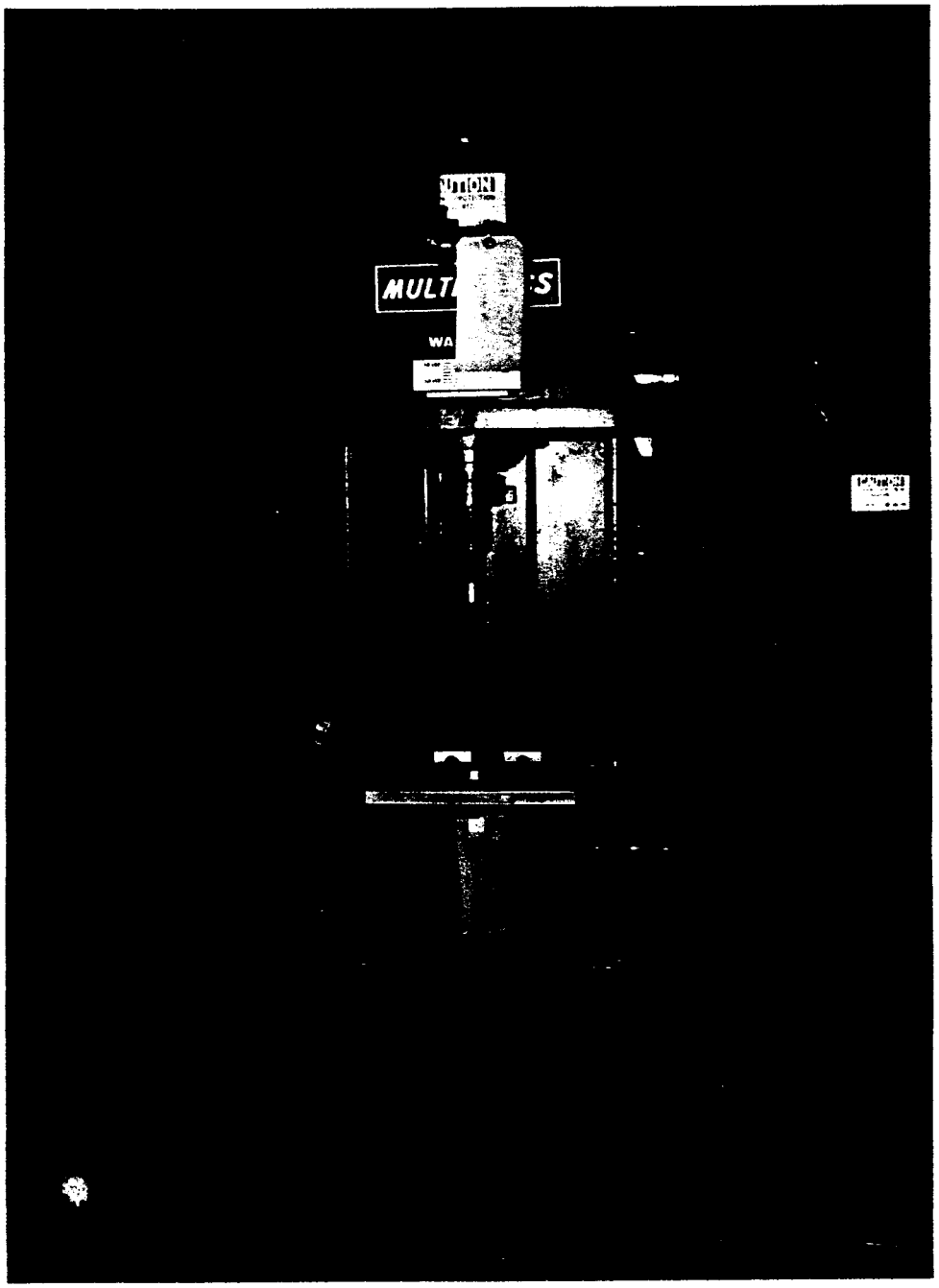
THREE KILOGRAM MIXER WITH TEMPERATURE CONTROL JACKET USED FOR INTERMEDIATE EVALUATION OF SAMPLE COMPOSITIONS



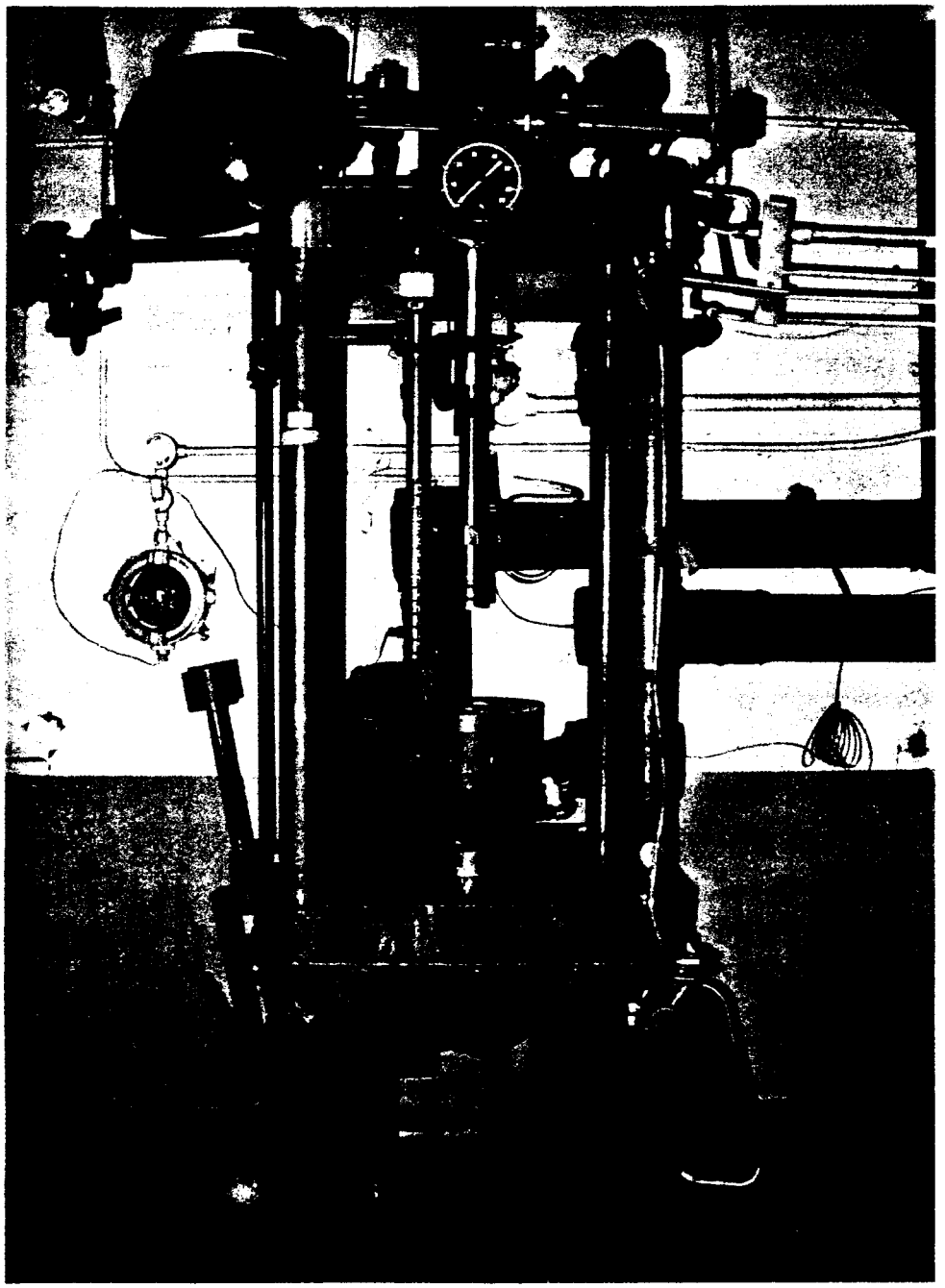
PICTURE 2
5 GALLON REACTOR



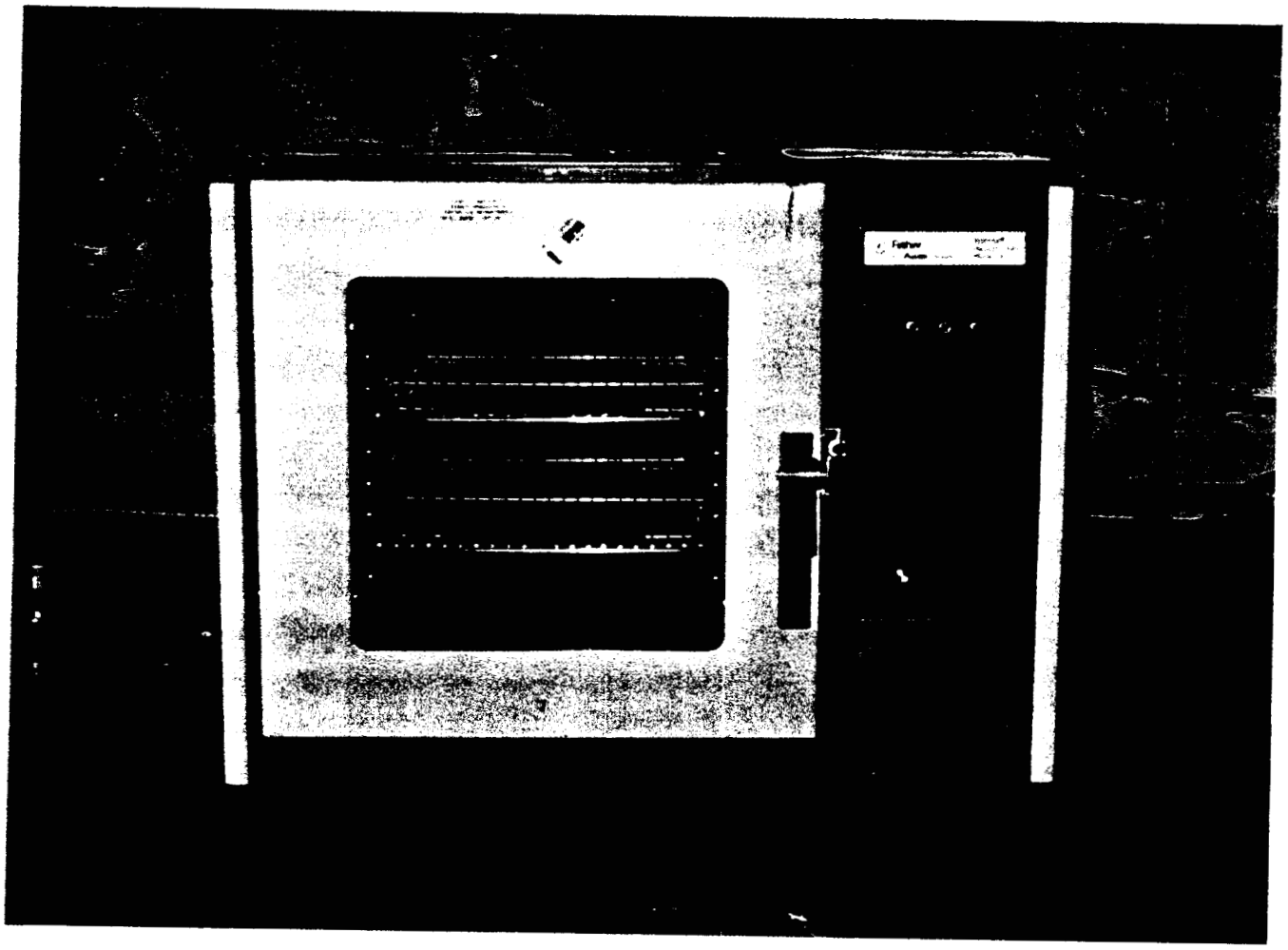
PROPELLANT EXTRUSION PRESS



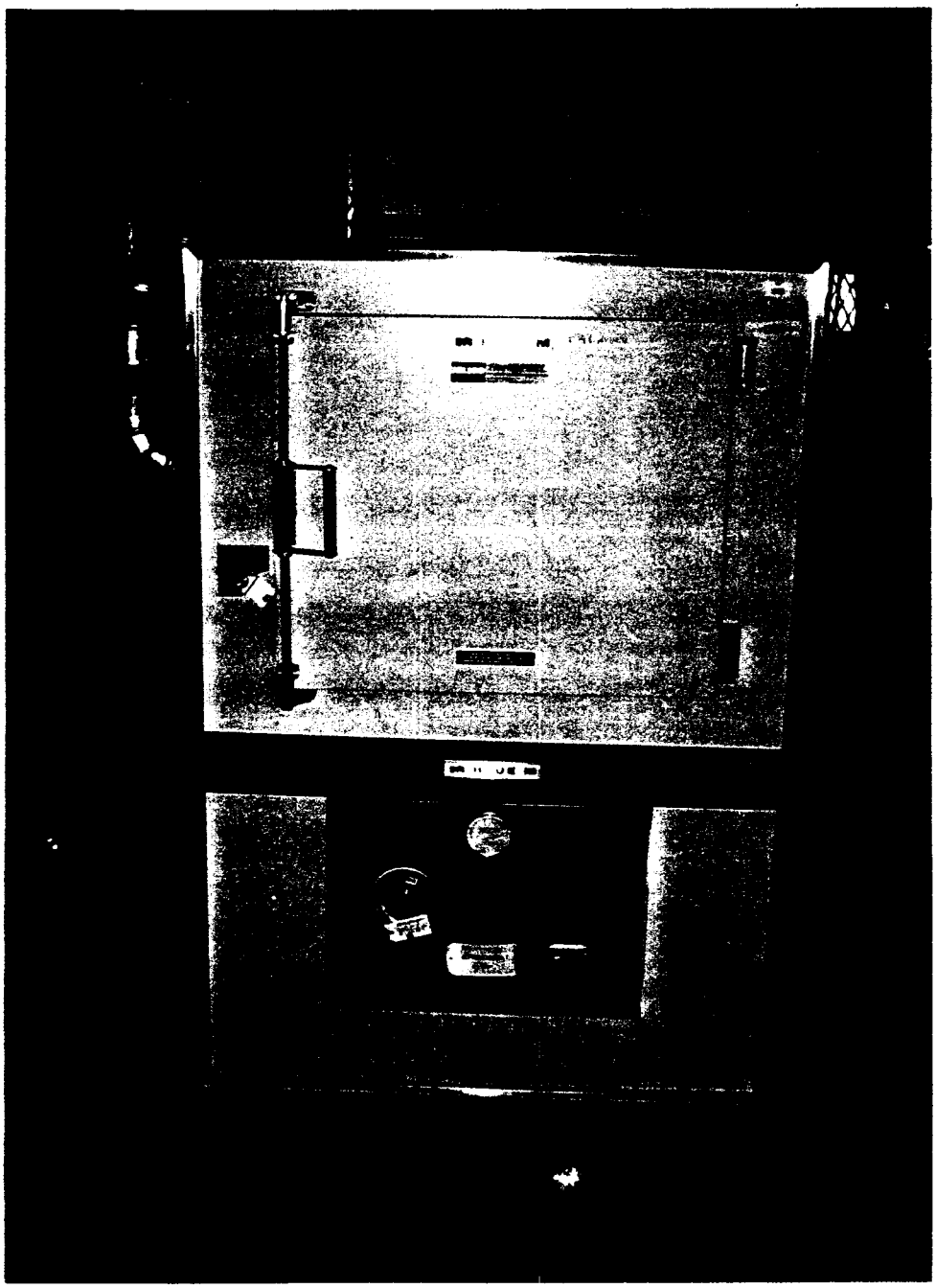
3" SOLVENTLESS EXTRUSION PRESS



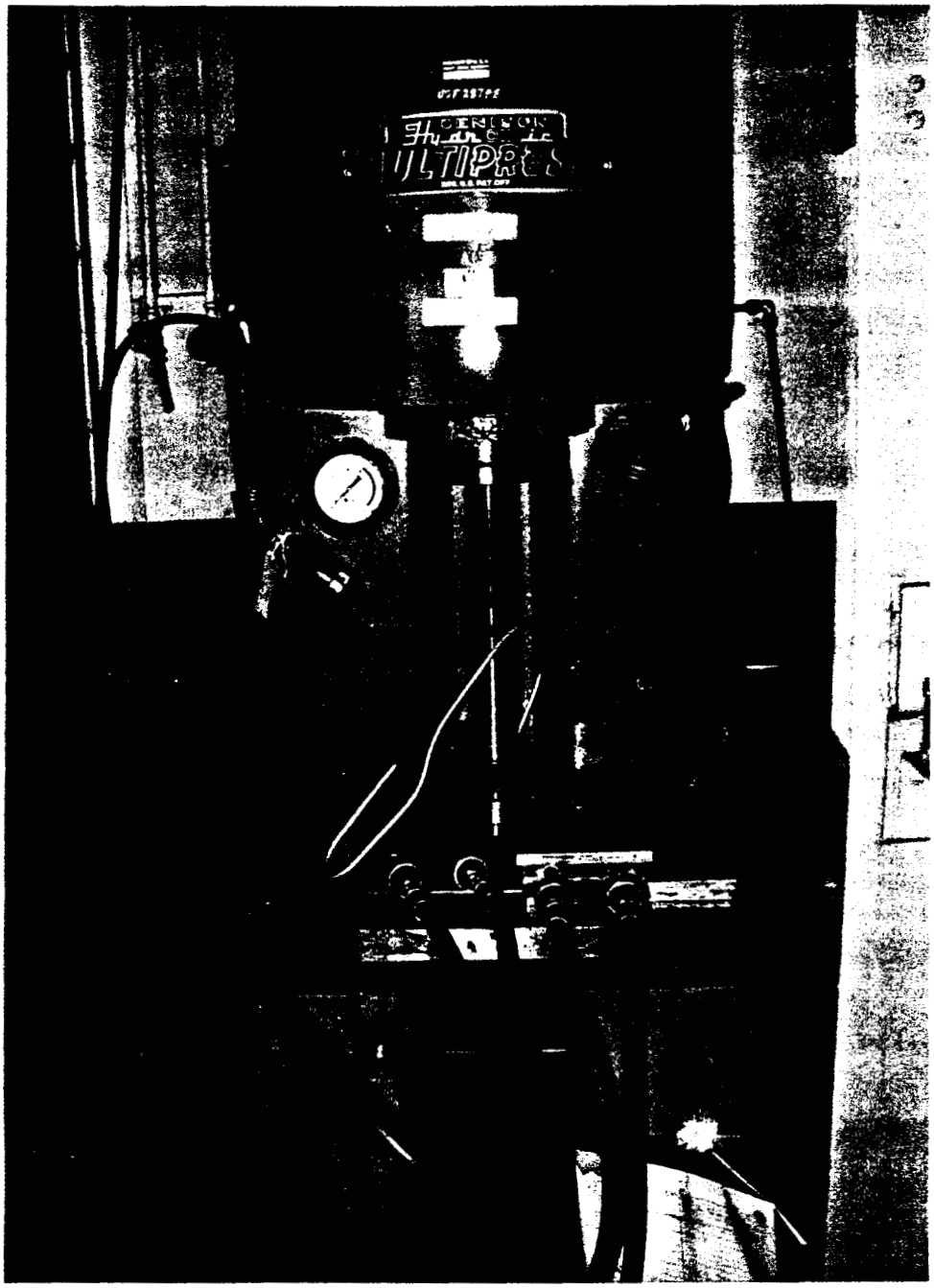
PORTABLE ENERGETIC DRYING OVEN



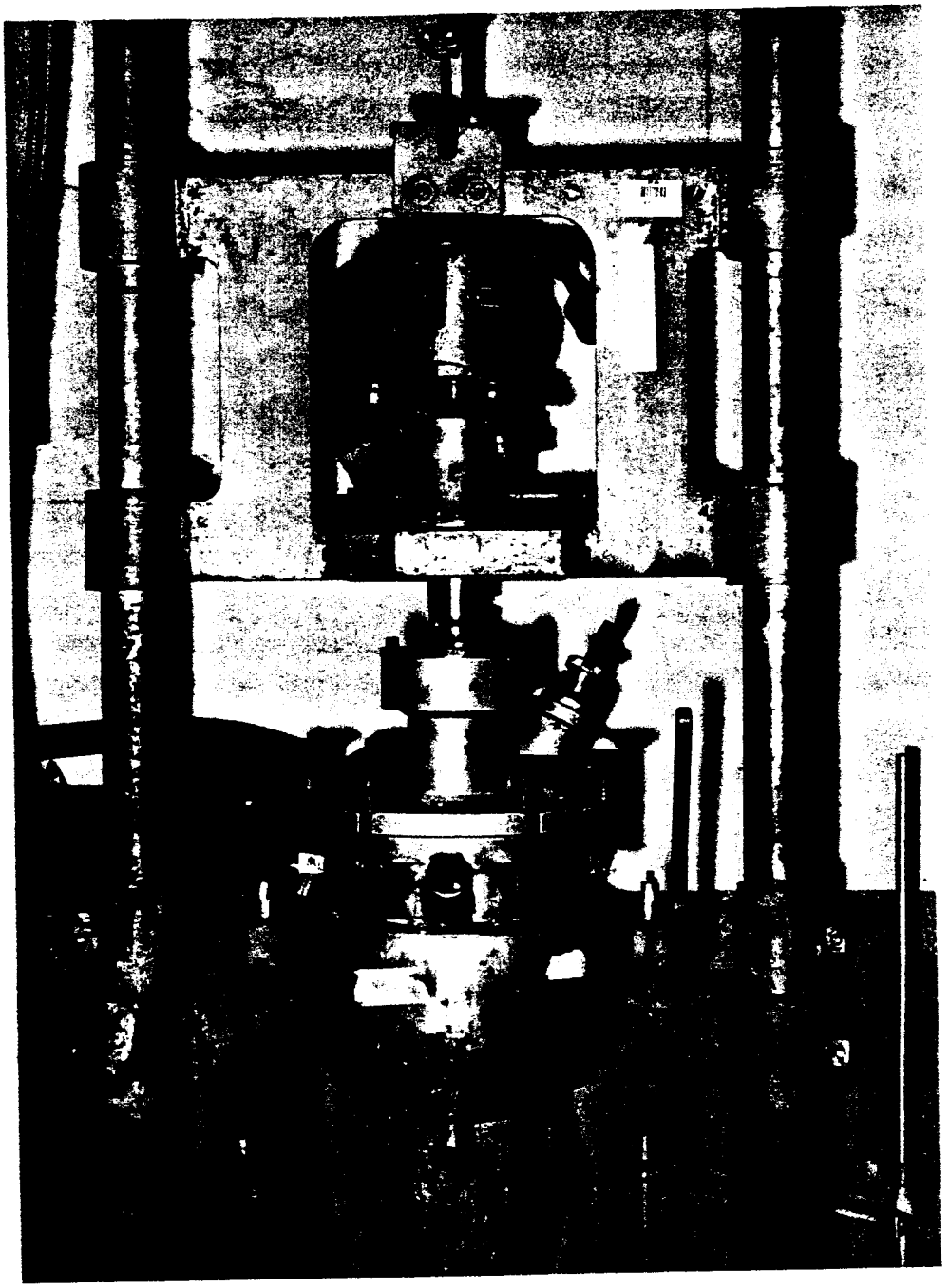
OVEN
PROPELLANT AND PROPELLANT INGREDIENT DRYING



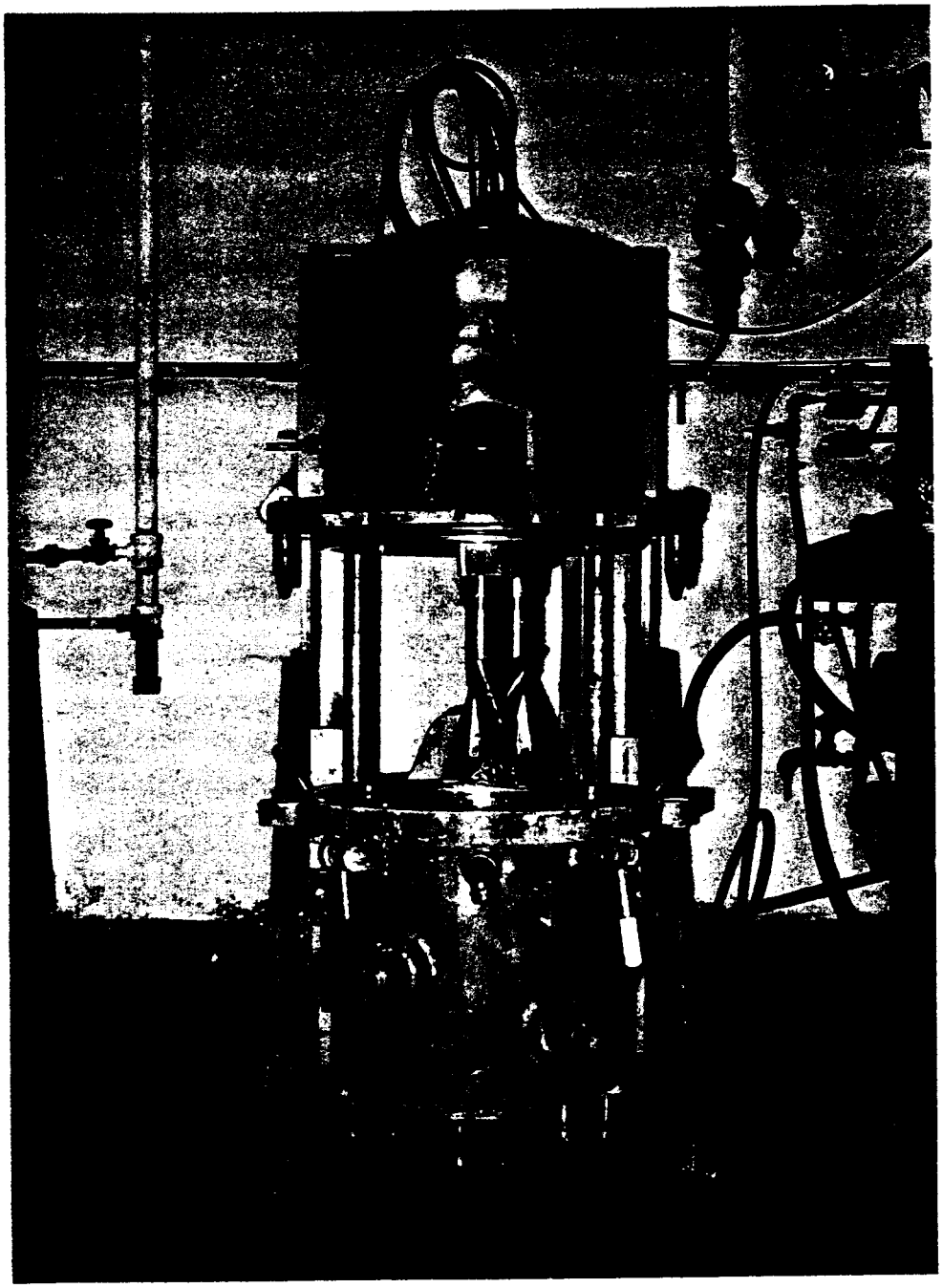
DENISON HYDRAULIC MULTIPRESS
USED FOR EXTRUSION OF PROPELLANT MIXES



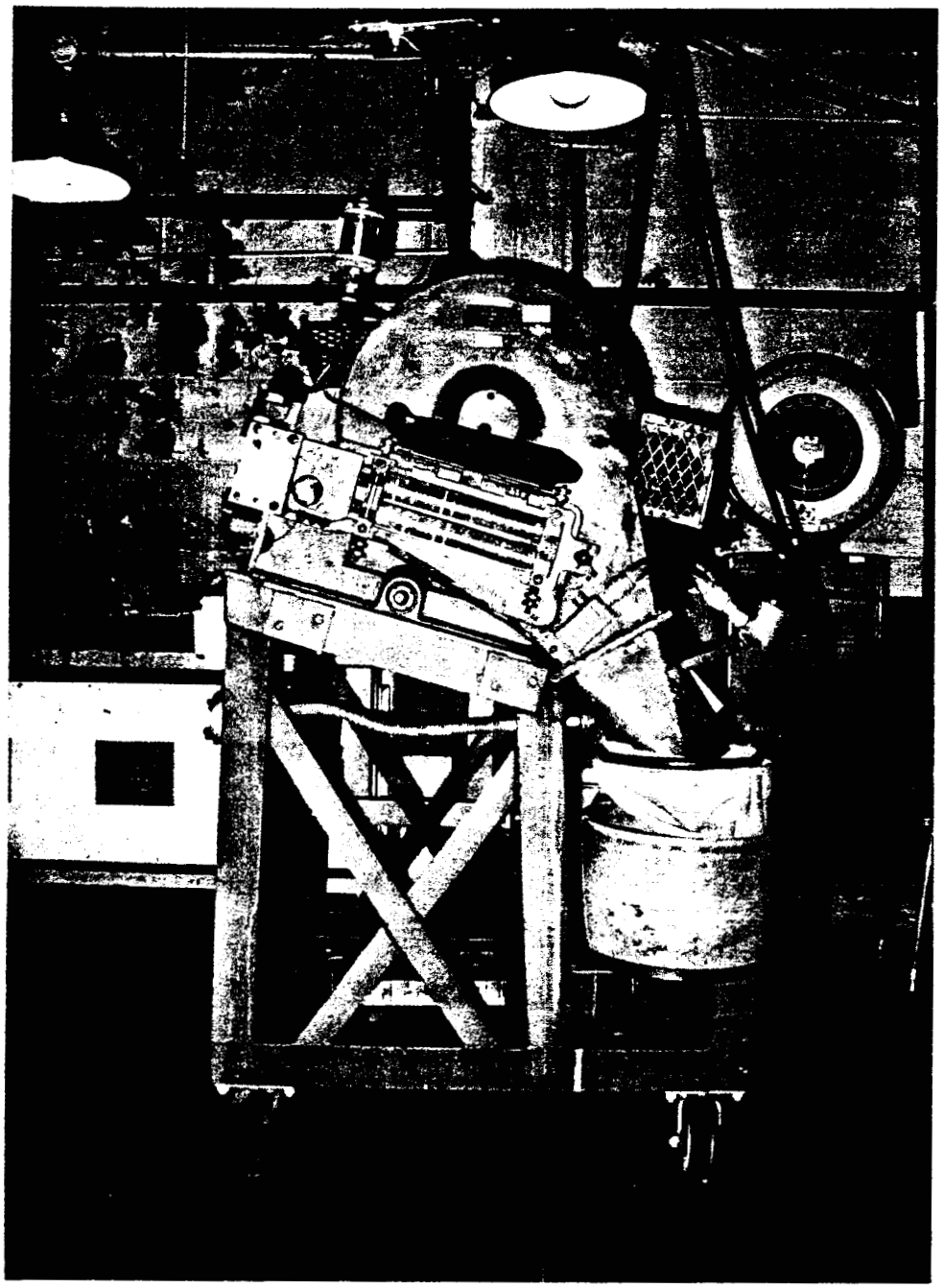
VERTICAL MIXER WITH TEMPERATURE CONTROL JACKET USED FOR PREPARATION OF PROPELLANT, PROPELLANT BINDERS AND GEL COMPOSITION SAMPLES



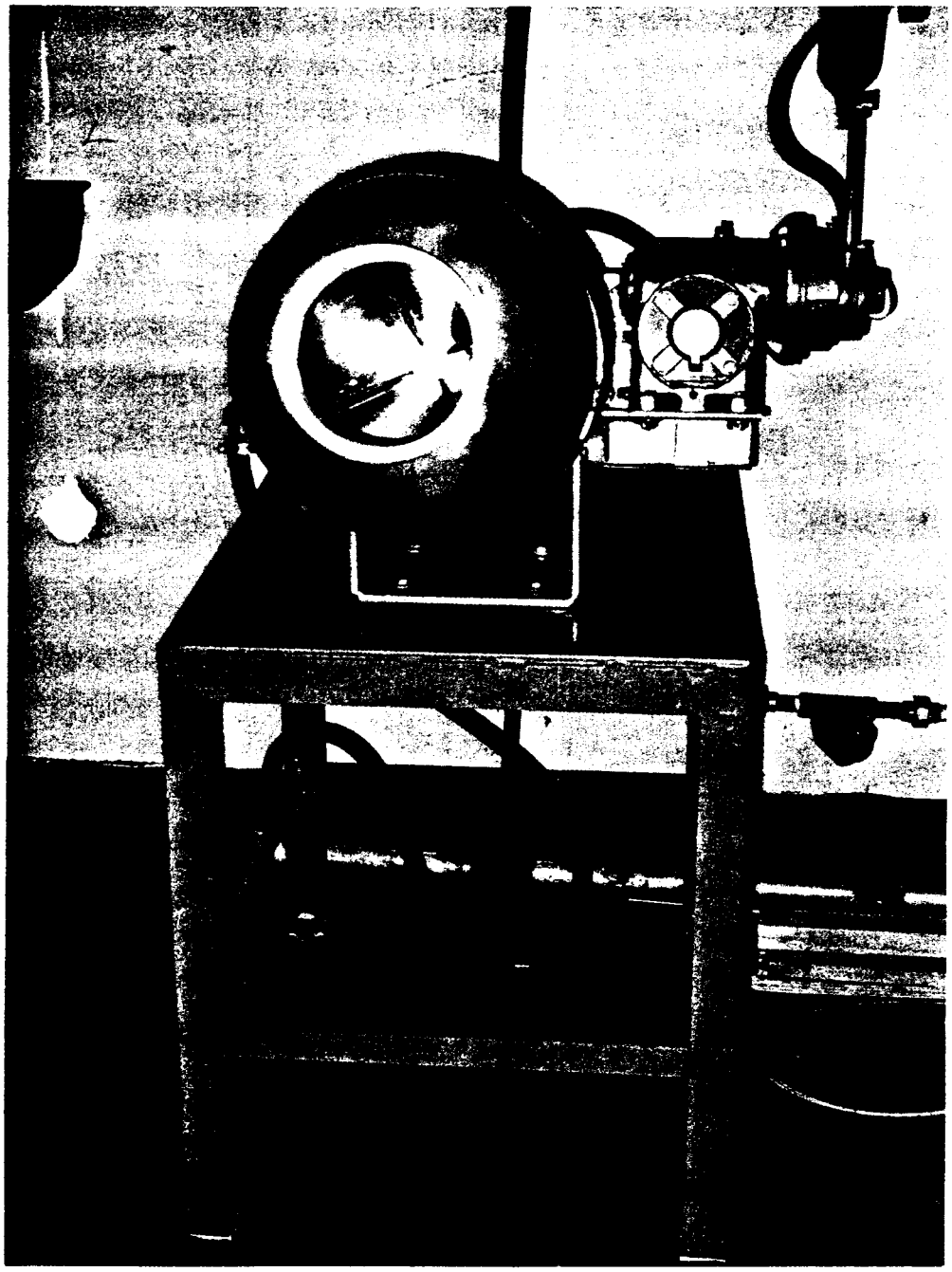
BRAMLEY VERTICAL MIXER WITH TEMPERATURE CONTROL JACKET USED FOR PREPARATION OF PROPELLANT, PROPELLANT BINDERS AND GEL COMPOSITION SAMPLES



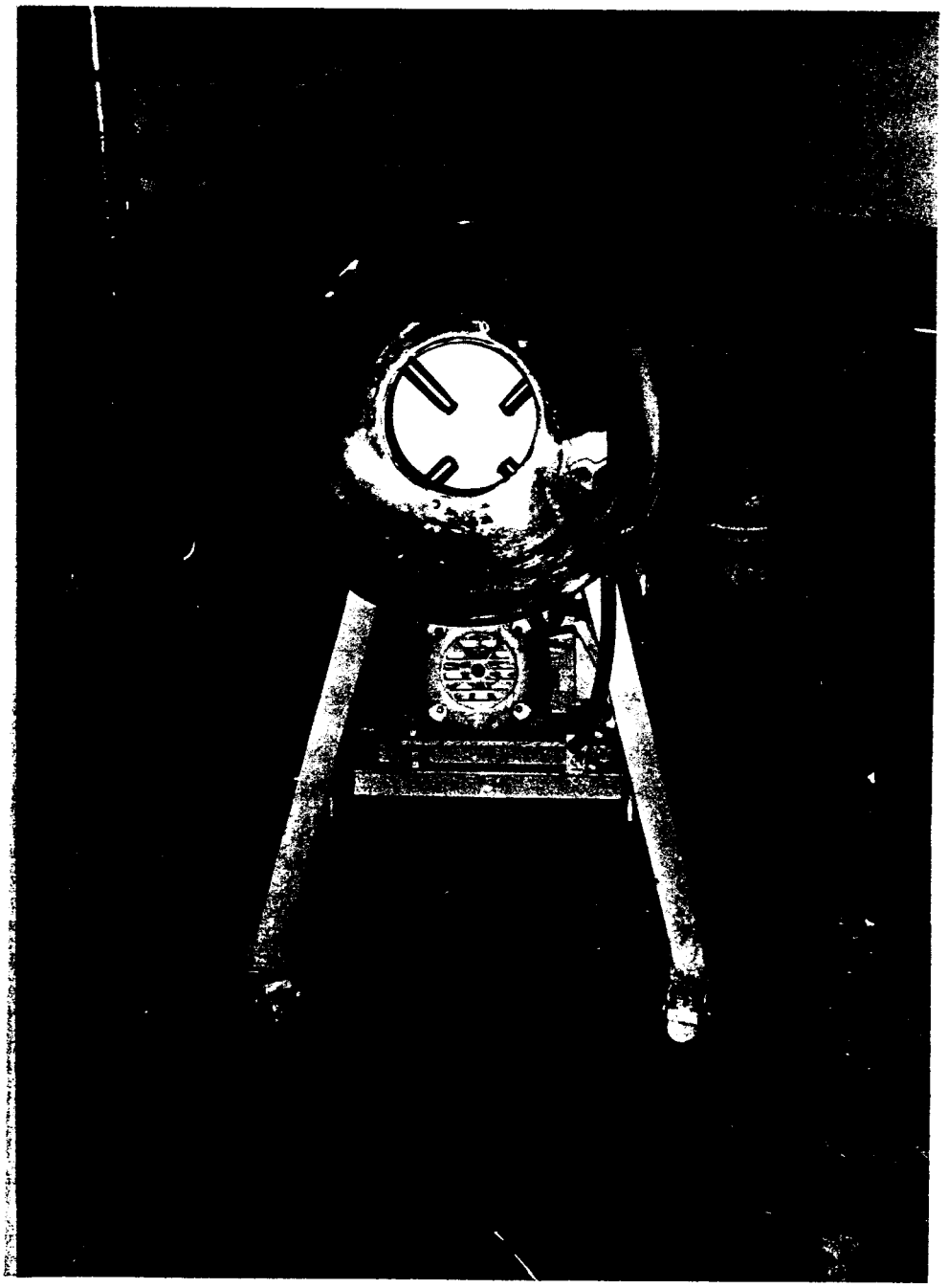
McKIERNAN-TERRY CUTTER
PROPELLANT GRAIN CUTTER



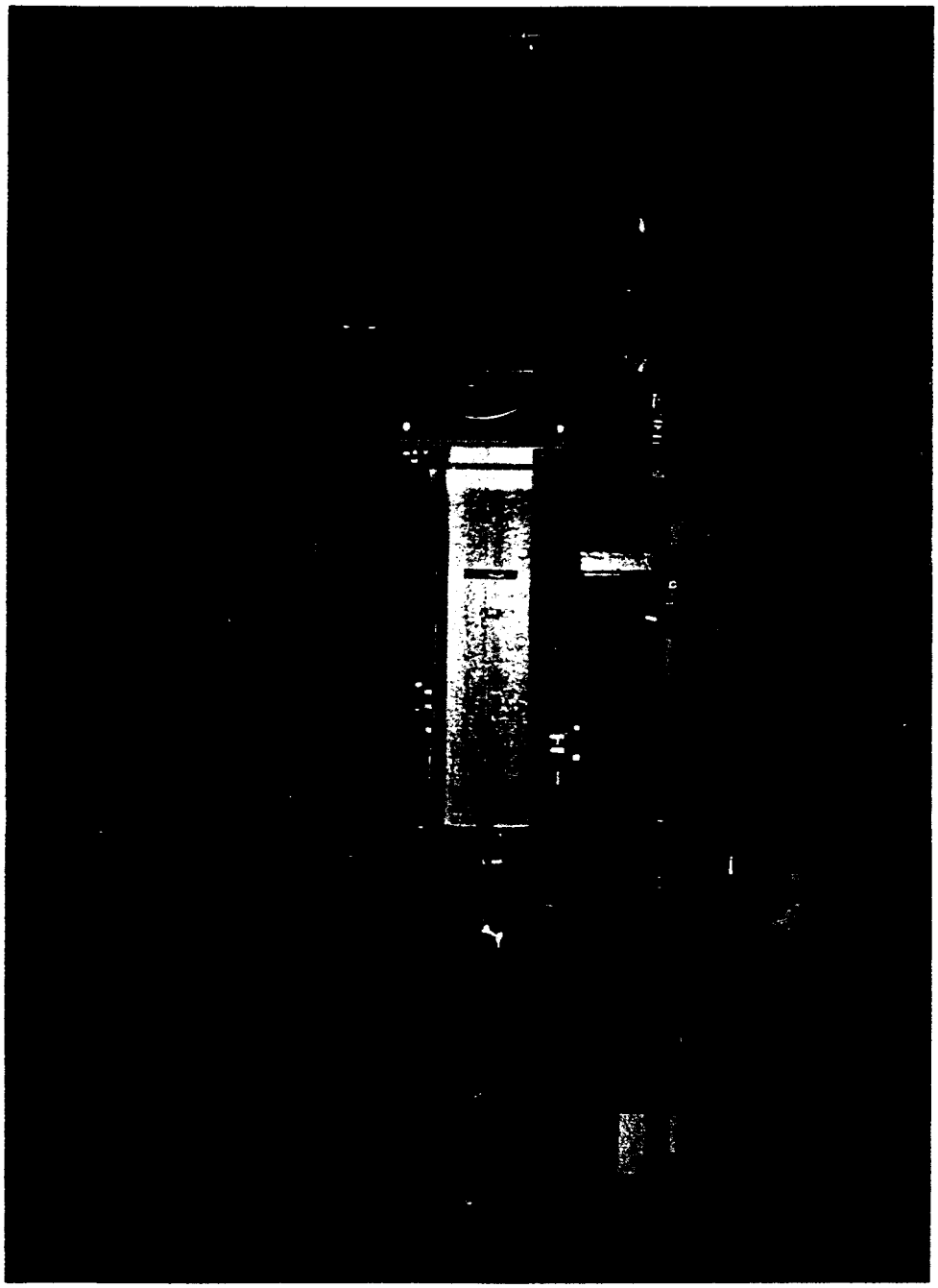
COATING BARREL
PROPELLANT COATING AND GLAZING



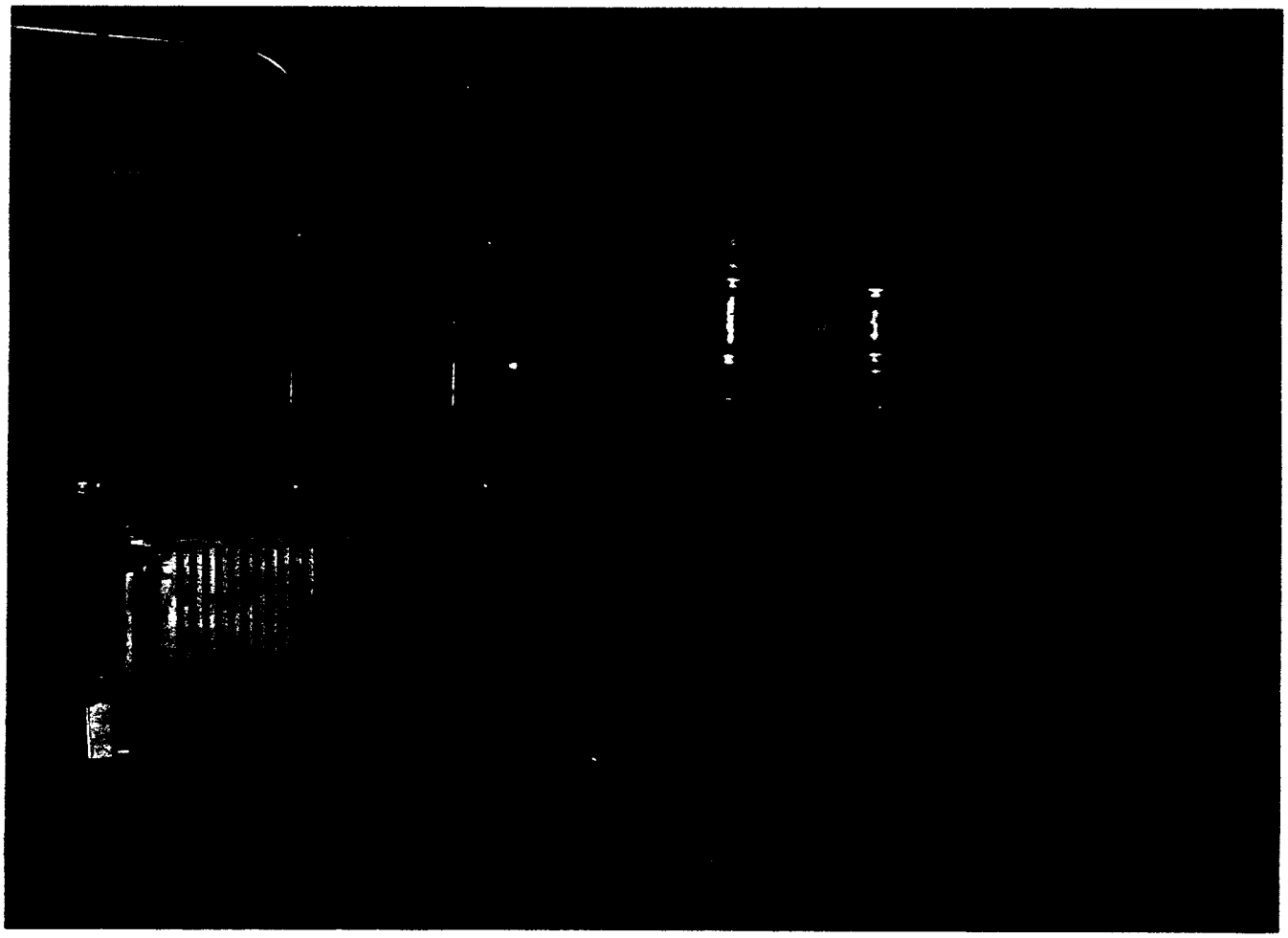
COATING BARREL
PROPELLANT COATING AND GLAZING



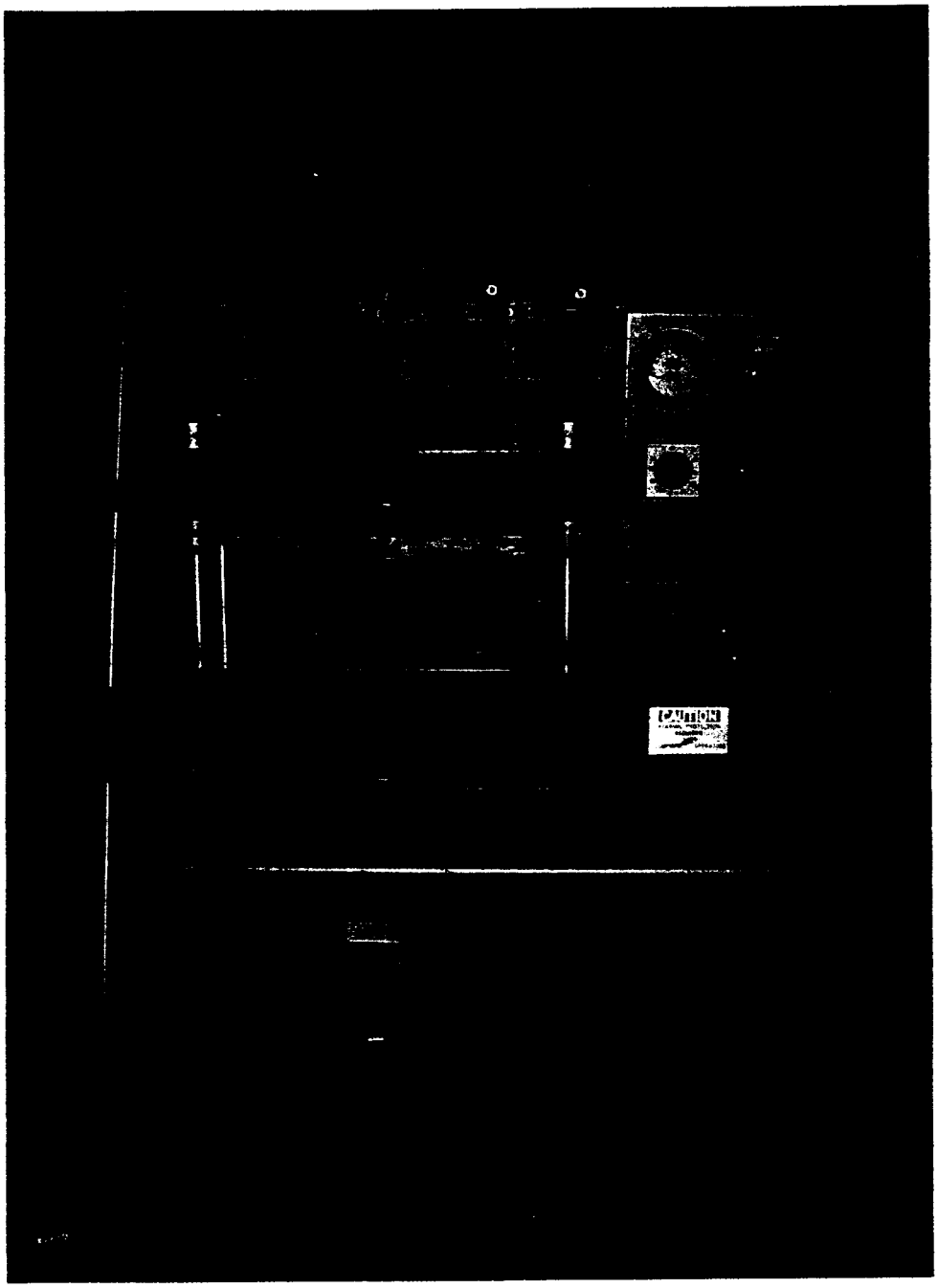
BATCH STILL REACTOR FOR PRODUCTION OF BALL PROPELLANT



CONTROL PANEL WITH FEED TANKS FOR BATCH STILL REACTOR



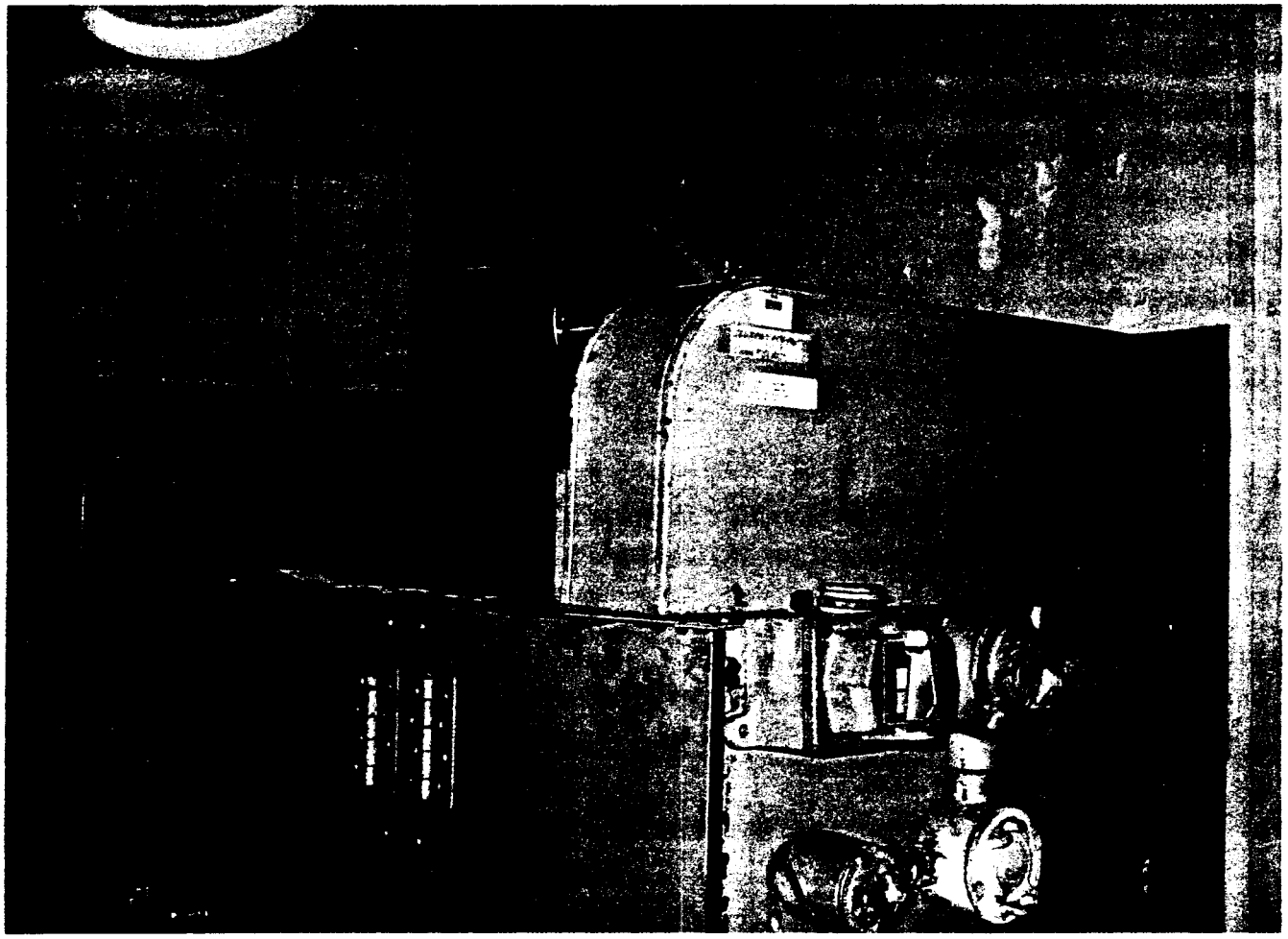
HOT PLATE PRESS



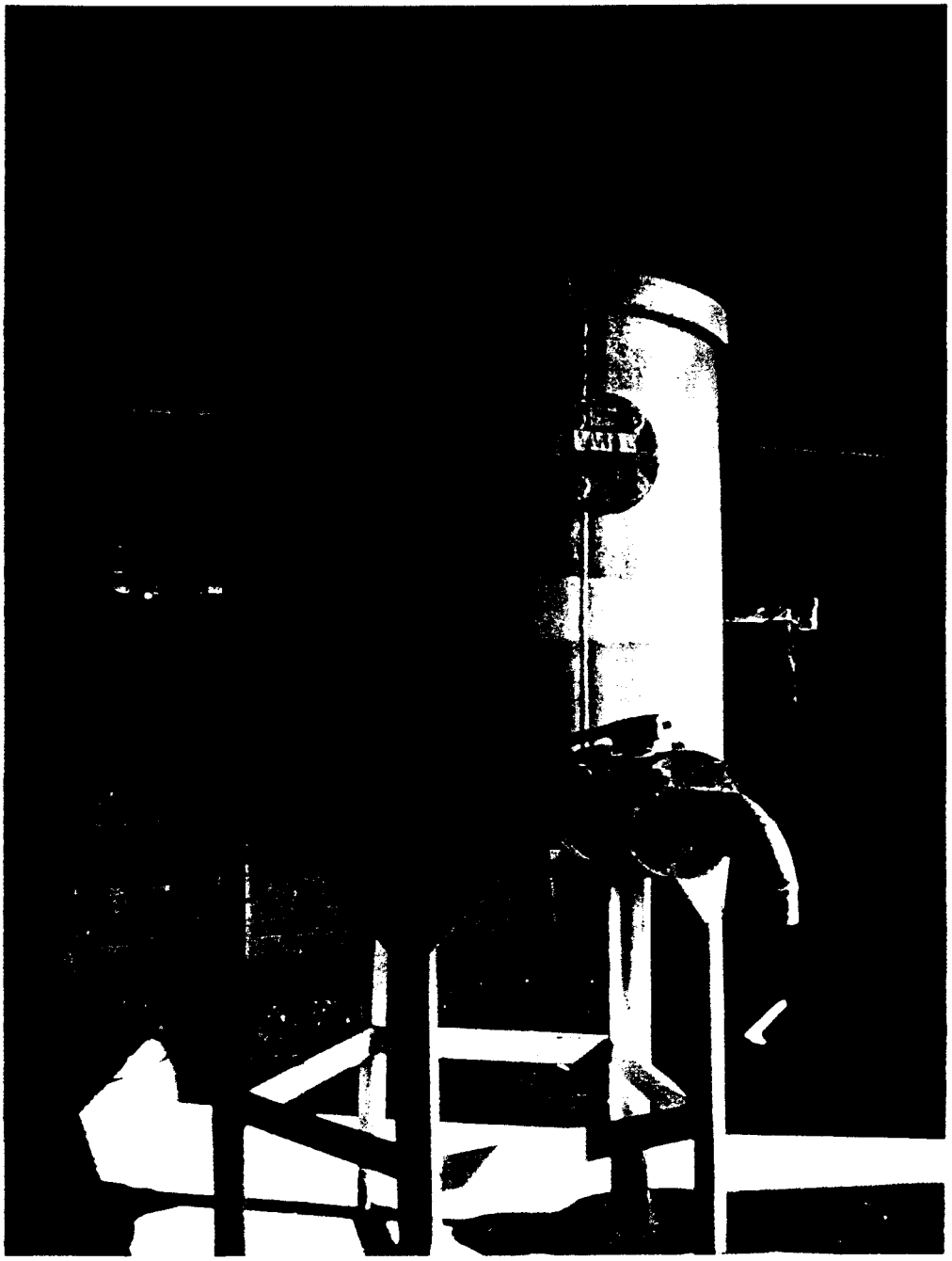
PULVERIZOR
GRINDING OF OXIDIZERS FOR IGNITOR COMPOSITIONS

FLAMMABLE STORAGE AREA
BULK FLAMMABLE LIQUIDS ARE STORED ON SPILL CONTAINMENT PALLETS

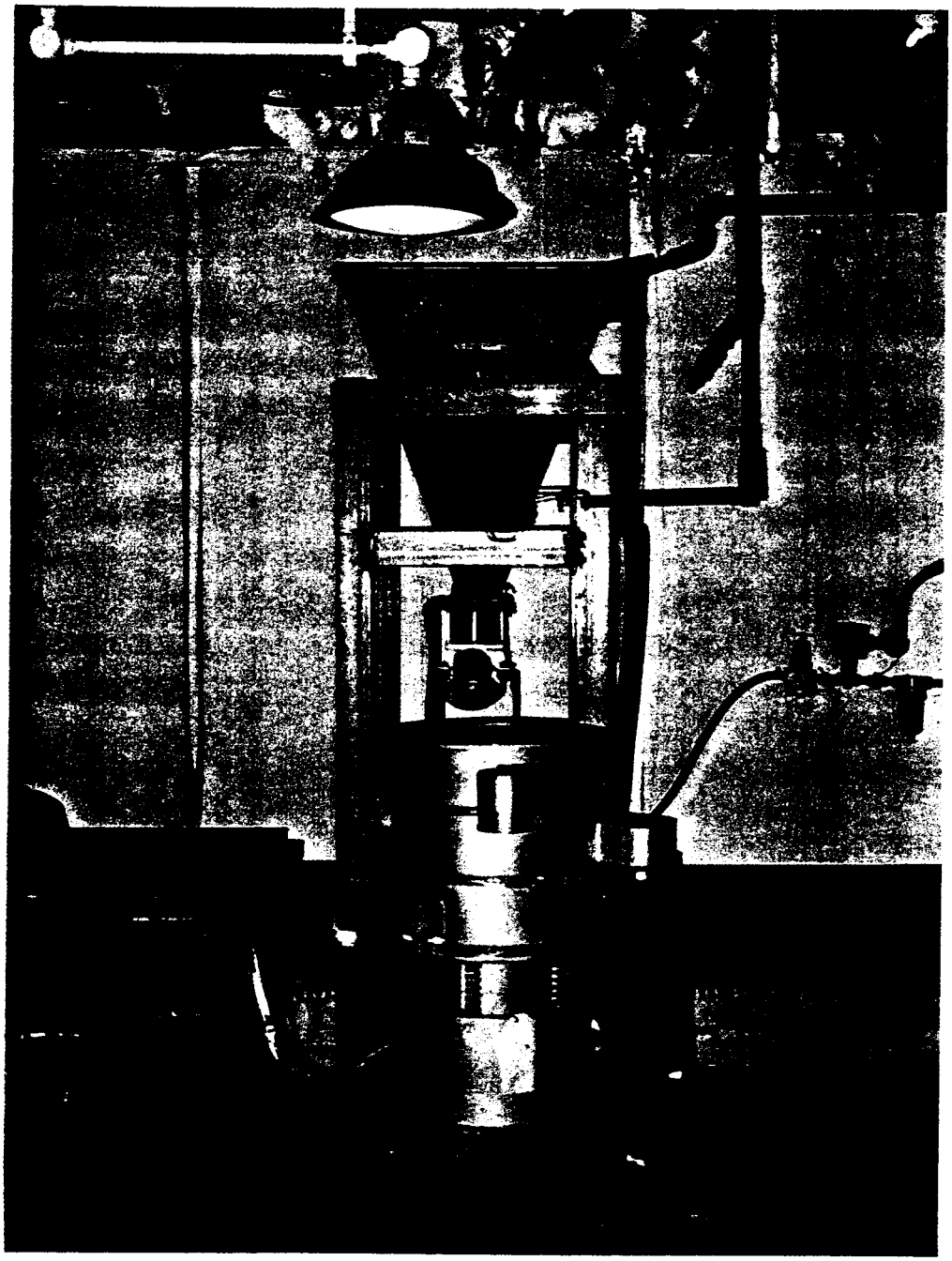
JAR MILL



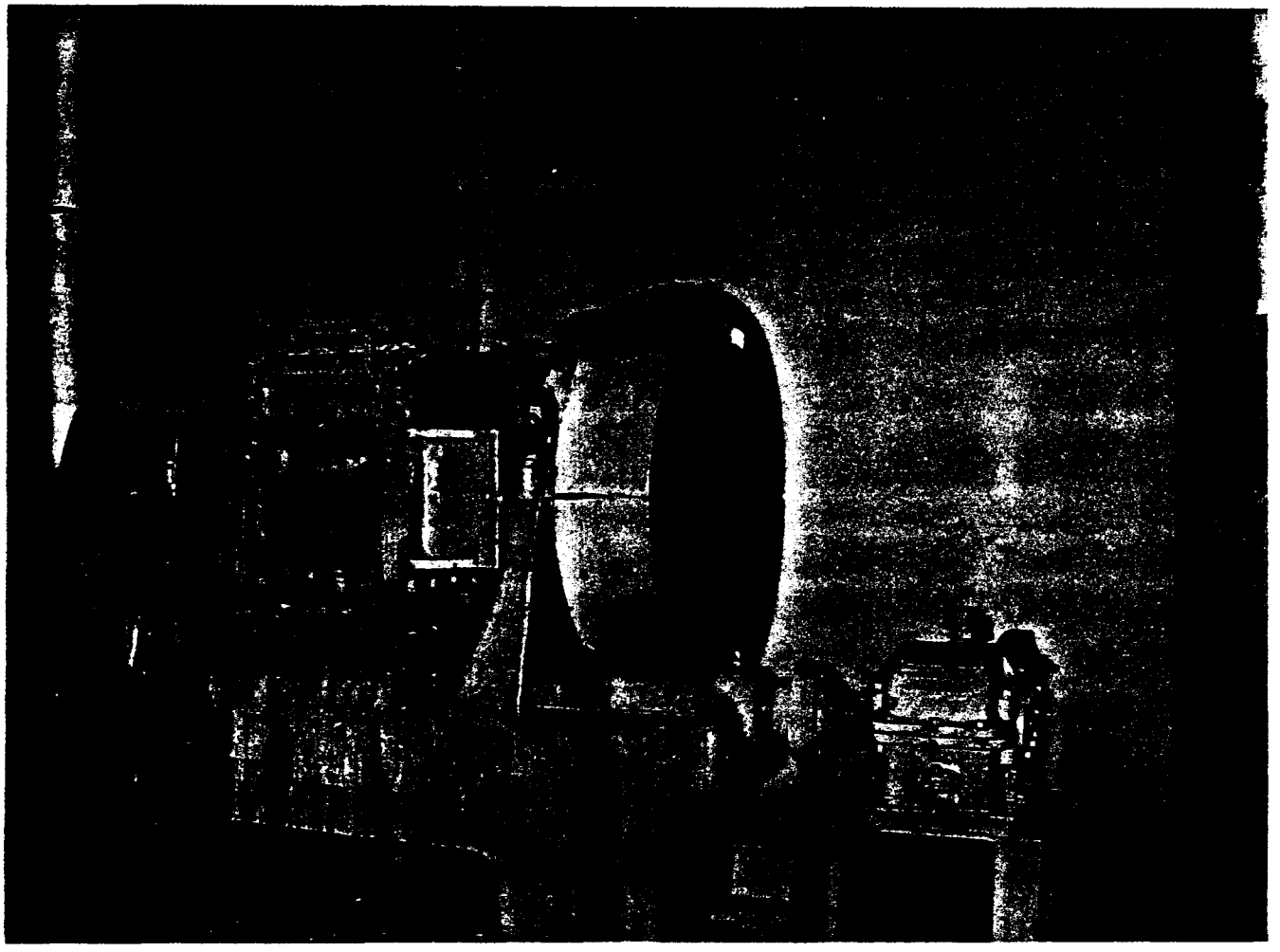
VACUUM PAN USED FOR THE DRYING OF NITROMINES SUCH AS RDX AND HMX



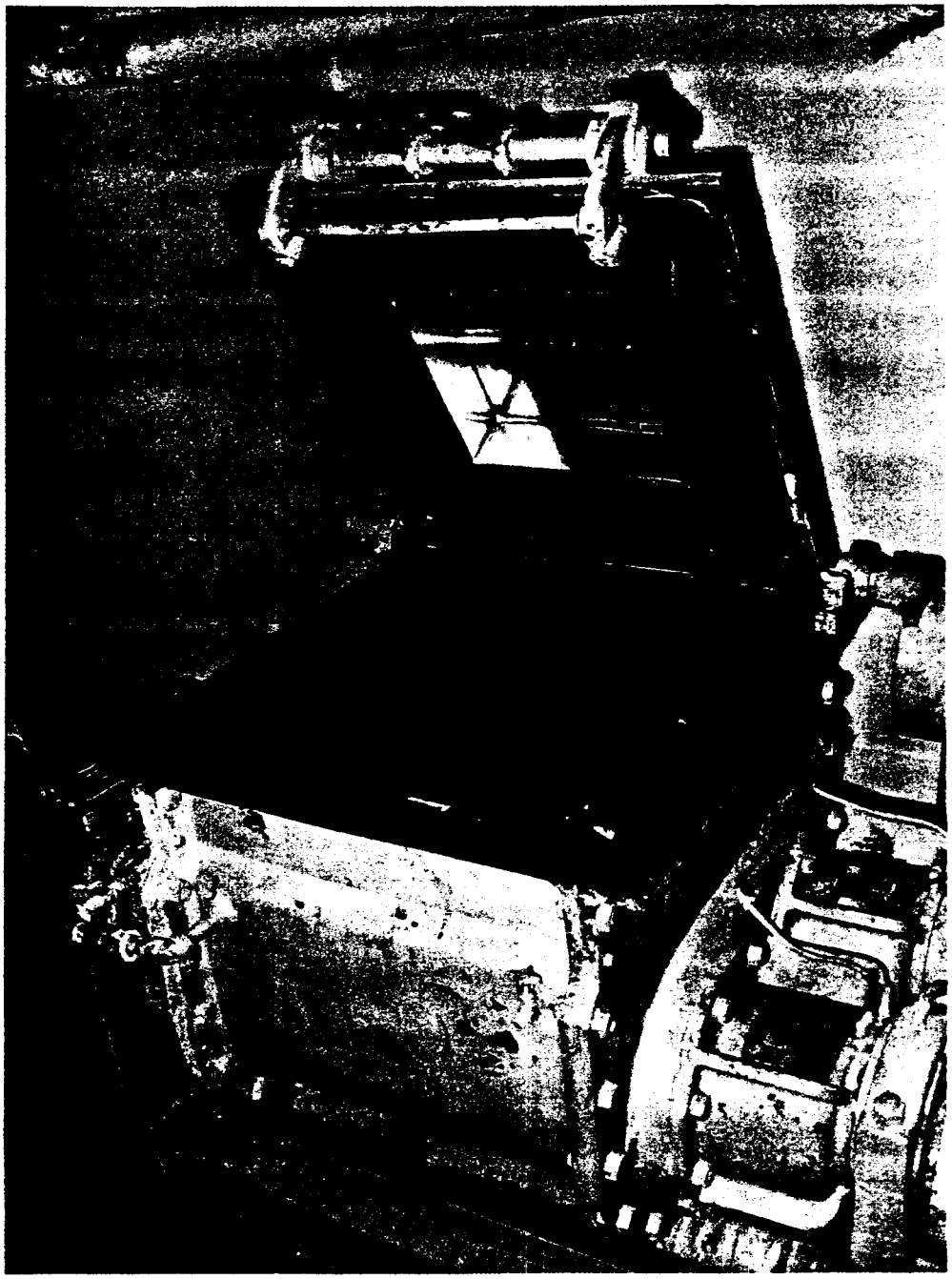
SWECO SEPERATOR SCREENING OPERATIONS



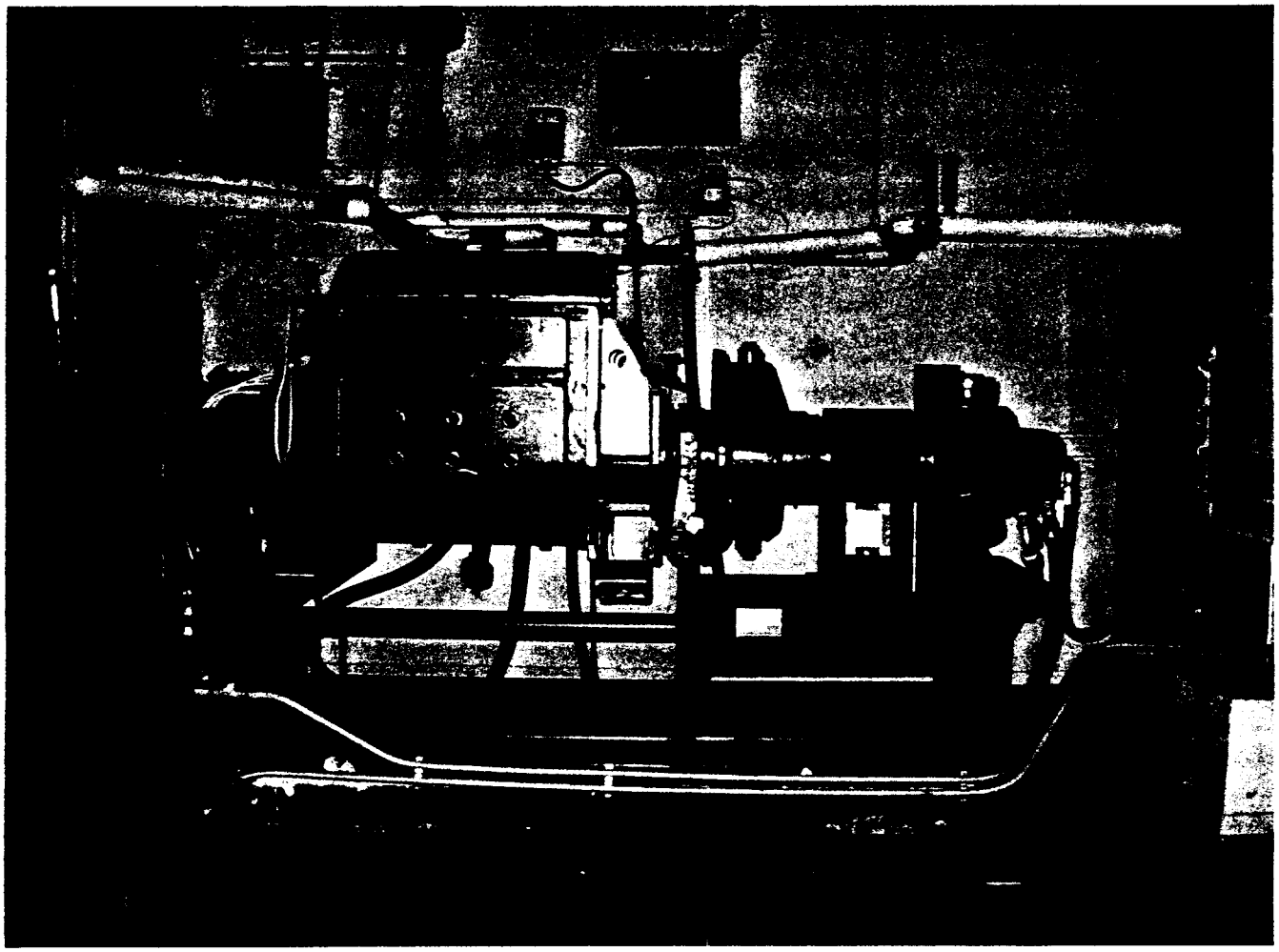
FIVE GALLON MIXER, ELECTRIC MOTOR DRIVEN, TEMPERATURE CONTROLLED JACKET, WITH AIR PRESSURE SPILL CAPABILITY



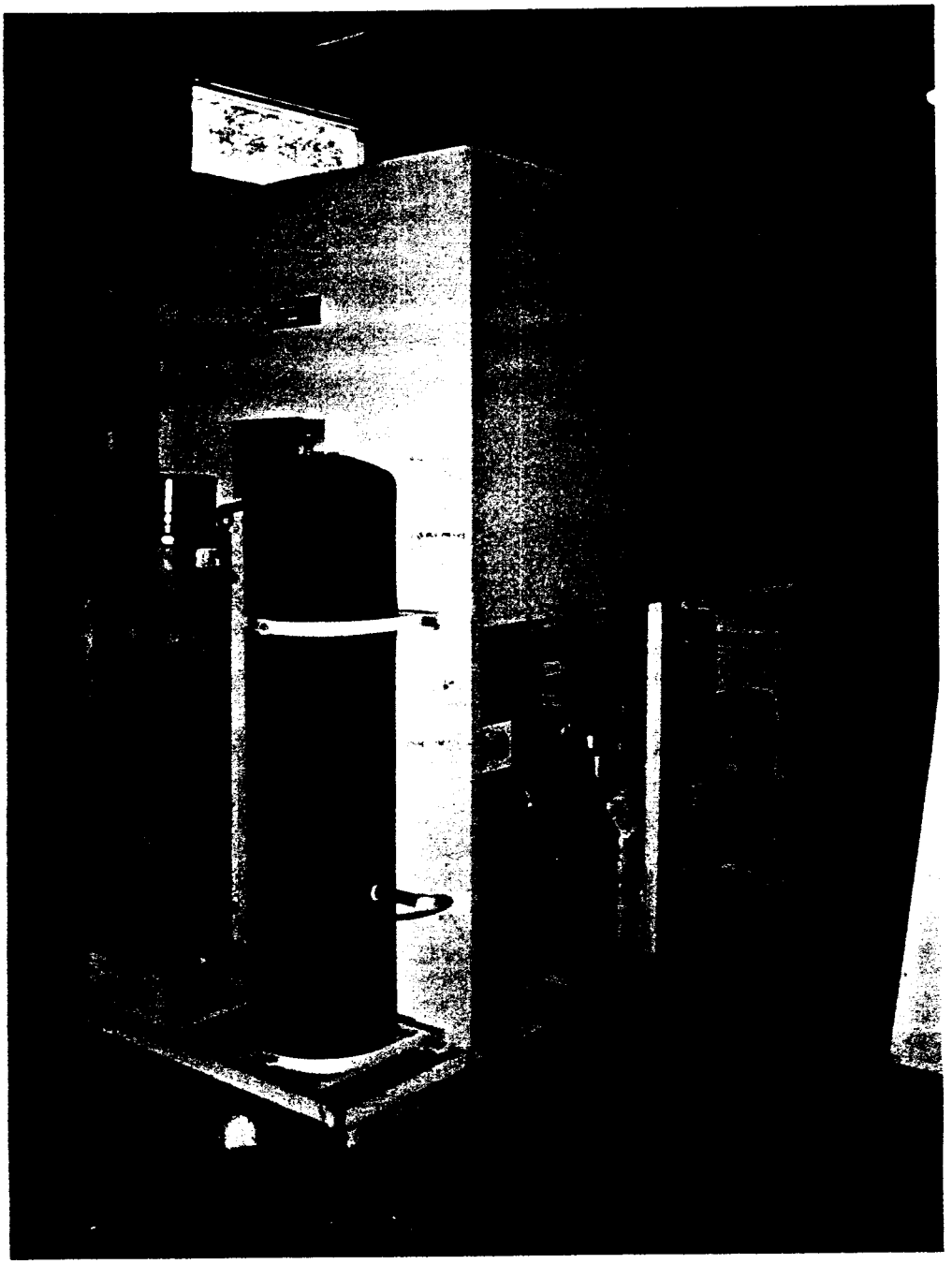
20 GALLON MIXER, ELECTRIC MOTOR DRIVEN, TEMPERATURE CONTROLLED JACKET, WITH AIR PRESSURE SPILL CAPABILITY



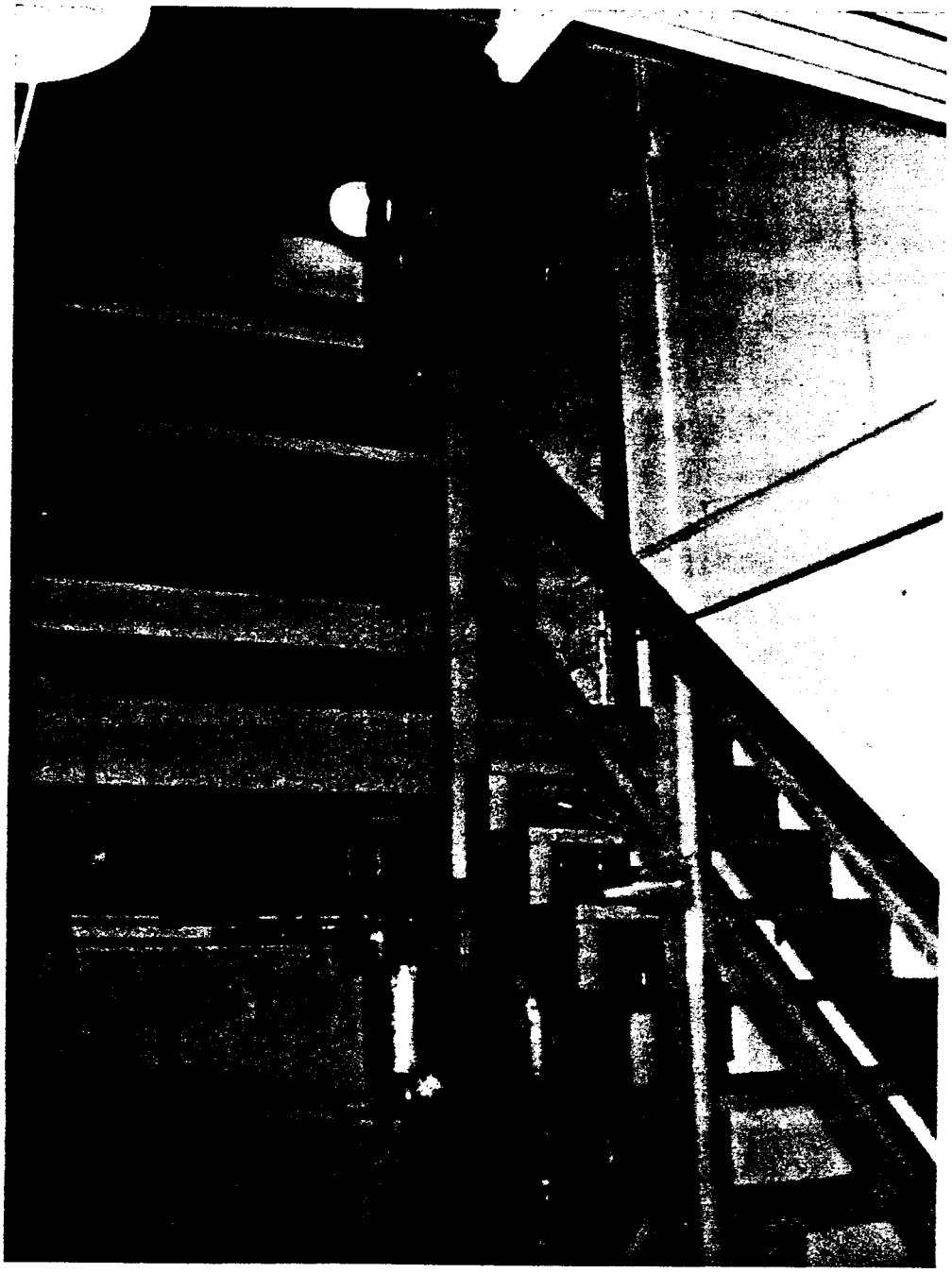
50 GALLON MIXER, HYDRAULIC DRIVEN, TEMPERATURE CONTROLLED JACKET, WITH HYDRAULIC SPILL CAPABILITY



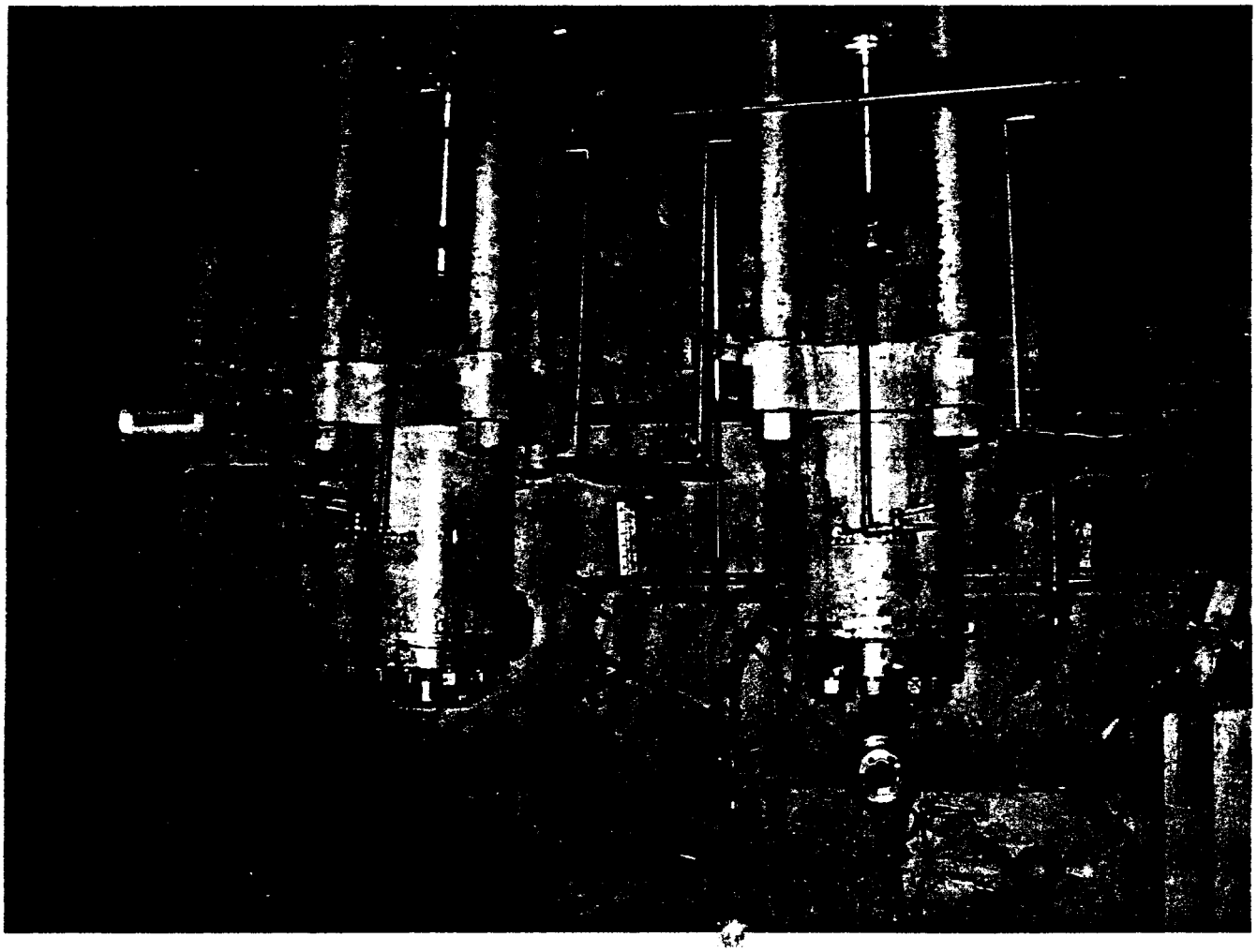
HEATER/CHILLER - EQUIPMENT PROVIDING TEMPERATURE CONDITIONED WATER TO THE FIVE, TWENTY AND FIFTY GALLON MIXERS



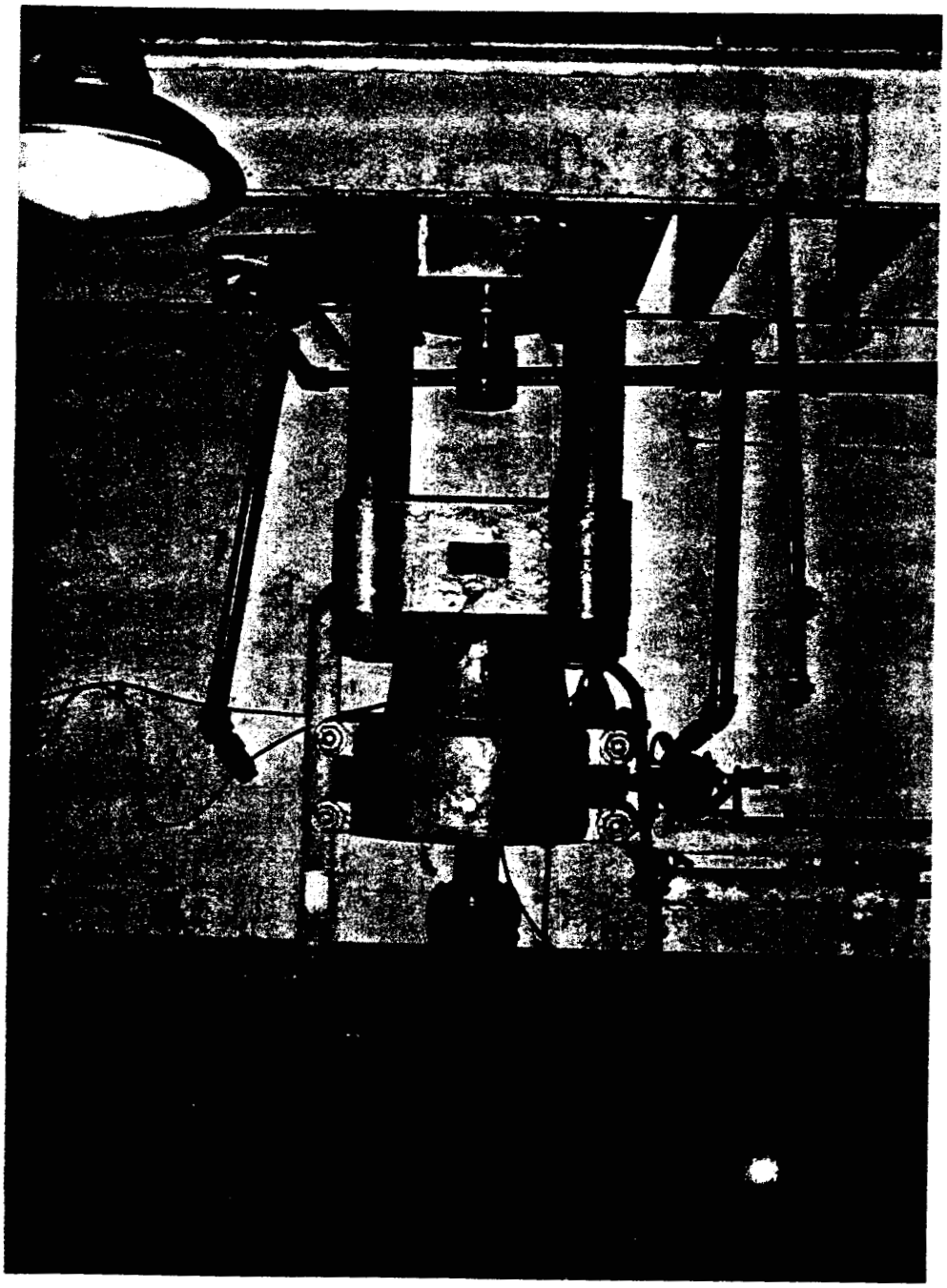
FOUR INCH HYDRAULIC EXTRUSION PRESS USED FOR THE BLOCKING AND EXTRUDING OF PROPELLANT MIXES. TOTAL OF FOUR OF THIS TYPE PRESS IN THE AREA. (FOOTNOTE) ALL HYDRAULIC PRESSES HAVE BEEN REFURBISHED IN THE PAST TWO YEARS.



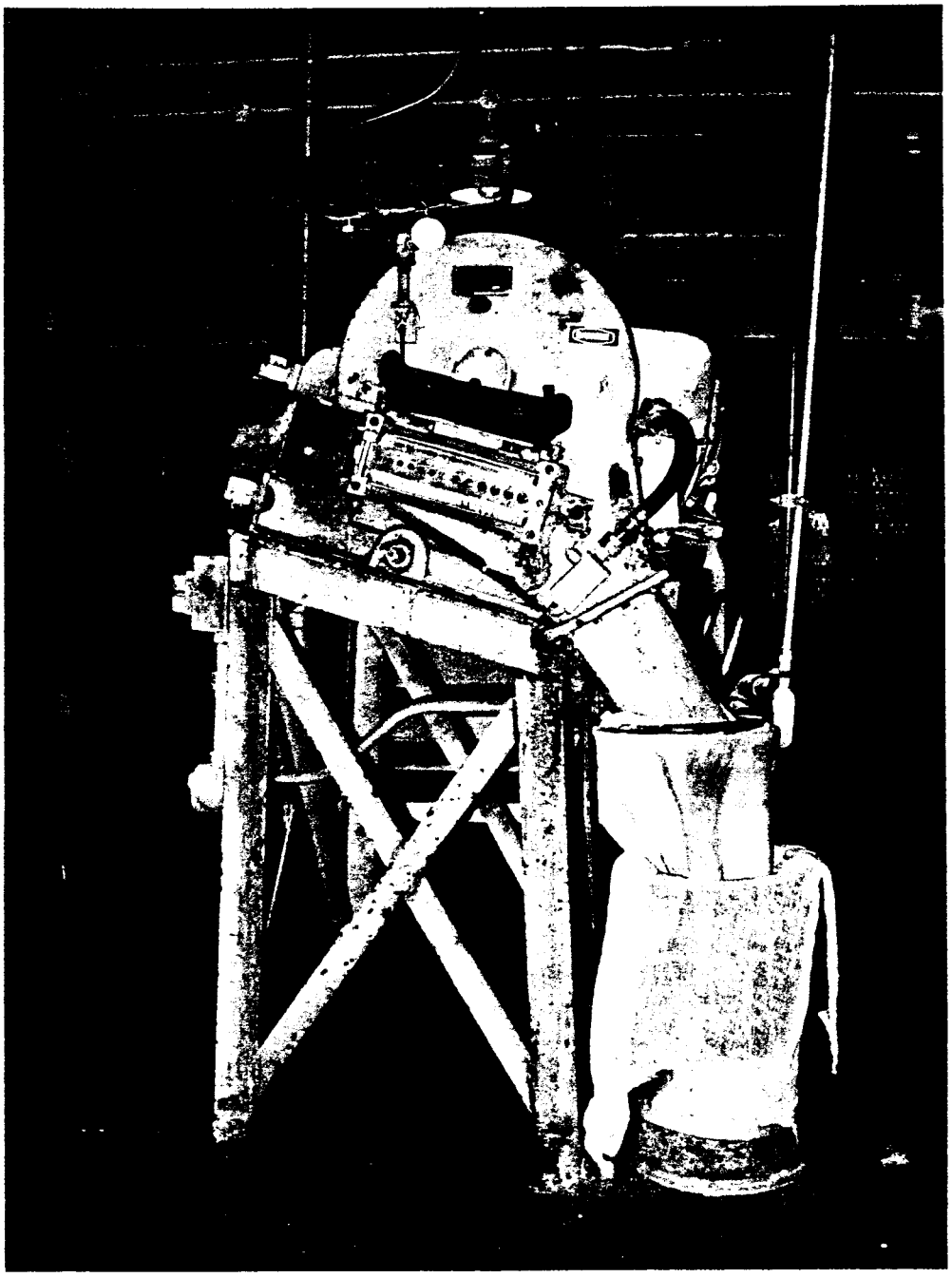
FOUR INCH HYDRAULIC EXTRUSION PRESS USED FOR THE BLOCKING AND EXTRUDING OF PROPELLANT MIXES. TOTAL OF FOUR OF THIS TYPE PRESS IN THE AREA. (FOOTNOTE) ALL HYDRAULIC PRESSES HAVE BEEN REFURBISHED IN THE PAST TWO YEARS.



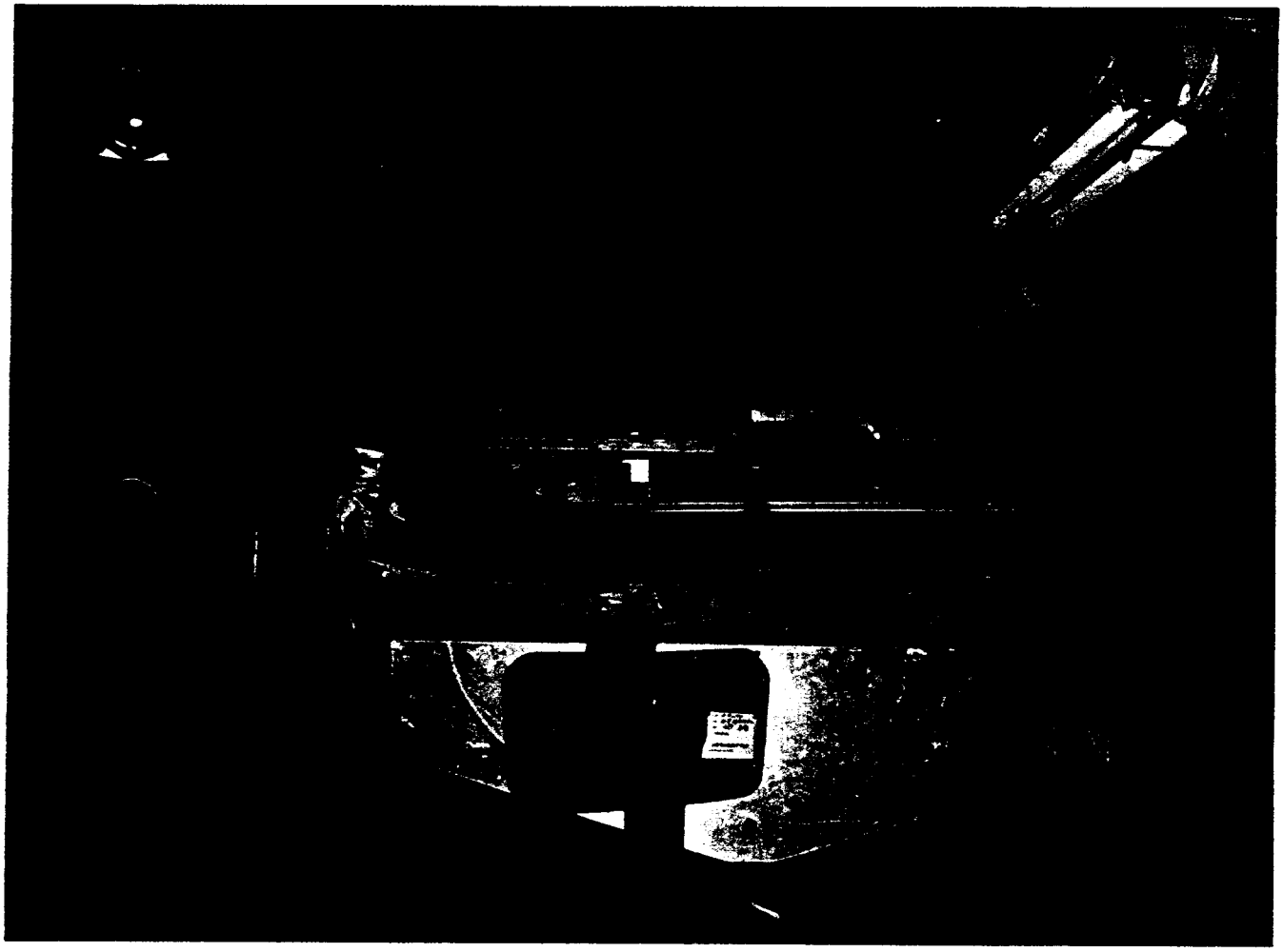
FARQUAR 4" HEATED EXTRUSION PRESS



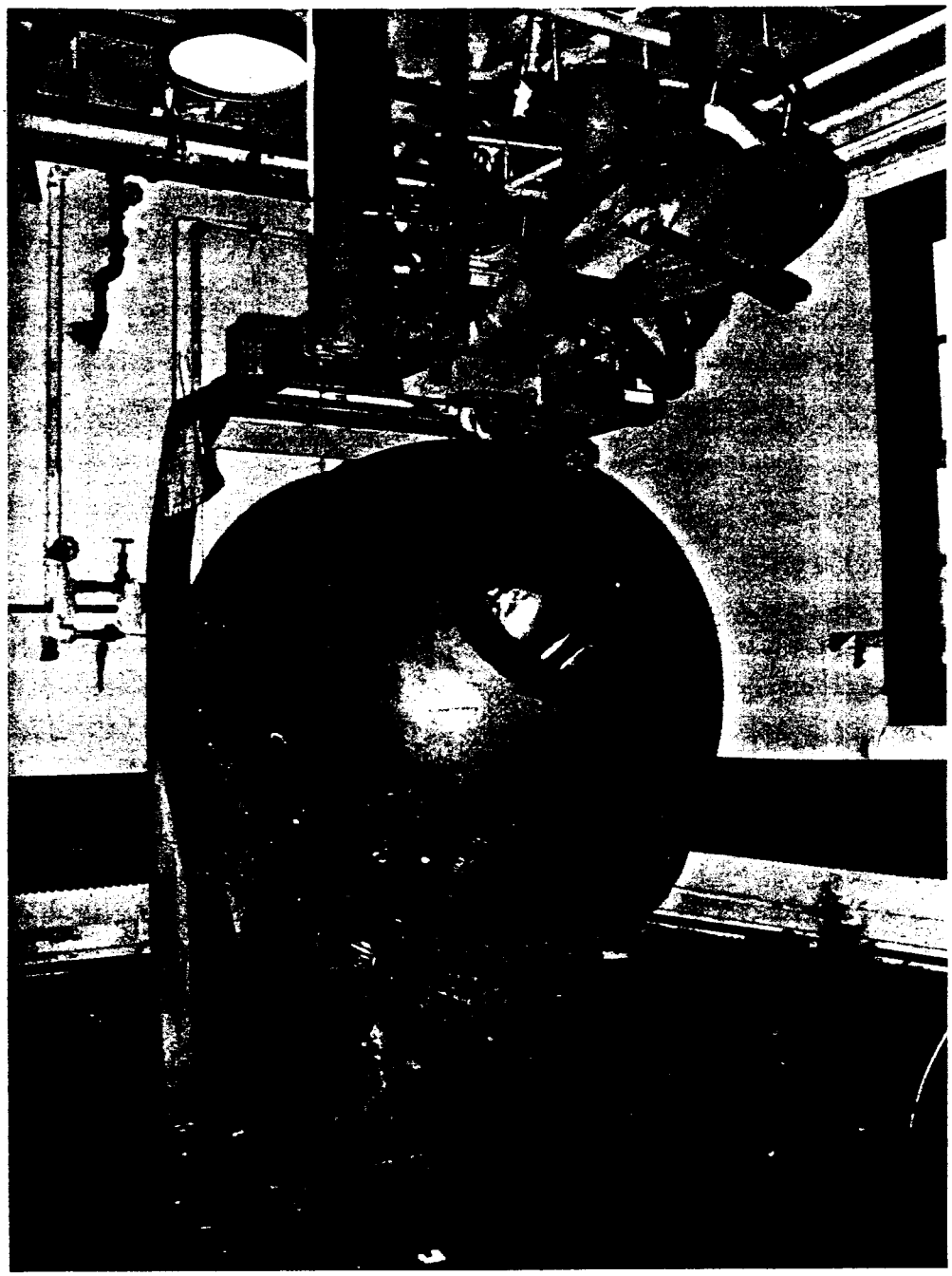
MCKIERNAN TERRY CUTTER USED FOR THE CUTTING OF PROPELLANT STRANDS IN SPECIFIC LENGTHS



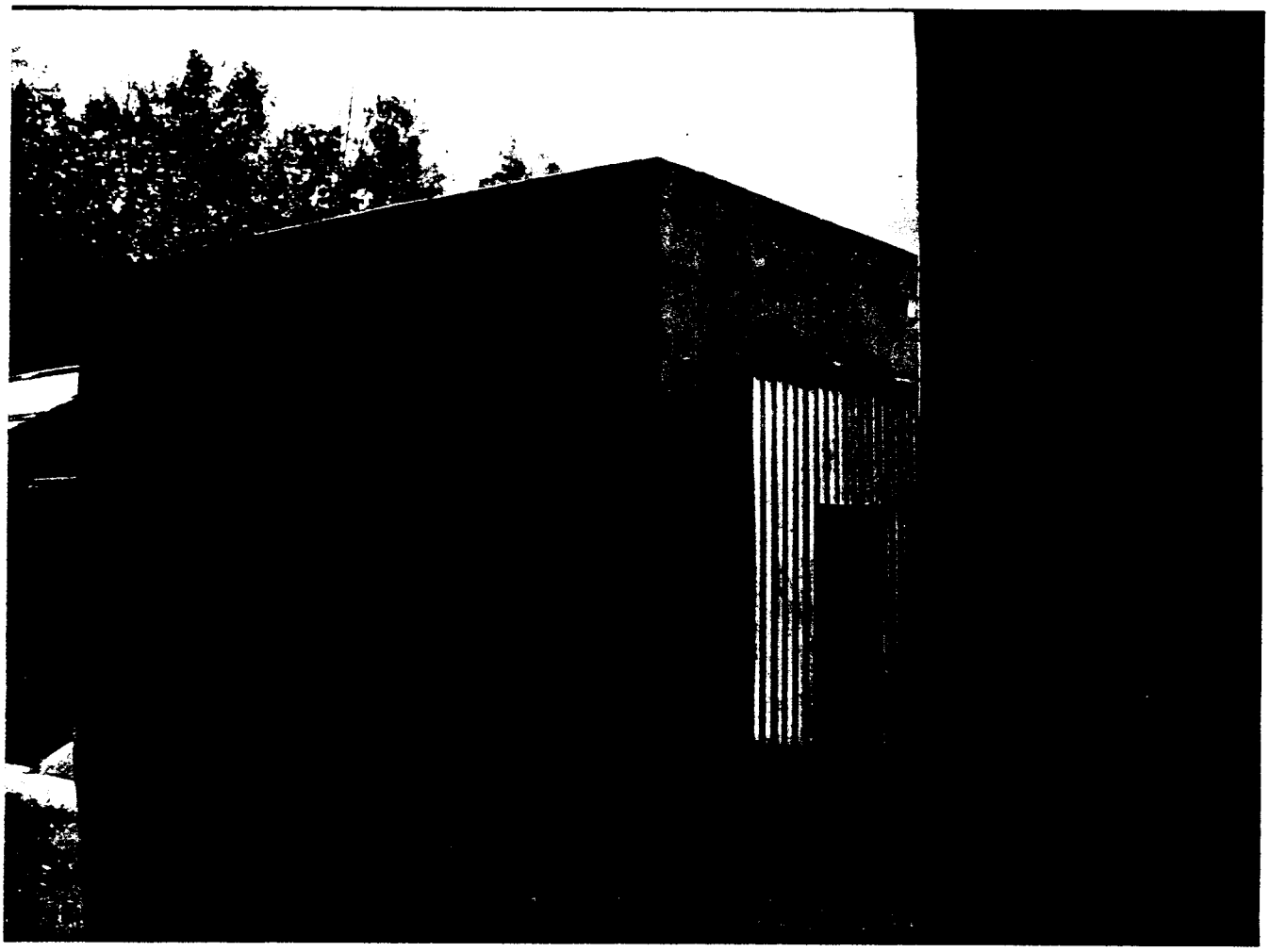
SEMI-AUTOMATIC PROPELLANT STRAND CUTTER



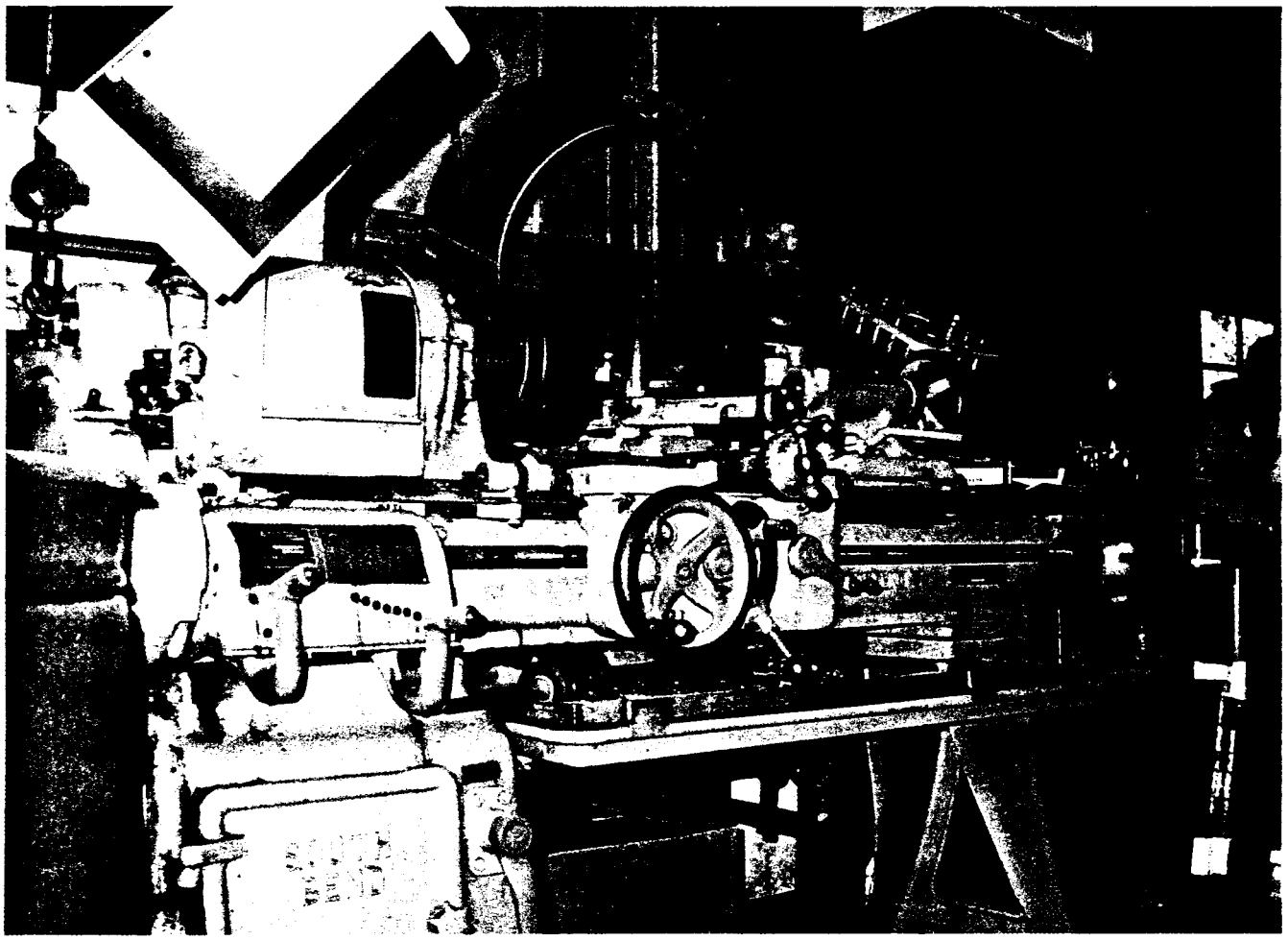
COATING BARREL
GRAPHITE COATING OF PROELLANTS



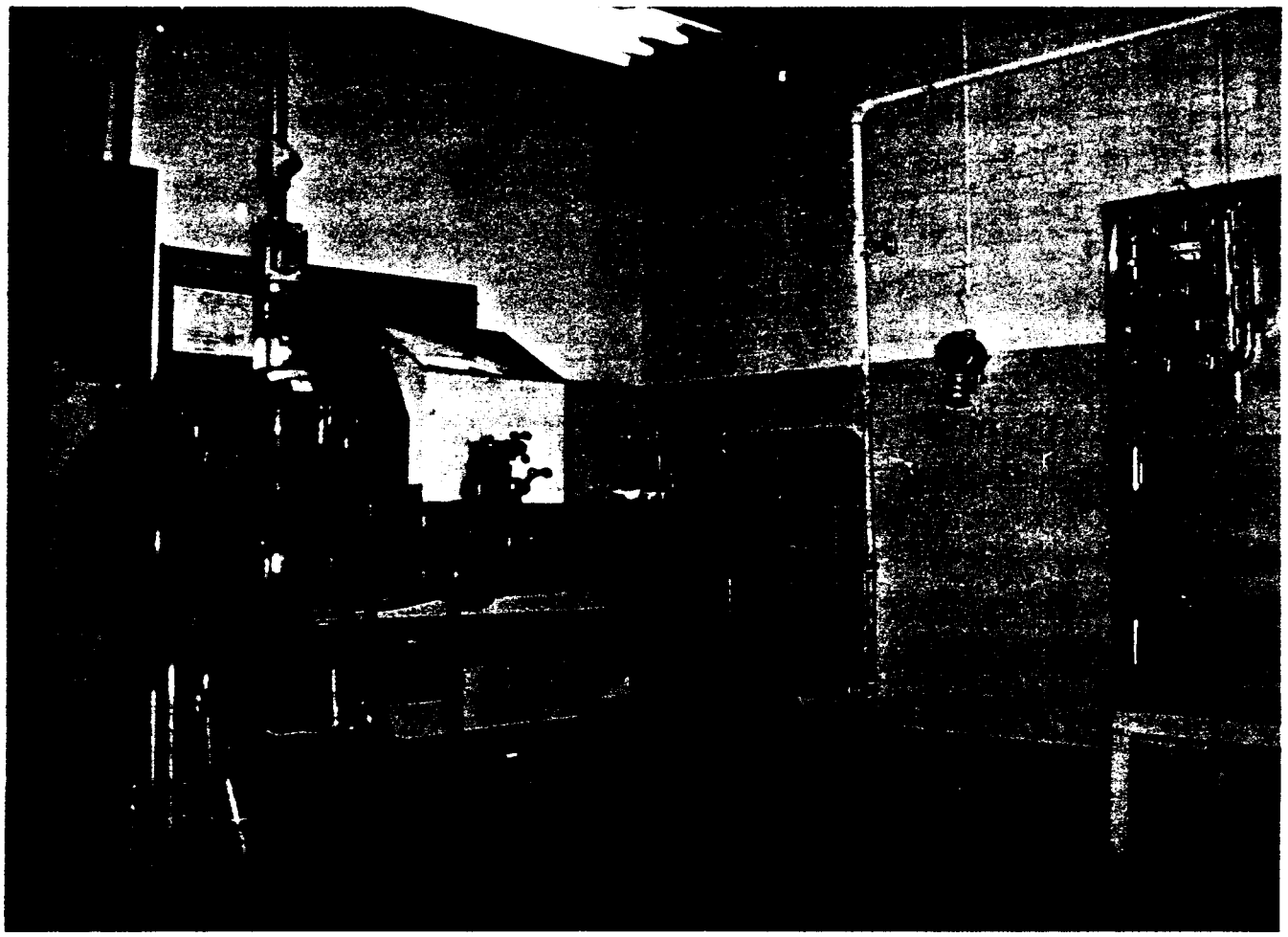
BUILDING 1420 - NEW 300 LB FRANGIBLE MACHINE



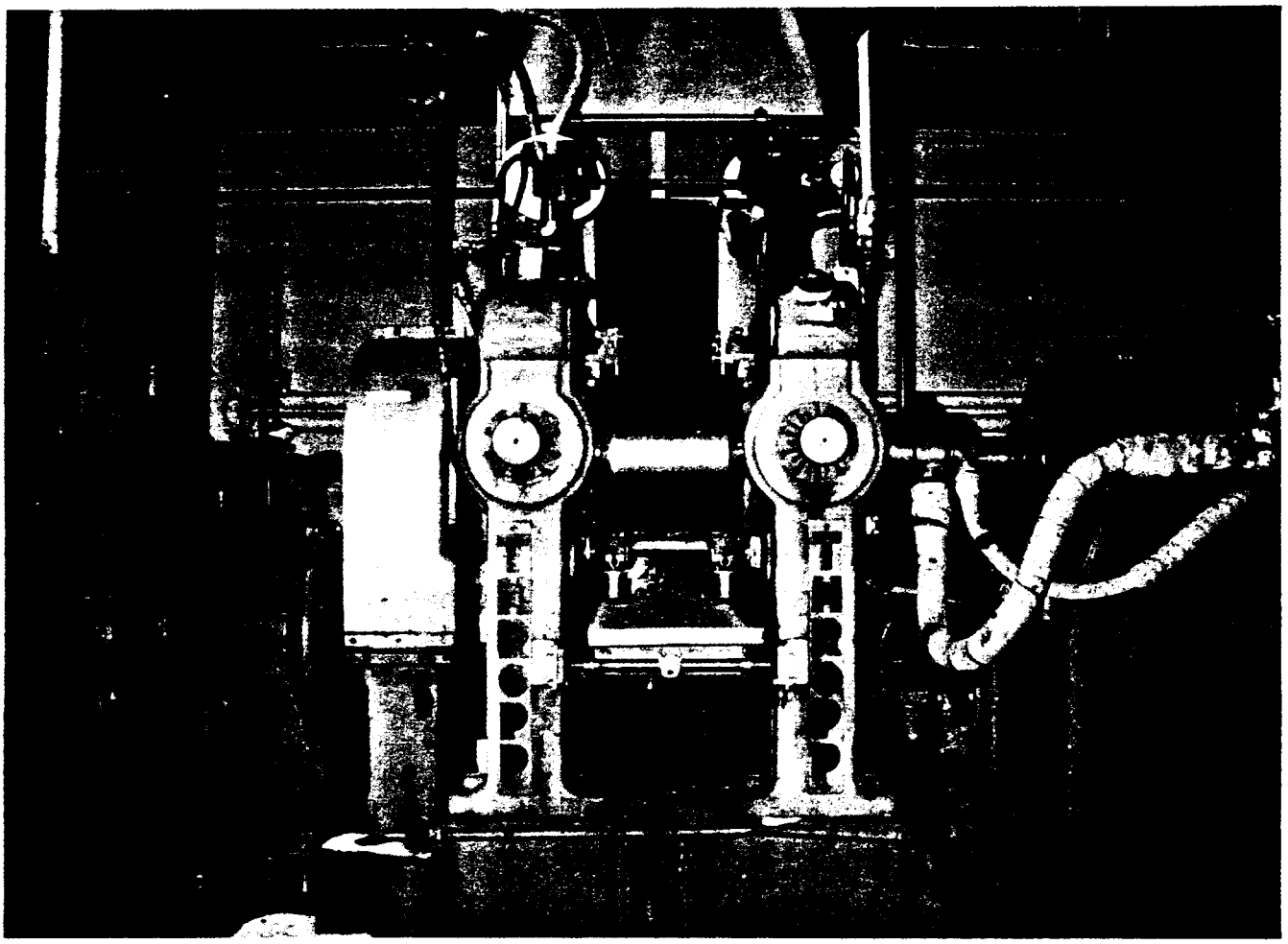
ENGINELATHE



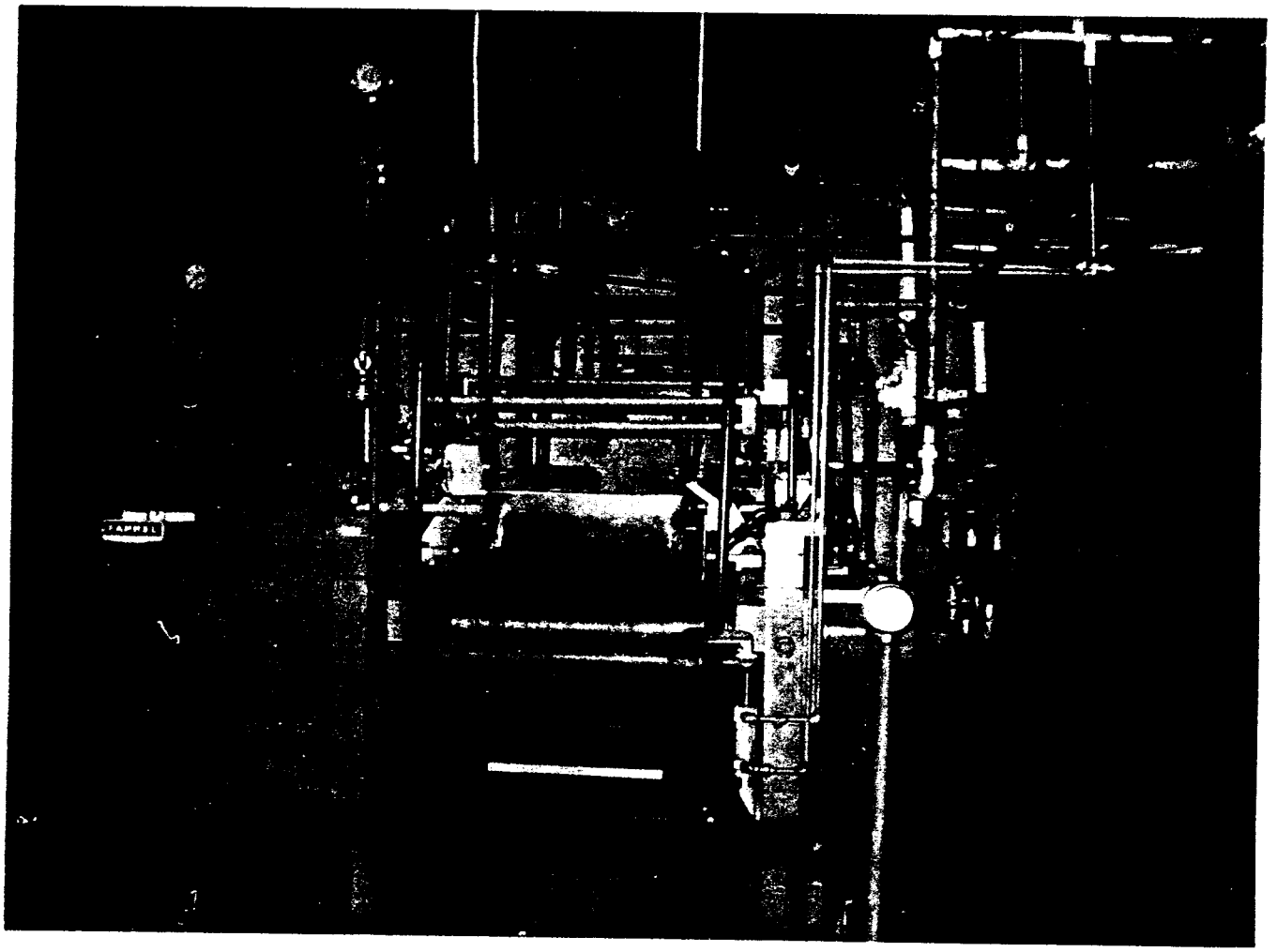
LATHE USED IN THE MACHINE OF PROPELLANT GRAIN SAMPLES



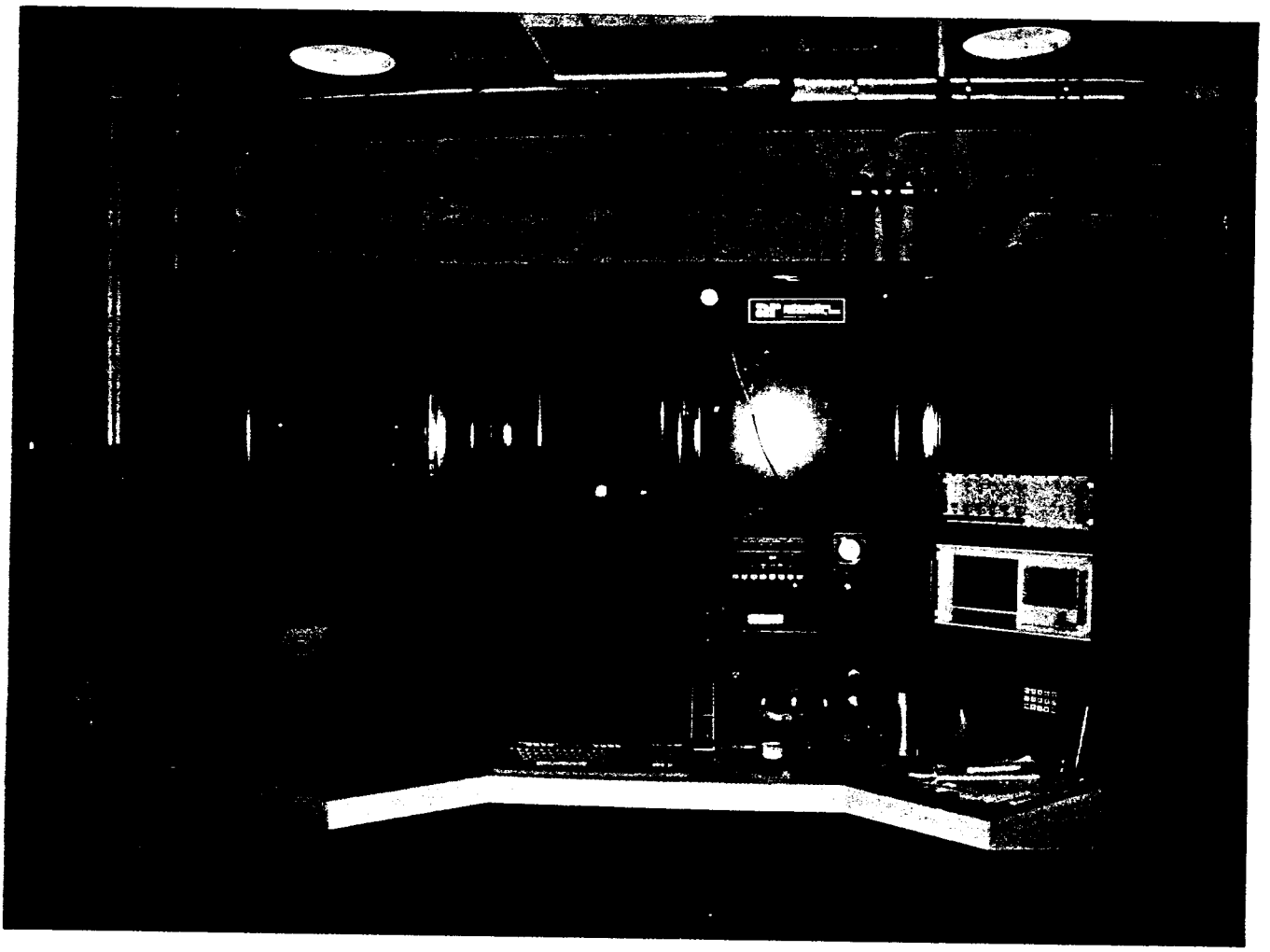
DIFFERENTIAL SPEED ROLL MILL
SOLVENTLESS PROPELLANT FORMULATION



ROLL MILL
THERE ARE SEVERAL DIFFERENTIAL AND EVEN SPEED ROLL MILLS

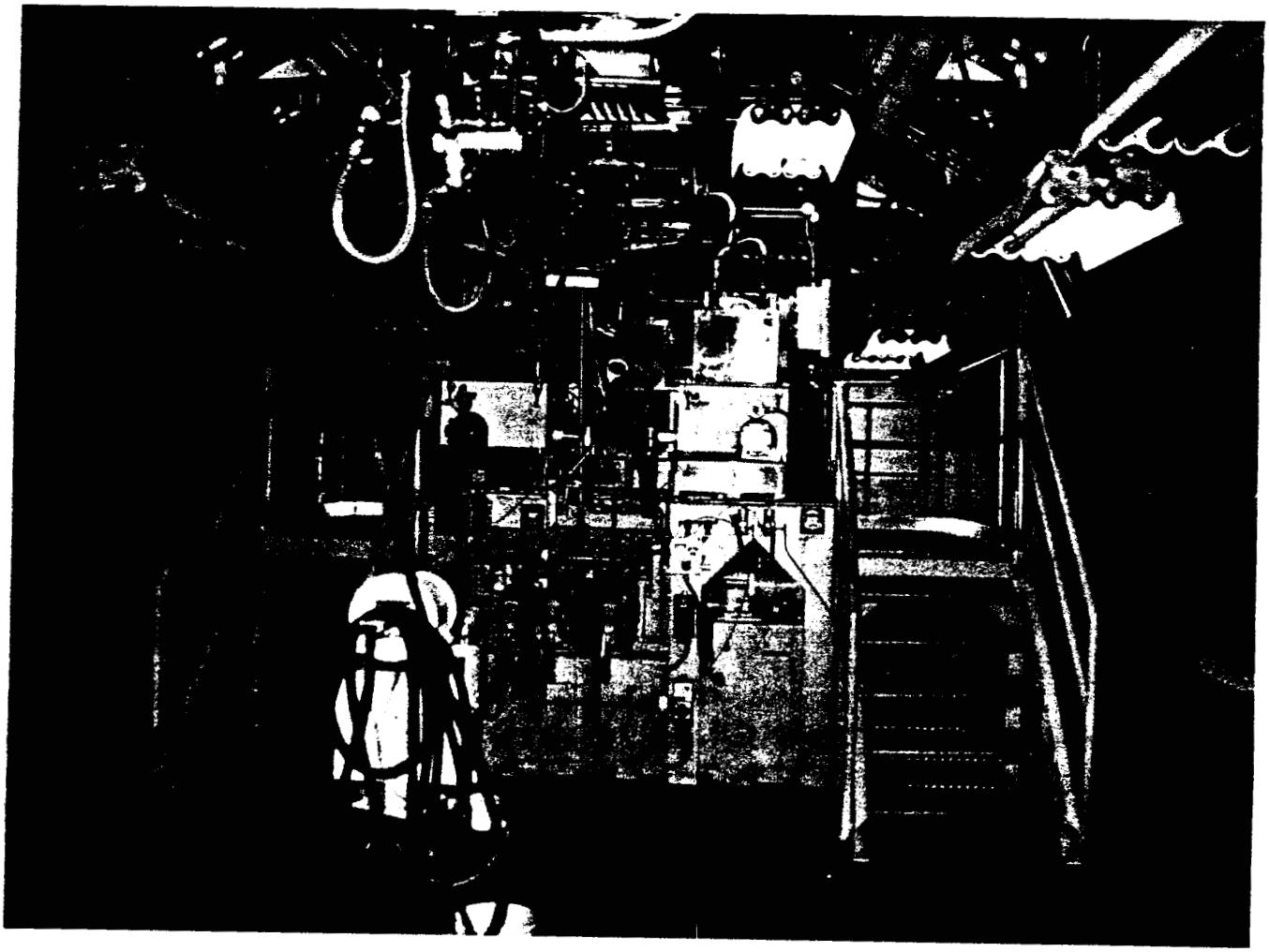


CONTROL PANEL FOR CONTINUOUS EXTRUDER

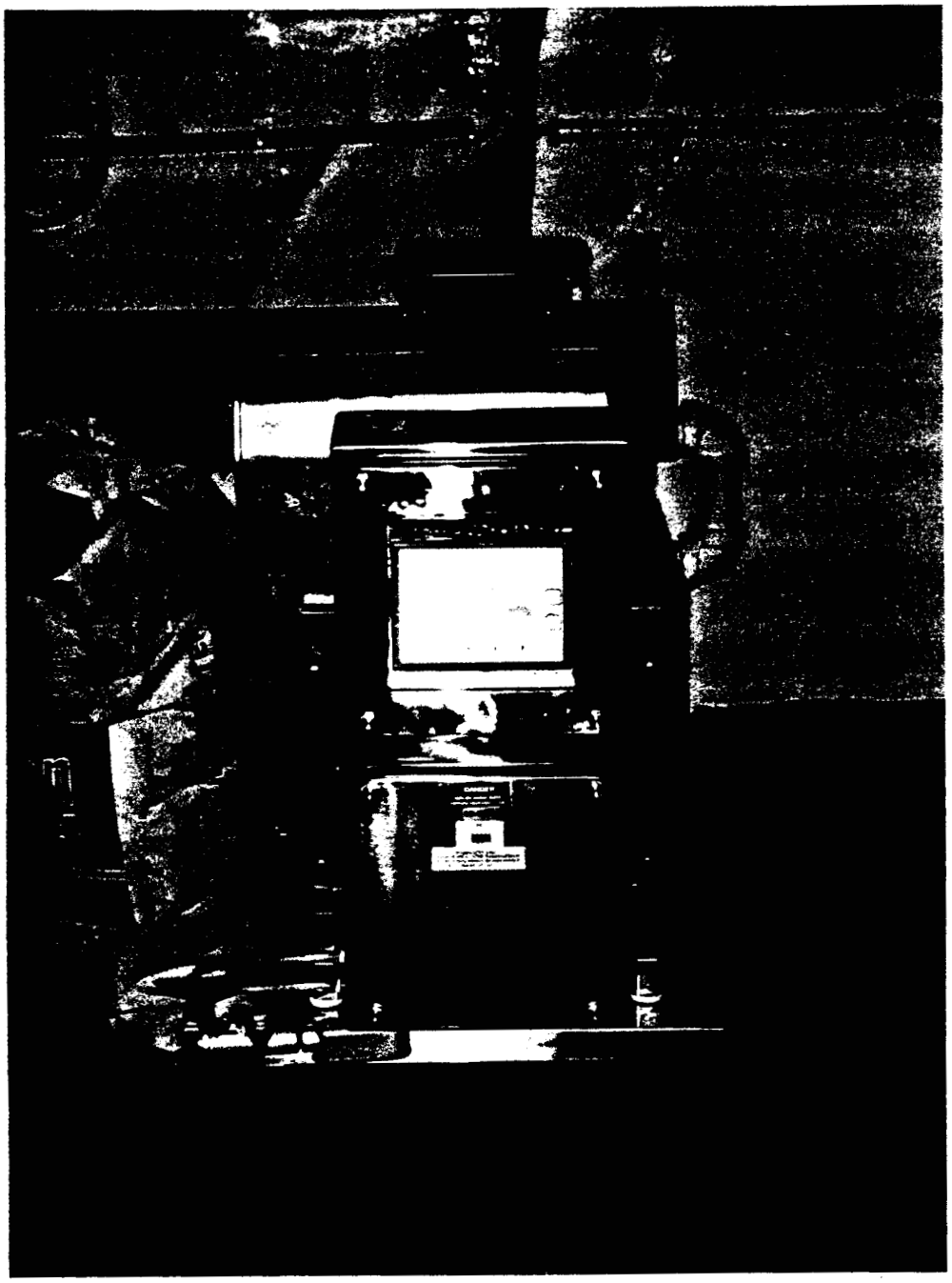


M

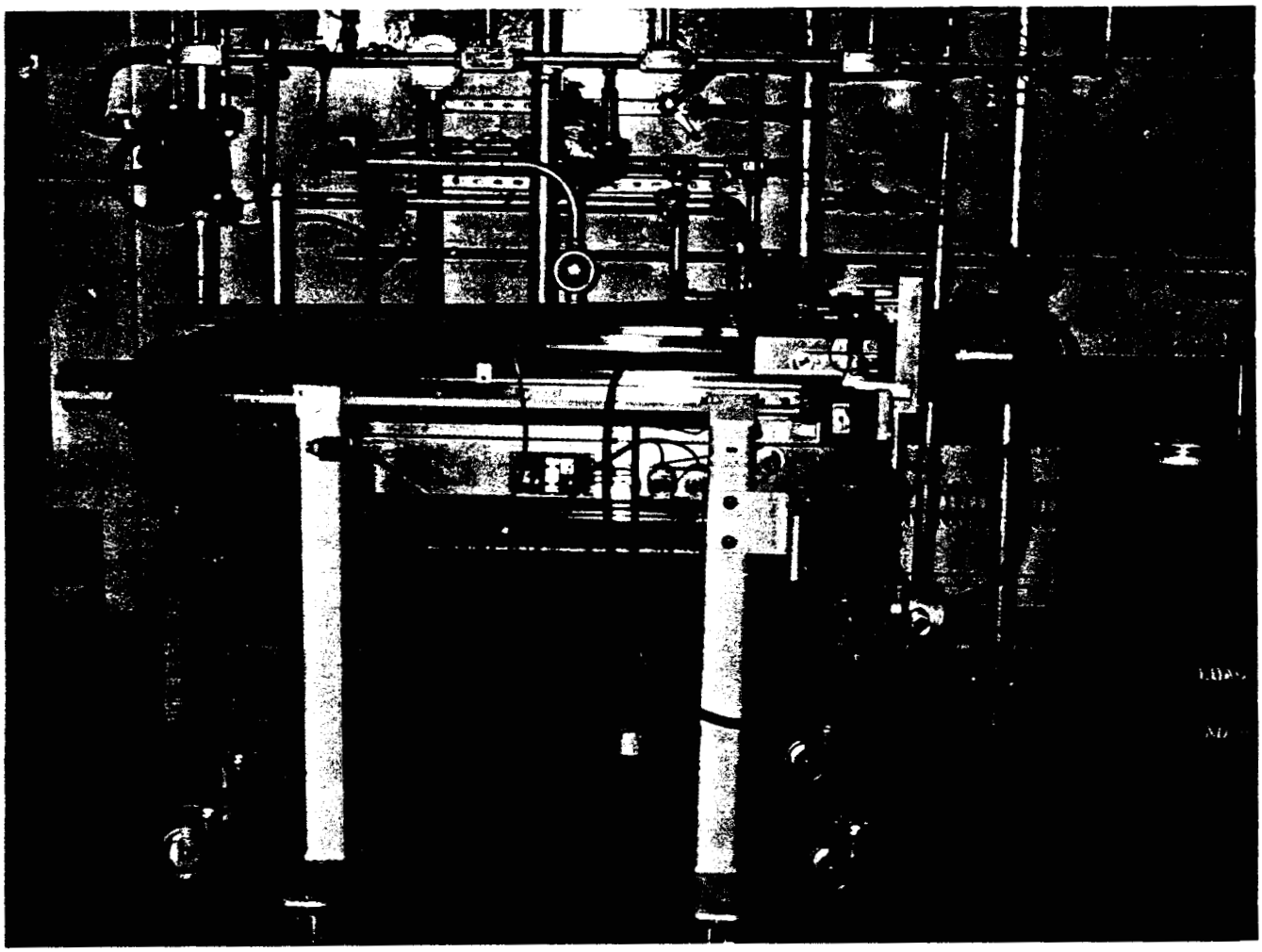
CONTINUOUS EXTRUDER
3 SOLID FEEDERS, 3 LIQUID FEEDERS AND 4 ZONE HEATING OF MIXING/EXTRUSION CHAMBER



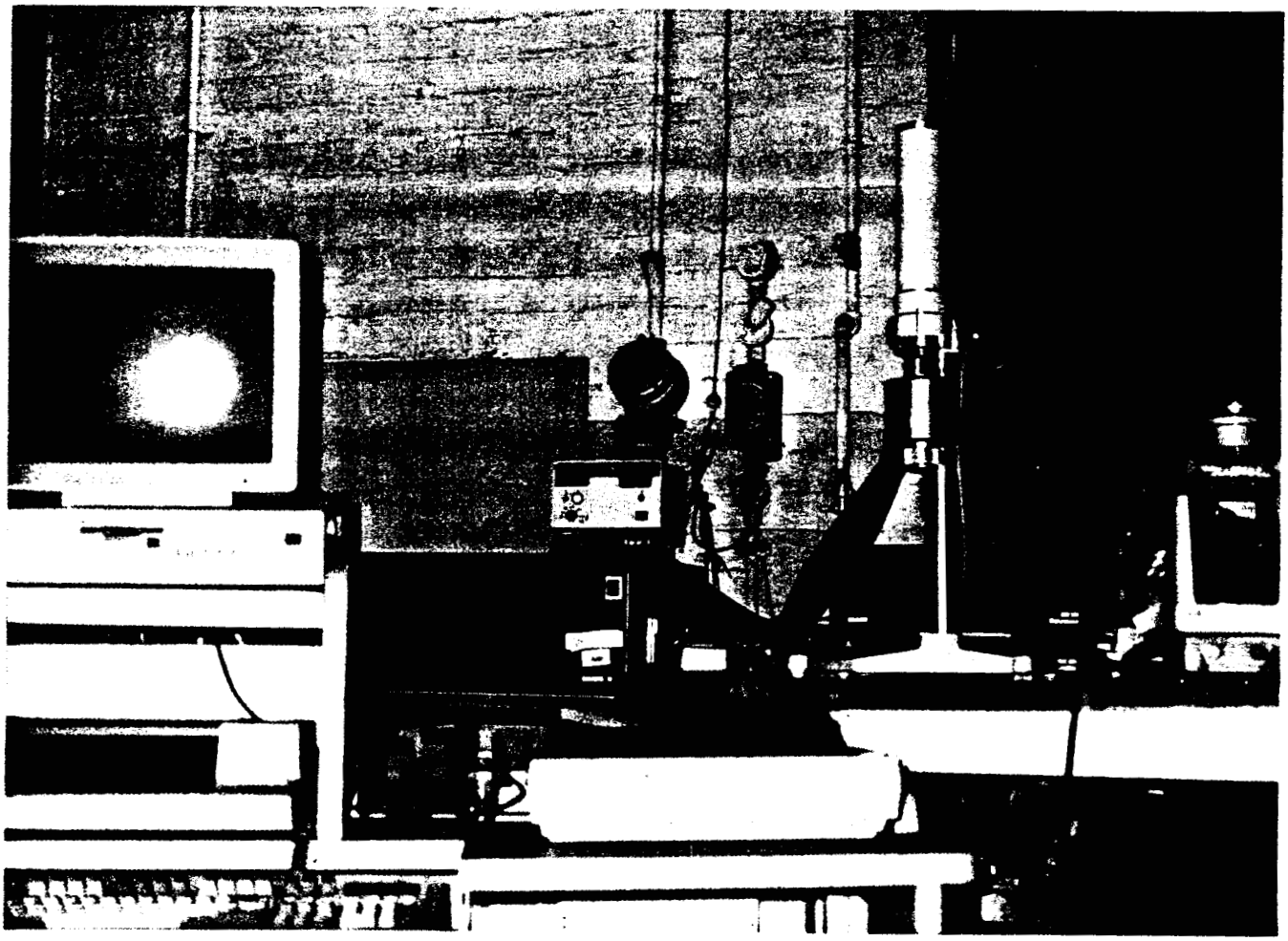
METAL DETECTOR/SEPARATOR USED TO SCREEN INGREDIENTS (INCLUDING NITRAMINES) FOR USE IN THE CONTINUOUS EXTRUDER



AUTOMATIC CUTTER FOR USE WITH CONTINUOUS EXTRUDER



VISCOMETER ROTARY
SYNCHRO-ELECTRIC

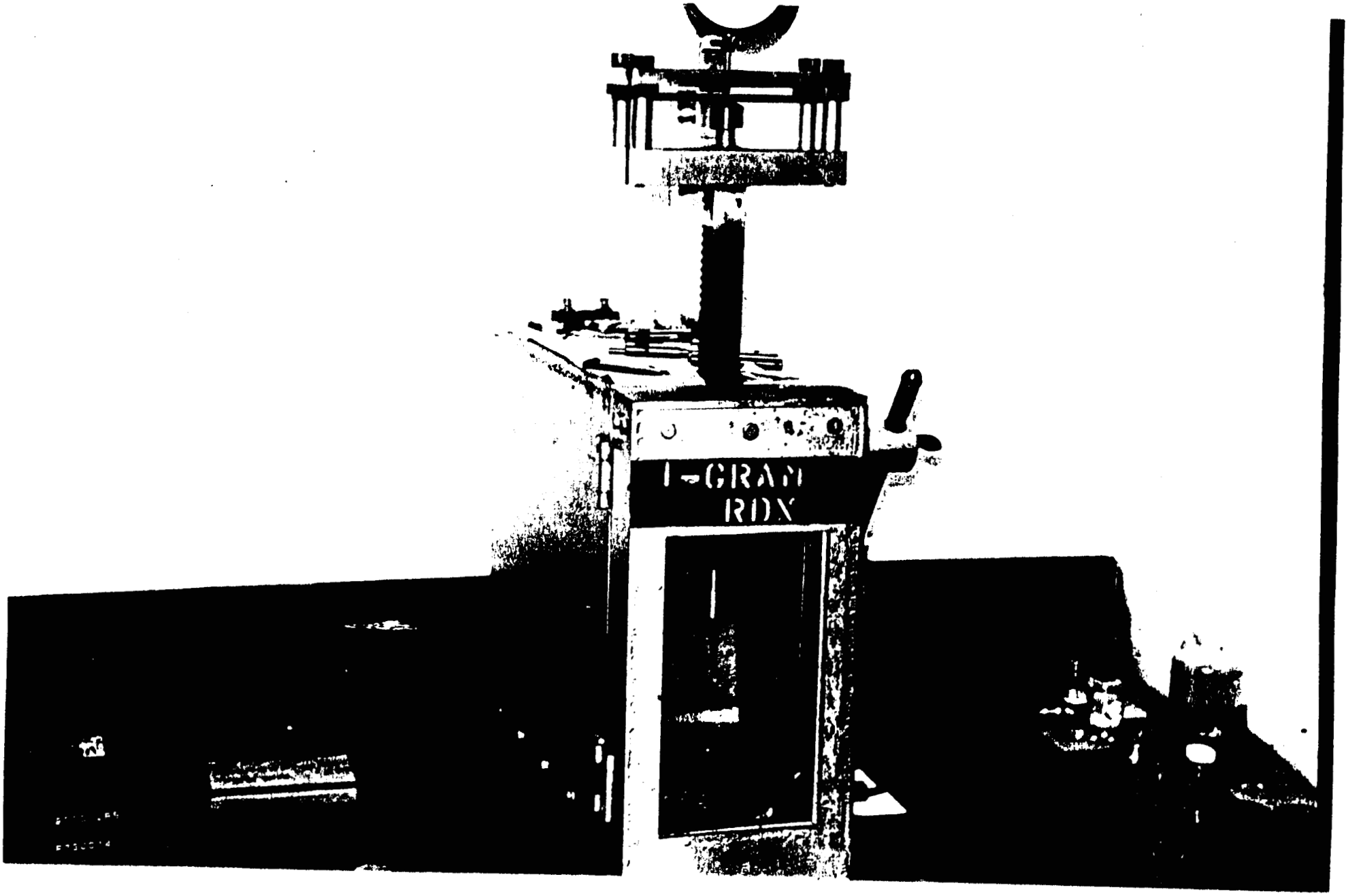


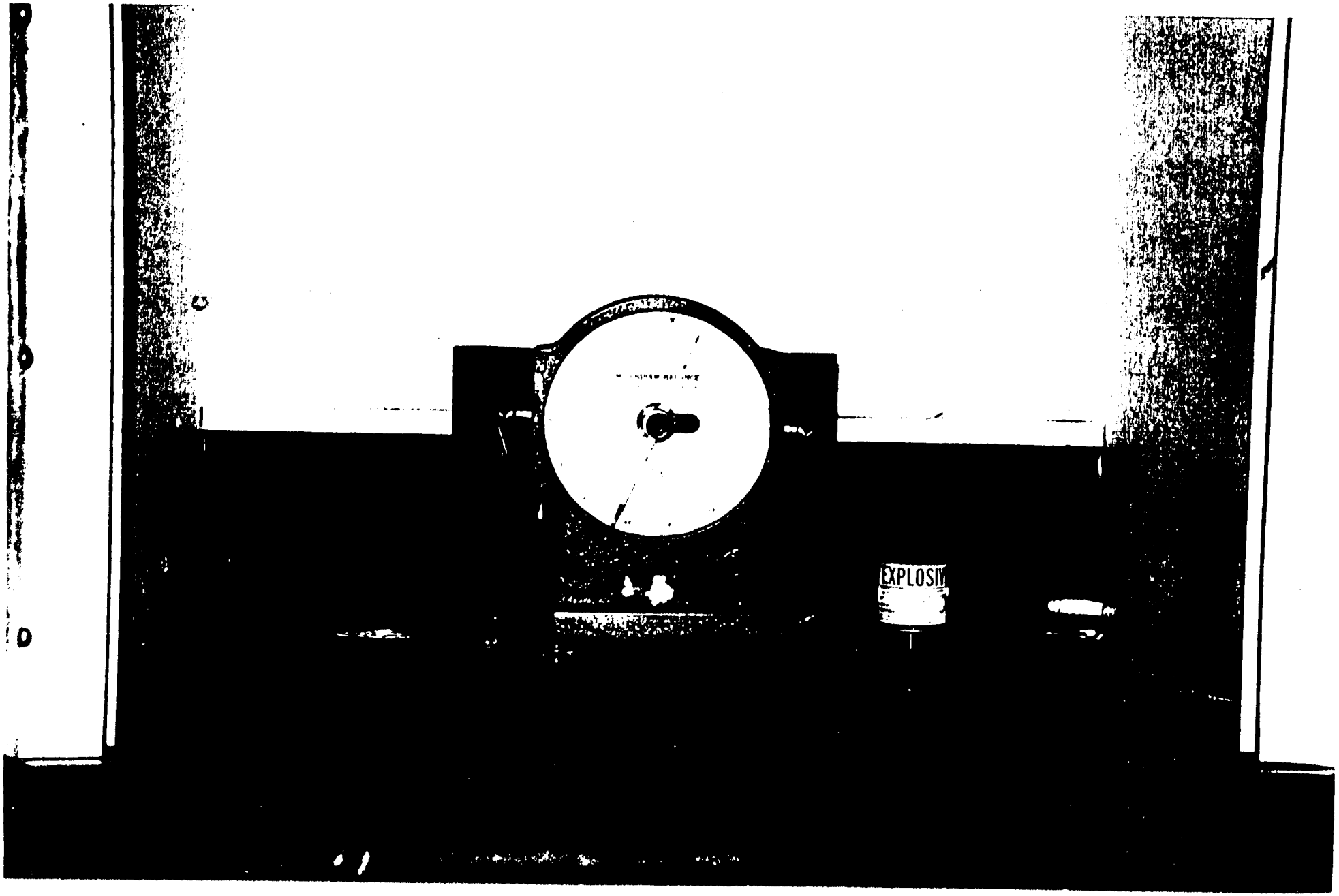
D. HAZARDS AND SENSITIVITY CAPABILITY

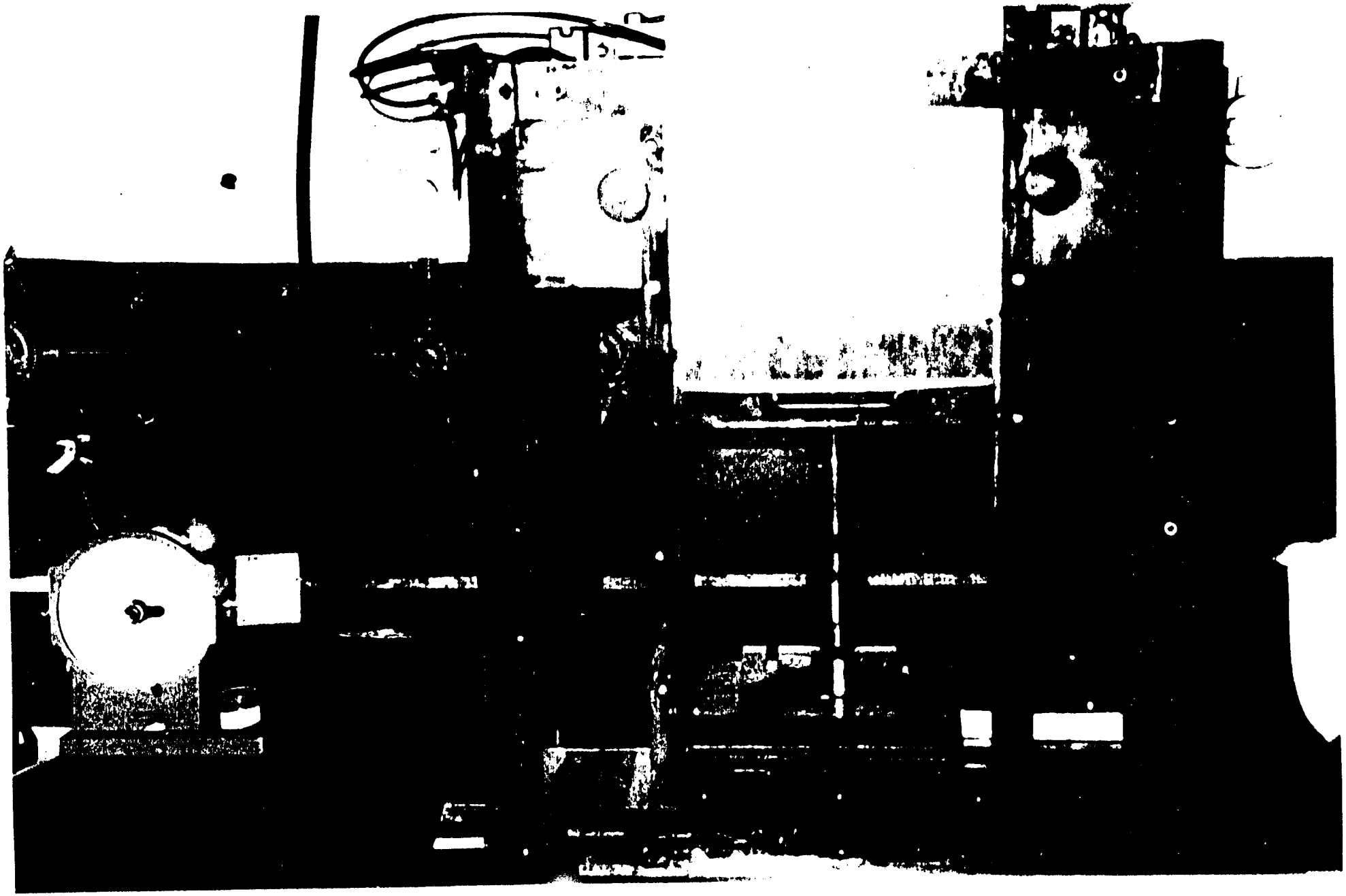
DETONATOR/PRIMER/CAP LOADING DEVELOPMENT LINE

- ENERGETIC MATERIAL SENSITIVITY & HAZARD ANALYSIS FACILITY

  This facility consists of barricaded hand and pneumatic presses, scales, force gages, and accessories. The equipment is mounted on benches with conductive tops and the room is equipped with a conductive floor. A screen-room provides protection for working with electrically sensitive items and a steam heated drying oven is available for energetic conditioning.


1-GRAM
RDX

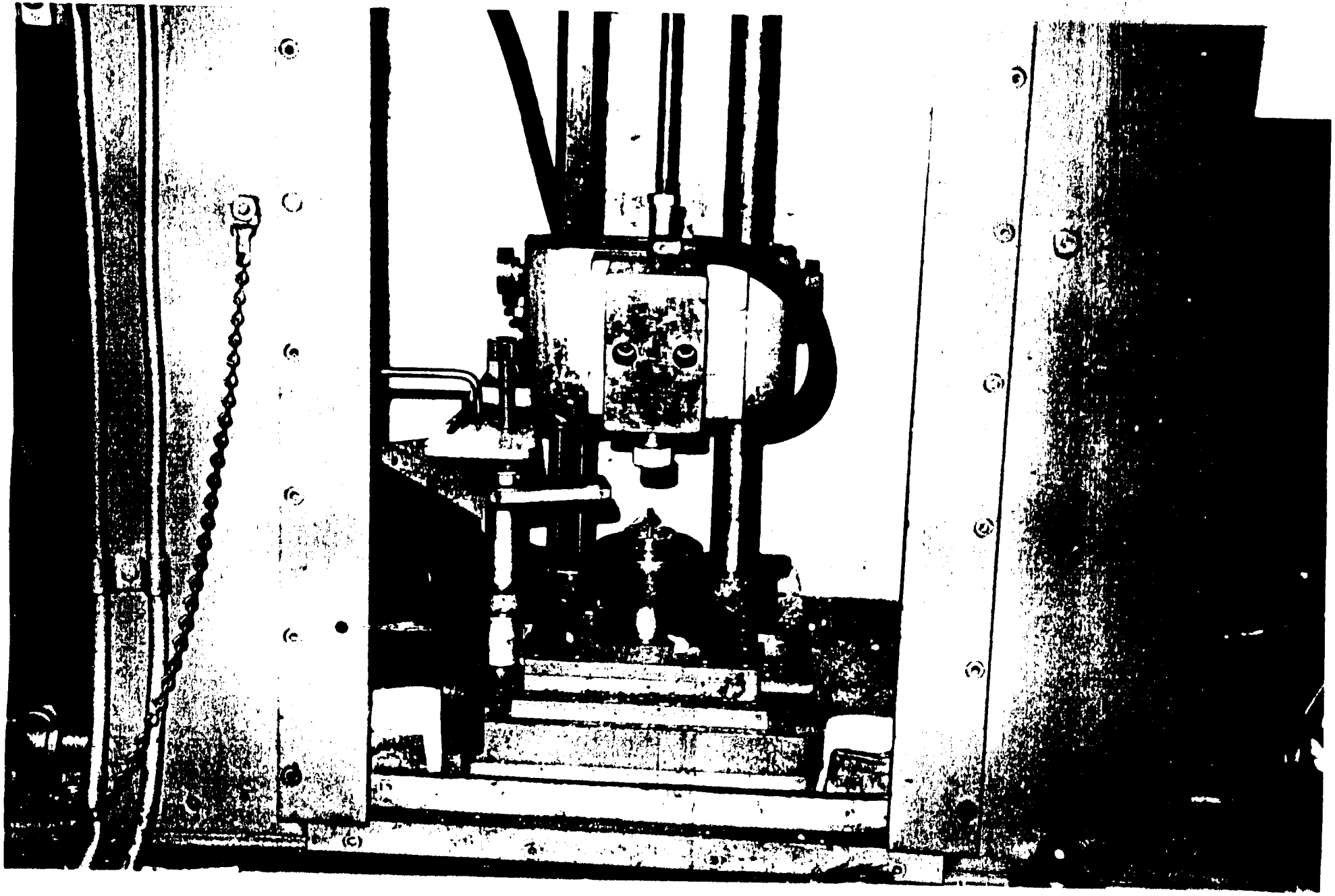

EXPLOSIV



NON-ELECTRIC DETONATOR & PRIMER TESTING SYSTEMS

- ENERGETIC MATERIAL SENSITIVITY & HAZARD ANALYSIS FACILITY

  This apparatus consists of a barricaded mechanism for providing accurate energy inputs to the firing pin of a stab or percussion activated explosive initiators. This is accomplished by dropping accurately located precision steel balls onto the firing pin from controlled heights. An electronically controlled pneumatic positioner provides precise and rapid setting of the desired height. Safety interlocks and an exhaust system are provided for operator protection. Computer control is being implemented.



ENVIRONMENTAL CONDITIONING CHAMBERS

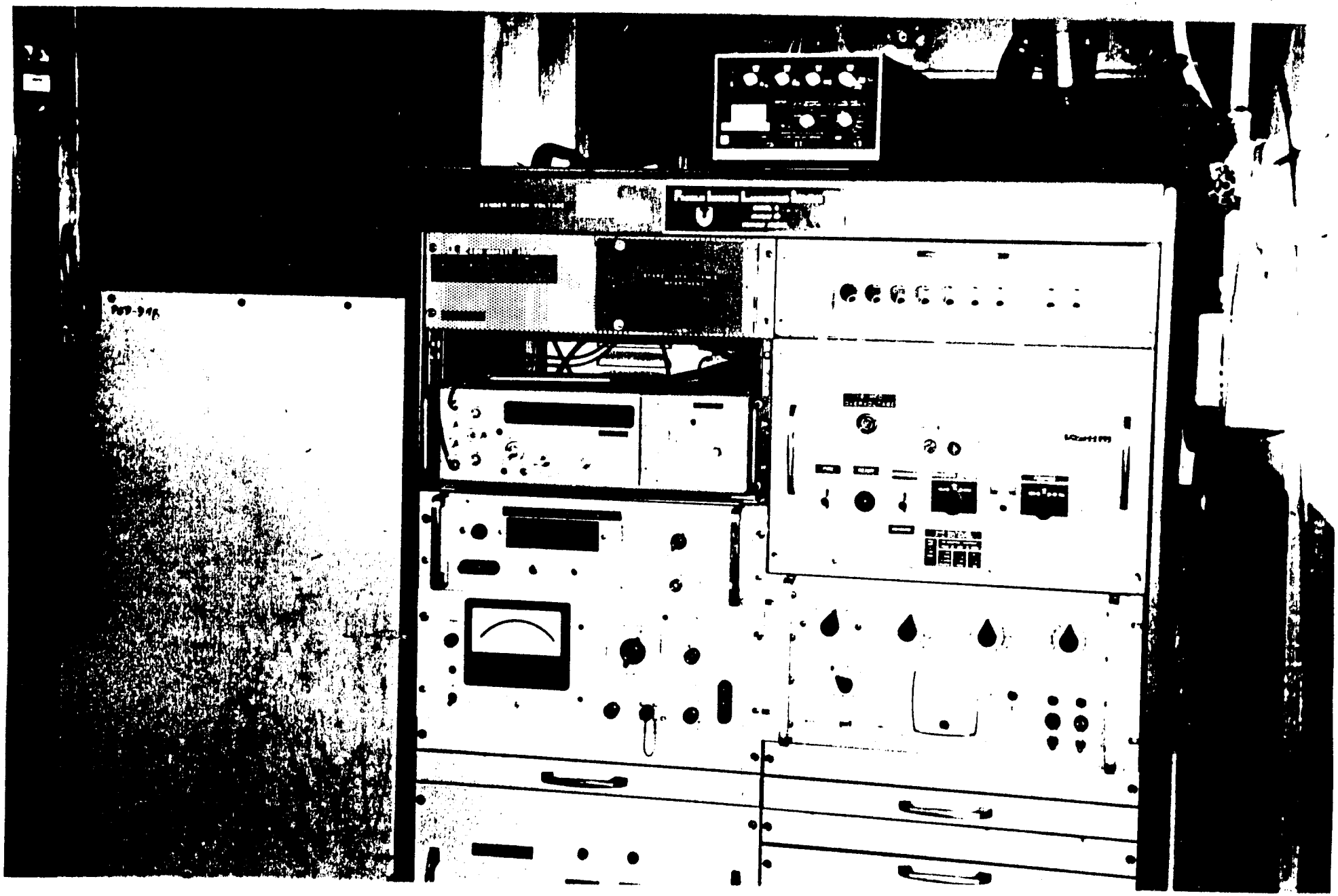
- ENERGETIC MATERIAL SENSITIVITY & HAZARD ANALYSIS FACILITY

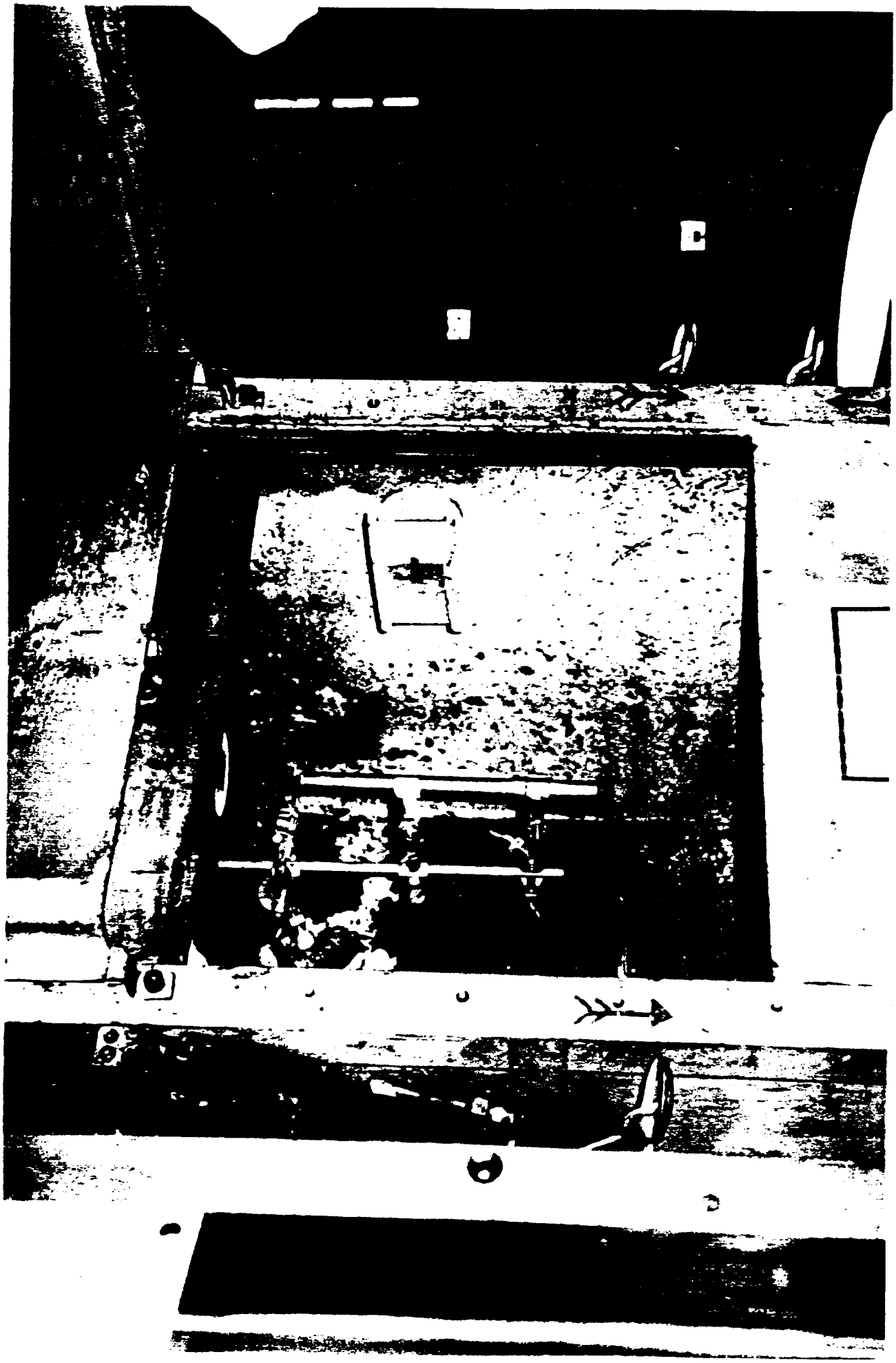
  A cold box and various electric ovens provide a capability to condition explosive test items to extremes of tempreature prior to testing. Such testing is essential in assuring munition reliability when subjected to various shipping and use conditions.

ELECTRIC DETONATOR & PRIMER TESTING SYSTEMS

- ENERGETIC MATERIAL SENSITIVITY & HAZARD ANALYSIS FACILITY

  This apparatus is comprised of a firing console which contains electronic equipment for providing precise, controlled electrical pulses to fire electrically initiated explosive devices. It also has equipment for r measuring electrical resistance and functioning time. A firing chamber with safety interlocks and exhaust is located in a screen-room next to the console and can accommodate charge up to 10 grams of explosive.



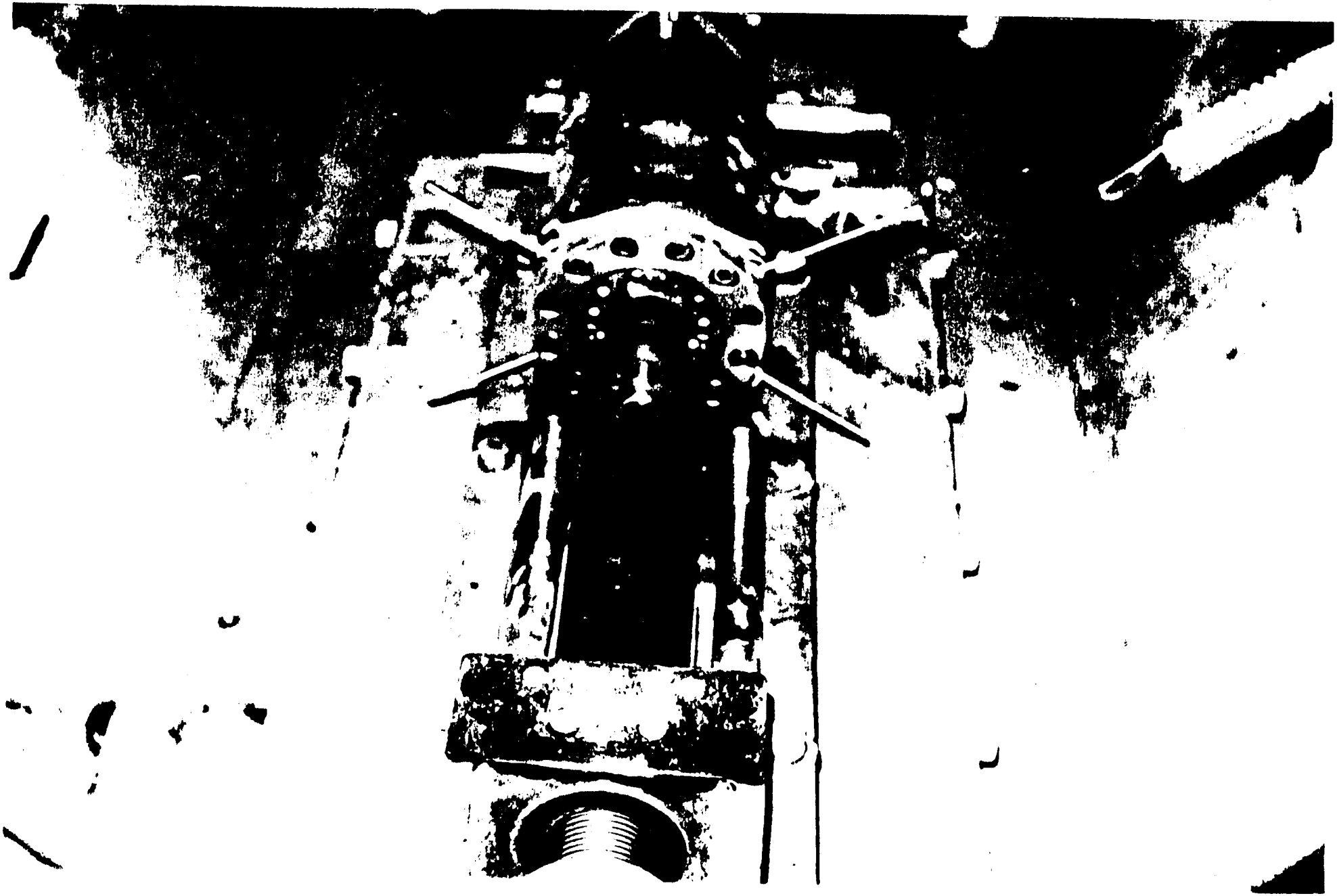


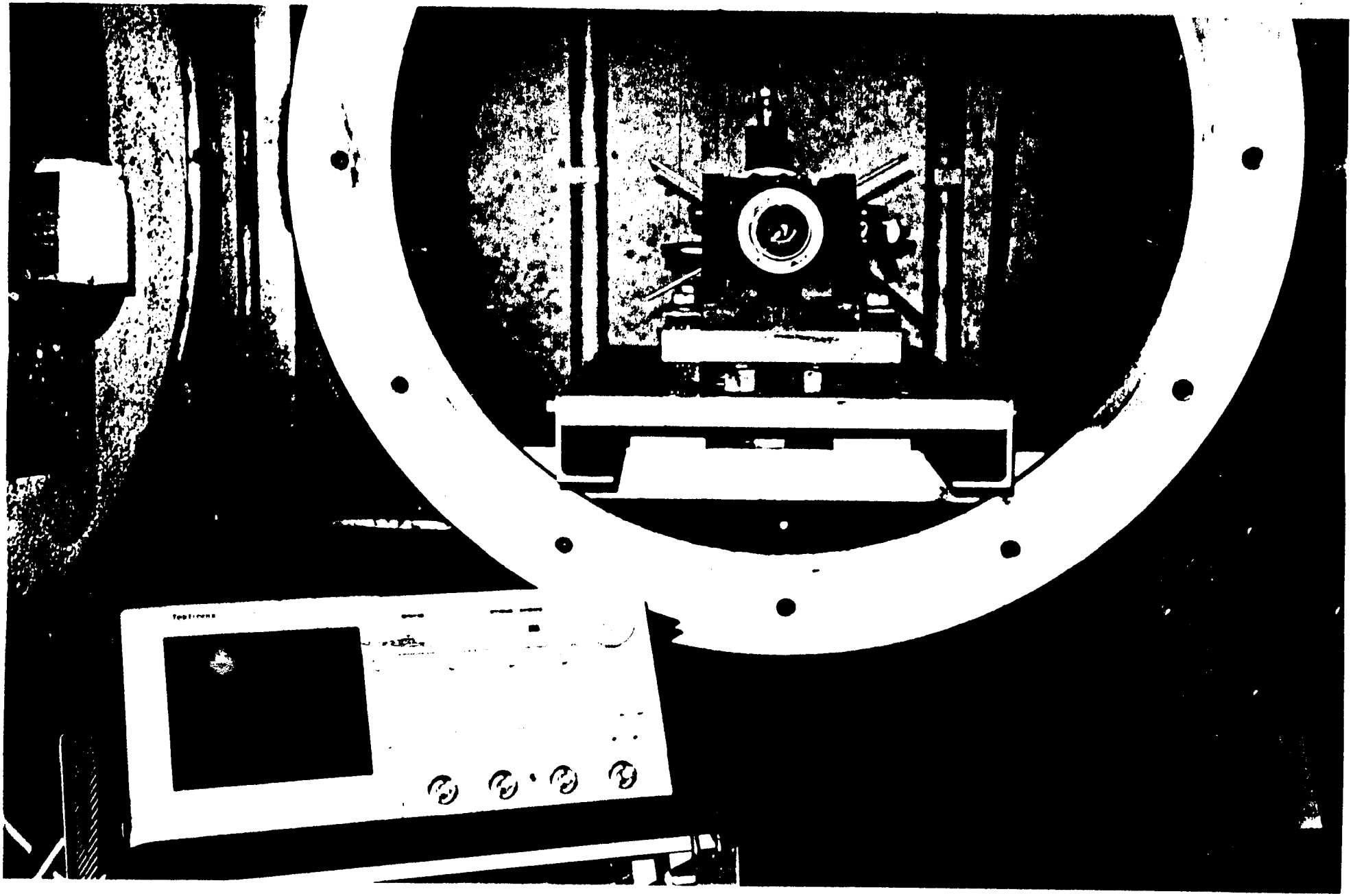
Primary Explosive Formulation Blending Equipment

- BUILDING 282
  - Remotely controlled equipment is used as a safety measure to mix and blend explosive powders. This is particularly needed when working with sensitive primary mixes. This apparatus allows experimentation with various blends and evaluation of different additives.

Set-Back Simulator Apparatus

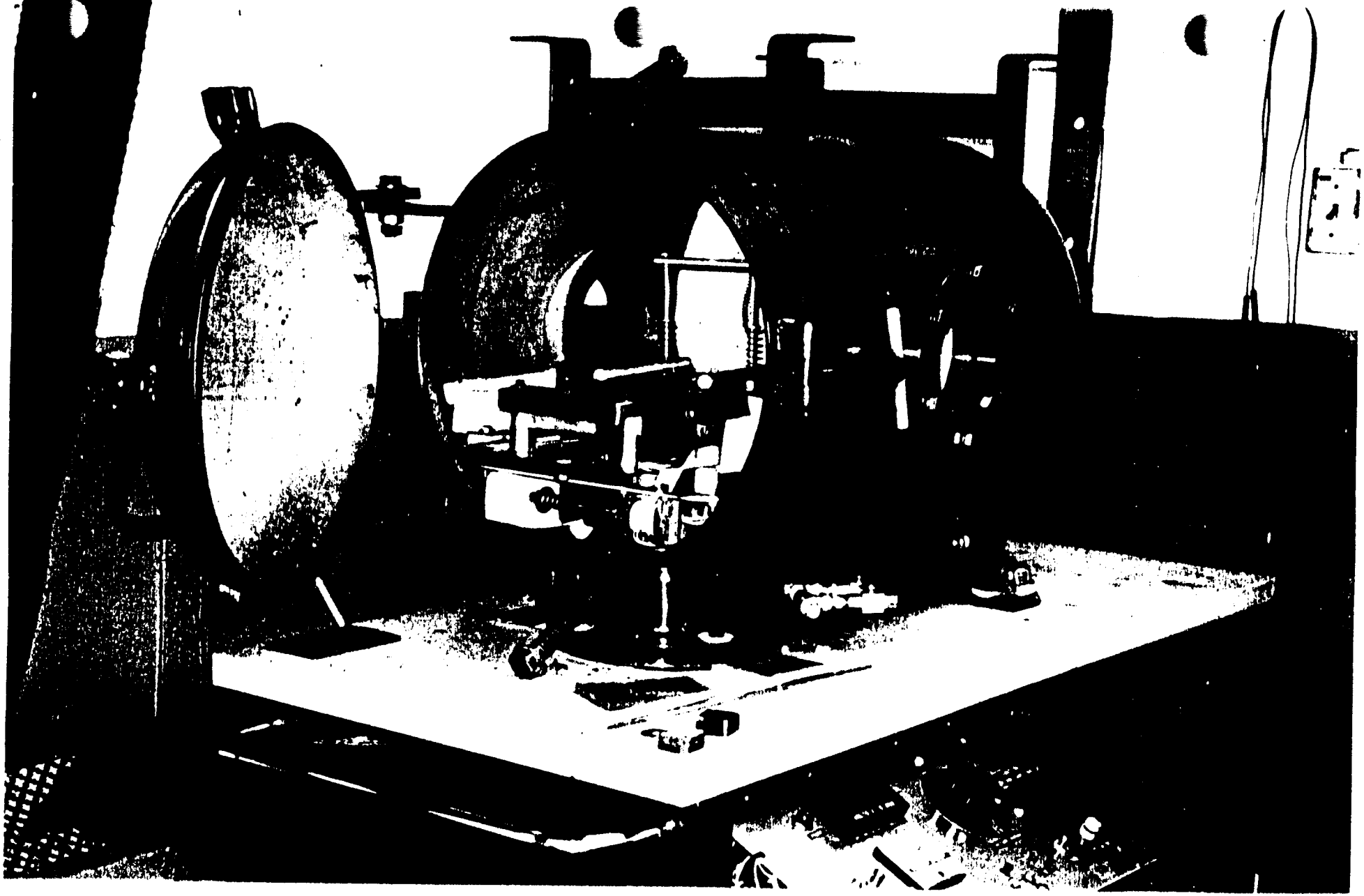
- BUILDING 282
  - High set-back forces encountered in gun firings are a well known cause of premature/in gun explosions. To facilitate investigations into the mechanisms involved and how to preclude this hazard, this apparatus enables set-back conditions to be simulated in the laboratory. This avoids the necessity for very costly and time consuming gun firings and also allows more precise instrumentation of the event. Explosive capacity is 20 grams.





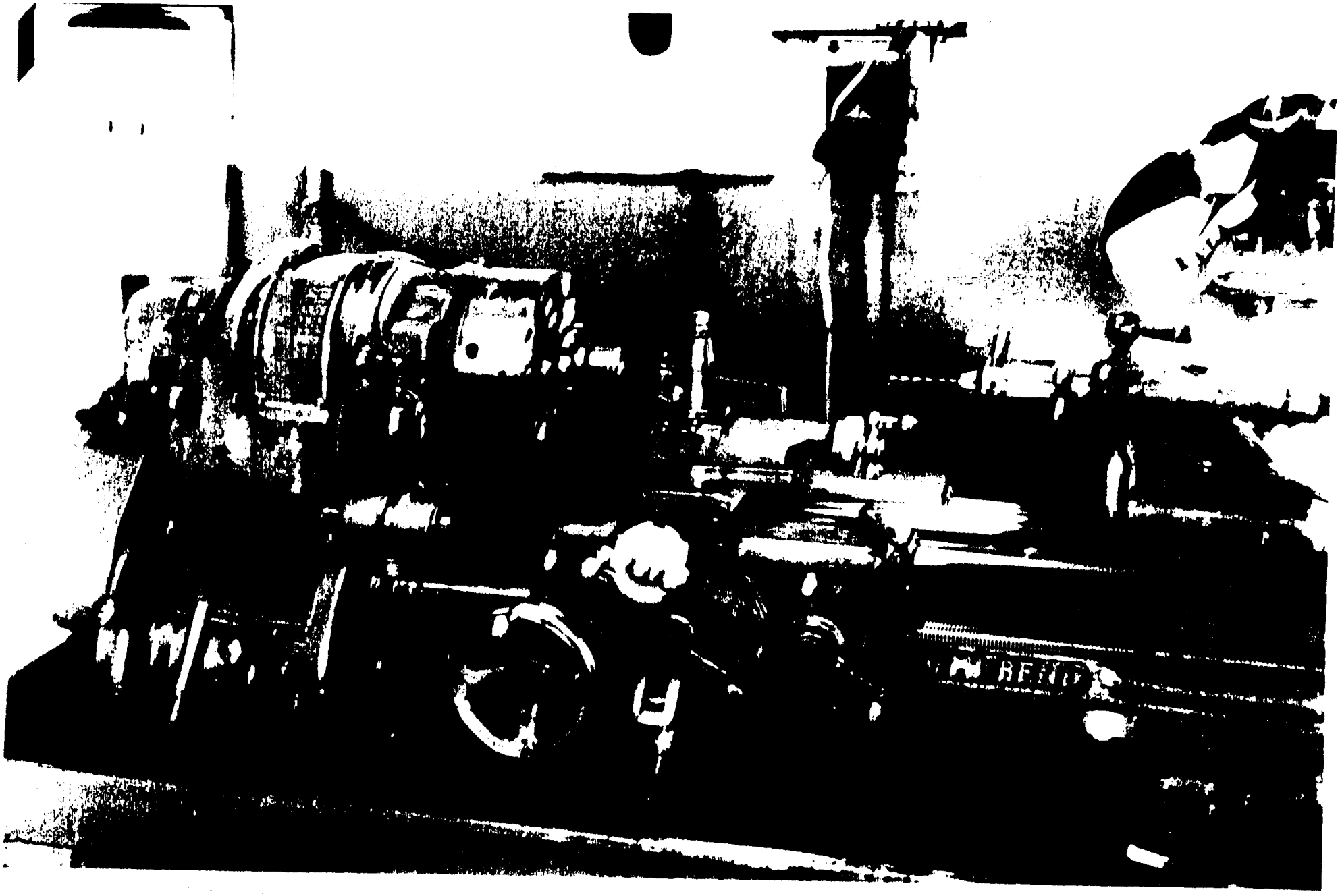
Slapper Sensitivity Apparatus

- BUILDING 282
  - This apparatus is being used to develop a new technique for the determination of mechanical shock sensitivity of explosives. It utilizes a high voltage capacitor to vaporize an aluminum foil which propels a mylar disc onto the explosive sample.
  - The advantages of this technique are that it can utilize a very small sample size (approximately 50 milligrams), can cover an impact range heretofore requiring much more extensive equipment, and is easily controllable over a wide range of impact velocities.



Machining Equipment (Lathe, Drill Press, Band Saw, Power Sander, Bench Grinder)

- BUILDING 282
  - Rapid fabrication, rejuvenation and refinishing of test fixtures and parts is often required during explosive testing. Having this machinery facilitates continuous, uninterrupted firing of explosive tests.

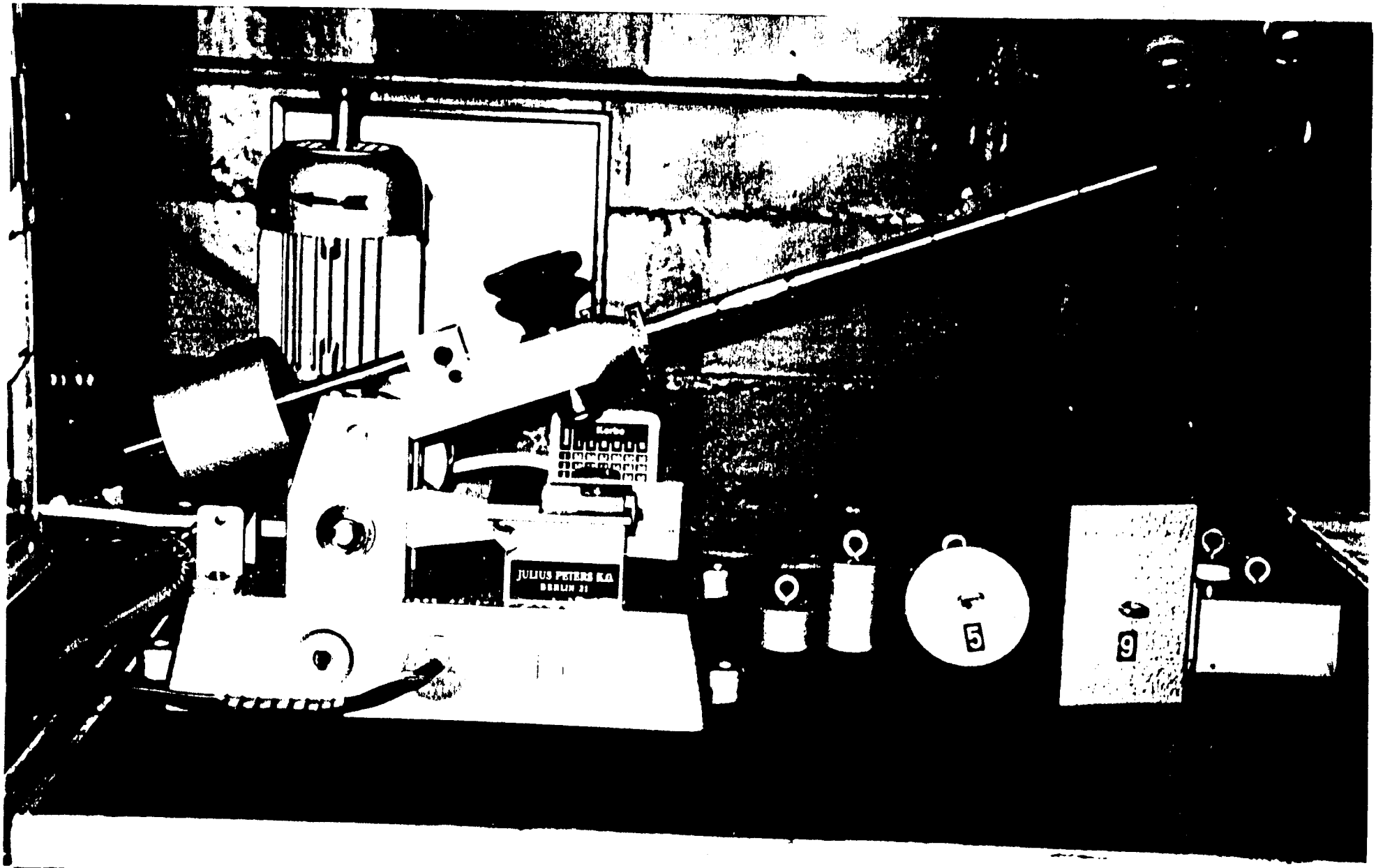


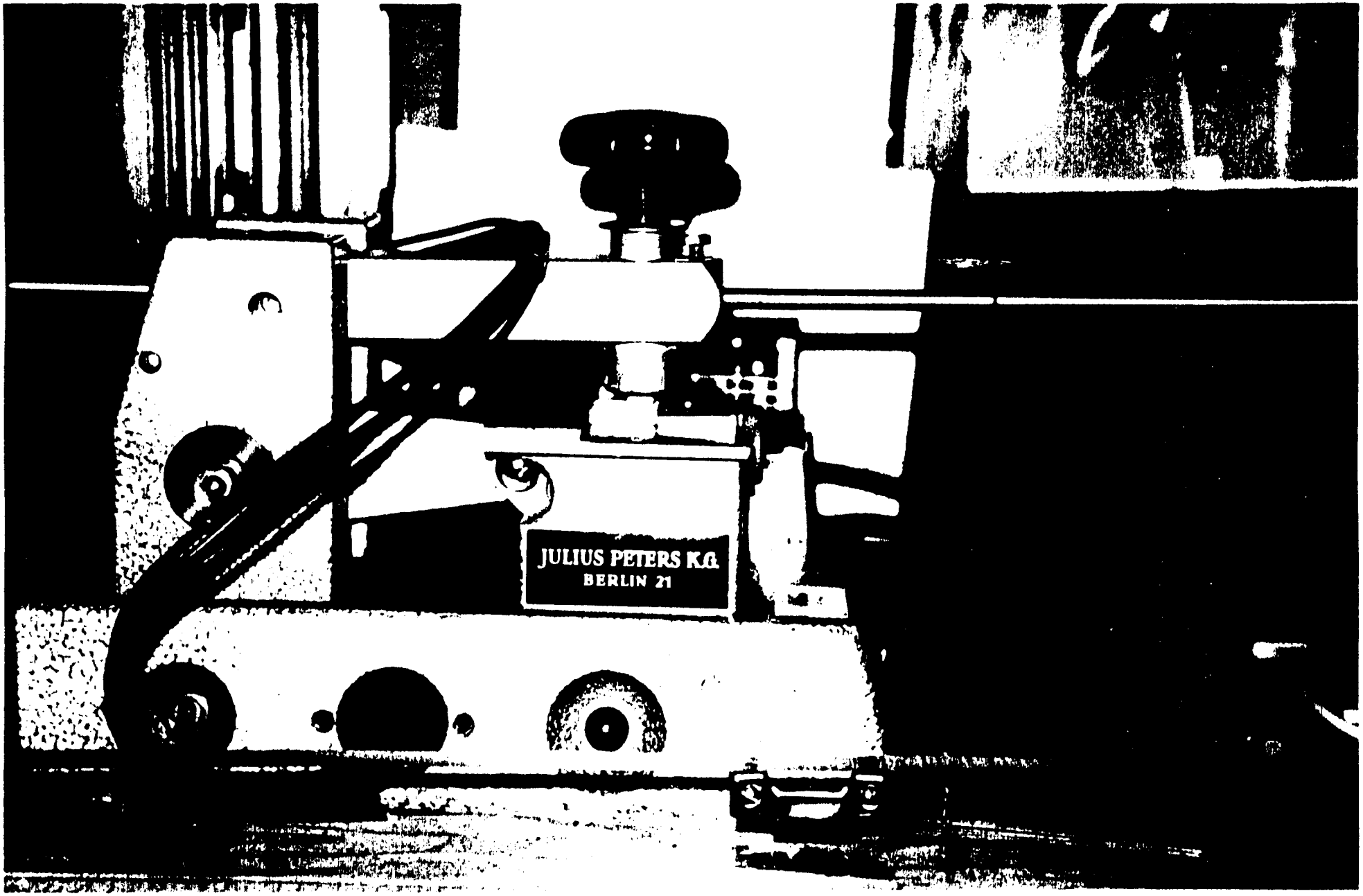
EXPLOSION TEMPERATURE APPARATUS

- BUIDLING 178
  - This method is used for determining the minimum temperature at which an energetic material will ignite or explode. The explosion temperature for the 5-second time to explosion is incorporated into the Hazardous Component Safety Data Sheet for the energetic material.

BAM FRICTION MACHINE

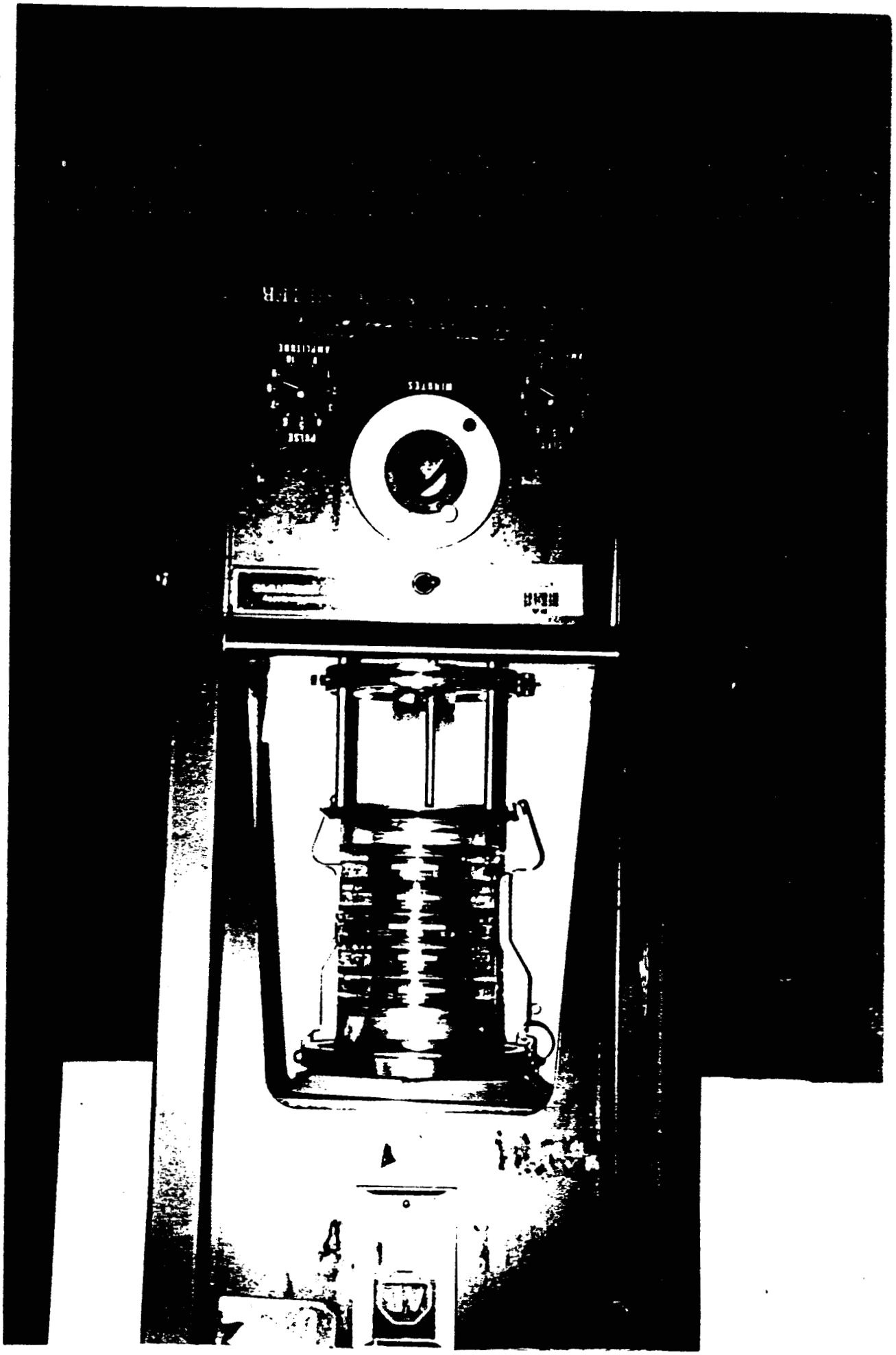
- BUILDING 178
  - The sensitiveness of solid(including paste-like and gel type) substances to friction is tested by the BAM Friction Apparatus. The method yeilds quantitative results in the form of limiting loads, which can be used as one of the criteria in a test series for determining the hazard classification of that material for transport following United Nations guidlines.


JULIUS PETERS K.G.
BERLIN 31
5
9


JULIUS PETERS K.G.
BERLIN 21

Sonic Sifter

- BUILDING 178
  - For obtaining particle size samples.


MINUTES
PULSE
AMPLITUDE

BUREAU OF EXPLOSIVES IMPACT TEST

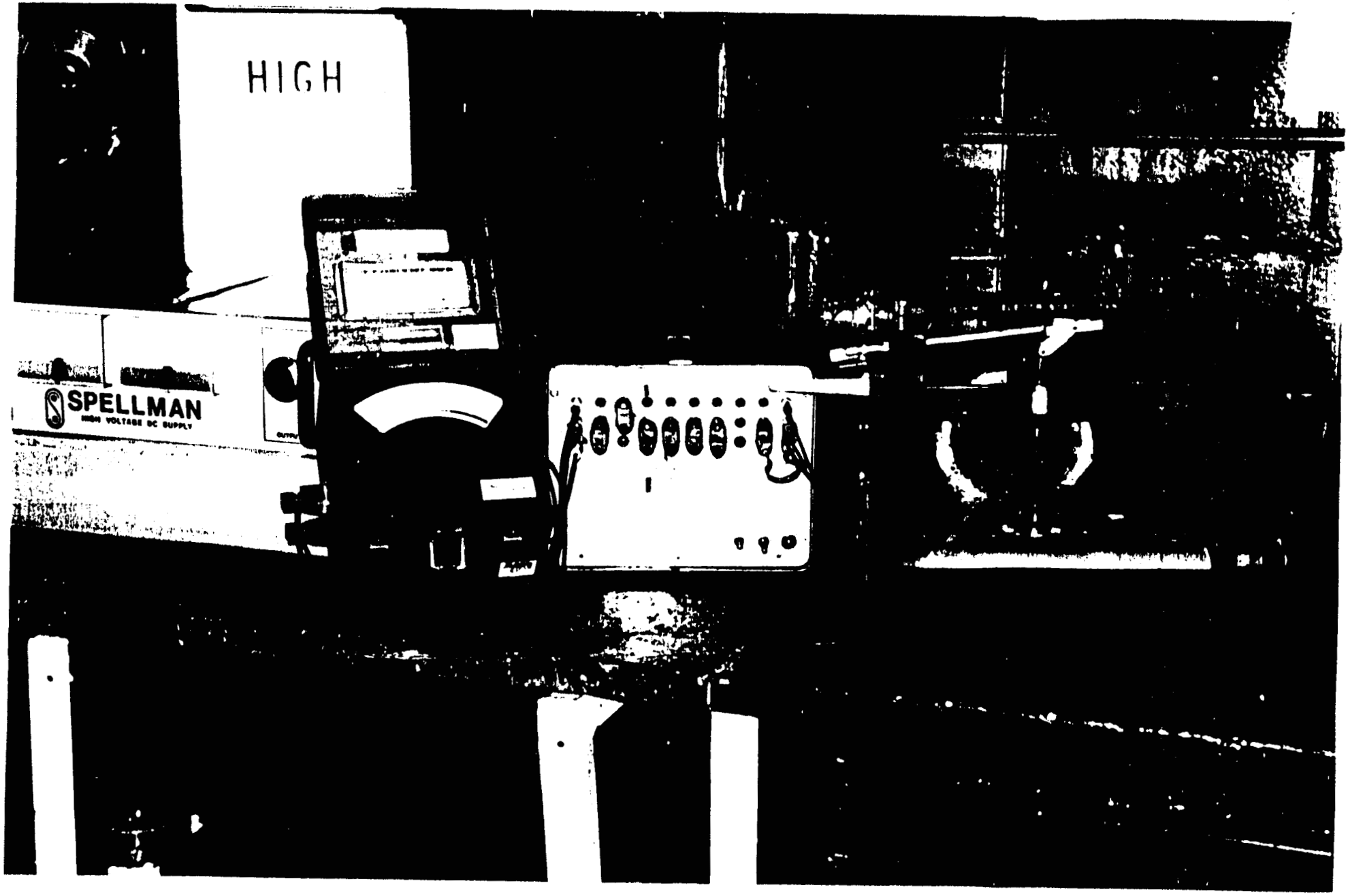
- BUILDING 178
  - This test is used in determining the Interim and Final Hazard Classification of an energetic material.

ERL, TYPE 12 IMPACT TEST

- BUILDING 178
  - This test is used to determine the sensitivity of an explosive to impact. Thetest results are incorporated into the Hazardous Component Safety Data Sheet forthe energetic material. The test results may also be used in R&D studies todetermine how impact sensitive a material is relative to other materials.

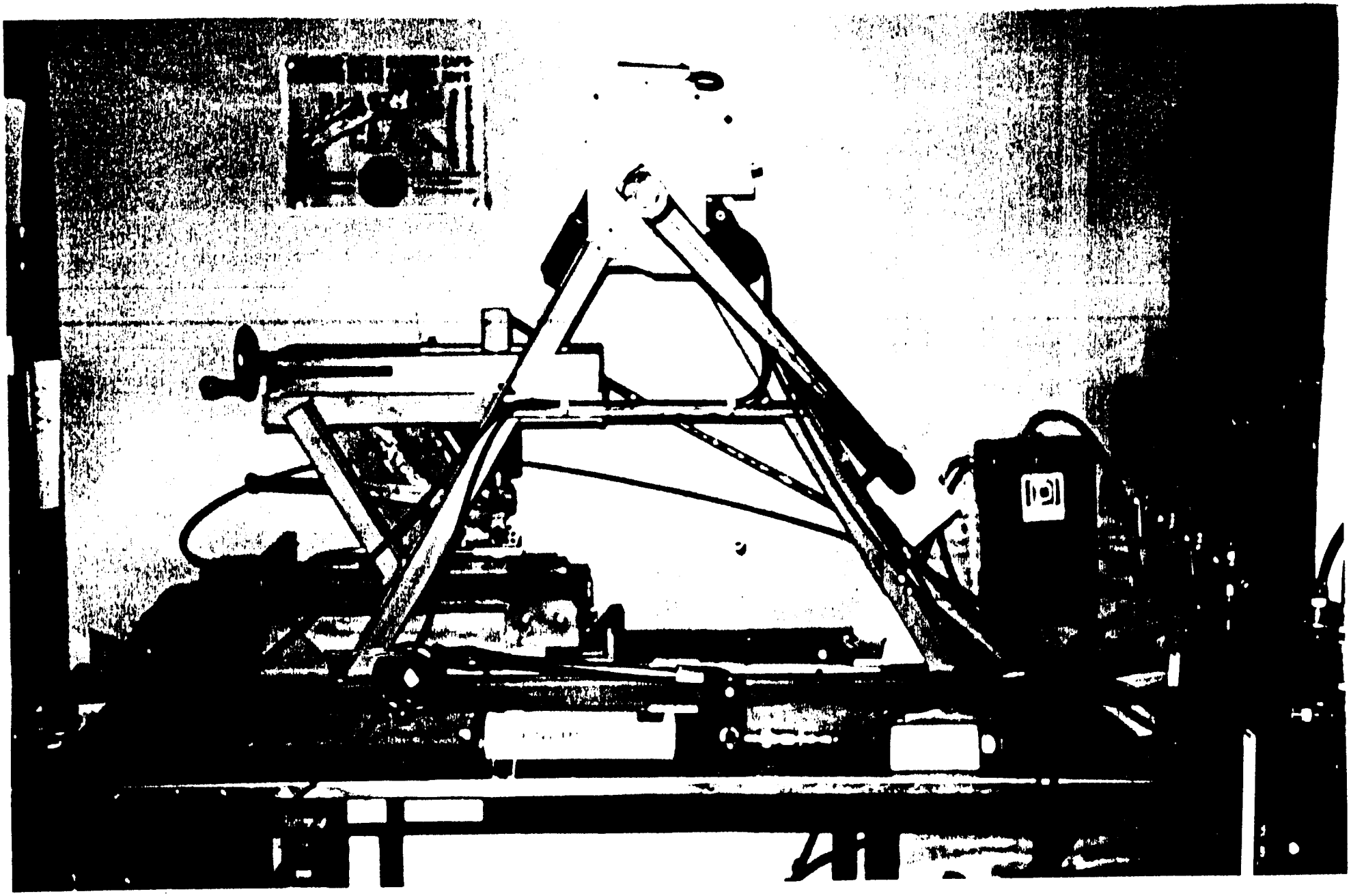
ELECTROSTATIC SENSITIVITY TEST

- BUILDING 178
  - This test is used to determine the sensitivity of an explosive to electrostatic discharge. The test results are incorporated into the Hazardous Component Safety Data Sheet for the energetic material. This test is also used in determining the Interim and Final Hazard Classification of an energetic material.


HIGH
SPELLMAN
HIGH VOLTAGE DC SUPPLY

ABL FRICTION MACHINE

- BUILDING 178
  - This test determines the sensitiveness of substances to frictional stimuli. The method yeilds quantitative results in the form of limiting loads, which can be used as one of the criteria in a test series for determining the hazard classification of that material for transport following United Nations guidlines.

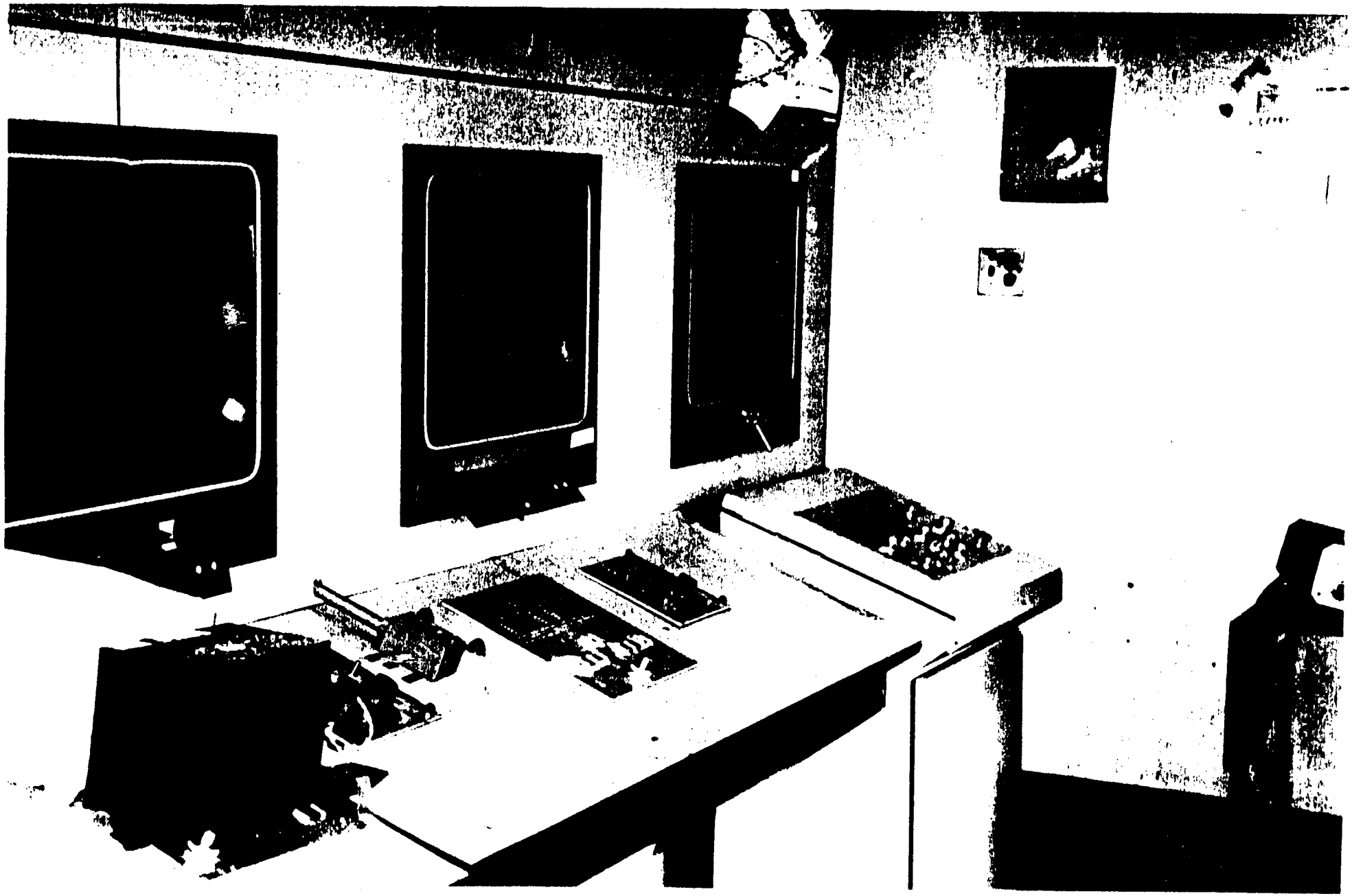


Drill press (2ea.)

- BUILDING 225
  - Explosion proof Buffalo and Deep Throat Cincinatti
  - Utilized for contact coring, loading and down loading of test specimens.
  - Equipped with hazardous waste recovery.

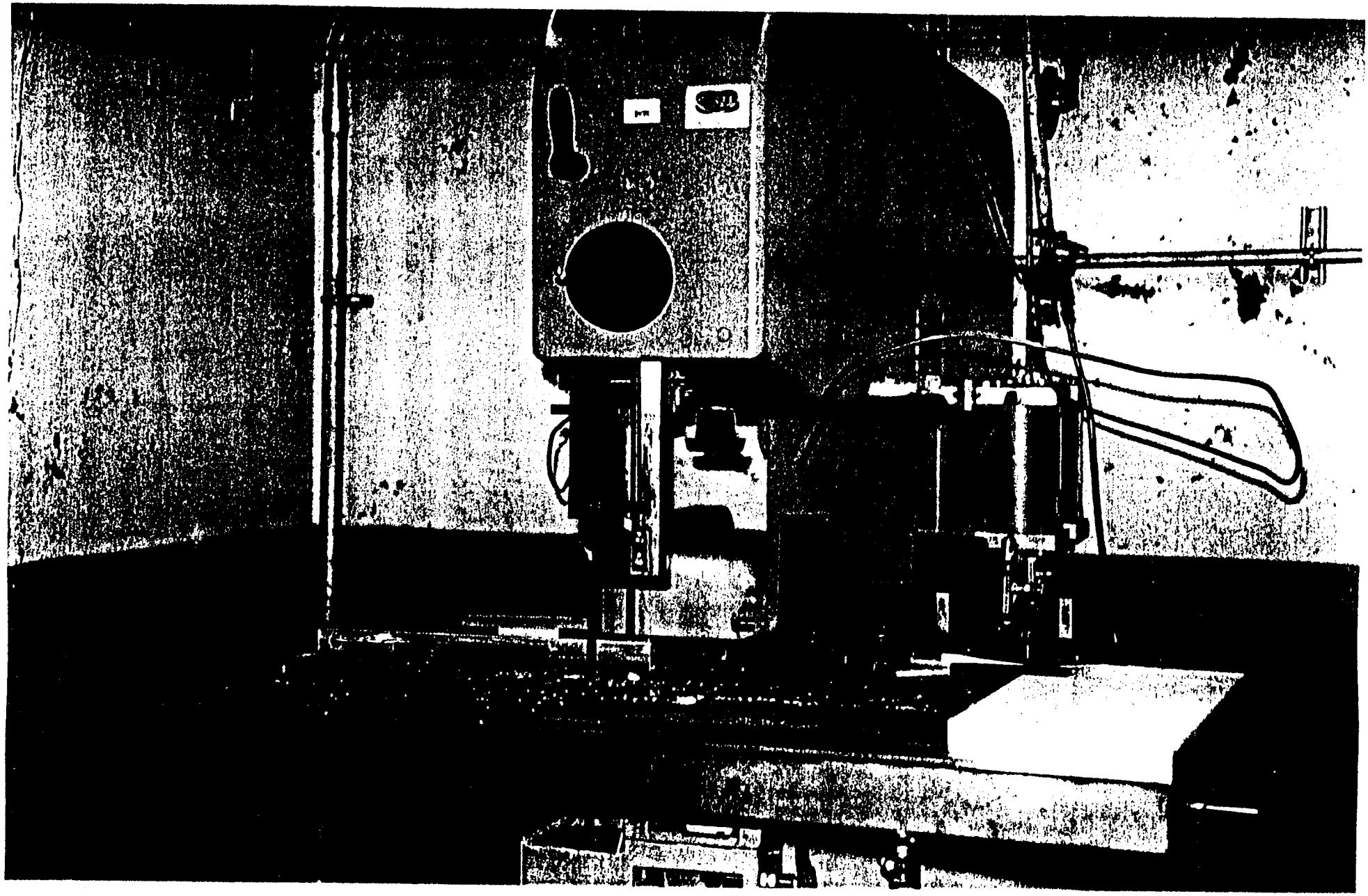
REMOTE CONTROL BUNKER

- BUILDING 225
  - Automatic and remote controls and instrumentation for explosive machining operations, ie. lathes, saws, mills, drill presses, etc



Bandsaw

- BUILDING 225
  - Explosion proof Do-all bandsaw.
  - Utilized for contact and remote sawing operations.
  - Equipped with hydraulic table and hazardous waste recovery systems.

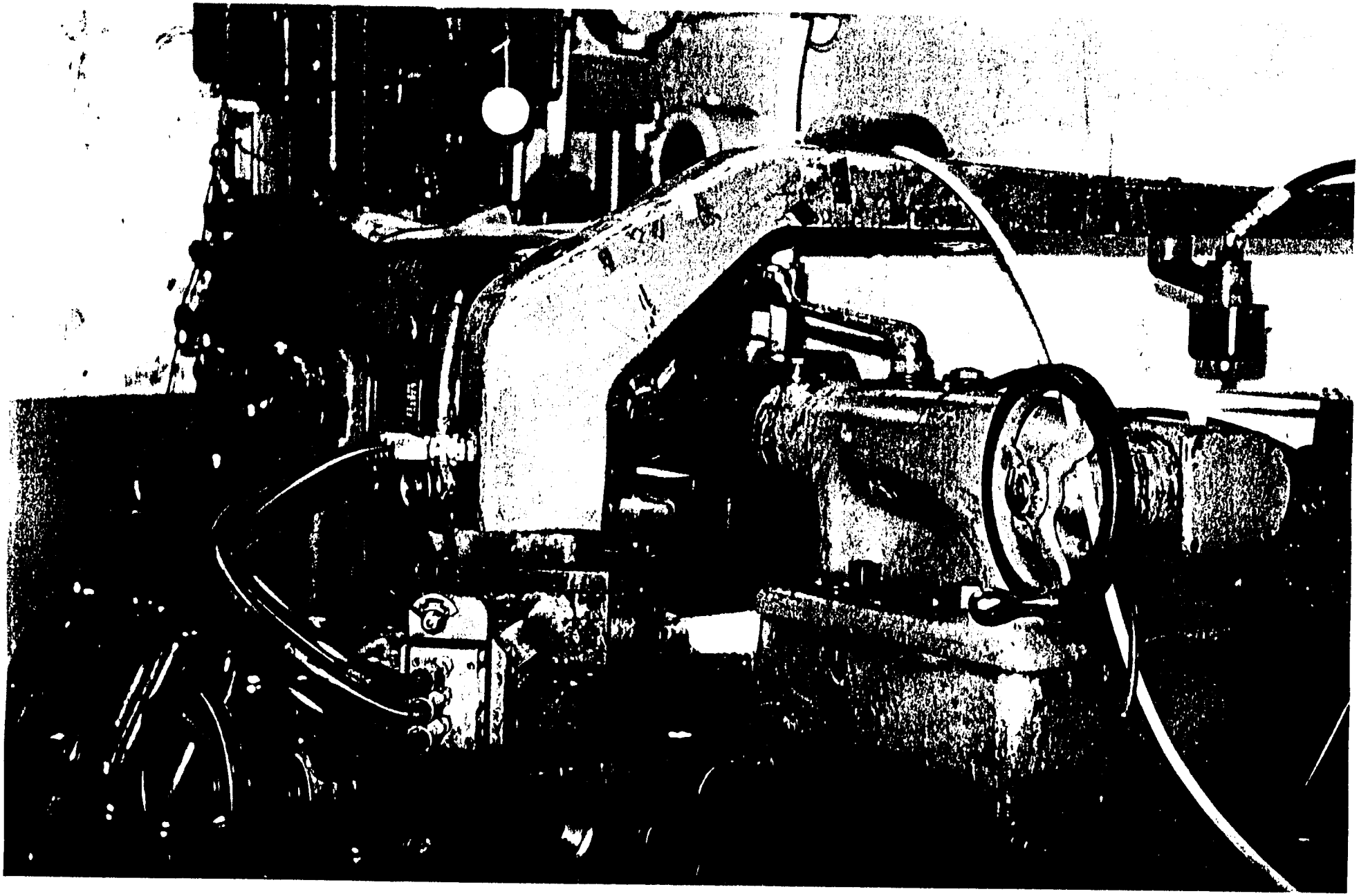


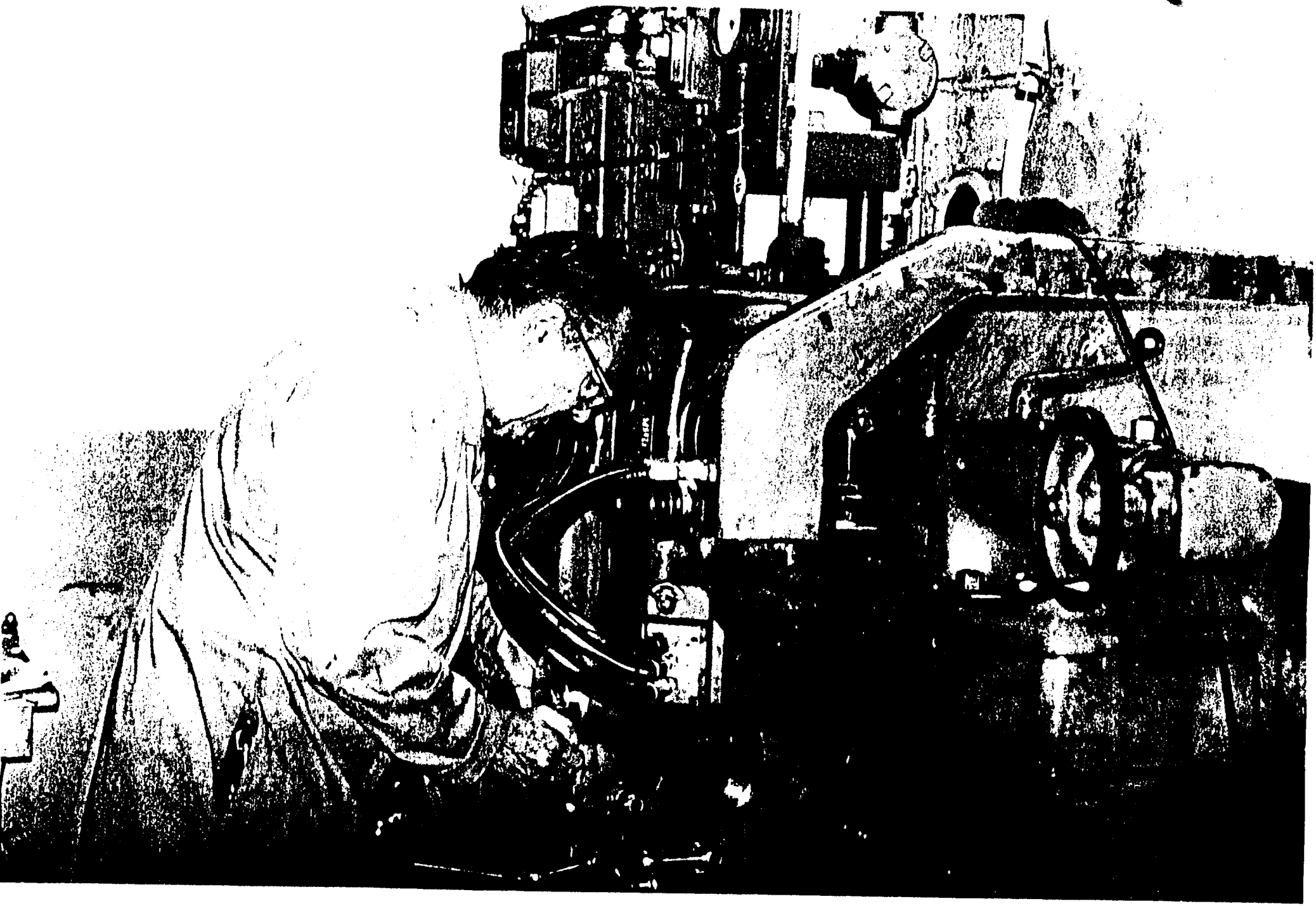
Milling Machine

- BUILDING 225
  - Explosion proof Accramill Milling machine
  - Utilized for contact and remote milling operations.
  - Equipped with digital readout, power drive, and hazardous waste recovery systems.

Monarch Lathe

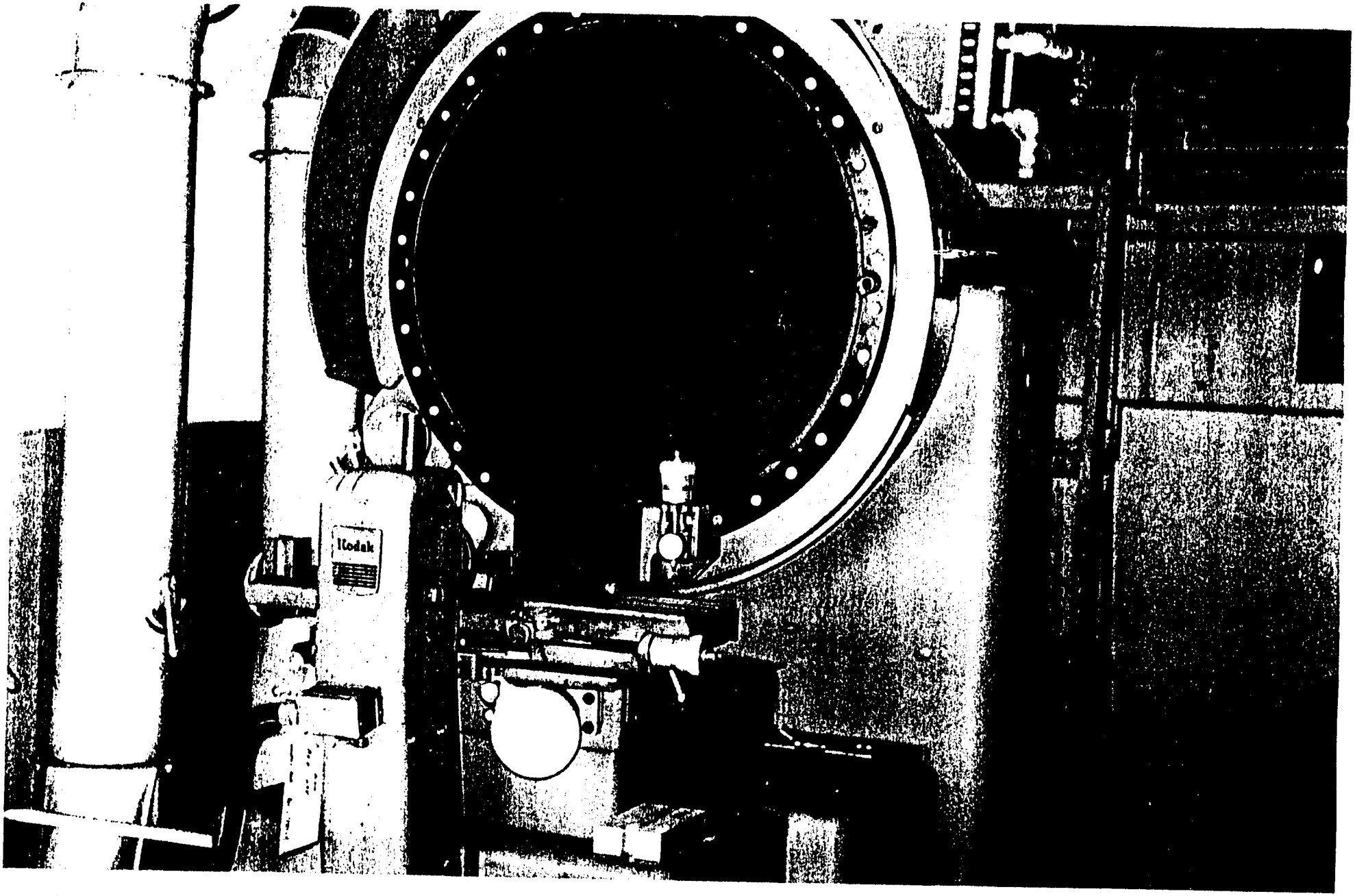
- BUILDING 225
  - Utilized for contact or remote machining of cast or pressed energetic materials.
  - Explosion proof with 28" swing lathe and taper attachment.
  - Equipped with vaccum chuck, overhead hoist, coolant recovery, and camera systems.





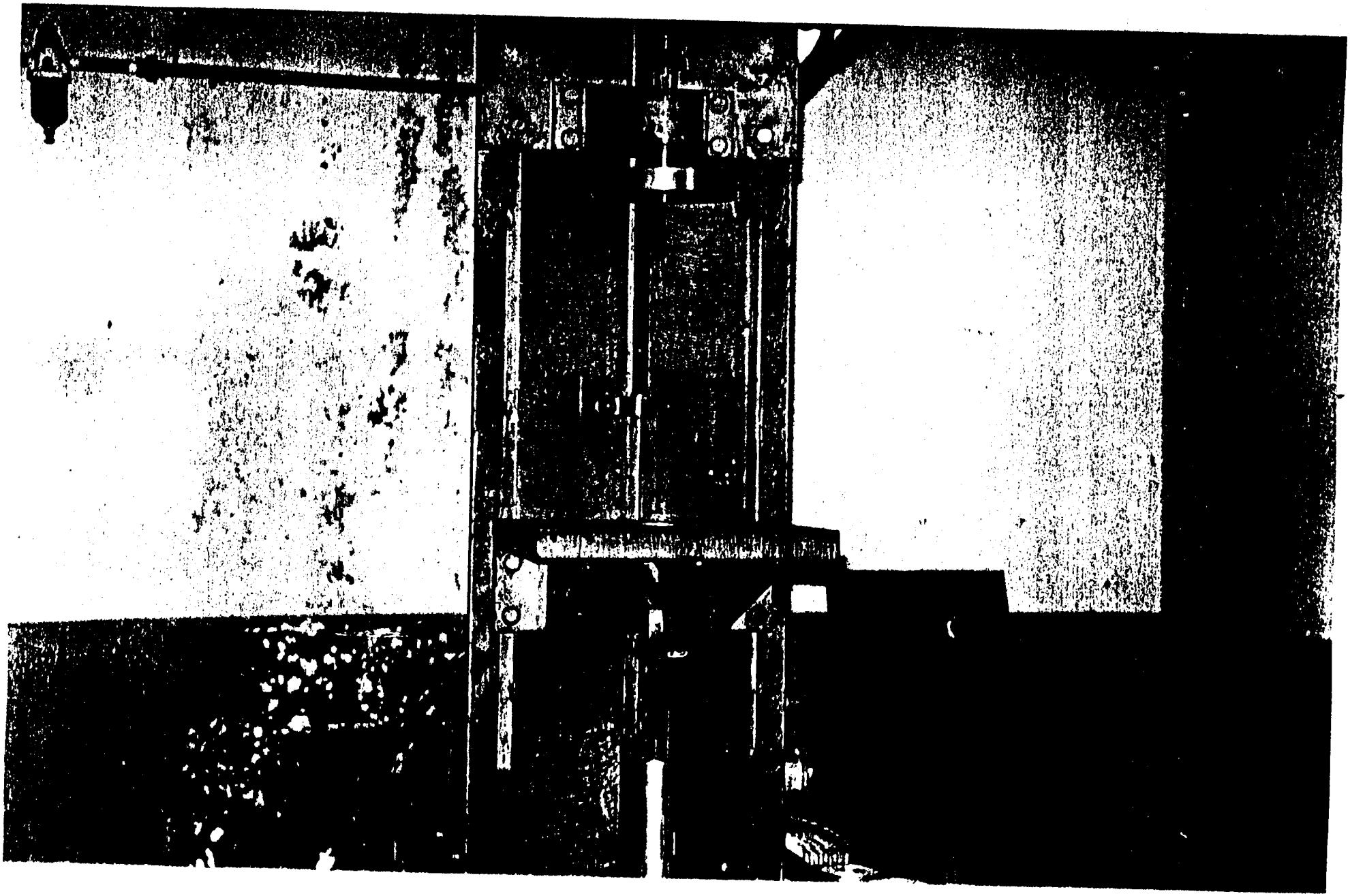
Optical Comparator

- BUILDING 225
  - Utilized to define complex angles and measurements for machining oprations for energetic materials.
  - Explosion Proof.


Kodak

Fuze Cavity Drilling Machine

- BUILDING 225
  - Explosion proof Hartford verticle drill machine.
  - Used to bore fuzewell cavities for cast mortars and large caliber projectiles.
  - Equipped with vacuum and remote controls.



G. GUN PROPULSION/CHARGE DESIGN CAPABILITY

Unicharge

Objective

[illegible]

Uncharge System

Unicharge Requirements

- [illegible]
- [illegible]

Milestones

- RDC APPROVED [illegible]
- MAS [illegible] [illegible]
- BEGIN FSED [illegible]
- READINESS FOR TEST REVIEW [illegible]
- [illegible] TC UNICHARGE [illegible]

Funding ($M)

[illegible]

Unicharge

Design

[illegible]

Technical Approach

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

Gun Firing Results 6 Zone Combustible Case M185 Cannon

INCREMENT	VELOCITY		PRESSURE			ZONING OVERLAP
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	871	286.0	7.7	53.1		
2	1206	279.2	9.0	62.1		11.0
3	1615	687.3	15.1	104.1		16.0
4	1988	888.3	23.7	163.6		15.2
5	2340	713.2	34.5	237.8		23.1
6	2710	676.0	47.0	324.0		21.7

EACH INCREMENT CONTAINED

[illegible]

Unicharge Technical Risks

- PROPELLANT SELECTION TO MEET SOLUTION
- IGNITION TRANSFER BETWEEN MODULES AT ALL TEMPERATURES
- POTENTIAL STICKER AND LACK OF LOW ZONE OVERLAP
- ZONING SOLUTION CONSISTENT WITH SYSTEM REQUIREMENTS

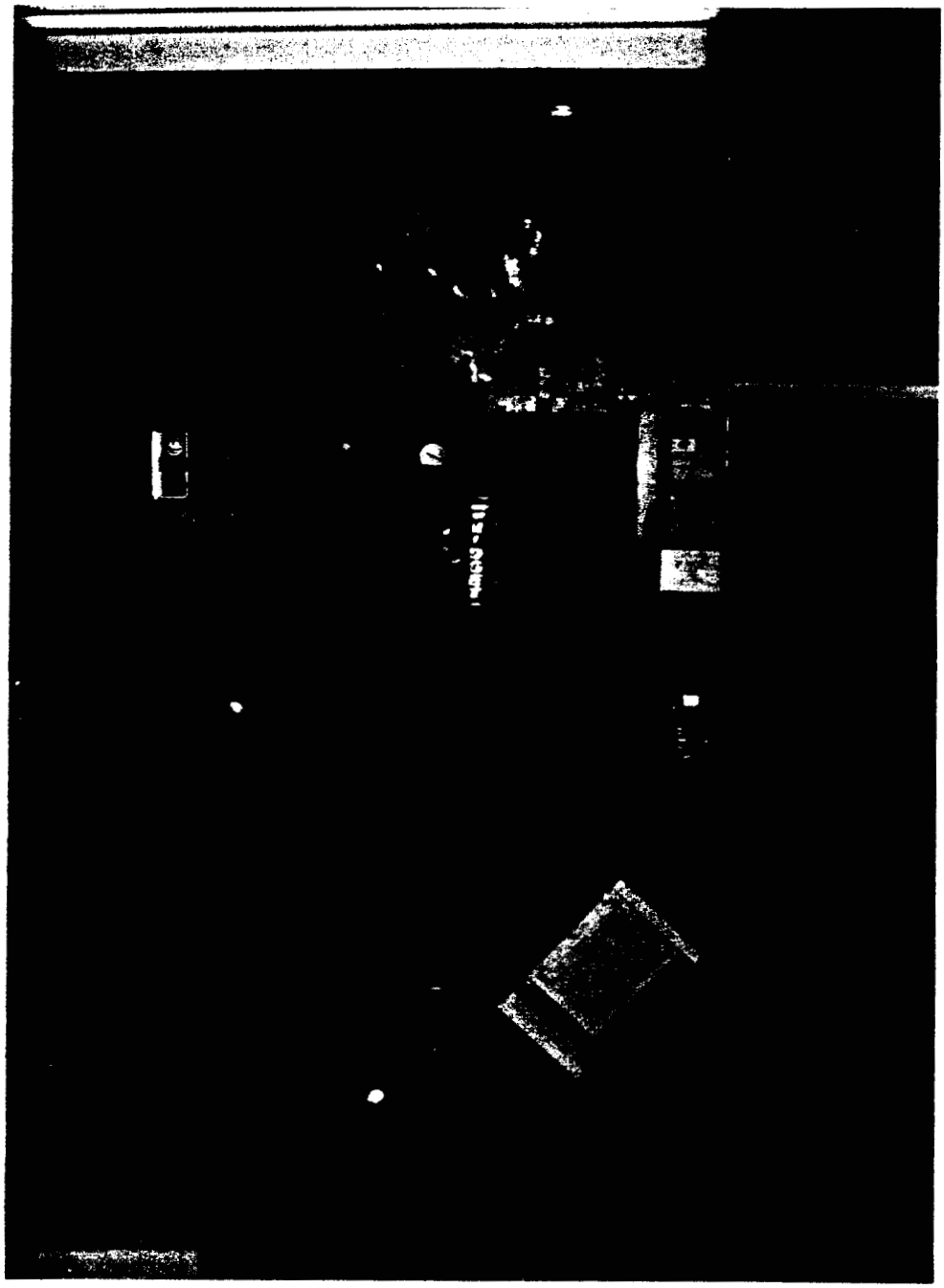
Summary

- UNICHARGE FEASIBILITY DEMONSTRATED
- CONCEPT HAS FULL TRADOC SUPPORT
- UNICHARGE SCHEDULE FOR TC FY93
- SIGNIFICANT LOGISTIC ADVANTAGES IDENTIFIED
- CONCEPT DEVELOPED FROM STATE OF THE ART TECHNOLOGY
- THERE ARE TECHNICAL ISSUES WHICH MUST BE RESOLVED

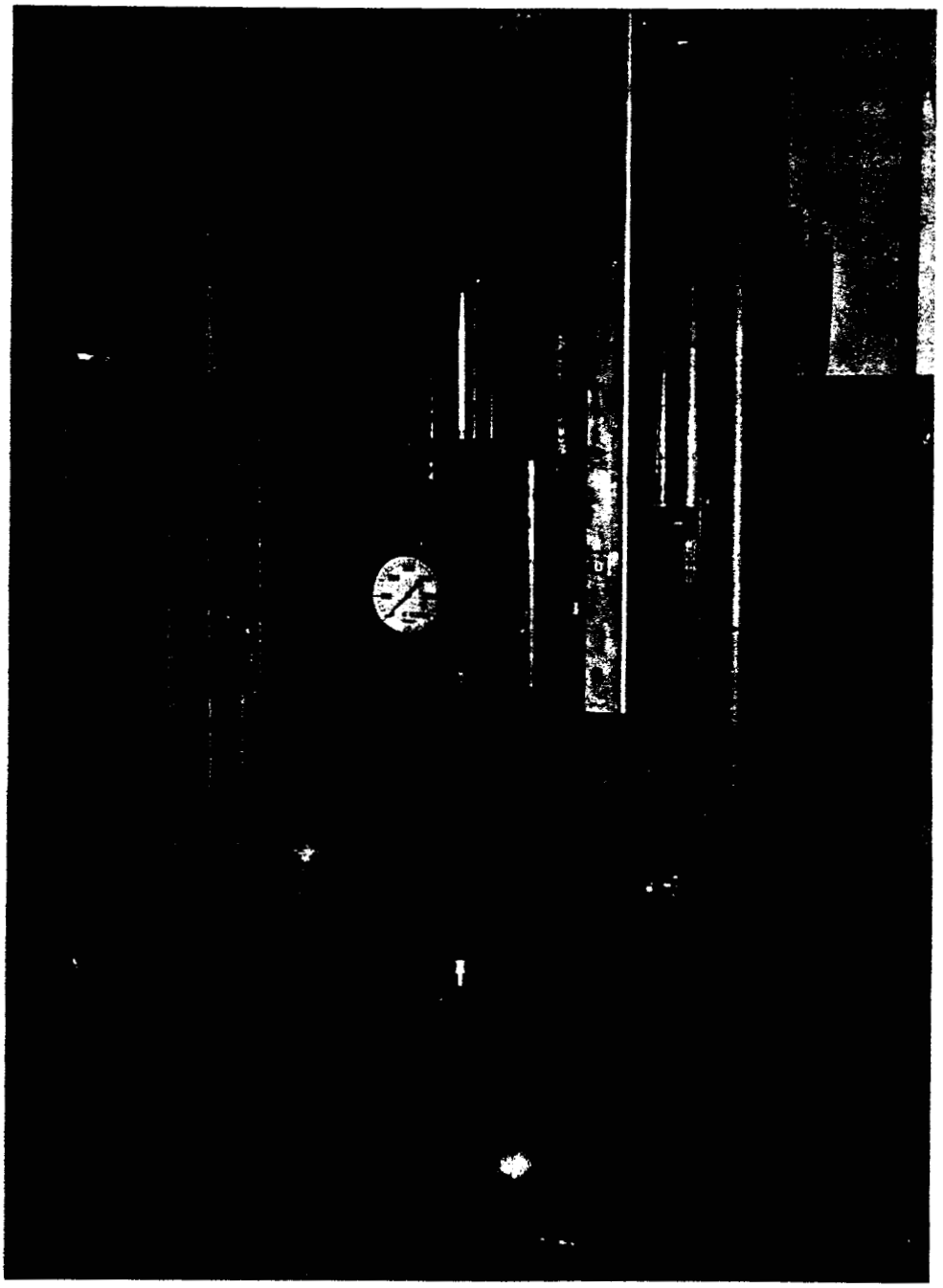
Future Work

- STUDY OF IGNITION GAS FLOW CHARACTERISTICS
- UNIFORMITY TEST WITH HOT AND COLD TEMPERATURES
- INVESTIGATION OF INSENSITIVE PROPELLANT
- EVALUATE WEAK FLASH AND BLAST

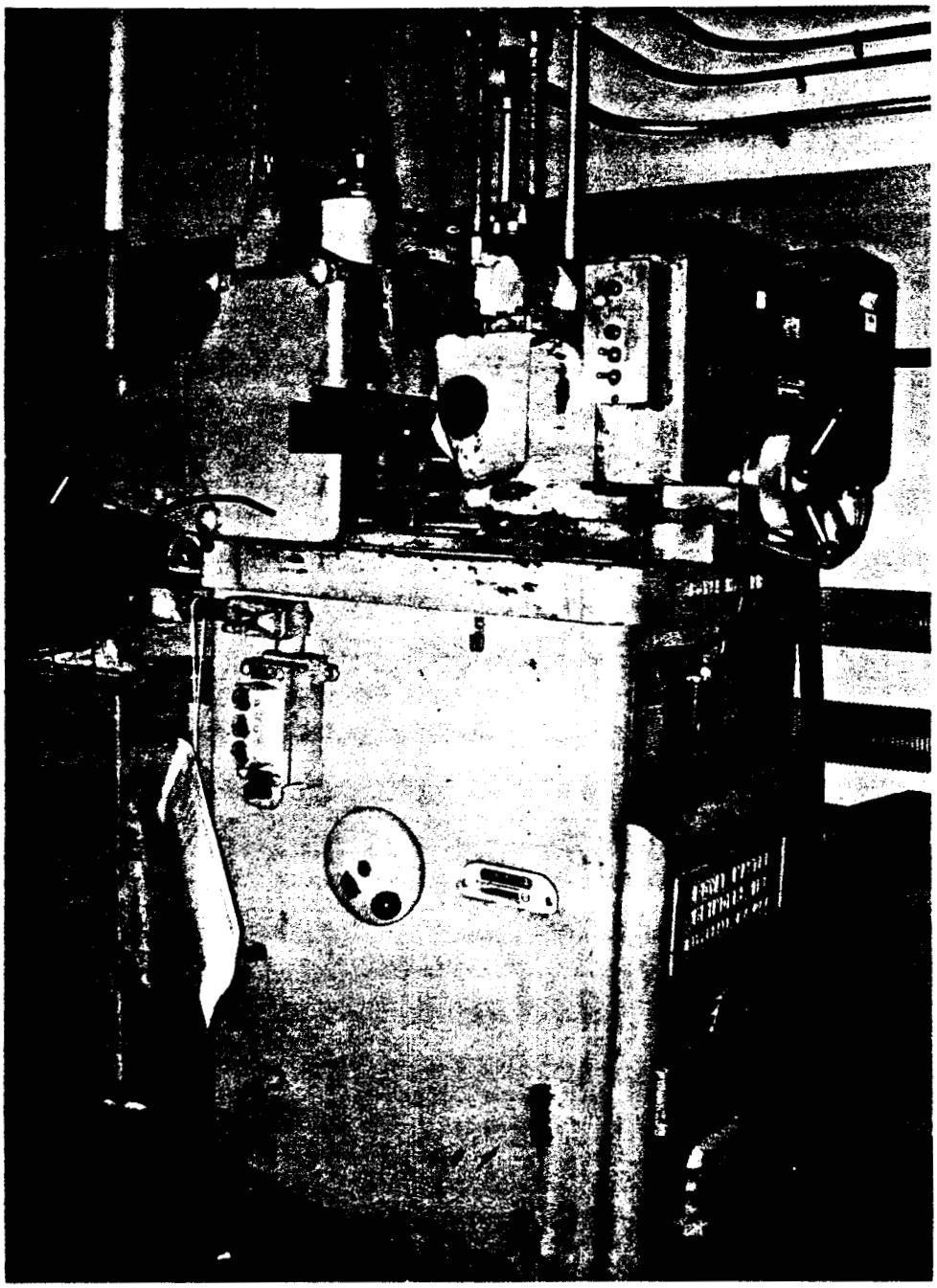
PICTURE 1
1-1/4 TON HYDRAULIC PRESS
PROPELLANT CONSOLIDATION FOR CASELESS AMMUNITION



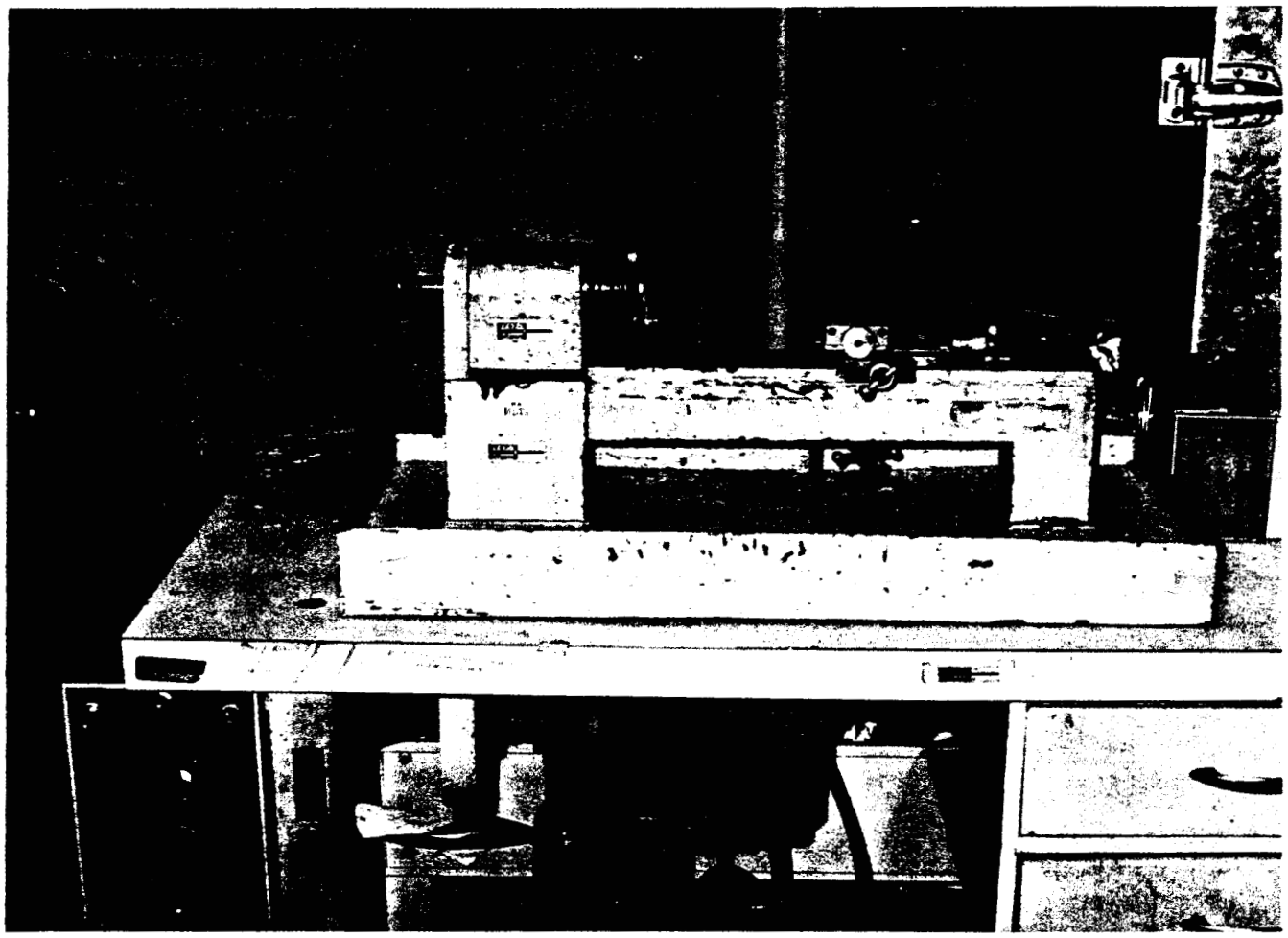
HYDRAULIC PRESS
PRODUCTION OF CASELESS PRIMERS



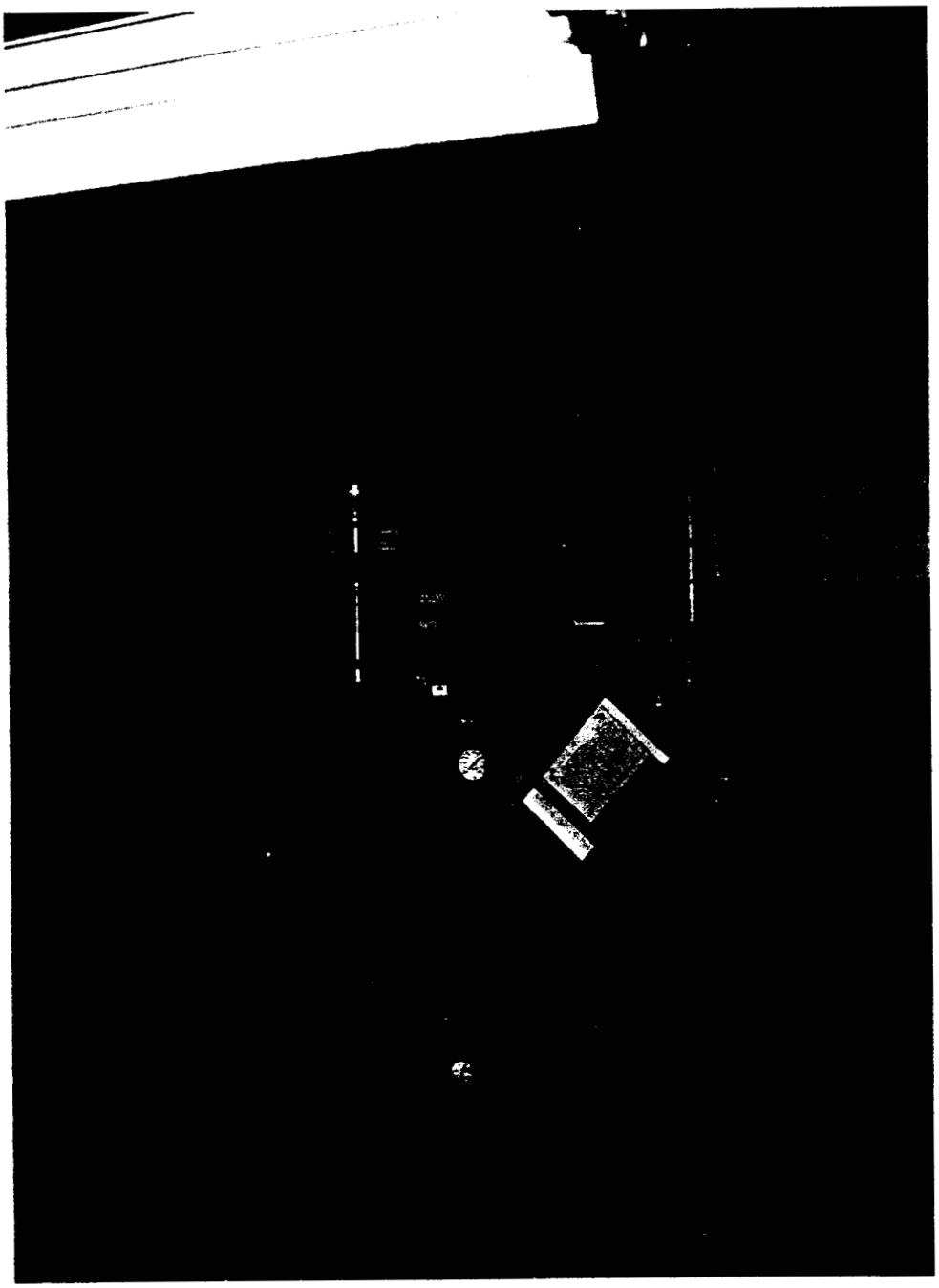
CENTERLESS GRINDER
MACHINING OF CASELESS AMMUNITION



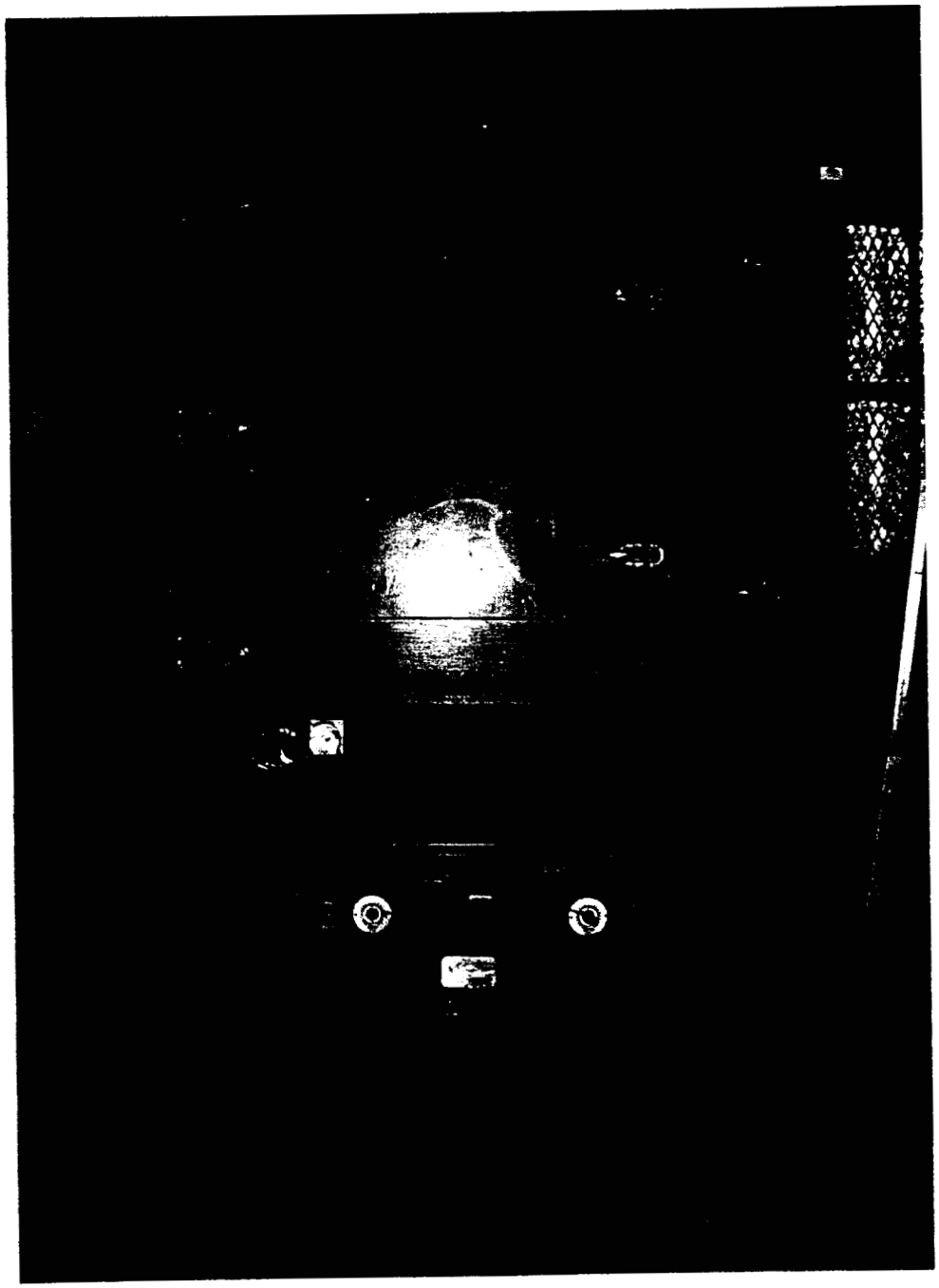
JEWLER'S LATHE
MACHINING OF CASELESS AMMUNITION



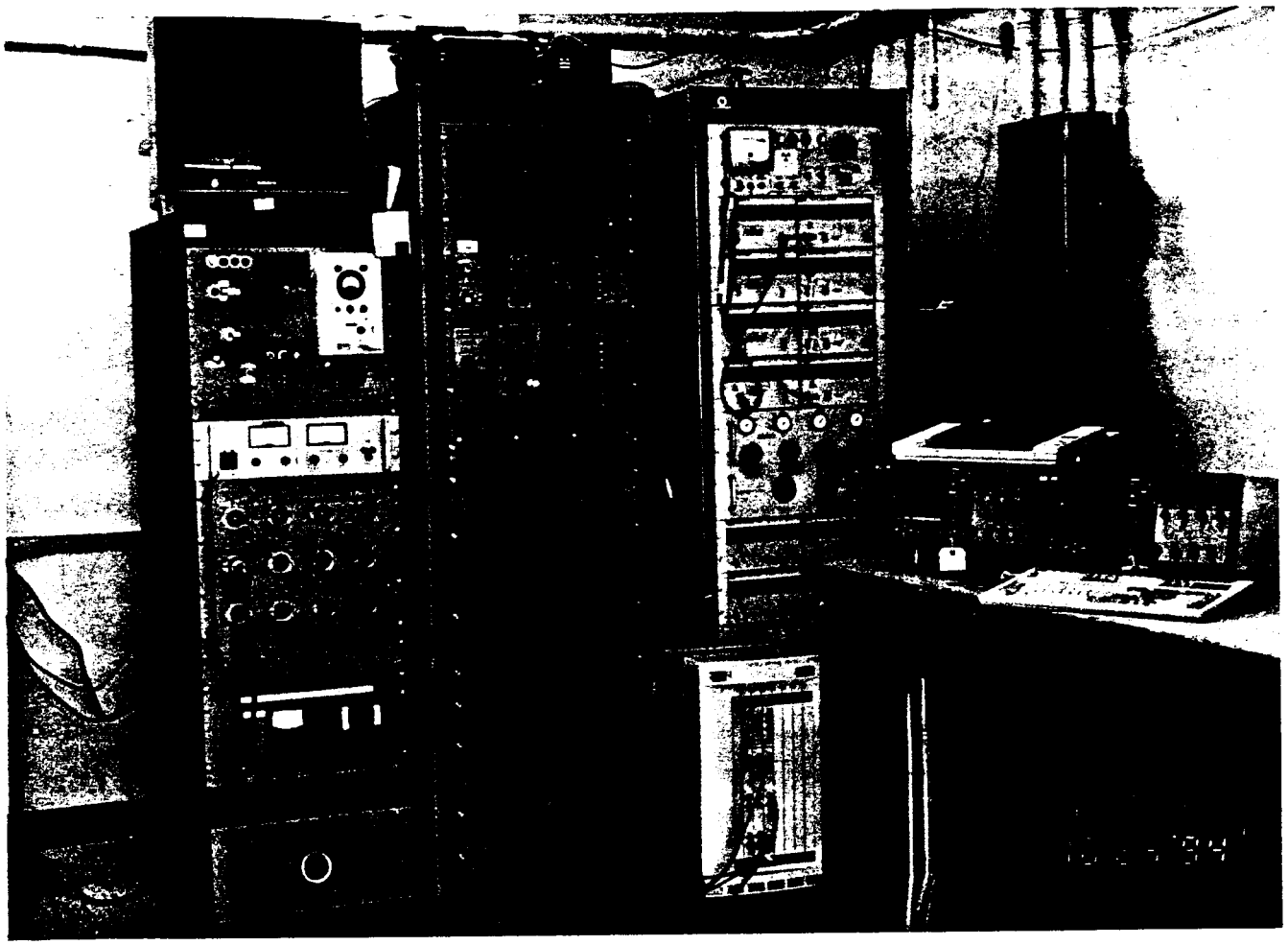
50 TON HYDRAULIC PRESS
PROPELLANT CONSOLIDATION



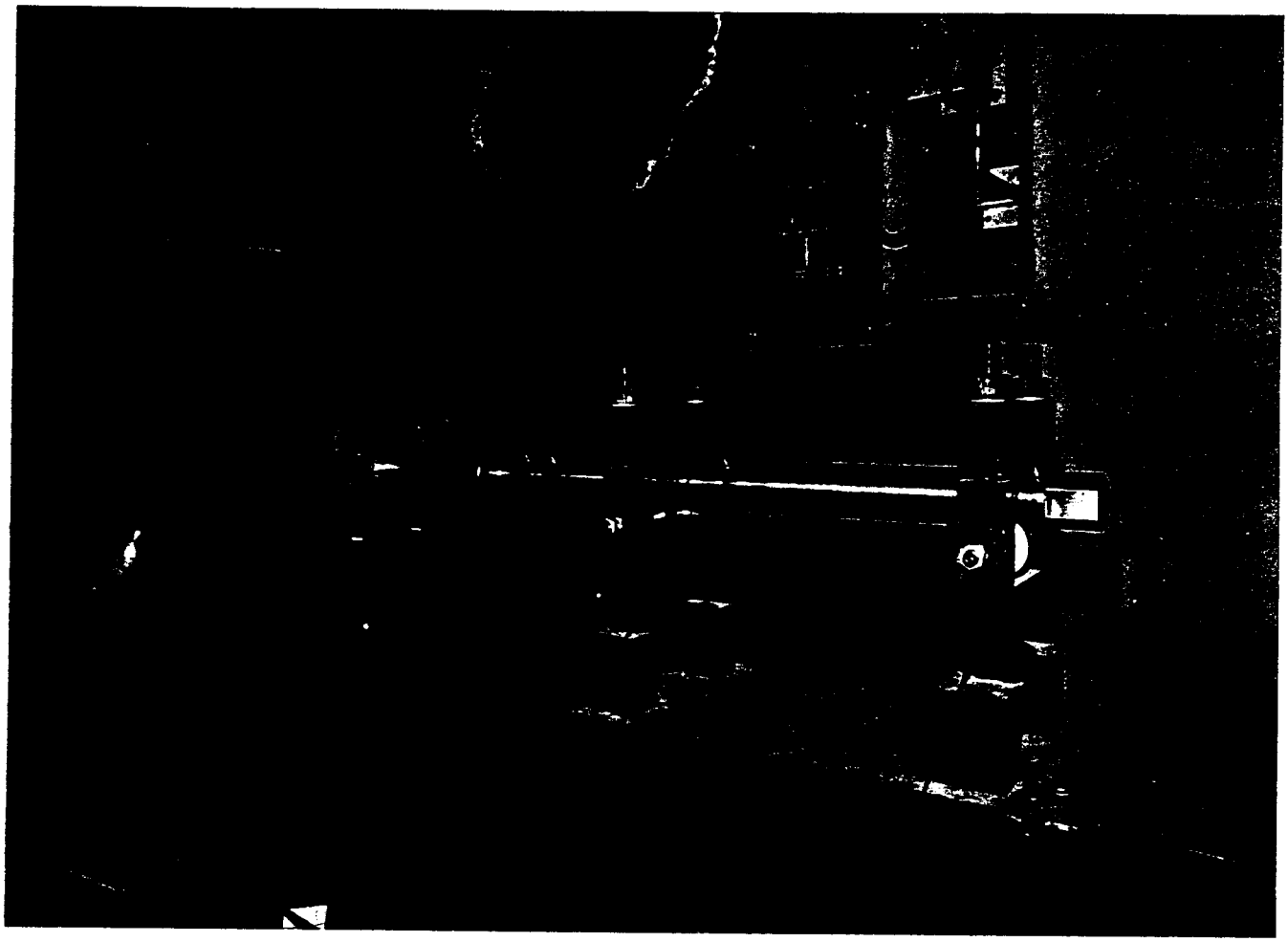
OVEN FOR DRYING OF IN-PROCESS PROPELLANT AND EXPLOSIVES



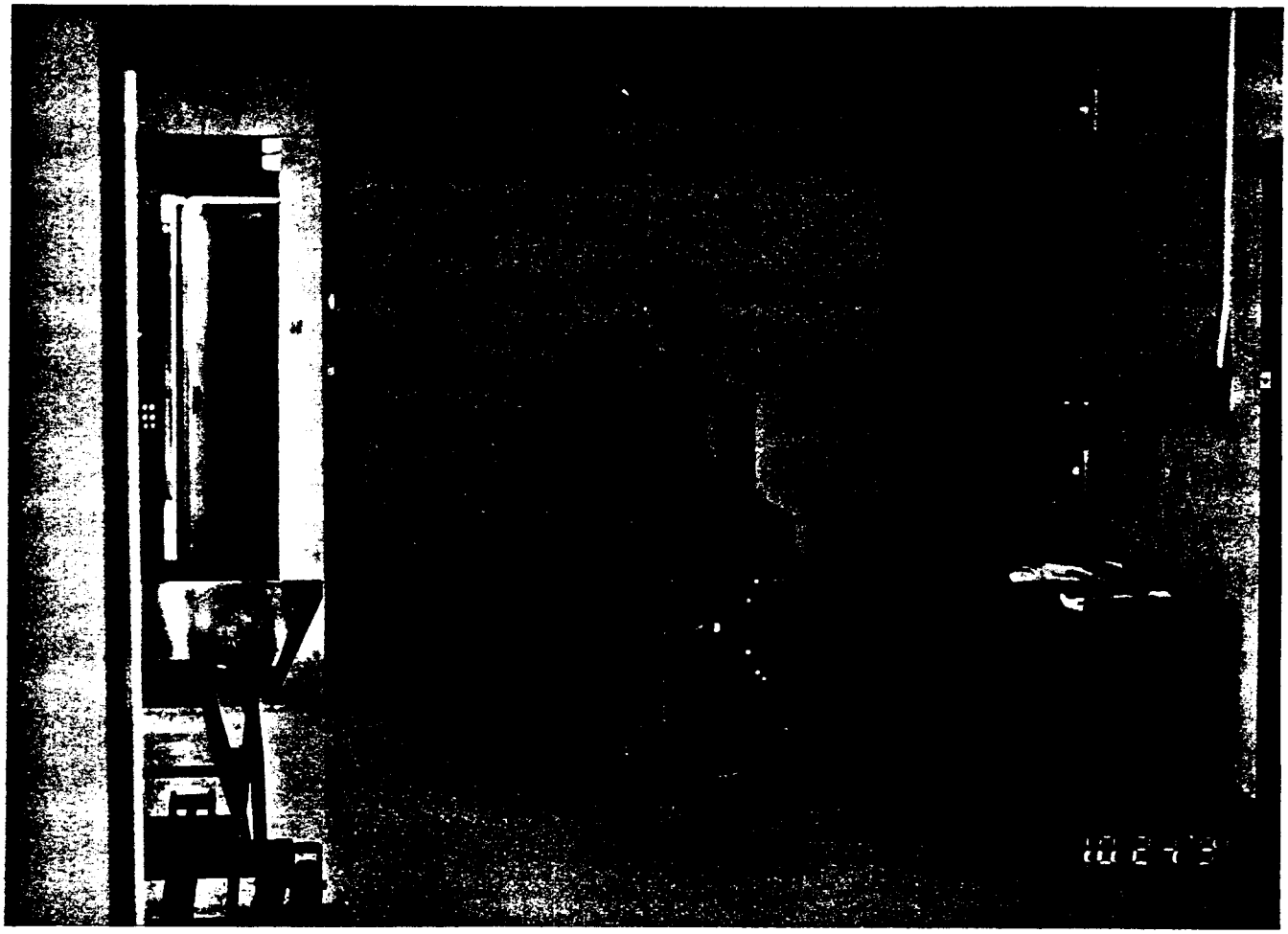
VACUUM OVEN FOR DRYING OF IN-PROCESS PROPELLANT AND EXPLOSIVES



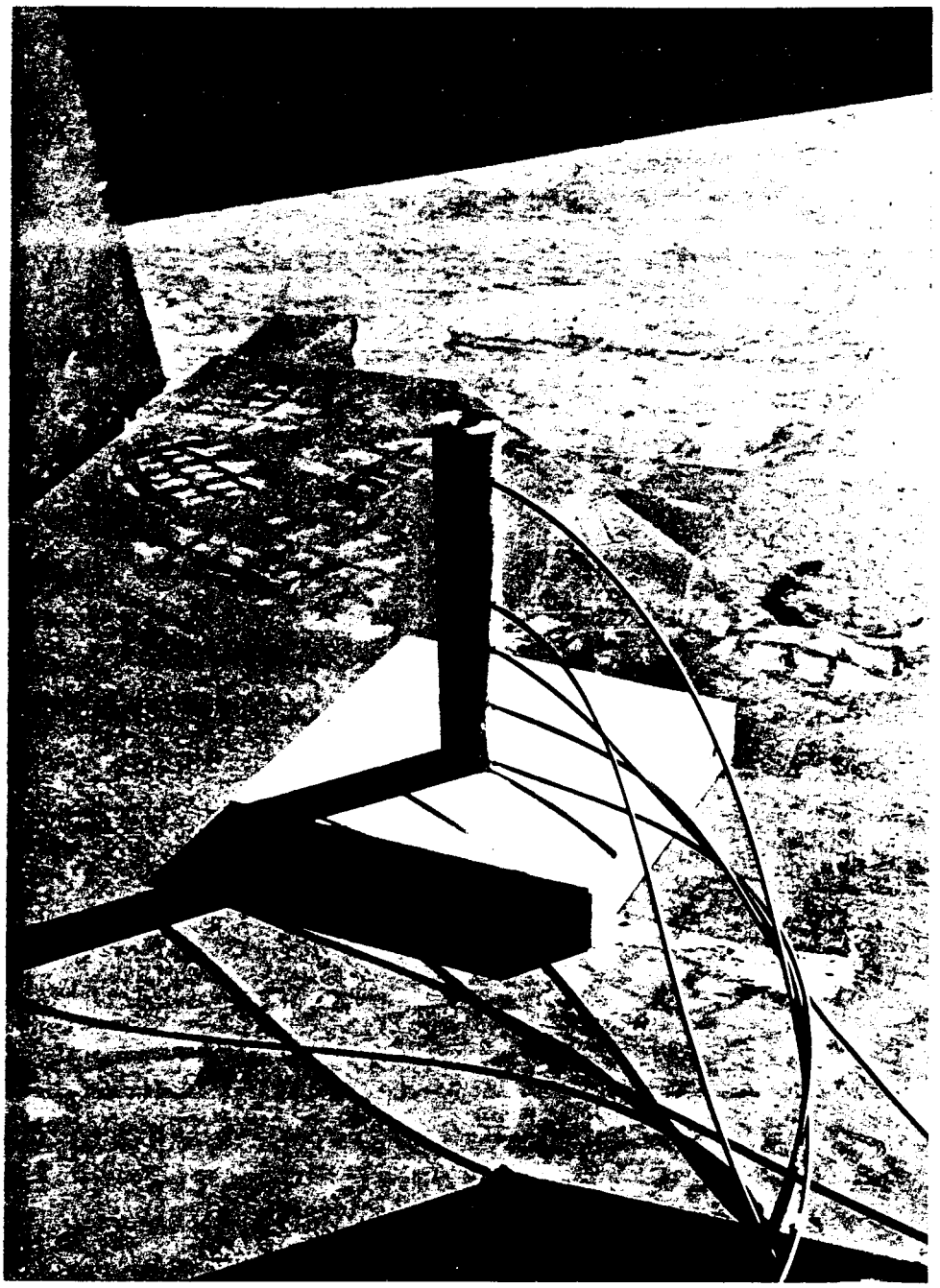
Control Room With Firing Control Panel, ETC Control Panel, Flash X-Ray Control Panel, And Data Acquisition Systems



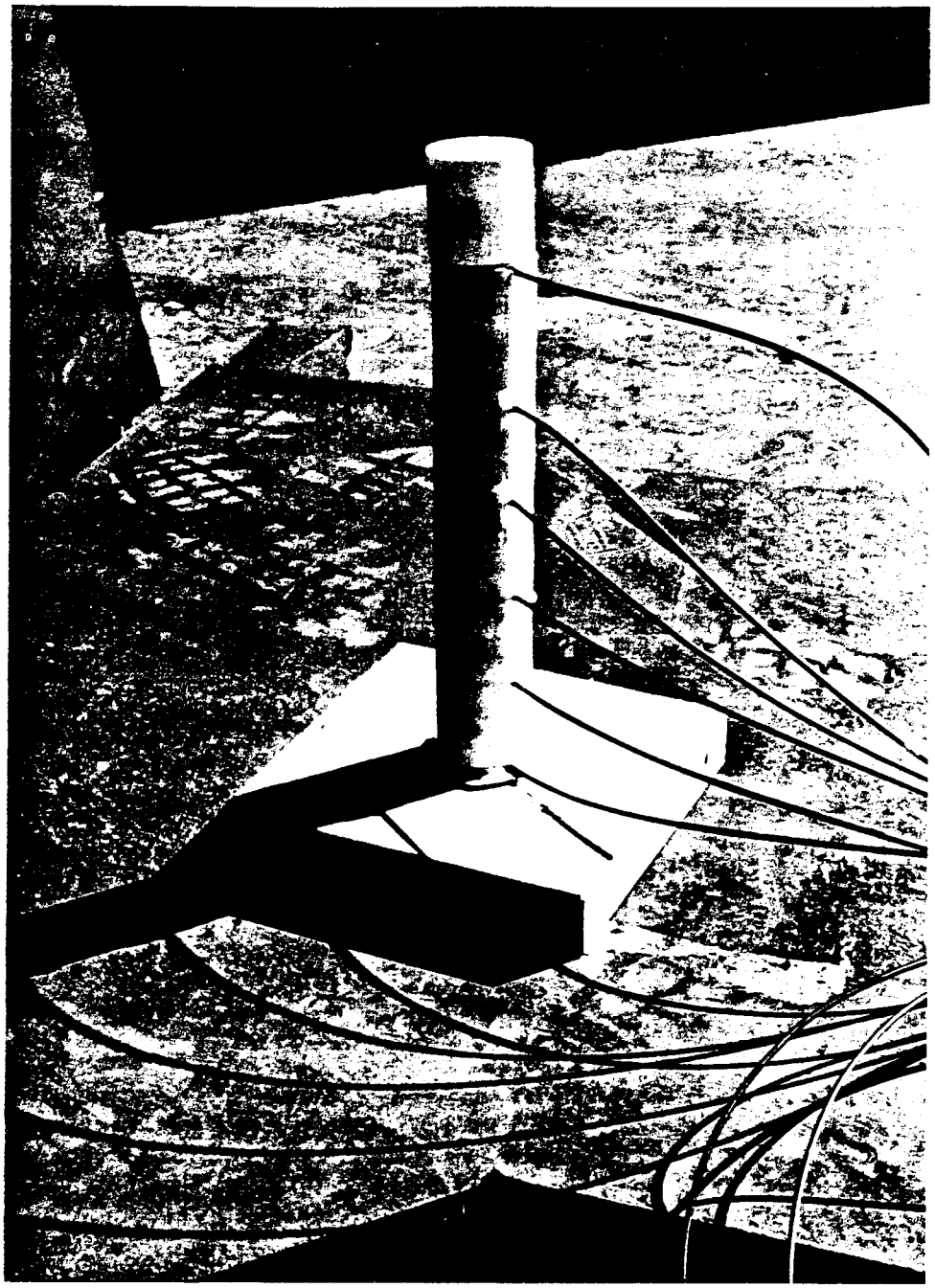
Highly Instrumented 20mm
Electrothermal Chemical (ETC) Gun



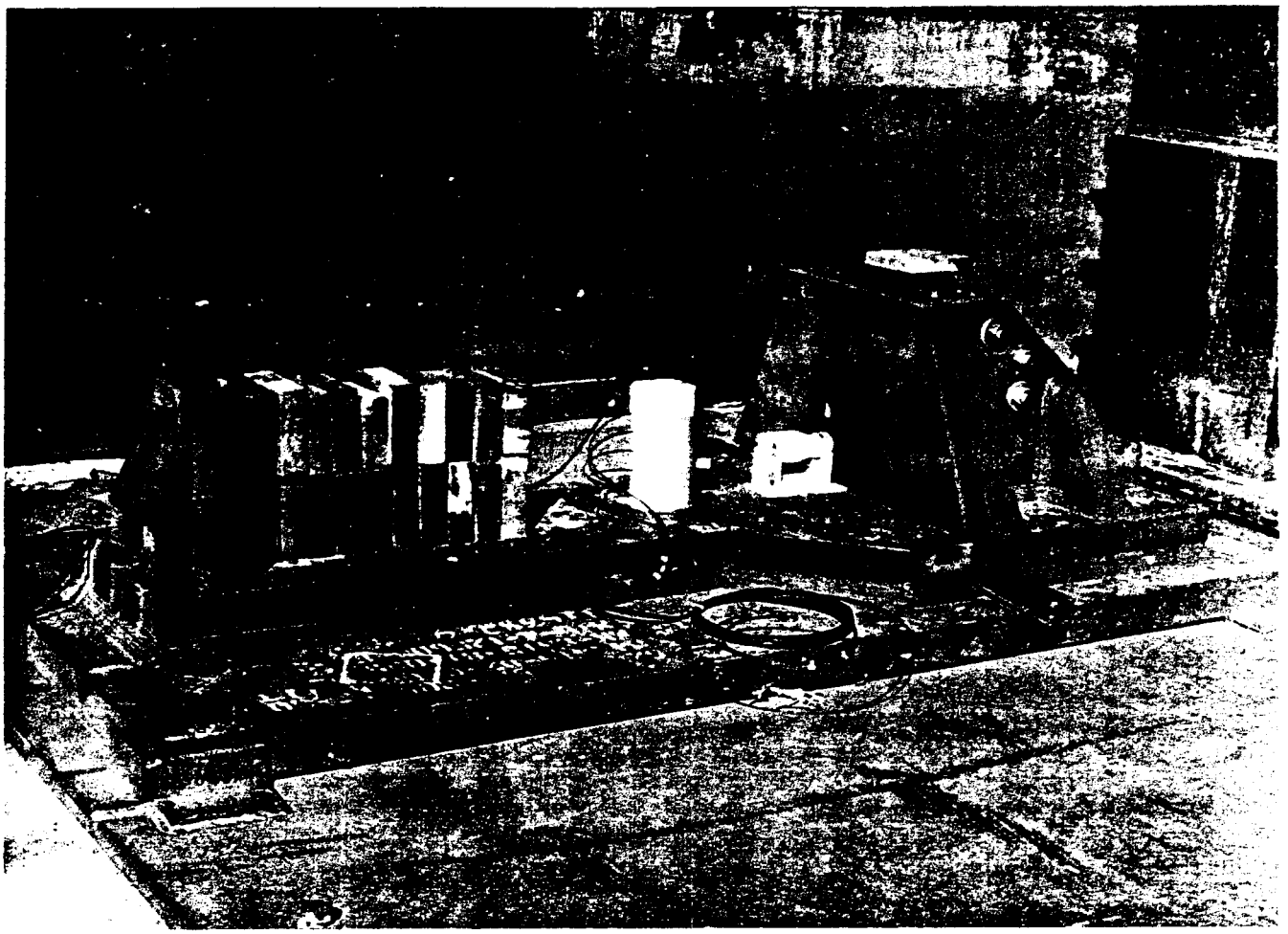
Liquid Propellant 30mm Regenerative
Gun Test Bay(Under Development)



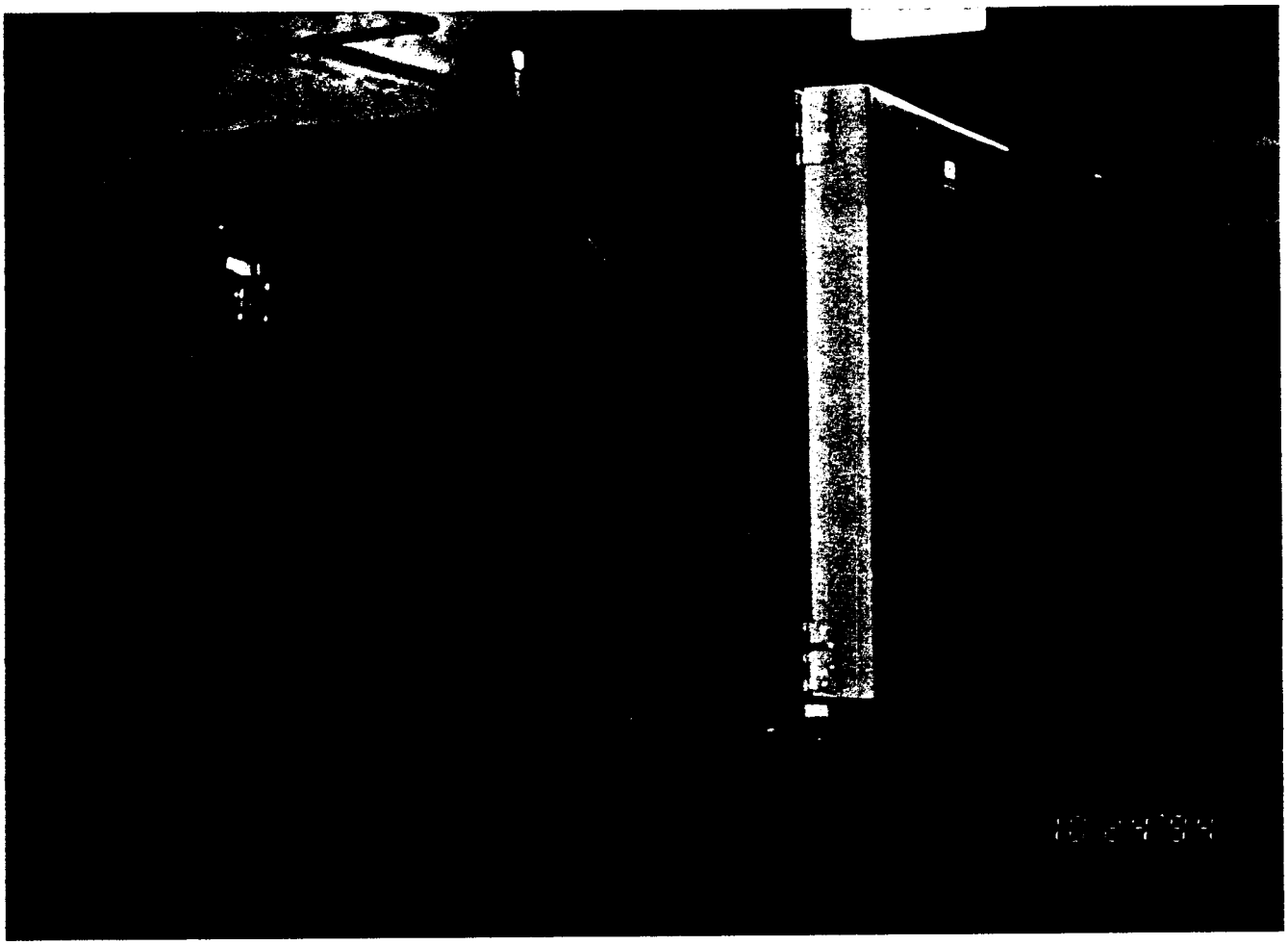
Solid Gun Propellants Shock Reactivity
Test Showing Fiber Optic Probes



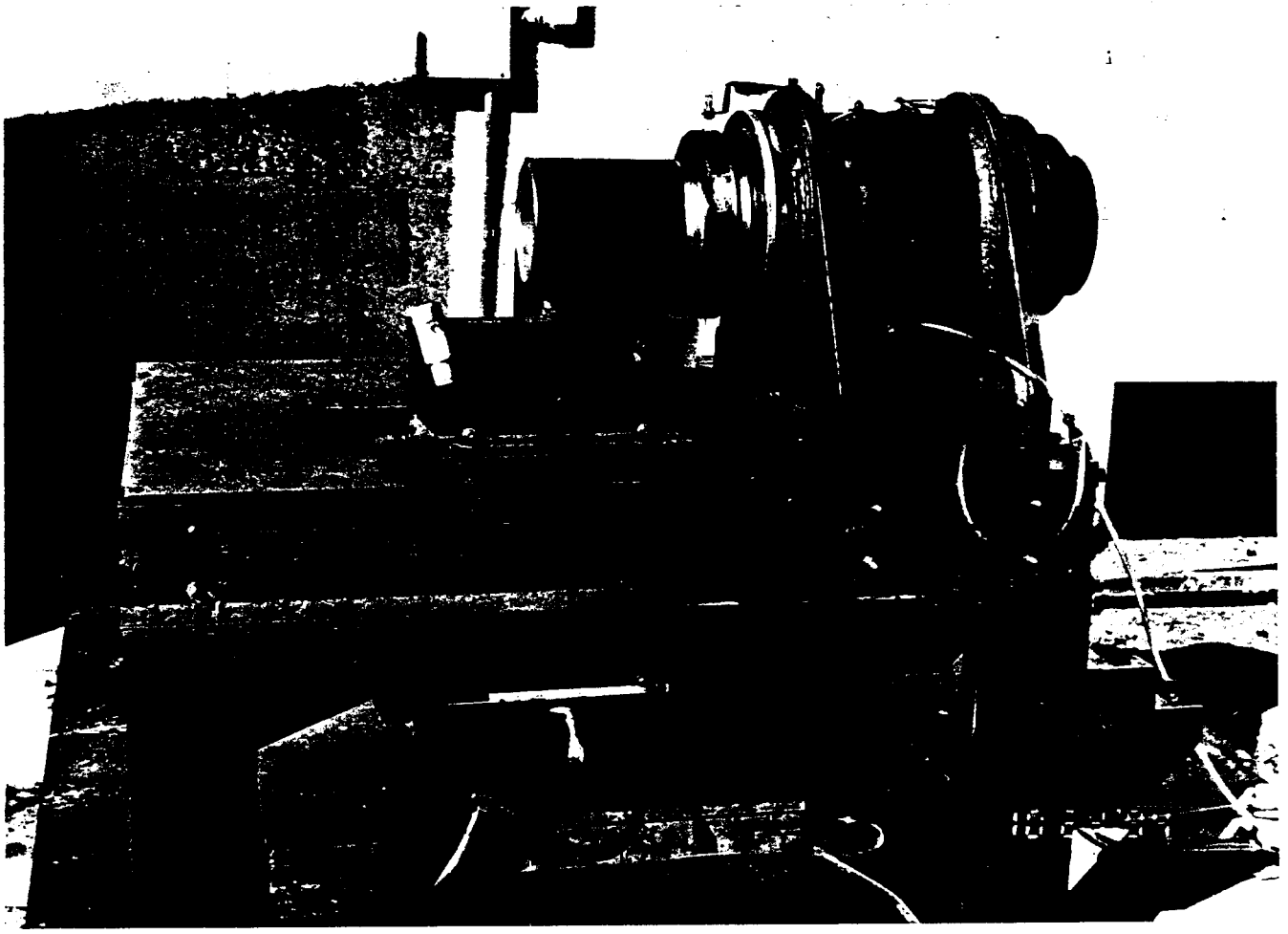
Solid Gun Propellants Critical Diameter Test
Showing Fiber Optic Probes



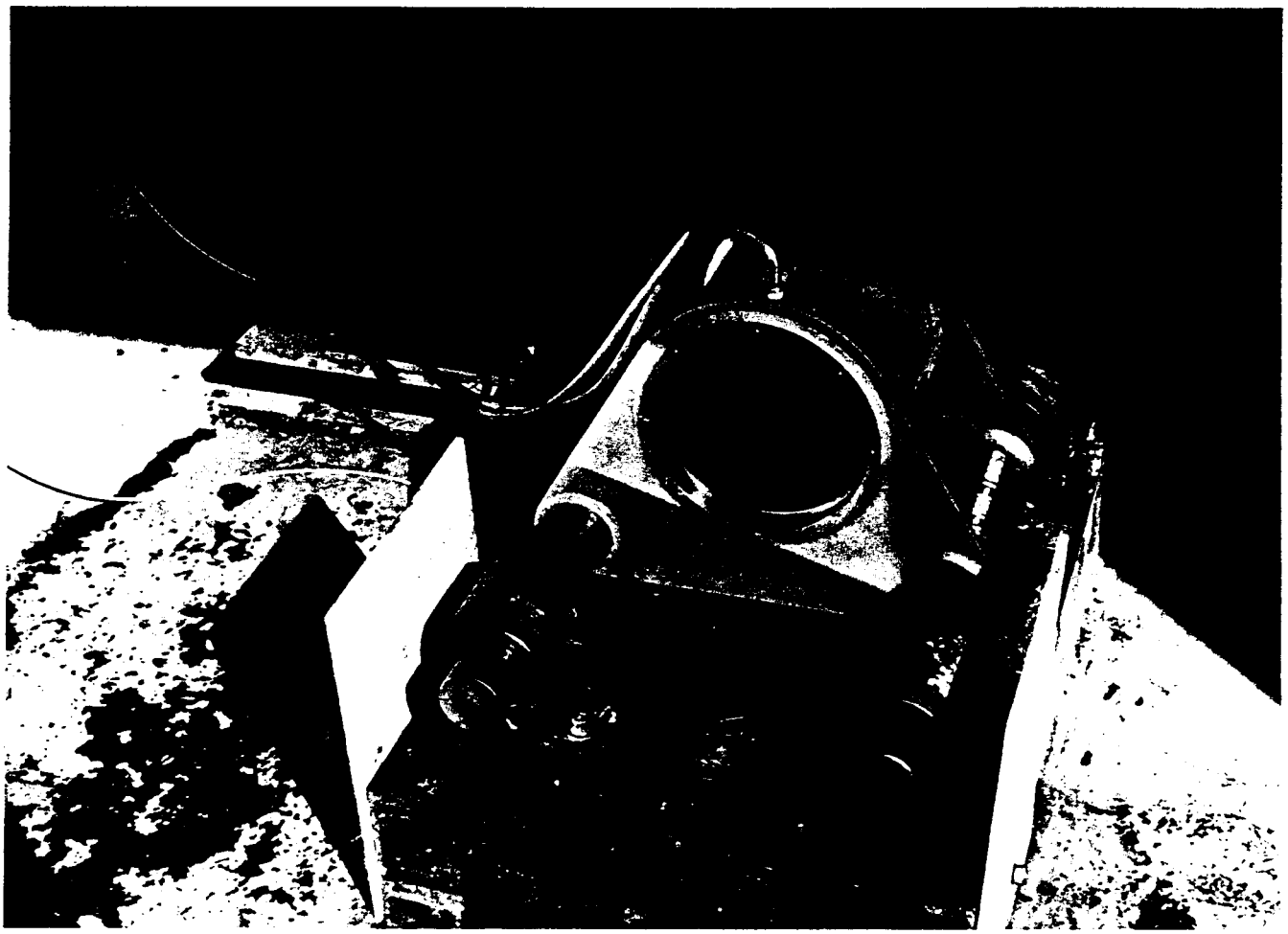
Shaped Charge Jet Impact On Gun Propellant
Test Fixture Showing Fiber Optic Probes



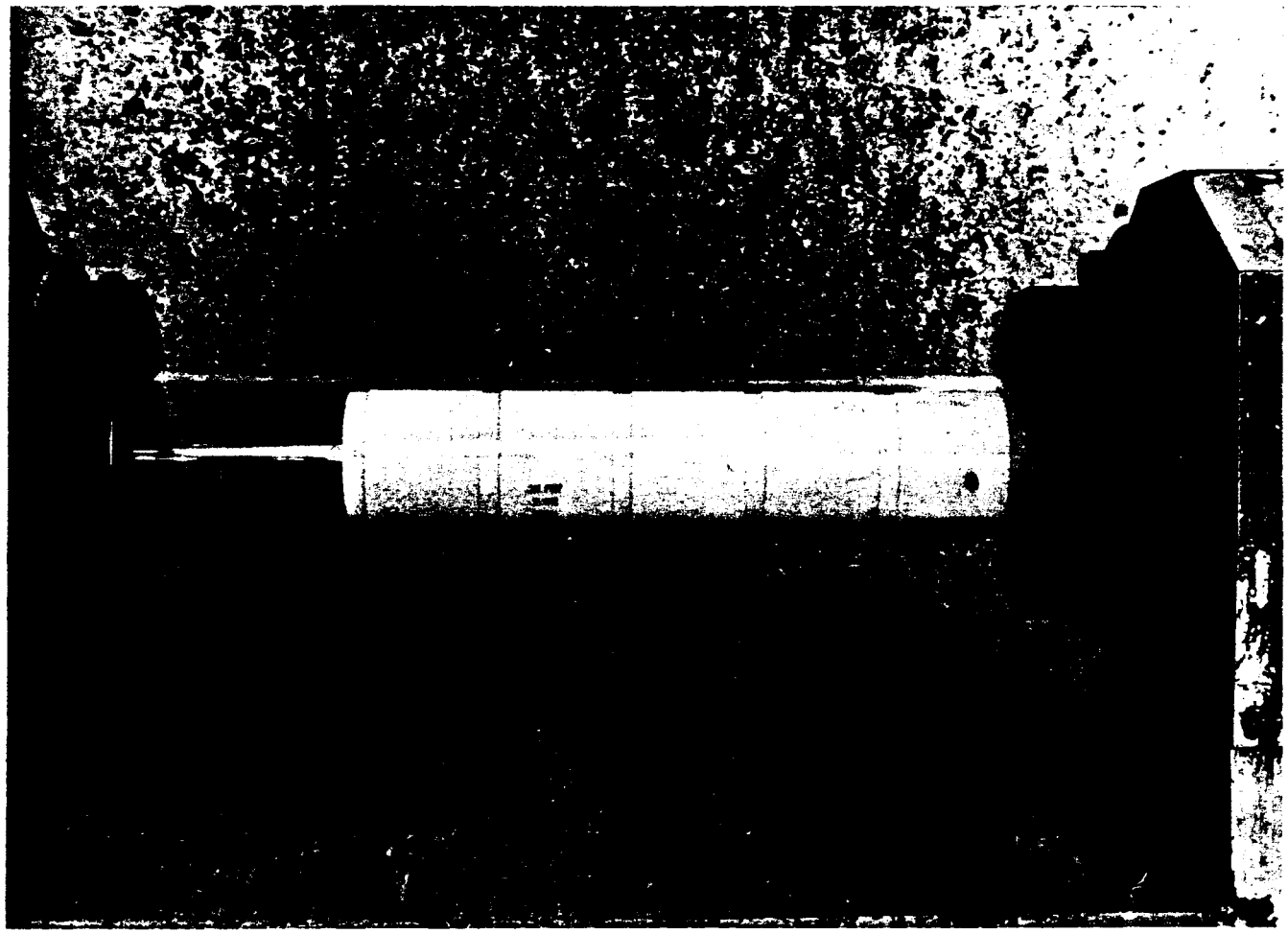
Computer Controlled Environmental
Conditioning Chambers



155mm Cargo Ejection Spin Test Fixture



Up To 155mm Components(ie. Base Bleed, Rocket Motor, and Ogive) High RPM(18,000) Spin Test Fixture (Shown Without Components' Adapter)

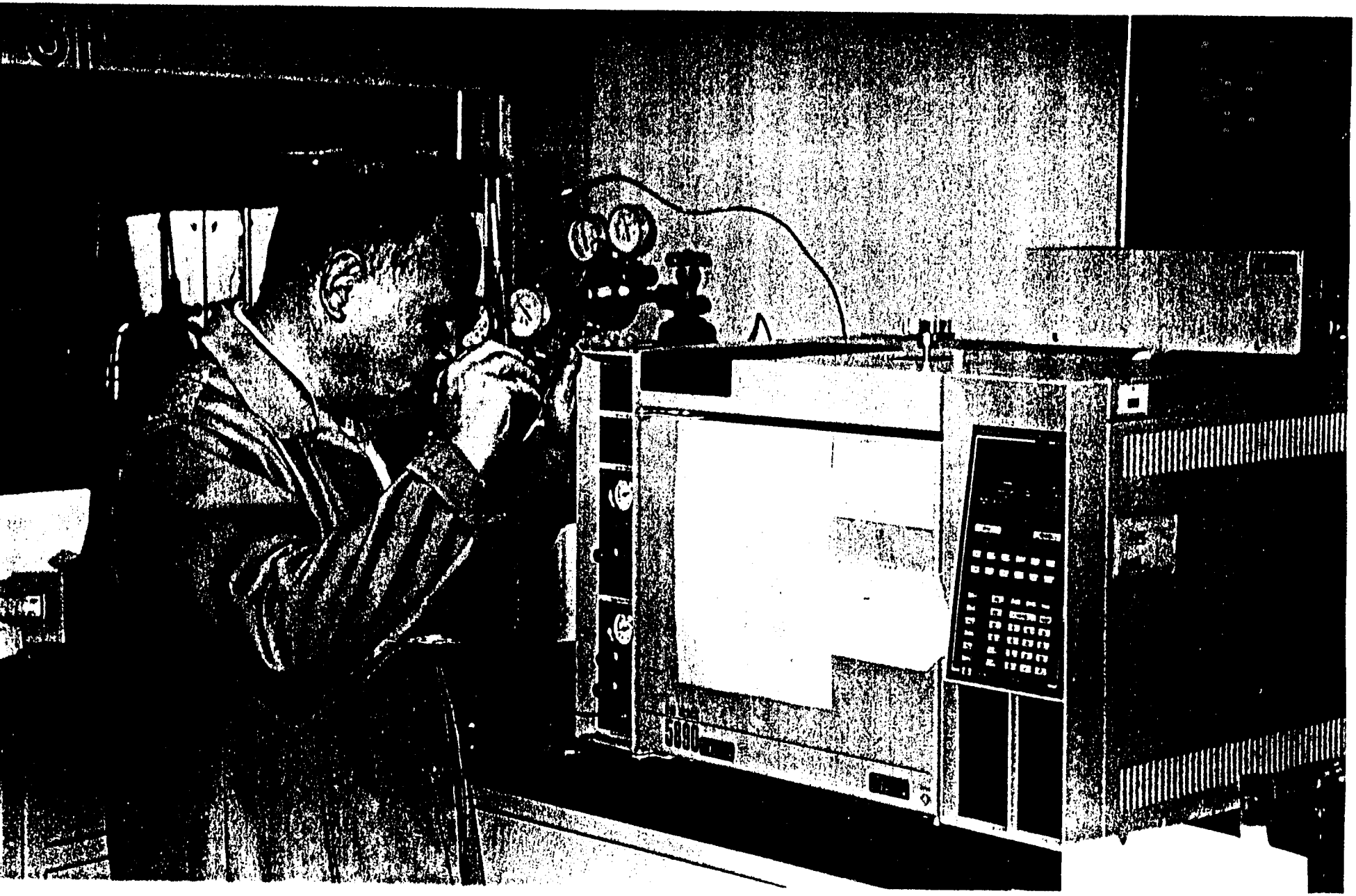


Interior Ballistic Simulator(IBS) With
Five 155mm Unicharge Increments

H. PROPELLANT SURVEILLANCE CAPABILITY

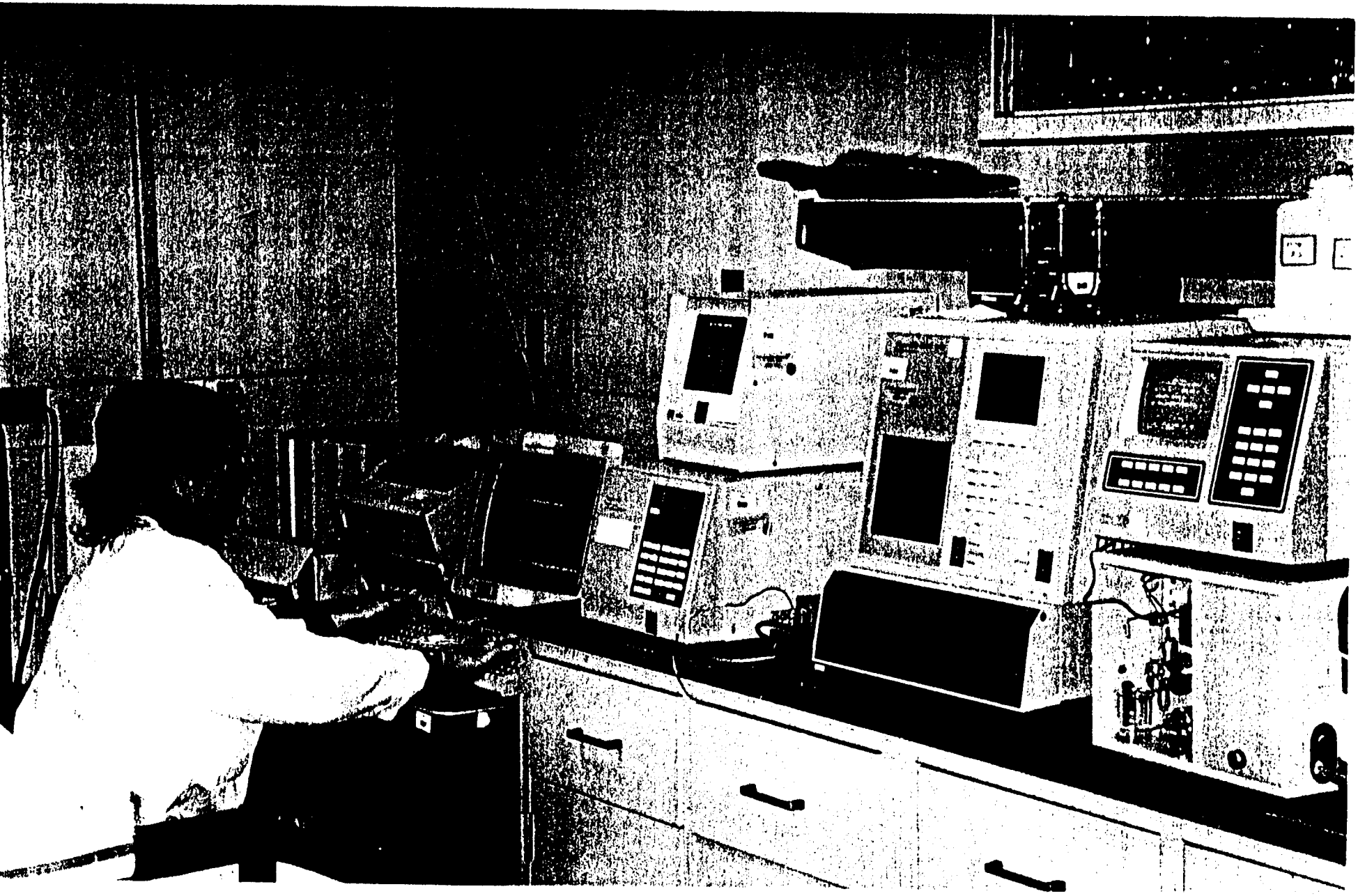
CAPILLARY GAS CHROMATOGRAPHY

- PROPELLANT SURVEILLANCE FACILITY
  - Propellant safe storage and handling condition is assessed by determining the total volatile and moisture content using this instrumentation.
  - Nitroglycerin content can be measured in order to assess ballistic changes with age


5890

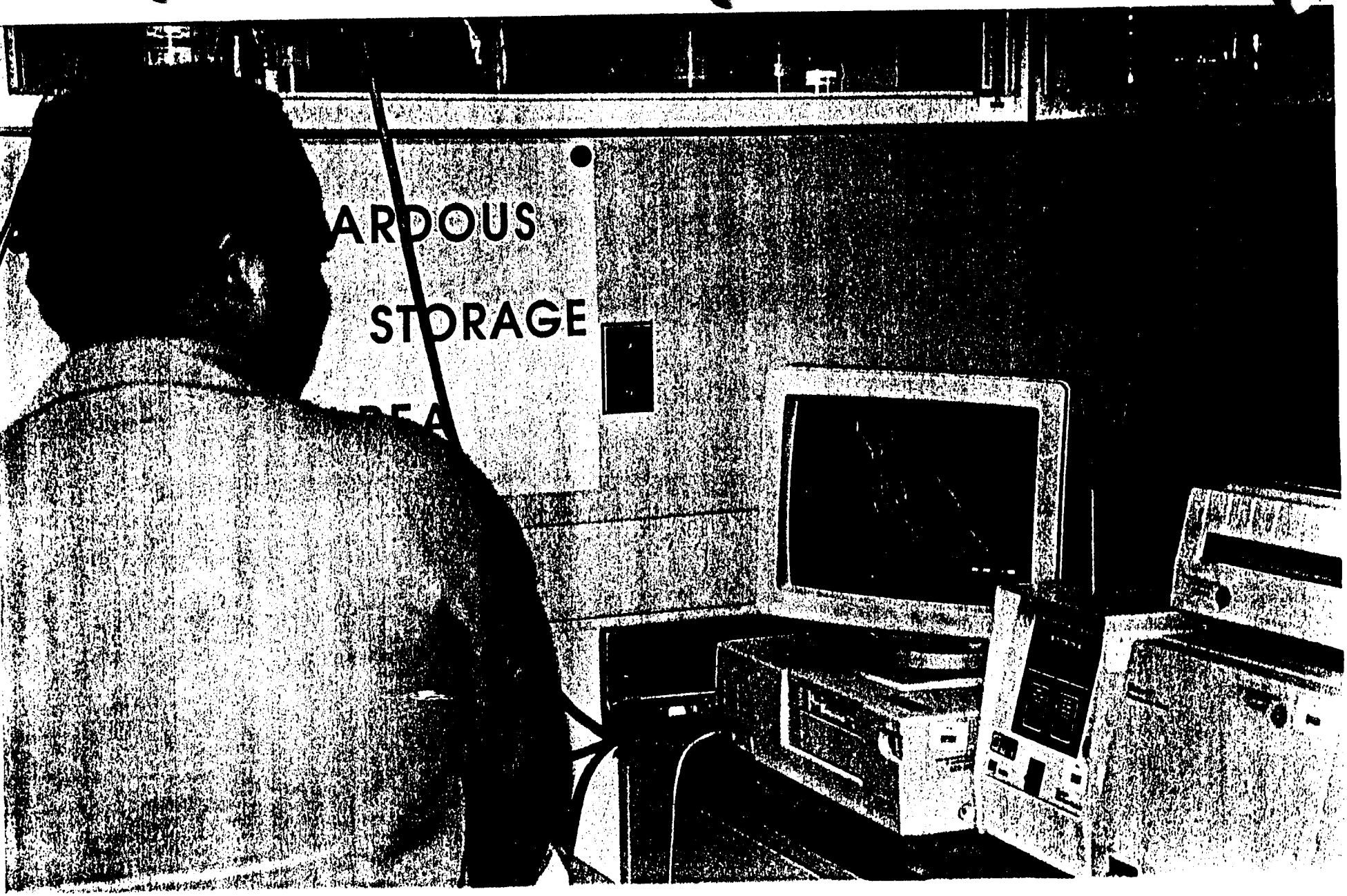
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

- PROPELLANT SURVEILLANCE FACILITY
  - A network of high performance liquid chromatographs support the assessment of all the Army's propellant assets for their safe storage and handling condition.
  - These chromatographs use automated injectors and sophisticated software that allows hundreds of samples to be run concurrently.
  - The laboratory routinely performs up to 10,000 tests annually.



HIGH PERFORMANCE LIQUID CHROMATOGRAPHY DIODE ARRAY SPECTROPHOTOMETRY

- PROPELLANT SURVEILLANCE FACILITY
  - Used to assess the safe storage and handling condition of the Army's propellant assets
  - Quantifies the amount of organic volatile and moisture content

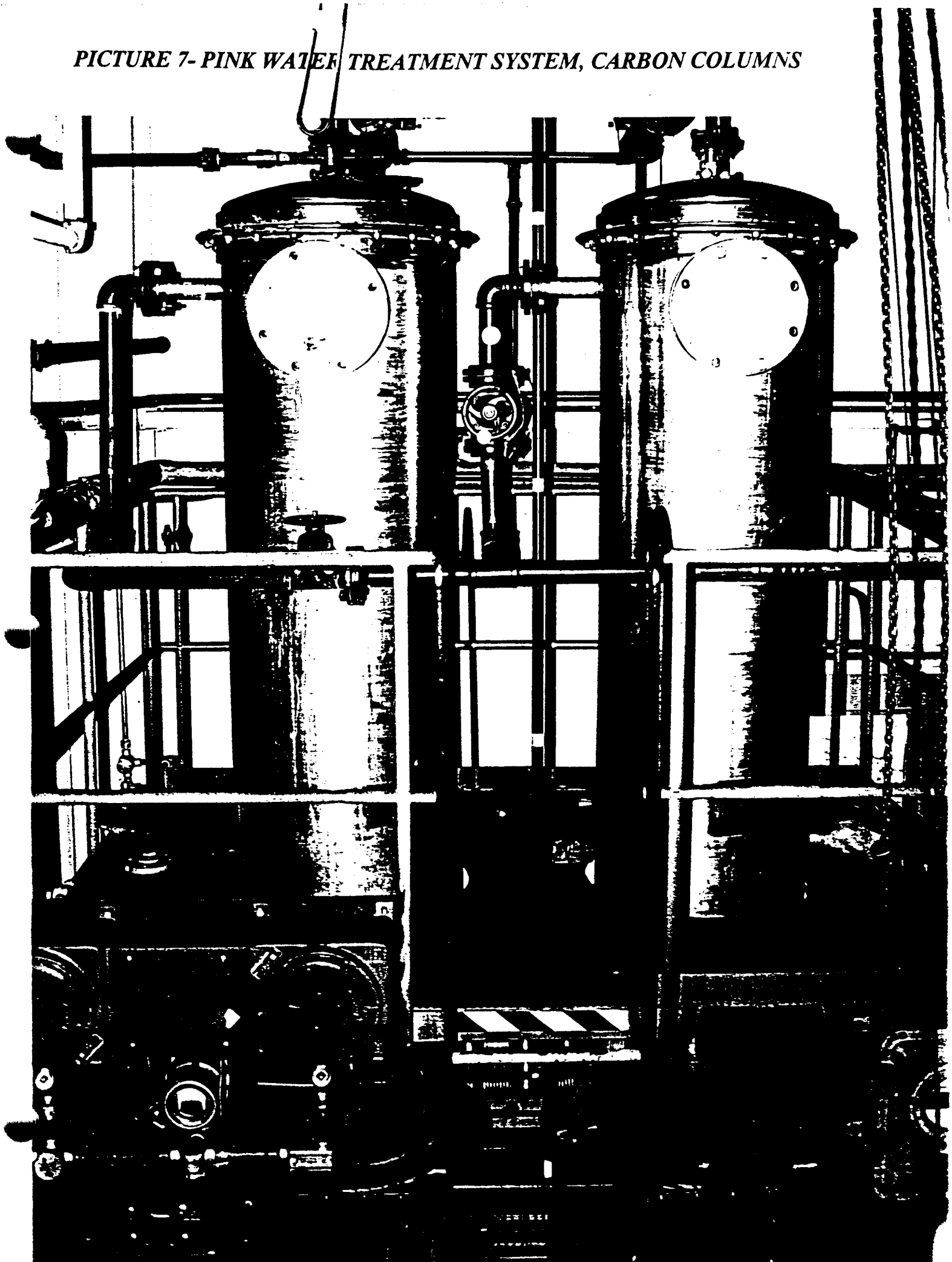

ARDOUS
STORAGE

I. DEMILITARIZATION

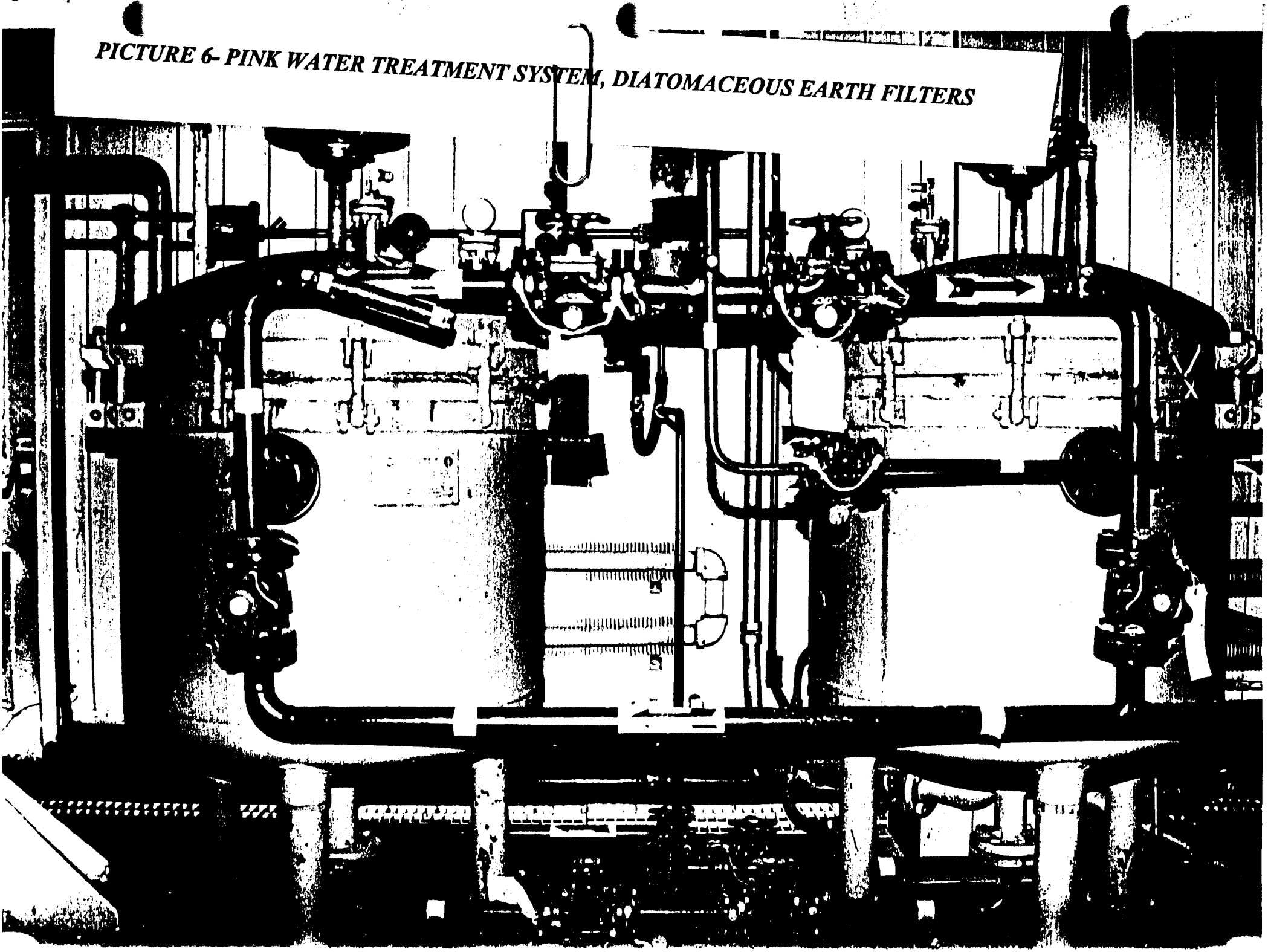
EXPLOSIVE WASH OUT AND RECLAMATION/PINK WATER TREATMENT FACILITY

- UNIQUE CONSTRUCTION
  - SAFETY DISTANCES (INTERIOR AND EXTERIOR)
  - HIGH EXPLOSIVE LIMIT 1000 LBS OF CLASS 1.1 EXPLOSIVE
  - EPA PERMITTED
- UNIQUE EQUIPMENT
  - PROJECTILE WASH OUT AND EXPLOSIVE RECLAMATION SYSTEM
  - PINK WATER TREATMENT SYSTEM
    - SETTLING TANKS
    - PINK WATER COOLING/FILTRATION SYSTEM (PICTURE 5)
    - DIATOMACEOUS EARTH FILTERS (PICTURE 6)
    - CARBON COLUMNS (PICTURE 7)
- PROGRAMS
  - RECOVERY OF EXPLOSIVES FROM MEDIUM AND LARGE CALIBER PROJECTILES
  - ON-LINE MONITORING SYSTEM FOR TREATED PINK WATER DISCHARGE

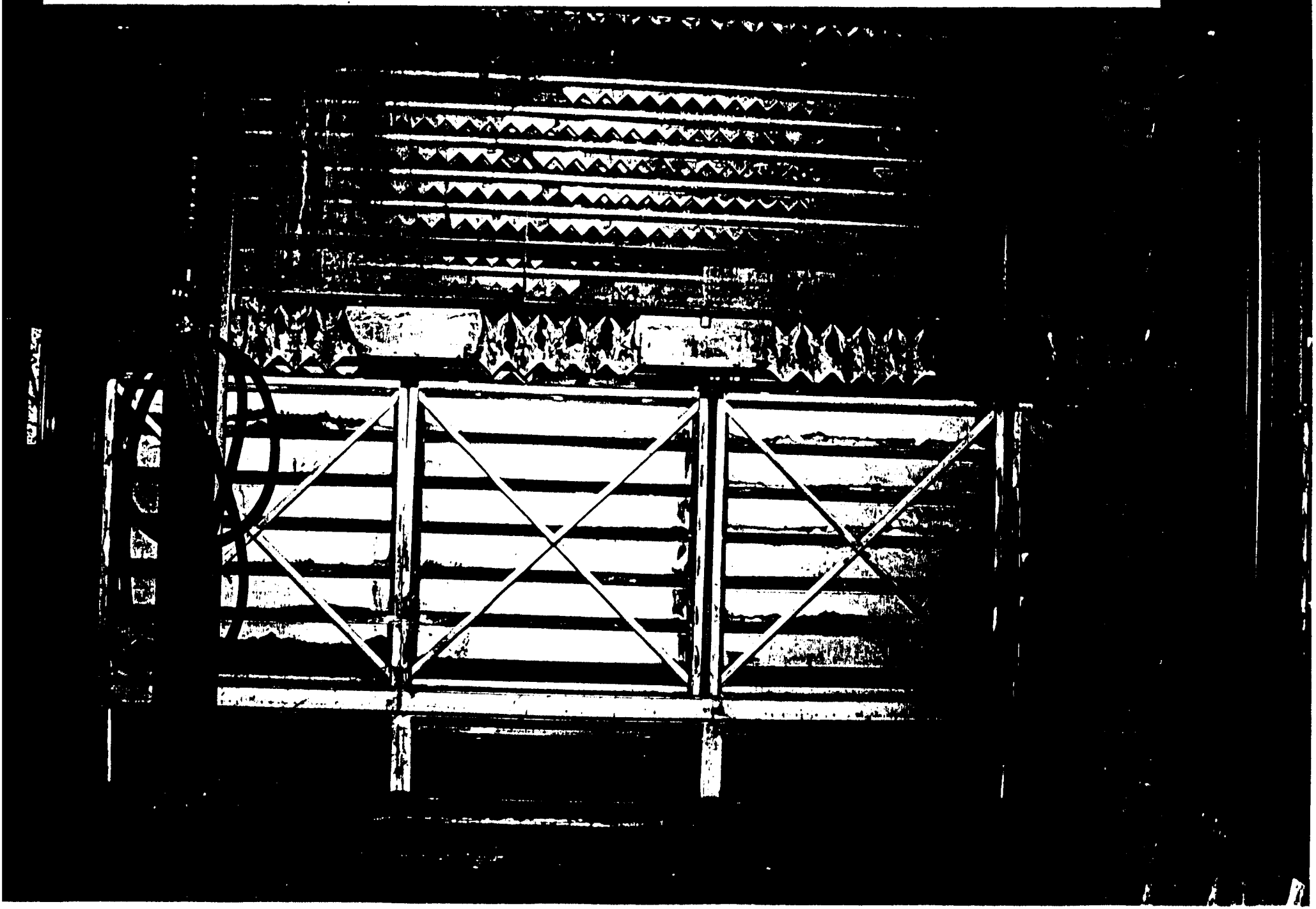
PICTURE 7- PINK WATER TREATMENT SYSTEM, CARBON COLUMNS



PICTURE 6- PINK WATER TREATMENT SYSTEM, DIATOMACEOUS EARTH FILTERS



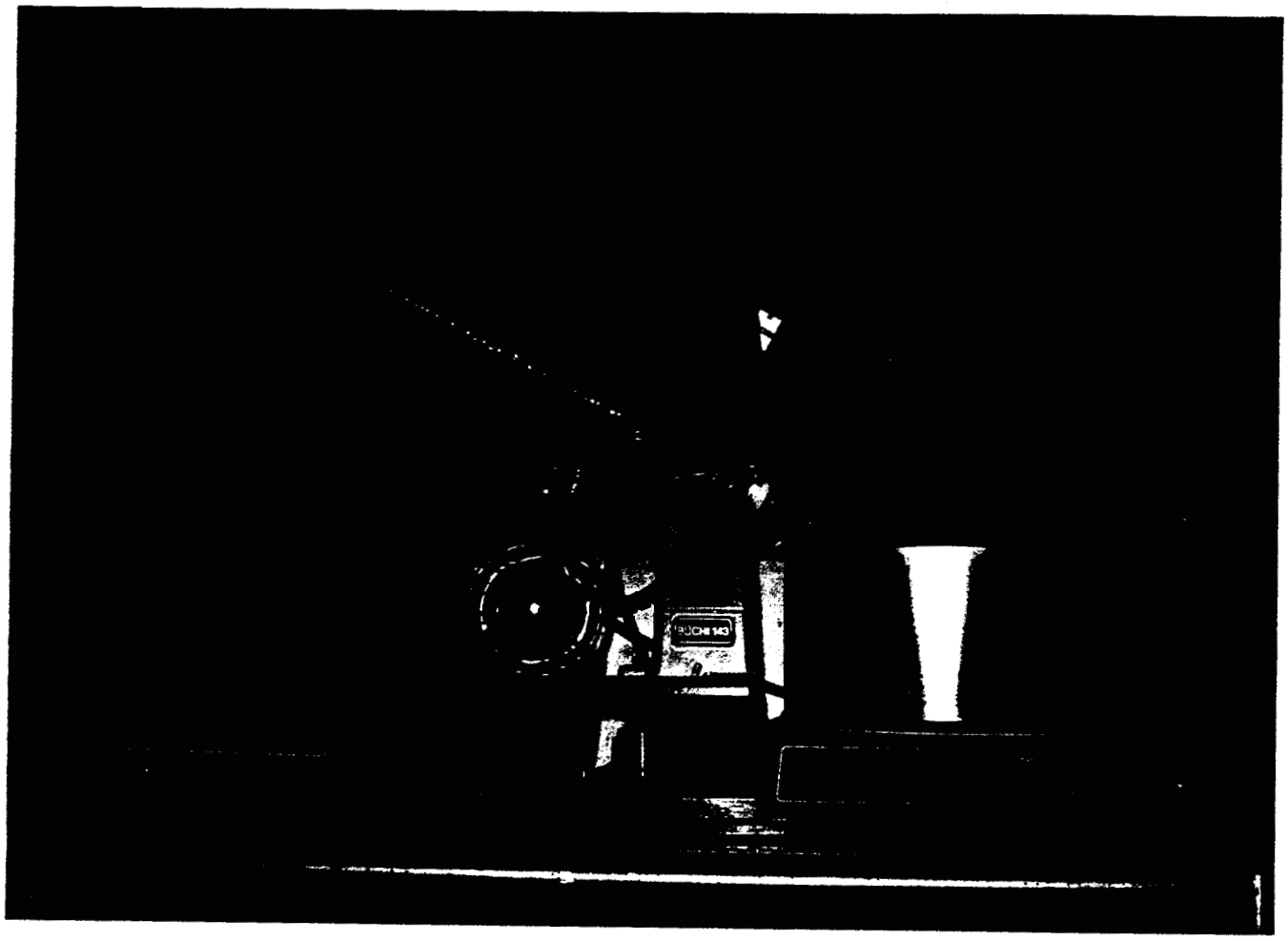
PICT E 5- PINK WATER TREATMENT SYSTEM, W R COOLING AND FILTRATION SYSTEM



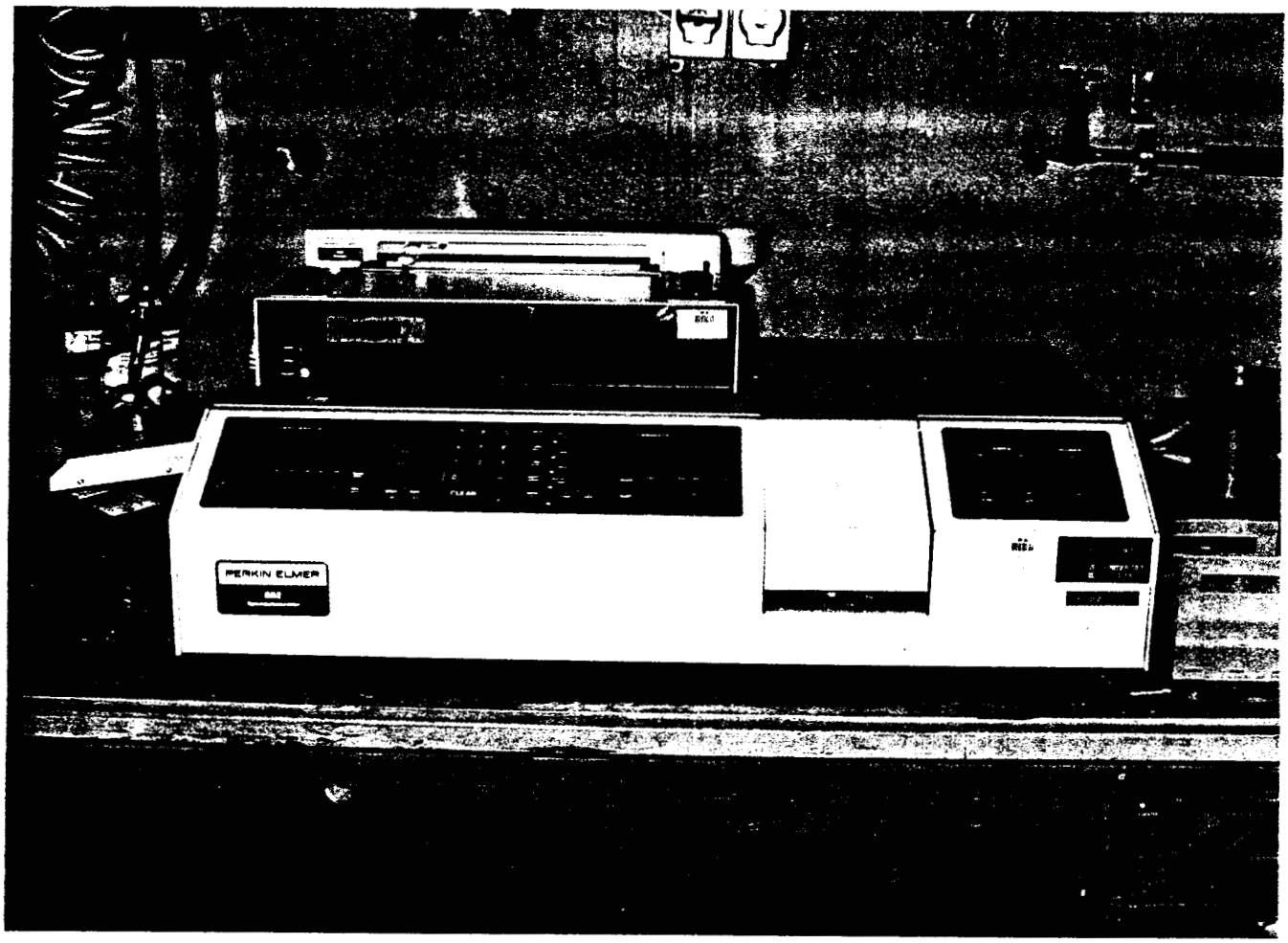
J. ENVIRONMENTAL

PICTURE 3
WORKBENCHES IN BIOTECHNOLOGY LAB

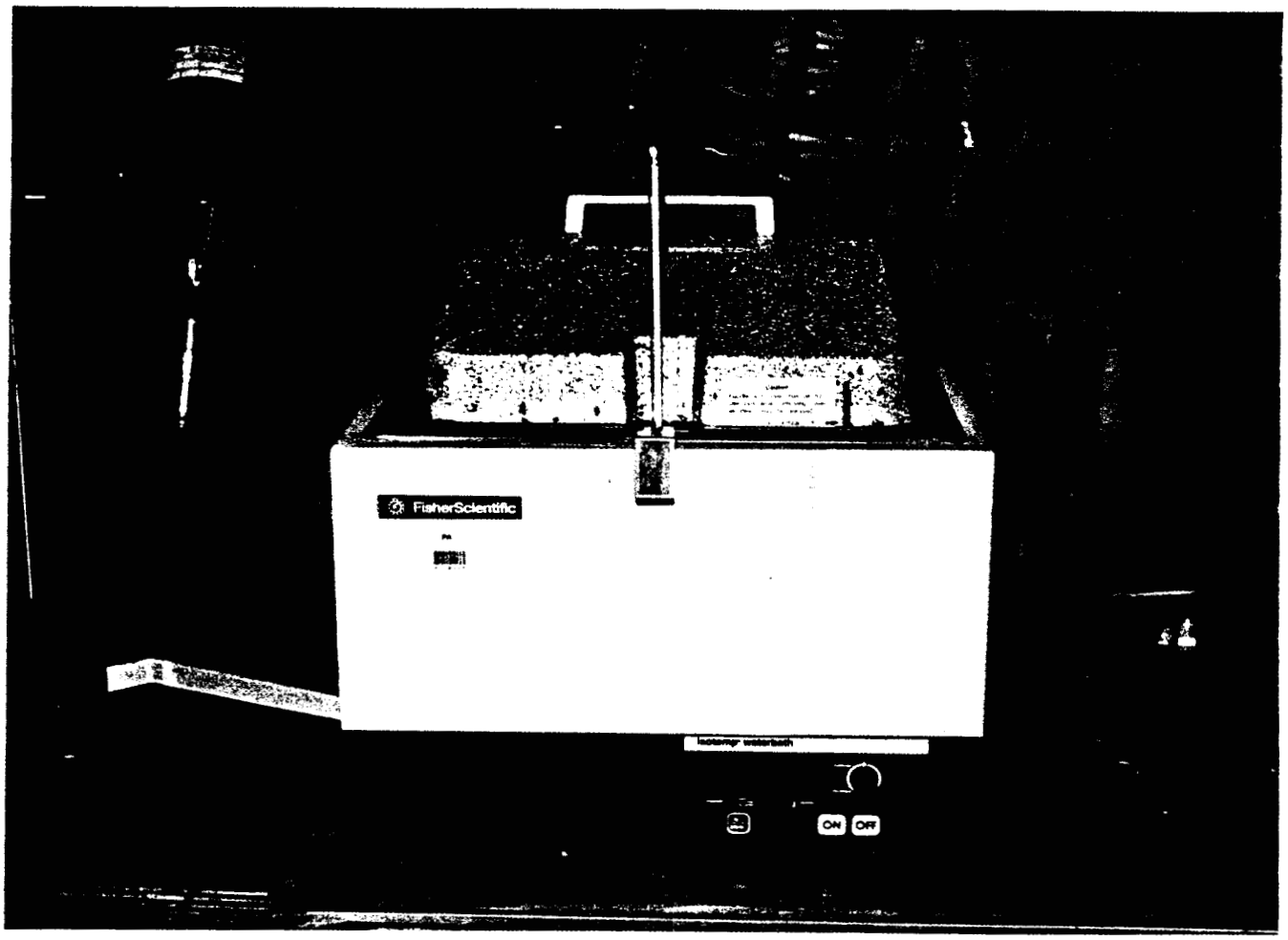
ROTARY EVAPORATOR



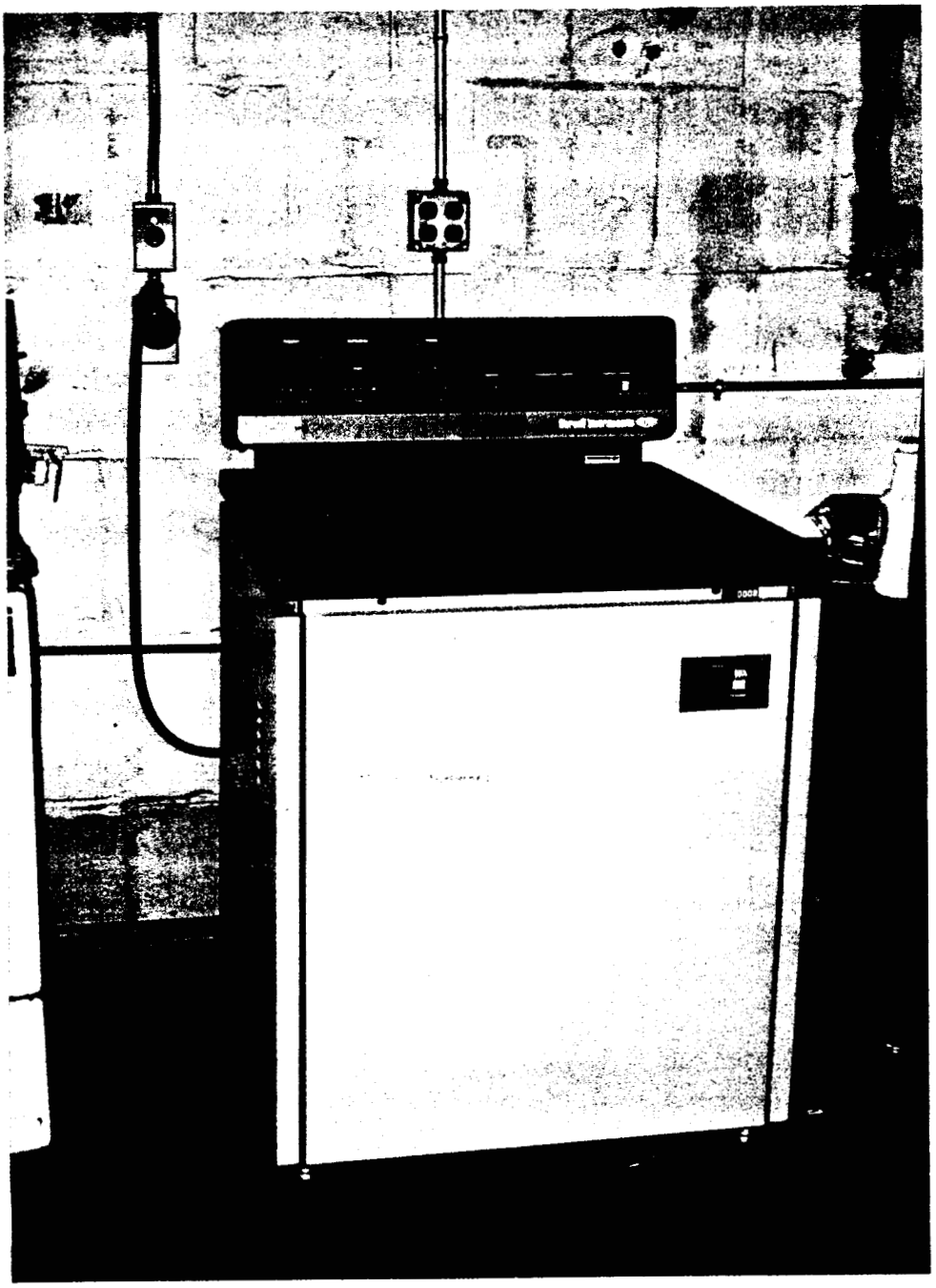
SPECTROPHOTOMETER



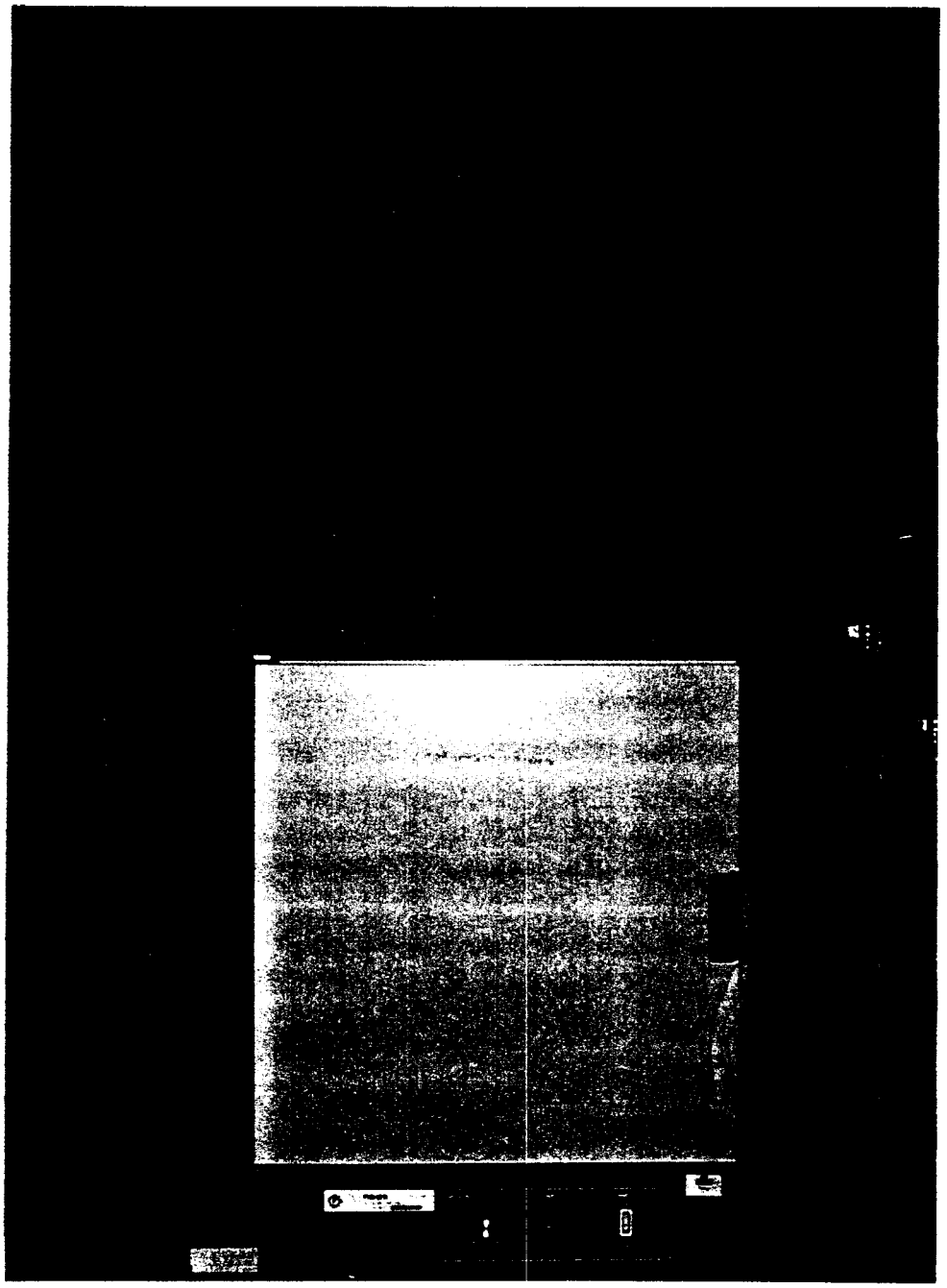
WATERBATH



CENTRIFUGE

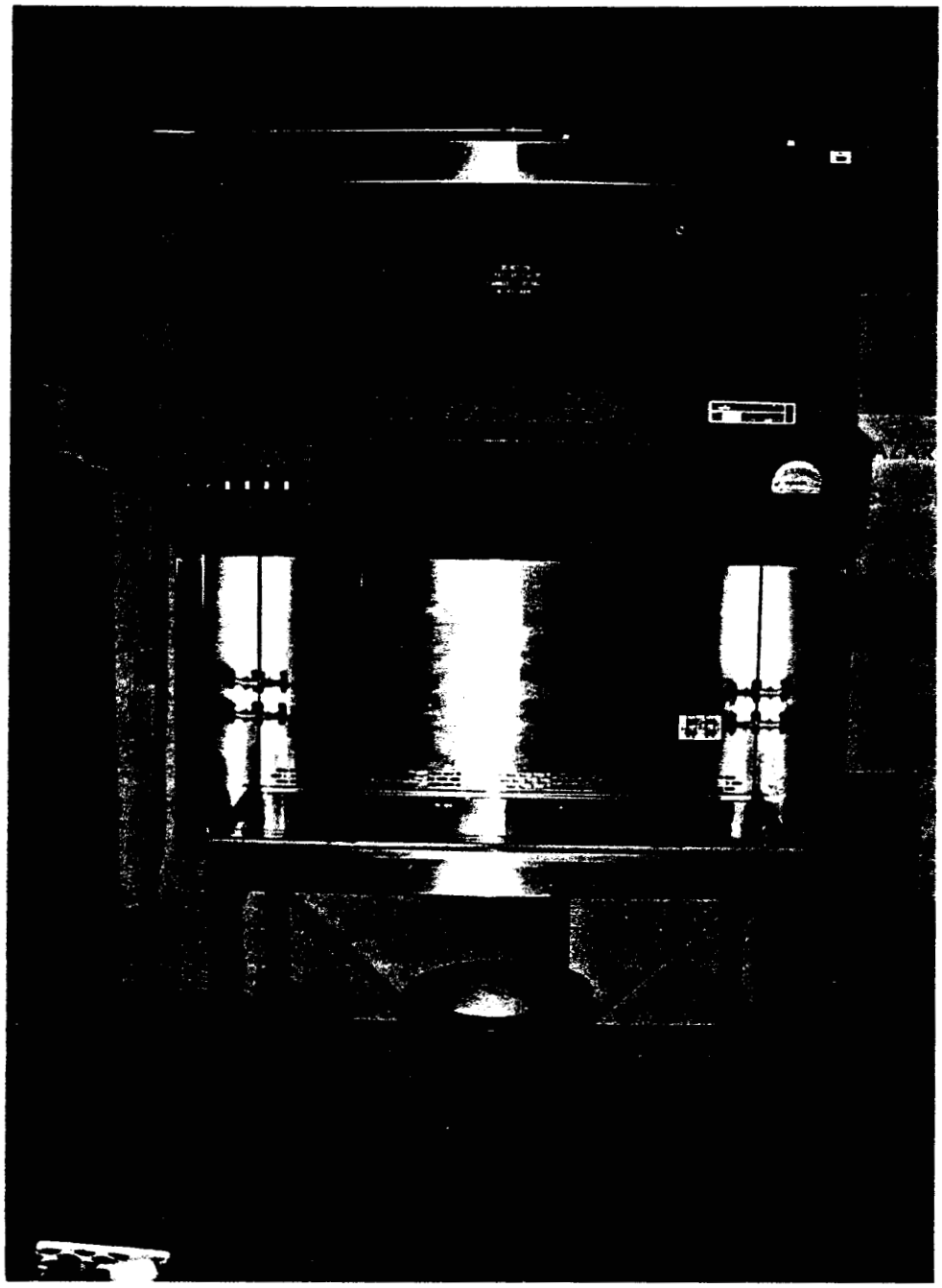


INCUBATOR

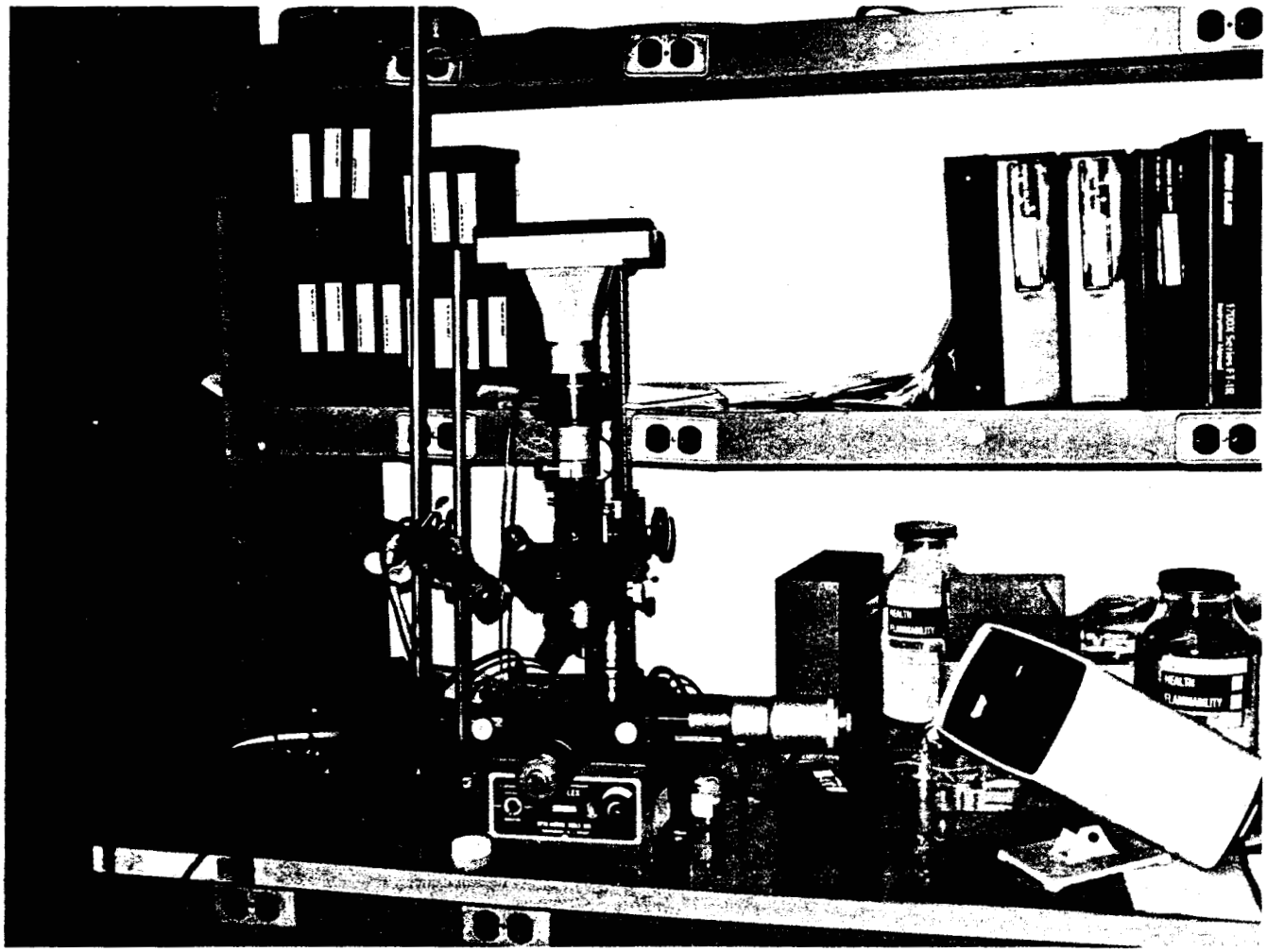


ISOTHERMAL STERILIZER

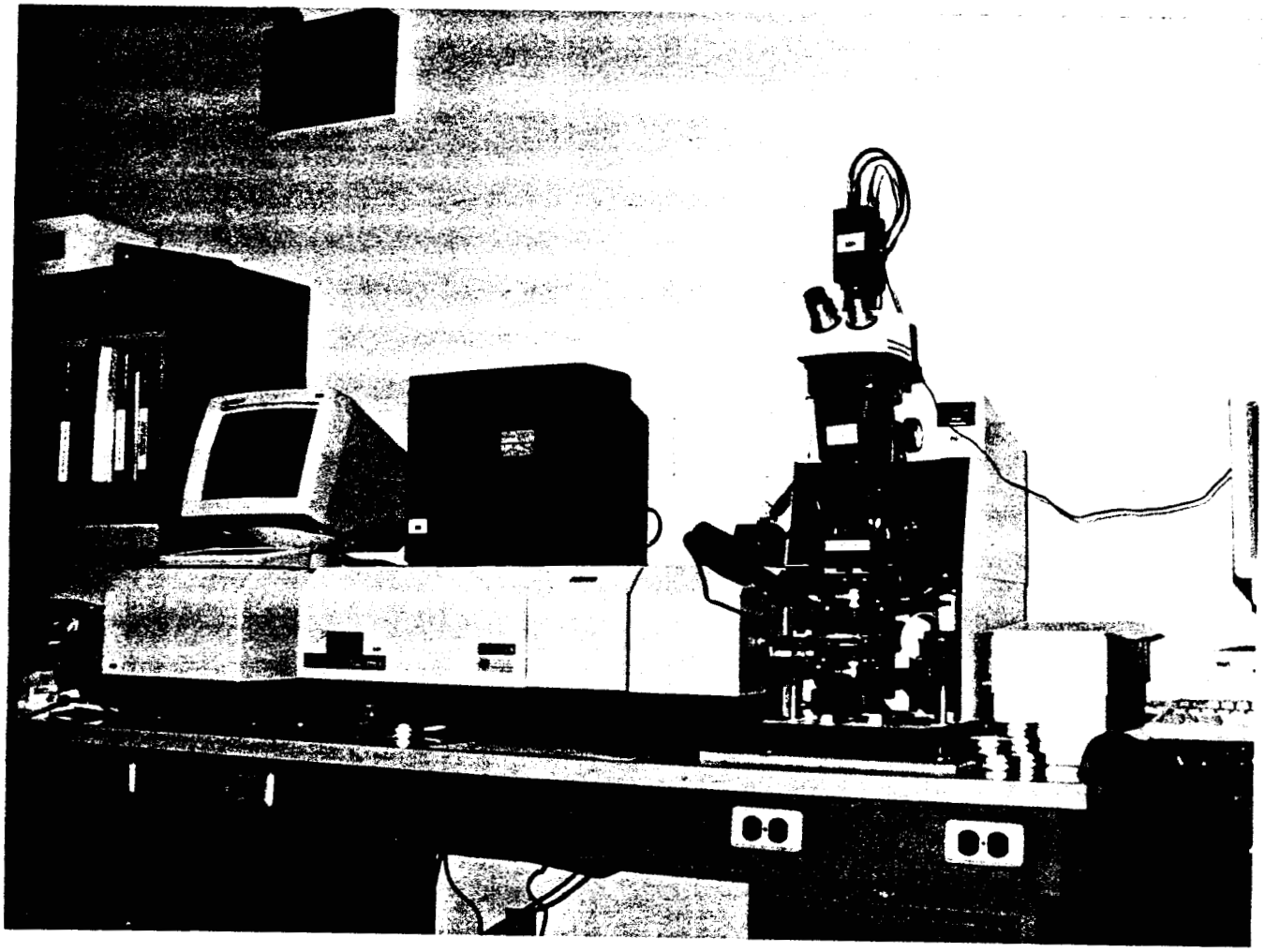
LAMINAR FLOW INOCULATION CHAMBER



MULTIPURPOSE MICROSCOPE WITH CAMERA

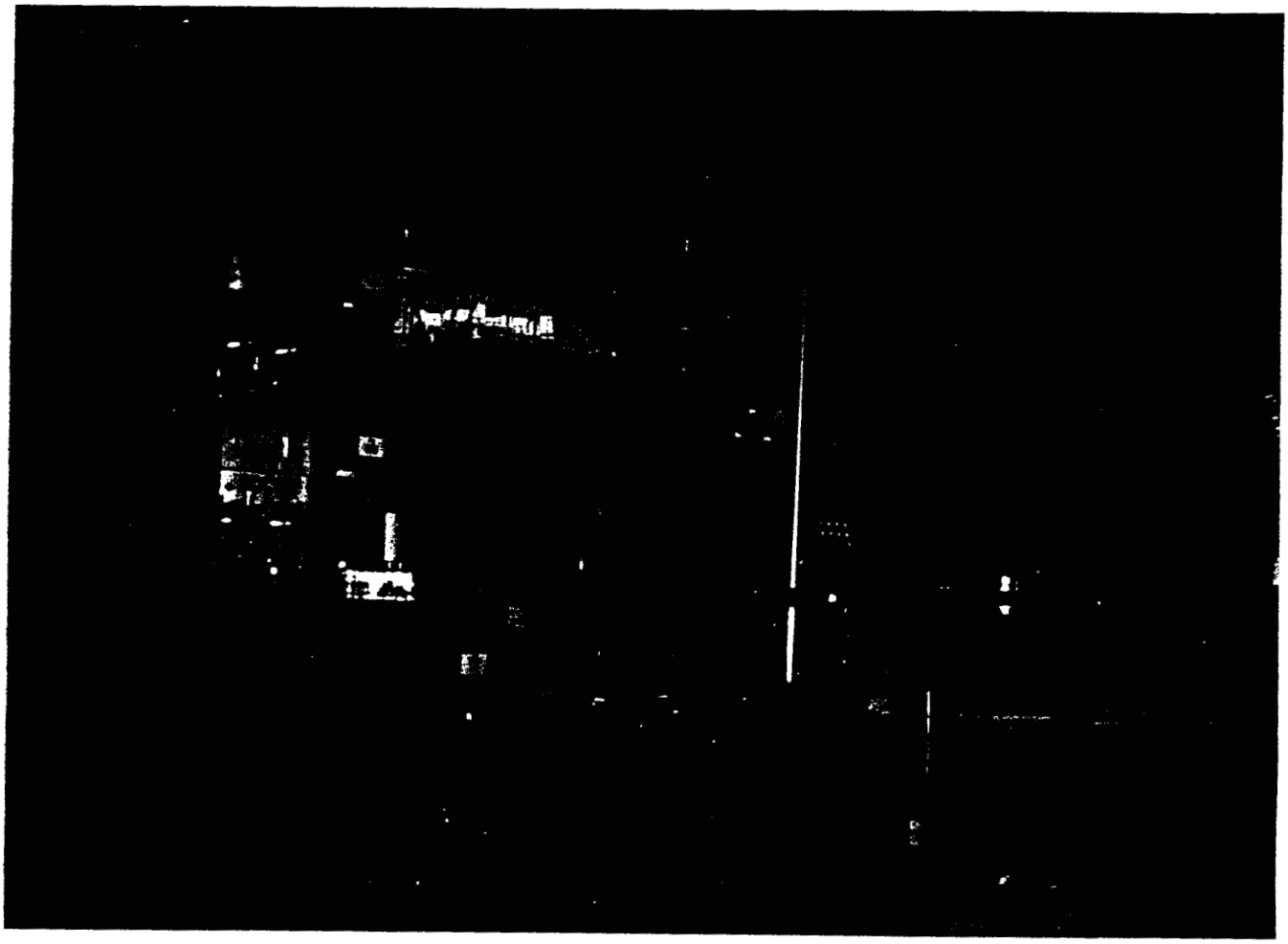


FT-IR MICROSCOPE



INFRARED SPECTROPHOTOMETER

PICTURE 4A
THERMAL ANALYSIS SYSTEM

PICTURE 4B

INSTRUMENTATION FOR HIGH PERFORMANCE LIQUID CHROMATOGRAPHY