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FINAL REPORT
TESTS ABLE AND BAKER

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Director
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VOLUME 2
PHOTOGRAPHIC RECORD

DIRECTOR OF SHIP MATERIAL
JOINT TASK FORCE ONE
OPERATION CROSSROADS

[redacted] 1948

[redacted]

REG. №

GROUP-3
Downgraded at 12 year intervals;
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11 JAN 1965

DIRECTOR OF SHIP MATERIAL

~~JOINT TASK FORCE~~ ONE

OPERATION CROSSROADS

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SHIP PREPARATION AND TARGET INSPECTION

[redacted]

[redacted]

PART VI, [redacted]

PHOTOGRAPHIC RECORD

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Director
Defense Atomic Support Agency
Washington, D. C. 20301

16 December ~~1946~~.

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Captain, U. S. Navy,
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[redacted]

REG. NO._____

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TEST ABLE

TEST BAKER

PART VI

PHOTOGRAPHIC RECORD

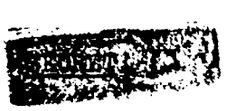
Section I - INTRODUCTION.

1. The purpose of this photographic record is to present visually the damage to electronic equipment from each test and to illustrate conditions described and analyzed in the report.

2. Photographs of selected electronic equipment installations aboard the target vessels were taken before Test ABLE, but only these which best illustrate comparisons of pre and post test conditions of units were chosen for this record. Post test photographs were taken only where damage was incurred. Where there was repetition, representative photographs were chosen to show typical damage. Additional photographs are included in the supporting files.

3. All pictures are mounted with short dimension across the page to allow maximum enlargement. Bottom of picture is either at bottom of page or along right margin.

4. Approximate ranges and bearings from the explosion are indicated for each ship.



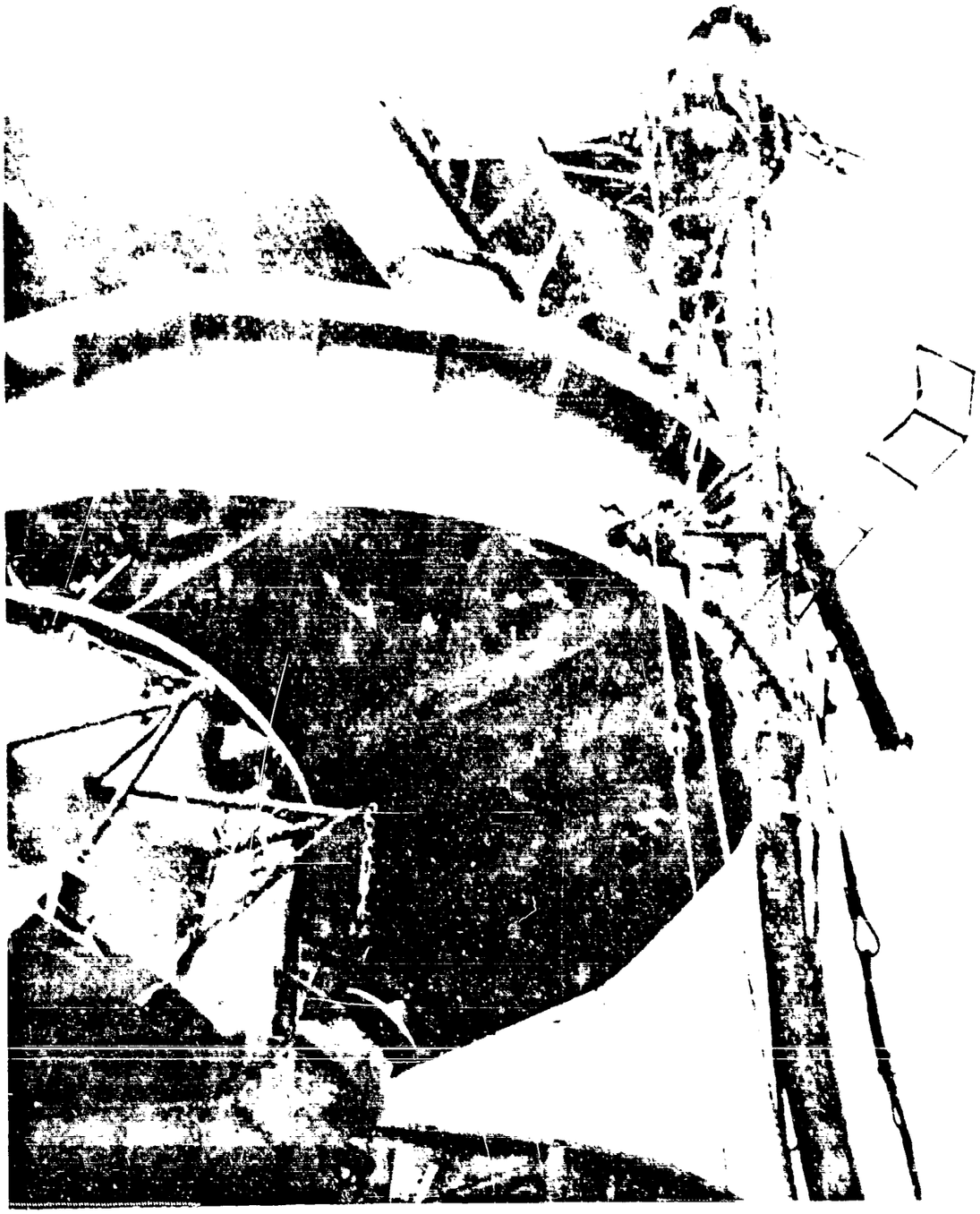
TEST ABLE

U.S.S. ARKANSAS (BB33)

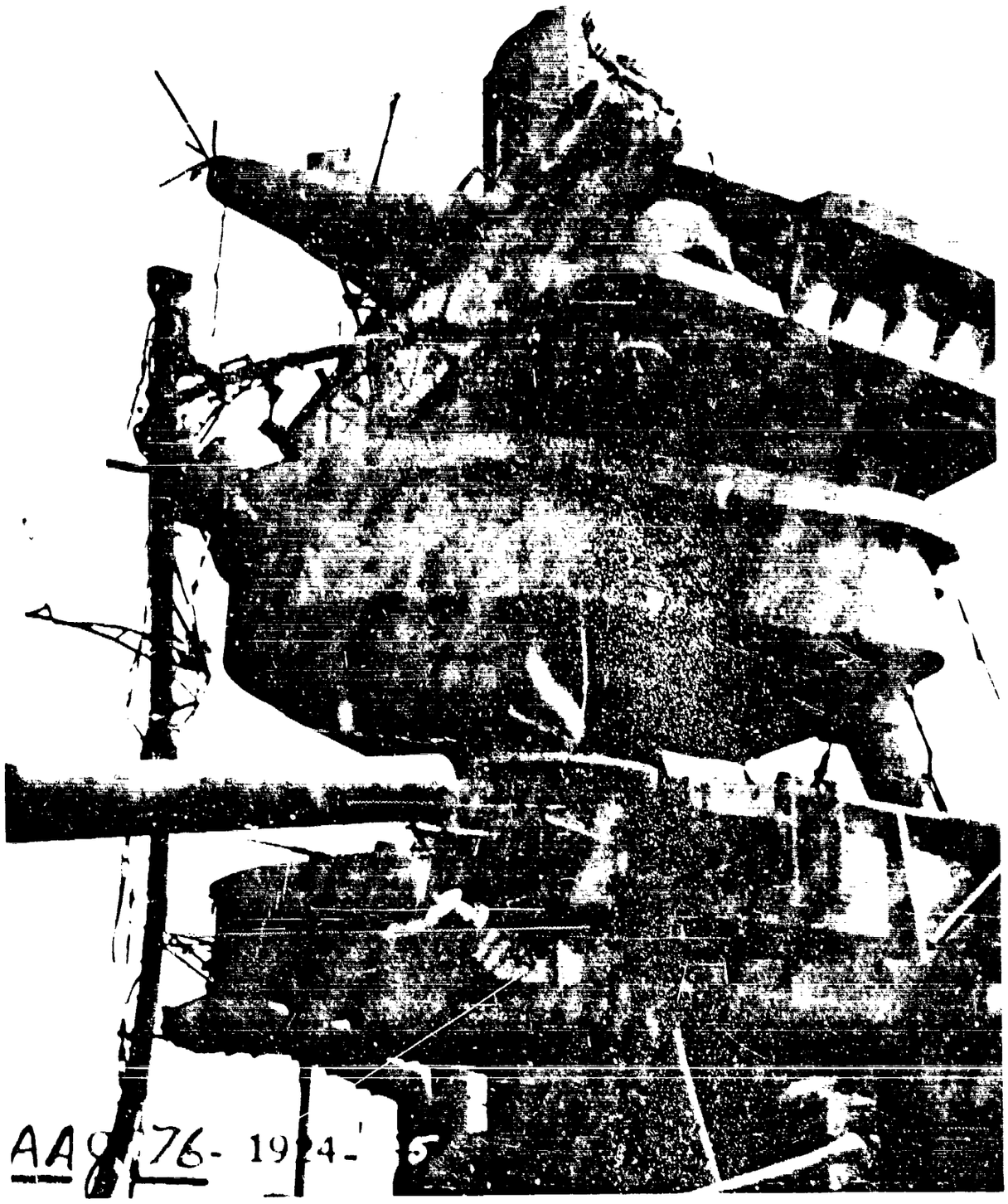
Range: 600 yards Bearing: 050°

Very heavy damage was sustained by this ship because of its proximity to the explosion center. Photographs illustrate the general shambles in which the topside of the ship was found.

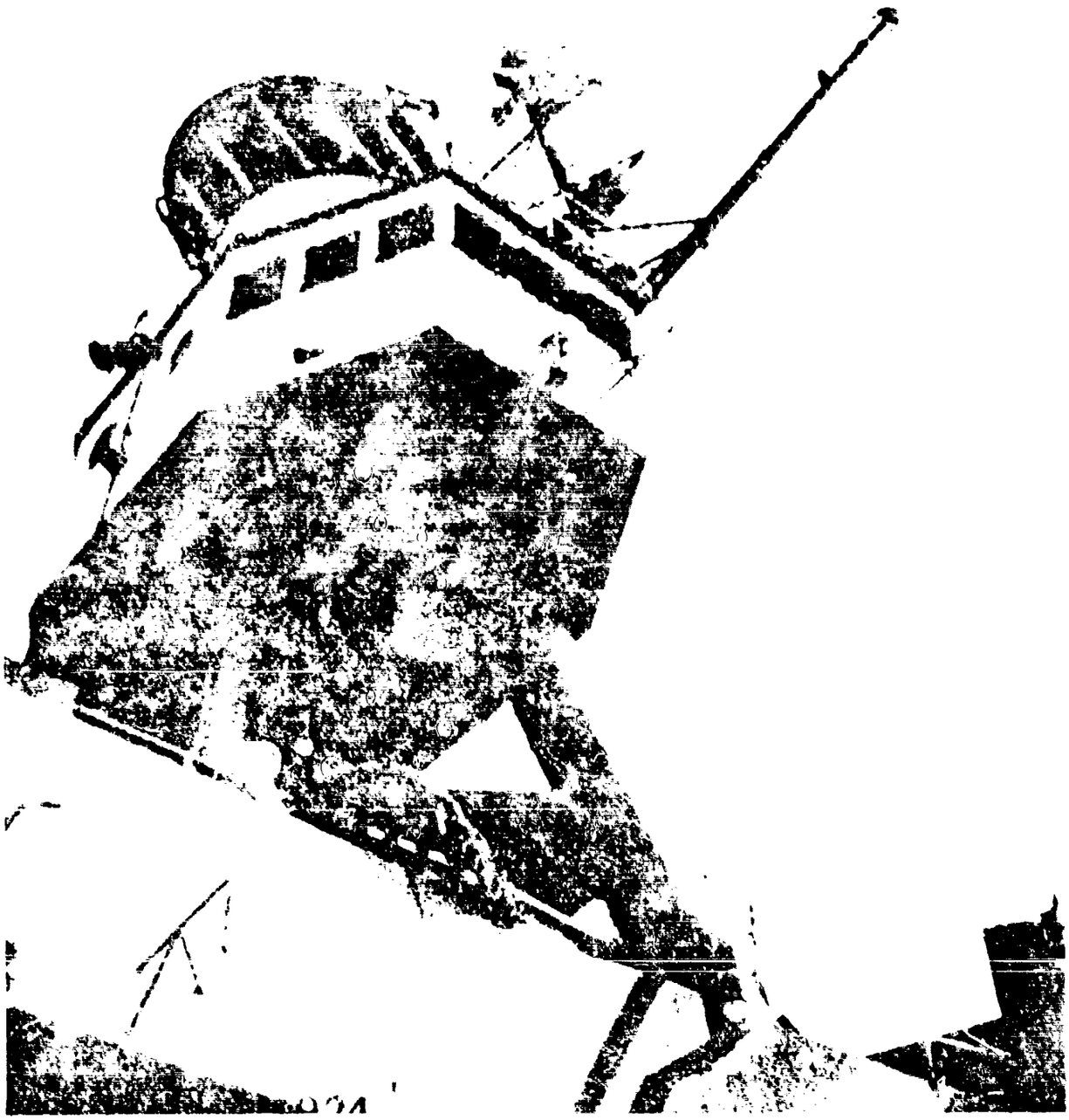
Broken radar masts, damaged antennas and exposed equipment give a good indication of the effect of the explosion at this distance.



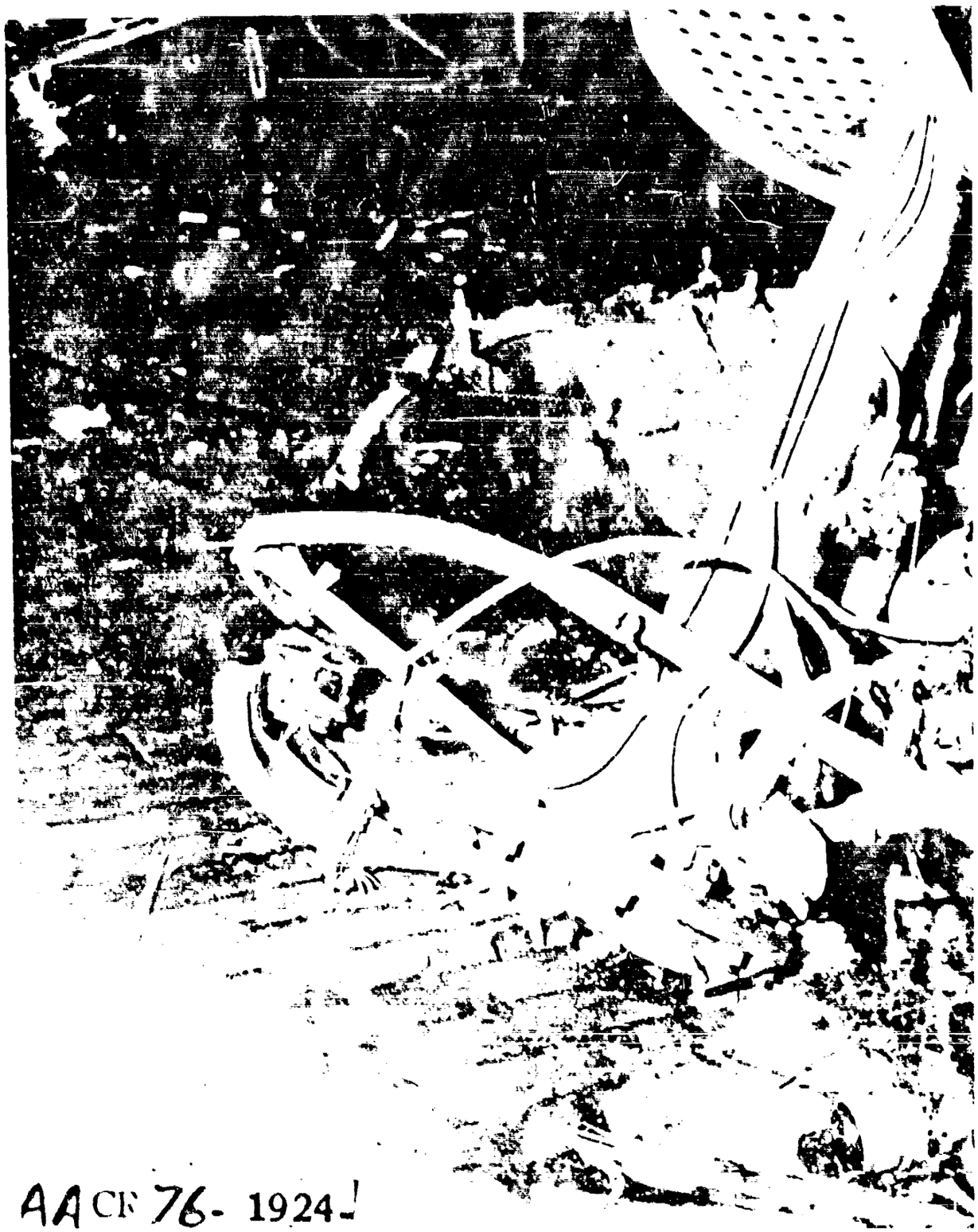
POST ABLE - MAINMAST AND SUPERSTRUCTURE. General view of damage. Note broken insulators (arrows).



POST ABLE - MAIN MAST AND SUPERSTRUCTURE. View of general overall damage to antennas and other equipment.



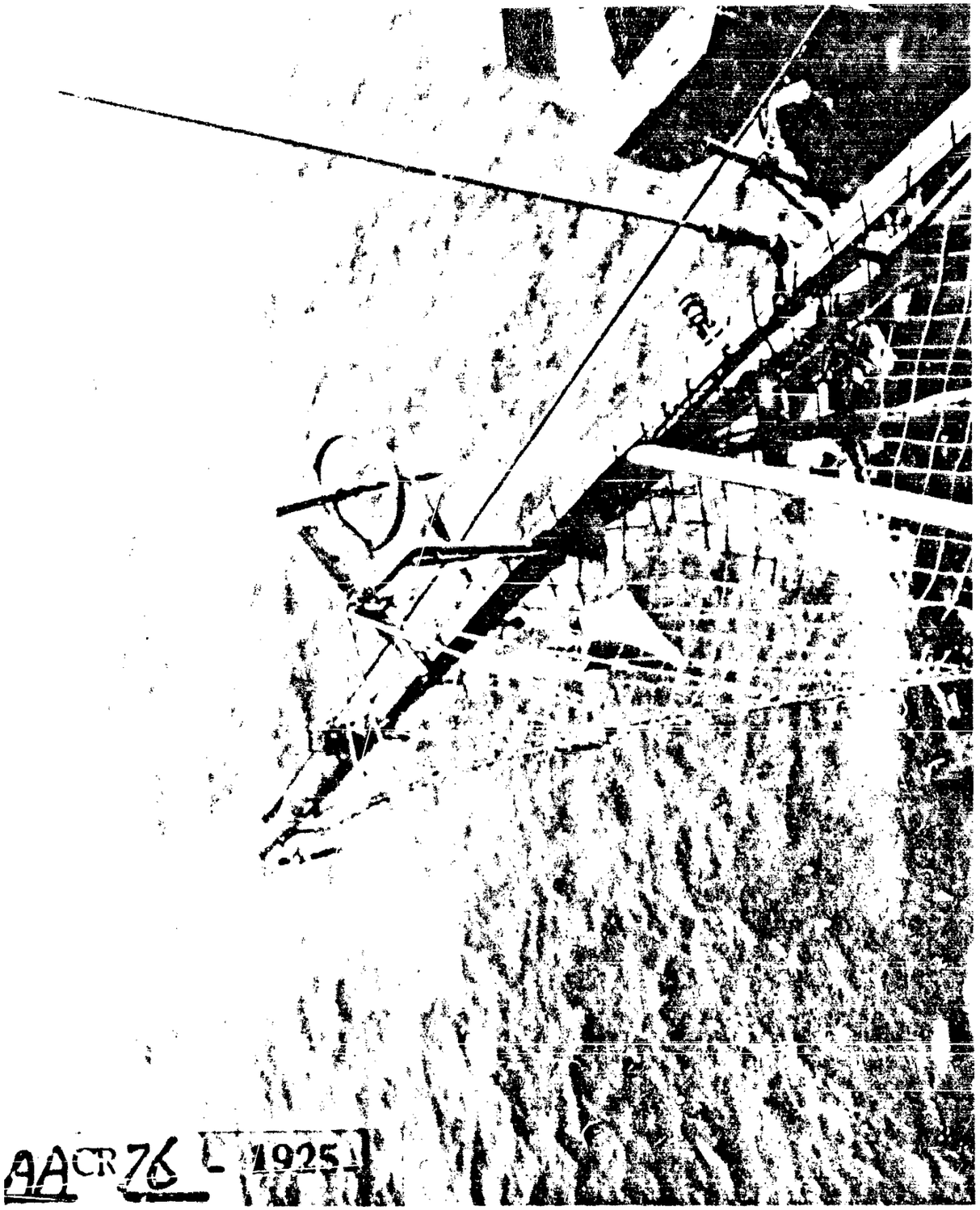
POST ABLE - FORWARD SUPERSTRUCTURE AND FORECAST. View of general damage caused by test.



AA CF 76- 1924-!

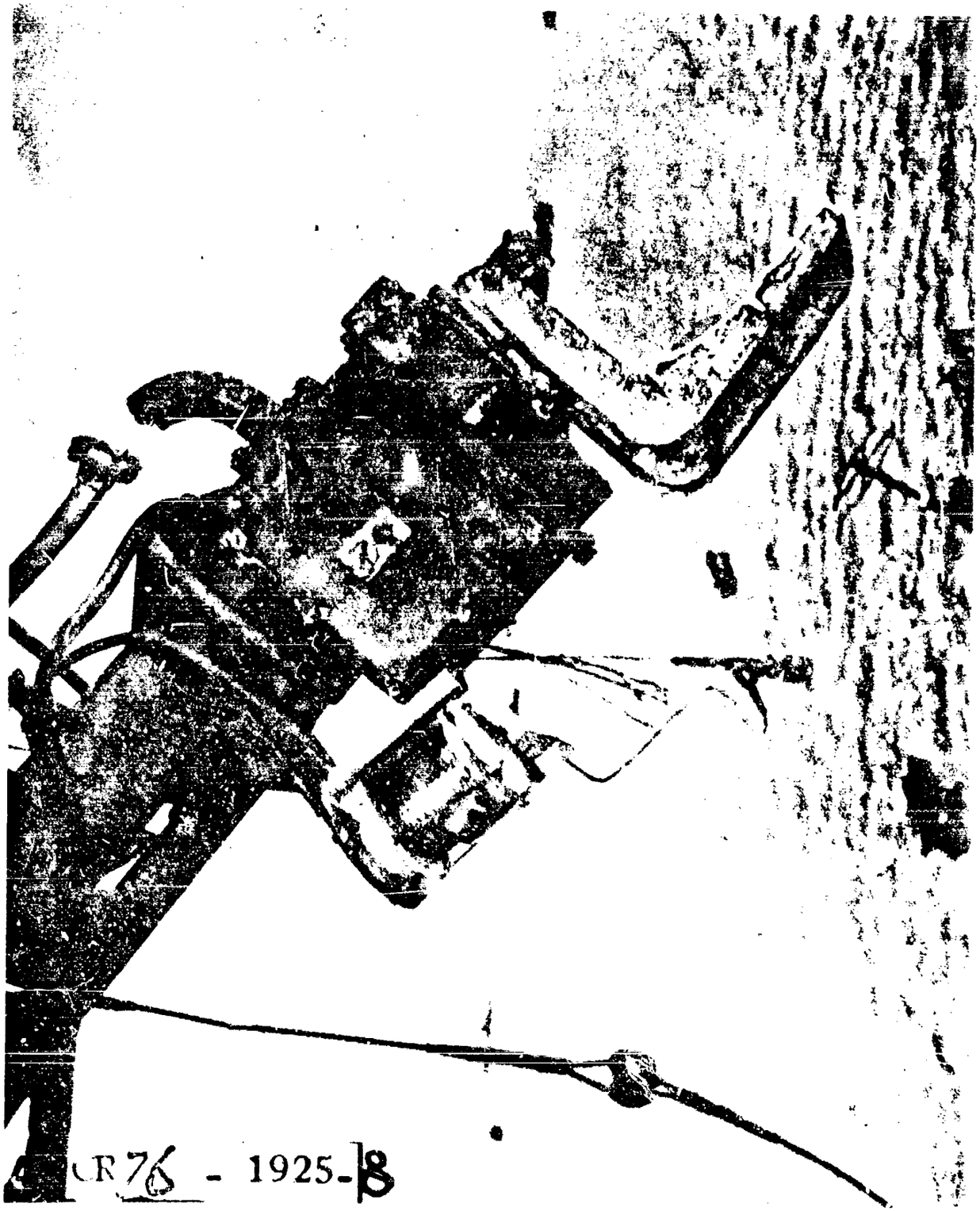
POST ABLE - TOP OF MAINMAST. The SC antenna was demolished when the mainmast folded, allowing the antenna to strike the deck.

POST ABLE - TOP OF MAINMAST. The top of mainmast hit the deck and smashed the SG radar antenna.

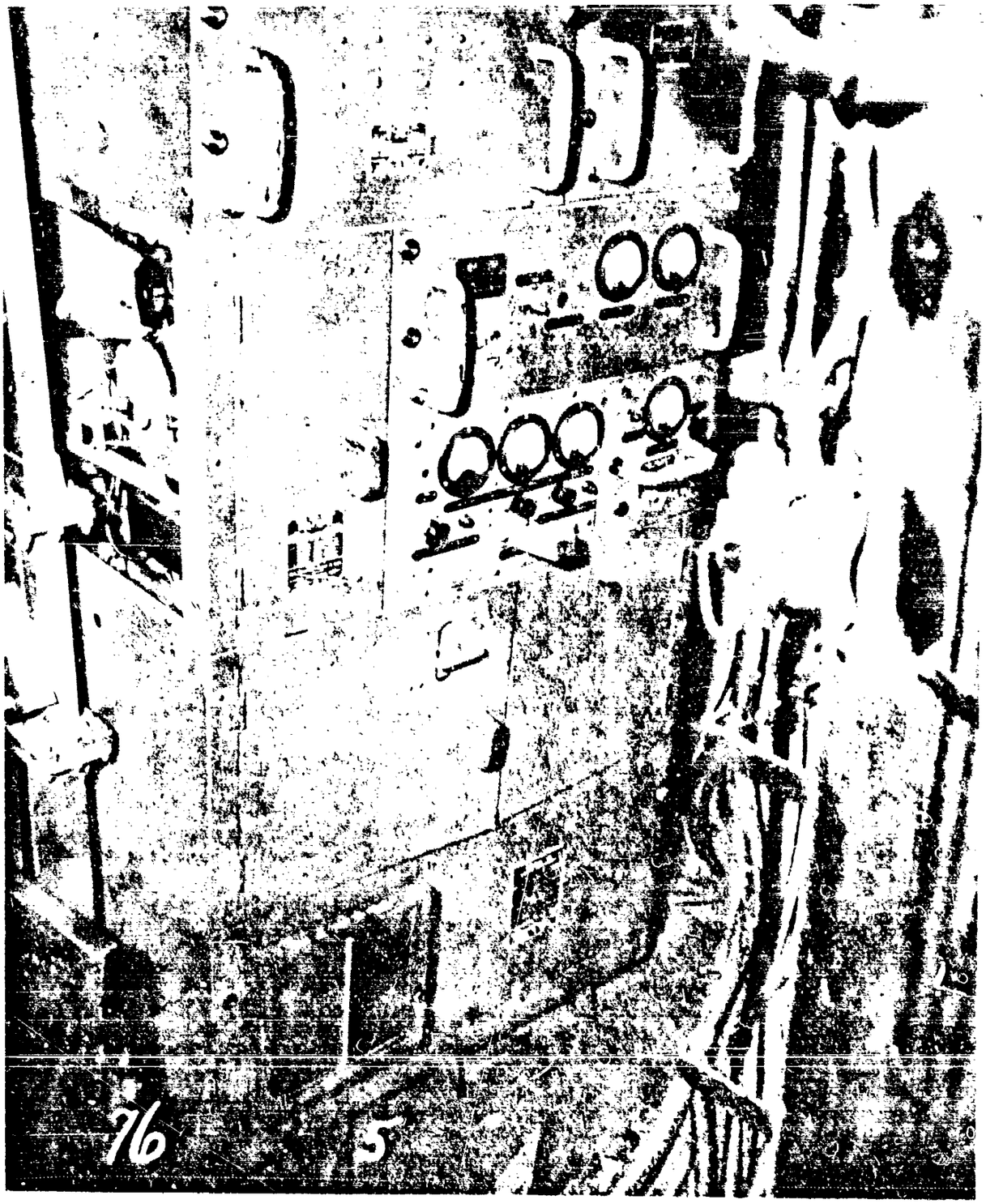


AACR 76 [1925]

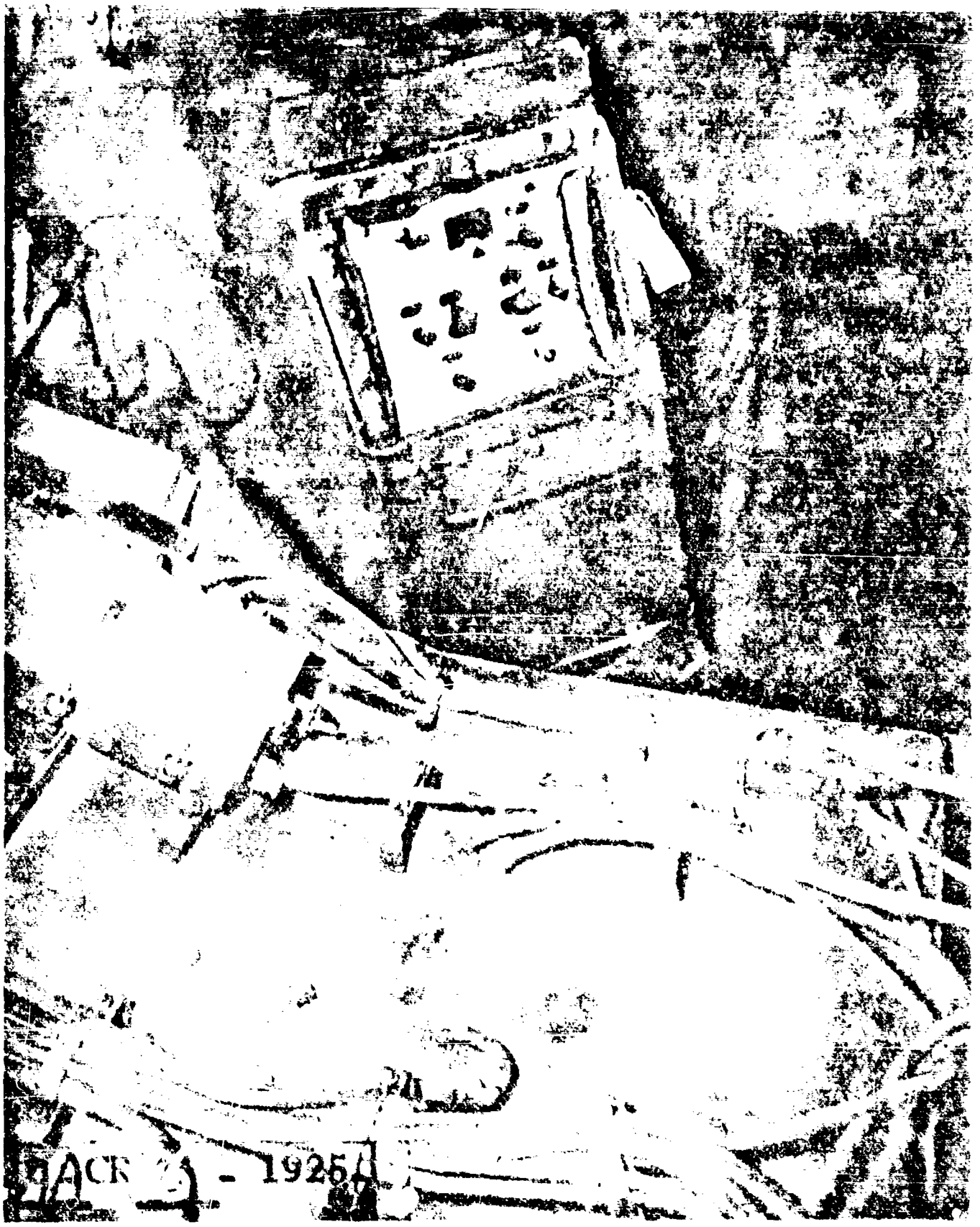
POST ABLE - ANTENNAS ON STARBOARD YARDARM. The TBS antenna was severly damaged. The BK antenna tilted slightly forward but was otherwise undamaged.



POST ABLE - FORWARD SG ANTENNA. This is one of the few SG antennas which did not survive the direct blast on test. One side of the reflector and the gooseneck nozzle were broken and missing. The waveguide at the entrance to the antenna was also broken.

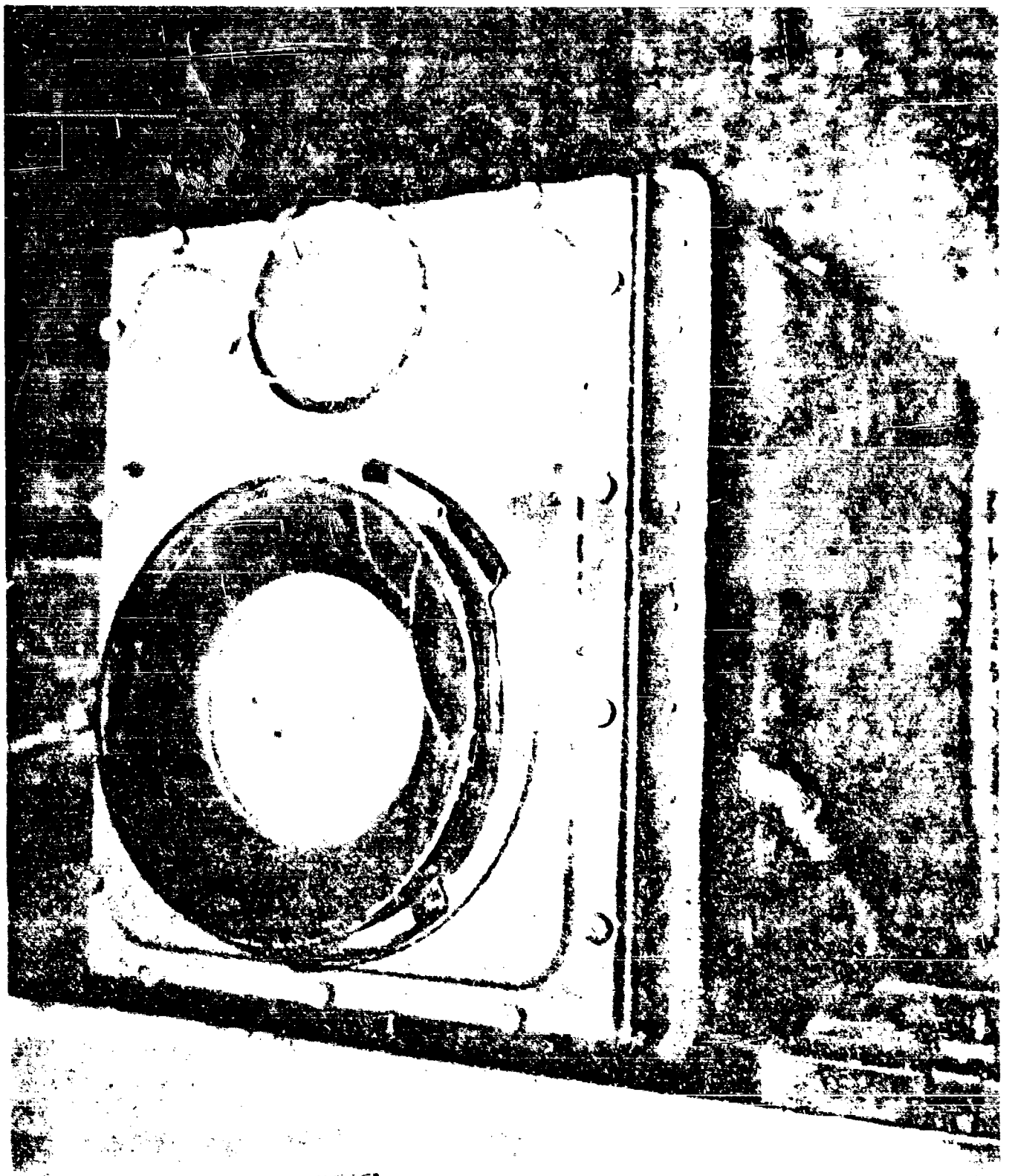


POST ABLE - FORWARD SG TRANSMITTER. The damage to this unit was greater than that apparent here. The bulkhead tilted the transmitter forward and the frame was so distorted that the transmitter doors would not close and drawer type units would not slide. Cables running up the side of the unit were torn and several were open. The wave guide was distorted causing crystal protector, (a) to jam.



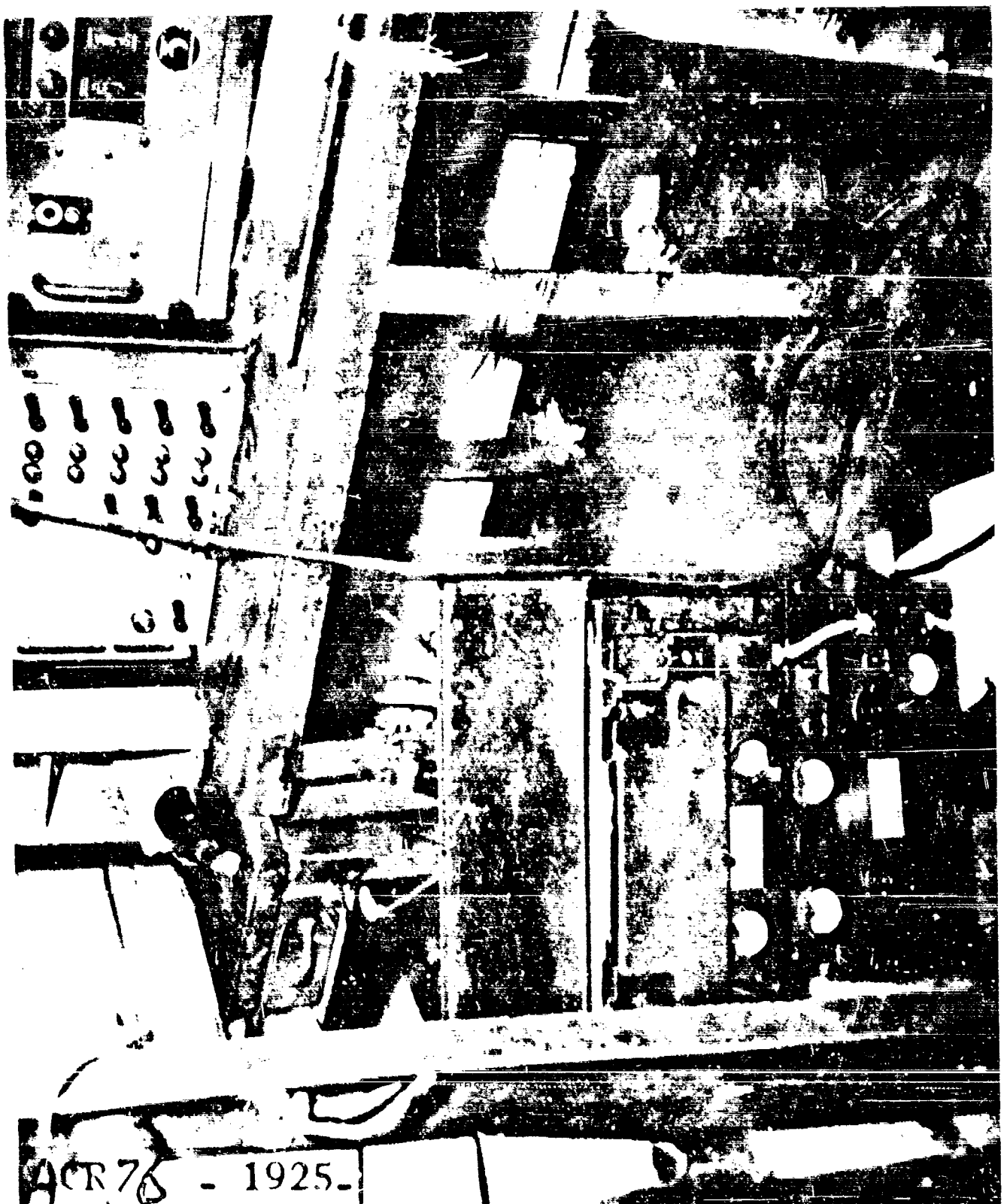
POST ABLE - VD-2 REMOTE PPI. The main physical damage suffered was caused by the heavy plate (shown in foreground) which fell and hit the unit.

POST ABLE - VD-2 REMOTE PPI. This was one of the few equipments which were exposed to severe blast and radiation in Test Able and were returned to NRL for analysis.

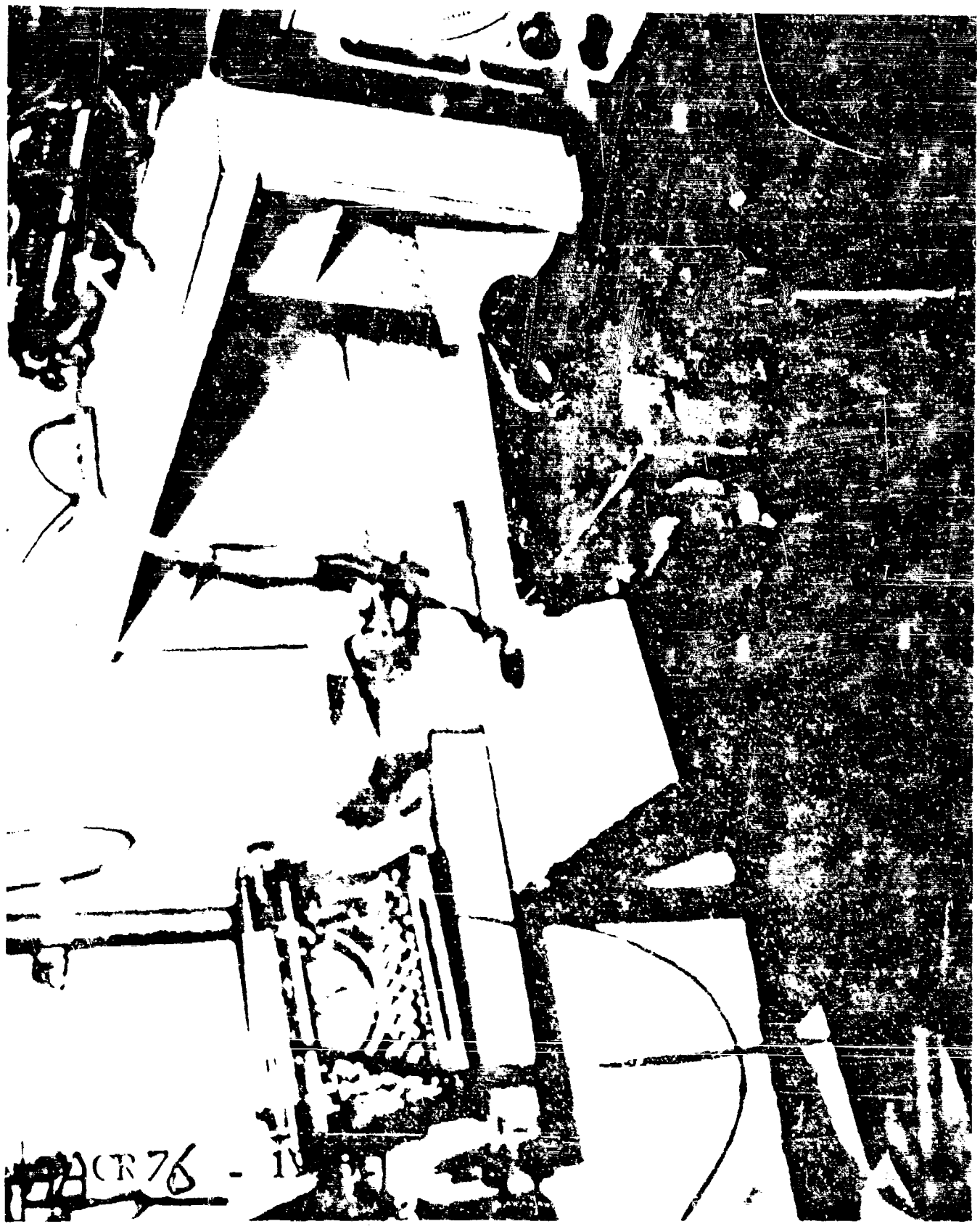


NAVCAD - 1887

POST ABLE - VD-2 PPI REPEATER. The plastic cover over the PPI tube was broken. This had no effect on the operation of the equipment as the tube itself was not broken.

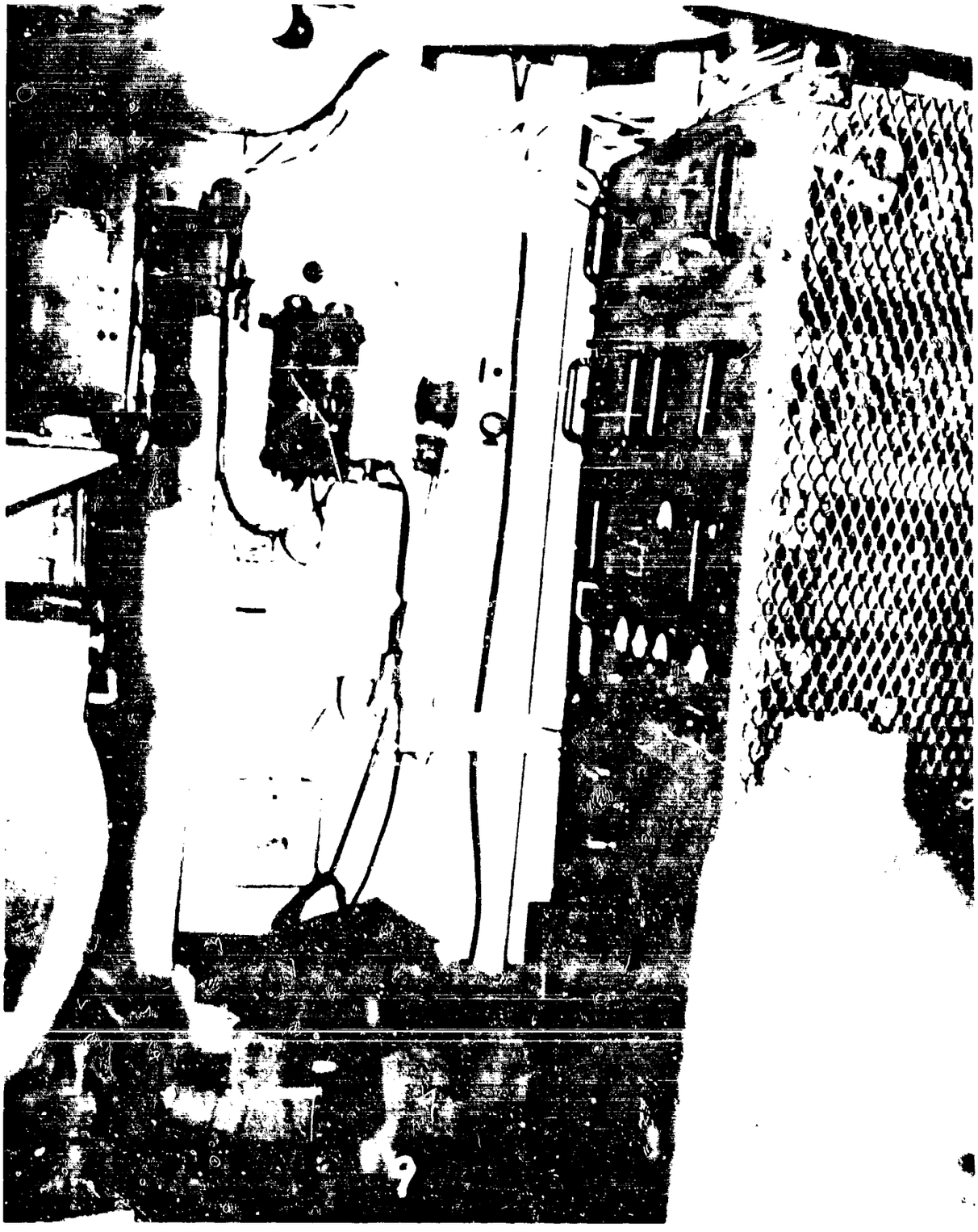


POST ABLE - TBS RECEIVER-TRANSMITTER. This unit sheared its mounting bolts and was hurled to the deck. The two sections became slightly separated. Besides the broken meter in the front panel there was considerable serious internal damage.



POST ABLE - TBS. Arrow shows the main terminal board of the TBS equipment. This remained on the shelf as the TBS was ripped away and hurled to the deck.

POST ABLE - TBS. View showing bottom of the TBS and broken wires which were from the terminal board.



POST ABLE - AFTER RADAR TRANSMITTER ROOM. In spite of having been severely shaken up, all individual units here were functionally operable. However all antennas for these equipments were swept away with the mainmast.

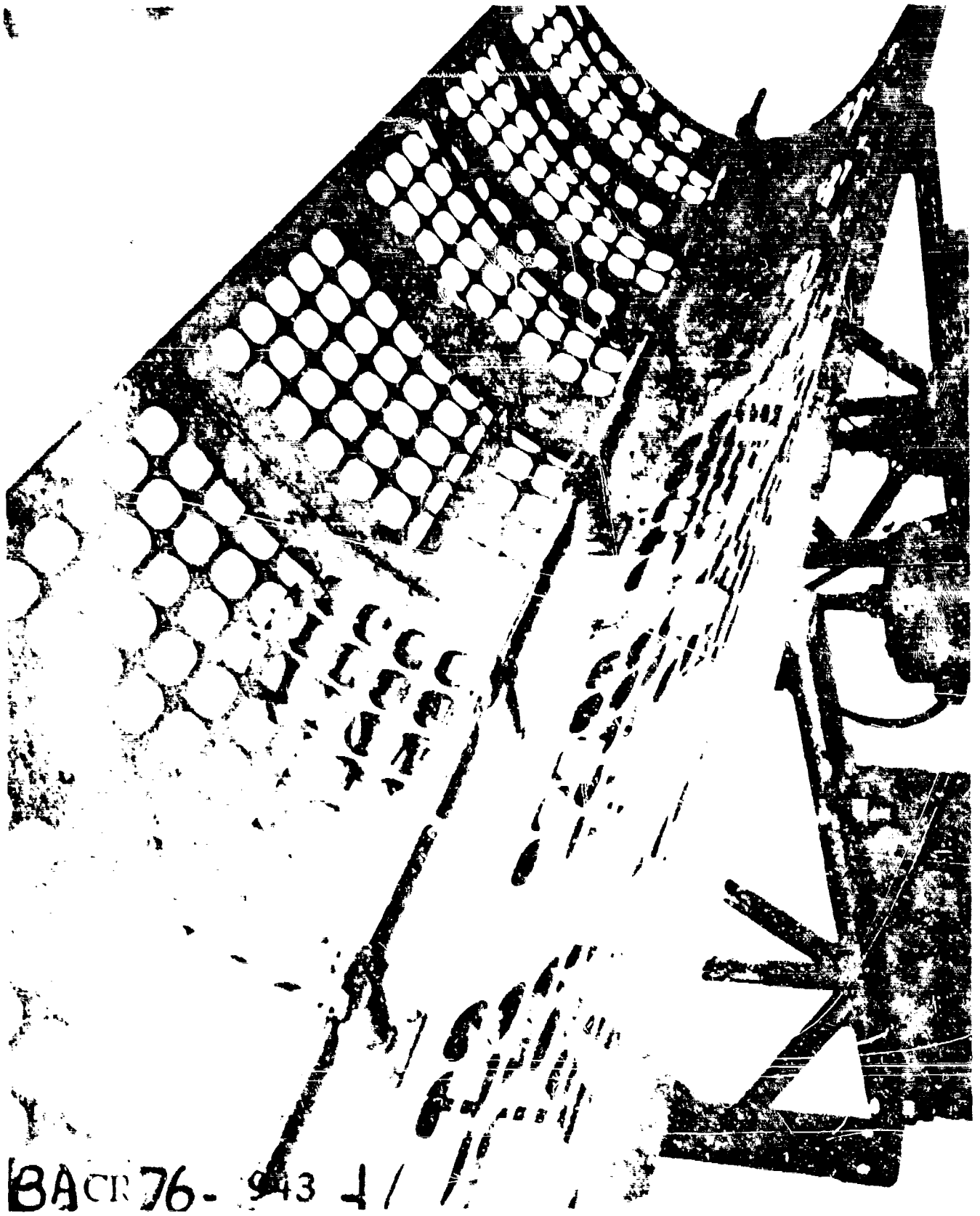
TEST ABLE

U.S.S. NEW YORK (BB-34)

Range: 1700 yards Bearing: 110°

The NEW YORK suffered very light damage.

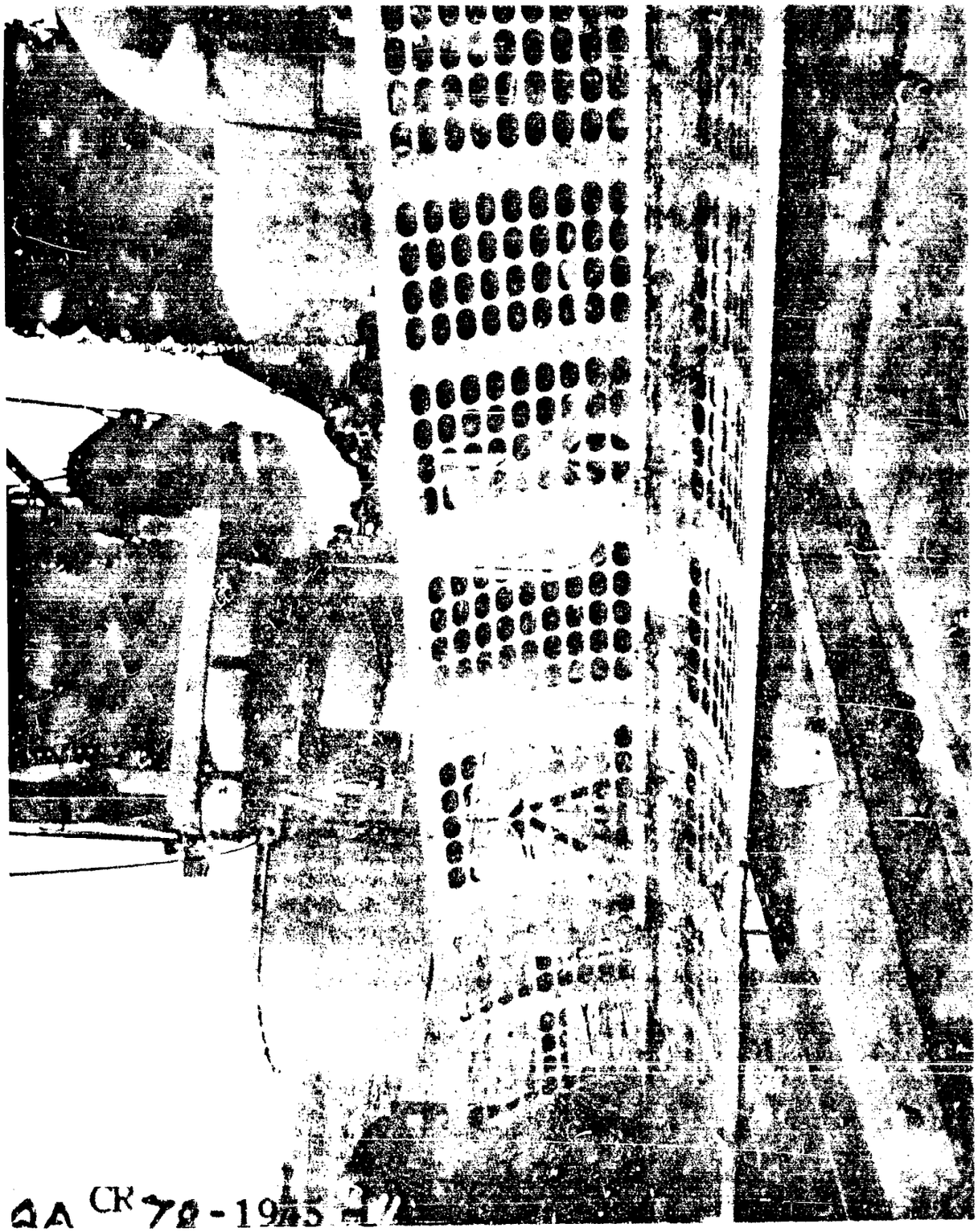
These pictures of the Mark 3 Mod. 2 antenna show the most serious case of damage on board this ship. Other damage was of minor importance.



BACR 76- 943 1/

PRE ABLE - MK. 3 RADAR ANTENNA. Antenna on main battery director aft.

POST ABLE - AN/SPS-3 RADAR ANTENNA. Supporting framework failed completely as blast blew antenna from mount.



QA CK 79-1945-47

POST ABLE - MK 3 RADAR ANTENNA. Close up of antenna after it was blown off an fell two decks. The main damage was caused by the fall, the mounting being the only part that failed. If mounting had not failed antenna probably would have been blown apart.

TEST ABLE

U.S.S. NEVADA (BB-36)

Range: 600 yards Bearing: 105°

The NEVADA suffered heavy damage to electronic equipment in Test ABLE because of its proximity to the explosion.

The most serious damage was to antennas and to equipment adjacent to outside bulkheads in the superstructure.

An example of damage to equipment in the superstructure is shown in the picture of the RCM room. This is the most severe case of such damage found on this ship.

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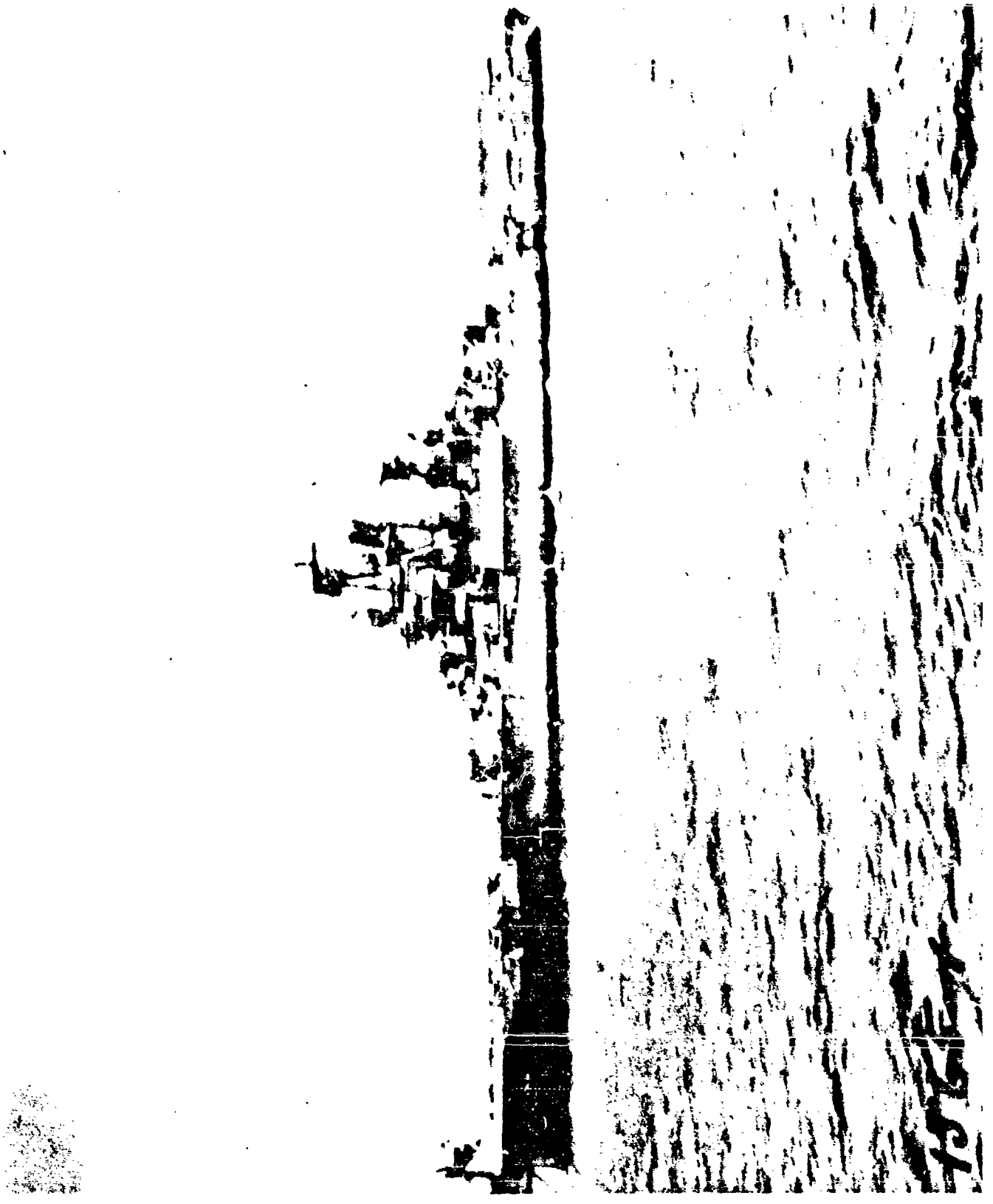
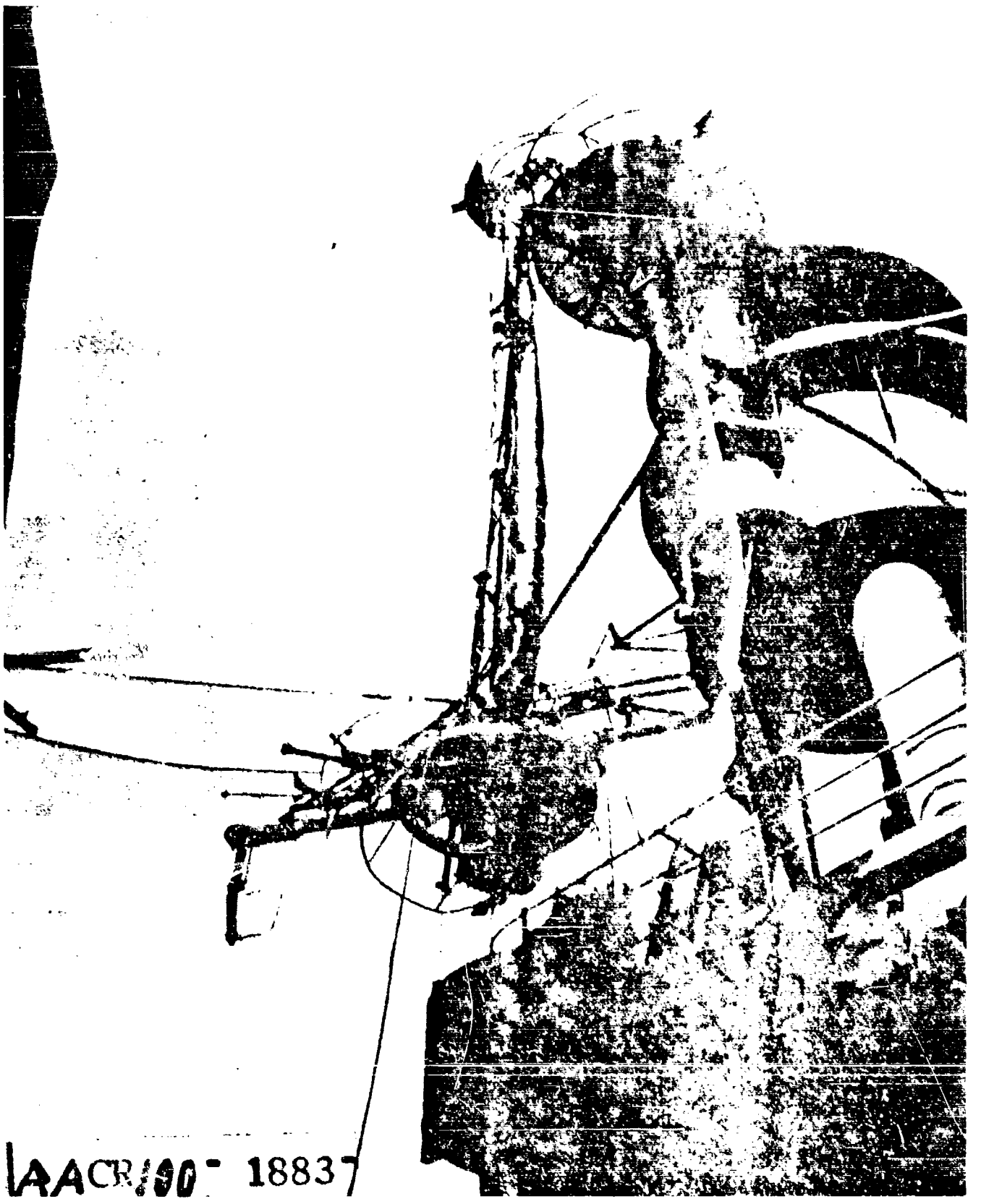


PRE ABLE. General view showing antenna array.

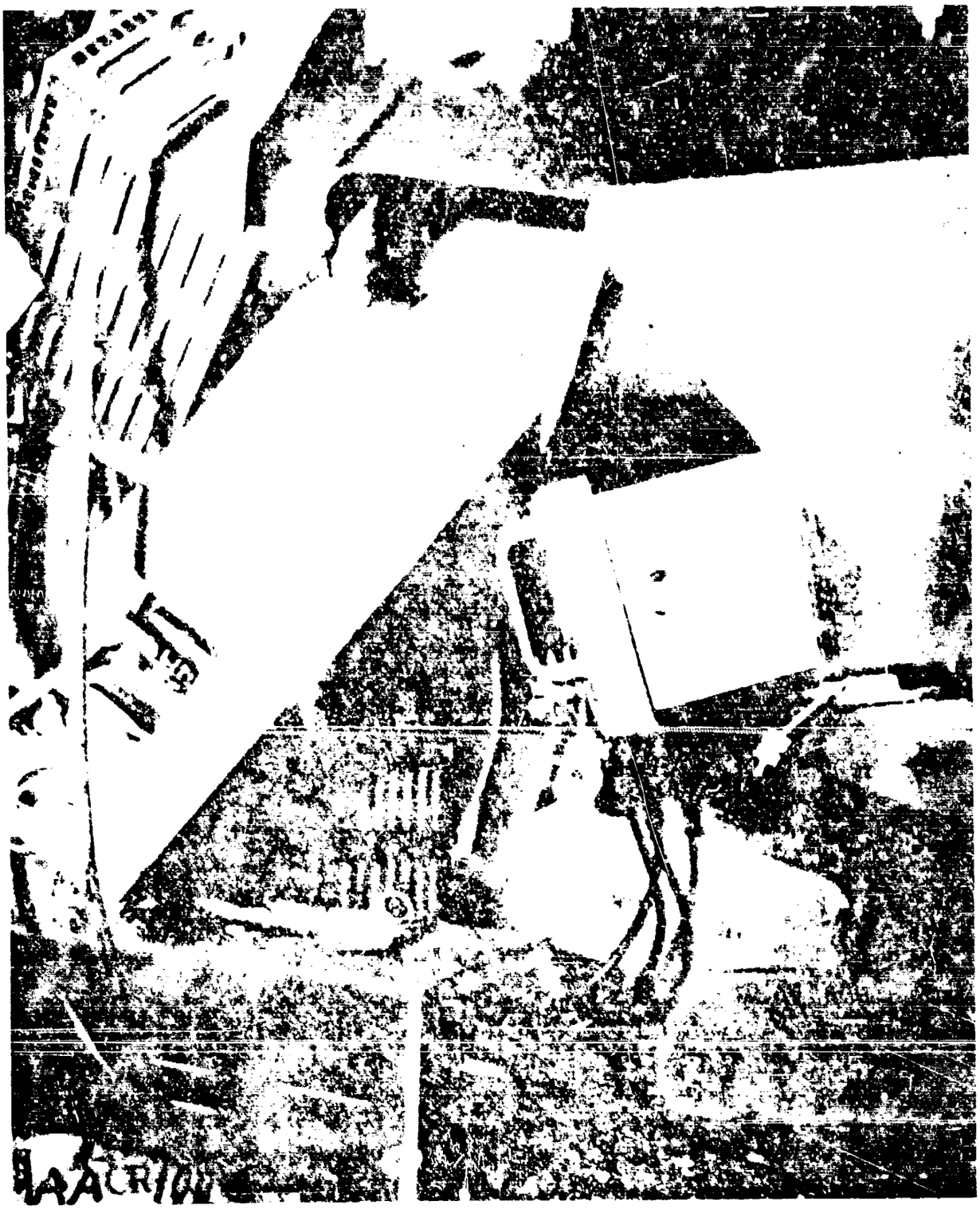
POST ABLE. General view. Note destruction of all antennas.



LAACR/90 - 18837

POST ABLE - TOP OF MAINMAST. Blown forward breaking reflector off of SG antenna. Mast was later cut down to remove hazard

POST ABLE - FORWARD SG ANTENNA. Fell to deck and shattered when top of foremast was blown off.

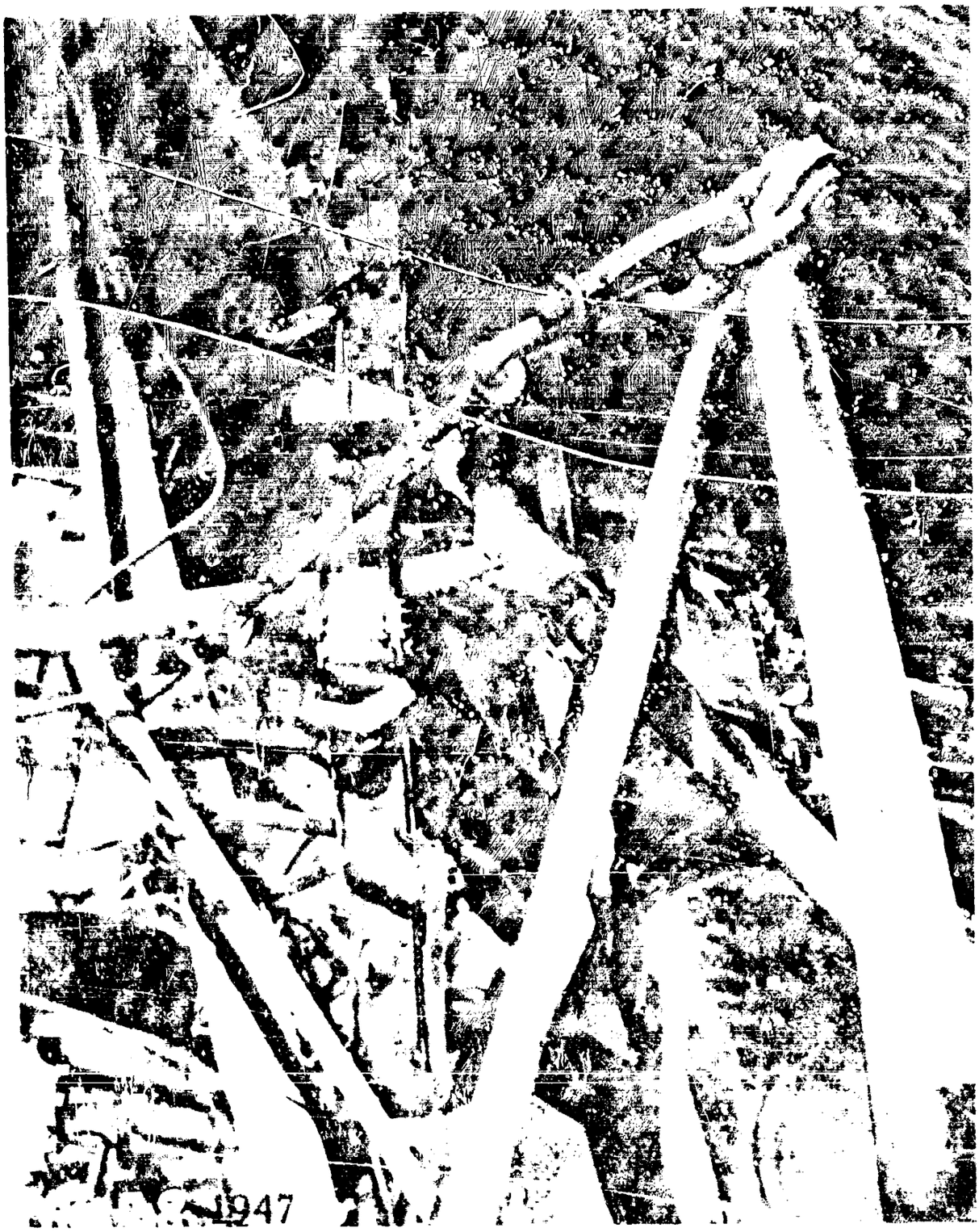


POST ABLE - RCM ROOM. Bulkheads caved in on both sides of room. Equipment was thrown from cases or ripped from mountings and thrown to deck. In no case did shockmounts separate at rubber, though bolts sheared and pulled through light metal of equipment covers or supporting brackets.

POST ABLE - RCM ROOM. Bulkheads caved in both fore and aft throwing all equipments from cases and shearing bolts.

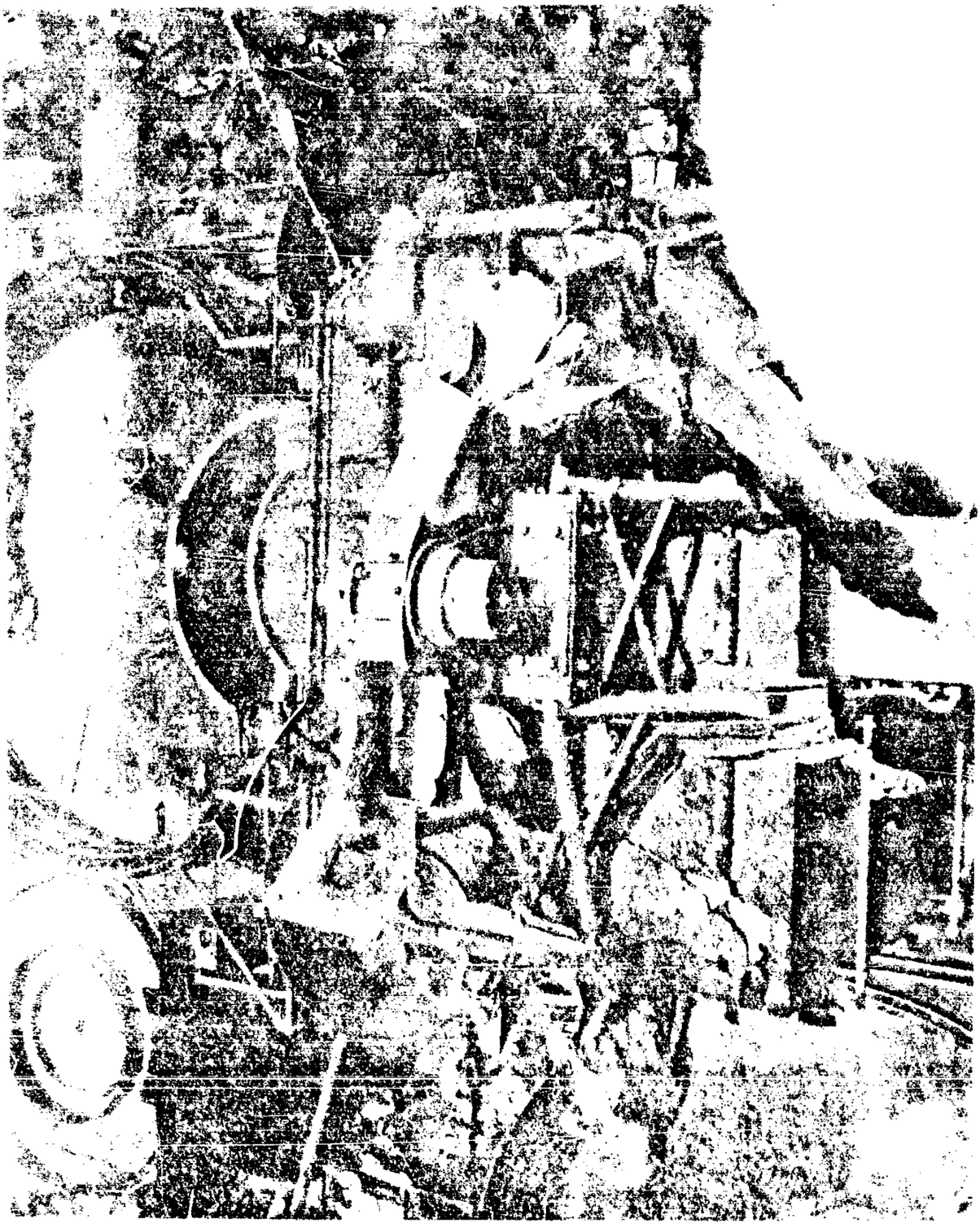
AAR [illegible]-1947

POST ABLE - MK 3 MOD 2 ANTENNA MOUNT AFT. Antenna was blown completely off.



POST ABLE - MK 3 ANTENNA MOUNT AFT. Part of Mk 3 antenna (A) which was blown off of mount.

POST ABLE - MK 3 MOD 2 INDICATOR. Knocked out of its case and found in this position.



POST ABLE - MK 12 AND 22 AFT. Remains of Mk 12 antenna mount.

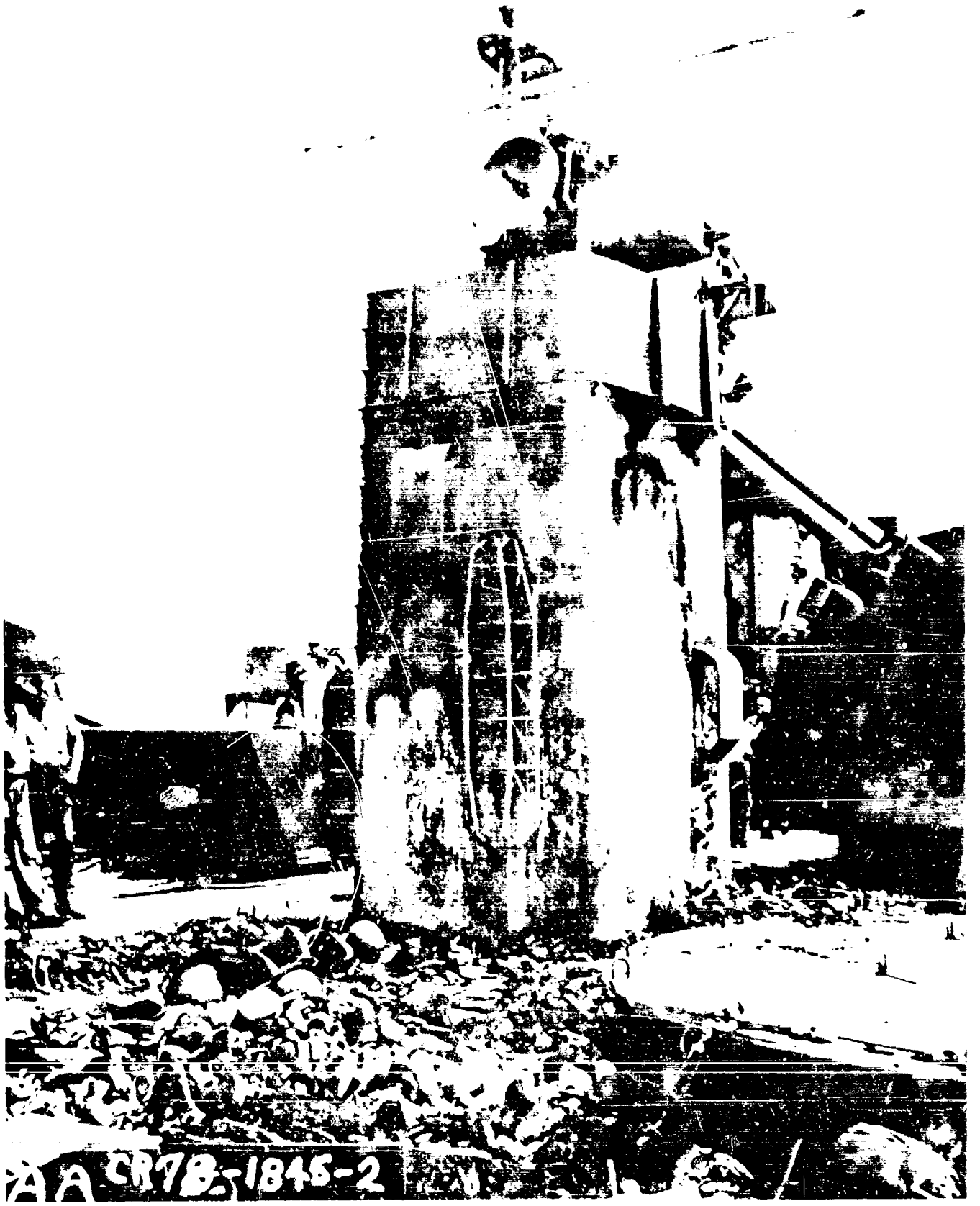
POST ABLE - MK 12 AND 22 AFT. Lobe switching assembly (A) with antenna coax and Mk 12 gear box assembly (B) lying in turret below sky 2 director. The Mk 12 antenna is lying below director.

TEST ABLE

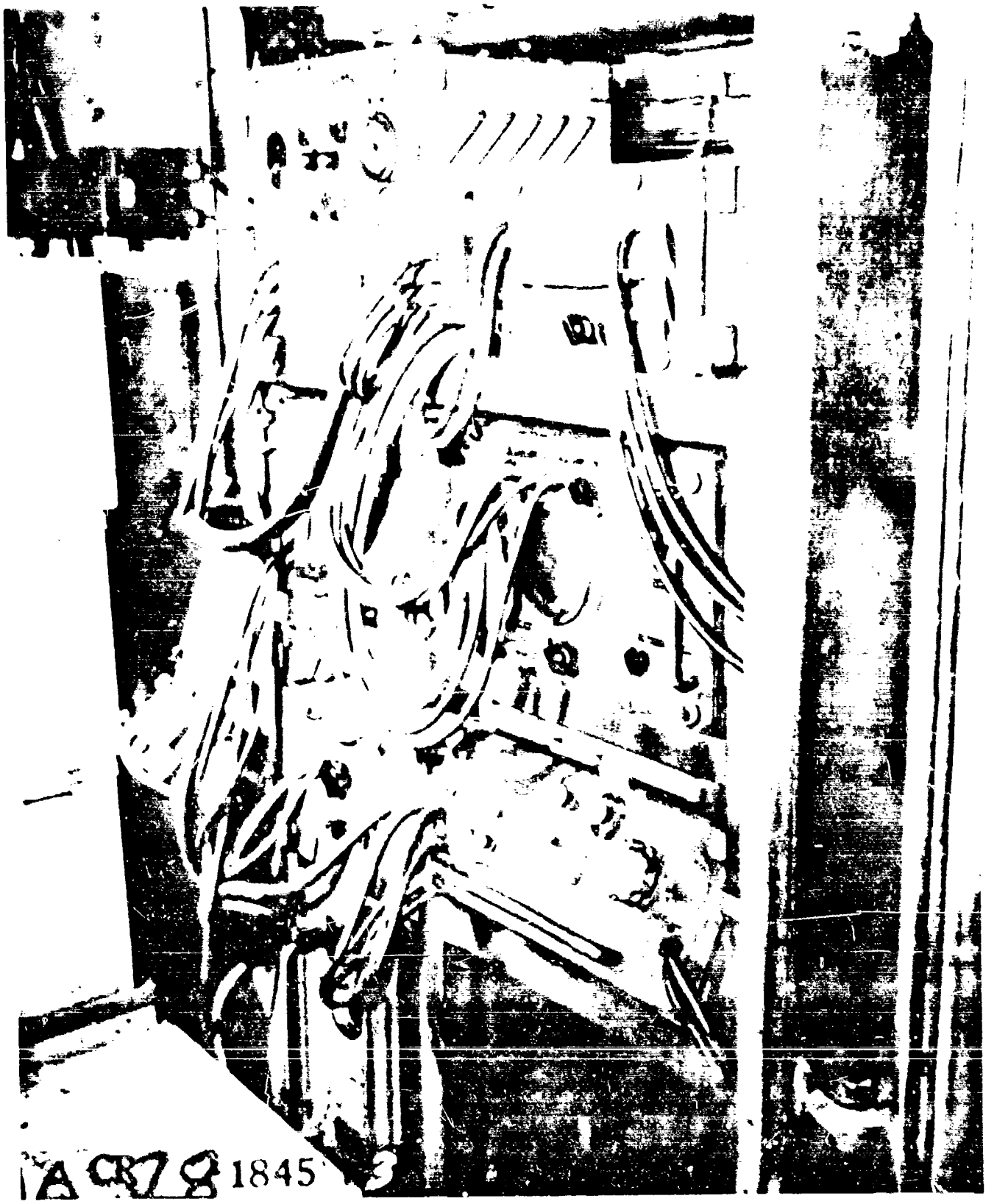
U.S.S. PENNSYLVANIA (BB-38)

Range: 1700 yards Bearing: 150°

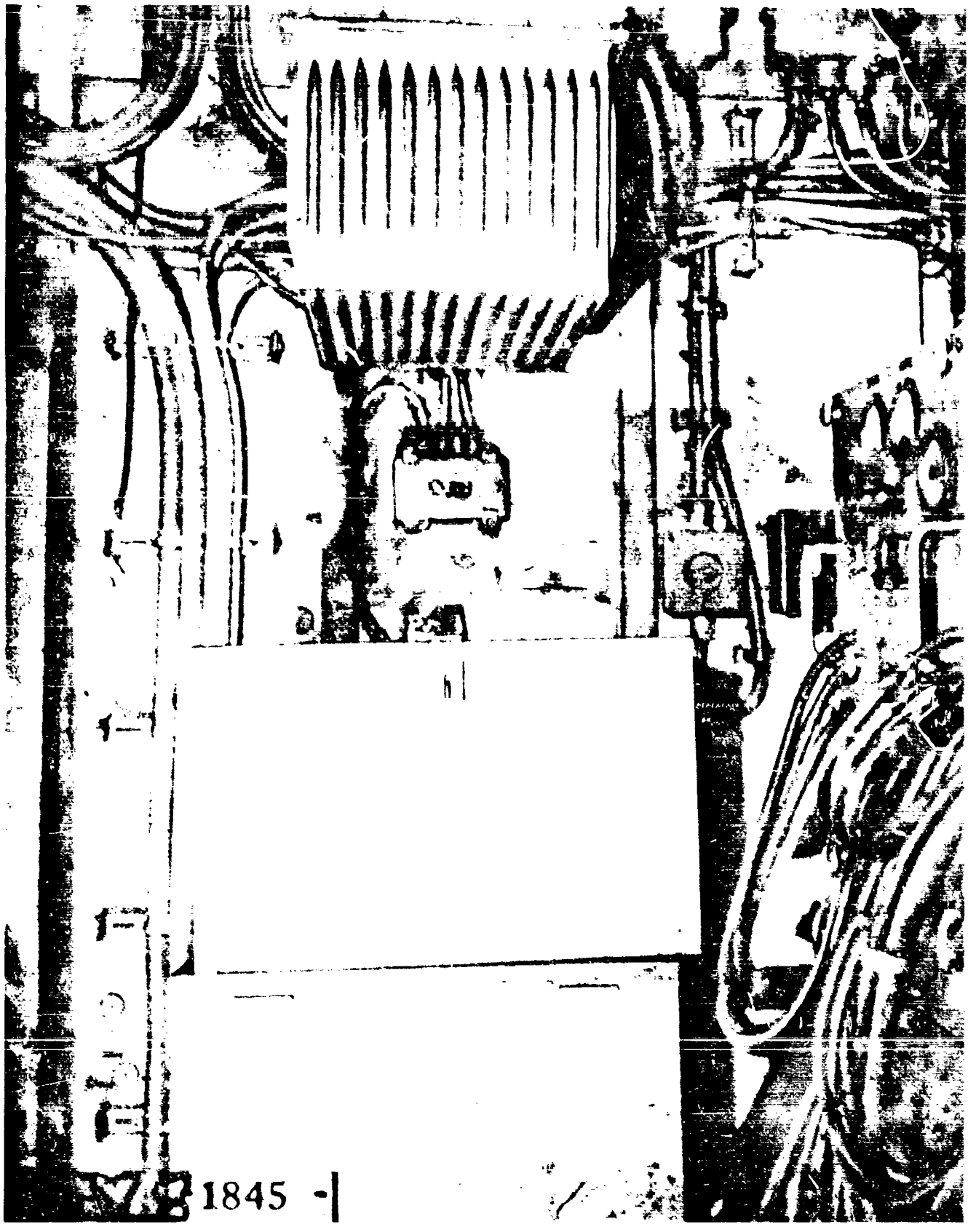
The damage aboard the PENNSYLVANIA was light. Fire from Army Quartermaster equipment exposed outside a radar compartment caused nearly all damage.



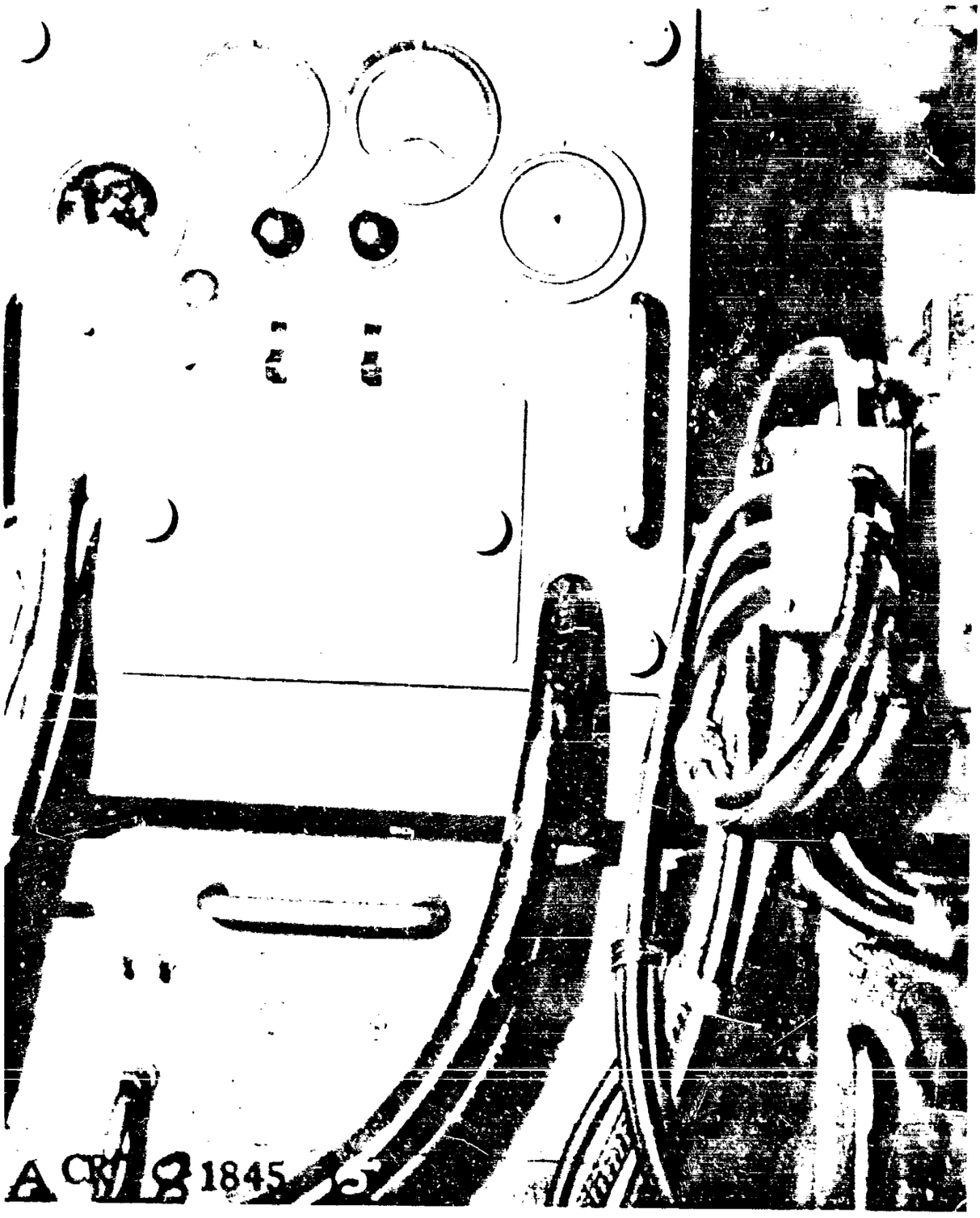
POST ABLE - DECKHOUSE CONTAINING MK 29 FIRE CONTROL RADAR. Radiation from blast set Army equipment on deck afire and burned outside of deckhouse. Heat caused damage to cables, melted tar out of transformers and smoked up equipment inside deckhouse. One meter was damaged. Equipment would probably have operated if cables had not failed.



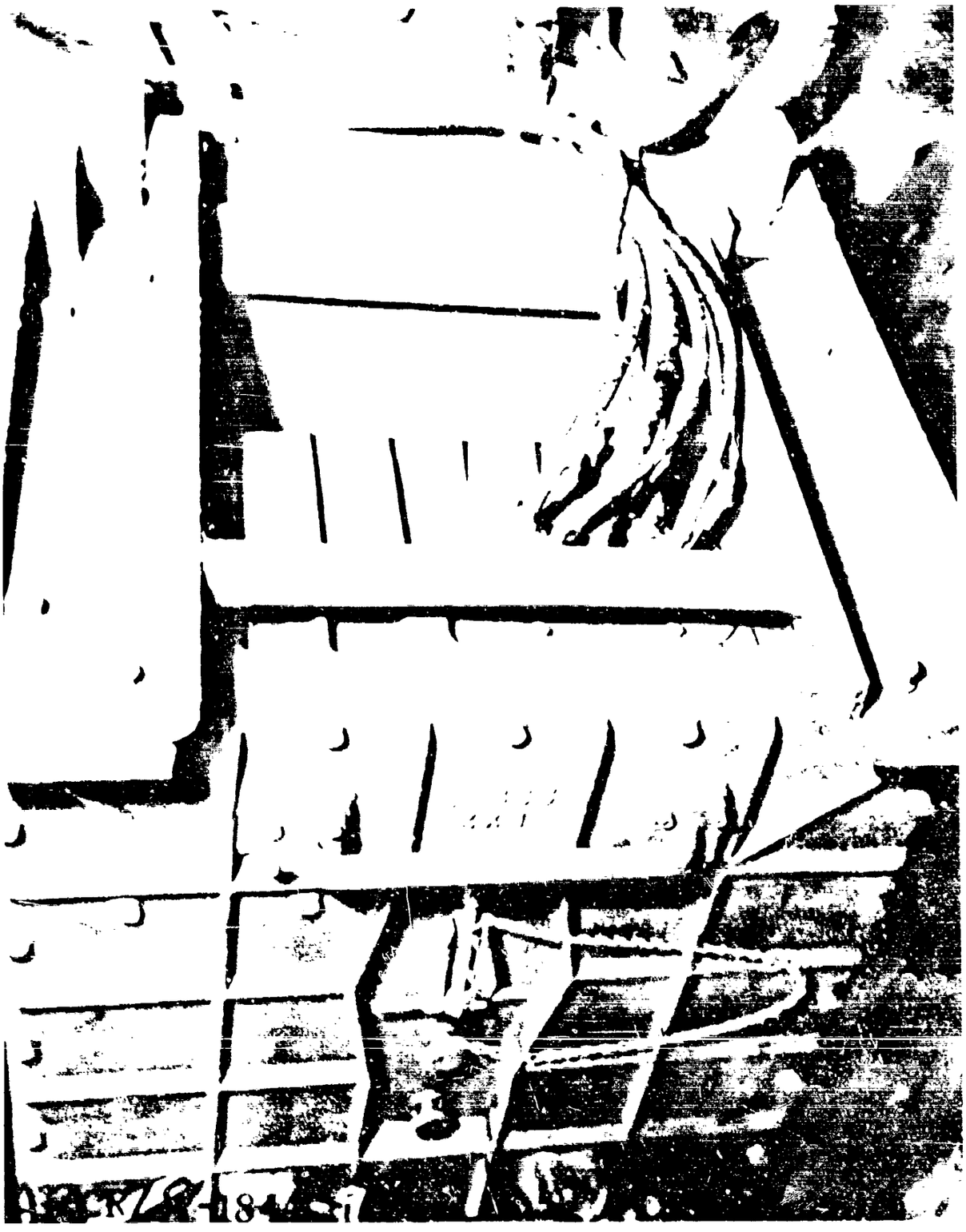
POST ABLE - MK 29 MOD 2 RADAR MAIN FRAME IN PORT RADAR TOWER. The fire outside the compartment caused some damage. Cabling which was secured to the bulkhead was damaged to such an extent that shorts and grounds occurred. The meters in the power control unit were damaged. The plastic cover over the A - scope changed color from green to clear around the edges. (See arrow).



POST ABLE - MK 29 MOD 2 RADAR. Transmitter-Receiver and mainframe were damaged by smoke and fire. Cables have been damaged by heat which melted the insulating material allowing it to squeeze out through the external shield.



POST ABLE - MK 29 RADAR POWER CONTROL UNIT. Shows the damage done to the meters by the intense heat. Meter needles were against stop pin at zero end of scale, indicating that movements had been damaged. Plastic around zero set screw in center of meter on right was badly burned.



POST ABLE - MK 28 RADAR TRANSMITTER. Transmitter forward on the side showing scorching of cables by blast radiation.

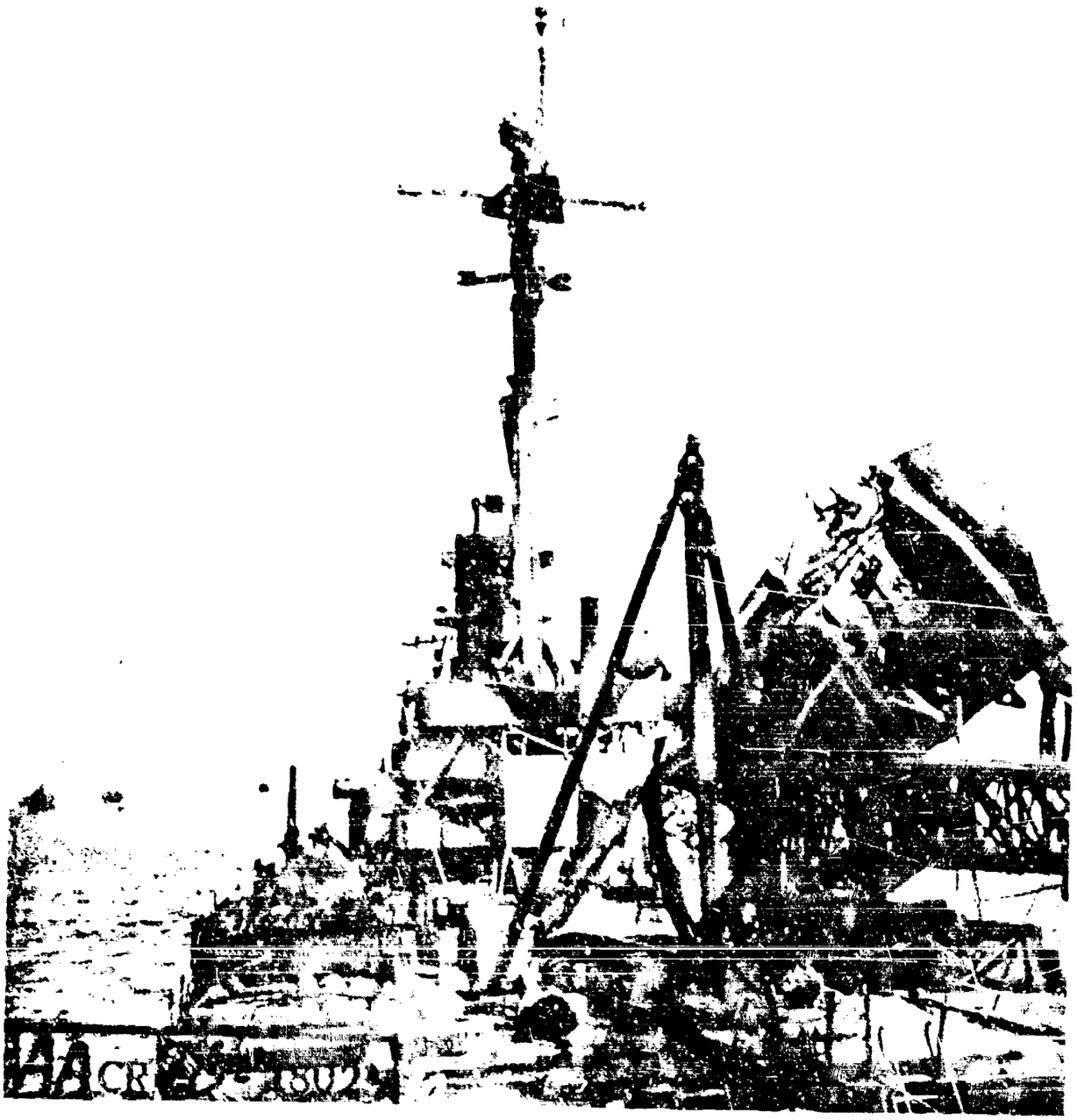
TEST ABLE

U.S.S. PENSACOLA (CA-24)

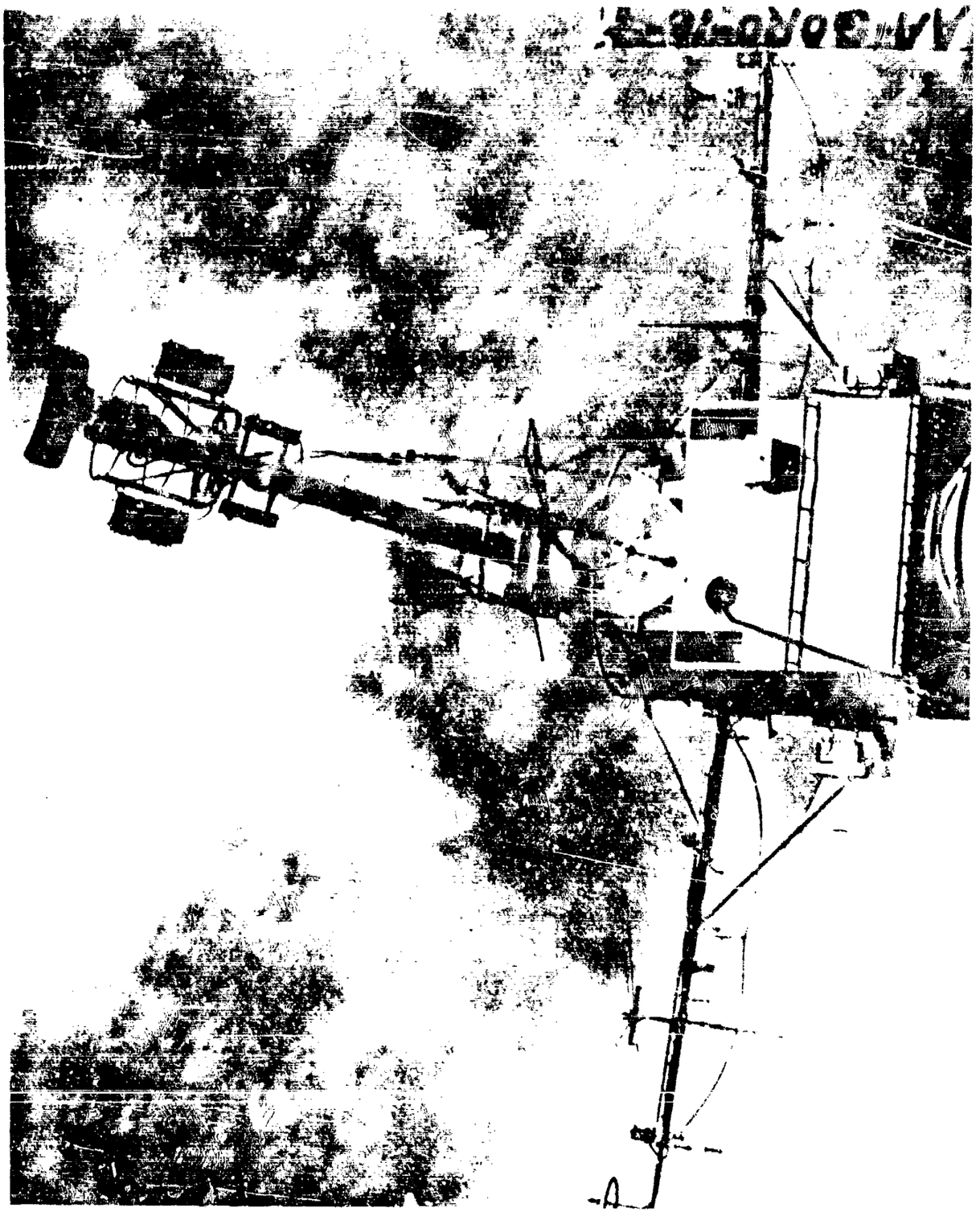
Range: 900 yards Bearing: 080°

The PENSACOLA received very heavy damage from test ABLE and many good photographs of equipment damage are included.

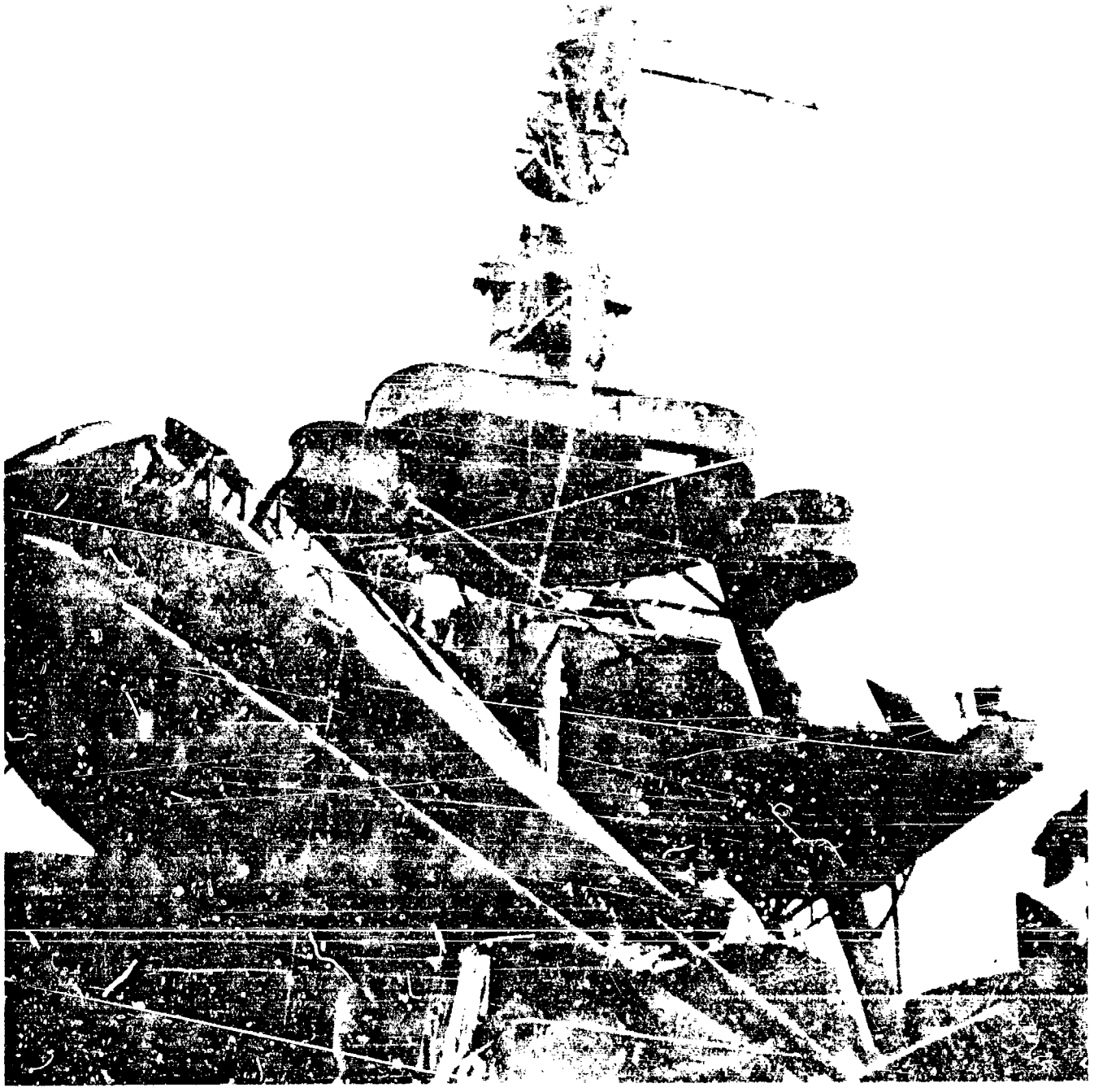
The pictures of antenna destruction help to stress the seriousness of damage to topside components and units.



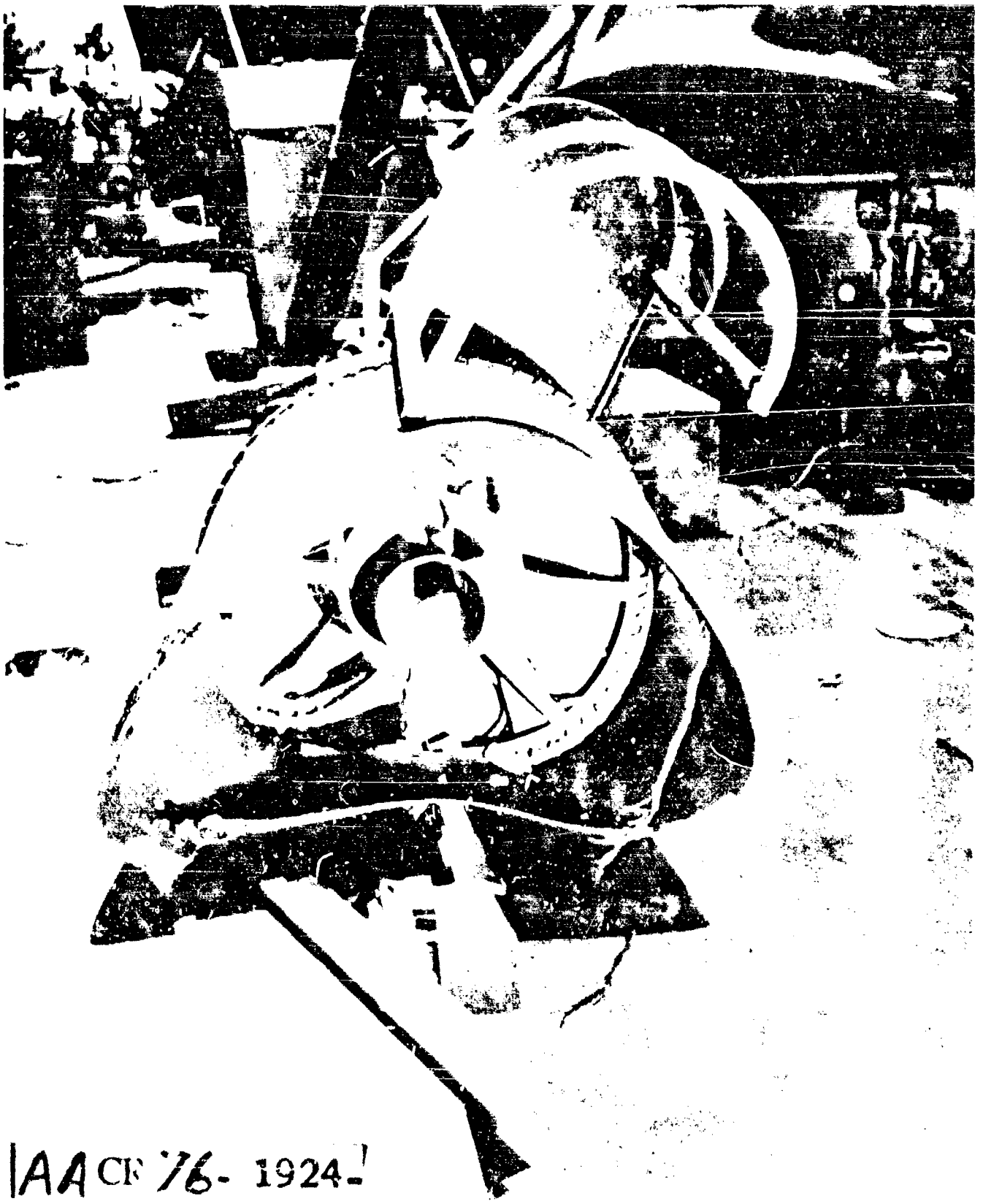
POST ABLE - GENERAL VIEW LOOKING AFT.



POST ABLE - ANTENNAS ON FOREMAST. The Nancy and SG equipments were operative after wiring was repaired. Due to the bend in the mast the equipment was useless operationally.

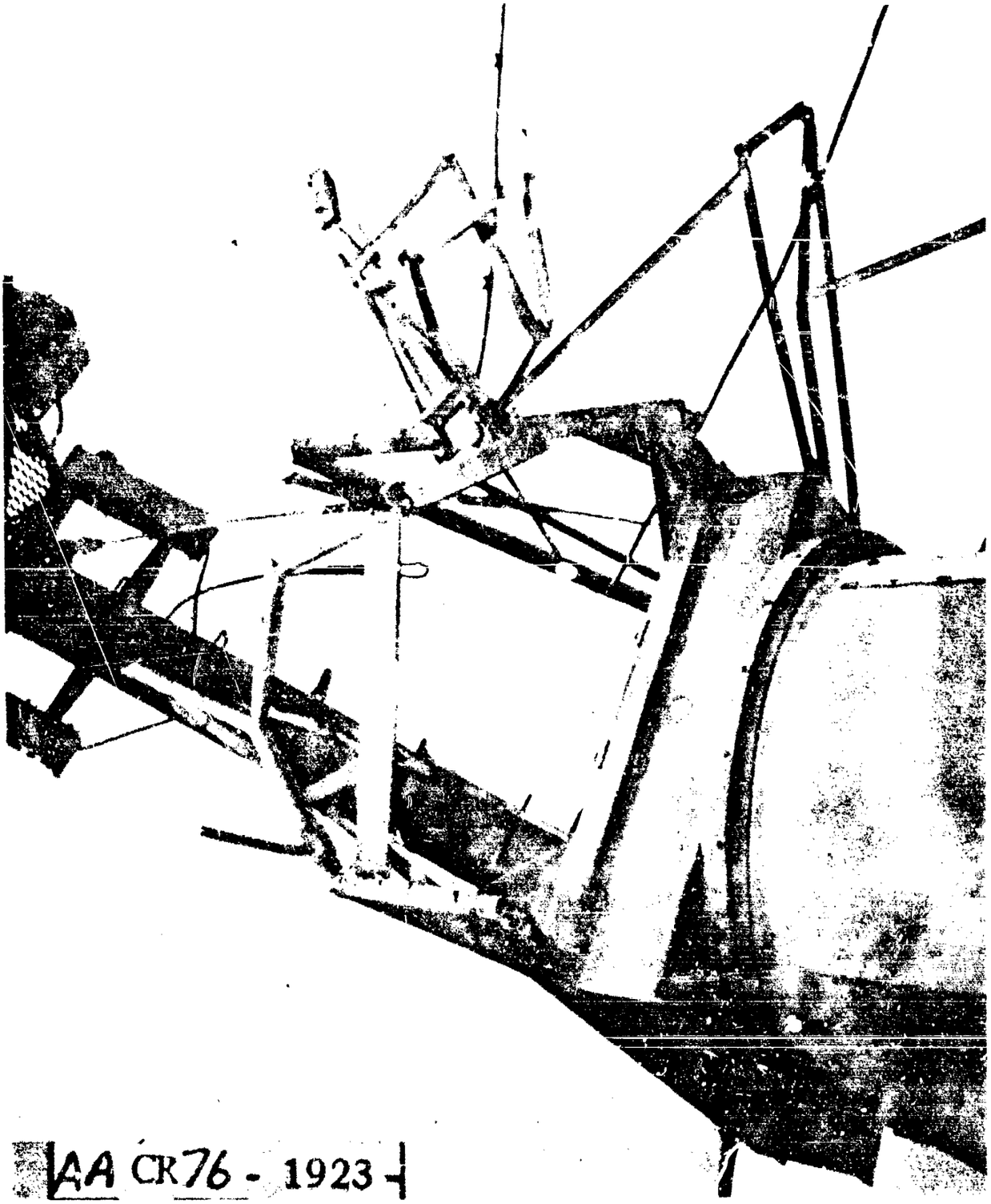


POST ABLE - FOREMAST SUPERSTRUCTURE. General view showing damage to for. mast and superstructure.



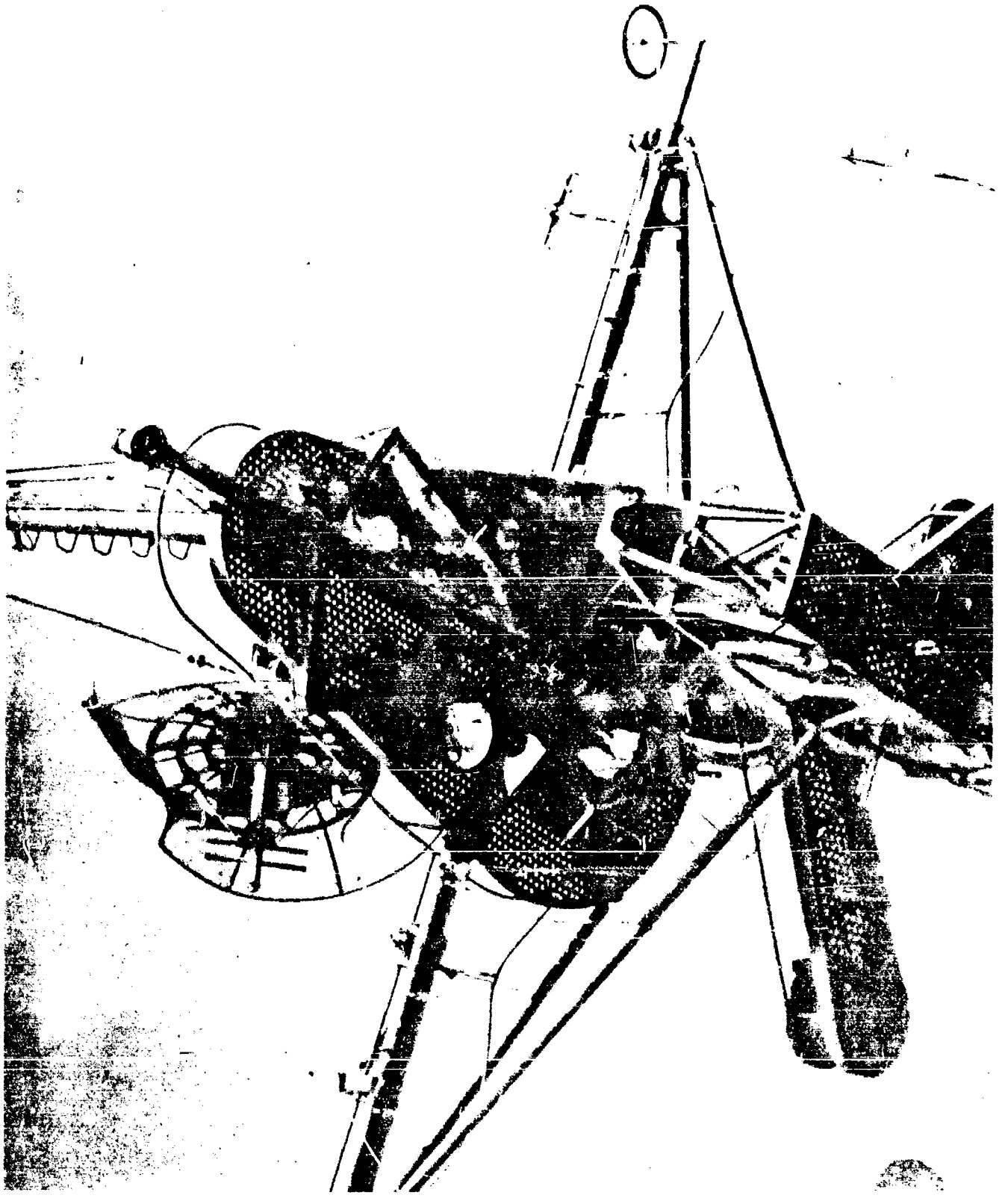
[AA CF 76- 1924-]

POST ABLE - TDY ANTENNA. Loss of supporting mast allowed antenna to fall to deck, completely disabling it.



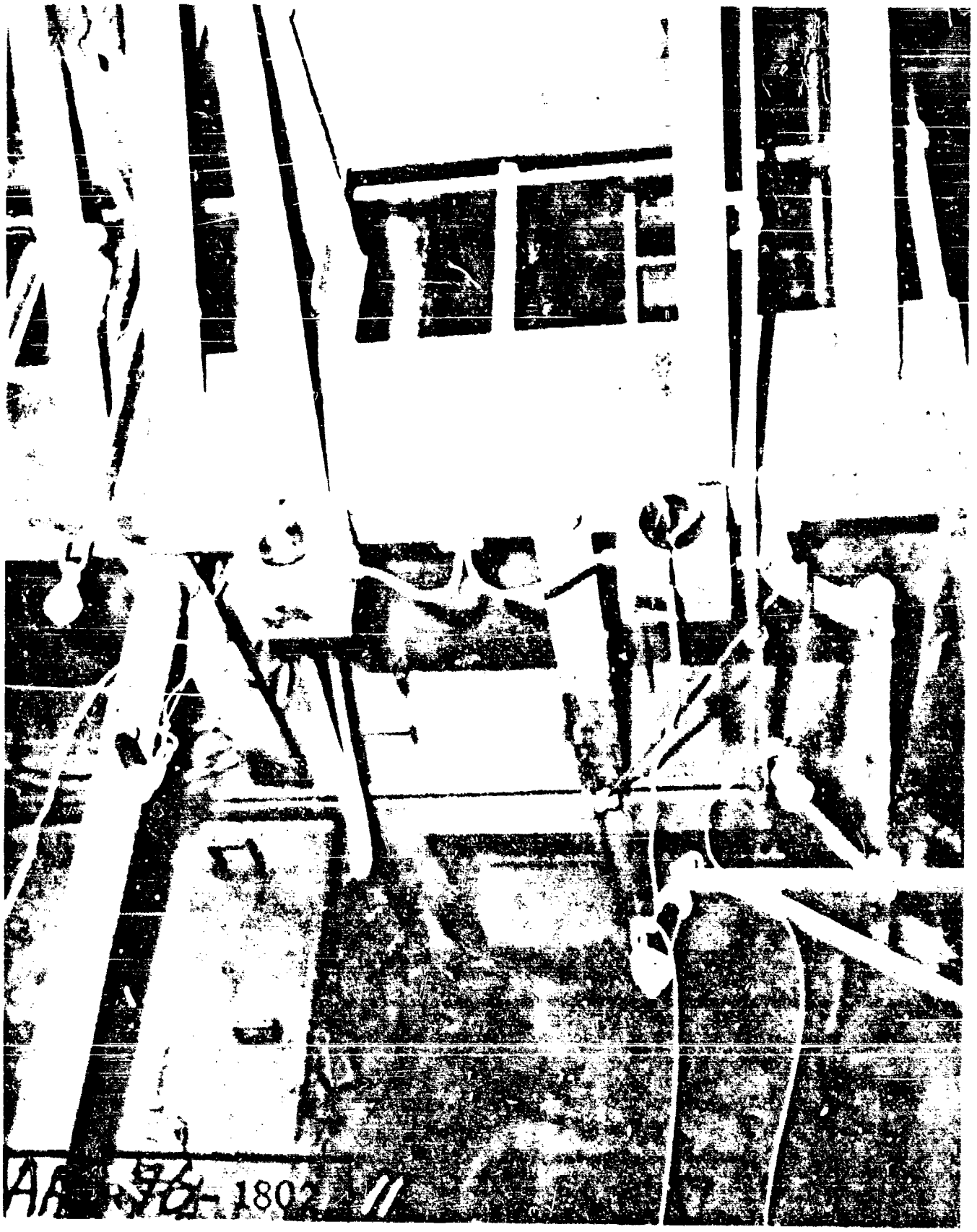
AA CR76 - 1923

POST ABLE - SK PEDESTAL. Fragments of antenna remaining.

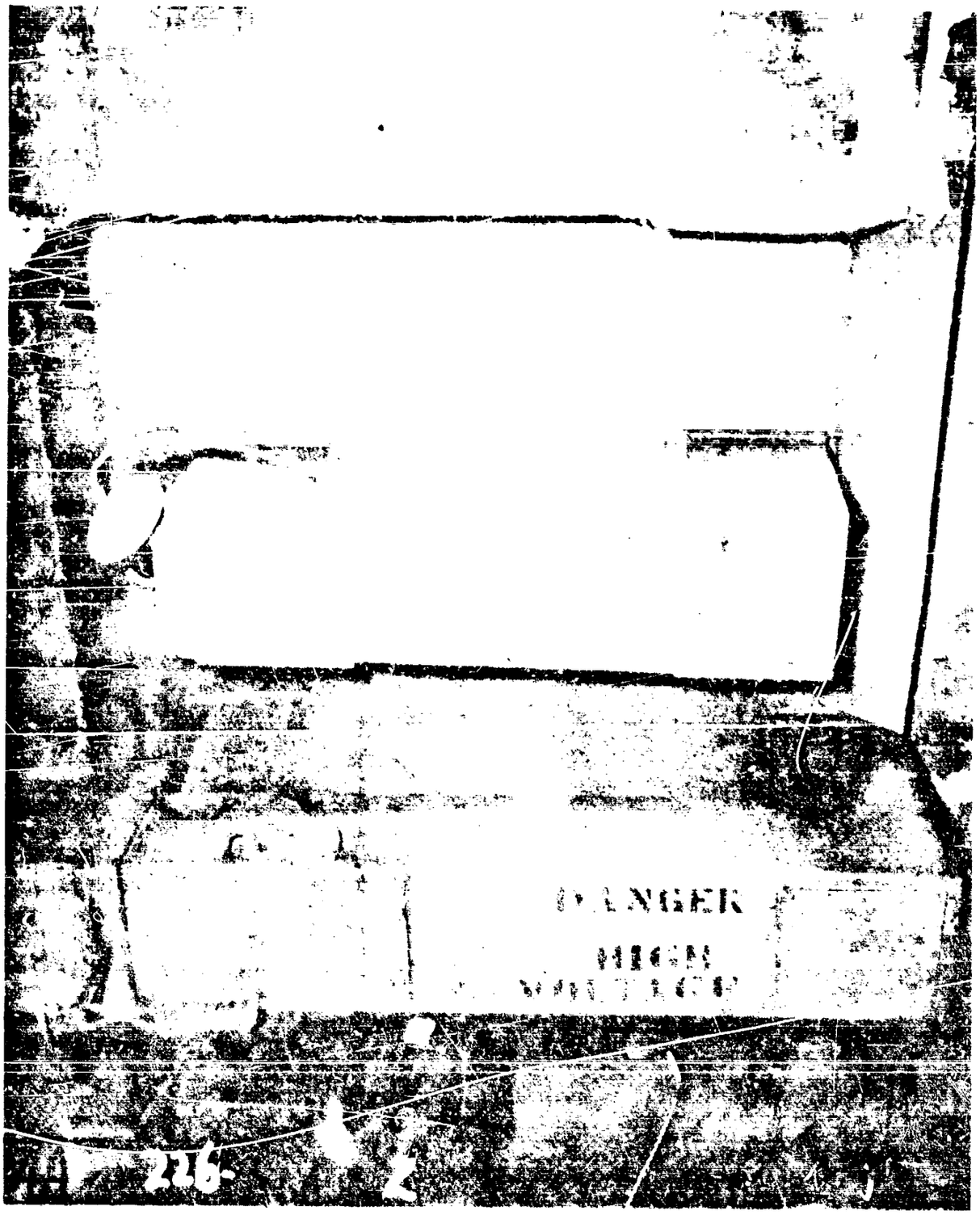


POST APLE - SP ANTENNA. Echoes were received in spite of damaged condition. Beam pattern was affected, and complete rotation was impossible due to damaged drive assembly in pedestal.

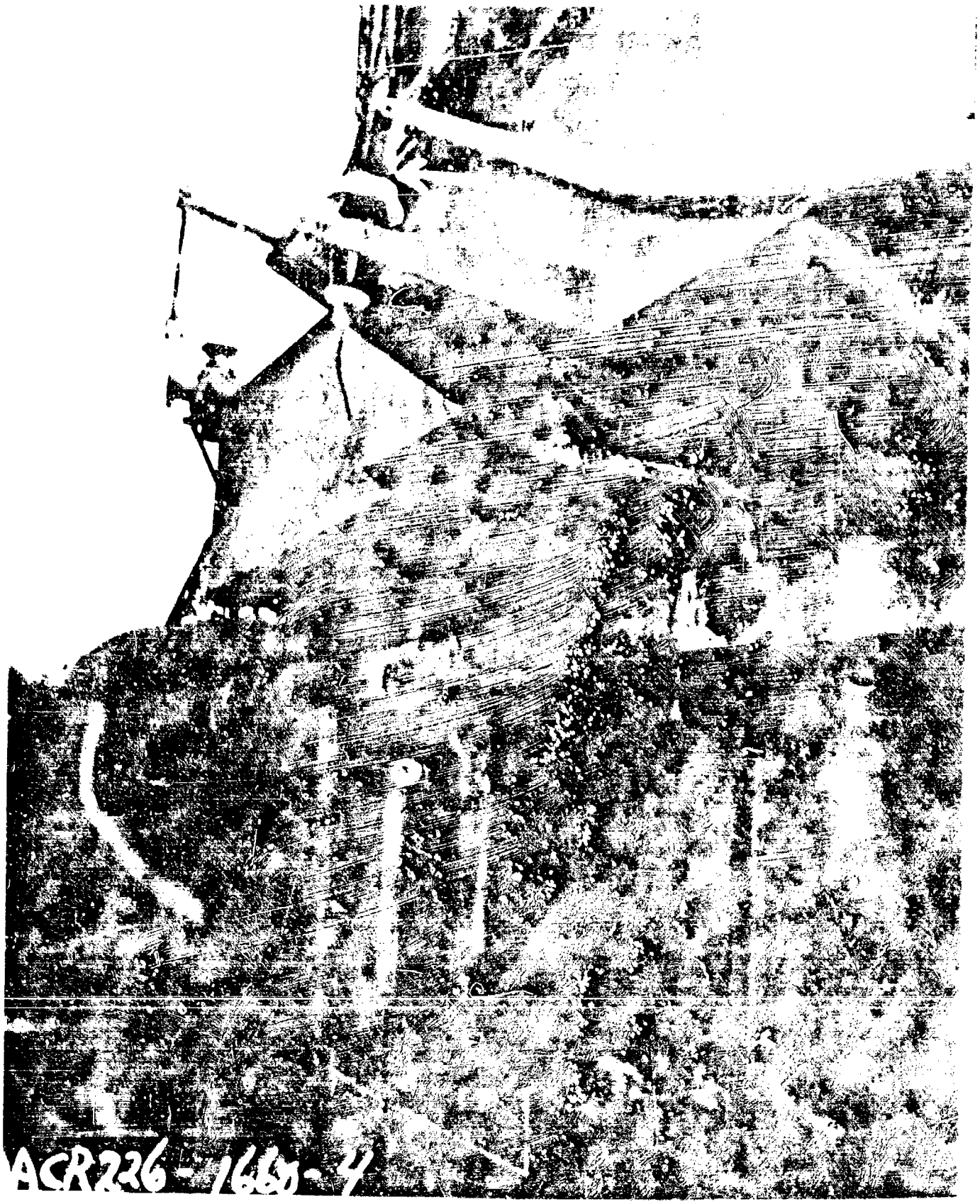
POST ABLE - SP TRANSMITTER. Knocked forward 4" when the bulkhead behind it was dished in by the blast. After realigning waveguide, (see arrow) operation was normal.



POST ABLE - INSULATORS AND ANTENNAS. Communication antennas were damaged in this manner in a number of cases. Both small entering insulators cracked from strain. Antenna wire was also parted.

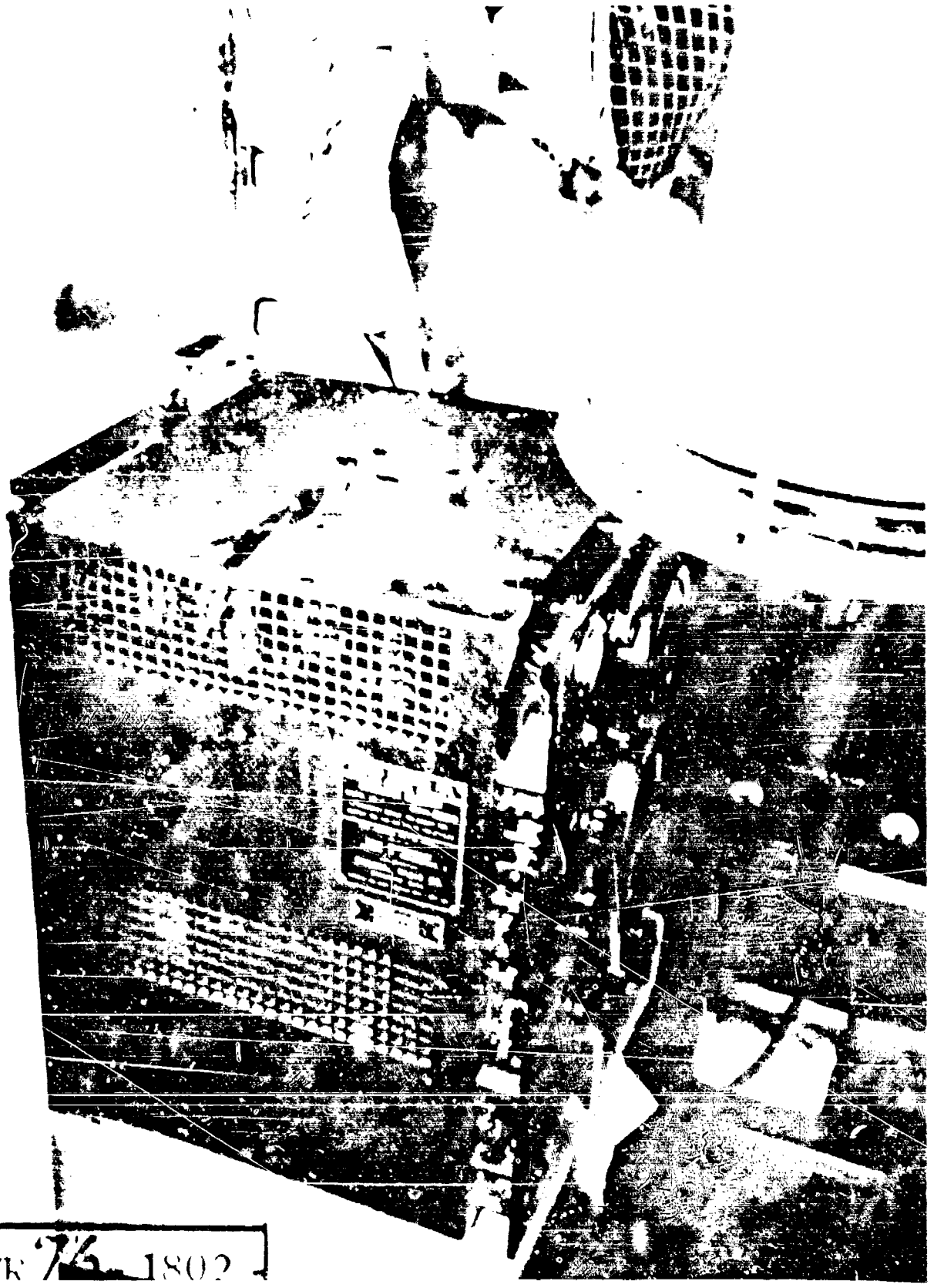


POST ABLE - ANTENNA TRUNKS. The strain on the lead in has broken the wire as well as the bowl of the entering insulator outside of Radio I.

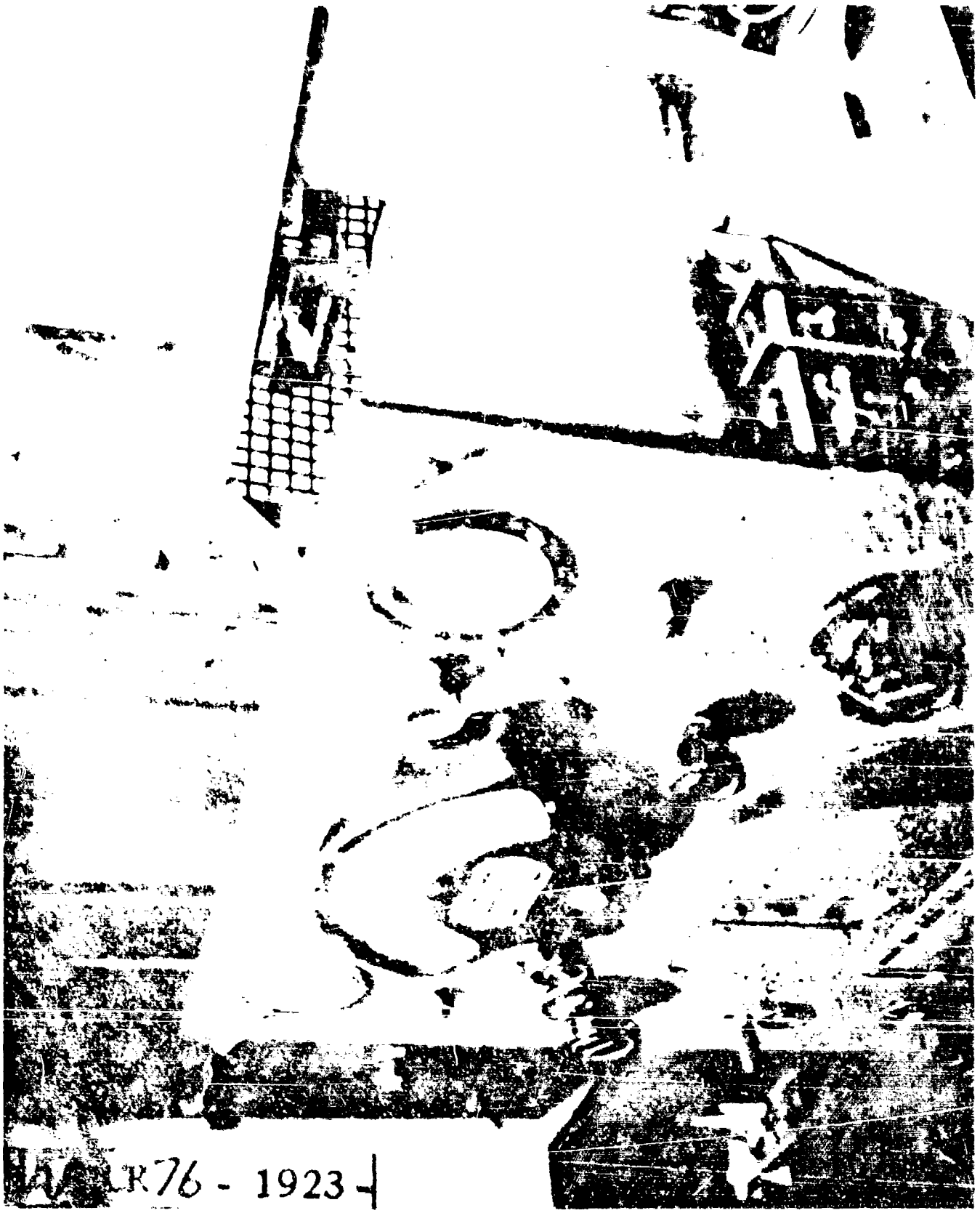


POST ABLE - WHIP ANTENNA. (See arrow). The large vertical types of whip antennas in general will not stand the force of the blast well as the smaller more flexible types.

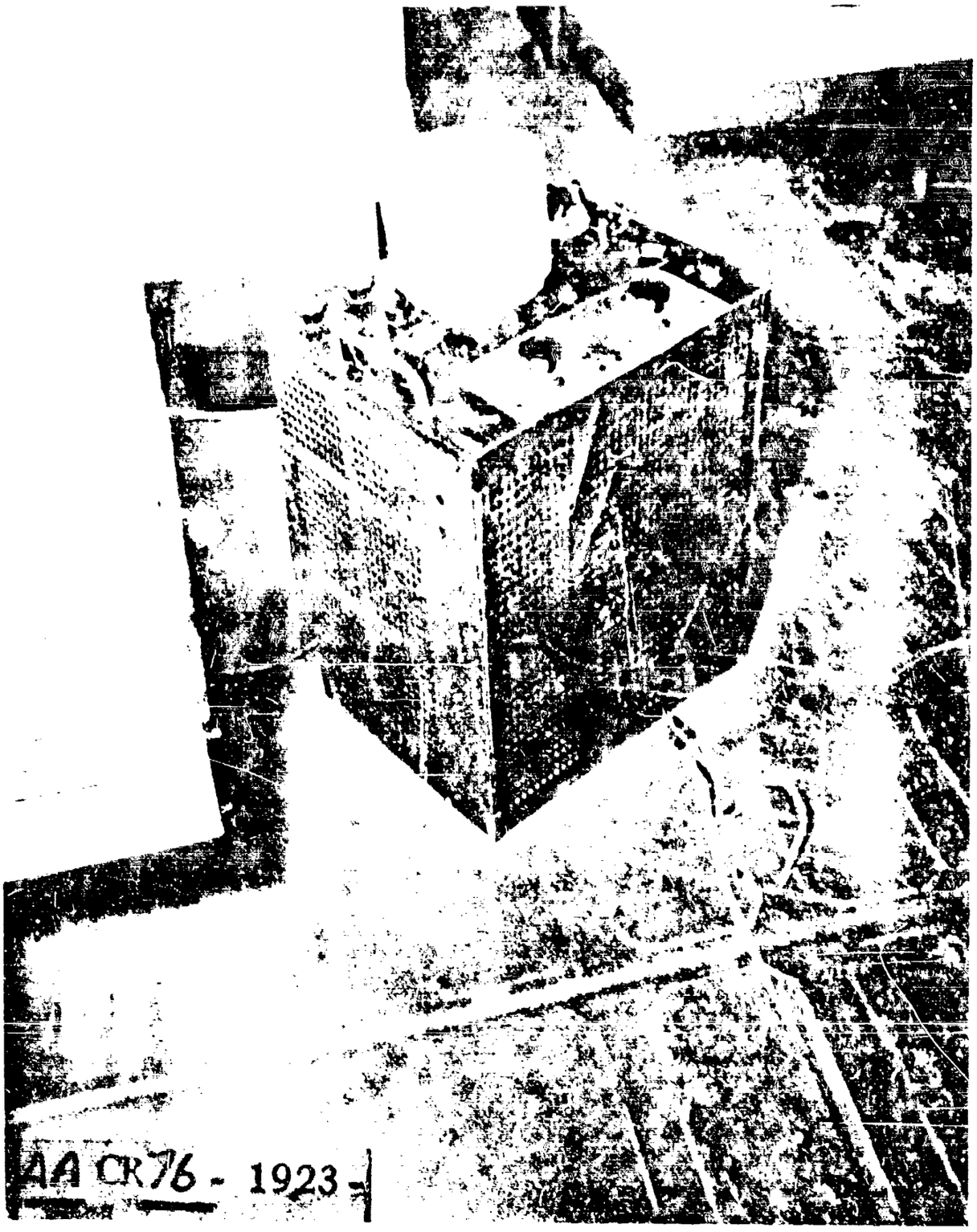
POST ABLE - RADIO III. Bulkhead which gave way and bulged caused considerable damage to bulkhead mounted units.



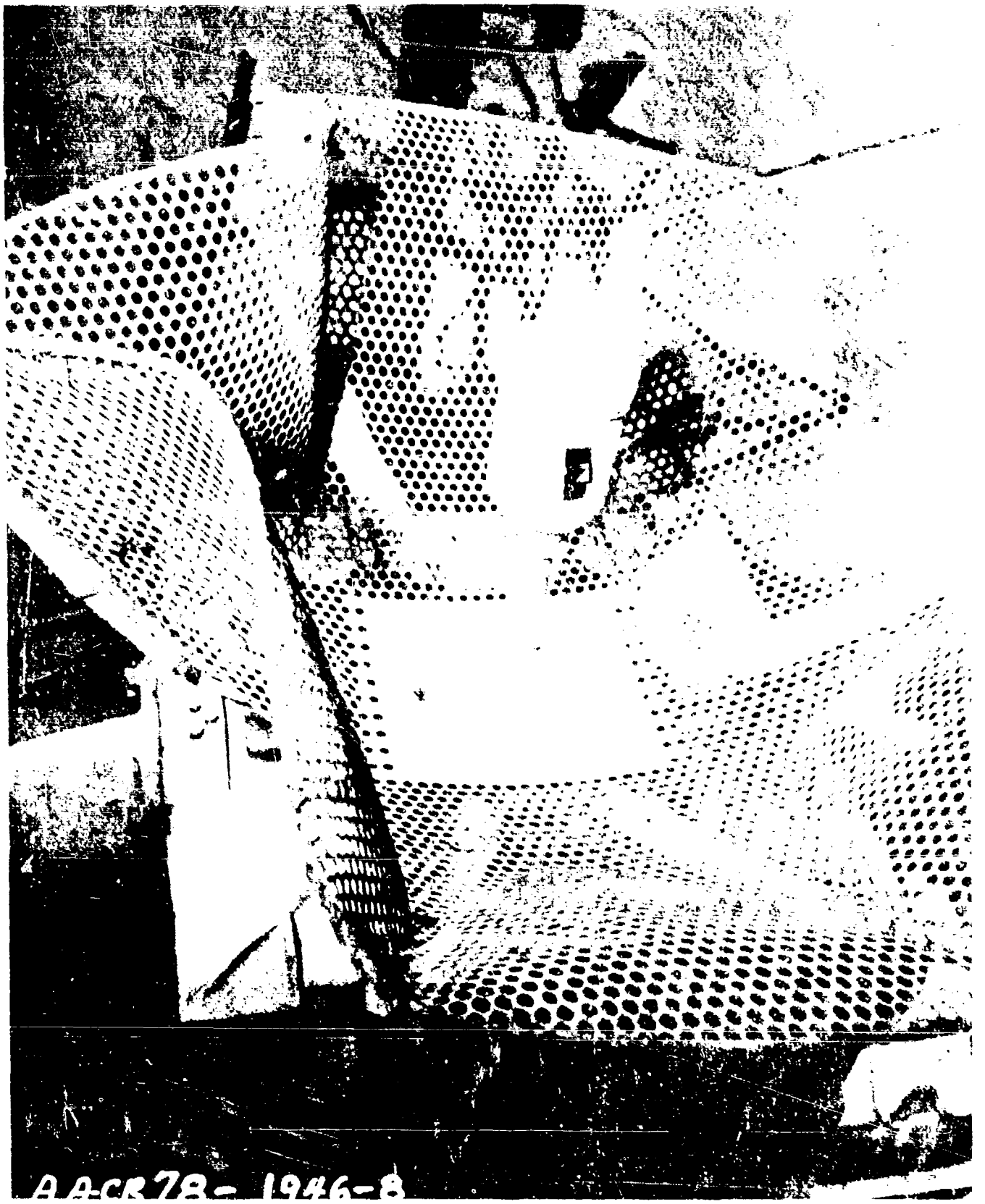
POST ABLE - LR) FREQUENCY METER - RADIO I. This unit was damaged by an unknown flying object and shock which caused the chassis to be sprung forward out of its case. In general the securing of panels in this manner is not adequate, since the panels were loosened in a number of instances.



POST ABLE - LR-1 FREQUENCY METER - RADIO I. Tube was broken and case was warped.



POST ABLE - LORAN. Aircraft type mounting racks are unsuitable for this type equipment. Practically the only damage suffered to loran equipment was the result of equipment being thrown to the deck.



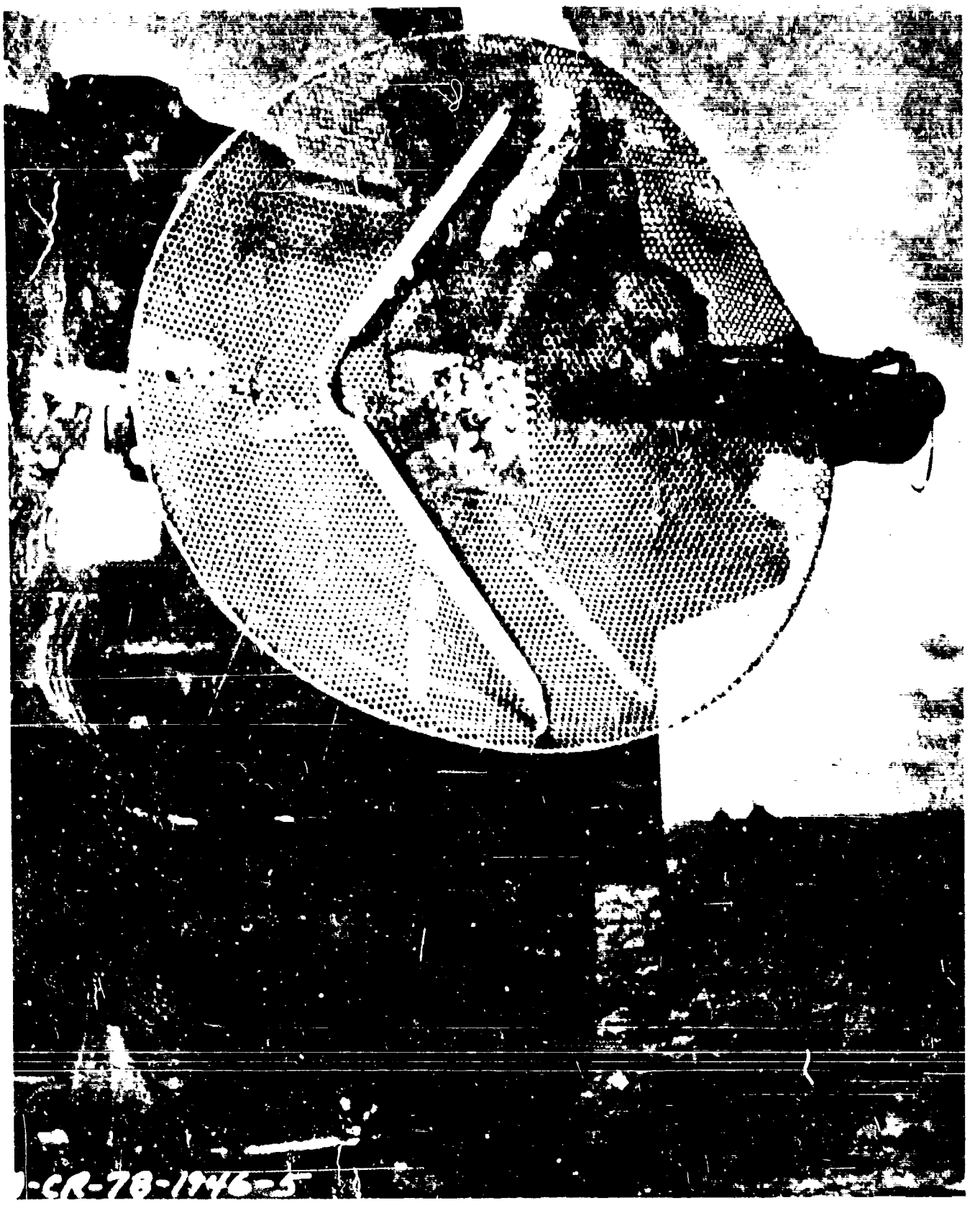
POST ABLE - MK 28 ANTENNA. Main battery forward. Parabola and one or two supports would have to be replaced.

POST ABLE - MK 28 MOD 2 RADAR. Starboard 40 MM quad gun mount. Remains of parabola support, "A" and parabola "C" are shown. Dipole assembly, "B" is bent about 45 degrees from normal and cover blown off. The coaxial line connecting transmitter to antenna was broken at "D".

POST ABLE - MK 28 REFLECTOR. Remains of reflector from Mk 28 antenna.

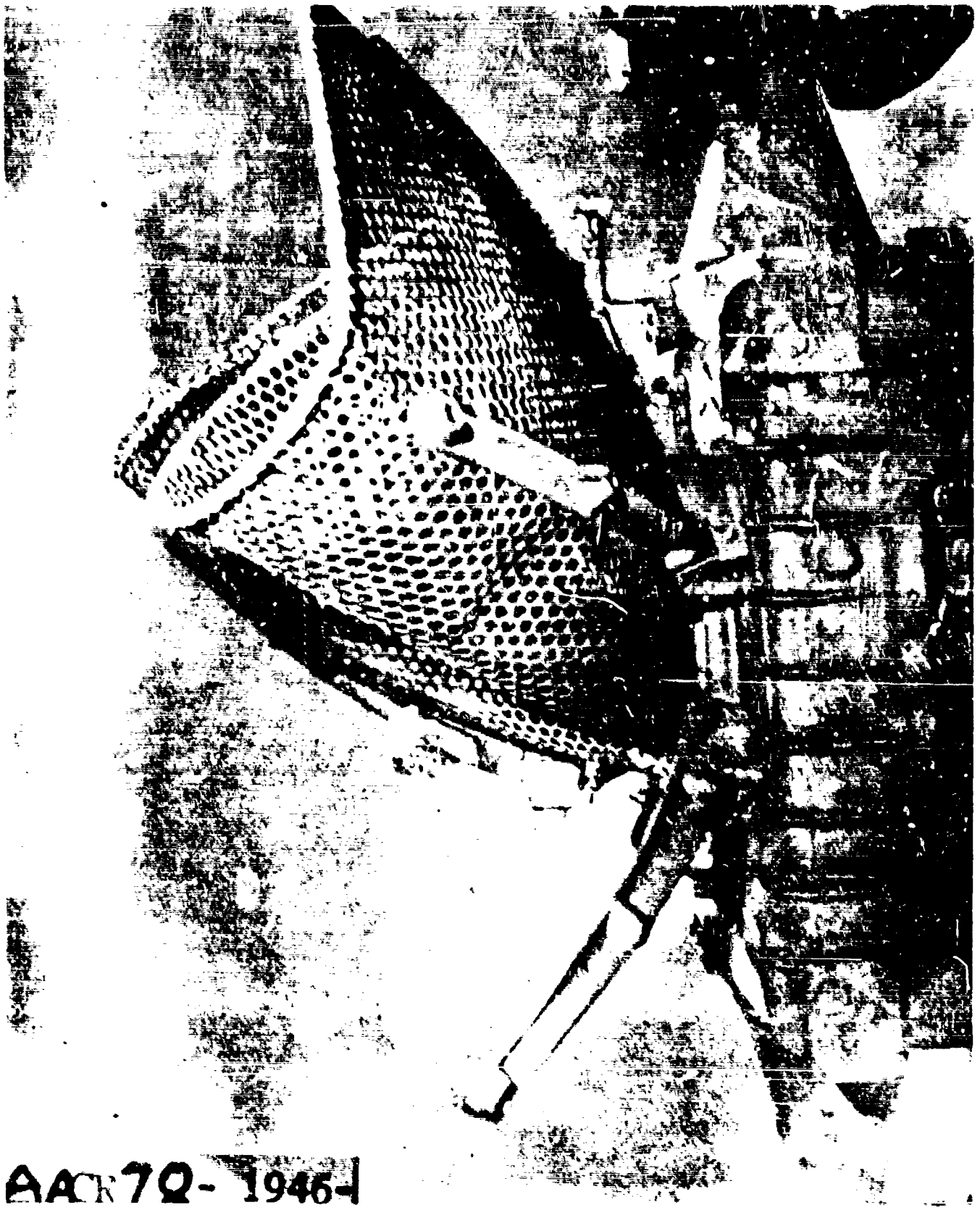
POST ABLE - MK 28 MOD 2 RADAR. Fire control for 40 MM quad port side. Antenna parabola has been badly bent and torn by the blast. The dipole assembly has been blown off.

POST ABLE - MK 28 ANTENNA. Main battery director aft. Parabola and supports were badly damaged. Polyethylene dipole cover was burned by heat from radiation. Cables to transmitter were also charred slightly.



POST ABLE - MK 28 MOD 3 RADAR. AA director aft. Radar was operating into dummy load during test. Dummy load was blown off at "C" and was found lying on deck. Support "A" was used to help hold the dummy load. Parabola was slightly bent and would have to be replaced.

POST ABLE - MK 28 RADAR LOAD RESISTOR. Mk 28 Mod 3 AA director was operating into dummy load "B" during test. Dummy load was blown off by blast.



AACR 70-1946-1

POST ABLE - MK 28 ANTENNA. Forward AA fire control antenna. Broken parabola support "A" is shown. Parabola, parabola support, and dipole assembly would all have to be replaced to restore operation.

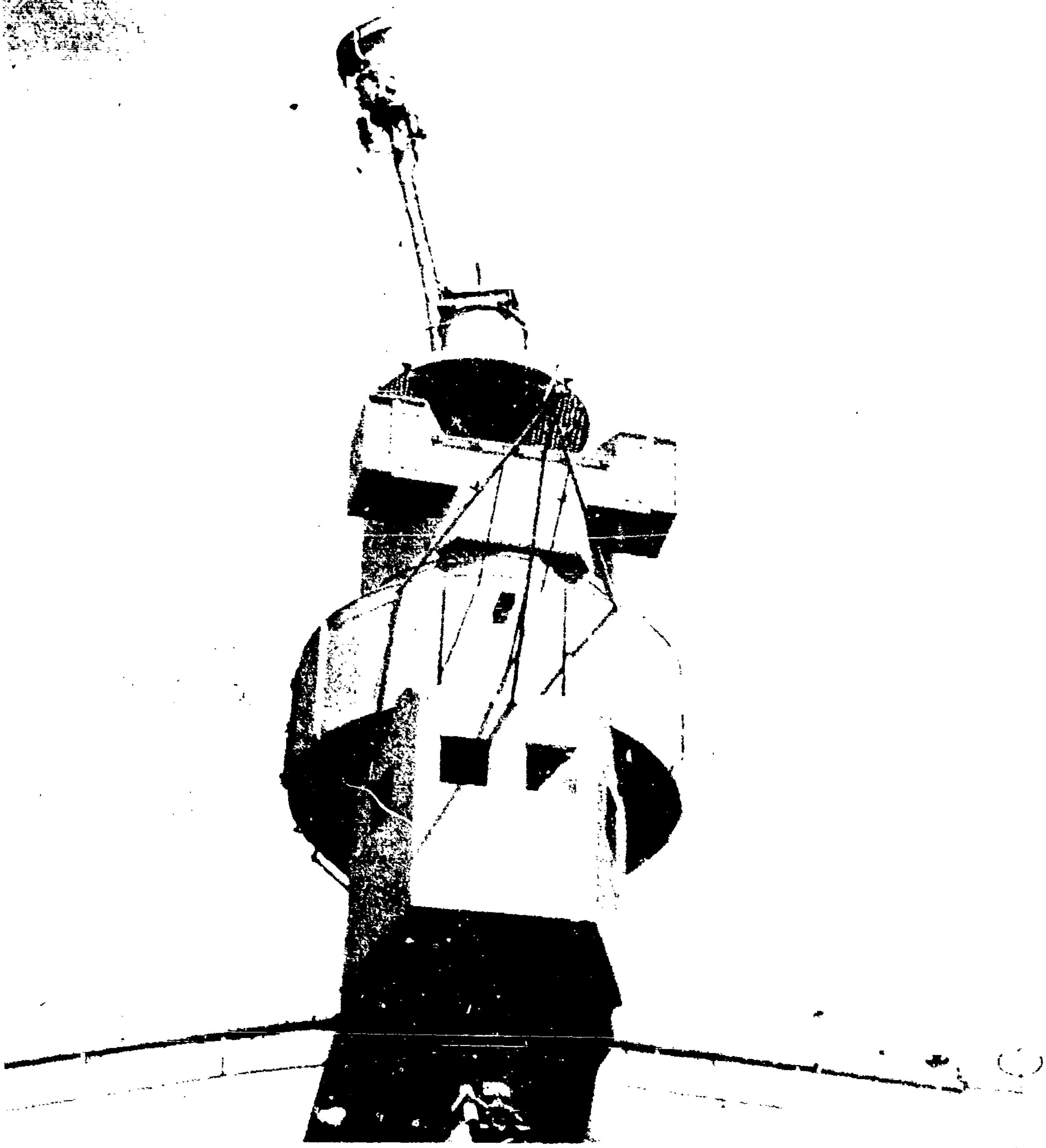
TEST ABLE

U.S.S. SALT LAKE CITY (CA-25)

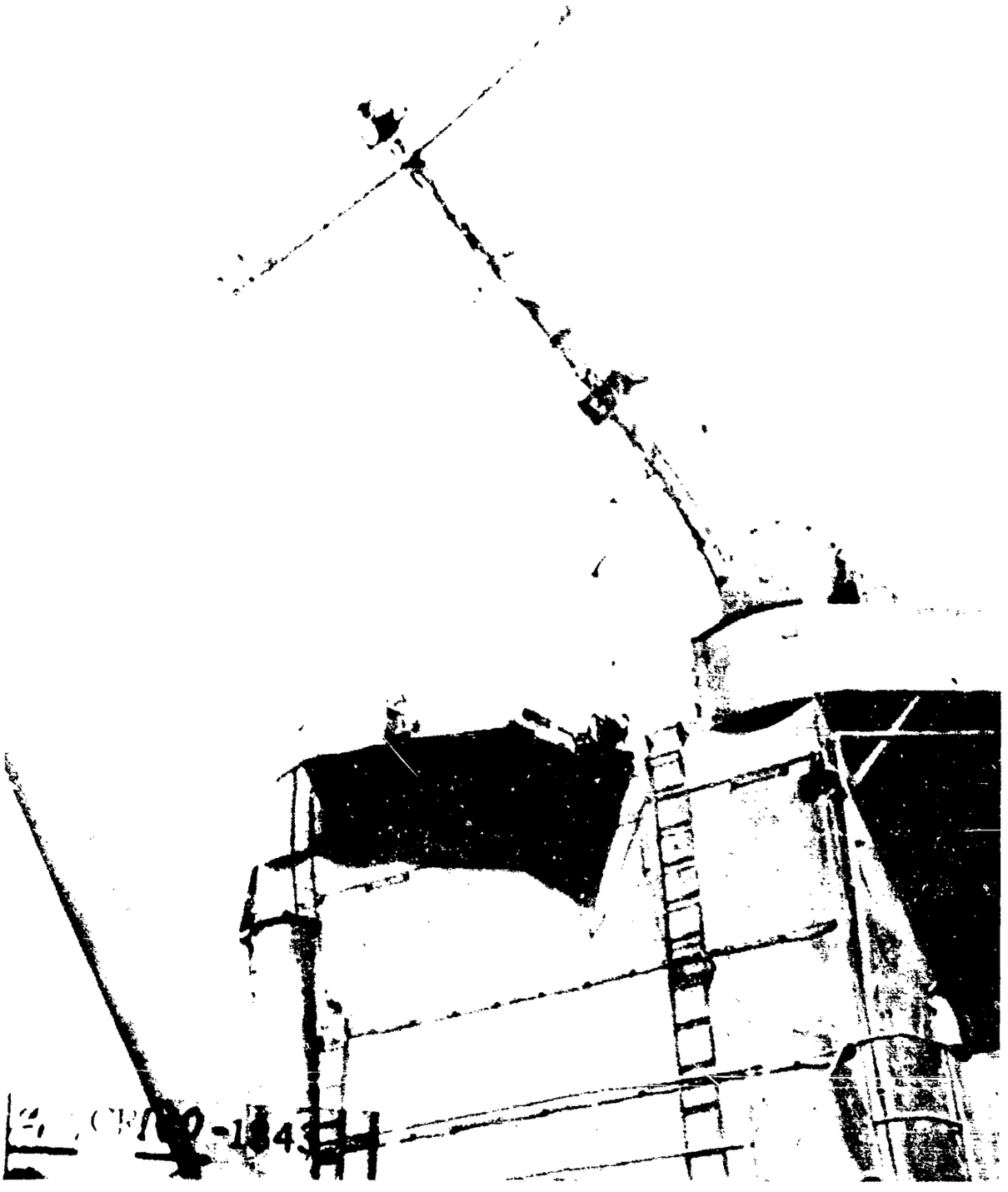
Range: 1000 yards Bearing: 135°

Heavy damage was sustained by this ship in test ABLE. Damage to BuShips and BuOrd equipment is well covered by these photographs.

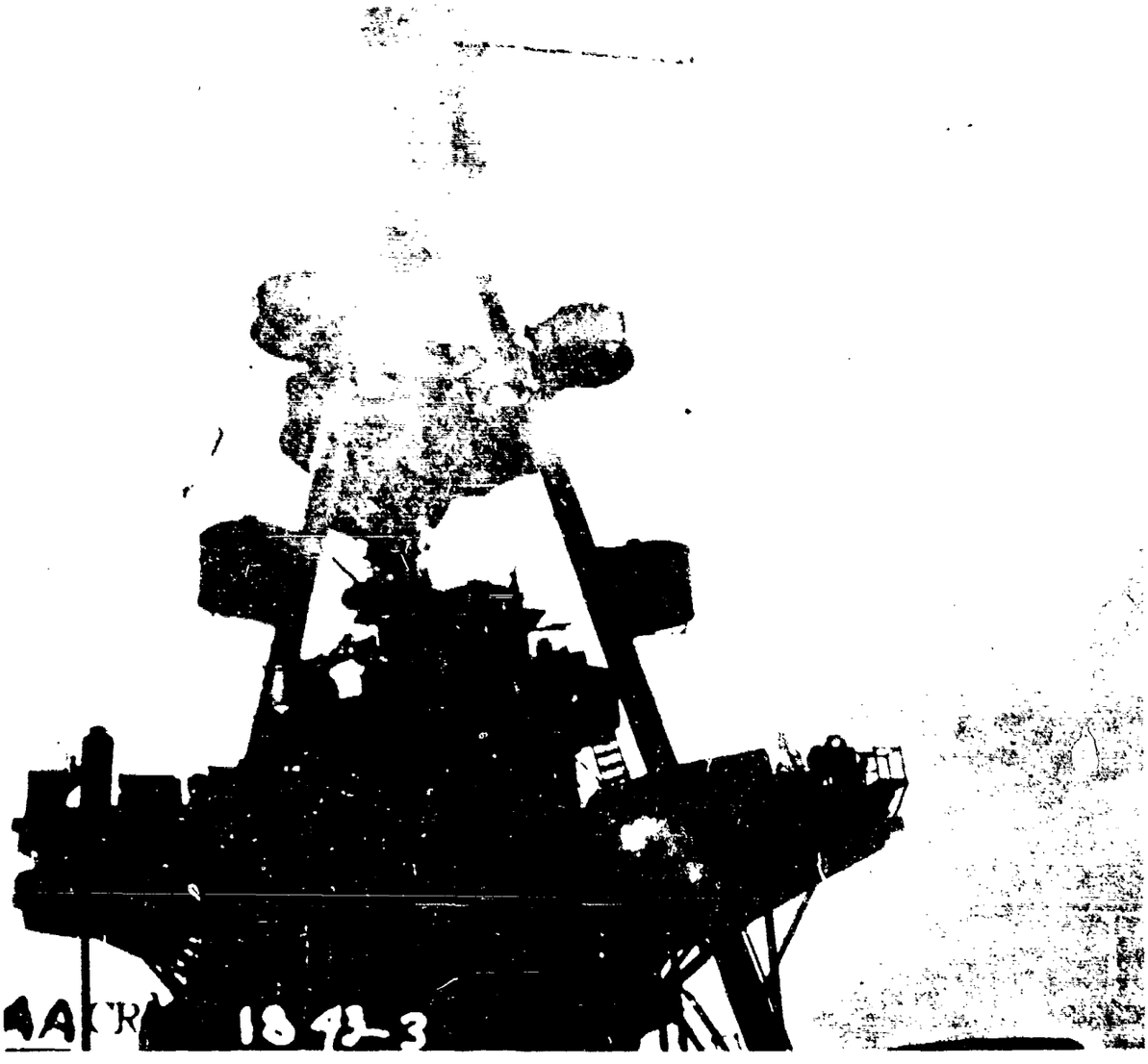
Notice that the major part of the damage is to units above deck and directly exposed to the blast.



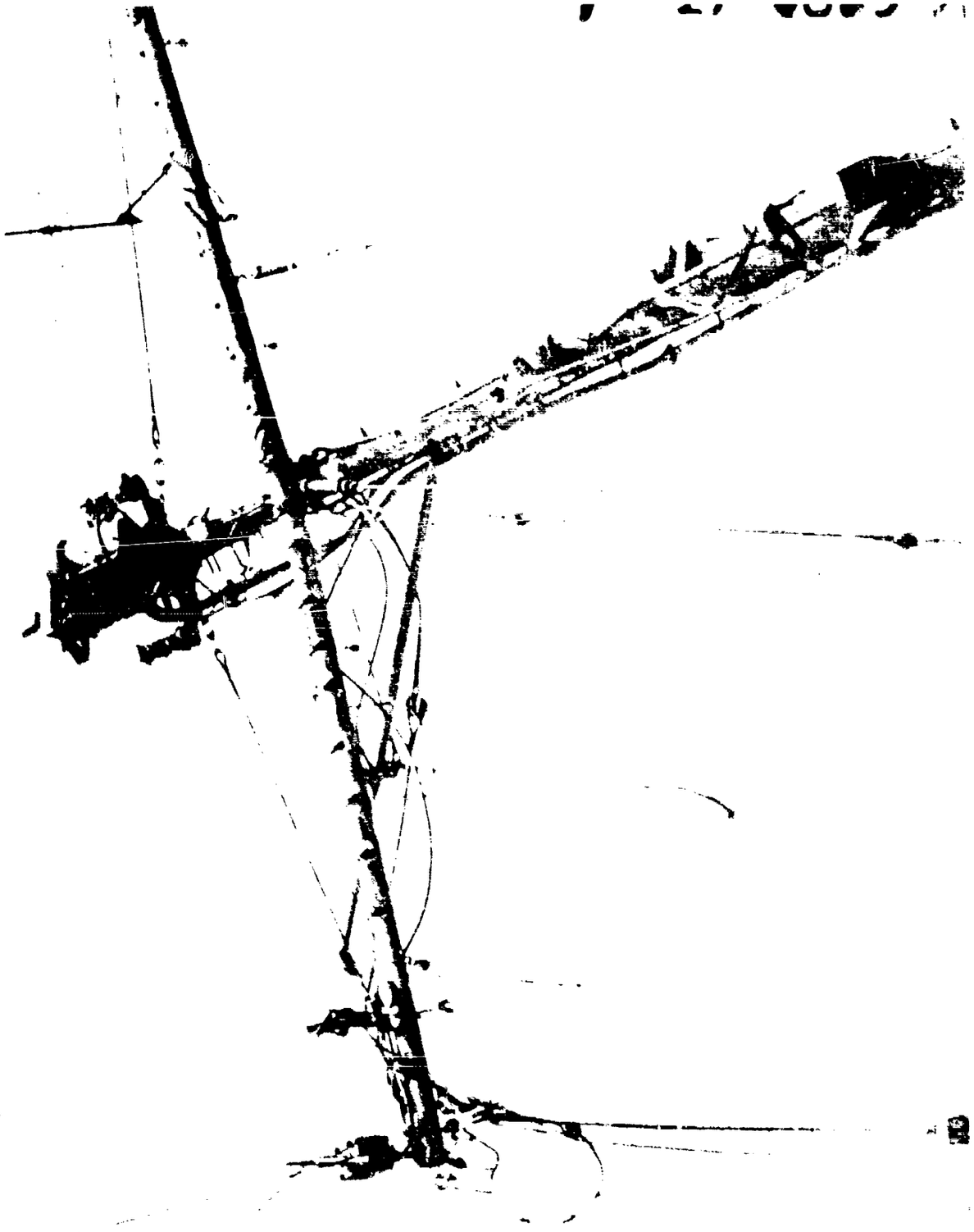
POST ABLE - BENT MAST. The radar at top was still operative, but the bearing and coverage were unsatisfactory.



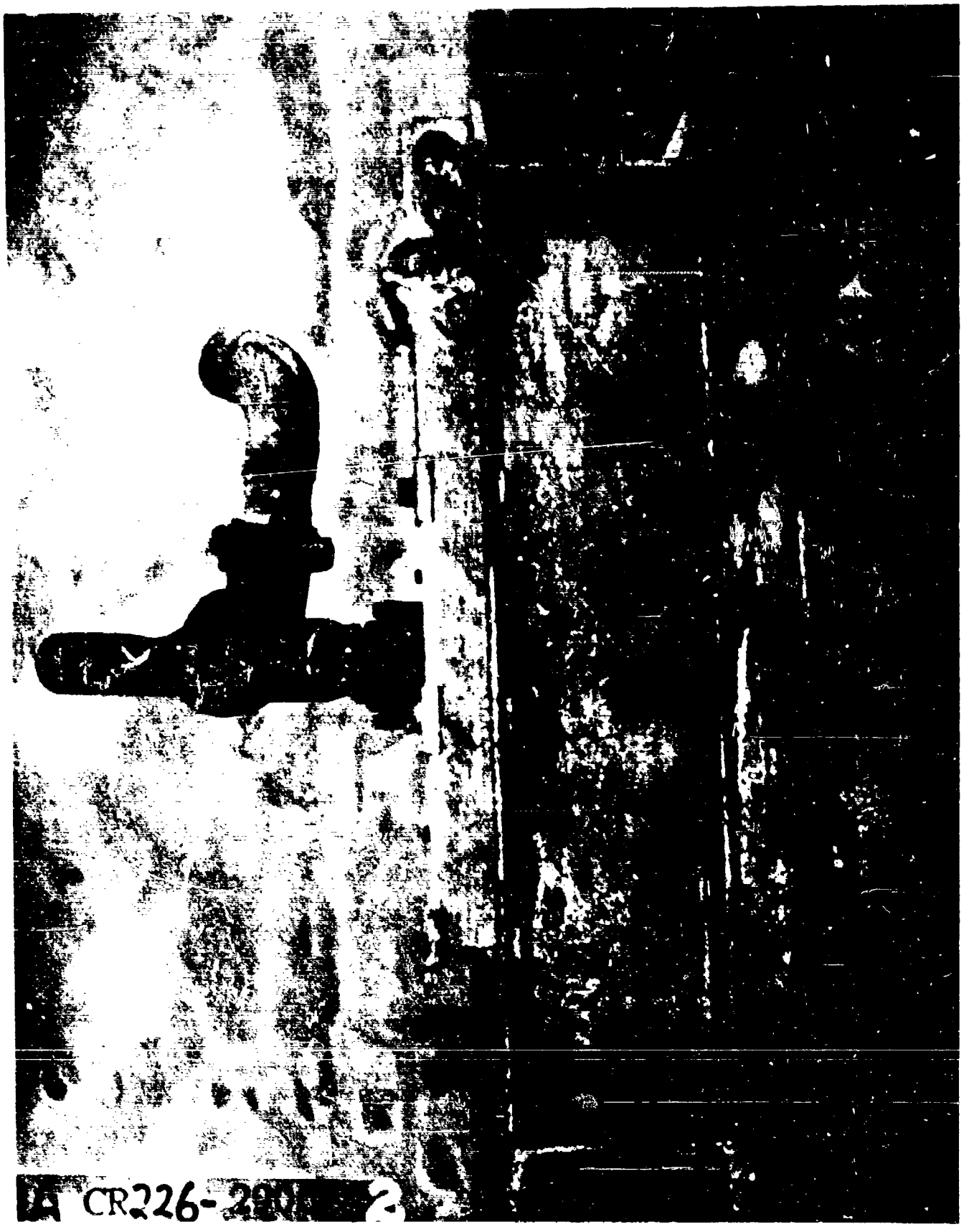
POST ABLE - BENT FOREMAST. Illustrating the manner in which many radio and radar equipments were disabled by loss of antennas.



POST ABLE - FOREMAST. Foremast and superstructure looking forward. Notice bent SG mast, missing SK antenna, and broken communication antennas.



POST ABLE - FOREMAST. Both radio and radar antennas were broken.



POST ABLE - SK ANTENNA PEDESTAL. Antenna was completely blown away. Similar damage occured to SK antennas on four other major target ships. This type antenna, because of its large size, was particularly susceptible to the Able blast.

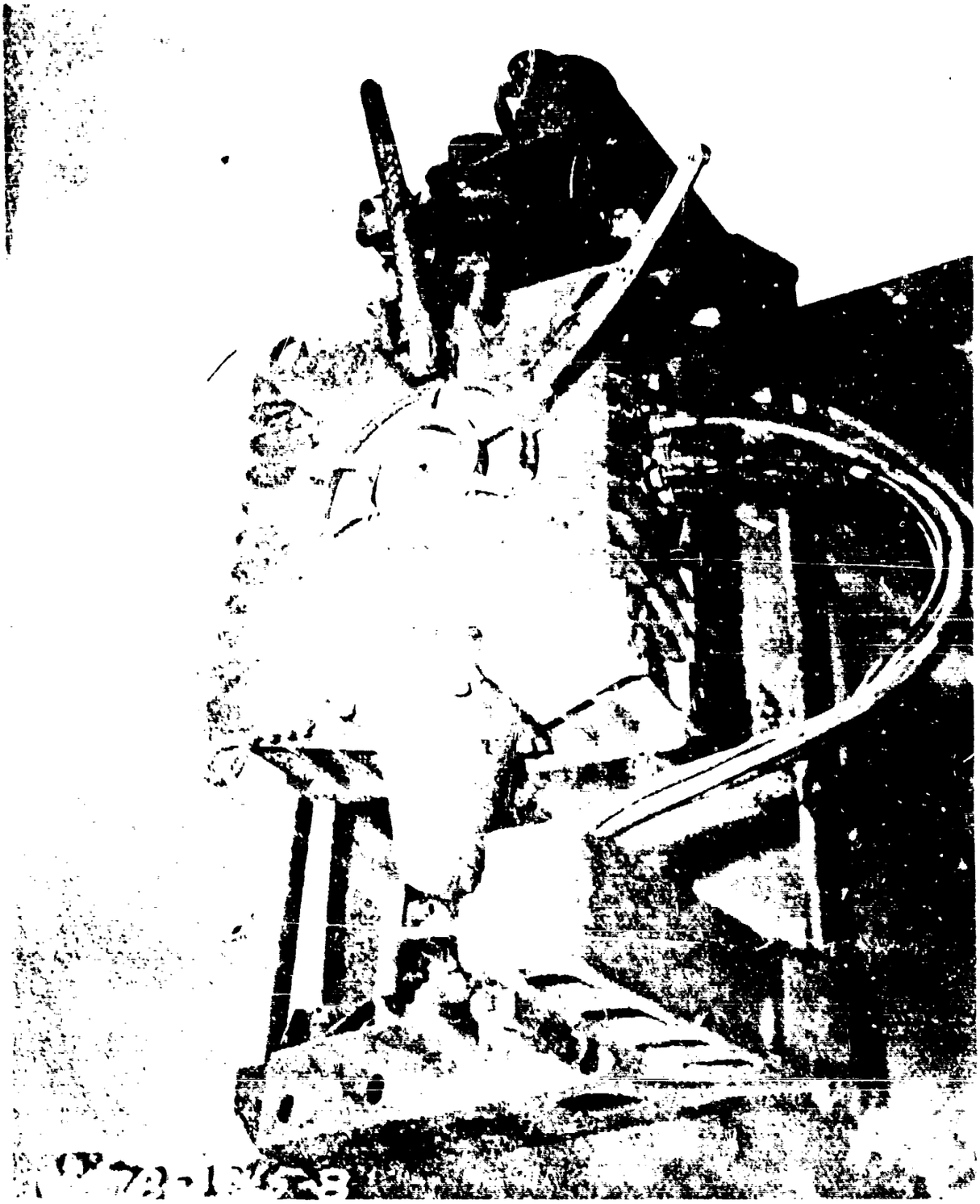
POST ABLE - SK ANTENNA PEDESTAL. The coaxial transmission line was bent as shown when the bedspring antenna was carried away by the blast. The antenna was torn loose from its mounting supports on top of the pedestal.

POST ABLE - TDY ANTENNA. Damaged antenna (See arrow).

POST ABLE - VD-2 ON FORWARD SUPERSTRUCTURE. The VD-2 housing suffered some damage from the blast.

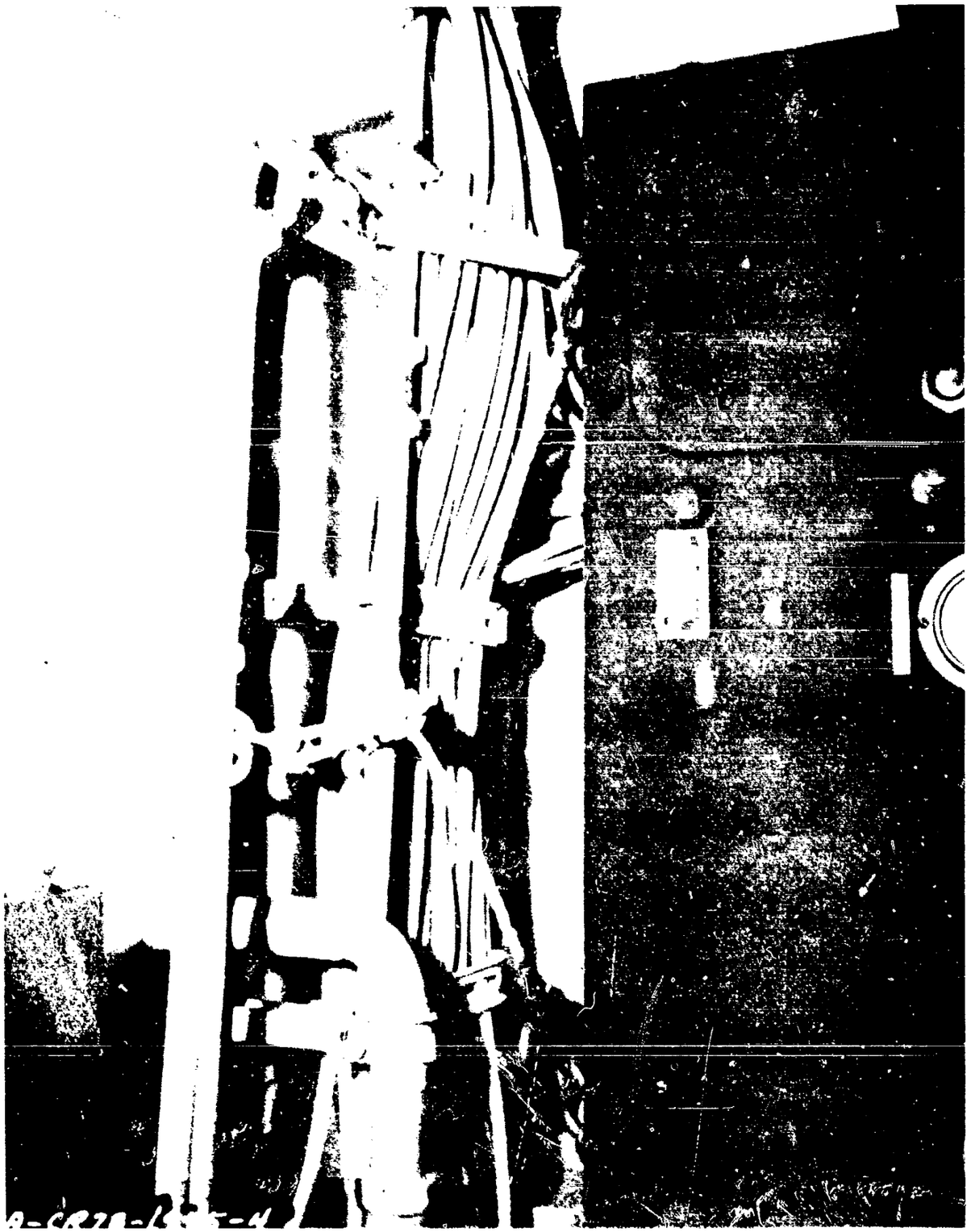
[illegible] Insulators on top of transmitter were broken (See arrow).

POST ABLE - TDE. Antenna lead-in insulator was broken (see arrow).

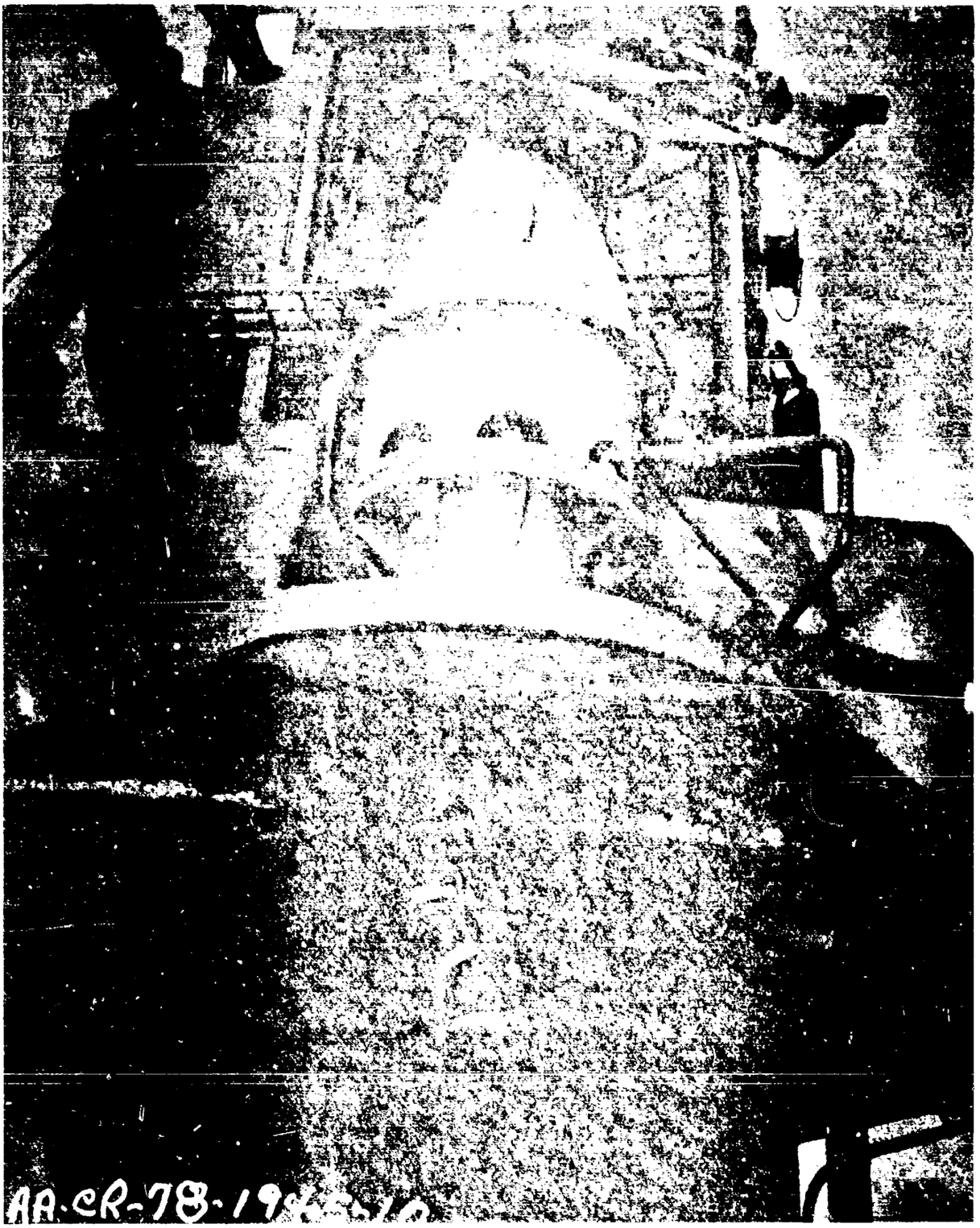


POST ABLE - MK 2M TRANSMITTER. The antenna was completely blown off.

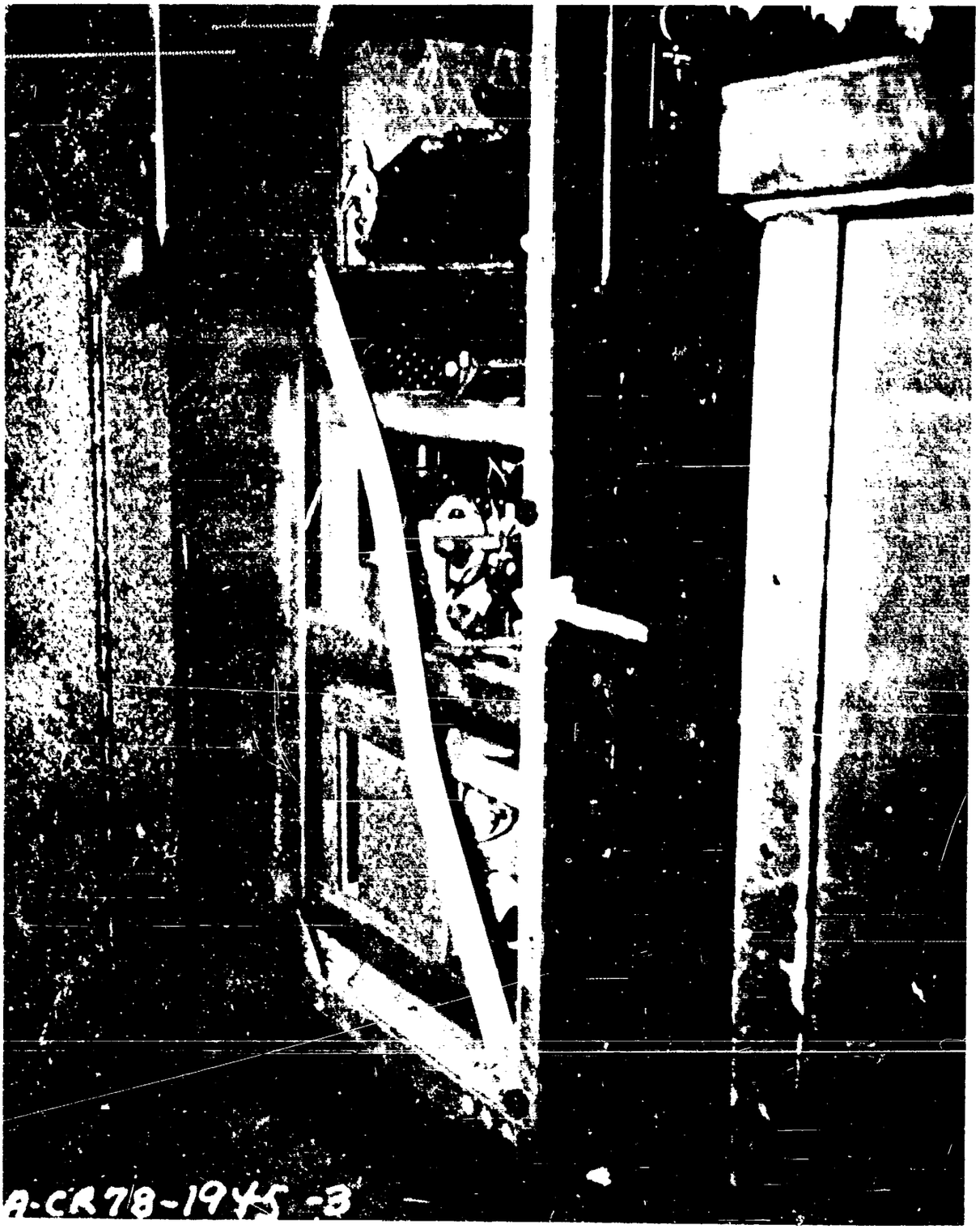
POST ABLE - MK 28 ANTENNA. MK 28 antenna as found on deck after test.



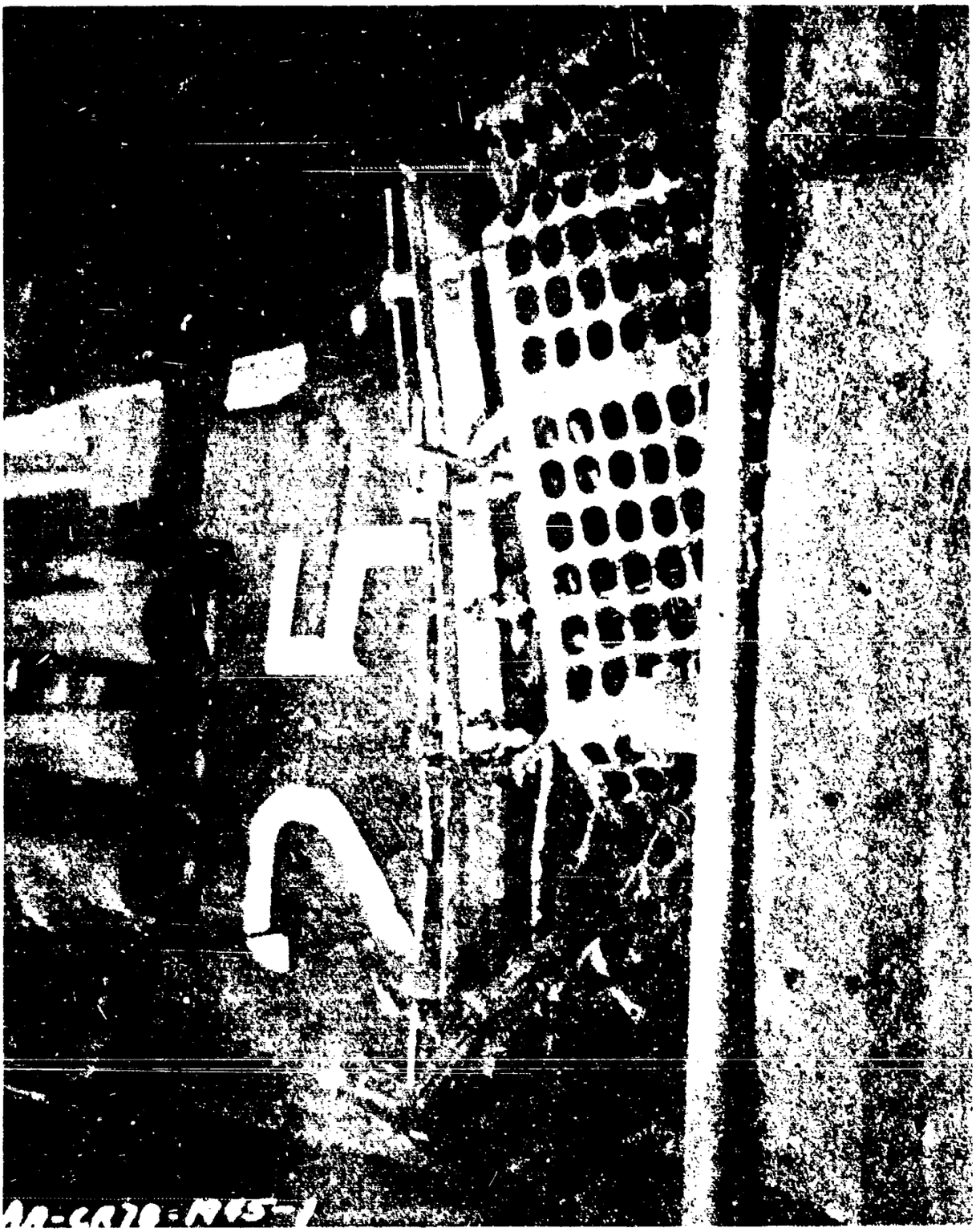
POST ABLE - MK 3 RADAR. The coaxial line was damaged by movement of the mainframe during the blast (See arrow).



POST ABLE - AFTER MK 3 ANTENNA PEDESTAL. The [illegible] cause of Mk 3 antenna failure was the [illegible]



POST ABLE - MK 4 RADAR. View of left side of main frame showing 705A clipper tube which was blown out of socket. The tube filament was broken.



POST ABLE - MK 4 ANTENNA. View from top of director. Reflector was smashed and dipoles were damaged.

PORTABLE - COAXIAL LINE. The MK 4 coax was broken and bent by the blast.

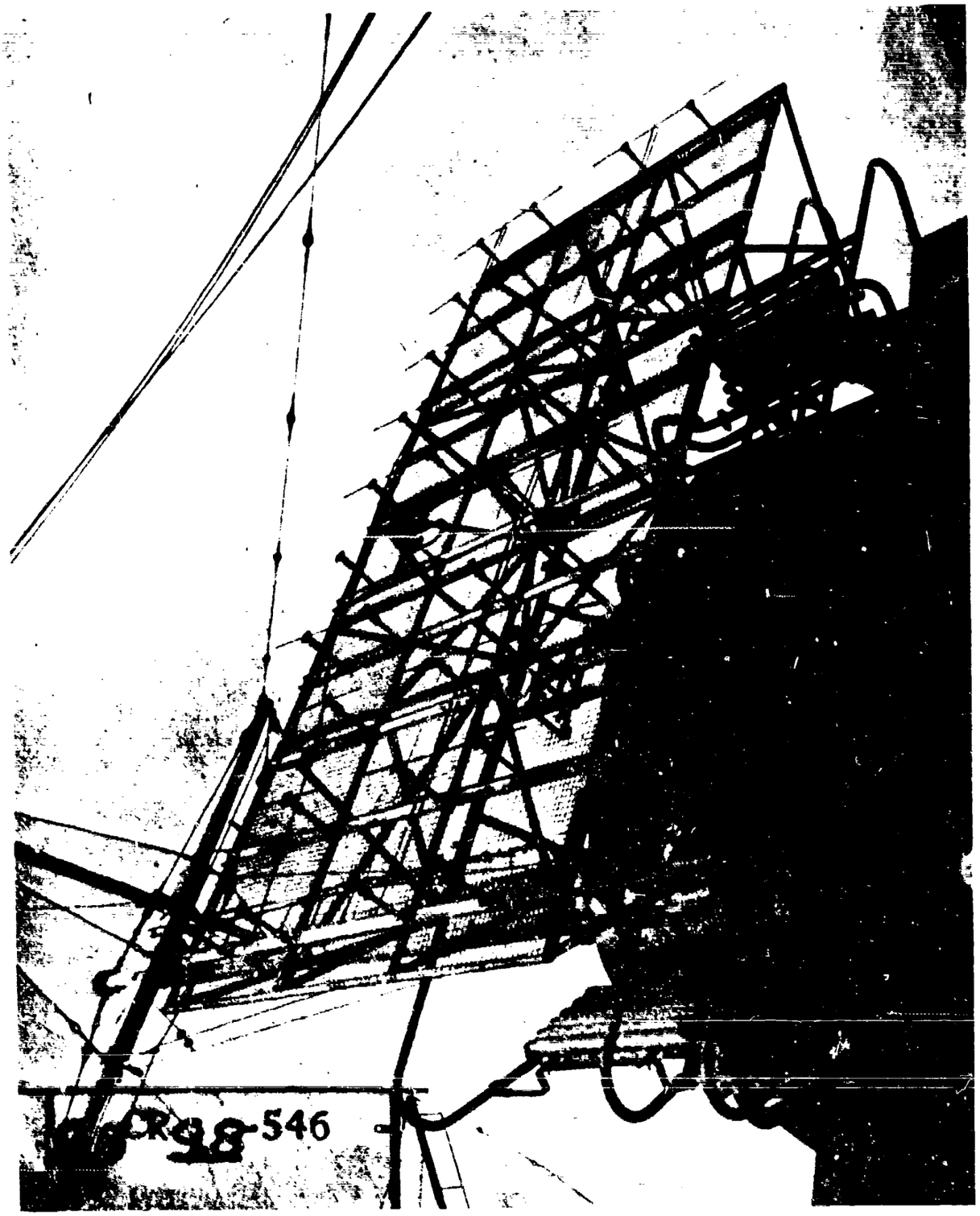
TEST ABLE

PRIN EUGEN (IX-300)

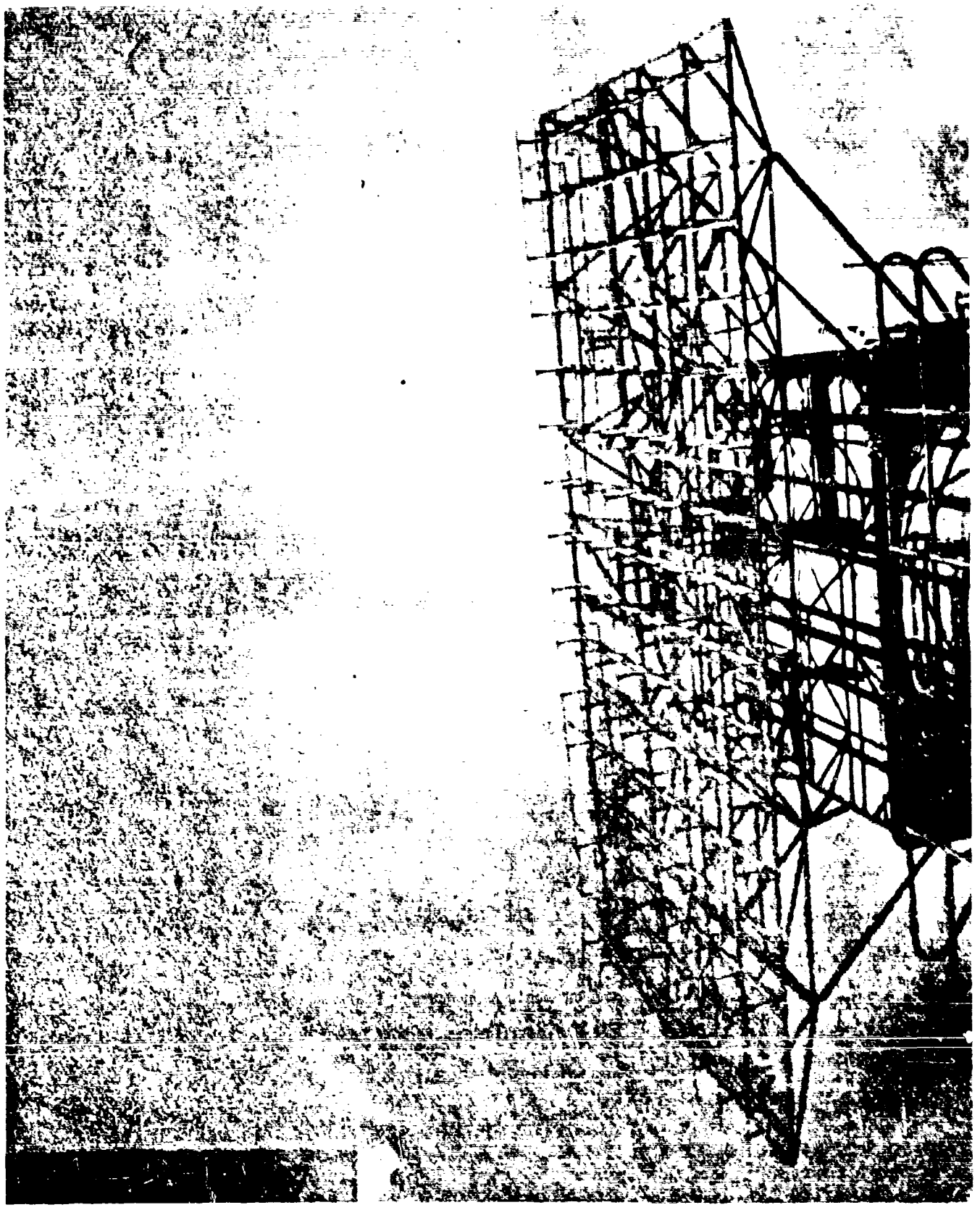
Range: 1200 yards Bearing: 300°

The only serious damage to radar equipment was to the SQ search radar when it was knocked off its tripod mount and fell to the deck, and the jamming of the forward fire control director when it was knocked off its track. Other damage except to communication antennas, was light.

Some pictures of undamaged German equipment are included for general interest.

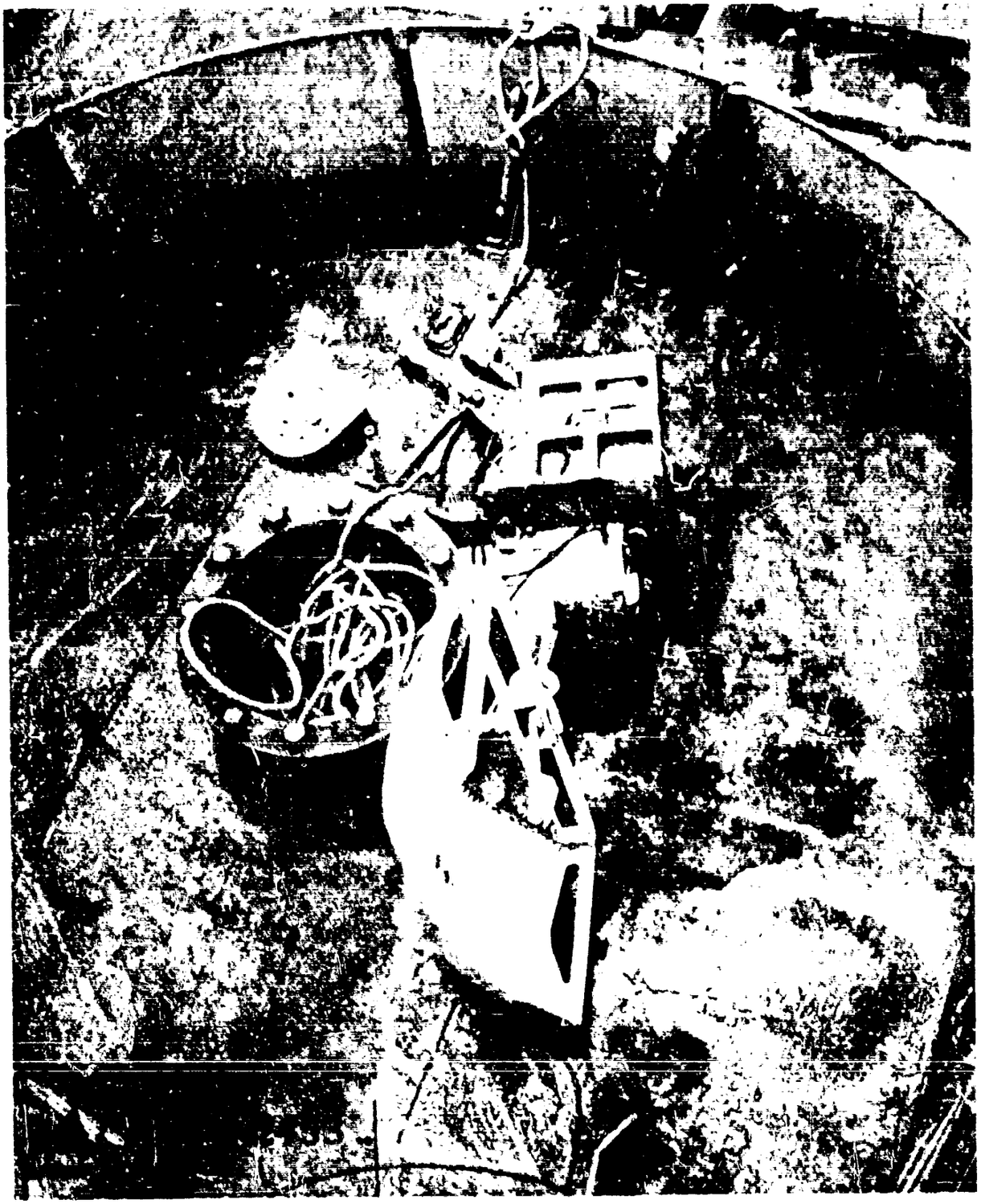


PRE-ABLE - GERMAN AFTER FIRE CONTROL RADAR ANTENNA. It may be seen that transmitted beam of German Fumo MK 28 is vertically polarized as compared to the horizontal polarization of the forward fire control radar (Fume MK 28).

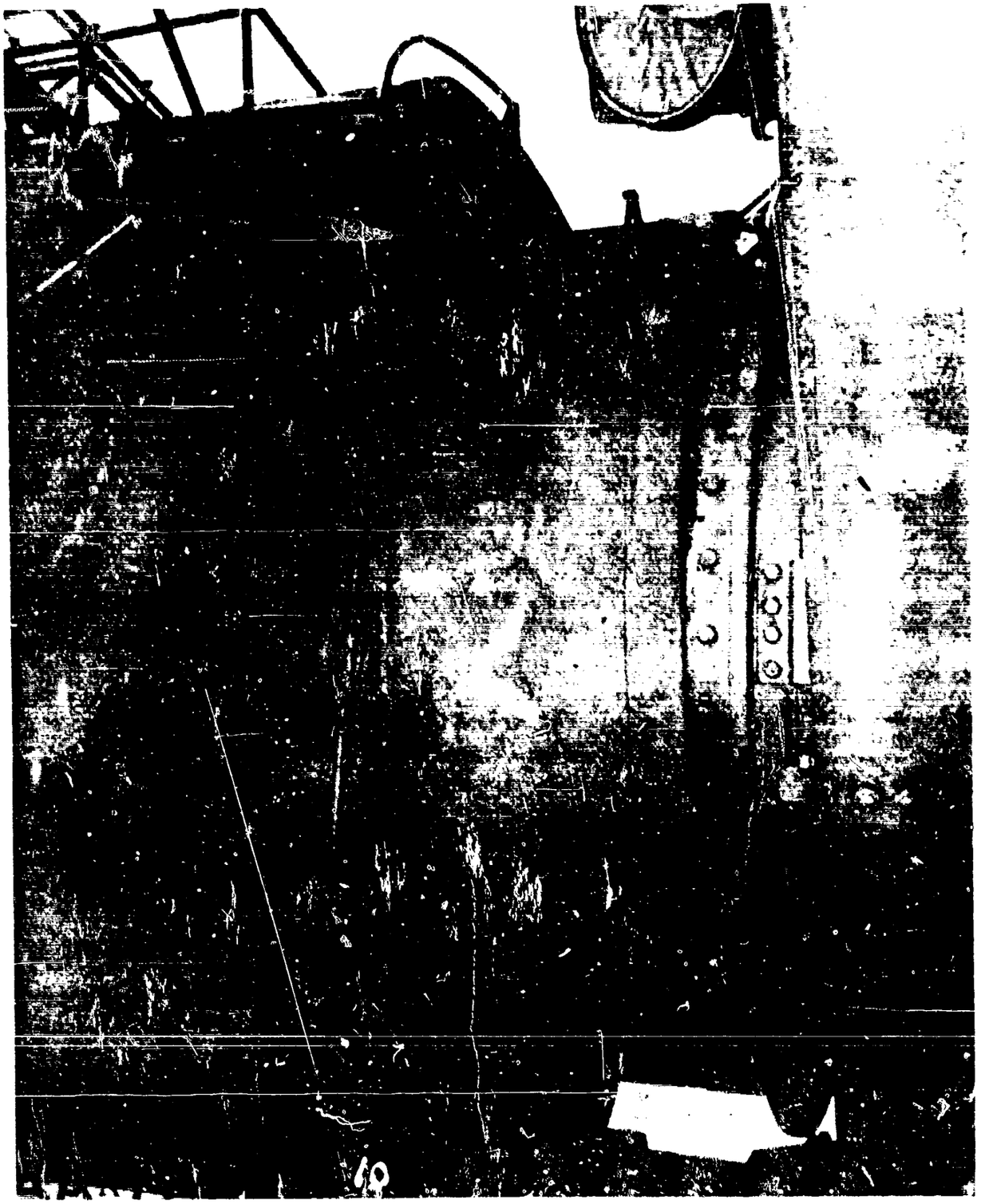


POST ABLE - GERMAN FORWARD FIRE CONTROL RADAR ANTENNA. Close up of German Fumo Mod 26 Fire Control Radar Antenna. A few dipoles were bent but not enough to prevent operation.

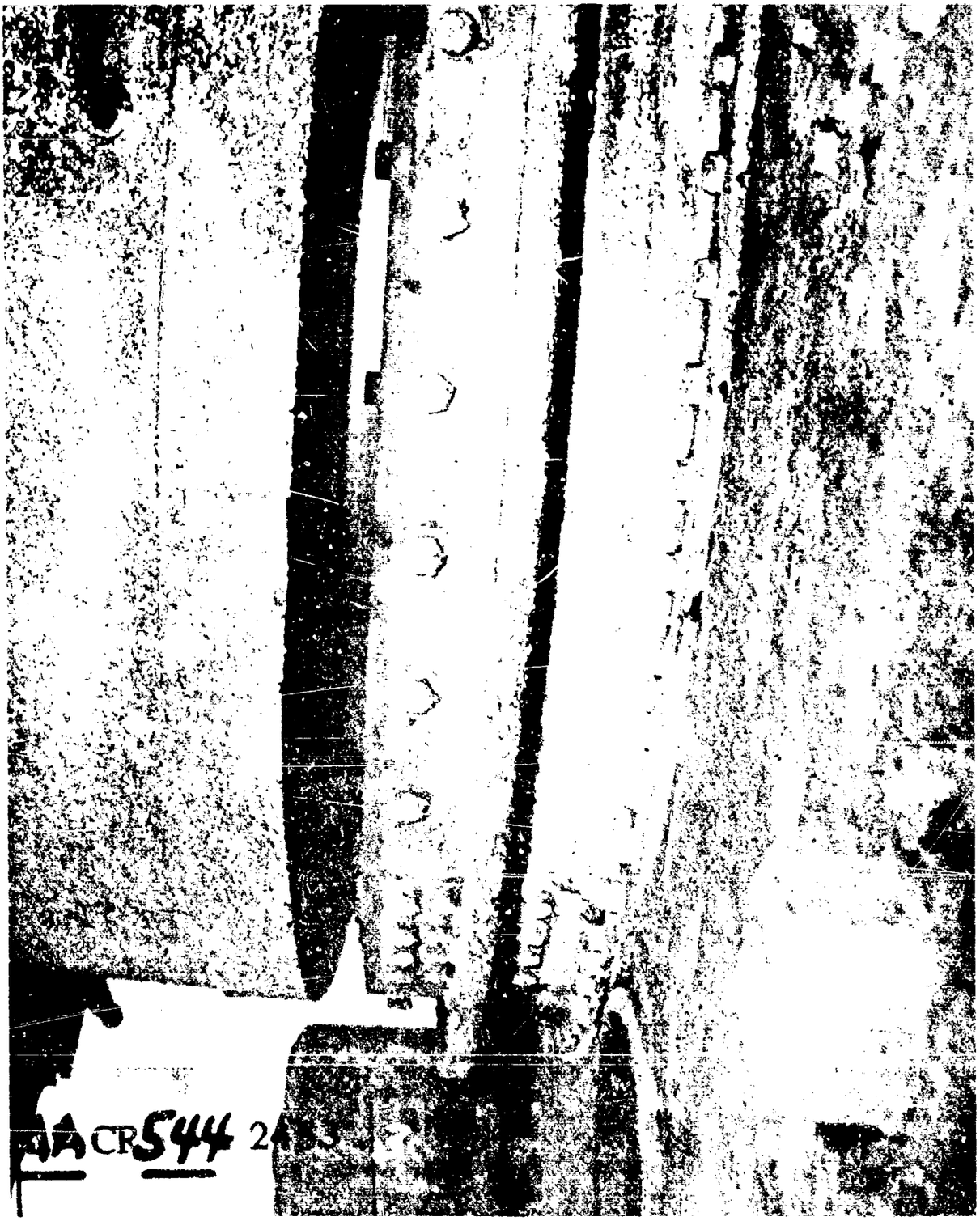
PREAMBLE - GERMAN FORWARD FIRE CONTROL AND USN SQ RADAR ANTENNAS. View of Fumo Mod 26 German Radar Fire Control Antenna. Below it can be seen a US NAVY SQ Portable Radar.



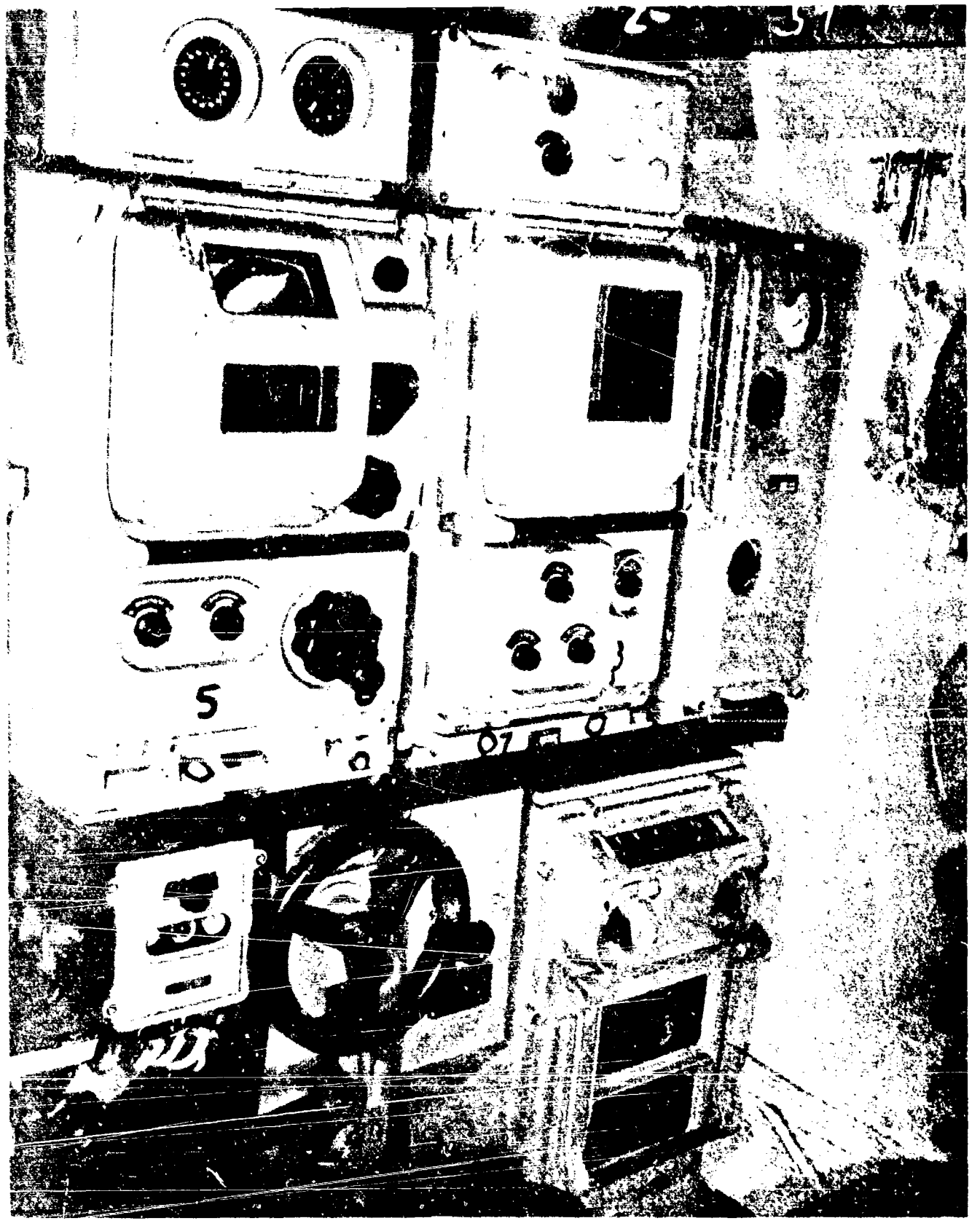
POST ABLE - USN SG RADAR. Supporting legs broke, allowing equipment to tip over on deck. Shock mounts were broken and antenna was bent by blast. Minor damage was also done when equipment hit deck.



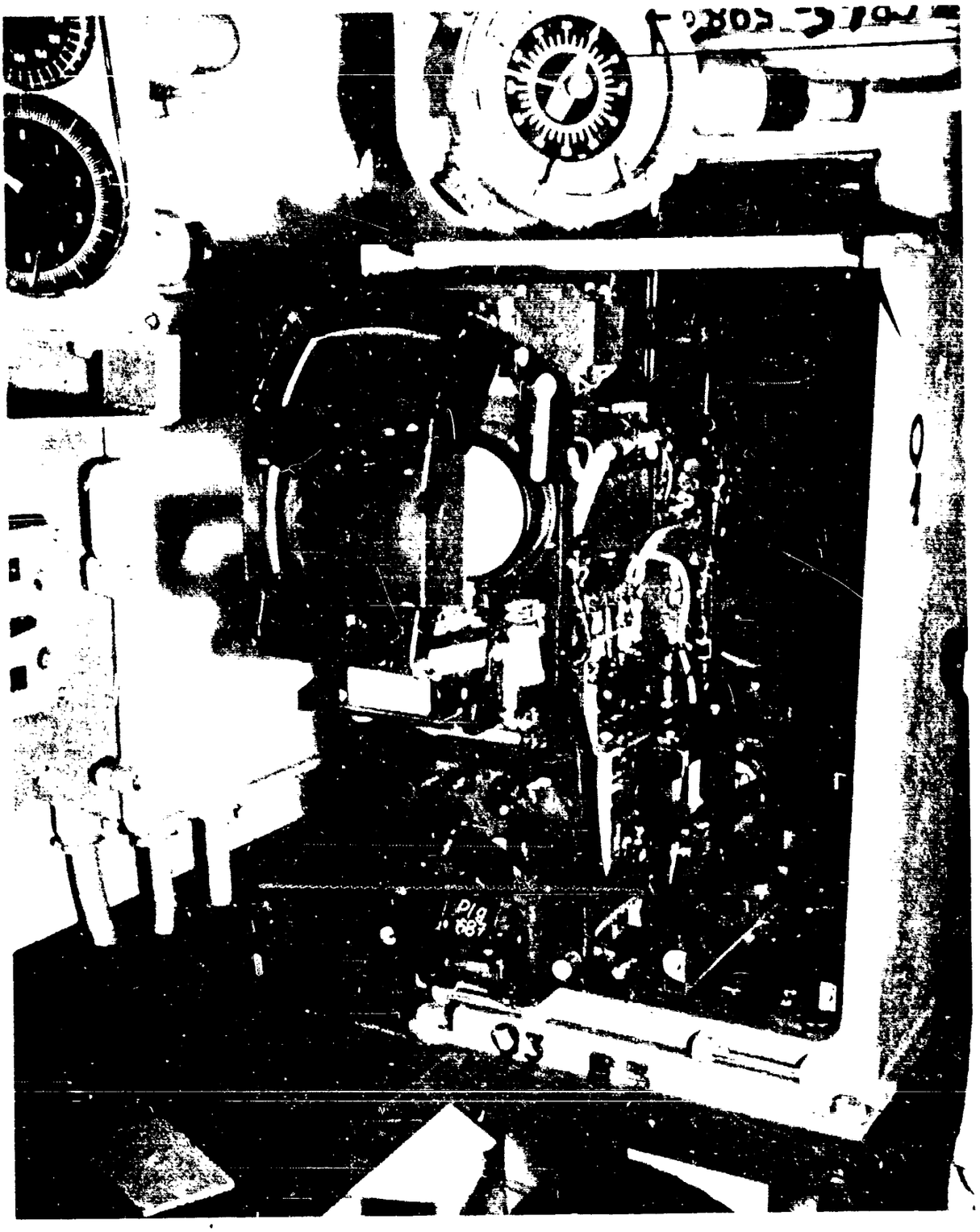
POS. ABLE - GERMAN FORWARD FIRE CONTROL RADAR DIRECTOR. Blast knocked director off its track and tipped it back 5 degrees. Director was only held by about 6 bolts, which sheared off.



POST ABLE - GERMAN FORWARD FIRE CONTROL RADAR DIRECTOR. Close up of director. This director was knocked back in place by the Test Baker explosion and then operated perfectly.



PRE ABLE - GERMAN FORWARD FIRE CONTROL RADAR. Part of main-frame of German Fumo MK 26 Radar. Of interest are the cast alumimum panels and also the locking mechanism which locks units in main-frame with single movement of handle.



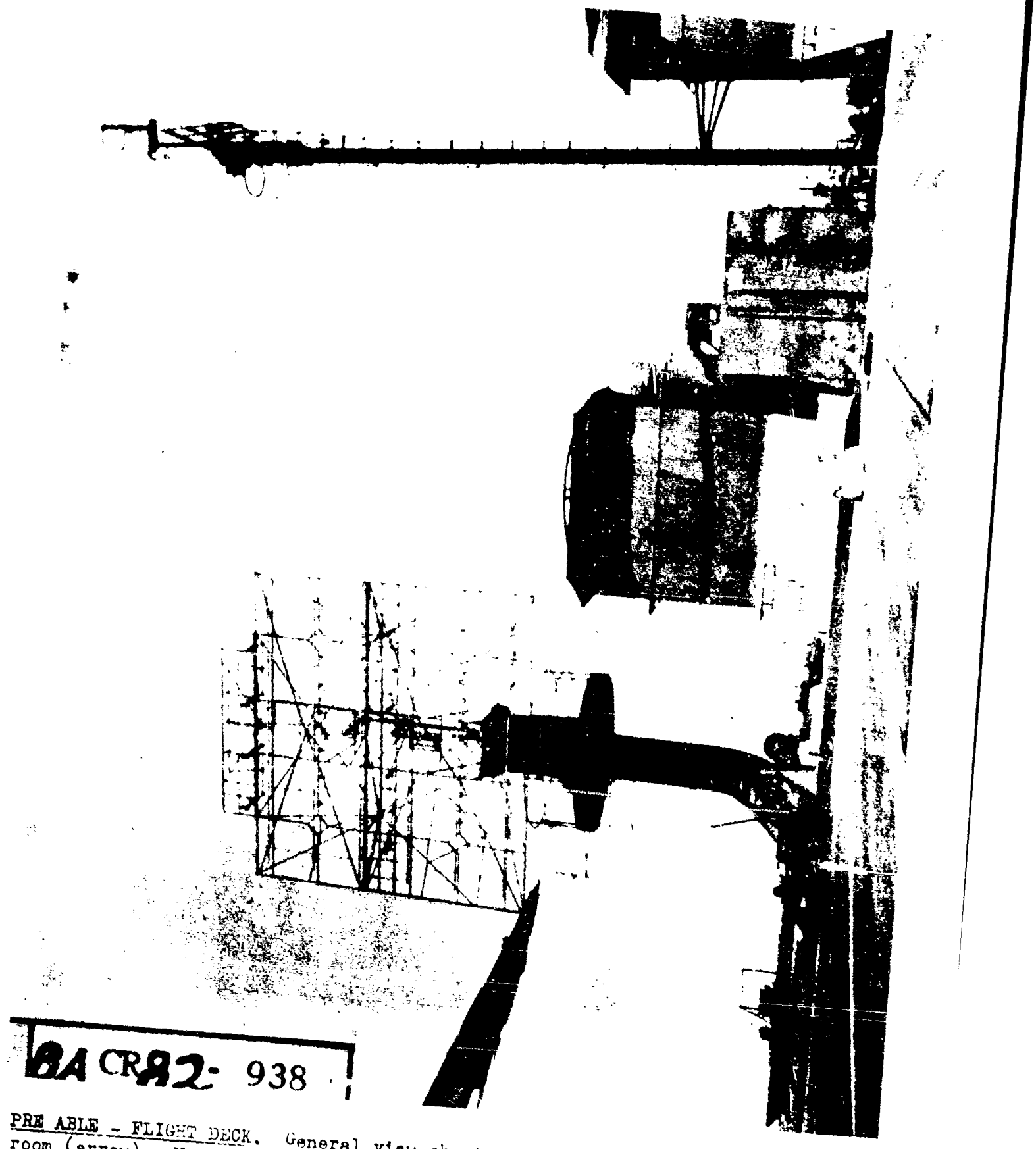
PRE ABLE - GERMAN FORWARD FIRE CONTROL RADAR. Indicator unit of German Fumo MK 26 Radar, with front panel removed. The Germans were very successful in designing this equipment so that it used the minimum number of vacuum tubes, and also in standardizing tube types so that very few types had to be carried for replacements.

TEST ABLE

U.S.S. INDEPENDENCE (CVL-22)

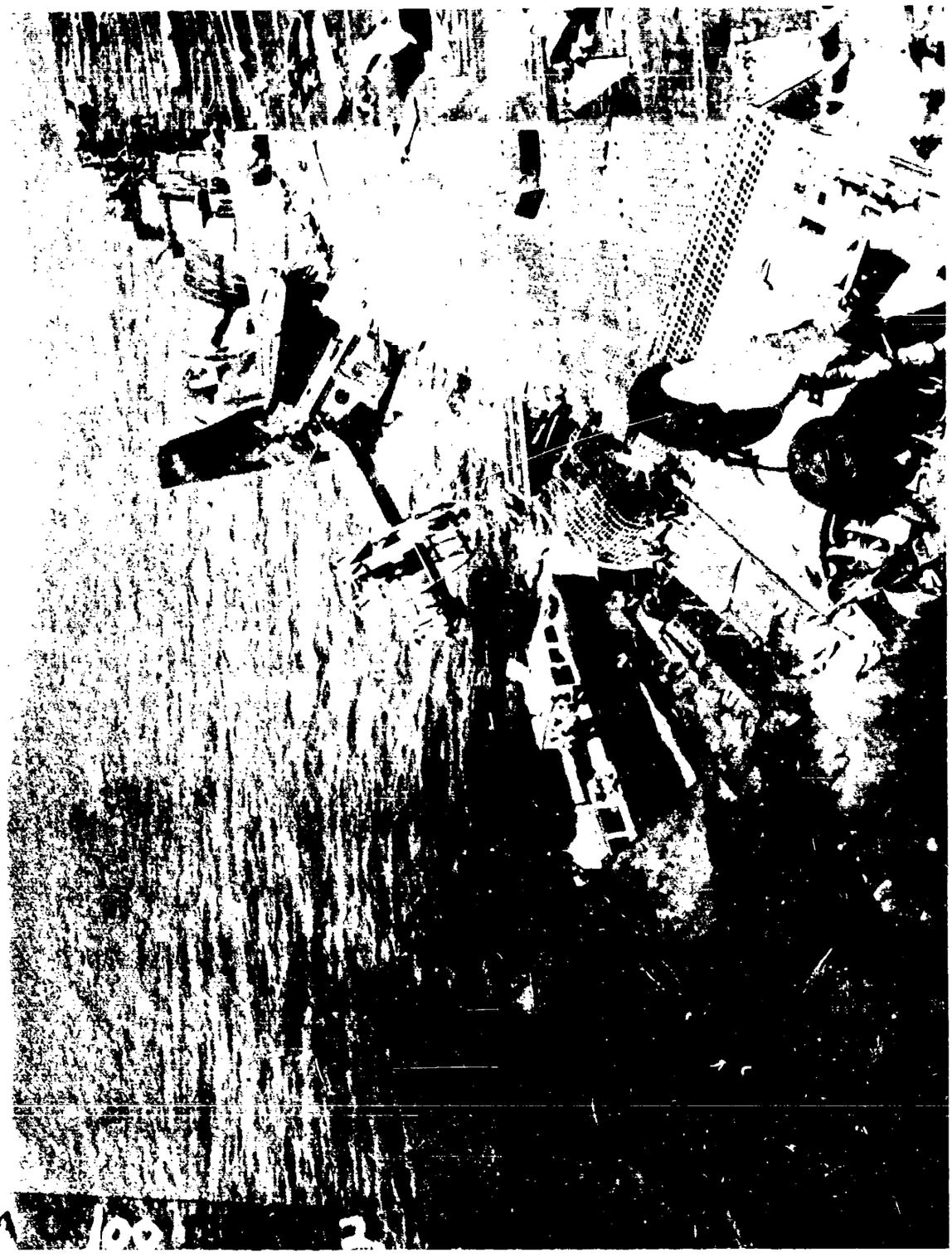
Range: 700 yards Bearing: 125°

This ship suffered the heaviest electronic damage of any surviving ship in Test ABLE. These pictures contain some of the best examples of damage along with good before and after comparisons.

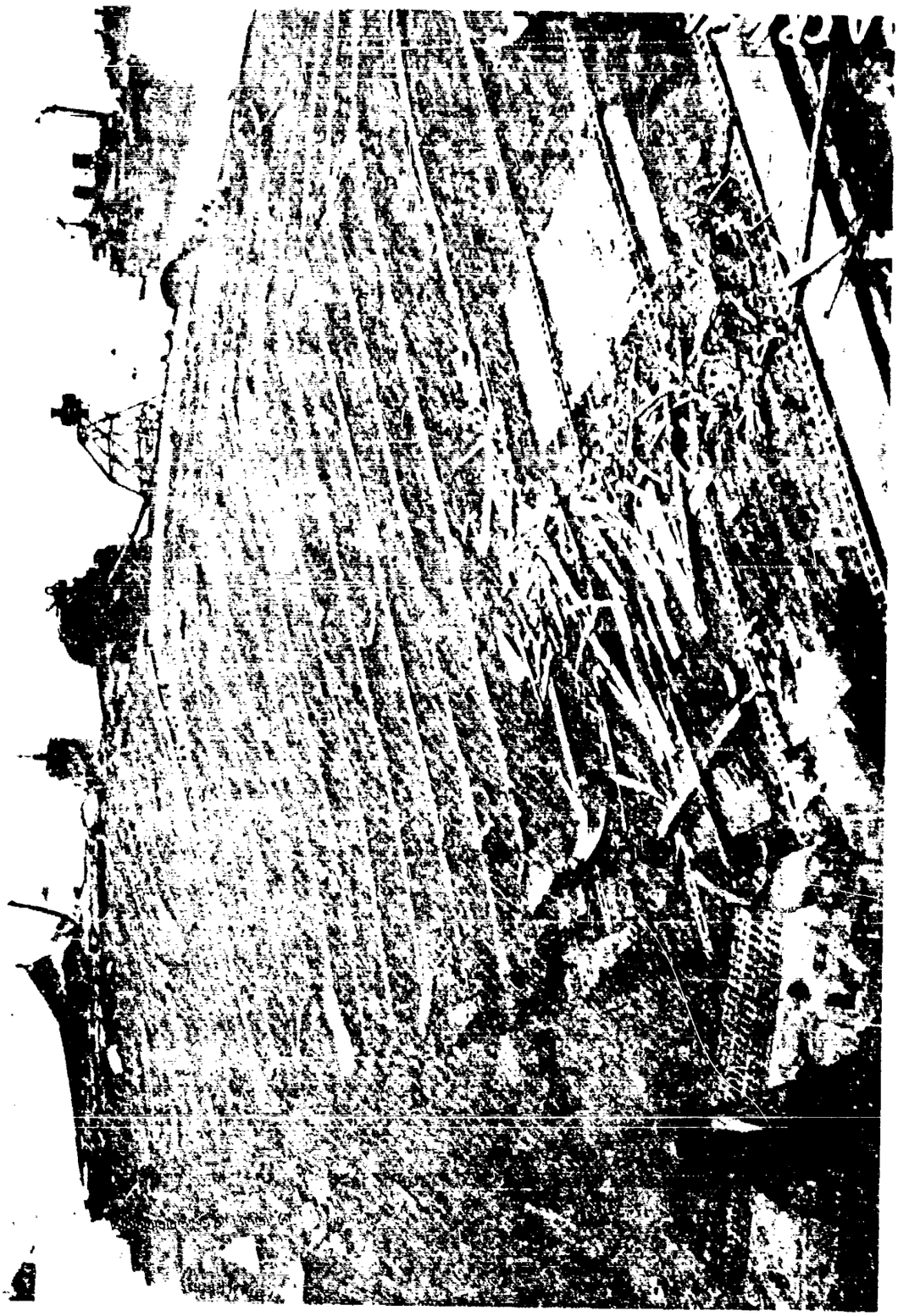


BA CR82- 938

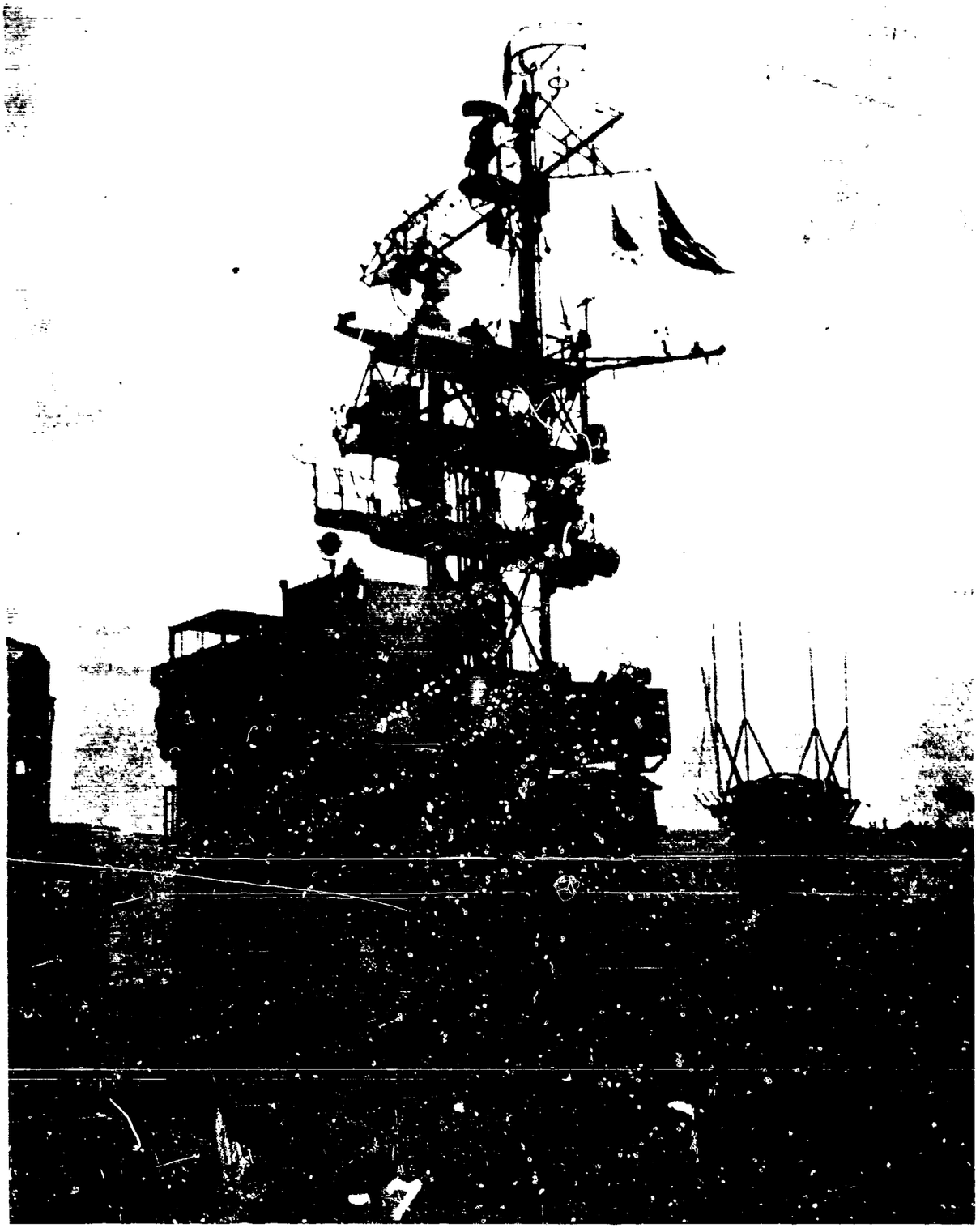
PRE ABLE - FLIGHT DECK. General view showing SK antenna and YM room (arrow). Note YG and CPN-6 antenna on mast.



POST ABLE - FLIGHT DECK. View looking aft along starboard side. In center is shown remains of SK antenna and tower upon which it was mounted. All objects extending above level of flight deck were either blown clear or bent over to starboard.

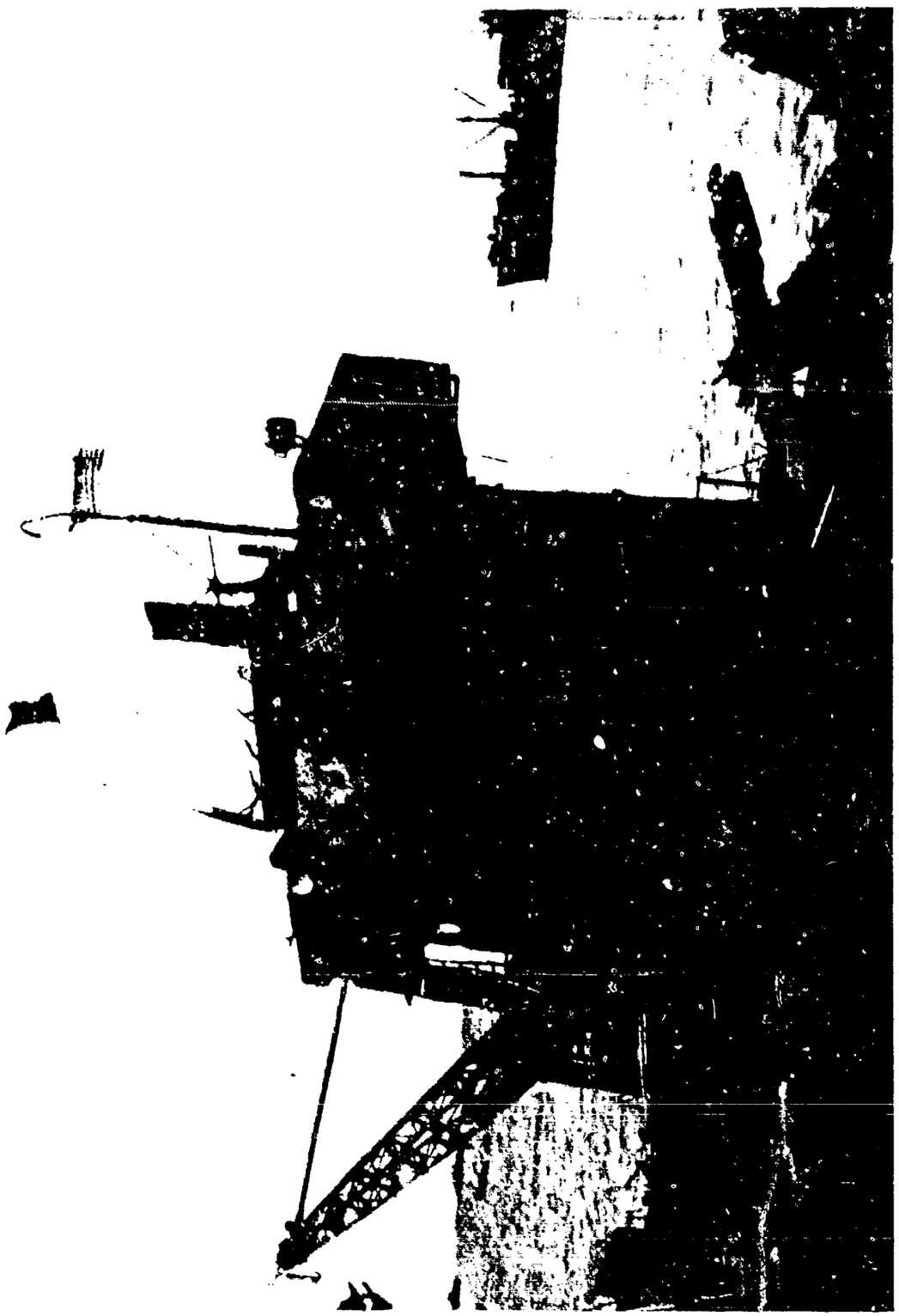


POST ABLE - FLIGHT DECK. General view looking aft from top of remaining part of island.

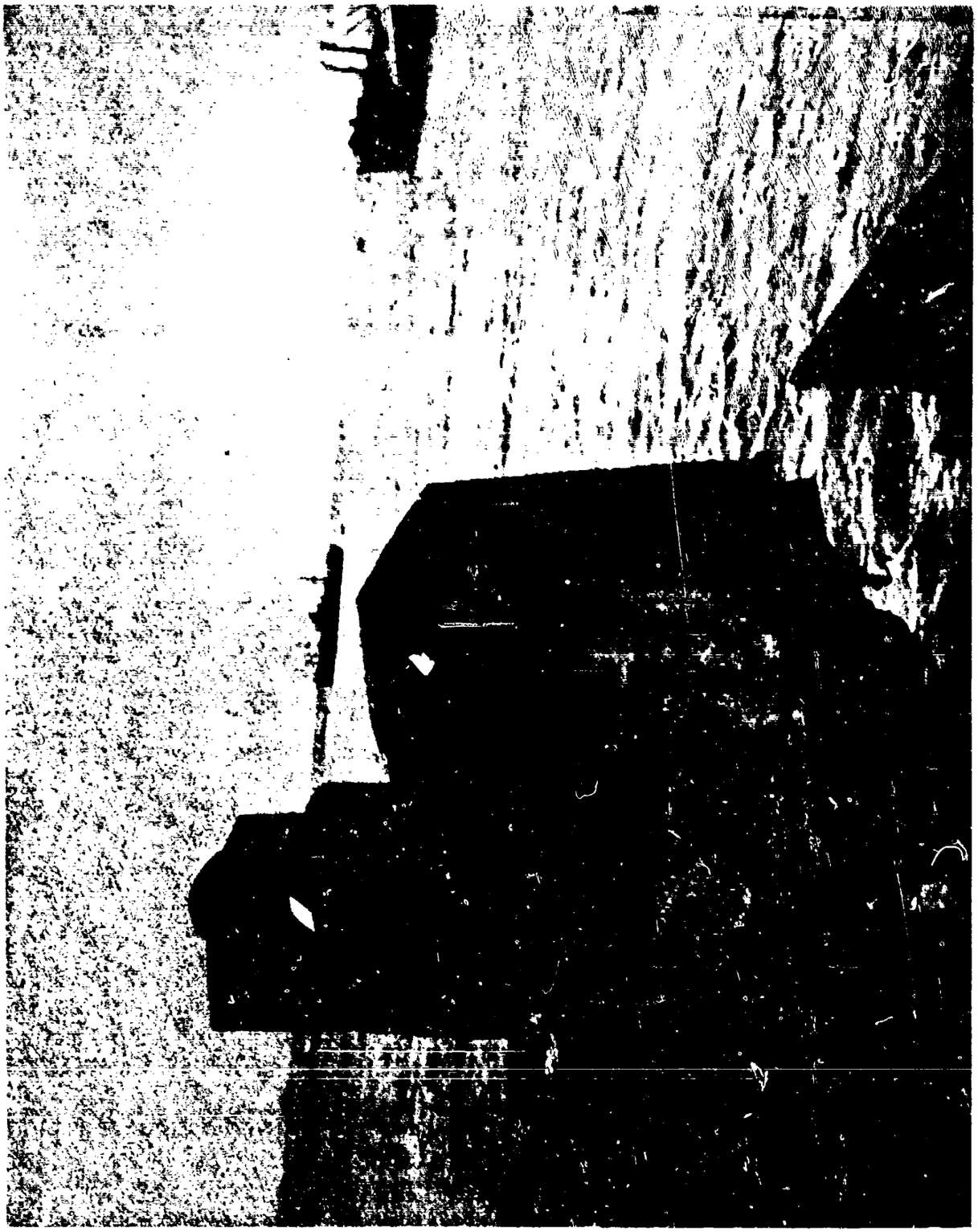


PRE ABLE - ISLAND. General view of island structure.

POST ABLE - ISLAND. General view of island structure.

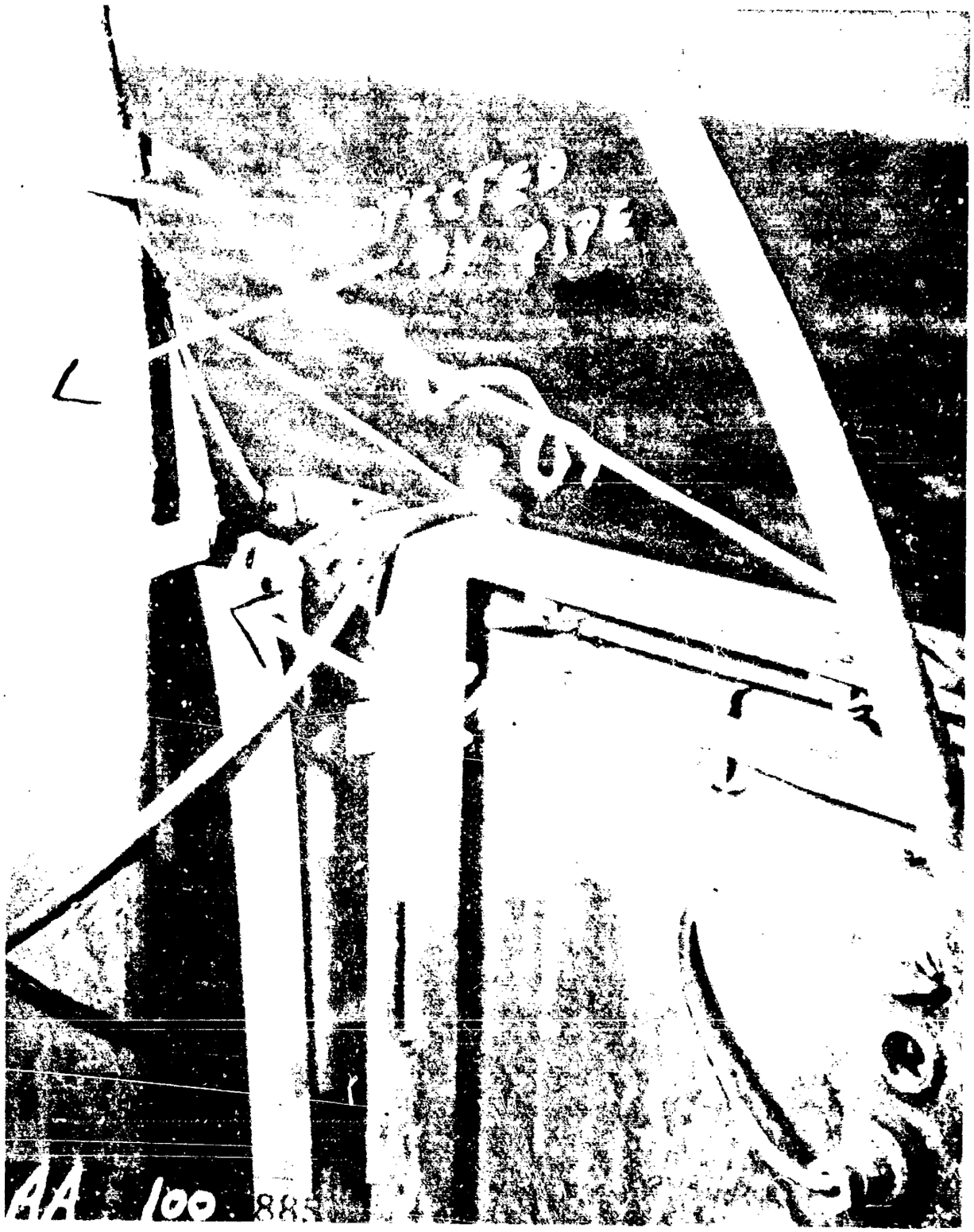


POST AFLE - ISLAND. View of island structure from center of flight deck.

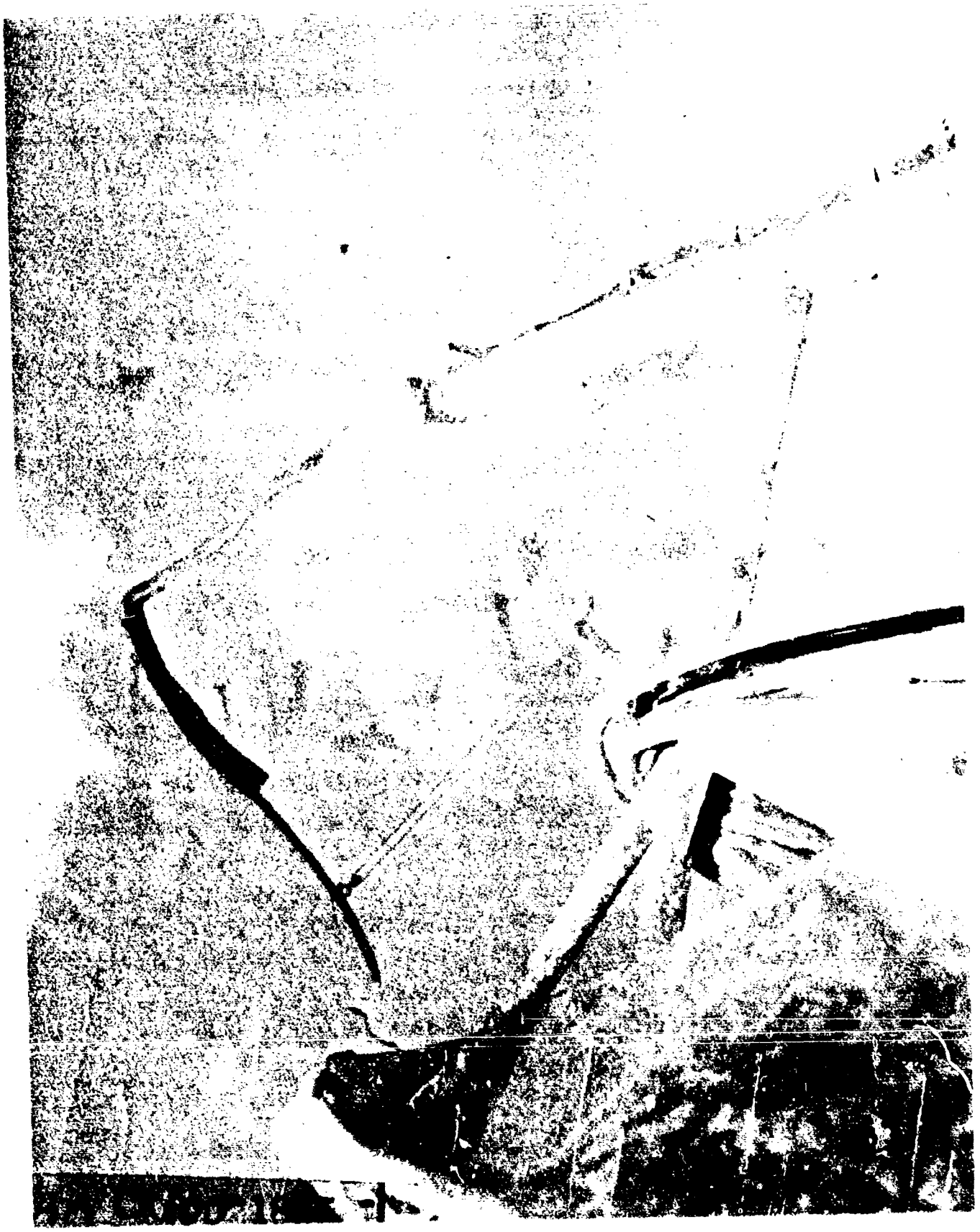


POST ABLE - YM ROOM. Bulkheads were caved in by blast.

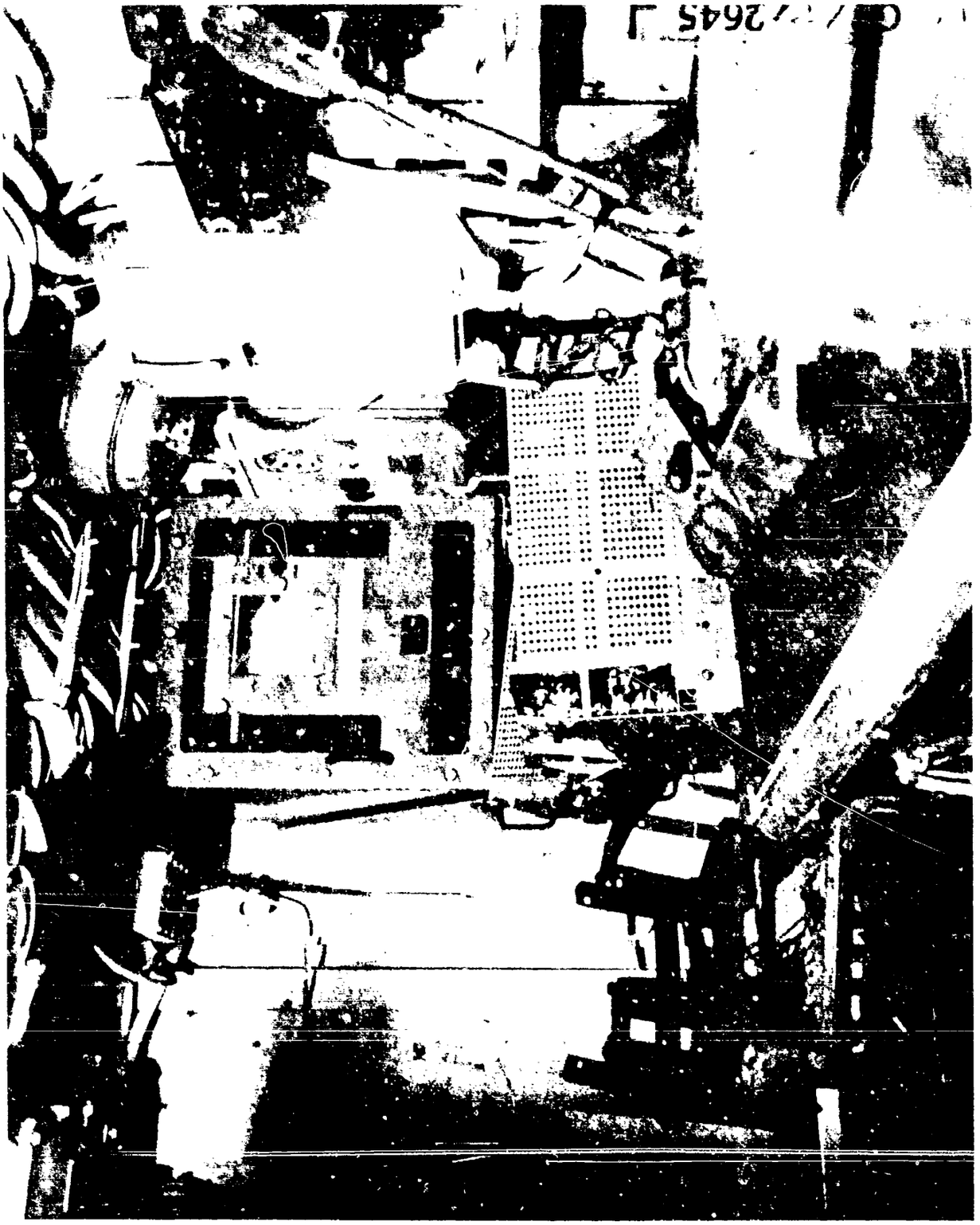
POST ABLE - SK TOWER. Close-up view of damage.



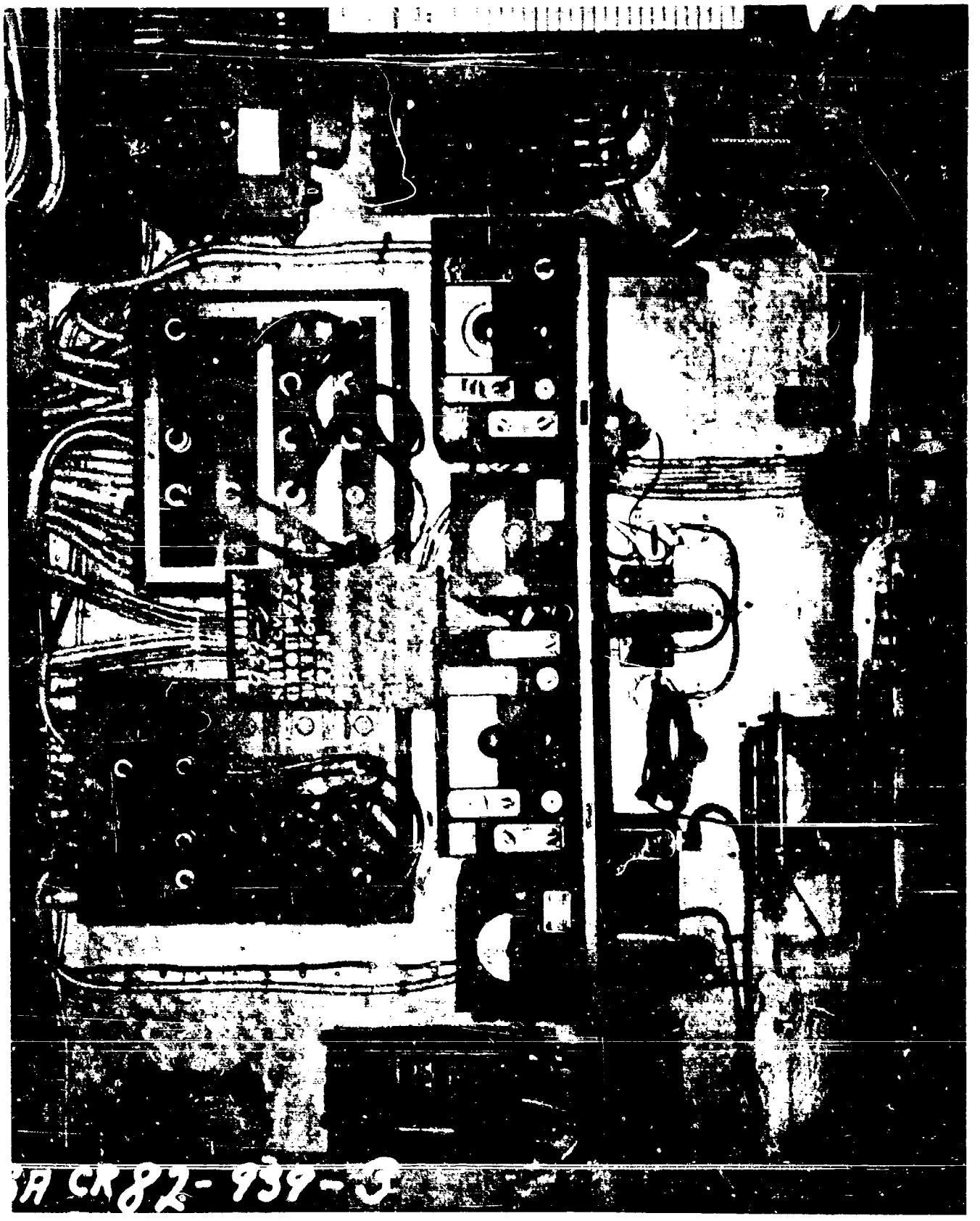
POST ABLE - WAVE GUIDE. Shows sheared off unprotected guide adjacent to continuing run of protected guide in pipe. (Arrow)



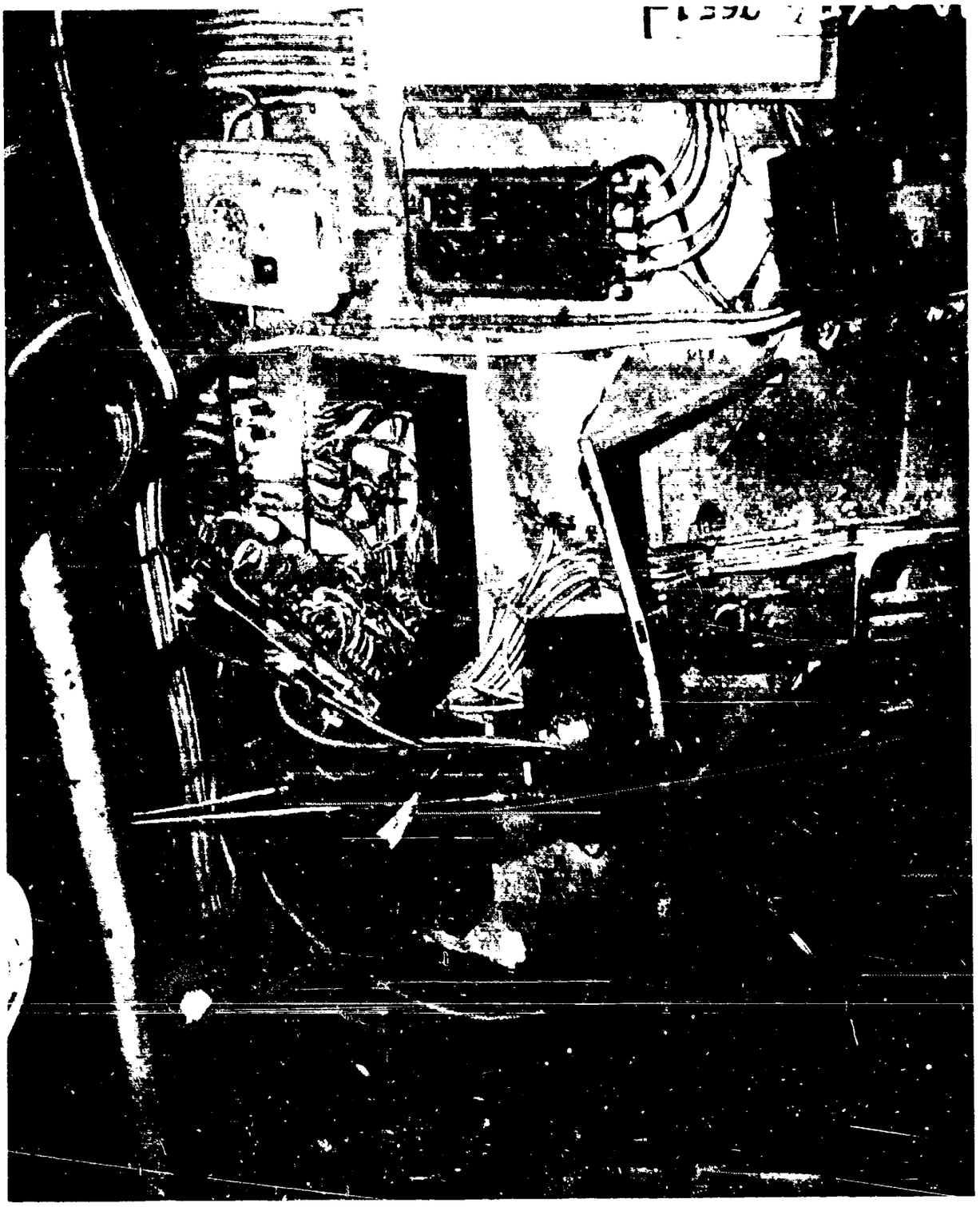
POST ABLE - WAVE GUIDE. Effect of blast on protected and unprotected waveguide. The protected guide was the highest remaining part of the island, and was used to jury-rig the Post Able signal halyards.



POST ABLE - CHART ROOM. NMB-1 and DAS-3 in chart-room. The DAS foundation and cabinet were warped and bent.



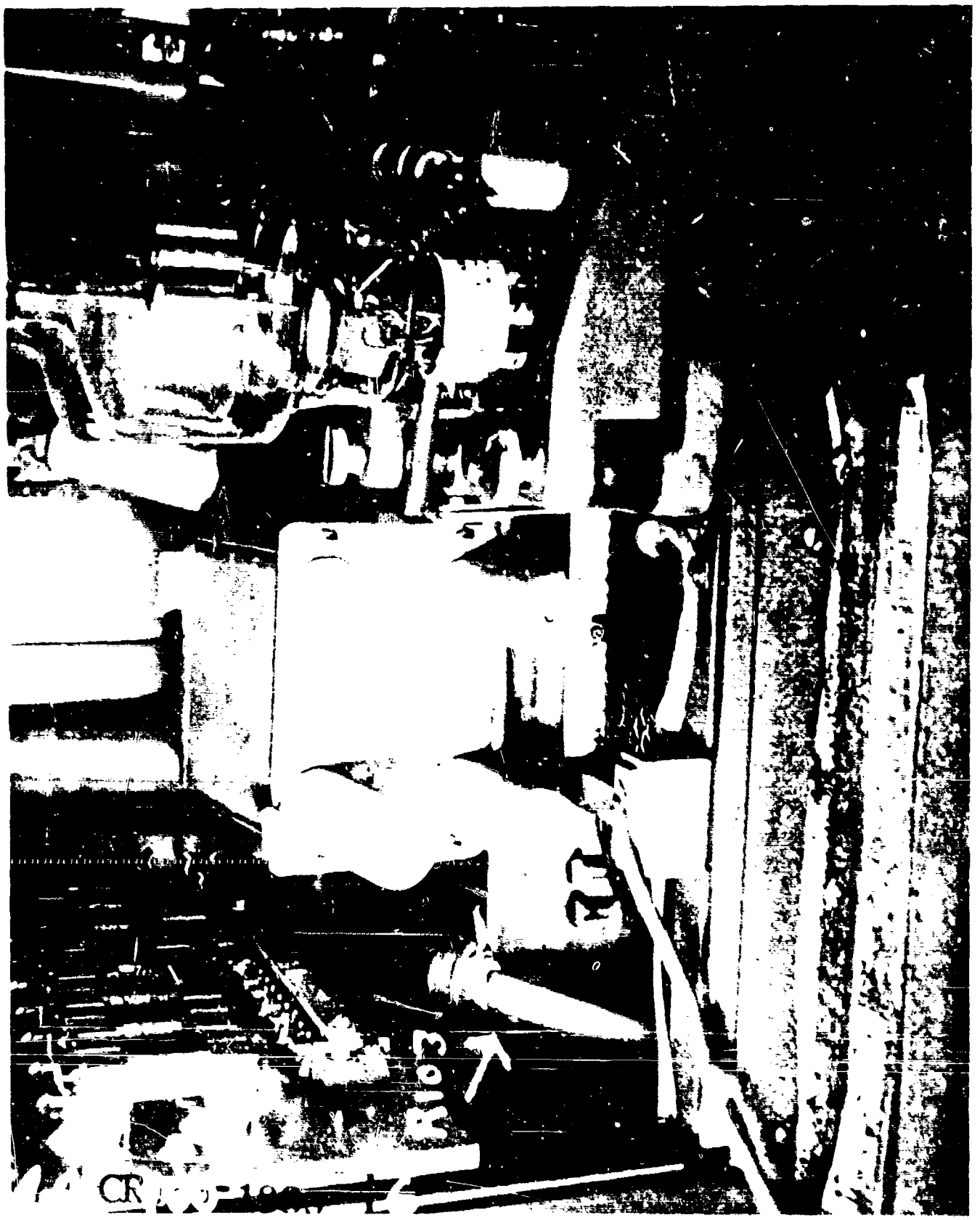
PRE ABLE - CIC. Showing after bulkhead with radio equipment and transfer panels.



POST ABLE - CIC. After bulkhead, showing damage caused by bulkhead buckling.

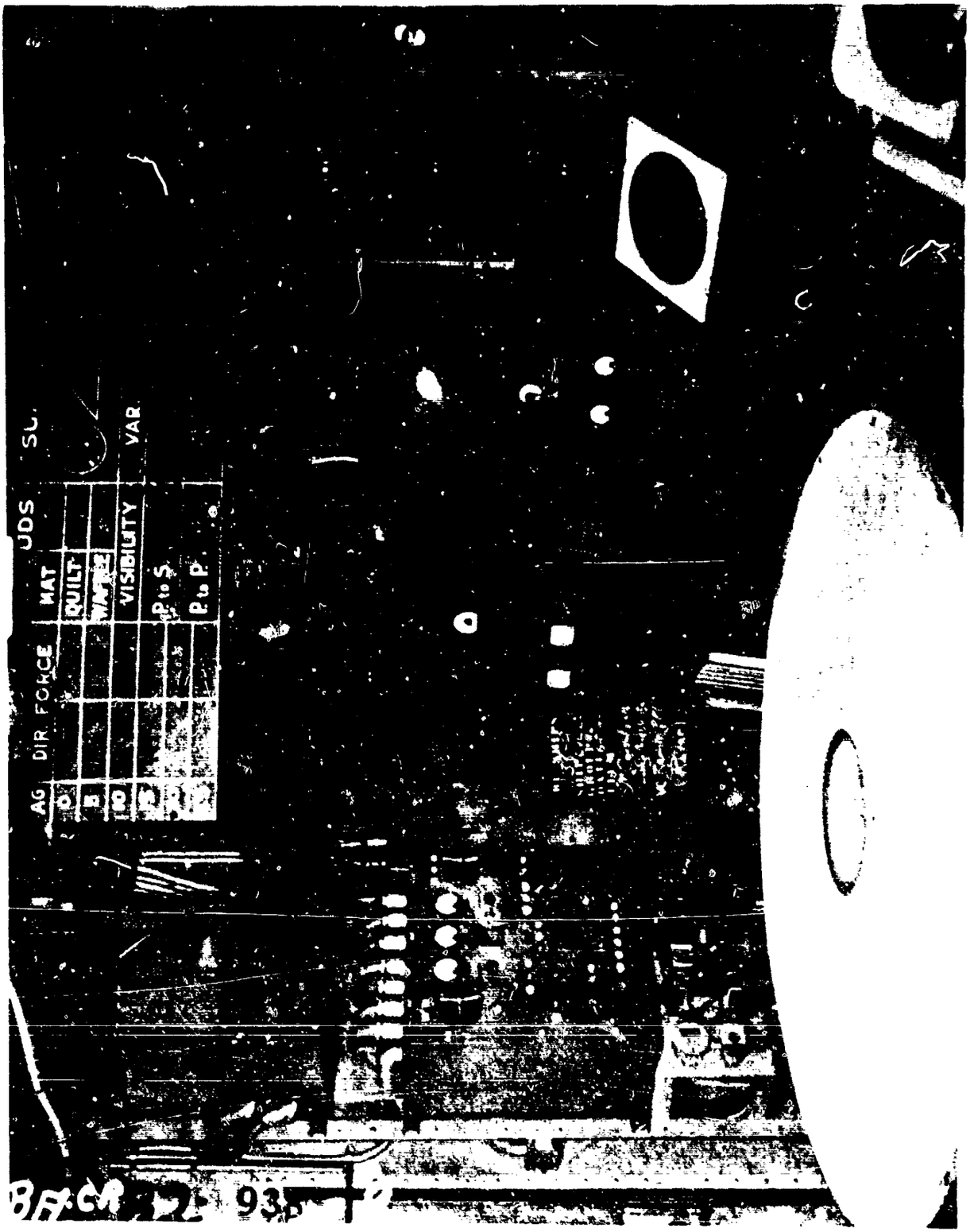
POST ABLE - CIC PORT SIDE AFT. Corner of CIC bulkhead was dished in, causing collapse of desk.

POST ABLE - SK RADAR ROOM SK indicator and all other equipment either thrown out of cases and hanging on cables or toppled from foundations. Note breakage of terminal strip mounting in equipment in left foreground. Also SK transmitter in center background tipped over to left with cone broken off at top.

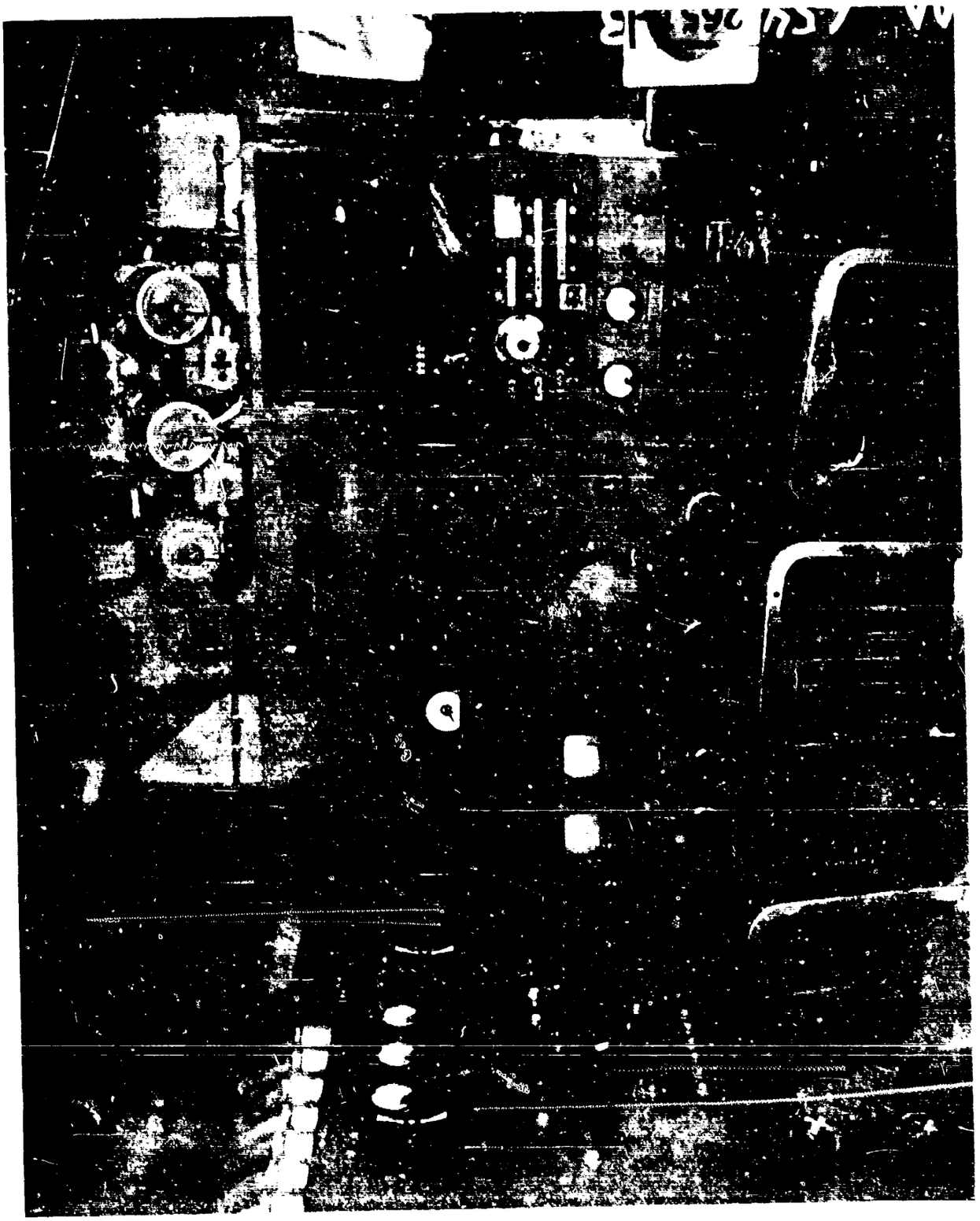


POST ABLE - INTERIOR OF SG MAIN FRAME. C-102 mounting insulators were broken. All insulators broke out at ends where taoped for mounting screws. Equipment suffered badly from shock as main frame mounting bolts sheared, allowing equipment to strike bulkhead. Also note R103 (arrow) which dropped out of clip when similiar stand-off insulator at one end broke.

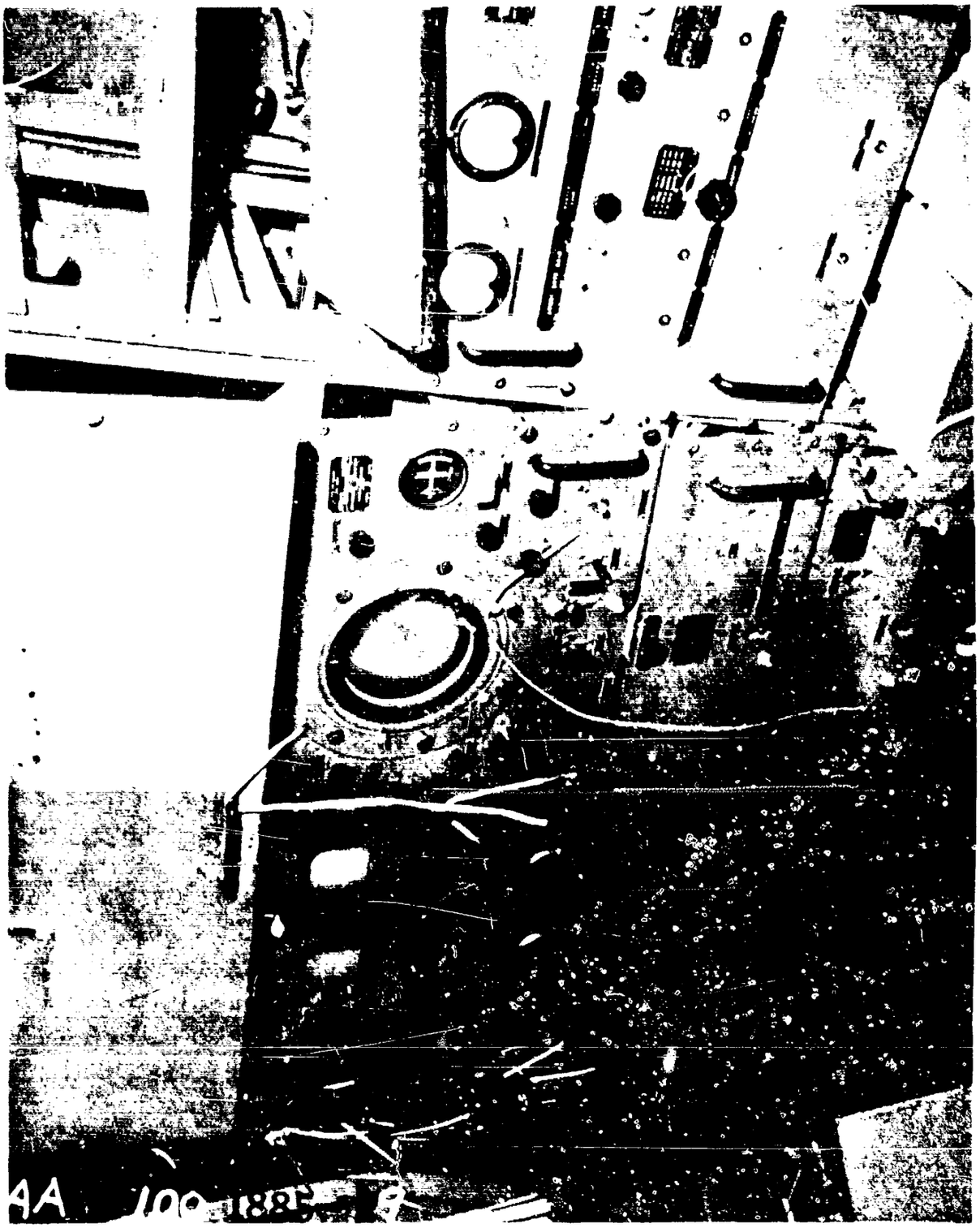
POST ABLE - SGa INDICATOR. This view shows how SG indicator foundation moved to starboard. There was no damage to the indicator itself.



PRE ABLE - SK CONSOLE. General view.



POST ABLE - SM CONSOLE. Frame was distorted to the right, jamming the drawers.



POST ABLE - SPARE SM CONSOLE. Close up of distorted frame and jammed shelves.

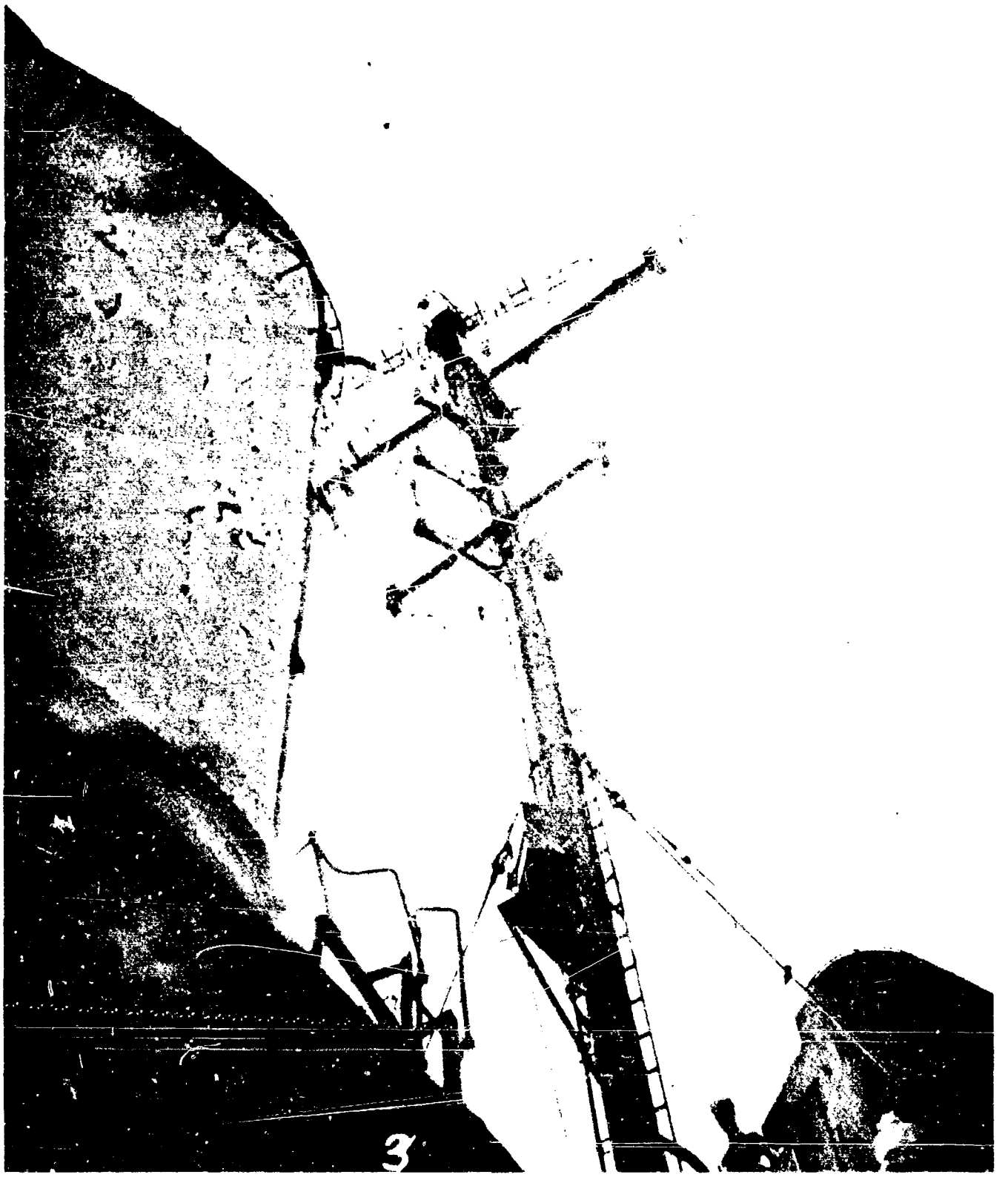
POST ABLE - VD-2 Equipment on open bridge. Welds parted on foundations, and subsequent movement of VD-2 parted cables. Housing sides were warped and top blown off, but VD-2 was apparently undamaged.

TEST ABLE

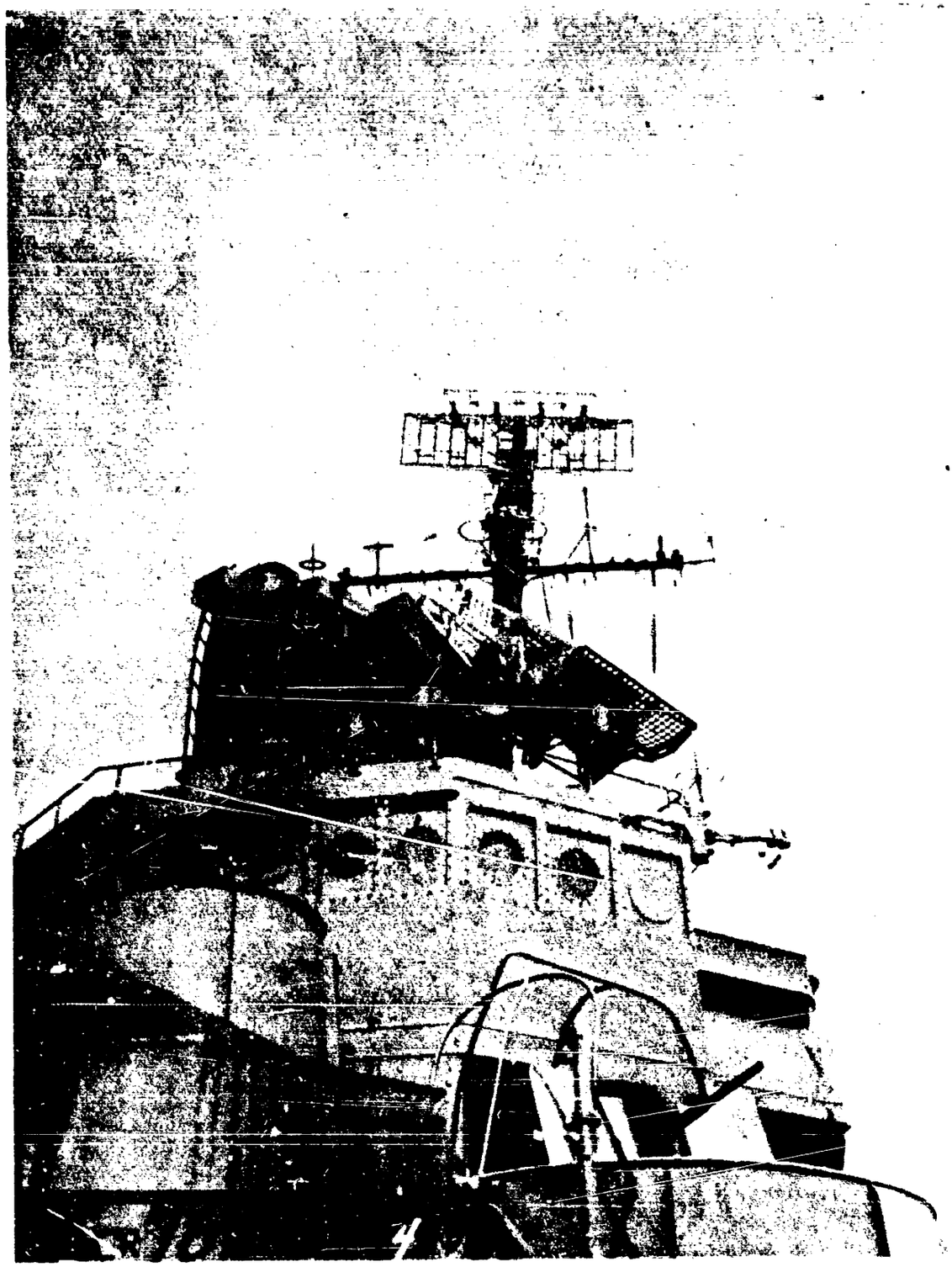
U.S.S. RALPH TALBOT (DD-390)

Range: 1200 yards Bearing: 090°

This ship sustained moderate damage to electronic equipment. Torn waveguide, broken communications antennas and ruptured shock mounts are shown here.

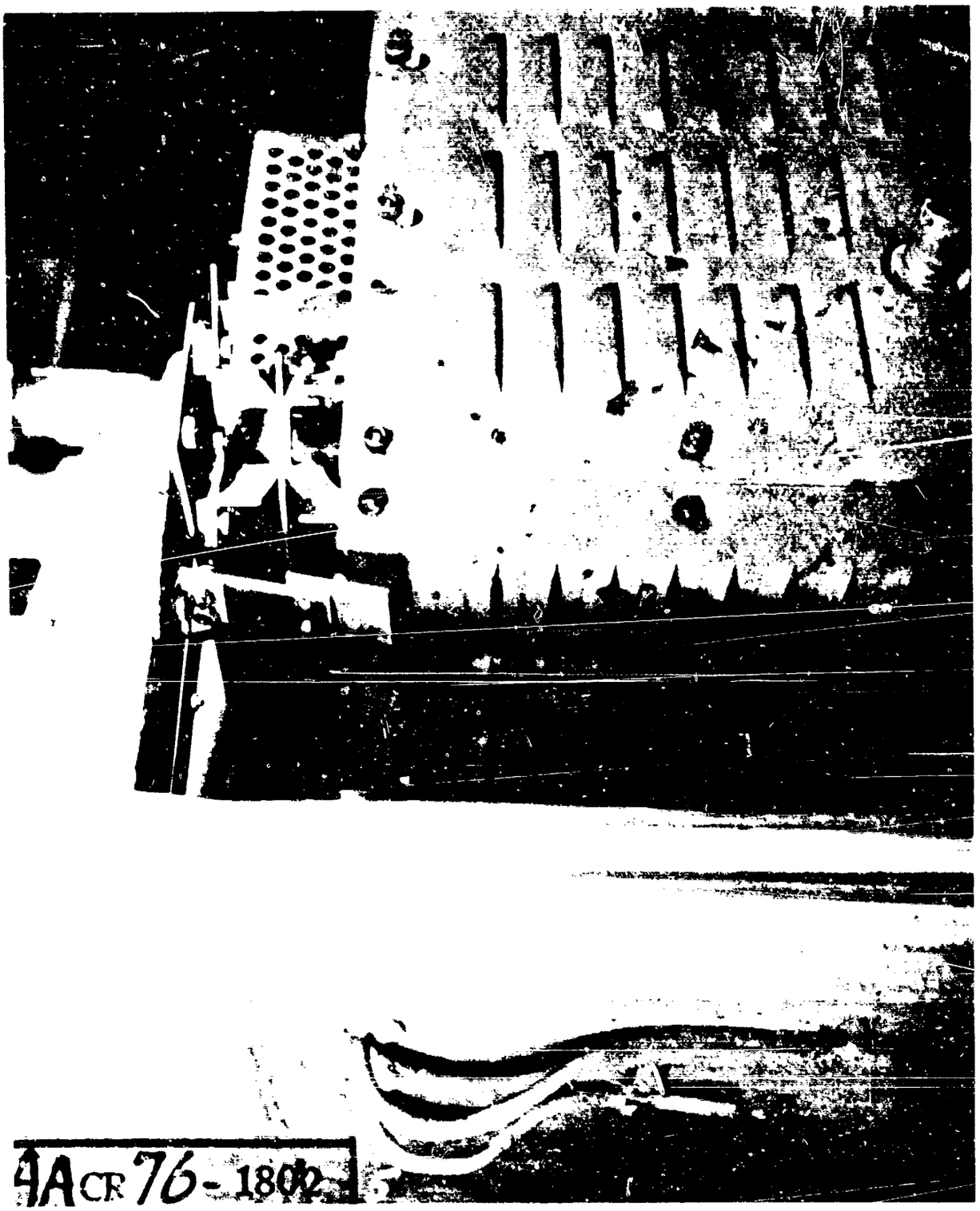


POST ABLE - FOREMAST. View of SC and other antennas. A slight bend in mast is visible, but it did not cause any damage to equipment.



POST ABLE - FOREMAST AND MAIN BATTERY DIRECTOR. Neither the SC or MK 4 radar antenna was materially damaged.

POST ABLE - SG WAVE GUIDE. Waveguide was damaged by flying piece of metal, but the equipment was still operative.



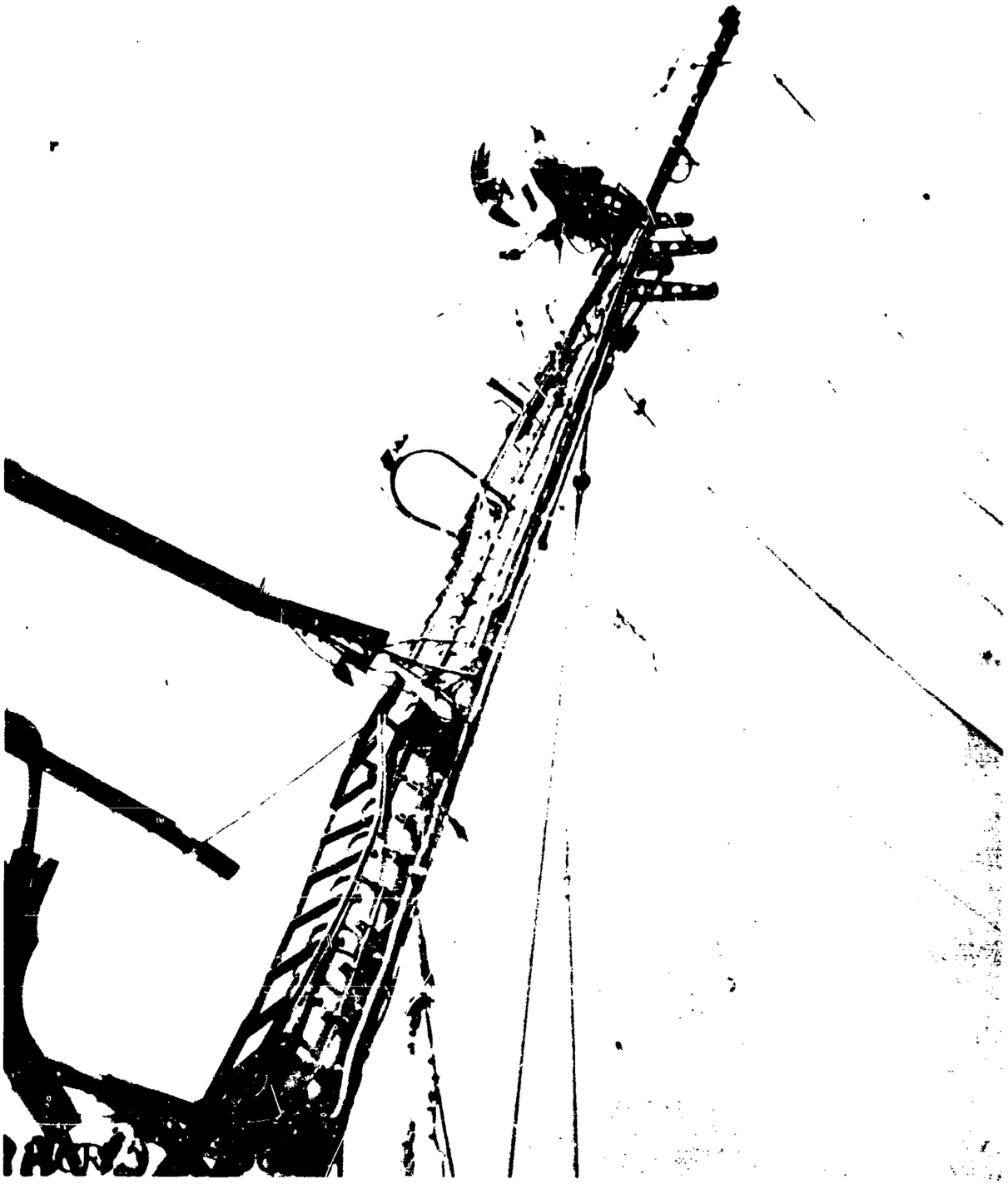
POST ABLE - SC-3 RADAR. This view of top of main frame illustrates a typical shock mount failure. The rubber usually pulled off at the metal to rubber seal, but sometimes the rubber pulled apart.

TEST ABLE

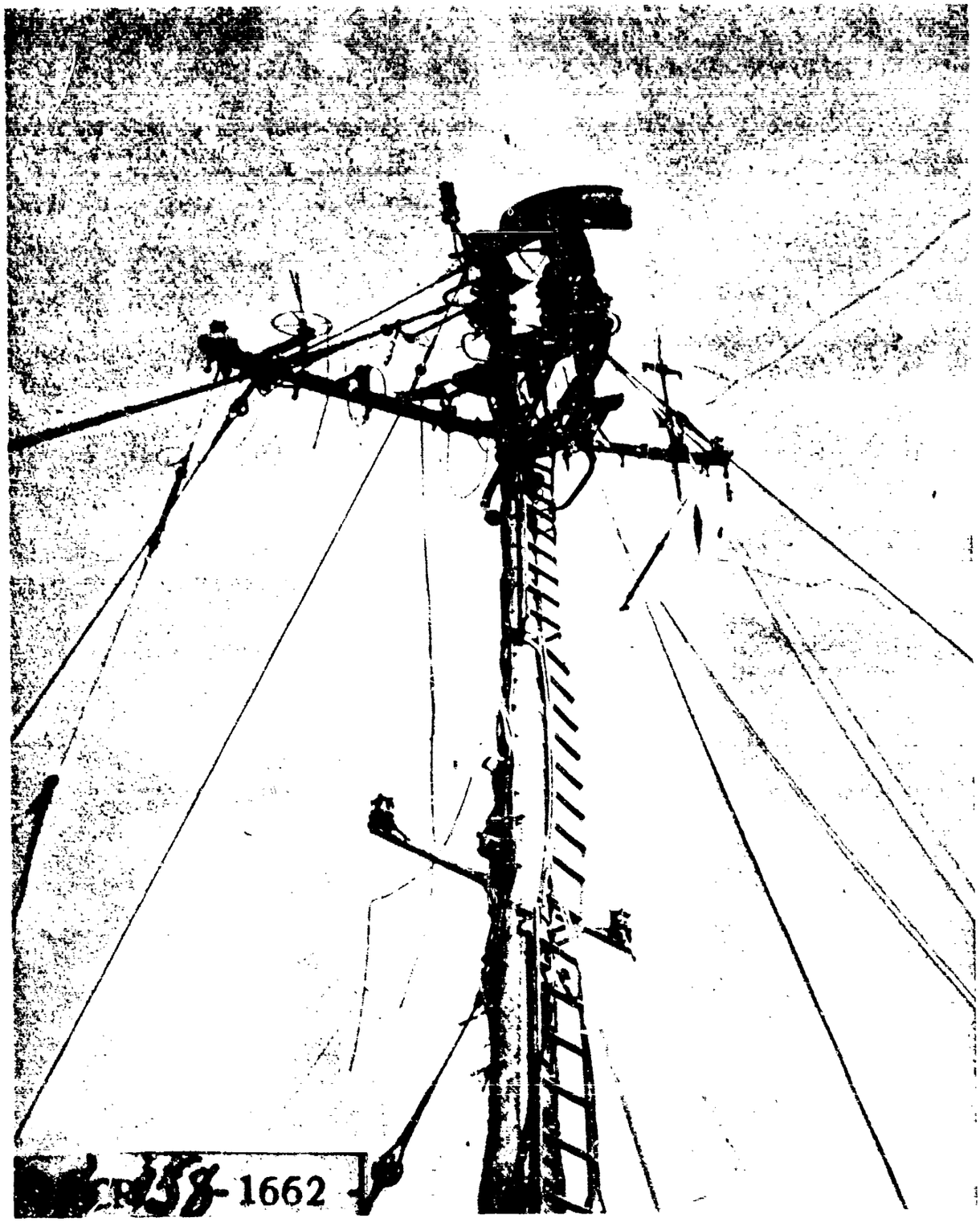
U.S.S. RHIND (DD-404)

Range: 900 yards Bearing: 005°T

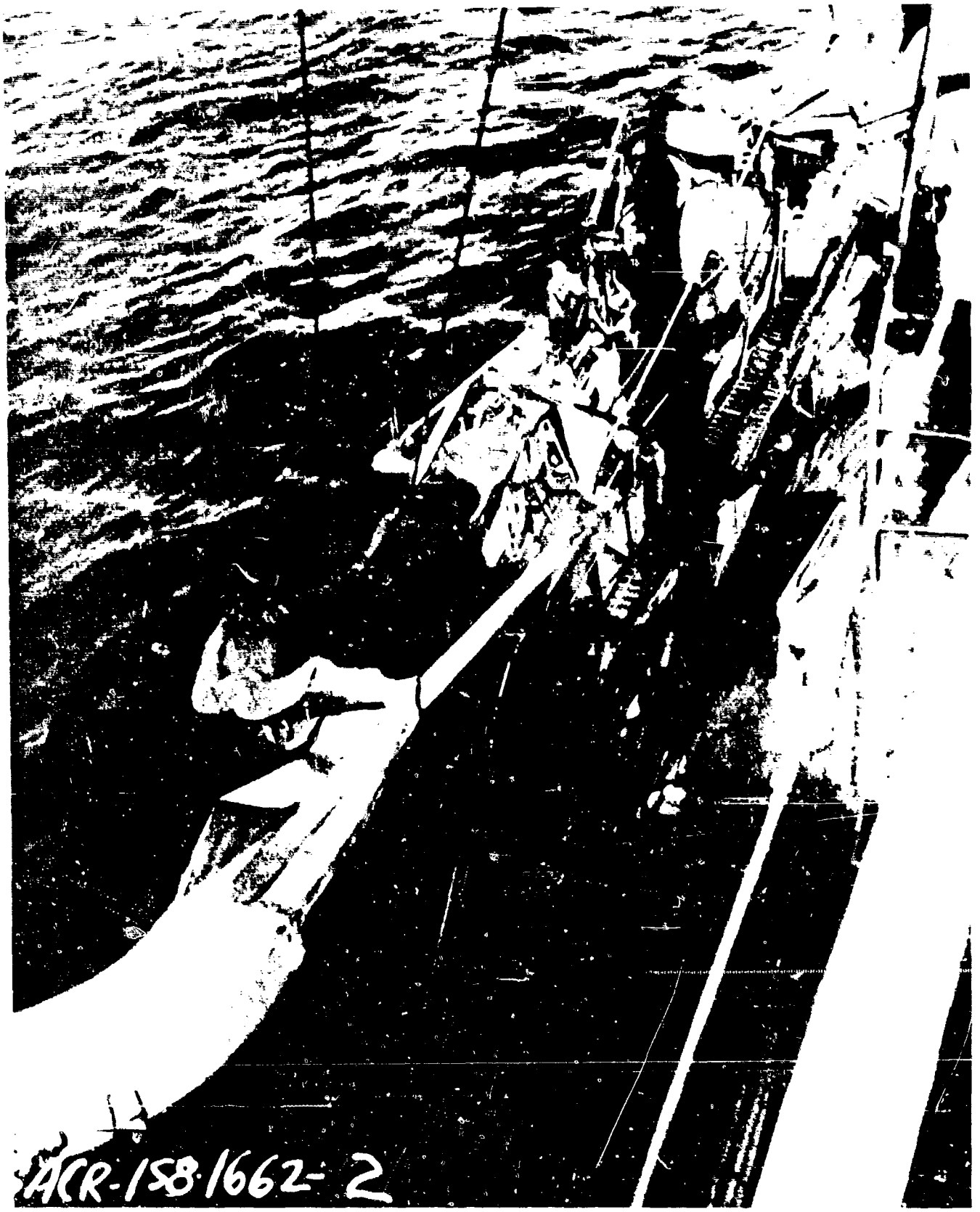
This vessel suffered major topside damage to communication and radar equipment. Units below decks suffered only minor damage due to buckled bulkheads.



POST ABLE - MAST. View from below the crossarm shows how the mast bent aft at its base and tore away from its bracing. The top section bent forward about 60° a the crossarm, leaving the SG antenna about 40° off normal position.



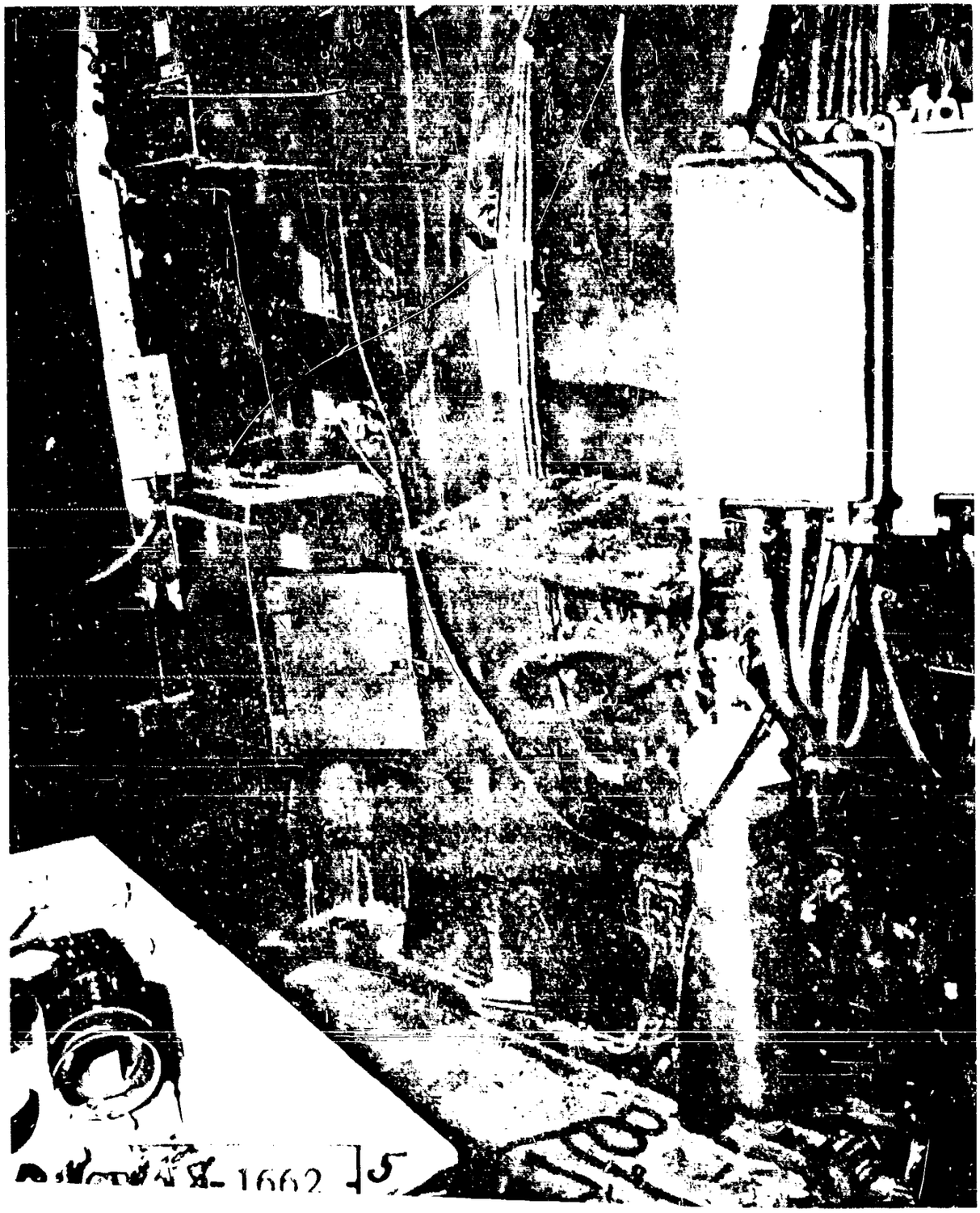
POST ABLE - MAST. View of top of mast showing the loss of SG wave guide and general damage to antenna. Mast is bent about 60° at crossarm in direction of camera.



POST ABLE - SG WAVEGUIDE. View showing the SG waveguide after being blown off the mast.

POST ABLE - CIC ROOM. Miscellaneous damage caused by bulging bulkheads.

POST ABLE - CIC ROOM. Miscellaneous damage caused by bulging bulkheads.



POST ABLE - CIC ROOM. Miscellaneous damage caused by buckled bulkheads.

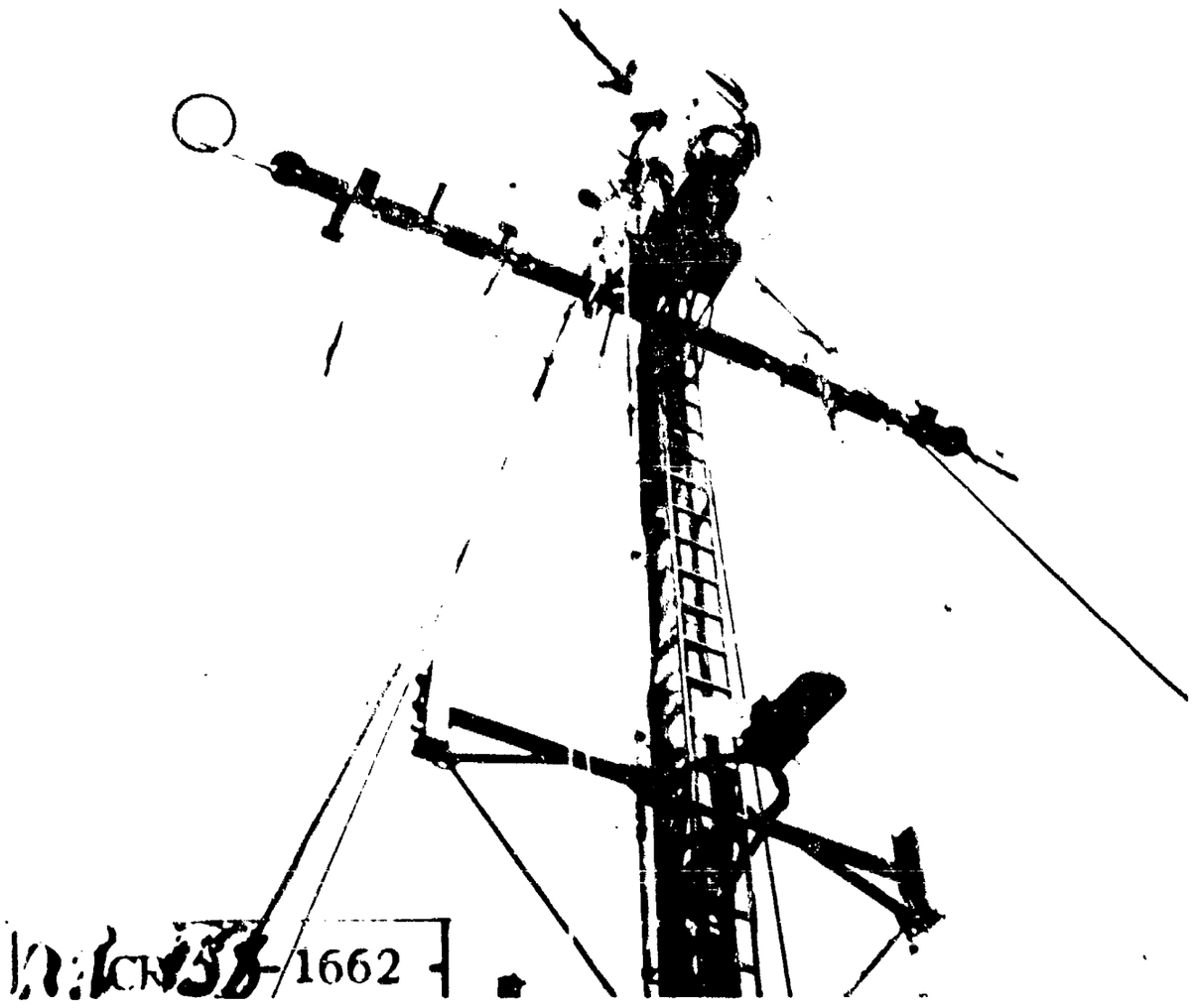
TEST ABLE

U.S.S. STACK (DD-406)

Range: 1200 yards Bearing: 340°

The single photograph shows the principal topside damage suffered on this vessel. Other damage consisted of numerous communication antennas down.

There was no damage to below decks installations.



NAVY 58-1662

POST ABLE - MAINMAST. SG-2 antenna was swept away from the top of its pedestal (arrow). The pedestal was left intact. The SG antenna and various other antennas on the yardarm were left intact.

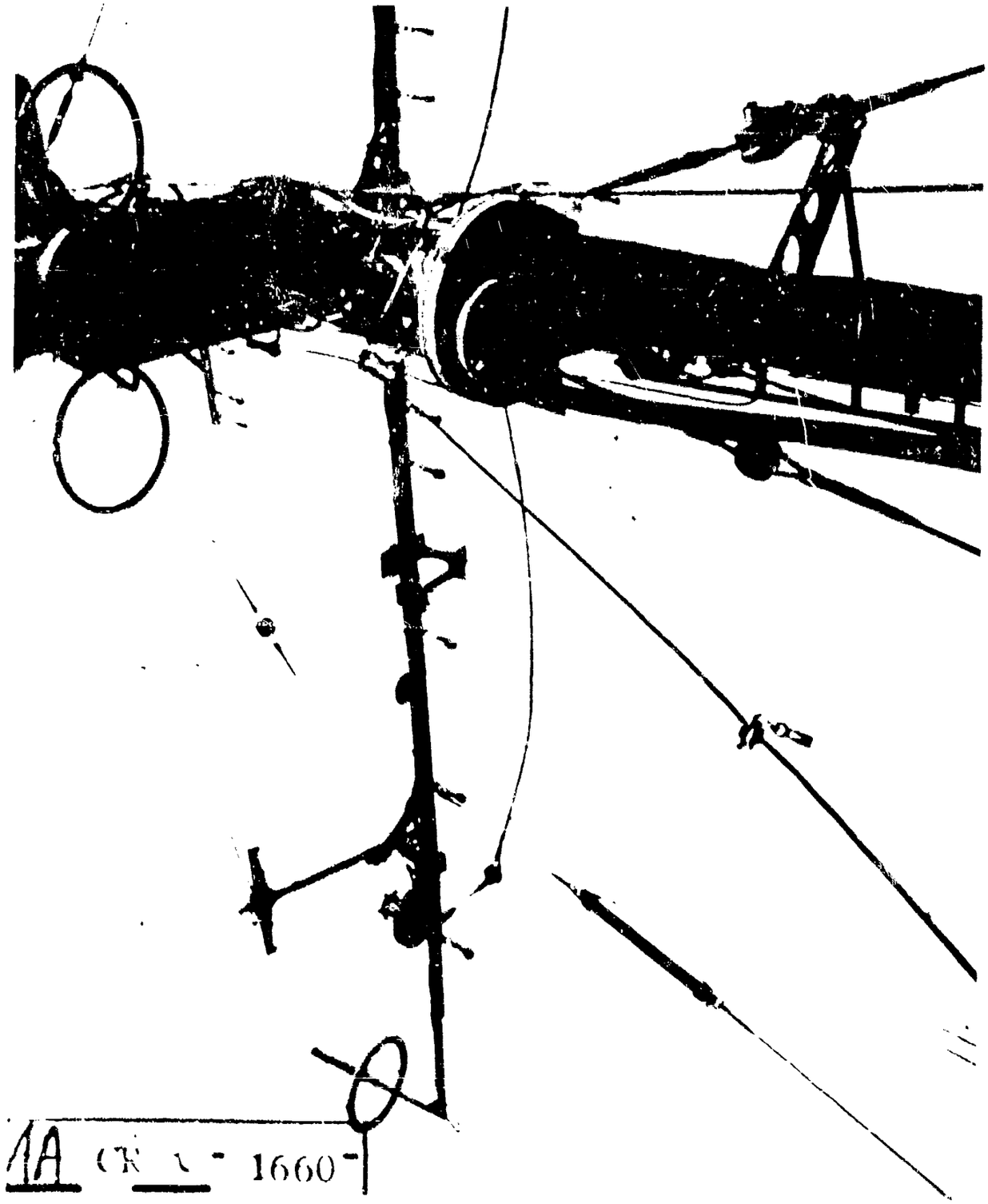
TEST ABLE

U.S.S. HUGHES (DD-410)

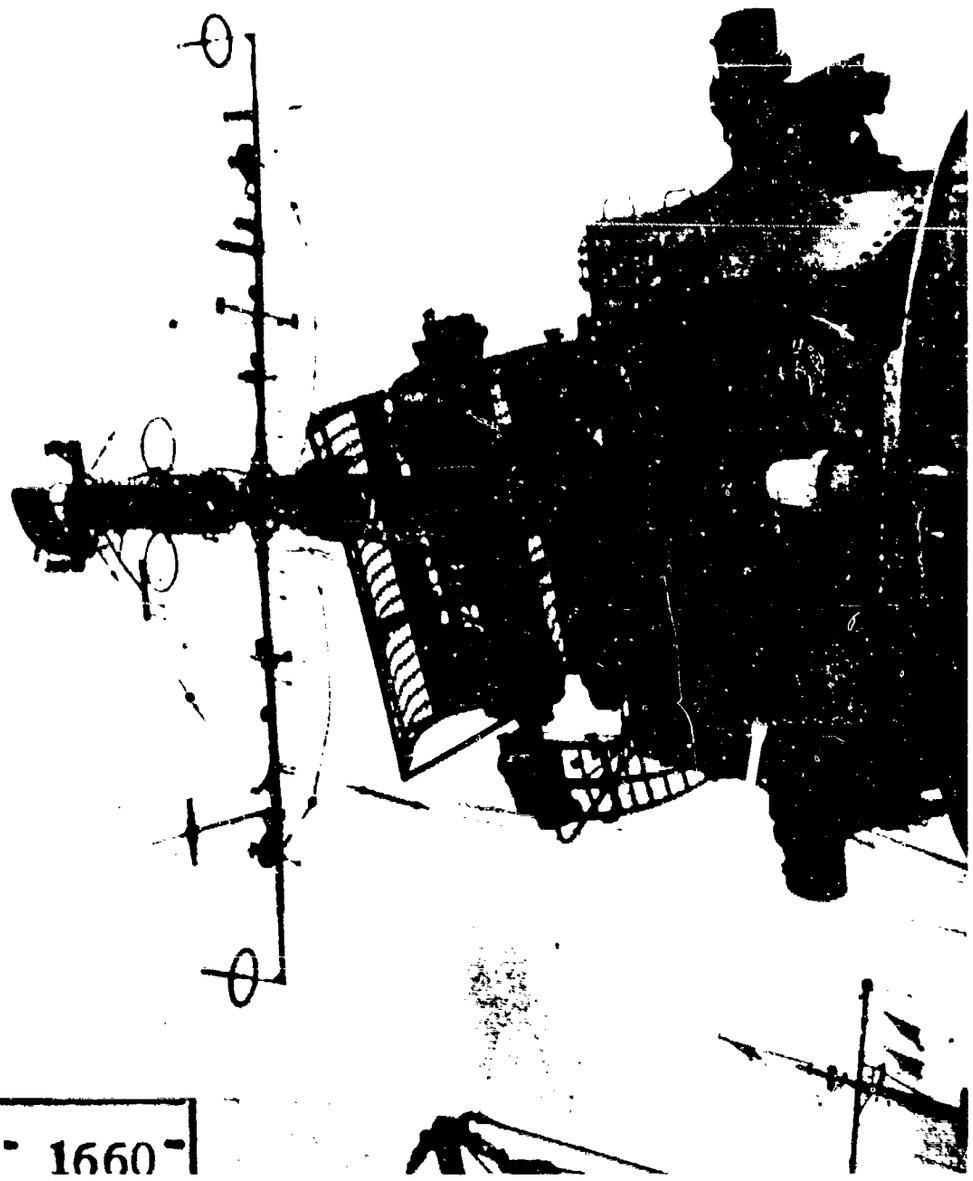
Range: 900 yards Bearing: 095°

This ship suffered heavy external damage from test ABLE and these photographs of antenna destruction cover all principal damage.

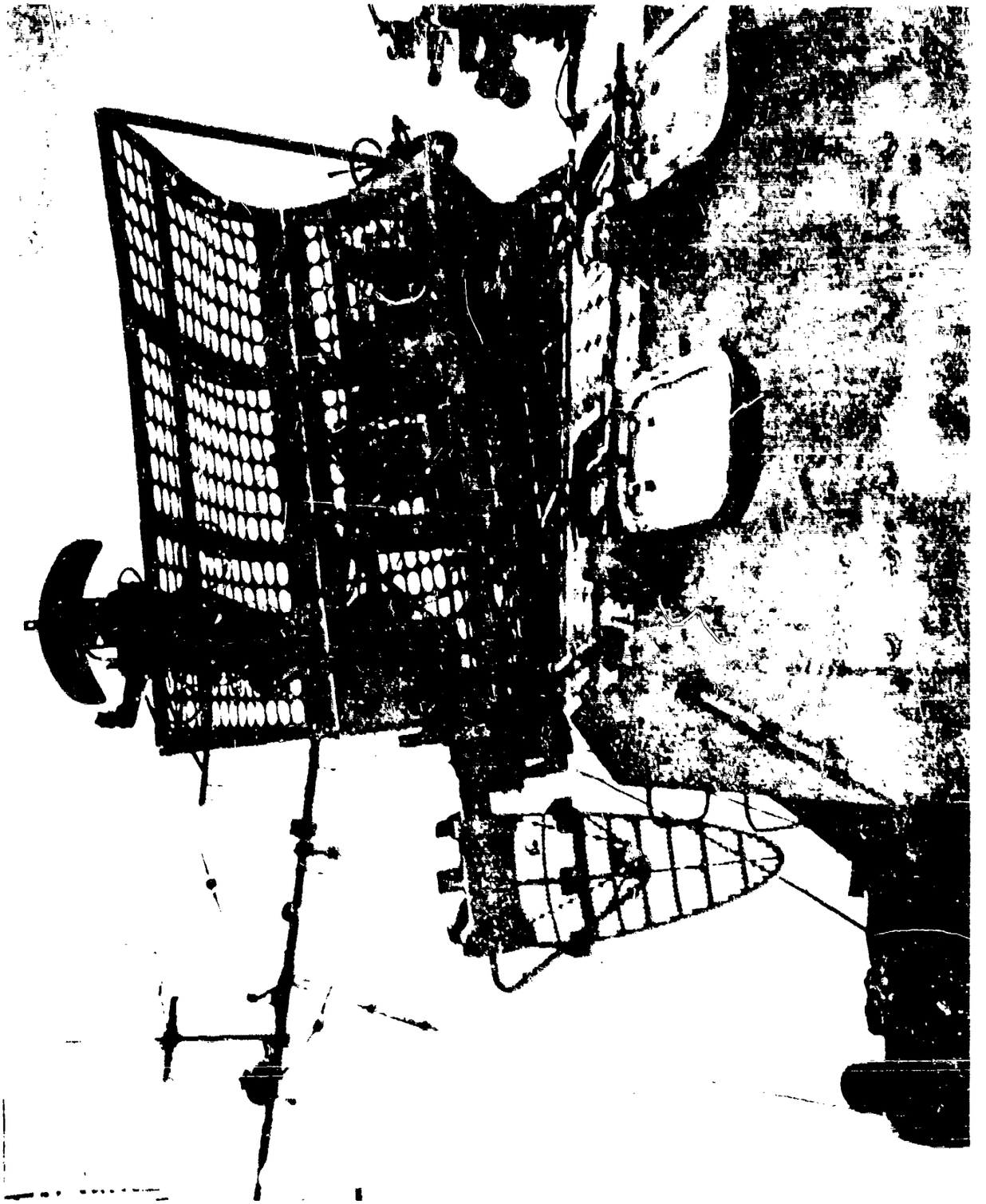
Note that the SG antenna is the only undamaged radar antenna remaining.



POST ABLE - COMMUNICATION ANTENNAS. The TBS antenna pedestal on starboard yardarm was bent forward about 90° by blast. No elements were damaged and antenna lead was intact. A bent whip antenna can also be seen on yardarm.



POST ABLE - MK 12 AND MK 22 RADAR ANTENNAS. General view.

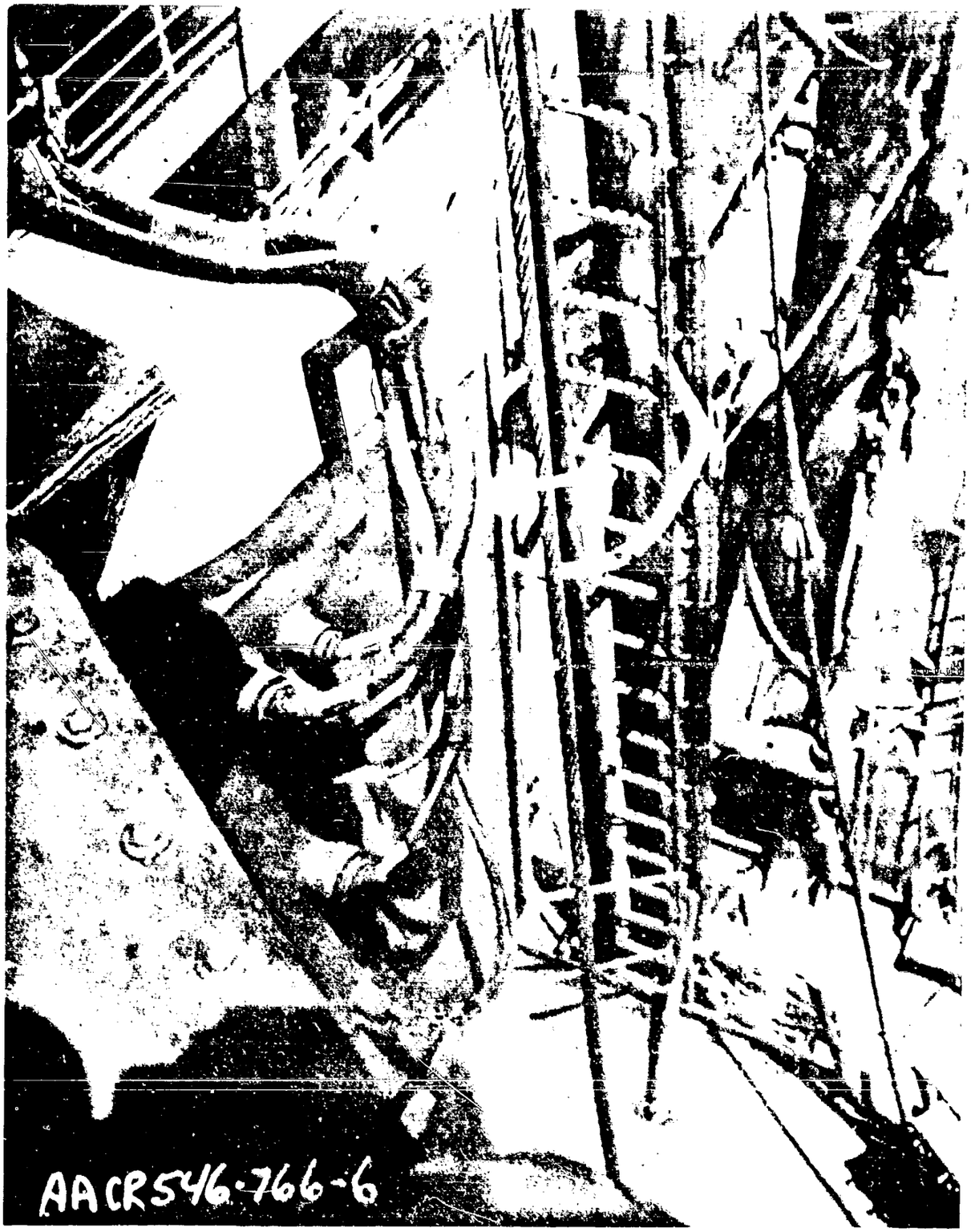


POST ABLE - MK 12 AND MK 22 RADAR ANTENNA. Closeup view.

POST ABLE - MK 4 ANTENNA MOUNT. Bottom of crosslevel mount (arrow) which is bent backwards, allowing bearings to fall out.

POST ABLE - MK 4 ANTENNA MOUNT. Close-up of bottom of cross level mount (A) bent, allowing bearings to fall out. (B)

POST ABLE - MK 4 AND MK 22 RADAR ANTENNAS. Position of MK 22 antenna (B) with respect to MK 4 antenna. Shaft connecting MK 22 to arm (C) was broken, allowing antenna to float freely.



POST ABLE - MK 22 RADAR. Cables to transmitter and antenna. Note charring which was caused by heat from radiation on Test Able. Damage was only on surface and did not keep cables from operating. Rubber covered cables suffered the worse damage.

TEST ABLE

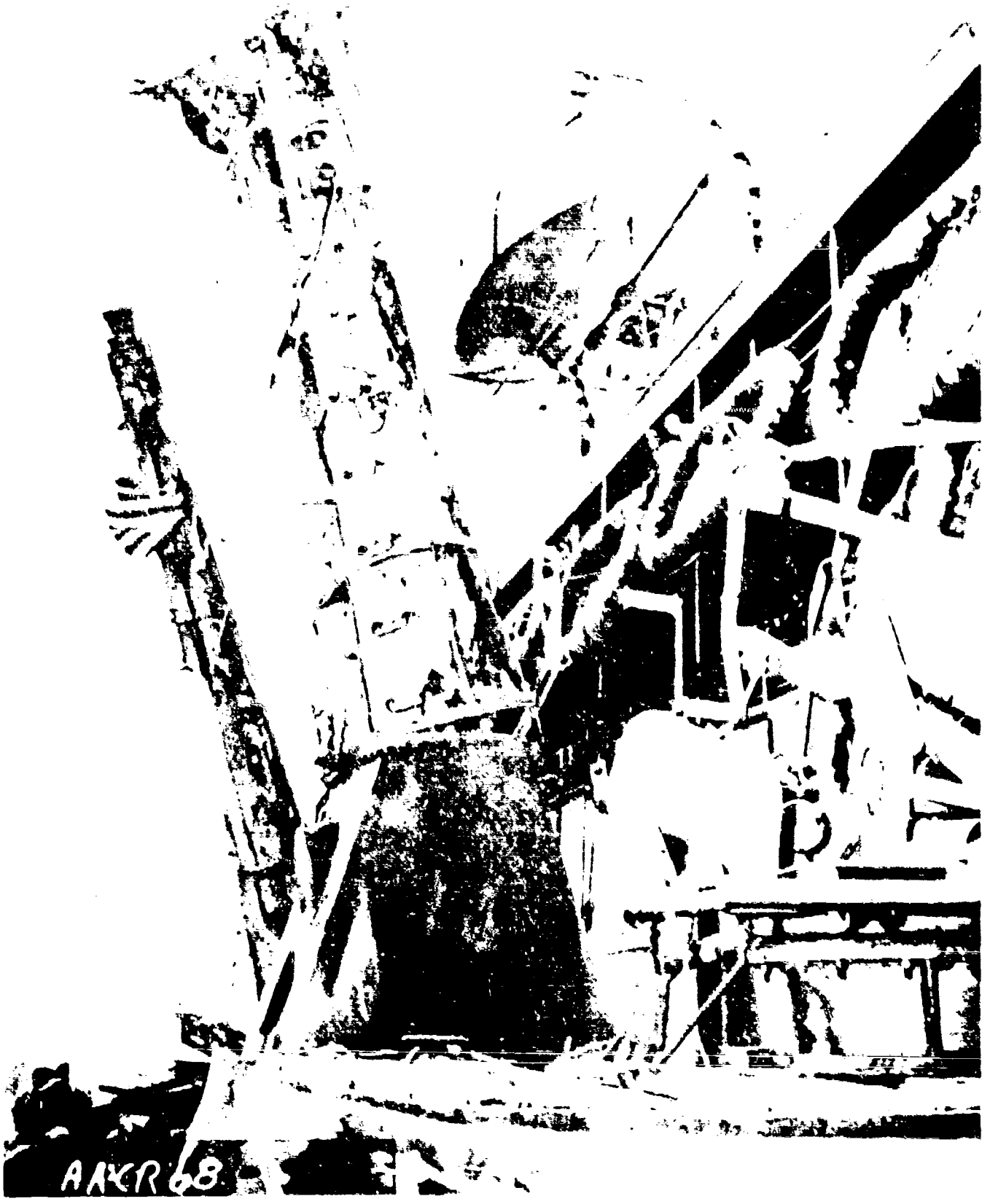
U.S.S. SKATE (SS-305)

Range: 500 yards Bearing: 125°T

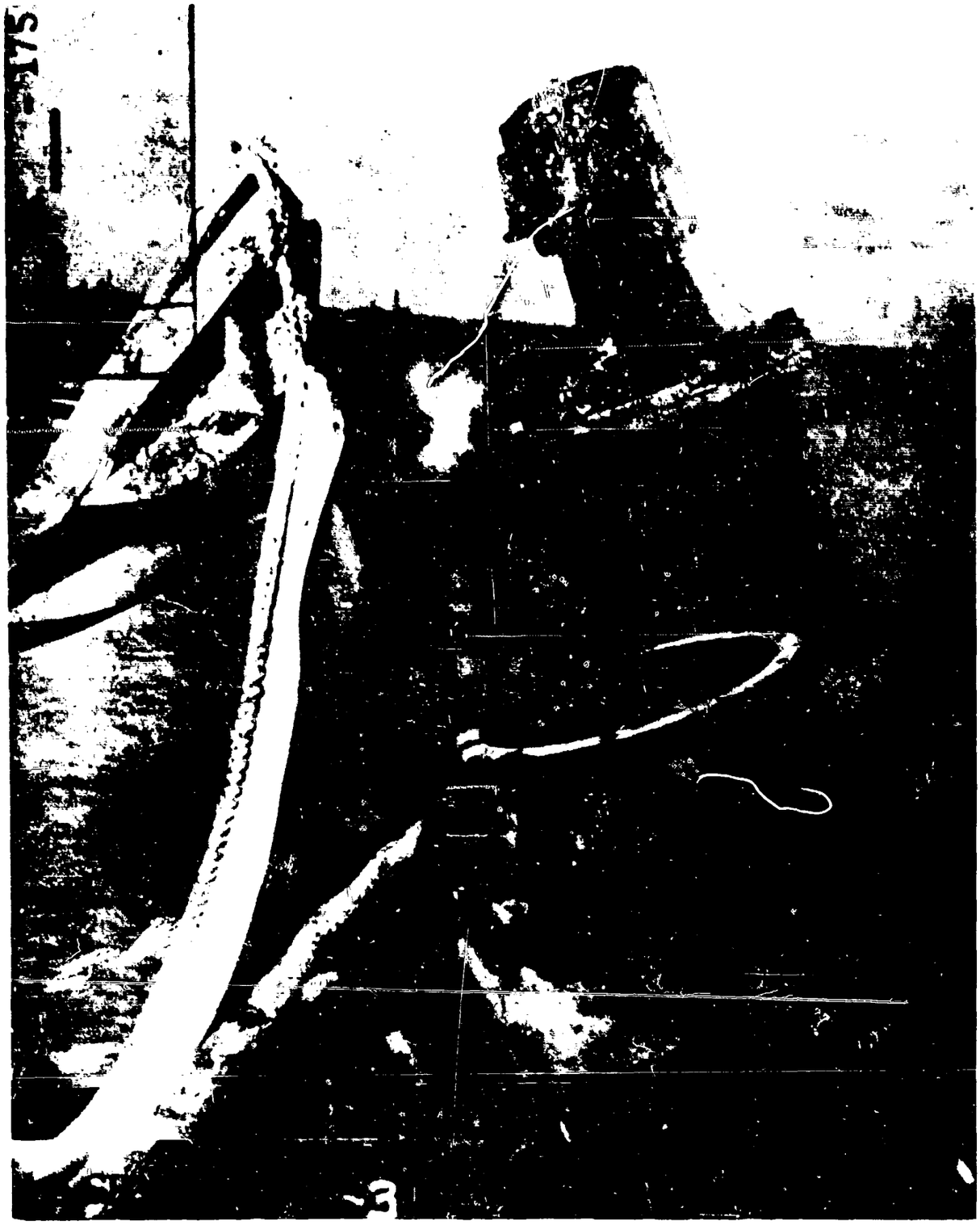
This submarine suffered very severe topside damage. Electronic equipment within the pressure hull suffered only minor shock damage.

POST ABLE - PORT SIDE. Showing general broadside view.

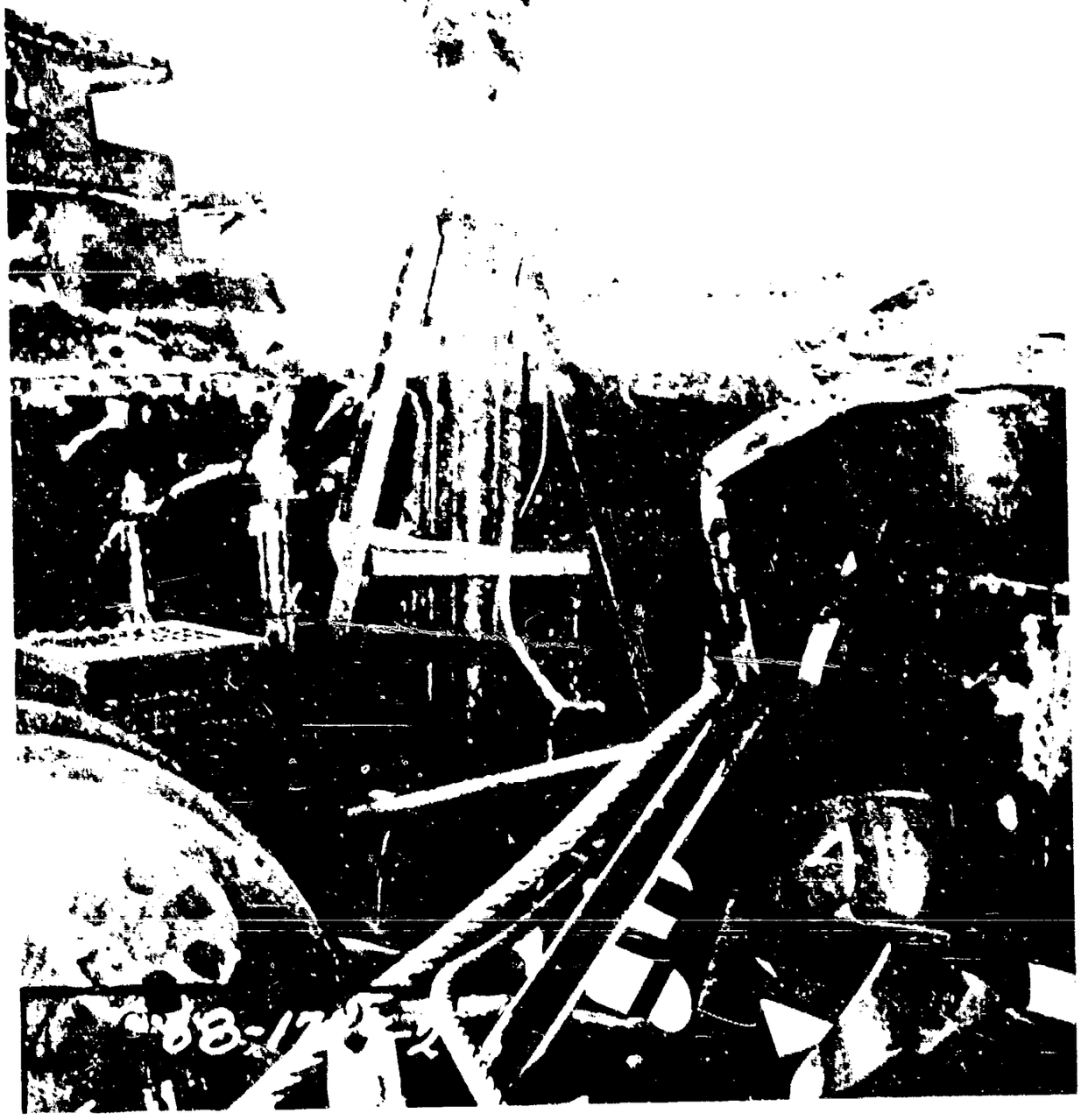
POST ABLE - STERN VIEW. Showing general topside damage.



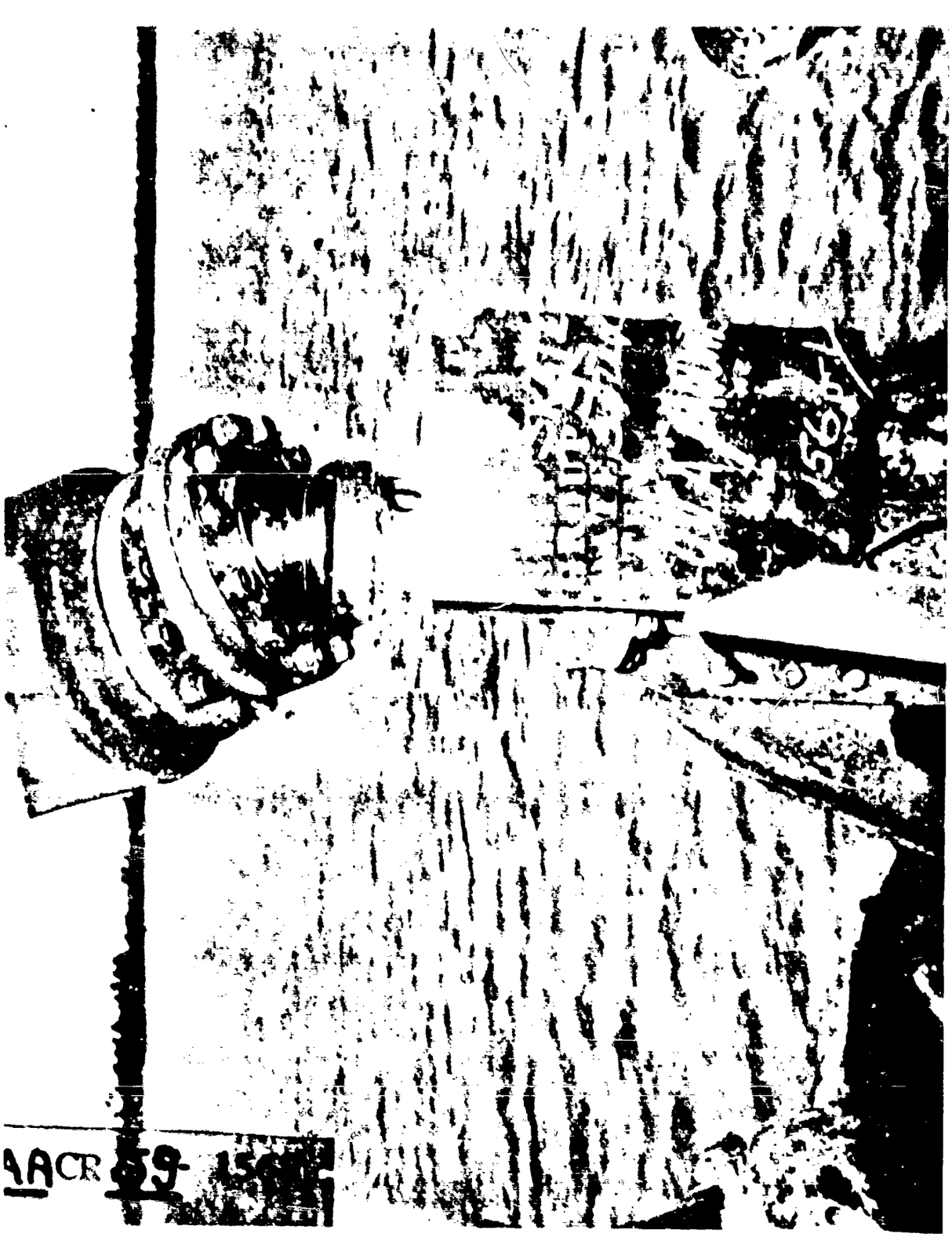
POST ABLE - TOPSIDE VIEW. General view of topside damage to periscope shears, SJ-1 antenna and SD antenna mast. The SD bowl insulator and antenna have been blown away.



POST ABLE - SJ RADAR ANTENNA. Close up view of the SJ antenna and reflector, showing how much it has been forced over.

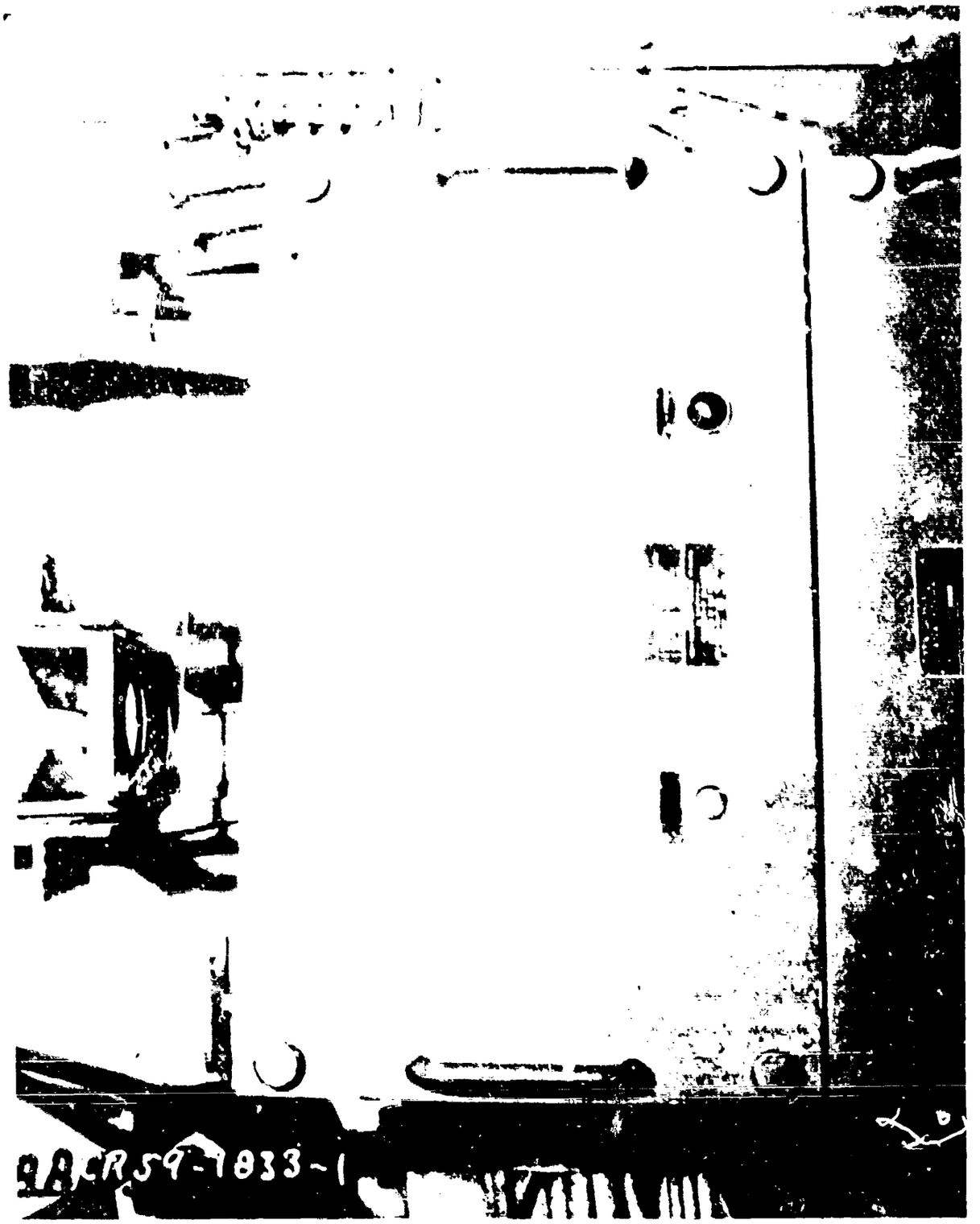


POST ABLE - X-QLA SONAR HEAD. View looking forward from the conning tower.

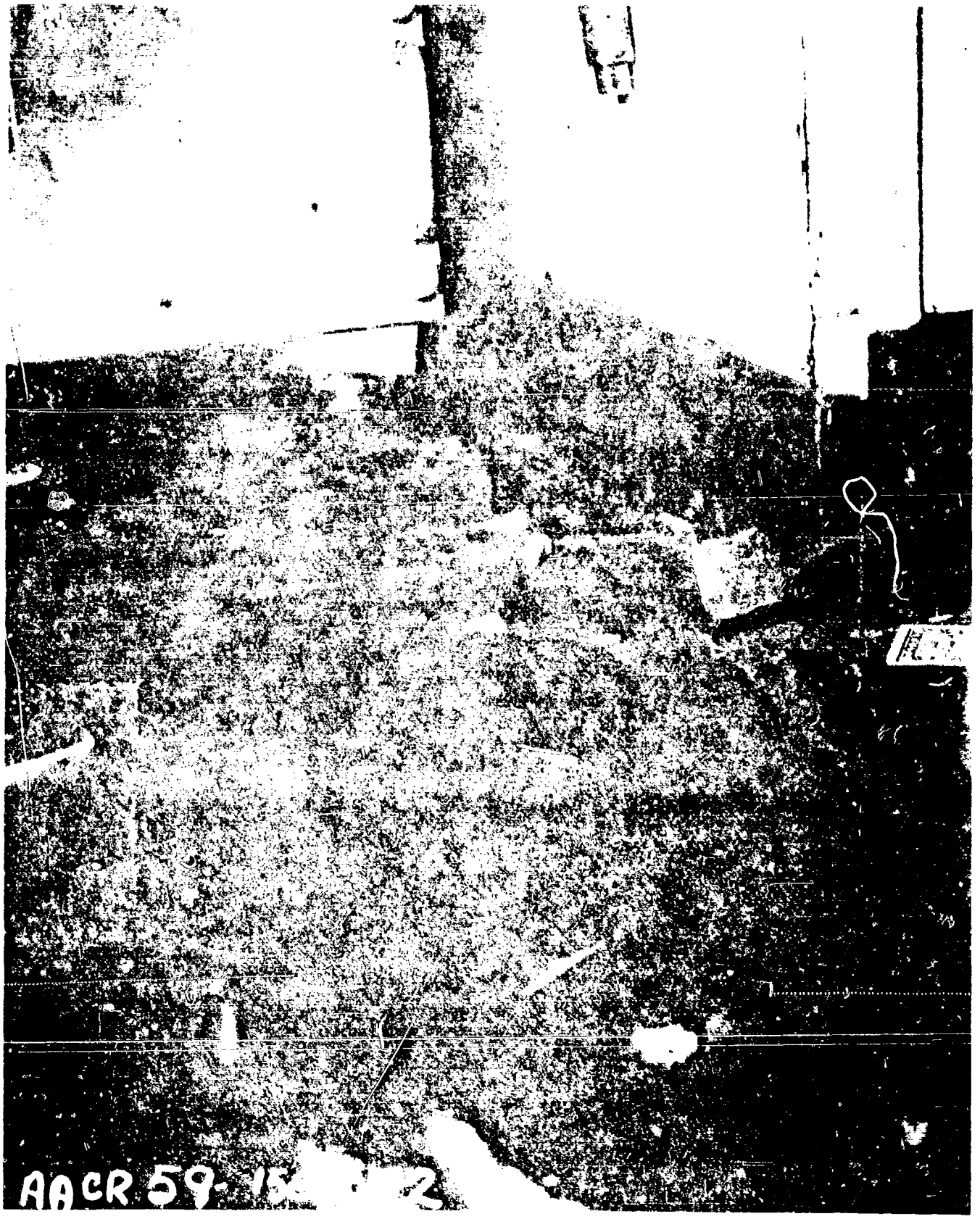


POST AELE - X-QLA SONAR HEAD. Close up view of the break in the pedestal and flange.

POST ABLE - X-QLA SONAR. Sine wave potentimeter drive gear of the X-QLA was thrown out of mesh.



POST ABLE - X-QLA STACK. Top shock mount on the X-QLA was broken free.



POST ABLE - X-QLA SOUND STACK. Lower shock mount was torn and damaged by the movement of the equipment.

POST ABLE - WCA SOUND STACK. QB head bearing repeater was jarred out of its frame because of a loose pin in the securing brace. Front panel of the TDM recorder dropped open, releasing the roll holding the recording paper. Damage was not serious and operation was found to be satisfactory.

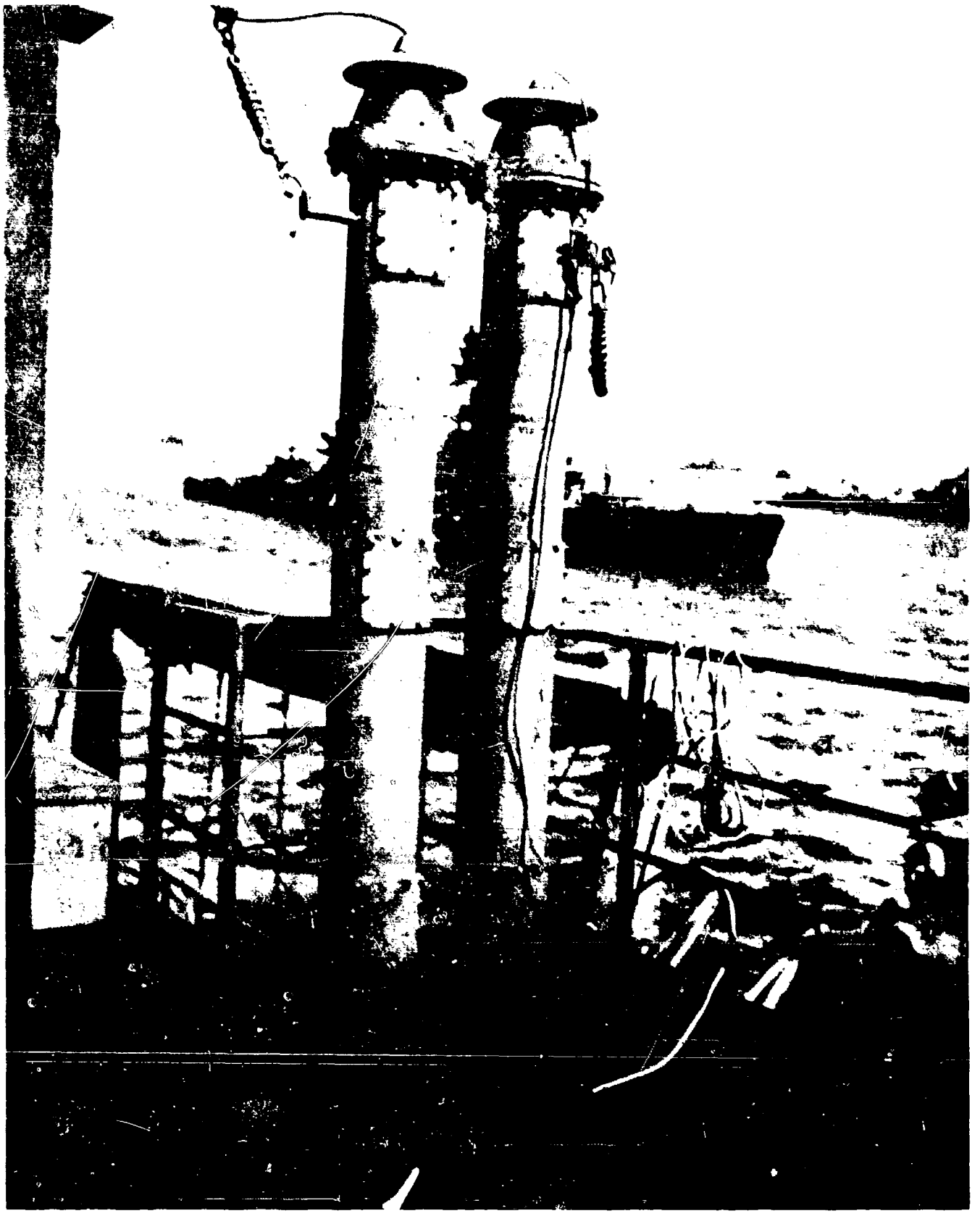
U.S.S. SKATE (SS-305)

TEST ABLE

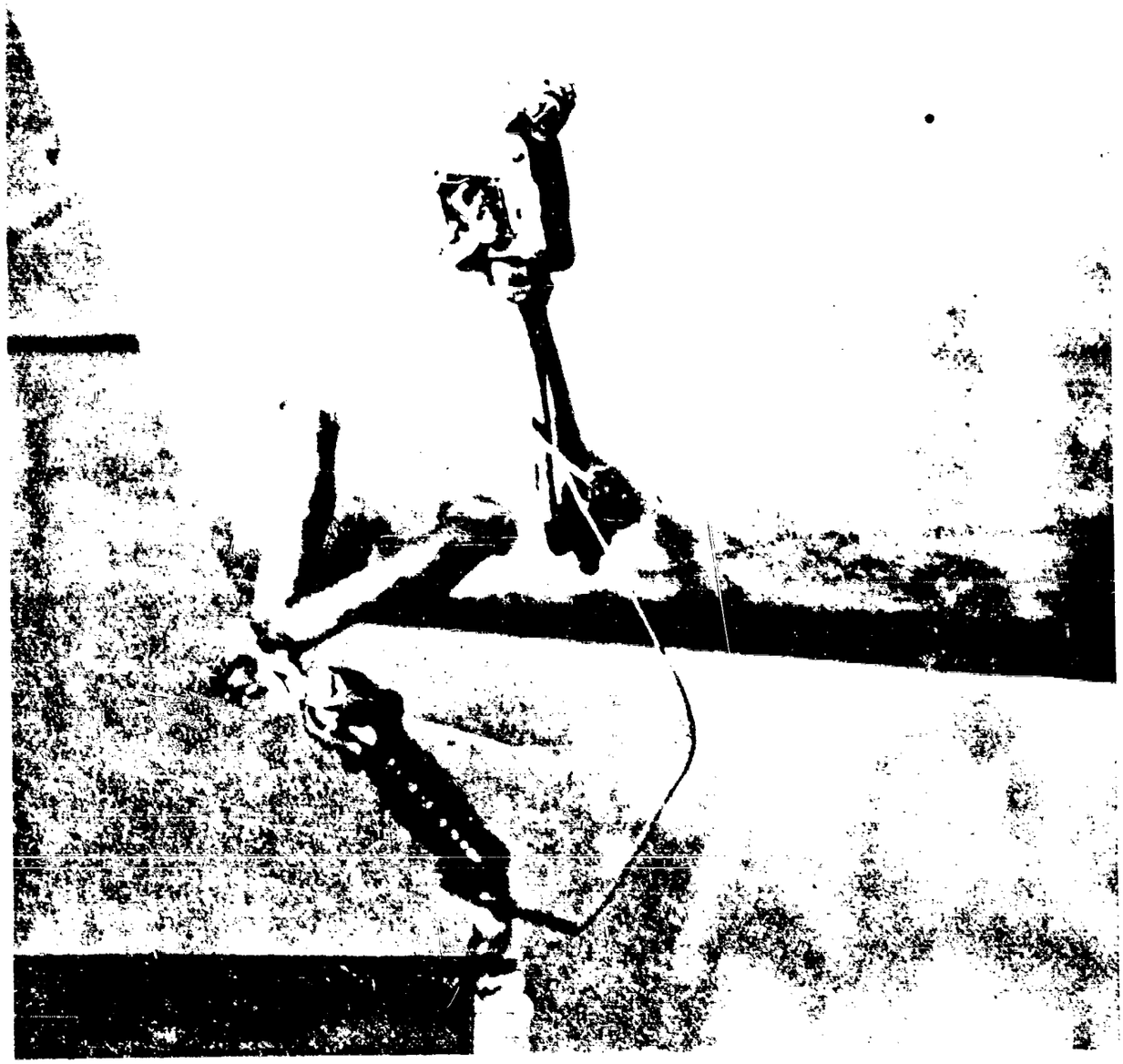
U.S.S. BANNER (APA-60)

Range: 1300 yards Bearing: 115°

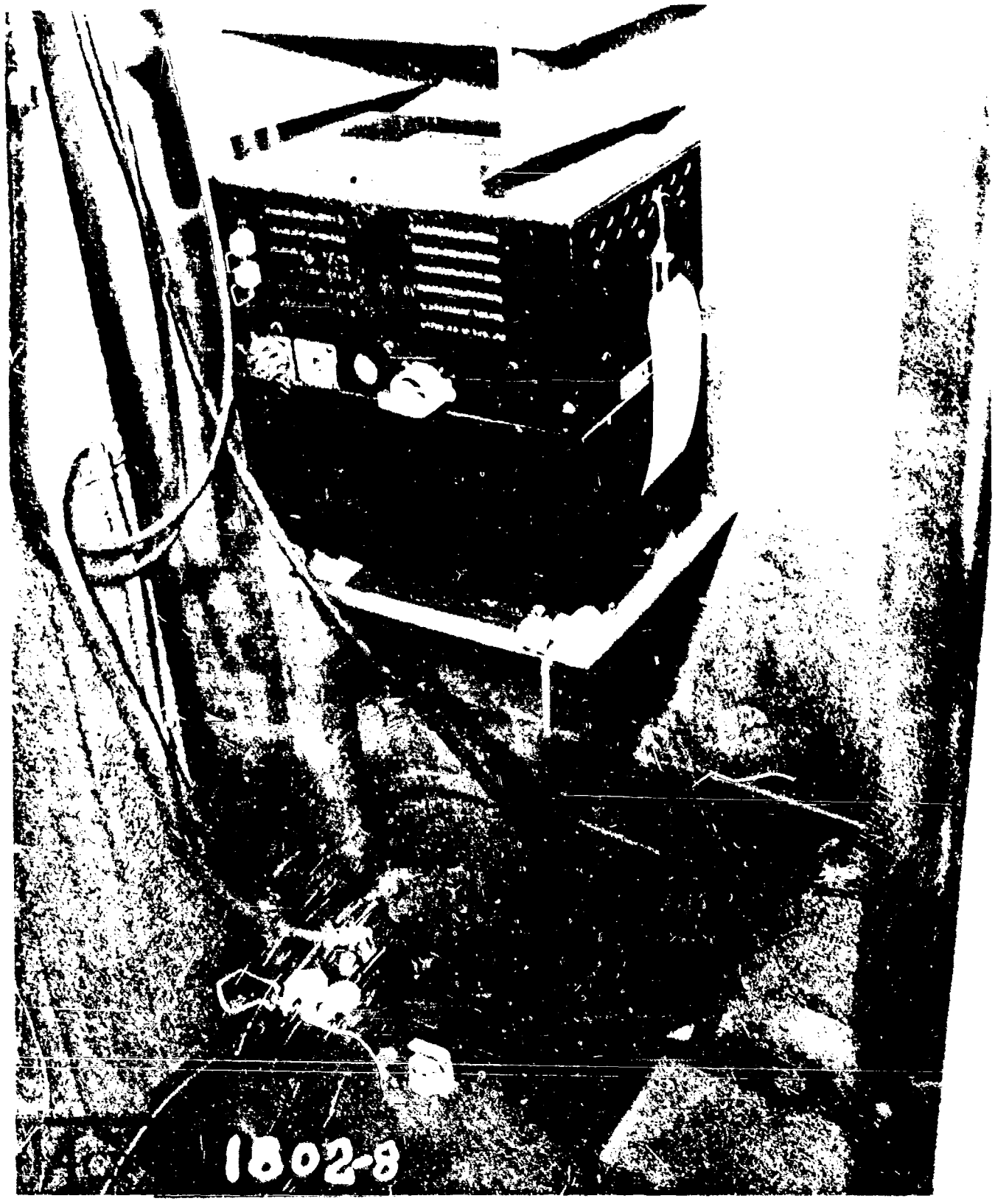
This ship suffered light damage. Pictures of damage to the ABK mountings and to antenna and antenna trunks are good examples of those types of damage.



POST ABLE - ANTENNA TRUNKS. Outboard antenna blown down.



POST ABLE - D/F SENSE ANTENNA. Broken sense antenna junction box.



POST ABLE - ABK MOUNTING. Example of ABK mounting failure. The upper unit lies on deck where it fell after breaking plugs on cables at control unit.

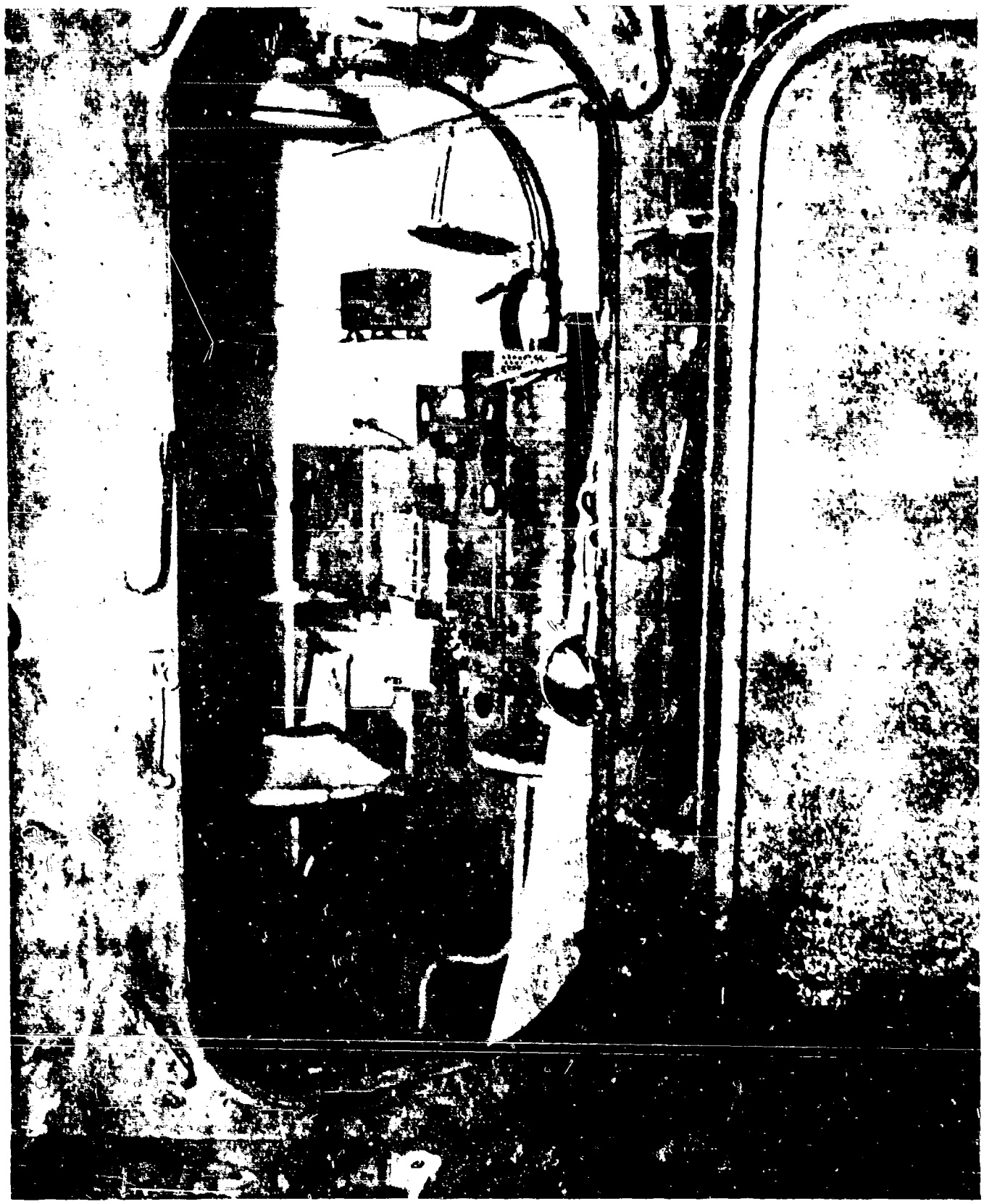
TEST ABLE

U.S.S. BRULE (APA-66)

Range: 100 yards Bearing: 070°

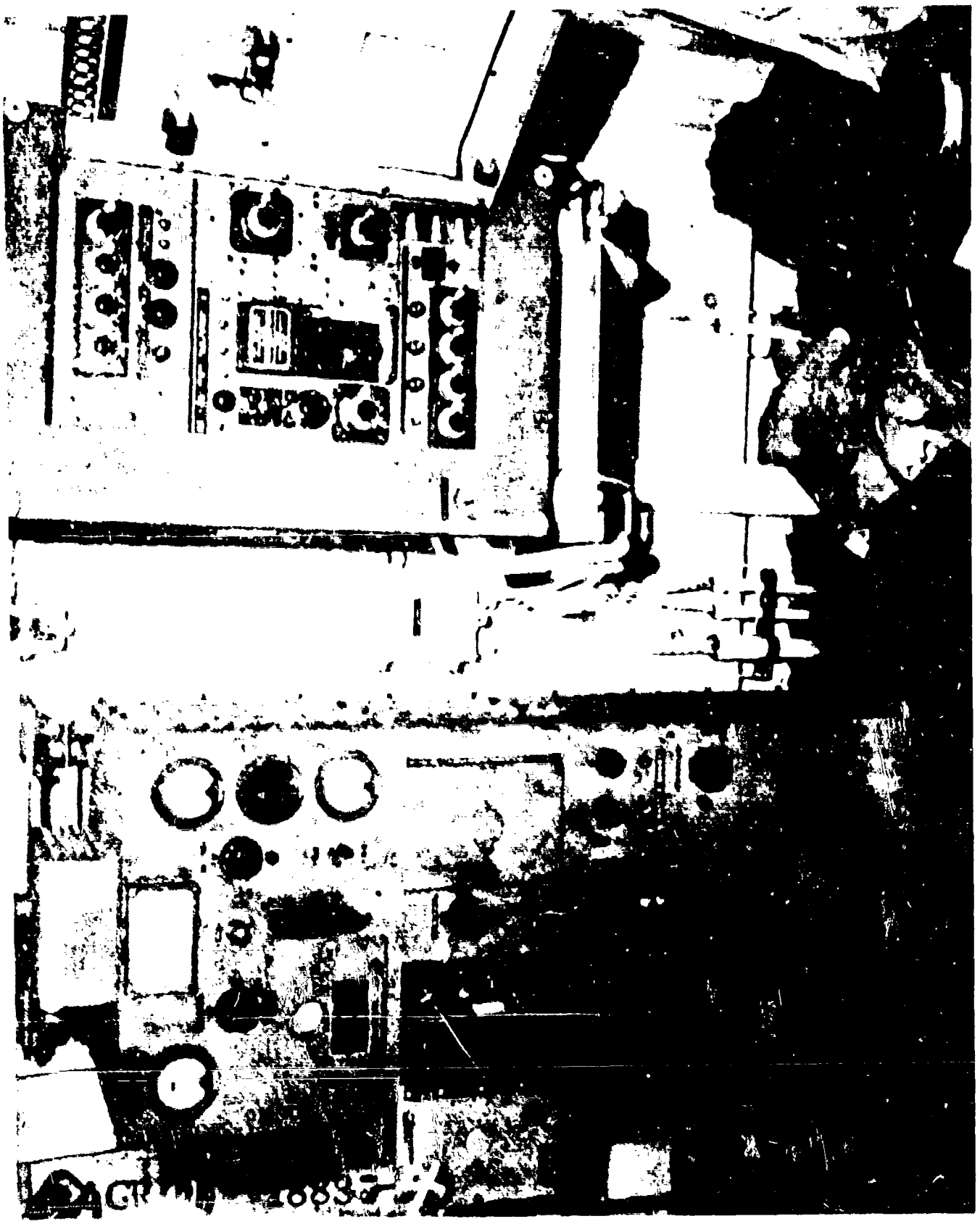
This ship received heavy damage in Test ABLE.

Of the numerous photographs taken of the resulting damage, the most interesting are those showing the SC radar transmitter, which was damaged by direct exposure to the explosion when compartment door was purposely left open. Typical cases of ABK mounting failure and antenna and antenna trunk insulator breakage are also shown.

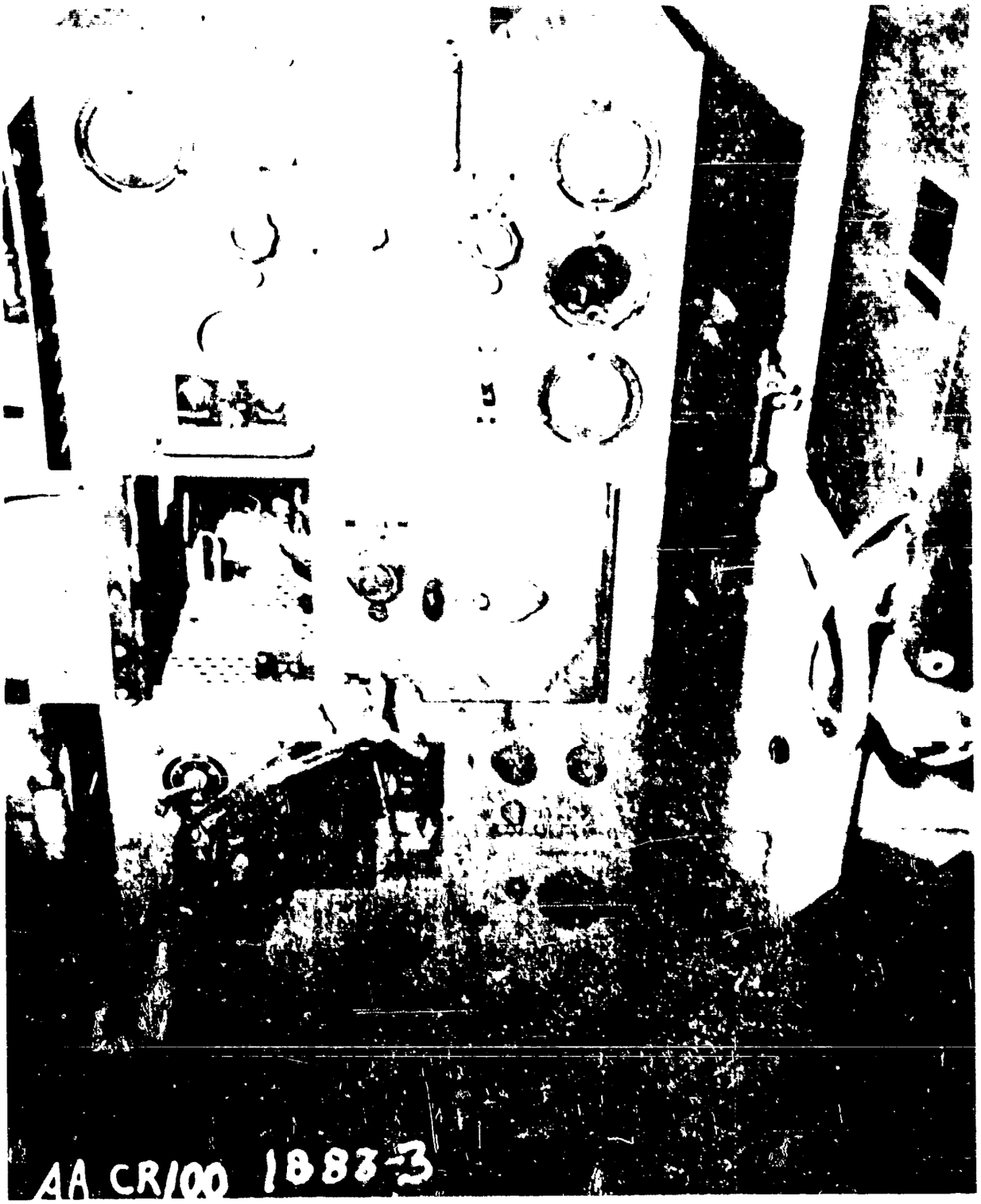


POST ABLE - SC-4 TRANSMITTER. Exposed to direct radiation from explosion in direction of photographs, as hatch was purposely left open.

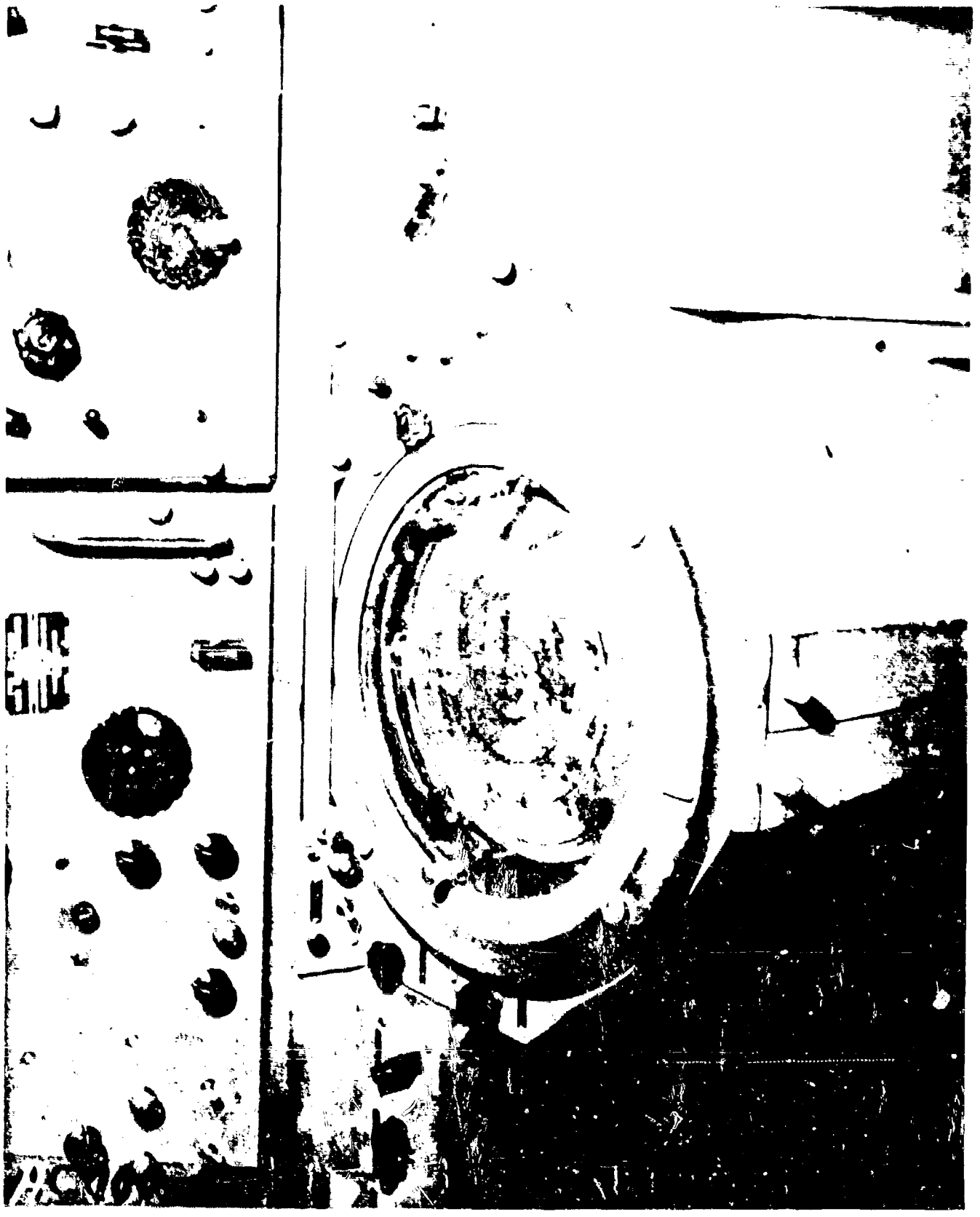
POST ABLE - SC-4 TRANSMITTER. View showing the side panel which was shaken loose. Several of the knurled screws which can be seen in the picture were evidently not properly secured. This unit has been returned to NRL for further study.



POST ABLE - SC-4 TRANSMITTER. Front view of the exposed transmitter showing damage to meters, knobs and access doors.



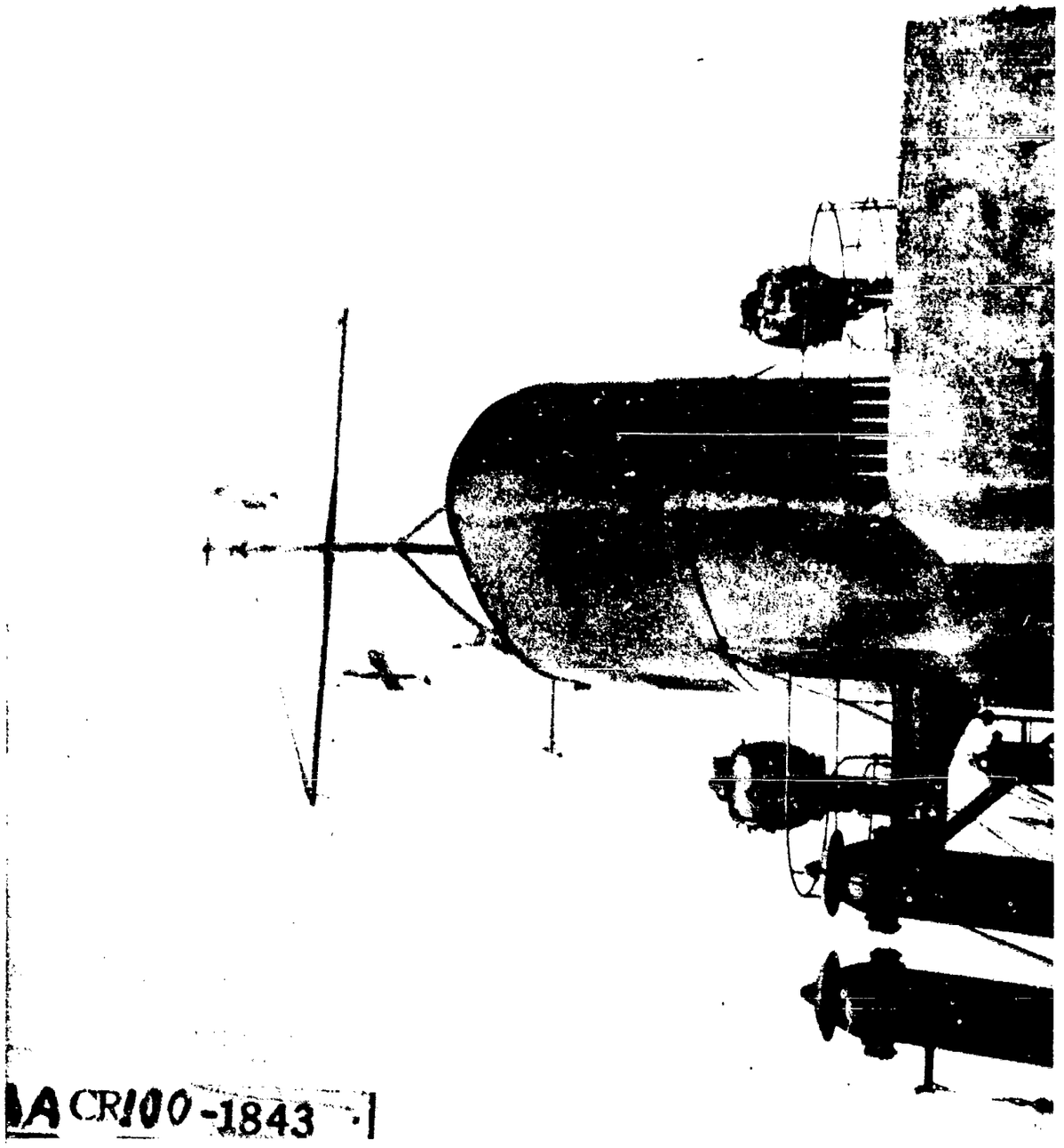
POST ABLE - SC-4 TRANSMITTER. Close-up view of the front of the SC-4 transmitter exposed to radiation. Plastic pilot light covers and knobs were seared, access doors bent, and meters damaged. The 3C7-A tubes were broken.



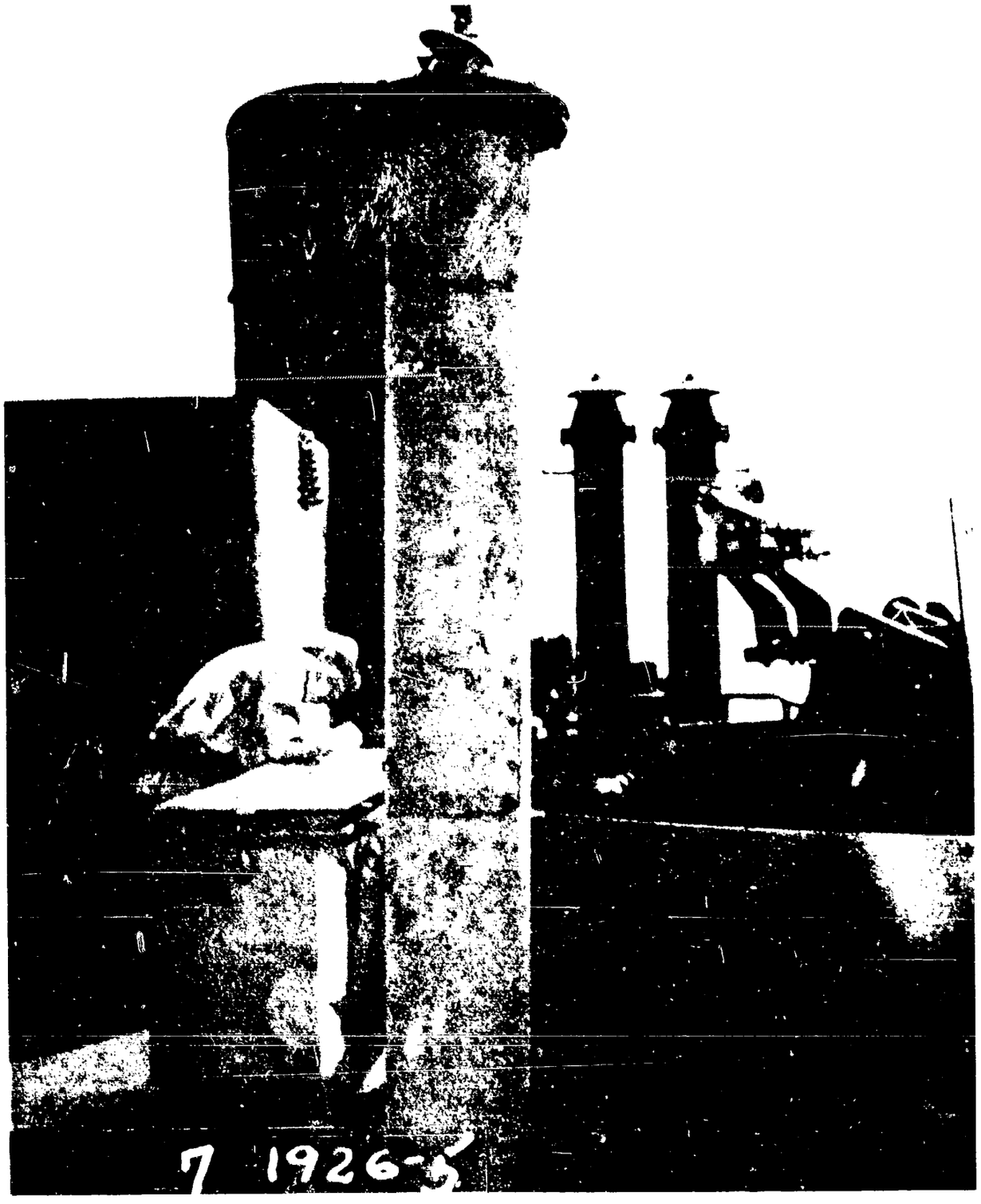
POST ABLE - SC-4 P.P.I. One of several cases where an SC PPI tube was broken at the neck because positioning screws were not properly tightened. The inrush of air through the neck of the tube blew the fluorescent material off the screen.

AA CR76 - 1926 8

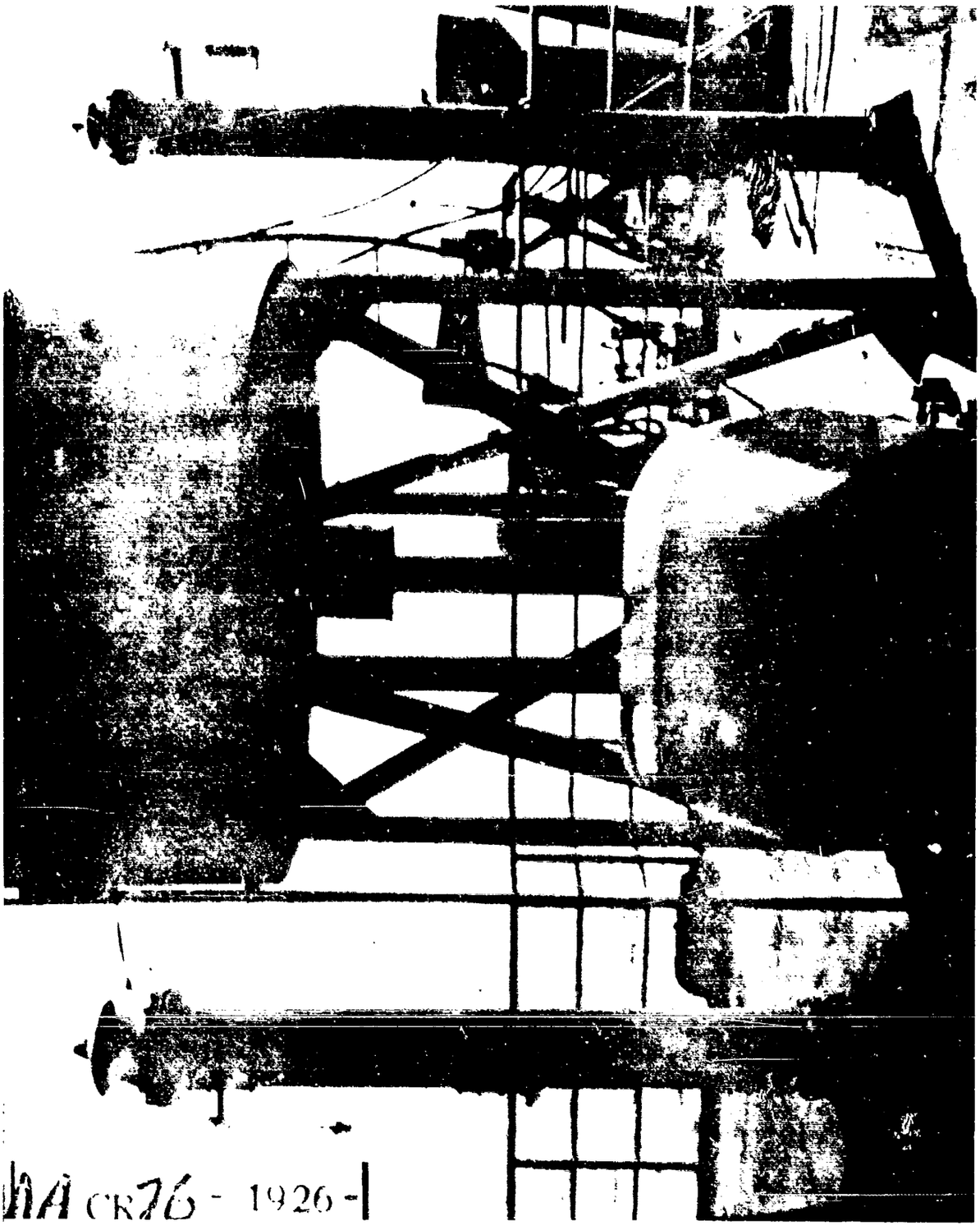
POST ABLE - SC-4 DRIVER UNIT. Unit was pulled out to show the broken lower standoff insulator (arrow) on the meter resistor which was broken by shock. Loss of resistor does not stop use of equipment and plugging it back into upper clip restored use of the meters.



POST ABLE - FOREMAST AND ANTENNA TRUNKS. Radiator of TBS antenna at top of foremast was bent. In left foreground are two radio antenna trunks from which antennas have been torn. Note arrows indicating broken strain insulators.

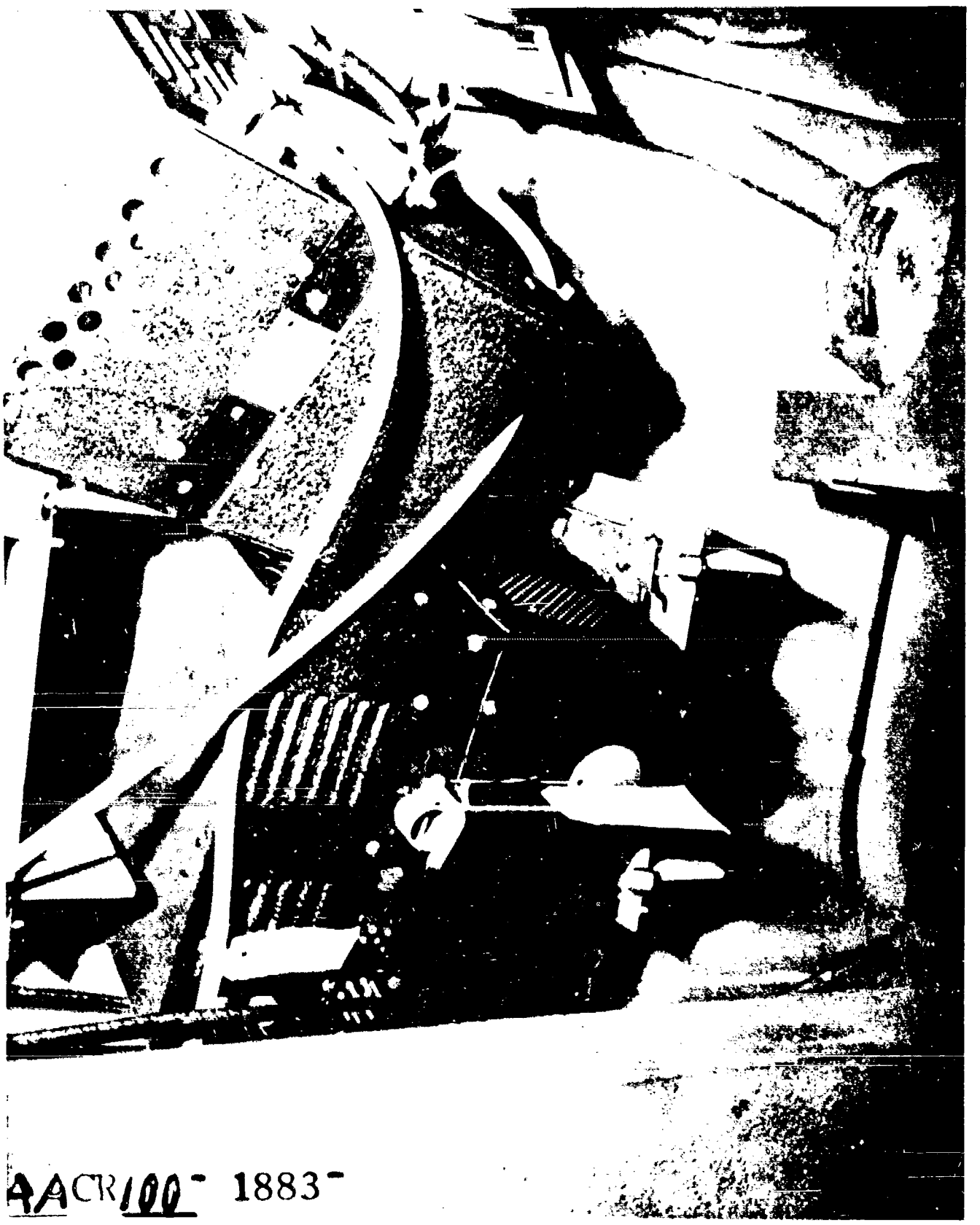


POST ABLE - ANTENNA TRUNK. Entering insulator was damaged and strain insulator broken by the blast.



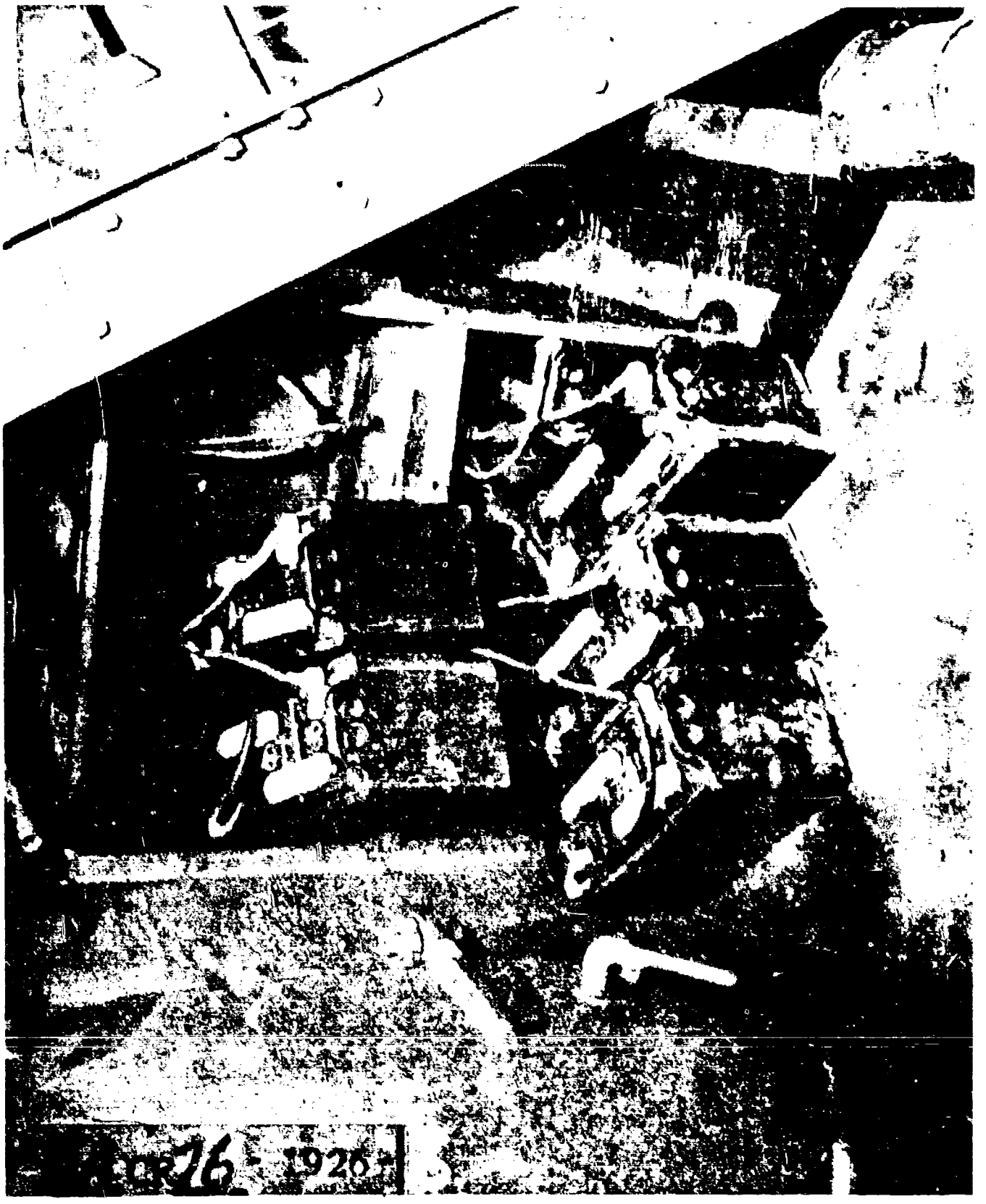
POST ABLE - EMERGENCY RADIO TRUNKS. Typical case of antenna damage, with broken strain insulator and wires.

POST ABLE - STRAIN INSULATOR. One of many cases of broken strain insulators.

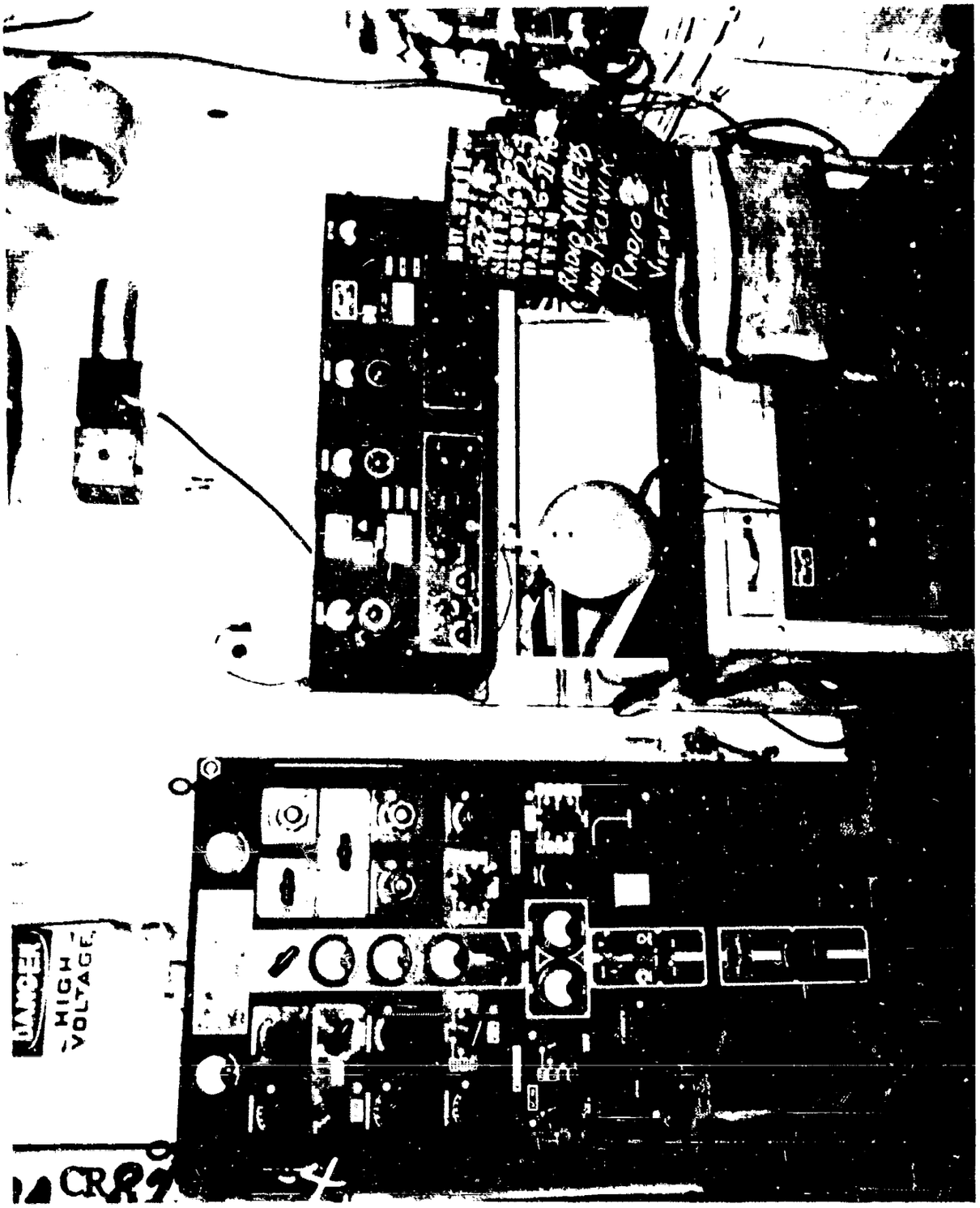


AACR100- 1883-

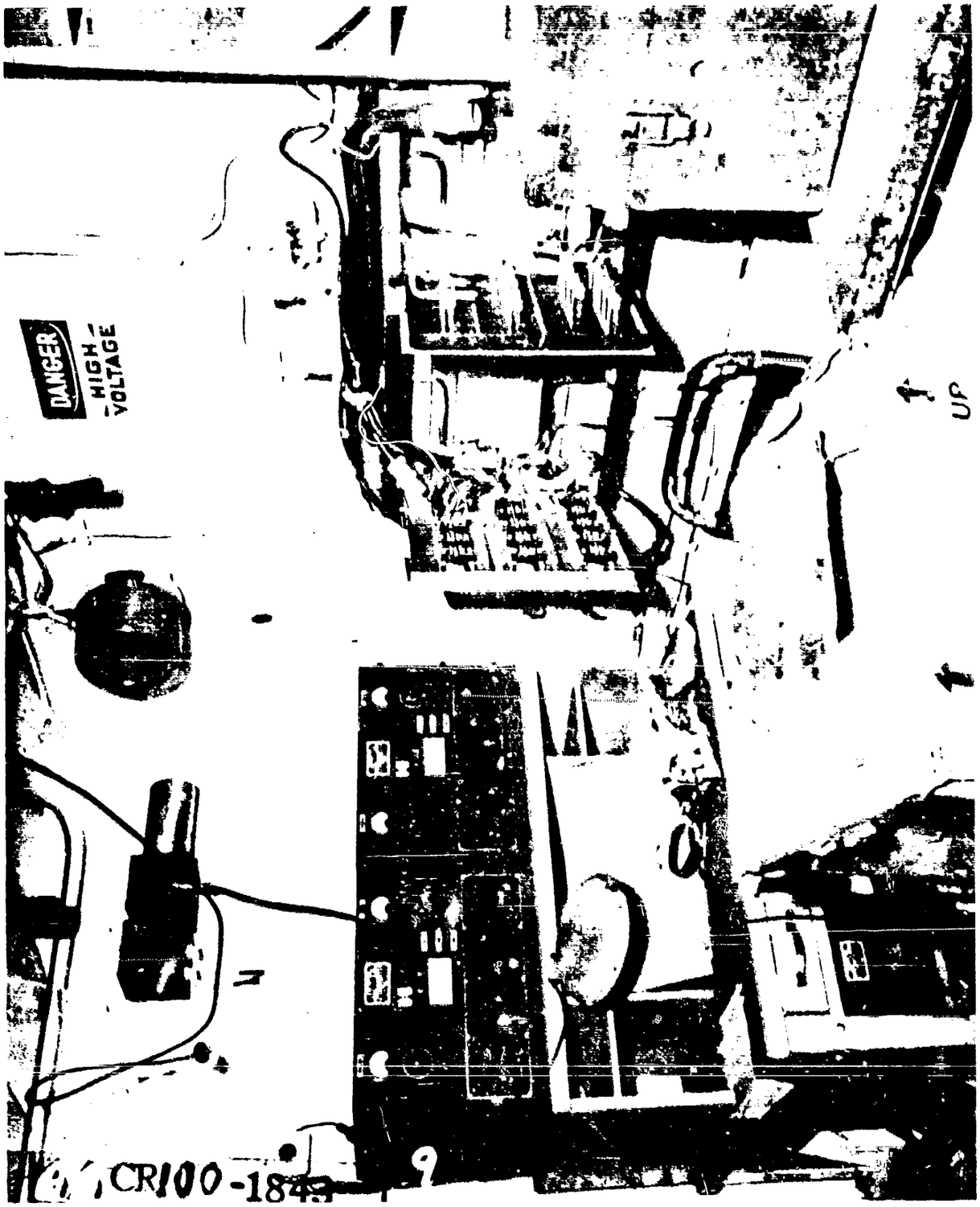
POST ABLE - ABK UNITS. Both ABK-3 units were completely shaken off their mountings by the blast shock but were otherwise undamaged.



POST ABLE - BATTERIES. Batteries for TCS power supply were knocked out of their locker due to being improperly secured. Their operation was unimpaired.



PRE ABLE - RADIO III. Shows TDE, RAK/RAL and patch panel.



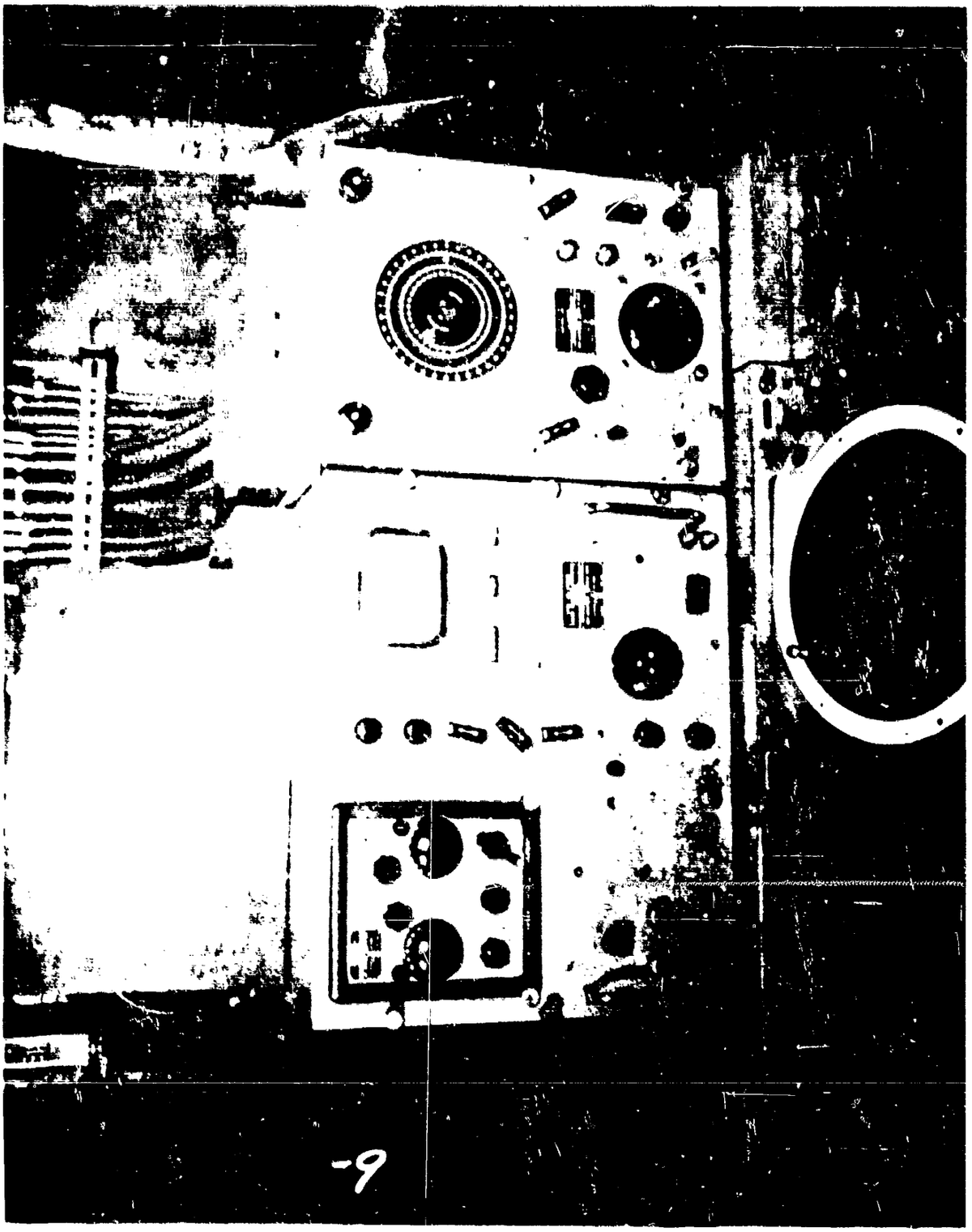
POST ABLE - RADIO III. The patch panel was opened by shock but caused no damage.

TEST ABLE

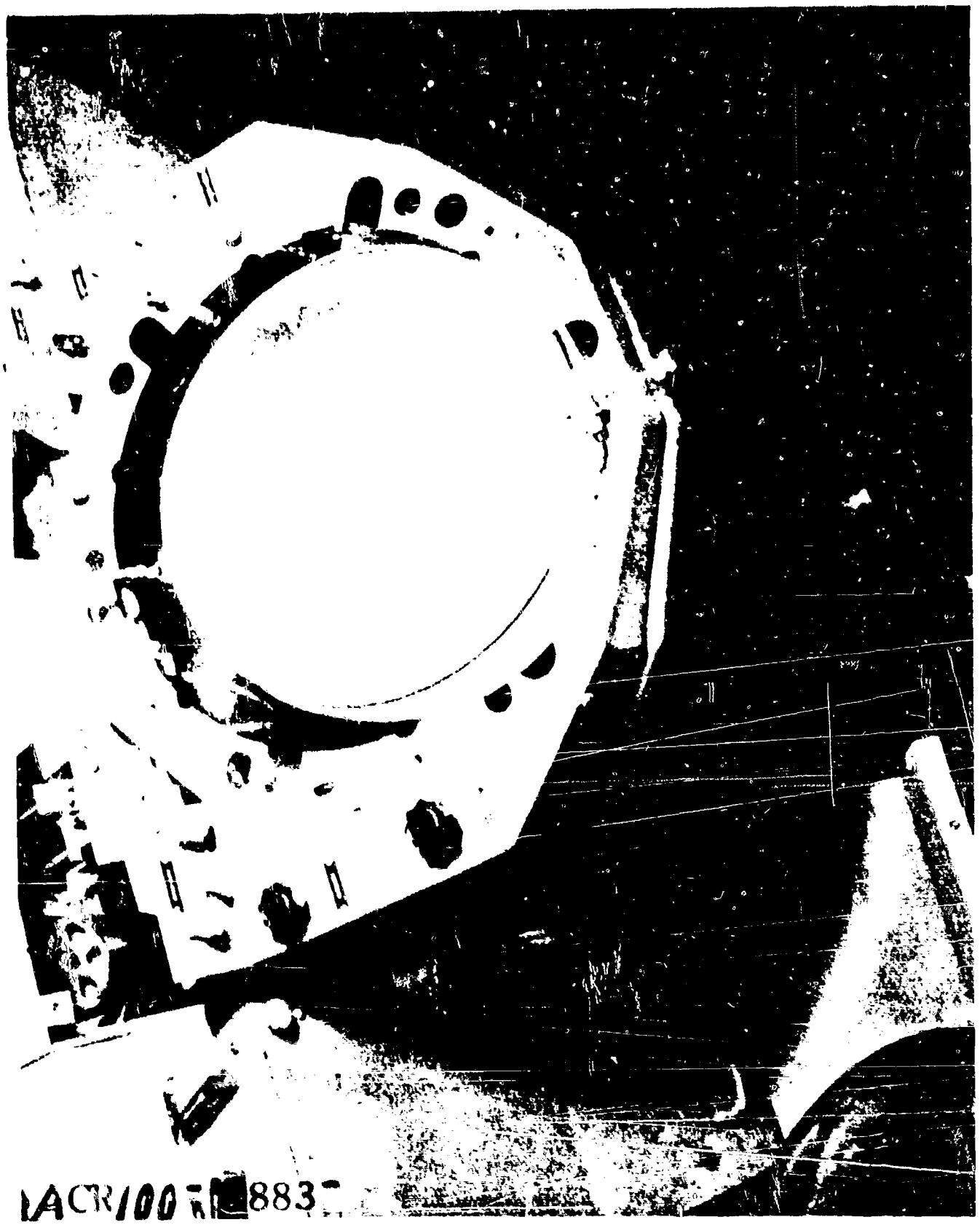
U.S.S. CARTERET (APA-70)

Range: 1600 yards Bearing: 080°

Very light damage was suffered by electronic equipment aboard this ship. The PPI tube of the SC radar equipment has been broken at the neck and the inrush of air has blown the fluorescent material off the screen.



PRE-ABLE SC-4 INDICATOR. Front view.



POST ARLE SC-4 INDICATOR. PPI Tube was loosely secured, allowing enough movement of neck of tube to shatter it under shock.

TEST ABLE

U.S.S. CRITTENDEN (APA-77)

Range: 600 yards Bearing: 275°

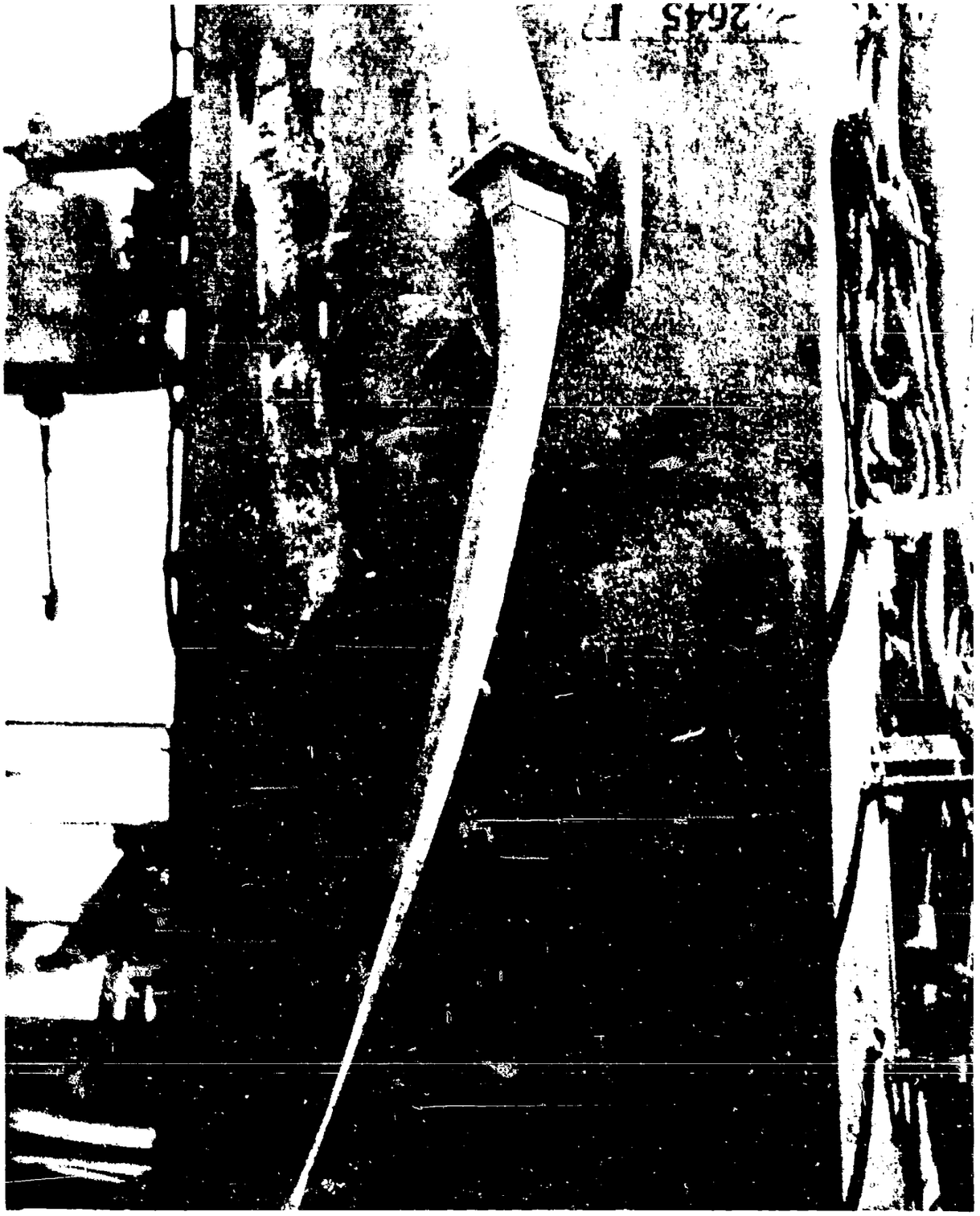
This ship suffered very heavy damage because of its proximity to the explosion. A good conception of its overall damage can be obtained from the photographs.

Particularly interesting pictures are the ones showing loss of radar antennas and waveguide damage. Also, it is interesting to note how the fathometer was damaged by the dishing in of the forward bulkhead of the wheelhouse.

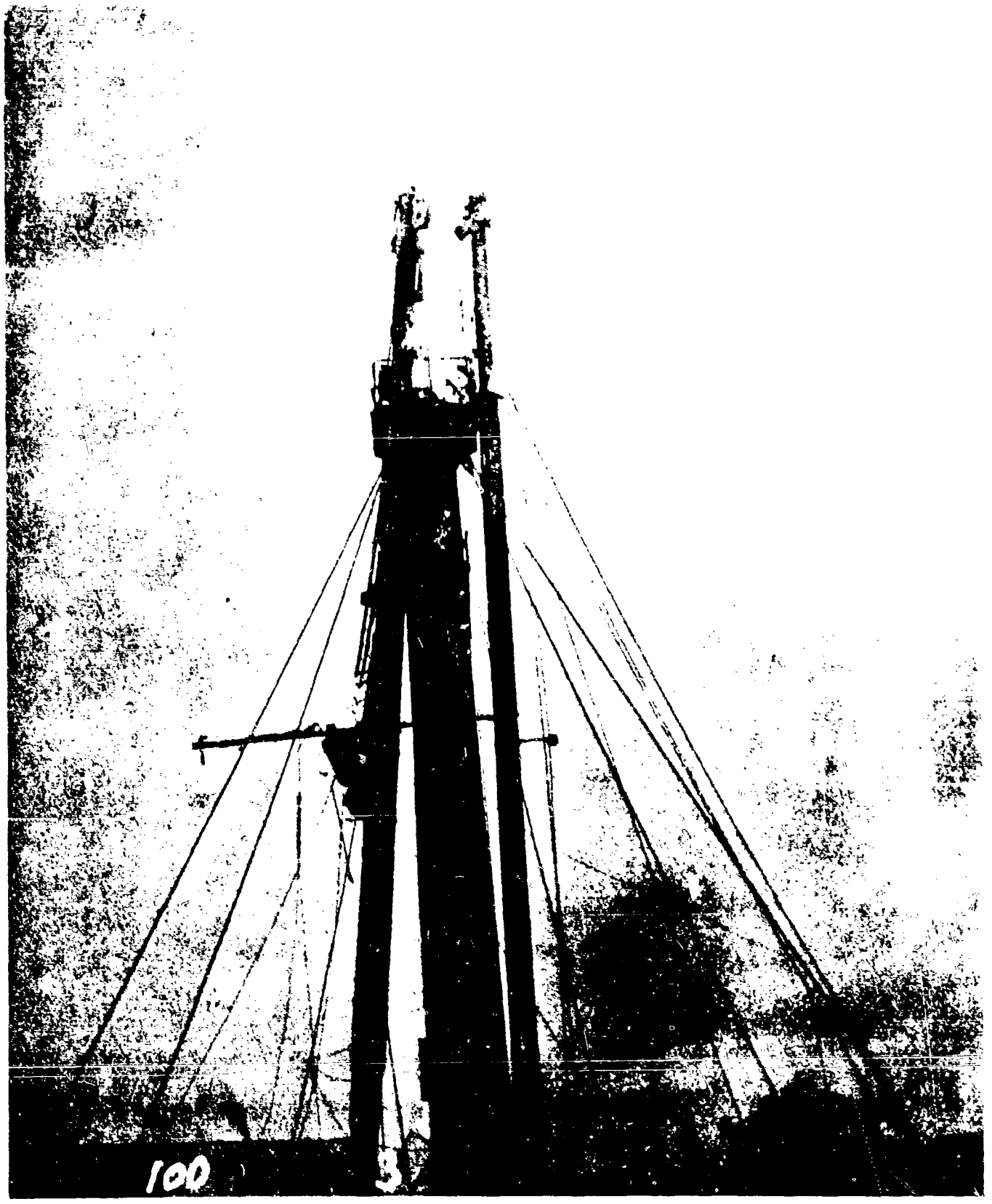
POST ABLE - FOREMAST. Top section blown over. Reflector was broken off of SG-1 antenna and waveguide collapsed.

CR 2645/4

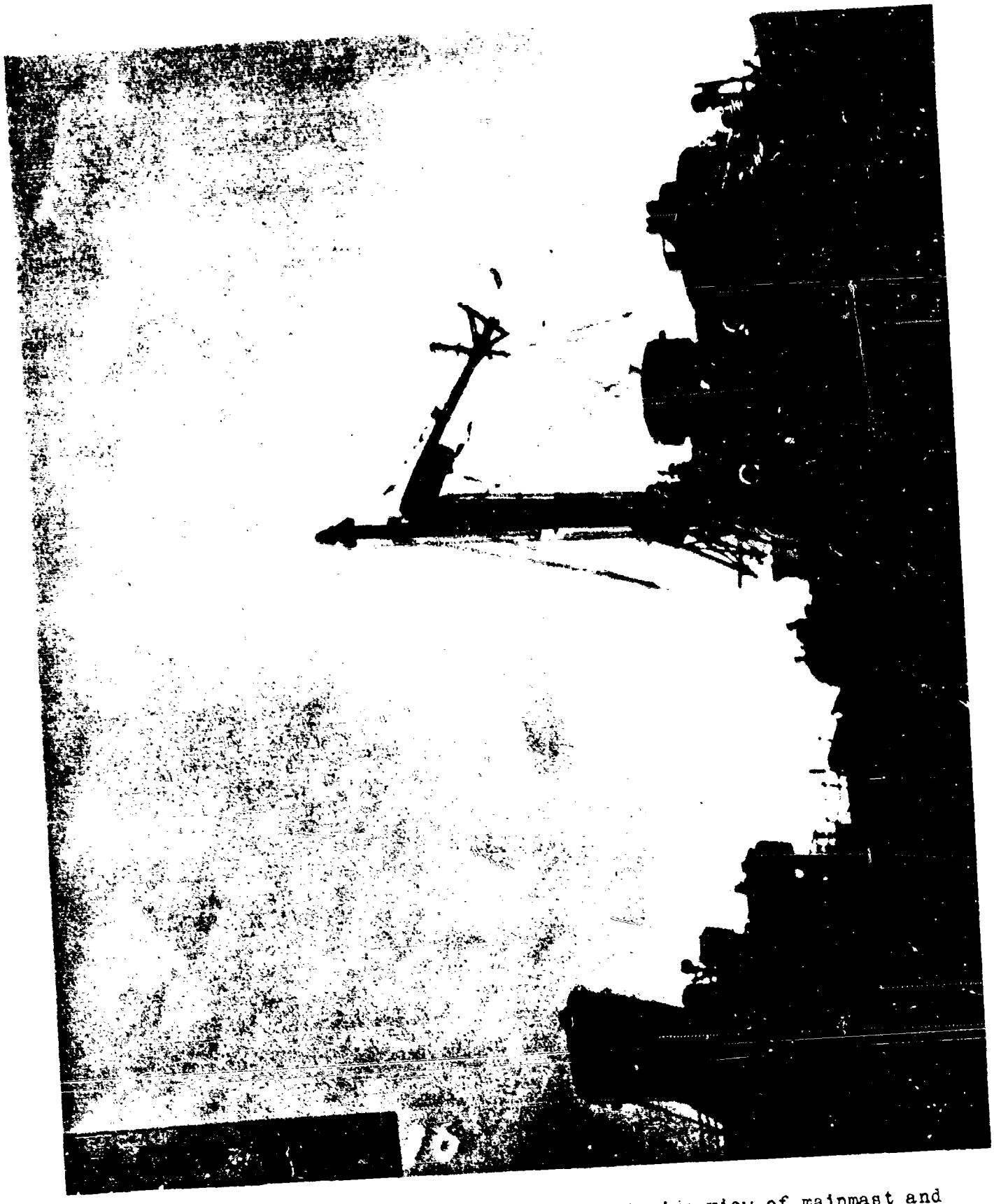
POST ABLE - FOREMAST. Top section blown over. Note condition of waveguide at center of picture, where flange has separated from guide at soldered joint. Waveguide was flattened and next line twisted for full length of exposed run.



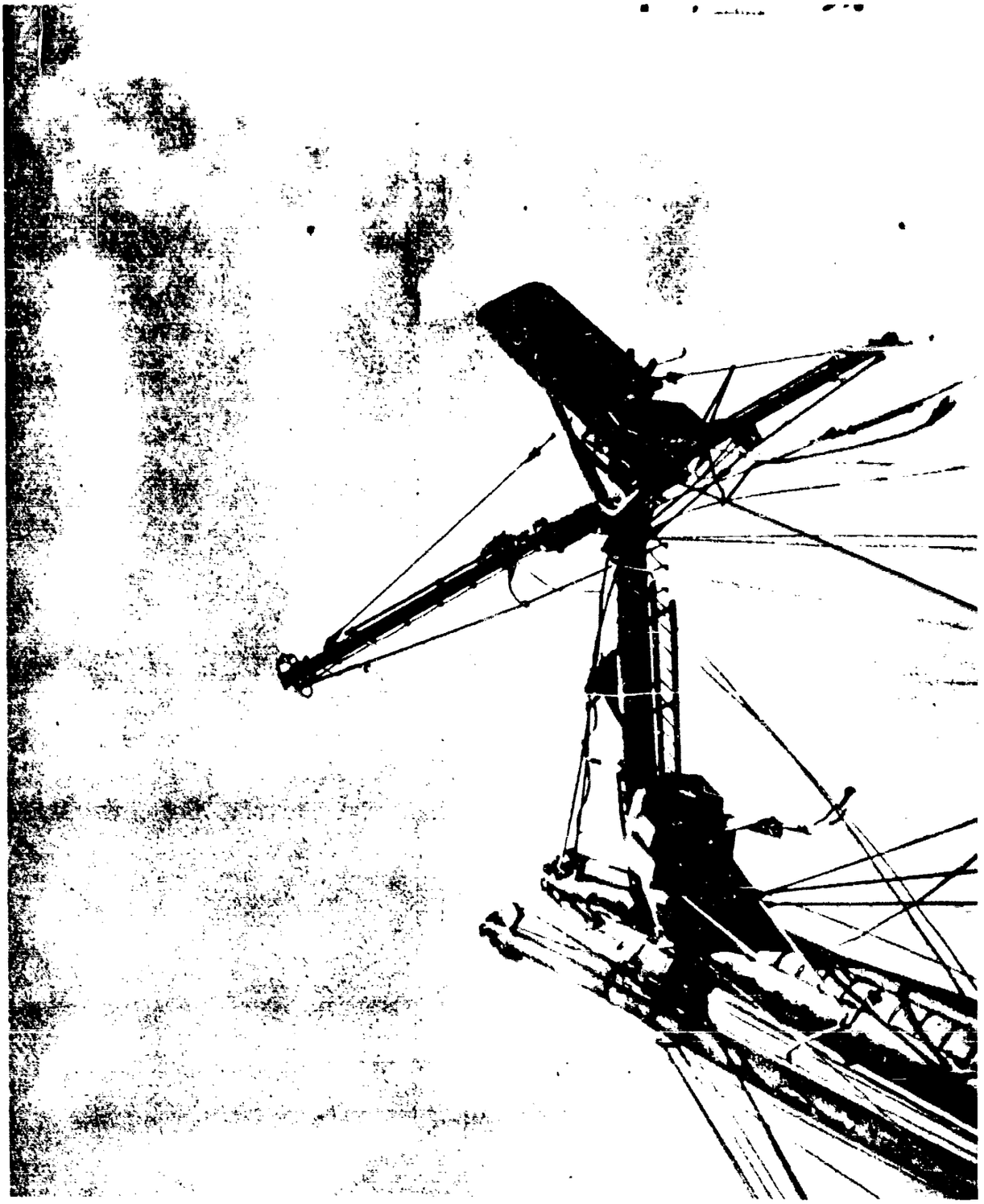
POST ABLE - FOREMAST. Close-up of flattened and twisted SG wave-guide.



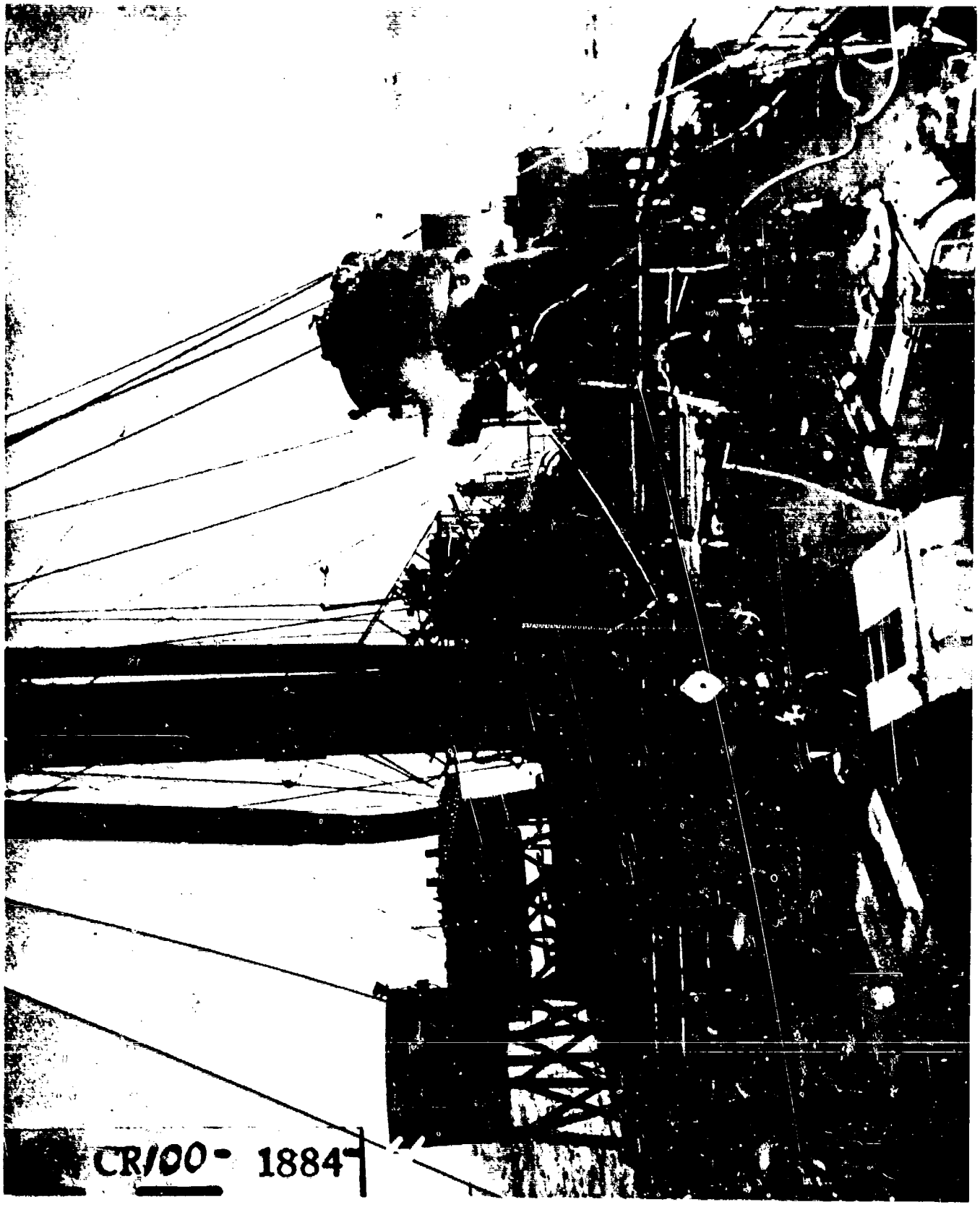
POST ABLE - MAINMAST. Upper section looking aft.



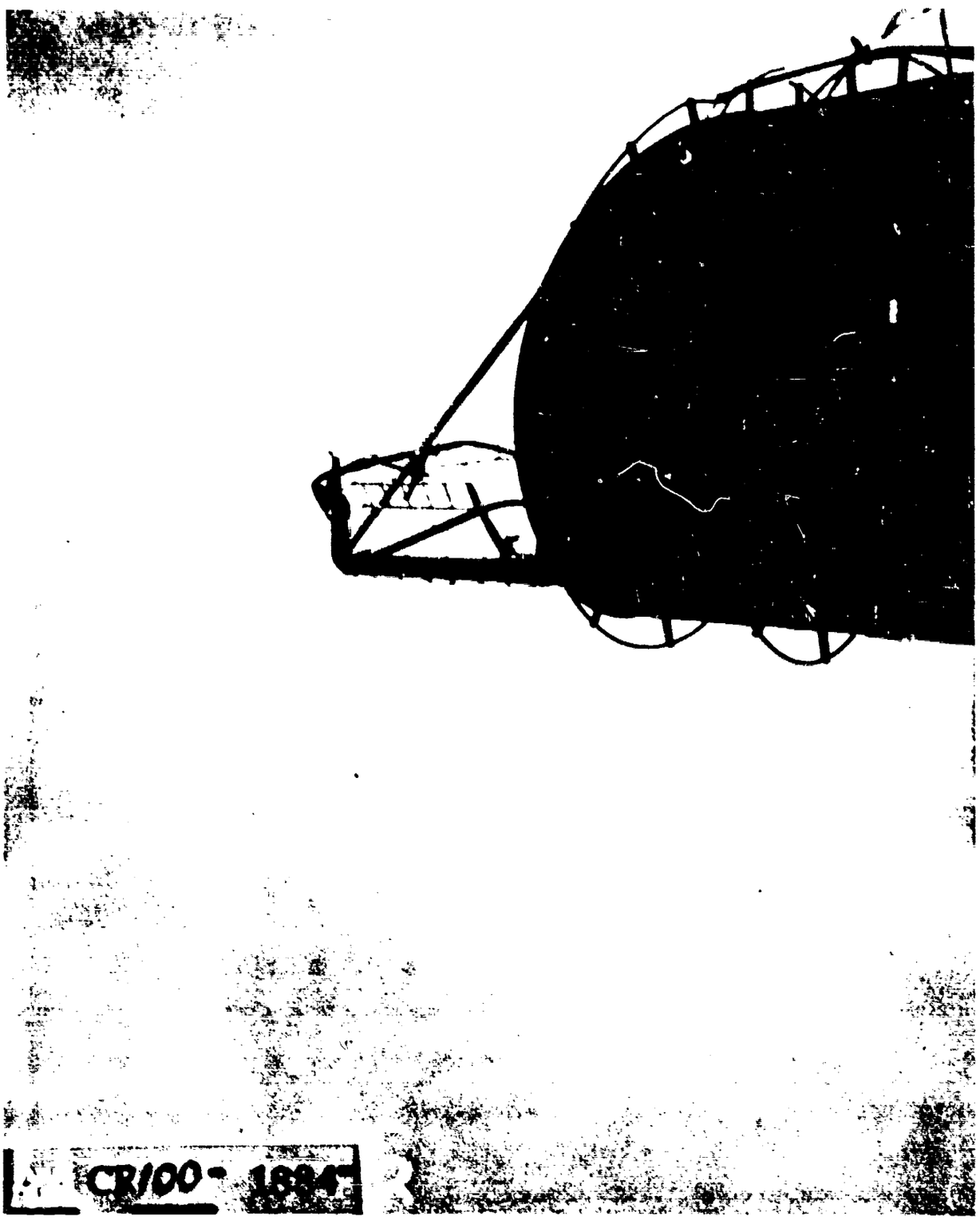
POST ABLE - MAINMAST. General port side view of mainmast and after structure.



POST ABLE - MAINMAST. Top section blown over. Base ring of SC-4 pedestal still bolted to foundation, with a few fragments of pedestal remaining.



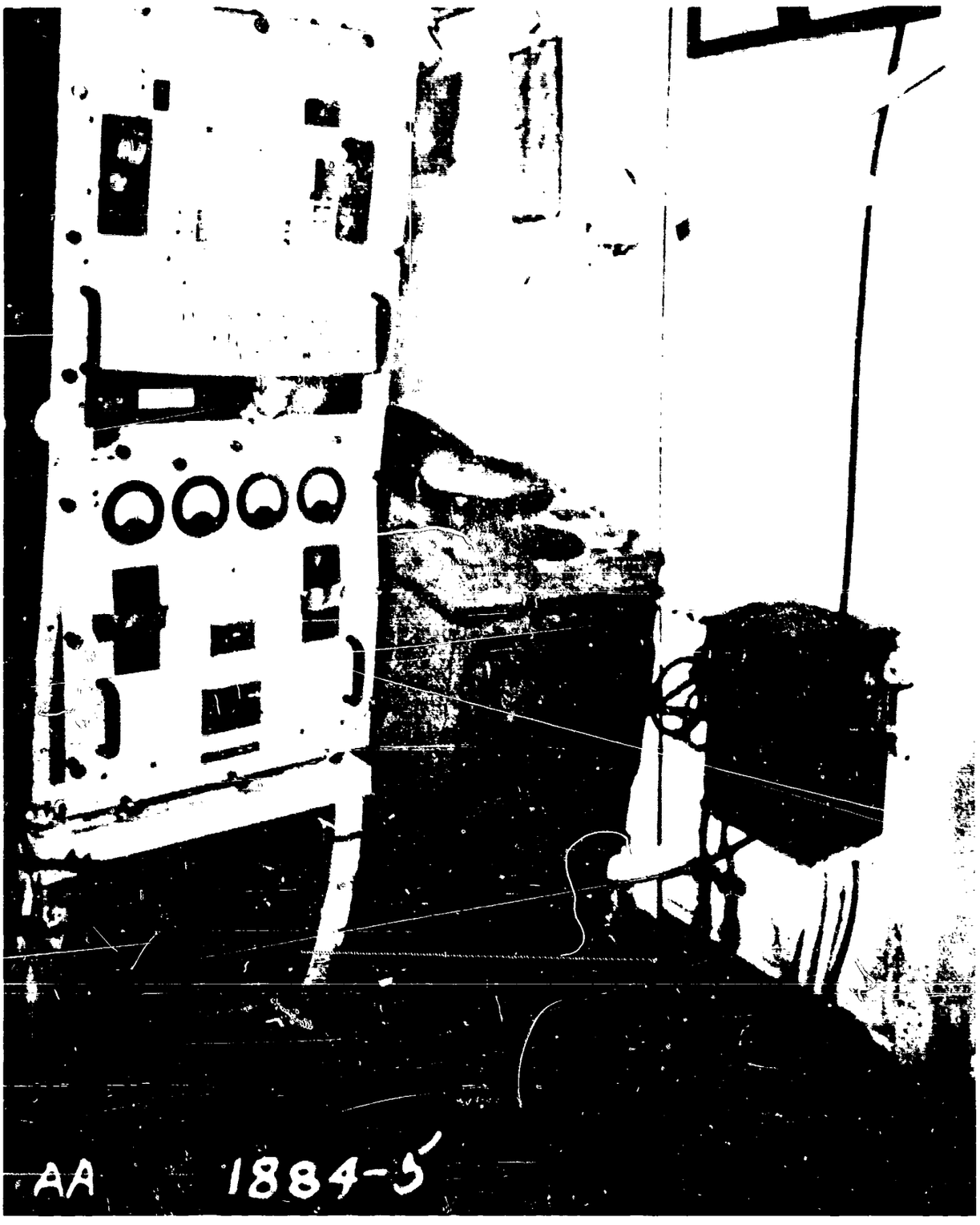
POST ABLE - MAINMAST. View of lower section looking aft shows boom, shattered SC-4 antenna, and port 40-mm director tub bent back.



CB/100-1084

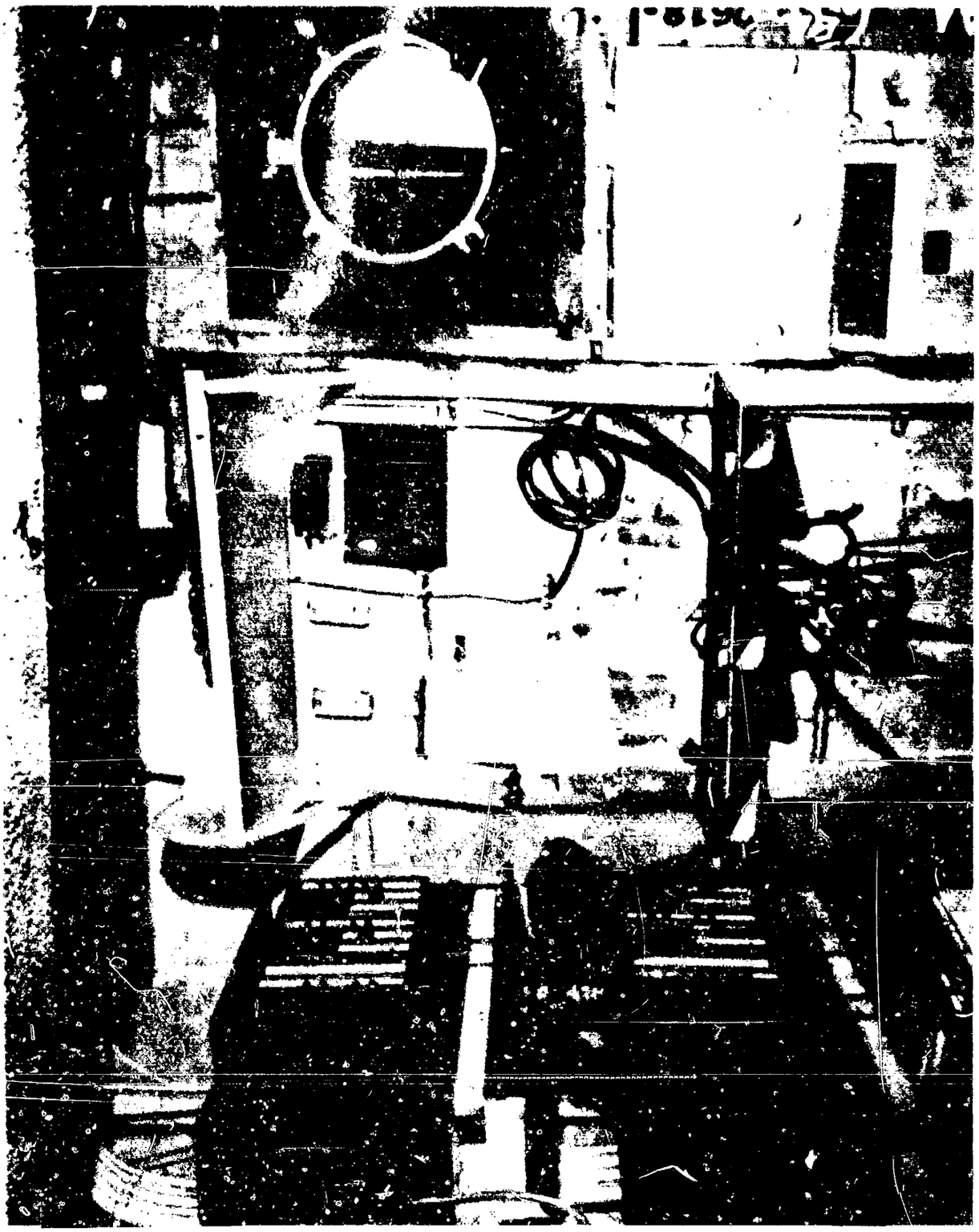
POST ABLE - ANTENNAS. View of damaged stack mounted antennas including TBS antenna.

PRE ABLE - PILOTHOUSE. Front view of VD-2 remote PPI.

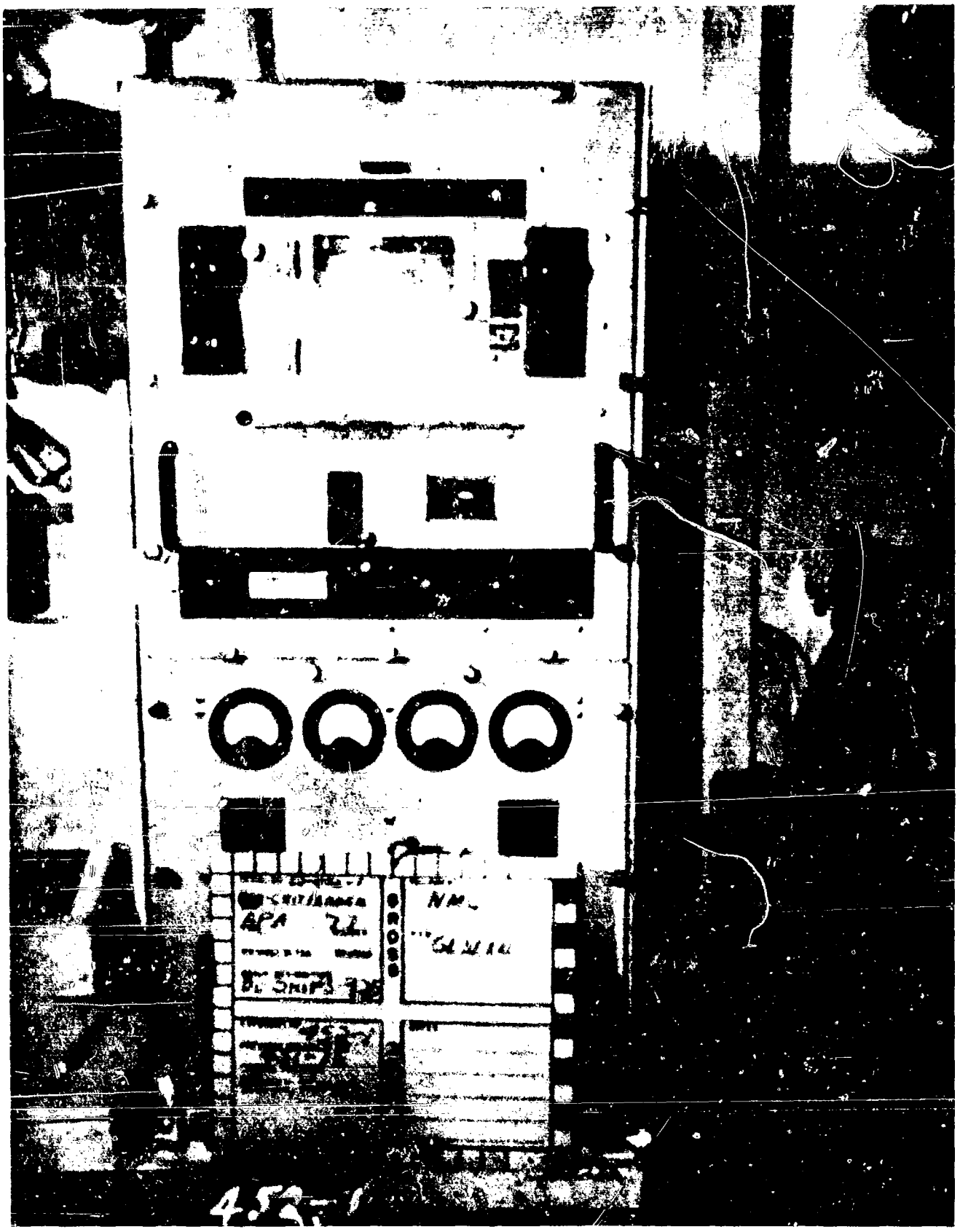


POST ABLE - PILOTHOUSE. Front view of NMC and VD-2. The welds parted on the VD-2 foundation, and the selector switch was torn from its mount. However, the VD-2 was still operable. The NMC was warped and had internal damage.

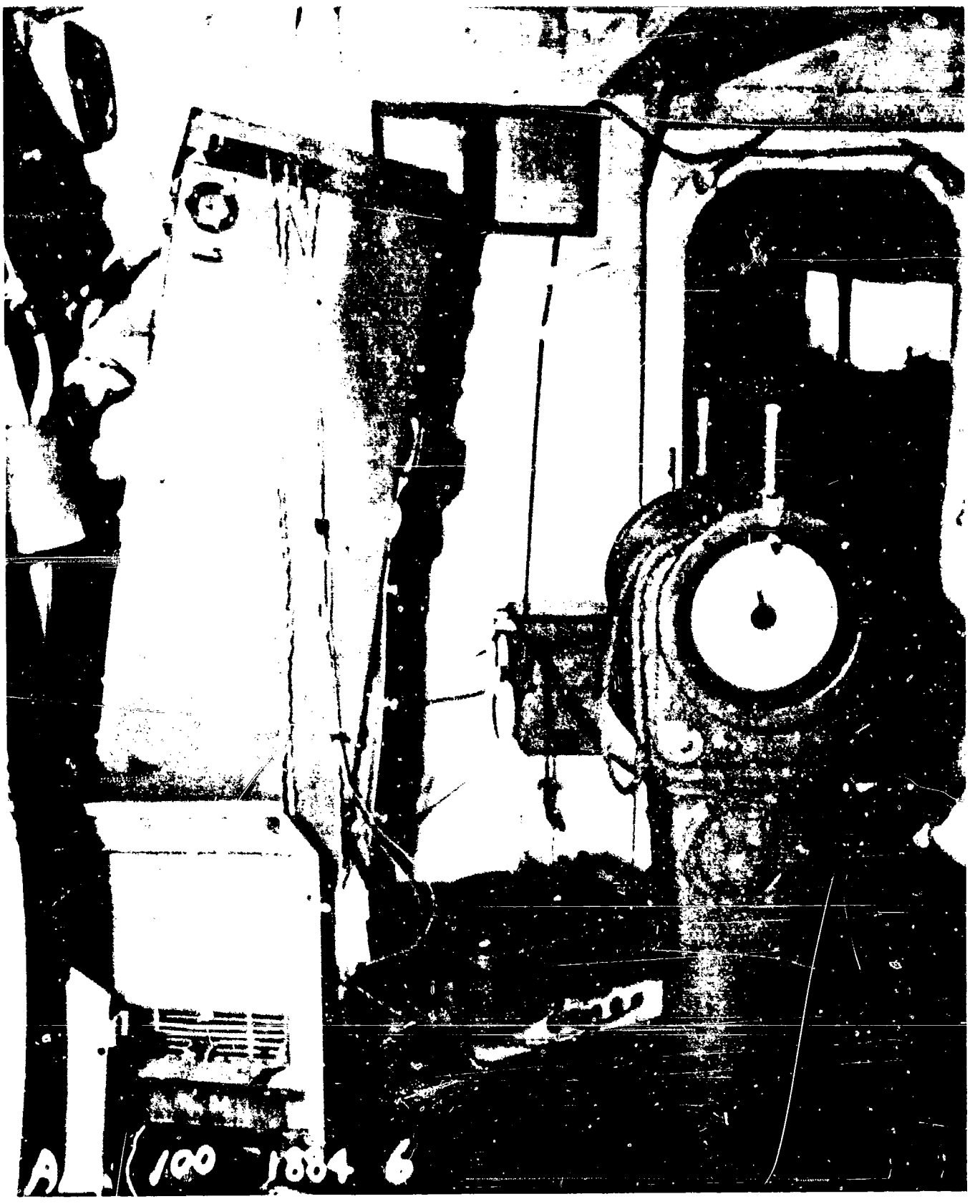
PRE ABLE - PILOT HOUSE. View of forward port corner.



POST ABLE - PILOTHOUSE. View of forward port corner. Shock mount bolts were sheared off.



PRE ABLE - NMC FATHOMETER. Front view.



POST ABLE - NMC FATHOMETER. Side view of NMC. Bulkhead to left (forward bulkhead of pilot house) was pushed in, tipping NMC aft and warping its foundation and main frame. Additional fathometer on deck was placed there by instrumentation crew for recording work during test.

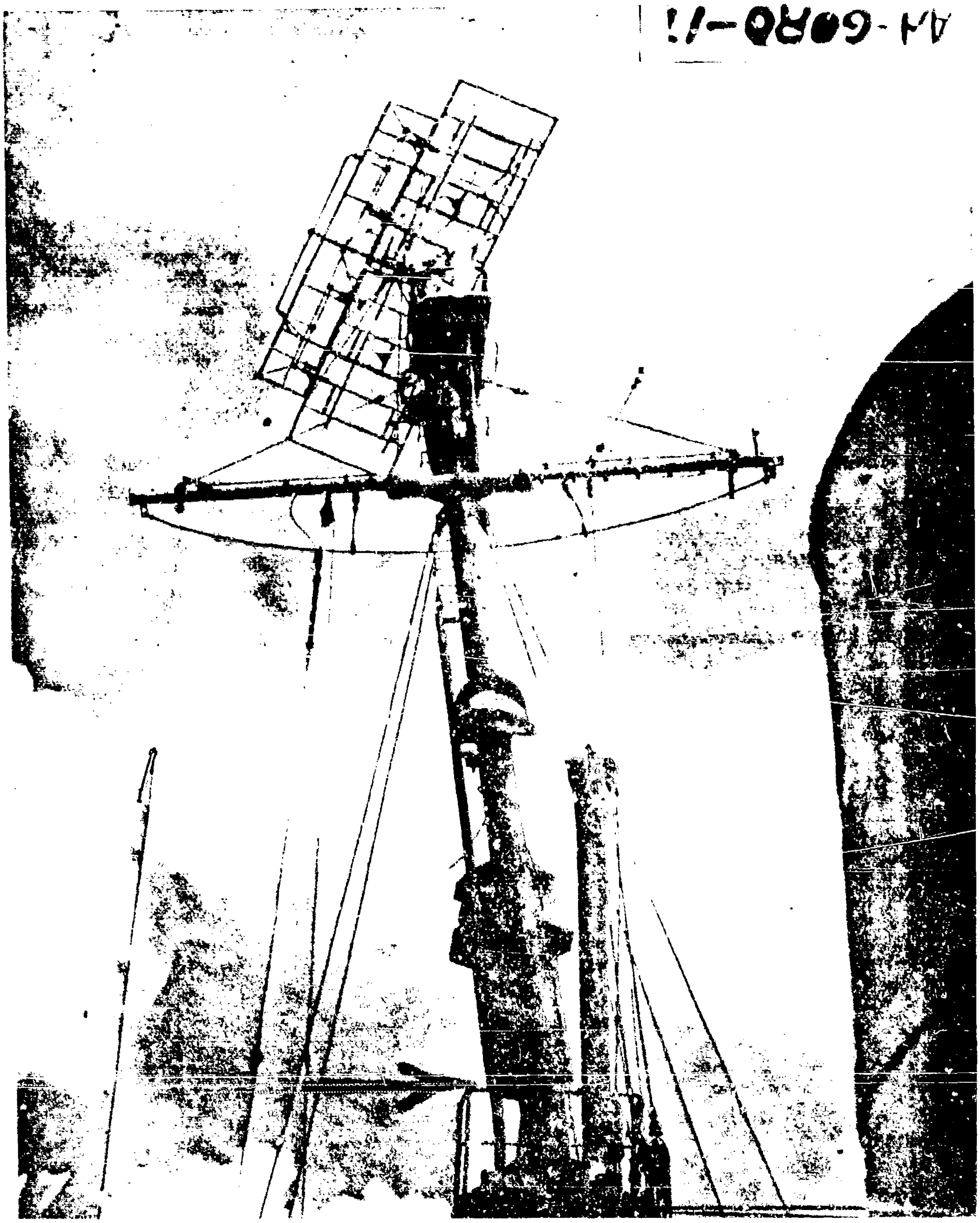
POST ABLE - PILOTHOUSE. View of forward port corner. Equipment knocked off mounts.

TEST ABLE

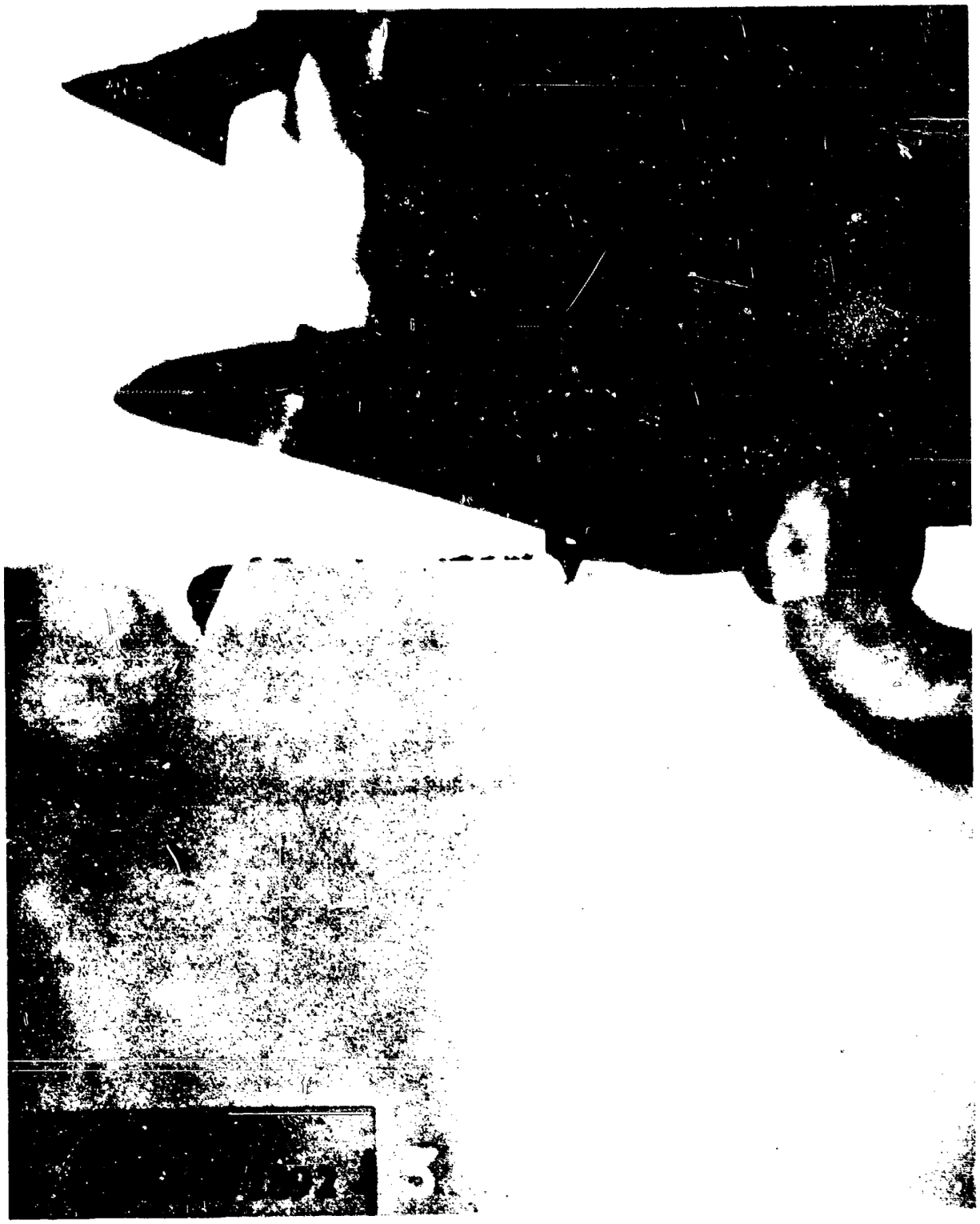
U.S.S. DAWSON (APA-79)

Range: 900 yards Bearing: 255°

This ship received heavy damage from the explosion. The photographs of the bent mainmast and damaged SC radar antenna and of the broken SG reflector show the most interesting damage aboard this ship.



POST ABLE - SC ANTENNA. Mainmast was bent, (see arrow) and SC antenna was tilted by blast.



POST ABLE - SG ANTENNA. SG antenna reflector broken by blast.

TEST BAKER

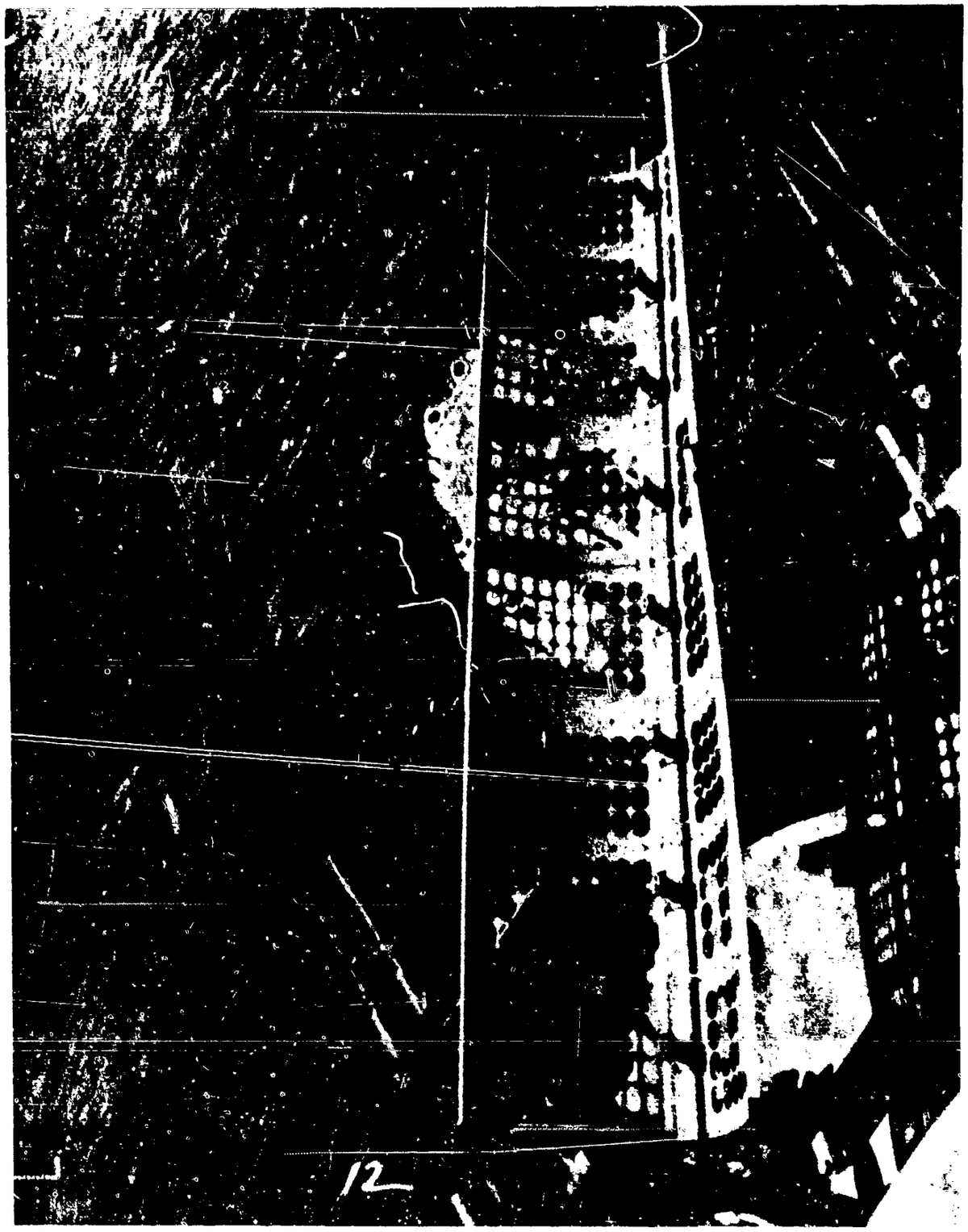
U.S.S. NEW YORK (BB34)

Range: 900 yards Bearing: 115°

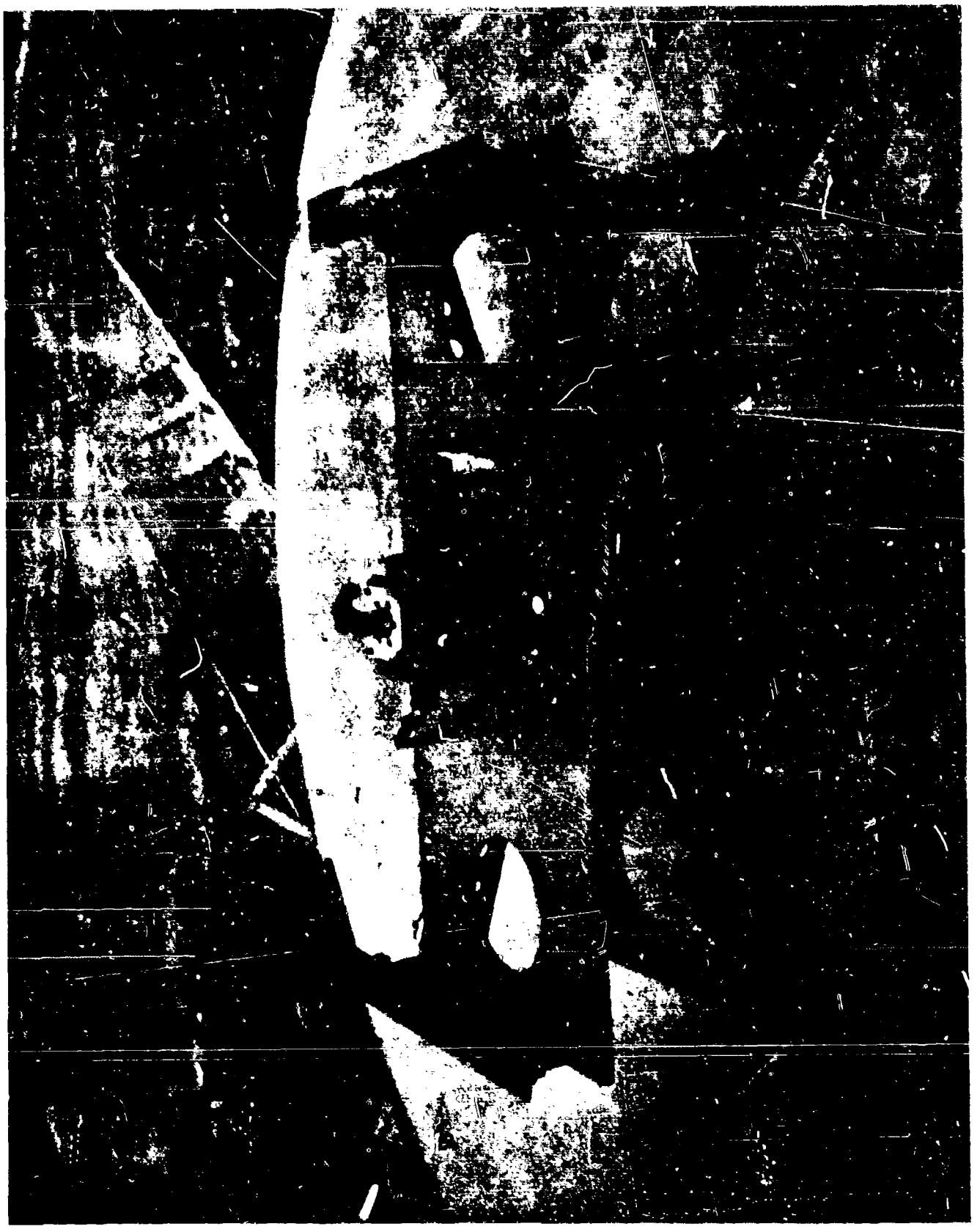
The damage to this ship was light. The MK 3 antenna received the only serious antenna damage from the BAKER explosion when it broke away from its mounting.

BACT 76- 943

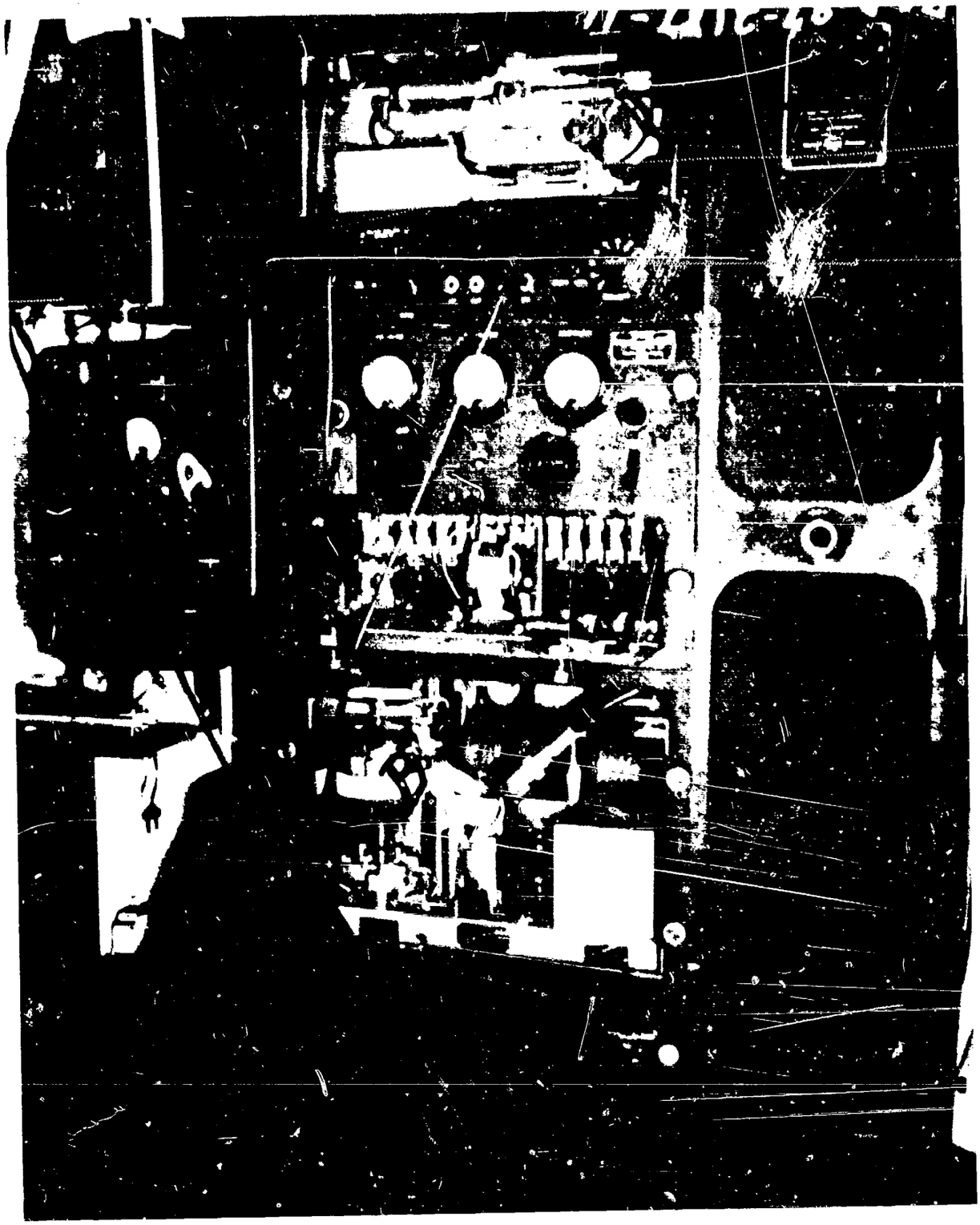
PRE BAKER - MK 3 RADAR ANTENNA. Main battery director forward. This antenna was undamaged during test Able.



POST BAKER - MK 3 RADAR ANTENNA. Antenna was apparently intact except for damage caused by fall.



POST BAKER - MK 3 RADAR ANTENNA. Antenna pedestal in foreground with the antenna which was blown off lying in the 40 MM gun mount in the background.



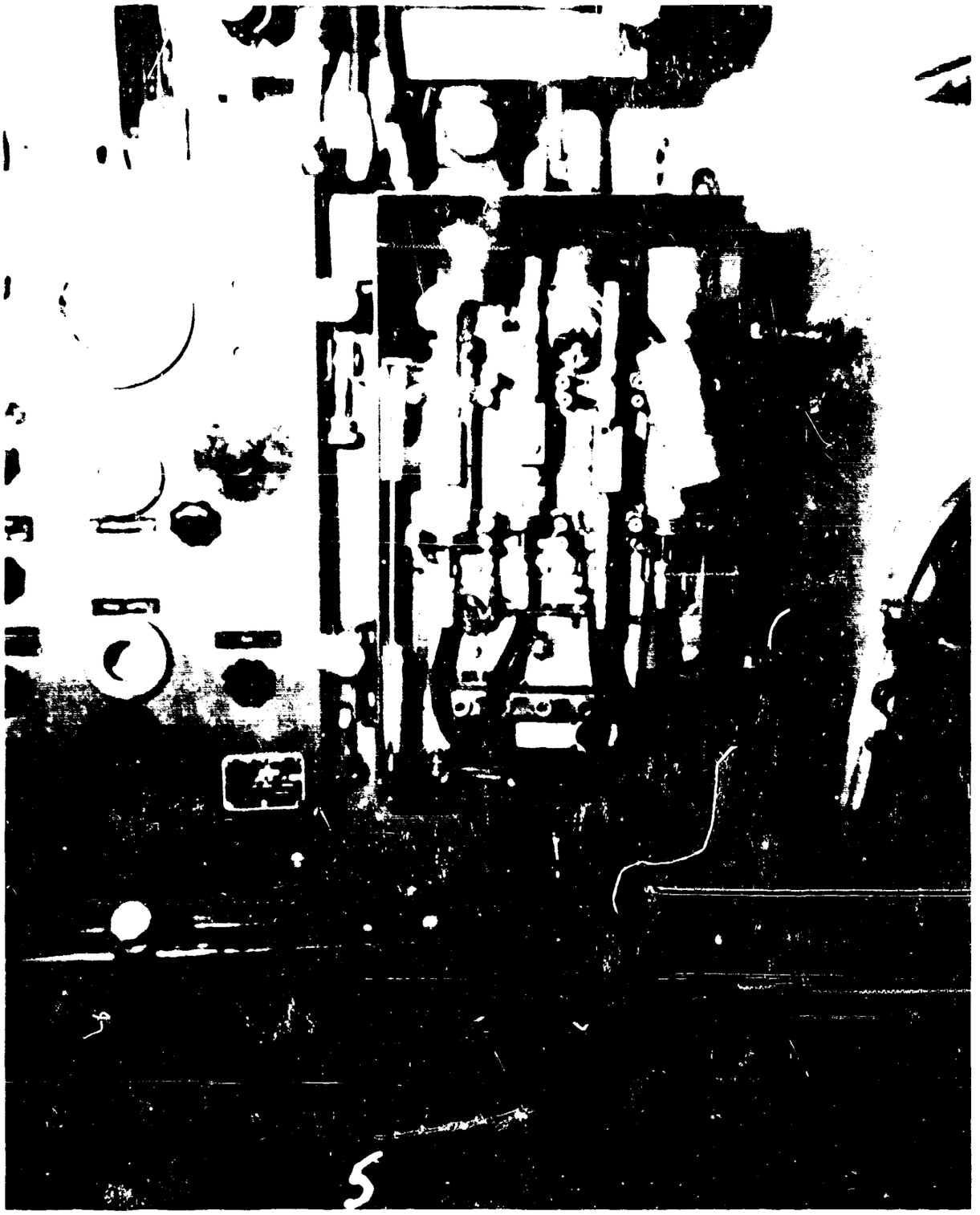
POST BAKER - MK 3 RADAR MAINFRAME. MK 3 Mod 2 main battery forward fire control radar. Regulated power supply "A" was broken loose from its mounts. Keyer tube located behind "B" was broken.

TEST BAKER

U.S.S. NEVADA (BB36)

Range: 1000 yards Bearing: 005°

The damage to this ship was moderate in Test BAKER. Only two photos are included, but they cover equipments which were most severely damaged. Damage was due to shock and mainly to fire control radar as shown.



POST BAKER - MK 12 MOD 1 RECEIVER. Damage to receiver in secondary battery director aft.

POST BAKER - MK [illegible]. [illegible] after secondary battery director modulator "A" and high voltage rectifier "B" were knocked from mounts, damaging these units as well as other components nearby.

TEST BAKER

U.S.S. PENNSYLVANIA (BB38)

Range: 1200 yards Bearing: 175°

This ship sustained moderate damage in Test BAKER. It is possible that the weight of falling water may have caused the failure of the MK 12 antenna mounts located on top of the MK 37 Secondary Battery Director as shown on page 197. Other damage probably resulted from shock.

POST BAKER - MK 12 RADAR ANTENNA MOUNT. Cross level gear assembly of MK 12 Mod 1 radar on port side MK 37 director. The construction is weak since the two housings "A" and "B" are mounted so that they are easily spread apart, allowing the antenna trunnion to fall out. The force of the blast, or the falling water, was sufficient to do this on several antennas of this type.

POST BAKER - MK 12 RADAR ANTENNA MOUNT. Starboard antenna mount cross level assemble. Note piece broken cut "A", and crack "B".

AB CR 80-4179

POST BAKER - MK 12 RADAR ANTENNA MOUNT. Bracket "B" was bent back, allowing antenna trunnion to fall out. Antenna fell forward so that it was pointing into water.

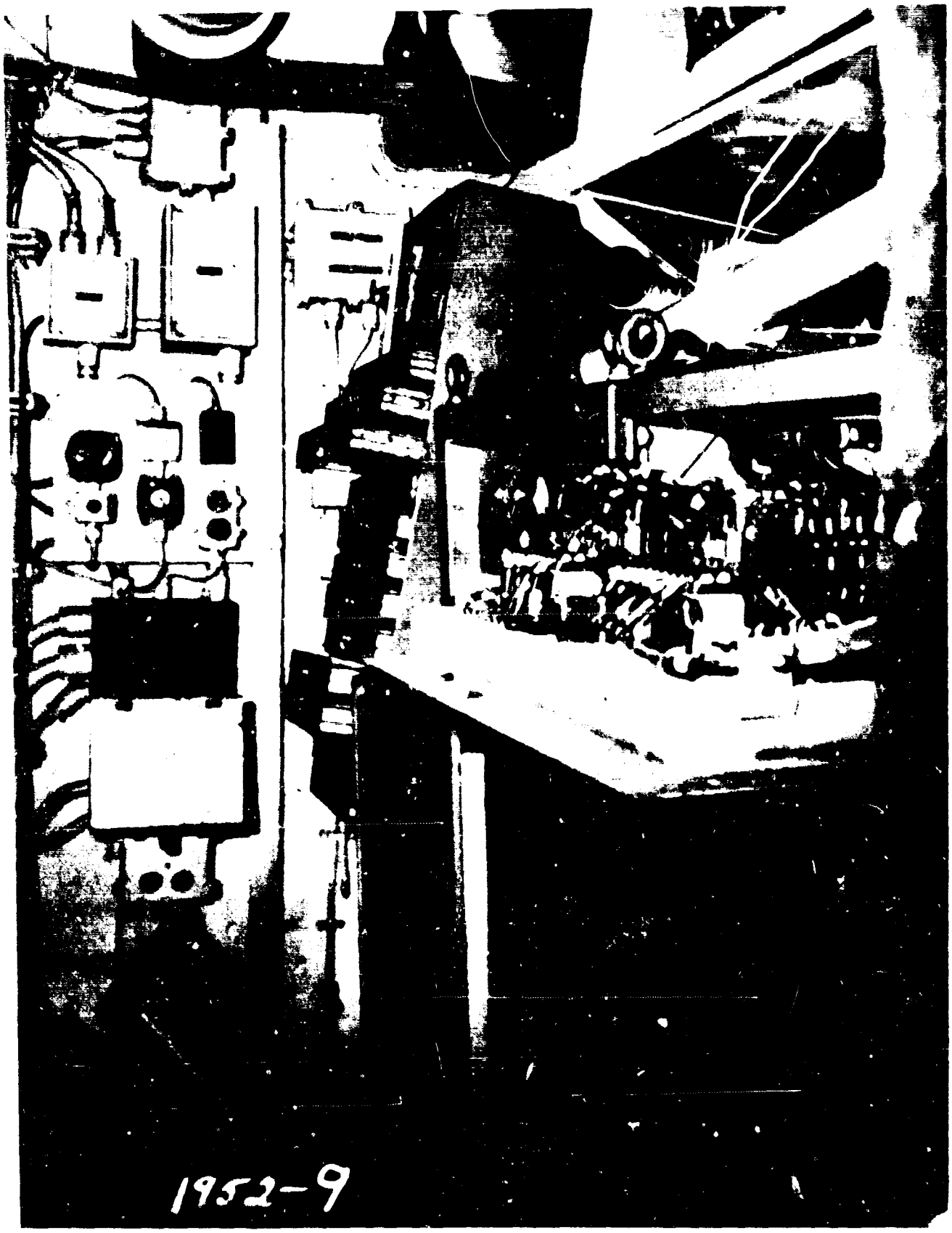
TEST BAKER

U.S.S. PENSACOLA (CA-24)

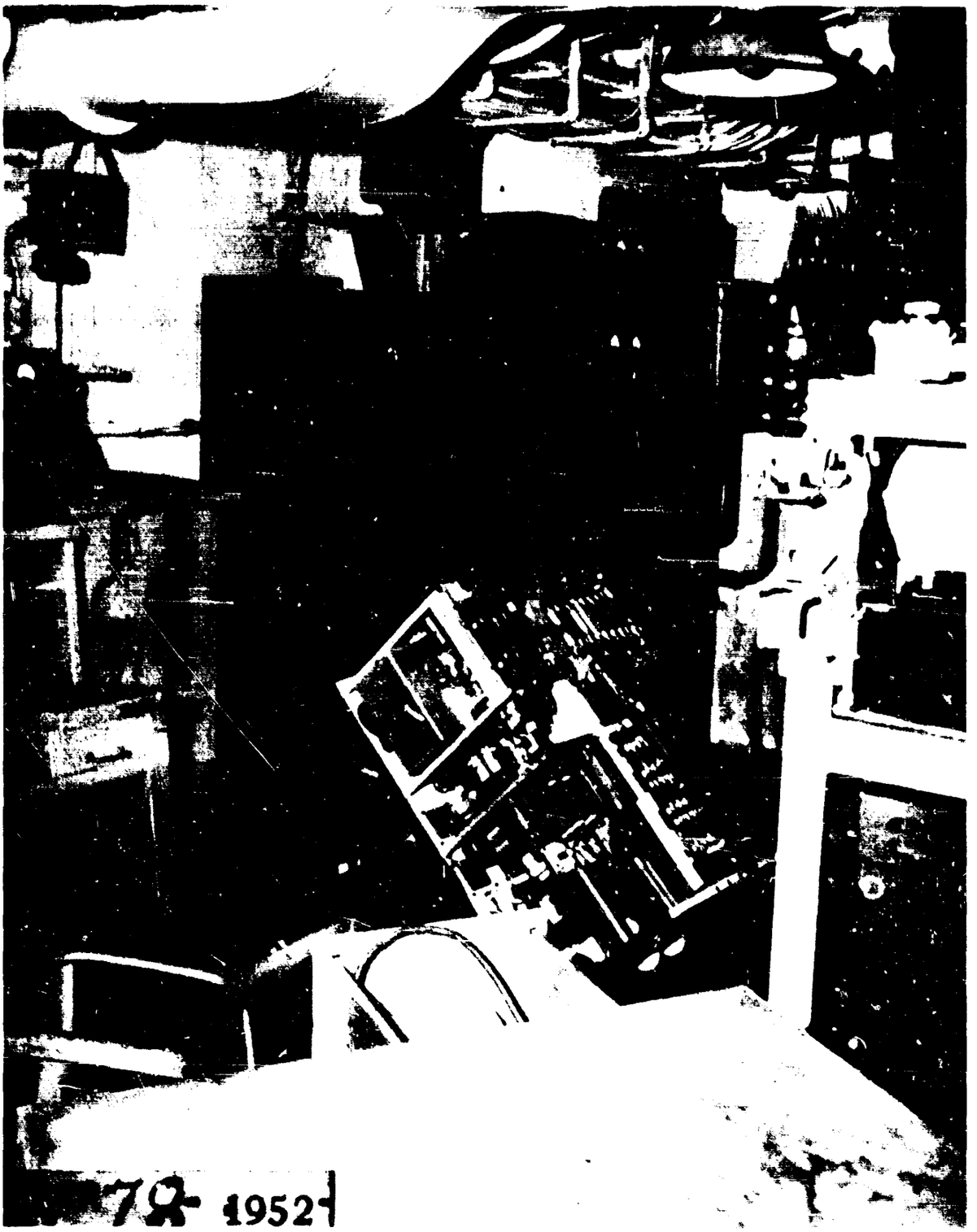
Range: 700 yards Bearing: 270°

Heavy damage was sustained by this ship, most of which was caused by shock. Numerous shockmount failures were encountered. These photographs give good coverage of representative types of damage found after Test BAKER.

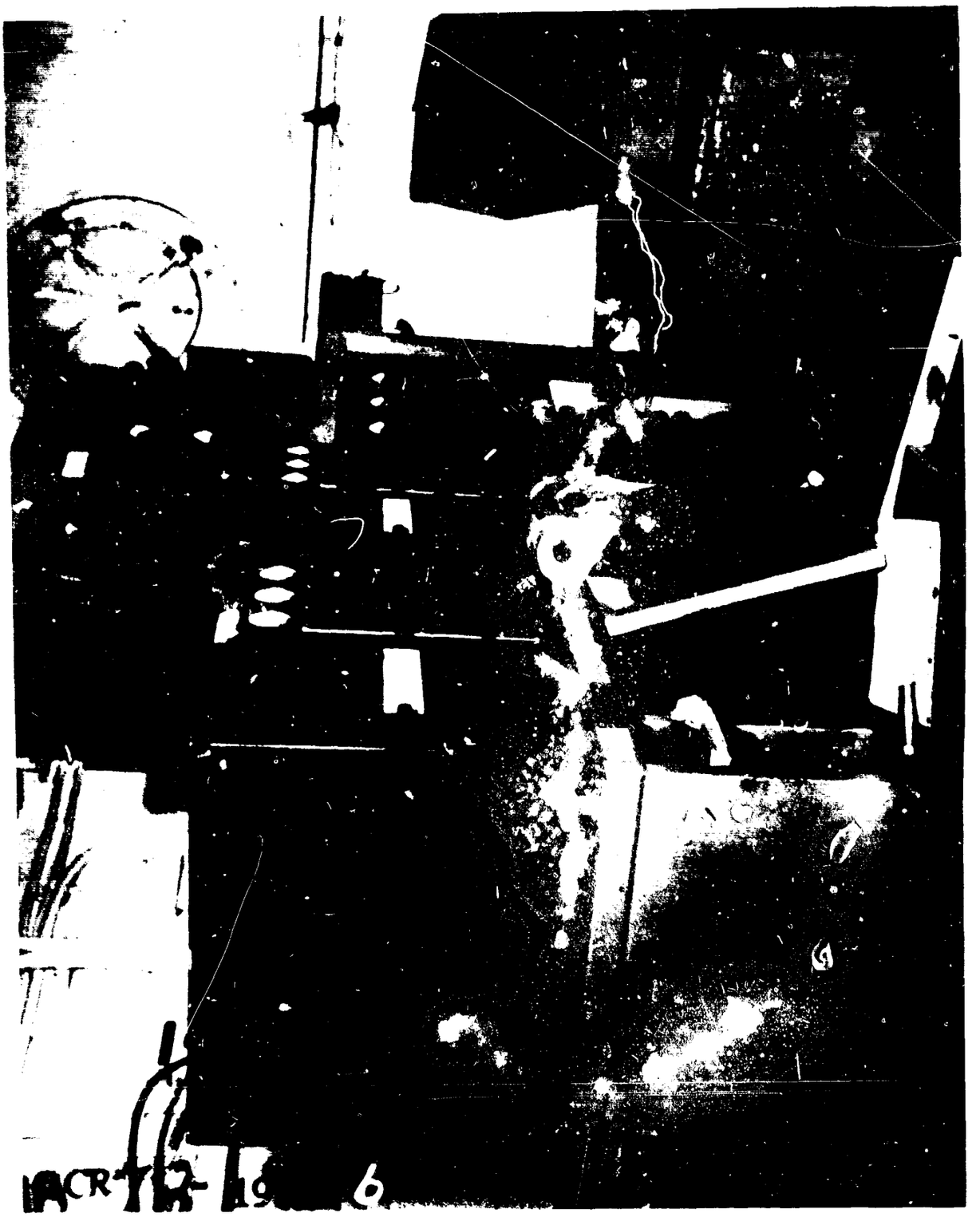
POST BAKER - SP TRANSMITTER-RECEIVER. The shock in this compartment was severe, but the equipment stood up well with the exception of damage to panel securing and meters. Arrow shows broken meter.



POST BAKER - SP TRANSMITTER-RECEIVER. The method of securing panels was inadequate. The damage sustained was due to the failure of the securing screws.

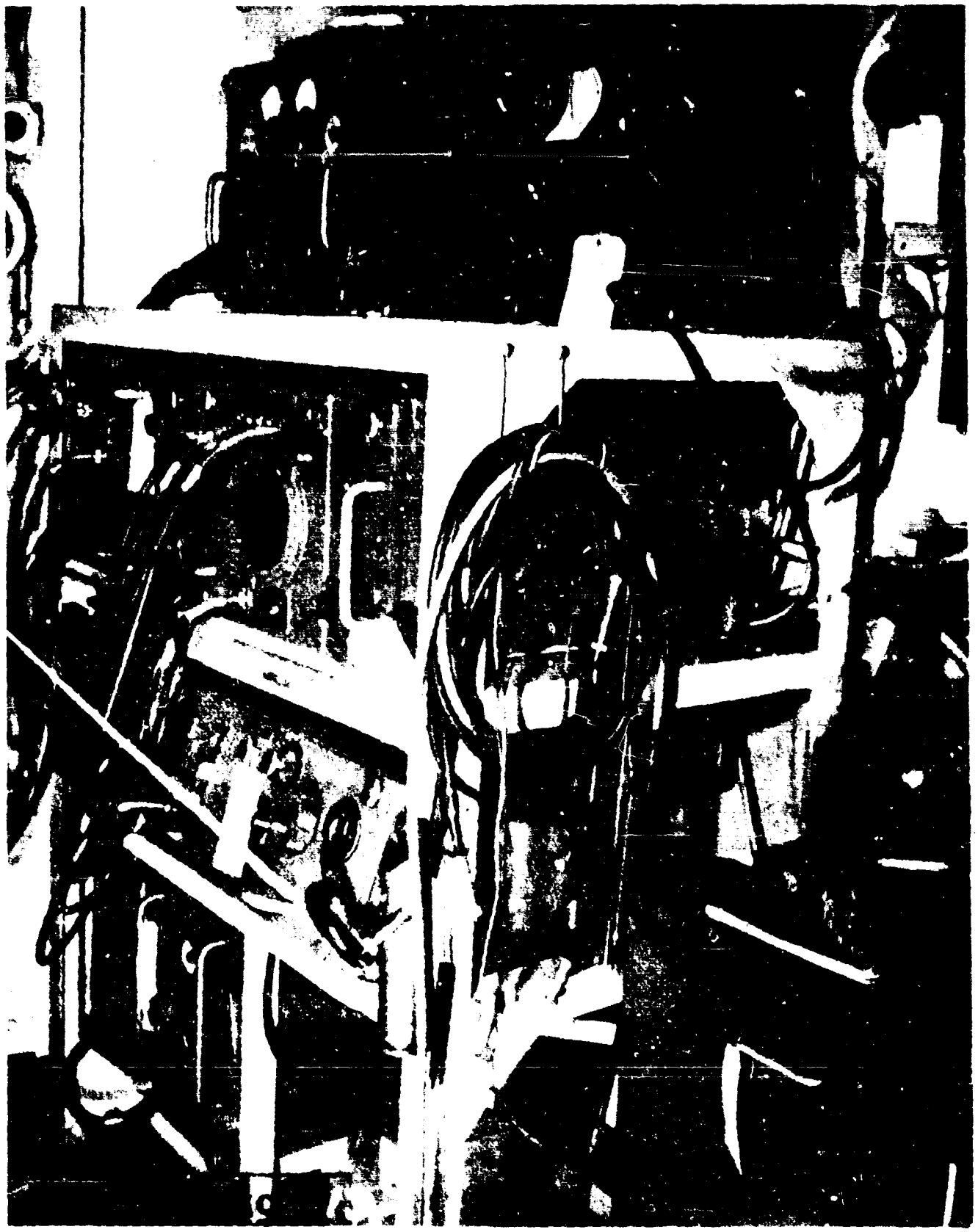


POST BAKER - TDE. TDE was pulled out of its case and fell to the deck. The method of securing this equipment in its case was inadequate to withstand the shock.

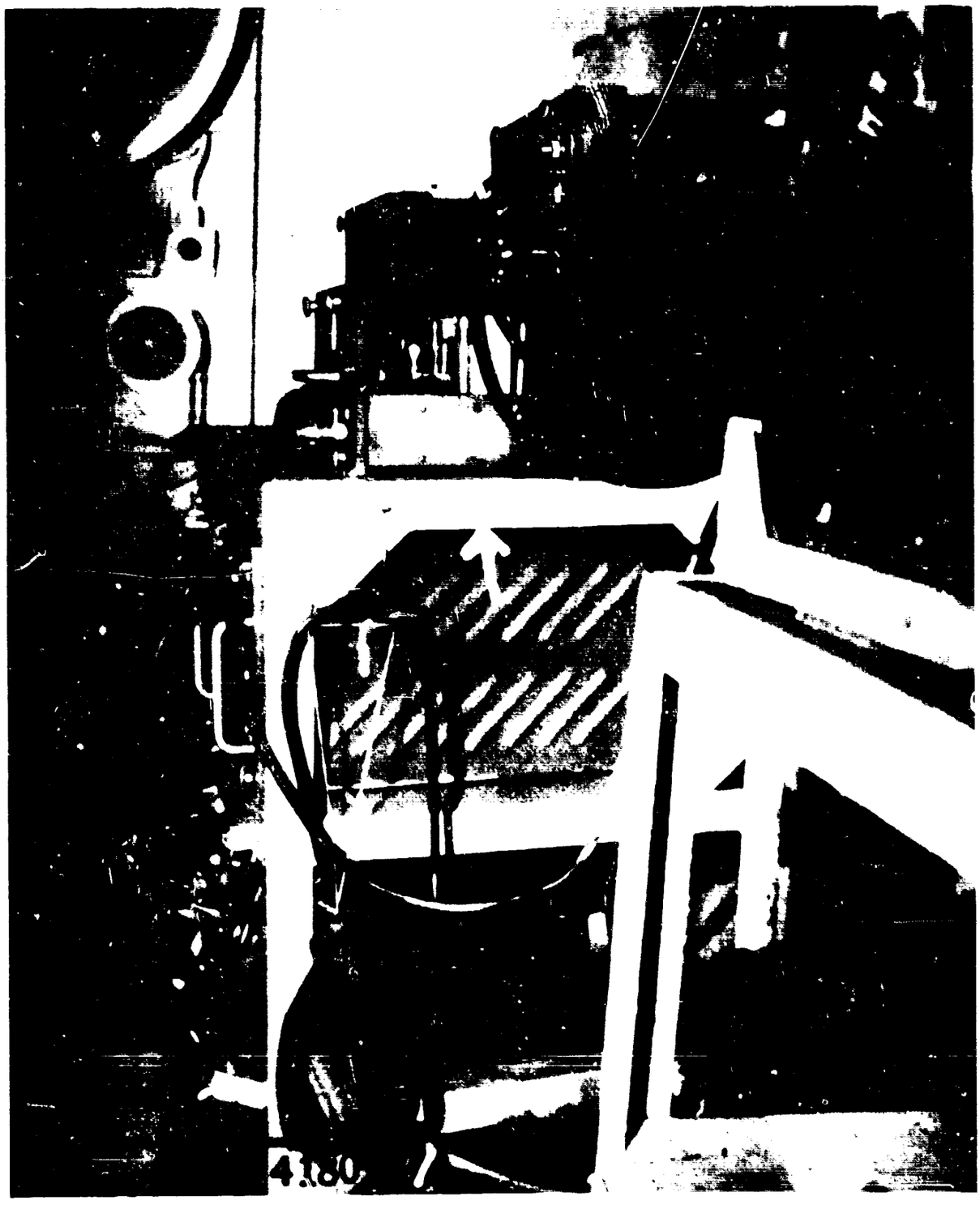


POST BAKER - RBB'S. Radio equipment shown here stood up well. The tables and stowage cabinets suffered the greatest damage.

POST BAKER - MK 28 FIRE CONTROL RADAR. Main battery forward. Main frame has been moved away from bulkhead and is leaning back at a 45 degree angle.

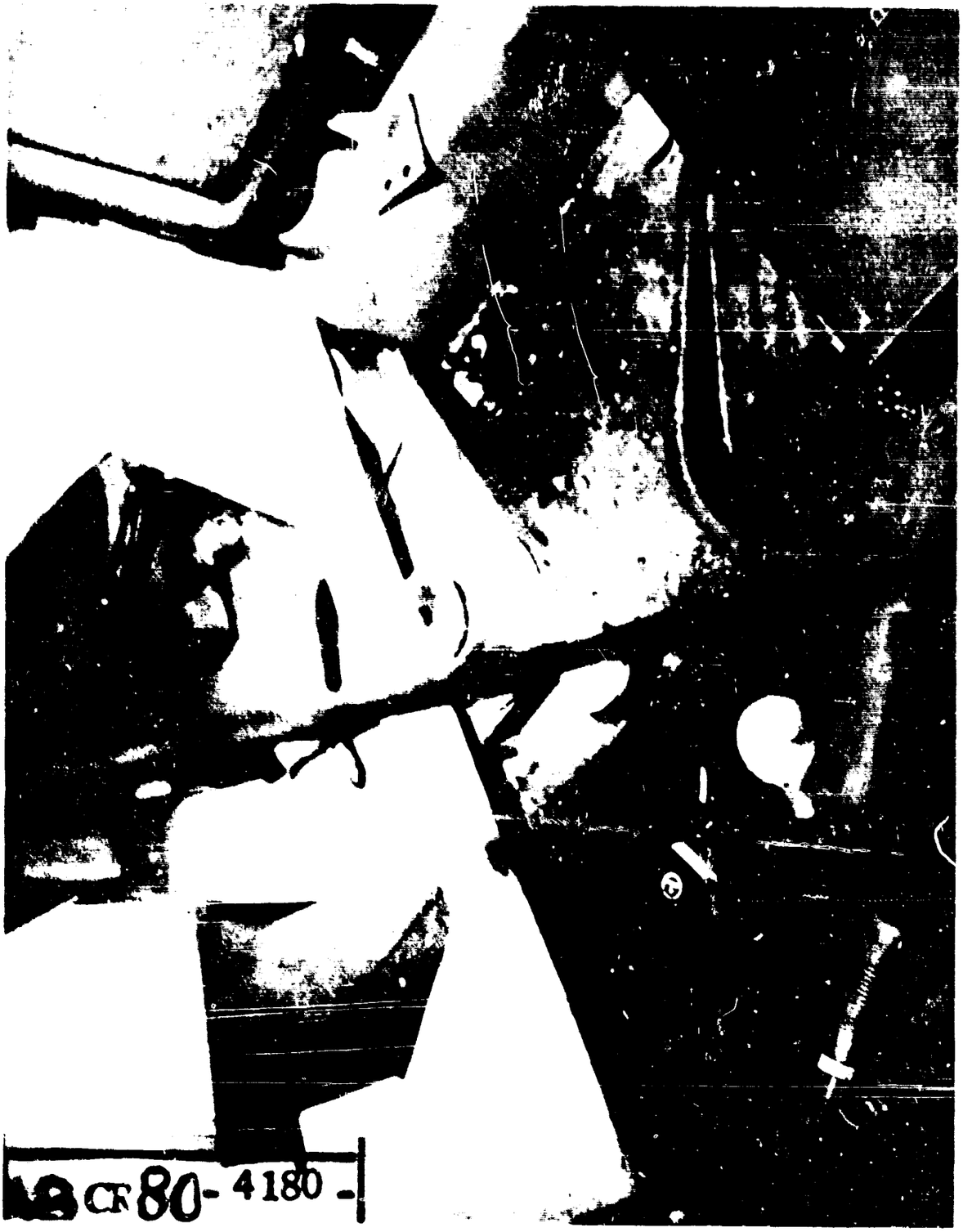


PRE BAKER - MK 28 RADAR, AA FORWARD. General view of main frame. This equipment was undamaged during Test Able.



POST BAKER - MK 28 RADAR, AA FORWARD. Main frame has shifted away from bulkhead (arrow).

PRE BAKER - MK 28 RADAR, AA FORWARD. Arrow points to main frame shock mounts. This equipment was undamaged during Test Able.



POST BAKER - MK 28 RADAR, AA FORWARD. Note the change in position of main frame and the broken shock mounts.

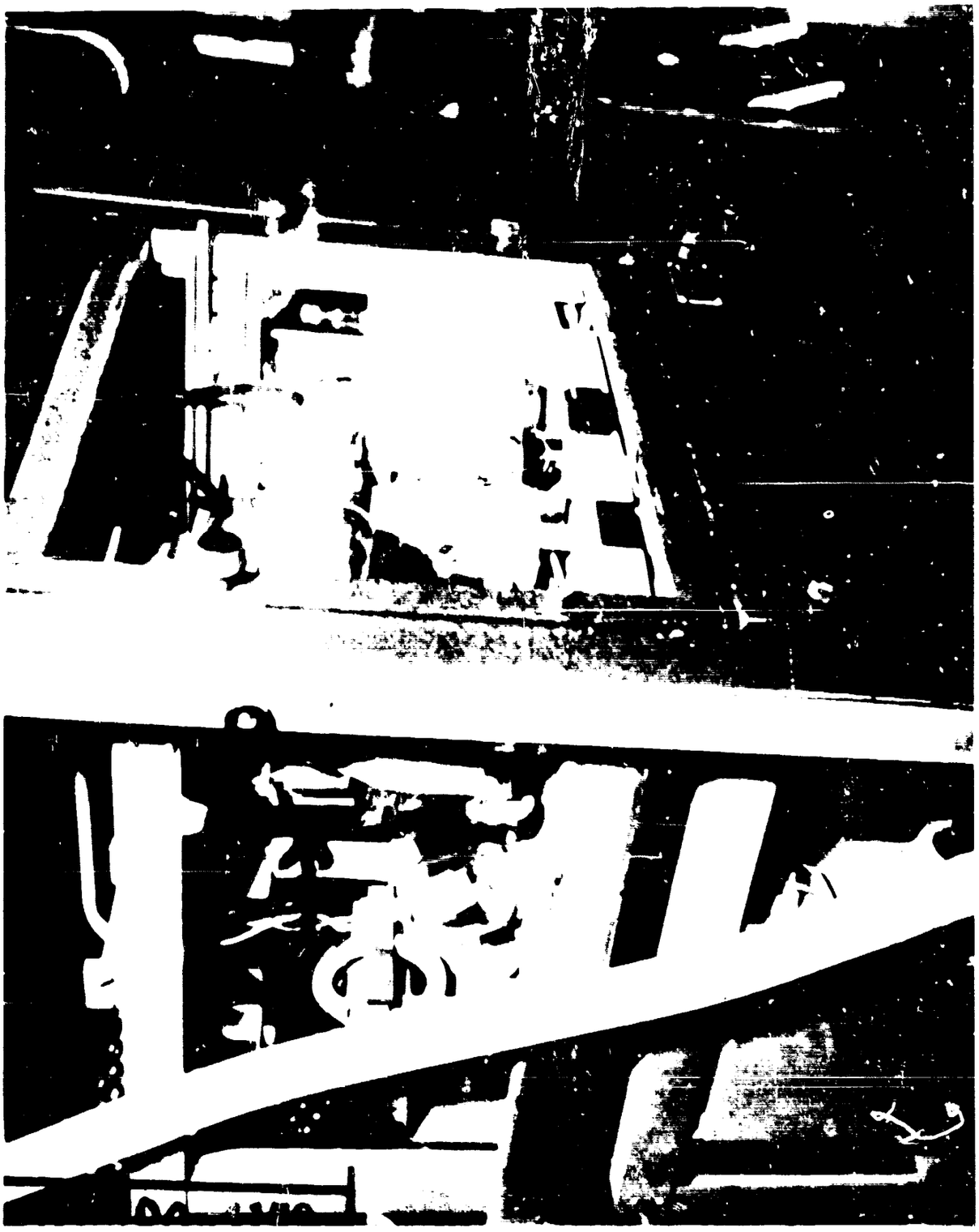
POST BAKER - MK 28 FIRE CONTROL RADAR. Shock mounts which supported the MK 28 main frame were broken.

TEST BAKER

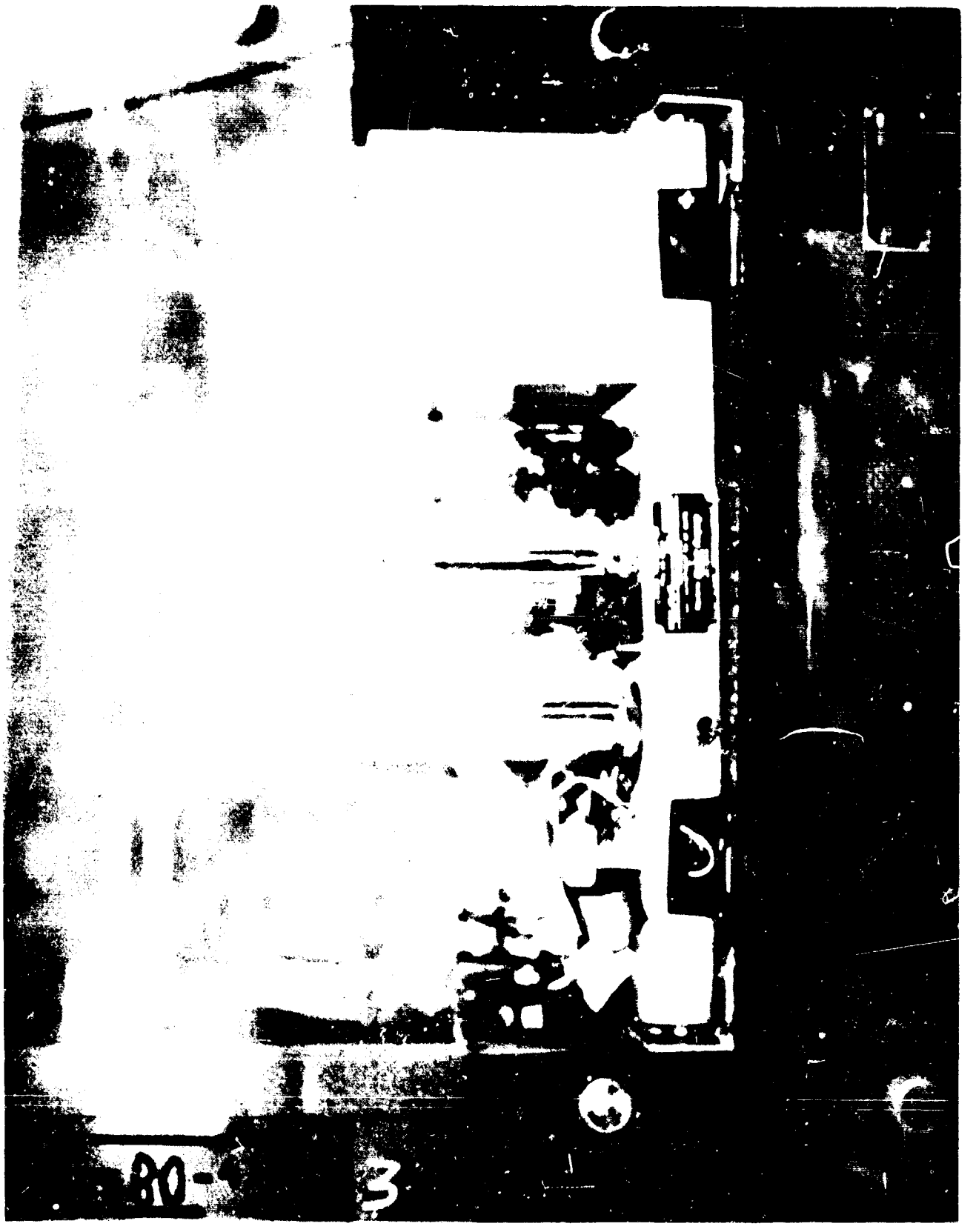
U.S.S. SALT LAKE CITY (CA25)

Range: 1200 yards Bearing: 060°

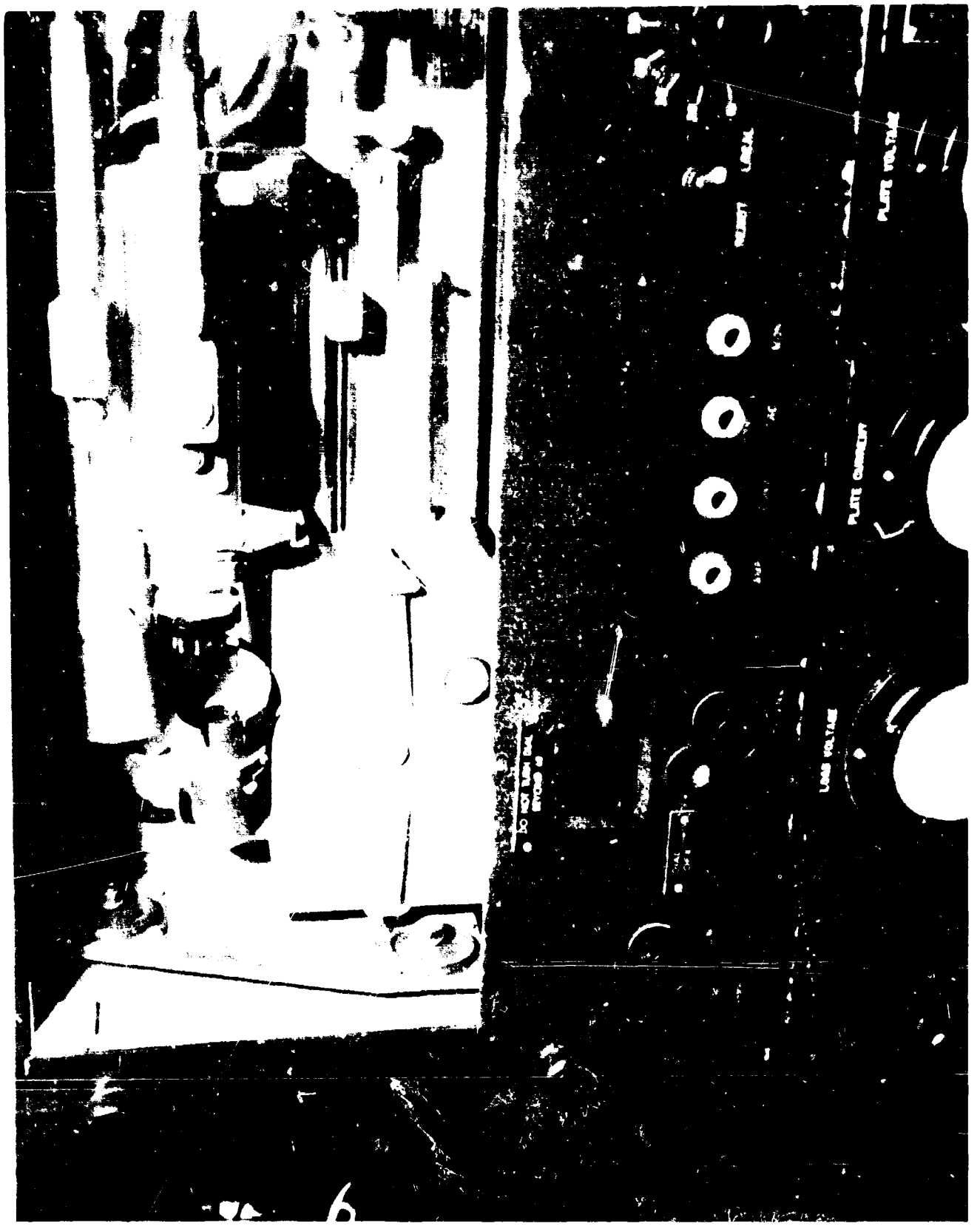
Moderate damage was suffered by this ship. Good examples of keyer tube breakage in the MK 3 and MK 4 transmitters are shown here.



POST BAKER - MK 4 RADAR MAIN FRAME. 705A clipper tube was blown out of socket (filament also broken). One of 701A tubes was broken and the other knocked out of socket. (See arrow).



POST BAKER - MK 3 RADAR - MAIN FRAME. Transmitter front panel moved, showing broken 701A tube on left. Chassis holding magnetron magnets was bent, and magnets did not line up properly. This unit was not shock mounted.



POST BAKER - FORWARD MK 4 RADAR RF AMPLIFIER UNIT. Socket was knocked off and bent. This main frame was not shock mounted.

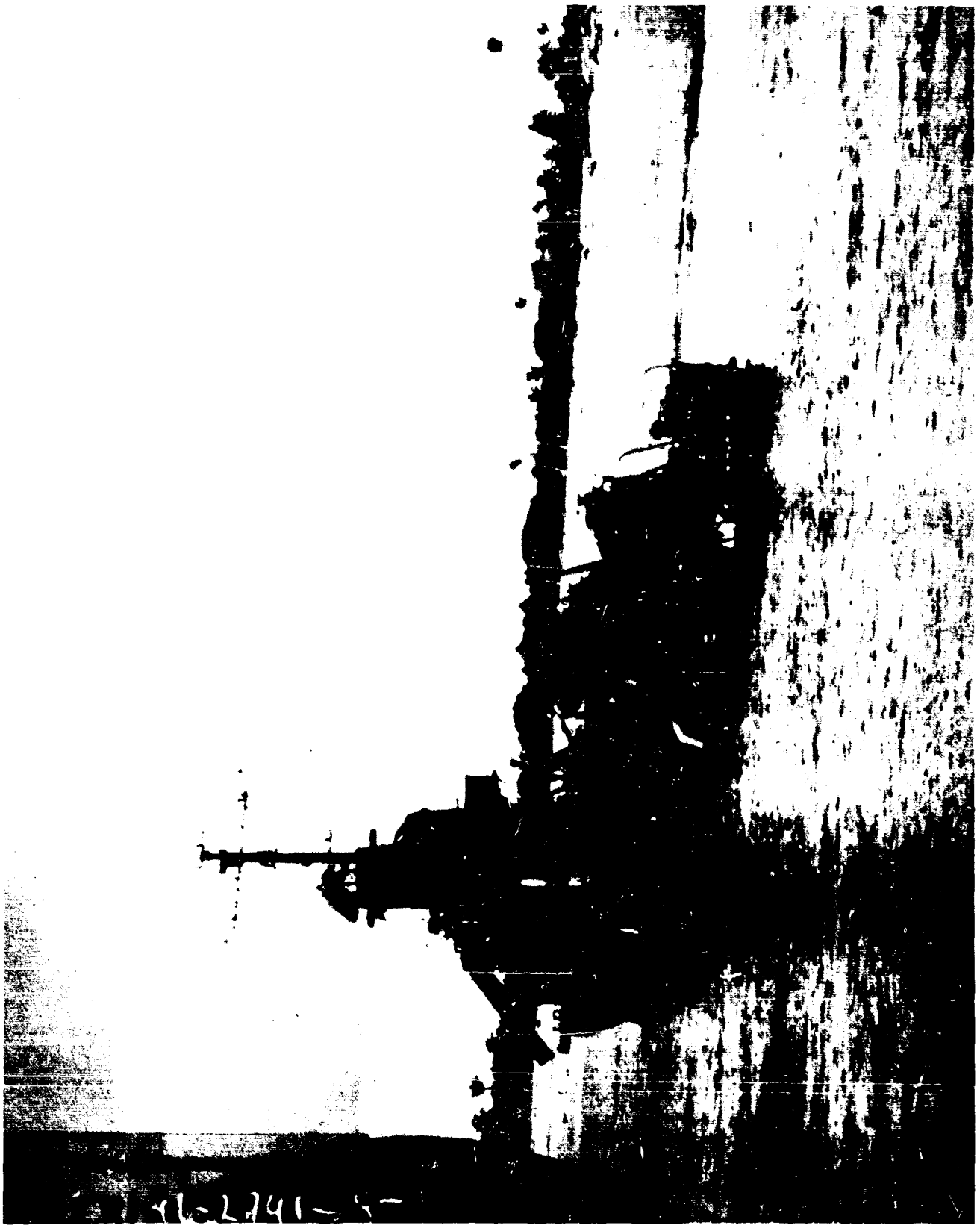
TEST BAKER

U.S.S. HUGHES (DD-410)

Range: 600 yards Bearing: 075°

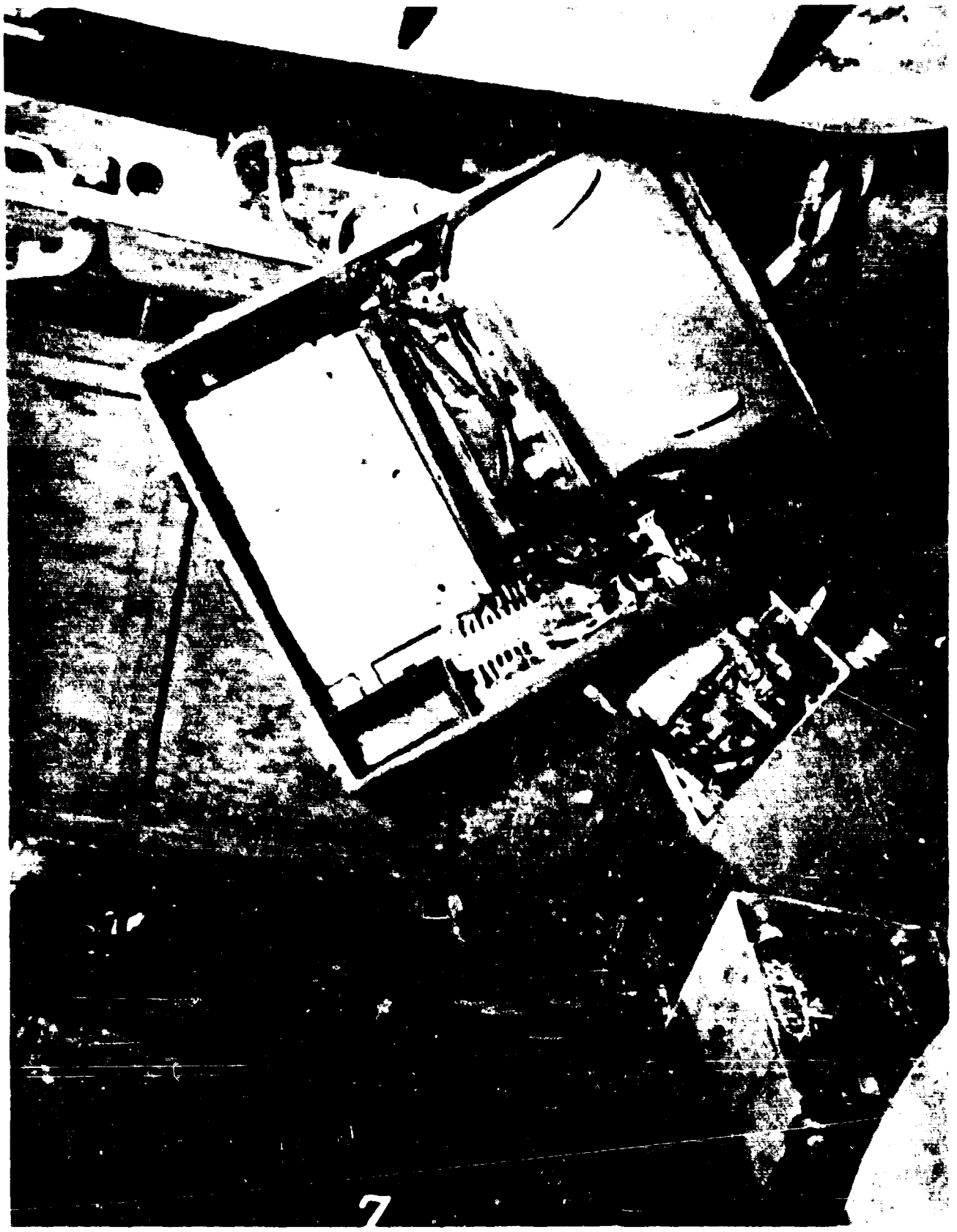
This ship was heavily damaged and was towed to Enyu Island in a sinking condition to make subsequent inspections possible.

These pictures show the heaviest shock damage to electronic equipment suffered by any surviving ship.

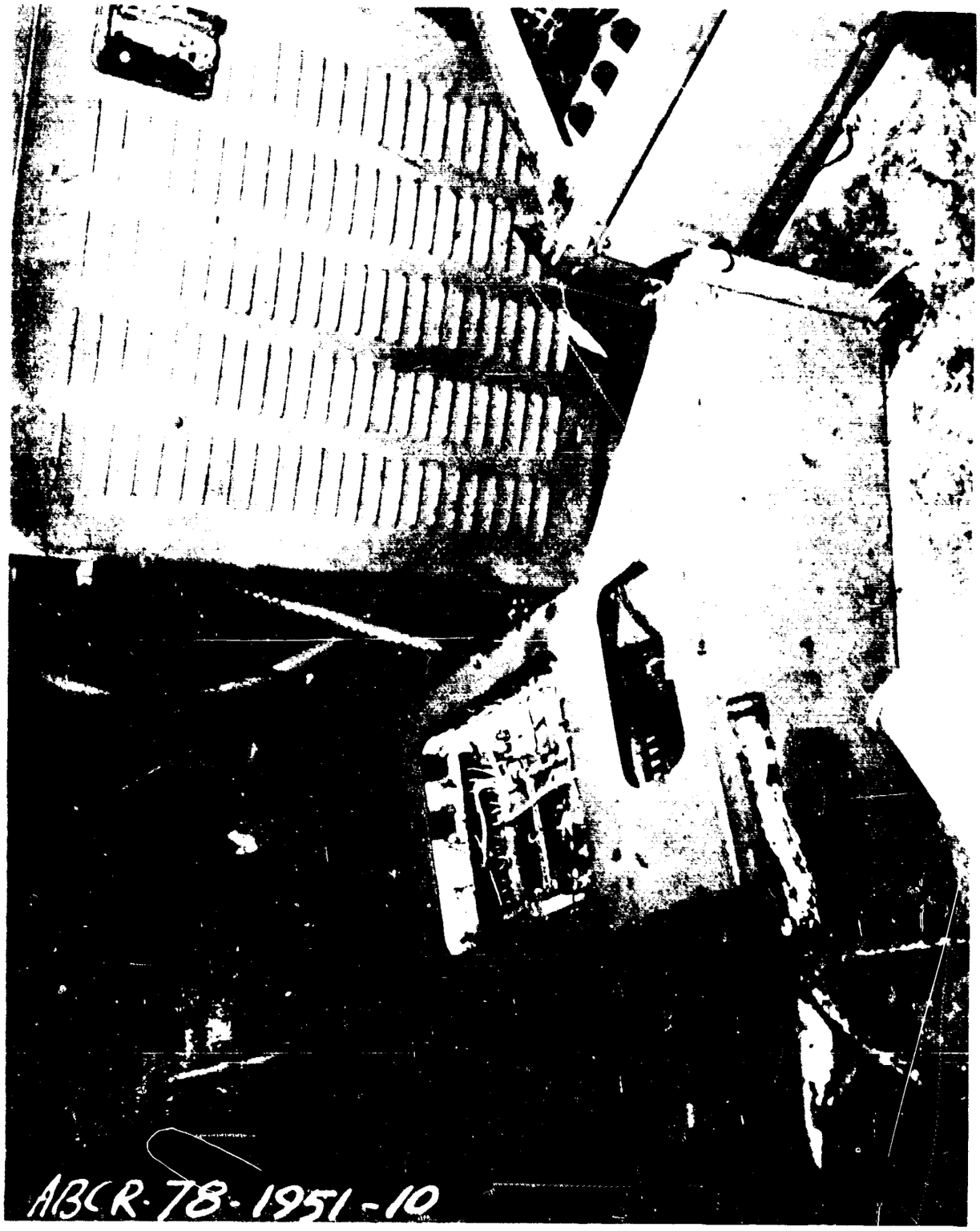


POST BAKER - PORT QUARTER VIEW. Showing ship beached off Enyu Island.

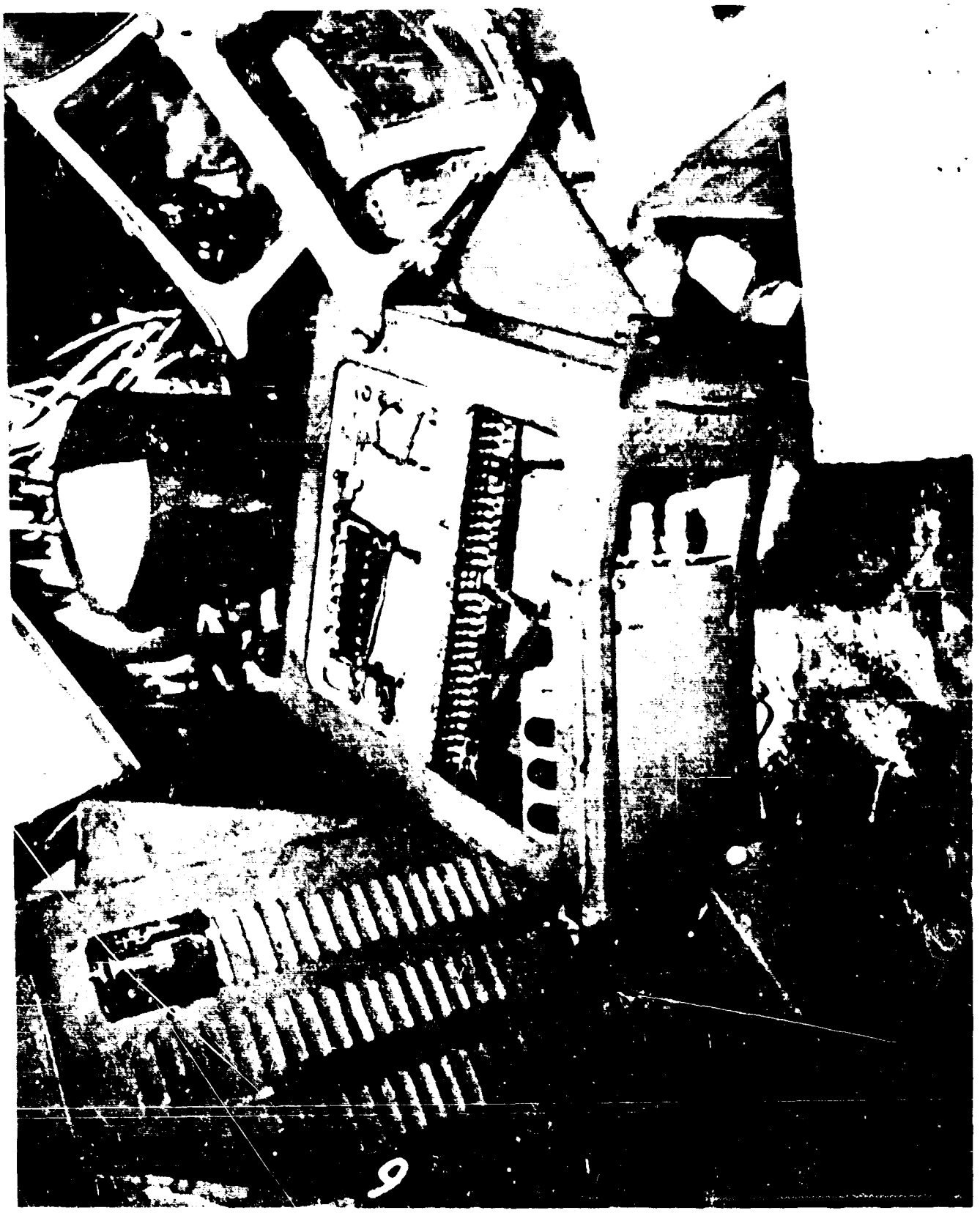
POST BAKER - WHEEL HOUSE. This VC Remote PPI was thrown upward from its foundation and over on its top behind the wheel.



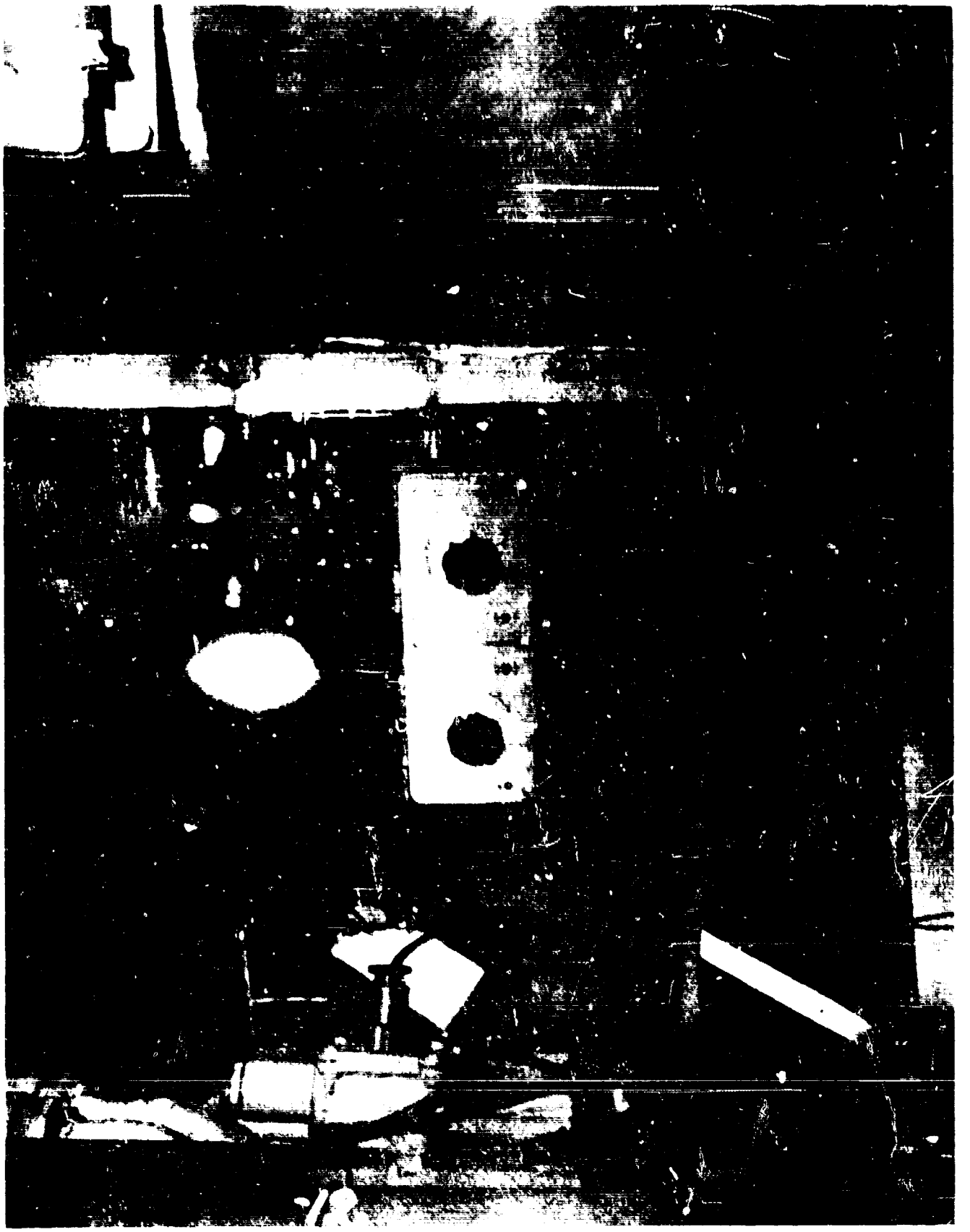
POST BAKER - WHEEL HOUSE. The MAN Radio Equipment was thrown from its original position to the deck.



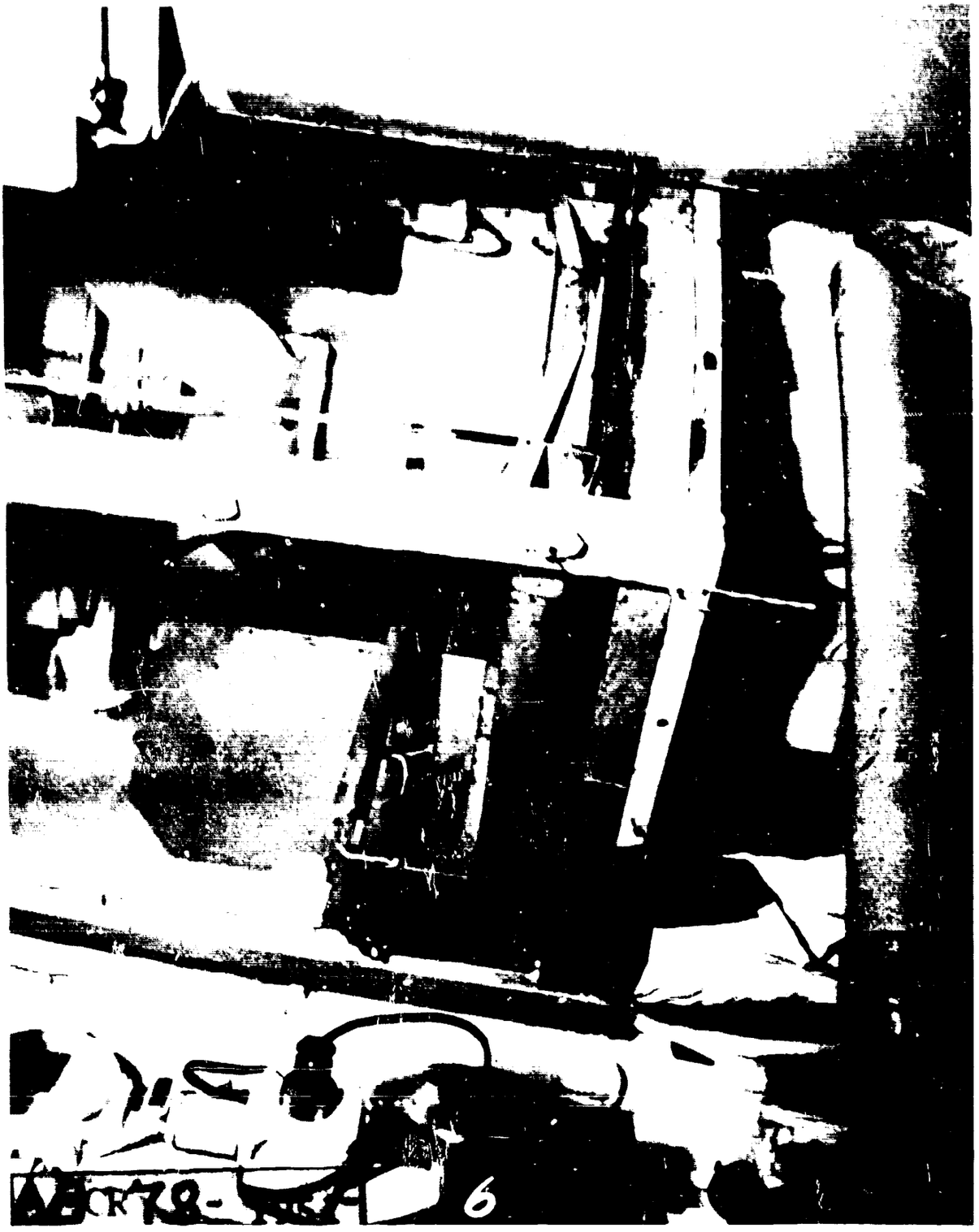
POST BAKER - SC MASTER PPI. The point where the foundation of the console was torn loose is visible to the right of the steel in the upper left hand portion of photo. The two control units thrown from console are in foreground.



POST BAKER - SC MASTER PPI. One of the two control units of the SC master PPI units which was thrown out of the console to the deck.

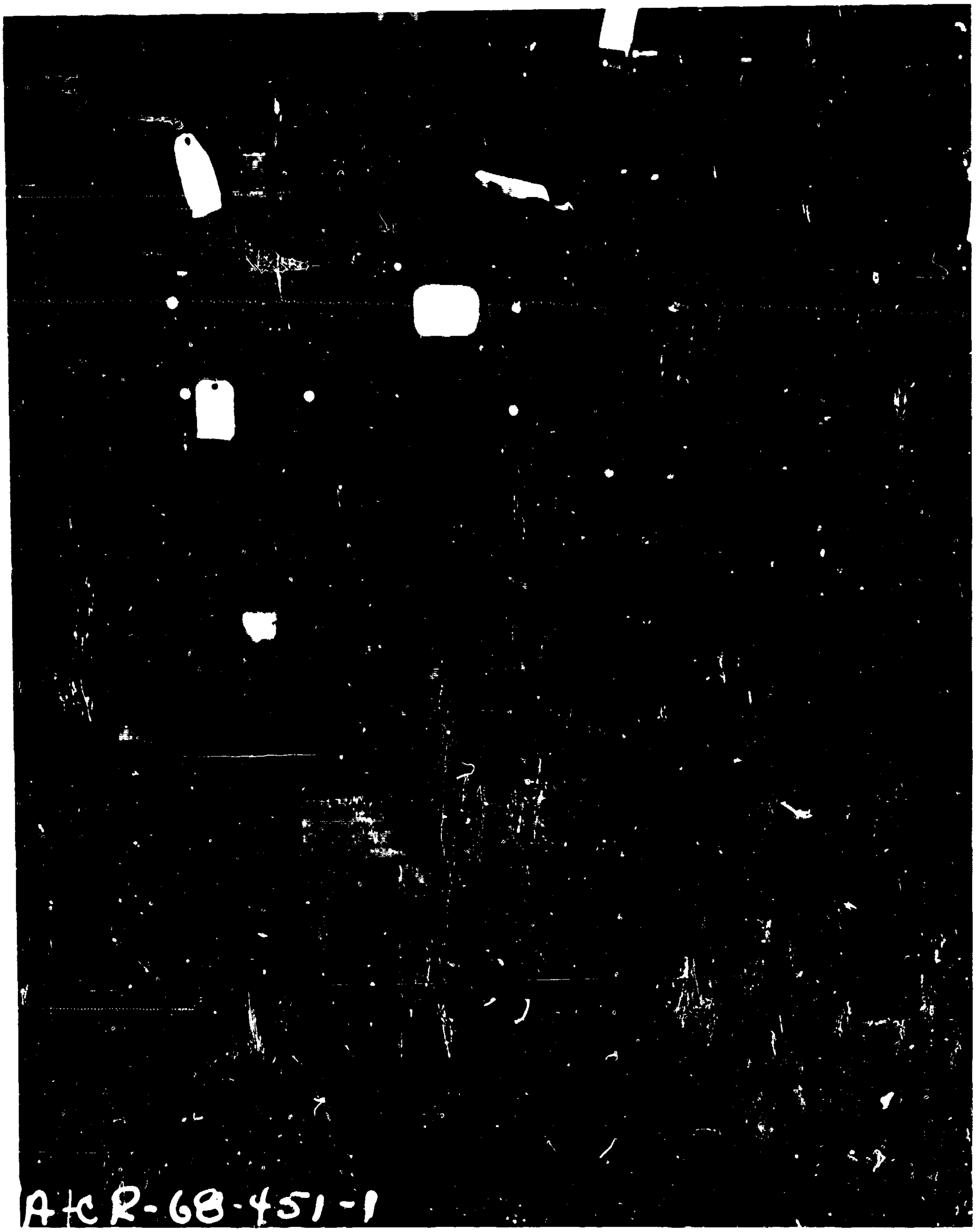


PRS BAKER - DAS-3. View showing DAS [illegible] above chart table. This equipment was [illegible].

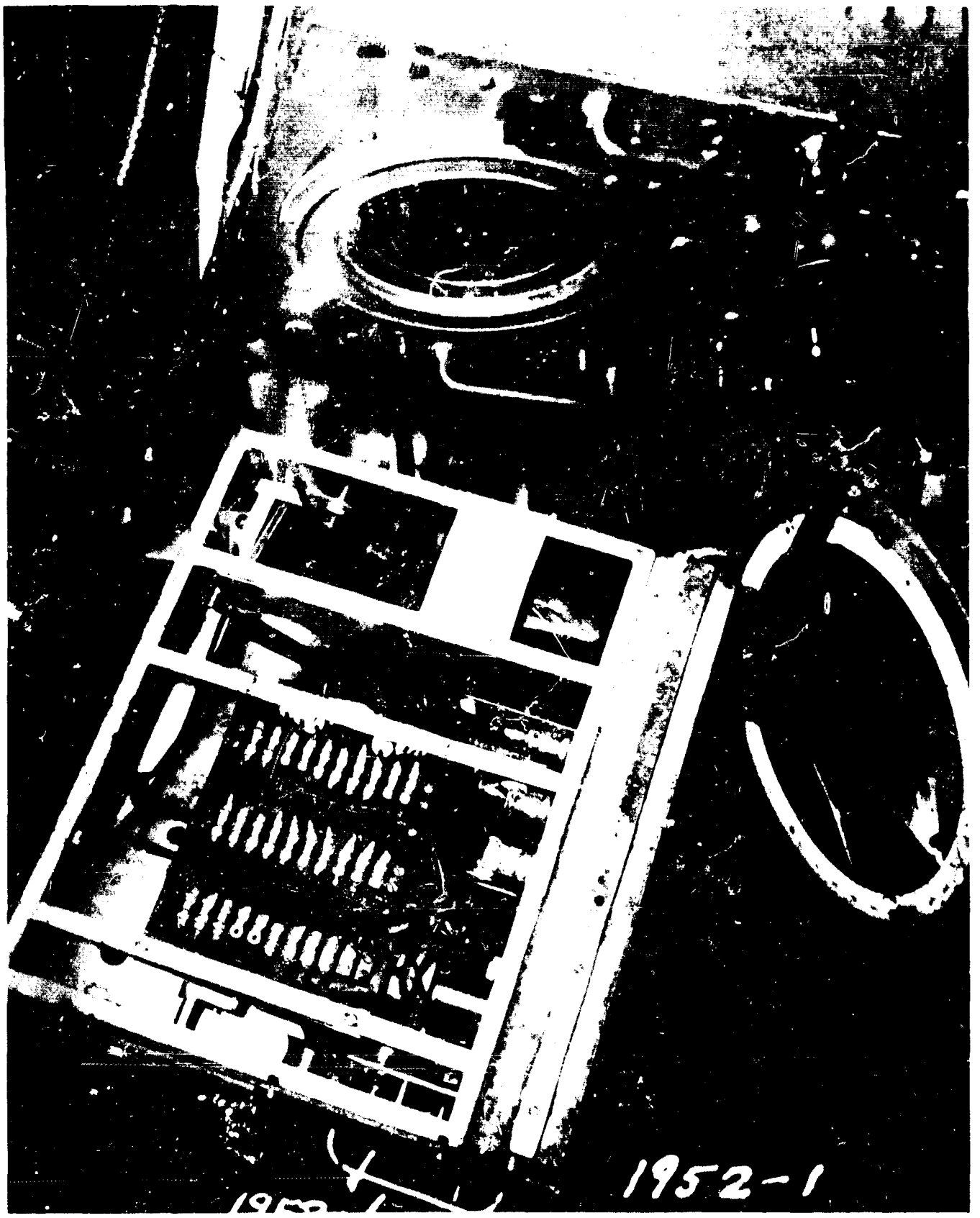


POST BAKER - DAS-3. This view shows how the Loran mounting racks were bent and damaged. The equipment was found on the chart table, where it was thrown by the shock.

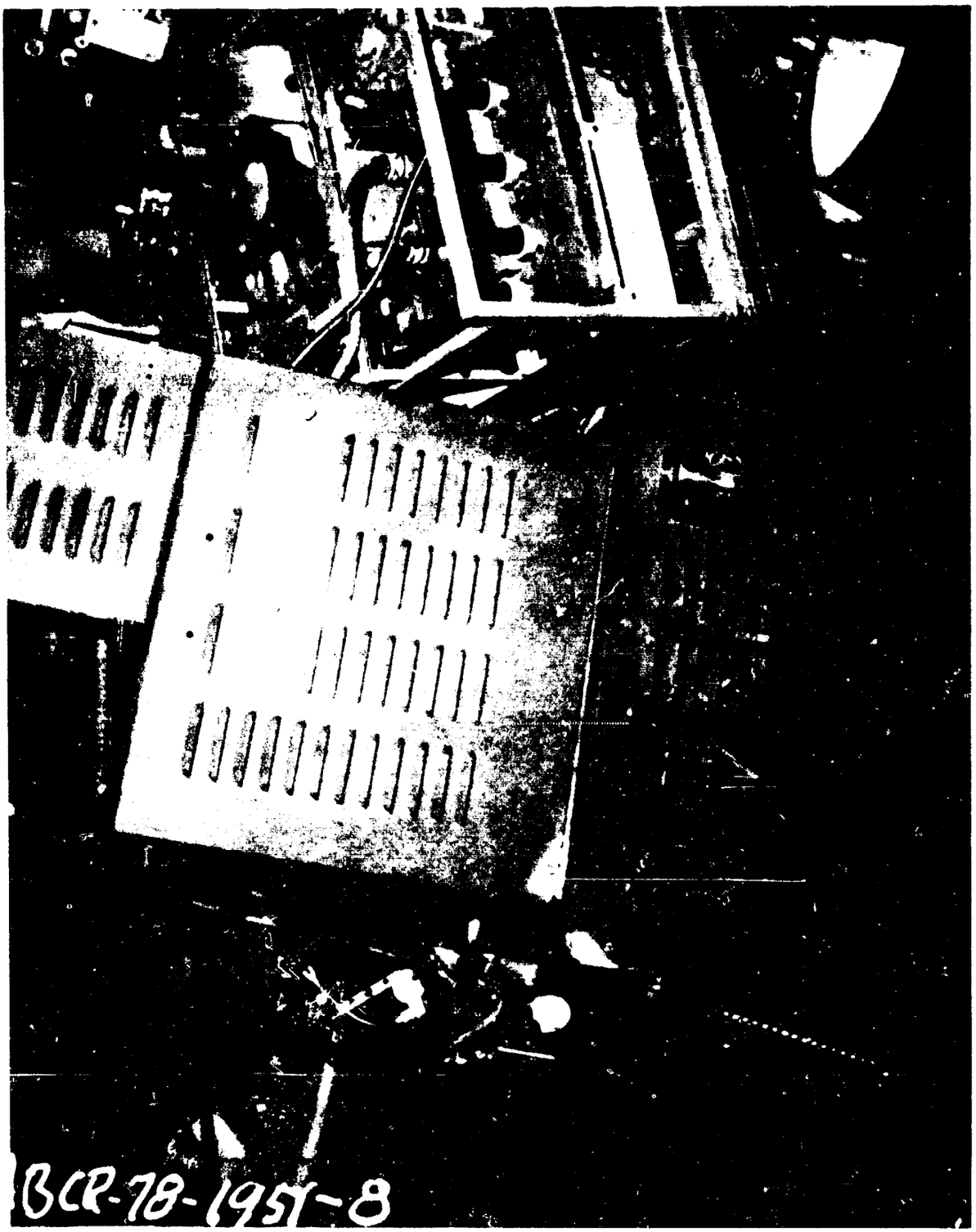
POST BAKER - DAS-3. The Loran equipment is shown here on the chart table. It was thrown out of its mounting brackets. The mounting brackets, as in the case with the ARK brackets, were too light to withstand the heavy shock.



PRE-BAKER - SC CONSOLE. General view. This equipment was undamaged during Test Able.

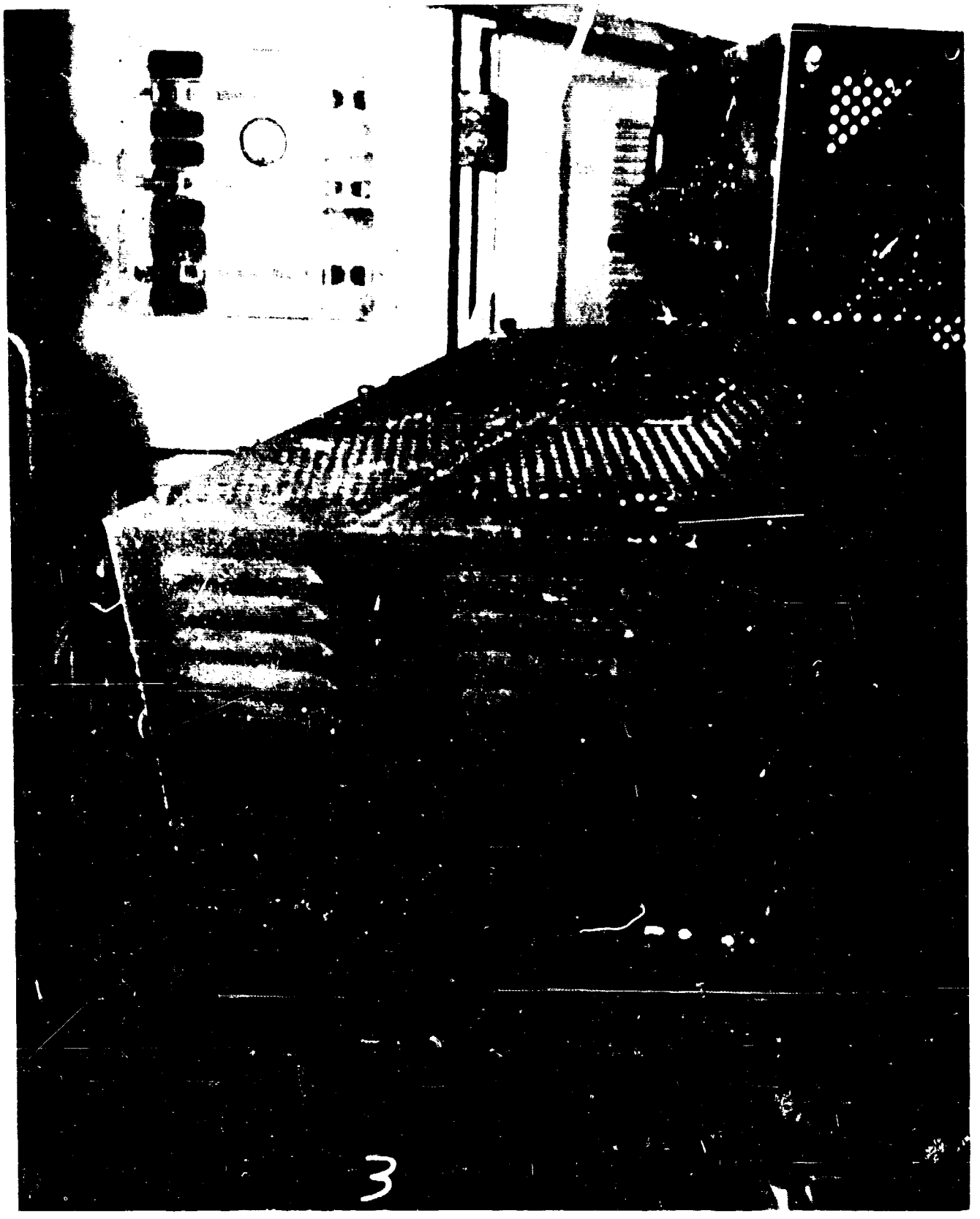


POST BAKER - SC C NSOLE. The entire console was m ved about 8 feet. The indicator was thrown out and was left hanging from its cables.

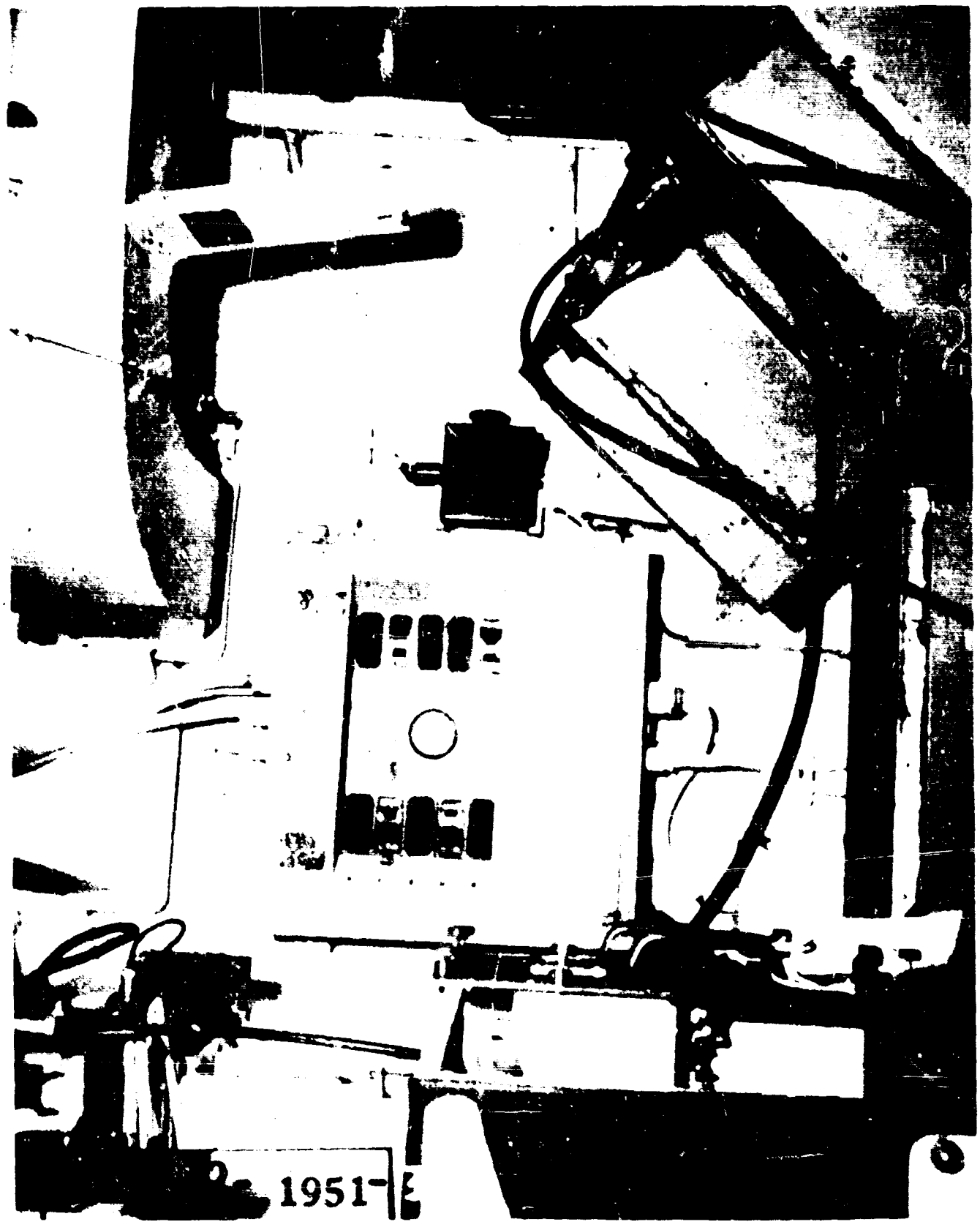


POST BAKER- SC CONSOLE. Top view showing the indicator on the right.

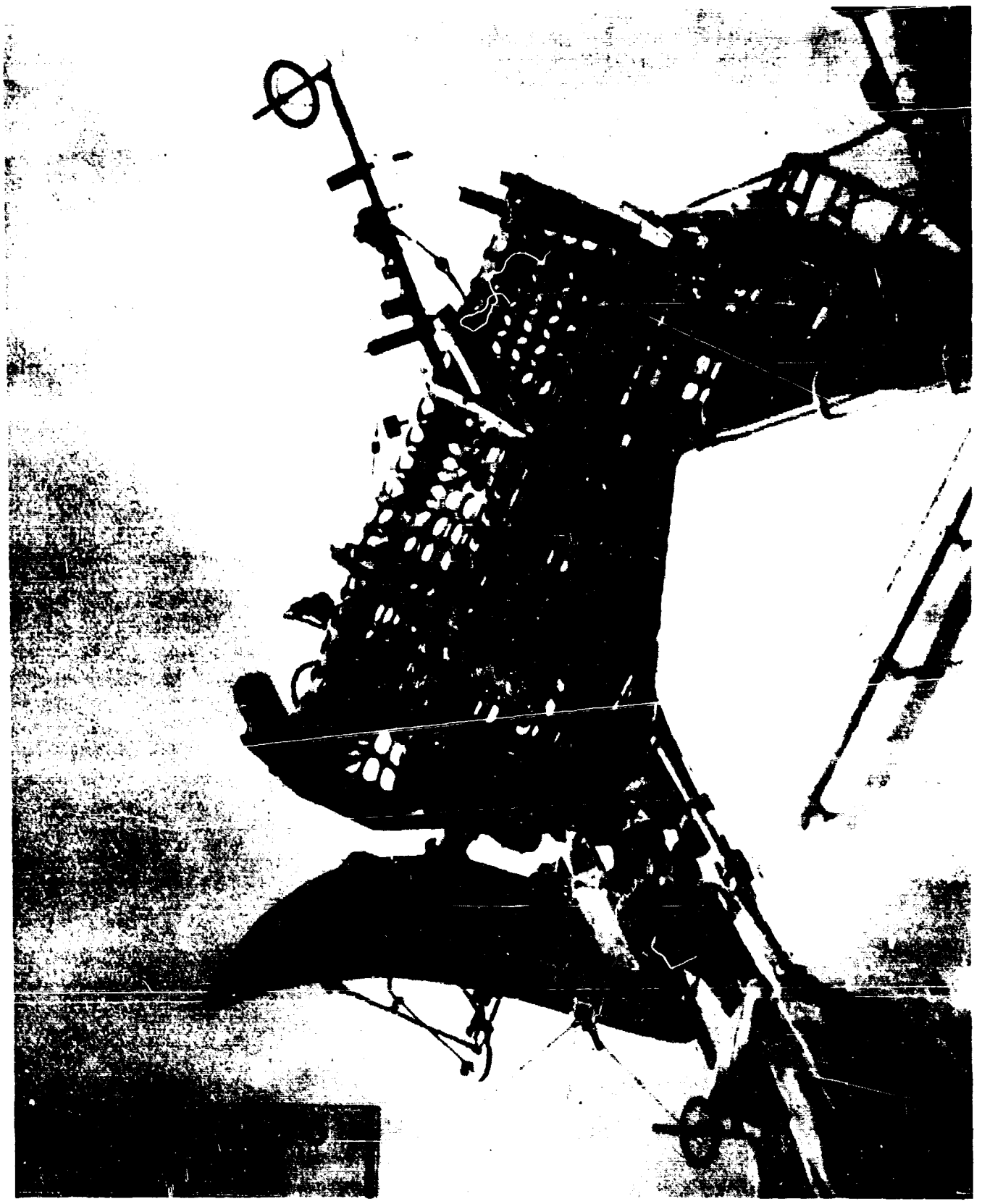
POST BAKER - SC CONSOLE AND ABK'S. Rear view of the SC indicator, showing distance console moved. Two ABK's are shown still in position. The control unit for the ABK's is shown entangled in the cabling, where it was thrown or pulled from beneath ABK shelf.



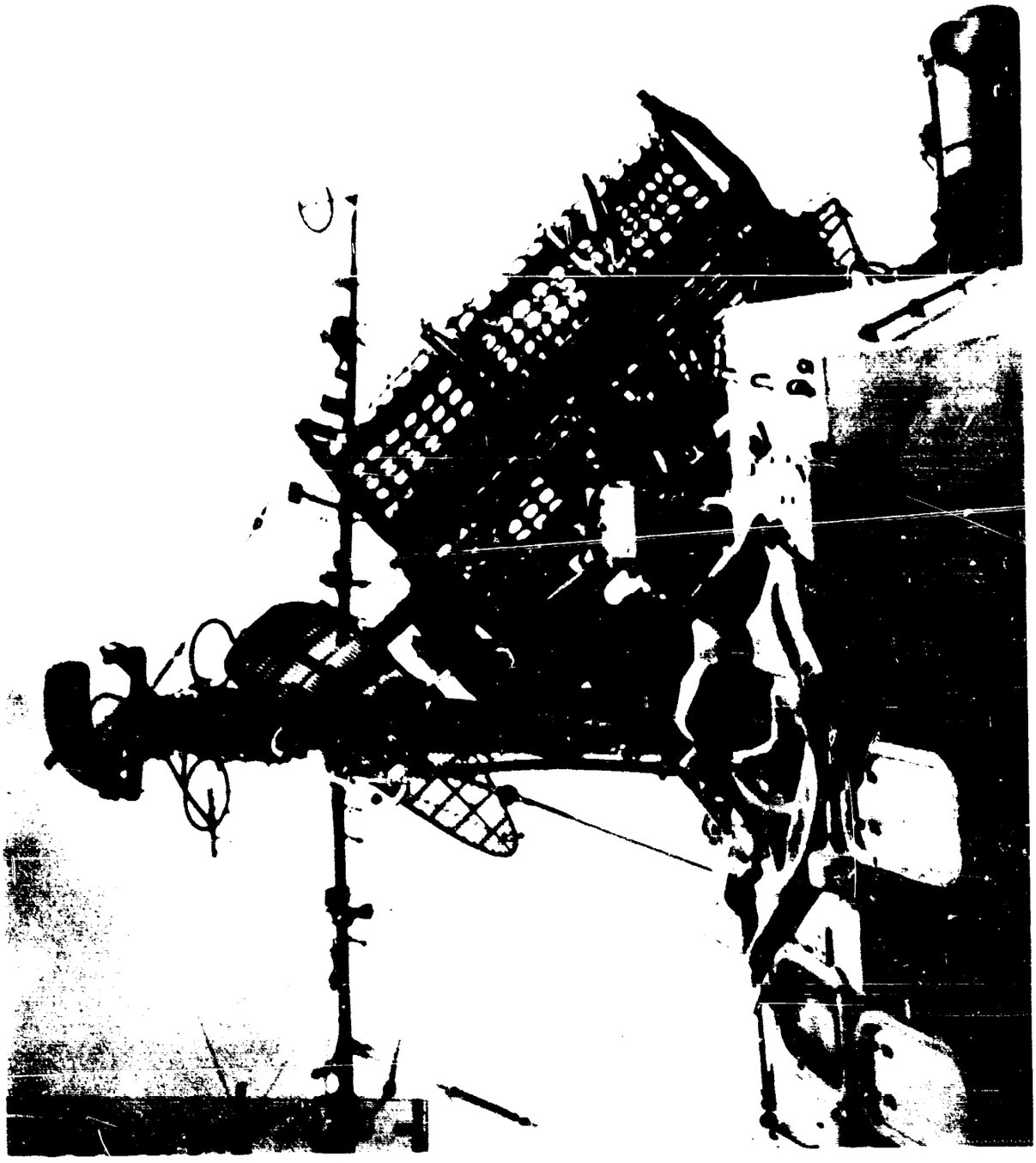
POST BAKER - RADIO CENTRAL. This TBS transmitter was thrown from its foundation mounts to the deck in front of the PBK. The overall damage was severe.



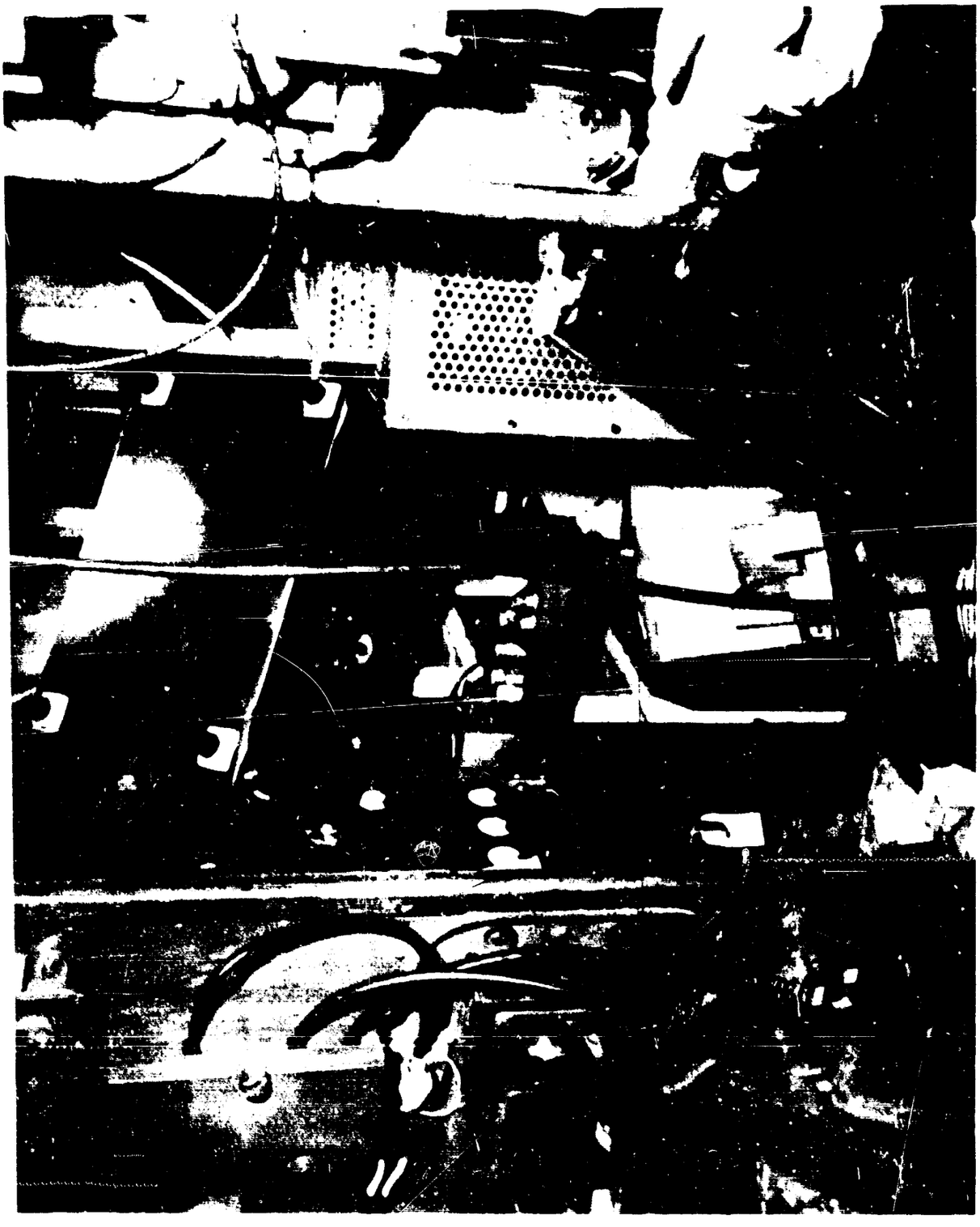
POST BAKER - RADIO CENTRAL. Receiver mounting rack was torn loose from desk, and receivers were dumped on the deck.



POST BAKER - MK 4 RADAR ANTENNA.



POST BAKER - MK 4 RADAR ANTENNA. MK 4 antenna was knocked over.



POST BAKER - TRANSMITTER ROOM (FROM CIC). Notice Mk 4 AGC unit hanging by its cables. Shock mounts had failed.

ABCR74-2976-1

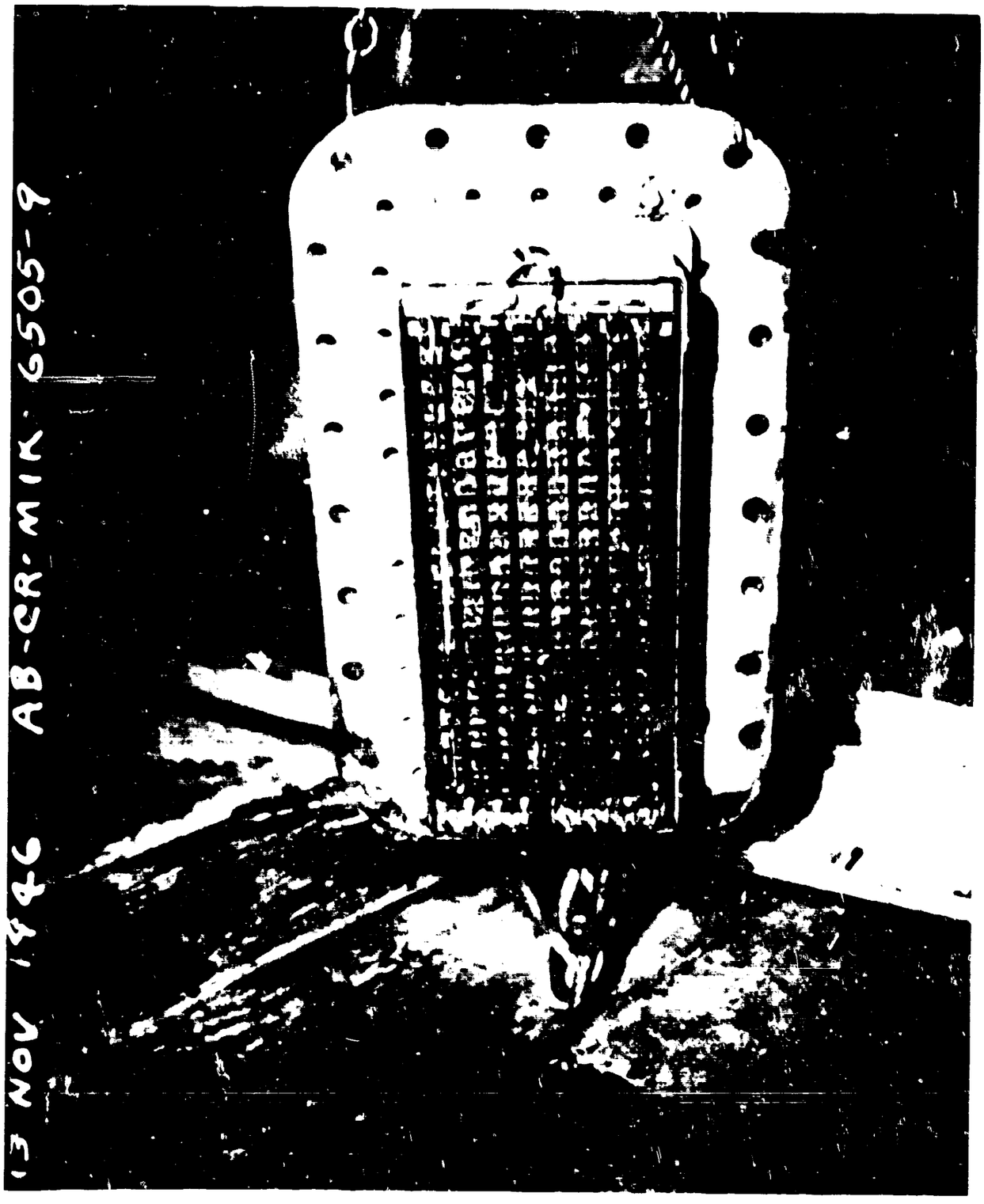
POST BAKER - MK 4 RADAR MAINFRAME. 701 keyer tubes were broken by Test Baker shock.

TEST BAKER

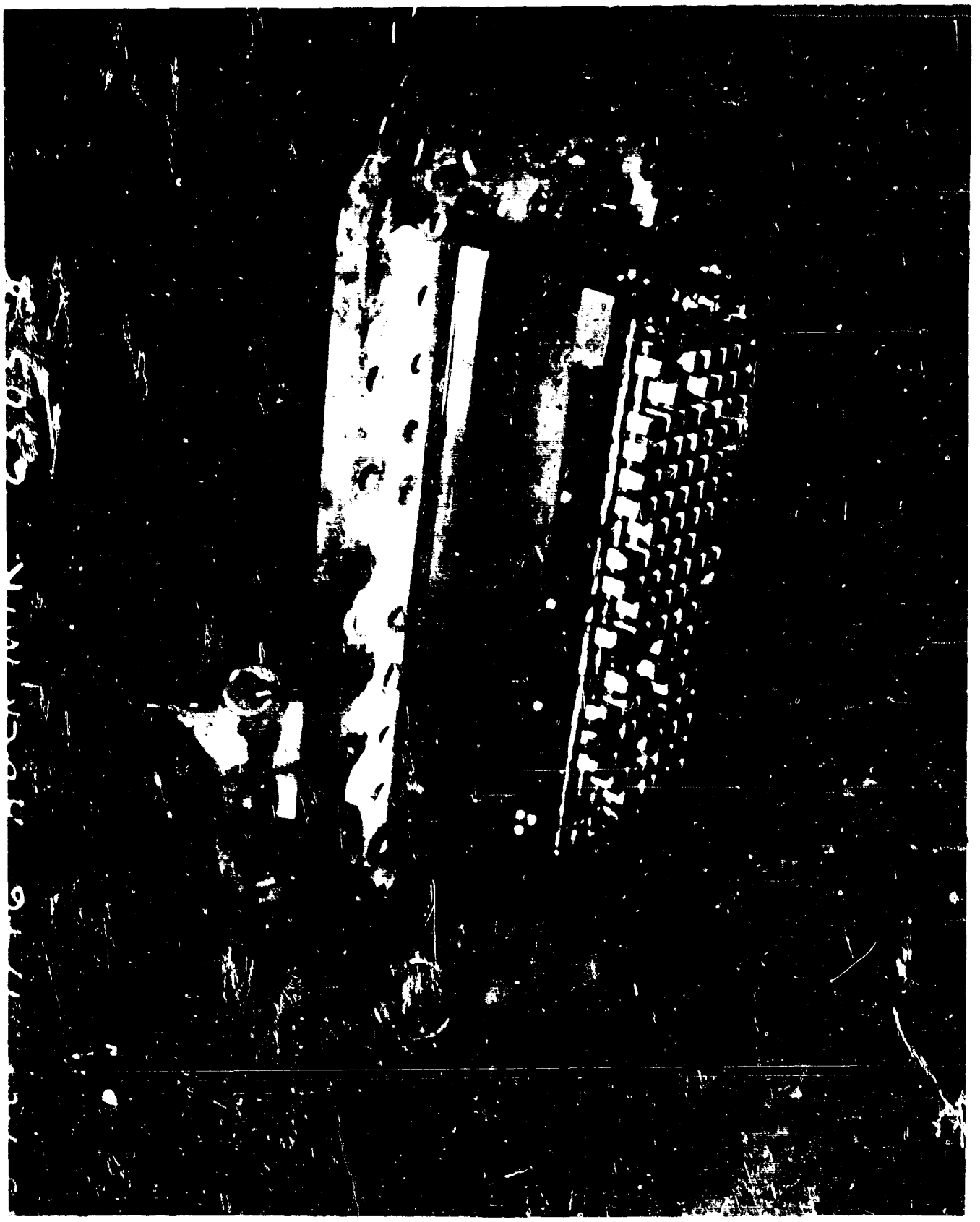
U.S.S. SKATE (SSN 578)

Range: 900 yards Bearing: 230°

The pictures of NGA projector are included for interest value only as it was not determined whether damage was due to Test BAKER or beaching after Test ABLE. Equipment appeared to operate normally in shallow water after both tests.



POST BAKER - NGA PROJECTOR. Face view of cover plate and crystal assembly, showing broken and missing crystals.



BOW BAKER - AGA INSPECTION. Side view of cover plate and crystal assembly. Note damaged and missing crystals.

POST BAKER - NGA PROJECTOR. Case with crystal assembly and cover plate removed. Note broken and loose crystals.

TEST BAKER

U.S.S. FALLON (APA81)

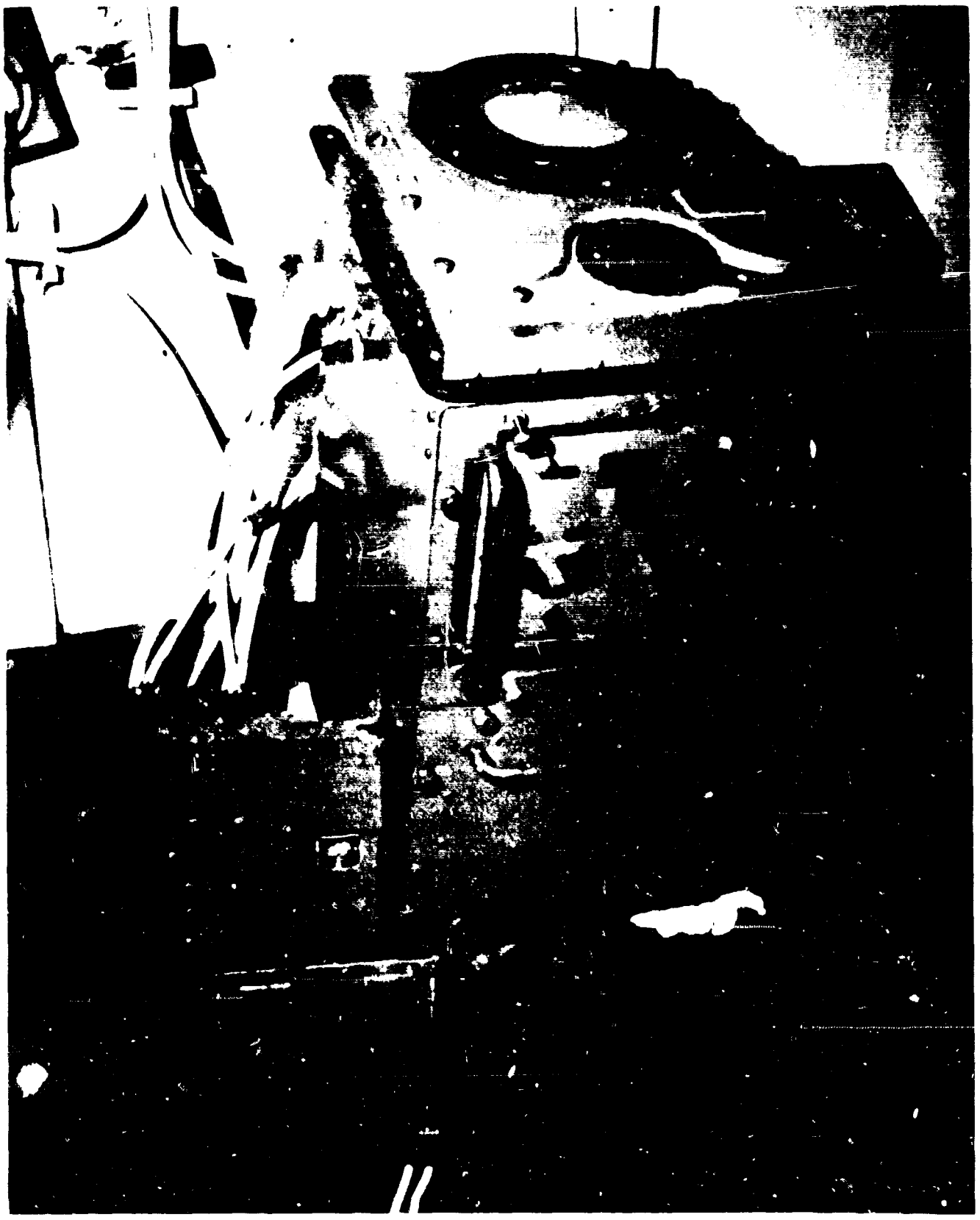
Range: 500 yards Bearing: 305°

This ship received heavy damage due to its proximity to the center of the blast. All types of damage to radar and communication equipments are depicted by this relatively complete collection of photographs. Note particularly the communication antenna pictures, which indicate that these antennas and rigging stood up fairly well even at this close range. The damage sustained was probably caused by falling water.

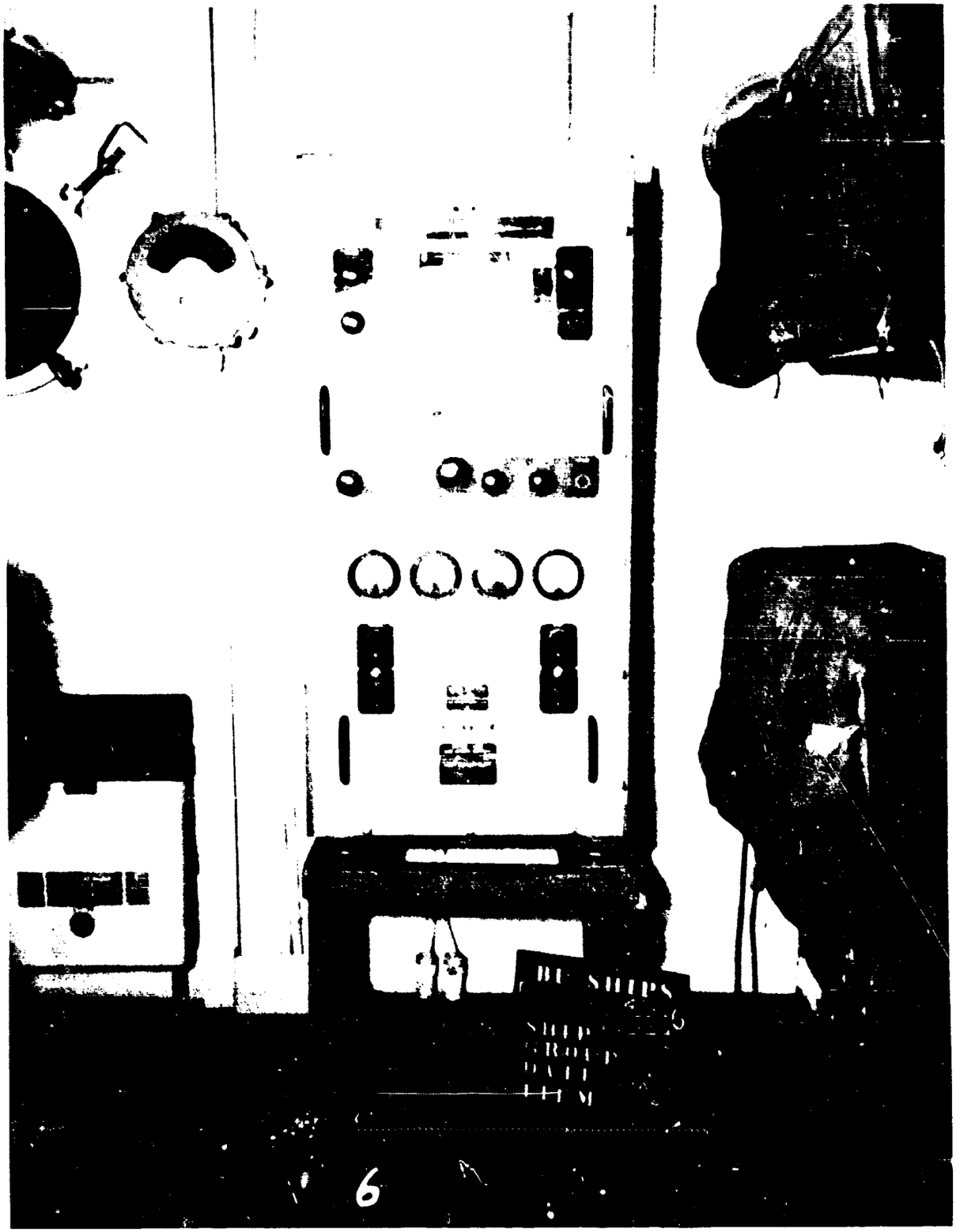
There are a number of good before and after pairs of photographs which make excellent comparison for details on damage. This ship suffered no damage from Test ABLE and all damage shown here can be attributed to the BAKER explosion.

POST BAKER - COMMUNICATION ANTENNAS. TBS antenna (arrow). Sand on the deck of this vessel indicates falling water may have caused this damage.

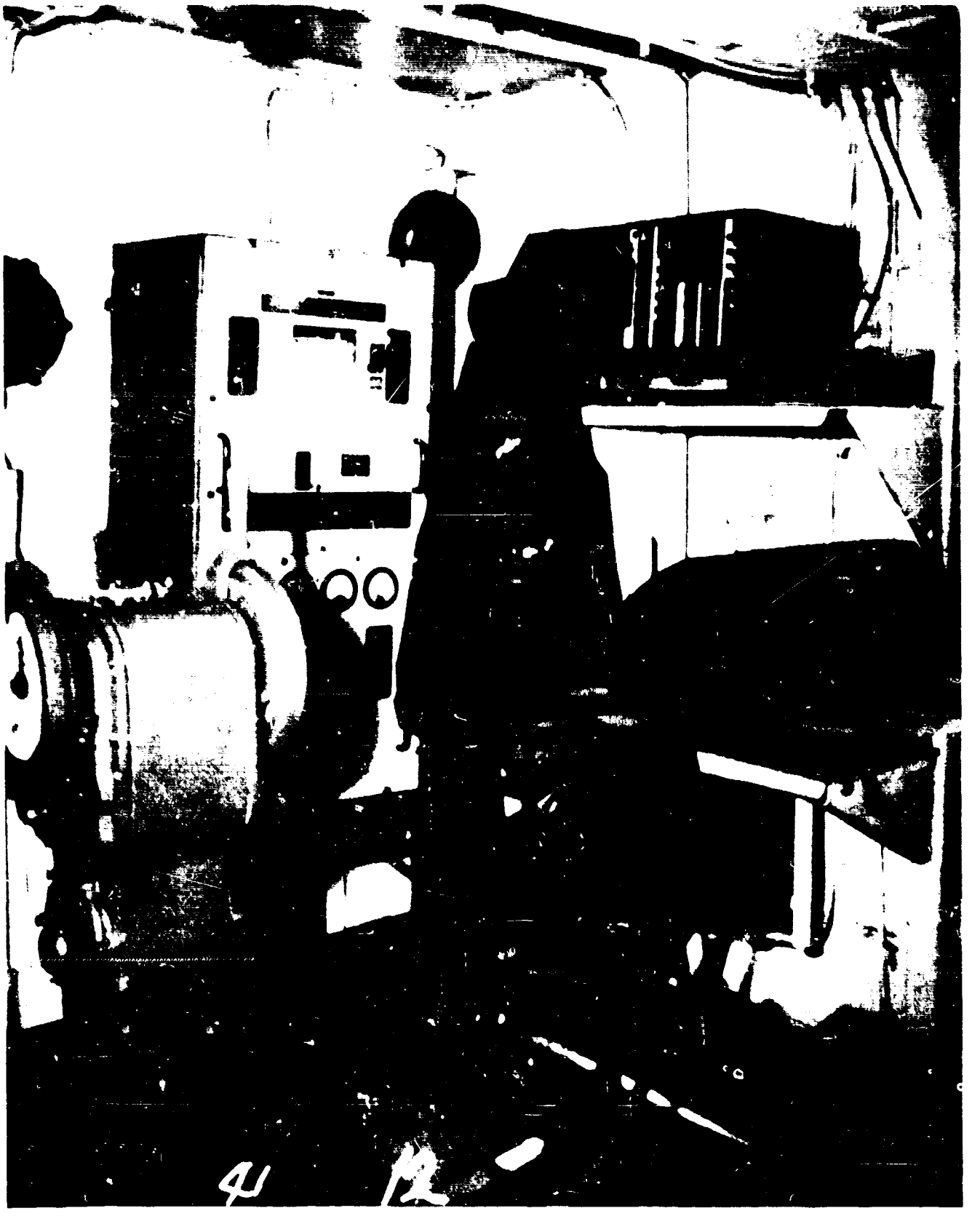
PRE BAKER - VD-2 FRONT VIEW. This equipment was undamaged during Test Able.



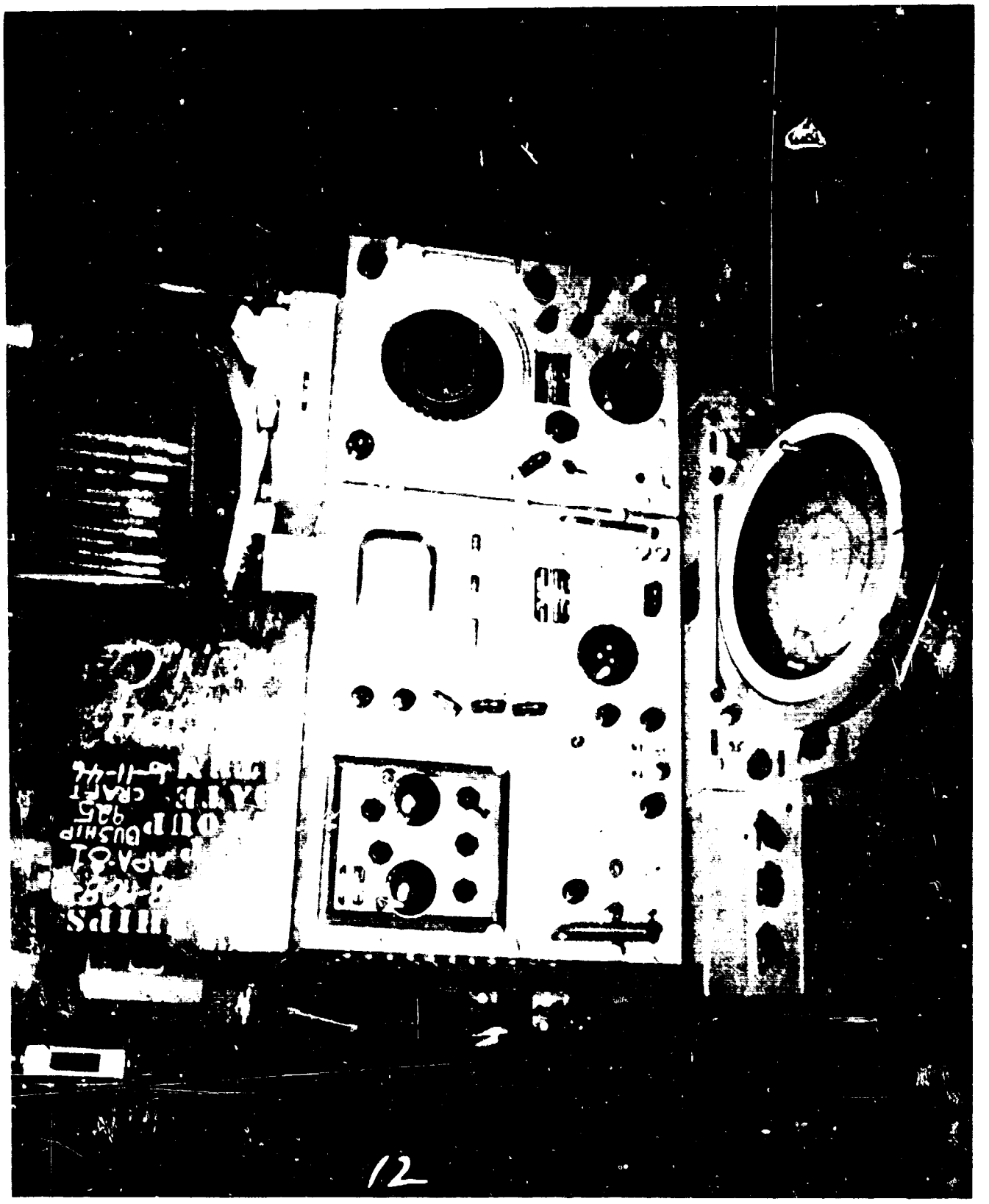
POST BAKER - VD-2. Cables to switch were broken when switch mounting failed. There was no other damage to unit.



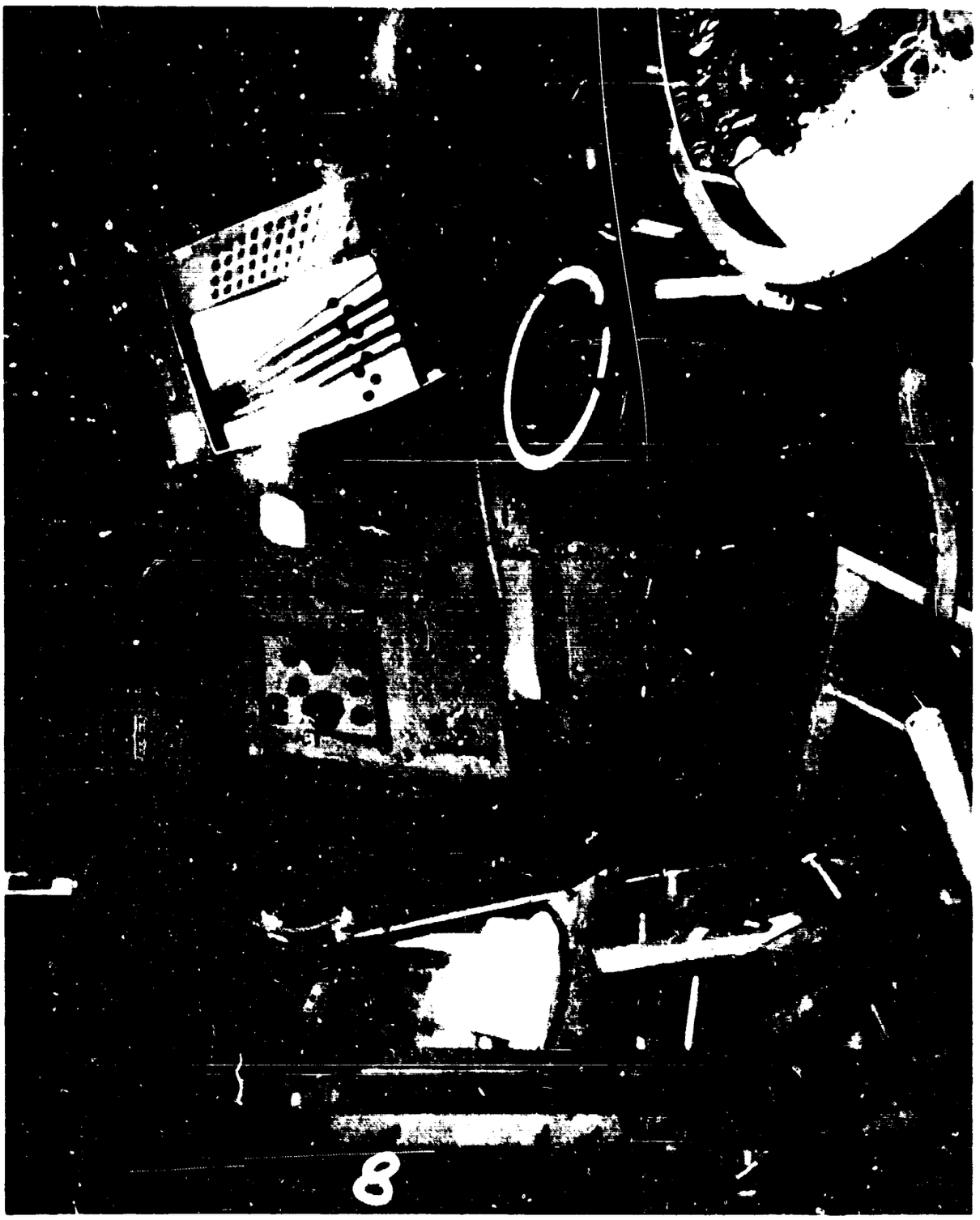
PRE BAKER - NMC AND SCR-608. NMC in pilot-house with SCR-608's at right under canvas covers. This equipment was undamaged during Test Able.



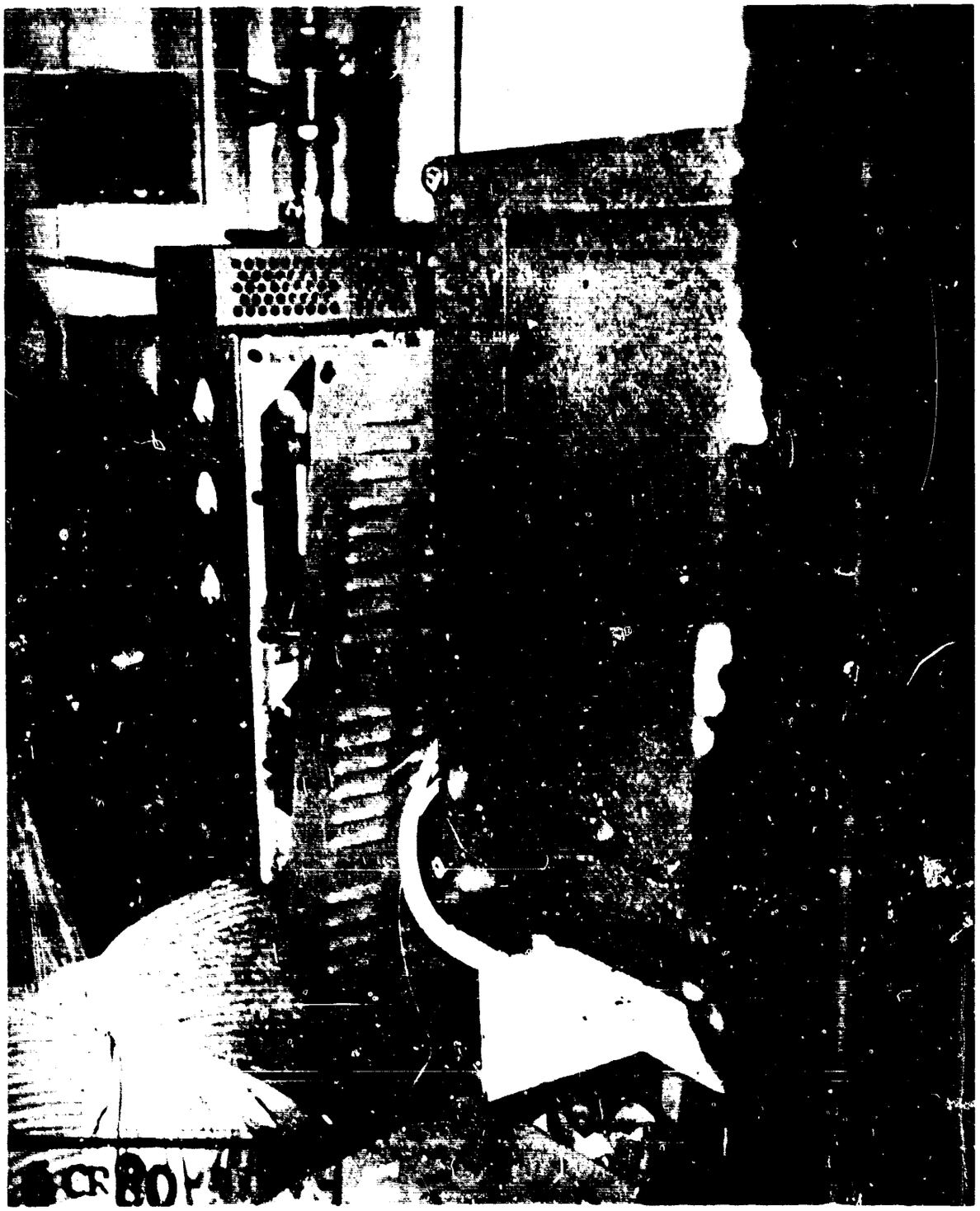
POST BAKER - NMC AND SCR-608. The NMC foundation warped, tilting equipment away from bulkhead. The SCR-608's were partially thrown from their foundations.



PRE BAKER - SC-4 INDICATOR FRONT VIEW. This equipment was undamaged during Test Able.

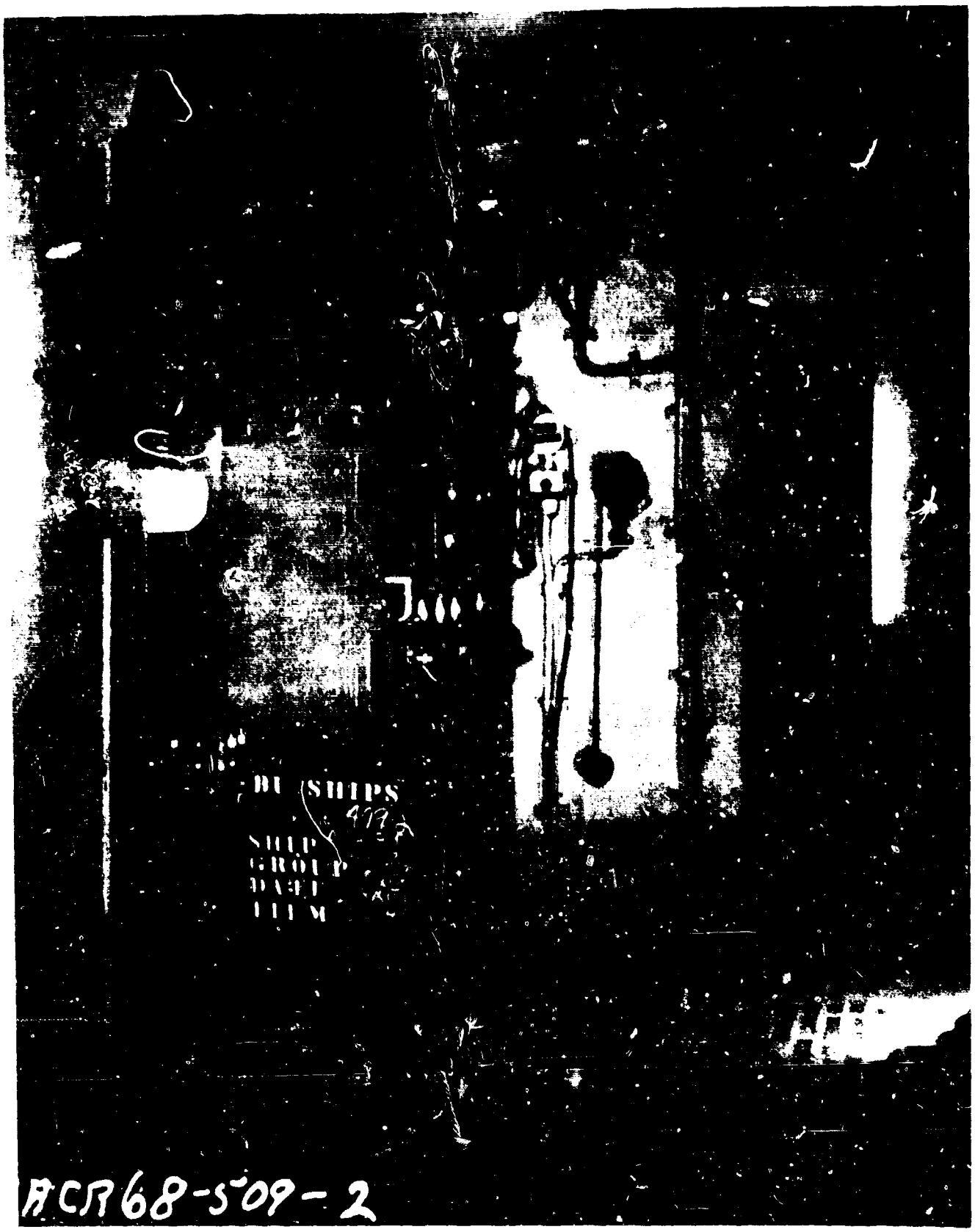


POST BAKER - SC-4 INDICATOR. The SC-4 indicator was seriously damaged as were most of the other equipment in CIC.

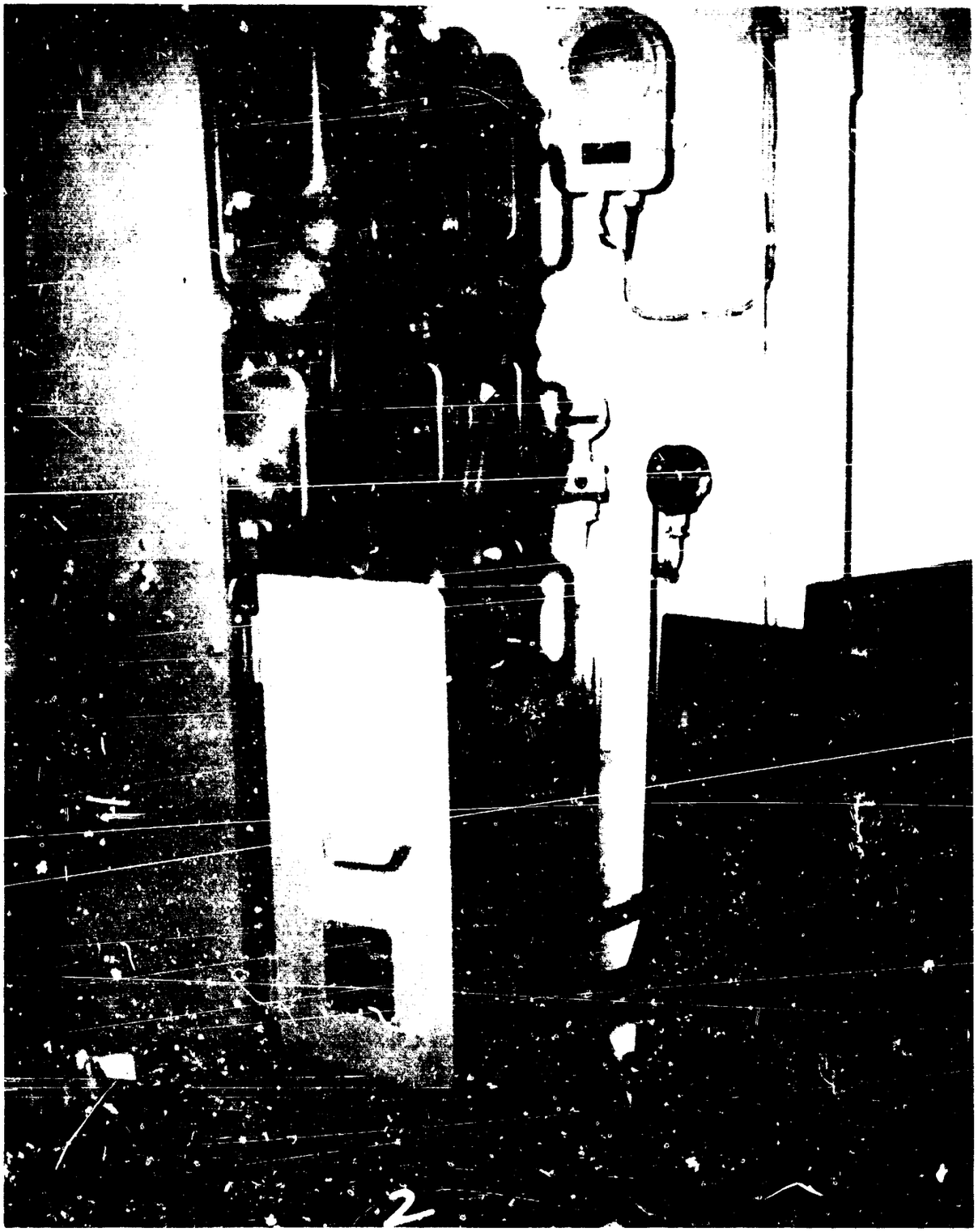


POST BAKER - SC-4 AND BM-1. SC-4 ring oscillator tubes were broken. The hour meter broke away from its mounting ring and top shock mounts came apart, allowing equipment to make violent contact with bulkhead and adjacent equipment. The BM-1 is in foreground.

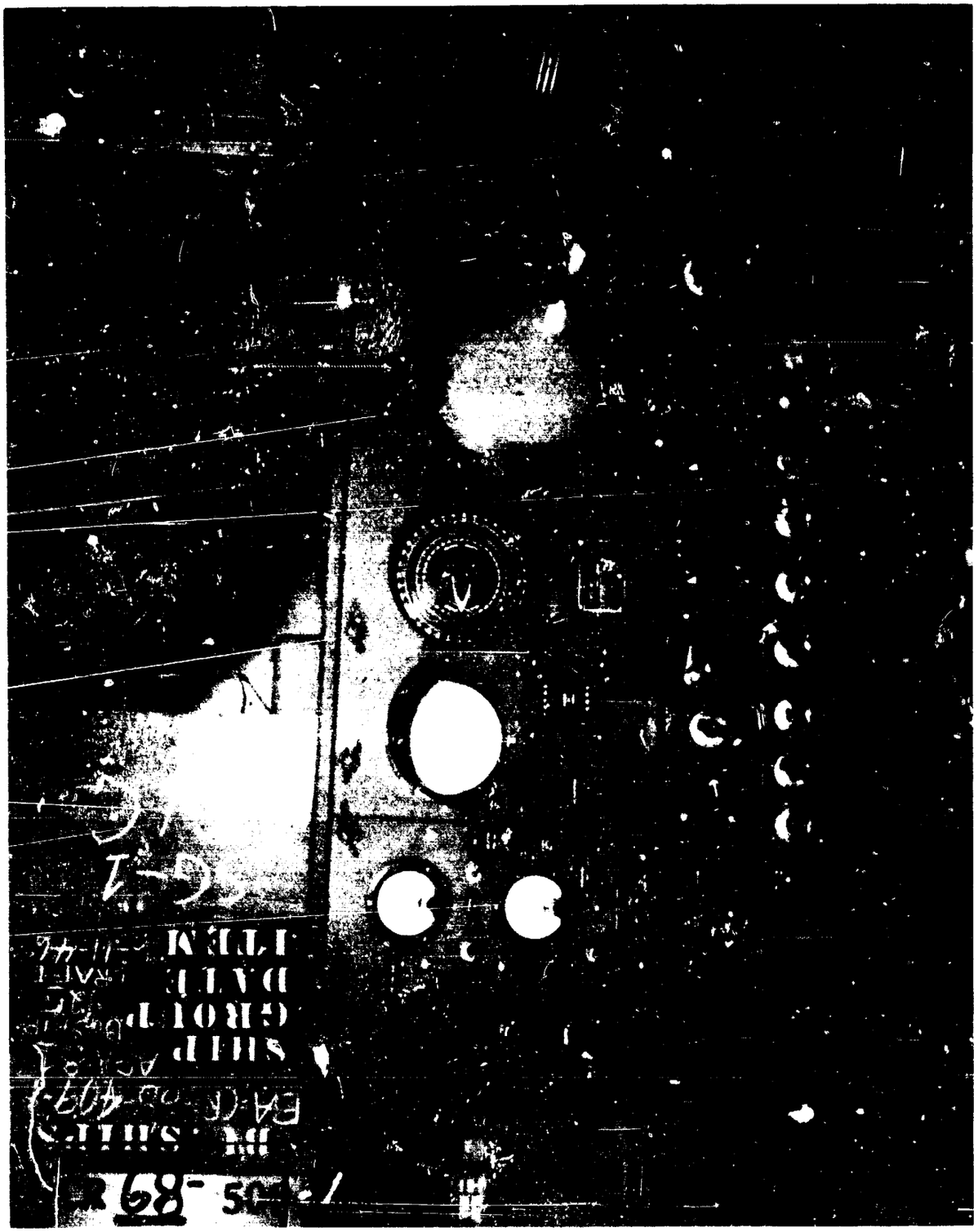
POST BAKER - ABK. The securing brackets of these aircraft type equipments were too flimsy to match the strength of the Lord mounts. Often the results were as shown here.



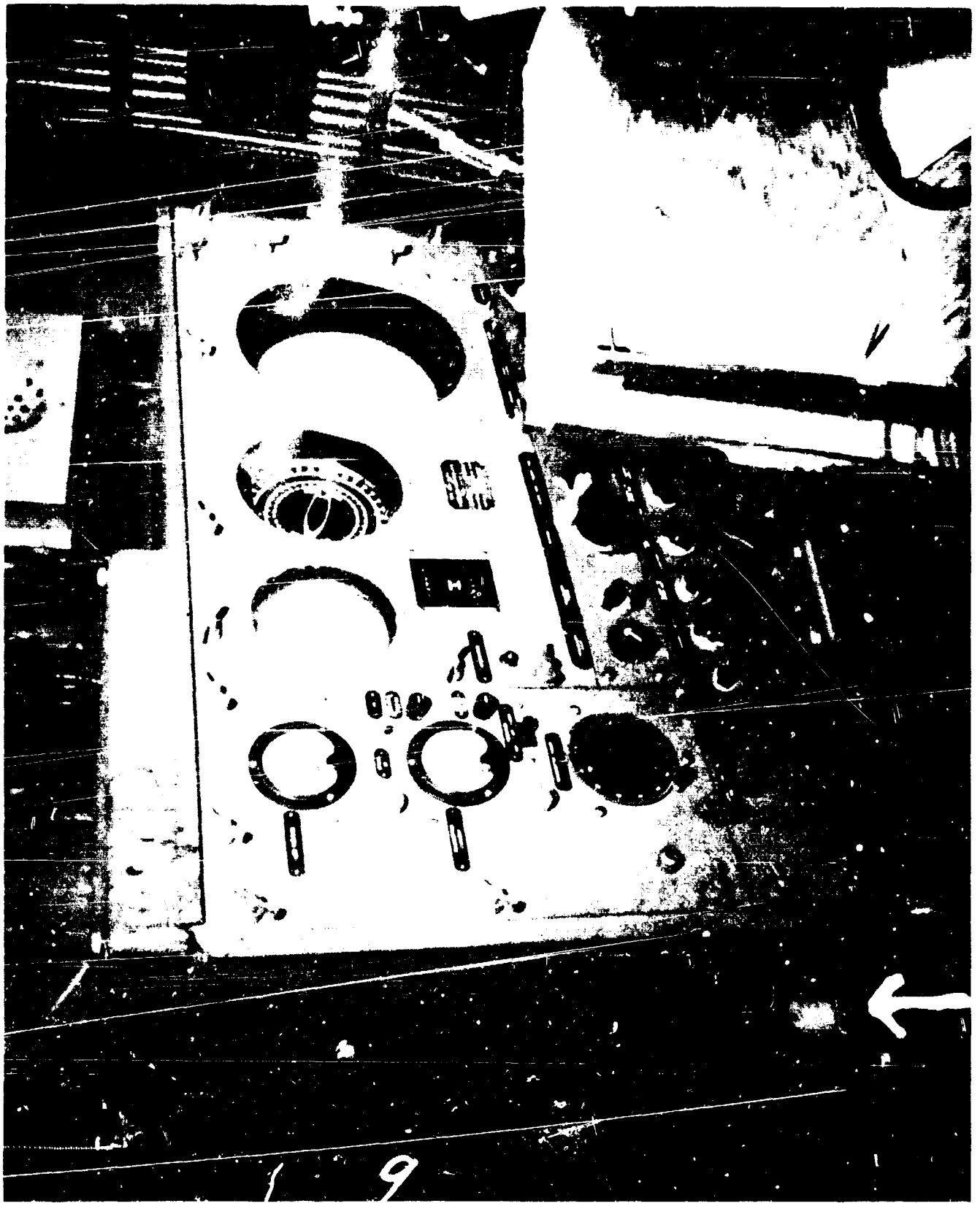
PRE BAKER - SG-1 TRANSMITTER. This equipment was undamaged during Test Able.



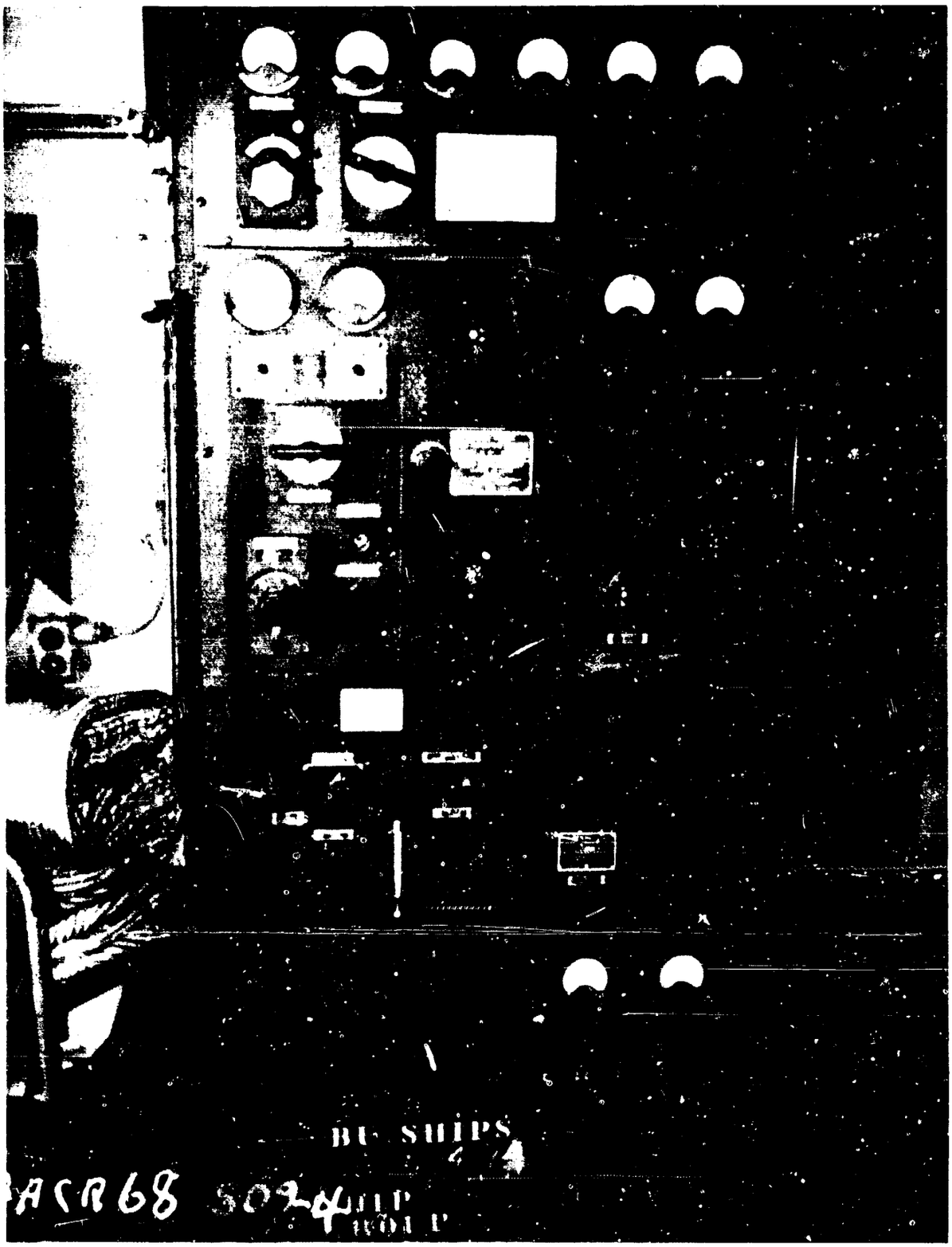
POST BAKER - SG-1 TRANSMITTER. Only damage was to magnetron, which dropped out of its mounting (apparently due to insufficient tightening of mounting screws). The weld parted on the main foundation, allowing main frame to tilt to the left of the picture. The rubber gasket around modulation generator has shaken out of its slot. Probably due to vibration.



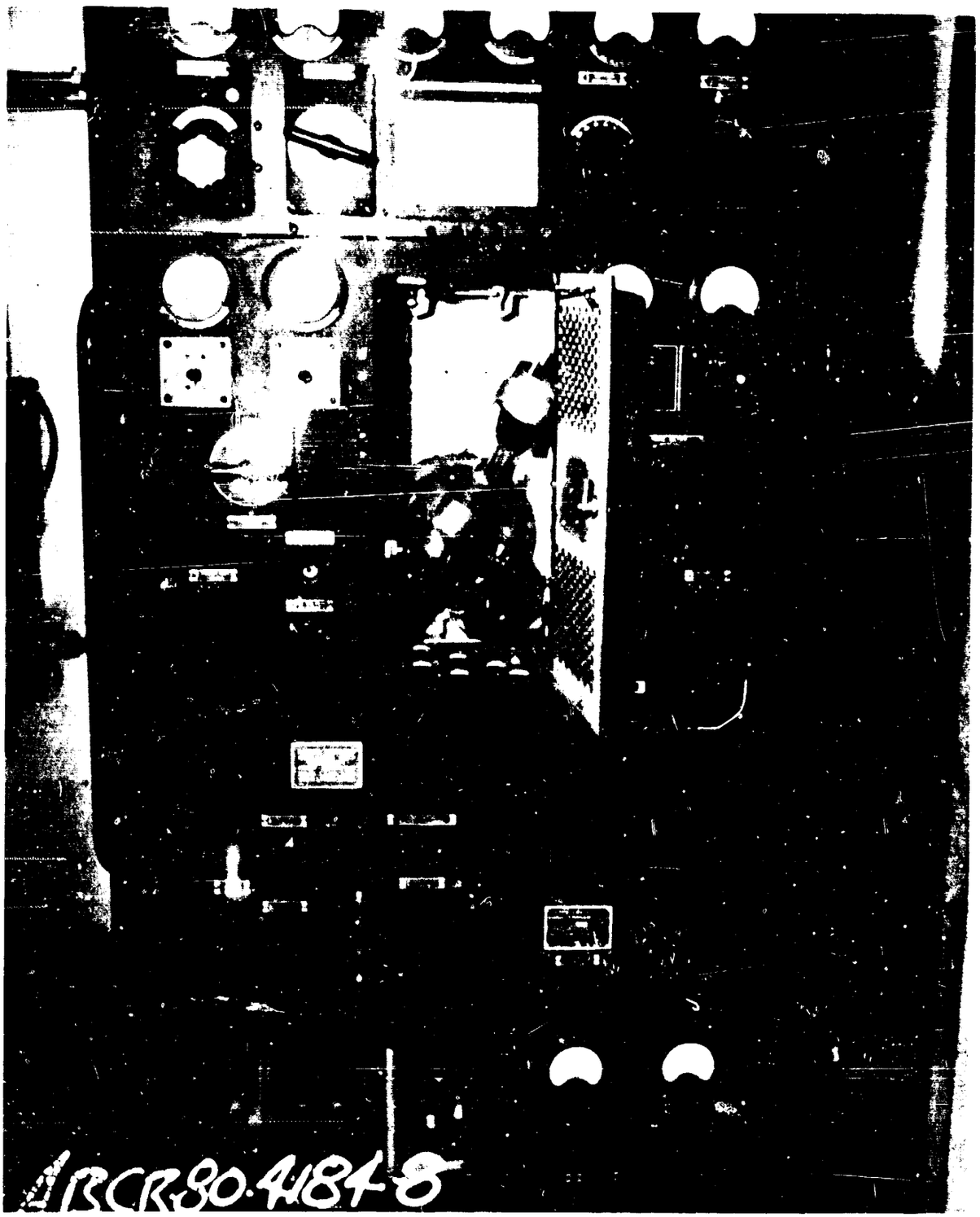
PRE BAKER - SG-1 INDICATOR FRONT VIEW. This equipment was undamaged during Test Able.



POST BAKER - SG-1 INDICATOR. This was the only equipment of its type in which the shock mount failed. The arrow points to center row of shock mounts. No other damage to indicator was noted.

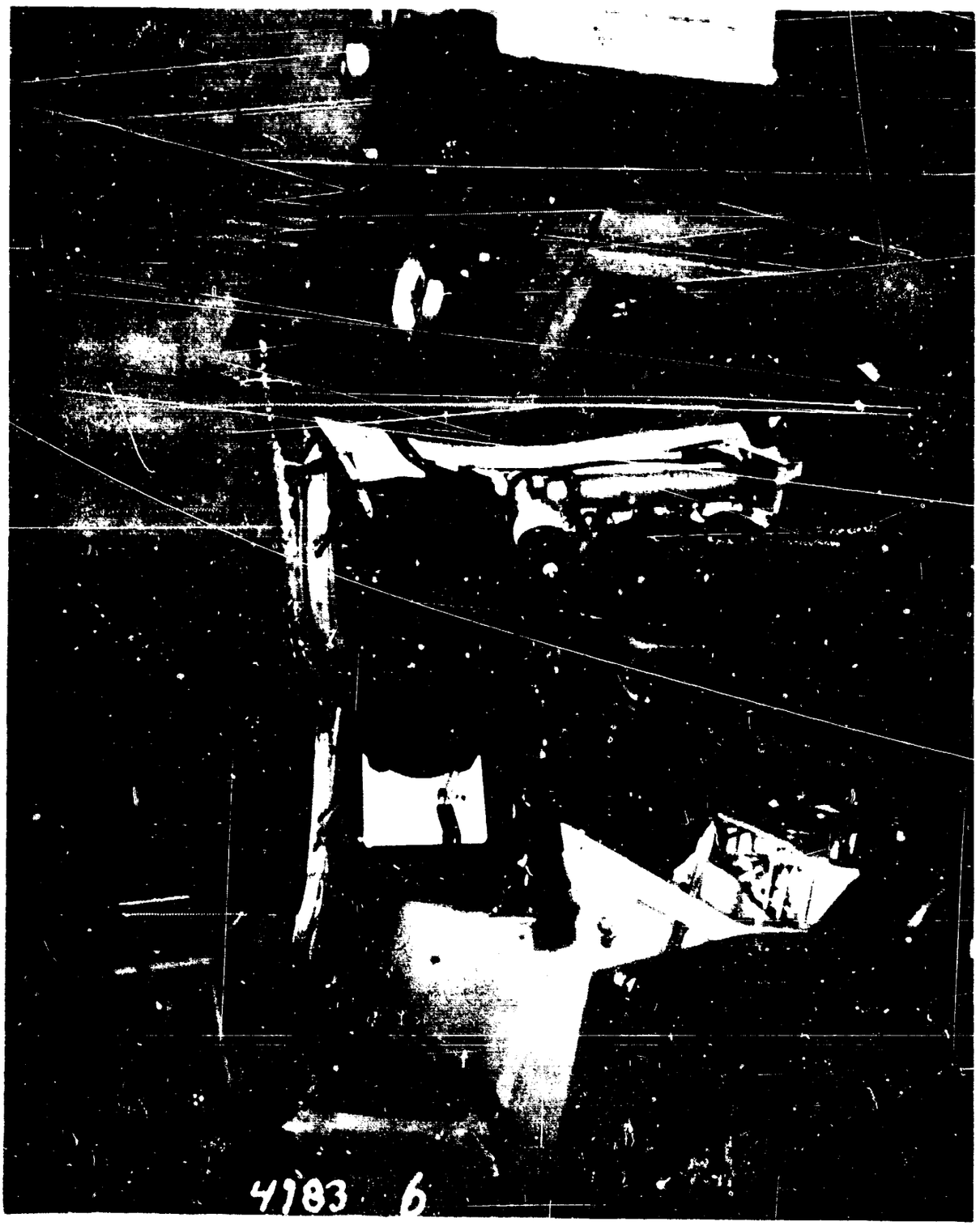


PRE BAKER - TBK-17. Front view. This equipment was undamaged during Test Able.

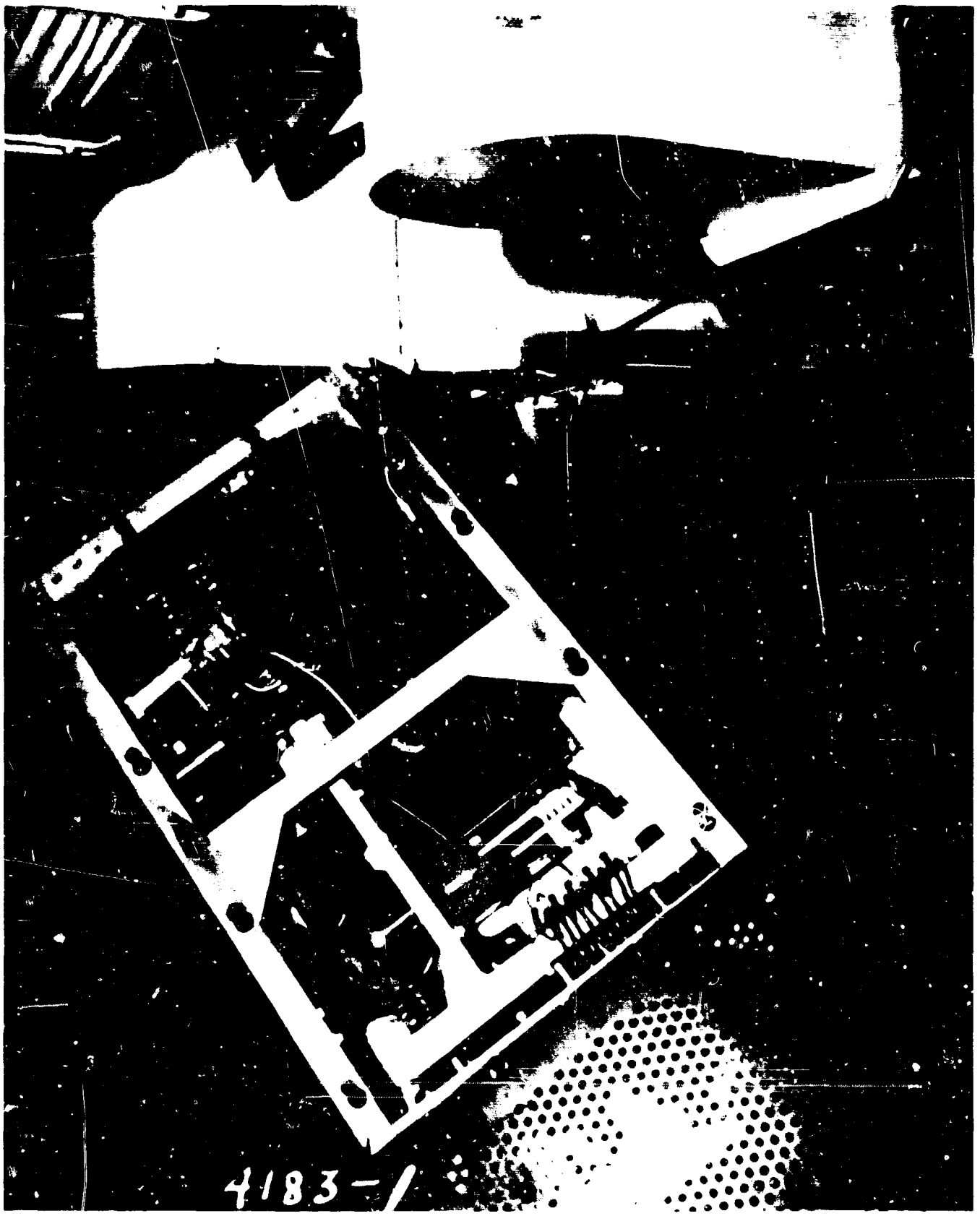


POST BAKER - TBK-17. PA tube was shaken from its mounting clips.

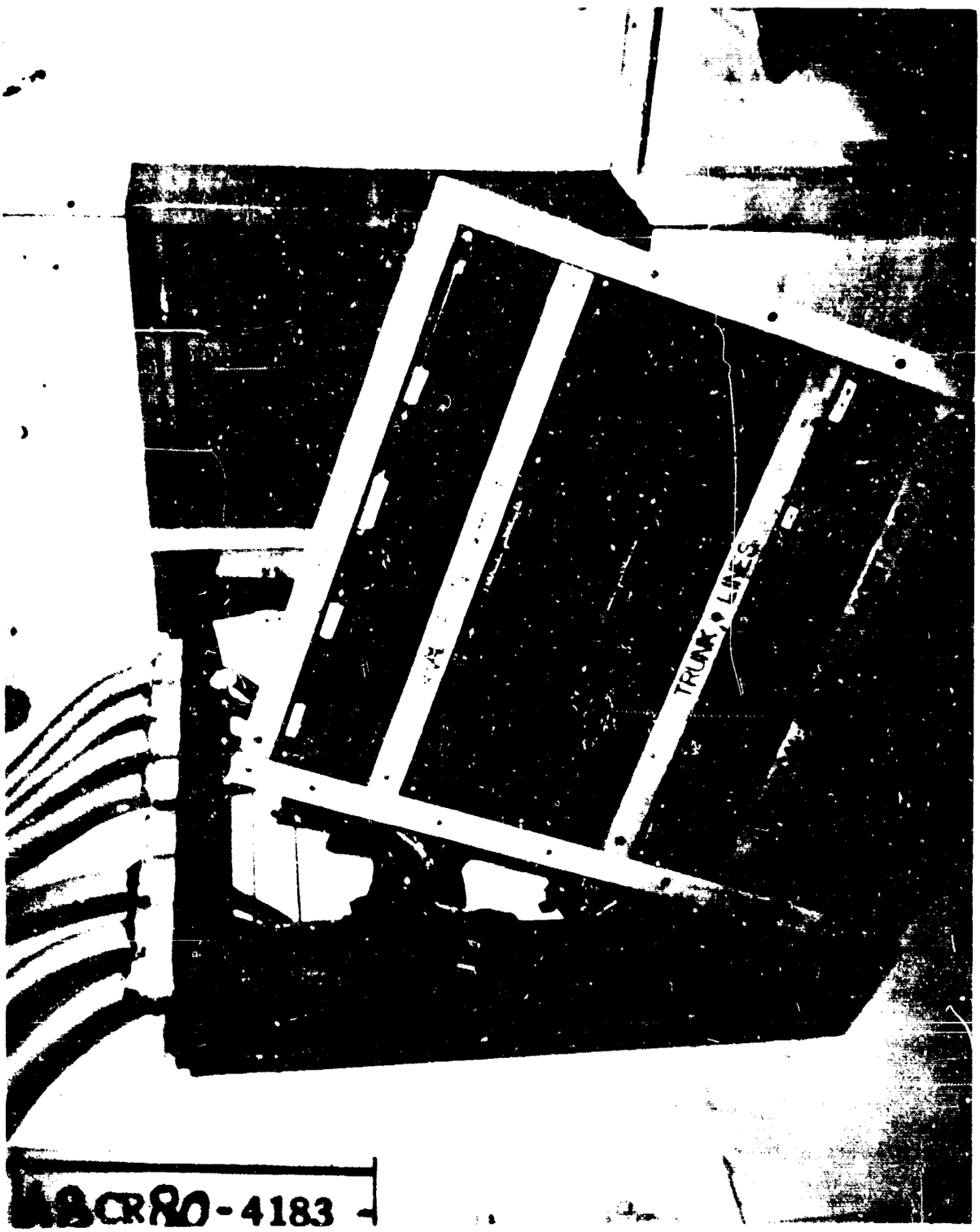
POST BAKER - RADIO I. Shows damage to TBK-17 and TCP-2.



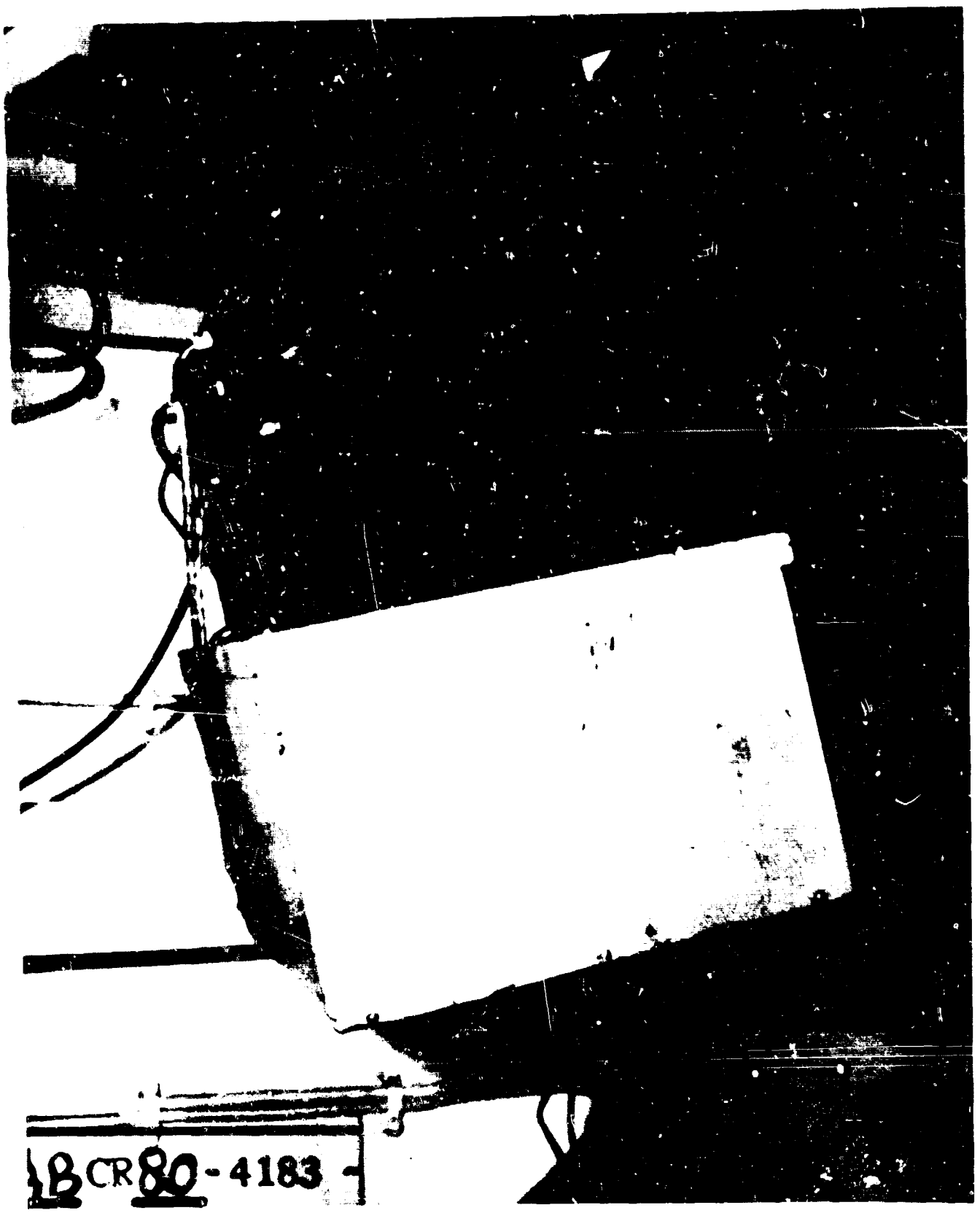
POST BAKER - RADIO I. View of the TCP-2.



POST BAKER - RADIO I. TAJ-19 foundation bolts were sheared off and equipment toppled over, breaking cables, jamming dials and warping frame.

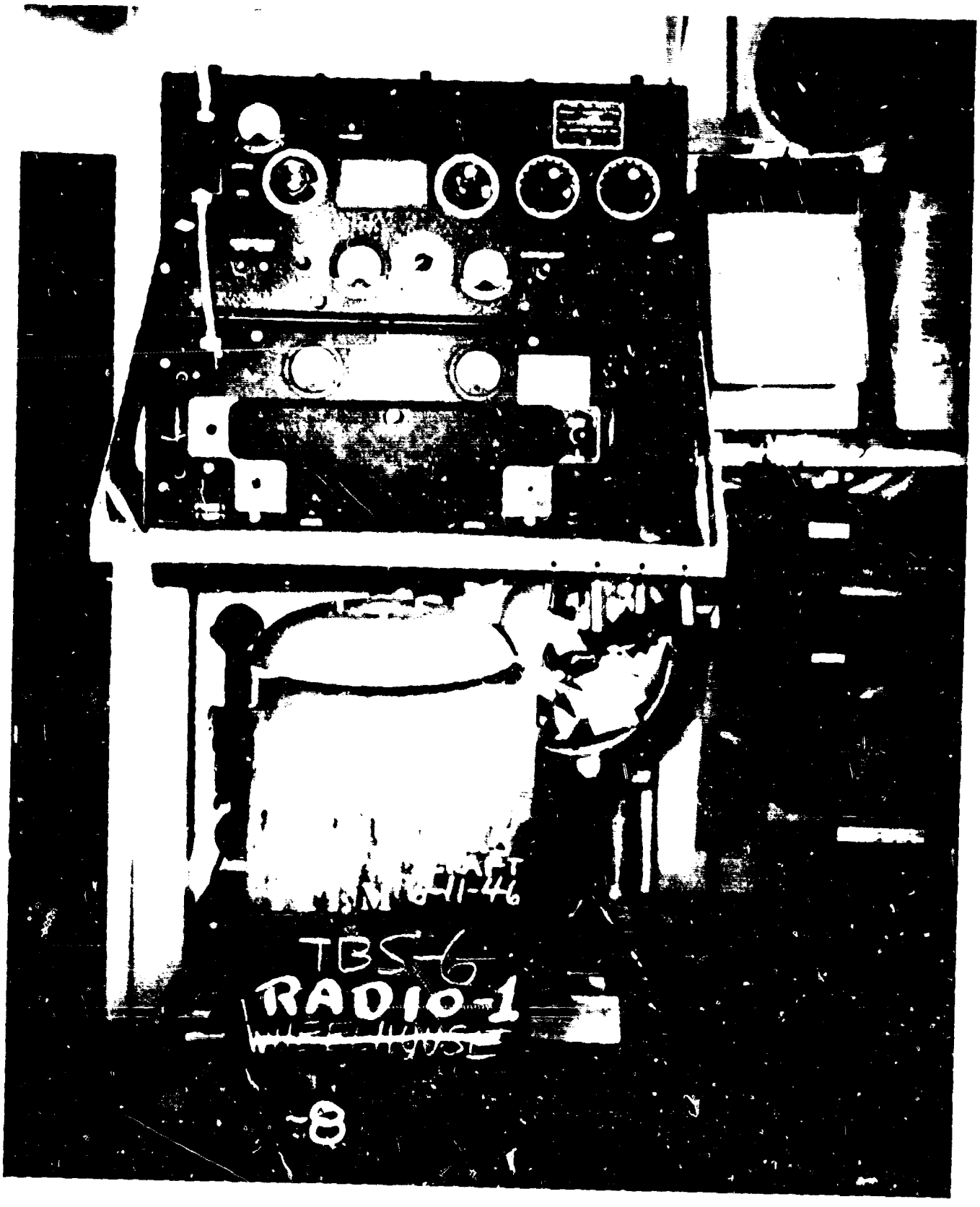


POST BAKER - RADIO I. Radiophone transfer panel. Door was thrown open, ripping off upper hinge, and left hanging on cables in this position. At right is corner of TAJ-19.

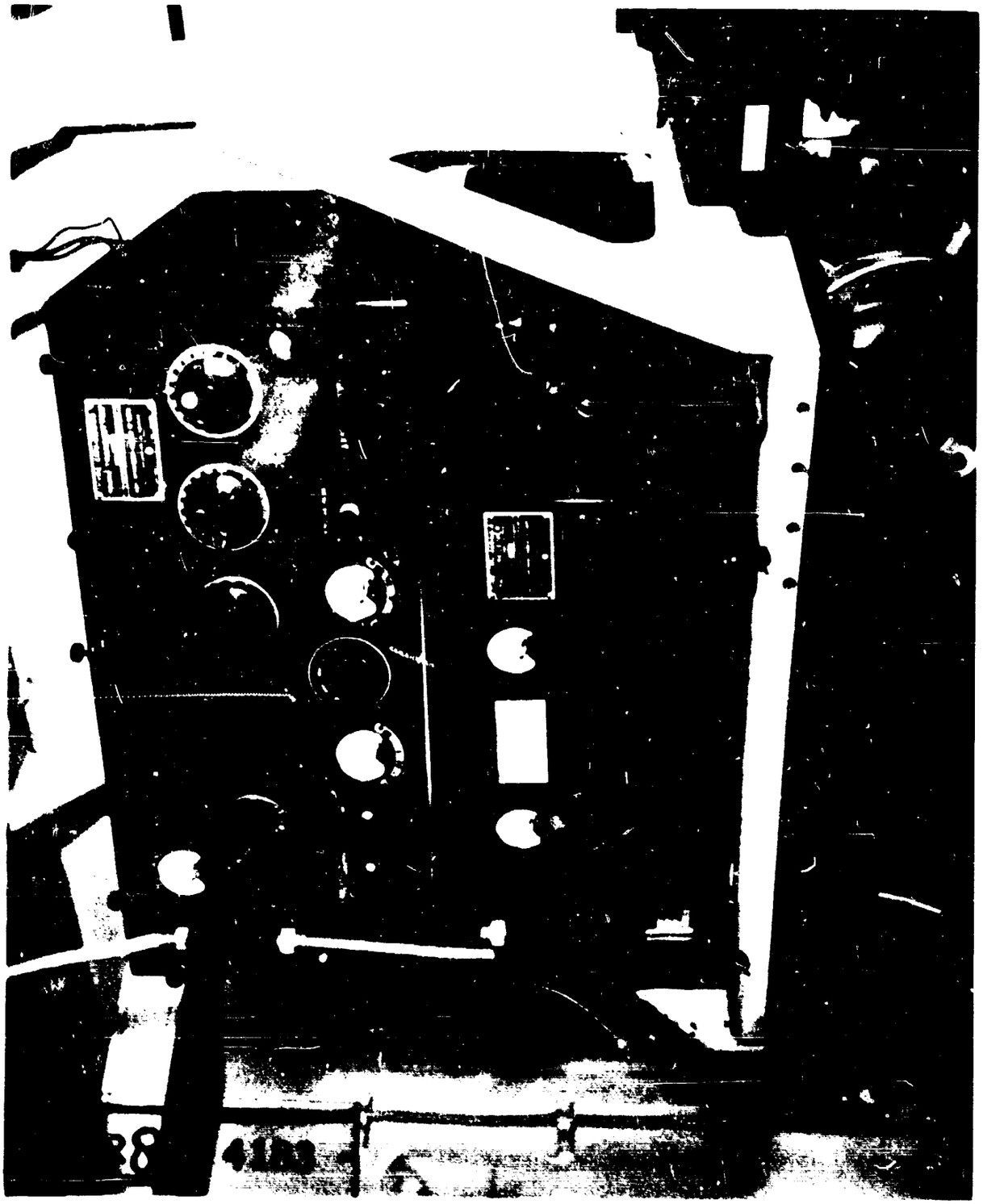


POST BAKER - RADIO I. These desk tops were fastened with self-tapping sheet-metal screws. They were unable to withstand the thrust of two heavy receivers mounted on them.

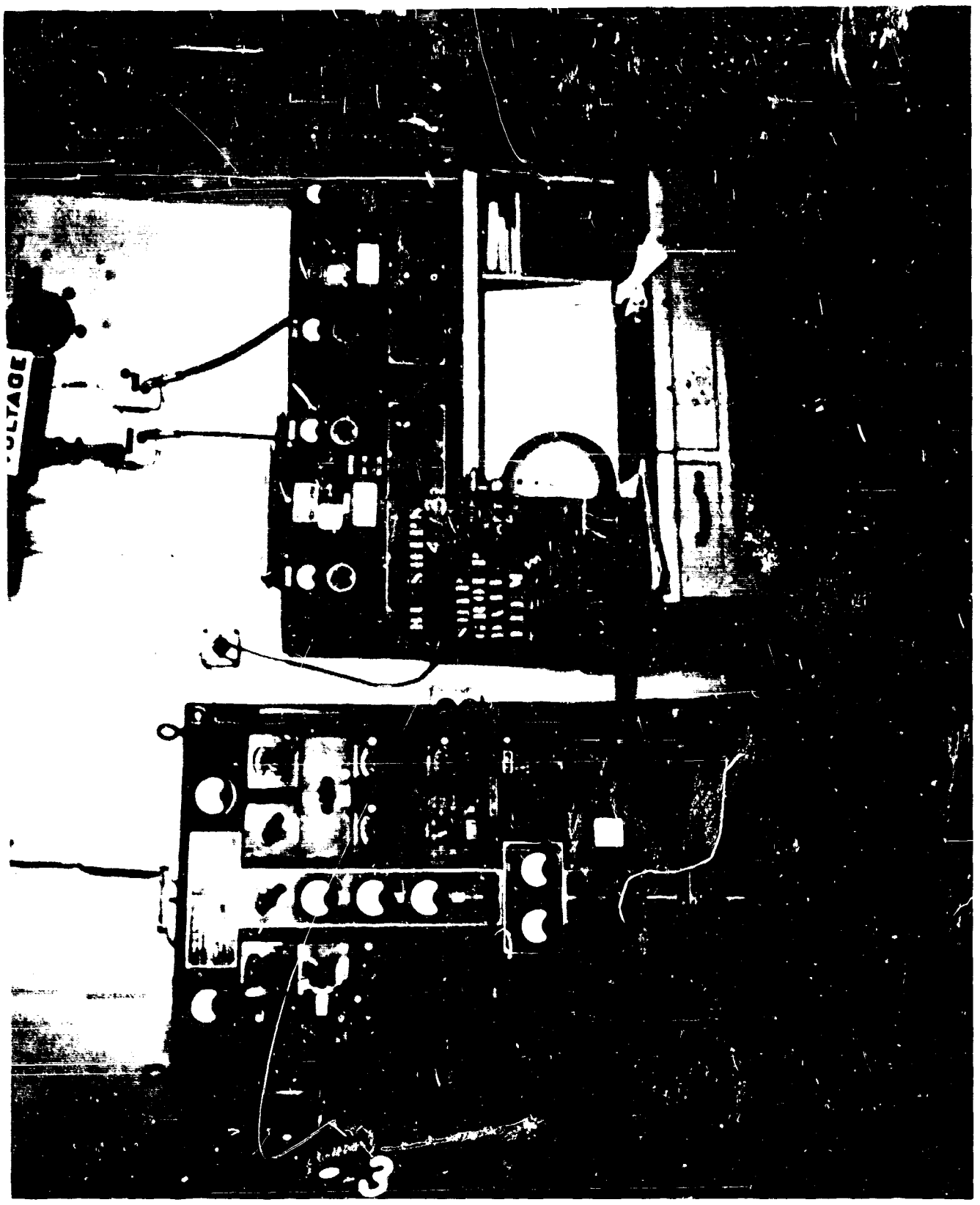
POST BAKER - TUBE LOCKER. Although the locker was thrown from its mounting by the blast, very little tube damage occurred because of protection furnished by the cardboard cartons.



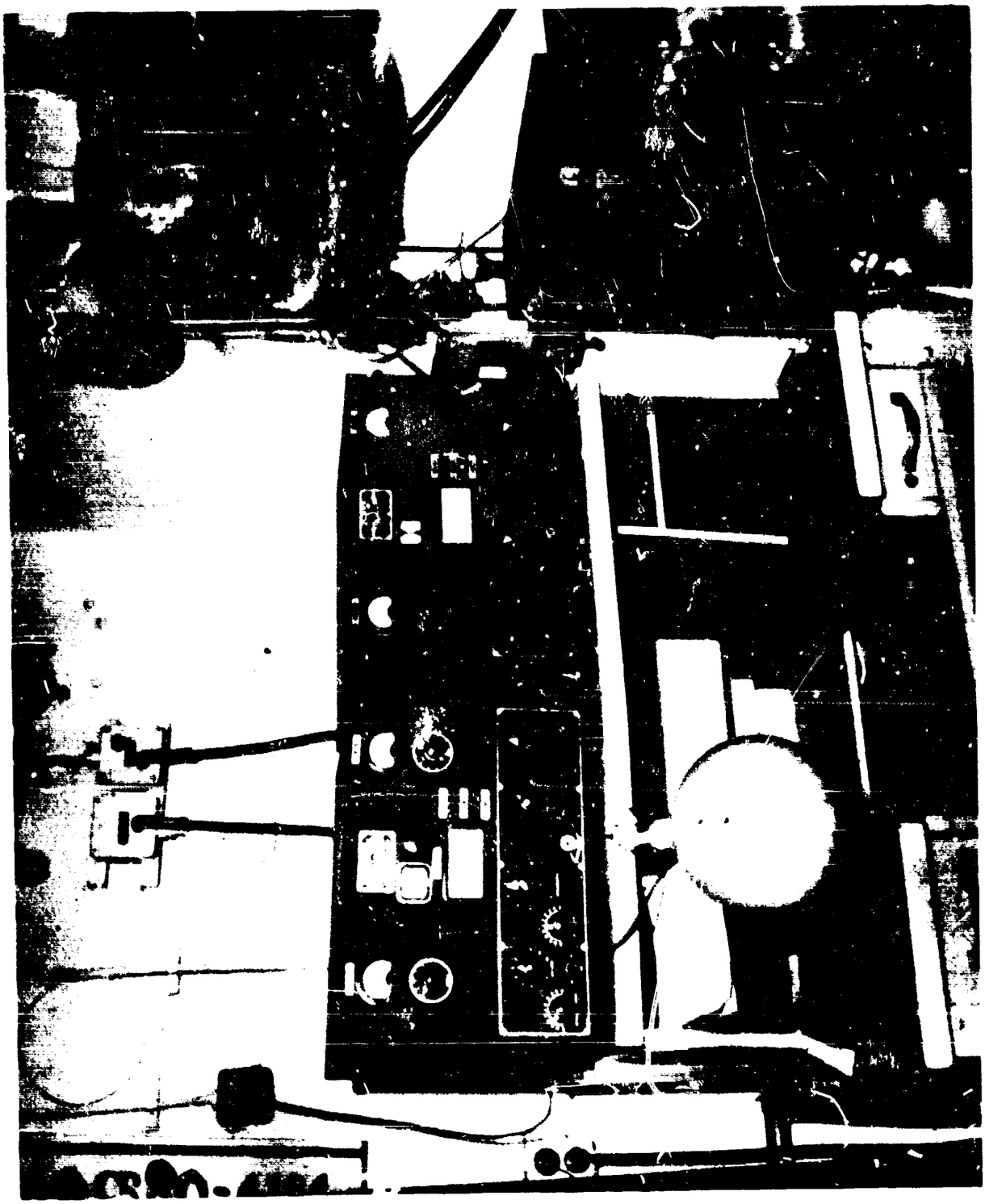
PRE BAKER - RADIO I. View of TBS-6. This equipment was undamaged during Test Able.



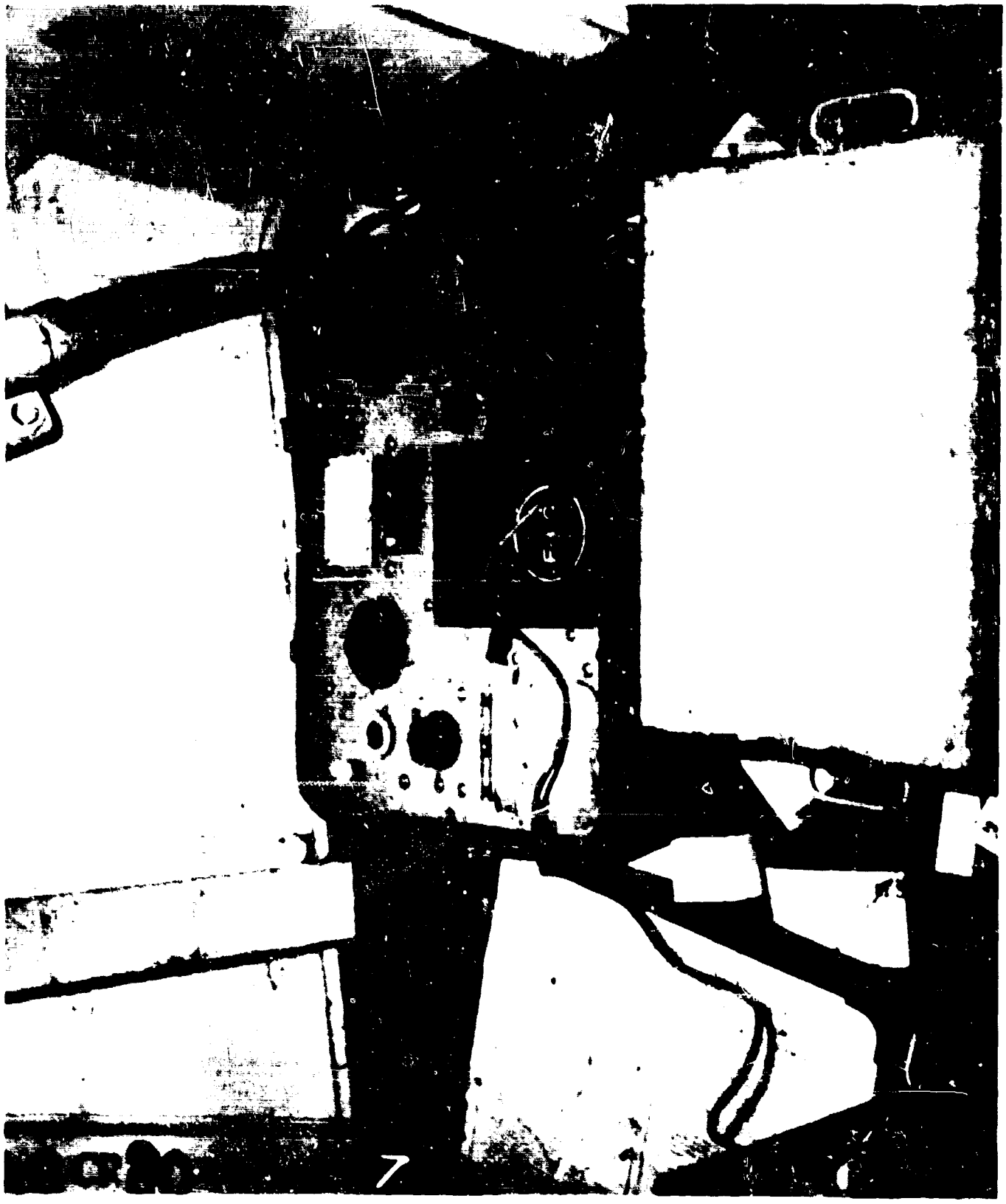
POST BAKER - RADIO I. Violence of shock sheared mounting bolts between receiver and transmitter on TBS-6, resulting in damage to receiver transmission line.



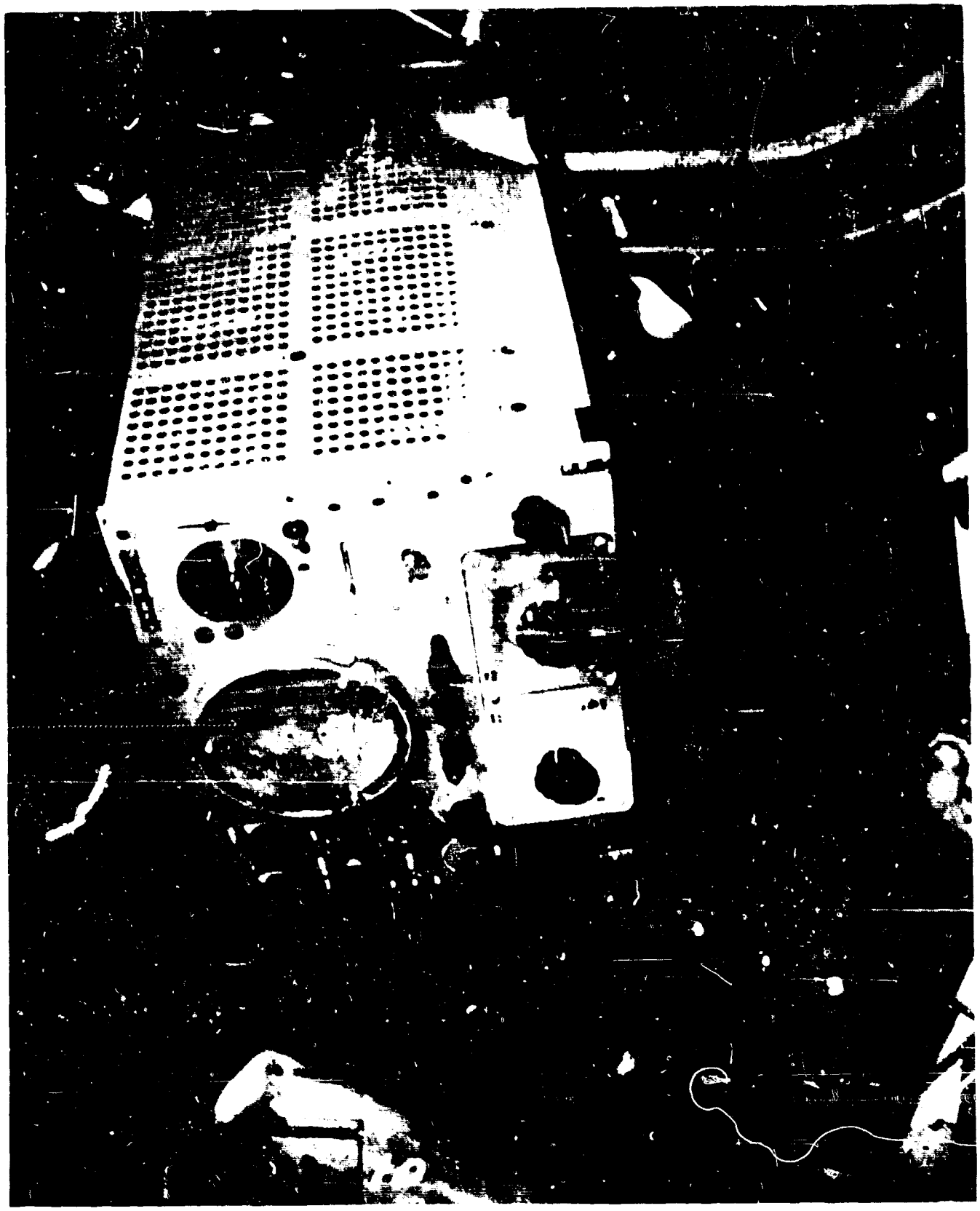
PRE BAKER - RAIK II. Shows TDL-3 and RAM/RAL. This equipment was undamaged during Test Able.



POST BAKER - RADIO II. Operating position showing twisted desk. At extreme lower edge of picture is the empty power supply cabinet from which power supply was thrown to deck.



POST BAKER - TCY-1 PORTABLE TRANSMITTER. Torn loose from its stowage rack.



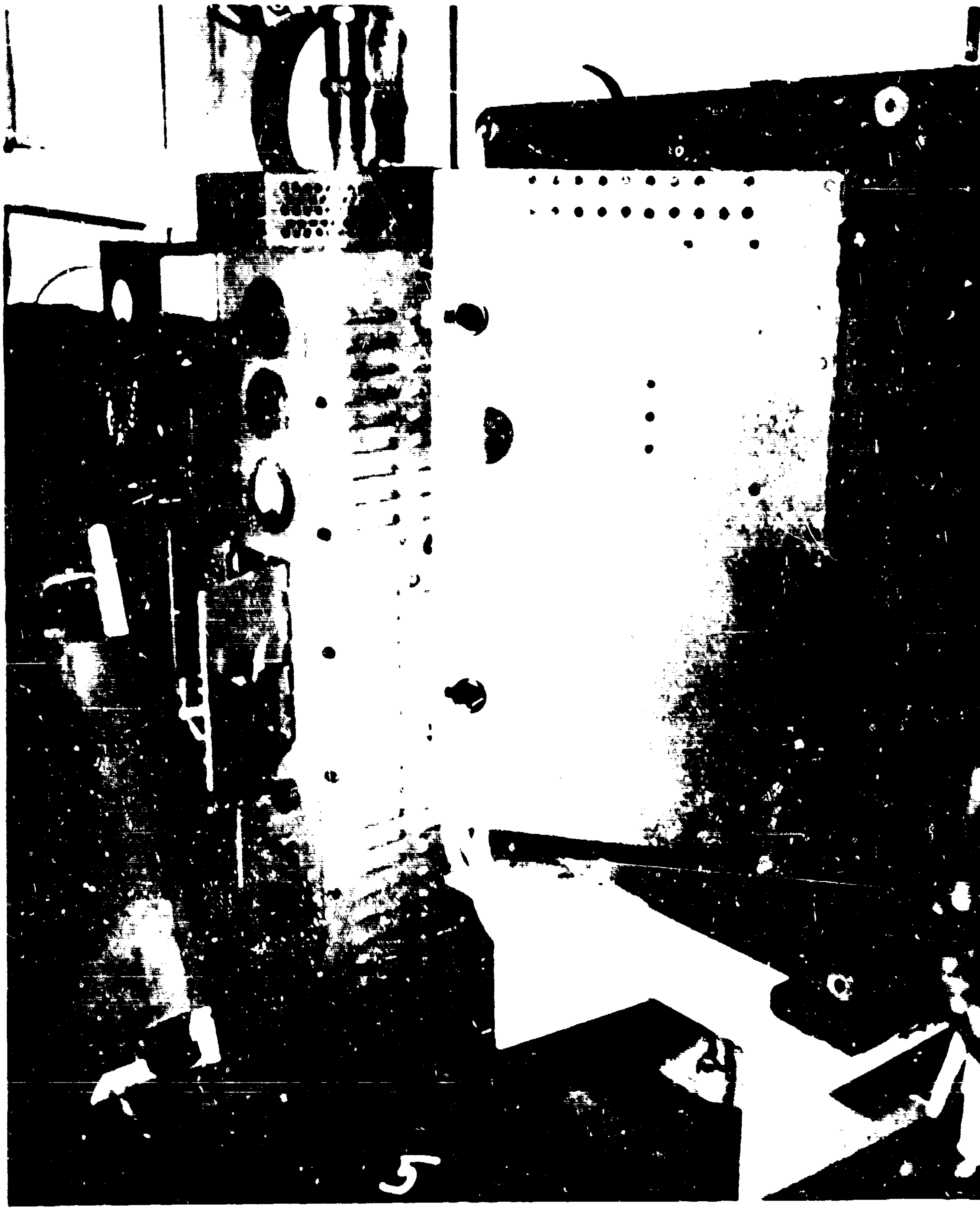
POST BAKER - DAS-3 IN CIC. The aircraft type mounting failed and indicator was jammed between vent and plotting table.

TEST BAKER

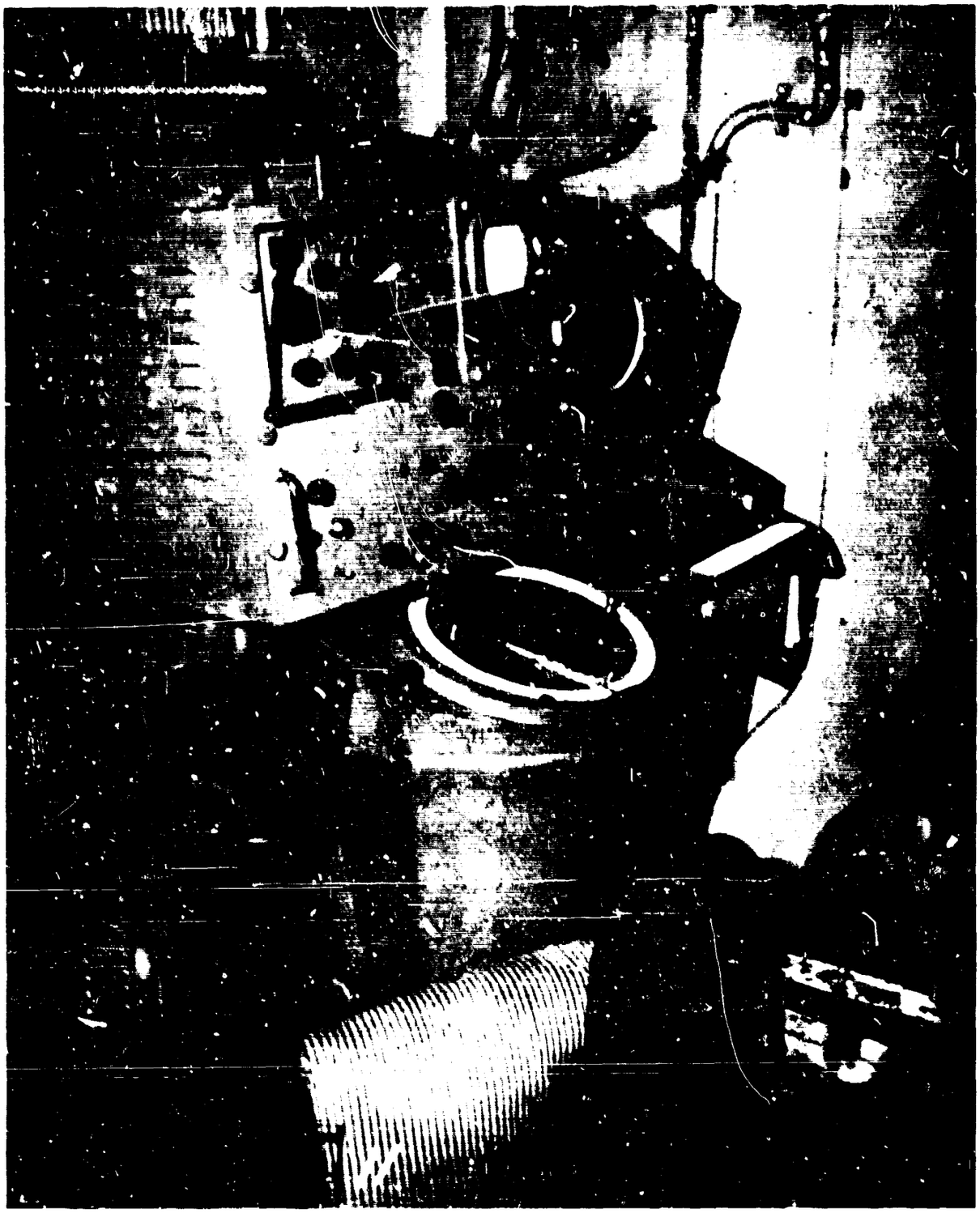
U.S.S. GASCONADE (APA85)

Range: 600 yards Bearing: 150°

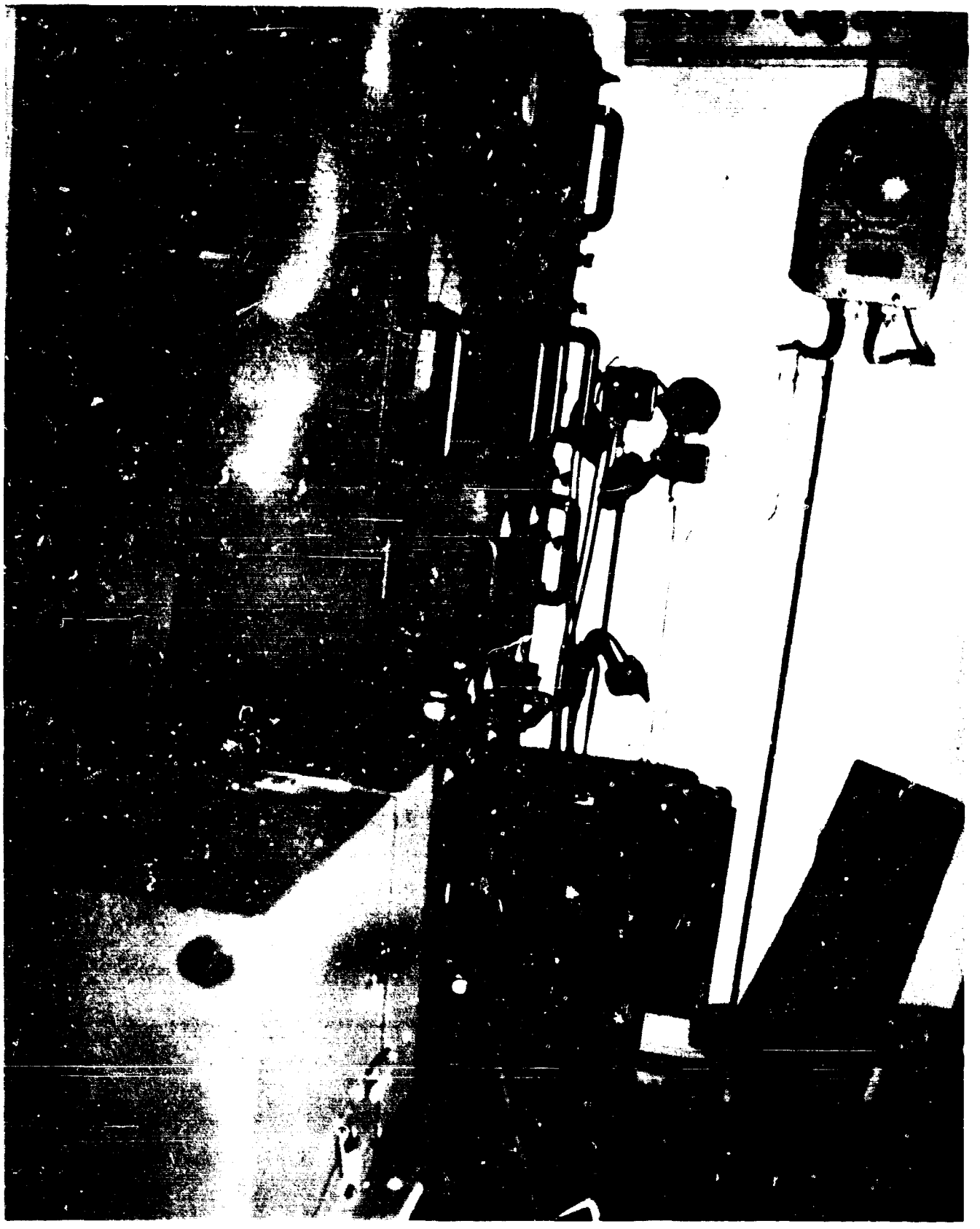
This ship received heavy shock damage. Several cases of damage caused by units tearing loose from shock mounts are included.



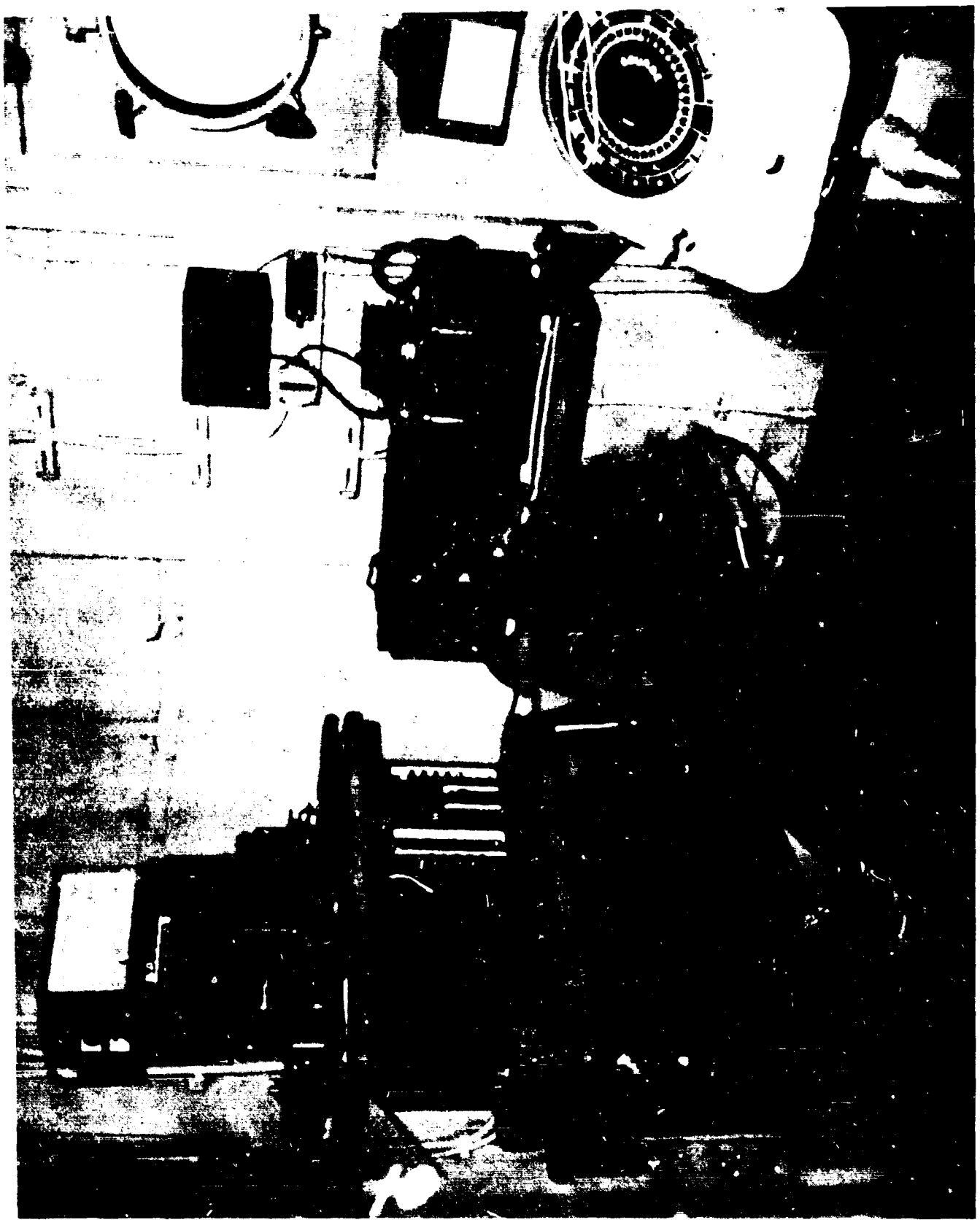
[illegible] - [illegible] AND BM-1. The [illegible] ring oscillator tubes (4 [illegible]'s) were broken. BM-1 [illegible] in foreground.



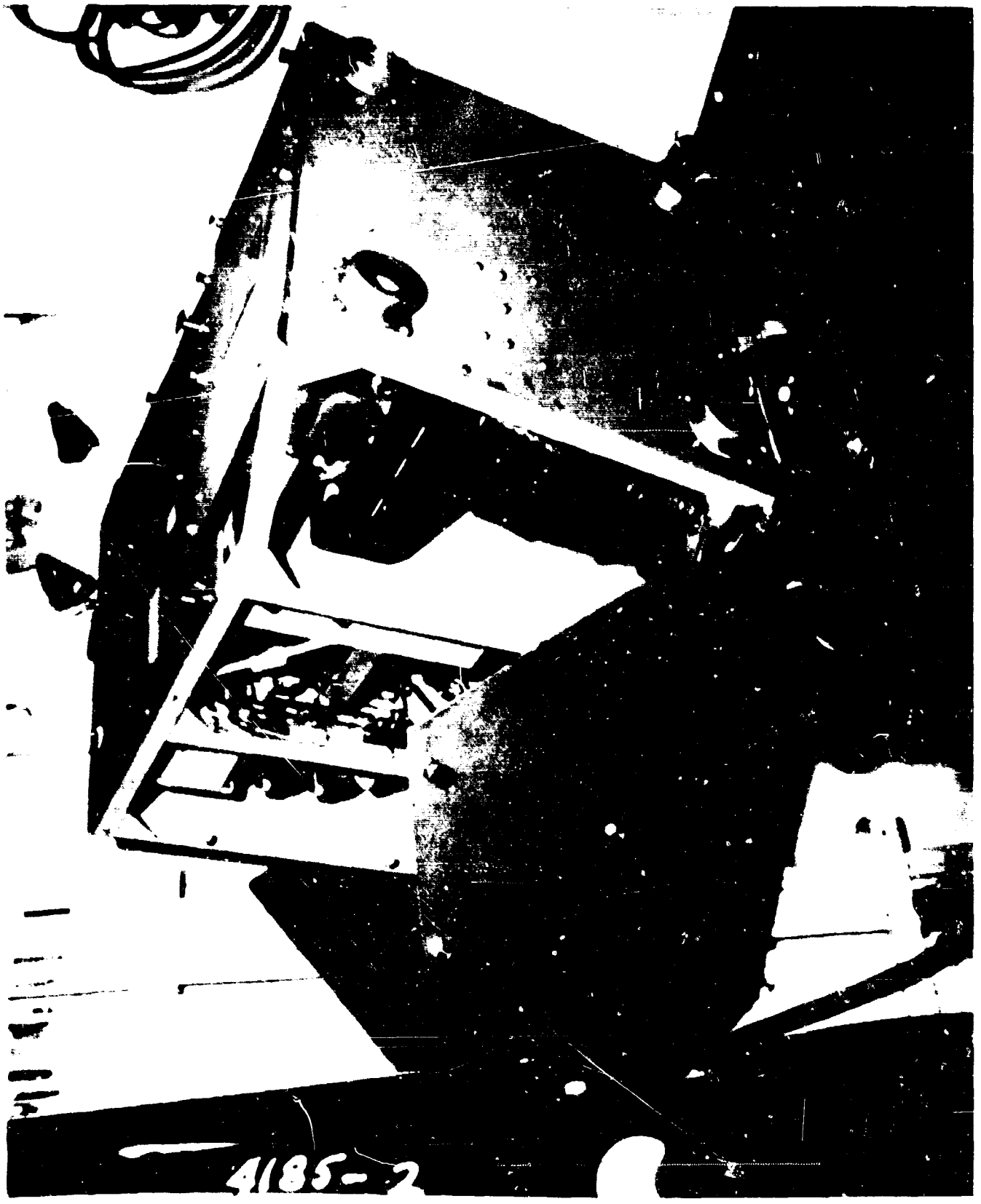
POST PANEL - SC-4 INDICATOR. The bearing control unit and receiver-indicator were torn loose from master PII and suffered damage in subsequent tossing about.



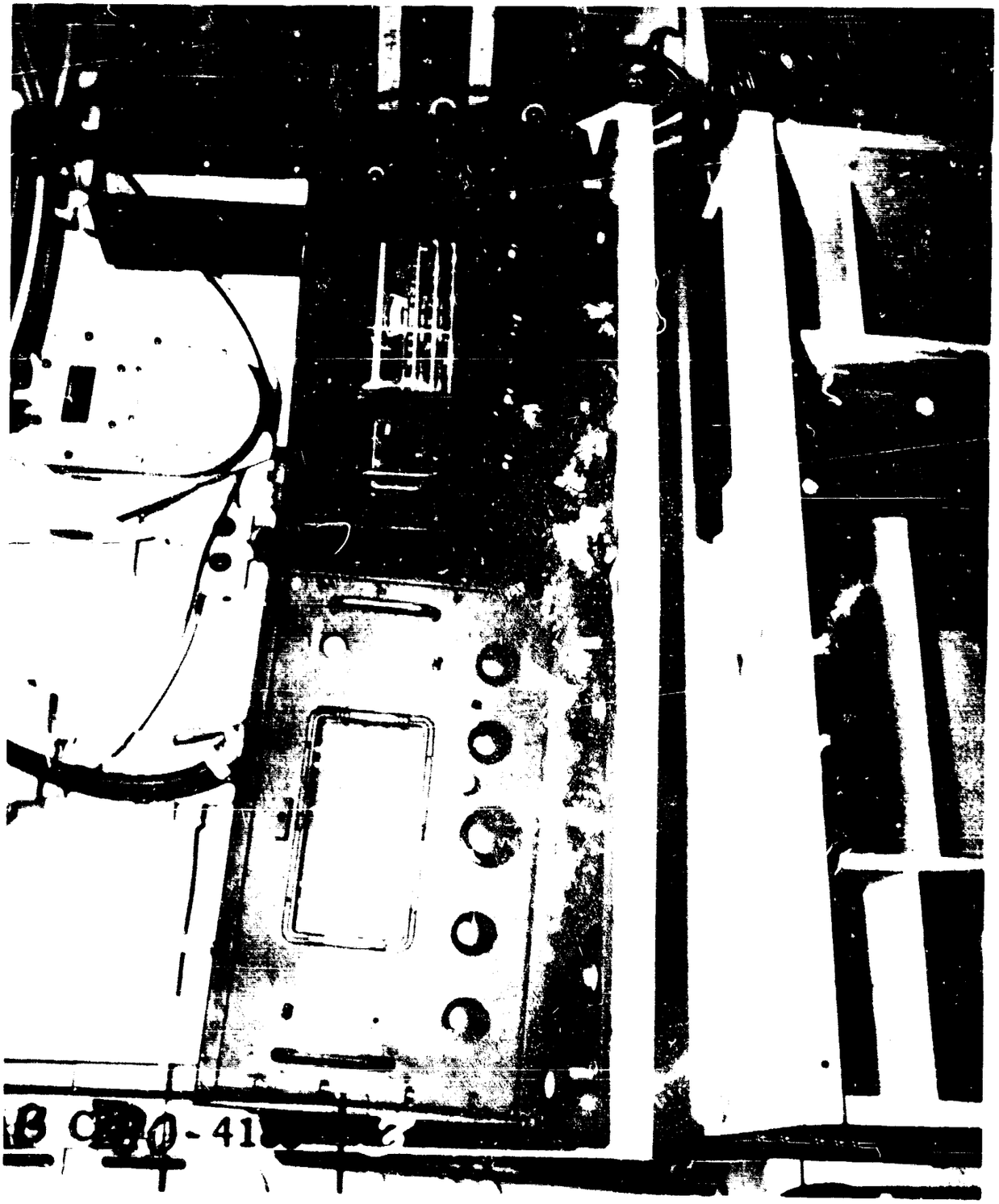
POST BAKER - SG MAIN FRAME. One 304-TH tube was shattered, and two 705-A's were shaken from their sockets. In this same compartment, the FN trans-ceiver was thrown from its cabinet and the ABK's torn from their shock mounts.



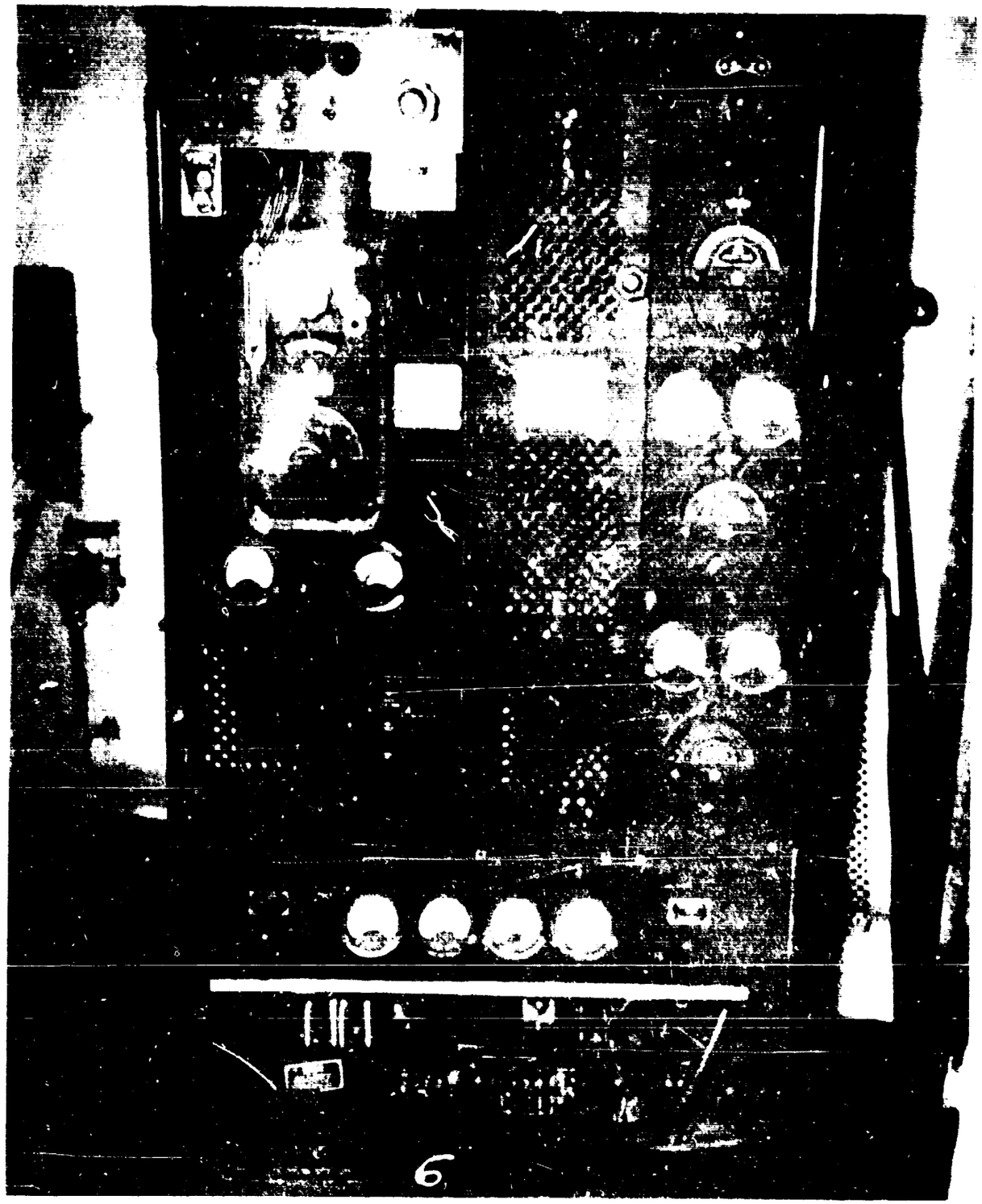
POST BAKER - PORT SIDE OF PILOT-HOUSE. Showing SCR-608 and SCR-624 equipments. Shock mounts separated on 624. Upper 608 was thrown to deck.



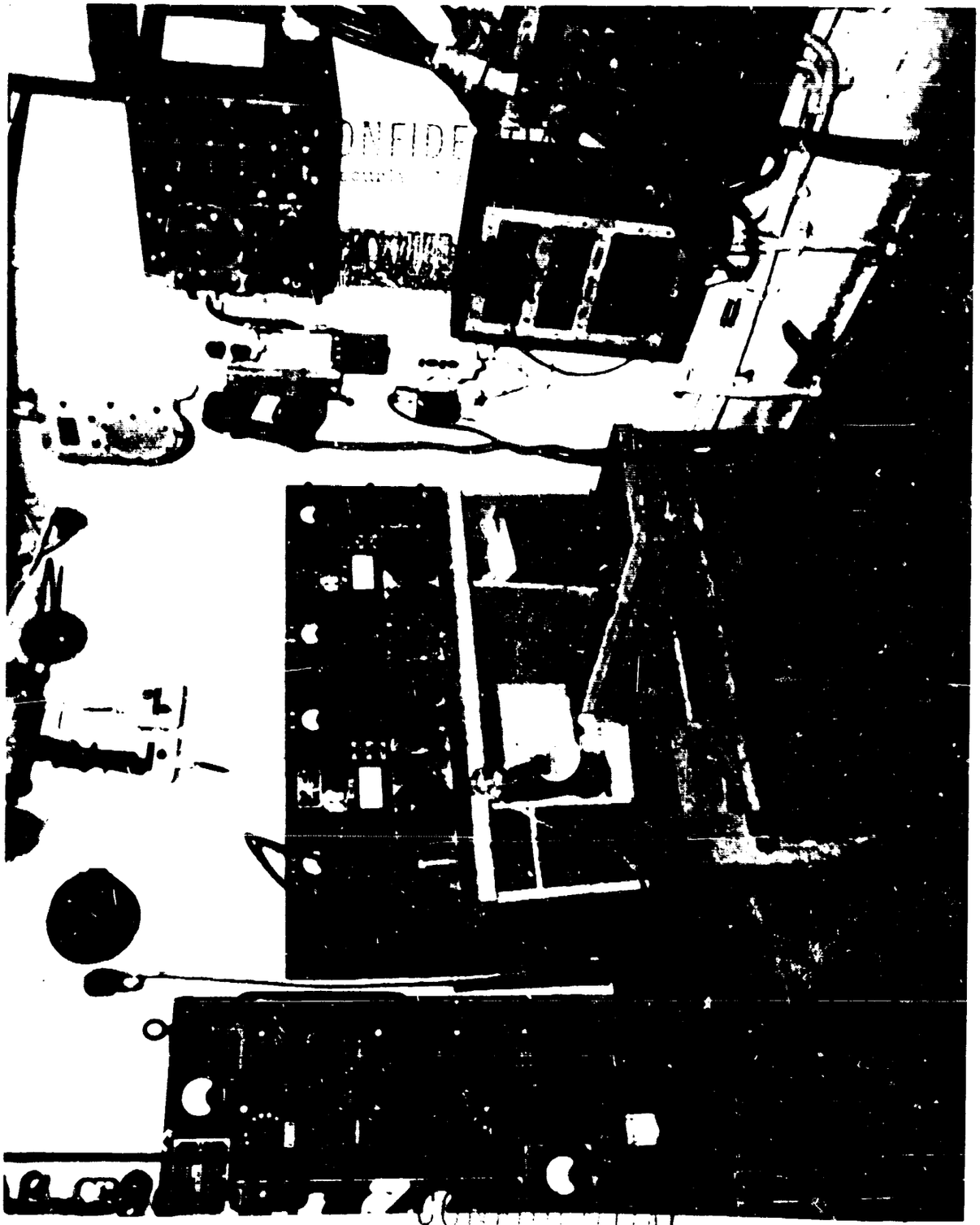
POST BAKER - TCP-2. These equipments were too heavy for the type shockmounts used. The shockmounts gave way, rendering the unit inoperative.



POST BAKER - RBO'S IN RADIO I. Shock mounts failed on receiver to left. No other damage to receiver.



POST BAKER - TRAILER IN BASIC III. Initial damage [illegible] was light, with two meters broken at center left of picture and lower panel open and warped, apparently by flying debris. Secondary damage, due to water splashing around on deck, rendered equipment inoperative until cleaned and dehydrated.



POST BAKER - RADIO III. View showing damaged desk and immersed receiver power supplies. TDE at left was rendered inoperative by immersion.

Defense Special Weapons Agency
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TRC

11 April 1997

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER
ATTENTION: OMI/Mr. William Bush

SUBJECT: Declassification of AD-367494

The Defense Special Weapons Agency (formerly the Defense Nuclear Agency) Security Office has reviewed and declassified the following report:

AD-367494 XRD-181 Volume 2.

Distribution statement **"A"** now applies.

Ardith Jarrett
ARDITH JARRETT
Chief, Technical Resource Center

copy furn: FC/DASIAC
KSC