

CAR026917 - Review of QA-scope flow restricting devices at PBNP.

Following the October 2002 event with the ORO-04008 flow orifice associated with the 0P-38B MDAFW Pump, PBNP conducted a review of all flow restricting devices that perform a QA-scope function. During this event particles from the pumps discharge became lodged in the flow restrictor and limited the flow through the line to below what was normally seen. These flow restrictors use a multi-stage anti-cavitation trim package installed in the body of a globe valve to limit flow. This type of flow restrictor uses very small holes in each stage along with a torturous path to limit flow and reduce the affects of cavitation.

A printout of the CHAMPS database was used as a starting point to determine the population of QA-scope flow restrictors installed in the plant. Next, a review of the plants P&IDs was conducted to determine if any orifices were installed in Safety-Related systems that did not have CHAMPS Ids. Finally, a limited plant walkdown and interviews were conducted to come up with a total population of 61 components that function as flow restriction devices in QA-scope applications (see attached Excel spreadsheet). Forty-eight of these are in safety-related applications.

The attached Excel spreadsheet also includes five components (1/2MS-279/283 and ORO-SA-001). The MS components are actually valves; however, they have a similar trim design to that used in the AFW pump recirc flow restrictors. The ORO-SA-001 components is of a similar design to the AFW Pump recirc piping flow restrictors. These five valves are installed in non-QA-scope applications. While these components have experienced some plugging problems in the past, the fact that they perform no safety-related function results in these problems not challenging the plant's nuclear safety.

The Safety Injection System (HHSI, RHR, and CS) pumps all have flow restriction devices installed in their recirc lines; however, none are similar to that installed in the AFW pumps recirc lines. The HHSI pumps have multi-staged off-center orifice plates installed in their recirc lines; whereas, the RHR and CS pumps have capillary type (extended length small bore pipe) flow restrictors. These types of flow restrictors are not as susceptible to clogging as the anti-cavitation trim packages used in the AFW system. In addition, they pass primary system water as opposed to the CST and Service Water seen in the AFW system.

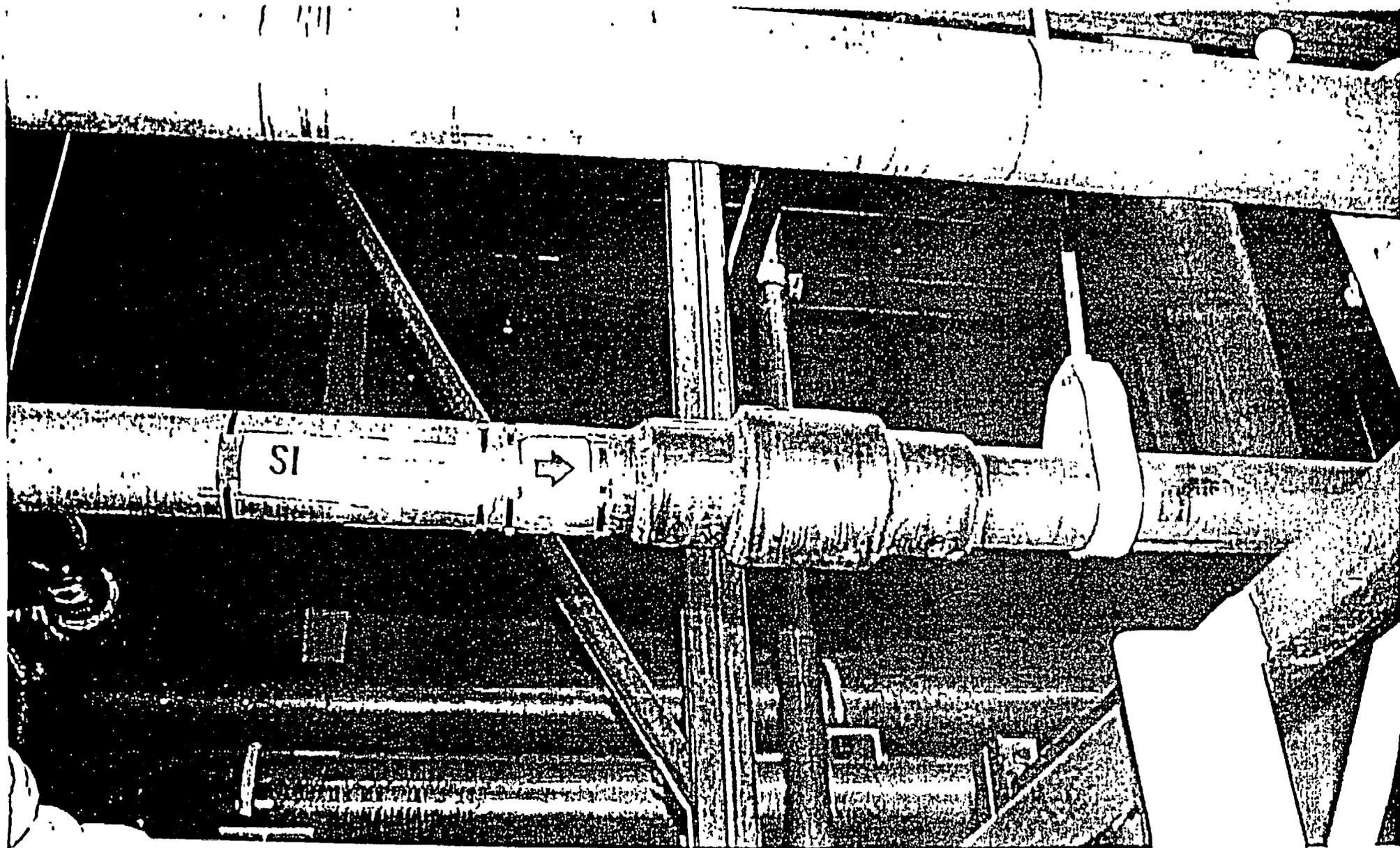
As can be seen in the attached Excel spreadsheet, PBNP also utilizes standard orifice plates in a large number of safety-related applications. These flow restrictors are not susceptible to small particle clogging like the trim sets installed in the AFW lines. The same is true for the large bore capillary tube style flow restrictors used at the PBNP. In addition, no capillary type flow restrictors were found installed in any safety-related applications that were not controlling primary system water flow.

The review of PBNP's flow restriction devices found only four applications (PB1/2 RO-04003, ORO-04008, and ORO-04015) where anti-cavitation trim packages were used in safety-related application. These are the flow restrictors installed in the recirc piping associated with the four AFW pumps (PB1/2 P-29 and 0P-38A/B). None of the other safety-related flow restriction devices were found to have this same susceptibility to small particle clogging.

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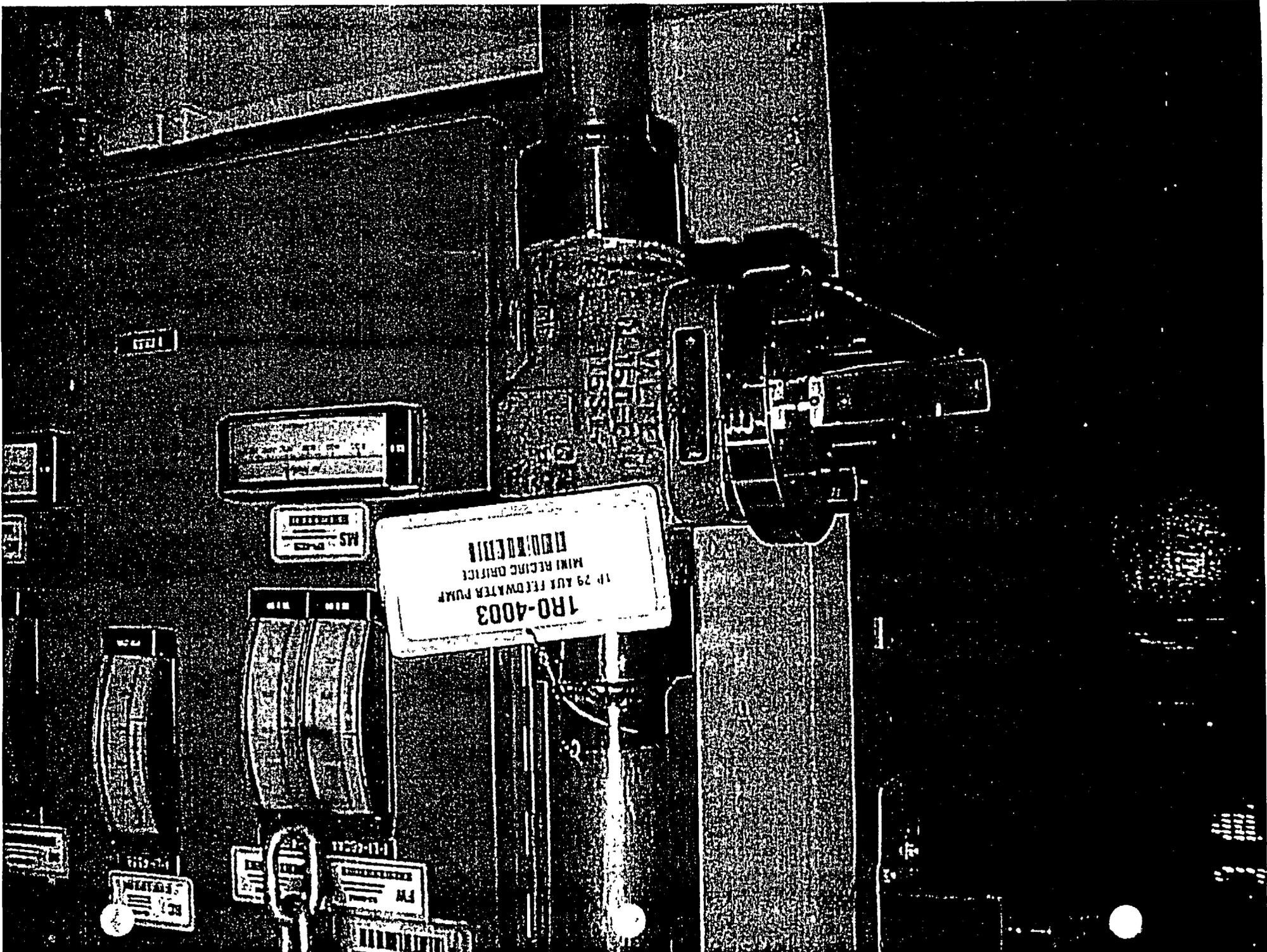
Equipment ID	Equipment Style	P&ID	Location	QA	SR	Equipment Name
PB1	RO-00198A	Capillary (2)	684J741-3 (D6) U1C	Y	Y	P-1A RCP #1 SEAL BYPASS ORIFICE
PB1	RO-00198B	Capillary (2)	684J741-3 (D8) U1C	Y	Y	P-1B RCP #1 SEAL BYPASS ORIFICE
PB1	RO-00199A	Capillary	684J741-3 (H7) 21/U1C/REGEN HX RM	Y	Y	LETDOWN ORIFICE A ORIFICE
PB1	RO-00199B	Capillary	684J741-3 (H6) 21/U1C/REGEN HX RM	Y	Y	LETDOWN ORIFICE B ORIFICE
PB1	RO-00199C	Capillary	684J741-3 (H6) 21/U1C/REGEN HX RM	Y	Y	LETDOWN ORIFICE C ORIFICE
PB1	RO-00458	Orifice Plate (2)	541F091-1 (B3) U1C	Y	Y	RC LOOP A COLD LEG RTD MANIFOLD ORIFICE
PB1	RO-00459	Orifice Plate (2)	541F091-1 (D10) U1C	Y	Y	RC LOOP B COLD LEG RTD MANIFOLD ORIFICE
PB1	RO-00487	Capillary (2)	541F091-2 (F5) 66/U1C	Y	Y	R-1 RV HEAD VENT FLOW ORIFICE
PB1	RO-00488	Capillary (2)	541F091-2 (G5) 66/U1C	Y	Y	T-1 PZR VENT FLOW ORIFICE
PB1	RO-00900A	Orifice Plate	110E017-3 (G5) 8/PAB	Y	Y	P-14A CONT SPRAY PUMP FLOW ORIFICE
PB1	RO-00900B	Capillary (1)	110E017-3 (F6) 8/PAB	Y	Y	P-14A CONT SPRAY PUMP RECIRC ORIFICE
PB1	RO-00900C	Orifice Plate	110E017-3 (C5) 8/PAB	Y	Y	P-14B CONT SPRAY PUMP FLOW ORIFICE
PB1	RO-00900D	Capillary (1)	110E017-3 (D6) 8/PAB	Y	Y	P-14B CONT SPRAY PUMP RECIRC ORIFICE
PB1	RO-04003	Valve/Trim/Adj	M-217-1 (B6) 8/CB/AFP RM 1P-29 CUB	Y	Y	1P-29 AFP MINI RECIRC ORIFICE
PB2	RO-00198A	Capillary (2)	685J175-3 (D6) 21/U2C/WEST STAIRS SOUTH	Y	Y	P-1A RCP #1 SEAL BYPASS ORIFICE
PB2	RO-00198B	Capillary (2)	685J175-3 (D8) U2C/P-1B RCP CUB/MIDDLE LVL E	Y	Y	P-1B RCP #1 SEAL BYPASS ORIFICE
PB2	RO-00199A	Capillary	685J175-3 (H7) 21/U2C/REGEN HX RM	Y	Y	LETDOWN ORIFICE A ORIFICE
PB2	RO-00199B	Capillary	685J175-3 (H6) 21/U2C/REGEN HX RM	Y	Y	LETDOWN ORIFICE B ORIFICE
PB2	RO-00199C	Capillary	685J175-3 (H6) 21/U2C/REGEN HX RM	Y	Y	LETDOWN ORIFICE C ORIFICE
PB2	RO-00458	Orifice Plate (2)	541F445-1 (B3) U2C	Y	Y	RC LOOP A COLD LEG RTD MANIFOLD ORIFICE
PB2	RO-00459	Orifice Plate (2)	541F445-1 (D8) U2C	Y	Y	RC LOOP B COLD LEG RTD MANIFOLD ORIFICE
PB2	RO-00487	Capillary (2)	541F445-2 (F5) 66/U2C	Y	Y	R-1 RV HEAD VENT FLOW ORIFICE
PB2	RO-00488	Capillary (2)	541F445-2 (G5) U2C/T-1 PZR CUB/UPPER LEVEL	Y	Y	T-1 PZR VENT FLOW ORIFICE
PB2	RO-00900A	Orifice Plate	110E035-3 (G5) 8/PAB	Y	Y	P-14A CONT SPRAY PUMP FLOW ORIFICE
PB2	RO-00900B	Capillary (1)	110E035-3 (F6) 8/PAB	Y	Y	P-14A CONT SPRAY PUMP RECIRC ORIFICE
PB2	RO-00900C	Orifice Plate	110E035-3 (C5) 8/PAB	Y	Y	P-14B CONT SPRAY PUMP FLOW ORIFICE
PB2	RO-00900D	Capillary (1)	110E035-3 (D6) 8/PAB	Y	Y	P-14B CONT SPRAY PUMP RECIRC ORIFICE
PB2	RO-04003	Valve/Trim/Adj	M-217-1 (G6) 8/CB/AFP RM 2P-29 CUB	Y	Y	2P-29 AFP MINI RECIRC ORIFICE
PB0	RO-03362A	Orifice Plate	M-227-1 (D10) 50/DGB/G-03 RADTR RM	Y	Y	G-03 EDG HX-265A RADIATOR VENT ORIFICE
PB0	RO-03362B	Orifice Plate	M-227-2 (E10) 50/DGB/G-04 RADTR RM	Y	Y	G-04 EDG HX-265B RADIATOR VENT ORIFICE
PB0	RO-03363A	Orifice Plate	M-227-1 (H8) 50/DGB/G-03 RADTR RM	Y	Y	G-03 EDG HX-266A LUBE OIL COOLER VENT ORIFICE
PB0	RO-03363B	Orifice Plate	M-227-2 (H8) 50/DGB/G-04 RADTR RM	Y	Y	G-04 EDG HX-266B LUBE OIL COOLER VENT ORIFICE
PB0	RO-03989A	Orifice Plate	M-219-3 (G5) 28/DGB/G-03 DAY TK RM	Y	Y	T-176A G-03 EDG DAY TANK INLET ORIFICE
PB0	RO-03989B	Orifice Plate	M-219-3 (E5) 28/DGB/G-04 FOTP/DAY TK RM	Y	Y	T-176B G-04 EDG DAY TANK INLET ORIFICE
PB0	RO-04008	Valve/Trim	M-217-1 (D6) 8/CB/AFP RM P-38A CUB	Y	Y	P-38A AFP MINI RECIRC ORIFICE
PB0	RO-04015	Valve/Trim	M-217-1 (E6) 8/CB/AFP RM P-38B CUB	Y	Y	P-38B AFP MINI RECIRC ORIFICE
PB1	RO-02909	Orifice Plate	M-207-4 (G9) 26/PAB/CENTRAL	Y	N	SW FROM HX-15A-D CONT VENT CLR MOV BYP ORIFICE
PB2	RO-02909	Orifice Plate	M-2207-2 (B7) 26/PAB/CENTRAL	Y	N	SW FROM HX-15A-D CONT VENT CLR MOV BYP ORIFICE
PB0	RO-01005A	Inline Orifice	684J972-1 (G6) 46/PAB/WG COMP RM	Y	N	K-1A WG COMP SEAL WATER MAKEUP INBOARD FLOW ORIFICE
PB0	RO-01005B	Inline Orifice	684J972-1 (B6) 46/PAB/WG COMP RM	Y	N	K-1B WG COMP SEAL WATER MAKEUP INBOARD FLOW ORIFICE
PB0	RO-01006A	Inline Orifice	684J972-1 (G6) 46/PAB/WG COMP RM	Y	N	K-1A WG COMP SEAL WATER MAKEUP FLOW ORIFICE
PB0	RO-01006B	Inline Orifice	684J972-1 (B6) 46/PAB/WG COMP RM	Y	N	K-1B WG COMP SEAL WATER MAKEUP FLOW ORIFICE

PB0	RO-01009A	Orifice Plate	684J972-1 (G6)	46/PAB/WG COMP RM	Y	N	K-1A WG COMP SEAL WATER FLOW ORIFICE
PB0	RO-01009B	Orifice Plate	684J972-1 (B6)	46/PAB/WG COMP RM	Y	N	K-1B WG COMP SEAL WATER FLOW ORIFICE
PB0	RO-01011A	Orifice Plate	684J972-1 (G6)	46/PAB/WG COMP RM	Y	N	K-1A WG COMP SEAL WATER MAKEUP FLOW ORIFICE
PB0	RO-01011B	Orifice Plate	684J972-1 (B6)	46/PAB/WG COMP RM	Y	N	K-1B WG COMP SEAL WATER MAKEUP FLOW ORIFICE
PB0	RO-01014A	Orifice Plate	684J972-1 (H6)	46/PAB/WG COMP RM	Y	N	K-1A WG COMP NITROGEN MAKEUP FLOW ORIFICE
PB0	RO-01014B	Orifice Plate	684J972-1 (C6)	46/PAB/WG COMP RM	Y	N	K-1B WG COMP NITROGEN MAKEUP FLOW ORIFICE
PB0	RO-06306	Coupling	M-209-3 (F8)	8/CB/AIR COMP RM	Y	N	T-33B/C IA RECEIVER CROSSTIE ORIFICE
PB1	Un-numbered	Capillary (1)	110E018-1 (C8)	8/PAB/PIPEWAY #2	Y	Y	1P-10A RHR Pump Recir Orifice
PB1	Un-numbered	Capillary (1)	110E018-1 (B8)	8/PAB/PIPEWAY #2	Y	Y	1P-10B RHR Pump Recir Orifice
PB2	Un-numbered	Capillary (1)	110E029-1 (C8)	8/PAB/PIPEWAY #3	Y	Y	2P-10A RHR Pump Recir Orifice
PB2	Un-numbered	Capillary (1)	110E029-1 (B8)	8/PAB/PIPEWAY #3	Y	Y	2P-10B RHR Pump Recir Orifice
PB1	Un-numbered	Staged Orif (1)	110E017-2 (F8)	8/PAB/SI PUMP AREA W	Y	Y	1P-15A HHSI Pump Recir Orifice
PB1	Un-numbered	Staged Orif (1)	110E017-2 (E8)	8/PAB/SI PUMP AREA W	Y	Y	1P-15B HHSI Pump Recir Orifice
PB2	Un-numbered	Staged Orif (1)	110E035-2 (E8)	8/PAB/SI PUMP AREA W	Y	Y	2P-15A HHSI Pump Recir Orifice
PB2	Un-numbered	Staged Orif (1)	110E035-2 (D8)	8/PAB/SI PUMP AREA W	Y	Y	2P-15B HHSI Pump Recir Orifice
PB1	MS-00279	Valve/Trim/Adj	M-201-3 (F5)	26/U1F	N	N	HX-18A1/2 SGBD HX OUT TO T-26 SGBD TANK IN THRTL
PB2	MS-00279	Valve/Trim/Adj	M-2201-3 (F6)	26/U1F	N	N	HX-18B1/2 SGBD HX OUTLET TO T-26 SGBD TANK THRTL
PB1	MS-00283	Valve/Trim/Adj	M-201-3 (F1)	28/U2F	N	N	HX-18A1/2 SGBD HX OUT TO T-26 SGBD TANK IN THRTL
PB2	MS-00283	Valve/Trim/Adj	M-2201-3 (F10)	26/U2F	N	N	HX-18B1/2 SGBD HX OUTLET TO T-26 SGBD TANK THRTL
PB0	RO-SA-001	Valve/Trim/Adj	PBM-227 (F7)	46/PAB	N	N	RADWASTE STEAM SUPPLY SOUND REDUCING ORIFICE
PB1	Z-275A	Tapered Cap (1)	110E017-3 (F5)	8/PAB	Y	Y	1P-14A CS Pump Eductor
PB1	Z-275B	Tapered Cap (1)	110E017-3 (C5)	8/PAB	Y	Y	1P-14B CS Pump Eductor
PB2	Z-275A	Tapered Cap (1)	110E035-3 (F5)	8/PAB	Y	Y	2P-14A CS Pump Eductor
PB2	Z-275B	Tapered Cap (1)	110E035-3 (C5)	8/PAB	Y	Y	2P-14B CS Pump Eductor
	Note (1)	Radiograph of	component avail	at SI Engineer's office			Note (2) Component in containment and could not be walked down.



RO-00900B and D style





180-4003
MINI RECING OFFICE
11 29 AVE FEEDWATER PULP
KIMBERLY CLARK

MS
11-11-2021

11-11-2021

11-11-2021

11-11-2021

11-11-2021

11-11-2021

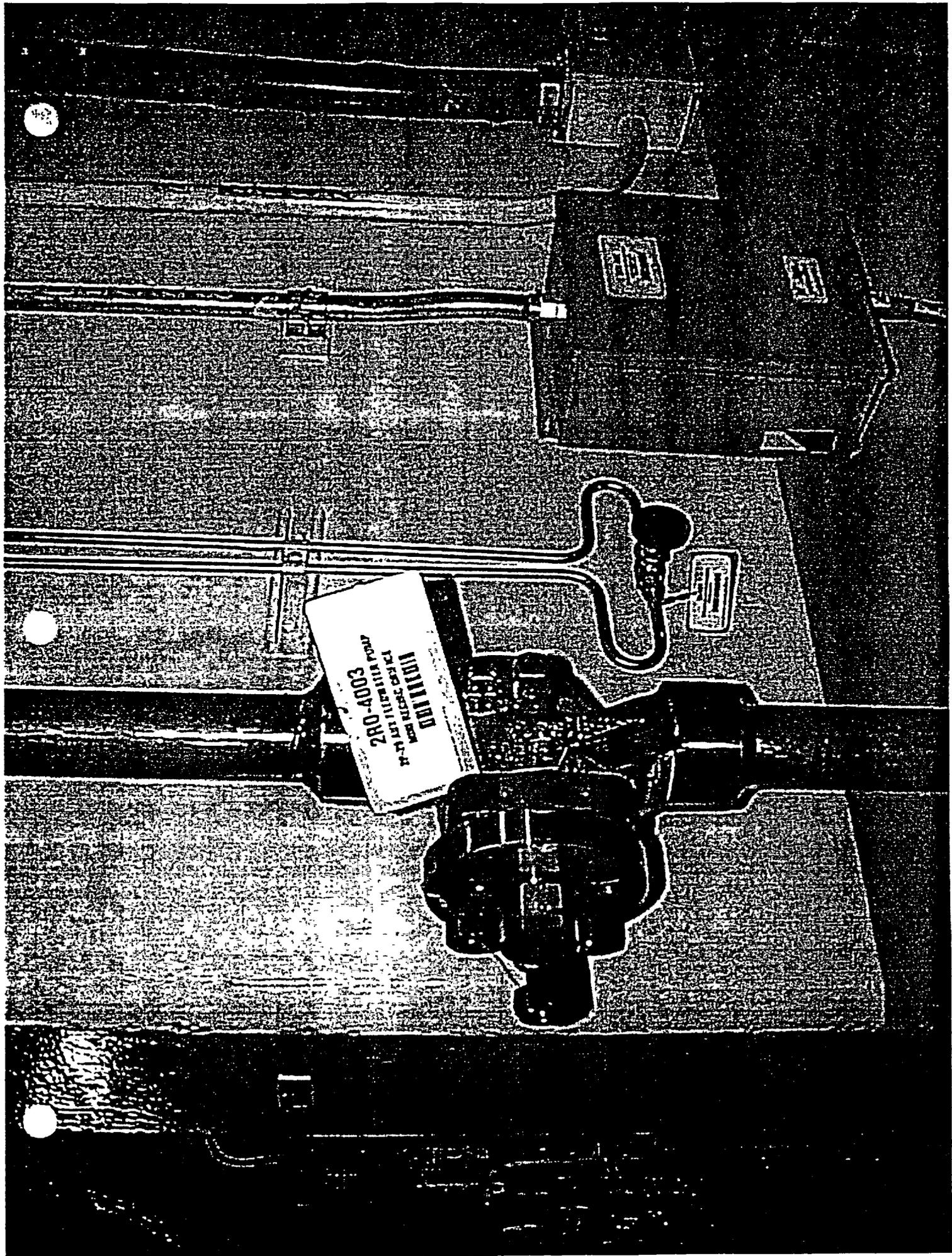
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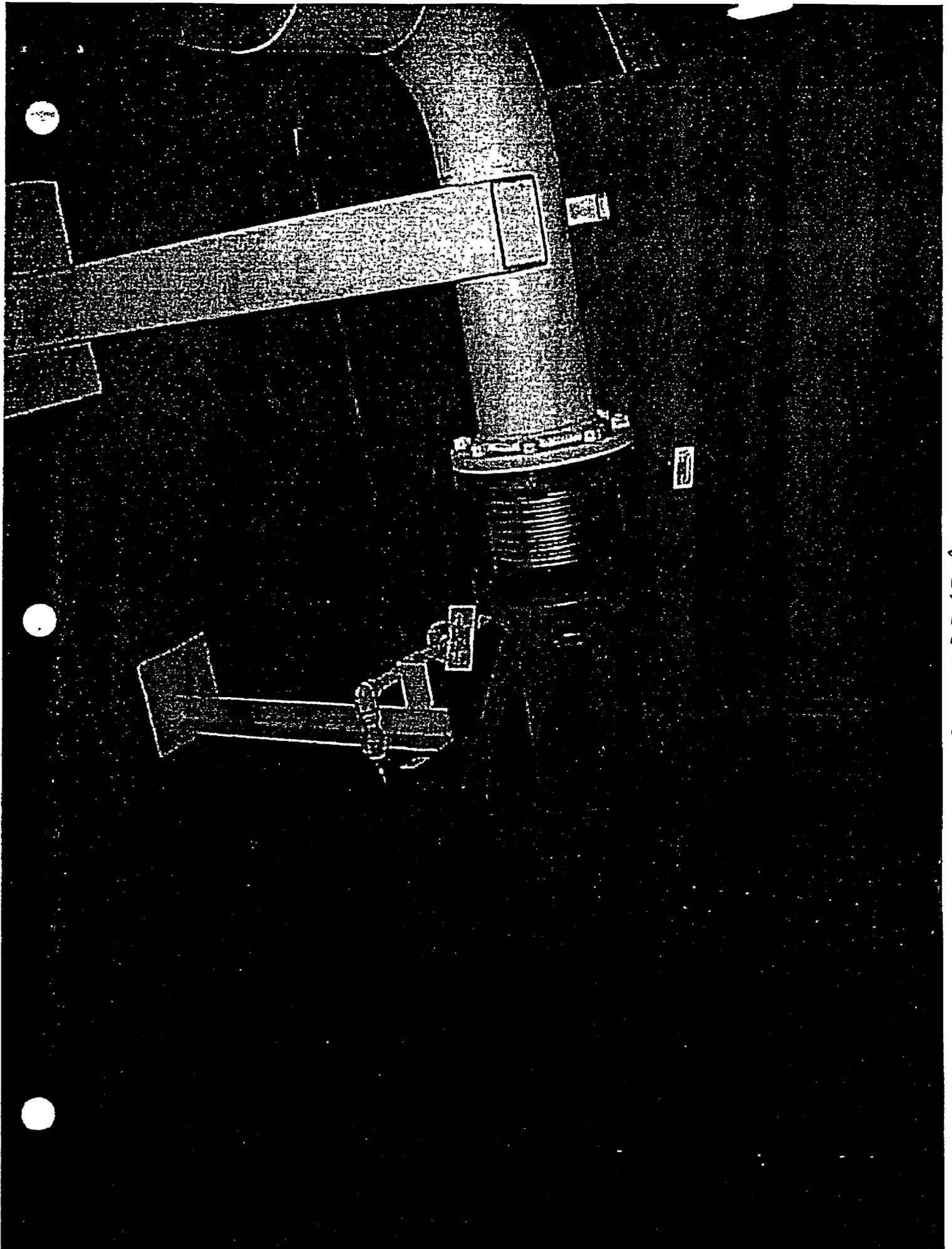
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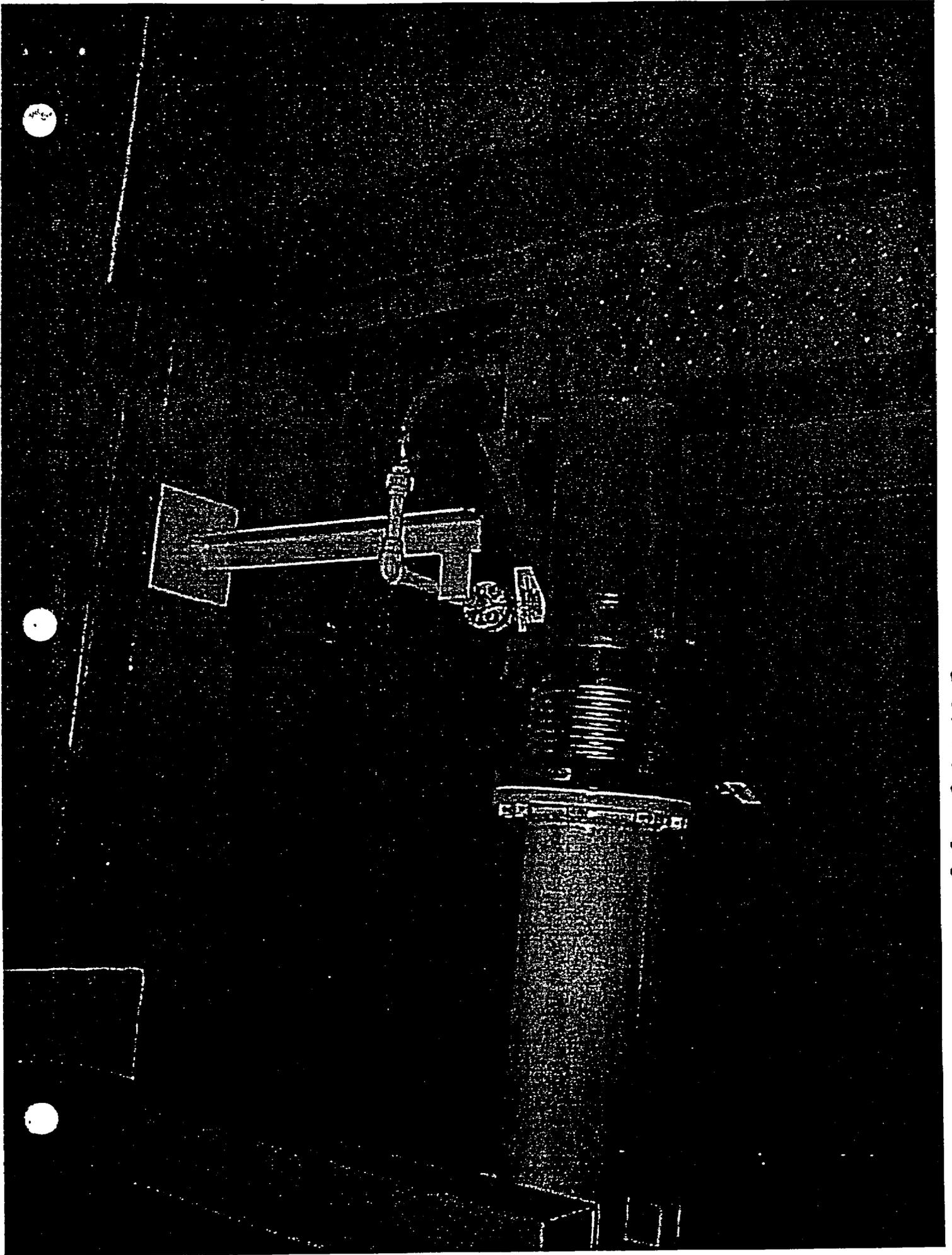
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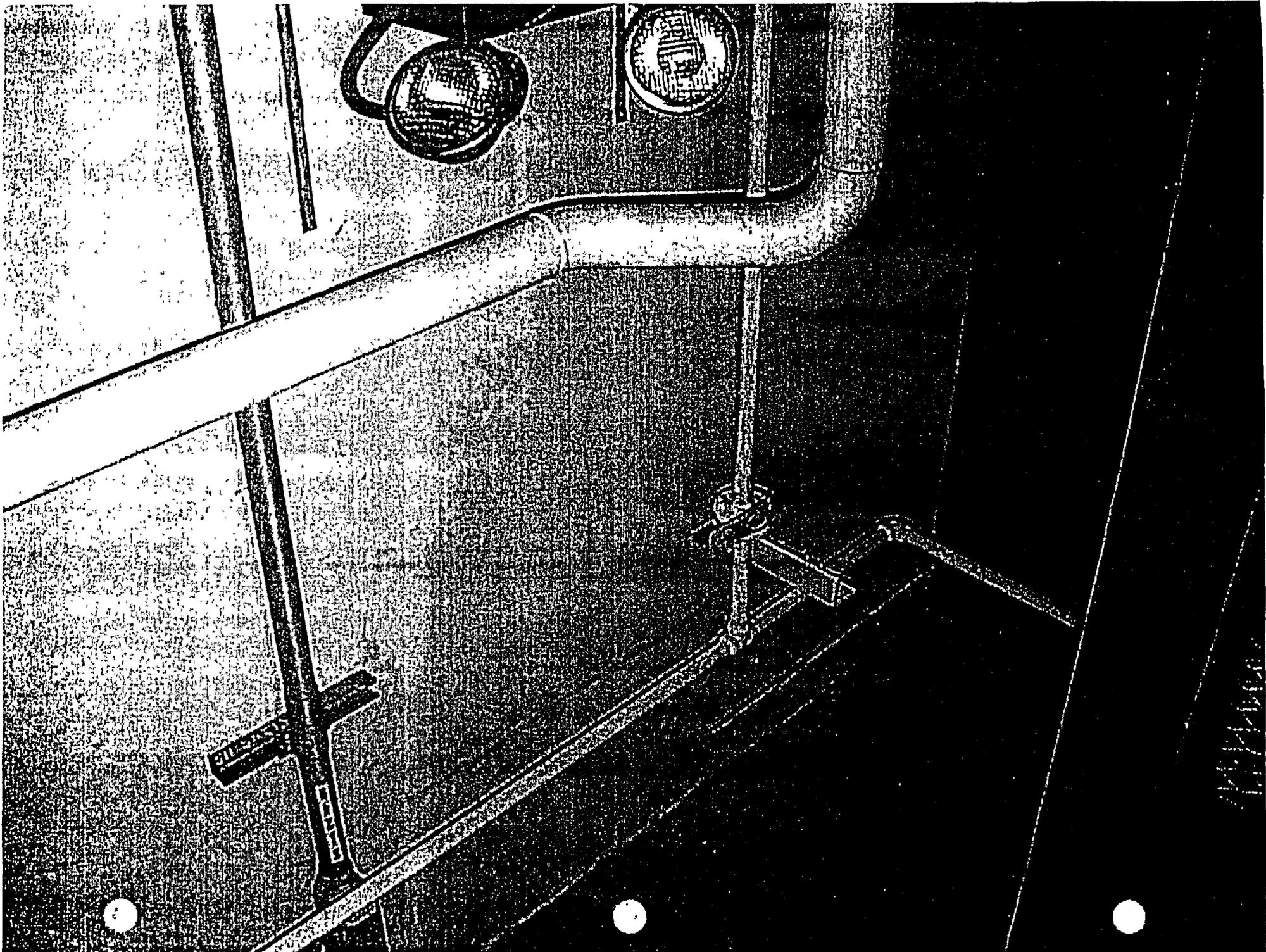


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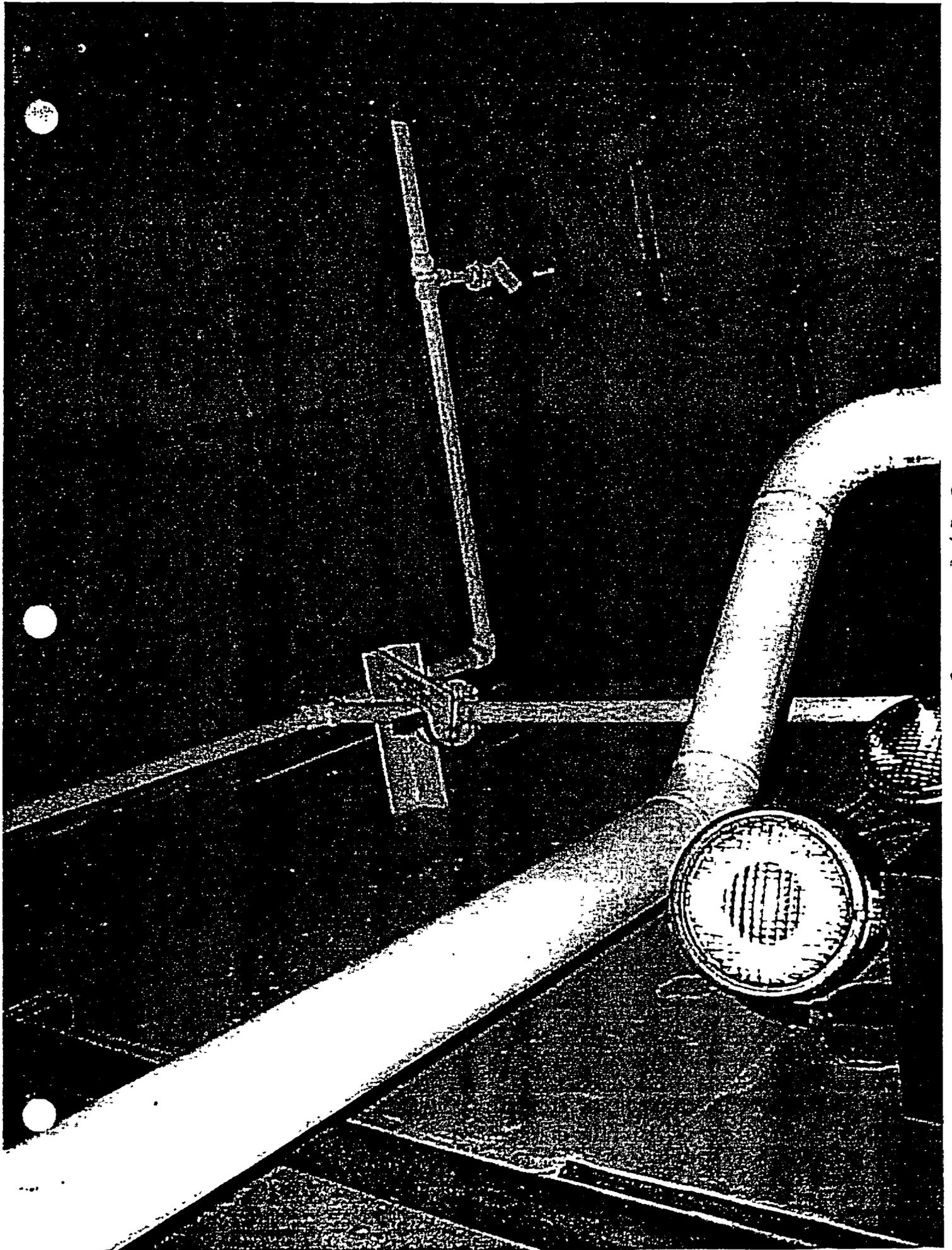


RA-M3322R

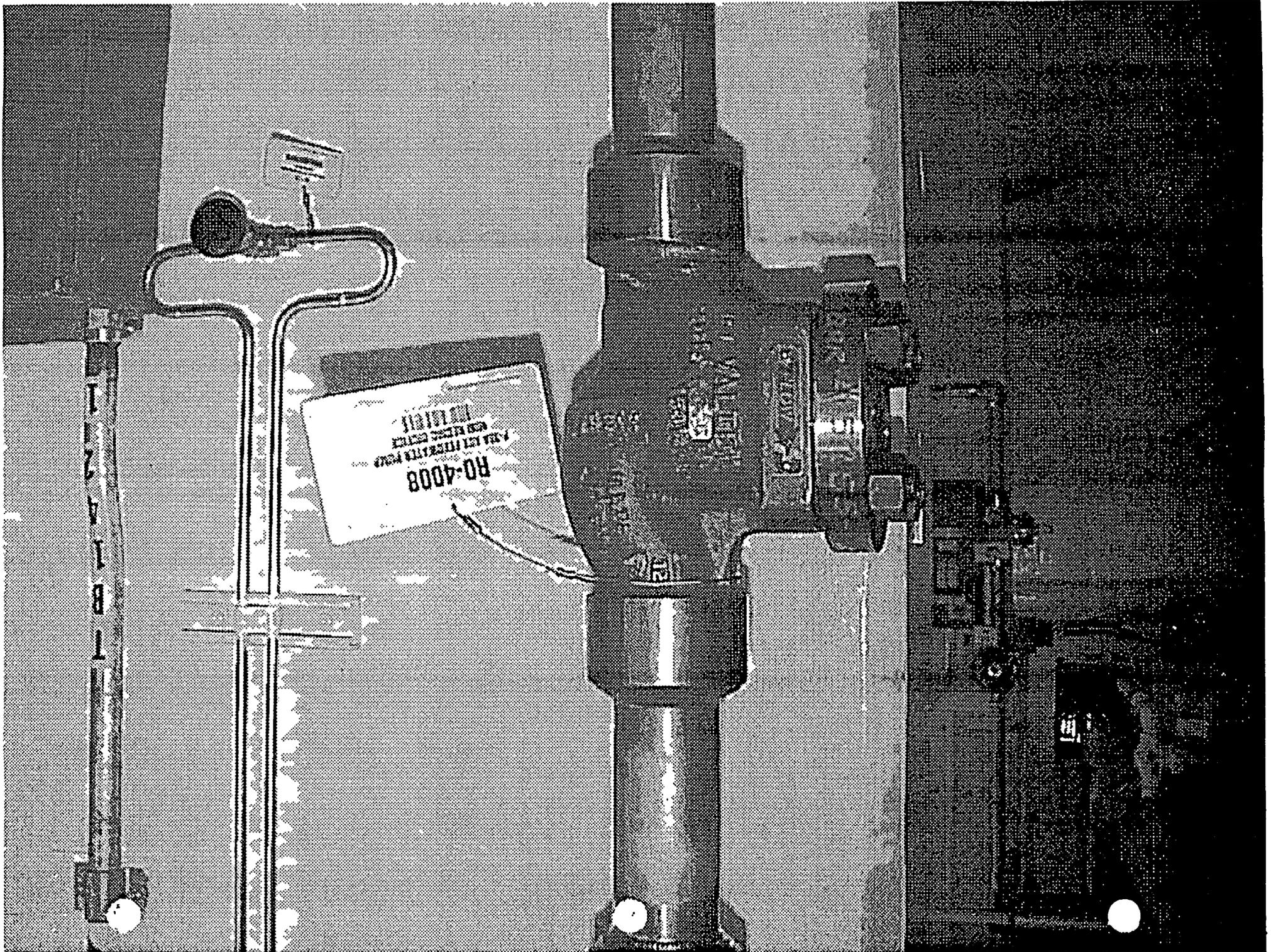
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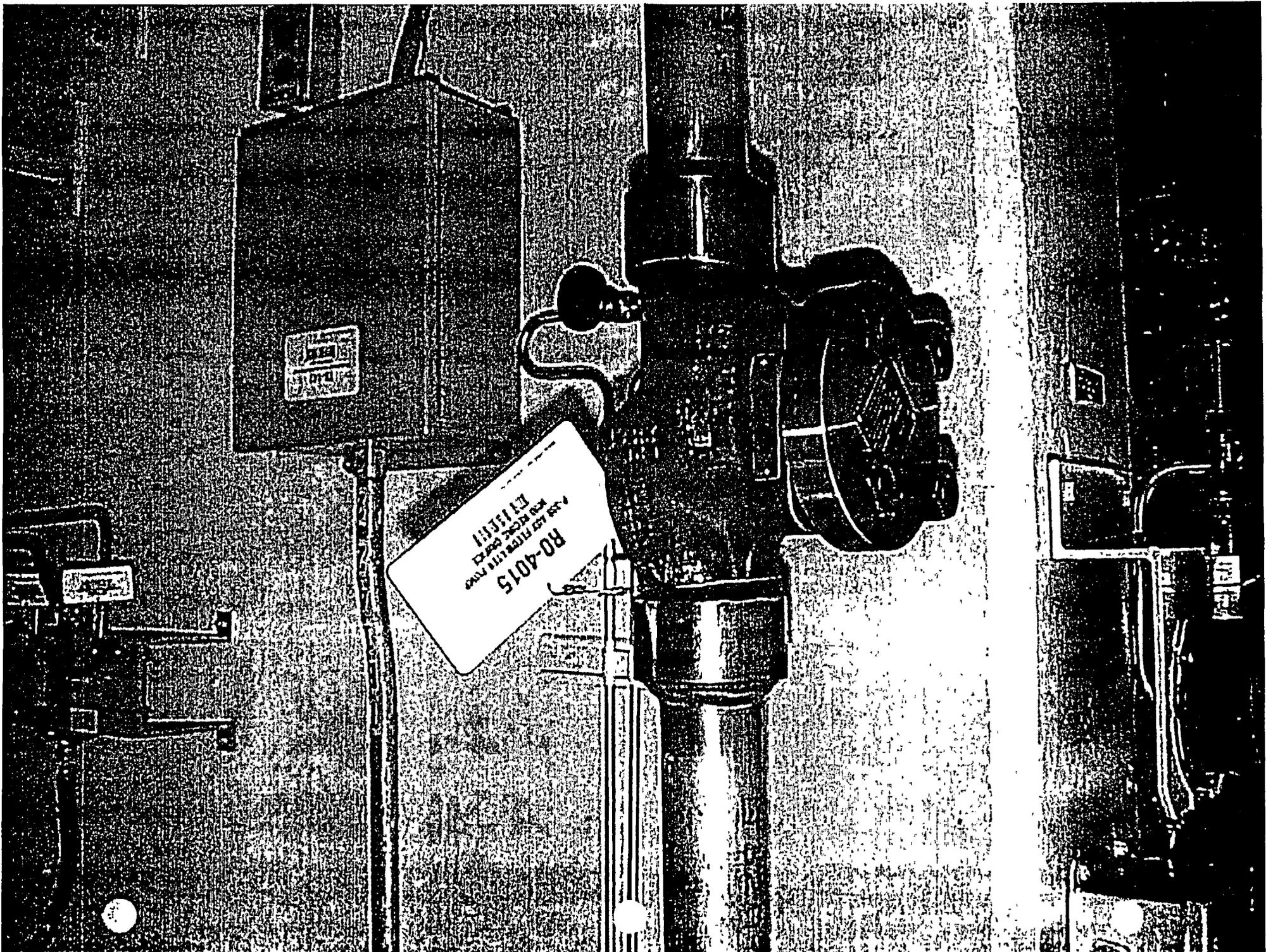
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RQ-4008
FALL TEST FILTERATION PUMP
AND REVERSE ENGINE
UNIT 1510111

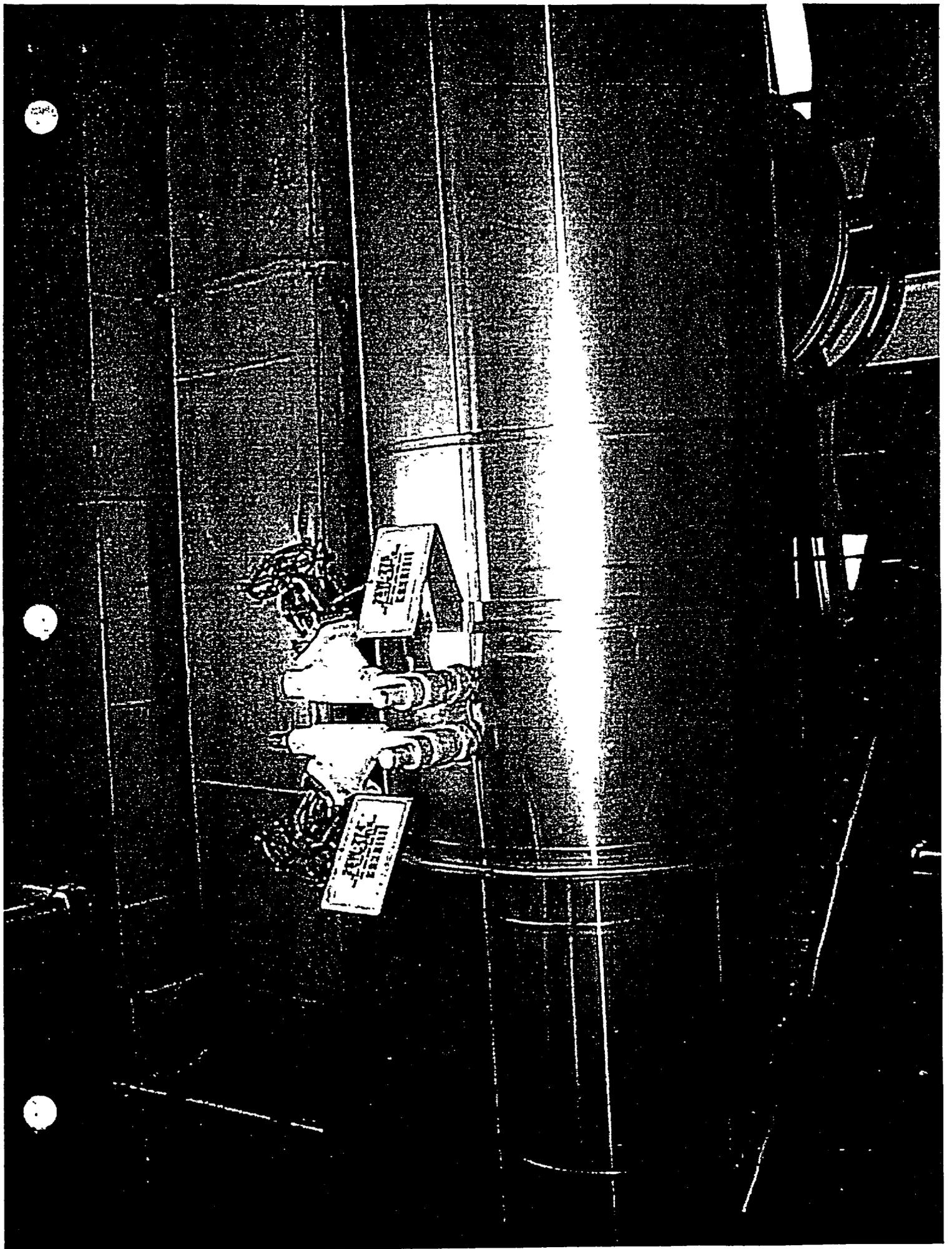


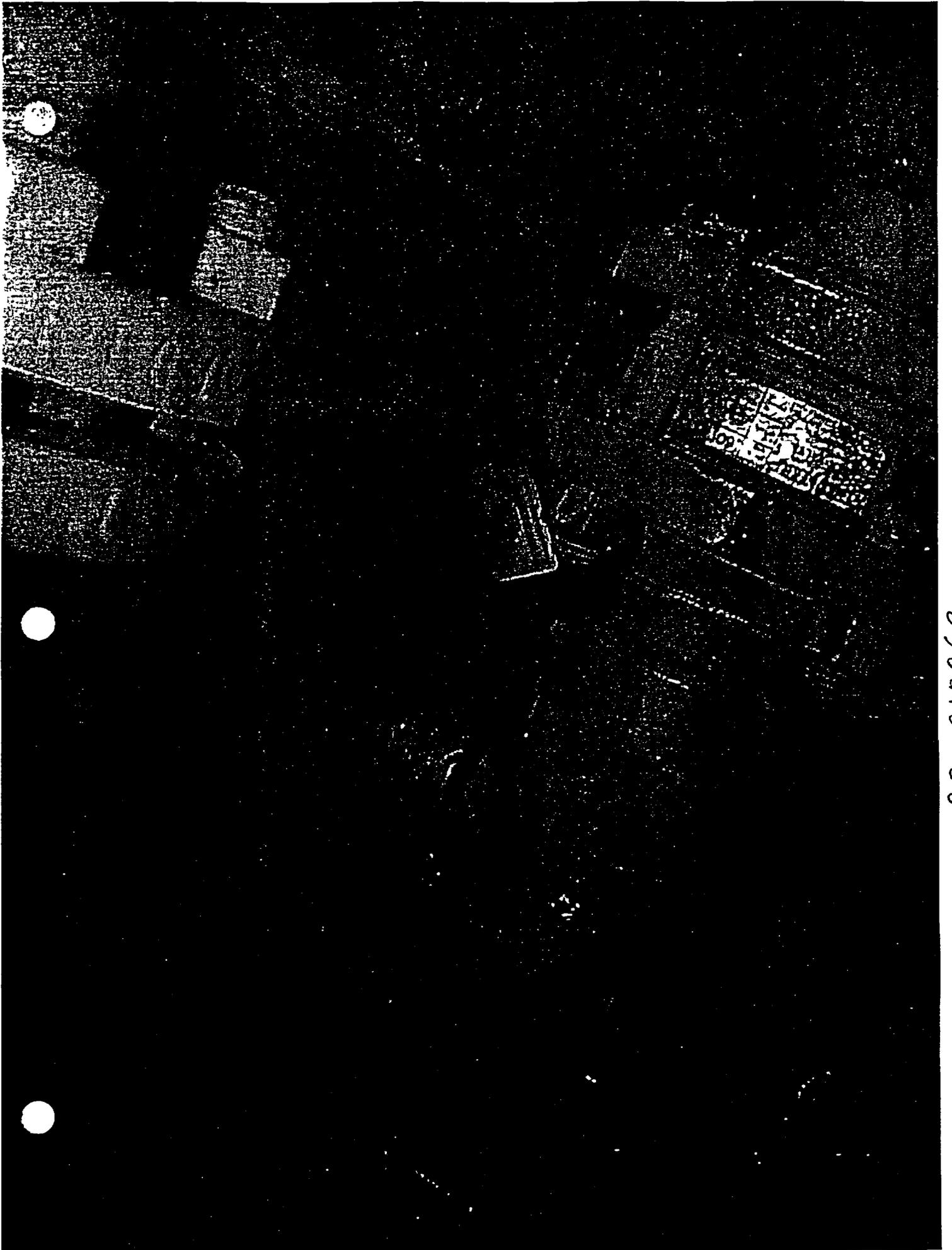
R0-4015
ASSY FOR FILTER UNIT ROOM

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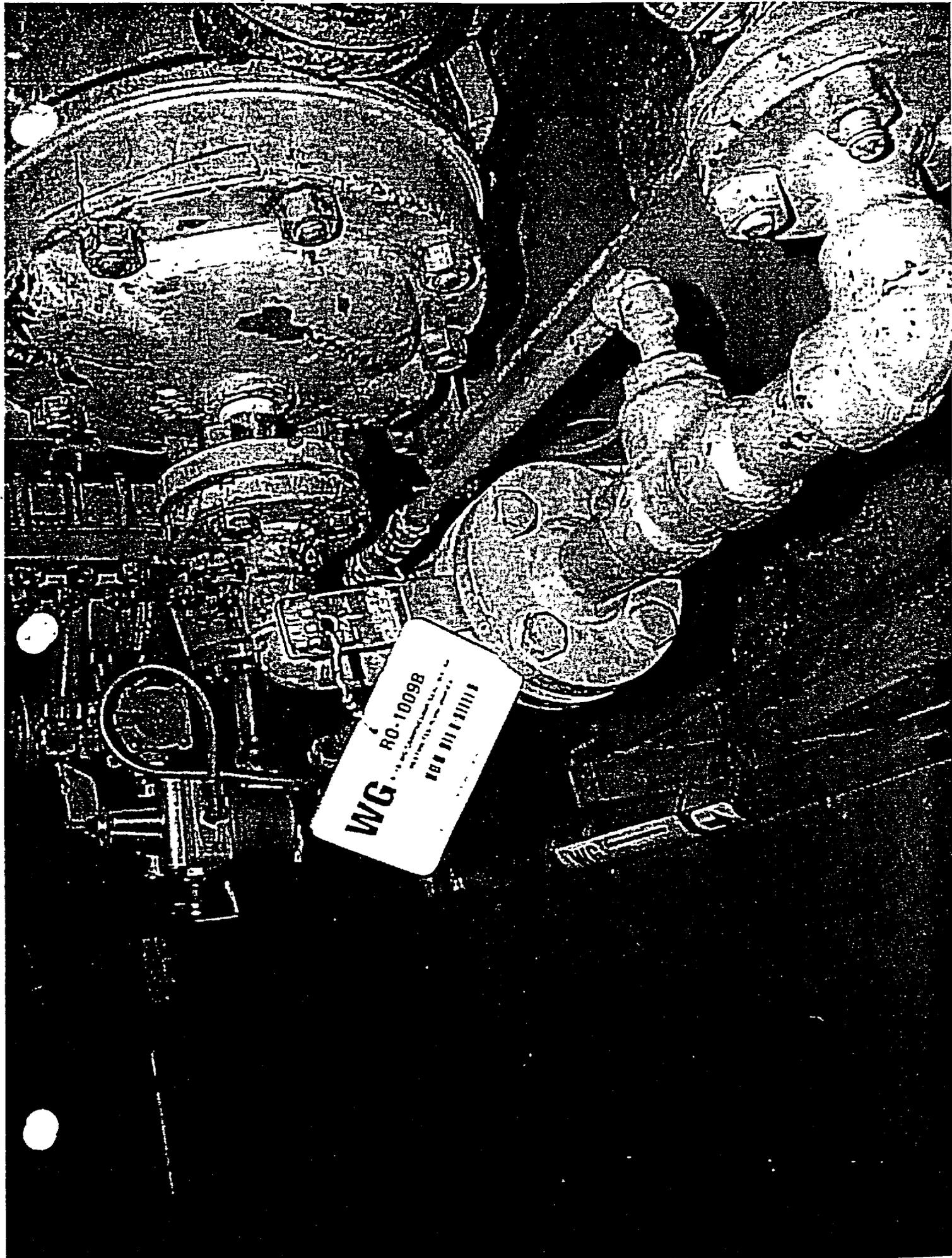
100-1000

100-1000





DN . 011116R



WVG RO-1009B
NEW BILKINIA

WG-1612A
K-18 WASTE GAS COMPRESSOR
EXHAUST CHECK VALVE



INLET
3 1/2" DIA
3 1/2" DIA

WG RO-1011B
K-18 WASTE GAS COMPRESSOR
RESTRICTOR PLATE COVER



INLET
3 1/2" DIA
3 1/2" DIA

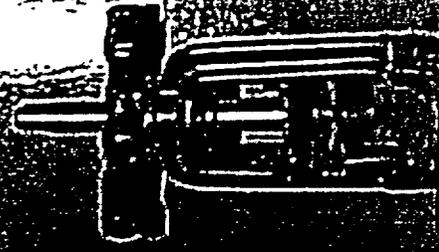
WG-1035
FEDERAL BUREAU OF INVESTIGATION
U.S. DEPARTMENT OF JUSTICE

2-888

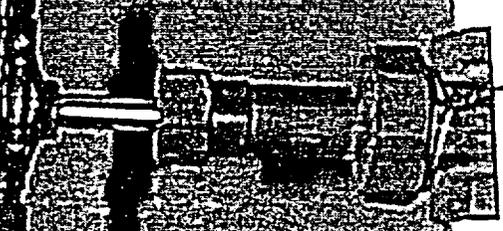
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FEDERAL BUREAU OF INVESTIGATION

2579
FEB 13 1968
FBI

T-330
INSTRUMENT AND
ACCESSORY
0110111



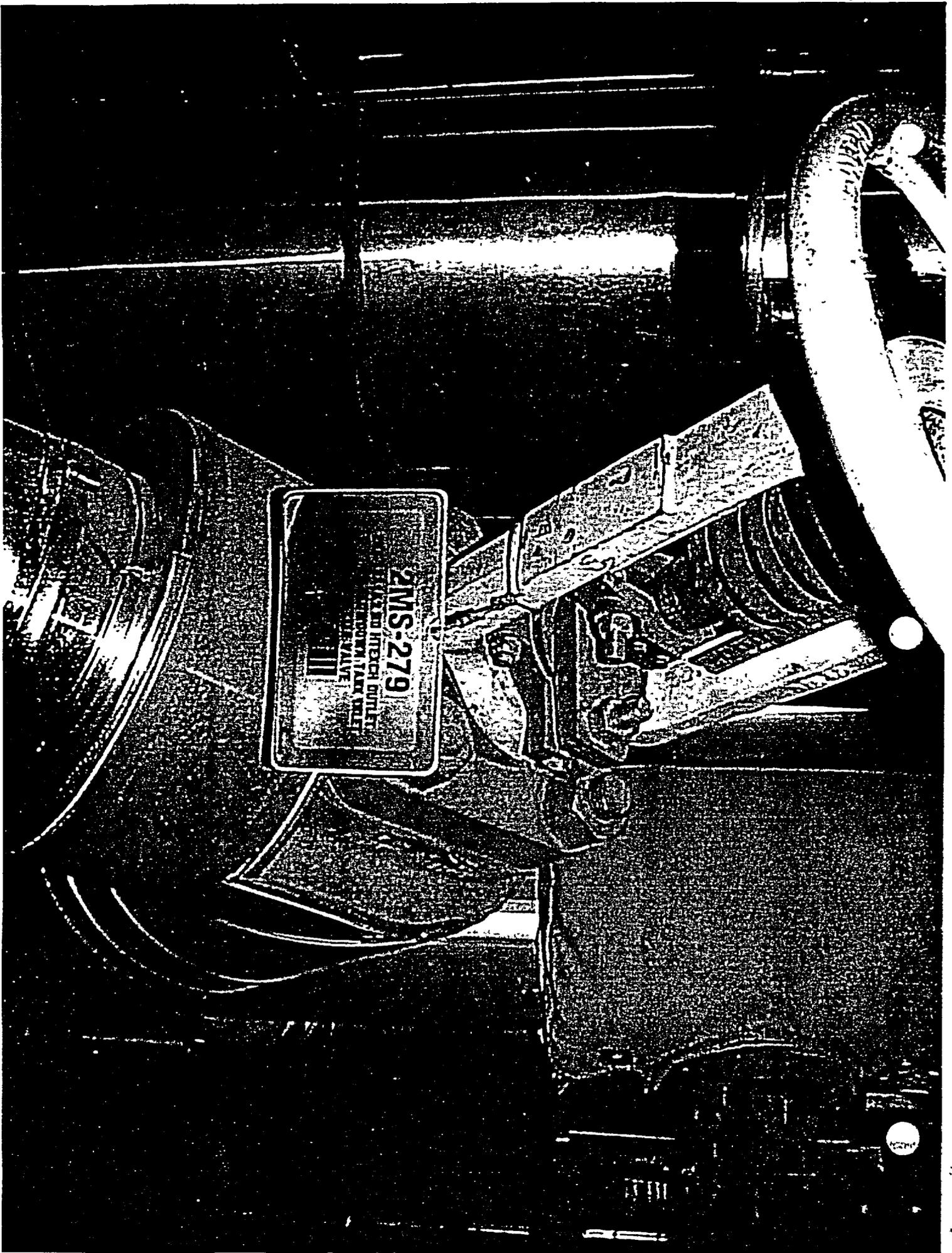
IA-5
(PARTS TO INSTRUMENT CASE)
0110111

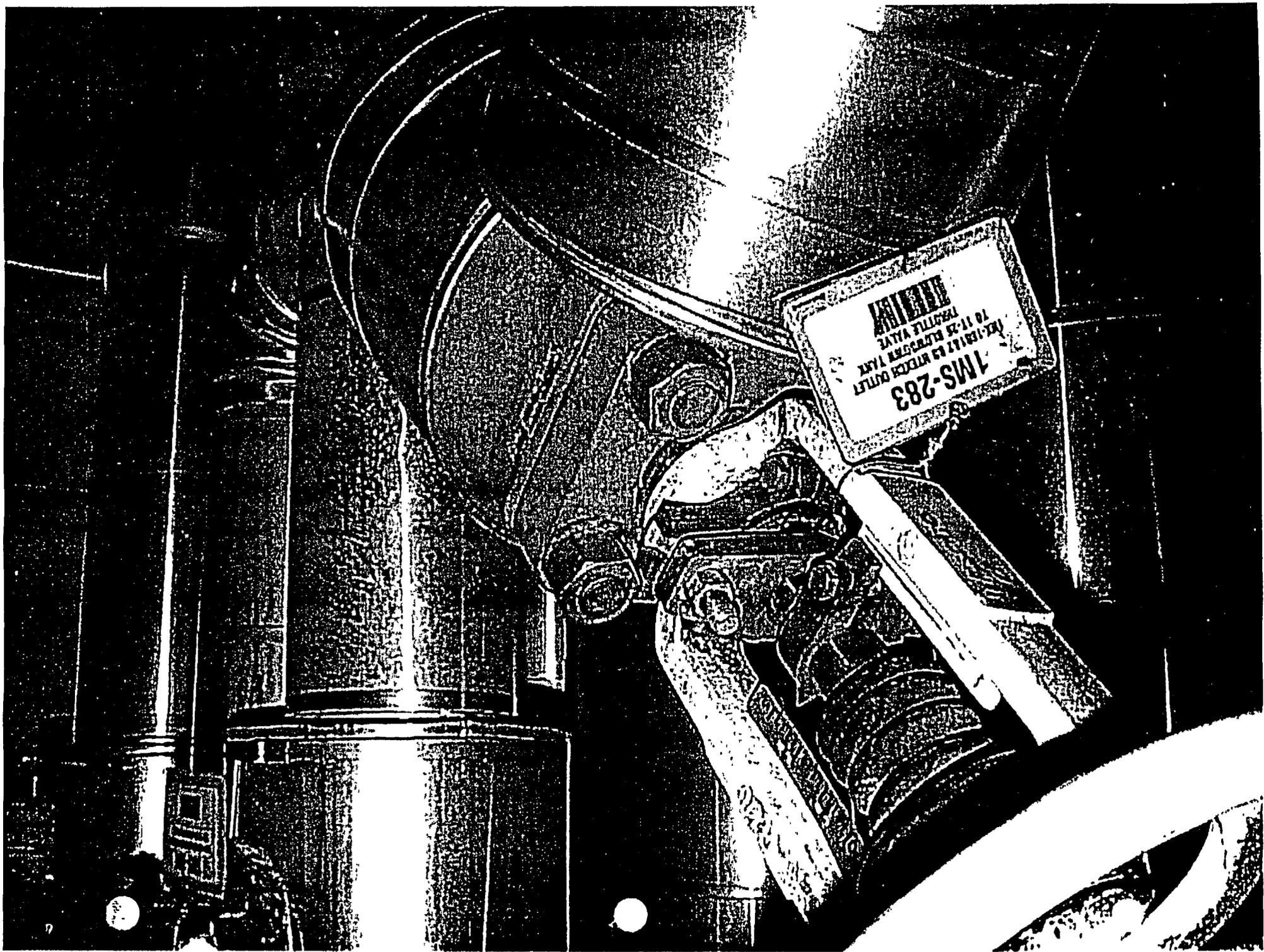


IA-31
(PARTS TO INSTRUMENT CASE)
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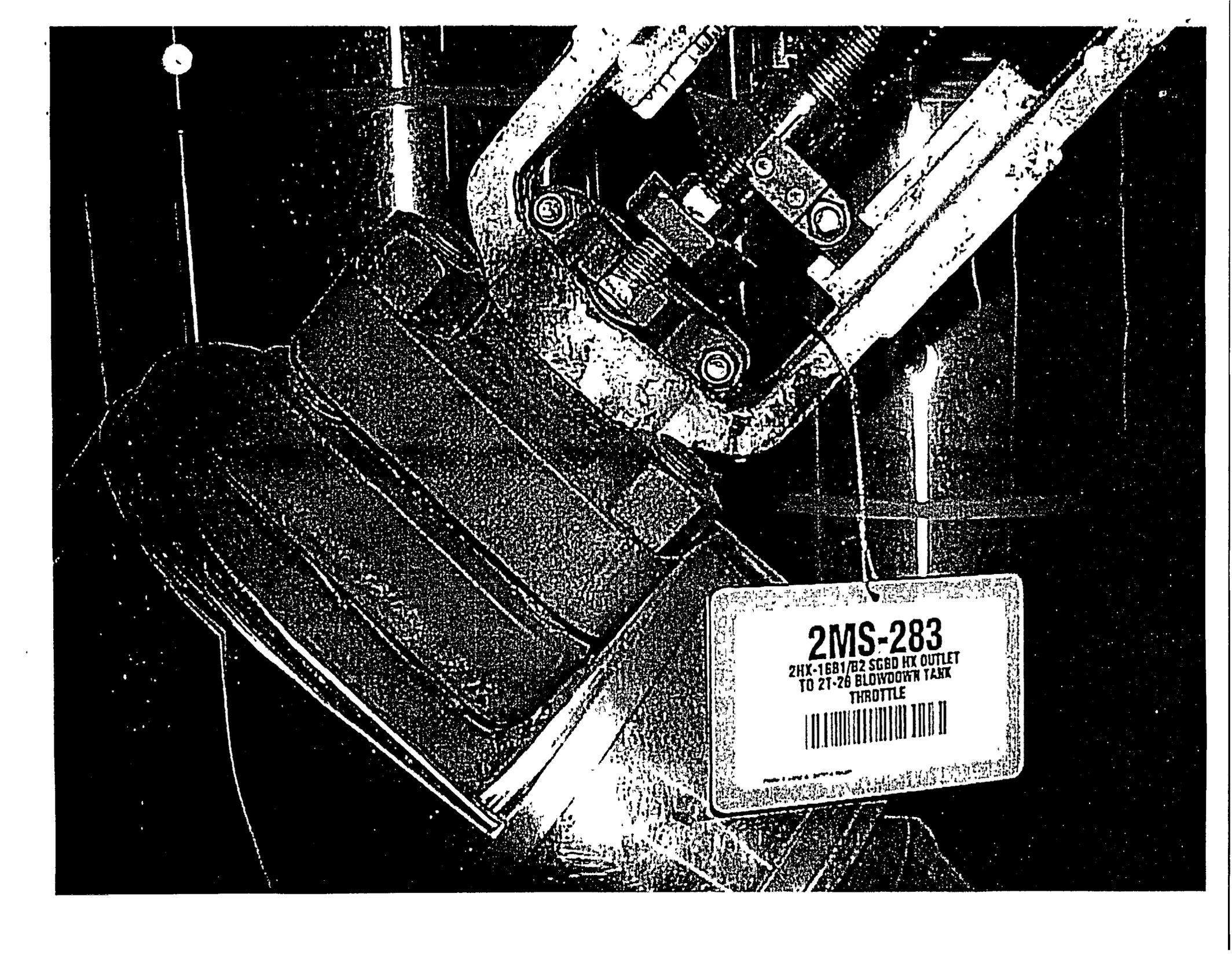
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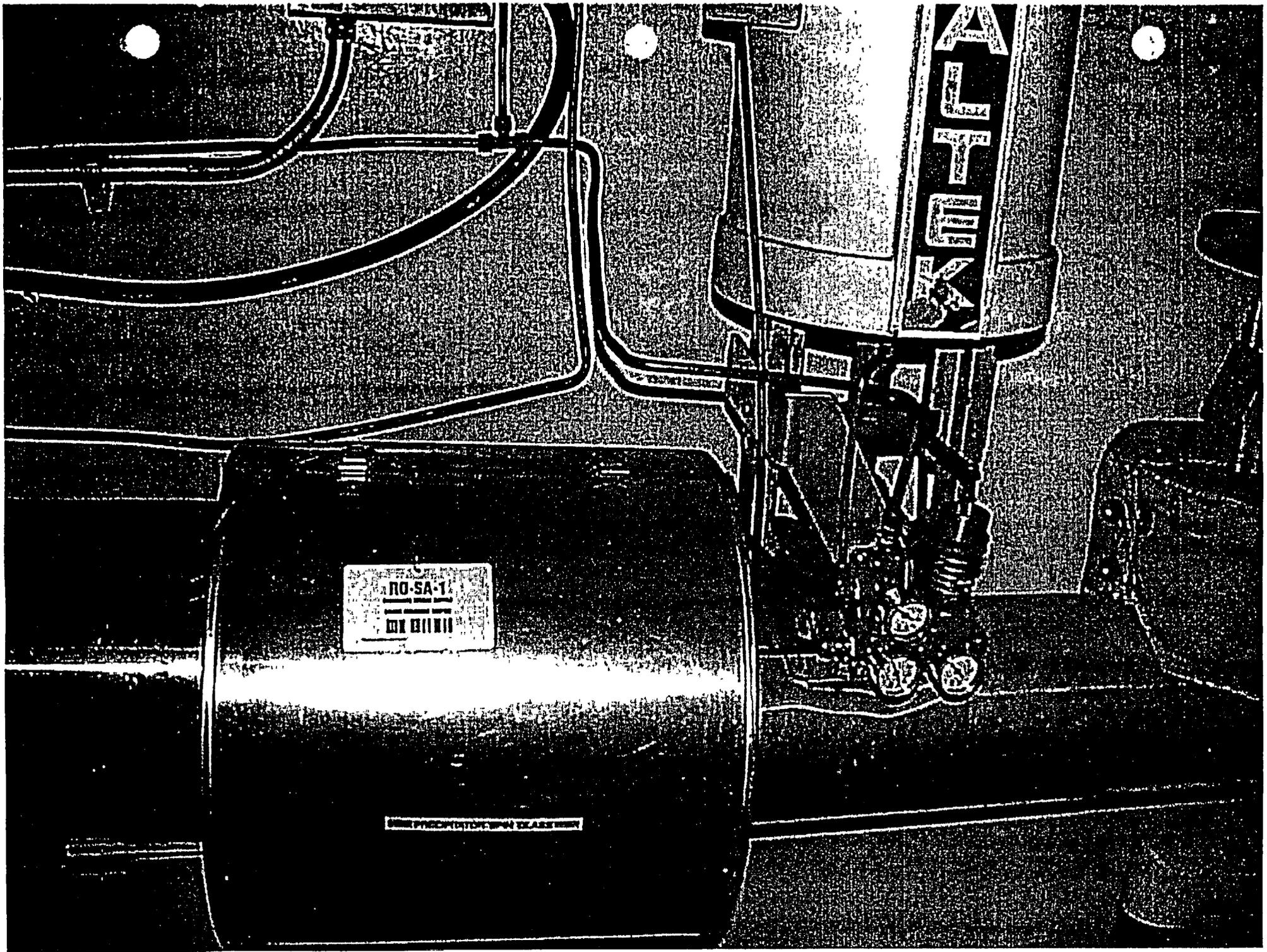
1MS-283
FEDERAL BUREAU OF INVESTIGATION
U.S. DEPARTMENT OF JUSTICE

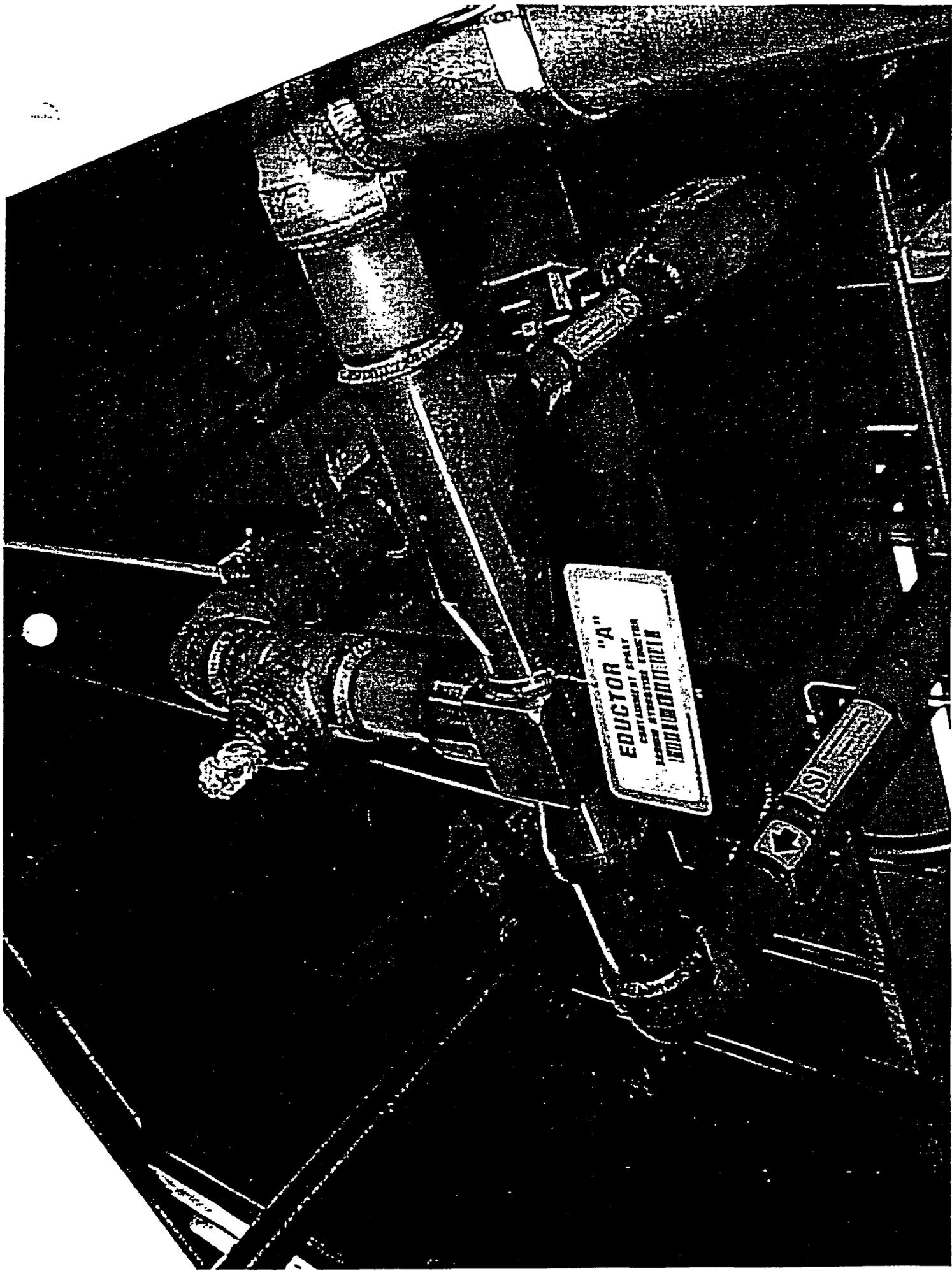


2MS-283

2HX-1681/B2 SGAD HX OUTLET
TO 2T-26 BLOWDOWN TANK
THROTTLE







EDUCTOR "A"
CANTONMENT, SPRING
FIELD, MISSISSIPPI
1944