POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT NO. 3 NUCLEAR POWER PLANT

SOP-FW-4 REV. 3

AUXILIARY FEEDWATER SYSTEM OPERATION

Written by: C. Emery

Reviewed by: [illegible]

PORC Review _____ Date _____

Approved by: J J Zulla Date 4/1/80

Effective Date 4/1/80

Auxiliary Feedwater System Operation

1.0 Intent

To provide a procedure for startup, operation and shutdown of the Auxiliary Feedwater System.

2.0 Precautions and Limitations

2.1 The local control switches for the auxiliary feedwater pumps are to be maintained in the "Remote" position.

2.2 The manual isolation valves on the recirculation line (BFD-51, BFD-53 and BFD-55) from each auxiliary feedwater pump shall be locked open prior to pump operation.

2.3 The following are Technical Specifications requirements for the auxiliary feedwater system whenever the Reactor Coolant System is heated above 350 F.

2.3.A Three of the three auxiliary feedwater pumps must be operable.

2.3.B The condensate storage tank contains a minimum of 360,000 gallons of water (19' indicated).

2.3.C City Water System piping and valves directly associated with providing backup supply to the auxiliary feedwater pumps shall be operable.

2.4 Each motor driven pump is provided with a pressure sustaining control system to prevent the pump from "running out" on its curve. As the discharge pressure of the pump decreases below the set point of 1200 psig, PT-406A for No. 31 pump and PT-406B for No. 33 pump will generate a signal that will override the signal from the flow controllers on the Condensate and Feedwater Supervisory Panel. The signal will operate to close the valves until the pressure is restored in the discharge line having low pressure.

2.5 Observe motor starting requirements in SOP-EL-5 when starting motor driven auxiliary feedwater pumps.

3.0 Initial Conditions

3.1 The system is lined up as per COL-FW-2.

4.1 Filling and Venting

4.1.A Assure that the auxiliary feedwater regulating valves are at least 20% open.

4.1.B Open vent valve CT-83A on the condensate suction header. When water issues from vent, close the valve.

4.1.C Open the vent valve on the suction of each pump (CT-83B, CT-83C and CT-83D). When water issues from vent, close the valve.

4.1.D Open pump casing vents (BFD-33A, BFD-33B and BFD-33C). When water issues from vent, close the valve.

4.1.E Open the vent valve on the discharge of each pump (BFD-32A, BFD-32B and BFD-32C). When water issues from the valves, close the valves.

4.1.F Open the vent valves on the inlet to the motor driven pump's flow control valves (BFD-44A, BFD-44B, BFD-44C and BFD-44D). When water issues from the valves, close the valves.

4.1.G Open the vent valves on the outlet of the turbine driven pump's flow control valves (BFD-49A, BFD-49B, BFD-49C and BFD-49D). When water issues from the valves, close the valves.

4.1.H Vent the lines to the following instrumentation:

FC-1135S	Aux. Feed Pump 31 Suction Flow
FC-1136S	Aux. Feed Pump 33 Suction Flow
FT-1200	Steam Generator 31 Aux. Feed F
FT-1201	Steam Generator 32 Aux. Feed F
FT-1202	Steam Generator 33 Aux. Feed F
FT-1203	Steam Generator 34 Aux. Feed F

4.1.I Close the auxiliary feedwater regulating valves.

4.2 Pump Startup

4.2.A Motor Driven Pumps Startup

4.2.A.1 Open the recirculation control valve for the pump(s) to be started.

4.2.A.2 Start the pump(s) and regulate the auxiliary feedwater control valves to achieve desired flow rate to the steam generators.

CAUTION
If the feed ring is uncovered (steam generator level below 15% for more than 5 minutes with no feed flow), then feed flow, when resumed should be limited to 150 gpm until the feed ring is full (steam generator level above 15%). This requirement does not apply in cold shutdown.

Uncovering of the feed ring for more than five minutes will be indicated by illumination of the warning light adjacent to the associated auxiliary controller. This light illuminates with steam generator level below 15% for more than 5 minutes and the associated motor driven Aux Feedwater Pump not running.

NOTE: When levels are re-established above 15%, reset the warning lights associated with the auxilliary feedwater controllers.

4.2.A.3 When flow from the pump reaches approximately 75 gpm, place the recirculation valve control switches in the "Auto" position.

4.2.B Turbine Driven Pump Startup

4.2.B.1 Ensure that steam supply valves MS-41, MS-42 and MS-54 are open and emergency shutoff valves PCV-1310A and PCV-1310D are open.

4.2.B.2 Open bypass valve MS-35 around main steam trap 64 (inlet to PCV-1139) and drain any condensate from the steam line. Once the steam line is free of condensate close valve MS-35.

4.2.B.3 Ensure that steam traps MST-64, MST-65, MST-67, MST-68 and MST-69 are lined up for operation.

4.2.B.4 Place the turbine driven auxiliary boiler feedwater pump hand speed changer at zero speed.

4.2.B.5 Open PCV-1139 by putting the auxiliary boiler feed pump control switch in the "Start" position.

4.2.B.6 Slowly increase turbine speed to maintain pump discharge pressure approximately 200 psi above steam generator pressure.

CAUTION

The turbine overspeed trip is set at 4500 rpm.

4.2.B.7 Regulate the auxiliary feedwater control valves, from steam driven pump, to achieve desired flow rate to the steam generators.

CAUTION: If the feed ring is uncovered (steam generator level below 15% for more than 5 minutes with no fed flow), then feed flow , when resumed should be limited to 150 gpm until the feed ring is full (steam generator level above 15%). This requirement does not apply in cold shutdown.

Uncovering of the feed ring for more than five minutes will be indicated by illumination of the warning light adjacent to the associated auxiliary controller. This light illuminates with steam generator level below 15% for more than 5 minutes and the associated motor driven Aux Feedwater Pump not running.

NOTE: When levels are re-established above 15%, reset the warning lights associated with the auxilliary feedwater controllers.

4.3 Normal Operation

4.3.A The system must be operable to start and deliver feedwater to the steam generators whenever the Reactor Coolant System is above 350°F in accordance with Technical Specifications.

4.3.B The auxiliary feedwater regulating valves from the motor driven pumps should be maintained at 35% open. The auxiliary feedwater regulating valves from the turbine driven pump should be left closed.

4.3.C If the Unit is shutdown during the winter months, the auxiliary feedwater pumps may be used to heat the condensate storage tank as follows:

4.3.C.1 Start the motor driven auxiliary feedwater pumps with their recirculation valves in "Auto" and their associated feedwater regulating valves closed.

4.3.C.2 Open the special high pressure drop valves BFD-77 (for ABFP 31) and BFD-78 (for ABFP 33) to provide a flow of 125 gpm from each pump as indicated by FC-1135S and FC-1136S on the suction side of pump 31 and 32 respectively.

NOTE: The flow rate to the condensate storage tank is extremely important in order to provide the maximum BTU input to the tank with minimum hazard to the pumps.

4.4 System Shutdown

4.4.A Shutdown the motor driven pumps and leave their control switches in the "Pull-Out" position.

4.4.B Shutdown the turbine driven pump as follows:

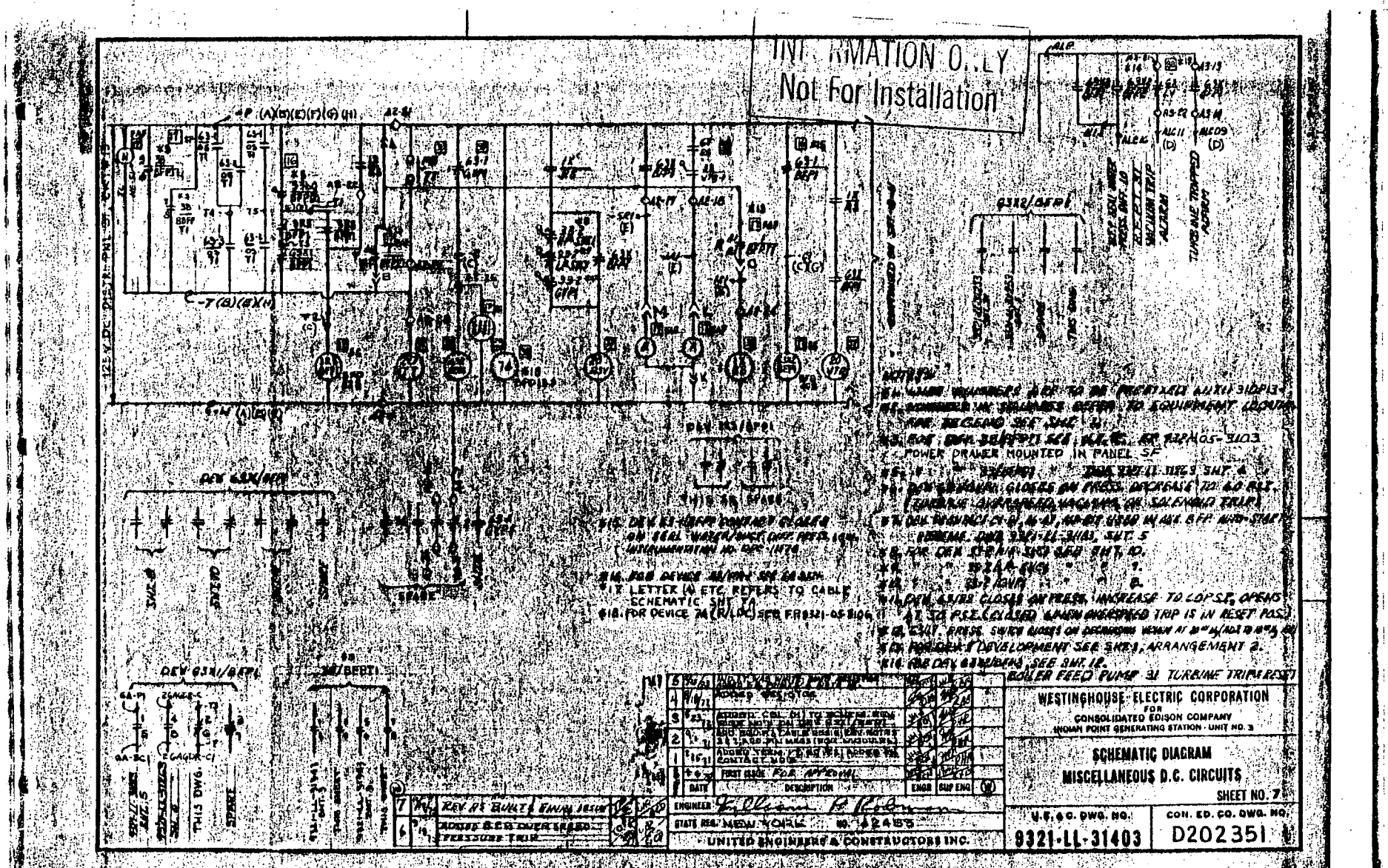
4.4.B.1 Run the turbine back to zero speed using the hand speed controller on SCF panel.

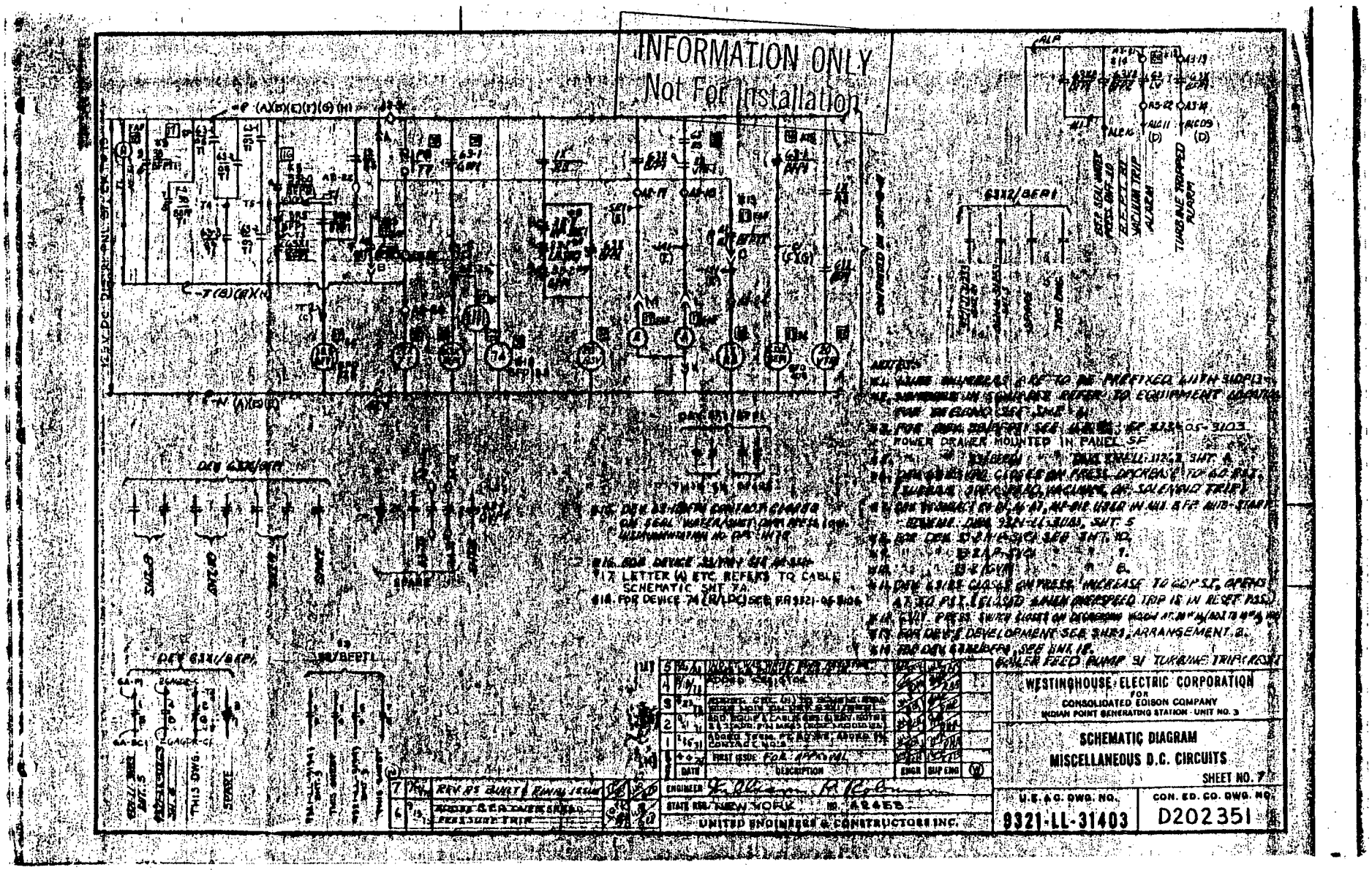
4.4.B.2 Operate the trip switch on the SCF panel. This closes PCV-1139, the inlet steam pressure regulating valve.

4.4.B.3 Close all eight auxiliary feedwater regulating valves.

4.4.B.4 If the pump is to be removed from service close steam supply valves MS-41, MS-42 and MS-54.

NOTE: This will make the pump inoperable.


INFORMATION ONLY
Not For Installation
WESTINGHOUSE ELECTRIC CORPORATION
FOR
CONSOLIDATED EDISON COMPANY
INDIAN POINT GENERATING STATION - UNIT NO. 3
SCHEMATIC DIAGRAM
MISCELLANEOUS D.C. CIRCUITS
SHEET NO. 7
U.E. & C. DWG. NO.
9321-LL-31403
CON. ED. CO. DWG. NO.
D202351
UNITED ENGINEERS & CONSTRUCTORS INC.
BOILER FEED PUMP 31 TURBINE TRIPPED
TURBINE TRIPPED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FOR
CONSOLIDATED EDISON COMPANY
INDIAN POINT GENERATING STATION - UNIT NO. 3
SCHEMATIC DIAGRAM
MISCELLANEOUS D.C. CIRCUITS
SHEET NO. 7
U.S.&G. DWG. NO.
9321-LL-31403
CON. ED. CO. DWG. NO.
D202351
UNITED ENGINEERS & CONSTRUCTORS INC.

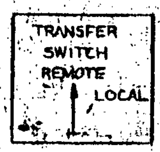
DEV. 43/EXF MAINTAINED POSITION

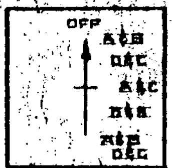
CONTACT	POSITION OFF	A & B	D & C	A & C	D & B	A & B D & C	REF. DWG.
A11-B11						X	*4
A12-B12	X						
A1-B1		X					SH.10
A2-B2			X				*5
A3-B3				X			SH.10
A4-B4					X		*5
A5-B5						X	SH.10
A6-B6	X						
A7-B7		X					*4
A8-B8			X				SH.13
A9-B9				X			*5
A10-B10					X		SH.15
C11-D11						X	SH.13
C12-D12	X						
C1-D1		X					SH.10
C2-D2			X				SH.13
C3-D3				X			SH.10
C4-D4					X		SH.13
C5-D5						X	*5
C6-D6	X						
C7-D7		X					
C8-D8			X				
C9-D9				X			
C10-D10					X		
E11-F11						X	SH.10
E12-F12	X						
E1-F1		X					
E5-F5						X	SH.13
E6-F6	X						
E7-F7		X					

A - EXHAUST FAN 31
B - P.A. BLD'G. SUPPLY FAN
C - C.P. PURGE FAN
D - EXHAUST FAN 32

DEV. 43 TYP. FOR AF1 SH. 11 AND AF3 SH.16

CONTACT	POSITION R	L
A11-B11		X
A12-B12	X	
A1-B1		X
A2-B2	X	
A3-B3		X
A4-B4	X	
A5-B5		X
A6-B6	X	
A7-B7		X
A8-B8	X	
A9-B9		X
A10-B10	X	
C11-D11		X
C12-D12	X	
C1-D1		X
C5-D5		X
C6-D6	X	
C7-D7		X





DEV. 1-1/ABFP2

CONTACT BLOCK	CIRCUIT POSITION L	R
1st BLOCK (FRONT) TYPE OT2M	NO	NO
2ND BLOCK TYPE OT2N	NC	NC

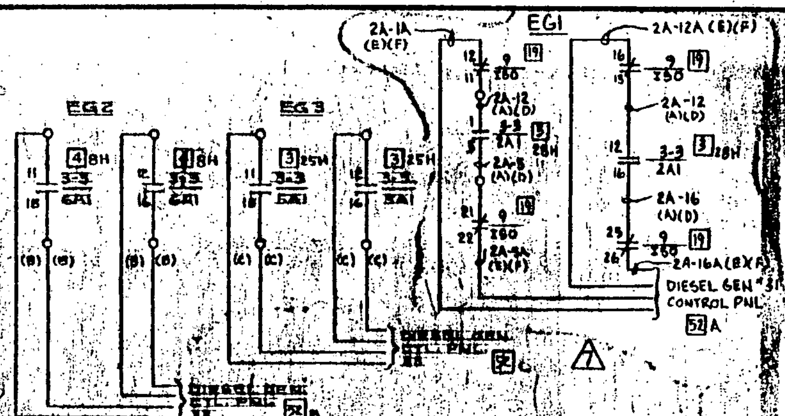
SH. 3

OPERATOR OT286M
3 POSITION
MAINTAINED
(AUTO / TRIP / ON)

DEV. 1-2/ABFP2

CONTACT BLOCK	CIRCUIT POSITION L	R
1st BLOCK (FRONT) TYPE OT2M	NO	NO
2ND BLOCK TYPE OT2N	NC	NC
3RD BLOCK TYPE OT2M	NO	NO

OPERATOR OT286M
3 POSITION
MAINTAINED
(AUTO / TRIP / ON)



NOTES:

*1. NUMBERS IN SQUARES REFER TO EQUIPMENT LOCATIONS. FOR LEGENDS SEE SH. 1
*2. FOR EMERGENCY DIESEL GENERATOR AUTO-START SCHEMATIC SEE U.E.&C. F.P. 9321-05-8445
*3. FOR DEVICE 3-3/GA SEE SH. 4
FOR DEVICE 3-3/5A SEE 9321-LL-31178 SH. 5
FOR DEVICE 3-37/2A SEE 9321-LL-31137 SH. 8
*4. 9321-LL-31178 SH. 6
*5. 9321-LL-31178 SH. 7
*6. LETTER (A) ETC. REFERS TO CABLE SCHEMATIC SH. 6A

EG1, EG2, & EG3 AUTO-START CIRCUITS

NO.	DATE	DESCRIPTION	ENGR	SUP ENG	
7	4/18/81	PASNY REVISION TO INCLUDE MOD # 79-3-123 EL			
6		REVISED AS BUILT & FINAL ISSUE			
5	8/17/74	REV'D. DEVICE 43			
4	5/4/74	REV'D. DEV. 1-1/ABFP2 & ADDED DEV. 1-2/ABFP2			
3	9/19/72	REV. DEV. 1-1/ABFP2			
1		FIRST ISSUE FOR CONSTRUCTION			

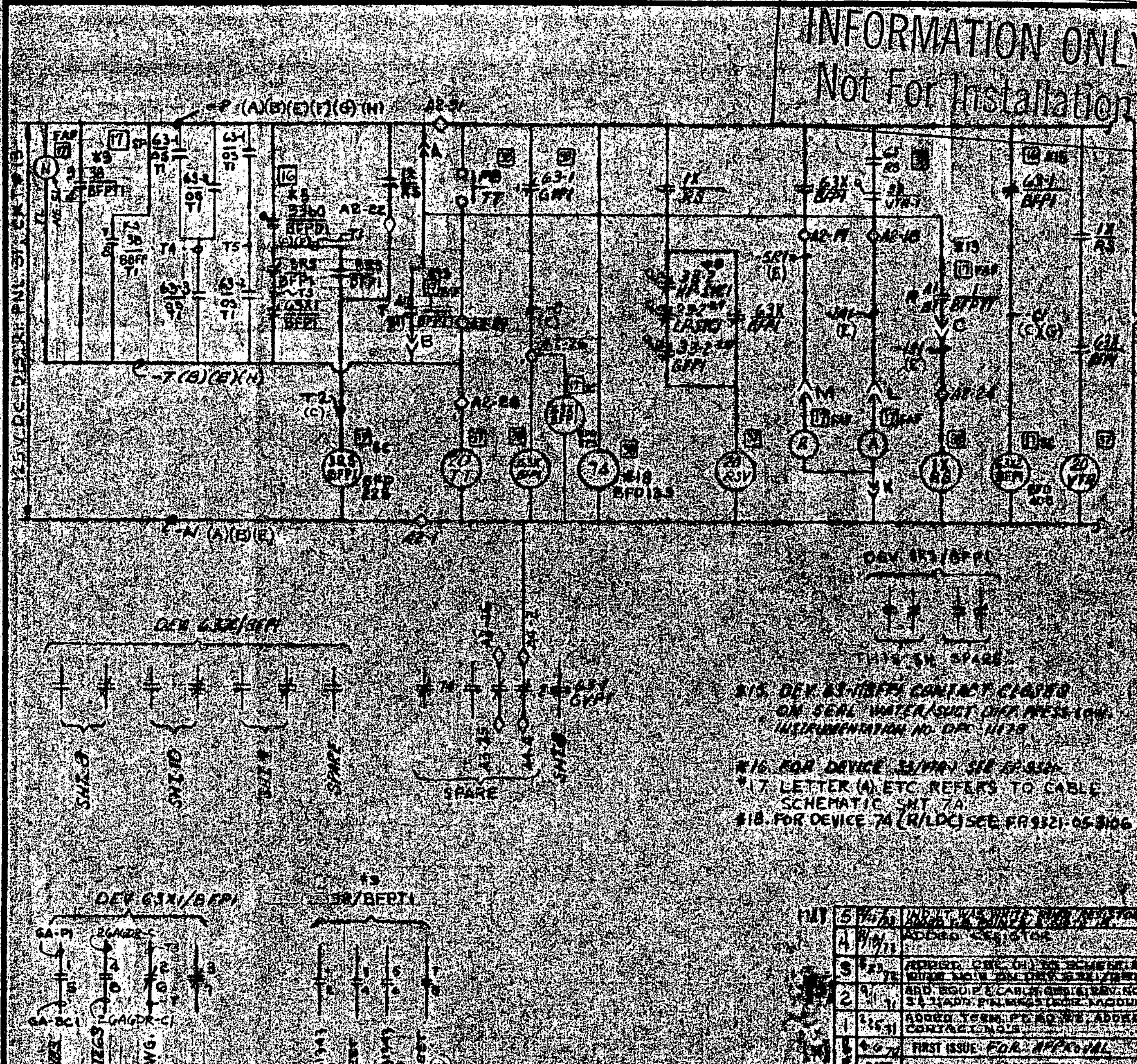
ENGINEER [signature]
STATE REG. NEW YORK NO. 42483
UNITED ENGINEERS & CONSTRUCTORS INC.

WESTINGHOUSE ELECTRIC CORPORATION
FOR
CONSOLIDATED EDISON COMPANY
INDIAN POINT GENERATING STATION - UNIT NO. 3

SCHEMATIC DIAGRAM
480V. SWITCHGEAR 32
SHEET NO. 6

U.E.&C. DWG. NO. 9321-LL-31183
CON. ED. CO. DWG. NO. D202470

INFORMATION ONLY
Not For Installation



NOTES:

*1. [illegible] NUMBERS ARE TO BE PREFIXED WITH 310P13-

*2. NUMBERS IN SQUARES REFER TO EQUIPMENT LOCATION FOR LEGEND SEE SHT. 1.

*3. FOR DEV. 38/BFP1 SEE [illegible] 9321-05-3103. POWER DRAWER MOUNTED IN PANEL SF

*4. " " 33/BFP1 " DWG 9321-LL-31203 SHT. 4.

*6. DEV 63/BFP VPL CLOSES ON PRESS. DECREASE TO 40 PSI. (TURBINE OVERSPEED, VACUUM, OR SOLENOID TRIP)

*7. DEV 1X CONTACT [illegible] USED IN AUX. BFP AUTO-START SCHEME DWG 9321-LL-31403, SHT. 5

*8. FOR DEV. 33-2 (HP-SV) SEE SHT. 10.

*9. " " 33-2 (LP-SV) " " 9.

*10. " " 33-2 (GV) " " 8.

*11. DEV. 63/RS CLOSES ON PRESS. INCREASE TO 60 PSI, OPENS AT 50 PSI. (CLOSED WHEN OVERSPEED TRIP IS IN RESET POS.)

*12. 63LV PRESS. SWITCH CLOSES ON DECREASING VACUUM AT [illegible]

*13. FOR DEV. 3 DEVELOPMENT SEE SHT 4, ARRANGEMENT 2.

*14. FOR DEV 63 [illegible] SEE SHT. 12.

*15. DEV. 63-1/BFP1 CONTACT CLOSED ON SEAL WATER/SUCT. DIFF. PRESS. LOW. INSTRUMENTATION NO. DPC-1129

*16. FOR DEVICE 33/VPV1 SEE [illegible]

*17. LETTER (A) ETC. REFERS TO CABLE SCHEMATIC SHT. 7A.

*18. FOR DEVICE 74 (R/LDC) SEE FR 9321-05-3106

REV	DATE	DESCRIPTION	ENGR	SUP ENG	(W)
7	[illegible]	REV. AS BUILT & FINAL ISSUE	[illegible]	[illegible]	
6	[illegible]	ADDED BFP OVERSPEED TRIP	[illegible]	[illegible]	
5	[illegible]	[illegible] RESISTOR	[illegible]	[illegible]	
4	[illegible]	ADDED RESISTOR	[illegible]	[illegible]	
3	[illegible]	ADDED CBL. (H) TO SCHEME [illegible]	[illegible]	[illegible]	
2	[illegible]	ADD EQUIP. & CABLE [illegible] REV. NOTES 3 & 4, ADD PIN [illegible] (FOR MODULES)	[illegible]	[illegible]	
1	[illegible]	ADDED TERM. PT. NO'S, ADDED [illegible] CONTACT NO'S	[illegible]	[illegible]	
0	[illegible]	FIRST ISSUE FOR APPROVAL	[illegible]	[illegible]	

ENGINEER [signature]

STATE REG. NEW YORK NO. 42455

UNITED ENGINEERS & CONSTRUCTORS INC.

BOILER FEED PUMP 31 TURBINE TRIP-RESET

WESTINGHOUSE ELECTRIC CORPORATION
FOR
CONSOLIDATED EDISON COMPANY
INDIAN POINT GENERATING STATION UNIT NO. 3

SCHEMATIC DIAGRAM
MISCELLANEOUS D.C. CIRCUITS

SHEET NO. 7

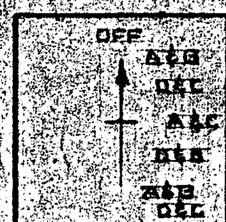
U.E.&C. DWG. NO. 9321-LL-31403

CON. ED. CO. DWG. NO. D202351

DEV. 43 EXF MAINTAINED POSITION

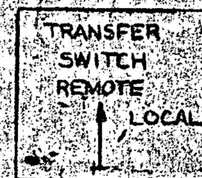
CONTACT	POSITION OFF	A & B	D & C	A & C	D & B	A & B D & C	REF. DWG.
A11-B11						X	*4
A12-B12	X						
A1-B1		X					SH.10
A2-B2			X				*5
A3-B3				X			SH.10
A4-B4					X		*4
A5-B5						X	SH.10
A6-B6	X						
A7-B7		X					*4
A8-B8			X				SH.13
A9-B9				X			*5
A10-B10					X		SH.13
C11-D11						X	SH.13
C12-D12	X						
C1-D1		X					SH.10
C2-D2			X				SH.13
C3-D3				X			SH.10
C4-D4					X		SH.13
C5-D5						X	*5
C6-D6	X						
C7-D7		X					
C8-D8			X				
C9-D9				X			
C10-D10					X		
E11-F11						X	SH.10
E12-F12	X						
E1-F1		X					
E5-F5						X	SH.13
E6-F6	X						
E7-F7		X					

A - EXHAUST FAN 31
B - F.A. BLDG. SUPPLY FAN
C - C.B. PURGE FAN
D - EXHAUST FAN 32



DEV 43 TYP. FOR AF1 SH. 11 AND AF3 SH. 16

CONTACT	POSITION R	L
A11-B11		X
A12-B12	X	
A1-B1		X
A2-B2	X	
A3-B3		X
A4-B4	X	
A5-B5		X
A6-B6	X	
A7-B7		X
A8-B8	X	
A9-B9		X
A10-B10	X	
C11-D11		X
C12-D12	X	
C1-D1		X
C5-D5		X
C6-D6	X	
C7-D7		X



DEV. 1-1/ABFP2

CONTACT BLOCK	CIRCUIT POSITION L	R
1ST. BLOCK (FRONT) TYPE OT2M	NO	NO
2ND. BLOCK TYPE OT2N	NC	NC

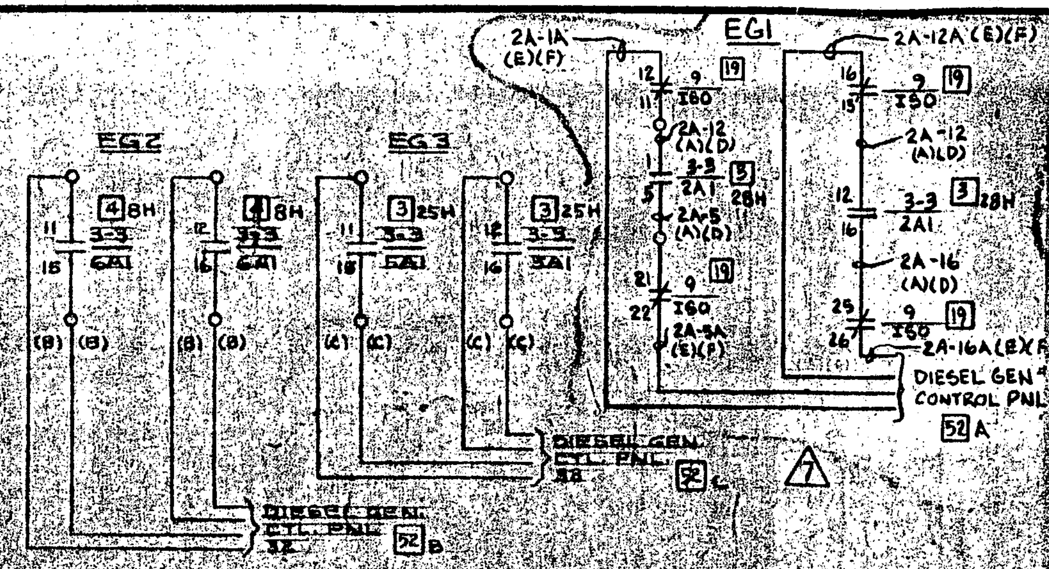
(ON 5)

AUTO TRIP ON — OPERATOR OT2S6M 3 POSITION MAINTAINED.

DEV. 1-2/ABFP2

CONTACT BLOCK	CIRCUIT POSITION L	R
1ST. BLOCK (FRONT) TYPE OT2M	NO	NO
2ND. BLOCK TYPE OT2N	NC	NC
3RD. BLOCK TYPE OT2M	NO	NO

AUTO TRIP ON — OPERATOR OT2S6M 3 POSITION MAINTAINED



NOTES

*1- NUMBERS IN SQUARES REFER TO EQUIPMENT LOCATIONS. FOR LEGENDS SEE SH. 1

*2- FOR EMERGENCY DIESEL GENERATORS AUTO-START SCHEMATIC SEE U.E. & C F.P. 9321-05-8445

*3- FOR DEVICE 3-3/6A SEE SH. 4
FOR DEVICE 3-3/5A SEE 9321-LL-31173, SH. 5
FOR DEVICE 3-3/2A SEE 9321-LL-31173, SH. 6

*4- 9321-LL-31213, SH. 6

*5- 9321-LL-31213, SH. 7

*6- LETTER (A) ETC. REFERS TO CABLE SCHEMATIC, SH. 6A

EG1, EG2, & EG3 AUTO-START CIRCUITS

INFORMATION ONLY
Not For Installation

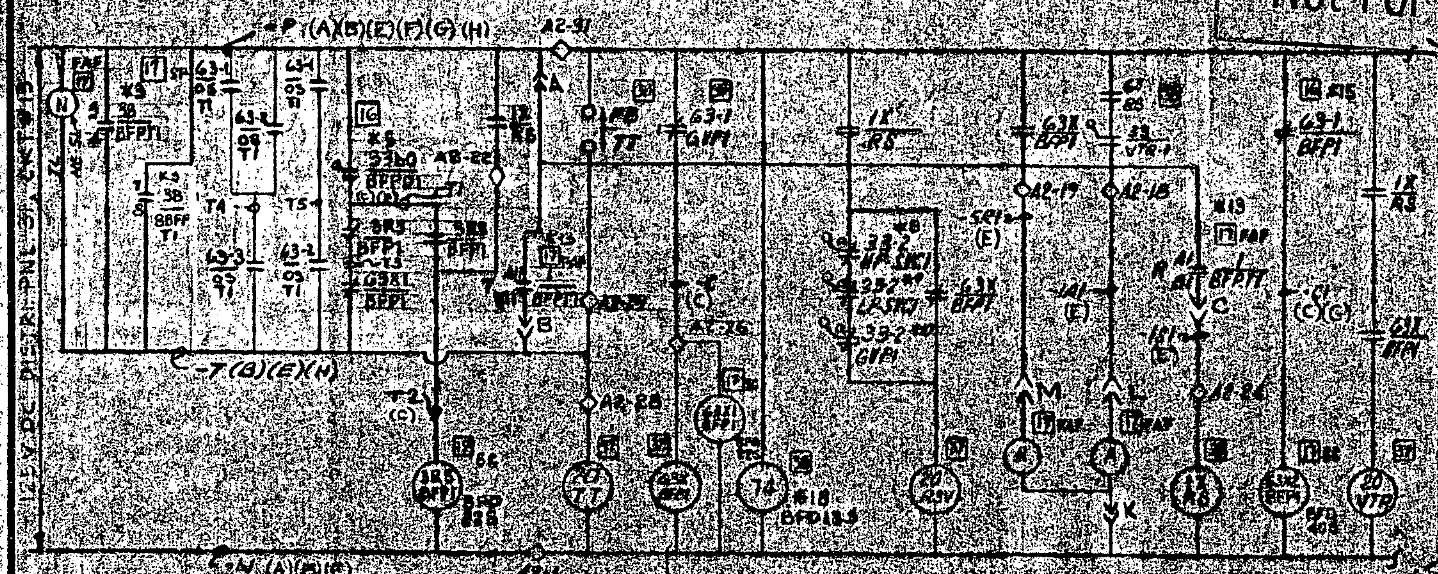
REV. NO.	DATE	DESCRIPTION	ENGR	SUP ENG	W
6	11/17/76	REVISED AS BUILT CONDITIONS			
5	6/17/74	REV'D. DEVICE 43			#0543
4	3/4/74	REV'D. DEV. 1-1/ABFP2 & ADDED DEV. 1-2/ABFP2			
3	5/19/72	REV. DEV. 1-1/ABFP2			
7	6/18/81	PASNY REVISION TO INCLUDE MOD # 79-3-123 EL			
0	11/6/70	FIRST ISSUE FOR CONSTRUCTION			

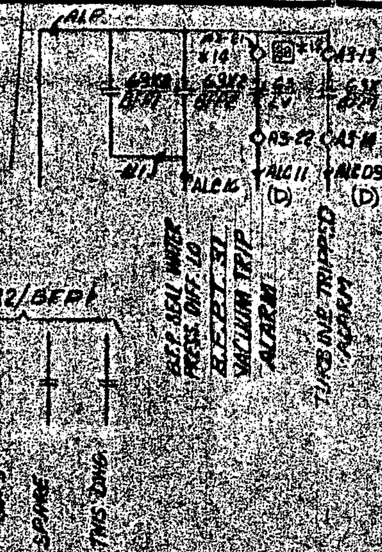
ENGINEER William P. Robinson
STATE REG. NEW YORK NO. 42453
UNITED ENGINEERS & CONSTRUCTORS INC.

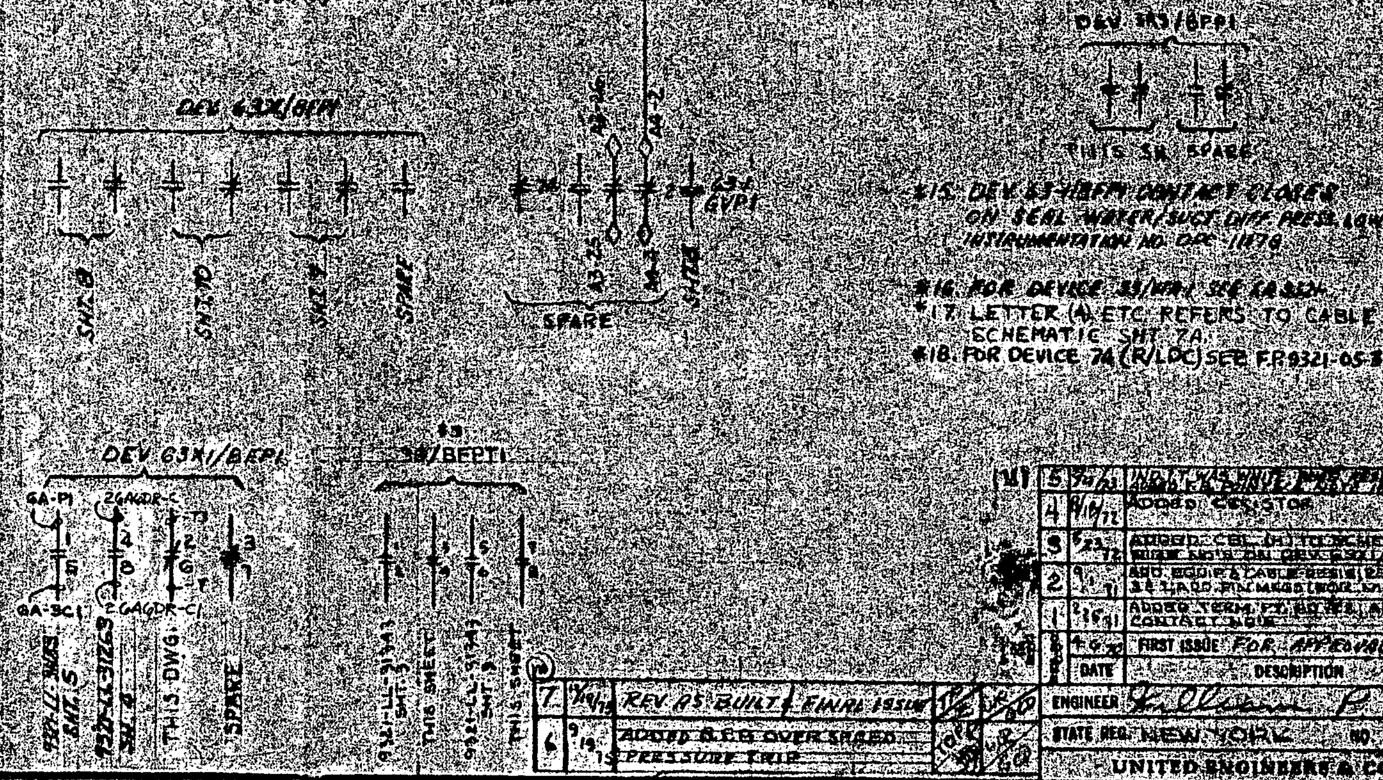
WESTINGHOUSE ELECTRIC CORPORATION
FOR
CONSOLIDATED EDISON COMPANY
INDIAN POINT GENERATING STATION - UNIT NO. 3

SCHEMATIC DIAGRAM
480 V. SWITCHGEAR 32
SHEET NO. 6

U.E.&C. DWG. NO. 9321-LL-31183
CON. ED. CO. DWG. NO. D202470







NOTES:

*1. WIRE NUMBERS ARE TO BE PREFIXED WITH 31DP13-
*2. NUMBERS IN SQUARES REFER TO EQUIPMENT LOCATION PER LEGEND SEE SHT. 1.
*3. FOR DEV. 3B(BFPT) SEE W.E. REF. 9321-05-3103 POWER DRAWER MOUNTED IN PANEL SF
*5. [illegible]
*6. DEV. 63/GVPI CLOSES ON PRESS. DECREASE TO 60 P.S.I. (TURBINE OVERSPEED, VACUUM, OR SOLENOID TRIP)
*7. DEV. CONTACT USED IN AUX. B.F.P. AUTO-START. REFER DWG 9321-LL-31183, SHT. 5
*8. FOR DEV. 33-2/HP. SVCI SEE SHT. 10.
*9. " 33-2/LP-SVCI " " 9.
*10. " 33-2/GVPI " " 8.
*11. DEV. 63/RS CLOSES ON PRESS. INCREASE TO P.S.I. OPENS AT 50 P.S.I. (CLOSED WHEN OVERSPEED TRIP IS IN RESET POS.)
*12. 63/LV. PRESS SWITCH CLOSES ON DECREASING VACUUM AT 20" Hg (ADJ TO 18" Hg)
*13. FOR DEV. 1 DEVELOPMENT SEE SHT. 1, ARRANGEMENT 2.
*14. FOR DEV. 63X2/BFPI, SEE SHT. 12.
*15. DEV. 63-1/BFPI CONTACT CLOSES ON SEAL WATER/SUCT. DIFF. PRESS. LOW. INSTRUMENTATION NO. DPC 1178
*16. FOR DEVICE 33/VH1 SEE [illegible]
*17. LETTER (A) ETC. REFERS TO CABLE SCHEMATIC SHT. 7A.
*18. FOR DEVICE 74 (R/LDC) SEE F.P. 9321-05-3106

BOILER FEED PUMP 31 TURBINE TRIP & RESET

	DATE	DESCRIPTION	ENGR	SUP ENG
7	1/19/73	REV. AS BUILT & FINAL ISSUE		
6	9/19	ADDED B.F.P. OVERSPEED PRESSURE TRIP		
5		[illegible]		
4	8/10/72	ADDED RESISTOR		
3	6/23/72	ADDED CBL (H) TO SCHEM. REV. [illegible]		
2	9/71	ADD EQUIP. & CABLE DESIG. REV. NOTES [illegible]		
1	2/19/71	ADDED TERM. PT. NOTES, ADDED CONTACT NOTE		
0	4-9-70	FIRST ISSUE FOR APPROVAL		

ENGINEER [signature]
STATE REG. NEW YORK NO. 42455
UNITED ENGINEERS & CONSTRUCTORS INC.

WESTINGHOUSE ELECTRIC CORPORATION
FOR
CONSOLIDATED EDISON COMPANY
INDIAN POINT GENERATING STATION - UNIT NO. 3

SCHEMATIC DIAGRAM
MISCELLANEOUS D.C. CIRCUITS

SHEET NO. 7

U.E.&C. DWG. NO. 9321-LL-31403
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