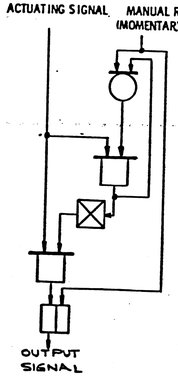
South Carolina Electric & Gas Co.
DOCUMENT SECTION
APR 17 1985
PRINTED
COPY NO

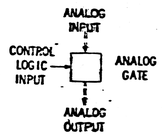
LOGIC SYMBOLS

SYMBOL	LOGIC FUNCTION	
	AND	A DEVICE WHICH PRODUCES AN OUTPUT ONLY WHEN EVERY INPUT EXISTS.
	NOT	A DEVICE WHICH PRODUCES AN OUTPUT ONLY WHEN THE INPUT DOES NOT EXIST.
	OR	A DEVICE WHICH PRODUCES AN OUTPUT WHEN ONE INPUT (OR MORE) EXISTS.
	OFF RETURN MEMORY	A DEVICE WHICH RETAINS THE CONDITION OF OUTPUT CORRESPONDING TO THE LAST ENERGIZED INPUT, EXCEPT UPON INTERRUPTION OF POWER IT RETURNS TO THE OFF CONDITION.
	RETENTIVE MEMORY	A DEVICE WHICH RETAINS THE CONDITION OF OUTPUT CORRESPONDING TO THE LAST ENERGIZED INPUT (ALSO UPON INTERRUPTION OF POWER).
	ADJUSTABLE TIME DELAY ENERGIZING	A DEVICE WHICH PRODUCES AN OUTPUT FOLLOWING DEFINITE INTENTIONAL TIME DELAY AFTER RECEIVING AN INPUT.
2/3	COINCIDENCE (2 OUT OF 3 SHOWN)	A DEVICE WHICH PRODUCES AN OUTPUT WHEN THE PRESCRIBED NUMBER OF INPUTS EXIST (EXAMPLE 2 INPUTS MUST EXIST FOR AN OUTPUT).
M.R. L R	RETENTIVE MEMORY WITH MANUAL RESET	A DEVICE HAVING THE LOGICAL FUNCTION AS INDICATED BY THE DIAGRAM BELOW



ADDITIONAL SYMBOLS

- PS HS A — INSTRUMENT CHANNEL BISTABLE
- INDICATES THAT THE DEVICE OR INSTRUMENT CHANNEL HAS A BISTABLE LOGIC 1 OUTPUT WHEN:
  - THE PARAMETER MEASURED IS GREATER THAN A PRESET VALUE
  - THE PARAMETER MEASURED IS LESS THAN A PRESET VALUE
  - THE PARAMETER MEASURED DEVIATES FROM A PRESET VALUE BY MORE THAN A PRESET AMOUNT.
  - OR OR — SAME AS ABOVE EXCEPT WITH AN AUTOMATICALLY SET VARIABLE VALUE
  - OR OR — SAME AS ABOVE EXCEPT WITH REQUIRED HYSTERESIS BETWEEN TURN ON AND TURN OFF.
- 27 — NON-INSTRUMENT BISTABLE
- OUTPUT INDICATOR SAME AS EXPLAINED ABOVE
- A2 — ALARM ANNUNCIATOR (ALARMS ON THE SAME SHEET WITH THE SAME SUBSCRIPT SHARE A COMMON ANNUNCIATOR WINDOW)
- R — REACTOR TRIP "FIRST OUT" ANNUNCIATOR
- A — TURBINE TRIP "FIRST OUT" ANNUNCIATOR
- T — INDICATOR LAMP
  - A ACTUATION STATUS LIGHTS
  - T TRIP STATUS LIGHTS
  - P PERMISSIVE STATUS LIGHTS
  - B BYPASS STATUS LIGHTS
- C — COMPUTER INPUT
- LOGIC INFORMATION TRANSMISSION
- ANALOG INFORMATION TRANSMISSION
- I — ANALOG DISPLAY
  - I ANALOG INDICATOR
  - R RECORDER
  - R2 RECORDER 2 PEN
  - R3 RECORDER 3 PEN
  - R8 RECORDER 8 POINT
- Σ — ANALOG SUMMER



A DEVICE WHICH PERMITS AN ANALOG SIGNAL TO PASS IN AN ISOLATED CIRCUIT IF THE CONTROL LOGIC INPUT EXISTS.

DEVICE FUNCTION LETTERS AND NUMBERS

FB	FLOW CHANNEL
LB	LEVEL CHANNEL
NC	NUCLEAR CHANNEL
PB	PRESSURE CHANNEL
RC	RADIATION CHANNEL
SB	SPEED CHANNEL
TB	TEMPERATURE CHANNEL
ZB	POSITION CHANNEL
20	ELECTRIC OPERATED VALVE
27	UNDERVOLTAGE RELAY
33	POSITION SWITCH
52	AC CIRCUIT BREAKER
63	PRESSURE SWITCH
71	LEVEL SWITCH
80	FLOW SWITCH
81	UNDERFREQUENCY RELAY

S. C. ELECTRIC & GAS CO.
RECEIVED
APR 17 1985
NUCLEAR OPERATIONS

SOUTH CAROLINA ELECTRIC & GAS CO.
Virgil C. Summer Nuclear Station Unit No. 1

- [x] APPROVED
- [ ] APPROVED AS NOTED
- [ ] RETURNED FOR CORRECTION

CHECKING IS ONLY FOR GENERAL DESIGN AND GENERAL DIMENSIONS SET FORTH IN CONTRACT DOCUMENTS AND DOES NOT RELIEVE CONTRACTOR FROM HIS OBLIGATION AS TO DETAIL WORKMANSHIP AND GUARANTEES.

GILBERT/COMMONWEALTH, INC.
BY Jack K. Dean
B/M ITEM No. RKA DATE 4/4/85
MRF-20434

D11627

1MS-41-011-1-6

SOUTH CAROLINA ELECTRIC & GAS COMPANY
PLANT: VIRGIL C. SUMMER NUCLEAR STATION
UNIT: CGE
STATUS: APPROVED
CERTIFICATION LTR. NO. CGE-84-802
AUTHORITY: R. A. STOUGH
ENGR. LTR. NO. IRST-01714

INDEX

TITLE	SHEET NO.	SUBS							
INDEX AND SYMBOLS	1	1	2	3	4	5	6	7	
REACTOR TRIP SIGNALS	2	1	1	2	3	4	4	5	
NUCLEAR INSTR. & MANUAL TRIP SIGNALS	3	1	2	2	2	2	2	2	
NUCLEAR INSTR. PERMISSIVES & BLOCKS	4	1	1	1	1	2	2	3	
PRIMARY COOLANT SYSTEM TRIP SIGNALS	5	1	2	3	4	5	5	5	
PRESSURIZER TRIP SIGNALS	6	1	2	2	2	3	4	4	
STEAM GENERATOR TRIP SIGNALS	7	1	2	2	3	4	4	4	
SAFEGUARDS ACTUATION SIGNALS	8	1	2	3	3	4	5	5	
ROD CONTROLS & ROD BLOCKS	9	1	2	2	2	3	3	3	
STEAM DUMP CONTROL	10	1	2	2	3	4	5	6	
PRESSURIZER PRESSURE & LEVEL CONTROL	11	1	2	2	3	4	5	5	
PRESSURIZER HEATER CONTROL	12	1	1	1	2	3	3	3	
FEEDWATER CONTROL & ISOLATION	13	1	2	3	4	5	5	5	
AUXILIARY FEEDWATER PUMPS STARTUP	14	1	2	2	3	4	4	4	
TURBINE TRIPS RUNBACKS & OTHER SIGNALS	15	1	2	2	3	4	4	5	
PRESSURIZER PWR. RLF VLV CONTROL	16	-	-	-	-	-	1	1	

NOTES:

1. IN ALL LOGIC CIRCUITS, THE INDICATED ACTUATION OF A SYSTEM OR DEVICE OCCURS WHEN A LOGIC 1 SIGNAL IS PRESENT. EXCEPT WHERE INDICATED OTHERWISE. ALL BISTABLES ARE "DE-ENERGIZE TO ACTUATE" SUCH THAT A LOGIC 1 SIGNAL IS DEFINED TO BE PRESENT WHEN THE BISTABLE OUTPUT VOLTAGE IS OFF.
2. EXCEPT WHERE INDICATED OTHERWISE. THE FOLLOWING IS TRUE: ALL LOGIC CIRCUITS ARE REDUNDANT. ALL INSTRUMENT CHANNELS. BISTABLES. ANNUNCIATORS. COMPUTER INPUTS. AND INDICATOR LAMPS ARE NOT REDUNDANT. MANUAL CONTROLS DO NOT HAVE REDUNDANT ACTUATORS. BUT DO HAVE REDUNDANT CONTACTS WHERE LOGIC IS REDUNDANT. ALL INDICATOR LAMPS. ANNUNCIATORS. AND COMPUTER INPUTS ARE CONNECTED TO BOTH TRAINS (WHERE LOGIC IS REDUNDANT) SO THAT A SIGNAL IN EITHER TRAIN WILL ACTUATE.
3. WHENEVER A PROCESS SIGNAL IS USED FOR CONTROL AND IS DERIVED FROM A PROTECTION CHANNEL, ISOLATION MUST BE PROVIDED.
4. FOR THIS SET OF DRAWINGS ALL SWITCHES, PUSH BUTTONS, ANNUNCIATORS AND INDICATORS WHICH ARE MOUNTED ON THE MAIN CONTROL BOARD ARE SUPPLIED BY OTHERS. IN ADDITION TO THE ABOVE, SCOPE BY OTHERS IS ALSO INDICATED DIRECTLY ON SHEETS WITHIN THIS SET.
5. THIS SET OF DRAWINGS ILLUSTRATES THE FUNCTIONAL REQUIREMENTS OF THE REACTOR CONTROL AND PROTECTION SYSTEM, INCLUDING ENGINEERED SAFEGUARDS. THESE DRAWINGS DO NOT REPRESENT ACTUAL HARDWARE IMPLEMENTATION. FOR HARDWARE IMPLEMENTATION. REFER TO THE FOLLOWING LIST:

FUNCTIONAL DIAGRAM	BLOCK OR WIRING DIAGRAM
REACTOR PROTECTION SYSTEM (SHEETS 1 TO 8)	DRAWING NUMBERS: 108D932, 7245D38, 108Z1G4, 5655D49, 5655D50, 271CG22, 5655D51
REACTOR CONTROL SYSTEM (SHEETS 9 TO 15)	DRAWING NUMBERS: 108D932, 271CG22, 5655D52

6. FOR DUAL BISTABLES (I.E. BISTABLE WITH COMMON INPUT CIRCUITRY. BUT WITH 2 SETPOINTS. 2 OUTPUTS) THE OUTPUT/ SETPOINT NUMBER (AS TAGGED PHYSICALLY ON THE BISTABLE) IS SHOWN CIRCLED BELOW THE BISTABLE SYMBOL.

EXAMPLE: TB 459 A ① ② TB 459 A

7. CUSTOMER NOMENCLATURE IS NOTED IN [BRACKETS].

REV	DESCRIPTION	DATE	APPROVED
1	SQ CGE-300 D 906488		
2	CGE-300 ECN-9888 REVISED SUB BLOCK CIRCUIT CHANGES HERE	9-4-73	
3	CGE-300 ECN-30456 REVISIONS ARE BLACKLINED UPDATED SUB BLOCK	10-8-74	
4	CGE-300 ECN-30850 REVISED SUB BLOCK R.M.KEMERER 8/8/76	10-14-74	
5	CGE-300 ECN-31346 REVISED SUB BLOCK OTHER REVISIONS CIRCLED	8-24-76	
6	CGE-300 ECN-32228 CHANGES APPROVED AND CIRCLED	7-5-79	
7	CGE-300 ECN-33035 REVISED SUB BLOCK	9-11-81	

PENDING/HOLD CHG
Use with reference to
ECR: 50768
DATE: 06/14/12
INITIALS: CVT

DFTM.	D. GUZZO	2-23-72
CHKR.		
DES. ENG.	Daniel B. Pitts	6-7-72
MFG. ENG.		
MTLS. ENG.		
APP.		
APP.		
APP.		
DF. & SUPV.		6-7-72

Westinghouse Electric Corporation
ATOMIC POWER DIV. PITTSBURGH, PA. U.S.A.
TITLE SOUTH CAROLINA ELECT & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION
FUNCTIONAL DIAGRAMS
INDEX AND SYMBOLS
SCALE ~
DIMENSIONS IN INCHES
DO NOT SCALE
108D837
SHEET 1
SUB 1 2 3 4 5 6 7

GILBERT/COMMONWEALTH, INC.
REC'D
W. O. NO.
OCT 16 '84 5262

M/6