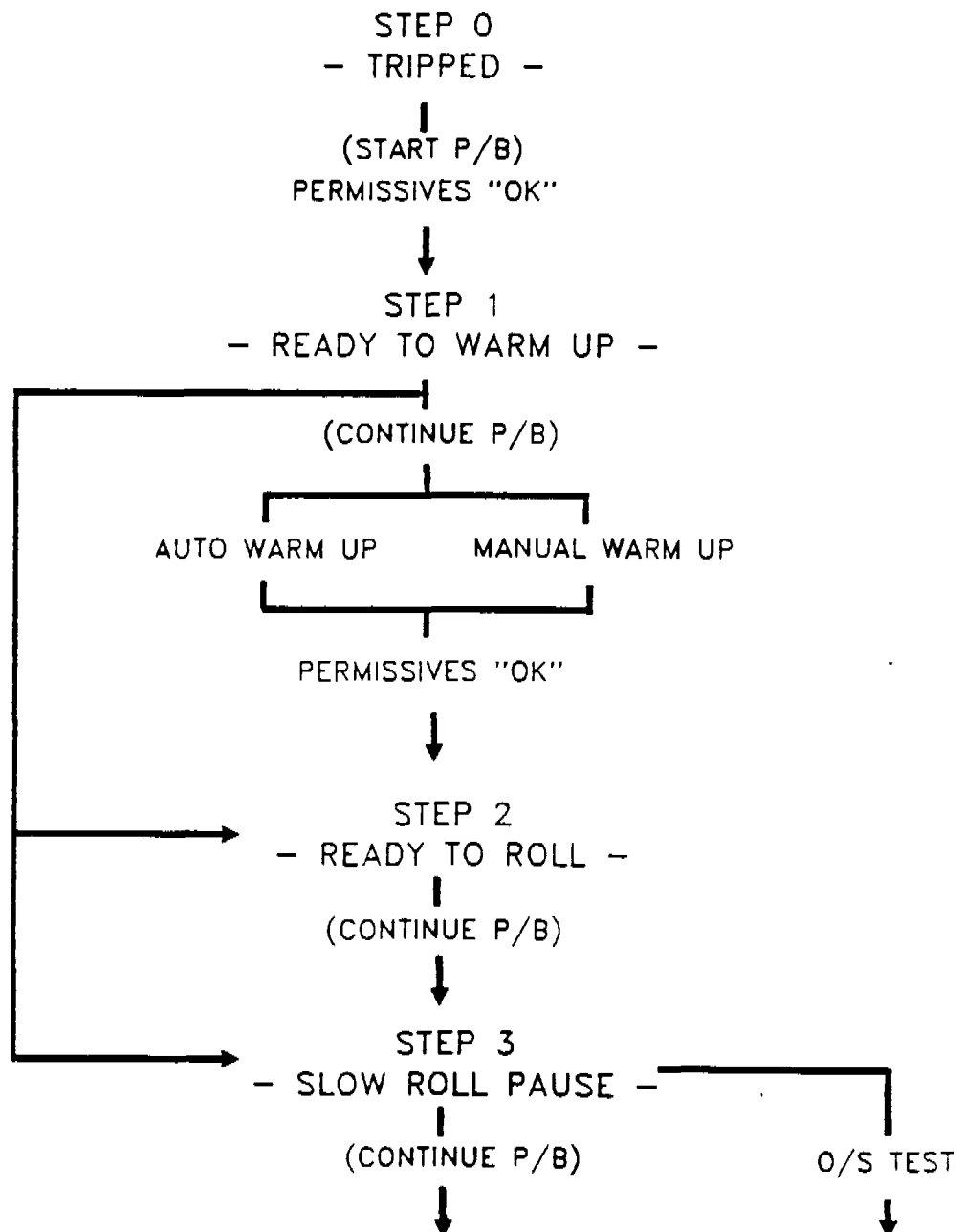
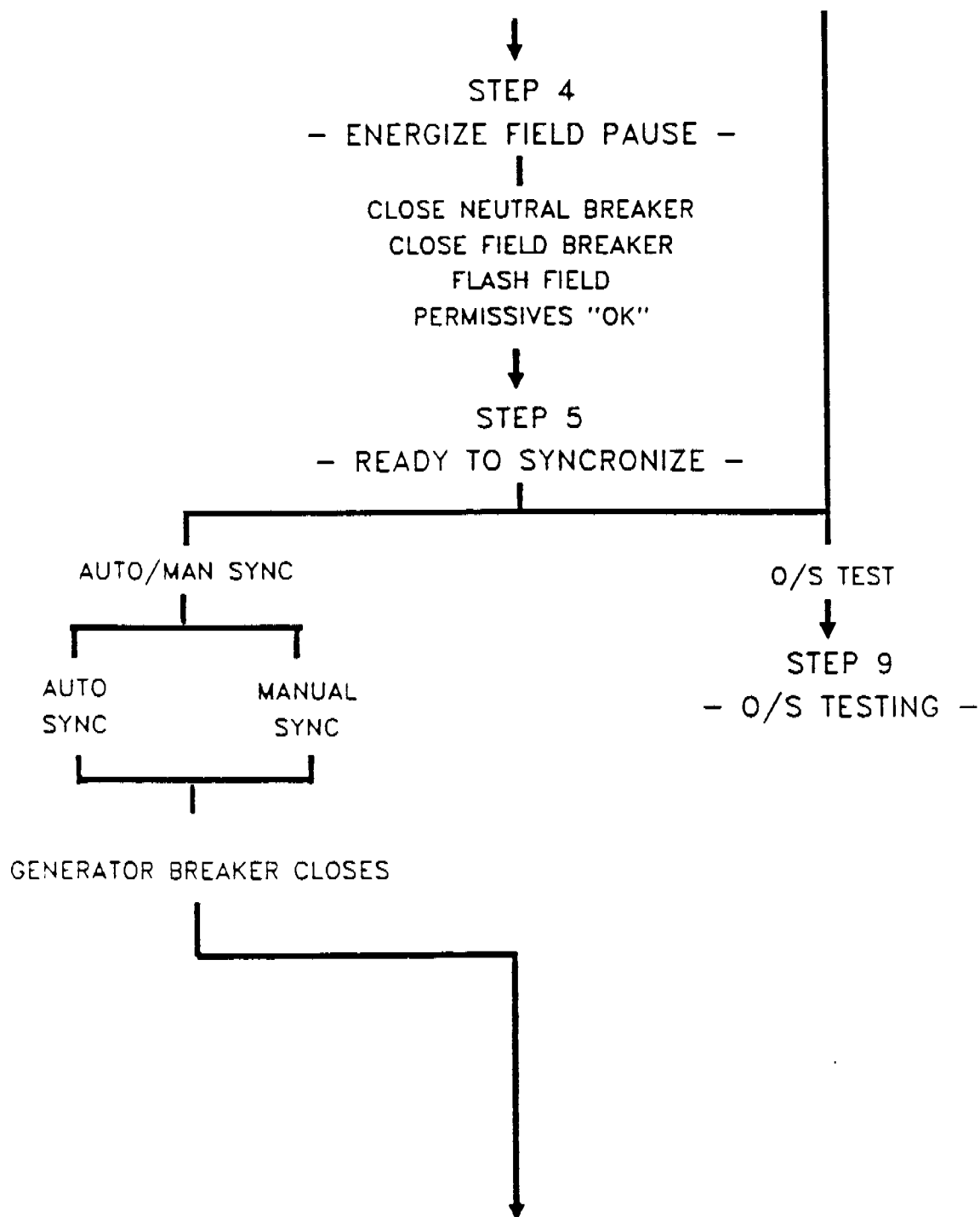


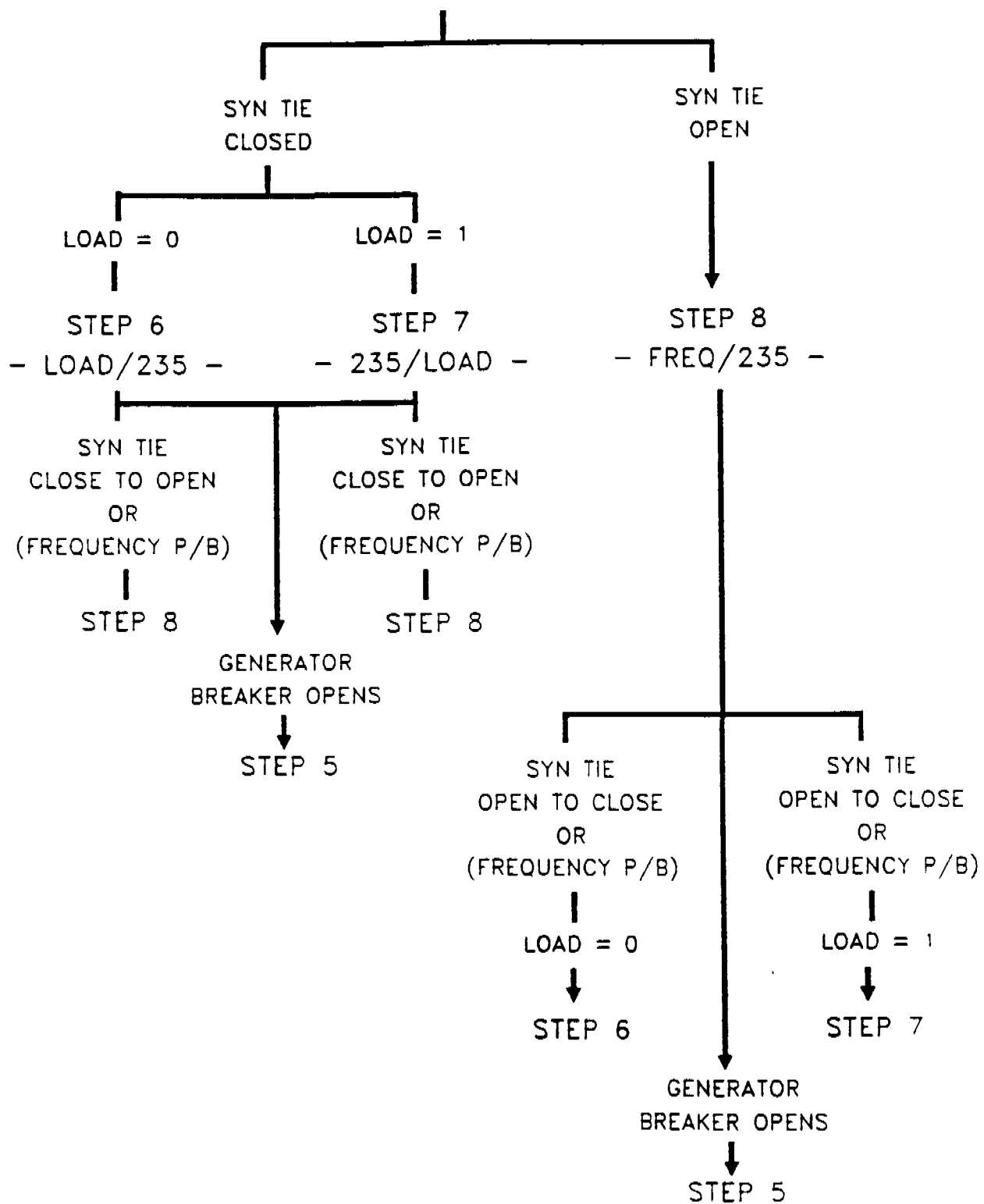
PROGRAM FLOW CHART



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STEP 0 - TRIPPED

ENTER STEP

ANY OF THE FOLLOWING TRIP CONDITIONS:

<u>WHAT TRIP</u>	<u>WHEN IS TRIP ENABLED</u>
ELECTRONIC OVERSPEED (SPEED > 3930 - STEPS 0 - 8) (SPEED > 650(LE), 3930(HE) or 4100(M) - STEP 9)	ANY STEP
LOSS OF SPEED PROBES (SPEED < 100 RPM)	>= STEP 2 AND SPEED > 100 RPM
LOW STOP VALVE HYD. PRESS. (PRESS < 500 PSIG)	>= STEP 2
LOW BEARING OIL PRESS. (PRESS < 8.0 PSIG)	ANY STEP
CONDENSER HIGH PRESS. (START-UP - TRIP > 25" HG) (GEN. BRKR CLOSING & PRESS < 7" HG - TRIP > 10" HG)	>= STEP 2 AND PRESS. < TRIP S.P.
MAX ENERGY TIMEOUT (STEAM ENERGY > SP & SPEED = 0)	STEP 2
SPEED INCREASE AT WARMUP (SPEED > TG SPEED)	STEP 1
FRONT STANDARD TRIP (MECH O/S or PUSH HANDLE)	ANY STEP (ONLY FOR F.O. INDICATION)
VIBRATION (> 1.5 INCHES/SEC)	ANY STEP
THRUST (> 20 MILLS ACTIVE OR INACTIVE)	ANY STEP
STOP PUSHBUTTON (P/B ON TRI-SEN PANEL)	ANY STEP
EMERGENCY TRIP (P/B FOR ETD TRIP)	>= STEP 2
BEARING TEMPERATURE (BOTH BEARING TEMP > 220)	ANY STEP
PROTECTIVE RELAY DEVICE (86 DEVICE TRIP)	ANY STEP
WARM-UP TIME OUT TRIP (60 SECONDS TO INITIATE WARM-UP)	STEP 1

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STEP 0 - TRIPPED (CONT'D)

EXIT STEP

ALL TRIPS CLEARED

AND

START PERMISSIVES "OK"

AND

"START P/B" IS PRESSED

START PERMISSIVES

SUPPLY STEAM PRESS > 1200 PSIG

SERVO HYDRAULIC PRESSURE OK

GENERATOR BREAKER OPEN

V1 AND V2 VALVES CLOSED

OVERSPEED TEST SWITCH IN "NORMAL" POSITION

ACTION TAKEN IN STEP

ETD TRIP OUTPUT "ON"

CLOSE V1 AND V2 VALVES

START TURNING GEAR MOTOR IF BEARING OIL PRESSURE > 8 PSIG

ENGAGE TURNING GEAR IF MOTOR IS RUNNING AND TURBINE SPEED <= 1 RPM

TURN OFF ENGAGE SOLENOID 10 SEC AFTER SPEED INCREASES TO > 1 RPM

IF BEARING OIL PRESSURE < 8 PSIG, TURN TURNING GEAR MOTOR "OFF" AND ALARM

RUN VOLTAGE REGULATOR DOWN FOR 30 SECONDS

SAVE TRIP INFORMATION (CAUSE, DATE AND TIME, HIGHEST SPEED, LOWEST SPEED, HIGHEST VACUUM PRESSURE, LOWEST BEARING OIL PRESSURE)

25# EXT/ADM CONTROLLER IN MANUAL WITH 50% OUTPUT

25# EXT/ADM CONTROLLER IN MANUAL WITH 0% OUTPUT

SEAL STEAM CONTROLLER SETPOINT TO -3.0 PSIG

CONDENSER VACUUM CONTROLLER IN MANUAL WITH 100% OUTPUT

IF START PERMISSIVES "OK", LIGHT UP START P/B

STEP 1 - READY TO WARM-UP

TO ENTER STEP STEP 0 - TRIPPED AND START PERMISSIVES ARE "OK"
AND "START P/B" IS PRESSED

TO EXIT STEP

IF IN AUTO WARMUP:

SUB-STEP X = 12

AND

WARM-UP PERMISSIVES ARE "OK"

IF IN MANUAL WARMUP:

WARM-UP PERMISSIVES ARE "OK"

WARM-UP PERMISSIVES

STOP VALVE OPEN

AND

STEAM CHEST PRESS > 1200 PSIG

ACTION TAKEN IN STEP

SPEED/LOAD CONTROLLER IN MANUAL WITH OUTPUT AT 0%

235# EXTRACTION ADMISSION CONTROLLER IN MANUAL AND OUTPUT AT 45%

SEAL STEAM CONTROLLER IN AUTOMATIC WITH SP = -3.0 PSIG

CONDENSER VACUUM CONTROLLER CASCADED TO CONDENSER HOOD TEMPERATURE CONTROLLER

AUTO SYNC PRESELECTED "ON"

IF SPEED < 50 RPM, AUTO WARM-UP PRESELECTED "ON"

IF IN AUTO WARMUP AND "CONTINUE P/B" PRESSED:

1. OPEN STOP VALVE
(ETD TRIP OUTPUT "OFF", ETD RESET OUTPUT "ON" FOR 2 SEC.)
2. IF X=12, GO TO EXIT CHECK
3. CLOSE STOP VALVE WHEN STEAM CHEST PRESS. > SP(X)
(ETD TRIP OUTPUT "ON")
4. START 5 MINUTE TIMER.
5. WHEN 5 MINUTE TIMER EXPIRES, OPEN AFTER SEAT DRAIN VALVE.
6. WHEN STEAM CHEST PRESSURE IS < 50 PSIG, CLOSE AFTER SEAT DRAIN VALVE AND OPEN V1 AND V2 AT 1%/SEC FOR 20 SECONDS.
7. WHEN STEAM CHEST PRESSURE IS <= 10 PSIG, CLOSE V1 AND V2 AND INCREMENT X.
8. GO TO 1

(ALLOW STEP RAISING AND LOWERING BY PRESSING "WARM-UP P/B" AND "RAISE" OR "LOWER" P/B TOGETHER)

STEP 1 - READY TO WARM-UP (CONT'D)

STEAM CHEST WARM-UP TABLE

<u>X</u>	<u>PRESS. SETPOINT</u>
1	50
2	50
3	75
4	100
5	100
6	200
7	300
8	400
9	500
10	700
11	900
12	1200

IF IN MANUAL WARMUP AND "CONTINUE P/B" PRESSED:

1. ETD TRIP OUTPUT "OFF"
2. GO TO EXIT CHECK

IF IN MANUAL WARMUP AND SPEED > 50 RPM:

1. ETD TRIP OUTPUT "OFF"
2. ETD RESET PULSED "ON"
3. GO TO EXIT CHECK

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STEP 2 - READY TO ROLL

TO ENTER STEP

FROM STEP 1 - READY TO WARM UP AND WARM-UP PERMISSIVES ARE "OK"
AND SPEED < 500 RPM

TO EXIT STEP

RPM >= 500 RPM AND "CONTINUE P/B" IS PRESSED

ACTION TAKEN IN STEP

ENABLE LOW STOP VALVE HYD. PRESS. TRIP
ENABLE HIGH CONDENSOR VACUUM TRIP (25" HG)

WHEN "CONTINUE P/B" IS PRESSED:

SPEED CONTROLLER IN AUTOMATIC
RAMP SPEED SETPOINT FROM CURRENT SPEED TO 500 RPM AT 100 RPM/MIN
ENABLE MAX ENERGY TIMEOUT TRIP
ENABLE LOSS OF SPEED PROBE TRIP WHEN SPEED > 100 RPM
DISABLE SPEED INCREASE AT WARMUP TRIP
TURNING GEAR MOTOR "OFF" WHEN SPEED > 10 RPM

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STEP 3 - SLOW ROLL PAUSE (500 RPM)

TO ENTER STEP

STEP 2 - READY TO ROLL AND SPEED $\geq$ 500 RPM

OR

STEP 1 - READY TO WARM-UP AND SPEED $>$ 500 AND $<$ 3200 RPM

TO EXIT STEP

SPEED $\geq$ 3200 RPM

ACTION TAKEN IN STEP

WHEN "CONTINUE P/B" IS PRESSED:

RAMP SPEED SP FROM 500 RPM TO 3200 RPM AT 200 RPM/MIN

FAST RAMP SPEED SP THRU CRITICALS

ALLOW TO HOLD SPEED SP BY PRESSING "HOLD P/B"

DO NOT ALLOW SPEED SP TO STOP INSIDE OF CRITICAL RANGE, RAMP SPEED SP TO THE CRITICAL ZONE LIMIT (HI/LO) IN WHICH THE SPEED WAS RAMPING TOWARD.

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STEP 4 - ENERGIZE FIELD PAUSE (3200 RPM)

TO ENTER STEP

STEP 3 - SLOW ROLL PAUSE AND SPEED $\geq$ 3200 RPM

TO EXIT STEP

SPEED $\geq$ 3600 RPM

AND

NEUTRAL BREAKER CLOSED

ACTION TAKEN IN STEP

1. COMMAND NEUTRAL BREAKER CLOSED
2. IF NEUTRAL BREAKER DID NOT CLOSE, ALARM AND HOLD
3. IF NEUTRAL BREAKER CLOSED, CLOSE MAIN FIELD BREAKER
4. IF VOLTAGE REGULATOR ON "LOW LIMIT", THEN CLOSE FIELD FLASH OUTPUT FOR 6 SECONDS AND WAIT 15 SECONDS
5. IF GEN. VOLTAGE IS LESS THAN 1KV, THEN ALARM AND HOLD
6. RAMP SPEED SP TO 3600 RPM AT 200 RPM/MIN.
7. IF GEN. VOLTAGE IS GREATER THAN 14.4 KV, ALARM AND HOLD

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STEP 5 - READY TO SYNCHRONIZE (3600 RPM)

TO ENTER STEP

STEP 4 - ENERGIZE FIELD PAUSE AND SPEED SP $\geq$ 3600 RPM

TO EXIT STEP

GENERATOR BREAKER CLOSING

OR

"O/S TEST" SWITCH PUT IN "MECHANICAL"

OR

"O/S TEST" SWITCH PUT IN "ELECTRICAL"

ACTION TAKEN IN STEP

WHEN "SYNCHROSCOPE SWITCH" IS "ON"

IF MANUAL SYNC. "ON",

ALLOW PANEL SPEED RAISE/LOWER COMMANDS WITHIN ALLOWABLE WINDOW
(3610/3595)

IF AUTO SYNC. "ON",

SEND VOLTAGE RAISE/LOWER COMMANDS TO VOLTAGE REGULATOR TO BRING
GEN. VOLTAGE WITHIN 5% OF 14.4 KV.

IF VERI-SYNC SWITCH IS IN AUTO, TURN AUTO SYNCHRONIZER "ON" AND
WAIT 3 SECONDS BEFORE ACCEPTING ANY SPEED RAISE/LOWER COMMANDS
FROM AUTO SYNCHRONIZER.

LIMIT SPEED RAISE/LOWER COMMANDS TO WITHIN ALLOWABLE WINDOW
(3610/3595)

BEGIN REPEATING VOLTAGE RAISE/LOWER COMMANDS FROM AUTO.
SYNCHRONIZER TO VOLTAGE REGULATOR.

LIMIT VOLTAGE RAISE/LOWER COMMANDS TO WITHIN ALLOWABLE WINDOW
(15.0/14.0)

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JP 6 - LOAD/235 CONTROL

TO ENTER STEP

STEP 5 - READY TO SYNCHRONIZE AND GENERATOR BREAKER CLOSES
AND LOAD PRIORITY = 0 AND SYN BUS BREAKER IS CLOSED

OR

STEP 7 - 235/LOAD CONTROL AND LOAD PRIORITY = 0

OR

STEP 8 - FREQUENCY/235 CONTROL AND ("FREQUENCY P/B" IS PRESSED OR
SYN BUS BREAKER CLOSES) AND LOAD PRIORITY = 0

TO EXIT STEP

SYN BUS BREAKER OPENS

OR

GENERATOR BREAKER OPENS

OR

LOAD PRIORITY = 1

OR

"FREQUENCY P/B" IS PRESSED

ACTION TAKEN IN STEP

DROOP CONTROL ENABLED

235 EXT/ADM CONTROL ENABLED

CONDENSER VACUUM CONTROLLER IN MANUAL

SET V1 AND V2 VALVES LOW LIMITS TO RUN MINIMUM

IF COMING FOR STEP 5 - READY TO SYNCHRONIZE

KICK LOAD SP FOR 3 MW

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STEP 7 - 235/LOAD CONTROL

TO ENTER STEP

STEP 5 - READY TO SYNCHRONIZE AND GENERATOR BREAKER CLOSING AND
LOAD PRIORITY = 1 AND SYN BUS BREAKER IS CLOSED

OR

STEP 6 - LOAD/235 CONTROL AND LOAD PRIORITY = 1

OR

STEP 8 - FREQUENCY/235 CONTROL AND ("FREQUENCY P/B" IS PRESSED OR
SYN BUS BREAKER CLOSING) AND LOAD PRIORITY = 1

TO EXIT STEP

SYN BUS BREAKER OPENS

OR

GENERATOR BREAKER OPENS

OR

LOAD PRIORITY = 0

OR

"FREQUENCY P/B" IS PRESSED

ACTION TAKEN IN STEP

DROOP CONTROL ENABLED

235 EXT/ADM CONTROL ENABLED

1 CONDENSER VACUUM CONTROLLER IN MANUAL

SET V1 AND V2 VALVES LOW LIMITS TO RUN MINIMUM

IF COMING FROM STEP 5 - READY TO SYNCHRONIZE

KICK LOAD SP FOR 3 MW

STEP 8 - FREQUENCY/235 CONTROL

TO ENTER STEP

STEP 5 - READY TO SYNCHRONIZE AND GENERATOR BREAKER CLOSSES AND
SYN BUS BREAKER IS OPEN

OR

STEP 6 - LOAD/235 CONTROL AND (SYN BUS BREAKER OPENS OR
"FREQUENCY P/B" IS PRESSED)

OR

STEP 7 - 235/LOAD CONTROL AND (SYN BUS BREAKER OPENS OR
"FREQUENCY P/B" IS PRESSED)

TO EXIT STEP

SYN BUS BREAKER CLOSSES

OR

GENERATOR BREAKER OPENS

OR

"FREQUENCY P/B" IS PRESSED

ACTION TAKEN IN STEP

LIGHT "FREQUENCY P/B" LAMP

SPEED CONTROL ENABLED

235 EXT/ADM CONTROL ENABLED

V1 AND V2 VALVES LOW LIMITS (0 MW)

PUT CONDENSER VACUUM CONTROLLER IN MANUAL

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STEP 9 - O/S TESTING

TO ENTER STEP

STEP 5 - READY TO SYNCHRONIZE AND "O/S TEST" SWITCH IS NOT
IN "NORMAL" POSITION

OR

STEP 3 - SLOW ROLL PAUSE AND SPEED < 640 RPM AND "O/S" TEST
SWITCH IS IN "ELECT" POSITION

TO EXIT STEP

"O/S TEST" SWITCH IN "NORMAL" POSITION

ACTION TAKEN IN STEP

IF "MECHANICAL" TESTING SELECTED:

MOVE ELECTRONIC TRIP SP TO 4100 RPM

RAISE GOVERNOR MAXIMUM TO 4050 WHEN "O/S TEST P/B" IS PRESSED

IF "ELECTRICAL" TESTING SELECTED:

IF SPEED < 640 RPM, MOVE ELECTRONIC TRIP SP TO 650 RPM

RAISE GOVERNOR MAXIMUM TO 4050 WHEN "O/S TEST P/B" IS PRESSED

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GOVERNOR CONSTANTS

CRITICAL SPEEDS		
	START	STOP
1ST	1800	2200
2ND	2800	3100

SPEED SWITCHES	SPEED(RPM)
LOSS OF SPEED PROBE TRIP	<100
SLOW ROLL	500
FLASH FIELD	3200
SYNC	3600
MAX GOVERNOR	3780
BYPASS WARM-UP	>50
OVSPD TRIP	3930
OVSPD TRIP FOR MECH OVSPD TEST	4100
OVSPD TEST MAX GOV	4050
OVERSPEED TRIP TEST (STARTUP)	650

MISCELLANEOUS	
1ST ACCELERATION RATE	100 RPM/MIN (0 - 500 RPM)
2ND ACCELERATION RATE	200 RPM/MIN (500 - 3600 RPM)

PID CONTROLLER CONSTANTS

	SP/LD	EX/AD	SL STM	C PRS	C HOOD
TUNING					
RUN PROP BAND	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
RUN RESET	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
RUN DERIVATIVE	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
START PROP BAND	<u>100</u>				
START RESET	<u>10</u>				
START DERIVATIVE	<u>0</u>				
FREQUENCY PROP BAND	<u>100</u>				
FREQUENCY RESET	<u>10</u>				
FREQUENCY DERIVATIVE	<u>0</u>				
RAMP RATES					
SET PT RAMP RATE LOCAL	<u>1</u>	<u>.5</u>	<u>.5</u>	<u>.5</u>	
SET POINT RAMP REMOTE	<u>1</u>	<u>.5</u>			
SET POINT RAMP METRA	<u>1</u>	<u>.5</u>	<u>.5</u>	<u>.5</u>	
CONT OUTPUT MAX RUN	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
CONT OUTPUT MAX START	<u>20</u>				
CONTR. OUTPUT MINIMUM	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
MAX OUTPUT CHANGE RUN	<u>500</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
MAX OUTPUT CHG START	<u>100</u>				
NORMALIZE HIGH	<u>4100</u>				
NORMALIZE LOW	<u>0</u>				
PROP ON PV CHANGE ONLY	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
REVERSE ACTING CONT	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>
SET POINT TRACKING	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>N</u>	<u>Y</u>

IVE LIMITS.

	LOW	HIGH
V1	20	<u>100</u>
V2	20	<u>100</u>

FOR START UP V1 LOW LIMIT SHALL BE ZERO UNTIL V1 IS 2% ABOVE RUN LOW LIMIT
AND BREAKER IS CLOSED.

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V1 & V2 OUTPUT LIMITS

STARTUP

- V1 (UPPER AND LOWER)
 - V1 LOW LIMIT SHALL BE SET TO 0%.
 - V1 HIGH LIMIT SHALL BE SET TO 2% ABOVE THE POSITION REQUIRED TO RUN THE TURBINE AT 3600 RPM. (APPROX 20%)
- V2
 - V2 LOW LIMIT SHALL BE SET TO 0%.
 - V2 HIGH LIMIT SHALL BE PROPORTIONAL TO V1 HIGH LIMIT DURING START UP.

RUNNING (GENERATOR BREAKER CLOSED)

- V1 (UPPER AND LOWER)
 - V1 LOW LIMIT SHALL BE SET TO POSITION THAT WILL SUSTAIN MINIMUM LOAD (APPROX 20%) WHEN THE GENERATOR BREAKER IS CLOSED.
 - V1 LOW LIMIT CAN BE SET TO 0% FOR SHUTDOWN BY PRESSING THE V1 LIMIT BYPASS PUSH BUTTON WHEN THE VALVE POSITION IS LESS THAN OR EQUAL TO THE V1 LOW LIMIT + 2%.
 - V1 HIGH LIMIT SHALL BE SET TO 100% WHEN THE GENERATOR BREAKER IS CLOSED.
- V2
 - V2 LOW LIMIT SHALL BE SET TO LIMIT MINIMUM FLOW TO CONDENSER TO 120,000 #/HR
 - V2 HIGH LIMIT SHALL BE SET TO LIMIT MAXIMUM FLOW TO CONDENSER 400,000 #/HR.

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